

CUSTOMER: \_\_\_\_\_

DATE: \_\_\_\_\_

# APPROVAL SPECIFICATION

**ROHS+HS**  
COMPLIANT

AEC-Q200

PRODUCT NAME: Winding Wire Common Mode Choke Coil

YOUR PART NO.:

OUR PART NO.: AMGRC2012 Series

VERSION: V1.0

## RECEPTION

**THE SPECIFICATION HAS BEEN ACCEPTED.**

DATE:

COMPANY:

CFMD

CHKD

RCVD

MANUFACTURING NAME

SHENZHEN MICROGATE TECHNOLOGY CO., LTD

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## Component SPEC Version Record

Rev.	Effective Date	Changed Contents	Change Reasons	Approved By
1.0	2019.09.21	New released	/	Remo

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## 1.Scope

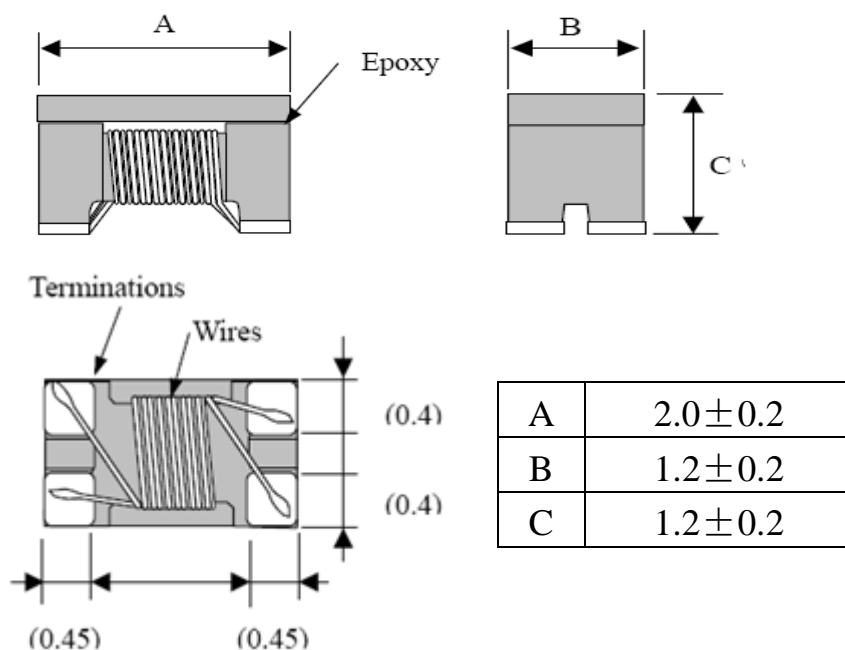
This specification applies to the AMGRC2012 series of Common Mode Choke Coil.

## 2.Product Identification

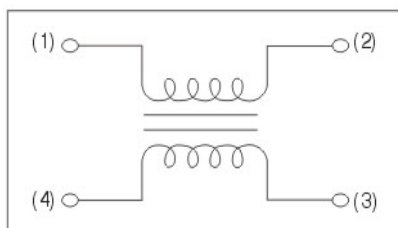
<u>AMGRC</u>	<u>2012</u>	<u>□</u>	<u>□ □ □</u>	<u>T</u>	-	<u>2</u>	-	<u>LF</u>
①	②	③	④	⑤		⑥		⑦

- ① Product Symbol(Automotive electronics products)
- ② Dimensions L×W: (2012=2.0×1.2 mm)
- ③ Type code (U For Ultra High-speed Differential Signal Lines, P For SerDes (PoC) )
- ④ Impedance: (Example 900=90×10<sup>0</sup>=90Ω)
- ⑤ Packing Style: (T: Taping B: Bulk)
- ⑥ Number of signal lines
- ⑦ Lead Free

## 3.Appearance, Dimensions



## 4.Electrical Schematic



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## 5. Testing Conditions

<Unless otherwise specified>

Temperature : Ordinary Temperature 5 to 35℃

Humidity : Ordinary Humidity 25 to 85% (RH)

<In case of doubt>

Temperature : 20±2℃

Humidity : 60 to 75% (RH)

