Bluetooth 2.0+EDR USB module (BM-GP-CS-08A)

Data Sheet March 2006 Rev 1.0

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Introduction

The Bluetooth Class 2 Module (model number BM-GP-CS-08A) is a small module with 10-way connector that provides a complete 2.4GHz Bluetooth system. This ready-to-use Class2 Bluetooth module provides a fully compliant Bluetooth system V2.0+EDR for data and audio communications.

This module also provides the coexistence solution that is critical for Notebook implementation. The coexistence solution includes AFH, and Activity Signaling (CSR coexistence solution), WCS (Wireless Coexistence Solution). AFH and Activity Signaling is the default setting.

This module is provided with Toshiba PC stack for Windows XP.

The module is ideally for Notebook PC, Table PC and UMPC.

Features

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- Fully Qualified Bluetooth v2.0 system
- Enhanced Data Rate(EDR) compliant for both 2Mbps & 3Mbps modulation modes
- With small size suitable for compact system integration. Low power consumption, extend the battery life.
- Support for 802.11b/g Coexistence including Intel WCS (Wireless Coexistence System) (Optional).
- Integrated Printed Antenna
- On board 8 Mbits flash memory for firmware upgrade

General Description

Features	Description
Standards	Fully compliant with Bluetooth™ 2.0+EDR Standard
Frequency Band	2.402GHz ~ 2.480GHz
Sensitivity	-82 dBm
Output Power	4 dBm max with power control (Maximum Power measurement is from chip set)
Integrated Antenna	Type A: Average gain: -2.95dbi @2.45GHz (max) Type B: Average gain: -4.4dbi @2.45GHz (max)
Coverage	10m ~20m (Varies depending on operating environment)
Temperature	Operating temperature: 0 ℃ to +70 ℃ Storage temperature: -40 ℃ to +85 ℃
Operating Voltage	3.3V DC +/- 10%
Power Consumption	Peak RF current during TX burst: 65 mA Peak RF current during RX burst: 47 mA
Data Rate	Asynchronous:723.2kbps/57.6kbps Synchronous:433.9kbps/433.9kbps
Interface	JST SM10B-SRSS-TB connector
Dimensions	Length: 36.0 mm, Width: 13.8 mm, Height: 3.8 mm
Weight	2.0 grams +/- 15%

Electrical Connector Pinout

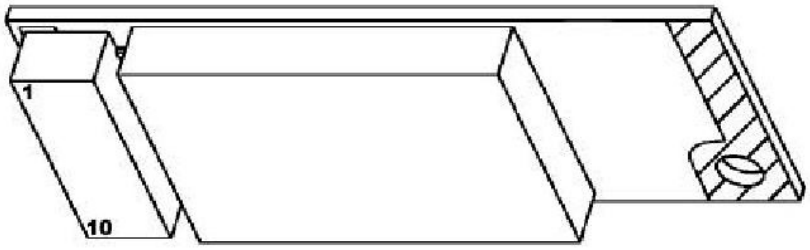


Figure 1: Connector pin assignment

Pin Number	Pin Name	Description
1	GND	Ground
2	USB_D+	USB D+
3	USB_D-	USB D-
4	BT_Active	BT_Active output to WLAN for Co-Existence.
5	BT_Priority / Ch_Clk	BT Priority and Channel Clock for WCS. (Only available when WCS is enabled.)
6	HW_RADIO_DIS# (Optional)	Disable radio transmissions when low
7	WLAN_Active / Ch_Data	WLAN_Active input from WLAN for Activity Signalling. Or Channel Data for WCS (Only available when WCS is enabled).
8	+3.3V	3.3V power input
9	LED	LED indicator for radio activity. (Not available when WCS is enabled)
10	GND	Ground

