

# Bluetooth 1.2 USB module (BM-GP-CS-08)



**Data Sheet** December 2004 Rev 1.4

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## Introduction

The Bluetooth Class 2 Module (model number BM-GP-CS-08) 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 V1.2 for data and audio communications.

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



## Feature

- Fully Qualified Bluetooth v1.2 system
- Enhanced Data Rate(EDR) compliant with v0.9 of specification for both 2Mbps & 3Mbps modulation modes
- Scatternet Support
- With small size suitable for compact system integration. Low power consumption, extend the battery life.
- 2.402 – 2.4835 GHz frequency band.
- Support for 802.11b/g Coexistence including Intel WCS (Wireless Coexistence System).
- Integrated Printed Antenna
- Easy for integration into mobile and handheld device with flexible system configuration and antenna design.
- On board 8 Mbits flash memory for firmware upgrade

## Bluetooth USB Module (BM-GP-CS-08)

### General Description

| Features           | Description                                                                      |
|--------------------|----------------------------------------------------------------------------------|
| Standards          | Fully compliant with Bluetooth™ 1.2 Standard                                     |
| Frequency Band     | 2.402GHz ~ 2.4835GHz                                                             |
| Sensitivity        | -82 dBm                                                                          |
| Output Power       | 4 dBm max with power control (Maximum Power measurement is from chip set)        |
| Integrated Antenna | Peak Gain @ 2.45GHz: 0.5dBi                                                      |
| Coverage           | 10m ~20m (Varies depending on operating environment)                             |
| Temperature        | Operating temperature: 0 °C to +70 °C<br>Storage temperature: -40 °C to +85 °C   |
| Operating Voltage  | 3.3V DC +/- 10%                                                                  |
| Power Consumption  | Peak RF current during TX burst: 65 mA<br>Peak RF current during RX burst: 47 mA |
| Data Rate          | Asynchronous: 723.2kbps/57.6kbps<br>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%                                                                |
| Operating systems  | Windows 98SE/ME/2000/XP                                                          |

### Electrical Connector Pinout

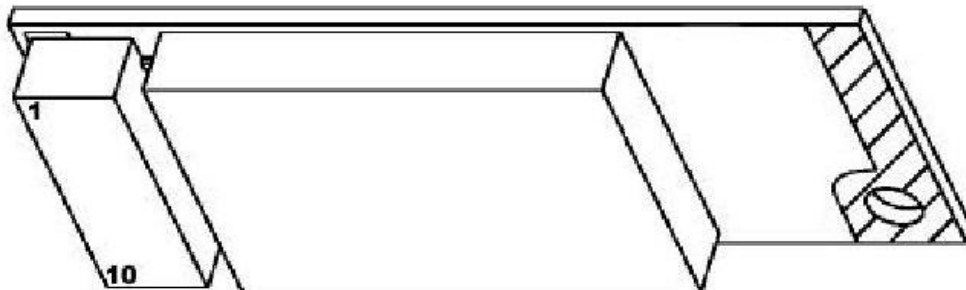


Figure 1: Connector pin assignment

| Pin Number | Pin Name                    | Description                                                                                                         |
|------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------|
| 1          | GND                         | Ground                                                                                                              |
| 2          | USB_D+                      | USB D+                                                                                                              |
| 3          | USB_D-                      | USB D-                                                                                                              |
| 4          | RSVD                        | Reserved for BT_Active output to 802.11b for Co-Existence. This is optional if you need Activity Signalling scheme. |
| 5          | BT_Priority / Ch_Clk (PIO4) | BT Priority and Channel Clock for WCS.                                                                              |
| 6          | HW_RADIO_DIS# (Optional)    | Disable radio transmissions when low                                                                                |
| 7          | Ch_Data (PIO6)              | Channel Data for WCS (Standard). Or, WLAN_Active input from 802.11b for Activity Signalling which is optional.      |
| 8          | +3.3V                       | 3.3V power input                                                                                                    |
| 9          | LED                         | LED indicator for radio activity                                                                                    |
| 10         | GND                         | Ground                                                                                                              |