Atmospheric Pressure : 86 to 106 kPa

## 6. Rating

Operating Temperature Range : -40 to +125℃

Storage condition : Temperature 20 ~25℃, Relative humidity 40%~60%

### AMGRC2012U Series

Part NO.	Zc@100MHz	DCR Max.	Rated Current Max.	Rated Voltage Max.	IR Min.	Cut-off Freq. Typ.
Units	Ω	Ω	mA	V	MΩ	GHz
AMGRC2012U670T-2-LF	67±25%	0.30	320	20	10	8.5
AMGRC2012U900T-2-LF	90±25%	0.40	280	20	10	7.5
AMGRC2012U121T-2-LF	120±25%	0.40	280	20	10	7.5

### AMGRC2012P Series

Part NO.	Zc@100MHz	DCR Max.	Rated Current Max.	Rated Voltage Max.	IR Min.	Cut-off Freq. Typ.
Units	Ω	Ω	mA	V	MΩ	GHz
AMGRC2012P201T-2-LF	200±25%	0.17	500	20	10	2.9
AMGRC2012P391T-2-LF	390±25%	0.36	300	20	10	2.4

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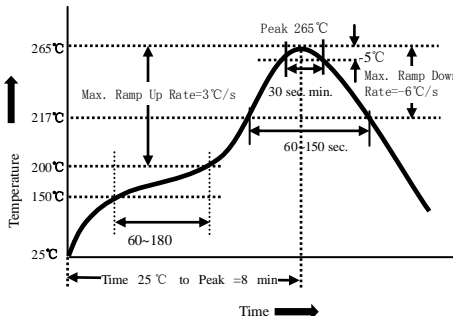
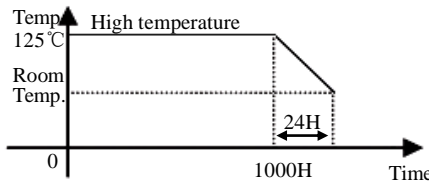
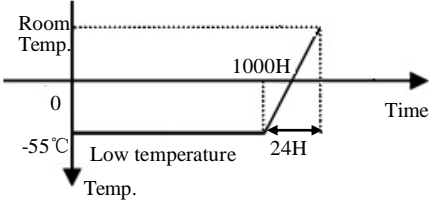
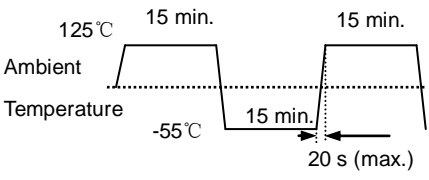
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## 7.Reliable Performance

No.	Item	Requirements	Test Methods and Remarks	Reference	Sample Size
1	Solderability	Terminal area shall be at least 95% covered .	①Temperature: $240 \pm 5^{\circ}\text{C}$ , flux 5-10 s. ②Sample immersion tin furnace $3 \pm 1\text{s}$ . ③Sn/3.0Ag/0.5Cu	AEC-Q200 (J-STD-002)	15
2	Resistance to Soldering Heat	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	①The peak temperature: $260 \pm 5/-0^{\circ}\text{C}$ . ②Reflow: 3 times. ③Temperature curve is as below: 	AEC-Q200 (MIL-STD-202 Method 210)	30
3	High Temperature Storage		①Temperature: $125 \pm 2^{\circ}\text{C}$ . ②Time : 1000(+48,0) hours. ③Measurement at $24 \pm 4$ hours after test conclusion. 	AEC-Q200 (MIL-STD-202 Method 108)	77
4	Low Temperature Storage		①Temperature: $-55 \pm 2^{\circ}\text{C}$ . ②Time : 1000(+48,0) hours. ③Measurement at $24 \pm 4$ hours after test conclusion. 	JESD22-A119	77
5	Thermal shock		①First $-55^{\circ}\text{C}$ for 15 minutes, last $125^{\circ}\text{C}$ 15 minutes as 1 cycle. Go through 100 cycles. ②Max transfer time is 20 second. ③Measurement at $24 \pm 4$ hours after test conclusion. 	MIL-STD-202 Method 107	30

