



FCC Test Report

Equipment : AC5400 Wireless Tri-Band MU-MIMO Gigabit Router
Brand Name : TP-Link
Model No. : Archer C5400
FCC ID : TE7C5400V2
Standard : 47 CFR FCC Part 15.247
Operating Band : 2400 MHz – 2483.5 MHz
Function : ☒ Point-to-multipoint; ☐ Point-to-point
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 Oct. 28, 2015 and completely tested on Jun. 13, 2017. 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.


Cliff Chang
SPORTON INTERNATIONAL INC.



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Summary of Test Result

Conformance Test Specifications				
Report Clause	Ref. Std. Clause	Description	Limit	Result
1.1.2	15.203	Antenna Requirement	FCC 15.203	Complied
2.1	15.247(d)	Emissions in Restricted Frequency Bands	Restricted Bands: FCC 15.209	Complied



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FCC ID: TE7C5400V2

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), ac (VHT20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40), ac (VHT40)	2422-2452	3-9 [7]

Band	Mode	BWch (MHz)	Nant
2.4G	11b	20	4
2.4G	11g	20	4
2.4G	n (HT20)	20	4
2.4G	n (HT40)	40	4
2.4G	ac (VHT20)	20	4
2.4G	ac (VHT40)	40	4

Note:

- ♦ 2.4G is the 2.4GHz Band (2.4-2.4835GHz).
- ♦ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- ♦ 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ♦ VHT20, VHT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- ♦ BWch is the nominal channel bandwidth.
- ♦ Nss-Min is the minimum number of spatial streams.
- ♦ Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	TP-LINK	3101500737	PCB Antenna	I-PEX	1.8	1.8
2	TP-LINK	3101500737	PCB Antenna	I-PEX	1.8	1.8
3	TP-LINK	3101500737	PCB Antenna	I-PEX	1.8	1.8
4	TP-LINK	3101500737	PCB Antenna	I-PEX	1.8	1.8
5	TP-LINK	3101500734	PCB Antenna	I-PEX	-	1.8
6	TP-LINK	3101500734	PCB Antenna	I-PEX	-	1.8
7	TP-LINK	3101500734	PCB Antenna	I-PEX	-	1.8
8	TP-LINK	3101500734	PCB Antenna	I-PEX	-	1.8

Note: 1.The EUT has eight antennas.

2.The EUT has three radios. (Radio 1 supports 5GHz band 1 and band 2 WLAN function, Radio 2 supports 5GHz band 3 and band 4 WLAN function and Radio 3 supports 2.4GHz WLAN function.)

3.The EUT supports WLAN (4TX, 4RX):

Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.

1.1.3 EUT Operational Condition

EUT Power Type	From power adapter		
Beamforming Function	☒	With beamforming for 802.11n/ac in 2.4GHz/5GHz.	☐ Without beamforming

1.1.4 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR5N0101-01AA

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking						
1. Updating chip version to "BCM4366 C0" from "BCM4366 B1". The difference between original version and new version as below: <table><tr><th>Version</th><th>Description</th></tr><tr><td>BCM4366 B1 (Original)</td><td>Single User Multiple Input Multiple Output</td></tr><tr><td>BCM4366 C0 (New)</td><td>Multi-User Multiple-Input Multiple-Output</td></tr></table>	Version	Description	BCM4366 B1 (Original)	Single User Multiple Input Multiple Output	BCM4366 C0 (New)	Multi-User Multiple-Input Multiple-Output	Emissions in Restricted Frequency Bands Below 1GHz. Note: After verified does not affect the other test results.
Version	Description						
BCM4366 B1 (Original)	Single User Multiple Input Multiple Output						
BCM4366 C0 (New)	Multi-User Multiple-Input Multiple-Output						
2. Changing applicant's company to "TP-Link Technologies Co., Ltd." from "TP-LINK TECHNOLOGIES CO., LTD." 3. Changing brand name to "TP-Link" from "TP-LINK". 4. Changing FCC ID to "TE7C5400V2" from "TE7C5400".	It does not need to re-test.						

1.2 Testing Applied Standards

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

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2013
- ◆ FCC KDB 558074 D01 v04
- ◆ FCC KDB 662911 D01 v02r01
- ◆ FCC KDB 644545 D01 v01r02

1.3 Testing Location Information

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 : 886-3-318-0055
☒	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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH01-CB	Joy Tseng	22°C / 54%	Jun. 13, 2017

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

1.4 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))

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%

1.5 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
The EUT for Emissions in Restricted Frequency Bands test was performed at Z axis and Y axis position and the worst case was found from Z axis. So the measurement will follow this same test configuration.	
1	EUT in Z axis

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	
1	2.4GHz WLAN + 5GHz WLAN Band1/Band2 + 5GHz WLAN Band 3/Band4
Refer to Sporton Test Report No.: FA5N0101-05 for Co-location RF Exposure Evaluation.	

