

W-LAN Module Data Sheet

802.11b/g module

Product Part Number: LBWA1ZZVK7-539

Revision History

Revision Code	Date	Description	Comments
-	2011/11/29	First Issue	

Murata Confidential

Notice for Murata Wireless Modules.

Please read the specification including the NOTICE (Page20) and the Disclaimer (Page24) in this datasheet before using the Murata Wireless Modules.

Murata Confidential

● Module Features

- Murata LBWA1ZZVK7 module integrates WLAN function.
- WLAN: IEEE 802.11 b, g, compliant.
- Typical WLAN Transmit Power (typical):
 - +19.5dBm at 11Mbps, CCK (11b)
 - +15.0dBm at 54Mbps, OFDM (11g)
- Typical WLAN Sensitivity (typical):
 - T.B.D at 8% PER, 11Mbps
 - T.B.D at 10% PER, 54Mbps
- Module size: 16.5x11.5mm typical.
- Module height: 2.2mm max.

- FCC (USA) and IC (Canada) Certification will be supported with mono-pole type antenna.

- Murata LBWA1ZZVK7 module consists of the following components
 - Texas Instruments CC3000 SoC – WLAN baseband and RF converter
 - Clock sources – Both Fast Clock and Slow Clock are integrated.
 - Front End Module – A combination of PA and a switch
 - Band Pass Filter – Filtering out of band noise and interference
 - EEPROM – A non volatile memory
 - Power FET switch – minimizing leakage current in shutdown mode. The switching mode power source provides 3.3V supply for the CC3000 from either battery or MCU the board.
 - Level Shifter – Supporting 1.8V and 3.3V Host Interface.

- Seamless integration with several Texas Instruments MSP430 and Stellaris processors
- SPI host interface for WLAN
- RoHS Compliance

Scope

This specification is applied to the IEEE802.11 b/g WLAN module.

Host Interface

- W-LAN : SPI

IC/Firmware

- W-LAN BB/MAC : CC3000
 - FEM for CC3000 : TriQuint TQM679002A (E2.6)

Reference Clock : 26MHz Reference Clock is integrated.

Sleep Clock : 32.768kHz oscillator is integrated.

Weight : T.B.D (mg)

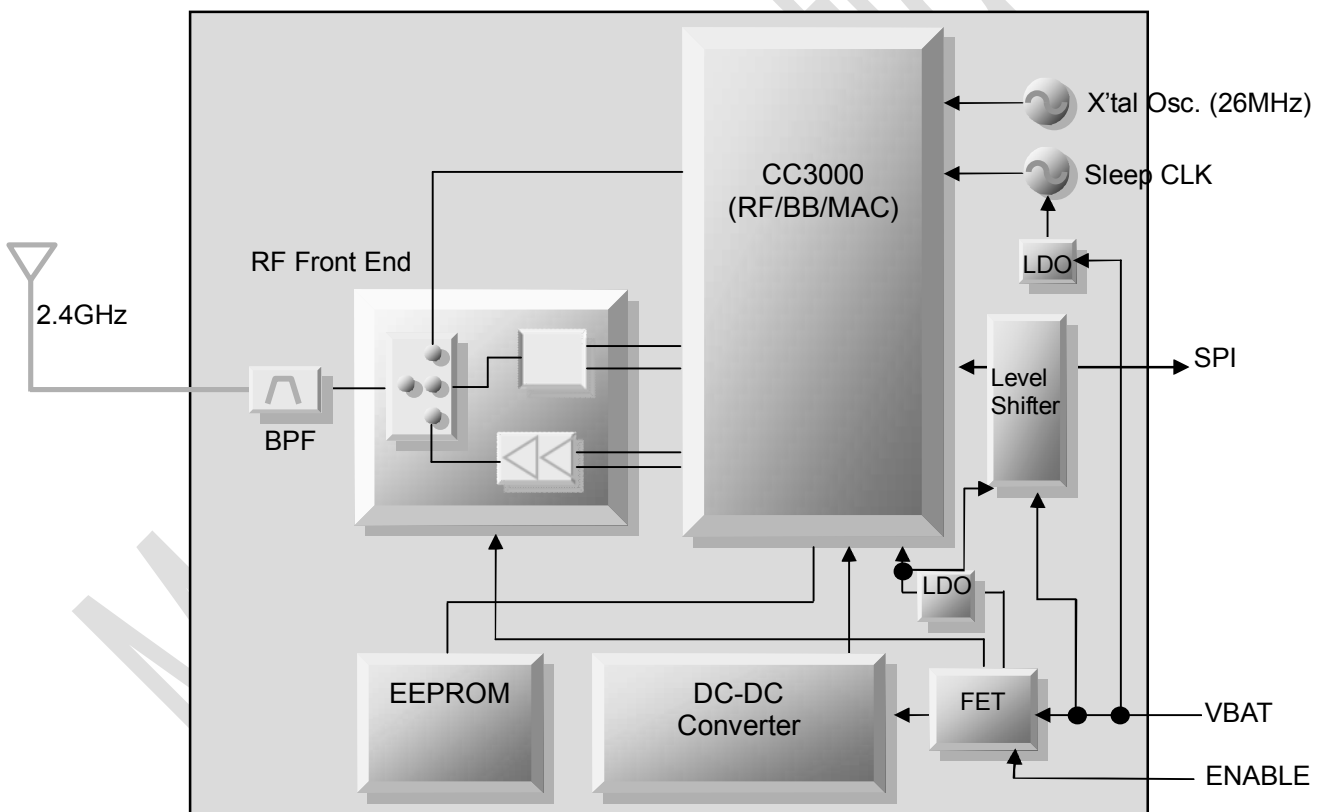
MSL : Level3

RoHS Compliant

1 Part Number

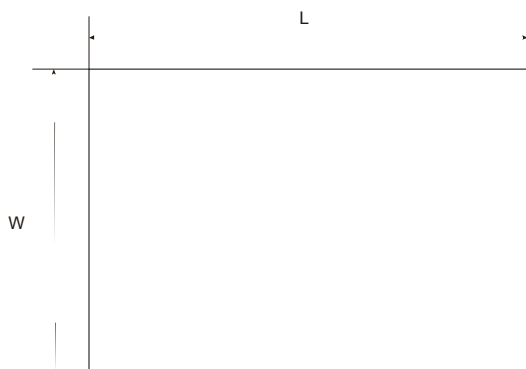
Part Number	LBWA1ZZVK7-539
-------------	----------------