Table 2: Connector pin assignment

Block Diagram

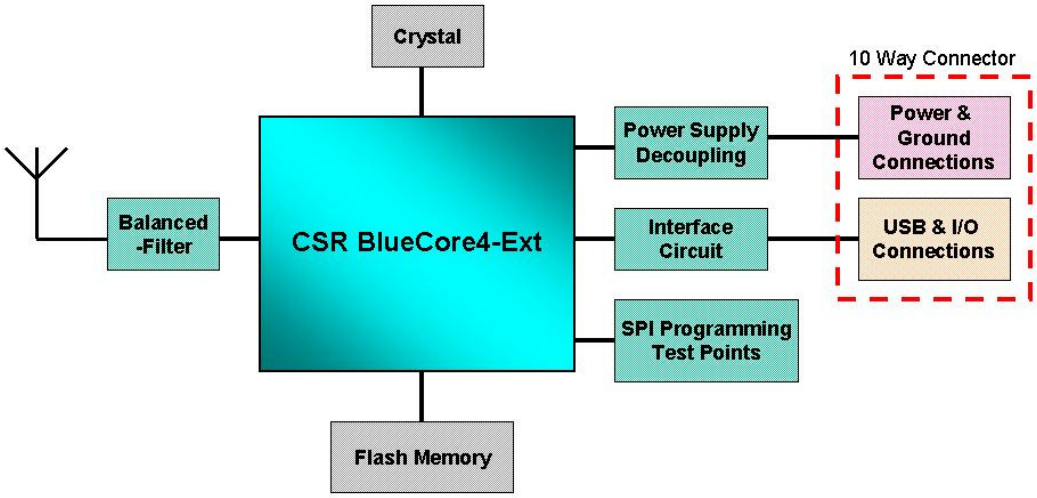


Figure 2: Module Block Diagram

Electrical Characteristics

Absolute Maximum Ratings		
Rating	**Min**	**Max**
Storage Temperature	-40 °C	+85 °C
Supply Voltage: VDD	-0.40V	+3.60V

Recommended Operating Conditions		
Operating Condition	**Min**	**Max**
Operating Temperature Range*	0 °C	+70 °C
Supply Voltage: VDD	+3.0V	+3.60V

Input/Output Terminal Characteristics				
Digital Terminals	Min	Typ	Max	Unit
Input Voltage				
VIL input logic level low (VDD=3.0V)	-0.4		+0.8	V
VIH input logic level high	0.7VDD	-	VDD+0.4	V
Output Voltage				
VOL output logic level low, (I_O = 4.0mA), VDD=3.0V	-	-	0.2	V
VOH output logic level high, (I_O = -4.0mA), VDD=3.0V	VDD-0.2	-	-	V
USB Terminals	Min	Typ	Max	Unit
Input threshold				
VIL input logic level low	-	-	0.3VDD	V
VIH input logic level high	0.7VDD	-	-	V
Input leakage current				
VSS < VIN< VDD	-1	1	5	µA
CI Input capacitance	2.5	-	10	pF
Output levels to correctly terminated USB Cable				
VOL output logic level low	0	-	0.2	V
VOH output logic level high	2.8	-	VDD	V

Average Current Consumption		
VDD=3.3V Temperature = 20℃		
Mode	**Typ**	**Unit**
ACL data transfer 1Mbps USB (Slave)	50	mA
ACL data transfer 1Mbps USB (Master)	58	mA
Standby Mode (Connected to host, no RF activity)	10	mA
Deep Sleep	380	uA

Peak Current Consumption		
VDD=3.3V Temperature = 20℃		
Mode	**Typ**	**Unit**
Peak RF current during TX burst (+4 dBm , CW mode)	55.0	mA
Peak RF current during TX burst (0 dBm , CW mode)	52.0	mA
Peak RF current during RX burst (-82 dBm)	44.0	mA

