CHIP COILS (CHIP INDUCTORS) LQM2HPZ□□□□J0□
Murata Standard Reference Specification [AEC-Q200]

1. Scope

This reference specification applies to chip coils (chip inductors) LQM2HPZ_J0 series for automotive electronics based on AEC-Q200 except for power trains and safeties.

2. Part Numbering

(Ex.)

LQ	M	2H	P	Z	1R0	M	J	0	L
Product ID	Structure	Dimension (L × W)	Application and characteristic	Category	Inductance	Tolerance	Dimension (T)	Other	Packaging L: taping *B: bulk

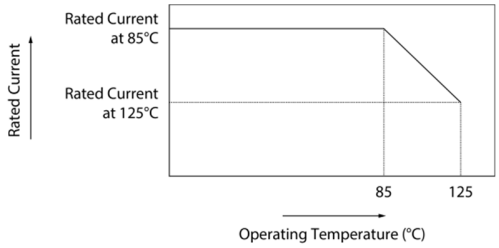
*B: Bulk packing is also available.

3. Part Number and 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 (A)*1		ESD Rank 4: < 8 kV
		Nominal value (μH)	Tolerance (%)			Ambient temperature 85°C*2	Ambient temperature 125°C*2	
	LQM2HPZ1R0MJ0L	1.0	±20	0.09±25%	70	1.5	1.1	4
	LQM2HPZ2R2MJ0L	2.2	±20	0.12±25%	40	1.0	0.75	4
	LQM2HPZ3R3MJ0L	3.3	±20	0.12±25%	30	1.0	0.75	4

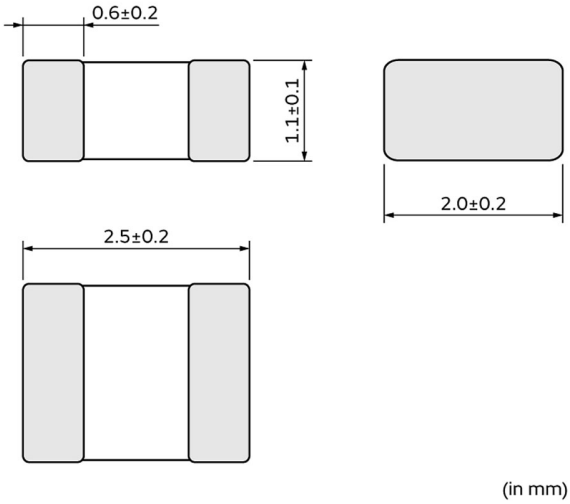
*1 When rated current is applied to the products, temperature rise caused by self-generated heat shall be limited to 40°C max.
*2 As shown in the diagram below, derating is applied to the rated current based on the operating temperature.



4. Testing Conditions

Unless otherwise specified	Temperature: ordinary temperature (15°C to 35°C) Humidity: ordinary humidity [25% to 85% (RH)]
In case of doubt	Temperature: 20°C±2°C Humidity: 60% to 70% (RH) Atmospheric pressure: 86 kPa to 106 kPa

5. Appearance and Dimensions



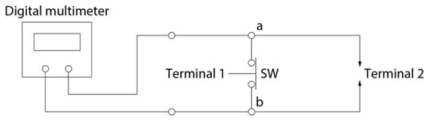
(in mm)

Unit mass (typical value): 0.027 g

6. Marking

No marking.

7. Electrical Performance

No.	Item	Specification	Test method
7.1	Inductance	Meet chapter 3 ratings.	Measuring equipment: Keysight 4294A or the equivalent (1 mA) Measuring frequency: 1 MHz
7.2	DC resistance	Meet chapter 3 ratings.	Measuring equipment: digital multimeter Measuring circuit:  Measure with the product set to terminal 2 and the switch pressed (open between a and b). When setting or removing the product, press the switch to short between a and b.
7.3	Self-resonant frequency	Meet chapter 3 ratings.	Measuring equipment: Keysight 4294A or the equivalent