2 Block Diagram



3 Dimensions and Terminal Configurations

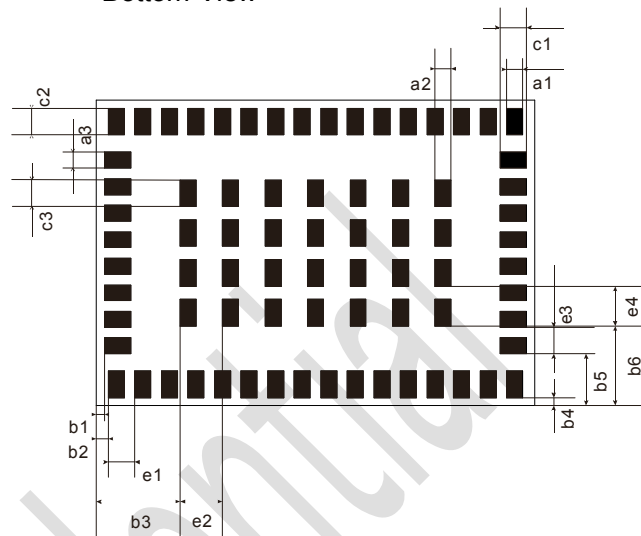
<Top View>



<Side View>



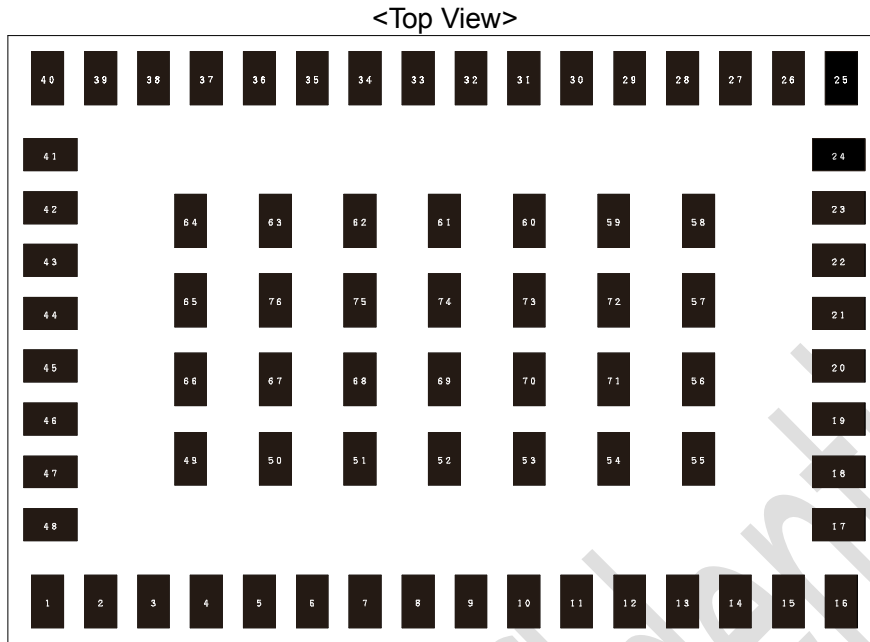
<Bottom View>



(unit: mm)

Mark	Dimensions	Mark	Dimensions	Mark	Dimensions
L	16.5 +/- 0.2	W	11.5 +/- 0.2	T	2.20 Max
a1	0.6 +/- 0.1	a2	0.6 +/- 0.1	a3	0.6 +/- 0.1
b1	0.3 +/- 0.2	b2	0.45 +/- 0.200	b3	3.15 +/- 0.200
b4	0.3 +/- 0.2	b5	1.95 +/- 0.20	b6	3.0 +/- 0.2
c1	1.0 +/- 0.1	c2	1.0 +/- 0.1	c3	1.0 +/- 0.1
e1	1.0 +/- 0.1	e2	1.6 +/- 0.1	e3	1.0 +/- 0.1
e4	1.5 +/- 0.1	-	-	-	-

Terminal configuration



No.	Terminal Name	Type	Power	System	Connection to IC Terminal		Description
1	GND	-	-	-	-	-	Ground
2	ENABLE	I	-	-	FET	FET	Module Enable Power Supply Input
3	GND	-	-	-	-	-	Ground
4	VBAT	I	-	-	FET LDO Level Shifter	FET LDO Level Shifter	Power Supply Input
5	GND	-	-	-	-	-	Ground
6	GND	-	-	-	-	-	Ground
7	GND	-	-	-	-	-	Ground
8	GND	-	-	-	-	-	Ground
9	WL_RS232_RX	I/O	-	WLAN	3000	RS232_Rx	Connect to FUNC2 pin with 2kohm resistor.
10	WL_RS232_TX	I/O	-	WLAN	3000	RS232_Tx	RS232_Tx
11	WL_EN1	-	-	-	3000	WL_EN	Connect to WL_EN2
12	UART_DBG	-	-	WLAN	3000	WL_UART_DBG	Logger
13	WL_EN2	I	-	WLAN	3000	BT_EN	Connect to WL_EN1
14	GND	-	-	-	-	-	Ground
15	GND	-	-	-	-	-	Ground
16	GND	-	-	-	-	-	Ground
17	GND	-	-	-	-	-	Ground
18	SPI_CLK	IO	-	WLAN	3000	SPI_CLK	SPI Clock from the host
19	SPI_DI	IO	-	WLAN	3000	SPI_DIN	SPI Data-in from the host
20	GND	-	-	-	-	-	Ground
21	SPI_CS	IO	-	WLAN	3000	SPI_CS	SPI Chip select
22	SPI_DO	IO	-	WLAN	3000	SPI_DOUT	SPI Data-out from the host
23	SPI_IRQ	IO	-	WLAN	3000	SPI_IRQ	SPI Interrupt Request
24	GND	-	-	-	-	-	Ground
25	GND	-	-	-	-	-	Ground
26	GND	-	-	-	-	-	Ground
27	FUNC5/NC	IO	-	-	3000	NC	NC

