

Bluetooth Low Energy Module Data Sheet

Dialog Semiconductor Chipset
for Bluetooth 4.1

Tentative P/N : LBCA2HNZYZ-711

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Revision History

Revision Code	Date	Description
	Oct.24.2013	First issue
A	Feb.13.2014	4. Dimensions and Terminal Configurations Added Dimensions of m6 and m7 5. Revised Absolute Maximum Ratings 6. Revised Operating Condition 10. Revised RF Characteristics 12. Recommended Land Pattern Corrected to Top view
B	Mar.20.2014	11. packing Information Added the figure of Tape and Reel
C	Apr.23.2014	1. Revised Scope Added the weight 5.Revised Absolute Maximum Ratings 8.Revised Sleep Clock for 32kHz Crystal 10.Revised RF Characteristics 13.Revised Application Circuit
D	Apr.29.2014	11.Revised Packing Information
E	Jun.04.2014	5.Revised Absolute Maximum Ratings 6. Operating Conditions 10.Revised RF Characteristics
F	Jul.02.2014	4.Revised Dimensions and Terminal Configurations 10.Revised RF Characteristics 13.Revised Application Circuit

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 Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Murata products and disclaimers thereto appears at the end of this specification sheet.

1. Scope

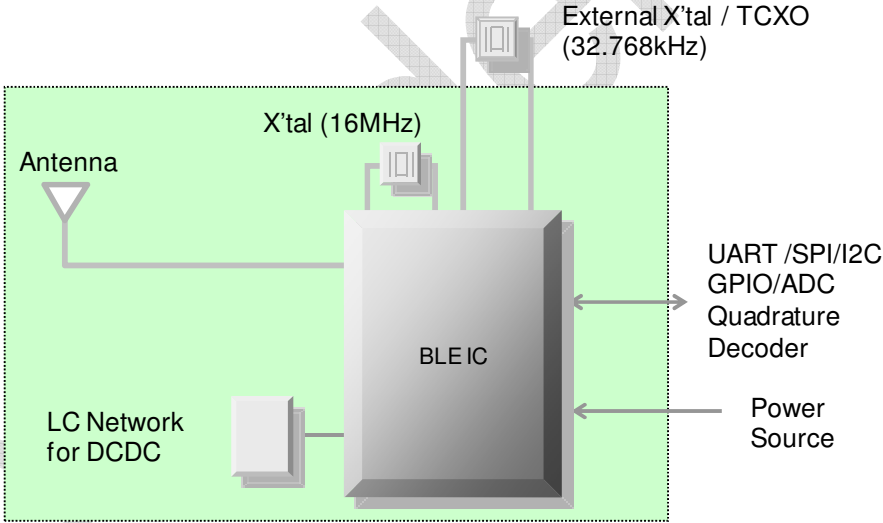
This specification is applied to the Bluetooth low energy module.

- Interface : UART/SPI
- IC : DA14580 (Dialog Semiconductor)
- Reference Clock : Internal Crystal.
- Weight : 0.107g
- MSL : 3
- RoHS : This module is compliant with the RoHS directive.

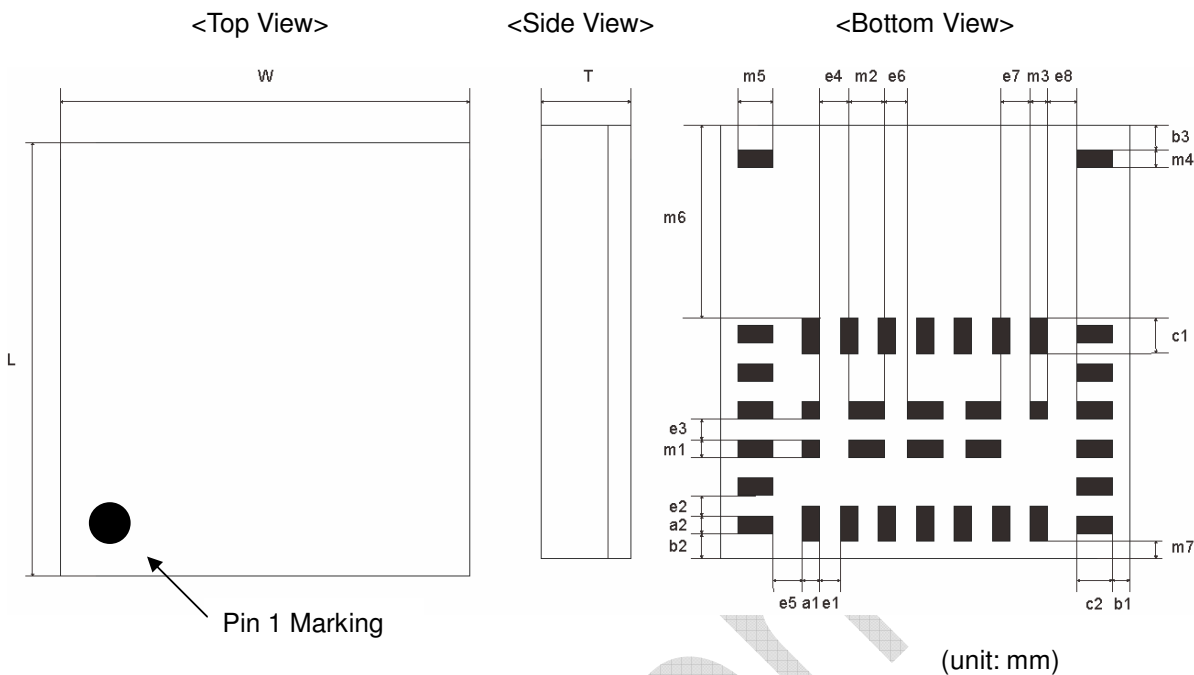
2. Part Number

Part Number	LBCA2HNZYZ-711
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3. Block Diagram



