



# FCC Radio Test Report

## FCC ID: 2BCGWHX220

**This report concerns: Class II permissive Change**

**Project No.** : 2505G010  
**Equipment** : AX1800 Whole Home Mesh Wi-Fi AP  
**Brand Name** : tp-link  
**Model Name** : HX220, HX220-G5  
**Applicant** : TP-LINK CORPORATION PTE. LTD.  
**Address** : 7 Temasek Boulevard #29-03 Suntec Tower One, Singapore 038987  
**Manufacturer** : TP-LINK CORPORATION PTE. LTD.  
**Address** : 7 Temasek Boulevard #29-03 Suntec Tower One, Singapore 038987  
**Date of Receipt** : May 13, 2025  
**Date of Test** : May 19, 2025 ~ May 29, 2025  
**Issued Date** : Jul. 23, 2025  
**Test Sample** : Engineering Sample No.: DG2025051334  
**Standard(s)** : FCC CFR Title 47, Part 15, Subpart C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc. (Dongguan)

**Prepared by**

Chella Zheng

**Approved by**

Chay Cai

No.3, Jinshagang 1st Road, Dalang, Dongguan, Guangdong People's Republic of China .

Tel: +86-769-8318-3000 Web: [www.newbtl.com](http://www.newbtl.com) Service mail: [btl\\_qa@newbtl.com](mailto:btl_qa@newbtl.com)

**Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacturer's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by **BTL**.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

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**BTL**'s laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

**Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

Table of Contents	Page
<b>REVISION HISTORY</b>	<b>4</b>
<b>1 . APPLICABLE STANDARDS</b>	<b>5</b>
<b>2 . SUMMARY OF TEST RESULTS</b>	<b>5</b>
2.1 TEST FACILITY	6
2.2 MEASUREMENT UNCERTAINTY	6
2.3 TEST ENVIRONMENT CONDITIONS	6
<b>3 . GENERAL INFORMATION</b>	<b>7</b>
3.1 GENERAL DESCRIPTION OF EUT	7
3.2 DESCRIPTION OF TEST MODES	9
3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
3.4 SUPPORT UNITS	10
3.5 CUSTOMER INFORMATION DESCRIPTION	10
<b>4 . RADIATED EMISSIONS</b>	<b>11</b>
4.1 LIMIT	11
4.2 TEST PROCEDURE	11
4.3 DEVIATION FROM TEST STANDARD	13
4.4 TEST SETUP	13
4.5 EUT OPERATION CONDITIONS	13
4.6 TEST RESULTS - 30 MHZ TO 1000 MHZ	13
<b>5 . MEASUREMENT INSTRUMENTS LIST</b>	<b>14</b>
<b>6 . EUT TEST PHOTO</b>	<b>15</b>
<b>APPENDIX A - RADIATED EMISSION - 30 MHZ TO 1000 MHZ</b>	<b>16</b>

**REVISION HISTORY**

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-1-2505G010	R00	<p>This is a supplementary report to the original test report (BTL-FCCP-1-2110C026).</p> <p>1. Changed the information of applicant and manufacturer.</p> <p>2. Changed PCB board(The network signal transformer and its related components).</p> <p>So the worst case of radiated emissions 30MHz to 1GHz test items have been re-evaluated and recorded in the test report. In this report only recorded the new test data. Other original test results please refer to original report.</p>	Jul. 23, 2025	Valid

## 1. APPLICABLE STANDARDS

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

ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of A2LA:

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC CFR Title 47, Part 15, Subpart C				
Standard(s) Section	Test Item	Test Result	Judgment	Remark
15.247(d)				
15.205(a)				
15.209(a)	Radiated Emissions	APPENDIX A	PASS	-----

Note:

(1) "N/A" denotes test is not applicable in this test report.

(2) The other test records and results please refer to the test report number: BTL-FCCP-1-2110C026, issued date is Dec. 17, 2021.

This report is only valid conjunction with the above referenced test report.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of Room 102 & 702, Building A3, No.9, Jinshagang 1st Road, Dalang, Dongguan, Guangdong People's Republic of China.

