FCC TEST REPORT (15.407)

REPORT NO.:	RF120725E01-1
MODEL NO.:	WNDAP660
FCC ID:	PY312200203
RECEIVED:	July 19, 2012
TESTED:	July 19 to Aug. 04, 2012
ISSUED:	Aug. 15, 2012

APPLICANT:	Netgear Incorporated.
ADDRESS:	350 East Plumeria Drive San Jose California United States 95134

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.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120725E01-1	Original release	Aug. 15, 2012

1. CERTIFICATION

PRODUCT:	ProSafe 3x3 Dual Radio, Dual Band Wireless Access Point
BRAND NAME:	Netgear
MODEL NO.:	WNDAP660
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Netgear Incorporated.
TESTED:	July 19 to Aug. 04, 2012
STANDARDS:	**FCC Part 15, subpart E (section 15.407)** ANSI C63.10-2009

The above equipment (Model: WNDAP660) 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:** *Aug. 15 , 2012*
(Elsie Hsu, Specialist)

APPROVED BY : _____ , **DATE:** *Aug. 15 , 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 E (SECTION 15.407)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -2.94dB at 22.44141MHz
15.407(b/1/2/3) (b)(6)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.4dB at 5150.00MHz.
15.407(a/1/2)	Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

NOTE:

1. The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2.400 ~ 2.4835GHz and 5.725~5.850GHz 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)	3.84 dB
Radiated emissions (6GHz -18GHz)	4.09 dB
Radiated emissions (18GHz -40GHz)	4.24 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	ProSafe 3x3 Dual Radio, Dual Band Wireless Access Point
MODEL NO.	WNDAP660
POWER SUPPLY	DC 12V from power adapter or DC 56V from POE
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 450Mbps
OPERATING FREQUENCY	**For 15.407** 802.11a: 5.18 ~ 5.24GHz
	For 15.247 802.11b/g/n: 2.412 ~ 2.462GHz 802.11a: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) **For 15.247 (5GHz)** 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)

MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 14.377mW 802.11n (HT20): 32.486mW 802.11n (HT40): 45.134mW **For 15.247 (2.4GHz)** 802.11b: 250.352mW 802.11g: 575.666 mW 802.11n (HT20): 547.711mW 802.11n (HT40): 341.814mW **For 15.247 (5GHz)** 802.11a: 360.869mW 802.11n (HT20): 355.585mW 802.11n (HT40): 347.243mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	Console cable (unshielded, 1.5m) × 1
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1

NOTE:

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

Adapter			
No	Brand	Model No.	Spec.
1	NETGEAR	MT18-9120150-A1	Input: 120V, 0.5A, 60Hz Output: 12V, 1.5A DC output cable (Unshielded, 1.8m)
2	NETGEAR	SAL018F1 NA	Input: 100-120V, 0.6A, 47-63Hz Output: 12V, 1.5A DC output cable (Unshielded, 1.8m)
POE			
Brand		Model No.	Spec.
PHIHONG		POE30U-560(G)	Input: 100-240V, 0.95A, 50-60Hz Output: 56V, 0.55A
From the above two adapters and POE were pre-tested in chamber, the radiated emission worse case was found in **Adapter 2**. Therefore only the test data of the adapter was recorded in this report.			

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

Internal Antenna (For 2.4GHz / 5GHz)				
Transmitter Circuit	Antenna Type	Peak Gain (dBi)		
		2.4GHz	5GHz Band 1	5GHz Band 4
Chain (0)	Dipole	2.44	4.36	5.95
Chain (1)	Dipole	2.44	5.31	5.02
Chain (2)	Dipole	2.44	3.87	3.96

External Antenna (For 2.4GHz)					
Model	Antenna Type	Gain (dBi) (Exclude cable loss)	Cable Loss (dB)	Net Gain (dBi) (Include cable loss)	Connecter Type
ANT-32405	Dipole	5	3.68	1.32	SMA Plug Reverse
From the above antennas, internal antenna was selected for testing.					

3. The EUT incorporates a MIMO function without beam forming.

MODULATION MODE	TX/RX FUNCTION
802.11b	3Tx (Diversity)/ 3Rx
802.11g	3Tx(Diversity)/ 3Rx
802.11a	3Tx(Diversity)/ 3Rx
802.11n (HT20)	3Tx/3Rx
802.11n (HT40)	3Tx/3Rx

4. Radiated spurious emissions of the simultaneous operation(2.4GHz and 5GHz) has been evaluated and no non-compliance was found
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. 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

Four channels are provided for 802.11a, 802.11n (HT20):

CHANNEL	FREQUENCY
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz

Two channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY
38	5190 MHz
46	5230 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	
Mode 1	√	√	√	√	With adapter 1
Mode 2	√	-	-	-	With adapter 2
Mode 3	√-	-	-	-	With POE

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

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

Note: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane.**

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)
802.11n (HT40)	38 to 46	46	OFDM	BPSK	13.5

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)
802.11n (HT40)	38 to 46	46	OFDM	BPSK	13.5

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	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11n (HT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (HT40)	38 to 46	38, 46	OFDM	BPSK	13.5

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	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11n (HT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (HT40)	38 to 46	38, 46	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C,70%RH 27deg. C,63%RH	120Vac, 60Hz	Mike Hsieh Scott Chen
RE<1G	21deg. C, 64%RH	120Vac, 60Hz	Evan Huang
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
APCM	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:

