



Flaircomm Microelectronics, Inc.

FLC-BTM083IQ2A Datasheet

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1. Introduction

FLC-BTM083IQ2A is a small form factor, low power and highly economic Bluetooth radio module that allows OEM to add wireless capability to their products. The module supports multiple interfaces that make it simple to design into fully certified embedded Bluetooth solutions.

With FLC's AT+ programming interfaces, designers can easily customize their applications to support different Bluetooth profiles, such as SPP, DUN, HDP, and etc. The module supports Bluetooth® Enhanced Data Rate (EDR) and delivers up to 3 Mbps data rate.

The module is an appropriate product for designers who want to add wireless capability to their products.

1.1 Naming Declaration

New Naming	Old Naming	Description
FLC-BTM083IQ2A	NA	With a built-in antenna.

Table 1: Naming Declaration

1.2 Block Diagram

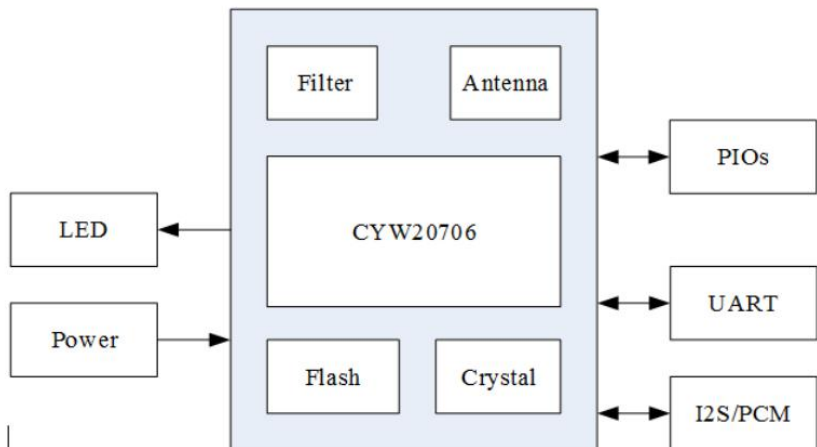


Figure 1: Block Diagram

1.3 Features

- Fully qualified single-chip dual mode Bluetooth v4.2
- On-board antenna design
- Small form factor
- SMT pads for easy and reliable PCB mounting

1.4 Applications

- Cable replacement
- Measurement and monitoring systems
- sensors and controls
- Medical devices
- PCs and laptops

2. General Specification

Bluetooth Specification	
Standard	Fully qualified single-chip dual mode Bluetooth v4.2 , Class 1.5 ^a
Profiles	detailed profiles depends on the firmware
Frequency Band	2.402GHz ~ 2.480GHz
Maximum Data Rate	3Mbps
Antenna	On-Board

Datasheet

Baseband Crystal OSC	20MHz
Interface	UART, PIO, AIO, PCM
Sensitivity	-90dBm@0.1%BER 1M; -92dBm@BLE 1M
RF TX Power	9dBm@BR 1M; 7dBm@BLE 1M
Supply Voltage	3V ~ 3.6V DC
Working Current	Depends on profiles
Standby Current	TBD
Operating Environment	
Temperature	-20°C to +70°C
Humidity	TBD
Certifications	TBD
Environmental	TBD
Dimension and Weight	
Dimension	12.0mm x 22.0mm x 2.6mm
Weight	TBD

Table 2: General Specification

a) The RF TX Power is measured in front of antenna .

