CUSTOMER: _____ DATE: _____

APPROVAL SPECIFICATION

ROHS+HS COMPLIANT **AEC-Q200**

PRODUCT NAME:	Winding Wire Common Mode Choke Coil
YOUR PART NO.:	
OUR PART NO.:	AMGRC3225series
VERSION:	V1.0

RECEPTION THE SPECIFICATION HAS BEEN ACCEPTED. DATE: **COMPANY:**		
CFMD	CHKD	RCVD

MANUFACTURING NAME

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Component SPEC Version Record

Rev.	Effective Date	Changed Contents	Change Reasons	Approved By
V1.0	Fer. 23.2019	New released	/	Remo

1. Scope

This specification applies to the AMGRC3225 series of Common Mode Choke Coil.

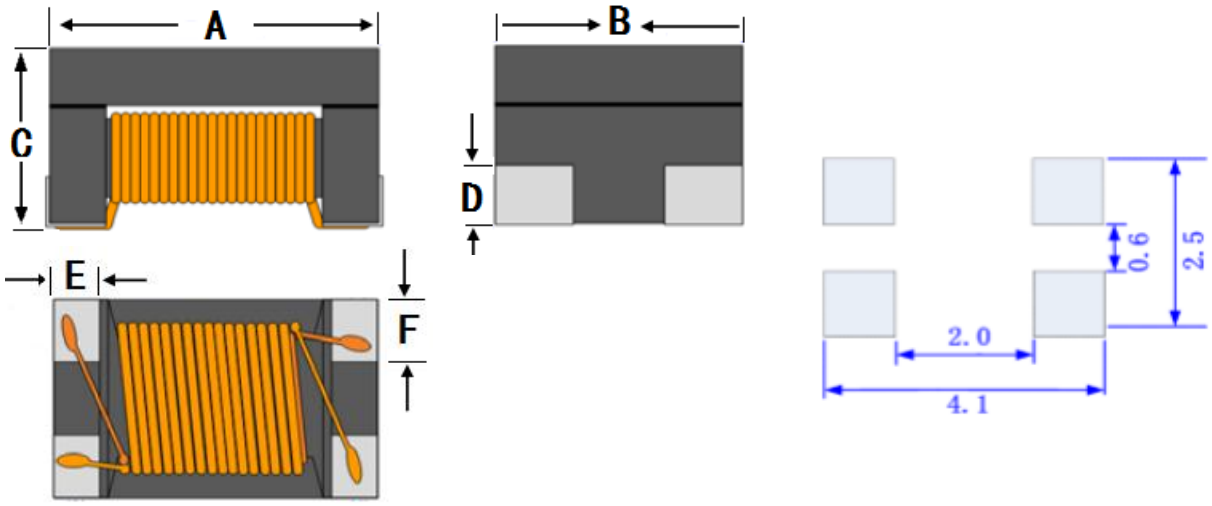
2. Product Identification

AMGRC	3225	□	□□□	T	-	2	-	LF
①	②	③	④	⑤		⑥		⑦

① Product Symbol （Automotive electronics products）
② Dimensions L×W：（3225=3.2×2.5 mm）
③ Type code(B For CAN, R For A2B® (50Mbps), E For Ethernet, F For CAN/CAN-FD)
④ Inductance：（Example: 101=10×10^1=100uH,510=51*10^0=51uH）
⑤ Packing Style：（T: Taping B: Bulk）
⑥ Number of signal lines
⑦ Lead Free

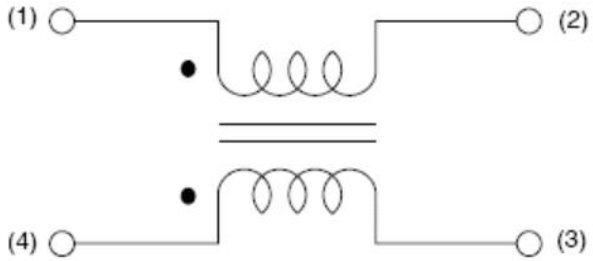
3.Appearance and Dimensions

(1) Appearance and dimensions



Dimensions in mm						
Model	A	B	C	D Ref.	E Ref.	F Ref.
AMGRC3225 Series	3.2±0.2	2.5±0.2	2.35±0.2	0.4	0.70	0.95

