FrelTec GmbH

Mathildenstr. 10A
82319 Starnberg
Germany

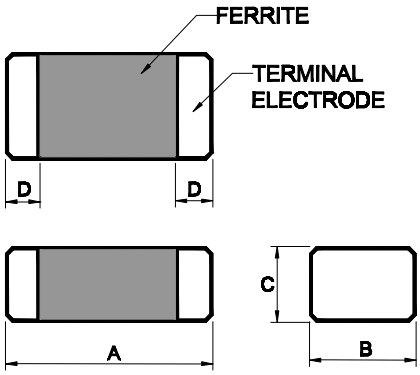
Multilayer Chip Ferrite Bead SMD

Part Number

198	05*	151*	S*		Q*	E02
Type	Size	Nominal Impedance	Material	Rated Current	Tolerance	Packing
198 : SMD Multilayer Chip Ferrite Bead	02 : 0402	The value is given in Ohm. First two digits are significant The last digit is the multiplier which denotes the number of zero following	D, E, G, U	The value is given in Ampere. A indicate the decimal point.	Q: ±25%	T10: tape and reel, for 10kpcs, paper tape, 0402
For ultra large current	03 : 0603					T04: tape and reel, for 4kpcs, paper tape, 0603, 0805
	05 : 0805	Example: 060 : 6Ohm 470 : 47Ohm 151 : 150 Ohm		Example: 1A5: 1,5A 3A0: 3,0A		
						* not all combination is possible

All products according to RoHS (2011/65/EU)

Dimensions:

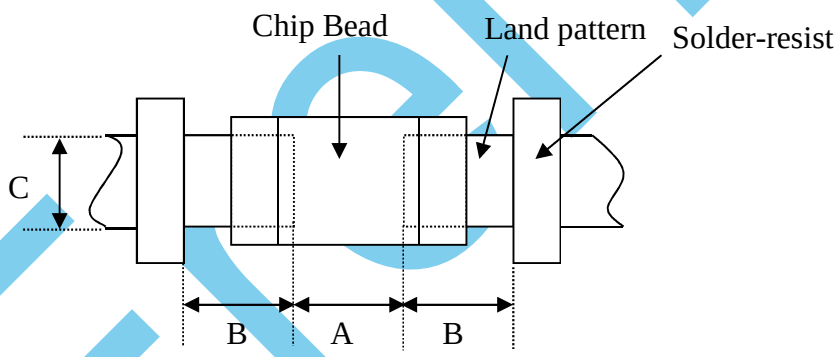


Unit: mm

Type	A	B	C	D
0402	1,0±0,15	0,5±0,15	0,5±0,15	0,25±0,1
0603	1,6±0,15	0,8±0,15	0,8±0,15	0,3±0,2
0805	2,0 (+0,3, -0,1)	1,25±0,2	0,85±0,2	0,5±0,3

unit: mm

Recommended PCB pattern for reflow soldering:



unit: mm

Type	A	B	C
0402	0,45~0,55	0,40~0,50	0,45~0,55
0603	0,60~0,80	0,60~0,80	0,60~0,80
0805	0,80~1,20	0,80~1,20	0,90~1,60

Electrical Characteristics

0402

Impedance (Ω)	Z Test Freq. (MHz)	DCR (mΩ) Max.	Ir (mA) Max.	Material	Thickness (mm)
0~30	100	45	2000	D	0.5±0.15
30±25%	100	50	1700	D	
30±25%	100	35	2200	D	
60±25%	100	75	1500	D	
80±25%	100	70	1500	D	
120±25%	100	90	1300	D	
220±25%	100	160	900	D	

