

# **iBT-06 Series**

## **Bluetooth Module with HCI Interface**

**(  Bluetooth® Qualified QDID : B021756 )**

Doc. Name : iBT-06-Rev0.5.02.doc  
Date : 2013-11-21  
Revision : 0.5.02

Copyright ©, 2013 by Engineering Department, Valence Semiconductor Design Limited.  
All rights reserved. No part of this document may be reproduced, transmitted, transcribed,  
stored in a retrieval system, or translated into any language, in any form or by any means  
without the prior written permission of Valence Semiconductor Design Limited.

### 1. Overview

iBT-06 Series Bluetooth modules are Class 2 modules supporting Bluetooth v2.1 + EDR specification. It is implemented by using the RDA5876a chip. iBT-06 Series is designed to interface with an external MCU with HCI command control for supporting audio or data applications.

### 2. Features

- A single chip radio and baseband IC for Bluetooth applications
  - Fully Qualified Bluetooth v2.1+EDR
  - Class 2 power output (10 meter minimum)
  - Support for 2-wires / 3-wires 802.11 co-existence
  - HCI Interface to external MCU
  - Build-in or external PCB antenna
  - Build-in FM radio tuner
  - Supply voltage : 3.3V to 4.2V
  - RoHS compliant
- Dimension:
    - iBT-06 :21.5mm (L) x 14mm (W) x 2.2mm (H)
    - iBT-06S :21.5mm (L) x 14mm (W) x 2.5mm (H)
    - iBT-06-02 :21.5mm (L) x 14mm (W) x 2.2mm (H)
    - iBT-06-02S :21.5mm (L) x 14mm (W) x 2.2mm (H)
    - iBT-06-03 :14.6mm (L) x 14mm (W) x 2.2mm (H)
    - iBT-06-03S :14.6mm (L) x 14mm (W) x 2.2mm (H)
    - iBT-06-04 :14.6mm (L) x 14mm (W) x 2.2mm (H)
    - iBT-06-04S :14.6mm (L) x 14mm (W) x 2.2mm (H)

### 3. Applications

- Wireless speakers
- Stereo headset
- Hands-free car kit
- VoIP handsets
- Data Transfer
- Docking Stations

