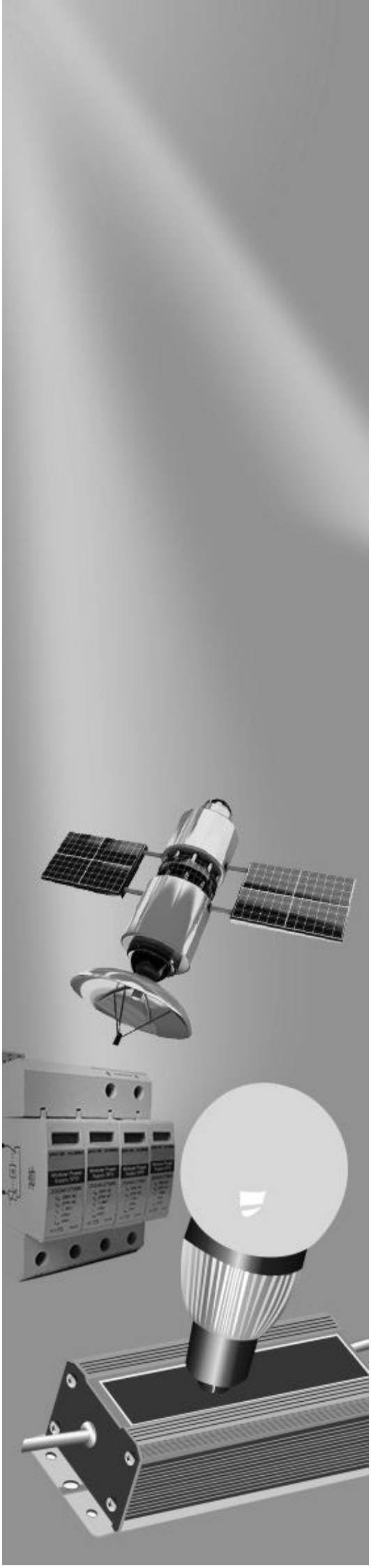
DATA SHEET

METAL OXIDE VARISTORS
HIGH SURGE SERIES

10D-X4.5 series

RoHS compliant & Halogen free



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Metal Oxide Varistor：10D-X4.5 Series

■ Features



1. RoHS compliant
2. Halogen-free series are available.
3. Body size：Φ10mm
4. High peak surge current rating up to 4.5kA (8/20μs pulse)
5. Operating voltage range：130Vac ~ 550Vac
6. Agency recognition：UL / CSA / VDE/ CQC

■ Recommended Applications

1. Power supply
2. Home appliance
3. Industrial equipment
4. Telecommunication or telephone system
5. Smart meter
6. PLC (Power line communication)
7. Lighting products
8. Photovoltaic industry

■ Parameters

	10D-X4.5 Series	Units
AC Voltage Range (Vac)	130 to 550	V
DC Voltage Range (Vdc)	170 to 745	V
Peak Current for 8/20μS Current Wave	4500	A
Energy Range For 10/1000μS Current Wave	52 to 152	J
Operation Ambient Temperature Range	-40 to +105	℃
Storage Temperature Range	-40 to +125	℃
Varistor Voltage Range Vn (Vdc)	200 to 910	V
Voltage Proof	>2500	V
Temperature Cycle (-40~125℃)	5	cycles

■ Part Number Code

5	6	1	K	D	10	J	–	O	X4.5	T	R
1	2	3	4	5	6	7		8	9	10	11

Varistor Voltage(V1mA)	
471	47x10¹V=470V
561	56x10¹V=560V

Tolerance of Voltage	
K	±10%

Body Size	
10	Φ10mm

Surge	
J	High surge

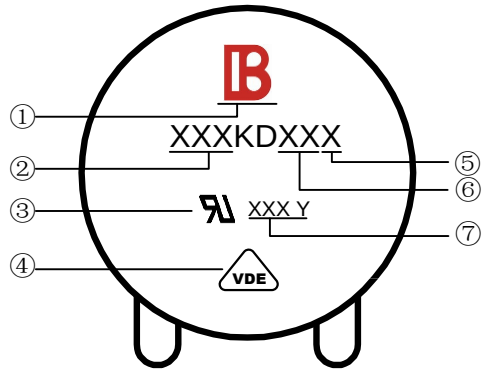
Surge current
4.5KA

Appearance	
D	round, epoxy coating

Lead formation	
O	Outside Kink Lead
F	In Line Kink Lead
Blank	Straight lead

Packaging	
TR	Tape & reel packing (hole pitch:12.7mm)
TB	Tape & ammo box packing (hole pitch:12.7mm)
ER	Tape & reel packing (hole pitch:15.0mm)
EB	Tape & ammo box packing (hole pitch:15.0mm))
Blank	Bulk