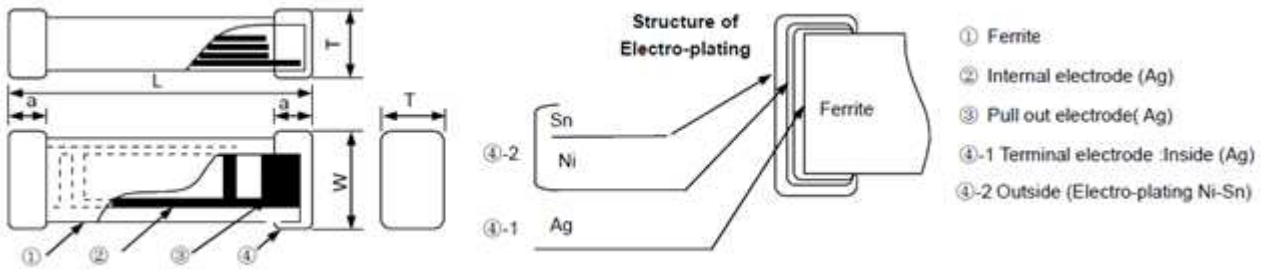
0603

Impedance (Ω)	Z Test Freq. (MHz)	DCR (mΩ) Max.	Ir (mA) Max.	Material	Thickness (mm)
30±25%	100	60	1800	G	0.8±0.15
60±25%	100	100	1200	G	
100±25%	100	150	1000	G	
22±25%	100	10	6000	U	
28±25%	100	10	6000	U	
70±25%	100	20	4000	U	
220±25%	100	50	2200	U	
330±25%	100	70	1500	U	
390±25%	100	120	1500	U	
470±25%	100	120	1500	U	
600±25%	100	150	1300	U	
30±25%	100	10	5000	E	
60±25%	100	20	3500	E	
100±25%	100	30	3000	E	
180±25%	100	50	2200	E	
220±25%	100	50	2200	E	
330±25%	100	80	1700	E	
600±25%	100	150	1000	E	
26±25%	100	7	6000	W	

0805

Impedance (Ω)	Z Test Freq. (MHz)	DCR (mΩ) Max.	Ir (mA) Max.	Material	Thickness (mm)
22±25%	100	10	6000	D	0.85±0.2
80±25%	100	20	4000	D	
22±25%	100	10	6000	U	
30±25%	100	10	6000	U	
60±25%	100	20	4000	U	
220±25%	100	40	3000	U	
30±25%	100	10	6000	E	
120±25%	100	20	4000	E	
220±25%	100	40	3000	E	
300±25%	100	50	2500	E	
330±25%	100	50	2500	E	
600±25%	100	90	2000	E	
1000±25%	100	120	1500	E	

Construction



Material Information

Code	Part Name	Material Name
1	Ferrite Body	Ferrite Powder
2	Inner Coils	Silver Paste
3	Pull-out Electrode (Ag)	Silver Paste
4-1	Terminal Electrode: Inside Ag	Termination Silver Composition
4-2	Electro-Plating: Ni/Sn plating	Plating Chemicals

Test and Measurement Procedures

1 Test Conditions

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

a. Ambient Temperature: 20±15℃
b. Relative Humidity: 65±20%
c. Air Pressure: 86kPa to 106kPa

If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 20±2°C
b. Relative Humidity: 65±5%
c. Air Pressure: 86kPa to 106kPa

2 Visual Examination

a. Inspection Equipment: 20× magnifier

3 Electrical Test

3.1 DC Resistance (DCR)

a. Refer to tabel above.
b. Test equipment (Analyzer): High Accuracy Milliohmmeter-HP4338B or equivalent.

3.2 Inductance (Z)

a. Refer to tabel above.
b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A or equivalent.
   Test fixture: HP16192A; Test signal: -20dBm or 50mV
c. Test frequency refers to tabel above**.**

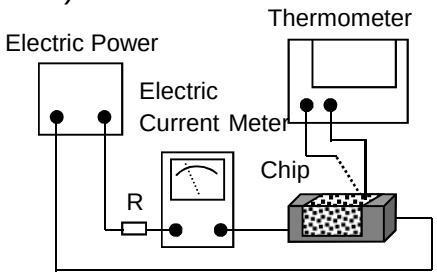
3.3 Rated Current

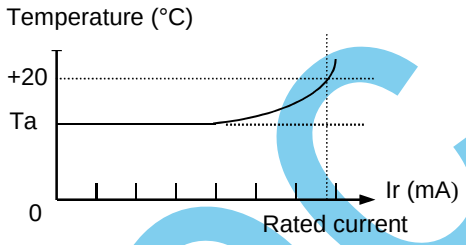
a. Refer to table above
b. Test equipment (see Fig below): Electric Power, Electric current meter,

Thermometer.