8. AEC-Q200 Requirement

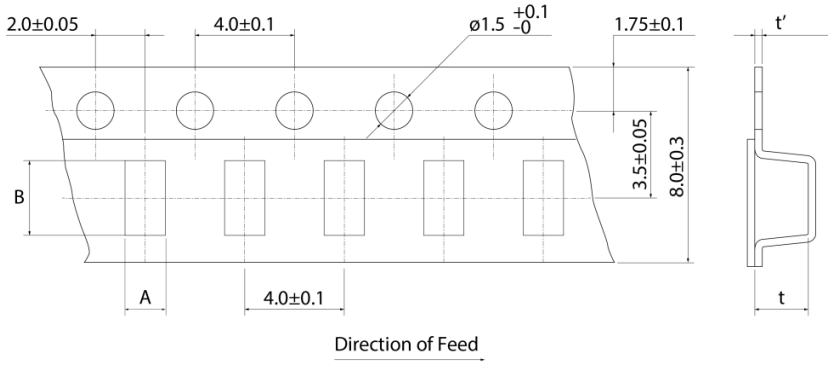
8.1 Performance [based on table 5 for magnetics (inductors/transformer) AEC-Q200 Rev. D issued June 1, 2010]

AEC-Q200			Murata specification/deviation
No.	Stress	Test method	
3	High temperature exposure	1000 h at 125°C Set for 24 h at room temperature, then measured. Unpowered.	Meet table A after testing. Table A Appearance: No damage Inductance change (at 1 MHz): Within ±20%
4	Temperature cycling	1000 cycles -55°C to +125°C Set for 24 h at room temperature, then measured.	Meet table A after testing.

AEC-Q200			Murata specification/deviation
No.	Stress	Test method	
7	Biased humidity	1000 h at 85°C, 85% (RH)	Meet table B after testing. Table B Appearance: No damage Inductance change (at 1 MHz): Within ±50%
8	Operational life	Apply 125°C 1000 h Set for 24 h at room temperature, then measured.	Meet table B after testing.
9	External visual	Visual inspection	No abnormalities
10	Physical dimension	Meet chapter 5, "Appearance and Dimensions".	No defects
12	Resistance to solvents	Per MIL-STD-202 Method 215	Not applicable
13	Mechanical shock	Per MIL-STD-202 Method 213 Condition C: 100 g's/6 ms/half sine	Meet table A after testing.
14	Vibration	5 g's for 20 min, 12 cycles each of 3 orientations Test from 10 Hz to 2000 Hz	Meet table A after testing.
15	Resistance to soldering heat	No-heating Solder temperature 260°C±5°C Immersion time 10 s	Pre-heating: 150°C to 180°C/90 s±30 s Meet table A after testing.
17	ESD	Per AEC-Q200-002	Meet chapter 3 ratings. No defects
18	Solderbility	Per J-STD-002	Method b: not applicable 95% of the terminations is to be soldered.
19	Electrical characterization	Measured: inductance	No defects
20	Flammability	Per UL-94	Not applicable
21	Board flex	Epoxy-PCB (1.6 mm) Deflection 2 mm (min.) 60 s minimum holding time	Meet table A after testing.
22	Terminal strength	Per AEC-Q200-006 A force of 17.7 N for 60 s	No defects

9. Specification of Packaging

9.1 Appearance and dimensions of tape (8 mm width/plastic tape)



A	2.25±0.1
B	2.75±0.1
t	1.3±0.1
t'	0.25±0.05

(in mm)

* The dimensions of the cavity are measured at its bottom.

9.2 Taping specifications

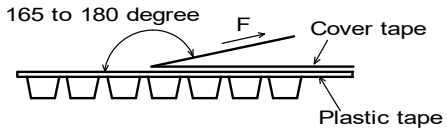
Packing quantity (Standard quantity)	3000 pcs/reel
Packing method	The products are placed in embossed cavities of a plastic tape and sealed by a cover tape.
Feed hole position	The feed holes on the plastic tape are on the right side when the cover tape is pulled toward the user.
Joint	The plastic tape and the cover tape are seamless.
Number of missing products	Number of missing products 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 Break down force of tape

Break down force of plastic tape	10 N min.
Break down force of cover tape	5 N min.

