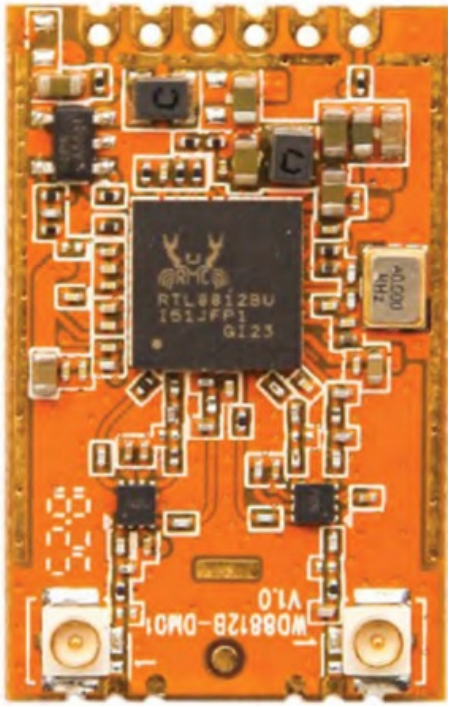
Contents [hide]

DRTECH TOP-8812BU PHY and RF Single Chip



Product Usage Instructions:

Installation:

Connect the device to an available USB2.0 port on your computer.

Driver Installation:

Install the appropriate drivers for the device on your operating system.

Connection:

Search for available WiFi networks and connect to the desired network using the device.

Settings:

Configure network settings and security preferences as needed through your operating system’s network settings.

General

The General of WIFI

- CMOS MAC,Baseband PHY and RF in a single chip for IEEE 802.11a/b/g/n/ac Draft 2.0 WLAN
- 802.11ac MIMO solution for 5G band
- Complete 802.11n MIMO solution for 2.4GHz and SGHz band

- 2×2 MIMO technology for extended reception robustness and exceptional throughput Maximun PHY data rate up tol73. 3Mbps using 20Mhz bandwidth, 400Mbps using 40MHz bandwidth, and 866.7Mbps using 80MHz bandwidth
- Backward compatible with 802.1 la/b/g devices while operating at 802.1ln data rates
- Backward compatible with 802.11a/n devices while operating at 802.11ac data rates.

Host Interface

- Complies with USB Specification R evision 2.0
- Standards Supported
- TEEE 802.11a/b/g/n/ac Draft 2.0 compatible WLAN
- IEEE 802.11e QoS Enhancement (W MM)
- IEEE 802.111 (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- IEEE 802.11h TPC, Spectrum Measurement
- IEEE 802.11k Radio Resource Measurement
- WAPI (Wireless Authentication Privacy Infrastructure) certified.
- Cisco Compatible Extensions (CCX) for WLAN devices

MAC Features

- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Low latency, immediate High-Throughput Block Acknowledgement (HT-BA)
- Long NAV for media reservation with CF-End for NAV release
- PHY-level spoofing to enhance legacy compatibility
- MIMO power-saving mechanism
- Channel management and co-existence compatible
- Multiple BSSID feature allows the RTL8812BU to assume multiple MAC identities when used as a wireless bridge
- Transmit Opportunity (TXOP) Short Inter-Frame Space (SIFS) bursting for higher multimedia bandwidth
- WiFi Direct supports wireless peer-to-peer applications

Other Features

- Supports Wake-On-WLAN via Magic Packet and Wake-up frame
- Transmit Beamforming
- CCA on secondary through RIS/CTS handshake.
- Support TCP/UDP/IP checks um offload

Peripheral Interfaces

- Up to 12 General Purpose Input/Output pins
- Three configurable LED pins (mux with GPIO pins)
- Configurable Bluetooth Coexistence Interface (mux with GPIO pins)
- Generates 40MHz clock for the eripheral chip
- Single external power source, 3.3 V only

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PHY Features

- IEEE 802.1 MIMO OFD M
- IEEE 802.1 In MIMO OFDM
- Two Transmit and Two Receive paths 5MHz / IOMHz / 20MHz / 40MHz / SOMHz bandwidth transmission
- Support 2.4Ghz and 5Ghz band channels
- Short Guard Interval (400ns)
- Sounding packet.
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble, OFDM with BPSK, QPSK, 16QAM,64QAM and 256QAM modulation.Convolutional coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54Mbps in 802.1 lg, 300Mbps in 802.11n and 866.7Mbps in 802.1 lac.