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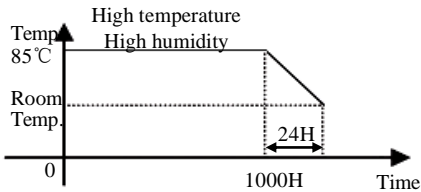
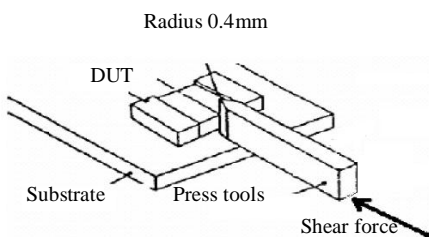
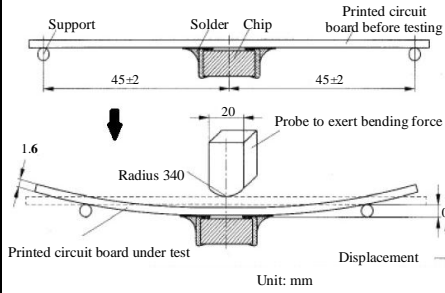
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6	Humidity Resistance	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	<p>①1000(+48,0) hours, 85 °C/85%RH. ②Unpowered. ③Measurement at 24±4 hours after test conclusion.</p> 	AEC-Q200 (MIL-STD-202 Method 103)	77
7	Terminal Strength	No case deformation or change in appearance.	<p>①The test samples shall be soldered to the board. ②5N, 60±1s</p> 	-	30
8	Board Flex	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	<p>①Part mounted on a 100mm*40mm FR4 PCB board, which is 1.6mm thick and as a Layer-thickness 35 μm ± 10 μm. ②Bending speed is 1mm/s. ③Keeping the P.C Board 2 mm minimum for 60 seconds.</p> 	AEC-Q200 (AEC-Q200-005)	30
9	Drop	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	<p>①Height: 1 m, Free fall, 10times. ②Direction: 1 Angle, 1side, 2surface.</p>	JESD22-B111	30

10	Vibration	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	10~2000Hz,5g,20min/Cycle,4 hours in each 3 mutually perpendicular directions (total of 12 hours)	AEC-Q200	30
11	Mechanical Shock	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	Half sine shock pulse,100g,6ms,6 shocks in each 3 mutually perpendicular directions (total of 18 shocks)	MIL-STD-202 Method213	30
12	Loading at High Temperature	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	①Temperature: $125 \pm 2^\circ\text{C}$ . ②Time : 1000(+48,0) hours. ③Proper current. ④Measurement at $24 \pm 4$ hours after test conclusion.	AEC-Q200 (MIL-PRF-27)	77
13	Loading at Damp Heat	(1) No case deformation or change in appearance. (2) $ \Delta Z/Z_0  \leq 10\%$	①Temperature: $60 \pm 2^\circ\text{C}$ , Humidity: 90% to 95% RH ; ② Duration: 1000(+48,0) hours ③Applied current: Rated current. ④Measurement at $24 \pm 4$ hours after test conclusion.	AEC-Q200	77

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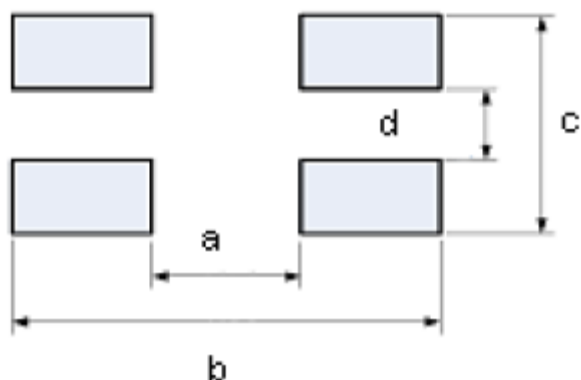
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## 8. Recommended Soldering Conditions

