

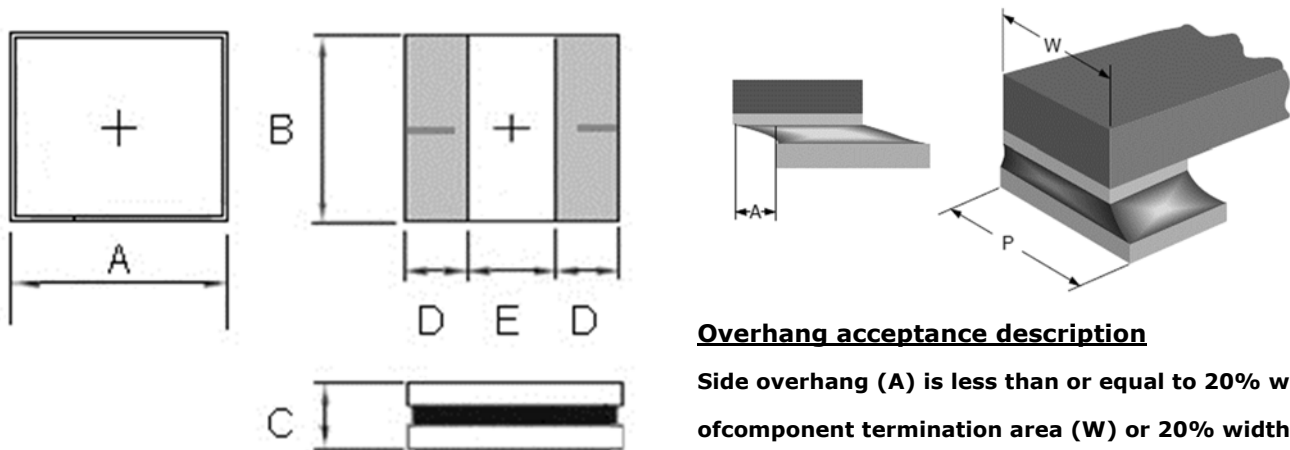
## **FEATURES**

- Low profile
- Low DCR
- Large Current Adaptable
- High Frequency(up to 1MHz)

## **APPLICATIONS**

- Laptop Computer / Notebook Computer
- Graphic Card/ VGA Module
- DC/DC converter or VRM applications
- Thin type on-board power supply module for exchanger
- Inductor for general purpose use

## **CONFIGURATIONS & DIMENSIONS ( unit in mm )**



### **Overhang acceptance description**

Side overhang (A) is less than or equal to 20% width of component termination area (W) or 20% width of land (P) whichever is less.

