

LTM8830 Combo Module

Data Sheet

V 1.2

Jul. 2016

LTM8830 Data Sheet

| Revision | Date | Description |
|----------|------------|------------------------------------|
| V1.0 | 2016/03/24 | Initial release |
| V1.1 | 2016/07/07 | Modify the thickness |
| V1.2 | 2016/07/19 | Add the WiFi &BT RF Specifications |

longsys

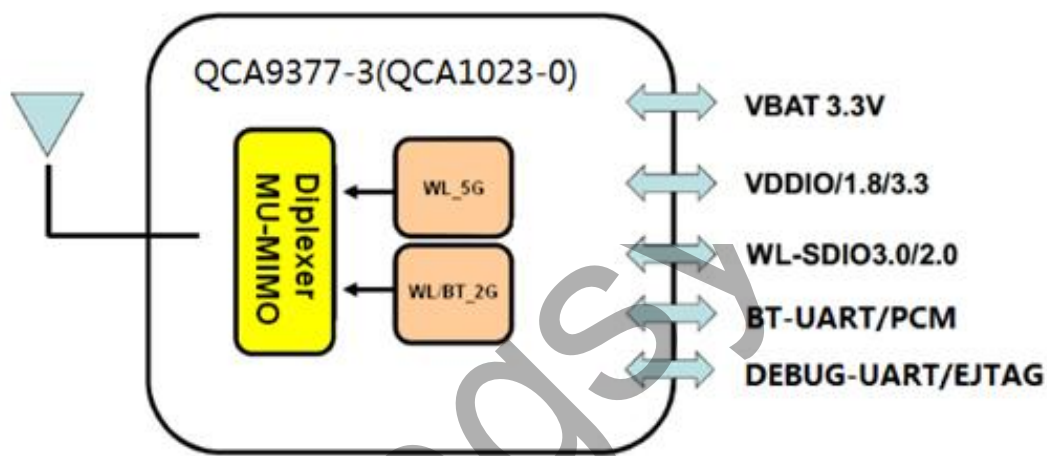
LTM8830 Data Sheet

| | |
|--|---------------|
| 1.Introduction | - 4 - |
| 1.1 Overview | - 4 - |
| 1.2 Product Features | - 4 - |
| 2. GENERAL SPECIFICATION | - 5 - |
| 2.1 WiFi &BT RF Specifications | - 5 - |
| 3. Electrical Specification | - 8 - |
| 3.1 Absolute Maximum Ratings | - 8 - |
| 3.2 Recommended Operating Condition | - 8 - |
| 3.3 Digital Logic Characteristics | - 8 - |
| 3.4 Typical power consumption | - 9 - |
| 4. Mechanical Specification | - 10 - |
| 4.1 Outline Drawing (Unit:±0.15mm) | - 10 - |
| 4.2 Recommended Footprin | - 11 - |
| 4.3 Pin Definition | - 12 - |
| 5. Environmental Requirements | - 14 - |
| 5.1 Operating Condition: | - 14 - |
| 5.2 Storage Condition: | - 14 - |
| 5.3 Recommended | - 14 - |
| 5.4 Patch WIFI modules installed before the notice | - 15 - |

1.Introduction

1.1 Overview

LTM8830 is a highly integrated and excellent performance Wireless LAN (WLAN) SDIO network interface device . This module design is based on the Qualcomm Atheros QCA9377-3(QCA1023-0) HW chipset. The QCA9377-3(QCA1023-0) is a single-chip wireless local area network (WLAN) and Bluetooth (BT) combo solution to support 1x1 with IEEE802.11a/b/g/n/ac WLAN standards and BT4.1+HS enabling seamless integration of WLAN/BT and Low Energy technology ,It is designed to provide excellent performance with low power Consumption and enhance the advantages of robust system and cost-effective.



