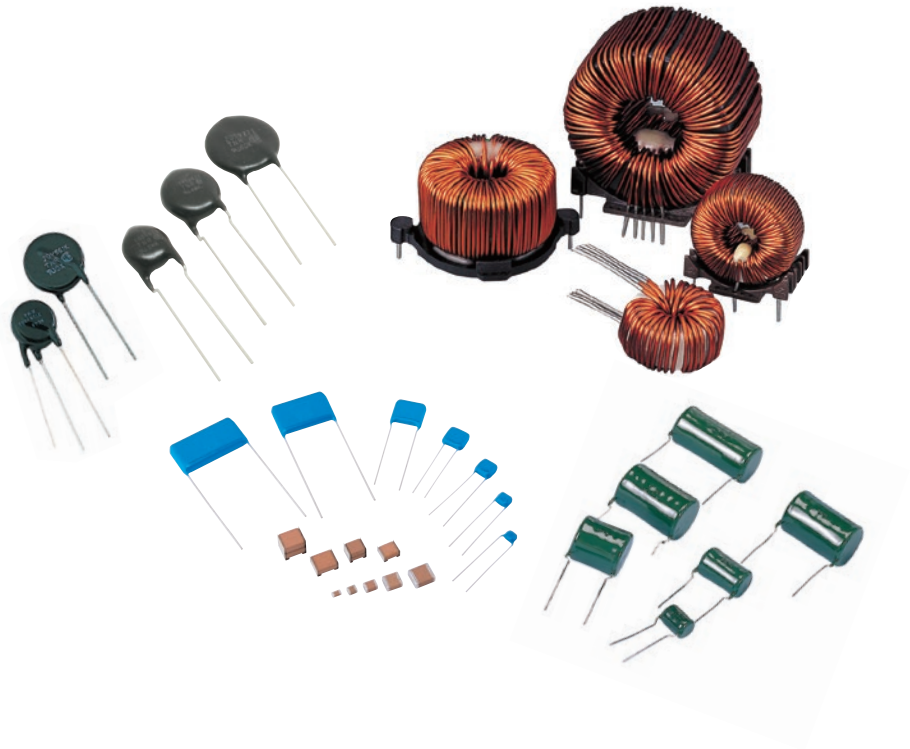
English

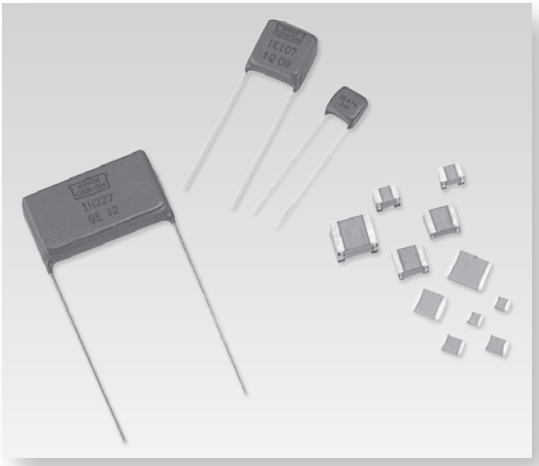
NIPPON CHEMI-CON

2020

CERAMIC CAPACITORS
VARISTORS
FILM CAPACITORS
CHOKE COILS

CAT.NO.E1002Z / E1006C / E1003W / E1008U





MULTILAYER CERAMIC CAPACITORS

Item	Series	Rated Voltage Range (V_{dc})	Rated Capacitance Range(μF)	Temperature Characteristics	RoHS2 Compliant	Page
Chip Type	NTS	25 to 500	0.010 to 47	X7R : -55～+125℃ ΔC/C 25℃=±15% X7S : -55～+125℃ ΔC/C 25℃=±22%	Compliant	13
Chip Type	NTF	25 to 500	0.033 to 33			13
Chip Type	KVF	25 to 100	0.033 to 15	X8L : -55～+125℃ ΔC/C 25℃=±15% +125～+150°C ΔC/C 25℃=+15%, -40%		19
Metal cap Type	NTJ	25 to 250	1.0 to 100	X7R : -55～+125℃ ΔC/C 25℃=±15%		22
Metal cap Type	KVJ	25 to 100	0.68 to 22	X8L : -55～+125℃ ΔC/C 25℃=±15% +125～+150°C ΔC/C 25℃=+15%, -40%		25
Lead Type	NTD	25 to 500	0.1 to 470	X7R : -55～+125℃ ΔC/C 25℃=±15%		28
Lead Type	KVD	25 to 100	0.1 to 15	X8L : -55～+125℃ ΔC/C 25℃=±15% +125～+150℃ ΔC/C 25℃=+15%, -40%		32

Part Numbering System

◆ PART NUMBERING SYSTEM (CHIP TYPE)

Code	Contents
K	Ceramic capacitor

Code	Temp. character
B	X7R
L	X8L
S	X7S

Code	Tol.(%)
M	±20
K	±10

Code	Taping
T	Taping
B	Bulk

Code	Type
00	Standard

1	2 3	4 5 6	7	8 9 10	11	12 13	14 15	16	17 18
K	T S	5 0 0	B	1 0 6	M	5 5	N 0	T	0 0
Category	Series code	Voltage code	Temp. character code	Capacitance code	Capacitance tolerance	Size code	Terminal code	Taping code	Supplement code

Code	series
TS	NTS
TF	NTF
VF	KVF

Code	Voltage(V)
250	25
350	35
500	50
101	100
251	250
501	500

Code	Cap.(μF)
333	0.033
473	0.047
104	0.1
474	0.47
105	1
475	4.7
106	10
⋮	⋮

Code	Size(L×W)/(EIA CODE)
31	3.2×1.6(1206)
32	3.2×2.5(1210)
43	4.5×3.2(1812)
55	5.7×5.0(2220)
76	7.5×6.3(3025)

Code	Type
N	Tin plating, Size design code
E	
F	
J	

Code	Type
0	Standard
L	Excellent temp.cycle Bending:1mm
H	Excellent temp.cycle Bending:2mm

◆ PART NUMBERING SYSTEM (METAL CAP)

Code	Contents
K	Ceramic capacitor

Code	Temp. character
B	X7R
L	X8L

Code	Tol.(%)
M	±20

Code	Taping
T	Taping
B	Bulk

Code	Type
00	Standard

1	2 3	4 5 6	7	8 9 10	11	12 13	14 15	16	17 18
K	T J	5 0 0	B	1 5 6	M	5 5	B F	T	0 0
Category	Series code	Voltage code	Temp. character code	Capacitance code	Capacitance tolerance	Size code	Terminal code	Taping code	Supplement code

Code	series
TJ	NTJ
VJ	KVJ

Code	Voltage(V)
250	25
350	35
500	50
101	100
251	250

Code	Cap.(μF)
105	1
475	4.7
106	10
476	47
⋮	⋮

Code	Size(L×W)
55	6.0×5.3
76	7.8×6.6

Code	Series	Elements	Note	Plating
AF	NTJ	1	55, 76 size	Tin
BF	NTJ	2		Tin
AR	KVJ	1	55 size	Tin
BR	KVJ	2	55 size	Tin

◆ PART NUMBERING SYSTEM (RADIAL LEAD TYPE)

Code	Contents
K	Ceramic capacitor

Code	Temp. character
B	X7R
L	X8L

Code	Tol.(%)
M	±20

Code	Taping
T	Taping
B	Bulk

Code	Type
00	Standard

1	2 3	4 5 6	7	8 9 10	11	12 13	14 15	16	17 18
K	T D	5 0 0	B	1 5 6	M	5 5	A 0	T	0 0
Category	Series code	Voltage code	Temp. character code	Capacitance code	Capacitance tolerance	Size code	Terminal code	Taping code	Supplement code

Code	series
TD	NTD
VD	KVD

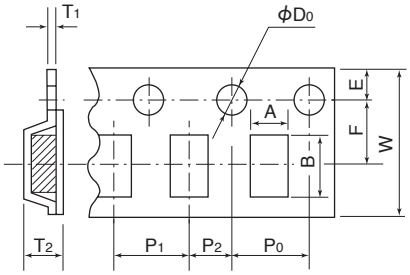
Code	Voltage(V)
250	25
350	35
500	50
101	100
251	250
501	500

Code	Cap.(μF)
104	0.1
474	0.47
105	1
475	4.7
106	10
476	47
⋮	⋮

Code	Size(L×W)
32	5.0×6.0
43	6.5×6.5
55	7.5×9.0
76	10.0×11.5
80	13.5×15.0
90	22.5×20.0
99	28.5×20.0

Code	Terminal
A0	Straight Lead
B0	Crimped Lead

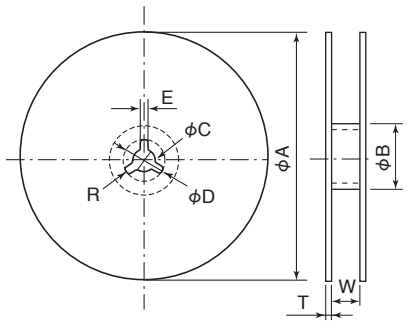
◆CHIP TYPE TAPING SPECIFICATION



Type	Size Code	Dimensions (mm)										
		A*	B*	W ±0.3	F ±0.05	E ±0.1	P1 ±0.1	P2 ±0.05	P0 ±0.1	φD ±0.1	T1 max.	T2 max.
Chip type	31	1.9	3.5	8.0	3.5	1.75	4.0	2.0	4.0	1.5	0.6	1.5
	32	2.8	3.5	8.0	3.5	1.75	4.0	2.0	4.0	1.5	0.6	2.5
	43	3.65	4.95	12.0	5.5	1.75	8.0	2.0	4.0	1.5	0.6	3.5
	55	5.5	6.25	12.0	5.5	1.75	8.0	2.0	4.0	1.5	0.6	3.5
	76	6.85	8.05	16.0	7.5	1.75	12.0	2.0	4.0	1.5	0.6	5.5
Metal cap type	55	5.3	6.4	16.0	7.5	1.75	8.0	2.0	4.0	1.5	0.6	6.0
	76	6.9	8.2	16.0	7.5	1.75	12.0	2.0	4.0	1.5	0.6	7.5
		6.9	8.2	24.0	11.5	1.75	24.0	2.0	4.0	1.5	0.4	8.5
		6.9	8.2	32.0	14.2	1.75	24.0	2.0	4.0	1.5	0.5	10.0

*Reference

●REEL SPECIFICATIONS



Size Code / Code	Dimensions (mm)					
	NTS, NTF, KVF			NTJ, KVJ		
	31, 32	43, 55	76	55, 76	76	
φA	178±2	178±2	178±2	382±2	382±2	382±2
φB	50min.	50min.	50min.	80min.	80min.	80min.
φC	13±0.5	13±0.5	13±0.5	13±0.5	13±0.5	13±0.5
φD	21±0.8	21±0.8	21±0.8	21±0.8	21±0.8	21±0.8
E	2±0.5	2±0.5	2±0.5	2±0.5	2±0.5	2±0.5
W	9±0.5	13±0.5	17±0.5	17±0.5	25±0.5	33±0.5
T	1±0.5	1±0.5	1±0.5	2±0.5	2±0.5	2±0.5
R	1.0	1.0	1.0	1.0	1.0	1.0

NTS, NTF, KVF Series quantity per reel (pcs. / reel)

Size Code	31	32	43	55	76
Quantity	2000/3000	1600	800	800	300/500

Note : Refer to STANDARD RATINGS

NTJ, KVJ Series quantity per reel (pcs. / reel)

Size Code	55	76
Quantity	400/1500/2000	400/500/1200

Note : Refer to STANDARD RATINGS

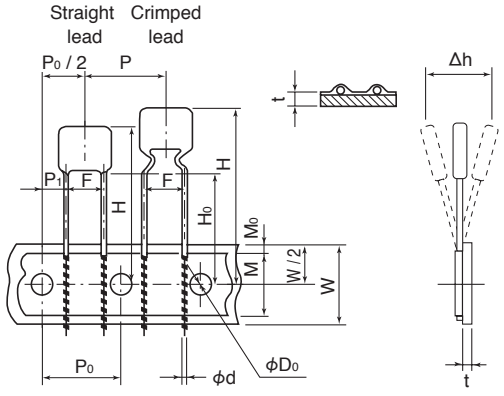
◆RADIAL LEAD TYPE TAPING SPECIFICATION

● NTD, KVD Series

Available for 32, 43, 55, 76 sizes. Ammo Packaging.

Size Code	Dimensions H (mm)		Quantity per Packing (pcs.)
	Straight lead	Crimped lead	
32	23max.	25max.	2000
43	24max.	26max.	
55	26max.	28max.	
76	29max.	30max.	1000/1500

Note : Refer to STANDARD RATINGS



(mm)

Code	P	P0	P1	P0 / 2	F	W	W / 2	M	M0	H0	φD0	φd	t	Δh
Dimensions (mm)	12.7	12.7	3.85	6.35	5.0	18.0	9.0	13.0	1.5	16.0	4.0	0.5	0.6	0
	±1	±0.3	±0.7	±1.3	+0.8 −0.2	+1.0 −0.5	±0.5	±1	±1.5	min.	±0.2	±0.05	±0.2	±2

Minimum Packaging Quantity

Please order by units of minimum packaging quantity.

◆ Chip

Series	Size code	Elements	Rated voltage (V_{dc})	Rated Capacitance (μF)	Taping (pcs.)	Tray (pcs. / box)	Bagged (pcs. / box)
NTS, NTF, KVF	31	-	25	3.3	2,000	-	6,000
		-	50	1.5	2,000	-	6,000
		-	50	2.2	2,000	-	6,000
		-	100	1.0	2,000	-	6,000
		-	100	1.5	2,000	-	6,000
		-	100	2.2	2,000	-	6,000
	32	-	All Voltage Range		1,600	-	6,000
	43	-	All Voltage Range		800	-	3,000
	55	-	All Voltage Range		800	-	1,500
NTS	76	-	500	0.68	500	-	1,500
			Rating other than the above		300	-	1,500

◆ Metal Cap

Series	Size code	Elements	Rated voltage (V_{dc})	Rated Capacitance (μF)	Taping (pcs.)	Tray (pcs. / box)	Bagged (pcs. / box)
NTJ, KVJ	55	1	All Voltage Range		400	800	-
		2	25	68	1,500	700	-
			50	33	1,500	700	-
			100	15	1,500	700	-
			All rating other than the above		2,000	800	-
	76	1	All Voltage Range		1,200	800	-
		2	25	100	400	600	-
			50	33	500	700	-
			100	10	500	700	-
			All rating other than the above		500	600	-

◆ Radial Lead

Series	Size code	Elements	Rated voltage (V_{dc})	Rated Capacitance (μF)	Taping (pcs.)	Tray (pcs. / box)	Bagged (pcs. / box)
NTD, KVD	32	-	All Voltage Range		2,000	-	2,000
	43	-	All Voltage Range		2,000	-	2,000
	55	-	All Voltage Range		2,000	-	2,000
	76	-	500	0.68	1,500	-	500
			500	1.0	1,500	-	500
			500	1.2	1,500		500
			Rating other than the above		1,000	-	500
	80	-	All Voltage Range		-	100	-
	90	-	All Voltage Range		-	60	-
	99	-	All Voltage Range		-	50	-

The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems.
We are not in any case responsible for any failures or damage caused by the use of information contained herein.
You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.
Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event any of our products malfunction.

1 In designing device circuits

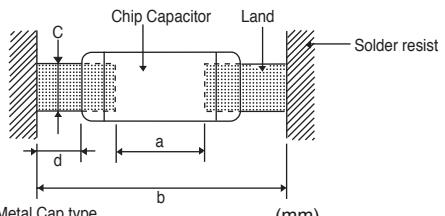
(1) Confirming the installation and operating environment of capacitors, use them within the rated performance limits prescribed in their catalog or product specifications. Otherwise, excessive use conditions cause the capacitors to have catastrophic failure such as short circuit, open circuit or firing.
(2) Do not apply a DC voltage which exceeds the full rated voltage. The peak voltage of a superimposed AC voltage (ripple voltage) on the DC voltage must not exceed the full rated voltage.
(3) By considering the temperature characteristic and the DC bias characteristic of the ceramic capacitors, please determine the right capacitance. The capacitance of the capacitors changes in low and high temperature ambiences and depends on the applied bias voltages. The capacitance change (i.e. reduction) may affect the performance of the circuit which is containing the capacitors. Therefore, please examine the capacitors in the actual operational conditions to verify that they are right ones.
(4) The common failure mode of multilayer ceramic capacitors is contingent insulation breakdown or short circuit. When the capacitors are used in a high-power circuit, they may damage the surroundings of the capacitors when failed. Therefore, the high-power circuit should have protective device/protective devices to shut down the circuit from the capacitor/capacitors. The reliability of the capacitors improves when the ambient temperatures are in the normal temperature range and the applied voltages are low.
(5) When large high frequency ripple current acrosses multilayer ceramic capacitor, the capacitor can vibrate. The phenomenon occurs as the capacitor, has natural vibration frequency due to the mechanical dimensions, resonates to the large high frequency ripple current.
To prevent the resonance, please select the capacitor or change the ripple current frequency.
For your information, we indicate the following resonance frequency to each chip size.

Size Code	Chip Size	(kHz)
31	3.2× 1.6	650, 1200, 1600
32	3.2× 2.5	650, 850, 1200
43	4.5× 3.2	450, 650, 1200
55	5.7× 5.0	350, 450, 850
76	7.5× 6.3	350, 600, 750
80	10.0× 9.0	230, 320, 620
90	20.0×12.7	100, 170, 450
99	25.0×12.7	80, 160, 250

(6) The capacitance of the capacitors depends on the ambient temperatures and bias voltages. Therefore, please examine the capacitors when they are to be used in a time-constant circuit before the use.
(7) Consult us for devices that requires high reliability. For components which are used to the devices whose failure affects human life or causes social loss by serious damage, higher reliable designs than general purpose components are required.
(8) Please contact us,when you use it for AC use.

2 In designing PC boards

(1) Put the proper volume of solder (the size of fillet) on PC boards for installing surface mount capacitors, because it directly affects the installed capacitors. The design of copper pad patterns and dimensions should be set so that the proper volume of solder can be provided. The standard land dimensions are shown below.
(2) Land width of PC boards shall not exceed the width of chip capacitors.



●Chip type (mm)

Code \ Size Code	31	32	43	55	76
a	2.2 to 2.5	2.2 to 2.5	3.5 to 3.7	4.5 to 4.7	5.0 to 5.2
b	4.2 to 5.8	4.2 to 5.8	5.5 to 6.1	6.7 to 8.3	8.8 to 10.8
c	1.2 to 1.6	1.8 to 2.5	2.3 to 3.2	3.5 to 5.0	4.7 to 6.3
d	0.4 to 0.8	0.5 to 1.0	0.6 to 1.1	0.7 to 1.2	0.8 to 1.3

●Metal Cap type (mm)

Code \ Size Code	55	76
a	3.5 to 4.5	5.5 to 6.5
b	6.5 to 7.5	8.8 to 9.8
c	4.0 to 5.0	5.5 to 6.5
d	0.5 to 1.5	0.8 to 1.8

(3) When the multilayer ceramic capacitors are mounted on a substrate, the chips may crack when mechanical stress is put. Also, when the substrate is bent, they may also crack. Therefore, please make sure that the material and size of the substrate and the capacitor positions are right.
(4) For a leaded capacitor, design the PC boards with the correct terminal hole space equal to the lead space of the capacitor.

3 Installation

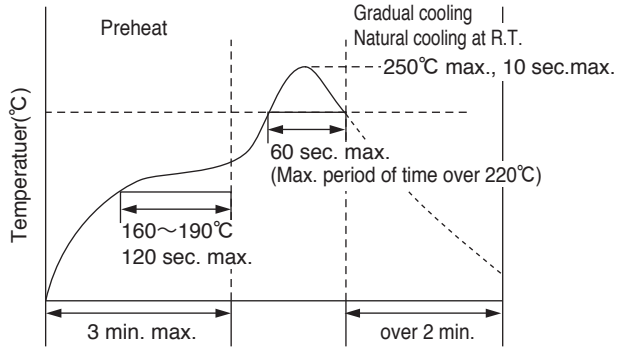
(1) When installing leaded capacitors in the PC boards by means of an automatic insertion machine, minimize the mechanical shock applied to the capacitors by the lead clinch unit of the machine.
(2) When the capacitors are to be mounted on a substrate, please minimize the shock and weight to the capacitor bodies. The nozzle pressure during the mounting process should be adjusted to 1N～3N maximum in static load.
(3) Periodically maintain and inspect installation machines.
(4) Where an adhesive is used to pre-anchor capacitors on PC boards, use appropriate copper pad dimensions,type of adhesive, coating volume, curing temperature and time, etc. to prevent the capacitors from deteriorating.

4 Soldering

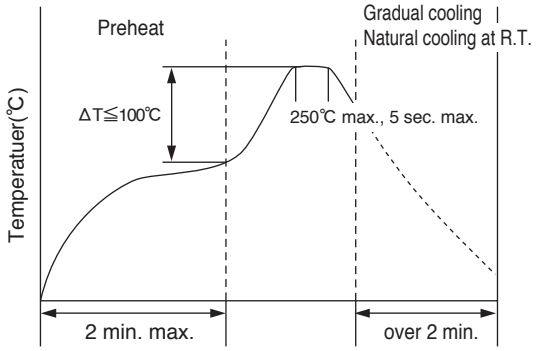
(1) Use flux with a halogen content of less than 0.1 wt. %. Do not use strong acid flux.
(2) Minimize a volume of flux to coat the PC boards with.
(3) Follow the soldering conditions prescribed in the catalog or product specifications. Excessive thermal stress affects the performance of the capacitors.
(4) Note that surface mount capacitors with the size 3.2×1.6 or smaller tend to stand up during vapor phase reflow soldering.
(5) For reflow soldering, place surface mount capacitors on the PC boards as soon as possible after solder paste was coated.
(6) Please be aware that thermal deformation of substrates during mounting process cause stress to the substrates. Especially, substrates which are mounting chip capacitors are to be flow soldered to solder leaded parts or solder other parts onto the substrates, please make sure that the deformation during the soldering causes no harm. In fact, the deformation may cause stress to the substrates which leads to the capacitor element cracks/insulation-layer break down/insulation resistance degradation.The effect of the stress due to the deformation depends on the material of the substrates. Therefore, please be aware of the following information.
   a) Ceramic substrates
      The stress due to the deformation of ceramic substrates is thought be the minimum. Heat contract difference during solder hardening can be the effect to ceramic capacitors mounted on the substrates. So, please avoid forced cooling during the hardening.
   b) Glass epoxy substrates
      The stress due to the deformation and warp of glass epoxy substrates affects ceramic capacitors mounted. The stress depends on the size and material of the substrates, pattern positions and thermal gradient during soldering. Temperature difference between the both sides of the substrates may also cause the stress. When the material of the substrates, which are mounting ceramic capacitors, is FR-4 or the equivalent and other parts are to be flow soldered, the surface of the side with the capacitors shall be sufficiently preheated to 150℃ or over before the flow soldering. During the soldering, the temperature difference between the side with the capacitors and the other side of the substrate should be 100℃ maximum.
   c) Metal substrates
      The deformation and warp of metal substrates considerably affect ceramic capacitors mounted. Therefore, please use metal caps which can moderate the stress of the substrates.
(7) After reflow/flow soldering, please cool the PC boards which mounted capacitors naturally in the air.
(8) Ceramic chip capacitors are solderable by twice maximum in reflow or flow soldering. When the capacitors are to be reflow soldered and then flow soldered, there shall be no additional soldering to the capacitors. However, the capacitors having a size of 5.7×5.0 or larger should be soldered by one time only.
(9) Metal cap type capacitors (NTJ series) is two times reflow.
(10) Due to the nature of ceramic, radical heating or cooling and partial heating may crack the ceramic capacitor element. Please have enough pre-heating process before soldering.
(11) Ultrasonic cleaning time shall be ten minutes maximum.
When the power of ultrasonic cleaner is too high, the strength of terminations may drop.
Therefore, carefully examine the cleaning conditions before use.
(12) Adjust the amount of solder cream in order that solder fillet shall be 1/2 to 2/3 height of chips. If fillet can confirm, size of 4.5×3.2 or larger is not this limit.
(13) When more than two chips are mounted on a common land, please separate the chips by the solder resist.
(14) In hand soldering, please take into consideration the following items.
   1. Fully pre-heat on a heating plate whose surface temperature is 100℃ to 150℃ .
   2. Soldering iron power shall not exceed 30W.
   3. Soldering iron tip diameter shall not exceed 3mm.
   4. Temperature of iron tip shall be adjusted to not exceed 300℃,3sec.
   5. The soldering iron tip shall not touch ceramic body directly.
   6. After soldering, let the products to be room temperature to cool gradually.

5 Soldering profile

Reflow Soldering Profile



Flow Soldering Profile



*Flow Soldering
Tin plating
(Size code : 31, 32, 43)

(1) Do not expose the product to temperatures of 250°C or higher.

6 Cleaning

(1) In the case that the assembly boards are washed, choose the appropriate cleaning agent for the washing purpose.
(2) To determine the cleaning conditions, make sure by means of the actual washing equipment that the performance of the capacitors is not affected.
(3) In the case that water-soluble flux was used, sufficiently wash the assembly boards.

7 Coating materials

(1) When ceramic capacitors are to be resin coated or molded, please pay enough attention. Ceramic capacitors molded in resin, and please do not use it. There is fear to destroy a capacitor by stress to occur by the expansion / the shrinkage when resin stiffens. When a thermal expansion shrinkage coefficient in hardening uses big resin, coating in the resin which is soft with capacitors, please make that stress is added to capacitors small as much as possible.
(2) Confirm that harmful resolution or formation gasses are not generated from the coating materials during the curing process or by spontaneously leaving the coated assembly boards.
(3) If a coating material is cured at higher temperatures than the Category temperature of the capacitor, the exterior resin will deteriorate resulting in the capacitor damage.

8 Handling

(1) When cutting off a multi-board to make individual units, curving or twisting the board may crack the capacitors. Appropriate tools should be used to cut it off.
(2) Excessive mechanical shock to capacitors or their assembly boards may make the capacitors crack.
(3) Use leaded capacitors without bending their lead wires as much as possible.
(4) When ceramic capacitors are stored with no load, the capacitance reduces during the storage (named "aging characteristic"). As for the product that capacitance decreased, capacity recovers in an initial value by heat-treating it.
(5) When the electrodes of the ceramic capacitors are made of silver, needle crystals may form on the electrodes in an ambience containing sulfur compounds.

9 Storage

(1) Do not store and use capacitors in the following environment. Water or salt water splashes, dew wets or toxic gasses (hydrogen sulfide, sulfurous acid,chlorine, ammonium) fills, Vibration or mechanical shock exceeding the limits prescribed in the catalog or product specifications.
(2) Do not store capacitors in places that direct sunlight pours down or dewy places.
(3) Avoid high temperature and humidity.
The storage conditions should be : Temperature=Lower than 40℃
Humidity=Lower than 70% RH

10 About AEC-Q200

The Automotive Electronics Council (AEC) was originally established by American major automotive manufactures. Today, the committees are composed of representatives from the sustaining Members of manufacturing companies in automotive electrical components. It has standardized the criteria for "stress test qualification" and "reliability test" for the electronic components.

AEC-Q200 is the reliability test standard for approval of passive components, it has been specified test subjects and quantity etc. for each components. Criteria of reliability tests such as our main products "Multilayer Ceramic Capacitors" are also described in this.

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for the Multilayer Ceramic Capacitors used in automotive applications to increase in recent years.

AEC-Q200 compliant product is the product which we evaluated by AEC-Q200 standard.

Please contact us for more information.

Please obtain and verify our product specification sheet before you use our product.

11 Catalogs

Product specifications in this catalog are subject to change without notice.

Please request and make sure our product specifications before purchase and/or use.

12 Response to the Substances of Concern

(1) Nippon Chemi-Con aims for developing products that meet laws and regulations concerning substances of concern.
(Some products may contain regulated substances for exempted application.)
Please contact us for more information about law-compliance status.

(2) According to the content of REACH handbook (Guidance on requirements for substances in articles which is published on May 2008), our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for EU REACH Regulation Article 7 (1).
Reference: Electrolytic Condenser Investigation Society
"Study of REACH Regulation in EU about Electrolytic Capacitor" (publicized on 13 March 2008)

For the details, refer to Guideline of notabilia for fixed multilayer ceramic capacitors for use in electronic equipment, EIAJ RCR-2335 issued by Electronic Industries Association of Japan.

STANDARDIZATION

The following series were discontinued.Please use the replacements in the table.

◆MULTILAYER CERAMIC CHIP CAPACITORS

Discontinued series	Characteristics	Replacements	Page
TCCS	Y5U, Termination (Tin Plating)	NTS	13
TCCR	Y5U, Termination (Silver)	NTS	13
THCS	Y5U, Termination (Tin Plating), Down sized	NTS	13
THCR	Y5U, Termination (Silver), Down sized	NTS	13
TMCS	Y5U, Termination (Tin Plating), High Reliability	NTF	13

◆METAL CAP TYPE MULTILAYER CERAMIC CAPACITORS

Discontinued series	Characteristics	Replacements	Page
TCP	Y5U	NTJ	22
THP	Y5U, Down sized	NTJ	22
TMP	Y5U, Down sized, High Reliability	NTJ	22

◆DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

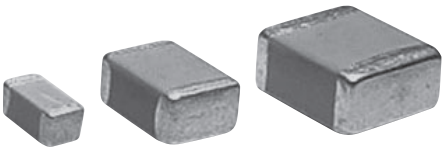
Discontinued series	Characteristics	Replacements	Page
TCD	Y5U	NTD	28
THD	Y5U, Down sized	NTD	28

Lead oxides are included as a dielectric material in the discontinued series (Y5U characteristics) on the above lists.
Under RoHS directive, such Lead (Pb) was already restricted from January 1, 2013. Under ELV directive, it is restricted from January 1, 2016.
Please use the replacements which are RoHS compliant.

NTS Series / NTF Series

RoHS2 Compliant

(General product) **Temperature cycle : 1000 cycles**



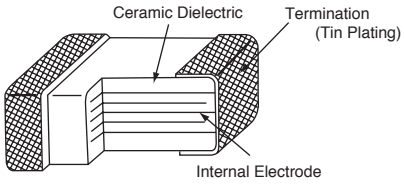
◆FEATURES

1. Large capacitance by small size.
2. X7R and X7S temperature characteristics.
3. High permissible ripple current capability.
4. NTF: Temperature cycle : 1000 cycles.

◆APPLICATIONS

1. Smoothing circuit of DC-DC converters.
2. On-board power supplies.
3. Voltage regulators for computers.
3. Noise suppressor for various kinds of equipments.
4. High reliability equipments.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55 to +125℃
2. Rated Voltage Range	25, 35, 50, 100, 250, 500Vdc
3. Rated Capacitance Range	0.010 to 47μF
4. Rated Capacitance Tolerance	M (±20%) : Standard, K (±10%)
5. Temperature Characteristics	X7R
6. Rated Ripple Current	See No.5 on the following table

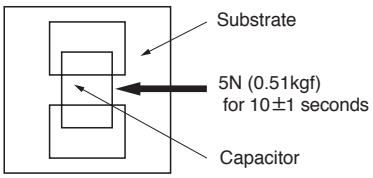
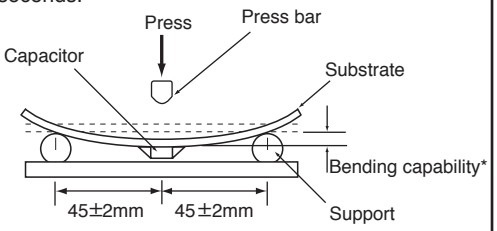
◆SPECIFICATIONS

<table>
<tr><th>No.</th><th>Items</th><th>Specification</th><th>Test Condition</th></tr>
<tr><td>1</td><td>Withstand Voltage</td><td>No abnormality.</td><td>
<table>
<tr><th>Rated voltage</th><th>Withstand voltage</th></tr>
<tr><td>Less than 250V</td><td>250% of rated voltage</td></tr>
<tr><td>More than 250V
Less than 500V</td><td>100V +
150% of rated voltage</td></tr>
<tr><td>More than 500V</td><td>130% of rated voltage</td></tr>
</table>
Shall be applied for 5 seconds.
</td></tr>
<tr><td>2</td><td>Insulation Resistance</td><td>100/CR(MΩ) or 4000(MΩ)
whichever is less.</td><td>Rated voltage shall be applied for 60±5 seconds at temperature 25±2℃.</td></tr>
<tr><td>3</td><td>Rated Capacitance</td><td>Within specified tolerance.</td><td rowspan="2">
<table>
<tr><td></td><td>CR≦10μF</td><td>CR>10μF</td></tr>
<tr><td>Temperature</td><td colspan="2">25±2℃</td></tr>
<tr><td>Frequency</td><td>1±0.1kHz</td><td>120±12Hz</td></tr>
<tr><td>Voltage</td><td>1±0.2Vrms</td><td>0.5±0.2Vrms</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Dissipation Factor</td><td>X7R temperature characteristics
of 5.0% or less
X7S temperature characteristics
of 7.5% or less</td></tr>
<tr><td>5</td><td>Rated Ripple Current</td><td>See STANDARD RATINGS</td><td>10kHz～1MHz (sine curve)
Ripple voltage Vp shall be less than
the rated voltage.</td></tr>
</table>

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for Multilayer ceramic capacitors. Please contact us for more information.

NTS Series / NTF Series

◆SPECIFICATIONS

No.	Items	Specification	Test Condition
6	Adhesion	No visible damage.	
7	Bend strength of the face plating	Appearance : No visible damage. ΔC/C : ±15%	The substrate shall be bend at a rate of 1mm/s for 5 seconds.  *Bending capability NTS : 1mm NTF : 1mm or 2mm
8	Solderability	Min. 75% of surface of the termination shall be covered with new solder	Solder: Pb Free Solder Temperature: 245±5℃ Dipping Time: 2±0.5sec.
9	Resistance to Soldering Heat	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification.	Preheating Condition : Step 1: 100±10℃, 2min. Step 2: 200±10℃, 2min. Solder Temperature : 260±5℃ Dipping Time : 2±0.5 seconds
10	Temperature Cycle	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification.	Step 1: Min. Category temperature ±3, 30±3 Step 2: Room temperature, 3 max. Step 3: Max. Category temperature ±3, 30±3 Step 4: Room temperature, 3 max. For above temperature cycle. NTS : For 5 cycles NTF : For 1000 cycles
11	Humidity Load Life	Appearance : No abnormality. ΔC/C : ±15% I.R. : 25/C_R(MΩ) or 1000(MΩ) whichever is less. Dissipation Factor X7R temperature characteristics D.F: 10% or less X7S temperature characteristics D.F: 15% or less	Temperature : 40±2℃ Humidity : 90 to 95%RH Voltage : Rated voltage Time : 500^{+24}_{0}hours
12	Endurance	Appearance : No abnormality. ΔC/C : ±15% I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less. Dissipation Factor X7R temperature characteristics D.F: 10% or less X7S temperature characteristics D.F: 15% or less	Temperature : 125±3℃ Voltage : Rated voltage Time : 1000^{+48}_{0}hours

*C_R : Rated Capacitance(μF)

NTS Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Electrostatic Capacitance Temperature Characteristics	Dimensions(mm)				Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
			L	W	T max.	a			
25	1.0	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTS250B105M31N0T00	3,000
	1.5	X7R						KTS250B155M31N0T00	3,000
	2.2	X7R						KTS250B225M31N0T00	3,000
	3.3	X7S						KTS250S335M31N0T00	2,000
	3.3	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTS250B335M32N0T00	1,600
	4.7	X7R						KTS250B475M32N0T00	1,600
	6.8	X7R						KTS250B685M32N0T00	1,600
	10	X7S						KTS250S106M32N0T00	1,600
	10	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTS250B106M43N0T00	800
	15	X7R						KTS250B156M43N0T00	800
	22	X7S						KTS250S226M43N0T00	800
	22	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTS250B226M55N0T00	800
	33	X7R			3.0			KTS250B336M55N0T00	800
	47	X7R	7.5±0.5	6.3±0.5	4.0	1.0±0.5	3.0	KTS250B476M76N0T00	300
35	1.0	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTS350B105M31N0T00	3,000
	1.5	X7R						KTS350B155M31N0T00	3,000
	2.2	X7R						KTS350B225M31N0T00	3,000
	3.3	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTS350B335M32N0T00	1,600
	4.7	X7R						KTS350B475M32N0T00	1,600
	6.8	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTS350B685M43N0T00	800
	10	X7R						KTS350B106M43N0T00	800
	15	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTS350B156M55N0T00	800
	22	X7R						KTS350B226M55N0T00	800
	33	X7R	7.5±0.5	6.3±0.5	4.0	1.0±0.5	3.0	KTS350B336M76N0T00	300
	47	X7R						KTS350B476M76N0T00	300
50	0.33	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTS500B334M31N0T00	3,000
	0.47	X7R						KTS500B474M31N0T00	3,000
	0.68	X7R						KTS500B684M31N0T00	3,000
	1.0	X7R						KTS500B105M31N0T00	3,000
	1.5	X7R						KTS500B155M31N0T00	2,000
	2.2	X7R						KTS500B225M31N0T00	2,000
	1.5	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTS500B155M32N0T00	1,600
	2.2	X7R						KTS500B225M32N0T00	1,600
	3.3	X7R						KTS500B335M32N0T00	1,600
	4.7	X7R						KTS500B475M32N0T00	1,600
	4.7	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTS500B475M43N0T00	800
	6.8	X7R						KTS500B685M43N0T00	800
	10	X7R						KTS500B106M43N0T00	800
	10	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTS500B106M55N0T00	800
	15	X7R						KTS500B156M55N0T00	800
	22	X7R	7.5±0.5	6.3±0.5	4.0	1.0±0.5	3.0	KTS500B226M76N0T00	300
100	0.1	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTS101B104M31N0T00	3,000
	0.15	X7R						KTS101B154M31N0T00	3,000
	0.22	X7R						KTS101B224M31N0T00	3,000
	0.33	X7R						KTS101B334M31N0T00	3,000
	0.47	X7R						KTS101B474M31N0T00	3,000
	0.68	X7R						KTS101B684M31N0T00	3,000
	1.0	X7R						KTS101B105M31N0T00	2,000
	1.5	X7R						KTS101B155M31N0T00	2,000
	2.2	X7R						KTS101B225M31N0T00	2,000
	1.0	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTS101B105M32N0T00	1,600
	1.5	X7R						KTS101B155M32N0T00	1,600
	2.2	X7R						KTS101B225M32N0T00	1,600
	3.3	X7R						KTS101B335M32N0T00	1,600
	1.5	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTS101B155M43N0T00	800
	2.2	X7R						KTS101B225M43N0T00	800
	3.3	X7R		3.2±0.5				KTS101B335M43J0T00	800
	4.7	X7R			3.2			KTS101B475M43E0T00	800
	6.8	X7R		3.2±0.4	2.8	0.6±0.3	1.0	KTS101B685M43N0T00	800
	3.3	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTS101B335M55N0T00	800
	4.7	X7R						KTS101B475M55N0T00	800
	6.8	X7R			3.2			KTS101B685M55F0T00	800
	10	X7R			2.8	1.0±0.4		KTS101B106M55NHT00	800
	6.8	X7R	7.5±0.5	6.3±0.5	3.5	1.0±0.5	3.0	KTS101B685M76N0T00	300

※Please consult with us when you consider the rating other than a standard table.

NTS Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Electrostatic Capacitance Temperature Characteristics	Dimensions(mm) L	W	Tmax.	a	Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
250	0.01	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTS251B103M31N0T00	3,000
	0.022	X7R						KTS251B223M31N0T00	3,000
	0.033	X7R						KTS251B333M31N0T00	3,000
	0.047	X7R						KTS251B473M31N0T00	3,000
	0.068	X7R						KTS251B683M31N0T00	3,000
	0.1	X7R						KTS251B104M31N0T00	3,000
	0.15	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTS251B154M32N0T00	1,600
	0.22	X7R						KTS251B224M32N0T00	1,600
	0.33	X7R						KTS251B334M32N0T00	1,600
	0.47	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTS251B474M43N0T00	800
	0.68	X7R						KTS251B684M43N0T00	800
	1.0	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTS251B105M55N0T00	800
	1.5	X7R						KTS251B155M55N0T00	800
	1.5	X7R	7.5±0.5	6.3±0.5	3.5	1.0±0.5	3.0	KTS251B155M76N0T00	300
	2.2	X7R			5.0			KTS251B225M76N0T00	300
500	0.47	X7R	5.7±0.4	5.0±0.4	2.7	0.8±0.5	1.5	KTS501B474M55N0T00	800
	0.56	X7R			3.0			KTS501B564M55N0T00	800
	0.68	X7R	7.5±0.5	6.3±0.5	2.5	1.0±0.5	2.0	KTS501B684M76N0T00	500
	1.0	X7R			3.2			KTS501B105M76N0T00	300
	1.2	X7R			3.5			KTS501B125M76N0T00	300

※Please consult with us when you consider the rating other than a standard table.

◆PART NUMBERING SYSTEM

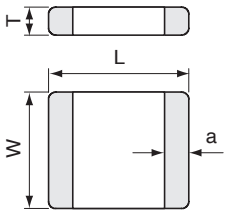
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
K	T	S	1	0	1	B	2	2	5	M	3	2	N	0	T	0	0

- Supplement code
- Taping code
- Terminal code
- Size code
- Capacitance tolerance code
- Nominal Capacitance code
- Temperature characteristics code
- Rated voltage code
- Series code
- Category

Size Code

Size Code	Code JIS	Code EIA
31	3216	1206
32	3225	1210
43	4532	1812
55	5750	2220
76	7563	3025

◆DIMENSIONS



Please refer to"Part Numbering System" of the beginning of a catalog for the details.

NTF Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Electrostatic Capacitance Temperature Characteristics	Dimensions(mm)				Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
			L	W	T max.	a			
25	1.0	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTF250B105M31NLT00	3,000
	1.5	X7R						KTF250B155M31NLT00	3,000
	2.2	X7R						KTF250B225M31NLT00	3,000
	3.3	X7S						KTF250S335M31NLT00	2,000
	3.3	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTF250B335M32NHT00	1,600
	4.7	X7R						KTF250B475M32NHT00	1,600
	6.8	X7R						KTF250B685M32NHT00	1,600
	10	X7S						KTF250S106M32NHT00	1,600
	10	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTF250B106M43NHT00	800
	15	X7R						KTF250B156M43NHT00	800
	22	X7S						KTF250S226M43NHT00	800
	22	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTF250B226M55NHT00	800
	33	X7R			3.0			KTF250B336M55NHT00	800
	47	X7R	7.5±0.5	6.3±0.5	4.0	1.0±0.5	3.0	KTF250B476M76NHT00	300
35	1.0	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTF350B105M31NLT00	3,000
	1.5	X7R						KTF350B155M31NLT00	3,000
	2.2	X7R						KTF350B225M31NLT00	3,000
	3.3	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTF350B335M32NHT00	1,600
	4.7	X7R						KTF350B475M32NHT00	1,600
	6.8	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTF350B685M43NHT00	800
	10	X7R						KTF350B106M43NHT00	800
	15	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTF350B156M55NHT00	800
	22	X7R						KTF350B226M55NHT00	800
50	0.33	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTF500B334M31NLT00	3,000
	0.47	X7R						KTF500B474M31NLT00	3,000
	0.68	X7R						KTF500B684M31NLT00	3,000
	1.0	X7R						KTF500B105M31NLT00	3,000
	1.5	X7R						KTF500B155M31NLT00	2,000
	2.2	X7R						KTF500B225M31NLT00	2,000
	1.5	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTF500B155M32NHT00	1,600
	2.2	X7R						KTF500B225M32NHT00	1,600
	3.3	X7R						KTF500B335M32NHT00	1,600
	4.7	X7R						KTF500B475M32NHT00	1,600
	4.7	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTF500B475M43NHT00	800
	6.8	X7R						KTS500B685M43NHT00	800
	10	X7R						KTF500B106M43NHT00	800
	10	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTF500B106M55NHT00	800
	15	X7R						KTF500B156M55NHT00	800
	22	X7R	7.5±0.5	6.3±0.5	4.0	1.0±0.5	3.0	KTF500B226M76NHT00	300
100	0.1	X7R	3.2±0.2	1.6±0.2	1.8	0.5±0.3	0.3	KTF101B104M31NLT00	3,000
	0.15	X7R						KTF101B154M31NLT00	3,000
	0.22	X7R						KTF101B224M31NLT00	3,000
	0.33	X7R						KTF101B334M31NLT00	3,000
	0.47	X7R						KTF101B474M31NLT00	3,000
	0.68	X7R						KTF101B684M31NlT00	3,000
	1.0	X7R						KTF101B105M31NLT00	2,000
	1.5	X7R						KTF101B155M31NLT00	2,000
	2.2	X7R						KTF101B225M31NLT00	2,000
	1.0	X7R	3.2±0.4	2.5±0.3	2.6	0.6±0.3	0.5	KTF101B105M32NHT00	1,600
	1.5	X7R						KTF101B155M32NHT00	1,600
	2.2	X7R						KTF101B225M32NHT00	1,600
	3.3	X7R						KTF101B335M32NHT00	1,600
	1.5	X7R	4.5±0.4	3.2±0.4	2.8	0.6±0.3	1.0	KTF101B155M43NHT00	800
	2.2	X7R						KTF101B225M43NHT00	800
	3.3	X7R		3.2±0.5				KTF101B335M43JHT00	800
	4.7	X7R			3.2			KTF101B475M43EHT00	800
	6.8	X7R		3.2±0.4	2.8	0.6±0.3	1.0	KTF101B685M43NHT00	800
	4.7	X7R	5.7±0.4	5.0±0.4	2.8	0.8±0.5	2.0	KTF101B475M55NHT00	800
	6.8	X7R			3.2			KTF101B685M55FHT00	800
	10	X7R			2.8	1.0±0.4		KTF101B106M55NHT00	800

※Please consult with us when you consider the rating other than a standard table.

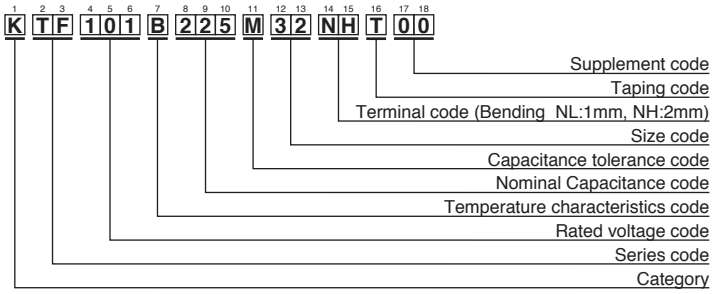
NTF Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Electrostatic Capacitance Temperature Characteristics	Dimensions(mm)				Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
			L	W	Tmax.	a			
250	0.033	X7R	3.2±0.3	1.6±0.2	1.8	0.7±0.2	0.3	KTF251B333M31NLT00	3,000
	0.047	X7R						KTF251B473M31NLT00	3,000
	0.068	X7R						KTF251B683M31NLT00	3,000
	0.1	X7R						KTF251B104M31NLT00	3,000
	0.15	X7R	3.2±0.4	2.5±0.3	2.6	0.7±0.2	0.5	KTF251B154M32NLT00	1,600
	0.22	X7R						KTF251B224M32NLT00	1,600
	0.33	X7R						KTF251B334M32NLT00	1,600
	0.47	X7R	4.5±0.4	3.2±0.4	2.8	0.7±0.2	1.0	KTF251B474M43NLT00	800
	0.68	X7R						KTF251B684M43NLT00	800
	1.0	X7R	5.7±0.4	5.0±0.4	2.8	1.0±0.4	2.0	KTF251B105M55NLT00	800
	1.5	X7R						KTF251B155M55NLT00	800
500	0.47	X7R	5.7±0.4	5.0±0.4	2.7	1.0±0.4	1.5	KTF501B474M55NLT00	800
	0.56	X7R			3.0			KTF501B564M55NLT00	800

※Please consult with us when you consider the rating other than a standard table.

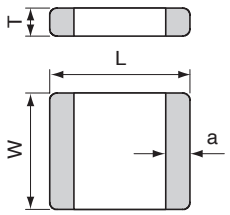
◆PART NUMBERING SYSTEM



Size Code

Size Code	Code	
	JIS	EIA
31	3216	1206
32	3225	1210
43	4532	1812
55	5750	2220
76	7563	3025

◆DIMENSIONS



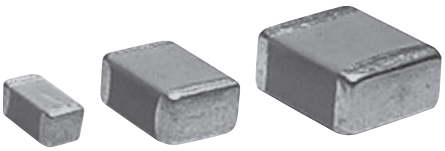
Please refer to"Part Numbering System" of the beginning of a catalog for the details.

MULTILAYER CERAMIC CHIP CAPACITORS

KVF Series

RoHS2 Compliant | AEC-Q200 | High temperature 150℃

Temperature cycle : 1000 cycles



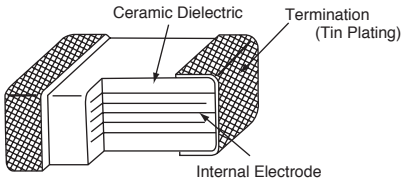
◆FEATURES

1. Temperature range : -55 to +150℃
2. Temperature characteristics : X8L
3. Exellent noise absorption.
4. Automotive grade (AEC-Q200)

◆APPLICATIONS

1. Noise filter for automotive equipment (ECU etc.)
2. Equipment used in a high temperature environment

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55～+150°C
2. Rated Voltage Range	25, 50, 100 Vdc
3. Rated Capacitance Range	0.033～15μF
4. Rated Capacitance Tolerance	M(±20%)
5. Temperature Characteristics	X8L
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

No.	Items	Specification	Test Condition
1	Withstand Voltage	No abnormality.	250% of rated voltage shall be applied for 5 seconds.
2	Insulation Resistance	100/CR(MΩ) or 4000(MΩ) whichever is less.	Rated voltage shall be applied for 60±5 seconds at temperature 25±2℃.
3	Rated Capacitance	Within specified tolerance.	See table below
4	Dissipation Factor	5.0% maximum.	
5	Rated Ripple Current	See table below	10kHz～1MHz (sine curve) Ripple voltage Vp shall be less than the rated voltage. The surface temperature MLCC must not exceed the maximum category temperature when the ripple current is applied.

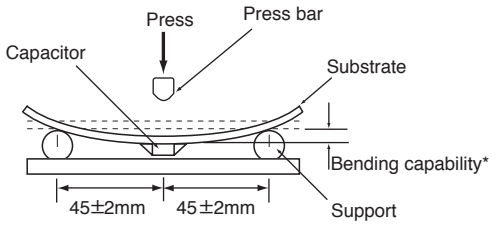
	CR≦10μF	CR>10μF
Temperature	25±2℃	
Frequency	1±0.1kHz	120±12Hz
Voltage	1±0.2Vrms	0.5±0.2Vrms

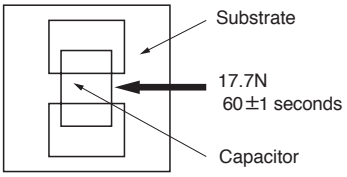
Size code	31	32	43	55
Arms	0.3	0.5	1.0	2.0

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for Multilayer ceramic capacitors. Please contact us for more information.

KVF Series

◆SPECIFICATIONS

<table>
<tr><th>No.</th><th>Items</th><th>Specification</th><th>Test Condition</th></tr>
<tr><td>6</td><td>High Temperature Exposure (Storage)</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% maximum
I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less.</td><td>Temperature : Max. category temperature±3°C
Time : 1000 $^{+48}_{0}$ hours</td></tr>
<tr><td>7</td><td>Temperature Cycle</td><td>Appearance : No visible damage.
ΔC/C : ±15%
D.F. : To meet the initial specification.
I.R. : To meet the initial specification.</td><td><table><tr><th>Step</th><th>Temperature (°C)</th><th>(min.)</th></tr><tr><td>1</td><td>Min.Category temperature±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>3 max.</td></tr><tr><td>3</td><td>Max. Category temperature±3</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>3 max.</td></tr></table>(Epoxy resin PCB t=1.6mm)
For 1000 cycles</td></tr>
<tr><td>8</td><td>Biased Humidity</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% maximum
I.R. : 25/C_R(MΩ) or 1000(MΩ) whichever is less.</td><td>Temperature : 85°C±3°C
Humidity : 80 ～ 85%RH
Voltage : Rated voltage
Time : 1000 $^{+48}_{0}$ hours</td></tr>
<tr><td>9</td><td>Operational Life</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% maximum
I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less.</td><td>Temperature : Max. category temperature±3°C
Voltage : Rated voltage
Time : 1000 $^{+48}_{0}$ hours</td></tr>
<tr><td>10</td><td>Mechanical Shock</td><td>Appearance : No abnormality.
ΔC/C : To meet the initial specification.
D.F. : To meet the initial specification.</td><td>MIL-STD-202 Method213 Condition F
Peak value : 1,500 G
Normal duration : 0.5 ms
Velocity change : 15.4 ft/sec (4.7m/s)
Direction and time : 3 times each in X,Y, Z axis. Total 18 times</td></tr>
<tr><td>11</td><td>Resistance to Soldering Heat</td><td>Appearance : No visible damage.
ΔC/C : ±15%
D.F. : To meet the initial specification.
I.R. : To meet the initial specification.</td><td>Preheating temperature : 150±10°C
Preheating time : 1 to 2 minute
Solder temp. : 260±5°C
Dipping Time : 10±1s</td></tr>
<tr><td>12</td><td>ESD</td><td>Appearance : No abnormality.
ΔC/C : To meet the initial specification.
D.F. : To meet the initial specification.
I.R. : To meet the initial specification.</td><td>AEC-Q200-002
Connection : Between terminals
Direct Contact : 8kV (150pF 2000Ω)
Times : ±1time</td></tr>
<tr><td>13</td><td>Solderability</td><td>Min. 75% of surface of the termination shall be covered with new solder.</td><td><table><tr><td>Solder</td><td>Pb Free</td></tr><tr><td>Solder Temperature</td><td>245±5°C</td></tr><tr><td>Dipping Time</td><td>2±0.5s</td></tr></table></td></tr>
<tr><td>14</td><td>Board Flex</td><td>Appearance : No visible damage.
ΔC/C : ±15%</td><td>The substrate shall be bend at rate of 1mm/s for 5 seconds.
 

∗ Bending capability : 1mm or 2mm</td></tr>
<tr><td>15</td><td>Terminal Strength (SMD)</td><td>No visible damage.</td><td> 
</td></tr>
</table>

*CR : Rated Capacitance(μF)

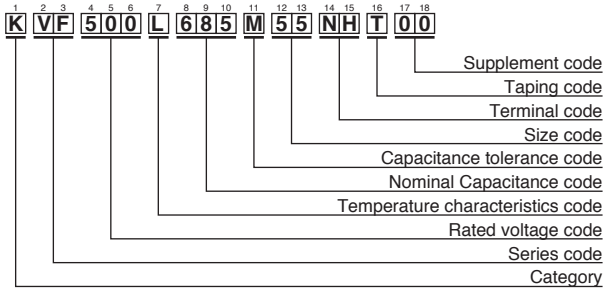
KVF Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions(mm)				Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
		L	W	T max.	a			
25	0.33	3.2±0.3	1.6±0.2	1.8	0.7±0.2	0.3	KVF250L334M31NLT00	3,000
	0.47						KVF250L474M31NLT00	3,000
	0.68						KVF250L684M31NLT00	3,000
	1.0						KVF250L105M31NLT00	3,000
	1.5	3.2±0.4	2.5±0.3	2.6	0.7±0.2	0.5	KVF250L155M32NHT00	1,600
	2.2						KVF250L225M32NHT00	1,600
	3.3						KVF250L335M32NHT00	1,600
	4.7	4.5±0.4	3.2±0.4	2.8	0.7±0.2	1.0	KVF250L475M43NHT00	800
	6.8						KVF250L685M43NHT00	800
	10	5.7±0.4	5.0±0.4	2.8	1.0±0.4	2.0	KVF250L106M55NHT00	800
	15						KVF250L156M55NHT00	800
50	0.1	3.2±0.3	1.6±0.2	1.8	0.7±0.2	0.3	KVF500L104M31NLT00	3,000
	0.15						KVF500L154M31NLT00	3,000
	0.22						KVF500L224M31NLT00	3,000
	0.33						KVF500L334M31NLT00	3,000
	0.47						KVF500L474M31NLT00	3,000
	0.68	3.2±0.4	2.5±0.3	2.6	0.7±0.2	0.5	KVF500L684M32NLT00	1,600
	1.0						KVF500L105M32NHT00	1,600
	1.5	4.5±0.4	3.2±0.4	2.8	0.7±0.2	1.0	KVF500L155M43NHT00	800
	2.2						KVF500L225M43NHT00	800
	3.3	5.7±0.4	5.0±0.4	2.8	1.0±0.4	2.0	KVF500L335M55NLT00	800
	4.7						KVF500L475M55NHT00	800
	6.8			3.2			KVF500L685M55NHT00	800
100	0.033	3.2±0.3	1.6±0.2	1.8	0.7±0.2	0.3	KVF101L333M31NLT00	3,000
	0.047						KVF101L473M31NLT00	3,000
	0.068						KVF101L683M31NLT00	3,000
	0.1						KVF101L104M31NLT00	3,000
	0.15	3.2±0.4	2.5±0.3	2.6	0.7±0.2	0.5	KVF101L154M32NLT00	1,600
	0.22						KVF101L224M32NLT00	1,600
	0.33						KVF101L334M32NLT00	1,600
	0.47	4.5±0.4	3.2±0.4	2.8	0.7±0.2	1.0	KVF101L474M43NLT00	800
	0.68						KVF101L684M43NLT00	800
	1.0	5.7±0.4	5.0±0.4	2.8	1.0±0.4	2.0	KVF101L105M55NLT00	800
	1.5						KVF101L155M55NLT00	800

※ Please consult with us when you consider the rating other than a standard table.

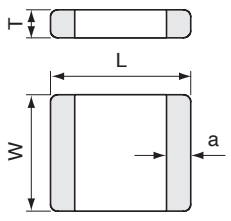
◆PART NUMBERING SYSTEM



Size Code

Size Code	Code	
	JIS	EIA
31	3216	1206
32	3225	1210
43	4532	1812
55	5750	2220
76	7563	3025

◆DIMENSIONS

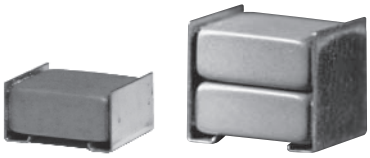


Please refer to"Part Numbering System" of the beginning of a catalog for the details.

METAL CAP TYPE MULTILAYER CERAMIC CAPACITORS

NTJ Series

RoHS2 Compliant



◆FEATURES

1. Small size and large capacitance, high ripple current.
2. Temperature cycle: 1000 cycles.
3. X7R temperature characteristics.
4. Excellent noise absorption.
5. For reflow soldering use.
6. Suitable for aluminum substrate.

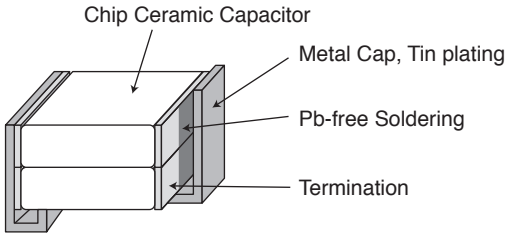
◆APPLICATIONS

1. Smoothing circuit of switching mode AC-DC or DC-DC converter.
2. On-board power supply.
3. Noise suppressor for various kinds of equipments.

◆CUSTOM MADE PRODUCTS

We can offer custom made one element metal cap type capacitors for request of customers.
Please contact us if you have questions for details.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55～+125℃
2. Rated Voltage Range	25, 35, 50, 100, 250Vdc
3. Rated Capacitance Range	1.0 to 100μF
4. Rated Capacitance Tolerance	M(±20%)
5. Temperature Characteristics	X7R
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

No.	Items	Specification	Test Condition
1	Withstand Voltage	No abnormality.	250% of rated voltage shall be applied for 5 seconds. (Only 250Vdc products : 475V)
2	Insulation Resistance	100/CR(MΩ) or 4000(MΩ) whichever is less.	Rated voltage shall be applied for 60±5 seconds at temperature 25±2℃.
3	Rated Capacitance	Within specified tolerance.	<table><tr><td></td><td>CR≦10μF</td><td>CR>10μF</td></tr><tr><td>Temperature</td><td colspan="2">25±2℃</td></tr><tr><td>Frequency</td><td>1±0.1kHz</td><td>120±12Hz</td></tr><tr><td>Voltage</td><td>1±0.2Vrms</td><td>0.5±0.2Vrms</td></tr></table>
4	Dissipation Factor	5.0% maximum	
5	Rated Ripple Current	See STANDARD RATINGS	10kHz～1MHz (sine curve) Ripple voltage Vp shall be less than the rated voltage.

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for Multilayer ceramic capacitors. Please contact us for more information.

NTJ Series

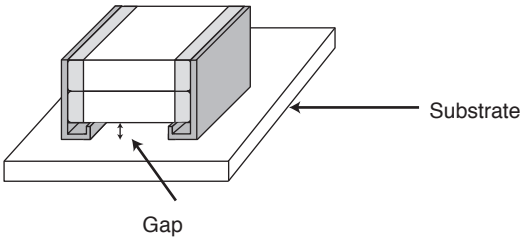
◆SPECIFICATIONS

<table>
<tr><th>No.</th><th>Items</th><th>Specification</th><th>Test Condition</th></tr>
<tr><td>6</td><td>Temperature Cycle</td><td>Appearance : No visible damage.
ΔC/C : ±15%
D.F. : To meet the initial specification.
I.R. : To meet the initial specification.</td><td>
<table>
<tr><th>Step</th><th>Temperature (℃)</th><th>(min.)</th></tr>
<tr><td>1</td><td>Min. Category temperature ±3</td><td>30±3</td></tr>
<tr><td>2</td><td>Room temperature</td><td>3 max.</td></tr>
<tr><td>3</td><td>Max. Category temperature ±3</td><td>30±3</td></tr>
<tr><td>4</td><td>Room temperature</td><td>3 max.</td></tr>
</table>
<Cycle>
1000 cycles</td></tr>
<tr><td>7</td><td>Humidity Load Life</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% max.
I.R. : 25/C_R(MΩ) or 1000(MΩ)
whichever is less.</td><td>Temperature : 40±2℃
Humidity : 90 to 95%RH
Voltage : Rated voltage
Time : 500^{+24}_{0}hours</td></tr>
<tr><td>8</td><td>Endurance</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% max.
I.R. : 50/C_R(MΩ) or 1000(MΩ)
whichever is less.</td><td>Temperature : 125±3℃
Voltage : Rated voltage
Time : 1000^{+48}_{0}hours</td></tr>
</table>

*C_R : Rated Capacitance(μF)

◆Note of mountig for NTJ series.

1. The gap of capacitor and a substrate shall be the mounting face.
2. To prevent degredation of temperature cycling capability, if need to be careful about amount of solder that would not go into the inner side of terminations.



METAL CAP TYPE MULTILAYER CERAMIC CAPACITORS

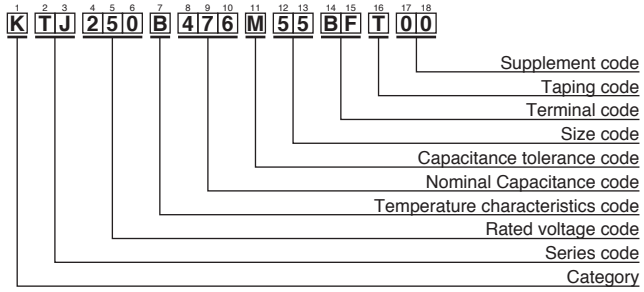
NTJ Series

◆STANDARD RATINGS

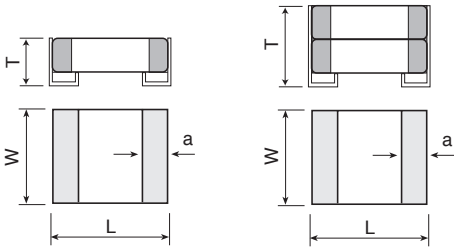
Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions(mm)				Element	Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
		L	W	Tmax.	a				
25	33	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KTJ250B336M55AFT00	400
	33	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KTJ250B336M55BFT00	2,000
	47							KTJ250B476M55BFT00	2,000
	68							KTJ250B686M55BFT00	1,500
	47	7.8±0.5	6.6±0.5	5.5	1.5±0.3	1	3.0	KTJ250B476M76AFT00	1,200
	68	7.8±0.5	6.6±0.5	8.5	1.5±0.3	2	4.0	KTJ250B686M76BFT00	500
	100			9.5				KTJ250B107M76BFT00	400
35	33	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KTJ350B336M55BFT00	2,000
	47							KTJ350B476M55BFT00	2,000
	47	7.8±0.5	6.6±0.5	5.5	1.5±0.3	1	3.0	KTJ350B476M76AFT00	1,200
	68	7.8±0.5	6.6±0.5	8.5	1.5±0.3	2	4.0	KTJ350B686M76BFT00	500
	100							KTJ350B107M76BFT00	500
50	15	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KTJ500B156M55AFT00	400
	15	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KTJ500B156M55BFT00	2,000
	22							KTJ500B226M55BFT00	2,000
	33							KTJ500B336M55BFT00	1,500
	22	7.8±0.5	6.6±0.5	5.5	1.5±0.3	1	3.0	KTJ500B226M76AFT00	1,200
	33	7.8±0.5	6.6±0.5	8.5	1.5±0.3	2	4.0	KTJ500B336M76BFT00	500
	47							KTJ500B476M76BFT00	500
100	4.7	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KTJ101B475M55AFT00	400
	6.8	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KTJ101B685M55BFT00	2,000
	10							KTJ101B106M55BFT00	2,000
	15							KTJ101B156M55BFT00	1,500
	22							KTJ101B226M55BFT00	2,000
	6.8	7.8±0.5	6.6±0.5	5.5	1.5±0.3	1	3.0	KTJ101B685M76AFT00	1,200
	15	7.8±0.5	6.6±0.5	8.5	1.5±0.3	2	4.0	KTJ101B156M76BFT00	500
250	1.0	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KTJ251B105M55AFT00	400
	1.5	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KTJ251B155M55BFT00	2,000
	2.2			6.5				KTJ251B225M55BFT00	2,000
	2.2	7.8±0.5	6.6±0.5	5.5	1.5±0.3	1	3.0	KTJ251B225M76AFT00	1,200
	3.3	7.8±0.5	6.6±0.5	8.5	1.5±0.3	2	3.0	KTJ251B335M76BFT00	500

※ Please consult with us when you consider the rating other than a standard table.

◆PART NUMBERING SYSTEM



◆DIMENSIONS



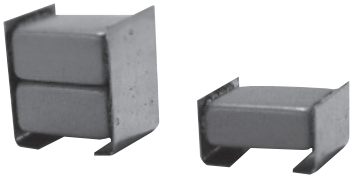
1 Element　　2 Elements

Please refer to"Part Numbering System" of the beginning of a catalog for the details.

METAL CAP TYPE MULTILAYER CERAMIC CAPACITORS

KVJ Series

RoHS2 Compliant | AEC-Q200 | High temperature 150℃



◆FEATURES

1. Automotive grade(AEC-Q200)
2. Small size and large capacitance, high ripple current.
3. Temperature cycle: 1000 cycles.
4. X8L temperature characteristics.
5. For reflow soldering use.
6. Suitable for aluminum substrate.

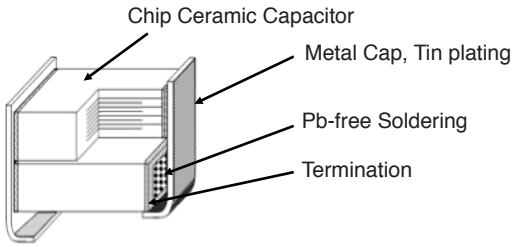
◆APPLICATIONS

1. For automotive equipment
2. Smoothing circuit of switching mode AC-DC or DC-DC converter.
3. On-board power supply.
4. Noise suppressor for various kinds of equipments.

◆CUSTOM MADE PRODUCTS

We can offer custom made one element metal cap type capacitors for request of customers.
Please contact us if you have questions for details.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55～+150℃
2. Rated Voltage Range	25, 50, 100Vdc
3. Rated Capacitance Range	0.68 to 22μF
4. Rated Capacitance Tolerance	M(±20%)
5. Temperature Characteristics	X7R
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

No.	Items	Specification	Test Condition
1	Withstand Voltage	No abnormality.	250% of rated voltage shall be applied for 5 seconds.
2	Insulation Resistance	100/CR(MΩ) or 4000(MΩ) whichever is less.	Rated voltage shall be applied for 60±5 seconds at temperature 25±2℃.
3	Rated Capacitance	Within specified tolerance.	See table below
4	Dissipation Factor	5.0% maximum	
5	Rated Ripple Current	See STANDARD RATINGS	10kHz～1MHz (sine curve) Ripple voltage Vp shall be less than the rated voltage.

	CR≦10μF	CR>10μF
Temperature	25±2℃	
Frequency	1±0.1kHz	120±12Hz
Voltage	1±0.2Vrms	0.5±0.2Vrms

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for Multilayer ceramic capacitors. Please contact us for more information.

KVJ Series

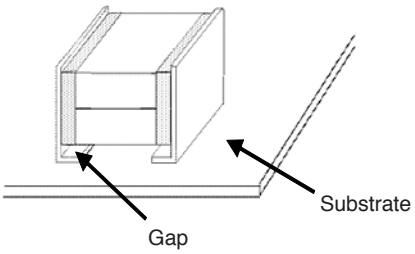
◆SPECIFICATIONS

No.	Items	Specification	Test Condition
6	Temperature Cycle	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification.	<table><tr><th>Step</th><th>Temperature (℃)</th><th>(min.)</th></tr><tr><td>1</td><td>Min. Category temperature ±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>3 max.</td></tr><tr><td>3</td><td>Max. Category temperature ±3</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>3 max.</td></tr></table><Cycle> 1000 cycles
7	Humidity Load Life	Appearance : No abnormality. ΔC/C : ±20% D.F. : 10% max. I.R. : 25/C_R(MΩ) or 1000(MΩ) whichever is less.	Temperature : 85±3℃ Humidity : 80 to 85%RH Voltage : Rated voltage Time : 1000^{+48}_{0}hours
8	Endurance	Appearance : No abnormality. ΔC/C : ±20% D.F. : 10% max. I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less.	Temperature : 150±3℃ Voltage : Rated voltage Time : 1000^{+48}_{0}hours

*C_R : Rated Capacitance(μF)

◆Note of mountig for KVJ series.

1. The gap of capacitor and a substrate shall be the mounting face.
2. To prevent degredation of temperature cycling capability, if need to be careful about amount of solder that would not go into the inner side of terminations.



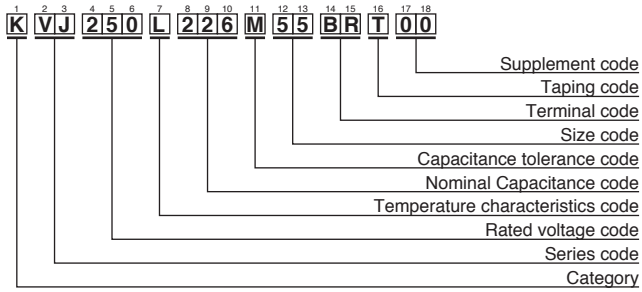
KVJ Series

◆STANDARD RATINGS

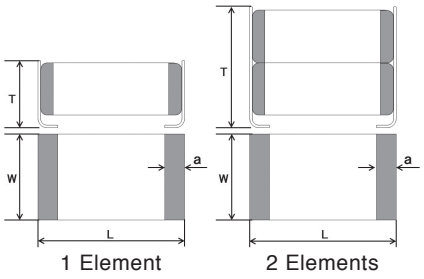
Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions(mm)				Element	Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / reel)
		L	W	Tmax.	a				
25	6.8	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KVJ250L685M55ART00	400
	10	6.0±0.4	5.3±0.4	3.8	1.3±0.3			KVJ250L106M55ART00	400
	15	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KVJ250L156M55BRT00	2,000
	22	6.0±0.4	5.3±0.4	6.0	1.3±0.3			KVJ250L226M55BRT00	2,000
50	2.2	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KVJ500L225M55ART00	400
	3.3	6.0±0.4	5.3±0.4	3.8	1.3±0.3			KVJ500L335M55ART00	400
	4.7	6.0±0.4	5.3±0.4	3.8	1.3±0.3			KVJ500L475M55ART00	400
	6.8	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KVJ500L685M55BRT00	2,000
	10	6.0±0.4	5.3±0.4	6.0	1.3±0.3			KVJ500L106M55BRT00	2,000
100	0.68	6.0±0.4	5.3±0.4	3.8	1.3±0.3	1	2.0	KVJ101L684M55ART00	400
	1.0	6.0±0.4	5.3±0.4	3.8	1.3±0.3			KVJ101L105M55ART00	400
	1.5	6.0±0.4	5.3±0.4	5.5	1.3±0.3	2	3.0	KVJ101L155M55BRT00	2,000
	2.2	6.0±0.4	5.3±0.4	6.0	1.3±0.3			KVJ101L225M55BRT00	2,000

※ Please consult with us when you consider the rating other than a standard table.

◆PART NUMBERING SYSTEM



◆DIMENSIONS

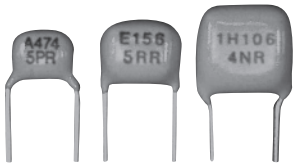


Please refer to"Part Numbering System" of the beginning of a catalog for the details.

DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

NTD Series

RoHS2 Compliant



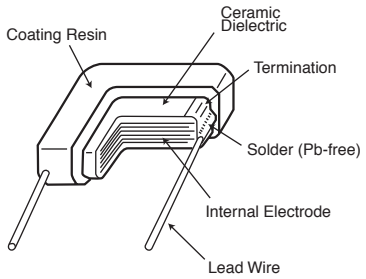
◆FEATURES

1. Small in size and wide capacitance range.
   Max. 470μF is available.
2. Temperature characteristic is X7R in EIA code.
3. Superior humidity characteristic and long life.
4. Excellent high frequency characteristic due to low ESR.
5. High rated ripple current.
6. 250Vdc items are available.
7. Resin(UL94 V-0) used for coating.
8. Pb-free design(also ceramic dielectric)

◆APPLICATIONS

1. Smoothing circuit of switching mode AC-DC or DC-DC converter.
2. Noise suppressor for various kinds of equipments.
3. By-pass or decoupling circuits.
4. Automotive equipments.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55 to +125℃
2. Rated Voltage Range	25, 35, 50, 100, 250, 500Vdc
3. Rated Capacitance Range	0.1 to 470μF
4. Rated Capacitance Tolerance	M(±20%)
5. Temperature Characteristics	X7R
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

<table>
<tr><th>No.</th><th colspan="2">Items</th><th>Specification</th><th>Test Condition</th></tr>
<tr><td>1</td><td rowspan="2">Withstand Voltage</td><td>Between Terminals</td><td rowspan="2">No abnormality.</td><td rowspan="2"><table><tr><td>Rated voltage</td><td>Withstand voltage</td></tr><tr><td>Less than 250V</td><td>250% of rated voltage</td></tr><tr><td>More than 250V
Less than 500V</td><td>100V +
150% of rated voltage</td></tr><tr><td>More than 500V</td><td>130% of rated voltage</td></tr></table>Shall be applied for 5 seconds.</td></tr>
<tr><td></td><td>Terminals to Coating Resin</td></tr>
<tr><td>2</td><td colspan="2">Insulation Resistance</td><td>100/CR(MΩ) or 4000(MΩ) whichever is less.</td><td>Rated voltage shall be applied for 60±5 seconds at temperature 25±2℃.</td></tr>
<tr><td>3</td><td colspan="2">Rated Capacitance</td><td>Within specified tolerance.</td><td rowspan="2"><table><tr><td></td><td>CR≦10μF</td><td>CR>10μF</td></tr><tr><td>Temperature</td><td colspan="2">25±2℃</td></tr><tr><td>Frequency</td><td>1±0.1kHz</td><td>120±12Hz</td></tr><tr><td>Voltage</td><td>1±0.2Vrms</td><td>0.5±0.2Vrms</td></tr></table></td></tr>
<tr><td>4</td><td colspan="2">Dissipation Factor</td><td>5.0% maximum.</td></tr>
</table>

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for Multilayer ceramic capacitors. Please contact us for more information.

NTD Series

◆SPECIFICATIONS

<table>
<tr><th>No.</th><th colspan="2">Items</th><th>Specification</th><th>Test Condition</th></tr>
<tr><td>5</td><td colspan="2">Rated Ripple Current</td><td>See STANDARD RATINGS</td><td>10kHz to 1MHz (sine curve)
Ripple voltage Vp shall be less than the rated voltage.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Robustness of Terminations</td><td>Tension</td><td rowspan="2">No visible damage.</td><td>The force applied shall be :
<table><tr><th>Lead ϕ (mm)</th><th>Tensile(N)</th><th>(sec.)</th></tr><tr><td>0.5 max.</td><td>5</td><td>10±1</td></tr><tr><td>0.6 min.</td><td>10</td><td>10±1</td></tr></table></td></tr>
<tr><td>Bending</td><td><table><tr><th>Lead ϕ (mm)</th><th>Bending(N)</th><th>(kg)</th></tr><tr><td>0.5 max.</td><td>2.5</td><td>0.25</td></tr><tr><td>0.6 min.</td><td>5</td><td>0.51</td></tr></table>Time : 2times.</td></tr>
<tr><td>7</td><td colspan="2">Vibration</td><td>Appearance : No abnormality.
Capacitance : To meet the initial specification.
D.F. : To meet the initial specification.</td><td>Amplitude : 1.5mm
Frequency range : 10-55-10Hz (1 min)
Direction and time :
2 hours each to X, Y, Z axis. Total 6 hours.</td></tr>
<tr><td>8</td><td colspan="2">Solderability</td><td>Min. 75% of surface of the termination shall be covered with new solder.</td><td><table><tr><th>Solder</th><th>Pb Free</th></tr><tr><td>Solder Temperature</td><td>245±5℃</td></tr><tr><td>Dipping Time</td><td>2±0.5sec.</td></tr></table></td></tr>
<tr><td>9</td><td colspan="2">Resistance to Soldering Heat</td><td>Appearance : No abnormality.
ΔC/C : ±15%
D.F. : To meet the initial specification.
I.R. : To meet the initial specification.</td><td>Solder Temperature : 350±10℃
Dipping Time : 3±0.5 sec.
Depth : 1.5 to 2mm</td></tr>
<tr><td>10</td><td colspan="2">Temperature Cycle</td><td>Appearance : No abnormality.
ΔC/C : ±15%
D.F. : To meet the initial specification.
I.R. : To meet the initial specification.</td><td><table><tr><th>Step</th><th>Temperature (℃)</th><th>(min.)</th></tr><tr><td>1</td><td>Min. Category temperature ±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>3 max.</td></tr><tr><td>3</td><td>Max. Category temperature ±3</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>3 max.</td></tr></table>For 5 cycles for above temperature cycle.</td></tr>
<tr><td>11</td><td colspan="2">Humidity Load Life</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% maximum
I.R. : 25/C_R(MΩ) or 1000(MΩ) whichever is less.</td><td>Temperature : 40±2℃
Humidity : 90 to 95%RH
Voltage : Rated voltage
Time : 500$^{+24}_{0}$ hours</td></tr>
<tr><td>12</td><td colspan="2">Endurance</td><td>Appearance : No abnormality.
ΔC/C : ±20%
D.F. : 10% maximum
I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less.</td><td>Temperature : 125±3℃
Voltage : Rated voltage
Time : 1000$^{+48}_{0}$ hours</td></tr>
</table>

*C_R : Rated Capacitance(μF)

DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

NTD Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions (mm)					Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / box)
		Lmax.	Wmax.	Tmax.	F±0.8	φd±0.05			
25	3.3	5.0	6.0	3.5	5.0	0.5	0.3	KTD250B335M32A0T00	2,000
	4.7							KTD250B475M32A0T00	2,000
	6.8	6.5	6.5	4.0	5.0	0.5	0.8	KTD250B685M43A0T00	2,000
	10							KTD250B106M43A0T00	2,000
	15							KTD250B156M43A0T00	2,000
	15	7.5	9.0	4.5	5.0	0.5	1.0	KTD250B156M55A0T00	2,000
	22							KTD250B226M55A0T00	2,000
	33							KTD250B336M55A0T00	2,000
	47	10.0	11.5	5.5	5.0	0.5	1.5	KTD250B476M76A0T00	1,000
	68	13.5	15.0	6.0	10.0	0.6	2.0	KTD250B686M80A0B00	—
	100			8.0				KTD250B107M80A0B00	—
	150	22.5	20.0	6.0	20.0	0.8	3.0	KTD250B157M90A0B00	—
	220			8.0				KTD250B227M90A0B00	—
	330	28.5	20.0	8.0	25.0	0.8	4.0	KTD250B337M99A0B00	—
	470			11.5				KTD250B477M99A0B00	—
35	3.3	5.0	6.0	3.5	5.0	0.5	0.3	KTD350B335M32A0T00	2,000
	4.7							KTD350B475M32A0T00	2,000
	6.8	6.5	6.5	4.0	5.0	0.5	0.8	KTD350B685M43A0T00	2,000
	10							KTD350B106M43A0T00	2,000
	15	7.5	9.0	4.5	5.0	0.5	1.0	KTD350B156M55A0T00	2,000
	22							KTD350B226M55A0T00	2,000
	33	10.0	11.5	5.0	5.0	0.5	1.5	KTD350B336M76A0T00	1,000
	47			5.5				KTD350B476M76A0T00	1,000
50	1.0	5.0	6.0	3.5	5.0	0.5	0.3	KTD500B105M32A0T00	2,000
	1.5							KTD500B155M32A0T00	2,000
	2.2							KTD500B225M32A0T00	2,000
	3.3							KTD500B335M32A0T00	2,000
	4.7	6.5	6.5	4.0	5.0	0.5	0.8	KTD500B475M43A0T00	2,000
	6.8							KTD500B685M43A0T00	2,000
	10	7.5	9.0	4.5	5.0	0.5	1.0	KTD500B106M55A0T00	2,000
	15							KTD500B156M55A0T00	2,000
	22	10.0	11.5	5.0	5.0	0.5	1.5	KTD500B226M76A0T00	1,000
	33	13.5	15.0	5.5	10.0	0.6	2.0	KTD500B336M80A0B00	—
	47	22.5	20.0	6.0	20.0	0.8	3.0	KTD500B476M90A0B00	—
	68							KTD500B686M90A0B00	—
	100			7.0				KTD500B107M90A0B00	—
	150	28.5	20.0	7.5	25.0	0.8	4.0	KTD500B157M99A0B00	—
	220			10.0				KTD500B227M99A0B00	—
100	0.33	5.0	6.0	3.5	5.0	0.5	0.3	KTD101B334M32A0T00	2,000
	0.47							KTD101B474M32A0T00	2,000
	0.68							KTD101B684M32A0T00	2,000
	1.0							KTD101B105M32A0T00	2,000
	1.5							KTD101B155M32A0T00	2,000
	2.2							KTD101B225M32A0T00	2,000
	1.5	6.5	6.5	4.0	5.0	0.5	0.8	KTD101B155M43A0T00	2,000
	2.2							KTD101B225M43A0T00	2,000
	3.3							KTD101B335M43A0T00	2,000
	4.7							KTD101B475M43A0T00	2,000
	3.3	7.5	9.0	4.5	5.0	0.5	1.0	KTD101B335M55A0T00	2,000
	4.7							KTD101B475M55A0T00	2,000
	6.8			4.7				KTD101B685M55A0T00	2,000
	6.8	10.0	11.5	5.0	5.0	0.5	1.5	KTD101B685M76A0T00	1,000
	10	13.5	15.0	5.0	10.0	0.6	2.0	KTD101B106M80A0B00	—
	15			6.0				KTD101B156M80A0B00	—
	22	22.5	20.0	6.0	20.0	0.8	3.0	KTD101B226M90A0B00	—
	33							KTD101B336M90A0B00	—
	47	28.5	20.0	7.5	25.0	0.8	4.0	KTD101B476M99A0B00	—
	68							KTD101B686M99A0B00	—
	100			9.0				KTD101B107M99A0B00	—

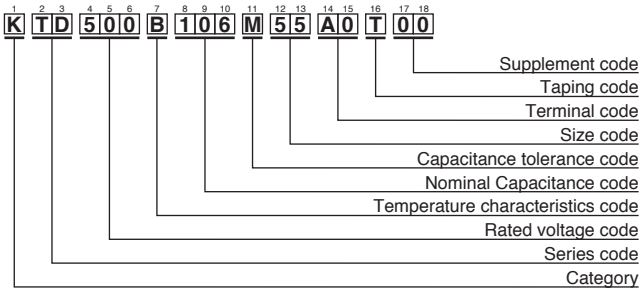
DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

NTD Series

250	0.1	5.0	6.0	3.5	5.0	0.5	0.3	KTD251B104M32A0T00	2,000
	0.15							KTD251B154M32A0T00	2,000
	0.22							KTD251B224M32A0T00	2,000
	0.33							KTD251B334M32A0T00	2,000
	0.47	6.5	6.5	4.0	5.0	0.5	0.8	KTD251B474M43A0T00	2,000
	0.68							KTD251B684M43A0T00	2,000
	1.0	7.5	9.0	4.5	5.0	0.5	1.0	KTD251B105M55A0T00	2,000
	1.5							KTD251B155M55A0T00	2,000
	2.2	10.0	11.5	6.0	5.0	0.5	1.5	KTD251B225M76A0T00	1,000
	2.2	13.5	15.0	5.0	10.0	0.6	2.0	KTD251B225M80A0B00	—
	3.3	22.5	20.0	6.0	20.0	0.8	3.0	KTD251B335M90A0B00	—
	4.7							KTD251B475M90A0B00	—
	6.8	28.5	20.0	7.5	25.0	0.8	4.0	KTD251B685M99A0B00	—
	10							KTD251B106M99A0B00	—
	15							KTD251B156M99A0B00	—
500	0.47	7.5	9.0	3.5	5.0	0.5	0.8	KTD501B474M55A0T00	2,000
	0.56							KTD501B564M55A0T00	2,000
	0.68	10.0	11.5	3.4	5.0	0.5	1.0	KTD501B684M76A0T00	1,500
	1.0			3.8				KTD501B105M76A0T00	1,500
	1.2			4.2				KTD501B125M76A0T00	1,500

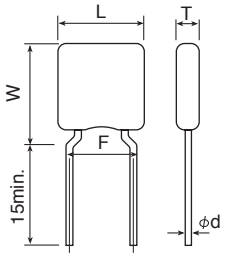
※Please consult with us when you consider the rating other than a standard table.

◆PART NUMBERING SYSTEM

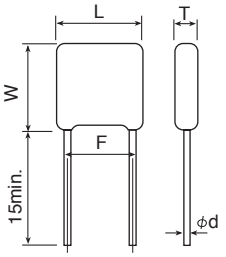


◆DIMENSIONS

Crimped lead
32 to 76 Size



Straight lead
For all size



Please refer to"Part Numbering System" of the beginning of a catalog for the details.

DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

KVD Series

RoHS2 Compliant | AEC-Q200 | High temperature 150°C

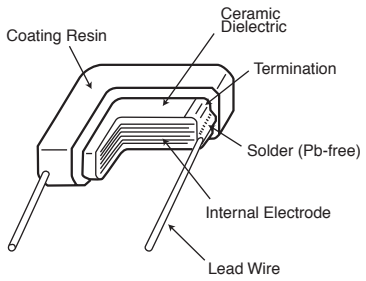
◆FEATURES

1. Temperature range : -55 to +150°C
2. Temperature characteristic : X8L
3. Small in size and wide capacitance range.
   Max. 15μF is available.
4. Epoxy resin(UL94 V-0)used for coating.
5. Automotive grade(AEC-Q200)

◆APPLICATIONS

1. Noise fillter for automotive equipment(ECU etc.)
2. Equipment used in a high temperature environment

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55～+150°C
2. Rated Voltage Range	25, 50, 100 Vdc
3. Rated Capacitance Range	0.1～15μF
4. Rated Capacitance Tolerance	M(±20%)
5. Temperature Characteristics	X8L
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

No.	Items		Specification	Test Condition
1	Withstand Voltage	Between Terminals	No abnormality.	250% of rated voltage shall be applied for 5 seconds. (Only 250Vdc products : 475V)
		Terminals to Coating Resin		
2	Insulation Resistance		100/CR(MΩ) or 4000(MΩ) whichever is less.	Rated voltage shall be applied for 60±5 seconds at temperature 25±2℃.
3	Rated Capacitance		Within specified tolerance.	See table below
4	Dissipation Factor		5.0% maximum.	See table below

	CR≦10μF	CR>10μF
Temperature	25±2℃	
Frequency	1±0.1kHz	120±12Hz
Voltage	1±0.2Vrms	0.5±0.2Vrms

As customer requirement, Chemi-Con has submits the test results according to AEC-Q200 for Multilayer ceramic capacitors. Please contact us for more information.

DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

KVD Series

◆SPECIFICATIONS

No.	Items	Specification	Test Condition
5	Rated Ripple Current	<table><tr><td>Size code</td><td>32</td><td>43</td><td>55</td></tr><tr><td>Arms</td><td>0.3</td><td>0.8</td><td>1.0</td></tr></table>	10kHz to 1MHz (sine curve) Ripple voltage Vp shall be less than the rated voltage. The surface temperature of MLCC must not exceed the maximum category temperature when the ripple current is applied.
6	High Temperature Exposure(Storage)	Appearance : No structural damage such as cracks ΔC/C : ±20% D.F. : 10% maximum I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less.	Temperature : Max. category temperature±3°C Time : 1000 $\pm^{48}_{0}$ hours
7	Temperature Cycle	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification.	<table><tr><td>Step</td><td>Temperature(°C)</td><td>(min)</td></tr><tr><td>1</td><td>Min Category temperature ±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>3 max.</td></tr><tr><td>3</td><td>Max. Category temperature ±3</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>3 max.</td></tr></table>For 1000 cycles
8	Biased Humidity	Appearance : No abnormality. ΔC/C : ±20% D.F. : 10% maximum I.R. : 25/C_R(MΩ) or 1000(MΩ) whichever is less.	Temperature : 85°C±3°C Humidity : 80 ~ 85%RH Voltage : Rated voltage Time : 1000 $\pm^{48}_{0}$ hours
9	Operational Life	Appearance : No structural damage such as cracks ΔC/C : ±20% D.F. : 10% maximum I.R. : 50/C_R(MΩ) or 1000(MΩ) whichever is less.	Temperature : Max. category temperature±3°C Voltage : Rated voltage Time : 1000 $\pm^{48}_{0}$ hours
10	Terminal Strength (Leaded) — Tension	No visible damage.	The force applied shall be : <table><tr><td>Lead φ(mm)</td><td>Tensile(N)</td><td>(sec.)</td></tr><tr><td>0.5 max.</td><td>5</td><td>10±1</td></tr></table>
	Terminal Strength (Leaded) — Bending		<table><tr><td>Lead φ(mm)</td><td>Bending(N)</td><td>(kg)</td></tr><tr><td>0.5 max.</td><td>2.5</td><td>0.25</td></tr></table>Time : 2times.
11	Mechanical Shock	Appearance : No abnormality. ΔC/C : To meet the initial specification. D.F. : To meet the initial specification.	MIL-STD-202 Method 213 Condition C Peak value : 100G Normal duration : 6 ms Velocity change : 12.3 ft/sec(3.8m/s) Direction and time : 3 times each in X,Y, Z axis. Total 18 times
12	Vibration	Appearance : No abnormality. ΔC/C : To meet the initial specification. D.F. : To meet the initial specification.	MIL-STD-202 Method 204 Test condition : 5G peak Amplitude : 1.5mm max. Frequency : 10-2000-10Hz(20 minute) Direction and time : 12 times each in X,Y, Z axis. Total 36 times
13	Resistance to Soldering Heat	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification.	Solder temp. : 260±5°C Dipping Time : 10±1s Depth : 1.5 to 2mm
14	ESD	Appearance : No abnormality. ΔC/C : To meet the initial specification. D.F. : To meet the initial specification. I.R. : To meet the initial specification.	AEC-Q200-002 Connection : Between terminals Direct Contact : 8kV(150pF 2000Ω) Times : ±1time
15	Solderability	Min. 75% of surface of the termination shall be covered with new solder.	<table><tr><td>Solder</td><td>Pb Free</td></tr><tr><td>Solder Temperature</td><td>245±5°C</td></tr><tr><td>Dipping Time</td><td>2±0.5s</td></tr></table>

*CR : Rated Capacitance(μF)

DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

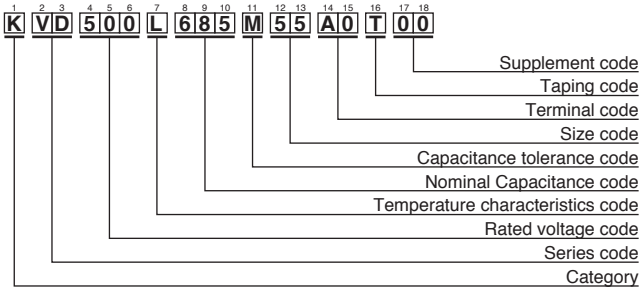
KVD Series

◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions(mm)					Maximum ripple current (Arms)	Part Number	Taping Quantity per reel (pcs. / box)
		L max.	W max.	T max.	F±0.8	φd±0.05			
25	1.0	5.0	6.0	3.5	5.0	0.5	0.3	KVD250L105M32A0T00	2,000
	1.5							KVD250L155M32A0T00	2,000
	2.2							KVD250L225M32A0T00	2,000
	3.3							KVD250L335M32A0T00	2,000
	4.7	6.5	6.5	4.0	5.0	0.5	0.8	KVD250L475M43A0T00	2,000
	6.8							KVD250L685M43A0T00	2,000
	10	7.5	9.0	4.5	5.0	0.5	1.0	KVD250L106M55A0T00	2,000
	15							KVD250L156M55A0T00	2,000
50	0.33	5.0	6.0	3.5	5.0	0.5	0.3	KVD500L334M32A0T00	2,000
	0.47							KVD500L474M32A0T00	2,000
	0.68							KVD500L684M32A0T00	2,000
	1.0							KVD500L105M32A0T00	2,000
	1.5	6.5	6.5	4.0	5.0	0.5	0.8	KVD500L155M43A0T00	2,000
	2.2							KVD500L225M43A0T00	2,000
	3.3	7.5	9.0	4.5	5.0	0.5	1.0	KVD500L335M55A0T00	2,000
	4.7							KVD500L475M55A0T00	2,000
	6.8			4.7				KVD500L685M55A0T00	2,000
100	0.1	5.0	6.0	3.5	5.0	0.5	0.3	KVD101L104M32A0T00	2,000
	0.15							KVD101L154M32A0T00	2,000
	0.22							KVD101L224M32A0T00	2,000
	0.33							KVD101L334M32A0T00	2,000
	0.47	6.5	6.5	4.0	5.0	0.5	0.8	KVD101L474M43A0T00	2,000
	0.68							KVD101L684M43A0T00	2,000
	1.0	7.5	9.0	4.5	5.0	0.5	1.0	KVD101L105M55A0T00	2,000
	1.5							KVD101L155M55A0T00	2,000

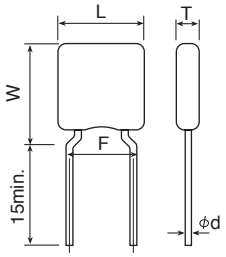
※ Please consult with us when you consider the rating other than a standard table.

◆PART NUMBERING SYSTEM

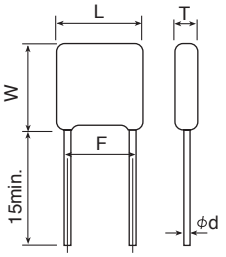


◆DIMENSIONS

Crimped lead



Straight lead

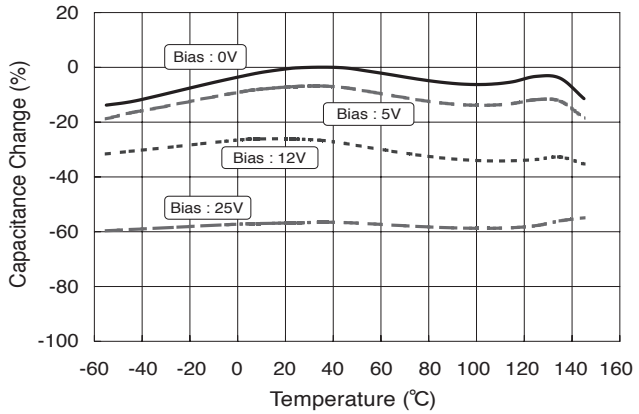


Please refer to"Part Numbering System" of the beginning of a catalog for the details.

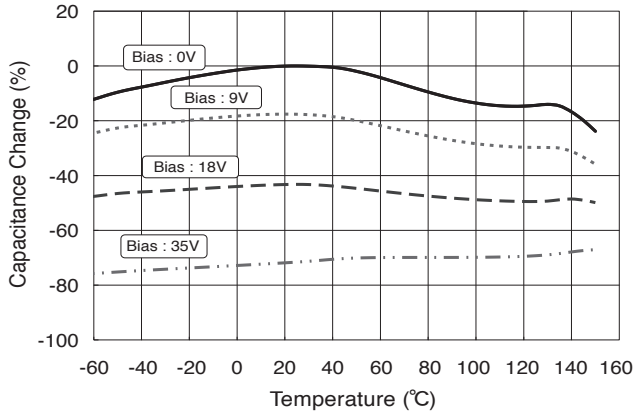
CHARACTERISTICS DATA

◆Temperature and DC voltage Characteristics

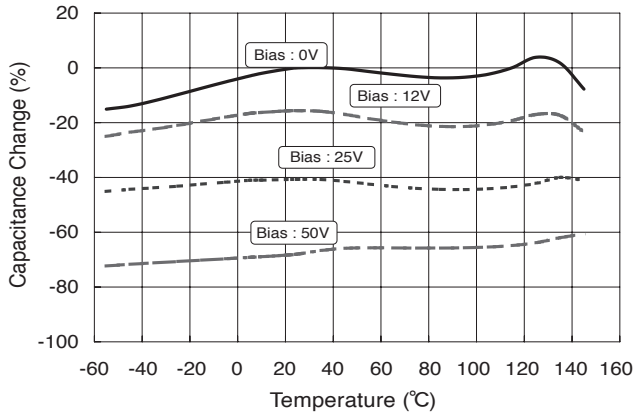
●NTS/NTF/NTD/NTJ series (X7R)　25V



●NTS/NTF/NTD/NTJ series (X7R)　35V

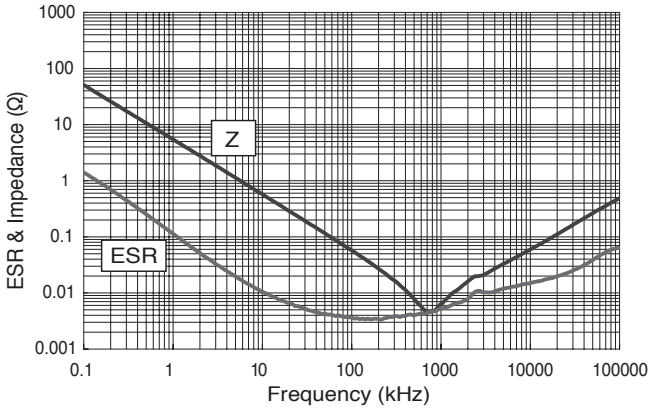


●NTS/NTF/NTD/NTJ series (X7R)　50V

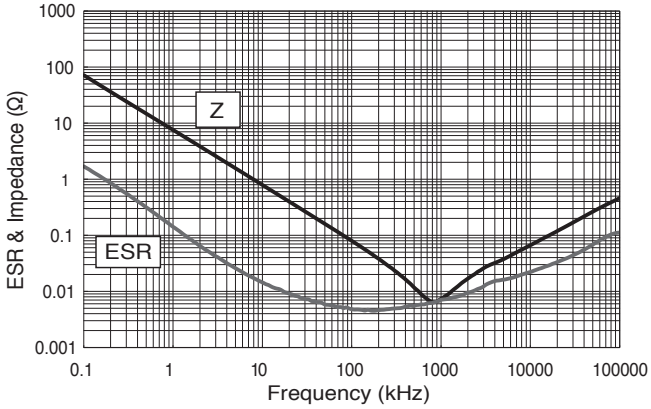


◆Frequency Characteristics

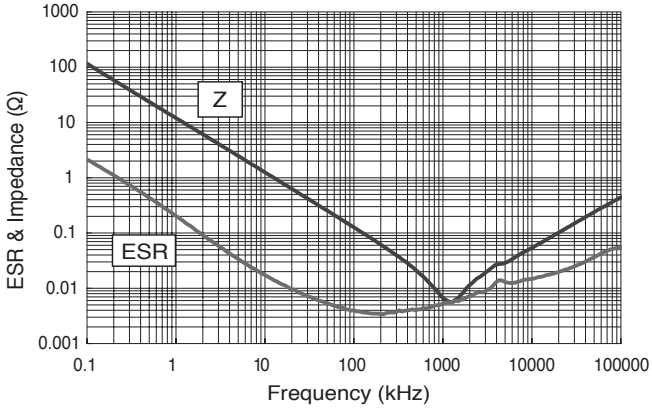
●NTS Series　25V/33μF



●NTS Series　35V／22μF



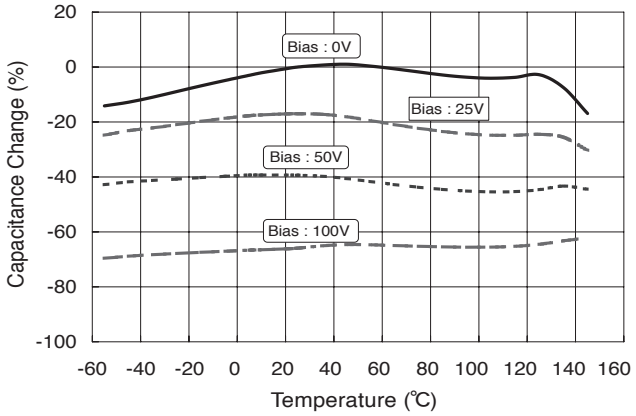
●NTS Series　50V/15μF



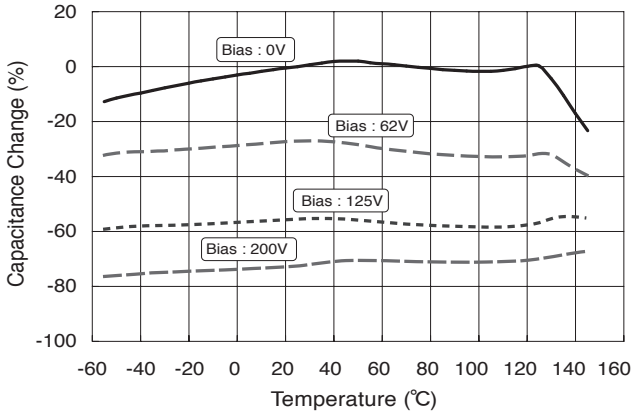
CHARACTERISTICS DATA

◆Temperature and DC voltage Characteristics

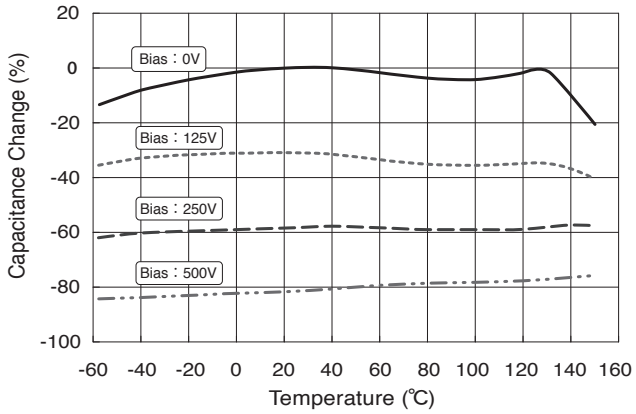
●NTS/NTF/NTD/NTJ series (X7R)　100V



●NTS/NTF/NTD/NTJ series (X7R)　250V

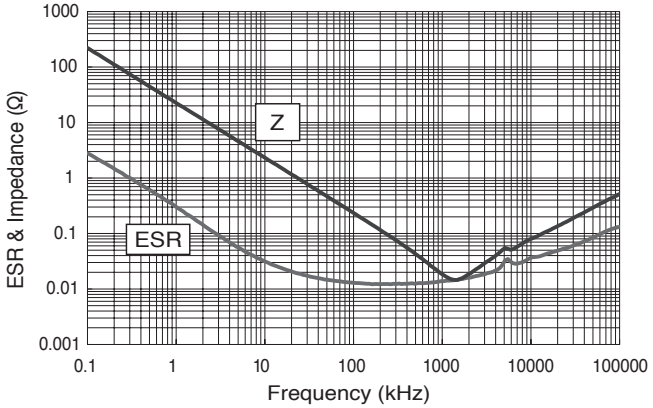


●NTS/NTF/NTD/NTJ Series (X7R)　500V

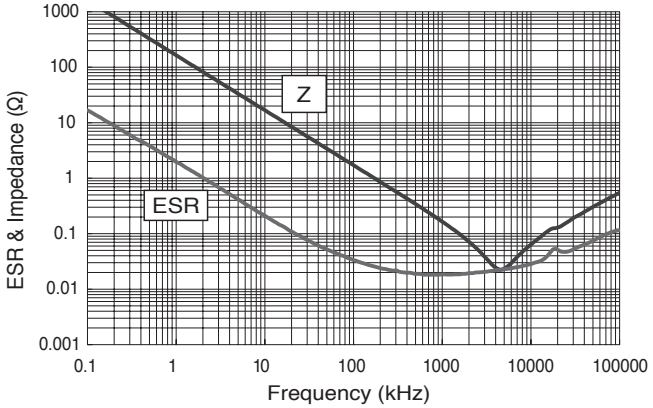


◆Frequency Characteristics

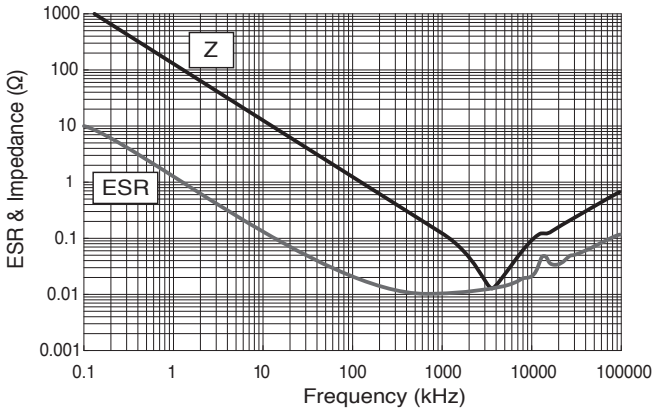
●NTS Series　100V/6.8μF



●NTS Series　250V/1.0μF



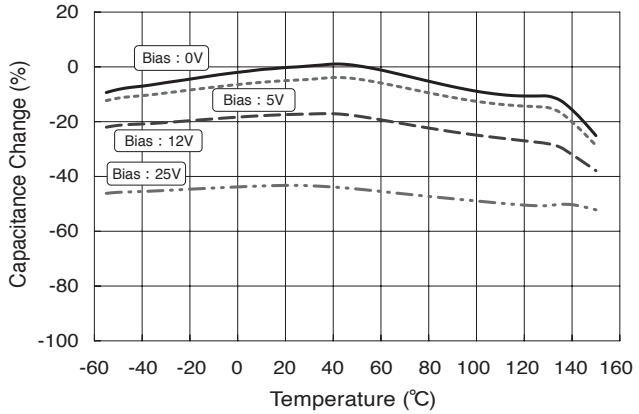
●NTS Series (X7R)　500V/1.2μF



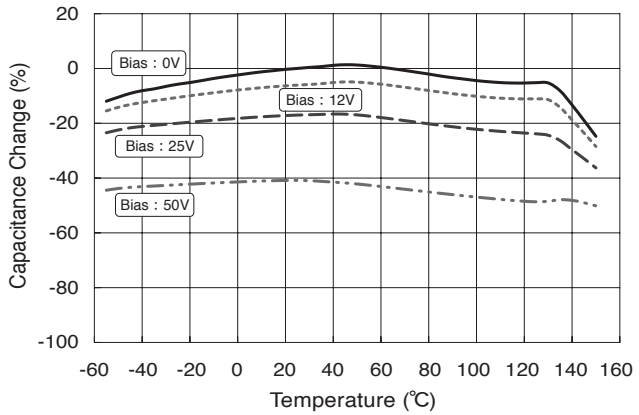
CHARACTERISTICS DATA

◆Temperature and DC voltage Characteristics

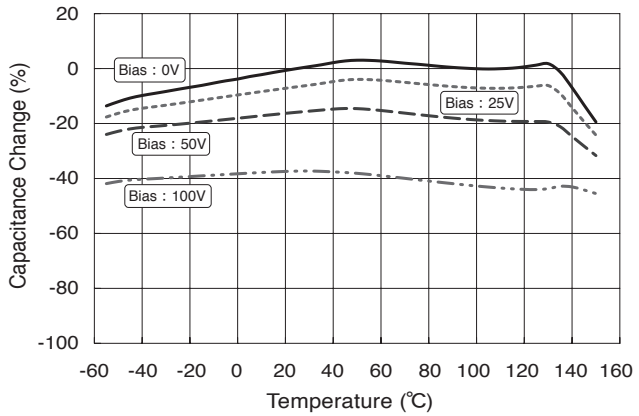
●KVF/KVD series (X8L)　25V



●KVF/KVD series (X8L)　50V

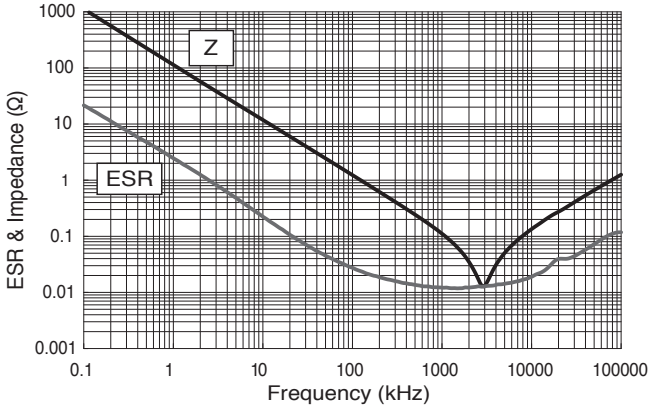


●KVF/KVD series (X8L)　100V

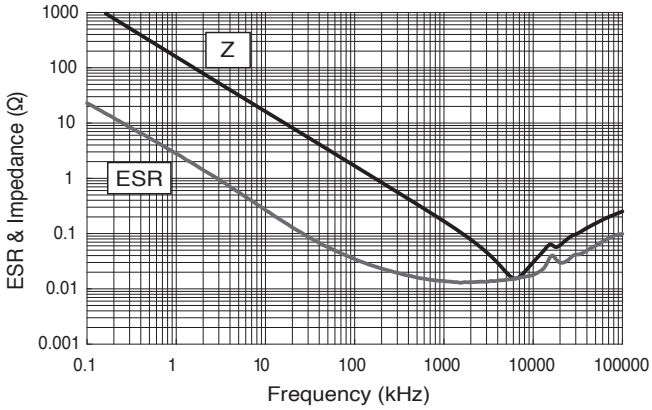


◆Frequency Characteristics

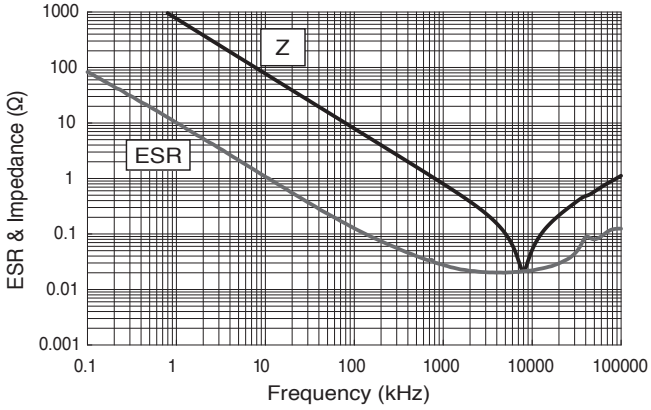
●KVF Series　25V/1.5μF

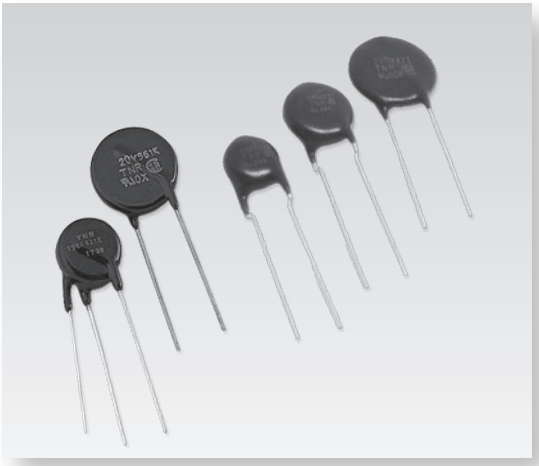


●KVF Series　50V/1.0μF



●KVF Series　100V/0.22μF





METAL OXIDE VARISTOR TNR™

Item	Series	Features	Page
Disk Type	V Series	Very Large Surge Capability	57
	SV Series	Non flammable and Little Scatter Type Very Large Surge Capability	78
	H Series	High Energy Low Voltage	89
	GF Series	Disk Type with Thermal Fuse	93

All the series mentioned above is RoHS2 compliant products.

The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems.
We are not in any case responsible for any failures or damage caused by the use of information contained herein.
You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.
Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event any of our products malfunction.

1 The performance of varistors may deteriorate, the inside elements may be damaged, and they cause the varistors to smoke or catch fire, if the following precautions are not observed.

(1) Do not use varistors in places whose temperature exceeds their rated operating temperature due to direct sunlight or heating objects.
(2) Do not use varistors in a humid place directly exposed to the weather or steam.
(3) Do not use varistors in places filled with dust, salt-mist or corrosive gas.
(4) The soldering method is flow soldering and iron soldering. The recommended conditions are as follows.
- Flow soldering : Pre-heat 100±20°C, 60 to 90 sec., Soldering 260±5°C, 10±1sec.
- Iron soldering : 350±10°C, less than 4sec.

(5) Do not use solvents such as thinner and acetone which dissolve or make the exterior covering of varistors deteriorate.
Ultrasonic cleaning shall be so set that the vibration can not travel the assembly boards.
(6) Do not expose varistors to intense vibration, shock (drop shock etc.) or pressure making the exterior covering or inside element crack.
(7) Do not apply high voltage exceeding the rated maximum applying voltage to varistors.
In the case of automotive jump starts, however, use the varistors within short-term allowable voltage limits prescribed in the catalog.
If voltage wave form is not complete DC, a maximum value of peak voltages shall not exceed the rated maximum applying voltage.
(8) Do not apply peak currents exceeding the rated maximum energy.
(9) When peak currents are repeatedly applied to varistors, do not exceed the pulse life time ratings prescribed in the catalog.
(10) When peak currents are intermittently applied to varistors at short intervals, do not exceed the rated wattage.
(11) Using varistors in circuits whose frequency exceeds 1kHz may damage their elements by heat generation due to dielectric loss.
(12) In the case of coating or molding varistors with resin, do not use the resin which makes the varistors deteriorate.
(13) Do not install varistors in places near by flammable substances.

2 Varistors may blow up, if the following precautions are not observed.

(1) Do not use varistors in circuits applied peak currents exceeding the specified limits.
(2) Do not exceed the rated maximum applying voltage.

3 Varistors do not function but damages devices, if the following precautions are not observed.

(1) Hold the root of the varistor lead when bending or cutting the lead.
(2) The lead close to insulation cover shall not be bent or applied to outer force.
(3) When soldering the lead, do not damage a solder material and insulator fabricating the varistor.

4 The following preventive measures should be made for avoiding unexpected accident.

(1) When using a varistor in between circuits, connect an earth leakage breaker (ground-fault circuit interrupter) or current fuse in series with the varistor.
(2) When using a varistor in between a circuit and ground, connect an earth leakage breaker (ground-fault circuit interrupter) or both of a current fuse and thermal fuse in series with the varistor. Also, in case of excessive voltage due to ground short circuit accident, use the varistor with the rated voltage higher than the excessive voltage.

5 Store varistors at a temperature of –10 to + 40°C and a relative humidity of less than 75%.

Avoid storing in environment of rapid changes in temperature, direct sunlight, corrosive gas or dust, and store with the varistors packaged and use within 1 year.
Please confirm soldering of the lead wire with the product stored in a long time in more than 1 year.

6 Follow safety standards such as Electrical, UL, CSA and so forth, which specify the use of varistors.

7 Catalogs

Product specifications in this catalog are subject to change without notice.
Please request and make sure our product specifications before purchase and/or use.
Parformance test data in the catalogs show typical values, which are not assured in the catalogs.

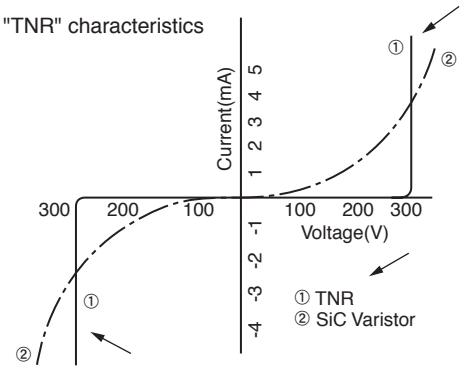
8 Response to the Substances of Concern

(1) Nippon Chemi-Con aims for developing products that meet laws and regulations concerning substances of concern.
(Some products may contain regulated substances for exempted application.)
Please contact us for more information about law-compliance status.
(2) According to the content of REACH handbook (Guidance on requirements for substances in articles which is published on May 2008), our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for EU REACH Regulation Article 7 (1).
Reference: Electrolytic Condenser Investigation Society
"Study of REACH Regulation in EU about Electrolytic Capacitor" (publicized on 13 March 2008)

TNR is a "NEW" metal oxide varistor having steep non-linear V-I characteristics and high discharge current capability, as follows:

◆TNR Features

1. Excellent transient voltage suppression
2. High discharge current capability
3. Wide range of voltage ratings
4. Symmetrical V-I characteristics (Non Polarity)
5. Fast response
6. Steady operation for repeating surge
7. Low temperature coefficient
8. High reliability
9. UL recognized
10. CSA recognized

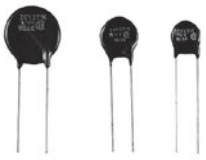


◆Applications

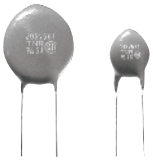
1. Electronics instrument protection
2. Telephone system protection
3. Relay contact point protection
4. Rectification diode protection
5. SCR protection
6. Reduction of abnormal voltage in high voltage current
7. Switching transistor proteciton
8. Reduction of switching surge in electromagnetic brake
9. Prevention of error in digital circuit
10. Reduction of noise from an abnormal voltage

◆Group Chart

V Series



SV Series



H Series

GF Series

◆Part Numbering System

The current parts numbering system is changed to new system for global coding.
Your cooperation will be very much appreciated.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T	N	D	1	4	V	–	2	7	1	K	B						

Design Code
Lead Forming / Taping
Packing Style⑥
Varistor Volt. Tolerance⑤
Varistor Voltage④
Series③
Size code
Product Form②
Category①

①Category	
T	Metal Oxide Varistors TNR

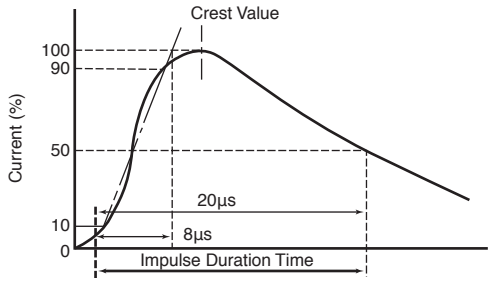
②Product Form	
ND	Disk Type
NL	Sleeve Type

③Series	
V–	V Series

④Varistor Voltage
The first two digits are significant figures and the third one denotes the number of following zeros.

⑤Varistor Volt. Tolerance	
K	±10%

⑥Packing Style	
B	Bulk
T	Taping

Technical Term	Description
Varistor Voltage	Voltage across the varistor measured at CmA DC. C = 0.1 or 1.0 as specified.
Max. Allowable Voltage (ACrms)	Maximum continuous sinusoidal RMS voltage which may be applied.
Max. Allowable Voltage (DC)	Maximum continuous DC voltage which may be applied.
Maximum Clamping Voltage	Peak voltage across the varistor, measured under conditions of a specified peak impulse current and specified waveform (8/20μs) applied 1 time.
Rated Wattage	Maximum power that can be applied within the specified ambient temperature.
Maximum Peak Current	Maximum current within the ±10% varistor voltage change with standard impulse current (8/20μs) applied 1 time.
Current Wave Form for Clamping Voltage Test and Maximum Peak Current	
Energy	Maximum energy within the ±10% varistor voltage change when 1 impulse τ msec long is applied. τ = 2 or 20 ms as specified.
Capacitance	Typical value measured at a 1kHz test frequency. (Sin wave. Reference purpose only)

SAFETY STANDARDS for V Series

◆TNR V Series / Recognized safety standards

Standards	Category Name	Title	File No.	Varistor Voltage Ranges	Symbol
UL1449	VZCA2 (USA) VZCA8 (Canada)	Surge Protective Devices	E323623	82～1800 V	○
CSA C22.2 No.269.5-17 Class 2213 31	-----	Type 5-Component Surge Protective Devices(SPD), Varistor Type V Series	LR-97864	200～1800 V	☆
VDE	-----	Varistor DIN EN 61051-1:2009-04 IEC 61051-1:2007-04 61051-2:1991-01 61051-2(ed.1);am1:2009-05 61051-2-2:1991-01	118623	15～1800 V	□
CQC	-----	GB/T10193, GB/T10194 GB4943.1, GB8898	(1)	82～1800 V	◇

Note(1) File number of CQC varies according to a part number. Pleasee refer to us.

Recognized Part numbers

Rating	Varistor voltage (V)	Part Number							
		TND05V-***K	TND07V-***K	TND09V-***K	TND10V-***K	TND10V-***KS	TND12V-***K	TND14V-***K	TND20V-***K
820K	82	○ □	○ □	○ □	○ □ ◇			○ □ ◇	○ □ ◇
101K	100	○ □	○ □	○ □	○ □ ◇			○ □ ◇	○ □ ◇
121K	120	○ □	○ □	○ □	○ □ ◇			○ □ ◇	○ □ ◇
151K	150	○ □	○ □	○ □	○ □ ◇			○ □ ◇	○ □ ◇
181K	180	○ □	○ □	○ □	○ □ ◇			○ □ ◇	○ □ ◇
201K	200	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
221K	220	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
241K	240	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
271K	270	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
331K	330	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
361K	360	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
391K	390	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
431K	430	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇		○ ☆ ■ ◇	○ ☆ ■ ◇	○ ☆ ■ ◇
471K	470	○ ☆ □	○ ☆ □	○ ☆ □	○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
511K	510		○ ☆ □	○ ☆ □	○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
561K	560				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
621K	620				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
681K	680				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
751K	750				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
821K	820				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
911K	910				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
102K	1000				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
112K	1100				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
122K	1200				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
152K	1500				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
182K	1800				○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆

"***K" or "***KS": Ratings

○ : UL1449, ☆ : CSA, □ : VDE, ■ : VDE and IEC 62368-1:2014 G.8.2
◇ : CQC(GB/T10193, GB/T10194), ◆ : CQC(GB/T10193, GB/T10194, GB4943.1, GB8898)

*Recognized marking

UL, CSA : on the products VDE, CQC: on the package label

*The safety standards may be changed without a notice. Please refer for the latest certificate to us.
Please refer to each certification organization for the inquiry about the contents of the safety standards.

◆The AC Rated Voltage and Maximum Allowable Voltage

Rating	Maximum Allowable Voltage		AC Rated Voltage (Vrms)	
	ACrms (V)	DC (V)	UL1449	CSA
820K	50	65	45	N/A
101K	60	85	55	N/A
121K	75	100	68	N/A
151K	95	125	86	N/A
181K	110	145	100	N/A
201K	130	170	118	118
221K	140	180	127	127
241K	150	200	136	136
271K	175	225	159	159
331K	210	270	189	189
361K	230	300	209	209
391K	250	320	227	227
431K	275	350	250	250
471K	300	385	272	272
511K	320	410	286	286
561K	350	460	318	318
621K	385	505	350	350
681K	420	560	381	381
751K	460	615	418	418
821K	510	670	463	463
911K	550	745	500	500
102K	625	825	568	568
112K	680	895	600	600
122K	720	980	600	600
152K	860	1220	600	600
182K	1000	1465	600	600

◆Application Notes

1) CSA regulate "Maximum Rating Fuse" for using TNR to "Audio, Video and Similar Electronic Equipment" as below

Maximum Peak Current 8/20μs, 1 time(A)	Type of TNR	Maximum Rating of Fuse (A)
Up to 500		3
501～2000	TND05V, TND07V	5
2001～6000	TND09V, TND10V, TND12V, TND14V	10
Over 6000	TND20V	Not specified

2) "Rated Voltages" are specified for UL/CSA recognized components besides Maximum Allowable Voltage because of conforming to the Standby Current specified in safety standards.
In case of making an application to UL/CSA approval for equipment with TNR, the maximum AC operating voltage of equipment shall be lower than the TNR Rated Voltage.

SAFETY STANDARDS for SV Series

◆TNR SV Series / Recognized safety standards

Standards	Category Name	Title	File No.	Varistor Voltage Ranges	Symbol
UL1449	VZCA2 (USA) VZCA8 (Canada)	Surge Protective Devices	E323623	SV : 220～1000 V	○
CSA C22.2 No.269.5-17 Class 2213 31	-----	Type 5-Component Surge Protective Devices(SPD), Varistor Type SV Series	LR-97864	SV : 220～1000 V	☆
VDE	-----	Varistor DIN EN 61051-1:2009-04 IEC 61051-1:2007-04 61051-2:1991-01 61051-2(ed.1);am1:2009-05 61051-2-2:1991-01	118623	SV : 220～1000 V	□
CQC	-----	GB/T10193, GB/T10194 GB4943.1, GB8898	(1)	SV : 220～1000 V	◇

Note(1) File number of CQC varies according to a part number. Pleasee refer to us.

Recognized Part numbers

Rating	Varistor voltage (V)	Part number					
		TND07SV***K	TND10SV***K	TND10SV***KS	TND12SV***K	TND14SV***K	TND20SV***K
221K	220	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
241K	240	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
271K	270	○ ☆ □	○ ☆ □ ◇			○ ☆ ■ ◇	○ ☆ ■ ◇
431K	430	○ ☆ □	○ ☆ □ ◇		○ ☆ ■ ◇	○ ☆ ■ ◇	○ ☆ ■ ◇
471K	470	○ ☆ □	○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
511K	510	○ ☆ □	○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
561K	560		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
621K	620		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
681K	680		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
751K	750		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
821K	820		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
911K	910		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆
102K	1000		○ ☆ □ ◇	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆	○ ☆ ■ ◆

"***K" or "***KS": Ratings

○ : UL1449, ☆ : CSA, □ : VDE, ■ : VDE and IEC 62368-1:2014 G.8.2
◇ : CQC(GB/T10193, GB/T10194), ◆ : CQC(GB/T10193, GB/T10194, GB4943.1, GB8898)

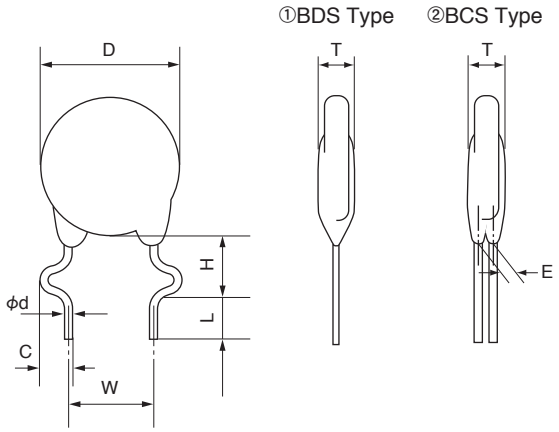
*Recognized marking

UL, CSA : on the products VDE, CQC: on the package label

*The safety standards may be changed without a notice. Please refer for the latest certificate to us.
Please refer to each certification organization for the inquiry about the contents of the safety standards.

●This Specifies the lead forming specifications for Disk Type (V, H series)

◆FORM



◆DIMENSIONS

Unit : mm

Type	5V, 7V, 9V, 9H	10V, 12V, 14V, 12H, 15H	20V, 23H
Lead style code	BDS	BCS	BCS
D	refer to each spec.	refer to each spec.	refer to each spec.
T	refer to each spec.	refer to each spec.	refer to each spec.
H	$6.0^{+2.0}_{-1.0}$	$6.0^{+2.0}_{-1.0}$	$6.0^{+2.0}_{-1.0}$
L	5.0±1.0	5.0±1.0	5.0±1.0
W	5.0±1.0	7.5±1.0	10.0±1.0
φd	0.6±0.05	0.8±0.05	0.8±0.05
C	2.0±0.5	2.0±0.5	2.0±0.5
E	—	refer to each spec.	refer to each spec.

◆PART NUMBERING SYSTEM (BULK)

Code	Category
T	Metal Oxyde Varistor TNR

Code	Product Form
ND	Disk Type

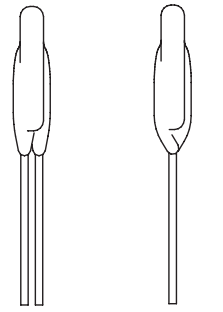
Varistor Voltage
The first two digits are sighificant figures and the third one denote the number of following zeros.

1	2 3	4 5	6 7	8 9 10	11	12 13 14	15 16 17 18
T	N D	1 2	V -	4 7 1	K	B 0 0	A A A 0
Category	Product Form	Size	Series	Varistor Voltage	Varistor Voltage Tolerance	Bulk Forming Code	Design code

Code	Size
05	φ5
07	φ7
09	φ9
10	φ10
12	φ12
14	φ14
15	φ15
20	φ20
23	φ23

Code	Series
V-	V Series
SV	SV Series
H-	H Series
GF	GF Series

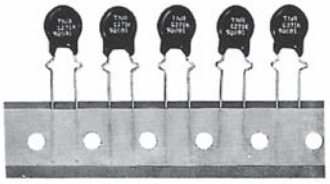
Code	Varistor Volt. Tolerance
K	±10%



Code	Type	Lead Style
BDS (300)	5V,7V,9V,9H	Crimped (Form-B)
B00 (None)		Straight (Form-B)
BCS (300)	10V,12V,14V,20V, 12H,15H,23H	Crimped (Form-A)
B00 (None)		Straight (Form-A)

Note : The Code (300) is the Previous Code.

●This Specifies taping specifications for TNR varistors which have normal disk diameter of 5 to 15mm and nominal varistor voltage of 15 to 510V.



◆PART NUMBERING SYSTEM

Code	Category
T	Metal Oxyde Varistor TNR

Code	Product Form
ND	Disk Type

Varistor Voltage
The first two digits are sighificant figures and the third one denote the number of following zeros.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T	N	D	1	2	V	-	4	7	1	K	T	F	A	A	A	A	0
Category	Product Form		Size		Series		Varistor Voltage			Varistor Voltage Tolerance	Taping Code			Design code			

Code	Size
05	φ5
07	φ7
09	φ9
10	φ10
12	φ12
14	φ14
15	φ15

Code	Series
V-	V Series
H-	H Series

Code	Varistor Volt. Tolerance
K	±10%

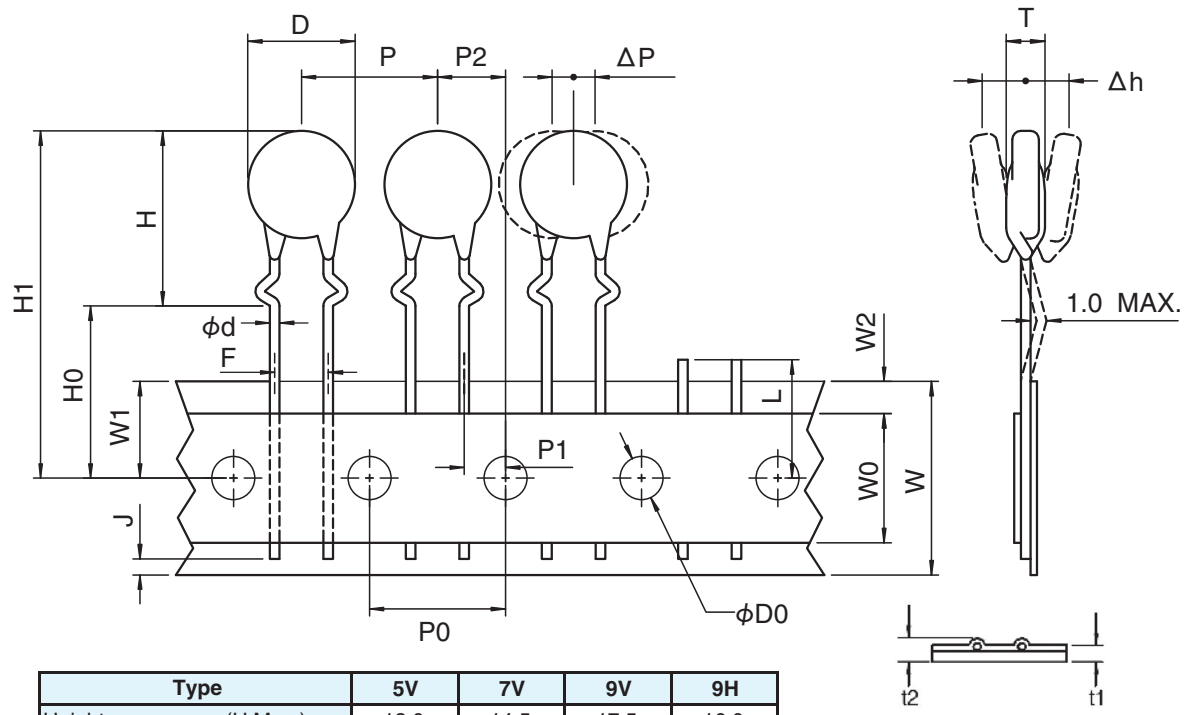
Form-A

Form-B (Parallel)

Feed hole pitch 12.7mm Code	Feed hole pitch 15.0mm Code	Type	Lead Style
TFA (T15)	—	5V,7V,9V,9H	Crimped (Form-B)
TBA (T25)	—		Straight (Form-B)
TEA (T1)	—	10V,12V,14V	Crimped (Form-A)
TFA (T15)	TFB (T8)		Crimped (Form-B)
TAA (T2)	—		Straight (Form-A)
TBA (T25)	TBB (T7)		Straight (Form-B)
TEA (T1)	—	12H,15H	Crimped (Form-A)
TFA (T15)	—		Crimped (Form-B)
TAA (T2)	—		Straight (Form-A)
TBA (T25)	—		Straight (Form-B)

Note : The Code (T1,T15,T2,T25,T8,T7) are the old taping code.

◆5V, 7V, 9V, 9H : TYPE TFA(T15) (Crimped Lead)

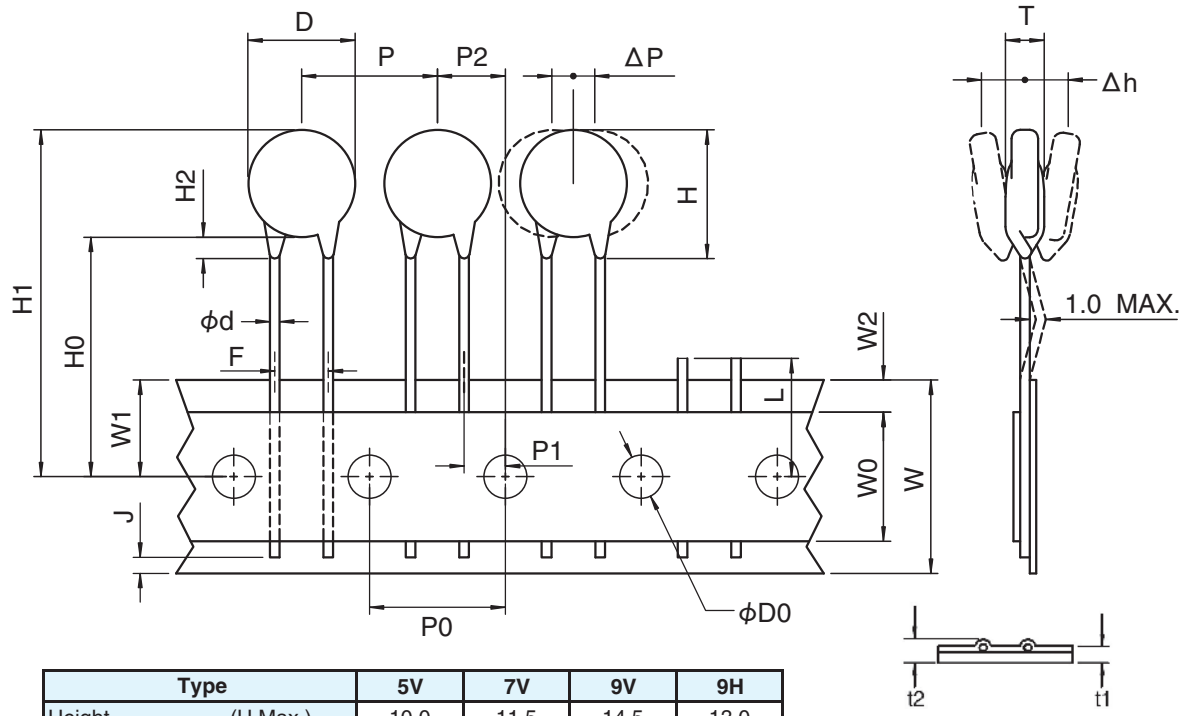


Type	5V	7V	9V	9H
Height (H Max.)	13.0	14.5	17.5	16.0
Component Height (H1 Max.)	30.0	31.0	34.0	33.0

◆TYPE TFA(T15)

Parameter	Code	Dimensions (mm)	Note
Diameter of component	D	—	Refer to the applicable detail spec
Thickness of component	T	—	Refer to the applicable detail spec
Lead diameter	φd	0.6±0.05	
Pitch of component	P	12.7±1.0	
Feed hole pitch	P0	12.7±0.3	Cumulative pitch error : ±1 mm/20 pitches
Feed hole diameter	φD0	4.0±0.2	
Feed hole center to lead	P1	3.85±0.7	Measured at the upper end of tape
Feed hole center to component center	P2	6.35±1.3	
Feed hole position	W1	9.0±0.5	
Lead spacing	F	5.0±0.8	
Deviation across tape	Δh	0±2.0	
Deviation along tape	ΔP	0±1.0	
Carrier tape width	W	$18.0\pm^{1.0}_{0.5}$	
Hold down tape width	W0	5.0 Min.	
Tape thickness	t1	0.6±0.3	
Total tape thickness	t2	1.5 Max.	
Hold down tape position	W2	3.0 Max.	
Seating plane height	H0	16.0±0.5	
Component height	H1	—	Please refer to the above list
Lead position	J	6.0 Max.	
Defective article cut position	L	11.0 Max.	

◆ 5V, 7V, 9V, 9H : TYPE TBA(T25) (Straight Lead)

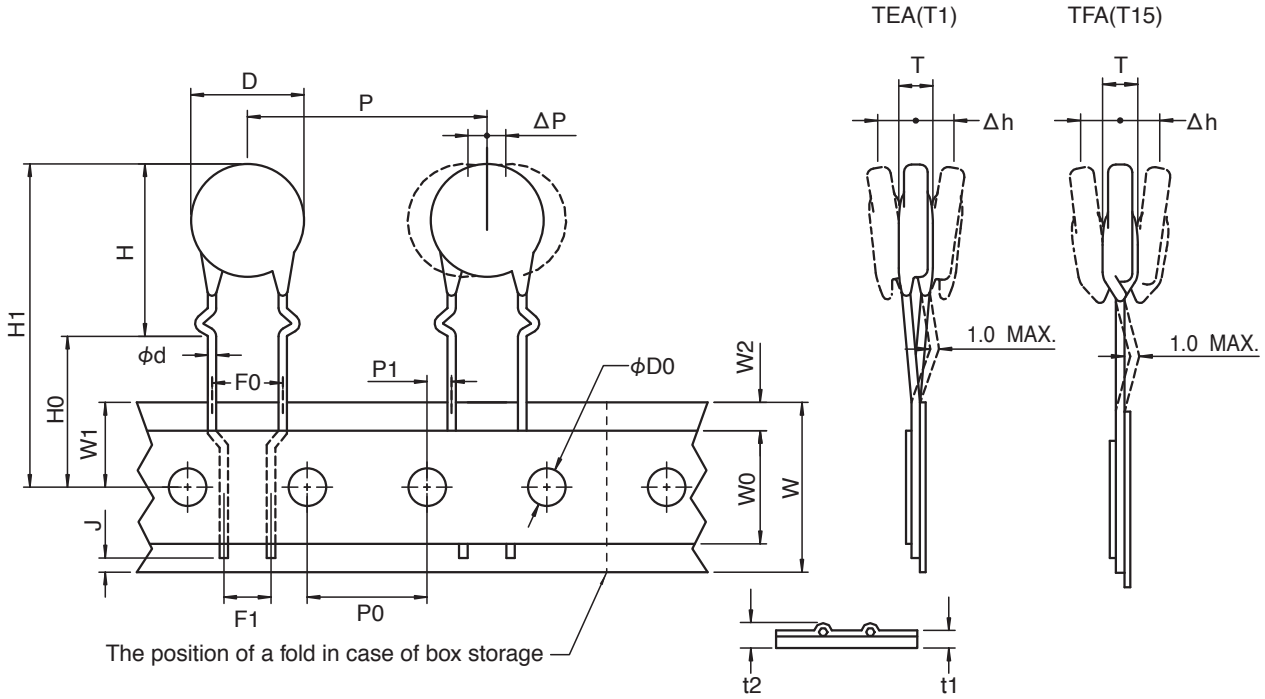


Type	5V	7V	9V	9H
Height (H Max.)	10.0	11.5	14.5	13.0
Component Height (H1 Max.)	29.0	30.0	33.0	32.0

◆TYPE TBA(T25)

Parameter	Code	Dimensions (mm)	Note
Diameter of component	D	—	Refer to the applicable detail spec
Thickness of component	T	—	Refer to the applicable detail spec
Lead diameter	φd	0.6±0.05	
Pitch of component	P	12.7±1.0	
Feed hole pitch	P0	12.7±0.3	Cumulative pitch error : ±1 mm/20 pitches
Feed hole diameter	φD0	4.0±0.2	
Feed hole center to lead	P1	3.85±0.7	Measured at the upper end of tape
Feed hole center to component center	P2	6.35±1.3	
Feed hole position	W1	9.0±0.5	
Lead spacing	F	5.0±0.8	
Deviation across tape	Δh	0±2.0	9V : 34.0 Max.
Deviation along tape	ΔP	0±1.0	
Carrier tape width	W	$18.0\pm^{1.0}_{0.5}$	
Hold down tape width	W0	5.0 Min.	
Tape thickness	t1	0.6±0.3	
Total tape thickness	t2	1.5 Max.	
Hold down tape position	W2	3.0 Max.	
Height from tape center to component base	H0	$20.0\pm^{1.5}_{1.0}$	
Component height	H1	—	Please refer to the above list
	H2	3.0 Max.	
Lead position	J	6.0 Max.	
Defective article cut position	L	11.0 Max.	

◆10V, 12V, 14V, 12H, 15H : TYPE TEA(T1), TFA(T15) (Crimped Lead)

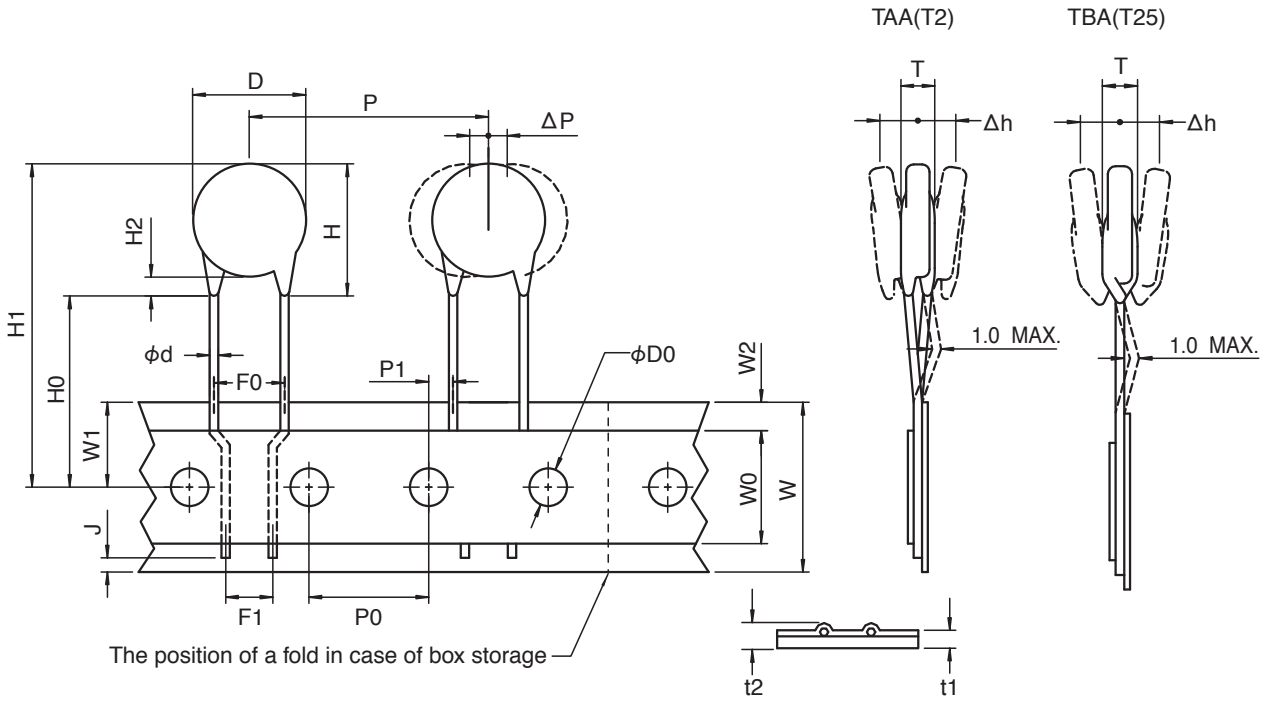


Type	10V	12V	14V	12H	15H
Height (H Max.)	17.5	19.0	21.0	21.0	24.0
Component Height (H1 Max.)	35.0	36.0	38.0	38.0	41.0

◆TYPE TEA(T1), TFA(T15)

Parameter	Code	Dimensions (mm)	Note
Diameter of component	D	—	Refer to the applicable detail spec
Thickness of component	T	—	Refer to the applicable detail spec
Lead diameter	ϕd	0.8±0.05	
Pitch of component	P	25.4±1.0	
Feed hole pitch	P0	12.7±0.3	Cumulative pitch error : ±1 mm/20 pitches
Feed hole diameter	ϕD0	4.0±0.2	
Feed hole center to lead	P1	2.6±0.5	Measured at the upper end of tape
Feed hole position	W1	9.0±0.5	
Lead spacing	F0	7.5±0.8	
	F1	5.0 Nom.	
Deviation across tape	Δh	0±2.0	
Deviation along tape	ΔP	0±1.0	
Carrier tape width	W	$18.0^{+1.0}_{-0.5}$	
Hold down tape width	W0	5.0 Min.	
Tape thickness	t1	0.6±0.3	
Total tape thickness	t2	1.5 Max.	
Hold down tape position	W2	3.0 Max.	
Seating plane height	H0	16.0±1.0	
Component height	H1	—	Please refer to the above list
Lead position	J	6.0 Max.	

◆10V, 12V, 14V, 12H, 15H : TYPE TAA(T2), TBA(T25) (Straight Lead)

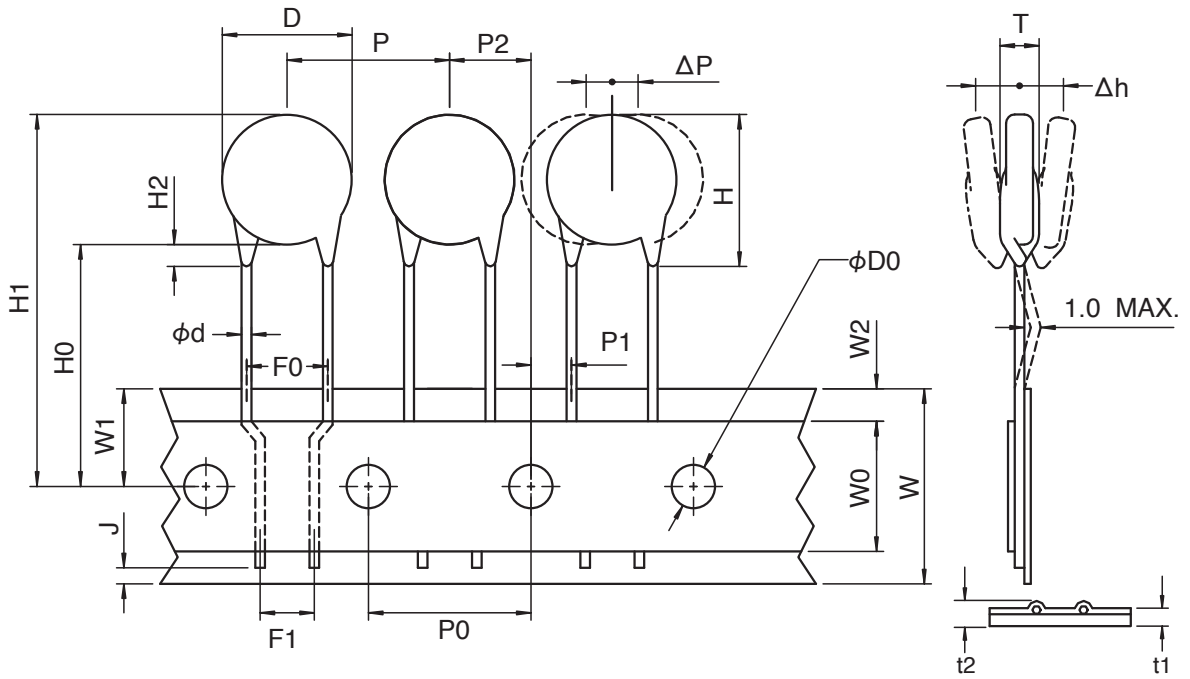


Type	10V	12V	14V	12H	15H
Height (H Max.)	15.5	17.0	19.0	16.5	19.0
Component Height (H1 Max.)	40.0	41.0	43.0	41.0	44.0

◆TYPE TAA(T2), TBA(T25)

Parameter	Code	Dimensions (mm)	Note
Diameter of component	D	—	Refer to the applicable detail spec
Thickness of component	T	—	Refer to the applicable detail spec
Lead diameter	ϕd	0.8±0.05	
Pitch of component	P	25.4±1.0	
Feed hole pitch	P0	12.7±0.3	Cumulative pitch error : ±1 mm/20 pitches
Feed hole diameter	ϕD0	4.0±0.2	
Feed hole center to lead	P1	2.6±0.5	Measured at the upper end of tape
Feed hole position	W1	9.0±0.5	
Lead spacing	F0	7.5±0.8	
	F1	5.0 Nom.	
Deviation across tape	Δh	0±2.0	
Deviation along tape	ΔP	0±1.0	
Carrier tape width	W	$18.0^{+1.0}_{-0.5}$	
Hold down tape width	W0	5.0 Min.	
Tape thickness	t1	0.6±0.3	
Total tape thickness	t2	1.5 Max.	
Hold down tape position	W2	3.0 Max.	
Height from tape center to component base	H0	20.0 Min.	SE : 19.0 Min.
Component height	H1	—	Please refer to the above list
	H2	3.0 Max.	
Lead position	J	6.0 Max.	

◆10V, 12V, 14V : TYPE TBB(T7) (Straight Lead, 15mm Pitch)

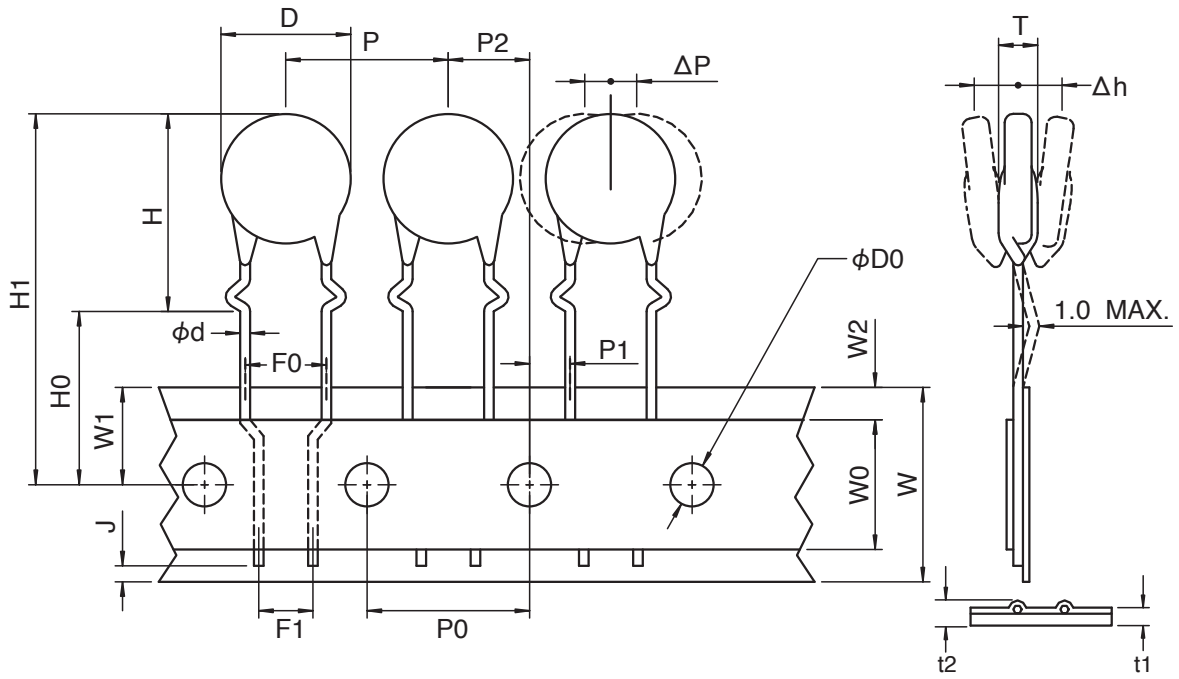


Type	10V	12V	14V
Height (H Max.)	15.5	17.0	19.0
Component Height (H1 Max.)	37.0	39.0	41.0

◆TYPE TBB(T7)

Parameter	Code	Dimensions (mm)	Note
Diameter of component	D	—	Refer to the applicable detail spec (14V : 15.0 Max.)
Thickness of component	T	—	Refer to the applicable detail spec
Lead diameter	φd	0.8±0.05	
Pitch of component	P	15.0±1.0	14SE : 30.0 ±1.0 mm
Feed hole pitch	P0	15.0±0.3	Cumulative pitch error : ±1 mm/20 pitches
Feed hole diameter	φD0	4.0±0.2	
Feed hole center to lead	P1	3.75±0.5	Measured at the upper end of tape
Feed hole center to component center	P2	7.5±1.3	
Feed hole position	W1	9.0±0.5	
Lead spacing	F0	7.5±0.8	
	F1	5.0 Nom.	
Deviation across tape	Δh	0±2.0	
Deviation along tape	ΔP	0±1.3	
Carrier tape width	W	$18.0\pm^{1.0}_{0.5}$	
Hold down tape width	W0	5.0 Min.	
Tape thickness	t1	0.6±0.3	
Total tape thickness	t2	1.5 Max.	
Hold down tape position	W2	3.0 Max.	
Height from tape center to component base	H0	$20.0\pm^{1.5}_{1.0}$	
Component height	H1	—	Please refer to above list
	H2	3.0 Max.	
Lead position	J	6.0 Max.	

◆10V, 12V, 14V : TYPE TFB(T8) (Crimped Lead, 15mm Pitch)

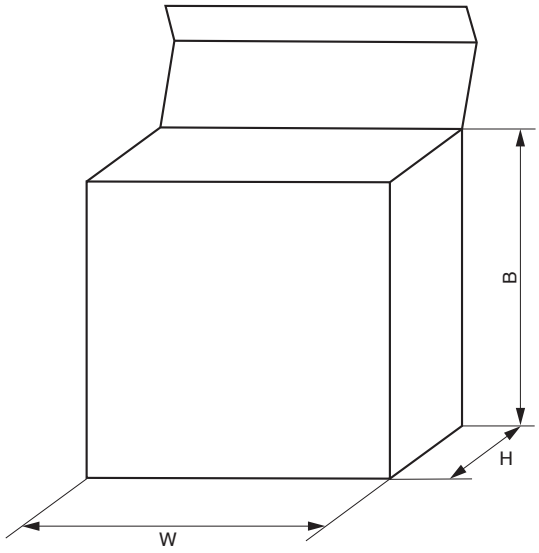


Type	10V	12V	14V
Height (H Max.)	17.5	19.0	21.0
Component Height (H1 Max.)	35.0	36.0	38.0

◆TYPE TFB(T8)

Parameter	Code	Dimensions (mm)	Note
Diameter of component	D	—	Refer to the applicable detail spec (14V : 15.0 Max.)
Thickness of component	T	—	Refer to the applicable detail spec
Lead diameter	ϕd	0.8±0.05	
Pitch of component	P	15.0±1.0	14SE : 30.0±1.0 mm
Feed hole pitch	P0	15.0±0.3	Cumulative pitch error : ±1 mm/20 pitches
Feed hole diameter	ϕD0	4.0±0.2	
Feed hole center to lead	P1	3.75±0.5	Measured at the upper end of tape
Feed hole center to component center	P2	7.5±1.3	
Feed hole position	W1	9.0±0.5	
Lead spacing	F0	7.5±0.8	
	F1	5.0 Nom.	
Deviation across tape	Δh	0±2.0	
Deviation along tape	ΔP	0±1.3	
Carrier tape width	W	$18.0\pm^{1.0}_{0.5}$	
Hold down tape width	W0	5.0 Min.	
Tape thickness	t1	0.6±0.3	
Total tape thickness	t2	1.5 Max.	
Hold down tape position	W2	3.0 Max.	
Seating plane height	H	—	10V ; 17.5 Max. 14V ; 21.0 Max.
	H0	16.0±1.0	
Component height	H1	—	Please refer to above list
Lead position	J	6.0 Max.	

◆Packaging

	Box			
Configuration				
Dimensions (mm)		TFA, TBA (T15, T25)	TEA, TFA, TAA, TBA (T1, T15, T2, T25)	TFB, TBB, TLB (T8, T7, T71)
		5V, 7V, 9V, 9H	10V, 12V, 14V, 12H, 15H	10V, 12V, 10SV, 12SV, 14SV
	W	325±5	330±5	340 max.
	H	47±3	57±3	65 max.
	B	280±10	315±10	360 max.

◆Others

1) On the box or the reel, the following are noted.
   1. Part number
   2. Lot number
   3. Quantity
   4. Country of origin
2) Minimum order quantity shall be the packaging quantity per one box one reel.

Minimum Packaging Quantity

Please order by units of minimum packaging quantity.

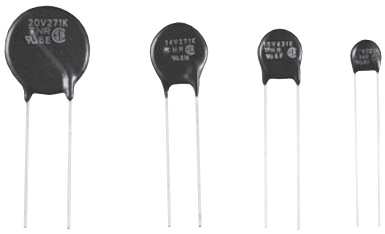
◆Disk Type

Series	Type	Varistor Voltage Range (V)	Taping Type		Bulk Type	
			Feed hole pitch (mm)	(pcs)	Straight Lead (pcs/bag)	Formed/Cut Lead (pcs/bag)
V	5V, 7V	15 to 270	12.7	1,500	3,000	5,000
		330 to 620	12.7	1,000	3,000	5,000
	9V	15 to 270	12.7	1,500	2,000	5,000
		330 to 620	12.7	1,000	2,000	5,000
	10V	18 to 270	12.7	800	1,500	2,500
			15.0	1,000		
		330 to 390	12.7	500	1,500	2,500
			15.0	1,000		
		430 to 620	12.7	500	1,000	2,500
			15.0	1,000		
		680 to 750	–	–	1,000	2,500
		820 to 1000	–	–	1,000	2,000
		1100 to 1800	–	–	500	1,000
	12V	430 to 620	12.7	500	1,000	2,500
			15.0	1,000		
		680 to 750	–	–	1,000	2,500
		820 to 1000	–	–	1,000	2,000
		1100 to 1800	–	–	500	500
	14V	18 to 270	12.7	800	1,500	2,000
			15.0	1,000		
		330 to 390	12.7	500	1,500	2,000
			15.0	1,000		
		430 to 620	12.7	500	1,000	2,000
			15.0	1,000		
		680 to 750	–	–	1,000	2,000
		820 to 1000	–	–	1,000	1,500
		1100 to 1200	–	–	500	500
		1500 to 1800	–	–	500	500
	20V	18 to 430	–	–	700	1,000
		470 to 620	–	–	500	1,000
		680 to 1100	–	–	500	500
		1200	–	–	500	500
		1500 to 1800	–	–	200	500
SV	10SV	220 to 680	15.0	500	–	–
	12SV	430 to 680	15.0	500	–	–
	14SV	220 to 680	15.0	300	–	–
	20SV	220 to 390	–	–	700	700
		430 to 680	–	–	500	500
SV (22 to 68V)	5SV	22 to 68	12.7	1,500	–	–
	7SV	22 to 68	12.7	1,500	–	–
	10SV	22 to 68	12.7	800	–	–
	14SV	22 to 68	12.7	800	–	–
	20SV	22 to 68	–	–	700	700
H	9H	22 to 47	12.7	1,500	3,000	5,000
	12H	22 to 47	12.7	800	1,500	2,500
	15H	22 to 47	12.7	800	1,500	2,000
	23H	22 to 47	–	–	700	1,000
GF	15GF	All Voltage range	–	–	800	–
	23GF	270 to 470	–	–	500	–
		820	–	–	400	–

Metal Oxide Varistors TNR™ Disk Type

V Series

RoHS2 Compliant



◆FEATURES

- ●Large surge capability (the surge current ratings of TNR V series, by 8/20 μs, are about two times larger than TNR G series).
- ●Large energy capability (1.5 time larger than TNR G series).
- ●One rank smaller TNR V has same peak current as TNR G.
- ●Excellent voltage non-linear coefficient.
  Low clamping voltage.
- ●Symmetrical V-I characteristics (No polarity).
- ●Fast response.
- ●Stable characteristics against repeated surges.
- ●Superior temperature characteristics.
- ●High reliability
- ●UL, CSA and VDE recognized components
  UL 1449 3rd File : E323623
  CSA File : LR97864
  VDE File : 118623
- ●Coating resin : UL94V-0

◆APPLICATIONS

- ●Protection for semiconductors from over voltage.
- ●Protection for electronic instruments from lightning surges.
- ●Absorption of on-off surges from motors and relays.

Operating Temperature Range: -40 to +85℃
Storage Temperature Range: -50 to +125℃

◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T	N	D			V	–				K	B						

Design Code
Lead Forming / Taping
Packing Style⑦
Varistor Volt. Tolerance⑥
Varistor Voltage⑤
Series④
Element Diameter③
Product Form②
Category①

①Category	
T	Metal Oxide Varistors TNR

②Product Form	
ND	Disk Type

③Element Diameter	
05	φ 5 mm
07	φ 7 mm
09	φ 9 mm
10	φ10 mm
12	φ12 mm
14	φ14 mm
20	φ20 mm

④Series	
V–	V Series

⑤Varistor Voltage
The first two digits are significant figures and the third one denotes the number of following zeros.

