ZigBee Module Data Sheet

Sample Part Number: CMBA1ZZABE

For 802.15.4

SMD Type Module

Revision History

Revision Code	Date	Description	Comments
0.1	May.14,2013	Initial Draft	TYPE-ABE_Preliminary_20150323
0.2	May.07,2015	-Modify size description, add tolerance information -Modify Maximum transmitting power from 8dBm to 5dBm	
0.3	July.10,2015	-Modify Operating Voltage from 2V~3.6V to 2.7V~3.6V -Add information of packing condition and storage condition	
0.4	July.22, 2015	-Add current consumption in Electrical Characteristics	
0.5	Aug.26, 2015	-Modify size information of Customer Board Design recommendation	
0.6	Nov.11, 2015	-Modify pin function of pin17 & pin 18, remove UART function of these two pins	
1.0	Dec.09, 2015	-Add pin description of CC2530 which used to control internal flash -Add NC pin description of CC2530	
1.1	July.28,2016	-Add Label information -Add pictures in Packing condition	
1.2	Sept. 7, 2017	-Add regulatory statements. -Revise label info by adding regulatory identifiers.	

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1. Scope

This specification is applied to the IEEE802.15.4 ZigBee Module

- Interface : UART, SPI, PWM
- IC : CC2530 (Texas Instruments)
- Reference Clock: 32MHz reference clock is integrated.
- RoHS : This module is compliant with the RoHS directive.

2. Part Number

Part Number	CMBA1ZZABE

3. Dimensions, Marking and Terminal Configurations

Unit:mm

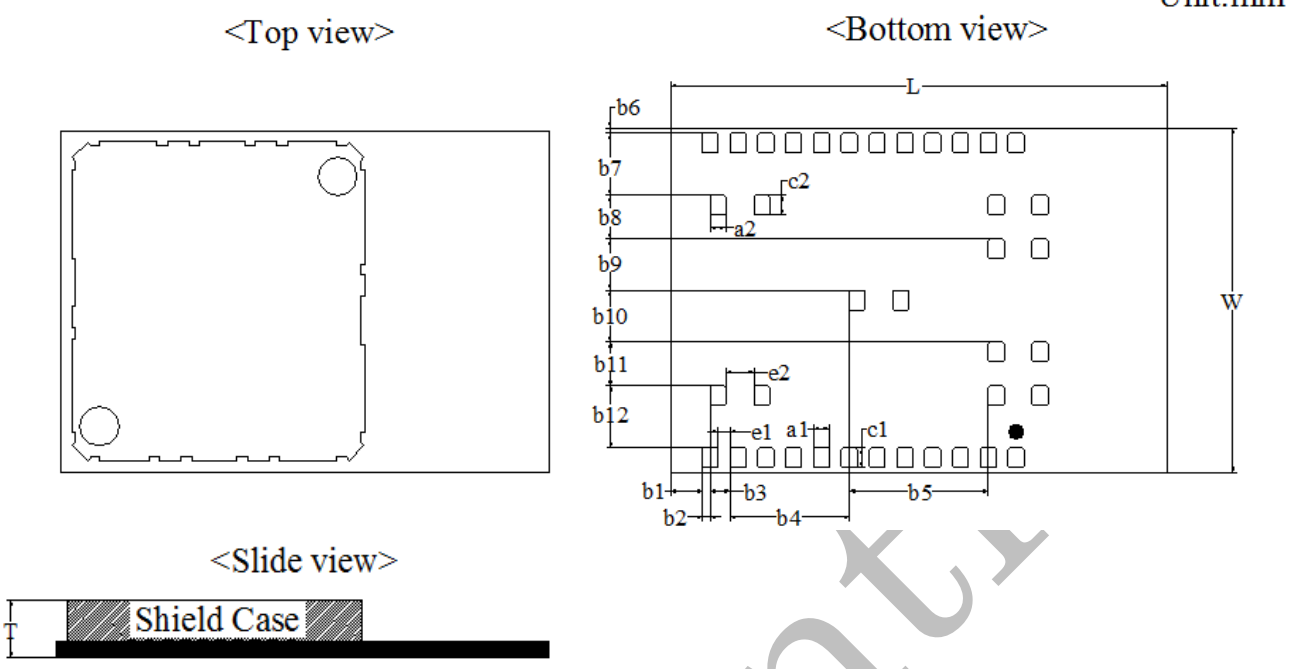
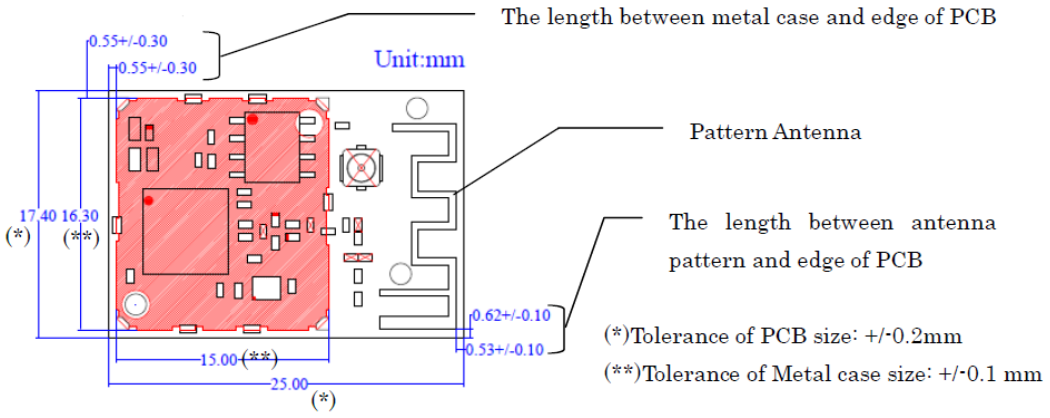


