




Approval Sheet

Bluetooth® Module

Customer MODEL	BnCOM MODEL
BT-MSOIII	BPM610

History

VERSION	DATE	DESCRIPTION
1.0	2019-11-27	Initial Release

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BT-MSOIII

Specification

Revision 1.0

2019/11/27

CONFIDENTIAL INFORMATION

BnCOM Co.,Ltd.

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OEM/integrators Installation Manual

the modules limited to OEM installation only

the OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Instructions to the OEM/integrator

The OEM integrator must include the instructions or statements required by part 15.19 and 15.21 in the user manual.

the OEM integrator must include a separate section in the host user's manual concerning the operating conditions to satisfy RF exposure compliance.

there is requirement that the grantee provide guidance to the host manufacturer for compliance with part 15b requirements.

1. General

1.1 Overview

This specification covers Bluetooth module which complies with Bluetooth specification version 5.0 and integrates RF & Baseband controller in small package. This Module has deployed Airoha AB1122 chipset.

All detailed specification including pin outs and electrical specification may be changed without notice.

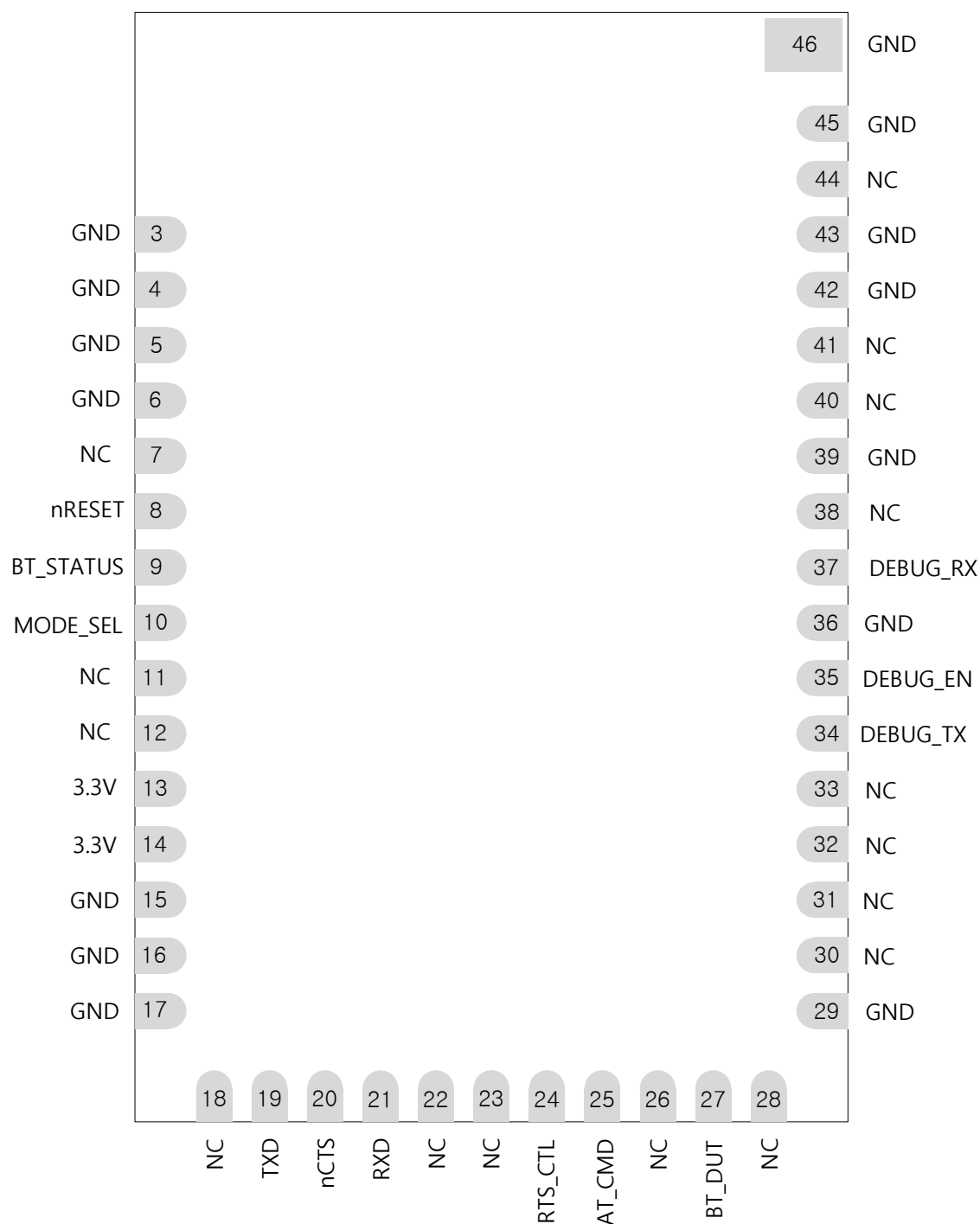
1.2 Features

- Bluetooth® v5.0 (Dual mode) specification compliant
- Radio includes integrated balun and typical RF performance of 8dBm transmit power and -94 dBm receive sensitivity
- Embedded 80251 MCU with 12/24MHz clock rate
- Embedded 4Mbit Flash
- Serial interfaces: UART
- 4 general purpose PIOs
- Competitive Size: 28mm x 18mm x 2.8mm : 44Pin
- Operating temperature range (MAX -30℃ ~ 85℃)

1.3 Application

- Mobile Payment
- POS System

1.4 Pin Configuration



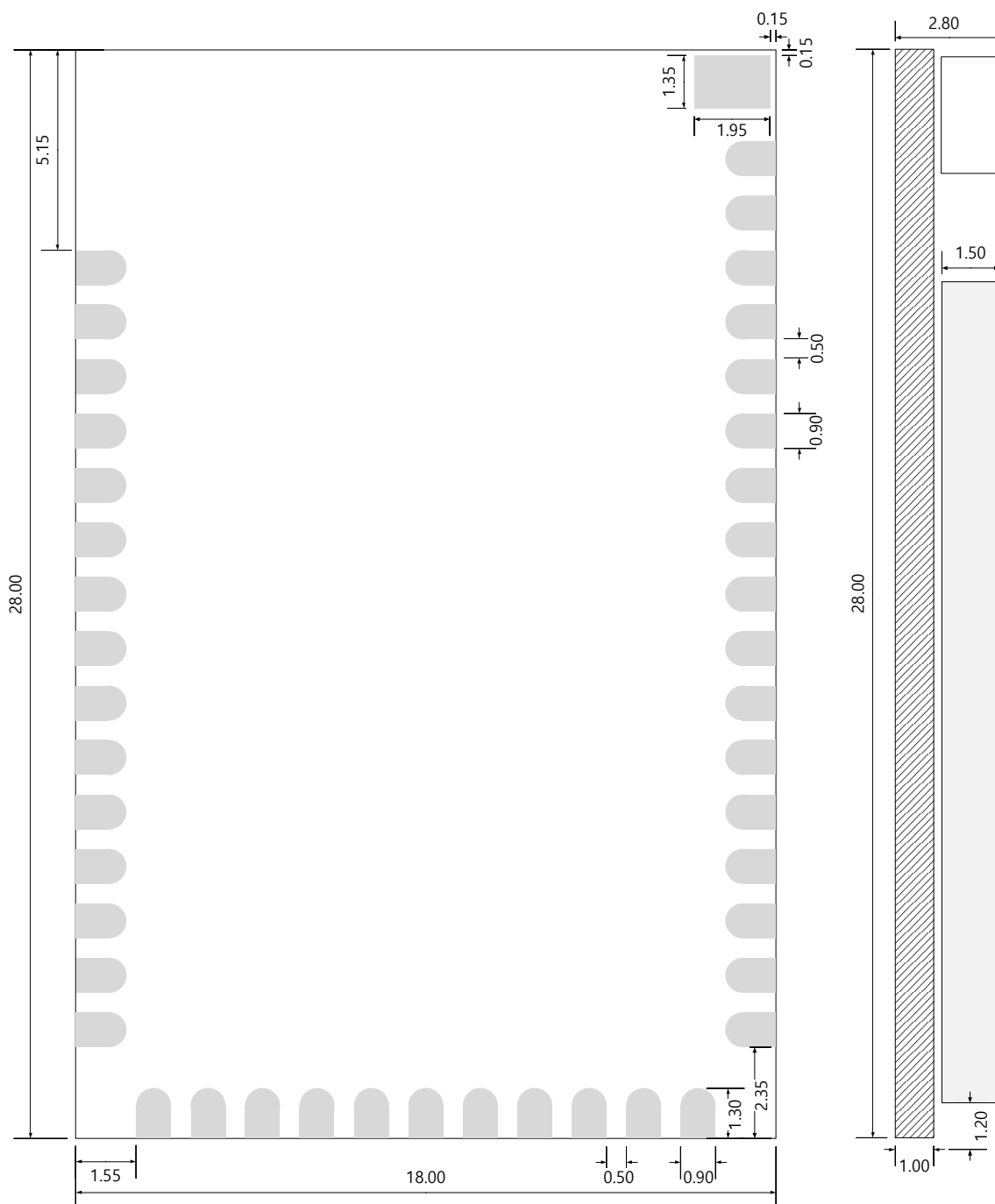
Pin Configuration (TOP VIEW)

