

## NTE1V010 thru NTE1V300 NTE2V010 thru NTEV480 NTE524V13 thru NTE524V48 Metal Oxide Varistors (MOV)

### **Description:**

The NTE Metal Oxide Varistors feature a barrier layer that gives the user fast response time. These devices have a high transient current handling capability when high voltage is applied. Static resistance is, however, very high under low voltage conditions, permitting low standby drain currents.

The NTE 1V Series Varistors have a non-linear voltage/current characteristic as expressed by the relationship:

$$I = KV^n$$

Where  $I$  = The current in amperes  
 $V$  = The voltage  
 $K$  = A constant  
 $n$  = A constant which shows the dependence of the voltage  $V$  upon the current  $I$ . It is called the voltage-dependant index

### **Features:**

- High Transient Current Capability – up to 6500A
- Fast Response Time – less than 35ns
- Excellent Voltage Clamping Characteristics
- Very Low Temperature Coefficient
- Low Standby Current
- High Energy Capability
- The Value for “n” is Greater
- Very Low Leakage Current
- Low Capacitance
- Low Overshoot Characteristics

### **Electrical Ratings:**

#### **Varistor Voltage**

The voltage across the varistor at a DC current of 1.0mA.

#### **Energy**

The maximum electrical energy which can be dissipated within the varistor by a single impulse of 10 x 1000μs current waveform with continuous voltage applied. Energy ratings are based on a shift of varistor voltage of less than 10% of the initial value. The unit is expressed in joules.

#### **Peak Current**

The maximum current allowable for a single pulse of 8 x 20μs exponential waveform.

Operating Ambient Temperature .....	–40° to +85°C
Storage Temperature .....	–40° to +125°C
Response Time .....	less than 35ns
Voltage Temperature Coefficient .....	less than 0.05%/°C
Non-Linear Exponent	
NTE1V010 to NTE1V075, NTE2V010 to NTE2V075 .....	15 to 50
NTE1V095 to NTE1V300, NTE2V095 to NTE2V480, NTE524V13 to NTE524V48 .....	greater than 40
Maximum Leakage Current .....	10μA

**Electrical Characteristics:**

NTE Type Number	Case Diameter	Maximum Ratings (T <sub>A</sub> = 25°C)				Characteristics		
		Continuous		Transient		Nominal Varistor Voltage @ 1mA DC Test Current (Volts)	Maximum Clamping Voltage, V <sub>C</sub> @ Test Current (8/20μs) (Volts)	Transient Power Dissipation (Watts)
		RMS Voltage (Volts)	DC Voltage (Volts)	Energy (10/1000μs) (Joules)	Peak Current (8/20μs) (Amps)			
		V <sub>m</sub> (AC)	V <sub>m</sub> (DC)	W <sub>TM</sub>	I <sub>TM</sub>			
1V010	8.5mm	10	12	0.8	250	18	45	0.25
2V010	16mm	10	12	3.5	1000	18	45	0.60
1V014	8.5mm	14	18	1.2	250	22	55	0.25
2V014	16mm	10	12	4.0	1000	22	55	0.60
1V015	8.5mm	15	20	1.0	250	24	52	0.25
2V015	16mm	15	20	4.5	1000	24	48	0.60
1V017	8.5mm	17	22	1.3	250	27	60	0.25
2V017	16mm	17	22	5.0	1000	27	60	0.60
1V020	8.5mm	20	26	1.5	250	33	70	0.25
2V020	16mm	20	26	6.0	1000	33	70	0.60
1V025	8.5mm	25	31	1.7	250	39	80	0.25
2V025	16mm	25	31	7.0	1000	39	80	0.60
1V030	8.5mm	30	38	2.3	250	47	95	0.25
2V030	16mm	30	38	8.5	1000	47	95	0.60
1V035	8.5mm	35	45	2.7	250	56	110	0.25
2V035	16mm	35	45	10.0	1000	56	110	0.60
1V040	8.5mm	43	55	3.2	250	68	135	0.25
2V040	16mm	43	55	13.0	1000	68	135	0.60
1V050	8.5mm	52	66	4.0	250	82	150	0.25
2V050	16mm	52	66	14.0	1000	82	150	0.60
1V060	8.5mm	63	80	6.0	1200	100	175	0.25
2V060	16mm	63	80	18.0	4500	100	175	0.60
1V075	8.5mm	75	95	5.0	1200	120	205	0.25
2V075	16mm	75	95	21.0	4500	120	205	0.60
1V095	8.5mm	95	125	7.0	1200	150	250	0.25
2V095	16mm	95	125	29.0	4500	150	250	0.60
1V115	8.5mm	115	150	10.0	1200	171	295	0.25
2V115	16mm	115	150	35.0	4500	171	300	0.60
1V130	8.5mm	135	180	10.0	1200	216	355	0.25
2V130	16mm	135	180	39.0	4500	216	355	0.60
524V13	23mm	135	180	72.0	6500	216	355	1.00
1V150	8.5mm	160	210	10.0	1200	240	410	0.25
2V150	16mm	160	210	40.0	4500	240	410	0.60
524V15	23mm	160	210	80.0	6500	240	410	1.00
1V175	8.5mm	170	225	12.0	1200	270	450	.025
524V17	23mm	170	225	90.0	6500	270	450	1.00
1V250	8.5mm	240	320	20.0	1200	390	630	0.25
2V250	16mm	240	320	70.0	4500	390	630	0.60
524V25	23mm	240	320	129.0	6500	390	630	1.00
1V275	8.5mm	260	330	20.0	1200	430	685	0.25
2V275	16mm	260	330	72.0	4500	430	685	0.60
524V27	23mm	260	330	135.0	6500	430	685	1.00