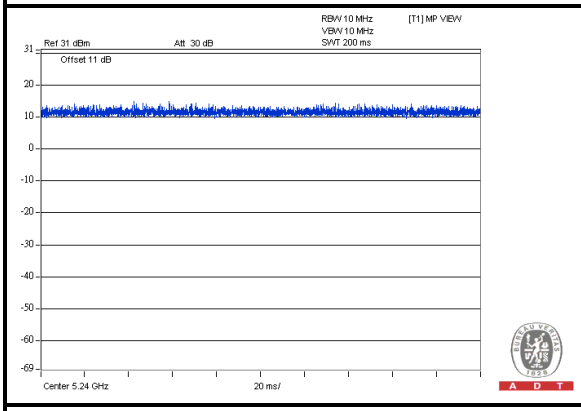
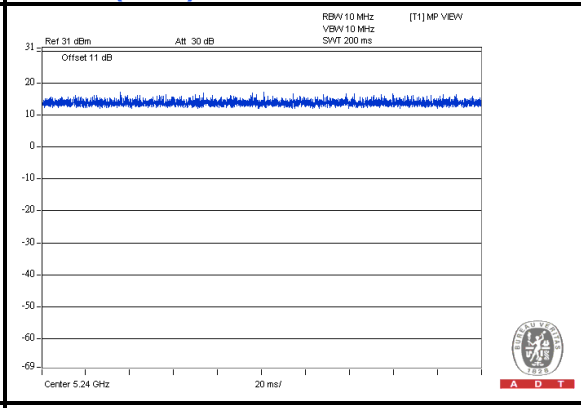
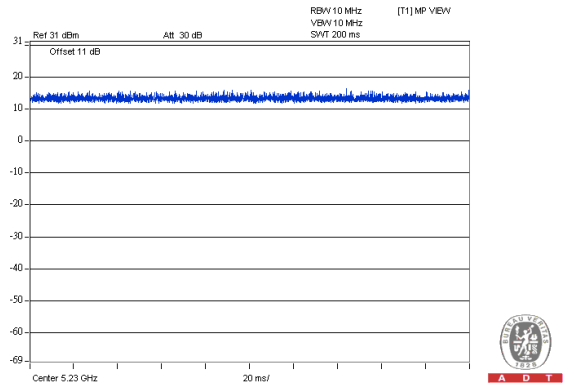
FCC Part 15, Subpart E (15.407)
789033 D01 General UNII Test Procedures v01r01
ANSI C63.10-2009

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.

3.4 DUTY CYCLE OF TEST SIGNAL

Test tool can set the EUT to transmit at > 98 % duty cycle.

802.11a	802.11n (HT20)
	
802.11n (HT40)	
	

3.5 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.

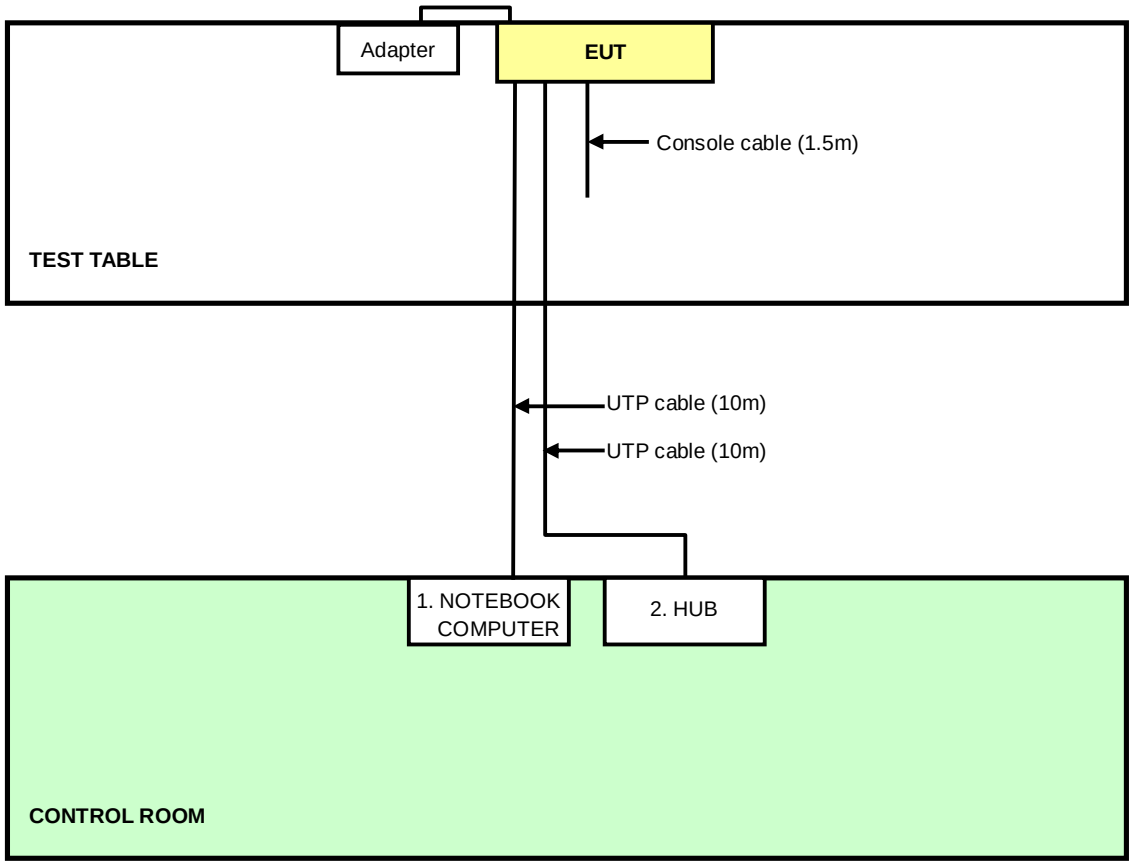
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC

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

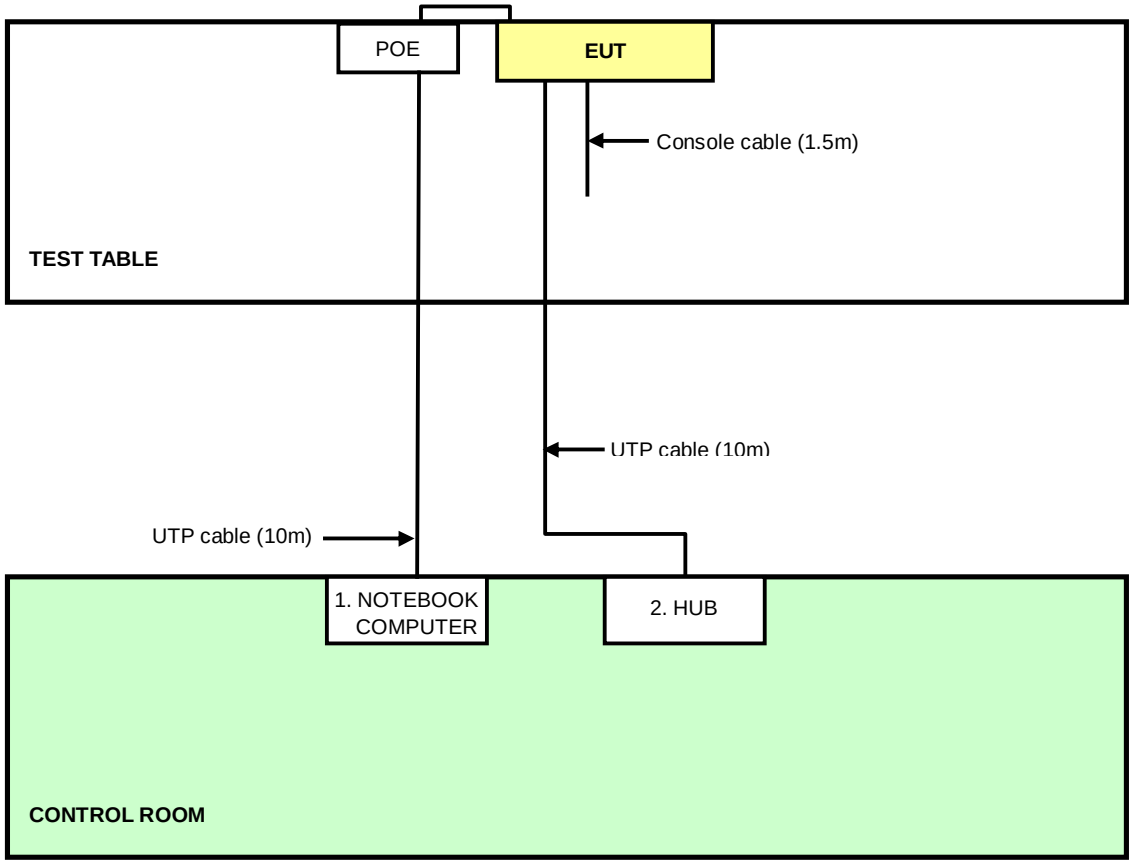
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Adapter Mode:



For POE Mode:


POE
EUT
Console cable (1.5m)
TEST TABLE
UTP cable (10m)
UTP cable (10m)
1. NOTEBOOK COMPUTER
2. HUB
CONTROL ROOM

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 0.5-5 5-30	66 to 56 56 60	56 to 46 46 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	ESCS 30	100375	Mar. 12, 2012	Mar.11, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 07, 2011	Sep. 06, 2012
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 08,2012	June 07,2013
RF Cable (JYEBAO)	5DFB	COCCAB-001	Aug. 29, 2011	Aug. 28, 2012
50 ohms Terminator	50	EMC-3	Sep. 26, 2011	Sep. 25, 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. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: July 19 to Aug. 04, 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.

b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

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

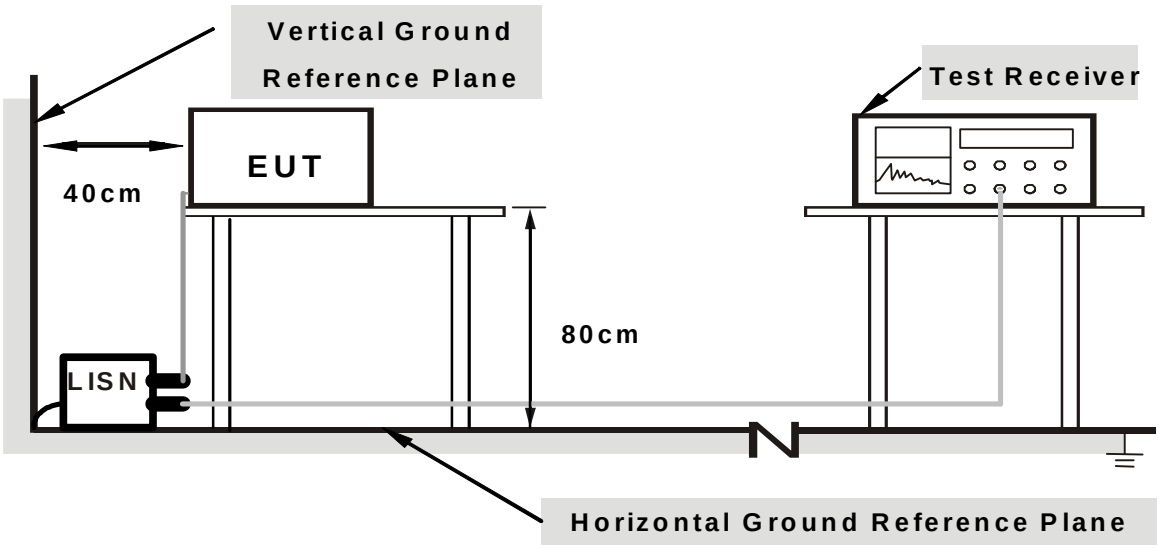
d. The frequency range from 150kHz to 30MHz was searched. Emission level under (Limit – 20dB) was not recorded.

Note: 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



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 partner and placed them outside of testing area.
3. The communication partner ran test program “artgui.exe [art2 ver 2 25BIN]” to enable EUT under transmission/receiving condition continuously via one UTP cable.

