1 Features

- Operating Frequency Band 2.40 GHz~2.48GHz unlicensed ISM Band
- Bluetooth Spec. v2.0 Compliant + EDR
- Enhanced Data Rate (EDR) compliant with v2.0.E.2 of specification for both 2Mbps and 3Mbps modulation modes
- Class 2 type Output Power
- Support Firmware Upgrade
- Support Piconet, up to 7 Slaves
- Scatternet Support
- USB 2.0 and UART Host Interface
- PCM Audio Interface
- Low Voltage Power Supply, 2.7V to 3.6V
- Nominal Supply Voltage at 3.3±0.1V
- Built-in 8Mbit Flash Memory
- Low Power Modes Available: Park, Sniff, Hold and Deep Sleep
- Surface-mount, Size: 31.7 x 14.5 x 1.8 mm

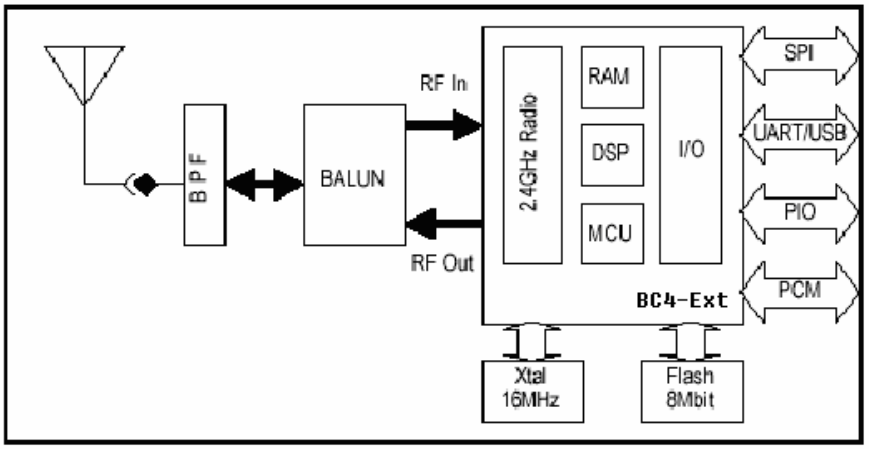
2 Product Description

The BC04 Bluetooth Module is a Class 2 Bluetooth module using BlueCore4-External chipset from leading Bluetooth chipset supplier, Cambridge Silicon Radio. It provides a fully compliant Bluetooth system for data and voice communications. Interfaces with a host via USB or UART and support full data rate up to 3Mbps modulation modes. Voice interface supported PCM protocol. The module and device firmware is fully compliant with the Bluetooth specification v2.0.

3 Applications

- PCs, PDAs
- Computer Accessories (CF Cards, USB DonglesPCMCIA, RS232 Adaptors, etc.)
- Mice, Keyboard, Joysticks
- Cordless Phone
- FAX, Printer Adaptors
- Digital Camera
- Access Points to LAN and/or Dial-up network

