#### 1. Scope

This reference specification applies to chip coils (chip inductors) LQM18DH

### 2. Part Numbering

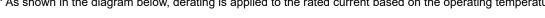
(⊏x.) LQ	М	18	DH	6R8	м	70	L	
Product ID	Туре	Dimension (L × W)	Application and characteristic (H: for automotive electronics)	Inductance	Tolerance	Category	Packaging L: taping *B: bulk	

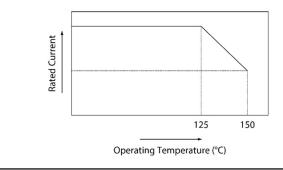
\*B: Bulk packing is also available.

(The product sealed on the carrier tape is stored in a plastic bag.)

#### 3. Part Number and Rating

Operating temperature range		-5	5°C to +1	50°C						
Storage temperature range		-5	5°C to +1	50°C						
			Indu	ctance				Rated curren (mA)	ť	
Customer	Murata		Mansinal		DC resistance Self-resonant frequency	Deceder	Based on terr		ESD	
Part number	Part number		Nominal value (µH) Tolerance (%)	(Ω)	(MHz min.)	Based on inductance change <sup>*1</sup>	Ambient temperature 125°C	Ambient temperature 150°C	rank	
	LQM18DH6R8M7	'0L	6.8	±20	0.74±0.22	40	120	330	10	4
	LQM18DH100M70L		10	±20	1.05±0.32	32	100	300	10	4
	LQM18DH150M70L		15	±20	$1.95 \pm 0.59$	24	80	220	10	4
LQM18DH220M70		0L	22	±20	$2.40 \pm 0.72$	15	50	200	10	4
	LQM18DH330M70L		33	±20	$2.40 \pm 0.72$	13	30	200	10	4
	LQM18DH470M7	0L	47	±20	$2.55 \pm 0.77$	10	20	180	10	4
* As shown ir	the diagram below	, de	rating is a	applied to	he rated curre	nt based on th	e operatinc	temperature	Э.	





ESD Rank	Maximum Withstand Voltage
4	6000 V (DC) to < 8000 V (DC)

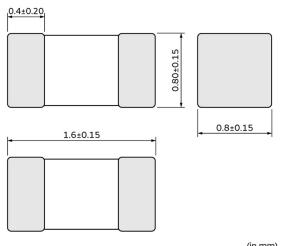
#### 4. Testing Conditions

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

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# **Reference Only**

#### 5. Appearance and Dimensions



Equivalent Circuit

### 

Unit mass (typical value): 0.005 g

(in mm)

#### 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 Measuring frequency: 1 MHz
7.2	DC resistance	Meet chapter 3 ratings.	Measuring equipment: digital multimeter Measuring circuit: Digital multimeter Terminal 1 SW 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 E4294A or the equivalent
7.4	Rated current	When rated current is applied to the products, inductance will be within ±50% of initial inductance value range. Temperature rise caused by self- generated heat shall be limited to 40°C max.	Apply the rated current specified in chapter 3.

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#### 8. Q200 Requirement

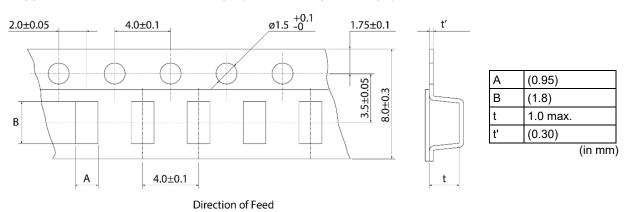
## Performance(based on Table 5 for Magnetics Inductors/Transformer) AEC-Q200 Rev.D issued June 1. 2010