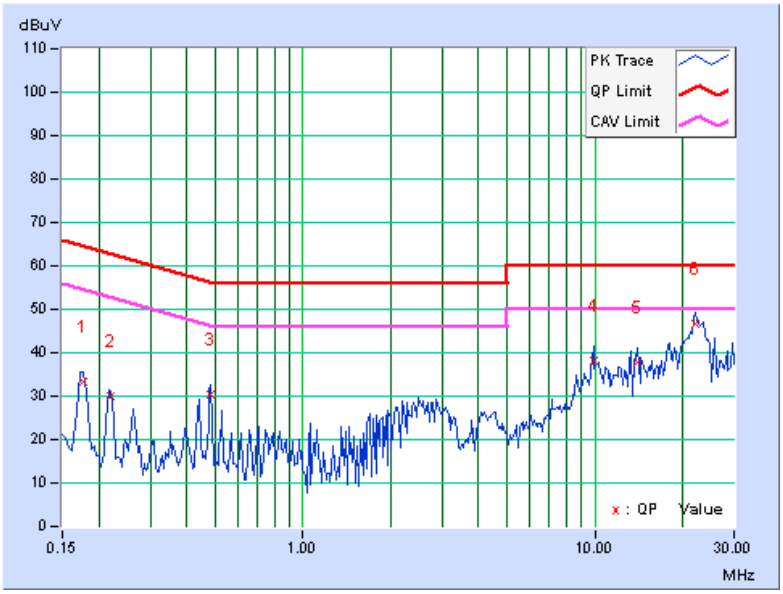
4.1.7 TEST RESULTS (MODE 1)

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	0.17734	0.07	33.09	31.65	33.16	31.72	64.61	54.61	-31.45	-22.89
2	0.22031	0.07	29.84	28.76	29.91	28.83	62.81	52.81	-32.90	-23.98
3	0.48203	0.08	30.44	30.23	30.52	30.31	56.30	46.30	-25.78	-15.99
4	9.90625	0.53	37.57	33.77	38.10	34.30	60.00	50.00	-21.90	-15.70
5	14.05469	0.66	37.18	35.86	37.84	36.52	60.00	50.00	-22.16	-13.48
6	22.19141	0.85	45.92	44.94	46.77	45.79	60.00	50.00	-13.23	-4.21

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.

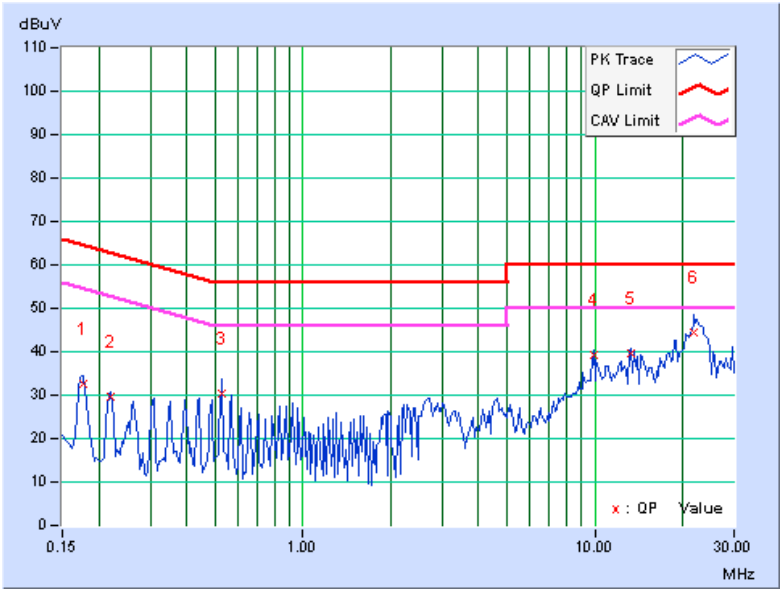


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

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	0.17734	0.06	32.66	32.49	32.72	32.55	64.61	54.61	-31.89	-22.06
2	0.22031	0.06	29.63	28.83	29.69	28.89	62.81	52.81	-33.12	-23.92
3	0.52891	0.08	30.21	27.89	30.29	27.97	56.00	46.00	-25.71	-18.03
4	9.90234	0.39	38.77	35.08	39.16	35.47	60.00	50.00	-20.84	-14.53
5	13.31641	0.51	39.13	37.85	39.64	38.36	60.00	50.00	-20.36	-11.64
6	21.94531	0.73	43.87	43.35	44.60	44.08	60.00	50.00	-15.40	-5.92

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.



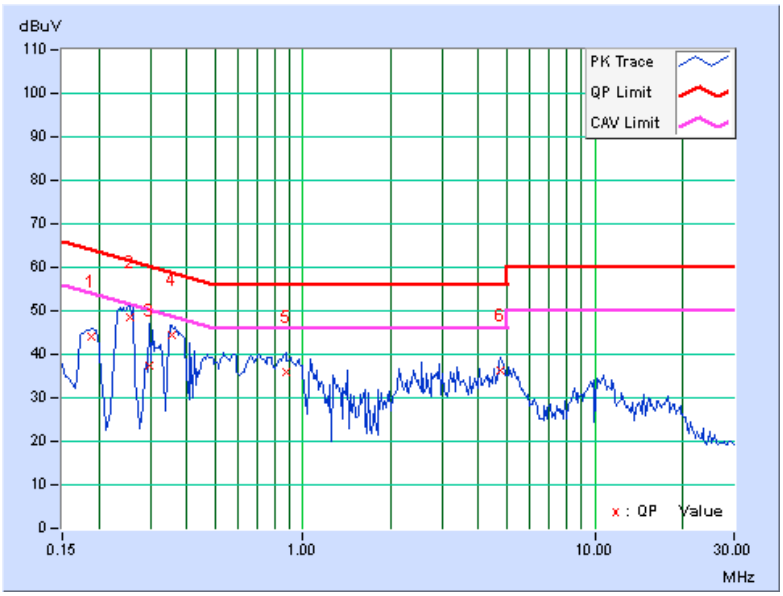
4.1.8 TEST RESULTS (MODE 2)

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	0.18906	0.08	43.93	34.17	44.01	34.25	64.08	54.08	-20.07	-19.83
2	0.25547	0.09	48.49	39.41	48.58	39.50	61.58	51.58	-13.00	-12.08
3	0.29844	0.09	37.44	25.49	37.53	25.58	60.29	50.29	-22.76	-24.71
4	0.35703	0.10	44.18	33.90	44.28	34.00	58.80	48.80	-14.52	-14.80
5	0.87266	0.13	35.74	23.57	35.87	23.70	56.00	46.00	-20.13	-22.30
6	4.76172	0.43	35.79	27.65	36.22	28.08	56.00	46.00	-19.78	-17.92

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.

