FCC Co-location Test Report

Equipment	**: AC1350 Wireless Dual Band Router**
Brand Name	**: TP-LINK**
Model No.	**: Archer C60**
FCC ID	**: TE7C60**
Standard	**: 47 CFR FCC Part 15**
Applicant / Manufacturer	**: TP-LINK TECHNOLOGIES CO., LTD.** Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen,China

The product sample received on Jun. 23, 2016 and completely tested on Nov. 11, 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 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., the test report shall not be reproduced except in full.

Reviewed by:

Kevin Liang / Assistant Manager

Testing Laboratory 1190

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Revision History

Report No.	Version	Description	Issued Date
FR642212-02CO	Rev. 01	Initial issue of report	Nov. 17, 2016

1 CO-LOCATION

1.1 Transmitter Radiated Unwanted Emissions

1.1.1 Transmitter Radiated Unwanted Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 30 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

1.1.2 Measuring Instruments

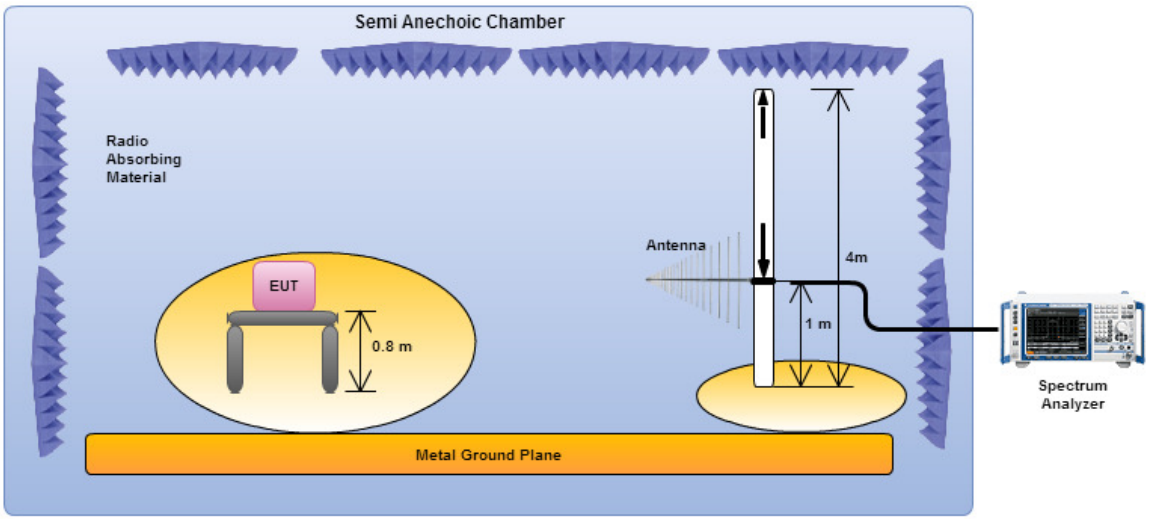
Refer a test equipment and calibration data table in this test report.

1.1.3 Test Procedures

Test Method			
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).		
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].		
☒	For the transmitter unwanted emissions shall be measured using following options below:		
	☒	Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.	
	☒	Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.	
		☐	Refer as KDB 558074, clause 12.2.5.1 and 9.2.1 Option 1 (spectral trace averaging)
		☐	Refer as KDB 558074, clause 12.2.5.2 and 9.2.1 Option 2 (slow sweep speed).
		☒	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
		☒	Refer as KDB 558074, clause 12.2.4 and 9.1.1 measurement procedure peak limit.
		☒	Refer as KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
☒	For radiated measurement, refer as KDB 558074, clause 12.1.		
	☐	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.	
	☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.	
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.	
☐	For conducted and cabinet radiation measurement, refer as KDB 558074, clause 12.2.2.		
	☐	For conducted unwanted emissions into non-restricted bands (relative emission limits). Devices with multiple transmit chains: Refer as KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs.	
	☐	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB	