■ Marking Code



① Brightking Logo
② Varistor Voltage
③ UL Accreditation Logo
④ VDE Accreditation Logo
⑤ “J” is High Surge Code, no “J” is Standard Surge
⑥ Disk Size
⑦ Internal control code

■ Structure and Dimensions

Structure

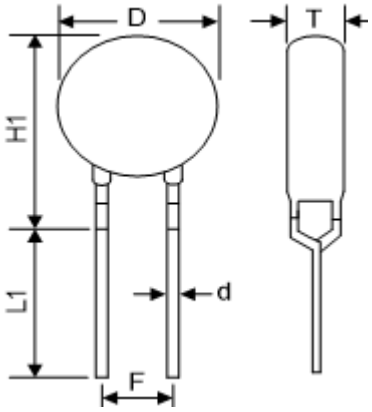


Fig 1. In Line Kink Lead

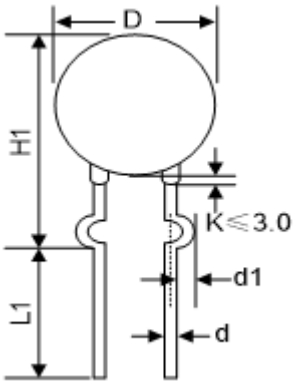


Fig 2. Outside Kink Lead

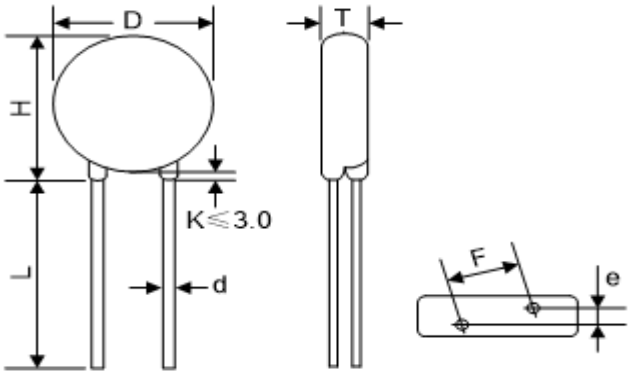


Fig 3. Straight Lead

■ Dimension Table

Table 1
Unit: mm

Symbol	Dimension
H (max.)	17.5
H1 (max.)	19.0
L (min.)	20.0
L1 (min.)	15.0
D (max.)	14.0
F (±0.8)	7.5
T (max.)	Table 2
e (±0.8)	Table 2
d (±0.05)	0.8
d1 (±0.4)	1.4

Table 2
Unit: mm

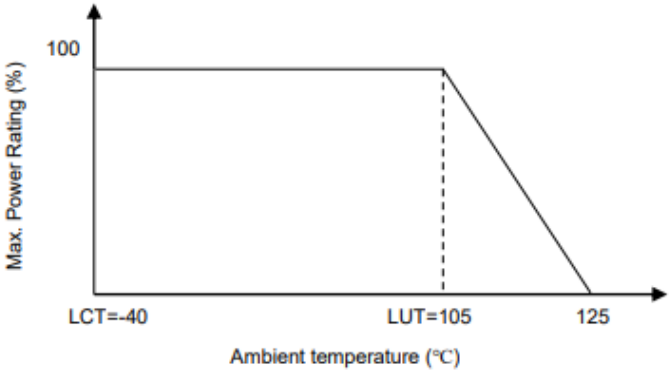
Model	T (max.)	e	Model	T (max.)	e
201K	5.0	2.0	471K	6.7	3.2
221K	5.1	2.1	511K	6.8	3.4
241K	5.2	2.2	561K	7.0	3.6
271K	5.4	2.4	621K	7.3	3.9
301K	5.5	2.5	681K	7.6	4.2
331K	5.8	2.5	751K	8.0	4.3
361K	6.0	2.7	781K	8.1	4.4
391K	6.2	2.8	821K	8.3	4.6
431K	6.5	3.0	911K	8.8	5.0