### 4. Pin Drawing

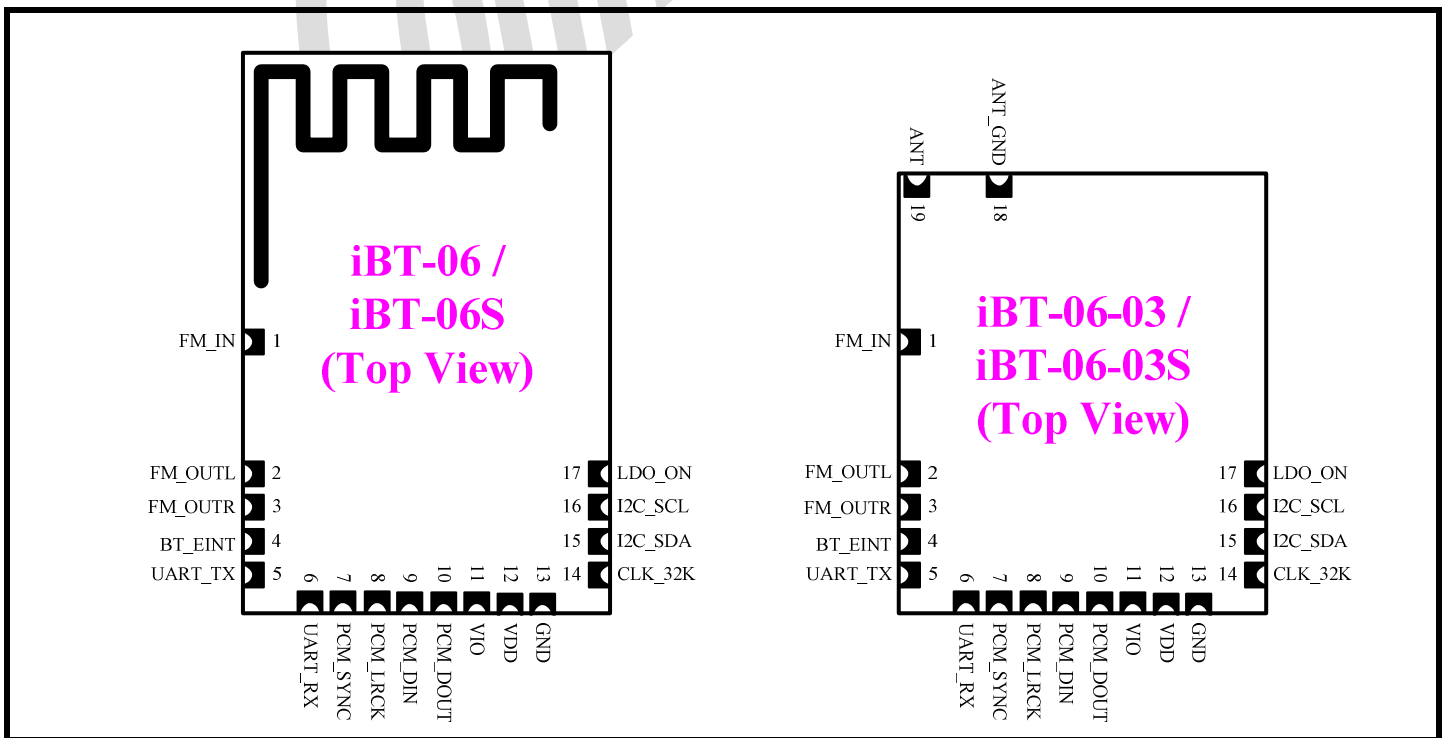
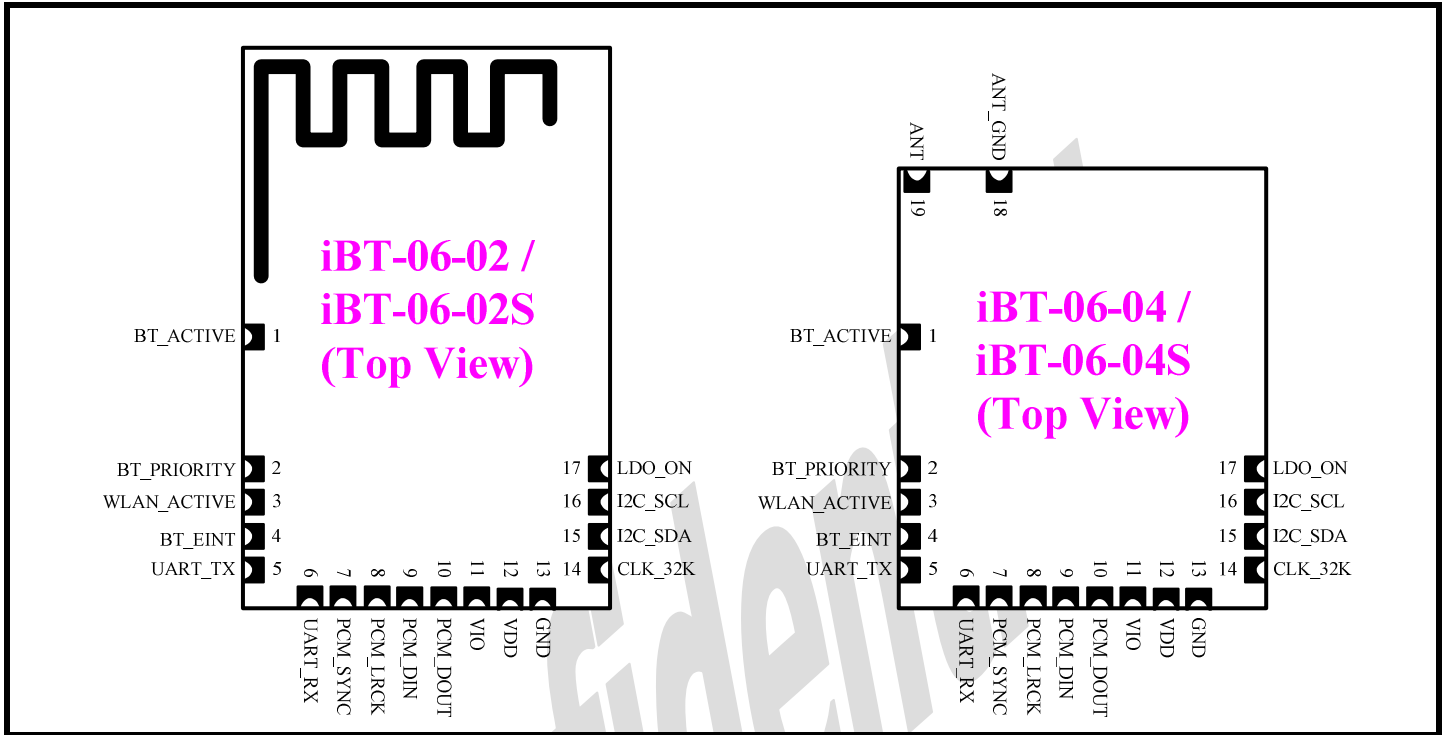