### (1) Recommended Footprint



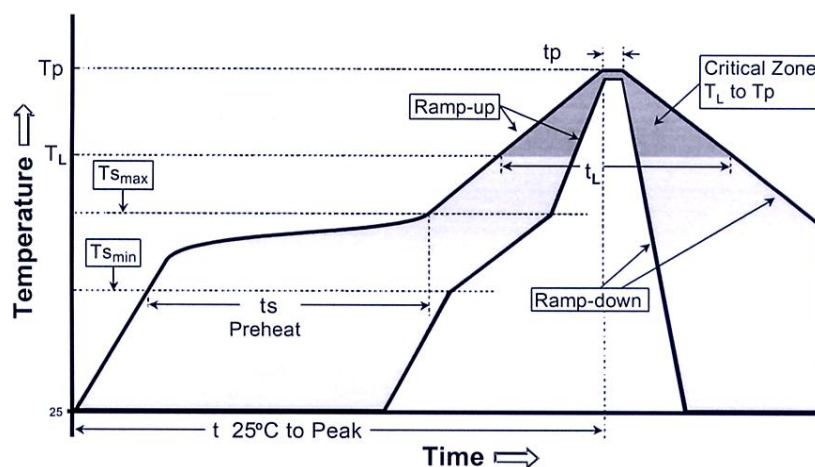
a	1.00 mm
b	2.60 mm
c	1.20 mm
d	0.40 mm

### (2) Recommended Reflow soldering conditions

Profile Feature	Lead-Free Assembly
Average Ramp-Up Rate ( T <sub>smax</sub> to T <sub>p</sub> )	3 °C /second max.
Preheat <ul style="list-style-type: none"> <li>Temperature Min (T<sub>smin</sub>)</li> <li>Temperature Max (T<sub>smax</sub>)</li> <li>Time ( t<sub>smin</sub> to t<sub>smax</sub>) min to t<sub>smax</sub>)</li> </ul>	150 °C 200 °C 60-180 seconds
Time maintained above: <ul style="list-style-type: none"> <li>Temperature (T<sub>L</sub>)</li> <li>Time (t<sub>L</sub>)</li> </ul>	217 °C 60-150 seconds
Peak/Classification Temperature (T <sub>p</sub> )	255 °C
Peak/Classification Time (T <sub>p</sub> )	30 seconds max.
Time within 5 °C of actual Peak Temperature (t <sub>p</sub> )	20-40 seconds
Ramp-Down Rate	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

### Standard soldering profile



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(3) Reworking with soldering iron

The following conditions must be strictly followed when using a soldering iron.

<b>Pre-heating</b>	150°C, 1 minute
<b>Tip temperature</b>	350°C max
<b>Soldering iron output</b>	30w max
<b>End of soldering iron</b>	φ 1mm max
<b>Soldering time</b>	5 seconds max

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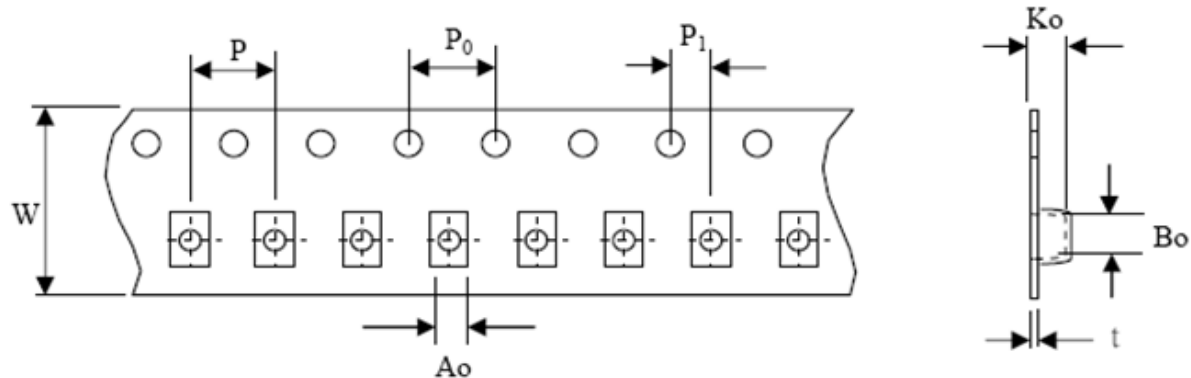
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## 9. Packaging

