

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.

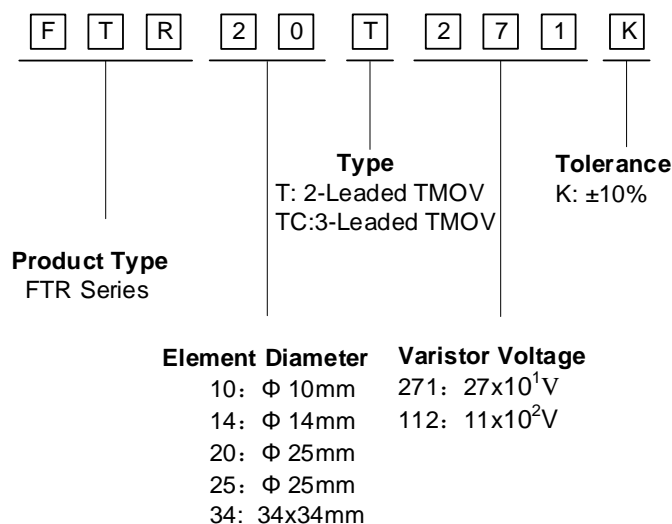
Features

- TMOV integrated thermal protection device
- Fast responding to transient over-voltage
- High peak surge current rating up to 10KA
- 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

