FCC TEST REPORT (15.247)

REPORT NO.:	RF120614E05
MODEL NO.:	WUMC710
FCC ID:	Q87-WUMC710
RECEIVED:	June 22, 2012
TESTED:	June 27 to July 04, 2012
ISSUED:	July 12, 2012
APPLICANT:	Cisco Consumer Products LLC
ADDRESS:	121 Theory Drive Irvine, CA 92617(USA)
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120614E05	Original release	July 12, 2012

1. CERTIFICATION

PRODUCT:	802.11ac Wireless Ethernet Bridge
BRAND NAME:	Cisco
MODEL NO.:	WUMC710
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Cisco Consumer Products LLC
TESTED:	June 27 to July 04, 2012
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: WUMC710) 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 : Phoenix Huang , **DATE:** July 12, 2012
(Phoenix Huang, Specialist)

APPROVED BY : , **DATE:** July 12, 2012
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.00dB at 0.20078MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 5455.00MHz & 11590.00MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX not a standard connector.

NOTE:

1. The EUT was operating in 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.725~5.850GHz. For the 5.15~5.25GHz RF parameters was recorded in another test report.

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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.69 dB
Radiated emissions (1GHz -6GHz)	3.56 dB
Radiated emissions (6GHz -18GHz)	4.10 dB
Radiated emissions (18GHz -40GHz)	4.24 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	802.11ac Wireless Ethernet Bridge
MODEL NO.	WUMC710
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only.
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11a: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
OPERATING FREQUENCY	**For 15.407** 802.11a/n/ac: 5.18 ~ 5.24GHz
	For 15.247 802.11a/n/ac: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
	For 15.247 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 13.196mW 802.11n (HT20): 28.954mW 802.11n (HT40): 47.349mW 802.11ac (VHT80): 48.464mW **For 15.247** 802.11a: 171.845mW 802.11n (HT20): 169.758mW 802.11n (HT40): 240.256mW 802.11ac (VHT80): 328.245mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	UTP cable (1.5m) × 1
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1

NOTE:

1. The EUT has two transformers and following below:

No.	Model	Transformer
1	WUMC710	TAG Transformer Model : GC3601A
2		Mingtek Transformer Model : HN36201CG
Above two transformers were pre-tested in chamber, the worse case was found in transformer 1. Therefore only the test data of the model was recorded in this report.		

2. The EUT must be supplied with a power adapter and following two different models could be chosen as following table:

No.	Brand	Model No.	Spec.
1	HON-KWANG	HK-AX-120A150-US	Input: 100-240V, 0.8A, 50/60Hz Output: 12V, 1.5A DC output cable: (1.5m, unshielded)
2	SOLYTECH	CAD1812C	Input: 100-240V, 1.0A, 50-60Hz Output: 12V, 1.5A DC output cable: (1.5m, unshielded)
Above two adapters were pre-tested in chamber, the radiated emission worse case was found in adapter 2. Therefore only the test data of the model was recorded in this report.			

3. The EUT incorporates a MIMO function.

MODULATION MODE	TX/RX FUNCTION
802.11a	3Tx/3Rx
802.11n (HT20)	3Tx/3Rx
802.11n (HT40)	3Tx/3Rx
802.11n (VHT20)	3Tx/3Rx
802.11ac(VHT40)	3Tx/3Rx
802.11ac (VHT80)	3Tx/3Rx

Note: The modulation and bandwidth are similar for 11n mode for 20MHz (40MHz) and 11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

4. The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Antenna Type	Gain (dBi) (Include cable loss)	Frequency range (MHz to MHz)	Cable Loss (dB)	Cable Lenth (cm)
Chain (0)	Balanced	4.87	5150 – 5825	0.8	13
Chain (1)	Balanced	4.49	5150 – 5825	0.73	12.7
Chain (2)	Balanced	4.04	5150 – 5825	0.85	15.5

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.

6. When the EUT operating in 802.11ac, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 9.

7. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

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

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz

One channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
155	5775 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	OB	
1	√	-	-	-	-	With Adapter 1
2	√	√	√	√	√	With Adapter 2

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

RE ³ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

OB: Conducted Out-Band Emission Measurement

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	149 to 165	149	OFDM	BPSK	6

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	149 to 165	149	OFDM	BPSK	6

RADIATED EMISSION TEST (ABOVE 1 GHZ):

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)	155	155	OFDM	BPSK	97.5

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)	155	155	OFDM	BPSK	97.5

CONDUCTED OUT-BAND EMISSION MEASUREMENT:

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)	155	155	OFDM	BPSK	97.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C,65%RH	120Vac, 60Hz	Kyle Huang
RE<1G	22deg. C, 68%RH	120Vac, 60Hz	Evan Huang
RE≥1G	22deg. C, 61%RH	120Vac, 60Hz	Amos Chuang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang
OB	25deg. C, 60%RH	120Vac, 60Hz	Rex Huang

3.3 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)
558074 D01 DTS Meas Guidance v01
ANSI C63.10-2009