4. Dimensions and Terminal Configurations

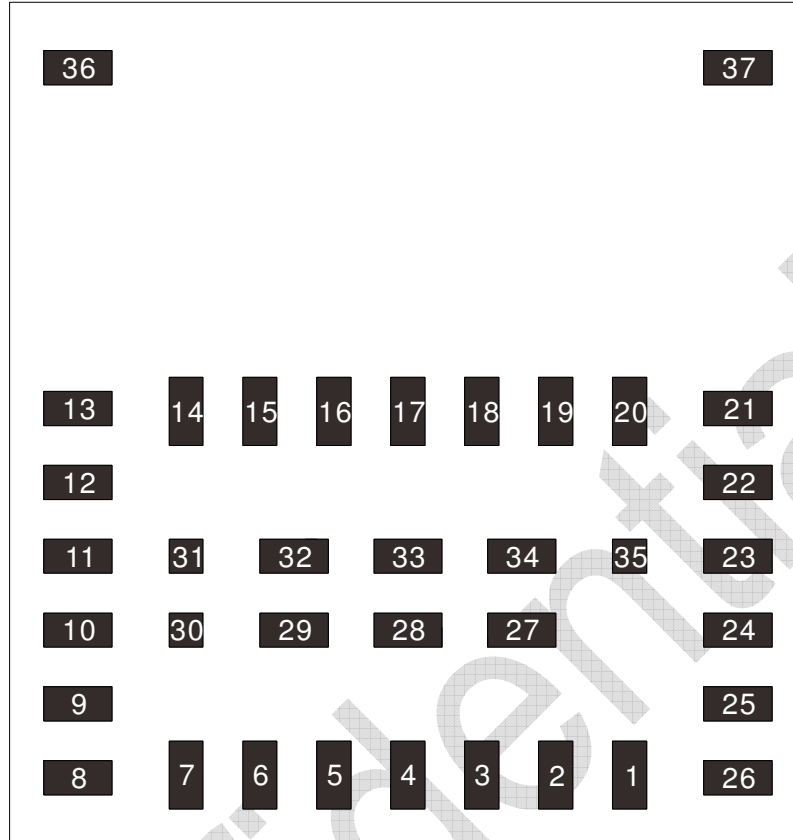


Dimension

Mark	Dimensions	Mark	Dimensions	Mark	Dimensions	Mark	Dimensions
L	7.4±0.25	W	7.0±0.25	T	1.0 Max		
a1	0.3±0.1	a2	0.3±0.1				
b1	0.3±0.2	b2	0.425±0.2	b3	0.425±0.2		
c1	0.6±0.1	c2	0.6±0.1				
e1	0.35±0.1	e2	0.35±0.1	e3	0.35±0.1	e4	0.5±0.1
e5	0.5±0.1	e6	0.4±0.1	e7	0.5±0.1	e8	0.5±0.1
m1	0.3±0.1	m2	0.6±0.1	m3	0.3±0.1	m4	0.3±0.1
m5	0.6±0.1	m6	3.3±0.2	m7	0.3±0.2		

Terminal Configurations

<Bottom View>



No.	Terminal Name	Connection to IC Terminal	Description
1	P0_5	P0_5	INPUT/OUTPUT with selectable pull up/down resistor. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes. Contain state retention mechanism during power down.
2	P0_7	P0_7	
3	P0_6	P0_6	
4	SWCLK	SWCLK	INPUT JTAG clock signal
5	SWDIO	SWDIO	INPUT/OUTPUT. JTAG Data input/output. Bidirectional data and control communication
6	GND	GND	GND
7	VBAT	VBAT	INPUT Battery connection.
8	GND	GND	GND
9	XTAL32KP	XTAL32KP	INPUT. Crystal input for the 32.768 kHz XTAL
10	XTAL32KM	XTAL32KM	OUTPUT. Crystal output for the 32.768 kHz XTAL
11	P0_3	P0_3	INPUT/OUTPUT with selectable pull up/down resistor. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes. Contain state retention mechanism during power down.
12	P0_2	P0_2	
13	ANTout	-	※refer to reference schematic
14	ANTin	-	※refer to reference schematic
15	GND	GND	GND
16	GND	GND	GND

No.	Terminal Name	Connection to IC Terminal	Description
17	GND	GND	GND
18	GND	GND	GND
19	NC	-	NC
20	GND	GND	GND
21	GND	GND	GND
22	P0_1	P0_1	INPUT/OUTPUT with selectable pull up/down resistor. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes. Contain state retention mechanism during power down.
23	P0_0	P0_0	
24	P0_4	P0_4	
25	RST	RST	INPUT. Reset signal (Active High). It can be connected to GND if not used.
26	GND	GND	GND
27	GND	GND	GND
28	GND	GND	GND
29	GND	GND	GND
30	P1_1	P1_1	INPUT/OUTPUT with selectable pull up/down resistor. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes. Contain state retention mechanism during power down.
31	VPP	VPP	INPUT. This pin is used while OTP programming and testing. OTP programming: $VPP = 6.8V \pm 0.25V$ OTP Normal operation: VPP float
32	GND	GND	GND
33	GND	GND	GND
34	GND	GND	GND
35	P1_0	P1_0	INPUT/OUTPUT with selectable pull up/down resistor. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes. Contain state retention mechanism during power down.
36	NC		NC
37	NC		NC

5. Absolute Maximum Ratings

Item	Min	Max	Unit	Remarks
Storage Temperature	-40	85	degC	
VBAT		3.6	V	

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability. No damage assuming only one parameter is set at limit at a time with all other parameters are set within operating condition.

6. Operating Condition

Item	Min	Typ	Max	Unit	Remarks
Operating Temperature ^{*1}	-40		85	degC	
VBAT	2.35		3.3	V	
RF Load Impedance		50		Ω	

*1 Functionality is guaranteed but specifications require derating at extreme temperatures.

