



WW-ML067 (Band 41 only)

LTE Module

Specification

Version 0.3



Revision History

Document Release	Date	Modification	Initials	Approved
Version 0.1	2014/03/28	1. First release	Shengyen. Fan	Ivan. Chen
Version 0.2	2014/09/18	1. Recommended design PCIE LTE connect maximum power	Vic. Lee	Ivan. Chen
Version 0.3	2014/12/01	1. Band 41 only	Vic. Lee	Ivan. Chen



1. General Description

1-1. Product Overview and Functional Description

Billion Electric Co., Ltd. WW-ML067 is a (4G) LTE mini-PCIE module. It implements 3GPP release 9 modem on a mini-PCI Express card. It supports next-generation LTE standards with Category 4 150Mbps for DL and 50 Mbps for UL (megabits-per-second) throughput. User can surf internet by WW-ML067 in anywhere and anytime where 4G TD-LTE (Band 41) networks covered. WW-ML067 is designed to provide fast, reliable and easy user experience.

WW-ML067 uses Marvell PXA1802 communications processor. The PXA1802 is an advanced, highly integrated Long-Term Evolution (LTE) modem for multimedia-centric handsets. The PXA1802 solution incorporates mature and proven LTE technology to provide Mobile handset platform.

<FCC Part 15.21 statement>

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

<FCC Part 15.105 statement>

Note: 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 equipments does cause harmful interference 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.

A simplified block diagram of the WW-ML067 module is depicted in the figure below.



RF exposure statements:

Information to OEM integrator

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 manual of the end product.

The user manual which is provided by OEM integrators for end users must include the following information in a prominent location.

1. To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.
2. Only those antennas with same type and lesser gain filed under this FCC ID number can be used with this device.
3. The regulatory label on the final system must include the statement: "Contains FCC ID: xxxx or using electronic labeling method as documented in KDB 784748.
4. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two ways authentication between module and the host system.

This module can't be used on radio system and operation individually. Using others antenna must be re-testing and certification.



1-2. Antenna Description

1.) Type #1 Dipole:

A. Electrical Characteristics	
Frequency	2500 ~ 2700 MHz
S.W.R.	<= 2.0
Peak Gain	4.15dBi
Polarization	Linear
Impedance	50 Ohm
B. Material & Mechanical Characteristics	
Material of Radiator	Cu
Material of Plastic	TPEE / ABS
Cable Type	RG-178
Connector Type	SMA Male
C. Environmental	
Operation Temperature	- 40 °C ~ + 65 °C
Storage Temperature	- 40 °C ~ + 80 °C
Antenna Color Storage life	< 2 year

2.) Type #2 Dipole:

A. Electrical Characteristics	
Frequency	2500 ~ 2700 MHz
S.W.R.	<= 2.5
Antenna Gain	6 dBi
Polarization	Linear
Impedance	50 Ohm
B. Material & Mechanical Characteristics	
Material of Radiator	Cu
Material of Plastic	Body: ABS Holder: PA+ABS
Cable Type	RG178
Connector Type	SMA Male
Connector Pull Test	>= 5 Kg
C. Environmental	
Operation Temperature	- 40 °C ~ + 65 °C
Storage Temperature	- 40 °C ~ + 80 °C
Antenna Color Storage life	< 1 year



3.) Type #3 Patch antenna:

RF Specification	
Frequency range	2500-2700 MHz
Polarization	Linear, Vertical / Horizontal
HPBW/Horizontal	Port 1:22° / Port 2:21°
HPBW/Vertical	Port 1:23° / Port 2:22°
Peak Gain	11.5 dBi (Cable Loss Included)
VSWR	2.0 max:1
Isolation	20 dB typ.
Power handing	2W (cw)
Impedance	50 Ohms
Cable	Φ1.37, 250mm (Port1: Gray; Port2: White)
Connector	U.FL x2

4.) Type #4 Dipole (全頻)