Series	A	B	C	D	E
HAP252012	2.5 ± 0.3	2.0 ± 0.35	1.3 MAX	0.85 REF	0.80 REF

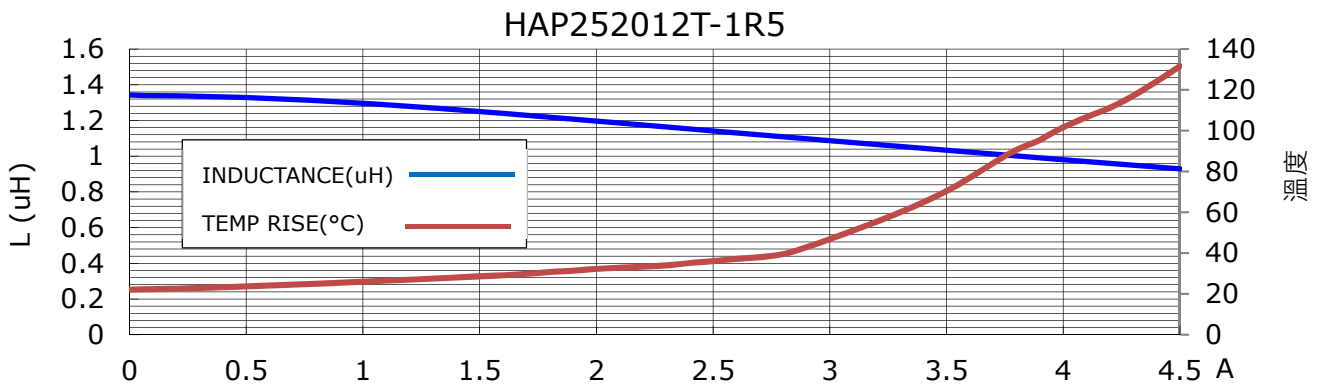
