Testing Laboratory 3787

# RADIO EXPOSURE TEST REPORT

| | | |
|---|---|---|
| FCC ID | : | MSQ-RTBE8Y00 |
| Equipment | : | BE3600 Dual Band WiFi 7 Router |
| Brand Name | : | ASUS |
| Model Name | : | RT-BE58U V2, TUF-BE3600 V2, RT-BE3600 V2, RT-BE55 |
| Applicant | : | ASUSTeK COMPUTER INC.<br>1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan |
| Standard | : | 47 CFR Part 2.1091 |

**The product was received on Apr. 17, 2025, and testing was started from Apr. 17, 2025 and completed on Jun. 03, 2025. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.**

**Approved by: Sam Chen**

*Sporton International Inc. Hsinchu Laboratory*
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**Photographs of EUT v01**

# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FA541834 | 01 | Initial issue of report | Jun. 11, 2025 |
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# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| 2 | - | Exposure evaluation | PASS | - |

| **Conformity Assessment Condition:** |
|---|
| 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.<br>2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty". |
| **Disclaimer:** |
| The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity. |

**Reviewed by: Sam Chen**

**Report Producer: Sandy Chuang**

# 1 General Description

## 1.1 EUT General Information

| RF General Information | | | |
|---|---|---|---|
| **Evaluation Mode** | **Frequency Range (MHz)** | **Operating Frequency (MHz)** | **Modulation Type** |
| 2.4GHz WLAN | 2400-2483.5 | 2412-2462 | 802.11b: DSSS (DBPSK, DQPSK, CCK)<br>802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM) |
| 5GHz WLAN | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 5180-5250<br>5250-5320<br>5500-5720<br>5745-5825 | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM) |

## 1.2 Antenna Information

| Ant. | Port | | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|---|---|
| | 2.4GHz | 5GHz | | | | | |
| 1 | 1 | - | XINSHENG | SSR-2402018 | Dipole | I-PEX | Note 1 |
| 2 | - | 1 | XINSHENG | SSR-2503030 | Dipole | I-PEX | |
| 3 | 2 | - | XINSHENG | SSR-2402019 | Dipole | I-PEX | |
| 4 | - | 2 | XINSHENG | SSR-2402021 | Dipole | I-PEX | |

Note 1:

| Ant. | Port | | Antenna Gain (dBi) | | | | |
|---|---|---|---|---|---|---|---|
| | 2.4GHz | 5GHz | WLAN 2.4GHz | WLAN 5GHz UNII 1 | WLAN 5GHz UNII 2A | WLAN 5GHz UNII 2C | WLAN 5GHz UNII 3 |
| 1 | 1 | - | 3.37 | - | - | - | - |
| 2 | - | 1 | - | 2.91 | 3.37 | 2.99 | 3.08 |
| 3 | 2 | - | 3.46 | - | - | - | - |
| 4 | - | 2 | - | 3.11 | 3.20 | 3.09 | 3.10 |

Note 2: The above information was declared by manufacturer.

Note 3: Directional gain information

| Type | Maximum Output Power | Power Spectral Density |
|---|---|---|
| Non-BF | Directional gain = Max.gain + array gain.<br>For power measurements on IEEE 802.11 devices<br>Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4 | $Directional\ Gain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ |
| BF | $Directional\ Gain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ | $Directional\ Gain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ |

Ex.

Directional Gain (NSS1) formula : $Directional\ Gain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$

NSS1(g1,1) = $10^{G1/20}$ ; NSS1(g1,2)= $10^{G2/20}$ ; NSS1(g1,2)= $10^{G3/20}$; NSS1(g1,2)= $10^{G4/20}$

gj,k =(Nss1(g1,1) + Nss1(g1,2) + Nss1(g1,3) + Nss1(g1,4) )$^2$

DG = 10 log[(Nss1(g1,1) + Nss1(g1,2) + Nss1(g1,3) + Nss1(g1,4))$^2$ / $N_{ANT}$] => 10 log[($10^{G1/20}$ + $10^{G2/20}$ + $10^{G3/20}$ + $10^{G4/20}$ )$^2$ / $N_{ANT}$]

Where ;