3. Pin Definition

3.1 Pin Configuration

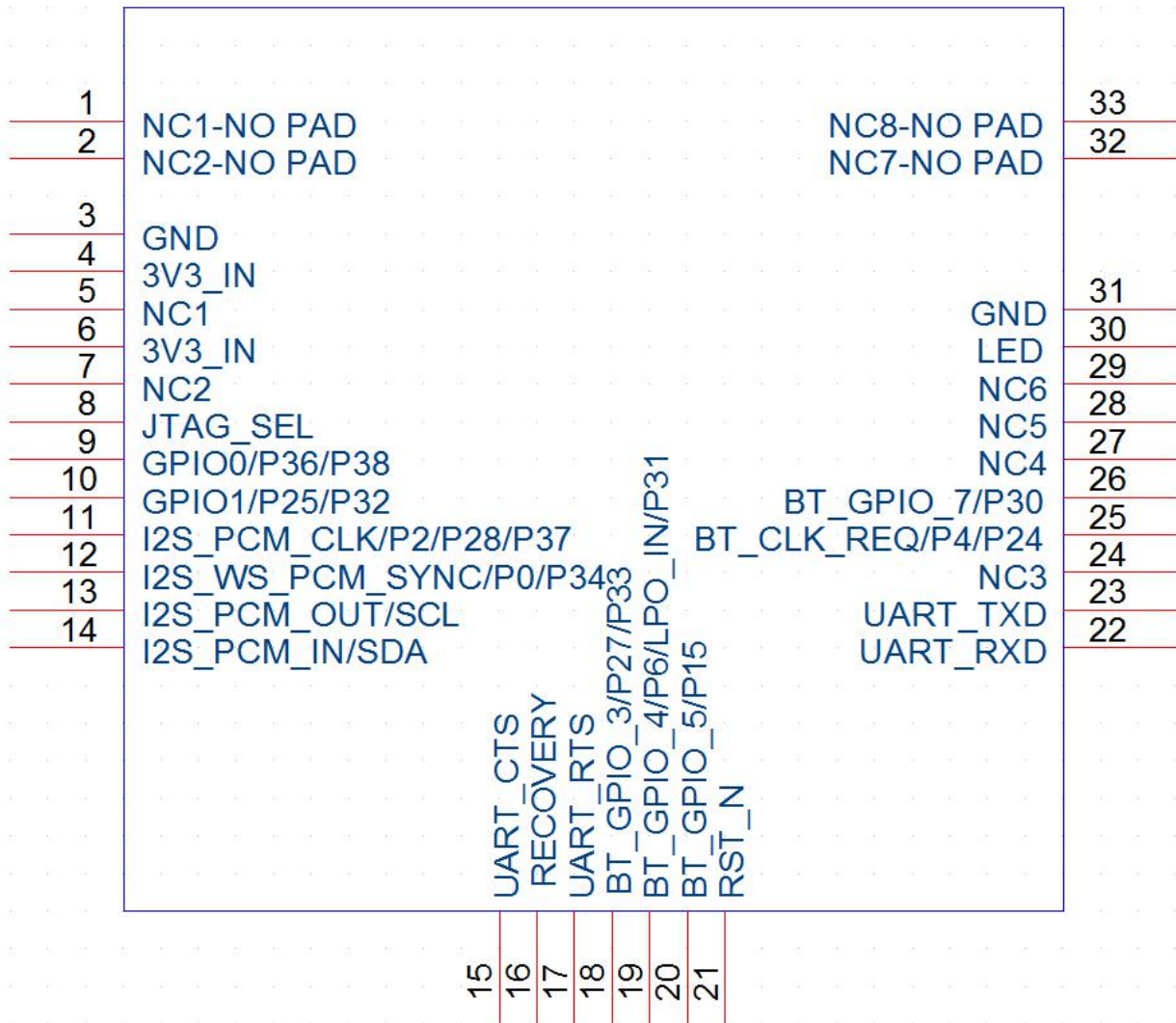


Figure 2: Pin Configuration

3.2 Pin Definition

Datasheet

Pin	Symbol	I/O Type	Description
1	NC1-NO PAD	NC1-NO PAD	NO PAD
2	NC2-NO PAD	NC2-NO PAD	NO PAD
3	GND	Ground	Ground
4	3V3_IN	Power	3.3V regulated power supply
5	NC1	Not connected	Not connected
6	3V3_IN	Power	3.3V regulated power supply
7	NC2	Not connected	Not connected
8	JTAG_SEL	I/O	ARM JTAG debug mode control. Connect to GND for all applications
9	GPIO0/P36/ P38	I	BT_GPIO_0/BT_DEV_WAKE A signal from the host to the module that the host requires attention
		I/O	GPIO: P36 A/D converter input 3 SPI_1: SPI_CLK (master and slave)
		I/O	GPIO: P38 A/D converter input 1 SPI_1: MOSI (master and slave) IR_TX
10	GPIO1/P25/ P32	I	BT_GPIO_1/BT_HOST_WAKE A signal from the device to the host indicating that the Bluetooth device requires attention.
		I/O	GPIO: P25 SPI_1: MISO (master and slave) Peripheral UART: puart_rx
		I/O	GPIO: P32 A/D converter input 7 SPI_1: SPI_CS (slave only)
11	I2S_PCM_CLK/P2/P28/P37	I/O	I2S_PCM_CLK
		I/O	GPIO: P2 SPI_1: SPI_CS (slave only) SPI_1: MOSI (master only) Peripheral UART: puart_rx
		I/O	GPIO: P28 A/D converter input 11, LED1