Figure 1 iBT-06, iBT-06S, iBT-06-03, iBT-06-03S Pin Diagram

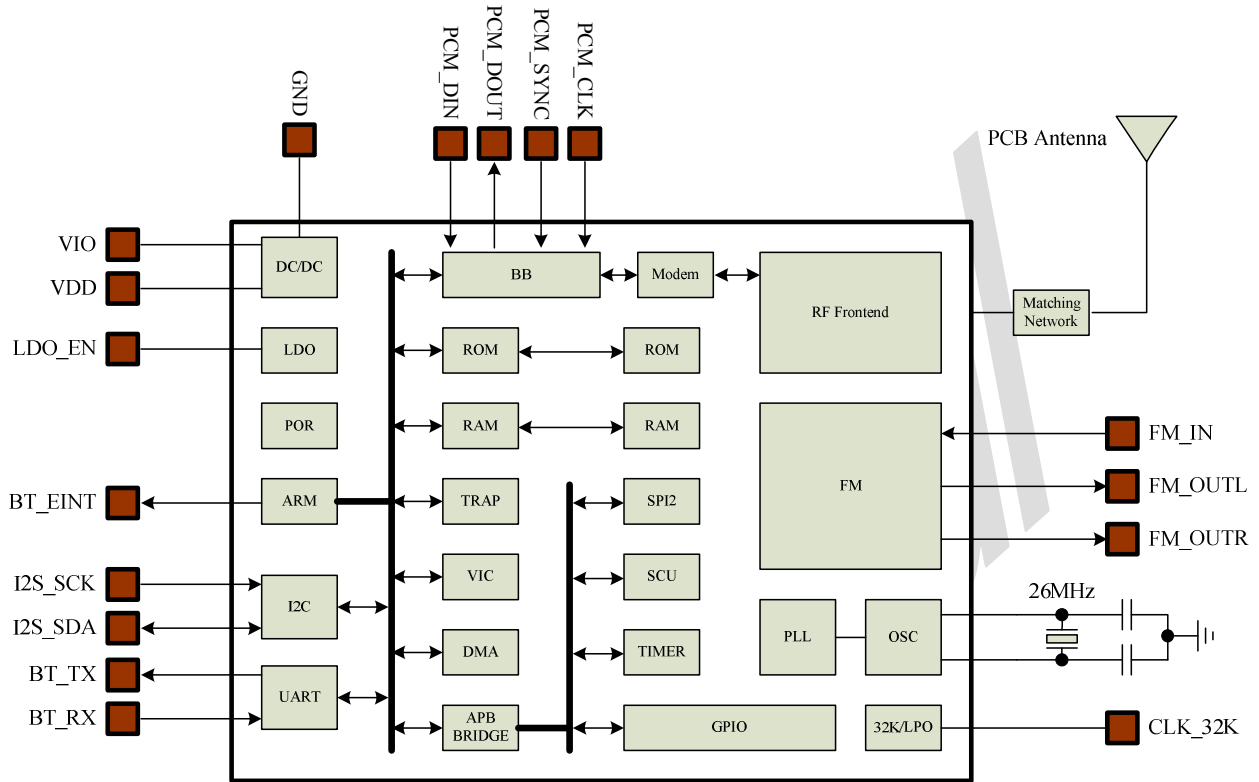


**Figure 2 iBT-06-02, iBT-06-02S, iBT-06-04, iBT-06-04S Pin Diagram**

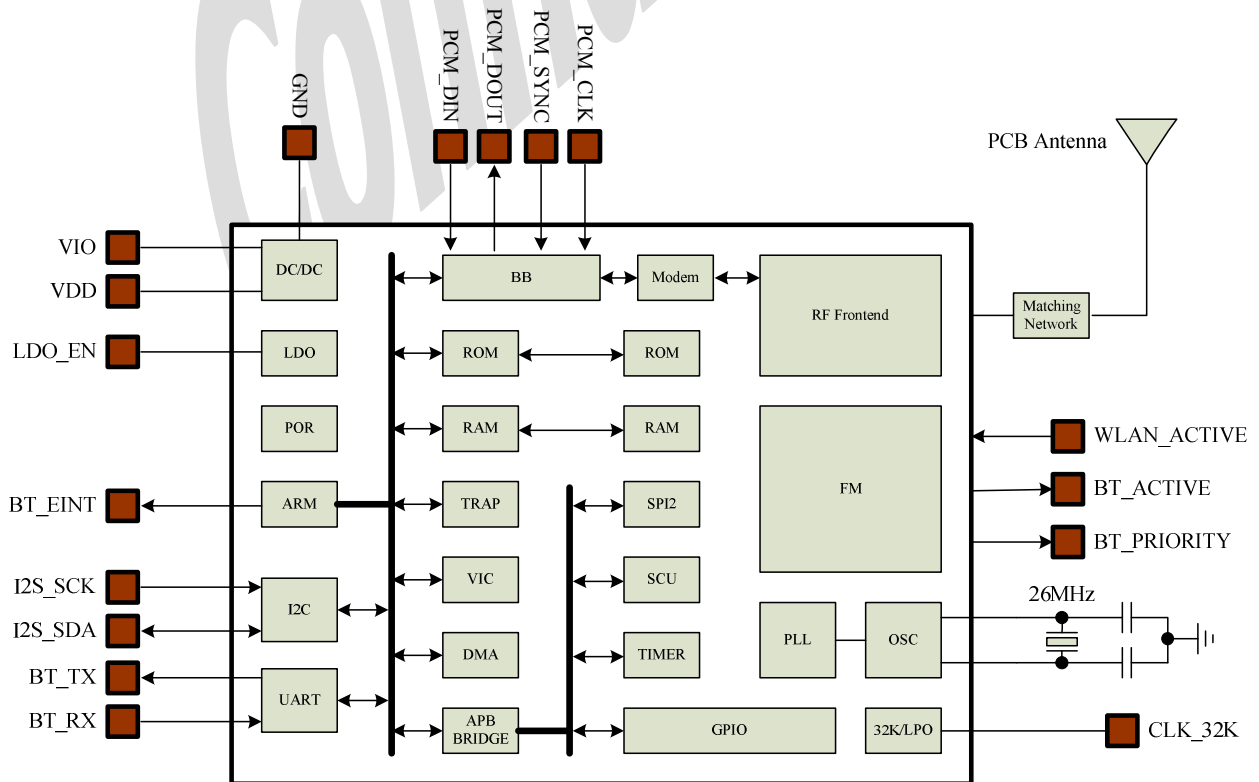
## 5. Ordering Information

Ordering Number	PCB Antenna	FM Tuner	WiFi Coexistence Control	Shield Can
iBT-06	X	X		
iBT-06S	X	X		X
iBT-06-02	X		X	
iBT-06-02S	X		X	X
iBT-06-03		X		
iBT-06-03S		X		X
iBT-06-04			X	
iBT-06-04S			X	X