- OFDM receive diversity with MRC using up to 2 receive paths. Switch diversity used for DSSS/CCK
- Support STBC
- Support LDPC
- Hardware antenna diversity
- Selectable digital transmit and receiver FIR filters
- Programmable scaling in transmitter and receiver to trade quantization noise against increased probability of clipping
- Fast receiver Automatic Gain Control (AGC)
- On-chip ADC and DAC
- Built-in both 2.4GHz and 5G Hz PA
- Built-in both 2.4GHz and 5G Hz LNA

PRODUCT SPECIFICAT IONS

Main chipset : WiFi Single Chip: Realtek RTL8812BU-CG functional Specifications

Main chipset	RTL8812BU-CG
Standards	***WiFi:*** IEEE 802.11a,IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IEEE 802.11e,, IEEE 802.11i
Bus Interface	***WiFi:*** USB2.0

Data Rate	**802.11b:** 11, 5.5, 2, 1 Mbps **802.11g:** 54, 48, 36, 24, 18, 12, 9, 6 Mbps **802.11n:** MCS 0 to 7 for HT20MHz ;MCS 0 to 7 for HT40MHz **802.11ac:** 866.7Mbps
Modulation Techniques	**802.11b(DSSS) :** CCK, DQPSK, DBPSK **802.11 g (OFDM) :** 64 QAM, 256 QAM, QPSK , BPSK
Operating Channel	**WiFi 2.4GHz:** 1 1: (Ch. 1-11) – United States 1 3: (Ch. 1-13) – Europe, Japan
Frequency Range	**WIFI:2.4GHz 5GHz**
Security	WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64 bit & 128bit, WMM, IEEE 802.11e, IEEE 802.11i
OS supported	Linux /Android/Windows

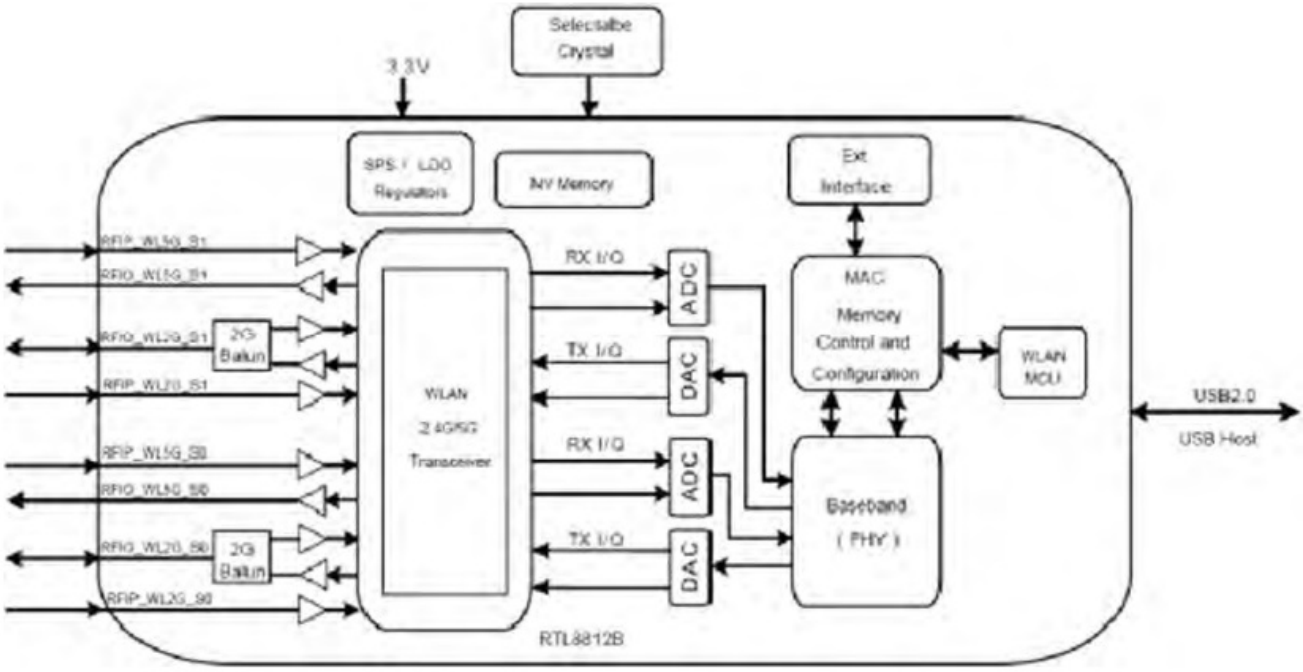
Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-20	+85	℃
Ambient Operating Temperature	0	70	℃