4.Equivalent Circuit



5. Testing Conditions

Unless otherwise specified, the standard conditions for measurement/test as:
Ambient Temperature : 5 to 35℃
Relative Humidity: 25 to 85% RH
Atmospheric Pressure: 86 to 106 kPa

If any doubt on the results, measurements/tests should be made within the following limits:
Ambient Temperature : 25±1℃
Relative Humidity: 60 to 70% RH
Atmospheric Pressure: 86 to 106 kPa

6.Rating

Operating Temperature Range : -40 to +125℃

AMGRC3225B Series:

Part No.	Inductance	DC Resistance	Rated Current	Rated Voltage	Insulation Resistance	Withstanding Voltage
	-30%~50%	MAX	Max	-	Min	-
Units	(uH)	Ω	mA	V	MΩ	Vdc
Symbol	L	DCR	Ir	V_{DC}	IR	-
AMGRC3225B110T-2-LF	11@0.1MHz,0.1V	0.4	400	80	10	200
AMGRC3225B220T-2-LF	22@0.1MHz,0.1V	0.5	300	80	10	200
AMGRC3225B510T-2-LF	51@0.1MHz,0.1V	0.7	200	80	10	200
AMGRC3225B101T-2-LF	100@0.1MHz,0.1V	1.5	150	80	10	200

AMGRC3225R Series

Part No.	Inductance	DC Resistance	Rated Current	Rated Voltage	Insulation Resistance	Withstanding Voltage
	-30%~50%	MAX	Max	-	Min	-
Units	(uH)	Ω	mA	V	MΩ	Vdc
Symbol	L	DCR	Ir	V_{DC}	IR	-
AMGRC3225R101T-2-LF	100@0.1MHz,0.1V	3.36	100	50	10	125

AMGRC3225E Series:

Part No.	Inductance	DC Resistance	Rated Current	Rated Voltage	Insulation Resistance	Withstanding Voltage
		MAX	Max	-	Min	-
Units	(uH)	Ω	mA	V	MΩ	Vdc
Symbol	L	DCR	Ir	V_{DC}	IR	-
AMGRC3225E101T-2-LF	100 (Typ.) (@0.1MHz,0.5V) 80 -25%/+50% (@ 0.1MHz,0.1V)	3.12	150	50	10	125
AMGRC3225E201T-2-LF	200@0.1MHz,0.1V	4.8	70	50	10	125

AMGRC3225F Series

Part No.	Inductance	DC Resistance	Rated Current	Rated Voltage	Insulation Resistance	Withstanding Voltage
	-30%~50%	MAX	Max	-	Min	-
Units	(uH)	Ω	mA	V	MΩ	Vdc
Symbol	L	DCR	Ir	V_{DC}	IR	-
AMGRC3225F101T-2-LF	100@0.1MHz,0.1V	2.1	100	50	10	125

7. Electrical Performance

Common Mode Impedance；

Common Mode Impedance shall meet item 6 when measured on the condition of Table 1.

Table 1

Measuring Equipment	Impedance analyzer keysight E4982A or equivalent
Measuring Frequency	Item 6
Measuring signal level	-13dBm
Measuring Fixture	keysight 16197A

Inductance；

Inductance shall meet item6 when measured on the condition of Table 2.

Table 2

Measuring Equipment	Chroma3302 or equivalent
Measuring Frequency	Item 6

DC Resistance

D.C Resistance shall meet item 6 when measured on the condition of Table 2.

Table 3

Measuring Equipment	LCR Meter HIOKI 3542 or equivalent

Rated current

Temperature rise no more than 40℃ against chip surface temperature when the allowable current is applied.

