

# **Module EL.MT7663BUN-WFT Datasheet**

**IEEE 802.11 2x2 WiFi 5 Wireless LAN**

**and**

**Bluetooth 5.1**

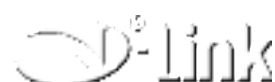
**USB Combo Module**

[SoC MT7663BEN]

for 802.11a/b/g/n/ac + Bluetooth 5.1

**Version: 0.4**

For Private Preview



## 1. Features

### 1.1 Module overview

EL.MT7663BUN-WFT module design is based on Mediatek MT7663BUN solution, The MT7663BUN is a highly integrated single chip which has built in a 2x2 dual-band wireless LAN radio and Bluetooth radio. It includes Bluetooth EDR and LE radio which complies with Bluetooth v2.1+EDR, v4.2, and v5.1. The Module is a highly integrated MAC/BBP and 2.4/5GHz PA/LNA single chip which supports a 866.7Mbps PHY rate. The Module is designed to support standard-based features in the areas of security, quality of service, and international regulations, giving end users the greatest performance anytime and in any circumstance. This documentation describes the engineering requirements specification.

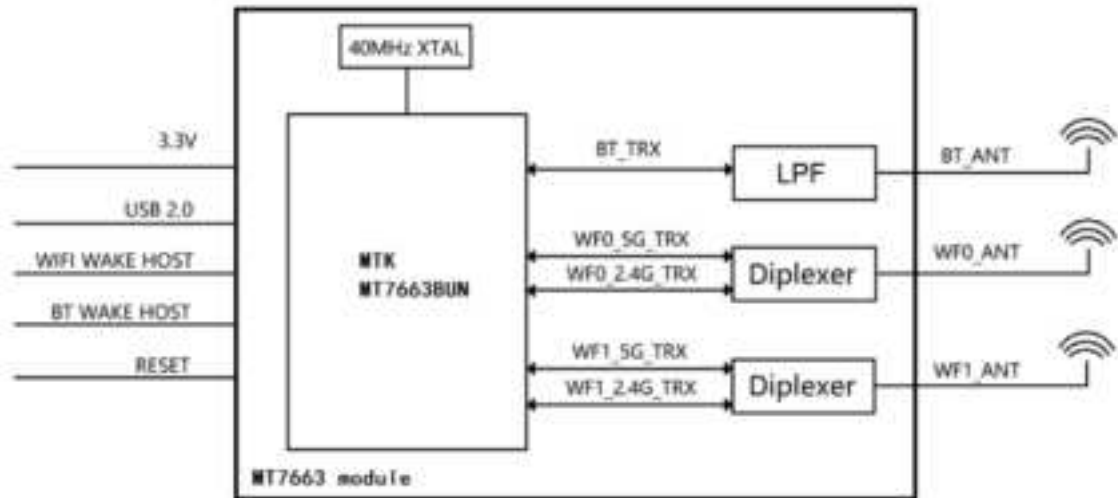
### 1.2 system function

This WLAN Module design is based on Mediatek MT7663BUN. It is a highly integrated single-chip MIMO(Multiple In Multiple Out) Wireless LAN (WLAN) network interface controller complying with the 802.11 specification and Bluetooth over USB interface. It combines a MAC, a 2T2R capable baseband, and RF in a single chip. An intelligent Wi-Fi/Bluetooth coexistence algorithm is implemented to provide the best harmonized Wi-Fi and Bluetooth radio performance.

### 1.3 System characteristics

|                      |                                                                                                                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Size          | Typical:25.0mmx 30.0mm x 6.0mm                                                                                                                                                                         |
| Main chip            | Mediatek MT7663BUN                                                                                                                                                                                     |
| frequency band       | 2.4G/5G                                                                                                                                                                                                |
| Antenna              | External Antennas Design                                                                                                                                                                               |
| voltage              | 3.3V +/-10% input                                                                                                                                                                                      |
| PCB information      | 4-layers design (1+/-0.15mm)                                                                                                                                                                           |
| Peripheral interface | USB 2.0                                                                                                                                                                                                |
| working temperature  | -10℃ to +70℃                                                                                                                                                                                           |
| Storage temperature  | -40℃ to +85℃                                                                                                                                                                                           |
| power waste          | Power Consumption (WIFI TX): 700mA@5V 5G TX NSS=2 HT20 MCS0<br>Power Consumption (WIFI RX): 150mA@5V 5G RX NSS=2 VHT80 MCS9<br>Power Consumption (BT TX): 82mA@5V<br>Power Consumption (BT RX) 29mA@5V |
| Antistatic index     | HBM 2 kV (Class 1 B)<br>ESD : ±4 kV                                                                                                                                                                    |

