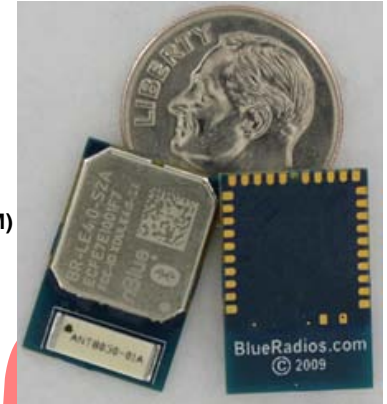


Bluetooth® 4.0 Low Energy Embedded Dual Mode SoC Class1 Module

BlueBridge® BR-LE4.0-D2#

OUTLINE

- **AT HOME. AT WORK. ON THE ROAD.** USING BLUETOOTH LOW ENERGY WIRELESS TECHNOLOGY MEANS TOTAL FREEDOM FROM THE CONSTRAINTS AND CLUTTER OF WIRES IN YOUR LIFE.
- Three types of Class1 models: With/without RF chip antenna, or U.FL connector.
- FCC, IC, CE, RoHS, and Bluetooth® Ver 4.0 compliant ISM 2.4GHz dual mode module.
- Code space in Texas Instruments MSP430 for client applications (100kB Flash, 4kB RAM) Baseband is TI dual mode CC2564
- UART (2-wire or 4-wire with CTS/RTS) and SPI/I2C interface
- Analog, RTC, battery monitor, temperature sensor, watchdog timer.
- Includes integrated software stack, profiles, and AT modem like commands.
- Embedded Bluetopia® Bluetooth Stack Protocols and Profiles Include: SPP, HDP, GAP, GATT, SMP, ATT, L2CAP, BATT, etc.



FEATURES

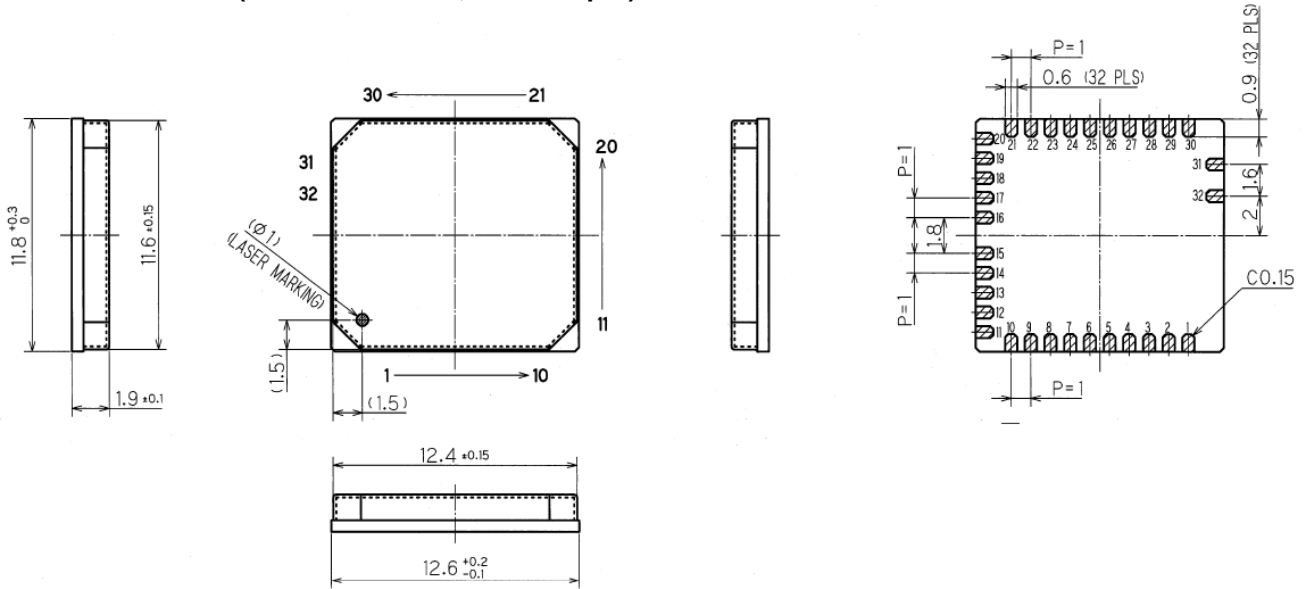
- The BlueRadios serial radio modems can be configured, commanded, and controlled through simple ASCII strings over the Bluetooth RF link or UART.
- UART baud rate speeds: 9600bps up to 1Mbps.
- 375 meter (1200feet) est. distance Line of Sight (LOS) with chip antenna running SPP
- Software adjustable transmit power from short to long range applications (Class1, 2 & 3)
- Low power consumption (24mA TX, 18mA RX, 0.1mA idle mode, and 0.2uA deep sleep timer)
- Small-form factor SMT radio modem that requires NO external components required
- Operating temperature range: -40~+85°C.
- Secure and robust communication link with billions of unique codes
 - ✓ FHSS (Frequency Hopping Spread Spectrum)
 - ✓ 24 bit CRC Error correction for guaranteed packet delivery
 - ✓ AES-128 bit encryption using CCM for encryption and authentication of packets.

