



Superworld Electronics (S) Pte Ltd

西普爾電子(新)私營有限公司

(Wholly owned by Superworld Holdings (S) Pte Ltd)

Reliability Test Standards

(1) Section A :

1. Molded Power Inductor
2. Ferrite Chip Beads and Inductor
3. LAN Transformer
4. SMD Power Inductor SPS2520 & SPS2016
5. Ceramic Wirewound Inductor (SCI Series)

➔ Table 1 (Commercial)

(2) Section B :

6. HF Transformer
7. Standard Power Inductor
8. Wireless Charging
9. Toroidal Choke Coil

➔ Table 2 (Commercial) *Refer Notes

(3) For other products not in the list, we shall handle it on a case-by-case basis.



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Section A

1. Molded Power Inductor
2. Ferrite Chip Beads and Inductor
3. LAN Transformer
4. SPS2520 and SPS2016
5. Ceramic Wirewound Inductor (SCI Series)

➔ Table 1 (Commercial)





Table 1 Reliability Test Standard (Commercial)

Test	Failure Criteria	Test Condition
Operational Life	<ul style="list-style-type: none">a. Appearance: No damageb. L. Change: within $\pm 10\%$ of initial valuec. DCR Change: within $\pm 15\%$ of initial valued. No electrical short circuit & no broken wire.	<ul style="list-style-type: none">a. Test Qty :<ul style="list-style-type: none">1. Trial production, 48PCS2. Mass Production, 48PCSb. Temperature: $125\pm 2^{\circ}\text{C}$.c. Duration: 500 ± 12hrs.d. Equipment : Thermostatic Oven
Biased Humidity (Humidity loading)	<ul style="list-style-type: none">a. Appearance: No damageb. L. Change: within $\pm 10\%$ of initial valuec. DCR Change: within $\pm 15\%$ of initial valued. No electrical short circuit & no broken wire.	<ul style="list-style-type: none">a. Test Qty :<ul style="list-style-type: none">1. Trial production, 48PCS2. Mass Production, 48PCSb. Humidity $85\pm 2\%$ RH, Temperature: $85\pm 2^{\circ}\text{C}$.c. Duration: 500 ± 12hrs.d. Equipment: Humidity Chamber
Moisture Resistance	<ul style="list-style-type: none">a. Appearance: No damageb. L. Change: within $\pm 10\%$ of initial valuec. DCR Change: within $\pm 15\%$ of initial valued. No electrical short circuit & no broken wire.	<ul style="list-style-type: none">a. Test Qty :<ul style="list-style-type: none">1. Trial production, 48PCS2. Mass Production, 48PCSb. Equipment: Humidity Chamberc. Procedure:<ul style="list-style-type: none">1. Baked at 50°C for 25hrs. Measured at room temperature after placing for 4 hrs.2. Raise temperature to $65\pm 2^{\circ}\text{C}$ 90-100% RH in 2.5hrs, and keep 3 hours, cool down to 25°C in 2.5hrs.3. Keep at 25°C for 2 hrs then keep at -10°C for 3 hrs.4. Keep at 25°C 80-100%RH for 15min and vibrate at the frequency of 10 to 55 Hz to 10 Hz, measure at room temperature after placing for 1~2 hrs.