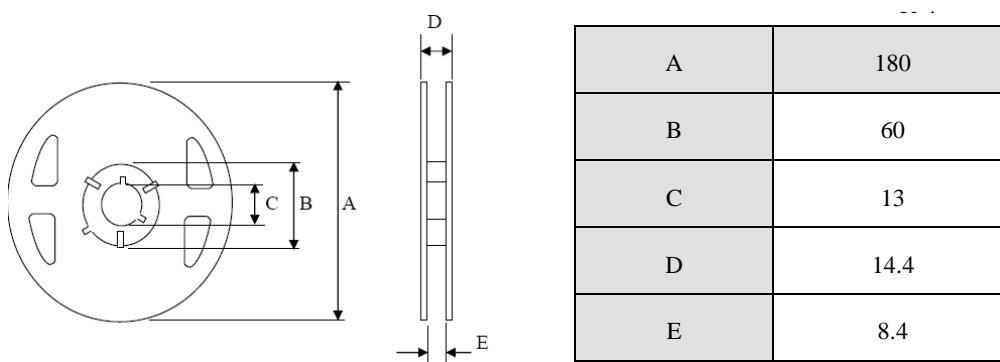
### (1) Dimensions of Tape:



(Dimensions in mm; Tolerance :  $\pm 0.1$ )

Symbol	W	P	P <sub>0</sub>	P <sub>1</sub>	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	t
Dimension	8.0	4.0	4.0	2.0	1.50	1.25	1.35	0.24

### (2) Dimensions of Reel



### (3) Pulling strength of tapes:

Carrier tape	10N or more (1kgf or more)
Cover tape	5N or more (1kgf or more)

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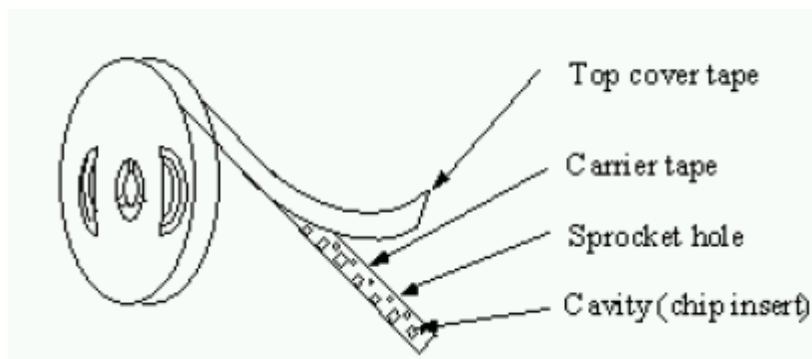
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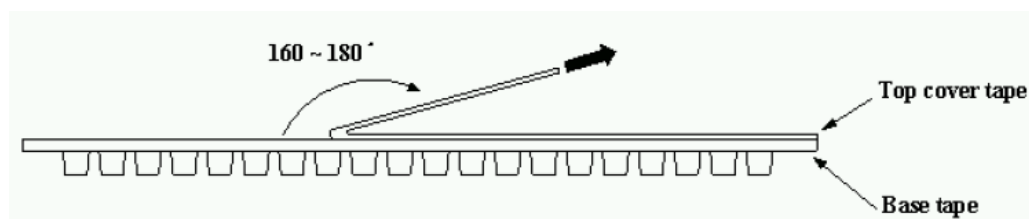
(4) Taping figure and drawing direction:



Tape material: Base tape: Polystyrene Cover tape: polyester

(5) Peeling strength of cover tape:

Cover tape	0.10~1.0N
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Test condition:

Temperature: 5~35℃

Humidity: 45~85%

(6) Packing quantity

Φ180 mm reel T type: 2000pcs/reel

## 10. Products Storage

- The solder ability of the external electrode may be deteriorated if packages are stored where they are exposed to high temperature or high humidity. Besides, to ensure packing material's good state, packages must be stored at -10℃ to 40℃ and 70% RH.
- The solder ability 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<sub>2</sub>S).
- Packaging materials may deform if packages are exposed directly to sunlight.
- Minimum packages, such as polyvinyl heat-seal packages shall not be opened until they are used. If opened, use the reels as soon as possible.
- Solderability shall be guaranteed for 12 months from the date of delivery on condition that they are stored at the environment specified in specification. For those parts, which passed more than the time shall be checked solder-ability before use.