■ Electrical Characteristics

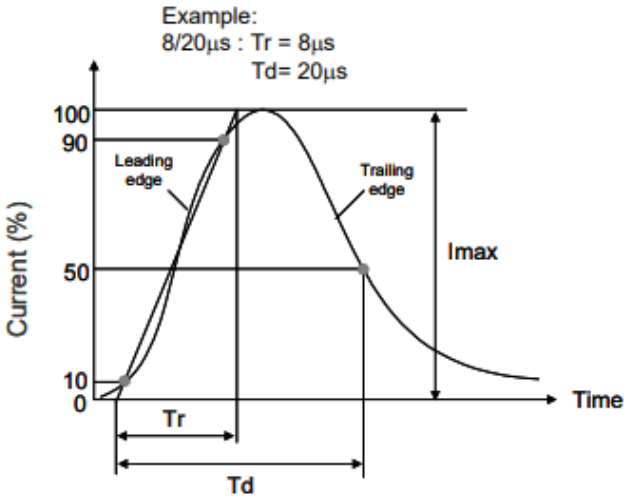
10D-4.5KA Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)
	V_{1mA}	$V_{ac(rms)}$	V_{dc}	I_P	V_P	I_{max}	P	W_{max}
	(V)	(V)	(V)	(A)	(V)	(A)	(W)	(J)
201KD10J-X4.5	200 (180~220)	130	170	25	340	4500	0.4	52
221KD10J-X4.5	220 (198~242)	140	180	25	360	4500	0.4	58
241KD10J-X4.5	240 (216~264)	150	200	25	395	4500	0.4	64
271KD10J-X4.5	270 (243~297)	175	225	25	455	4500	0.4	67
301KD10J-X4.5	300 (270~330)	190	250	25	500	4500	0.4	70
331KD10J-X4.5	330 (297~363)	210	275	25	550	4500	0.4	72
361KD10J-X4.5	360 (324~396)	230	300	25	595	4500	0.4	76
391KD10J-X4.5	390(351~429)	250	320	25	650	4500	0.4	82
431KD10J-X4.5	430(387~473)	275	350	25	710	4500	0.4	93
471KD10J-X4.5	470(423~517)	300	385	25	775	4500	0.4	99
511KD10J-X4.5	510(459~561)	320	415	25	845	4500	0.4	107
561KD10J-X4.5	560(504~616)	350	460	25	925	4500	0.4	113
621KD10J-X4.5	620(558~682)	385	505	25	1025	4500	0.4	125
681KD10J-X4.5	680(612~748)	420	560	25	1120	4500	0.4	128
751KD10J-X4.5	750(675~825)	460	615	25	1235	4500	0.4	134
781KD10J-X4.5	780(702~858)	485	640	25	1300	4500	0.4	139
821KD10J-X4.5	820(738~902)	510	670	25	1355	4500	0.4	146
911KD10J-X4.5	910(819~1001)	550	745	25	1500	4500	0.4	152

