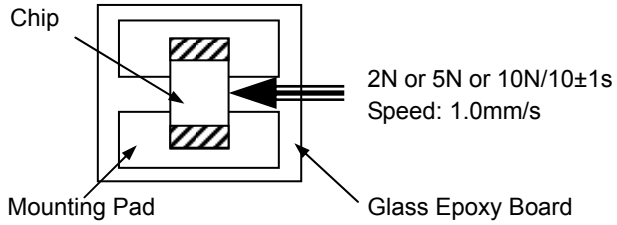
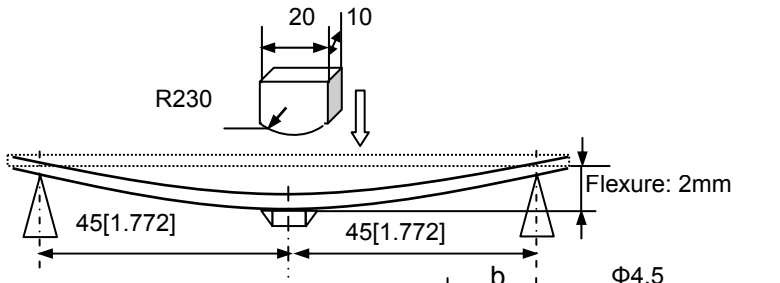
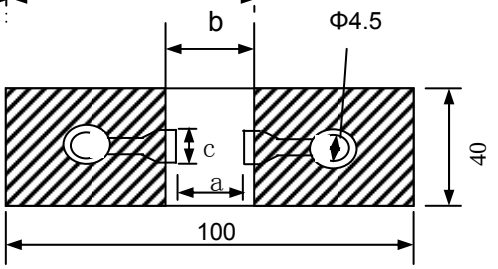
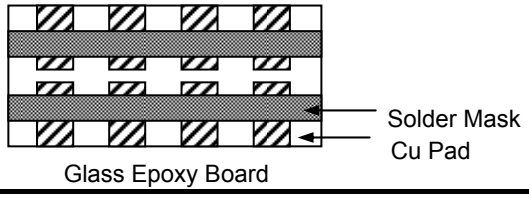
RELIABILITY AND TEST CONDITIONS

Multilayer Chip Ferrite Bead (GZ/SZ/PZ/UPZ/HZ/HPZ series)/Chip Ferrite Bead Array (ARZ series)

<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td>1. Operating Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>2. Storage Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>3. Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.</td><td>① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow.
② 2N force for 0603 series.
③ 5N force for 1005 and 1608 series.
④ 10N force for 2010, 2012, 3216 and 4516series.
⑤ Keep time: 10±1s
 
</td></tr>
<tr><td rowspan="2">4. Resistance to Flexure</td><td>No visible mechanical damage.</td><td>① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure.
② Flexure: 2mm
③ Pressurizing Speed: 0.5mm/sec
④ Keep time: ≥30 sec</td></tr>
<tr><td colspan="2"> 

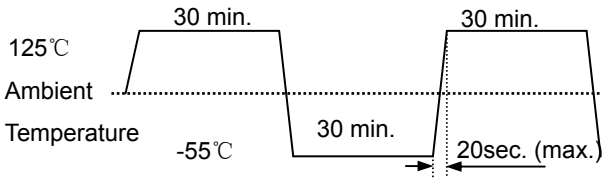
Unit: mm [inch]


<table>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>0603[0201]</td><td>0.25</td><td>0.8</td><td>0.3</td></tr>
<tr><td>1005[0402]</td><td>0.4</td><td>1.5</td><td>0.5</td></tr>
<tr><td>1608[0603]</td><td>1.0</td><td>3.0</td><td>1.2</td></tr>
<tr><td>2012[0805]</td><td>1.2</td><td>4.0</td><td>1.65</td></tr>
<tr><td>3216[1206]</td><td>2.2</td><td>5.0</td><td>2.0</td></tr>
<tr><td>4516[1806]</td><td>2.8</td><td>8.5</td><td>2.0</td></tr>
</table></td></tr>
<tr><td>5. Vibration</td><td>① No visible mechanical damage.
② Impedance change: Within ±20%.</td><td>① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder.
② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz.
③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours).
 
</td></tr>
</table>

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

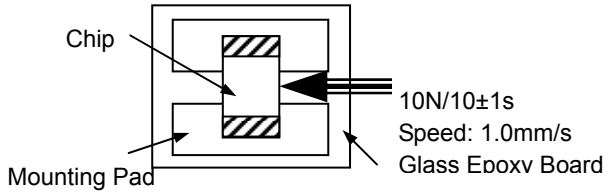
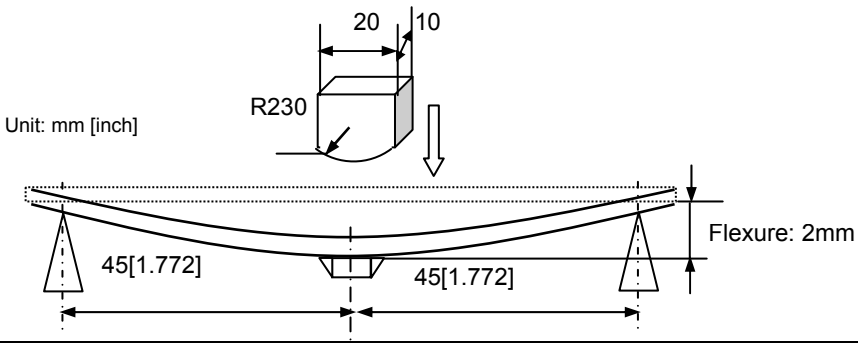
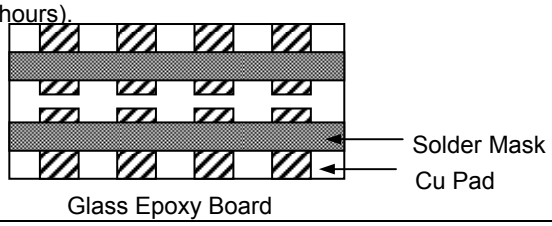
Multilayer Chip Ferrite Bead (GZ/SZ/PZ/UPZ/HZ/HPZ series)/Chip Ferrite Bead Array (ARZ series)

Items	Requirements	Test Methods and Remarks
6. Dropping	① No visible mechanical damage. ② Impedance change: Within ±20%.	Drop chip bead 10 times on a concrete floor from a height of 100 cm.
7. Temperature	Impedance change should be within ±20% of initial value measuring at 20℃.	Temperature range:-55℃ to +125℃ Reference temperature: +20℃
8. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 75% coverage for 0603 series, and 95% coverage for the other.	① Solder temperature: 240±2℃ ② Duration: 3 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
9. Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall be exceeded 75% coverage for 0603 series, and 95% coverage for the other ③ Impedance change: Within ±20%.	① Solder temperature: 260±3℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Thermal Shock	① No visible mechanical damage. ② Impedance change: Within ±20%.	① Temperature and time: -55℃ for 30±3 min →125℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
11. Resistance to Low Temperature	① No visible mechanical damage. ② Impedance change: Within ±20%.	① Temperature: -55±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Damp Heat (Steady States)	① No visible mechanical damage. ② Impedance change: Within ±20%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Loading Under Damp Heat	① No visible mechanical damage. ② Impedance change: Within ±20%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied current: Rated current ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
14. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Impedance change: Within ±20%.	① Temperature: GZ&SZ&HZ&ARZ series: 125±2℃ PZ&UPZ&HPZ series: 85±2℃ ② Duration: 1000^{+24} hours ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Chip 3-Terminal EMI Filters (MFL series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-40℃ to +85℃	
2. Storage Temperature Range	-40℃ to +85℃	
3. Terminal Strength	No removal or split of the termination or other defects shall occur.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 5N force for 1608 series, 10N force for 2012 series ③ Keep time: 10±1s 
4. Resistance to Flexure	No visible mechanical damage.	① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure. Solder the chip to the test jig (glass epoxy board) using eutectic solder. Then apply a force in the direction. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: ≥30 sec
		
5. Vibration	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours). 
6. Dropping	No visible mechanical damage.	Drop the chip 10 times on a concrete floor from a height of 100 cm.
7. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 75% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Chip 3-Terminal EMI Filters (MFL series)

Items	Requirements	Test Methods and Remarks
8. Resistance to Soldering Heat	No visible mechanical damage.	① Solder temperature: 260±3℃ ② Duration: 5 sec. ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Thermal Shock	① No visible mechanical damage. ② Insulation resistance: Satisfy electrical characteristics	① Temperature and time: -40℃ for 30±3 min→85℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Damp Heat (Steady States)	① No visible mechanical damage ② Insulation resistance: Satisfy electrical characteristics	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Loading Under Damp Heat	① No visible mechanical damage ② Insulation resistance: Satisfy electrical characteristics	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied current: Rated current ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Loading at High Temperature (Life Test)	① No visible mechanical damage ② Insulation resistance: Satisfy electrical characteristics	① Temperature: 85±2℃ ② Duration: 1000^{+24} hours ③ Applied current: Rated current ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