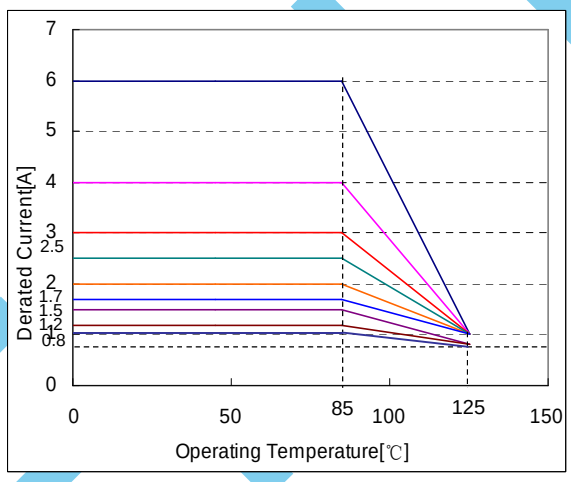
c. Measurement method (see Fig below):
   i. Set test current to be 0 mA.
   ii. Measure initial temperature of chip surface.
   iii. Gradually increase voltage and measure chip temperature for corresponding current.

d. Definition of Rated Current (Ir): Ir is direct electric current as chip surface temperature rose just 20°C against chip initial surface temperature (Ta). (see Fig below):

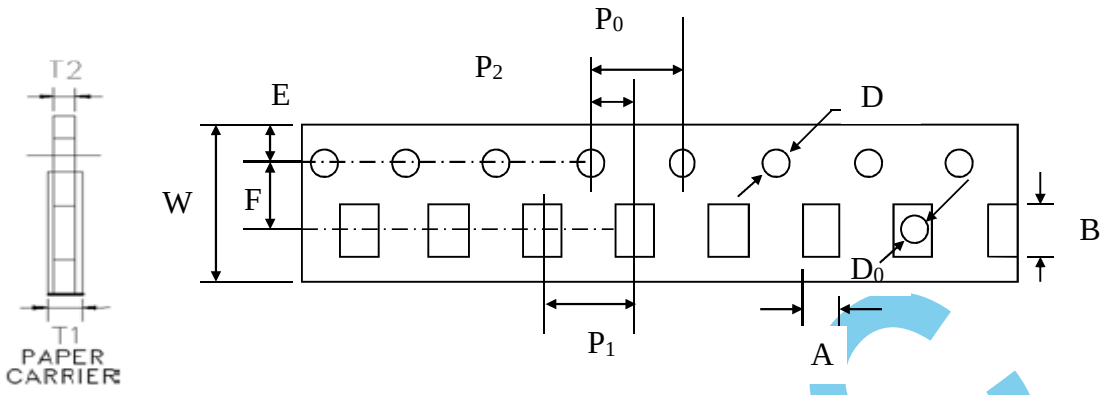




e. When operating temperatures exceeding +85℃, derating of current is necessary for chip ferrite beads for which rated current is 1000mA and over. Please apply the derating curve shown in chart according to the operating temperature.