4 Block Diagram



5 Pin Descriptions

PIN	NAME	TYPE	DESCRIPTION
1	GND	GND	Ground
2	PIO9	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
3	GND	GND	Ground
4	AIO0	Bi-directional	Programmable input/output line
5	PIO8	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
6	RESETB	CMOS input with weakinternal pull-up	internal pull-up Reset if low. Input debounced so must be low for >5ms to cause a reset
7	SPI_MISO	CMOS output, tri-state, with weak internal pull-down	Serial Peripheral Interface data output
8	SPI_CSB	CMOS input with weak internal pull-up	Chip select for Synchronous Serial Interface active low
9	SPI_CLK	CMOS input with weak internal pull-down	Serial Peripheral Interface clock
10	SPI_MOSI	CMOS input with weak internal pull-down	Serial Peripheral Interface data input
11	UART_CTS	CMOS input with weak internal pull-down	UART clear to send active low
12	UART_TX	CMOS output, tri-state, with weak internal pull-up	UART data output
13	UART_RTS	CMOS output, tri-state, with weak internal pull-up	UART request to send active low
14	UART_RX	CMOS input with weak internal pull-down	UART data input
15	1.8V Filter		Filter Capacitor for 1.8V
16	VDD	Power Supply	+3.3V Power Supply. Since the big DC/DC ripple, using the LDO to supply the power to module is required, or the distance will be affected.
17	NC		Do Not Connect This Pin
18	AIO1	Bi-directional	Programmable input/output line
19	AIO2	Bi-directional	Programmable input/output line
20	PIO11	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
21	PIO10	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
22	PCM_OUT	CMOS output, tri-state, with weak internal pull-down	Synchronous data output
23	PCM_SYNC	Bi-directional with weak internal pull-down	Synchronous data sync
24	PCM_IN	CMOS input, with weak internal pull-down	Synchronous data input
25	PCM_CLK	Bi-directional with weak internal pull-down	Synchronous data clock
26	USB_DP	Bi-directional	USB data plus with selectable internal 1.5k. pull-up resistor
27	USB_DM	Bi-directional	USB data minus
28	PIO7	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
29	PIO[6]/ WLAN_Active/	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line or Optionally WLAN_Active/Ch_Data input

	Ch_Data		for co-existence signalling
30	PIO[5]/ BT_Active	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line or Optionally BT_Active output for co-existence signalling
31	PIO[4]/ BT_Priority/ Ch_Clk	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line or Optionally BT_Priority/Ch_Clk output for co-existence signalling
32	PIO3	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
33	PIO2	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
34	PIO1	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
35	PIO0	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
36	GND	GND	Ground

6 Electrical Specifications

6.1 Electrical Characteristics

Input/Output Terminal Characteristics

Digital Terminals	Min	Typ	Max	Unit
Input Voltage Levels				
VIL input logic level low 2.7V ≤ VDD ≤ 3.0V	-0.4	-	+0.8	V
VIH input logic level high	0.7VDD	-	VDD+0.4	V
Output Voltage Levels				
VOL output logic level low (Io = 4.0mA), 2.7V ≤ VDD ≤ 3.0V	-	-	0.2	V
VOH output logic level high (Io = -4.0mA), 2.7V ≤ VDD ≤ 3.0V	VDD-0.2	-	-	V
Input and Tri-state Current with				
Strong pull-up	-100	-40	-10	μA
Strong pull-down	+10	+40	+100	μA
Weak pull-up	-5.0	-1.0	-0.2	μA
Weak pull-down	+0.2	+1.0	+5.0	μA
I/O pad leakage current	-1	0	+1	μA
CI Input Capacitance	1.0	-	5.0	pF

Input/Output Terminal Characteristics(Continued)

USB Terminals	Min	Typ	Max	Unit
VDD_USB for correct USB operation (1)	3.1	-	3.6	V
Input threshold				
VIL input logic level low	-	-	0.3VDD_USB	V
VIH input logic level high	0.7VDD_USB	-	-	V
Input leakage current				
VSS_PADS < VIN < VDD_USB(1)	-1	1	5	μA
CI Input capacitance	2. 5	-	10.0	pF
Output Voltage levels To correctly terminated USB Cable				
VOL output logic level low	0.0	-	0.2	V
VOH output logic level high	2.8	-	VDD_USB	V

Notes：
(1) Let VDD voltage higher than common appliance, when USB works

6.2 Absolute Maximum ratings

Absolute maximum ratings for supply voltage and voltages on digital and analogue pins of the Module are listed below; exceeding these values will cause permanent damage.

