

Datasheet of Bluetooth BM57SPPSyC2 Module

iSSC Technologies Corp.

Revision History

Date	Revision Content	Version
2012/03/08	Preliminary Draft Version	0.2

Content

1. Introduction	3
1.1. Major Components	3
1.2. Features.....	3
1.3. Application	4
1.4. Certifications	4
2. Product Specification	5
2.1. Chipset.....	5
2.2. Interfaces.....	5
2.3. Hardware Design Considerations.....	5
3. Hardware Architecture.....	10
4. Compatibility Requirements.....	10
5. Environmental Requirements	11
5.1. Temperature	11
5.2. Humidity.....	11
Appendix A: Dimension and Foot Print	12
Appendix B: Product Image.....	13
Appendix C: PIN Assignment	14
Appendix D: Reflow Profile.....	16
Appendix E: Schematic	17
Appendix F: Reference Schematic	18
Appendix G: Test Board Layout Information.....	19
Appendix H: Test Board Layout Information	19
Appendix H: Label Information.....	19
Appendix I: Packaging Information.....	20
Appendix I: Reversion History.....	21

1. Introduction

Part Name: iSSC BM57SPPSyC2 Bluetooth module

Part Number: BM57SPPSyC2-xxxxxx

The iSSC BM57SPPSyC2 Bluetooth module is design for MFi (The Made for iPod, Made for iPhone and Made for iPad logos) electronic accessory via Bluetooth connectivity. It is available in the 2.4GHz ISM band Class 2 Radio, compatible with Bluetooth Core Specification Version 3.0 + EDR.

iSSC IS1657NM single chip solution combines transceiver and baseband function to decrease the external components. It narrows down the module size and minimizes its cost. The optimized power designs minimize power consumption to keep low battery.

The module is integrated with shielding case and 2.4GHz RF Chip antenna. It has passed the Bluetooth SIG and FCC Part 15 certification.

***Notice:**

- 1. Changes or modifications made to this equipment not expressly approved by the Grantee of the FCC ID may void the FCC authorization to operate this equipment.**
- 2. LABEL OF THE END PRODUCT:** The final end product must be labeled in a visible area with the following " Contains FCC ID: A8TBM57SPPSYC2A".

1.1. Major Components

- iSSC IS1657NM (48 pin QFN, single-chip Bluetooth transceiver and baseband processor)
- Serial EEPROM 8K (1024*8) TSSOP 8P

1.2. Features

- Bluetooth 3.0 EDR compliant
- Low power 1.8V RF operation
- RF transmitter output power Class 2
- RF receiver GFSK typical -90dBm, $\pi/4$ PSK typical -90dBm, 8DPSK typical -83dBm
- Internal ROM and 4Mibts of flash
- HCI over UART
- I2C for external EEPROM and authentication chip (to enable functionality between your electronic accessory and the iPod, iPhone and iPad)
- 1 LED driver
- 2.4GHz ceramic chip antenna

1.3. Application

- GPS
- Printers
- Electric Scale
- Blood Pressure Monitors
- Bar code Scanner
- Industrial Applications (CNC, PLC, RFID)
- Embedded systems

1.4. Certifications

- Bluetooth SIG: QDID B017511

http://www.bluetooth.org/tpg/QLI_viewQDL.cfm?qid=17511

- FCC ID: A8TBM57SPPSYC2A

ISSC Confidential

2. Product Specification

2.1. Chipset

7x7 mm² 48 pin QFN IS1657NM

2.2. Interfaces

- Multi function GPIO interface
- Bluetooth RF interface
- HCI over URAT up to 921600 bps
- I2C for external EEPROM and authentication chip
- 2/4 wires SPI interface (master/slave) for external peripherals control. (Optional)

2.3. Hardware Design Considerations

- Power

The module requires either a 3.3V or 5V supply voltage. (3.3V was suggested)

- Power ramp-up timing restriction

- 1) BAT_IN : ramp-up (0 to 1.6V) < 200ms
- 2) PMULDO_O : PMU-logic ramp-up (0 to 1.6V) < 60ms
- 3) VCC_RF (1.8V power domain) : RF BPOR ramp-up (0 to 1.6V) < 20ms

- Power on sequence

- 1) BAT_IN/ BAT_IN_5V: must be first!
- 2) 3.3V power domain: VDD_IO/ VDD_FIO must power-up early than 1.8V power.
- 3) 1.8V power domain: 1V8/ VCC_RF/ VDD_XO/ 1V8_U_P
- 4) RST_N: digital reset released from 0 to 1.6V must be the last one.

- Recommended operating conditions

Rating	Min	Typ	Max
VDD_IO_x,	3.2V		3.63V
SW_BTN	3.2V		4.3V
BAT_IN	3.2V		4.3V

- Clock Sources

A high accuracy crystal with ± 10 ppm tolerance is connected to the BM57SPPSyC2 clock input pins.