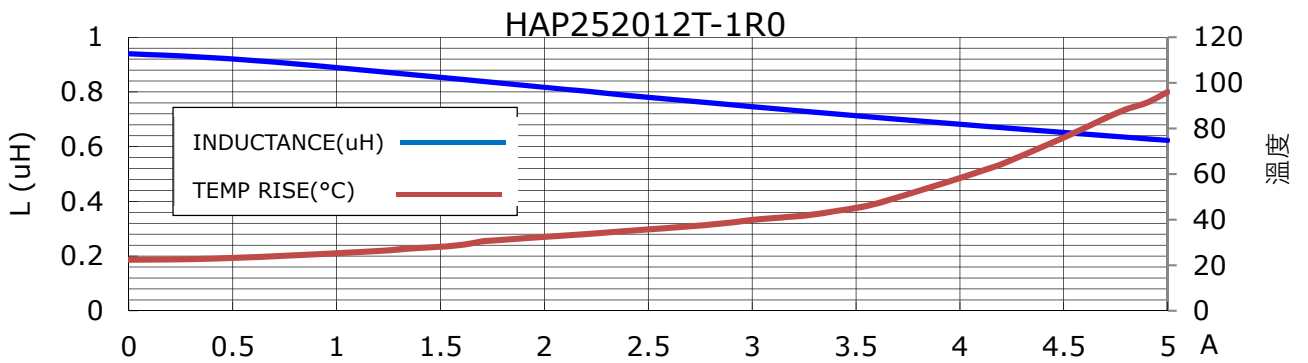
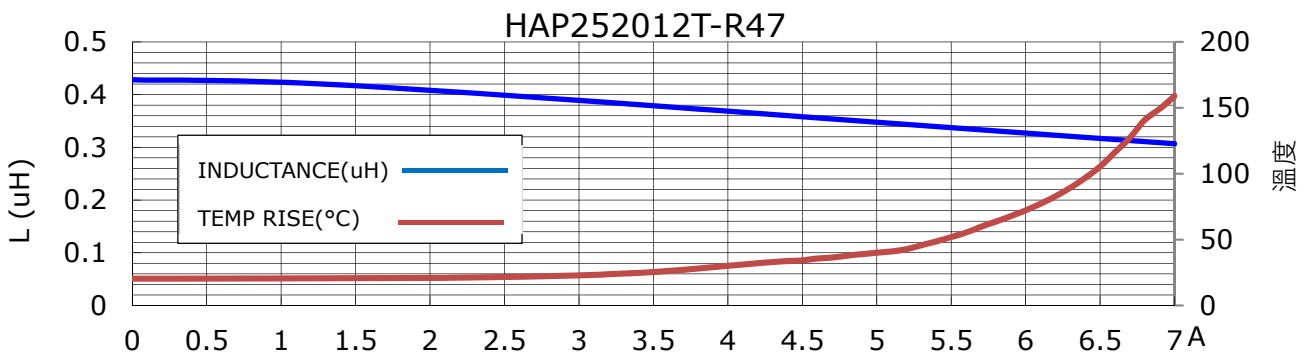
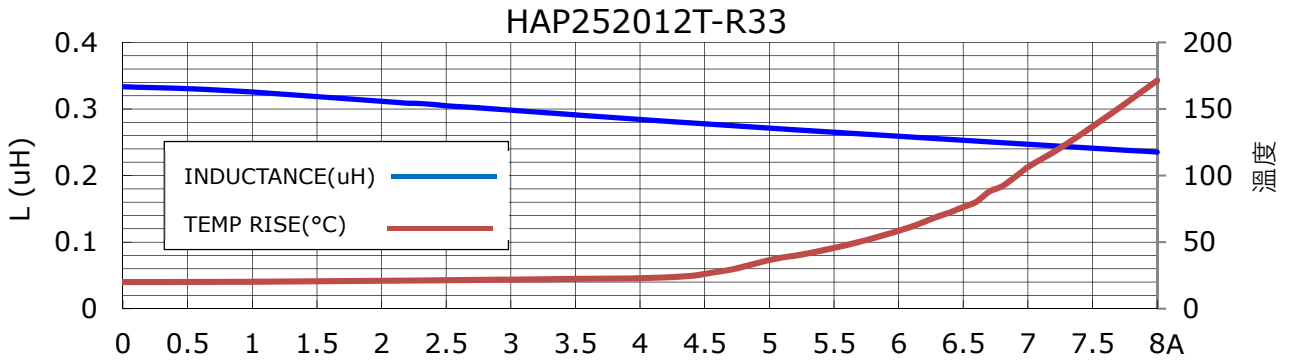
## Electrical characteristics