28	SCL	-	-	-	3000	SCL	I2C to EEPROM Connect to SCL_EEPROM pin
29	SDA	-	-	-	3000	SDA	I2C to EEPROM Connect to SDA_EEPROM pin
30	NS_URAT_DBG						
31	FUNC4	IO	-	-	3000	NS_UARTD	Networking subsystem UART Debug line
32	FUNC2	IO	-	-	3000	FUNC2	Connect to WL_RS232_RX pin with 2kohm resister.
33	GND	-	-	-	-	-	Ground
34	GND	-	-	-	-	-	Ground
35	SDA_EEPROM	-	-	-	Memory	EEPROM	Connect to SDA pin
36	SCL_EEPROM	-	-	-	Memory	EEPROM	Connect to SCL pin
37	GND				3000	NC (D)	NC
38	GND	-	-	-	-	-	Ground
39	GND	-	-	-	-	-	Ground
40	GND						Ground
41	GND						Ground
42	GND	-	-	-	-	-	Ground
43	GND	-	-	-	-	-	Ground
44	2.4G_ANT	I/O	-	WLAN	-	-	RF transmitter output and RF receiver input
45	GND	-	-	-	-	-	Ground
46	GND	-	-	-	-	-	Ground
47	GND	-	-	-	-	-	Ground
48	GND	-	-	-	-	-	Ground
49 ~ 76	GND	-	-	-	-	-	Ground

4 Rating

Parameter		min.	max	unit
Storage Temperature		-40	85	deg.C
Supply Voltage	VBAT	-0.5	4.5	V
	ENABLE	-0.5	4.5	V

5 Operating Condition

Parameter		min.	typ.	max	unit
Operating Temperature		-30	25	70	deg.C
Supply Voltage	VBAT	2.7	3.6	4.5	V
	ENABLE	1.65	1.8	1.95	V

6 Input/Output Terminal Characteristic

	min.	max	unit
V _{IH} : High-level input voltage	2.0	-	V
V _{IL} : Low-level input voltage	-	0.8	V
V _{OH} : High-level output voltage	VBAT	-	V
V _{OL} : Low-level output voltage	0	VBAT	V

7 WLAN Power Up/Down Sequence

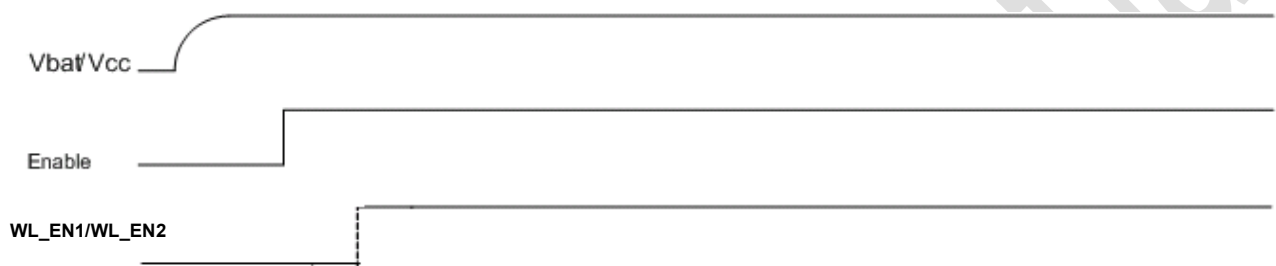
7.1 Power Up Sequence

The following sequence describes device powerup from shutdown. ENABLE starts the initialization sequence, and subsequent events are automatic.

Power up requirements:

1. No signals are allowed on the IO pins if no IO power supplied, because the IOs are not 'failsafe'. Exceptions are SLOWCLK, XTALP and which are failsafe and can tolerate external voltages with no VDDS and DC2DC.
2. VBAT , VIO, and SLOWCLK must be stable before releasing EN.

The LBWA1ZZVK7 module should activate the power on with only one control enable line from the MCU. Below is the wake up sequence.



