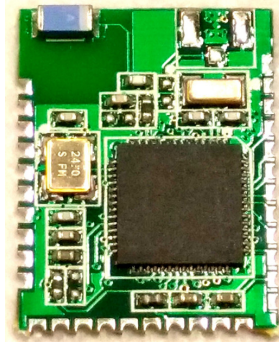# Bluetooth BLE V4.2 single mode module

Model: BLEM-C

Application:

- **Computer peripherals and I/O devices**
   Mouse
   Keyboard
   Multi-touch trackpad
- **Interactive entertainment devices**
   Remote control
   3D Glasses
   Gaming controller
- **Personal Area Networks**
   Health/fitness sensor and monitor devices
   Medical devices
   Key-fobs + wrist watch
- **Remote control toys**

Description

■ Bluetooth 4.2 qualified single-mode module

■ Module size: 14.52 mm ×19.20 mm × 2.00 mm

■ 256-KB flash memory, 32-KB SRAM memory

■ Industrial temperature range: –40 ℃ to +85 ℃

■ Antenna: Chip (default), U.FL or RF-out (Option)

■ Support capacitive sensors for buttons or sliders

■ Bluetooth Low Energy protocol stack supporting generic access profile (GAP)

Central, Peripheral, Observer, or Broadcaster roles

■ Switches between Central and Peripheral roles on-the-go

Power Consumption

■ TX output power: –18 dbm to +3 dbm

■ Received signal strength indicator (RSSI) with 1-dB resolution

- TX current consumption of 15.6 mA (radio only, 0 dbm)
- RX current consumption of 16.4 mA (radio only)
- Low-power mode support
- Deep Sleep: 1.3 µA with watch crystal oscillator (WCO) on
- Hibernate: 150 nA with SRAM retention
- Stop: 60 nA with XRES wakeup

UUID:

UUID_180A_SERV = UUID.fromString("0000180A-0000-1000-8000-00805F9B34FB"),

UUID_180A_VER   = UUID.fromString("00002A26-0000-1000-8000-00805F9B34FB"),//x.x.x(ASCII/read only)

UUID_NOTIFY= UUID.fromString("00002902-0000-1000-8000-00805F9B34FB"),//20byte

UUID_BLE_SERV= UUID.fromString("0003ABCD-0000-1000-8000-00805F9B0131"),

UUID_BLE_DATA= UUID.fromString("00031234-0000-1000-8000-00805F9B0130"),

UUID_BLE_SENT= UUID.fromString("00031234-0000-1000-8000-00805F9B0131"),//20byte

UUID_BLE_CONF= UUID.fromString("00031234-0000-1000-8000-00805F9B0132");//5byte

RF Current Specifications:

- Receive current in normal mode: 18.7 mA (Typical)
- RF Radio receive current in normal mode: 16.4 mA(Typical) Measured at VDDR
- HIGHGAIN Receive current in high-gain mode: 21.5 mA(Typical)
- TX current at 3-dBm setting (PA10): 20 mA(Typical)
- TX current at 0-dBm setting (PA7): 16.5 mA(Typical)
- Radio TX current at 0 dBm setting (PA7): 15.6 mA(Typical) Measured at VDDR
- Radio TX current at 0 dBm excluding Balun loss: 14.2 mA(Typical) Guaranteed by design simulation
- TX current at –3-dBm setting (PA4): 15.5 mA(Typical)
- TX current at –6-dBm setting (PA3): 14.5 mA(Typical)
- TX current at –12-dBm setting (PA2): 13.2 mA(Typical)
- TX current at –18-dBm setting (PA1): 12.5 mA(Typical)
- Average current at 1-second BLE connection interval: 18.9 – µA(Typical), TXP: 0 dBm; ±20-ppm, master and slave clock, accuracy. For empty PDU exchange
- Average current at 4-second BLE connection interval: 6.25 µA(Typical), TXP: 0 dBm; ±20-ppm master and slave clock accuracy. For empty PDU exchange

RSSI Specifications:

- RSSI accuracy: ±5 dB(Typical)
- RSSI resolution: 1 dB(Typical)

- RSSI sample period: 6 µs(Typical)