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

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

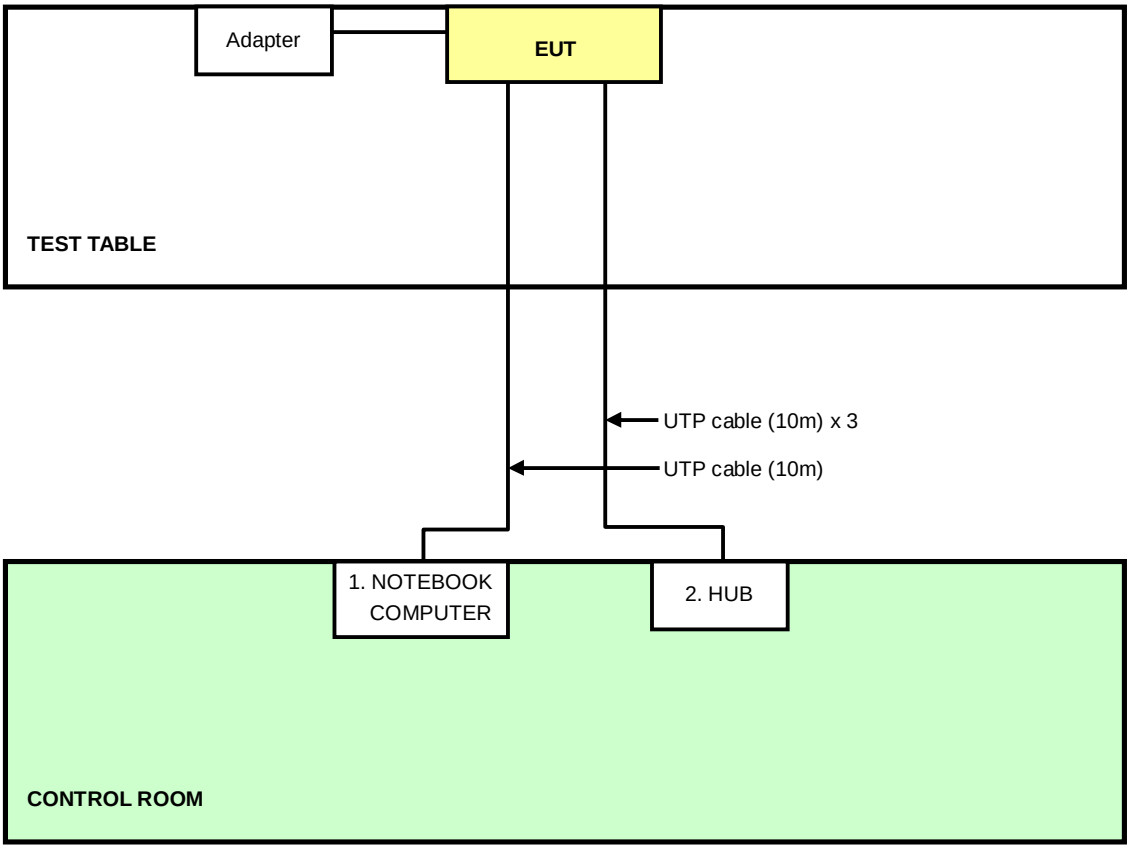
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m
2	UTP cable, 10m

NOTE: All power cords of the above support units are non shielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	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 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100287	Feb. 29, 2012	Feb. 28, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK 8127	8127-523	Sep. 20, 2011	Sep. 19, 2012
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	848773/004	Nov. 01, 2011	Oct. 31, 2012
RF Cable (JYEBAO)	5DFB	COACAB-002	Aug. 06, 2011	Aug. 05, 2012
50 ohms Terminator	50	3	Nov. 02, 2011	Nov. 01, 2012
Software ADT	BV ADT_Cond_V7.3.7 .3	NA	NA	NA

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 test was performed in Shielded Room No. A.
3 The VCCI Con A Registration No. is C-817.
4. Tested Date: June 28, 2012

4.1.3 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.

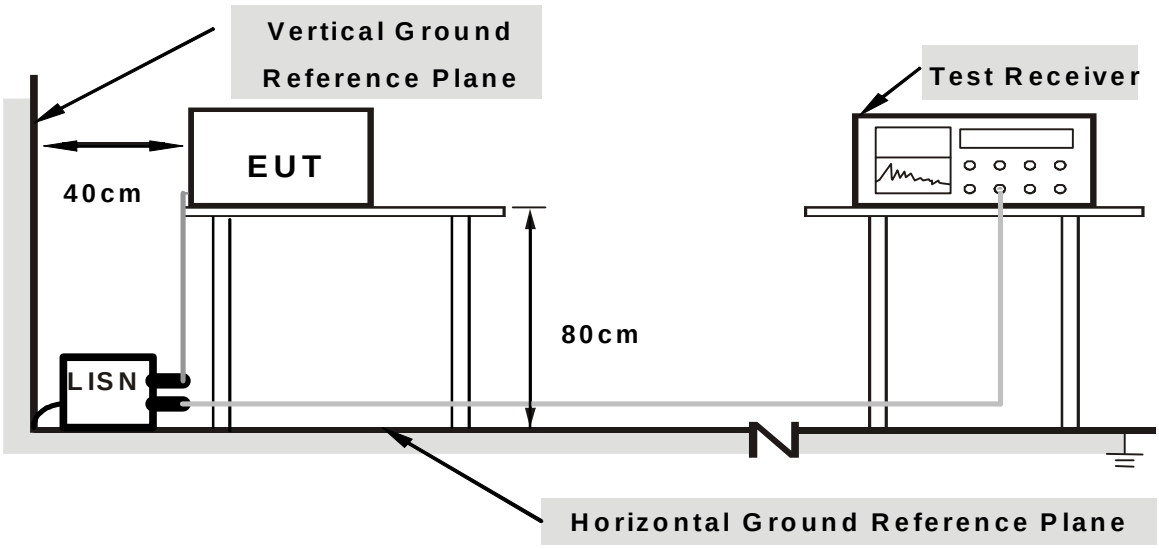
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared other computer system (support unit 1) to act as communication partners and placed them outside of testing area.
3. The communication partners ran test program “MTool.exe v1.0.0.9” to enable EUT under transmission/receiving condition continuously via one UTP cable.

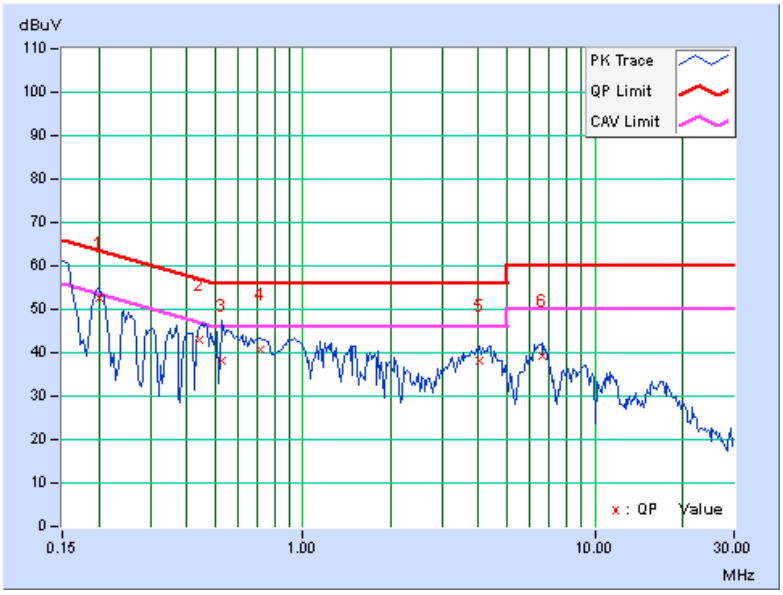
4.1.7 TEST RESULTS (MODE 1)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.20078**	**0.06**	**52.67**	**43.52**	**52.73**	**43.58**	**63.58**	**53.58**	**-10.85**	**-10.00**
2	0.43906	0.07	42.81	31.97	42.88	32.04	57.08	47.08	-14.20	-15.04
3	0.52891	0.08	37.94	16.65	38.02	16.73	56.00	46.00	-17.98	-29.27
4	0.71641	0.10	40.53	31.43	40.63	31.53	56.00	46.00	-15.37	-14.47
5	4.02344	0.27	37.98	28.29	38.25	28.56	56.00	46.00	-17.75	-17.44
6	6.62500	0.33	38.91	30.86	39.24	31.19	60.00	50.00	-20.76	-18.81

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.

