SPK ELECTRONICS CO., LTD.

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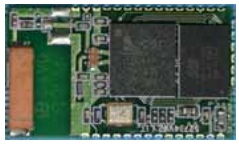


Product ID	EBM003
Product Name	**CSR BC4 class 2 Bluetooth module**
Firmware Version	
Hardware Version	**Rev.1.1**

1. DESCRIPTION

EBM003 full qualified Bluetooth V2.0+EDR system. It EBM003 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. EBM003 have its sufficient pin definitions, high receiving sensitivity, low power consumption and excellent performance with its integrated chip antenna.

2. FEATURE

Bluetooth specification V2.0+EDR (**E**nhanced **D**ata **R**ate)
CSR BlueCore4-External inside
Complete Co-location and Co-existence with 802.11 (AWMA, AFH and SFH)
RF output power class 2 with power control
Supply Voltage 3.3V
Internal crystal oscillator (26 MHz)
Surface mount type: EBM003: 14.5 x 28.0 x 2.0 mm^3
Bluetooth enhanced data rate up to 2178kbps asymmetric
Support for all Bluetooth power saving modes (Park, Sniff, Hold)
µ-law, A-law and CVSD transcoders on SCO channel
13 or 16 bit linear, 8 bit µ-law or a-law PCM interface
Full 8- to 128-bit encryption
High receiving sensitivity (-83dBm)
USB, UART and I2C interface
11 digital + 2 analog IO's for individual usage by embedded software
16bit RISC core for embedded profiles or application software
Power control
Manufactured in conformance with RoHS

3. APPLICATIONS

Cable Replacement Serial Point-to-point
Cable Replacement Multipoint
Terminal Server
PC Client

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
Modulation Method		GFSK,1Mbps,0.5BT Gaussian
Data Rate (MAX)	1M	Asynchronous:723.2kbps/57.6kbps Synchronous:433.9kbps
	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

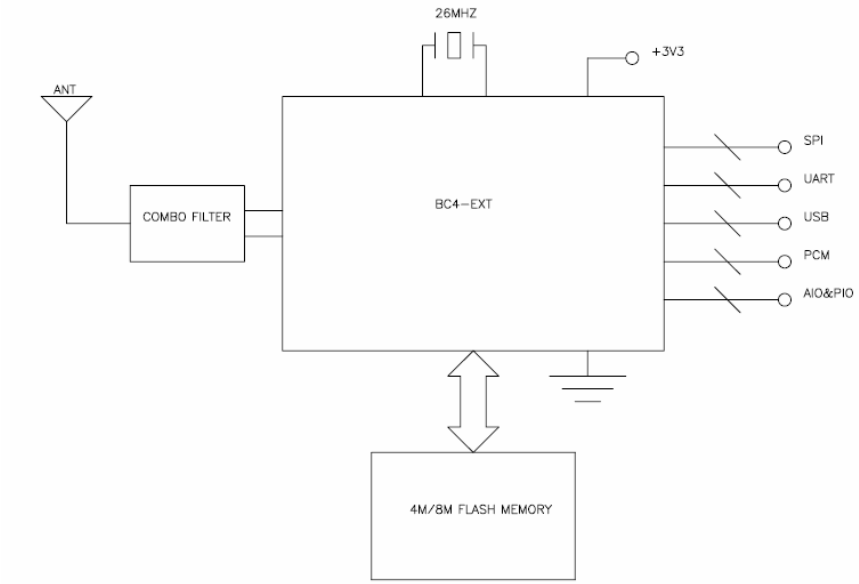
4.2.1 Transmitter Section

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 M +/- 500 kHz |M-N|=2 |M-N|≧3 Exception				 -20 -20 -40 -20	 dBc dBm dBm dBm	Max hold and 100kHz
Out of band spurious (Operation mode) 30MHz to 1GHz 1GHz to 12.75GHz 1.8GHz to 1.9GHz 5.1GHz to 5.3GHz				 -36 -30 -47 -47	 dBm dBm dBm dBm	100kHz RBW
Adjacent Channel Power +/-2MHz >+/-3MHz				 -20 -40	 dB 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 ±40 ±40	KHz KHz KHz	DH1 DH3 DH5 Max Drift rate:400Hz/10us
Operation current				80	mA	Peak Current during bust

