Leadtek Bluetooth Module LRBT02 Discrete Data Sheet

Highlights :

- Powered by nRF52810 low power core logic
- 2.4 GHz transceiver -96 dBm sensitivity in Bluetooth® low energy mode
- Reception for High BT 4.2 BT 5.0 availability and accuracy
- Compact module size for easy integration
- Dimension : 13.8 x 9 x 1.9 mm
- Internet of Things (IoT)
    - Home automation
    - Sensor networks
    - Building automation
    - Industrial
    - Retail

Rev 0.1

Leadtek Research Inc.
18F., No. 166, Jian-Yi Rd., Chung-Ho Dist.,
New Taipei City 23511
Taiwan, R.O.C.
Tel : +886-2-8226-5800
Fax : +886-2-8226-5801
gps@leadtek.com.tw
www.leadtek.com.tw

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Change History

Rev.	Date	Change Description	Modified by	Remark
1.0	2022/09/01	Draft	YoungLee	

Table

Figure

1 Introduction

Leadtek new generation LRBT02 Bluetooth module products
The main unit's circuitry consists of a device chipset; the nRF52810 Microcontroller Unit and 2.4G RF, the nRF52810 chip has UART output interface transform .The system is powered by system supply with a nominal voltage of 3.3V volts.

The nRF52810 Microcontroller is the main processor responsible for driving the RF 2.4GHz signal communicate and data link to UART interface transform.

Figure 1-1： LR BT02 Image

1.1 Features

1.1.1 Performance

- 2.4 GHz transceiver
  - -96 dBm sensitivity in Bluetooth® low energy mode
  - 1 Mbps, 2 Mbps supported data rates
  - TX power -20 to +4 dBm in 4 dB steps
  - Single-pin antenna interface
  - 5.3 mA peak current in TX (0 dBm)
  - 5.4 mA peak current in RX
  - RSSI (1 dB resolution)
- ARM® Cortex®-M4 32-bit processor with FPU, 64 MHz
  - 215 EEMBC CoreMark® score running from flash memory
  - 58 µA/MHz running from flash memory
  - 51.6 µA/MHz running from RAM
  - Data watchpoint and trace (DWT), embedded trace macrocell (ETM), and instrumentation trace macrocell (ITM)
  - Serial wire debug (SWD)
  - Trace port
  - Flexible power management
  - Supply voltage range 2.6 V–3.6 V
  - Fully automatic LDO and DC/DC regulator system
  - Fast wake-up using 64 MHz internal oscillator

1.1.2 Hardware and Software

- Support for concurrent multi-protocol
- 12-bit, 200 ksps ADC - 8 configurable channels with programmable gain
- 64 level comparator
- 15 level low power comparator with wakeup from System OFF mode
- General purpose I/O pins
- Digital microphone interface (PDM)
- 5x 32-bit timers with counter mode
- Up to SPI master/slave with EasyDMA
- Up to I2C compatible 2-Wire master/slave
- UART (CTS/RTS) with EasyDMA
- Programmable peripheral interconnect (PPI)
- AES HW encryption with EasyDMA

1.2 Advantages

• 2.4 GHz transceiver

• -96 dBm sensitivity in *Bluetooth*® low energy mode

• 1 Mbps, 2 Mbps supported data rates

• TX power -20 to +4 dBm in 4 dB steps

Flexible power management

• Supply voltage range 2.6 V–3.6 V

• Fully automatic LDO and DC/DC regulator system

• Serial wire debug (SWD)

2 Technical Specification

2.1 Hardware Features

- Based on the high performance features of Nordic™ low power single chipset
- SMT pads allow for fully automatic assembly processes equipment and reflow soldering
- RoHS compliant (lead-free and Halogen free)

2.1.1 Hardware Specification

Specification	BT02
Processor	Nordic/ NRF52810
Product	BLUETOOTH Module
connector	25Pin
Form Factor Size *DIMENSIONS	23x10.2x6mm
WEIGHT	5g
BT4.0 & BLE	BT 4.0 & BT 5.0
RF(Frequency)	2.405~2.480GHz
TX output power	8~-20 dBm
RX Sensitivity	-90 dBm
Antenna	Internal
Communication range * TX Power 0dB	BLE: 30m
Power consumption * TX Power 0dB	＊.Transmitting mode < 15mA
	＊.Receiving mode < 22mA
	＊.standby mode < 8.5mA
Environment	＊.Operating temperature-30~75℃
	＊.Storage temperature-30~75℃
	＊.Operating Humidity max.95%RH
Power supply	3.3 V
LED Indicator	NA
Data Rate	77.7k bps
Compatibility	NA
Interface	UART / I2C /--
UART Baud Rate	115200 ~ 230400
Regulatory/ Compliance	NCC