Table 2: Connector pin assignment

### Block Diagram

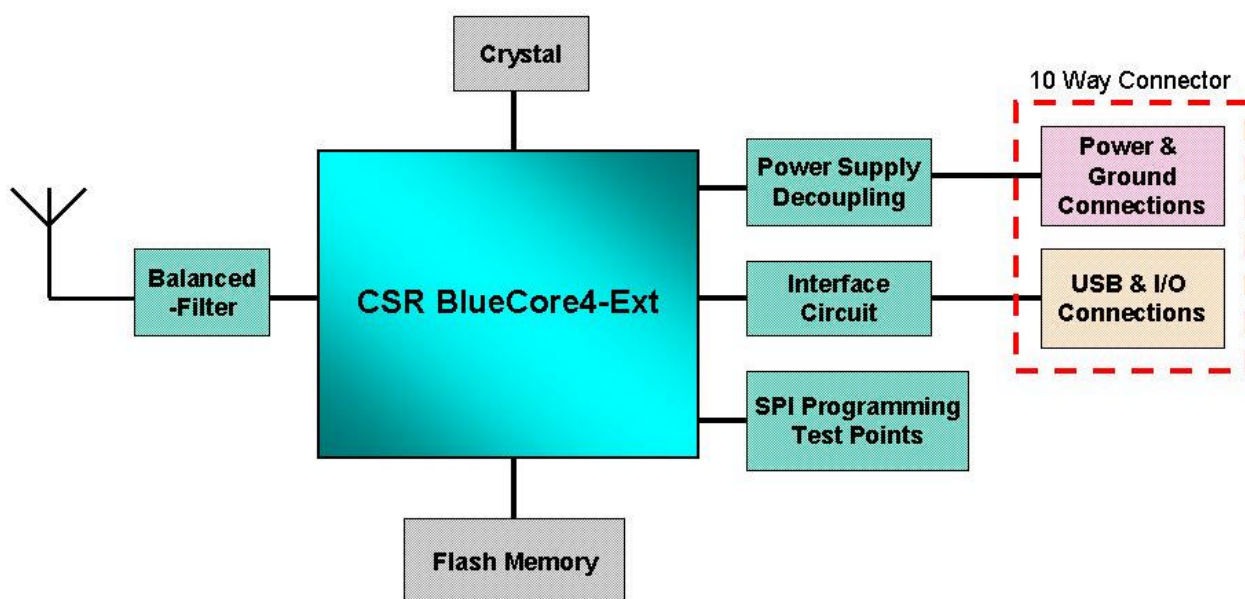


Figure 2: Module Block Diagram

### 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 |

## Bluetooth USB Module (BM-GP-CS-08)

| Input/Output Terminal Characteristics                            |         |     |         |               |
|------------------------------------------------------------------|---------|-----|---------|---------------|
| Digital Terminals                                                | Min     | Typ | Max     | Unit          |
| <b>Input Voltage</b>                                             |         |     |         |               |
| VIL input logic level low (VDD=3.0V)                             | -0.4    |     | +0.8    | V             |
| VIH input logic level high                                       | 0.7VDD  | -   | VDD+0.4 | V             |
| <b>Output Voltage</b>                                            |         |     |         |               |
| VOL output logic level low, ( $I_o = 4.0\text{mA}$ ), VDD=3.0V   | -       | -   | 0.2     | V             |
| VOH output logic level high, ( $I_o = -4.0\text{mA}$ ), VDD=3.0V | VDD-0.2 | -   | -       | V             |
| USB Terminals                                                    | Min     | Typ | Max     | Unit          |
| <b>Input threshold</b>                                           |         |     |         |               |
| VIL input logic level low                                        | -       | -   | 0.3VDD  | V             |
| VIH input logic level high                                       | 0.7VDD  | -   | -       | V             |
| <b>Input leakage current</b>                                     |         |     |         |               |
| VSS < VIN < VDD                                                  | -1      | 1   | 5       | $\mu\text{A}$ |
| CI Input capacitance                                             | 2.5     | -   | 10      | pF            |
| <b>Output levels to correctly terminated USB Cable</b>           |         |     |         |               |
| 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°C                      |     |               |
| 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 | $\mu\text{A}$ |