- Serial Flash and Firmware Version

Firmware code is stored on chip internal flash.

- Radio Characteristics

Bluetooth V3.0 + EDR

Frequency Band: 2402-2480 GHz

Number of Channels: 79 1MHz channels

- Current Consumption

Operation Mode	Peak current	AVG current	Unit	Note
Peak current at TX mode	50.357		mA	
Peak current at RX mode	49.413		mA	
Standby mode (Discoverable & connectable mode)		2.382	mA	
Deep power down mode		0.276	mA	
Connected + Sniff, Master (No data)		2.723	mA	No data was transmitted Sniff (40 20 4 0)
Connected + Sniff, Master (No data)		0.673	mA	No data was transmitted Sniff (500 20 4 0)
Connected + Sniff, Slave (No data)		0.745	mA	No data was transmitted Sniff (500 20 3 3) iPhone parameters
Data, Master		17.641	mA	Data transmitted at 115200bps
Data, Slave		18.025	mA	Data transmitted at 115200bps

- Terminal characteristics

Condition :	Min	Typ	Max	Unit
VDD_IO=3.3V				
I/O voltage levels				
V _{IL} input logic levels low	-0.3		0.8	V
V _{IH} input logic levels high	2.0		3.6	V
V _{OL} output logic levels low			0.4	V
V _{OH} output logic levels high	2.4			V
Reset terminal				
V _{TH,res} threshold voltage		1.6		V
Input and tri-state current with				
Pull-up Resistor		65		Kohm
Leakage current	-10		+10	μA
Vdd supply current				
TX mode			70	mA
RX mode			70	mA

- Baud Rate

Desired baud rate	Clock	P	Div	Actual Baud rate	Error Rate %
921600	48000000	13	3.50641026	923077	0.16
460800	48000000	13	7.51282051	461538	0.16
230400	48000000	13	15.525641	230769	0.16
115200	16000000	13	10.1837607	111888	-2.87
57600	16000000	13	20.8675214	58608	1.75
38400	16000000	13	31.5512821	38462	0.16
28800	16000000	13	42.2350427	28623	-0.62
19200	16000000	13	63.6025641	19231	0.16
14400	16000000	13	84.9700855	14480	0.55
9600	16000000	13	127.705128	9615	0.16
4800	16000000	13	255.910256	4808	0.16
2400	16000000	13	512.320513	2399	-0.03

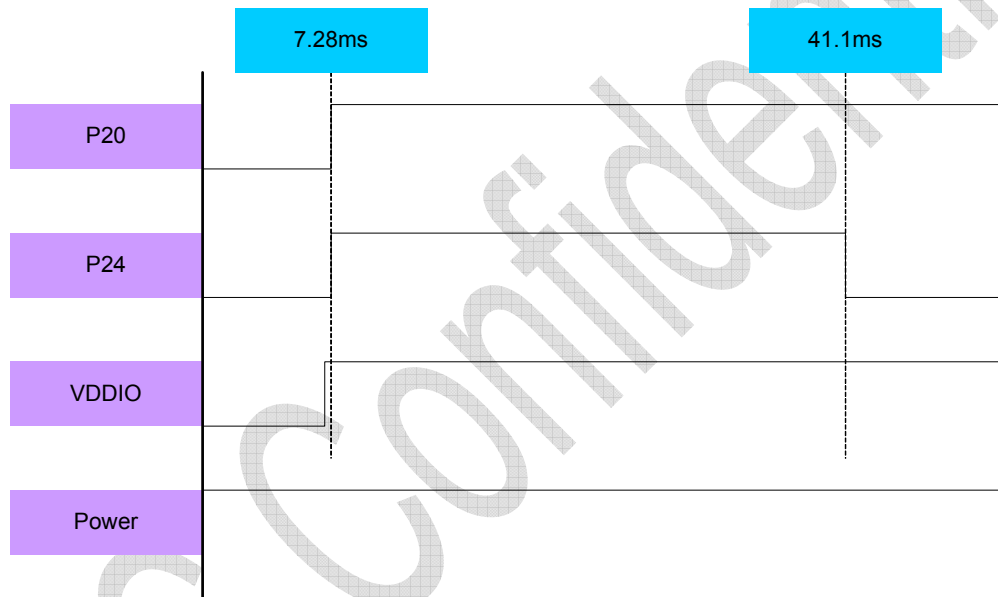
- Testing Criterion

NO.	Testing Item Name	Spec.
1	Device Initialization	
2	System Verify	System Power>1.6V
3	PMU LDO trim	1.8~2.1
4	Calibration LDO18	1.81~1.93V
5	Calibration LDO33	3.1~3.4V
6	RF frequency calibration	< 10k Hz
7	RF TX power verify	> -5 dBm
8	8852 output power	-2dbm~+4dbm
9	Initial carrier test	+/- 30KHz
10	Single slot sensitivity	> -70dbm
11	Multi slot sensitivity	> -70dbm
12	Modulation index test	'140KHz ≤ f1avg ≤ 175KHz f2max ≥ 115KHz f2/f1avg ≥ 0.8

