

## CHIP COIL(CHIP INDUCTORS) LQH31MN□□□□03L REFERENCE SPECIFICATION

### 1. Scope

This reference specification applies to LQH31MN series, Chip coil (Chip Inductors).

### 2. Part Numbering

(ex)   LQ     H     31     M     N     R15     M     0     3     L    
 Product ID Structure Dimension (L×W) Applications and Characteristics Category Inductance Tolerance Features Electrode Packaging L:Taping

### 3. Rating

- Operating Temperature Range.      – 40 °C to + 85 °C
- Storage Temperature Range.       – 40 °C to + 85 °C

Customer Part Number	MURATA Part Number	Inductance		Q (min.)	DC Resistance (Ω)	Self Resonant Frequency (MHz min.)	*Rated Current (mA)	
		(μH)	Tolerance					
	LQH31MNR15M03L	0.15	M:±20% K:±10%	20	0.39±40%	250	250	
	LQH31MNR15K03L							
	LQH31MNR22M03L	0.22				0.43±40%	250	240
	LQH31MNR22K03L							
	LQH31MNR33M03L	0.33			0.45±40%	250	230	
	LQH31MNR33K03L							
	LQH31MNR47M03L	0.47			0.83±40%	200	215	
	LQH31MNR47K03L							
	LQH31MNR56M03L	0.56			0.61±40%	180	200	
	LQH31MNR56K03L							
	LQH31MNR68M03L	0.68			0.67±40%	160	190	
	LQH31MNR68K03L							
	LQH31MNR82M03L	0.82		0.73±40%	120	185		
	LQH31MNR82K03L							
	LQH31MN1R0M03L	1.0		0.49±30%	100	175		
	LQH31MN1R0K03L							
	LQH31MN1R2M03L	1.2	M:±20% K:±10% J:± 5%	35	0.9±30%	90	165	
	LQH31MN1R2K03L							
	LQH31MN1R2J03L					0.37±30%		
	LQH31MN1R5M03L	1.5			1.0±30%	75	155	
	LQH31MN1R5K03L							
	LQH31MN1R5J03L							
	LQH31MN1R8M03L	1.8			1.6±30%	60	150	
	LQH31MN1R8K03L							
	LQH31MN1R8J03L							
	LQH31MN2R2M03L	2.2			0.7±30%	50	140	
	LQH31MN2R2K03L							
	LQH31MN2R2J03L							
	LQH31MN2R7M03L	2.7		0.55±30%	43	135		
	LQH31MN2R7K03L							
	LQH31MN2R7J03L							
	LQH31MN3R3M03L	3.3		0.61±30%	38	130		
	LQH31MN3R3K03L							
	LQH31MN3R3J03L							

Customer Part Number	MURATA Part Number	Inductance		Q (min.)	DC Resistance ( $\Omega$ )	Self Resonant Frequency (MHz min.)	*Rated Current (mA)
		( $\mu$ H)	Tolerance				
	LQH31MN3R9M03L	3.9	M:±20% K:±10% J:± 5%	35	1.5±30%	35	125
	LQH31MN3R9K03L						
	LQH31MN3R9J03L						
	LQH31MN4R7M03L	4.7					
	LQH31MN4R7K03L						
	LQH31MN4R7J03L						
	LQH31MN5R6M03L	5.6					
	LQH31MN5R6K03L						
	LQH31MN5R6J03L						
	LQH31MN6R8M03L	6.8					
	LQH31MN6R8K03L						
	LQH31MN6R8J03L						
	LQH31MN8R2M03L	8.2					
	LQH31MN8R2K03L						
	LQH31MN8R2J03L						
	LQH31MN100K03L	10	K:±10% J:± 5%	40	2.5±30%	20	100
	LQH31MN100J03L						
	LQH31MN120K03L	12					
	LQH31MN120J03L						
	LQH31MN150K03L	15					
	LQH31MN150J03L						
	LQH31MN180K03L	18					
	LQH31MN180J03L						
	LQH31MN220K03L	22					
	LQH31MN220J03L						
	LQH31MN270K03L	27					
	LQH31MN270J03L						
	LQH31MN330K03L	33					
	LQH31MN330J03L						
	LQH31MN390K03L	39					
	LQH31MN390J03L						
	LQH31MN470K03L	47					
	LQH31MN470J03L						
	LQH31MN560K03L	56					
	LQH31MN560J03L						
	LQH31MN680K03L	68					
	LQH31MN680J03L						
	LQH31MN820K03L	82					
	LQH31MN820J03L						
	LQH31MN101K03L	100					
	LQH31MN101J03L						

\*When applied Rated current to the Products, self temperature rise shall be limited to 20°C max and Inductance will be within ±10% of initial Inductance value.