⑥Varistor Volt. Tolerance	
K	±10%

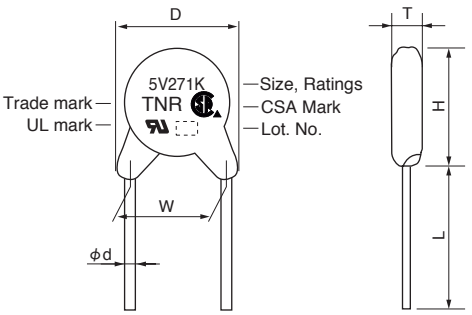
⑦Packing Style	
B	Bulk
T	Taping

V Series

◆STANDARD RATINGS (Type 5V)

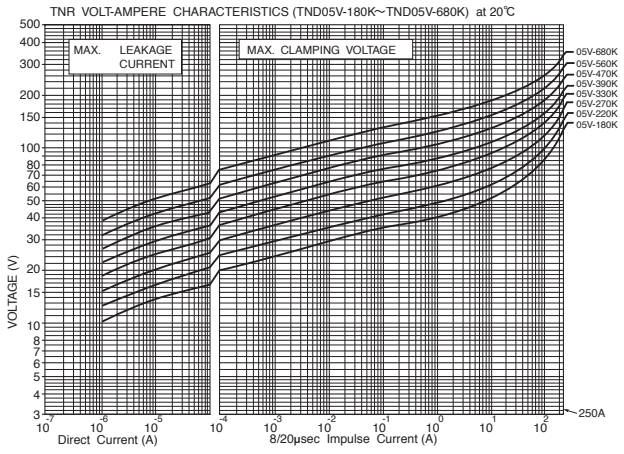
Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V0.1mA	T Max.
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage					
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)
TND05V-180KB00AAA0	TNR5V180K	11	14		0.4			40	2540	18 (16～ 20)	
TND05V-220KB00AAA0	TNR5V220K	14	18		0.5			48	2090	22 (20～ 24)	
TND05V-270KB00AAA0	TNR5V270K	17	22		0.7			60	1790	27 (24～ 30)	
TND05V-330KB00AAA0	TNR5V330K	20	26	250A/1 time	0.8	0.01	1	73	1480	33 (30～ 36)	4.5
TND05V-390KB00AAA0	TNR5V390K	25	30	125A/2 times	0.9			86	1310	39 (35～ 43)	
TND05V-470KB00AAA0	TNR5V470K	30	37		1.1			104	1140	47 (42～ 52)	
TND05V-560KB00AAA0	TNR5V560K	35	44		1.3			123	1000	56 (50～ 62)	
TND05V-680KB00AAA0	TNR5V680K	40	55		1.6			150	870	68 (61～ 75)	
TND05V-820KB00AAA0	TNR5V820K	50	65		2.5			145	400	82 (74～ 90)	4.1
TND05V-101KB00AAA0	TNR5V101K	60	85		3			175	350	100 (90～110)	4.3
TND05V-121KB00AAA0	TNR5V121K	75	100		3.5			210	310	120 (108～132)	4.5
TND05V-151KB00AAA0	TNR5V151K	95	125		4.5			260	270	150 (135～165)	4.8
TND05V-181KB00AAA0	TNR5V181K	110	145		5			325	190	180 (162～198)	4.3
TND05V-201KB00AAA0	TNR5V201K	130	170		6			355	110	200 (185～225)	4.4
TND05V-221KB00AAA0	TNR5V221K	140	180	800A/1 time	6.5	0.1	5	380	110	220 (198～242)	4.5
TND05V-241KB00AAA0	TNR5V241K	150	200	600A/2 times	7.5			415	100	240 (216～264)	4.6
TND05V-271KB00AAA0	TNR5V271K	175	225		8			475	90	270 (247～303)	4.8
TND05V-331KB00AAA0	TNR5V331K	210	270		9.5			570	80	330 (297～363)	5.1
TND05V-361KB00AAA0	TNR5V361K	230	300		11			620	80	360 (324～396)	5.3
TND05V-391KB00AAA0	TNR5V391K	250	320		12			675	70	390 (351～429)	5.4
TND05V-431KB00AAA0	TNR5V431K	275	350		13.5			745	70	430 (387～473)	5.6
TND05V-471KB00AAA0	TNR5V471K	300	385		15			810	60	470 (423～517)	5.8

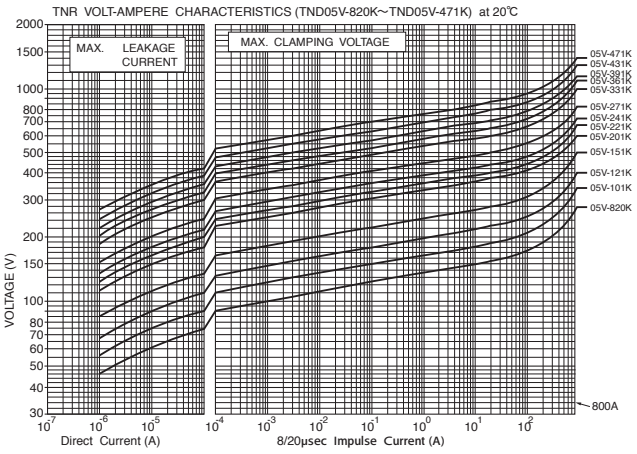
◆DIMENSIONS [mm]



D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
7.5	10.0	Ref. to RATINGS	20.0	0.6	5.0

◆V-I CURVE



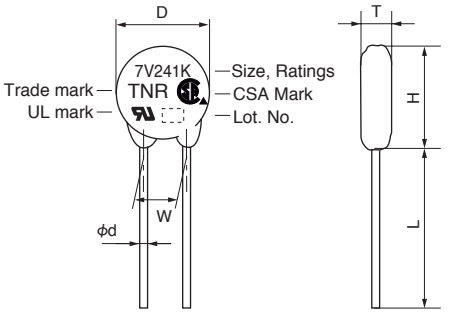


V Series

◆STANDARD RATINGS (Type 7V)

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V1mA	T Max.
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage					
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)
TND07V-150KB00AAA0	TNR7V150K	8	12		0.7			30	4600	15 (13～ 17)	4.5
TND07V-180KB00AAA0	TNR7V180K	11	14		0.9			36	3800	18 (16～ 20)	4.5
TND07V-220KB00AAA0	TNR7V220K	14	18		1.1			43	3200	22 (20～ 24)	4.6
TND07V-270KB00AAA0	TNR7V270K	17	22	500A/1 time	1.3			53	2800	27 (24～ 30)	4.7
TND07V-330KB00AAA0	TNR7V330K	20	26		1.6	0.02	2.5	65	2300	33 (30～ 36)	4.9
TND07V-390KB00AAA0	TNR7V390K	25	30	250A/2 times	1.9			77	2100	39 (35～ 43)	4.8
TND07V-470KB00AAA0	TNR7V470K	30	37		2.3			93	1900	47 (42～ 52)	4.9
TND07V-560KB00AAA0	TNR7V560K	35	44		2.7			110	1700	56 (50～ 62)	5.0
TND07V-680KB00AAA0	TNR7V680K	40	55		3.3			135	1500	68 (61～ 75)	5.2
TND07V-820KB00AAA0	TNR7V820K	50	65		5			135	800	82 (74～ 90)	4.1
TND07V-101KB00AAA0	TNR7V101K	60	85		6			165	700	100 (90～110)	4.3
TND07V-121KB00AAA0	TNR7V121K	75	100		7			200	650	120 (108～132)	4.5
TND07V-151KB00AAA0	TNR7V151K	95	125		9			250	600	150 (135～165)	4.8
TND07V-181KB00AAA0	TNR7V181K	110	145		11			300	430	180 (162～198)	4.3
TND07V-201KB00AAA0	TNR7V201K	130	170		12.5			340	250	200 (185～225)	4.4
TND07V-221KB00AAA0	TNR7V221K	140	180	1750A/1 time	13.5			360	230	220 (198～242)	4.5
TND07V-241KB00AAA0	TNR7V241K	150	200		15	0.25	10	395	210	240 (216～264)	4.6
TND07V-271KB00AAA0	TNR7V271K	175	225	1250A/2 times	17			455	190	270 (247～303)	4.8
TND07V-331KB00AAA0	TNR7V331K	210	270		20			545	160	330 (297～363)	5.1
TND07V-361KB00AAA0	TNR7V361K	230	300		23			595	150	360 (324～396)	5.3
TND07V-391KB00AAA0	TNR7V391K	250	320		25			650	140	390 (351～429)	5.4
TND07V-431KB00AAA0	TNR7V431K	275	350		27.5			710	130	430 (387～473)	5.6
TND07V-471KB00AAA0	TNR7V471K	300	385		30			775	120	470 (423～517)	5.8
TND07V-511KB00AAA0	TNR7V511K	320	410		32			845	110	510 (459～561)	6.0

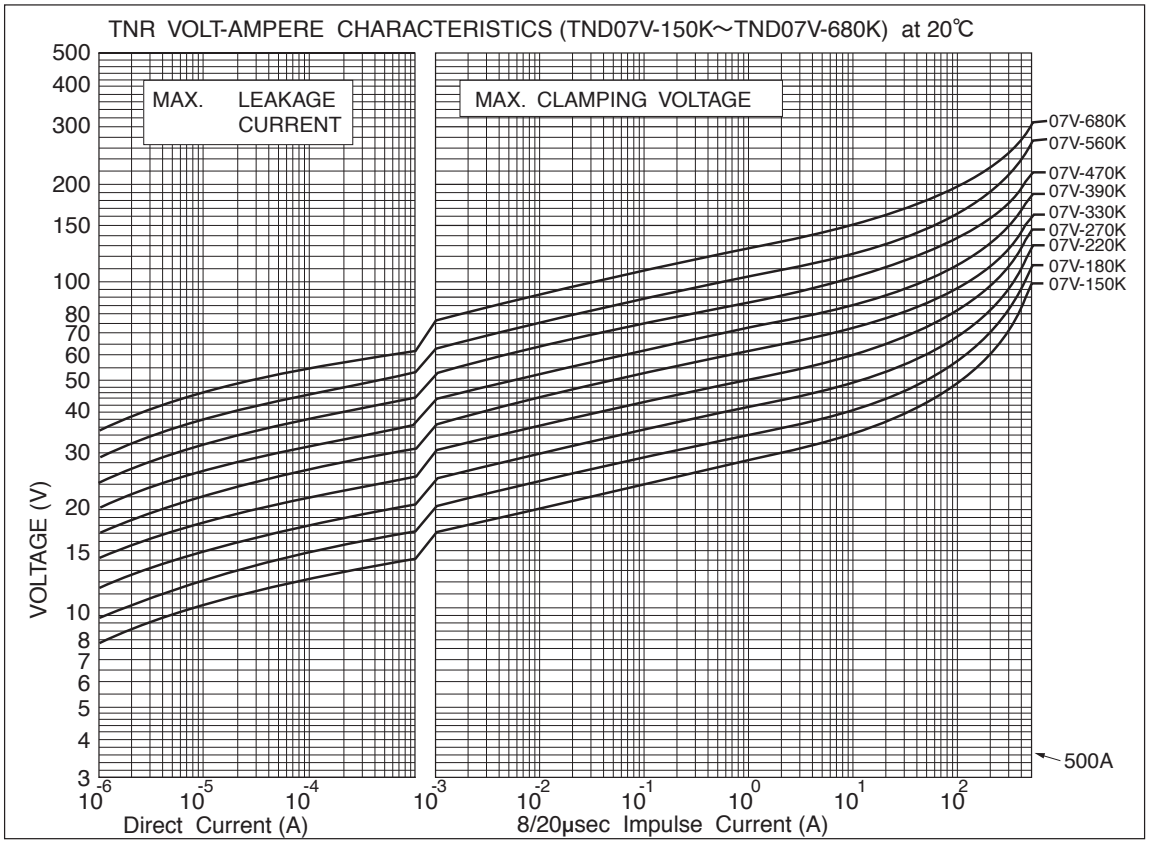
◆DIMENSIONS [mm]

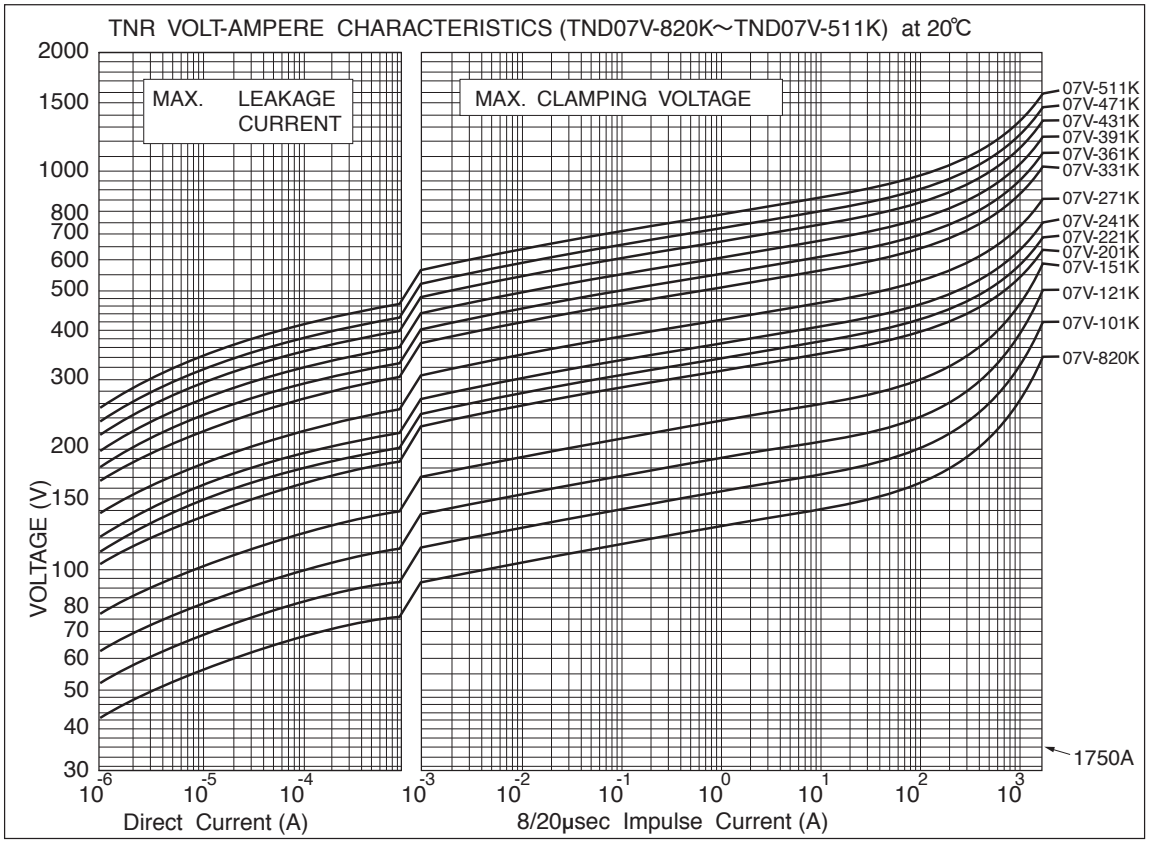


D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
8.5	11.5	Ref. to RATINGS	20.0	0.6	5.0

V Series

◆V-I CURVE (Type 7V)



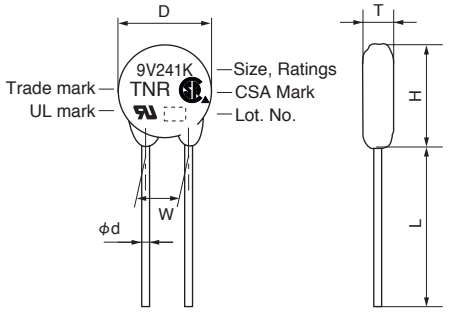


V Series

◆RATINGS (Type 9V)

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V1mA	T Max.
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage					
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)
TND09V-150KB00AAA0	TNR9V150K	8	12		2.0			30	9600	15 (13～ 17)	3.8
TND09V-180KB00AAA0	TNR9V180K	11	14		2.2			36	8000	18 (16～ 20)	3.8
TND09V-220KB00AAA0	TNR9V220K	14	18		2.6			43	7000	22 (20～ 24)	4.0
TND09V-270KB00AAA0	TNR9V270K	17	22	800A/1 time	3.2			53	6000	27 (24～ 30)	4.2
TND09V-330KB00AAA0	TNR9V330K	20	26		4.0	0.02	5	65	5000	33 (30～ 36)	4.5
TND09V-390KB00AAA0	TNR9V390K	25	30	400A/2 times	4.7			77	4500	39 (35～ 43)	4.0
TND09V-470KB00AAA0	TNR9V470K	30	37		5.6			93	4000	47 (42～ 52)	4.2
TND09V-560KB00AAA0	TNR9V560K	35	44		6.7			110	3500	56 (50～ 62)	4.4
TND09V-680KB00AAA0	TNR9V680K	40	55		8.2			135	3200	68 (61～ 75)	4.5
TND09V-820KB00AAA0	TNR9V820K	50	65		10			135	1700	82 (74～ 90)	3.8
TND09V-101KB00AAA0	TNR9V101K	60	85		12			165	1600	100 (90～110)	3.9
TND09V-121KB00AAA0	TNR9V121K	75	100		14.5			200	1400	120 (108～132)	4.1
TND09V-151KB00AAA0	TNR9V151K	95	125		18			250	1300	150 (135～165)	4.4
TND09V-181KB00AAA0	TNR9V181K	110	145		22			300	900	180 (162～198)	4.0
TND09V-201KB00AAA0	TNR9V201K	130	170		25			340	500	200 (185～225)	4.1
TND09V-221KB00AAA0	TNR9V221K	140	180	3000A/1 time	27.5			360	450	220 (198～242)	4.2
TND09V-241KB00AAA0	TNR9V241K	150	200		30	0.25	25	395	400	240 (216～264)	4.3
TND09V-271KB00AAA0	TNR9V271K	175	225	2000A/2 times	35			455	350	270 (247～303)	4.5
TND09V-331KB00AAA0	TNR9V331K	210	270		42			545	300	330 (297～363)	4.8
TND09V-361KB00AAA0	TNR9V361K	230	300		45			595	280	360 (324～396)	5.0
TND09V-391KB00AAA0	TNR9V391K	250	320		50			650	260	390 (351～429)	5.1
TND09V-431KB00AAA0	TNR9V431K	275	350		55			710	240	430 (387～473)	5.3
TND09V-471KB00AAA0	TNR9V471K	300	385		60			775	220	470 (423～517)	5.6
TND09V-511KB00AAA0	TNR9V511K	320	410		67			845	210	510 (459～561)	5.8

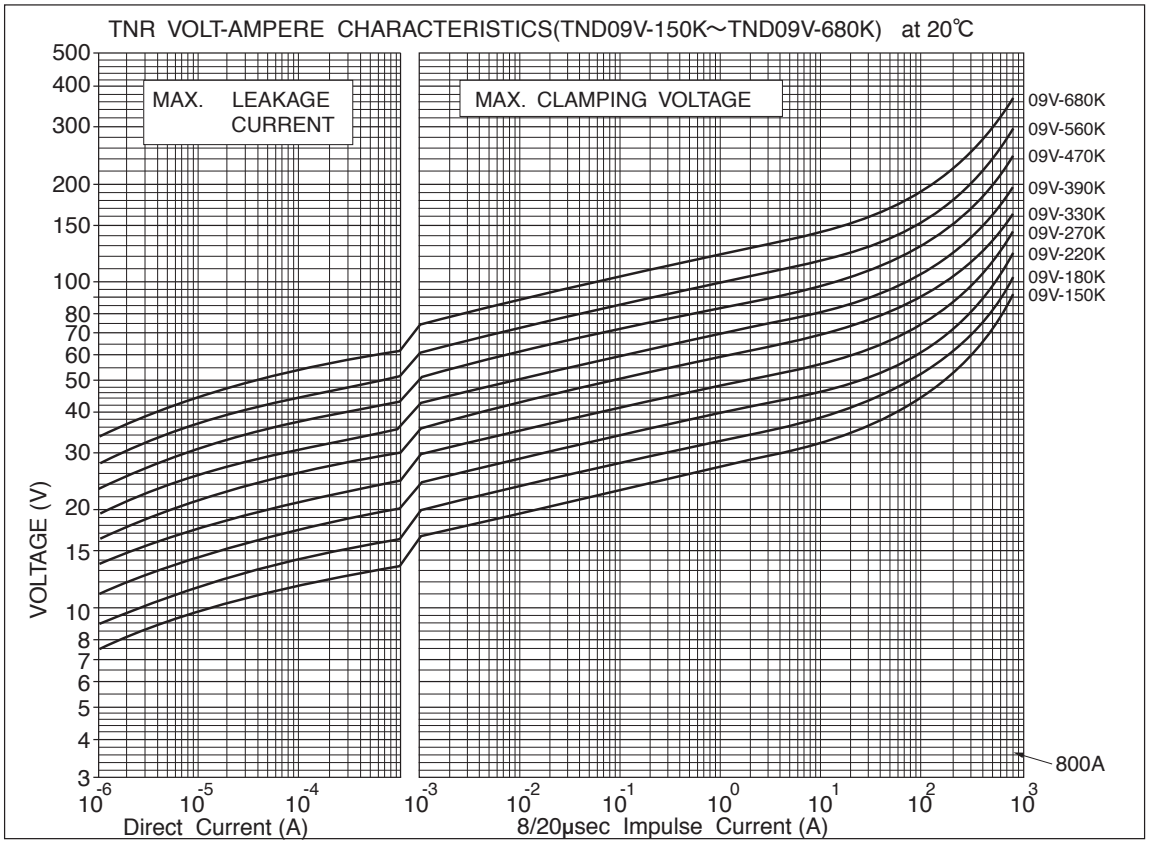
◆DIMENSIONS [mm]

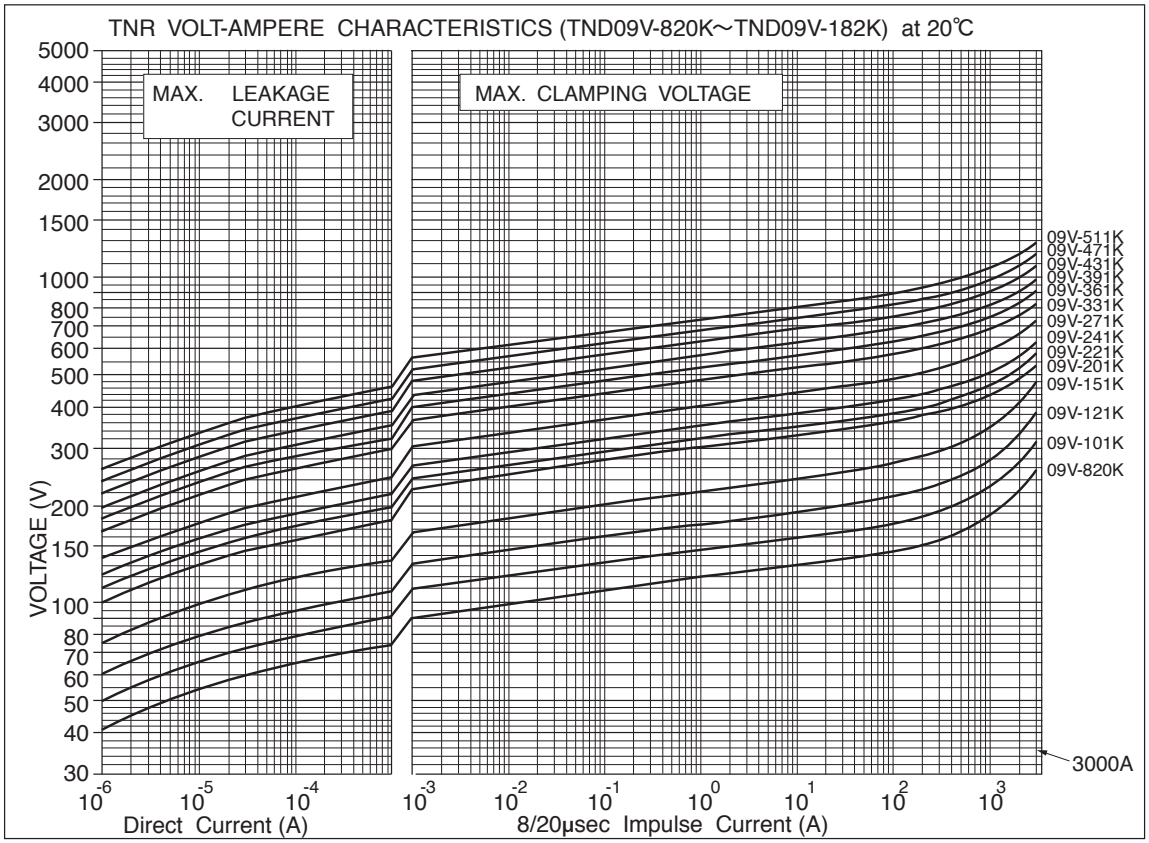


D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
11.5	14.5	Ref. to RATINGS	20.0	0.6	5.0

V Series

◆V-I CURVE (Type 9V)





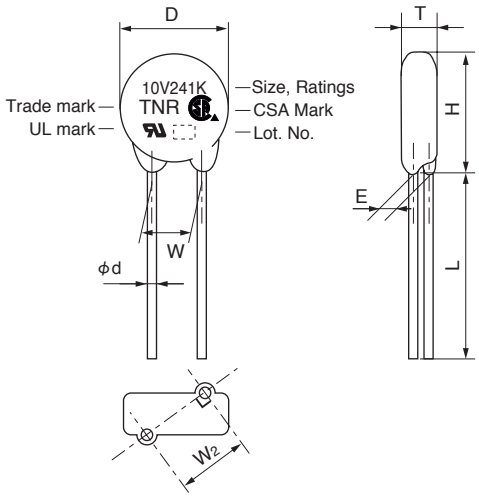
V Series

◆RATINGS (Type 10V)

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V_{1mA}	T Max.	E ±1.0	W2 reference
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage							
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)	(mm)	(mm)
TND10V-150KB00AAA0	TNR10V150K	8	12		2.0			30	9600	15 (13～ 17)	4.5	1.0	7.6
TND10V-180KB00AAA0	TNR10V180K	11	14		2.2			36	8000	18 (16～ 20)	4.6	1.1	7.6
TND10V-220KB00AAA0	TNR10V220K	14	18		2.6			43	7000	22 (20～ 24)	4.7	1.2	7.6
TND10V-270KB00AAA0	TNR10V270K	17	22	1000A/1 time	3.2			53	6000	27 (24～ 30)	4.8	1.3	7.6
TND10V-330KB00AAA0	TNR10V330K	20	26		4.0	0.05	5	65	5000	33 (30～ 36)	5.0	1.5	7.6
TND10V-390KB00AAA0	TNR10V390K	25	30	500A/2 times	4.7			77	4500	39 (35～ 43)	4.9	1.3	7.6
TND10V-470KB00AAA0	TNR10V470K	30	37		5.6			93	4000	47 (42～ 52)	5.0	1.4	7.6
TND10V-560KB00AAA0	TNR10V560K	35	44		6.7			110	3500	56 (50～ 62)	5.1	1.6	7.7
TND10V-680KB00AAA0	TNR10V680K	40	55		8.2			135	3200	68 (61～ 75)	5.3	1.8	7.7
TND10V-820KB00AAA0	TNR10V820K	50	65		10			135	1700	82 (74～ 90)	4.5	1.1	7.6
TND10V-101KB00AAA0	TNR10V101K	60	85		12			165	1600	100 (90～ 110)	4.7	1.3	7.6
TND10V-121KB00AAA0	TNR10V121K	75	100		14.5			200	1400	120 (108～ 132)	4.9	1.4	7.6
TND10V-151KB00AAA0	TNR10V151K	95	125		18			250	1300	150 (135～ 165)	5.2	1.7	7.7
TND10V-181KB00AAA0	TNR10V181K	110	145		22			300	900	180 (162～ 198)	4.7	1.1	7.6
TND10V-201KB00AAA0	TNR10V201K	130	170		25			340	500	200 (185～ 225)	4.8	1.2	7.6
TND10V-221KB00AAA0	TNR10V221K	140	180		27.5			360	450	220 (198～ 242)	4.9	1.3	7.6
TND10V-241KB00AAA0	TNR10V241K	150	200		30			395	400	240 (216～ 264)	5.0	1.3	7.6
TND10V-271KB00AAA0	TNR10V271K	175	225		35			455	350	270 (247～ 303)	5.2	1.4	7.6
TND10V-331KB00AAA0	TNR10V331K	210	270		42			545	300	330 (297～ 363)	5.5	1.6	7.7
TND10V-361KB00AAA0	TNR10V361K	230	300		45			595	280	360 (324～ 396)	5.7	1.8	7.7
TND10V-391KB00AAA0	TNR10V391K	250	320	3500A/1 time	50			650	260	390 (351～ 429)	5.8	1.9	7.7
TND10V-431KB00AAA0	TNR10V431K	275	350		55	0.4	25	710	240	430 (387～ 473)	6.0	2.0	7.8
TND10V-471KB00A◇A0	TNR10V471K□	300	385	2500A/2 times	60			775	220	470 (423～ 517)	6.2	2.1	7.8
TND10V-511KB00A◇A0	TNR10V511K□	320	410		67			845	210	510 (459～ 561)	6.4	2.3	7.8
TND10V-561KB00A◇A0	TNR10V561K□	350	460		67			922	195	560 (504～ 616)	6.7	2.5	7.9
TND10V-621KB00A◇A0	TNR10V621K□	385	505		67			1025	180	620 (558～ 682)	7.1	2.7	8.0
TND10V-681KB00A◇A0	TNR10V681K□	420	560		67			1120	165	680 (612～ 748)	7.4	2.9	8.0
TND10V-751KB00A◇A0	TNR10V751K□	460	615		70			1240	150	750 (675～ 825)	7.8	3.1	8.1
TND10V-821KB00A◇A0	TNR10V821K□	510	670		80			1355	140	820 (738～ 902)	8.1	3.4	8.2
TND10V-911KB00A◇A0	TNR10V911K□	550	745		90			1500	125	910 (819～1001)	8.6	3.7	8.4
TND10V-102KB00A◇A0	TNR10V102K□	625	825		100			1650	115	1000 (900～1100)	9.1	4.0	8.5
TND10V-112KB00A◇A0	TNR10V112K□	680	895		110			1815	105	1100 (990～1210)	9.7	4.4	8.7
TND10V-122KB00A◇A0	TNR10V122K□	720	980		120			1950	95	1200 (1080～1320)	10.5	4.7*	8.9**
TND10V-152KB00A◇A0	TNR10V152K□	860	1220		150			2440	85	1500 (1350～1650)	12.4	5.8*	9.5**
TND10V-182KB00A◇A0	TNR10V182K□	1000	1465		183			2970	70	1800 (1700～1980)	14.4	6.9*	10.2**

*E±2 **W2±2

◆DIMENSIONS [mm]



	◇	□
Standard	A	N/A
ϕ10 IEC 62368-1:2014 G.8.2 conforming product	S	S

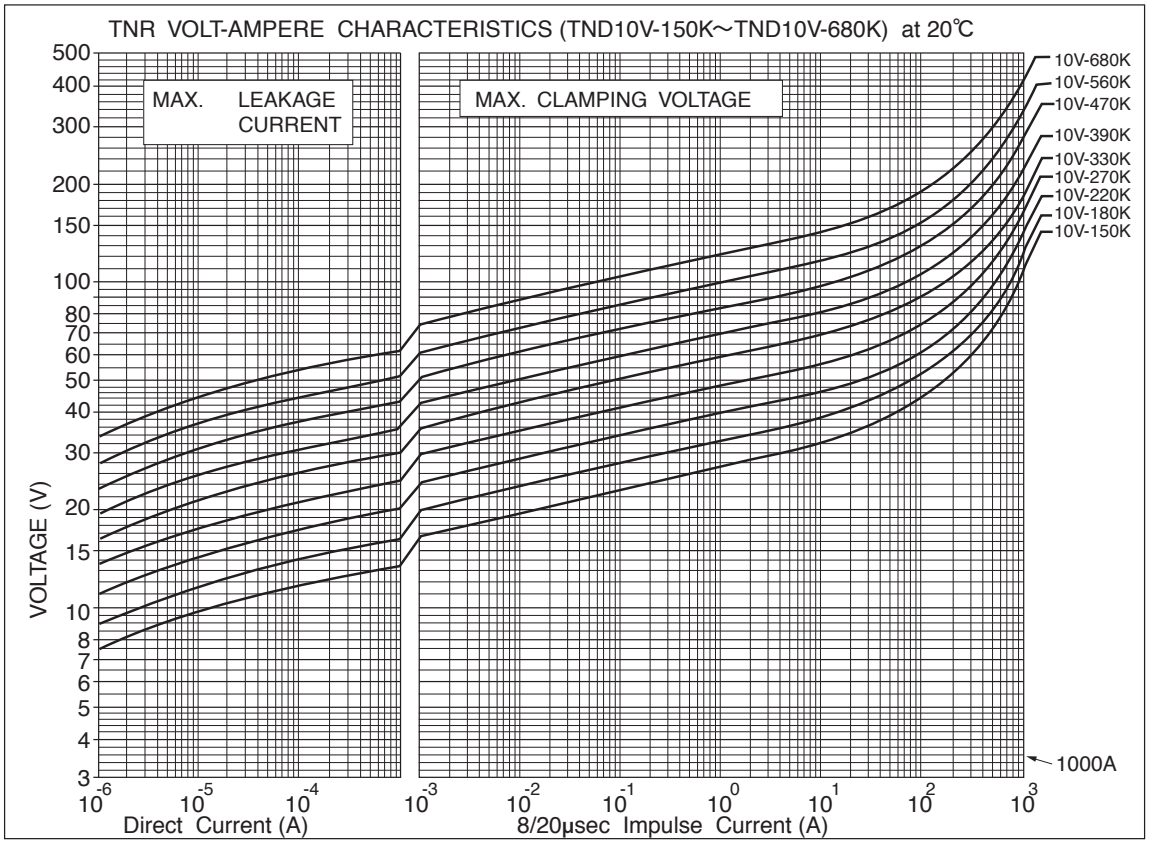
Part Number	D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
TND10V-150K to TND10V-511K	11.5	14.5	Ref. to RATINGS	20.0	0.8	7.5
TND10V-561K to TND10V-112K	12.5	15.5				
TND10V-122K to TND10V-182K	13.5	16.5				

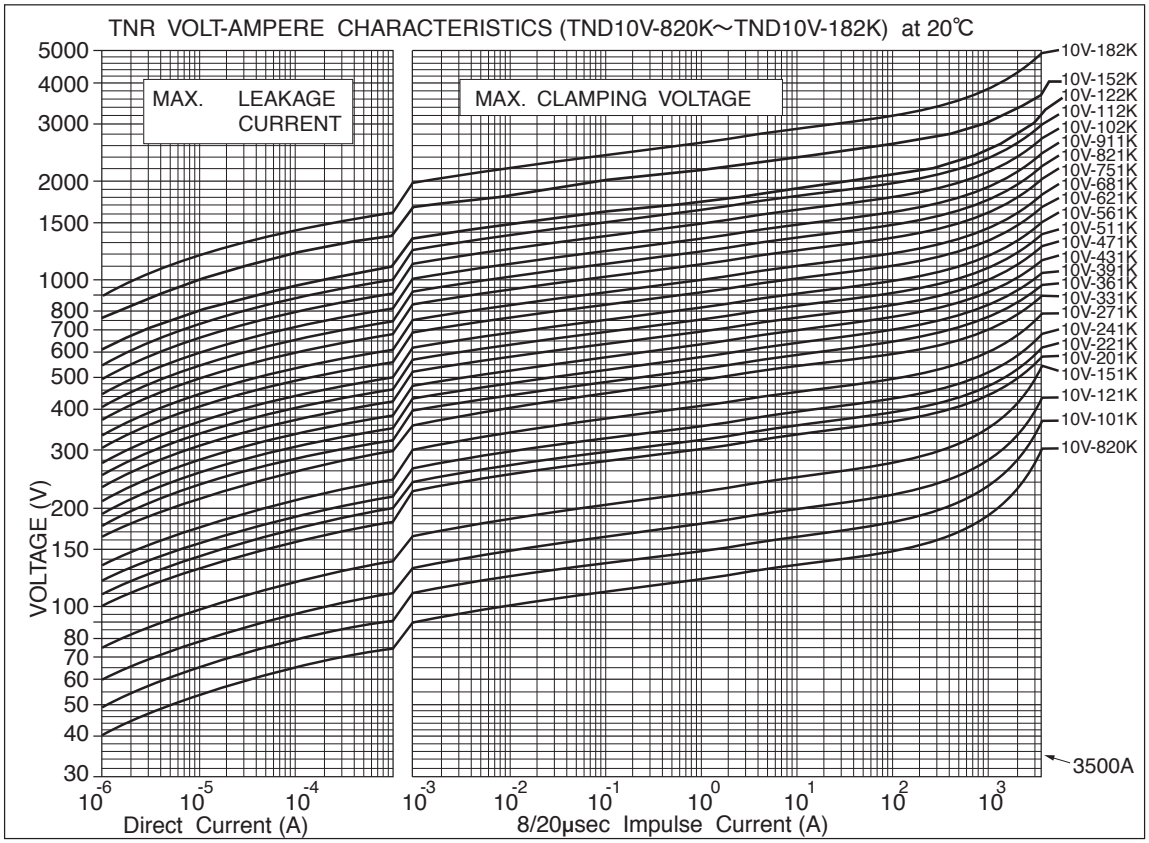
●Common to standard product and IEC 62368-1:2014 G.8.2 conforming product

●The product with less than 620V of varistor voltage, taping is possible.
Please refer to taping and forming specifications.
The lead type parallel to a straight prepares, too.

V Series

◆V-I CURVE (Type 10V)





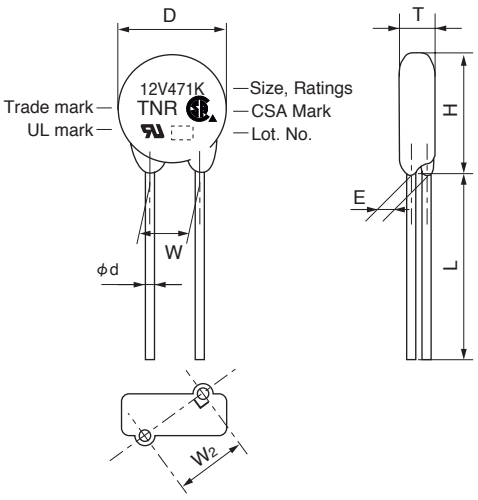
V Series

◆RATINGS (Type 12V)

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V_{1mA}	T Max.	E ±1.0	W2 reference
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage							
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)	(mm)	(mm)
TND12V-431KB00AAA0	TNR12V431K	275	350		55			710	375	430 (387～ 473)	6.0	2.0	7.8
TND12V-471KB00AAA0	TNR12V471K	300	385		60			775	345	470 (423～ 517)	6.2	2.1	7.8
TND12V-511KB00AAA0	TNR12V511K	320	410		67			845	330	510 (459～ 561)	6.4	2.3	7.8
TND12V-561KB00AAA0	TNR12V561K	350	460		67			922	305	560 (504～ 616)	6.7	2.5	7.9
TND12V-621KB00AAA0	TNR12V621K	385	505		67			1025	280	620 (558～ 682)	7.1	2.7	8.0
TND12V-681KB00AAA0	TNR12V681K	420	560	4,200A/1 time	67			1120	260	680 (612～ 748)	7.4	2.9	8.0
TND12V-751KB00AAA0	TNR12V751K	460	615		70	0.4	25	1240	235	750 (675～ 825)	7.8	3.1	8.1
TND12V-821KB00AAA0	TNR12V821K	510	670	3,000A/2 times	80			1355	220	820 (738～ 902)	8.1	3.4	8.2
TND12V-911KB00AAA0	TNR12V911K	550	745		90			1500	195	910 (819～1001)	8.6	3.7	8.4
TND12V-102KB00AAA0	TNR12V102K	625	825		100			1650	180	1000 (900～1100)	9.1	4.0	8.5
TND12V-112KB00AAA0	TNR12V112K	680	895		110			1815	165	1100 (990～1210)	9.7	4.4	8.7
TND12V-122KB00AAA0	TNR12V122K	720	980		120			1950	150	1200 (1080～1320)	10.5	4.7*	8.9**
TND12V-152KB00AAA0	TNR12V152K	860	1220		150			2440	135	1500 (1350～1650)	12.4	5.8*	9.5**
TND12V-182KB00AAA0	TNR12V182K	1000	1465		183			2970	110	1800 (1700～1980)	14.4	6.9*	10.2**

*E±2 **W2±2

◆DIMENSIONS [mm]

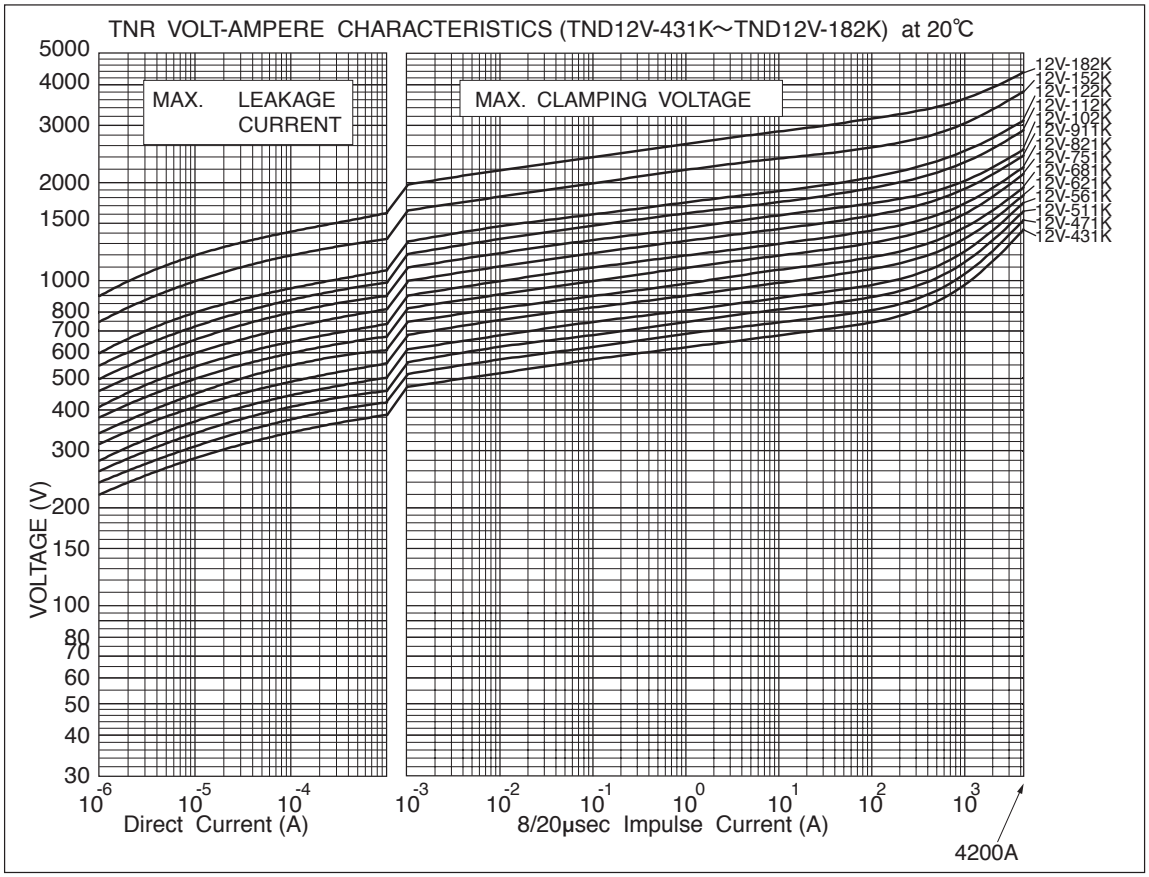


Part Number	D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
TND12V-431K to TND12V-102K	14.0	17.0	Ref. to RATINGS	20	0.8	7.5
TND12V-112K	15.0	18.0				
TND12V-122K						
TND12V-152K to TND12V-182K	16.0	19.0				

●The product with less than 620V of varistor voltage, taping is possible.
Please refer to taping and forming specifications.
The lead type parallel to a straight prepares, too.

V Series

◆V-I CURVE (Type 12V)



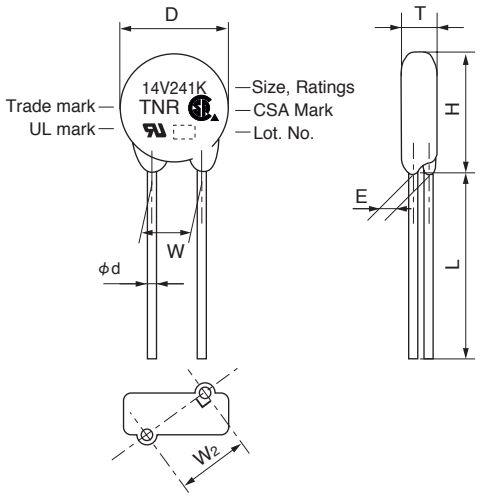
V Series

◆RATINGS (Type 14V)

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V1mA	T Max.	E ±1.0	W2 Reference
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage							
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)	(mm)	(mm)
TND14V-150KB00AAA0	TNR14V150K	8	12		3.6			30	19500	15 (13～ 17)	4.5	1.0	7.6
TND14V-180KB00AAA0	TNR14V180K	11	14		4.3			36	16500	18 (16～ 20)	4.6	1.1	7.6
TND14V-220KB00AAA0	TNR14V220K	14	18		5.3			43	13500	22 (20～ 24)	4.7	1.2	7.6
TND14V-270KB00AAA0	TNR14V270K	17	22	2000A/1 time	6.5			53	12000	27 (24～ 30)	4.8	1.4	7.6
TND14V-330KB00AAA0	TNR14V330K	20	26		7.9	0.1	10	65	10000	33 (30～ 36)	5.0	1.6	7.7
TND14V-390KB00AAA0	TNR14V390K	25	30	1000A/2 times	9.4			77	9000	39 (35～ 43)	4.9	1.3	7.6
TND14V-470KB00AAA0	TNR14V470K	30	37		11			93	8000	47 (42～ 52)	5.0	1.5	7.6
TND14V-560KB00AAA0	TNR14V560K	35	44		13			110	7500	56 (50～ 62)	5.1	1.7	7.7
TND14V-680KB00AAA0	TNR14V680K	40	55		16			135	6500	68 (61～ 75)	5.3	2.0	7.8
TND14V-820KB00AAA0	TNR14V820K	50	65		20			135	3000	82 (74～ 90)	4.5	1.1	7.6
TND14V-101KB00AAA0	TNR14V101K	60	85		25			165	2700	100 (90～ 110)	4.7	1.3	7.6
TND14V-121KB00AAA0	TNR14V121K	75	100		30			200	2500	120 (108～ 132)	4.9	1.4	7.6
TND14V-151KB00AAA0	TNR14V151K	95	125		37			250	2300	150 (135～ 165)	5.2	1.7	7.7
TND14V-181KB00AAA0	TNR14V181K	110	145		45			300	1650	180 (162～ 198)	4.7	1.1	7.6
TND14V-201KB00AAA0	TNR14V201K	130	170		50			340	950	200 (185～ 225)	4.8	1.2	7.6
TND14V-221KB00AAA0	TNR14V221K	140	180	6000A/1 time	55			360	850	220 (198～ 242)	4.9	1.3	7.6
TND14V-241KB00AAA0	TNR14V241K	150	200		60			395	800	240 (216～ 264)	5.0	1.4	7.6
TND14V-271KB00AAA0	TNR14V271K	175	225	5000A/2 times	70			455	700	270 (247～ 303)	5.2	1.5	7.6
TND14V-331KB00AAA0	TNR14V331K	210	270		80			545	600	330 (297～ 363)	5.5	1.7	7.7
TND14V-361KB00AAA0	TNR14V361K	230	300		90			595	550	360 (324～ 396)	5.7	1.8	7.7
TND14V-391KB00AAA0	TNR14V391K	250	320		100			650	500	390 (351～ 429)	5.8	1.9	7.7
TND14V-431KB00AAA0	TNR14V431K	275	350		110			710	460	430 (387～ 473)	6.0	2.1	7.8
TND14V-471KB00AAA0	TNR14V471K	300	385		125	0.6	50	775	420	470 (423～ 517)	6.2	2.2	7.8
TND14V-511KB00AAA0	TNR14V511K	320	410		136			845	390	510 (459～ 561)	6.4	2.4	7.9
TND14V-561KB00AAA0	TNR14V561K	350	460		136			922	360	560 (504～ 616)	6.7	2.6	7.9
TND14V-621KB00AAA0	TNR14V621K	385	505		136			1025	330	620 (558～ 682)	7.1	2.8	8.0
TND14V-681KB00AAA0	TNR14V681K	420	560		136			1120	310	680 (612～ 748)	7.4	3.0	8.1
TND14V-751KB00AAA0	TNR14V751K	460	615		150			1240	280	750 (675～ 825)	7.8	3.3	8.2
TND14V-821KB00AAA0	TNR14V821K	510	670	5000A/1 time	165			1355	250	820 (738～ 902)	8.1	3.5	8.3
TND14V-911KB00AAA0	TNR14V911K	550	745		180			1500	230	910 (819～1001)	8.6	3.9	8.5
TND14V-102KB00AAA0	TNR14V102K	625	825	4500A/2 times	200			1650	210	1000 (900～1100)	9.1	4.2	8.6
TND14V-112KB00AAA0	TNR14V112K	680	895		220			1815	190	1100 (990～1210)	9.7	4.6	8.8
TND14V-122KB00AAA0	TNR14V122K	720	980		240			1950	170	1200 (1080～1320)	10.5	4.9*	9.0**
TND14V-152KB00AAA0	TNR14V152K	860	1220		300			2440	150	1500 (1350～1650)	12.4	6.0*	9.6**
TND14V-182KB00AAA0	TNR14V182K	1000	1465		360			2970	120	1800 (1700～1980)	14.4	7.1*	10.3**

*E±2 **W2±2

◆DIMENSIONS [mm]

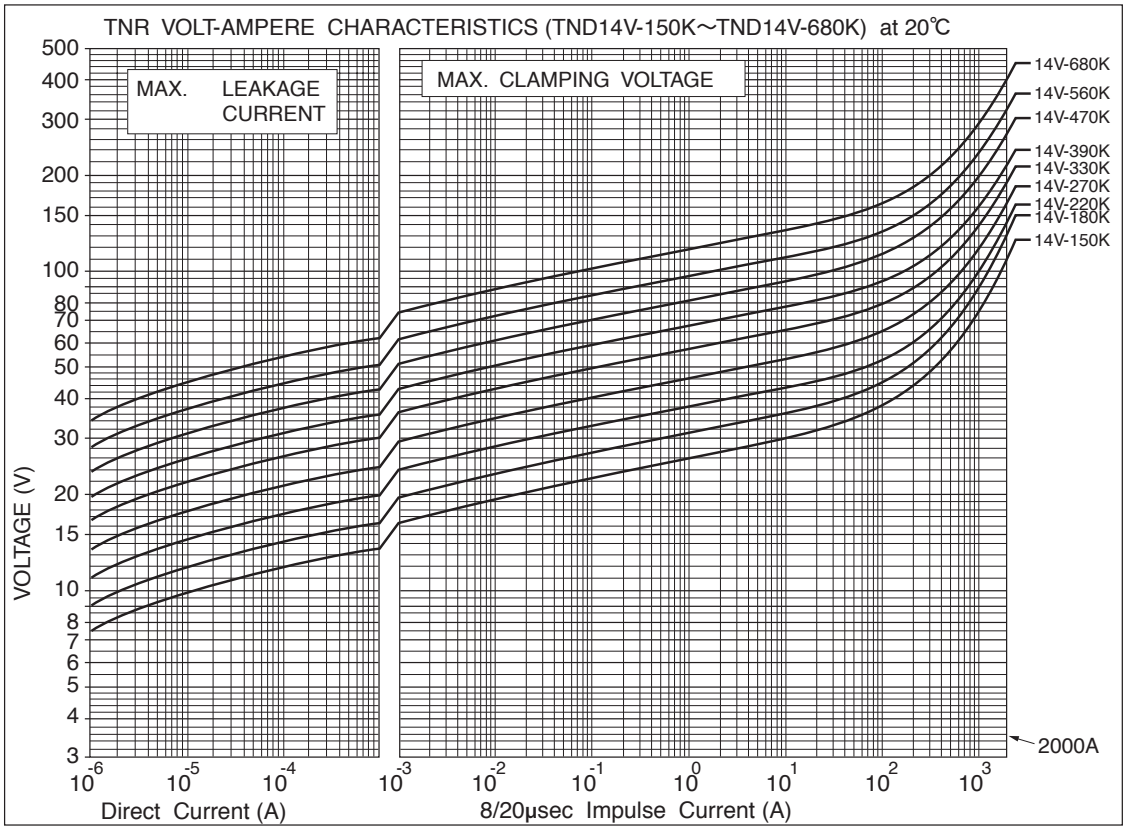


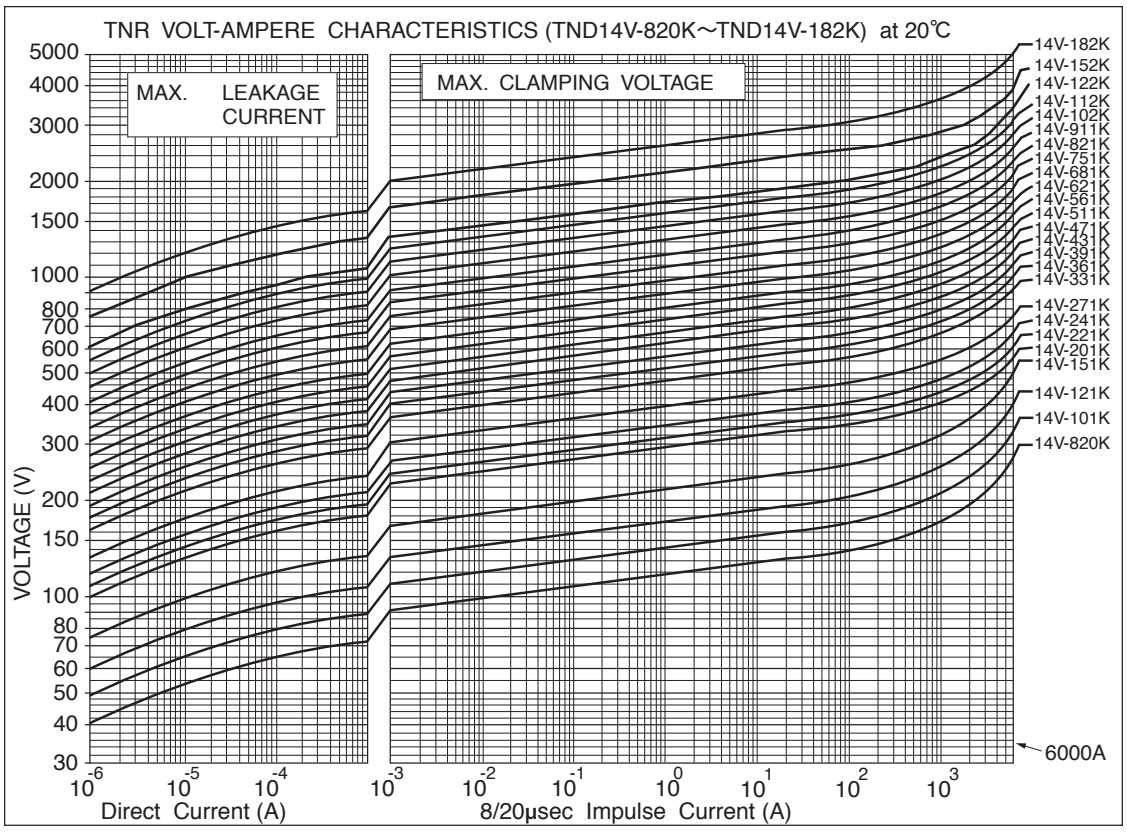
Part Number	D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
TND14V-150K to TND14V-511K	15.5	18.5	Ref. to RATINGS	20	0.8	7.5
TND14V-561K to TND14V-112K	16.0	19.0				
TND14V-122K to TND14V-182K	17.0	20.5				

●The product with less than 620V of varistor voltage, taping is possible.
Please refer to taping and forming specifications.
The lead type parallel to a straight prepares, too.

V Series

◆V-I CURVE (Type 14V)





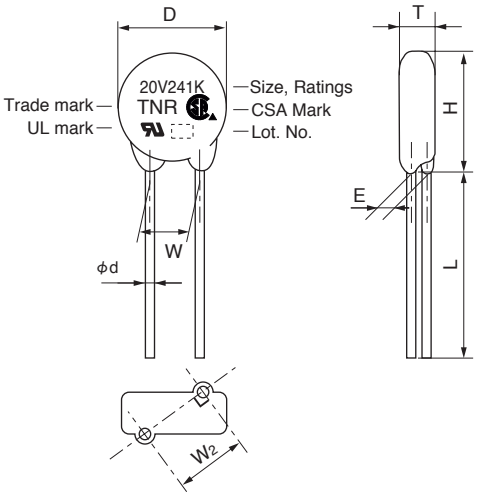
V Series

◆RATINGS (Type 20V)

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V1mA	T Max.	E ±1.0	W2 Reference
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage							
		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	(A)	(V)	(pF)	(V)	(mm)	(mm)	(mm)
TND20V-180KB00AAA0	TNR20V180K	11	14		12			36	39000	18 (16～ 20)	5.1	1.1	10.1
TND20V-220KB00AAA0	TNR20V220K	14	18		14			43	33000	22 (20～ 24)	5.2	1.2	10.1
TND20V-270KB00AAA0	TNR20V270K	17	22	3000A/1 time	17			53	28000	27 (24～ 30)	5.3	1.4	10.1
TND20V-330KB00AAA0	TNR20V330K	20	26		21	0.2	20	65	24000	33 (30～ 36)	5.5	1.6	10.1
TND20V-390KB00AAA0	TNR20V390K	25	30	2000A/2 times	25			77	21000	39 (35～ 43)	5.5	1.3	10.1
TND20V-470KB00AAA0	TNR20V470K	30	37		30			93	19000	47 (42～ 52)	5.6	1.5	10.1
TND20V-560KB00AAA0	TNR20V560K	35	44		36			110	17000	56 (50～ 62)	5.7	1.7	10.1
TND20V-680KB00AAA0	TNR20V680K	40	55		44			135	15000	68 (61～ 75)	5.8	2.0	10.2
TND20V-820KB00AAA0	TNR20V820K	50	65		40			135	6700	82 (74～ 90)	4.9	1.2	10.1
TND20V-101KB00AAA0	TNR20V101K	60	85		50			165	6100	100 (90～ 110)	5.1	1.4	10.1
TND20V-121KB00AAA0	TNR20V121K	75	100		60			200	5600	120 (108～ 132)	5.3	1.5	10.1
TND20V-151KB00AAA0	TNR20V151K	95	125		75			250	5100	150 (135～ 165)	5.6	1.8	10.2
TND20V-181KB00AAA0	TNR20V181K	110	145		85			300	3900	180 (162～ 198)	5.1	1.2	10.1
TND20V-201KB00AAA0	TNR20V201K	130	170		100			340	2700	200 (185～ 225)	5.2	1.2	10.1
TND20V-221KB00AAA0	TNR20V221K	140	180	10000A/1 time	110			360	2500	220 (198～ 242)	5.3	1.3	10.1
TND20V-241KB00AAA0	TNR20V241K	150	200		120			395	2300	240 (216～ 264)	5.4	1.4	10.1
TND20V-271KB00AAA0	TNR20V271K	175	225	7000A/2 times	135			455	2000	270 (247～ 303)	5.6	1.5	10.1
TND20V-331KB00AAA0	TNR20V331K	210	270		160			545	1700	330 (297～ 363)	5.9	1.7	10.1
TND20V-361KB00AAA0	TNR20V361K	230	300		180			595	1500	360 (324～ 396)	6.1	1.9	10.2
TND20V-391KB00AAA0	TNR20V391K	250	320		195			650	1400	390 (351～ 429)	6.2	2.0	10.2
TND20V-431KB00AAA0	TNR20V431K	275	350		215			710	1300	430 (387～ 473)	6.4	2.1	10.2
TND20V-471KB00AAA0	TNR20V471K	300	385		250	1.0	100	775	1200	470 (423～ 517)	6.6	2.3	10.3
TND20V-511KB00AAA0	TNR20V511K	320	410		273			845	1100	510 (459～ 561)	6.8	2.4	10.3
TND20V-561KB00AAA0	TNR20V561K	350	460		273			922	1000	560 (504～ 616)	7.1	2.6	10.3
TND20V-621KB00AAA0	TNR20V621K	385	505		273			1025	900	620 (558～ 682)	7.5	2.9	10.4
TND20V-681KB00AAA0	TNR20V681K	420	560		273			1120	830	680 (612～ 748)	7.8	3.1	10.5
TND20V-751KB00AAA0	TNR20V751K	460	615		300			1240	750	750 (675～ 825)	8.2	3.4	10.6
TND20V-821KB00AAA0	TNR20V821K	510	670	7500A/1 time	325			1355	700	820 (738～ 902)	8.5	3.6	10.6
TND20V-911KB00AAA0	TNR20V911K	550	745		360			1500	620	910 (819～1001)	9.0	4.0	10.8
TND20V-102KB00AAA0	TNR20V102K	625	825	6500A/2 times	400			1650	560	1000 (900～1100)	9.5	4.3	10.9
TND20V-112KB00AAA0	TNR20V112K	680	895		440			1815	510	1100 (990～1210)	10.1	4.7	11.0
TND20V-122KB00AAA0	TNR20V122K	720	980		480			1950	450	1200 (1080～1320)	10.8	5.1*	11.2**
TND20V-152KB00AAA0	TNR20V152K	860	1220		600			2440	390	1500 (1350～1650)	12.8	6.2*	11.8**
TND20V-182KB00AAA0	TNR20V182K	1000	1465		720			2970	340	1800 (1700～1980)	14.8	7.4*	12.4**

*E±2 **W2±2

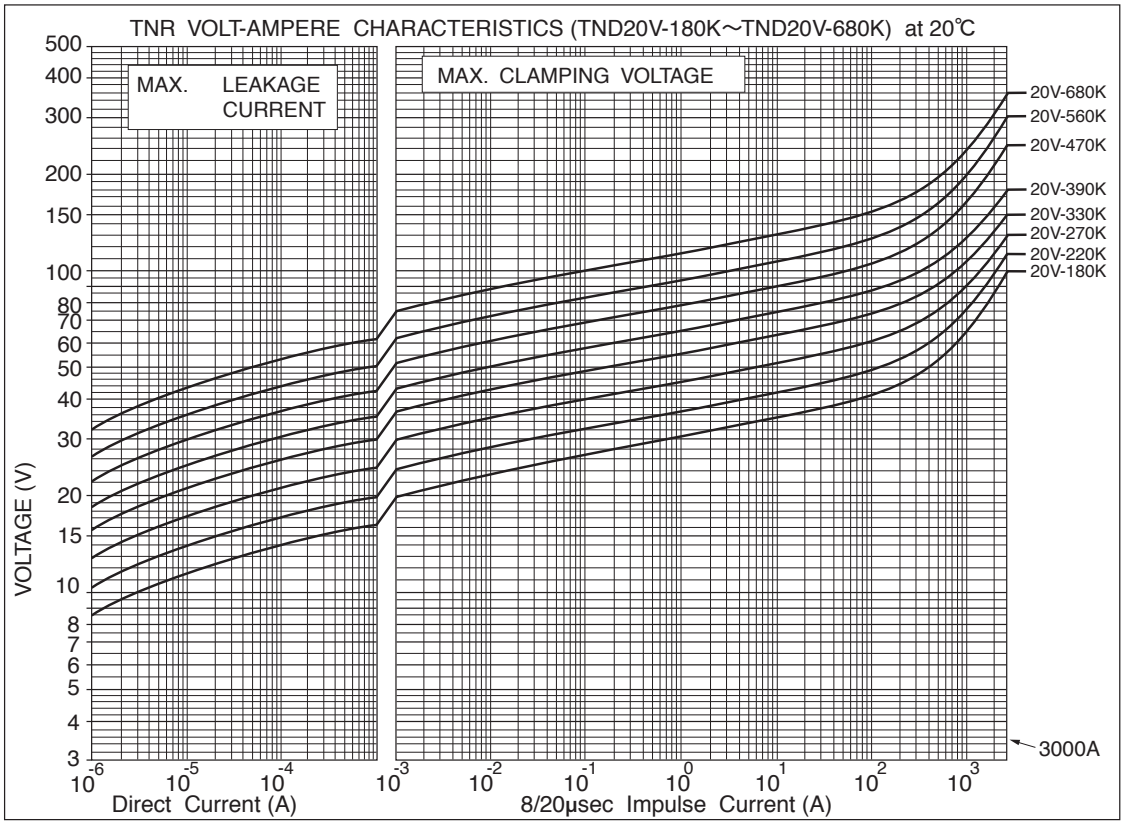
◆DIMENSIONS [mm]

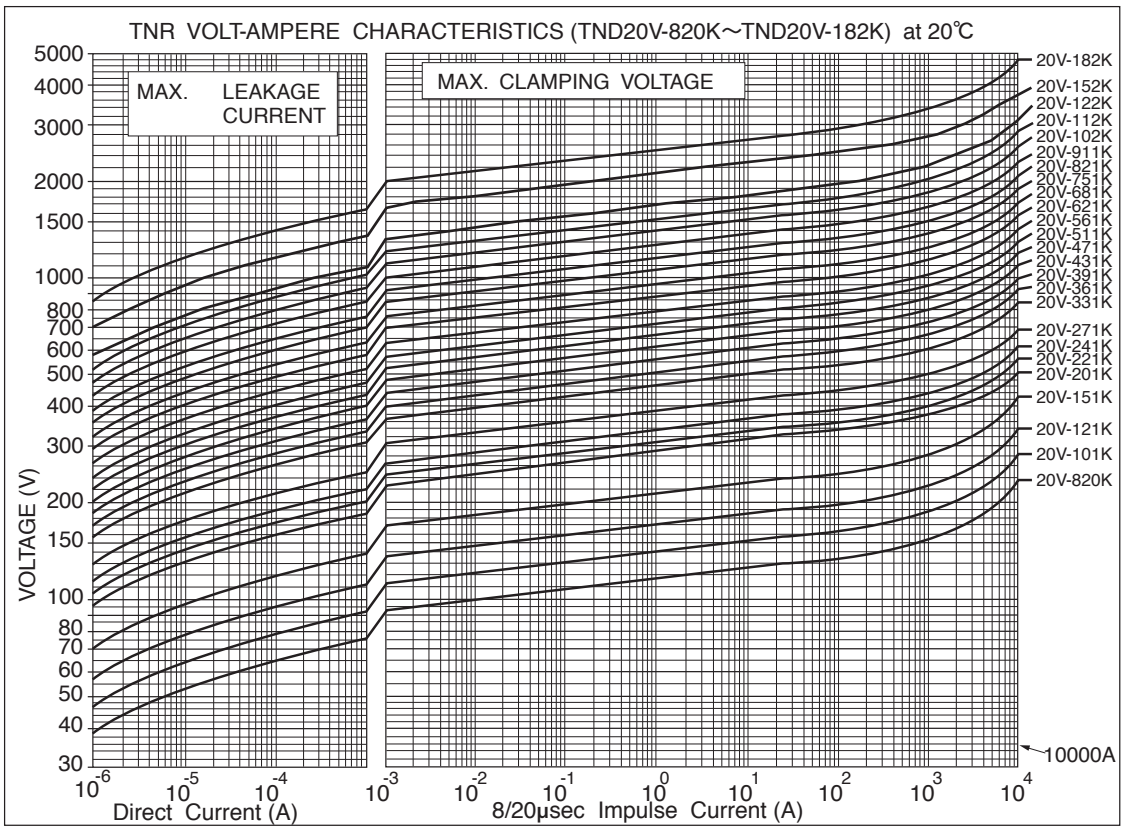


Part Number	D Max.	H Max.	T Max.	L Min.	ϕd ±0.05	W ±1.0
TND20V-180K to TND20V-511K	21.5	24.5	Ref. to Ratings	20	0.8	10.0
TND20V-561K to TND20V-112K	22.5	25.5				
TND20V-122K to TND20V-182K	23.5	28.0				

V Series

◆V-I CURVE (Type 20V)





V Series

◆GENERAL SPECIFICATIONS

Item	Test Conditions	Specifications
Standard Test Condition	20±15℃, 85%RH Max.	
Varistor Voltage	Voltage across varistor at specified current. Type: 5V — Current CmA: 0.1 Type: 7V, 9V, 10V, 12V, 14V, 20V — Current CmA: 1.0	Satisfy the specification
Maximum Allowable Voltage	Maximum continuous AC voltage (50 to 60Hz AC) and maximum DC voltage which can be applied.	Satisfy the specification
Maximum Peak Surge Current	Maximum surge current (8/20μs pulse wave to be applied once, or twice, 2 minutes apart) for varistor voltage change within±10% of the initial value.	Satisfy the specification
Energy Rating	Maximum energy (2 ms. square wave to be applied once) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Rated Wattage	Maximum power (50 to 60Hz AC power to be applied for 1000 hours at 85±2℃) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Maximum Clamping Voltage	Maximum voltage across varistor when 8/20μs rated current surge is applied.	Satisfy the specification
Capacitance	Varistor's capacitance at 1kHz, standard test condition.	For reference only.
Voltage Temperature Coefficient	$\frac{\text{VcmA at 85℃} - \text{VcmA at 25℃}}{\text{VcmA at 25℃}} \times \frac{1}{60} \times 100\ (\%/℃)$ VcmA : Actual varistor voltage	Within ±0.05%/℃
Insulation	Short circuit the two leads of varistor, and put the varistor body into metal balls (1.6mm diameter) leaving 2mm epoxy coating outside. Then, apply 2.5kVrms between the leads and the metal balls for 60±5 sec..	The varistor shall withstand with no abnormality.

◆ENVIRONMENTAL CHARACTERISTICS

Item	Test Conditions	Specifications
High Temperature Storage (Dry heat)	The specimen shall be subjected 125±2℃ for 1000±12 hours without load.	Δ VcmA/VcmA≦±5% However, on varistors have nominal varistor voltages from 15V to 68V, the varistor voltage change shall be Δ VcmA/VcmA≦±10%
Low Temperature Storage	The specimen shall be subjected -40±2℃ for 1000±12 hours without load.	Δ VcmA/VcmA≦±5%
Damp heat (Humidity)	The specimen shall be subjected to 40±2℃, 90 to 95%RH for 1000±12 hours without load.	ΔVcmA/VcmA≦±5%
Temperature Cycle	The temperature cycle shown below shall be repeated 5 cycles. -40±3℃, 30 minutes ⇔ +85±2℃, 30 minutes	ΔVcmA/VcmA≦±5% No remarkable damage
High Temperature Operating	The specimen shall be subjected to 85±2℃ with the maximum allowable voltage for 1000±12 hours.	ΔVcmA/VcmA≦±10%
Damp heat Operating	The specimen shall be subjected to 40±2℃, 90 to 95%RH with the maximum allowable voltage for 1000±12 hours.	ΔVcmA/VcmA≦±10%

Varistor voltage change of forward direction shall be measured in the test of unipolar surge life and DC load life.
Varistor voltage change is measured after stored at Standard Test Conditions for 1 to 2 hours.
Note : For 42V battery line, please contact our sales office.

V Series

◆MECHANICAL CHARACTERISTICS

<table>
<tr><th>Item</th><th>Test Conditions</th><th>Specifications</th></tr>
<tr><td>Resistance to Soldering Heat</td><td>Each lead shall be dipped into a solder bath having a temperature of 350±10℃ to a point 2.0 to 2.5 mm from the body of the unit, be held there for 3^{+1}_{-0} sec and then be stored at room temperature for 1 to 2 hours. The ΔVcmA and mechanical damage shall be examined.
or
Each lead shall be dipped into a solder bath having a temperature of 260±10℃ to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10±1 sec and then be stored at room temperature for 1 to 2 hours. The ΔVcmA and mechanical damage shall be examined.</td><td>ΔVcmA/VcmA ≦±5%
No remarkable damage</td></tr>
<tr><td>Solderability</td><td>Each lead shall be dipped into a methanol solution (about 25%) of rosin for 5 to 10 sec.
Then each lead shall be dipped into a solder.
<table>
<tr><td>Solder</td><td>Pb free (Sn-3.0Ag-0.5Cu)</td><td>Eutectic (Sn/Pb)</td></tr>
<tr><td>Solder Temp.</td><td>245±5℃</td><td>235±5℃</td></tr>
<tr><td>Dipping Time</td><td colspan="2">2±0.5sec.</td></tr>
<tr><td>Dipping Depth</td><td colspan="2">1.5 to 2.0mm (from the body)</td></tr>
</table></td><td>At least, 95% of the leads shall be covered with solder uniformly.</td></tr>
<tr><td>Lead Pull Strength</td><td>Fix varistor body, and suspend specified weight toward direction of lead axis.
<table>
<tr><td>Type</td><td>Lead Diameter</td><td>Weight</td></tr>
<tr><td>5V, 7V, 9V</td><td>0.6mm</td><td>10N</td></tr>
<tr><td>10V, 12V, 14V, 20V</td><td>0.8mm</td><td>10N</td></tr>
</table></td><td>No abnormality such as disconnection.

ΔVcmA/VcmA ≦±5%</td></tr>
<tr><td>Lead Bend Strength</td><td>Fix varistor body vertically. Then suspend specified weight and bent the varistor body by 90°, and return it to the original position. Carry out the operation in the opposite direction and return the body to the original position.
<table>
<tr><td>Type</td><td>Lead Diameter</td><td>Weight</td></tr>
<tr><td>5V, 7V, 9V</td><td>0.6mm</td><td>5N</td></tr>
<tr><td>10V, 12V, 14V, 20V</td><td>0.8mm</td><td>5N</td></tr>
</table></td><td>The leads shall not disconnect, slacken and peel off.</td></tr>
<tr><td>Vibration</td><td>Mount varistor body on vibrator, and conduct the follwing vibration test.
Peak-to-Peak amplitude : 1.5mm
Vibration frequency range : 10Hz to 55Hz
Sweeping time:
Approximately one minute for 10Hz →55Hz →10Hz
Direction and duration of vibration :
Three directions of X, Y and Z. Two hours each.
Six hours total.</td><td>No remarkable appearance abnormality.

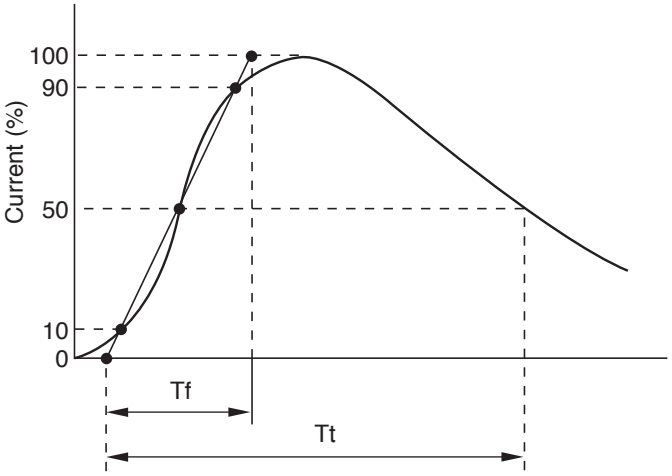
ΔVcmA/VcmA ≦±5%</td></tr>
</table>

PULSE LIFE TIME RATINGS

When the following factors are different from the specified conditions,
the peak pulse current should be revised based on the PULSE LIFE TIME RATINGS.

- Impulse duration time
- Number of impulse

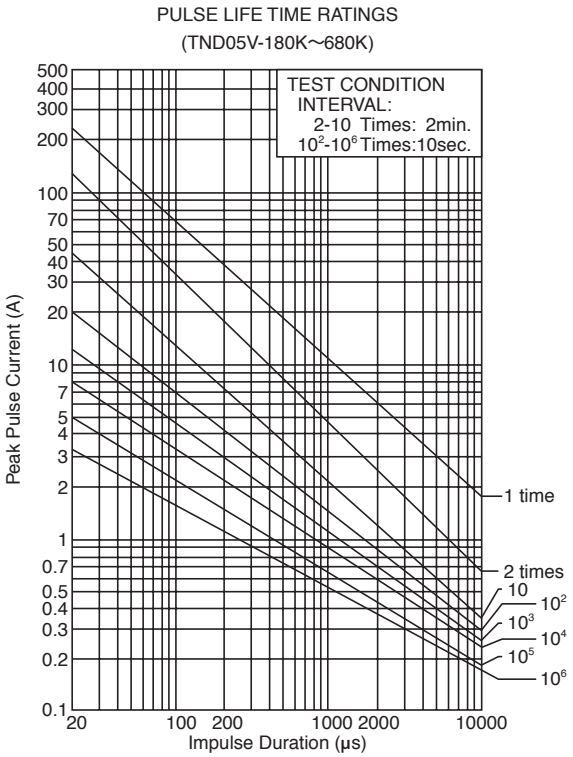
(Impulse Current Wave Form)

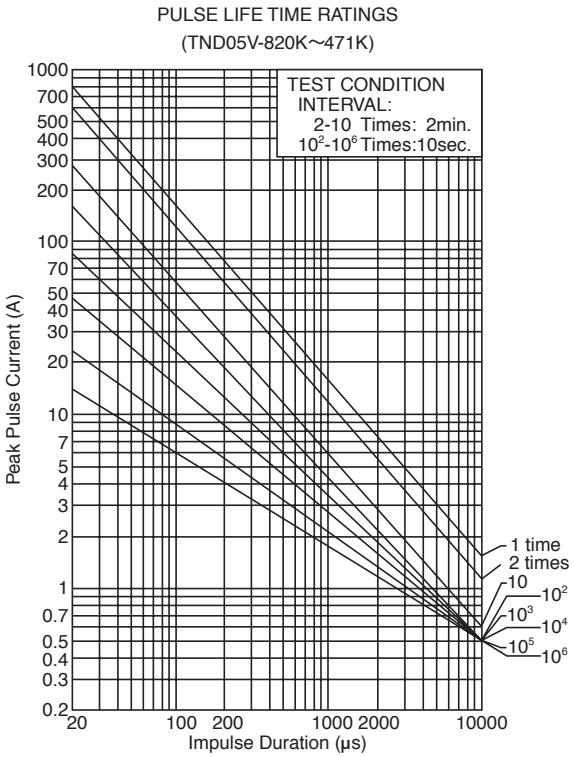


Tf : (Rise Time)

Tt : (Impulse Duration)

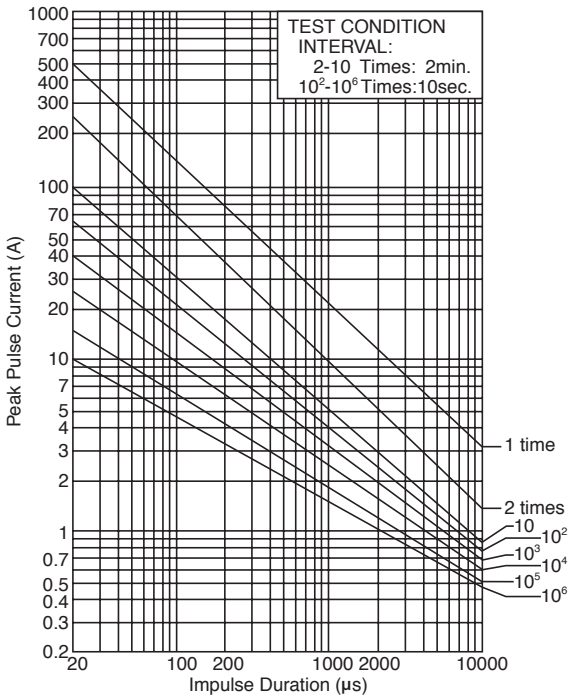
●V series



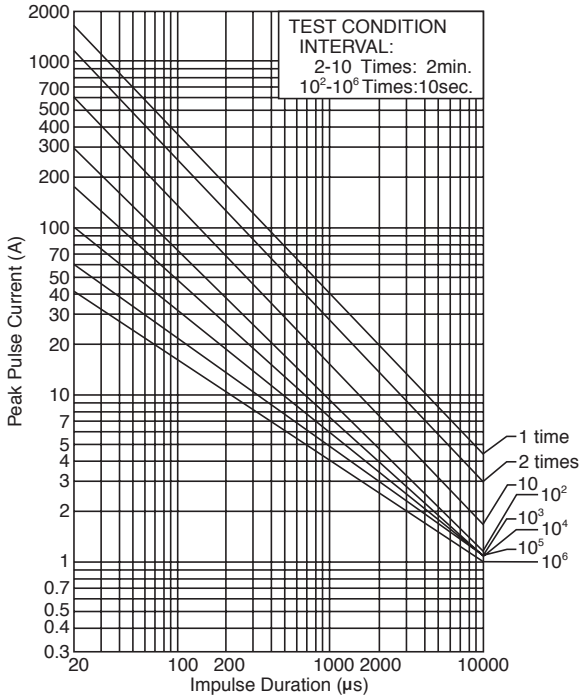


●V series

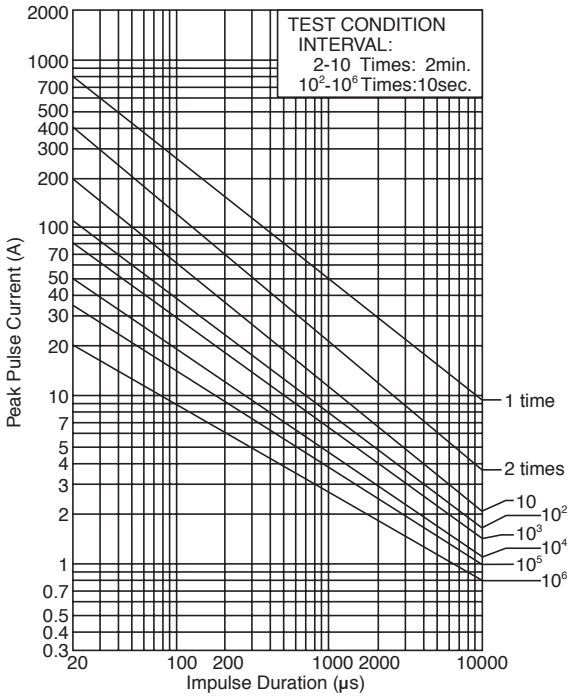
PULSE LIFE TIME RATINGS
(TND07V-150K～680K)



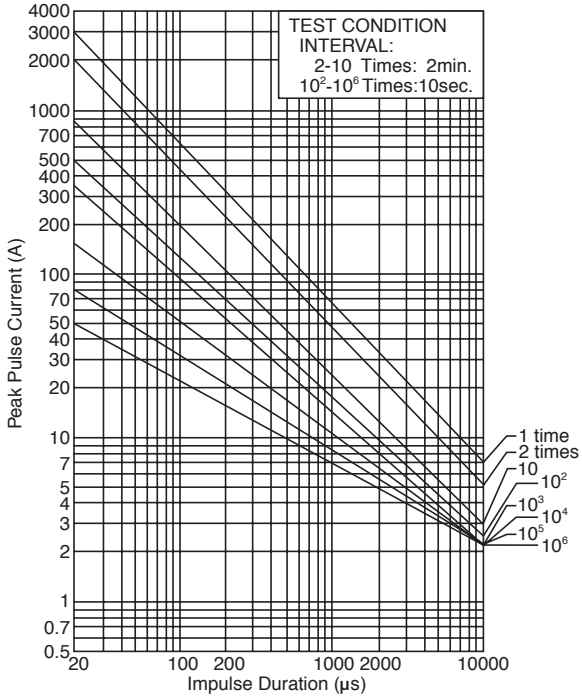
PULSE LIFE TIME RATINGS
(TND07V-820K～511K)



PULSE LIFE TIME RATINGS
(TND09V-150K～680K)

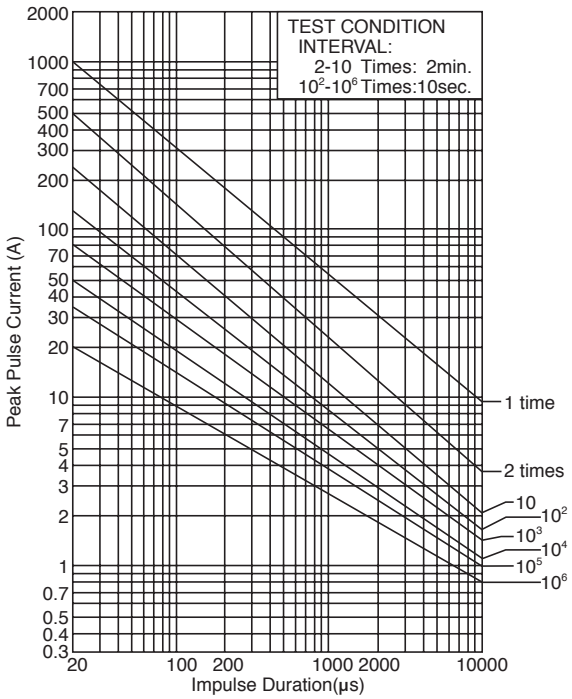


PULSE LIFE TIME RATINGS
(TND09V-820K～511K)

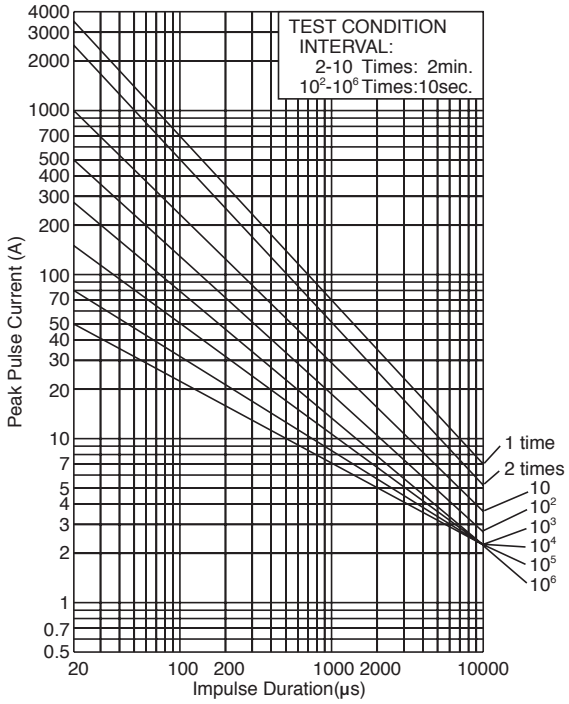


●V series

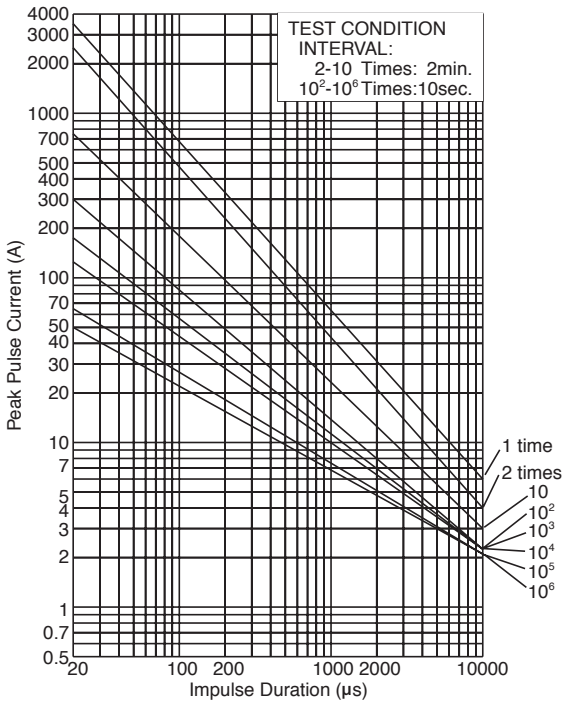
PULSE LIFE TIME RATINGS
(TND10V-150K～680K)



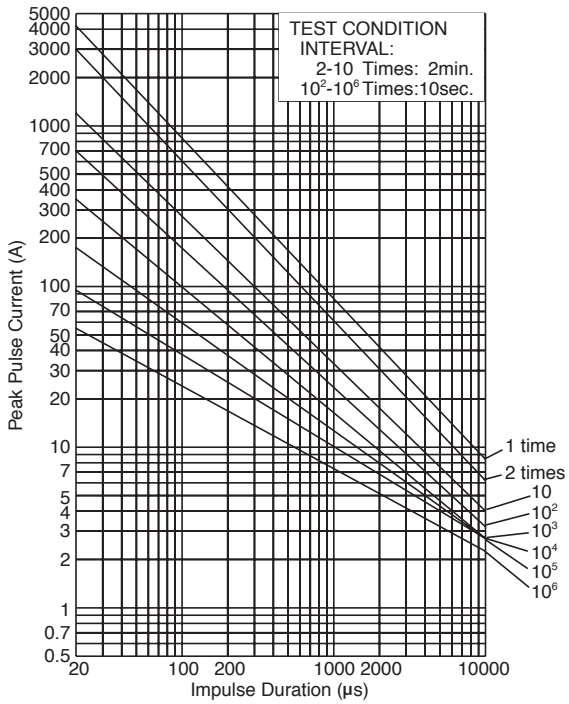
PULSE LIFE TIME RATINGS
(TND10V-820K～511K)



PULSE LIFE TIME RATINGS
(TND10V-561K～182K)

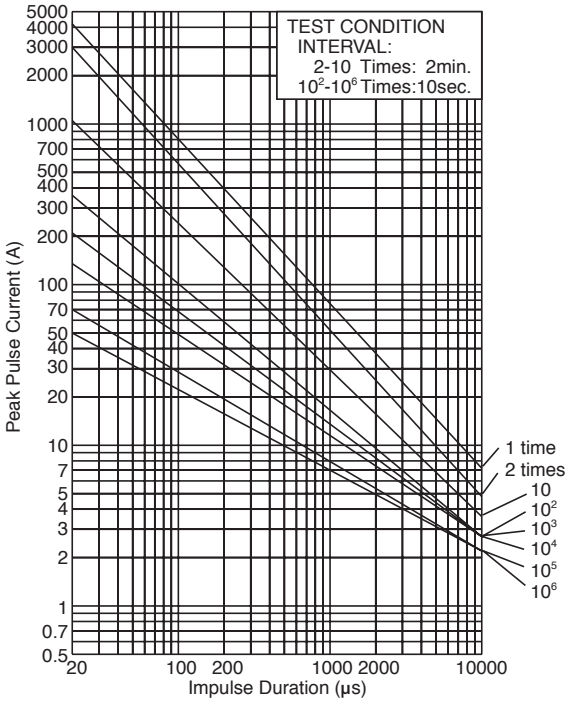


PULSE LIFE TIME RATINGS
(TND12V-431K～511K)

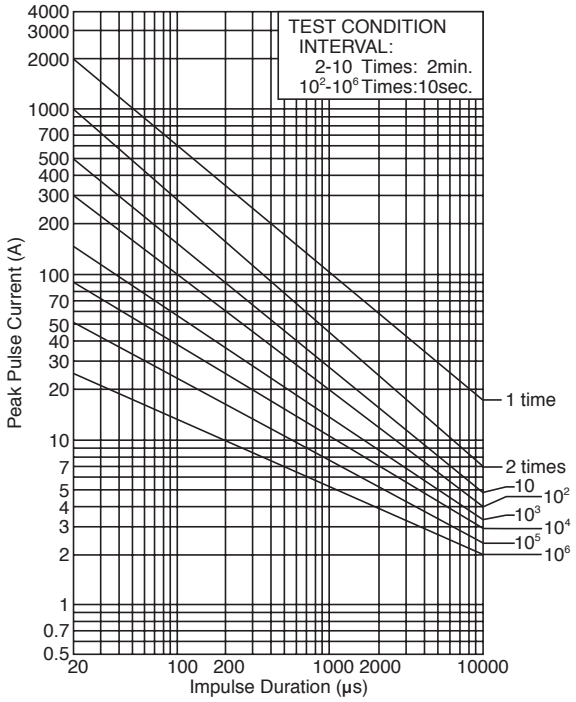


●V series

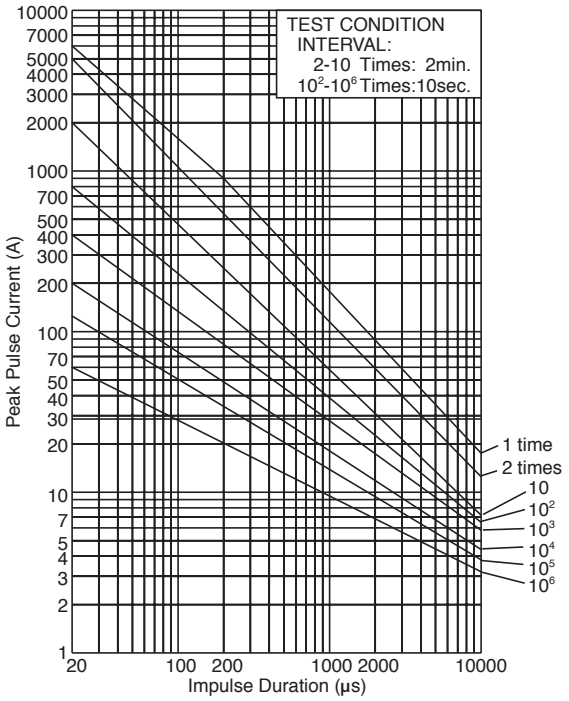
PULSE LIFE TIME RATINGS
(TND12V-561K～182K)



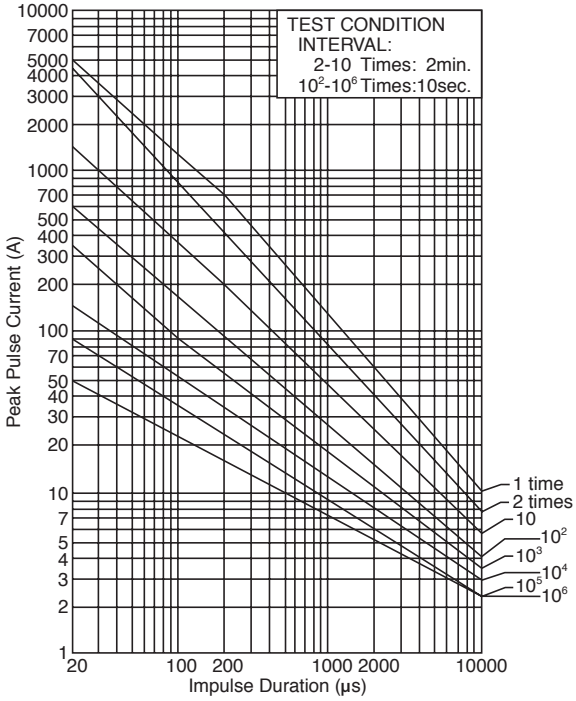
PULSE LIFE TIME RATINGS
(TND14V-150K～680K)



PULSE LIFE TIME RATINGS
(TND14V-820K～511K)

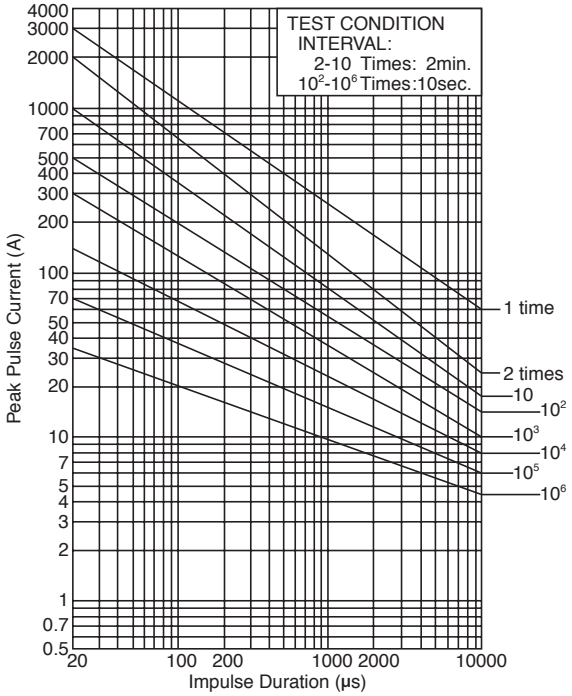


PULSE LIFE TIME RATINGS
(TND14V-561K～182K)

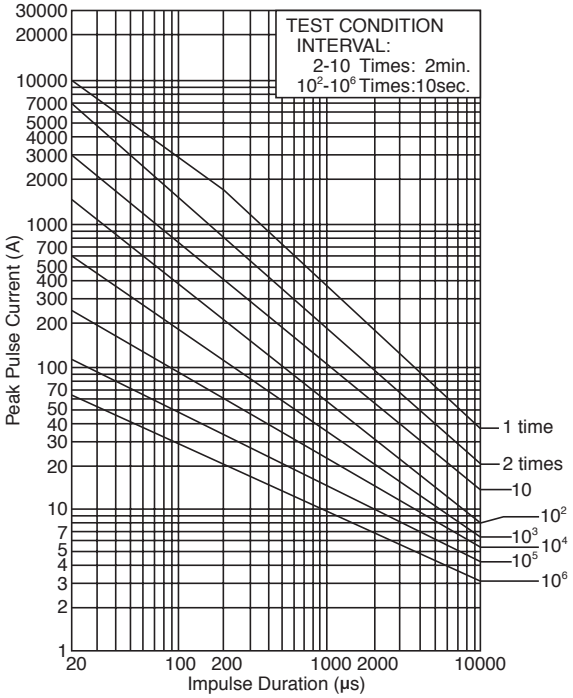


●V series

PULSE LIFE TIME RATINGS
(TND20V-180K～680K)

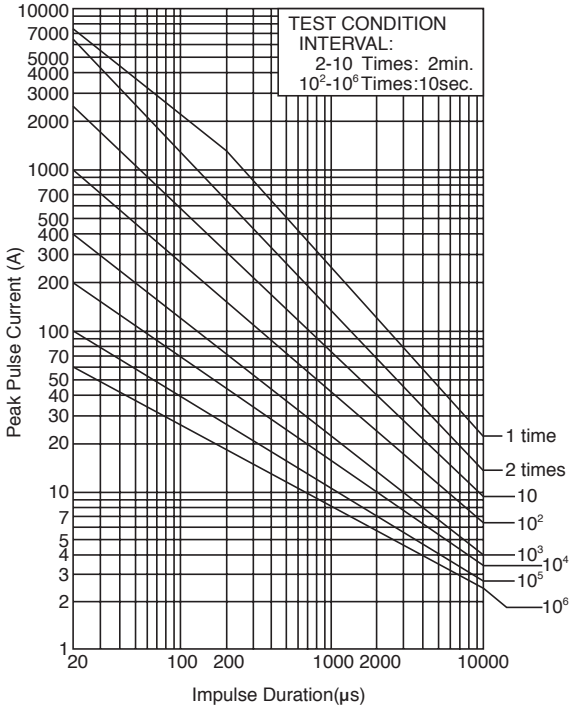


PULSE LIFE TIME RATINGS
(TND20V-820K～511K)



●V series

PULSE LIFE TIME RATINGS
(TND20V-561K～182K)



NIPPON CHEMI-CON

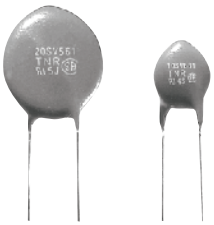
METAL OXIDE VARISTORS TNR™

SV Series

Upgrade!

