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CHIP COIL (CHIP INDUCTORS) LQM21DN□□□□70L REFERENCE SPECIFICATION

1. Scope

This reference specification applies to Chip Coil (Chip Inductors) LQM21DN_70 series.

2. Part Numbering

(ex)

LQ	M	21	D	N	100	M	7	0	L
Product ID	Structure	Dimension (L×W)	Applications and Characteristics	Category	Inductance	Tolerance	Features	Electrode	Packaging L: Taping *B: BULK

*B: Bulk packing also available

3. Rating

・Operating Temperature Range. – 55°C to +125°C

・Storage Temperature Range. – 55°C to +125°C

Customer Part Number	MURATA Part Number	Inductance		DC Resistance (Ω)		Self Resonant Frequency (MHz min.)	Rated Current (mA)	
		(μH)	Tolerance	Typ.	Max.		*1 (Based on Inductance change)	*2(Based on Temperature rise)
	LQM21DN100M70L	10	±20%	0.65	0.845	27	250	300
	LQM21DN150M70L	15	±20%	0.95	1.235	24	140	250
	LQM21DN220M70L	22	±20%	1.25	1.625	19	100	220
	LQM21DN330M70L	33	±20%	2.30	2.99	16	80	200
	LQM21DN470M70L	47	±20%	2.30	2.99	12	50	200
	LQM21DN101M70L	100	±20%	3.15	4.095	8	20	160

*1: When applied Rated current to the Products, Inductance will be within ±50% of initial inductance value range.

*2: When applied Rated current to the Products, temperature rise caused by self-generated heat shall be limited to 40℃ max.

4. Testing Conditions

《Unless otherwise specified》

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

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

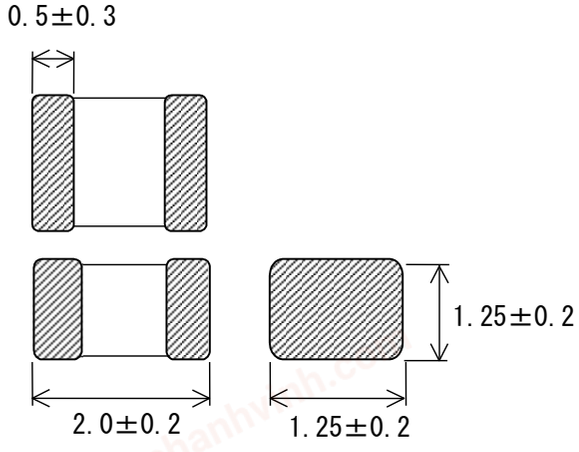
《In case of doubt》

Temperature : 20°C ± 2°C

Humidity : 60%(RH) to 70%(RH)

Atmospheric Pressure : 86kPa to 106kPa

5. Appearance and Dimensions



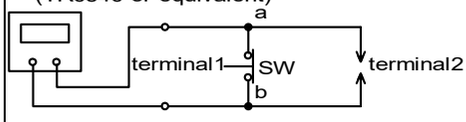
■Unit Mass (Typical value)
0.016g

(in mm)

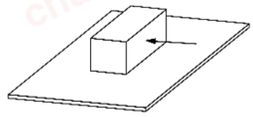
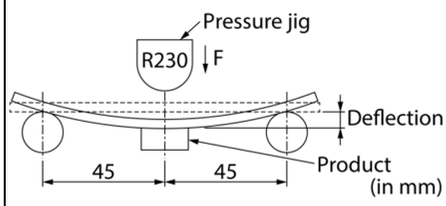
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6. Electrical Performance

No.	Item	Specification	Test Method
6.1	Inductance	Inductance shall meet item 3.	Measuring Equipment: KEYSIGHT 4294A or equivalent (1mA) Measuring Frequency: 1MHz
6.2	DC Resistance	DC Resistance shall meet item 3.	Measuring Equipment: Digital multi meter Digital multi meter (TR6846 or equivalent)  DC resistance shall be measured after putting chip coil between the terminal 2 under the condition of opening between a and b. Every measurement the terminal 1 shall be shorted between a and b when changing chip coil.
6.3	Self Resonant Frequency (S.R.F)	S.R.F shall meet item 3.	Measuring Equipment: KEYSIGHT 4294A or equivalent