7.2 Power Down Sequence

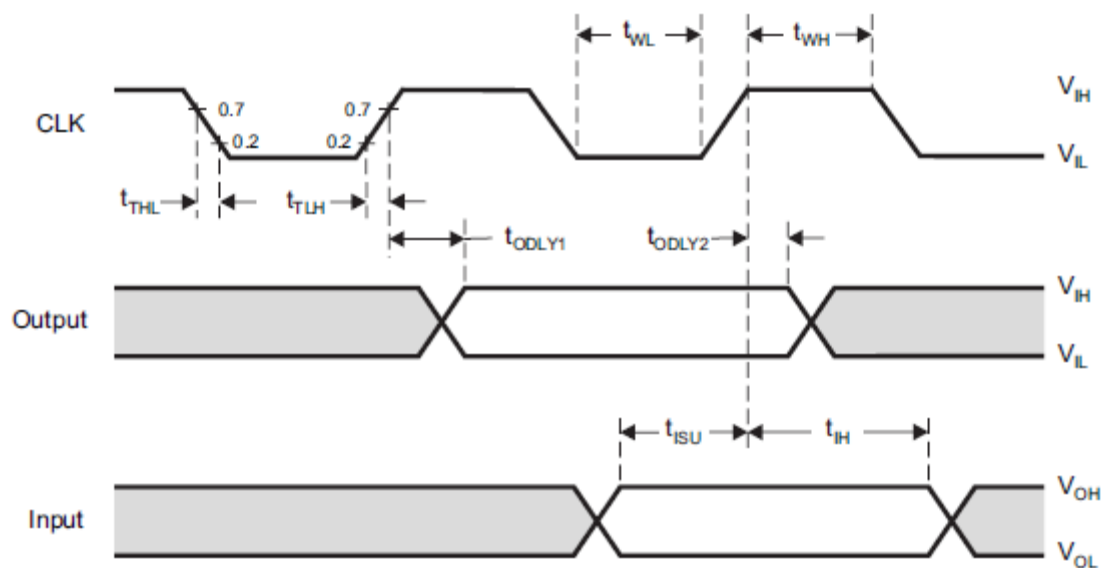


8 HOST Interface
8.1 Host interface: SPI

8.2 SPI Interface timing
8.2.1 SPI Clock Switching Characteristic

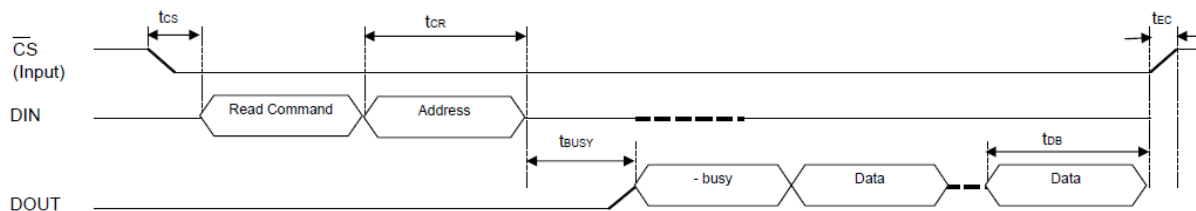
PARAMETER			MIN	MAX	UNIT
f_{clock}	Clock frequency, CLK	$CL \leq 10\text{pF}$	0	48	MHz
DC	Low/High duty cycle	$CL \leq 10\text{pF}$	40	60	%
t_{WL}	Pulse duration, CLK low	$CL \leq 10\text{pF}$	5		ns
t_{WH}	Pulse duration, CLK high	$CL \leq 10\text{pF}$	5		ns
t_{TLH}	Rise time, CLK	$CL \leq 10\text{pF}$		4.3	ns
t_{THL}	Fall time, CLK	$CL \leq 10\text{pF}$		3.5	ns
t_{ISU}	Setup time, input valid before CLK \uparrow	$CL \leq 10\text{pF}$	5		ns
t_{IH}	Hold time, input valid after CLK \uparrow	$CL \leq 10\text{pF}$	5		ns
t_{ODLY1}	Delay time, CLK \downarrow to output valid	$CL \leq 10\text{pF}$	4	15	ns
t_{ODLY2}	Delay time, CLK \downarrow to output invalid	$CL \leq 10\text{pF}$	5	15	ns

SPI Timing

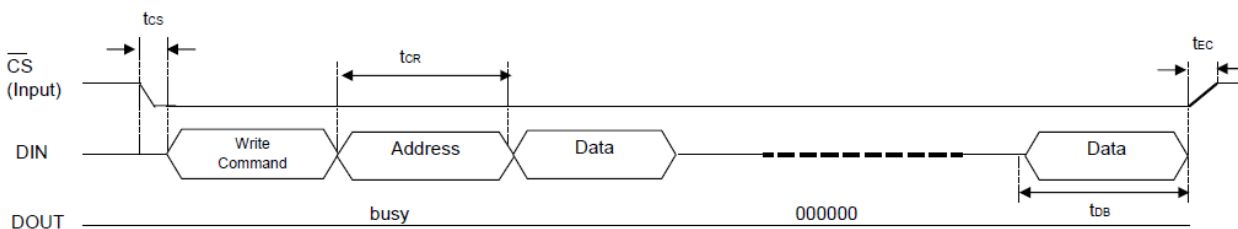


8.2.2 SPI Data Switching Characteristic

SPI Inter face read



SPI Inter face write



Parameter		MIN	MAX	Unit
tcs	Delay time, $\overline{CS} \downarrow$ to DIN read/write command valid	0		16 Clock Cycle
tcr	Delay time, DIN read command invalid to DOUT/DIN card reponse valid		1	16 Clock Cycle
tbusy	Fixed busy delay till DOUT data valid	1	7	32 Clock Cycle
tec	Delay time, DOUT data invalid to $\overline{CS} \uparrow$	0		16 Clock Cycle
tDB	Data Block Size		1	32 Clock Cycle

9 Electrical Characteristics

9.1 DC/RF Characteristics for IEEE802.11b

11Mbps mode unless otherwise specified. 25deg.C, VBAT=3.6V, ENABLE=1.8V

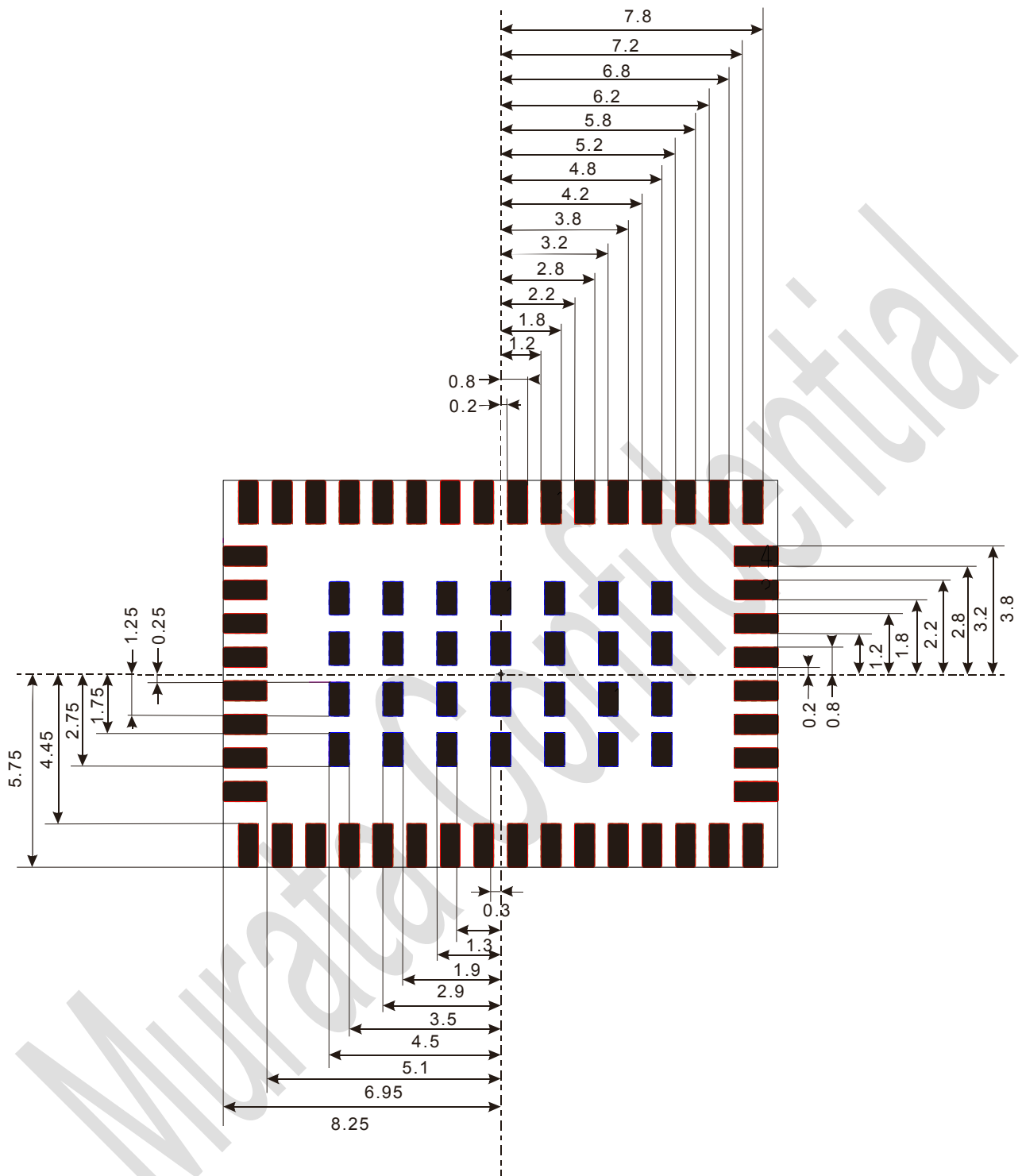
Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS / CCK			
Frequency	2400 - 2500MHz			
Data rate	1, 2, 5.5, 11Mbps			
- DC Characteristics -	min.	typ.	max.	unit
1. DC current				
1) Tx mode	-	TBD		mA
2) Rx mode	-	TBD		mA
3) Sleep mode	-	TBD		uA
- Tx Characteristics -	min.	typ.	max.	unit
2. Power Levels		+19.5		dBm
3. Spectrum Mask				
1) 1st side lobes	-	-	-30	dBr
2) 2nd side lobes	-	-	-50	dBr
4. Power-on and Power-down ramp	-	-	2	μsec
5. RF Carrier Suppression	15	-	-	dB
6. Modulation Accuracy (EVM)	-	-	35	%
- Rx Characteristics -	min.	typ.	max.	unit
7. Minimum Input Level Sensitivity				
1) 11Mbps (FER ≤ 8%)	-	-	-76	dBm
8. Maximum Input Level (FER ≤ 8%)	-10	0	-	dBm