■ Power Derating Curve

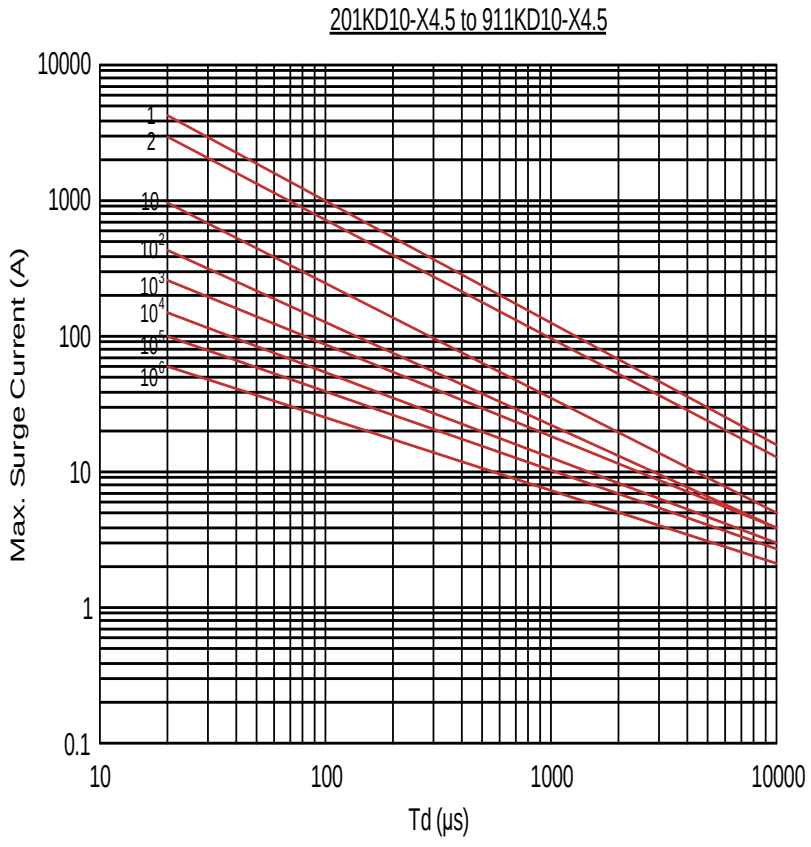


■ Surge Current Standard Waveform



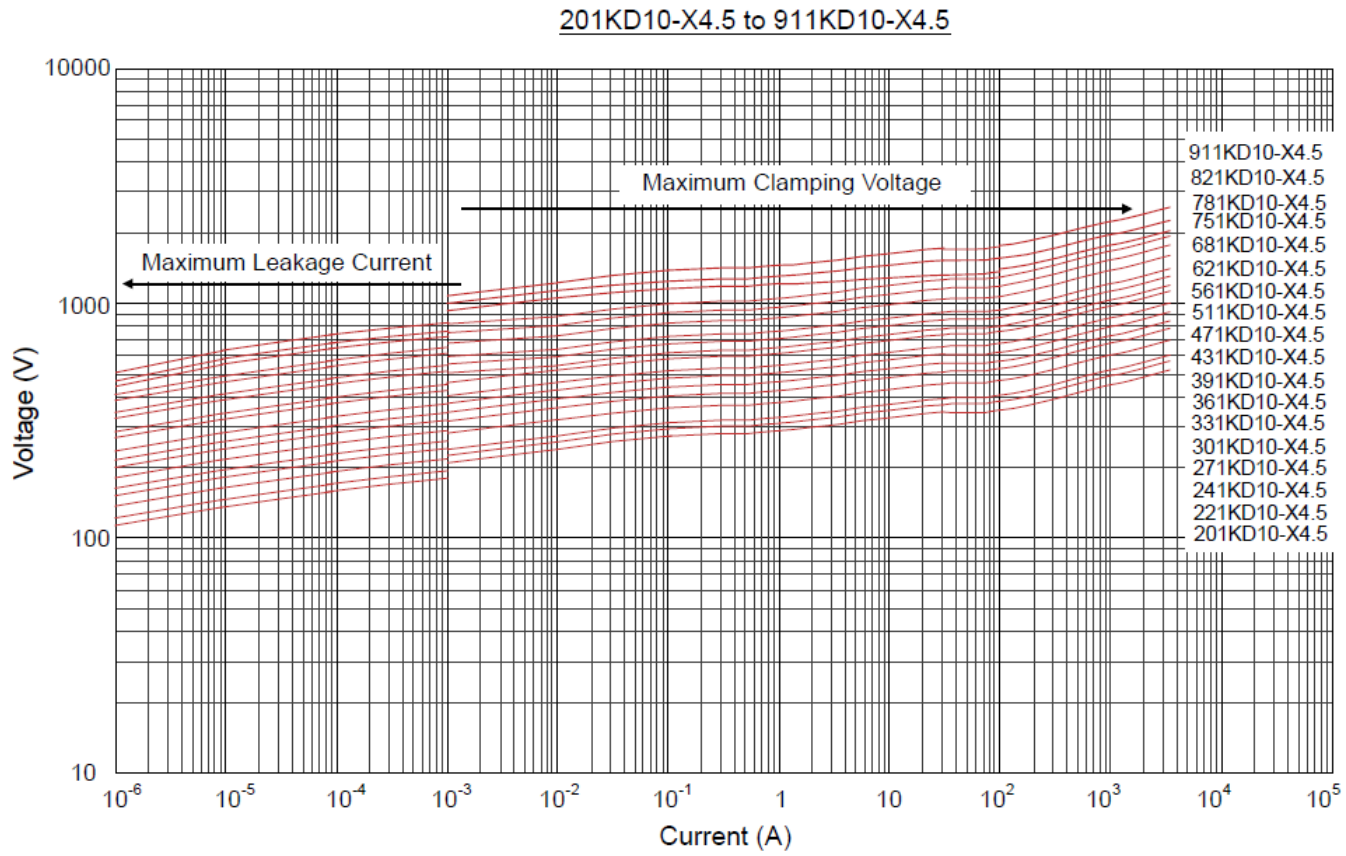
■ Maximum Surge Current Derating Curve

10D Max. Surge Current Derating Curves



■ Maximum Leakage Current and Maximum Clamping Voltage Curve

10D Max. Leakage Current and Max. Clamping Voltage Curves

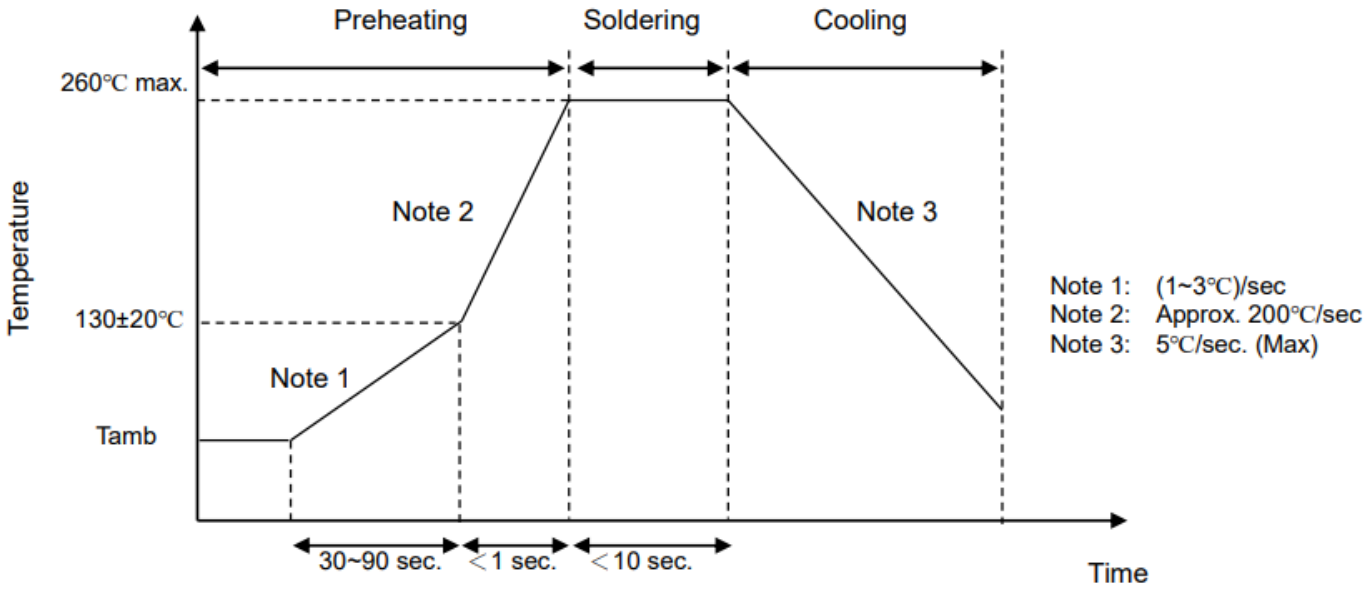


■ Reliability

Item	Standard	Test conditions / Methods	Specifications
Tensile Strength of Terminals	IEC 60068-2-21	Gradually apply the specified force and keep the unit fixed for 10±1 sec Terminal diameter (mm) / Force (Kg) 0.5<d≦0.8 : 1.0 0.8<d≦1.25 : 2.0	|△V1mA /V1mA| ≦5% No visible damage
Bending Strength of Terminals	IEC 60068-2-21	Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction Terminal diameter (mm) / Force (Kg) 0.5<d≦0.8 : 0.5 0.8<d≦1.25 : 1.0	|△V1mA /V1mA| ≦5% No visible damage