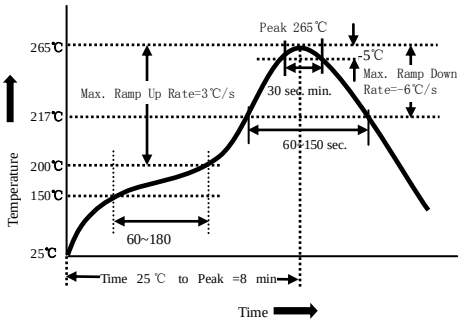
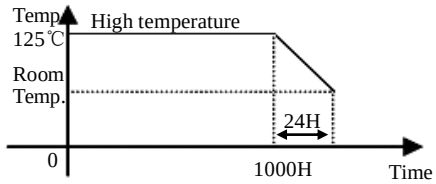
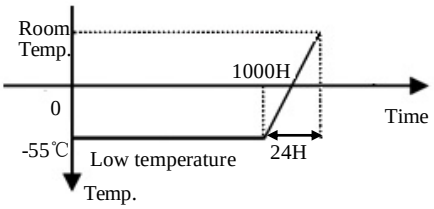
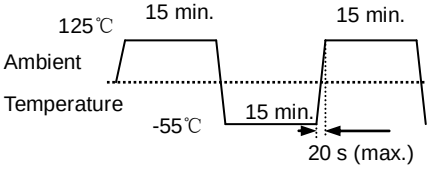
Insulation Resistance

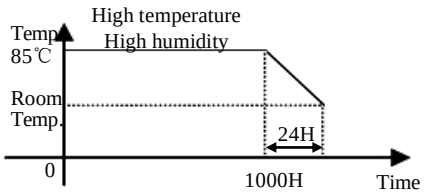
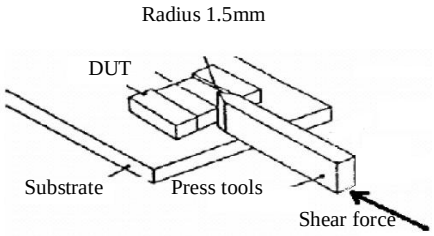
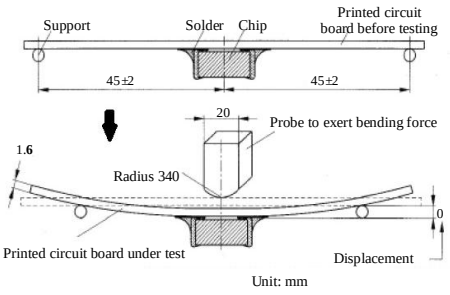
Insulation Resistance shall meet item 6 when measured on the condition of Table4.

Table 4

Measuring Equipment	HIOKI SM7110

8. Reliability

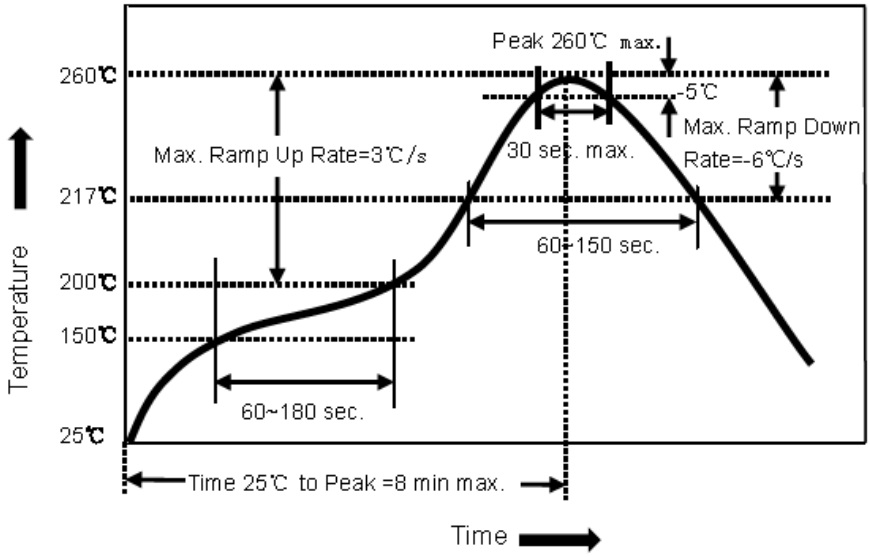
No.	Item	Requirements	Test Methods and Remarks	Reference	Sample Size
1	Solderability	Terminal area shall be at least 95% covered .	①Temperature:240±5℃, flux 5-10 s. ②Sample immersion tin furnace 3 ±1s. ③Sn/3.0Ag/0.5Cu	AEC-Q200 (J-STD-002)	15
2	Resistance to Soldering Heat	(1) No case deformation or change in appearance. (2)｜ΔL/L0｜≤10%	①The peak temperature: 260+5/-0℃. ②Reflow:3times. ③Temperature curve is as below: 	AEC-Q200 (MIL-STD-202 Method 210)	30
3	High Temperature Storage		①Temperature: 125±2℃. ②Time : 1000(+48,0) hours. ③Measurement at 24±4 hours after test conclusion. 	AEC-Q200 (MIL-STD-202 Method 108)	77
4	Low Temperature Storage		①Temperature: -55±2℃. ②Time : 1000(+48,0) hours. ③Measurement at 24±4 hours after test conclusion. 	JESD22-A119	77
5	Thermal shock		①First -55℃ for 15 minutes, last 125℃ 15minutes as 1 cycle. Go through 100 cycles. ②Max transfer time is 20 second. ③Measurement at 24±4 hours after test conclusion. 	MIL-STD-202 Method 107	30