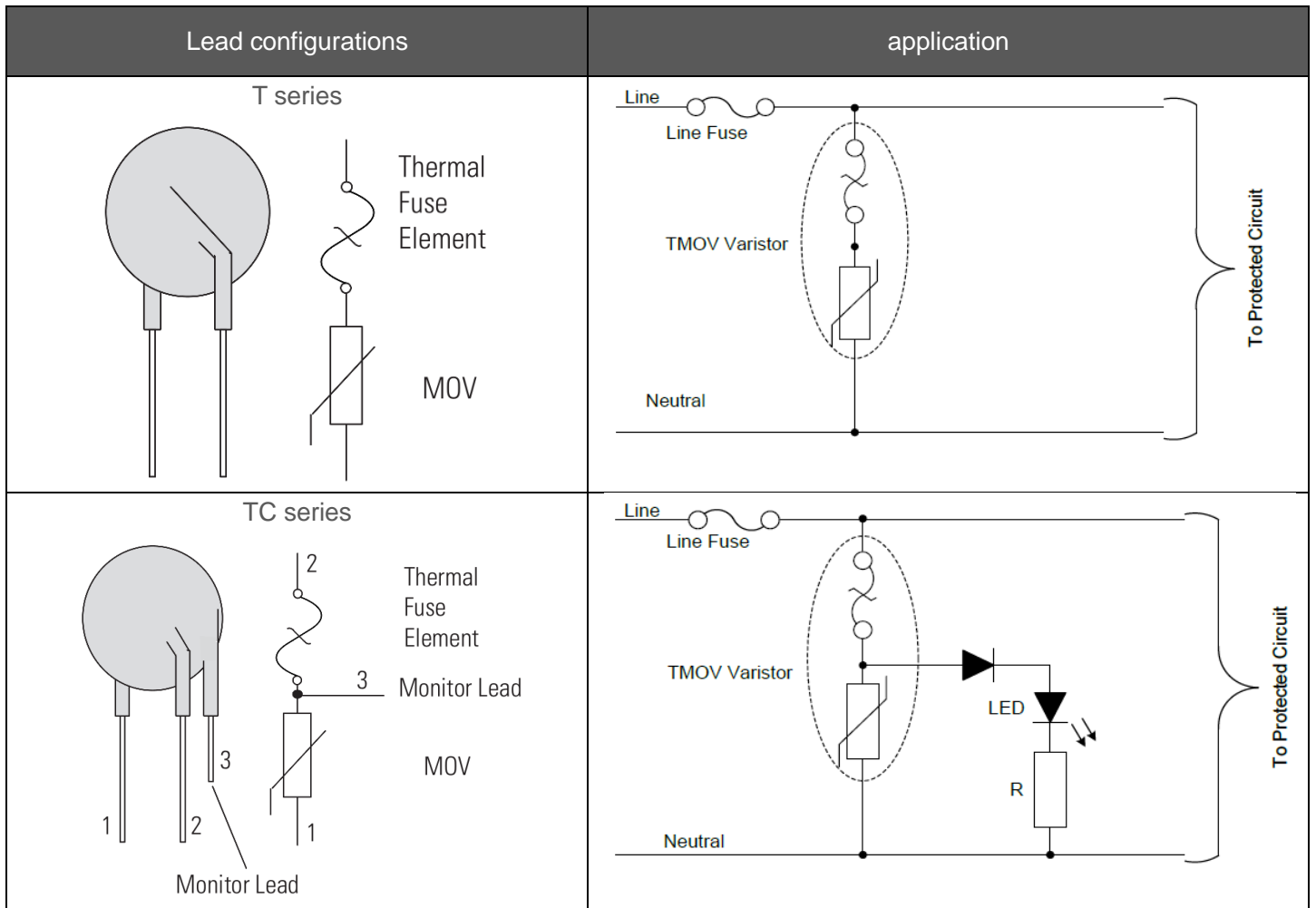


Electrical Characteristics

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)					
FTR20T(TC)181K	115	150	180(162~198)	100	300	10000	110	1.0	9.0	4
FTR20T(TC)201K	130	170	200(180~220)	100	340	10000	140	1.0	9.0	4
FTR20T(TC)221K	140	180	220(198~242)	100	360	10000	155	1.0	9.0	4
FTR20T(TC)241K	150	200	240(216~264)	100	395	10000	170	1.0	9.0	4
FTR20T(TC)271K	175	225	270(243~297)	100	455	10000	190	1.0	9.0	4
FTR20T(TC)301K	190	250	300(270~330)	100	500	10000	205	1.0	9.5	4.5
FTR20T(TC)331K	210	275	330(297~363)	100	550	10000	215	1.0	9.5	4.5
FTR20T(TC)361K	230	300	360(324~396)	100	595	10000	225	1.0	9.5	4.5
FTR20T(TC)391K	250	320	390(351~429)	100	650	10000	240	1.0	9.5	4.5
FTR20T(TC)431K	275	350	430(387~473)	100	710	10000	270	1.0	9.5	5.5
FTR20T(TC)471K	300	385	470(423~517)	100	775	10000	350	1.0	11	5.5
FTR20T(TC)511K	320	415	510(459~561)	100	845	10000	380	1.0	11	5.5
FTR20T(TC)561K	350	460	560(504~616)	100	925	10000	400	1.0	11	5.5
FTR20T(TC)621K	385	505	620(558~682)	100	1025	10000	425	1.0	11	6.0
FTR20T(TC)681K	420	560	680(612~718)	100	1120	10000	435	1.0	11	6.0
FTR20T(TC)751K	460	615	750(675~825)	100	1240	10000	455	1.0	11	7.0
FTR20T(TC)781K	485	640	780(702~858)	100	1290	10000	461	1.0	12	7.0
FTR20T(TC)821K	510	670	820(738~902)	100	1355	10000	475	1.0	12	7.0
FTR20T(TC)911K	550	745	910(819~1001)	100	1500	10000	500	1.0	12	8.0
FTR20T(TC)102K	625	825	1000(900~1100)	100	1650	10000	560	1.0	13	8.0
FTR20T(TC)112K	680	895	1100(990~1210)	100	1815	10000	610	1.0	13	9.0
FTR20T(TC)122K	750	990	1200(1080~1320)	100	1980	10000	650	1.0	13	9.0