1.6 EUT Operation during Test

During the test, the EUT operation to normal function.

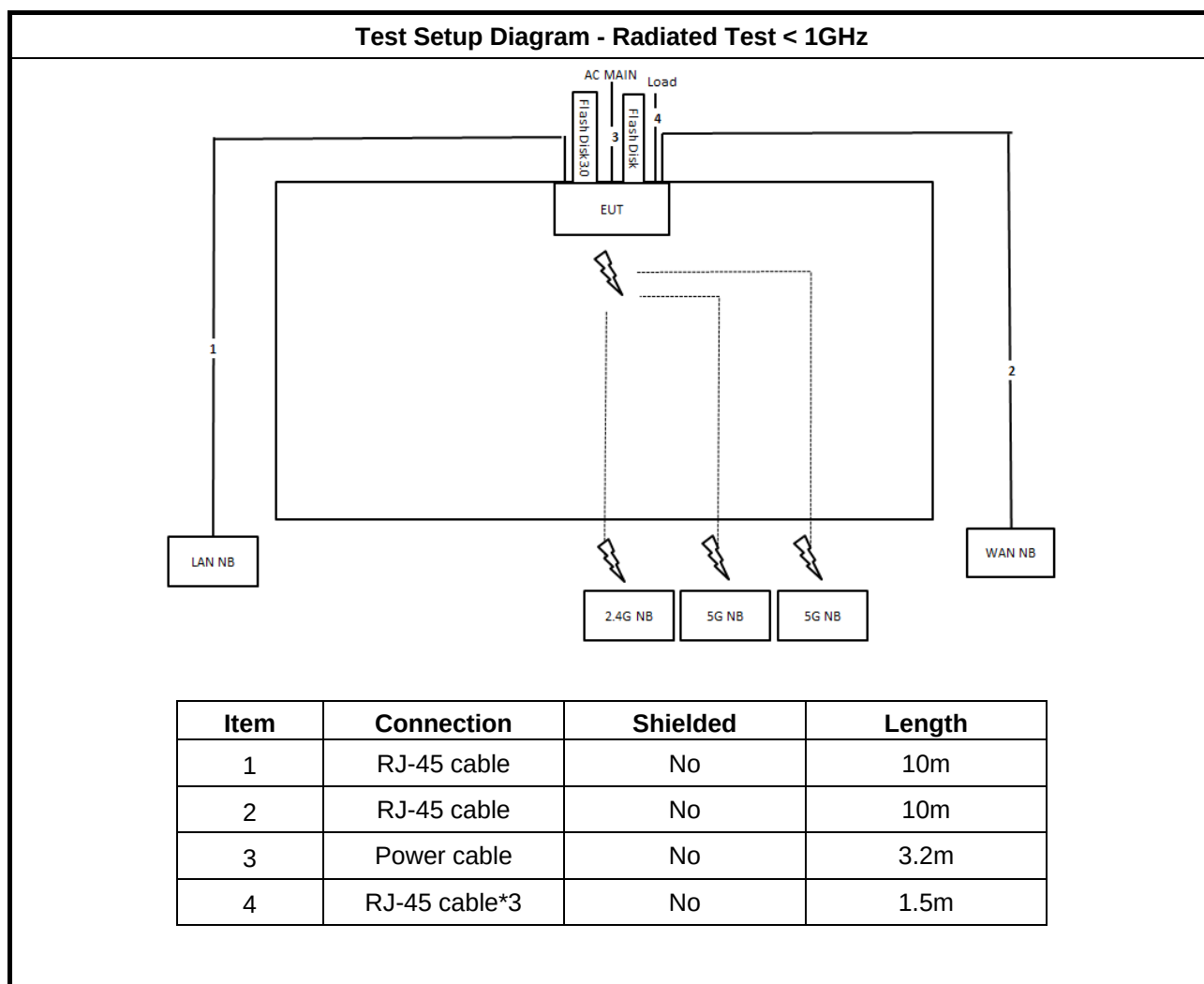
1.7 Accessories

Accessories				
Equipment Name	Brand Name	Model Name	Rating	Remark
Adapter	Huntkey	HKA06012050-7G	Input: 100-240Vac, 50/60Hz, 1.5A Output: 12.0Vdc, 5.0A	Cable (Non-shielded, 1.4m)
Other				
Power cable*1: Non-shielded, 1.8m				

1.8 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook*2	DELL	E4300	DoC
2	Notebook*3	Apple	Mac Book	DoC
3	Flash disk	Silicon Power	Touch 835	DoC
4	Flash disk3.0	Silicon Power	B06	DoC

1.9 Test Setup Diagram



2 Transmitter Test Result

2.1 Emissions in Restricted Frequency Bands

2.1.1 Emissions in Restricted Frequency Bands 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 20 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.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