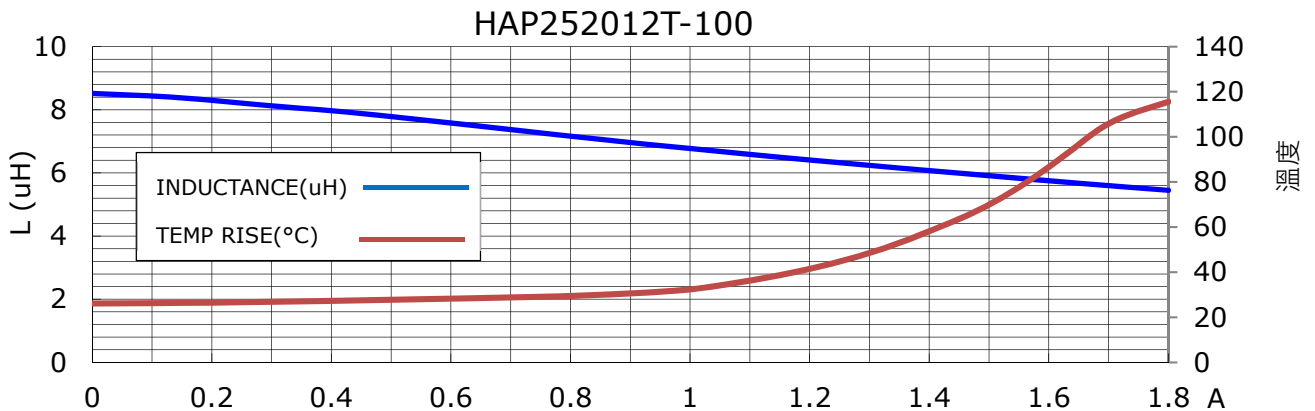
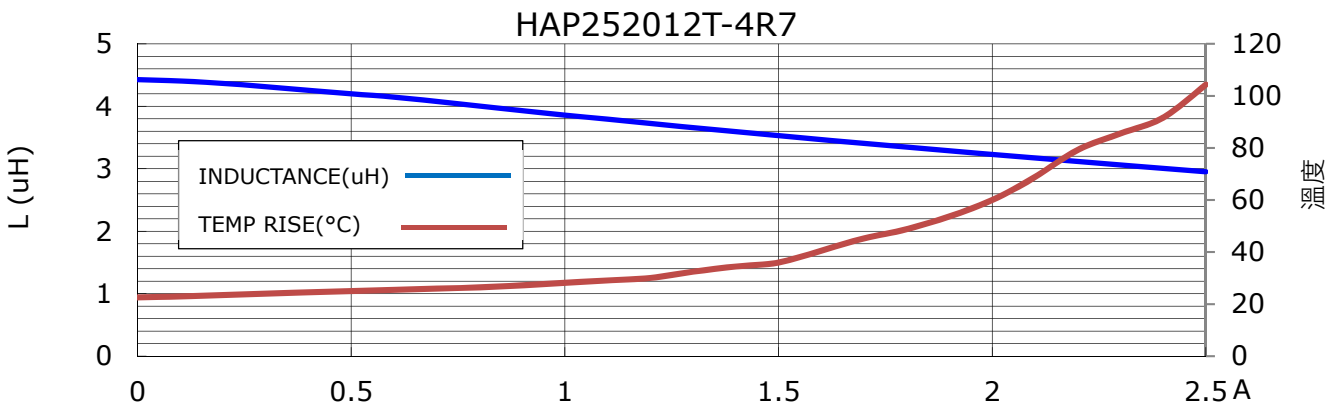
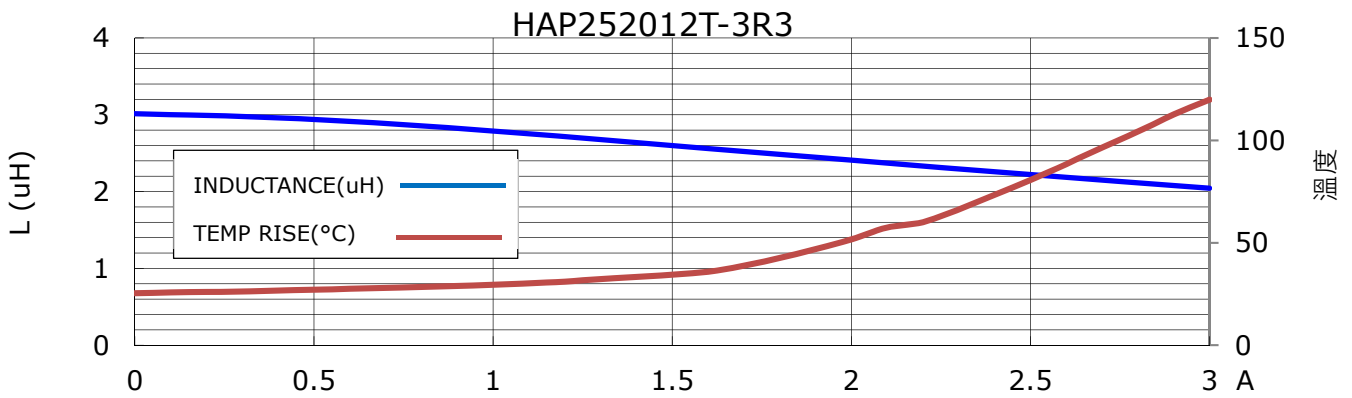
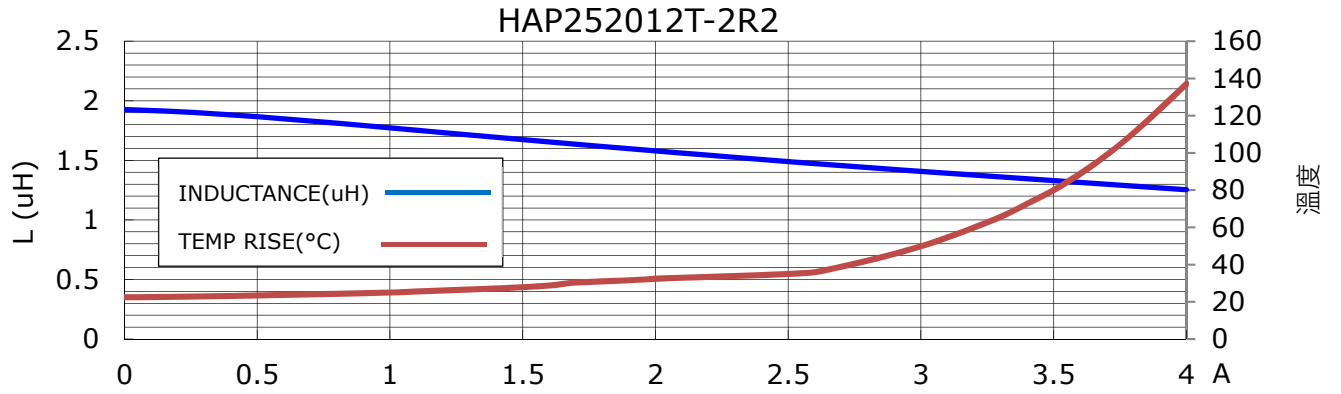
Part Number	Inductance ( $\mu$ H)	Test Frequency (Hz)	DCR		I sat		I rms	
			( $\Omega$ ) typ.	( $\Omega$ ) Max.	(A) typ.	(A) Max.	(A) typ	(A) Max.
HAP252012T-R33M	0.33 $\pm$ 20%	1M	0.022	0.032	6.80	6.5	4.7	4.3
HAP252012T-R47M	0.47 $\pm$ 20%	1M	0.025	0.035	6.30	6.0	4.3	4.0
HAP252012T-1R0M	1.0 $\pm$ 20%	1M	0.047	0.055	4.80	4.5	3.5	3.2
HAP252012T-1R5M	1.5 $\pm$ 20%	1M	0.065	0.072	4.10	3.8	2.7	2.4
HAP252012T-2R2M	2.2 $\pm$ 20%	1M	0.09	0.108	3.30	3.1	2.4	2.3
HAP252012T-3R3M	3.3 $\pm$ 20%	1M	0.14	0.165	2.60	2.4	2.2	2.0
HAP252012T-4R7M	4.7 $\pm$ 20%	1M	0.20	0.30	2.20	2.10	2.00	1.90
HAP252012T-100M	10 $\pm$ 20%	1M	0.45	0.55	1.40	1.30	1.10	1.00