1.2 Product Features

- WLAN dual-band 1x1 IEEE802.11a/b/g/n/ac and Bluetooth V4.1+HS
- Support WLAN 20MHz/40MHz at 2.4GHz and 20/40/80 MHz at 5GHz
- Support BT4.1+HS , BLE and be backwards compatible with BT1.x,2.x+EDR.
- Support BT for class 1 and class 2 power level transmissions without requiring an external PA.
- Support low-power SDIO3.0 interface for WLAN and UART/PCM interface for BT
- Both WLAN and BT power management utilize advanced power saving techniques:
 - ◆ clock gating on idle or inactive blocks;
 - ◆ voltage scaling on specific blocks in certain states;
 - ◆ fast start and settling circuits to reduce Tx;
 - ◆ active duty cycles, processor frequency scaling,
 - ◆ and other techniques to optimize power consumption across all operating states.
- Advanced features:

LTM8830 Data Sheet

- ◆ Maximal Likelihood(ML) decoding
- ◆ Low-Density Parity Check(LDPC)
- One-chip one-time programmable(OTP) memory
- GP/HF compliance

2. GENERAL SPECIFICATION

2.1 WiFi &BT RF Specifications

| | |
|--|---|
| Main Chipset | Qualcomm QCA9377-3(QCA1023-0) |
| Operating Frequency | 2.4GHz~2.4835GHz, 5.15GHz~5.845GHz |
| Standards | WiFi: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, BT:V2.1+EDR/BT v3.0/BT v3.0+HS/BT v4.1 |
| Modulation | WiFi: 802.11b: CCK, DQPSK, DBPSK 802.11a/g: 64QAM,16QAM, QPSK, BPSK 802.11n: 64QAM,16QAM, QPSK, BPSK 802.11ac: 256QAM,64QAM,16QAM, QPSK, BPSK BT:FHSS |
| PHY Bandwidth | WiFi: 802.11b: 11, 5.5, 2, 1 Mbps; 802.11 a/g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: HT20 mode: MCS0~MCS7,up to 72.2Mbps HT40 mode: MCS0~MCS7,up to 150Mbps 802.11ac VHT80:MCS0~MCS9,up to 433Mbps BT:1 Mbps for Basic Rate |
| Transmit Output Power(Typical) Tolerance: ±3.0dBm | 2.4G 802.11b @11Mbps 18dBm 802.11g @6Mbps 18dBm 802.11g @54Mbps 18dBm 802.11n HT20 @MCS0 18dBm 802.11n HT20 @MCS7 16.5dBm 802.11n HT40 @MCS0 17dBm 802.11n HT40 @MCS7 16dBm |

LTM8830 Data Sheet

| | |
|-------------------------------|--|
| Receiver Sensitivity(Typical) | 5G 802.11a @6Mbps 15dBm 802.11a @54Mbps 12dBm 802.11n HT20 @MCS0 15dBm 802.11n HT20 @MCS7 11dBm 802.11n HT40 @MCS0 14dBm 802.11n HT40 @MCS7 11dBm 802.11ac VHT20 @MCS0 15dBm 802.11ac VHT20 @MCS8 11dBm 802.11ac VHT40 @MCS0 14dBm 802.11ac VHT40 @MCS9 9dBm 802.11ac VHT80 @MCS0 13dBm 802.11ac VHT80 @MCS9 8dBm |
| | 2.4GHz 802.11b -96dBm (1Mbps) 8% PER -88dBm (11Mbps) 8% PER 802.11g -91dBm (6Mbps) 10% PER -75dBm (54Mbps) 10% PER 802.11n -90dBm (MCS 0_HT20) 10% PER -72dBm (MCS 7_HT20) 10% PER -88dBm (MCS 0_HT40) 10% PER -70dBm (MCS 7_HT40) 10% PER 5GHz 802.11a -90dBm (6Mbps) 10% PER -74dBm (54Mbps) 10% PER 802.11n -90dBm (MCS 0_HT20) 10% PER -70dBm (MCS 7_HT20) 10% PER -88dBm (MCS 0_HT40) 10% PER -67dBm (MCS 7_HT40) 10% PER 802.11ac -67dBm (Nss1 MCS8_VHT20) 10% PER -62dBm (Nss1 MCS9_VHT20) 10% PER -60dBm (Nss1 MCS9_VHT80) 10% PER |