9.2 DC/RF Characteristics for IEEE802.11g

54Mbps mode unless otherwise specified. 25deg.C, VBAT=3.6V, ENABLE =1.8V

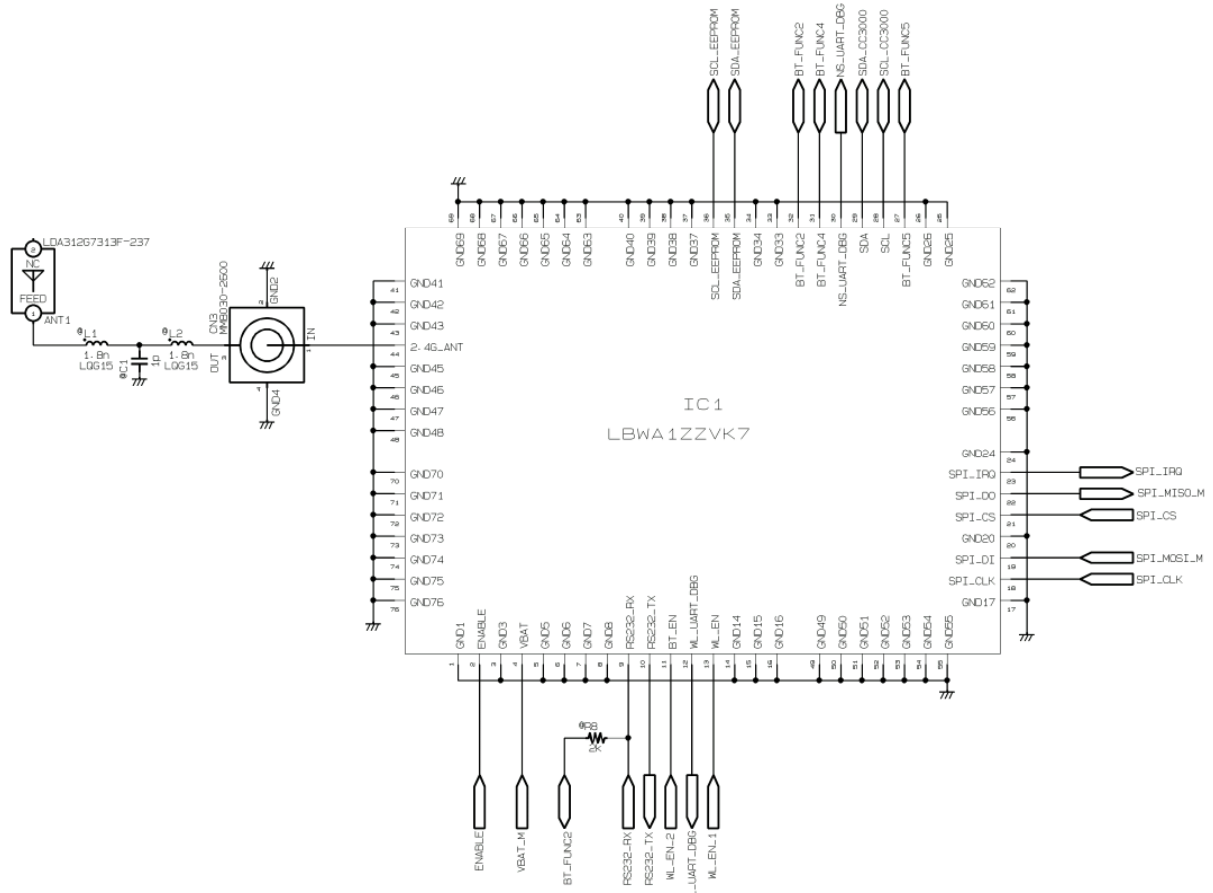
Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM			
Frequency	2400 - 2483.5MHz			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
- DC Characteristics -	min.	typ.	max.	unit
1. DC current				
1) Tx mode	-	TBD		mA
2) Rx mode	-	TBD		mA
3) Sleep mode	-	TBD		uA
- Tx Characteristics -	min.	typ.	max.	unit
2. Power Levels		+15		dBm
3. Spectrum Mask				
1) at fc +/- 11MHz	-		-20	dBr
1) at fc +/- 20MHz	-		-28	dBr
1) at fc +/- 30MHz	-		-40	dBr
4. Spurious Emissions				
1) 30MHz to 1GHz	-		-36	dBm
2) 1GHz to 12.75GHz	-		-30	dBm
3) 1.8GHz to 1.9GHz	-		-47	dBm
4) 5.15GHz to 5.3GHz	-		-47	dBm
5. Constellation Error (EVM)	-		-25	dB
- Rx Characteristics -	min.	typ.	max.	unit
6. Minimum Input Level Sensitivity				
1) 54Mbps (PER ≤ 10%)	-		-65	dBm
7. Maximum Input Level (PER ≤ 10%)	-20		-	dBm

