

CHIP COIL (CHIP INDUCTORS) LQH43NH□□□□03L
Murata Standard Specification 【AEC-Q200】

1.Scope

This specification applies to LQH43NH series, Chip coil (Chip Inductors) for automotive Electronics based on AEC-Q200 .

2.Part Numbering

(ex) LQ H 43 N H 1R0 M 0 3 L
 Product ID Structure Dimension Applications Category Inductance Tolerance Features Electrode Packaging
 (L×W) and Characteristics L:Taping

3.Rating

- Operating Temperature Range. -40 °C to +125 °C
- Storage Temperature Range. -40 °C to +125 °C

Customer's Part Number	MURATA Part Number	Inductance		Q (min.)	DC Resistance		Self Resonant Frequency (MHz min)	*1:Rated Current (mA)	ESD 5A: 8kV
		(μH)	Tolerance (%)		(Ω)	Tolerance (%)			
	LQH43NH1R0M03L	1.0	M: ±20	20	0.033	±20	120	1300	5A
	LQH43NH1R2K03L	1.2	K: ±10		0.043		100	1100	
	LQH43NH1R5J03L	1.5	J: ±5		0.049		85	1000	
	LQH43NH1R8J03L	1.8			0.043		75	1050	
	LQH43NH2R2J03L	2.2			0.049		62	1000	
	LQH43NH2R7J03L	2.7			0.053		53	950	
	LQH43NH3R3J03L	3.3			0.077		47	800	
	LQH43NH3R9J03L	3.9			0.12		41	650	
	LQH43NH4R7J03L	4.7			0.090		38	750	
	LQH43NH5R6J03L	5.6			25		0.11	33	
	LQH43NH6R8J03L	6.8	30	0.18		31	530		
	LQH43NH8R2J03L	8.2		0.18	27	530			
	LQH43NH100J03L	10	35	0.20	23	480			
	LQH43NH120J03L	12		0.25	21	420			
	LQH43NH150J03L	15		0.30	19	390			
	LQH43NH180J03L	18		0.35	17	365			
	LQH43NH220J03L	22		0.47	15	300			
	LQH43NH270J03L	27		0.60	14	280			
	LQH43NH330J03L	33		0.70	12	250			
	LQH43NH390J03L	39		0.80	11	230			
	LQH43NH470J03L	47		0.87	10	210			
	LQH43NH560J03L	56		1.34	9.3	180			
	LQH43NH680J03L	68	1.52	8.4	170				
	LQH43NH820J03L	82	1.70	7.5	165				
	LQH43NH101J03L	100	40	2.00	6.8	150			
	LQH43NH121J03L	120		2.60	6.2	130			
	LQH43NH151J03L	150		3.00	5.5	120			

Customer's Part Number	MURATA Part Number	Inductance		Q (min.)	DC Resistance		Self Resonant Frequency (MHz min)	*1:Rated Current (mA)	ESD 5A: 8kV
		(μH)	Tolerance (%)		(Ω)	Tolerance (%)			
	LQH43NH181J03L	180	J: ±5	40	±20	3.40	5.0	110	5A
	LQH43NH221J03L	220				3.80	4.5	100	
	LQH43NH271J03L	270				5.50	4.0	90	
	LQH43NH331J03L	330				6.20	3.6	85	
	LQH43NH391J03L	390				6.90	3.3	80	
	LQH43NH471J03L	470				7.80	3.0	75	
	LQH43NH561J03L	560				11.3	2.7	60	
	LQH43NH681J03L	680				12.9	2.5	55	
	LQH43NH821J03L	820				14.5	2.2	50	
	LQH43NH102J03L	1000				15.5	2.0	45	
	LQH43NH122J03L	1200				20.3	1.8	40	
	LQH43NH152J03L	1500				23.7	1.6	35	
	LQH43NH182J03L	1800				26.7	1.5	35	
	LQH43NH222J03L	2200				30.6	1.3	30	

