

## 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.

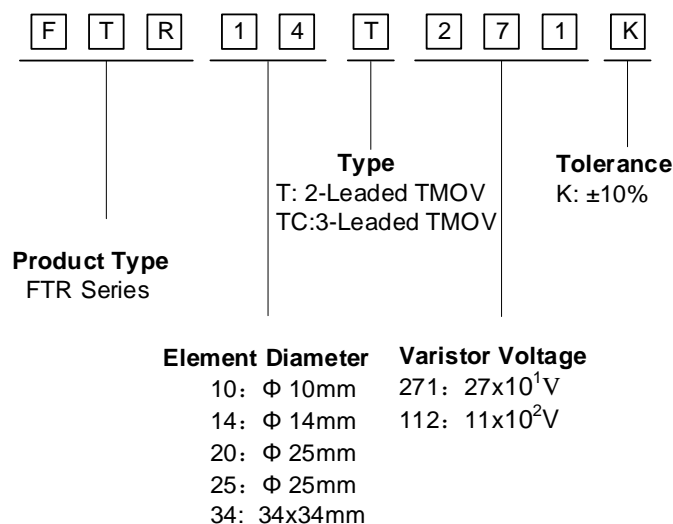
### Features

- TMOV integrated thermal protection device
- Fast responding to transient over-voltage
- High peak surge current rating up to 6KA
- 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

