

# Disk Varistor/SMD Molded Varistor

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### Disk Varistor

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# SMD Molded Varistor

- Products Overview
- “MD” Series
- Packing & Dimension



## Products Overview

INR

### ● Construction

1. Cylindrical varistor element, encapsulated
2. Encapsulation : Thermoplast, Flame-retardant
3. Termination : Soldered Ni-Fe alloy

### ● Features

1. Large with standing surge current capability in compact size
2. Excellent response against high steep surge voltage
3. Low clamping voltage for better surge protection

### ● Applications

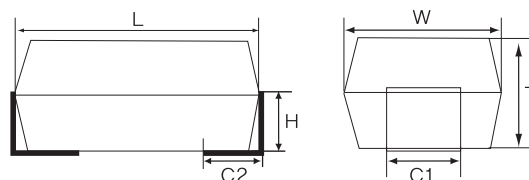
1. Suppression for inductive switching or other transient events such as surge voltage at the board level
2. Provide on-board transient voltage protection of IC and transistors

### ● Ordering Information

INR	32	MD	271	K
①	②	③	④	⑤

- ① Symbol : AMOTECH
- ② Dimensions
- ③ Design : SMD molded varistor
- ④ Maximum allowable voltage : Working voltage  
110 = 11VAC    500 = 50VAC  
271 = 275VAC    171 = 175VAC
- ⑤ Tolerance of working voltage:  
J :  $\pm 5\%$ , K :  $\pm 10\%$ , L :  $\pm 15\%$  M :  $\pm 20\%$

### ● Shape & Dimension



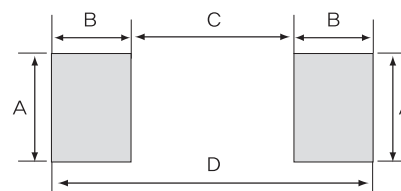
(mm)

Type	L	W	T	C1	C2	H
INR32MD110~171	8.0 $\pm$ 0.3	6.3 $\pm$ 0.3	3.2 $\pm$ 0.3	3.0 $\pm$ 0.3	1.7 $\pm$ 0.3	1.7 $\pm$ 0.3
INR32MD211~301	8.0 $\pm$ 0.3	6.3 $\pm$ 0.3	4.5 $\pm$ 0.3	3.0 $\pm$ 0.3	1.7 $\pm$ 0.3	2.3 $\pm$ 0.3
INR40MD110~171	10.2 $\pm$ 0.3	8.0 $\pm$ 0.3	3.2 $\pm$ 0.3	3.0 $\pm$ 0.3	1.7 $\pm$ 0.3	1.7 $\pm$ 0.3
INR40MD211~301	10.2 $\pm$ 0.3	8.0 $\pm$ 0.3	4.5 $\pm$ 0.3	3.0 $\pm$ 0.3	1.7 $\pm$ 0.3	2.3 $\pm$ 0.3

### ● Recommended Solder Pad Layout

(mm)

Type	A	B	C	D
INR32MD110~171	3.5	2.8	4.5	10.1
INR32MD211~301	3.5	2.8	4.5	10.1
INR40MD110~171	3.5	2.8	4.5	
INR40MD211~301	3.5	2.8	4.5	10.1



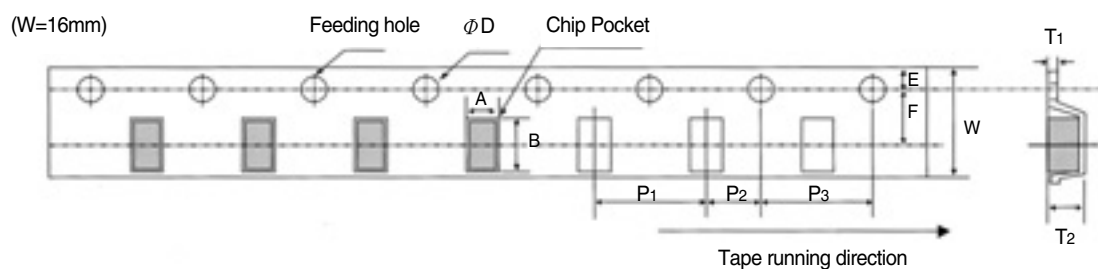
**● Electrical Characteristics**

Part Number	Working Voltage		Varistor Voltage	Clamping Voltage	Transient Energy	Peak Current	Capacitance
	(VAC)	(VDC)	(V:1mA Dc)	(VC* Max)	(J)	(A)	(pF@1kHz)
	< 50 $\mu$ A			8/20 $\mu$ s	10/1000 $\mu$ s	8/20 $\mu$ s	1kHz
INR32MD110	11	14	18 (16~20)	40	0.3	100	2,200
INR40MD110	11	14	18 (16~20)	36	0.8	250	5,000
INR32MD140	14	18	22 (20~24)	48	0.4	100	2,000
INR40MD140	14	18	22 (20~24)	43	0.9	250	4,200
INR32MD170	17	22	27 (24~30)	60	0.5	100	1,800
INR40MD170	17	22	27 (24~30)	53	1.0	250	3,600
INR32MD200	20	26	33 (30~36)	73	0.6	100	1,400
INR40MD200	20	26	33 (30~36)	65	1.2	250	3,200
INR32MD250	25	31	39 (35~43)	86	0.8	100	1,200
INR40MD250	25	31	39 (35~43)	77	1.5	250	2,700
INR32MD300	30	38	47 (42~52)	104	1.0	100	1,000
INR40MD300	30	38	47 (42~52)	93	1.8	250	2,200
INR32MD350	35	45	56 (50~62)	123	1	100	900
INR40MD350	35	45	56 (50~62)	110	2.2	250	2,000
INR32MD400	40	56	68 (61~75)	150	1.2	100	600
INR40MD400	40	56	68 (61~75)	135	2.5	250	1,600
INR32MD500	50	65	82 (74~90)	145	1.7	400	350
INR40MD500	50	65	82 (74~90)	155	3.5	1,200	900
INR32MD600	60	85	100 (90~110)	175	2.0	400	250
INR40MD600	60	85	100 (90~110)	165	4.0	1,200	800
INR32MD750	75	100	120 (108~132)	210	2.5	400	225
INR40MD750	75	100	120 (108~132)	200	5	1,200	600
INR32MD950	95	125	150 (135~165)	260	3	400	180
INR40MD950	95	125	150 (135~165)	250	6.0	1,200	500
INR32MD111	115	150	180 (162~198)	315	3.5	400	160
INR40MD111	115	150	180 (162~198)	300	8.0	1,200	500
INR32MD131	130	170	200 (180~220)	355	4.0	400	150
INR40MD131	130	170	200 (180~220)	340	10.0	1,200	400
INR32MD141	140	180	220 (195~242)	380	4.5	400	140
INR40MD141	140	180	220 (195~242)	360	10	1,200	400
INR32MD151	150	200	240 (216~264)	415	5	400	120
INR40MD151	150	200	240 (216~264)	395	10.0	1,200	300
INR31MD171	175	225	270 (243~297)	475	6.0	400	110
INR40MD171	175	225	270 (243~297)	455	12.0	1,200	300
INR32MD211	210	275	330 (297~363)	580	6.5	400	100
INR40MD211	210	275	330 (297~363)	550	14.0	1,200	250
INR32MD231	230	300	360 (324~396)	620	7.5	400	90
INR40MD231	230	300	360 (324~396)	595	15	1,200	225
INR32MD251	250	320	390 (351~429)	675	8	400	80
INR40MD251	250	320	390 (351~429)	650	17.0	1,200	200
INR32MD271	275	350	430 (387~473)	745	9.0	400	70
INR40MD271	275	350	430 (387~473)	710	20.0	1,200	175
INR32MD301	300	385	470 (423~517)	810	10.0	400	60
INR40MD301	300	385	470 (423~517)	775	20.0	1,200	150
INR32MD141	440	590	710 (639~781)	1,180	10.0	400	40
INR40MD141	400	590	710 (639~781)	1,145	25.0	1,200	95

## Packing & Dimension

INR

### ● Packing Specifications

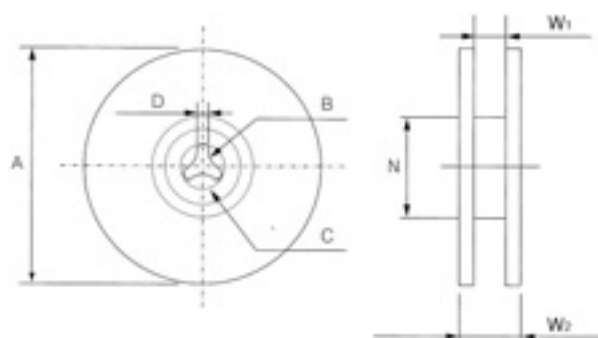


Dimensions in mm

Dimensions(mm)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	$\phi D$	T <sub>1</sub> (max.)	T <sub>2</sub>
32MD	7.0±0.2	8.7±0.2	16.0±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1	1.5±0.1,0	0.6	6.5max
40MD	8.6±0.2	10.6±0.2	16.0±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1	1.5±0.1,0	0.6	6.5max

### ● Reel Dimensions

#### ● Reel



Type size	A <sub>max</sub>	B	C <sub>min</sub>	D <sub>min</sub>	N <sub>min</sub>	W <sub>1</sub>	W <sub>2</sub>
Dimension(mm)	382 max.	13.0±0.2	20.2	1.5	50	16.4±2.0	22.4

### ● Packing Quantity

Size Code	Embossed Taping	Bulk
"32MD", "40MD"	2,000 pcs/reel	200 pcs/bag



# Disk Varistor

- Products Overview
- Explanation of Part Number
- “D” Series (5D, 7D, 10D, 14D, 20D)
- High Energy “S” Series (5D, 7D, 10D, 14D, 20D)
- “HC” Series
- “AUTO” Series
- “AUTO (PT)” Series
- Taping Specifications
- Cutting Specifications
- Application



### • Description

INR Varistor is a non-linear resistance material in which the current varies as a power of the applied voltage. Voltage sensitive varistors have been used to great advance in many important application in the electrical-power, communications and electronic industries.

INR Varistors are made from electrical grade ZINC OXIDE.

Special shapes that can be produced by pressure molding or extrusion are also available.

- \* Suppression of mains-borne transients in consumer and industrial equipmet.
- \* Suppression of internally-generated spikes in electronic ciecuity.
- \* Suppression of line transients in telephony equipment.

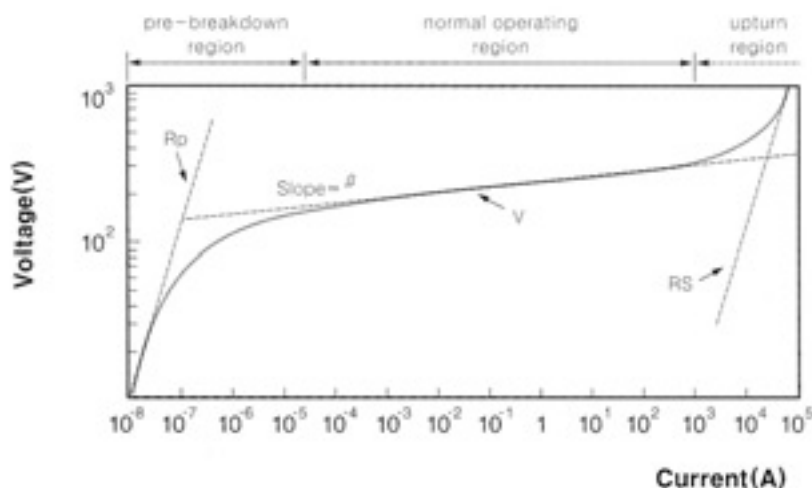
### • Features

1. Wide voltage/energy range
2. Excellent clamp ratio
3. Fast response time
4. Low stand by power
5. No follow-on current
6. Low leakage current
7. Symmetric V-I Characteristics
8. Low series resistance

### • Explanation

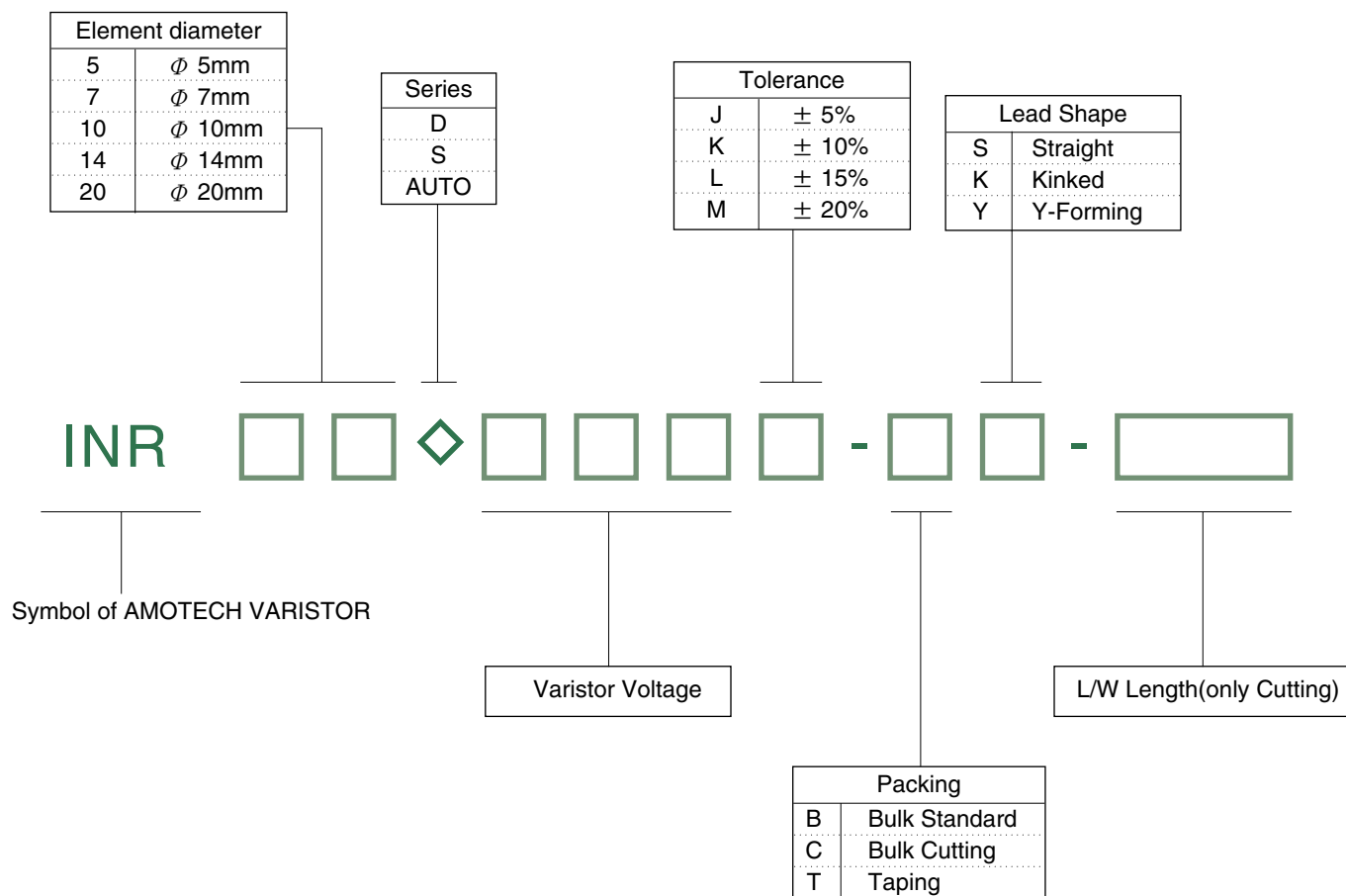
The crystal structure of a varistor has no directionality therefore Varistors are bipolar devices with symmetrical, sharp voltage breakdown characteristics, they exhibit an electrical behaviour similar to back-to-back Zener Diodes. Zener Diode can be used in negative polarity, so Zener Diode can also be used in both polarities to two back-to-back diodes, but cost increases.