Radio Characteristics

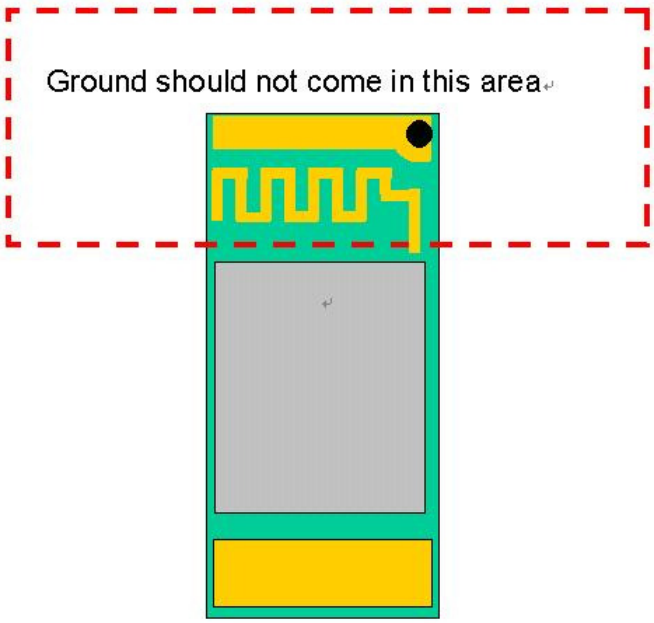
Radio Characteristics, VDD = 3.3V Temperature = +20℃						
Receiver	**Frequency (GHz)**	**Min**	**Typ**	**Max**	**Bluetooth Specification**	**Unit**
Sensitivity at 0.1% BER	2.402	-	-82	-78	≤–70	dBm
	2.441	-	-84	-80		dBm
	2.480	-	-84	-80		dBm
Maximum received signal at 0.1% BER	2.402	0	-	-	≥-20	dBm
	2.441	0	-	-		dBm
	2.480	0	-	-		dBm
Transmitter	**Frequency (GHz)**	**Min**	**Typ**	**Max**	**Bluetooth Specification**	**Unit**
RF transmit power	2.402	-3	4	-	-6 to +4[4]	dBm
	2.441	-3	4	-		dBm
	2.480	-3	4	-		dBm
Initial carrier frequency tolerance	2.402	-	10	35	75	kHz
	2.441	-	10	35		kHz
	2.480	-	10	35		kHz
RF power control range		25	35	-	≥16	dB
20dB bandwidth for modulated carrier		-	820	1000	≤1000	kHz
Drift (five slot packet)		-	±15	±25	±25	kHz
Drift Rate		-	±250	±400	±400	Hz/µs
	Frequency (GHz)	**Min**	**Typ**	**Max**	**Bluetooth Specification**	**Unit**
Δf1avg “Maximum Modulation”	2.402	140	165	175	140≤f1avg≤175	kHz
	2.441	140	165	175		kHz
	2.480	140	165	175		kHz
Δf2max “Minimum Modulation”	2.402	115	140	-	≥115	kHz
	2.441	115	140	-		kHz
	2.480	115	140	-		kHz

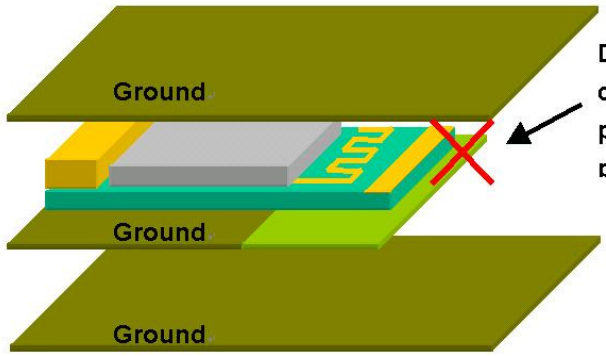
Notes:
Results shown are referenced to input of the RF Balanced-Filter.

Radio Characteristics, C/I and Adjacent Channel Power VDD = 3.3V Temperature = +20℃ Frequency = 2441 MHz					
Receiver	**Min**	**Typ**	**Max**	**Bluetooth Specification**	**Unit**
C/I co-channel	-	9	11	≤11	dB
Adjacent channel selectivity C/I $F=F_0+1MHz$	-	-4	0	≤0	dB
Adjacent channel selectivity C/I $F=F_0-1MHz$	-	-4	0	≤0	dB
Adjacent channel selectivity C/I $F=F_0+2MHz$	-	-35	-30	≤-30	dB
Adjacent channel selectivity C/I $F=F_0-2MHz$	-	-21	-20	≤-20	dB
Adjacent channel selectivity C/I $F=F_0+3MHz$	-	-45	-40	≤-40	dB
Adjacent channel selectivity C/I $F=F_{Image}$	-	-18	-9	≤-9	dB
Adjacent channel selectivity C/I $F=F_0-4MHz$	-	-25	-20	≤-20	dB
Transmitter	**Min**	**Typ**	**Max**	**Bluetooth Specification**	**Unit**
Adjacent channel transmit power $F=F_0\pm2MHz$	-	-35	-20	≤-20	dBm
Adjacent channel transmit power $F=F_0\pm3MHz$	-	-45	-40	≤-40	dBm