| Peak Current Consumption                           |      |      |
|----------------------------------------------------|------|------|
| VDD=3.3V Temperature = 20°C                        |      |      |
| 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°C |                 |     |           |           |                           |             |
|-------------------------------------------------------|-----------------|-----|-----------|-----------|---------------------------|-------------|
| Receiver                                              | Frequency (GHz) | Min | Typ       | Max       | Bluetooth Specification   | Unit        |
| Sensitivity at 0.1% BER                               | 2.402           | -   | -82       | -78       | $\leq -70$                | dBm         |
|                                                       | 2.441           | -   | -84       | -80       |                           | dBm         |
|                                                       | 2.480           | -   | -84       | -80       |                           | dBm         |
| Maximum received signal at 0.1% BER                   | 2.402           | 0   | -         | -         | $\geq -20$                | 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         | -         | $-6 \text{ dB} + 4^{(4)}$ | 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        | -         | $\geq 16$                 | dB          |
| 20dB bandwidth for modulated carrier                  |                 | -   | 820       | 1000      | $\leq 1000$               | kHz         |
| Drift ( five slot packet)                             |                 | -   | $\pm 15$  | $\pm 25$  | $\pm 25$                  | kHz         |
| Drift Rate                                            |                 | -   | $\pm 250$ | $\pm 400$ | $\pm 400$                 | Hz/ $\mu$ s |
|                                                       | Frequency (GHz) | Min | Typ       | Max       | Bluetooth Specification   | Unit        |
| f1avg " Maximum Modulation"                           | 2.402           | 140 | 165       | 175       | $140 \leq f1avg \leq 175$ | kHz         |
|                                                       | 2.441           | 140 | 165       | 175       |                           | kHz         |
|                                                       | 2.480           | 140 | 165       | 175       |                           | kHz         |
| f2max " Minimum Modulation"                           | 2.402           | 115 | 140       | -         | $\geq 115$                | kHz         |
|                                                       | 2.441           | 115 | 140       | -         |                           | kHz         |
|                                                       | 2.480           | 115 | 140       | -         |                           | kHz         |

### Notes:

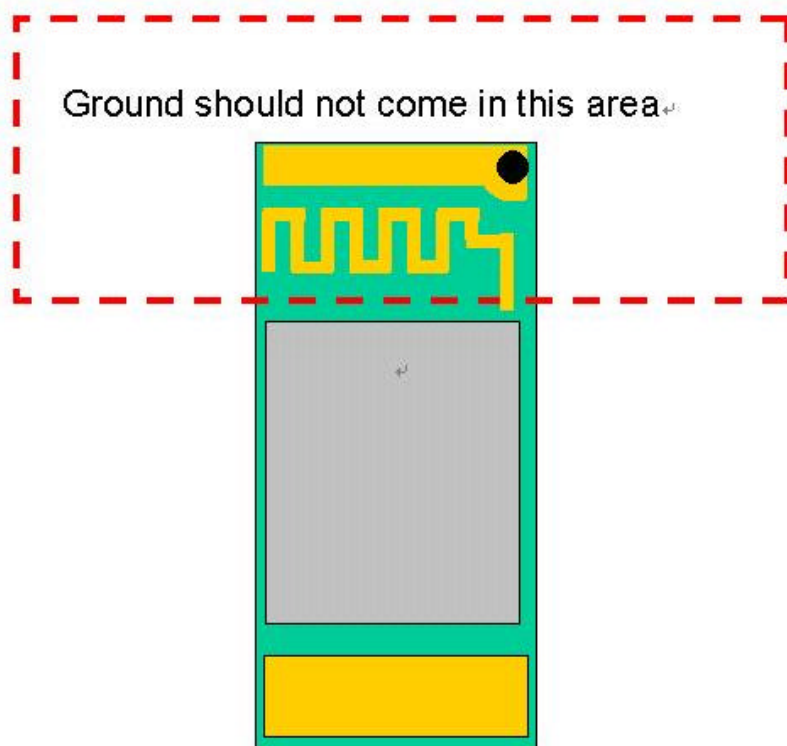
Results shown are referenced to input of the RF Balanced-Filter.