- Timing Sequence

Timing Sequence for Mode selection Pin (P20, P24) under APP mode

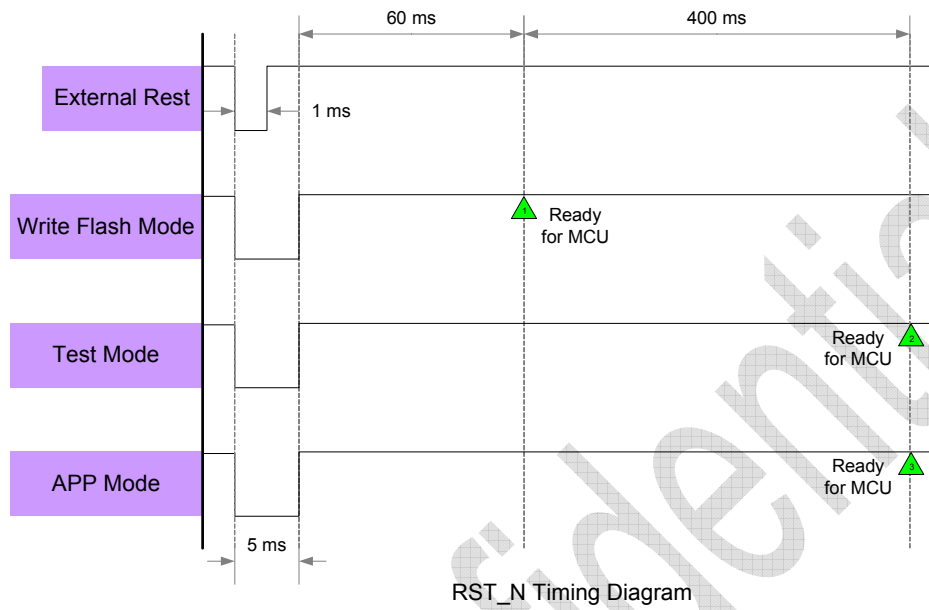
Pin No.	I/O	Name	Description
4	I	BAT_IN	3.3V power input
7	P	VDD_IO	Main power supply
17	I	P20	System configuration, refer to P2_4, MCU do NOT drive under APP Mode
18	I	P24	Boot mode selection (MCU NOT drive under APP Mode) P2_0/ P2_4: HH → Application LL → Boot mode LH → HCI UART mode for testing and system configuration.



P20, P24 Mode Selection Timing Diagram

Timing Sequence for Rest Pin (RST_N) under different mode

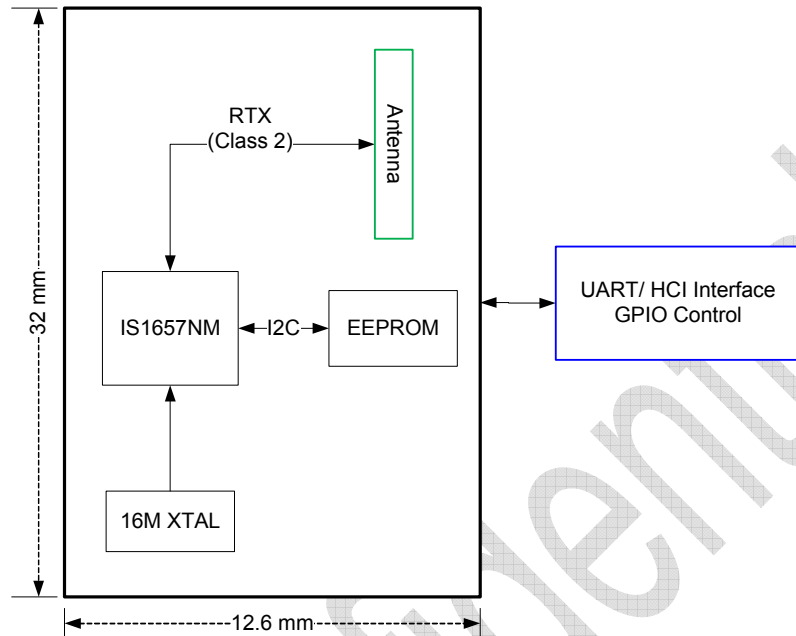
22	I	RST_N	External reset input (Low Active), clock period 62.5n at least.
----	---	-------	---



