



## **Metal oxide varistor**

ThermoFuse varistor (AdvancedD series)

**Series/Type:** ETFV14K\*\*\*E2  
**Ordering code:** B72214T2\*\*\*K101  
Date: 2007-04-26  
Version: b

### Applications

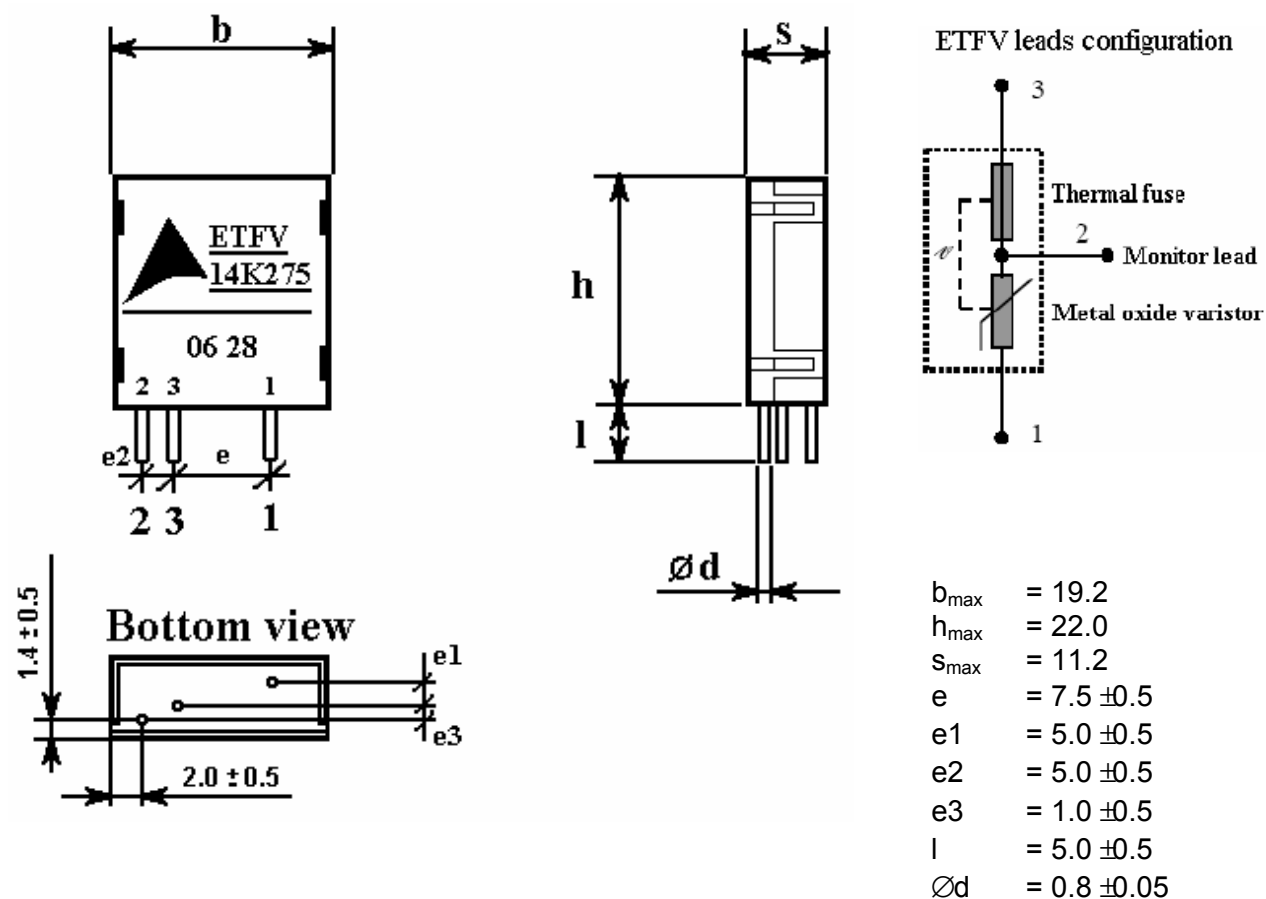
Overvoltage protection with integrated thermal fuse.

Suitable for use in industrial and household appliance applications.