RoHS2 Compliant

High temperature



Our newly developed TNR SV series is to prevent from being caught fire even very high surge energy is applied.
Thus electric appliance using TNR SV series can be much safer like TNR SE series.

◆FEATURES

- ●Little scatter at the destruction under over voltage.
- ●Environmental characteristics (Upgrade)
  High temperature operating : 125°C,1000hours
  Damp heat operating : 85°C,85%RH, 1000hours
  Temperature cycle : -40°C ⇔ +125°C, 1000cycles
- ●Coating resin doesn't burn under the flammability test of UL.
- ●Material of Coating resin:UL94V-0 and Halogen free
- ●UL, CSA and VDE recognized components

UL1449	File：E323623
CSA	File：LR97864
VDE	File：118623
CQC	File number varies according to a part number. Pleasee refer to us.

- ●Accepted temperature varies according to Safety standards.
  Please refer to us for the details.
- ●AEC-Q200 compliant : φ10～φ14 (220V～680V) Please contact Chemi-con for more details, test data, information.

◆APPLICATIONS

- ●Protection for semiconductors from over voltage.
- ●Protection for electronic instruments from lightning surge.
- ●Absorption of on-off surge from motors and relays.

Operating Temperature Range： -40 ～ +125°C
Storage Temperature Range ： -50 ～ +150°C

◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T	N	D	1	0	S	V	4	7	1	K	T	L	B	P	A	A	0

Design Code
Lead Forming / Taping
Packing Style (Taping)
⑥Varistor Voltage Tolerance
⑤Varistor Voltage
④Series
③Element Diameter
②Product Form
①Category

①Category	
T	Metal Oxide Varistor TNR

②Product Form	
ND	Disk Type

③Element Diameter	
07	φ7 mm
10	φ10 mm
12	φ12 mm
14	φ14 mm
20	φ20 mm

④Series	
SV	SV series

⑤Varistor Voltage
The first two digits are significant figures and the third one denotes the number of folowing zeros.

⑥Varistor Voltage Tolerance	
K	±10%

◆CAUTIONS and WARNINGS

Varistors may be short-circuit or be destroyed, in case of absorbing over rating voltage or over rating surge.
Please connect a current fuse or a circuit breaker in series with varistors.

SV Series

◆RATING AND CHARACTERISTICS

Part Number	Previous Part Number	Maximum Ratings					Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V1mA	Thickness T MAX.
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage					
		AC (Vrms)	DC (V)	8/20us (A)	2ms (J)	(W)	(A)	(V)	(pF)	(V)	
TND07SV221KTBAAAA0	TNR7SV221K-T25	140	180		13.5			360	230	220 (198 to 242)	5.0
TND07SV241KTBAAAA0	TNR7SV241K-T25	150	200		15			395	210	240 (216 to 264)	5.1
TND07SV271KTBAAAA0	TNR7SV271K-T25	175	225	1,750A/1time	17	0.25	10	455	190	270 (247 to 303)	5.2
TND07SV431KTBAAAA0	TNR7SV431K-T25	275	350	1,250A/2times	27.5			710	130	430 (387 to 473)	6.2
TND07SV471KTBAAAA0	TNR7SV471K-T25	300	385		30			775	120	470 (423 to 517)	6.3
TND07SV511KTBAAAA0	TNR7SV511K-T25	320	410		32			845	110	510 (459 to 561)	6.6
TND10SV221KTLBPAA0	TNR10SV221K417-T71	140	180		27.5			360	450	220 (198 to 242)	5.4
TND10SV241KTLBPAA0	TNR10SV241K417-T71	150	200		30			395	400	240 (216 to 264)	5.5
TND10SV271KTLBPAA0	TNR10SV271K417-T71	175	225		35			455	350	270 (247 to 303)	5.7
TND10SV431KTLBPAA0	TNR10SV431K417-T71	275	350		55			710	240	430 (387 to 473)	6.5
TND10SV471KTLBP◇A0	TNR10SV471K□-T71	300	385		60			775	220	470 (423 to 517)	6.7
TND10SV511KTLBP◇A0	TNR10SV511K□-T71	320	410	3,500A/1time	67			845	210	510 (459 to 561)	6.9
TND10SV561KTLBP◇A0	TNR10SV561K□-T71	350	460	2,500A/2times	67	0.4	25	922	195	560 (504 to 616)	7.2
TND10SV621KTLBP◇A0	TNR10SV621K□-T71	385	505		67			1025	180	620 (558 to 682)	7.5
TND10SV681KTLBP◇A0	TNR10SV681K□-T71	420	560		67			1120	165	680 (612 to 748)	7.9
TND10SV751KB00A◇A0	TNR10SV751K□	460	615		70			1240	150	750 (675 to 825)	8.2
TND10SV821KB00A◇A0	TNR10SV821K□	510	670		80			1355	140	820 (738 to 902)	8.6
TND10SV911KB00A◇A0	TNR10SV911K□	550	745		90			1500	125	910 (819 to 1001)	9.1
TND10SV102KB00A◇A0	TNR10SV102K□	625	825		100			1650	115	1000 (900 to 1100)	9.6
TND12SV431KTLBPAA0	TNR12SV431K417-T71	275	350		55			710	375	430 (387 to 473)	6.5
TND12SV471KTLBPAA0	TNR12SV471K417-T71	300	385		60			775	345	470 (423 to 517)	6.7
TND12SV511KTLBPAA0	TNR12SV511K417-T71	320	410		67			845	330	510 (459 to 561)	6.9
TND12SV561KTLBPAA0	TNR12SV561K417-T71	350	460		67			922	305	560 (504 to 616)	7.2
TND12SV621KTLBPAA0	TNR12SV621K417-T71	385	505	4,200A/1time	67	0.4	25	1025	280	620 (558 to 682)	7.5
TND12SV681KTLBPAA0	TNR12SV681K417-T71	420	560	3,000A/2times	67			1120	260	680 (612 to 748)	7.9
TND12SV751KB00AAA0	TNR12SV751K	460	615		70			1240	235	750 (675 to 825)	8.4
TND12SV821KB00AAA0	TNR12SV821K	510	670		80			1355	220	820 (738 to 902)	8.8
TND12SV911KB00AAA0	TNR12SV911K	550	745		90			1500	195	910 (819 to 1001)	9.2
TND12SV102KB00AAA0	TNR12SV102K	625	825		100			1650	180	1000 (900 to 1100)	9.7
TND14SV221KTLBPAA0	TNR14SV221K417-T71	140	180		55			360	850	220 (198 to 242)	5.4
TND14SV241KTLBPAA0	TNR14SV241K417-T71	150	200		60			395	800	240 (216 to 264)	5.5
TND14SV271KTLBPAA0	TNR14SV271K417-T71	175	225	6,000A/1time	70			455	700	270 (247 to 303)	5.7
TND14SV431KTLBPAA0	TNR14SV431K417-T71	275	350	5,000A/2times	110			710	460	430 (387 to 473)	6.5
TND14SV471KTLBPAA0	TNR14SV471K417-T71	300	385		125			775	420	470 (423 to 517)	6.7
TND14SV511KTLBPAA0	TNR14SV511K417-T71	320	410		136			845	390	510 (459 to 561)	6.9
TND14SV561KTLBPAA0	TNR14SV561K417-T71	350	460		136	0.6	50	922	360	560 (504 to 616)	7.2
TND14SV621KTLBPAA0	TNR14SV621K417-T71	385	505		136			1025	330	620 (558 to 682)	7.5
TND14SV681KTLBPAA0	TNR14SV681K417-T71	420	560		136			1120	310	680 (612 to 748)	7.9
TND14SV751KB00AAA0	TNR14SV751K	460	615	5,000A/1time	150			1240	280	750 (675 to 825)	8.4
TND14SV821KB00AAA0	TNR14SV821K	510	670	4,500A/2times	165			1355	250	820 (738 to 902)	8.8
TND14SV911KB00AAA0	TNR14SV911K	550	745		180			1500	230	910 (819 to 1001)	9.2
TND14SV102KB00AAA0	TNR14SV102K	625	825		200			1650	210	1000 (900 to 1100)	9.7
TND20SV221KB00AAA0	TNR20SV221K	140	180		110			360	2500	220 (198 to 242)	5.4
TND20SV241KB00AAA0	TNR20SV241K	150	200		120			395	2300	240 (216 to 264)	5.5
TND20SV271KB00AAA0	TNR20SV271K	175	225	10,000A/1time	135			455	2000	270 (247 to 303)	5.7
TND20SV431KB00AAA0	TNR20SV431K	275	350	7,000A/2times	215			710	1300	430 (387 to 473)	6.5
TND20SV471KB00AAA0	TNR20SV471K	300	385		250			775	1200	470 (423 to 517)	6.7
TND20SV511KB00AAA0	TNR20SV511K	320	410		273			845	1100	510 (459 to 561)	6.9
TND20SV561KB00AAA0	TNR20SV561K	350	460		273	1.0	100	922	1000	560 (504 to 616)	7.2
TND20SV621KB00AAA0	TNR20SV621K	385	505		273			1025	900	620 (558 to 682)	7.6
TND20SV681KB00AAA0	TNR20SV681K	420	560		273			1120	830	680 (612 to 748)	7.9
TND20SV751KB00AAA0	TNR20SV751K	460	615	7,500A/1time	300			1240	750	750 (675 to 825)	8.4
TND20SV821KB00AAA0	TNR20SV821K	510	670	6,500A/2times	325			1355	700	820 (738 to 902)	8.8
TND20SV911KB00AAA0	TNR20SV911K	550	745		360			1500	620	910 (819 to 1001)	9.2
TND20SV102KB00AAA0	TNR20SV102K	625	825		400			1650	560	1000 (900 to 1100)	9.7

	◇	□
Standard	A	417
φ10 IEC 62368-1:2014 G.8.2 conforming product	S	S417

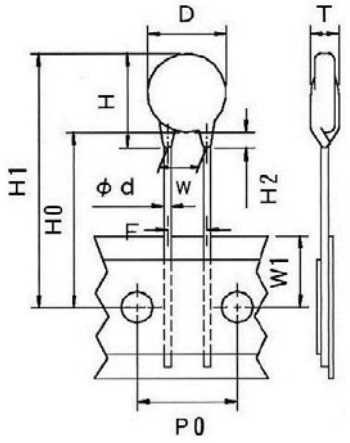
SV Series

◆ DIMENSIONS

● Refer to the table below for standard packing styles.

	TND07SV	TND10SV	TND12SV	TND14SV	TND20SV
221K to 511K	Taping	Taping	Taping	Taping	Bulk
561K to 681K	—	Taping	Taping	Taping	Bulk
751K to 102K	—	Bulk	Bulk	Bulk	Bulk

·TND 7SV is a taping product.

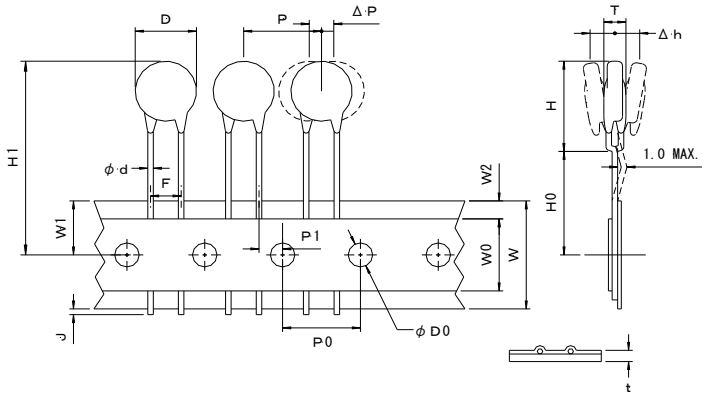


Symbol	7SV
D	9.0 Max.
H	14.0 Max.
T	Ref. to RATINGS
ϕd	0.6±0.05
P0	12.7±0.3
W1	9.0±0.5
W	5.0±1.0
F	5.0±0.8
H0	$20.0\pm^{1.5}_{1.0}$
H1	32.5 Max.
H2	5.0 Max.

·Taping specifications of TND10SV/TND12SV/TND14SV

Taping Code : TLB

Symbol	10SV	12SV	14SV
D	12.5	14.5	16.5
ϕd	0.8±0.05	←	←
P	15.0±1.0	15.0±1.0	30.0±1.0
P0	15.0±0.3	←	←
ϕD0	4.0±0.2	←	←
P1	3.75±0.5	←	←
W1	9.0±0.5	←	←
F	7.5±0.8	←	←
Δh	0±2.0	←	←
ΔP	0±1.3	←	←
W	$18.0\ ^{+1.0}_{-0.5}$	←	←
W0	5.0 MIN.	←	←
W2	3.0 MAX.	←	←
t	0.6±0.3	←	←
H	20.0 MAX.	23.5 MAX	25.0 MAX.
H0	19.0±1.0	←	←
H1	46.5 MAX.	←	←
J	6.0 MAX.	←	←



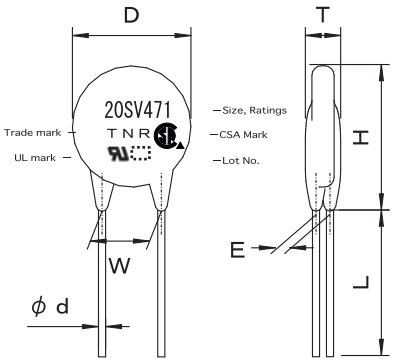
SV Series

◆DIMENSION

Part Number	D MAX.	H MAX.	L MIN.	φd ±0.05	W ±1.0	E ±1.0
TND10SV751KB00A◇A0	13.0	18.0	20.0	0.8	7.5	3.1
TND10SV821KB00A◇A0						3.4
TND10SV911KB00A◇A0						3.7
TND10SV102KB00A◇A0						4.0
TND12SV751KB00AAA0	15.0	20.0				3.1
TND12SV821KB00AAA0						3.4
TND12SV911KB00AAA0						3.7
TND12SV102KB00AAA0						4.0
TND14SV751KB00AAA0	16.5	21.5				3.3
TND14SV821KB00AAA0						3.5
TND14SV911KB00AAA0						3.9
TND14SV102KB00AAA0						4.2
TND20SV221KB00AAA0	22.5	27.5			10.0	1.3
TND20SV241KB00AAA0						1.4
TND20SV271KB00AAA0						1.5
TND20SV431KB00AAA0						2.1
TND20SV471KB00AAA0						2.3
TND20SV511KB00AAA0						2.4
TND20SV561KB00AAA0	23.0	28.5				2.6
TND20SV621KB00AAA0						2.9
TND20SV681KB00AAA0						3.1
TND20SV751KB00AAA0	23.5	29.5				3.4
TND20SV821KB00AAA0						3.6
TND20SV911KB00AAA0						4.0
TND20SV102KB00AAA0						4.3

◆MARKING

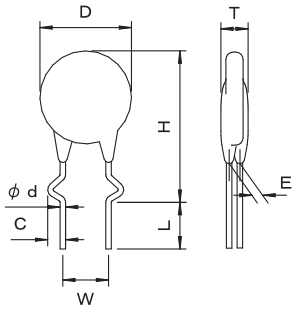
EX)



•TND10SV/TND12SV/TND14SV with the rating 751K or above and TND20SV are packaged in bulk.

Lead forming Type

Part No.	TND20SV***KBESAAA0
Forming Code	BES (310)
D	refer to each spec.
T	refer to each spec.
H	31.0 MAX.
L	5.0 ± 1.0
W	10.0 ± 1.0
φd	0.8 ± 0.05
C	2.0 ± 0.5
E	refer to each spec.



◆V-I CURVE

V-I characteristics and PULE LIFE TIME RATINGS are same as those of V series.
Please see V-I CURVE and PULE LIFE TIME RATINGS of V series.

CROSS REFERENCE TABLE（Common to standard product and IEC 62368-1:2014 G.8.2 conforming product）

TNR SV SERIES	TNR V SERIES	V-I CURVE GO TO REF. PAGE	PULSE LIFE TIME RATINGS GO TO REF. PAGE
TND07SV221K to TND07SV511K	TND07V-221K to TND07V-511K	P.57	P.71
TND10SV221K to TND10SV102K	TND10V-221K to TND10V-102K	P.61	P.72
TND12SV431K to TND12SV102K	TND12V-431K to TND12V-102K	P.63	P.72 to 73
TND14SV221K to TND14SV102K	TND14V-221K to TND14V-102K	P.65	P.73
TND20SV221K to TND20SV102K	TND20V-221K to TND20V-102K	P.67	P.74

SV Series

◆GENERAL SPECIFICATIONS

Item	Test Conditions	Specifications
Standard Test Condition	20±15℃, 85%RH Max.	–
Varistor Voltage	The voltage between the two terminals measured at 1mA DC is called Varistor Voltage. The measurement shall be made as fast as possible to avoid heat affection.	Satisfy the specification
Maximum Allowable Voltage	Maximum continuous AC voltage (50 to 60Hz AC) and maximum DC voltage which can be applied.	Satisfy the specification
Maximum Peak Surge Current	Maximum surge current (8/20μs pulse wave to be applied once, or twice, 2 minutes apart) for varistor voltage change within±10% of the initial value.	Satisfy the specification
Energy Rating	Maximum energy (2 ms. square wave to be applied once) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Rated Wattage	Maximum power (50 to 60Hz/AC power to be applied for 1000 hours at 125°C) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Maximum Clamping Voltage	Maximum voltage across varistor when 8/20μs rated current surge is applied.	Satisfy the specification
Capacitance	Varistor's capacitance at 1kHz, standard test condition.	For reference only.
Voltage Temperature Coefficient	$\frac{\text{V1mA at 125℃} - \text{V1mA at 25℃}}{\text{V1mA at 25℃}} \times \frac{1}{100} \times 100\ (\%/℃)$ V1mA : Actual varistor voltage	Within ±0.05%/℃
Insulation	Short circuit the two leads of varistor, and put the varistor body into metal balls (1.6mm diameter) leaving 2mm resin coating outside. Then, apply 2.5kVrms between the leads and the metal balls for 60±5 sec.	The varistor shall withstand with no abnormality.

◆ENVIRONMENTAL CHARACTERISTICS

Item	Test Conditions	Specifications
High Temperature Storage (Dry heat)	The specimen shall be subjected 150±2°C for 1000±12 hours without load.	ΔV1mA/V1mA≦±10%
Low Temperature Storage	The specimen shall be subjected -40±2°C for 1000±12 hours without load.	ΔV1mA/V1mA≦±5%
Damp heat (Humidity)	The specimen shall be subjected to 85±2°C, 80 to 85%RH for 1000±12 hours without load.	ΔV1mA/V1mA≦±5%
Temperature Cycle	The temperature cycle shown below shall be repeated 1000 cycles. −40±3°C, 30 minutes⇔ +125±2°C, 30 minutes	ΔV1mA/V1mA≦±5% No remarkable damage
High Temperature Operating	The specimen shall be subjected to 125±2°C with the maximum allowable voltage for 1000± 12 hours.	ΔV1mA/V1mA≦±10%
Damp heat Operating	The specimen shall be subjected to 85±2°C, 80 to 85%RH with the maximum allowable voltage for 1000±12 hours.	ΔV1mA/V1mA≦±10%

Varistor voltage change of forward direction shall be measured in the test of unipolar surge life and DC load life.
Varistor voltage change is measured after stored at Standard Test Conditions for 1 to 2 hours.

SV Series

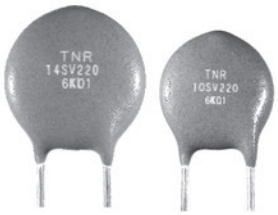
◆MECHANICAL CHARACTERISTICS

Item	Test Conditions	Specifications
Resistance to Soldering Heat	Each lead shall be dipped into a solder bath having a temperature of 350±10°C to a point 2.0 to 2.5 mm from the body of unit, be held there for 3^{+1}_{0} sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined. or Each lead shall be dipped into a solder bath having a temperature of 260±10°C to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10±1 sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined.	ΔV1mA/V1mA ≦±5% No remarkable damage
Solderability	Each lead shall be dipped into a methanol solution (about 25%) of rosin for 5 to 10 sec. Then each lead shall be dipped into a solder. Solder: Pb free (Sn-3.0Ag-0.5Cu) / Eutectic (Sn/Pb) Solder Temp.: 245±5℃ / 235±5℃ Dipping Time: 2±0.5sec. Dipping Depth: 1.5 to 2.0mm (from the body)	At least, 95% of the leads shall be covered with solder uniformly.
Lead Pull Strength	Fix varistor body, and suspend specified weight toward direction of lead axis. Lead diameter: ϕ0.8mm — Force: 10N	No abnormality such as disconnection. ΔV1mA/V1mA ≦±5%
Lead Bend Strength	The varistor shall be secured with its terminal kept vertical and the force specified below shall be applied in the axial direction. The terminal shall granually be bend by 90 in one direction then back to original position. The damage of the terminal shall be visually examined. 7SV: 0.6mm: 10N 10SV, 12SV, 14SV, 20SV: 0.8mm: 10N	No remarkable damage as remarkable the innner ceramic element or terminal open.
Vibration	Mount varistor body on vibrator, and conduct the following vibration test. Peak-to-Peak amplitude : 1.5mm Vibration frequency range : 10 to 55Hz Sweeping time: å Approximately one minute for 10Hz → 55Hz → 10Hz Direction and duration of vibration : Three directions of X, Y, and Z. 2 hours each. 6 hours total.	No remarkable apperance abnormality. ΔV1mA/V1mA ≦±5%
Flammability test	The varistor shall be subjected 60 sec. applications of test flame. Burnar : Bunsen gas burner 9000kcal / m^3 Diameter of flame nozzle : ϕ9.5mm Position : The spesimen shall be fixed horizonal. Point of application shall be approximately center of the specimen.	No catching fire, and no flaming drops.

SV Series Low varistor voltage

New!

RoHS2 Compliant | AEC-Q200 | High temperature



By using the resin properties of the SV series to a low varistor voltage products, it has achieved a high heat resistance and temperature cycle resistance.
Low varistor voltage SV series is for automotive in compliance with the AEC-Q200.

◆FEATURES

- High temperature operating : 1,000 hours at 125°C.
- Damp heat oprerating : 1,000 hours at 85°C/85%RH.
- Temperature cycle : -40°C⇔+125°C, 1000cycle.
- Material of Coating resin:UL94V-0 and Halogen free.
- AEC-Q200 compliant : Please contact Chemi-con for more details, test data, information.

◆APPLICATIONS

- Absorption of automotive load dump surge.
- Absorption of ignition-off surge.
- Absorption of switching surge of horn, motor, and relay.
- Protection of automotive electronics and semi conductors.

Operating Temperature Range : -40 ～ +125°C
Storage Temperature Range : -50 ～ +150°C

◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T	N	D	1	0	S	V	2	2	0	K	T	B	A	A	A	A	0

- 18 Design Code
- 13 14 Lead Forming/Taping
- 12 Packing Style (Taping)
- 11 ⑥Varistor Voltage Tolerance
- 8 9 10 ⑤Varistor Voltage
- 6 7 ④Series
- 4 5 ③Element Diameter
- 2 3 ②Product Form
- 1 ①Category

①Category	
T	Metal Oxide Varistor TNR

②Product Form	
ND	Disk Type

③Element Diameter	
5	φ5mm
7	φ7mm
10	φ10mm
14	φ14mm
20	φ20mm

④Series	
SV	SV series

⑤Varistor Voltage
The first two digits are significant figures and the third one denotes the number of folowing zeros.

⑥Varistor Voltage Tolerance	
K	±10%

SV Series Low varistor voltage

◆RATING AND CHARACTERISTICS

Part Number	Previous Part Number	Maximum Ratings						Max. Clamping Voltage		Capacitance Typical @1kHz	Varistor Voltage V1mA 5SV：V0.1mA	Thickness T MAX.
		Max. Allowable Voltage		Max.Peak Current	Max. Energy	Max.Applicable voltage for short period /5 minutes	Rated Wattage					
		AC(Vrms)	DC(V)	8/20μs(A)	2ms(J)	DC(V)	(W)	(A)	(V)	(pF)	(V)	
TND05SV220KTBAAAA0	TNR5SV220K-T25	12	16		0.5	24			48	3600	22 (20～24)	5.0
TND05SV270KTBAAAA0	TNR5SV270K-T25	15	19		0.7	29			60	3100	27 (24～30)	5.0
TND05SV330KTBAAAA0	TNR5SV330K-T25	18	24		0.8	36			73	2500	33 (30～36)	5.5
TND05SV390KTBAAAA0	TNR5SV390K-T25	22	28	125A	0.9	42	0.01	1	86	2300	39 (35～43)	5.0
TND05SV470KTBAAAA0	TNR5SV470K-T25	26	34	/2 times	1.1	50			104	2000	47 (42～52)	5.0
TND05SV560KTBAAAA0	TNR5SV560K-T25	30	42		1.3	50			123	1700	56 (50～62)	5.5
TND05SV680KTBAAAA0	TNR5SV680K-T25	40	55		1.6	65			150	1500	68 (61～75)	5.5
TND07SV220KTBAAAA0	TNR7SV220K-T25	12	16		1.1	24			43	5400	22 (20～24)	5.0
TND07SV270KTBAAAA0	TNR7SV270K-T25	15	19		1.3	29			53	4800	27 (24～30)	5.0
TND07SV330KTBAAAA0	TNR7SV330K-T25	18	24		1.6	36			65	3900	33 (30～36)	5.5
TND07SV390KTBAAAA0	TNR7SV390K-T25	22	28	250A	1.9	42	0.02	2.5	77	3600	39 (35～43)	5.0
TND07SV470KTBAAAA0	TNR7SV470K-T25	26	34	/2 times	2.3	50			93	3300	47 (42～52)	5.0
TND07SV560KTBAAAA0	TNR7SV560K-T25	30	42		2.7	50			110	2900	56 (50～62)	5.5
TND07SV680KTBAAAA0	TNR7SV680K-T25	40	55		3.3	65			135	2600	68 (61～75)	5.5
TND10SV220KTBAAAA0	TNR10SV220K-T25	12	16		2.6	24			43	12000	22 (20～24)	6.0
TND10SV270KTBAAAA0	TNR10SV270K-T25	15	19		3.2	29			53	11000	27 (24～30)	6.0
TND10SV330KTBAAAA0	TNR10SV330K-T25	18	24		4.0	36			65	8500	33 (30～36)	6.5
TND10SV390KTBAAAA0	TNR10SV390K-T25	22	28	500A	4.7	42	0.05	5	77	7600	39 (35～43)	6.0
TND10SV470KTBAAAA0	TNR10SV470K-T25	26	34	/2 times	5.6	50			93	6800	47 (42～52)	6.0
TND10SV560KTBAAAA0	TNR10SV560K-T25	30	42		6.7	50			110	6000	56 (50～62)	6.5
TND10SV680KTBAAAA0	TNR10SV680K-T25	40	55		8.2	65			135	5400	68 (61～75)	6.5
TND14SV220KTBAAAA0	TNR14SV220K-T25	12	16		5.3	24			43	23000	22 (20～24)	6.0
TND14SV270KTBAAAA0	TNR14SV270K-T25	15	19		6.5	29			53	21000	27 (24～30)	6.0
TND14SV330KTBAAAA0	TNR14SV330K-T25	18	24		7.9	36			65	17000	33 (30～36)	6.5
TND14SV390KTBAAAA0	TNR14SV390K-T25	22	28	1000A	9.4	42	0.1	10	77	16000	39 (35～43)	6.0
TND14SV470KTBAAAA0	TNR14SV470K-T25	26	34	/2 times	11	50			93	14000	47 (42～52)	6.0
TND14SV560KTBAAAA0	TNR14SV560K-T25	30	42		13	50			110	13000	56 (50～62)	6.5
TND14SV680KTBAAAA0	TNR14SV680K-T25	40	55		16	65			135	11000	68 (61～75)	6.5
TND20SV220KB00AAA0	TNR20SV220K	12	16		14	24			43	56000	22 (20～24)	6.0
TND20SV270KB00AAA0	TNR20SV270K	15	19		17	29			53	48000	27 (24～30)	6.0
TND20SV330KB00AAA0	TNR20SV330K	18	24		21	36			65	41000	33 (30～36)	6.5
TND20SV390KB00AAA0	TNR20SV390K	22	28	2000A	25	42	0.2	20	77	36000	39 (35～43)	6.0
TND20SV470KB00AAA0	TNR20SV470K	26	34	/2 times	30	50			93	33000	47 (42～52)	6.0
TND20SV560KB00AAA0	TNR20SV560K	30	42		36	50			110	29000	56 (50～62)	6.5
TND20SV680KB00AAA0	TNR20SV680K	40	55		44	65			135	26000	68 (61～75)	6.5

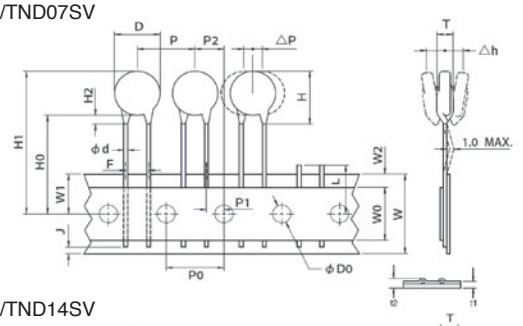
◆DIMENSION

TND05SV/TND07SV/TND10SV/TND14SV：Taping product is normal specifications.

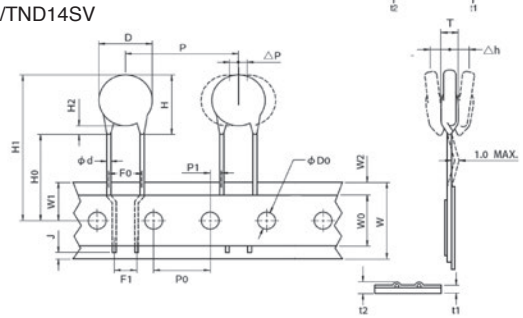
Taping Code：TBA (T25)　　Unit：mm

Symbol	5SV	7SV	10SV	14SV
D	8.0 Max.	9.0 Max.	12.0 Max.	16.0 Max.
φd	0.6±0.05	←	0.8±0.05	←
P	12.7±1.0	←	25.4±1.0	←
P0	12.7±0.3	←	12.7±0.3	←
φD0	4.0±0.2	←	4.0±0.2	←
P1	3.85±0.7	←	2.6±0.5	←
P2	6.35±1.3	←	-	-
W1	9.0±0.5	←	9.0±0.5	←
F	5.0±0.8	←	-	
F0	-	-	7.5±0.8	←
F1	-	-	5.0 Nom.	←
Δh	0±2.0	←	0±2.0	←
ΔP	0±1.0	←	0±1.0	←
W	$18.0^{+1.0}_{-0.5}$	←	$18.0^{+1.0}_{-0.5}$	←
W0	5.0 Min.	←	5.0 Min.	←
t1	0.6±0.3	←	0.6±0.3	←
t2	1.5 Max.	←	1.5 Max.	←
W2	3.0 Max.	←	3.0 Max.	←
H0	$20.0^{+1.5}_{-1.0}$	←	19.0 Min.	←
H	11.0 Max.	12.0 Max.	17.0 Max.	20.0 Max.
H1	29.0 Max.	30.0 Max.	41.5 Max.	43.5 Max.
H2	3.0 Max.	←	5.0 Max.	←
J	6.0 Max.	←	6.0 Max.	←
L	11.0 Max.	←	-	-

●TND05SV/TND07SV



●TND10SV/TND14SV



SV Series Low varistor voltage

◆DIMENSION

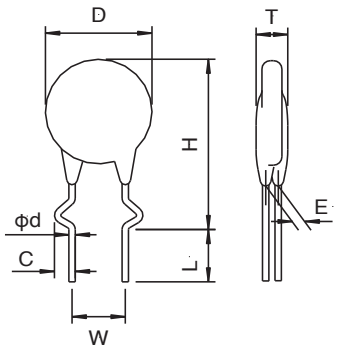
TND20SV：Bulk only

Stlaight lead Type

Part Number	D MAX.	H MAX.	L MIN.	φd ±0.05	W ±1.0	E ±1.0
TND20SV220KB00AAA0	22.5	27.0	20.0	0.8	10	1.2
TND20SV270KB00AAA0						1.4
TND20SV330KB00AAA0						1.6
TND20SV390KB00AAA0						1.3
TND20SV470KB00AAA0						1.5
TND20SV560KB00AAA0						1.7
TND20SV680KB00AAA0						2.0

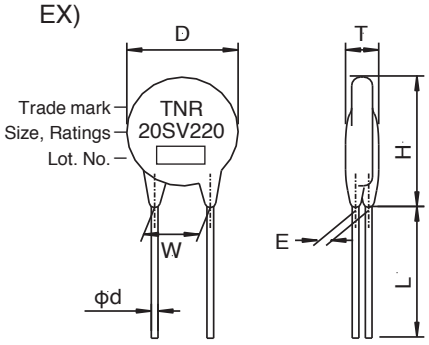
Lead forming Type

Part No.	TND20SV***KBESAAA0
Forming Code	BES (310)
D	refer to each spec.
T	refer to each spec.
H	30.5 MAX.
L	5.0 ± 1.0
W	10.0 ± 1.0
φd	0.8 ± 0.05
C	2.0 ± 0.5
E	refer to each spec.



◆MARKING

EX)



◆V-I CURVE

V-I characteristics and PULE LIFE TIME RATINGS are same as those of V series.
Please see V-I CURVE and PULE LIFE TIME RATINGS of V series.

CROSS REFERENCE TABLE

TNR SV SERIES	TNR V SERIES	V-I CURVE GO TO REF. PAGE	PULSE LIFE TIME RATINGS GO TO REF. PAGE
TND05SV220K	TND05V-220K	P.55	P.70
TND05SV270K	TND05V-270K		
TND05SV330K	TND05V-330K		
TND05SV390K	TND05V-390K		
TND05SV470K	TND05V-470K		
TND05SV560K	TND05V-560K		
TND05SV680K	TND05V-680K		
TND07SV220K	TND07V-220K	P.57	P.71
TND07SV270K	TND07V-270K		
TND07SV330K	TND07V-330K		
TND07SV390K	TND07V-390K		
TND07SV470K	TND07V-470K		
TND07SV560K	TND07V-560K		
TND07SV680K	TND07V-680K		
TND10SV220K	TND10V-220K	P.61	P.72
TND10SV270K	TND10V-270K		
TND10SV330K	TND10V-330K		
TND10SV390K	TND10V-390K		
TND10SV470K	TND10V-470K		
TND10SV560K	TND10V-560K		
TND10SV680K	TND10V-680K		
TND14SV220K	TND14V-220K	P.65	P.73
TND14SV270K	TND14V-270K		
TND14SV330K	TND14V-330K		
TND14SV390K	TND14V-390K		
TND14SV470K	TND14V-470K		
TND14SV560K	TND14V-560K		
TND14SV680K	TND14V-680K		
TND20SV220K	TND20V-220K	P.67	P.74
TND20SV270K	TND20V-270K		
TND20SV330K	TND20V-330K		
TND20SV390K	TND20V-390K		
TND20SV470K	TND20V-470K		
TND20SV560K	TND20V-560K		
TND20SV680K	TND20V-680K		

SV Series Low varistor voltage

◆GENERAL SPECIFICATIONS

Item	Test Conditions	Specifications
Standard Test Condition	20±15°C, 85%RH Max.	–
Varistor Voltage	The voltage between the two terminals measured at 1mA (5SV：0.1mA) DC is called Varistor Voltage. The measurement shall be made as fast as possible to avoid heat affection.	Satisfy the specification
Maximum Allowable Voltage	Maximum continuous AC voltage (50 to 60Hz/AC) and maximum DC voltage which can be applied.	Satisfy the specification
Maximum Peak Surge Current	Maximum surge current (8/20μs pulse wave to be applied twice, 5 minutes apart) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Energy Rating	Maximum energy (2ms square wave to be applied once) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Rated Wattage	Maximum power (50 to 60Hz/AC power to be applied for 1000 hours at 125°C) for varistor voltage change within ±10% of the initial value.	Satisfy the specification
Maximum Clamping Voltage	Maximum voltage across varistor when 8/20μs rated current surge is applied.	Satisfy the specification
Capacitance	Varistor's capacitance at 1kHz, standard test condition.	For reference only.
Voltage Temperature Coefficient	$\frac{\text{V1mA at 125℃} - \text{V1mA at 25℃}}{\text{V1mA at 25℃}} \times \frac{1}{100} \times 100\ (\%/℃)$ V1mA：Actual Varistor Voltage	Within ±0.05%/°C
Maximum Applicable Voltage for a Short Period (5 minutes)	Maximum DC voltage to be applied for only 5 minutes.	ΔV1mA/V1mA≦±15%

*: The varistor voltage of 5SV is V0.1mA

◆ENVIRONMENTAL CHARACTERISTICS

Item	Test Conditions	Specifications
High Temperature Storage (Dry heat)	The specimen shall be subjected 150±2°C for 1000±12 hours without load.	ΔV1mA/V1mA≦±10%
Low Temperature Storage	The specimen shall be subjected −40±2°C for 1000±12 hours without load.	ΔV1mA/V1mA≦±5%
Damp heat (Humidity)	The specimen shall be subjected to 85±2°C, 80 to 85%RH for 1000±12 hours without load.	ΔV1mA/V1mA≦±10%
Temperature Cycle	The temperature cycle shown below shall be repeated 1000 cycles. −40±3°C, 30 minutes ⇔ +125±2°C, 30 minutes	ΔV1mA/V1mA≦±10% No remarkable damage
High Temperature Operating	The specimen shall be subjected to 125±2°C with the maximum allowable voltage for 1000±12 hours.	ΔV1mA/V1mA≦±10%
Damp heat Operating	The specimen shall be subjected to 85±2°C, 80 to 85%RH with the maximum allowable voltage for 1000±12 hours.	ΔV1mA/V1mA≦±10%

Varistor voltage change of forward direction shall be measured in the test of unipolar surge life and DC load life.
Varistor voltage change is measured after stored at Standard Test Conditions for 1 to 2 hours.

*: The varistor voltage of 5SV is V0.1mA

SV Series Low varistor voltage

◆MECHANICAL CHARACTERISTICS

Item	Test Conditions	Specifications
Resistance to Soldering Heat	Each lead shall be dipped into a solder bath having a temperature of 350±10°C to a point 2.0 to 2.5 mm from the body of unit, be held there for 3^{+1}_{0} sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined. or Each lead shall be dipped into a solder bath having a temperature of 260±10°C to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10±1 sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined.	ΔV1mA/V1mA≦±5% No remarkable damage
Solderability	Each lead shall be dipped into a methanol solution (about 25%) of rosin for 5 to 10 sec. Then each lead shall be dipped into a solder. Solder: Pb free (Sn-3.0Ag-0.5Cu) / Eutectic (Sn/Pb) Solder Temp.: 245±5℃ / 235±5℃ Dipping Time: 2±0.5sec. Dipping Depth: 1.5 to 2.0mm (from the body)	At least, 95% of the leads shall be covered with solder uniformly.
Lead Pull Strength	After gradually applying the load keeping the unit fixed for 10±5 seconds in axial direction. Type / Lead Diameter / Force 5SV,7SV / 0.6mm / 10N 10SV,14SV,20SV / 0.8mm / 10N	No abnormality such as disconnection. ΔV1mA/V1mA≦±5%
Lead Bend Strength	The unit shall be secured with its terminal kept vertical and the weight specified below be applied in the axial direction. The terminal shall gradually be bend by 90° in one direction then 90° in the opposite direction, and again back to original position. The damage of the terminal shall be visually examined. Type / Lead Diameter / Force 5SV,7SV / 0.6mm / 5N 10SV,14SV,20SV / 0.8mm / 5N	No remarkable damage as remarkable the innner ceramic element or terminal open.
Vibration	Mount varistor body on vibrator, and conduct the following vibration test. Peak-to-Peak amplitude : 1.5mm , Acceleration : 5G Vibration frequency range : 10 to 500Hz Sweeping time: Approximately 20 minutes for 10Hz→500Hz→10Hz Direction and duration of vibration : Three directions of X, Y, and Z. 2 hours each. 6 hours total.	No remarkable apperance abnormality. ΔV1mA/V1mA≦±5%
Flammability test	The varistor shall be subjected 60 sec. applications of test flame. Burnar : Bunsen gas burner 9000kcal / m^3 Diameter of flame nozzle : φ9.5mm Position : The spesimen shall be fixed horizonal. Point of application shall be approximately center of the specimen .	No catching fire, and no flaming drops.

*: The varistor voltage of 5SV is V0.1mA

METAL OXIDE VARISTORS TNR™

H Series

RoHS2 Compliant

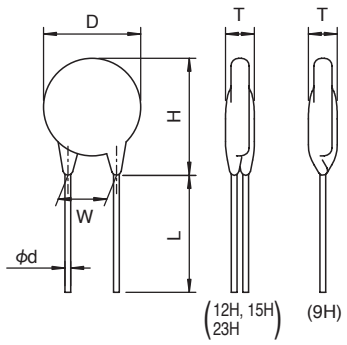
High Energy, Low Varistor Voltage Series

◆STANDARD RATINGS

Operating Temperature Range: -40 to +125℃
Storage Temperature Range: -50 to +150℃

Part Number	Previous Part Number (Just for your reference)	Max. Allowable Voltage		Maximum applicable voltage for a short period	Max. Energy	Max. Clamping Voltage		Varistor Voltage V_{1mA}
		Continuous		5 minutes				
		AC (Vrms)	DC (V)	DC (V)	20ms(J)	(A)	(V)	(V)
TND09H-220KB00AAA0	TNR9H220K	12	16	24			43	22 (20～24)
TND09H-270KB00AAA0	TNR9H270K	15	19	29			53	27 (24～30)
TND09H-330KB00AAA0	TNR9H330K	18	24	36	5	2	65	33 (30～36)
TND09H-390KB00AAA0	TNR9H390K	22	28	42			77	39 (35～43)
TND09H-470KB00AAA0	TNR9H470K	26	34	50			93	47 (42～52)
TND12H-220KB00AAA0	TNR12H220K	12	16	24			43	22 (20～24)
TND12H-270KB00AAA0	TNR12H270K	15	19	29			53	27 (24～30)
TND12H-330KB00AAA0	TNR12H330K	18	24	36	10	5	65	33 (30～36)
TND12H-390KB00AAA0	TNR12H390K	22	28	42			77	39 (35～43)
TND12H-470KB00AAA0	TNR12H470K	26	34	50			93	47 (42～52)
TND15H-220KB00AAA0	TNR15H220K	12	16	24			43	22 (20～24)
TND15H-270KB00AAA0	TNR15H270K	15	19	29			53	27 (24～30)
TND15H-330KB00AAA0	TNR15H330K	18	24	36	20	10	65	33 (30～36)
TND15H-390KB00AAA0	TNR15H390K	22	28	42			77	39 (35～43)
TND15H-470KB00AAA0	TNR15H470K	26	34	50			93	47 (42～52)
TND23H-220KB00AAA0	TNR23H220K	12	16	24			43	22 (20～24)
TND23H-270KB00AAA0	TNR23H270K	15	19	29			53	27 (24～30)
TND23H-330KB00AAA0	TNR23H330K	18	24	36	40	25	65	33 (30～36)
TND23H-390KB00AAA0	TNR23H390K	22	28	42			77	39 (35～43)
TND23H-470KB00AAA0	TNR23H470K	26	34	50			93	47 (42～52)

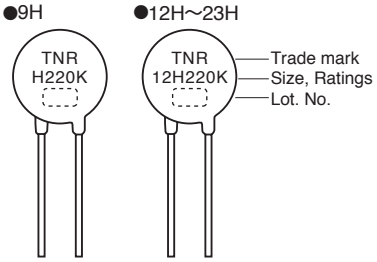
◆DIMENSIONS [mm]



Type	D Max.	H Max.	T Max.	W ±1.0	L Min.	ϕd ±0.05
9H	10.0	13.0	5.0	5.0	25.0	0.6
12H	13.5	16.5	5.0	7.5	25.0	0.8
15H	16.5	19.0	5.0	7.5	25.0	0.8
23H	24.0	27.0	5.0	10.0	25.0	0.8

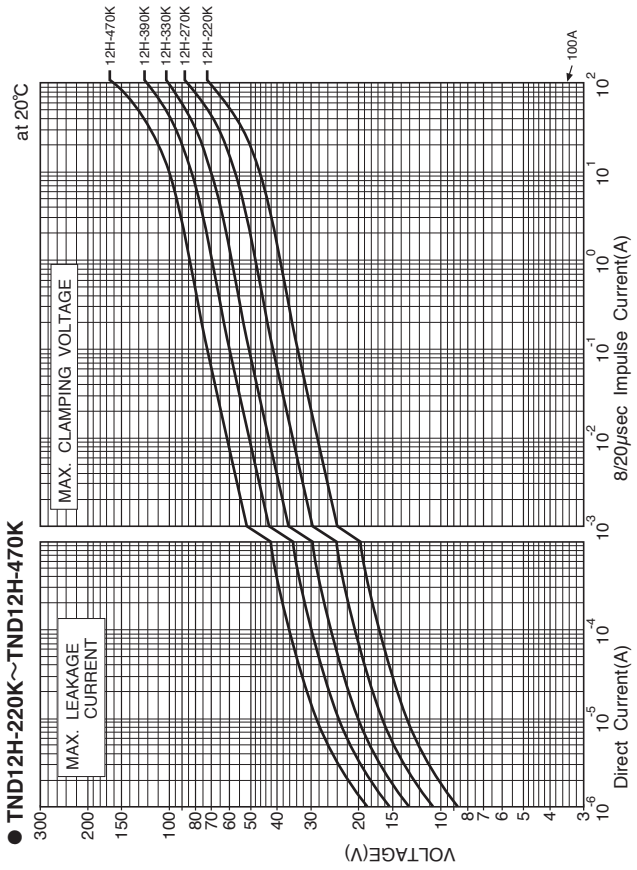
◆MARKING

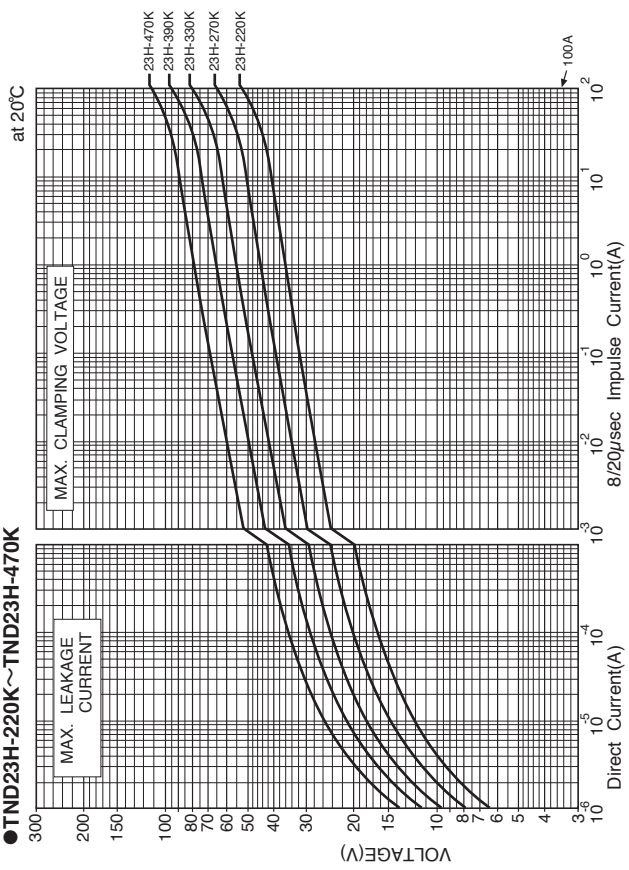
EX)

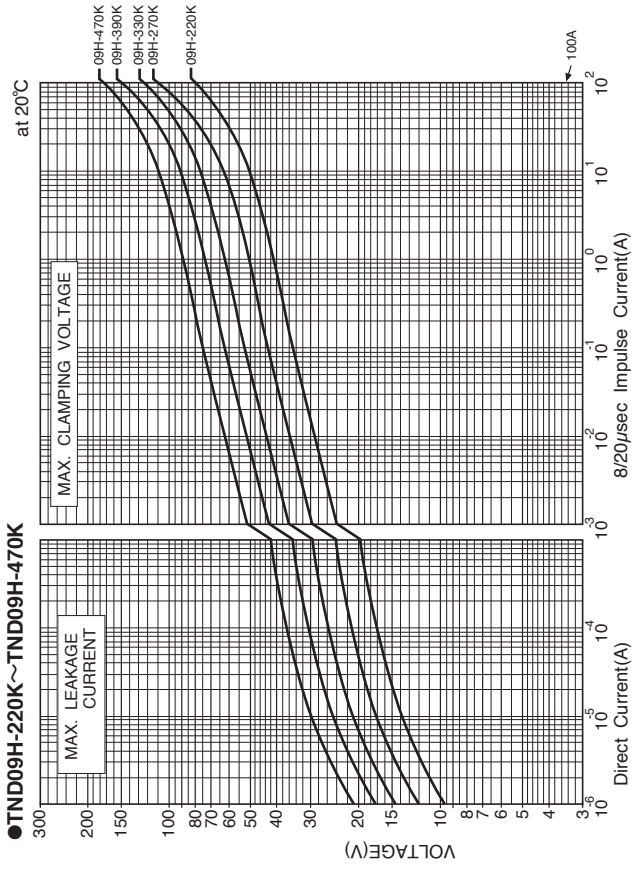


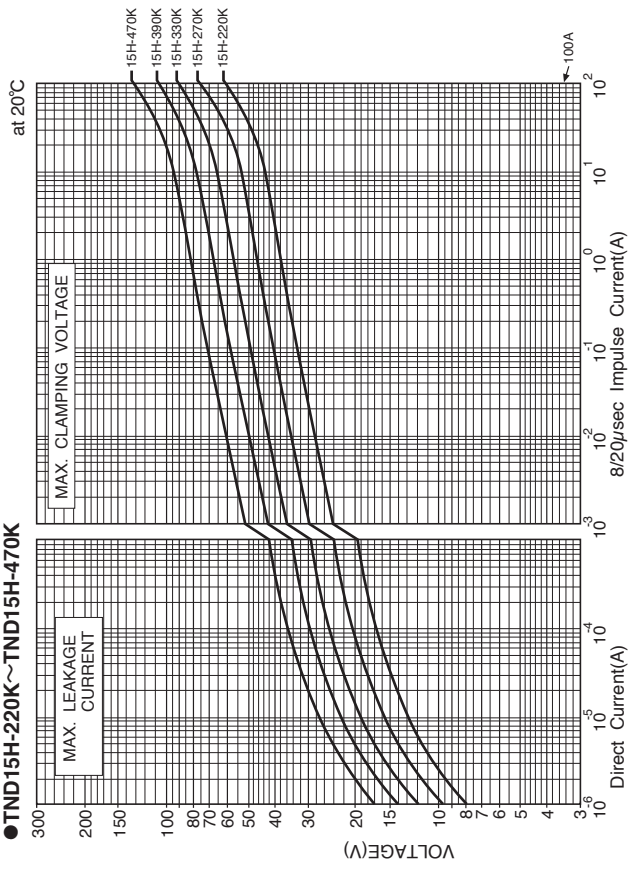
H Series

◆V-I CURVE









H Series

◆GENERAL SPECIFICATIONS

Operating Temperature Range: -40 to +125℃
Storage Temperature Range: -50 to +150℃

Item	Test Conditions	Specifications
Standard Test Condition	20±15℃, 85%RH Max.	
Varistor Voltage	The voltage between the two terminals measured at 1mA DC is called Varistor Voltage. The measurement shall be made as fast as possible to avoid heat affection.	Satisfy the specification.
Maximum Allowable Voltage	Maximum continuous sinusoidal RMS voltage or Maximum continuous DC voltage which may be applied.	Refer to Ratings.
Maximum applicable voltage for a short period (5 minutes)	Maximum DC voltage to be applied for only 5 minutes.	Refer to Ratings.
Maximum Clamping Voltage	The maximum voltage between the terminals, measured standard impulse current (8/20 μs).	Satisfy the specification.
Maximum Energy	Maximum energy within the ±10% varistor voltage change when 1 impulse 20 ms long is applied.	Satisfy the specification.
Temperature Coefficient	$\frac{V1mA\ at\ 85℃ - V1mA\ at\ 25℃}{V1mA\ at\ 25℃} \times \frac{1}{60} \times 100\ (\%/℃)$	Within ±0.05 % / ℃

◆MECHANICAL CHARACTERISTICS

Item	Test Conditions	Specifications
Terminal Pull Strength	After gradually applying the force keeping the unit fixed for 10±1 sec. in axial direction, the damage of the terminals shall be visually examined. Lead diameter: ϕ0.6mm. ϕ0.8mm — Force: 10 N	ΔV1mA / V1mA ≦±5% No remarkable damage
Terminal Bending Strength	The unit shall be secured with its terminal kept vertical and the weight specified below be applied in the axial direction. The terminal shall gradually be bend by 90° in one direction then 90º in the opposite direction, and again back to original position. The damage of the terminal shall be visually examined. Lead diameter: ϕ0.6mm. ϕ0.8mm — Force: 5 N	No remarkable damage
Vibration	After repeatedly applying a single harmonic vibration (amplitude : 0.75mm) double amplitude : 1.5mm with 1 minute vibration frequency cycle (10Hz→500Hz→10Hz) to each three perpendicular directions for 2 hours. Total 6 hours. The devices shall be visually examined.	ΔV1mA / V1mA ≦±5% No remarkable damage
Resistance to Soldering Heat	Each lead shall be dipped into a solder bath having a temperature of 350±10℃ to a point 2.0 to 2.5 mm from the body of the unit, be held there for 3^{+1}_{-0} sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined. or Each lead shall be dipped into a solder bath having a temperature of 260±10℃ to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10±1 sec and then be stored at room temperature for 1 to 2 hours. The ΔV1mA and mechanical damage shall be examined.	ΔV1mA / V1mA ≦±5% No remarkable damage
Solderability	Each lead shall be dipped into a methanol solution (about 25%) of rosin for 5 to 10 sec. Then each lead shall be dipped into a solder.	At least, 95% of the leads shall be covered with solder uniformly.

Solder	Pb free (Sn-3.0Ag-0.5Cu)	Eutectic (Sn/Pb)
Solder Temp.	245±5℃	235±5℃
Dipping Time	2±0.5sec.	
Dipping Depth	1.5 to 2.0mm (from the body)	

H Series

◆ENVIRONMENTAL CHARACTERISTICS

Item	Test Conditions	Specifications
High Temperature Storage (Dry heat)	The specimen shall be subjected 150±2℃ for 1000±12 hours without load.	ΔV1mA/V1mA≦±10%
Low Temperature Storage	The specimen shall be subjected -40±2℃ for 1000±12 hours without load.	ΔV1mA/V1mA≦±5%
Damp heat (Humidity)	The specimen shall be subjected to 60±2℃, 90 to 95%RH for 1000±12 hours without load.	ΔV1mA/V1mA≦±10%
Temperature Cycle	The temperature cycle shown below shall be repeated 50 cycles. -40±3℃, 30 minutes ⇔ +150±2℃, 30 minutes	ΔV1mA/V1mA≦±10% No remarkable damage
High Temperature Operating	The specimen shall be subjected to 125±2℃ with the maximum allowable voltage for 1000±12 hours.	ΔV1mA/V1mA≦±20%
Damp heat Operating	The specimen shall be subjected to 60±2℃, 90 to 95%RH with the maximum allowable voltage for 1000±12 hours.	ΔV1mA/V1mA≦±10%

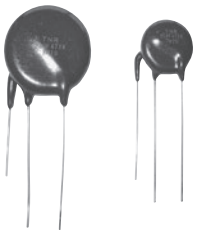
Varistor voltage change of forward direction shall be measured in the test of unipolar surge life and DC load life.
Varistor voltage change is measured after stored at Standard Test Conditions for 1 to 2 hours.
Note : For 42V battery line, please contact our sales office.

METAL OXIDE VARISTORS TNR™

GF Series

RoHS2 Compliant

GF Series are combined TNR Varistor with Thermal Fuse
●Coating resin : UL94V-0

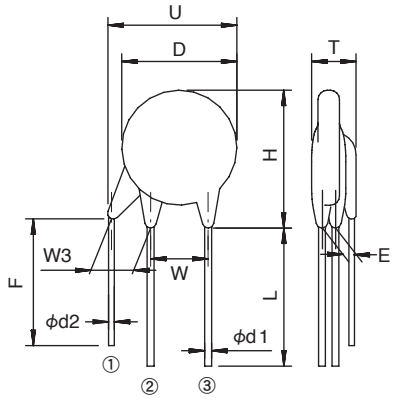


Operating Temperature Range: -40 to +85℃
Storage Temperature Range: -50 to +125℃

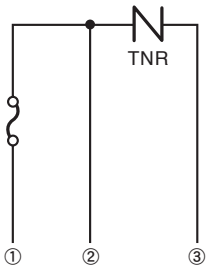
◆STANDARD RATINGS

Part Number	Previous Part Number (Just for your reference)	Maximum Ratings					Max. Clamping Voltage	Capacitance Typical @1kHz	Varistor Voltage V1mA	T Max.	E ±1.0
		Max. Allowable Voltage		Max. Peak Current	Max. Energy	Rated Wattage					
15GF Type		AC(Vrms)	DC(V)	8/20μs(A)	2ms(J)	(W)	V50A (V)	(pF)	(V)	(mm)	(mm)
TND15GF271KB00EAA0	TNR15GF271K-E	175	225		50	0.6	440	680	270 (243～297)	9	1.5
TND15GF471KB00EAA0	TNR15GF471K-E	300	385	2500A/2 times	80	0.6	765	450	470 (423～517)	10	2.2
TND15GF821KB00EAA0	TNR15GF821K-E	510	670		110	0.6	1340	280	820 (738～902)	12	3.5
23GF Type		AC (Vrms)	DC (V)	8/20μs(A)	2ms(J)	(W)	V100A (V)	(pF)	(V)	(mm)	(mm)
TND23GF271KB00EAA0	TNR23GF271K-E	175	225		90	0.8	440	1850	270 (243～297)	9	1.5
TND23GF471KB00EAA0	TNR23GF471K-E	300	385	4000A/2 times	150	1.0	765	1200	470 (423～517)	10	2.3
TND23GF821KB00EAA0	TNR23GF821K-E	510	670		190	1.5	1340	800	820 (738～902)	12	3.6

◆DIMENSIONS [mm]



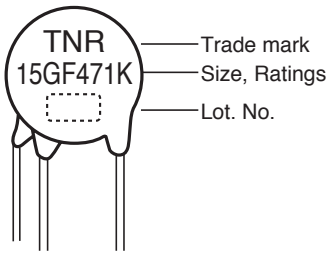
	15GF	23GF
D	18 Max.	25 Max.
T	Refer to Standard Ratings	
H	22 Max.	32 Max.
W	7.5±1	10±1
W3	2.5 Min.	2.5 Min.
L	25 Min.	25 Min.
U	23 Max.	28 Max.
F	17 Min.	17 Min.
E	Refer to Standard Ratings	
ϕd1	0.8±0.05	0.8±0.05
ϕd2	0.53±0.05	0.58±0.05



Type	Thermal fuse ratings
15GF	145℃-250V-1A
23GF	145℃-250V-3A

◆MARKING

EX)



Metal Oxide Varistors TNR™
Technical Note, Application Examples

1. WHAT IS A VARISTOR?

A varistor has the volt-ampere characteristics in which current suddenly starts to flow through the device at a certain voltage, as shown in Figure 1.

The varistors are used to protect semiconductor devices in electronic and electric circuits from overvoltage. As shown in Figure 2, a varistor is inserted in parallel with a circuit to be protected. When an impulse is applied to the circuit, pulse current Is, which is determined by pulse voltage Vs and pulse impedance Zs, flows to limit the pulse voltage to the varistor limit voltage Vclamp.

The relation can be expressed by the equations as follows:

$$Vs = Is \times Zs + Vclamp \quad (1)$$

$$Vclamp = Vs - Is \times Zs \quad (2)$$

The pulse current Is is easily obtained by the following equation because of Vs >> Vclamp.

$$Is \fallingdotseq \frac{Vs}{Zs} \quad (3)$$

Thus, the circuit can be protected from being damaged by pulse voltages as long as it has withstand voltage larger than the maximum limit voltage.

Owing to the characteristic, the varistors are extremely effective as protecting devices of electronic and electric equipment by absorption of abnormal voltages and lightening pulses.

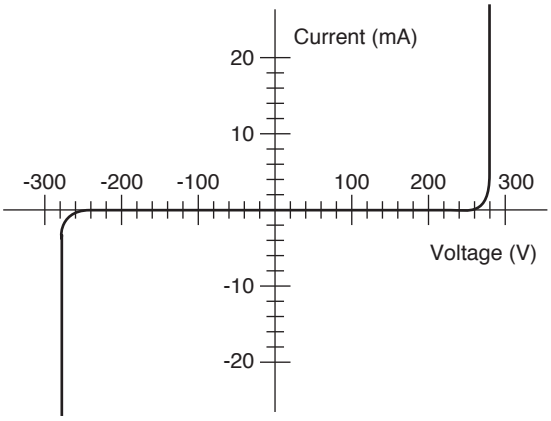


Fig. 1 Volt-ampere characteristics of varistor

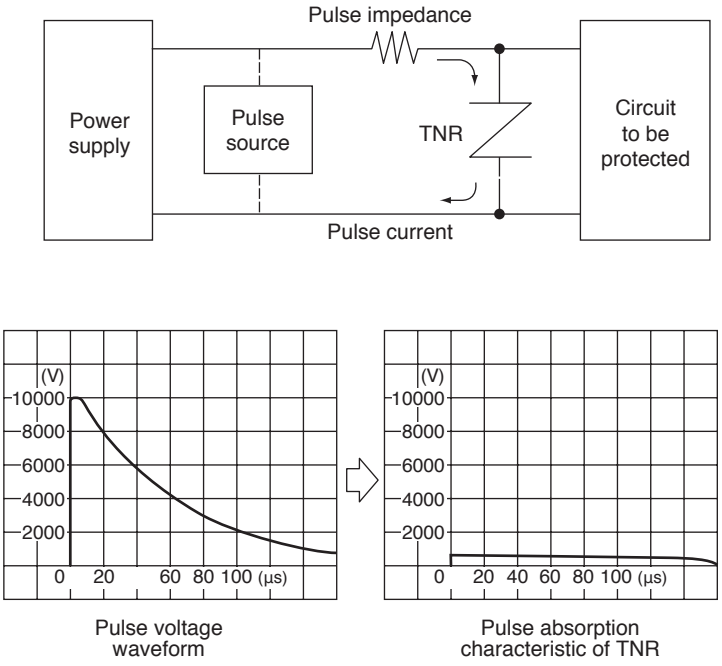


Fig. 2 Pulse absorption by varistor

2. SAMPLE USED AND NOTES ON TNR

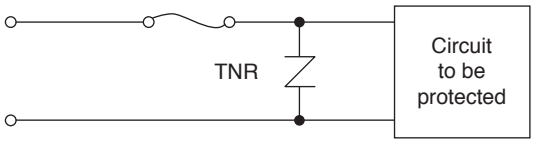
This chapter describes general sample uses and notes on use of TNRs. Take these conditions into consideration when you select TNRs of appropriate ratings.

2-1 PROTECTION FROM POWER PULSE

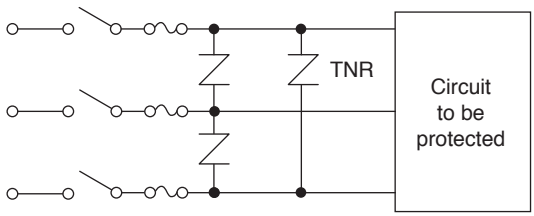
(1)Examples of wiring

Line to line protection

DC or single-phase AC

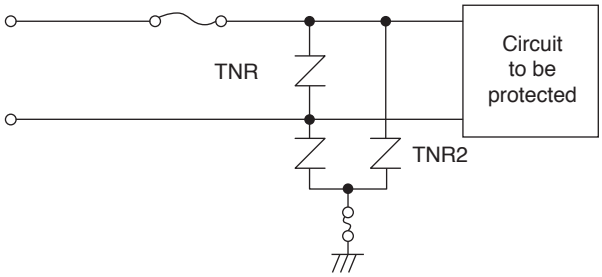


Three-phase AC

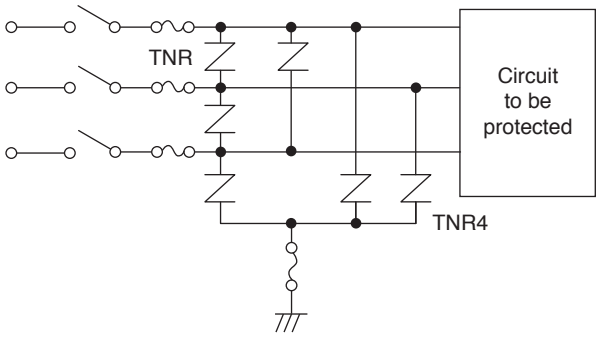


Line to line and line to ground protection

DC or single-phase AC



Three-phase AC



(2)Examples of rating selections

TNR used for line to line

Power Voltage	Type
AC100V	TND□□V-221K TND□□V-241K TND□□V-271K*
AC200V	TND□□V-391K TND□□V-431K TND□□V-471K*
DC12V	TND□□V-220K TND□□V-270K
DC24V	TND□□V-330K TND□□V-390K TND□□V-470K

Notes:

1)If a TNR is used at power voltage other than the examples above, never make the power voltage increase over the maximum allowable voltage.

2)For individual wiring or capacitive load, the power voltage is temporarily increased by resonance at switch on or off. Thus, use a TNR of the type with mark * for the power of 100 VAC or 200 VAC.

TNR used for line to ground

TNR	Power Voltage	Type
TNR2	AC100V AC200V	TND□□V-431K TND□□V-471K TND□□V-911K≦** TND□□V-182K ***
TNR4	AC200V	TND□□V-431K TND□□V-471K TND□□V-911K≦** TND□□V-182K ***

Notes:

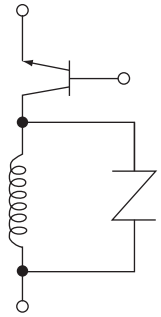
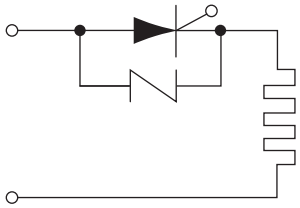
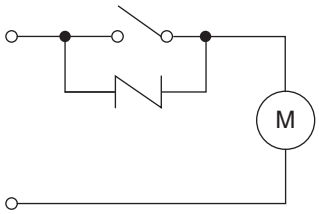
1)In an insulation resistance test (500V mega test) of a unit, it may incorrectly judged to be bad due to its leak current from the TNR mounted on the unit. Test the unit with the TNR removed after obtaining approval of the unit user on removing the TNR. Or use a TNR with mark ** for the test unit.

2)In a withstand voltage test (1000 VAC test) of a unit, it may incorrectly judged to be bad due to its leakage current from the TNR mounted on the unit. Test the unit with the TNR removed after obtaining approval of the unit user on removing the TNR. Or use a TNR with mark *** for the test unit.

3)Use a TNR of 200 VAC type between the 100 VAC power line to ground to prevent the power supply from being damaged by overvoltage such as ground-fault.

2-2 PROTECTION OF SEMICONDUCTORS AND ICs FROM INDUCTIVE ON/OFF PULSES AND ERASE OF CONTACT SPARKS

(1)Examples of wiring

Switching surge protection	Semiconductor protection	Erasing contact sparks
		

(2)Examples of rating selections

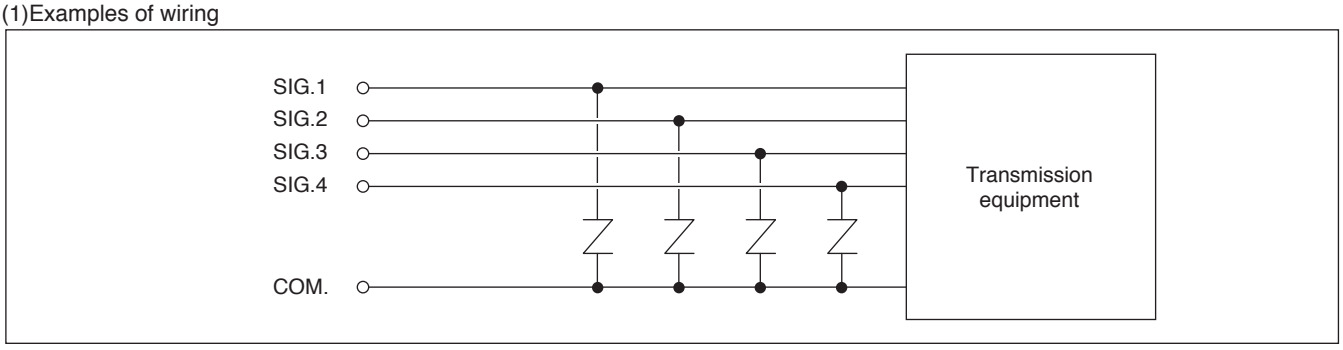
Examples of general selections		
Power Voltage	Type	Notes:
DC 12V	TND□□V-220K	1)If a TNR is used at power voltage other than the examples to the left, never make the power voltage increase over the maximum allowable voltage. 2)For other than a complete DC voltage, never make the maximum peak voltage increase over the maximum allowable voltage. 3)Take the pulse energy generated in load into account sufficiently to define the maximum peak current, maximum energy, and rated wattage.
DC 24V	TND□□V-390K	
DC100V	TND□□V-151K	
AC100V	TND□□V-221K TND□□V-241K TND□□V-271K	

(3)Notes on use of TNR

1. Be careful of the notes described in Section 2-1 "PROTECTION FROM POWER PULSE."
2. Select a proper TNR satisfying the desired relationship between the number of pulse applications and the TNR rating, referring to the reduction curve of pulse life time ratings.
3. Select a TNR having rated wattage larger than averaged pulse wattage to make the TNR absorb high-frequent pulses.

2-3 REDUCING PULSES ON SIGNAL TRANSMISSION LINES

(1)Examples of wiring



(2)Examples of rating selections

Examples of general selections		
Signal Carrier Voltage	Type	Notes:
DC 12V max.	TND□□V-150K TND□□V-220K TND□□V-820K≦	1)Any TNR includes electrostatic capacitor listed in the rating table. Take special note when a TNR is applied to high-frequency signal. 2)When signal of higher voltage than that of normal signals (such as bell signal) is superimposed on normal signals, select an appropriate TNR available for the higher voltage. 3)Use a TNR with a type of varistor voltage 82V or higher if signal is too low to be attenuated.
DC 24V	TND□□V-390K TND□□V-820K≦	

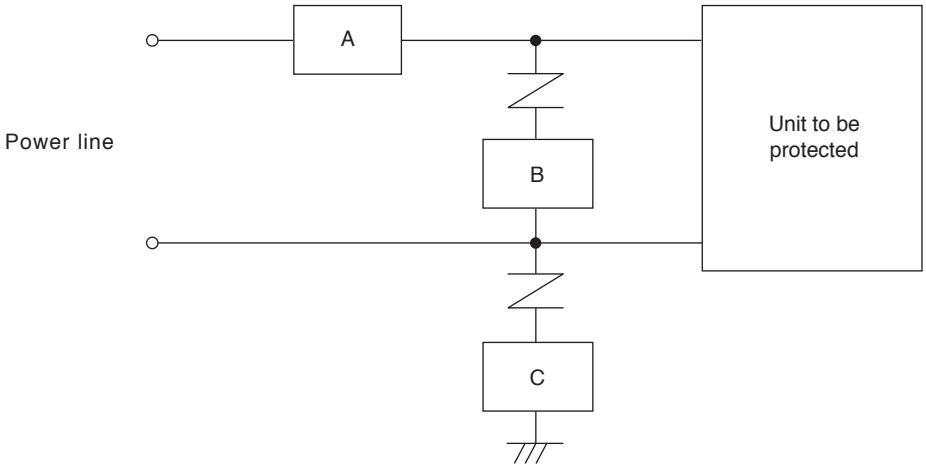
2-4 Examples of selections in fields

Example of general selections			
Use	Location	Type	
Commercial	Indoor	TND05V-□□□K TND07V-□□□K TND10V-□□□K TND12V-□□□K	Notes 1)Each number in the range between 5 to 20 specifies the diameter of a TNR. The larger the diameter is the greater the maximum peak current of the TNR is. Select a TNR of the type covering the expected peak current. 2)Pay sufficient attention to the conditions peculiar to the unit on which the selected TNR is mounted as well as normal selection examples.
	Outdoor	TND07V-□□□K TND10V-□□□K TND12V-□□□K TND14V-□□□K	
Communication, Measurement, Control	Indoor	TND07V-□□□K TND10V-□□□K TND12V-□□□K TND14V-□□□K	
	Outdoor	TND07V-□□□K TND10V-□□□K TND12V-□□□K TND14V-□□□K	
Industry, Power	Indoor or outdoor	TND14V-□□□K TND20V-□□□K	

2-5 Notes on use

Take the notes for reduction of power pulses into account as well as those explained below.

1. Take the action shown in the figure below because the TNR may be short-circuited or broken when it absorbs a pulse exceeding its rating.



1)Mount the TNR closer to the circuit than the overcurrent protector such as a breaker or fuse to disconnect the TNR from the power supply immediately at short circuit of the TNR.

2)Mount the overcurrent protector at location B if it cannot be mounted at location A.

3)Selection examples of ratings of fuses mounted at location A or B are listed below:

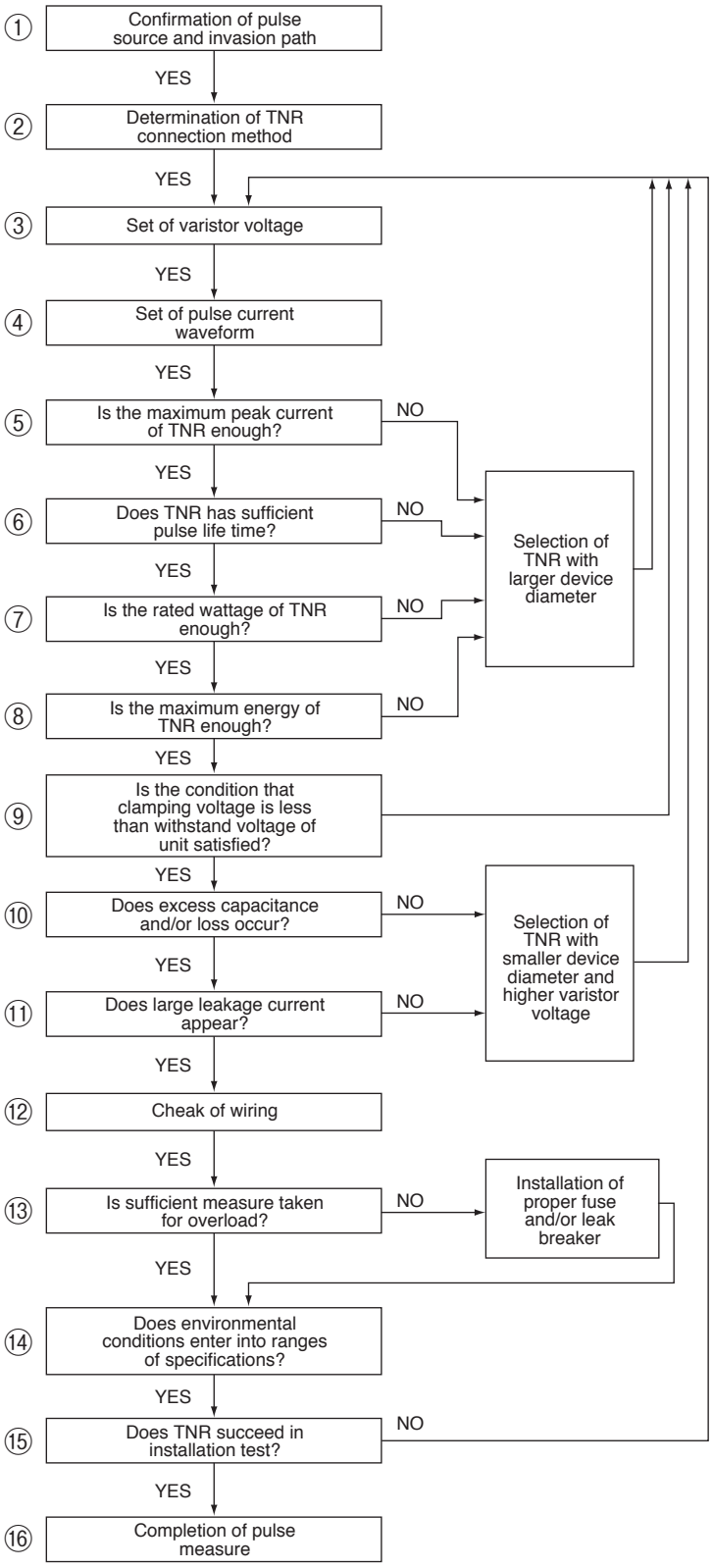
Type (TND-)	05V-□□□K	07V-□□□K	09V-□□□K 10V-□□□K 12V-□□□K	14V-□□□K 20V-□□□K
Fuse rating	3A max.	5A max.	7A max.	10A max.

4)Use a leak breaker or at position A or mount a temperature fuse connected thermally to the TNR at position C if the TNR inserted between the power line and the earth is grounded to the unit earth. It is also effective to use a TNR of the GF series which includes a thermal fuse.

2. Check that the TNR is used within the range of the rating operating temperature if it is exposed to direct sunlight or placed near a heating unit.
3. Make wiring of the TNR as short as possible. With long wiring, large voltage drop occurring at a rapid rising pulse on the L component of the wiring causes the TNR not to be effective enough for surge absorption.

3. SELECTION OF TNR RATING

3-1 RATING SELECTION PROCEDURE



①Make clear pulse sources and invasion paths including outer lightening, inner lightening (on/off lightening), line to line portion, line to ground portion, power line, and signal line.

②See the Sample uses and notes on TNR described earlier for the connections of TNRs.

③Set the varistor voltage so that the circuit voltage may not exceed the maximum allowable voltage. Take fully care of the applied voltage in insulating resistance or withstand voltage test if the TNR is inserted between a line to ground.

④The peak pulse current is almost equal to the value obtained by dividing the expected pulse voltage by the pulse impedance.

⑤Select a TNR with device diameter for the maximum peak current larger than the peak pulse current if the expected number of pulses are not more than 2.

⑥if many impulses are expected, select a TNR with device diameter for pulse life time longer than the requested life time, referring to the figure of pulse life time ratings.

⑦Select a TNR with device diameter for rated wattages larger than the averaged pulse wattage if pulses are applied continuously to the TNR at a high rate.

⑧Take care of the maximum energy as well if impulses are expected to have high energy.

⑨Select the varistor voltage and diameter of TNR so that the withstand voltage of the unit to be protected exceeds the maximum clamping voltage. If no TNR can satisfy the requested characteristics, it may be necessary to make the withstand voltage of the unit higher.

⑩Contact us when you use a high frequency circuit. The capacitance of the TNR may attenuate high frequency signals and the TNR may be heated by the loss.

⑪See the maximum leakage current known from the volt-ampere characteristic curve.

⑫Make wiring as short as possible. With long wiring, large voltage drop occurring at a rapid rising pulse on the L component of the wiring and its magnetic joint with other wiring cause the TNR not to be effective enough for surge absorption.

⑬Connect a fuse before the TNR. See 2-5 for selection of a fuse.

⑭Take note that the temperature around the TNR does not become larger than the maximum operating temperature.

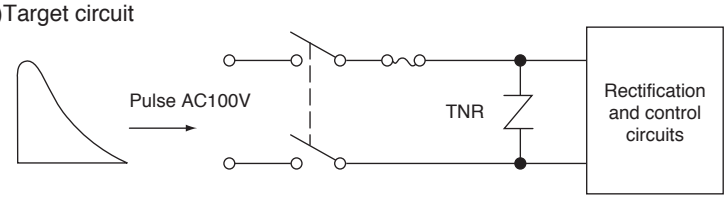
⑮Perform installation test as much as possible to confirm the performance of the TNR.

⑯The action for absorbing pulses by TNR is now completed.

3-2 EXAMPLES OF TNR SELECTION

3-2-1 ACTION FOR EXTERNAL LIGHTENING PULSES OF POWER SUPPLY OF CONTROL UNIT

(1)Target circuit



Conditions
1)Withstand voltage Vt: 600V
2)Pulse impedance Zs: 50ohm
3)Pulse voltage Vs: 12kV at duty cycle of 1.2/50μsec
4)Number of pulses: 100 = 10times × 10years
5)Pulse interval: 2 minutes or more

(2)Selection of TNR based on rating selection procedure

1. Confirmation of pulse source and invasion path: Circuit between external lightening pulse and power line. (The unit is not grounded.)
2. Determination of TNR connection method: Between power lines. (AC power input side of unit to be protected.)
3. Set of varistor voltage
   Select the TNR of 270V type based on the above sample use, because it is inserted between the 100 VAC power lines. Select a proper type of a TNR if the relationship between the withstand and clamping voltages of the unit to be protected does not satisfy the condition described in item 9.
4. Set of pulse current waveform
   a)Pulse current peak value (Ip)

$$Ip = \frac{Vs}{Zs} = \frac{12{,}000}{50} = 240[A]$$

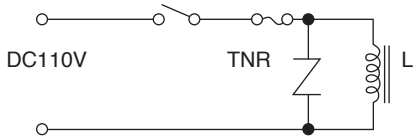
   b)Duration of wave tail of pulse current
   The duration of wave tail of pulse current can be shorter than that of pulse voltage. However, set the duration of wave tail of pulse current T to 40μs for safety. (In actual, it is about 25μs if the pulse voltage wave has the duty cycle of 1.2/50μs.
5. Is the maximum peak current of TNR enough?
   Because the maximum peak current is 240A, it is often considered that a TNR of 5V type with the maximum peak current of 250A (secured for two pulses) can be available. However, the duration of wave tail of pulse current is not 20μs for a total of 100 pulses. Thus it is necessary to check the pulse life time of the TNR.
6. Does TNR have sufficient pulse life time?
   The conditions include Ip = 240A, T = 40μA, total number of pulses = 100, and pulse interval = 2 minutes or more. Collate these four conditions with the pulse life ratings of the TNR. (Refer to the manual of CAT. No. 1006 for the pulse life time ratings.)

TNR Type	Number of pulses
5V	2 to 10
7V	10 to 100
10V	100 to 1000
14V	1000 to 10000

   Depending on the above specification, a TNR of the 10V type can be selected. Thus the TNR of type TND10V-271K is determined as a candidate from the results above together with the result described in Item 3.
7. Is rated wattage of TNR enough?
   The rated wattage of the TNR should not particularly be taken into account because the pulses are supplied to the unit at a low frequency.
8. Is the maximum energy of TNR enough?
   The maximum energy of the TNR should not be taken into account because lightening pulses of short duration of wave tail is only applied to the unit.
9. Is the condition that clamping voltage is less than withstand voltage of unit satisfied?
   The maximum clamping voltage of TNR10V271K is defined as $V_{25A} = 455V_{max}$ in the rating table. However, since the maximum current flowing through the circuit is 240A, the voltage at 240A should be read from the TNR volt-ampere characteristics to compare it with the unit withstand voltage of 600V. The relationship is satisfied as follows: $V_{240A} = 510V < 600V$
   (See the manual CAT. NO. 1006 for the TNR volt-ampere characteristics.)
10. Does excess capacitance and/or loss occur?
    As the power line of commercial frequency 50 to 60 Hz is low frequency, it does not cause severe problems.
11. Does large leakage current appear?
    As the 100 VAC power line produces only a small leakage current of several μA, it does not cause severe problems.
12. Check of wiring
    Note that the wiring to the TNR is not be electrostatically and magnetically coupled with the rectification circuit and control circuit lines. Make the wiring as short as possible to minimize the stray inductance.
13. Is sufficient measure taken for overload?
    Attach a fuse of about 5A before the TNR for occurrence of overvoltage. (See 2-5.)
14. Do environmental conditions enter into ranges of specifications?
    Check operating temperature range of the unit unless it is used near heaters such as coils.
15. Does TNR succeed in installation test?
    Perform the test with TND10V-271K connected to confirm the performance of the unit.
16. Completion of pulse measure
    After insertion of TND10V-271K to the unit as shown in the figure, the action required for absorbing pulses is now completed.