BTL's Registration Number for FCC: 747969

BTL's Designation Number for FCC: CN1377

## 2.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

The BTL measurement uncertainty as below table:

A. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	$U_{\text{,}}(\text{dB})$
DG-CB18 (3m)	CISPR	30MHz ~ 200MHz	V	4.40
		30MHz ~ 200MHz	H	3.10
		200MHz ~ 1,000MHz	V	5.20
		200MHz ~ 1,000MHz	H	4.68

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

## 2.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By	Test Date
Radiated Emissions- 30MHz to 1000MHz	25°C	47%	AC 120V/60Hz	Allen Tong	May 28, 2025

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	AX1800 Whole Home Mesh Wi-Fi AP
Brand Name	tp-link
Test Model	HX220
Model Name	HX220, HX220-G5
Model Difference(s)	Only differ in model name.
Power Source	DC Voltage supplied from AC adapter. Model: T120100-2B1
Power Rating	I/P:100-240V~ 50/60Hz 0.3A      O/P:12.0V <del>====</del> 1.0A
Operation Frequency	2412 MHz ~ 2462 MHz
Modulation Type	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM IEEE 802.11ax: OFDMA
Bit Rate of Transmitter	IEEE 802.11b: 11/5.5/2/1 Mbps IEEE 802.11g: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 300 Mbps IEEE 802.11ax: up to 573.6 Mbps

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

#### 2. Channel List:

CH01 - CH11 for IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20), IEEE 802.11ax(HE20)
CH03 - CH09 for IEEE 802.11n(HT40), IEEE 802.11ax(HE40)

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

#### 3. Antenna Specification:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	tp-link	3101504017	Dipole	WELD	1
2	tp-link	3101504018	Dipole	WELD	1

Note:

- 1) This EUT supports CDD, and all antennas have the same gain, Directional gain =  $G_{ANT} + \text{Array Gain}$ .  
For power measurements,  $\text{Array Gain} = 0\text{dB}$  ( $N_{ANT} \leq 4$ ), so the Directional gain=1.  
For power spectral density measurements,  $N_{ANT} = 2$ ,  $N_{SS} = 1$ .  
So the Directional gain =  $G_{ANT} + \text{Array Gain} = G_{ANT} + 10\log(N_{ANT}/N_{SS})\text{dBi} = 1 + 10\log(2/1)\text{dBi} = 4.01$ .
- 2) Beamforming Gain: 3dB. Directional gain =  $3 + 1 = 4$ .

## 4. Table for Antenna Configuration:

For Non Beamforming:

Operating Mode \ TX Mode	2TX
IEEE 802.11b	V(Ant. 1 + Ant. 2)
IEEE 802.11g	V(Ant. 1 + Ant. 2)
IEEE 802.11n(HT20)	V(Ant. 1 + Ant. 2)
IEEE 802.11n(HT40)	V(Ant. 1 + Ant. 2)
IEEE 802.11ax(HE20)	V(Ant. 1 + Ant. 2)
IEEE 802.11ax(HE40)	V(Ant. 1 + Ant. 2)

For Beamforming:

Operating Mode \ TX Mode	2TX
IEEE 802.11n(HT20)	V(Ant. 1 + Ant. 2)
IEEE 802.11n(HT40)	V(Ant. 1 + Ant. 2)
IEEE 802.11ax(HE20)	V(Ant. 1 + Ant. 2)
IEEE 802.11ax(HE40)	V(Ant. 1 + Ant. 2)