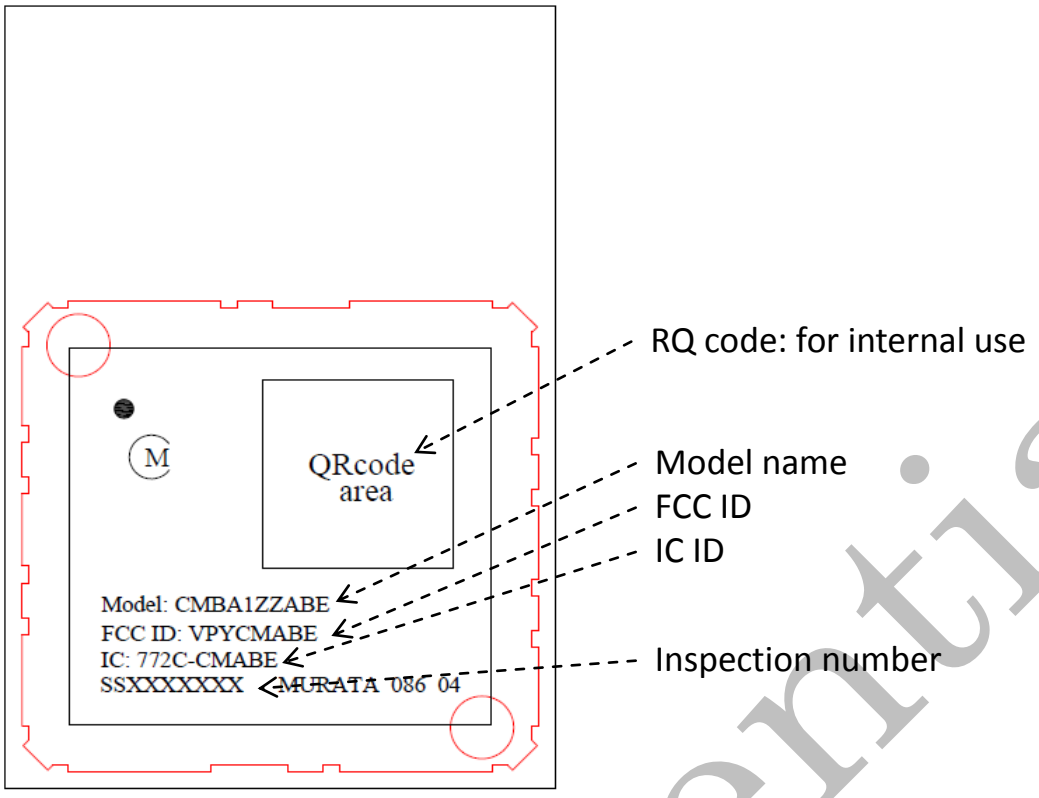
Table 1 Dimension (Unit: mm)

