

CHIP COIL (CHIP INDUCTORS) LQP02TN□□□□02□ Reference Specification

1.Scope

This reference specification applies to LQP02TN series, Chip coil (Chip Inductors).

2.Part Numbering

(ex) LQ P 02 T N ON4 B 0 D Electrode Packaging
Product ID Structure Dimension Applications (L×W) and Characteristics Characteristics Category Inductance Tolerance Features Features D:8mm-wide / paper tape
L:4mm-wide / plastic tape

*Bulk packing also available. (A product is put in the plastic bag under the taping conditions.)

3.Rating

•Operating Temperature Range. -55°C to +125°C

(Ambient temperature : Rated current can be handled in this temperature range.)

•Storage Temperature Range. -55°C to +125°C

Ctora	ge Temperature Range.		550 10 +1250			Self		
Customer Part Number	MURATA Part Number	Inc	ductance	Q	DC Resistance	Resonant Frequency		Rated Current
Pait Number	Part Number	(nH)	Tolerance	(min)	(Ω max)		Hz)	(mA)
	LQP02TN0N2B02D	, ,				Min.	*Typ.	
	LQP02TN0N2B02L							
	LQP02TN0N2C02D	0.2						
	LQP02TN0N2C02D							
	LQP02TN0N2C02L LQP02TN0N3B02D			-		20000		
	LQP02TN0N3B02L							
	LQP02TN0N3C02D	0.3						
	LQP02TN0N3C02L							
					-			
	LQP02TN0N4B02D							
	LQP02TN0N4B02L	0.4						
	LQP02TN0N4C02D				0.50	18000	20000	320
	LQP02TN0N4C02L		B:±0.1nH C:±0.2nH					
	LQP02TN0N5B02D							
	LQP02TN0N5B02L	0.5						
	LQP02TN0N5C02D	3.3						
	LQP02TN0N5C02L							
	LQP02TN0N6B02D					17000		
	LQP02TN0N6B02L	0.6						
	LQP02TN0N6C02D	0.0						
	LQP02TN0N6C02L							
	LQP02TN0N7B02D							
	LQP02TN0N7B02L	0.7		8				
	LQP02TN0N7C02D	0.7		0				
	LQP02TN0N7C02L					16500		
	LQP02TN0N8B02D					10300		
	LQP02TN0N8B02L	0.8						
	LQP02TN0N8C02D	0.0						
	LQP02TN0N8C02L							
	LQP02TN0N9B02D							
	LQP02TN0N9B02L	0.9					16100	
	LQP02TN0N9C02D	0.0					10100	
	LQP02TN0N9C02L					42000		
	LQP02TN1N0B02D					13000		
	LQP02TN1N0B02L	4.0			0.00		45000	220
	LQP02TN1N0C02D	1.0			0.60		15900	220
	LQP02TN1N0C02L							

