



RF MEASUREMENT REPORT

FCC ID: 2AXJ4XE75V3
Applicant: TP-Link Corporation Limited
Product: AXE5400 Whole Home Mesh Wi-Fi 6E AP
Model No.: HX716 Pro
Brand Name: tp-link
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
Result: Complies
Received Date: 2023-08-04
Test Date: 2023-10-23 ~ 2023-10-25

Reviewed By:

Kevin Guo

Kevin Guo

Approved By:

Robin Wu

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2308RSU024-U1	V01	Initial Report	2023-11-10	Valid

Note: This report is prepared for FCC Class II permissive change supplement based on the FCC ID: 2AXJ4XE75V3, original grant date: 08/20/2023 to open the NII-2a/-2c bands and Beamforming function via the software.

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1. General Information

1.1. Applicant

TP-Link Corporation Limited

Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hongkong

1.2. Manufacturer

TP-Link Corporation Limited

Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hongkong

1.3. Testing Facility

☐	Test Site – MRT Suzhou Laboratory
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
	Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	Laboratory Accreditations
	A2LA: 3628.01 FCC: CN1166 VCCI: ☐R-20025 ☐G-20034 ☐C-20020 ☐T-20020 ☐R-20141 ☐G-20134 ☐C-20103 ☐T-20104
☒	Test Site – MRT Shenzhen Laboratory
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	Laboratory Accreditations
	A2LA: 3628.02 FCC: CN1284
	CNAS: L10551 ISED: CN0105
☐	Test Site – MRT Taiwan Laboratory
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: 3261
	FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	AXE5400 Whole Home Mesh Wi-Fi 6E AP
Model No.	HX716 Pro
EUT Serial No.	SN: 000AEB130969
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Antenna Information	Refer to selection 1.7
Power Supply	By Adapter
Accessory	
Adapter	Model: T120200-2B1 Input: 100-240V ~ 50/60Hz 0.8A Output: 12V 2.0A
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

Frequency Range	802.11b/g/n-HT20/ax-HE20 & VHT20: 2412 ~ 2462MHz 802.11n-HT40/ax-HE40 & VHT40: 2422 ~ 2452MHz	
Channel Number	802.11b/g/n-HT20/ax-HE20 & VHT20: 11 802.11n-HT40/ax-HE40 & VHT40: 7	
Type of Modulation	802.11b: DSSS 802.11g/n & VHT: OFDM 802.11ax: OFDMA	
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ax: up to 574Mbps VHT: up to 400Mbps	
Channel Puncturing Function	☐ Supported	☒ Unsupported
Support RU	☒ Full RU	☐ Partial RU

1.6. Working Frequencies

802.11b/g/n-HT20/ax-HE20 & VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40/ax-HE40 & VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

1.7. Antenna Details

Antenna Type	Frequency Range (MHz)	Number of spatial streams	Max. Antenna Gain (dBi)	Beamforming Directional Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
Dipole	2412 ~ 2462	1	1.97	4.98	1.97	4.98
	5150 ~ 5850	1	0.97	3.98	0.97	3.98
	5925 ~ 7125	1	0.99	4.00	0.99	4.00
	5925 ~ 7125	2	0.99	--	0.99	0.99

Remark:

- The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.
If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, 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 $N_{ANT} \leq 4$;
- The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g. BF Directional gain = $G_{ANT} + 10 \log (N_{ANT})$.
- The information as above is from the AUT report.

Test Mode	TX Paths	CDD Mode	Beamforming Mode
802.11b/g (DTS)	2	√	X
802.11n/ax & VHT (DTS)	2	√	√
802.11a (NII)	2	√	X
802.11n/ac/ax (NII)	2	√	√
802.11ax (6ID)	2	√	√
Note: “√” means “Support”, “X” means “Not support”.			

2. Test Configuration

2.1. Test Details for Class II Perssive Change

C2PC Change List	Verified Test Item	Remark
- Open the UNII-2a/-2c bands via software. - Open the Beamforming function at 802.11n/ac/ax of 2.4G/5G/6G bands via software.	Output Power	Verified power only.