Mark	Dimension	Mark	Dimension	Mark	Dimension
L	25.0±0.2	W	17.4±0.2	T	3.1 max
a1	0.8±0.1	a2	0.8±0.1	b1	1.6±0.15
b2	0.4±0.1	b3	1.0±0.1	b4	6.0±0.1
b5	7.0±0.1	b6	0.25±0.15	b7	3.15±0.1
b8	2.2±0.1	b9	2.6±0.1	b10	2.6±0.1
b11	2.2±0.1	b12	3.15±0.1	c1	1.0±0.1
c2	1.0±0.1	e1	0.6±0.1	e2	1.4±0.1



Note: This module cannot connect to the external antenna. It has to use the existing antenna (PCB Antenna).

Label Information



Terminal Configurations

< Top View >

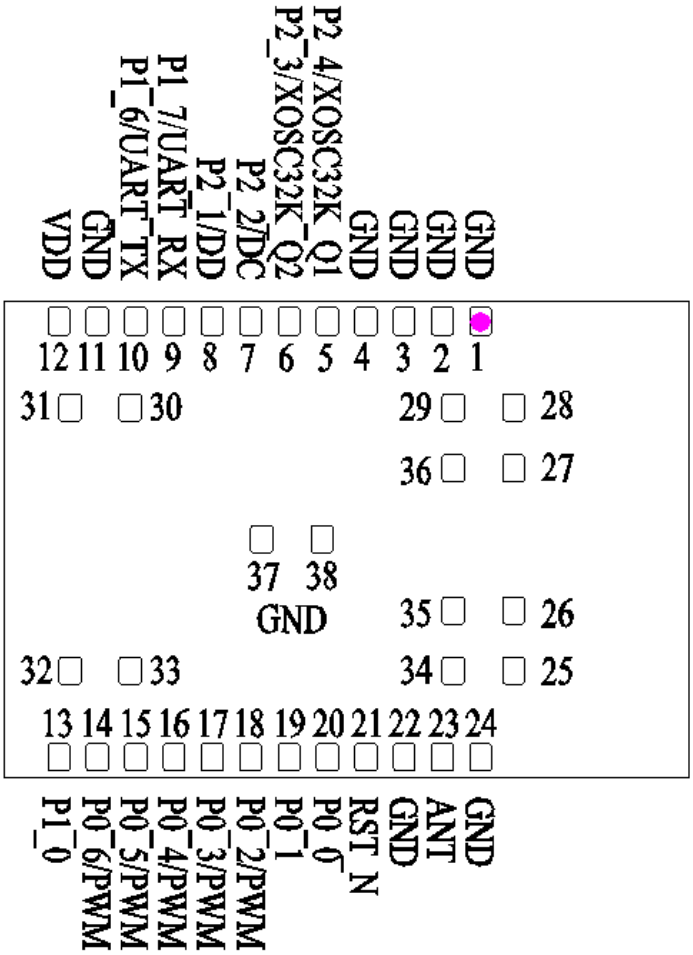


Table 2 Terminal Configurations

Pin NO.	Terminal Name	Type	Connection to IC terminal	Description
1	GND	Ground	-	Ground
2	GND	Ground	-	Ground
3	GND	Ground	-	Ground
4	GND	Ground	-	Ground
5	P2_4	I/O	P2_4	Port 2_4/32.768kHz XOSC Q1
6	P2_3	I/O	P2_3	Port 2_3/32.768kHz XOSC Q2
7	P2_2/DC	I/O	P2_2	Port 2_2 or Debug clock
8	P2_1/DD	I/O	P2_1	Port 2_1 or Debug data
9	P1_7/UART_RX	I/O	P1_7	Port 1_7 or UART RX
10	P1_6/UART_TX	I/O	P1_6	Port 1_6 or UART TX