Table 2-1 ： Hardware Specification

2.1.2 Electrical Characteristics

Operation Conditions				
Parameter	**Min.**	**Typ.**	**Max.**	**Units**
Input Operation supply voltage	2.6	3.3v	3.6	V
Peak supply current	--	15	--	mA
Standby Backup current	--	--	60	uA
I/O Input high level (VIH)	1.8	--	3.6	V
I/O Input low level (VIL)	0	--	0.4	V
I/O Output high level (VoH)	1.82	--	2.52	V
I/O Output low level (VoL)	0	--	0.4	V

Table 2-2：Electrical Characteristics

2.1.3 Pin Assignment

Pin #	Name	Type	Description
1	VSS	PWS	Ground
2	VCC_IN	PWS	DC +3.6~2.6V input
3	P0.25	I/O	General-purpose digital I/O
4	P0.26	I/O	General-purpose digital I/O
5	P0.29	I/O	General purpose I/O SAADC/COMP/LPCOMP input
6	P0.30	I/O	General purpose I/O SAADC/COMP/LPCOMP input
7	P0.31	I/O	General purpose I/O SAADC/COMP/LPCOMP input
8	VSS	PWS	Ground
9	DEC_4	PWS	1V3 regulator supply decoupling.
10	DCC	PWS	DC/DC converter output pin
11	XL2	I/O	Connection to 32.768khz crystal
12	XL1	I/O	Connection to 32.768khz crystal
13	VSS	PWS	Ground
26	VSS	PWS	Ground
27	Reserved	N/A	Keep floating
28	CST	N/A	General purpose I/O ,default UART CST
29	RST	N/A	General purpose I/O, default UART RST
30	UART TX	O	General purpose I/O, default UART TX
31	UART RX	I	General purpose I/O, default UART RX
32	P0.18	I/O	General purpose I/O Single wire output / Trace port output
33	P0.19	I/O	General purpose I/O
34	RESET	I/O	Configurable as pin reset
35	SWDCLK	I	Serial wire debug clock input for debug and programming
36	SWDIO	I/O	Serial wire debug I/O for debug and programming
37	VSS	PWS	Ground

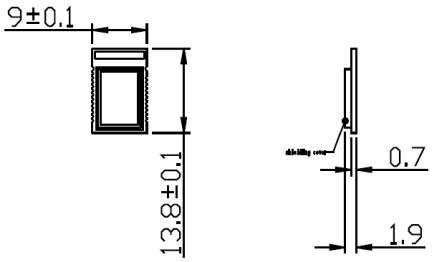
Table 2-3：Pin Assignment

2.2 Physical Specification

- Physical dimensions of the LR BT02 Bluetooth module are as follow:

Items	Description
Length	13.8 ± 0.3 mm
Width	9.0 ± 0.3 mm
Height	1.9 ± 0.3 mm
Weight	1.8 g

Table 2-4：Module's Dimension



2.3 Environmental Specification

Item	Description
Operating temperature range	-30 deg. C to +75 deg. C
Storage temperature range	-35 deg. C to +75 deg. C
Humidity	Up to 95% non-condensing or a wet Bulb temperature of +35 deg. C

Table 2-5：Environmental Specification

2.4 Reference Design

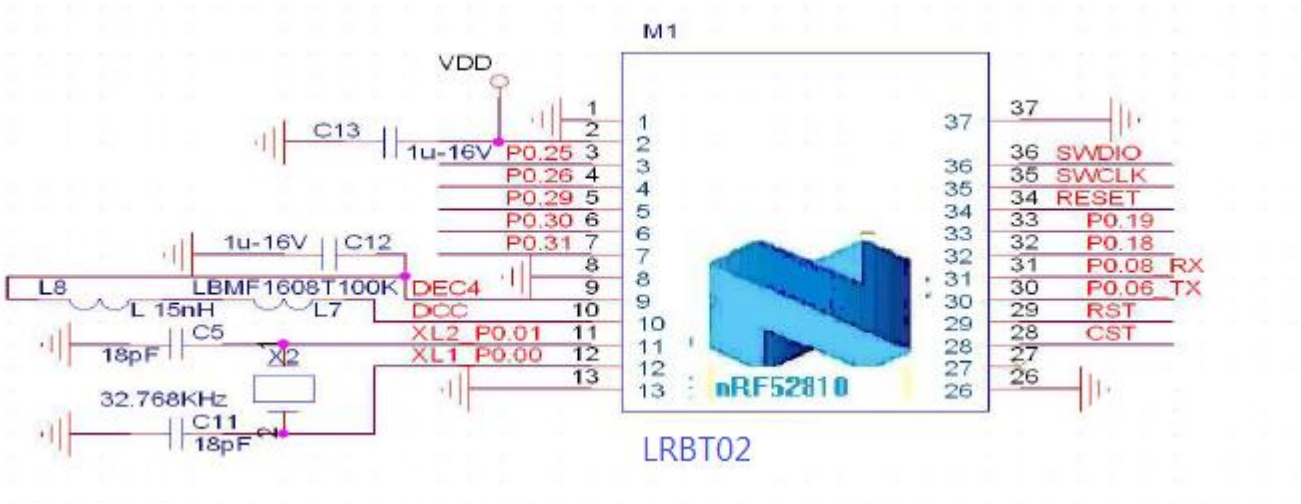


Figure 2-1： Typical Design Diagram

3 Package Specification➔➔TBD

3.1 Specifications

(Unit: mm)