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

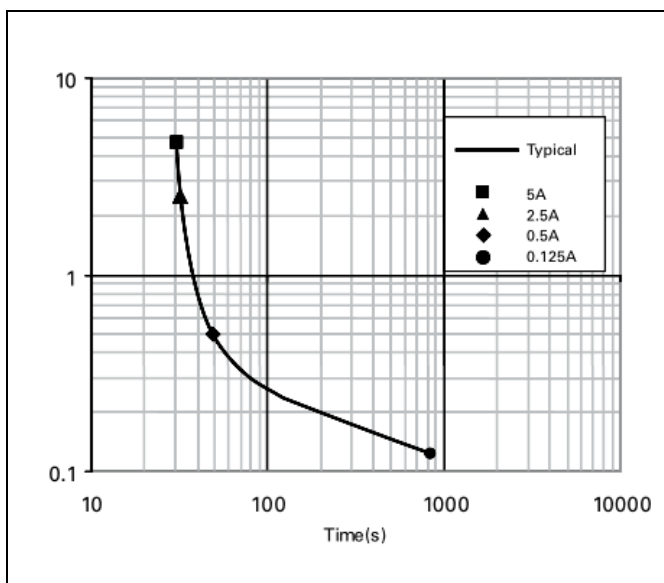
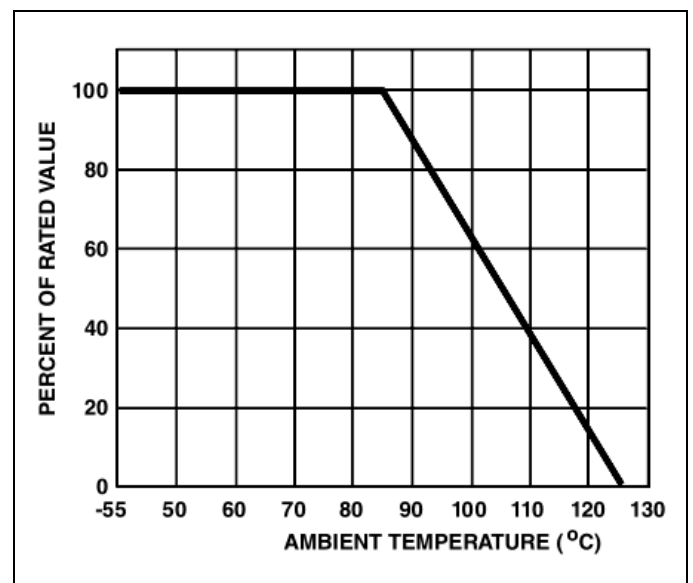
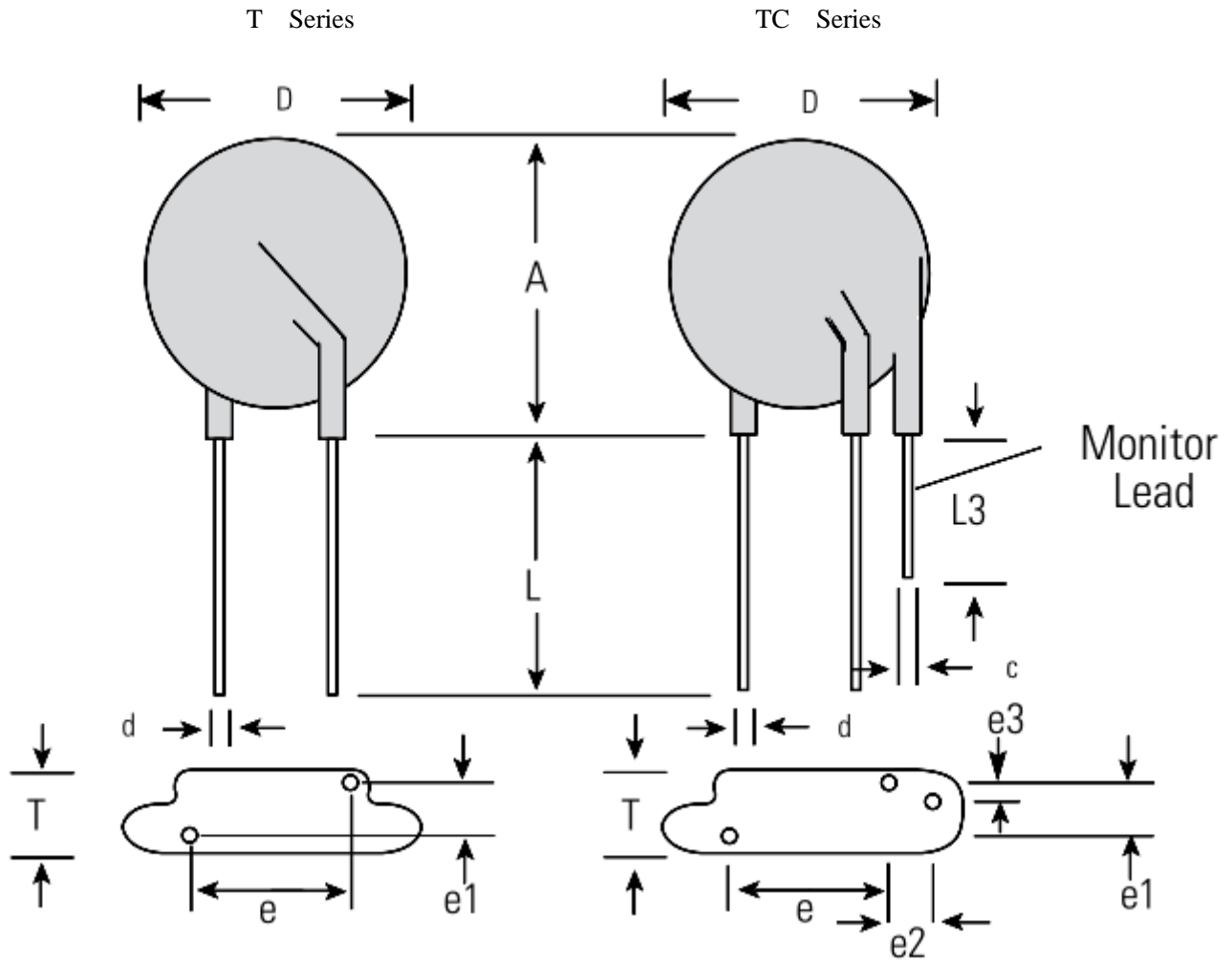


