RF Exposure Evaluation Declaration

FCC ID	:	**2BH7FBE550V2**
Applicant	:	**TP-Link Systems Inc.**
Application Type	:	**Certification**
Product	:	**BE9300 Tri-Band Wi-Fi 7 Router**
Model No.	:	**Archer BE550, Archer BE9300**
Brand Name	:	**tp-link**
FCC Classification	:	**Digital Transmission System (DTS)** **Unlicensed National Information Infrastructure (NII)** **15E 6GHz Low Power Indoor Access Point (6ID)** **15E 6GHz Subordinate Indoor Device (6PP)**
Received Date	:	**September 14, 2024**

Test By : Owen Tsai
(Owen Tsai)

Reviewed By : Paddy Chen
(Paddy Chen)

Approved By : Chenz Ker
(Chenz Ker)

Testing Laboratory
3261

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

Revision History

Report No.	Version	Description	Issue Date	Note
2407TW0103-U6	1.0	Original Report	2024-09-23	Valid

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General Information

Applicant	TP-Link Systems Inc.
Applicant Address	10 Mauchly, Irvine, CA 92618
Manufacturer	TP-Link Systems Inc.
Manufacturer Address	10 Mauchly, Irvine, CA 92618
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
MRT FCC Registration No.	291082

Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Canada, EU and TELEC Rules.

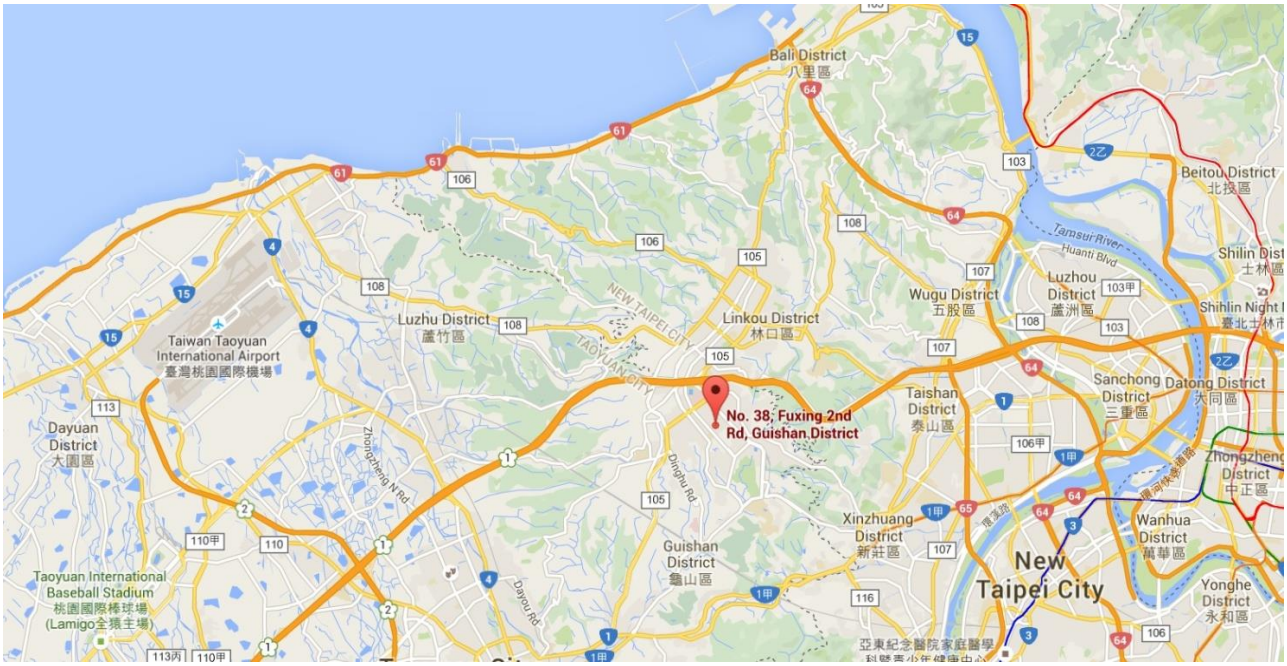
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name:	BE9300 Tri-Band Wi-Fi 7 Router
Model No.:	Archer BE550, Archer BE9300
Brand Name:	tp-link
Specification	802.11a/b/g/n/ac/ax/be
Accessory	
Power Adapter	Brand: MASS POWER Model No: NBS30D120250VU Input: 100 - 240V ~ 50/60Hz 0.8A Output: DC 12.0V 2.5A DC Cable Out: Non-Shielded, 1.5m

Model Difference: The difference of models only for marketing different, the other hardware was the same. (Declared by the manufacturer).

