Metal oxide varistor

ThermoFuse varistor (AdvanceD series)

Series/Type:	**ETFV20K***E2
Ordering code:	**B72220T2***K101
Date:	2007-04-26
Version:	f

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Applications

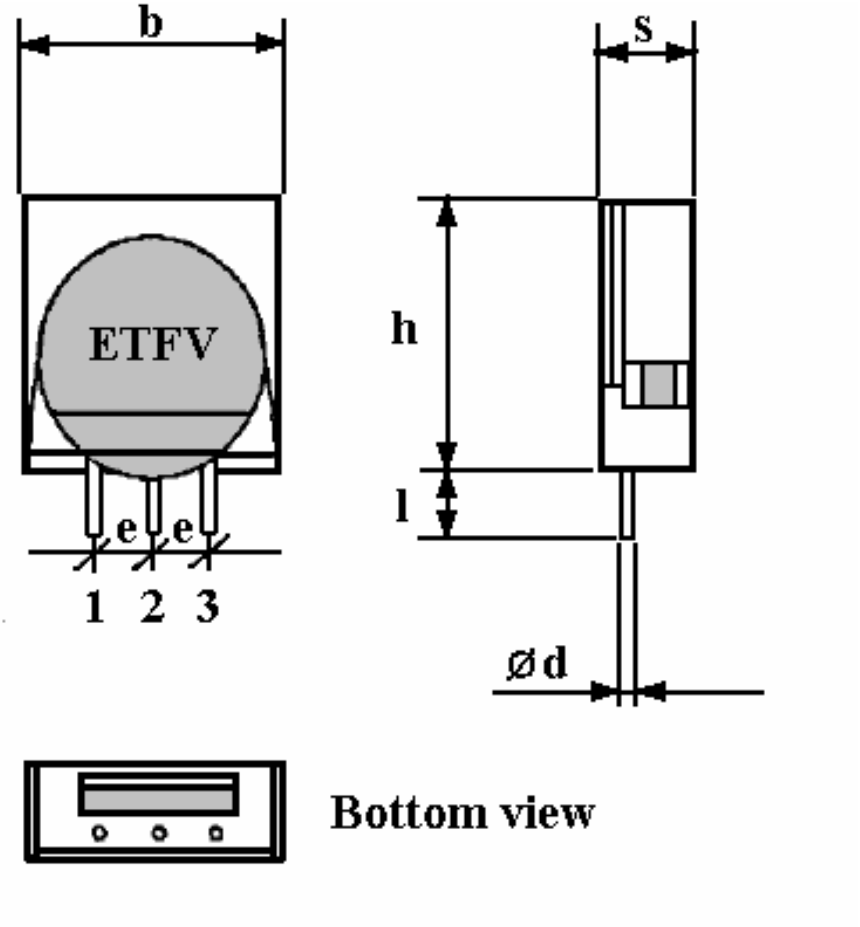
Overvoltage protection with integrated thermal fuse.

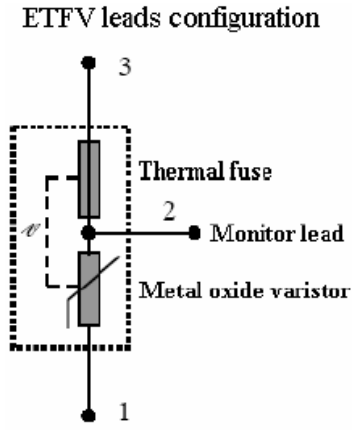
Suitable for use in industrial and household appliance applications.

Nomenclature

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

Dimensional drawings in mm





b_{max}	= 22.0
h_{max}	= 25.7
s_{max}	= 9.7
e	= 5.0 ±0.5
l	= 5.0 ±0.5
∅d	= 0.8 ±0.05