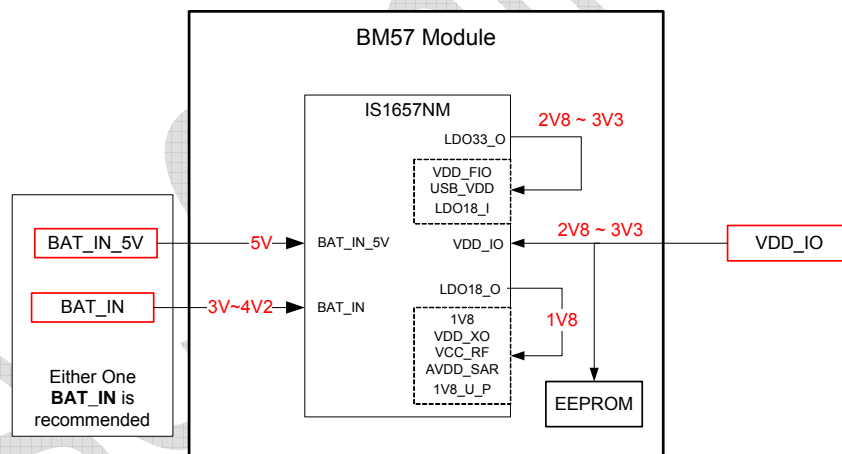
RST_N Timing Diagram

3. Hardware Architecture

Block Diagram



Power Tree



4. Compatibility Requirements

The BM57SPPSyC2 Bluetooth module shall pass the standard test plan, which includes hardware compatibility and reliability, and software compatibility test.

5. Environmental Requirements

5.1. Temperature

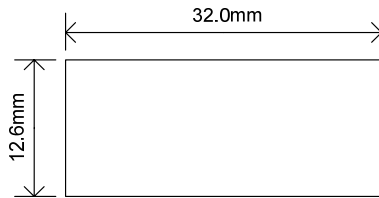
Conditions	Operating Temperature	Non-Operating Temperature
Minimum	-10 °C	-40°C
Maximum	+70 °C	+80 °C

5.2. Humidity

Conditions	Operating Humidity	Non-Operating Humidity
Minimum	10%	5%
Maximum	90%	95%

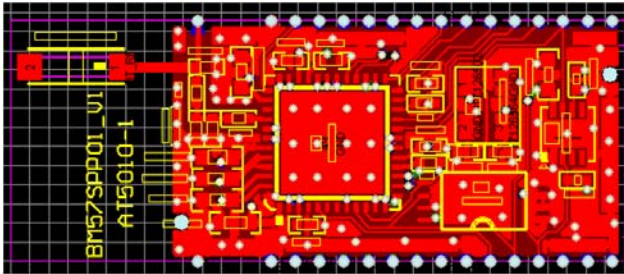
Appendix A: Dimension and Foot Print

1. Dimension

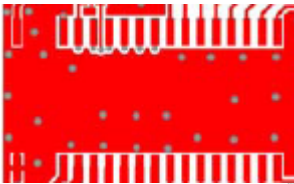


- 32mm * 12.6mm * 1.86mm (Length * Width * Height)
- board thickness: 0.8mm (4 layers PCB)

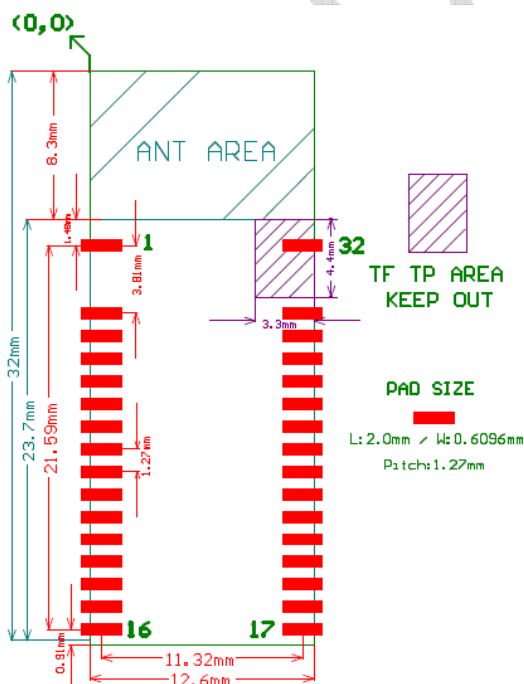
2. Module Foot Print



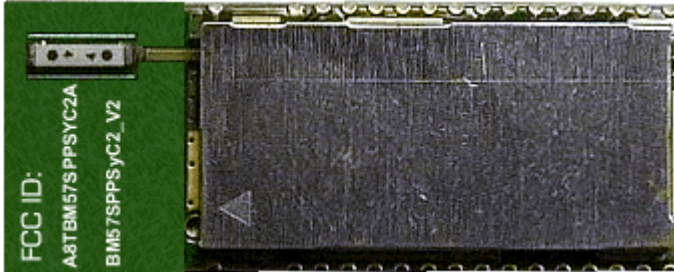
3. The mandatory layout under the module.