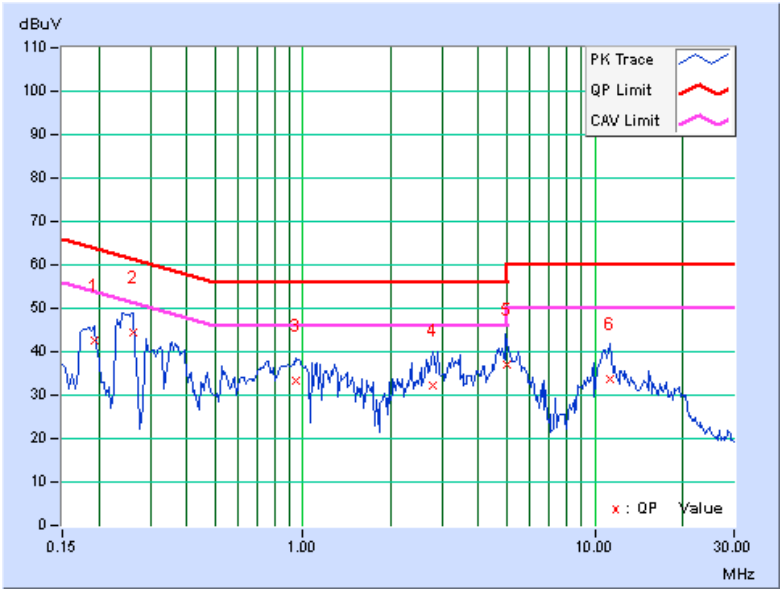


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

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	0.08	42.57	29.72	42.65	29.80	63.91	53.91	-21.26	-24.11
2	0.26328	0.09	44.38	27.71	44.47	27.80	61.33	51.33	-16.86	-23.53
3	0.94297	0.12	33.22	22.42	33.34	22.54	56.00	46.00	-22.66	-23.46
4	2.80078	0.27	32.05	22.71	32.32	22.98	56.00	46.00	-23.68	-23.02
5	5.00000	0.40	36.61	29.39	37.01	29.79	56.00	46.00	-18.99	-16.21
6	11.24219	0.69	33.13	27.19	33.82	27.88	60.00	50.00	-26.18	-22.12

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.



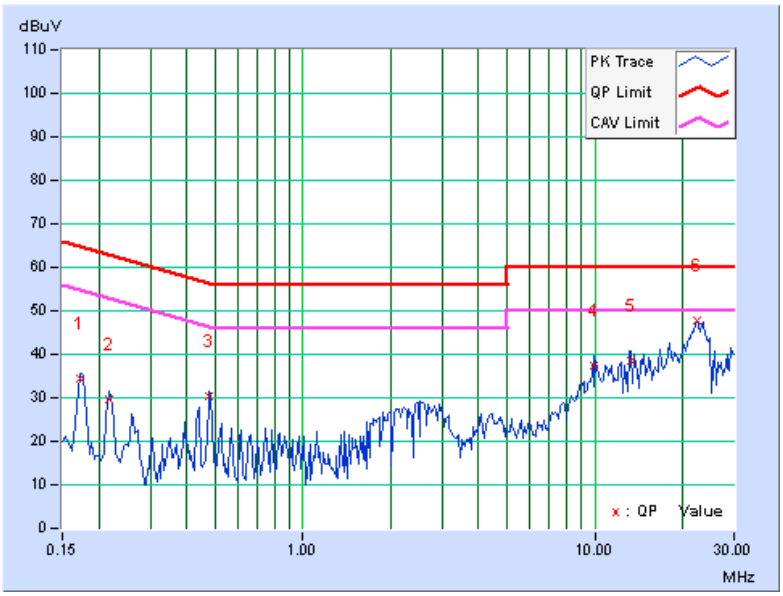
4.1.9 TEST RESULTS (MODE 3)

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	0.17344	0.07	34.26	32.61	34.33	32.68	64.79	54.79	-30.46	-22.11
2	0.21641	0.07	29.69	28.46	29.76	28.53	62.96	52.96	-33.19	-24.42
3	0.47813	0.08	30.28	30.12	30.36	30.20	56.37	46.37	-26.01	-16.17
4	9.89453	0.53	37.05	33.06	37.58	33.59	60.00	50.00	-22.42	-16.41
5	13.32031	0.64	37.95	36.80	38.59	37.44	60.00	50.00	-21.41	-12.56
6	**22.44141**	**0.85**	**47.04**	**46.21**	**47.89**	**47.06**	**60.00**	**50.00**	**-12.11**	**-2.94**

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.

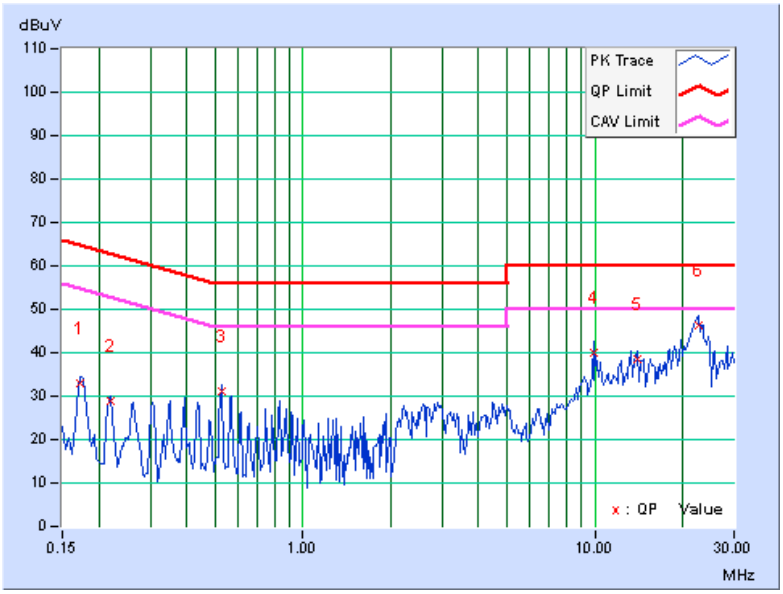


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

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	0.17344	0.06	33.02	32.86	33.08	32.92	64.79	54.79	-31.71	-21.87
2	0.22031	0.06	28.83	28.08	28.89	28.14	62.81	52.81	-33.92	-24.67
3	0.52500	0.08	31.16	30.96	31.24	31.04	56.00	46.00	-24.76	-14.96
4	9.89844	0.39	39.48	35.65	39.87	36.04	60.00	50.00	-20.13	-13.96
5	14.05859	0.53	37.82	35.75	38.35	36.28	60.00	50.00	-21.65	-13.72
6	22.68750	0.75	45.71	45.29	46.46	46.04	60.00	50.00	-13.54	-3.96

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 EMISSION AND BANDEDGE MEASUREMENT

4.2.1 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:

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.