Figure 5-2： TRAY specification

Polystyrene Alloy Taping Specification

- 10 sprocket hole pitch cumulative tolerance ±0.20mm
- Carrier camber is within 1mm in 100mm
- A0 and B0 are measured on a plane 0.3mm above the bottom of the pocket
- K0 is measured from a plane on the inside bottom of the pocket to the top surface of the carrier
- All dimensions conform to EIA standard EIA-481-2
- 22” 1R= 63M 3000PCS 13”21M 1000PCS

Figure 5-3： Polystyrene alloy taping specification

4 Soldering Profile (RoHS)

4.1 Reflow Profile

High quality, low defect soldering requires identifying the optimum temperature profile for reflowing the solder paste. To have the correct profile assures components, boards, and solder joints are not damaged and reliable solder connection is achievable. Profiles are essential for establishing and maintaining processes. You must be able to repeat the profile to achieve process consistently. The heating and cooling rise rates must be compatible with the solder paste and components. The period of time that the assembly is exposed to certain temperatures must first be defined and then maintained.

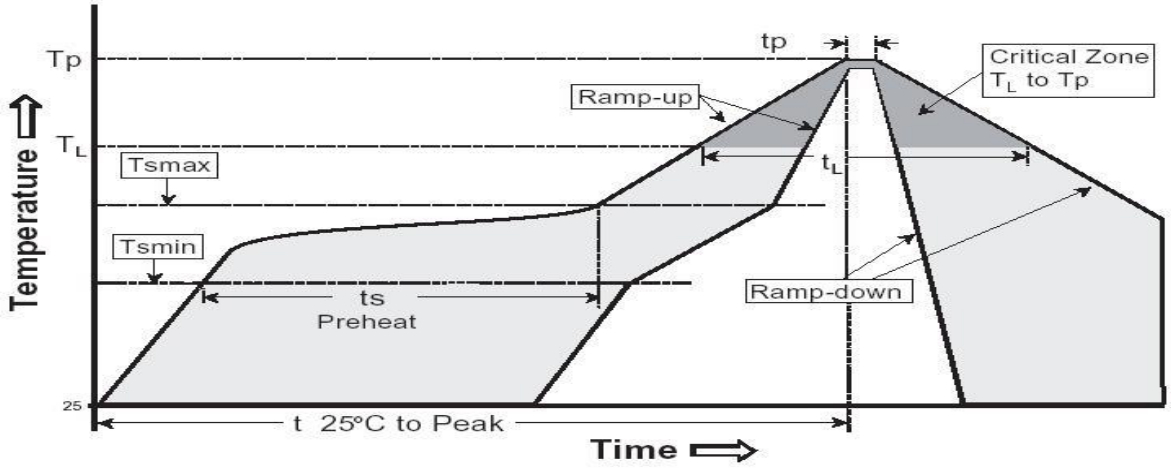


Figure 6-1： Reflow profile (Time zone)

Average ramp-up rate	**3℃/second max.**
Preheat (Tsmax – Tsmin, ts)	**150~200℃ ; 60~180seconds**
Time maintained above (TL, tL)	**217℃ ; 60~150seconds**
Peak Temperature (Tp)	**255~260℃ ; 10~20seconds**
Ramp-down rate	**6℃/second max.**
Time 25℃ to Peak Temperature	**8 minutes max.**
Maximum number of reflow cycles	**≤3**

Figure 6-2： Reflow profile (Parameters)

4.2 Storage and Baking Condition

1. Calculated shelf life in sealed bag: 6 months at <40℃ and <90% relative humidity(RH).
2. When the bag is opened, devices that will be subjected to reflow soldering or other high temperature process must be :
   2-1. Mount within: 24 hours of factory conditions ≤30℃ /60% RH, or
   2-2. Store at <10% RH under the protection against humidity and static electricity
3. Devices require bake before mounting, if :
   3-1. Humidity indicator card is >60% when it reads at 23±5℃
   3-2. 2-1 or 2-2 not met
4. If baking is required, devices may be baked for 24 hours at 125±5℃

Note: if device containers cannot be subjected to high temperature or if shorter bake times are desired, please refer to IPC/JEDEC J-STD-020 for bake procedure

Contact

Headquarters and Global Market Administration

Leadtek Research Inc.,
18F, No. 166, Jian-Yi Rd., Chung-Ho Dist.,
New Taipei City 23511, Taiwan, R.O.C.
Phone : +886-2-8226-5800
Website : www.leadtek.com

5 Appendix

TBA

FCC Compliance

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.
This device complies with Part 15 of the FCC Rules. Its operation is subject to the following two conditions:
1) The device may not cause harmful interference.
2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that

to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

End product labeling:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Custom design antennas may be used, however the OEM installer must following the FCC 15.21 requirements and verify if new FCC approval will be necessary.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: I2ILRBT02”.

Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/ warning as show in this manual.