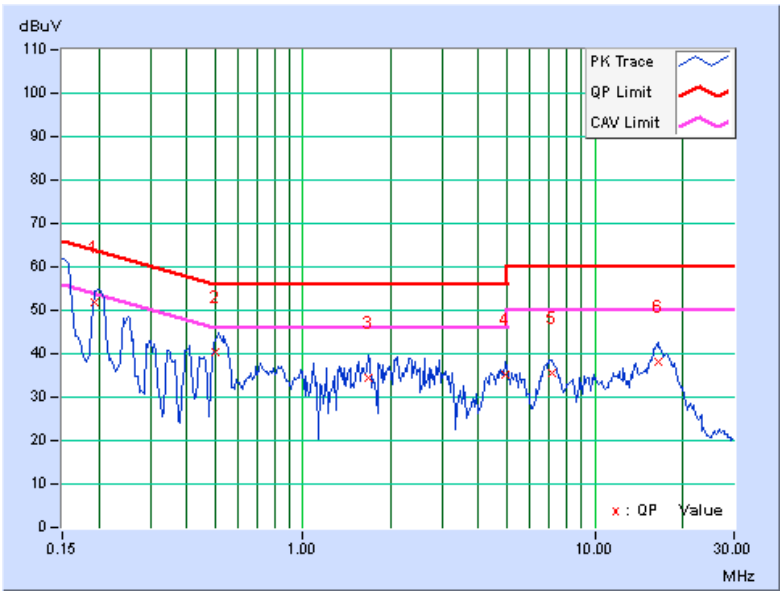


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19297	0.07	51.86	36.22	51.93	36.29	63.91	53.91	-11.98	-17.62
2	0.50000	0.09	40.29	32.66	40.38	32.75	56.00	46.00	-15.62	-13.25
3	1.68750	0.16	34.39	23.13	34.55	23.29	56.00	46.00	-21.45	-22.71
4	4.93359	0.27	34.99	24.63	35.26	24.90	56.00	46.00	-20.74	-21.10
5	7.12500	0.32	35.19	26.94	35.51	27.26	60.00	50.00	-24.49	-22.74
6	16.42578	0.53	37.49	31.53	38.02	32.06	60.00	50.00	-21.98	-17.94

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.



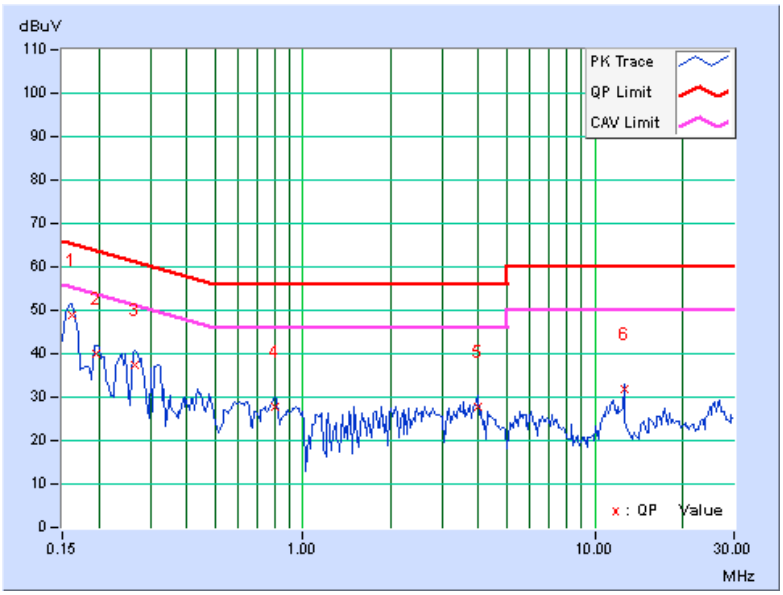
4.1.8 TEST RESULTS (MODE 2)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.06	48.93	42.91	48.99	42.97	65.38	55.38	-16.39	-12.41
2	0.19687	0.06	39.99	28.61	40.05	28.67	63.74	53.74	-23.69	-25.07
3	0.26719	0.06	37.43	22.47	37.49	22.53	61.20	51.20	-23.71	-28.67
4	0.79844	0.10	27.75	16.70	27.85	16.80	56.00	46.00	-28.15	-29.20
5	3.98047	0.27	27.56	17.25	27.83	17.52	56.00	46.00	-28.17	-28.48
6	12.62891	0.46	31.33	28.36	31.79	28.82	60.00	50.00	-28.21	-21.18

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.

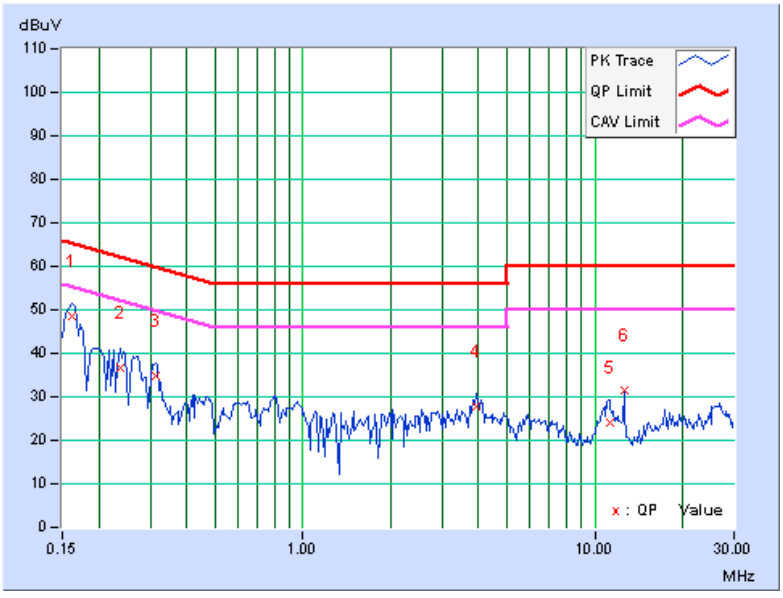


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.07	48.37	42.71	48.44	42.78	65.38	55.38	-16.94	-12.60
2	0.23594	0.07	36.75	26.94	36.82	27.01	62.24	52.24	-25.42	-25.23
3	0.31406	0.08	34.58	25.05	34.66	25.13	59.86	49.86	-25.21	-24.74
4	3.91406	0.25	27.60	17.93	27.85	18.18	56.00	46.00	-28.15	-27.82
5	11.22266	0.41	23.63	15.75	24.04	16.16	60.00	50.00	-35.96	-33.84
6	12.62891	0.44	31.07	28.14	31.51	28.58	60.00	50.00	-28.49	-21.42

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.



