Bluetooth V4.1 Low Energy Module
For Active RFID Reader or Tag

Model: BLEM-R (Reader)

Model: BLEM-T (Tag)

Reader: UART packet data output
Tag: UART sensor data input

Application:

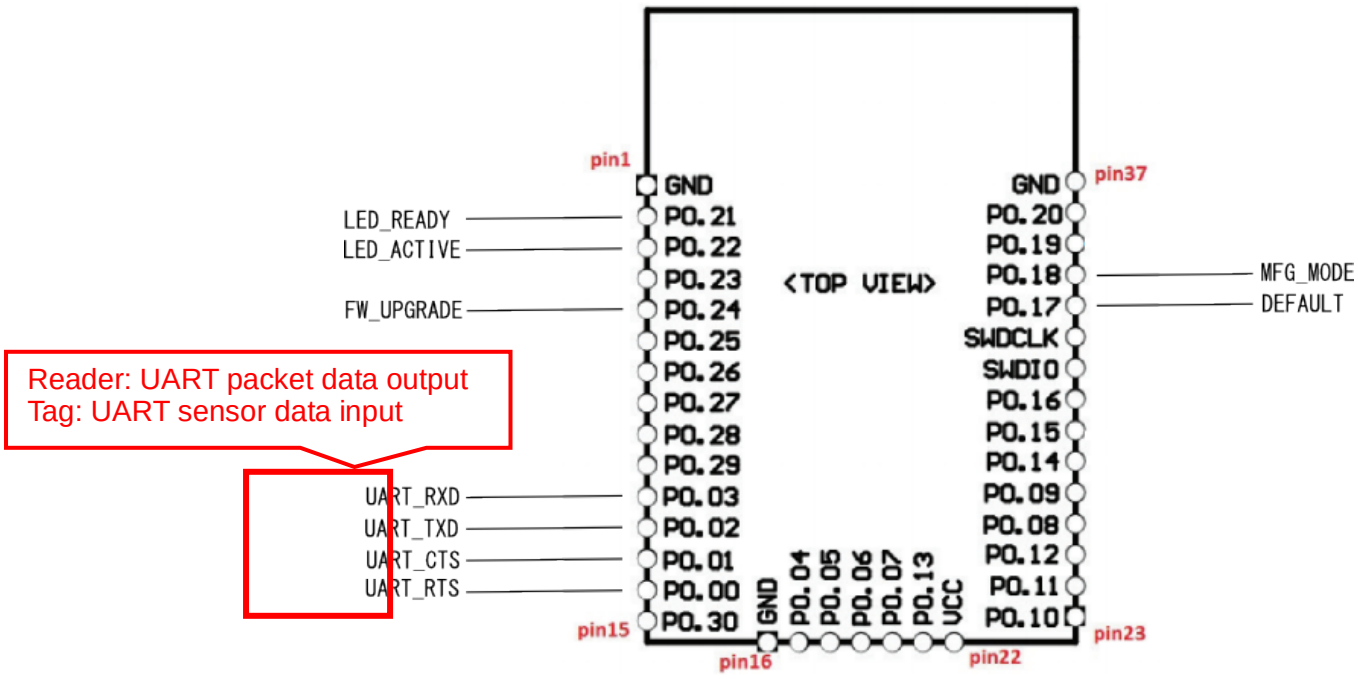
- **Computer peripherals and I/O devices**
  - Mouse
  - Keyboard
  - Multi-touch trackpad
- **Interactive entertainment devices**
  - Remote control
  - 3D Glasses
  - Gaming controller
- **Personal Area Networks**
  - Health/fitness sensor and monitor devices
  - Medical devices
  - Key-fobs + wrist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

Specifications:

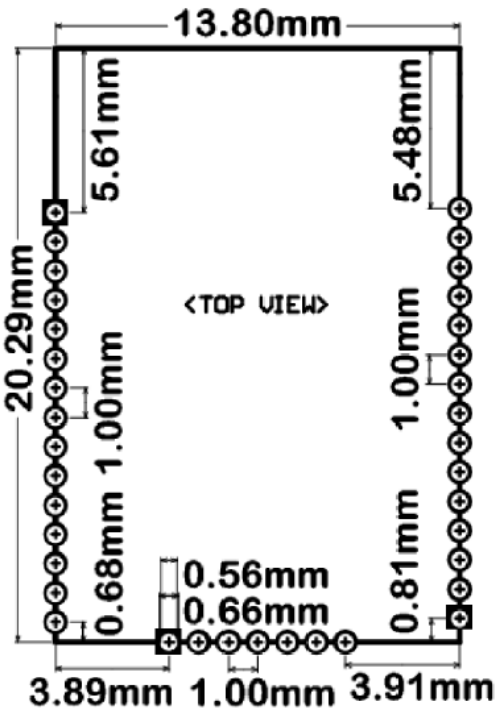
Frequency band	2.4GHz ISM (2.40000 – 2.4835GHz)
Microcontroller	32-bit ARM Cortex M0
On-air data rate	250 kbps, 1 Mbps or 2 Mbps
Modulation	GFSK
Output power	Programmable: +4 to -20dBm in 4dB steps
Sensitivity	-93dBm *Bluetooth* low energy