Specino. JELI	243C-0014AA-01							P.2/14
Customer Part Number	MURATA Part Number	In	ductance	Q (min)	DC Resistance (Ω max)		ency z min)	Rated Current (mA)
		(nH)	Tolerance			Min.	*Тур.	
	LQP02TN1N1B02D							
	LQP02TN1N1B02L	1.1						
	LQP02TN1N1C02D	1.1						
	LQP02TN1N1C02L					12500	15200	
	LQP02TN1N2B02D					12500	15300	
	LQP02TN1N2B02L	4.0						
	LQP02TN1N2C02D	1.2						
	LQP02TN1N2C02L							
	LQP02TN1N3B02D							
	LQP02TN1N3B02L							
	LQP02TN1N3C02D	1.3					14800	
	LQP02TN1N3C02L							
	LQP02TN1N4B02D				0.60	11500		220
	LQP02TN1N4B02L							
	LQP02TN1N4C02D	1.4					14400	
	LQP02TN1N4C02L							
	LQP02TN1N5B02D							1
	LQP02TN1N5B02L							
	ļ	1.5				11700		
	LQP02TN1N5C02D							
	LQP02TN1N5C02L		-					
	LQP02TN1N6B02D					9500	12000	
	LQP02TN1N6B02L							
	LQP02TN1N6C02D		B:±0.1nH					
	LQP02TN1N6C02L							
	LQP02TN1N7B02D			8	0.70		11800	
	LQP02TN1N7B02L		C:±0.2nH					
	LQP02TN1N7C02D		1.7					
	LQP02TN1N7C02L							
	LQP02TN1N8B02D						11300	
	LQP02TN1N8B02L	1.8						
	LQP02TN1N8C02D	1.0						
	LQP02TN1N8C02L							
	LQP02TN1N9B02D							
	LQP02TN1N9B02L	1.9					12000	
	LQP02TN1N9C02D	1.9					12000	
	LQP02TN1N9C02L					9000		
	LQP02TN2N0B02D					9000		
	LQP02TN2N0B02L	2.0					11100	200
	LQP02TN2N0C02D	2.0					11100	200
	LQP02TN2N0C02L]					
	LQP02TN2N1B02D							
	LQP02TN2N1B02L	2.1			0.75		11200	
	LQP02TN2N1C02D	2.1			0.75		11200	
	LQP02TN2N1C02L							
	LQP02TN2N2B02D							
	LQP02TN2N2B02L	2.2					10000	
	LQP02TN2N2C02D	۷.۷					10000	
	LQP02TN2N2C02L					7500		
	LQP02TN2N3B02D					7500		
	LQP02TN2N3B02L	2.2					0700	
	LQP02TN2N3C02D	2.3					9700	
	LQP02TN2N3C02L							

Customer Part Number	MURATA Part Number	In	ductance	Q (min)	DC Resistance (Ω max)	Self Reson Freque	ency	Rated Current (mA)
		(nH)	Tolerance		(== :::=::,	Min.	*Typ.	(,
	LQP02TN2N4B02D	, ,						
	LQP02TN2N4B02L	2.4			0.75		0500	
	LQP02TN2N4C02D	2.4			0.75		9500	
	LQP02TN2N4C02L							
	LQP02TN2N5B02D							
	LQP02TN2N5B02L	2.5					9300	
	LQP02TN2N5C02D	2.5					9300	
	LQP02TN2N5C02L							
	LQP02TN2N6B02D							
	LQP02TN2N6B02L	2.6			0.80		9100	
	LQP02TN2N6C02D	2.0			0.00		9100	
	LQP02TN2N6C02L							
	LQP02TN2N7B02D							
	LQP02TN2N7B02L	2.7					9200	200
	LQP02TN2N7C02D	۷.1					3200	200
	LQP02TN2N7C02L							
	LQP02TN2N8B02D							
	LQP02TN2N8B02L	2.8					12000	
	LQP02TN2N8C02D	2.0	<u></u>				12000	
	LQP02TN2N8C02L	2.9						
	LQP02TN2N9B02D							
	LQP02TN2N9B02L			,u	1.10			
	LQP02TN2N9C02D				1.10			
	LQP02TN2N9C02L		D: ± 0.4 n U				11800	
	LQP02TN3N0B02D						11000	
	LQP02TN3N0B02L		0.0	B:±0.1nH C:±0.2nH	8		7500	
	LQP02TN3N0C02D		C.±0.211⊓	8		7500		
	LQP02TN3N0C02L							
	LQP02TN3N1B02D		3.1					
	LQP02TN3N1B02L	3.1					12000	
	LQP02TN3N1C02D	0.1						
	LQP02TN3N1C02L		_					
	LQP02TN3N2B02D							
	LQP02TN3N2B02L	3.2					10400	
	LQP02TN3N2C02D	0.2					10400	
	LQP02TN3N2C02L		4					
	LQP02TN3N3B02D							
	LQP02TN3N3B02L	3.3						
	LQP02TN3N3C02D	0.0						
	LQP02TN3N3C02L		1		1.30		10400	180
	LQP02TN3N4B02D							100
	LQP02TN3N4B02L	3.4						
	LQP02TN3N4C02D							
	LQP02TN3N4C02L		4					
	LQP02TN3N5B02D							
	LQP02TN3N5B02L	3.5					10200	
	LQP02TN3N5C02D	0.0					.0200	
	LQP02TN3N5C02L		4					
	LQP02TN3N6B02D							
	LQP02TN3N6B02L	3.6					10100	
	LQP02TN3N6C02D	5.0					10100	
	LQP02TN3N6C02L							