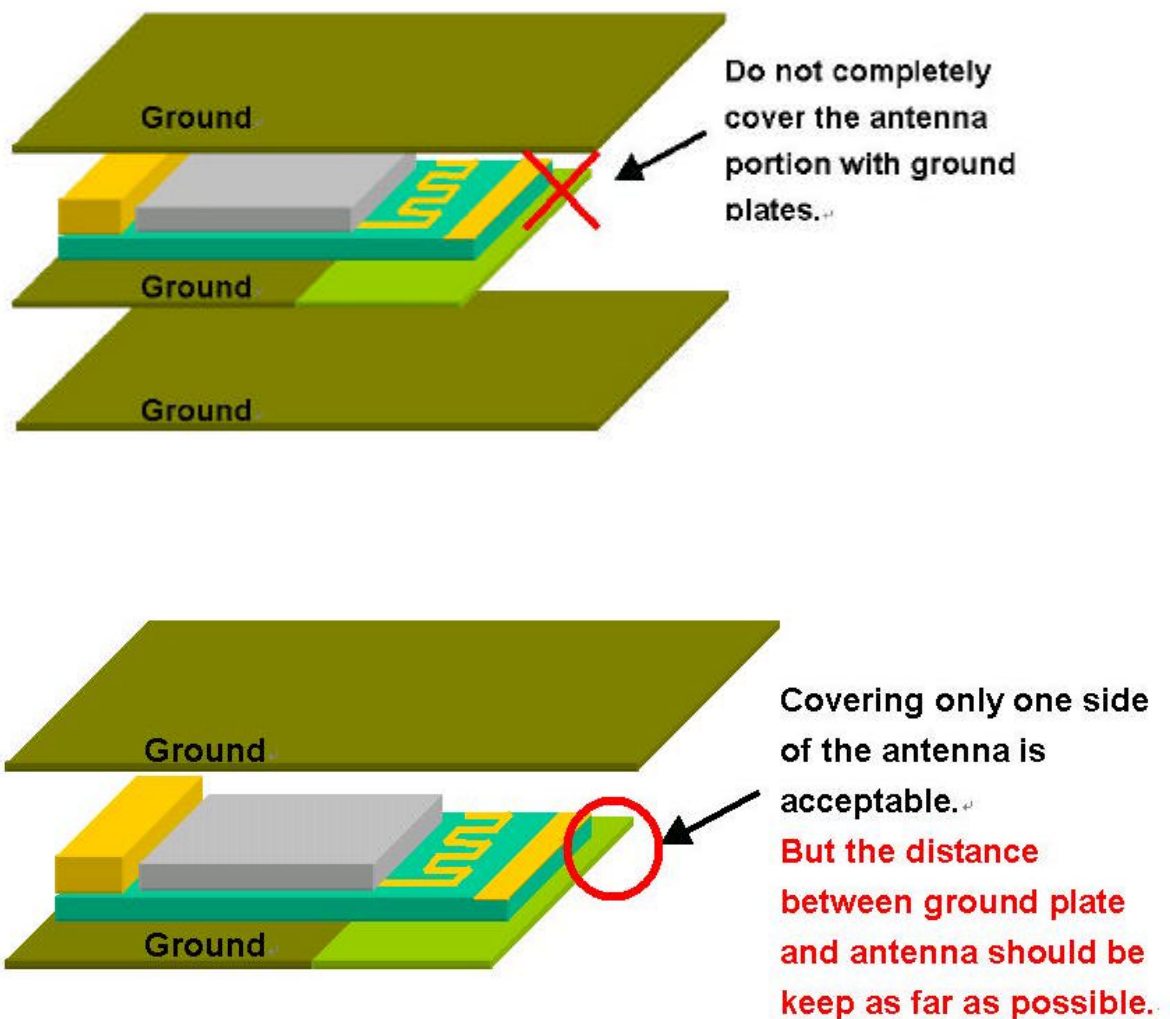
## Bluetooth USB Module (BM-GP-CS-08)