## 11. Transportation

The cases shall not be damaged, destroyed and rained on.

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## 12. Warning and Attentions

### (1) General Handling Precautions

- a. Handling
  - i. Always wear static control bands to protect against ESD.
  - ii. Any devices used (soldering iron, measuring instruments) should be properly grounded.
  - iii. Use non-magnetic tweezers when handing the chips.
- b. Breakaway PC boards(splitting along perforations)
  - i. When splitting the PCB after mounting product, care should be taken not to give any stresses of deflection or twisting to the board.
  - ii. Board separation should not be done manually, but by using the appropriate devices.
- c. Mechanical considerations
  - i. Please do not give the product any excessive mechanical shocks.
  - ii. Please do not add any shock and power to a product in transportation.
- d. Pick-up pressure
  - i. Please do not push to add any pressure to a winding part; please do not give any shock and push into a ferrite core exposure part

### (2) Precautions on Use

- a. Always wear static control bands to protect against ESD.
- b. Any devices used (soldering iron, measuring instruments) should be properly grounded.
- c. Use non-magnetic tweezers when handing the chips.
- d. Pre-heating when soldering, and refer to the recommended condition specified in specification.
- e. Don't apply current in excess of the rated current value. It may cause damage to components due to over-current.
- f. Keep clear of anything that may generate magnetic fields such as speakers, coils.
- g. When soldering, the electrical characteristics (such as impedance) may be varied due to hot energy and mechanical stress.
- h. When coating products with resin, the relatively high resin curing stress may change the electrical characteristics. For exterior coating, select resin carefully so that electrical and mechanical performance of the product is not affected. Before using, please evaluate reliability with the product mounted in your application set.
- i. When mount chips with adhesive in preliminary assembly, do appropriate check before the soldering stage, i.e., the size of land pattern, type of adhesive, amount applied, hardening of the adhesive on proper usage and amounts of adhesive to use.
- j. Mounting density: Add special attention to radiating heat of products when mounting other components nearby. The excessive heat by other products may cause deterioration at joint of this product with substrate.
- k. Since some products are constructed like an open magnetic circuit, narrow spacing between components may cause magnetic coupling.
- l. Please do not give the product any excessive mechanical shocks in transportation.
- m. Please do not touch wires by sharp terminals such as tweezers to avoid causing any damage to wires.
- n. Please do not add any shock and power to the soldered product to avoid causing any damage to chip body.
- o. Please do not touch the electrodes by naked hand as the solderability of the external electrodes may deteriorate by grease or oil on the skin.

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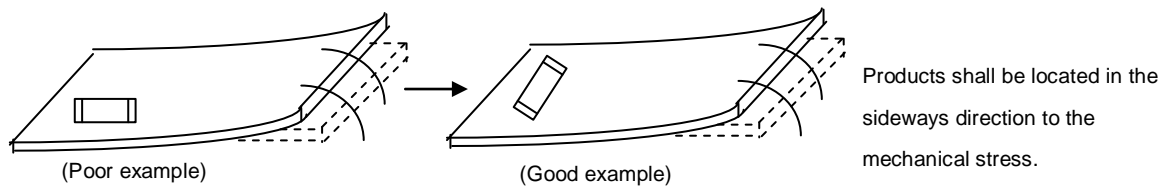
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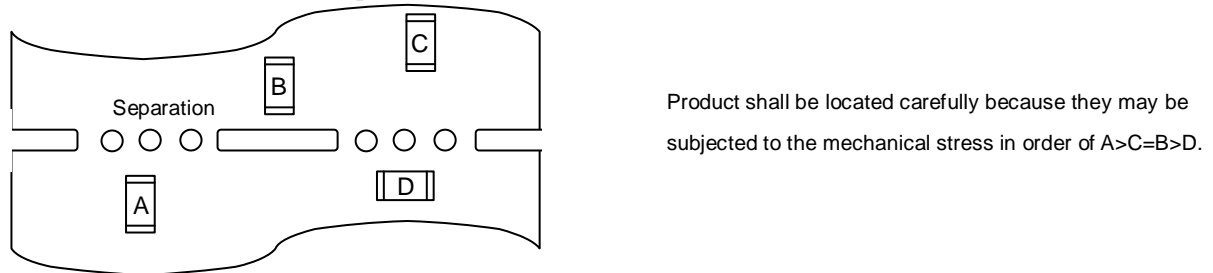
### (3) PCB Bending Design

