FCC Test Report (Co-Located)

Report No.:	RF141219C21-2
FCC ID:	TE7C5V2
Test Model:	Archer C5
Received Date:	Dec. 19, 2014
Test Date:	Mar. 09 ~ Mar. 10, 2015
Issued Date:	Mar. 10, 2015
Applicant:	TP-LINK TECHNOLOGIES CO., LTD.
Address:	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF141219C21-2	Original release.	Mar. 10, 2015

1 Certificate of Conformity

Product:	AC1200 Wireless Dual Band Gigabit Router
Brand:	TP-LINK
Test Model:	Archer C5
Sample Status:	Prototype
Applicant:	TP-LINK TECHNOLOGIES CO., LTD.
Manufacturer:	TP-LINK TECHNOLOGIES CO., LTD.
Test Date:	Mar. 09 ~ Mar. 10, 2015
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2009

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Mar. 10, 2015

Suntee Liu / Specialist

Approved by : _____ , **Date:** Mar. 10, 2015

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247) 47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -5.85dB at 0.16172MHz.
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4/6)	Radiated Emission	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00 & 5120.00 MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1200 Wireless Dual Band Gigabit Router
Brand	TP-LINK
Test Model	Archer C5
H/W	Archer C5
S/W	AC1200 Wireless Dual Band Gigabit Router
Status of EUT	Prototype
Power Supply Rating	12Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps
Operating Frequency	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 5.0GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	2412~2462MHz: 518.369mW 5180~5240MHz: 171.408mW 5745~5825MHz: 570.501mW
Antenna Type	2.4GHz: Omni directional antenna with 2dBi gain 5.0GHz: Omni directional antenna with 3dBi gain
Antenna Connector	SMA reverse
Accessory Device	Adapter
Data Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers. This device supports chip beamforming.

Modulation Mode	TX Function
802.11b	1TX
802.11g	2TX
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX

*The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT uses following adapter.

Brand	Ten Pao International Inc.
Model	S040EU1200250
Input Power	100-240Vac, 50/60Hz, 1.2A Max.
Output Power	12.0Vdc, 2500mA
Power Line	1.5m DC cable without core attached on adapter

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

3.2 Description of Test Modes

FOR 2.4GHz

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to			Description
	RE≥1G	RE<1G	PLC	
A	√	√	√	Refer to each test item
B	√	√	√	Refer to each test item

Where RE≥1G: Radiated Emission above 1GHz RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-plane.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	TX Function
A	802.11g	2412~2462	1 to 11	6	2TX
	802.11a	5180~5240	36 to 48	40	2TX
B	802.11g	2412~2462	1 to 11	6	2TX
	802.11n (HT20)	5745~5825	149 to 165	157	2TX

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	TX Function
A	802.11g	2412~2462	1 to 11	6	2TX
	802.11a	5180~5240	36 to 48	40	2TX
B	802.11g	2412~2462	1 to 11	6	2TX
	802.11n (HT20)	5745~5825	149 to 165	157	2TX

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	TX Function
A	802.11g	2412~2462	1 to 11	6	2TX
	802.11a	5180~5240	36 to 48	40	2TX
B	802.11g	2412~2462	1 to 11	6	2TX
	802.11n (HT20)	5745~5825	149 to 165	157	2TX

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	20 deg. C, 65% RH	120Vac, 60Hz	Jones Chang
RE<1G	20 deg. C, 65% RH	120Vac, 60Hz	Jones Chang
PLC	22 deg. C, 70% RH	120Vac, 60Hz	Jones Chang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