10. Land pattern



(unit : mm)

10. Reference Circuit



11. Evaluation board of LBWA1ZZVK7-TEMP

LBWA1ZZVK7-TEMP Evaluation Module board (EM board) enables a pre-defined interface and form factor solution for compatibility with other TI microcontroller development boards such as MSP430 Experimenter's board and Stellaris LM3S9B96-DK. The LBWA1ZZVK7 Module and EM board will communicate over the SPI interface through the 20pin connector.

Evaluation Module board (EM board) Part Number	LBWA1ZZVK7-TEMP-D
---	-------------------

Murata Confidential

12. Tape and Reel Packing

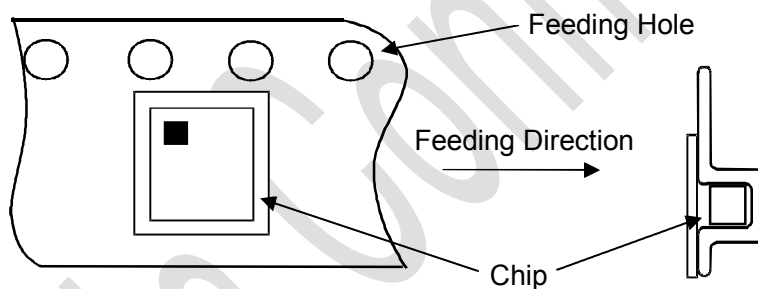
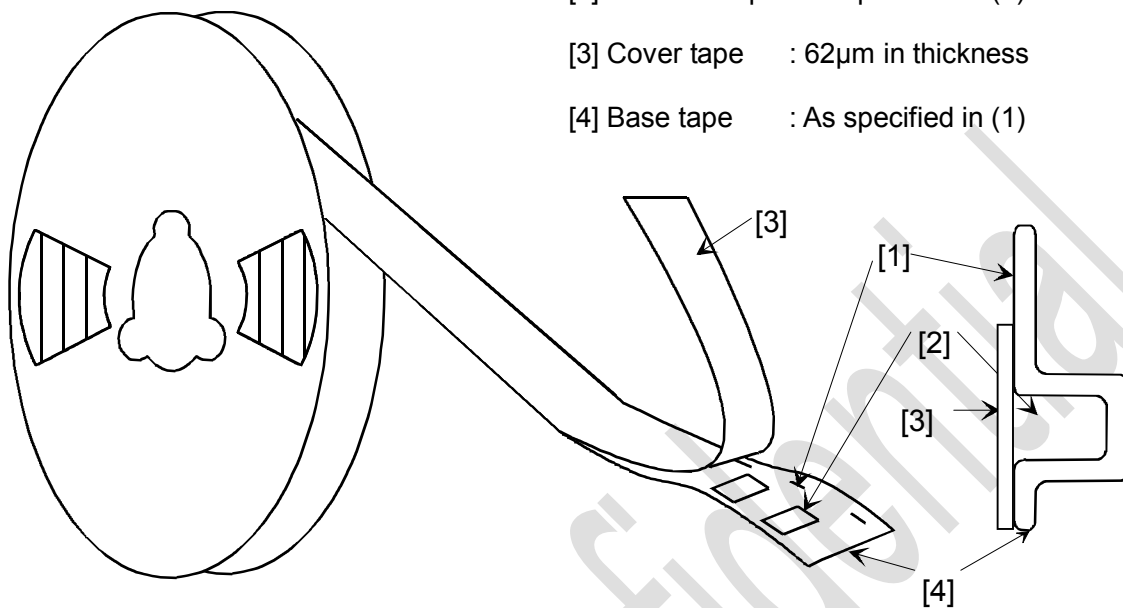
(1) Dimensions of Tape (Plastic tape)
T.B.D