Junction Temperature	0	125	℃

Diagram

- Dual-Band 11ac (1×1) Solution with Single Antenna



Power Supply DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
WLA_VD33_PA,WLA_VD33_PA	3.3V I/O and RFAFE				
D,WLG_VD33_PAD,WL_VD33_S YN, VD33IO,SW_HV3,	Supply Voltage	3.0	3.3	3.6	V
V33USB,VD33A					

DC Characteristics

Module	**Voltage**	**Current Consumption (linking)**
8812B-DM01 V1.0	3.3V	

EPower Supply DC Characteristics

1. RF Characteristics for IEEE802.11 (11Mbps mode unless otherwise specified)

Items	**Contents**			
Specification	IEEE802.11b			
Channel frequency	2412 ~ 2472 MHz			
RX (per≦-85 dBm@8%)	-85 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		17		dBm
EVM (≦-18)		-18		dB

2. RF Characteristics for IEEE802.11g (54Mbps mode unless otherwise specified)

Items	**Contents**			
Specification	IEEE802.11g			
Channel frequency	2412 ~ 2472 MHz			
RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit

Power Level (±2dB)		14		dBm
EVM (≤-25)		-27		dB

3. RF Characteristics for IEEE802.11n (BW20_MCS7)

Items	**Contents**			
Specification	IEEE802.11n (BW20_MCS7)			
Channel frequency	2412 ~ 2472 MHz			
RX (per≤-65 dBm@10%)	-65 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		13		dBm
EVM (≤-28)		-28		dB

4. RF Characteristics for IEEE802.11n (BW40_MCS7)

Items	**Contents**			
Specification	IEEE802.11n (BW40_MCS7)			
Channel frequency	2422 ~ 2462 MHz			
RX (per≤-65 dBm@10%)	-65 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		12		dBm
EVM (≤-28)		-28		dB

5. RF Characteristics for IEEE802.11a (54Mbps mode unless otherwise specified)

Items	**Contents**			
Specification	IEEE802.11a			
Channel frequency	5180 ~ 5240 MHz,			
RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		14		dBm
EVM (≦-25)		-27		dB

Items	**Contents**			
Specification	IEEE802.11a			
Channel frequency	5745 ~ 5805 MHz			
RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		11		dBm
EVM (≦-25)		-27		dB

6. RF Characteristics for IEEE802.11n (BW20_MCS7)

Items	**Contents**
Specification	IEEE802.11n
Channel frequency	5180 ~ 5240 MHz,

RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		14		dBm
EVM (≦-25)		-27		dB

Items	**Contents**			
Specification	IEEE802.11n			
Channel frequency	5745 ~ 5805 MHz			
RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		11		dBm
EVM (≦-25)		-27		dB

7. RF Characteristics for IEEE802.11n (BW40_MCS7)

Items	**Contents**			
Specification	IEEE802.11n			
Channel frequency	5190 ~ 5230 MHz,			
RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit

Power Level (±2dB)		10		dBm
EVM (≤-25)		-27		dB

Items	**Contents**			
Specification	IEEE802.11n			
Channel frequency	5755 ~ 5795 MHz			
RX (per≤-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		8		dBm
EVM (≤-25)		-27		dB

8. RF Characteristics for IEEE802.11ac (BW20_MCS8)

Items	**Contents**			
Specification	IEEE802.11ac			
Channel frequency	5180 ~ 5240 MHz			
RX (per≤-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		14		dBm
EVM (≤-25)		-27		dB

Items	**Contents**

Specification	IEEE802.11ac			
Channel frequency	5745 ~ 5805 MHz			
RX (per≦-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dB)		11		dBm
EVM (≦-25)		-27		dB

9. RF Characteristics for IEEE802.11AC (BW40_MCS9)

Items	**Contents**			
Specification	IEEE802.11AC (BW40_MCS9)			
Channel frequency	5190 ~ 5230 MHz			
RX (per≦-65 dBm@10%)	-63 dBm			
Freq err Limit	±10PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		10		dBm
EVM (≦-32)		-32		dB