Varistor electrical characeristics are conventionally displayed the log-log format for the purpose of expression of the characteristics. This type of display is known as the "V-I Curve" or "Characteristic Curve". The V-I Curve has three distinct regions.

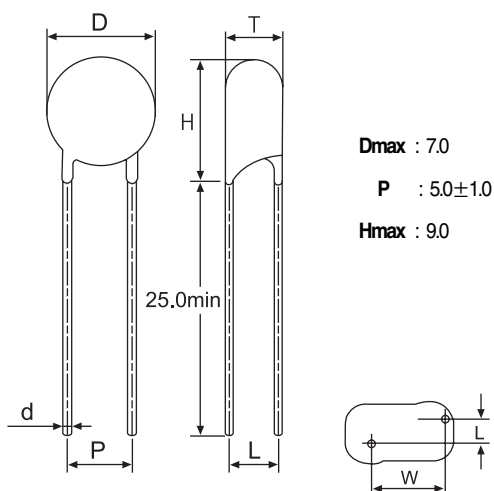


## Explanation of Part Number

INR



## ● Dimension in mm



Part No.	Tmax.	Part No.	Tmax.
INR5D180K	3.7	INR5D201K	4.1
INR5D220K	3.8	INR5D221K	4.2
INR5D270K	4.0	INR5D241K	4.3
INR5D330K	4.2	INR5D271K	4.5
INR5D390K	4.4	INR5D331K	4.8
INR5D470K	4.7	INR5D361K	5.0
INR5D560K	5.1	INR5D391K	5.2
INR5D680K	5.5	INR5D431K	5.4
INR5D820K	3.5	INR5D471K	5.6
INR5D101K	3.6	INR5D511K	5.8
INR5D121K	3.7	INR5D561K	6.0
INR5D151K	3.8	INR5D621K	6.2
INR5D181K	4.0	—	—

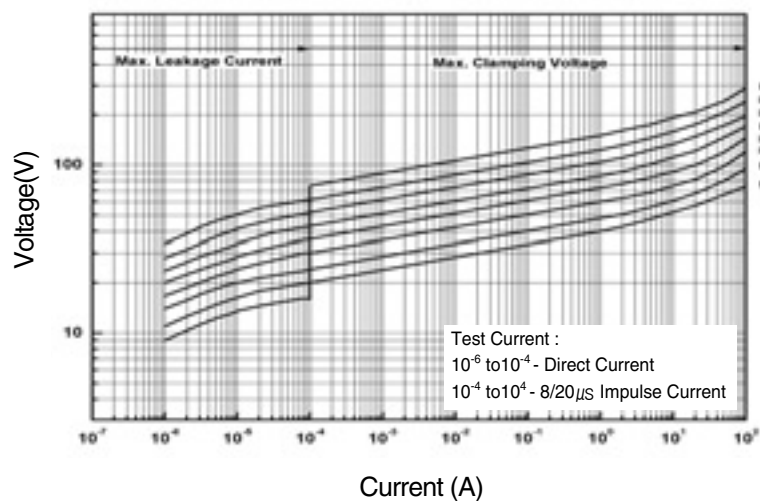
## ● Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR5D180K	18 ( 16 ~ 20 )	11	14	40	1	0.01	0.3	100	2,200
INR5D220K	22 ( 20 ~ 24 )	14	18	48	1	0.01	0.4	100	2,000
INR5D270K	27 ( 24 ~ 30 )	17	22	60	1	0.01	0.5	100	1,800
INR5D330K	33 ( 30 ~ 36 )	20	26	73	1	0.01	0.6	100	1,400
INR5D390K	39 ( 35 ~ 43 )	25	31	86	1	0.01	0.8	100	1,200
INR5D470K	47 ( 42 ~ 52 )	30	38	104	1	0.01	1.0	100	1,000
INR5D560K	56 ( 50 ~ 62 )	35	45	123	1	0.01	1.0	100	900
INR5D680K	68 ( 61 ~ 75 )	40	56	150	1	0.01	1.2	100	600
INR5D820K	82 ( 74 ~ 90 )	50	65	145	5	0.1	1.7	400	350
INR5D101K	100 ( 90 ~ 110 )	60	85	175	5	0.1	2.0	400	250
INR5D121K	120 ( 108 ~ 132 )	75	100	210	5	0.1	2.5	400	225
INR5D151K	150 ( 135 ~ 165 )	95	125	260	5	0.1	3.0	400	180
INR5D181K	180 ( 162 ~ 198 )	115	150	315	5	0.1	3.5	400	160
INR5D201K	200 ( 180 ~ 220 )	130	170	355	5	0.1	4.0	400	150
INR5D221K	220 ( 198 ~ 242 )	140	180	380	5	0.1	4.5	400	140
INR5D241K	240 ( 216 ~ 264 )	150	200	415	5	0.1	5.0	400	120
INR5D271K	270 ( 243 ~ 297 )	175	225	475	5	0.1	6.0	400	110
INR5D331K	330 ( 297 ~ 363 )	210	275	580	5	0.1	6.5	400	100
INR5D361K	360 ( 324 ~ 396 )	230	300	620	5	0.1	7.5	400	90
INR5D391K	390 ( 351 ~ 429 )	250	320	675	5	0.1	8	400	80
INR5D431K	430 ( 387 ~ 473 )	275	350	745	5	0.1	9	400	70
INR5D471K	470 ( 423 ~ 517 )	300	385	810	5	0.1	10	400	60
INR5D511K	510 ( 459 ~ 561 )	320	415	845	5	0.1	10	400	60
INR5D561K	560 ( 504 ~ 616 )	350	460	925	5	0.1	11	400	50
INR5D621K	620 ( 558 ~ 682 )	385	505	1,025	5	0.1	11	400	40

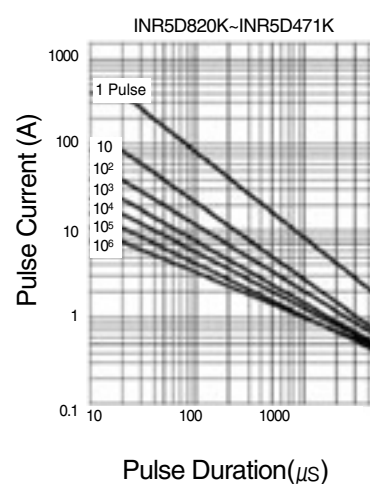
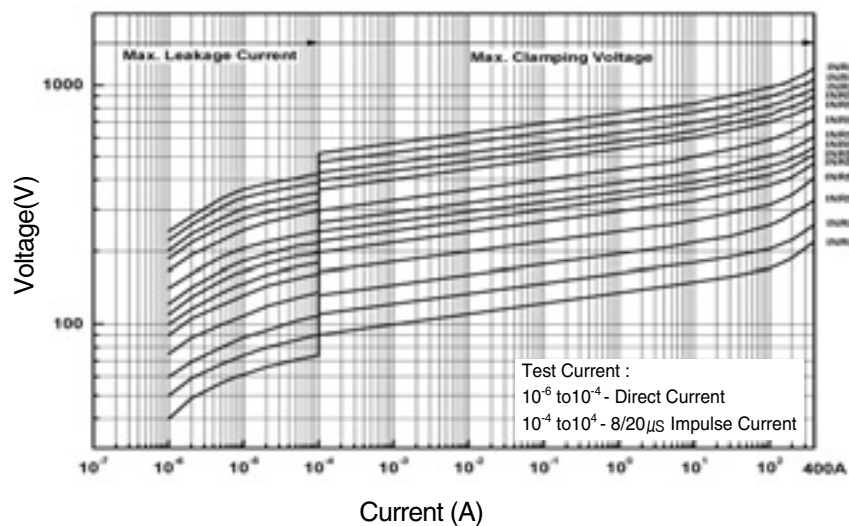
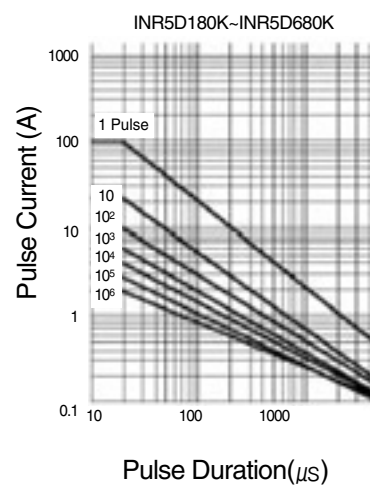
※ Design, Specifications are subject to change without notice.

- Typical Characteristics

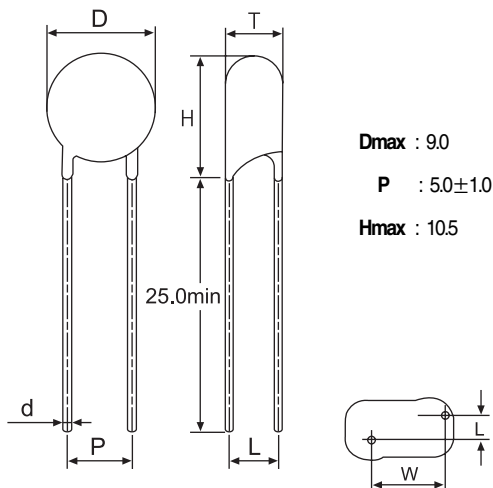
- Voltage VS. Current



- Impulse



● Dimension in mm



Part No.	Tmax.	Part No.	Tmax.
INR7D180K	3.7	INR7D241K	4.3
INR7D220K	3.8	INR7D271K	4.5
INR7D270K	4.0	INR7D331K	4.8
INR7D330K	4.2	INR7D361K	5.0
INR7D390K	4.4	INR7D391K	5.2
INR7D470K	4.7	INR7D431K	5.4
INR7D560K	5.1	INR7D471K	5.6
INR7D680K	5.5	INR7D511K	5.8
INR7D820K	3.5	INR7D561K	6.0
INR7D101K	3.6	INR7D621K	6.2
INR7D121K	3.7	INR7D681K	6.2
INR7D151K	3.8	INR7D751K	6.4
INR7D181K	4.0	INR7D781K	6.6
INR7D201K	4.1	INR7D821K	6.8
INR7D221K	4.2	—	—

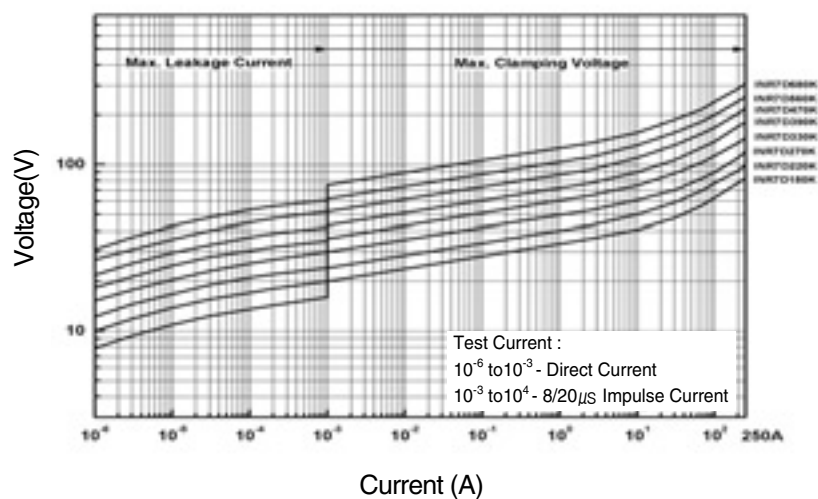
● Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR7D180K	18 ( 16 ~ 20 )	11	14	36	2.5	0.02	0.8	250	5,000
INR7D220K	22 ( 20 ~ 24 )	14	18	43	2.5	0.02	0.9	250	4,200
INR7D270K	27 ( 24 ~ 30 )	17	22	53	2.5	0.02	1.0	250	3,600
INR7D330K	33 ( 30 ~ 36 )	20	26	65	2.5	0.02	1.2	250	3,200
INR7D390K	39 ( 35 ~ 43 )	25	31	77	2.5	0.02	1.5	250	2,700
INR7D470K	47 ( 42 ~ 52 )	30	38	93	2.5	0.02	1.8	250	2,200
INR7D560K	56 ( 50 ~ 62 )	35	45	110	2.5	0.02	2.2	250	2,000
INR7D680K	68 ( 61 ~ 75 )	40	56	135	2.5	0.02	2.5	250	1,600
INR7D820K	82 ( 74 ~ 90 )	50	65	155	10	0.25	3.5	1,200	900
INR7D101K	100 ( 90 ~ 110 )	60	85	165	10	0.25	4	1,200	800
INR7D121K	120 ( 108 ~ 132 )	75	100	200	10	0.25	5	1,200	600
INR7D151K	150 ( 135 ~ 165 )	95	125	250	10	0.25	6	1,200	500
INR7D181K	180 ( 162 ~ 198 )	115	150	300	10	0.25	8	1,200	500
INR7D201K	200 ( 180 ~ 220 )	130	170	340	10	0.25	10	1,200	400
INR7D221K	220 ( 198 ~ 242 )	140	180	360	10	0.25	10	1,200	400
INR7D241K	240 ( 216 ~ 264 )	150	200	395	10	0.25	10	1,200	300
INR7D271K	270 ( 243 ~ 297 )	175	225	455	10	0.25	12	1,200	300
INR7D331K	330 ( 297 ~ 363 )	210	275	550	10	0.25	14	1,200	250
INR7D361K	360 ( 324 ~ 396 )	230	300	595	10	0.25	15	1,200	225
INR7D391K	390 ( 351 ~ 429 )	250	320	650	10	0.25	17	1,200	200
INR7D431K	430 ( 387 ~ 473 )	275	350	710	10	0.25	20	1,200	175
INR7D471K	470 ( 423 ~ 517 )	300	385	775	10	0.25	20	1,200	150
INR7D511K	510 ( 459 ~ 561 )	320	415	845	10	0.4	20	1,200	140
INR7D561K	560 ( 504 ~ 616 )	350	460	925	10	0.4	22	1,200	130
INR7D621K	620 ( 558 ~ 616 )	385	505	1,025	10	0.4	22	1,200	120
INR7D681K	680 ( 612 ~ 748 )	420	560	1,120	10	0.4	24	1,200	110
INR7D751K	750 ( 675 ~ 825 )	460	615	1,240	10	0.4	25	1,200	100
INR7D781K	780 ( 702 ~ 858 )	485	640	1,290	10	0.4	25	1,200	90
INR7D821K	820 ( 738 ~ 902 )	510	670	1,335	10	0.4	27	1,200	80

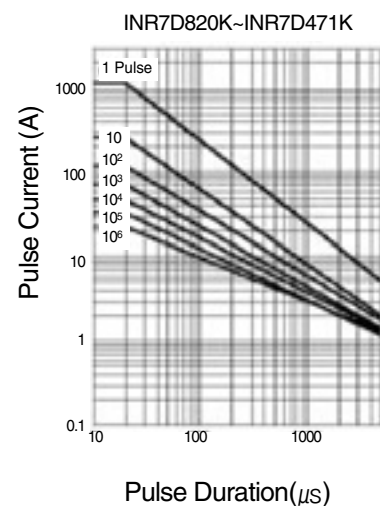
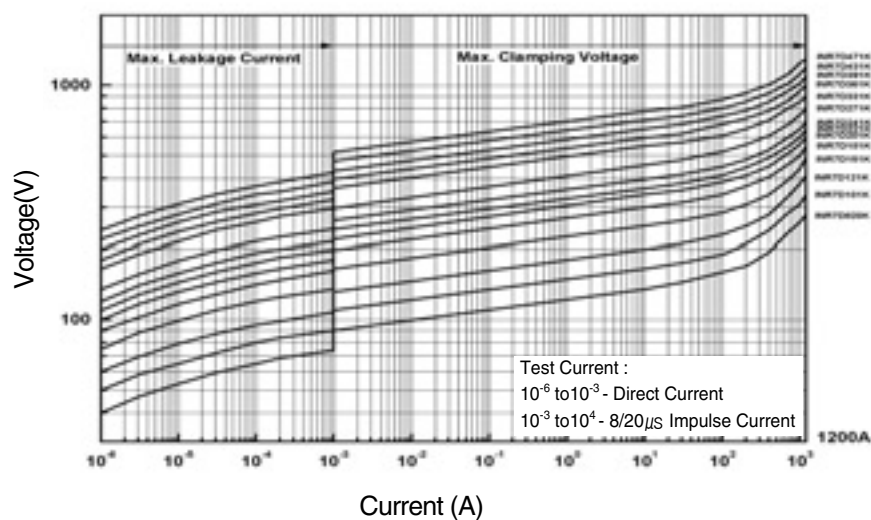
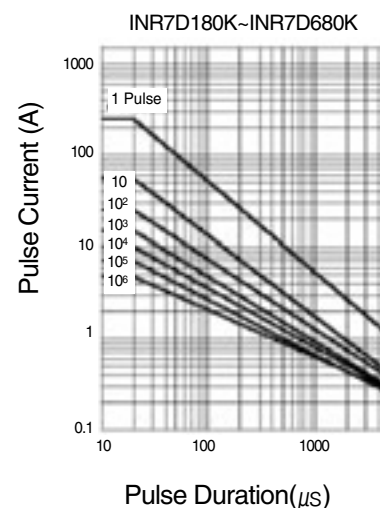
※ Design, Specifications are subject to change without notice.