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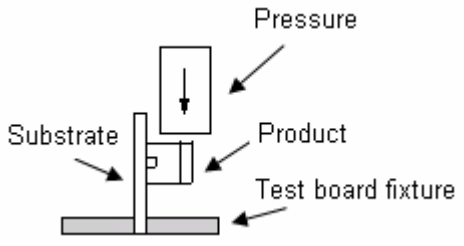
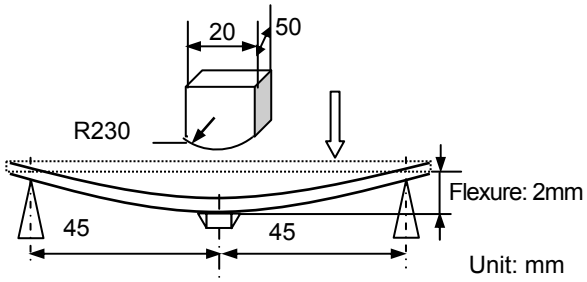
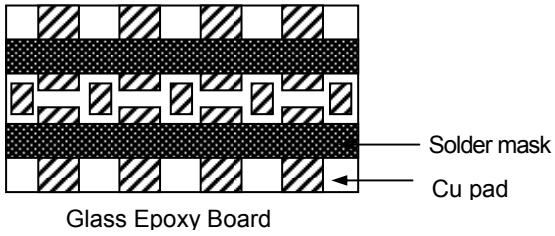
RELIABILITY AND TEST CONDITIONS

Wire Wound Chip Common Mode Choke Coil (SDCW/SDCW-H series)

Item	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-40℃ to +85℃	
2. Storage Temperature Range	-40℃ to +85℃	
3. Terminal strength	No removal or split of the termination or other defects shall occur.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 5N force for 2012 series ③ 8N force for 3216 series. ④ Keep time: 30±1s 
4. Resistance to Flexure	No visible mechanical damage.	① Solder the chip to the test jig (glass epoxy board) using eutectic solder. Then apply a force in the direction shown as the following figure. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: 5s 
5. Vibration	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours). 

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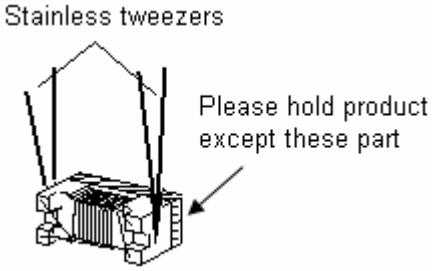
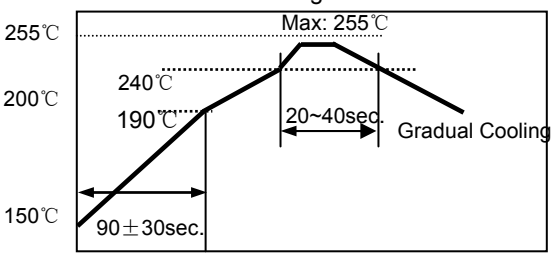
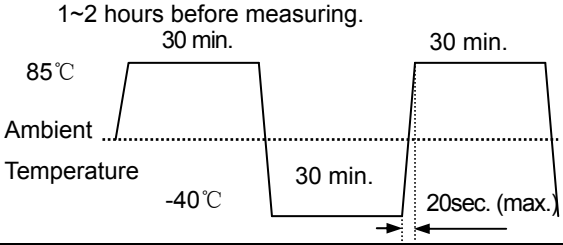
RELIABILITY AND TEST CONDITIONS

Wire Wound Chip Common Mode Choke Coil (SDCW/SDCW-H series)

Item	Requirements	Test Methods and Remarks
6. Dropping	No visible mechanical damage.	Drop the chip 10 times on a concrete floor from a height of 100 cm.
7. Solderability	Wetting shall be exceeded 95% coverage, except welding points.	① Solder temperature: 240±2℃ ② Duration: 4±1sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight 
8. Resistance to soldering heat	① No visible mechanical damage. ② Impedance change: within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Reflow soldering. ② The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
9. Temperature Characteristics	① No visible mechanical damage. ② Impedance change: Within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Temperature range: -40℃ to +85℃ ② Reference temperature: +20℃
10. Thermal shock	① No mechanical damage. ② Impedance change: Within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Temperature and time: -40℃ for 30±3 min →85℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 250 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
11. Resistance to low temperature	① No mechanical damage. ② Impedance change: Within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Temperature: -40±2℃ ② Duration: 500^{+12} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Damp heat (Steady states)	① No visible mechanical damage. ② Impedance change: Within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 500^{+12} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

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RELIABILITY AND TEST CONDITIONS

Wire Wound Chip Common Mode Choke Coil (SDCW/SDCW-H series)

Item	Requirements	Test Methods and Remarks
13. Loading under damp heat	① No visible mechanical damage. ② Impedance change: Within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 500^{+12} hours ④ Applied current: Rated current. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
14. Loading at high temperature (Life test)	① No visible mechanical damage. ② Impedance change: Within ±20%. ③ Insulation Resistance: 10MΩ Min.	① Temperature: 85±2℃ ② Duration: 500^{+12} hours ③ Applied current: Rated current ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

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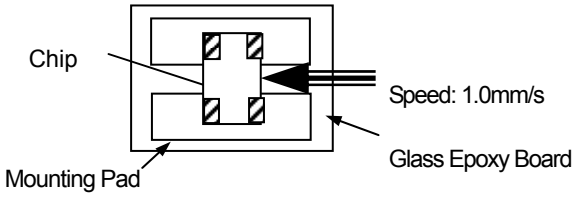
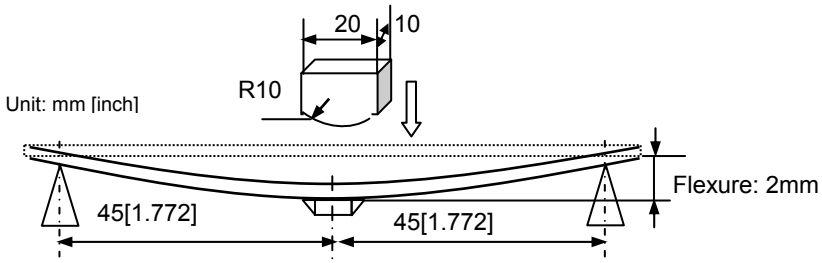
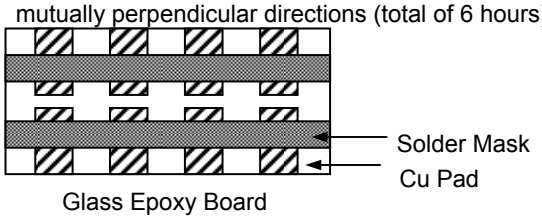
RELIABILITY AND TEST CONDITIONS

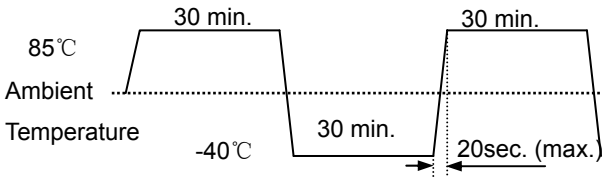
Multilayer Chip Common Mode Choke Coil (SDCM series)/
Chip Common Mode Choke Coil Array (SDCMA series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-40℃ to +85℃	
2. Storage Temperature Range	-40℃ to +85℃	
3. Terminal Strength	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 10N force for 2012&3216 series. ③ Keep time: 10±1sec 
4. Resistance to Flexure	No visible mechanical damage.	① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure. Solder the chip to the test jig (glass epoxy board) using eutectic solder. Then apply a force in the direction. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: ≥30 sec
		
5. Vibration	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours). 
6. Dropping	No visible mechanical damage.	Drop the chip 10 times on a concrete floor from a height of 100 cm.
7. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 75% coverage.	① Solder temperature: 240±2℃ ② Duration: 3sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Multilayer Chip Common Mode Filter (SDCM series)/
Chip Common Mode Choke Coil Array (SDCMA series)

Items	Requirements	Test Methods and Remarks
8. Resistance to Soldering Heat	No visible mechanical damage.	① Solder temperature: 260±3℃ ② Duration: 5 sec. ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Thermal Shock	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature and time: -40℃ for 30±3 min→85℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
10. Damp Heat (Steady States)	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 500^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Resistance to High temperature	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature: 85±2℃ ② Duration: 500^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