A. Electrical Characteristics	
Frequency	700 ~ 960 MHz 1710 ~ 2700 MHz
S.W.R.	<= 2.0 @ 824 MHz <= 2.0 @ 1880 ~ 2300 MHz
Antenna Gain	0.5 ± 0.5dBi @ 700 ~ 960 MHz 2.0 ± 0.7dBi @ 1710 ~ 2700 MHz
Efficiency (%)	40 % @ 700 ~ 960 MHz 76% @ 1710 ~ 2700 MHz
Polarization Linear	
Impedance	50 Ohm
B. Material & Mechanical Characteristics	
Material of Radiator	Cu
Material of Plastic	BODY: ABS HINGE:ABS
Cable Type	RG-178U-03
Connector Type	SMA Male
C. Environmental	
Operation Temperature	- 40 °C ~ + 65 °C
Storage Temperature	- 40 °C ~ + 80 °C
Antenna Color Storage life	< 2 year

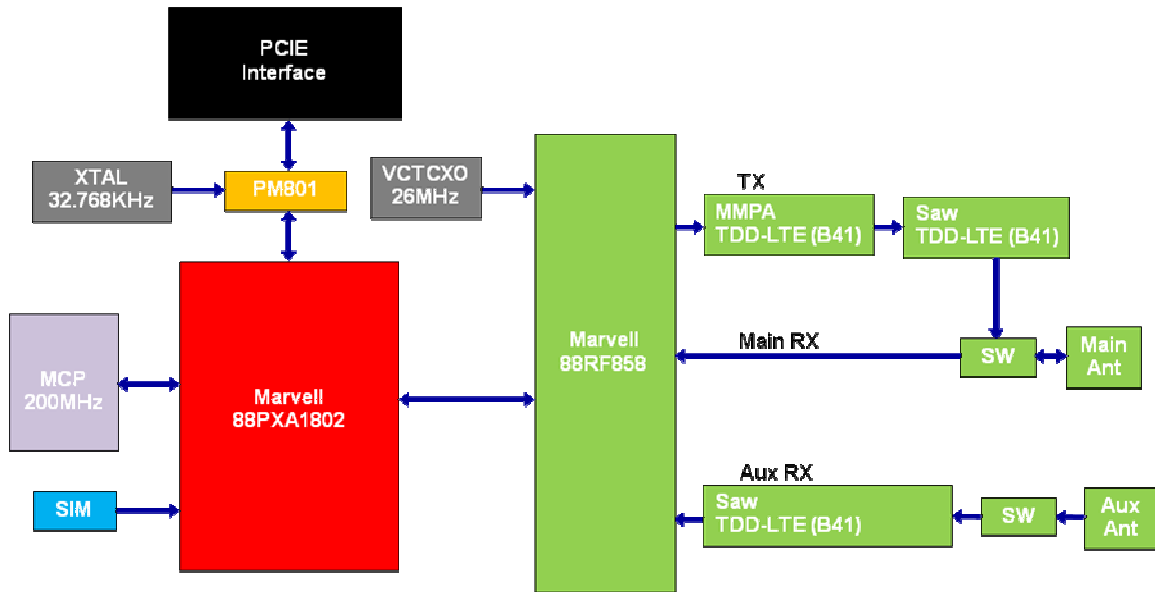


Figure 1. WW-ML067 Mini-PCIE Module Block Diagram

1-2. Key Features

Supported Frequency Bands

TDD-LTE Band 41

Supported Network Modes

Time Division Long Term Evolution (TDD-LTE)

