

# SPK Bluetooth module design datasheet

Doc Version : 20120308



<b>Product ID</b>	<b>EBM-A09</b>
<b>Product Name</b>	<b>CSR BC4 class 2 Bluetooth module</b>
<b>Firmware Version</b>	
<b>Hardware Version</b>	<b>Rev.1.0</b>

## 1. DESCRIPTION

EBM-009 full qualified Bluetooth V2.0+EDR system. It EBM-A09 is a fully integrated Bluetooth Class 2 module using CSR BlueCore4-External solution which include radio frequency, base-band DSP, link manager, and Host Control Interface. EBM-A09 have its sufficient pin definitions, high receiving sensitivity, low power consumption and excellent performance.

## 2. FEATURES

Comply with Bluetooth Specification V2.0+EDR

Enhanced Data Rate (EDR) compliant with v0.9 of specification for both 2Mbps and 3Mbps modulation modes

Support up to 7 ACL connection and 3 SCO connection

Support faster connection, Flush timeout, Synchronization, LMP improvements, AFH, Parameter ranges and LMP SCO Handle.

12 PIO/ 2 AIO pins definition is ideally suited for rapid embedded development any kind of products.

13 or 16 bit linear, 8 bit  $\mu$ -Law or A-Law PCM interface

UART interface with programmable baud rate

Compact size (26.00 x 14.50 x 2.0mm) can be fit any type of product

RF output power  $-6\text{dBm} \sim +4\text{ dBm}$  (class 2).

High receiving sensitivity ( $-83\text{ dBm}$  0.1% BER).

Output interface over USB/UART/PCM/SPI.

### 3. APPLICATIONS

PCs, PDAs, Computer Accessories (Compact Flash Cards, PCMCIA Cards, SD Cards and USB Dongles), Access Points and Digital Cameras.

### 4. SPECIFICATIONS

#### 4.1 General Specification

ITEMS		SPECIFICATION
Supply Voltage		VDD: 3.3V+/-0.1V Regulated supply voltage
Carrier Frequency		2400MHz to 2483.5MHz (USA, Spain, France)
Modulation Method		GFSK,1Mbps,0.5BT Gaussian
	1M	Asynchronous:723.2kbps/57.6kbps Synchronous:433.9kbps
Data Rate (MAX)	2M	Asynchronous:1448.4kbps/115.2kbps Synchronous:864.7kbps
	3M	Asynchronous:2178.1kbps/177.1kbps Synchronous:1306.9kbps
Transmission Power		+3dBm to -20dBm; Power control 6 stage
Hopping		1600hops/sec, 1MHz channel space
Receiving Signal Range		-83dBm to -20 dBm
Receiver IF Frequency		NEAR ZERO frequency
Baseband Crystal OSC		26MHz
Output Interface		USB,PCM,SPI,UART
Operation Temperature		-40 to +85 degree
Storage Temperature		-40 to +105 degree
Absolute Max Supply Voltage		3.6V for VDD, other VDD +0.3V
Bluetooth Specification		Ver2.0+EDR
USB Specification		v1.1 compatibility USB v2.0