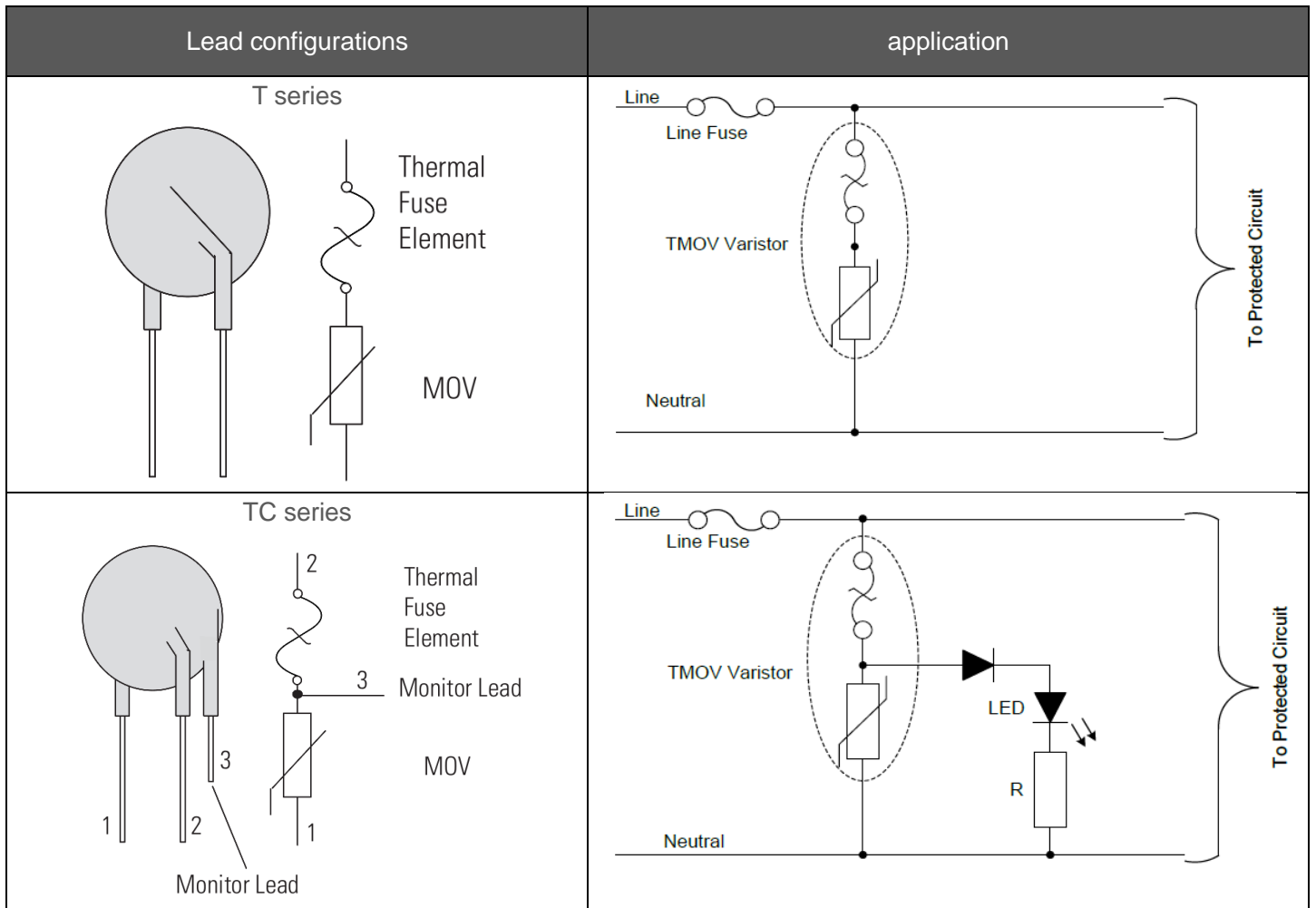


**Electrical Characteristics**

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)					
FTR14T(TC)181K	115	150	180(162~198)	50	300	6000	56	0.6	9.0	4
FTR14T(TC)201K	130	170	200(180~220)	50	340	6000	70	0.6	9.0	4
FTR14T(TC)221K	140	180	220(198~242)	50	360	6000	78	0.6	9.0	4
FTR14T(TC)241K	150	200	240(216~264)	50	395	6000	84	0.6	9.0	4
FTR14T(TC)271K	175	225	270(243~297)	50	455	6000	99	0.6	9.0	4
FTR14T(TC)301K	190	250	300(270~330)	50	500	6000	108	0.6	9.5	4.5
FTR14T(TC)331K	210	275	330(297~363)	50	550	6000	115	0.6	9.5	4.5
FTR14T(TC)361K	230	300	360(324~396)	50	595	6000	130	0.6	9.5	4.5
FTR14T(TC)391K	250	320	390(351~429)	50	650	6000	140	0.6	9.5	4.5
FTR14T(TC)431K	275	350	430(387~473)	50	710	6000	155	0.6	9.5	4.5
FTR14T(TC)471K	300	385	470(423~517)	50	775	6000	175	0.6	11	5.5
FTR14T(TC)511K	320	415	510(459~561)	50	845	6000	180	0.6	11	5.5
FTR14T(TC)561K	350	460	560(504~616)	50	925	6000	185	0.6	11	5.5
FTR14T(TC)621K	385	505	620(558~682)	50	1025	6000	190	0.6	11	5.5
FTR14T(TC)681K	420	560	680(612~718)	50	1120	6000	200	0.6	11	5.5
FTR14T(TC)751K	460	615	750(675~825)	50	1240	6000	210	0.6	11	8
FTR14T(TC)781K	485	640	780(702~858)	50	1290	6000	220	0.6	12	8
FTR14T(TC)821K	510	670	820(738~902)	50	1355	6000	235	0.6	12	8
FTR14T(TC)911K	550	745	910(819~1001)	50	1500	6000	255	0.6	12	8
FTR14T(TC)102K	625	825	1000(900~1100)	50	1650	6000	280	0.6	13	8
FTR14T(TC)112K	680	895	1100(990~1210)	50	1815	6000	310	0.6	13	10
FTR14T(TC)122K	750	990	1200(1080~1320)	50	1980	6000	324	0.6	13	10