4.2.2 Receiver Section

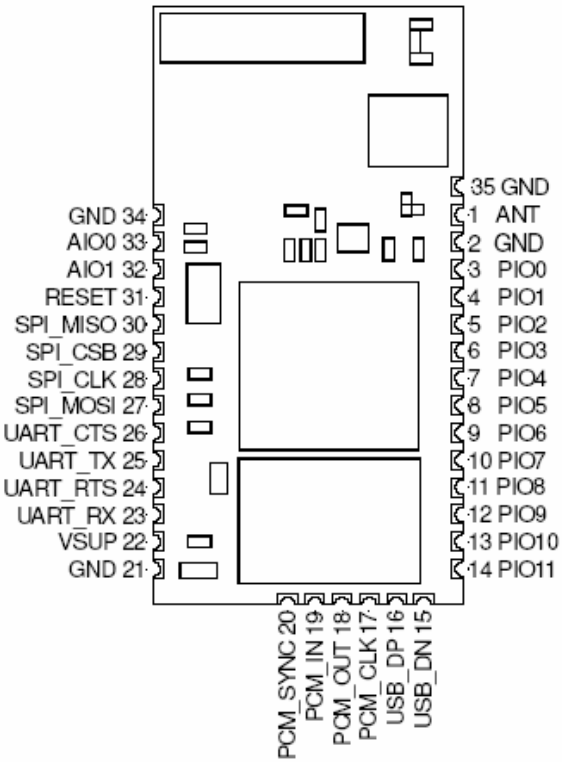
ITMES	Min	Typ	Max	Unit	Condition
Sensitivity Single slot packet Multi slot packet	 -83 -82	 -81 -80	 -78 -78	 dBm dBm	BER 10E-3, hopping off/1600K returned payload bit Multi slot packets uses DH5
Maximum received signal	-20			dBm	BER 10E-3, hopping off 1600K returned payload bit, multi slot packet, DH1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

5. BLOCK DIAGRAM



6. PIN CONFIGURATION AND MECHANICAL DIMENSION

6.1 Pin Placement

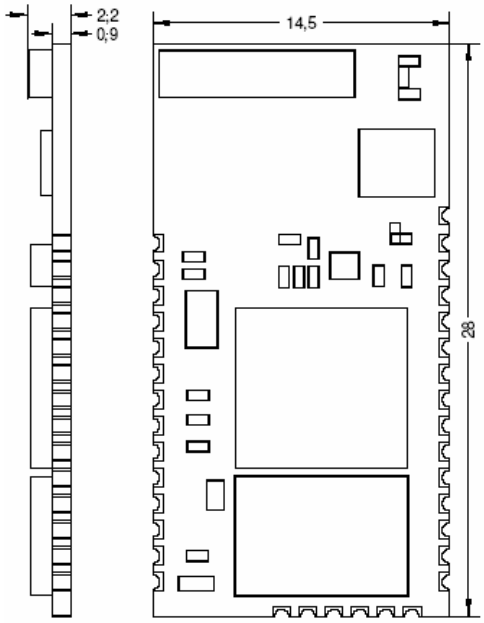


6.2 Pin Definition

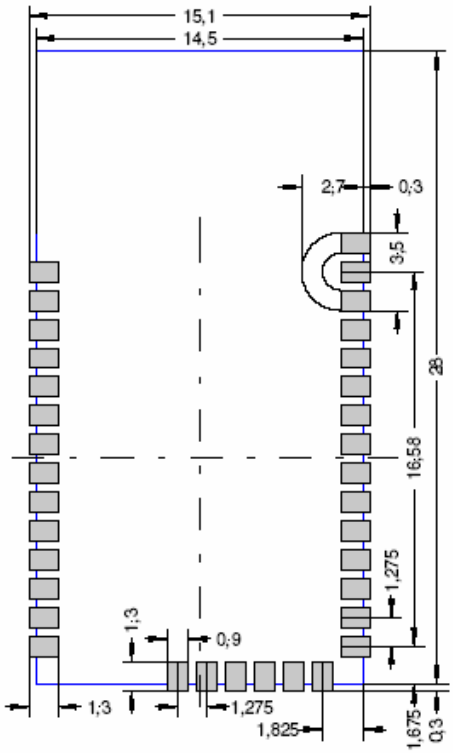
PIN Name	No	I/O	Description
ANT	1	I/O	Transmitter out and receiver input
GND	2		Ground
PIO0/RXEN	3	I/O	Control output for external LNA(if fitted)
PIO1/TXEN	4	I/O	Control output for external PA class 1 only
PIO2/USB_Pull_Up	5	I/O	PIO or USB pull-up
PIO3/USB_Wake_Up	6	I/O	PIO or Output goes high to wake up PC when in
PIO4/BT_Priority/Ch_Clk	7	I/O	Programmable input/output line or Optionally BT_Priority/Ch_Clk output for co-existence
PIO5/BT_Active	8	I/O	Programmable input/output line or Optionally BT_Active output for co-existence signaling
PIO6/Wlan_Active/Ch_Da a	9	I/O	Programmable input/output line or Optionally WALN_Active/Ch_Data input for co-existence signaling
PIO7/RAM_CSB	10	I/O	Programmable Input/Output Line
PIO8	11	I/O	Programmable Input/Output Line
PIO9	12	I/O	Programmable Input/Output Line
PIO10	13	I/O	Programmable Input/Output Line
PIO11	14	I/O	Programmable Input/Output Line
USB_DN	15	I/O	USB Data-
USB_DP	16	I/O	USB Data+
PCM_CLK	17	I/O	Synchronous Data Clock
PCM_OUT	18	O	Synchronous Data Output
PCM_IN	19	I	Synchronous 8kss data out
PCM_SYNC	20	I/O	Synchronous Data Strobe
GND	21		Ground
VSUP	22	I	3V3 for RF circuit
UART_RX	23	I	Asynchronous Serial Data
UART_RTS	24	O	UART ready to send
UART_TX	25	O	Asynchronous Serial Data Output
UART_CTS	26	I	UART clear to send
SPI_MOSI	27	I	Synchronous Serial Interface Data Input
SPI_CLK	28	I	Synchronous Serial Interface Clock
SPI_CSB	29	I	Chip select for Synchronous Serial Interface
SPI_MISO	30	O	Synchronous Serial Interface Data Input
RESET	31	I	Reset **(active low, normal high)**
AIO0	32	I/O	Programmable Input/Output line
AIO1	33	I/O	Programmable Input/Output line
GND	34		Ground
GND	35		Ground