1.5 Device Terminal Functions

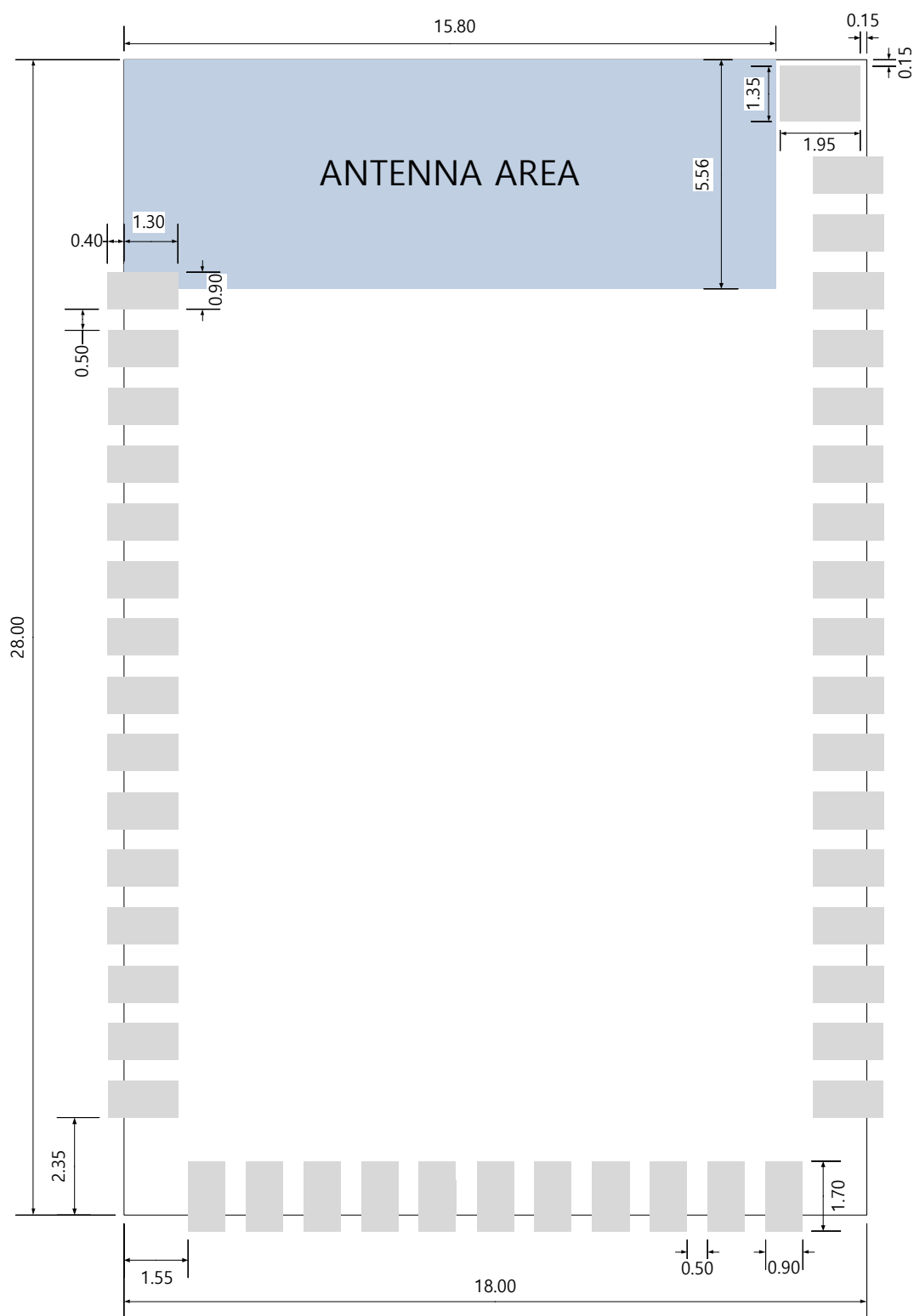
	Function	Pin Name	Pin No.	Pin type	Description	Note
PIO	PIO[7]	MODE_SEL	10	Bideirection, Weak Pull Down	Firmware Mode Select	
	PIO[5]	BT_DUT	27		BT DUT	
	PIO[14]	BT_STATUS	9		BT_STATUS	
	PIO[4]	AT_CMD	25		AT Command	
	PIO[24]	RTS_CTL	24		RTS Control	
UART Interface	UART_RX	RXD	21	Bidirection Weak Pull Down	UART Data Input	
	UART_TX	TXD	19		UART Data Output	
	PIO[12]	nCTS	20		UART Clear to Send Active Low	
Debug Interface	UART_RX	DEBUG_RX	37	Bidirection Weak Pull Down	Debug Line Input	
	UART_TX	DEBUG_TX	34		Debug Line Output	
	SDA	DEBUG_EN	35		Debug Mode Enable, Active Low	
Other Pins	BAT_P	3.3V	13,14	Input, Strong Pull Up	Positive Power Supply	
	RST_N	nRESET	8		Reset	
	GROUND	GND	3,4,5,6,15,16,17,29,36,39,42,43,45,46		Ground	
	NC	NC	7,11,12,18,22,23,26,28,30,31,32,33,38,40,41,44		Not Connect	