Parameter	Min	Max	Unit
Peak current of power supply	0	75	mA
Voltage at digital pins	-0.3	3.6	V
Voltage at POWER pin	2.7	3.6	V

6.3 Power Consumption

Operation Mode	Connection Type	UART Rate (kbps)	Average	Unit
Page scan	-	115.2	0.42	mA
Inquiry and page scan	-	115.2	0.76	mA
ACL No traffic	Master	115.2	4.60	mA
ACL With file transfer	Master	115.2	10.3	mA
ACL No traffic	Slave	115.2	17.0	mA
ACL With file transfer	Slave	115.2	24.7	mA
ACL 40ms sniff	Master	38.4	2.40	mA
ACL 1.28s sniff	Master	38.4	0.37	mA
SCO HV1	Master	38.4	39.2	mA
SCO HV3	Master	38.4	20.3	mA
SCO HV3 30ms sniff	Master	38.4	19.8	mA
ACL 40ms sniff	Slave	38.4	2.11	mA
ACL 1.28s sniff	Slave	38.4	0.42	mA
Parked 1.28s beacon	Slave	38.4	0.20	mA
SCO HV1	Slave	38.4	39.1	mA
SCO HV3	Slave	38.4	24.8	mA
SCO HV3 30ms sniff	Slave	38.4	19.0	mA
Standby Host connection(a)	-	38.4	40	uA
Reset (RESETB low)(a)	-	-	34	uA

(a) Low power mode on the linear regulator is entered and exited automatically when the chip enters/leaves Deep Sleep mode .

7 DC Characteristics

7.1 RF Performance

7.1.1 Transmit Power

Temperature = +20 ° C					
	Min	Typ	Max	Bluetooth Specification	Unit
Maximum RF transmit power(1)(2)	-	2.5	-	-6 to +4(3)	dBm

Notes：
(1) BlueCore4 firmware maintains the transmit power to be within the Bluetooth v2.0 + EDR specification limits.

(2) Measurement made using a PSKEY_LC_MAX_TX_POWER setting corresponds to a PSKEY_LC_POWER_TABLE power table entry of 63.
(3) Class 2 RF transmit power range, Bluetooth v2.0 + EDR specification.

7.1.2 Receiver Sensitivity

Temperature = +20°C						
	Frequency(GHz)	Min	Typ	Max	Bluetooth Specification	Unit
Sensitivity at 0.1% BER for all packet types	2.402	-	-84	-	≤-70	dBm
	2.441	-	-84	-		
	2.480	-	-85	-		
Maximum received signal at 0.1% BER		-	10	-	≤-20	dBm

8 Solder Profiles

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.

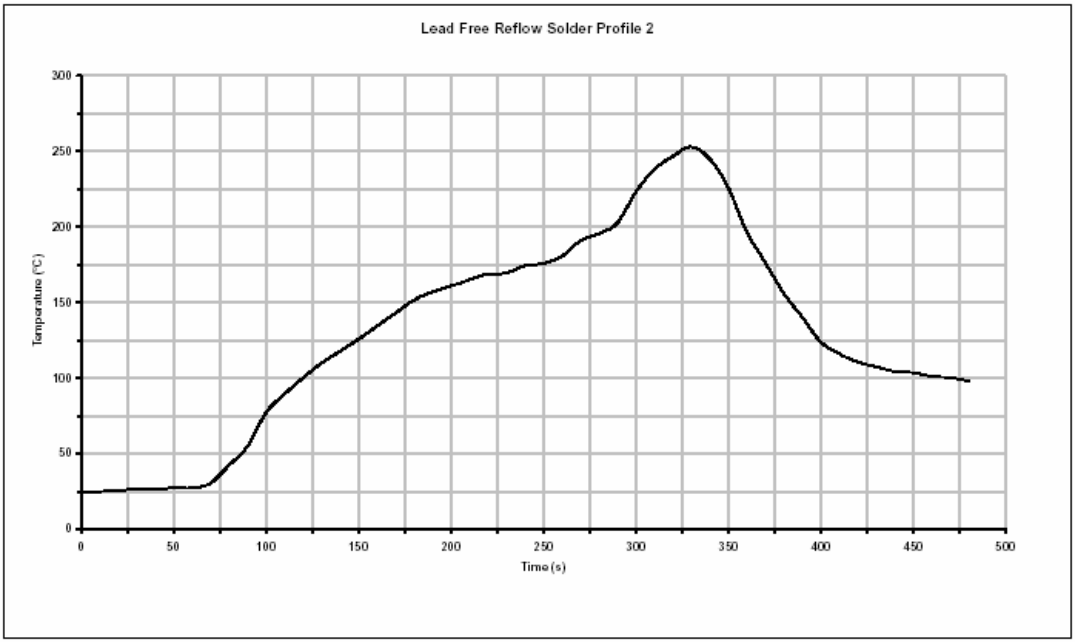
2.Equilibrium Zone - This zone brings the board to a uniform temperature and also activates the flux.