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7. DC Characteristics

Parameters	Description	Conditions	Min	Typ	Max	Unit
V_{IH}	HIGH level input voltage	Active mode	0.84			V
V_{IL}	LOW level input voltage	Active mode			0.36	V
V_{OH}	HIGH level output voltage	Active mode	1.88			V
V_{OL}	LOW level output voltage	Active mode			0.47	V
$I_{IH}(PD)$	HIGH level input current with internal pull down enabled	$V_{in} = V_{BAT} = 2.5V$	50		150	μA
$I_{IL}(PU)$	LOW level input current with internal pull up enabled	$V_{in} = GND = 0V$	-150		-50	μA

8. Sleep Clock

For 32kHz Crystal

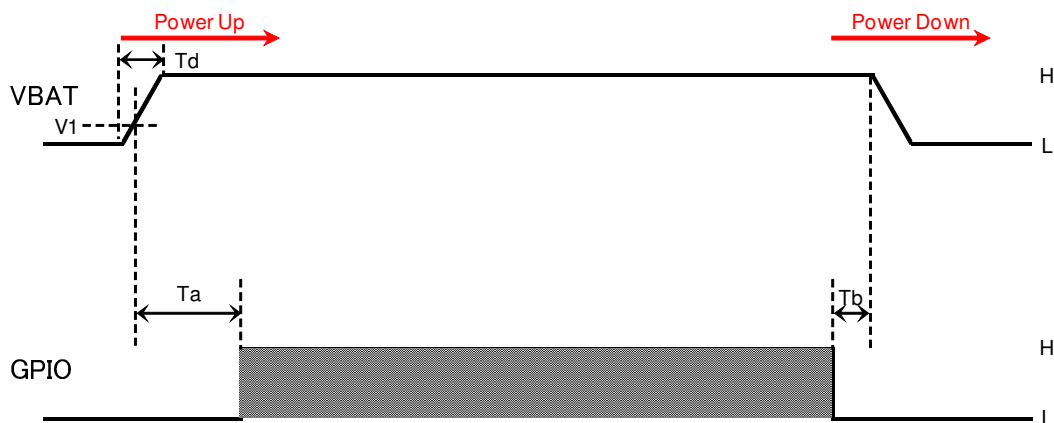
Parameters	Description	Conditions	Min	Typ	Max	Unit
f_{XTAL}	Crystal frequency			32.768		kHz
ESR	Equivalent Series Resistance				100	kohm
C_L	Load Capacitance		6	7	9	pF
C_0	Shunt Capacitance			1	2	pF
df_{XTAL}	Crystal frequency tolerance		-250		250	ppm
D_{Lmax}	Maximum drive level		0.1			μW

For 32kHz Crystal Oscillator

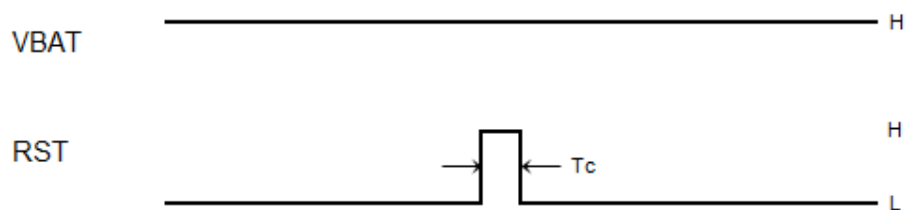
Parameters	Description	Conditions	Min	Typ	Max	Unit
f_{XO}	Oscillator frequency			32.768		kHz
A_{XO}	Amplitude		100		1500	mVpp
df_{XO}	Frequency tolerance		-250		250	ppm

9. Power Sequence

Power Up / Down Sequence



Reset and Power Cycle Sequence



Symbol	Description	Typ	Unit
Ta	Time between VCC valid and GPIO enabled	Ta > 500	us
Tb	Time between GPIO invalid and VCC invalid	Tb > 0	us
Tc	Length of RST pulse	Tc > 10	us
Td	Required VBAT ramp-up time	Td < 50	ms
V1	Threshold voltage of VBAT rise up	V1 > 2.35	V

10. RF Characteristics

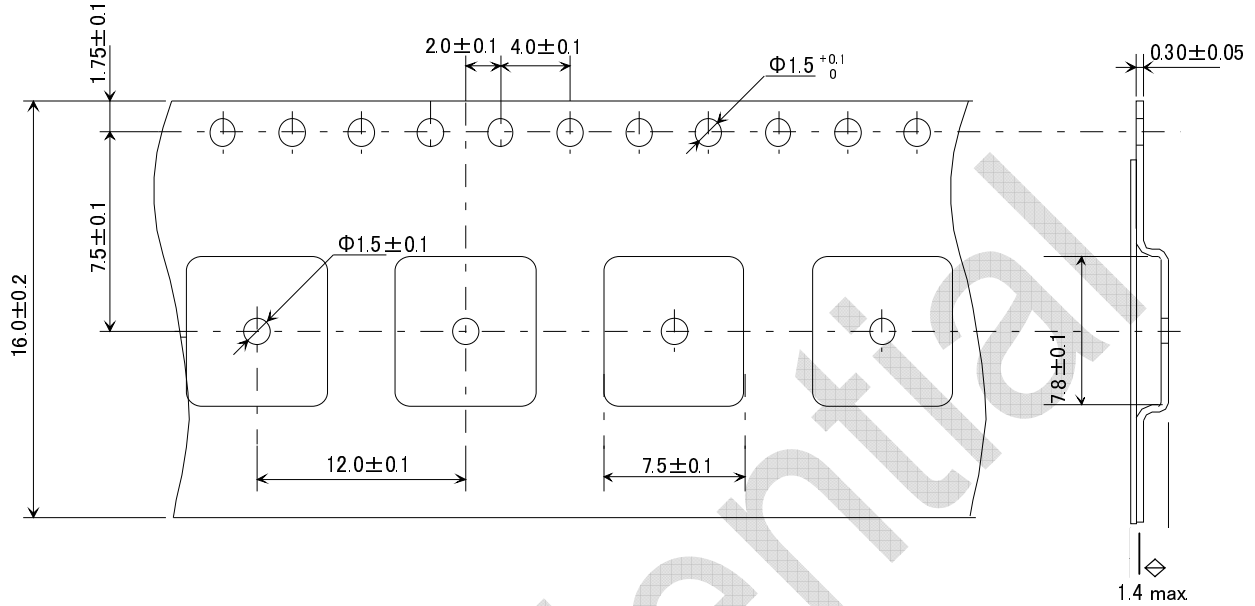
Normal Condition: VBAT=3.0V, +25deg.C, (otherwise notified)