Vibration	IEC 60068-2-6	Frequency range: 10 ~ 55 Hz Amplitude: 0.75mm or 98 m/s2 Direction: 3 mutually perpendicular directions, 2 hrs each.	|△V1mA /V1mA| ≦5% No visible damage
Solderability	IEC 60068-2-20	245 ± 3 ℃, 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder
Resistance to Soldering Heat	IEC 60068-2-20	260 ± 3 ℃, 10 ± 1 sec	|△V1mA /V1mA| ≦5% No visible damage
High Temperature Storage	IEC 60068-2-2	125±5℃ x 1000± 24hrs	|△V1mA /V1mA| ≦5% No visible damage
Low Temperature Storage	IEC 60068-2-1	-40±2℃ x 1000± 24hrs	|△V1mA /V1mA| ≦5% No visible damage
Damp Heat, Steady State	IEC 60068-2-78	The test is divided into two groups: a. 40±2℃, 90 ~ 95 % RH, 1344hrs b. 40±2℃, 90 ~ 95 % RH, at 10%Vdc, 1344hrs	|△V1mA /V1mA| ≦5% No visible damage Insulation Resistance ≧100MΩ
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles。 Step 1: -40±3 : 30±3 Step 2: Room temperature : 5±3 Step 3: 125±3 : 30±3 Step 4: Room temperature : 5±3	|△V1mA /V1mA| ≦5% No visible damage