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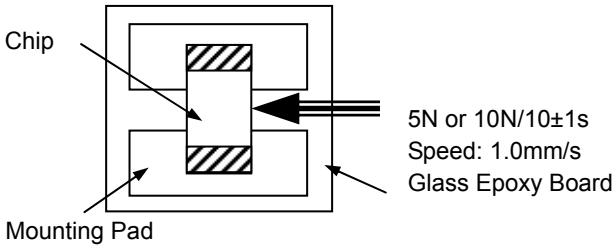
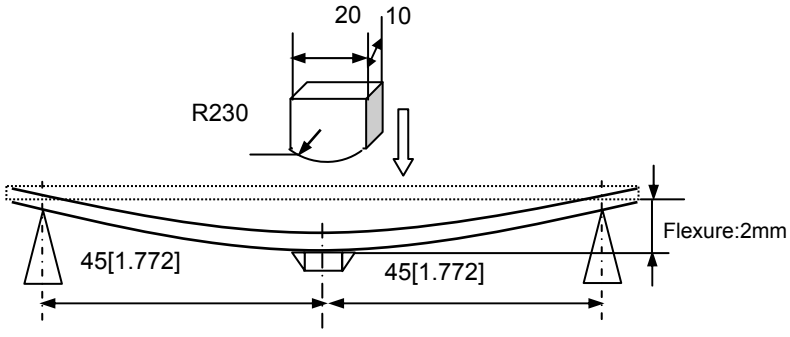
RELIABILITY AND TEST CONDITIONS

Multilayer Chip Varistor (SDV (Cp≥3pF) series)

<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td>1. Operating Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>2. Storage Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>3. Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.</td><td>① Solder the chip to the testing jig (glass epoxy board shown as the following figure.) using eutectic solder. Then apply a force in the direction of the arrow.
② 5N force for 1005 and 1608 series.
③ 10N force for 2012 and 3216 series.
④ Keep time: 10±1s
 
</td></tr>
<tr><td rowspan="2">4. Resistance to Flexure</td><td>No visible mechanical damage.</td><td>① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure.
② Flexure: 2mm
③ Pressurizing speed: 0.5mm/sec
④ Keep time: ≥30 sec</td></tr>
<tr><td colspan="2"> 

Unit: mm [inch]
<table>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>1005[0402]</td><td>0.4</td><td>1.5</td><td>0.5</td></tr>
<tr><td>1608[0603]</td><td>1.0</td><td>3.0</td><td>1.2</td></tr>
<tr><td>2012[0805]</td><td>1.2</td><td>4.0</td><td>1.65</td></tr>
<tr><td>3216[1206]</td><td>2.2</td><td>5.0</td><td>2.0</td></tr>
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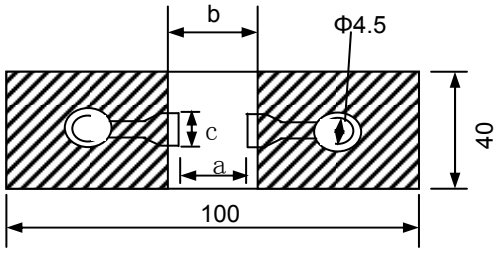
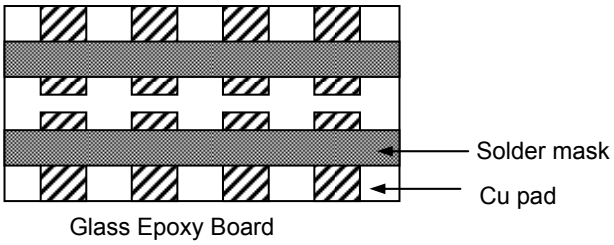
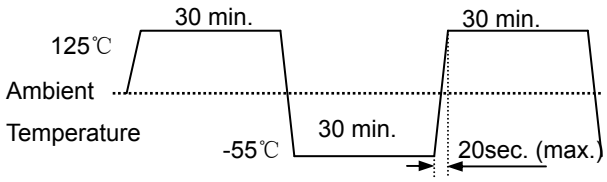

</td></tr>
</table>

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Multilayer Chip Varistor (SDV (Cp≥3pF) series)

Items	Requirements	Test Methods and Remarks
5. Vibration	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours). 
6. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 90% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
7. Resistance to Soldering Heat	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Solder temperature: 260±3℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
8. Thermal Shock	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature and time: -55℃for 30±3 min→125℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
9. Resistance to Low Temperature	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: -55±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Damp Heat (Steady States)	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

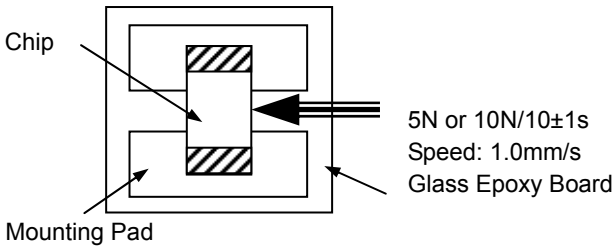
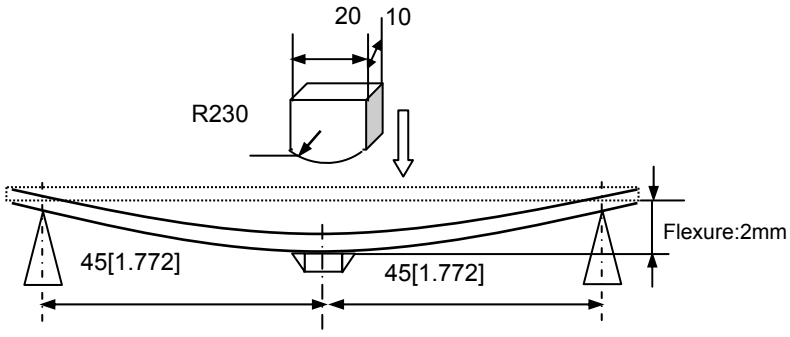
Multilayer Chip Varistor (SDV (Cp≥3pF) series)

Items	Requirements	Test Methods and Remarks
11. Loading Under Damp Heat	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied voltage: DC working voltage ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours ③ Applied voltage: DC working voltage ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Maximum Surge Current	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-5 standard 1.2/50us-8/20us voltage-current combination pulse	① Temperature: 25±5℃ ② Humidity: 30% to 65% RH ③ Number of hit: each 1 time of +/- polarity. ④ Pulse waveform: 8/20 us ⑤ Applied current: maximum surge current (I_P) ⑥ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
14. Maximum Surge Energy	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-5 standard 10/1000us current pulse	① Temperature: 25±5℃ ② Humidity: 30% to 65% RH ③ Number of hit: 1 time ④ Pulse waveform: 10/1000 us ⑤ Applied energy: maximum surge energy (E_T) ⑥ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
15. ESD Life	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-2 standard ESD gun C=150pF R=330Ω	① Discharge: Contact discharge ② Voltage: 8000V (Level 4) ③ Polarity: +, - ④ Number: 10 times within 10 sec ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
16. ESD Test	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-2 standard ESD gun C=150pF R=330Ω	① Discharge: Air discharge ② Voltage: 15000V (Special level) ③ Polarity: +, - ④ Number: 10 times within 10 sec ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Ultra low capacitance Multilayer Chip Varistor (SDV (Cp≤2pF) series)

<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td>1. Operating Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>2. Storage Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>3. Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.</td><td>① Solder the chip to the testing jig (glass epoxy board shown as the following figure.) using eutectic solder. Then apply a force in the direction of the arrow.
② 5N force for 1005 and 1608 series.
③ 10N force for 2012 and 3216 series.
④ Keep time: 10±1s
 
</td></tr>
<tr><td rowspan="2">4. Resistance to Flexure</td><td>No visible mechanical damage.</td><td>① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure.
② Flexure: 2mm
③ Pressurizing speed: 0.5mm/sec
④ Keep time: ≥30 sec</td></tr>
<tr><td colspan="2"> 

Unit: mm [inch]
<table>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>1005[0402]</td><td>0.4</td><td>1.5</td><td>0.5</td></tr>
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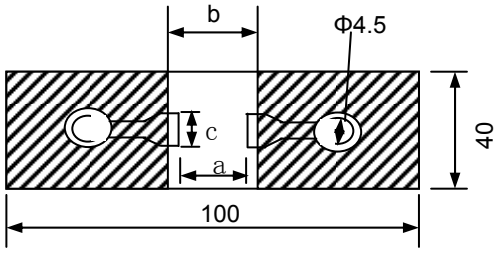
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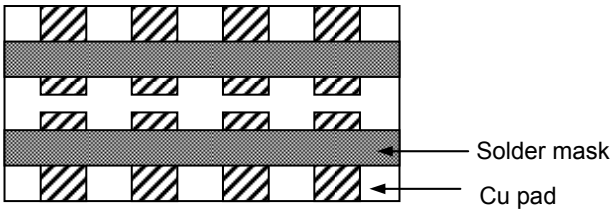
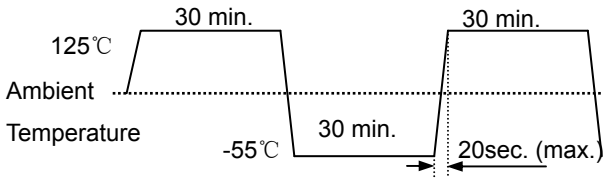
Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Ultra low capacitance Multilayer Chip Varistor (SDV (Cp≤2pF) series)