P.4/14

O	2430-0014AA-01			_	DC	Self Resor		Rated
Customer Part Number	MURATA	Inductance		Q (min)	Resistance	Frequency		Current
i ait ivallibei	Part Number	(-11)	T.1	(min)	(Ω max)	(MHz)		(mA)
	LQP02TN3N7B02D	(nH)	Tolerance			Min.	*Typ.	
	LQP02TN3N7B02L							
	LQP02TN3N7C02D	3.7				10300		
	LQP02TN3N7C02L							
	LQP02TN3N8B02D		1					1
	LQP02TN3N8B02L							
	LQP02TN3N8C02D	3.8					10100	
	LQP02TN3N8C02L							
	LQP02TN3N9B02D		-					•
	LQP02TN3N9B02L							
	LQP02TN3N9C02D	3.9				7500	9700	
	LQP02TN3N9C02L		B:±0.1nH					
	LQP02TN4N0B02D		C:±0.2nH					1
	LQP02TN4N0B02L							
	LQP02TN4N0C02D	4.0			1.30		9800	180
	LQP02TN4N0C02L							
	LQP02TN4N1B02D		1					-
	LQP02TN4N1B02L						9600	
	LQP02TN4N1C02D	4.1						
	LQP02TN4N1C02L							
	LQP02TN4N2B02D						0700	
	LQP02TN4N2B02L	4.2						
	LQP02TN4N2C02D						8700	
	LQP02TN4N2C02L					7000		
	LQP02TN4N3H02D		4.3			7000		
	LQP02TN4N3H02L						8800	
	LQP02TN4N3J02D	4.3		8				
	LQP02TN4N3J02L			_				
	LQP02TN4N7H02D				4.50	6500	8600	
	LQP02TN4N7H02L	4.7						- 160
	LQP02TN4N7J02D	4.7						
	LQP02TN4N7J02L							
	LQP02TN5N1H02D				1.50		8300	
	LQP02TN5N1H02L	E 4						
	LQP02TN5N1J02D	5.1						
	LQP02TN5N1J02L							
	LQP02TN5N6H02D							
	LQP02TN5N6H02L	5.6	H:±3%			6000	7500	
	LQP02TN5N6J02D	5.6	J:±5%			6000	7500	
	LQP02TN5N6J02L				1.00			
	LQP02TN6N2H02D				1.80			
	LQP02TN6N2H02L	62					7400	
	LQP02TN6N2J02D	6.2					7400	
	LQP02TN6N2J02L					5500		140
	LQP02TN6N8H02D					5500		140
	LQP02TN6N8H02L	6.8					7100	
	LQP02TN6N8J02D	0.0					7 100	
	LQP02TN6N8J02L]		2.00			
	LQP02TN7N5H02D				2.00			
	LQP02TN7N5H02L	7.5				4500	6500	
	LQP02TN7N5J02D	7.0				1500	3300	
	LQP02TN7N5J02L				<u> </u>			