Item / Conditions	Spec.			Unit
	MIN	TYP	MAX	
Center frequency	2402	-	2480	MHz
Channel Spacing	-	2	-	MHz
Number of RF Channels	-	40	-	-
Output power (Measured at ANT pin)	-	-1	-	dBm
Modulation characteristics				
1) $\Delta f_{1\text{avg}}$	225	-	275	kHz
2) $\Delta f_{2\text{max}}$ (at 99.9%)	185	-	-	kHz
3) $\Delta f_{2\text{avg}} / \Delta f_{1\text{avg}}$	0.8	-	-	-
Carrier frequency offset and drift				
1) Frequency offset: $ f_n - f_{TX} $	-	-	150	kHz
2) Frequency drift: $ f_0 - f_n $	-	-	50	kHz
3) Drift rate #0: $ f_1 - f_0 $	-	-	20	kHz
4) Drift rate #n: $ f_n - f_{n-5} $	-	-	20	kHz
Receiver sensitivity (PER < 30.8%)	-	-93	-70	dBm
Maximum input signal level (PER < 30.8%)	-10	-	-	dBm
PER Report Integrity (-30dBm input)	50	-	65.4	%
TX Current consumption	-	4.8	-	mA
RX Current consumption	-	5.1	-	mA

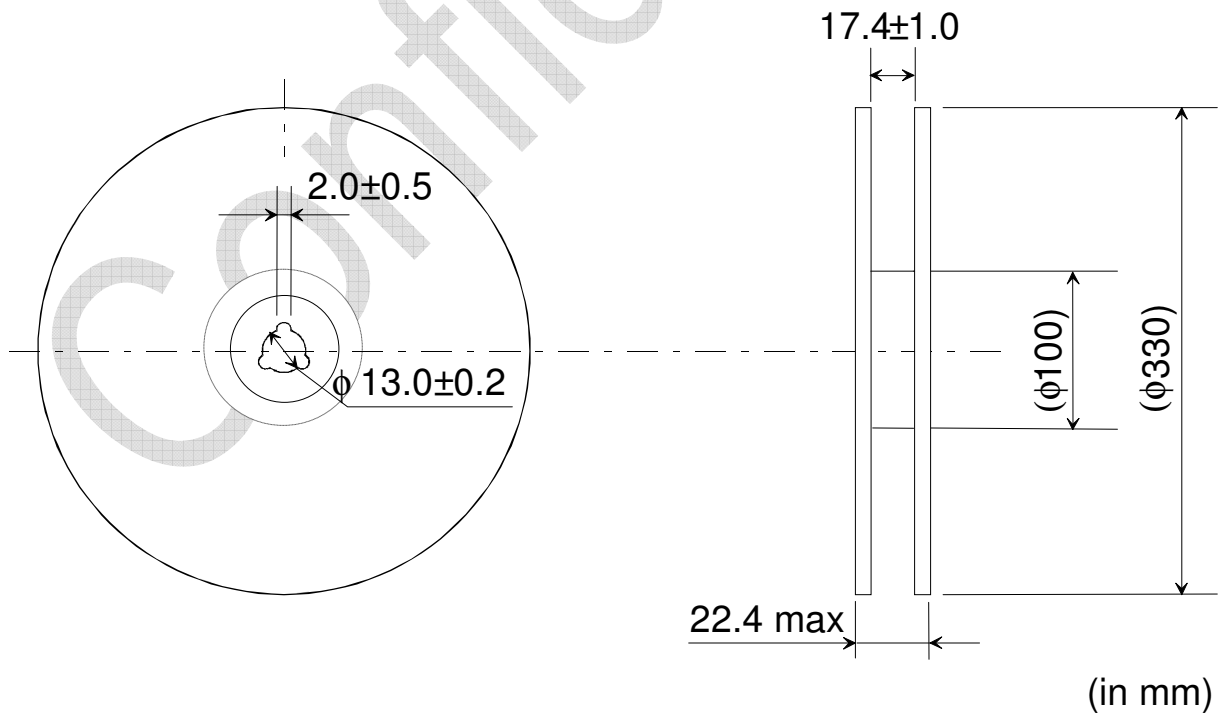
*Since Murata cannot always guarantee 100% connection success in all actual condition, please implement retry of connection until success if you will program the application software for central device.