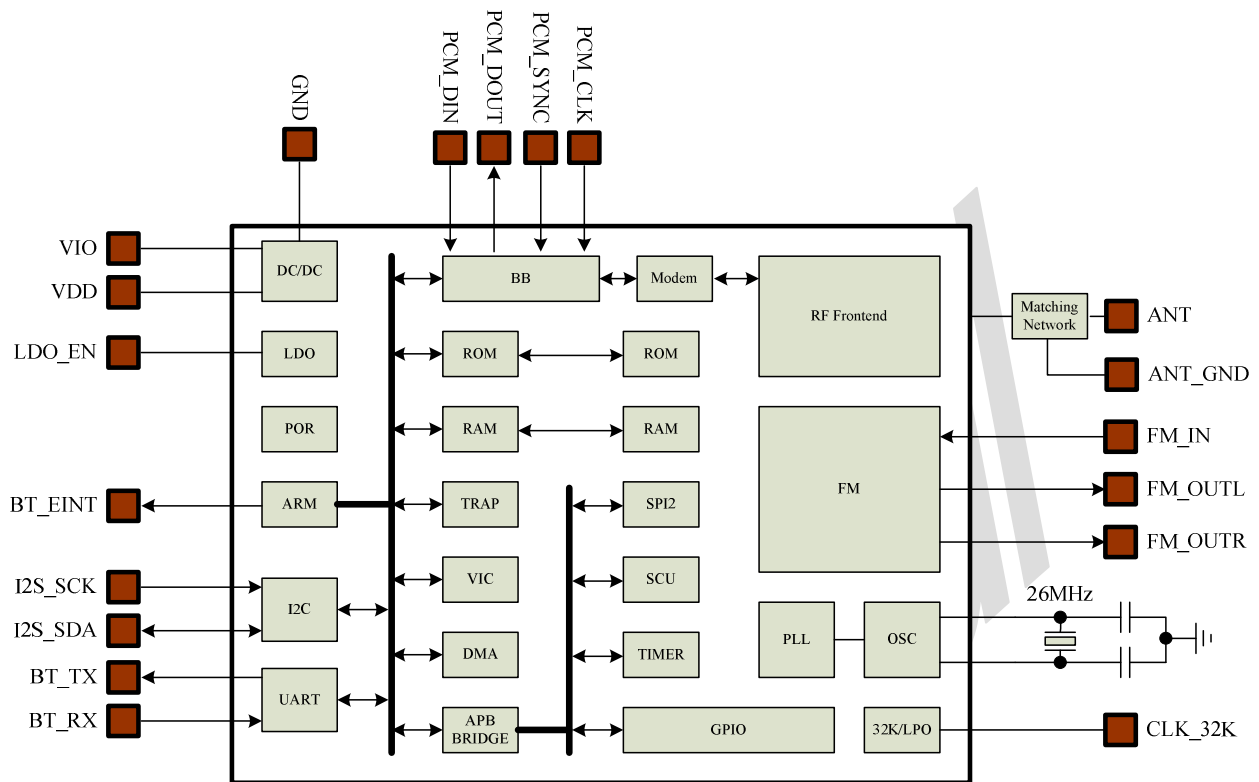
### 6. Block Diagram



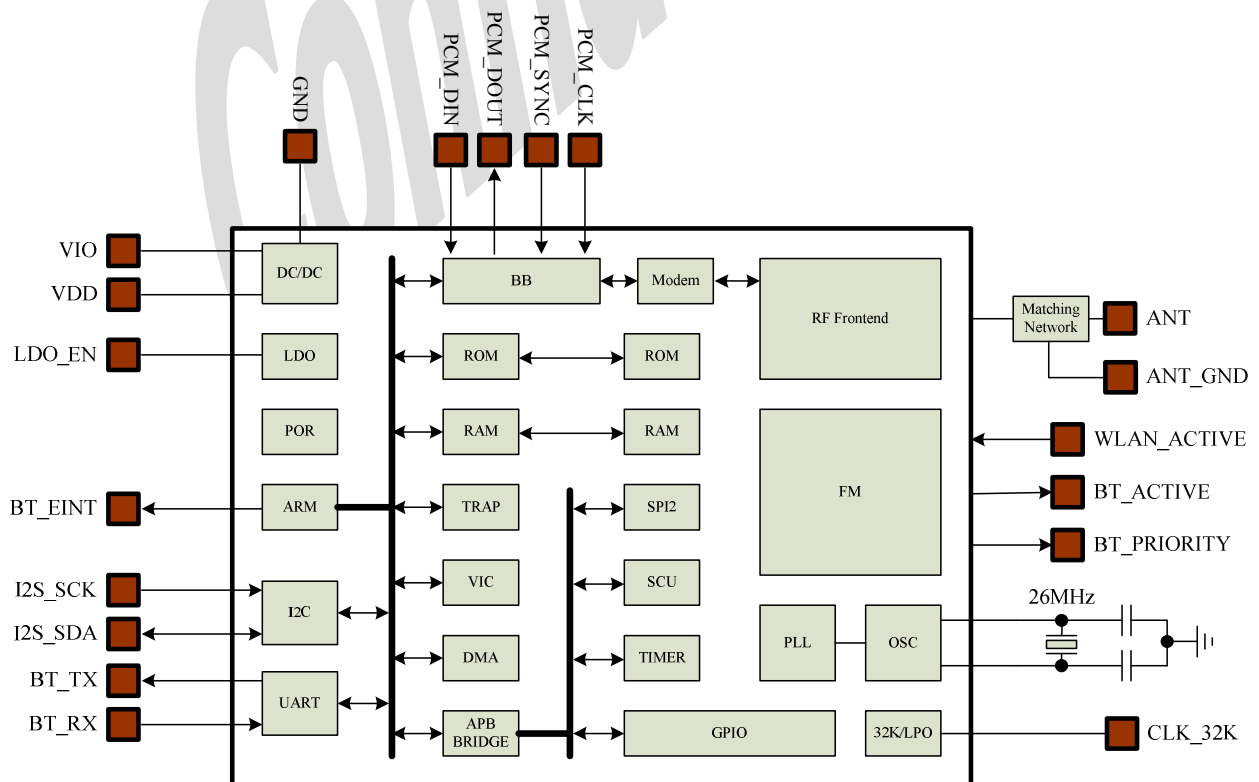
**Figure 3 iBT-06 and iBT-06S Block Diagram**