3-2-2 ACTION FOR ON-OFF PULSE FROM RELAY

(1)Target circuit



Conditions
1)Coil rating: I = 0.25 A, L = 1H
2)Relay operation: 2 times per sec, 8 hours per day, and 6 days per week
3)Life: 5 years
4)Number of pulses: $2 \times 3600 \times 8 \times 313 \times 5 = 0.9 \times 10^8$
5)Desired suppress voltage: up to 250 V

(2)Selection of TNR based on rating selection procedure

1. Confirmation of pulse source and invasion path: Wiring between on/off relay line and power line.
2. Determination of TNR connection method: Between power line (in parallel with coil).
3. Set of varistor voltage
   A TNR will be inserted between the 110 VDC power lines. Because the application is not defined as a typical example, the varistor voltage must be determined from the relationship between the circuit voltage and the maximum allowable voltage. Select the TNR of type 151K (150V) with the maximum allowable voltage of 121V or more, assuming voltage fluctuation of + 10%.
4. Set of pulse current waveform
   a)Pulse peak current (Ip): 0.25A same as load current.
   b)Duration of wave tail of pulse current
   The duration of wave tail of pulse current can be calculated from the following equation assuming the pulse current wave to be a rectangle wave.
   $E = 1/2L\ Ip^2 = 0.5 \times 1 \times 0.25 \times 0.25 = 0.031[J]$

   $$T = \frac{E}{Ip \cdot Vp} = \frac{0.031 \times 1000}{0.25 \times 220} = 0.56[ms]$$

   where Vp: estimated clamping voltage of TNR of type 151K at 0.25A read from the TNR volt-ampere characteristics.
5. Is the maximum peak current of TNR enough?
   Check the pulse life time of the TNR because pulses occur at a high frequency.
6. Does TNR have sufficient pulse life time?
   The conditions include Ip = 0.25A, T = 0.56msec, number of applied pulses = 0.9×10^8, and applied pulse interval = 0.5 sec. Since the applied pulse interval is shorter than the specification of 10 sec, the equivalent current and the equivalent number of applied pulses should be found with the equivalent interval set to 10 sec.

   $$\text{Equivalent current} = 0.25 \times \frac{10}{0.5} = 5[A]$$

   $$\text{Equivalent number of applied pulses} = 0.9 \times 10^8 \times \frac{0.5}{10} = 4.5 \times 10^6$$

   In addition, the duration of wave tail of the pulse current T is 0.56msec = 560µsec as known from the result of Item 4. Collate these conditions with the pulse life time rating of the TNR.

TNR type	Number of pulses
7V	10^5 to $10^6 < 4.5 \times 10^6$
10V	$> 4.5 \times 10^6$

   Depending on the above specification, a TNR of the 10V type can be selected. Thus, the TNR of type TND10V-151K is determined as a candidate from the results above together with the result described in Item 3.
7. Is rated wattage of TNR enough?
   The averaged wattage Ps[W] absorbed by the TNR is, $Ps = E\ fs = 0.031 \times 2 = 0.062[W]$
   where fs is the repeated pulse frequency [times per sec]. From the viewpoint of the absorbing wattage, a TNR of 5V type (0.1W) may be available. However, a TNR of 10V type (0.4W) is better if the pulse life time ratings of the TNR in Item 6 is also taken into account.
8. Is the maximum energy of TNR enough?
   This is already considered in the pulse life time because many pulses are applied to the TNR (see Item 6).
9. Is the condition that clamping voltage is less than withstand voltage of unit satisfied?
   The maximum clamping voltage of TND10V-151K was assumed to be about 220V in Item 4. By checking it with the TNR volt-ampere characteristics, we find $V_{0.25A} = 210V < 250V$. Thus this requested characteristic is satisfied.
10. Does excess capacitance and/or loss occur?
    As the DC power line does not cause severe problems.
11. Does large leakage current appear?
    As the 110 VDC power line produces only a small leakage current of several µA, it does not cause severe problems.
12. Check of wiring
    Insert the TNR near the coil as much as possible to reduce induction to other components.
13. Is sufficient measure taken for overload?
    Attach a fuse of 3A to 5A before the TNR for occurrence of overvoltage.
14. Do. environmental conditions enter into ranges of specifications?
    Check operating temperature range of the unit and temperature near the coils.
15. Does TNR succeed in installation test?
    Perform the test with TND10V-151K connected to confirm the performance of the unit.
16. Completion of pulse measure
    After insertion of TND10V-151K to the unit as shown in the figure, the action required for absorbing pulses is now completed.

4. LOAD REDUCTION CURVE OF TNR FOR TEMPERATURE

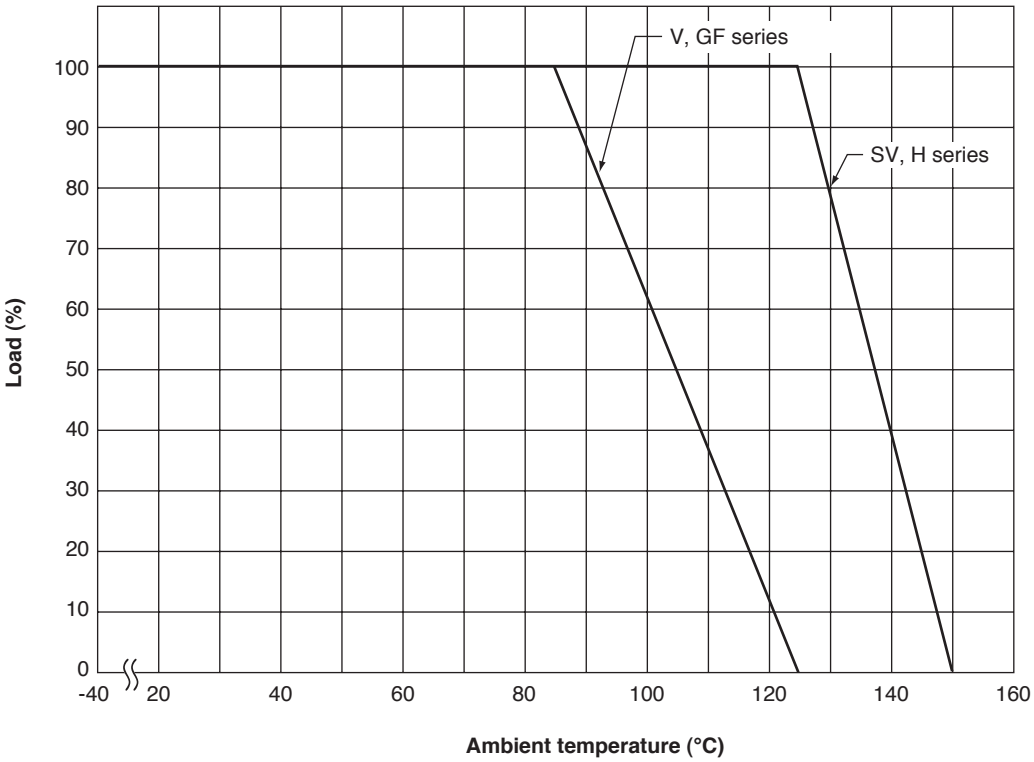


Fig. 3 Load reduction curve

The load includes the rated wattage, maximum allowable voltage, maximum peak current (SV series : Values of 2 times), maximum energy. For example, when TND10V-221K is used at 95°C, the load is found to be 75% from the load reduction curve above. Thus, the parameters can be calculated as follows.

1. Rated wattages	0.4W × 0.75 = 0.3W
2. Maximum allowable voltage	AC : 140V × 0.75 = 105V DC : 180V × 0.75 = 135V
3. Maximum peak current	2500A × 0.75 = 1875A
4. Maximum energy	27.5J × 0.75 = 20.63J

5. DETERIORATION OF TNR

5-1 DETERIORATION OF TNR

(1)In case where no pulses are applied to TNR

As known from the relationship between mean life of TNR and ambient temperature shown in the figure below, a TNR can have the mean life of longer than 100 years if it is used at ambient temperature and circuit voltage within their maximum ratings. Accordingly it can be said that the TNR has hardly been deteriorated.

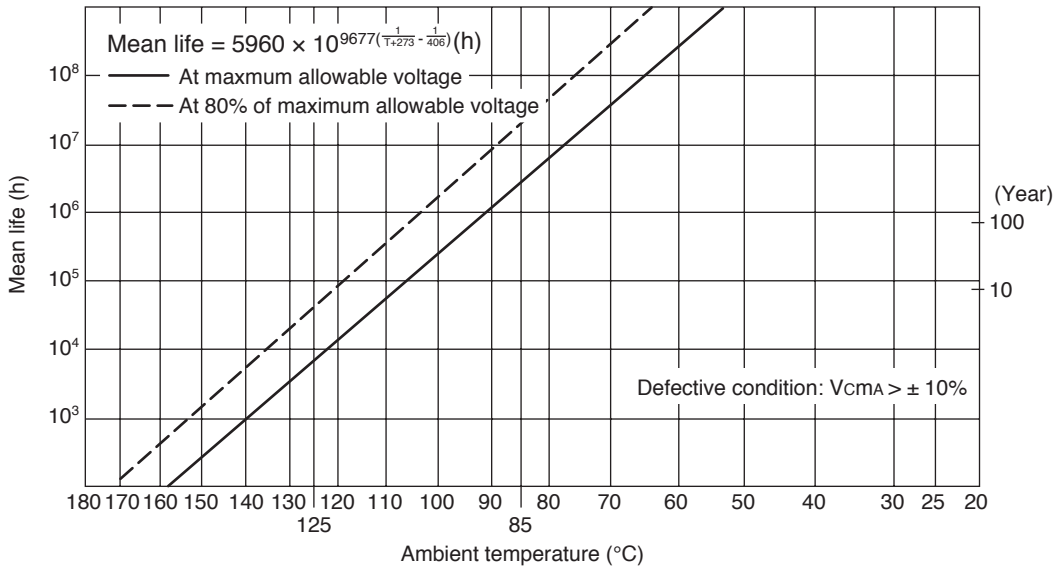


Fig. 4 Relationship between mean life TNR and ambient temperature

(2)In case where pulses are applied to TNR

Being a pulse absorption component, the TNR is deteriorated if it is subject to pulses exceeding its rating.

1. With lightening pulses applied to a TNR, the waveform, energy, and frequency cannot be defined. Thus the period taken until the TNR is deteriorated cannot also be determined.
2. With on/off pulses applied to a TNR, the waveform, energy, and frequency can be measured or estimated. Thus the period taken until the TNR can almost be estimated from the pulse life time ratings.
   However, because a TNR with the rating suited to the requested pulse life time ratings is normally selected, the TNR will hardly be deteriorated within the life of equipment including the TNR.

5-2 HOW TO CHECK DETERIORATION OF TNR AND FREQUENCY OF THE CHECKING

(1)Deterioration of TNR

The TNR is deteriorated by overvoltage application caused by overpulses and fluctuation of power voltage.

Adsorption of Excess Energy → Increase in Leakage Current → Heat Generation → Thermal Runaway →

Short Circut → Destruction (The TNR may be opened depending on conditions)

(2)How to check deterioration of TNR

As described in (1) of Section 5-2, the deterioration of a TNR is known by increase in leakage current. Accordingly, how a TNR is deteriorated can be measured by the leakage current.

The initial value of the leakage current of a TNR (or leakage current occurring when the DC voltage half of the nominal varistor voltage is applied to the TNR) is about 1μA though the value varies depending on the rating of the TNR. The leakage current of 10μA is a sign that deterioration begins in the TNR, so the TNR should be replaced with a new one.

However, the leakage current of 10μA causes the TNR to generate only the minimum heat, which will not lead the thermal runaway immediately. The TNR has a shorter pulse life than that in the initial state.

6. PULSE PESPONSE CHARACTERISTICS OF TNR

The TNR itself has a response time for a pulse as extremely short as 1 nsec. However, it is difficult to measure the time because of a large influence of the inductance of lead wire.

In actual use, the clamping voltage is increased a little with a fast rising pulse even at the same current because of influence of the inductance of lead wire. Figure 5 shows the ratio of clamping voltages at faster pulse rise times to the clamping voltage at application of standard pulse current waveform of 8/20μs, which is called overshoot ratio. The figure is an example when pulse current having rising time of 0.5μs to 8μs and constant peak current of 10A are applied to TND14V-271K. In the figure, the overshoot of about 10% appears at the rising time of 0.5μs.

In actual use of TNR, the rising of pulse voltage is limited by inductance and capacitance on the way to transmit in line. The rise time is almost not less than 1μs.

The wiring should be as short as possible because longer wiring make the overshoot higher.

Figures 6 and 7 show pulse absorption characteristics of a TNR with the wiring lengths of 5mm and 25cm respectively, as extreme examples. In these examples, the clamping voltage with wiring length of 25cm is about 1250V, which is about two times and a half of the clamping voltage of about 500V with wiring length of 5mm.

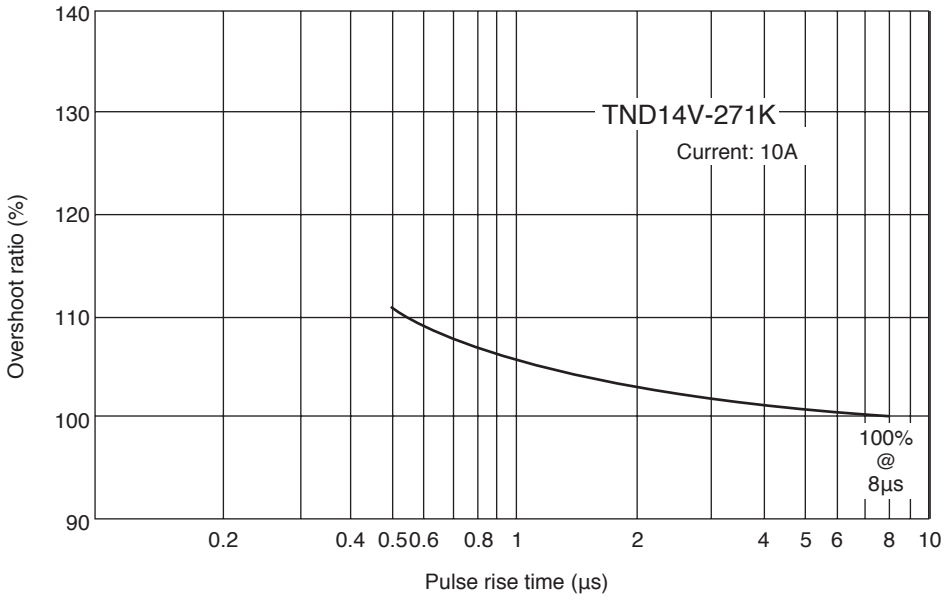


Fig. 5 Relationship between pulse rise time and overshoot ratio

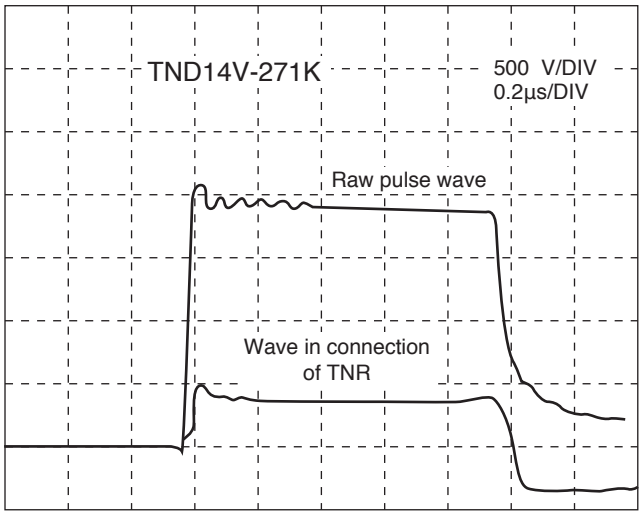


Fig. 6 Pulse absorption characteristic of TNR (wiring length of 5mm)

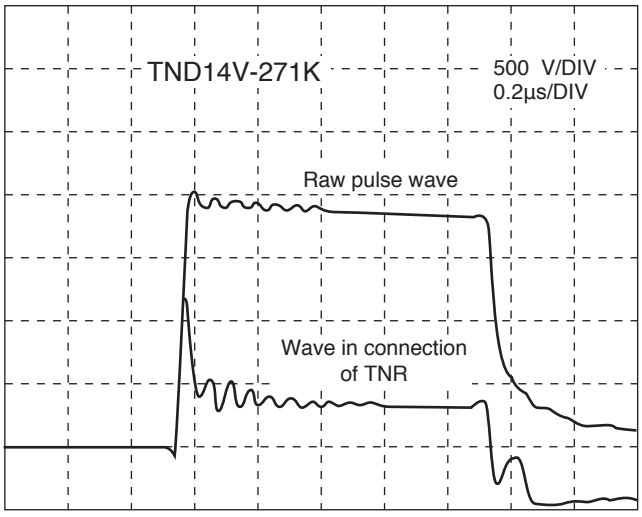
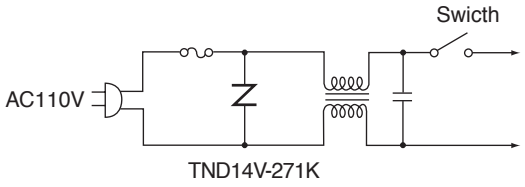
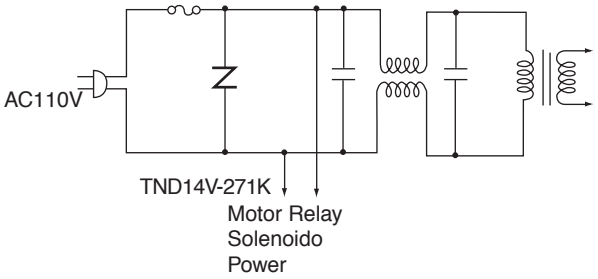


Fig. 7 Pulse absorption characteristic of TNR (wiring length of 25cm)

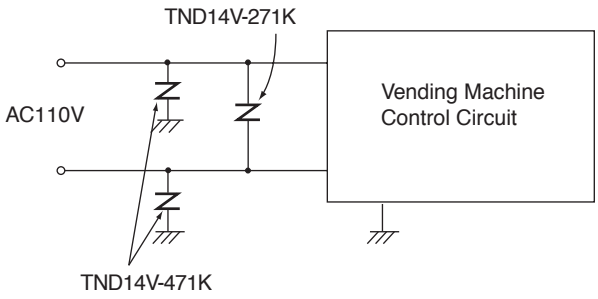
(1)Power Source Curcuit



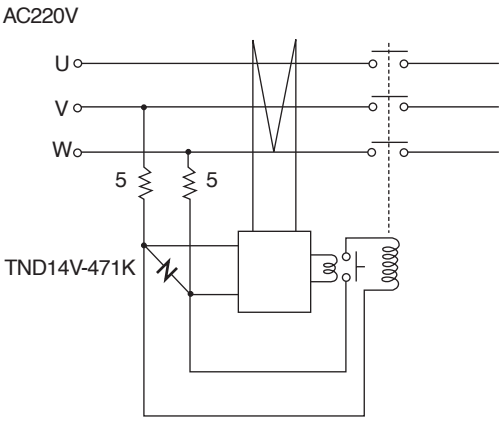
(2)Micro Computer Equipment



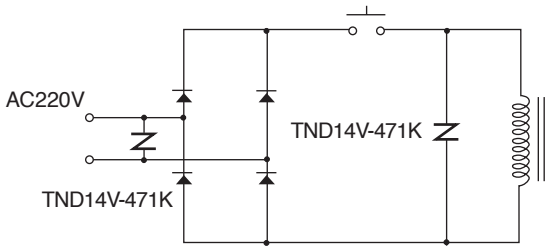
(3)Vending Machine



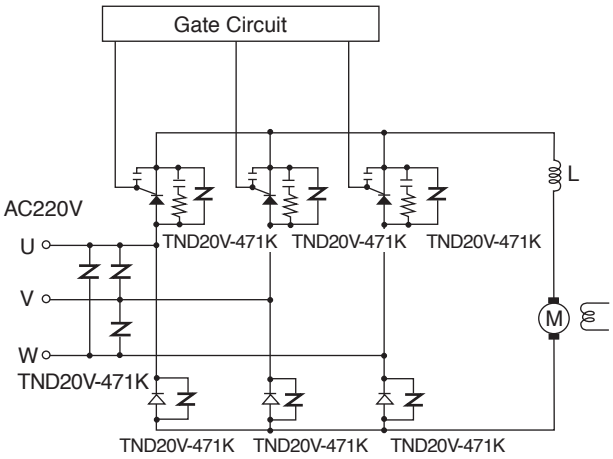
(4)Leakage Current Detector



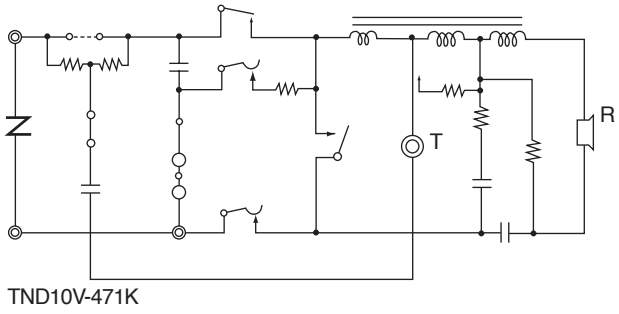
(5)Maganetic Brake

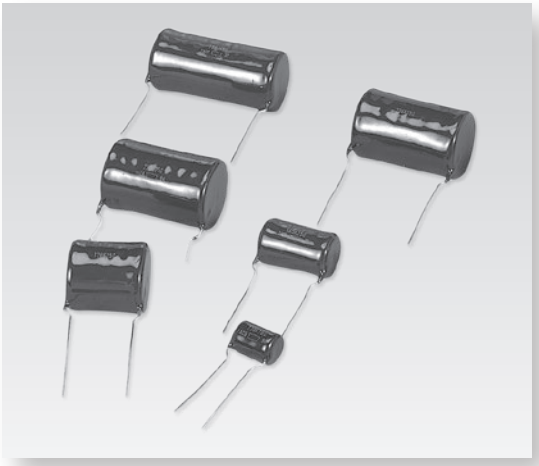


(6)Control of 20kW DC Motor



(7)Telephone

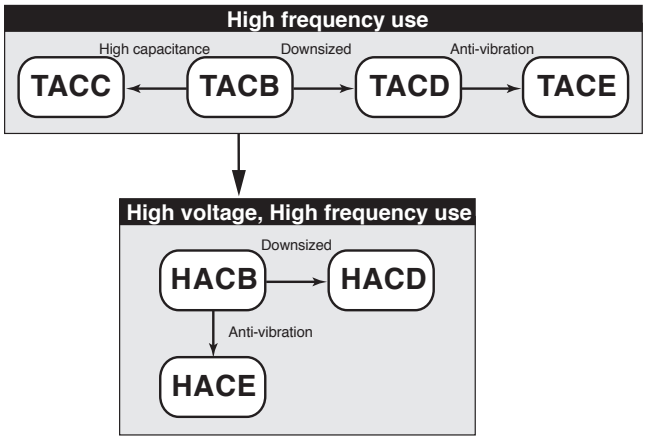




FILM CAPACITORS

Series	Major uses	Rated voltage range	Rated Capacitance range (μF)	Category temperature range (℃)	Page
TACE	High frequency use, metallized polypropylene film. Permissible large current and anti-vibration	250 to 1000 V_{dc}	0.47 to 22	-40 to +105	113
TACD	High frequency use, metallized polypropylene film. Standard type (Downsizing of TACB series)	250 to 1000 V_{dc}	0.033 to 22	-40 to +105	114
TACC	High frequency use, metallized polypropylene film. Large capacitance type of TACB series	450 to 1000 V_{dc}	1.0 to 18	-40 to +105	117
TACB	High frequency use, metallized polypropylene film.	250 to 800 V_{dc}	0.033 to 22	-40 to +105	118
HACE	High frequency use, metallized polypropylene film. High voltage type and anti-vibration	630 to 2000 V_{dc}	0.18 to 1.5	-40 to +105	121
HACD	High frequency use, metallized polypropylene film. High voltage type of TACD series (Downsizing of HACB series)	630 to 4000 V_{dc}	0.0033 to 1.5	-40 to +105	122
HACB	High frequency use, metallized polypropylene film. High voltage type of TACB series	630 to 4000 V_{dc}	0.001 to 1.2	-40 to +105	125

◆Metallized polypropylene film capacitors



Part Numbering System

(Example:TACD series 250V 0.82μF)

Code	Contents
F	Film Capacitors

Code	Series
TACD	TACD

Code	Type
V	Copper Wire

Code	Tol.(%)
J	± 5

Code	Forming Style
L	Type B

1	2 3 4 5	6 7 8	9	10 11 12	13	14	15	16	17	18
F	T A C D	2 5 1	V	8 2 4	J	D	L	C	Z	0
Category	Series code	Voltage code	Terminal code	Capacitance code	Capacitance tolerance	Size code	Lead Forming Code	Lead Spacing Code	Lead Length Code	Supplement Code

Code	Voltage(V)
251	250

Code	Cap.(μF)
824	0.82

Code	Dimensions(mm)
C	10.0

Code	Dimensions(mm)
Z	Standard

*Others (Refer to the standard ratings .)

(Series code)

Code	Series name
TACE	TACE
TACD	TACD
TACC	TACC
TACB	TACB
HACE	HACE

Code	Series name
HACD	HACD
HACB	HACB

(Voltage code)

Code	Voltage(V)
251	250
3B1	315
401	400
501	500
631	630

Code	Voltage(V)
801	800
102	1000
1C2	1250
152	1500
162	1600

Code	Voltage(V)
182	1800
202	2000
252	2500
3B2	3150
402	4000

(Terminal code)

Code	Terminal
V	Tin plated copper wire
U	Tin plated copper clad steel wire
N	4 terminals tab

(Capacitance code)

Unit of capacitance with (pF),and a sign of capacitance expresses it in 3 characters.
significant digit(two columns) + index(one column) unit : pF
(Example :1μF[1,000,000pF]="105")

(Capacitance tolerance code)

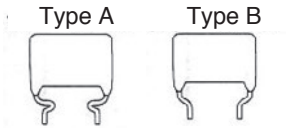
Code	tolerance(%)
H	±3
J	±5
K	±10

(Size code)

This is eigenvalue. The details are standard ratings.

(Lead Forming Code)

Code	Type
A	Straight lead
F	Type A
L	Type B



(Lead Spacing Code)

Code	Dimensions(mm)
B	7.5
C	10.0
G	12.5
D	15.0
0	16.5
H	17.5
N	20.0
1	21.5
E	22.5

コード	Dimensions(mm)
P	25.0
2	26.5
F	27.5
Q	30.0
J	37.5
4	41.5
W	47.5
5	51.5

(Lead Length Code)

Code	Dimensions(mm)
M	5.0
S	Special
Z	Standard

(Supplement Code)

This is eigenvalue. The details are standard ratings.

Minimum Packaging Quantity

Please order by units of minimum packaging quantity.

◆Metallized polypropylene film capacitors

Series	Voltage (V_{dc})	Rated Capacitance (μF)	Bagged (pcs/box)	Boxed (pcs)
TACE	250	15 to 18	-	200
		22	-	150
	400	6.8 to 8.2	-	200
		10 to 12	-	150
	630	0.47 to 3.3	-	200
		4.7	-	150
	1000	0.47 to 1.0	-	200
		1.5	-	150
TACD	250	0.82 to 1.2	600	-
		1.5 to 1.8	500	-
		2.2	400	-
		2.7	300	-
		3.3 to 3.9	500	-
		4.7	400	-
		5.6 to 8.2	300	-
		10 to 12	200	-
		15	150	-
	315	0.33 to 0.68	800	-
		0.82	600	-
		1.0 to 1.8	500	-
		2.2 to 2.7	300	-
		3.3	500	-
		3.9	400	-
		4.7	300	-
		5.6	200	-
		6.8 to 8.2	200	-
		10 to 12	150	-
		15 to 22	100	-
	400	0.22 to 0.27	800	-
		0.33 to 0.68	600	-
		0.82 to 1.0	400	-
		1.2 to 1.5	300	-
		1.8 to 2.7	400	-
		3.3 to 3.9	300	-
		4.7	200	-
		5.6 to 6.8	200	-
		8.2	150	-
	500	0.22 to 0.27	800	-
		0.33 to 0.68	500	-
		0.82	300	-
		1.0	400	-
		1.2	500	-
		1.5 to 1.8	400	-
		2.2 to 2.7	300	-
		3.3 to 3.9	200	-
		4.7	150	-
	630	0.1 to 0.15	800	-
		0.18	600	-
		0.22 to 0.33	500	-
		0.39	400	-
		0.47	300	-
		0.56 to 1.0	400	-
		1.2 to 1.5	300	-
		1.8	200	-
		2.2 to 2.7	200	-
		3.3	150	-
		3.9 to 5.6	100	-
	800	0.056 to 0.082	800	-
		0.1 to 0.12	600	-
		0.15 to 0.27	500	-
		0.33 to 0.68	400	-
		0.82 to 1.0	300	-
		1.2 to 1.8	200	-
		2.2	150	-
		2.7 to 3.9	100	-
	1000	0.033 to 0.039	800	-
		0.047 to 0.082	600	-
		0.1 to 0.12	500	-
		0.15 to 0.18	400	-
		0.22 to 0.27	300	-
		0.33 to 0.39	400	-
		0.47 to 0.68	300	-
		0.82 to 1.0	200	-
		1.2	150	-

Series	Voltage (V_{dc})	Rated Capacitance (μF)	Bagged (pcs/box)	Boxed (pcs)
TACC	450	5.6 to 8.2	200	-
		10 to 12	150	-
		15	100	-
		18	100	-
	630	3.3	200	-
		3.9 to 6.8	150	-
		8.2	100	-
		10	100	-
	800	2.2 to 2.7	200	-
		3.3 to 3.9	150	-
		4.7	100	-
		5.6 to 6.8	100	-
	1000	1.0	200	-
		1.2	150	-
		1.5 to 1.8	100	-
		2.2 to 2.7	100	-
TACB	250	0.33 to 0.39	800	-
		0.47 to 0.68	600	-
		0.82 to 1.2	500	-
		1.5 to 1.8	400	-
		2.2 to 2.7	300	-
		3.3	400	-
		3.9 to 6.8	300	-
		8.2	200	-
		10	200	-
		12	150	-
		15 to 22	100	-
	315	0.22 to 0.27	800	-
		0.33 to 0.47	600	-
		0.56 to 2.2	400	-
		2.7 to 3.9	300	-
		4.7 to 5.6	200	-
		6.8	200	-
		8.2	150	-
	400	0.1	700	-
		0.12 to 0.18	600	-
		0.22 to 0.33	500	-
		0.39 to 1.2	400	-
		1.5 to 1.8	300	-
		2.2	200	-
		2.7	200	-
		3.3 to 3.9	150	-
		4.7 to 5.6	100	-
	630	0.056 to 0.082	800	-
		0.1 to 0.12	600	-
		0.15	500	-
		0.18 to 0.27	400	-
		0.33 to 0.47	300	-
		0.56 to 0.68	400	-
		0.82 to 1.0	300	-
		1.2 to 1.8	200	-
		2.2	150	-
		2.7 to 3.9	100	-
	800	0.033 to 0.039	800	-
		0.047 to 0.068	600	-
		0.082 to 0.15	400	-
		0.18 to 0.22	300	-
		0.27 to 0.33	400	-
		0.39 to 0.56	300	-
		0.68 to 1.0	200	-
		1.2	150	-

Series	Voltage (V_{dc})	Rated Capacitance (μF)	Bagged (pcs/box)	Boxed (pcs)
HACE	630	0.47 to 1.0	-	200
		1.5	-	150
	1250	0.47 to 0.68	-	150
		1.0 to 1.5	-	100
	1600	0.27 to 0.33	-	150
	2000	0.18 to 0.22	-	150
HACD	630	0.047 to 0.082	600	-
		0.1	500	-
		0.12 to 0.22	400	-
		0.27	300	-
		0.33	500	-
		0.39 to 0.68	400	-
		0.82	300	-
		1.0 to 1.2	200	-
		1.5	200	-
	1000	0.033 to 0.056	600	-
		0.068	500	-
		0.082 to 0.1	400	-
		0.12 to 0.47	300	-
		0.56 to 0.82	200	-
		1.0	200	-
		1.2	150	-
	1250	0.018 to 0.039	600	-
		0.047 to 0.082	400	-
		0.1 to 0.12	300	-
		0.15 to 0.18	400	-
		0.22 to 0.27	300	-
		0.33 to 0.47	200	-
		0.56 to 0.68	150	-
		0.82 to 1.2	100	-
	1600	0.0068 to 0.012	600	-
		0.015	500	-
		0.018 to 0.027	400	-
		0.033 to 0.068	300	-
		0.082 to 0.15	400	-
		0.18 to 0.22	200	-
		0.27	200	-
		0.33	150	-
	2000	0.0033 to 0.0056	600	-
		0.0068	500	-
		0.008 to 0.015	400	-
		0.018 to 0.022	300	-
		0.027 to 0.068	400	-
		0.082	300	-
		0.1 to 0.15	200	-
		0.18	150	-
		0.220 to 0.330	100	-
	2500	0.015 to 0.022	300	-
		0.027 to 0.033	200	-
		0.039 to 0.056	300	-
		0.068 to 0.082	200	-
		0.1	150	-
	3150	0.0068 to 0.01	300	-
		0.012 to 0.015	200	-
		0.018 to 0.027	300	-
		0.033 to 0.039	200	-
		0.047	150	-
	4000	0.0039 to 0.0056	300	-
		0.0068 to 0.01	200	-
		0.012 to 0.015	300	-
		0.018	200	-
		0.022 to 0.027	150	-

Series	Voltage (V_{dc})	Rated Capacitance (μF)	Bagged (pcs/box)	Boxed (pcs)
HACB	630	0.033 to 0.039	800	-
		0.047 to 0.068	600	-
		0.082	500	-
		0.10 to 0.18	400	-
		0.22 to 0.27	300	-
		0.33 to 0.39	400	-
		0.47 to 0.56	300	-
		0.68 to 0.82	200	-
		0.1 to 0.12	150	-
	1000	0.018	800	-
		0.022 to 0.033	600	-
		0.039 to 0.056	500	-
		0.068 to 0.1	400	-
		0.12	300	-
		0.15	500	-
		0.18 to 0.27	400	-
		0.33	300	-
		0.39 to 0.56	200	-
		0.68	150	-
		0.82 to 1.2	100	-
	1250	0.012 to 0.027	600	-
		0.033	500	-
		0.039 to 0.056	400	-
		0.068 to 0.082	300	-
		0.1 to 0.12	400	-
		0.15 to 0.18	300	-
		0.22 to 0.33	200	-
		0.39 to 0.56	150	-
		0.68 to 0.82	100	-
		1.0	100	-
	1600	0.0047 to 0.0068	600	-
		0.0082 to 0.012	500	-
		0.015	400	-
		0.018 to 0.033	300	-
		0.039	500	-
		0.047 to 0.082	400	-
		0.1 to 0.12	300	-
		0.15 to 0.18	200	-
		0.22 to 0.27	150	-
		0.33 to 0.47	100	-
	2000	0.001 to 0.0039	800	-
		0.0047 to 0.0056	600	-
		0.0068	500	-
		0.0082 to 0.012	400	-
		0.015 to 0.022	300	-
		0.027 to 0.047	400	-
		0.056	300	-
		0.068 to 0.082	200	-
		0.1	200	-
		0.12 to 0.15	150	-
		0.18 to 0.27	100	-
	3150	0.0047 to 0.0068	200	-
		0.0082	400	-
		0.010 to 0.012	300	-
		0.015	200	-
		0.018	200	-
		0.022 to 0.033	150	-
	4000	0.0027	300	-
		0.0033 to 0.0047	200	-
		0.0056 to 0.0068	300	-
		0.0082 to 0.01	200	-
		0.012 to 0.018	150	-

The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems.
We are not in any case responsible for any failures or damage caused by the use of information contained herein.
You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.
Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event any of our products malfunction.

1 In designing device circuits

(1) Confirming operating and installation environment,use capacitors within the performance limits prescribed in their catalog or product specifications.
(2) Do not use capacitors at the environment of which temperature drastically changes even though it stays within the prescribed range.
(3) Do not use capacitors at the humid or dewy environment.
(4) Select the proper capacitors matching for an application.
(5) Do not use the capacitors, which have particularly been designed for a specific application, into other applications. In particular, do not use the capacitor samples, which are provided for the purpose of appearance or electrical check, for other purpose.
(6) Charge and discharge cycles that are rapidly repeated at more than the prescribed conditions causes capacitors to deteriorate in their characteristics or breakdown.
(7) Unless otherwise prescribed, do not apply the surge or ripple voltage of which peak voltage exceeds the specified full rated voltage.
(8) Where using capacitors at a rated temperature, do not apply voltage more than the derating voltage specified at the temperature.
(9) Where using capacitors into AC or pulsing circuits, do not apply current more than the specified maximum permissible current. For the details, consult us.
(10) A rise in capacitor temperature, which is caused by a ripple current, shall be so set as not to exceed the specified limit at non-circulating air condition. Note that a capacitor changes in the temperature rise by the operating temperature as its capacitance changes.
(11) The sum of ambient temperature, including the influence of heat from other components, and the rise of temperature by self-heating must be within the specified upper category.
(12) Do not connect capacitors in series or parallel. Consult us for it.

2 Installation and assembly board washing

(1) Do not pull or twist the lead wires of a capacitor by applying the force more than the limits when installing the capacitor into the printed circuit board. In particular, the capacitor shall be so installed into the board as not to have a crack in the covering resin of the capacitor. If it cannot be avoided, use capacitors with pre-formed lead wires.
(2) If a large-sized capacitor is installed and/or the device is exposed to a vibration shock, anchor the body of the capacitor to the board by means of a clamp or adhesive that does not effect the capacitor.
(3) Do not touch the exterior cover of a capacitor to the metal part of the device or other components.
(4) For soldering, follow the specified conditions. Because the plastic film of the capacitors is effected by heat, overheating the capacitors during soldering causes tanδ to increase.
(5) If the assembly boards are washed for the purposes of removing residual flux, follow the specified conditions.
①Alcohols, Water soluble solvents.
②Cleaning Methods Vaporized Cleaning, Dip Cleaning, Ultrasonic Cleaning. When Cleaning, Temperature and Period Shall not Be Exceeded 50℃ and 5 Minutes.
③After Treatment It is Necessary To Remove Cleaning Solvent From P.W.B. By enough Dryness.

3 While devices are operating

(1) Do not touch a capacitor, while under load, directly with bare hands.Touching the capacitor causes a shock hazard.
(2) Even under non–load condition, a capacitor may have charge. Also, the capacitor that has been discharged may be spontaneously recharged by dielectric absorption. Handle the capacitor after discharging with a discharge resistor.
(3) Do not short the terminals of a capacitor by applying any conductive object. Do not spillany electric–conductive liquid such as acid or alkaline solution over the capacitor as Well.
(4) Do not use capacitors at the following environment ;
①Water, chemicals or oil spatters on the capacitors.
②Direct sunlight pours down onto the capacitors.
③Ozone, ultraviolet rays or radiation is applied to the capacitors.
④Corrosive gas is exposed to the capacitors.

4 If a capacitor should fail while under load, follow the below

If smoke, fire or stench should be emitted while the device is operating, turn off or unplug the power supply of the device and then extinguish a fire.

5 Storage and handling

(1) For the capacitors that are stored for more than a year, make sure of their characteristics and lead solder ability before use.
(2) Don't increase an excessive vibration, a shock, pressure, and so on to the capacitors.
(3) Don't add the excessive power to the lead wire.
(4) Scratching the dielectric film of a capacitor causes If a capacitor body is scratched or damaged so deep that the dielectric film is damaged, the dielectric will be destructively damaged.Handle capacitors with care.

6 Disposal

Burning capacitors may discharge toxic gas. Ask a specialist for the disposal of industrial wastes.

7 Catalogs

Product specifications in this catalog are subject to change without notice.
Please request and make sure our product specifications before purchase and/or use.

8 Response to the Substances of Concern

(1) Nippon Chemi-Con aims for developing products that meet laws and regulations concerning substances of concern.
(Some products may contain regulated substances for exempted application.)
Please contact us for more information about law-compliance status.

(2) According to the content of REACH handbook (Guidance on requirements for substances in articles which is published on May 2008), our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for EU REACH Regulation Article 7 (1).
Reference: Electrolytic Condenser Investigation Society
"Study of REACH Regulation in EU about Electrolytic Capacitor"
(publicized on 13 March 2008)

ELECTRONIC EQUIPMENT FILM CAPACITOR

TACE Series

RoHS2 Compliant

- ●Maximum operating temperature 105℃.
- ●Allowable temperature rise 15K max.
- ●Tab : 4 terminals

◆SPECIFICATIONS

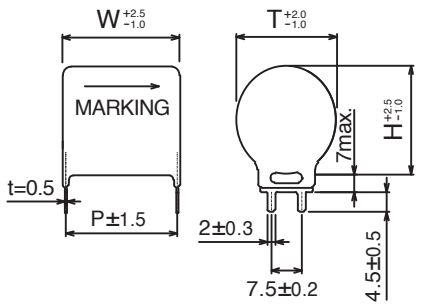
Items	Characteristics				
Category temperature range	-40 to +105℃				
Rated voltage range	250Vdc, 400Vdc, 630Vdc, 1000Vdc				
Capacitance tolerance	±5% (J)				
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.				
Dissipation factor (tanδ)	Not more than 0.05% : Equal or less than 1μF. Not more than (c×0.015+0.05)% : More than 1μF.				
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.				
	Rated voltage (Vdc)	250	400	630	1000
	Measurement voltage (Vdc)	100	100	500	500
Endurance	The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 105℃.				
	Appearance	No serious degradation			
	Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.			
	Dissipation factor (tanδ)	No more than initial specification at 1kHz.			
	Capacitance change	Within ±5% of initial value.			
Loading under damp heat	The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃90～95%RH.				
	Appearance	No serious degradation.			
	Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.			
	Dissipation factor (tanδ)	No more than initial specification at 1kHz.			
	Capacitance change	Within ±5% of initial value.			

◆STANDARD RATINGS

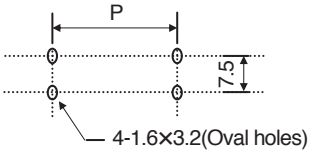
WV (Vdc)	Cap (μF)	Dimensions (mm)				Maximum ripple current (Arms)	WV (Vac)	Part Number
		W	H	T	P			
250	15	24.5	30.0	28.6	22.5	14.3	100	FTACE251N156JEAES0
	18		32.8	31.2		15.6		FTACE251N186JEAES0
	22	29.5	31.9	30.4	27.5	14.2		FTACE251N226JFAFS0
400	6.8	24.5	29.0	27.6	22.5	11.9	150	FTACE401N685JEAES0
	8.2		31.6	30.1		13.1		FTACE401N825JEAES0
	10	29.5	30.9	29.4	27.5	11.8		FTACE401N106JFAFS0
	12		33.6	32.0		13.0		FTACE401N126JFAFS0
630	0.47	17.5	16.5	15.7	15.0	5.9	175	FTACE631N474JDADS0
	0.68		19.3	18.4		7.1		FTACE631N684JDADS0
	1.0		23.0	22.0		8.6		FTACE631N105JDADS0
	1.5	19.5	25.5	24.3	17.5	9.2		FTACE631N155JHAHS0
	2.2	24.5	25.7	24.5	22.5	8.6		FTACE631N226JEAES0
	3.3		31.0	29.5		10.6		FTACE631N335JEAES0
	4.7	29.5	32.4	30.8	27.5	10.4		FTACE631N475JFAFS0
1000	0.47	19.5	24.0	22.9	17.5	6.9	250	FTACE102N474JHAHS0
	0.68		28.5	27.1		7.3		FTACE102N684JHAHS0
	1.0	24.5	28.3	27.0	22.5	7.1		FTACE102N105JEAES0
	1.5	29.5	30.1	28.7	27.5	7.3		FTACE102N155JFAFS0

(1)The maximum ripple current : +85℃ max., 100kHz, sine wave
(2)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS



The recommended conditions for mounting.



NIPPON CHEMI-CON

ELECTRONIC EQUIPMENT FILM CAPACITOR

TACD Series

RoHS2 Compliant

- ●Maximum operating temperature 105℃.
- ●Allowable temperature rise 15K max.
- ●Downsizing of TACB series.

◆SPECIFICATIONS

Items	Characteristics
Category temperature range	-40 to +105℃
Rated voltage range	250 to 1000Vdc
Capacitance tolerance	±5% (J)
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.
Dissipation factor (tanδ)	Not more than 0.05% : Equal or less than 1μF. Not more than (c×0.015+0.05)% : More than 1μF.
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.

Rated voltage (Vdc)	250	315	400	500	630	800	1000
Measurement voltage (Vdc)	100	100	100	100	500	500	500

Endurance

The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 105℃.

Appearance	No serious degradation
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF.
	No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	No more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

Loading under damp heat

The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃ 90～95%RH.

Appearance	No serious degradation.
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF.
	No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	No more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm) W	H	T	F	φd	Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
250	0.82	16.2	10.8	10.3	10.0	0.8	5.45	100	FTACD251V824JDLCZ0	TACD2E824J
	1.0		11.6	11.1			6.00		FTACD251V105JDLCZ0	TACD2E105J
	1.2		12.5	11.9			6.57		FTACD251V125JDLCZ0	TACD2E125J
	1.5		13.6	13.0			7.34		FTACD251V155JDLCZ0	TACD2E155J
	1.8		14.7	14.0			8.04		FTACD251V185JDLCZ0	TACD2E185J
	2.2		15.9	15.2			8.89		FTACD251V225JDLCZ0	TACD2E225J
	2.7	23.2	14.0	13.4	17.5		6.66		FTACD251V275JELHZ0	TACD2E275J
	3.3		15.2	14.5			7.36		FTACD251V335JELHZ0	TACD2E335J
	3.9		16.4	15.6			8.00		FTACD251V395JELHZ0	TACD2E395J
	4.7		17.8	16.9			8.78		FTACD251V475JELHZ0	TACD2E475J
	5.6	28.2	17.1	16.3	22.5	1.0	7.87		FTACD251V565JFLEZ0	TACD2E565J
	6.8		18.7	17.8			8.67		FTACD251V685JFLEZ0	TACD2E685J
	8.2		20.3	19.3			9.52		FTACD251V825JFLEZ0	TACD2E825J
	10		22.2	21.2			10.00		FTACD251V106JFLEZ0	TACD2E106J
	12		24.1	23.0			10.00		FTACD251V126JFLEZ0	TACD2E126J
	15		26.8	25.5			10.00		FTACD251V156JFLEZ0	TACD2E156J
315	0.33	16.2	8.6	8.2	10.0	0.8	3.78	125	FTACD3B1V334JDLCZ0	TACD2F334J
	0.39		9.1	8.7			4.11		FTACD3B1V394JDLCZ0	TACD2F394J
	0.47		9.7	9.2			4.51		FTACD3B1V474JDLCZ0	TACD2F474J
	0.56		10.3	9.8			4.93		FTACD3B1V564JDLCZ0	TACD2F564J
	0.68		11.0	10.5			5.43		FTACD3B1V684JDLCZ0	TACD2F684J
	0.82		11.9	11.3			5.87		FTACD3B1V824JDLCZ0	TACD2F824J
	1.0		12.8	12.2			6.49		FTACD3B1V105JDLCZ0	TACD2F105J
	1.2	18.2	12.9	12.3	12.5		6.23		FTACD3B1V125JHLGZ0	TACD2F125J
	1.5		14.1	13.4			6.96		FTACD3B1V155JHLGZ0	TACD2F155J
	1.8		15.2	14.5			7.63		FTACD3B1V185JHLGZ0	TACD2F185J
	2.2	23.2	14.4	13.7	17.5		6.49		FTACD3B1V225JELHZ0	TACD2F225J
	2.7		15.6	14.9			7.19		FTACD3B1V275JELHZ0	TACD2F275J
	3.3		17.1	16.3			7.95		FTACD3B1V335JELHZ0	TACD2F335J
	3.9		18.3	17.5			8.65		FTACD3B1V395JELHZ0	TACD2F395J
	4.7		19.9	19.0			9.34		FTACD3B1V475JELHZ0	TACD2F475J
	5.6	28.2	19.3	18.4	22.5	1.0	8.51		FTACD3B1V565JFLEZ0	TACD2F565J
	6.8		21.0	20.0			9.38		FTACD3B1V685JFLEZ0	TACD2F685J
	8.2		22.9	21.8			10.00		FTACD3B1V825JFLEZ0	TACD2F825J
	10		25.1	23.9			10.00		FTACD3B1V106JFLEZ0	TACD2F106J
	12		27.3	26.0			10.00		FTACD3B1V126JFLEZ0	TACD2F126J
	15	43.2	24.2	23.1	37.5		9.33		FTACD3B1V156JTLJZ0	TACD2F156J
	18		26.3	25.1			10.00		FTACD3B1V186JTLJZ0	TACD2F186J
	22		28.9	27.5			10.00		FTACD3B1V226JTLJZ0	TACD2F226J

(1)Capacitance tolerance:Standard(J:±5%),Option(K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

TACD Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φ φd				
400	0.22	16.2	8.7	8.3	10.0	0.8	3.91	150	FTACD401V224JDLCZ0	TACD2G224J
	0.27		9.3	8.9			4.33		FTACD401V274JDLCZ0	TACD2G274J
	0.33		10.0	9.5			4.27		FTACD401V334JDLCZ0	TACD2G334J
	0.39		10.6	10.1			4.64		FTACD401V394JDLCZ0	TACD2G394J
	0.47		11.4	10.8			5.09		FTACD401V474JDLCZ0	TACD2G474J
	0.56		12.2	11.6			5.56		FTACD401V564JDLCZ0	TACD2G564J
	0.68		13.1	12.5			6.13		FTACD401V684JDLCZ0	TACD2G684J
	0.82	18.2	13.2	12.6	12.5		5.89		FTACD401V824JHLGZ0	TACD2G824J
	1.0		14.3	13.7			6.50		FTACD401V105JHLGZ0	TACD2G105J
	1.2	23.2	13.4	12.8	17.5		5.71		FTACD401V125JELHZ0	TACD2G125J
	1.5		14.7	14.1			6.13		FTACD401V155JELHZ0	TACD2G155J
	1.8		15.9	15.2			6.71		FTACD401V185JELHZ0	TACD2G185J
	2.2		17.4	16.5			7.43		FTACD401V225JELHZ0	TACD2G225J
	2.7		19.0	18.1			8.23		FTACD401V275JELHZ0	TACD2G275J
	3.3	28.2	18.6	17.7	22.5	1.0	7.47		FTACD401V335JFLEZ0	TACD2G335J
	3.9		20.0	19.1			8.13		FTACD401V395JFLEZ0	TACD2G395J
	4.7		21.8	20.7			8.92		FTACD401V475JFLEZ0	TACD2G475J
	5.6		23.6	22.5			9.74		FTACD401V565JFLEZ0	TACD2G565J
	6.8		25.8	24.5			10.00		FTACD401V685JFLEZ0	TACD2G685J
	8.2		28.1	26.8			10.00		FTACD401V825JFLEZ0	TACD2G825J
500	0.22	18.2	9.6	9.2	12.5	0.8	3.09	150	FTACD501V224JHLGZ0	TACD2H224J
	0.27		10.2	9.8			3.42		FTACD501V274JHLGZ0	TACD2H274J
	0.33		11.1	10.6			3.78		FTACD501V334JHLGZ0	TACD2H334J
	0.39		11.7	11.2			4.11		FTACD501V394JHLGZ0	TACD2H394J
	0.47		12.7	12.1			4.51		FTACD501V474JHLGZ0	TACD2H474J
	0.56		13.6	13.0			4.93		FTACD501V564JHLGZ0	TACD2H564J
	0.68		14.7	14.0			5.43		FTACD501V684JHLGZ0	TACD2H684J
	0.82		15.9	15.2			5.96		FTACD501V824JHLGZ0	TACD2H824J
	1.0	23.2	14.9	14.2	17.5		5.08		FTACD501V105JELHZ0	TACD2H105J
	1.2		16.1	15.3			5.57		FTACD501V125JELHZ0	TACD2H125J
	1.5		17.6	16.8			6.23		FTACD501V155JELHZ0	TACD2H155J
	1.8		19.1	18.2			6.82		FTACD501V185JELHZ0	TACD2H185J
	2.2		20.9	19.9			7.54		FTACD501V225JELHZ0	TACD2H225J
	2.7	28.2	20.4	19.4	22.5	1.0	6.85		FTACD501V275JFLEZ0	TACD2H275J
	3.3		22.3	21.3			7.57		FTACD501V335JFLEZ0	TACD2H335J
	3.9		24.1	23.0			8.23		FTACD501V395JFLEZ0	TACD2H395J
	4.7		26.3	25.1			9.04		FTACD501V475JFLEZ0	TACD2H475J
630	0.1	16.2	9.1	8.7	10.0	0.8	2.99	175	FTACD631V104JDLCZ0	TACD2J104J
	0.12		9.6	9.2			3.28		FTACD631V124JDLCZ0	TACD2J124J
	0.15		10.4	10.0			3.66		FTACD631V154JDLCZ0	TACD2J154J
	0.18		11.2	10.7			4.02		FTACD631V184JDLCZ0	TACD2J184J
	0.22		12.0	11.5			4.44		FTACD631V224JDLCZ0	TACD2J224J
	0.27		13.1	12.5			4.92		FTACD631V274JDLCZ0	TACD2J274J
	0.33	18.2	13.1	12.5	12.5		4.76		FTACD631V334JHLGZ0	TACD2J334J
	0.39		14.0	13.4			5.17		FTACD631V394JHLGZ0	TACD2J394J
	0.47		15.2	14.5			5.68		FTACD631V474JHLGZ0	TACD2J474J
	0.56	23.2	14.0	13.4	17.5		4.79		FTACD631V564JELHZ0	TACD2J564J
	0.68		15.2	14.5			5.27		FTACD631V684JELHZ0	TACD2J684J
	0.82		16.5	15.7			5.79		FTACD631V824JELHZ0	TACD2J824J
	1.0		18.0	17.1			6.39		FTACD631V105JELHZ0	TACD2J105J
	1.2		19.5	18.6			7.00		FTACD631V125JELHZ0	TACD2J125J
	1.5	28.2	19.1	18.2	22.5	1.0	6.42		FTACD631V155JFLEZ0	TACD2J155J
	1.8		20.8	19.8			7.04		FTACD631V185JFLEZ0	TACD2J185J
	2.2		22.7	21.7			7.79		FTACD631V225JFLEZ0	TACD2J225J
	2.7		25.0	23.8			8.62		FTACD631V275JFLEZ0	TACD2J275J
	3.3		27.4	26.1			9.54		FTACD631V335JFLEZ0	TACD2J335J
	3.9	43.2	23.9	22.8	37.5		6.93		FTACD631V395JTLJZ0	TACD2J395J
	4.7		25.9	24.7			7.61		FTACD631V475JTLJZ0	TACD2J475J
	5.6		28.1	26.8			8.31		FTACD631V565JTLJZ0	TACD2J565J

(1)Capacitance tolerance:Standard(J:±5%),Option(K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

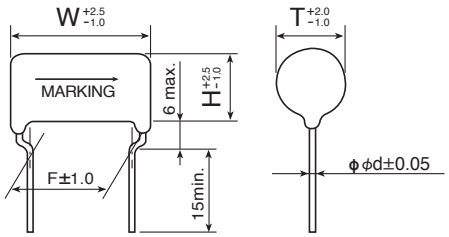
TACD Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φ φd				
800	0.056	16.2	8.5	8.1	10.0	0.8	2.60	200	FTACD801V563JDLCZ0	TACD2K563J
	0.068		9.0	8.6			2.86		FTACD801V683JDLCZ0	TACD2K683J
	0.082		9.6	9.2			3.14		FTACD801V823JDLCZ0	TACD2K823J
	0.1		10.3	9.8			3.34		FTACD801V104JDLCZ0	TACD2K104J
	0.12		11.0	10.5			3.66		FTACD801V124JDLCZ0	TACD2K124J
	0.15		12.0	11.4			4.09		FTACD801V154JDLCZ0	TACD2K154J
	0.18	18.2	12.4	11.8	12.5		3.92		FTACD801V184JHLGZ0	TACD2K184J
	0.22		13.4	12.8			4.33		FTACD801V224JHLGZ0	TACD2K224J
	0.27		14.6	13.9			4.80		FTACD801V274JHLGZ0	TACD2K274J
	0.33	23.2	13.5	12.9	17.5		4.09		FTACD801V334JELHZ0	TACD2K334J
	0.39		14.4	13.8			4.46		FTACD801V394JELHZ0	TACD2K394J
	0.47		15.6	14.9			4.88		FTACD801V474JELHZ0	TACD2K474J
	0.56		16.8	16.0			5.34		FTACD801V564JELHZ0	TACD2K564J
	0.68		18.3	17.5			5.87		FTACD801V684JELHZ0	TACD2K684J
	0.82		19.9	19.0			6.46		FTACD801V824JELHZ0	TACD2K824J
	1.0	28.2	19.2	18.3	22.5	1.0	5.85		FTACD801V105JFLEZ0	TACD2K105J
	1.2		20.8	19.9			6.41		FTACD801V125JFLEZ0	TACD2K125J
	1.5		23.0	22.0			7.17		FTACD801V155JFLEZ0	TACD2K155J
	1.8		25.1	23.9			7.85		FTACD801V185JFLEZ0	TACD2K185J
	2.2		27.5	26.2			8.68		FTACD801V225JFLEZ0	TACD2K225J
	2.7	43.2	23.8	22.7	37.5		6.44		FTACD801V275JTLJZ0	TACD2K275J
	3.3		26.0	24.8			7.12		FTACD801V335JTLJZ0	TACD2K335J
	3.9		28.0	26.7			7.73		FTACD801V395JTLJZ0	TACD2K395J
1000	0.033	16.2	8.9	8.5	10.0	0.8	2.28	250	FTACD102V333JDLCZ0	TACD3A333J
	0.039		9.4	9.0			2.48		FTACD102V393JDLCZ0	TACD3A393J
	0.047		10.0	9.6			2.72		FTACD102V473JDLCZ0	TACD3A473J
	0.056		10.7	10.2			2.97		FTACD102V563JDLCZ0	TACD3A563J
	0.068		11.5	11.0			3.28		FTACD102V683JDLCZ0	TACD3A683J
	0.082		12.4	11.8			3.60		FTACD102V823JDLCZ0	TACD3A823J
	0.1	18.2	12.3	11.7	12.5		3.48		FTACD102V104JHLGZ0	TACD3A104J
	0.12		13.2	12.6			3.81		FTACD102V124JHLGZ0	TACD3A124J
	0.15		14.5	13.8			4.26		FTACD102V154JHLGZ0	TACD3A154J
	0.18	23.2	13.3	12.7	17.5		3.60		FTACD102V184JELHZ0	TACD3A184J
	0.22		14.4	13.8			3.97		FTACD102V224JELHZ0	TACD3A224J
	0.27		15.8	15.0			4.40		FTACD102V274JELHZ0	TACD3A274J
	0.33		17.2	16.4			4.86		FTACD102V334JELHZ0	TACD3A334J
	0.39		18.5	17.6			5.29		FTACD102V394JELHZ0	TACD3A394J
	0.47		20.1	19.1			5.81		FTACD102V474JELHZ0	TACD3A474J
	0.56	28.2	19.2	18.3	22.5	1.0	5.21		FTACD102V564JFLEZ0	TACD3A564J
	0.68		20.9	19.9			5.74		FTACD102V684JFLEZ0	TACD3A684J
	0.82		22.8	21.7			6.30		FTACD102V824JFLEZ0	TACD3A824J
	1.0		24.9	23.7			6.96		FTACD102V105JFLEZ0	TACD3A105J
	1.2		27.1	25.8			7.62		FTACD102V125JFLEZ0	TACD3A125J

(1)Capacitance tolerance:Standard(J:±5%),Option(K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS (mm)



ELECTRONIC EQUIPMENT FILM CAPACITOR

TACC Series

RoHS2 Compliant

- Maximum operating temperature 105℃.
- Allowable temperature rise 15K max.
- Large capacitance of TACB series.

◆SPECIFICATIONS

Items	Characteristics
Category temperature range	-40 to +105℃
Rated voltage range	450 to 1000Vdc
Capacitance tolerance	±5% (J)
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.
Dissipation factor (tanδ)	No more than 0.05% : Equal or less than 1μF. No more than (c×0.015+0.05)% : More than 1μF.
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.

Rated voltage (Vdc)	450	630	800	1000
Measurement voltage (Vdc)	100	500	500	500

Endurance

The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 85℃.

Appearance	No serious degradation
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF.
	No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	No more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

Loading under damp heat

The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃ 90～95%RH.

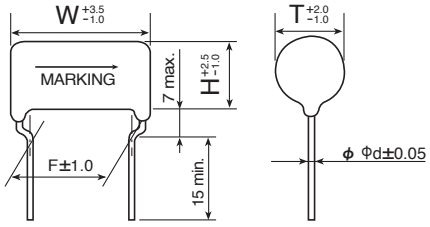
Appearance	No serious degradation.
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF.
	No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	No more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm) W	H	T	F	φd	Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
450	5.6	33.2	21.0	20.0	27.5	1.0	7.0	115	FTACC451V565JRLFZ0	TACC2W565J
	6.8		22.9	21.9			7.7		FTACC451V685JRLFZ0	TACC2W685J
	8.2		25.0	23.8			8.5		FTACC451V825JRLFZ0	TACC2W825J
	10		27.4	26.1			9.4		FTACC451V106JRLFZ0	TACC2W106J
	12	43.2	25.7	24.5	37.5		7.5		FTACC451V126JTLJZ0	TACC2W126J
	15		28.5	27.1			8.4		FTACC451V156JTLJZ0	TACC2W156J
	18	53.2	27.4	26.1	47.5		7.3		FTACC451V186JULWZ0	TACC2W186J
630	3.3	33.2	21.5	20.4	27.5	1.0	5.6	150	FTACC631V335JRLFZ0	TACC2J335J
	3.9		23.2	22.1			6.1		FTACC631V395JRLFZ0	TACC2J395J
	4.7		25.2	24.0			6.7		FTACC631V475JRLFZ0	TACC2J475J
	5.6		27.4	26.1			7.3		FTACC631V565JRLFZ0	TACC2J565J
	6.8	43.2	25.8	24.6	37.5		5.9		FTACC631V685JTLJZ0	TACC2J685J
	8.2		28.0	26.7			6.5		FTACC631V825JTLJZ0	TACC2J825J
	10	53.2	27.3	26.0	47.5		5.6		FTACC631V106JULWZ0	TACC2J106J
800	2.2	33.2	21.9	20.8	27.5	1.0	4.5	175	FTACC801V225JRLFZ0	TACC2K225J
	2.7		24.0	22.9			5.0		FTACC801V275JRLFZ0	TACC2K275J
	3.3		26.3	25.1			5.6		FTACC801V335JRLFZ0	TACC2K335J
	3.9		28.5	27.1			6.0		FTACC801V395JRLFZ0	TACC2K395J
	4.7	43.2	26.8	25.5	37.5		4.9		FTACC801V475JTLJZ0	TACC2K475J
	5.6	53.2	25.7	24.5	47.5		4.2		FTACC801V565JULWZ0	TACC2K565J
	6.8		28.0	26.7			4.6		FTACC801V685JULWZ0	TACC2K685J
1000	1.0	33.2	23.4	22.3	27.5	1.0	3.9	200	FTACC102V105JRLFZ0	TACC3A105J
	1.2		25.5	24.3			4.2		FTACC102V125JRLFZ0	TACC3A125J
	1.5		28.2	26.9			4.7		FTACC102V155JRLFZ0	TACC3A155J
	1.8	43.2	26.4	25.2	37.5		3.8		FTACC102V185JTLJZ0	TACC3A185J
	2.2	53.2	25.8	24.6	47.5		3.3		FTACC102V225JULWZ0	TACC3A225J
	2.7		28.2	26.9			3.7		FTACC102V275JULWZ0	TACC3A275J

(1)Capacitance tolerance : Standard (J:±5%) , Option (K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS (mm)



ELECTRONIC EQUIPMENT FILM CAPACITOR

TACB Series

RoHS2 Compliant

- Maximum operating temperature 105℃.
- Allowable temperature rise 15K max.
- A little hum is produced when applied AC voltage.

◆SPECIFICATIONS

Items	Characteristics
Category temperature range	-40 to +105℃
Rated voltage range	250 to 800Vdc
Capacitance tolerance	±5% (J)
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.
Dissipation factor (tanδ)	No more than 0.05% : Equal or less than 1μF. No more than (c×0.015+0.05)% : More than 1μF.
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.

Rated voltage (Vdc)	250	315	400	630	800
Measurement voltage (Vdc)	100	100	100	500	500

Endurance — The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 105℃.

Appearance	No serious degradation
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF.
	No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	No more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

Loading under damp heat — The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃ 90～95%RH.

Appearance	No serious degradation.
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF.
	No less than 3000ΩF : More than 0.3μF.
Dissipation factor (tanδ)	No more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm) W	H	T	F	φd	Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
250	0.33	16.2	8.6	8.3	10.0	0.8	3.08	125	FTACB251V334JDLCZ0	TACB2E334J
	0.39		9.2	8.8			3.34		FTACB251V394JDLCZ0	TACB2E394J
	0.47		9.7	9.3			3.67		FTACB251V474JDLCZ0	TACB2E474J
	0.56		10.3	9.8			4.01		FTACB251V564JDLCZ0	TACB2E564J
	0.68		11.1	10.6			4.42		FTACB251V684JDLCZ0	TACB2E684J
	0.82		11.9	11.4			4.85		FTACB251V824JDLCZ0	TACB2E824J
	1.0		12.9	12.3			5.35		FTACB251V105JDLCZ0	TACB2E105J
	1.2	18.2	12.9	12.3	12.5		5.03		FTACB251V125JHLGZ0	TACB2E125J
	1.5		14.1	13.5			5.63		FTACB251V155JHLGZ0	TACB2E155J
	1.8		15.2	14.5			6.17		FTACB251V185JHLGZ0	TACB2E185J
	2.2	23.2	14.5	13.8	17.5		5.04		FTACB251V225JELHZ0	TACB2E225J
	2.7		15.7	15.0			5.58		FTACB251V275JELHZ0	TACB2E275J
	3.3		17.1	16.3			6.17		FTACB251V335JELHZ0	TACB2E335J
	3.9		18.4	17.5			6.71		FTACB251V395JELHZ0	TACB2E395J
	4.7		20.0	19.0			7.36		FTACB251V475JELHZ0	TACB2E475J
	5.6	28.2	19.3	18.4	22.5	1.0	6.38		FTACB251V565JFLEZ0	TACB2E565J
	6.8		21.0	20.0			7.03		FTACB251V685JFLEZ0	TACB2E685J
	8.2		22.1	21.9			7.72		FTACB251V825JFLEZ0	TACB2E825J
	10		25.2	24.0			8.52		FTACB251V106JFLEZ0	TACB2E106J
	12		27.3	26.0			9.34		FTACB251V126JFLEZ0	TACB2E126J
	15	43.2	24.2	23.1	37.5		6.45		FTACB251V156JTLJZ0	TACB2E156J
	18		26.3	25.1			7.07		FTACB251V186JTLJZ0	TACB2E186J
	22		28.9	27.5			7.81		FTACB251V226JTLJZ0	TACB2E226J
315	0.22	16.2	8.7	8.3	10.0	0.8	2.81	150	FTACB3B1V224JDLCZ0	TACB2F224J
	0.27		9.3	9.0			3.11		FTACB3B1V274JDLCZ0	TACB2F274J
	0.33		10.0	9.6			3.44		FTACB3B1V334JDLCZ0	TACB2F334J
	0.39		10.7	10.2			3.74		FTACB3B1V394JDLCZ0	TACB2F394J
	0.47		11.4	10.9			4.10		FTACB3B1V474JDLCZ0	TACB2F474J
	0.56		12.1	11.6			4.48		FTACB3B1V564JDLCZ0	TACB2F564J
	0.68		13.2	12.6			4.94		FTACB3B1V684JDLCZ0	TACB2F684J
	0.82	18.2	13.2	12.6	12.5		4.65		FTACB3B1V824JHLGZ0	TACB2F824J
	1.0		14.4	13.7			5.14		FTACB3B1V105JHLGZ0	TACB2F105J

(1)Capacitance tolerance : Standard (J:±5%) , Option (K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

TACB Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm) W	H	T	F	φd	Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
315	1.2	23.2	13.4	12.8	17.5	0.8	4.16	150	FTACB3B1V125JELHZ0	TACB2F125J
	1.5		14.8	14.1			4.65		FTACB3B1V155JELHZ0	TACB2F155J
	1.8		15.9	15.2			5.09		FTACB3B1V185JELHZ0	TACB2F185J
	2.2		17.3	16.5			5.63		FTACB3B1V225JELHZ0	TACB2F225J
	2.7		19.0	18.1			6.24		FTACB3B1V275JELHZ0	TACB2F275J
	3.3	28.2	18.6	17.7	22.5	1.0	5.47		FTACB3B1V335JFLEZ0	TACB2F335J
	3.9		20.0	19.0			5.95		FTACB3B1V395JFLEZ0	TACB2F395J
	4.7		21.8	20.7			6.53		FTACB3B1V475JFLEZ0	TACB2F475J
	5.6		23.6	22.5			7.13		FTACB3B1V565JFLEZ0	TACB2F565J
	6.8		25.8	24.6			7.86		FTACB3B1V685JFLEZ0	TACB2F685J
	8.2		28.1	26.8			8.63		FTACB3B1V825JFLEZ0	TACB2F825J
400	0.1	16.2	9.2	8.8	10.0	0.8	2.40	175	FTACB401V104JDLCZ0	TACB2G104J
	0.12		9.7	9.3			2.62		FTACB401V124JDLCZ0	TACB2G124J
	0.15		10.5	10.1			2.93		FTACB401V154JDLCZ0	TACB2G154J
	0.18		11.2	10.7			3.21		FTACB401V184JDLCZ0	TACB2G184J
	0.22		12.1	11.6			3.55		FTACB401V224JDLCZ0	TACB2G224J
	0.27		13.1	12.5			3.94		FTACB401V274JDLCZ0	TACB2G274J
	0.33	18.2	13.2	12.6	12.5		3.71		FTACB401V334JHLGZ0	TACB2G334J
	0.39		14.1	13.5			4.04		FTACB401V394JHLGZ0	TACB2G394J
	0.47		15.2	14.5			4.43		FTACB401V474JHLGZ0	TACB2G474J
	0.56	23.2	14.1	13.5	17.5		3.54		FTACB401V564JELHZ0	TACB2G564J
	0.68		15.3	14.6			3.90		FTACB401V684JELHZ0	TACB2G684J
	0.82		16.6	15.8			4.29		FTACB401V824JELHZ0	TACB2G824J
	1.0		18.1	17.2			4.73		FTACB401V105JELHZ0	TACB2G105J
	1.2		19.6	18.6			5.19		FTACB401V125JELHZ0	TACB2G125J
	1.5	28.2	19.2	18.3	22.5	1.0	4.58		FTACB401V155JFLEZ0	TACB2G155J
	1.8		20.8	19.8			5.02		FTACB401V185JFLEZ0	TACB2G185J
	2.2		22.8	21.8			5.55		FTACB401V225JFLEZ0	TACB2G225J
	2.7		25.1	23.9			6.15		FTACB401V275JFLEZ0	TACB2G275J
	3.3		27.5	26.2			6.79		FTACB401V335JFLEZ0	TACB2G335J
	3.9	43.2	23.9	22.8	37.5		4.57		FTACB401V395JTLJZ0	TACB2G395J
	4.7		25.9	24.7			5.02		FTACB401V475JTLJZ0	TACB2G475J
	5.6		28.1	26.8			5.48		FTACB401V565JTLJZ0	TACB2G565J
630	0.056	16.2	8.5	8.2	10.0	0.8	1.96	200	FTACB631V563JDLCZ0	TACB2J563J
	0.068		9.1	8.7			2.16		FTACB631V683JDLCZ0	TACB2J683J
	0.082		9.6	9.2			2.38		FTACB631V823JDLCZ0	TACB2J823J
	0.1		10.3	9.8			2.62		FTACB631V104JDLCZ0	TACB2J104J
	0.12		11.0	10.5			2.88		FTACB631V124JDLCZ0	TACB2J124J
	0.15		11.9	11.4			3.21		FTACB631V154JDLCZ0	TACB2J154J
	0.18	18.2	12.3	11.8	12.5		3.10		FTACB631V184JHLGZ0	TACB2J184J
	0.22		13.4	12.8			3.42		FTACB631V224JHLGZ0	TACB2J224J
	0.27		14.6	13.9			3.79		FTACB631V274JHLGZ0	TACB2J274J
	0.33	23.2	13.5	12.9	17.5		3.04		FTACB631V334JELHZ0	TACB2J334J
	0.39		14.5	13.8			3.30		FTACB631V394JELHZ0	TACB2J394J
	0.47		15.6	14.9			3.63		FTACB631V474JELHZ0	TACB2J474J
	0.56		16.8	16.0			3.96		FTACB631V564JELHZ0	TACB2J564J
	0.68		18.3	17.4			4.36		FTACB631V684JELHZ0	TACB2J684J
	0.82		19.9	18.9			4.79		FTACB631V824JELHZ0	TACB2J824J
	1.0	28.2	19.2	18.3	22.5	1.0	4.16		FTACB631V105JFLEZ0	TACB2J105J
	1.2		20.8	19.8			4.55		FTACB631V125JFLEZ0	TACB2J125J
	1.5		23.0	22.0			5.09		FTACB631V155JFLEZ0	TACB2J155J
	1.8		25.1	23.9			5.58		FTACB631V185JFLEZ0	TACB2J185J
	2.2		27.5	26.2			6.17		FTACB631V225JFLEZ0	TACB2J225J
	2.7	43.2	23.8	22.7	37.5		4.17		FTACB631V275JTLJZ0	TACB2J275J
	3.3		26.0	24.8			4.61		FTACB631V335JTLJZ0	TACB2J335J
	3.9		28.0	26.7			5.01		FTACB631V395JTLJZ0	TACB2J395J

(1)Capacitance tolerance : Standard (J: ± 5%) , Option (K:± 10%)
(2)The maximum ripple current : +85℃max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

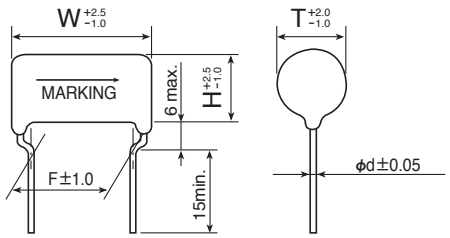
TACB Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
800	0.033	16.2	9.0	8.6	10.0	0.8	1.81	250	FTACB801V333JDLCZ0	TACB2K333J
	0.039		9.5	9.1			1.97		FTACB801V393JDLCZ0	TACB2K393J
	0.047		10.1	9.7			2.16		FTACB801V473JDLCZ0	TACB2K473J
	0.056		10.8	10.3			2.36		FTACB801V563JDLCZ0	TACB2K563J
	0.068		11.5	11.0			2.60		FTACB801V683JDLCZ0	TACB2K683J
	0.082		12.5	11.9			2.85		FTACB801V823JDLCZ0	TACB2K823J
	0.1	18.2	12.3	11.8	12.5		2.67		FTACB801V104JHLGZ0	TACB2K104J
	0.12		13.3	12.7			2.92		FTACB801V124JHLGZ0	TACB2K124J
	0.15		14.6	13.9			3.26		FTACB801V154JHLGZ0	TACB2K154J
	0.18	23.2	13.4	12.8	17.5		2.59		FTACB801V184JELHZ0	TACB2K184J
	0.22		14.5	13.8			2.87		FTACB801V224JELHZ0	TACB2K224J
	0.27		15.8	15.1			3.17		FTACB801V274JELHZ0	TACB2K274J
	0.33		17.2	16.4			3.51		FTACB801V334JELHZ0	TACB2K334J
	0.39		18.5	17.6			3.82		FTACB801V394JELHZ0	TACB2K394J
	0.47		20.1	19.1			4.19		FTACB801V474JELHZ0	TACB2K474J
	0.56	28.2	19.2	18.3	22.5	1.0	3.59		FTACB801V564JFLEZ0	TACB2K564J
	0.68		20.9	19.9			3.96		FTACB801V684JFLEZ0	TACB2K684J
	0.82		22.8	21.8			4.35		FTACB801V824JFLEZ0	TACB2K824J
	1.0		25.0	23.8			4.80		FTACB801V105JFLEZ0	TACB2K105J
	1.2		27.2	25.9			5.26		FTACB801V125JFLEZ0	TACB2K125J

(1)Capacitance tolerance:Standard(J:±5%),Option(K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS (mm)



NIPPON CHEMI-CON

ELECTRONIC EQUIPMENT FILM CAPACITOR

HACE Series

RoHS2 Compliant

- Maximum operating temperature 105℃.
- A little hum is produced when applied AC voltage.
- Tab : 4 terminals

◆SPECIFICATIONS

Items	Characteristics
Category temperature range	-40 to +105℃
Rated voltage range	630Vdc, 1250Vdc, 1600Vdc, 2000Vdc
Capacitance tolerance	±5%(J)
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.
Dissipation factor (tanδ)	No more than 0.05% : Equal or less than 1μF. No more than (c×0.015+0.05)% : More than 1μF.
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.

Rated voltage (Vdc)	630	1250	2000
Measurement voltage (Vdc)	500	1000	1000

Endurance — The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 105℃.

Appearance	No serious degradation
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	Not more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

Loading under damp heat — The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃ 90～95%RH.

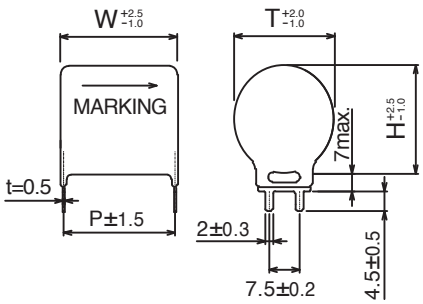
Appearance	No serious degradation.
Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.
Dissipation factor (tanδ)	Not more than initial specification at 1kHz.
Capacitance change	Within ±5% of initial value.

◆STANDARD RATINGS

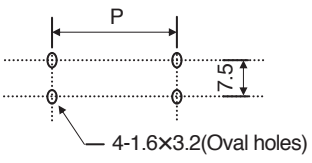
WV (Vdc)	Cap (μF)	Dimensions (mm) W	H	T	P	Maximum ripple current (Arms)	WV (Vac)	Part Number
630	0.47	18.5	26.1	24.9	16.5	10.5	300	FHACE631N474J0A0S0
	0.68	23.5	25.3	24.1	21.5	11.1		FHACE631N684J1A1S0
	1.0		29.8	28.3		13.5		FHACE631N105J1A1S0
	1.5	28.5	31.5	30.0	26.5	13.5		FHACE631N155J2A2S0
1250	0.47	28.5	29.1	27.7	26.5	10.1	400	FHACE1C2N474J2A2S0
	0.68		34.5	32.8		12.0		FHACE1C2N684J2A2S0
	1.0	43.5	30.8	29.3	41.5	12.0		FHACE1C2N105J4A4S0
	1.5	53.5	32.5	31.0	51.5	13.5		FHACE1C2N155J5A5S0
1600	0.27	28.5	30.2	28.8	26.5	9.6	450	FHACE162N274J2A2S0
	0.33		33.2	31.6		10.6		FHACE162N334J2A2S0
2000	0.18	28.5	30.8	29.3	26.5	8.8	450	FHACE202N184J2A2S0
	0.22		33.8	32.2		9.7		FHACE202N224J2A2S0

(1)The maximum ripple current : +85℃ max, 100KHz, sine wave
(2)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS



The recommended conditions for mounting.



NIPPON CHEMI-CON

ELECTRONIC EQUIPMENT FILM CAPACITOR

HACD Series

RoHS2 Compliant

- Maximum operating temperature 105℃.
- Allowable temperature rise 15K max.
- Downsizing of HACB series.

◆SPECIFICATIONS

Items	Characteristics								
Category temperature range	-40 to +105℃								
Rated voltage range	630 to 4000Vdc								
Capacitance tolerance	±5%(J)								
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.								
Dissipation factor (tanδ)	No more than 0.05% : Equal or less than 1μF. No more than (c×0.015+0.05)% : More than 1μF.								
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.								
	Rated voltage (Vdc)	630	1000	1250	1600	2000	2500	3150	4000
	Measurement voltage (Vdc)	500	1000	1000	1000	1000	1000	1000	1000
Endurance	The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 105℃.								
	Appearance	No serious degradation							
	Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.							
	Dissipation factor (tanδ)	Not more than initial specification at 1kHz.							
	Capacitance change	Within ±5% of initial value.							
Loading under damp heat	The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃ 90～95%RH.								
	Appearance	No serious degradation.							
	Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.							
	Dissipation factor (tanδ)	Not more than initial specification at 1kHz.							
	Capacitance change	Within ±5% of initial value.							

