METAL OXIDE VARISTOR

CHARACTERISTICS AND FUNCTION INTRODUCTION

JNR ZINC OXIDE VARISTORS

Zinc oxide varistor is a voltage dependent resistor with symmetrical voltage-current characteristics that is designed to protect all kinds of electronic devices or elements from switching and induced lightening surges. It's non linear exponent characteristic with broad using range and mass production is gradually being used by various level of electric engineering.

FEATURES

Fast response time.

Low leakage current.

Excellent voltage & energy ration.

Low standby power and no follow on current.

High performance in surge current handing capability.

High performance in clamping voltage characteristics.

APPLICATIONS

IC, diode, transistor, thyristor, triac, and other semiconductor protection.

Suppression of mainborne transients in consumer electronics and industrial electronics.

Suppression of internally generated spikes in electronics circuit.

Surge protection in, communication, measuring and controller electronics.

Surge protection in electronic home appliances and gas and petroleum appliances.

Relay and electromagetic valve surge absorption.

PARAMENTERS DEFINITION

Varistor Voltage (breakdown voltage):

The varistor voltage is the voltage across the varistor measured at a specified current IC(0.1mA or 1mA) of specified duration.

Maximum allowable voltage:

The Maximum allowable voltage corresponds to the rest state of the varistor. The rest state voltage offers a low leakage current in order to limit the power consumption of the protected device and not to disturb the circuit to be protected.

Non linear exponent (α):

The varistor voltage-current characteristic is defined by the equation:

$I=KV^{\alpha}$ where K is a constant dependent on geometry, and is the non linear exponent. We usually take two points(V_1, I_1)(V_2, I_2) to estimate the of α .

$$\alpha = \frac{\log I_1/I_2}{\log V_1/V_2}$$

In which, and I2 are the current value corresponding to the voltage value V_1 and V_2

Maximum clamping voltage:

Maximum clamping voltage is the maximum voltage Vp between two terminals with the specified standard impulse current I (8x20 μ sec.). The voltage value is an indication on the protective function of the varistor.

METAL OXIDE VARISTOR

SPECIFICATION - 7ø JNR VARISTOR

Spec. / Part No.	Varistor Voltage V 0.1mA (V)		Maximum allowable Voltage		Maximum Clamping Voltage V5A (V)max	Withstanding Surge Current (8/20us)		Rated (W)	Energy 10/100us (J)	Typical Capacitan 1KHz (PF)
			ACrms (V)	DC (V)		1 Time (A)	2 Time (A)			
JNR-7D180K	18	(16-20)	11	14	38	250	125	0.02	1.2	3,500
JNR-7D220K	22	(20-24)	14	18	43	250	125	0.02	1.4	2,800
JNR-7D270K	27	(24-30)	17	22	53	250	125	0.02	1.7	2,200
JNR-7D330K	33	(30-36)	20	26	65	250	125	0.02	2.2	1,800
JNR-7D390K	39	(35-43)	25	31	77	250	125	0.02	2.4	1,450
JNR-7D470K	47	(42-52)	30	38	93	250	125	0.02	3	1,150
JNR-7D680K	68	(61-75)	40	56	135	250	125	0.02	4.3	970
JNR-7D820K	82	(74-90)	50	65	135	1200	600	0.25	5.5	930
JNR-7D101K	100	(90-110)	60	85	165	1200	600	0.25	7	860
JNR-7D121K	120	(108-132)	75	100	200	1200	600	0.25	8	670
JNR-7D151K	150	(135-165)	95	125	250	1200	600	0.25	11	490
JNR-7D181K	180	(162-198)	115	150	300	1200	600	0.25	13	330
JNR-7D201K	200	(185-225)	130	170	340	1200	600	0.25	14.3	240
JNR-7D221K	220	(198-242)	140	180	360	1200	600	0.25	15.5	190
JNR-7D241K	240	(216-264)	150	200	395	1200	600	0.25	16.8	165
JNR-7D271K	270	(247-303)	175	225	455	1200	600	0.25	19.8	150
JNR-7D301K	300	(270-330)	195	250	505	1200	600	0.25	21	135
JNR-7D331K	330	(297-363)	210	275	550	1200	600	0.25	23	130
JNR-7D361K	360	(324-396)	230	300	595	1200	600	0.25	26	125
JNR-7D391K	390	(351-429)	250	320	650	1200	600	0.25	30	105
JNR-7D431K	430	(387-473)	275	350	710	1200	600	0.25	33	100
JNR-7D471K	470	(423-517)	300	385	775	1200	600	0.25	35	90
JNR-7D511K	510	(459-561)	320	418	842	1200	600	0.25	37	80
JNR-7D561K	560	(504-616)	350	460	920	1200	600	0.25	39	75