1.6 Package Dimensions & Land Pattern

- unit = mm
- General Tolerances = $\pm 0.2\text{mm}$



BT-MSOIII Dimensions



Land Pattern

2. Characteristics

2.1 Electrical Characteristics

■ Absolute Maximum Ratings

Rating	Min	Max	Unit
Storage Temperature range	-40	85	°C
VDD	-0.3	4.4	V

■ Recommended Operating Conditions

Operating Condition	Min	Typ	Max	Unit
Operating Temperature range	-30	20	85	°C
VDD	2.7	3.3	3.6	V

■ Current consumption

Classic (Test Condition : VDD =3.3V, Temp = 25°C)		Avr	Peak	Unit
Standby current	-	9.2	-	mA
Connected current	-	7.8	-	mA
TX current with UART	-	13		mA
RX current with UART	-	11		mA

UART baud rate = 230,400bps

■ Digital Terminals

Input Voltage Levels	Min	Typ	Max	Unit
V _{IL} input logic level low	0	-	0.3xVDD	V
V _{IH} input logic level high	0.7 x VDD	-	VDD+0.4	V
Output Voltage Levels	Min	Typ	Max	Unit
V _{OL} output logic level low, I _{OL} = 4.0mA	-	-	0.4	V
V _{OH} output logic level high, I _{OH} = -4.0mA	VDD-0.4	-	-	V