Customer Part Number	MURATA Part Number	In	ductance	Q (min)	DC Resistance (Ω max)	Self Resor Frequ		Rated Current (mA)
	T dit Hambon	(nH)	Tolerance	` ′	(32 IIIax)	Min.	*Typ.	(IIIA)
	LQP02TN8N2H02D	()	. 0.0.0.0				. , , , .	
	LQP02TN8N2H02L							
	LQP02TN8N2J02D	8.2				4500	6200	
	LQP02TN8N2J02L							
	LQP02TN9N1H02D				2.10			
	LQP02TN9N1H02L							
	LQP02TN9N1J02D	9.1		8			5600	
	LQP02TN9N1J02L					4000		
	LQP02TN10NH02D					4000		
	LQP02TN10NH02L							
	LQP02TN10NJ02D	10			2.50		5300	
	LQP02TN10NJ02L							
	LQP02TN11NH02D							
	LQP02TN11NH02L							
	LQP02TN11NJ02D	11					4400	
	LQP02TN11NJ02L					0.500		
	LQP02TN12NH02D				2.80	3500		
	LQP02TN12NH02L							
	LQP02TN12NJ02D	12						140
	LQP02TN12NJ02L	13 H:±3% J:±5%				4000		
	LQP02TN13NH02D						4200	
	LQP02TN13NH02L		2					
	LQP02TN13NJ02D							
	LQP02TN13NJ02L			_	3.20	2000		
	LQP02TN15NH02D			7		3000	3800	
	LQP02TN15NH02L		H:±3%					
	LQP02TN15NJ02D					3600		
	LQP02TN15NJ02L				3.50			
	LQP02TN16NH02D		16					
	LQP02TN16NH02L	16					2600	
	LQP02TN16NJ02D	16				2500	3600	
	LQP02TN16NJ02L							
	LQP02TN18NH02D						3400	
	LQP02TN18NH02L	40						
	LQP02TN18NJ02D	18						
	LQP02TN18NJ02L							
	LQP02TN20NH02D		1					
	LQP02TN20NH02L	00					0400	
	LQP02TN20NJ02D	20					3100	
	LQP02TN20NJ02L				5 00			
	LQP02TN22NH02D	22			5.00	2300		
	LQP02TN22NH02L						0000	
	LQP02TN22NJ02D						3000	
	LQP02TN22NJ02L			_				400
	LQP02TN24NH02D		1	6				120
	LQP02TN24NH02L	0.4					2002	
	LQP02TN24NJ02D	24					2800	
	LQP02TN24NJ02L				<i>E E</i> 0	0 0000		
	LQP02TN27NH02D				5.50	2000	0500	
	LQP02TN27NH02L	27						
	LQP02TN27NJ02D	27					2500	
	LQP02TN27NJ02L							

Customer Part Number	MURATA Part Number	In	ductance	Q DC Resistance (Ω max)		Self Resonant Frequency (MHz)		Rated Current (mA)
		(nH)	Tolerance		,	Min.	*Тур	, ,
	LQP02TN30NH02D							
	LQP02TN30NH02L	20		6			2000	
	LQP02TN30NJ02D	30					2600	
	LQP02TN30NJ02L				6.50	1800		
	LQP02TN33NH02D				6.50	1800		
	LQP02TN33NH02L	33	H:±3%				2300	00
	LQP02TN33NJ02D	33						
	LQP02TN33NJ02L							
	LQP02TN36NH02D		J:±5%				2300	90
	LQP02TN36NH02L	36						
	LQP02TN36NJ02D	30		4				
	LQP02TN36NJ02L				7.00	4000		
	LQP02TN39NH02D				7.00	1600		
	LQP02TN39NH02L	00					2100	
	LQP02TN39NJ02D	39						
	LQP02TN39NJ02L							

^{*} Typical value is actual performance.

4. Testing Conditions

《Unless otherwise specified》

Temperature : Ordinary Temperature / 15°C to 35°C

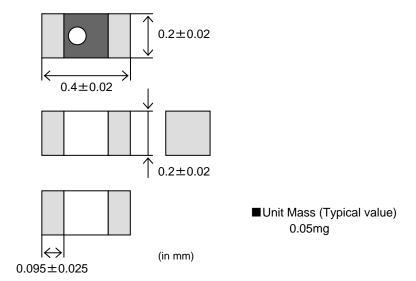
Humidity: Ordinary Humidity / 25%(RH) to 85 %(RH)