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

4. Testing Conditions

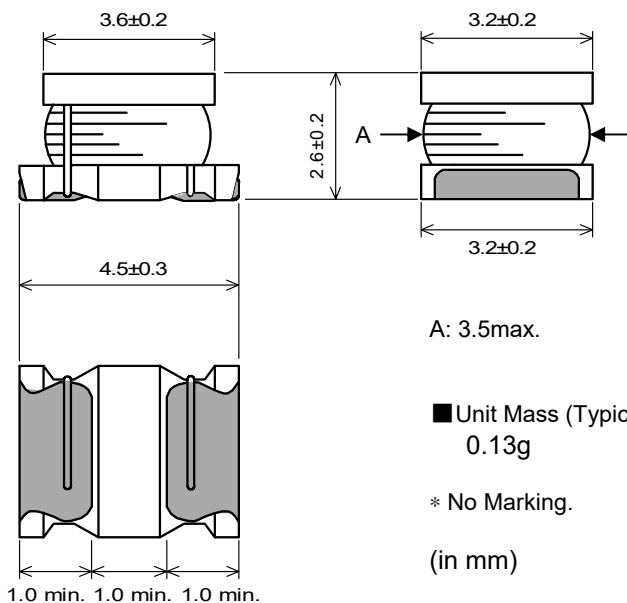
《Unless otherwise specified》

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 (No marking)



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 / 1.0 to 390μH 1kHz / 470 to 2200μH
6.2	Q	Q shall meet item 3.	Measuring Equipment: KEYSIGHT 4192A or equivalent Measuring Frequency: 1MHz / 1.0 to 82μH 796kHz / 100 to 820μH 252kHz / 1000 to 2200μH
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

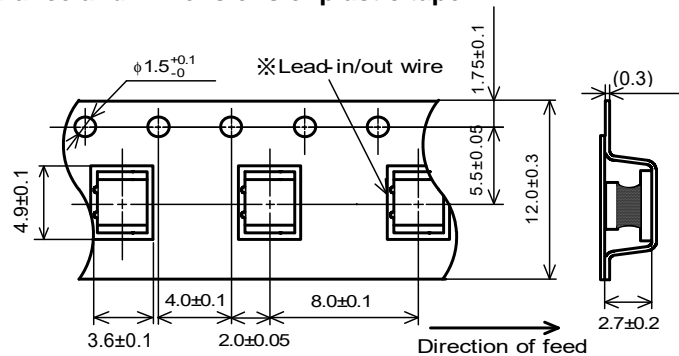
7. AEC-Q200 Requirement**7.1 Performance (based on Table 5 for Magnetics(Inductors / Transformer)****AEC-Q200 Rev.D issued June. 1 2010**

AEC-Q200			Murata Specification / Deviation				
No	Stress	Test Method					
3	High Temperature Exposure	1000hours at 125 deg C Set for 24hours at room temperature, then measured.	Meet Table A after testing. Table A <table border="1" style="margin-left: 20px;"> <tr> <td>Appearance</td> <td>No damage</td> </tr> <tr> <td>Inductance change</td> <td>Within ±10%</td> </tr> </table>	Appearance	No damage	Inductance change	Within ±10%
Appearance	No damage						
Inductance change	Within ±10%						
4	Temperature Cycling	1000cycles -40 deg C to + 125 deg C Set for 24hours at room temperature, then measured.	Meet Table A after testing.				
7	Biased Humidity	1000hours at 85 deg C, 85%RH unpowered.	Meet Table A after testing.				
8	Operational Life	Apply 125 deg C 1000 hours Set for 24hours at room temperature, then measured	Meet Table A after testing.				
9	External Visual	Visual inspection	No abnormalities				
10	Physical Dimension	Meet ITEM 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 100g's/6ms/Half sine	Meet Table A after testing.				
14	Vibration	5g's for 20 minutes, 12cycles eah of 3 orientations Test from 10-2000Hz. 12cycles each of 3 orientations	Meet Table A after testing.				
15	Resistance to Soldering Heat	No-heating Solder temperature 260C+/-5 deg C Immersion time 10s	Meet Table A after testing.				
17	ESD	Per AEC-Q200-002	Meet Item 3 (Rating) No defects				
18	Solderbility	Per J-STD-002	Method B : Not Applicable 95% of the terminations is to be soldered. (Except exposed wire)				
19	Electrical Characterization	Measured : Inductance	No defects				