Electrical data

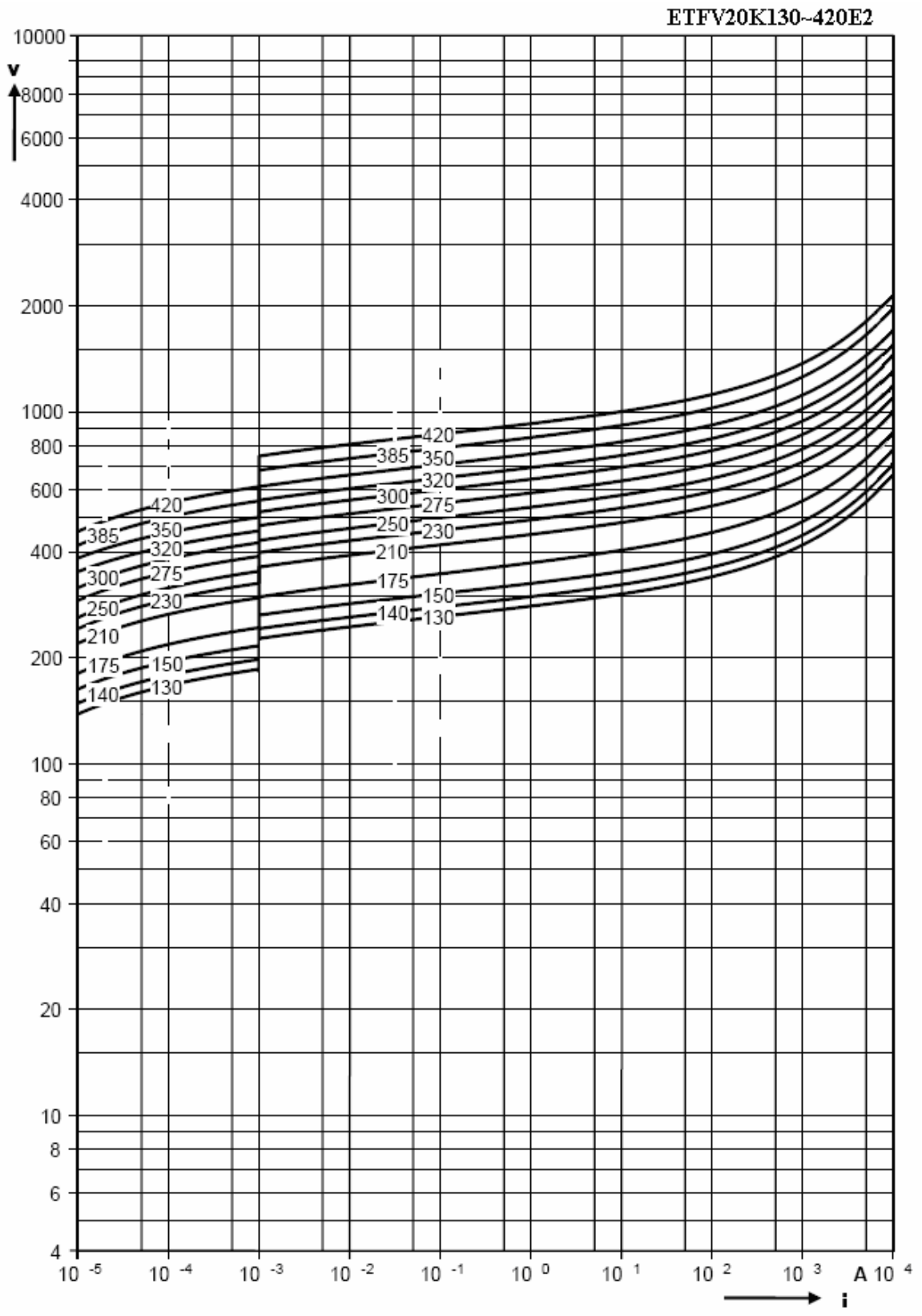
Maximum ratings (85 °C)

Ordering code	Type	Max. operating AC voltage [V]	Max. operating DC voltage [V]	Surge current (8/20 µs) 1 time [A]	Energy absorption (2 ms) 1 time [J]	Average power dissipation [W]
B72220T2131K101	ETFV20K130E2	130	170	10000	100	1.0
B72220T2141K101	ETFV20K140E2	140	180	10000	110	1.0
B72220T2151K101	ETFV20K150E2	150	200	10000	120	1.0
B72220T2171K101	ETFV20K175E2	175	225	10000	135	1.0
B72220T2211K101	ETFV20K210E2	210	270	10000	160	1.0
B72220T2231K101	ETFV20K230E2	230	300	10000	180	1.0
B72220T2251K101	ETFV20K250E2	250	320	10000	195	1.0
B72220T2271K101	ETFV20K275E2	275	350	10000	215	1.0
B72220T2301K101	ETFV20K300E2	300	385	10000	250	1.0
B72220T2321K101	ETFV20K320E2	320	420	10000	273	1.0
B72220T2351K101	ETFV20K350E2	350	460	10000	273	1.0
B72220T2381K101	ETFV20K385E2	385	505	10000	273	1.0
B72220T2421K101	ETFV20K420E2	420	560	10000	273	1.0