6	Humidity Resistance	(1) No case deformation or change in appearance. (2)｜ΔL/L0｜≤10%	①1000(+48,0) hours, 85℃/85%RH. ②Unpowered. ③Measurement at 24±4 hours after test conclusion. 	AEC-Q200 (MIL-STD -202 Method 103)	77
7	Terminal Strength	No case deformation or change in appearance.	①The test samples shall be soldered to the board. ②17.7N, 60±1s 	-	30
8	Board Flex	(1) No case deformation or change in appearance. (2)｜ΔL/L0｜≤10%	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. 	AEC-Q200 (AEC-Q200-005)	30
9	Drop	(1) No case deformation or change in appearance. (2)｜ΔL/L0｜≤10%	①Height: 1 m, Free fall, 10times. ②Direction: 1 Angle, 1side, 2surface.	JESD22-B111	30

10	Vibration		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)｜ΔL/L0｜≤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)｜ΔL/L0｜≤10%	①Temperature: 125±2℃. ②Time : 1000(+48,0) hours. ③Proper current. ④Measurement at 24±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)｜ΔL/L0｜≤10%	①Temperature: 60±2℃, Humidity: 90% to 95% RH ; ② Duration: 1000(+48,0) hours ③Applied current: Rated current. ④Measurement at 24±4 hours after test conclusion.	AEC-Q200	77
14	ESD Test		HBM ESD discharge waveform(8KV)	AEC-Q200-002	15

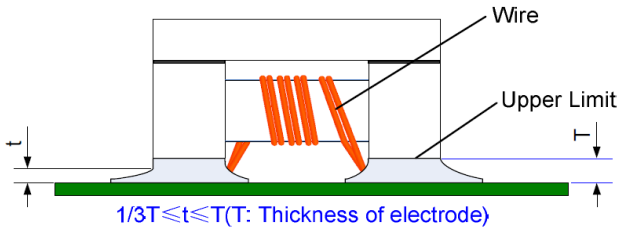
9. Recommended Soldering Conditions

(1) Reflow soldering conditions



*Above reflow soldering curve is from J-STD-020D.

(2) 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.

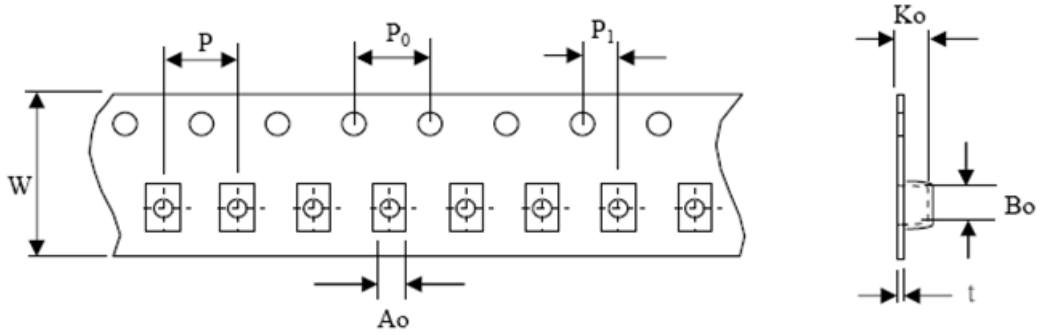
(3)Iron soldering

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

Pre-heating	150℃, 1 minute
Tip temperature	350℃ max
Soldering iron output	30w max
End of soldering iron	Φ 1mm max
Soldering time	3 seconds max