RF Performance Characteristics:
- RF output power on ANT: –18(min.), 3 dBm(Max.), (Configurable via register settings)
- RF receive sensitivity on ANT: –87 dBm (Typical)
- Module frequency range: 2400 ~ 2480 MHz
- Peak gain: 0.5 dBi
- Average gain: –0.5 dBi
- Return loss: –10.5 dB
- Channel spacing: 2 MHz (Typical)
- On-air data rate: 1000 kbps (Typical)
- BLE.IDLE to BLE. TX transition time: 120µs (Typical), 140 µs(Max.)
- BLE.IDLE to BLE. RX transition time – 75µs (Typical), 120 µs(Max.)

Chip Antenna specifications:
- Working Frequency Range: 2450±50MHz
- Fc(GHz): 2.5
- Gain(dBi): 2 (Typical)

DC Specifications:
- Power supply input voltage: 1.8 ~ 5.5 V (With regulator enabled)
- Power supply input voltage unregulated : 1.71V(min.), 1.8V (Typical), 1.89 V (Max.) (Internally unregulated supply)
- Radio supply voltage (radio on) :1.9V (min.), 5.5 V(Max.)
- Radio supply voltage (radio off) :1.71V(min.), 5.5 V (Max.)

Active Mode, T = 25 ℃, VDD = 3.3 V
- Execute from flash; CPU at 3 MHz: 1.7 mA (Typical)
- Execute from flash; CPU at 6 MHz: 2.5 mA (Typical)
- Execute from flash; CPU at 12 MHz: 4 mA (Typical)
- Execute from flash; CPU at 24 MHz: 7.1 mA (Typical)
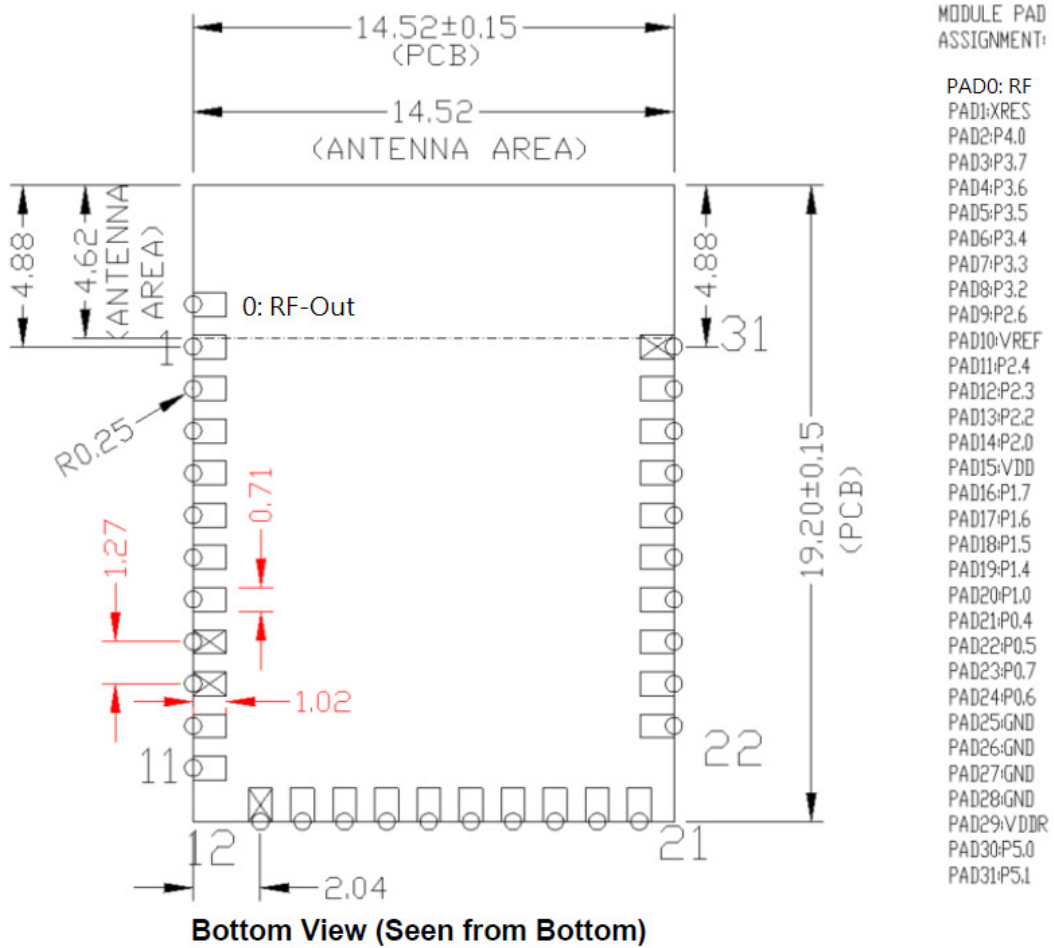- Execute from flash; CPU at 48 MHz: 13.4 mA (Typical)