**Figure 4 iBT-06 and iBT-06S Block Diagram**



**Figure 5 iBT-06-03 and iBT-06-03S Block Diagram**



**Figure 6 iBT-06-04 and iBT-06-04S Block Diagram**

### 7. Pin Description

Pin No.	Pin Name		Pin Type	Pin Descriptions
	iBT-06 iBT-06S	iBT-06-03 iBT-06-03S		
1	FM_IN		IA	FM antenna input
2	FM_OUTL		OA	FM Radio Audio Left Output
3	FM_OUTR		OA	FM Radio Audio Right Output
4	BT_EINT		O	Active high signal to interrupt external MCU
5	BT_TX		O	Bluetooth UART Data Output
6	BT_RX		I	Bluetooth UART Data Input
7	PCM_SYNC		I	PCM data sync
8	PCM_CLK		I	PCM data clock
9	PCM_DIN		I	PCM data input
10	PCM_DOUT		O	PCM data output
11	VIO			I/O Supply Voltage
12	VDD			Module Supply Voltage
13	GND			Module Ground
14	CLK_32K		I	External 32kHz Clock input
15	I2C_SDA		B	I2C Data Signal
16	I2C_SCL		I	I2C Clock Signal
17	LDO_ON		I	Control signal to enable / disable the internal LDO that provide power to the internal core. This control signal will also reset the internal core logic. '1' Enable LDO    '0' LDO disable
18	-	ANT_GND	O	External antenna connection return
19	-	ANT	I	External antenna connection point

Pin No	Pin Name		Pin Type	Pin Descriptions
	iBT-06-02 iBT-06-02S	iBT-06-04 iBT-06-04S		
1	BT_ACTIVE		O	A "1" indicates that BT is active transmitting data
2	BT_PRIORITY		O	A "1" indicates that BT request to have priority over WLAN
3	WLAN_ACTIVE		I	A "1" indicates that WLAN is active transmitting data
4	BT_EINT		O	Active high signal to interrupt external MCU
5	BT_TX		O	Bluetooth UART Data Output
6	BT_RX		I	Bluetooth UART Data Input
7	PCM_SYNC		I	PCM data sync
8	PCM_CLK		I	PCM data clock
9	PCM_DIN		I	PCM data input
10	PCM_DOUT		O	PCM data output
11	VIO			I/O Supply Voltage
12	VDD			Module Supply Voltage
13	GND			Module Ground
14	CLK_32K		I	External 32kHz Clock input
15	I2C_SDA		B	I2C Data Signal
16	I2C_SCL		I	I2C Clock Signal
17	LDO_ON		I	Control signal to enable/disable the internal LDO that provide power to the internal core. This control signal will also reset the internal core logic. '1' Enable LDO    '0' LDO disable
18	-	ANT_GND	O	External antenna connection return
19	-	ANT	I	External antenna connection point

O     output pad                      IA     Analog Input  
 I     Input                                OA     Analog Output

## 8. Electrical Specification

### 8.1. Absolute Maximum Rating

Item	Symbol	Rating	Unit
Module Supply Voltage	VDD	-0.4 to 4.5	V
I/O Supply Voltage	VIO	-0.4 – 4.0	V
Peak Current	I <sub>pk</sub>	0 - 70	mA
Storage Temperature	T <sub>STG</sub>	-20 to 85	°C

### 8.2. Recommended Operating Condition

Item	Symbol	Min	Typ	Max	Unit
Module Supply Voltage	VDD	3.3		4.2	V
I/O Supply Voltage	VIO	1.8		3.3	V
RF Operating Temperature		0	25	60	°C
Operating Temperature		0	25	55	°C

### 8.3. Digital Input / Output Port Characteristics

VDD=3.3V, VIO=3.3V, operating temperature = 25 °C unless specified otherwise

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Input Voltage Levels</b>						
V <sub>IL</sub>	Input low voltage		-0.3		0.25*VIO	V
V <sub>IH</sub>	Input high voltage		0.7*VIO		VIO+0.3	V
V <sub>sch</sub>	Schmitt voltage level		0.3*VIO		0.7*VIO	V
<b>Output Voltage Levels</b>						
V <sub>OL</sub>	Output low voltage	I <sub>OL</sub> = -4mA			0.125	V
V <sub>OH</sub>	Output high voltage	I <sub>OH</sub> = 4mA	0.75*VIO		VIO	V
<b>Current Consumption</b>						
Operating Current		Depends on profiles		25		mA
Standby Current					0.5	mA