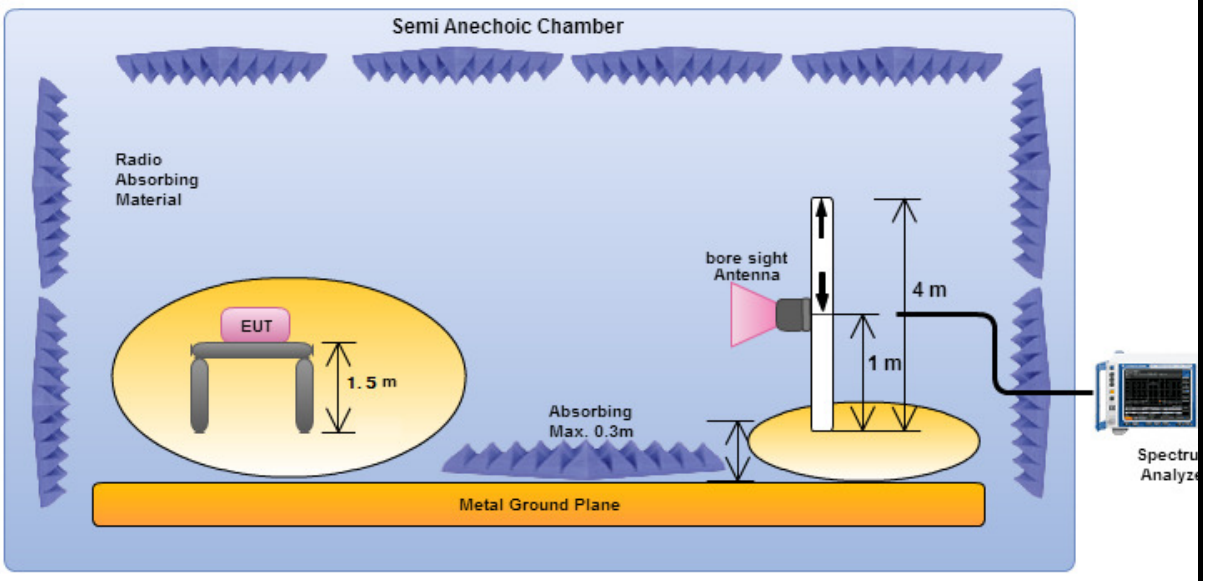
1.1.4 Test Setup

Transmitter Radiated Unwanted Emissions (below 1GHz)



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna.

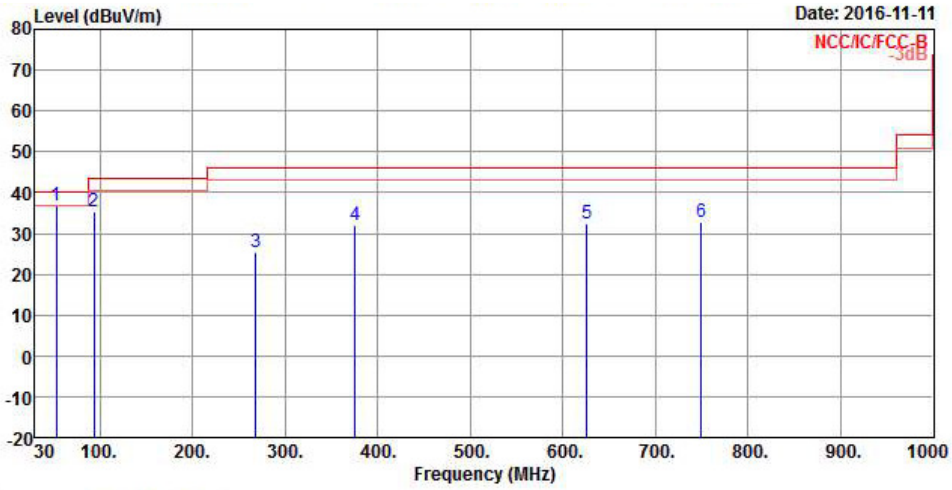
Transmitter Radiated Unwanted Emissions (above 1GHz)



Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

1.1.5 Results of Radiated Emissions (Blow 1GHz)

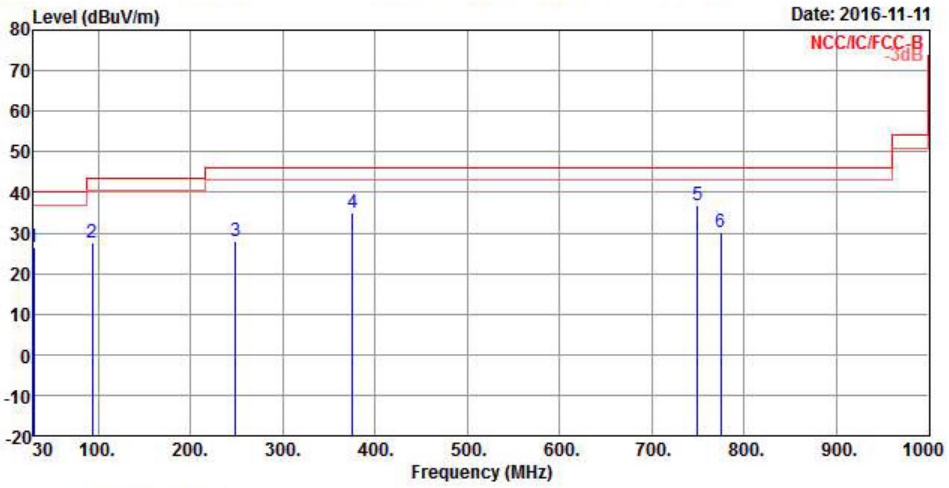
Transmitter Radiated Unwanted Emissions			
Operating Mode	Adapter Mode and Transmit	**Polarization**	V
Operating Function	2.4GHz Wi-Fi 3TX 11g (2437MHz) + 5GHz Wi-Fi 2TX 11a (5240MHz)		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	53.2800	36.80	-3.20	40.00	50.98	12.58	1.03	27.79	QP
2	94.0200	35.47	-8.03	43.50	47.14	14.75	1.44	27.86	Peak
3	268.6200	25.41	-20.59	46.00	32.18	18.03	2.32	27.12	Peak
4	375.3200	32.13	-13.87	46.00	36.81	20.19	2.80	27.67	Peak
5	625.5800	32.29	-13.71	46.00	33.20	23.85	3.71	28.47	Peak
6	749.7401	32.61	-13.39	46.00	31.83	24.75	4.17	28.14	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Unwanted Emissions			
Operating Mode	Adapter Mode and Transmit	**Polarization**	H
Operating Function	2.4GHz Wi-Fi 3TX 11g (2437MHz) + 5GHz Wi-Fi 2TX 11a (5240MHz)		

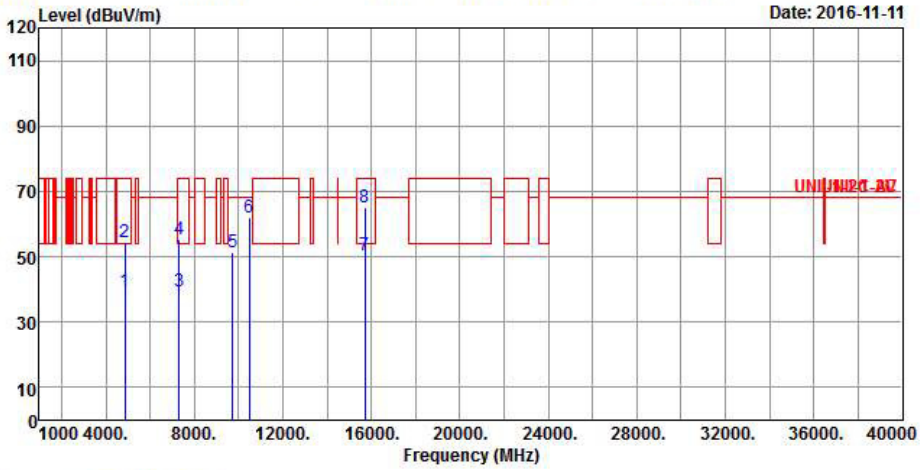


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	30.0000	26.50	-13.50	40.00	30.75	22.02	0.68	26.95	Peak
2	94.0200	27.66	-15.84	43.50	39.33	14.75	1.44	27.86	Peak
3	249.2200	28.00	-18.00	46.00	35.57	17.32	2.20	27.09	Peak
4	375.3200	34.96	-11.04	46.00	39.64	20.19	2.80	27.67	Peak
5	749.7401	36.71	-9.29	46.00	35.93	24.75	4.17	28.14	Peak
6	774.9600	30.36	-15.64	46.00	29.43	24.78	4.27	28.12	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