4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	**EIRP Limit (dBm)**	**Equivalent Field Strength at 3m (dBμV/m)** *note 3
5150~5250	-27	68.3
5250~5350	-27	68.3
5470~5725	-27	68.3
5725~5825	-27 *note 1	68.3
	-17 *note 2	78.3

NOTE:

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. 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)

4.2.3 TEST INSTRUMENTS

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, 2012	July 24, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	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
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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: July 26 to 28, 2012

4.2.4 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.

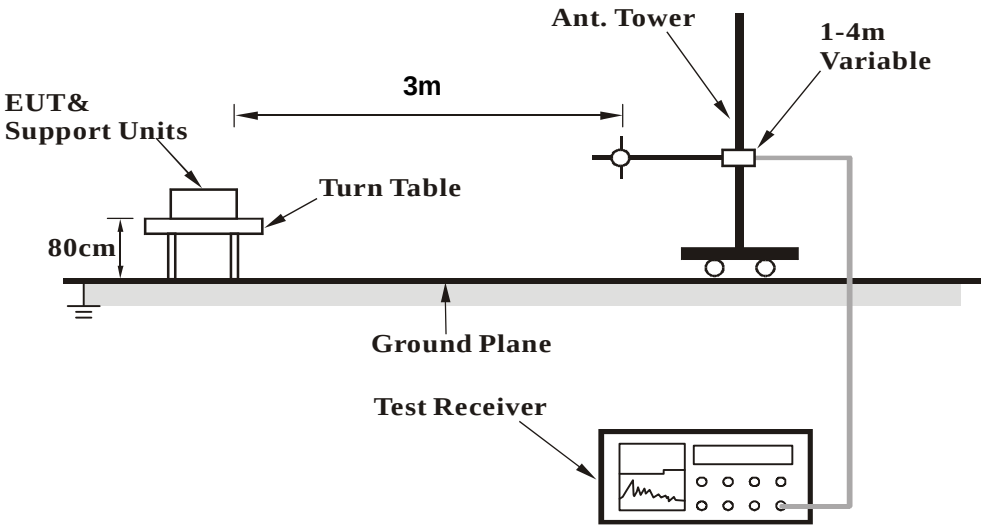
NOTE:

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.

4.2.5 DEVIATION FROM TEST STANDARD

No deviation

4.2.6 TEST SETUP



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

4.2.7 EUT OPERATING CONDITION

Same as 4.1.6

4.2.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11n (HT40)

CHANNEL	TX Channel 46	**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	176.02	36.2 QP	43.5	-7.3	1.00 H	60	22.93	13.31
2	374.97	37.9 QP	46.0	-8.1	1.00 H	39	20.85	17.08
3	416.65	37.2 QP	46.0	-8.9	2.00 H	306	19.07	18.08
4	666.64	39.6 QP	46.0	-6.4	1.00 H	158	16.43	23.13
5	677.06	38.7 QP	46.0	-7.3	1.00 H	326	15.44	23.30
6	916.63	37.1 QP	46.0	-8.9	1.25 H	144	9.79	27.30
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	94.19	34.9 QP	43.5	-8.6	1.00 V	340	25.89	8.99
2	374.97	38.8 QP	46.0	-7.3	1.25 V	170	21.67	17.08
3	416.65	33.9 QP	46.0	-12.1	1.25 V	253	15.80	18.08
4	583.39	36.5 QP	46.0	-9.5	1.75 V	44	14.64	21.86
5	624.96	42.3 QP	46.0	-3.7	1.50 V	176	19.77	22.54
6	666.64	37.8 QP	46.0	-8.2	1.25 V	170	14.65	23.13

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 36	**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	5150.00	58.6 PK	74.0	-15.4	1.29 H	98	16.30	42.30
2	5150.00	46.2 AV	54.0	-7.8	1.29 H	98	3.90	42.30
3	*5180.00	103.8 PK			1.29 H	98	61.40	42.40
4	*5180.00	93.4 AV			1.29 H	98	51.00	42.40
5	#10360.00	52.7 PK	68.3	-15.6	1.24 H	75	3.49	49.21
6	15540.00	60.9 PK	74.0	-13.1	1.28 H	48	5.80	55.10
7	15540.00	48.0 AV	54.0	-6.0	1.28 H	48	-7.10	55.10
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	5150.00	59.3 PK	74.0	-14.7	1.05 V	22	17.00	42.30
2	5150.00	46.6 AV	54.0	-7.4	1.05 V	22	4.30	42.30
3	*5180.00	102.1 PK			1.05 V	22	59.70	42.40
4	*5180.00	91.1 AV			1.05 V	22	48.70	42.40
5	#10360.00	53.8 PK	68.3	-14.5	1.14 V	22	4.59	49.21
6	15540.00	58.2 PK	74.0	-15.8	1.08 V	25	3.10	55.10
7	15540.00	45.5 AV	54.0	-8.5	1.08 V	25	-9.60	55.10

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	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	*5200.00	100.9 PK			1.37 H	328	58.43	42.47
2	*5200.00	90.4 AV			1.37 H	328	47.93	42.47
3	#10400.00	52.8 PK	68.3	-15.5	1.21 H	64	3.97	48.83
4	15600.00	60.9 PK	74.0	-13.1	1.25 H	45	5.93	54.97
5	15600.00	47.8 AV	54.0	-6.2	1.25 H	45	-7.17	54.97
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	*5200.00	100.8 PK			1.11 V	23	58.33	42.47
2	*5200.00	89.9 AV			1.11 V	23	47.43	42.47
3	#10400.00	55.8 PK	68.3	-12.5	1.17 V	27	6.97	48.83
4	15600.00	57.9 PK	74.0	-16.1	1.07 V	22	2.93	54.97
5	15600.00	45.5 AV	54.0	-8.5	1.07 V	22	-9.47	54.97