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
630	0.047	17.7	9.8	9.3	12.5	0.8	2.65	250	FHACD631V473J0LGZ0	HACD2J473J
	0.056		10.4	10.0			2.89		FHACD631V563J0LGZ0	HACD2J563J
	0.068		11.0	10.5			3.19		FHACD631V683J0LGZ0	HACD2J683J
	0.082		11.6	11.1			3.50		FHACD631V823J0LGZ0	HACD2J823J
	0.1		12.3	11.7			3.86		FHACD631V104J0LGZ0	HACD2J104J
	0.12		13.1	12.5			4.23		FHACD631V124J0LGZ0	HACD2J124J
	0.15		14.1	13.5			4.73		FHACD631V154J0LGZ0	HACD2J154J
	0.18		15.1	14.4			5.18		FHACD631V184J0LGZ0	HACD2J184J
	0.22	22.7	13.8	13.2	17.5		4.31		FHACD631V224J1LHZ0	HACD2J224J
	0.27		14.9	14.2			4.78		FHACD631V274J1LHZ0	HACD2J274J
	0.33		16.1	15.3			5.28		FHACD631V334J1LHZ0	HACD2J334J
	0.39		17.1	16.3			5.74		FHACD631V394J1LHZ0	HACD2J394J
	0.47		18.5	17.6			6.30		FHACD631V474J1LHZ0	HACD2J474J
	0.56		19.9	18.9			6.88		FHACD631V564J1LHZ0	HACD2J564J
	0.68	27.7	19.0	18.1	22.5	1.0	6.19		FHACD631V684J2LEZ0	HACD2J684J
	0.82		20.5	19.6			6.79		FHACD631V824J2LEZ0	HACD2J824J
	1.0		22.3	21.3			7.50		FHACD631V105J2LEZ0	HACD2J105J
	1.2		24.2	23.0			8.22		FHACD631V125J2LEZ0	HACD2J125J
	1.5		26.7	25.4			9.19		FHACD631V155J2LEZ0	HACD2J155J
1000	0.033	17.7	10.0	9.6	12.5	0.8	2.43	270	FHACD102V333J0LGZ0	HACD3A333J
	0.039		10.4	10.0			2.64		FHACD102V393J0LGZ0	HACD3A393J
	0.047		11.0	10.5			2.90		FHACD102V473J0LGZ0	HACD3A473J
	0.056		11.5	11.0			3.17		FHACD102V563J0LGZ0	HACD3A563J
	0.068		12.2	11.7			3.49		FHACD102V683J0LGZ0	HACD3A683J
	0.082		13.0	12.4			3.83		FHACD102V823J0LGZ0	HACD3A823J
	0.1		13.9	13.3			4.23		FHACD102V104J0LGZ0	HACD3A104J
	0.12		14.9	14.2			4.64		FHACD102V124J0LGZ0	HACD3A124J
	0.15	22.7	13.7	13.1	17.5		3.90		FHACD102V154J1LHZ0	HACD3A154J
	0.18		14.7	14.0			4.27		FHACD102V184J1LHZ0	HACD3A184J
	0.22		15.8	15.1			4.72		FHACD102V224J1LHZ0	HACD3A224J
	0.27		17.1	16.3			5.23		FHACD102V274J1LHZ0	HACD3A274J
	0.33		18.6	17.7			5.79		FHACD102V334J1LHZ0	HACD3A334J
	0.39		19.9	19.0			6.29		FHACD102V394J1LHZ0	HACD3A394J

(1)The maximum ripple current : +85℃ max., 100kHz, sine wave
(2)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

HACD Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
1000	0.47	27.7	18.9	18.0	22.5	1.0	5.63	270	FHACD102V474J2LEZ0	HACD3A474J
	0.56		20.4	19.4			6.15		FHACD102V564J2LEZ0	HACD3A564J
	0.68		22.1	21.1			6.78		FHACD102V684J2LEZ0	HACD3A684J
	0.82		24.0	22.9			7.44		FHACD102V824J2LEZ0	HACD3A824J
	1.0		26.2	25.0			8.22		FHACD102V105J2LEZ0	HACD3A105J
	1.2		28.5	27.1			9.00		FHACD102V125J2LEZ0	HACD3A125J
1250	0.018	17.7	9.7	9.3	12.5	0.8	2.04	300	FHACD1C2V183J0LGZ0	HACD3B183J
	0.022		10.4	9.9			2.25		FHACD1C2V223J0LGZ0	HACD3B223J
	0.027		11.0	10.5			2.50		FHACD1C2V273J0LGZ0	HACD3B273J
	0.033		11.6	11.1			2.76		FHACD1C2V333J0LGZ0	HACD3B333J
	0.039		12.3	11.7			3.00		FHACD1C2V393J0LGZ0	HACD3B393J
	0.047		13.0	12.4			3.29		FHACD1C2V473J0LGZ0	HACD3B473J
	0.056		13.8	13.2			3.60		FHACD1C2V563J0LGZ0	HACD3B563J
	0.068		14.8	14.2			3.96		FHACD1C2V683J0LGZ0	HACD3B683J
	0.082	22.7	13.3	12.7	17.5		3.24		FHACD1C2V823J1LHZ0	HACD3B823J
	0.1		14.3	13.6			3.57		FHACD1C2V104J1LHZ0	HACD3B104J
	0.12		15.3	14.6			3.91		FHACD1C2V124J1LHZ0	HACD3B124J
	0.15		16.7	15.9			4.38		FHACD1C2V154J1LHZ0	HACD3B154J
	0.18		17.9	17.1			4.79		FHACD1C2V184J1LHZ0	HACD3B184J
	0.22		19.5	18.6			5.30		FHACD1C2V224J1LHZ0	HACD3B224J
	0.27	27.7	18.5	17.7	22.5	1.0	4.77		FHACD1C2V274J2LEZ0	HACD3B274J
	0.33		20.1	19.2			5.28		FHACD1C2V334J2LEZ0	HACD3B334J
	0.39		21.6	20.6			5.74		FHACD1C2V394J2LEZ0	HACD3B394J
	0.47		23.4	22.3			6.30		FHACD1C2V474J2LEZ0	HACD3B474J
	0.56		25.3	24.1			6.87		FHACD1C2V564J2LEZ0	HACD3B564J
	0.68		27.6	26.3			7.58		FHACD1C2V684J2LEZ0	HACD3B684J
	0.82	42.7	23.2	22.1	37.5		5.55		FHACD1C2V824JTLJZ0	HACD3B824J
	1.0		25.4	24.2			6.13		FHACD1C2V105JTLJZ0	HACD3B105J
	1.2		27.5	26.2			6.72		FHACD1C2V125JTLJZ0	HACD3B125J
1600	0.0068	19.7	10.0	9.5	15.0	0.8	1.49	350	FHACD162V682JKLDZ0	HACD3C682J
	0.0082		10.6	10.1			1.80		FHACD162V822JKLDZ0	HACD3C822J
	0.01		11.2	10.6			2.09		FHACD162V103JKLDZ0	HACD3C103J
	0.012		11.8	11.2			2.29		FHACD162V123JKLDZ0	HACD3C123J
	0.015		12.6	12.0			2.56		FHACD162V153JKLDZ0	HACD3C153J
	0.018		13.4	12.8			2.80		FHACD162V183JKLDZ0	HACD3C183J
	0.022		14.4	13.7			3.10		FHACD162V223JKLDZ0	HACD3C223J
	0.027		15.0	14.3			3.43		FHACD162V273JKLDZ0	HACD3C273J
	0.033		16.3	15.5			3.80		FHACD162V333JKLDZ0	HACD3C333J
	0.039	22.7	13.0	12.4	17.5		2.60		FHACD162V393J1LHZ0	HACD3C393J
	0.047		13.8	13.2			2.85		FHACD162V473J1LHZ0	HACD3C473J
	0.056		14.7	14.0			3.11		FHACD162V563J1LHZ0	HACD3C563J
	0.068		15.8	15.1			3.43		FHACD162V683J1LHZ0	HACD3C683J
	0.082		17.0	16.2			3.77		FHACD162V823J1LHZ0	HACD3C823J
	0.1		18.4	17.6			4.16		FHACD162V104J1LHZ0	HACD3C104J
	0.12	27.7	17.2	16.4	22.5	1.0	3.68		FHACD162V124J2LEZ0	HACD3C124J
	0.15		18.9	18.0			4.12		FHACD162V154J2LEZ0	HACD3C154J
	0.18		20.4	19.4			4.51		FHACD162V184J2LEZ0	HACD3C184J
	0.22		22.2	21.1			4.99		FHACD162V224J2LEZ0	HACD3C224J
	0.27		24.2	23.1			5.53		FHACD162V274J2LEZ0	HACD3C274J
	0.33		26.5	25.3			6.11		FHACD162V334J2LEZ0	HACD3C334J
2000	0.0033	19.7	9.3	8.9	15.0	0.8	0.73	350	FHACD202V332JKLDZ0	HACD3D332J
	0.0039		9.7	9.2			0.85		FHACD202V392JKLDZ0	HACD3D392J
	0.0047		10.2	9.7			1.03		FHACD202V472JKLDZ0	HACD3D472J
	0.0056		10.9	10.4			1.23		FHACD202V562JKLDZ0	HACD3D562J
	0.0068		11.8	11.2			1.50		FHACD202V682JKLDZ0	HACD3D682J
	0.0082		12.6	12.0			1.80		FHACD202V822JKLDZ0	HACD3D822J
	0.01		13.5	12.9			2.20		FHACD202V103JKLDZ0	HACD3D103J
	0.012		14.4	13.7			2.63		FHACD202V123JKLDZ0	HACD3D123J
	0.015		15.6	14.9			2.97		FHACD202V153JKLDZ0	HACD3D153J
	0.018		16.7	16.0			3.26		FHACD202V183JKLDZ0	HACD3D183J

(1)The maximum ripple current : +85℃ max., 100kHz, sine wave
(2)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

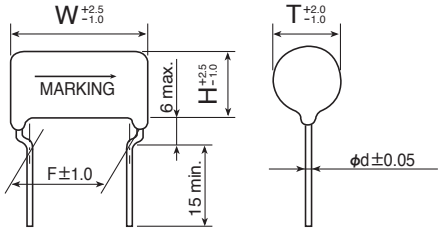
HACD Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
2000	0.022	22.7	13.1	12.5	17.5	0.8	2.27	350	FHACD202V223J1LHZ0	HACD3D223J
	0.027		14.0	13.4			2.51		FHACD202V273J1LHZ0	HACD3D273J
	0.033		15.1	14.4			2.78		FHACD202V333J1LHZ0	HACD3D333J
	0.039		16.1	15.3			3.02		FHACD202V393J1LHZ0	HACD3D393J
	0.047		17.3	16.5			3.32		FHACD202V473J1LHZ0	HACD3D473J
	0.056		18.6	17.7			3.62		FHACD202V563J1LHZ0	HACD3D563J
	0.068	27.7	17.5	16.6	22.5	1.0	3.22		FHACD202V683J2LEZ0	HACD3D683J
	0.082		18.8	18.0			3.54		FHACD202V823J2LEZ0	HACD3D823J
	0.1		20.5	19.5			3.91		FHACD202V104J2LEZ0	HACD3D104J
	0.12		22.1	21.1			4.28		FHACD202V124J2LEZ0	HACD3D124J
	0.15		24.4	23.2			4.79		FHACD202V154J2LEZ0	HACD3D154J
	0.18		26.4	25.2			5.24		FHACD202V184J2LEZ0	HACD3D184J
	0.22	42.7	22.6	21.5	37.5		3.93		FHACD202V224JTLJZ0	HACD3D224J
	0.27		24.7	23.5			4.35		FHACD202V274JTLJZ0	HACD3D274J
	0.33		27.0	25.7			4.81		FHACD202V334JTLJZ0	HACD3D334J
2500	0.015	34.7	11.7	11.2	30.0	1.0	2.11	500	FHACD252V153JRLQZ0	HACD3E153J
	0.018		12.6	12.0			2.31		FHACD252V183JRLQZ0	HACD3E183J
	0.022		13.7	13.0			2.55		FHACD252V223JRLQZ0	HACD3E223J
	0.027		14.9	14.2			2.83		FHACD252V273JRLQZ0	HACD3E273J
	0.033		16.2	15.4			3.13		FHACD252V333JRLQZ0	HACD3E333J
	0.039		17.4	16.6			3.40		FHACD252V393JRLQZ0	HACD3E393J
	0.047		18.9	18.0			3.73		FHACD252V473JRLQZ0	HACD3E473J
	0.056		20.4	19.5			4.07		FHACD252V563JRLQZ0	HACD3E563J
	0.068		22.3	21.3			4.49		FHACD252V683JRLQZ0	HACD3E683J
	0.082		24.3	23.1			4.93		FHACD252V823JRLQZ0	HACD3E823J
	0.1		26.6	25.4			5.44		FHACD252V104JRLQZ0	HACD3E104J
3150	0.0068	34.7	11.5	11.0	30.0	1.0	1.64	630	FHACD3B2V682JRLQZ0	HACD3F682J
	0.0082		12.4	11.8			1.80		FHACD3B2V822JRLQZ0	HACD3F822J
	0.01		13.4	12.8			1.99		FHACD3B2V103JRLQZ0	HACD3F103J
	0.012		14.4	13.7			2.18		FHACD3B2V123JRLQZ0	HACD3F123J
	0.015		15.8	15.1			2.44		FHACD3B2V153JRLQZ0	HACD3F153J
	0.018		17.1	16.3			2.67		FHACD3B2V183JRLQZ0	HACD3F183J
	0.022		18.7	17.8			2.95		FHACD3B2V223JRLQZ0	HACD3F223J
	0.027		20.5	19.5			3.27		FHACD3B2V273JRLQZ0	HACD3F273J
	0.033		22.4	21.4			3.62		FHACD3B2V333JRLQZ0	HACD3F333J
	0.039		24.2	23.1			3.93		FHACD3B2V393JRLQZ0	HACD3F393J
	0.047		26.4	25.1			4.31		FHACD3B2V473JRLQZ0	HACD3F473J
4000	0.0039	34.7	11.2	10.6	30.0	1.0	1.63	720	FHACD402V392JRLQZ0	HACD3G392J
	0.0047		12.0	11.4			1.79		FHACD402V472JRLQZ0	HACD3G472J
	0.0056		12.8	12.2			1.95		FHACD402V562JRLQZ0	HACD3G562J
	0.0068		13.9	13.2			2.15		FHACD402V682JRLQZ0	HACD3G682J
	0.0082		15.0	14.3			2.36		FHACD402V822JRLQZ0	HACD3G822J
	0.01		16.3	15.6			2.60		FHACD402V103JRLQZ0	HACD3G103J
	0.012		17.7	16.8			2.85		FHACD402V123JRLQZ0	HACD3G123J
	0.015		19.5	18.6			3.19		FHACD402V153JRLQZ0	HACD3G153J
	0.018		21.2	20.2			3.49		FHACD402V183JRLQZ0	HACD3G183J
	0.022		23.2	22.1			3.86		FHACD402V223JRLQZ0	HACD3G223J
	0.027		25.5	24.2			4.28		FHACD402V273JRLQZ0	HACD3G273J

(1)The maximum ripple current : +85℃ max., 100kHz, sine wave
(2)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS (mm)



NIPPON CHEMI-CON

ELECTRONIC EQUIPMENT FILM CAPACITOR

HACB Series

RoHS2 Compliant

- Maximum operating temperature 105℃.
- Allowable temperature rise 15K max.
- A little hum is produced when applied AC voltage.

◆SPECIFICATIONS

Items	Characteristics							
Category temperature range	-40 to +105℃							
Rated voltage range	630 to 4000Vdc							
Capacitance tolerance	J:±5%							
Voltage proof (Terminal - Terminal)	No degradation, at 150% of rated voltage shall be applied for 60 seconds.							
Dissipation factor (tanδ)	No more than 0.05% : Equal or less than 1μF. No more than (c×0.015+0.05)% : More than 1μF.							
Insulation resistance (Terminal - Terminal)	No less than 30000MΩ : Equal or less than 0.33μF. No less than 10000ΩF : More than 0.33μF.							
	Rated voltage (Vdc)	630	1000	1250	1600	2000	3150	4000
	Measurement voltage (Vdc)	500	1000	1000	1000	1000	1000	1000
Endurance	The following specifications shall be satisfied, after 1000hrs with applying rated voltage×125% at 105℃.							
	Appearance	No serious degradation						
	Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.						
	Dissipation factor (tanδ)	Not more than initial specification at 1kHz.						
	Capacitance change	Within ±5% of initial value.						
Loading under damp heat	The following specifications shall be satisfied, after 500hrs with applying rated voltage at 40℃ 90～95%RH.							
	Appearance	No serious degradation.						
	Insulation resistance (Terminal - Terminal)	No less than 10000MΩ : Equal or less than 0.33μF. No less than 3000ΩF : More than 0.33μF.						
	Dissipation factor (tanδ)	Not more than initial specification at 1kHz.						
	Capacitance change	Within ±5% of initial value.						

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm) W	H	T	F	φd	Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
630	0.033	17.7	8.7	8.3	12.5	0.8	3.50	300	FHACB631V333J0LGZ0	HACB2J333J
	0.039		9.3	8.8			3.81		FHACB631V393J0LGZ0	HACB2J393J
	0.047		9.8	9.3			4.18		FHACB631V473J0LGZ0	HACB2J473J
	0.056		10.4	10.0			4.56		FHACB631V563J0LGZ0	HACB2J563J
	0.068		11.3	10.8			5.03		FHACB631V683J0LGZ0	HACB2J683J
	0.082		12.1	11.6			5.52		FHACB631V823J0LGZ0	HACB2J823J
	0.1		13.1	12.5			6.10		FHACB631V104J0LGZ0	HACB2J104J
	0.12		14.0	13.4			6.68		FHACB631V124J0LGZ0	HACB2J124J
	0.15	22.7	12.9	12.3	17.5		5.67		FHACB631V154J1LHZ0	HACB2J154J
	0.18		13.8	13.2			6.21		FHACB631V184J1LHZ0	HACB2J184J
	0.22		15.1	14.4			6.87		FHACB631V224J1LHZ0	HACB2J224J
	0.27		16.5	15.7			7.61		FHACB631V274J1LHZ0	HACB2J274J
	0.33		18.0	17.1			8.41		FHACB631V334J1LHZ0	HACB2J334J
	0.39		19.3	18.4			9.15		FHACB631V394J1LHZ0	HACB2J394J
	0.47	27.7	18.4	17.5	22.5	1.0	8.24		FHACB631V474J2LEZ0	HACB2J474J
	0.56		19.9	18.9			9.00		FHACB631V564J2LEZ0	HACB2J564J
	0.68		21.7	20.6			9.34		FHACB631V684J2LEZ0	HACB2J684J
	0.82		23.6	22.5			10.0		FHACB631V824J2LEZ0	HACB2J824J
	1.0		25.8	24.6			10.0		FHACB631V105J2LEZ0	HACB2J105J
	1.2		28.1	26.8			10.0		FHACB631V125J2LEZ0	HACB2J125J
1000	0.018	17.7	8.6	8.3	12.5	0.8	3.00	350	FHACB102V183J0LGZ0	HACB3A183J
	0.022		9.3	8.8			3.32		FHACB102V223J0LGZ0	HACB3A223J
	0.027		9.8	9.5			3.68		FHACB102V273J0LGZ0	HACB3A273J
	0.033		10.7	10.2			4.06		FHACB102V333J0LGZ0	HACB3A333J
	0.039		11.3	10.8			4.42		FHACB102V393J0LGZ0	HACB3A393J
	0.047		12.1	11.6			4.85		FHACB102V473J0LGZ0	HACB3A473J
	0.056		13.0	12.4			5.29		FHACB102V563J0LGZ0	HACB3A563J
	0.068		14.0	13.4			5.83		FHACB102V683J0LGZ0	HACB3A683J
	0.082	22.7	12.5	11.9	17.5		4.78		FHACB102V823J1LHZ0	HACB3A823J
	0.1		13.5	12.9			5.28		FHACB102V104J1LHZ0	HACB3A104J
	0.12		14.6	13.9			5.79		FHACB102V124J1LHZ0	HACB3A124J
	0.15		16.1	15.3			6.47		FHACB102V154J1LHZ0	HACB3A154J
	0.18		17.3	16.5			7.09		FHACB102V184J1LHZ0	HACB3A184J
	0.22		18.9	18.0			7.83		FHACB102V224J1LHZ0	HACB3A224J

(1)Capacitance tolerance:Standard (J:±5%),Option (H:±3%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

HACB Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
1000	0.27	27.7	18.0	17.1	22.5	1.0	7.07	350	FHACB102V274 J2LEZ0	HACB3A274J
	0.33		19.6	18.6			7.82		FHACB102V334 J2LEZ0	HACB3A334J
	0.39		21.1	20.1			8.50		FHACB102V394 J2LEZ0	HACB3A394J
	0.47		22.9	21.9			9.34		FHACB102V474 J2LEZ0	HACB3A474J
	0.56		25.0	23.8			10.0		FHACB102V564 J2LEZ0	HACB3A564J
	0.68		27.3	26.0			10.0		FHACB102V684 J2LEZ0	HACB3A684J
	0.82	42.7	22.8	21.8	37.5		8.44		FHACB102V824 J4LJZ0	HACB3A824J
	1.0		25.0	23.8			9.34		FHACB102V105 J4LJZ0	HACB3A105J
	1.2		27.1	25.8			10.0		FHACB102V125 J4LJZ0	HACB3A125J
1250	0.012	17.7	8.5	8.2	12.5	0.8	2.68	400	FHACB1C2V123J0LGZ0	HACB3B123J
	0.015		9.2	8.8			3.00		FHACB1C2V153J0LGZ0	HACB3B153J
	0.018		9.8	9.3			3.29		FHACB1C2V183J0LGZ0	HACB3B183J
	0.022		10.5	10.1			3.63		FHACB1C2V223J0LGZ0	HACB3B223J
	0.027		11.3	10.8			4.03		FHACB1C2V273J0LGZ0	HACB3B273J
	0.033		12.2	11.7			4.45		FHACB1C2V333J0LGZ0	HACB3B333J
	0.039		13.1	12.5			4.84		FHACB1C2V393J0LGZ0	HACB3B393J
	0.047		14.0	13.4			5.31		FHACB1C2V473J0LGZ0	HACB3B473J
	0.056	22.7	13.3	12.7	17.5		4.61		FHACB1C2V563J1LHZ0	HACB3B563J
	0.068		14.4	13.7			5.08		FHACB1C2V683J1LHZ0	HACB3B683J
	0.082		15.5	14.8			5.58		FHACB1C2V823J1LHZ0	HACB3B823J
	0.1		16.9	16.1			6.16		FHACB1C2V104J1LHZ0	HACB3B104J
	0.12		18.4	17.5			6.75		FHACB1C2V124J1LHZ0	HACB3B124J
	0.15	27.7	17.2	16.4	22.5	1.0	6.02		FHACB1C2V154J2LEZ0	HACB3B154J
	0.18		18.6	17.7			6.60		FHACB1C2V184J2LEZ0	HACB3B184J
	0.22		20.3	19.3			7.29		FHACB1C2V224J2LEZ0	HACB3B224J
	0.27		22.3	21.3			8.08		FHACB1C2V274J2LEZ0	HACB3B274J
	0.33		24.4	23.3			8.93		FHACB1C2V334J2LEZ0	HACB3B334J
	0.39		26.3	25.1			9.34		FHACB1C2V394J2LEZ0	HACB3B394J
	0.47	42.7	21.9	20.8	37.5		7.10		FHACB1C2V474J4LJZ0	HACB3B474J
	0.56		23.7	22.6			7.75		FHACB1C2V564J4LJZ0	HACB3B564J
	0.68		25.8	24.6			8.54		FHACB1C2V684J4LJZ0	HACB3B684J
	0.82		27.6	26.3			9.34		FHACB1C2V824J4LJZ0	HACB3B824J
	1.0	52.7	27.0	25.7	47.5		8.57		FHACB1C2V105JULWZ0	HACB3B105J
1600	0.0047	19.7	8.8	8.5	15.0	0.8	1.32	450	FHACB162V472 JKLDZ0	HACB3C472J
	0.0056		9.3	9.0			1.58		FHACB162V562 JKLDZ0	HACB3C562J
	0.0068		10.0	9.6			1.93		FHACB162V682 JKLDZ0	HACB3C682J
	0.0082		10.7	10.2			2.32		FHACB162V822 JKLDZ0	HACB3C822J
	0.01		11.5	11.0			2.83		FHACB162V103 JKLDZ0	HACB3C103J
	0.012		12.3	11.8			3.39		FHACB162V123 JKLDZ0	HACB3C123J
	0.015		13.5	12.9			4.24		FHACB162V153 JKLDZ0	HACB3C153J
	0.018		14.6	13.9			4.47		FHACB162V183 JKLDZ0	HACB3C183J
	0.022		15.8	15.1			4.94		FHACB162V223 JKLDZ0	HACB3C223J
	0.027	22.7	13.0	12.4	17.5		3.86		FHACB162V273 J1LHZ0	HACB3C273J
	0.033		14.0	13.4			4.27		FHACB162V333 J1LHZ0	HACB3C333J
	0.039		15.1	14.4			4.64		FHACB162V393 J1LHZ0	HACB3C393J
	0.047		16.4	15.6			5.09		FHACB162V473 J1LHZ0	HACB3C473J
	0.056		17.6	16.8			5.56		FHACB162V563 J1LHZ0	HACB3C563J
	0.068		19.1	18.2			6.12		FHACB162V683 J1LHZ0	HACB3C683J
	0.082	27.7	17.4	16.6	22.5	1.0	5.29		FHACB162V823 J2LEZ0	HACB3C823J
	0.1		19.0	18.1			5.84		FHACB162V104 J2LEZ0	HACB3C104J
	0.12		20.6	19.6			6.40		FHACB162V124 J2LEZ0	HACB3C124J
	0.15		22.8	21.8			7.15		FHACB162V154 J2LEZ0	HACB3C154J
	0.18		24.7	23.6			7.84		FHACB162V184 J2LEZ0	HACB3C184J
	0.22		27.2	25.9			8.66		FHACB162V224 J2LEZ0	HACB3C224J
	0.27	42.7	23.4	22.3	37.5		6.47		FHACB162V274 J4LJZ0	HACB3C274J
	0.33		25.9	24.7			7.15		FHACB162V334 J4LJZ0	HACB3C334J
	0.39		27.9	26.6			7.77		FHACB162V394 J4LJZ0	HACB3C394J

(1) Capacitance tolerance:Standard(J:±5%) ,Option(H:±3%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

ELECTRONIC EQUIPMENT FILM CAPACITOR

HACB Series

◆STANDARD RATINGS

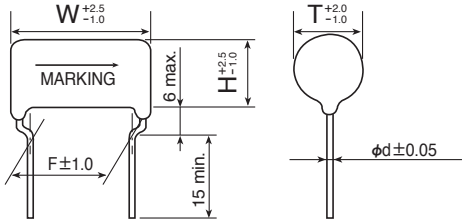
WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
2000	0.001	19.7	8.3	8.1	15.0	0.8	0.28	450	FHACB202V102JKLDZ0	HACB3D102J
	0.0012		9.0	8.6			0.34		FHACB202V122JKLDZ0	HACB3D122J
	0.0015		9.6	9.2			0.42		FHACB202V152JKLDZ0	HACB3D152J
	0.0018		9.3	9.0			0.51		FHACB202V182JKLDZ0	HACB3D182J
	0.0022		10.0	9.6			0.62		FHACB202V222JKLDZ0	HACB3D222J
	0.0027		8.5	8.2			0.76		FHACB202V272JKLDZ0	HACB3D272J
	0.0033		9.1	8.7			0.93		FHACB202V332JKLDZ0	HACB3D332J
	0.0039		9.6	9.2			1.10		FHACB202V392JKLDZ0	HACB3D392J
	0.0047		10.2	9.8			1.33		FHACB202V472JKLDZ0	HACB3D472J
	0.0056		11.0	10.5			1.53		FHACB202V562JKLDZ0	HACB3D562J
	0.0068		11.8	11.3			1.92		FHACB202V682JKLDZ0	HACB3D682J
	0.0082		12.7	12.1			2.32		FHACB202V822JKLDZ0	HACB3D822J
	0.01		13.7	13.1			2.83		FHACB202V103JKLDZ0	HACB3D103J
	0.012		14.8	14.1			3.39		FHACB202V123JKLDZ0	HACB3D123J
	0.015		16.3	15.5			4.24		FHACB202V153JKLDZ0	HACB3D153J
	0.018	22.7	13.2	12.6	17.5		3.52		FHACB202V183J1LHZ0	HACB3D183J
	0.022		14.3	13.6			3.89		FHACB202V223J1LHZ0	HACB3D223J
	0.027		15.5	14.8			4.31		FHACB202V273J1LHZ0	HACB3D273J
	0.033		17.0	16.2			4.77		FHACB202V333J1LHZ0	HACB3D333J
	0.039		18.3	17.4			5.19		FHACB202V393J1LHZ0	HACB3D393J
	0.047		19.8	18.8			5.69		FHACB202V473J1LHZ0	HACB3D473J
	0.056	27.7	17.9	17.0	22.5	1.0	4.89		FHACB202V563J2LEZ0	HACB3D563J
	0.068		19.4	18.5			5.39		FHACB202V683J2LEZ0	HACB3D683J
	0.082		21.2	20.2			5.91		FHACB202V823J2LEZ0	HACB3D823J
	0.1		23.2	22.1			6.53		FHACB202V104J2LEZ0	HACB3D104J
	0.12		25.3	24.1			7.15		FHACB202V124J2LEZ0	HACB3D124J
	0.15		27.9	26.6			8.00		FHACB202V154J2LEZ0	HACB3D154J
	0.18	42.7	22.1	21.1	37.5		5.67		FHACB202V184J4LJZ0	HACB3D184J
	0.22		24.5	23.4			6.27		FHACB202V224J4LJZ0	HACB3D224J
	0.27		26.5	25.3			6.95		FHACB202V274J4LJZ0	HACB3D274J

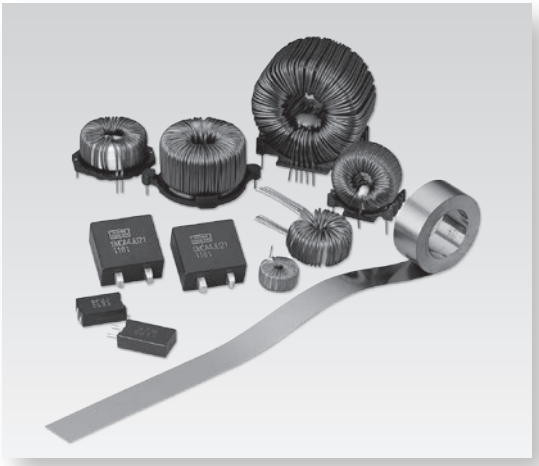
(1)Capacitance tolerance:Standard (J:±5%),Option (H:±3%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

WV (Vdc)	Cap (μF)	Dimensions (mm)					Maximum ripple current (Arms)	WV (Vac)	Part Number	Previous Part Number (Just for your reference)
		W	H	T	F	φd				
3150	0.0047	34.7	12.0	11.5	30.0	1.0	2.60	920	FHACB3B2V472JLLQZ0	HACB3F472J
	0.0056		12.9	12.3			2.84		FHACB3B2V562JLLQZ0	HACB3F562J
	0.0068		13.9	13.3			3.13		FHACB3B2V682JLLQZ0	HACB3F682J
	0.0082		15.0	14.3			3.44		FHACB3B2V822JLLQZ0	HACB3F822J
	0.01		16.3	15.5			3.80		FHACB3B2V103JLLQZ0	HACB3F103J
	0.012		17.5	16.7			4.16		FHACB3B2V123JLLQZ0	HACB3F123J
	0.015		19.3	18.4			4.65		FHACB3B2V153JLLQZ0	HACB3F153J
	0.018		20.9	19.9			5.09		FHACB3B2V183JLLQZ0	HACB3F183J
	0.022		22.9	21.9			5.63		FHACB3B2V223JLLQZ0	HACB3F223J
	0.027		25.2	24.0			6.24		FHACB3B2V273JLLQZ0	HACB3F273J
	0.033		27.5	26.2			6.90		FHACB3B2V333JLLQZ0	HACB3F333J
4000	0.0027	34.7	12.7	12.1	30.0	1.0	1.56	920	FHACB402V272JLLQZ0	HACB3G272J
	0.0033		13.7	13.1			1.91		FHACB402V332JLLQZ0	HACB3G332J
	0.0039		14.6	13.9			2.25		FHACB402V392JLLQZ0	HACB3G392J
	0.0047		15.7	15.0			2.72		FHACB402V472JLLQZ0	HACB3G472J
	0.0056		17.0	16.2			3.24		FHACB402V562JLLQZ0	HACB3G562J
	0.0068		18.4	17.5			3.71		FHACB402V682JLLQZ0	HACB3G682J
	0.0082		20.0	19.0			4.07		FHACB402V822JLLQZ0	HACB3G822J
	0.01		21.8	20.7			4.49		FHACB402V103JLLQZ0	HACB3G103J
	0.012		23.7	22.6			4.92		FHACB402V123JLLQZ0	HACB3G123J
	0.015		26.2	25.0			5.50		FHACB402V153JLLQZ0	HACB3G153J
	0.018		28.5	27.1			6.03		FHACB402V183JLLQZ0	HACB3G183J

(1)Capacitance tolerance : Standard (J:±5%) , Option (K:±10%)
(2)The maximum ripple current : +85℃ max., 100kHz, sine wave
(3)WV(Vac) : 50Hz or 60Hz, sine wave

◆DIMENSIONS (mm)





NANOCRYSTALLINE / AMORPHOUS / DUST CHOKE COILS

NANOCRYSTALLINE/AMORPHOUS/DUST CHOKE COILS

Series	Major uses	Miniaturization	Thin type	Low loss	Low cost	Large capacity	Classification	Page
	Standard Specifications							130
	Accessories							131
	Choke Coil Characteristics							133
FL (Upgrade!)	Line filter for inverter or large power supply	◎		○		◎	Common mode	134
SM (Upgrade!)	DC-DC converter Switching mode power supplies Antinoise measures for automotive electrical unit	◎	◎	○	○		Package	149
CM	Switching mode power supplies DC-DC converter Normal mode line filter	◎		○		○	Toroidal with gap	151
CMJ	Switching mode power supplies Step up and down converter	◎		○		○		158
AM	Harmonic counter-measure active filter Normal mode line filter	◎		○		○		160
AW	Harmonic counter-measure active filter Uninterruptible power supply system (UPS)	◎		○		◎	Toroidal without gap	164
TM	Switching mode power supplies DC-DC converter Normal mode line filter	○	○	○	○			166
BM	Switching mode power supplies DC-DC converter Normal mode line filter	◎	○	○	◎		Dust	172
DM	DC-DC converter Switching mode power supplies Harmonic counter-measure active filter	○	◎	○	◎	◎		177
	Coil Design Request							183

GLOBAL CODE SYSTEM

The current parts numbering system is changed to new system for global coding.

Your cooperation will be very much appreciated.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L	B	T	M	0	1	0	3	0	0	N	6	–	V	0	E

- Solder control code⑥
- Specifications control code⑤
- Mounting Direction④
- Core Abbreviation③
- Rated Inductance②
- Rated Current①
- Series
- Section code
- Class code

①Rated Current code

Code	Rated Current
0R5	0.5A
001	1A
010	10A
100	100A

②Rated Inductance code

Code	Rated Inductance
0R5	0.5μH
010	1μH
100	10μH
101	100μH
102	1000μH

③Core Abbreviation code

Code	Core Abbreviation
N6-	N6
JRH	JRH

④Mounting Direction code

Code	Mounting Direction
V	Vertical
H	Horizontal
D	Vertical pedestal
B	Horizontal pedestal
Y	Vertical pedestal with pins
W	Horizontal pedestal with pins

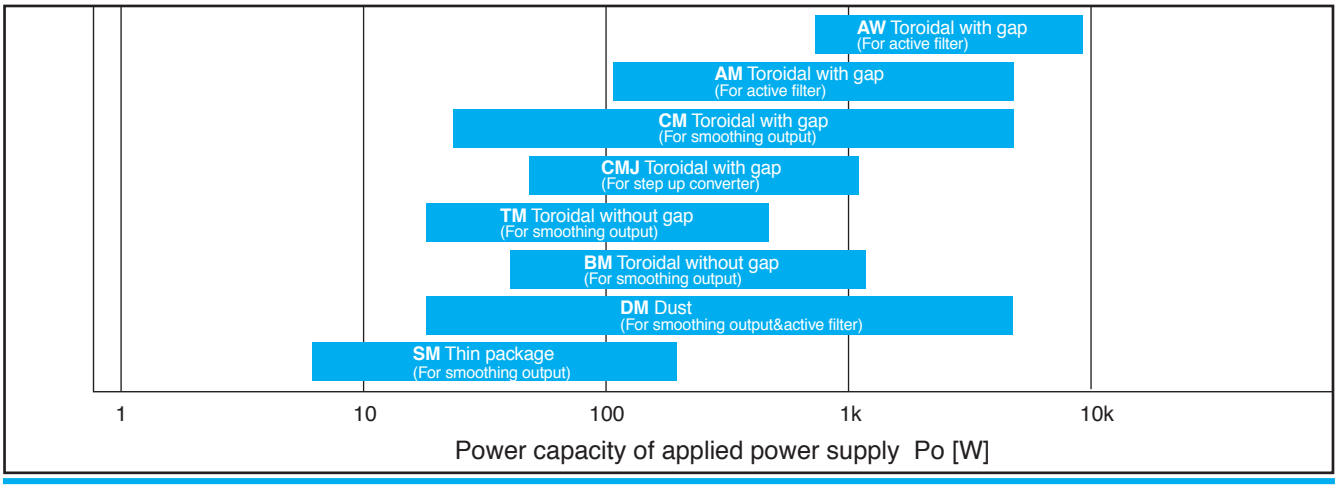
⑤Specifications control code

Code	Specifications
0	Standard
1	Custom

⑥Solder control code

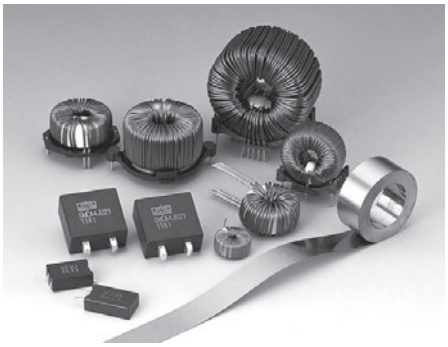
Code	Specifications
0	Not Pb free
E	Pb free

COIL SERIES GUIDE



Amorphous metal and NIPPON CHEMI-CON Amorphous Choke Coil

The amorphous metal has non crystalline structure generated by cooling molten metal rapidly. Due to the amorphous structure, the amorphous metal has excellent magnetic, mechanical, and chemical features in comparison with conventional metallic substances. NIPPON CHEMI-CON started developing amorphous components for electronic and electric equipment by making full use of the material and process technologies at its early stages and has continued the synthetic research and development to optimally match the amorphous choke coils with the material features and their applications through a variety of characteristics. NIPPON CHEMI-CON will help the customers design smaller and higher performance products by supplying excellent amorphous choke coils through the sophisticated production technology and manufacturing know-how.



STANDARD SPECIFICATIONS

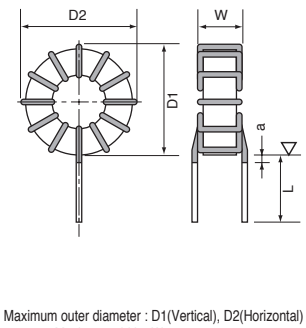
◆General Specification of Toroidal Coil

Items	Amorphous coils Rated value	Dust coils Rated value
Operating temperature range *1	-40 to 130℃	-40 to 120℃ (Coating type) -40 to 130℃ (Case type)
Storage temperature range	-40 to 130℃	-40 to 120℃ (Coating type) -40 to 130℃ (Case type)
Operating humidity range *1	20 to 95%RH	
Storage humidity range	20 to 80%RH	
Operating frequency range *2	20kHz to 500kHz	
Temperature rise *3	40K or less	
Insulation type	Type B (130℃)	Type A(105℃) Coating type Type B(130℃) Case type
Incombustibility	UL 94 V-0	

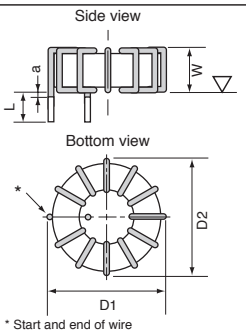
*1 Temperature on the coil surface including the temperature rise in installation. Never use the coil at a temperature exceeding the rated temperature range.
*2 Recommended range. When infra-acoustic frequency component is impressed, a beat sound sometimes occurs.
*3 The temperature rise on the coil surface at the rated d.c. current.

Note carefully that the temperature of the core may exceed the operating temperature range depending on the circumference condition even if the coil is used in the specification ranges described above.

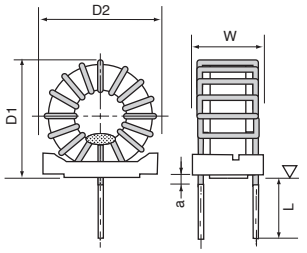
◆DIMENSIONS



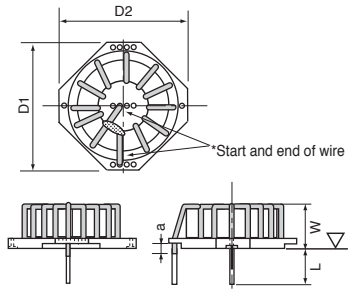
Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length : L=30±3mm
Soldering boundary : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.



* Start and end of wire
Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length *1 : L=15±3mm
Soldering boundary *1 : a=1.5mmMAX
*1 The bottom of the core or coil (▽) is defined as base surface.
Note that this does not include the size of the drawing part on the lead.



Maximum outer diameter *1 : D2
Maximum width *2 : D1
Maximum width : W
Total lead length *2 : L=13±2mm
Soldering boundary : a=0mm MAX
*1 Indicates the maximum dimension of coil or stand.
*2 The bottom of the pedestal (▽) is defined as base surface.



Maximum outer diameter *1 : D1, D2
Maximum width : W
Total lead length *2 : L=13±2mm
Soldering boundary : a=0mm MAX
*1 Indicates the maximum dimension of coil or stand.
*2 The bottom of the pedestal (▽) is defined as base surface.

◆Notes on use

- ●Note that the lead wire may not be subject to excess force and also may not be bent repeatedly because the wire is made of copper.
- ●Never make the coil hit on a hard and/or sharp substance. If so, the coating of the coils may be damaged to ruin the performance of the coil.
- ●Contact NIPPON CHEMI-CON for how to clean the substrate on which the coil is mounted.
- ●When infra-acoustic frequency component is impressed, a beat sound sometimes occurs.
- ●Response to the Substances of Concern

(1) Nippon Chemi-Con aims for developing products that meet laws and regulations concerning substances of concern.
(Some products may contain regulated substances for exempted application.)
Please contact us for more information about law-compliance status.

(2) According to the content of REACH handbook (Guidance on requirements for substances in articles which is published on May 2008), our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for EU REACH Regulation Article 7 (1).
Reference: Electrolytic Condenser Investigation Society
"Study of REACH Regulation in EU about Electrolytic Capacitor" (publicized on 13 March 2008)

ACCESSORIES

NIPPON CHEMI-CON would like to serve the customers with smaller and higher qualified products.
Please name your best suited attaching parts in installation.

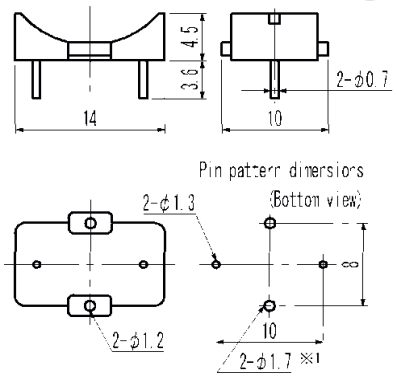
◆Accessories used for choke coils of upright type

Unit : [mm]

Pedestal P/N XD1408VL (2PBF)

P/N of available core : NS/AQD/CPF

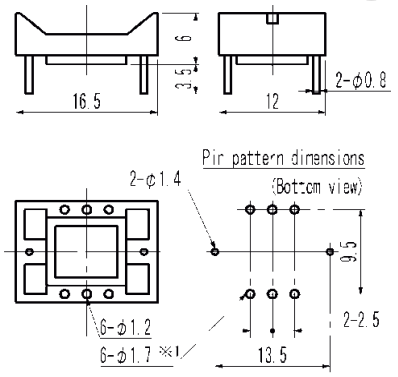
Standard



Pedestal P/N XD1610VW (2PBF)

P/N of available core : N1/N2

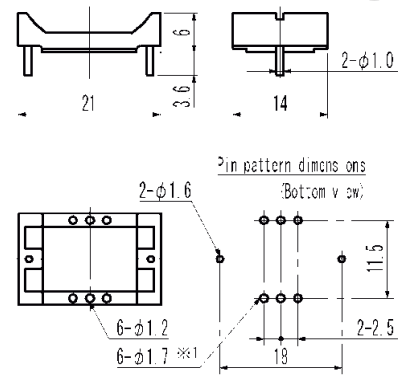
Standard



Pedestal P/N XD2212VW (2PBF)

P/N of available core : ASD

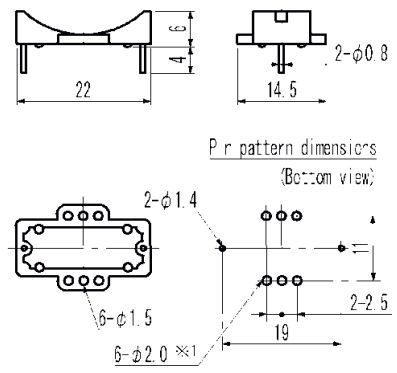
Standard



Pedestal P/N XD2811VW (2PBF)

P/N of available core : G4/N5/ARD/CTB

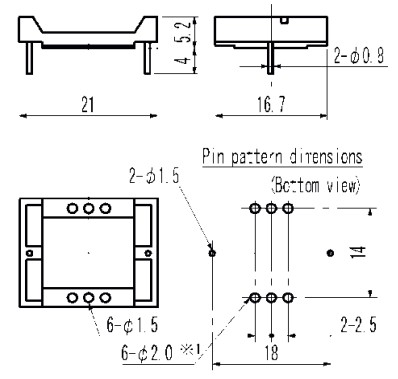
Standard



Pedestal P/N XD2314VW (2PBF)

P/N of available core : G3/NU/NP

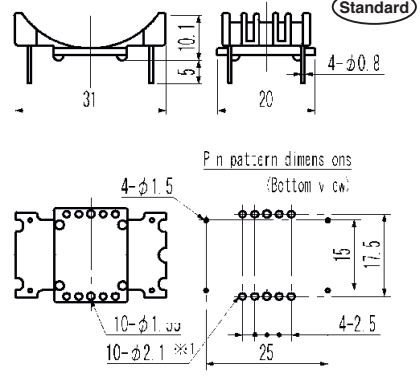
Standard



Pedestal P/N XD3415VW (4PBF)

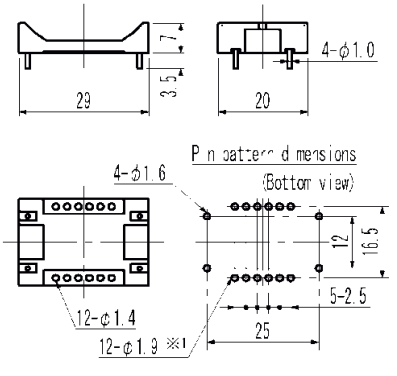
P/N of available core : G6/G7/G8/J7H/J8H/N6/N7/X6/X7/X8/AUD

Standard



Pedestal P/N XD3417VL (4PBF)

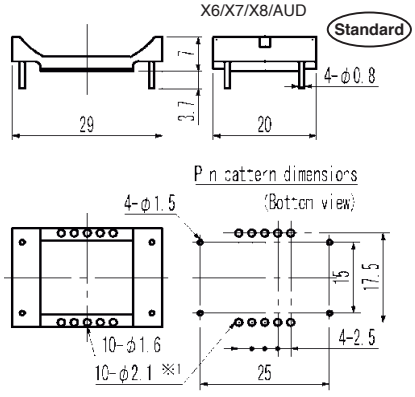
P/N of available core : G6/G7/G8/J7H/J8H/N6/N7/X6/X7/X8/AUD



Pedestal P/N XD3418VW (4PBF)

P/N of available core : G6/G7/G8/J7H/J8H/N6/N7/X6/X7/X8/AUD

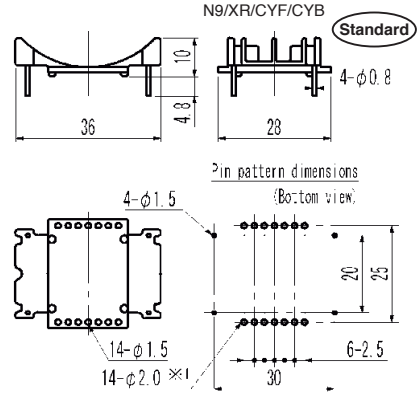
Standard



Pedestal P/N XD4420VW (4PBF)

P/N of available core : G9/G0/GJ/JRH/JAH/JBH/N9/XR/CYF/CYB

Standard



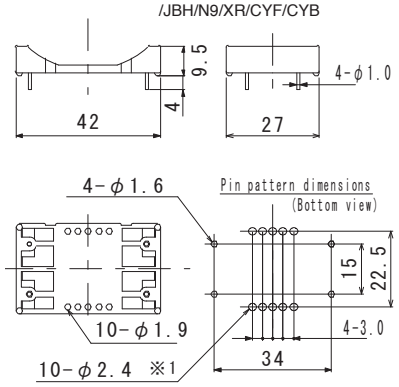
*1 In the case of a lead wire with greatest dimensions.
*2 The Specification with auxiliary pins is marked by ( ).

◆Accessories used for choke coils of upright type

Unit : [mm]

Pedestal P/N XD4227VL (4PBF)

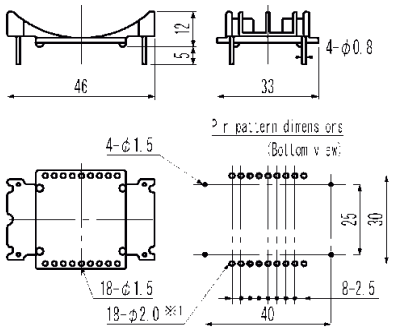
P/N of available core : G9/G0/GJ/JRH/JAH /JBH/N9/XR/CYF/CYB



Pedestal P/N XD5625VW (4PBF)

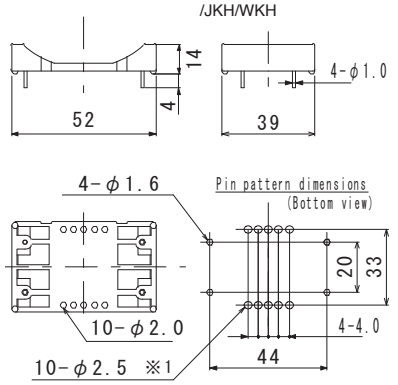
P/N of available core : GQ/GK/JCH /JKH/WKH

Standard



Pedestal P/N XD5239VL (4PBF)

P/N of available core : GQ/GK/JCH /JKH/WKH



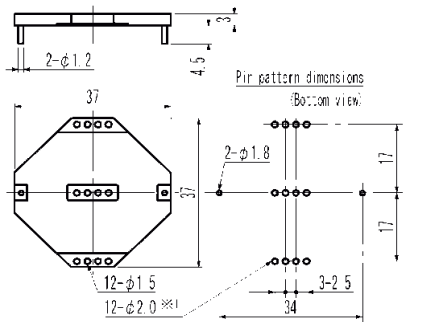
◆Accessories used for choke coils of lying type

Unit : [mm]

Pedestal P/N XD3237HW (2PBF)

P/N of available core : G6/G7/G8/J7H/J8H /N6/N7/X6/X7/X8/AUD

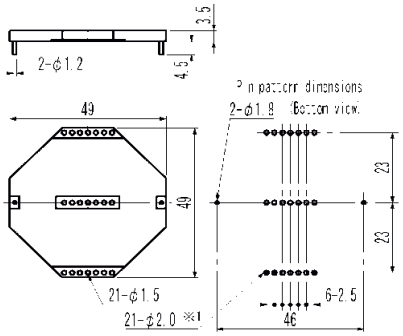
Standard



Pedestal P/N XD4449HW (2PBF)

P/N of available core : G0/GJ/JBH

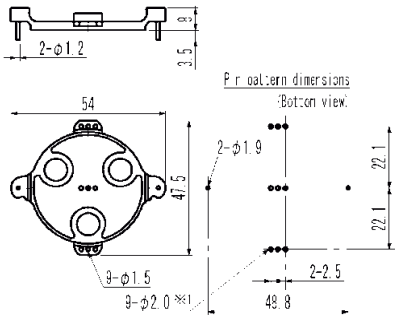
Standard



Pedestal P/N XD4054HW (2PBF)

P/N of available core : G9/JRH/JAH /N9/XR

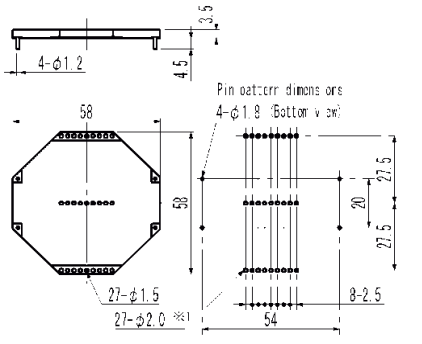
Standard



Pedestal P/N XD5358HW (4PBF)

P/N of available core : GQ/GK/JCH/JKH/WKH

Standard

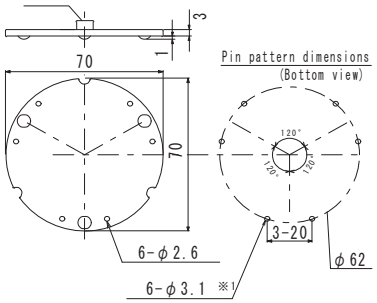


Pedestal P/N XD7070HL

P/N of available core : MGQ, LGQ

Standard

Coil positioning projections



Pedestals for 2P coils are also available.

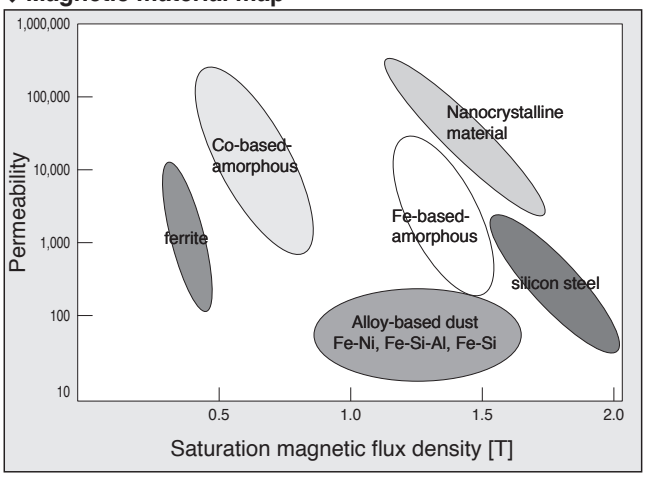
- The specification described in this manual is defined on the basis of the documentation, information, and data obtained when the document is written. However, the actual performance of each product may vary depending on the configuration of the circuit including the product. Therefore, confirm the performance and stability of the product in the circuit which you design.
- In general, electronic components may generate heat depending on their operating conditions. Accordingly, never use the products near some flammable substances. In addition, never use the products if any specification exceeds the rated value. This may cause human injury and/or device failure.
- Handle the coils carefully so that rear short circuits may not occur.
- The product specification may be subject to change without notice for improvement.

CHOKE COIL CHARACTERISTICS

◆Characteristics comparison of magnetic materials

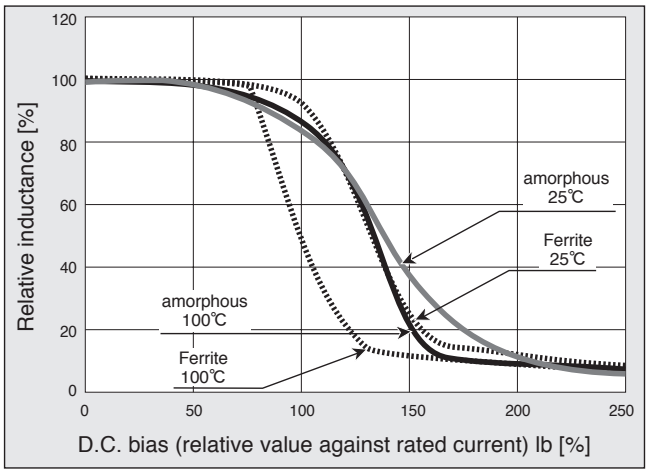
Application	Material shape	Product name	Composition	Saturation magnetic flux density Bs [mT]	Magnetic permeability μ(100[kHz])	Curie point Tc [°C]	Frequency Characteristics (Reference) [kHz]
Power system	Foil strip	Amorphous	Fe-Si-B	1.56	- 5,000	415	- 150
			Co-Fe-Ni-Si-B	0.6	- 18,000	180	-
		Silicon steel plate	Fe-Si	1.3	- 800	700	- 20
	Powder	Alloy dust	Fe-Ni (High Flux)	1.5	26 to 200	420	- 300
			Fe-Si-Al (Sendust)	1.1	26 to 200	570	- 150
			Fe-Si (Mega flax)	1.6	26 to 200	500	- 50
			Fe-Si-B (Amorphous dust)	1.56	60 to 200	415	- 300
		ferrite	Mn-Zn	0.4	- 2,400	250	- 500
			Ni-Zn	0.3	10 to 500	350	- 1,000
Normal	Powder	Fe dust	Fe	1.0	75	770	- 20
Common	Foil strip	Nanocrystalline	Fe-Si-Br-Nb-Cu	1.23	15,000 to 31,000	570	- 1,000
	Powder	ferrite	Mn-Zn	0.5	5,000 to 16,000	130	- 1,000

◆Magnetic material map

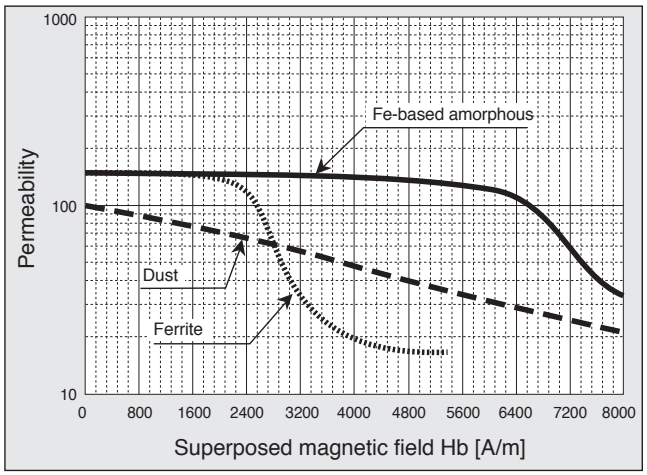


◆D.C. bias of amorphous choke coil

●Temperature dependence : Core temperature 25, 100℃



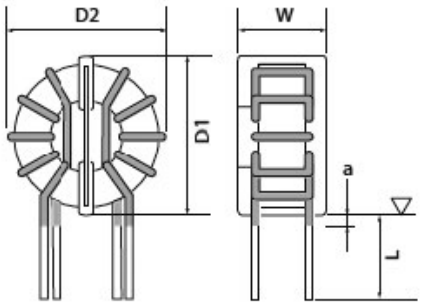
◆D.C. bias of normal mode choke coil



NANOCRYSTALLINE COMMON MODE COILS

FL-V New! Series

RoHS2 Compliant



◆MAJOR USES
●AC/DC Common mode filter

◆FEATURES
●Compared to conventional coils, the inductance level (100kHz) has been significantly improved.
●Compared to conventional coils, a higher impedance level has been realized within wide ranges of frequencies.
●Conforming to insulating type B and incombustibility UL94V-0

◆CORE STANDARD SPECIFICATIONS

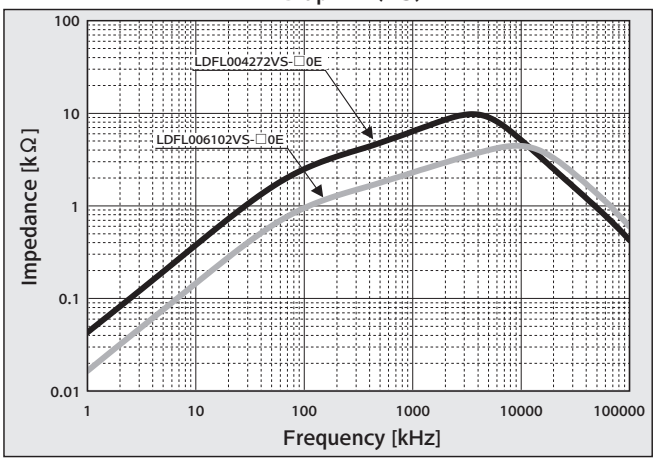
Coil Part No.*1	Core Part No.	Rated voltage [V]	Rated Current [A]	Inductance		D.C.R. mΩ (max)	Winding mmϕ× lines	Outside Dimensions			Frequency Characteristics Graph	Temperature rise Graph
				10kHz [mH]	100kHz [mH]			D1 [mm]	D2 [mm]	W [mm]		
LDFL004272VS-□0E	F110705	250	3.5	6.0	2.7	38	0.55×1P	15.0	16.0	12.0	1,2	A
LDFL006102VS-□0E			5.5	2.3	1.0	16	0.7×1P					
LDFL006832VD-□0E	F221407	250	5.5	18.3	8.3	26	0.9×1P	27.0	31.0	17.5	3,4	B
LDFL009412VD-□0E			9	9.1	4.1	16	1.1×1P					
LDFL012282VD-□0E			12	6.2	2.8	9.5	1.3×1P					
LDFL014172VD-□0E			14	3.8	1.7	7	1.4×1P					
LDFL007652V6-□0E	F221310	250	7	16.3	6.5	22	1.0×1P	29.0	31.0	21.0	5,6	C
LDFL010302V6-□0E			10	6.7	3.0	11	1.2×1P					
LDFL012202V6-□0E			12	4.5	2.0	7.5	1.3×1P					
LDFL008123VV-□0E	F251513	250	8	25.3	11.5	26	1.1×1P	30.5	34.0	23.5	7,8	D
LDFL011742VV-□0E			11	16.2	7.4	15	1.3×1P					
LDFL013412VV-□0E			13	9.1	4.1	12	1.4×1P					
LDFL015372VBU□0E	F281815	700	15	8.1	3.7	6.7	1.7×1P	36.0	40.0	29.5	9,10	E
LDFL021252VBU□0E			21	5.4	2.5	4.5	1.9×1P					
LDFL026152VBU□0E			26	3.3	1.5	2.9	1.5×2P					
LDFL020592VJU□0E	F372315	700	20	12.9	5.9	5.7	1.5×2P	48.0	50.0	32.5	11,12	F
LDFL027282VJU□0E			27	6.2	2.8	3.1	1.7×2P					
LDFL039172VJU□0E			39	3.7	1.7	1.5	2.0×2P					

*1 For Coil Part No., vertical type=V, horizontal type=H are used

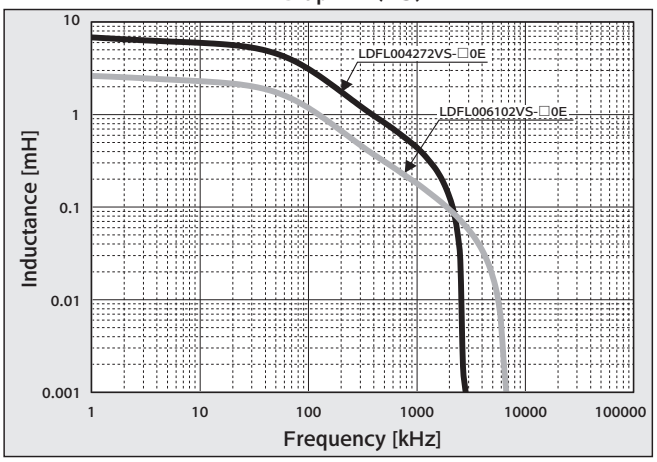
FL-V Series

Frequency Characteristics Ambient temperature : 25°C

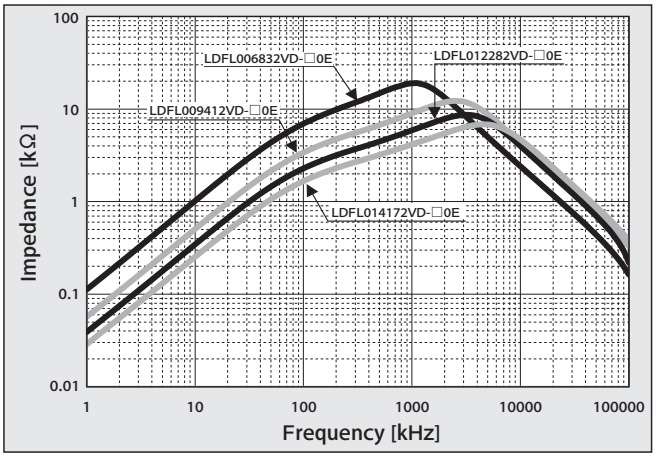
Graph-1（VS）



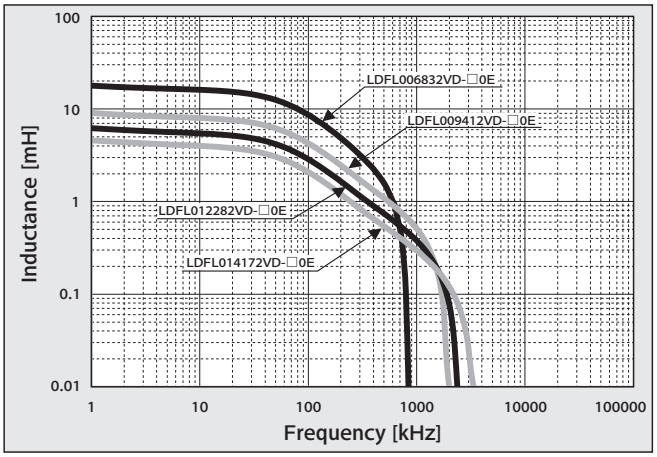
Graph-2（VS）



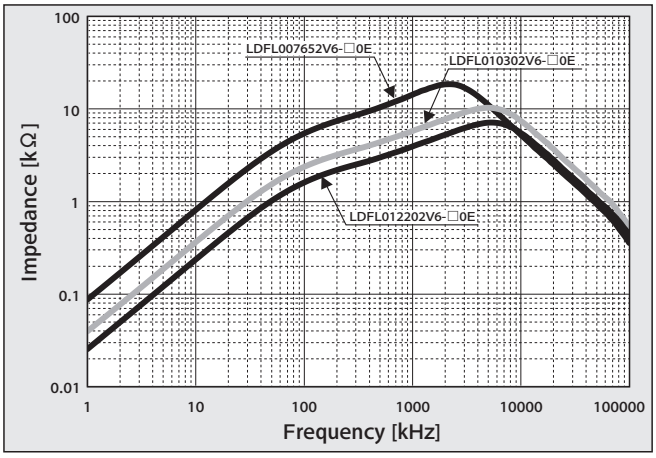
Graph-3（VD）



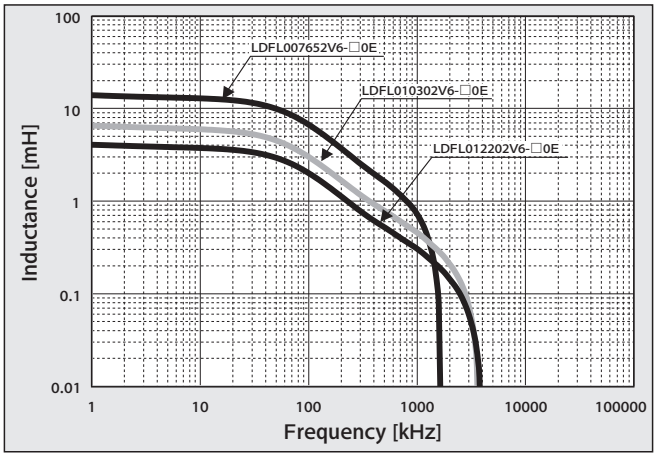
Graph-4（VD）



Graph-5（V6）



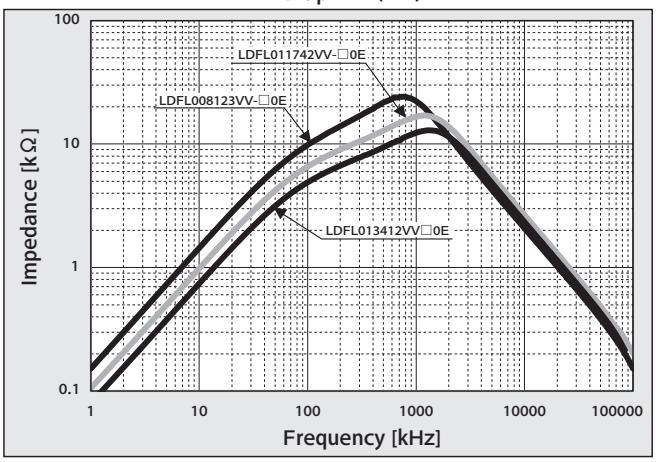
Graph-6（V6）



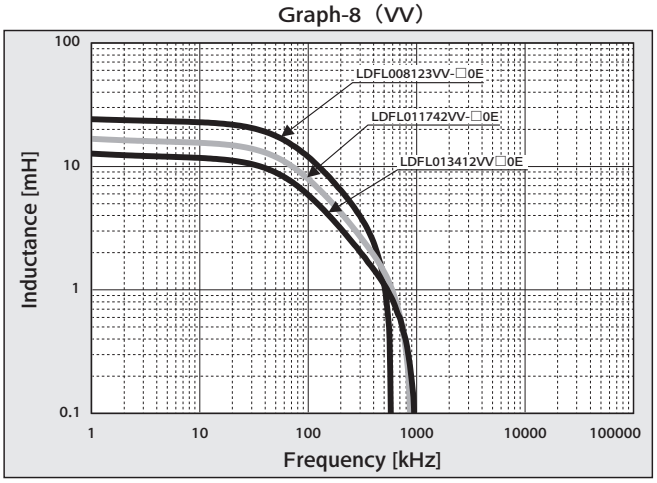
FL-V Series

Frequency Characteristics Ambient temperature : 25°C

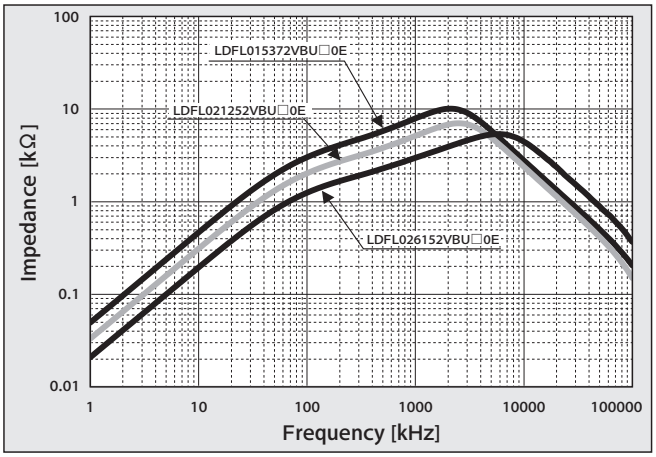
Graph-7（VV）



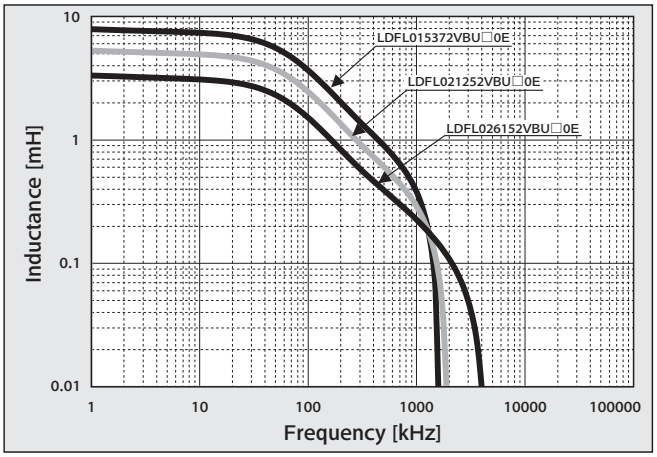
Graph-8（VV）



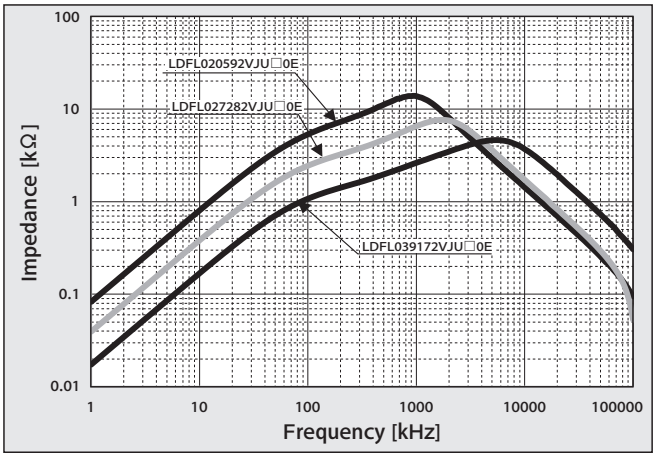
Graph-9（VBU）



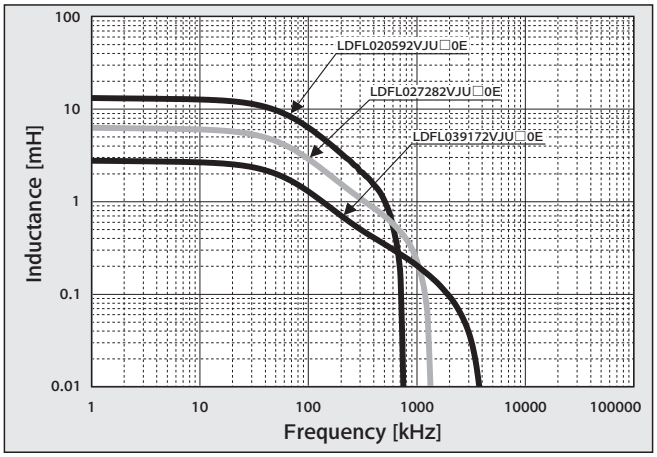
Graph-10（VBU）



Graph-11（VJU）



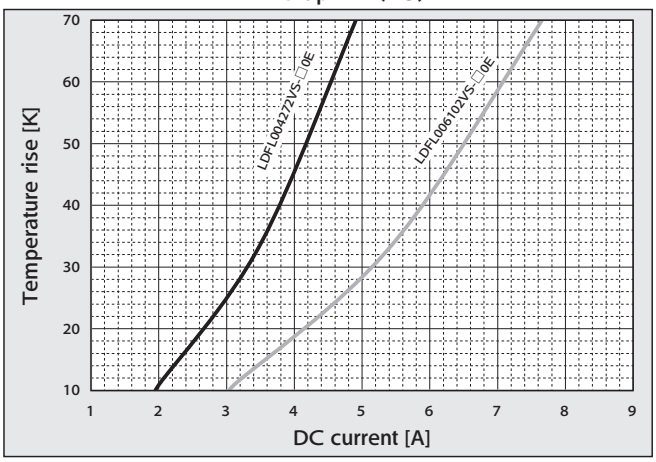
Graph-12（VJU）



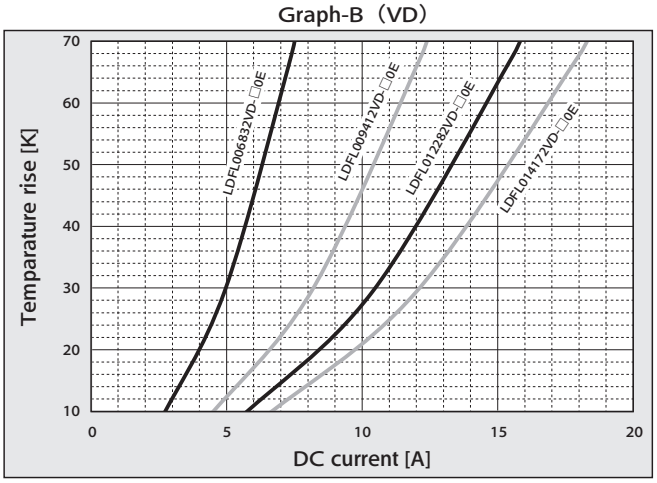
FL-V Series

Temperature rise Ambient temperature: 25°C （calm） Saturation temperature for the DC current flow
*** Installation conditions or the influence of heat emitted by surrounding components are not considered in this data.**

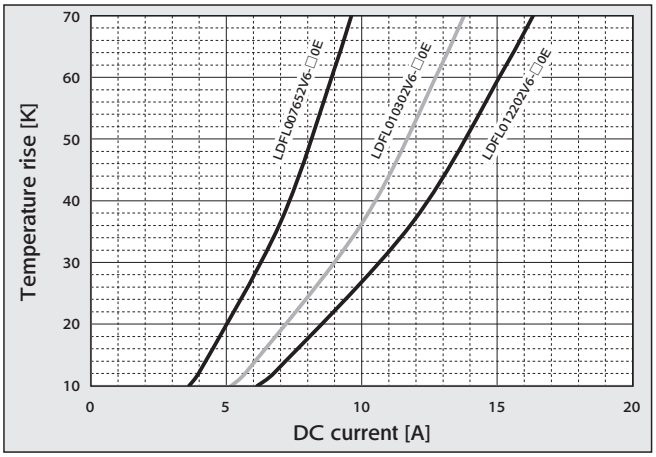
Graph-A（VS）



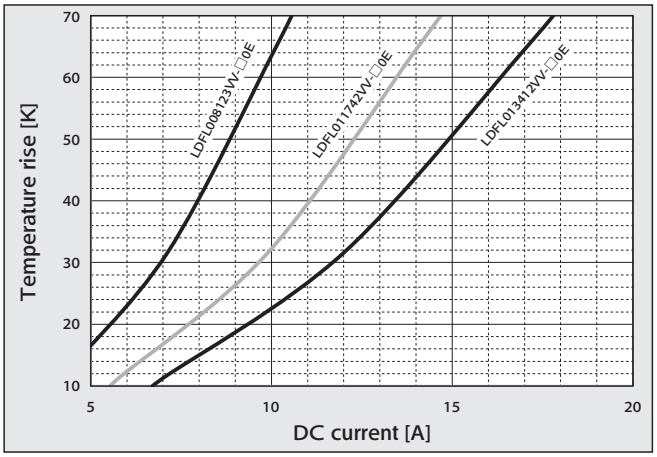
Graph-B（VD）



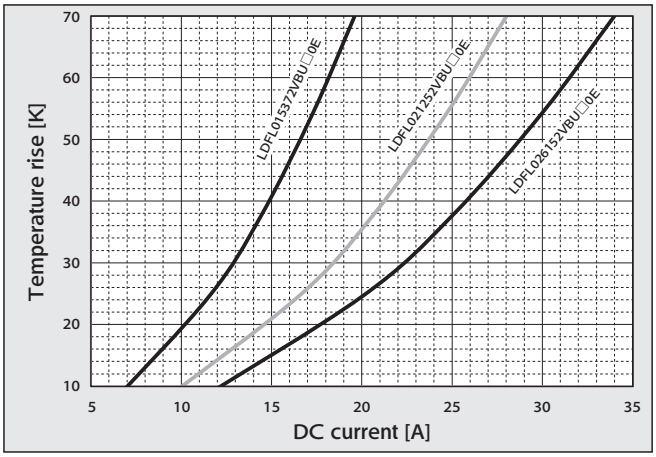
Graph-C（V6）



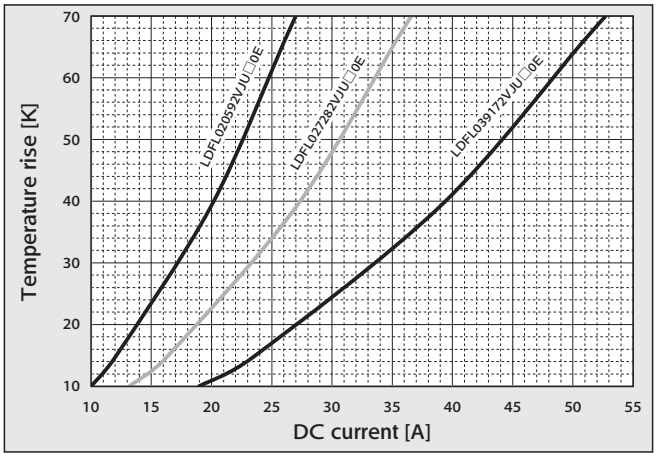
Graph-D（VV）



Graph-E（VBU）



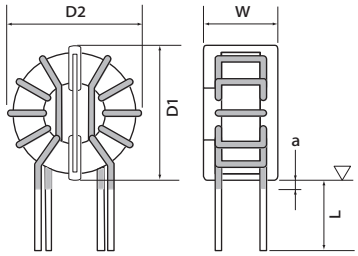
Graph-F（VJU）



NANOCRYSTALLINE COILS

FL Series

Standard type for single phase



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=30±3mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆MAJOR USES

●Common mode coils for noise filter in inverter or large capacity power supply

◆FEATURES

●Small profile, light through adoption of high permeability core
●High inductance in spite of a small number of turns
●Low temperature rise and low D.C. resistance
●Stable frequency performance of noise suppression in wide frequency range
●Excellent temperature characteristics

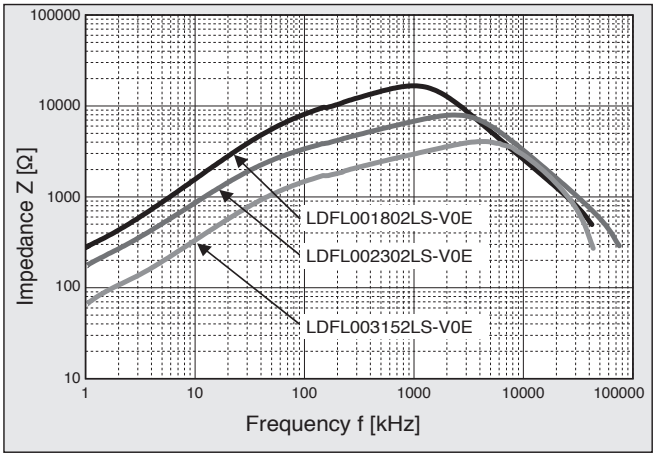
◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			10kHz (Typical)	100kHz (Rating)			D1 mm	D2 mm	W mm
			mH	mH					
●	LDFL001802LS-V0E (FL01393LSPBF)	1	28.0	8.0	200	0.35×1P	15.0	16.0	11.9
●	LDFL002302LS-V0E (FL02173LSPBF)	2	11.6	3.0	85	0.45×1P	15.0	16.0	11.9
●	LDFL003152LS-V0E (FL03872LSPBF)	3	5.6	1.5	45	0.55×1P	15.0	16.0	11.9
	LDFL003552L5-V0E (FL03552L5PBF)	3	22.0	5.5	56	0.7 ×1P	28.0	29.0	15.0
	LDFL003153L6-V0E (FL03153L6PBF)	3	60.0	15.0	82	0.7 ×1P	29.0	30.5	20.5
	LDFL005132L5-V0E (FL05132L5PBF)	5	5.4	1.3	16	1.0 ×1P	29.0	30.0	15.0
	LDFL005332L6-V0E (FL05332L6PBF)	5	13.0	3.3	21	1.0 ×1P	29.0	30.5	20.0
	LDFL005302LT-V0E (FL05302LTPBF)	5	13.0	3.0	17	1.1 ×1P	34.0	36.0	20.0
	LDFL005502LT-V0E (FL05502LTPBF)	5	23.0	5.0	23	1.1 ×1P	34.5	36.5	20.5
	LDFL005103LR-V0E (FL05103LRPBF)	5	39.0	10.0	33	1.1 ×1P	39.0	41.0	25.5
	LDFL008451L5-V0E (FL08451L5PBF)	8	1.8	0.45	6.5	1.3 ×1P	29.5	31.0	15.0
	LDFL008102L6-V0E (FL08102L6PBF)	8	4.2	1.0	9	1.3 ×1P	29.5	31.5	20.5
	LDFL010102LT-V0E (FL10102LTPBF)	10	5.8	1.0	8	1.5 ×1P	34.0	38.0	22.0
	LDFL010302LT-V0E (FL10302LTPBF)	10	13.0	3.0	11	1.4 ×1P	36.0	38.0	22.0
	LDFL010502LR-V0E (FL10502LRPBF)	10	24.0	5.0	15	1.5 ×1P	40.0	43.0	27.0
	LDFL010103LJ-V0E (FL10103LJPBF)	10	46.5	10.0	20	1.5 ×1P	46.5	47.5	27.5
	LDFL015102LT-V0E (FL15102LTPBF)	15	3.7	1.0	6	1.6 ×1P	34.5	38.0	20.5
	LDFL015302LR-V0E (FL15302LRPBF)	15	15.0	3.0	10	1.8 ×1P	40.0	42.5	29.0
	LDFL015502LJ-V0E (FL15502LJPBF)	15	24.8	5.0	11	1.8 ×1P	47.0	49.0	28.0
	LDFL020102LR-V0E (FL20102LRPBF)	20	4.2	1.0	5	1.5 ×2P	42.5	43.0	28.0
	LDFL020302LJ-V0E (FL20302LJPBF)	20	13.5	3.0	7	1.5 ×2P	46.5	48.0	30.0
	LDFL025252LJ-V0E (FL25252LJPBF)	25	11.6	2.5	5	1.6 ×2P	47.0	49.0	31.0
	LDFL030102LR-V0E (FL30102LRPBF)	30	4.2	1.0	5	1.7 ×2P	39.5	44.0	29.5
	LDFL030202LJ-V0E (FL30202LJPBF)	30	9.9	2.0	6	1.7 ×2P	47.0	48.5	31.0

The total lead length of the items marked with ● is 15±3mm.