### Nomenclature

ETFV	=	EPCOS ThermoFuse varistor
14	=	Rated disk diameter (mm)
K	=	Tolerance of $V_V$ at 1 mA: $\pm 10\%$
***	=	Max. AC voltage (see table on page 3)
E2	=	Energy absorption characteristics, AdvancedD series

### Dimensional drawings in mm



**Electrical data**

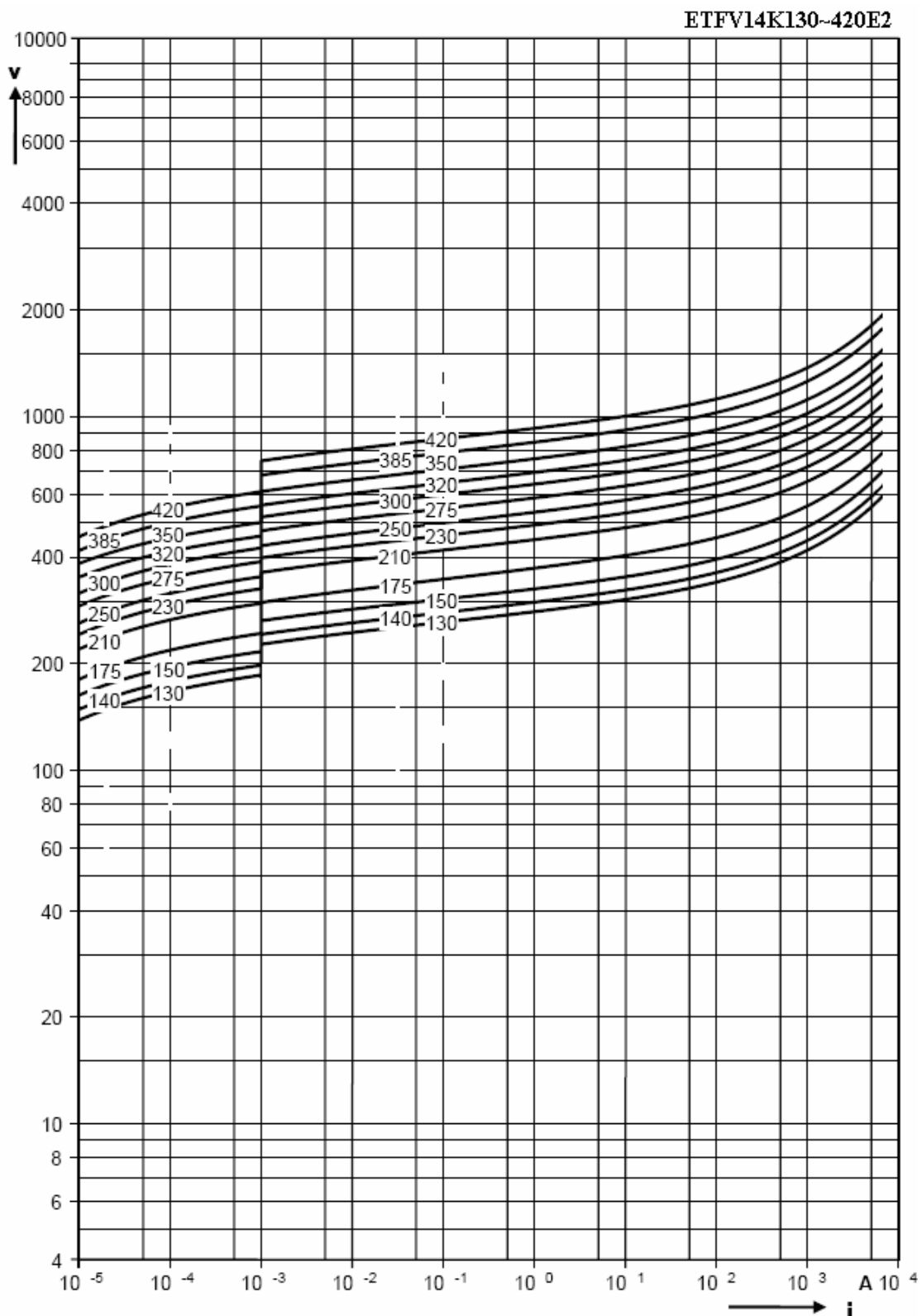
Maximum ratings (85 °C)