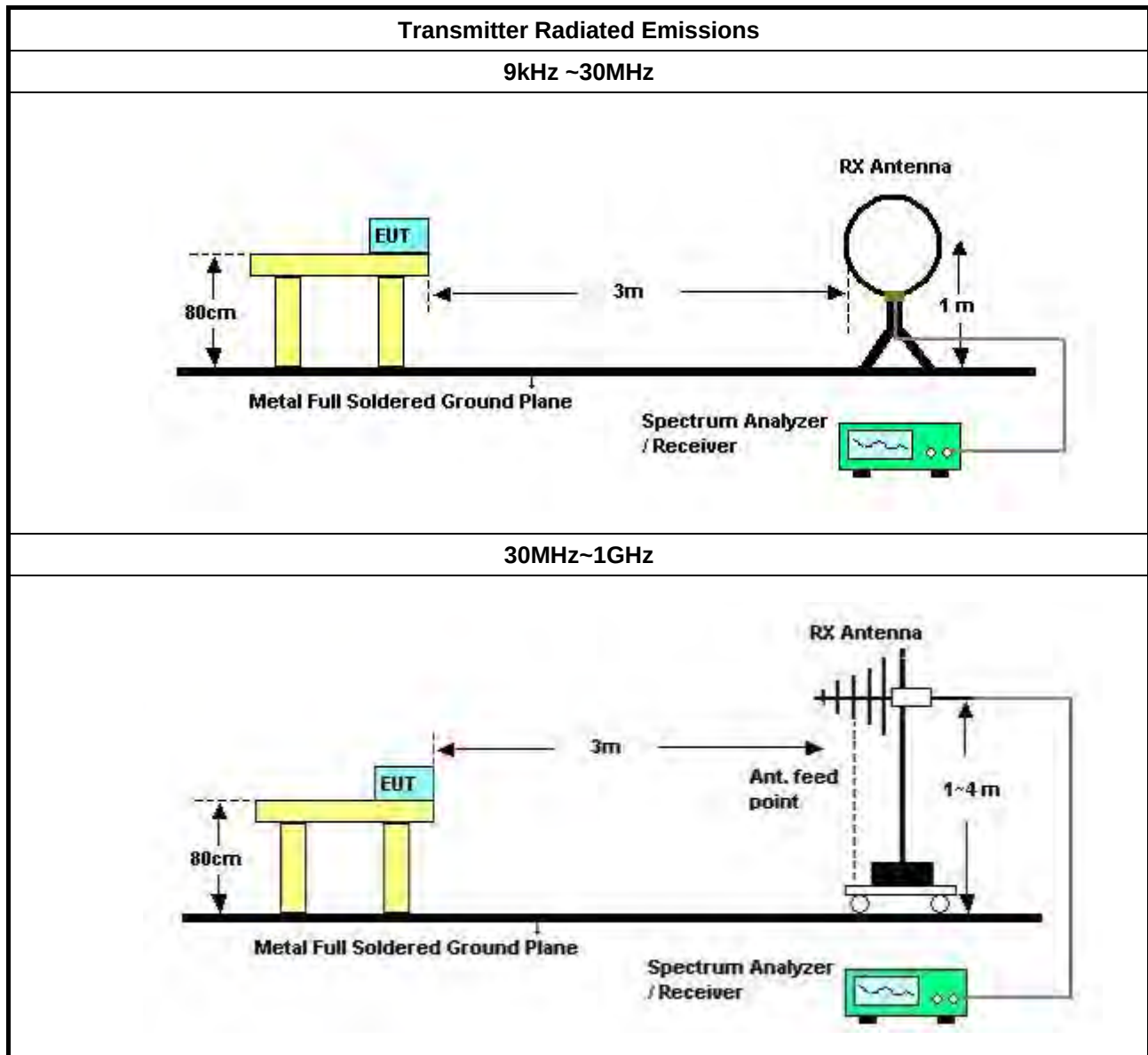
2.1.2 Measuring Instruments

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

2.1.3 Test Procedures

Test Method	
The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
Refer as ANSI C63.10, clause 6.9.2.2 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
For the transmitter unwanted emissions shall be measured using following options below:	
	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
	☐ Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
	☐ Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
	☒ Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$).
	☐ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
	☐ Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
	☒ Refer as FCC KDB 558074, clause 12.2.4 measurement procedure peak limit.
For the transmitter band-edge emissions shall be measured using following options below:	
	Refer as FCC KDB 558074 clause 13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	Refer as FCC KDB 558074, clause 13.2 (ANSI C63.10, clause 6.9.3) for marker-delta method for band-edge measurements.
	Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 12.2.2.	
	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
	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.

2.1.4 Test Setup



2.1.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

2.1.6 Test Result of Transmitter Radiated Unwanted Emissions

Refer as Appendix A

3 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2016	Aug. 29, 2017	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2017	May 01, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 22, 2016	Nov. 21, 2017	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 06, 2017	May 05, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Mar. 15, 2018*	Radiation (03CH01-CB)

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

“*” Calibration Interval of instruments listed above is two years.