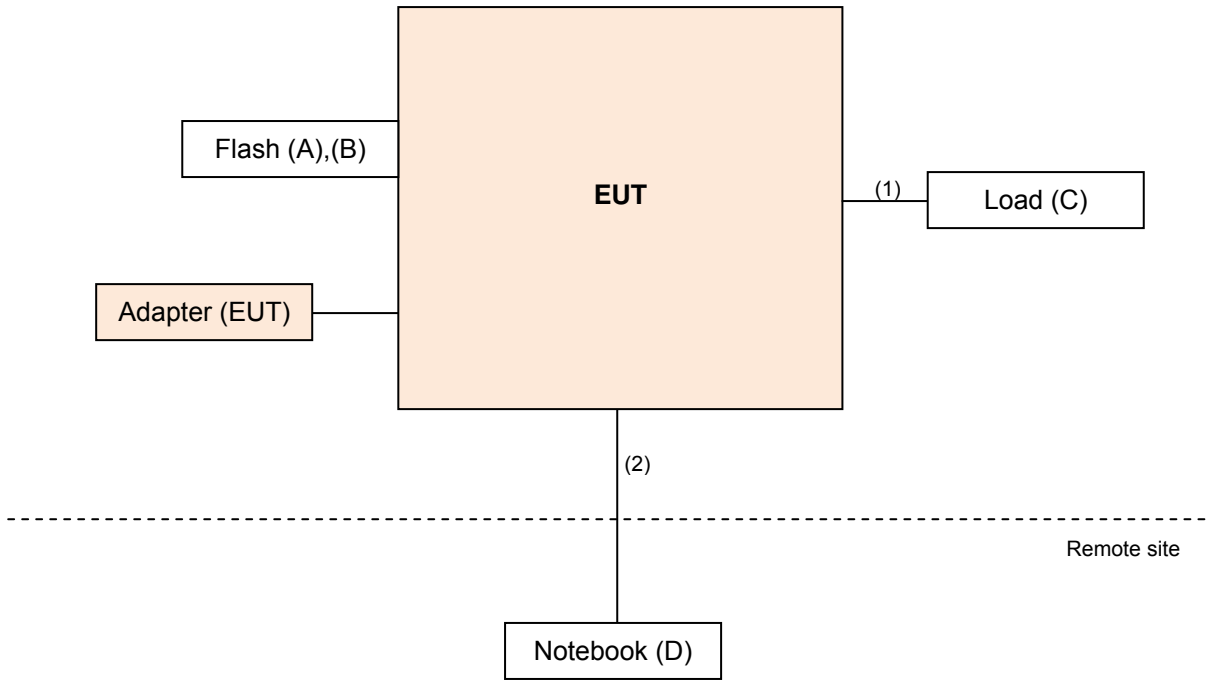
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB Flash Drive	Transcend	V85	569992-8209	FCC DoC Approved	-
B.	USB Flash Drive	Transcend	V85	538455 4488	FCC DoC Approved	-
C.	Load	NA	NA	NA	NA	-
D.	Notebook	DELL	D531	CN-0XM006-48643-81 U-2610	QDS-BRCM1020	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item D acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45	4	1.8	N	0	-
2.	RJ45	1	3	N	0	-

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

FCC Part 15, Subpart E (15.407)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (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 lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedure New Rules v01	FIELD STRENGTH AT 3m	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) [*1] PK:-17 (dBm/MHz) [*2]	PK: 68.2(dBμV/m) [*1] PK:78.2 (dBμV/m) [*2]

NOTE: [*1] beyond 10MHz of the band edge [*2] within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 01, 2014	Nov. 30, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Feb. 11, 2015	Feb. 10, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2014	Aug. 08, 2015
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	248780/4 309222/4 274092/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable Worken	8D-FB	Cable-CH9-01	Aug. 11, 2014	Aug. 10, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2014	Oct. 17, 2015
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. The test was performed in HwaYa Chamber 9.

