

RF Exposure Evaluation Report

Equipment : 5GHz 300Mbps 13dBi Outdoor CPE
Brand Name : tp-link
Model No. : CPE510
FCC ID : TE7CPE510V3
Standard : 47 CFR Part 2.1091
Applicant : TP-Link Technologies Co., Ltd.
Building 24 (floors 1,3,4,5) and 28 (floors1-4),Central
Science and Technology Park,Nanshan
Shenzhen,518057 China
Manufacturer : TP-Link Technologies Co., Ltd.
Building 24 (floors 1,3,4,5) and 28 (floors1-4),Central
Science and Technology Park,Nanshan
Shenzhen,518057 China

The product sample received on Jul. 07, 2017 and completely tested on Jul. 28, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091, KDB447498 D01 General RF Exposure Guidance v06 and pass the limit.

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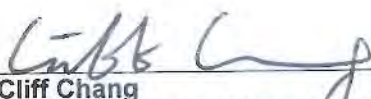

Cliff Chang
SPORTON INTERNATIONAL INC.





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REVISION HISTORY

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1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)

1.2 Testing Location

Testing Location		
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

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 ²)	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 / f)*	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 ²)	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/f)*	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 32 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

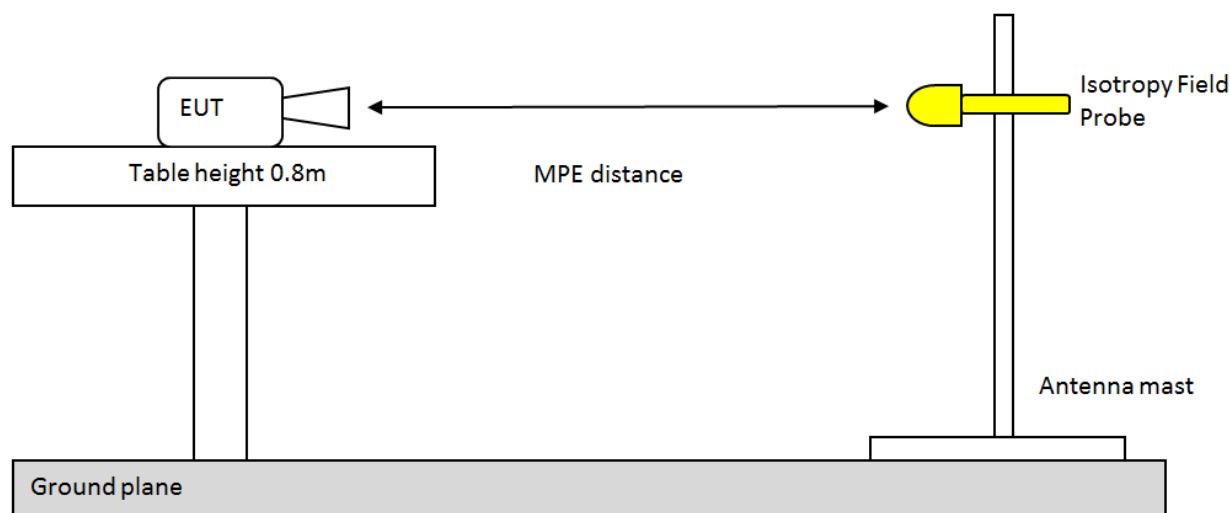
d = Separation distance between radiator and human body (m)

The formula can be changed to

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



2.3 MPE Measurement Method



Horizontal Plane

1. Align Probe with antenna axis. Probe should same height as Antenna axis.
And take power density measurement with Probe.
2. Rotate table 45 degree (30 degree if MPE distance is more 60cm).
Take power density measurement again.
3. Repeat step 2, until complete 360 degree.
Each measured power density should be less than MPE limit.

Vertical Plane

1. Align Probe with antenna axis. Move probe to height of 10cm above ground plane.
Take power density measurement.
Then repeat measure with 10cm increment of probe height until 180 cm.
2. Rotate table 45 degree (30 degree if MPE distance is more 60cm).
Repeat the power density measure from 10cm to 180cm
3. Repeat step 2, until complete 360 degree.
Spatial Average of same vertical plane should be less then MPE limit.