**4. Testing Conditions**

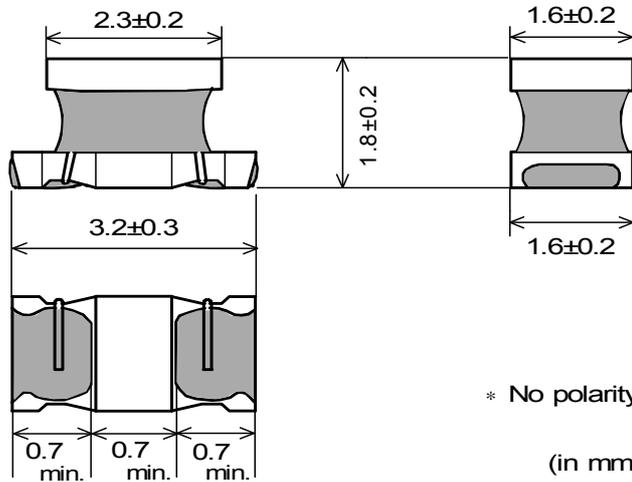
《Unless otherwise specified》

Temperature : Ordinary Temperature / 15°C to 35°C  
 Humidity : Ordinary Humidity / 25%(RH) to 85%(RH)

《In case of doubt》

Temperature : 20 ± 2°C  
 Humidity : 60%(RH) to 70%(RH)  
 Atmospheric Pressure : 86kPa to 106 kPa

**5. Appearance and Dimensions**

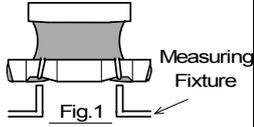


■ Unit Mass (Typical value)  
0.029g

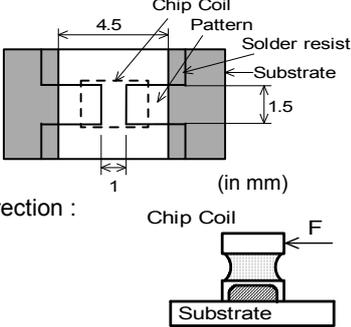
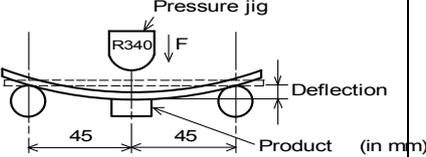
\* No polarity.

(in mm)

**6. Electrical Performance**

No.	Item	Specification	Test Method
6.1	Inductance	Inductance shall meet item 3.	Measuring Equipment : KEYSIGHT 4192A or equivalent Measuring Frequency : 1MHz Measuring Fixture : 
6.2	Q	Q shall meet item 3.	Measuring Equipment : KEYSIGHT 4192A or equivalent Measuring Frequency : 25.2MHz / 0.15µH ~ 0.82µH 10MHz / 1.0µH ~ 2.7µH 8MHz / 3.3µH ~ 8.2µH 5MHz / 10µH ~ 18µH 2.5MHz / 22µH ~ 100µH Measuring Fixture : See Fig.1.
6.3	DC Resistance	DC Resistance shall meet item 3.	Measuring Equipment : Digital multi meter
6.4	Self Resonant Frequency(S.R.F)	S.R.F shall meet item 3.	Measuring Equipment : KEYSIGHT E4991A or equivalent
6.5	Temperature Characteristics	Temperature Coefficient Inductance / 0.15µH ~ 18µH : 150 PPM/ °C±150 PPM / °C 22µH ~ 100µH : 650 PPM/ °C±450 PPM / °C	Temperature coefficient on the basis of step 3 shall meet specification after tested as follows.It shall be subjected to the condition of Table 1,and its inductance shall be measured at each step after reaching the thermal equilibrium and be calculated. <u>Table 1</u> Step1/+20°C ±2°C      Step4/+85°C ±2°C Step2/ -25°C ±2°C      Step5/+20°C ±2°C Step3/+20°C ±2°C