The clamping voltage from 180K to 680K is tested with current 2.5A

METAL OXIDE VARISTOR

PERFORMANCE CHARACTERISTICS - ELECTRICAL

Characteristics	Test Method	Specifications
Standard test condition	Environmental conditions under which every measuring is done without doubt on the measuring results. Unless specified, the temperature and relative humidity should be to 5 to 35 ^{o}C and 45 to	
Varistor voltage	The varistor voltage is measured with an impressed current of 1mA (exception, ø5: 0.1mA) and serves to characterize each varistor type.	To meet the specified value
Maximum operating voltage	The maximum sinusoidal RMS voltage or maximum DC voltage that can be applied continuoulsy in the specified environmental temperature range.	
Maximum clamping voltage	Maximum clamping voltage is the maximum voltage Vp between two terminals with the specified standard impulse current Ip (8 x 20μs).	
Withstanding surge current	The maximum current within the varistor voltage change of ±10% with the standard impulse current (8 x 20μs)applies one or two times.	
Energy	The maximum energy within the varistor voltage change of ± 10% when one impulse of 10/1000 μs or 2 msec is applied.	
Rated power	The maximum power that can be applied within the specified ambient temperature.	
Capcitance	The capacitance of varistor is the typical value measured at 1KHz, 1Vrms max, OV bias and 20 ± 2 ^{o}C	
Temperature coefficient of varistor voltage	$\frac{\text{Vc at 85 }^{o}\text{C - Vc at 25 }^{o}\text{C}}{\text{Vc at 25 }^{o}\text{C}}$ x (1/60) x 100 (%/ ^{o}C)	-0.05% / ^{o}C max.

METAL OXIDE VARISTOR

PERFORMANCE CHARACTERISTICS - MECHANICAL

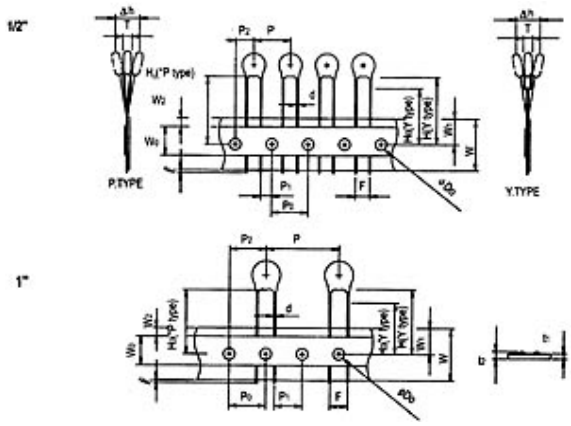
Characteristics	Test Method	Specifications
Robustness of Terminations (Tensile)	After gradually applying the force specified below and keeping the unit fixed for ten seconds, the terminal shall be visually examined for any damage. **Terminal diameter** — **Force** ø0.6mm — 9.8N(1.0kgf) ø0.8mm — 9.8N(1.0kgf) ø1.0mm — 19.6N(2.0kgf)	No outstanding damage
Robustness of Terminations(Bending)	The unit shall be secured with its terminal kept vertical and the force specified below be applied in the axial direction. The terminal shall gradually be bent by 90° in one direction, then 90° in the opposite direction , and again back to the original position. The damage of the terminal shall be visually examined. **Terminal diameter** — **Force** ø0.6mm — 4.9N(0.5kgf) ø0.8mm — 4.9N(0.5kgf) ø1.0mm — 9.8N(1.0kgf)	
Vibration	After repeatedly applying a single harmonic vibration (amplitued: 0.75mm): double amplitude: 1.5mm with 1 minute vibration frequency cycles (10Hz to 55Hz to 10Hz) to each of three perpendicular directions for 2 hours. Thereafter, the unit shall be visually examined.	
Solderability	After dipping the terminals to a depth of approximately 3mm from the body in a soldering bath of 235 ± 5 °C for 2 ± 0.5 seconds, the terminal shall be visually examined.	Approximated 95% of the terminals shall be covered with solder uniformly.
Resistance to Soldering Heat	After ecah lead shall be dipped into a solder bath having a temperature 260± 5 °C to a point 2.0 to 2.5mm from the body of the unit, using shielding board (t=1.5mm), be held there for specified time (5 series:5± 1s and others: 10 ±1s), and then be stored at room temperature and humidity for 1 to 2 hours. The change of Vc and mechanical damages are examined.	△VcmA/VcmA≦ ±5% No outstanding damage

METAL OXIDE VARISTOR

PERFORMANCE CHARACTERISTICS - ENVIRONMENTAL

Characteristics	Test Method	Specifications
High Temperature Storage/Dry Heat	The specimen shall be subjected to 125± 2°C for 1000 hours in a thermostatic bath with out load and then stored at room temperature and humidity for 1 to 2 hors. Thereafter, change of Vc shall be measured.	
Damp Heat/Humidity (Steady State)	The specimen shall be subjected to 40± 20°C, 90 to 95% RH for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of Vc shall be measured.	
Temperature Cycle	The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for 1 to 2 hours. The change of Vc and mechanical damage shall be examined. **Step** / **Temperature(°C)** / **Period(minutes)** 1 / -40±3 / 30±3 2 / Room temperature / 15±3 3 / 125±2 / 30±3 4 / Room temperature / 15±3	△VcmA/VcmA≦ ±5%
High Temperature Load/Dry Heat Load	After being continuously applied the Maximum Allowable Voltage at 85 ± 2°C for 1000 hours, the specimen shall be stored at room temperature and humidity for 1 to 2 hours. Thereafter, the change of Vc shall be measured.	△VcmA/VcmA≦ ±10%
Damp Heat Load Humidty Load	The specimen shall be subjected to 40±2°C, 90 to 95% RH and the Maximum Allowable Voltage for 1000 hours and then stored at room temperature and humidity for 1 to 2 hours, Thereafter, the change of Vc shall be measured.	△VcmA/VcmA≦ ±10%
Low Temperature Storage/Cold	The specimen shall be subjected to -40±2°C without load for 1000 hours and then stored at room temperature for 1 to 2 hours. Thereafter, the change of Vc shall be measured.	△VcmA/VcmA≦ ±5%