• Typical Characteristics

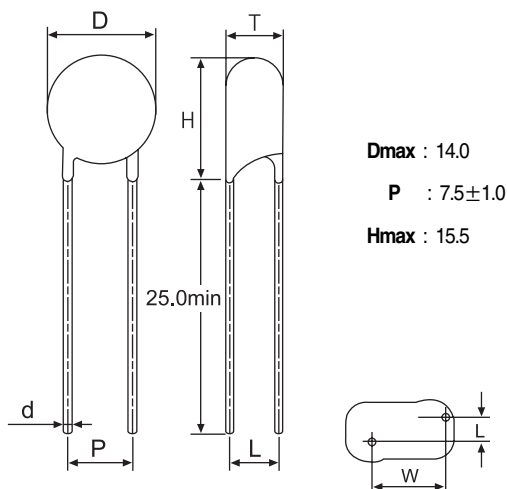
• Voltage VS. Current



• Impulse



● Dimensions in mm



Part No.	Tmax.	Part No.	Tmax.
INR10D180K	4.2	INR10D271K	5.0
INR10D220K	4.3	INR10D331K	5.3
INR10D270K	4.5	INR10D361K	5.5
INR10D330K	4.7	INR10D391K	5.7
INR10D390K	4.9	INR10D431K	5.9
INR10D470K	5.2	INR10D471K	6.1
INR10D560K	5.6	INR10D561K	6.6
INR10D680K	6.0	INR10D621K	6.9
INR10D820K	4.0	INR10D681K	7.3
INR10D101K	4.1	INR10D751K	7.7
INR10D121K	4.2	INR10D781K	7.8
INR10D151K	4.3	INR10D821K	6.3
INR10D181K	4.5	INR10D911K	6.6
INR10D201K	4.6	INR10D102K	6.9
INR10D221K	4.7	INR10D112K	7.3
INR10D241K	4.8	—	—

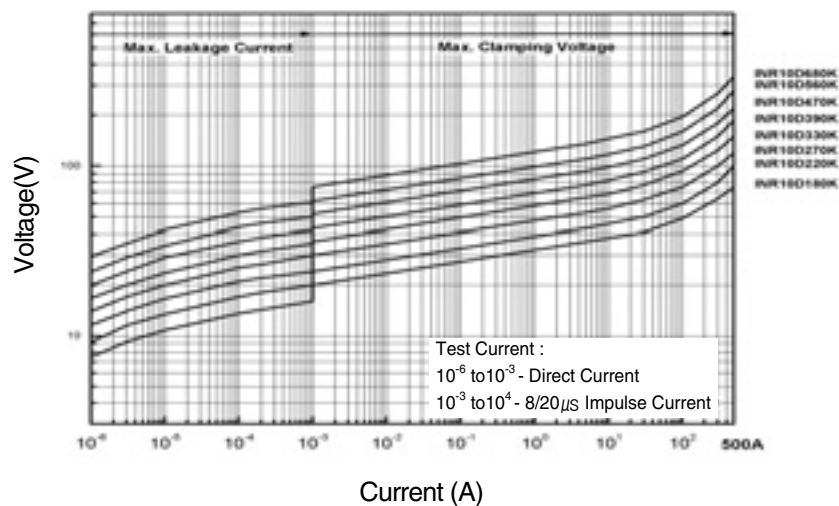
● Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR10D180K	18 ( 16 ~ 20 )	11	14	36	5	0.05	1.5	500	9,500
INR10D220K	22 ( 20 ~ 24 )	14	18	43	5	0.05	2.0	500	8,500
INR10D270K	27 ( 24 ~ 30 )	17	22	53	5	0.05	2.5	500	6,500
INR10D330K	33 ( 30 ~ 36 )	20	26	65	5	0.05	3.0	500	5,500
INR10D390K	39 ( 35 ~ 43 )	25	31	77	5	0.05	3.5	500	4,500
INR10D470K	47 ( 42 ~ 52 )	30	38	93	5	0.05	4.5	500	4,000
INR10D560K	56 ( 50 ~ 62 )	35	45	110	5	0.05	5.5	500	3,500
INR10D680K	68 ( 61 ~ 75 )	40	56	135	5	0.05	6.5	500	3,000
INR10D820K	82 ( 74 ~ 90 )	50	65	155	25	0.4	8	2,500	1,500
INR10D101K	100 ( 90 ~ 110 )	60	85	165	25	0.4	10	2,500	1,400
INR10D121K	120 ( 108 ~ 132 )	75	100	200	25	0.4	12	2,500	1,100
INR10D151K	150 ( 135 ~ 165 )	95	125	250	25	0.4	16	2,500	1,000
INR10D181K	180 ( 162 ~ 198 )	115	150	300	25	0.4	18	2,500	800
INR10D201K	200 ( 180 ~ 220 )	130	170	340	25	0.4	20	2,500	800
INR10D221K	220 ( 198 ~ 242 )	140	180	360	25	0.4	23	2,500	700
INR10D241K	240 ( 216 ~ 264 )	150	200	395	25	0.4	25	2,500	600
INR10D271K	270 ( 243 ~ 297 )	175	225	455	25	0.4	30	2,500	500
INR10D331K	330 ( 297 ~ 363 )	210	275	550	25	0.4	30	2,500	400
INR10D361K	360 ( 324 ~ 396 )	230	300	595	25	0.4	35	2,500	350
INR10D391K	390 ( 351 ~ 429 )	250	320	650	25	0.4	40	2,500	320
INR10D431K	430 ( 387 ~ 473 )	275	350	710	25	0.4	45	2,500	300
INR10D471K	470 ( 423 ~ 517 )	300	385	775	25	0.4	45	2,500	270
INR10D561K	560 ( 504 ~ 616 )	350	455	925	25	0.4	45	2,500	250
INR10D621K	620 ( 558 ~ 682 )	385	505	1,025	25	0.4	45	2,500	225
INR10D681K	680 ( 612 ~ 748 )	420	560	1,120	25	0.4	45	2,500	200
INR10D751K	750 ( 675 ~ 825 )	460	615	1,240	25	0.4	50	2,500	180
INR10D781K	780 ( 702 ~ 858 )	485	640	1,290	25	0.4	50	2,500	180
INR10D821K	820 ( 738 ~ 902 )	510	670	1,355	25	0.4	55	2,500	180
INR10D911K	910 ( 819 ~ 1,001 )	550	745	1,500	25	0.4	60	2,500	150
INR10D102K	1,000 ( 900 ~ 1,100 )	625	825	1,650	25	0.4	65	2,500	140
INR10D112K	1,100 ( 990 ~ 1,210 )	680	895	1,815	25	0.4	70	2,500	130

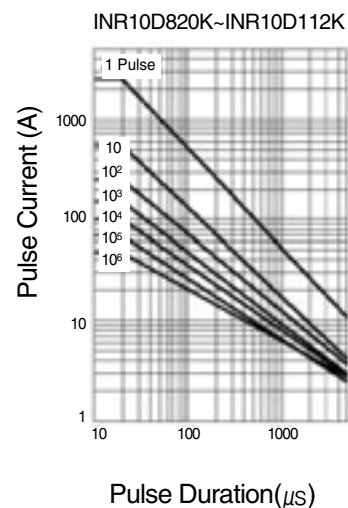
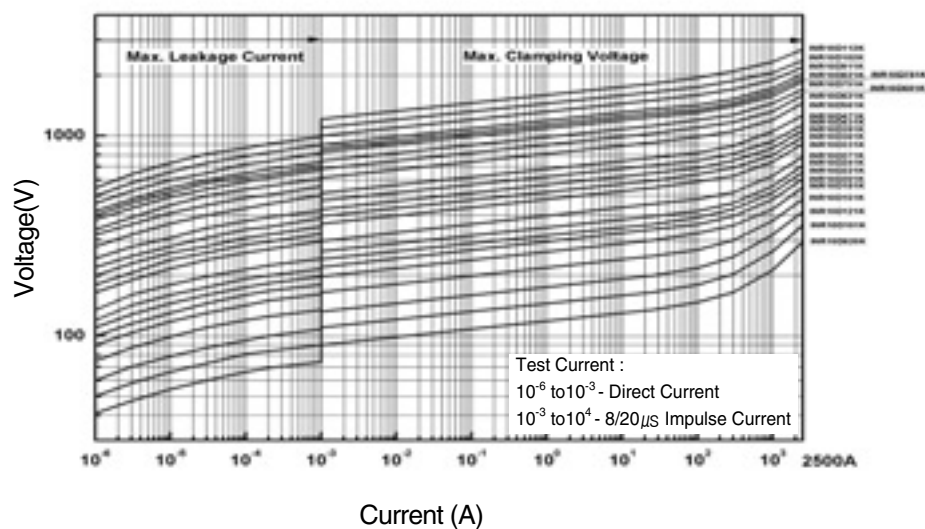
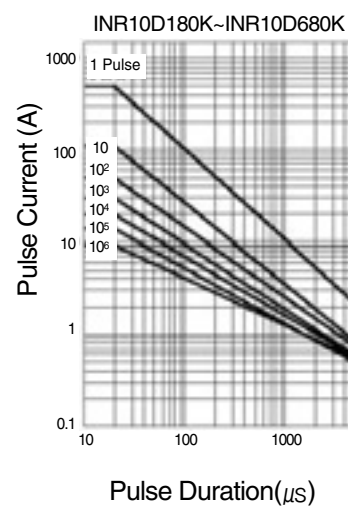
※ Design, Specifications are subject to change without notice.

## • Typical Characteristics

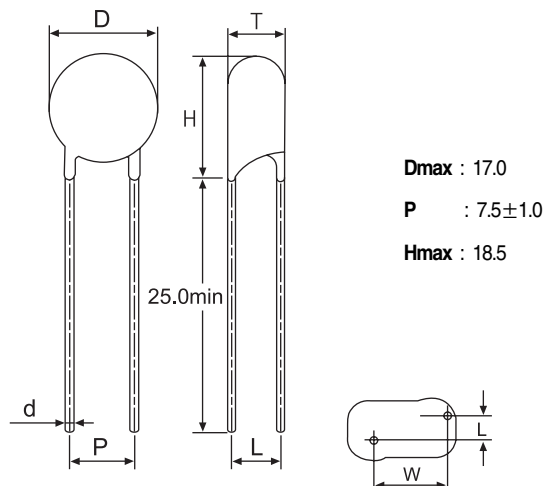
### • Voltage VS. Current



### • Impulse



## ● Dimensions in mm



Part No.	Tmax.	Part No.	Tmax.
INR14D180K	4.2	INR14D271K	5.0
INR14D220K	4.3	INR14D331K	5.3
INR14D270K	4.5	INR14D361K	5.5
INR14D330K	4.7	INR14D391K	5.7
INR14D390K	4.9	INR14D431K	5.9
INR14D470K	5.2	INR14D471K	6.1
INR14D560K	5.6	INR14D561K	6.6
INR14D680K	6.0	INR14D621K	6.9
INR14D820K	4.0	INR14D681K	7.3
INR14D101K	4.1	INR14D751K	7.7
INR14D121K	4.2	INR14D781K	7.8
INR14D151K	4.3	INR14D821K	6.3
INR14D181K	4.5	INR14D911K	6.6
INR14D201K	4.6	INR14D102K	6.9
INR14D221K	4.7	INR14D112K	7.3
INR14D241K	4.8	INR14D182K	9.7

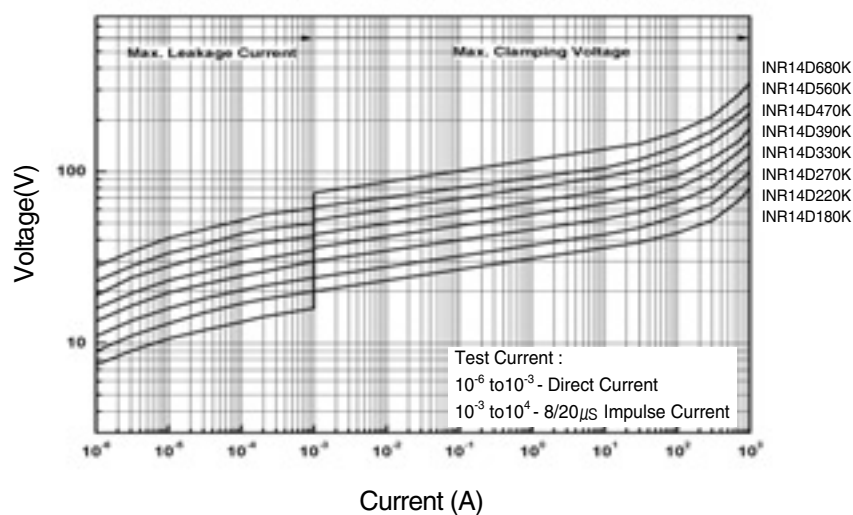
## ● Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR14D180K	18 ( 16 ~ 20 )	11	14	36	10	0.1	3.5	1,000	18,000
INR14D220K	22 ( 20 ~ 24 )	14	18	43	10	0.1	4	1,000	15,000
INR14D270K	27 ( 24 ~ 30 )	17	22	53	10	0.1	5	1,000	13,000
INR14D330K	33 ( 30 ~ 36 )	20	26	65	10	0.1	6	1,000	12,000
INR14D390K	39 ( 35 ~ 43 )	25	31	77	10	0.1	7	1,000	9,000
INR14D470K	47 ( 42 ~ 52 )	30	38	93	10	0.1	8.5	1,000	7,500
INR14D560K	56 ( 50 ~ 62 )	35	45	110	10	0.1	10	1,000	6,500
INR14D680K	68 ( 61 ~ 75 )	40	56	135	10	0.1	12	1,000	4,000
INR14D820K	82 ( 74 ~ 90 )	50	65	155	50	0.6	14	4,500	3,000
INR14D101K	100 ( 90 ~ 110 )	60	85	165	50	0.6	18	4,500	2,800
INR14D121K	120 ( 108 ~ 132 )	75	100	200	50	0.6	20	4,500	2,000
INR14D151K	150 ( 135 ~ 165 )	95	125	250	50	0.6	25	4,500	1,500
INR14D181K	180 ( 162 ~ 198 )	115	150	300	50	0.6	30	4,500	1,200
INR14D201K	200 ( 180 ~ 220 )	130	170	340	50	0.6	35	4,500	1,000
INR14D221K	220 ( 198 ~ 242 )	140	180	360	50	0.6	40	4,500	1,000
INR14D241K	240 ( 216 ~ 264 )	150	200	395	50	0.6	40	4,500	950
INR14D271K	270 ( 243 ~ 297 )	175	225	455	50	0.6	50	4,500	850
INR14D331K	330 ( 297 ~ 363 )	210	275	550	50	0.6	60	4,500	750
INR14D361K	360 ( 324 ~ 396 )	230	300	595	50	0.6	65	4,500	650
INR14D391K	390 ( 351 ~ 429 )	250	320	650	50	0.6	70	4,500	600
INR14D431K	430 ( 387 ~ 473 )	275	350	710	50	0.6	75	4,500	550
INR14D471K	470 ( 423 ~ 517 )	300	385	775	50	0.6	80	4,500	500
INR14D561K	560 ( 504 ~ 616 )	350	455	925	50	0.6	80	4,500	450
INR14D621K	620 ( 558 ~ 682 )	385	505	1,025	50	0.6	85	4,500	400
INR14D681K	680 ( 612 ~ 748 )	420	560	1,120	50	0.6	90	4,500	350
INR14D751K	750 ( 675 ~ 825 )	460	615	1,240	50	0.6	100	4,500	300
INR14D781K	780 ( 702 ~ 858 )	485	640	1,290	50	0.6	105	4,500	300
INR14D821K	820 ( 738 ~ 902 )	510	670	1,355	50	0.6	110	4,500	250
INR14D911K	910 ( 819 ~ 1,001 )	550	745	1,500	50	0.6	120	4,500	250
INR14D102K	1,000 ( 900 ~ 1,100 )	625	825	1,650	50	0.6	130	4,500	225
INR14D112K	1,100 ( 990 ~ 1,210 )	680	895	1,815	50	0.6	140	4,500	225
INR14D182K	1,800 ( 1,620 ~ 1,980 )	1,000	1,465	2,970	50	0.6	240	4,500	120