LTM8830 Data Sheet

| | |
|----------------------|---|
| Operating Channel | WiFi 2.4GHz: 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan BT 2.4GHz: Ch. 0 ~78 |
| Media Access Control | WiFi: CSMA/CA with ACK BT:AFH, Time Division |
| Antenna | External Antenna |
| Network Architecture | WiFi: Ad-hoc mode (Peer-to-Peer) Infrastructure mode Software AP WiFi Direct BT:Pico Net, Scatter Net |
| Security | WiFi: WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i BT:Simple Paring |
| OS Supported | Android /Linux |
| Host Interface | WiFi: SDIO BT: UART |
| Operating Voltage | 3.3V DC I/O supply voltage |
| Dimension | Typical L12.0*W12.0*H2.0mm |

3. Electrical Specification

3.1 Absolute Maximum Ratings

These specifications indicate levels where permanent damage to the device can occur. Functional operation is not guaranteed under these conditions. Operation at absolute maximum conditions for extended can adversely affect long-term reliability of the device.

| Symbol | Condition | Min. | Typ. | Max | Unit |
|--------------------------------|----------------|------|------|------|------|
| VDD | Respect to GND | -0.3 | 3.3 | 3.63 | V |
| Max Ripple on Supplied Voltage | 3.3V | | | 330 | mVpp |
| Storage Temperature | -- | -40 | 25 | 85 | °C |
| ESD (HBM) | | | | 2000 | V |

3.2 Recommended Operating Condition

| Symbol | Condition | Min. | Typ. | Max | Unit |
|-----------------------|----------------|-------|------------|-------|------|
| VDD | Respect to GND | 3.135 | 3.3 | 3.465 | V |
| VDDIO | Respect to GND | 1.71 | 1.8 or 3.3 | 3.46 | V |
| Operating Temperature | -- | -10 | 25 | 70 | °C |

3.3 Digital Logic Characteristics

Table 1 General DC Electrical Characteristics (for 1.8V VIO Operation)

| Symbol | Parameter | Min. | Max | Unit |
|--------|---------------------------|---------|---------|------|
| +3.3V | Power supply | 3.3-5% | 3.3+5% | V |
| VIH | High-level input voltage | 0.7-VIO | VIO+0.3 | V |
| VIL | Low-level input voltage | -0.3 | 0.3-VIO | V |
| IIL | Input low leakage current | -5 | 5 | uA |
| VOH | High-level output voltage | VIO-0.4 | VIO | V |
| VOL | Low-level output voltage | 0 | 0.4 | V |
| IOH | High-level output voltage | 3 | — | mA |
| IOL | Low-level output current | - | -11 | mA |

3.4 Typical power consumption

| LTM8830 Typical power consumption | | | |
|-----------------------------------|------|-------------|-------------------|
| VCC 3.3V VDD_SDIO 3.3V | | | |
| Frequency | Mode | | Current (Typical) |
| 2.4G | RX | 11b 1 Mbps | 58mA |
| | | 11g 54 Mbps | 68mA |
| | | MCS7 HT20 | 69mA |
| | | | |
| | TX | 11b 11 Mbps | 358mA |
| | | 11g 54 Mbps | 333mA |
| | | MCS7 HT20 | 326mA |
| | | | |
| 5G | RX | MCS0 HT20 | 93mA |
| | | MCS7 HT20 | 91mA |
| | | MCS8 VHT20 | 108mA |
| | | | |
| | | MCS0 HT40 | 91mA |
| | | MCS7 HT40 | 95mA |
| | | MCS8 VHT40 | 112mA |
| | | MCS9 VHT40 | 97mA |
| | | | |
| | | MCS7 VHT80 | 127mA |
| | | MCS8 VHT80 | 156mA |
| | | MCS9 VHT80 | 125mA |
| | | | |
| | TX | MCS0 HT20 | 487mA |
| | | MCS7 HT20 | 422mA |
| | | MCS8 VHT20 | 413mA |
| | | | |
| | | MCS0 HT40 | 467mA |
| | | MCS7 HT40 | 424mA |
| | | MCS8 VHT40 | 422mA |
| | | MCS9 VHT40 | 417mA |
| | | | |
| | | MCS7 VHT80 | 428mA |
| | | MCS8 VHT80 | 424mA |
| | | MCS9 VHT80 | 421mA |