6.3 Layout Guide

6.3.1 Dimension

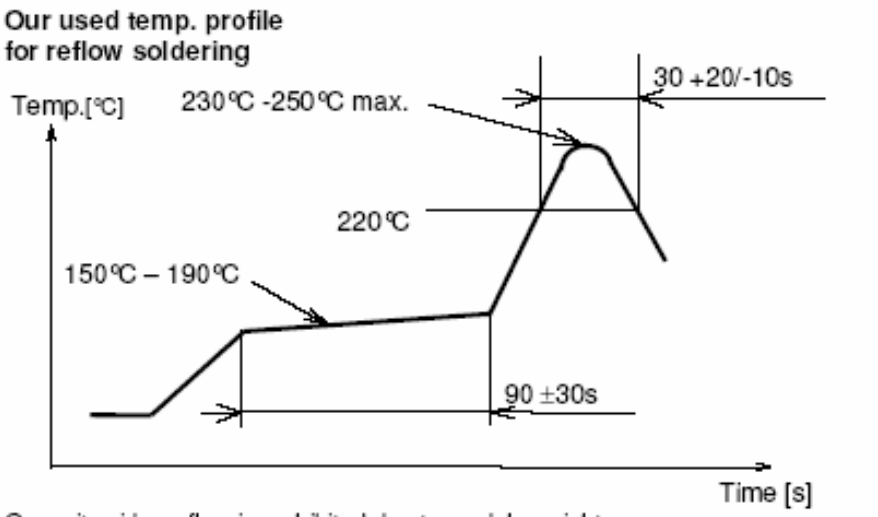


6.3.2 Recommended Land Pattern



6.3.3 Re-flow Temperature-Time Profile

The data here is given only for guidance on solder and has to be adopted to your process and other re-flow parameters for example the used solder paste. The paste manufacturer provides a re-flow profile recommendation for his product.



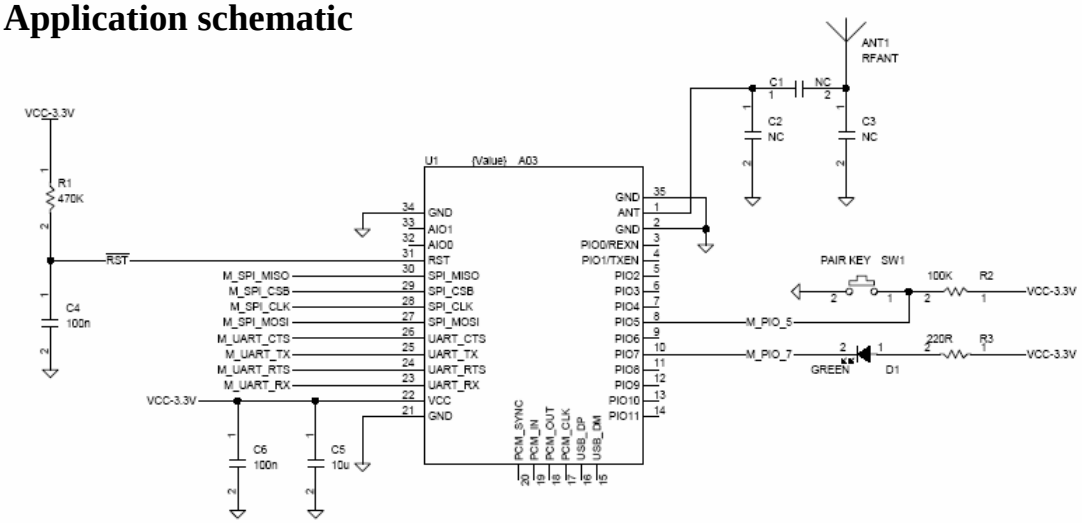
Opposite side re-flow is prohibited due to module weight.
Devices will withstand the specified profile and will withstand up to 2 re-flows to a maximum temperature of 260℃.