SPECIFICATIONS

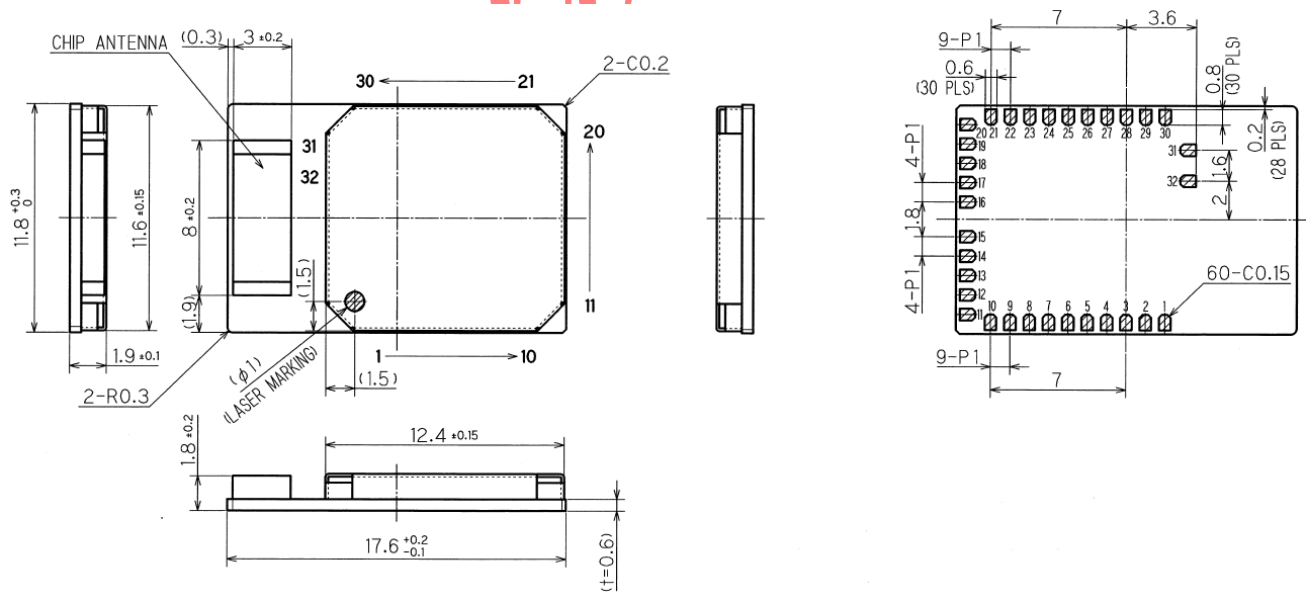
Item	Low Energy Specifications
Frequency	2402 ~ 2480MHz
Modulation	GFSK, 250 KHz deviation
Channel intervals	Programmable 1 MHz steps
Number of channels	BLE: 40CH: 37 AFH data channels. 3 discoverable, connectable and broadcasting channel BT2.1: 79CH FHSS/GFSK 1600 hops/sec.
Power supply voltage	(1.8 to 3.6) 3.0Vdc recommended and < 10mVp-p noise
Current consumption	24mA worst case peak @10.5dBm
Transmission rate (over the air)	1Mbps
Receive sensitivity	-93dBm typ.
Output Power (Class1)	10.5 dBm max.
RX/TX turnaround	150 usec. with 103.5dBm link budget
Dimensions	Without antenna
	With antenna
	11.8(W)X12.6(L)X1.9(H)mm
	11.8(W)X17.6(L)X1.9(H)mm