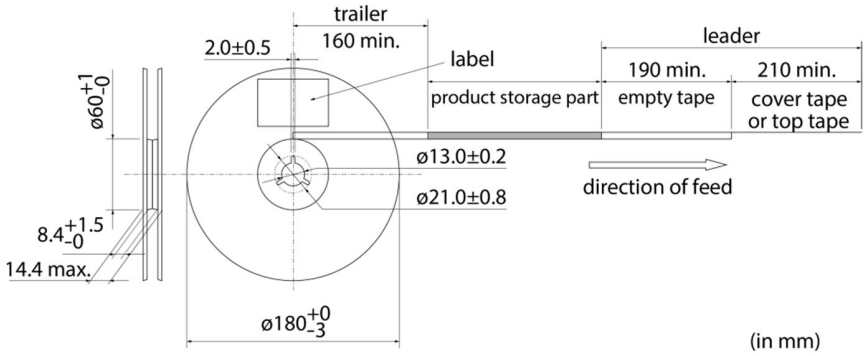
9.4 Peeling off force of cover tape

Speed of peeling off	300 mm/min
Peeling off force	0.1 N to 0.7 N (The lower limit is for typical value.)



9.5 Dimensions of leader section, trailer section and reel

A vacant section is provided in the leader (start) section and trailer (end) section of the tape for the product. The leader section is further provided with an area consisting only of the cover tape (or top tape). (See the diagram below.)



9.6 Marking for reel

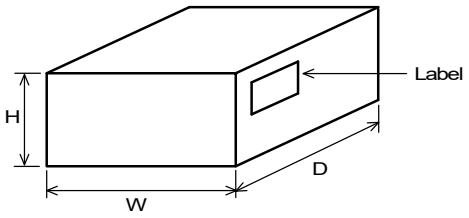
Customer part number, Murata part number, inspection number (*1), RoHS marking (*2), quantity, etc.

*1 Expression of inspection No.: □□ (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 (2) Murata classification number

9.7 Marking on outer box (corrugated box)

Customer name, purchasing order number, customer part number, Murata part number, RoHS marking (*2), quantity, etc.

9.8 Specification of outer box



Dimensions of outer box (mm)			Standard reel quantity in outer box (reel)
W	D	H	
186	186	93	5
* Above outer box size is typical. It depends on a quantity of an order.			

10. ⚠Caution

10.1 Restricted 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) Disaster/crime prevention equipment
(7) Traffic signal equipment
(8) Transportation equipment (trains, ships, etc.)
(9) Data-processing equipment
(10) Applications of similar complexity and/or reliability requirements to the applications listed in the above

10.2 Precautions on rating

Do not use the products in excess of their rated current. Doing so may cause the product to generate heat, resulting in short circuit between inner electrodes, wire breakage, or melted solder, which may cause dropping of parts.

10.3 Fail-safe

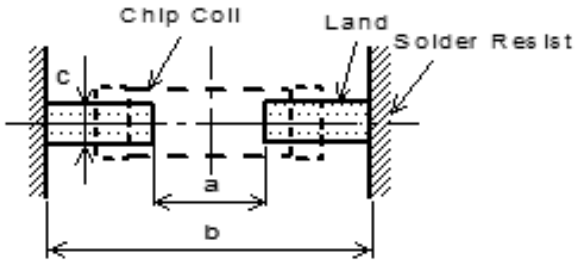
Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

11. Precautions for Use

This product is designed to be mounted by soldering. If you want to use other mounting method, for example, using a conductive adhesive, please consult us beforehand.
Also, if repeatedly subjected to temperature cycles or other thermal stress, due to the difference in the coefficient of thermal expansion with the mounting substrate, the solder (solder fillet part) in the mounting part may crack.
The occurrence of cracks due to thermal stress is affected by the size of the land where mounted, the solder volume, and the heat dissipation of the mounting substrate. Carefully design it when a large change in ambient temperature is assumed.

11.1 Land dimensions

The following diagram shows the recommended land dimensions for flow and reflow soldering:



a	1.6
b	3.0
c	1.5

(in mm)