### 3.2 DESCRIPTION OF TEST MODES

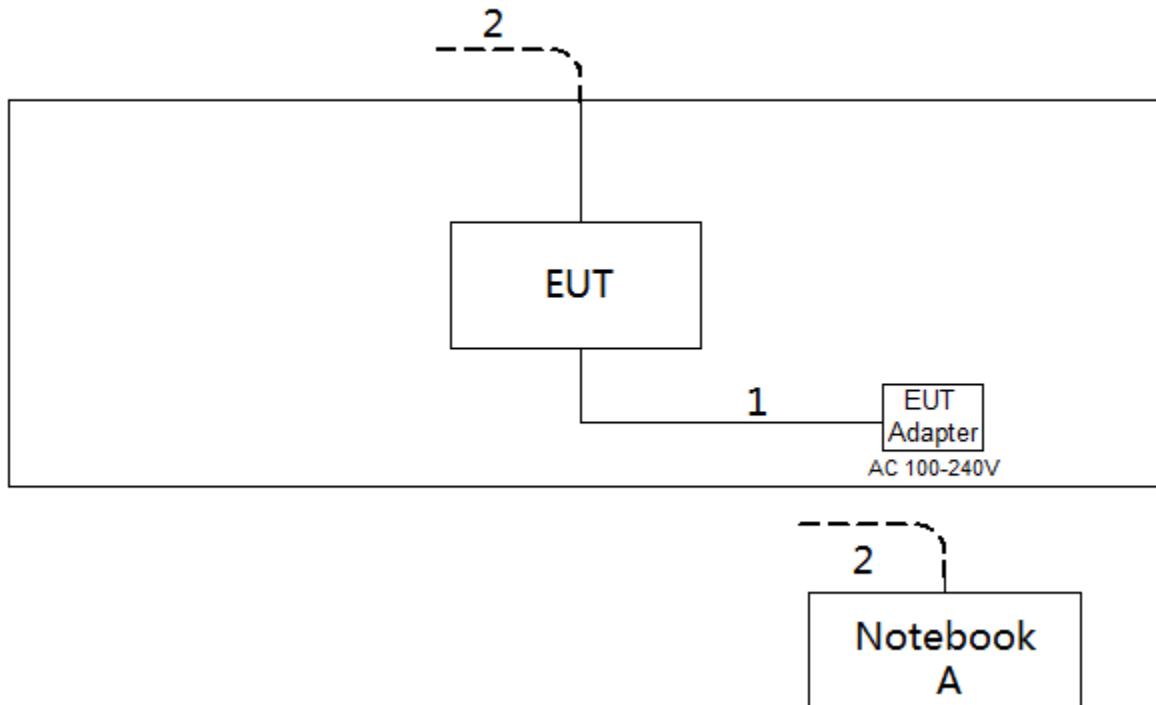
The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX AX(HE20) Mode Channel 06

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

<b>Radiated emissions test – 30MHz to 1GHz</b>	
Final Test Mode	Description
Mode 1	TX AX(HE20) Mode Channel 06

### 3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



### 3.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
A	Notebook	Dell	Inspiron 15-7559	N/A

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.5m
2	RJ45 Cable	NO	NO	10m

### 3.5 CUSTOMER INFORMATION DESCRIPTION

- 1) The antenna gain and beamforming gain are provided by the manufacturer.

## 4. RADIATED EMISSIONS

### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### NOTE:

- (1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

### 4.2 TEST PROCEDURE

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- i. For the actual test configuration, please refer to the related Item -EUT Test Photos.

The following table is the setting of the receiver:

Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

Spectrum Parameters	Setting
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3 MHz for PK value 1 MHz / 1/T Hz for AVG value