Electrical Characteristics (Cont'd):

NTE Type Number	Case Diameter	Maximum Ratings (T <sub>A</sub> = 25°C)				Characteristics		
		Continuous		Transient		Nominal Varistor Voltage @ 1mA DC Test Current (Volts)	Maximum Clamping Voltage, V <sub>C</sub> @ Test Current (8/20μs) (Volts)	Transient Power Dissipation (Watts)
		RMS Voltage (Volts)	DC Voltage (Volts)	Energy (10/1000μs) (Joules)	Peak Current (8/20μs) (Amps)			
		V <sub>m</sub> (AC)	V <sub>m</sub> (DC)	W <sub>TM</sub>	I <sub>TM</sub>	V <sub>NOM</sub>	V <sub>CL</sub>	P <sub>D</sub>
1V300	8.5mm	280	370	22.0	1200	470	740	0.25
2V300	16mm	280	370	79.0	4500	470	740	0.60
524V30	23mm	280	370	149.0	6500	470	740	1.00
2V420	16mm	420	560	90.0	4500	680	1110	0.60
524V42	23mm	420	560	160.0	6500	680	1110	1.00
2V480	16mm	480	640	105.0	4500	750	1240	0.60
524V48	23mm	480	640	180.0	6500	750	1240	1.00

Cautions:

- NTE varistors short-circuit when subjected to surges beyond their peak current and energy ratings.
- NTE varistors short-circuit when operated at steady-state voltages well beyond their voltage ratings, which may eventually result in open-circuiting leaving the circuit without protection.
- The following precautions should be taken to minimize this potential hazard:
- Fusing the varistor to limit high fault currents.
  - Protecting the surrounding circuitry by physical shielding.
  - Locating the varistor away from other components.

Typical Power Supply Circuit

	D	H	L	LL	LS	LD
1V Series	.345 (9.0)	.235 (6.0)	.475 (12.0)	1.000 (25.4)	.200 (5.08)	.024 (0.6)
2V Series	.699 (17.8)	.275 (7.0)	.787 (20.0)	1.000 (25.4)	.315 (8.0)	.031 (0.8)
524V Series	.945 (24.0)	.291 (7.4)	1.230 (31.0)	1.063 (27.0)	.394 (10.0)	.039 (1.0)