## 4.2. Electrical Characteristics

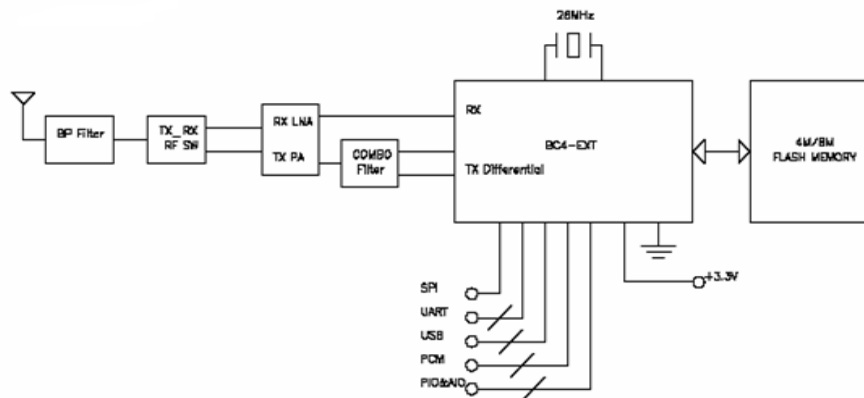
### 4.2.1 Transmitter Section

ITMES		Min	Typ	Max	Unit	Condition
Transmission power		-6	TBD	+4	dBm	Longest supported packet
Initial Frequency Accuracy		-75		75	KHz	Hopping ON/OFF Continuous TX
In-band spurious						Max hold and 100kHz
M +/- 500 kHz				-20	dBc	
M-N =2				-20	dBm	
M-N ≥3				-40	dBm	
Exception				-20	dBm	
Out of band spurious (Operation mode)						100kHz RBW
30MHz to 1GHz				-36	dBm	
1GHz to 12.75GHz				-30	dBm	
1.8GHz to 1.9GHz				-47	dBm	
5.1GHz to 5.3GHz				-47	dBm	
Adjacent Channel Power						
+/-2MHz				-20	dB	
>+/-3MHz				-40	dB	
Modulation Characteristics	F1AVG	140		175	KHz	00001111,Hopping off DH1
	F2MIN	115			KHz	01010101,Hopping off DH1
	F2AVG/F1AVG	0.8				
Frequency Drift				±25	KHz	DH1
				±40	KHz	DH3
				±40	KHz	DH5
						Max Drift rate:400Hz/10us
Operation current				80	mA	Peak Current during bust

## 4.2.2 Receiver Section

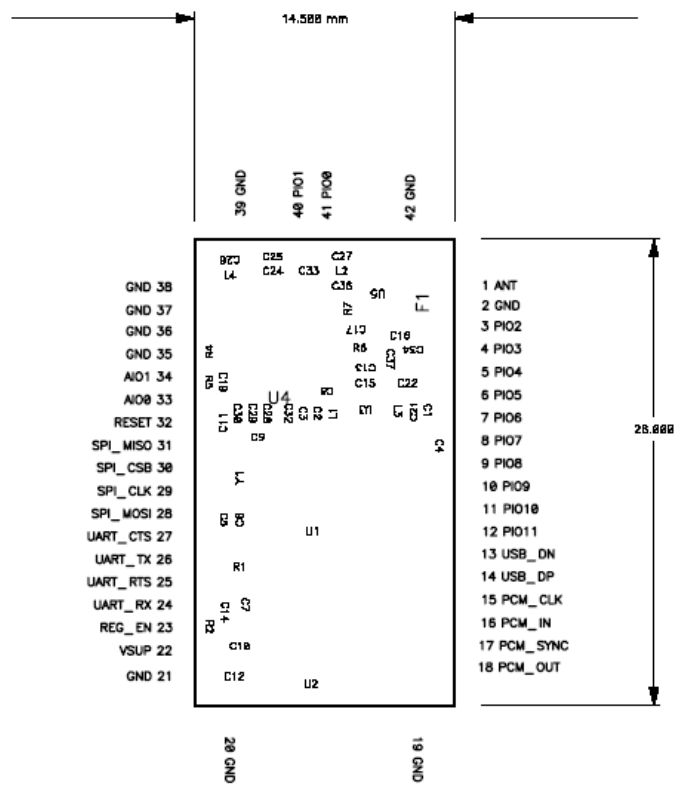
ITMES	Min	Typ	Max	Unit	Condition
Sensitivity					BER 10E-3, hopping
Single slot packet	-83	-81	-78	dBm	off/1600K returned payload bit
Multi slot packet	-82	-80	-78	dBm	Multi slot packets uses DH5
Maximum received signal	-20			dBm	BER 10E-3, hopping off 1600K returned payload bit, multi slot packet, DH1
Out-band blocking					Hopping off, BER 10E-3
30MHz to 2000MHz	-10			dBm	
2000MHz to 2399MHz	-27			dBm	
2498MHz to 3000MHz	-27			dBm	
3000MHz to 12.75GHz	-10			dBm	
(idle mode)					
30MHz to 1GHz			-57	dBm	
1GHz to 12.75GHz			-47	dBm	
1.8GHz to 1.9GHz			-47	dBm	
5.15GHz to 5.3GHz			-47	dBm	
Intermodulation	-39			dBm	Hopping off, BER 10E-3
Interference Performance					NTC, BER 10E-3 Measured at hopping off.
Co-channel			14	dB	
Image frequency			-6	dB	
Adjacent(1MHz) to In-band image			-16	dB	