4.2 RADIATED AND BANDEDGE EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED AND BANDEDGE EMISSION 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 30dB 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.

4.2.2 TEST INSTRUMENTS

For below 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Pre-Selector Agilent	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Signal Generator Agilent	N5181A	MY49060347	July 25, 2011	July 24, 2012
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-04	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 23, 2011	Nov. 22, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Loop Antenna(*) R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 08, 2011	Oct. 07, 2012
Software	ADT_Radiated_V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

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 above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3 The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. H.
5 The FCC Site Registration No. is 797305.
6 The CANADA Site Registration No. is IC 7450H-3.
7 Tested Date: June 27, 2012

For above 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250254	July 12, 2011	July 11, 2012
Pre-Selector Agilent	N9039A	MY46520311	July 12, 2011	July 11, 2012
Signal Generator Agilent	N5181A	MY49060517	July 12, 2011	July 11, 2012
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02578	July 04, 2011	July 03, 2012
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Apr. 09, 2012	Apr. 08, 2013
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Loop Antenna(*) R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 26, 2011	Dec. 25, 2012
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

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 above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3 The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. G.
5 The FCC Site Registration No. is 966073.
6 The VCCI Site Registration No. is G-137.
7 The CANADA Site Registration No. is IC 7450H-2.
8 Tested Date: June 29, 2012

4.2.3 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.

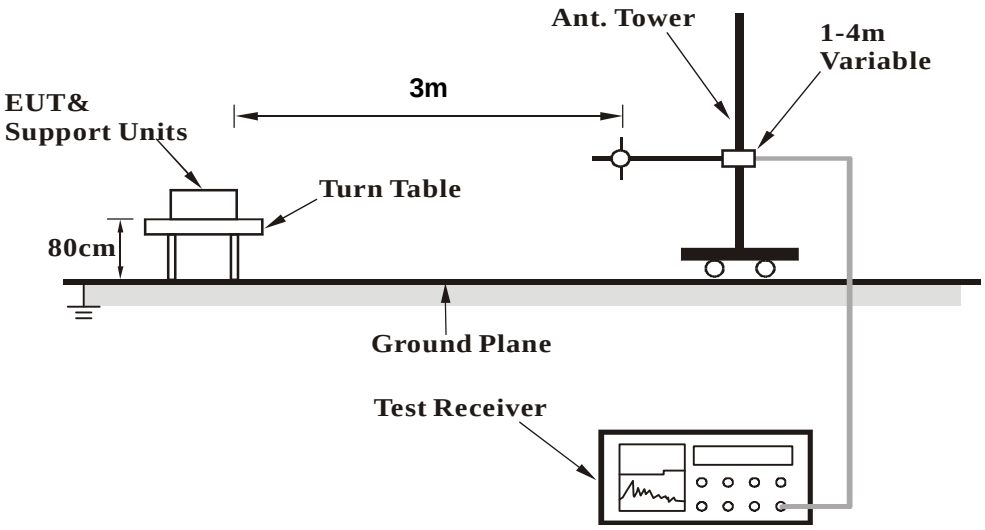
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. 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.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 149	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

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	250.03	36.2 QP	46.0	-9.8	1.00 H	253	22.88	13.30
2	599.97	32.6 QP	46.0	-13.4	1.50 H	258	10.38	22.22
3	625.07	35.9 QP	46.0	-10.1	1.50 H	314	13.35	22.54
4	750.01	33.4 QP	46.0	-12.6	1.00 H	25	8.83	24.56
5	799.98	35.3 QP	46.0	-10.8	1.00 H	233	9.63	25.62
6	875.04	43.3 QP	46.0	-2.7	1.00 H	360	16.62	26.66
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	43.86	35.8 QP	40.0	-4.2	1.00 V	0	21.74	14.08
2	250.03	32.4 QP	46.0	-13.7	2.00 V	206	19.05	13.30
3	600.09	35.2 QP	46.0	-10.8	1.00 V	0	12.97	22.22
4	625.07	36.2 QP	46.0	-9.8	1.00 V	0	13.63	22.54
5	800.10	33.8 QP	46.0	-12.3	1.00 V	104	8.13	25.62
6	875.06	41.3 QP	46.0	-4.7	1.00 V	352	14.66	26.66

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

ABOVE 1GHz DATA

802.11a

CHANNEL	TX Channel 149	**DETECTOR FUNCTION**	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	5425.00	64.8 PK	74.0	-9.2	1.15 H	103	22.41	42.39
2	5425.00	53.1 AV	54.0	-0.9	1.15 H	103	10.71	42.39
3	*5745.00	116.5 PK			1.14 H	159	73.55	42.95
4	*5745.00	106.9 AV			1.14 H	159	63.95	42.95
5	11490.00	66.5 PK	74.0	-7.5	1.24 H	61	17.25	49.25
6	11490.00	53.2 AV	54.0	-0.8	1.24 H	61	3.95	49.25
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	5425.00	61.3 PK	74.0	-12.7	1.23 V	115	18.91	42.39
2	5425.00	49.5 AV	54.0	-4.5	1.23 V	115	7.11	42.39
3	*5745.00	112.1 PK			1.23 V	115	69.15	42.95
4	*5745.00	102.1 AV			1.23 V	115	59.15	42.95
5	11490.00	62.9 PK	74.0	-11.1	1.36 V	56	13.65	49.25
6	11490.00	49.0 AV	54.0	-5.0	1.36 V	56	-0.25	49.25