11.2 Flux and solder used

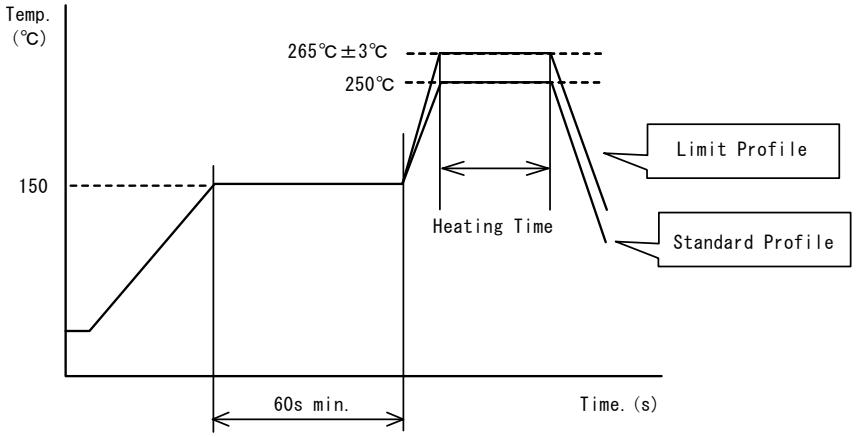
Flux	• Use a rosin-based flux. • Do not use a highly acidic flux with a halide content exceeding 0.2(wt)% (chlorine conversion value). • Do not use a water-soluble flux.
Solder	• Use Sn-3.0Ag-0.5Cu solder. • Standard thickness of solder paste: 100 μm to 150 μm

If you want to use a flux other than the above, please consult our technical department.

11.3 Soldering conditions (flow, reflow)

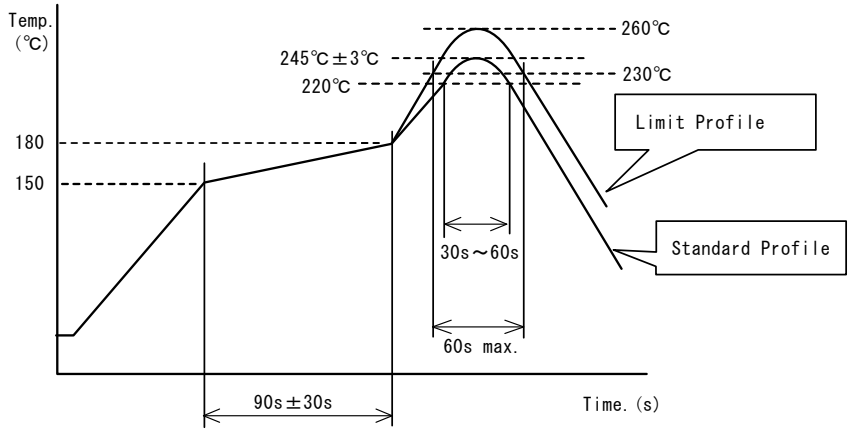
- Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 150°C max.
  Cooling into solvent after soldering also should be in such a way that the temperature difference is limited to 100°C max.
  Insufficient pre-heating may cause cracks on the product, resulting in the deterioration of product 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.

(1) Flow



	Standard profile	Limit profile
Pre-heating	150°C/60 s min.	150°C/60 s min.
Heating	250°C/4 s to 6 s	265°C±3°C/5 s
Number of flow cycles	2 times	2 times

(2) Reflow



	Standard profile	Limit profile
Pre-heating	150°C to 180°C/90 s±30 s	150°C to 180°C/90 s±30 s
Heating	Above 220°C/30 s to 60 s	Above 230°C/60 s max.
Peak temperature	245°C±3°C	260°C/10 s
Number of reflow cycles	2 times	2 times

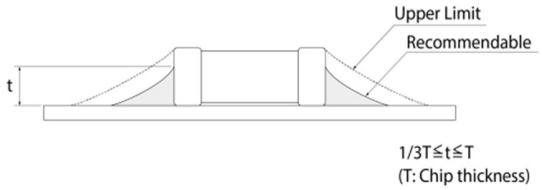
11.4 Reworking with soldering iron

The following requirements must be met to rework a soldered product using a soldering iron.

Item	Requirement
Pre-heating	150°C/approx. 1 min
Tip temperature of soldering iron	350°C max.
Power consumption of soldering iron	80 W max.
Tip diameter of soldering iron	ø3 mm max.
Soldering time	3 s (+1 s, -0 s)
Number of reworking operations	2 times max.
* Avoid a direct contact of the tip of the soldering iron with the product. Such a direction contact may cause cracks in the ceramic body due to thermal shock.	