Datasheet

			Current: 16 mA sink
		I/O	GPIO: P37 A/D converter input 2 SPI_1: MISO (slave only) BSC: SCL
12	I2S_WS_P CM_SYNC/ P0/P34	I/O	PCM sync/I2S word select
		I/O	GPIO: P0 A/D converter input 29 SPI_1: MOSI (master and slave) IR_RX,
		I/O	GPIO: P34 A/D converter input 5 Peripheral UART: puart_rx
13	I2S_PCM_ OUT/SCL	I/O	PCM/I2S data output. I2C_SCL
		I/O	GPIO: P3 Peripheral UART: puart_cts SPI_1: SPI_CLK (master and slave)
		I/O	GPIO: P35 A/D converter input 4 Peripheral UART: puart_cts BSC: SDA
14	I2S_PCM_I N/SDA	I/O	PCM/I2S data input. I2C_SDA
		I/O	GPIO: P12 A/D converter input 23
15	UART_CTS	I	UART clear to send input
16	RECOVER Y	I	It is used for the forced loading of modules and can be suspended
17	UART_RTS	O	UART request to send output
18	BT_GPIO_3 /P27/P33	I/O	BT_GPIO_3
		I/O	GPIO: P27 SPI_1: MOSI (master and slave) Current: 16 mA sink
		I/O	GPIO: P33 A/D converter input 6

Datasheet

			SPI_1: MOSI (slave only) Peripheral UART: puart_rx
19	BT_GPIO_4 /P6/LPO_IN /P31	I/O	BT_GPIO_4: can also be configured as a GCI pin.
		I/O	GPIO: P6 Peripheral UART: puart_rts SPI_1: SPI_CS (slave only)
		I/O	External LPO input
		I/O	GPIO: P31 A/D converter input 8 Peripheral UART: puart_tx
20	BT_GPIO_5 /P15	I/O	General-purpose I/O: can also be configured as a GCI pin. Debug UART
		I/O	GPIO: P15 A/D converter input 20 IR_RX 60Hz_main
21	RST_N	I	Active-low reset input
22	UART_RXD	I	UART receive data
23	UART_TXD	O	UART transmit data
24	NC3	NC	NC
25	BT_CLK_R EQ/P4/P24	O	Used for shared-clock application
		I/O	GPIO: P4 Peripheral UART: puart_rx SPI_1: MOSI (master and slave) IR_TX
		I/O	GPIO: P24 SPI_1: SPI_CLK (master and slave) Peripheral UART: puart_tx
26	BT_GPIO_7 /P30	I/O	General-purpose I/O: can also be configured as a GCI pin.
		I/O	GPIO: P30 A/D converter input 9 Peripheral UART: puart_rts
27	NC4	NC	NC
28	NC5	NC	NC
29	NC6	NC	NC
30	LED	I/O	LED driver; 16ma

Datasheet

31	GND	Ground	Ground
32	NC1-NO PAD	NC1-NO PAD	NO PAD
33	NC1-NO PAD	NC1-NO PAD	NO PAD

Table 3: Pin Definition

4. Physical Interfaces

4.1 Reset

The RST pin is an active low reset. Assert the reset signal for a period > 50ms to ensure a full reset.