11	GND	Ground	-	Ground
12	VDD	Power	AVDD/DVDD	Power supply
13	P1_0	I/O	P1_0	Port 1_0 20mA drive capability
14	P0_6/PWM	I/O	P0_6	Port 0_6 or PWM
15	P0_5/PWM	I/O	P0_5	Port 0_5 or PWM
16	P0_4/PWM	I/O	P0_4	Port 0_4 or PWM
17	P0_3/PWM	I/O	P0_3	Port 0_3 or PWM
18	P0_2/PWM	I/O	P0_2	Port 0_2 or PWM
19	P0_1	I/O	P0_1	Port 0_1
20	P0_0	I/O	P0_0	Port 0_0
21	RST_N	I	RESET_N	Reset, active-low
22	GND	Ground	-	Ground
23	NC	-	-	NC
24	GND	Ground	-	Ground
25~ 38	GND	Ground	-	Ground

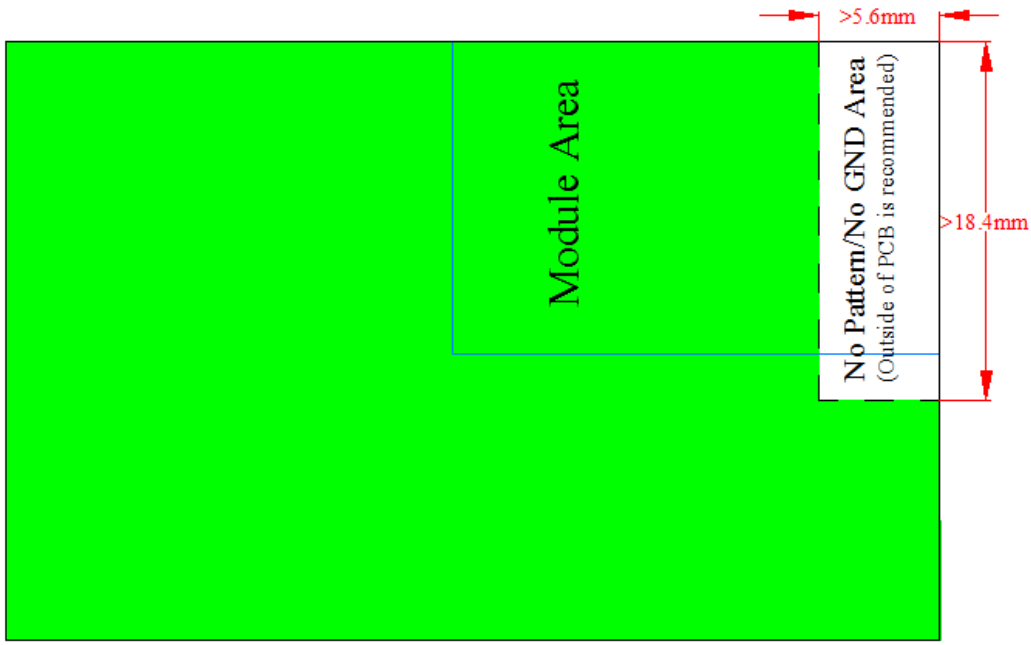
Note: GPIO pins are to be left OPEN if not used.