Ordering code	Type	Max. operating AC voltage [V]	Max. operating DC voltage [V]	Surge current (8/20 $\mu$ s) 1 time [A]	Energy absorption (2 ms) 1 time [J]	Average power dissipation [W]
B72214T2131K101	ETFV14K130E2	130	170	6000	50	0.6
B72214T2141K101	ETFV14K140E2	140	180	6000	55	0.6
B72214T2151K101	ETFV14K150E2	150	200	6000	60	0.6
B72214T2171K101	ETFV14K175E2	175	225	6000	70	0.6
B72214T2211K101	ETFV14K210E2	210	270	6000	80	0.6
B72214T2231K101	ETFV14K230E2	230	300	6000	90	0.6
B72214T2251K101	ETFV14K250E2	250	320	6000	100	0.6
B72214T2271K101	ETFV14K275E2	275	350	6000	110	0.6
B72214T2301K101	ETFV14K300E2	300	385	6000	125	0.6
B72214T2321K101	ETFV14K320E2	320	420	6000	136	0.6
B72214T2351K101	ETFV14K350E2	350	460	6000	136	0.6
B72214T2381K101	ETFV14K385E2	385	505	6000	136	0.6
B72214T2421K101	ETFV14K420E2	420	560	6000	136	0.6

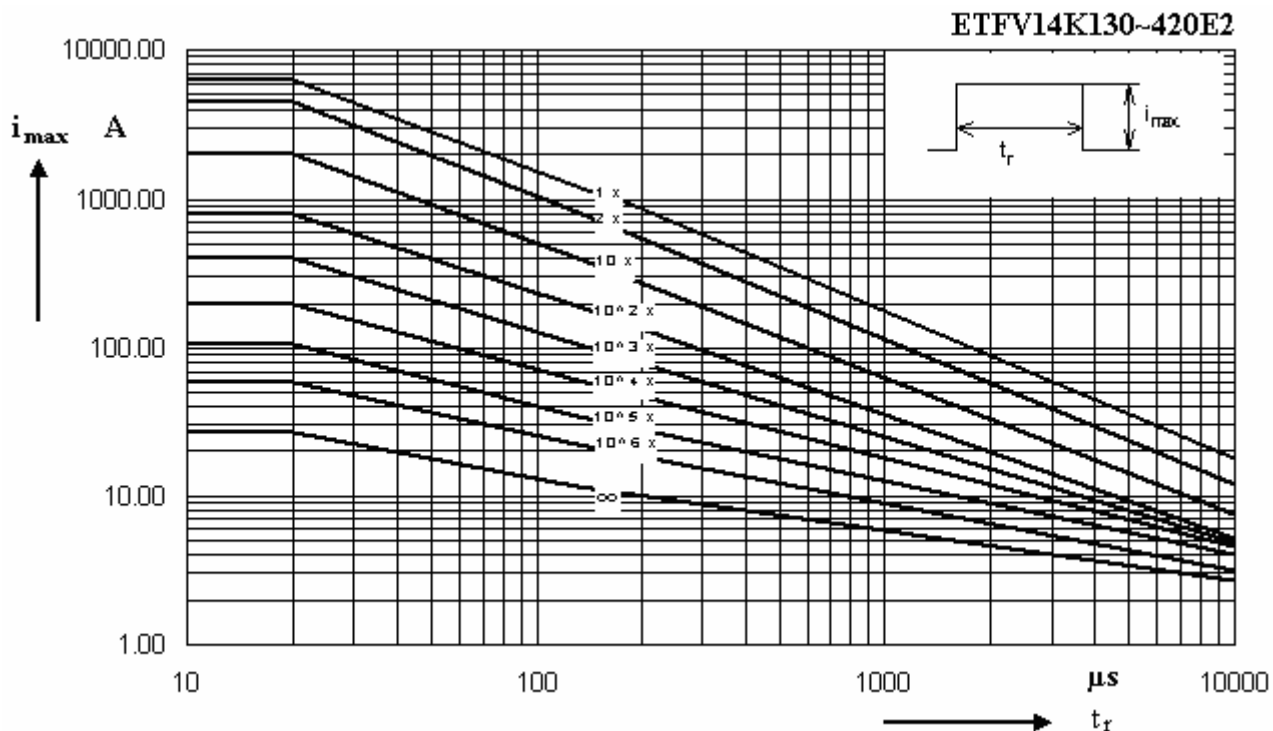
## Characteristics (25 °C)