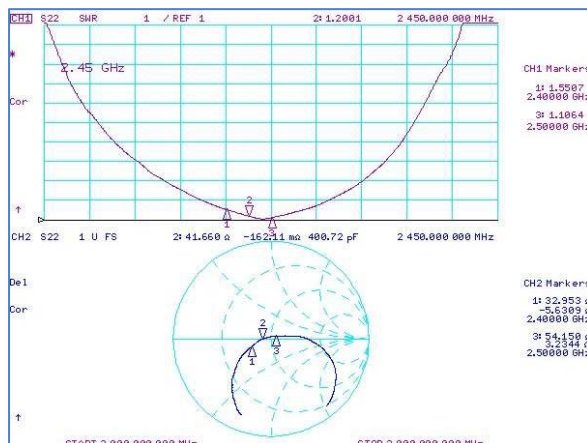
2.2 RF Characteristics

RF	Specification	Condition	Min	Typ	Max	Unit
Transmitter	Output transmit power	2.402	-	8.86	-	dB
		2.441	-	9.24	-	dB
		2.480	-	8.25	-	dB
	Transmit power density		-	-6.29	-	dBm
	Transmit power control	Pmin	-25.79	-	7.75	dBm
		Pst	3.88	4.81	-	dB
	Frequency Range		2401.515	-	2480.485	Mhz
	20dB bandwidth for modulation		-	925	-	Khz
	Adjacent channel transmit power	±2MHz	-	-22.4	-	dBm
		±3MHz	-	-48.09	-	dBm
		±4Mhz	-	-48.79	-	dBm
	Modulation characteristics	Δf1avg	-	165	-	Khz
		Δf2_pass_rate	-	100	-	%
		Δf2avg/Δf1avg	-	0.93	-	
	Intial carrier frequency tolerance	df0_avg	-	-13.7	-	Khz
Receiver	Carrier frequency drift	One slot packet(DH1)	-	-4.7	-	KHz
		Three slot packet(DH3)	-	-6.4	-	KHz
		Five slot packet(DH5)	-	-6.4	-	KHz
	Sensitivity at 0.1% BER for all basic rate packet types	2.402	-	-84.6	-	dBm
		2.441	-	-86.9	-	dBm
		2.480	-	-86.9	-	dBm
	Maximum input level		-20	-5	-	dBm

2.3 Antenna Characteristics

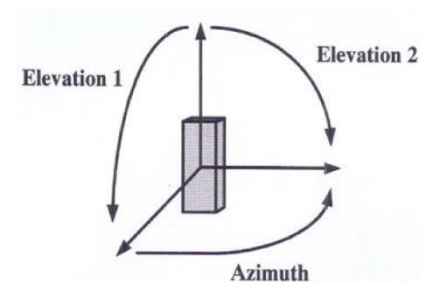
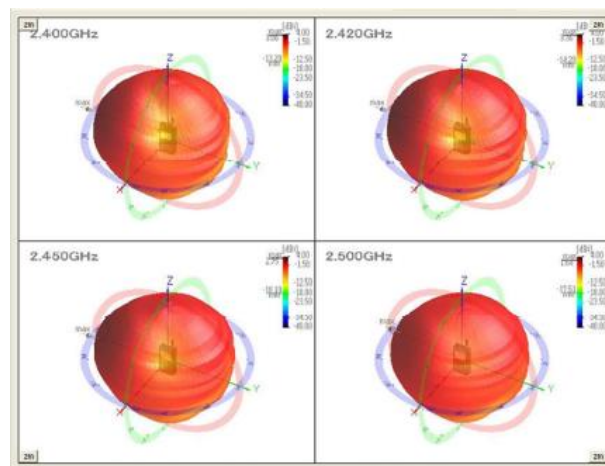
The antenna is monopole type of chip antenna. The antenna impedance matching is optimized for 1 mm ~ 2 mm mother board PCB thickness. The radiation pattern is impacted by the layout of the mother board. Typically the highest gain is towards GND plane and weakest gain away from the GND plane.

LOG, Smith Chart & VSWR



ITEM	SPEC
Frequency Range	2400 ~ 2485 MHz
VSWR	2:1 Max
Polarization	Linear
Impedance	50 ohm
Gain	3.36 dBi (Max)

Radiation Gain



Frequency [Mhz]	Efficiency [%]	Average Gain [dBi]	Peak Gain [dBi]
2,400	52.15	-2.83	3.06
2420	58.58	-2.32	3.36
2,450	57.85	-2.38	2.75
2,500	53.68	-2.7	1.64

3. Terminal Description

3.1 UART Interface

This is a standard UART interface for communicating with other serial devices.

BT-MSOIII UART interface provides a simple mechanism for communicating with other serial devices using the RS-232 protocol.

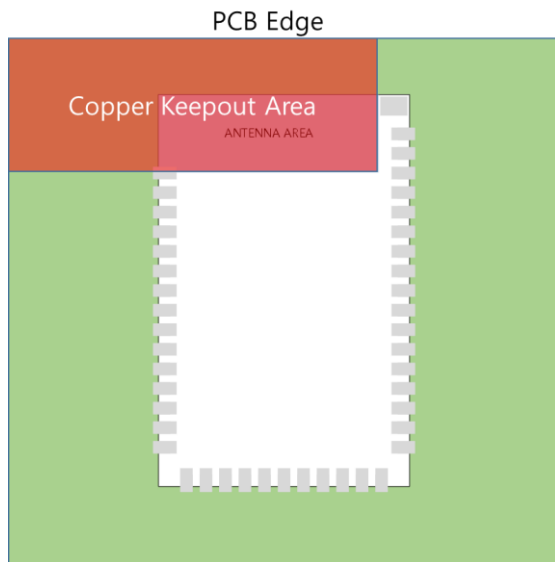
When BT-MSOIII is connected to another digital device, UART_RX and UART_TX transfer data between the 2 devices. The remaining 2 signals, UART_CTS and UART_RTS, implement optional RS232 hardware flow control where both are active low indicators