4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

5. The FCC Site Registration No. is 215374.

6. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. 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 from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-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. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

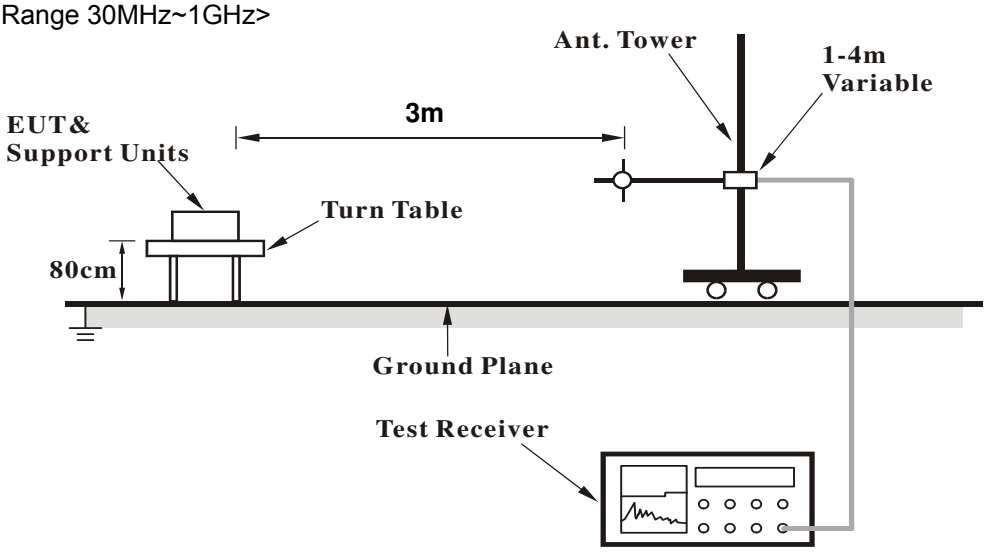
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

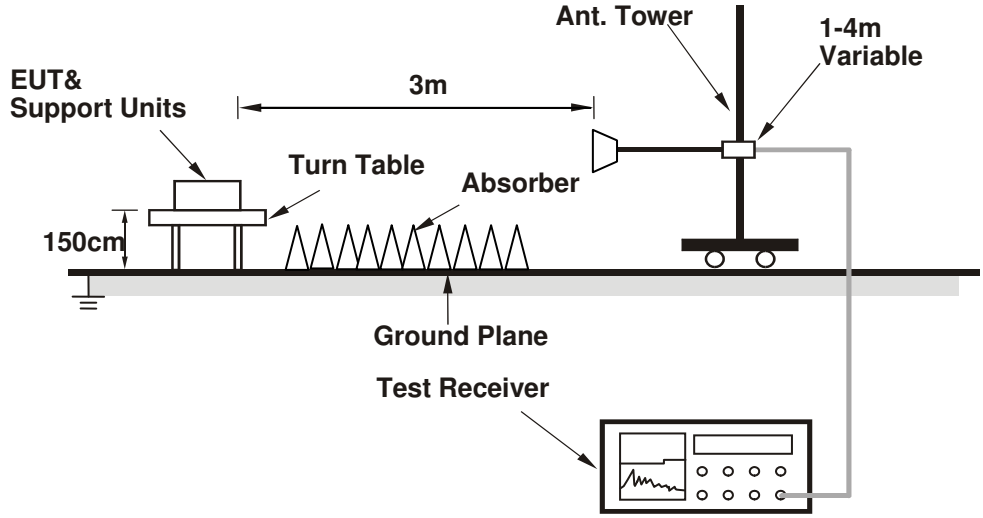
No deviation.

4.1.5 Test Setup

<Frequency Range 30MHz~1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".
e. The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Data