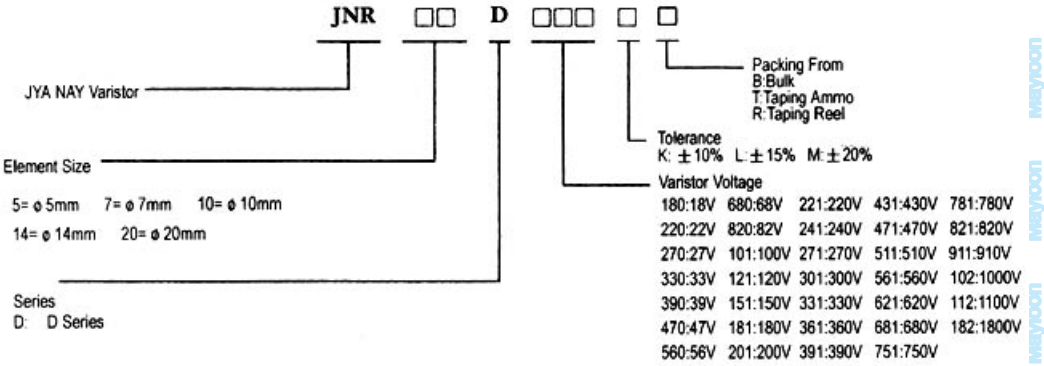
METAL OXIDE VARISTOR
DIMENSION OF TAPING PRODUCT



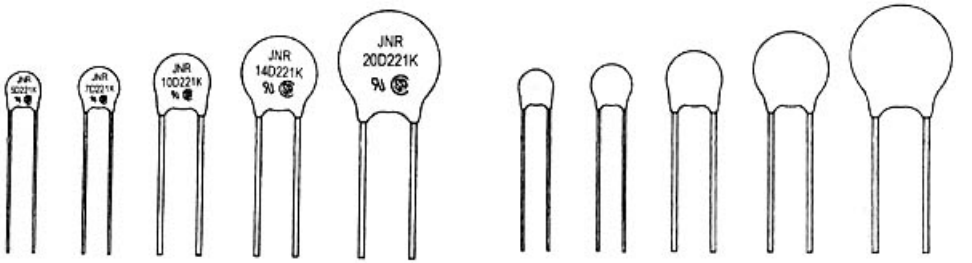
Sb	Item	5ø 7ø 10ø	14ø 20ø
I	Cut out length	1.1mm max.	1.1mm max.
H(Y type)	Height of component	20.0mm max.	21.5mm max.
H_0(Y type)	Height to seating plance	16.0± 0.5mm	16.0± 0.5mm
H_0(P type)	height of component from hole center	16.0mm~21.0mm	16.0mm~21.0mm
h	Feont to back devation	0± 2.0mm	0± 2.0mm
W	Carries tape width	18 $^{1}_{-0.5}$ mm	18 $^{1}_{-0.5}$ mm
W_0	Hole down tape width	6.0mm min	6.0mm min
W_1	Sprocket hole position	9 $^{0.75}_{-0.5}$ mm	9 $^{0.8}_{-0.2}$ mm
W_2	Adhesive tape position	3.0mm max.	3.0mm max.
F	Component lead spacing	5 $^{0.8}_{-0.2}$ mm	7.5 $^{0.8}_{-0.2}$ mm
P	Pitch of component	12.7± 0.3mm	25.4± 0.3mm
P_0	Sprocket hole pitch	12.7± 0.3mm	12.7± 0.3mm
P_1	Lead length from hole center to lead	3.85± 0.7mm	8.95± 0.7mm
P_2	Length from hole center to disk center	6.38± 1.3mm	12.7± 1.3mm
D_0	Sprocket hole diameter	4.0± 0.2mm	4.0± 0.2mm
d	Lead wire diameter	0.6± 0.05mm	0.8± 0.05mm
T	Disk thickness	See T max. Table	See T max. Table
t_1	Total thickness	0.7± 0.2mm	0.7± 0.2mm
t_2	Total thickness tape with tape	1.6mm max.	1.8mm max.

METAL OXIDE VARISTOR
PART NUMBER CODE JNR

HOW TO ORDER



METAL OXIDE VARISTOR
MARKING AND PACKING



Quantity per Package

Series	Bulk	Reel/Ammo
5	200	1000
7	200	1000
10	200	1000
14	200	1000
20	200	-