**8.4. RF Characteristics**

VDD=4.0V, operating temperature = 27 °C unless specified otherwise

Receiver	Units	Min	Typ	Max	Bluetooth Spec
Sensitivity at 0.1% BER	dBm		-85		≤ -70
Maximum Receiver Signal at 0.1% BER	dBm	0			≥ -20
C/I Co-Channel	dB		10		≤ 11
Adjacent Channel Selectivity C/I +1MHz	dB			-5	≤ 0
Adjacent Channel Selectivity C/I -1MHz	dB			0	≤ 0
2 <sup>nd</sup> Adjacent Channel Selectivity C/I +2Mhz	dB			-33	≤ -30
2 <sup>nd</sup> Adjacent Channel Selectivity C/I -2Mhz	dB			-30	≤ -20
3 <sup>rd</sup> Adjacent Channel Selectivity C/I +3Mhz	dB			-45	≤ -40
3 <sup>rd</sup> Adjacent Channel Selectivity C/I -3Mhz	dB			-40	≤ -40

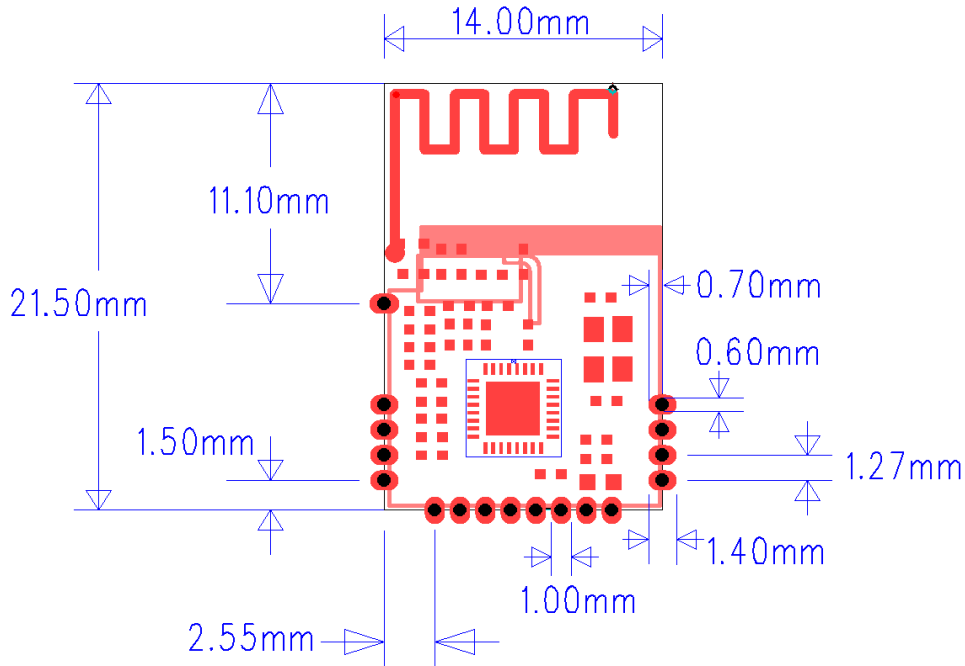
VDD=4.0V, operating temperature = 27 °C unless specified otherwise

Transmitter	Units	Min	Typ	Max	Bluetooth Spec
RF Output Power	dBm		1.6		-6 to +4
RF Power Control Range	dBm	-28		2.4	> 16
20dB Bandwidth for modulated Carrier	kHz		760		< 1000
Basic Data Rate Adjacent Channel Power					
2 <sup>nd</sup> Adjacent Channel (+/- 2Mhz)	dBm		-35		≤ -20
3 <sup>rd</sup> Adjacent Channel (+/- 3Mhz)	dBm		-40		≤ -40
Enhance Data Rate Adjacent Channel Power					
1 <sup>st</sup> Adjacent Channel (+/- 1MHz)	dBm		-37		≤ -29
2 <sup>nd</sup> Adjacent Channel (+/- 2Mhz)	dBm		-32		≤ -20
3 <sup>rd</sup> Adjacent Channel (+/- 3Mhz)	dBm		-40		≤ -40
Initial Carrier Frequency Tolerance	kHz	-0.25		4	-75 to +75