Table 1 Reliability Test Standard (Commercial) – Cont’d

Test	Failure Criteria	Test Condition															
Thermal shock	a. Appearance: No damage b. L. Change: within $\pm 10\%$ of initial value c. DCR Change: within $\pm 15\%$ of initial value d. No electrical short circuit & no broken wire.	a. Test Qty : 1. Trial production, 48PCS 2. Mass Production, 48PCS b. Procedure: Steps 1: $-40\pm 2^{\circ}\text{C}/30\pm 3\text{min}$ Steps 2: room temperature 3 min. Steps 3: $125\pm 2^{\circ}\text{C}/30\pm 3\text{min}$ Steps 4: room temperature 3 min. Step 1 to 4 repeat for 300 times. c. Equipment: Thermal shock tester															
Vibration	a. Appearance: No damage b. L. Change: within $\pm 10\%$ of initial value c. DCR Change: within $\pm 15\%$ of initial value d. No electrical short circuit & no broken wire.	a. Test Qty : 1. Trial production, 15PCS 2. Mass Production, 15PCS b. Equipment: Vibration checker c. Oscillation Frequency: $10\sim 2\text{K}\sim 10\text{Hz}$ for 20 minutes d. Total Amplitude: $1.52\text{mm}\pm 10\%$ e. Testing Time : 12 hours (20 minutes, 12 cycles each of 3 orientations.															
Mechanical Shock	a. Appearance: No damage b. L. Change: within $\pm 10\%$ of initial value c. DCR Change: within $\pm 15\%$ of initial value d. No electrical short circuit & no broken wire.	a. Test Qty : 1. Trial production, 15PCS 2. Mass Production, 15PCS b. Equipment: Mechanical shock tester <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type</th> <th>Peak value($g^{\prime} s$)</th> <th>Normal duration (D) (ms)</th> <th>Wave form</th> <th>Velocity change (Vi)ft/sec</th> </tr> </thead> <tbody> <tr> <td>SMD</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> <tr> <td>Lead</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> </tbody> </table>	Type	Peak value($g^{\prime} s$)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec	SMD	50	11	Half-sine	11.3	Lead	50	11	Half-sine	11.3
Type	Peak value($g^{\prime} s$)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec													
SMD	50	11	Half-sine	11.3													
Lead	50	11	Half-sine	11.3													



Table 1 Reliability Test Standard (Commercial) – Cont'd

Test	Failure Criteria	Test Condition								
Bending Test	a. Appearance: No damage b. L. Change: within $\pm 10\%$ of initial value c. DCR Change: within $\pm 15\%$ of initial value d. No electrical short circuit & no broken wire.	a. Test Qty : 1. Trial production, 15PCS 2. Mass Production, 15PCS b. Shall be mounted on a FR4 substrate of the following for a min. duration of 10 sec. 1. Dimensions: $\geq 0805: 40 \times 100 \times 1.2 \text{mm}$ $< 0805: 40 \times 100 \times 0.8 \text{mm}$ 2. Bending depth: $\geq 0805: 1.2 \text{mm}$ $< 0805: 0.8 \text{mm}$ c. Equipment: Bending Tester								
Solderability	a. Appearance : More than 95% of the terminal electrode shall be covered with solder.	a. Test Qty : 1. Trial production, 30PCS 2. Mass Production, 30PCS b. Solder Temperature: $245 \pm 5^\circ\text{C}$ for $4 \pm 1 \text{sec}$, Flux: Rosin, Equipment: Solder Pot								
Resistance to soldering heat	a. Appearance: No damage b. L. Change: within $\pm 10\%$ of initial value c. DCR Change: within $\pm 15\%$ of initial value d. No electrical short circuit & no broken wire.	a. Test Qty : 1. Trial production, 15PCS 2. Mass Production, 15PCS a. Equipment: Solder Pot <table border="1" data-bbox="951 1487 1544 1563"> <thead> <tr> <th>Soldering Temperature($^\circ\text{C}$)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> <th>Number of heat cycle</th> </tr> </thead> <tbody> <tr> <td>260 ± 5</td> <td>10 ± 1</td> <td>$25 \text{mm/s} \pm 6 \text{mm/s}$</td> <td>1</td> </tr> </tbody> </table>	Soldering Temperature($^\circ\text{C}$)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycle	260 ± 5	10 ± 1	$25 \text{mm/s} \pm 6 \text{mm/s}$	1
Soldering Temperature($^\circ\text{C}$)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycle							
260 ± 5	10 ± 1	$25 \text{mm/s} \pm 6 \text{mm/s}$	1							
Terminal Strength	Appearance: No crack, chip off and other defects resulted the characteristics out of spec should not be allowed. Performance Instruments is 40x CCD	a. Test Qty : 1. Trial production, 15PCS 2. Mass Production, 15PCS b. Apply force gradually ($> 0805: 1 \text{kg}$, $\leq 0805: 0.5 \text{kg}$) to the side of PCBA for $60 \pm 1 \text{sec}$. c. Equipment: Push Pull Tester								



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Section B

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➔ Table 2 (Commercial) *Refer Notes

*Table 2 - Notes

1. The current product test cycle is once a year.
2. The number of solder test is 5PCS, and the number of other reliability tests is 10PCS.