10.Packaging

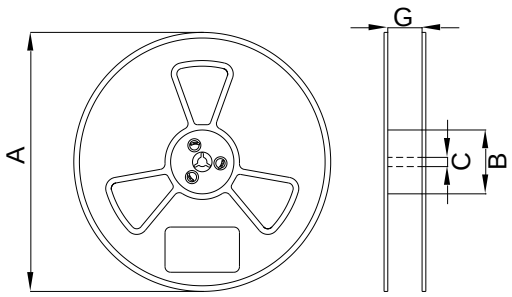
(1) Dimensions of Tape:



(Dimensions in mm; Tolerance : ±0.1)

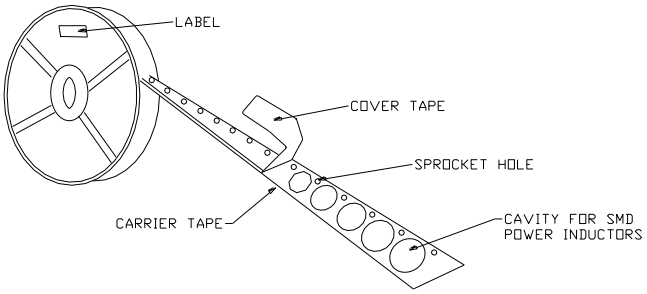
Symbol	W	P	P_0	P_1	A_0	B_0	K_0	t
Dimension	8.0	4.0	4.0	2.0	2.85	3.55	2.75	0.24

(2) Dimension of reel (Unit: mm)



Symbol	Dimension
A	180
B	60
C	13
G	8.4

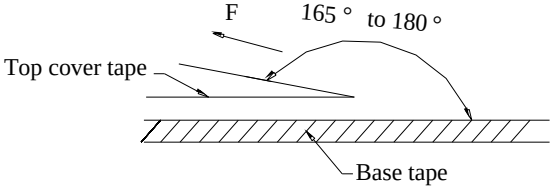
(3) Taping figure and drawing direction



(4) Packaging quantities: 1500PCS/Reel.

(5) Peeling strength of cover tape:

The force tearing off cover tape is 10 to 100 grams in the arrow direction under the following conditions.



Room Temp. (℃)	Room Humidity (%)	Room aim (hpa)	Peel Speed mm/min
5-35	45-85	860-1060	300

11. Storage

(1) Storage period

Products which inspected in MICROGATE over 12 months ago should be examined and used, which can be confirmed with inspection No. marked on the container. Solderability should be checked if this period is exceeded.

(2) Storage conditions

Products should be storage in the warehouse on the following conditions:

Temperature: -40 ~+ 60℃

Humidity: 5~85%RHrelative and humidity.

(3) Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solderability.

(4) Products should be storage on the palette for the prevention of the influence from humidity, dust and so on.

(5) Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.

(6) Products should be storage under the airtight packaged condition.

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

12. Warning and Attentions

⑴ 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

⑵ Precautions on Use

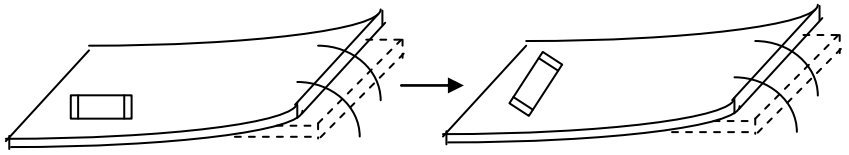
a. Always wear static control bands to protect against ESD.
b. Any devices used (soldering iron, measuring instruments) should be properly grounded.
c. Use non-magnetic tweezers when handing the chips.

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.

(3) PCB Bending Design

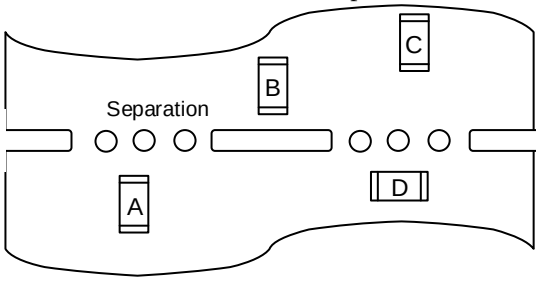
The following shall be considered when designing and laying out PCB's.

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



Products shall be located in the sideways direction to the mechanical stress.

b. Products location on PCB separation.



Product shall be located carefully because they may be subjected to the mechanical stress in order of A>C=B>D.

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.

⑷ 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. 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/l 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.