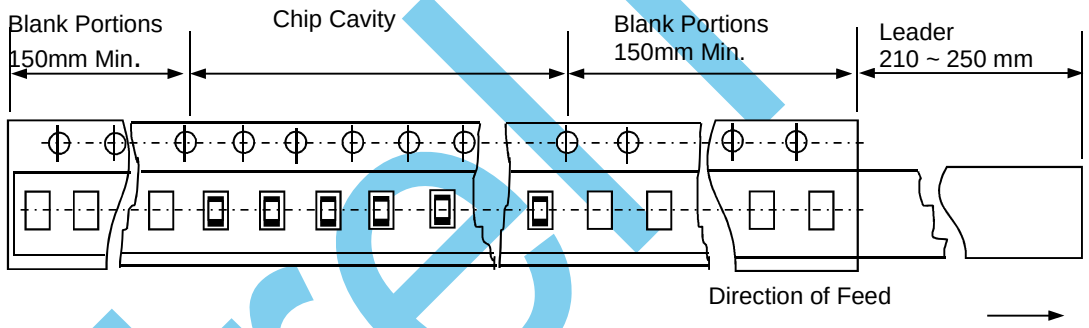


Tape Dimensions



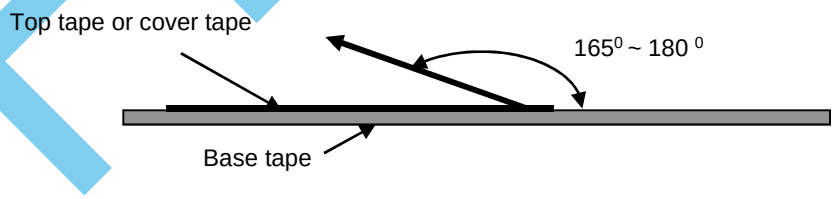
Packing	Size	A	B	W	F	E	P_1	P_2	P_0	D	T_1 (Max)
Paper Tape (T)	0402	0,65±0,1	1,15±0,1	8,0±0,3	3,5±0,05	1,75±0,1	2,0±0,05	2,0±0,05	4,0±0,1	1,50+0,1/-0	0,8
	0603	1,0±0,2	1,8±0,2	8,0±0,3	3,5±0,05	1,75±0,1	4,0±0,1	2,0±0,05	4,0±0,1	1,50+0,1/-0	1,1
	0805	1,5±0,2	2,3±0,2	8,0±0,3	3,5±0,05	1,75±0,1	4,0±0,1	2,0±0,05	4,0±0,1	1,50+0,1/-0	1,1

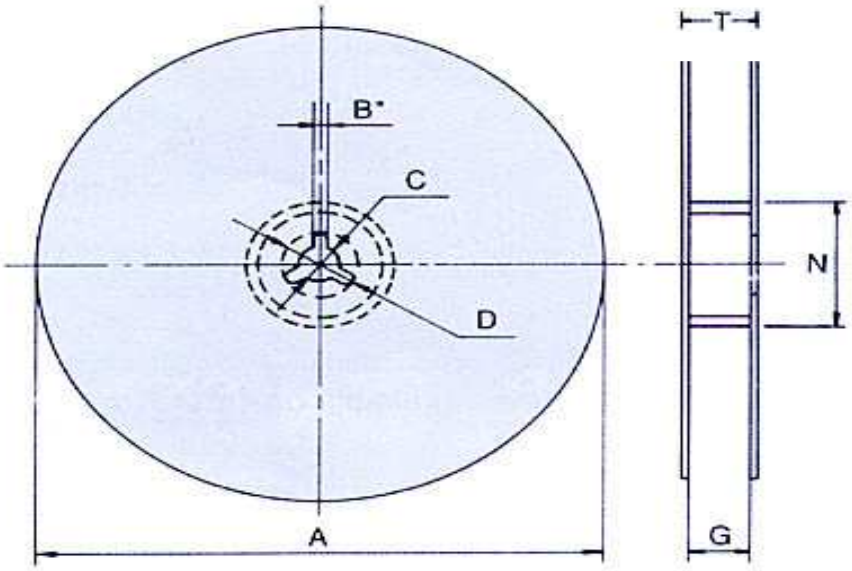
Lead Dimensions:



Cover Tape Peel off Strength

Specifications: 10gf to 70fg





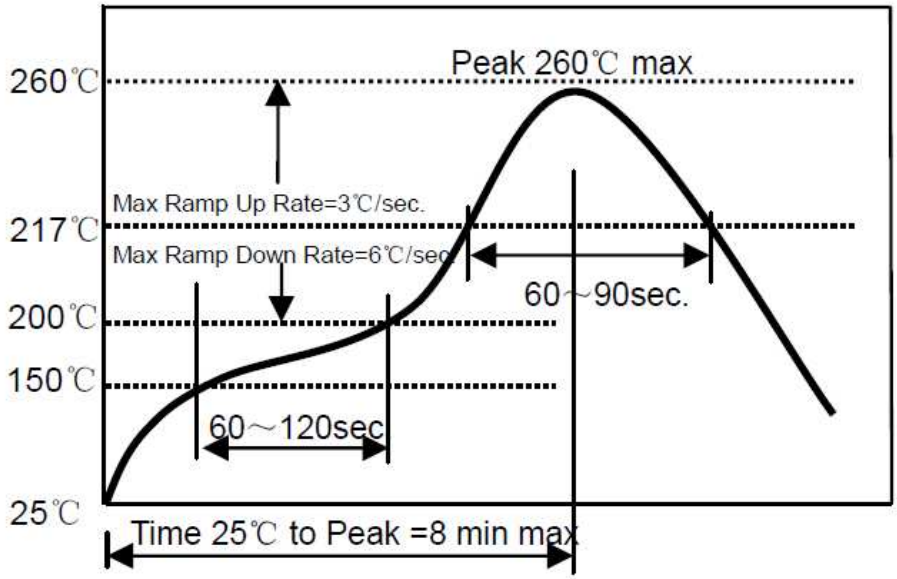
Symbol	Reel Type / Tape	A	N	C	B	T (max)	G
Dimension	7" reel	178±2,0	58,0±2,0	13,5±0,2	2,45±0,2	14,4	8,4+1,5/-0,0

in mm

Stock period

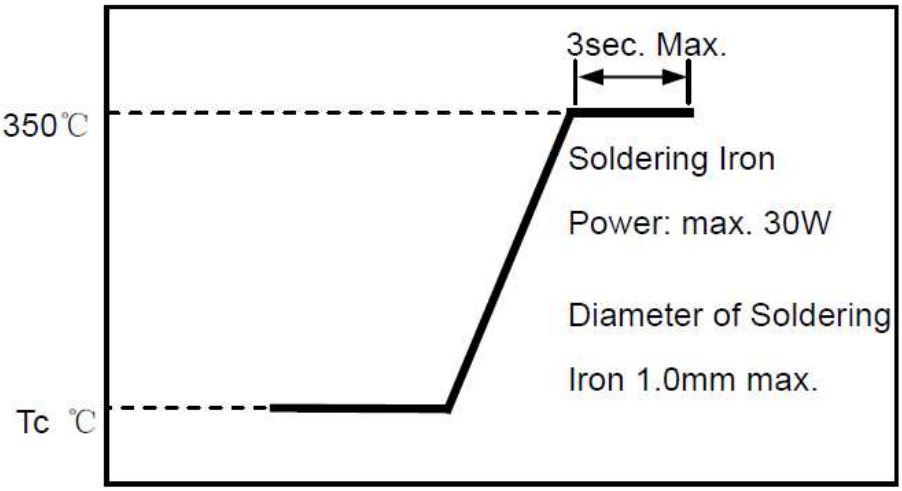
The performance of these products, including the solderability, is guaranteed for 12 month, provided that they remain packed as they were when delivered and stored at a temperature of maximum 40°C (minimum -10°C) and a relative humidity less than 70%RH
The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H_2S).
Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.