11. Packing Information

(1) Dimensions of Tape (Plastic tape)

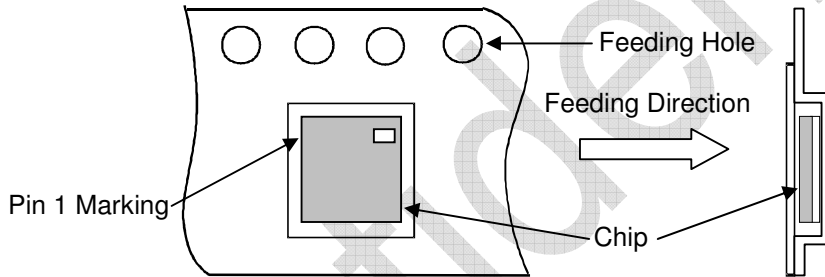
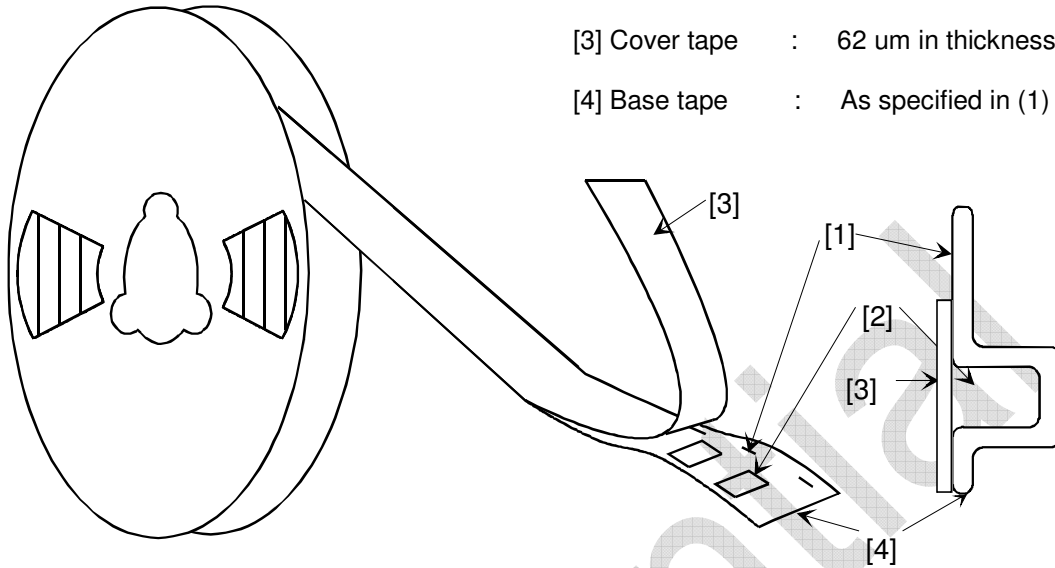


(2) Dimensions of Reel

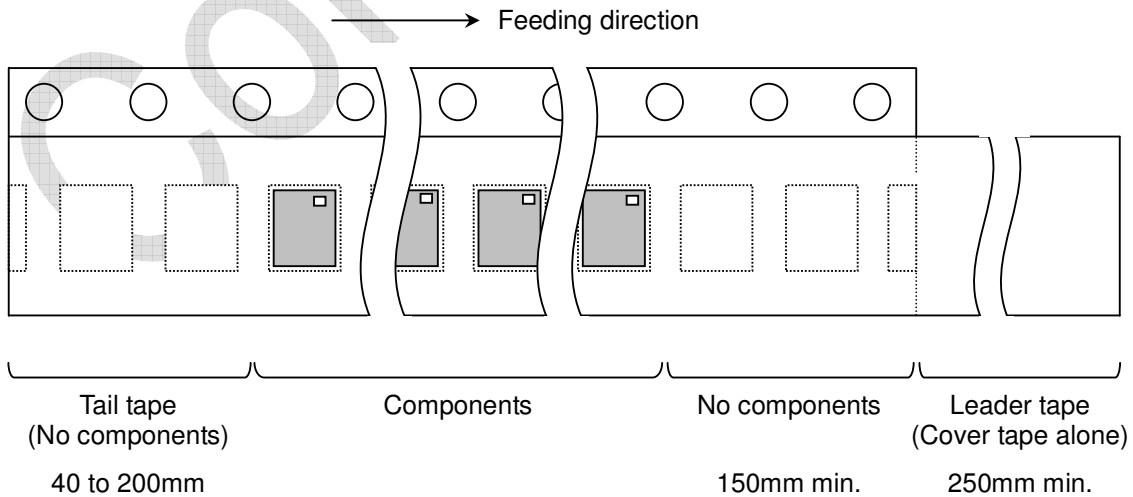


(3) Taping Diagrams

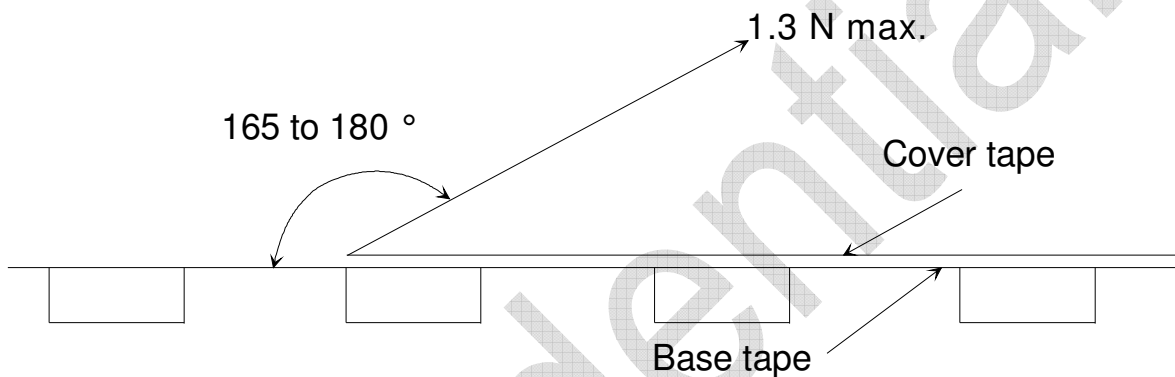
- [1] Feeding Hole : As specified in (1)
- [2] Hole for chip : As specified in (1)
- [3] Cover tape : 62 um in thickness
- [4] Base tape : As specified in (1)