DIMENSIONS

- BR-LE4.0-D2N (Without Antenna, SMD Output)



- BR-LE4.0-D2A (With Antenna)
2 dBi TDK ANT8030-2R4-01



Unit: mm

*For technical details of the products in this page, refer to Sales Dept., BlueRadios, Inc.

- Part is not 5Vdc tolerant
- Reset is active **low**; Pulse length required 2 usec. (min)
- PIO Sink/Source Current is 5mA
- 12-Bit ADC with Eight Channels and configurable Resolution

TERMINALS	
1. GND	17. PIO_21
2. SBWTCK (Spy-Bi-Wire)	18. PIO_22
3. RESET (Spy-Bi-Wire)	19. PIO_14
4. ADC_1	20. GND
5. SPI_MISO	21. ADC_0
6. SPI_CSB	22. PIO_9
7. SPI_CLK	23. PIO_2
8. SPI_MOSI	24. PIO_5
9. VDD(2.0-3.6V)	25. PIO_6
10. GND	26. PIO_3
11. UART_CTS	27. PIO_8
12. UART_RTS	28. PIO_4
13. UART_TX	29. PIO_7
14. UART_RX	30. GND
15. PIO_19	31. N.C. (RF_Test:ANT)
16. PIO_20	32. N.C. (RF_Test:GND)

Power-up Sequence

Allow 100msec for module to fully reboot from initial power up (cold start).

Power management sleep modes:

- PM0 – 74uA
- PM2 – 12uA
- PM3(Crystal) – 2.5uA
- PM3(VLO) – 1.5uA
- PM4 – 1.5uA
- PM4.5 – 0.2uA