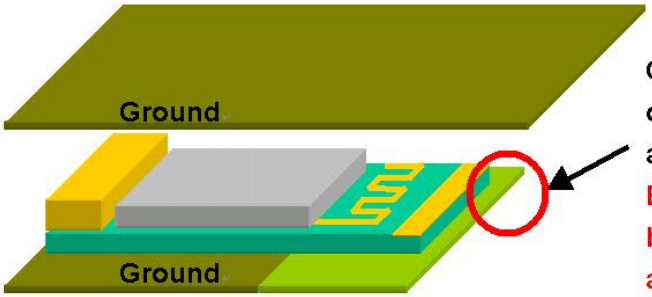
Mounting Guide for Antenna Radiation

In order to achieve longest communication range, please keep the area surrounding antenna free of grounding or metal housing.





Do not completely cover the antenna portion with ground plates.

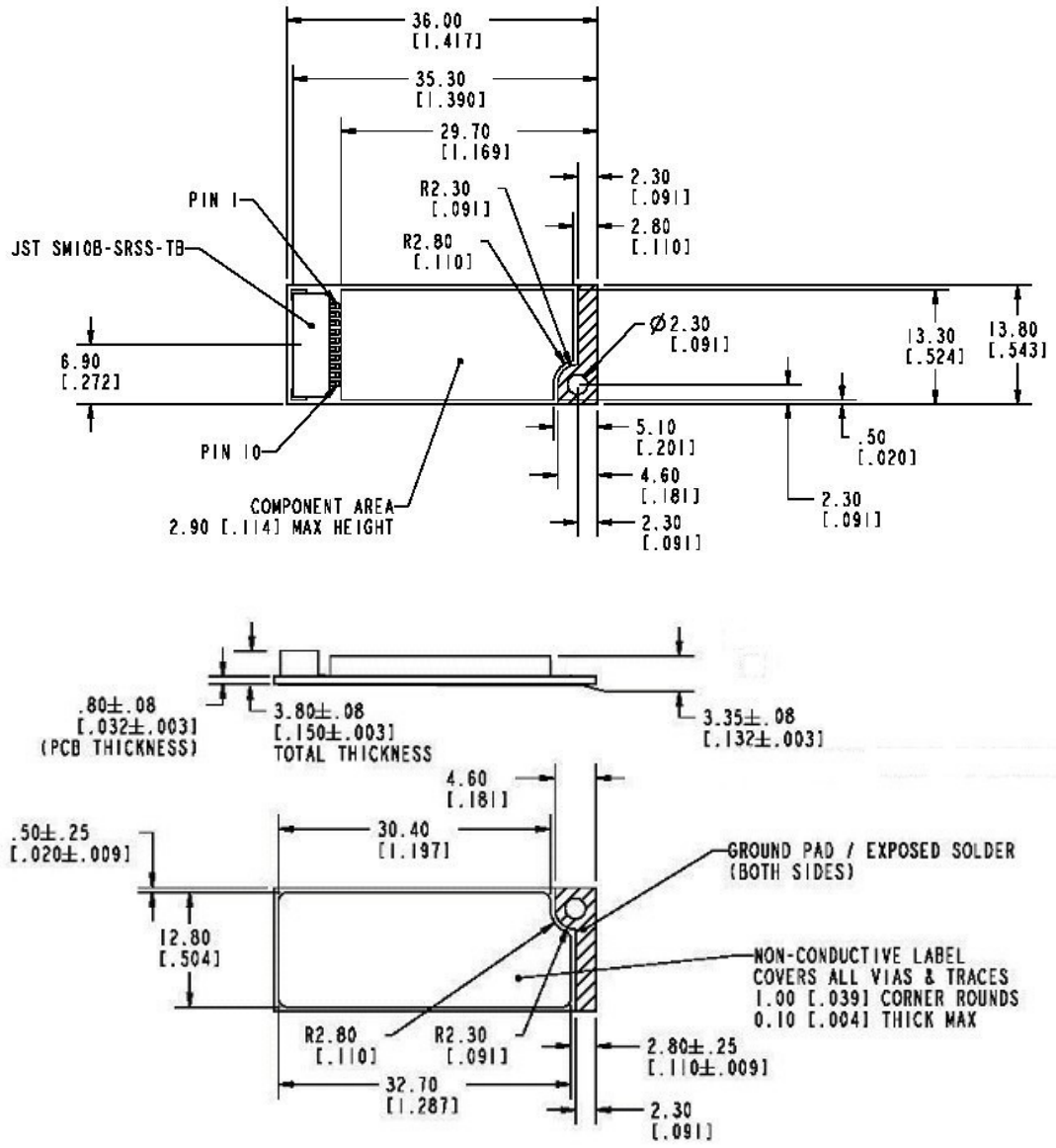


Covering only one side of the antenna is acceptable.
But the distance between ground plate and antenna should be keep as far as possible.

Impedance Matching of Antenna

BM-GP-CS-08/A/B utilizes a meander line printed antenna for radiate communication. Application environments, such as notebooks, PDAs, headsets or other handheld devices, both have plastic housings, different motherboards and other mechanism structures. These factors will