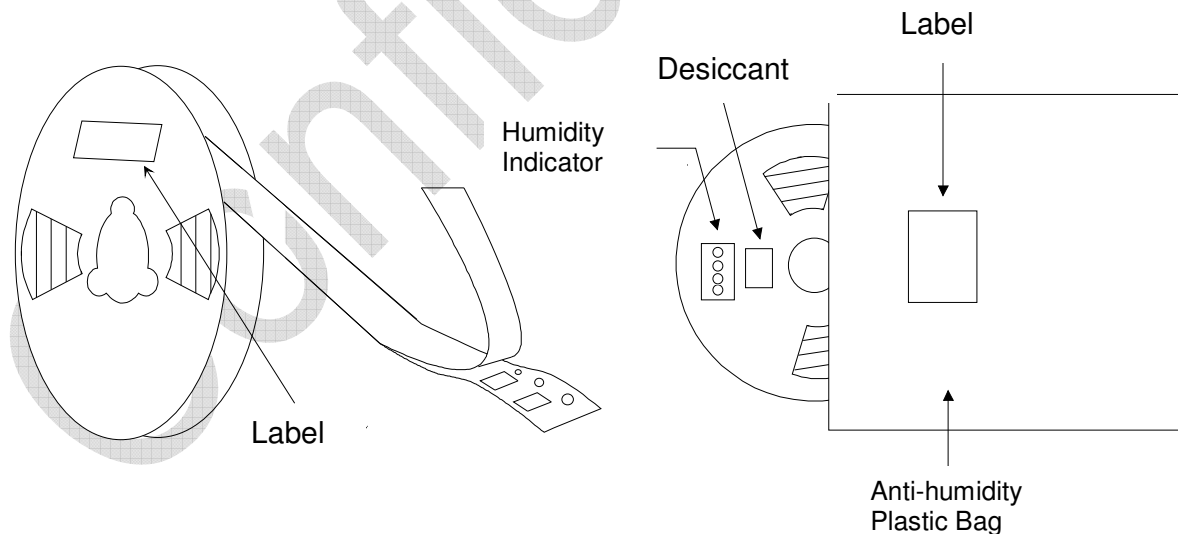
(4) Leader and Tail tape



- (5) The tape for chips are wound clockwise, the feeding holes to the right side as the tape is pulled toward the user.
- (6) The cover tape and base tape are not adhered at no components area for 250 mm min.
- (7) Tear off strength against pulling of cover tape : 5 N min.
- (8) Packaging unit : 1000 pcs./ reel
- (9) material : Base tape : Plastic
Reel : Plastic
Cover tape , cavity tape and reel are made the anti-static processing.
- (10) Peeling of force : 1.3 N max. in the direction of peeling as shown below.

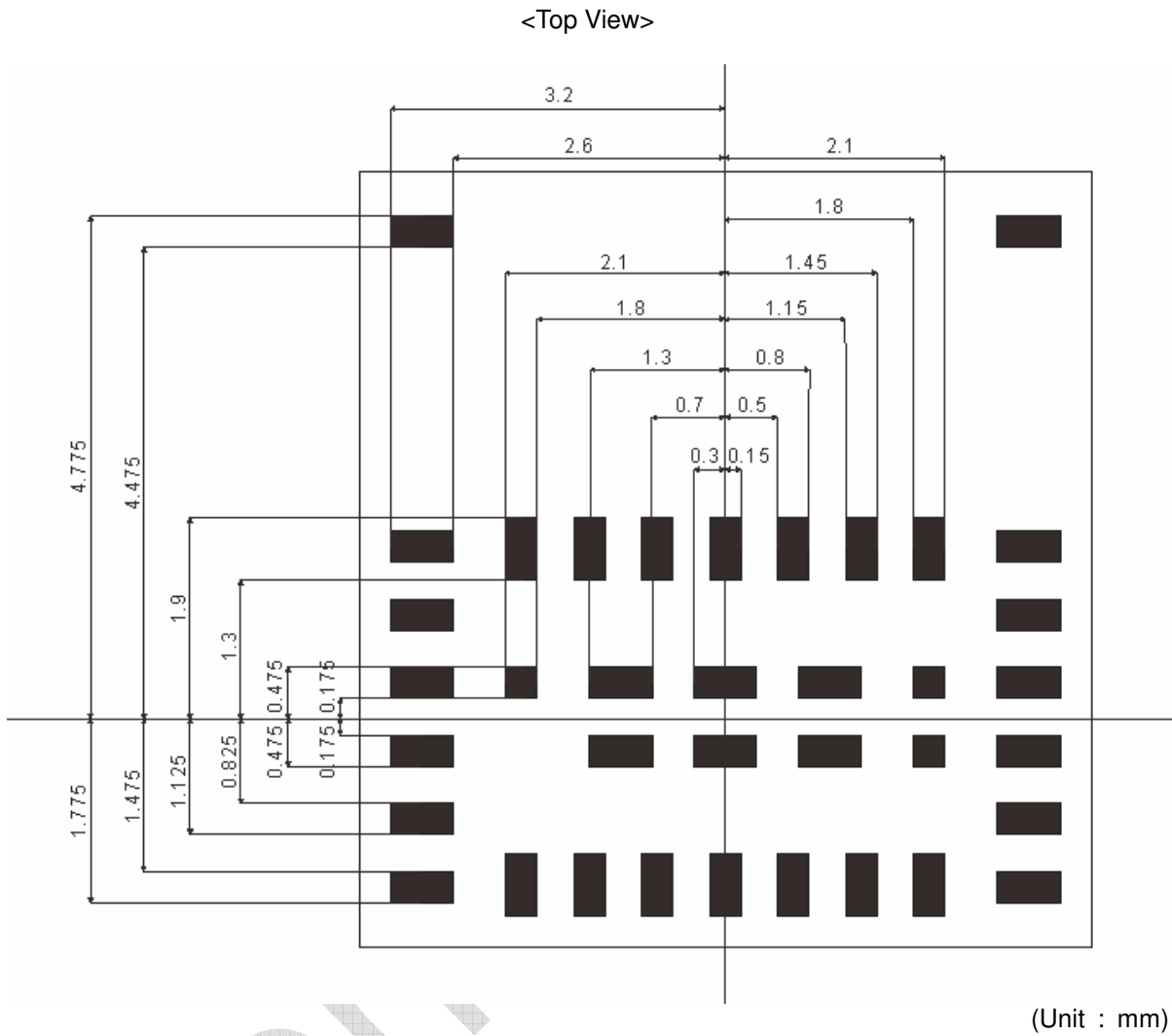


- (11) PACKAGE (Humidity proof Packing)