## 1. 4 Logic block diagram

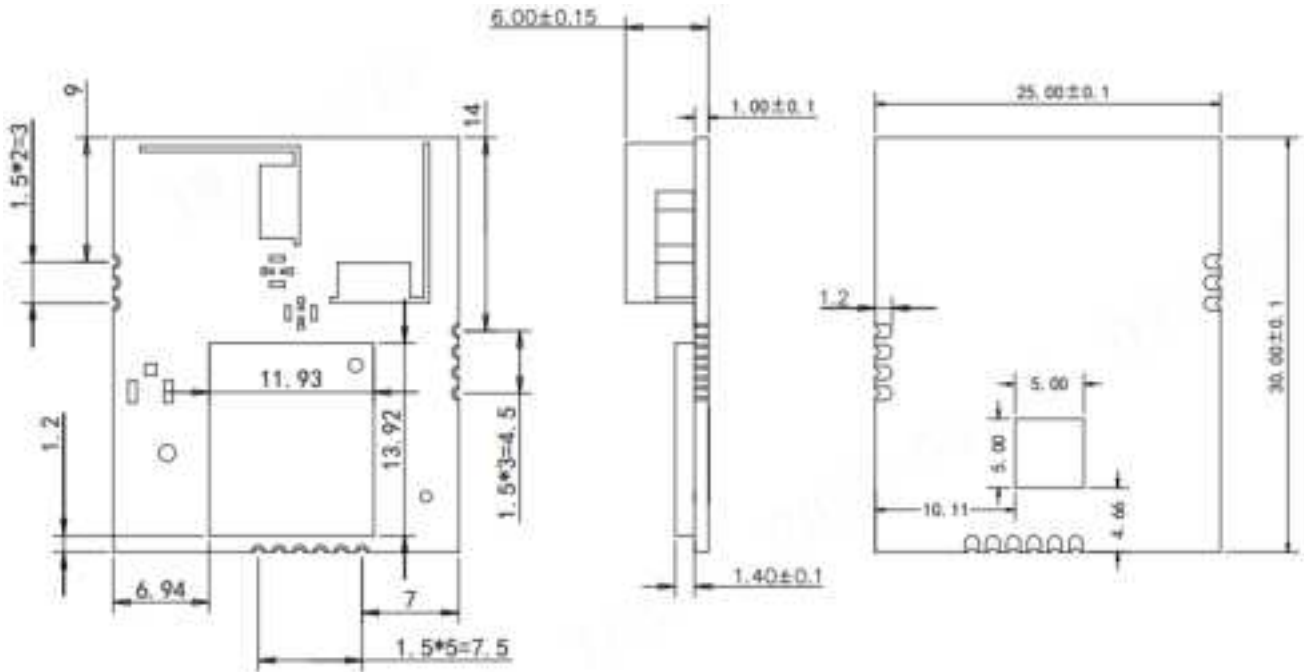


## 2. mechanical properties

### 2.1 size

Typical size (W x L x T): 25.0mm x 30.0mm x 6.0mm

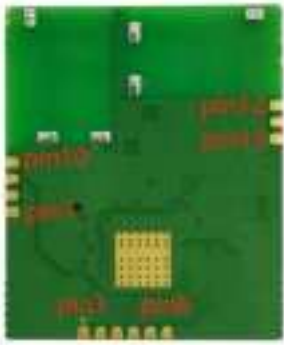
PCB thickness: 1.0mm (+/-0.15mm)



TOP View

BOT View

## 2. 2 Pin definition



| NO. | definition | function                |
|-----|------------|-------------------------|
| 1   | GND        | Module grounding        |
| 2   | DP+        | USB D+                  |
| 3   | DM-        | USB D-                  |
| 4   | VCC        | 3.3V INPUT              |
| 5   | CHIP_EN    | Module enable           |
| 6   | WIFI_WAKE  | WIFI WAKE Host          |
| 7   | GND        | Module grounding        |
| 8   | SYNC       | NC                      |
| 9   | BT_WAKE    | GPIO port of wake-up TV |
| 10  | GND        | Module grounding        |
| 11  | GND        | Module grounding        |
| 12  | BT_RF      | BT RF                   |
| 13  | GND        | Module grounding        |