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

### Lead configurations and application examples



### Ratings and Characteristic Curves

Figure 1. Thermal Characteristics

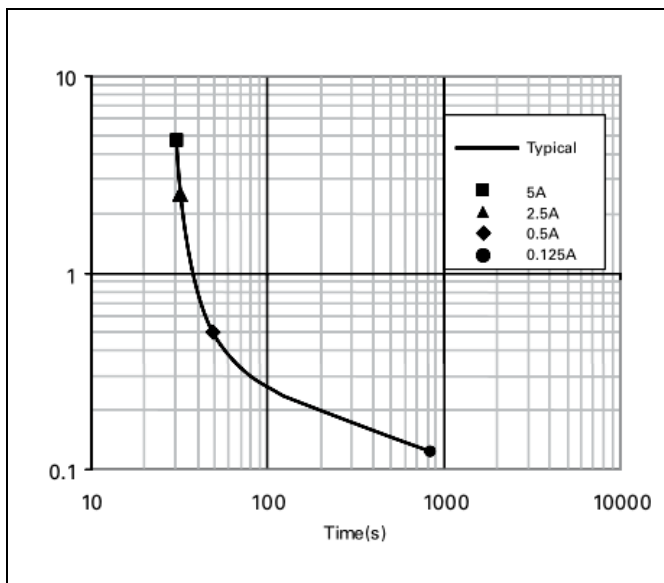
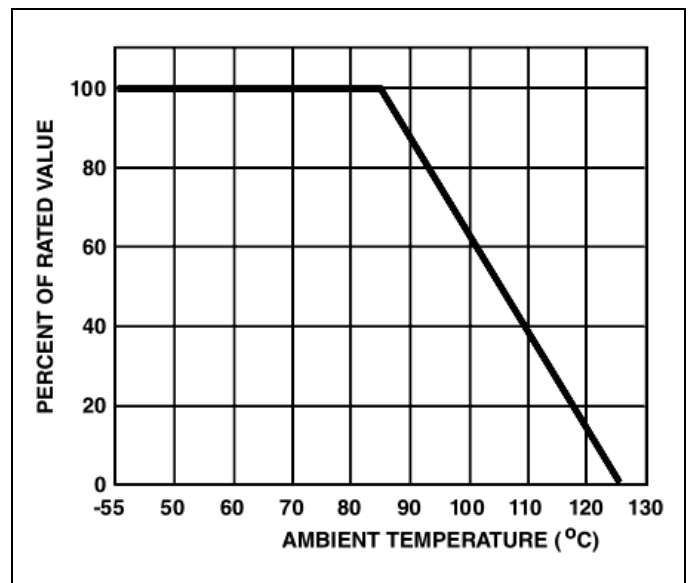
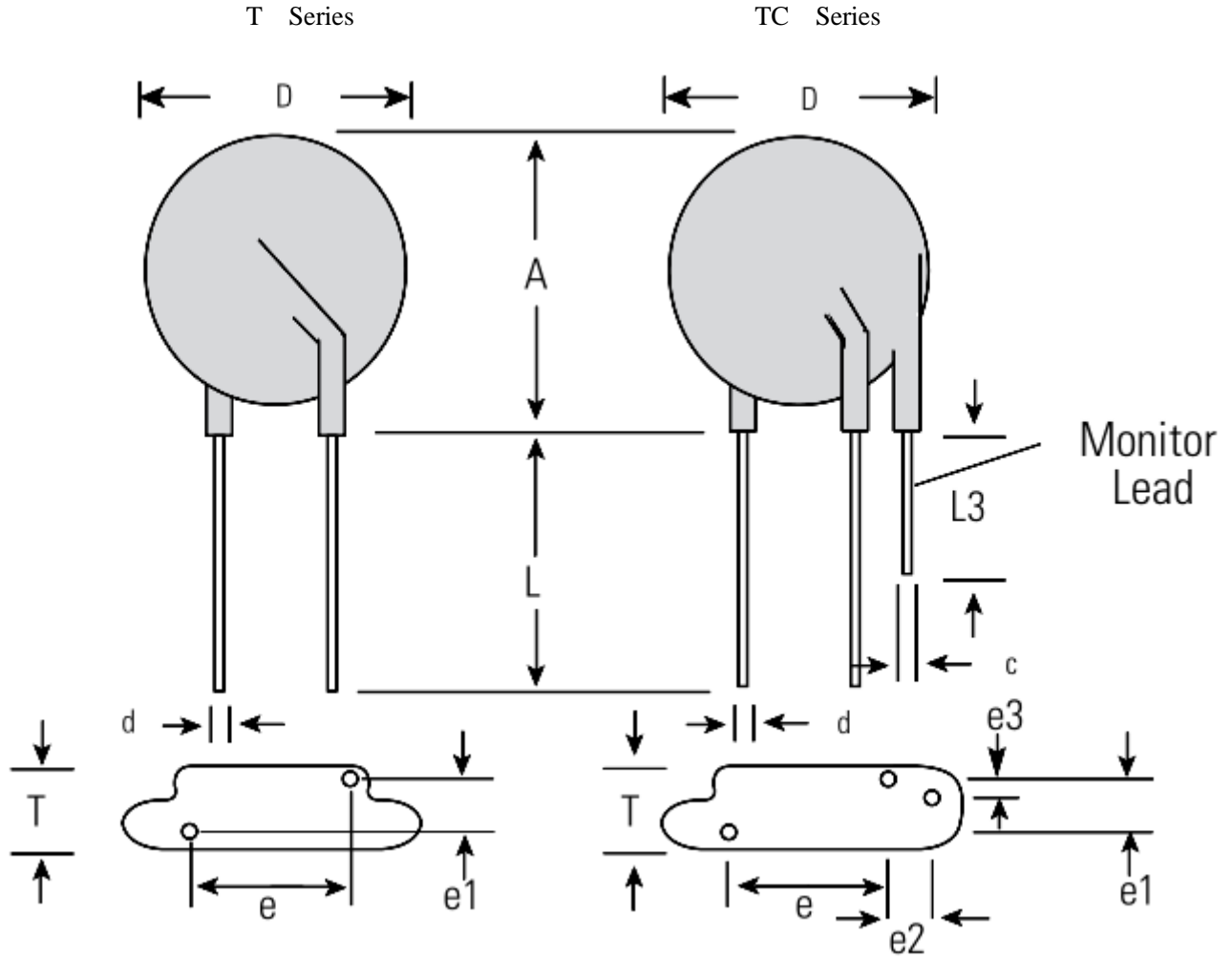