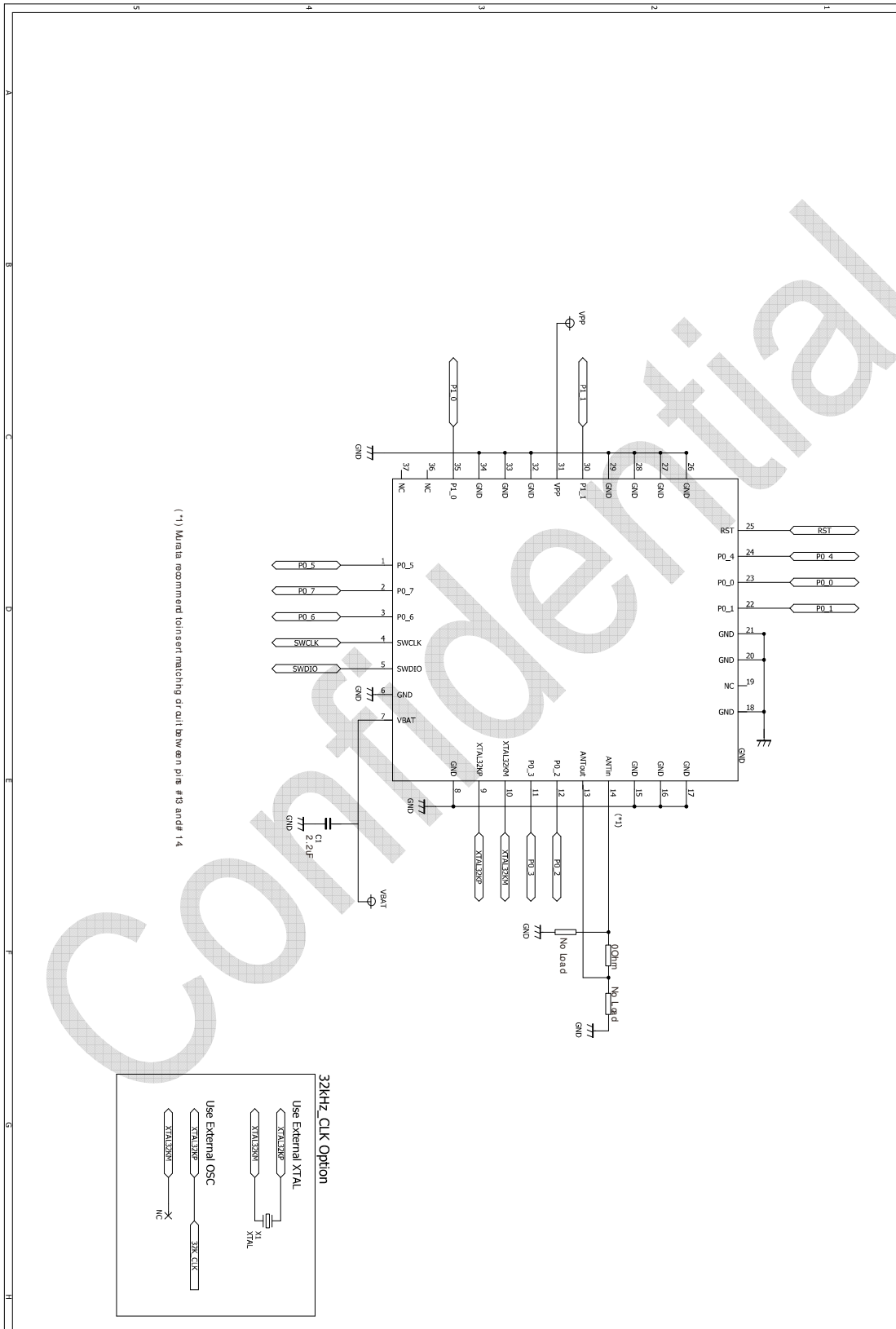


Tape and reel must be sealed with the anti-humidity plastic bag. The bag contains the desiccant and the humidity indicator.

12. Recommended Land Pattern



13. Application Circuit



NOTICE

1.Storage Conditions:

Please use this product within 6month after receipt.

- The product shall be stored without opening the packing under the ambient temperature from 5 to 35deg.C and humidity from 20 to 70%RH.
(Packing materials, in particular, may be deformed at the temperature over 40deg.C.)
- The product left more than 6months after reception, it needs to be confirmed the solderbility before used.
- The product shall be stored in non corrosive gas (Cl2, NH3, SO2, Nox, etc.).
- Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp object and dropping the product, shall not be applied in order not to damage the packing materials.

This product is applicable to MSL3 (Based on JEDEC Standard J-STD-020)

- After the packing opened, the product shall be stored at <30deg.C / <60%RH and the product shall be used within 168hours.
- When the color of the indicator in the packing changed, the product shall be baked before soldering.

Baking condition: 125+5/-0deg.C, 24hours, 1time

The products shall be baked on the heat-resistant tray because the material (Base Tape, Reel Tape and Cover Tape) are not heat-resistant.