1.1.6 Results for Radiated Emissions (Above 1GHz)

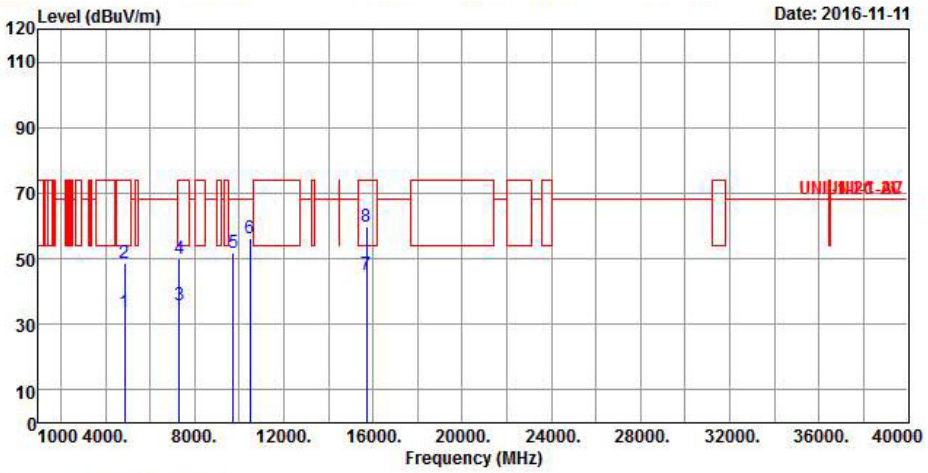
Transmitter Radiated Unwanted Emissions	
Operating Function	2.4GHz Wi-Fi 3TX 11g (2437MHz) + 5GHz Wi-Fi 2TX 11a (5240MHz)
Polarization	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.0000	39.36	-14.64	54.00	38.30	31.22	4.35	34.51	Average
2	4874.0000	54.60	-19.40	74.00	53.54	31.22	4.35	34.51	Peak
3	7311.0000	39.20	-14.80	54.00	32.77	35.88	5.40	34.85	Average
4	7311.0000	55.19	-18.81	74.00	48.76	35.88	5.40	34.85	Peak
5	9748.0000	51.58			41.98	38.70	6.13	35.23	Peak
6	10480.000	62.00	-6.20	68.20	51.21	39.48	6.22	34.91	Peak
7	15720.000	50.48	-3.52	54.00	39.56	37.87	8.04	34.99	Average
8	15720.000	65.22	-8.78	74.00	54.30	37.87	8.04	34.99	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions	
Operating Function	2.4GHz Wi-Fi 3TX 11g (2437MHz) + 5GHz Wi-Fi 2TX 11a (5240MHz)
Polarization	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.0000	33.62	-20.38	54.00	32.56	31.22	4.35	34.51	Average
2	4874.0000	48.58	-25.42	74.00	47.52	31.22	4.35	34.51	Peak
3	7311.0000	35.91	-18.09	54.00	29.48	35.88	5.40	34.85	Average
4	7311.0000	50.03	-23.97	74.00	43.60	35.88	5.40	34.85	Peak
5	9748.0000	51.98			42.38	38.70	6.13	35.23	Peak
6	10480.000	56.27	-11.93	68.20	45.48	39.48	6.22	34.91	Peak
7	15720.000	45.14	-8.86	54.00	34.22	37.87	8.04	34.99	Average
8	15720.000	59.61	-14.39	74.00	48.69	37.87	8.04	34.99	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

2 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSP 40	100593	9kHz~40GHz	26/10/2016	25/10/2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz~1GHz 3m	03/06/2016	02/06/2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz~18GHz 3m	03/06/2016	02/06/2017
Amplifier	Agilent	8447D	2944A11149	100kHz~1.3GHz	01/07/2016	30/06/2017
Amplifier	Agilent	8449B	3008A02602	1GHz~26.5GHz	20/09/2016	19/09/2017
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 01543	1GHz~18GHz	22/04/2016	21/04/2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz~40GHz	29/01/2016	28/01/2017
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz~1GHz	01/10/2016	30/09/2017
Amplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz~40GHz	01/06/2015	31/05/2017