AC Specifications:
- CPU frequency: 3MHz(min.), 48 MHz(Max.) (VDD: 1.71 ~ 5.5 V)
- Wakeup from Sleep mode: 0 µs(Typical), Guaranteed by characterization
- Wakeup from Deep-Sleep mode: 25 µs(max.), 24-MHz IMO. Guaranteed by characterization
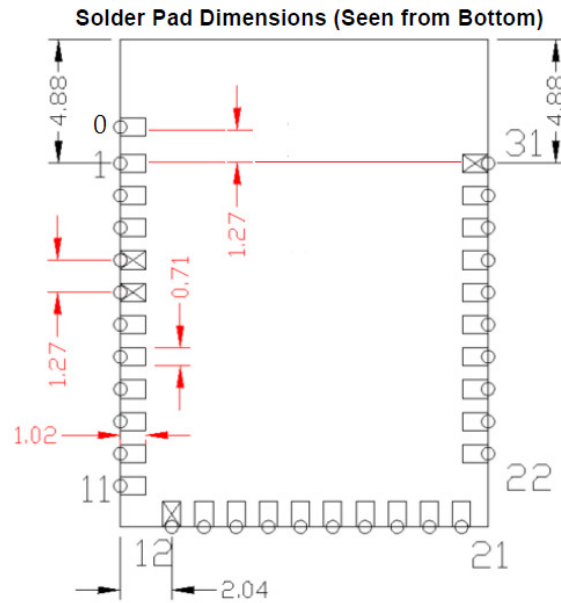
- Wakeup from Hibernate mode: 2 ms(Max.), Guaranteed by characterization
- Wakeup from Stop mode: 2.2 ms(Max.), XRES wakeup
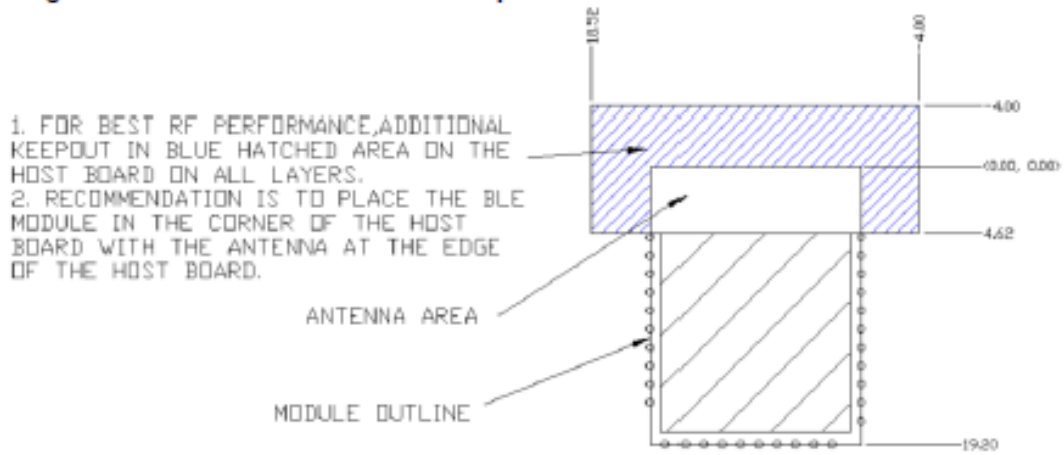
Environmental Conditions:

- Operating temperature: -40 ℃(min.), 85 ℃(Max.)
- Operating humidity (relative, non-condensation): 5%(min.), 85%(Max.)
- Thermal ramp rate: 3 ℃/minute(Max.)
- Storage temperature: –40 ℃(min.), 85 ℃(Max.)
- Storage temperature and humidity: – 85 °C at 85% (Max.)
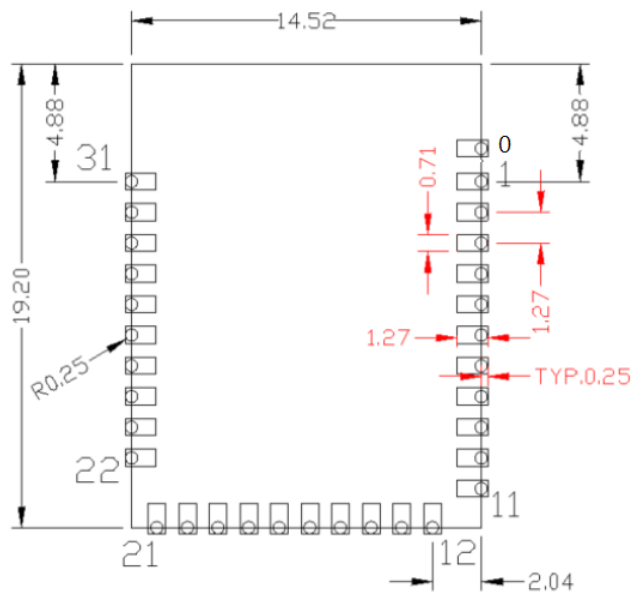- ESD: Module integrated into system: 15 kV Air, 2.2 kV Contact

Pin Definition:

Bottom View (Seen from Bottom)

MODULE PAD
ASSIGNMENT:

PAD0: RF
PAD1:XRES
PAD2:P4.0
PAD3:P3.7
PAD4:P3.6
PAD5:P3.5
PAD6:P3.4
PAD7:P3.3
PAD8:P3.2
PAD9:P2.6
PAD10:VREF
PAD11:P2.4
PAD12:P2.3
PAD13:P2.2
PAD14:P2.0
PAD15:VDD
PAD16:P1.7
PAD17:P1.6
PAD18:P1.5
PAD19:P1.4
PAD20:P1.0
PAD21:P0.4
PAD22:P0.5
PAD23:P0.7
PAD24:P0.6
PAD25:GND
PAD26:GND
PAD27:GND
PAD28:GND
PAD29:VDDR
PAD30:P5.0
PAD31:P5.1

Solder Pad Dimensions (Seen from Bottom)

Figure 3. Recommended Host PCB Keep Out Area Around the Antenna

1. FOR BEST RF PERFORMANCE,ADDITIONAL KEEPOUT IN BLUE HATCHED AREA ON THE HOST BOARD ON ALL LAYERS.
2. RECOMMENDATION IS TO PLACE THE BLE MODULE IN THE CORNER OF THE HOST BOARD WITH THE ANTENNA AT THE EDGE OF THE HOST BOARD.

ANTENNA AREA

MODULE OUTLINE

Host PCB Keep Out Area Around Trace Antenna

Host Layout Pattern:

**Top View (On Host PCB)**

Module Pad Location from Origin:

Top View (On Host PCB)
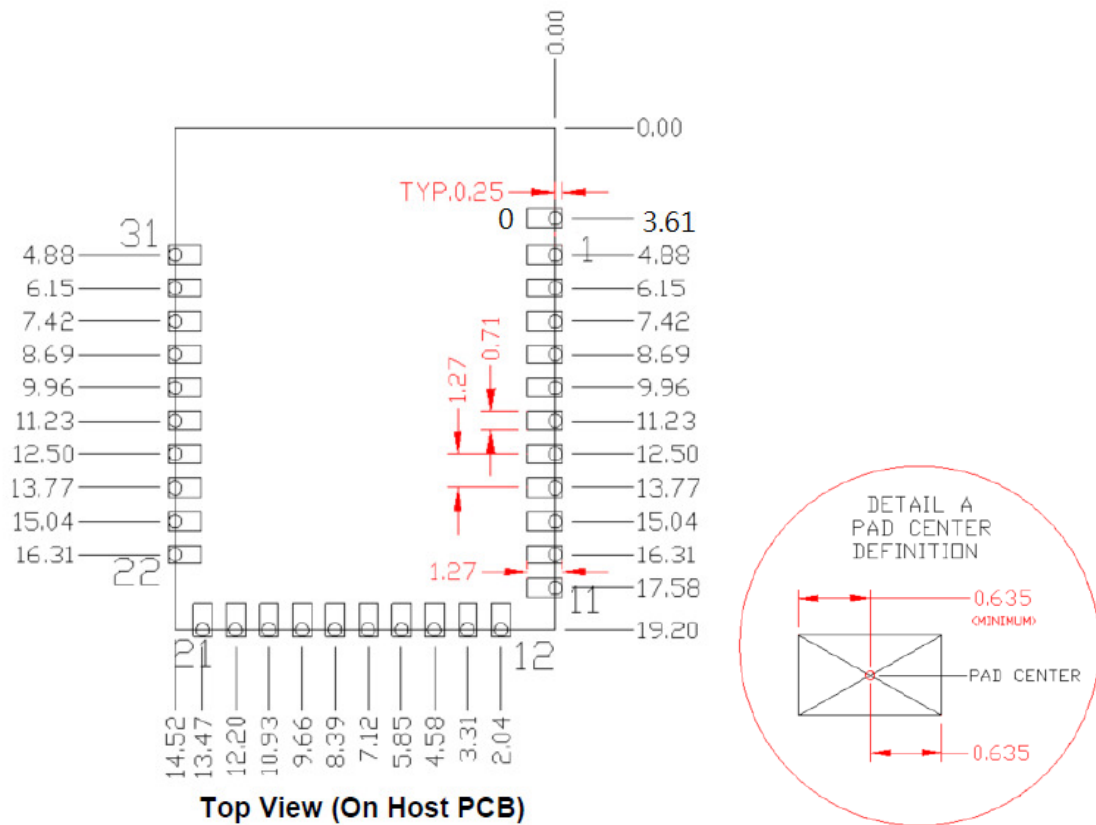
Serial port reference design:
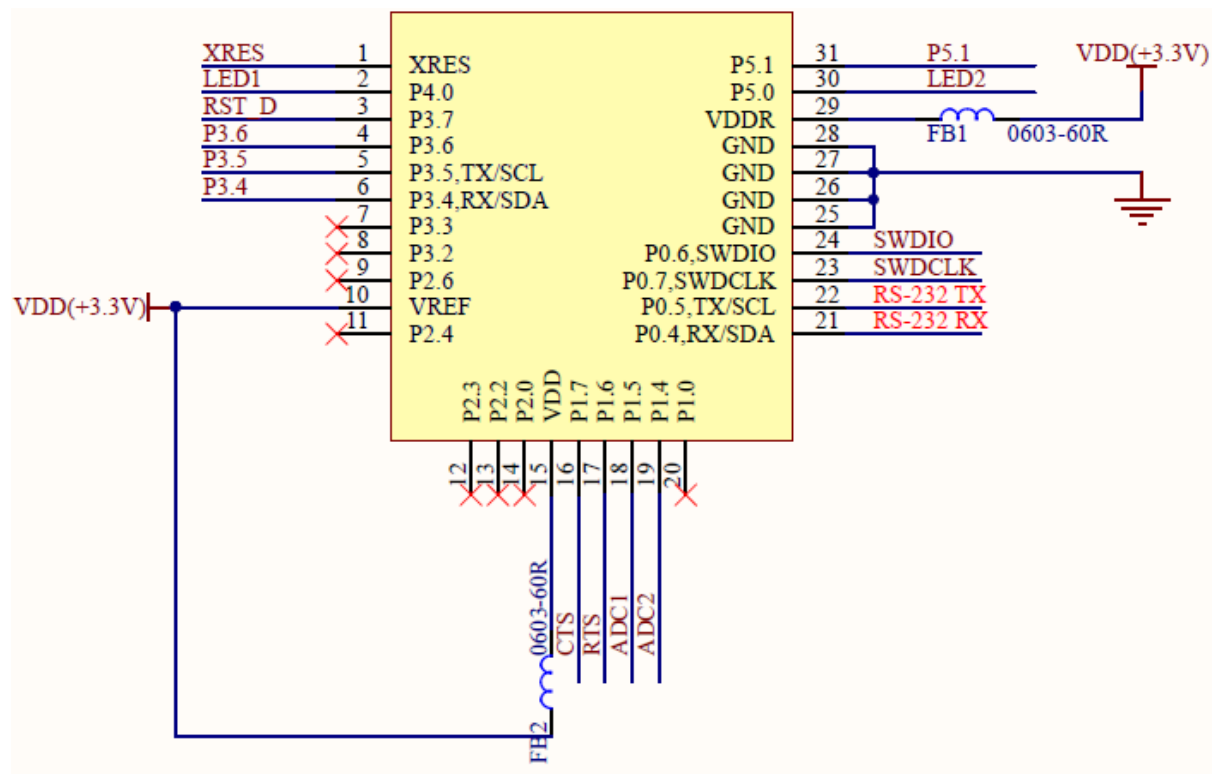
Hardware configuration:

		Stop Bit	Parity Bit，Hi Bit	Parity Bit，Lo Bit		Baud Rate Switch		
DIP9	DIP8	DIP7	DIP6	DIP5	DIP4	DIP3	DIP2	DIP1
1：DIP steup 0：SW steup	High：HWFC On Low：HWFC Off	High：2 stop bits High：1 stop bit	00：No parity 10：Odd parity	01：Odd parity 11：Even parity	1：Master mode 0：Slave mode	000：9600，100：19200 010：38400，110：57600 001：115200，101：230400 011：2400，111：4800		
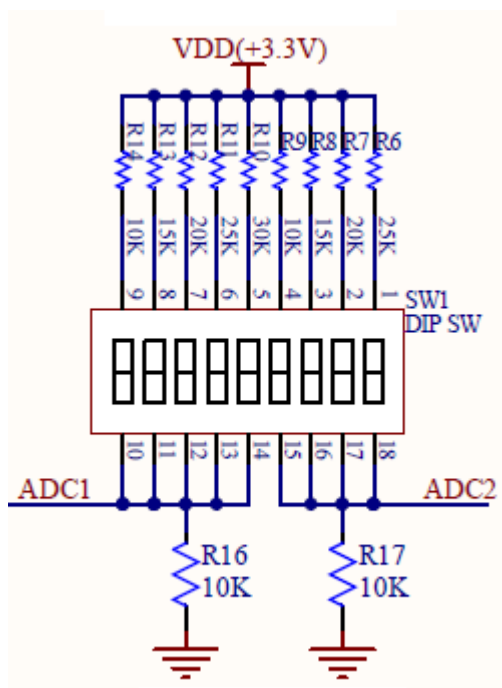
Antenna Option: Please choose one type

1. Chip antenna (Model: BLEM-C)
2. IPEX connector (Option) (Model: BLEM-I)
3. RF-Out pin (Option) (Model: BLEM-E)
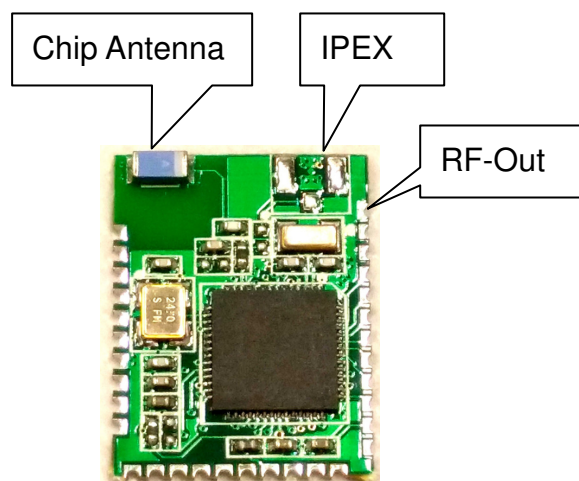
Remark: All contents are subject to change without prior notice.

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