4. The solder stop mask

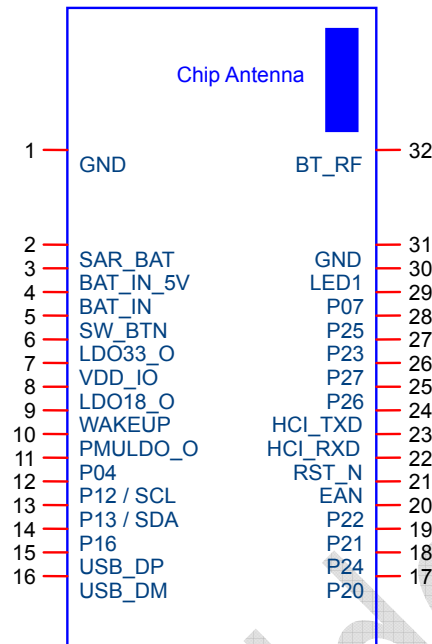


Appendix B: Product Image



ISSC Confidential

Appendix C: PIN Assignment



BM57_V2

Pin #	I/O	Name	Description
1	P	GND	Ground
2	I	SAR_BAT	Reserved
3	I	BAT_IN_5V	5V power input
4	I	BAT_IN	3.3V power input
5	I	SW_BTN	Reserved
6	P	LDO33_O	3V3 LDO output
7	P	VDD_IO	Main power supply
8	P	LDO18_O	LDO18 output
9	I	WAKEUP	Wake up BM57 from Shutdown State. (Low Active) It is only valid while BM57 into Shutdown State.
10	P	PMULDO_O	Output of PMULDO
11	O	P04	UART_TX_IND: H: BM57 indicate UART data will be transmitted out after a certain timing (setting by EEPROM, default 5 ms) L: Otherwise. STATUS_IND_2: BM57 State indication , refer to P22
12	I/O	P12/ SCL	I2C_SCL, for Authentication Coprocessor 2.0B
13	I/O	P13/ SDA	I2C_SDA, for Authentication Coprocessor 2.0B
14	I/O	P16	EEPROM WP

15	I/O	USB_DP	Reserved
16	I/O	USB_DM	Reserved
17	I	P20	System configuration, refer to P2_4, No drive under APP Mode
18	I	P24	Boot mode selection (No drive under APP Mode) P2_0/ P2_4: HH → Application LL → Boot mode LH → HCI UART mode for testing and system configuration.
19	O	P21	CP_RST: Reset Authentication Coprocessor 2.0B
20	O	P22	STATUS_IND: Bluetooth link status indication, P22/P04: HH → Power default value and Shutdown State. P22/P04: HL → Access State. P22/P04: LL → Link State w/o UART_TXD. P22/P04: LH → Link State with UART_TXD.
21	I	EAN	ROM/ Flash selection. (No drive under APP Mode) H: ROM code; L: Flash code
22	I	RST_N	External reset input (Low Active), clock period 62.5n at least.
23	I	HCI_RXD	UART_RXD
24	O	HCI_TXD	UART_TXD
25	I	P26	UART_CTS: UART Flow Control- set HIGH to disable TX transmitter.
26	O	P27	UART_RTS: UART Flow Control- go HIGH to disable host transmitter. Open data session indication- go LOW when APP session is ready.
27	I	P23	LINK_DROP: Host_MCU ask to drop SPP link under Link State; One low pulse with 10 ms duration low signal to trigger SPP disconnection. Otherwise it will be set as high always.
28	I	P25	Pairing Key: Device will enter Standby Mode after pull low over 240ms.
29	I	P07	UART_RX_IND: L: Inform BM57 that UART data will be transmitted out after 1 ms H: Otherwise.
30	O	LED1	LED1 driver
31	P	GND	Ground
32	RI/O	BT_RF	RF Port

Appendix D: Reflow Profile

1.) Follow: IPC/JEDEC J-STD-020 C

2.) Condition:

Average ramp-up rate (217°C to peak): 1~2°C/sec max.