3.1.1 Configuration list

Configuration Parameters	Supported Values
Data Length	8bit
Flow Control	Hardware RTS/CTS None
Parity	Even Odd None
Number of stop bits	1 or 2
Baud rate	1200 2400 4800 9600 19200 38400 57600 76800 115200 230400 460800 921600 1843200

4. Design Guide

4.1 ANT Placement Guide

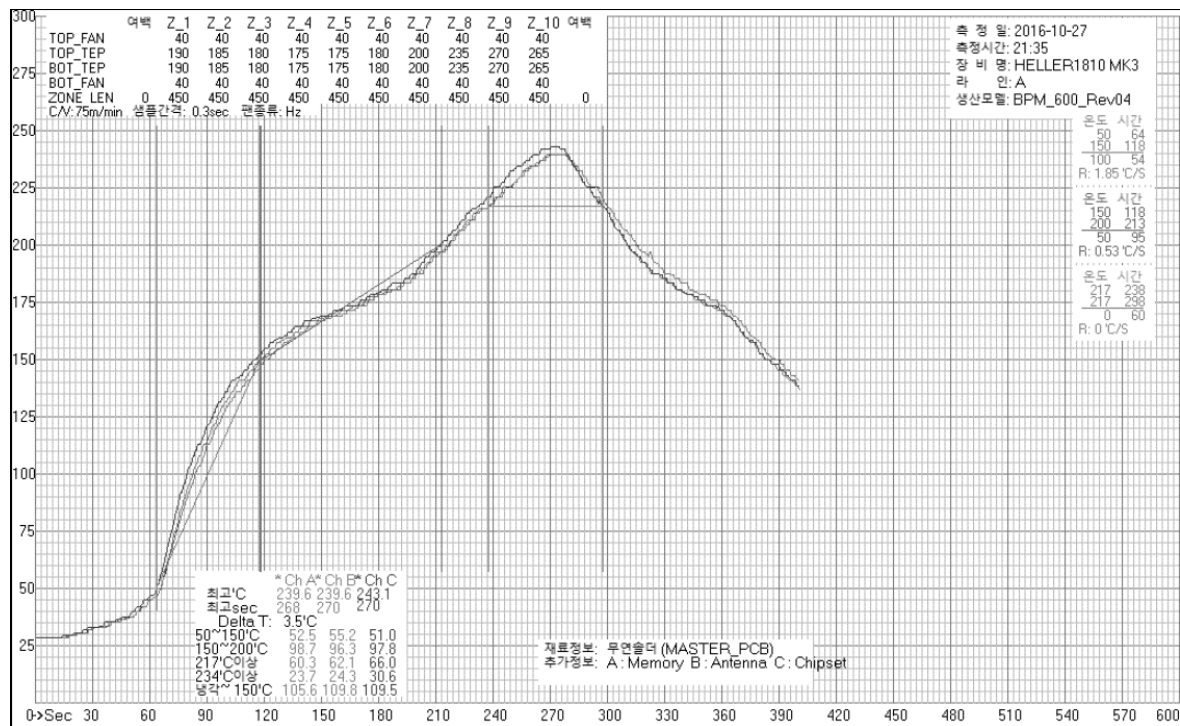


For antenna radiation, place the ANT area of the module on the outside of PCB
Or apply a 'Copper Keepout Area' as shown.

5. Solder 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 re-flow. There are four zones:

1. Preheat Zone - This zone raises the temperature at a controlled rate, typically 1-2.5°C/s.
2. Equilibrium Zone - This zone brings the board to a uniform temperature and also activates the flux. The duration in this zone (typically 2-3 minutes) will need to be adjusted to optimise the out gassing of the flux.
3. Reflow Zone - 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.
4. Cooling Zone - The cooling rate should be fast, to keep the solder grains small which will give a longer lasting joint. Typical rates will be 2-5°C/s.