Items	**Contents**
Specification	IEEE802.11AC (BW40_MCS8)
Channel frequency	5755 ~ 5795 MHz
RX (per≦-65 dBm@10%)	-63 dBm

Freq err Limit	±10PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		8		dBm
EVM (≤-32)		-32		dB

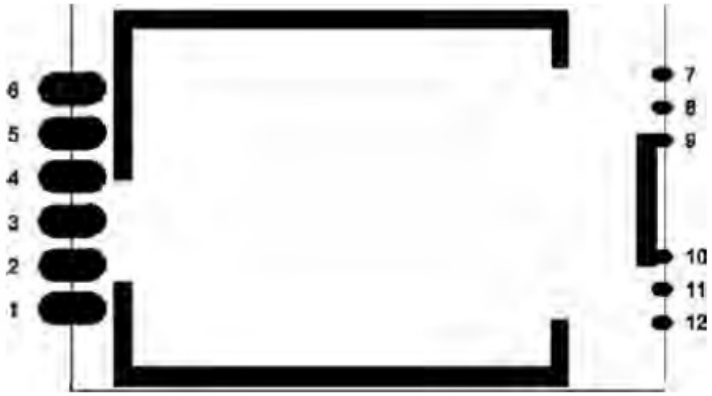
10. RF Characteristics for IEEE802.11AC (BW80_MCS9)

Items	**Contents**			
Specification	IEEE802.11AC (BW80_MCS9)			
Channel frequency	5210 MHz			
RX (per≤-60 dBm@10%)	-60 dBm			
Freq err Limit	±10PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		9		dBm
EVM (≤-32)		-32		dB

Items	**Contents**			
Specification	IEEE802.11AC (BW80_MCS9)			
Channel frequency	5775 MHz			
RX (per≤-60 dBm@10%)	-60 dBm			
Freq err Limit	±10PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dB)		6		dBm