CHANNEL	802.11g CH 6 + 802.11a CH 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.3 PK	74.0	-11.7	1.00 H	183	29.80	32.50
2	2390.00	49.7 AV	54.0	-4.3	1.00 H	183	17.20	32.50
3	*2437.00	114.1 PK			1.01 H	205	81.40	32.70
4	*2437.00	103.7 AV			1.01 H	205	71.00	32.70
5	2483.50	63.7 PK	74.0	-10.3	1.21 H	168	31.00	32.70
6	2483.50	49.7 AV	54.0	-4.3	1.21 H	169	17.00	32.70
7	4874.00	55.2 PK	74.0	-18.8	1.06 H	252	49.30	5.90
8	4874.00	41.2 AV	54.0	-12.8	1.06 H	252	35.30	5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.5 PK	74.0	-5.5	1.01 V	23	36.00	32.50
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.01 V**	**23**	**21.40**	**32.50**
3	*2437.00	121.5 PK			1.00 V	19	88.80	32.70
4	*2437.00	111.5 AV			1.00 V	19	78.80	32.70
5	2483.50	69.2 PK	74.0	-4.8	1.00 V	23	36.50	32.70
6	2483.50	53.6 AV	54.0	-0.4	1.00 V	23	20.90	32.70
7	4874.00	59.3 PK	74.0	-14.7	1.00 V	10	53.40	5.90
8	4874.00	44.8 AV	54.0	-9.2	1.00 V	10	38.90	5.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	802.11g CH 6 + 802.11a CH 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	62.1 PK	74.0	-11.9	1.06 H	74	56.10	6.00
2	5120.00	48.2 AV	54.0	-5.8	1.06 H	74	42.20	6.00
3	*5200.00	112.1 PK			1.00 H	88	72.50	39.60
4	*5200.00	102.4 AV			1.00 H	88	62.80	39.60
5	5350.00	60.5 PK	74.0	-13.5	1.09 H	66	54.40	6.10
6	5350.00	46.9 AV	54.0	-7.1	1.09 H	66	40.80	6.10
7	#10400.00	61.3 PK	74.0	-12.7	1.00 H	60	42.80	18.50
8	#10400.00	47.9 AV	54.0	-6.1	1.00 H	60	29.40	18.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	65.4 PK	74.0	-8.6	1.00 V	70	59.40	6.00
2	**5120.00**	**53.9 AV**	**54.0**	**-0.1**	**1.00 V**	**70**	**47.90**	**6.00**
3	*5200.00	122.6 PK			1.00 V	330	83.00	39.60
4	*5200.00	112.2 AV			1.00 V	330	72.60	39.60
5	5350.00	61.9 PK	74.0	-12.1	1.00 V	0	55.80	6.10
6	5350.00	50.9 AV	54.0	-3.1	1.00 V	0	44.80	6.10
7	#10400.00	62.9 PK	74.0	-11.1	1.02 V	55	44.40	18.50
8	#10400.00	49.5 AV	54.0	-4.5	1.02 V	55	31.00	18.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	802.11g CH 6 + 802.11n (HT20) CH 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.5 PK	74.0	-12.5	1.00 H	169	29.00	32.50
2	2390.00	49.0 AV	54.0	-5.0	1.00 H	169	16.50	32.50
3	*2437.00	114.7 PK			1.00 H	208	82.00	32.70
4	*2437.00	104.7 AV			1.00 H	208	72.00	32.70
5	2483.50	63.8 PK	74.0	-10.2	1.19 H	141	31.10	32.70
6	2483.50	48.7 AV	54.0	-5.3	1.19 H	141	16.00	32.70
7	4874.00	55.9 PK	74.0	-18.1	1.03 H	269	50.00	5.90
8	4874.00	41.7 AV	54.0	-12.3	1.03 H	269	35.80	5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.7 PK	74.0	-5.3	1.00 V	22	36.20	32.50
2	2390.00	53.8 AV	54.0	-0.2	1.00 V	22	21.30	32.50
3	*2437.00	121.9 PK			1.00 V	5	89.20	32.70
4	*2437.00	111.6 AV			1.00 V	5	78.90	32.70
5	2483.50	69.1 PK	74.0	-4.9	1.00 V	359	36.40	32.70
6	2483.50	53.5 AV	54.0	-0.5	1.00 V	359	20.80	32.70
7	4874.00	58.5 PK	74.0	-15.5	1.00 V	33	52.60	5.90
8	4874.00	45.1 AV	54.0	-8.9	1.00 V	33	39.20	5.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	802.11g CH 6 + 802.11n (HT20) CH 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	107.2 PK			1.00 H	254	66.70	40.50
2	*5785.00	96.5 AV			1.00 H	254	56.00	40.50
3	11570.00	65.4 PK	74.0	-8.6	1.49 H	44	47.00	18.40
4	11570.00	52.4 AV	54.0	-1.6	1.49 H	44	34.00	18.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	123.7 PK			1.09 V	176	83.20	40.50
2	*5785.00	112.4 AV			1.09 V	176	71.90	40.50
3	11570.00	65.4 PK	74.0	-8.6	1.51 V	303	47.00	18.40
4	11570.00	52.2 AV	54.0	-1.8	1.51 V	303	33.80	18.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz data