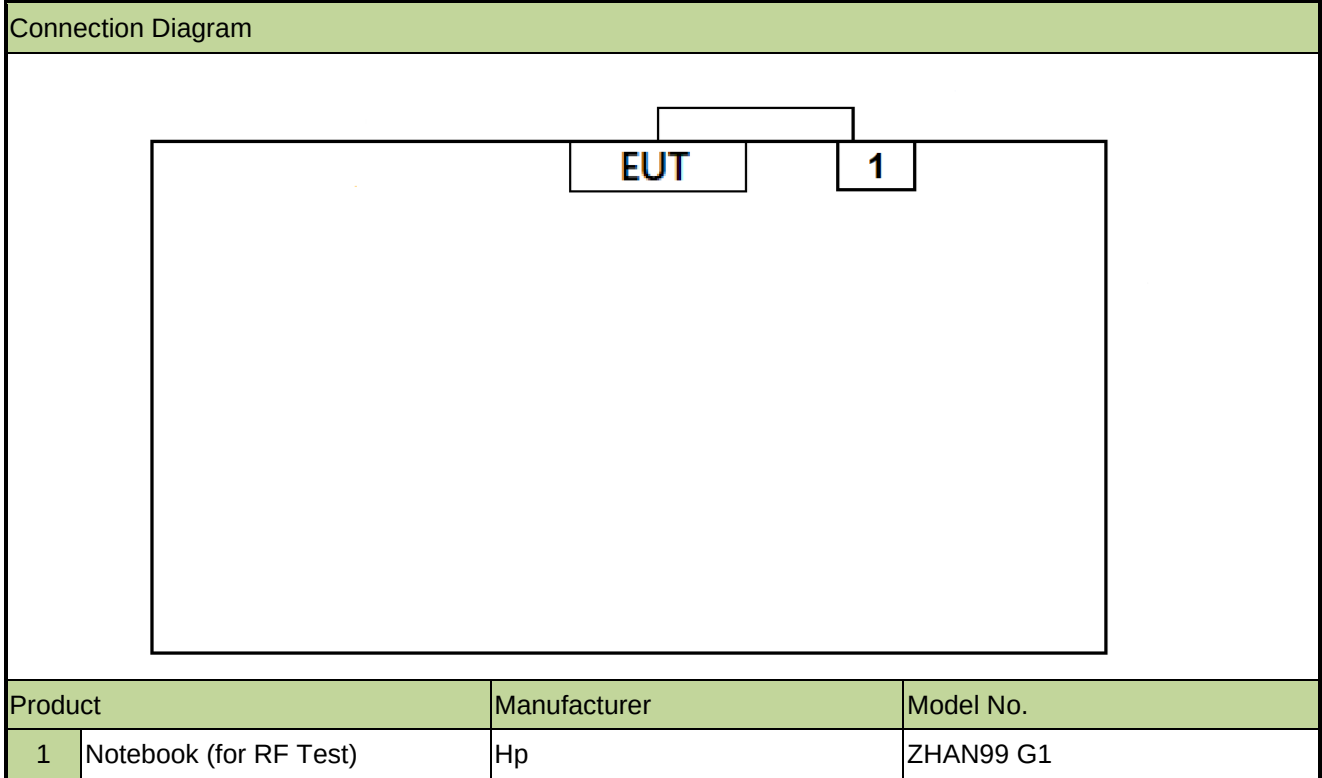
Note: This product is an extension based on the FCC ID: 2AXJ4XE75V3, original grant date: 08/20/2023, the changes and verified item refer to the table as above.

2.2. Test Mode

CDD Mode
Mode 1: Transmit by 802.11b _N _{ss} =1 (1Mbps)
Mode 2: Transmit by 802.11g _N _{ss} =1 (6Mbps)
Mode 3: Transmit by 802.11n-HT20 _N _{ss} =1 (MCS0)
Mode 4: Transmit by 802.11n-HT40 _N _{ss} =1 (MCS0)
Mode 5: Transmit by 802.11ax-HE20 _N _{ss} =1 (MCS0)
Mode 6: Transmit by 802.11ax-HE40 _N _{ss} =1 (MCS0)
Note: - For CDD mode, this device supports 2 N_{ss} and power level is the same of spatial multiplexing. The worst case is N_{ss}=1. - All test items were evaluated under CDD mode in this report. The RF output power setting under beamforming mode is same as CDD mode, so there is no additional test under beamforming mode. - EUT supports one configuration only in 802.11ax full RU mode.