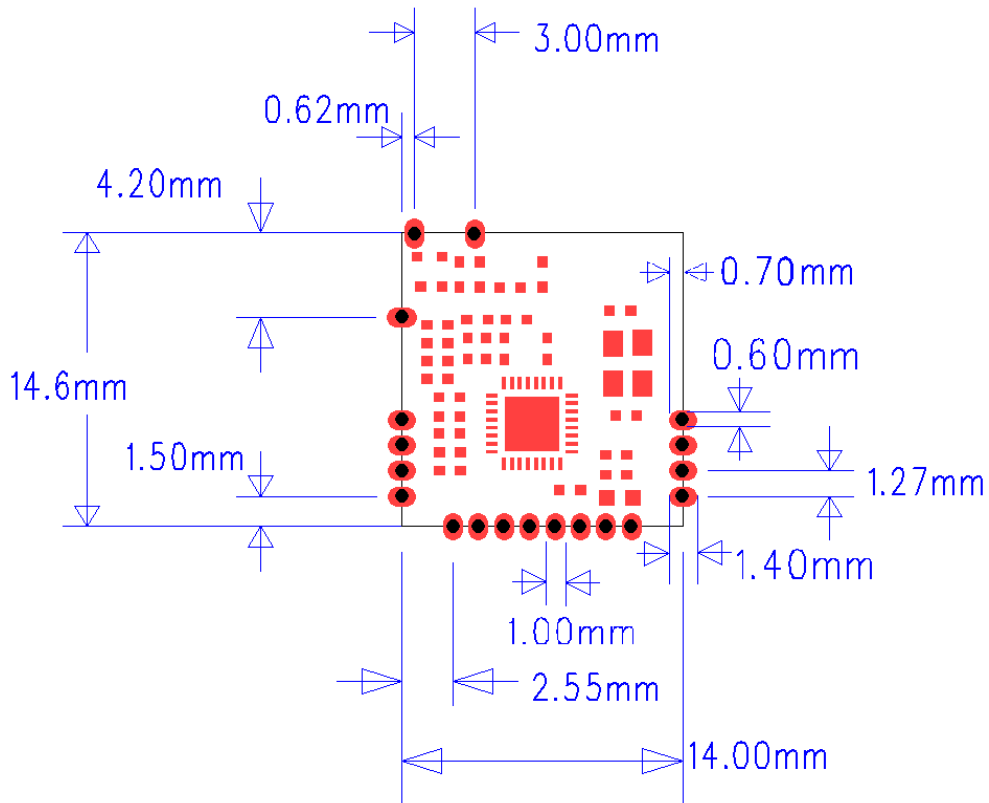


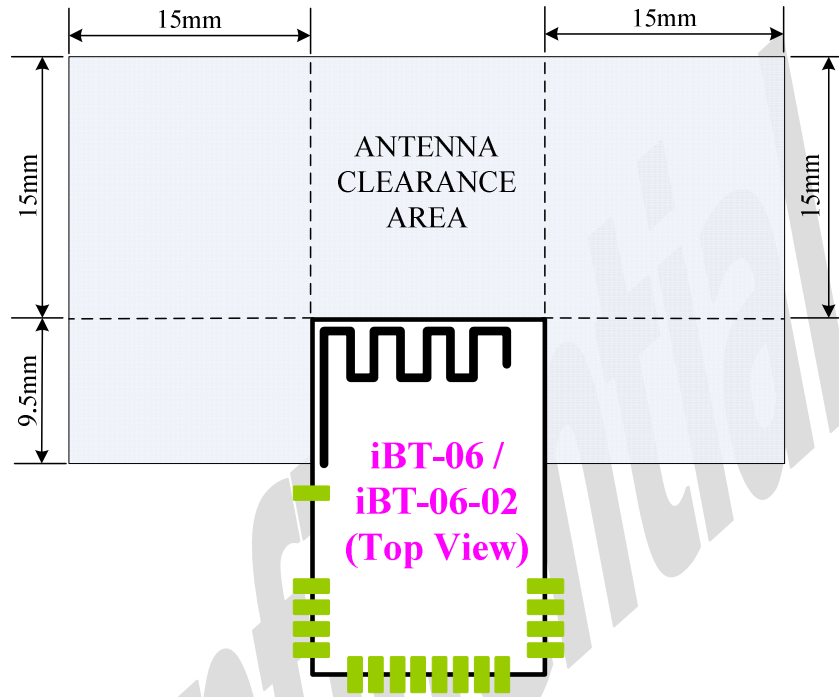
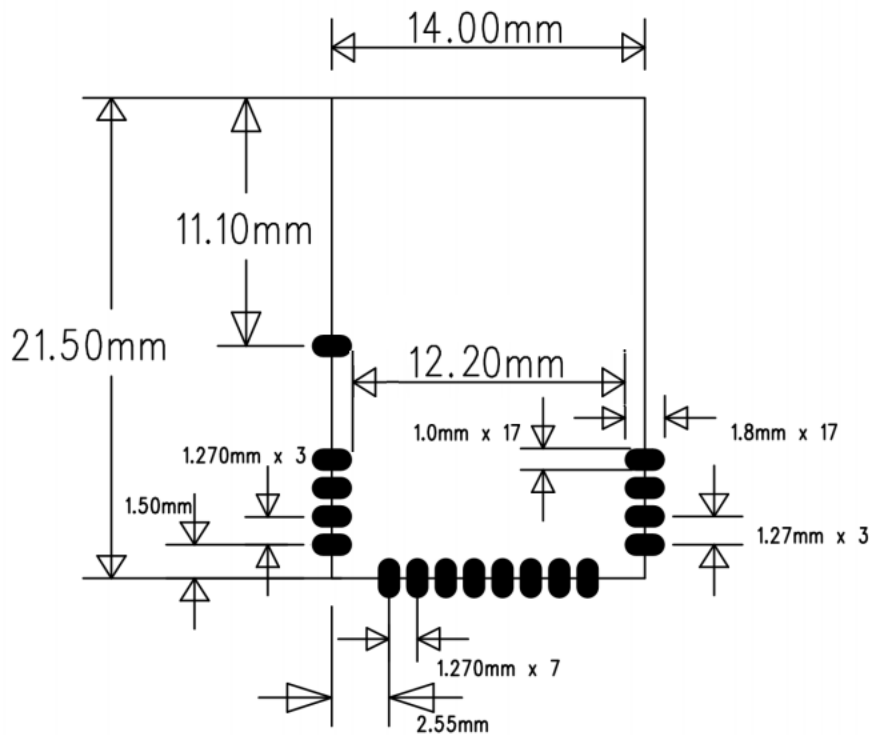
### 9. Module Dimension