CHANNEL	802.11g CH 6 + 802.11a CH 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.33	24.2 QP	40.0	-15.8	1.99 H	63	38.70	-14.50
2	156.35	25.9 QP	43.5	-17.6	1.00 H	254	39.90	-14.00
3	269.10	24.6 QP	46.0	-21.4	1.00 H	196	38.20	-13.60
4	490.70	24.5 QP	46.0	-21.5	1.49 H	11	33.20	-8.70
5	725.91	26.8 QP	46.0	-19.2	1.00 H	228	30.60	-3.80
6	926.13	28.6 QP	46.0	-17.4	1.24 H	198	28.50	0.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.95	34.1 QP	40.0	-5.9	1.00 V	359	48.80	-14.70
2	80.54	28.4 QP	40.0	-11.6	1.00 V	276	46.80	-18.40
3	158.30	23.9 QP	43.5	-19.6	1.00 V	155	37.90	-14.00
4	374.07	24.0 QP	46.0	-22.0	1.24 V	167	35.00	-11.00
5	519.86	26.0 QP	46.0	-20.0	1.00 V	320	34.10	-8.10
6	675.37	27.4 QP	46.0	-18.6	1.00 V	273	32.40	-5.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	802.11g CH 6 + 802.11n (HT20) CH 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	80.54	23.2 QP	40.0	-16.8	1.51 H	280	41.60	-18.40
2	99.98	24.4 QP	43.5	-19.1	1.51 H	275	43.10	-18.70
3	171.90	26.0 QP	43.5	-17.5	2.00 H	277	40.40	-14.40
4	199.12	30.7 QP	43.5	-12.8	1.99 H	103	47.60	-16.90
5	500.42	24.9 QP	46.0	-21.1	1.26 H	220	33.30	-8.40
6	725.91	27.9 QP	46.0	-18.1	1.01 H	233	31.70	-3.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.21	34.4 QP	40.0	-5.6	1.02 V	299	49.00	-14.60
2	76.65	29.3 QP	40.0	-10.7	1.99 V	122	46.80	-17.50
3	94.15	30.6 QP	43.5	-12.9	1.24 V	215	50.20	-19.60
4	313.81	22.9 QP	46.0	-23.1	1.99 V	19	35.10	-12.20
5	473.21	23.6 QP	46.0	-22.4	1.00 V	304	32.50	-8.90
6	624.83	25.7 QP	46.0	-20.3	1.00 V	290	31.30	-5.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Apr. 24, 2014	Apr. 23, 2015
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 10, 2014	Jul. 09, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

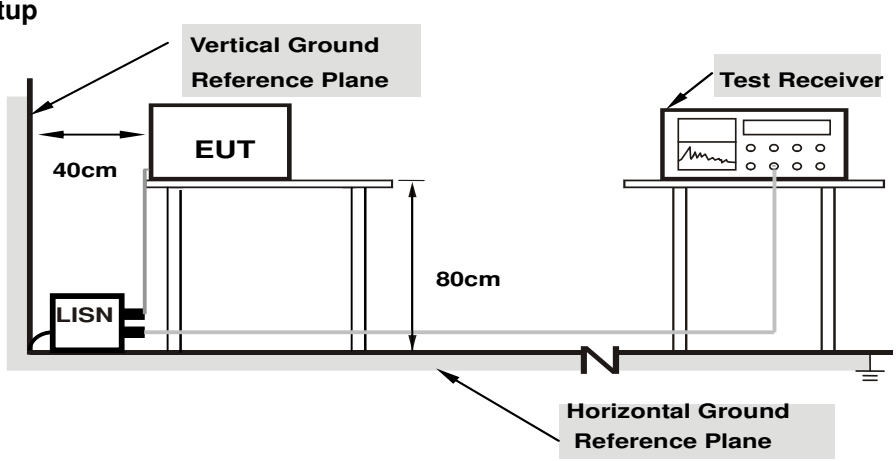
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

