

Metal Oxide Varistors (MOV) Data Sheet

Description

The FTR TMOV thermally protected varistors represent a new development in integrated circuit protection. Both versions are comprised of radial leaded Metal Oxide Varistors (MOVs) with an integrated thermally activated element designed to open in the event of overheating due to the abnormal overvoltage, limited current, conditions outlined in UL1449. The TMOV varistor’s integrated thermal element, in conjunction with appropriate enclosure design, helps facilitate SPD module compliance to UL1449 for both cord connected and permanently connected applications.

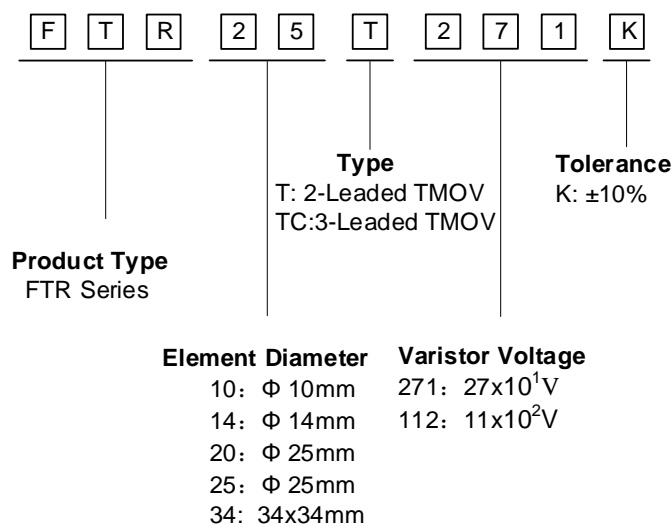
Features

- TMOV integrated thermal protection device
- Fast responding to transient over-voltage
- High peak surge current rating up to 15KA
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Three-lead version available for indication purposes
- Meets MSL level 1, per J-STD-020
- Operating Temperature: -55°C ~ +85°C
- Storage Temperature: -55°C ~ +125°C
- Agency recognition: UL 1449 4th /cUL /CQC

Applications

- SPD Products, Power supply, Telecommunication, Smart meter, or PLC protection
- Surge protection in consumer and industrial electronics
- Surge protection in electronic home appliances, gas and petroleum appliances
- Relay and electromagnetic valve surge absorption
- AC panel protection Modules

Part Number Code

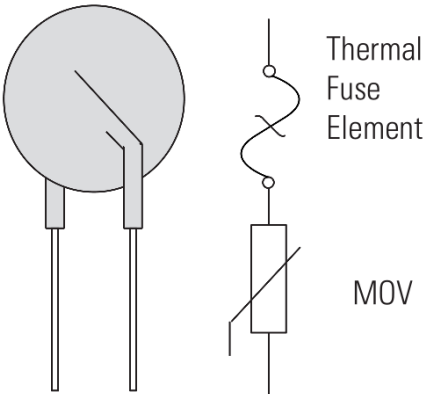
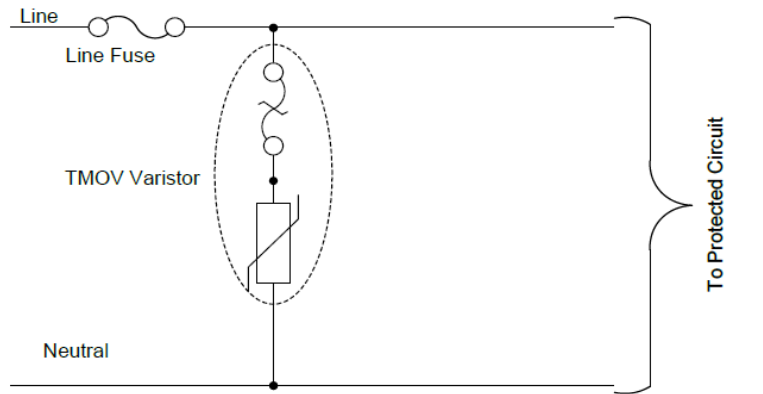
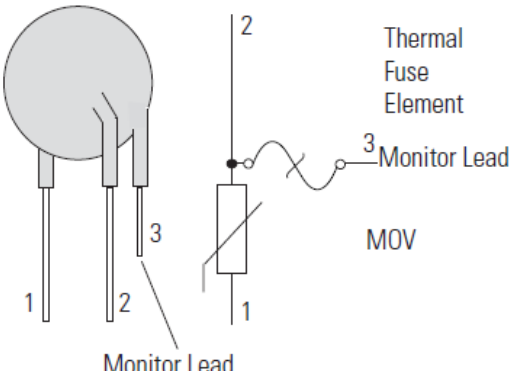
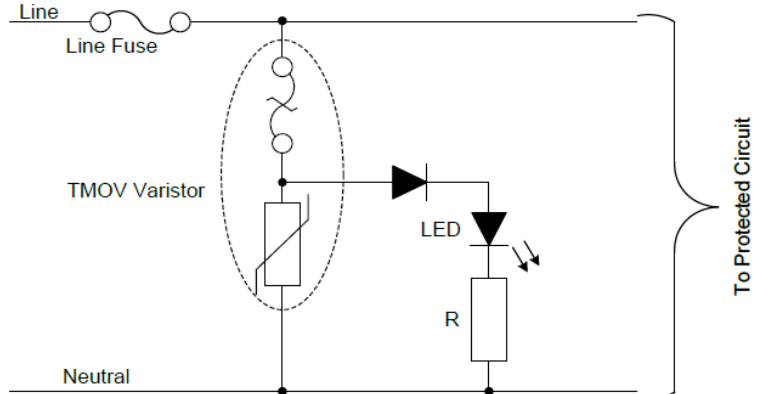