Items	Requirements	Test Methods and Remarks
5. Vibration	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours).  Glass Epoxy Board
6. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 90% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
7. Resistance to Soldering Heat	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Solder temperature: 260±3℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
8. Thermal Shock	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature and time: -55℃for 30±3 min→125℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
9. Resistance to Low Temperature	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: -55±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Damp Heat (Steady States)	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

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RELIABILITY AND TEST CONDITIONS

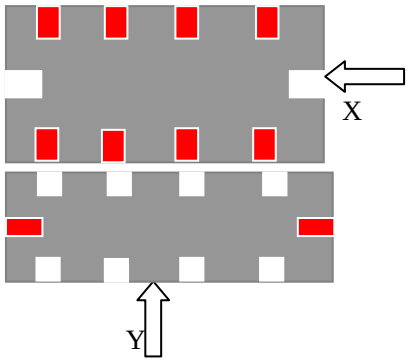
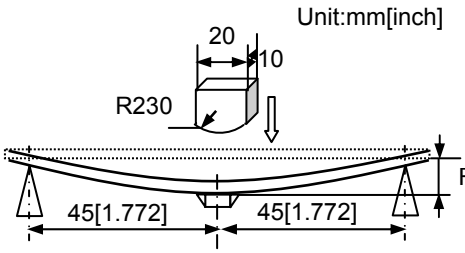
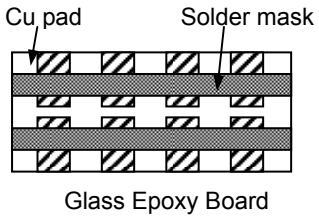
Ultra low capacitance Multilayer Chip Varistor (SDV ($C_p \leqslant 2pF$) series)

Items	Requirements	Test Methods and Remarks
11. Loading Under Damp Heat	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied voltage: DC working voltage ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours ③ Applied voltage: DC working voltage ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Multilayer Chip Varistor Array (SDVA-VA/FL/R series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-55℃ to +125℃	
2. Storage Temperature Range	-55℃ to +125℃	
3. Terminal Strength	No removal or split of the termination or other defects shall occur. 	① Solder the chip to the testing jig (glass epoxy board shown as the **left Fig**) using eutectic solder. Then apply a force in the direction of the arrow ② 10N force in X direction and 5N in Y direction ③ Keep time: 10±1s.
4. Resistance to Flexure	No visible mechanical damage. 	① Solder the chip to the test jig (glass epoxy board shown as **the left Fig.**) using a eutectic solder. Then apply a force in the direction shown the **left Fig.** ② Flexure: 2mm. ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time: 30 sec.
5. Vibration	No visible mechanical damage. 	① Solder the chip to the testing jig (glass epoxy board shown as the **left Fig.**) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
6. Solderability	① No visible mechanical damage. ② Wetting shall exceed 90% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight.
7. Resistance to Soldering Heat	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Solder the chip to the testing jig ② Solder temperature: 260±3℃, re-flowing 2 times ③ Duration: 5sec. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. ⑤ Solder: Sn/3.0Ag/0.5Cu. ⑥ Flux: 25% Resin and 75% ethanol in weight.

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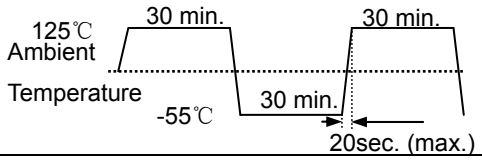
RELIABILITY AND TEST CONDITIONS

Multilayer Chip Varistor Array (SDVA-VA/FL/R series)

Items	Requirements	Test Methods and Remarks
8. Thermal Shock	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature, Time: -55℃for 30±3 min→125℃ for 30±3min. ② Transforming interval: 20sec. (max.) ③ Tested cycle: 100 cycles. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
9. Resistance to Low Temperature	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: -55±2℃ ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Loading Under Damp Heat	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ Applied voltage: DC Working Voltage. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Varistor voltage change: Within ±10%.	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours. ③ Applied voltage: DC Working Voltage. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Maximum Surge Current	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-5 standard 1.2/50us-8/20us voltage-current combination pulse	① Temperature: 25±5℃ ② Humidity: 30% to 65% RH. ③ Number of hit: each 1 time of +/- polarity. ④ Pulse waveform: 8/20 us. ⑤ Applied current: maximum surge current (I_P). ⑥ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. ESD Life	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-2 standard ESD gun C=150pF R=330Ω	① Discharge: Contact discharge. ② Voltage: 8000V (Level 4). ③ Polarity: +, -. ④ Number: 10 times within 10 sec. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
14. ESD Test	① No visible mechanical damage. ② Varistor voltage change: Within ±10%. IEC61000-4-2 standard ESD gun C=150pF R=330Ω	① Discharge: Air discharge. ② Voltage: 15000V (Special level). ③ Polarity: +, - ④ Number: 10 times within 10 sec. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

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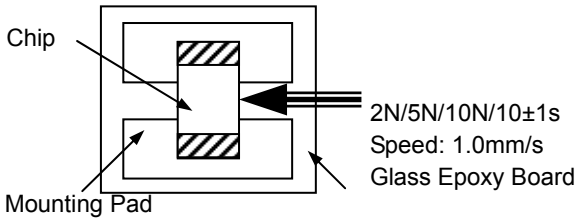
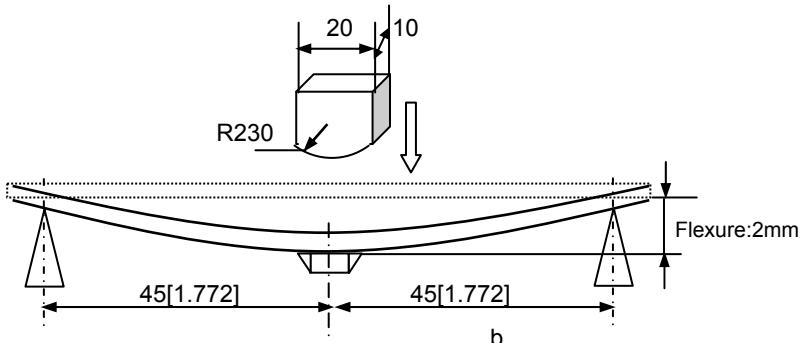
RELIABILITY AND TEST CONDITIONS

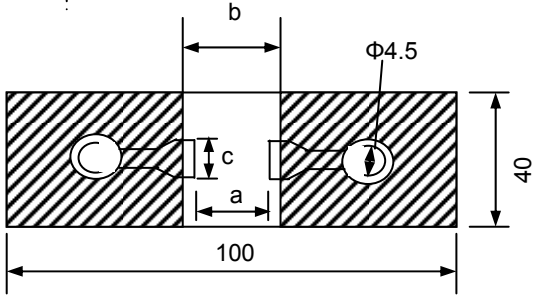
Multilayer Chip Inductor (SDFL/ SDCL-D/MSDCL/SDHL series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	SDFL series: -40℃ to +85℃ SDCL0603-D/1005-D/MSDCL0603 series: -55℃ to +125℃ SDCL-D/SDHL1608/SDCL2012-D series: -40℃ to +85℃ SDHL1005 series: -55℃ to +125℃	
2. Storage Temperature Range	SDFL series: -40℃ to +85℃ SDCL0603-D/1005-D/MSDCL0603 series: -55℃ to +125℃ SDCL-D/SDHL1608/SDCL2012-D series: -40℃ to +85℃ SDHL1005series: -55℃ to +125℃	
3. Terminal Strength	No removal or split of the termination or other defects shall occur.	① Solder the inductor to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 2N force for 0603 series. ③ 5N force for 1005 and 1608 series. ④ 10N force for 2012 and 3216 series. ⑤ Keep time: 10±1s 
4. Resistance to Flexure	No visible mechanical damage.	① Solder the inductor to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction of the arrow shown as the following figure. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: ≥30 sec



Unit: mm [inch]

Type	a	b	c
0603[0201]	0.25	0.8	0.3
1005[0402]	0.4	1.5	0.5
1608[0603]	1.0	3.0	1.2
2012[0805]	1.2	4.0	1.65
3216[1206]	2.2	5.0	2.0