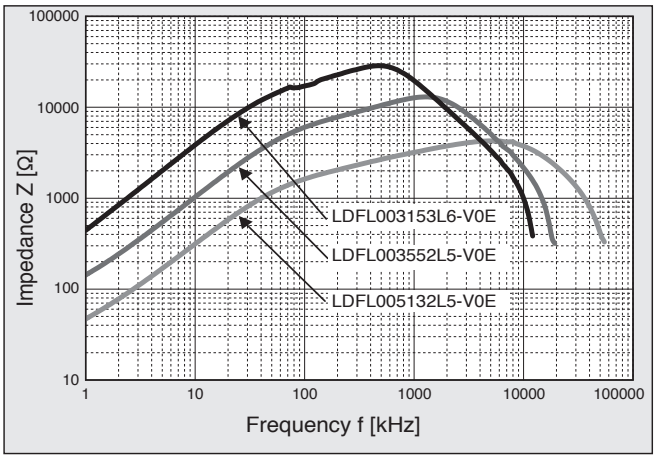
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (1)

●Rated Current: 1, 2, 3 [A]



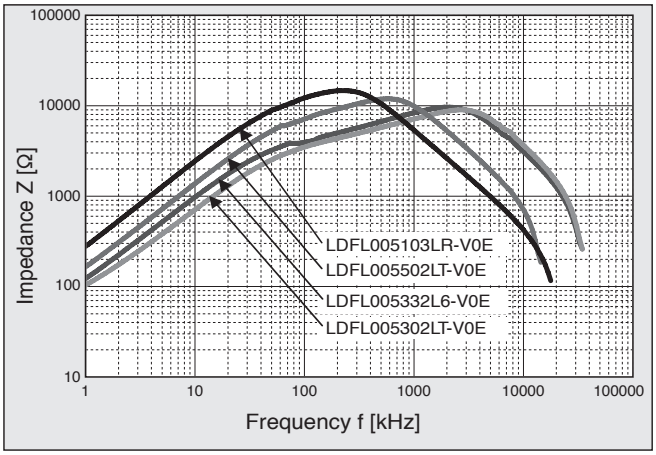
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (2)

●Rated Current: 3, 5 [A]



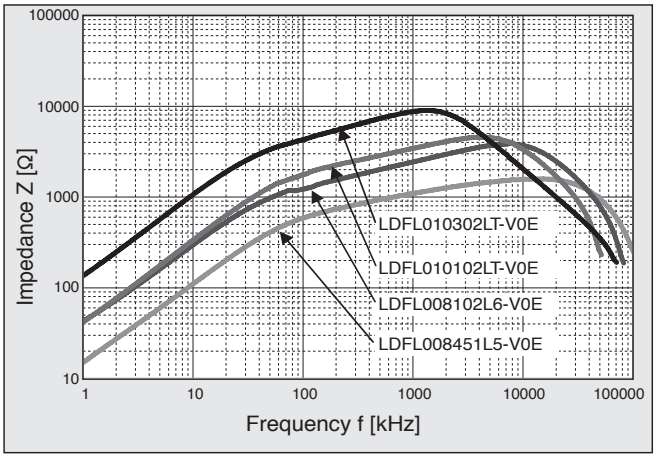
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (3)

●Rated Current: 5 [A]



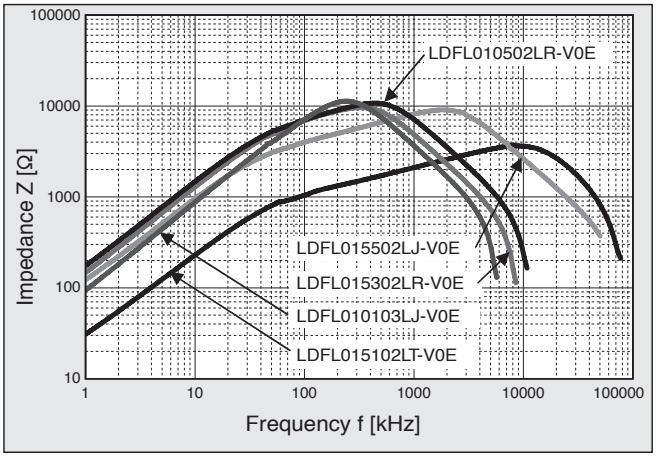
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (4)

●Rated Current: 8, 10 [A]



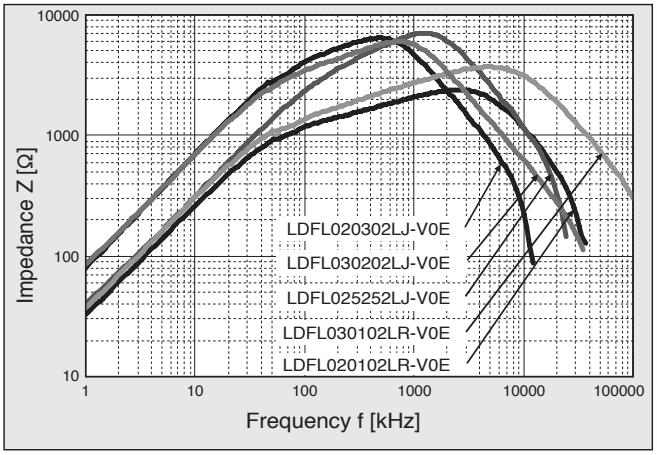
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (5)

●Rated Current: 10, 15 [A]



◆FREQUENCY - IMPEDANCE CHARACTERISTICS (6)

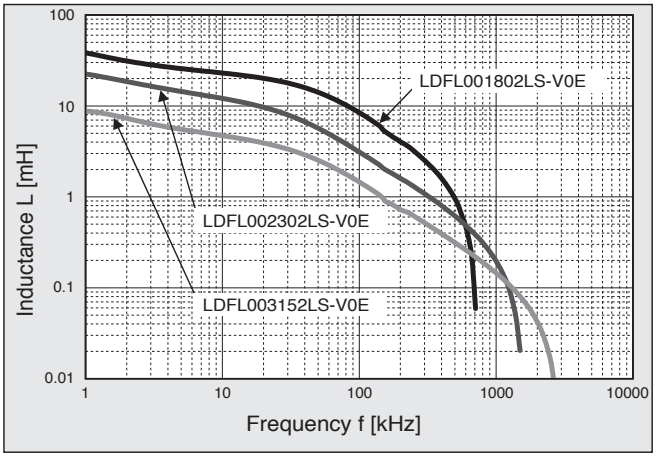
●Rated Current: 20, 25, 30 [A]



FL Series

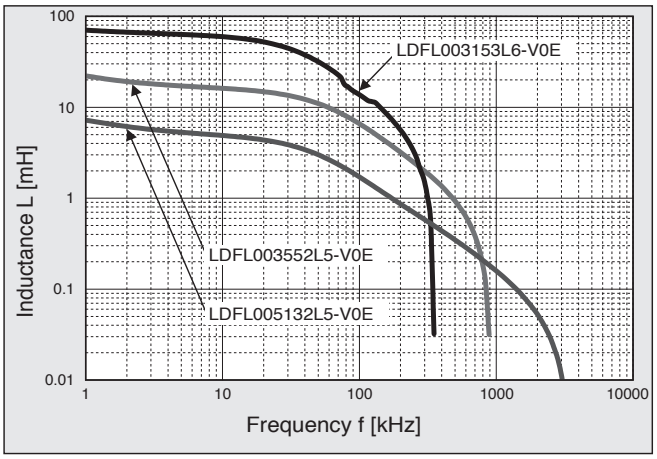
◆FREQUENCY - INDUCTANCE CHARACTERISTICS (1)

●Rated Current: 1, 2, 3 [A]



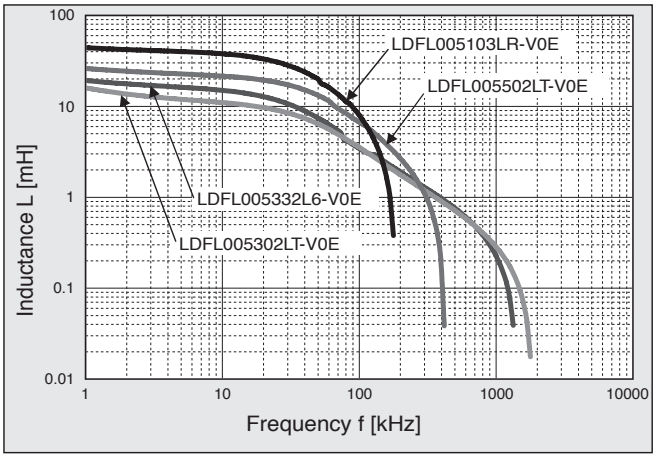
◆FREQUENCY - INDUCTANCE CHARACTERISTICS (2)

●Rated Current: 3, 5 [A]



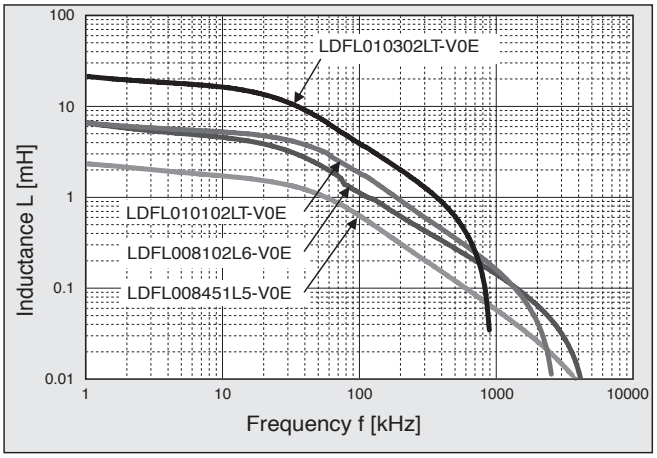
◆FREQUENCY - INDUCTANCE CHARACTERISTICS (3)

●Rated Current: 5 [A]



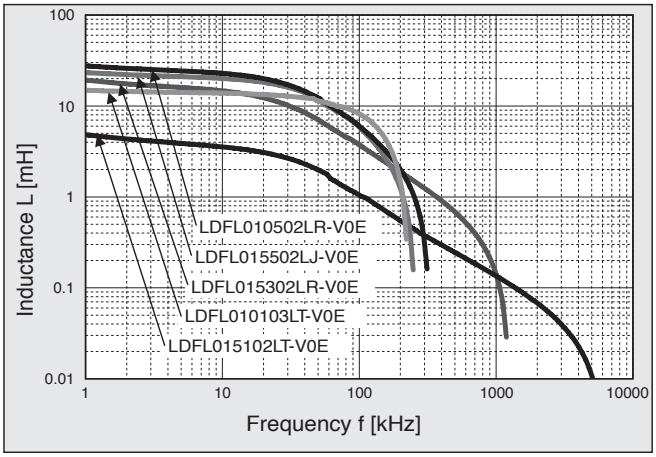
◆FREQUENCY - INDUCTANCE CHARACTERISTICS (4)

●Rated Current: 8, 10 [A]



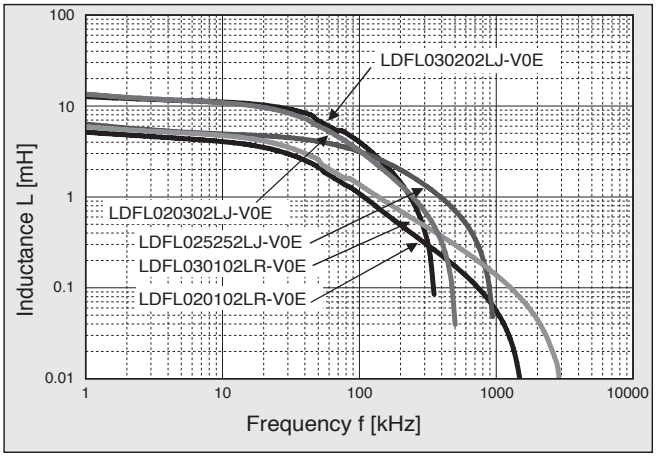
◆FREQUENCY - INDUCTANCE CHARACTERISTICS (5)

●Rated Current: 10, 15 [A]



◆FREQUENCY - INDUCTANCE CHARACTERISTICS (6)

●Rated Current: 20, 25, 30 [A]



NANOCRYSTALLINE COILS

FL Series

High voltage type for single phase

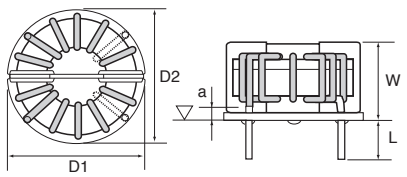
◆MAJOR USES

- Common mode coils for noise filter in inverter or large capacity power supply

◆FEATURES

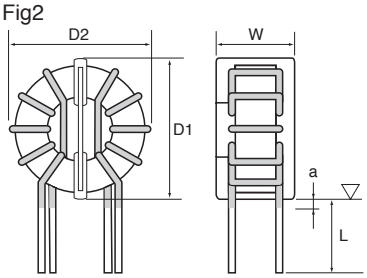
- Applicable to input voltage (700V)
- Remarkably miniaturized in profile benefited by high permeability core
- High inductance in spite of a small number of turns
- Low temperature rise and low D.C. resistance
- Stable frequency performance of noise suppression in wide frequency range
- Excellent temperature characteristics

Fig1



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=15±3mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

Fig2



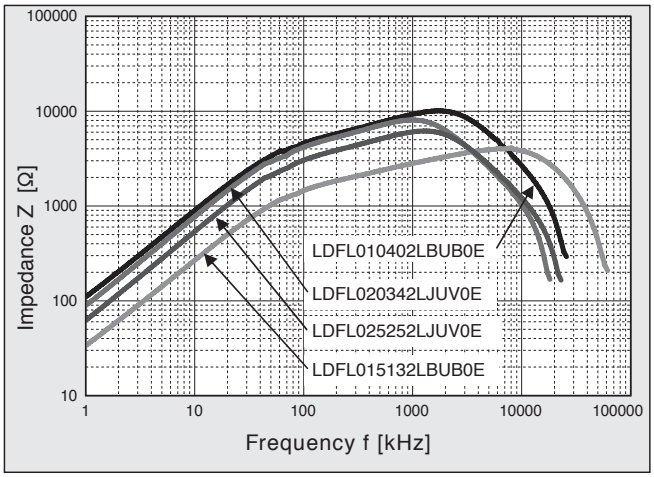
Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=30±3mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆COIL STANDARD SPECIFICATIONS

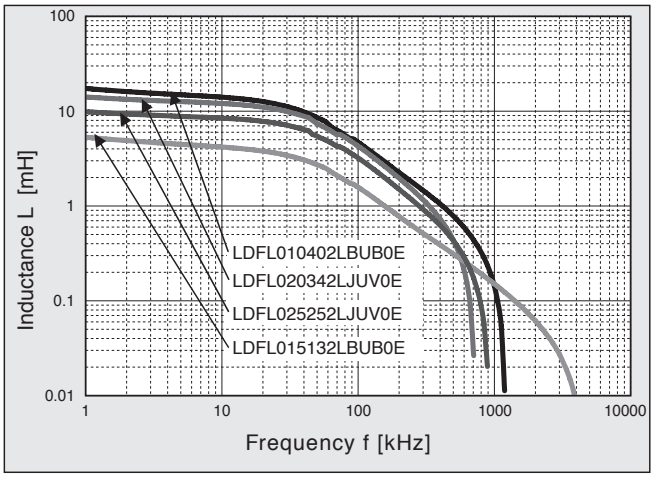
Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions			
		10kHz (Typical)	100kHz (Rating)			D1 mm	D2 mm	W mm	Dimensions
		mH	mH						
LDFL010402LBUB0E (FL10402LBUBPBF)	10	16.0	4.0	12	1.5×1P	42.0	42.0	32.0	Fig1
LDFL015132LBUB0E (FL15132LBUBPBF)	15	5.1	1.3	6	1.9×1P	42.0	42.0	32.5	Fig1
LDFL020342LJUV0E (FL20342LJUPBF)	20	13.5	3.4	8	1.4×2P	49.0	49.0	31.0	Fig2
LDFL025252LJUV0E (FL25252LJUPBF)	25	9.9	2.5	6	1.6×2P	50.0	50.0	32.0	Fig2

LDFL010402LBUB0E, LDFL015132LMBB0E listed in the above table are coils of lying type with pedestal.
For LDFL020342LJUV0E, LDFL025252LJUV0E, lying type is also available. "V" changes into "H" in last the third digit of the name of items.

◆FREQUENCY - IMPEDANCE CHARACTERISTICS



◆FREQUENCY - INDUCTANCE CHARACTERISTICS

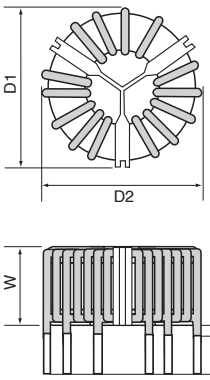


NANOCRYSTALLINE COMMON MODE COILS

FL-V New! Series

RoHS2 Compliant

For three-phase circuit



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=15±5mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆MAJOR USES

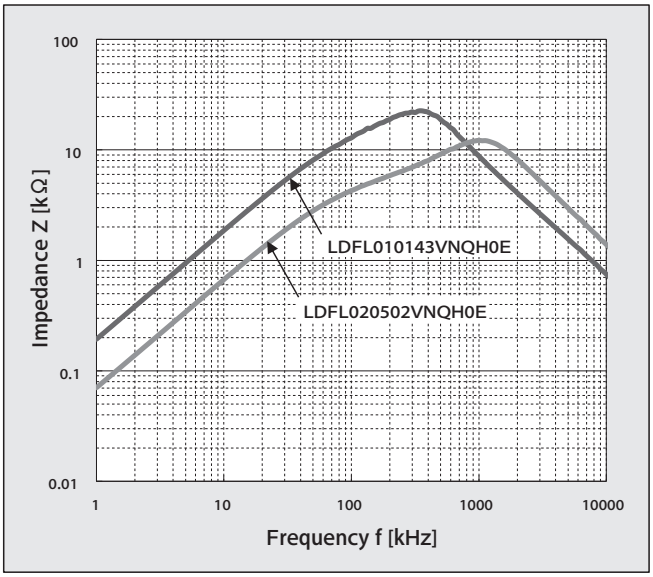
●Common mode coils for noise filter in inverter or large capacitypower supply

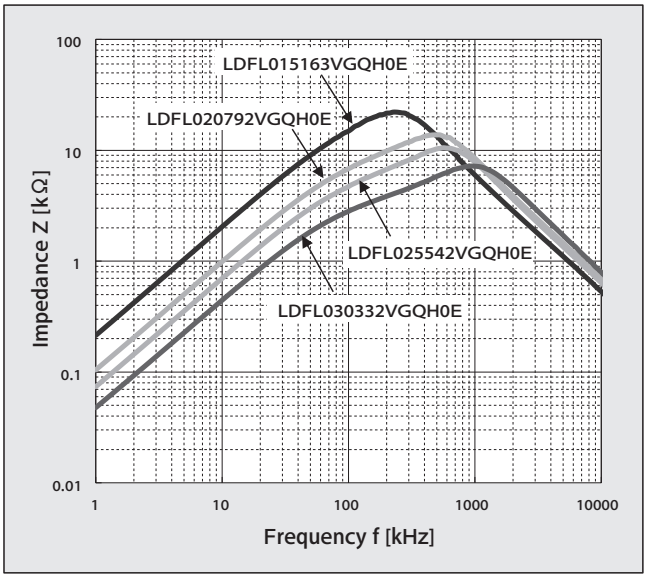
◆FEATURES

●Compared to conventional coils, the inductance level (100kHz) has been significantlyimproved.
●Compared to conventional coils, a higher impedance level has been realized withinwide ranges of frequencies.
●Conforming to insulating type B and incombustibility UL94V-0

◆CORE STANDARD SPECIFICATIONS

Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
		10kHz (Typical)	100kHz (Rating)			D1 mm	D2 mm	W mm
		mH	mH					
LDFL010143VNQH0E (FL10143VNQPBF)	10	30.7	14.0	18	1.5×1P	56.0	56.0	32.0
LDFL020502VNQH0E (FL20502VNQPBF)	20	11.1	5.0	6	2.0×1P	56.0	56.0	32.0
LDFL015163VGQH0E (FL15163VGQPBF)	15	34.5	15.7	15	2.0×1P	65.0	65.0	35.0
LDFL020792VGQH0E (FL20792VGQPBF)	20	17.3	7.9	6	2.3×1P	65.0	65.0	35.0
LDFL025542VGQH0E (FL25542VGQPBF)	25	11.7	5.4	5	1.8×2P	65.0	65.0	35.0
LDFL030332VGQH0E (FL30332VGQPBF)	30	7.2	3.3	4	2.0×2P	65.0	65.0	35.0





FL Series

For three-phase circuit

◆MAJOR USES

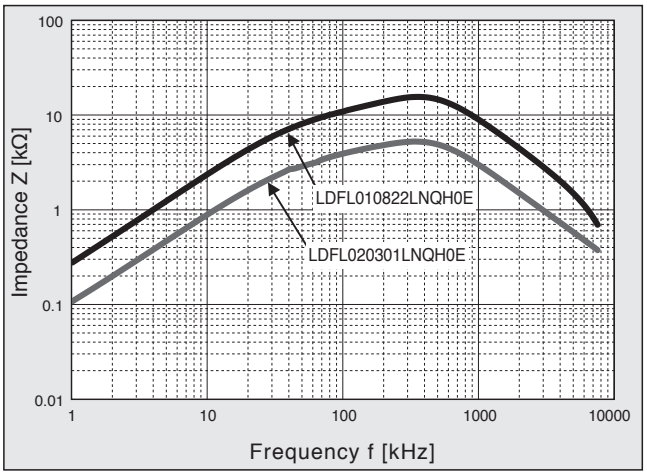
●Common mode coils for noise filter in inverter or large capacity power supply

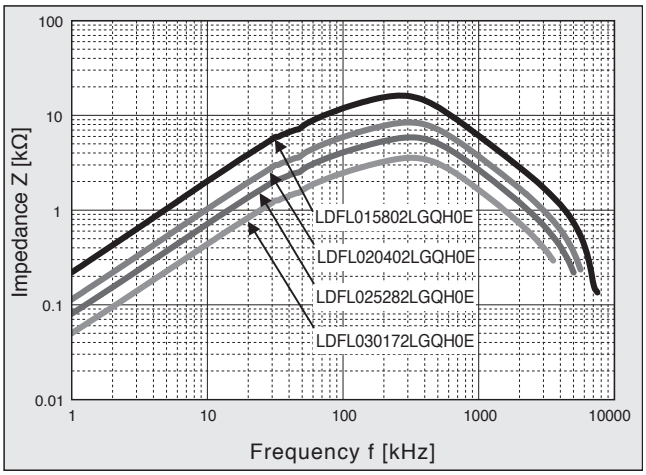
◆FEATURES

●Small profile, light through adoption of high permeability core
●High inductance in spite of a small number of turns
●Low temperature rise and low D.C. resistance
●Stable frequency performance of noise suppression in wide frequency range
●Excellent temperature characteristics
●Conforming to insulating type B and incombustibility UL94V-0

Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
		10kHz (Typical)	100kHz (Rating)			D1 mm	D2 mm	W mm
		mH	mH					
LDFL010822LNQH0E (FL10822LNQPBF)	10	27.0	8.2	18	1.5×1P	56.0	56.0	32.0
LDFL020302LNQH0E (FL20302LNQPBF)	20	11.0	3.0	6	2.0×1P	56.0	56.0	32.0
LDFL015802LGQH0E (FL15802LGQPBF)	15	30.0	8.0	15	2.0×1P	65.0	65.0	35.0
LDFL020402LGQH0E (FL20402LGQPBF)	20	16.0	4.0	6	2.3×1P	65.0	65.0	35.0
LDFL025282LGQH0E (FL25282LGQPBF)	25	10.0	2.8	5	1.8×2P	65.0	65.0	35.0
LDFL030172LGQH0E (FL30172LGQPBF)	30	7.0	1.7	4	2.0×2P	65.0	65.0	35.0

◆COIL STANDARD SPECIFICATIONS

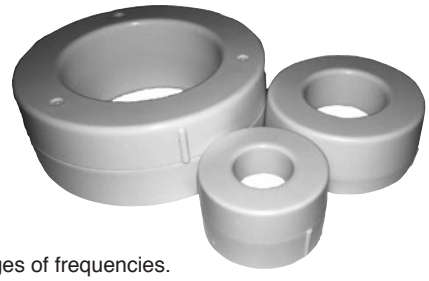




NANOCRYSTALLINE COMMON MODE COILS

FL-V New! Series

RoHS2 Compliant



◆MAJOR USES

- Signal power line noise control
- DC power line noise control
- AC power line noise control
- Zero-phase reactor

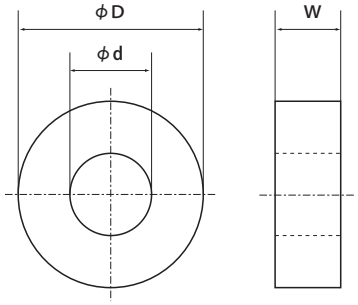
◆FEATURES

- Compared to conventional series, a higher impedance level has been realized withinwide ranges of frequencies.
- Conforming to insulating type B and incombustibility UL94V-0

◆CORE STANDARD SPECIFICATIONS

Core Part No.	Cross Sectional Area cm^2	Magnetic Path Length cm	Weight g	Outside Dimensions			Inductance Coefficient (AL Value) [$\mu H/N^2$] 100kHz at 0A
				ϕD mm	ϕd mm	W mm	
LRF251510MKCX	0.41	6.38	21	28.3	12.7	12.3	25.2
LRF251515MKCX	0.63	6.38	32	28.3	12.7	17.5	38.1
LRF322015MKCX	0.69	8.09	60	35.2	17.5	17.3	33.1
LRF372315MKCX	0.83	9.33	80	40.5	19.5	18.0	34.7
LRF462715MKCX	1.14	11.47	98	49.4	22.7	18.0	38.7
LRF462725MKCX	1.90	11.47	162	49.4	22.7	28.0	64.6
LRF624520MKCX	1.36	16.81	173	66.0	41.0	24.0	31.5

◆DIMENSIONS OF CORE

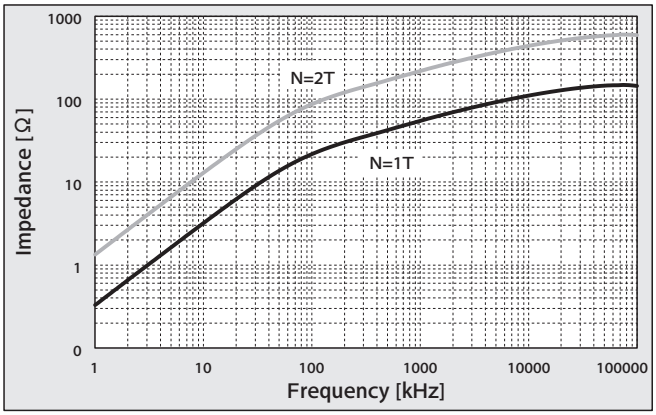


Outer diameter : ϕD
Inner diameter : ϕd
Width : W

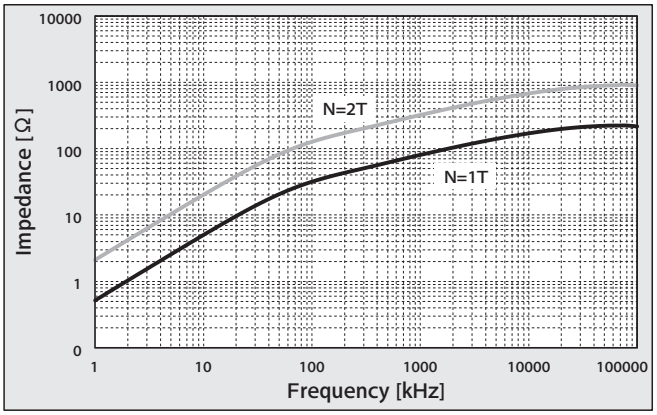
FL-V Series

◆FREQUENCY - IMPEDANCE CHARACTERISTICS

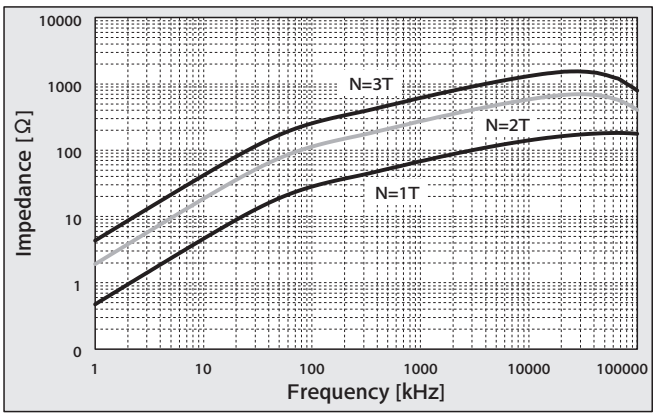
●LRF251510MKCX



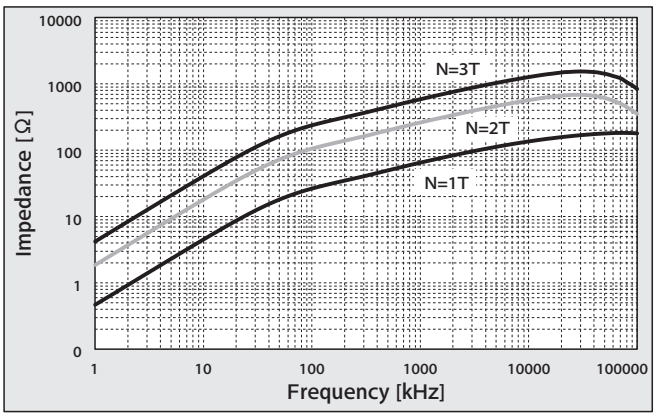
●LRF251515MKCX



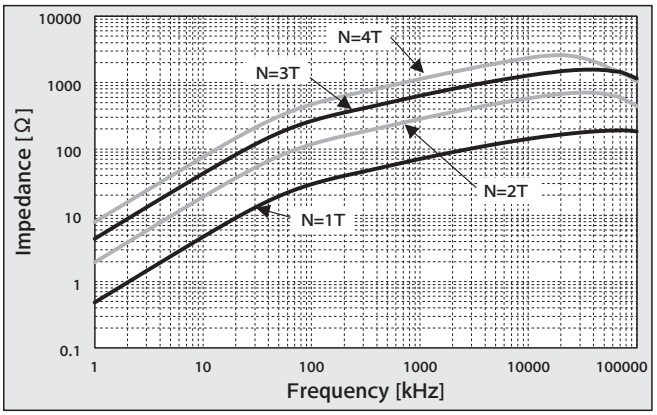
●LRF322015MKCX



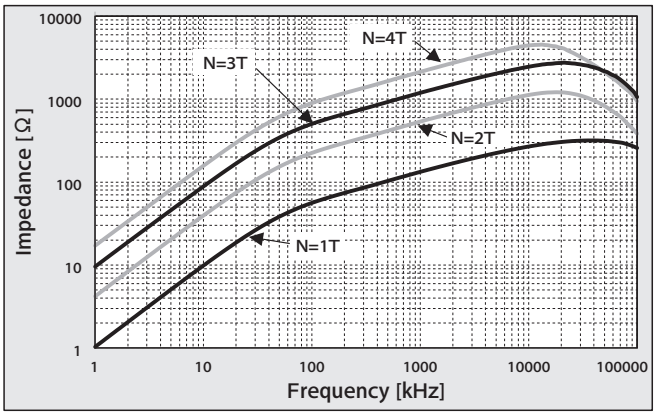
●LRF372315MKCX



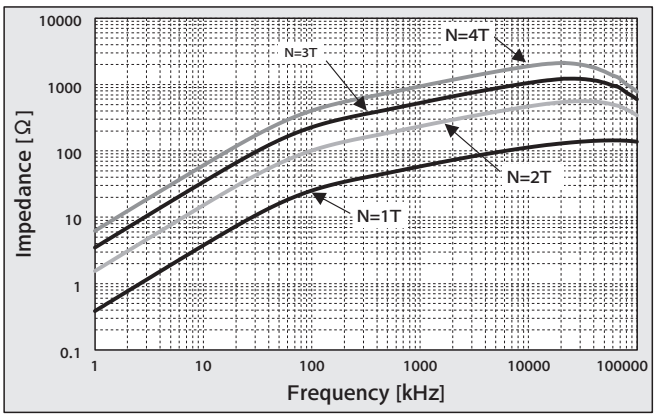
●LRF462715MKCX



●LRF462725MKCX



●LRF624520MKCX



NANOCRYSTALLINE CORES

FL Series

RoHS2 Compliant

The FM series coils are made of nano-crystal.

◆MAJOR USES

- ●Signal power line noise control
- ●DC power line noise control
- ●AC power line noise control
- ●Filter line
- ●Zero-phase reactor

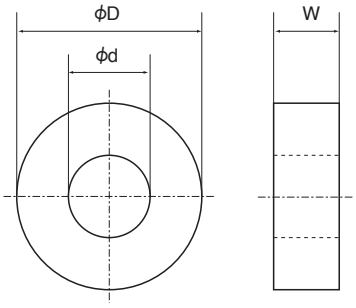
◆FEATURES

- ●The high permeability core is made of nanocrystalline soft magnetic alloy
- ●High impedance in spite of a small number of turns
- ●Excellent temperature characteristics
- ●Conforming to insulating type B and incombustibility UL94V-0

◆CORE STANDARD SPECIFICATIONS

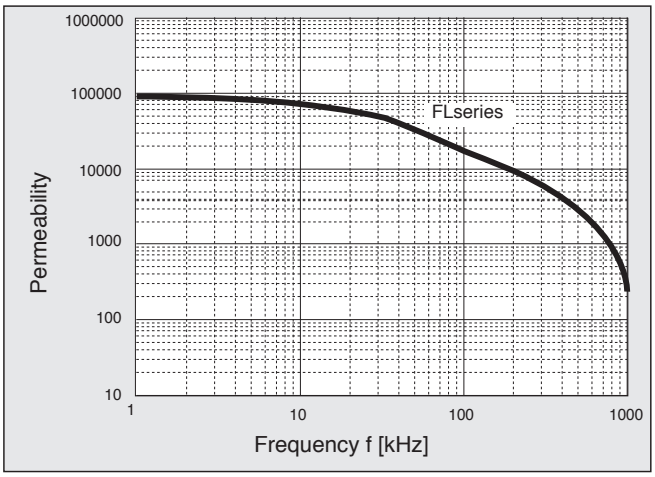
Core Part No. (Old Core Part No.)	Cross Sectional Area cm^2	Magnetic Path Length cm	Weight g	Outside Dimensions			Inductance Coefficient (AL Value) [μH/100kHz at 0A]
				ϕD mm	ϕd mm	W mm	
LRF251515MKX (F251515MKX)	0.63	6.40	35	28.3	12.7	17.5	18.3
LRF322015MKX (F322015MKX)	0.73	8.17	50	35.2	17.5	17.3	16.6
LRF372315MKX (F372315MKX)	0.85	9.42	67	40.5	19.5	18.0	17.2
LRF462715MKX (F462715MKX)	1.15	11.50	110	49.4	22.7	18.0	18.6
LRF462725MKX (F462725MKX)	1.92	11.50	176	49.4	22.7	28.0	31.0
LRF603525MKX (F603525MKX)	2.53	14.90	310	66.7	29.3	29.2	31.6
LRF624520MKX (F624520MKX)	1.36	16.80	200	66.0	41.0	24.0	15.2

◆DIMENSIONS OF CORE



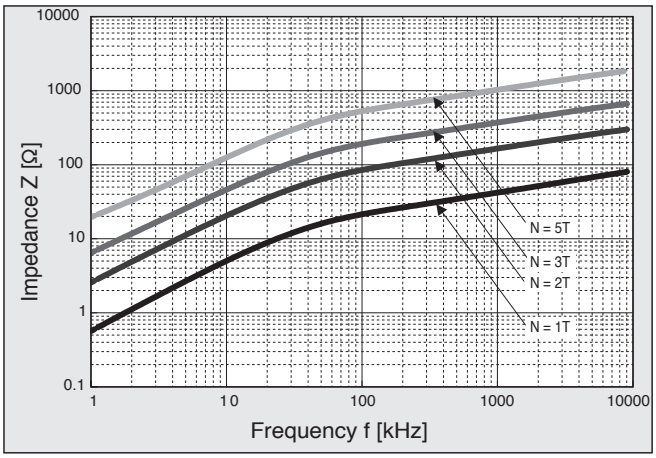
Outer diameter : ϕD
Inner diameter : ϕd
Width : W

◆FREQUENCY - PERMEABILITY CHARACTERISTICS



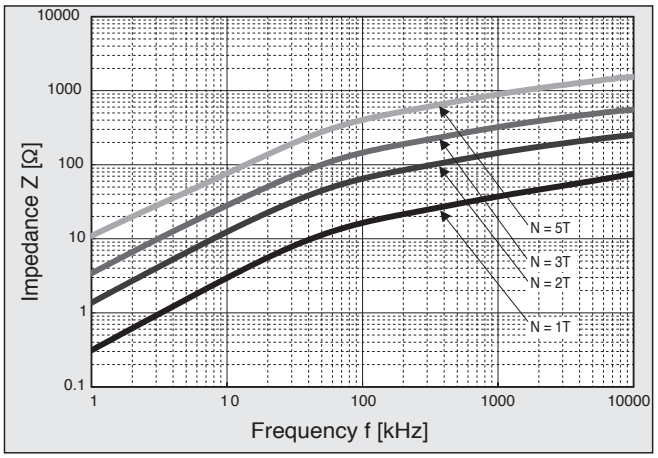
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (1)

●LRF251515MKX



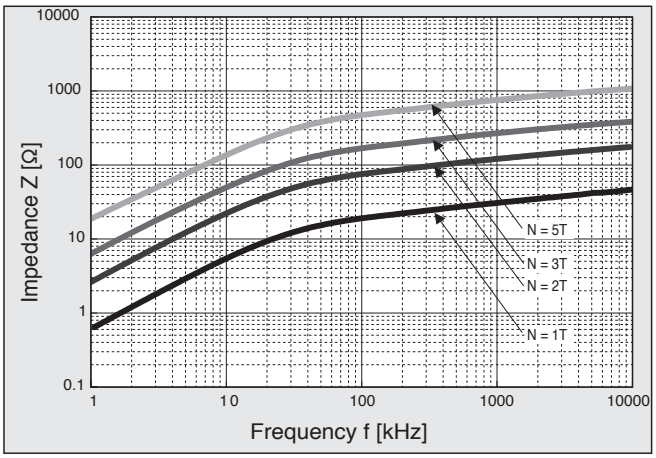
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (2)

●LRF322015MKX



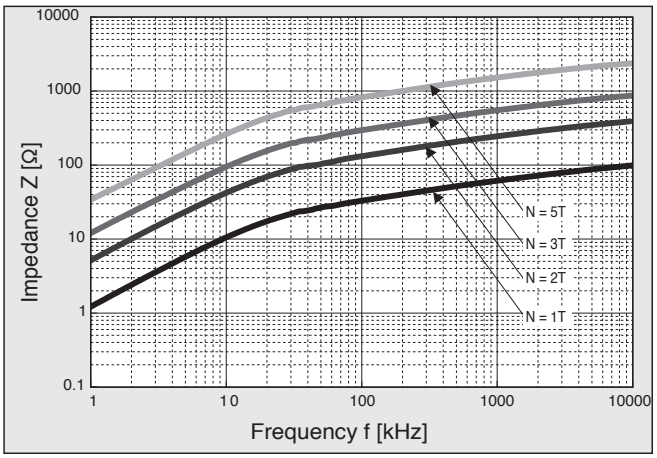
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (3)

●LRF372315MKX



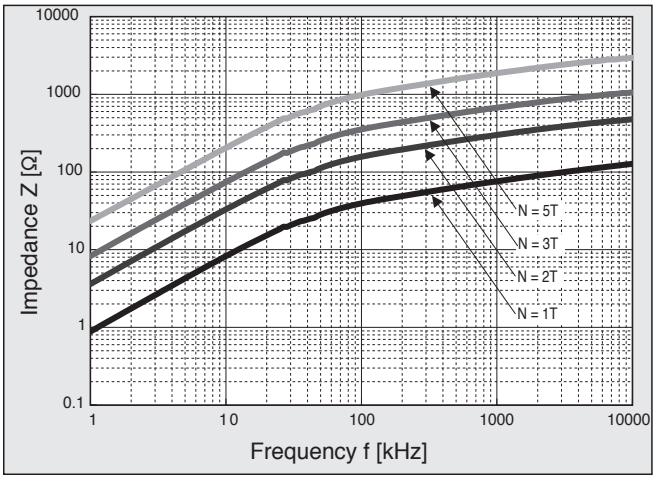
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (4)

●LRF462725MKX



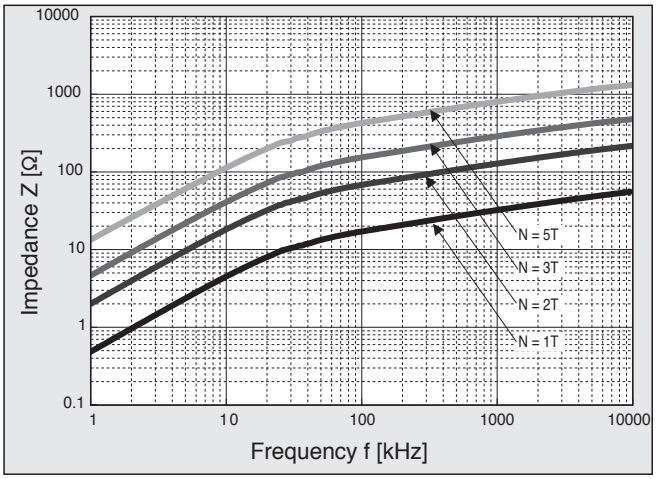
◆FREQUENCY - IMPEDANCE CHARACTERISTICS (5)

●LRF603525MKX



◆FREQUENCY - IMPEDANCE CHARACTERISTICS (6)

●LRF624520MKX



FL Series

◆MAJOR USES
- ●Zero-phase reactor
- ●Filter line
- ●AC/DC power line noise control

◆FEATURES
- ●Holes have been created to be used to attach the chassis to the housing case.
- ●High impedance in spite of a small number of turns
- ●Excellent temperature characteristics
- ●Conforming to insulating type B and incombustibility UL94-0

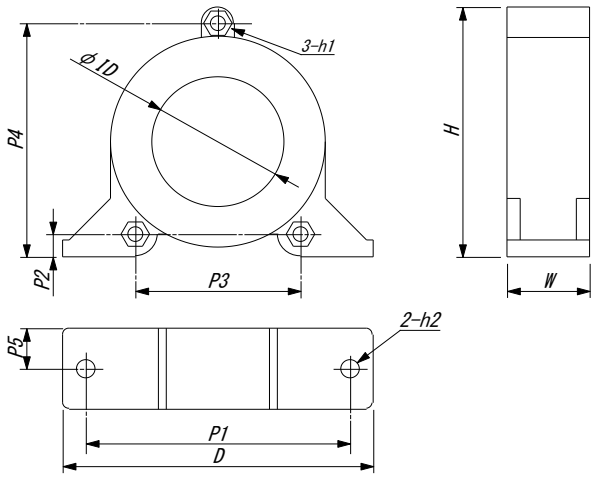
◆CORE STANDARD SPECIFICATIONS

Core Part No.	Cross Sectional Area [cm^2]	Magnetic Path Length [cm]	AL [$\mu H/N^2$]	
			10kHz	100kHz
LRF604520MBX	1.2typ.	16.4typ.	77.0typ.	13.0typ.
LRF1108020MBX	2.2typ.	30.0typ.	85.0typ.	15.0typ.

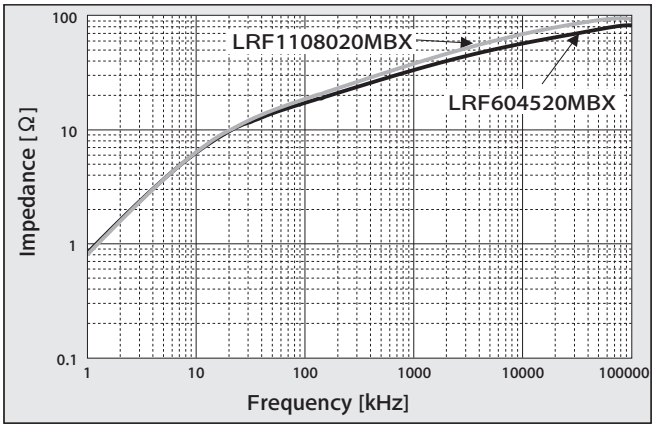
Core Part No.	Outside Dimensions [mm]								
	D	ϕID	H	W	P1	P2	P3	P4	P5
LRF604520MBX	95max.	39.5min.	78max.	26max.	80±0.5	7±0.5	50±0.5	72±0.5	12.5±0.3
LRF1108020MBX	181max.	74min.	131max.	26max.	150±0.5	20±0.5	100±0.5	124±0.5	12.5±0.3

Core Part No.	Applicable screws	
	h1	h2
LRF604520MBX	M4	M5
LRF1108020MBX	M5	M6

◆DIMENSIONS OF CORE



◆FREQUENCY - IMPEDANCE CHARACTERISTICS
(number of turns 1T)



AMORPHOUS CHOKE COILS

SM Series

RoHS2 Compliant

◆MAJOR USES

- Normal mode choke coils for noise/ripple control
- Choke coils for DC-DC converters
- Output choke coils for Switching Mode Power Supply

◆FEATURES

- Feedthrough core with a single-turn lead wire for remarkably small D.C. resistance (0.36 mΩ*)
- Supports high D.C. rated current (50 Ap*)
- Use of a Fe-base amorphous core for excellent operation stability at high temperatures
- Automotive grade models available
- Significantly improved safety and reliability because layer short circuits will not occur and because the leakage magnetic flux is extremely small

◆GENERAL SPECIFICATION

Items	SM Series
Operating temperature range*1	-40 to 130°C
Storage temperature range	-40 to 130°C
Operating humidity range	20 to 95%RH
Storage humidity range	20 to 80%RH
Operating frequency range*2	20kHz to 500kHz
Insulating Type (Housing case)	Type F (155°C)
Incombustibility (Housing case)	UL94V-0

*1 Temperature on the coil surface including the temperature rise in installation. Never use the coil at a temperature exceeding the rated temperature range.

*2 Recommended range. When infra-acoustic frequency component is impressed, a beat sound sometimes occurs.

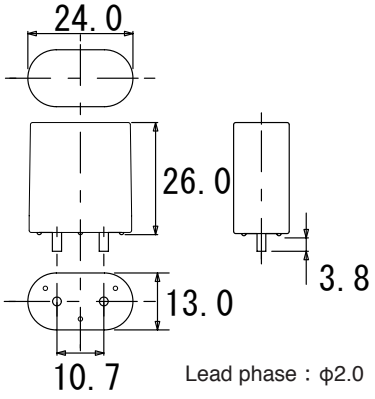
◆COIL STANDARD SPECIFICATIONS

Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance (20kHz)		D.C.R. mΩ (max)	Mounting Direction	Outside Dimensions		
		0[A] μH	Rating μH			ℓ mm	w mm	h mm
LESM0103R5P1FV0E (SM103R5P1FPBF)	10	3.7	3.5	0.40	Vertical	24.0	13.0	26.0
LESM0301R5P2DV0E (SM301R5P2DPBF)	30	2.3	1.3	0.36	Vertical	20.0	11.3	21.0
LESM030020P7DV0E (SM30020P7DPBF)	30	2.2	1.9	0.40	Vertical	24.0	13.0	21.0
LESM0400R9P5DV0E (SM400R9P5DPBF)	40	1.5	0.9	0.36	Vertical	20.0	11.3	21.0
LESM050010P1BV0E (SM50010P1BPBF)	50	2.4	1.2	0.40	Vertical	24.0	13.0	26.0

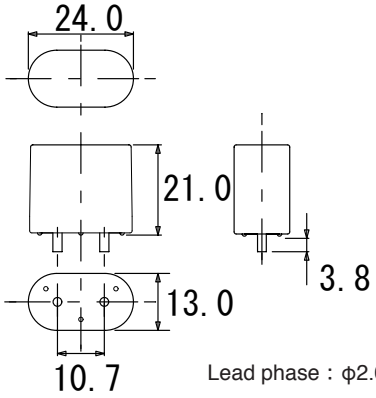
* The inductance at current 0[A] indicates the reference value.
* When using the product for automobiles, check with our representative about the usage conditions and other details before using the product. Note that the rated current refers to the current that flows under the rated inductance condition. Be sure to use the product below the maximum operating temperature.

◆STANDARD DIMENSION DIAGRAM (mm)

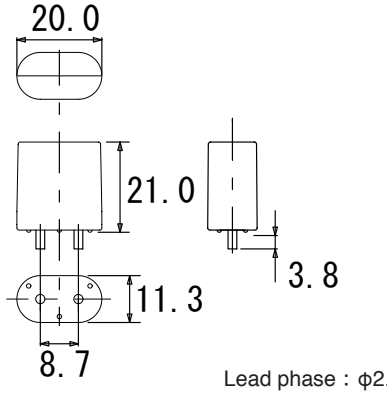
SIP type：LESM0103R5P1FV0E
LESM050010P1BV0E



SIP type：LESM030020P7DV0E

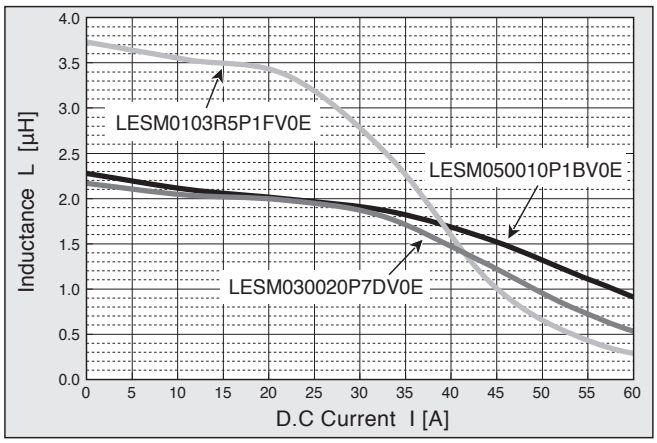


SIP type：LESM0301R5P2DV0E
LESM0400R9P5DV0E

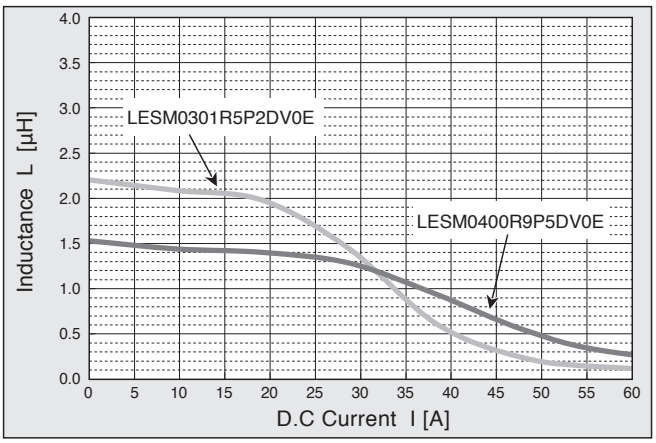


SM Series

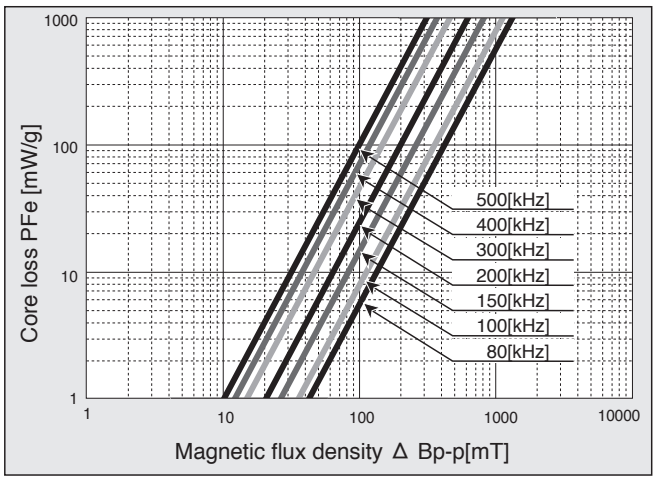
◆D.C. BIAS CHARACTERISTICS (1)



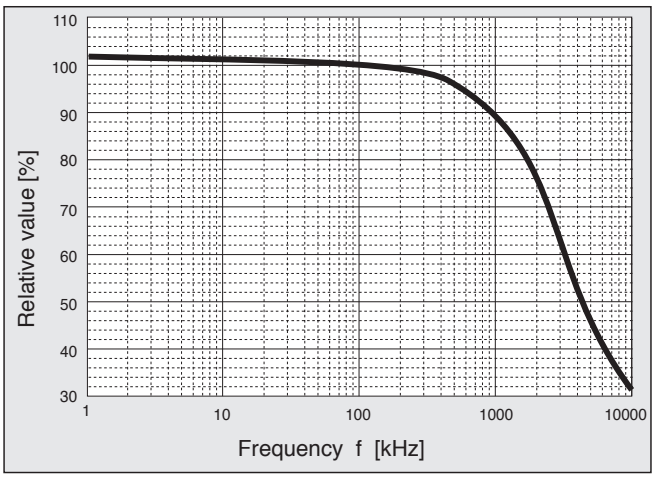
◆D.C. BIAS CHARACTERISTICS (2)



◆CORE LOSS CHARACTERISTICS



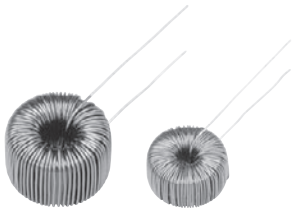
◆FREQUENCY - INDUCTANCE CHARACTERISTICS



AMORPHOUS CHOKE COILS

CM Series

RoHS2 Compliant



◆MAJOR USES

- Output choke coils for Switching Mode Power Supply
- For DC-DC converter
- Normal mode choke coils for noise control
- Please contact us when the coils are used in a high-voltage circuit.

◆FEATURES

- Smaller size in comparison with ferrite choke coil by about half in volume
- Lower core loss in comparison with silicon steel sheet by about half
- More excellent DC bias and temperature characteristics in comparison with dust choke
- Unidirectional leakage flux enables parts to be mounted adjacently adjacent mounting parts.

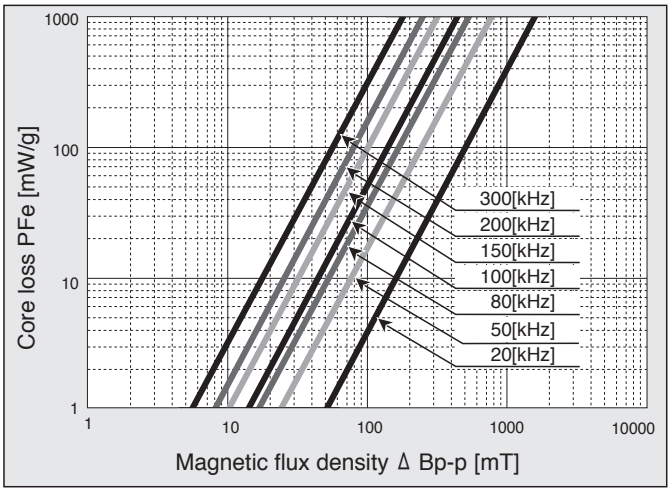
◆CORE STANDARD SPECIFICATIONS

Core Part No. (Old Core Part No.)	Abbreviation	Cross Sectional Area cm²	Magnetic Path Length cm	Outside Dimensions			Inductance Coefficient AL Value		
				Outer Diameter mm	Width mm	Height mm	I_{dc}=0[A] μH	Rated Current* μH	Rated Current Ampere Turn [AT]
LNC181210G (C181210G)	G3	0.264	4.71	20.2	8.8	11.8	0.122	0.116	150
LNC191305G (C191305G)	G4	0.132	5.03	22.0	10.0	8.0	0.050	0.045	200
LNC221310G (C221310G)	G6	0.396	5.50	24.7	10.5	12.0	0.164	0.147	190
LNC251510G (C251510G)	G7	0.440	6.28	28.3	12.7	12.3	0.133	0.120	300
LNC251515G (C251515G)	G8	0.660	6.28	28.3	12.7	17.5	0.185	0.170	330
LNC322010G (C322010G)	G9	0.528	8.17	35.2	17.5	12.3	0.137	0.125	330
LNC372310G (C372310G)	G0	0.616	9.42	40.5	19.5	13.0	0.154	0.140	350
LNC372315G (C372315G)	GJ	0.924	9.42	40.5	19.5	18.0	0.210	0.190	400
LNC462715G (C462715G)	GQ	1.254	11.5	49.4	22.7	18.0	0.235	0.207	450
LNC462725G (C462725G)	GK	2.090	11.5	49.4	22.7	28.0	0.360	0.320	550

*10[kHz], ±25%

◆CORE LOSS CHARACTERISTICS

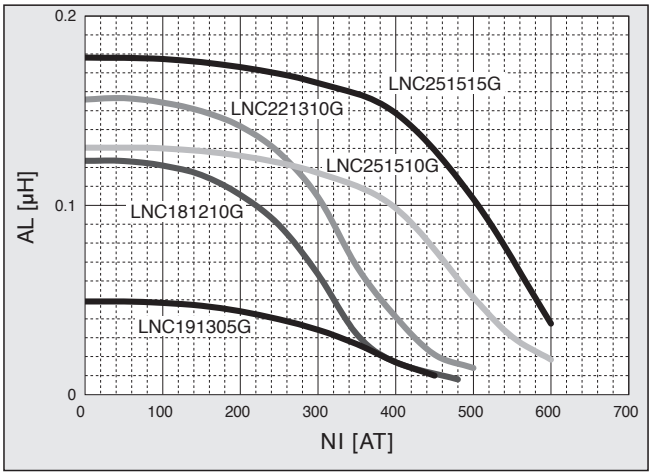
●CM choke



CM Series

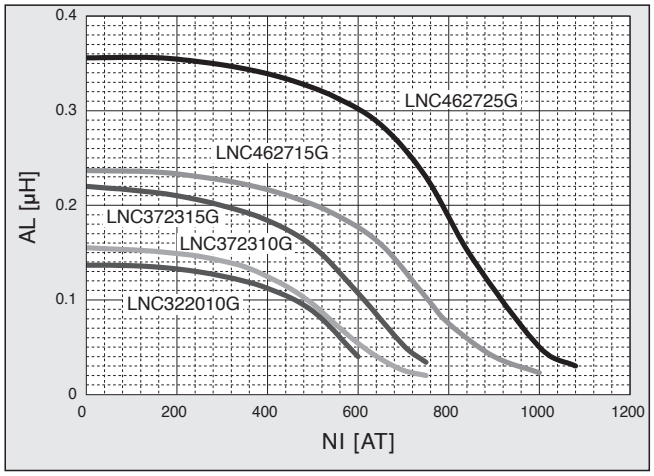
◆D.C. BIAS CHARACTERISTICS AL-AT(1)

●Frequency : 10[kHz]

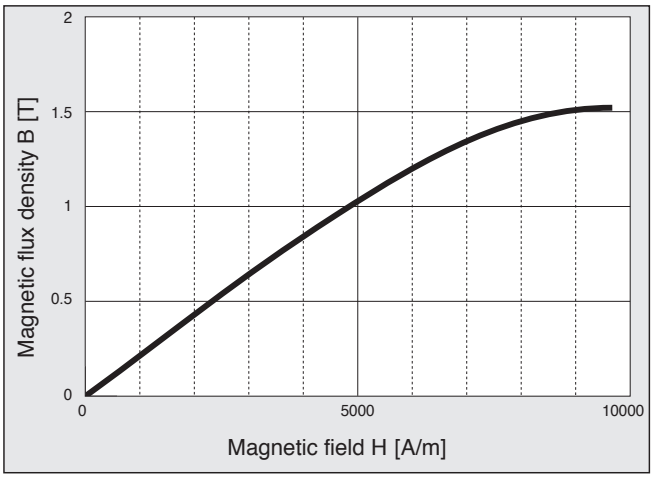


◆D.C. BIAS CHARACTERISTICS AL-AT(2)

●Frequency : 10[kHz]

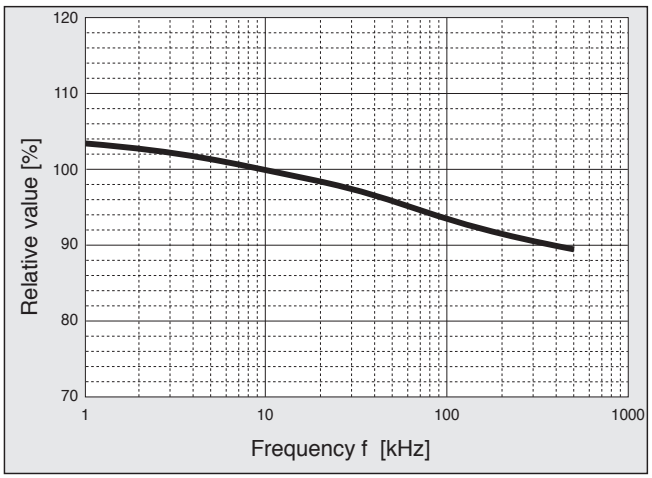


◆MAGNETIC FIELD - MAGNETIC DENSITY



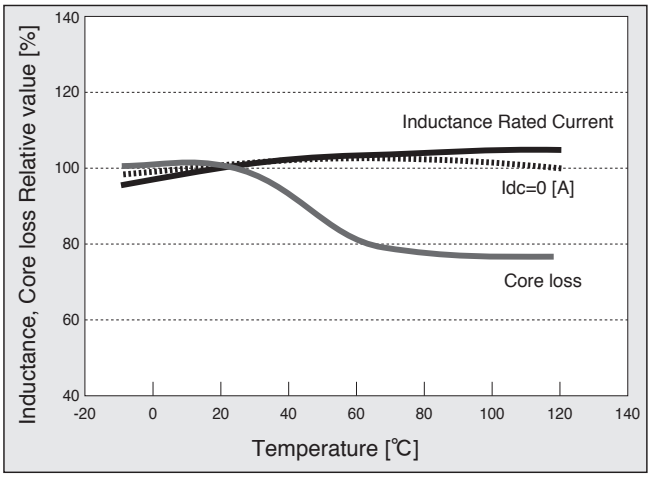
◆FREQUENCY - INDUCTANCE CHARACTERISTICS

●CM Core



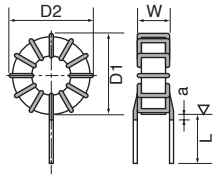
◆TEMPERATURE DEPENDENCE - INDUCTANCE AND CORE LOSS

●Frequency : 100[kHz]



AMORPHOUS CHOKE COILS

CM Series



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length : L=30±3mm
Soldering boundary : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (10kHz)		D.C.R. mΩ (max)	Winding mmφ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
●	LACM002601G3-V0E (CM02601G3PBF)	2	645	600	190	0.6×1P	23.5	24.0	16.0
●	LACM003401G3-V0E (CM03401G3PBF)	3	420	400	92	0.8×1P	24.5	25.0	17.5
●	LACM004201G3-V0E (CM04201G3PBF)	4	209	200	51	0.9×1P	24.5	25.0	16.5
●	LACM006101G3-V0E (CM06101G3PBF)	6	110	100	24	0.8×2P	24.5	25.0	17.5
●	LACM008700G3-V0E (CM08700G3PBF)	8	85	70	17	0.9×2P	25.0	25.5	19.0
●	LACM002401G4-V0E (CM02401G4PBF)	2	425	400	190	0.6×1P	24.5	25.0	12.5
●	LACM003251G4-V0E (CM03251G4PBF)	3	265	250	87	0.8×1P	25.5	26.0	13.5
●	LACM004101G4-V0E (CM04101G4PBF)	4	110	100	43	0.9×1P	25.5	26.0	13.0
●	LACM006500G4-V0E (CM06500G4PBF)	6	55	50	20	0.8×2P	25.5	26.0	14.0
●	LACM008300G4-V0E (CM08300G4PBF)	8	33	30	13	0.9×2P	26.0	26.5	14.0
●	LACM010150G4-V0E (CM10150G4PBF)	10	18	15	8	1.0×2P	26.5	27.0	13.5
◎	LACM001152G6-V0E (CM01152G6PBF)	1	1530	1500	390	0.5×1P	27.0	27.5	15.5
◎	LACM002102G6-V0E (CM02102G6PBF)	2	1050	1000	230	0.6×1P	27.5	28.0	16.0
◎	LACM003601G6-V0E (CM03601G6PBF)	3	690	600	110	0.8×1P	28.0	28.5	18.0
◎	LACM004301G6-V0E (CM04301G6PBF)	4	339	300	59	0.9×1P	28.5	29.0	17.0
◎	LACM005151G6-V0E (CM05151G6PBF)	5	165	150	34	1.0×1P	28.5	29.0	17.5
◎	LACM006151G6-V0E (CM06151G6PBF)	6	171	150	27	0.8×2P	28.0	28.5	17.5
◎	LACM010500G6-V0E (CM10500G6PBF)	10	60	50	11	1.0×2P	28.5	29.0	18.0
◎	LACM010700G6-V0E (CM10700G6PBF)	10	85	70	13	1.0×2P	29.5	30.0	18.5
◎	LACM015150G6-V0E (CM15150G6PBF)	15	17	15	5	1.0×3P	28.5	29.0	17.5
◎	LACM020150G6-V0E (CM20150G6PBF)	20	17	15	4	1.0×4P	29.0	29.5	18.5

*1 Rated inductance tolerance : ±25%, the inductance at current 0[A] indicates the reference value.
There is a horizontal putting type in all items in the above list."V"changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list."V" changes into "D" in last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎ item.
The type with the length putting seat is "V" changes into "B" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

CM Series

◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (10kHz) 0[A] μH	Inductance*1 (10kHz) Rating μH	D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions D1 mm	D2 mm	W mm
◎	LACM004401G7-V0E (CM04401G7PBF)	4	420	400	77	0.9×1P	32.0	32.5	18.0
◎	LACM006201G7-V0E (CM06201G7PBF)	6	207	200	35	0.8×2P	32.0	32.5	18.0
◎	LACM006261G7-V0E (CM06261G7PBF)	6	270	260	41	0.8×2P	32.0	32.5	18.5
◎	LACM008151G7-V0E (CM08151G7PBF)	8	160	150	24	0.9×2P	32.5	33.0	18.5
◎	LACM008191G7-V0E (CM08191G7PBF)	8	215	190	33	0.9×2P	32.5	33.0	19.5
◎	LACM010101G7-V0E (CM10101G7PBF)	10	110	100	16	1.0×2P	32.5	33.0	18.5
◎	LACM010121G7-V0E (CM10121G7PBF)	10	140	120	19	1.0×2P	33.0	33.5	19.5
◎	LACM015300G7-V0E (CM15300G7PBF)	15	35	30	7	1.0×3P	32.5	33.0	19.0
◎	LACM015500G7-V0E (CM15500G7PBF)	15	55	50	9	1.0×3P	33.0	33.5	19.5
◎	LACM020300G7-V0E (CM20300G7PBF)	2	35	30	6	1.0×4P	33.0	33.5	20.0
●	LACM025200G7-V0E (CM25200G7PBF)	25	26	20	4	1.0×5P	33.5	34.0	20.0
	LACM030130G7-V0E (CM30130G7PBF)	30	16	13	3	1.0×6P	34.0	34.5	20.0
◎	LACM002192G8-V0E (CM02192G8PBF)	2	1940	1900	390	0.6×1P	31.0	31.5	22.5
◎	LACM005301G8-V0E (CM05301G8PBF)	5	306	300	58	1.0×1P	33.0	33.5	24.5
◎	LACM010151G8-V0E (CM10151G8PBF)	10	170	150	22	1.0×2P	33.0	33.5	25.5
◎	LACM015700G8-V0E (CM15700G8PBF)	15	75	70	11	1.0×3P	33.5	34.0	26.0
◎	LACM020400G8-V0E (CM20400G8PBF)	20	45	40	7	1.0×4P	33.5	34.0	26.0
●	LACM025250G8-V0E (CM25250G8PBF)	25	27	25	5	1.0×5P	33.5	34.0	26.5
◎	LACM003102G9-V0E (CM03102G9PBF)	3	1070	1000	170	0.8×1P	39.0	39.5	19.0
◎	LACM006301G9-V0E (CM06301G9PBF)	6	335	300	48	0.8×2P	39.5	40.0	19.0
◎	LACM008251G9-V0E (CM08251G9PBF)	8	289	250	37	0.9×2P	39.5	40.0	19.0
◎	LACM010191G9-V0E (CM10191G9PBF)	10	220	190	21	1.1×2P	41.0	41.5	21.0
◎	LACM015850G9-V0E (CM15850G9PBF)	15	100	85	10	1.3×2P	41.0	41.5	21.5
◎	LACM020450G9-V0E (CM20450G9PBF)	20	55	45	7	1.2×3P	41.0	41.5	21.5
●	LACM030200G9-V0E (CM30200G9PBF)	30	23	20	3	1.3×4P	42.0	42.5	22.0

CM Series

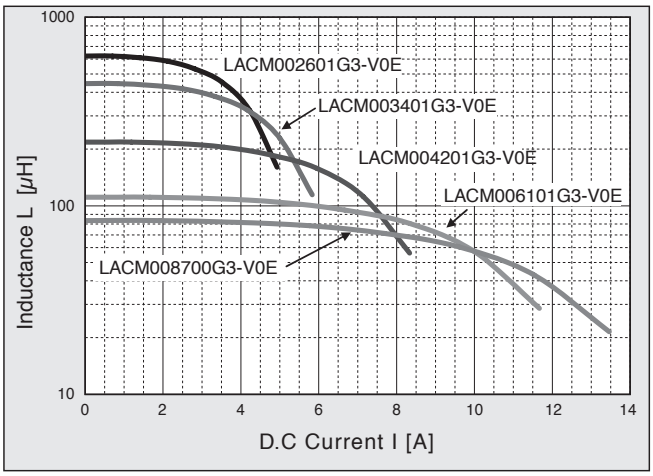
◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (10kHz)		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
◎	LACM006501G0-V0E (CM06501G0PBF)	6	569	500	61	0.8×2P	44.0	44.5	19.5
◎	LACM010201G0-V0E (CM10201G0PBF)	10	255	200	27	1.0×2P	45.0	45.5	20.0
◎	LACM015900G0-V0E (CM15900G0PBF)	15	135	90	13	1.0×3P	45.0	45.5	20.0
◎	LACM020500G0-V0E (CM20500G0PBF)	20	70	50	8	1.0×4P	45.0	45.5	20.5
◎	LACM025300G0-V0E (CM25300G0PBF)	25	38	30	6	1.0×5P	45.0	45.5	20.0
◎	LACM030250G0-V0E (CM30250G0PBF)	30	35	25	5	1.0×6P	45.5	46.0	20.5
◎	LACM035150G0-V0E (CM35150G0PBF)	35	18	15	4	1.0×7P	45.5	46.0	20.5
◎	LACM004102GJ-V0E (CM04102GJPBF)	4	1080	1000	140	0.9×1P	44.0	44.5	23.0
◎	LACM010301GJ-V0E (CM10301GJPBF)	10	380	300	31	1.0×2P	45.0	45.5	25.0
◎	LACM015121GJ-V0E (CM15121GJPBF)	15	137	120	14	1.0×3P	45.5	46.0	25.5
◎	LACM020700GJ-V0E (CM20700GJPBF)	20	83	70	12	1.0×4P	45.5	46.0	25.5
◎	LACM025500GJ-V0E (CM25500GJPBF)	25	60	50	7	1.0×5P	46.0	46.5	26.0
◎	LACM030300GJ-V0E (CM30300GJPBF)	30	38	30	4	1.0×6P	45.5	46.0	26.0
◎	LACM040150GJ-V0E (CM40150GJPBF)	40	18	15	3	1.3×5P	46.0	46.5	26.5
◎	LACM015201GQ-V0E (CM15201GQPBF)	15	255	200	20	1.0×3P	54.0	54.5	26.0
◎	LACM020101GQ-V0E (CM20101GQPBF)	20	125	100	12	1.0×4P	54.5	55.0	25.5
◎	LACM035300GQ-V0E (CM35300GQPBF)	35	35	30	5	1.0×7P	55.0	55.5	26.0
◎	LACM040200GQ-V0E (CM40200GQPBF)	40	24	20	3	1.3×5P	55.5	56.0	26.0
◎	LACM010501GK-V0E (CM10501GKPBF)	10	530	500	44	1.0×2P	54.5	55.0	34.5
◎	LACM015301GK-V0E (CM15301GKPBF)	15	350	300	24	1.0×3P	55.0	55.5	36.0
◎	LACM015451GK-V0E (CM15451GKPBF)	15	516	450	30	1.0×3P	55.5	56.0	36.5
◎	LACM020201GK-V0E (CM20201GKPBF)	20	250	200	15	1.0×4P	55.0	55.5	36.0
◎	LACM025101GK-V0E (CM25101GKPBF)	25	115	100	9	1.0×5P	55.5	56.0	35.5
◎	LACM030101GK-V0E (CM30101GKPBF)	30	115	100	8	1.0×6P	55.5	56.0	36.5
◎	LACM035500GK-V0E (CM35500GKPBF)	35	60	50	6	1.0×7P	56.0	56.5	36.5

CM Series

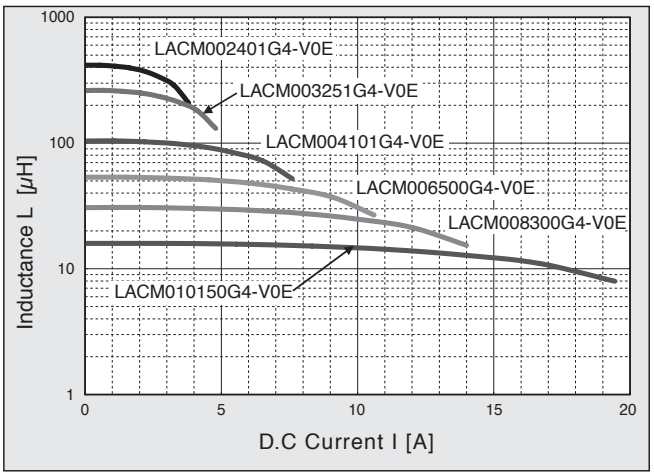
◆D.C. BIAS CHARACTERISTICS (1)

●Core : LNC181210G, Frequency : 10[kHz]



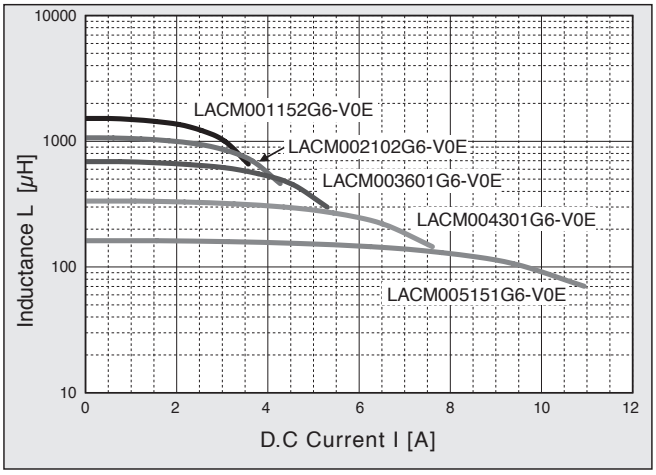
◆D.C. BIAS CHARACTERISTICS (2)

●Core : LNC191305G, Frequency : 10[kHz]



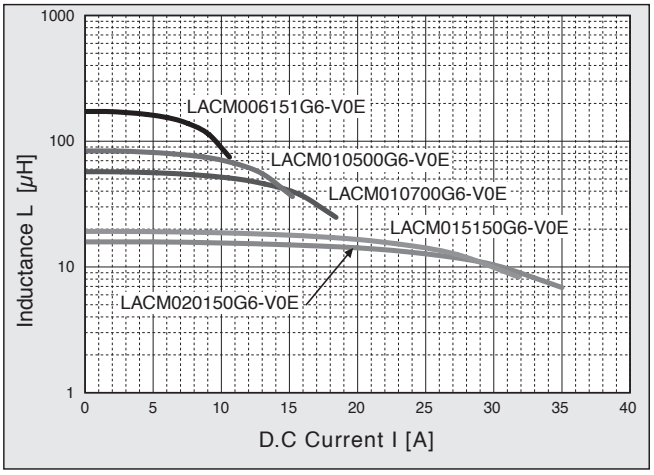
◆D.C. BIAS CHARACTERISTICS (3)

●Core : LNC221310G, Frequency : 10[kHz]



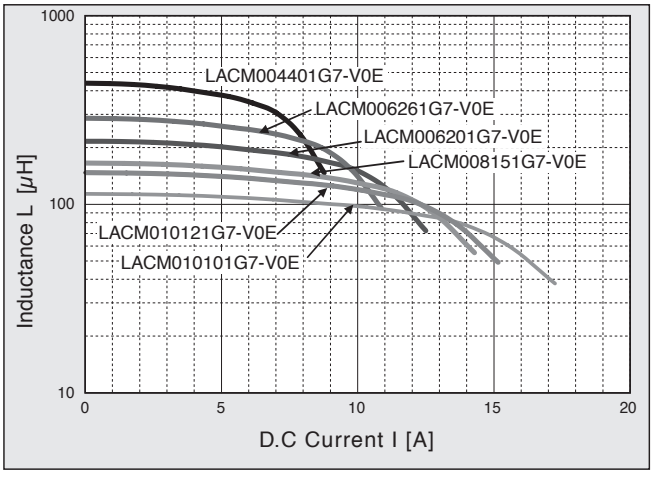
◆D.C. BIAS CHARACTERISTICS (4)

●Core : LNC221310G, Frequency : 10[kHz]



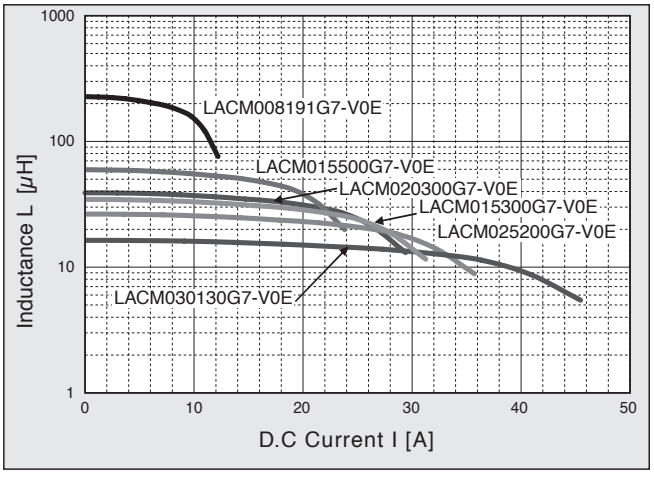
◆D.C. BIAS CHARACTERISTICS (5)

●Core : LNC251510G, Frequency : 10[kHz]



◆D.C. BIAS CHARACTERISTICS (6)

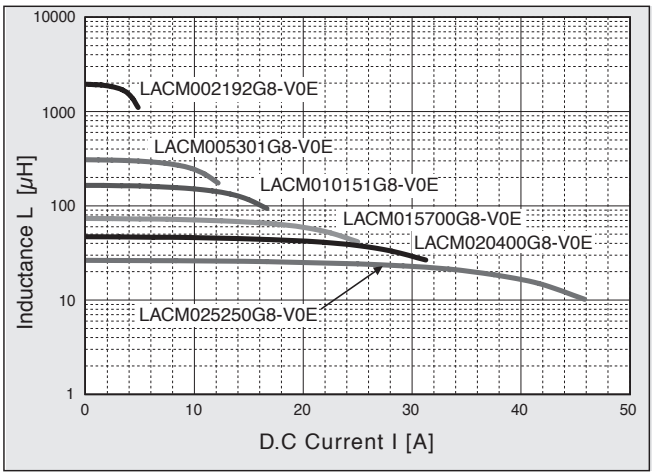
●Core : LNC251510G, Frequency : 10[kHz]



CM Series

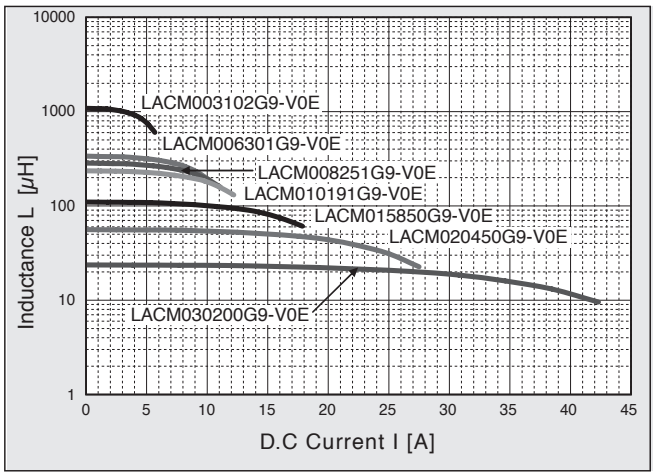
◆D.C. BIAS CHARACTERISTICS (7)

●Core : LNC251515G, Frequency : 10[kHz]



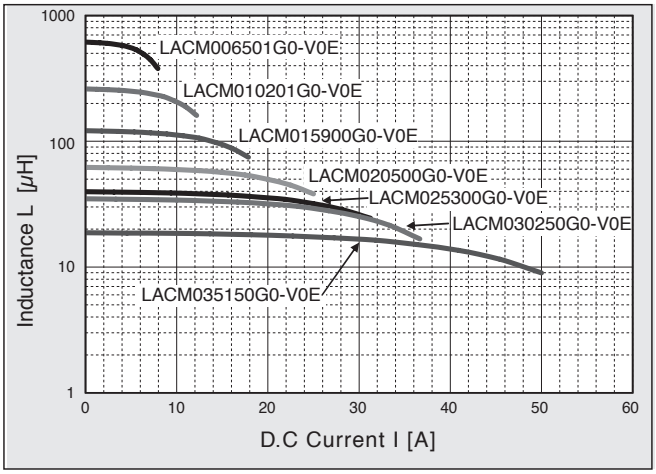
◆D.C. BIAS CHARACTERISTICS (8)

●Core : LNC322010G, Frequency : 10[kHz]



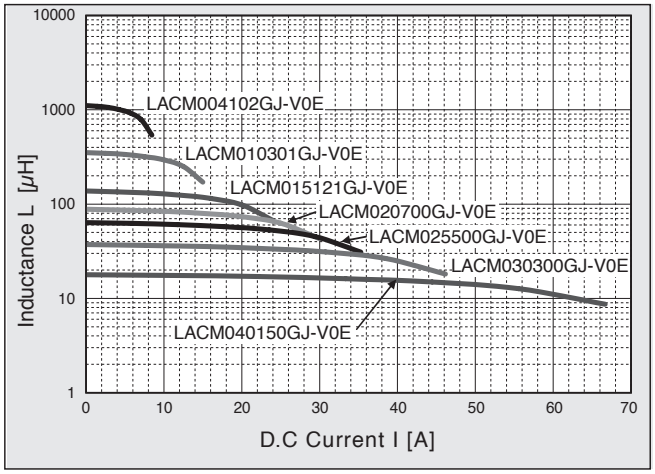
◆D.C. BIAS CHARACTERISTICS (9)

●Core : LNC372310G, Frequency : 10[kHz]



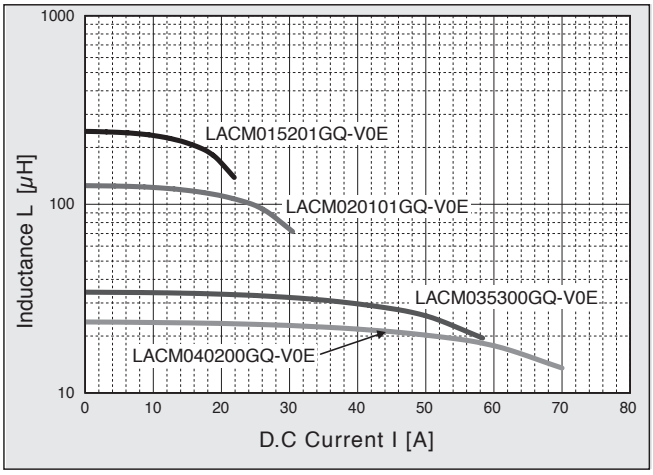
◆D.C. BIAS CHARACTERISTICS (10)

●Core : LNC372315G, Frequency : 10[kHz]



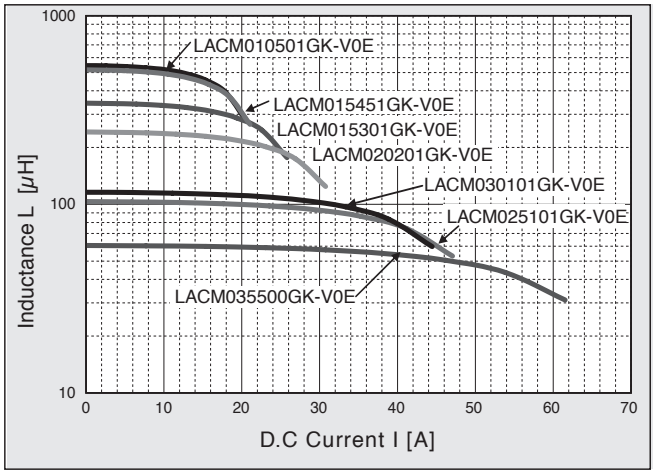
◆D.C. BIAS CHARACTERISTICS (11)

●Core : LNC462715G, Frequency : 10[kHz]



◆D.C. BIAS CHARACTERISTICS (12)

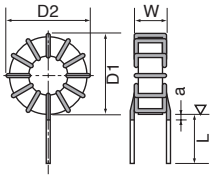
●Core : LNC462725G, Frequency : 10[kHz]



AMORPHOUS CHOKE COILS

CMJ Series

RoHS2 Compliant



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=30±3mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆MAJOR USES

- ●Output choke coils for Switching Mode Power Supply
- ●Choke coils for DC-DC converter
- ●Normal mode choke coils for noise control

◆FEATURES

- ●Miniaturization in comparison with CM series coils by about 30 percent
- ●Lineup about the standard from 3 to 30A
- ●Little inductance fall when overload

◆COIL STANDARD SPECIFICATIONS

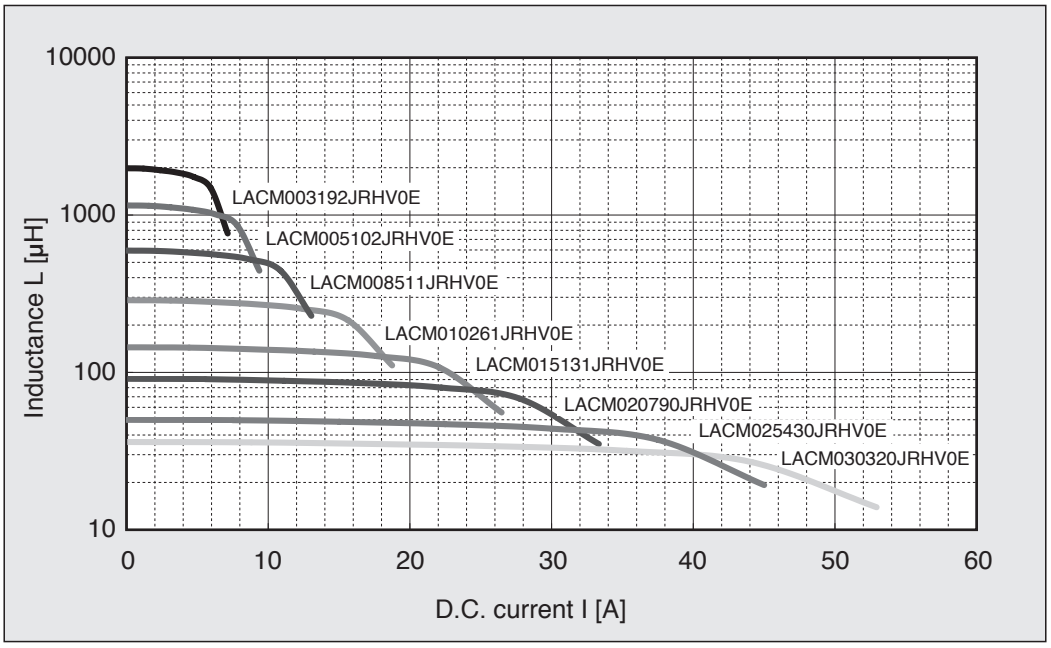
	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (10kHz)		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
◎	LACM003192JRHV0E (CM03192JRPBF)	3	2000	1900	290	0.9ϕ×1P	41.5	41.5	27.0
◎	LACM005102JRHV0E (CM05102JRPBF)	5	1200	1000	150	1.1ϕ×1P	42.0	42.0	28.0
◎	LACM008511JRHV0E (CM08511JRPBF)	8	600	510	77	1.3ϕ×1P	42.0	42.0	29.5
◎	LACM010261JRHV0E (CM10261JRPBF)	10	290	260	38	1.1ϕ×2P	42.0	42.0	28.0
◎	LACM015131JRHV0E (CM15131JRPBF)	15	150	130	20	1.3ϕ×2P	42.0	42.0	29.5
◎	LACM020790JRHV0E (CM20790JRPBF)	20	92	79	13	1.2ϕ×3P	42.5	42.5	28.5
●	LACM025430JRHV0E (CM25430JRPBF)	25	50	43	7	1.2ϕ×4P	42.5	42.5	28.5
●	LACM030320JRHV0E (CM30320JRPBF)	30	36	32	6	1.3ϕ×4P	42.5	42.5	29.5

*1 Rated inductance tolerance : ±25%, the inductance at current 0[A] indicates the reference value.
There is a horizontal putting type in all items in the above list."V"changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list."V" changes into "D" in last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎ item.
The type with the length putting seat is "V" changes into "B" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

CMJ Series

◆D.C. BIAS CHARACTERISTICS

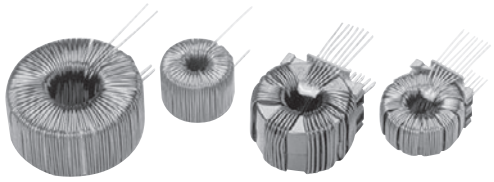
●Core : LNC322015J2, Frequency : 10 [kHz]



AMORPHOUS CHOKE COILS

AM Series

RoHS2 Compliant



◆MAJOR USES
- Choke coils for Power Factor Corrective circuit
- Normal mode choke coils for noise control

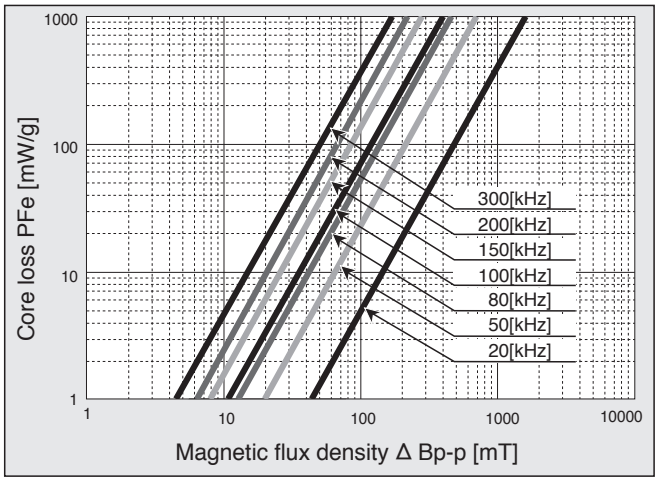
◆FEATURES
- Excellent D.C. bias characteristics
- Reduction of core loss in comparison with the conventional CM-series coils, providing low temperature rises for uses at power of 100V or larger
- Excellent temperature stability

◆CORE STANDARD SPECIFICATIONS

Core Part No. (Old Core Part No.)	Abbreviation	Cross Sectional Area cm^2	Magnetic Path Length cm	Outside Dimensions			Inductance Coefficient AL Value		
				Outer Diameter mm	Width mm	Height mm	I_{dc}=0[A] μH	Rated Current* μH	Rated Current Ampere Turn [AT]
LNC251510J3 (C251510J3)	J7H	0.430	6.28	28.3	12.7	12.3	0.100	0.075	430
LNC251515J2 (C251515J2)	J8H	0.645	6.28	28.3	12.7	17.5	0.140	0.113	460
LNC322015J2 (C322015J2)	JRH	0.774	8.17	35.2	17.5	17.3	0.122	0.102	600
LNC322020J2 (C322020J2)	JAH	1.032	8.17	35.5	17.0	23.8	0.156	0.125	660
LNC372320J2 (C372320J2)	JBH	1.204	9.42	40.5	19.5	23.0	0.173	0.140	700
LNC462720J2 (C462720J2)	JCH	1.634	11.50	49.4	22.7	23.0	0.191	0.156	840
LNC462725J2 (C462725J2)	JKH	2.043	11.50	49.4	22.7	28.0	0.230	0.183	900
LNC603525J2 (C603525J2)	JLH	2.688	14.90	66.7	29.3	29.2	0.230	0.166	1300

*100[kHz], ±25%

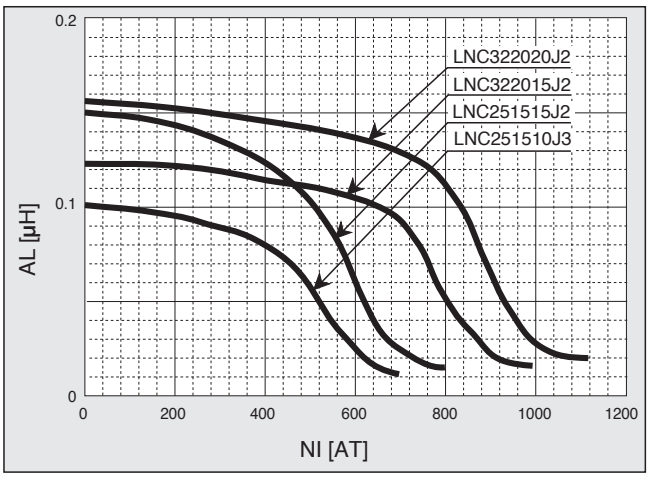
◆CORE LOSS CHARACTERISTICS
●AM choke



AM Series

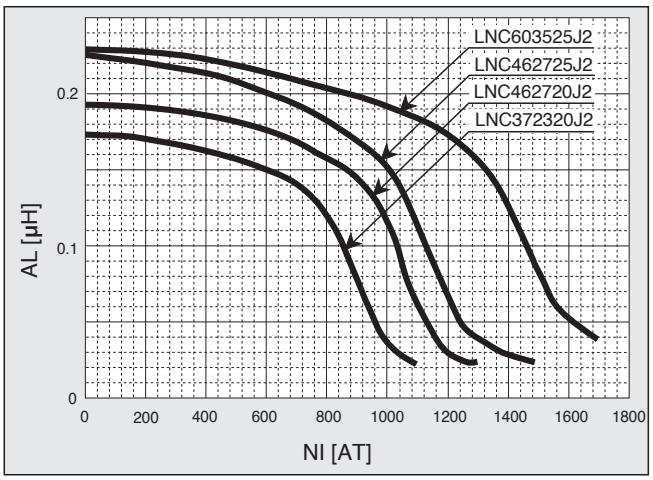
◆D.C. BIAS CHARACTERISTICS AL-AT(1)