Table 2.1 Internal SPI configuration and NC pin

IC Pin NO.	Terminal Name	Type	Description
5	P1_5/SPI_MOSI	I/O	Used to control internal flash
6	P1_4/SPI_MISO	I/O	Used to control internal flash
7	P1_3/SPI_CLK	I/O	Used to control internal flash
8	P1_2/SPI_SS	I/O	Used to control internal flash
9	P1_1	I/O	Float in module
12	P0_7	I/O	Float in module
36	P2_0	I/O	Float in module

(Reference)

<Customer Board Design recommendation for good RF performance – Top View>



4. Maximum absolute ratings

Table 3 Maximum ratings

Item	Min	Max	Unit	Remarks
Storage Temperature	-40	+85	degC	
VCC	-0.1	3.7	V	
Voltage on any Digital Pin	-0.1	VCC+0.1	V	
Input RF Level		10	dBm	

5. Operating Condition

Table 4 Operating specification

Item	Min	Typ	Max	Unit	Remarks
Operating Temperature	-40	25	+85	degC	
VCC	2.7	3.3	3.6	V	

6. Electrical Characteristics

Table 5 Electrical specification parameters

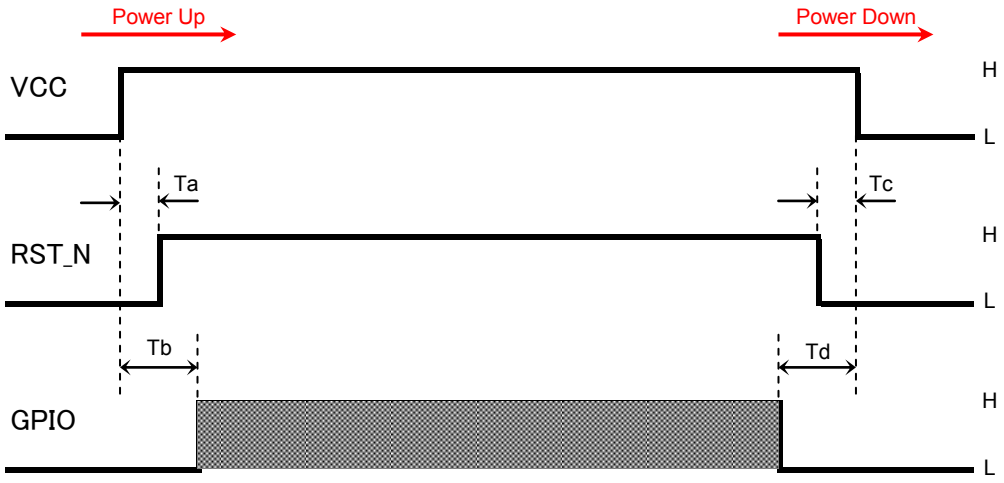
(Condition: T= +25deg.C, VCC=3.3V and f_c=2440MHz, measured at antenna feed point.)

Items	**Contents**			
Specification	IEEE 802.15.4			
Mode	offset QPSK			
Channel frequency (spacing)	2405 to 2480 MHz (5MHz)			
Radio baud rate	250kbps			
Frequency tolerance	-40	-	40	ppm
Transmitter	**Min.**	**Typ.**	**Max.**	**unit**
Output power	0	2.5	5	dBm
Spectral density mask (Relative)				
f < fc-3.5MHz, RBW:100kHz	-	-47	-20	dBr
f > fc+3.5MHz, RBW:100kHz	-	-44	-20	
Spectral density mask (Absolute)				
f < fc-3.5MHz, RBW:100kHz	-	-59	-30	dBm
f > fc+3.5MHz, RBW:100kHz	-	-55	-30	
EVM				
1000 chips, RMS	-	10	35	%
Receiver	**Min.**	**Typ.**	**Max.**	**unit**
Receiver sensitivity (PER < 1%)	-	-95	-85	dBm
Current Consumption	**Min.**	**Typ.**	**Max.**	**unit**
Continuous Tx(1)	-	32		mA
Continuous Rx(1)	-	25		mA

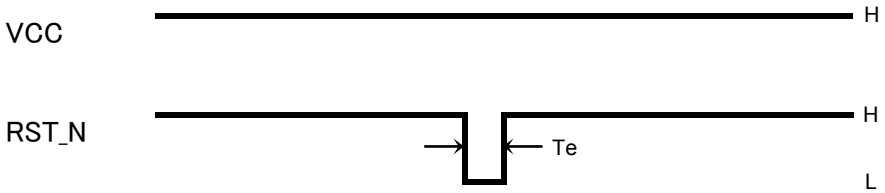
Note(1): Under condition of transmitting or receiving continuous wave

