



# RADIO EXPOSURE TEST REPORT

**FCC ID** : 2AXJ4X20V3

**Equipment** : AX1800 Whole Home Mesh Wi-Fi 6 System

**Brand Name** : tp-link

**Model Name** : Deco X20, Deco X21

**Applicant** : TP-Link Corporation Limited  
Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong

**Manufacturer** : TP-Link Corporation Limited  
Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong

**Standard** : 47 CFR Part 2.1091

The product was received on Nov. 10, 2021, and testing was started from Nov. 24, 2021 and completed on Feb. 07, 2022. 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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<b>Photographs of EUT v01</b>	





## Summary of Test Result

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

**Declaration of Conformity:**

1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to report "Measurement Uncertainty".

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: **Sam Chen**

Report Producer: **Penny Kao**



# 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) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)



**1.1.1 Antenna Information**

Ant.	Port		Brand	Model Name	Antenna Type	Connector	Gain (dBi)		
	WLAN 2.4GHz	WLAN 5GHz					WLAN 2.4GHz	WLAN 5GHz	
								UNII 1	UNII 3
1	1	1	TP-LINK	3101502757	PCB	I-Pex	1.94	0.97	0.94
2	2	2	TP-LINK	3101502756	PCB	I-Pex	1.93	0.90	0.85

Note 1: The above information was declared by manufacturer.

**For 2.4GHz WLAN function**

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

Port 1 and Port 2 could be used as transmitting/receiving antenna.  
 Port 1 and Port 2 could transmit/receive simultaneously.

**For 5GHz WLAN function**

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

Port 1 and Port 2 could be used as transmitting/receiving antenna.  
 Port 1 and Port 2 could transmit/receive simultaneously.

Note 2: Directional gain information

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

Ex.

Directional Gain (NSS1) formula :

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

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20} ; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}] => 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

Where ;

G1 = Ant 1 Gain ; G2 = Ant 2 Gain ; G3 = Ant 3 Gain ; G4 = Ant 4 Gain ;

2.4GHz DG = 4.95 dBi

5 GHz U-NII-1 DG =3.95 dBi

5 GHz U-NII-3 DG =3.91 dBi



### 1.2 Table for EUT supports functions

Function
AP Router
Mesh

Note: The above information was declared by manufacturer.

### 1.3 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	Description
Deco X20	All the models are identical, the different model names served as a marketing strategy.
Deco X21	

Note 1: From the above models, model: Deco X20 was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

### 1.4 Accessories

Accessories				
No.	Equipment Name	Brand Name	Model Name	Rating
1	Adapter	TP-Link	T120120-2B4	Input: 100-240V~50/60Hz, 0.4A Output: 12V, 1.2A

### 1.5 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/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<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/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<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 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

**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 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;G1D	1.94	27.07	29.01	0.50	29.51	0.89331	20	0.17772	1.00000
5.2G;D1D	0.97	28.55	29.52	0.50	30.02	1.00462	20	0.19986	1.00000
5.8G;D1D	0.94	29.99	30.93	0.50	31.43	1.38995	20	0.27652	1.00000

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )	Ratio (S/Limit)
2.4G;G1D	1.94	27.07	29.01	0.50	29.51	0.89331	20	0.17771	1.00000	0.17771
5.8G;D1D	0.94	29.99	30.93	0.50	31.43	1.38995	20	0.27652	1.00000	0.27652
									Sum Ratio	0.45423
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—————THE END—————