4.2 Serial Interfaces

4.2.1 UART Interface

The UART physical interface is a standard, 4-wire interface with adjustable baud rates from 38400 bps to 4Mbps. During initial boot, UART speeds may be limited to 750 kbps. The module has a 1040-byte receive FIFO and a 1040-byte transmit FIFO to support enhanced data rates. The interface supports the Bluetooth UART HCI (H4) specification. The default baud rate for H4 is 115.2 kbaud.

4.2.2 I2C

The module provides a 2-pin master I2C interface, which can be used to retrieve configuration information from an external EEPROM or to communicate with peripherals such as trackball or touch-pad modules, and motion tracking ICs used in mouse devices. The BSC interface is compatible with I2C slave devices. I2C does not support multimaster capability or flexible wait-state insertion by either master or slave devices.

The following transfer clock rates are supported by I2C:

- 100 kHz
- 400 kHz
- 800 kHz (Not a standard I2C-compatible speed.)
- 1 MHz (Compatibility with high-speed I2C-compatible devices is not guaranteed.)

The following transfer types are supported by I2C:

- Read (Up to 127 bytes can be read.)
- Write (Up to 127 bytes can be written.)
- Read-then-Write (Up to 127 bytes can be read and up to 127 bytes can be written.)
- Write-then-Read (Up to 127 bytes can be written and up to 127 bytes can be read.)

Hardware controls the transfers, requiring minimal firmware setup and supervision.

The clock pin (SCL) and data pin (SDA) are both Pulled-up by 4.7k resistors for proper operation.

4.3 Audio Interface

4.3.1 PCM Interface

The module includes a PCM interface that shares pins with the I2S interface. The PCM Interface on the module can connect to linear PCM codec devices in master or slave mode. In master mode, the module generates the PCM_CLK and PCM_SYNC signals. In slave mode, these signals are provided by another master on the PCM interface and are inputs to the module.

I ² S Pin	PCM Function
I2Sn SD IN	PCM IN
I2Sn SD OUT	PCM OUT
I2Sn WS	PCM SYNC
I2Sn SCK	PCM CLK

4.4 LED Drivers

As follower, The max-current is 16mA

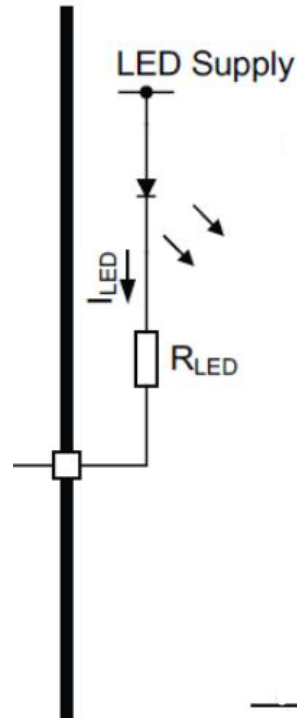


Figure 3: LED Equivalent Circuit

4.5 RF Interface

The module has a built-in antenna.

4.6 General Purpose Analogue IO

TBD.

4.7 General Purpose Digital IO

All these GPIOs can be configured by software to realize various functions. Do not connect them if not use.

5. Electrical Characteristic

5.1 Absolute Maximum Rating

Rating	Min	Max	Unit
Storage Temperature	-30	+85	°C
Operating Temperature	-30	+85	°C
PIO Voltage	-0.5	3.795	V
VDD-3V3_IN	-0.5	3.795	V

Table 5: Absolute Maximum Rating

5.2 Recommended Operating Conditions

Operating Condition	Min	Typical	Max	Unit
Storage Temperature	-30	--	+70	° C
Operating Temperature Range	-30	--	+70	° C
VDD	+3	+3.3	+3.6	V

Table 6: Recommended Operating Conditions

5.3 Input/output Terminal Characteristics

5.3.1 Digital Terminals

VDD=3V3_IN=3.3V

Supply Voltage Levels	Min	Typical	Max	Unit
Input Voltage Levels				
VIL input logic level low	-	-	+0.8	V
VIH input logic level high	2.0	-	-	V

Datasheet

Output Voltage Levels				
VOL output logic level low	-	-	0.4	V
VOH output logic level high	-	-	-	V