2.4G G1= 3.37 dBi ;G2= 3.46 dBi

5G UNII-1 G1 = 2.91 dBi; G2 = 3.11 dBi

5G UNII-2A G1 = 3.37 dBi; G2 = 3.20 dBi

5G UNII-2C G1 = 2.99 dBi; G2 = 3.09 dBi

5G UNII-3 G1 = 3.08 dBi; G2 = 3.10 dBi

2.4G DG = 6.43 dBi

5G UNII-1 DG = 6.02 dBi

5G UNII-2A DG = 6.30 dBi

5G UNII-2C DG = 6.05 dB

5G UNII-3 DG = 6.10 dBi

Note 4:

**For WLAN 2.4GHz function:**

**For IEEE 802.11b/g/n/VHT/ax/be mode (2TX/2RX):**

Port 1 and Port 2 can be use as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

**For WLAN 5GHz function:**

**For IEEE 802.11n/a/ac/ax/be mode (2TX/2RX):**

Port 1 and Port 2 can be use as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

## 1.3 Table for EUT Support Function

| Function | Supports Band |
|---|---|
| AP Router | Master |
| Bridge | Slave without radar detection |
| Repeater | Master |
| Mesh | Master |

Note 1: The USB port on this device supports both storage and WWAN functionality.
Note 2: The 1G LAN 1/WAN port and 2.5G LAN 1/WAN port will be fixed to the LAN function when the EUT is in WWAN function.
Note 3: The above information was declared by manufacturer.

## 1.4 Table for Multiple Listing and EUT Information

| EUT | Model Name | Housing Design | Way to fix antenna cable to port | LED Spacer Thickness | Power Button Size | USB port |
|---|---|---|---|---|---|---|
| 1 | RT-BE58U V2 | Housing design 1 | Note 1 | Thick | Small | With |
| - | RT-BE3600 V2 | | | | | |
| 2 | TUF-BE3600 V2 | Housing design 2 | | Thin | Big | With |
| 3 | RT-BE55 | Housing design 1 | | Thick | Small | Without |

| EUT | Model Name | RAM | Flash | Equip Adapter | Wall mounted port |
|---|---|---|---|---|---|
| 1 | RT-BE58U V2 | 1GB | 256M | Adapter 1~2 | Without |
| - | RT-BE3600 V2 | | | | |
| 2 | TUF-BE3600 V2 | 1GB | 256M | Adapter 1~2 | With |
| 3 | RT-BE55 | 512M | 128M | Adapter 3~4 | Without |

Note 1:

| EUT | Way to fix antenna cable to port |
|---|---|
| 1 | Ant.1: Fix the antenna cable on the holder in RC1<br>Ant.2: Fix the antenna cable on the holder in RC5<br>Ant.3: Fix the antenna cable on the holder in RC6<br>Ant.4: Fix the antenna cable on the holder in RC4 |
| 2 | Ant.1: Fix the antenna cable on the holder of the heatsink<br>Ant.2: Fix the antenna cable on the holder of the heatsink<br>Ant.3: Fix the antenna cable on the holder in RC4 and on the holder of the heatsink<br>Ant.4: Fix the antenna cable on the holder of the heatsink |
| 3 | Ant.1: Fix the antenna cable on the holder in RC1<br>Ant.2: Fix the antenna cable on the holder in RC5<br>Ant.3: Fix the antenna cable on the holder in RC6<br>Ant.4: Fix the antenna cable on the holder in RC4 |

Note 2: The different model names (RT-BE58U V2 and RT-BE3600 V2) served as strategy for marketing.

Note 3: From the above models, model: RT-BE58U V2 (EUT 1) was selected to test all items.

Note 4: The above information was declared by manufacturer.

## 1.5 Accessories

| Accessories | | | |
|---|---|---|---|
| **Equipment Name** | **Brand Name** | **Model Name** | **Rating** |
| Adapter 1 | Frecom | F24L6-120200SPAU | Input: 100-240V~50/60Hz, 0.6A<br>Output: 12.0V, 2.0A, 24.0W |
| Adapter 2 | LEI | MU24D1120200-A1 | Input: 100~240V~50/60Hz, 0.7A<br>Output: 12V, 2A |
| Adapter 3 | AMC | AD-0181200150US-1 | Input: 100-240V~50/60Hz, 0.6A<br>Output: 12V, 1.5A |
| Adapter 4 | Frecom | F18L10-120150SPAU | Input: 100-240V~50/60Hz, 0.6A<br>Output: 12.0V, 1.5A, 18.0W |
| **Others** | | | |
| RJ-45 cable 1*1: Non-shielded, 1.5m | | | |
| RJ-45 cable 2*1: Non-shielded, 1.5m | | | |