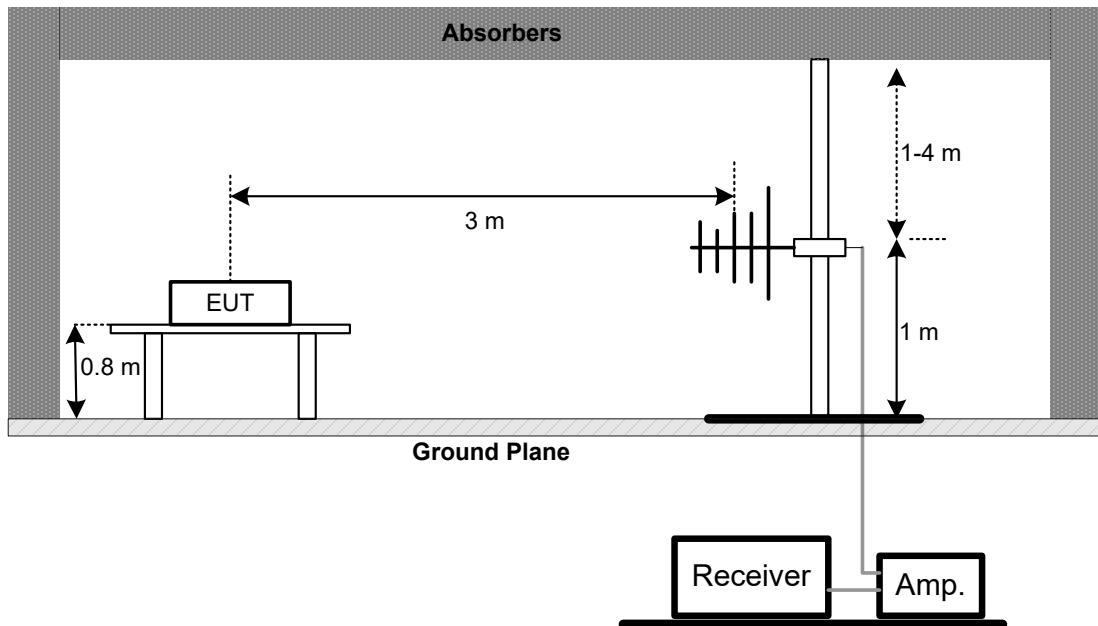
Receiver Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector
Start ~ Stop Frequency	1 GHz~26.5 GHz for PK/AVG detector

#### 4.3 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4 TEST SETUP

30 MHz to 1 GHz



#### 4.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.6 TEST RESULTS - 30 MHZ TO 1000 MHZ

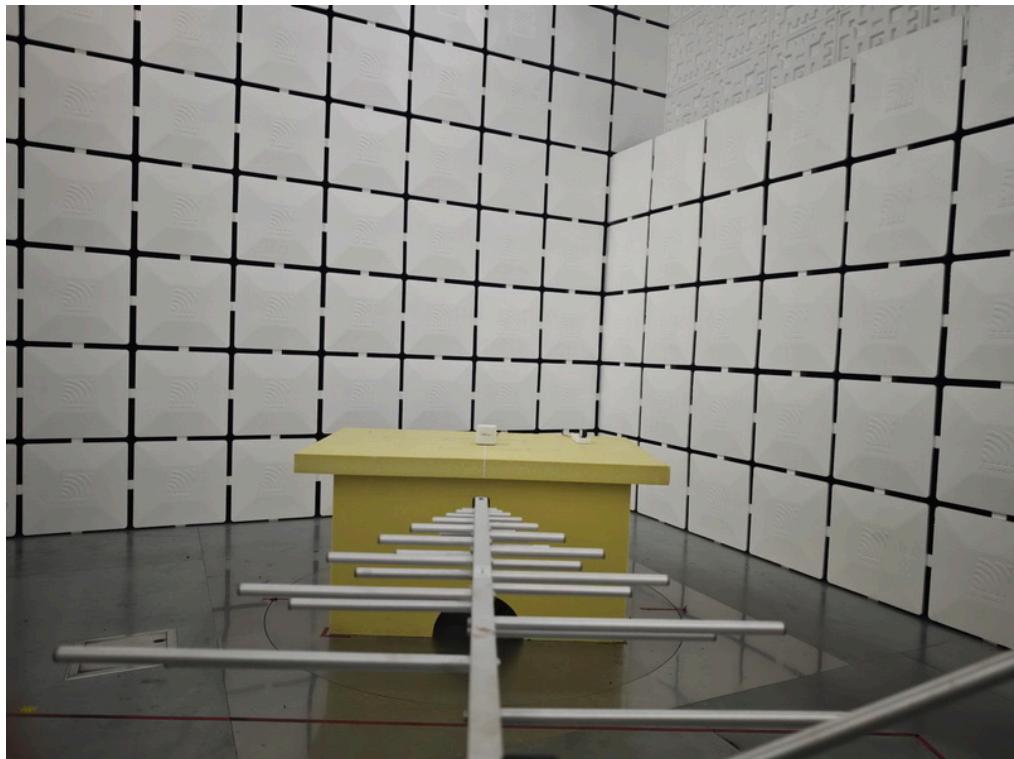
Please refer to the APPENDIX A.