EVM (≤-32)		-32		dB

MODULE PIN ASSIGNMENT

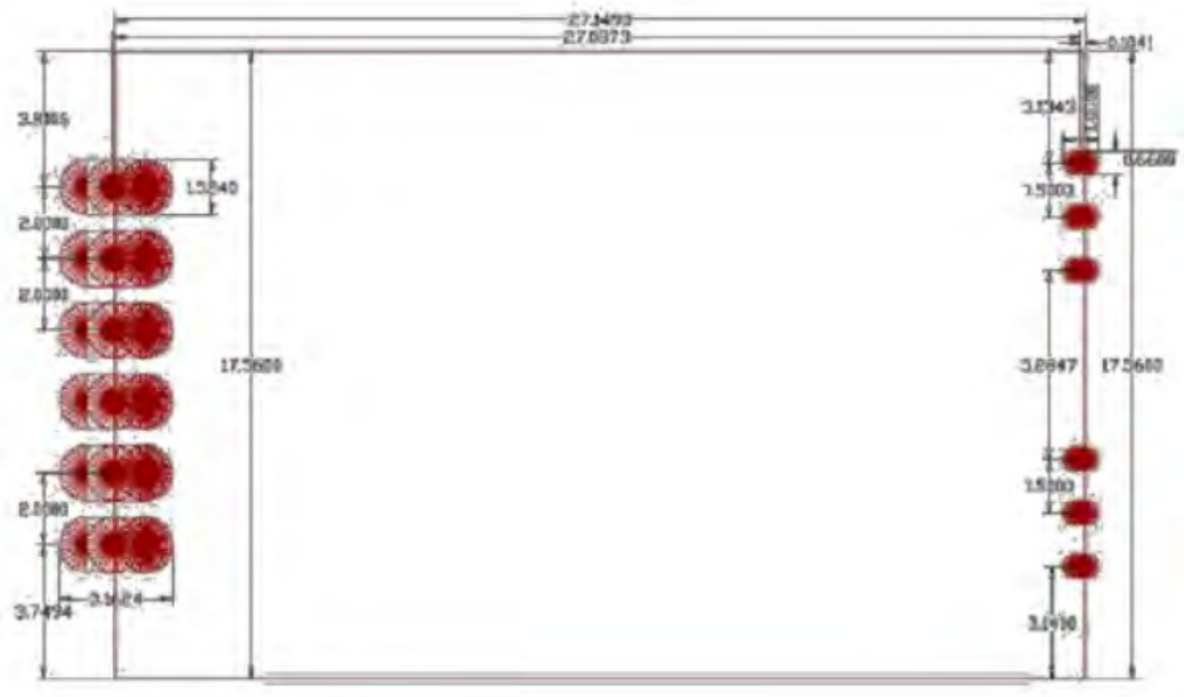


PIN	Function	Type	Description
1	WL_DIS_N	I	This Pin can externally shutdown the RTL8812BU (n o requirement for an extra power switch) or turn the WL AN radio off through the host interface according to t he internal setting of internal non-volatile memory. Th is pin is also shared with GPIO11
2	VDD33		3.3V
3	HSDM	I/O	USB D-
4	HSDP	I/O	USB D+
5	GND		Ground
6	WL_WAKE_H ST	I/O	General Purpose Input/Output Pin
7	GND		Ground
8	RF_0		ANT RF0

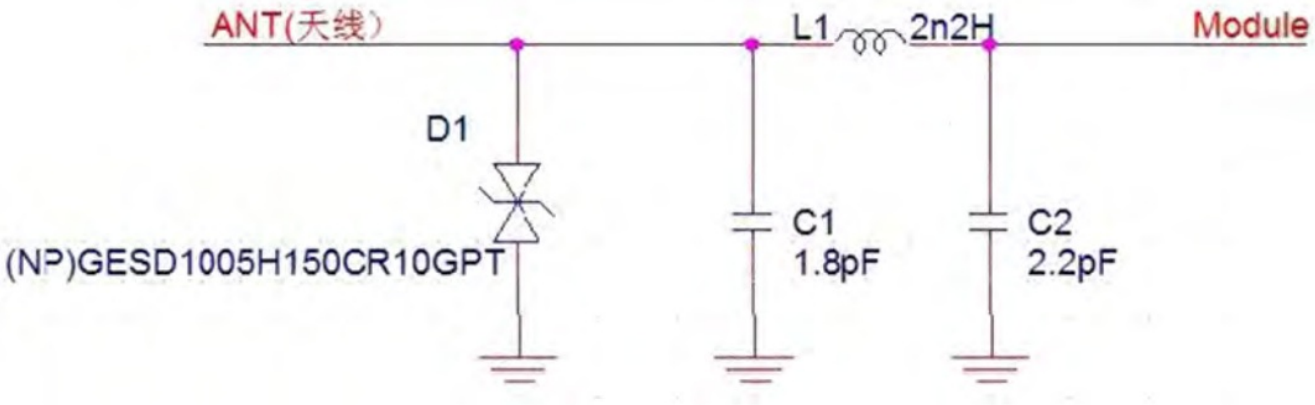
9	GND		Ground
10	GND		Ground
11	RF_1		ANT RF1
12	GND		Ground

Size reference

	Length	**Width**	**Height**
Dimensions (mm)	**27. 149** (Tolerance:**±**0.2mm	**17.56** (Tolerance:**±**0.2mm	**2.9** (Tolerance:**±**0.2mm