## 7. Mechanical Performance

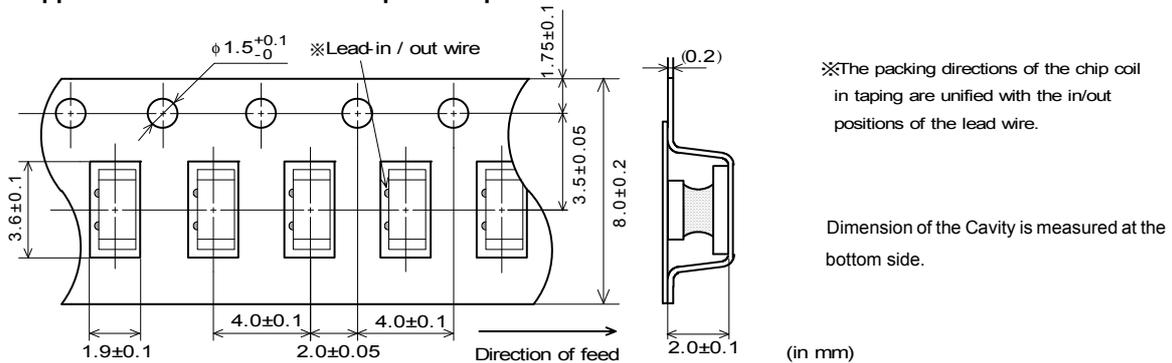
No.	Item	Specification	Test Method
7.1	Shear Test	Chip coil shall not be damaged after tested as test method.	Substrate : Glass-epoxy substrate  Applied Direction : Force : 10N Hold Duration : 5s ± 1s
7.2	Bending Test	Chip coil shall not be damaged after tested as test method.	Substrate : Glass-epoxy substrate (100mm·40mm·1.6mm) Speed of Applying Force : 1mm / s Deflection : 2mm Hold Duration : 30s 
7.3	Vibration		Oscillation Frequency : 10Hz ~ 55Hz ~ 10Hz for 1 min Total Amplitude : 1.5mm Testing Time : A period of 2 hours in each of 3 mutually perpendicular directions. (Total 6 hours)
7.4	Solderability	The wetting area of 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±10°C / 60 to 90seconds Solder Temperature : 240±5°C Immersion Time : 3±1 s
7.5	Resistance to Soldering Heat	Appearance:No damage Inductance Change : within ±5%	Flux: Ethanol solution of rosin, 25(wt)% (Immersed for 5s to 10s) Solder : Sn-3.0Ag-0.5Cu Pre-Heating: 150±10°C / 60 to 90seconds Solder Temperature: 270±5°C Immersion Time: 10±1 s Then measured after exposure in the room condition for 24±2 hours.

**8. Environmental Performance** (It shall be soldered on the substrate.)

No.	Item	Specification	Test Method
8.1	Heat Resistance	Appearance : No damage Inductance Change : within $\pm 5\%$ Q Change : within $\pm 20\%$	Temperature : $85\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$ Time : 1000h (+48h , -0h) Then measured after exposure in the room condition for $24\pm 2$ hours.
8.2	Cold Resistance		Temperature : $-40\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$ Time: 1000h (+48h , -0h) Then measured after exposure in the room condition for $24\pm 2$ hours..
8.3	Humidity		Temperature : $40\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$ Humidity : 90 %(RH) to 95 %(RH) Time : 1000h (+48h , -0h) Then measured after exposure in the room condition for $24\pm 2$ hours.
8.4	Temperature Cycle		1 cycle : 1 step : $-40\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C} / 30\text{ min} \pm 3\text{ min}$ 2 step : Ordinary temp. / 10 min ~ 15 min 3 step : $+85\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C} / 30\text{ min} \pm 3\text{ min}$ 4 step : Ordinary temp. / 10min ~ 15 min Total of 10 cycles Then measured after exposure in the room condition for $24\pm 2$ hours.

**9. Specification of Packaging**

**9.1 Appearance and Dimensions of plastic tape**



**9.2 Specification of Taping**

- (1) Packing quantity (standard quantity)  
2,000 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  
The sprocket holes are to the right as the tape is pulled toward the user.
- (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.

**9.3 Pull Strength**

Plastic tape	10N min.
Cover tape	

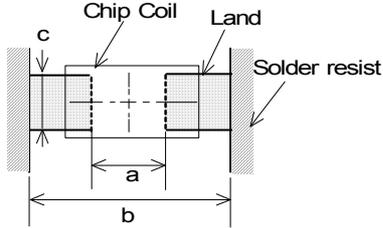


**11. Notice**

This product is designed for solder mounting.  
Please consult us in advance for applying other mounting method such as conductive adhesive.