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.

8.1 Solder Re-Flow Profile



Typical Lead-Free Re-flow Solder Profile

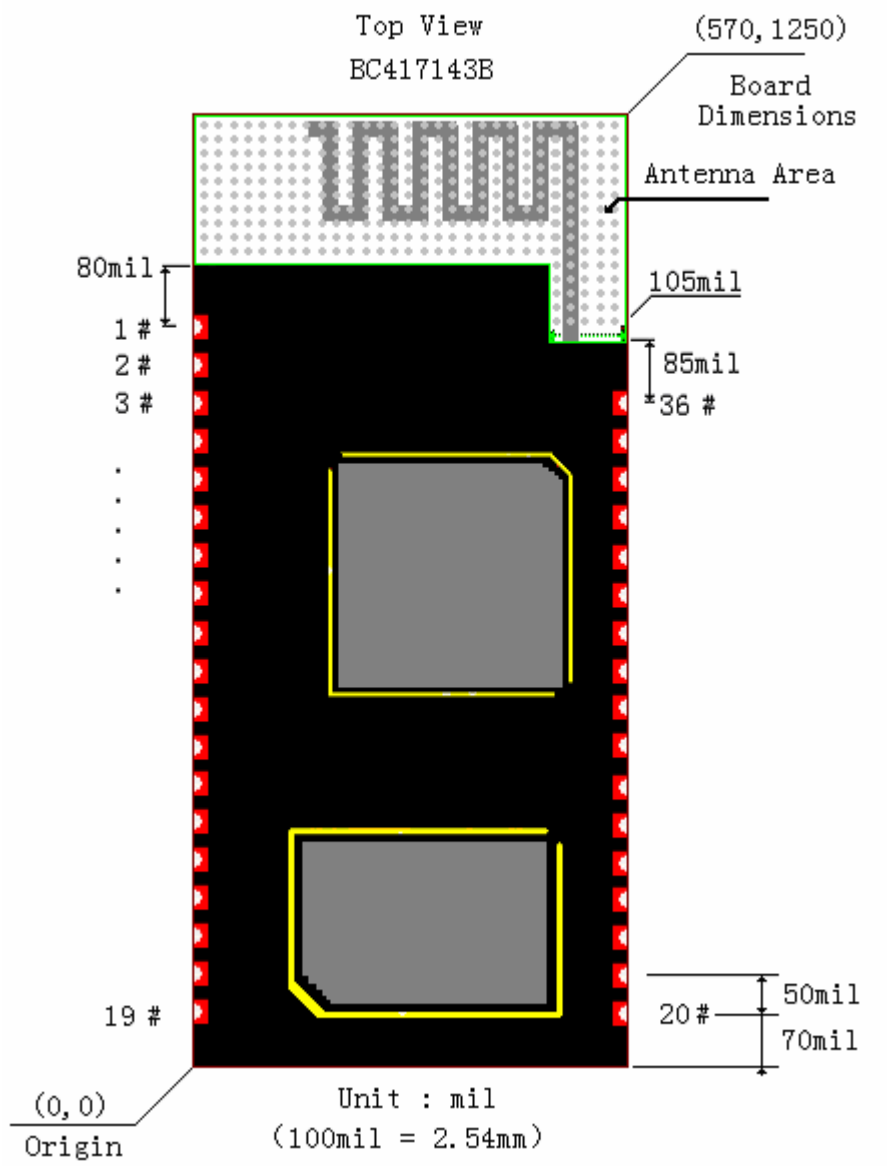
Key features of the profile:

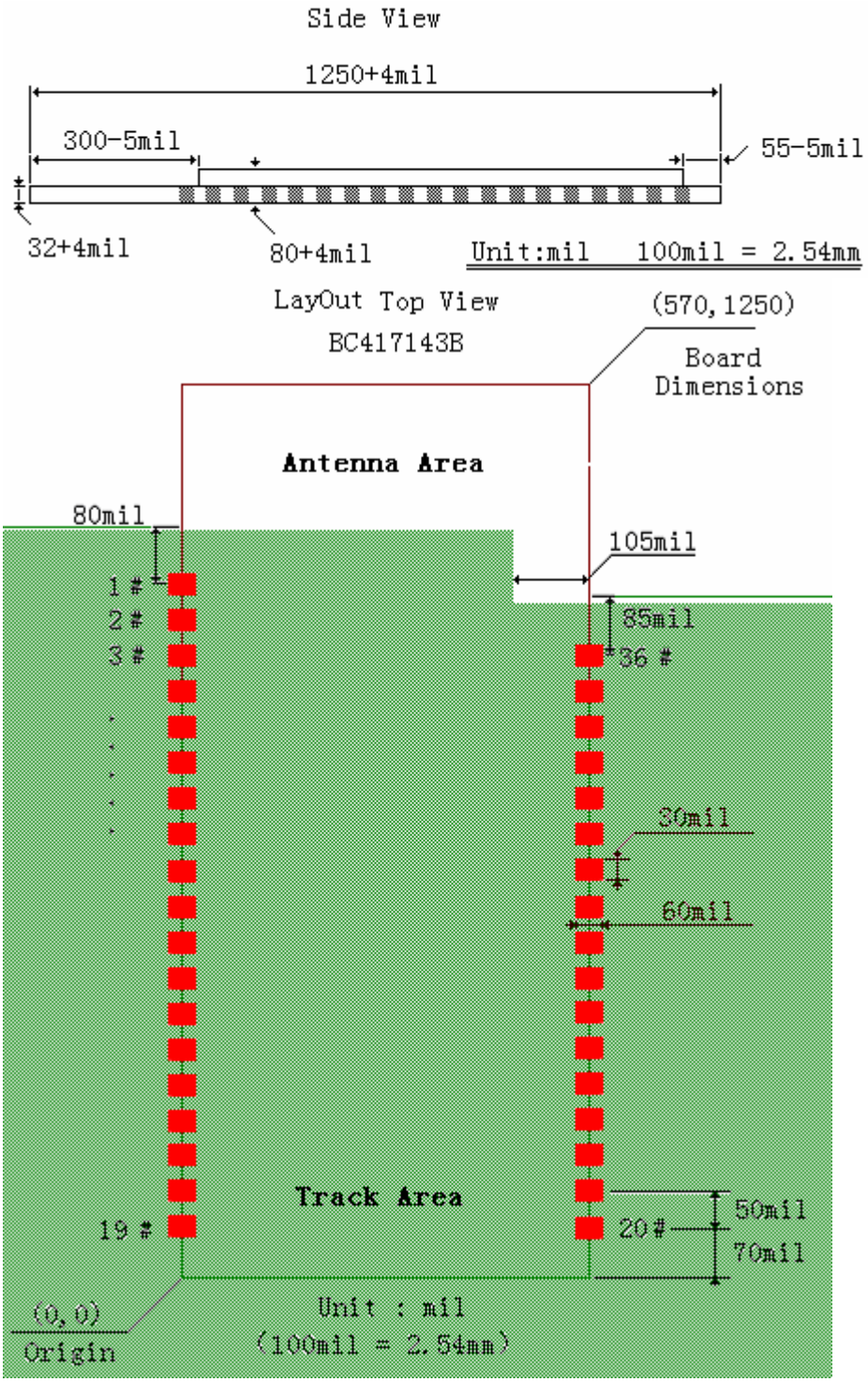
- Initial Ramp = 1-2.5°C/sec to 175°C±25°C equilibrium
- Equilibrium time = 60 to 180 seconds
- Ramp to Maximum temperature (250°C) = 3°C/sec max.
- Time above liquidus temperature (217°C): 45-90 seconds
- Device absolute maximum reflow temperature: 260°C

Devices will withstand the specified profile. Lead-free devices will withstand up to three reflows to a maximum temperature of 260°C.

