

environmental applications

Performance Characteristics

Parameter	Requirement	Test Method
Operating Temperature	-55°C to +125°C	—
Storage Temperature	40°C @ 70% humidity	Sealed plastic bags with desiccant shall be used to reduce the potential of oxidation on the terminations during storage.
Resistance to Solder Heat	Change in Impedance: Relative to value before test $\pm 20\%$ Appearance: There shall be no cracking. Solder Coverage: More than 75% of the terminal electrode shall be covered with solder.	Flux: 5 - 10 second dip After Flux: Air dry for 15 seconds Preheat: 150°C \pm 10°C Preheat Time: 60 seconds Solder Temperature: 260°C \pm 5°C Dip Time: 10 \pm 1 second
Solderability	Solder Coverage: More than 95% of the termination shall be covered with solder.	Flux: 5 - 10 second dip After Flux: Air dry for 15 seconds Solder Temperature: 245°C \pm 5°C Dip Time: 5 \pm 0.5 second
Leach Resistance	Appearance: There shall be no visible signs of physical or mechanical damage (i.e. no cracks). Terminations: Termination must not be leached away for more than 5%.	The bead shall be subjected to the following 5 steps for the period of time shown below. The 5 steps constitute one (1) rotation. 4 rotations shall be carried out. 1) Flux: 5 - 10 seconds 2) After Flux: Air dry for 15 seconds 3) Solder Temperature: 230°C \pm 5°C 4) Dip Time: 5 \pm 0.5 second 5) Cool: Air cool for 60 seconds
Insulation Resistance	Insulation Resistance: Min. 1G ohms	—
Solvent Resistance	Change in Impedance: Relative to value before test $\pm 10\%$	Cleaning by: Washer: Ultrasonic washer (100W) Solvent: Isopropyl alcohol Time: 3 minutes
Terminal Strength (hanging test)	Appearance: The terminal electrode shall not break off, nor shall there be damage to the body.	Type: W(kgf): Time: 1E — N/A 1J 0.5 30 seconds \pm 2 seconds 2A 1.0 30 seconds \pm 2 seconds 2B 1.5 30 seconds \pm 2 seconds
Terminal Strength (push test)	Appearance: There shall be no evidence of mechanical degradations to terminals or body.	Type: W(kgf): Time: 1E — N/A 1J 1.4 60 seconds 2A 1.8 60 seconds 2B 2.3 60 seconds

environmental applications (continued)

Performance Characteristics

Parameter	Requirement	Test Method																		
Bending Strength	Appearance: There shall be no physical or mechanical damage. Impedance: Relative to initial value before test $\pm 10\%$	Board: 90 x 40 x 1.6mm Bend: 1mm Time: 5 sec																		
Mechanical Shock	Appearance: There shall be no physical or mechanical damage. Impedance: Relative to initial value before test $\pm 10\%$	Force: 50G Time: 11 msec There shall be 3 shocks in each of 6 directions (18 shocks total)																		
Vibration	Impedance: Relative to initial value $\pm 10\%$	Only endurance conditioning by sweeping shall be made. The entire frequency range from 10 - 2,000 Hz, return to 10 Hz in 20 minutes (this will constitute one cycle). Amplitude: 15G The test shall have a 15G peak and shall be applied for a period of 4 hours (12 cycles) in each of 3 mutually perpendicular directions (a total of 36 cycles within a total of 12 hours).																		
Thermal Shock	Appearance: There shall be no physical or mechanical damage. Impedance: Relative to initial value $\pm 20\%$ DCR: The DCR shall not exceed initial specified value. Testing of the parts will be made at 0 hours, 250 hours and 500 hours. Before testing, the parts shall be allowed to cool to room temperature for 24 hours.	<table border="0"> <tr> <td>Step:</td> <td>Temperature:</td> <td>Time:</td> </tr> <tr> <td>1-start</td> <td>-40°C \pm 2°C</td> <td>—</td> </tr> <tr> <td>2-hold</td> <td>-40°C \pm 2°C</td> <td>30 minutes \pm 5 minutes</td> </tr> <tr> <td>3-transfer</td> <td>—</td> <td>0.5 minutes maximum</td> </tr> <tr> <td>4-hold</td> <td>$\pm 105^\circ\text{C} \pm 2^\circ\text{C}$</td> <td>30 minutes \pm 5 minutes</td> </tr> <tr> <td>5-transfer</td> <td>—</td> <td>0.5 minutes maximum</td> </tr> </table> <p>Steps 1 through 5 constitute one complete cycle and the test shall consist of a total of 500 cycles.</p>	Step:	Temperature:	Time:	1-start	-40°C \pm 2°C	—	2-hold	-40°C \pm 2°C	30 minutes \pm 5 minutes	3-transfer	—	0.5 minutes maximum	4-hold	$\pm 105^\circ\text{C} \pm 2^\circ\text{C}$	30 minutes \pm 5 minutes	5-transfer	—	0.5 minutes maximum
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3-transfer	—	0.5 minutes maximum																		
4-hold	$\pm 105^\circ\text{C} \pm 2^\circ\text{C}$	30 minutes \pm 5 minutes																		
5-transfer	—	0.5 minutes maximum																		
Load Humidity	Appearance: There shall be no physical or mechanical damage. Impedance: Relative to initial value $\pm 15\%$ Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.	Temperature: $\pm 85^\circ\text{C} \pm 2^\circ\text{C}$ Relative Humidity: 85% Time: 1,000 hours total Apply: 100% rated current																		
Life Test	Appearance: There shall be no physical or mechanical damage. Impedance: Relative to initial value $\pm 15\%$ Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.	Temperature: $\pm 85^\circ\text{C} \pm 2^\circ\text{C}$ Time: 1,000 hours total Apply: 100% rated current																		