## 1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

## 1.7 Testing Location

| Testing Location Information | |
|---|---|
| Test Lab.：Sporton International Inc. Hsinchu Laboratory | |
| Hsinchu | ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) |
| (TAF: 3787) | TEL: 886-3-656-9065 FAX: 886-3-656-9085 |
| | Test site Designation No. TW3787 with FCC. |
| | Conformity Assessment Body Identifier (CABID) TW3787 with ISED. |

# 2 Maximum Permissible Exposure

## 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm²) | Averaging Time \|E\|²,\|H\|² or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | *(100) | <6 |
| 3.0-30 | 1842/f | 4.89/f | *(900/f²) | <6 |
| 30-300 | 61.4 | 0.163 | 1.0 | <6 |
| 300-1500 | - | - | f/300 | <6 |
| 1500-100,000 | - | - | 5 | <6 |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm²) | Averaging Time \|E\|²,\|H\|² or S (minutes) |
|---|---|---|---|---|
| 0.3-1.34 | 614 | 1.63 | *(100) | <30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f²) | <30 |
| 30-300 | 27.5 | 0.073 | 0.2 | <30 |
| 300-1500 | - | - | f/1500 | <30 |
| 1500-100,000 | - | - | 1.0 | <30 |

Note: f = frequency in MHz ; *Plane-wave equivalent power density

## 2.2 MPE Calculation Method

The MPE was calculated at 51 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

***Pd*** = $\frac{30 \times P \times G}{377 \times d^2}$

## 2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

$d$ = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ / 2 π.

| Single RF Sources Subject to Routine Environmental Evaluation | |
|---|---|
| **RF Source frequency (MHz)** | **Threshold ERP (watts)** |
| 0.3-1.34 | 1,920 $R^2$. |
| 1.34-30 | 3,450 $R^2/f^2$. |
| 30-300 | 3.83 $R^2$. |
| 300-1,500 | 0.0128 $R^2f$. |
| 1,500-100,000 | 19.2$R^2$. |
| Note: R is in meters, f is in MHz. | |

## 2.4 Calculated Result and Limit

**Exposure Environment: General Population / Uncontrolled Exposure**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;D1D | 6.43 | 27.14 | 31.42 | 0.50 | 1555.966 | 51 | C | 4994.0 | 0.3117 |
| 5.2G;D1D | 6.02 | 29.84 | 33.71 | 0.13 | 2421.029 | 51 | C | 4994.0 | 0.4850 |
| 5.3G;D1D | 6.30 | 23.66 | 27.81 | 0.01 | 605.341 | 51 | C | 4994.0 | 0.1213 |
| 5.6G;D1D | 6.05 | 23.91 | 27.81 | 0.01 | 605.341 | 51 | C | 4994.0 | 0.1213 |
| 5.8G;D1D | 6.10 | 29.76 | 33.71 | 0.13 | 2421.029 | 51 | C | 4994.0 | 0.4850 |
| Band12;G7D | - | - | 21.85 | 0.50 | 171.791 | 51 | C | 2327.2 | 0.0738 |

**Simultaneous Transmission Analysis Mode:**

**Mode 1: EUT 1_WLAN 2.4GHz + WLAN 5GHz**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;D1D | 6.43 | 27.14 | 31.42 | 0.50 | 1555.966 | 51 | C | 4994.0 | 0.3117 |
| 5.8G;D1D | 6.10 | 29.76 | 33.71 | 0.13 | 2421.029 | 51 | C | 4994.0 | 0.4850 |
| Sum TL Ratio_C | 0.7967 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 2: EUT 1_WLAN 2.4GHz + WLAN 5GHz + WWAN**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;D1D | 6.43 | 27.14 | 31.42 | 0.50 | 1555.966 | 51 | C | 4994.0 | 0.3117 |
| 5.8G;D1D | 6.10 | 29.76 | 33.71 | 0.13 | 2421.029 | 51 | C | 4994.0 | 0.4850 |
| Band12;G7D | - | - | 21.85 | 0.50 | 171.791 | 51 | C | 2327.2 | 0.0738 |
| Sum TL Ratio_C | 0.8705 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

Note: The above antenna gain was declared by manufacturer.

———THE END———