(2) Dimensions of Reel
T.B.D

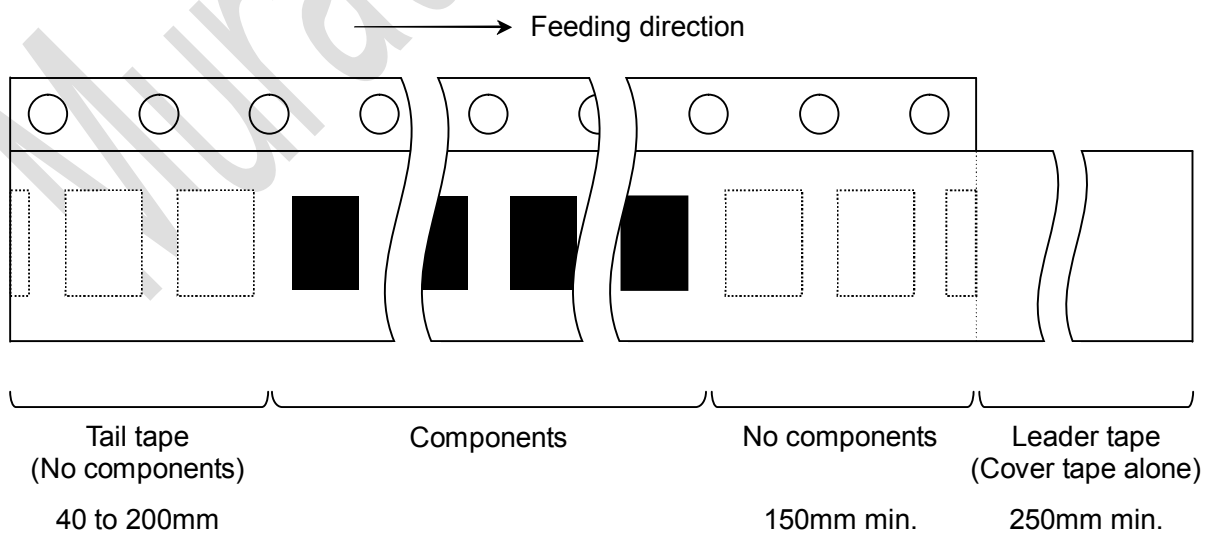
Murata Confidential

(3) Taping Diagrams

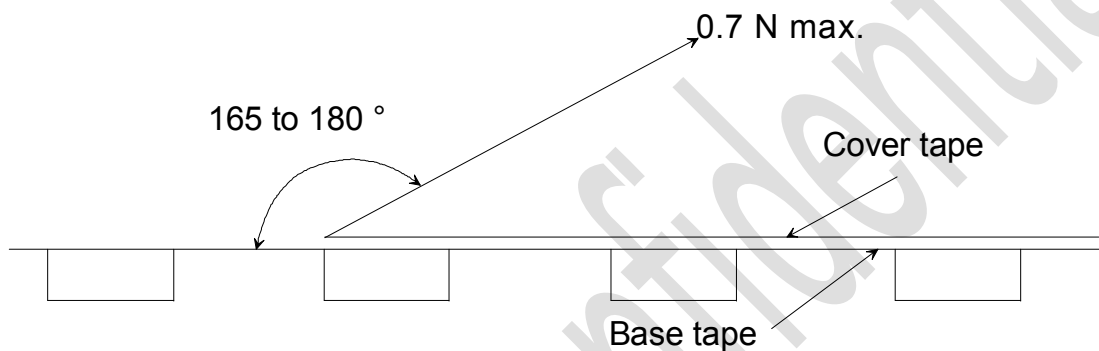
- [1] Feeding Hole : As specified in (1)
- [2] Hole for chip : As specified in (1)
- [3] Cover tape : 62μm in thickness
- [4] Base tape : As specified in (1)



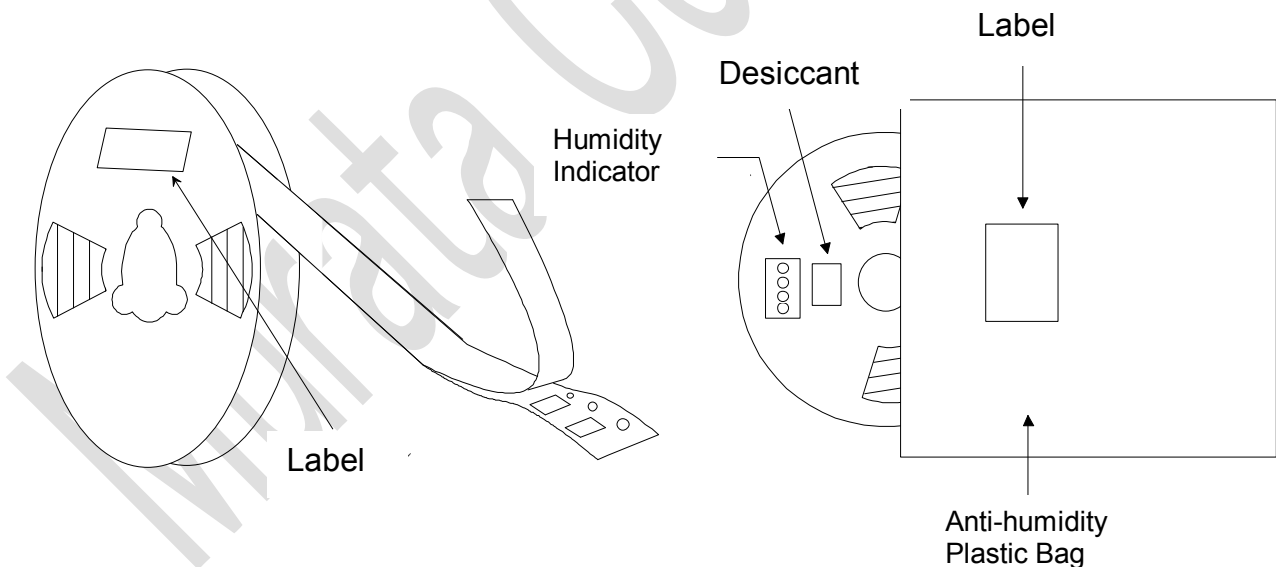
(4) Leader and Tail tape



- (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 250mm min.
- (7) Tear off strength against pulling of cover tape : 5N min.
- (8) Packaging unit : 500pcs./ reel
- (9) material : Base tape : Plastic
Real : Plastic
Cover tape, cavity tape and reel are made the anti-static processing.
- (10) Peeling of force : 0.7N max. in the direction of peeling as shown below.



- (11) Packaging (Humidity proof Packing)



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

NOTICE

1. Storage Conditions:

Please use this product within 6 months 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, No_x, 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 ≤ 30 deg.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 solderability.

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:

Carefully perform preheating so that the temperature difference (ΔT) between the solder and products surface should be in the following range. After mounting, pay special attention to maintain the temperature difference within 100deg.C. Soldering must be carried out by the above mentioned conditions to prevent products from damage. Contact Murata before use if concerning other soldering conditions.