Electrical Characteristics

Part Number	Maximum Allowable Voltage		Varistor Voltage V_{1mA} (V)	Maximum Clamping Voltage		Withstanding Surge current 8/20uS(A)	Maximum Energy (10/1000μs) (J)	Rated Power (W)	Dimension Tmax (mm)	Dimension e 1 max (mm)
	V_{AC} (V)	V_{DC} (V)		I_P (A)	V_C (V)					
FTR25T(TC)181K	115	150	180(162~198)	150	300	15000	175	1.2	11.8	3.8
FTR25T(TC)201K	130	170	200(180~220)	150	340	15000	210	1.2	11.9	3.8
FTR25T(TC)221K	140	180	220(198~242)	150	360	15000	230	1.2	12.0	3.8
FTR25T(TC)241K	150	200	240(216~264)	150	395	15000	255	1.2	12.0	3.8
FTR25T(TC)271K	175	225	270(243~297)	150	455	15000	285	1.2	12.0	3.8
FTR25T(TC)301K	190	250	300(270~330)	150	500	15000	310	1.2	12.0	4.5
FTR25T(TC)331K	210	275	330(297~363)	150	550	15000	325	1.2	12.0	4.5
FTR25T(TC)361K	230	300	360(324~396)	150	595	15000	340	1.2	12.0	4.5
FTR25T(TC)391K	250	320	390(351~429)	150	650	15000	360	1.2	12.0	4.5
FTR25T(TC)431K	275	350	430(387~473)	150	710	15000	440	1.2	13.5	5.5
FTR25T(TC)471K	300	385	470(423~517)	150	775	15000	490	1.2	13.5	5.5
FTR25T(TC)511K	320	415	510(459~561)	150	845	15000	530	1.2	13.5	5.5
FTR25T(TC)561K	350	460	560(504~616)	150	925	15000	560	1.2	13.5	5.5
FTR25T(TC)621K	385	505	620(558~682)	150	1025	15000	590	1.2	13.5	5.5
FTR25T(TC)681K	420	560	680(612~718)	150	1120	15000	620	1.2	15.8	7.8
FTR25T(TC)751K	460	615	750(675~825)	150	1240	15000	630	1.2	15.8	7.8
FTR25T(TC)781K	485	640	780(702~858)	150	1290	15000	675	1.2	15.8	7.8
FTR25T(TC)821K	510	670	820(738~902)	150	1355	15000	690	1.2	15.8	7.8
FTR25T(TC)911K	550	745	910(819~1001)	150	1500	15000	715	1.2	15.8	7.8
FTR25T(TC)102K	625	825	1000(900~1100)	150	1650	15000	750	1.2	18.0	10.0
FTR25T(TC)112K	680	895	1100(990~1210)	150	1815	15000	780	1.2	18.0	10.0
FTR25T(TC)122K	750	990	1200(1080~1320)	150	1980	15000	840	1.2	18.0	10.0