High Temp. Load	MIL-STD-202 Method 108	105±2℃, 1000±24hrs at VDC or V rms (Max. Continuous Voltage)	|△V1mA /V1mA|≦10 % No visible damage
8/20μs Surge Life	IEC 61051-1	8/20μs waveform, 10 surge currents, unipolar, interval 30 sec, amplitude corresponding to max. surge current derating curves for 20μs.	|△V1mA /V1mA|≦10 % No visible damage
10/1000μs Surge Life	IEC 61051-1	10/1000μs waveform, 10 surge currents, unipolar, interval 2 mins, amplitude corresponding to max. surge current derating curves for 1000μs.	|△V1mA /V1mA|≦10 % No visible damage
Voltage Proof	IEC 61051-1	Metal balls method, 2500 Vac 1 min	No visible damage

■ Soldering Recommendation

● Wave Soldering Profile

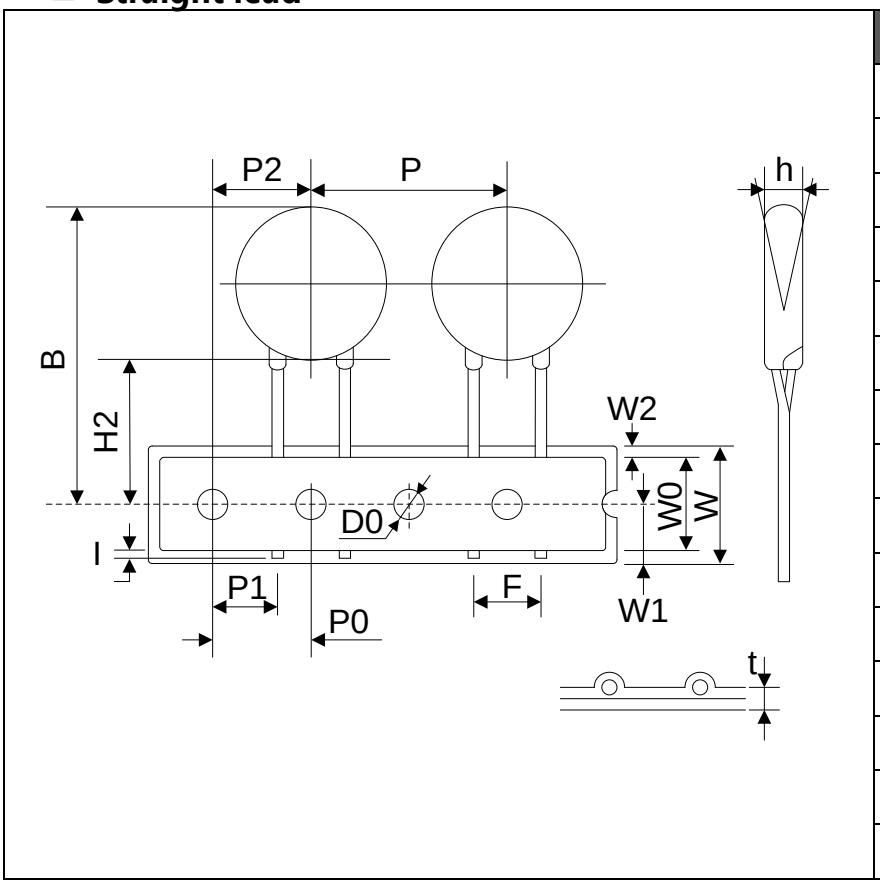


● Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360℃ (max.)
Soldering Time	3 sec (max.)
Distance from Varistor	2 mm (min.)