4. Mechanical Specification

4.1 Outline Drawing (Unit: $\pm 0.15\text{mm}$)

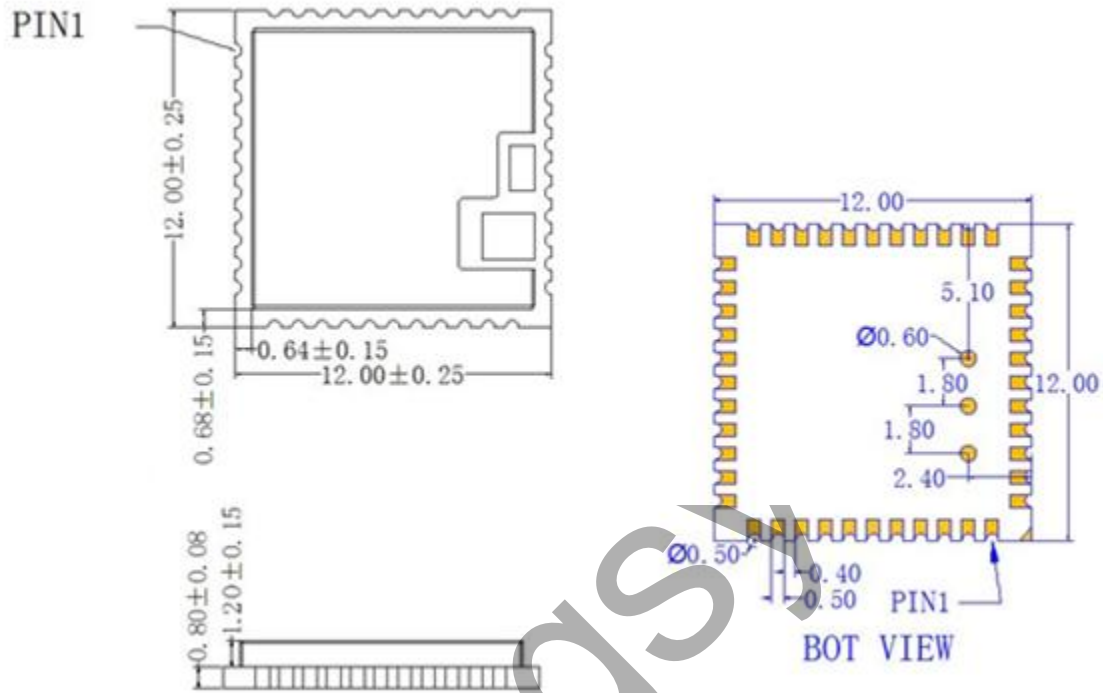


Figure 2

4.2 Recommended Footprin

| | | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | | |
|----|--------------|---|--------------|------------|------------|----------------|----------------|------------|------------|-----|----|----------|----------|----|
| | | UART_CTS | UART_RXD | UART_TXD | UART_RTS_N | Debug_UART_RXD | Debug_UART_TXD | NC | NC | GND | NC | BT_RST_N | | |
| 1 | GND | <div> <div>45</div> <div>46</div> <div>47</div> <div>TP1</div> <div>TP2</div> <div>TP3</div> </div> | | | | | | | | | | | GND | 33 |
| 2 | WL_BT_ANT | | | | | | | | | | | | TCK | 32 |
| 3 | GND | | | | | | | | | | | | GND | 31 |
| 4 | NC | | | | | | | | | | | | TMS | 30 |
| 5 | NC | | | | | | | | | | | | TDI | 29 |
| 6 | BT_WAKE | | | | | | | | | | | | PCM_SYNC | 28 |
| 7 | BT_HOST_WAKE | | | | | | | | | | | | PCM_IN | 27 |
| 8 | TD0 | | | | | | | | | | | | PCM_CLK | 26 |
| 9 | VBAT | | | | | | | | | | | | PCM_OUT | 25 |
| 10 | NC | | | | | | | | | | | | LPO | 24 |
| 11 | NC | | | | | | | | | | | | NC | 23 |
| | | WL_REG_ON | WL_HOST_WAKE | SDIO_DATA2 | SDIO_DATA3 | SDIO_DATA_CMD | SDIO_DATA_CLK | SDIO_DATA0 | SDIO_DATA1 | GND | NC | VDDIO | | |
| | | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | | |

Figure 3

4.3 Pin Definition

PIN Assignment

| Signal Name | Pin | Description |
|---------------|-----|--|
| GND | 1 | Ground connection |
| WL_BT_ANT | 2 | RF I/O port |
| GND | 3 | Ground connection |
| NC | 4 | Floating (NC) |
| NC | 5 | Floating (NC) |
| BT_WAKE | 6 | Host/platform wakeup BT device |
| BT_HOST_WAKE | 7 | BT wake-up platform |
| TDO | 8 | I/O Reserve for EJTAG |
| VBAT | 9 | 3.3V power supply |
| NC | 10 | Floating (NC) |