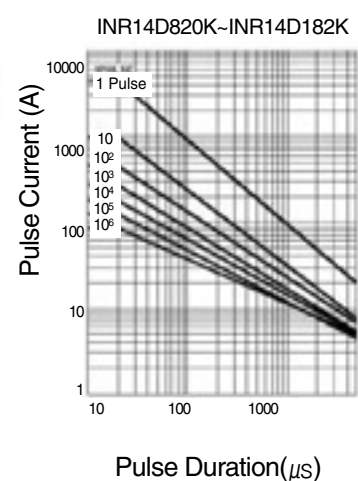
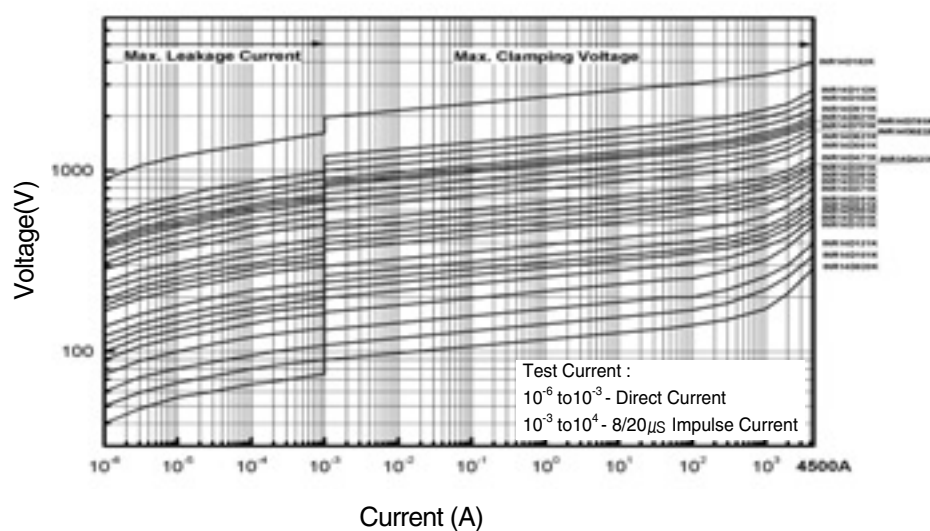
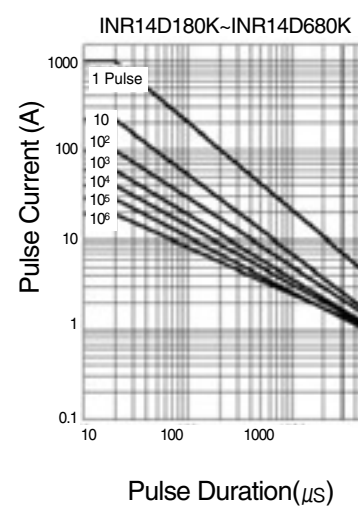
※ Design, Specifications are subject to change without notice.

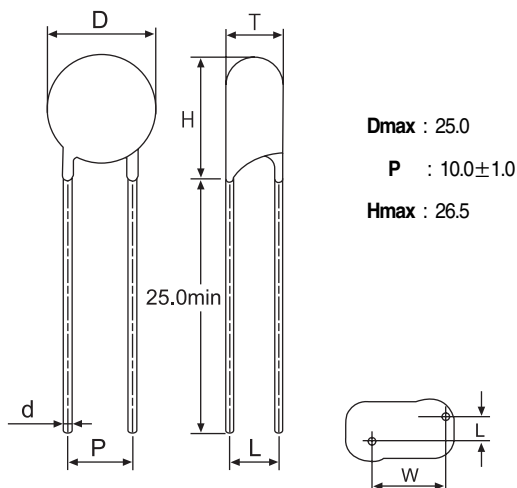
- Typical Characteristics

- Voltage VS. Current



- Impluse



**• Dimensions in mm**


Part No.	Tmax.	Part No.	Tmax.
INR20D180K	4.2	INR20D271K	5.0
INR20D220K	4.3	INR20D331K	5.3
INR20D270K	4.5	INR20D361K	5.5
INR20D330K	4.7	INR20D391K	5.7
INR20D390K	4.9	INR20D431K	5.9
INR20D470K	5.2	INR20D471K	6.1
INR20D560K	5.6	INR20D561K	6.6
INR20D680K	6.0	INR20D621K	6.9
INR20D820K	4.0	INR20D681K	7.3
INR20D101K	4.1	INR20D751K	7.7
INR20D121K	4.2	INR20D781K	7.8
INR20D151K	4.3	INR20D821K	6.3
INR20D181K	4.5	INR20D911K	6.6
INR20D201K	4.6	INR20D102K	6.9
INR20D221K	4.7	INR20D112K	7.3
INR20D241K	4.8	INR20D182K	9.7

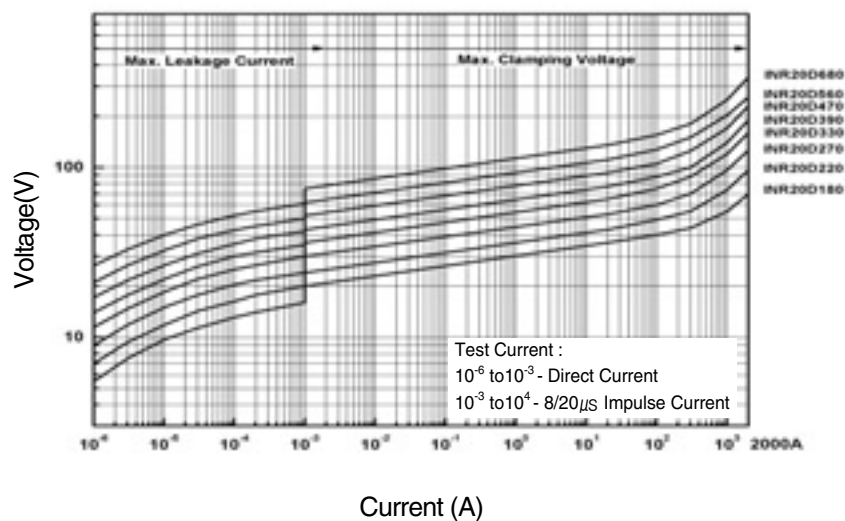
**• Electrical Characteristic**

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR20D180K	18 ( 16 ~ 20 )	11	14	36	20	0.2	10	2,000	40,000
INR20D220K	22 ( 20 ~ 24 )	14	18	43	20	0.2	13	2,000	35,000
INR20D270K	27 ( 24 ~ 30 )	17	22	53	20	0.2	15	2,000	3,000
INR20D330K	33 ( 30 ~ 36 )	20	26	65	20	0.2	20	2,000	2,500
INR20D390K	39 ( 35 ~ 43 )	25	31	77	20	0.2	24	2,000	2,200
INR20D470K	47 ( 42 ~ 52 )	30	38	93	20	0.2	30	2,000	1,800
INR20D560K	56 ( 50 ~ 62 )	35	45	110	20	0.2	35	2,000	1,200
INR20D680K	68 ( 61 ~ 75 )	40	56	135	20	0.2	40	2,000	7,500
INR20D820K	82 ( 74 ~ 90 )	50	65	155	100	1	27	6,500	6,000
INR20D101K	100 ( 90 ~ 110 )	60	85	165	100	1	30	6,500	5,000
INR20D121K	120 ( 108 ~ 132 )	75	100	200	100	1	40	6,500	4,000
INR20D151K	150 ( 135 ~ 165 )	95	125	250	100	1	50	6,500	3,500
INR20D181K	180 ( 162 ~ 198 )	115	150	300	100	1	60	6,500	2,700
INR20D201K	200 ( 180 ~ 220 )	130	170	340	100	1	70	6,500	2,500
INR20D221K	220 ( 198 ~ 242 )	140	180	360	100	1	75	6,500	2,250
INR20D241K	240 ( 216 ~ 264 )	150	200	395	100	1	80	6,500	2,000
INR20D271K	270 ( 243 ~ 297 )	175	225	455	100	1	90	6,500	1,800
INR20D331K	330 ( 297 ~ 363 )	210	275	550	100	1	105	6,500	1,600
INR20D361K	360 ( 324 ~ 396 )	230	300	595	100	1	120	6,500	1,400
INR20D391K	390 ( 351 ~ 429 )	250	320	650	100	1	130	6,500	1,200
INR20D431K	430 ( 387 ~ 473 )	275	350	710	100	1	140	6,500	1,000
INR20D471K	470 ( 423 ~ 517 )	300	385	775	100	1	150	6,500	1,000
INR20D561K	560 ( 504 ~ 616 )	350	455	925	100	1	150	6,500	900
INR20D621K	620 ( 558 ~ 682 )	385	505	1,025	100	1	150	6,500	800
INR20D681K	680 ( 612 ~ 748 )	420	560	1,120	100	1	160	6,500	750
INR20D751K	750 ( 675 ~ 825 )	460	615	1,240	100	1	175	6,500	600
INR20D781K	780 ( 702 ~ 858 )	485	640	1,290	100	1	180	6,500	550
INR20D821K	820 ( 738 ~ 902 )	510	670	1,355	100	1	190	6,500	550
INR20D911K	910 ( 819 ~ 1,001 )	550	745	1,500	100	1	215	6,500	500
INR20D102K	1000 ( 900 ~ 1,100 )	625	825	1,650	100	1	230	6,500	400
INR20D112K	1100 ( 990 ~ 1,210 )	680	895	1,815	100	1	250	6,500	350
INR20D182K	1800 ( 1,620 ~ 1,980 )	1,000	1,465	2,970	100	1	400	6,500	250

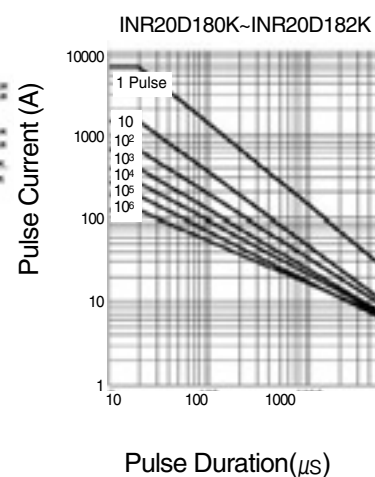
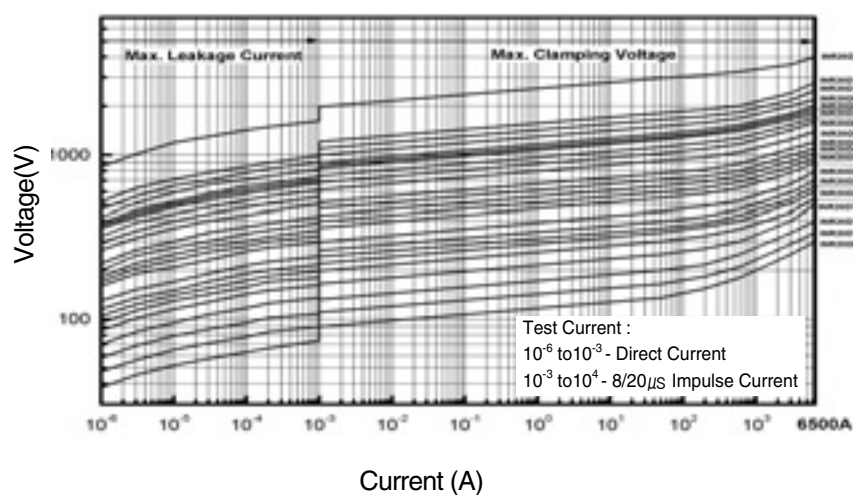
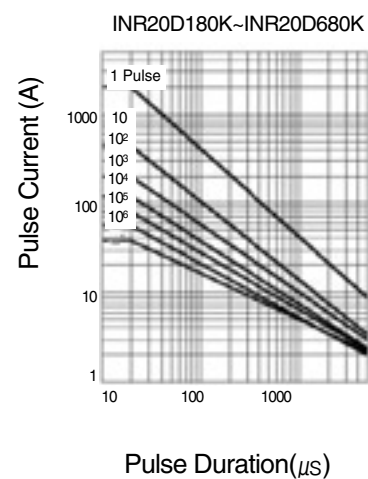
※ Design, Specifications are subject to change without notice.