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	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	*5240.00	101.3 PK			1.41 H	329	58.79	42.51
2	*5240.00	90.8 AV			1.41 H	329	48.29	42.51
3	5350.00	58.9 PK	74.0	-15.1	1.33 H	88	16.31	42.59
4	5350.00	46.4 AV	54.0	-7.6	1.33 H	88	3.81	42.59
5	#10480.00	53.2 PK	68.3	-15.1	1.23 H	76	3.81	49.39
6	15720.00	60.6 PK	74.0	-13.4	1.24 H	47	5.90	54.70
7	15720.00	47.7 AV	54.0	-6.3	1.24 H	47	-7.00	54.70
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	*5240.00	99.9 PK			1.10 V	22	57.39	42.51
2	*5240.00	89.5 AV			1.10 V	22	46.99	42.51
3	5350.00	59.2 PK	74.0	-14.8	1.10 V	22	16.61	42.59
4	5350.00	46.9 AV	54.0	-7.1	1.10 V	22	4.31	42.59
5	#10480.00	53.8 PK	68.3	-14.5	1.14 V	29	4.41	49.39
6	15720.00	58.6 PK	74.0	-15.4	1.05 V	18	3.90	54.70
7	15720.00	46.0 AV	54.0	-8.0	1.05 V	18	-8.70	54.70

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 radiated frequency is out of the restricted band.

802.11n (HT20)

CHANNEL	TX Channel 36	**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	5150.00	57.7 PK	74.0	-16.3	1.28 H	317	15.40	42.30
2	5150.00	46.1 AV	54.0	-7.9	1.28 H	317	3.80	42.30
3	*5180.00	102.4 PK			1.28 H	299	60.00	42.40
4	*5180.00	92.2 AV			1.28 H	299	49.80	42.40
5	#10360.00	53.0 PK	68.3	-15.3	1.26 H	74	3.79	49.21
6	15540.00	60.2 PK	74.0	-13.8	1.29 H	55	5.10	55.10
7	15540.00	47.6 AV	54.0	-6.4	1.29 H	55	-7.50	55.10
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	5150.00	59.3 PK	74.0	-14.7	1.13 V	30	17.00	42.30
2	5150.00	46.4 AV	54.0	-7.6	1.13 V	30	4.10	42.30
3	*5180.00	104.1 PK			1.13 V	30	61.70	42.40
4	*5180.00	93.2 AV			1.13 V	30	50.80	42.40
5	#10360.00	53.2 PK	68.3	-15.1	1.15 V	26	3.99	49.21
6	15540.00	59.1 PK	74.0	-14.9	1.01 V	13	4.00	55.10
7	15540.00	46.3 AV	54.0	-7.7	1.01 V	13	-8.80	55.10

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	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	*5200.00	103.8 PK			1.00 H	48	61.33	42.47
2	*5200.00	92.5 AV			1.00 H	48	50.03	42.47
3	#10400.00	53.7 PK	68.3	-14.6	1.21 H	72	4.87	48.83
4	15600.00	59.1 PK	74.0	-14.9	1.22 H	47	4.13	54.97
5	15600.00	46.6 AV	54.0	-7.4	1.22 H	47	-8.37	54.97
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	*5200.00	104.0 PK			1.18 V	41	61.53	42.47
2	*5200.00	93.0 AV			1.18 V	41	50.53	42.47
3	#10400.00	53.5 PK	68.3	-14.8	1.15 V	17	4.67	48.83
4	15600.00	59.0 PK	74.0	-15.0	1.02 V	21	4.03	54.97
5	15600.00	46.2 AV	54.0	-7.8	1.02 V	21	-8.77	54.97

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	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	*5240.00	103.5 PK			1.00 H	55	60.99	42.51
2	*5240.00	92.7 AV			1.00 H	55	50.19	42.51
3	5350.00	57.8 PK	74.0	-16.2	1.00 H	55	15.21	42.59
4	5350.00	46.1 AV	54.0	-7.9	1.00 H	55	3.51	42.59
5	#10480.00	53.9 PK	68.3	-14.4	1.25 H	54	4.51	49.39
6	15720.00	58.7 PK	74.0	-15.3	1.17 H	56	4.00	54.70
7	15720.00	46.4 AV	54.0	-7.6	1.17 H	56	-8.30	54.70
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	*5240.00	104.0 PK			1.14 V	27	61.49	42.51
2	*5240.00	92.9 AV			1.14 V	27	50.39	42.51
3	5350.00	59.3 PK	74.0	-14.7	1.14 V	27	16.71	42.59
4	5350.00	47.1 AV	54.0	-6.9	1.14 V	27	4.51	42.59
5	#10480.00	53.1 PK	68.3	-15.2	1.19 V	23	3.71	49.39
6	15720.00	58.4 PK	74.0	-15.6	1.02 V	25	3.70	54.70
7	15720.00	45.6 AV	54.0	-8.4	1.02 V	25	-9.10	54.70

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 radiated frequency is out of the restricted band.