AEC-Q200			Murata Specification / Deviation				
No	Stress	Test Method					
20	Flammability	Per UL-94	Not Applicable				
21	Board Flex	Epoxy-PCB(1.6mm) Deflection 2mm(min) 60s minimum holding time	Murata deviation request: 5s Meet Table B after testing. <u>Table B</u> <table border="1" style="margin-left: 20px;"> <tr> <td>Appearance</td> <td>No damage</td> </tr> <tr> <td>DC resistance change</td> <td>Within ±10%</td> </tr> </table>	Appearance	No damage	DC resistance change	Within ±10%
Appearance	No damage						
DC resistance change	Within ±10%						
22	Terminal Strength	Per AEC-Q200-006 A force of 17.7N for 60s	No defects				

8. Specification of Packaging

8.1 Appearance and Dimensions of plastic tape



※The packing directions of the chip coil in taping are unified with the in/out positions of the lead wire.

Dimension of the Cavity is measured at the bottom side.

8.2 Specification of Taping

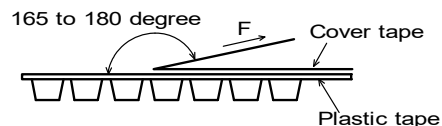
- (1) Packing quantity (standard quantity)
500 pcs / reel
- (2) Packing Method
Products shall be packed in the each embossed cavity of plastic tape and sealed by cover tape.
- (3) Sprocket hole
The sprocket holes are to the right as the tape is pulled toward the user.
- (4) Spliced point
Plastic tape 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.

8.3 Pull Strength

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

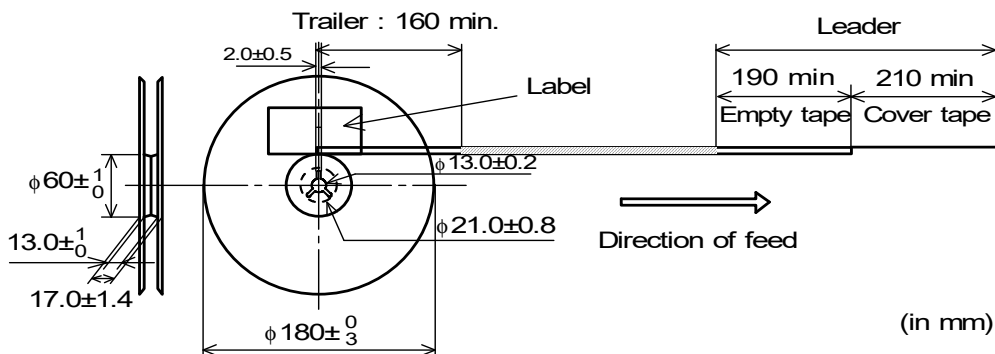
8.4 Peeling off force of cover tape

Speed of Peeling off	300mm / min
Peeling off force	0.2N to 0.7N (minimum value is typical)



8.5 Dimensions of Leader-tape, Trailer and Reel

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



8.6 Marking for reel

Customer part number, MURATA part number, Inspection number(*1), RoHS marking(*2), Quantity etc ...

*1) <Expression of Inspection No.> □□ OOOO xxx
 (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.

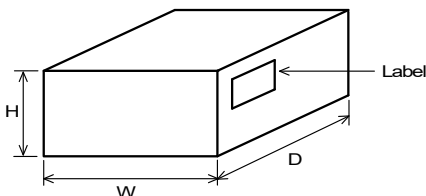
*2) « Expression of RoHS marking » ROHS - Y (Δ)
 (1) (2)

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

8.7 Marking for Outside package (corrugated paper box)

Customer name, Purchasing order number, Customer part number, MURATA part number, RoHS marking (*2), Quantity, etc ...