• Typical Characteristics

• Voltage VS. Current



• Impluse



**• Electrical Characteristic**
**• Series S 5D**

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR5S201K	200 ( 180 ~ 220 )	130	170	355	5	0.1	8.5	800	150
INR5S221K	220 ( 198 ~ 242 )	140	180	380	5	0.1	9.0	800	140
INR5S241K	240 ( 216 ~ 264 )	150	200	415	5	0.1	10.5	800	120
INR5S271K	270 ( 243 ~ 297 )	175	225	475	5	0.1	11	800	110
INR5S331K	330 ( 297 ~ 363 )	210	275	580	5	0.1	13	800	100
INR5S361K	360 ( 324 ~ 396 )	230	300	620	5	0.1	16	800	90
INR5S391K	390 ( 351 ~ 429 )	250	320	675	5	0.1	17	800	80
INR5S431K	430 ( 387 ~ 473 )	275	350	745	5	0.1	20	800	70
INR5S471K	470 ( 423 ~ 517 )	300	385	810	5	0.1	21	800	60

**• Series S 7D**

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR7S201K	200 ( 180 ~ 220 )	130	170	340	10	0.25	17.5	1,750	400
INR7S221K	220 ( 198 ~ 242 )	140	180	360	10	0.25	19	1,750	400
INR7S241K	240 ( 216 ~ 264 )	150	200	395	10	0.25	21	1,750	300
INR7S271K	270 ( 243 ~ 297 )	175	225	455	10	0.25	24	1,750	300
INR7S331K	330 ( 297 ~ 363 )	210	275	550	10	0.25	28	1,750	250
INR7S361K	360 ( 324 ~ 396 )	230	300	595	10	0.25	32	1,750	225
INR7S391K	390 ( 351 ~ 429 )	250	320	650	10	0.25	35	1,750	200
INR7S431K	430 ( 387 ~ 473 )	275	350	710	10	0.25	40	1,750	175
INR7S471K	470 ( 423 ~ 517 )	300	385	775	10	0.25	42	1,750	150

**• Series S 10D**

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	I <sub>p</sub> (A)	(W)	(J)	(A)	pF@1kHz
INR10S201K	200 ( 180 ~ 220 )	130	170	340	25	0.4	35	3,500	800
INR10S221K	220 ( 198 ~ 242 )	140	180	360	25	0.4	39	3,500	700
INR10S241K	240 ( 216 ~ 264 )	150	200	395	25	0.4	42	3,500	600
INR10S271K	270 ( 243 ~ 297 )	175	225	455	25	0.4	49	3,500	500
INR10S331K	330 ( 297 ~ 363 )	210	275	550	25	0.4	58	3,500	400
INR10S361K	360 ( 324 ~ 396 )	230	300	595	25	0.4	65	3,500	350
INR10S391K	390 ( 351 ~ 429 )	250	320	650	25	0.4	70	3,500	320
INR10S431K	430 ( 387 ~ 473 )	275	350	710	25	0.4	80	3,500	300
INR10S471K	470 ( 423 ~ 517 )	300	385	775	25	0.4	85	3,500	270
INR10S561K	560 ( 504 ~ 616 )	350	455	925	25	0.4	85	3,500	250
INR10S621K	620 ( 558 ~ 626 )	385	505	1,025	25	0.4	92	3,500	225
INR10S681K	680 ( 612 ~ 748 )	420	560	1,120	25	0.4	92	3,500	200
INR10S751K	750 ( 675 ~ 825 )	460	615	1,240	25	0.4	100	3,500	180

※ Design, Specifications are subject to change without notice.

## • Series S 14D

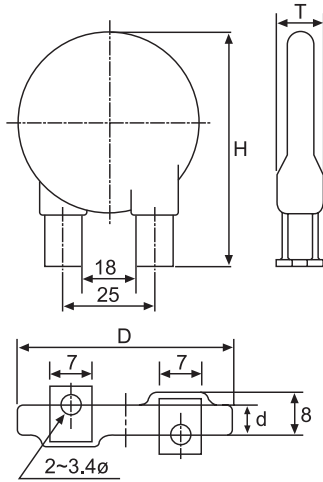
Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	Ip(A)	(W)	(J)	(A)	pF@1kHz
INR14S201K	200 (180 ~ 220)	130	170	340	50	0.6	70	6,000	1,000
INR14S221K	220 (198 ~ 242)	140	180	360	50	0.6	78	6,000	1,000
INR14S241K	240 (216 ~ 264)	150	200	395	50	0.6	84	6,000	950
INR14S271K	270 (243 ~ 297)	175	225	455	50	0.6	99	6,000	850
INR14S331K	330 (297 ~ 363)	210	275	550	50	0.6	115	6,000	750
INR14S361K	360 (324 ~ 396)	230	300	595	50	0.6	130	6,000	650
INR14S391K	390 (351 ~ 429)	250	320	650	50	0.6	140	6,000	600
INR14S431K	430 (387 ~ 473)	275	350	710	50	0.6	155	6,000	550
INR14S471K	470 (423 ~ 517)	300	385	775	50	0.6	175	6,000	500
INR14S561K	560 (504 ~ 616)	350	455	925	50	0.6	175	6,000	450
INR14S621K	620 (558 ~ 626)	385	505	1,025	50	0.6	190	6,000	400
INR14S681K	680 (612 ~ 748)	420	560	1,120	50	0.6	190	6,000	350
INR14S751K	750 (675 ~ 825)	460	615	1,240	50	0.6	210	6,000	300

## • Series S 20D

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s	Capacitance
	DC (V) @ 0.1mA	AC(V)	DC (V)	Max.(V)	Ip(A)	(W)	(J)	(A)	pF@1kHz
INR20S201K	200 (180 ~ 220)	130	170	340	100	1	150	10,000	2,500
INR20S221K	220 (198 ~ 242)	140	180	360	100	1	155	10,000	2,250
INR20S241K	240 (216 ~ 264)	150	200	395	100	1	168	10,000	2,000
INR20S271K	270 (243 ~ 297)	175	225	455	100	1	190	10,000	1,800
INR20S331K	330 (297 ~ 363)	210	275	550	100	1	228	10,000	1,600
INR20S361K	360 (324 ~ 396)	230	300	595	100	1	255	10,000	1,400
INR20S391K	390 (351 ~ 429)	250	320	650	100	1	275	10,000	1,200
INR20S431K	430 (387 ~ 473)	275	350	710	100	1	303	10,000	1,000
INR20S471K	470 (423 ~ 517)	300	385	775	100	1	350	10,000	1,000
INR20S561K	560 (504 ~ 616)	350	455	925	100	1	382	10,000	900
INR20S621K	620 (558 ~ 626)	385	505	1,025	100	1	382	10,000	800
INR20S681K	680 (612 ~ 748)	420	560	1,120	100	1	382	10,000	750
INR20S751K	750 (675 ~ 825)	460	615	1,240	100	1	420	10,000	600

※ Design, Specifications are subject to change without notice.

• Dimensions in mm



<b>D max</b>	32 HC : 36.0
	40HC : 44.0
<b>H max</b>	32HC : 44.0
	40HC : 50.0

Part No.	Tmax.	Part No.	Tmax.
INR32HC201K	6.1	INR40HC201K	7.5
INR32HC241K	5.9	INR40HC241K	7.7
INR32HC271K	5.7	INR40HC271K	7.9
INR32HC361K	5.2	INR40HC361K	8.4
INR32HC391K	5.0	INR40HC391K	8.6
INR32HC431K	4.8	INR40HC431K	8.8
INR32HC471K	4.6	INR40HC471K	9.0
INR32HC511K	4.4	INR40HC511K	9.2
INR32HC681K	3.4	INR40HC681K	10.2
INR32HC751K	3.0	INR40HC751K	10.6
INR32HC821K	2.6	INR40HC821K	11.0
INR32HC911K	2.1	INR40HC911K	11.5
INR32HC102K	1.6	INR40HC102K	12.0

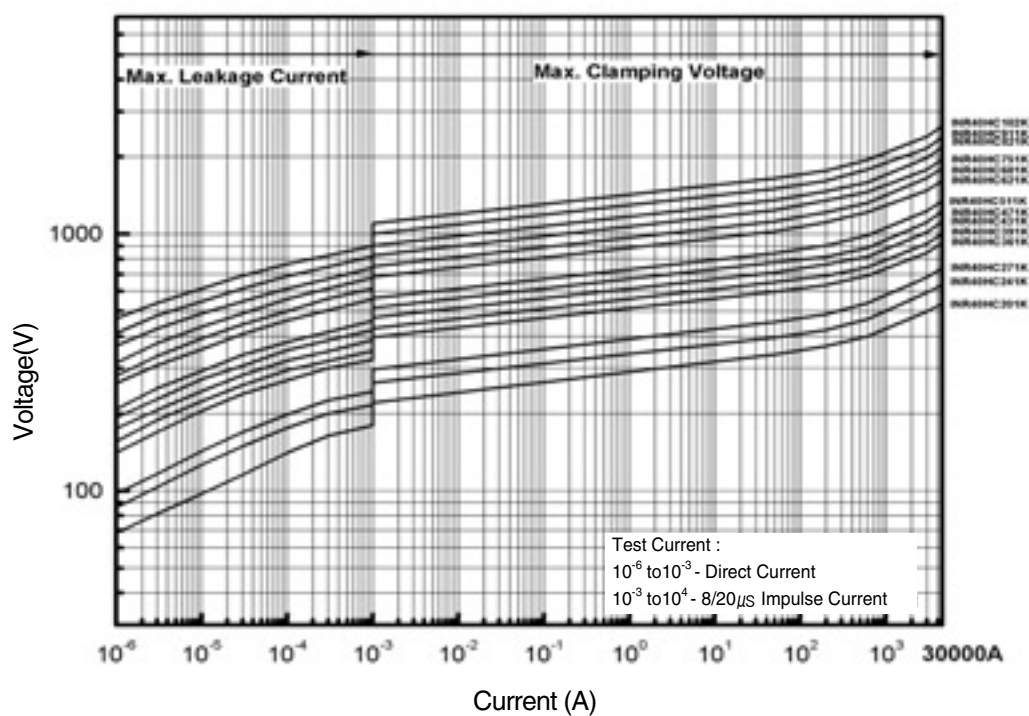
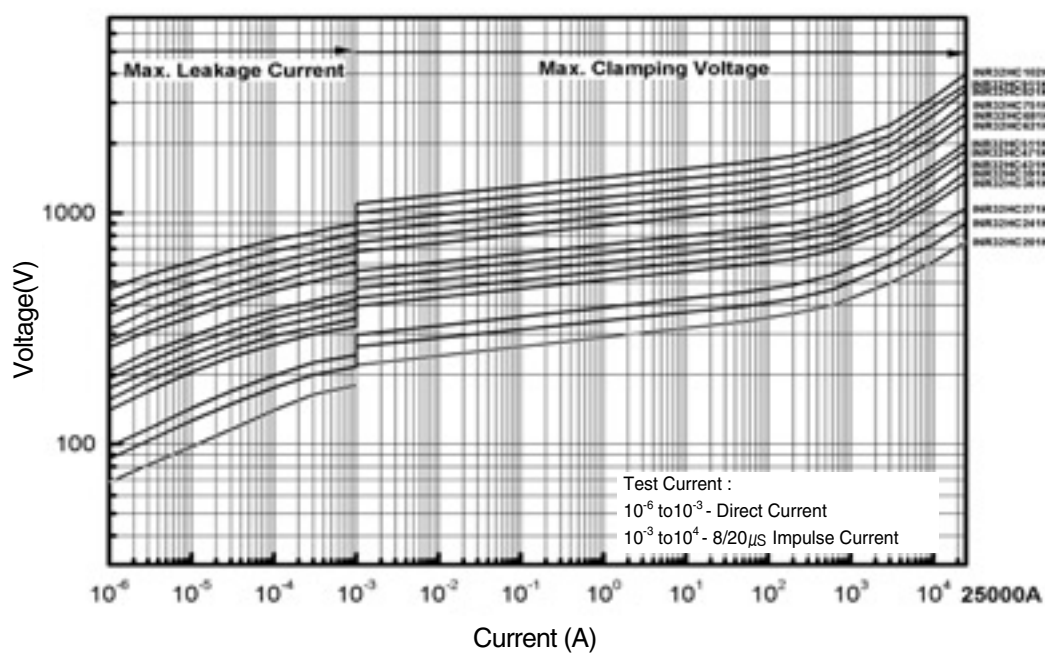
• Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Maximum Energy 10/1,000 $\mu$ s	Peak Current 8/20 $\mu$ s
	DC (V) @ 1mA	AC(V)	DC (V)	Max.(V)	Ip(A)	(J)	(KA)
INR32HC201K	200 ( 180 ~ 220 )	130	170	340	200	210	25
INR32HC241K	240 ( 216 ~ 264 )	150	200	395	200	240	25
INR32HC271K	270 ( 243 ~ 297 )	175	225	455	200	255	25
INR32HC361K	360 ( 324 ~ 396 )	230	300	595	200	325	25
INR32HC391K	390 ( 351 ~ 429 )	250	320	650	200	350	25
INR32HC431K	430 ( 387 ~ 473 )	275	350	710	200	400	25
INR32HC471K	470 ( 423 ~ 517 )	300	385	775	200	405	25
INR32HC511K	510 ( 459 ~ 561 )	320	415	845	200	405	25
INR32HC681K	680 ( 612 ~ 748 )	420	560	1,120	200	415	25
INR32HC751K	750 ( 675 ~ 825 )	460	615	1,240	200	500	25
INR32HC821K	820 ( 738 ~ 902 )	510	670	1,355	200	545	25
INR32HC911K	910 ( 819 ~ 1,001 )	550	745	1,500	200	600	25
INR32HC102K	1,000 ( 900 ~ 1,100 )	625	825	1,650	200	620	25
INR40HC201K	200 ( 180 ~ 220 )	130	170	340	250	260	30
INR40HC241K	240 ( 216 ~ 264 )	150	200	395	250	300	30
INR40HC271K	270 ( 243 ~ 297 )	175	225	455	250	340	30
INR40HC361K	360 ( 324 ~ 396 )	230	300	595	250	405	30
INR40HC391K	390 ( 351 ~ 429 )	250	320	650	250	435	30
INR40HC431K	430 ( 387 ~ 473 )	275	350	710	250	500	30
INR40HC471K	470 ( 423 ~ 517 )	300	385	775	250	505	30
INR40HC511K	510 ( 459 ~ 561 )	320	415	845	250	505	30
INR40HC681K	680 ( 612 ~ 748 )	420	560	1,120	250	560	30
INR40HC751K	750 ( 675 ~ 825 )	460	615	1,240	250	625	30
INR40HC821K	820 ( 738 ~ 902 )	510	670	1,355	250	680	30
INR40HC911K	910 ( 819 ~ 1,001 )	550	745	1,500	250	750	30
INR40HC102K	1,000 ( 900 ~ 1,100 )	625	825	1,650	250	780	30

※ Design, Specifications are subject to change without notice.