**11.1 Land pattern designing**

Recommended land patterns for flow and reflow soldering are as follows:  
It has been designed for Electric characteristics and solderability.  
Please follow the recommended patterns. Otherwise, their performance which includes electrical performance or solderability may be affected, or result to "position shift" in soldering process.



a	1.0
b	4.5
c	1.5

(in mm)

**11.2 Flux, Solder**

Flux	<ul style="list-style-type: none"> <li>• Use rosin-based flux.</li> <li>• Don't use highly acidic flux with halide content exceeding 0.2(wt)% (chlorine conversion value).</li> <li>• Don't use water-soluble flux.</li> </ul>
Solder	<ul style="list-style-type: none"> <li>• Use Sn-3.0Ag-0.5Cu solder</li> <li>• Standard thickness of solder paste : 200µm to 300µm</li> </ul>

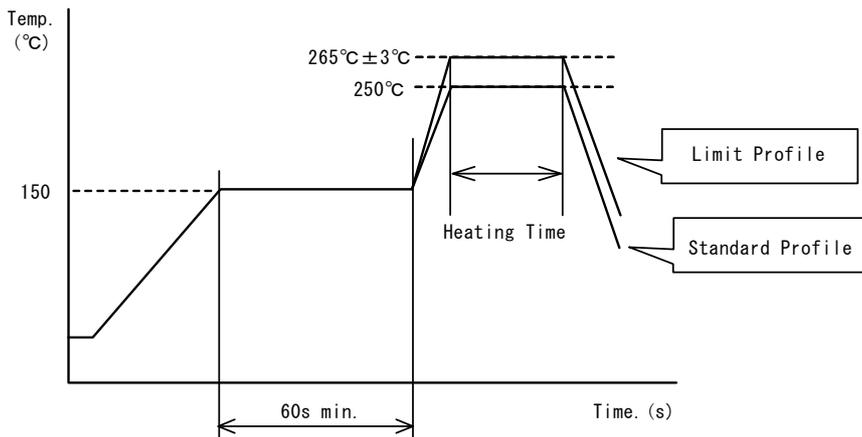
Other flux (except above) Please contact us for details, then use.

**11.3 Flow soldering / 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.

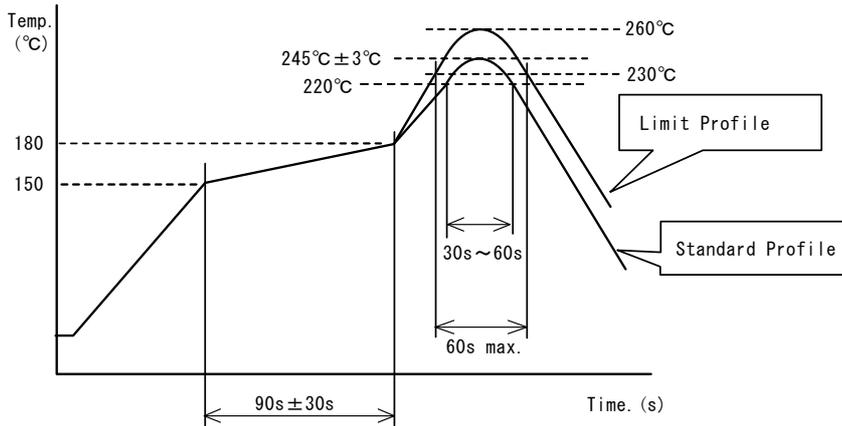
**Soldering profile**

(1)Flow soldering profile



	Standard Profile	Limit Profile
Pre-heating	150°C, 60s min.	
Heating	250°C, 4s~6s	265°C±3°C, 5s
Cycle of flow	2 times	2 times

(2)Reflow soldering profile



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

**11.4 Reworking with soldering iron.**

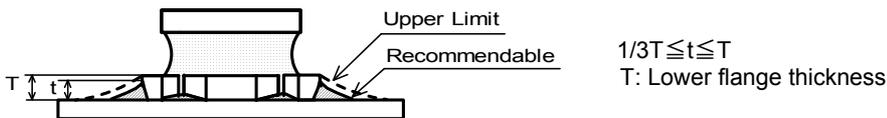
The following conditions must be strictly followed when using a soldering iron.

Pre-heating	150°C,1 min
Tip temperature	350°C max.
Soldering iron output	80W max.
Tip diameter	φ 3mm max.
Soldering time	3(+1,-0)s
Times	2 times

Note : Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the products due to the thermal shock.

**11.5 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.

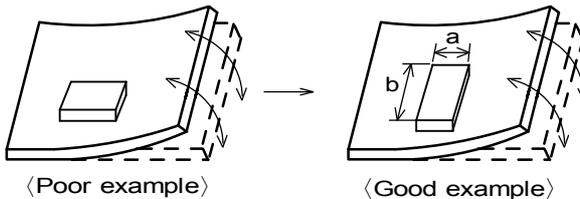


**11.6 Product's location**

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 direction]



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



**11.11 Storage and Handling Requirements**

## (1) Storage period

Use the products within 12 months after delivered.

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 to 40 °C

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

The electrode of the products is coated with solder. 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.

- 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.

**12.  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