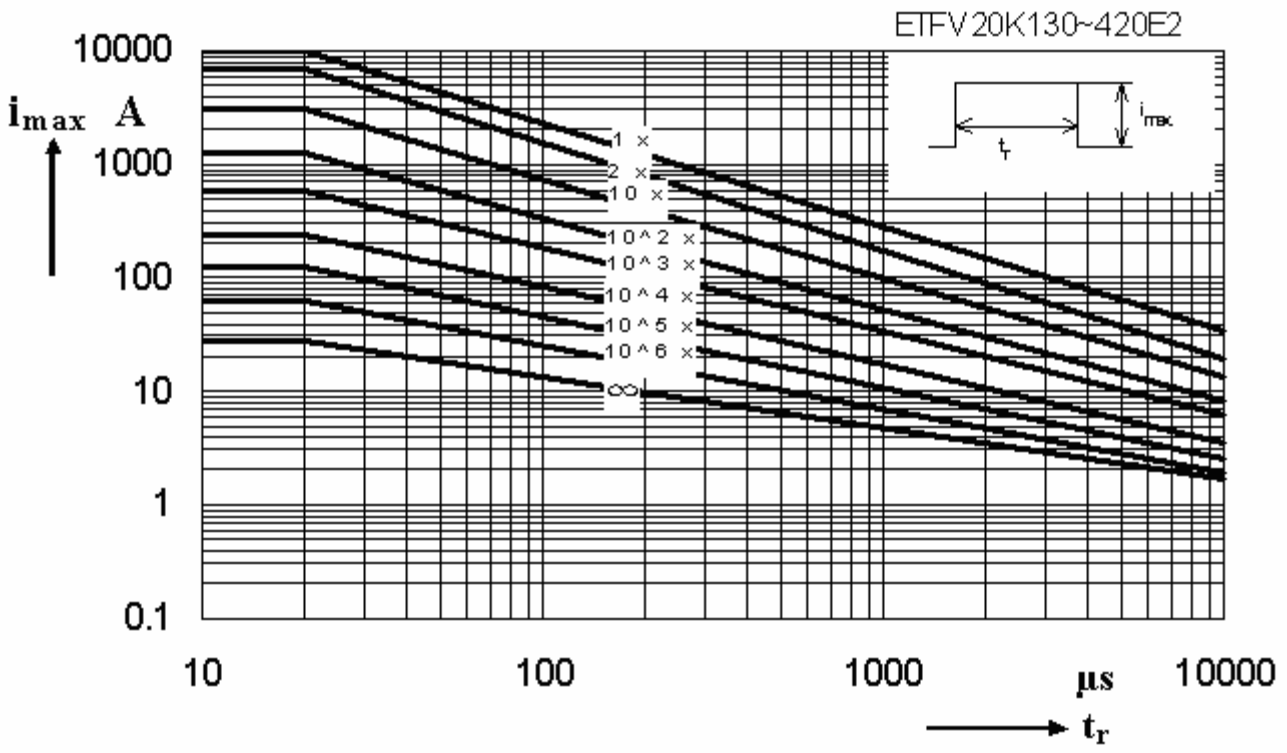
Characteristics (25 °C)

Ordering code	Type	Varistor voltage at 1 mA [V]	Clamping voltage at 100 A (8/20 µs) [V]	Typ. capacitance at 1 kHz [pF]
B72220T2131K101	ETFV20K130E2	205 ±10%	340	1340
B72220T2141K101	ETFV20K140E2	220 ±10%	360	1240
B72220T2151K101	ETFV20K150E2	240 ±10%	395	1160
B72220T2171K101	ETFV20K175E2	270 ±10%	455	1000
B72220T2211K101	ETFV20K210E2	330 ±10%	545	835
B72220T2231K101	ETFV20K230E2	360 ±10%	595	760
B72220T2251K101	ETFV20K250E2	390 ±10%	650	700
B72220T2271K101	ETFV20K275E2	430 ±10%	710	630
B72220T2301K101	ETFV20K300E2	470 ±10%	775	580
B72220T2321K101	ETFV20K320E2	510 ±10%	840	540
B72220T2351K101	ETFV20K350E2	560 ±10%	910	500
B72220T2381K101	ETFV20K385E2	620 ±10%	1025	450
B72220T2421K101	ETFV20K420E2	680 ±10%	1120	420