- Typical Characteristics

- Voltage VS. Current

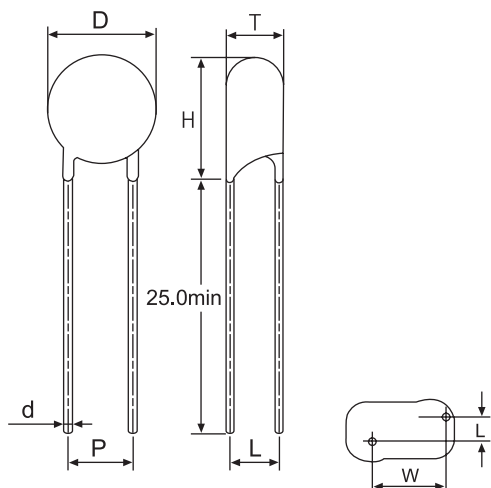


# AMOTECH DISK VARISTOR

INR

Series AUTO

## • Dimensions in mm



Part Number	Dmax.	Tmax.	P	Hmax.
INR10D220K AUTO	14.0	4.8	7.5±1.0	15.5
INR10D270K AUTO		5.6		
INR10D330K AUTO		6.7		
INR10D390K AUTO		7.8		
INR10D470K AUTO		8.5		
INR14D220K AUTO	17.0	4.9	7.5±1.0	18.5
INR14D270K AUTO		6.0		
INR14D330K AUTO		8.2		
INR14D390K AUTO		9.4		
INR14D470K AUTO		10.5		

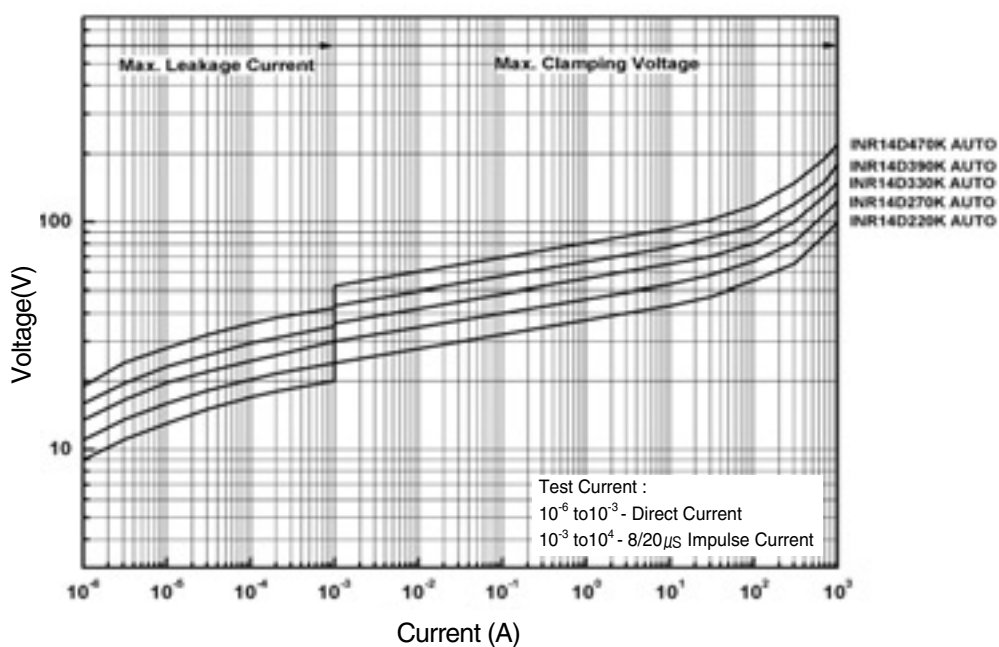
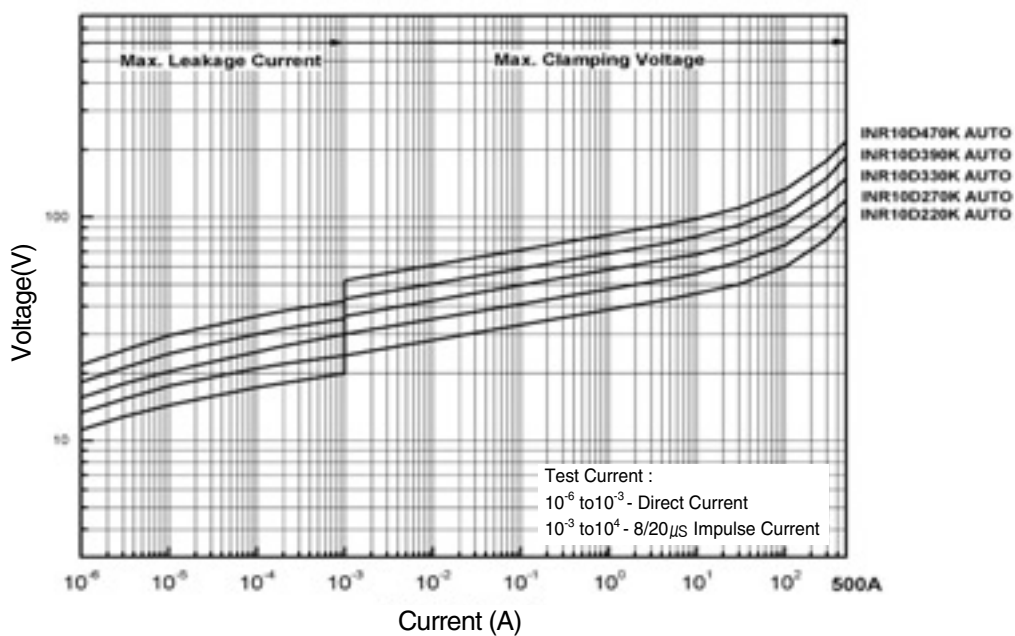
## • Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	VJUMP ( 5min )	Peak Current 8/20 $\mu$ s
	DC (V) @ 1mA	AC (V)	DC (V)	Max.(V)	Ip (A)	(W)	(V)	(A)
INR10D220K AUTO	22 ( 20 ~ 24 )	14	16	43	5	0.05	25	500
INR10D270K AUTO	27 ( 24 ~ 30 )	17	19	53	5	0.05	30	500
INR10D330K AUTO	33 ( 30 ~ 36 )	20	24	65	5	0.05	36	500
INR10D390K AUTO	39 ( 35 ~ 43 )	25	28	77	5	0.05	42	500
INR10D470K AUTO	47 ( 42 ~ 52 )	30	34	93	5	0.05	50	500
INR14D220K AUTO	22 ( 20 ~ 24 )	14	16	43	10	0.1	24	1,000
INR14D270K AUTO	27 ( 24 ~ 30 )	17	19	53	10	0.1	29	1,000
INR14D330K AUTO	33 ( 30 ~ 36 )	20	24	65	10	0.1	36	1,000
INR14D390K AUTO	39 ( 35 ~ 43 )	25	28	77	10	0.1	42	1,000
INR14D470K AUTO	47 ( 42 ~ 52 )	30	34	93	10	0.1	50	1,000

※ Design, Specifications are subject to change without notice.

• Typical Characteristics

• Voltage VS. Current

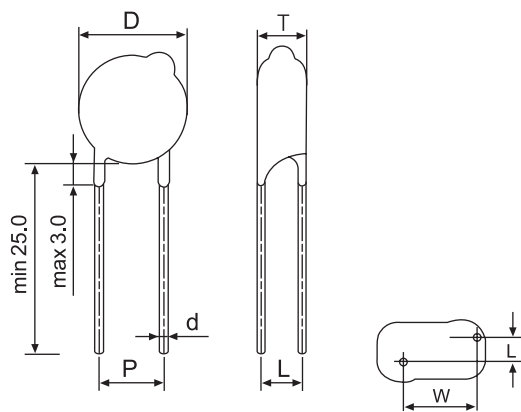


AMOTECH DISK VARISTOR

INR

Series AUTO(PT)

• Dimensions in mm



Part Number	Dmax.	Tmax.	P	Hmax.
INR10D220K AUTO	14.0	8.6	7.5±1.0	15.5
INR10D270K AUTO		9.3		
INR14D220K AUTO	17.0	8.9	7.5±1.0	18.5
INR14D270K AUTO		10.0		

• Electrical Characteristic

Part No.	Varistor Voltage	Maximum Allowable Voltage		Maximum Clamping Voltage		Rated Power	VJUMP ( 5min )	Peak Current 8/20 $\mu$ s
	DC (V) @ 1mA	AC (V)	DC (V)	Max.(V)	Ip (A)	(W)	(V)	(A)
INR10D220K AUTO	22 ( 20 ~ 24 )	14	16	43	5	0.1	25	1,000
INR10D270K AUTO	27 ( 24 ~ 30 )	17	19	53	5	0.1	30	1,000
INR14D220K AUTO	22 ( 20 ~ 24 )	14	16	43	10	0.2	25	2,000
INR14D270K AUTO	27 ( 24 ~ 30 )	17	19	53	10	0.2	30	2,000

※ Design, Specifications are subject to change without notice.

Lead Shape

S	Straight
K	Kinked
Y	Y-Forming

L/W Length(only Cutting)

INR

Element diameter

10	$\phi$ 10mm
14	$\phi$ 14mm

D

Packing

B	Bulk Standard
C	Bulk Cutting

K

Working temperature

1	85℃
2	125℃

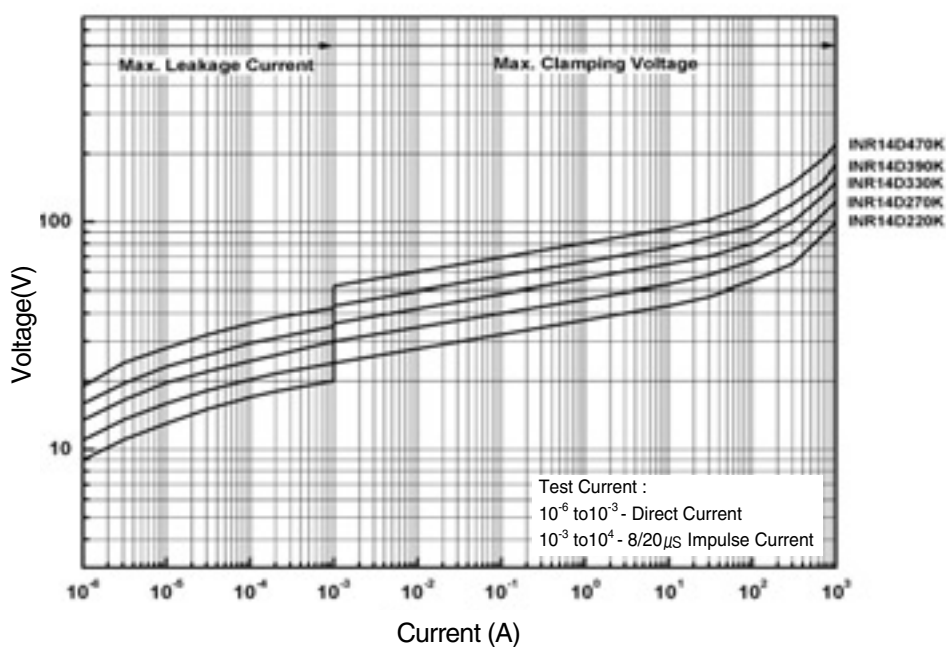
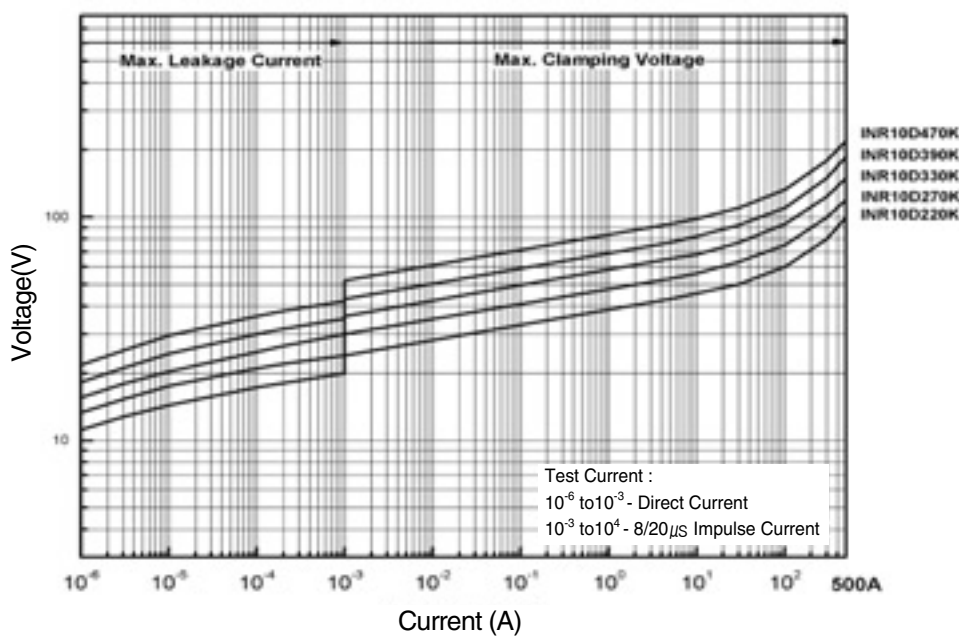
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PT

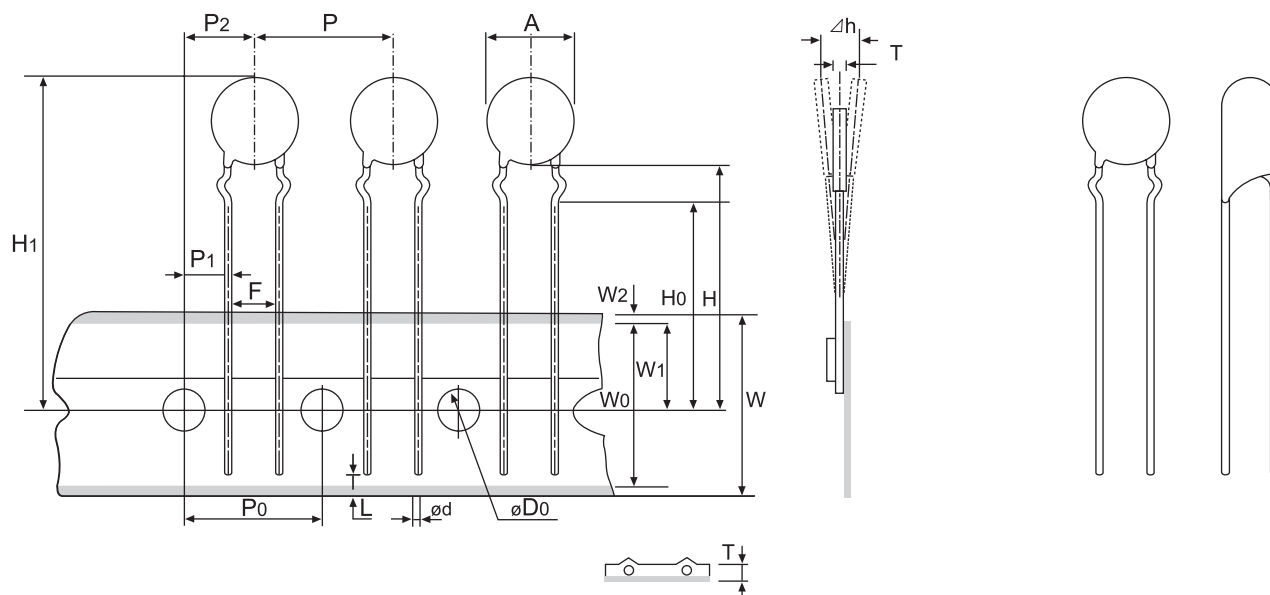
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- Typical Characteristics

- Voltage VS. Current



● Out-Side Kinked Taping Dimensions in mm



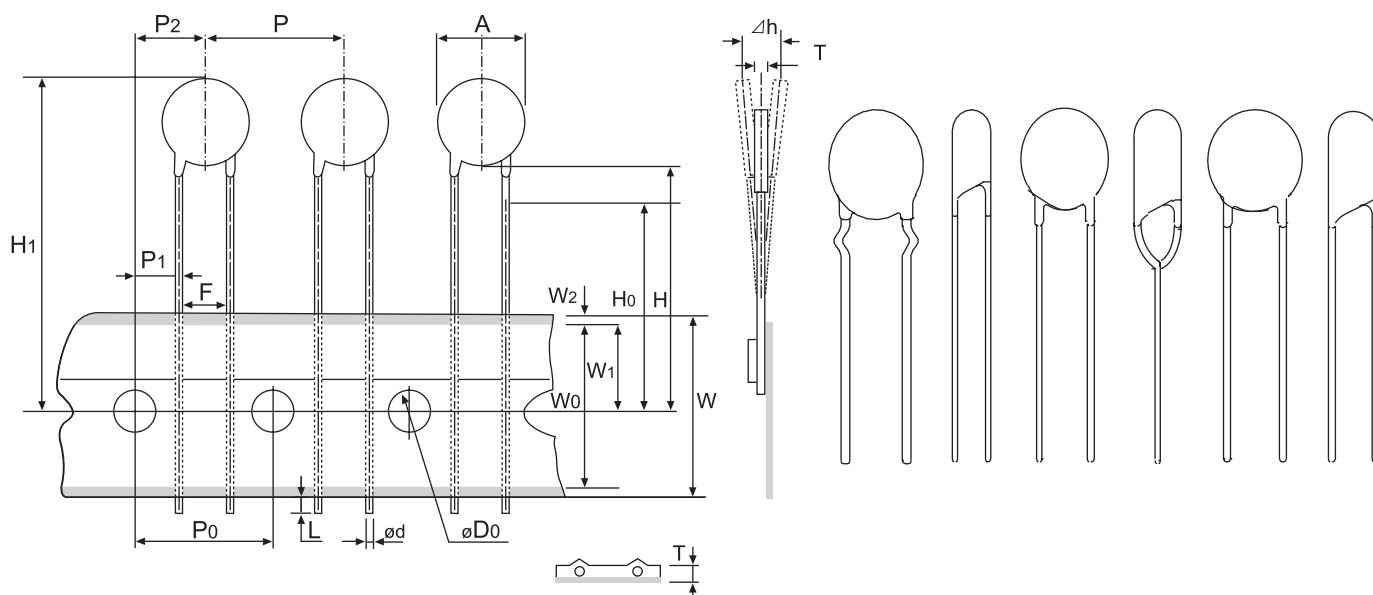
Series Symbol	φ 5	φ 7	φ 10	φ 14
A	7.5 max	9.0 max	14.0 max	17.0 max
φ d	0.6±0.02	0.6±0.02	0.8±0.02	0.8±0.02
P	12.7±1.0	12.7±1.0	15.0±1.0	30.0±1.0
P <sub>0</sub>	12.7±0.3	12.7±0.3	15.0±0.3	15.0±0.3
P <sub>1</sub>	3.85±0.7	3.85±0.7	3.75±0.7	3.75±0.7
P <sub>2</sub>	6.35±1.3	6.35±1.3	7.5±1.3	7.5±1.3
φ D <sub>0</sub>	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2
W	18.0±1.0	18.0±1.0	18.0±1.0	18.0±1.0
W <sub>0</sub>	12.5 max	12.5 max	12.5 max	12.5 max
W <sub>1</sub>	9.0±0.5	9.0±0.5	9.0±0.5	9.0±0.5
W <sub>2</sub>	3.0 max	3.0 max	3.0 max	3.0 max
H	20.0±1.0	20.0±1.0	21.0±1.0	21.0±1.0
H <sub>0</sub>	16.0±1.0	16.0±1.0	16.0±1.0	16.0±1.0
H <sub>1</sub>	29.0 max	32.0 max	36.0 max	40.0 max
Δh	0.0±2.0	0.0±2.0	0.0±2.0	0.0±2.0
T	0.6±0.3	0.6±0.3	0.6±0.3	0.6±0.3
L	7.0 max	7.0 max	7.0 max	7.0 max
F	5.0±0.5	5.0±0.5	7.5±0.5	7.5±0.5

※ Design, Specifications are subject to change without notice.