Provided Services

High-speed LTE packet data service of up to 150 Mbit/s

***Maximum data rate is subject to 4G services provided by network operators**

1-3. Main Features

Supported Features

Downlink LTE packet data service of up to 150 Mbit/s

Uplink LTE packet data service of up to 50 Mbit/s

Packet switched (PS) domain data service based on LTE

Linux 2.6.29 and later



2. Technical Specifications Table

2-1 Hardware

Model Name	WW-ML067
Product Description	Specifications
Major Chipset	Marvell PXA1802
Standards Compliance	LTE 3GPP Release 9 compliant WAN: LTE Band 41
External Interfaces	Supporting USB 2.0 high speed Standard 6-pin SIM card interface
Operating Conditions	
Voltage	3.3 V
Current(peak)	1.6±0.2 A
Ambient Temperature	Operating: Operating : -10°C to +55°C Storage: -20°C to +70°C
Dimension	Dimensions (L × W × H) : 50.95mm x 30mm x 4.82mm
Weight	About 12g
Electrical Specifications	
Operating Frequency	TDD-LTE : <ul style="list-style-type: none">● Band 41 (2496 MHz ~ 2690 MHz)
Maximum transmit power	● TDD-LTE: 23 ±2 dBm (Power Class 3)
Antenna	Embedded <ul style="list-style-type: none">● TDD -LTE: Main antenna connector.● TDD -LTE: Receive diversity antenna connector.
Receiver Sensitivity	● TDD-LTE: compliant with Category 4

2-2 Software

Others	<p>Network connection:</p> <ul style="list-style-type: none">● Automatic network selection and registration● Manual network selection and registration <p>Optional network connection types, for example:</p> <ul style="list-style-type: none">● 4G only <p>PIN management:</p> <ul style="list-style-type: none">● Edit● Enable/Disable● Verify
---------------	---



3. Electrical Characteristics

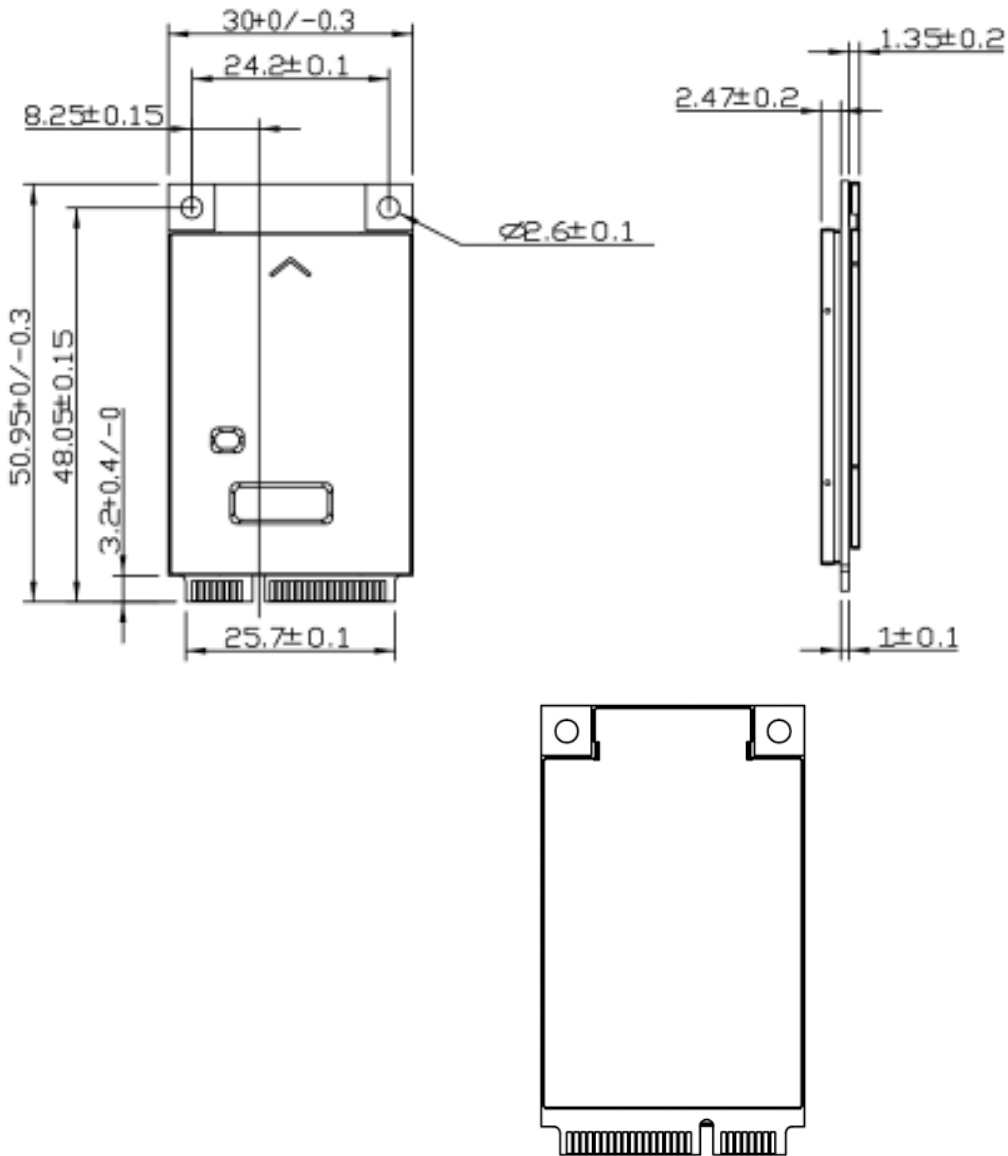
3-1. Recommended DC power supply for Micro USB