Notes: Leakage Current (@83% of V_{1mA}): $I_R \leq 25\mu A$

Lead configurations and application examples

Lead configurations	application
<p>T series</p>  <p>Thermal Fuse Element</p> <p>MOV</p>	 <p>Line</p> <p>Line Fuse</p> <p>TMOV Varistor</p> <p>Neutral</p> <p>To Protected Circuit</p>
<p>TC series</p>  <p>Thermal Fuse Element</p> <p>Monitor Lead</p> <p>MOV</p> <p>1 2 3</p> <p>1 2 3</p> <p>Monitor Lead</p>	 <p>Line</p> <p>Line Fuse</p> <p>TMOV Varistor</p> <p>LED</p> <p>R</p> <p>Neutral</p> <p>To Protected Circuit</p>

Ratings and Characteristic Curves

Figure 1. Thermal Characteristics

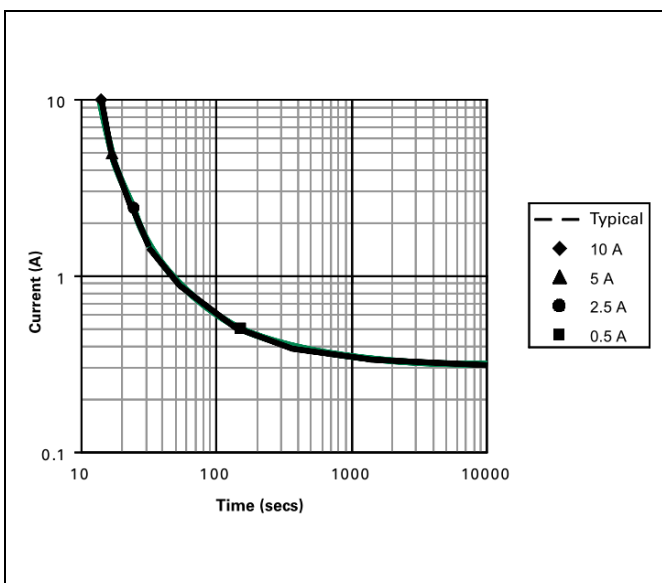
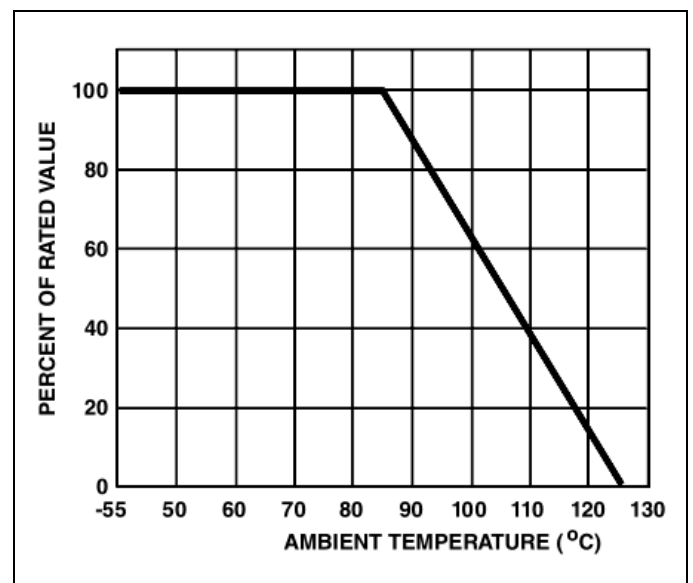
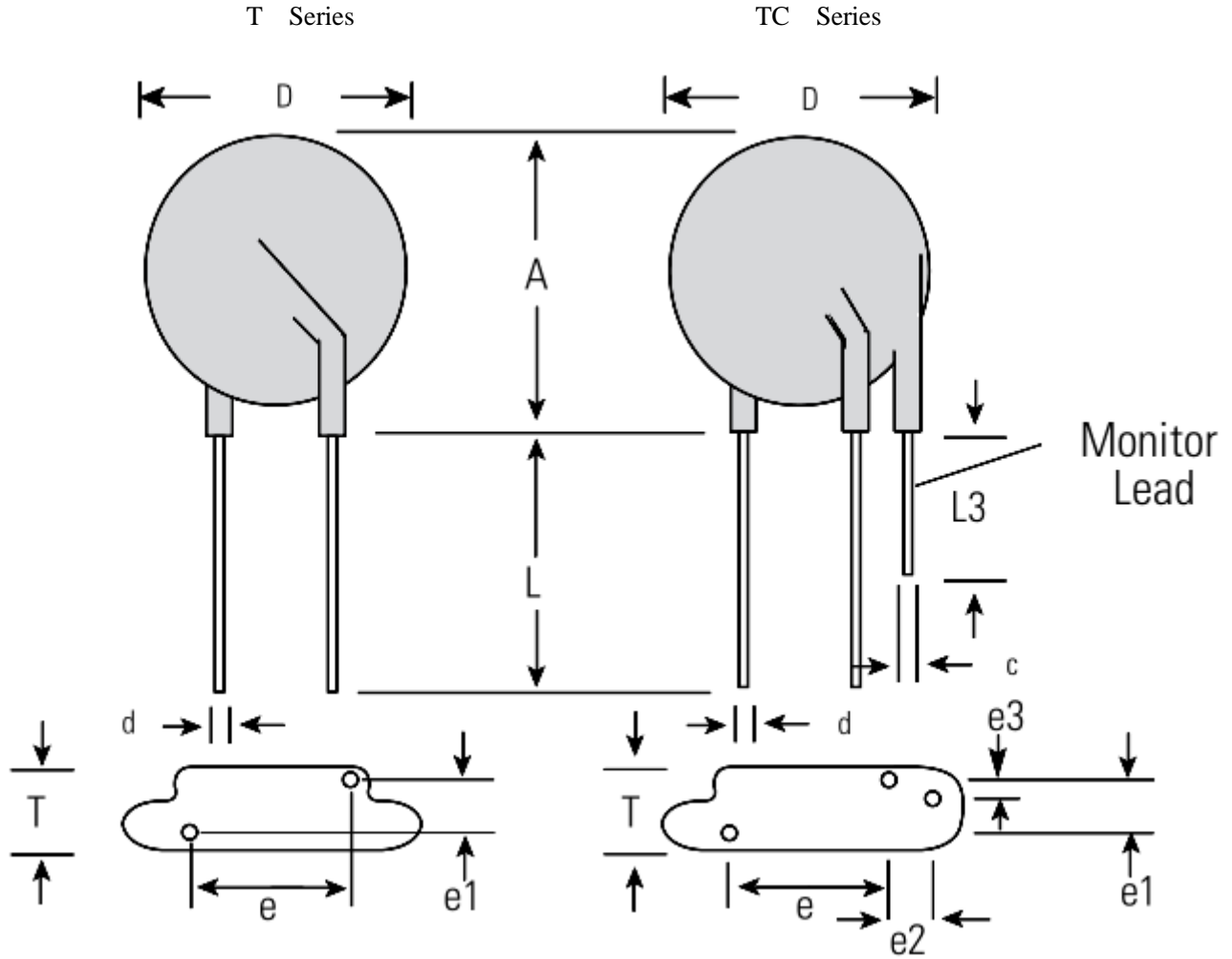