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	117.4 PK			1.15 H	103	74.40	43.00
2	*5785.00	107.1 AV			1.15 H	103	64.10	43.00
3	11570.00	66.2 PK	74.0	-7.8	1.24 H	60	16.91	49.29
4	11570.00	53.3 AV	54.0	-0.7	1.24 H	60	4.01	49.29
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	112.2 PK			1.22 V	118	69.20	43.00
2	*5785.00	102.4 AV			1.22 V	118	59.40	43.00
3	11570.00	62.0 PK	74.0	-12.0	1.32 V	57	12.71	49.29
4	11570.00	49.2 AV	54.0	-4.8	1.32 V	57	-0.09	49.29

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5825.00	116.6 PK			1.15 H	102	73.50	43.10
2	*5825.00	107.2 AV			1.15 H	102	64.10	43.10
3	11650.00	66.3 PK	74.0	-7.7	1.29 H	59	16.73	49.57
4	11650.00	53.3 AV	54.0	-0.7	1.29 H	59	3.73	49.57
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	*5825.00	112.5 PK			1.20 V	116	69.40	43.10
2	*5825.00	101.9 AV			1.20 V	116	58.80	43.10
3	11650.00	59.6 PK	74.0	-14.4	1.32 V	55	10.03	49.57
4	11650.00	49.1 AV	54.0	-4.9	1.32 V	55	-0.47	49.57

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

802.11n (HT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	5425.00	63.1 PK	74.0	-10.9	1.16 H	103	20.71	42.39
2	5425.00	52.7 AV	54.0	-1.3	1.16 H	103	10.31	42.39
3	*5745.00	115.4 PK			1.18 H	108	72.45	42.95
4	*5745.00	105.5 AV			1.18 H	108	62.55	42.95
5	11490.00	65.7 PK	74.0	-8.3	1.24 H	61	16.45	49.25
6	11490.00	53.3 AV	54.0	-0.7	1.24 H	61	4.05	49.25
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	5425.00	59.7 PK	74.0	-14.3	1.23 V	117	17.31	42.39
2	5425.00	48.5 AV	54.0	-5.5	1.23 V	117	6.11	42.39
3	*5745.00	113.4 PK			1.23 V	117	70.45	42.95
4	*5745.00	103.2 AV			1.23 V	117	60.25	42.95
5	11490.00	62.3 PK	74.0	-11.7	1.31 V	56	13.05	49.25
6	11490.00	49.5 AV	54.0	-4.5	1.31 V	56	0.25	49.25

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	115.2 PK			1.19 H	106	72.20	43.00
2	*5785.00	105.4 AV			1.19 H	106	62.40	43.00
3	11570.00	65.3 PK	74.0	-8.7	1.23 H	61	16.01	49.29
4	11570.00	53.4 AV	54.0	-0.6	1.23 H	61	4.11	49.29
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	114.2 PK			1.22 V	119	71.20	43.00
2	*5785.00	103.8 AV			1.22 V	119	60.80	43.00
3	11570.00	60.8 PK	74.0	-13.2	1.29 V	54	11.51	49.29
4	11570.00	49.3 AV	54.0	-4.7	1.29 V	54	0.01	49.29

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5825.00	116.5 PK			1.16 H	110	73.40	43.10
2	*5825.00	105.2 AV			1.16 H	110	62.10	43.10
3	11650.00	66.4 PK	74.0	-7.6	1.20 H	61	16.83	49.57
4	11650.00	53.4 AV	54.0	-0.6	1.20 H	61	3.83	49.57
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	*5825.00	112.4 PK			1.20 V	116	69.30	43.10
2	*5825.00	103.2 AV			1.20 V	116	60.10	43.10
3	11650.00	61.9 PK	74.0	-12.1	1.31 V	55	12.33	49.57
4	11650.00	49.1 AV	54.0	-4.9	1.31 V	55	-0.47	49.57

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

802.11n (HT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	5435.00	63.8 PK	74.0	-10.2	1.16 H	103	21.37	42.43
2	5435.00	53.0 AV	54.0	-1.0	1.16 H	103	10.57	42.43
3	*5755.00	115.3 PK			1.16 H	108	72.33	42.97
4	*5755.00	103.4 AV			1.16 H	108	60.43	42.97
5	11510.00	63.8 PK	74.0	-10.2	1.20 H	61	14.55	49.25
6	11510.00	52.1 AV	54.0	-1.9	1.20 H	61	2.85	49.25
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	5435.00	59.9 PK	74.0	-14.1	1.23 V	117	17.47	42.43
2	5435.00	48.5 AV	54.0	-5.5	1.23 V	117	6.07	42.43
3	*5755.00	111.6 PK			1.23 V	117	68.63	42.97
4	*5755.00	100.9 AV			1.23 V	117	57.93	42.97
5	11510.00	60.3 PK	74.0	-13.7	1.31 V	57	11.05	49.25
6	11510.00	47.6 AV	54.0	-6.4	1.31 V	57	-1.65	49.25

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	5460.00	63.8 PK	74.0	-10.2	1.43 H	109	21.29	42.51
2	5460.00	51.4 AV	54.0	-2.6	1.43 H	109	8.89	42.51
3	*5795.00	115.3 PK			1.15 H	109	72.29	43.01
4	*5795.00	104.2 AV			1.15 H	109	61.19	43.01
5	11590.00	66.0 PK	74.0	-8.0	1.23 H	59	16.70	49.30
6	**11590.00**	**53.5 AV**	**54.0**	**-0.5**	**1.23 H**	**59**	**4.20**	**49.30**
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	5460.00	59.9 PK	74.0	-14.1	1.25 V	119	17.39	42.51
2	5460.00	49.1 AV	54.0	-4.9	1.25 V	119	6.59	42.51
3	*5795.00	112.3 PK			1.25 V	119	69.29	43.01
4	*5795.00	101.7 AV			1.25 V	119	58.69	43.01
5	11590.00	61.9 PK	74.0	-12.1	1.30 V	56	12.60	49.30
6	11590.00	49.2 AV	54.0	-4.8	1.30 V	56	-0.10	49.30