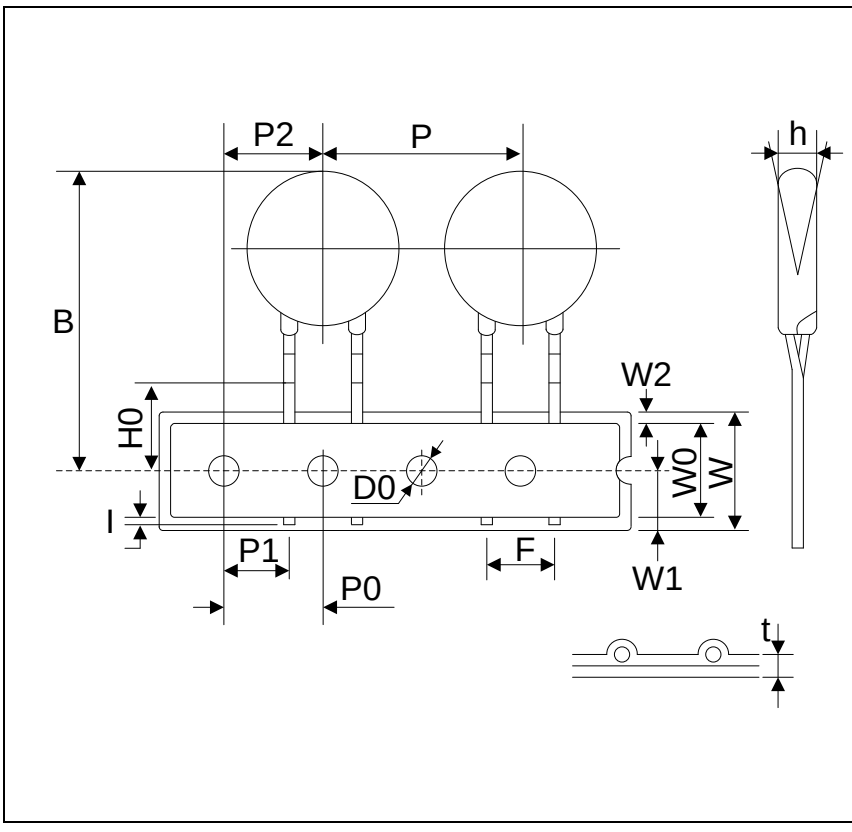
■ Taping Dimensions

■ Straight lead



Symbol	Dimension (mm)
P	25.4±1.0
P0	12.7±1.0
P1	8.95±0.7
P2	12.7±1.3
F	7.5±0.8
h	0±4
W	18.0±1.0
W0	12.0±1.0
W1	9.0±0.5
W2	3.0max
H2	20.0±2.0
I	2.0max
D0	4.0±0.2
t	0.6±0.3
B	40max

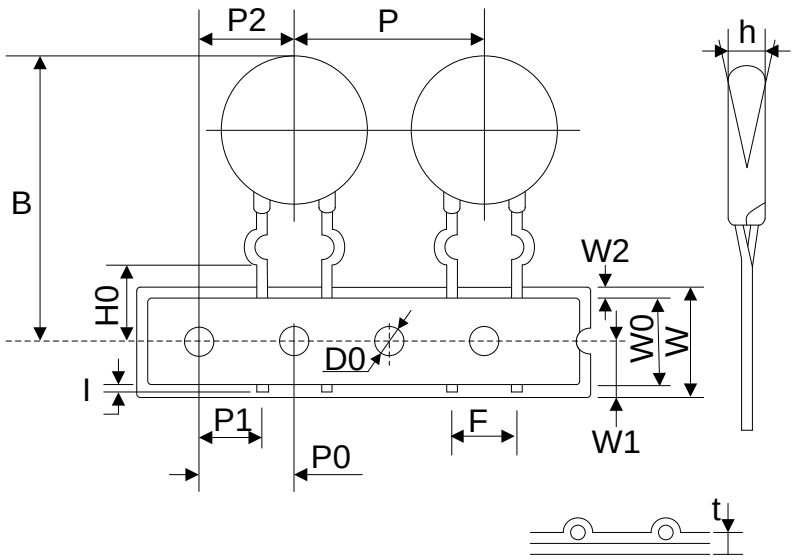
● In Line Kink Lead



Symbol	Dimension (mm)
P	25.4±1.0
P0	12.7±1.0
P1	8.95±0.7
P2	12.7±1.3
F	7.5±0.8
h	0±4
W	18.0±1.0
W0	12.0±1.0
W1	9.0±0.5
W2	3.0max
H0	16.0±1.0
I	2.0max
D0	4.0±0.2
t	0.6±0.3