## 5. BLOCK DIAGRAM



## 6. PIN CONFIGURATION AND MECHANICAL DIMENSION

### 6.1 Pin Placement

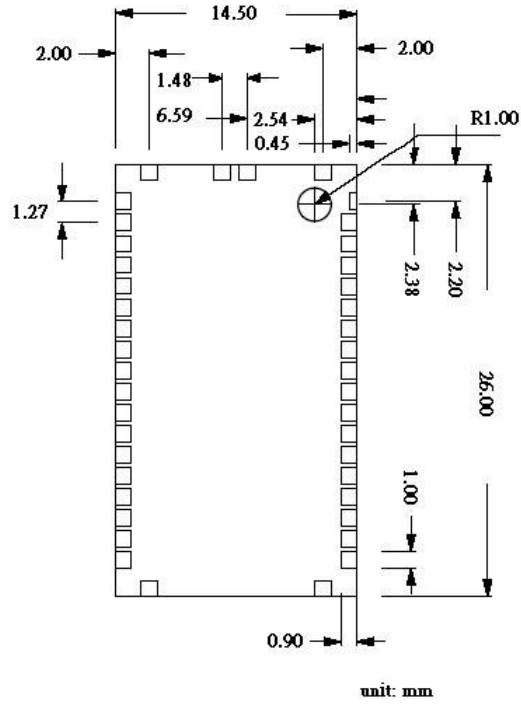


## 6.2 Pin Definition

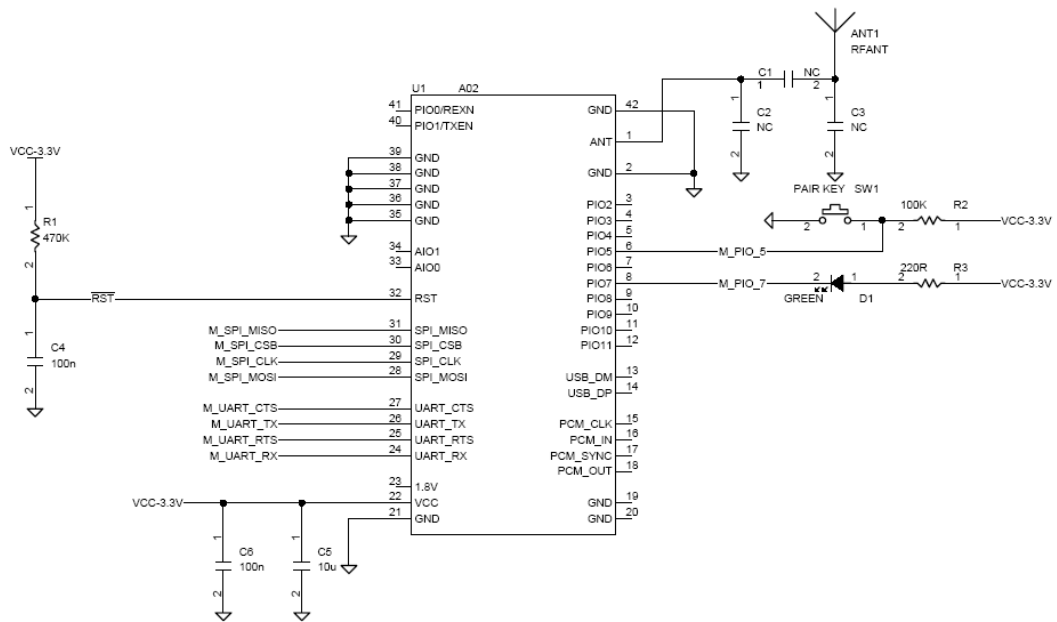
PIN Name	No	I/O	Description
ANT	1	I/O	Transmitter out and receiver input
GND	2		Ground
PIO2/USB_Pull_Up	3	I/O	PIO or USB pull-up
PIO3/USB_Wake_Up	4	I/O	PIO or Output goes high to wake up PC when in USB
PIO4/USB_ON	5	I/O	Programmable I/O lines/Interrupt request 1
PIO5/USB_DETACH	6	I/O	PIO line or chip detaches from USB when this input is
PIO6/CLK_REQ	7	I/O	PIO line or clock request for external clock line
PIO7/RAM_CSB	8	I/O	Programmable Input/Output Line
PIO8	9	I/O	Programmable Input/Output Line
PIO9	10	I/O	Programmable Input/Output Line
PIO10	11	I/O	Programmable Input/Output Line
PIO11	12	I/O	Programmable Input/Output Line
USB_DN	13	I/O	USB Data-
USB_DP	14	I/O	USB Data+
PCM_CLK	15	I/O	Synchronous Data Clock
PCM_IN	16	I	Synchronous 8kss data out
PCM_SYNC	17	I/O	Synchronous Data Strobe
PCM_OUT	18	O	Synchronous Data Output
GND	19		Ground
GND	20		Ground
GND	21		Ground
VSUP	22	I	3V3 for RF circuit
REG_EN	23		For BlueCore4 CORE
UART_RX	24	I	Asynchronous Serial Data
UART_RTS	25	O	UART ready to send
UART_TX	26	O	Asynchronous Serial Data Output
UART_CTS	27	I	UART clear to send
SPI_MOSI	28	I	Synchronous Serial Interface Data Input
SPI_CLK	29	I	Synchronous Serial Interface Clock
SPI_CSB	30	I	Chip select for Synchronous Serial Interface
SPI_MISO	31	O	Synchronous Serial Interface Data Input
RESET	32	I	Reset ( <b>active low, pull high</b> )
AIO0	33	I/O	Programmable Input/Output line
AIO1	34	I/O	Programmable Input/Output line
GND	35		Ground
GND	36		Ground
GND	37	I	Ground
GND	38		Ground
GND	39		Ground