Ordering code	Type	Varistor voltage at 1 mA [V]	Clamping voltage at 50 A (8/20 µs) [V]	Typ. capacitance at 1 kHz [pF]
B72214T2131K101	ETFV14K130E2	205 ±10%	340	650
B72214T2141K101	ETFV14K140E2	220 ±10%	360	610
B72214T2151K101	ETFV14K150E2	240 ±10%	395	570
B72214T2171K101	ETFV14K175E2	270 ±10%	455	490
B72214T2211K101	ETFV14K210E2	330 ±10%	545	410
B72214T2231K101	ETFV14K230E2	360 ±10%	595	385
B72214T2251K101	ETFV14K250E2	390 ±10%	650	350
B72214T2271K101	ETFV14K275E2	430 ±10%	710	320
B72214T2301K101	ETFV14K300E2	470 ±10%	775	300
B72214T2321K101	ETFV14K320E2	510 ±10%	840	280
B72214T2351K101	ETFV14K350E2	560 ±10%	910	260
B72214T2381K101	ETFV14K385E2	620 ±10%	1025	240
B72214T2421K101	ETFV14K420E2	680 ±10%	1120	220

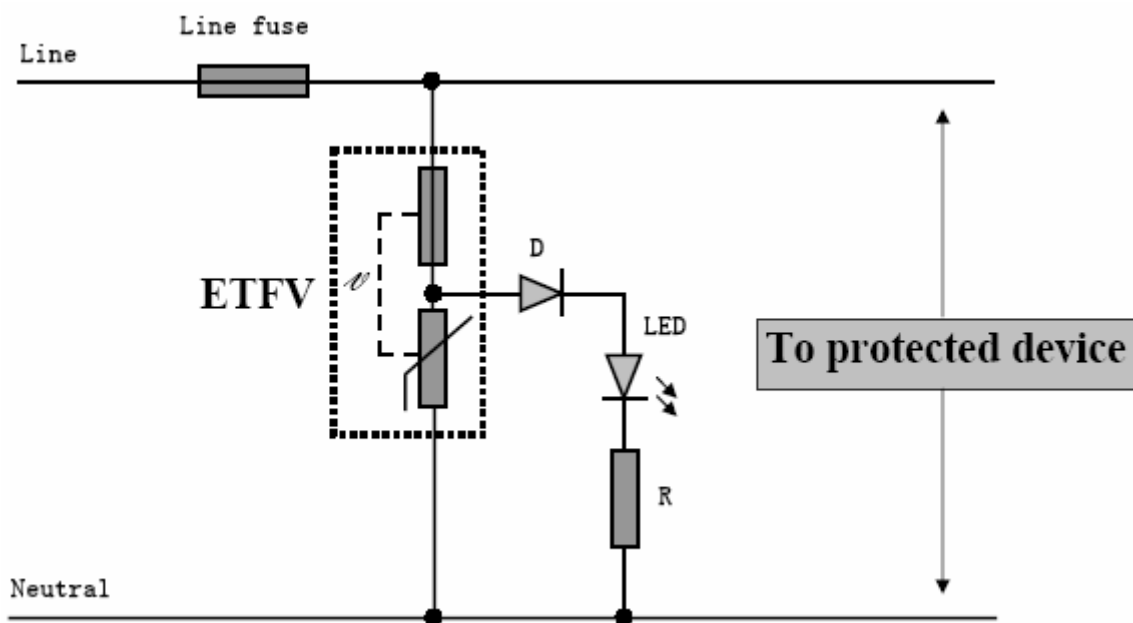
v/i characteristic



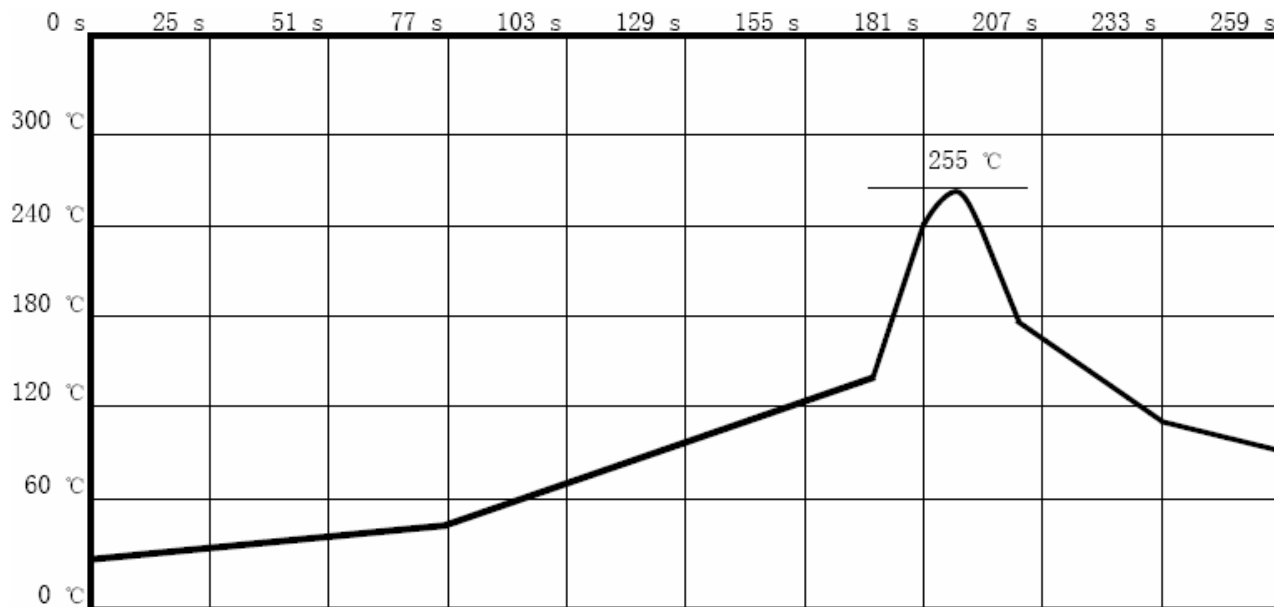
Maximum surge current  $i_{max} = f(t_r, \text{pulse train})$