Preheat : 150~200°C · 60~180 seconds

Temperature maintained above 217°C : 60~150 seconds

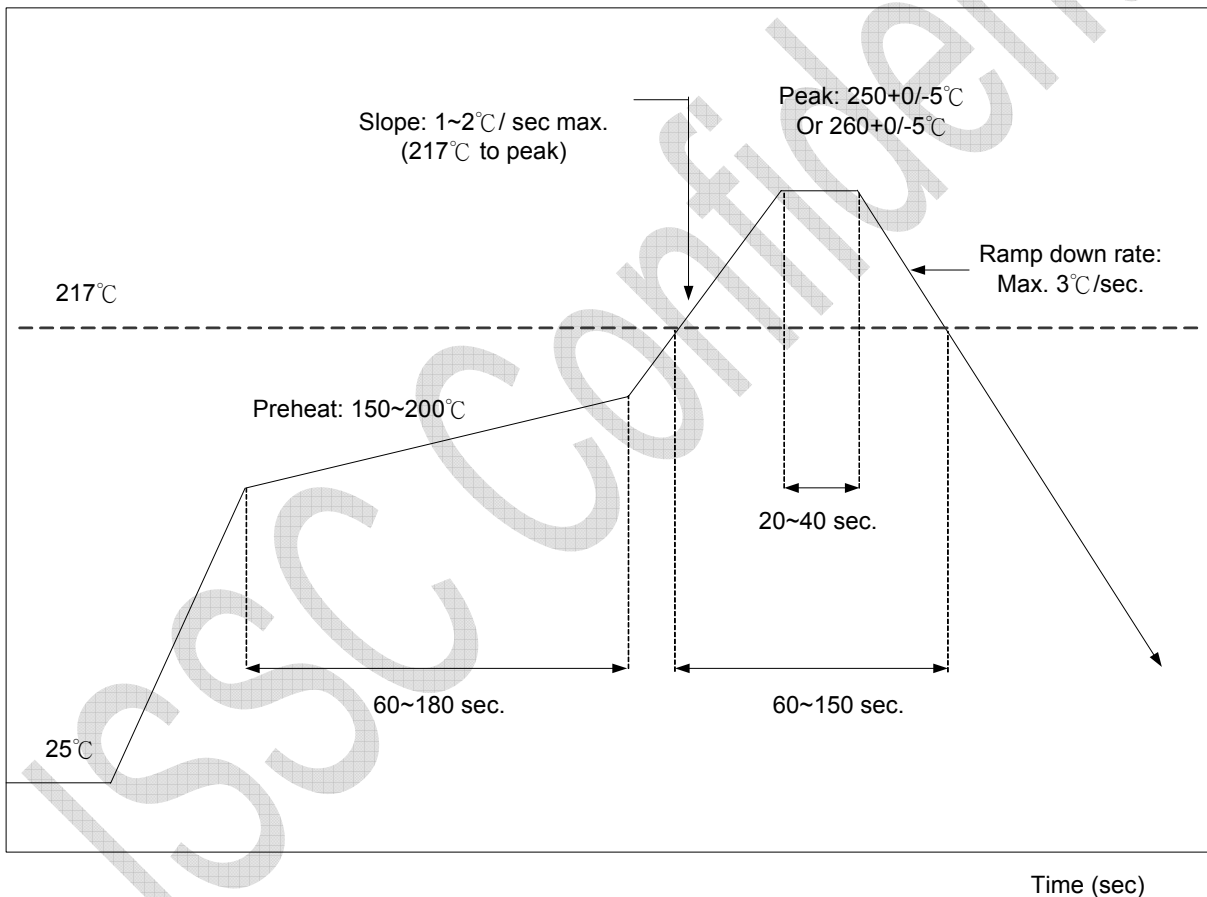
Time within 5°C of actual peak temperature: 20 ~ 40 sec.