《In case of doubt》

Temperature : 20°C ± 2°C

Humidity : 60%(RH) to 70 %(RH)
Atmospheric Pressure : 86kPa to 106 kPa

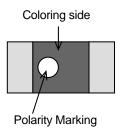
5. Appearance and Dimensions





6. Marking

Polarity Marking :white



7. Electrical Performance

No.	Item	Specification	Test Method
7.1	Inductance	Inductance shall meet item 3.	Measuring Equipment: KEYSIGHT E4991A or equivalent Measuring Frequency: (0.2nH~30nH) 500MHz (33nH~39nH) 300MHz Measuring Condition: Test signal level / about 0dBm Electrical length / 27.3mm Weight / about 3N Measuring Fixture: KEYSIGHT 16196D Insert Chip coil in the hole in order that the polarity marking is at the top of the side surface. Contact coil with each terminal by adding the weigh cover.
7.2	Q	Q shall meet item 3.	See diagram below. Polarity Marking Chip coil placement hole: φ 0.3mm Measuring Method:See P.14 <electrical inductance="" method="" of="" performance:measuring="" q=""></electrical>
7.3	DC Resistance	DC Resistance shall meet item 3.	Measuring Equipment:Digital multi meter
7.4	Self Resonant Frequency(S.R.F)	S.R.F shall meet item 3.	Measuring Equipment: KEYSIGHT 8753C or equivalent
7.5	Rated	Self temperature rise shall be	The rated current is applied.
	Current	limited to 25°C max.	

8.Mechanical Performance

No.	Item	Specification	Test Method
8.1	Shear Test	Chip coil shall not be damaged	Substrate:Glass-epoxy substrate
		after tested as test method.	Land
			$ \begin{array}{c c} \hline 0.23\\ \hline 0.56 \end{array} $ (in mm)
			Force:1N
			Hold Duration:5 s±1 s
			Applied Direction: Parallel to PCB.

No.	Item	Specification	Test Method
8.2	Bending Test	Chip coil shall not be damaged after tested as test method.	Substrate:Glass-epoxy substrate (100mm × 40mm × 0.8mm) Speed of Applying Force:1mm /s Deflection:1mm Hold Duration:30 s Pressure jig R340 F Deflection Deflection
8.3	Vibration	Appearance:No damage	Substrate:Glass-epoxy substrate Oscillation Frequency: 10Hz to 2000Hz to 10Hz for 20 min Total amplitude 1.5 mm or Acceleration amplitude 196 m/s² whichever is smaller. Testing Time:A period of 2h in each of 3 mutually perpendicular directions.
8.4	Solderability	The electrode shall be at least 90% covered with new solder coating.	Flux: Ethanol solution of rosin 25(wt)% (Immersed for 5s to 10s) Solder:Sn-3.0Ag-0.5Cu Pre-Heating:150°C±10°C / 60s to 90s Solder Temperature:240°C±5°C Immersion Time:3s±1s
8.5	Resistance to Soldering Heat	Appearance:No damage Inductance Change: within ±10%	Flux: Ethanol solution of rosin 25(wt)% (Immersed for 5s to 10s) Solder:Sn-3.0Ag-0.5Cu Pre-Heating:150°C±10°C / 60s to 90s Solder Temperature:260°C±5°C Immersion Time:5s±1s Then measured after exposure in the room condition for 24h±2h.

9.Environmental Performance

It shall be soldered on the substrate.

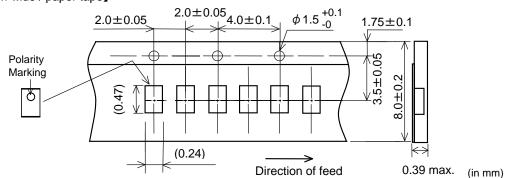
No.	Item	Specification	Test Method
9.1	Heat Resistance	Appearance:No damage Inductance Change: within ±10%	Substrate:Glass-epoxy substrate Temperature:125°C±2°C Time:1000h (+48h,-0h) Then measured after exposure in the room condition for 24h±2h.
9.2	Cold Resistance		Substrate:Glass-epoxy substrate Temperature:-55°C±3°C Time:1000 h (+48h,-0h) Then measured after exposure in the room condition for 24h±2h.
9.3	Humidity		Substrate:Glass-epoxy substrate Temperature:40°C±2°C Humidity:90%(RH) to 95%(RH) Time:1000 h(+48h,-0h) Then measured after exposure in the room condition for 24h±2h.
9.4	Temperature Cycle		Substrate:Glass-epoxy substrate 1 cycle: 1 step:-55°C±2°C / 30min±3 min 2 step:Ordinary temp. / 10~15 min 3 step:125°C±2°C / 30±3 min 4 step: Ordinary temp. / 10~15 min Total of 10 cycles Then measured after exposure in the room condition for 24h±2h.