### Notes

- 1.All test data is referenced to 25 °C ambient
- 2.Operating temperature range - 40 °C to + 125 °C
- 3.Idc(A):DC current (A) that will cause an approximate  $\Delta$ T of 40 °C (reference ambient temperature is 25 °C)
- 4.Isat(A):DC current (A) that will cause L0 to drop approximately 30 %
- 5.If Use wave soldering is there will be some risk.(Crack · unwitting& Mark Shedding).
- 6.Re-flow soldering temperatures below 240 degrees,there will be unwitting risk.
7. When total area of exposed wire occurring to each sides is not greater than 75% of coating resin area, that is acceptable.

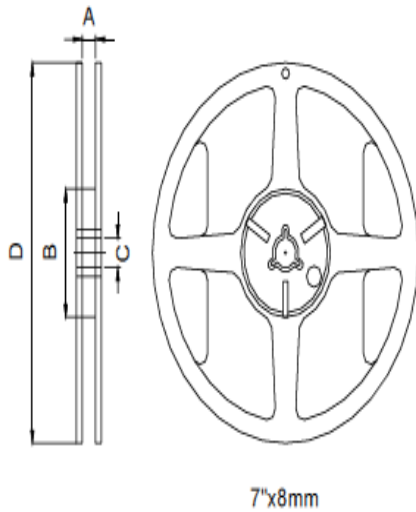
## CURRENT CHARACTERISTICS



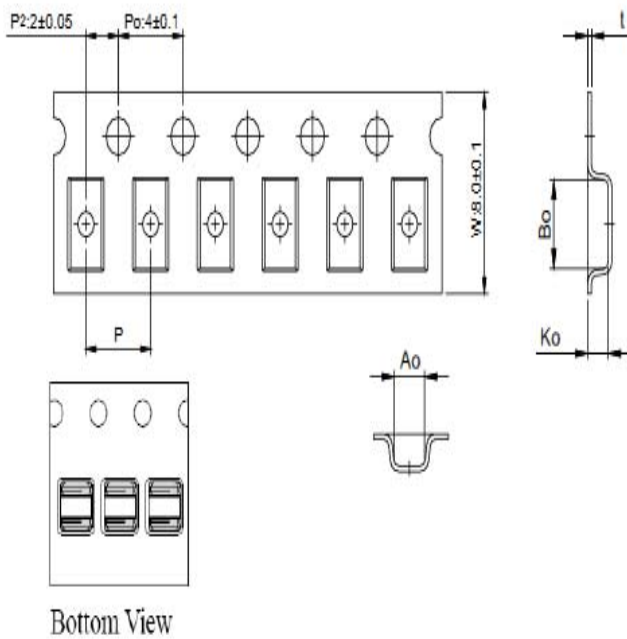


## Packaging Information

### Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
7x8mm	8.4±1.0	50 min.	13±0.8	178±2



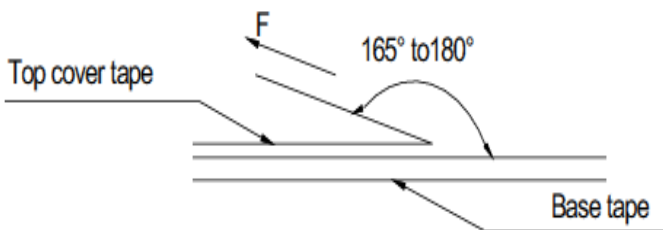
Series	Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
PIN	252012	2.85±0.1	2.40±0.1	1.35±0.1	4.0±0.1	0.23±0.05

## Packaging Information

### Packaging Quantity

Chip size	252012
Chip / Reel	2000

### Tearing Off Force



The force for tearing off cover tape is 15 to 80 grams in the arrow direction under the following conditions.

Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

- Storage Conditions

To maintain the solderability of terminal electrodes:

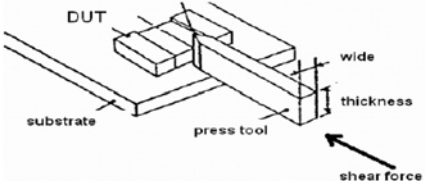
1. products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40°C and 60% RH.
3. Recommended products should be used within 12 months from the time of delivery.
4. The packaging material should be kept where no chlorine or sulfur exists in the air.