**5. MEASUREMENT INSTRUMENTS LIST**

<b>Radiated Emissions - 30 MHz to 1 GHz</b>					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	01381	Sep. 26, 2025
2	Attenuator	EMC INSTRUMENT	EMCI-N-6-06	AT-06009	Sep. 26, 2025
3	Preamplifier	EMC INSTRUMENT	EMC001330	980863	Sep. 05, 2025
4	Cable	RegalWay	LMR400-NMNM-2.5m	N/A	Jan. 07, 2026
5	Cable	RegalWay	LMR400-NMNM-7m	N/A	Jan. 07, 2026
6	Cable	RegalWay	LMR400-NMNM-3m	N/A	Jan. 07, 2026
7	Multi-Device Controller	ETS-Lindgren	N/A	N/A	N/A
8	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
9	MXE EMI Receiver	KEYSIGHT	N9038B	MY62210123	Oct. 29, 2025
10	MXA Signal Analyzer	KEYSIGHT	N9020B	MY63430227	Oct. 29, 2025
11	966 Chamber room	ETS	RFD-100 (NSA)	Q2179	Jan. 06, 2026
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

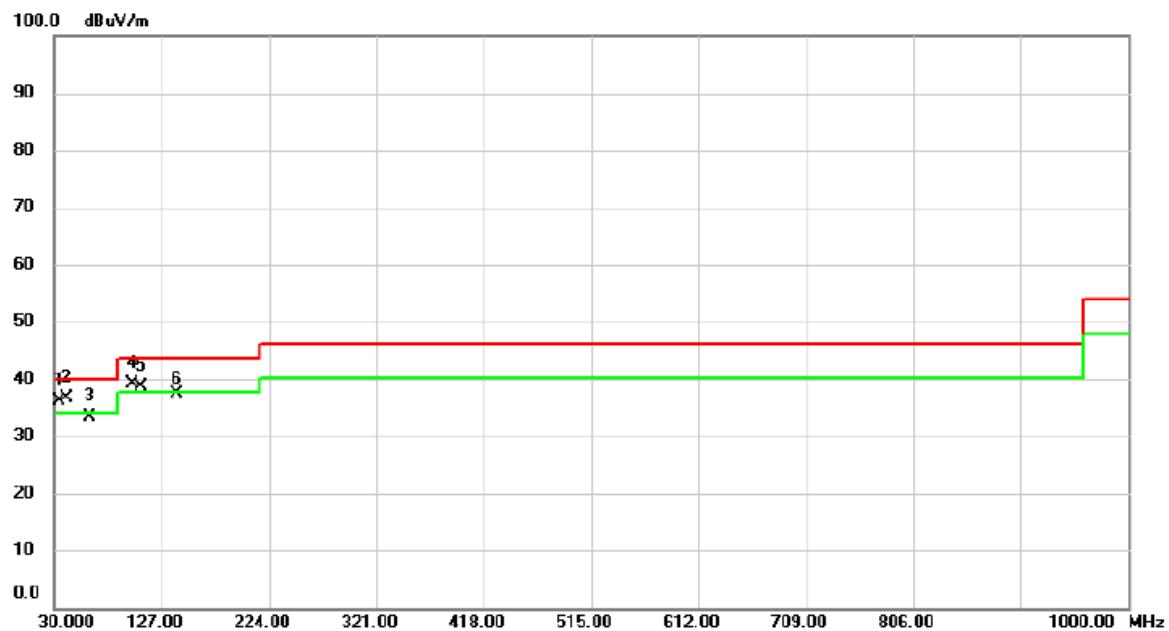
Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