PIO1/TXEN	40	I/O	Control output for external PA class 1 only
PIO0/RXEN	41	I/O	Control output for external LNA(if fitted)
GND	42		Ground

### 6.3 Layout Guide



## 6.4 Application schematic

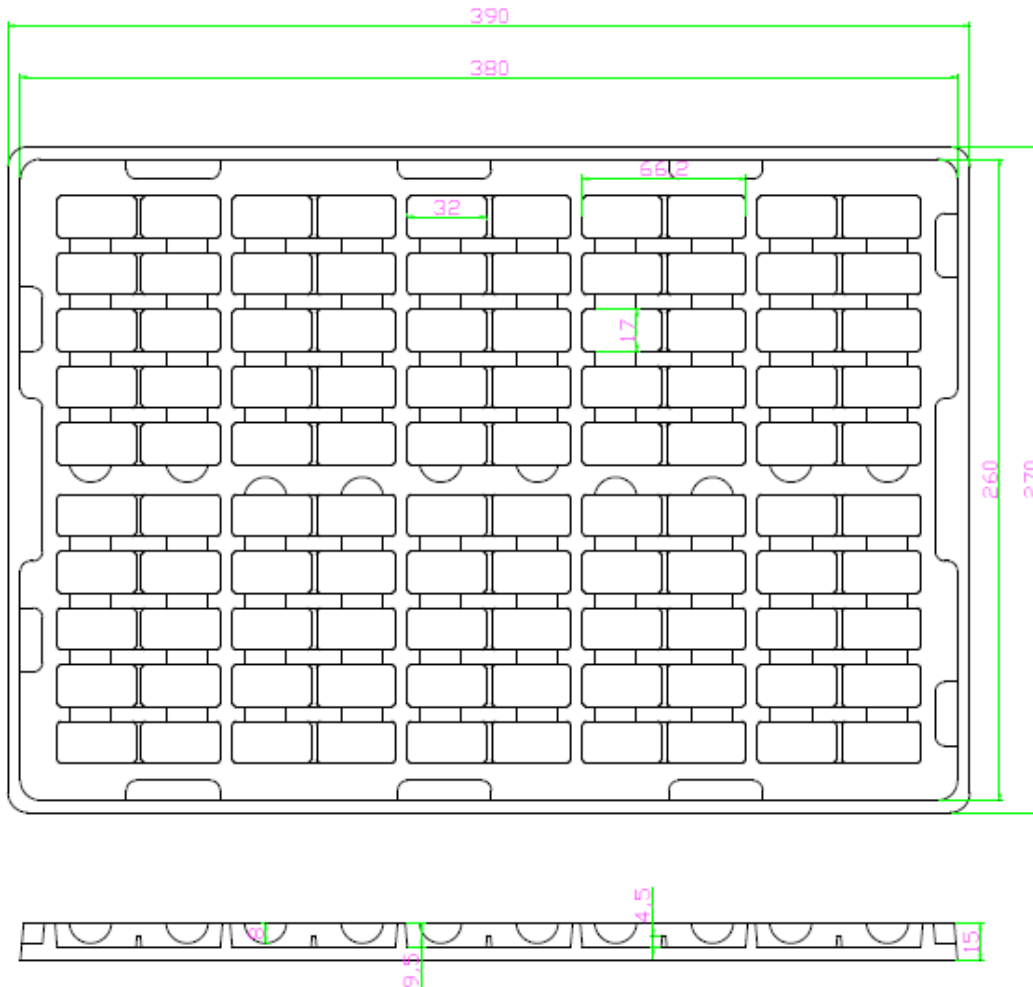




## 7. Package

### Tray Type

- a. Carrier not be exceed 1mm in 100mm.
- b. Packing dimensions meet : 390mm \* 270mm \* 15mm
- c. Material : white anti-static polystyrene
- d. Component load per tray : 100pcs



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