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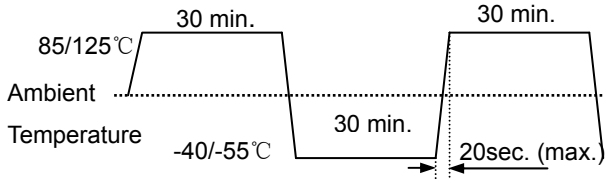
RELIABILITY AND TEST CONDITIONS

Multilayer Chip Inductor (SDFL/SDCL/SDCL-D/MSDCL/SDHL series)

Items	Requirements	Test Methods and Remarks
5. Vibration	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Solder the inductor to the testing jig using eutectic solder. ② The inductor shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
6. Dropping	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	Drop chip inductor 10 times on a concrete floor from a height of 100 cm.
7. Temperature	Inductance change should be within ±10% of initial value measuring at 20℃.	Temperature range: SDFL series: -40℃ to +85℃ SDCL0603-D/1005-D/MSDCL0603 series: -55℃ to +125℃ SDCL-D/SDHL1608/SDCL2012-D series:-40℃ to +85℃ SDHL1005 series: -55℃ to +125℃ Reference temperature:+20℃
8. Solderability	① No visible mechanical damage. ② Wetting shall exceed 75% coverage for 0603 series; exceed 95% for others.	① Solder temperature: 240±2℃ ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
9. Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall exceed 75% coverage for 0603 series; exceed 95% for others. ③ Inductance change: Within ±10%. ④ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Solder temperature: 260±3℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Thermal Shock	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Temperature and time: SDFL /SDCL1608-D/SDHL1608/SDCL2012-D series: -40℃ for 30±3 min →85℃ for 30±3min SDCL0603-D/1005-D/MSDCL0603 /SDHL1005 series: -55℃ for 30±3 min →125℃ for 30±3min ② Transforming interval: Max.20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

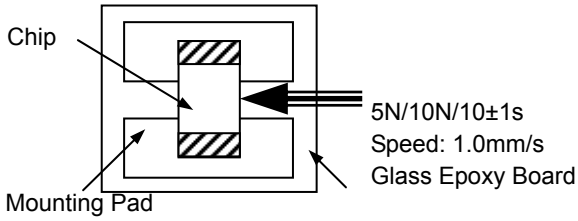
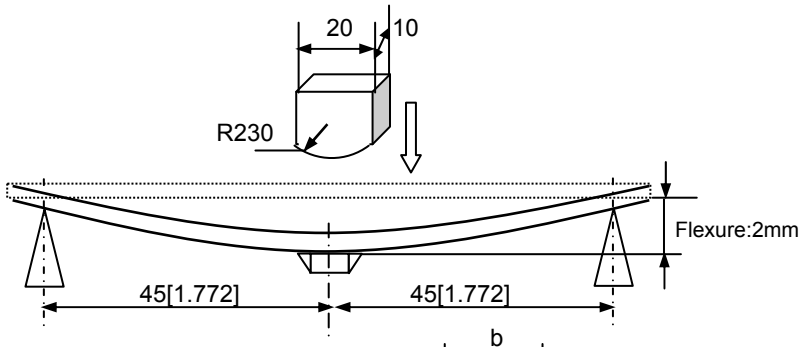
Multilayer Chip Inductor (SDFL/SDCL/SDCL-D/MSDCL/SDHL series)

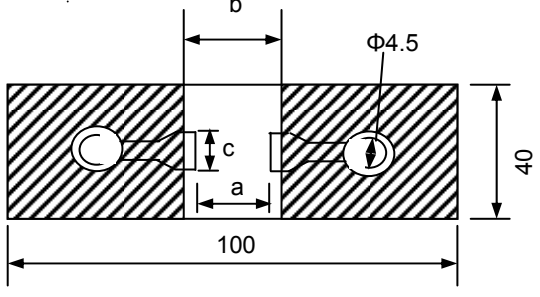
Items	Requirements	Test Methods and Remarks
11. Resistance to Low Temperature	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Temperature: SDFL series: -40±2℃ SDCL0603-D/1005-D/MSDCL0603 series: -55±2℃ SDCL-D/SDHL1608,SDCL2012-D series: -40±2℃ SDHL1005 series: -55±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Damp Heat (Steady States)	① No visible mechanical damage. ② Inductance change: Within ±10%. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Loading Under Damp Heat	① No visible mechanical damage. ② Inductance change: SDCL-D&SDHL&MSDCL series: Within ±10%. SDFL series: Within±10% for inductance≤12μH, Within±15% for inductance≥15μH. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied current: Rated current ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
14. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Inductance change: SDCL-D&SDHL&MSDCL series: Within ±10%. SDFL series: Within±10% for inductance≤12μH, Within±15% for inductance≥15μH. ③ Q factor change: SDCL-D&SDHL&MSDCL series: Within ±20%, SDFL series: Within ±30%.	① Temperature: SDFL series: 85±2℃ SDCL0603-D/1005-D/MSDCL0603 series:125±2℃ SDCL-D/SDHL1608,SDCL2012-D series: 85±2℃ SDHL1005 series: 125±2℃ ② Duration: 1000^{+24} hours ③ Applied current: Rated current ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Multilayer Chip Inductor for Choke (MCL series)

<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td>1. Operating Temperature Range</td><td colspan="2">-40℃ to +85℃</td></tr>
<tr><td>2. Storage Temperature Range</td><td colspan="2">-40℃ to +85℃</td></tr>
<tr><td>3. Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.</td><td>① Solder the inductor to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow.
② 5N force for 1608 series, 10N force for 2012 series.
③ Keep time: 10±1s
④ Speed: 1.0mm/s.
 
</td></tr>
<tr><td>4. Resistance to Flexure</td><td>No visible mechanical damage.</td><td>① Solder the inductor to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction of the arrow shown as the following figure.
② Flexure: 2mm
③ Pressurizing Speed: 0.5mm/sec
④ Keep time: ≥30 sec</td></tr>
<tr><td colspan="3"> 

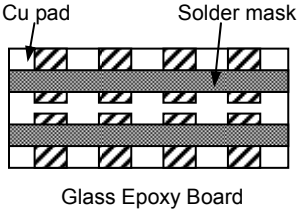
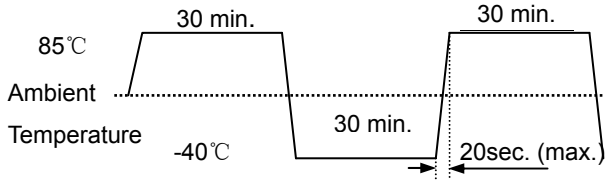
Unit: mm [inch]


<table>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>1608[0603]</td><td>1.0</td><td>3.0</td><td>1.2</td></tr>
<tr><td>2012[0805]</td><td>1.2</td><td>4.0</td><td>1.65</td></tr>
</table></td></tr>
</table>

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

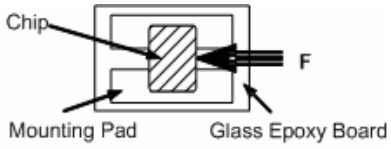
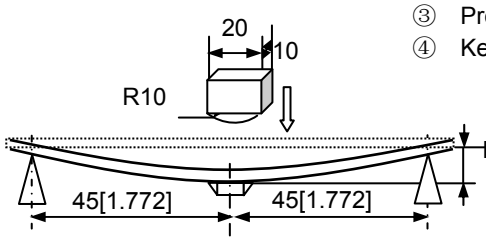
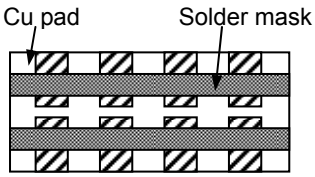
Multilayer Chip Inductor for Choke (MCL series)

Items	Requirements	Test Methods and Remarks
5. Vibration	① No visible mechanical damage.  	① Solder the inductor to the testing jig using eutectic solder. ② The inductor shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
6. Temperature	① Inductance change should be within ±20% of initial value measuring at 20℃.	① Temperature range: -40℃ to +85℃ Reference temperature:+20℃
7. Solderability	① No visible mechanical damage. ② Wetting shall exceed 95% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
8. Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall exceed 95% coverage. ③ Inductance change: Within ±20%.	① Solder temperature: 260±3℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Thermal Shock	① No visible mechanical damage. ② Inductance change: Within ±20%.	① Temperature and time: -40℃ for 30±3 min →85℃ for 30±3min ② Transforming interval: Max.20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
10. Resistance to Low Temperature	**① No mechanical damage.** **② Inductance change: Within ±20%.**	**① Temperature: -40±2℃** **② Duration: 1000^{+24} hours.** **③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.**
11. Loading Under Damp Heat	① No visible mechanical damage. ② Inductance change: Within ±20%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ Applied current: Rated current ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Inductance change: Within ±20%.	① Temperature: 85±2℃ ② Duration: 1000^{+24} hours ③ Applied current: Rated current ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