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

802.11ac VHT80

CHANNEL	TX Channel 155	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	5133.00	59.9 PK	74.0	-14.1	1.17 H	108	17.97	41.93
2	5133.00	50.7 AV	54.0	-3.3	1.17 H	108	8.77	41.93
3	5455.00	64.6 PK	74.0	-9.4	1.17 H	108	22.11	42.49
4	**5455.00**	**53.5 AV**	**54.0**	**-0.5**	**1.17 H**	**108**	**11.01**	**42.49**
5	*5775.00	112.9 PK			1.17 H	108	69.91	42.99
6	*5775.00	100.6 AV			1.17 H	108	57.61	42.99
7	11550.00	65.2 PK	74.0	-8.8	1.24 H	58	15.92	49.28
8	11550.00	50.5 AV	54.0	-3.5	1.24 H	58	1.22	49.28
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	5133.00	57.5 PK	74.0	-16.5	1.22 V	118	15.57	41.93
2	5133.00	45.7 AV	54.0	-8.3	1.22 V	118	3.77	41.93
3	5455.00	62.4 PK	74.0	-11.6	1.22 V	118	19.91	42.49
4	5455.00	50.7 AV	54.0	-3.3	1.22 V	118	8.21	42.49
5	*5775.00	109.6 PK			1.22 V	118	66.61	42.99
6	*5775.00	97.8 AV			1.22 V	118	54.81	42.99
7	11550.00	59.4 PK	74.0	-14.6	1.30 V	54	10.12	49.28
8	11550.00	47.4 AV	54.0	-6.6	1.30 V	54	-1.88	49.28

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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. Tested date : July 04, 2012

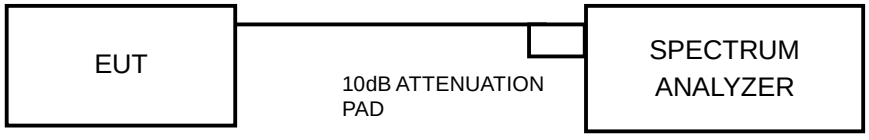
4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
2. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.52	16.60	16.56	0.5	PASS
157	5785	16.56	16.57	16.56	0.5	PASS
165	5825	16.51	16.63	16.59	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.86	17.77	17.83	0.5	PASS
157	5785	17.78	17.74	17.83	0.5	PASS
165	5825	17.81	17.74	17.79	0.5	PASS

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	37.08	36.85	36.37	0.5	PASS
159	5795	36.97	36.78	36.19	0.5	PASS

802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	76.54	76.48	75.30	0.5	PASS

4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 MHz band: 1 Watt (30dBm)

4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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. Tested date : July 04, 2012

4.4.3 TEST PROCEDURES

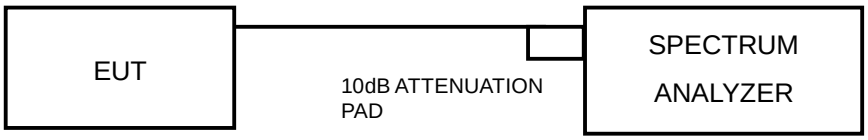
Follow FCC KDB 558074 DTS test procedure:
Measurement Procedure AVG2

1) Set the analyzer span to 5-30% greater than the EBW.
2) Set RBW =1MHz.
3) Set the VBW ≥ 3 x RBW.
4) Number of measurement points in the sweep ≥ 2 x (span/RBW).
5) Sweep time = auto couple.
6) Detector = power averaging (RMS) or sample.
7) Employ trace averaging in power averaging (RMS) mode over a minimum of 100 traces.
8) Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

802.11a

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	17.33	17.72	17.68	171.845	22.35	26.76	PASS
157	5785	16.82	17.38	17.01	153.020	21.85	26.76	PASS
165	5825	17.41	17.67	17.10	164.846	22.17	26.76	PASS

Note: Directional gain = $10 \log[(10^{G1(Chain0)/20} + 10^{G2(Chain1)/20} + 10^{G3(Chain2)/20})^2 / 3]$

Effective Legacy Gain (dBi) = 9.24

The effective legacy gain is 9.24dBi, therefore the limit needs to reduce.

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	17.49	17.61	17.48	169.758	22.30	30	PASS
157	5785	17.01	17.25	17.32	157.273	21.97	30	PASS
165	5825	17.38	17.08	17.05	156.451	21.94	30	PASS

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	18.13	17.98	18.28	195.117	22.90	30	PASS
159	5795	19.30	18.21	19.49	240.256	23.81	30	PASS

802.11ac (VHT80)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
155	5775	20.39	20.29	20.49	328.245	25.16	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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. Tested date : July 04, 2012

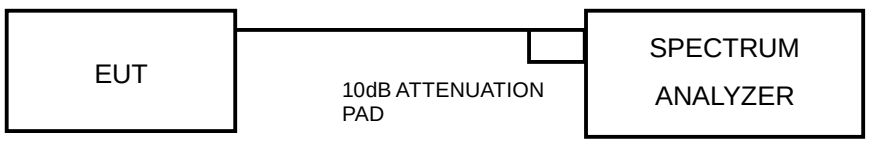
4.5.3 TEST PROCEDURE

1. Set the RBW = 100 kHz, VBW =300 kHz, Detector = Power Average (RMS).
2. Number of measurement points in the sweep ≥ 2 x span/RBW
3. Manually set the sweep time to ≥ 10 x (number of measurement points in sweep) x (transmission symbol period).
4. Perform the measurement over a single sweep.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(3 kHz/100kHz)

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11a

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-2.09	-17.32	4.77	-12.55	4.76	PASS
	157	5785	-2.77	-18.00	4.77	-13.23	4.76	PASS
	165	5825	-2.21	-17.44	4.77	-12.67	4.76	PASS
1	149	5745	-2.13	-17.36	4.77	-12.59	4.76	PASS
	157	5785	-2.52	-17.75	4.77	-12.98	4.76	PASS
	165	5825	-2.20	-17.43	4.77	-12.66	4.76	PASS
2	149	5745	-1.64	-16.87	4.77	-12.10	4.76	PASS
	157	5785	-2.24	-17.47	4.77	-12.70	4.76	PASS
	165	5825	-2.02	-17.25	4.77	-12.48	4.76	PASS

Note: Directional gain = 10 log[($10^{G1(Chain0)/20}$ + $10^{G2(Chain1)/20}$ + $10^{G3(Chain2)/20}$)^2 / 3]
Effective Legacy Gain (dBi) = 9.24
The effective legacy gain is 9.24dBi, therefore the limit needs to reduce.