Annual reliability: IR/ solder test/hot and cold shock test/high temperature test/high temperature and high humidity test for inductor/transformer; T products /R products/wireless charging solder test/cold and hot impact/high temperature test/high temperature and high humidity.

3. The appearance and characteristics of the test sample must be good.
4. In order to shorten the admission process, IR test, hot and cold shock test, MSL test and solder property should be arranged first for reliability test, and then the next stage of operation process can be carried out.



Table 2 Reliability Test Standard (Commercial)

Test	Failure Criteria	Test Condition
Solderability (J-STD-002D)	a. Appearance: More than 95% of the terminal electrode shall be covered with solder.	a. Pre-condition: Steam aging, (93±3°C) b. 16 hours±30 min c. Solder temperature: 245±5°C d. Duration: 5+0/-0.5 Sec e. Solder: lead-free solder (99%Sn0.3%Ag/0.7%Cn)
Temperature Cycling (JESD22, Method JA-104, MIL-STD-202, Method 107)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Lowest Temperature:-40°C, 30min min. b. Highest Temperature:125°C 30min min. c. Number of cycles: 100 d. Measured the electrical characteristic within 24±2 hrs after the test.
Biased Humidity Test (MIL-STD-202, Method 103)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Humidity : 85 ± 3%R.H b. Temperature: 85°C ± 2°C c. Duration: 500 hours d. Measured the electrical characteristic within 24±2 hrs after the test.
MSL moisture sensitivity test (J-STD-033, J-STD-020D)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Humidity : 85 ± 3%R.H b. Temperature: 85°C ± 2°C c. Duration: 168 hours d. Perform IR for 3 times within 4 hours after cooling down.
High Temperature Exposure Test (MIL-STD-202 Method 108)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Refer to the spec, test at the highest operating temperature : 85/105/125°C ± 2°C b. Duration: 500 hours c. Measured the electrical characteristic within 24±2 hrs after the test.



Table 2 Reliability Test Standard (Commercial) – Cont'd

Test	Failure Criteria	Test Condition
IR Test (J-STD-020D)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. 150-180°C/120 sec min b. 230°C/40 sec max c. 255°C/10 sec max
Vibration (packaging) (MIL-STD-202 method 201)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Frequency range: 10 HZ-55 HZ-10 Hz, 1 cycle b. X, Y, Z direction 1 minute per cycle, c. two hours. (total 6 hours) d. Amplitude range of no-load :1.52mm
Vibration (component) (MIL-STD-202 method 204)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Frequency range: 10 HZ-2000 HZ-10 Hz, last for 20 minutes (1 cycle) b. 12 cycles for each X, Y, and Z directions, total 12 hours. c. Maximum acceleration (m/s ²) : 5G d. Amplitude range of no-load :1.52mm
Salt spray test (ASTM B117 MIL- STD-202 method 101)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Salt and aqueous solution concentration ratio 5:95 (5% sodium chloride solution) b. PH: between 6.6 and 7.2 c. Temperature: 35 + 3 °C d. Relative humidity :95~98%RH e. Cycle: 24 hours
Solvent resistance test (MIL-STD-202 Method 215)	a. Appearance: No damage.	a. Immerse in the industrial alcohol 3+0.5/- 0 minutes, brush 10 times with toothbrush, repeat 3 times.
Hi-pot Test	a. Electrical characteristic within spec.	a. Used hi-pot tester to test based on the product spec.
Drop Test (ASTM D5276-98)	a. Appearance: No damage. b. The change of the electrical characteristics before and after the test must within the specification.	a. Use drop tester to drop the part in carton box from 1m height. b. Test sequence: Corner, three sides, six surfaces.



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➔ Please consult the Engineering/Quality Managerial teams for applicable reliability test requirements.

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