2.3. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.



2.4. Test Software

The test utility software used during testing was “QSPR”, and the version was 5.0-00202.
Final power setting please refer to operational description.

2.5. Applied Standards

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

- FCC Part 15.247
- KDB 558074 D01v05r02
- KDB 662911 D01v02r01
- ANSI C63.10-2013

2.6. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Attenuator	MVE	MVE2213	MRTSUE11062	1 year	2024-06-08	NS
Attenuator	MVE	MVE2213	MRTSUE11063	1 year	2024-06-08	NS
Attenuator	MVE	MVE2213	MRTSUE11064	1 year	2024-06-08	NS
Attenuator	MVE	MVE2213	MRTSUE11065	1 year	2024-06-08	NS
USB Power Sensor	Keysight	U2021XA	MRTSUE06581	1 year	2024-06-30	NS-TR2
Thermohygrometer	DELI	NO.8813	MRTSUE06783	1 year	2023-12-28	NS-TR2

Software	Version	Function
BenchVue Power Meter	2021	Power

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.
(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.4dB

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(b)(3)	Output Power	Conducted	Pass

Note:

The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

6.2. Output Power Measurement

6.2.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2.2. Test Procedure

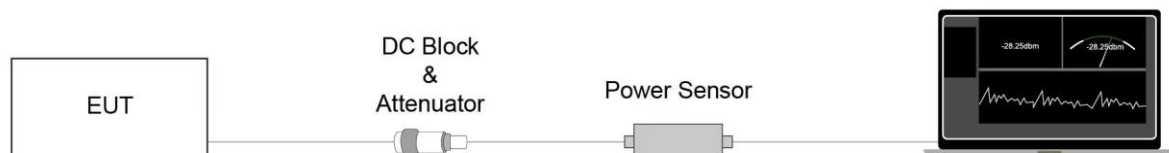
ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.2.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.1.

Appendix A – Test Result

A.1 Output Power Test Result

Test Site	NS-TR2	Test Engineer	Summer Tang
Test Date	2023-10-24	Test Mode	CDD Mode

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Total Average Power (dBm)	Limit (dBm)
				Ant 0	Ant 1		
11b	1Mbps	01	2412	25.51	25.90	28.72	≤ 30.00
11b	1Mbps	06	2437	25.52	26.02	28.79	≤ 30.00
11b	1Mbps	11	2462	25.91	25.77	28.85	≤ 30.00
11g	6Mbps	01	2412	22.32	21.76	25.06	≤ 30.00
11g	6Mbps	06	2437	25.82	25.32	28.59	≤ 30.00
11g	6Mbps	11	2462	22.86	22.63	25.76	≤ 30.00
11n-HT20	MCS0	01	2412	22.13	22.17	25.16	≤ 30.00
11n-HT20	MCS0	06	2437	26.01	25.47	28.76	≤ 30.00
11n-HT20	MCS0	11	2462	23.01	22.61	25.82	≤ 30.00
11n-HT40	MCS0	03	2422	20.14	19.83	23.00	≤ 30.00
11n-HT40	MCS0	06	2437	25.38	25.84	28.63	≤ 30.00
11n-HT40	MCS0	09	2452	20.95	21.25	24.11	≤ 30.00
11ax-HE20	MCS0	01	2412	22.20	22.35	25.29	≤ 30.00
11ax-HE20	MCS0	06	2437	26.02	25.49	28.77	≤ 30.00
11ax-HE20	MCS0	11	2462	23.08	22.70	25.90	≤ 30.00
11ax-HE40	MCS0	03	2422	20.28	19.97	23.14	≤ 30.00
11ax-HE40	MCS0	06	2437	25.46	25.92	28.71	≤ 30.00
11ax-HE40	MCS0	09	2452	21.17	20.85	24.02	≤ 30.00

Note 1: Total Average Power (dBm) = $10 \cdot \log \{10^{(\text{Ant 0 Average Power} / 10)} + 10^{(\text{Ant 1 Average Power} / 10)}\}$ (dBm).

Note 2: Power under Beamforming mode are the same as CDD mode.

Appendix B – Test Setup Photograph

Refer to “2308RSU024-UT” file.

Appendix C – EUT Photograph

Refer to “2308RSU024-UE” file.

The End