- Transportation

1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

## Reliability and Test Condition

Item	Performance	Test Condition															
Operating temperature	-40~+105°C (Including self - temperature rise)																
Storage temperature	1. -10~+40°C, 50~60%RH (Product with taping) 2. -40~+105°C (on board)																
<b>Electrical Performance Test</b>																	
Inductance	Refer to standard electrical characteristics list.	HP4284A, CH11025, CH3302, CH1320, CH1320S LCR Meter.															
DCR		CH16502, Agilent33420A Micro-Ohm Meter.															
Saturation Current (Isat)	Approximately $\Delta L30\%$	Saturation DC Current (Isat) will cause L0 to drop $\Delta L(\%)$															
Heat Rated Current (Irms)	Approximately $\Delta T40^\circ\text{C}$	Heat Rated Current (Irms) will cause the coil temperature rise $\Delta T(^\circ\text{C})$ . 1. Applied the allowed DC current 2. Temperature measured by digital surface thermometer															
<b>Reliability Test</b>																	
Life Test	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value Q : Shall not exceed the specification value. RDC : within $\pm 15\%$ of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Temperature : $125 \pm 2^\circ\text{C}$ (Inductor) Applied current : rated current Duration : 1000 $\pm$ 12hrs Measured at room temperature after placing for 24 $\pm$ 2 hrs															
Load Humidity		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Humidity : $85 \pm 2 \times \text{R.H.}$ , Temperature : $85^\circ\text{C} \pm 2^\circ\text{C}$ Duration : 1000hrs Min. with 100% rated current Measured at room temperature after placing for 24 $\pm$ 2 hrs															
Moisture Resistance		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) 1. Baked at $50^\circ\text{C}$ for 25hrs, measured at room temperature after placing for 4 hrs. 2. Raise temperature to $65 \pm 2^\circ\text{C}$ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to $25^\circ\text{C}$ in 2.5hrs. 3. Raise temperature to $65 \pm 2^\circ\text{C}$ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to $25^\circ\text{C}$ in 2.5hrs, keep at $25^\circ\text{C}$ for 2 hrs then keep at $-10^\circ\text{C}$ for 3 hrs 4. Keep at $25^\circ\text{C}$ 80-100%RH for 15min and vibrate at the frequency of 10 to 55 Hz to 10 Hz, measure at room temperature after placing for 1~2 hrs.															
Thermal shock		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Condition for 1 cycle Step1 : $-40 \pm 2^\circ\text{C}$ 30 $\pm$ 5min Step2 : $25 \pm 2^\circ\text{C}$ $\leq 0.5$ min Step3 : $125 \pm 2^\circ\text{C}$ 30 $\pm$ 5min Number of cycles : 500 Measured at room temperature after placing for 24 $\pm$ 2 hrs															
Vibration		Oscillation Frequency: 10 ~ 2K ~ 10Hz for 20 minutes Equipment : Vibration checker Total Amplitude: $1.52\text{mm} \pm 10\%$ Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations).															
Bending	Shall be mounted on a FR4 substrate of the following dimensions: $\geq 0.805$ inch(2012mm):40x100x1.2mm $< 0.805$ inch(2012mm):40x100x0.8mm Bending depth: $\geq 0.805$ inch(2012mm):1.2mm $< 0.805$ inch(2012mm):0.8mm duration of 10 sec.																
Shock	Appearance : No damage. Impedance : within $\pm 15\%$ of initial value Inductance : within $\pm 10\%$ of initial value Q : Shall not exceed the specification value. RDC : within $\pm 15\%$ of initial value and shall not exceed the specification value	<table border="1"> <thead> <tr> <th>Type</th> <th>Peak value (g's)</th> <th>Normal duration (D) (ms)</th> <th>Wave form</th> <th>Velocity change (Vi)ft/sec</th> </tr> </thead> <tbody> <tr> <td>SMD</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> <tr> <td>Lead</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> </tbody> </table>	Type	Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec	SMD	50	11	Half-sine	11.3	Lead	50	11	Half-sine	11.3
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SMD	50	11	Half-sine	11.3													
Lead	50	11	Half-sine	11.3													
Solder ability	More than 95% of the terminal electrode should be covered with solder.	Preheat: $150^\circ\text{C}$ , 60sec. Solder: Sn96.5% Ag3% Cu0.5% Temperature: $245 \pm 5^\circ\text{C}$															

		Flux for lead free: Rosin. 9.5% ° Dip time: 4±1sec ° Depth: completely cover the termination Depth: completely cover the termination								
Resistance to Soldering Heat		<table border="1"> <thead> <tr> <th>Temperature(°C)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> <th>Number of heat cycles</th> </tr> </thead> <tbody> <tr> <td>260 ±5 (solder temp)</td> <td>10 ±1</td> <td>25mm/s ±6 mm/s</td> <td>1</td> </tr> </tbody> </table>	Temperature(°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles	260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s	1
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260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s	1							
Terminal Strength	Appearance : No damage. Impedance : within±15% of initial value Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : within ±15% of initial value and shall not exceed the specification value e	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020Classification Reflow Profiles With the component mounted on a PCB with the device to be tested, apply a force(>0805:1kg , <=0805:0.5kg)to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to apply a shock to the component being tested. 								

Note : When there are questions concerning measurement result : measurement shall be made after 48 ± 2 hours of recovery under the standard condition.