## Taping Specifications

INR

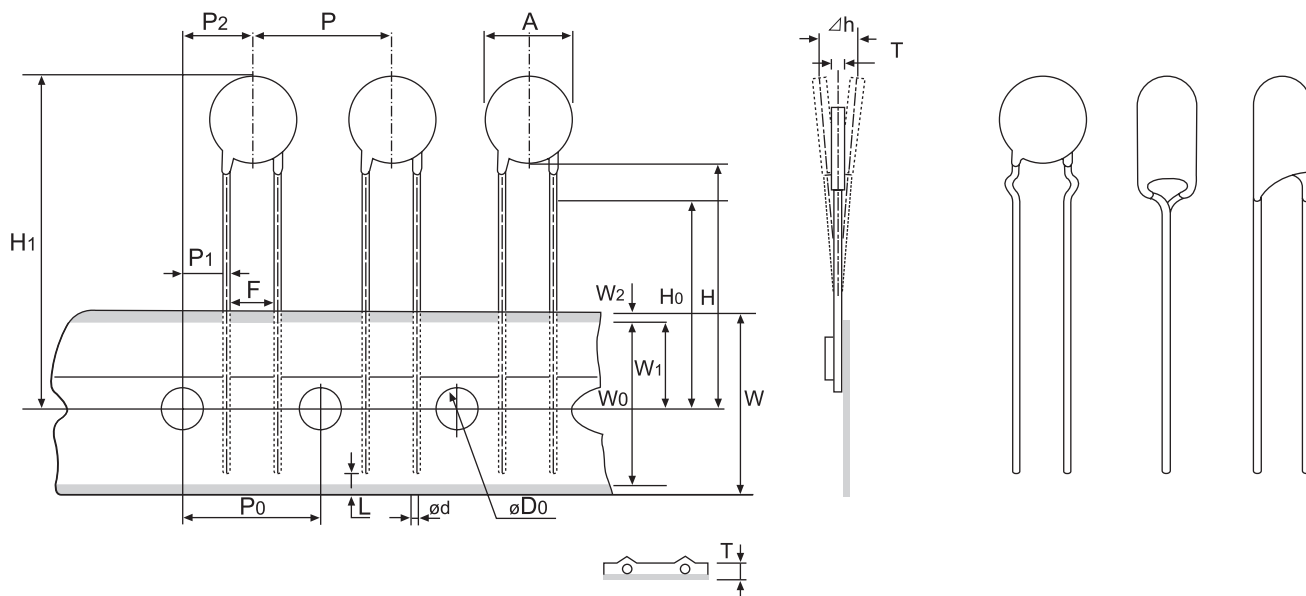
### ● Out-Side Kinked Taping Dimensions in mm



Series Symbol	φ 5	φ 7	φ 10	φ 14
A	7.5 max	9.0 max	14.0 max	17.0 max
φ d	0.6±0.02	0.6±0.02	0.8±0.02	0.8±0.02
P	12.7±1.0	12.7±1.0	15.0±1.0	30.0±1.0
P <sub>0</sub>	12.7±0.3	12.7±0.3	15.0±0.3	15.0±0.3
P <sub>1</sub>	3.85±0.7	3.85±0.7	3.75±0.7	3.75±0.7
P <sub>2</sub>	6.35±1.3	6.35±1.3	7.5±1.3	7.5±1.3
φ D <sub>0</sub>	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2
W	18.0±1.0	18.0±1.0	18.0±1.0	18.0±1.0
W <sub>0</sub>	12.5 max	12.5 max	12.5 max	12.5 max
W <sub>1</sub>	9.0±0.5	9.0±0.5	9.0±0.5	9.0±0.5
W <sub>2</sub>	3.0 max	3.0 max	3.0 max	3.0 max
H	20.0±1.0	20.0±1.0	21.0±1.0	21.0±1.0
H <sub>0</sub>	16.0±1.0	16.0±1.0	16.0±1.0	16.0±1.0
H <sub>1</sub>	29.0 max	32.0 max	36.0 max	40.0 max
Δh	0.0±2.0	0.0±2.0	0.0±2.0	0.0±2.0
T	0.6±0.3	0.6±0.3	0.6±0.3	0.6±0.3
L	1.0 max	1.0 max	1.0 max	1.0 max
F	5.0±0.5	5.0±0.5	7.5±0.5	7.5±0.5

※ Design, Specifications are subject to change without notice.

## • Y-Forming &amp; Straight Taping Dimensions in mm



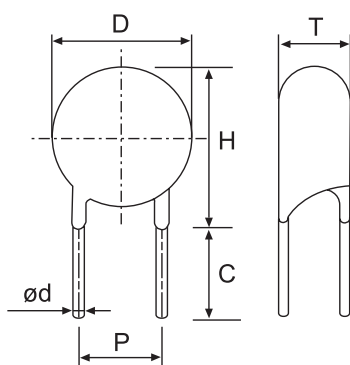
Series Symbol	φ 5	φ 7	φ 10	φ 14
A	7.5 max	9.0 max	14.0 max	17.0 max
φ d	0.6±0.02	0.6±0.02	0.8±0.02	0.8±0.02
P	12.7±1.0	12.7±1.0	15.0±1.0	30.0±1.0
P <sub>0</sub>	12.7±0.3	12.7±0.3	15.0±0.3	15.0±0.3
P <sub>1</sub>	3.85±0.7	3.85±0.7	3.75±0.7	3.75±0.7
P <sub>2</sub>	6.35±1.3	6.35±1.3	7.5±1.3	7.5±1.3
φ D <sub>0</sub>	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2
W	18.0±1.0	18.0±1.0	18.0±1.0	18.0±1.0
W <sub>0</sub>	12.5 max	12.5 max	12.5 max	12.5 max
W <sub>1</sub>	9.0±0.5	9.0±0.5	9.0±0.5	9.0±0.5
W <sub>2</sub>	3.0 max	3.0 max	3.0 max	3.0 max
H	20.0±1.0	20.0±1.0	21.0±1.0	21.0±1.0
H <sub>0</sub>	16.0±1.0	16.0±1.0	16.0±1.0	16.0±1.0
H <sub>1</sub>	29.0 max	32.0 max	36.0 max	40.0 max
Δ h	0.0±2.0	0.0±2.0	0.0±2.0	0.0±2.0
T	0.6±0.3	0.6±0.3	0.6±0.3	0.6±0.3
L	7.0 max	7.0 max	7.0 max	7.0 max
F	5.0±0.5	5.0±0.5	7.5±0.5	7.5±0.5

※ Design, Specifications are subject to change without notice.

## Cutting Specifications

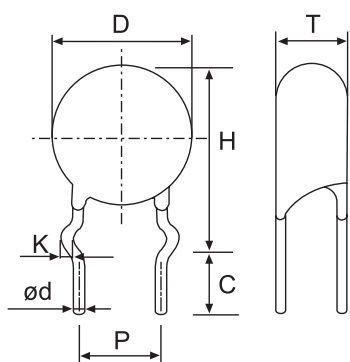
INR

### ● Straight Cutting Type

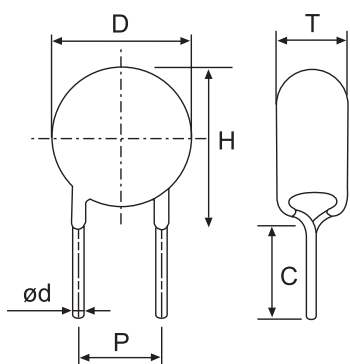


Series	Symbol	φ 5	φ 7	φ 10	φ 14	φ 20
H		Max 10.0	Max 12.0	Max 16.0	Max 20.0	Max 27.0
D		Max 7.5	Max 9.0	Max 14.0	Max 17.0	Max 25.0
p		5.0±1.0	5.0±1.0	7.5±1.0	7.5±1.0	10.0±1.0
φ d		0.6±0.02	0.6±0.02	0.8±0.02	0.8±0.02	1.0±0.02
T		3.5 ~ 6.5	3.5 ~ 6.9	4.0 ~ 8.5	4.0 ~ 12.8	4.0 ~ 10.1
C±0.5		3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0

### ● Outside Kinked Cutting Type



Series	Symbol	φ 5	φ 7	φ 10	φ 14	φ 20
H		Max 13.0	Max 15.0	Max 19.5	Max 23.0	Max 30.0
D		Max 7.5	Max 9.0	Max 14.0	Max 17.0	Max 25.0
p		5.0±1.0	5.0±1.0	7.5±1.0	7.5±1.0	10.0±1.0
φ d		0.6±0.02	0.6±0.02	0.8±0.02	0.8±0.02	1.0±0.02
T		3.5 ~ 6.5	3.5 ~ 6.9	4.0 ~ 8.5	4.0 ~ 12.8	4.0 ~ 10.1
C±0.5		3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0



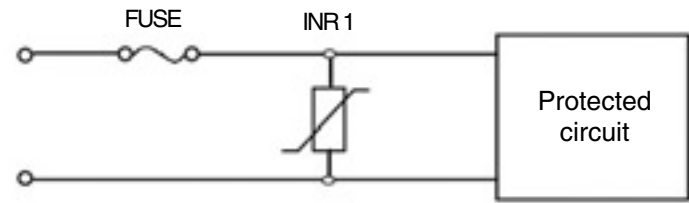
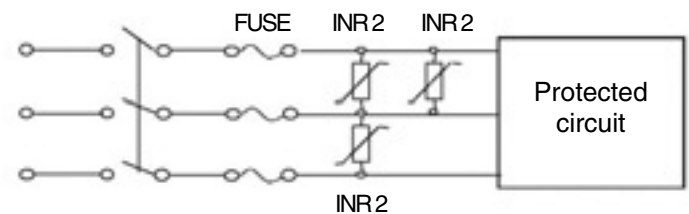
Series	Symbol	φ 5	φ 7	φ 10	φ 14	φ 20
H		Max 13.0	Max 15.0	Max 19.5	Max 23.0	Max 30.0
D		Max 7.5	Max 9.0	Max 14.0	Max 17.0	Max 25.0
p		5.0±1.0	5.0±1.0	7.5±1.0	7.5±1.0	10.0±1.0
φ d		0.6±0.02	0.6±0.02	0.8±0.02	0.8±0.02	1.0±0.02
T		3.5 ~ 6.5	3.5 ~ 6.9	4.0 ~ 8.5	4.0 ~ 12.8	4.0 ~ 10.1
C±0.5		3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0	3.4 ~ 10.0

※ Design, Specifications are subject to change without notice.

INR

Application

- Selection of varistor voltage with line to ground connections

Connections	INR	Nominal Line Voltage	MODEL
AC/DC Single - Phase(line to line)  	INR 1	AC 110V	INR ◇◇☆201K INR ◇◇☆221K INR ◇◇☆241K INR ◇◇☆271K <sup>1)</sup>
		AC 100V	INR ◇◇☆201K INR ◇◇☆221K INR ◇◇☆241K INR ◇◇☆271K <sup>1)</sup>
		AC 120V	INR ◇◇☆241K INR ◇◇☆271K INR ◇◇☆331K <sup>1)</sup>
		AC 200V	INR ◇◇☆431K INR ◇◇☆471K
		AC 220V	INR ◇◇☆471K
		AC 240V	INR ◇◇☆561K
		DC 12V	INR ◇◇☆220K
		DC 24V	INR ◇◇☆390K
AC Three - Phase(line to line)  	INR 2	AC 200V	INR ◇◇☆471K
		AC 220V	INR ◇◇☆471K
		AC 240V	INR ◇◇☆561K
		AC 380V	INR ◇◇☆821K
※ Notes ◇◇ : Disc size 5, 7, 10, 14, 20 ☆ : D series "D", S Series "S"			

※ Design, Specifications are subject to change without notice.

1. Maximum operating voltage shall be lower than Maximum allowable voltage of **INR**.
2. **INR** Varistor with<sup>1)</sup> are recommended for AC 100 V applications to withstand a temporary over voltage caused by LC resonance in capacitive load.

## Application

INR

### ● Selection of varistor voltage with line to ground connections

Connections	INR	Nominal Line Voltage	MODEL
AC/DC Single - Phase(line to ground)  	INR 3	AC 100V	INR ◇◇☆471K INR ◇◇☆561K INR ◇◇☆751K <sup>1)</sup> INR ◇◇☆182K <sup>1)</sup>
		AC 110V	
		AC 120V	
		AC 200V	
		AC 220V	
		AC 240V	
AC Three - Phase(line to ground)  	INR4	AC 200V	INR ◇◇☆431K INR ◇◇☆471K
	INR5	AC 220V	INR ◇◇☆751K <sup>1)</sup> INR ◇◇☆182K <sup>1)</sup>
	INR6	AC 240V	INR ◇◇☆561K INR ◇◇☆182K <sup>1)</sup> INR ◇◇☆821K <sup>1)</sup>
		AC 380V	INR ◇◇☆112K INR ◇◇☆182K <sup>1)</sup>
※ Notes ◇◇ : Disc size 5, 7, 10, 14, 20 ☆ : D series "D", S Series "S"			

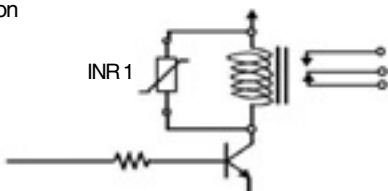
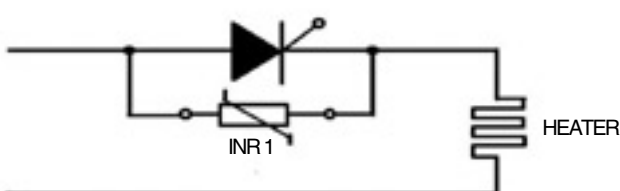
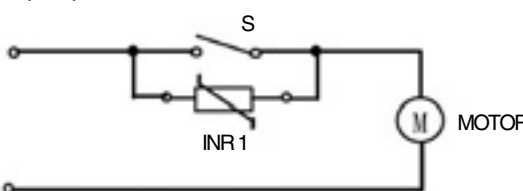
※ Design, Specifications are subject to change without notice.