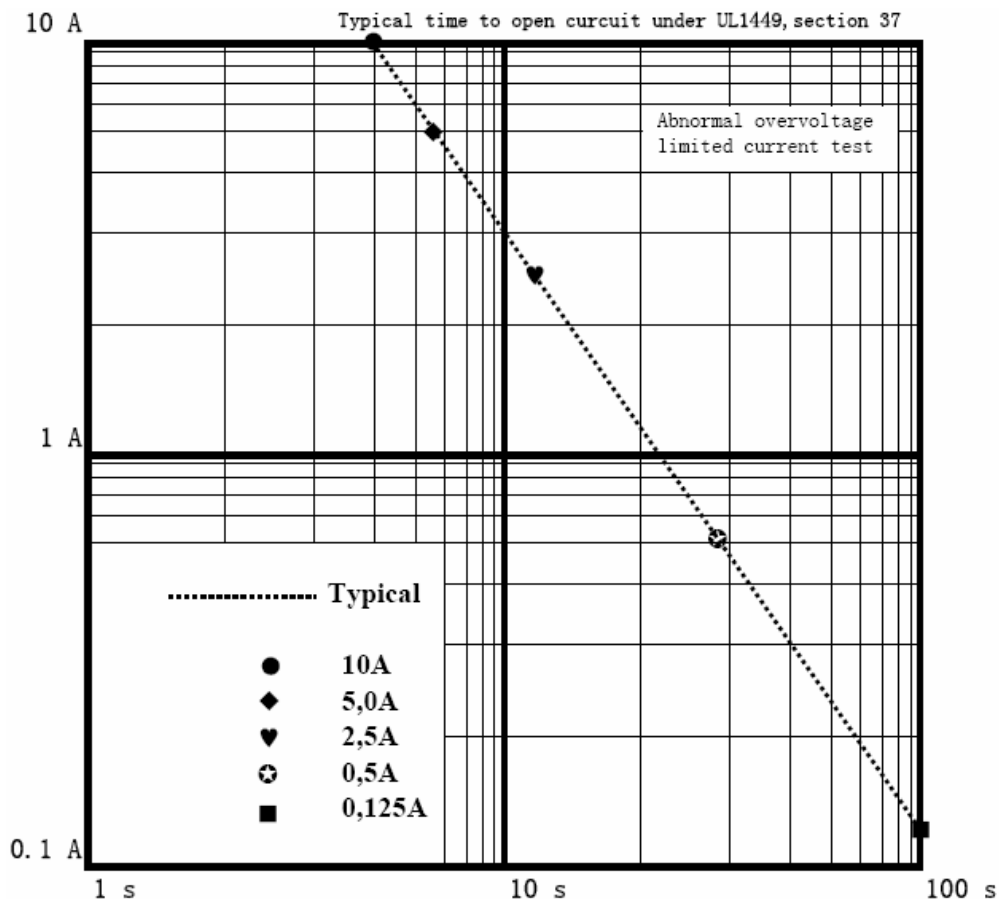
Typical application



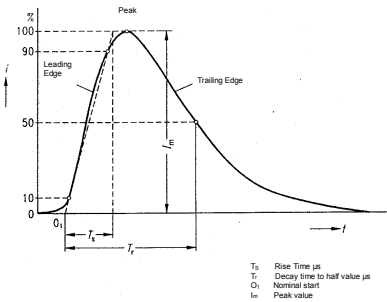
Typical wave soldering curve



Typical thermal characteristic



**Reliability data, electrical**

Characteristics	Test methods / Description	Specifications
Varistor voltage	The voltage between two terminals with the specified measuring current applied is called $V_V$ (1 mA <sub>DC</sub> @ 0.2 ... 2 s).	To meet the specified value.
Clamping voltage	The maximum voltage between two terminals with the specified standard impulse current (8/20 $\mu$ s) illustrated below applied.  	To meet the specified value.
Surge current derating, 8/20 $\mu$ s	CECC 42 000, test C 2.1 100 surge currents (8/20 $\mu$ s), unipolar, interval 30 s, amplitude corresponding to derating curve for 20 $\mu$ s	$ \Delta V/V (1 \text{ mA})  \leq 10\%$ (measured in direction of surge current) No visible damage
Surge current derating, 2 ms	CECC 42 000, test C 2.1 100 surge currents (2 ms), unipolar, interval 120 s, amplitude corresponding to derating curve for 2 ms	$ \Delta V/V (1 \text{ mA})  \leq 10\%$ (measured in direction of surge current) No visible damage



**Reliability data, mechanical**

<b>Characteristics</b>	<b>Test methods/Description</b>	<b>Specifications</b>
Solderability	IEC 60068-2-20 test Ta, method 1, 245 °C, 3 s:  After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 245 ±5 °C for 3 ±0.3 s, the terminals shall be visually examined.	The inspection shall be carried out under adequate light with normal eyesight or with the assistance of a magnifier capable of giving a magnification of 4 times to 10 times. The dipped surface shall be covered with a smooth and bright solder coating with no more than small amounts of scattered imperfections such as pinholes or un-wetted or de-wetted areas. These imperfections shall not be concentrated in one area.