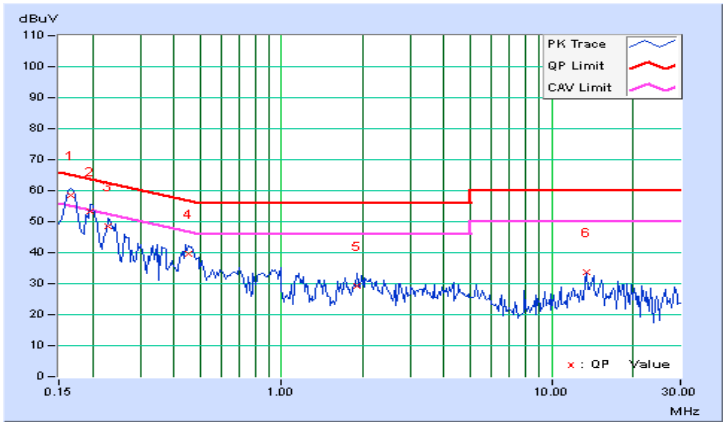
4.2.7 Test Results

CHANNEL	802.11g CH 6 + 802.11a CH 40	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	A		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.20	58.35	46.88	58.55	47.08	65.18	55.18	-6.63	-8.10
2	0.19687	0.20	53.25	41.74	53.45	41.94	63.74	53.74	-10.29	-11.80
3	0.22812	0.20	48.34	35.11	48.54	35.31	62.52	52.52	-13.98	-17.21
4	0.45078	0.21	39.41	29.72	39.62	29.93	56.86	46.86	-17.24	-16.93
5	1.89844	0.35	29.00	23.62	29.35	23.97	56.00	46.00	-26.65	-22.03
6	13.41797	0.56	33.12	32.98	33.68	33.54	60.00	50.00	-26.32	-16.46

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

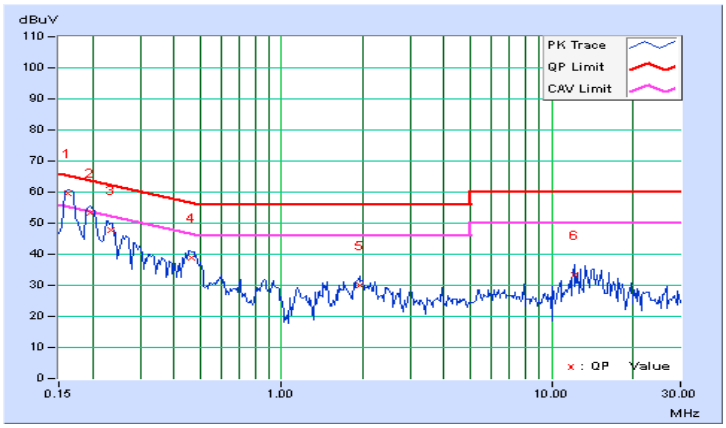


CHANNEL	802.11g CH 6 + 802.11a CH 40	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	A		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.16172**	**0.21**	**59.32**	**45.47**	**59.53**	**45.68**	**65.38**	**55.38**	**-5.85**	**-9.70**
2	0.19687	0.22	53.21	41.62	53.43	41.84	63.74	53.74	-10.31	-11.90
3	0.23466	0.23	47.60	34.29	47.83	34.52	62.28	52.28	-14.46	-17.77
4	0.46641	0.26	38.61	32.57	38.87	32.83	56.58	46.58	-17.71	-13.75
5	1.95703	0.40	29.75	24.35	30.15	24.75	56.00	46.00	-25.85	-21.25
6	12.13672	0.63	32.71	26.30	33.34	26.93	60.00	50.00	-26.66	-23.07