7. Mechanical Characteristic

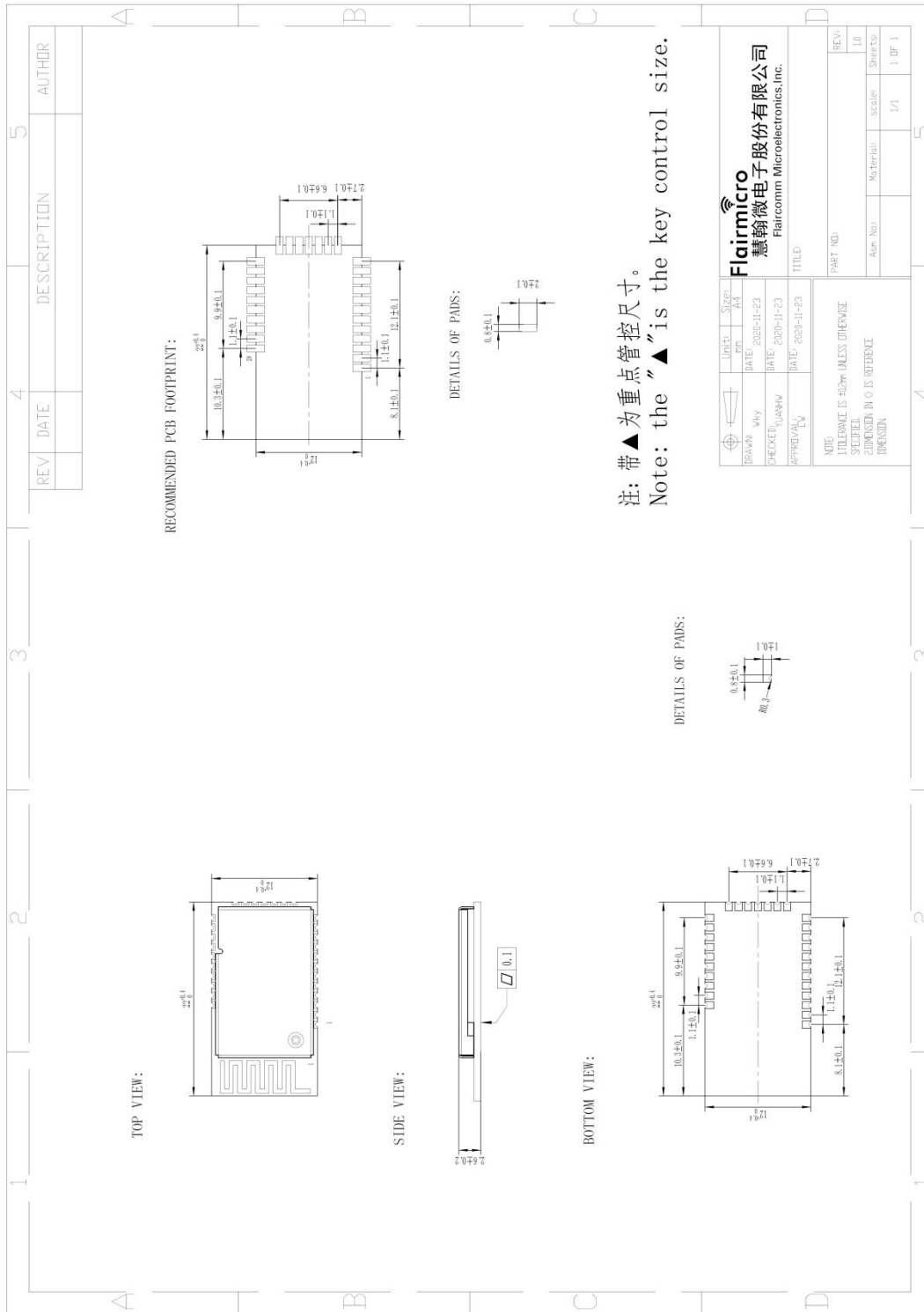


Figure 5: Mechanical Characteristics

8. Recommended PCB Layout and Mounting Pattern

A very important factor in achieving maximum Bluetooth performance is the placement of a module with on-board antenna designs onto the carrier board and corresponding PCB layout. There should be no any trace, ground and vias in the area of the carrier board underneath the module's on-board antenna section as indicated in **Figure 10**. Antenna portion of the module must be placed at least 5mm away from any metal part and the antenna should not be covered by any piece of metal. The antenna of the module **MUST** be kept as far from potential noise sources as possible and special care must also be taken with placing the module in proximity to circuitry that can emit heat. The RF part of the module is very sensitive to temperature and sudden changes can have an adverse impact on performance.