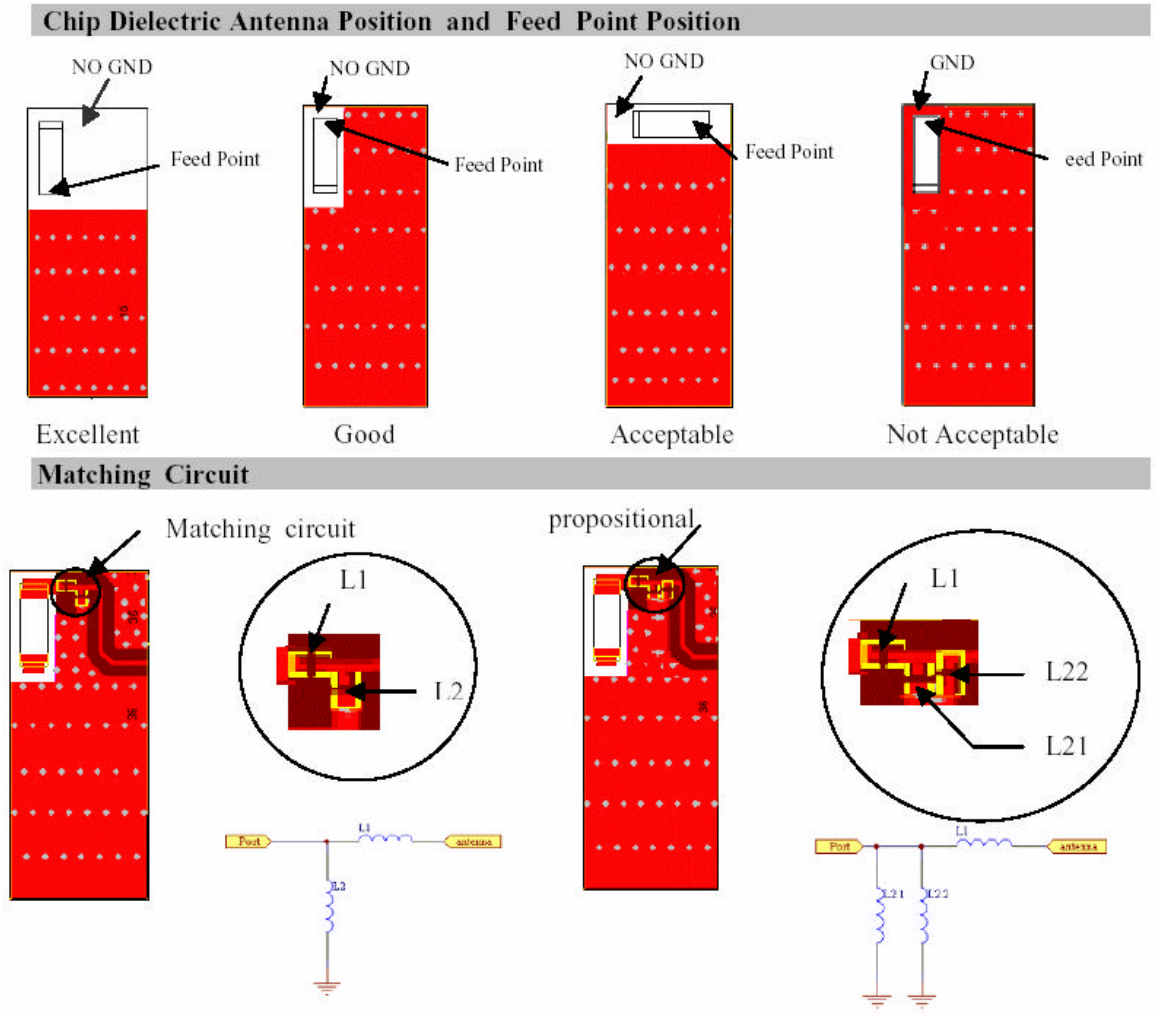
Notes：They need to be baked prior to mounting。