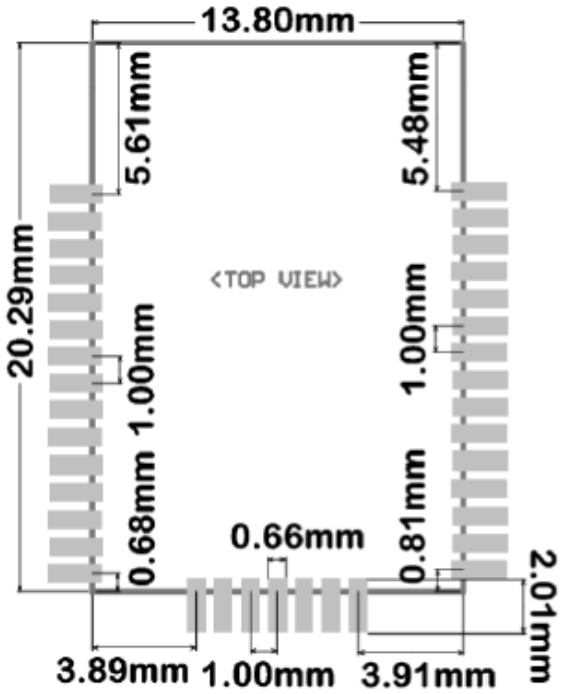
	-96dBm at 250kb -90dBm at 1Mbs -85dBm at 2Mbs
Radio current consumption LDO at 1.8V	16mA – TX at +4dBM output power 10.5mA – TX at 0dBm output power 13mA – RX at 1Mbs
Radio current consumption DC-DC at 3V	10.5mA – TX at +4dBm output power 8.1mA – TX at 0dBm output power 9.5mA – RX at 1Mbs
System current consumption	420nA – No RAM retention 530nA - 8k RAM retention 2µA – All peripherals in IDLE mode
Hardware Security	128-bit AES ECB/CCM/AAR co-processor