Peak temperature : 250+0/-5°C or 260+0/-5°C

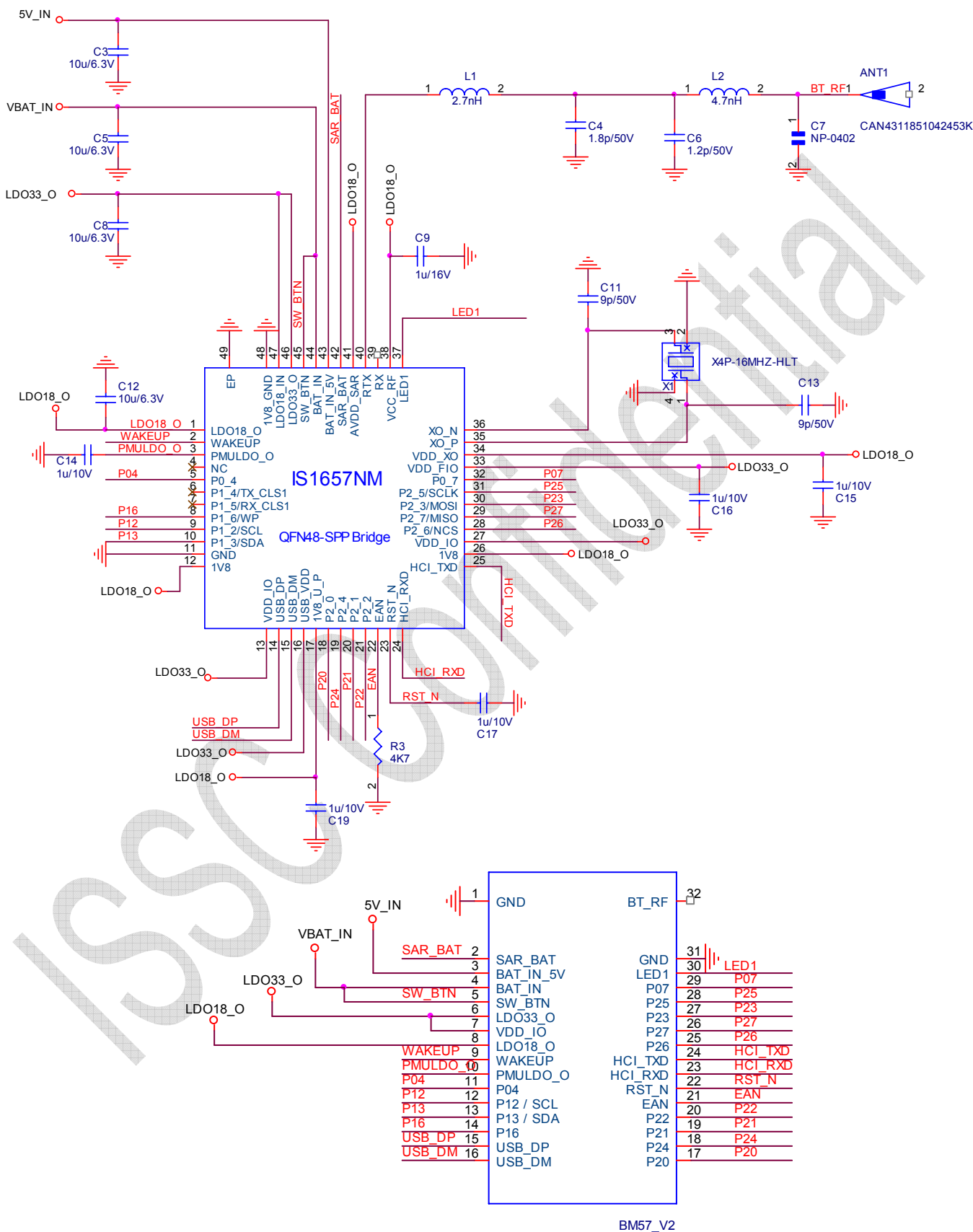
Ramp-down rate : 3°C/sec. max.

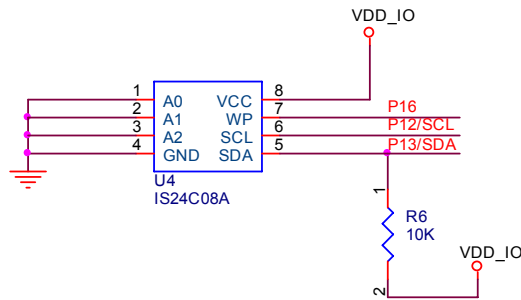
Time 25°C to peak temperature : 8 minutes max.