#### 9.1. iBT-06, iBT-06S, iBT-06-02, iBT-06-02S Module Dimension

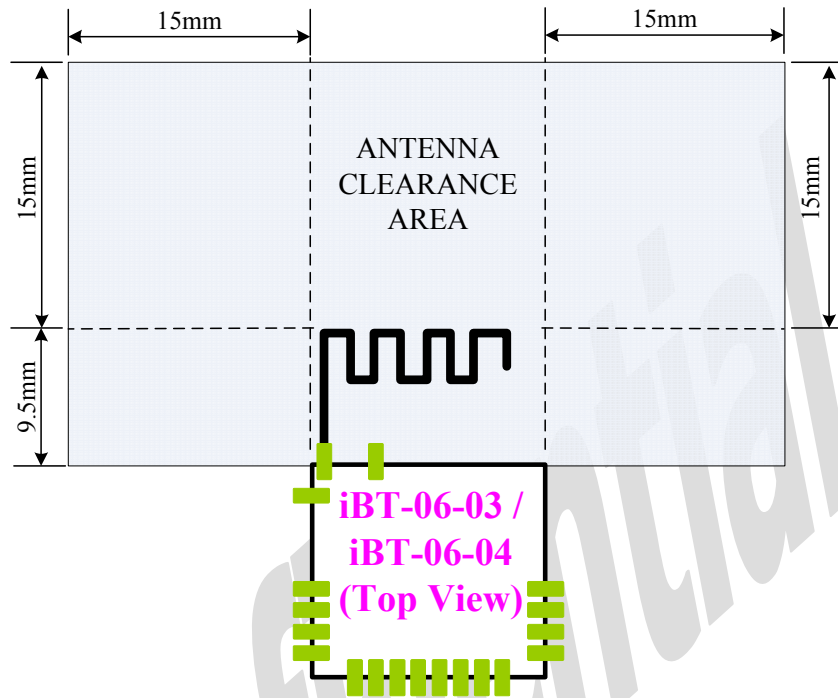


#### 9.2. iBT-06-03, iBT-06-03S, iBT-06-04, iBT-06-04S Module Dimension

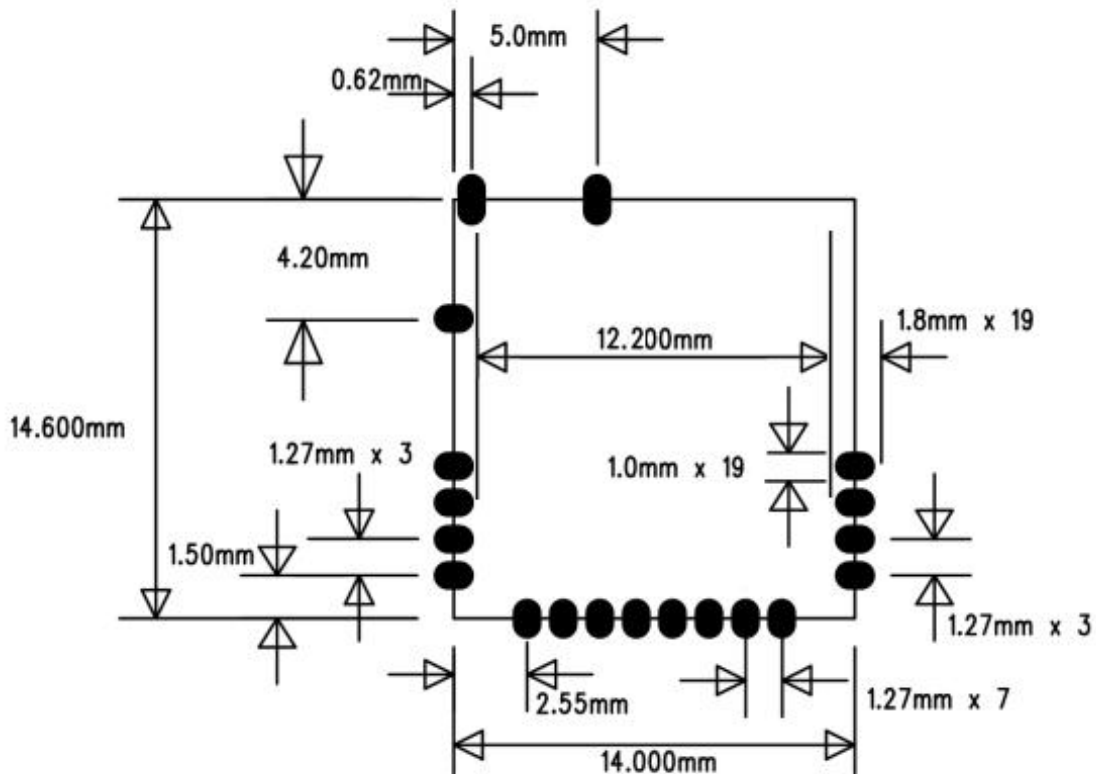


**10. PCB Layout Guidelines**
**10.1. iBT-06, iBT-06S, iBT-06-02 , iBT-06-02S Antenna Clearance**

**10.2. iBT-06, iBT-06S, iBT-06-02 , iBT-06-02S PCB Landing Pattern**


### 10.3. iBT-06-03, iBT-06-03S, iBT-06-04, iBT-06-04S Antenna Clearance



### 10.4. iBT-06-03, iBT-06-03S, iBT-06-04, iBT-06-04S PCB Landing Pattern



Confidential

Valence Semiconductor Design Ltd.  
Unit 1, 20/F., APEC Plaza, 49 Hoi Yuen Road, Kwun Tong, Hong Kong  
Tel: (852) 2797 3288 Fax: (852) 2776 7770  
<http://www.valencetech.com>

The information in this publication is believed to be accurate in all respects at the time of publication but is subject to change without notice. Valence Semiconductor Design Ltd. assumes no responsibility for errors and omissions, and disclaims responsibility for any consequences resulting from the use of information included herein. Additionally, Valence Semiconductor Design Ltd. assumes no responsibility for the functioning of undocumented features or parameters.