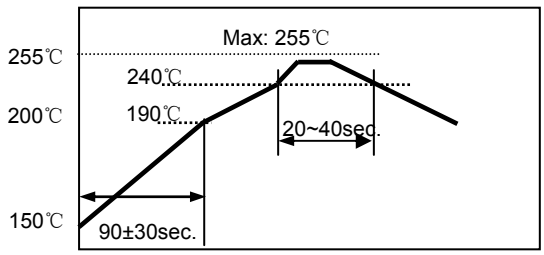
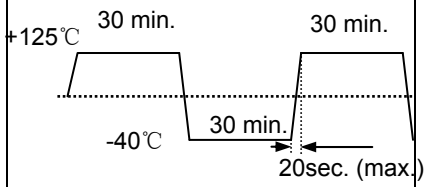
Wire Wound Chip Ceramic Inductors (SDWL-C series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-40℃ to +125℃	
2. Storage Temperature Range	-40℃ to +125℃	
3. Terminal Strength	No removal or split of the termination or other defects shall occur. 	① Solder the inductor to the testing jig (glass epoxy board shown in as the left figure.) ② using eutectic solder. Then apply a force in the direction of the arrow. ③ 4N force for SDWL1005C series. ④ 7N force for SDWL1608C series. ⑤ 20N force for 2012, 2520, 3225 and 4532 series. ⑥ Keep time: 10±1s ⑦ Speed: 1.0 mm/s.
4. Resistance to Flexure	No visible mechanical damage. Unit: mm [inch] 	① Solder the inductor to the test jig. Using a eutectic solder. Then apply a force in the direction shown as the left figure. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time ≧ 5 sec.
5. Vibration	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20% 	④ Solder the inductor to the testing jig (glass epoxy board shown in as the left figure.) ④ using eutectic solder. ⑤ The inductor shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ⑥ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours)
6. Dropping	① No visible mechanical damage. ② Inductance change: within ±5% ③ Q factor change: within ±20%	Drop chip inductor 10 times on a concrete floor from a height of 100 cm.
7. Temperature coefficient	+50±100ppm/℃	① Between -40℃ and +125℃ ② with a reference value of +20℃
8. Solderability	① 90% or more of electrode area shall be coated by new solder for SDWL1005C-S, SDWL1608C-S series. ② 80% or more of electrode area shall be coated by new solder for other series.	① Electrode of the coil shall be immersed in flux for 5 to 10 Seconds. ② The coil shall be immersed in solder bath at a temperature of 240±5℃, Duration for 3±0.5 seconds. ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

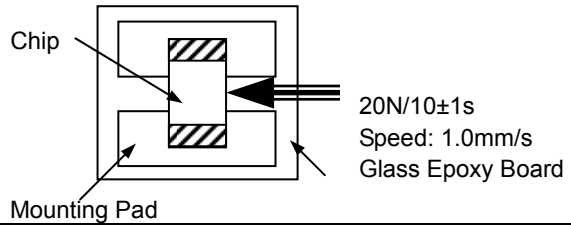
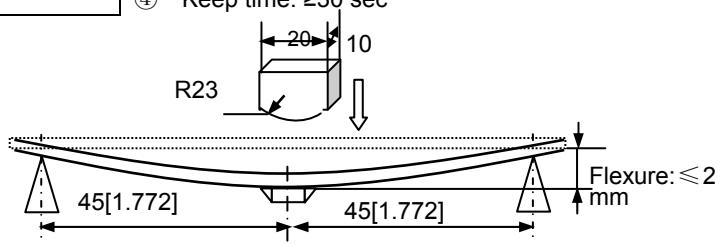
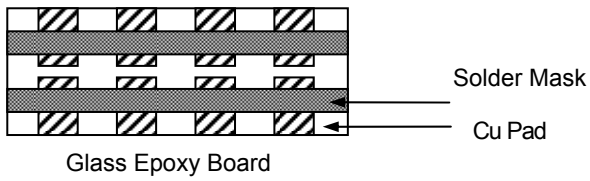
Wire Wound Chip Ceramic Inductors (SDWL-C series)

9. Resistance to Soldering Heat	① No visible mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20%	Re-flowing Profile: 
10. Thermal Shock	① No visible mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20% 	① Temperature, Time: (see the left figure.). -40℃ for 30±3 min →+125℃ for 30±3min ② Transforming interval: 20 sec. (max.) ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Resistance to Low Temperature	① No visible mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20%	① Temperature: -40±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Resistance to High Temperature	① No mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20%	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Damp Heat (Steady States)	① No mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20%	① Temperature: 60±2℃, Humidity: 90% to 95% RH ② Duration:1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
14. Loading Under Damp Heat	① No mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20%	① Temperature: 60±2℃, Humidity: 90% to 95% RH ② Duration: 1000^{+24}hours ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
15. Loading at High Temperature (Life Test)	① No mechanical damage. ② Inductance change: Within ±5% ③ Q factor change: Within ±20%	① Temperature: 125±2℃ ② Duration:1000^{+24}hours ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

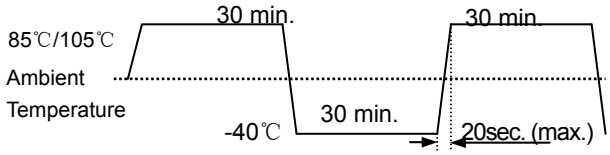
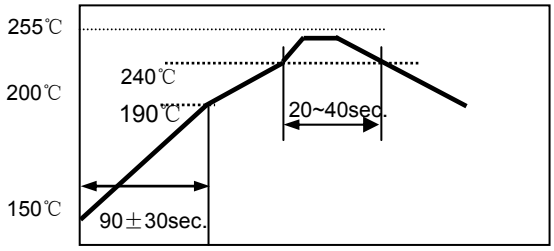
Wire Wound Chip Ferrite Inductors (SDWL-F/SDWL-FD series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	SDWL-F Series: -40℃ to +105℃ SDWL-FD Series: -40℃ to +85℃	
2. Storage Temperature Range	SDWL-F Series: -40℃ to +105℃ SDWL-FD Series: -40℃ to +85℃	
3. Terminal Strength	No removal or split of the termination or other defects shall occur.	① Solder the inductor to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 10N force for 2520, 3225 and 4532 series. ③ Keep time: 10±1s ④ Speed: 1.0mm/s 
4. Resistance to Flexure	No visible mechanical damage.	① Solder the inductor to the test jig. Using a eutectic solder. Then apply a force in the direction shown as the following figure. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: ≥30 sec Unit: mm [inch] 
5. Vibration	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%,	① Solder the inductor to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The inductor shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours). 
6. Dropping	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%,	Drop chip inductor 10 times on a concrete floor from a height of 100 cm.
7. Temperature	Inductance change: 1) ±5% for SDWL-F Series 2) ±10% for SDWL-FD Series.	Temperature range: SDWL-F Series: -40℃ to + 105℃ SDWL-FD Series: -40℃ to + 85℃ Reference temperature: +20℃

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

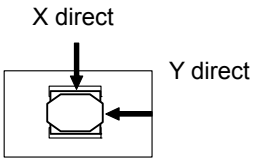
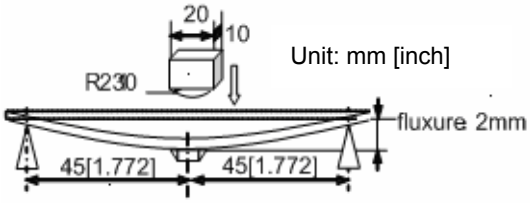
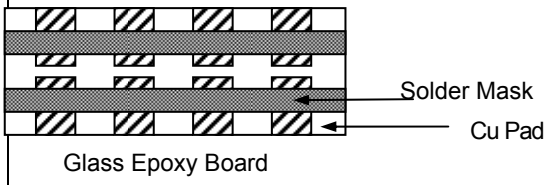
Wire Wound Chip Ferrite Inductors (SDWL-F/SDWL-FD series)