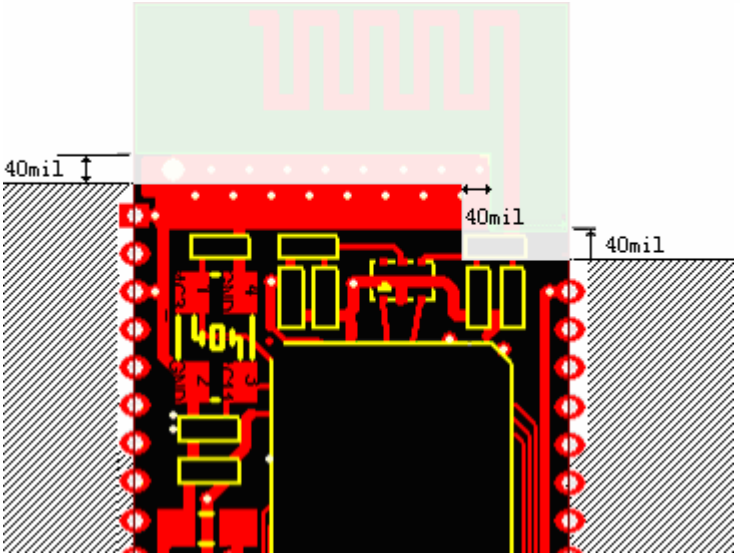
9 Physical Dimensions




Side View
1250+4mil
300-5mil
55-5mil
32+4mil
80+4mil
Unit:mil 100mil = 2.54mm
LayOut Top View
BC417143B
(570,1250)
Board
Dimensions
Antenna Area
80mil
105mil
1 #
2 #
3 #
85mil
36 #
30mil
60mil
Track Area
19 #
20 #
50mil
70mil
(0,0)
Origin
Unit : mil
(100mil = 2.54mm)

10 Chip dielectric antenna position and feed point position





As you see above, trying to remove metal under antenna is good for RF radiate.

it is a typical module PCB pic in the left part. In this part, shadow and natural color of module part can be set by user freely. Grayness is module's antenna part. Below this, trying to let metal line be inexistent.

11 Check List (refer to SCH pic)

11.1 Sch Check List

Function voltage of the module power is 2.7 to 3.6V. so the RS232 chipset needs to be transfer is also applied to this voltage bound. This typical component is MAX3232. but we should pay a attention on MAX3232 function baud rate, which is 120kbps.