8.8. 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

9. ⚠ Caution

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

9.2 Caution(Rating)

Do not exceed maximum rated current of the product. Thermal stress may be transmitted to the product and short/open circuit of the product or falling off the product may be occurred.

9.3 Fail-safe

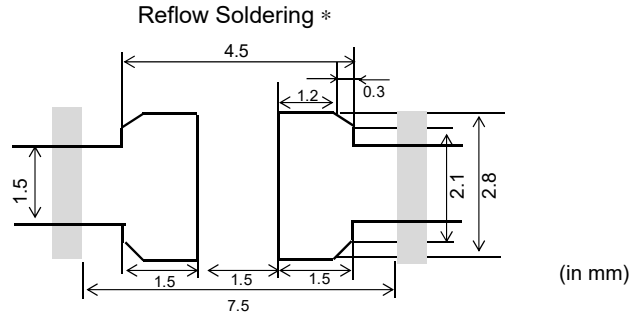
Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

10. Notice

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

10.1 Land pattern designing

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



10.2 Flux, Solder

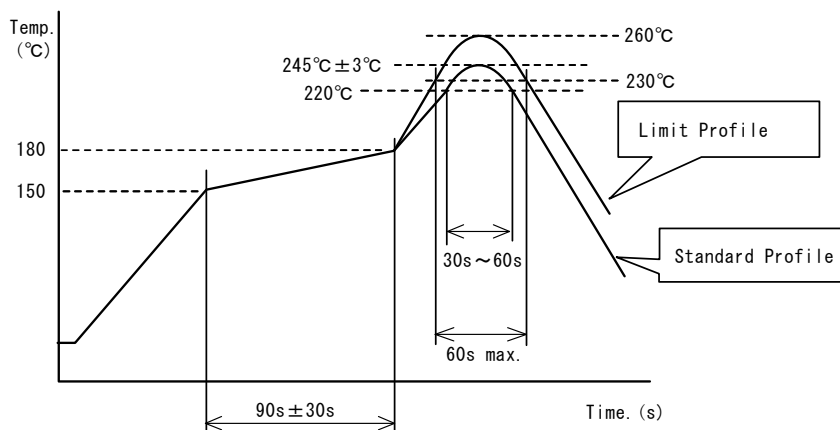
Flux	<ul style="list-style-type: none"> • Use rosin-based flux. • Don't use highly acidic flux with halide content exceeding 0.2(wt)% (chlorine conversion value). • Don't use water-soluble flux.
Solder	<ul style="list-style-type: none"> • Use Sn-3.0Ag-0.5Cu solder • Standard thickness of solder paste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

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

10.3 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	150~180°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	2time

10.4 Reworking with soldering iron.

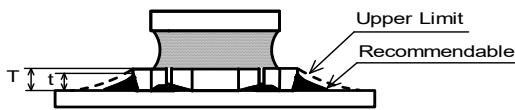
The following conditions must be strictly followed when using a soldering iron.

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
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.

10.5 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.



$$1/3T \leq t \leq T$$

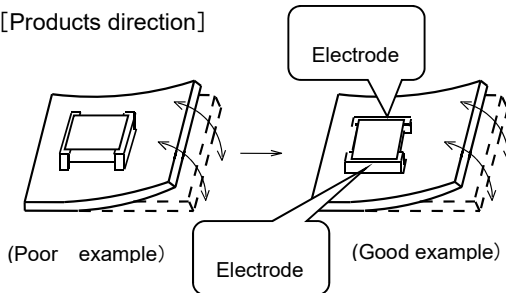
T: Lower flange thickness

10.6 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]

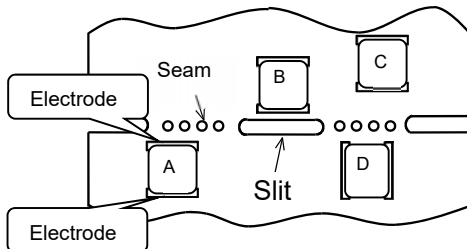


The electrode part of the products should be located like the picture to the mechanical stress.