Items	Requirements	Test Methods and Remarks
8. Thermal Shock	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%.	① Temperature and Time: SDWL-F Series: -40℃ for 30±3 min →105℃ for 30±3min. SDWL-FD Series: -40℃ for 30±3 min →85℃ for 30±3min. ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
9. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 90% coverage.	① Pre-heating temperature: 150℃ to 180℃ ② Pre-heating time: 3 minutes ③ Solder temperature: 240±2℃ ④ Duration: 3 sec ⑤ Material: Sn/3.0Ag/0.5Cu ⑥ Flux: 25% Resin and 75% ethanol in weight 
10. Resistance to Soldering Heat	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%.	① Pre-heating temperature: 150℃ to 180℃ ② Pre-heating time: 3 minutes ③ Solder temperature: 260±3℃ ④ Duration: 5 sec ⑤ Material: Sn/3.0Ag/0.5Cu ⑥ Flux: 25% Resin and 75% ethanol in weight ⑦ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Resistance to Low Temperature	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%.	① Low Temperature: -40±2℃ ② Duration: 1000±12 hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Resistance to High Temperature	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%.	① High Temperature: SDWL-F Series: 105℃±2℃ SDWL-FD Series: 85℃±2℃ ② Duration: 1000±12 hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Damp Heat (Steady States)	① No visible mechanical damage. ② Inductance change: SDWL-F Series: Within ±5%, SDWL-FD Series: Within ±10%.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000±12 hours. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

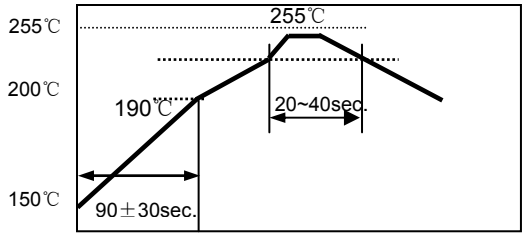
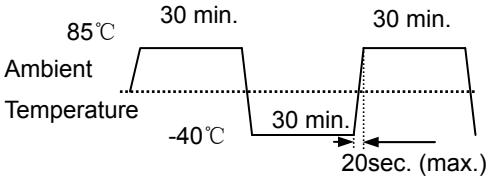
Power Inductors (SWPA/SWPU series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-25℃ to +120℃	
2. Storage Temperature Range	-25℃ to±120℃	
3. Terminal Strength	No removal or split of the termination or other defects shall occur. 	① Solder the inductor to the testing jig (glass epoxy board shown as the left figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 10N force for SWPA/SWPU30** series. 20N force for SWPA/SWPU 40** series. 30N force for SWPA/SWPU 60** series. 40N force for SWPA/SWPU 80** series. ③ Keep time: 5s
4. Resistance to Flexure	No visible mechanical damage. 	① Solder the chip to the test jig (glass epoxy board as the left figure.) ② using eutectic solder. Then apply a force in the direction shown as the left figure. ③ Flexure: 2mm ④ Pressurizing Speed: 0.5mm/sec ⑤ Keep time: 30±1s ⑥ Test board size: 100X40X1.0 ⑦ Land dimension: See the Recommended Land Patterns.
5. Vibration	① No visible mechanical damage. ② Inductance change: Within ±10% 	① Solder the chip to the testing jig (glass epoxy board shown as **the left figure**) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
6. Temperature coefficient	Inductance change: within ±20%	① Temperature: -25℃ ~ +85℃ ② with a reference value of +20℃, change rate shall be calculated
7. Solderability	90% or more of electrode area shall be coated by new solder.	① The test samples shall be dipped in flux, and then immersed in molten solder. ② Solder temperature: 245±5℃ ③ Duration: 5±1 sec. ④ Solder: Sn/3.0Ag/0.5Cu ⑤ Flux: 25% resin and 75% ethanol in weight ⑥ Immersion depth: all sides of mounting terminal shall be immersed

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

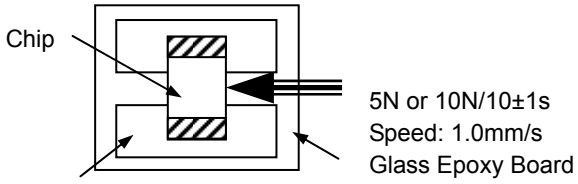
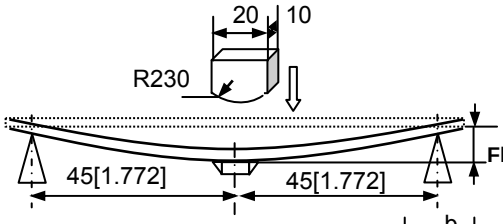
Power Inductors (SWPA/SWP Useries)

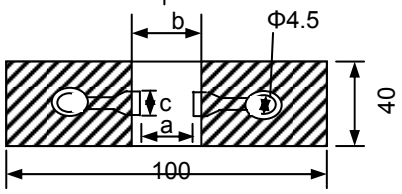
Items	Requirements	Test Methods and Remarks
8. Resistance to Soldering Heat	① No visible mechanical damage. ② Inductance change: Within ±10%	① Re-flowing Profile: Please refer to Re-flowing Profile item. ② Test board thickness: 1.0mm ③ Test board material: glass epoxy resin ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring 
9. Thermal Shock	① No visible mechanical damage. ② Inductance change: Within ±10% 	① Temperature and time: -40±3℃ for 30±3 min→ 85℃ for 30±3min ② Transforming interval: Max. 20 sec ③ Tested cycle: 10 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring
10. Resistance to Low Temperature	① No mechanical damage. ② Inductance change: Within±10%	① Temperature: -40±3℃ ② Duration: $1000^{\pm 24}$ hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring
11. Resistance to High Temperature	① No mechanical damage. ② Inductance change: Within±10%	① Temperature: 85±2℃ ② Duration: $1000^{\pm 24}$ hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Damp Heat	① No mechanical damage. ② Inductance change: Within±10%	① Temperature: 60±2℃ ② Humidity: 90% to 95%RH ③ Duration: $1000^{\pm 24}$ hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring
13. Loading Under Damp Heat	① No mechanical damage. ② Inductance change: Within±10%	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Applied current: Irms ④ Duration: 1000±24 hours ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring
14. Loading at High Temperature	① No mechanical damage. ② Inductance change: Within±10%	① Temperature: 85±2℃ ② Applied current: Irms ③ Duration: $1000^{\pm 24}$ hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring

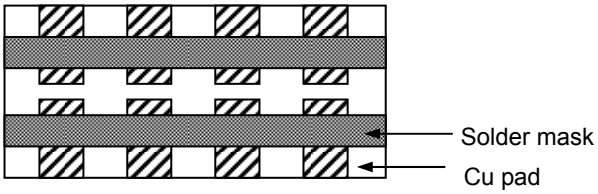
Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Chip NTC Thermistor (SDNT series)

<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td>1. Operating Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>2. Storage Temperature Range</td><td colspan="2">-55℃ to +125℃</td></tr>
<tr><td>3. Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.</td><td>① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow.
② 5N force for 1005 and 1608 series
③ 10N force for 2012 series
④ Keep time:10±1s
 
</td></tr>
<tr><td>4. Resistance to Flexure</td><td>No visible mechanical damage.</td><td>① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure.
② Flexure: 2mm
③ Pressurizing Speed: 0.5mm/sec
④ Keep time: ≥30 sec
 

Unit: mm [inch]
 

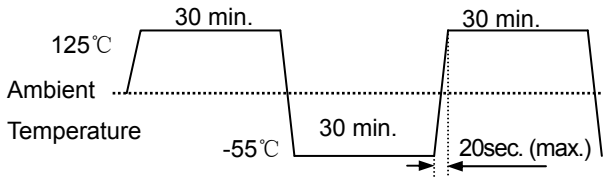
<table><tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr><tr><td>1005[0402]</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>1608[0603]</td><td>1.0</td><td>3.0</td><td>1.2</td></tr><tr><td>2012[0805]</td><td>1.2</td><td>4.0</td><td>1.65</td></tr></table></td></tr>
<tr><td>5. Vibration</td><td>No visible mechanical damage.</td><td>① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder.
② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5 mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz.
③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
 

Glass Epoxy Board</td></tr>
<tr><td>6. Dropping</td><td>No visible mechanical damage.</td><td>Drop the chip 10 times on a concrete floor from a height of 100 cm.</td></tr>
</table>

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Chip NTC Thermistor (SDNT series)

Items	Requirements	Test Methods and Remarks
7. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 80% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
8. Resistance to Soldering Heat	① No visible mechanical damage. ② R25 change: Within ±5%.*1 ③ B constant change: Within ±2%.*2	① Solder temperature: 260±3℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Thermal Shock	① No visible mechanical damage. ② R25 change: Within ±5%.*1 ③ B constant change: Within ±2%.*2	① Temperature and time: -55℃ for 30±3 min→125℃ for 30±3min ② Transforming interval: Max.20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
10. Resistance to Low Temperature	① No visible mechanical damage. ② R25 change: Within ±5%.*1 ③ B constant change: Within ±2%.*2	① Temperature: -55±2℃ ② Duration: 1000^{+24} hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Damp Heat (Steady States)	① No visible mechanical damage. ② R25 change: Within ±5%.*1 ③ B constant change: Within ±2%.*2	① Temperature: 60±2 ℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Resistance to High Temperature	① No visible mechanical damage. ② R25 change: Within ±5%.*1 ③ B constant change: Within ±2%.*2	① Temperature: 125±2℃ ② Humidity: 90% to 95% RH ③ Duration: 1000^{+24} hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
13. Loading at High Temperature (Life Test)	① No visible mechanical damage. ② R25 change: Within ±5%.*1 ③ B constant change: Within ±2%.*2	① Temperature: 85±2℃ ② Duration: 1000^{+24} hours. ③ Applied current: Max.Permissive Operating Current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