Power	Tolerance	Units
3.3V	$\pm 5\%$	V

3-2. Recommended design PCIE LTE connect peak current

Band	Current	Units
LTE	1.6 ± 0.2	A

4. Mechanical drawing





5. Pin Definition

Pin Assignment

Pin No	Definition	Basic Description	Type	
1	NC	NC		
2	VCC3P3	+3.3V power supply	I	Power
3	JTAG TRST_N	JTAG TRST_N		
4	GND-4	GND		
5	JTAG TDI	JTAG TDI		
6	JTAG TDO	JTAG TDO		
7	NC	NC		
8	USIM_PWR	VCC USIM		
9	GND-9	GND		
10	USIM_DATA	USIM DATA		
11	JTAG TMS	JTAG TMS		
12	USIM_CLK	USIM CLK		
13	JTAG_TCK	JTAG TCK		
14	USIM_RESET	USIM_RESET		
15	GND-15	GND		
16	NC	NC		
17	UART_RXD	UART_RXD		
18	GND-18	GND		
19	UART_TXD	UART_TXD		
20	W_Disable	WWAN DISABLE		
21	GND-21	GND		
22	PERSTn	WWAN RESET		
23	NC	NC		
24	VCC3P3	+3.3V power supply		
25	NC	NC		
26	GND-26	GND		
27	GND-27	GND		
28	NC	NC		
29	GND-29	GND		
30	I2C_SCL	I2C_SCL		
31	NC	NC		*



Pin No	Definition	Basic Description	Type	
32	I2C_SDA	I2C_SDA		
33	Module Enable	Module Enable	I	
34	GND-34	GND		
35	GND-35	GND		
36	USB_D-	USB_DMNS	I/O	
37	GND-37	GND		
38	USB_D+	USB_DPLS	I/O	
39	VCC3P3	+3.3V power supply	I	Power
40	GND-40	GND		
41	VCC3P3	+3.3V power supply	I	Power
42	WWAN_LED	WWAN_LED		
43	GND-43	GND		
44	NC	NC		
45	NC	NC		
46	NC	NC		
47	NC	NC		
48	NC	NC		
49	NC	NC		
50	GND-50	GND		
51	NC	NC		
52	VCC3P3	+3.3V power supply	I	Power



6. Power Delivery Requirements

Requirement	Description
Supply Voltage	3.3V within 5% tolerance on the motherboard.
Peak Current	The host board shall provide 2.5 A peak current.
Max in-rush Current	The Module boots maximum in-rush current of 6 A will be supported.
Power Stability	Use tantalum value more than 1000uF for power input (3.3V).

7. Minimum Rx Sensitivity – LTE

LTE Band	Duplex	Modulation	Bandwidth(MHz)	Rx Sensitivity(dBm)
41	TDD	QPSK	20	-95±1