2.Handling Conditions:

Be careful in handling or transporting products because excessive stress or mechanical shock may break products.

Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change. Do not touch products with bear hands that may result in poor solder ability and destroy by static electrical charge.

3.Standard PCB Design (Land Pattern and Dimensions):

All the ground terminals should be connected to the ground patterns. Furthermore, the ground pattern should be provided between IN and OUT terminals. Please refer to the specifications for the standard land dimensions.

The recommended land pattern and dimensions is as Murata's standard. The characteristics of products may vary depending on the pattern drawing method, grounding method, land dimensions, land forming method of the NC terminals and the PCB material and thickness. Therefore, be sure to verify the characteristics in the actual set. When using non-standard lands, contact Murata beforehand.

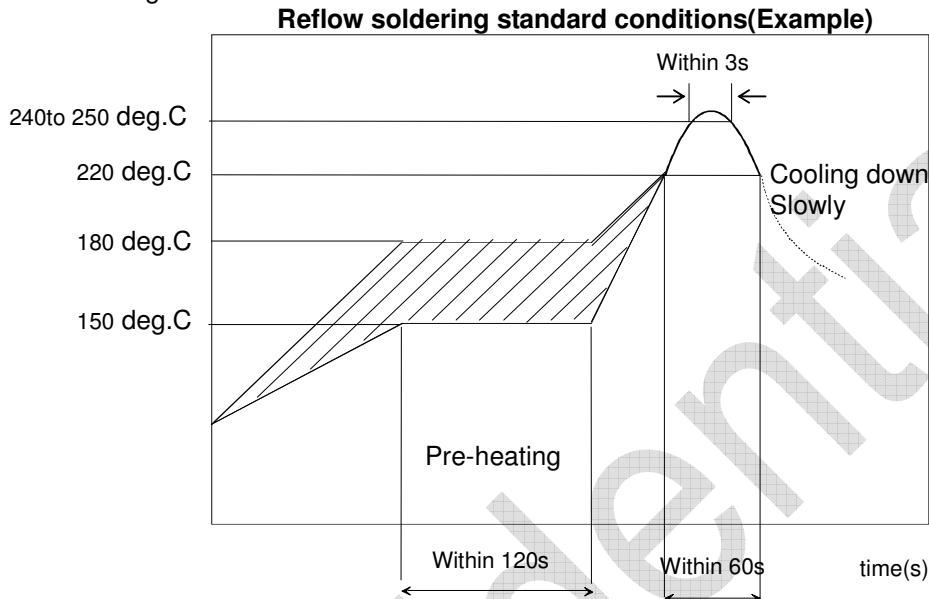
4.Notice for Chip Placer:

When placing products on the PCB, products may be stressed and broken by uneven forces from a worn-out chucking locating claw or a suction nozzle. To prevent products from damages, be sure to follow the specifications for the maintenance of the chip placer being used. For the positioning of products on the PCB, be aware that mechanical chucking may damage products.

5.Soldering Conditions:

The recommendation conditions of soldering are as in the following figure. When products are immersed in solvent after mounting, pay special attention to maintain the temperature difference within 100 °C. Soldering must be carried out by the above mentioned conditions to prevent products from damage. Set up the highest temperature of reflow within 260 °C. Contact Murata before use if concerning other soldering conditions.

Reflow soldering standard conditions



Please use the reflow within 2 times.

Use rosin type flux or weakly active flux with a chlorine content of 0.2 wt % or less.

6.Cleaning:

Since this Product is Moisture Sensitive, any cleaning is not permitted.

7.Operational Environment Conditions:

Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). Therefore, products have no problems to be used under the similar conditions to the above-mentioned. However, if products are used under the following circumstances, it may damage products and leakage of electricity and abnormal temperature may occur.

- In an atmosphere containing corrosive gas (Cl₂, NH₃, SO_x, NO_x etc.).
- In an atmosphere containing combustible and volatile gases.
- Dusty place.
- Direct sunlight place.
- Water splashing place.
- Humid place where water condenses.
- Freezing place.

If there are possibilities for products to be used under the preceding clause, consult with Murata before actual use.

As it might be a cause of degradation or destruction to apply static electricity to products, do not apply static electricity or excessive voltage while assembling and measuring.

8.Input Power Capacity:

Products shall be used in the input power capacity as specified in this specifications.
Inform Murata beforehand, in case that the components are used beyond such input power capacity range.

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PRECONDITION TO USE OUR PRODUCTS

PLEASE READ THIS NOTICE BEFORE USING OUR PRODUCTS.

Please make sure that your product has been evaluated and confirmed from the aspect of the fitness for the specifications of our product when our product is mounted to your product.

All the items and parameters in this product specification/datasheet/catalog have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment specified in this specification. You are requested not to use our product deviating from the condition and the environment specified in this specification.

Please note that the only warranty that we provide regarding the products is its conformance to the specifications provided herein. Accordingly, we shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this specification.

WE HEREBY DISCLAIMS ALL OTHER WARRANTIES REGARDING THE PRODUCTS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THAT THEY ARE DEFECT-FREE, OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

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- Aircraft equipment.
- Aerospace equipment
- Undersea equipment.
- Power plant control equipment
- Medical equipment.
- Transportation equipment (vehicles, trains, ships, elevator, etc.).
- Traffic signal equipment.
- Disaster prevention / crime prevention equipment.
- Burning / explosion control equipment
- Application of similar complexity and/ or reliability requirements to the applications listed in the above.

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Please do not use our products, our technical information and other data provided by us for the purpose of developing of mass-destruction weapons and the purpose of military use.

Moreover, you must comply with "foreign exchange and foreign trade law", the "U.S. export administration regulations", etc.

Please note that we may discontinue the manufacture of our products, due to reasons such as end of supply of materials and/or components from our suppliers.

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