| NC | 11 | Floating (NC) |
| WL_REG_ON | 12 | GPIO pin to on/off the WiFi function by software. Active high. Reserve pull high 100K resistor and shunt 100pF |
| WL_HOST_WAKE | 13 | capacitor to GND on platform. |
| SDIO_DATA_2 | 14 | SDIO data line 2 |
| SDIO_DATA_3 | 15 | SDIO data line 3 |
| SDIO_DATA_CMD | 16 | SDIO command line |
| SDIO_DATA_CLK | 17 | SDIO clock line |
| SDIO_DATA_0 | 18 | SDIO data line 0 |
| SDIO_DATA_1 | 19 | SDIO data line 1 |
| GND | 20 | Ground |
| NC | 21 | Floating (NC) |
| VDDIO | 22 | I/O Voltage supply input |
| NC | 23 | Floating (NC) |
| LPO | 24 | External Low Power Clock input |
| PCM_OUT | 25 | PCM Output |

LTM8830 Data Sheet

| Signal Name | Pin | Description |
|----------------|-------|--|
| PCM_CLK | 26 | PCM Clock |
| PCM_IN | 27 | PCM Input |
| PCM_SYNC | 28 | PCM Sync |
| TDI | 29 | Reserve for EJTAG |
| TDO | 30 | Reserve for EJTAG |
| GND | 31 | Ground |
| TCK | 32 | Reserve for EJTAG |
| GND | 33 | Ground |
| BT_RST_N | 34 | GPIO pin to on/off the BTfunction by software. Active high.Reserve pull high 100K resistor and shunt 100pF capacitor to GND on platform. |
| NC | 35 | Floating (NC) |
| GND | 36 | Ground |
| NC | 37 | Floating (NC) |
| NC | 38 | Floating (NC) |
| Debug_UART_TXD | 39 | TXD for Wi-Fi Uart_debug only, connected to RXD of the platform. |
| Debug_UART_RXD | 40 | RXD for Wi-Fi Uart_debug only,connected to TXD of the platform. |
| UART_RTS_N | 41 | UART RTS |
| UART_TXD | 42 | UART Output |
| UART_RXD | 43 | UART Input |
| UART_CTS_N | 44 | UART CTS |
| NC | 45~47 | Floating (NC) |
| 47PINS | Total | 12.0*12.0*1.8mm LGA Package |

5. Environmental Requirements

5.1 Operating Condition:

Operating Temperature: -10°C to $+70^{\circ}\text{C}$

Relative Humidity: 10-90% (non-condensing)