For Probe or measurement equipment requirement, please see FCC OET Bulletin 65 97-01

Note:

Either peak or spatially averaged results may be applied to determine compliance; and with respect to plane-wave equivalent power density limits when ≥ 300 MHz, and electric and magnetic field strength limits when < 300 MHz.



2.4 Measurement Result and Limit

Test Mode	11a (20M)	Test Frequency (MHz)	5200	MPE Distance (cm)	32	Power Setting	21	
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
100	0.01610	0.00362	0.00681	0.01721	0.01817	0.00454	0.00651	0.01714
Max PSD (mW/cm²)	0.01817							
MPE Limit (mW/cm²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
10	0.01035	0.00997	0.00422	0.00147	0.00212	0.00284	0.00447	0.00855
20	0.01334	0.01256	0.00227	0.00093	0.00072	0.00187	0.00757	0.01697
30	0.00821	0.00753	0.00345	0.00254	0.00159	0.00323	0.00689	0.00767
40	0.01369	0.00317	0.00333	0.00276	0.00166	0.00243	0.00471	0.01516
50	0.02854	0.00508	0.00351	0.00197	0.00237	0.00217	0.01479	0.03039
60	0.03311	0.00465	0.00267	0.00079	0.00351	0.00272	0.01874	0.03625
70	0.09152	0.00432	0.00134	0.00181	0.00101	0.00171	0.00711	0.08824
80	0.72314	0.01425	0.00553	0.00185	0.00213	0.00689	0.02578	0.71523
90	0.81785	0.00447	0.00357	0.00095	0.00172	0.00129	0.02147	0.85452
100	0.23756	0.00361	0.00091	0.00074	0.00198	0.00231	0.00875	0.24651
110	0.01304	0.00127	0.00132	0.00115	0.00187	0.00271	0.00184	0.01347
120	0.00668	0.00095	0.00067	0.00101	0.00093	0.00097	0.00225	0.00678
130	0.00913	0.00201	0.00088	0.00112	0.00154	0.00096	0.00207	0.00879
140	0.00746	0.00165	0.00097	0.00084	0.00112	0.00092	0.00223	0.00774
150	0.00602	0.00246	0.00041	0.00067	0.00117	0.00097	0.00301	0.00542
160	0.00441	0.00075	0.00052	0.00063	0.00064	0.00124	0.00324	0.00445
170	0.00154	0.00247	0.00081	0.00028	0.00072	0.00102	0.00194	0.00234
180	0.00256	0.00214	0.00068	0.00048	0.00079	0.00091	0.00171	0.00258
Spatial Average (mW/cm²)	0.11268	0.00463	0.00206	0.00122	0.00153	0.00206	0.00770	0.11506
Max Spatial Average (mW/cm²)	0.11506							
MPE Limit (mW/cm²)	1							