1. When the 500V insulation resistance test or the 1000v withstanding voltage test of the circuits employing **INR** is conducted, **INR** Varistor shall be removed after with<sup>1)</sup> the maximum allowable voltage exceeding to test voltage shall be used respectively.
2. To avoid failure caused by the ground fault, **INR** Varistor with higher varistor voltage listed in the table shall be used for the AC 100V application.

INR

Application

- Protection of the switching surge, semiconductor, contact spark suppression

Connections	INR	Nominal Line Voltage	MODEL
Switching surge protection 	INR 1	DC 12V	INR ◇◇☆180K INR ◇◇☆220K INR ◇◇☆820K
Semiconductor protection 		DC 24V	INR ◇◇☆390K INR ◇◇☆820K
Contact spark protection 		DC 100V	INR ◇◇☆151K
		AC 110V	INR ◇◇☆221K INR ◇◇☆241K INR ◇◇☆271K
		AC 220V	INR ◇◇☆431K INR ◇◇☆471K
※ Notes ◇◇ : Disc size 5, 7, 10, 14, 20 ☆ : D series "D", S Series "S"			

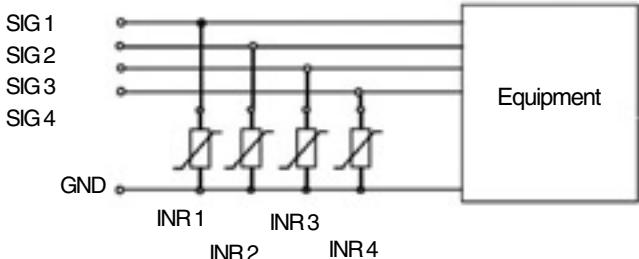
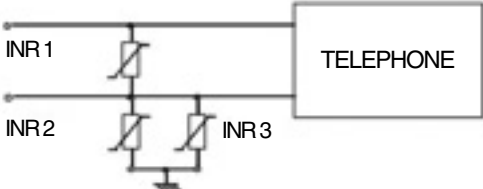
※ Design, Specifications are subject to change without notice.

1. The maximum allowable voltage of **INR** shall be higher than maximum operating voltage at all time.
2. Energy handing (energy or wattage rating) of **INR** shall be selected by studing switching surge energy from the inductive load.
3. The relation between surge current repetition and **INR** ratings is drawn in the impulse life characteristics of **INR** (Their parameters are impluse current crest, duration of impluse current and surge current repetition).
4. Capacitor connection in parallel with **INR** is recommended for a contact spark suppression.

## Application

INR

### ● Protection of the signal and telephone line

Connections	INR	Nominal Line Voltage	MODEL
<p>Signal line</p> 	INR1 INR2 INR3 INR4	DC 12V    DC 24V	INR ◇◇☆180K <sup>1)</sup> INR ◇◇☆220K <sup>1)</sup> INR ◇◇☆820K <sup>1)</sup>   INR ◇◇☆390K <sup>1)</sup> INR ◇◇☆820K <sup>1)</sup>
<p>Telephone line</p> 	INR1 INR2 INR3	Telephone Voltage	INR1 = INR ◇◇☆151K INR2 = INR ◇◇☆361K
<p>※ Notes</p> <p>◇◇ : Disc size 5, 7, 10, 14, 20</p> <p>☆ : D series "D", S Series "S"</p>			

※ Design, Specifications are subject to change without notice.

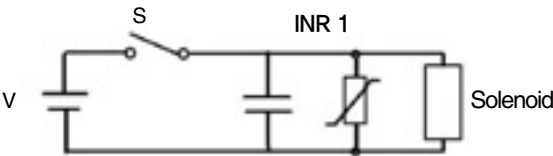
1. **INR** has relatively high capacitance listed in the table. Special attention shall be paid for it in high frequency circuit.
2. When high voltage such as the ringer voltage in telephone signal line is overlaid on signal voltage, varistor voltage of **INR** shall be selected based upon above higher voltage.
3. When **INR** is insertion loss is very critical in high frequency circuit, **INR** with<sup>1)</sup> is recommended.
4. Distinguish between INR 1 or INR 2 INR 3.

INR

Application

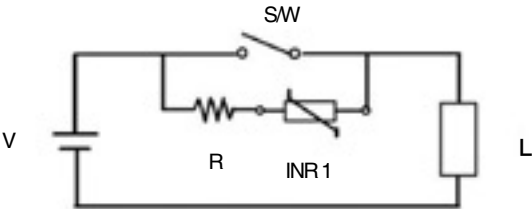
● Example of some different application

① Solenoid



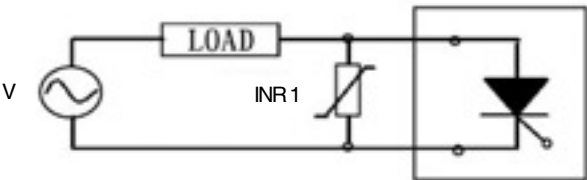
INR	Line Voltage	Model
INR1	DC 24V	INR ◇◇☆390K
	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K
	AC 220V	INR ◇◇☆471K

② Contact protection



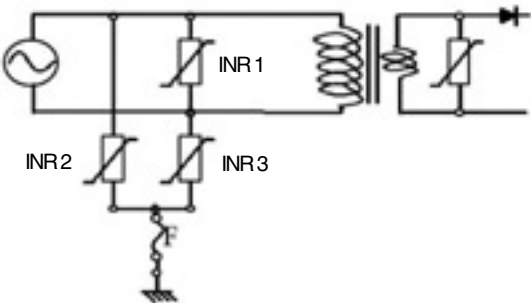
INR	Line Voltage	Model
INR1	DC 24V	INR ◇◇☆390K
	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K
	AC 220V	INR ◇◇☆471K

③ Thyristor protection



INR	Line Voltage	Model
INR1	DC 24V	INR ◇◇☆390K
	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K

④ Boiler



INR	Line Voltage	Model
INR1	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K
	AC 220V	INR ◇◇☆471K
INR2 INR3	AC 110V	INR ◇◇☆471K
	AC 200V	INR ◇◇☆751K
	AC 220V	INR ◇◇☆182K

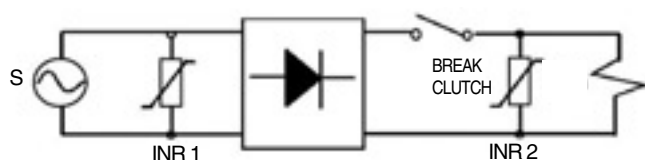
※ Notes  
◇◇ : Disc size 5, 7, 10, 14, 20  
☆ : D series "D", S Series "S"

## Application

INR

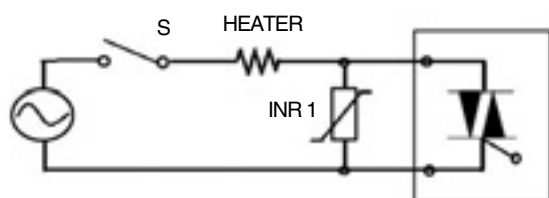
### • Example of some different application

#### ⑤ Solenoid



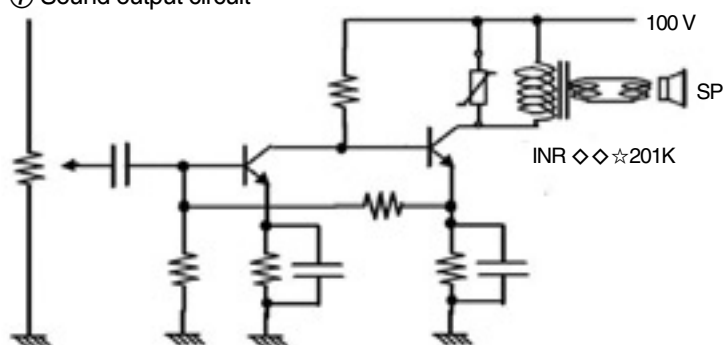
INR	Line Voltage	MODEL
INR1	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K
	AC 220V	INR ◇◇☆471K
INR2	AC 110V	INR ◇◇☆471K
INR3	AC 200V	INR ◇◇☆751K
	AC 220V	INR ◇◇☆182K

#### ⑥ Heater control

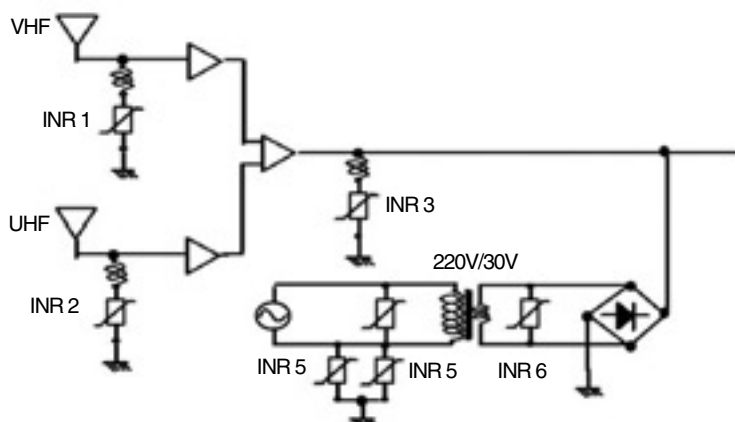


INR	Line Voltage	MODEL
INR1	DC 24V	INR ◇◇☆390K
	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K
	AC 220V	INR ◇◇☆471K

#### ⑦ Sound output circuit



#### ⑧ TV booster



INR	MODEL
INR1	INR ◇◇☆201K
INR2	INR ◇◇☆471K
INR3	INR ◇◇☆471K
INR4	INR ◇◇☆471K
INR5	INR ◇◇☆751K
INR6	INR ◇◇☆182K

#### ※ Notes

◇◇ : Disc size 5, 7, 10, 14, 20

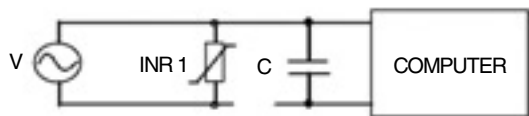
☆ : D series "D", S Series "S"

INR

Application

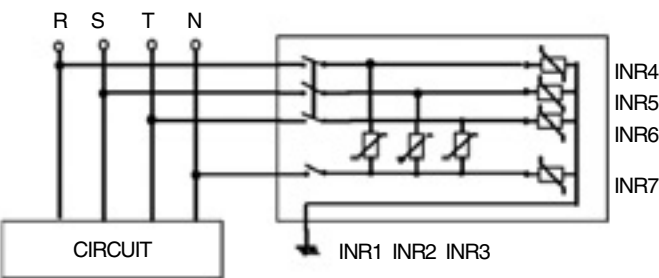
● Example of some different application

⑨ Computer



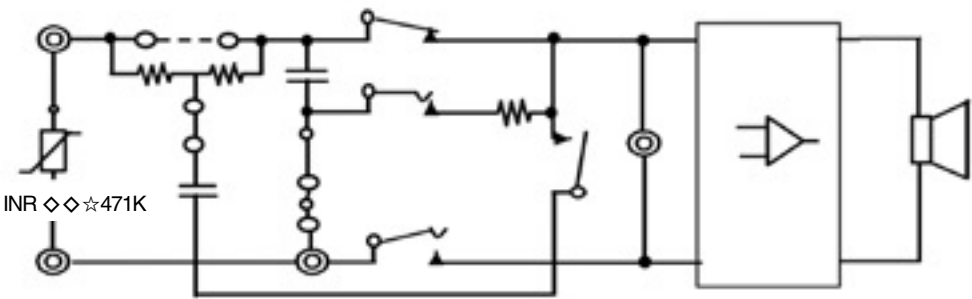
INR	Line Voltage	MODEL
INR1	AC 100V	INR ◇◇☆201K
	AC 110V	INR ◇◇☆201K
	AC 200V	INR ◇◇☆471K
	AC 220V	INR ◇◇☆471K

⑩ Three - phase



INR	Line Voltage	MODEL
INR1	AC 220V	INR ◇◇☆201K
INR2	AC 380V	INR ◇◇☆471K
INR3	AC 220V	INR ◇◇☆471K
INR4		INR ◇◇☆470K
INR5		INR ◇◇☆751K
INR6	AC 380V	INR ◇◇☆182K
INR7		

⑪ Telephone line



- ※ Notes
- ◇◇ : Disc size 5, 7, 10, 14, 20
  - ☆ : D series "D", S

### ● Mode of Failure(V dc)

ZnO Varistor are inherently regged and conservatively rated. Therefore, they exhibit a low failure rate. Nevertheless, the careful designer may wish to plan for potential failure modes and the resultant effects on circuitry being protected.

Varistors initial fail in a short-circuit mode when subjected to surges beyond their peak current / energy ratings. They also short-circuit when operated at steady-state voltages well beyond their voltage ratings. This latter mode of stress may result in the eventual open-circuiting of the device due to melting of the lead solder joint.

When the device fails in the shorts mode the current through the varistor becomes limited mainly by the course impedance. Consequently, a large amount of energy can be introduced, causing mechanical rupture of the package accompanied by expulsion of package material in both solid and gaseous forms. Steps may be taken to minimize this potential hazard by the follow in techniques;

- ① Fusing the varistor to limit high currents.
- ② Protecting the surrounding circuitry by physical shielding.
- ③ Protecting the circuit by locating the varistor away from other components.

### ● Fusing the Varistor

Varistor fusing should be coordinated to select fuse that limits current below the level where varistor package damage could occur. The location of the fuse may be in the distribution line to the circuit or it may be in series with the varistor as shown in Figure1-1. Generally, fuse rather than breaker protection is preferred, Breaker tripping is too slow to prevent excessive fault energy from being applied.

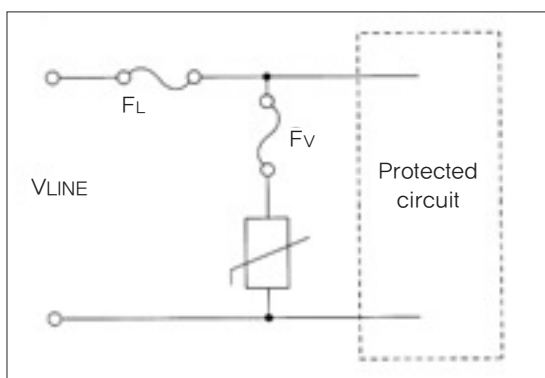


Figure 1-1 Schematic of fusing the varistor

In high power industrial circuits the line currents are generally so high as to rule out the use of a line fuse for varistor protection. The fuse may not clear under a varistor fault condition and would allow varistor failure. In low power(5A~20A) applications it may be feasible to use the line fuse, FL, only. Use of a line fuse, FL, rather than FV, does not present the problems of having the fuse are voltage adds to the varistor voltage, increasing the Vc, the transient clamp voltage. Since some fuses can have peak are voltages in excess of twice peak working voltage, fuse clearing can have a significant effect on protection levels.

Another factor in the choice of location is the consequence of system interruption. Fuse location FL will cause a shutdown of the circuit shile location FV will not. While the circuit can continue to operate when Fv clears, protection no longer is present. For this reason it is desirable to be able monitor the condition of Fv.

For the selection of fuse, refer to Table 1-1. If the capacity of the fuse is the small, it will likely burn out with the application of the surge.

INR Diameter	Φ5	Φ7	Φ10	Φ14	Φ20
Fuse capacity(A)	1~2	2~3	3~5	3~10	5~15

Table 1-1 Withstanding surge curve and recommened fuse capacity.