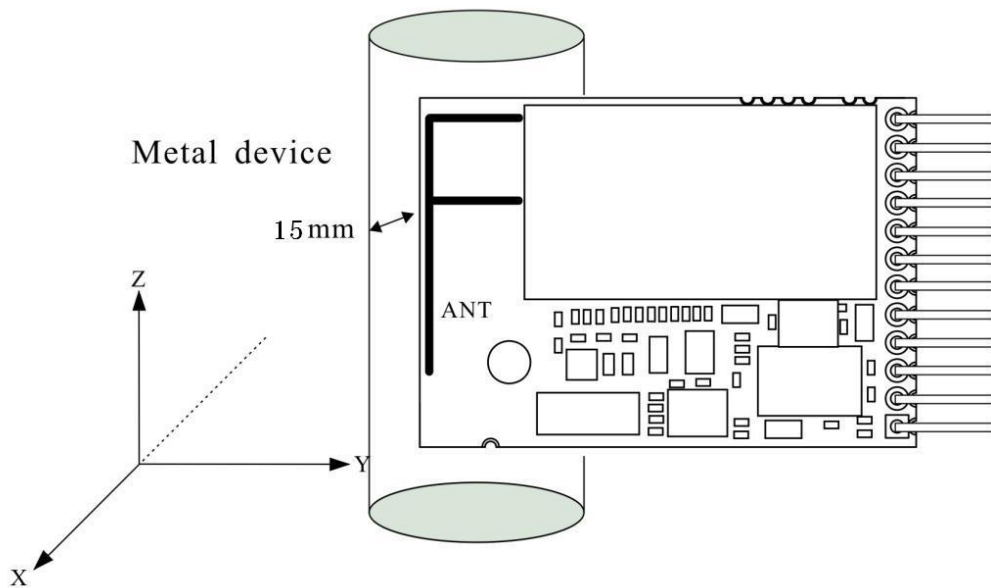


Figure 6: Leave 5mm Clearance Space from the Module Built-in Antenna

9. Recommended Reflow Profile

The soldering profile depends on various parameters necessitating a set up for each application. The data here is given only for guidance on solder reflow.