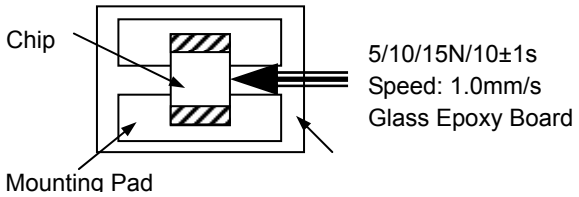
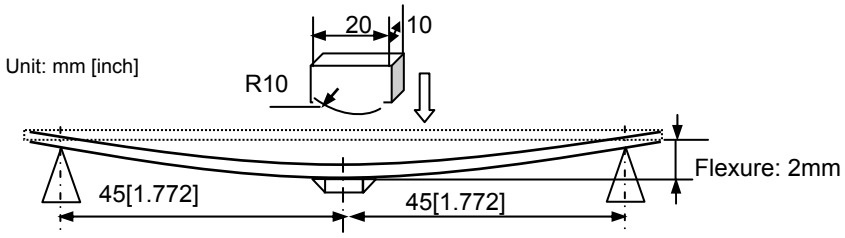
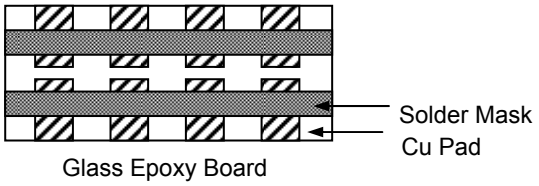
※*1: For F and H tolerance code, the change of R25 should be within ±1% and ±3% respectively. For others, the change of R25 should be within ±5%.

※*2: For F code tolerance, the change of B constant should be within ±1%. For others, the change of B constant should be within ±2%.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

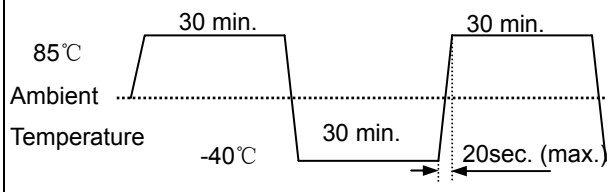
RF Component (SLFB/SLFL/SLFH/SLDA/SLASM series)

Items	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-40℃ to +85℃	
2. Storage Temperature Range	-40℃ to +85℃	
3. Terminal Strength	No visible mechanical damage.	① Solder the inductor to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 5N force for 1608 series. ③ 10N force for 2012, 2520 and 3216 series. ④ 15N force for 3225 series and others. ⑤ Keep time: 10±1sec. 
4. Resistance to Flexure	No visible mechanical damage.	① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure. Solder the chip to the test jig (glass epoxy board) using eutectic solder. Then apply a force in the direction. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: ≥30 sec
		
5. Vibration (Only for SLFB/SLFL /SLFH series)	No visible mechanical damage.	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours). 
6. Dropping	No visible mechanical damage.	① SLFB/SLFL /SLFH series: Drop the chip 10 times on a concrete floor from a height of 100 cm. ② SLDA series: Drop the chip 5 times on a wood floor from a height of 50 cm.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

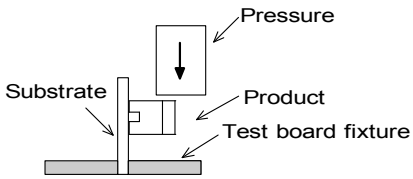
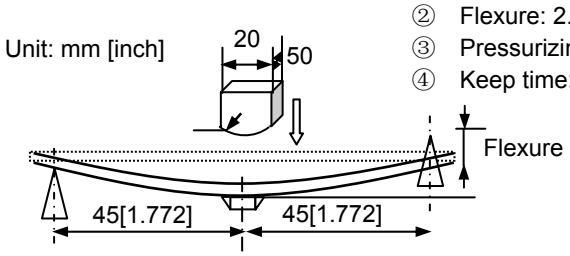
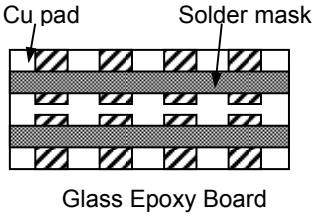
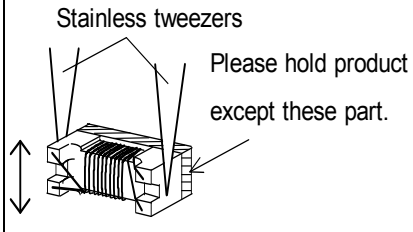
RF Component (SLFB/SLFL/SLFH/SLDA/SLASM series)

Items	Requirements	Test Methods and Remarks
7. Solderability	① No visible mechanical damage. ② Wetting shall be exceeded 75% coverage.	① Solder temperature: 240±2℃ ② Duration: 3sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight
8. Resistance to Soldering Heat	No visible mechanical damage.	① Solder temperature: 260±5℃ ② Duration: 5 sec ③ Solder: Sn/3.0Ag/0.5Cu ④ Flux: 25% Resin and 75% ethanol in weight ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Thermal Shock	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature and time: -40℃ for 30±3 min→85℃ for 30±3min ② Transforming interval: Max. 20 sec. ③ Tested cycle: 100 cycles for SLFB/SLFL/SLFH series 10 cycles for SLDA series ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 
10. Damp Heat (Steady States)	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Duration: 500^{+24} hours for SLFB/SLFL/SLFH series 96^{+24} hours for SLDA series ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Resistance to High temperature	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature: 85±2℃ Duration: 500^{+24} hours for SLFB/SLFL/SLFH series 96^{+24} hours for SLDA series ② The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Wire Wound Chip Balun Transformer (BW21S series)

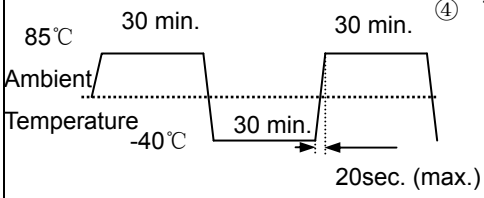
Item	Requirements	Test Methods and Remarks
1. Operating Temperature Range	-40℃ to +85℃	
2. Storage Temperature Range	-40℃ to +85℃	
3. Terminal strength	No removal or split of the termination or other defects shall occur. 	① Solder the chip to the testing jig (glass epoxy board shown as **the left figure**) using eutectic solder. Then apply a force in the direction of the arrow. ② 5N force. ③ Keep time: 5±1s.
4. Resistance to Flexure	No visible mechanical damage. 	① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as **the left figure**. ② Flexure: 2.0mm. ③ Pressurizing Speed: 0.5mm/s. ④ Keep time: 5s.
5. Vibration	No visible mechanical damage. 	Soldered on the substrate. Apply 10Hz Vibration for 2 hours in each of the three perpendicular directions. The amplitude is 1.5mm.
6. Dropping	No visible mechanical damage.	Drop the chip 3 times on a concrete floor from a height of 1m.
7. Solderability	Wetting shall be exceeded 95% coverage, except welding points. 	① Solder temperature: 240±2℃. ② Duration: 4±1sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ Velocity : 25mm/s

Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110 **Tel**: 0086-755-29832660 **Fax**: 0086-755-82269029 **E-Mail**: sunlord@sunlordinc.com

RELIABILITY AND TEST CONDITIONS

Wire Wound Chip Balun Transformer (BW21S series)

Item	Requirements	Test Methods and Remarks
8. Resistance to soldering heat	① No visible mechanical damage. ② Satisfy electrical characteristics.	① Reflow soldering. ② The chip shall be stabilized at normal condition for 1~2 hours before measuring.
9. Thermal shock	① No mechanical damage. ② Satisfy electrical characteristics.	① Temperature, time: -40℃for 30±3 min →85℃ for 30±3min. ② Transforming interval: 20 s.(max.). ③ Tested cycle: 10 cycles. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
10. Resistance to low temperature	① No mechanical damage. ② Satisfy electrical characteristics.	① Temperature: -40±2℃ ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
11. Damp heat (Steady states)	① No visible mechanical damage. ② Satisfy electrical characteristics.	① Temperature: 40±2℃. ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
12. Loading at high temperature (Life test)	① No visible mechanical damage. ② Satisfy electrical characteristics.	① Temperature: 85±2℃. ② Duration: 1000^{+24} hours. ③ Applied voltage: 2 times for Rated Voltage. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.



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