●Frequency : 100[kHz]



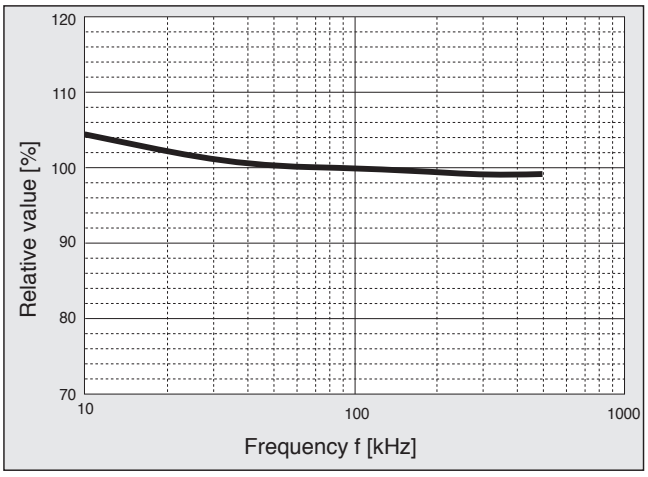
◆D.C. BIAS CHARACTERISTICS AL-AT(2)

●Frequency : 100[kHz]



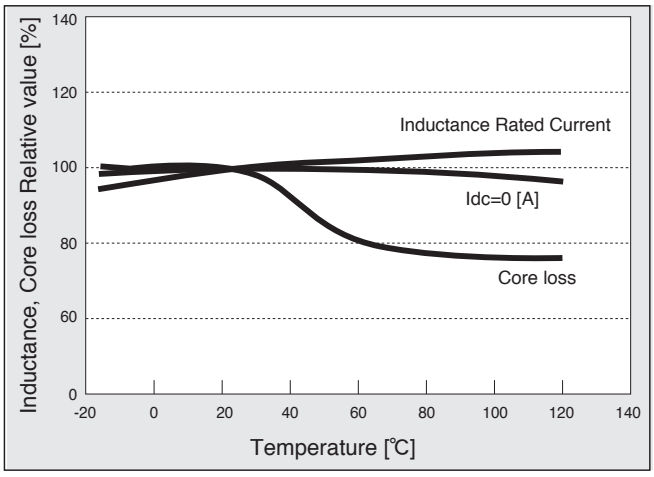
◆FREQUENCY - INDUCTANCE CHARACTERISTICS

●AM choke



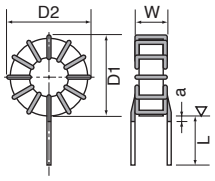
◆TEMPERATURE DEPENDENCE - INDUCTANCE AND CORE LOSS

●Frequency : 100[kHz]



AMORPHOUS CHOKE COILS

AM Series



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=30±3mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆COIL STANDARD SPECIFICATIONS

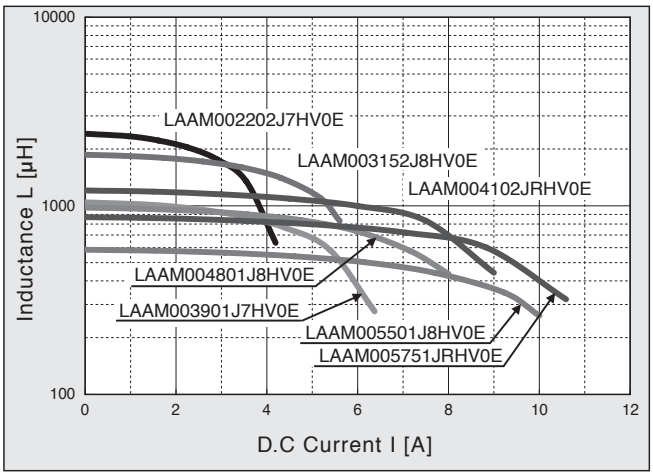
	Coil Part No. (Old Coil Part No.)	Rated Current Arms	Peak Current A	Inductance *1 (100kHz) *2		D.C.R. mΩ (max)	Winding mmϕXlines	Outside Dimensions		
				0[A] μH	Rating μH			D1 mm	D2 mm	W mm
◎	LAAM002202J7HV0E (AM02202J7HPBF)	2	2.8	2400 *2	2000 *2	350	0.7X1P	33.0	34.5	19.0
◎	LAAM003901J7HV0E (AM03901J7HPBF)	3	4.2	1100	900	170	0.9X1P	33.0	34.5	19.5
◎	LAAM003152J8HV0E (AM03152J8HPBF)	3	4.2	2000	1500	230	0.85X1P	35.5	35.5	26.0
◎	LAAM004801J8HV0E (AM04801J8HPBF)	4	5.7	1100	800	150	0.9X1P	34.0	34.0	25.5
◎	LAAM005501J8HV0E (AM05501J8HPBF)	5	7.1	600	500	80	1.1X1P	34.5	34.5	28.0
◎	LAAM004102JRHV0E (AM04102JRHPBF)	4	5.7	1200	1000	160	1.0X1P	40.5	42.0	26.5
◎	LAAM005751JRHV0E (AM05751JRHPBF)	5	7.1	890	750	110	1.1X1P	40.5	42.0	27.0
◎	LAAM005901JAHV0E (AM05901JAHPBF)	5	7.1	1000	900	115	1.1X1P	40.5	42.0	32.0
◎	LAAM006651JAHV0E (AM06651JAHPBF)	6	8.5	740	650	87	1.2X1P	41.0	42.5	32.5
◎	LAAM005122JBHV0E (AM05122JBHPBF)	5	7.1	1500	1200	140	1.1X1P	45.5	47.0	31.5
◎	LAAM006801JBHV0E (AM06801JBHPBF)	6	8.5	970	800	94	1.2X1P	45.0	46.5	30.5
◎	LAAM008501JBHV0E (AM08501JBHPBF)	8	11.3	600	500	53	1.0X2P	46.5	48.0	32.0
◎	LAAM008801JCHV0E (AM08801JCHPBF)	8	11.3	1000	800	73	1.0X2P	56.0	57.5	33.5
◎	LAAM010501JCHV0E (AM10501JCHPBF)	10	14.1	600	500	45	1.1X2P	54.5	56.0	32.5
◎	LAAM012351JCHV0E (AM12351JCHPBF)	12	17.0	420	350	33	1.2X2P	55.0	56.5	32.0
◎	LAAM010651JKHV0E (AM10651JKHPBF)	10	14.1	840	650	53	1.1X2P	56.0	57.5	38.0
◎	LAAM012451JKHV0E (AM12451JKHPBF)	12	17.0	590	450	41	1.2X2P	55.5	57.0	38.0
◎	LAAM015301JKHV0E (AM15301JKHPBF)	15	21.2	380	300	26	1.1X3P	55.5	57.0	38.0
	LAAM012701JLHV0E (AM12701JLHPBF)	12	17.0	860	700	53	1.2X2P	72.5	74.0	39.0
	LAAM015451JLHV0E (AM15451JLHPBF)	15	21.2	550	450	35	1.1X3P	72.0	73.5	40.0
	LAAM020251JLHV0E (AM20251JLHPBF)	20	28.3	310	250	20	1.1X4P	72.5	74.0	39.0

*1 Rated inductance tolerance : ±25%, the inductance at current 0[A] indicates the reference value.
*2 LAAM002202J7HV0E : 10kHz.
There is a horizontal putting type in all items in the above list."V"changes into "H" in last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎item.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

AM Series

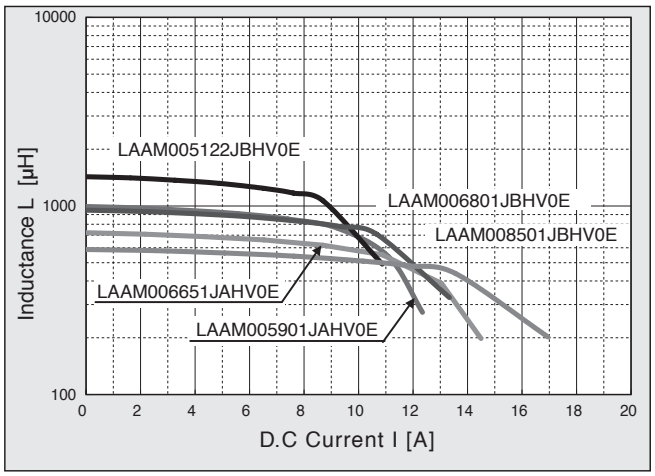
◆D.C. BIAS CHARACTERISTICS (1)

●Core : LNC251510J3, LNC251515J2, LNC322015J2,
Frequency : 100[kHz]



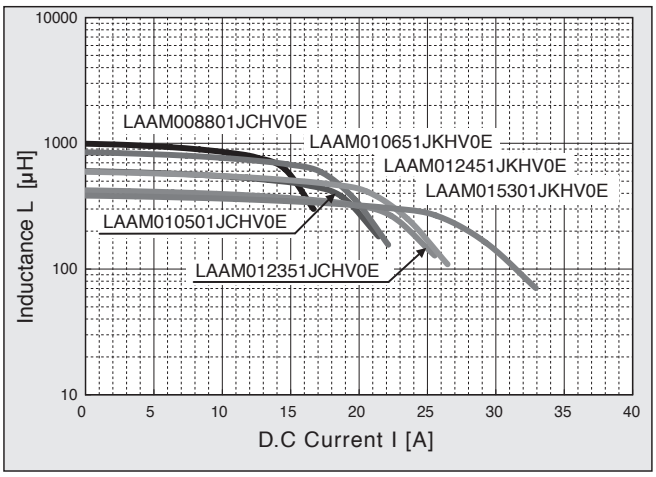
◆D.C. BIAS CHARACTERISTICS (2)

●Core : LNC322020J2, LNC372320J2, Frequency : 100[kHz]



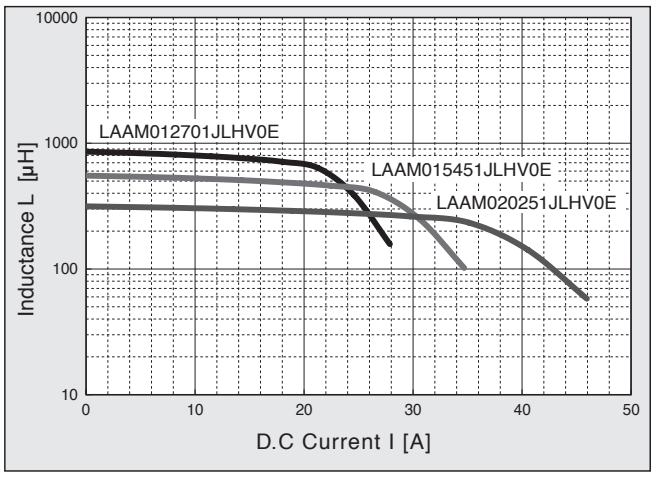
◆D.C. BIAS CHARACTERISTICS (3)

●Core : LNC462720J2, Frequency : 100[kHz]



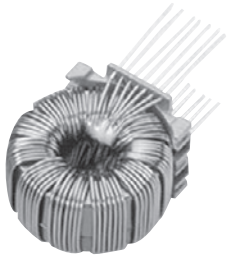
◆D.C. BIAS CHARACTERISTICS (4)

●Core : LNC603525J2, Frequency : 100[kHz]



AW Series

RoHS2 Compliant



◆MAJOR USES

- Choke coils for Power Factor Corrective circuit
- Output choke coils for inverter smoothing

◆FEATURES

- Miniaturization in comparison with AM series coils by about 30 percent
- Excellent D.C.bias characteristics

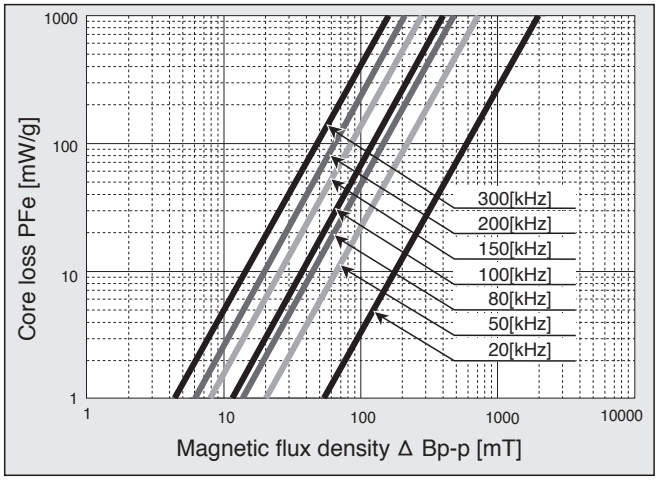
◆CORE STANDARD SPECIFICATIONS

Core Part No. (Old Core Part No.)	Abbreviation	Cross Sectional Area cm^2	Magnetic Path Length cm	Outside Dimensions			Inductance Coefficient AL Value		
				Outer Diameter mm	Width mm	Height mm	I_{dc}=0[A] μH	Rated Current* μH	Rated Current Ampere Turn [AT]
LNW462715J2 (W462715J2)	WQ	1.254	11.5	49.4	22.7	18.0	0.076	0.061	1760
LNW462720J2 (W462720J2)	WC	1.634	11.5	49.4	22.7	23.0	0.094	0.080	1800
LNW462725J2 (W462725J2)	WK	2.043	11.5	49.4	22.7	28.0	0.133	0.106	1900
LNW603525J2 (W603525J2)	WL	2.688	14.9	66.7	29.3	29.2	0.135	0.109	2500

*100[kHz], ±25%

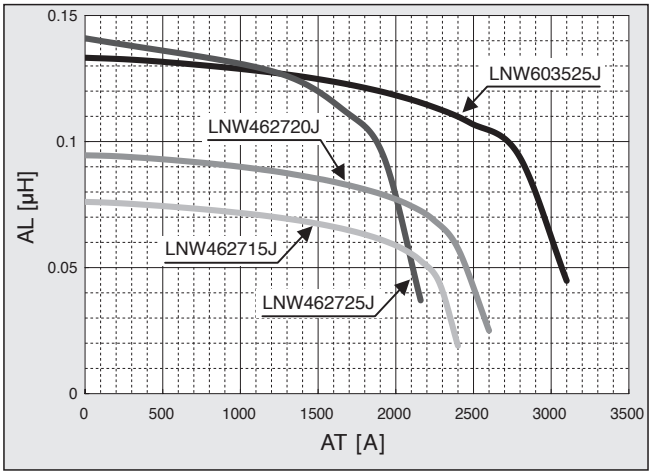
◆CORE LOSS CHARACTERISTICS (Magnetic Flux Density Dependency)

●AW choke

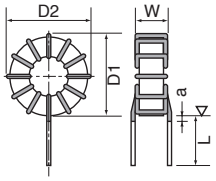


◆D.C. BIAS CHARACTERISTICS AL-AT

●AW core, Frequency : 100[kHz]



AW Series



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length* : L=30±3mm
Soldering boundary* : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

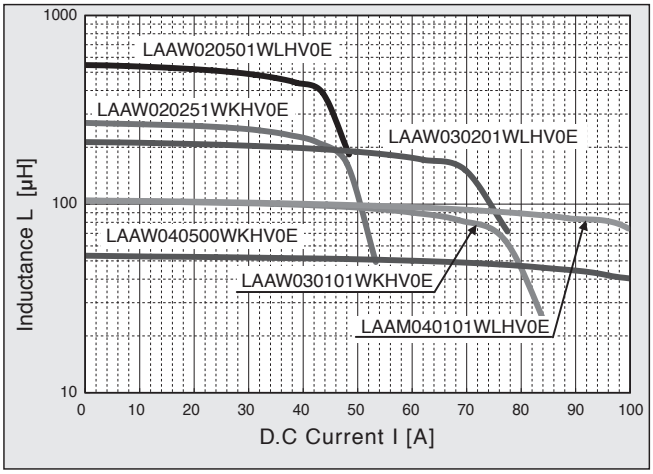
◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current Arms	Peak Current A	Inductance *1 (100kHz) 0[A] µH	Inductance *1 (100kHz) Rating µH	D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions D1 mm	Outside Dimensions D2 mm	Outside Dimensions W mm
◎	LAAW020251WKHV0E (AW20251WKHPBF)	20	28.3	270	250	20	1.0×5P	59.0	59.0	41.5
◎	LAAW030101WKHV0E (AW30101WKHPBF)	30	42.4	105	100	10	1.3×4P	57.0	57.0	41.5
	LAAW040500WKHV0E (AW40500WKHPBF)	40	56.6	53	50	6	1.5×4P	57.0	57.0	41.5
	LAAW020501WLHV0E (AW20501WLHPBF)	20	28.3	546	500	35	1.0×5P	78.5	78.5	46.0
	LAAW030201WLHV0E (AW30201WLHPBF)	30	42.4	213	200	15	1.3×4P	78.5	78.5	46.0
	LAAW040101WLHV0E (AW40101WLHPBF)	40	56.6	105	100	10	1.5×4P	78.5	78.5	46.0

*1 Rated inductance tolerance : ±25%, the inductance at current 0[A] indicates the reference value.
There is a horizontal putting type in all items in the above list."V"changes into "H" in last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎ item.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

◆D.C. BIAS CHARACTERISTICS

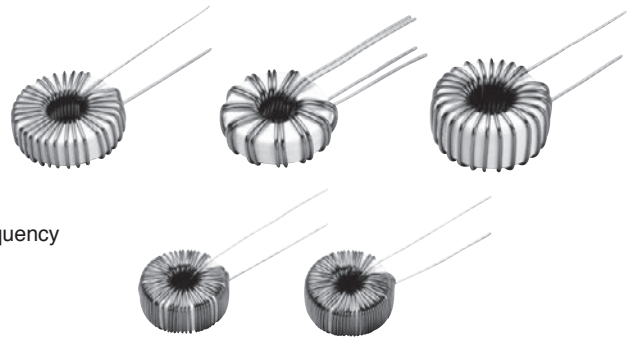
●Core : LNW462725J2, LNW603525J2, Frequency : 100[kHz]



AMORPHOUS CHOKE COILS

TM Series

RoHS2 Compliant



◆MAJOR USES

- Output choke coils for Switching Mode Power Supply
- Choke coils for DC-DC converter
- Normal mode choke coils for noise control

◆FEATURES

- Great reduction of core loss enabling low temperature rise at high frequency
- Miniaturization and reduction of DC resistance
- Low leakage flux due to gap-less structure
- Excellent frequency and temperature features

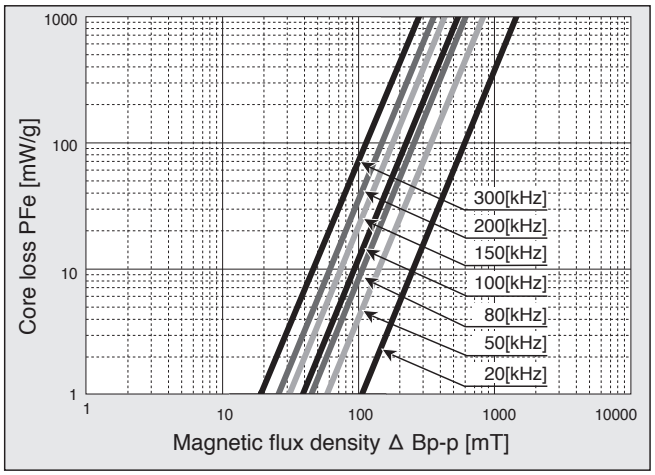
◆CORE STANDARD SPECIFICATIONS

Core Part No. (Old Core Part No.)	Abbreviation	Cross Sectional Area cm^2	Magnetic Path Length cm	Outside Dimensions			Inductance Coefficient AL Value		
				Outer Diameter mm	Width mm	Height mm	I_{dc}=0[A] μH	Rated Current* μH	Rated Current Ampere Turn [AT]
LPT100805N (T100805N)	NS	0.08	2.84	13.0	6.0	6.5	0.100	0.063	70
LPT130805N (T130805N)	N1	0.13	3.44	16.0	5.8	7.4	0.120	0.070	75
LPT150905N (T150905N)	N2	0.14	3.85	17.2	7.3	6.4	0.118	0.063	100
LPT211205N (T211205N)	N5	0.21	5.26	23.2	10.2	6.9	0.126	0.060	155
LPT160910N (T160910N)	NU	0.29	3.92	18.0	7.3	11.9	0.260	0.115	120
LPT191210N (T191210N)	NP	0.33	4.95	21.9	9.8	11.8	0.212	0.095	160
LPT221310N (T221310N)	N6	0.40	5.50	24.7	10.5	12.0	0.229	0.112	160
LPT251510N (T251510N)	N7	0.53	6.60	29.7	12.5	12.3	0.253	0.120	200
LPT322010N (T322010N)	N9	0.56	8.25	35.2	17.5	12.3	0.211	0.090	280

*200[kHz], ±25% (LPT100805N : 100[kHz], ±25%)

◆CORE LOSS CHARACTERISTICS

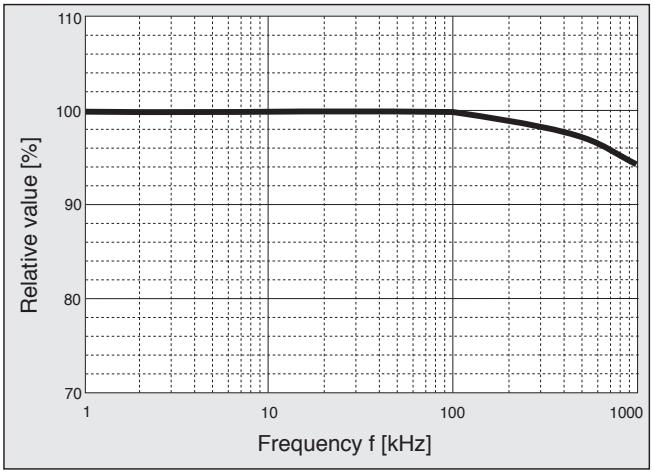
●TM choke



TM Series

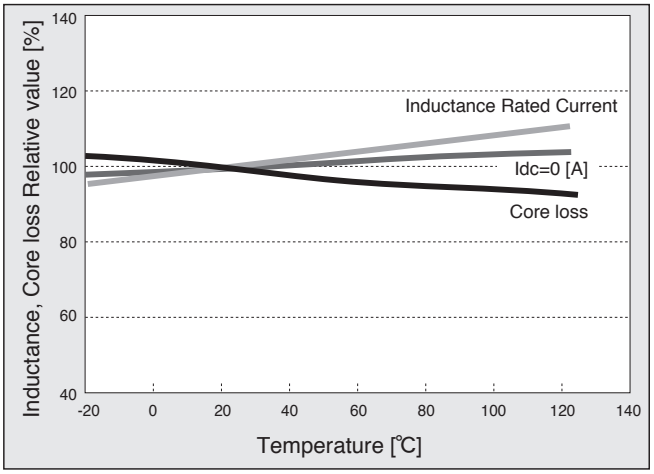
◆FREQUENCY - INDUCTANCE CHARACTERISTICS

●TM choke

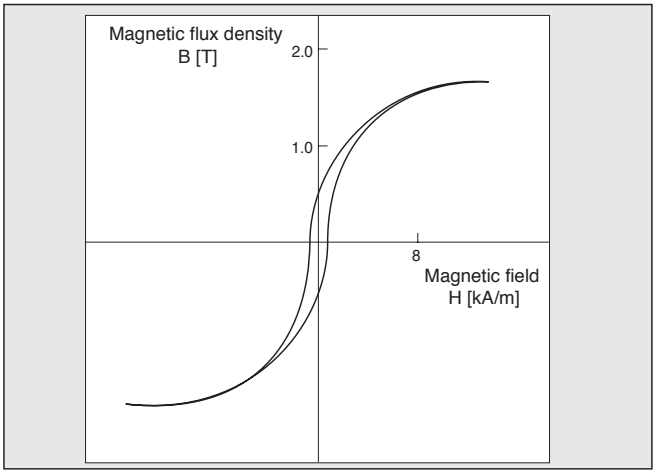


◆TEMPERATURE DEPENDENCE - INDUCTANCE AND CORE LOSS

●Frequency : 200[kHz]

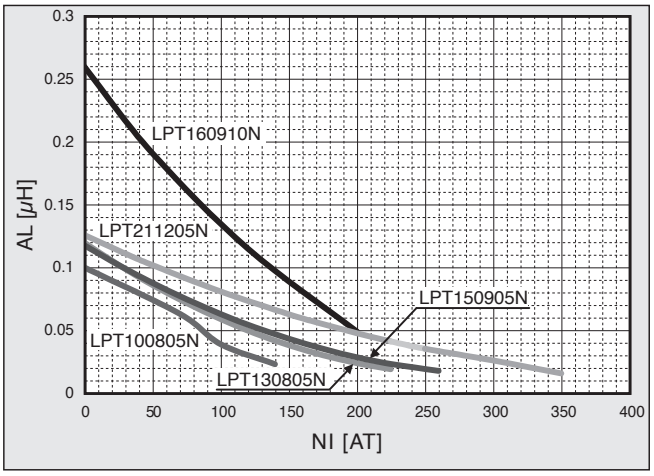


◆B-H CURVE



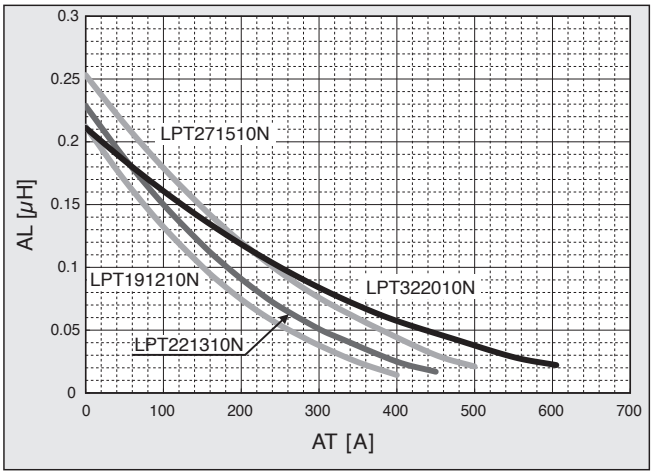
◆D.C. BIAS CHARACTERISTICS AL-AT(1)

●Frequency : 200[kHz] (LPT100805N : 100[kHz])



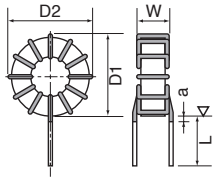
◆D.C. BIAS CHARACTERISTICS AL-AT(2)

●Frequency : 200[kHz]



AMORPHOUS CHOKE COILS

TM Series



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length : L=30±3mm
Soldering boundary : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (200kHz)*2		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
●	LBTM001201NS-V0E (TM01201NSPBF)	1	260 *2	200 *2	120	0.5×1P	16.0	16.0	11.0
●	LBTM002800NS-V0E (TM02800NSPBF)	2	120 *2	80 *2	60	0.6×1P	16.5	16.5	11.0
●	LBTM003270NS-V0E (TM03270NSPBF)	3	40 *2	27 *2	20	0.8×1P	16.5	17.0	11.5
●	LBTM005100NS-V0E (TM05100NSPBF)	5	14 *2	10 *2	9	1.0×1P	17.0	17.5	11.5
●	LBTM001201N1-V0E (TM01201N1PBF)	1	290	200	150	0.5×1P	18.5	19.0	10.5
●	LBTM001251N1-V0E (TM01251N1PBF)	1	400	250	170	0.5×1P	18.5	19.0	11.0
●	LBTM001301N1-V0E (TM01301N1PBF)	1	430	300	170	0.5×1P	19.5	19.5	11.5
●	LBTM002101N1-V0E (TM02101N1PBF)	2	160	100	70	0.6×1P	19.5	19.5	11.5
●	LBTM003400N1-V0E (TM03400N1PBF)	3	69	40	27	0.8×1P	19.5	19.5	11.5
●	LBTM004250N1-V0E (TM04250N1PBF)	4	43	25	18	0.9×1P	19.5	19.5	11.5
●	LBTM005150N1-V0E (TM05150N1PBF)	5	23	15	11	1.0×1P	19.5	20.0	11.5
●	LBTM001401N2-V0E (TM01401N2PBF)	1	580	400	210	0.5×1P	19.5	20.0	11.0
●	LBTM001501N2-V0E (TM01501N2PBF)	1	770	500	230	0.5×1P	20.0	20.5	11.0
●	LBTM002151N2-V0E (TM02151N2PBF)	2	240	150	89	0.6×1P	20.0	20.5	10.5
●	LBTM002201N2-V0E (TM02201N2PBF)	2	360	200	110	0.6×1P	20.0	20.5	11.0
●	LBTM002211N2-V0E (TM02211N2PBF)	2	400	210	110	0.6×1P	20.5	21.0	11.5
●	LBTM003700N2-V0E (TM03700N2PBF)	3	110	70	36	0.8×1P	20.5	21.0	11.5
●	LBTM004450N2-V0E (TM04450N2PBF)	4	74	45	24	0.9×1P	21.0	21.5	11.5
●	LBTM004500N2-V0E (TM04500N2PBF)	4	92	50	24	0.9×1P	21.0	21.5	11.5
●	LBTM005300N2-V0E (TM05300N2PBF)	5	52	30	17	1.0×1P	21.0	21.5	12.0
●	LBTM006200N2-V0E (TM06200N2PBF)	6	34	20	11	0.8×2P	21.0	21.5	12.0

*1 Rated inductance tolerance : ±25%, the inductance at current 0[A] indicates the reference value.
*2 LBTM001201NS-V0E, LBTM002800NS-V0E, LBTM003270NS-V0E, LBTM005100NS-V0E, LBTM001132N5-V0E : 100kHz
There is a horizontal putting type in all items in the above list."V "changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list."V" changes into "D" in last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎item.
The type with the length putting seat is "V" changes into "B" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

TM Series

◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance *1 (200kHz) *2		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
●	LBTM001132N5-V0E (TM01132N5PBF)	1	2000 *2	1300 *2	400	0.5×1P	26.0	27.0	12.0
●	LBTM003800N5-V0E (TM03800N5PBF)	3	120	80	41	0.8×1P	26.5	27.5	11.0
●	LBTM003171N5-V0E (TM03171N5PBF)	3	290	170	59	0.8×1P	26.5	27.5	12.0
●	LBTM005750N5-V0E (TM05750N5PBF)	5	150	75	27	1.0×1P	27.0	28.0	13.5
●	LBTM006450N5-V0E (TM06450N5PBF)	6	85	45	18	0.8×2P	27.0	28.0	13.0
●	LBTM008250N5-V0E (TM08250N5PBF)	8	45	25	11	0.9×2P	27.0	28.0	13.5
●	LBTM010160N5-V0E (TM10160N5PBF)	10	28	16	7	1.1×2P	28.0	29.0	14.0
●	LBTM015080N5-V0E (TM15080N5PBF)	15	15	8	4	1.1×3P	28.5	29.5	14.5
●	LBTM002351NU-V0E (TM02351NUPBF)	2	700	350	135	0.6×1P	22.0	22.0	16.5
●	LBTM003131NU-V0E (TM03131NUPBF)	3	230	130	44	0.8×1P	22.5	22.5	17.0
●	LBTM005500NU-V0E (TM05500NUPBF)	5	94	50	19	1.0×1P	22.5	22.5	16.5
●	LBTM008170NU-V0E (TM08170NUPBF)	8	31	17	7	0.9×2P	22.5	22.5	16.5
●	LBTM002621NP-V0E (TM02621NPPBF)	2	1200	620	150	0.7×1P	25.0	25.5	16.5
●	LBTM003291NP-V0E (TM03291NPPBF)	3	550	290	76	0.8×1P	25.0	25.5	16.0
●	LBTM004161NP-V0E (TM04161NPPBF)	4	320	160	46	0.9×1P	25.0	25.0	16.5
●	LBTM005101NP-V0E (TM05101NPPBF)	5	190	100	29	1.0×1P	25.5	26.0	16.5
●	LBTM006700NP-V0E (TM06700NPPBF)	6	130	70	19	0.8×2P	25.0	25.5	16.0
●	LBTM008400NP-V0E (TM08400NPPBF)	8	77	40	12	0.9×2P	25.0	25.0	16.5
●	LBTM010270NP-V0E (TM10270NPPBF)	10	54	27	7	1.1×2P	26.0	26.0	17.0
●	LBTM015120NP-V0E (TM15120NPPBF)	15	26	12	4	1.1×3P	26.0	26.0	17.5

TM Series

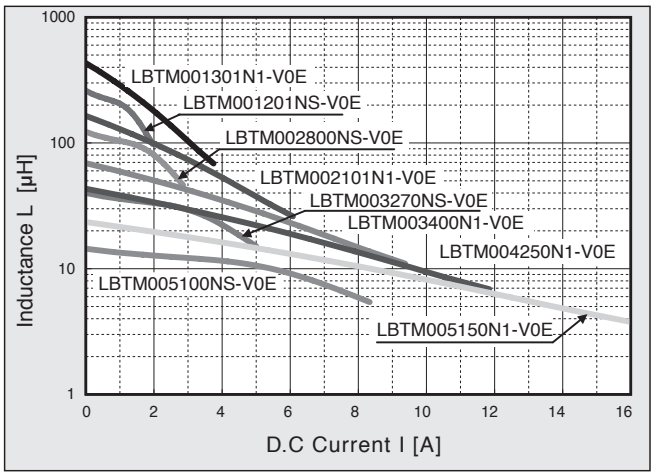
◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (200kHz)*2		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
◎	LBTM002701N6-V0E (TM02701N6PBF)	2	1200	700	150	0.7×1P	27.5	28.0	16.5
◎	LBTM003181N6-V0E (TM03181N6PBF)	3	260	180	50	0.8×1P	27.5	28.0	15.0
◎	LBTM003351N6-V0E (TM03351N6PBF)	3	640	350	82	0.8×1P	27.5	28.0	16.5
◎	LBTM004101N6-V0E (TM04101N6PBF)	4	140	100	33	0.9×1P	27.5	28.0	16.0
◎	LBTM004201N6-V0E (TM04201N6PBF)	4	370	200	48	0.9×1P	28.0	28.5	16.5
◎	LBTM005131N6-V0E (TM05131N6PBF)	5	250	130	34	1.0×1P	28.5	29.0	17.0
◎	LBTM006850N6-V0E (TM06850N6PBF)	6	170	85	22	0.8×2P	28.0	28.5	17.0
◎	LBTM008450N6-V0E (TM08450N6PBF)	8	83	45	13	0.9×2P	28.0	28.5	17.0
◎	LBTM010300N6-V0E (TM10300N6PBF)	10	51	30	7	1.1×2P	29.0	29.5	17.5
◎	LBTM015160N6-V0E (TM15160N6PBF)	15	33	16	5	1.1×3P	28.5	29.0	18.5
◎	LBTM020100N6-V0E (TM20100N6PBF)	20	23	10	4	1.3×3P	29.5	30.0	19.0
◎	LBTM002901N7-V0E (TM02901N7PBF)	2	1500	900	240	0.6×1P	32.0	32.5	15.5
◎	LBTM002112N7-V0E (TM02112N7PBF)	2	1800	1100	190	0.7×1P	32.5	33.0	16.5
◎	LBTM003481N7-V0E (TM03481N7PBF)	3	820	480	94	0.8×1P	32.5	33.0	16.5
◎	LBTM005141N7-V0E (TM05141N7PBF)	5	240	140	34	1.0×1P	33.0	33.5	16.0
◎	LBTM005211N7-V0E (TM05211N7PBF)	5	390	210	42	1.0×1P	33.0	33.5	17.5
	LBTM010300N7-V0E (TM10300N7PBF)	10	45	30	7	1.6×1P	35.5	36.0	18.5
◎	LBTM010500N7-V0E (TM10500N7PBF)	10	100	50	11	1.1×2P	34.0	34.5	18.0
◎	LBTM015260N7-V0E (TM15260N7PBF)	15	65	26	6	1.1×3P	33.5	34.0	18.0
	LBTM025100N7-V0E (TM25100N7PBF)	25	25	10	3	1.6×2P	35.5	36.0	19.0
◎	LBTM003501N9-V0E (TM03501N9PBF)	3	840	500	120	0.8×1P	38.5	39.0	18.5
◎	LBTM005281N9-V0E (TM05281N9PBF)	5	530	280	61	1.0×1P	39.5	40.0	19.0
◎	LBTM005301N9-V0E (TM05301N9PBF)	5	550	300	62	1.0×1P	39.5	40.0	19.0
	LBTM010600N9-V0E (TM10600N9PBF)	10	110	60	12	1.6×1P	41.5	42.0	20.0
◎	LBTM010800N9-V0E (TM10800N9PBF)	10	170	80	15	1.1×2P	41.0	41.5	20.5
◎	LBTM015400N9-V0E (TM15400N9PBF)	15	93	40	8	1.1×3P	39.5	40.0	20.0
◎	LBTM020130N9-V0E (TM20130N9PBF)	20	21	13	4	1.3×3P	41.0	41.5	19.5
◎	LBTM020200N9-V0E (TM20200N9PBF)	20	41	20	5	1.3×3P	40.5	41.0	20.5

TM Series

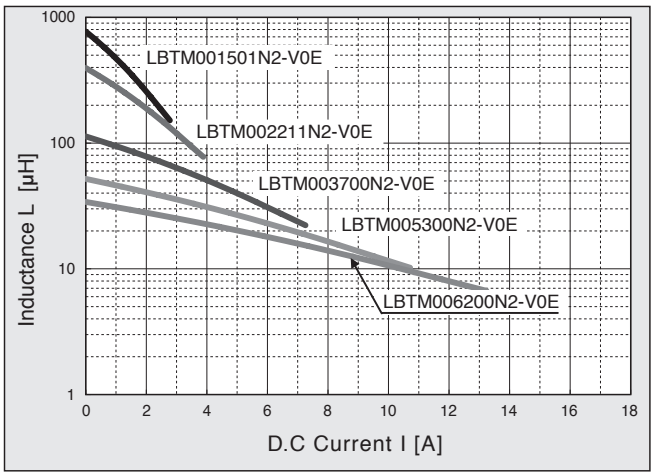
◆D.C. BIAS CHARACTERISTICS (1)

●Core : LPT100805N, Frequency : 100[kHz]
●Core : LPT130805N, Frequency : 200[kHz]



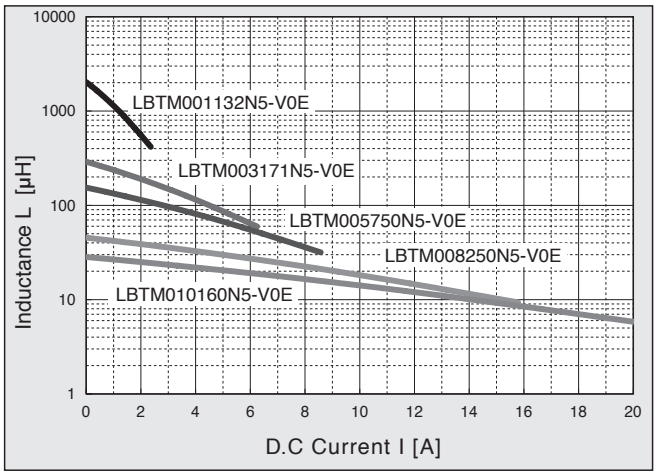
◆D.C. BIAS CHARACTERISTICS (2)

●Core : LPT150905N, Frequency : 200[kHz]



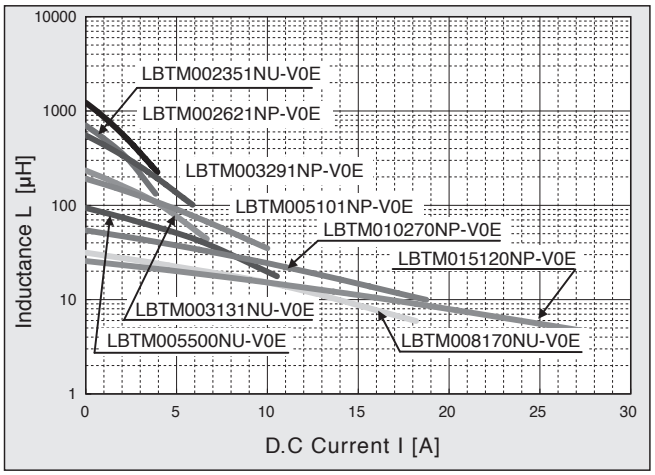
◆D.C. BIAS CHARACTERISTICS (3)

●Core : LPT211205N, Frequency : 200[kHz]



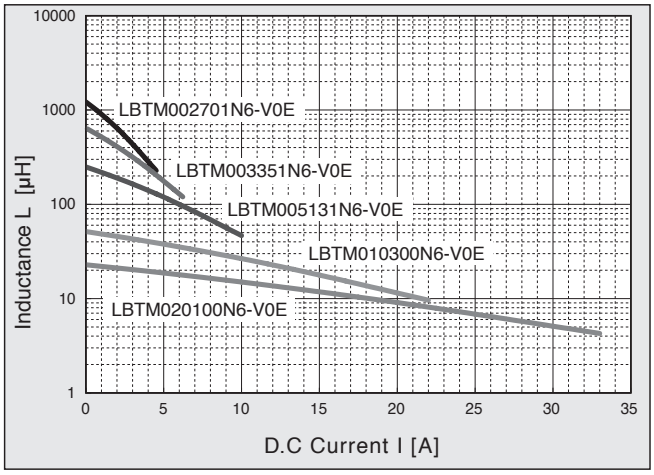
◆D.C. BIAS CHARACTERISTICS (4)

●Core : LPT160910N, LPT191210N, Frequency : 200[kHz]



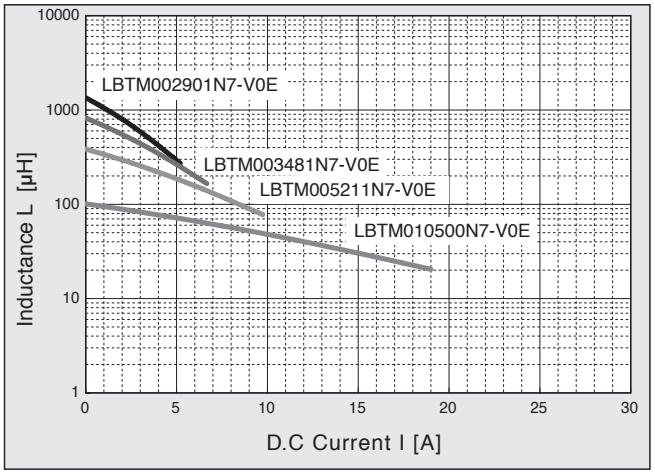
◆D.C. BIAS CHARACTERISTICS (5)

●Core : LPT221310N, Frequency : 200[kHz]



◆D.C. BIAS CHARACTERISTICS (6)

●Core : LPT271510N, Frequency : 200[kHz]



AMORPHOUS CHOKE COILS

BM Series

RoHS2 Compliant

◆MAJOR USES
- ●Output choke coils for Switching Mode Power Supply
- ●Choke coils for DC-DC converter
- ●Normal mode choke coils for noise control

◆FEATURES
- ●Miniaturization in comparison with TM series coils
- ●High inductance in low load current
- ●Low leakage flux due to gap-less structure

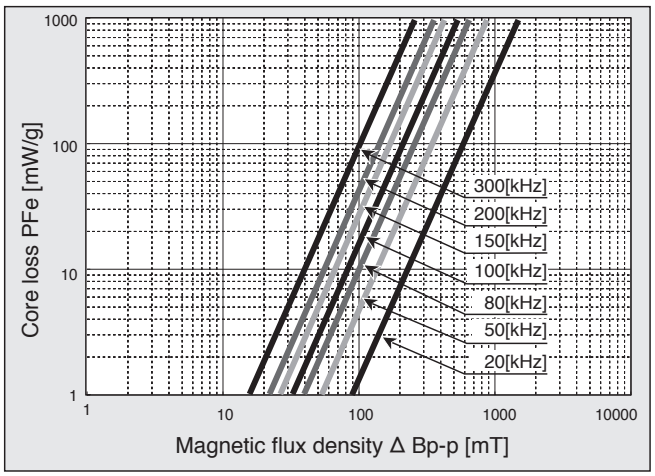
◆CORE STANDARD SPECIFICATIONS

Core Part No. (Old Core Part No.)	Abbreviation	Cross Sectional Area cm^2	Magnetic Path Length cm	Outside Dimensions			Inductance Coefficient AL Value		
				Outer Diameter mm	Width mm	Height mm	I_{dc}=0[A] μH	Rated Current* μH	Rated Current Ampere Turn [AT]
LPB150905N (B150905N)	X2	0.140	3.85	17.2	7.3	6.4	0.079	0.047	100
LPB190910N (B190910N)	XU	0.447	4.49	21.6	7.3	11.9	0.248	0.100	200
LPB221310N (B221310N)	X6	0.396	5.50	24.7	10.5	12.0	0.153	0.065	240
LPB251510N (B251510N)	X7	0.430	6.28	28.3	12.7	12.3	0.153	0.068	270
LPB251515N (B251515N)	X8	0.645	6.28	28.3	12.7	17.5	0.226	0.091	300
LPB322015N (B322015N)	XR	0.774	8.17	35.2	17.5	17.3	0.229	0.091	350
LPB372315N (B372315N)	XJ	0.924	9.42	40.5	19.5	18.0	0.209	0.096	375
LPB462715N (B462715N)	XQ	1.254	11.50	49.4	22.7	18.0	0.232	0.084	600
LPB462720N (B462720N)	XC	1.634	11.50	49.4	22.7	23.0	0.310	0.112	600

*200[kHz], ±25%

◆CORE LOSS CHARACTERISTICS

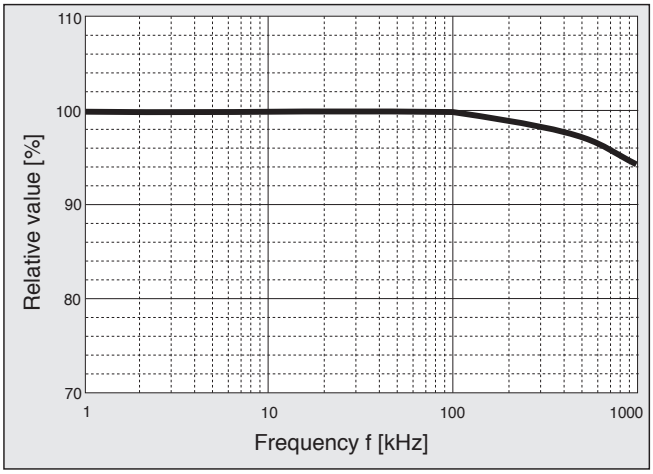
●BM choke



BM Series

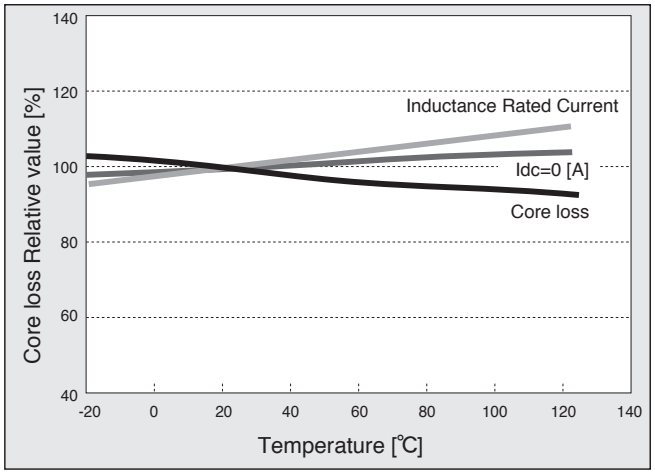
◆FREQUENCY - INDUCTANCE CHARACTERISTICS

●BM choke

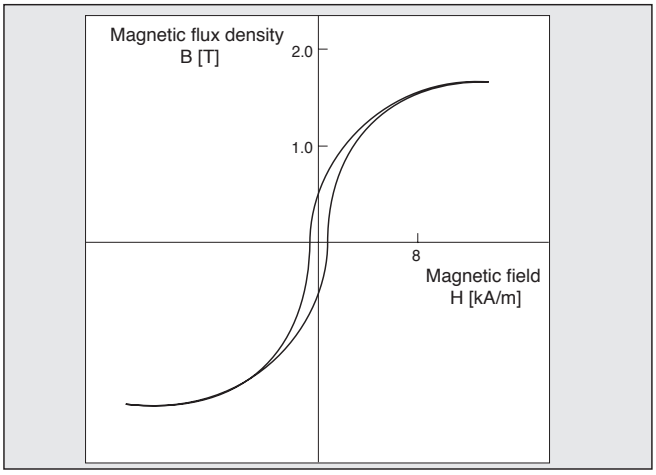


◆TEMPERATURE DEPENDENCE - INDUCTANCE AND CORE LOSS

●Frequency : 200[kHz]

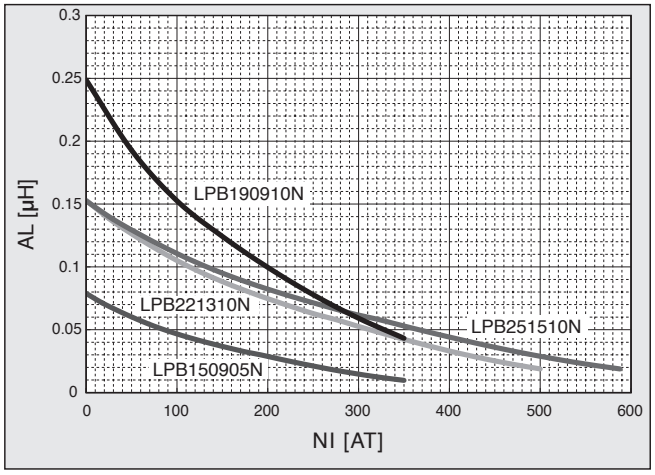


◆B-H CURVE



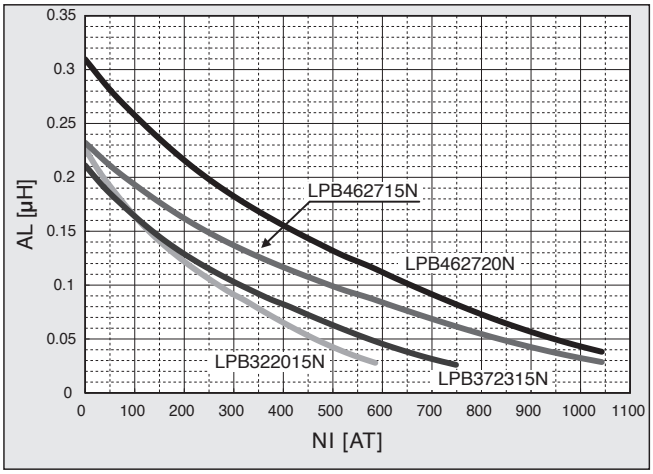
◆D.C. BIAS CHARACTERISTICS AL-AT(1)

●Frequency : 200[kHz]

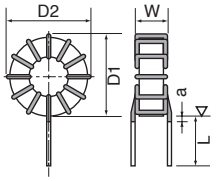


◆D.C. BIAS CHARACTERISTICS AL-AT(2)

●Frequency : 200[kHz]



BM Series



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length : L=30±3mm
Soldering boundary : a=1.5mmMAX
*The bottom of the core or coil (▽) is defined as base surface.

◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (200kHz)*2		D.C.R. mΩ (max)	Winding mmφ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
◎	LBBM003421X6-V0E (BM03421X6PBF)	3	980 *2	420 *2	130	0.8×1p	29.0	29.0	17.5
◎	LBBM005161X6-V0E (BM05161X6PBF)	5	360	160	55	1.0×1p	29.0	29.0	18.0
◎	LBBM008600X6-V0E (BM08600X6PBF)	8	140	60	20	0.9×2p	29.0	29.0	18.0
◎	LBBM010300X6-V0E (BM10300X6PBF)	10	62	30	11	1.0×2p	29.0	29.0	18.0
◎	LBBM015150X6-V0E (BM15150X6PBF)	15	35	15	6	1.0×3p	29.5	29.5	18.5
◎	LBBM020100X6-V0E (BM20100X6PBF)	20	23	10	4	1.0×4p	29.5	29.5	18.5
◎	LBBM025060X6-V0E (BM25060X6PBF)	25	13	6	2	1.2×4p	30.0	30.0	19.0
◎	LBBM0303R6X6-V0E (BM30040X6PBF)	30	7.5	3.6	2	1.3×4p	31.0	31.0	19.5
◎	LBBM003551X7-V0E (BM03551X7PBF)	3	1300 *2	550 *2	150	0.8×1p	32.5	32.5	18.0
◎	LBBM005201X7-V0E (BM05201X7PBF)	5	460	200	60	1.0×1p	32.0	32.5	18.0
◎	LBBM008800X7-V0E (BM08800X7PBF)	8	190	80	26	0.9×2p	32.5	33.0	18.5
◎	LBBM010500X7-V0E (BM10500X7PBF)	10	120	50	16	1.0×2p	32.5	33.0	18.5
◎	LBBM015270X7-V0E (BM15270X7PBF)	15	65	27	8	1.0×3p	33.0	33.5	19.0
◎	LBBM020150X7-V0E (BM20150X7PBF)	20	36	15	5	1.2×3p	33.5	33.5	20.0
◎	LBBM025090X7-V0E (BM25090X7PBF)	25	24	9	3	1.2×4p	33.5	33.5	21.0
◎	LBBM030070X7-V0E (BM30070X7PBF)	30	16	7	3	1.3×4p	34.5	34.5	21.0
	LBBM035050X7-V0E (BM35050X7PBF)	35	13	5.0	3	1.4×4p	34.0	34.0	21.0
	LBBM0403R4X7-V0E (BM40030X7PBF)	40	8.0	3.4	2	1.4×5p	35.0	35.0	21.0

*1 Rated inductance tolerance : ±25%, the inductance at current 0[A] indicates the reference value.
*2 LBBM003801X8-V0E, LBBM003122XR-V0E, LBBM003421X6-V0E, LBBM003551X7-V0E : 50kHz.
There is a horizontal putting type in all items in the above list."V "changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list."V" changes into "D" in last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎ item.
The type with the length putting seat is "V" changes into "B" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

BM Series

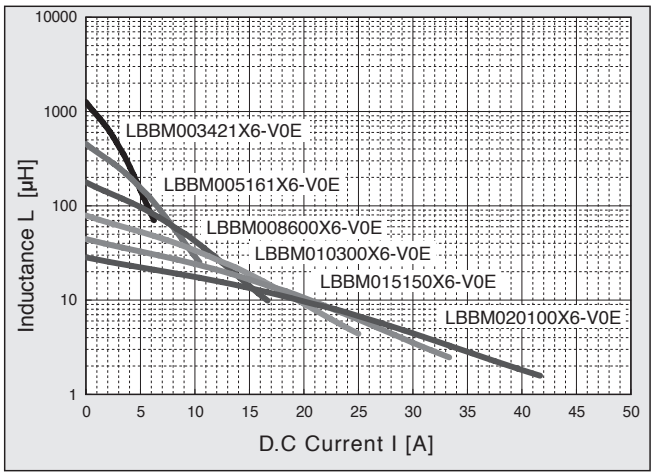
◆COIL STANDARD SPECIFICATIONS

	Coil Part No. (Old Coil Part No.)	Rated Current A	Inductance*1 (200kHz)*2		D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions		
			0[A] μH	Rating μH			D1 mm	D2 mm	W mm
◎	LBBM003801X8-V0E (BM03801X8PBF)	3	1800 *2	800 *2	185	0.8×1P	33.0	33.0	24.5
◎	LBBM005351X8-V0E (BM05351X8PBF)	5	820	350	85	1.0×1p	34.0	34.0	24.5
◎	LBBM008121X8-V0E (BM08121X8PBF)	8	280	120	30	1.3×1p	34.0	34.0	24.5
◎	LBBM010750X8-V0E (BM10750X8PBF)	10	170	75	17	1.1×2p	34.0	34.0	25.5
◎	LBBM015350X8-V0E (BM15350X8PBF)	15	82	35	9	1.3×2p	34.5	34.5	25.0
◎	LBBM020210X8-V0E (BM20210X8PBF)	20	51	21	6	1.2×3p	34.0	34.0	26.0
◎	LBBM025130X8-V0E (BM25130X8PBF)	25	33	13	4	1.2×4p	35.0	35.0	26.0
◎	LBBM030090X8-V0E (BM30090X8PBF)	30	23	9	3	1.3×4p	35.5	35.5	27.0
	LBBM0357R5X8-V0E (BM35070X8PBF)	35	18	7.5	3	1.4×4p	35.0	35.0	27.5
	LBBM040050X8-V0E (BM40050X8PBF)	40	11	5.0	2	1.4×5p	36.5	36.5	26.5
◎	LBBM003122XR-V0E (BM03122XRPBF)	3	2800 *2	1200 *2	155	1.0×1p	41.5	41.5	26.5
◎	LBBM005481XR-V0E (BM05481XRPBF)	5	1000	480	100	1.1×1p	41.0	41.0	25.5
◎	LBBM008191XR-V0E (BM08191XRPBF)	8	430	190	40	1.3×1p	41.5	41.5	25.5
◎	LBBM010121XR-V0E (BM10121XRPBF)	10	260	120	22	1.1×2p	42.0	42.0	26.0
◎	LBBM015570XR-V0E (BM15570XRPBF)	15	130	57	13	1.3×2p	41.5	41.5	26.0
◎	LBBM020310XR-V0E (BM20310XRPBF)	20	68	31	7	1.2×3p	42.0	42.0	26.0
●	LBBM025200XR-V0E (BM25200XRPBF)	25	48	20	5	1.2×4p	41.5	41.5	26.0
●	LBBM030140XR-V0E (BM30140XRPBF)	30	30	14	4	1.3×4p	42.0	42.0	27.0
●	LBBM0359R5XR-V0E (BM35100XRPBF)	35	21	9.5	3	1.4×4p	42.0	42.0	26.0
●	LBBM0406R5XR-V0E (BM40070XRPBF)	40	14	6.5	2	1.4×5p	42.5	42.5	26.5
●	LBBM0454R9XR-V0E (BM45050XRPBF)	45	10	4.9	2	1.3×6p	42.5	42.5	26.5

BM Series

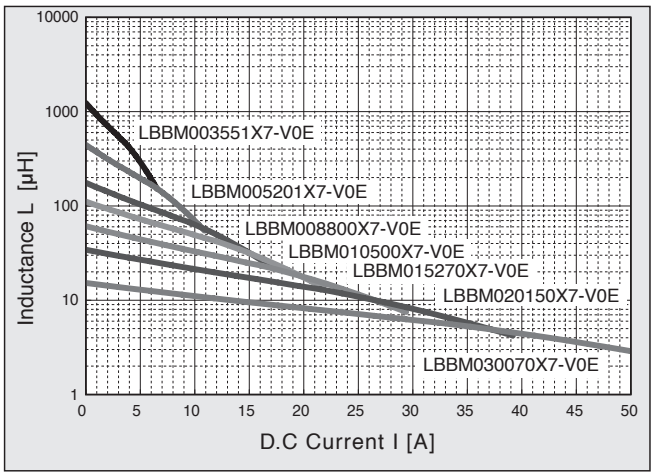
◆D.C. BIAS CHARACTERISTICS (1)

●Core : LPB221310N, Frequency : 200[kHz]



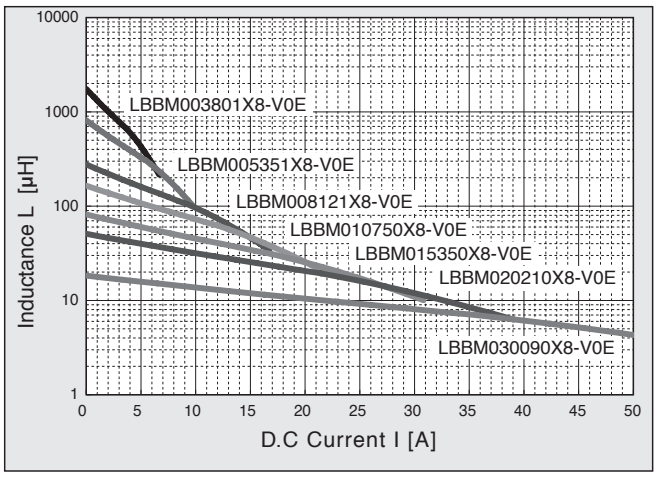
◆D.C. BIAS CHARACTERISTICS (2)

●Core : LPB251510N, Frequency : 200[kHz]



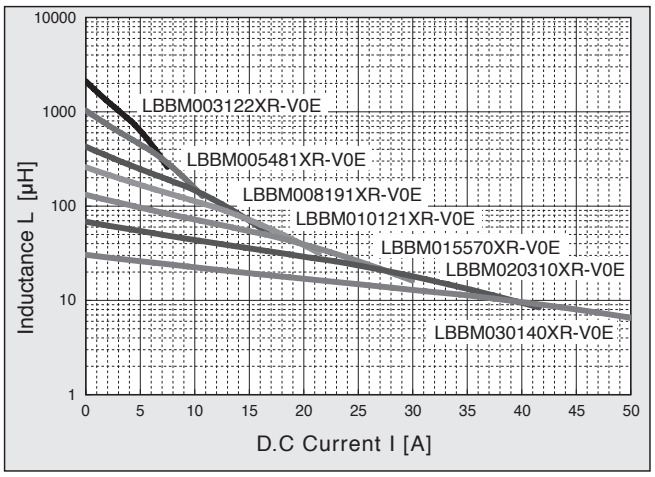
◆D.C. BIAS CHARACTERISTICS (3)

●Core : LPB251515N, Frequency : 200[kHz]



◆D.C. BIAS CHARACTERISTICS (4)

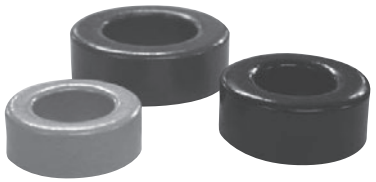
●Core : LPB322015N, Frequency : 200[kHz]



DUST CHOKE COILS

DM Series

RoHS2 Compliant



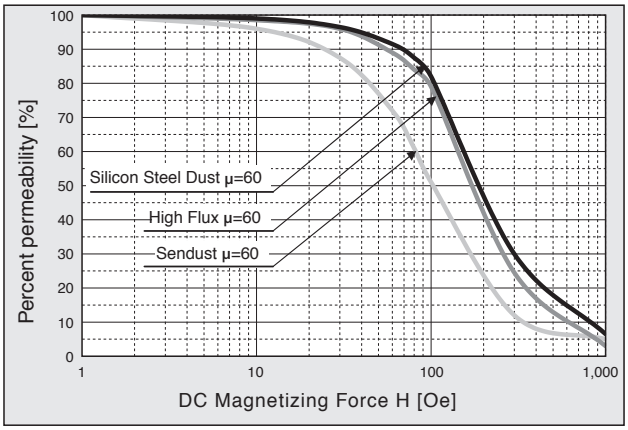
◆MAJOR USES

- Output choke coils for Switching Mode Power Supply
- Choke coils for DC-DC converter
- Normal mode choke coils for noise control
- Choke coils for Power Factor Corrective circuit

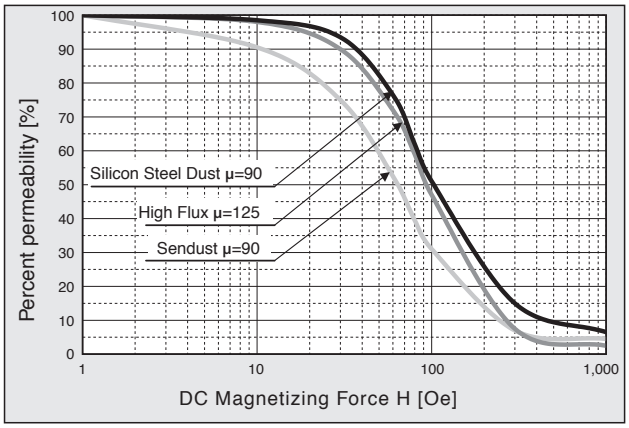
◆FEATURES

- Excellent characteristics in frequency and temperature
- Miniaturization and excellent D.C. bias characteristics in comparison with ferrite choke coils by the feature of higher saturation magnetic flux density

◆D.C. bias of Dust core (1)

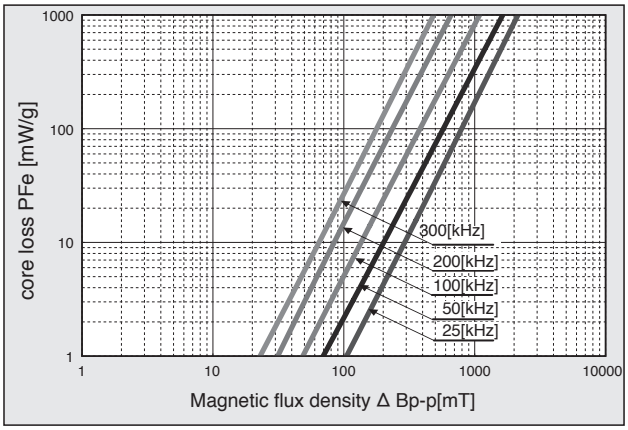


◆D.C. bias of Dust core (2)



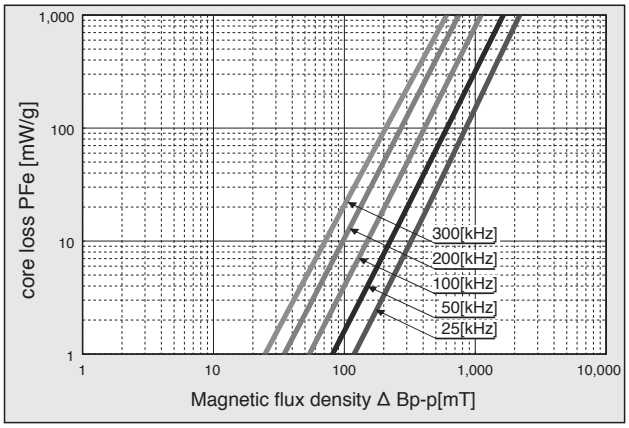
◆Core Loss Characteristics (1) (Magnetic Flux Density Dependency)

●Sendust(Fe-Si-Al)



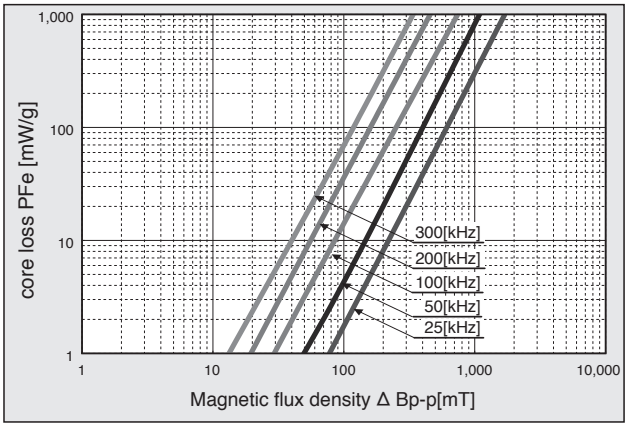
◆Core Loss Characteristics (2) (Magnetic Flux Density Dependency)

●High Flux(Fe-Ni)



◆Core Loss Characteristics (3) (Magnetic Flux Density Dependency)

●Silicon steel dust (Fe-Si)

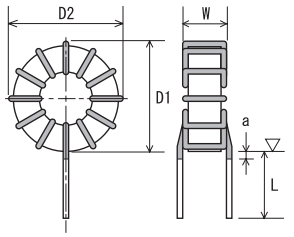


DM Series

Sendust (Fe-Si-Al)

RoHS2 Compliant

●Permissible end-to-end voltage of coils : 250V



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length ※ : L = 30±3mm
Soldering boundary ※ : a = 1.5mmMAX
※ The bottom of the core or coil (▽) is defined as base surface.

◆COIL STANDARD SPECIFICATIONS

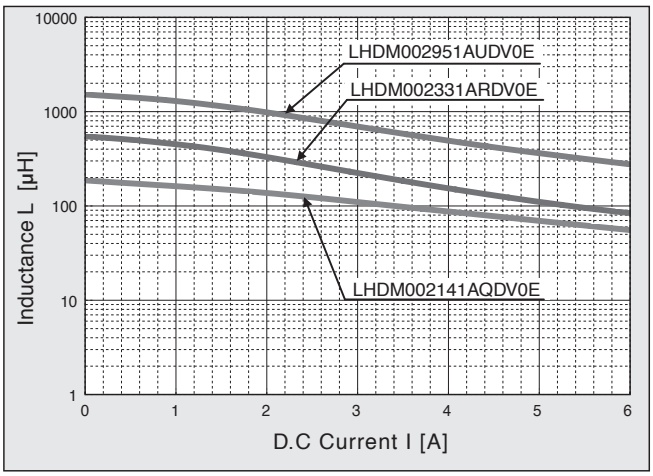
	Coil Part No.	Rated Current A	Inductance*1 (100kHz) 0[A] μH	Inductance*1 (100kHz) Rating μH	D.C.R. mΩ (max)	Winding mmφ×lines	Outside Dimensions D1 mm	D2 mm	W mm
●	LHDM002141AQDV0E	2	190	135	78	0.7φ×1P	22.5	23.5	12.5
●	LHDM003800AQDV0E	3	120	80	48	0.8φ×1P	23.0	24.0	13.5
●	LHDM005300AQDV0E	5	46	30	23	1.0φ×1P	23.5	24.5	14.5
●	LHDM002331ARDV0E	2	550	330	150	0.7φ×1P	26.0	27.0	14.0
●	LHDM003101ARDV0E	3	140	100	58	0.8φ×1P	26.0	27.0	14.0
●	LHDM005550ARDV0E	5	95	55	32	1.0φ×1P	26.5	27.0	14.5
◎	LHDM003251AUGV0E	3	360	250	90	0.8φ×1P	32.5	33.0	14.0
◎	LHDM005161AUGV0E	5	310	160	55	1.0φ×1P	33.5	34.0	15.0
◎	LHDM010300AUGV0E	10	48	30	14	1.1φ×2P	34.0	34.5	16.0
◎	LHDM002951AUDV0E *2	2	1500	950	260	0.7φ×1P	32.5	33.5	18.5
◎	LHDM003231AUDV0E *2	3	300	230	90	0.8φ×1P	32.5	33.5	18.5
◎	LHDM005141AUDV0E *2	5	210	140	50	1.0φ×1P	33.0	34.0	19.0
	LHDM010330AUDV0E *2	10	48	33	12	1.6φ×1P	35.0	36.0	20.5
◎	LHDM005571AZDV0E *2	5	800	570	95	1.1φ×1P	52.5	53.0	26.5
	LHDM010151AZDV0E *2	10	220	150	28	1.6φ×1P	55.0	56.0	28.0
	LHDM020200AZDV0E *2	20	26	20	6	1.8φ×2P	55.0	56.0	28.5

*1 Rated inductance tolerance ; ±20%, the inductance at current 0[A] indicates the reference value.
*2 Correspondence with the core case is possible.
There is a horizontal putting type in all items in the above list.
'V' changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list. "D" in last the third digit of the name of items.
There is a type with the length putting seat in ◎ item in the above list.
"V" changes into "D" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

DM Series

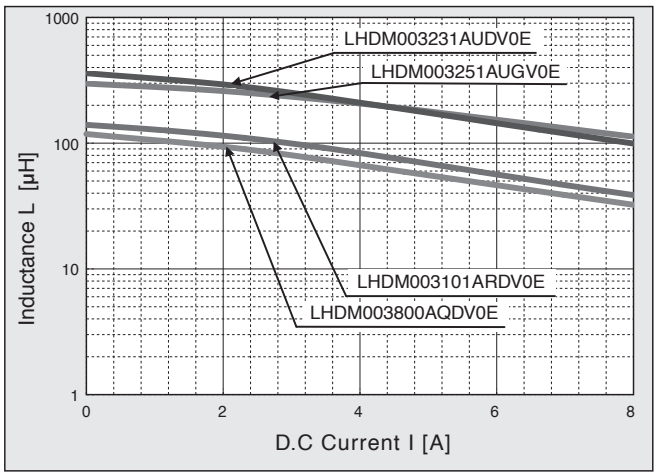
◆D.C. BIAS CHARACTERISTICS (1)

●Rated Current : 2[A], Frequency : 100[kHz]



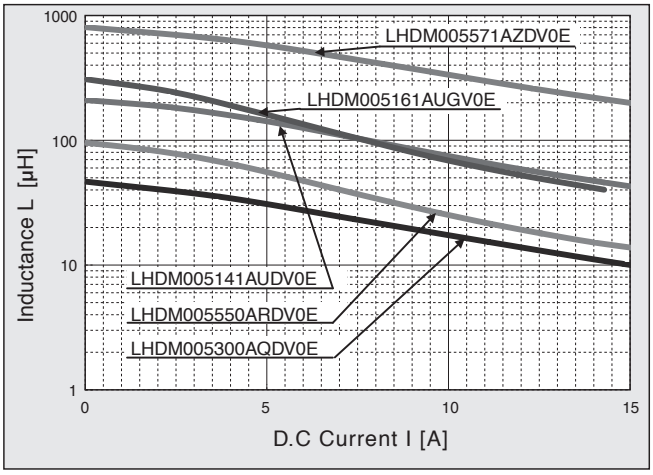
◆D.C. BIAS CHARACTERISTICS (2)

●Rated Current : 3[A], Frequency : 100[kHz]



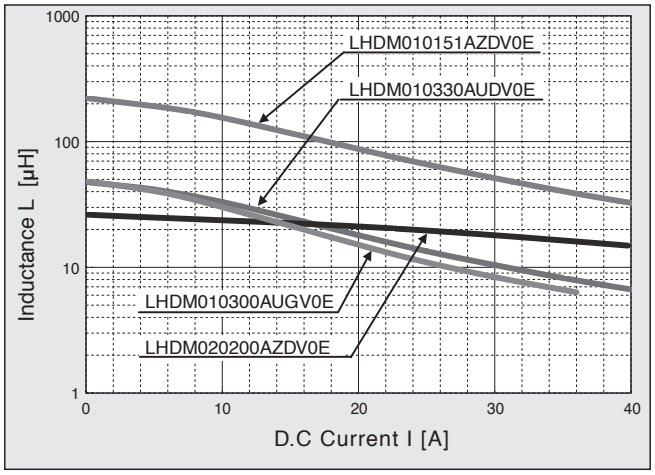
◆D.C. BIAS CHARACTERISTICS (3)

●Rated Current : 5[A], Frequency : 100[kHz]



◆D.C. BIAS CHARACTERISTICS (4)

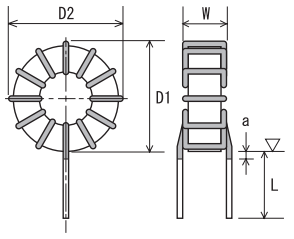
●Rated Current : 10, 20[A], Frequency : 100[kHz]



DM Series
High Flux (Fe-Ni)

RoHS2 Compliant

●Permissible end-to-end voltage of coils : 250V



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length ※ : L = 30±3mm
Soldering boundary ※ : a = 1.5mmMAX
※ The bottom of the core or coil (▽) is defined as base surface.

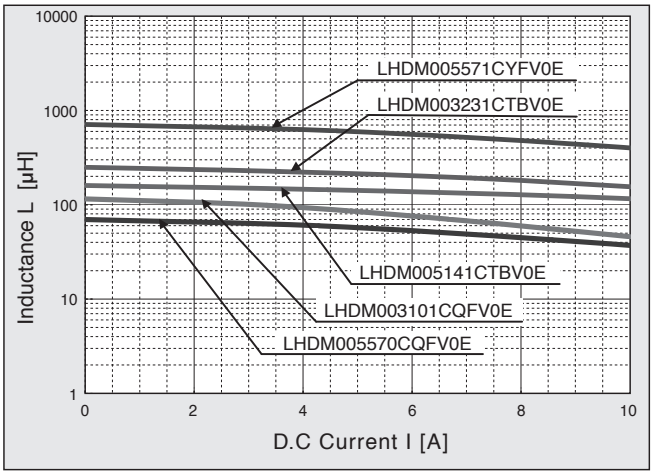
◆COIL STANDARD SPECIFICATIONS

	Coil Part No.	Rated Current A	Inductance*1 (100kHz) 0[A] μH	Inductance*1 (100kHz) Rating μH	D.C.R. mΩ (max)	Winding mmφ×lines	Outside Dimensions D1 mm	D2 mm	W mm
●	LHDM003101CQFV0E	3	115	100	45	0.8φ×1P	22.0	23.0	13.5
●	LHDM005570CQFV0E	5	70	57	25	1.0φ×1P	22.5	23.5	14.5
●	LHDM003231CTBV0E	3	250	230	96	0.8φ×1P	29.0	30.0	16.5
●	LHDM005141CTBV0E	5	160	140	52	1.0φ×1P	29.5	30.5	17.5
	LHDM010330CTBV0E	10	37	33	12	1.6φ×1P	31.5	32.5	19.5
◎	LHDM005571CYFV0E *2	5	710	570	76	1.1φ×1P	46.5	47.5	23.0
	LHDM010151CYBV0E *2	10	170	150	28	1.6φ×1P	47.5	48.5	26.0
	LHDM020200CYBV0E *2	20	24	20	6	1.8φ×2P	48.0	49.0	26.5

*1 Rated inductance tolerance ; ±20%, the inductance at current 0[A] indicates the reference value.
*2 Correspondence with the core case is possible.
There is a horizontal putting type in all items in the above list.
'V' changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list. "D" in last the third digit of the name of items.
There is a type with the length putting seat in ◎ item in the above list.
"V" changes into "D" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

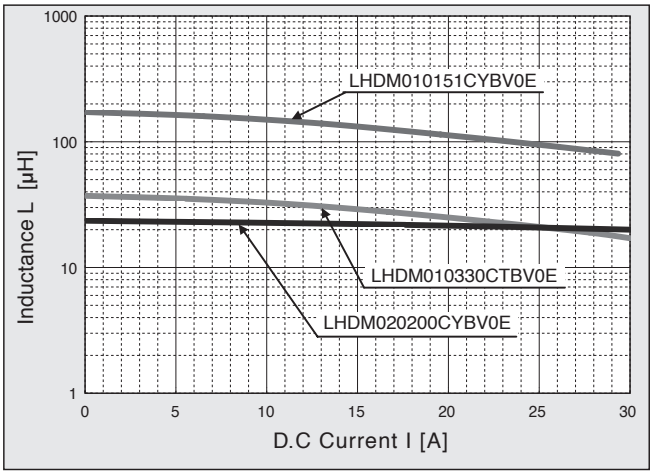
◆D.C. BIAS CHARACTERISTICS (1)

●Frequency : 100[kHz]



◆D.C. BIAS CHARACTERISTICS (2)

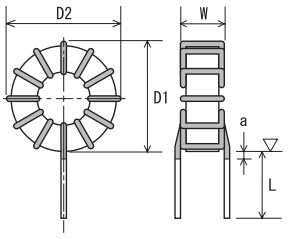
●Frequency : 100[kHz]



DM Series

RoHS2 Compliant

High Flux (Applicable to case type)



Maximum outer diameter : D1(Vertical), D2(Horizontal)
Maximum width : W
Total lead length ※ : L = 30±3mm
Soldering boundary ※ : a = 1.5mmMAX
※ The bottom of the core or coil (▽) is defined as base surface.

◆FEATURES

●Dust coils of case type are applicable as PET UL94V-0 Type F (155°C).

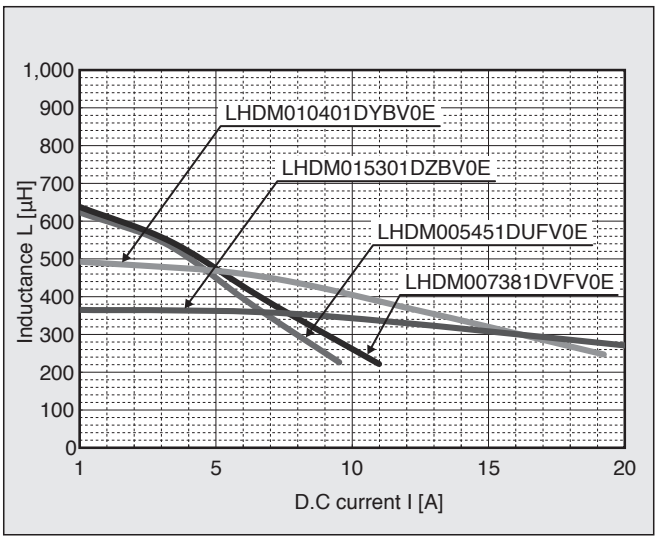
◆COIL STANDARD SPECIFICATIONS

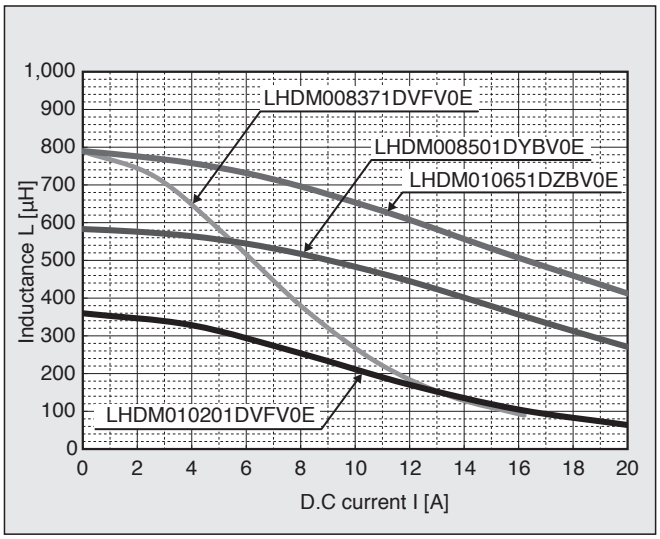
	Coil Part No.	Rated Current A	Inductance*1 (100kHz) 0[A] μH	Inductance*1 (100kHz) Rating μH	D.C.R. mΩ (max)	Winding mmϕ×lines	Outside Dimensions D1 mm	D2 mm	W mm
◎	LHDM005451DUFV0E	5	620	450	85	1.0ϕ×1P	34.5	35.5	22.0
◎	LHDM007381DVFV0E	7	640	380	65	1.2ϕ×1P	41.5	42.0	21.5
◎	LHDM008371DVFV0E	8	750 *2	370 *2	59	1.3ϕ×1P	42.5	43.0	23.0
◎	LHDM008501DYBV0E	8	570 *2	500 *2	68	1.4ϕ×1P	50.0	50.5	27.5
◎	LHDM010201DVFV0E	10	340	200	30	1.1ϕ×2P	43.5	44.0	23.0
●	LHDM010401DYBV0E	10	490	400	58	1.5ϕ×1P	50.0	50.5	27.0
◎	LHDM010651DZBV0E	10	760 *2	650 *2	72	1.0ϕ×2P	57.5	58.0	31.0
◎	LHDM015301DZBV0E	15	360	300	35	1.3ϕ×2P	57.0	57.5	32.0

*1 Rated inductance tolerance : ±20%, inductance at current 0[A] indicates reference value.
*2 LHDM008371DVFV0E, LHDM008501DYBV0E, LHDM010651DZBFV0E:50kHz
There is a horizontal putting type in all items in the above list."V" changes into "H" in last the third digit of the name of items.
There is a type with the length putting seat in ● item in the above list. "V" changes into "D" in the last the third digit of the name of items.
There are the type with the length putting seat and the horizontal putting seat in ◎ item.
The type with the length putting seat is "V" changes into "B" in last the third digit of the name of items.
*Order the auxiliary pins separately if they are required for the pedestal.
Please select them according to the situation.

◆D.C. BIAS CHARACTERISTICS

●Frequency : 100[kHz]





Minimum quantity in a package

●Minimum Packaging Quantity

Please order by units of minimum packaging quantity.
The quantity in a package basically depends on the **core size** and **coil shapes**.
Note that the outside dimensions vary depending on the diameter of the winding and/or the number of turns, therefore, the number of products in a package may differ.

How to read a Coil Part No.

Coil Part No. (Example)	L	D	F	L	0	1	0	1	0	2	L	T	-	V	0	E
Digits	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

14th digit : V vertical type
: H horizontal type

11th to 13th digits: Core used

8th to 10th digits: Rated Inductance (Example: 1mH)

5th to 7th digits: Rated Current (Example: 10A)

3rd to 4th digits: Series class code (Example: FL series)

1st and 2nd digits: Product section code

◆Quantity in a package (pcs/pack)

Digits in Coil Part No.			
3rd to 4th digits	11th to 13th digits	14th digit	
Series	Core used	Coil shape	
		V: vertical type	H: horizontal type
FL	LS-	200	400
	L5-	231	192
	L6-	231	192
	LT-	100	75
	LR-	80	75
	LJ-	48	50
	LBU	---	50
	LJU	48	50
	LNQ	---	32
	LGQ	---	32
SM	P1F	270	---
	P2D	280	---
	P7D	200	---
	P5D	280	---
	P1B	270	---
CM	G3-	200	192
	G4-	200	256
	G6-	231	192
	G7-	231	75
	G8-	132	75
	G9-	100	75
	G0-	100	75
	GJ-	80	75
	GQ-	64	32
	GK-	48	32
	JRH	100	75
AM	J7H	231	75
	J8H	132	75
	JAH	80	50
	JBH	60	50
	JCH	48	32
	JKH	48	32

Digits in Coil Part No.			
3rd to 4th digits	11th to 13th digits	14th digit	
Series	Core used	Coil shape	
		V: vertical type	H: horizontal type
AW	WKH	24	32
	WLH	18	18
TM	NS-	200	400
	N1-	200	256
	N2-	200	256
	NU-	200	---
	NP-	231	192
	N5-	231	256
	N6-	231	192
	N7-	100	75
	N9-	100	75
BM	X6-	231	192
	X7-	231	75
	X8-	132	75
	XR-	100	75
DM	AQD	200	---
	ARD	200	---
	AUG	231	---
	AUD	231	---
	AZD	64	---
	CQF	200	---
	CTB	132	---
	CYF	50	---
	CYB	50	---
	DUF	132	---
	DVF	80	---
	DYB	32	---
	DZB	18	---

◆Coil Design Request

Date Month Year

Customer name			
Post name		TEL	
		FAX	
Person in charge name		E-mail	
Target price		Competitor	
Estimated usage	pcs per month(s) year(s)	Start of mass production time	/ / psc

New Design Investigations

Type:

☐Switching mode power supplies
☐Normal mode line filter
☐Harmonic counter-measure (Active filter)
☐Common mode choke coil
☐Others

Equipment Classification:

Equipment Classification (Option)

Electrical specification:

Rated output voltage	[V]	Conversion frequency	[kHz]
Output current	[A]	Ripple current	[A p-p]
Power output capacity	[W]	Peak current	[A]

Inductance

at Rated current	[A]	[μH]
at Peak current	[A]	[μH]
(Others)	[A]	[μH]

For others:

Mounting direction	Vertical or Horizontal	Pedestal (Stand)	Yes or No
Dimension limit (Yes or No)	× [mm] or less	Height from substrage	[mm] or less
Ambient temperature	[℃]	Temperature rise	[K] or less
Cooling method	Natural or Forced or Others		

Remarks (including special instructions on lead handling)