	B	40max

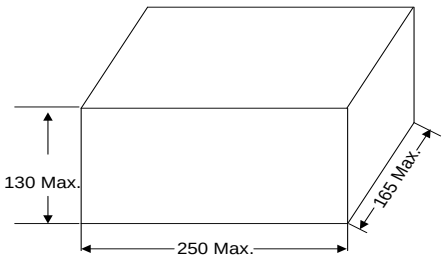
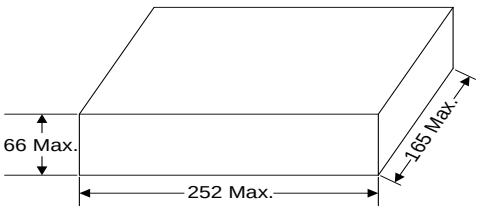
● Outside Kink Lead



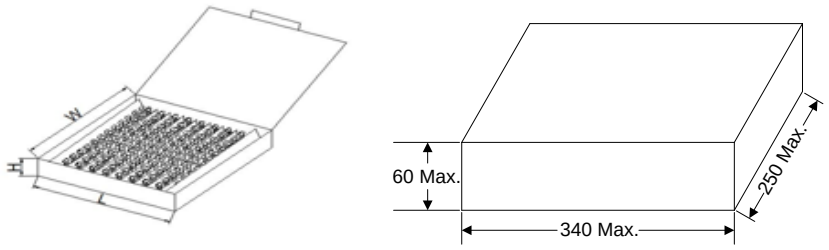
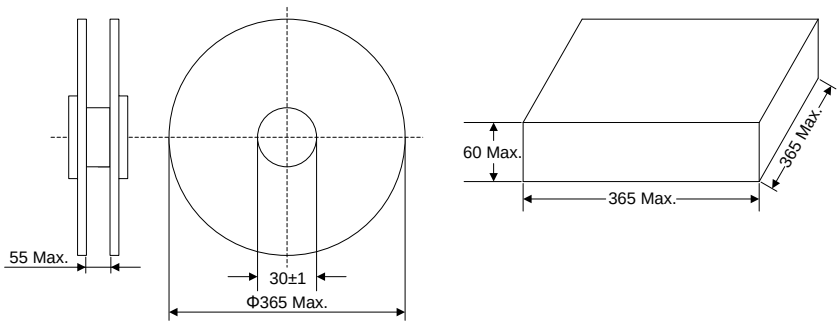
Symbol	Dimension (mm)
P	25.4±1.0
P0	12.7±1.0
P1	8.95±0.7
P2	12.7±1.3
F	7.5±0.8
h	0±4
W	18.0±1.0
W0	12.0±1.0
W1	9.0±0.5
W2	3.0max
H0	16.0±1.0
I	2.0max
D0	4.0±0.2
t	0.6±0.3
B	40max

■ Quantity

● Bulk Packing

Packaging Dimensions (Unit: mm)	Voltage Type	Quantity
In bulk for Terminals Untrimmed Products 	201K~621K	500pcs/bag, 4bags/box
	681K~911K	400pcs/bag, 4bags/box
In bulk for Terminals Trimmed Products 	201K~621K	500pcs/bag, 4bags/box
	681K~911K	400pcs/bag, 4bags/box

- **Reel Packing**

Packaging Dimensions (Unit: mm)	Voltage Type	P0：12.7mm (pcs/box)	P0：15.0mm (pcs/box)
Tape & Box 	201K-241K	750	1000
	271K-391K	600	1000
	431K-621K	500	750
	681K-751K	300	600
	781K-911K	300	500
Tape & Reel 	201K-391K	1000	1000
	431K-621K	750	750
	681K-751K	500	750
	781K-911K	500	500

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