**6. EUT TEST PHOTO****Radiated Emissions Test Photos****30 MHz to 1 GHz**

## **APPENDIX A - RADIATED EMISSION - 30 MHZ TO 1000 MHZ**

Test Mode	TX AX(HE20) Mode Channel 06	Polarization	Vertical
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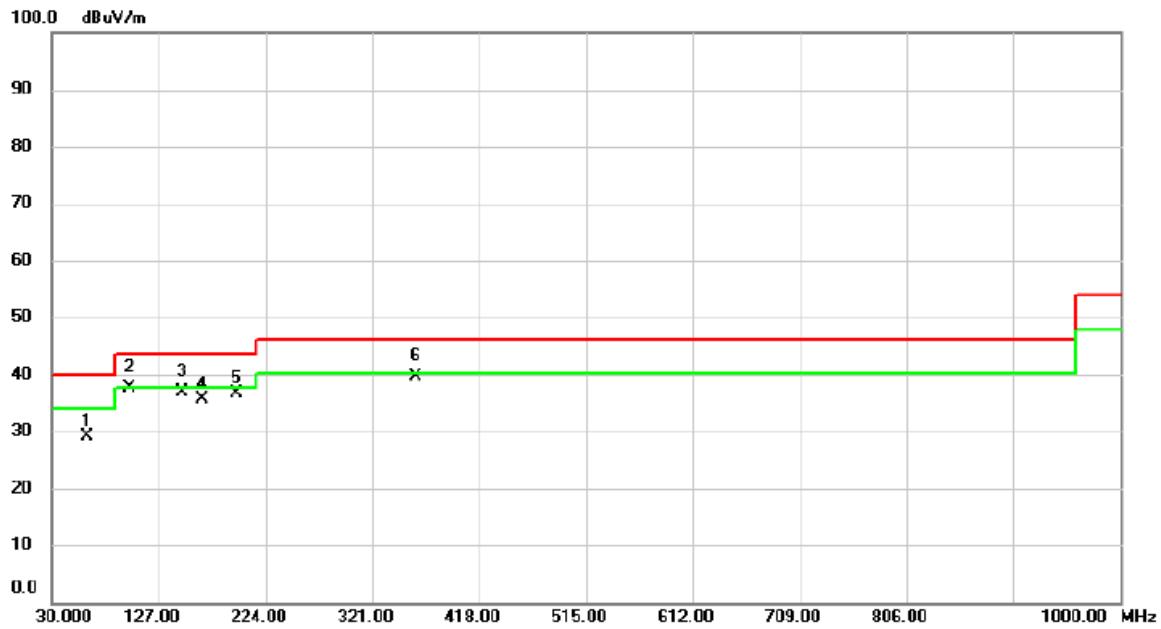


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	!	33.880	52.05	-15.93	36.12	40.00	-3.88	QP	
2	*	40.670	51.71	-15.15	36.56	40.00	-3.44	QP	
3		61.040	49.12	-15.70	33.42	40.00	-6.58	QP	
4	!	100.810	58.62	-19.57	39.05	43.52	-4.47	QP	
5	!	108.570	57.03	-18.47	38.56	43.52	-4.96	QP	
6		140.580	52.92	-15.49	37.43	43.52	-6.09	peak	

## REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX AX(HE20) Mode Channel 06	Polarization	Horizontal
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1		61.040	44.76	-15.70	29.06	40.00	-10.94	peak
2 *		100.810	57.22	-19.57	37.65	43.52	-5.87	QP
3		148.340	52.05	-15.07	36.98	43.52	-6.54	QP
4		166.770	51.06	-15.33	35.73	43.52	-7.79	peak
5		196.840	54.96	-18.30	36.66	43.52	-6.86	peak
6		359.800	52.58	-12.99	39.59	46.02	-6.43	QP

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.