- (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.

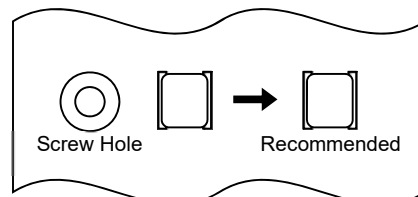
Contents of Measures	Stress Level
(1) Turn the mounting direction of the component parallel to the board separation surface.	A > D *1
(2) Add slits in the board separation part.	A > B
(3) Keep the mounting position of the component away from the board separation surface.	A > C



*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.



10.7 Cleaning Conditions

Products shall be cleaned on the following conditions.

- (1) Cleaning temperature shall be limited to 60°C max.(40°C max for alcohol type cleaner.)
- (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. Alternative 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.

10.8 Resin coating (moistureproof coating)

Do not make any resin coating.

The inductance value may change due to high cure-stress of resin to be used for coating/molding products. An open circuit issue may occur by mechanical stress caused by the resin, amount/cured shape of resin, or operating condition etc. Some resin contains some impurities or chloride possible to generate chlorine by hydrolysis under some operating condition may cause corrosion of wire of coil, leading to open circuit.

10.9 Caution for use

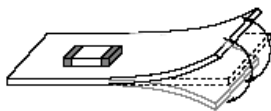
- Sharp material such as a pair of tweezers or other material such as bristles of cleaning brush, shall not be touched to the winding portion to prevent the breaking of wire.
- Mechanical shock should not be applied to the products mounted on the board to prevent the breaking of the core

10.10 Handling of a substrate

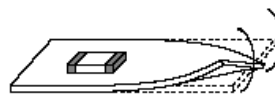
After mounting products on a substrate, do not apply any stress to the product caused by bending or twisting to the substrate when cropping the substrate, inserting and removing a connector from the substrate or tightening screw to the substrate.

Excessive mechanical stress may cause cracking in the product.

Bending



Twisting



10.11 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

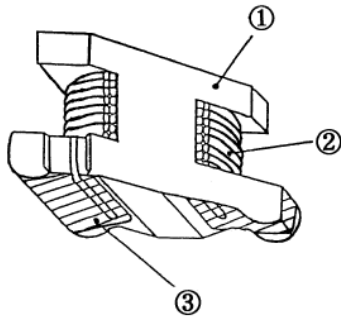
Humidity : 15 % to 85 % relative humidity No rapid change on temperature and humidity

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.

11. Structure, Construction material

No.	Item	General Material Name
①	Core	Ferrite
②	Wire	Polyurethane Enameled Copper Wire
③	Electrode	Ni alloy + High - Temperature solder (Sn-Cu)

12. Country of origin, Production Plant

Country of origin : Malaysia
 Production Plant : Murata Electronics (Malaysia) Sdn.Bhd.
 Plot 15, Bemban Industrial Park Jalan Bemban, 31000 Batu Gajah, Perak, Malaysia

Or

Country of origin : Japan
 Production Plant : Anamizu Murata Manufacturing Co., Ltd.
 Oomachi Chi 53, Anamizu-Machi Housu-gun Ishikawa Japan

Or

Country of origin : Japan
 Production Plant : Tome Murata Manufacturing Co., Ltd.
 11-1, Nakae 4-Chome, Sanuma,
 Hasama-Chou, Tome-Shi,
 Miyagi, Japan

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 agreed specifications.
- (3) Please return one duplicate of this product specification to us with your signature to acknowledge your receipt. If the duplicate is not returned by two month after issued date, the product specification will be deemed to have been received by you.
- (4) We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

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