| Radio Characteristics, C/I and Adjacent Channel Power<br>VDD = 3.3V Temperature = +20°C Frequency = 2441 MHz |     |     |     |                         |      |
|--------------------------------------------------------------------------------------------------------------|-----|-----|-----|-------------------------|------|
| <u>Receiver</u>                                                                                              | Min | Typ | Max | Bluetooth Specification | Unit |
| C/I co-channel                                                                                               | -   | 9   | 11  | $\leq 11$               | dB   |
| Adjacent channel selectivity C/I $F=F_0+1\text{MHz}$                                                         | -   | -4  | 0   | $\leq 0$                | dB   |
| Adjacent channel selectivity C/I $F=F_0-1\text{MHz}$                                                         | -   | -4  | 0   | $\leq 0$                | dB   |
| Adjacent channel selectivity C/I $F=F_0+2\text{MHz}$                                                         | -   | -35 | -30 | $\leq -30$              | dB   |
| Adjacent channel selectivity C/I $F=F_0-2\text{MHz}$                                                         | -   | -21 | -20 | $\leq -20$              | dB   |
| Adjacent channel selectivity C/I $F=F_0+3\text{MHz}$                                                         | -   | -45 | -40 | $\leq -40$              | dB   |
| Adjacent channel selectivity C/I $F=F_{\text{Image}}$                                                        | -   | -18 | -9  | $\leq -9$               | dB   |
| Adjacent channel selectivity C/I $F=F_0-4\text{MHz}$                                                         | -   | -25 | -20 | $\leq -20$              | dB   |
| <u>Transmitter</u>                                                                                           | Min | Typ | Max | Bluetooth Specification | Unit |
| Adjacent channel transmit power $F=F_0\pm 2\text{MHz}$                                                       | -   | -35 | -20 | $\leq -20$              | dBm  |
| Adjacent channel transmit power $F=F_0\pm 3\text{MHz}$                                                       | -   | -45 | -40 | $\leq -40$              | 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.