Figure 2. Current, Energy, Power Derating Curve

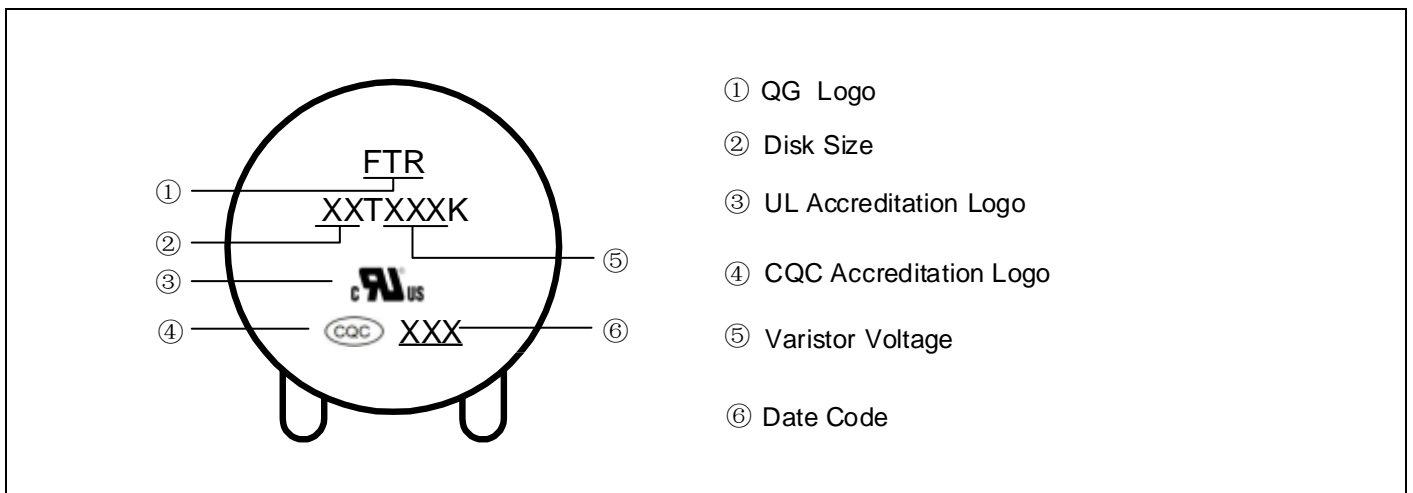


### Dimensions



Symbol	D (max.)	A (max.)	e ( $\pm 1$ )	e2 ( $\pm 1$ )	e3 (max.)	L (min.)	L3 (min.)	d ( $\pm 0.05$ )	c ( $\pm 0.05$ )	Tmax	e1
T series (mm)	17	22	7.5	n/a	n/a	25.4	n/a	0.8	n/a	Please refer to the Electrical Characteristics Table	
TC series (mm)	17	22	7.5	5.0	2.0	25.4	6.0	0.8	0.8		