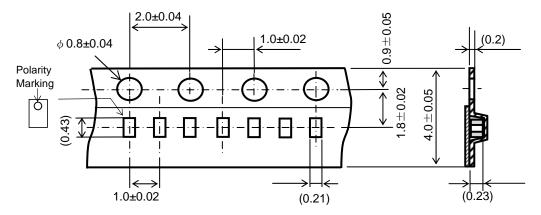
10. Specification of Packaging

10.1 Appearance and Dimensions of paper tape

[8mm-wide / paper tape]



[4mm-wide / plastic tape]



Dimension of the Cavity is measured at the bottom side.

10.2 Specification of Taping

[8mm-wide / paper tape]

(1) Packing quantity (standard quantity)

20,000 pcs. / reel

(2) Packing Method

Products shall be packed in the cavity of the base tape and sealed by cover tape.

(3) Sprocket hole

The sprocket holes are to the right as the tape is pulled toward the user.

(4) Spliced point

Base tape and Cover tape has no spliced point.

(5) Missing components number

Missing components number within 0.1 % of the number per reel or 1 pc., whichever is greater, and are not continuous. The Specified quantity per reel is kept.

[4mm-wide / plastic tape]

(1) Packing quantity (standard quantity) 40,000 pcs. / reel

(2) Packing Method

Products shall be packed in the each embossed cavity of plastic tape and sealed by cover tape.

(3) Sprocket hole

Sprocket hole shall be located on the left-hand side toward the direction of feed.

(4) Spliced point

Plastic tape and Cover tape has no spliced point.

(5) Missing components number

Missing components number within 0.1 % of the number per reel or 1 pc., whichever is greater, and are not continuous. The Specified quantity per reel is kept.



10.3 Pull Strength

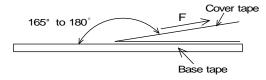
Cover tape	5N min
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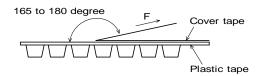
10.4 Peeling off force of cover tape

Speed of Peeling off	300mm/min
Dealing off force	0.1N to 0.6N
Peeling off force	(minimum value is typical)

[8mm-wide / paper tape]

[4mm-wide / plastic tape]

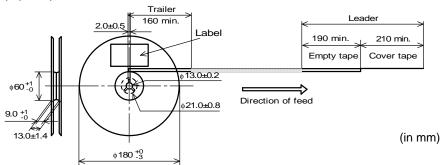




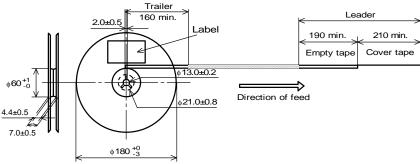
10.5 Dimensions of Leader-tape, Trailer and Reel

There shall be leader-tape (top tape and empty tape) and trailer-tape (empty tape) as follows.