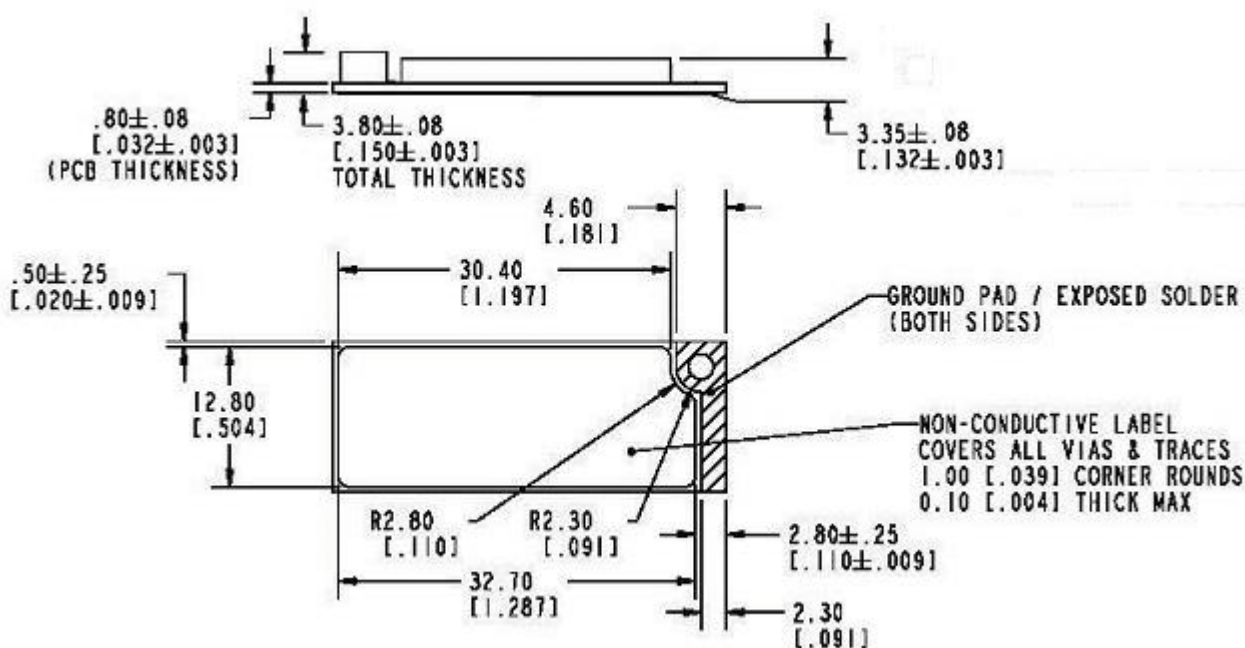
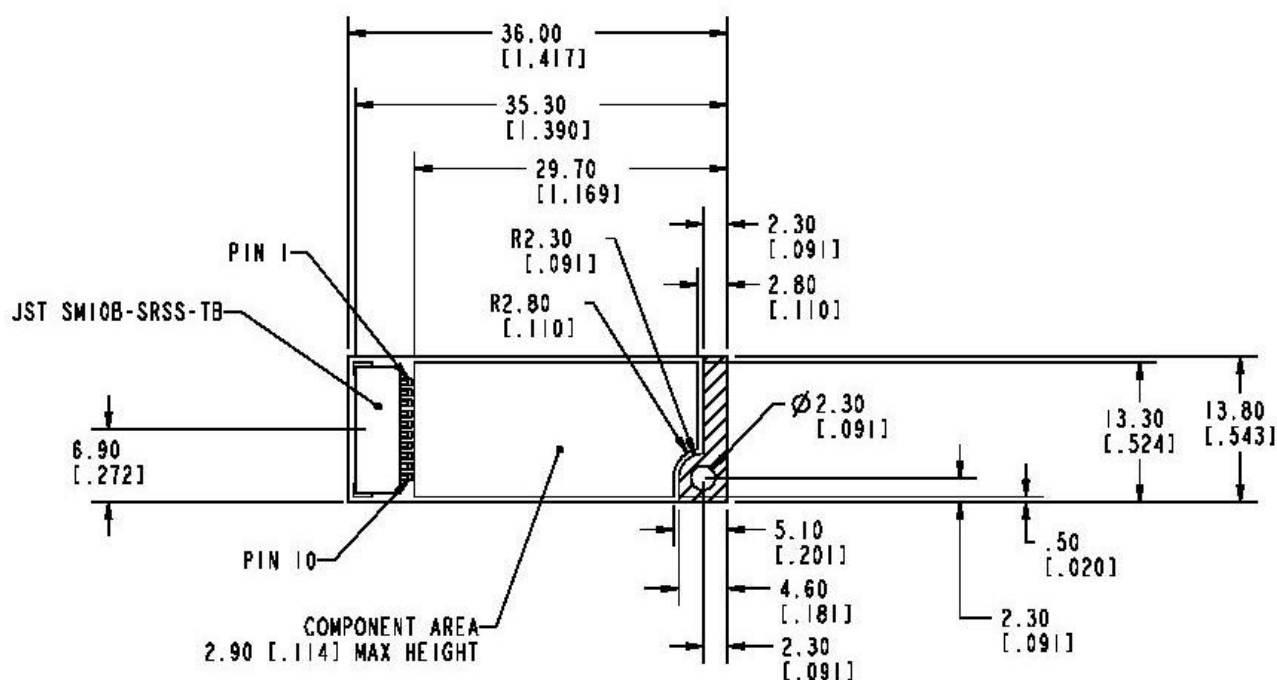