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Test Mode	11a (20M)	Test Frequency (MHz)	5240	MPE Distance (cm)	32	Power Setting	21	
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
100	0.01812	0.00408	0.00567	0.02017	0.01962	0.00603	0.00481	0.02072
Max PSD (mW/cm²)	0.02072							
MPE Limit (mW/cm²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
10	0.01182	0.00653	0.0354	0.00157	0.00225	0.00314	0.01014	0.01295
20	0.00615	0.00279	0.00171	0.00165	0.00313	0.00124	0.00258	0.01245
30	0.01254	0.00521	0.00162	0.00127	0.00093	0.00117	0.00717	0.01247
40	0.01258	0.00617	0.00276	0.00247	0.00121	0.00194	0.00913	0.01345
50	0.00421	0.00331	0.00127	0.00123	0.00097	0.00157	0.00921	0.01023
60	0.03159	0.00339	0.00201	0.00064	0.00095	0.00276	0.00347	0.03162
70	0.16051	0.00542	0.00267	0.00129	0.00134	0.00163	0.00643	0.15345
80	0.62451	0.00786	0.00401	0.00319	0.00273	0.00113	0.00465	0.63742
90	0.71036	0.01015	0.00223	0.00419	0.00127	0.00165	0.01714	0.72409
100	0.13152	0.00502	0.00091	0.00091	0.00097	0.00182	0.00172	0.19352
110	0.00714	0.00245	0.00239	0.00113	0.00247	0.00106	0.00203	0.00691
120	0.00741	0.00184	0.00124	0.00134	0.00189	0.00121	0.00262	0.00725
130	0.00642	0.00046	0.00024	0.00104	0.00101	0.00048	0.00173	0.00621
140	0.00613	0.00325	0.00076	0.00168	0.00171	0.00063	0.00295	0.00521
150	0.00501	0.00251	0.00091	0.00046	0.00053	0.00106	0.00367	0.00517
160	0.00362	0.00274	0.00117	0.00069	0.00097	0.00152	0.00205	0.00325
170	0.00172	0.00072	0.00091	0.00081	0.00108	0.00105	0.00129	0.00312
180	0.00145	0.00091	0.00063	0.00081	0.00103	0.00106	0.00092	0.00162
Spatial Average (mW/cm²)	0.09693	0.00393	0.00349	0.00147	0.00147	0.00145	0.00494	0.10224
Max Spatial Average (mW/cm²)	0.10224							
MPE Limit (mW/cm²)	1							



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Report No. : FA780308

Test Mode	11n HT20	Test Frequency (MHz)	5240	MPE Distance (cm)	32	Power Setting	21	
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
100	0.01612	0.00529	0.00675	0.01789	0.01654	0.00704	0.00316	0.02354
Max PSD (mW/cm²)	0.02354							
MPE Limit (mW/cm²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
10	0.01125	0.00654	0.00384	0.00145	0.00241	0.00335	0.01125	0.01458
20	0.00641	0.00294	0.00207	0.00153	0.00113	0.00117	0.00252	0.00641
30	0.01122	0.00512	0.00157	0.00131	0.00101	0.00131	0.00652	0.01231
40	0.01252	0.00674	0.00247	0.00229	0.00114	0.00172	0.00806	0.01274
50	0.00512	0.00431	0.00374	0.00267	0.00121	0.00121	0.00651	0.00715
60	0.03114	0.00335	0.00245	0.00072	0.00067	0.00272	0.00372	0.03121
70	0.17137	0.00786	0.00165	0.00206	0.00157	0.00147	0.00657	0.17785
80	0.68133	0.00675	0.00256	0.00315	0.00275	0.00431	0.17151	0.64151
90	0.71652	0.00548	0.00263	0.00505	0.00148	0.00172	0.01601	0.72613
100	0.12131	0.00613	0.00097	0.00078	0.00131	0.00194	0.00352	0.12141
110	0.00257	0.00234	0.00251	0.00181	0.00243	0.00101	0.00211	0.00601
120	0.00176	0.00087	0.00128	0.00158	0.00141	0.00085	0.00242	0.00694
130	0.00943	0.00362	0.00025	0.00113	0.00107	0.00042	0.00161	0.00591
140	0.00564	0.00272	0.00066	0.000163	0.00184	0.00071	0.00311	0.00518
150	0.00513	0.00157	0.00071	0.00048	0.00052	0.00104	0.00338	0.00436
160	0.00572	0.00408	0.00085	0.00067	0.00101	0.00138	0.00218	0.00329
170	0.00265	0.00302	0.00075	0.00044	0.00055	0.00096	0.00267	0.00193
180	0.00204	0.00251	0.00114	0.00031	0.00064	0.00062	0.00115	0.00195
Spatial Average (mW/cm²)	0.10017	0.00422	0.00178	0.00153	0.00134	0.00155	0.01416	0.09927
Max Spatial Average (mW/cm²)	0.10017							
MPE Limit (mW/cm²)	1							



2.5 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Isotropic Probe	ETS-LINDGREN	HI-6105	00130664	100kHz-6GHz	Oct. 10, 2016	Oct. 09, 2017	03CH01-CB

Note: Calibration Interval of instrument listed above is one year.