Figure 2. Current, Energy, Power Derating Curve

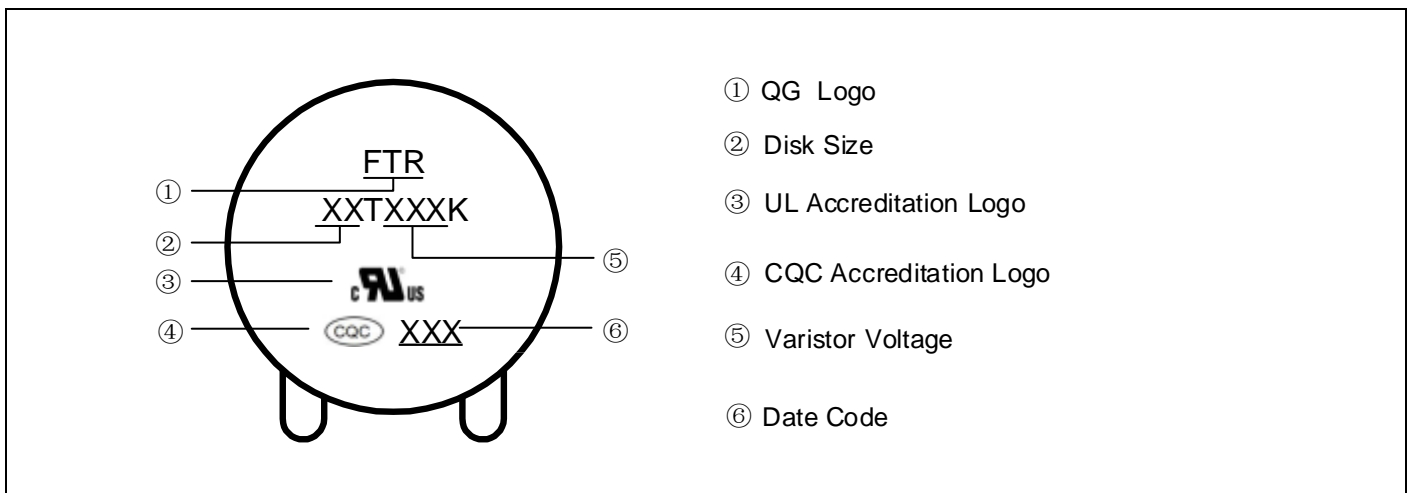


Dimensions



Symbol	D (max.)	A (max.)	e (± 1)	e2 (± 1)	e3 (max.)	L (min.)	L3 (min.)	d (± 0.05)	c (± 0.05)	Tmax	e1
T series (mm)	28.5	35.5	12.7	n/a	n/a	25.4	n/a	1.0	n/a	Please refer to the Electrical Characteristics Table	
TC series (mm)	28.5	35.5	12.7	6.5	2.5	25.4	6.0	1.0	0.8		