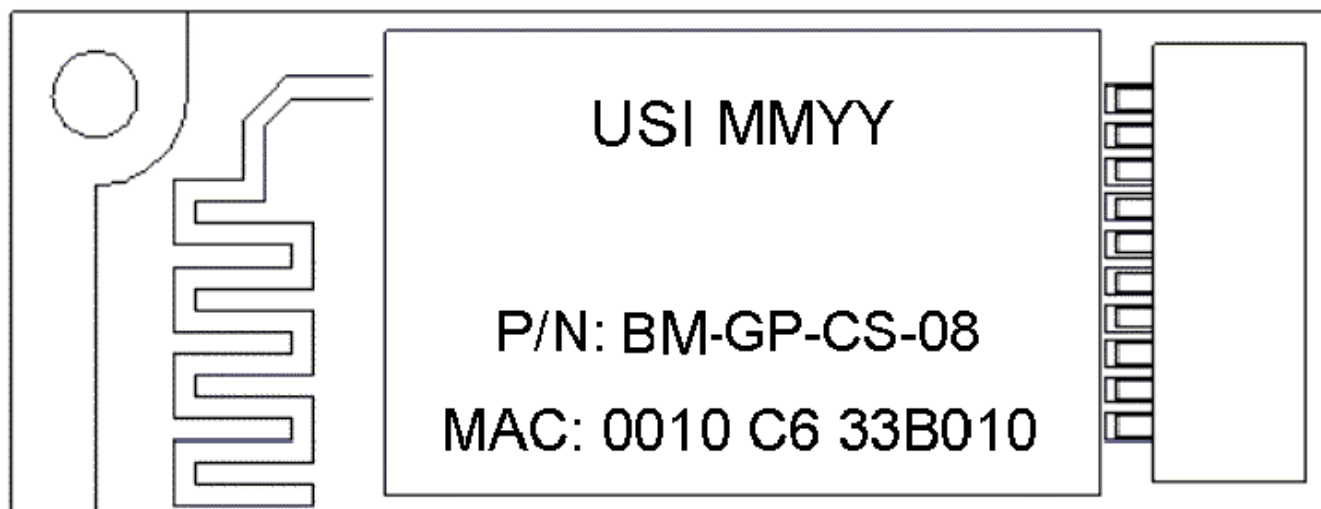
### Impedance Matching of Antenna

*BM-GP-CS-08* 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



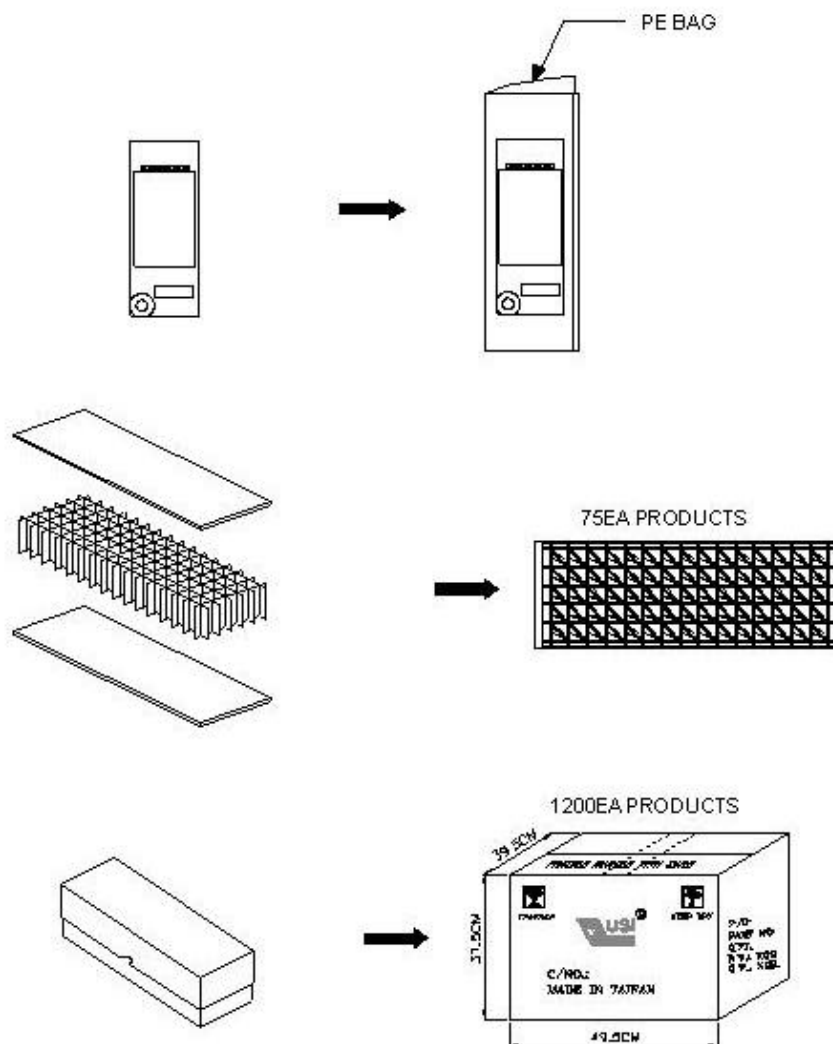
### Laser Marking



#### Legend:

1. USI MMY: MMY is the date code. MM stands for month while YY stands for the last 2 digits of the year.
2. P/N: BM-GP-CS-08 is the the standard USI model number. This part number can be customize to your specific part number.
3. MAC: MAC address.

### Packaging



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For Additional information, please contact the following:

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