No.	Stress	EC-Q200 Test Method	Murata Specification / Deviation
			· ·
	High temperature	1000 h at 150°C	Appearance: No damage
	exposure	Set for 24 h at room condition,	Inductance change rate: within ±50%
		then measured.	(Inductance value: 6.8 μH to 22 μH)
			Inductance change rate: within +40 %, -60%
			(Inductance value: 33 μH to 47 μH)
4	Temperature cycling	1000 cycles	Appearance: No damage
	iomporatare eyemig	-55°C to +150°C	Inductance change rate: within ±50%
		Set for 24 h at room condition,	
		then measured.	
7	Biased humidity	1000 h at 85°C, 85% (RH).	Appearance: No damage
		Unpowered.	Inductance change rate: within ±50%
		Set for 24 h at room condition,	
		then measured.	
8	Operational life	Apply 150°C 1000 h	Appearance: No damage
0			
		Set for 24 h at room condition,	Inductance change rate: within ±50%
		then measured.	
9	External visual	Visual inspection	No abnormalities
		•	
10	Physical dimension	Meet chapter 5, "Appearance	No defects
	,	and Dimensions".	
12	Resistance to	Per MIL-STD-202	Not applicable
12	solvents	Method 215	
13	Mechanical shock	Per MIL-STD-202	Appearance: No damage
		Method 213	Inductance change rate: within ±50%
		Condition C:	_
		100 g's/6 ms/half sine	
4.4	) (ik nation	_	
14	Vibration	5 g's for 20 min, 12 cycles each	Appearance: No damage
		of 3 orientations	Inductance change rate: within ±30%
		Test from 10 Hz to 2000 Hz	
15	Resistance	No-heating	Appearance: No damage
	to Soldering Heat	Solder temperature	Inductance change rate: within ±30%
	-	260°C±5°C	(Inductance value: 6.8 μH to 10 μH)
		Immersion time 10 s	Inductance change rate: within +50 %
			(Inductance value: $15 \mu\text{H}$ to $47 \mu\text{H}$ )
			Deviation for AEC-Q200
			Pre-heating: 150°C/60s
17	ESD	Per AEC-Q200-002	ESD Rank: Refer to chapter 3, "Part Number and Rating
			Appearance: No damage
			Inductance change rate: within ±50%
18	Solderability	Per J-STD-002	95% or more of the outer electrode shall be covered
-	-7		with new solder seamlessly.
			Deviation for AEC 0200
			Deviation for AEC-Q200
			Method b: Not applicable
			Pre-heating: 150°C/60s
19	Electrical	Measured: inductance	No defects
	Characterization		
20	Flammability	Per UL-94	Not applicable
21	Board Flex	Epoxy-PCB (1.6 mm)	Appearance:No damage
<u> </u>			
		Deflection 2 mm (min.)	Inductance change rate: within ±30%
		60 s minimum holding time	(Inductance value: 6.8 μH to 22 μH)
			Inductance change rate: within ±50%
			(Inductance value: 33 μH to 47 μH)
22	Terminal Strength	Per AEC-0200-006	Appearance: No damage
22	Terminal Strength	Per AEC-Q200-006 A force of 17.7 N for 60 s	Appearance: No damage

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#### 9. Specification of Packaging

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



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

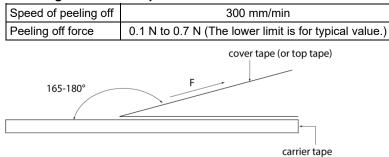
#### 9.2 Taping specifications

<u> </u>					
Packing quantity (Standard quantity)	4000 pcs/reel				
Packing method	The products are placed in cavities of a carrier tape and sealed by a cover tape (top tape and bottom tape when the cavities of the carrier tape are punched type).				
Feed hole position	The feed holes on the carrier tape are on the right side when the cover tape (top tape when the cavities of the carrier tape are punched type) is pulled toward the user.				
Joint	The carrier tape and cover tape (top tape when the cavities of the carrier tape are punched type) 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

Cover tape (or top tape)	5 N min.
Bottom tape (only when the cavities of the carrier tape are punched type)	5 N min.

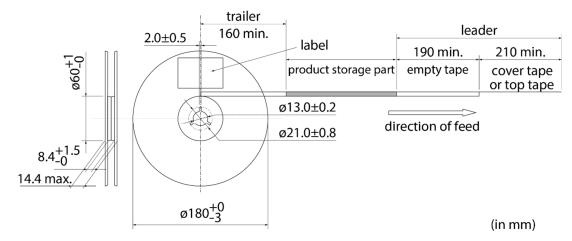
#### 9.4 Peeling off force of tape



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#### 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

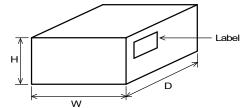
Customer part number, Murata part number, inspection number (\*1), RoHS marking (\*2), quantity, etc.

*1 Expression of inspection No.:	(1) Factory code
	(2) Date
(1) (2) (3)	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:	(1) RoHS regulation conformity
ROHS- Y (△)	(2) Murata classification number
(1) (2)	

#### 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



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

#### **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

(8) Disaster/crime prevention equipment(9) Data-processing equipment

(7) Traffic signal equipment

(6) Transportation equipment (trains, ships, etc.)

(10) Applications of similar complexity and/or reliability requirements to the applications listed in the above

#### 10.2 Precautions on rating

Avoid using in exceeded the rated temperature range, rated voltage, or rated current. Usage when the ratings are exceeded could lead to wire breakage, burning, or other serious fault.

#### 10.3 Inrush current

If an inrush current (or pulse current or rush current) that significantly exceeds the rated current is applied to the product, overheating could occur, resulting in wire breakage, burning, or other serious fault.