7. Power Sequences

8.1 Power Up/Down Sequence

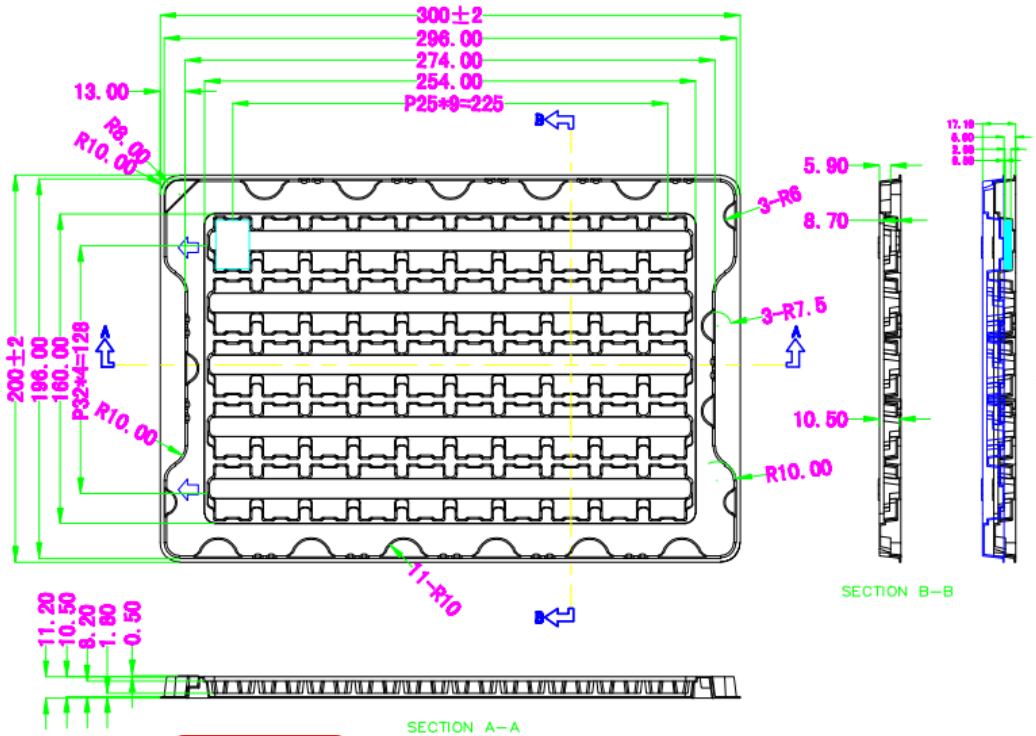


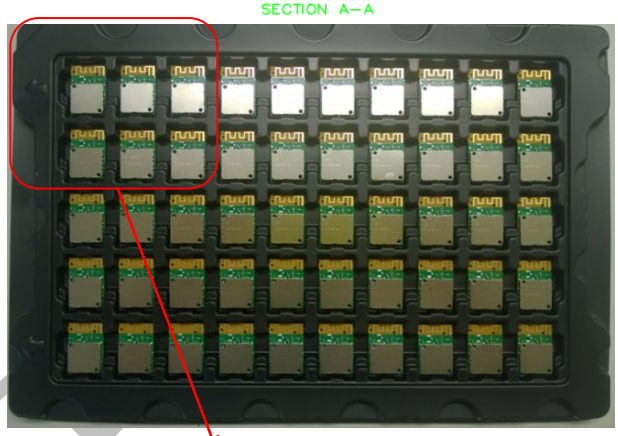
8.2 Reset and Power Cycle Sequence



Symbol	Description	Typ.	Unit
Ta	Time between VCC valid and RST_N ramped-up	Ta > 0	usec
Tb	Time between VCC valid and GPIO enabled	Tb > 400	
Tc	Time between RST_N invalid and VCC invalid	Tc > 0	
Td	Time between GPIO invalid and VCC invalid	Td > 0	
Te	Length of RST_N pulse	Te > 1	

8. Packing Condition





There are 50pcs of products per tray.