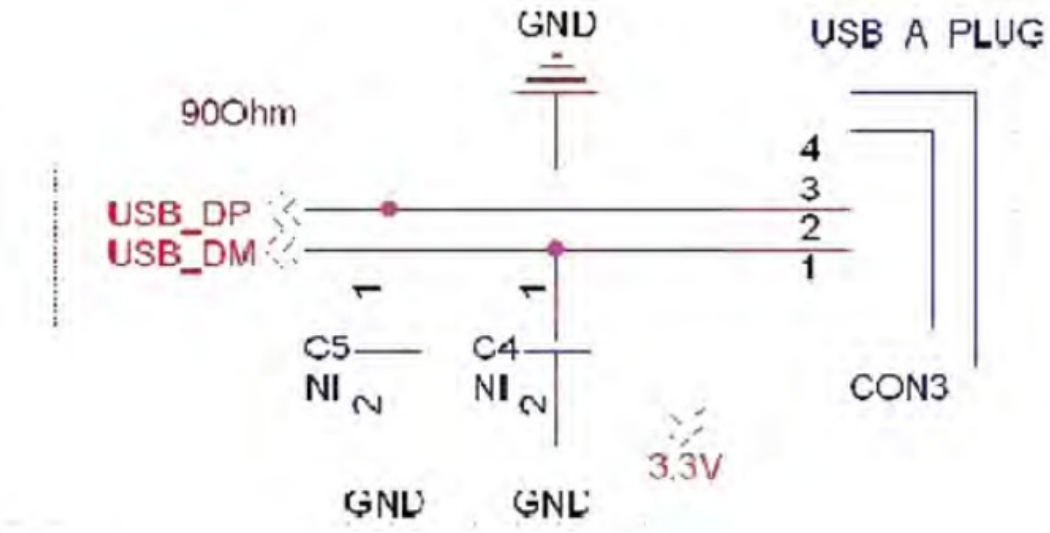


WIFI/BT RF Circuit reference pictures



1. Above the dotted box part of the antenna matching is needed, the actual antenna matching electronic parameters shall prevail.
2. For RF part layout to do 50 ohm impedance. can't go on 90°of layout .The line length can't more than 20 mm.

USB interface electrical characteristics



Compliance Information

FCC & IC (FCC ID: RNH-TOP8812BU / 29808-TOP8812BU) – FCC

Statement requirements

§ 15.19

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

§ 15.105 Information to the user.

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 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.

§ 15.21

Changes or modifications not expressly approved by the manufacturer (or party responsible) for compliance could void the user's authority to operate the equipment.

Radiation Exposure Statement

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.
- If the host device into which this device is integrated is used in close proximity to the human body (less than 20 cm), SAR assessment is required.

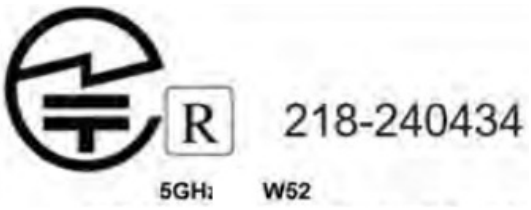
IC

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Label

- **Product:** Wireless Module
- **Model Name:** TOP-8812BU
- **Manufacturer:** TOPLINKST TECHNOLOGY CO, ,LTD
- **FCC 10:** RNH-TOP8812BU
- **Made in China**



Integrators Installation Guide (For FCC/IC)

Important Notice to OEM integrators

1. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
2. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band

emissions).

The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s).

- The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

End Product Labeling

- When the module is installed in the host device, the FCC ID/IC label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: RNH-TOP8812BU” & “Contains IC: 29808-TOP8812BU”
- The FCC ID can be used only when all FCC/IC compliance requirements are met.

Antenna Installation

1. The transmitter module may not be co-located with any other transmitter or antenna.
2. Only antennas of the equal or less gains as shown below may be used with this module:

Frequency Band	**2.4 GHz Band**	**5.2 GHz Band**	**5.8GHz Band**
Max. Gain (dBi)	APDR-600WT: -5.5 dBi APDR-600WS: -3.6 dBi	APDR-600WT: 0.7 dBi APDR-600WS: -0.4 dBi	APDR-600WT: 1.1 dBi APDR-600WS: -0.5 dBi

Note: The above gain is considered cable loss.

When using an antenna higher than the gain mentioned above, the product may require C2PC filing with additional tests (Radiated spurious emissions etc.) and RF exposure evaluation.

Manual Information to the End User

- 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.

Additional Testing, Part 15 Subpart B Disclaimer

- The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

EMI Considerations

A host manufacture is recommended to use KDB 996369 D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties For standalone mode, reference the guidance in KDB 996369 D04 Module Integration Guide and for simultaneous mode; see KDB 996369 D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

FAQS

Q: How do I know if the device is properly connected?

A: Check your computer's network settings to see if the device is recognized and connected to a network.

Q: Can I use this device with a Mac operating system?

A: The device is compatible with Linux / Android / Windows operating systems only.

Q: What should I do if the device is not detecting any WiFi networks?

A: Make sure the device is properly installed and drivers are correctly set up. Try

reconnecting the device or restarting your computer.

Documents / Resources

	DRTECH TOP-8812BU PHY and RF Single Chip [pdf] User Manual RNH-TOP8812BU, RNHTOP8812BU, top8812bu, TOP-8812BU PHY and RF Single Chip, TOP-8812BU, PHY and RF Single Chip, Single Chip, Chip

References

- User Manual

DRTECH

chip, DRTECH, PHY and RF Single Chip, RNH-TOP8812BU, RNHTOP8812BU, Single Chip, TOP-8812BU, TOP-8812BU PHY and RF Single Chip, top8812bu

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