5.2 Storage Condition:

Temperature: -40°C to $+85^{\circ}\text{C}$ (non-operating)

Relative Humidity: 5-90% (non-condensing)

MTBF: Over 50,000hours

5.3 Recommended

Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : $<250^{\circ}\text{C}$

Number of Times : ≤ 2 times

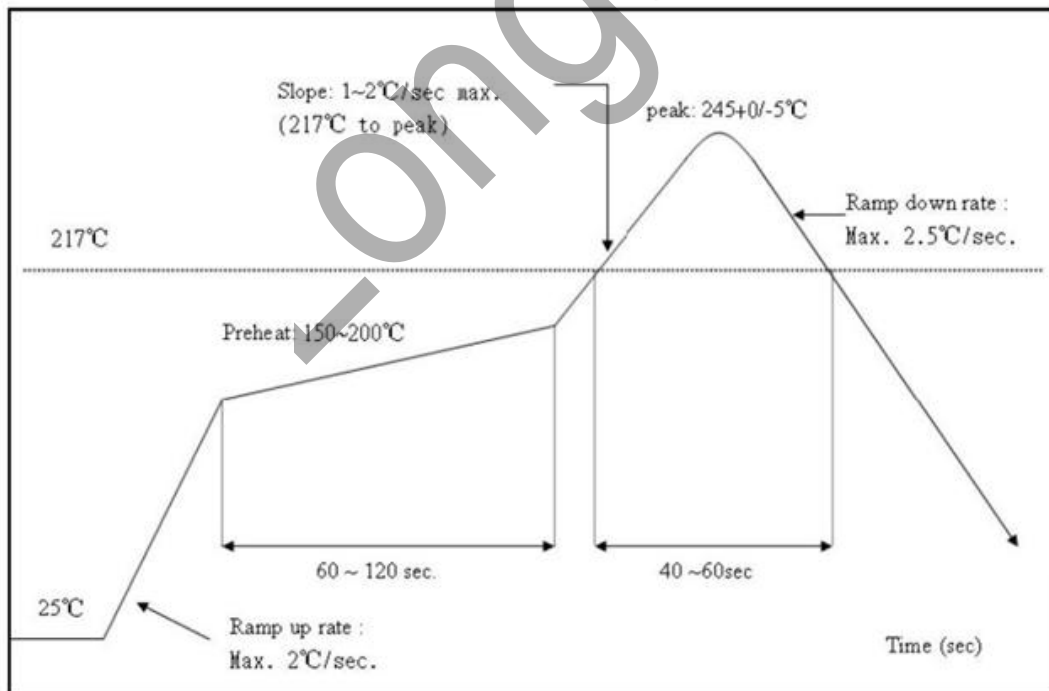


Figure 5

5.4 Patch WIFI modules installed before the notice

WIFI module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm,
0.12 mm thickness when open a stencil
2. Take and use the WIFI module, please insure the electrostatic protective measures.
3. Reflow soldering temperature should be according to the customer the main size of the products,
such as the temperature set at $250 \pm 5^{\circ}\text{C}$ for the MID motherboard.

About the module packaging, storage and use of matters needing attention are as follows:

1. The module of the reel and storage life of vacuum packing:

1). Shelf life: 8 months, storage environment conditions:

temperature in: $< 40^{\circ}\text{C}$, relative humidity: $< 90\%$ r.h.

2. The module vacuum packing once opened, time limit of the assembly:

Card:

1) check the humidity display value should be less than 30% (in blue),
such as: 30% ~ 40% (pink) or greater than 40% (red) the module have been moisture absorption.

2) factory environmental temperature humidity control: $\leq 30^{\circ}\text{C}$, $\leq 60\%$ r.h..

3). Once opened, the workshop the preservation of life for 168 hours.

3. Once opened, such as when not used up within 168 hours:

1). The module must be again to remove the module moisture absorption.

2). The baking temperature: 125°C , 8 hours.

3.) After baking, put the right amount of desiccant to seal packages.