4. Pin definition

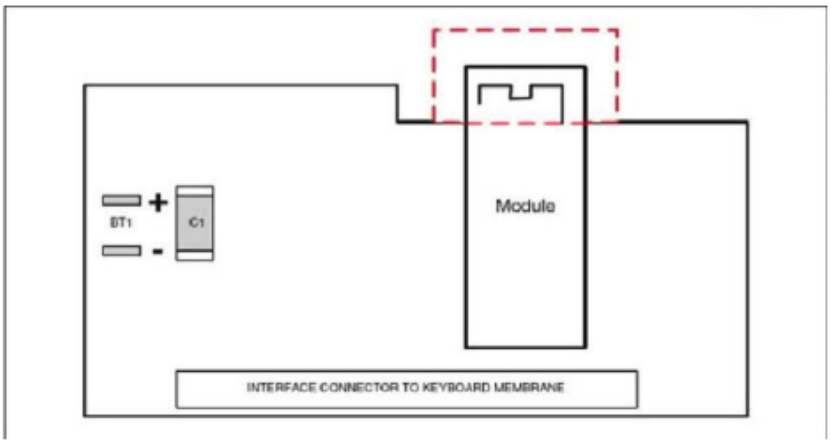


5. Layout guide

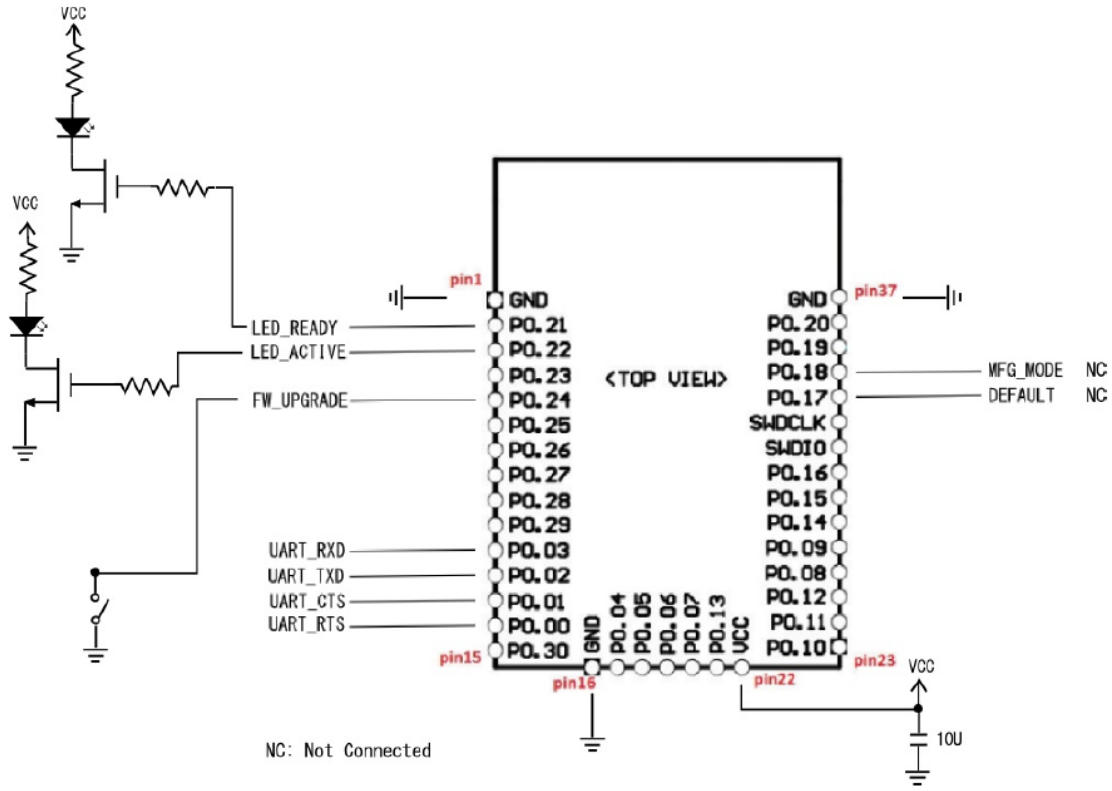




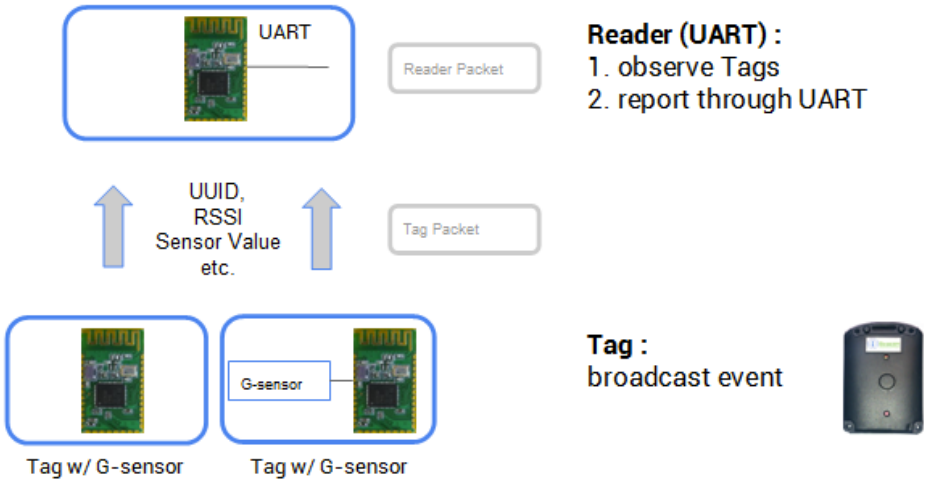
Antenna Clearance area:



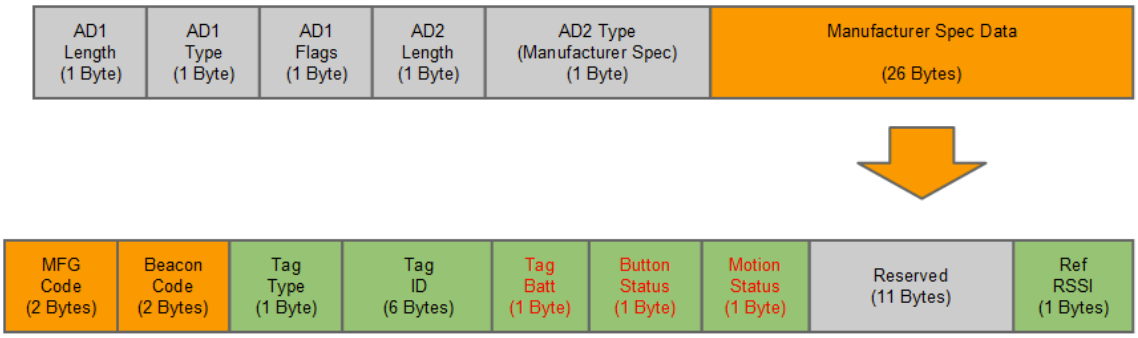
Reference Circuit::