2.2. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	T_X Paths	Number of spatial streams	Antenna Gain (dBi)		Beamforming Directional Gain (dBi)	CDD Directional Gain (dBi)	
				Ant 0	Ant 1		For Power	For PSD
Dipole	2412 ~ 2462	2	1	2.00	2.00	5.01	2.00	5.01
	5150 ~ 5250	2	1	2.44	2.69	5.70	2.69	5.70
	5250 ~ 5350	2	1	3.00	2.71	6.01	3.00	6.01
	5470 ~ 5725	2	1	2.91	2.62	5.92	2.91	5.92
	5725 ~ 5850	2	1	2.84	2.84	5.85	2.84	5.85
	5945 ~ 6425	2	1	3.00	1.96	6.01	3.00	6.01
	5945 ~ 6425	2	2	3.00	1.96	--	3.00	3.00
	6425 ~ 6525	2	1	2.83	2.42	5.84	2.83	5.84
	6425 ~ 6525	2	2	2.83	2.42	--	2.83	2.83
	6525 ~ 6885	2	1	2.62	3.00	6.01	3.00	6.01
	6525 ~ 6885	2	2	2.62	3.00	--	3.00	3.00
	6885 ~ 7125	2	1	2.85	2.87	5.88	2.87	5.88
	6885 ~ 7125	2	2	2.85	2.87	--	2.87	2.87
Remark:								

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log (N_{ANT}/ N_{SS}) dB;

- For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11ac/ax/be, not include 802.11a/b/g/n. BF Directional gain = G_{ANT} + 10 log (N_{ANT}).
3. The information as above is from the antenna report.

Test Mode	T_X Paths	CDD Mode	Beamforming Mode
802.11b/g/n (DTS)	2	√	X
802.11ax/be (DTS)	2	√	√
802.11a/n (NII)	2	√	X
802.11ac/ax/be (NII)	2	√	√
802.11ax/be (6ID/6PP)	2	√	√

2.3. Device Classification

According to the user manual, this device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.

2.4. Applied Standards

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

FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01

3. RF Exposure Evaluation

3.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*($900/f^2$)	<6
30-300	61.4	0.163	1.0	<6
300-1,500	--	--	f/300	<6
1,500-100,000	--	--	5	<6
(B) Limits for General Population/ Uncontrolled Exposures				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*($180/f^2$)	<30
30-300	27.5	0.073	0.2	<30
300-1,500	--	--	f/1500	<30
1,500-100,000	--	--	1.0	<30

f= frequency in MHz. * = Plane-wave equivalent power density.

3.2. MPE Exemptions

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

(Option A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.
Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

(Option B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$P\,th(mW) = \{ERP_{20cm}(d\,/\,20cm)^{x}$ d ≤ 20cm

$P\,th(mW) = \{ERP_{20cm}$ 20cm < d ≤ 40cm

Where

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

and

$ERP_{20cm}(mW) = \{2040f$ 0.3GHz ≤ f < 1.5GHz

$ERP_{20cm}(mW) = \{3060$ 1.5GHz ≤ f ≤ 6GHz

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1920R^2$
1.34-30	$3450R^2/f^2$
30-300	$3.83R^2$
300-1,500	$0.0128R^2/f$
1,500-100,000	$19.2R^2$

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

$\boldsymbol{P_i}$ = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile,

or portable RF source *i* at a distance between 0.5 cm and 40 cm (inclusive).

$\boldsymbol{P_{th,i}}$ = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source *i*.

$\boldsymbol{ERP_j}$ = the ERP of fixed, mobile, or portable RF source *j*.

$\boldsymbol{ERP_{th,j}}$ = exemption threshold ERP for fixed, mobile, or portable RF source *j*, at a distance of at least λ/2π according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section.

$\boldsymbol{Evaluated_k}$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$\boldsymbol{Exposure\ Limit_k}$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k*, as applicable from §1.1310 of this chapter.

3.3. Test Result of RF Exposure Evaluation

Product	BE9300 Tri-Band Wi-Fi 7 Router
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Conducted Power (dBm)	Tune-up Power (dBm)	Antenna Gain (dBi)	Tune-up EIRP (dBm)
802.11b/g/n/ax/be	2412 ~ 2462	27.87	28.37	5.01	33.38
802.11a/n/ac/ax/be	5180 ~ 5825	27.60	28.10	6.01	34.11
802.11ax/be	5955 ~ 7095	22.70	23.20	6.01	29.21

Note

1: Tune-up power was declared by manufacturer.

2.: Tune-up EIRP = Tune-up Conducted Power + Directional Gain

For single RF source, Option C

Test Mode	λ / 2 π (m)	R (m)	Tune-up ERP (mW)	Threshold ERP (mW)
Wi-Fi (DTS)	0.0198	0.43	1327.4	3550.08
Wi-Fi (NII)	0.0092	0.43	1570.4	3550.08
Wi-Fi (6ID/6PP)	0.01	0.43	508.2	3550.08

Note 1: R is from user manual.

Note 2: Tune-up Power (mW) = $10^{[\text{Tune-up Power (dBm)}/10]}$

Note 3: ERP (mW) = $10^{[(\text{Tune-up EIRP(dBm)}-2.15)/10]}$

For multiple RF sources

The EUT supports Wi-Fi 2.4GHz + Wi-Fi 5GHz + Wi-Fi 6GHz simultaneous transmissions.

So the Max Simultaneous Transmission = 1327.4/3550.08 (DTS) + 1570.4/3550.08 (NII) + 508.2/3550.08 (6ID) = 0.9594 < 1

Therefore, the device qualifies for RF exposure test exemption.

The End