Figure 2. Current, Energy, Power Derating Curve



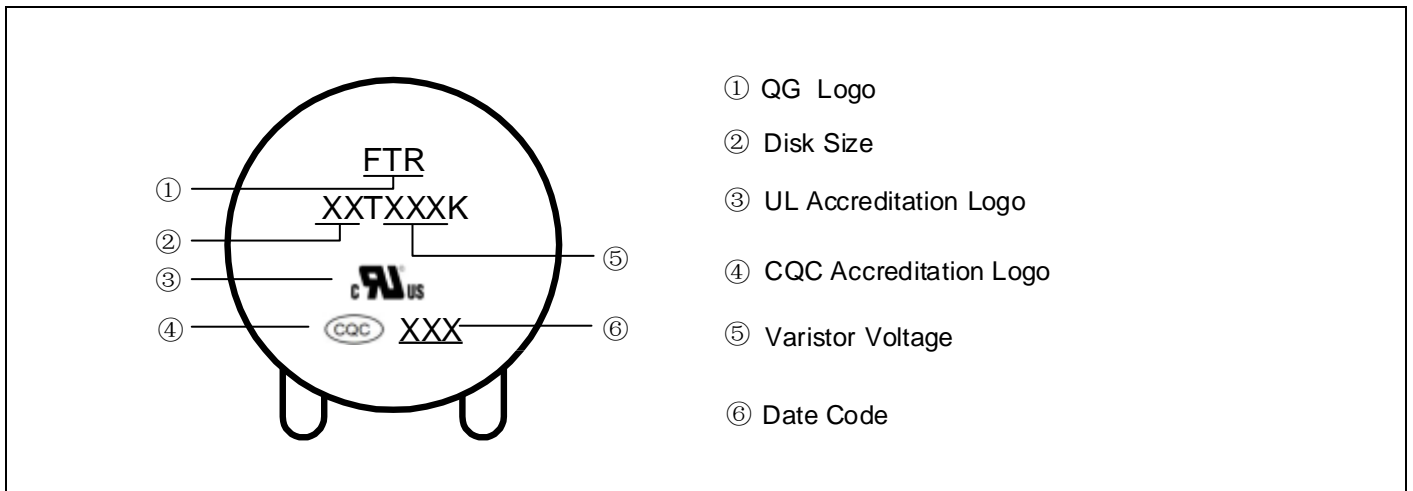
Dimensions



Symbol	D (max.)	A (max.)	e (±1)	e2 (±1)	e3 (max.)	L (min.)	L3 (min.)	d (±0.05)	c (±0.05)	Tmax	e1
T series (mm)	23	28	7.5	n/a	n/a	25.4	n/a	0.8/1.0	n/a	Please refer to the Electrical Characteristics Table	
TC series (mm)	23	28	7.5	5.0	2.0	25.4	6.0	0.8/1.0	0.8		

Notes: d=0.8mm (181K~681K) ;d=1mm (751K~122K)