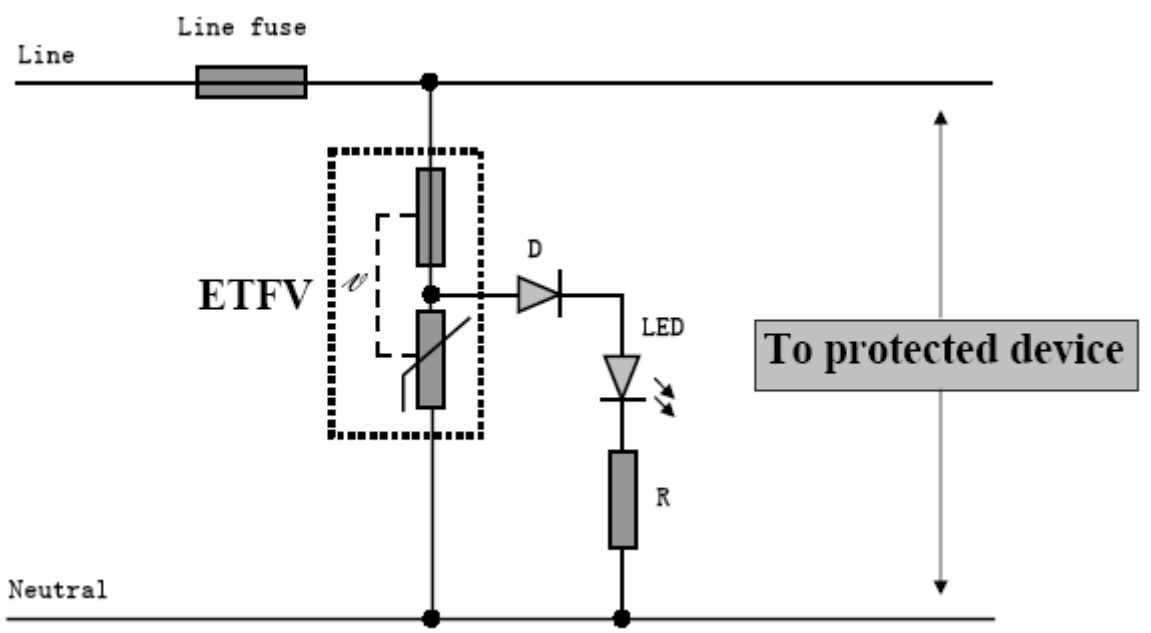
v/i characteristic



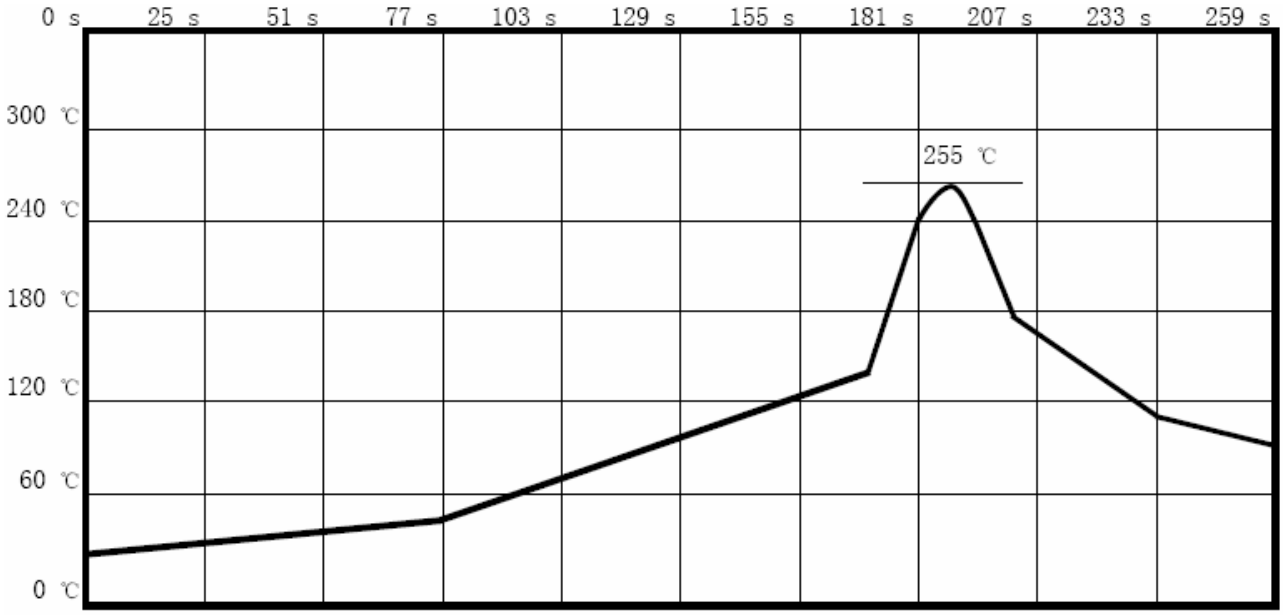
Maximum surge current i_{max} = f (t_r, pulse train)