[8mm-wide / paper tape]



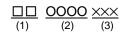
[4mm-wide / plastic tape]



10.6 Marking for reel

Customer part number, MURATA part number, Inspection number(*1) ,RoHS Marking(*2), Quantity etc \cdots

*1) < Expression of Inspection No.>



- (1) Factory Code
- (2) Date First digit : Year / Last digit of year

Second digit : Month / Jan. to Sep. \rightarrow 1 to 9, Oct. to Dec. \rightarrow O,N,D

Third, Fourth digit: Day

- (3) Serial No.
- *2) <Expression of RoHS Marking >

ROHS –
$$\underline{Y}$$
 ($\underline{\Delta}$)

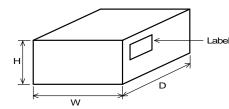
- (1) RoHS regulation conformity parts.
- (2) MURATA classification number



10.7 Marking for Outside package (corrugated paper box)

Customer name, Purchasing order number, Customer part number, MURATA part number, RoHS Marking (*2) ,Quantity, etc · · ·

10.8 Specification of Outer Case



Outer Case Dimensions (mm)			Standard Reel Quantity in Outer Case (Reel)	
W	D	Η	in Outer Case (Reei)	
186	186	93	5(8mm-wide / paper tape)	
			10(4mm-wide / plastic tape)	

* Above Outer Case size is typical. It depends on a quantity of an order.

11. /\text{\text{Caution}}

Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- (1) Aircraft equipment
- Aerospace equipment
- Undersea equipment
- Power plant control equipment
- (5) Medical equipment
- (6) Transportation equipment (vehicles, trains, ships, etc.)
- Traffic signal equipment
- (8) Disaster prevention / crime prevention equipment
- (9) Data-processing equipment(10) Applications of similar complexity and /or reliability requirements to the applications listed in the above

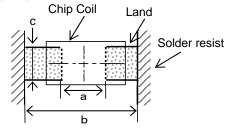
12. Notice

Products can only be soldered with reflow.

This product is designed for solder mounting.

Please consult us in advance for applying other mounting method such as conductive adhesive.

12.1 Land pattern designing



а	0.16~0.20	
b	0.40~0.56	
С	0.20~0.23	
	(in	mm)

12.2 Flux, Solder

Use rosin-based flux.

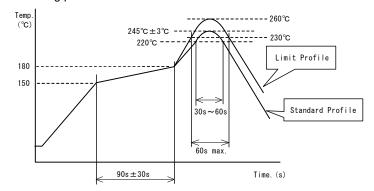
Don't use highly acidic flux with halide content exceeding 0.2(wt)% (chlorine conversion value). Don't use water-soluble flux.

- Use Sn-3.0Ag-0.5Cu solder.
- Standard thickness of solder paste : 50μ m to 80μ m.

12.3 Reflow soldering conditions

- · Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 150°C max. Cooling into solvent after soldering also should be in such a way that the temperature difference is limited to 100°C max. Insufficient pre-heating may cause cracks on the product, resulting in the deterioration of products quality.
- Standard soldering profile and the limit soldering profile is as follows. The excessive limit soldering conditions may cause leaching of the electrode and / or resulting in the deterioration of product quality.

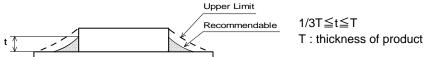
· Reflow soldering profile



	Standard Profile	Limit Profile	
Pre-heating	150°C~180°C 、90s±30s		
Heating	above 220°C, 30s∼60s	above 230°C, 60s max.	
Peak temperature	245°C±3°C	260°C,10s	
Cycle of reflow	2 times	2 times	

12.4 Solder Volume

· Solder shall be used not to be exceeded the upper limits as shown below.

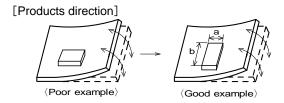


Accordingly increasing the solder volume, the mechanical stress to Chip is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance.

12.5 Attention regarding P.C.B. bending

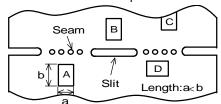
The following shall be considered when designing and laying out P.C.B.'s.

(1) P.C.B. shall be designed so that products are not subject to the mechanical stress due to warping the board.



Products shall be located in the sideways direction (Length:a < b) to the mechanical stress.

(2) Products location on P.C.B. separation



Products (A,B,C,D) shall be located carefully so that products are not subject to the mechanical stress due to warping the board. Because they may be subjected the mechanical stress in order of $A>C>B \cong D$.



