

# Reliability Testing Procedures

Varistor testing procedures comply with CECC 42200, IEC 1051-1,2 and AEC-Q200.

Testing results are available upon customer request. Special tests can be performed upon customer request.

Reliability Parameter	Test	Tested according to	Condition to be satisfied after testing
<b>AC/DC Bias Reliability</b>	AC/DC Life Test	CECC 42200, Test 4.20 or IEC 1051-1, Test 4.20., AEC-Q200 Test8 - 1000 h at UCT	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage
<b>Pulse Current Capability</b>	$I_{\max}$ 8/20 $\mu\text{s}$	CECC 42200, Test C 2.1 or IEC 1051-1, Test 4.5. 10 pulses in the same direction at 2 pulses per minute at maximum peak current for 10 pulses	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage
<b>Pulse Energy Capability</b>	$W_{\max}$ 10/1000 $\mu\text{s}$	CECC 42200, Test C 2.1 or IEC 1051-1, Test 4.5. 10 pulses in the same direction at 1 pulse every 2 minutes at maximum peak current for 10 pulses	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage
<b>WLD Capability</b>	WLD x 10	ISO 7637, Test pulse 5, 10 pulses at rate 1 per minute	$ \delta V_n (1 \text{ mA})  < 15 \%$ no visible damage
<b>Vjump Capability</b>	$V_{\text{jump}}$ 5 min	Increase of supply voltage to $V \geq V_{\text{jump}}$ for 1 minute	$ \delta V_n (1 \text{ mA})  < 15 \%$ no visible damage
<b>Environmental and Storage Reliability</b>	Climatic Sequence	CECC 42200, Test 4.16 or IEC 1051-1, Test 4.17. a) Dry heat, 16 h, UCT, Test Ba, IEC 68-2-2 b) Damp heat, cyclic, the first cycle : 55 °C, 93 % RH, 24 h, Test Db 68-2-4 c) Cold, LCT, 2 h, Test Aa, IEC 68-2-1 d) Damp heat cyclic, remaining 5 cycles : 55 °C, 93 % RH, 24 h /cycle, Test Bd, IEC 68-2-30	$ \delta V_n (1 \text{ mA})  < 10 \%$
	Thermal Shock	CECC 42200, Test 4.12, Test Na, IEC 68-2-14, AEC-Q200 Test16, 5 cycles UCT/LCT, 30 minutes	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage
	Steady State Damp Heat	CECC 42200, Test 4.17, Test Ca, IEC 68-2-3, AEC-Q200 Test 6, 56 days, 40 °C, 93 % RH. AEC-Q200 Test7 : Bias, Rh, T all at 85.	$ \delta V_n (1 \text{ mA})  < 10 \%$
	Storage Test	IEC 68-2-2, Test Ba, AEC-Q200 Test3, 1000 h at maximum storage temperature	$ \delta V_n (1 \text{ mA})  < 5 \%$
<b>Mechanical Reliability</b>	Solderability	CECC 42200, Test 4.10.1., Test Ta, IEC 68-2-20 solder bath and reflow method	Solderable at shipment and after 2 year of storage, criteria > 95 % must be covered by solder
	Resistance to Soldering Heat	CECC 42200, Test 4.10.2., Test Tb, IEC 68-2-20 solder bath and reflow method	$ \delta V_n (1 \text{ mA})  < 5 \%$
	Robustness of Termination	CECC 42000, Test 4.11, Test Ua, IEC 68-2-21 AEC-Q200 Test11, Conditions A(2,27kg) and C(227g)	no visual damage
	Vibration	CECC 42200, Test 4.15., Test Fc, IEC 68-2-6, AEC-Q200 Test14. Frequency range 10 to 55 Hz (AEC : 10-2000Hz) Amplitude 0.75 m/s <sup>2</sup> or 98 m/s <sup>2</sup> (AEC :5g's for 20minutes) Total duration 6 h (3 x 2 h) (AEC : 12cycles each of 3 directions) Waveshape - half sine	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage
	Mechanical Shock	CECC 42200, Test 4.14, Test Ea, IEC 68-2-27, AEC-Q200 Test13 Acceleration = 490 m/s <sup>2</sup> (AEC : MIL-STD-202-Method 213), Pulse duration = 11 ms, Waveshape - half sine; Number of shocks = 3 x 6	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage
<b>Electrical Transient Conduction</b>	ISO-7637-1 Pulses	AEC-Q200 Test30 : Test pulses 1 to 3. Also other pulses - freestyle.	$ \delta V_n (1 \text{ mA})  < 10 \%$ no visible damage