## 2. 3 Information identification



TOP VIEW



BOTTOM VIEW

### 3. RF characteristics

#### 3.1 Wi-Fi RF characteristics

| Items                                                   | Contents                                                                                                                                                                    |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WLAN Standard                                           | IEEE 802.11a/b/g/n/ac                                                                                                                                                       |
| Frequency Range                                         | 5.1GHz~5.9GHz (5GHz, excluding 5500~5720MHz)                                                                                                                                |
|                                                         | 2.412GHz~2.462GHz (Wifi)                                                                                                                                                    |
| Channels                                                | CH1 to CH11 @ 2.4G                                                                                                                                                          |
|                                                         | CH36 to CH165 @ 5G(excluding CH100~144)                                                                                                                                     |
| Modulation Mode                                         | 11b: DBPSK, DQPSK and CCK and DSSS<br>11a/g: BPSK, QPSK, 16QAM, 64QAM and OFDM<br>11n: BPSK, QPSK, 16QAM, 64QAM and OFDM<br>11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM and OFDM |
| Output Power                                            | 802.11b /1Mbps~11Mbps: 15dBm $\pm$ 2dBm                                                                                                                                     |
|                                                         | 802.11g /6Mbps~48 Mbps: 13dBm $\pm$ 2dBm                                                                                                                                    |
|                                                         | 802.11g /54Mbps: 13dBm $\pm$ 2dBm                                                                                                                                           |
|                                                         | 802.11a /6Mbps~48 Mbps: 14dBm $\pm$ 2dBm                                                                                                                                    |
|                                                         | 802.11a /54Mbps: 14dBm $\pm$ 2dBm                                                                                                                                           |
|                                                         | 2.4G 802.11n HT20 / MCS0-MCS6: 15dBm $\pm$ 2dBm                                                                                                                             |
|                                                         | 2.4G 802.11n HT20 /MCS7: 15dBm $\pm$ 2dBm                                                                                                                                   |
|                                                         | 5G 802.11n HT20 / MCS0-MCS6: 16dBm $\pm$ 2dBm                                                                                                                               |
| EVM                                                     | 5G 802.11n HT20 /MCS7: 16dBm $\pm$ 2dBm                                                                                                                                     |
|                                                         | 2.4G 802.11n HT40 / MCS0-MCS6: 12dBm $\pm$ 2dBm                                                                                                                             |
|                                                         | 2.4G 802.11n HT40 /MCS7: 12dBm $\pm$ 2dBm                                                                                                                                   |
|                                                         | 5G 802.11n HT40 / MCS0-MCS6: 16dBm $\pm$ 2dBm                                                                                                                               |
|                                                         | 5G 802.11n HT40 /MCS7: 16dBm $\pm$ 2dBm                                                                                                                                     |
|                                                         | 5G 802.11ac VHT20/VHT40/VHT80 MCS0-MCS6: 16dBm $\pm$ 2dBm                                                                                                                   |
|                                                         | 5G 802.11ac VHT20/VHT40/VHT80 MCS7: 16dBm $\pm$ 2dBm                                                                                                                        |
|                                                         | 5G 802.11ac VHT20/VHT40/VHT80 MCS8-MCS9: 16dBm $\pm$ 2dBm                                                                                                                   |
| Receive Sensitivity 11b, 20MHz<br>error rate $\leq$ 8%  | 802.11b /11Mbps : $\leq$ -15dBm                                                                                                                                             |
|                                                         | 802.11g /54Mbps : $\leq$ -28dBm                                                                                                                                             |
|                                                         | 802.11n HT20 /MCS7: $\leq$ -30dBm                                                                                                                                           |
|                                                         | 802.11n HT40 /MCS7 : $\leq$ -30dBm                                                                                                                                          |
| Receive Sensitivity 11g, 20MHz<br>error rate $\leq$ 10% | 1Mbps $\leq$ -76dBm                                                                                                                                                         |
|                                                         | 11Mbps $\leq$ -76dBm                                                                                                                                                        |
| Receive Sensitivity 11n, 20MHz<br>误包率 $\leq$ 10%        | 6Mbps $\leq$ -82dBm                                                                                                                                                         |
|                                                         | 54Mbps $\leq$ -65dBm                                                                                                                                                        |
| Receive Sensitivity 11n, 40MHz<br>error rate $\leq$ 10% | MCS0 $\leq$ -82dBm                                                                                                                                                          |
|                                                         | MCS7 $\leq$ -64dBm                                                                                                                                                          |
| Receive Sensitivity 11n, 40MHz<br>error rate $\leq$ 10% | MCS0 $\leq$ -79dBm                                                                                                                                                          |
|                                                         | MCS7 $\leq$ -61dBm                                                                                                                                                          |