cause the deviation of antenna resonant frequency. Therefore, impedance matching of antenna should be optimized for various applications to achieve longest communication range. Please consult USI for further information.

Mechanical Drawing



Label Information

First line: USI and Date code. The first two digits of date code is the year and last two digits are the week number. The date code is used to identify the production date.

Second line: The part numer which may have different information.

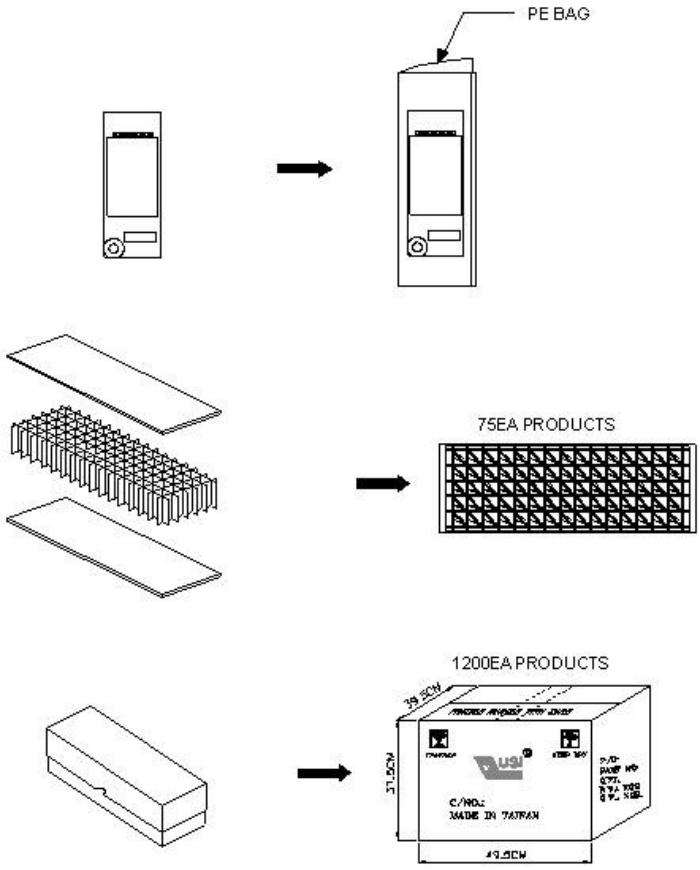
Third line: The MAC address.

WARNING:

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.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Packaging



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