Lead Free Reflow Soldering Profile



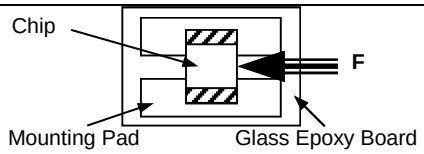
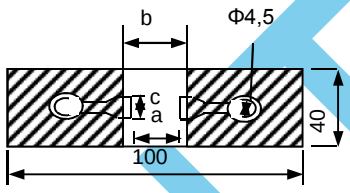
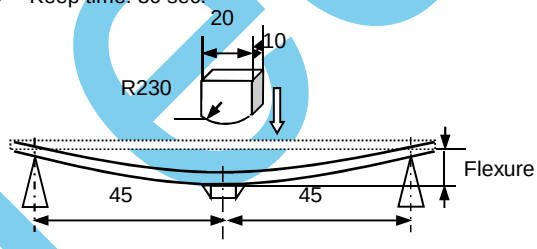
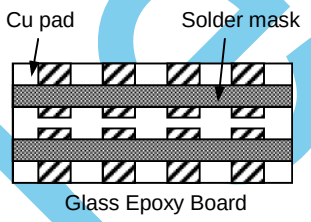
- Pre-heating: 150~200°C/60~120 sec.
- Time above 217°C: 60~90sec
- Max temp: 260°C
- Max time at max temp: 10s.
- Solder paste: Sn/3,0 Ag/0,5Cu
- Max.2 times for re-flowing

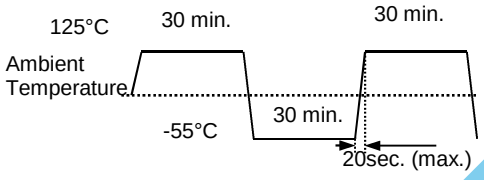
Iron Soldering Profile



- Iron soldering power: Max.30W.
- Pre-heating: 150°C / 60sec.
- Soldering Tip temperature: 350°C Max.
- Soldering time: 3sec Max.
- Solder paste: Sn/3,0 Ag/0,5Cu.
- Max.1 times for iron soldering.
- Take care not to apply the tip of the soldering iron to the terminal electrodes.

Reliability Test

Items	Requirements	Test Methods and Remarks
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 using leadfree solder. Then apply a force in the direction of the arrow. ② force for 0402 and 0603 series 10N force for 0805 series. ③ Keep time: 10±1s. ④ Speed: 1,0 mm/s.
Resistance to Flexure	No visible mechanical damage. Type / a / b / c 0402 / 0,4 / 1,5 / 0,5 0603 / 1,0 / 3,0 / 1,2 0805 / 1,2 / 4,0 / 1,65 Unit: mm 	① Solder the inductor to the test jig (glass epoxy board shown) Using a leadfree solder. Then apply a force in the direction shown. ② Flexure: 2mm. ③ Pressurizing Speed: 0,5mm/sec. ④ Keep time: 30 sec. 
Vibration	① No visible mechanical damage. ② Inductance change: Within ±20% 	① Solder the inductor to the testing jig (glass epoxy board shown) using leadfree solder. ② The beat 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).
Dropping	① No visible mechanical damage. ② Inductance change: Within ±20%.	Drop chip beat 10 times on a concrete floor from a height of 100 cm.
Temperature	Inductance change should be within ±20% of initial value measuring at 20°C.	Temperature range: -55°C~ +125°C Reference temperature: +20□
Solderability	① No visible mechanical damage. ② Wetting shall exceed 95% coverage	① Solder temperature: 240±2°C ② Duration: 3sec. ③ Solder: Sn/3,0Ag/0,5Cu. ④ Flux: 25% Resin and 75% ethanol in weight.

Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall exceed 95% coverage ③ Impedance change: Within ±20%.	① Solder temperature: 260±3°C. ② Duration: 5sec. 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.
Thermal Shock	① No mechanical damage. ② Inductance change: Within ±20%. 	① Temperature, Time: -55°C for 30±3 min→ 125°C 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.
Resistance to Low Temperature	□ No mechanical damage. ② Inductance change: Within ±20%.	① Temperature: -55±2°C ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
Resistance to High Temperature	□ No mechanical damage. ② Inductance change: Within ±20%.	① Temperature: 125±2°C ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
Damp Heat (Steady States)	① No visible mechanical damage. ② Inductance change: Within ±20%.	① Temperature: 60±2°C 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.
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.
Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Impedance 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.

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