One inner box has nice trays including one tray without products for top. Products quantity of one inner box is 400pcs. One outer box has four inner boxes. Products quantity of one outer box is 1600pcs.

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 35 °C and humidity from 20 to 70 %RH. (Packing materials, in particular, may be deformed at the temperature over 40 °C)
- 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 solderability 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.

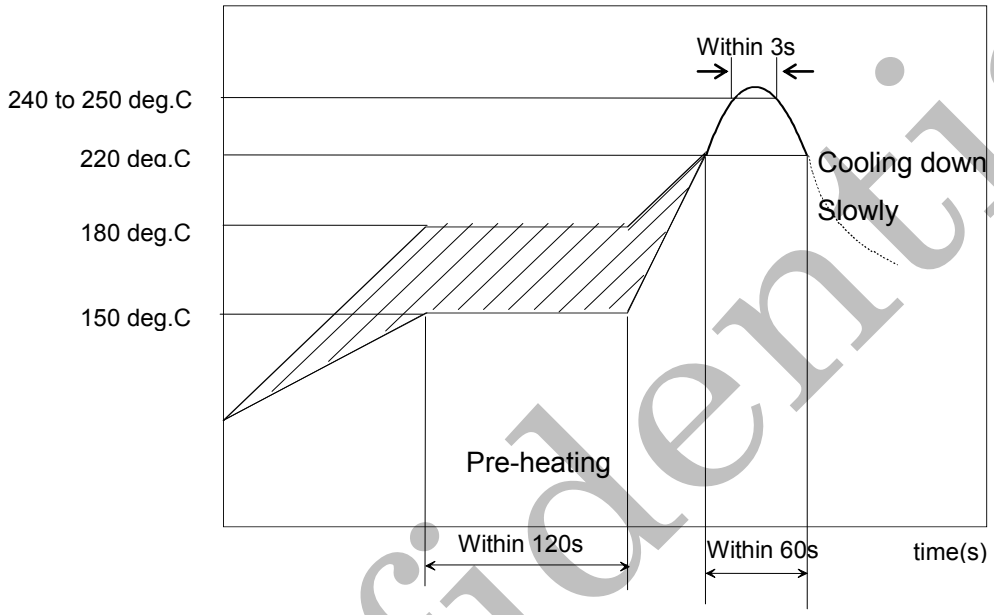
4 Notice for Chip Placer :

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 ℃.
Contact Murata before use if concerning other soldering conditions.

Reflow soldering standard conditions(Example)



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 (Cl_2, NH_3, 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.

9 FCC/Industry Canada Statement (to be placed on End Products)

FCC statement:

This module has been tested and found to comply with the FCC Part15.
These limits are designed to provide reasonable protection against harmful interference in approved installations.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may

cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Modifications or changes to this equipment not expressly approved by Murata Manufacturing Co., Ltd. may void the user's authority to operate this equipment.
The modular transmitter must be equipped with either a permanently affixed label or must be capable of electronically displaying its FCC identification number

(A) If using a permanently affixed label, the modular transmitter must be labeled with its own FCC identification number, and, if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: VPYCMABE" or "Contains FCC ID: VPYCMABE."
(B) If the modular transmitter uses an electronic display of the FCC identification number, the information must be readily accessible and visible on the modular transmitter or on the device in which it is installed. If the module is installed inside another device, then the outside of the device into which the module is installed must display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC certified transmitter module(s)."

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IC statement:
Label of the end product:
The final end product must be labeled in a visible area with the following "Contains transmitter module

IC: 772C-CMABE"

This Class B digital apparatus complies with Canadian ICES-003.
Cetappareilnumérique de la classe B estconforme à la norme NMB-003 du Canada.

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
1) l'appareil ne doit pas produire de brouillage;
2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radiation Exposure Statement:
This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual.

The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed.
If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also
display a label referring to the enclosed module. The end product shall haves the words "Contains Transmitter Module FCC ID: VPYCMABE, IC: 772C-CMABE".