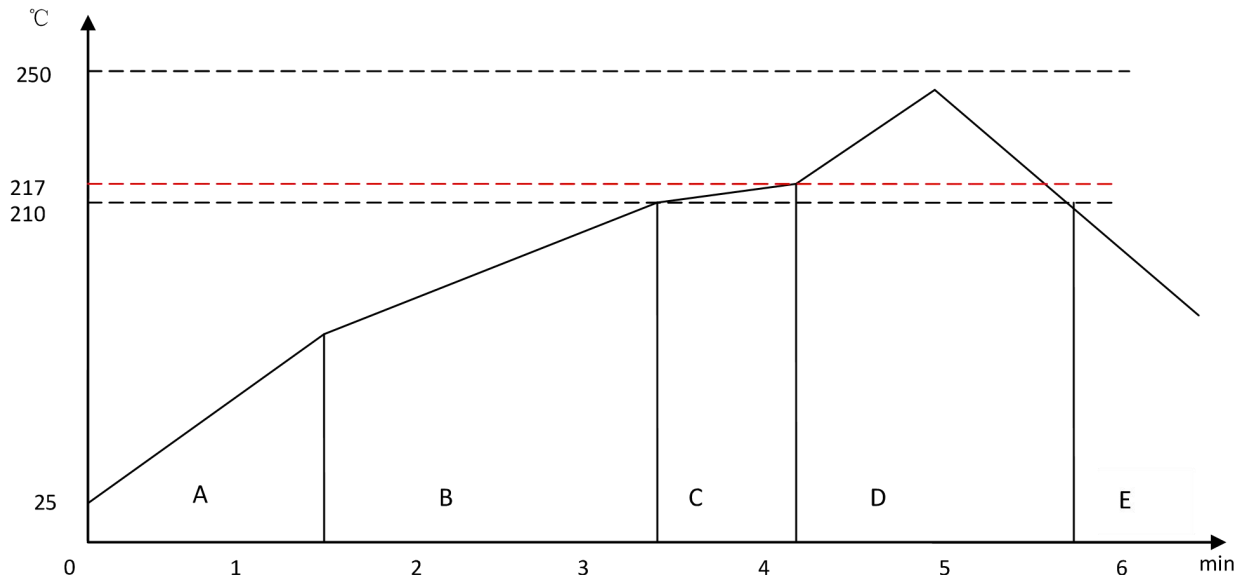


Figure 7: Recommended Reflow Profile

Pre-heat zone (A) — This zone raises the temperature at a controlled rate, **typically 0.5 – 2 °C/s**. The purpose of this zone is to preheat the PCB board and components to 120 ~ 150 °C. This stage is required to distribute the heat uniformly to the PCB board and completely remove solvent to reduce the heat shock to components.

Equilibrium Zone 1 (B) — In this stage the flux becomes soft and uniformly encapsulates solder particles and spread over PCB board, preventing them from being re-oxidized. Also with elevation of temperature and liquefaction of flux, each activator and rosin get activated and start eliminating oxide film formed on the surface of each solder particle and PCB board. **The temperature is recommended to be 150° to 210° for 60 to 120 second for this zone.**

Equilibrium Zone 2 (c) (optional) — In order to resolve the upright component issue, it is recommended to keep the temperature in 210 – 217 ° for about 20 to 30 second.

Reflow Zone (D) — The profile in the figure is designed for Sn/Ag3.0/Cu0.5. It can be a reference for other lead-free solder. The peak temperature should be high enough to achieve good wetting but not so high as to cause component discoloration or damage. Excessive soldering time can lead to intermetallic growth which can result in a brittle joint.

Datasheet

The recommended peak temperature (T_p) is 230 ~ 250 °C. The soldering time should be 30 to 90 second when the temperature is above 217 °C.

Cooling Zone (E) — The cooling ate should be fast, to keep the solder grains small which will give a longerlasting joint. **Typical cooling rate should be 4 °C.**

Figure 8: Product Packaging Information

10.2 Ordering Information

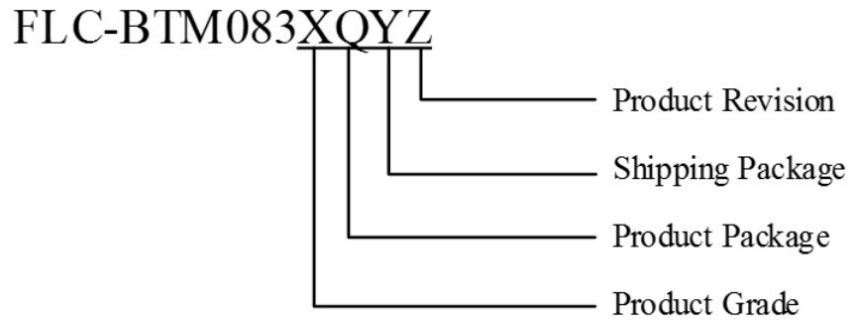


Figure 9: Ordering Information

10.2.1 Product Revision

Product Revision	Description	Availability
A	With a built-in antenna.	Yes

Table 7: Product Revision

10.2.2 Shipping Package

Shipping Package	Description	Quantity	Availability
0	Form Tray	—	No
1	Plastic Tray	—	No
2	Tape	800x5 = 4000	Yes

Table 8: Shipping Package

10.2.3 Product Package

Product Package	Description	Availability
Q	QFN	Yes
L	LGA	No
B	BGA	No

Datasheet

C	Connector	No
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Table 9: Product Package

10.2.4 Product Grade

Product Grade	Description	Availability
I	Industrial or Consumer	Yes
V	Automobile After-Market	No
A	Automobile Before-Market	No

Table 10: Product Grade

Note: This module is consumer grade