Melange Systems
Wireless controls in action

TarangMini™ RT08BL10

Bluetooth® Low Energy (BLE) Module

Preliminary Document – Subject to change without notice

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Revision History

Version	Date	Notes
0p1	17-04-2023	Initial release

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PRODUCT DESCRIPTION

TarangMini™ RT08BL10 is a new generation Bluetooth® Low Energy (BLE) module from Melange Systems. These highly integrated ultra-low power devices are built around Realtek RTL8762CMF.
Powered by an ARM® Cortex™ - M4 processor the module features extremely simple interfacing options to provide wireless capabilities to any embedded products in industrial and automotive segments. TarangMini™ RT08BL10 supports Bluetooth® v5.0 stack and multiple profiles based on customer's choice.

FEATURES

- Built-in Bluetooth® 5.0 stack and application profiles with simple API host interface on UART.
- Supports transparent UART mode (like SPP) for data transfer requirements (Default)
- Application and profile customization support for large volume procurements
- Compact footprint (11.5 mm x 13.5 mm)
- 2.4 GHz wireless operation supports up to 2Mbps air data rate.
- Wide power supply range (1.8 V to 3.6 V)
- Ultra-low power consumption.
- Wide temperature range (-40 to +85 degree C)
- Programmable RF transmit power up to 8 dBm.
- Excellent receiver sensitivity (–95 dBm)
- Rich peripheral support - UART, SPI, I2C, PWM, SWD
- Castellated SMT pads for easy and reliable PCB mounting.
- Environmentally friendly, RoHS compliant
- WPC ETA Certification (for India operations) *

APPLICATIONS

- Beacon Applications
- Remote Control
- Industrial Controls
- Smart Home Automation
- Electronic Instrument Cluster
- Asset Tracking
- Health Care Applications
- Home Appliances

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1. Functional Block Diagram

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2. Module Interface Details

TarangMini™ RT08BL10 module has 23-pin 1.27 mm pitch **Castellated Pads** distributed in three rows at the module edges. These connector / pads are used for interfacing the module with a microcontroller / RS232 level converter / USB to serial base board.

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3. Pin Definition

Pin	Name	Type	Function
1	P2_6	I/O	DIO
2	P2_5	I/O	DIO
3	P2_4	I/O	DIO
4	P2_3	I/O	DIO
5	VDD	Power Supply	Supply Voltage
6	P2_2	I/O	DIO
7	P0_3/BOOT	I/O	Internally Pulled up for normal operation Low: Flash Programming
8	GND	Power Supply	Ground
9	P0_6	I/O	DIO
10	TXD	UART Transmit	Serial data OUT from Tarang
11	RXD	UART Receive	Serial data IN to Tarang
12	SWDCLK	PROG	SWCLK
13	SWDIO	PROG	SWDIO
14	P0_5	I/O	DIO
15	P0_4	I/O	DIO
16	P0_2	I/O	DIO
17	P0_1	I/O	DIO
18	P0_0	I/O	DIO
19	RST	Reset function of the module	Reset module (Active low)
20	P3_2	I/O	DIO
21	GND	Power Supply	Ground
22	NC	NC	NC
23	NC	NC	NC

- Digital I/O functionalities are defined based on the chosen firmware. Unused I/Os can be left open.
- All General Purpose I/O Support 8 mA drive capability

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4. Recommended Operating Conditions

Parameter	Min	Max	Unit
Supply Voltage	1.8	3.6	V
Operating Temperature	-40	+85	°C
Storage Temperature	-55	+125	°C

- Exposure to Maximum Rating conditions for extended periods may affect device reliability.
- Stresses beyond the Maximum Ratings may cause permanent damage to the device.

5. Power Consumption

@VDD 3.3 V, Temp 25°C, Freq 2440 MHz

Parameter	Typical Value
Receive Mode	7.3 mA
Transmit Mode	7.9 mA (@ 0 dBm)
Transmit Mode	11.3 mA (@ 7.5 dBm)

6. Radio Characteristics

@VDD 3.3 V, Temp 25°C, Freq 2440 MHz

Parameter	Typical Value
Frequency Band	2400 - 2480 MHz
Modulation	GFSK
Transmit Power	+7.5 dBm (@ 1Mbps)
Receiver Sensitivity	-95 dBm (@ 1Mbps)

7. DC Characteristics – Digital IO

Parameter	Min	Typ	Max	Unit
Internal Pull up on Reset Pin		10		KΩ

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8. Mechanical Dimensions and Footprint

a. TarangMini™ RT08BL10 Mechanical Dimensions

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b. TarangMini™ RT08BL10 Recommended footprint

All Dimensions are in mm

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c. Placement Recommendation

- To ensure maximum performance, it is recommended that the module be installed on the host PCB's edge, with the antenna edge facing outward. It is important to note that the antenna's placement has a significant impact on the overall system performance. The antenna needs sufficient space to emit RF signals, and it should not be enclosed by a ground plane.
- It is crucial to avoid placing any top, inner, or bottom copper layer under the antenna area, as it can negatively affect the antenna's performance.
- Make sure that there is no exposed copper on the bottom side (TOP side of the HOST PCB) of the module.
- To prevent excessive noise coupling with signal lines or power supply voltage, use an effective layout technique.
- The presence of metals in close proximity to the antenna can cause a degradation in its performance. The extent of the degradation will vary depending on the characteristics of the host system.
- The efficiency of the PCB trace antenna is impacted by its proximity to copper or laminate materials.

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9. Typical Application Schematics

Note:

- If the power domain of the Host controller differs, it is necessary to use a level translator.
- By default, the primary UART is utilized to upgrade the firmware via the module's internal boot-loader. This process required the usage of interface signals such as VDD, TXD, RXD, BOOT, RESET, and GROUND
- The upgrade of firmware is also possible through JTAG. To perform this upgrade, the following interface signals are necessary: SWDIO, SWCLK, RESET, VDD, and GROUND
- To perform an external firmware upgrade, access to the test pad or edge connector is required. It is necessary to put the Host controller into a high impedance/tri-state while performing this access.
- The bottom side of the module includes five additional TP (test point) pads reserved for manufacturing programming and debugging during factory use. It is not advisable to have any signal traces running on the Host PCB at the Module mounting place.

10. Soldering Recommendations

TarangMini™ RT08BL10 modules are manufactured following standard lead-free reflow profile IPC/JEDEC J-STD-020. This module can be soldered to the host PCB using standard leaded and lead-free solder reflow profiles. Follow the below recommendation to avoid damaging the module.

- ✓ Do not exceed peak temperature of 235°C ~ 245°C.
- ✓ Refer to the solder paste data sheet for specific reflow profile recommendations.
- ✓ Use no-clean flux solder paste.
- ✓ Do not wash as moisture can be trapped under the shield.
- ✓ Use only one flow. If the PCB requires multiple flows, apply the module on the final flow.

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