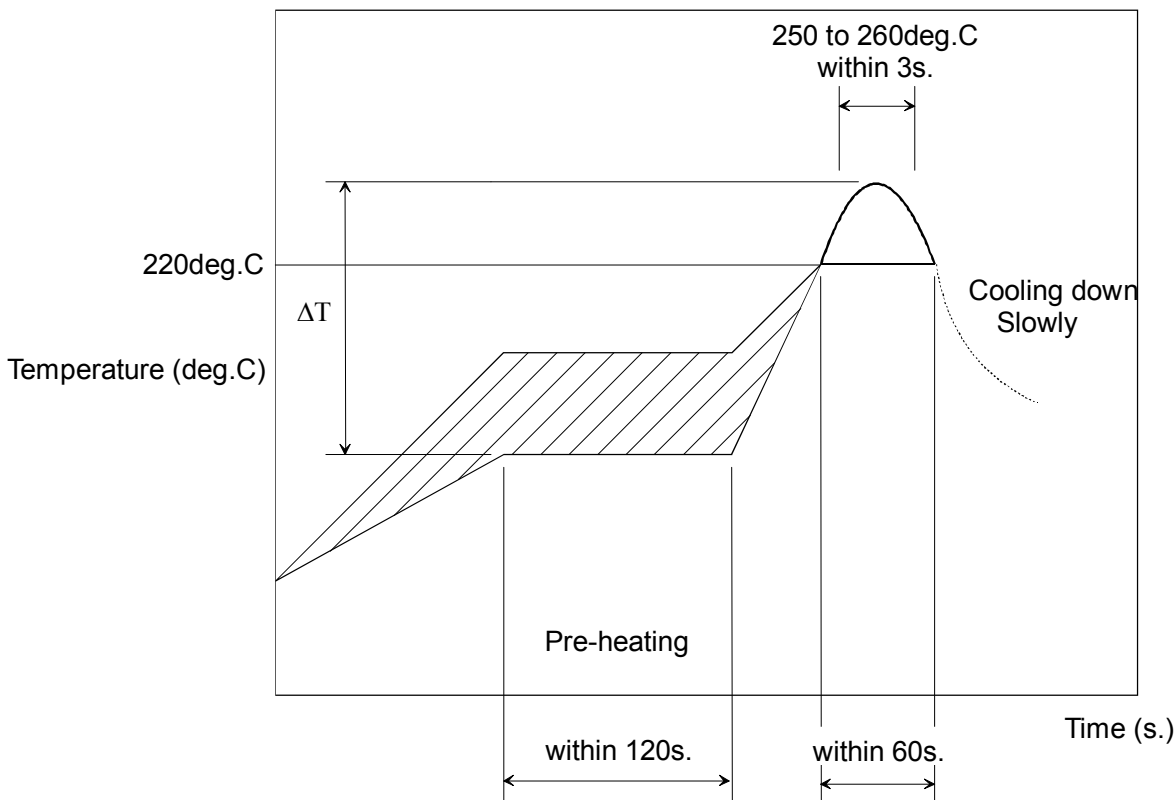
Soldering method	Temperature
Soldering iron method	$\Delta T \leq 130 \text{deg.C}$
Reflow method	

- Soldering iron method conditions are indicated below.

Item	Kind of iron	Ceramics heater
Soldering iron wattage		$\leq 18W$
Temperature of iron-tip		$\leq 350 \text{deg.C}$
Iron contact time		within 3s.

- Diameter of iron-tip : $\Phi 3.0 \text{mm}$ max.

Reflow soldering standard conditions (Example)



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

Inform Murata beforehand, in case that the components are used beyond such input power capacity range.

9. Limitation of Applications:

The product is designed and manufactured for consumer application only and is not available for any application listed below which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property.

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

10. Underfill Condition:

Halfway underfill on components in the module can make unexpected stress on the components and the module has a possibility not to meet the specification.

In order to avoid this, any underfill shall not be into module inside in case of applying underfill on your PCB.

 **Note:**

Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.

We consider it not appropriate to include other terms and conditions for transaction warranty in product specifications, drawings or other technical documents. Therefore, even if your original part of this product specification includes such terms and conditions as warranty clause, product liability clause, or intellectual property infringement liability clause, we are not able to accept such terms and conditions in this product specification unless they are based on the governmental regulation or what we have agreed otherwise in a separate contact. We would like to suggest that you propose to discuss them under negotiation of contract.

● Disclaimer

Please read this notice before using the Murata Wireless Modules.

1. Please note that the only warranty that Murata Manufacturing Co., Ltd. ("Murata") provides regarding the products is its conformance to the specifications provided herein. Accordingly, Murata 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.

MURATA 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.

YOU AGREE TO INDEMNIFY AND DEFEND MURATA AND ITS AFFILIATES AGAINST ALL CLAIMS, DAMAGES, COSTS, AND EXPENSES THAT MAY BE INCURRED, INCLUDING WITHOUT LIMITATION, ATTORNEY FEES AND COSTS, DUE TO THE USE OF PRODUCTS.

2. The product is designed and manufactured for general consumer applications, and not for any particular application, so testing and use of the product shall be conducted at your own risk and responsibility. Specifically, please observe the following:
 - i) Please conduct validation and verification of the products in actual condition of mounting and operating environment before commercial shipment of the equipment.
 - ii) Please pay attention to minimize any mechanical vibration or shock, not to drop the product or a substrate that contains the product during transportation.
 - iii) Since the application of static electricity or overvoltage may cause defect in the product or deterioration of its reliability, caution must be taken against exposure to any static electricity generated by electrified items such as work benches, soldering irons, tools, carrying containers, etc.
 - iv) Caution shall be taken to avoid overstress to the product during and after the soldering process.
 - v) Since the applied soldering method may deteriorate the reliability, thorough evaluation is recommended.
 - vi) In case the product is to be used in equipment or electric circuit that requires high safety or reliability function or performances, sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage. Please provide and appropriate fail-safe function on your product to prevent any damages that may be caused by the abnormal function or the failure of our product.

Notwithstanding the foregoing, the product shall not be used in any application listed below which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property.

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

3. Murata's warranty as provided in Clause 1 above that the products comply with descriptions expressly specified in the specifications shall be effective for a period of six (6) months from the date of delivery.

Murata shall not be liable for any defects that occur in dry packed products that are installed more than six (6) months after shipment.

Murata's liability under this warranty shall be limited to products that are returned during the warranty period to the address designated by Murata and that are determined by Murata not to conform to such warranty. If Murata elects to repair or replace such products, Murata shall have reasonable time to repair such products or provide replacements. Repaired products shall be warranted for the remainder of the original warranty period. Replaced products shall be warranted for a new full warranty period.

For avoidance of doubt, Murata shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than Murata including improper installation or testing, or for any products that have been altered or modified in any way by an entity other than Murata. Moreover, Murata shall not be liable for any defects that result from your or third party's design, specifications or instructions for such products.

4. Testing and other quality control techniques are used to the extent Murata deems necessary. Unless mandated by government requirements, Murata does not necessarily test all parameters of each product.

5. EOL

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