802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-2.15	-17.38	4.77	-12.61	8	PASS
	157	5785	-2.83	-18.06	4.77	-13.29	8	PASS
	165	5825	-2.22	-17.45	4.77	-12.68	8	PASS
1	149	5745	-2.25	-17.48	4.77	-12.71	8	PASS
	157	5785	-2.27	-17.50	4.77	-12.73	8	PASS
	165	5825	-2.52	-17.75	4.77	-12.98	8	PASS
2	149	5745	-2.43	-17.66	4.77	-12.89	8	PASS
	157	5785	-2.41	-17.64	4.77	-12.87	8	PASS
	165	5825	-2.68	-17.91	4.77	-13.14	8	PASS

802.11n (HT40)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-4.91	-20.14	4.77	-15.37	8	PASS
	159	5795	-3.93	-19.16	4.77	-14.39	8	PASS
1	151	5755	-4.77	-20.00	4.77	-15.23	8	PASS
	159	5795	-4.93	-20.16	4.77	-15.39	8	PASS
2	151	5755	-4.38	-19.61	4.77	-14.84	8	PASS
	159	5795	-2.98	-18.21	4.77	-13.44	8	PASS

802.11ac (VHT80)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	155	5775	-6.18	-21.41	4.77	-16.64	8	PASS
1	155	5775	-6.11	-21.34	4.77	-16.57	8	PASS
2	155	5775	-6.04	-21.27	4.77	-16.50	8	PASS

4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

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. Tested date : July 04, 2012

4.6.3 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = power average (RMS).
4. Manually set the sweep time to ≥ 10 x (number of measurement points in sweep) x (transmission symbol period).
5. Perform the measurement over a single sweep.
6. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

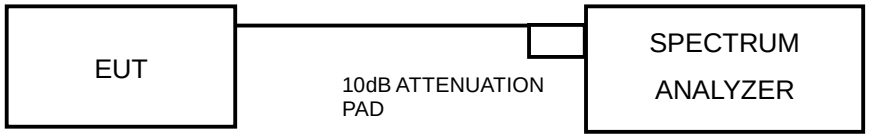
MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = power average (RMS).
5. Manually set the sweep time to ≥ 10 x (number of measurement points in sweep) x (transmission symbol period).
6. Perform the measurement over a single sweep.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

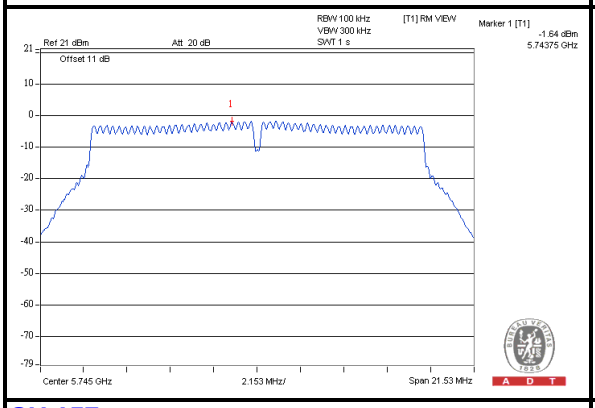
4.6.7 TEST RESULTS

The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit. Only worst data of each operating mode is presented.

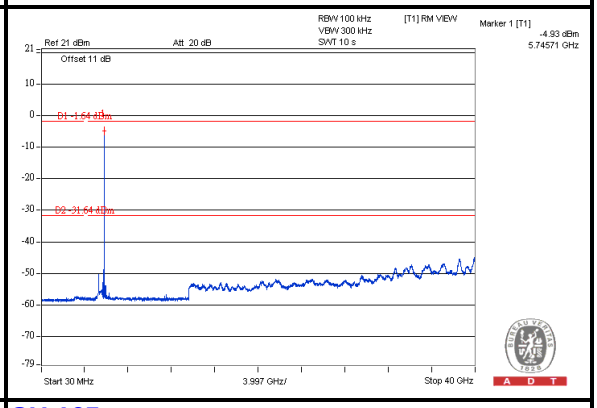
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11a

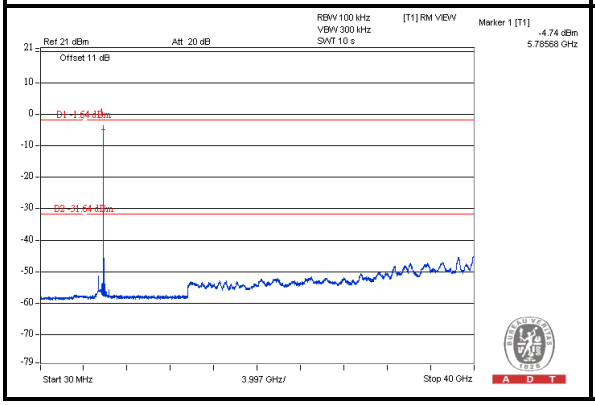
Maximum REF



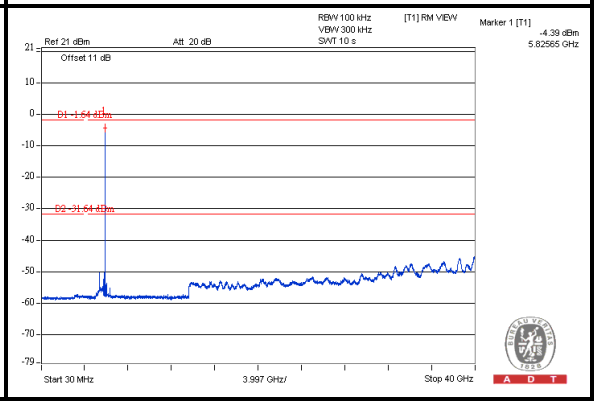
CH 149



CH 157

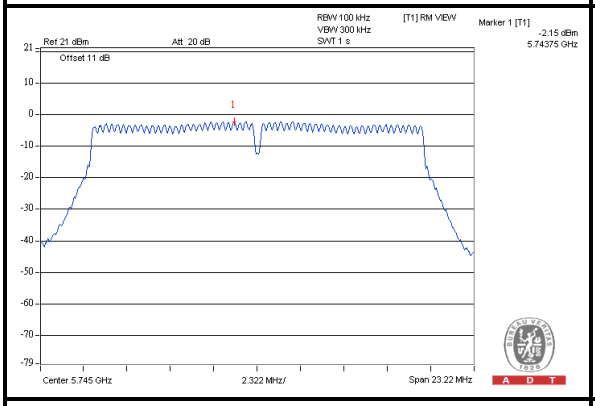


CH 165

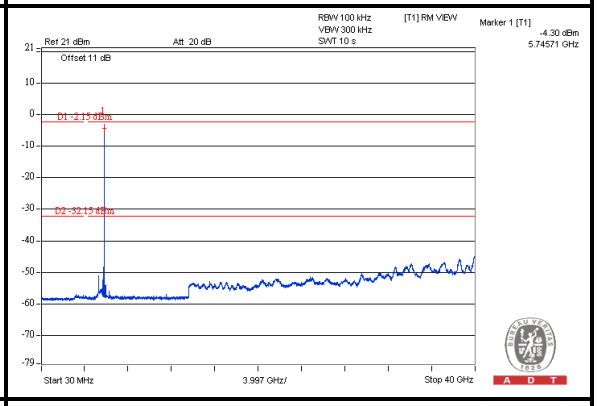


802.11n (HT20)