Marking Code



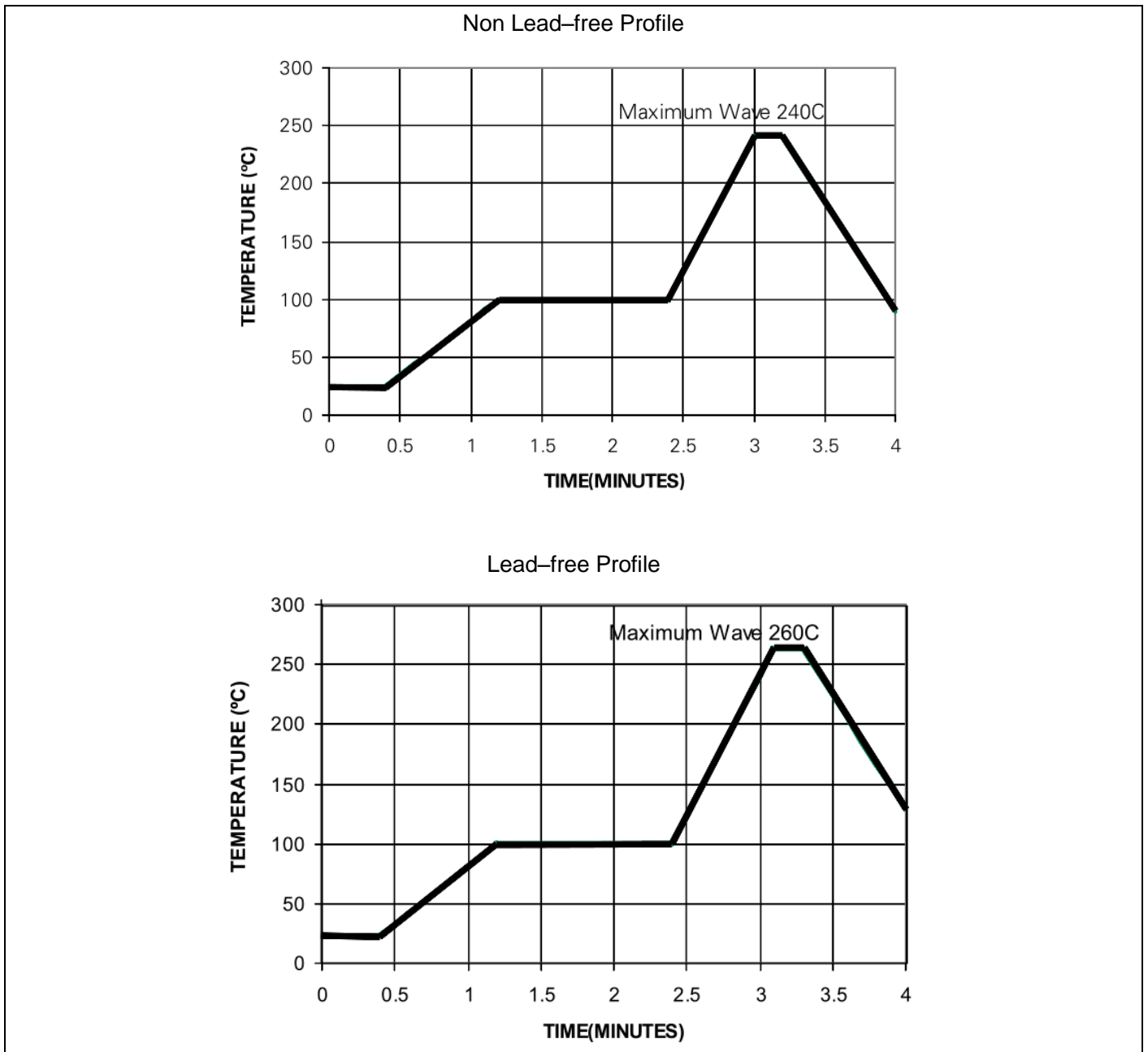
Mechanical Characteristics

Items	Test conditions / Methods	Specifications								
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Terminal diameter (mm)</td> <td>Force(kg)</td> </tr> <tr> <td>0.5<d≤0.8</td> <td>1.0</td> </tr> <tr> <td>0.8<d≤1.25</td> <td>2.0</td> </tr> <tr> <td>1.25<d</td> <td>4.0</td> </tr> </table>	Terminal diameter (mm)	Force(kg)	0.5<d≤0.8	1.0	0.8<d≤1.25	2.0	1.25<d	4.0	NO Visible damage Δ V1mA/V1mA ≤5%
Terminal diameter (mm)	Force(kg)									
0.5<d≤0.8	1.0									
0.8<d≤1.25	2.0									
1.25<d	4.0									
Bending Strength of Terminals	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. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Terminal diameter (mm)</td> <td>Force(kg)</td> </tr> <tr> <td>0.5<d≤0.8</td> <td>0.5</td> </tr> <tr> <td>0.8<d≤1.25</td> <td>1.0</td> </tr> <tr> <td>1.25<d</td> <td>2.0</td> </tr> </table>	Terminal diameter (mm)	Force(kg)	0.5<d≤0.8	0.5	0.8<d≤1.25	1.0	1.25<d	2.0	NO Visible damage Δ V1mA/V1mA ≤5%
Terminal diameter (mm)	Force(kg)									
0.5<d≤0.8	0.5									
0.8<d≤1.25	1.0									
1.25<d	2.0									
Vibration	Frequency range: 10~55 Hz Amplitude: 0.75mm or 98m/s ² Direction: 3 mutually perpendicular directions, 2hrs each.	NO Visible damage Δ V1mA/V1mA ≤5%								
Solder ability	Solder Temp: 245±5°C Dipping Time: 2±0.5 sec	At least 95% of terminal electrode is covered by new solder								
Resistanceto Soldering Heat	Solder Temp: 260±5°C Dipping Time: 10±1 sec	NO Visible damage Δ V1mA/V1mA ≤5%								

Reliability

Items	Test conditions / Methods	Specifications
High Temperature Storage	Ambient Temp: 85±2°C Duration: 1000hrs	Δ V1mA/V1mA ≤5%
Low Temperature Storage	Ambient Temp: -55±2°C Duration: 1000hrs	Δ V1mA/V1mA ≤5%
Humidity	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs	Δ V1mA/V1mA ≤5%
Temperature Cycle	The conditions shown below shall be repeated 5 cycles	
	Step	Temperature (°C)
	1	-55±3
	2	Room temperature
	3	85±3
	4	Room temperature
	Period (minutes)	
	30±3	
	15±3	
	30±3	
	15±3	
High Temperature Load	Ambient Temp: 85±2°C Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	ΔV1mA/V1mA ≤5%
Damp Heat Load	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage ΔV1mA/V1mA ≤5%
Voltage Proof	Metal balls method, 2500Vac 1 min.	No visible damage

Soldering Recommendation



Quantity

Packaging Dimensions (Unit: mm)	Quantity	
	50pcs/bag	2bags/box