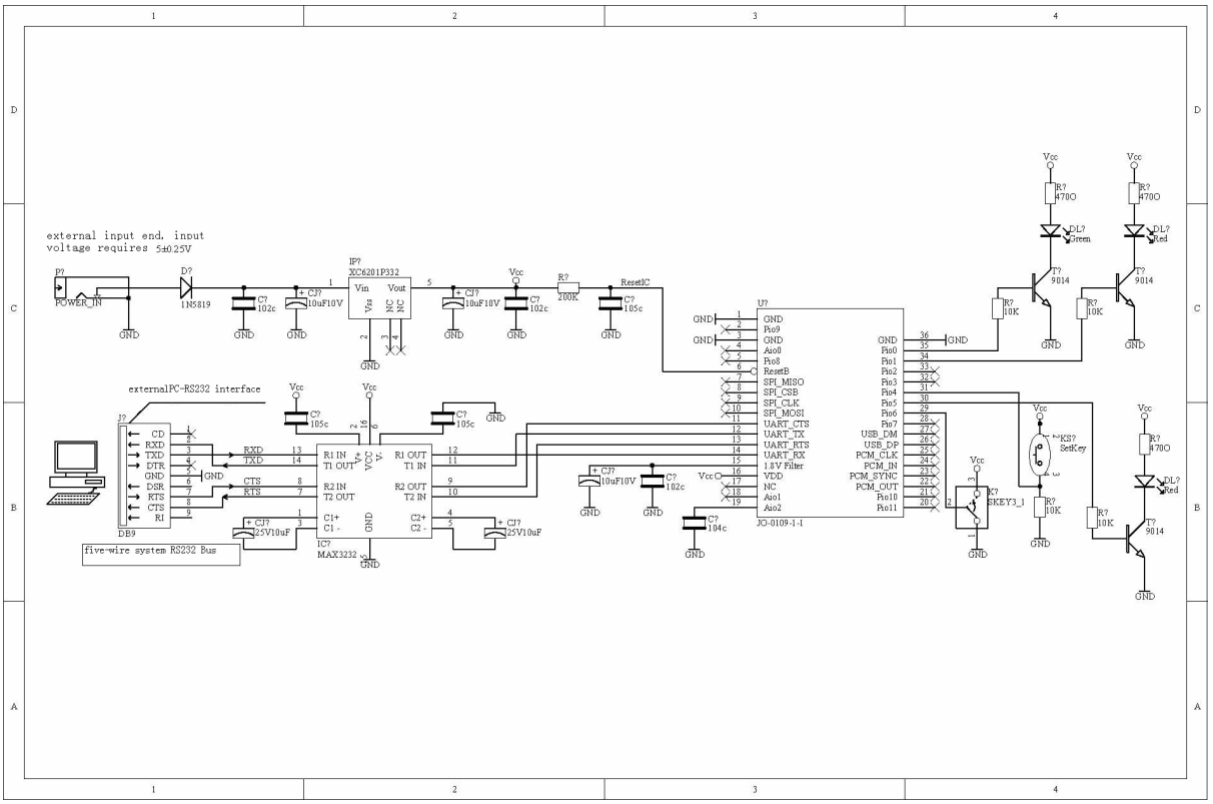
pic adopt stable voltage chipset, the highest voltage is 12V.SCH. obviously, module should be broken if beyond this bound. This chipset fall into lower-voltage chipset, we suggest adopting external power in the range of 5±0.25v.

From above USB power supply list, we can get once we use USB, the best way is trying to let module work on the range of 3.3±0.1 V.

11.2 PCB Check List

- antenna part(RF part) is close to device edge to the greatest extent, there must be without any metal obstruct between the direction of antenna energy radiate and outside. Check more details in 10 Chip dielectric antenna position and feed point position" ?
- the bottom of module touch PCB. in order to eliminate capable short circuit, try to use insulation material separating two side of metal in setting module part. Simple way, place a holistic silk-screen here.
- considering about integer beauty impression on the base of compliance to electric product and mechanism configuration requirement, component setting must be equilibria and density in order on PCB.
- PCB dimension must be similar to machining drawing, and accord with PCB manufacturing craftwork request. try to make sure there isn't any conflict in two dimension space or three dimension when we set MARK point here.
- component need replacing frequently ask for convenient insert board. UART with direction adopt dissymmetric UART mark.
- though current module we use right now isn't hot-sensitive component, we also need proper distance between two components.
- setting line must have logical direction. For example, input/ output, AC/DC, strong/weak singal, high/ low frequency, high/ low voltage and so on, their direction should be a line (or separated) not mingle with another, in order to avoid disturbing each other. The best setting direction is compliant to line, but it is hard to realize.
- logically set power strain wave/capacitance. Try to be close to these components in setting capacitance. If the distance is too far it can't function well.

12 Figure


external input end, input
voltage requires 5±0.25V
externalPC-RS232 interface
five-wire system RS232 Bus
MAX3232
XC6201P332
JO-0109-1-1
SetKey
SKEY3_1