7. Mechanical Performance

No.	Item	Specification	Test Method
7.1	Shear test	No significant mechanical damage or no sign of electrode peeling off shall be observed.	The product is soldered on a substrate for test. Applying force: 10 N Holding time: 5 s 
7.2	Bending test	No significant mechanical damage or no sign of electrode peeling off shall be observed.	The product is soldered on a substrate for test. Test substrate: glass-epoxy substrate (100 mm × 40 mm × 1.6 mm) Pressurizing speed: 1.0 mm/s Pressure jig: R230 Amount of bending: 2 mm Holding time: 20 s 
7.3	Vibration	Appearance shall have no significant mechanical damage.	The product is soldered on a substrate for test. Oscillation frequency: 10 Hz to 2000 Hz to 10 Hz/20 min Amplitude: total amplitude of 3.0 mm or acceleration amplitude of 196 m/s2, whichever is smaller Test time: 3 directions perpendicular to each other, 2 h for each direction (6h in total)

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No.	Item	Specification	Test Method
7.4	Resistance to soldering heat	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±50%	Flux: Ethanol solution of rosin, 25(wt)% Pre-heating: 150°C/60 s Solder: Sn-3.0Ag-0.5Cu solder Solder temperature: 260°C±5°C Immersion time: 10 s Post-treatment: left for 4 hours to 48 hours at room temperature.
7.5	Solderability	95% or more of the outer electrode shall be covered with new solder seamlessly.	Flux: Ethanol solution of rosin, 25(wt)% Pre-heating: 150°C/60 s Solder: Sn-3.0Ag-0.5Cu solder Solder temperature: 245°C±3°C Immersion time: 3 s

8. Environmental Performance

It shall be soldered on the substrate.

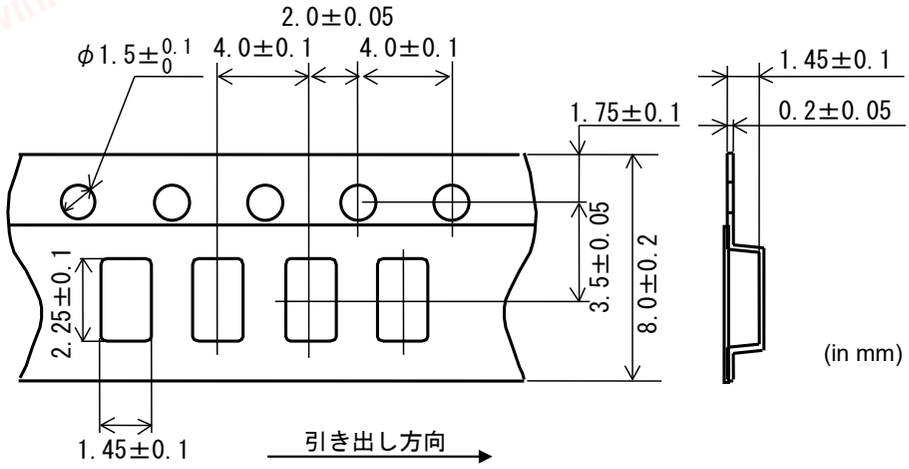
No.	Item	Specification	Test Method
8.1	Heat Life	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±50% (for LQM21DN101M70L +40%-60%)	Temperature: 125°C±2°C Applying Current: Rated Current Test time: 1000 h (+48 h, -0 h) Post-treatment: left for 4 hours to 48 hours at room temperature.
8.2	Heat resistance	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±50% (for LQM21DN101M70L +40%-60%)	Temperature: 125°C±2°C Test time: 1000 h (+48 h, -0 h) Post-treatment: left for 4 hours to 48 hours at room temperature.
8.3	Cold resistance	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±50%	Temperature: -55°C±2°C Test time: 1000 h (+48 h, -0 h) Post-treatment: left for 4 hours to 48 hours at room temperature.
8.4	Humidity	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±50% (for LQM21DN101M70L +40%-60%)	Temperature: 40°C±2°C Humidity: 90% to 95% (RH) Test time: 1000 h (+48 h, -0 h) Post-treatment: left for 4 hours to 48 hours at room temperature.
8.5	Temperature Cycle	Appearance: No significant mechanical damage shall be observed. Inductance change rate: within ±50%	Single cycle conditions: Step 1: -55°C (+0°C, -3°C), 30 min (+3 min, -0 min) Step 2: ordinary temperature, 3 min max. Step 3:+150°C (+3°C, -0°C), 30 min (+3 min, -0 min) Step 4: ordinary temperature, 3 min max. Number of testing: 100 cycles Post-treatment: left for 4 hours to 48 hours at room temperature.

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9. Specification of Packaging

9.1 Appearance and Dimensions of plastic tape (8mm-wide)



Dimension of the Cavity is measured at the bottom side.

9.2 Specification of Taping

(1) Packing quantity (standard quantity)
3,000 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.