System Architecture:



Tag Packet:



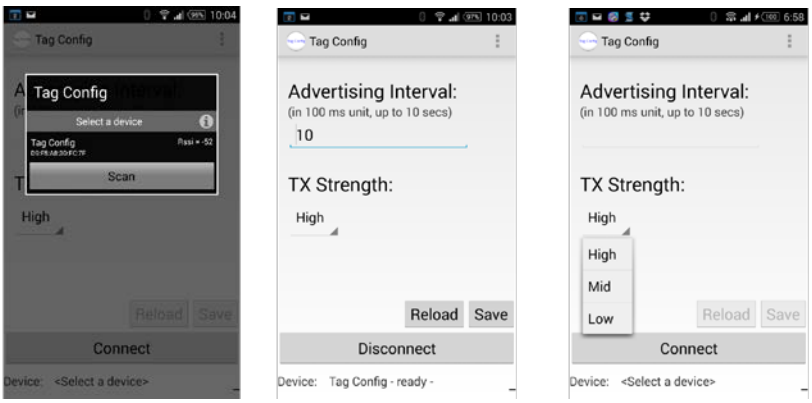
BLE ADV:

AD1 (Length, Type, Flags)	BLE Advertising Flags
AD2 Length	fixed to 27 (type + manufacturer spec data)
AD2 Type	fixed to 0xFF (for manufacturer)
Manufacturer Spec Data	manufacturer defined payload

Manufacturer Spec Data:

Field	Description	Field Offset
MFG Code	Manufacturer vendor code, fixed	0
Beacon Code	Magic Code to identify packet format, fixed to 0xBCAA	2
Tag Type	type of tag ex. 1: tag w/o g-sensor, 2: tag w/ g-sensor ..	4
Tag ID	6 bytes ID of tag	5
Tag Batt	batt voltage of tag in 1/10 volt unit	11
Tag Button Status	button status ex. 0: released, 1: pushed	12
Tag Motion Status	motion status ex. 0: non-moving, 1: moving	13
Reserved	reserved for sensor data (11 bytes)	14
Ref RSSI	calibrated rssi at 1 M for approaching usage	25

Tag setup APP:



Reader Output Format:

$<msg type>,<reader id>,<tag type>,<tag id>,<tag batt>,<button status>,<motion status>,<reserved>,<tag rssi>#

Field	Description
$	start of report
msg type	Type of message ex. 0: general scanner, 1: tag scanner
reader id	6 bytes ID of reader in hex => 12 chars
tag type	type of tag ex. 1: tag w/o g-sensor, 2: tag w/ g-sensor ..
tag id	6 bytes ID of tag in hex => 12 chars
tag batt	batt voltage of tag in 1/10 volt unit
tag button status	button status ex. 0: released, 1: pushed
tag motion status	motion status ex. 0: non-moving, 1: moving
reserved	Reserved for external sensor data (11 bytes)
tag rssi	tag read rssi
#	end of report

Reader UART is fixed at 115200,8,N,1

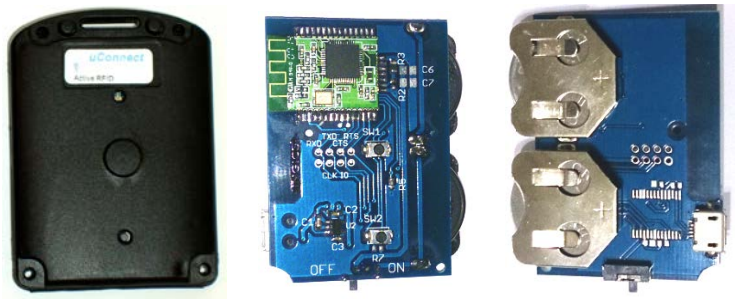
example:

$1,E2C69918FD94,1,FFC98B7FC1A9,32,0,0,,-55#
$1,E2C69918FD94,1,FFC98B7FC1A9,32,1,1,,-55#
$1,E2C69918FD94,1,FFC98B7FC1A9,32,1,1,,-54#
$1,E2C69918FD94,1,FFC98B7FC1A9,32,1,1,,-63#
$1,E2C69918FD94,1,FFC98B7FC1A9,32,0,0,,-56#

Default Tag Adv Period: 1000 ms

Panic Mode Tag Adv Period: 300 ms

Application-1: Tag



Application-2: RS-232 Reader

Remark: All contents are subject to change without notice.