6.4 Housing Guidelines

The individual case must be checked to decide whether a specific housing is suitable for the use of the internal antenna. A plastic housing must at least fulfill the following requirements:

Non-conductive material, non-RF-blocking plastics
No metallic coating
ABS is suggested

6.5 Application schematic



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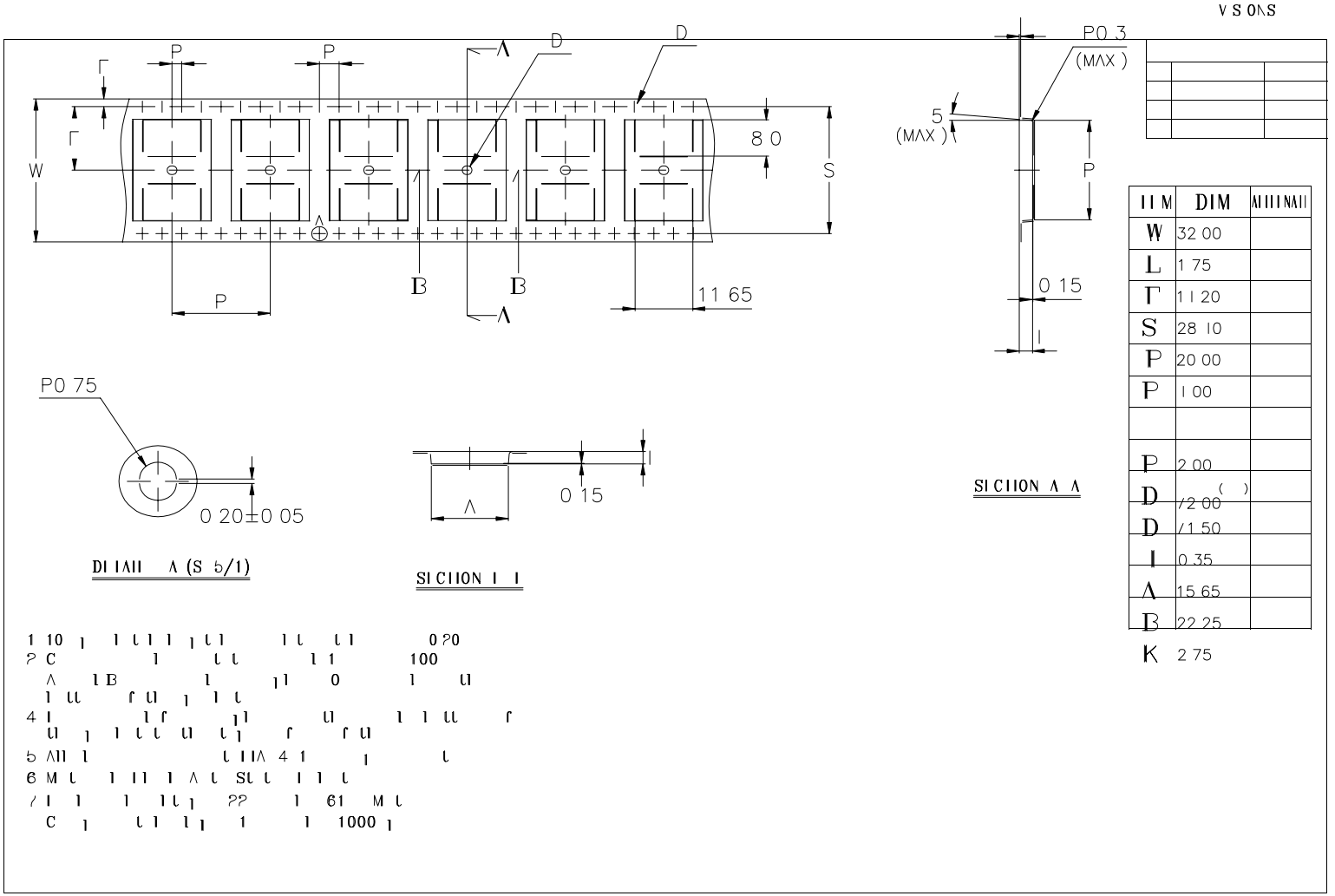

ITEM	DIM	MINIMUM
W	32 00	
L	1 75	
T	11 20	
S	28 10	
P	20 00	
P	1 00	
P	2 00	
D	2 00	
D	1 50	
I	0 35	
A	15 65	
B	22 25	
K	2 75	