Cycle interval : 5 minus

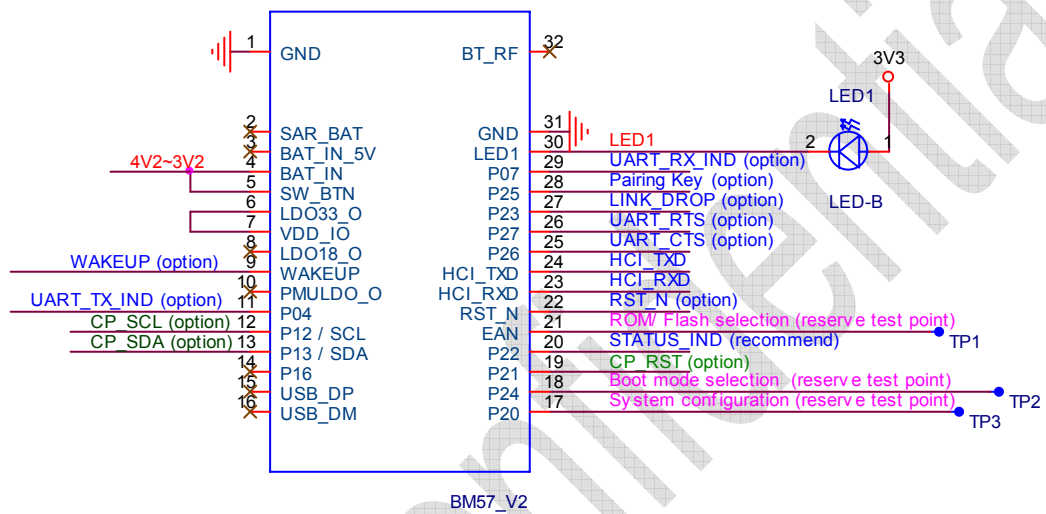


Appendix E: Schematic



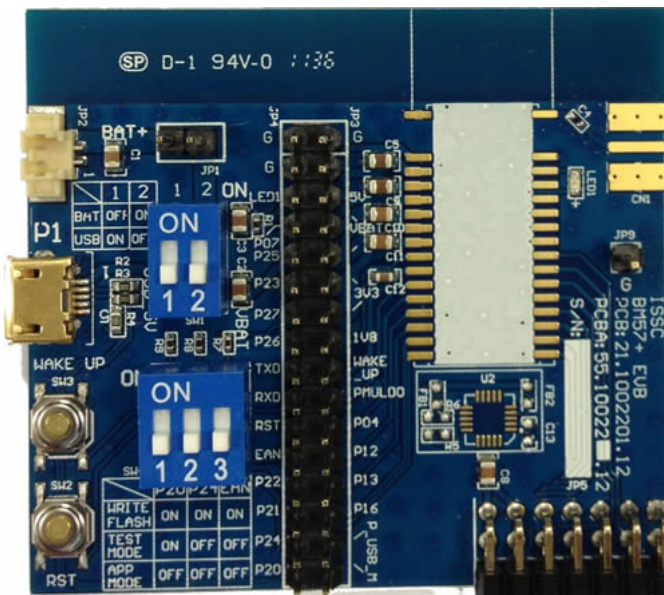


Appendix F: Reference Schematic



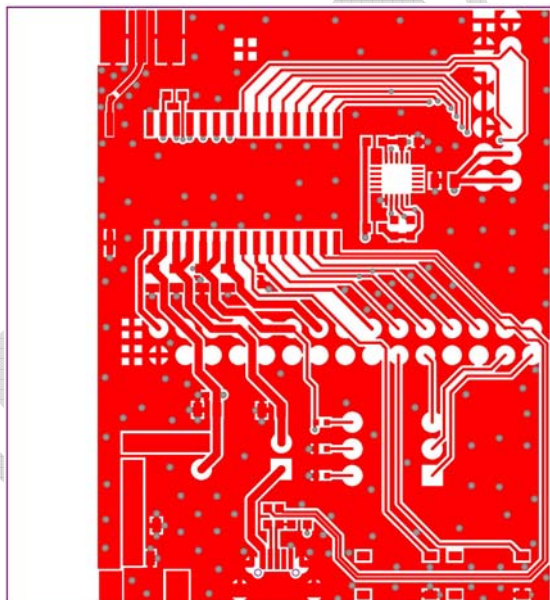
Test Point: TP1, TP2, TP3 are recommended for future firmware, EEPROM table update if the module are welded on load board.

Appendix G: Test Board Layout Information

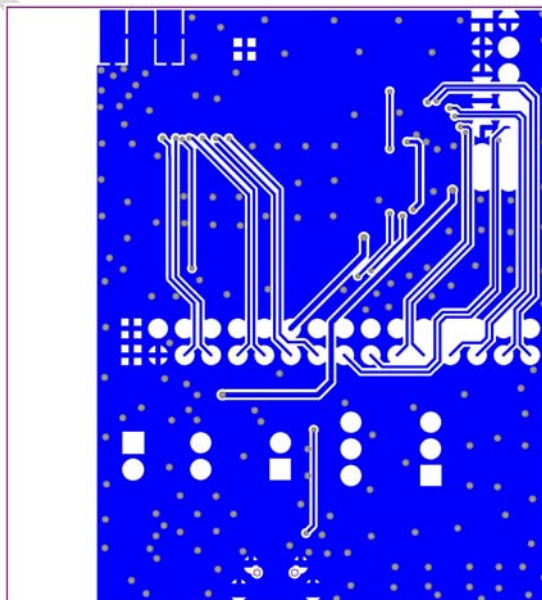


1. The **CN1** is reserved for SMA Connector, It's will be used only if user would like to check module RF performance.
2. The **C4** components must be removed under general condition. The RF trace will output from the chip antenna on the module.

Appendix H: Test Board Layout Information



Top



Bottom

Appendix H: Label Information

TBA

Appendix I: Packaging Information

TBA

ISSC Confidential

Appendix I: Reversion History

Version	Date	History
0.1	2011/12/11	Preliminary Draft Version

ISSC Confidential