The following shall be considered when designing and laying out PCB's.

- a. PCB shall be designed so that products are not subjected to the mechanical stress from board warp or deflection.



- b. Products location on PCB separation.



- c. When splitting the PCB board, or insert (remove) connector, or fasten thread after mounting components, care is required so as not to give any stress of deflection or twisting to the board. Because mechanical force may cause deterioration of the bonding strength of electrode and solder, even crack of product body. Board separation should not be done manually, but by using appropriate devices.

### (4) Recommended PCB Design for SMT Land-Patterns

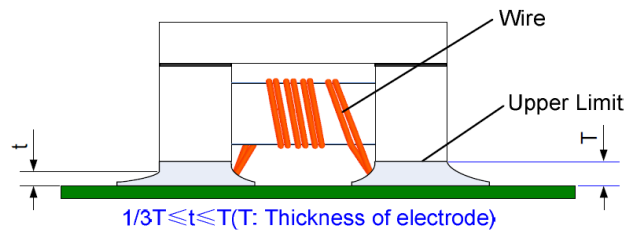
When chips are mounted on a PCB, the amount of solder used (size of fillet) and the size of PCB Land-Patterns can directly affect chip performance. Therefore, the following items must be carefully considered in the design of solder land patterns.

- a. Please use the PCB pad and solder paste we recommend, and contact us in advance if they need to be changed.
- b. The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
- c. When more than one part is jointly soldered onto the same land or pad, the pad must be designed that each component's soldering point is separated by solder-resist.

**Recommended land dimensions please refer to product specification.**

### 13.Solder Volume

Solder shall be used not to exceed as shown below.



- a. Accordingly increasing the solder volume, the mechanical stress to chip is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance.
- b. Before soldering, please ensure that the solder should not adhere to the wire part of chip.
- c. Please pay particular attention to whether there is flux remaining on surface of the wire part of chip after subjected to reflow soldering since this may causing short circuit of parts.

### 14.Circuit Design

Operating environment: The products described in this specification are intended for use in general electronic equipment, (office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems) where product failure might result in loss of life injury or damage. For such uses, contact Sunlord Sales Department in advance

### 15.Cleaning

Products shall be cleaned on the following conditions:

- a. Cleaning temperature shall be limited to 60℃ Max. (40℃ Max. for fluoride and alcohol type cleaner.)
- b. Ultrasonic cleaning shall comply with the following conditions, avoiding the resonance phenomenon at the mounted products and PCB.
  - Power: 20W/1 Max.
  - Frequency: 28 KHz to 40 KHz
  - Time: 5 minutes Max
- c. Cleaner
  - i. Alternative cleaner
    - Isopropyl alcohol (IPA)
    - HCFC-225
  - ii. Aqueous agent
    - Surface Active Agent Type (Clean through-750H)
    - Hydrocarbon Type (Techno Cleaner-335)
    - Higher Alcohol Type (Pine Alpha ST-100S)
    - Alkali saponifier Type (※ Aqua Cleaner 240)

※ Alkali saponification shall be diluted to 20% volume with de-ionized water.

※ Please contact our technical service department before using other cleaner.
- d. There shall be no residual flux and residual cleaner after cleaning. In the case of using aqueous agent, product shall be dried completely after rinse with de-ionized water in order to remove the cleaner.
- e. Some products may become slightly whitened. However, product performance or usage is not affected.
- f. Please take care of winding part while cleaning.
- g. After cleaning, parts could be subjected to the next reflow soldering till the solvent remaining on surface of parts being volatilized.

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