11.5 Solder volume

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

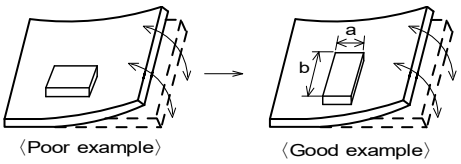


An increased solder volume increases mechanical stress on the product. Exceeding solder volume may cause the failure of mechanical or electrical performance.

11.6 Product's location

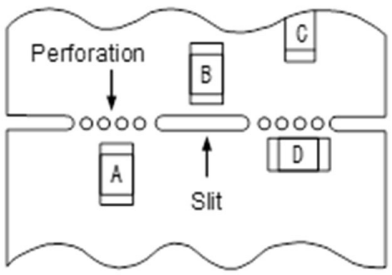
The following shall be considered when designing and laying out PCBs.

(1) PCB shall be designed so that products are not subject to mechanical stress due to warping the board.
[Products direction]
Products shall be located in the sideways direction (length: a < b) to the mechanical stress.

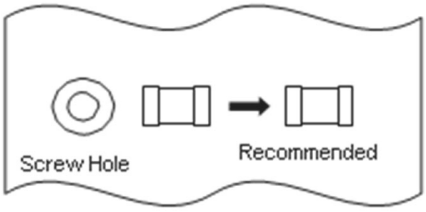


(2) Components location on PCB separation
It is effective to implement the following measures, to reduce stress in separating the board.
It is best to implement all of the following three measures; however, implement as many measures as possible to reduce stress.

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.



11.7 Handling of 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

11.8 Cleaning

The product shall be cleaned under the following conditions.
(1) The cleaning temperature shall be 60°C max. If isopropyl alcohol (IPA) is used, the cleaning temperature shall be 40°C max.
(2) Perform ultrasonic cleaning under the following conditions. Exercise caution to prevent resonance phenomenon in mounted products and the PCB.

Item	Requirement
Power	20 W/L max.
Time	5 min max.
Frequency	28 kHz to 40 kHz

(3) Cleaner
Alcohol-based cleaner: IPA
Aqueous agent: PINE ALPHA ST-100S
(4) There shall be no residual flux or residual cleaner. When using aqueous agent, rinse the product with deionized water adequately and completely dry it so that no cleaner is left.
* For other cleaning, consult our technical department.

11.9 Storage and transportation

Storage period	Use the product within 6 months after delivery. If you do not use the product for more than 6 months, check solderability before using it.
Storage conditions	• The products shall be stored in a room not subject to rapid changes in temperature and humidity. The recommended temperature range is -10°C to +40°C. The recommended relative humidity range is 15% to 85%. Keeping the product in corrosive gases, such as sulfur, chlorine gas or acid may cause the poor solderability. • Do not place the products directly on the floor; they should be placed on a palette so that they are not affected by humidity or dust. • Avoid keeping the products in a place exposed to direct sunlight, heat or vibration. • Avoid storing the product by itself bare (i.e. exposed directly to air).
Transportation	Excessive vibration and impact reduces the reliability of the products. Exercise caution when handling the products.

11.10 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.

11.11 Handling of product

Inductance could change due to the effect of magnetism. Do not use magnetized tweezers, magnets, or other similar tools when handling the product (instead, use tweezers with resin or ceramic tips).

11.12 Magnetic saturation

A current exceeding the rated current could cause the inductance value to drop due to magnetic saturation.

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.

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DFE201610P-2R2M=P2 GCM188R71H152KA37D GJM1555C1H6R0BB01D LQG18HH3N9S00D 84225C LQG15WH19NH02D LQG15WZ0N7C02D BLM18HE152SZ1D GRT155C81A105KE01D LQG15WZ9N5H02D LQH44PN3R3MPRL LQH5BPN100MT0L GRM21BC81E106ME51L LQH43MN102J03L XRCGE26M000FXA2AR0 GRM1555C1H4R7CA01D GRM033R71E222KA12D GRM1555C2A330JA01D LBEE5XV1YM-574 LQW2BAN68NG00L GRM155C81E225KE11D BLM21BD222TN1D GRM0335C1H7R0BA01D GRM033R71A472KA01D GRM155R61A223KA01D GRM31BR73A471KW01L LXES02TAA1-145 BLM18HE601SN1D DLM0QSB350HY2D LQG15HS12NJ02D