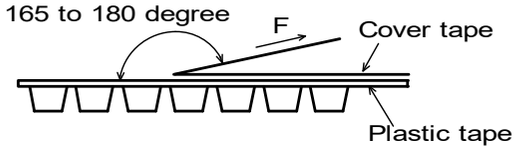
(5) Missing components number
Missing components number within 0.025% of the number per reel or 1 pc., whichever is greater, and are not continuous. The Specified quantity per reel is kept.

9.3 Pull Strength

Plastic tape	10N min.
Cover tape	5N min.

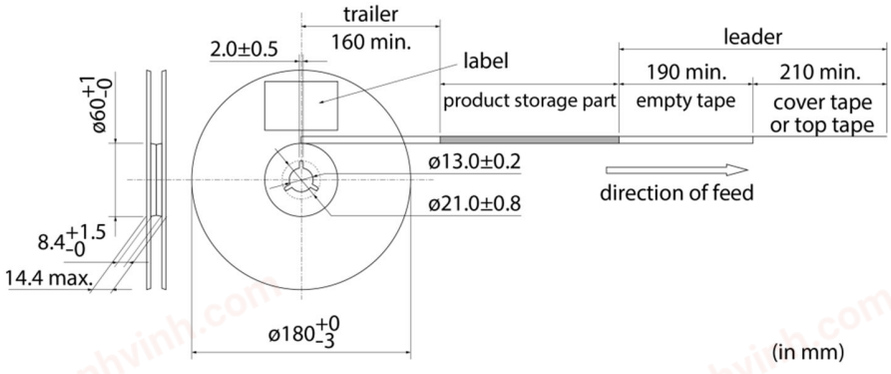
9.4 Peeling off force of cover tape

Speed of Peeling off	300mm / min
Peeling off force	Plastic tape: 0.1N to 0.7N (minimum value is typical)



9.5 Dimensions of Leader-tape, Trailer and Reel

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



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9.6 Marking for reel

Customer part number, MURATA part number, Inspection number (∗1) ,RoHS marking (∗2), Quantity etc ・・・

∗1) <Expression of Inspection No.> □□ OOOO ×××
(1) (2) (3)

(1) Factory Code
(2) Date First digit : Year / Last digit of year
Second digit : Month / Jan. to Sep. → 1 to 9, Oct. to Dec. → O, N, D
Third, Fourth digit : Day
(3) Serial No.

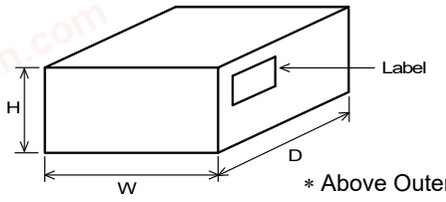
∗2) <Expression of RoHS marking > ROHS – Y (△)
(1) (2)

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

9.7 Marking for Outside package (corrugated paper box)

Customer name, Purchasing order number, Customer part number, MURATA part number, RoHS marking (∗2), Quantity, etc ・・・

9.8. Specification of Outer Case



Outer Case Dimensions (mm)			Standard Reel Quantity in Outer Case (Reel)
W	D	H	
186	186	93	5

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

10. ⚠Caution

10.1 Limitation of Applications

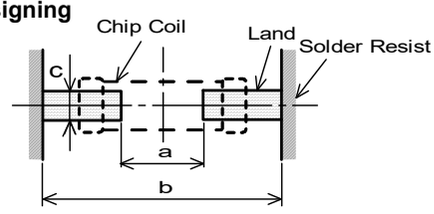
Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

(1) Aircraft equipment
(2) Aerospace equipment
(3) Undersea equipment
(4) Power plant control equipment
(5) Medical equipment
(6) Transportation equipment (trains, ships, etc.)
(7) 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

11. Notice

This product is designed for solder mounting.
Please consult us in advance for applying other mounting method such as conductive adhesive.
Cracks may occur at the connection of solder (solder fillet portion) due to the difference of the coefficient of thermal expansion from a mounting board when heat stress like heat cycle, etc. are repeatedly given to them.

11.1 Land pattern designing



a	1.2
b	3.0 to 4.0
c	1.0

(in mm)

11.2 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: 100 μm to 150 μm.

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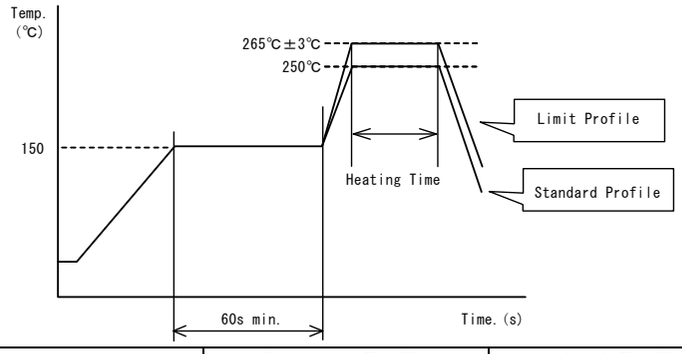
11.3 Flow soldering / Reflow soldering conditions

・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.