#### 10.4 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

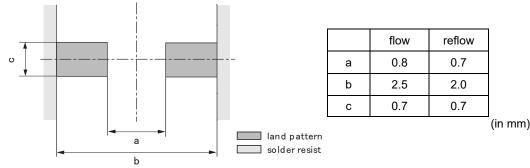
This product is designed to be mounted by soldering. If you want to use other mounting method, for example, using a conductive adhesive, please consult us beforehand.

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:



#### 11.2 Flux and solder used

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

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

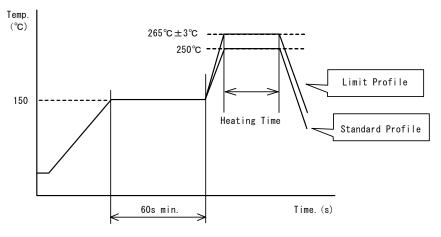
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#### 11.3 Soldering conditions (flow, reflow)

 Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 100°C max.

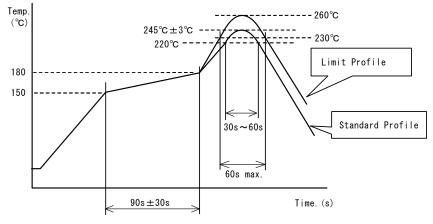
Cooling into solvent after soldering also should be in such a way that the temperature difference is limited to 100°C max. Insufficient pre-heating may cause cracks on the product, resulting in the deterioration of product quality.

- 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

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#### 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	60 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 increase the volume too much.

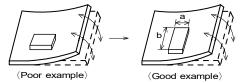
An increased solder volume increases mechanical stress on the product. Exceeding solder volume may cause the failure of mechanical or electrical performance.

#### **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.

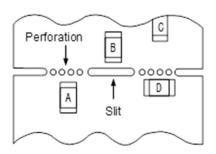


(2) Components location on PCB separation

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.	



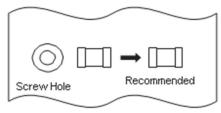
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#### (3) Mounting components near screw holes

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

#### 12.8 Cleaning

When cleaning this product, observe the following conditions.

Any cleaning may cause deterioration in the quality of the product, so please check the quality of this product before use. (1) The cleaning temperature shall be 60°C max. If isopropyl alcohol (IPA) is used, the cleaning temperature shall be 40°C max.

- (2) When ultrasonic cleaning is used, under some cleaning conditions, the substrate could resonate and the substrate vibrations could result in chip cracks, solder breakage, and other problems. Be sure to always perform a test cleaning beforehand using an actual cleaning device, and then check the quality of the products.
- (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, please 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	<ul> <li>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.</li> <li>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.</li> <li>Avoid keeping the products in a place exposed to direct sunlight, heat or vibration.</li> <li>Do not keep products in bulk packaging. Bulk storage could result in collisions between the products or between the products and other parts, resulting in chipping or wire breakage.</li> <li>Avoid storing the product by itself bare (i.e. exposed directly to air).</li> </ul>
Transportation	Excessive vibration and impact reduces the reliability of the products. Exercise caution when handling the products.

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#### 11.10 Resin coating (including moisture-proof coating)

When the product is coated/molded with resin, its electrical characteristics may change.

A wire breakage issue may occur by mechanical stress caused by the resin, amount/cured shape of resin, or operating condition etc.

Some resins contain impurities or hydrolyzable chlorine, which could result in corrosion of the conducting materials, leading to wire breakage.

So, please pay your careful attention when you select resin in case of coating/molding the products with the resin. Prior to use the coating resin, please make sure no reliability issue is observed by evaluating products mounted on your board.

#### **11.11 Mounting conditions**

Check the mounting condition before using.

Using mounting conditions (nozzles, equipment conditions, etc.) that are not suitable for products may lead to pick up errors, misalignment, or damage to the product.

#### 11.12 Operating environment

Do not use this product under the following environmental conditions as it may cause deterioration of product quality. (1) In the corrodible atmosphere such as acidic gases, alkaline gases, chlorine, sulfur gases, organic gases and etc.

- (the sea breeze, Cl2, H2S, NH3, SO2, NO2, etc)
- (2) In the atmosphere where liquid such as organic solvent, may splash on the products.

(3) In the atmosphere where the temperature/humidity changes rapidly and it is easy to dew.

#### 11.13 Mounting density

If this product is placed near heat-generating products, be sure to implement sufficient heat-dissipating measures. If this product is subjected to a significant amount of heat from other products, this could adversely affect product quality, resulting in a circuit malfunction or failure of the mounted section. Also, be sure that the product is used in a manner so that the heat that the product is subjected to from other products does not exceed the upper limit of the rated operating temperature for the product.

#### **11.14 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).

### 12. **ANote**

(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

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