### Marking Code



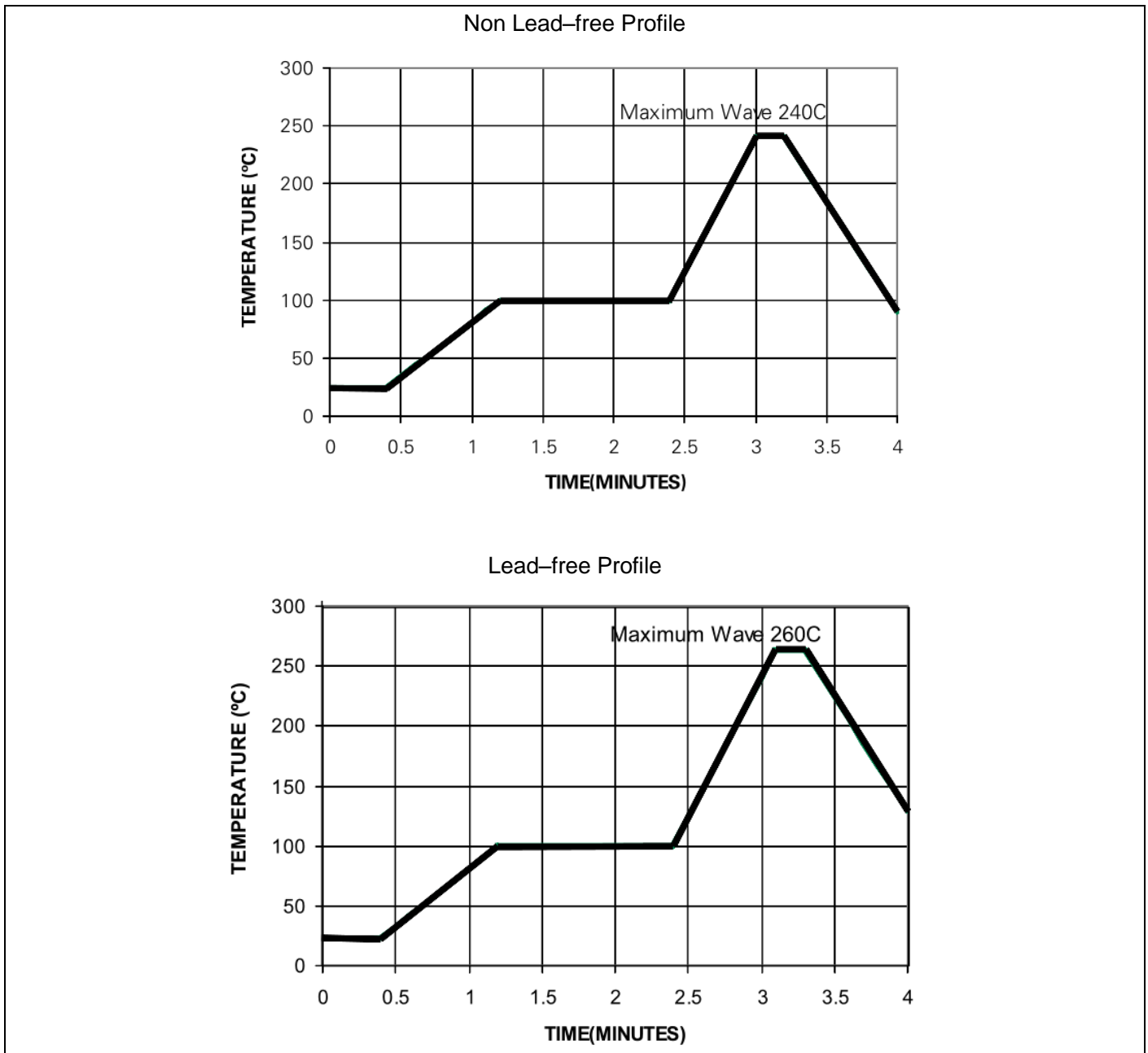
**Mechanical Characteristics**

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"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force(kg)</th> </tr> </thead> <tbody> <tr> <td>0.5&lt;d≤0.8</td> <td>1.0</td> </tr> <tr> <td>0.8&lt;d≤1.25</td> <td>2.0</td> </tr> <tr> <td>1.25&lt;d</td> <td>4.0</td> </tr> </tbody> </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"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force(kg)</th> </tr> </thead> <tbody> <tr> <td>0.5&lt;d≤0.8</td> <td>0.5</td> </tr> <tr> <td>0.8&lt;d≤1.25</td> <td>1.0</td> </tr> <tr> <td>1.25&lt;d</td> <td>2.0</td> </tr> </tbody> </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 <sup>2</sup> 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								
Resistance to Soldering Heat	Solder Temp: 260±5°C Dipping Time: 10±1 sec	NO Visible damage  Δ V1mA/V1mA  ≤5%								

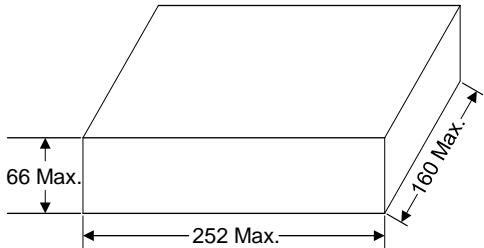
**Reliability**

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)	Period (minutes)
	1	-55±3	30±3
	2	Room temperature	15±3
	3	85±3	30±3
4	Room temperature	15±3	
High Temperature Load	Ambient Temp: 85±2°C Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	Δ V1mA/V1mA  ≤5%	
Damp Heat Load	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage  Δ V1mA/V1mA  ≤5%	
Voltage Proof	Metal balls method, 2500Vac 1 min.	No visible damage	

### Soldering Recommendation



### Quantity

Packaging Dimensions (Unit: mm)	Quantity	
<p>bulk</p> 	200pcs/bag	2bags/box