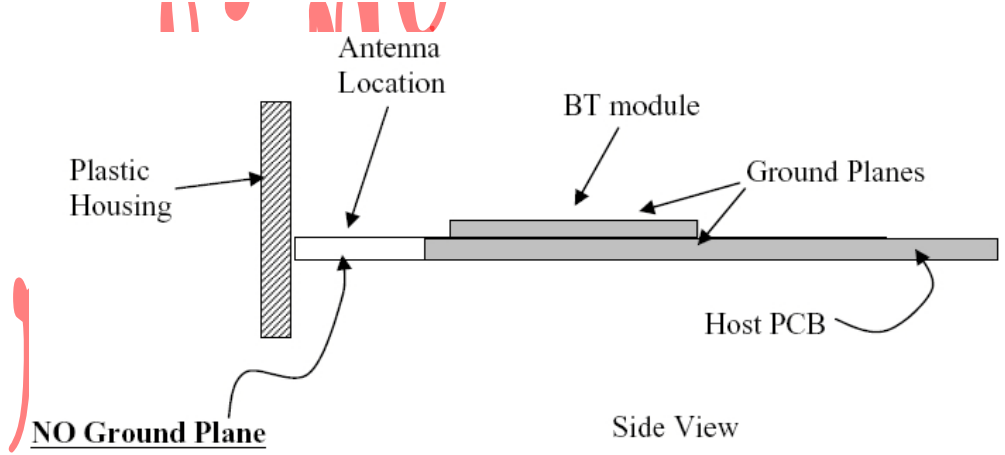
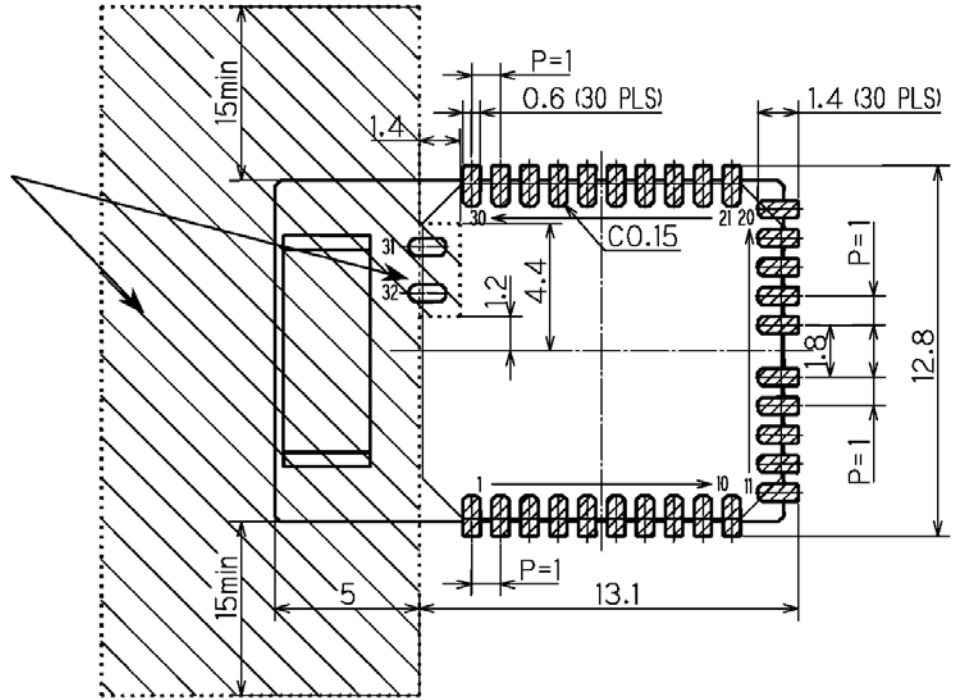
Firmware Options

- **AT Command**
 - Multi-point / Broadcast
 - Point-to-point
 - Repeater
- **Application Protocol Interface (API)**
- **Custom**

STANDARD LAND DIMENSIONS

● **BR-LE4.0-D2# (With Antenna)**

In this area, you should not locate any parts or GND plane / Patterns on surface or internal layer.



Note: Radio requires a RF ground plane on the rest of the Printed Circuit Board (PCB). This can be located on any layer of the PCB. Extend the RF ground plane parallel to module pins 31 and 32 the entire length of your board. Connect all ground pins and do not notch the ground plane around the module. Bottom of module is grounded so be careful of vias or conductive traces located under the modules that are not soldered masked to prevent shorting. Keep metallic components, connectors, copper traces, internal layers, and ground planes away from the antenna area in 3D space!

APPLICATIONS

- Telemedicine / Telehealth
- Medical Patient Monitoring
- Human Interface Devices (Keyboard, Mouse, Remote control)
- Sports and leisure equipment
- Mobile phone accessories
- Remote control for computers, MP3 playe
- Consumer Electronics
- Remote monitoring and control
- Health Care and Medical
- Smart Grid
- Automated Meter Reading (AMR)
- Home/Building Automation
- Machine-to-Machine (M2M)
- Wireless Sensor Networks
- Wireless Alarms and Security
- Lighting and HVAC control
- Proximity and out of range detection

Development Kit (BR-EVAL-LE4.0-D2A)

New Development kit, containing a BlueRadios Development Board (BR-DEV-LE4.0-D2A) and a BlueRadios BlueBridge mini USB Dongle (BR-MUSB-LE4.0-D2A), to set up a connection quickly and evaluate range and performance of the BR-LE4.0-D2A.