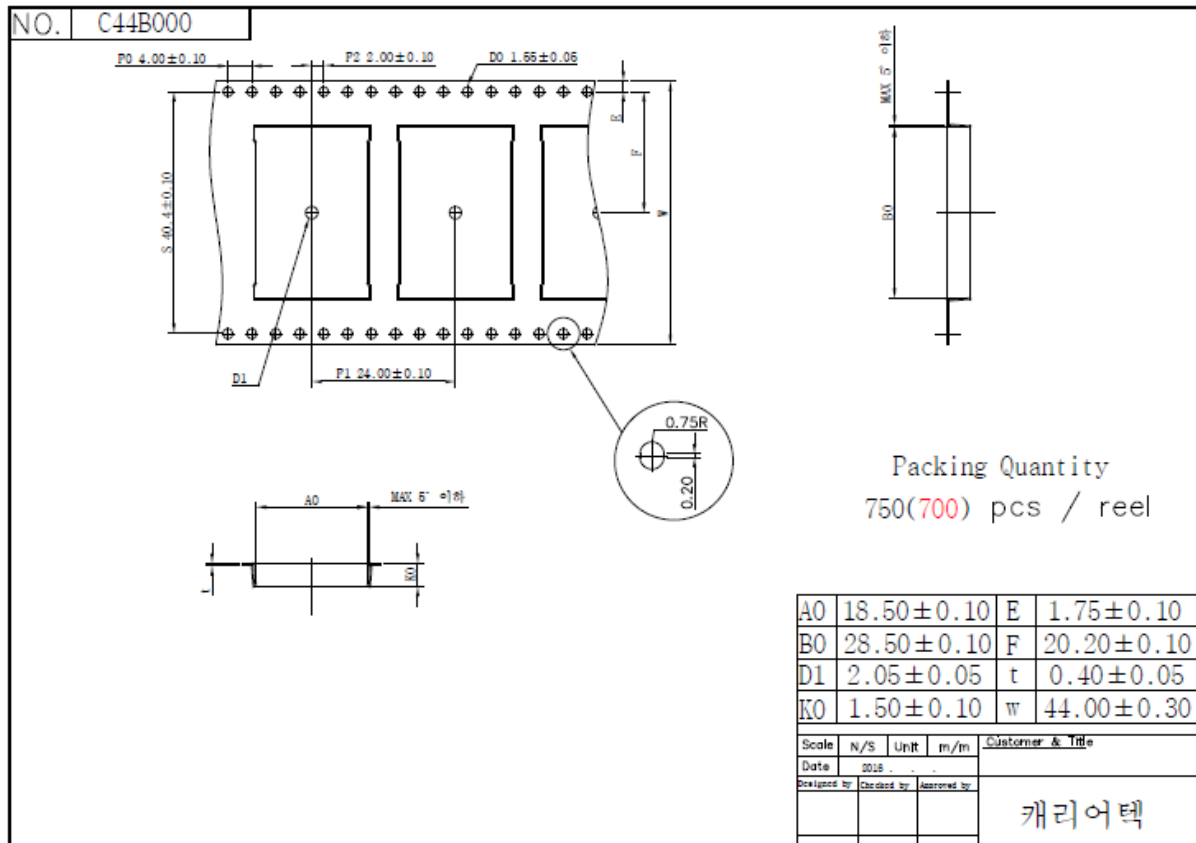
Typical Reflow Solder Profile

Key features of the profile:

- Initial ramp = 1-2.5°C/sec to 175°C ±25°C equilibrium
- Equilibrium time = 60 to 180 seconds
- Ramp to maximum temperature (245°C) = 3°C/sec max.
- Time above liquidus temperature (217°C): 45-90 seconds
- Device absolute maximum reflow temperature: 260°C

Devices will withstand the specified profile.

6. Package Information



7. Certification note.

7.1 FCC/IC

FCC Information to User

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 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.

Caution

THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Exposure to Radio Frequency Radiation.

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

Any Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Attention: Tout changement ou modification non expressément approuvé par le fabricant peut annuler le droit de l'utilisateur à utiliser l'équipement.

IMPORTANT NOTE : FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

IC Information to User

This device complies with Industry Canada's licence-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, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Bluetooth module has been granted modular approval for mobile applications. OEM integrators for host products may use the module in their final products without additional FCC / IC (Industry Canada) certification if they meet the following conditions. Otherwise, additional FCC / IC approvals must be obtained.

The host product with the module installed must be evaluated for simultaneous transmission requirements.

The user's manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC / IC RF exposure guidelines.

To comply with FCC / IC regulations limiting both maximum RF output power and human exposure to RF radiation, use this module only with the included onboard antenna.

A label must be affixed to the outside of the host product with the following statements:

Product Name : Bluetooth Module (Appliance Service Tool)

Contains FCC ID: 2AKMF-BT-MSOIII

Contains IC: 22266-BTMSOIII

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.