Marking Code



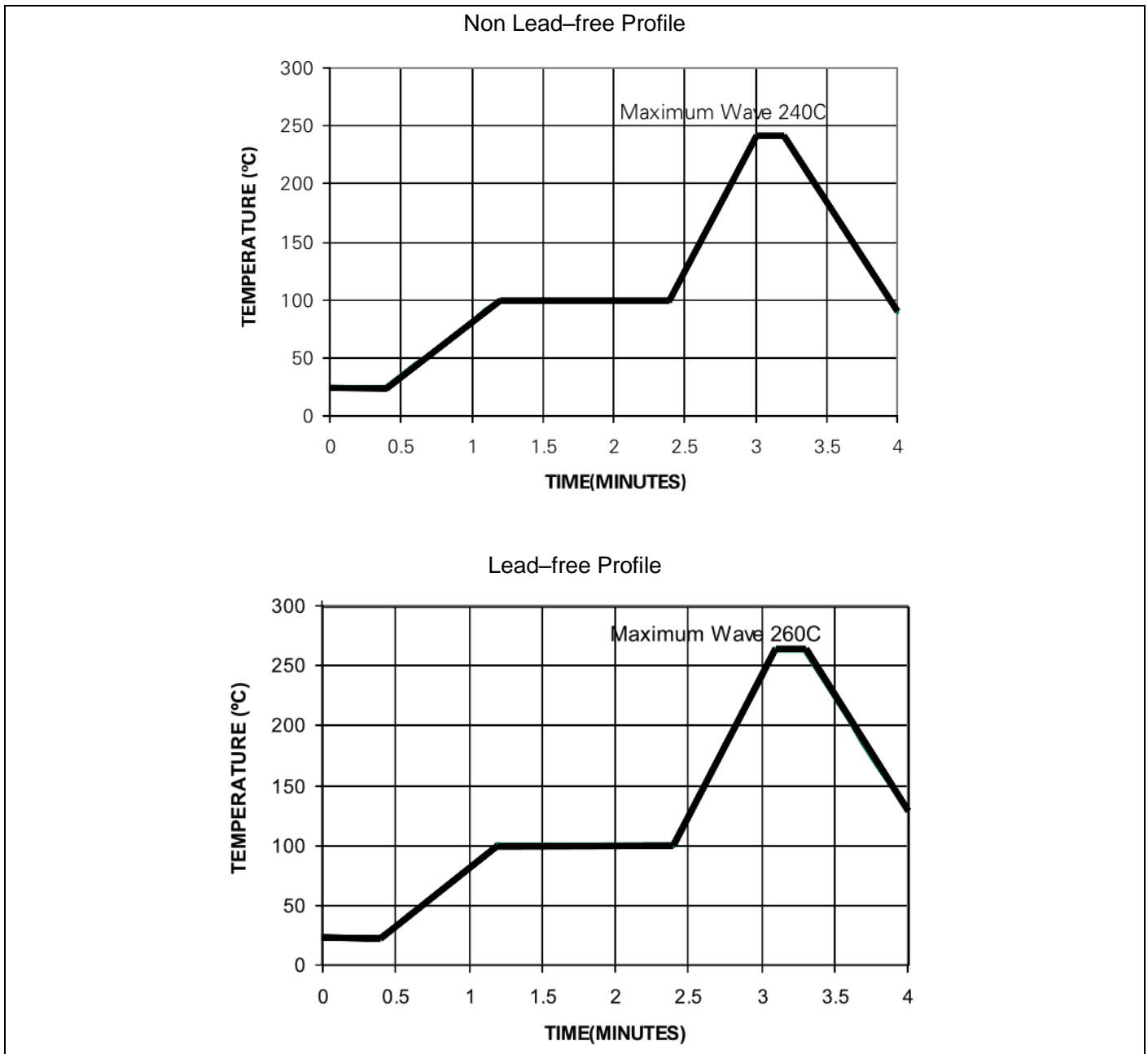
Mechanical Characteristics

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<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> </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<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> </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 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								
Resistance to Soldering Heat	Solder Temp: 260±5°C Dipping Time: 10±1 sec	NO Visible damage Δ V1mA/V1mA ≤5%								

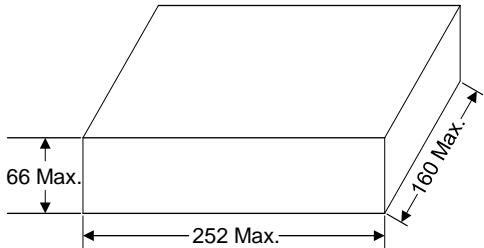
Reliability

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> 	100pcs/bag	2bags/box