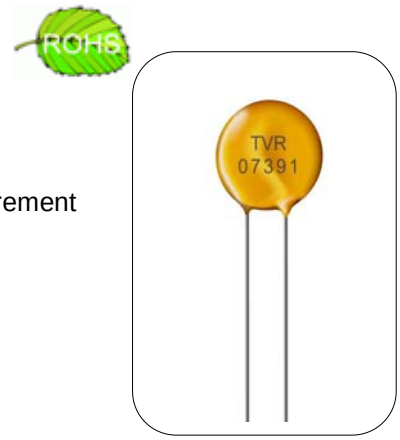
Metal Oxide Varistor：TVR Series

Disc Type Varistor for Surge Protection

■ Features



1. Body size: Φ5 ~ Φ20mm
2. Wide operating voltage range：11Vac ~ 1000Vac
3. Operating temperature range：-40 ~ +85℃
4. Agency recognition: UL 1449 3rd /UL 1414/cUL/VDE /CSA/CQC
5. TVR14181~14112 and TVR20181~20112 meet IEC 60950-1 Annex Q requirement
6. TVR20 series for SPD type 2 is available
7. RoHS compliant & Halogen-free series are available

■ Recommended Applications

1. Power supply
2. Home appliance
3. Industrial equipment
4. Telecommunication or telephone system

■ Part Number Code

T	V	R	0	5	1	8	0	K	S						Y
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Product Type	
TVR	THINKING Varistor TVR Series

Size	
05	Φ5mm
07	Φ7mm
10	Φ10mm
14	Φ14mm
20	Φ20mm

Varistor Voltage(V_{1mA})	
180	$18x10^0$V=18V
241	$24x10^1$V=240V
102	$10x10^2$V=1000V

Tolerance of V_{1mA}	
K	±10%

Internal Control Code
0001~ZZZZ

Optional Suffix	
Y	RoHS compliant
F	RoHS compliant & Halogen-Free
R	UL 1449 3RD TYPE 2 application (TVR20 only)

Appearance	
S	Straight lead, epoxy coating
F	Y kink lead, epoxy coating
J	L kink lead, epoxy coating

Packaging	
A	Tape (hole pitch:12.7mm)
E	Tape (hole pitch:15.0mm)
B	Tape + ammo box packing
R	Tape + reel packing
C	Bulk + cut lead (followed by the codes of 2 leaded length
Blank	Bulk

Note: Optional suffix will be the 11th digit if packaging and internal control codes are not coded.

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■ Reliability

<table>
<tr><th>Item</th><th>Standard</th><th>Test conditions / Methods</th><th>Specifications</th></tr>
<tr><td>Tensile Strength of Terminals</td><td>IEC60068-2-21</td><td>Gradually applying the force specified and keeping 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
1.25<d : 4.0</td><td>No visible damage
｜△V/V_{1mA}｜≦5%</td></tr>
<tr><td>Bending Strength of Terminals</td><td>IEC 60068-2-21</td><td>Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original positi on. 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
1.25<d : 2.0</td><td>No visible damage
｜△V/V_{1mA}｜≦5%</td></tr>
<tr><td>Vibration</td><td>IEC 61051-1</td><td>Frequency range: 10-55 Hz
Amplitude: 0.75mm or 98 m/s^2
Direction: 3 mutually perpendicular directions, 2hrs each</td><td>｜△V/V_{1mA}｜≦5%
No visible damage</td></tr>
<tr><td>Solderability</td><td>IEC 60068-2-20</td><td>245±3℃, 3±0.3 sec</td><td>At least 95% of terminal electrode is covered by new solder</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>IEC 60068-2-20</td><td>260±3℃, 10±1 sec,
(5±0.5sec for TVR05)</td><td>｜△V/V_{1mA}｜≦ ± 5 %
No visible damage</td></tr>
<tr><td>High Temperature Storage</td><td>IEC 60068-2-2</td><td>125±5℃ x 1000± 24 hrs</td><td>｜△V/V_{1mA}｜≦ 5 %
No visible damage</td></tr>
<tr><td>Damp Heat, Steady State</td><td>IEC 60068-2-3</td><td>a. 40±2℃, 90 ~ 95 % RH, 1344HRS
b. 40±2℃, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs</td><td>No visible damage
｜△V/V_{1mA}｜≦ 5%
Insulation Resistance≧100MΩ</td></tr>
<tr><td>Rapid Change of Temperature</td><td>IEC 60068-2-14</td><td>The conditions shown below shall be repeated 5 cycles
<table><tr><th>Step</th><th>Temperature (℃)</th><th>Period (minutes)</th></tr><tr><td>1</td><td>-40±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>5±3</td></tr><tr><td>3</td><td>85±2</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>5±3</td></tr></table></td><td>No visible damage
｜△V/V_{1mA}｜≦ 5 %</td></tr>
<tr><td>Endurance at Upper Category Temperature</td><td>IEC61051-4.20</td><td>85 ± 2 ℃, 1000 ± 24 hrs, at Vdc or Vrms (Max. Operating Voltage)</td><td>｜△V/V_{1mA}｜≦ 10 %
No visible damage</td></tr>
<tr><td>Low Temperature Storage (Optional)</td><td>CECC42000</td><td>–40±5℃, 1000±24 hrs</td><td>｜△V/V_{1mA}｜≦ 5%
No visible damage</td></tr>
<tr><td>8/20μs Surge Life</td><td>CECC42000</td><td>10,000 pulses(8/20μS), unipolar, interval 10 sec, amplitude corr. to max. surge current derating curves for 20μs</td><td>｜△V_{1mA}/V_{1mA}｜≦10 %
No visible damage</td></tr>
<tr><td>10/1000μs Surge Life</td><td>CECC42000</td><td>10/1000μS waveform, 10 surge currents, unipolar, interval 2mins, amplitude corr. to max. surge current derating curves for 1000μS</td><td>｜△V_{1mA}/V_{1mA}｜≦10 %
No visible damage</td></tr>
</table>

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Item	Standard	Test conditions / Methods	Specifications
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{ at }85℃ - V_{1mA}\text{ at }25℃}{V_{1mA}\text{ at }25℃} \times \frac{1}{60} \times 100\ (\%/℃)$ $\frac{V_{1mA}\text{ at }-40℃ - V_{1mA}\text{ at }25℃}{V_{1mA}\text{ at }25℃} \times \frac{1}{65} \times 100\ (\%/℃)$	$-0.05 \leqq T_C \leqq 0.05\ (\%/℃)$
Voltage Proof	IEC61051-4.8	Metal balls method, 2500 V_{ac} 1 min	No visible damage

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