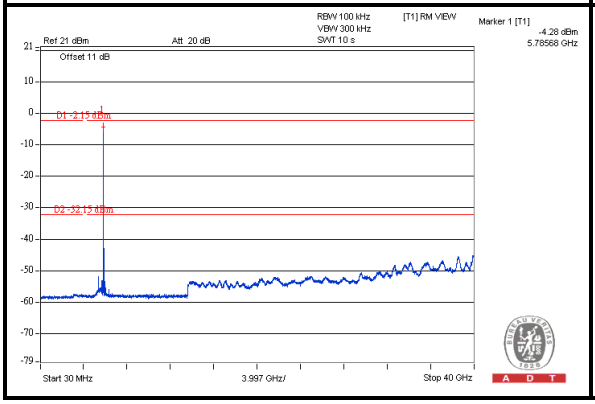
Maximum REF



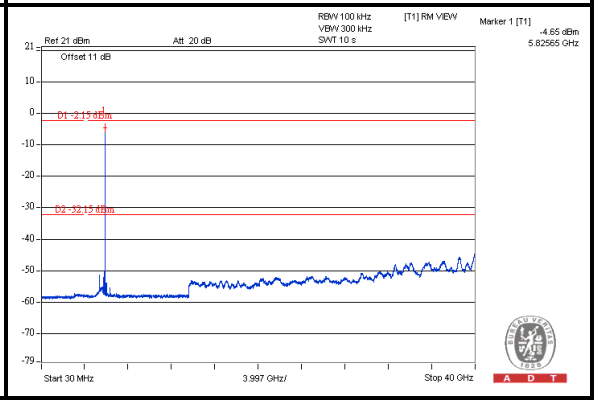
CH 149



CH 157

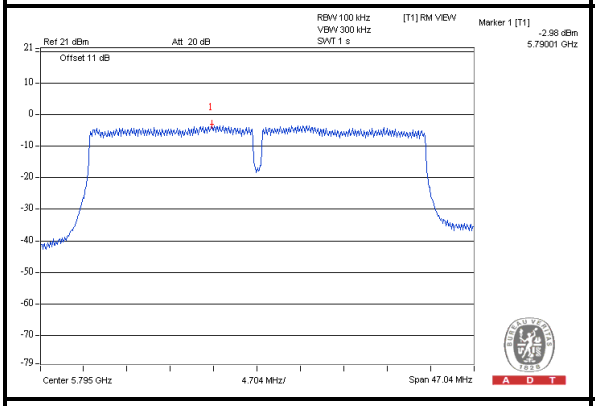


CH 165

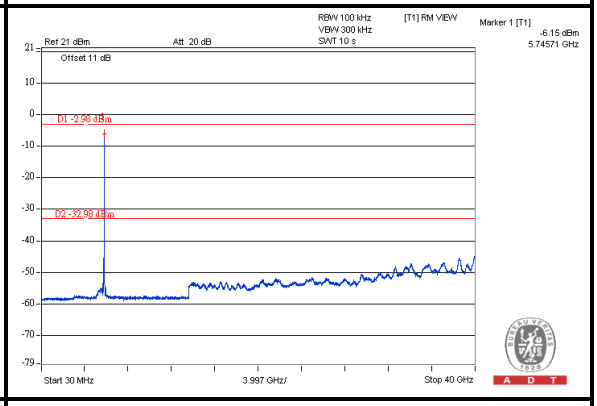


802.11n (HT40)

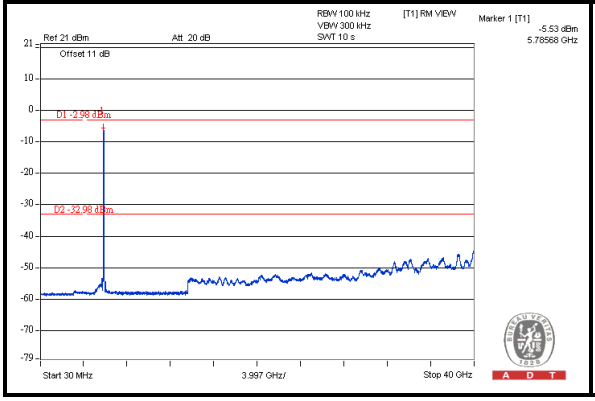
Maximum REF



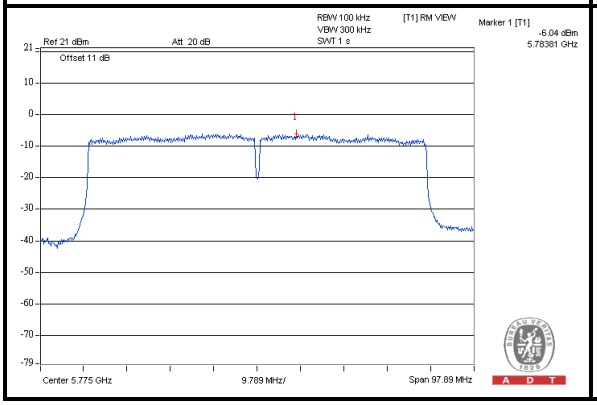
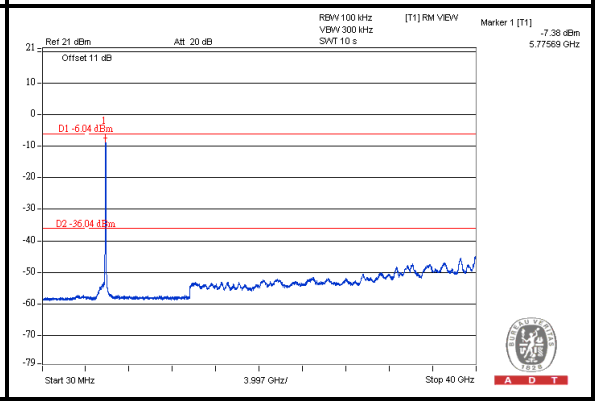
CH 151



CH 159



802.11ac (VHT80)

Maximum REF	CH 155
	

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. 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:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.adt.com.tw

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

7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

--- END ---