AT-style software interface command dictionary can be modified for high volume customers. Custom software development available upon request.

AT-Style Commands Reference (BlueRadios_ATBLE_Commands_Rev)

Compiler tools required for embedding custom applications in the MSP430

TMDSCCS-MCUN01D - Code Composer Studio IDE - Microcontroller - Node Locked Single User (N01D)

Download Only / NO DVD

\$445.00

Texas Instruments

<https://estore.ti.com/Software-Development-Tools-C33.aspx>

Benefits of BLE over traditional Bluetooth

IP aware, automatically interacts directly with the web application, phone PC, STB, or gateway is a pass through no special applications required on the Gateway which is a transparent pipe from device to an IP address.

- Broadcast support
- Connectionless always off technology
- Proximity and out of range detection
- 10 msec. connect time and low data latency
- First low power wireless technology standard

In LE, GAP defines four specific roles: Broadcaster, Observer, Peripheral, and Central. A device may support multiple LE GAP roles provided that the underlying Controller supports those roles or role combinations. However, only one LE GAP role may be supported at a given time. Each role specifies the requirements for the underlying Controller. This allows for Controllers to be optimized for specific use cases.

The **Broadcaster** role is optimized for transmitter only applications. Devices supporting the broadcaster role use advertising to broadcast data. The broadcaster role does not support connections. The **Observer** role is optimized for receiver only applications. Devices supporting the observer role are the complementary device for a broadcaster and receives broadcast data contained in advertisements. The observer role does not support connections. The **Peripheral** role is optimized for devices that support a single connection and are less complex than central devices. Devices supporting the peripheral role only require Controllers that support the Controller's slave role. The **Central** role supports multiple connections and is the initiator for all

connections with devices in the peripheral role. Devices supporting the central role require a Controller that supports the Controller's master role and generally supports more complex functions compared to the other LE GAP roles.

PART NUMBER ORDERING: BR-LE4.0-D2#

BR = BlueRadios

LE = Low Energy

4.0 = *Bluetooth* LE version

D = Dual Mode

2 = Class2 +100 meter

= A (Antenna)

= U (U.FL RF Connector)

= N (No Antenna, SMD Output)

<u>Part Number</u>	<u>Description</u>
1) BR-LE4.0-D2A	<i>Bluetooth</i> Low Energy v4.0 Dual Mode with Antenna
2) BR-LE4.0-D2U	<i>Bluetooth</i> Low Energy v4.0 Dual Mode with U.FL RF Connector
3) BR-LE4.0-D2N	<i>Bluetooth</i> Low Energy v4.0 Dual Mode No Antenna, SMD Output

STANDARD PACKAGING

Tape and Reel (T&R) 500 or 1,000 piece 330mm x 25mm reel sizes

1) BR-LE4.0-D2A

2) BR-LE4.0-D2U

3) BR-LE4.0-D2N

Price and Order information

http://www.blueradios.com/orderinfo_new.htm

Bluetooth Low Energy, part of *Bluetooth* Ver. 4.0, specifies two types of implementation: **single** mode and **dual** mode. Single mode chips implement the low energy specification and consume just a fraction of the power of classic *Bluetooth*, allowing the short-range wireless standard to extend to coin cell battery applications for the first time. Dual mode chips combine low energy with the power of classic *Bluetooth* and are likely to become a de facto feature in almost all new *Bluetooth* enabled cellular phones and computers.

Note: Single mode *Bluetooth* 4.0 Low Energy is **not** backwards compatible with previous *Bluetooth* standards. Dual mode *Bluetooth* 4.0 Low Energy is backwards compatible but is not practical for low power devices but targeted to gateway products.