12.6 Cleaning Conditions

Products shall be cleaned on the following conditions.

- (1) Cleaning temperature shall be limited to 60°C max.(40°C max for IPA)
- (2) Ultrasonic cleaning shall comply with the following conditions with avoiding the resonance phenomenon at the mounted products and P.C.B.

Power: 20 W / I max. Frequency: 28kHz to 40kHz Time: 5 min max.

- (3) Cleaner
 - 1. Alcohol type cleaner Isopropyl alcohol (IPA)
 - 2. Aqueous agent PINE ALPHA ST-100S
- (4) There shall be no residual flux and residual cleaner after cleaning.
 In the case of using aqueous agent, products shall be dried completely after rinse with de-ionized water in order to remove the cleaner.
- (5) Other cleaning Please contact us.

12.7 Resin coating

When products are coated with resin, please contact us in advance.

12.8 Handling of a substrate

(1) There is a possibility of chip cracking caused by PCBexpansion/contraction with heat, because stress on a chip is different depending on PCB material and structure.

When the thermal expansion coefficient greatly differs between the board used for mounting and the chip, it will cause cracking of the chip due to the thermal expansion and contraction.

The chip is assumed to be mounted on the PCB of glass-epoxy material, and we don't test with other PCB material which has different thermal expansion coefficient from Glass-epoxy.

When other PCB materials are considered, please be sure to evaluate by yourself...

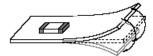
(2)After mounting products on a substrate, do not apply any stress to the product caused by bending or twisting to the substrate when cropping the substrate, inserting and removing a connector from the substrate or tightening screw to the substrate.

Excessive mechanical stress may cause cracking in the product.

In case of the mounting on flexible PCB, there is a possibility of chip cracking caused by mechanical stress even from small bending or twisting.

When the flexible PCB is considered, please be sure to evaluate by yourself.

Bending Twisting





12.9 Storage and Handing Requirements

(1) Storage period

Use the products within 12 months after deliverd. Solderability should be checked if this period is exceeded.

- (2) Storage conditions
 - Products should be stored in the warehouse on the following conditions.

Temperature : -10°C ~ 40°C

Humidity : 15% to 85% relative humidity No rapid change on temperature and humidity.

- Products should not be stored on bulk packaging condition to prevent the chipping of the core and the breaking of winding wire caused by the collision between the products.
- Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.
- Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.



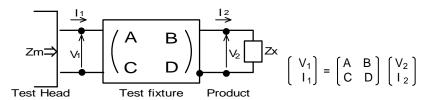
- (3) Handling Condition
 - Care should be taken when transporting or handling product to avoid excessive vibration or mechanical shock.

13. /\ Note

- (1)Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- (2) You are requested not to use our product deviating from the reference specifications.
- (3)The contents of this reference specification are subject to change without advance notice. Please approve our product specifications or transact the approval sheet for product specifications before ordering.

<Electrical Performance:Measuring Method of Inductance/Q>

(1) Residual elements and stray elements of test fixture can be described by F-parameter shown in following.



(2) The impedance of chip coil Zx and measured value Zm can be described by input/output current/voltage.

$$Zm = \frac{V_1}{I_1}$$
 $Zx = \frac{V_2}{I_2}$

(3) Thus, the relation between Zx and Zm is following;

$$Zx = \alpha \frac{Zm - \beta}{1 - Zm \Gamma}$$
 where, $\alpha = D / A = 1$
 $\beta = B / D = Zsm - (1 - Yom Zsm)Zss$
 $\Gamma = C / A = Yom$

Zsm:measured impedance of short chip Zss:residual impedance of short chip (0.110nH) Yom:measured admittance when opening the fixture

(4) Lx and Qx shall be calculated with the following equation.

$$x = \frac{Im(Zx)}{2\pi f}$$
 , $Qx = \frac{Im(Zx)}{Re(Zx)}$ Lx :Inductance of chip coil Qx:Q of chip coil f :Measuring frequency