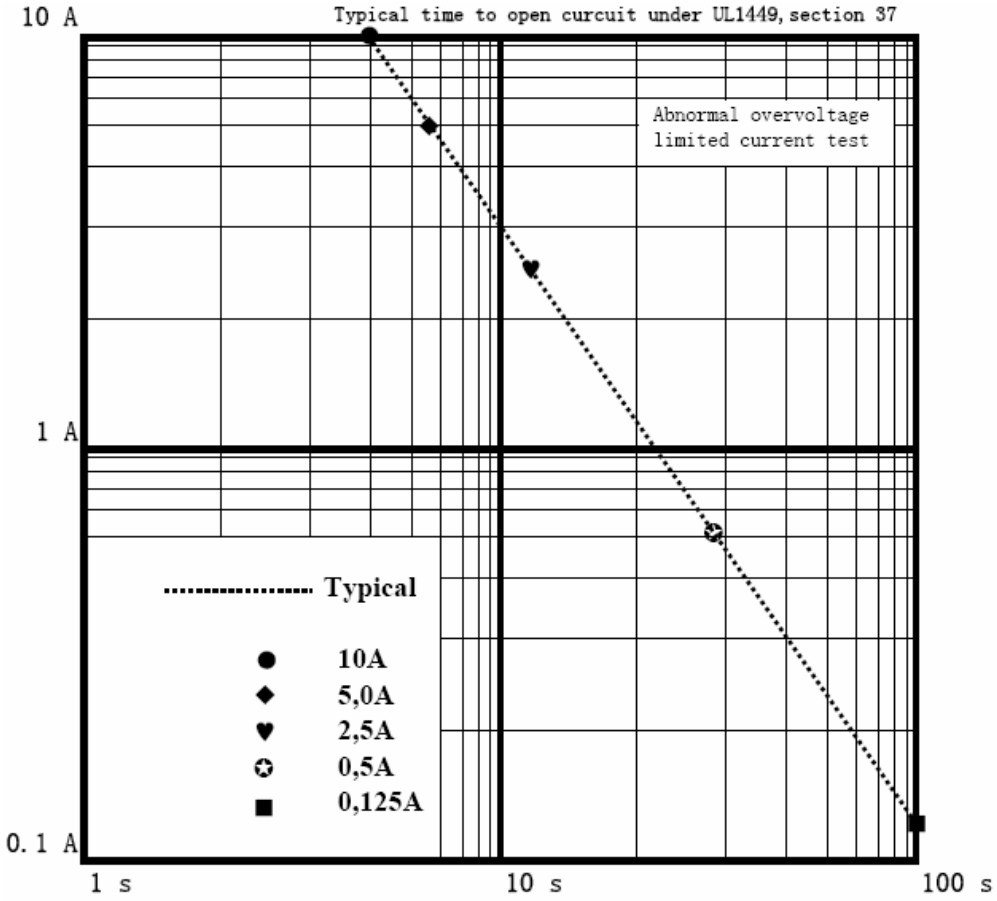
Typical application



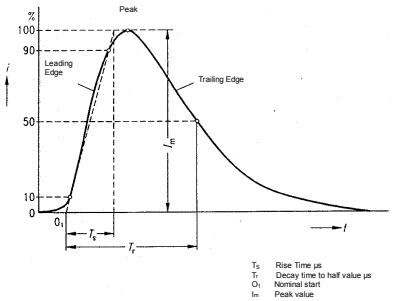
Typical wave soldering curve



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_{DC} @ 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 µs) illustrated below applied.  	To meet the specified value.
Surge current derating, 8/20 µs	CECC 42 000, test C 2.1 100 surge currents (8/20 µs), unipolar, interval 30 s, amplitude corresponding to derating curve for 20 µs	| Δ V/V (1 mA) | ≤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	| Δ V/V (1 mA) | ≤10% (measured in direction of surge current) No visible damage

Reliability data, mechanical

Characteristics	Test methods/Description	Specifications
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.	$\lvert \Delta V/V \ (1\ mA) \rvert \leq 5\%$ 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_v 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_v 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_v 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_v and mechanical damage shall be examined. 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

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