Resistance to soldering heat	IEC 60068-2-20 test Tb, method 1 A, 260 °C, 10 s:  Each lead shall be dipped into a solder bath having a temperature of 260 ±5 °C to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10 ±1 s and then be stored at room temperature and normal humidity for 1 to 2 hours. The change of $V_v$ and mechanical damage shall be examined.	$ \Delta V/V (1 \text{ mA})  \leq 5\%$ No visible damage

**Reliability data, environmental**

Characteristics	Test methods/Description	Specifications												
Max. AC operating voltage	CECC 42 000, test 4.20 1000 h at 85 ±2 °C):  After being continuously applied the maximum allowable voltage at 85 ±2 °C for 1000 hours, the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V <sub>v</sub> shall be measured.	Δ V/V (1 mA)   ≤10%												
Damp heat, steady state	IEC 60068-2-3 56 days, 40 °C, 93% r.H.:  The specimen shall be subjected to 40 ±2 °C, 90 to 95% r.H. for 56 days, then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V <sub>v</sub> shall be measured.	Δ V/V (1 mA)   ≤10%												
Climatic sequence	CECC 42 000, test 4.16  The specimen shall be subjected to: a) dry heat at +85 °C, 16 h b) damp heat, 1st cycle: 55 °C/25 °C, 93% r.H., 24 h c) cold, -40 °C, 2 h d) damp heat, additional 5 cycles:  55/25 °C, 93% r.H., 24 h/cycle Then the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V <sub>v</sub> shall be measured.	Δ V/V (1 mA)   ≤10%												
Fast temperature cycling	IEC 60068-2-14, test Na, +85/-40 °C dwell time 30 min, 5 cycles:  The temperature cycle shown below shall be repeated 5 times. Then the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. The change of V <sub>v</sub> and mechanical damage shall be examined.  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40 ±3</td> <td>30 ±3</td> </tr> <tr> <td>2</td> <td>transition time</td> <td>&lt;10 s</td> </tr> <tr> <td>3</td> <td>+85 ±2</td> <td>30 ±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (min.)	1	-40 ±3	30 ±3	2	transition time	<10 s	3	+85 ±2	30 ±3	Δ V/V (1 mA)   ≤5% No visible damage
Step	Temperature (°C)	Period (min.)												
1	-40 ±3	30 ±3												
2	transition time	<10 s												
3	+85 ±2	30 ±3												

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