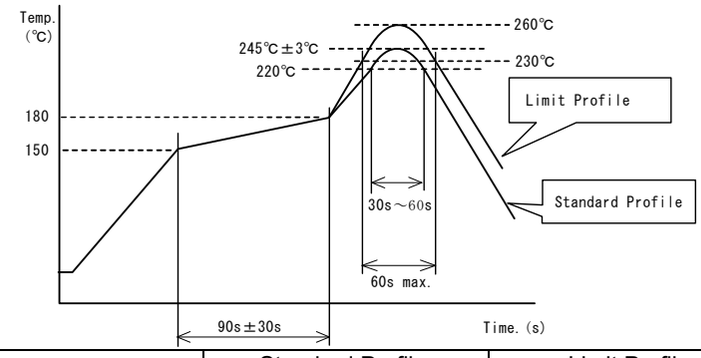
Soldering profile

(1) Flow soldering profile



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

(2) 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

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	φ3mm max.
Soldering time	3(+1, -0)s
Time	2 times

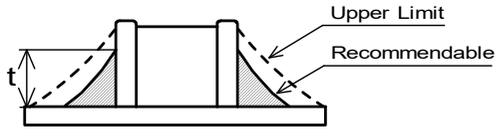
Note : Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the products due to the thermal shock.

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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.



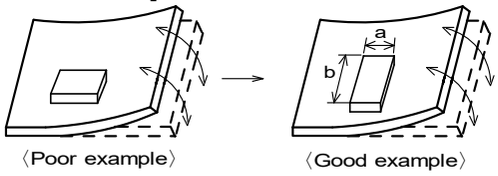
1/3T≦t≦T
T: thickness of electrode

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]

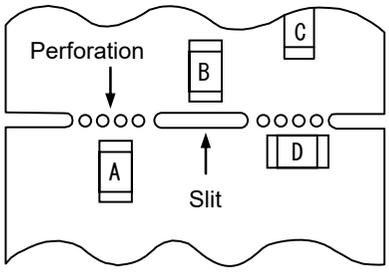


Products shall be located in the sideways direction (Length: a‹b) to the mechanical stress.

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

It is effective to implement the following measures, to reduce stress in separating the board.
It is best to implement all of the following three measures; however, implement as many measures as possible to reduce stress.

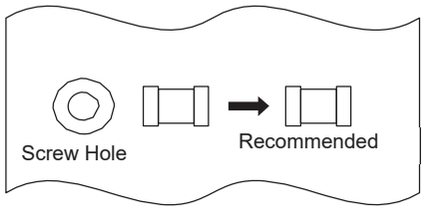
Contents of Measures	Stress Level
(1) Turn the mounting direction of the component parallel to the board separation surface.	A > D *1
(2) Add slits in the board separation part.	A > B
(3) Keep the mounting position of the component away from the board separation surface.	A > C



*1 A > D is valid when stress is added vertically to the perforation as with Hand Separation.
If a Cutting Disc is used, stress will be diagonal to the PCB, therefore A > D is invalid.

(3) Mounting Components Near Screw Holes

When a component is mounted near a screw hole, it may be affected by the board deflection that occurs during the tightening of the screw. Mount the component in a position as far away from the screw holes as possible.



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11.7 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 / l 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.

11.8 Resin coating

The inductance value may change and/or it may affect on the product's performance due to high cure-stress of resin to be used for coating/molding products. So please pay your careful attention when you select resin. In prior to use, please make the reliability evaluation with the product mounted in your application set.

11.9 Caution for use

There is possibility that the inductance value change due to magnetism. Don't use a magnet or a pair of tweezers with magnetism when chip coil are handled. (The tip of the tweezers should be molded with resin or pottery.)

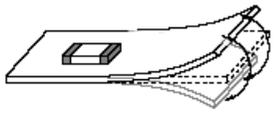
11.10 Magnetic Saturation

When the excessive current over rated current is applied, the inductance value may change due to magnetism.

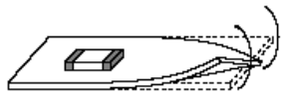
11.11 Handling of a substrate

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.

Bending



Twisting



11.12 Storage and Handing Requirements

(1) Storage period
Use the products within 6 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
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 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.
・Products should be stored under the airtight packaged condition.

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

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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 order