|                                                           |                                                        |
|-----------------------------------------------------------|--------------------------------------------------------|
| Receive Sensitivity<br>11ac, 20MHz error rate $\leq 10\%$ | MCS0 $\leq -82\text{dBm}$<br>MCS7 $\leq -64\text{dBm}$ |
| Receive Sensitivity<br>11ac, 40MHz error rate $\leq 10\%$ | MCS7 $\leq -79\text{dBm}$<br>MCS7 $\leq -56\text{dBm}$ |
| Receive Sensitivity<br>11ac, 80MHz error rate $\leq 10\%$ | MCS7 $\leq -76\text{dBm}$<br>MCS7 $\leq -51\text{dBm}$ |

### 3.2 BT RF characteristics

| Items                                            | Contents                           |
|--------------------------------------------------|------------------------------------|
| Channel                                          | BR, EDR: CH0 to CH78               |
|                                                  | LE: CH0 to CH39                    |
| Modulation                                       | GFSK、 $\pi/4$ -DQPSK、8PSK          |
| TX Power                                         | BR: $9\text{dBm} \pm 2\text{dBm}$  |
|                                                  | EDR: $9\text{dBm} \pm 2\text{dBm}$ |
|                                                  | LE: $4\text{dBm} \pm 2\text{dBm}$  |
| RX Characteristics                               | /                                  |
| 1. Receiver Sensitivity<br>(BER<0.1%, PER<30.8%) | BR: $-92\text{dBm}$                |
|                                                  | EDR: $-91\text{dBm}$               |
|                                                  | LE: $-95\text{dBm}$                |
| 2. Maximum usable signal                         | BR: $-5\text{dBm}$                 |
|                                                  | EDR: $-5\text{dBm}$                |
|                                                  | LE: $-5\text{dBm}$                 |

#### FCC regulatory compliance statement

##### §15.19 Statement

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.

##### §15.21 Information to user

Warning: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### #List of applicable FCC Rules:

47 CFR Part 15, Subpart C 15.247

47 CFR Part 15, Subpart E 15.407

#### #Summarize the specific operational use conditions

The module can be used in teleconference machine. After installing this module, the telephone can be connected to the router through a wireless network. In WIFI coverage, users can send various instructions through smart phones or PCs, which is very convenient. The input voltage of the module is nominally 3.3V, and other antennas of the same type with less than the original gain can be replaced.

**RF Exposure compliance statement**

This Module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

**# Antenna Change Notice to Host manufacturer**

The module itself does have two antenna. During the test, the host provides a Metal antenna with a maximum gain of 3.55dBi.

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

**Labelling Instruction for Host Product Integrator**

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: 2AWY6-ELMT7663BUNT" any similar wording that expresses the same meaning may be used.

§ 15.19 Labelling requirements shall be complied on end user device.

Labelling rules for special device, please refer to §2.925, § 15.19 (a)(5) and relevant KDB publications. For E-label, please refer to §2.935.

**Information on test modes and additional testing requirements**

Test software access to different test modes: BT\_Combo\_Tool\_formal and customer\_package\_UiV2.06\_DLLv4.09\_E2-20200304\_WinDriverV.0.0.2.5\_FWv.10c0f240

Testing item, Frequencies, Transmit Power, Modulation Type, test Antennas can be selected on the test script instructions.

**FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer**

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.

Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in §15.105 *Information to the user* or such similar statement and place it in a prominent location in the text of host product manual. Original texts as following:

**For Class B:** 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.

For Class A

*Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

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#### ISED compliance statement

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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

#### ISED Radiation Exposure statement

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment.

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

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20cm entre le radiateur et votre corps.

#### End Device Labelling

Please notice that if the IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: **26332-ELMT7663BUT**" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit : Contient IC : **26332-ELMT7663BUT** est le numéro d'homologation du module.

## 5G Wi-Fi Use Notice

1. the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
2. the maximum antenna gain permitted for devices in the bands 5250-5350 MHz shall comply with the e.i.r.p. limit; and
3. the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.
4. Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

1. les dispositifs fonctionnant dans la bande 5 150-5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

2. le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5 250-5 350 MHz doit se conformer à la limite de p.i.r.e.;

3. le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5 725-5 825 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

4. De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.