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

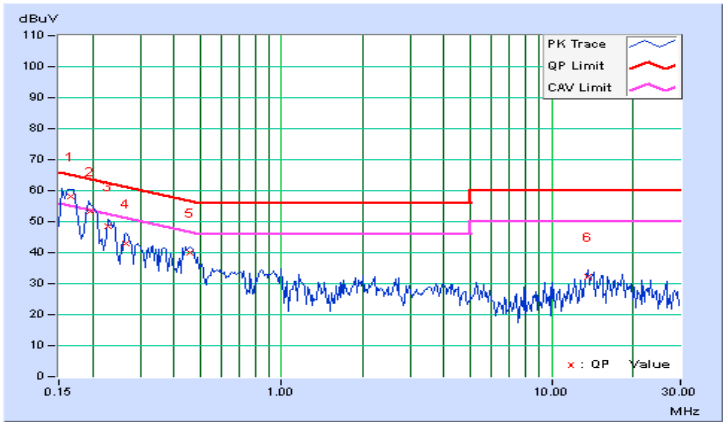


CHANNEL	802.11g CH 6 + 802.11n (HT20) CH 157	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	B		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.20	58.09	46.47	58.29	46.67	65.18	55.18	-6.89	-8.51
2	0.19682	0.20	53.15	40.98	53.35	41.18	63.74	53.74	-10.39	-12.56
3	0.22812	0.20	48.14	34.46	48.34	34.66	62.52	52.52	-14.18	-17.86
4	0.26719	0.20	42.76	30.11	42.96	30.31	61.20	51.20	-18.24	-20.89
5	0.45859	0.21	39.97	33.60	40.18	33.81	56.72	46.72	-16.54	-12.91
6	13.60156	0.56	31.51	29.05	32.07	29.61	60.00	50.00	-27.93	-20.39

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

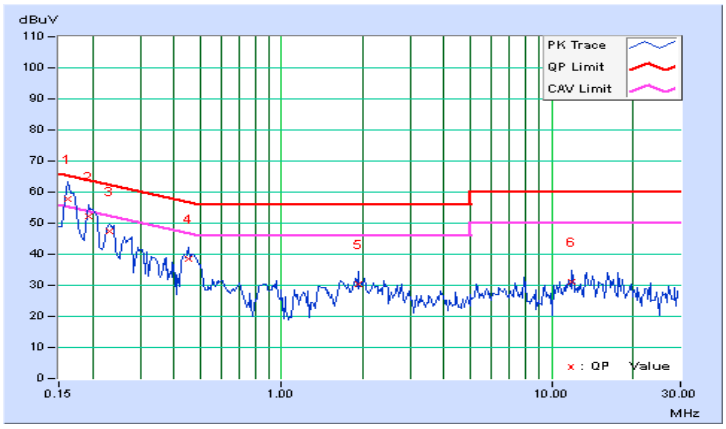


CHANNEL	802.11g CH 6 + 802.11n (HT20) CH 157	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	B		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.21	57.75	43.26	57.96	43.47	65.38	55.38	-7.42	-11.91
2	0.19297	0.22	51.90	35.86	52.12	36.08	63.91	53.91	-11.79	-17.83
3	0.23203	0.22	47.34	35.06	47.56	35.28	62.38	52.38	-14.81	-17.09
4	0.45469	0.26	38.40	29.70	38.66	29.96	56.79	46.79	-18.13	-16.83
5	1.92578	0.39	29.84	24.14	30.23	24.53	56.00	46.00	-25.77	-21.47
6	11.89063	0.62	30.40	27.77	31.02	28.39	60.00	50.00	-28.98	-21.61

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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