802.11n (HT40)

CHANNEL	TX Channel 38	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	5150.00	68.0 PK	74.0	-6.0	1.07 H	265	25.70	42.30
2	**5150.00**	**52.6 AV**	**54.0**	**-1.4**	**1.07 H**	**265**	**10.30**	**42.30**
3	*5190.00	101.1 PK			1.00 H	113	58.70	42.44
4	*5190.00	90.3 AV			1.00 H	113	47.86	42.44
5	#10380.00	53.4 PK	68.3	-14.9	1.26 H	62	4.38	49.02
6	15570.00	59.2 PK	74.0	-14.8	1.13 H	55	4.16	55.04
7	15570.00	46.8 AV	54.0	-7.2	1.13 H	55	-8.24	55.04
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	5150.00	63.1 PK	74.0	-10.9	1.14 V	21	20.80	42.30
2	5150.00	49.1 AV	54.0	-4.9	1.14 V	21	6.80	42.30
3	*5190.00	106.1 PK			1.14 V	21	63.66	42.44
4	*5190.00	94.6 AV			1.14 V	21	52.16	42.44
5	#10380.00	53.1 PK	68.3	-15.2	1.14 V	20	4.08	49.02
6	15570.00	58.9 PK	74.0	-15.1	1.00 V	28	3.86	55.04
7	15570.00	45.9 AV	54.0	-8.1	1.00 V	28	-9.14	55.04

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 radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	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	*5230.00	104.6 PK			1.00 H	84	62.10	42.50
2	*5230.00	93.0 AV			1.00 H	84	50.50	42.50
3	5350.00	59.5 PK	74.0	-14.5	1.00 H	84	16.91	42.59
4	5350.00	48.4 AV	54.0	-5.6	1.00 H	84	5.81	42.59
5	#10460.00	53.2 PK	68.3	-15.1	1.19 H	42	3.95	49.25
6	15690.00	57.6 PK	74.0	-16.4	1.10 H	57	2.93	54.67
7	15690.00	46.0 AV	54.0	-8.0	1.10 H	57	-8.67	54.67
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	*5230.00	103.7 PK			1.19 V	23	61.20	42.50
2	*5230.00	91.7 AV			1.19 V	23	49.20	42.50
3	5350.00	59.1 PK	74.0	-14.9	1.19 V	23	16.51	42.59
4	5350.00	47.2 AV	54.0	-6.8	1.19 V	23	4.61	42.59
5	#10460.00	53.0 PK	68.3	-15.3	1.20 V	15	3.75	49.25
6	15690.00	58.0 PK	74.0	-16.0	1.00 V	21	3.33	54.67
7	15690.00	45.4 AV	54.0	-8.6	1.00 V	21	-9.27	54.67

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 radiated frequency is out of the restricted band.

4.3 PEAK TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.47 – 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

NOTE: Where B is the 26dB emission bandwidth in MHz.

4.3.2 TEST INSTRUMENTS

FOR POWER OUTPUT MEASUREMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	0824006	May 10, 2012	May 09, 2013
Power Sensor Anritsu	MA2411B	0738172	May 10, 2012	May 09, 2013

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 31, 2012

FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250113	Nov. 30, 2011	Nov. 29, 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 31, 2012

4.3.3 TEST PROCEDURE

FOR POWER OUTPUT MEASUREMENT

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

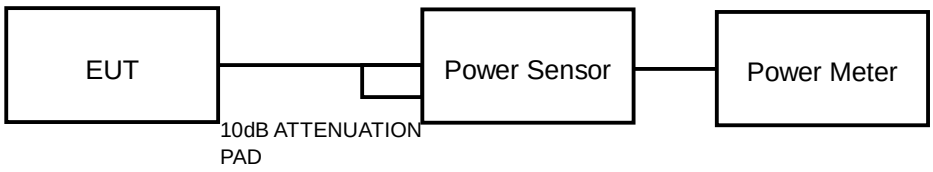
FOR 26dB OCCUPIED BANDWIDTH

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

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 specific channel frequencies individually.

4.3.7 TEST RESULTS

POWER OUTPUT:

802.11a

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	6.60	6.70	7.10	14.377	11.58	13.69	PASS
40	5200	6.50	6.30	7.50	14.356	11.57	13.69	PASS
48	5240	6.60	6.30	6.90	13.735	11.38	13.69	PASS

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3]$
Effective Legacy Gain (dBi) = 9.31
The effective legacy gain is 9.31dBi, therefore the limit needs to reduce.

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	10.70	9.90	10.40	32.486	15.12	17	PASS
40	5200	10.80	9.70	10.30	32.071	15.06	17	PASS
48	5240	10.70	9.60	10.20	31.340	14.96	17	PASS

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
38	5190	11.60	11.20	12.10	43.855	16.42	17	PASS
46	5230	11.50	11.70	12.10	45.134	16.55	17	PASS

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 0	CHAIN 1	CHAIN 2
36	5180	25.05	24.45	24.21
40	5200	24.98	23.98	24.02
48	5240	24.75	23.83	23.36

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 0	CHAIN 1	CHAIN 2
36	5180	25.72	24.27	24.93
40	5200	25.65	25.27	24.77
48	5240	26.23	25.15	24.44

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 0	CHAIN 1	CHAIN 2
38	5190	53.35	54.01	51.99
46	5230	55.08	53.72	52.02

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 – 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.4.2 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 31, 2012

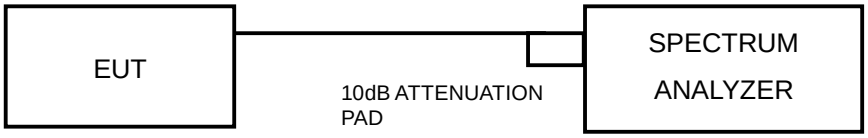
4.4.3 TEST PROCEDURES

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6

4.4.7 TEST RESULTS

802.11a

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
36	5180	-4.54	-4.54	-4.60	0.17	0.69	PASS
40	5200	-4.37	-5.38	-4.28	0.01	0.69	PASS
48	5240	-4.69	-4.91	-4.75	-0.10	0.69	PASS

NOTE: Note: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$ + $10^{G3/20}$)^2 / 3]
Effective Legacy Gain (dBi) = 9.31

The effective legacy gain is 9.31dBi, therefore the limit needs to reduce.

Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
36	5180	-0.86	-1.33	-0.45	3.61	4	PASS
40	5200	-0.38	-1.54	-1.08	3.60	4	PASS
48	5240	-0.66	-1.81	-0.78	3.44	4	PASS

NOTE: Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
38	5190	-2.69	-3.50	-2.34	1.73	4	PASS
46	5230	-2.44	-3.01	-2.30	1.86	4	PASS

NOTE: Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

4.5 PEAK POWER EXCURSION MEASUREMENT

4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

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 31, 2012

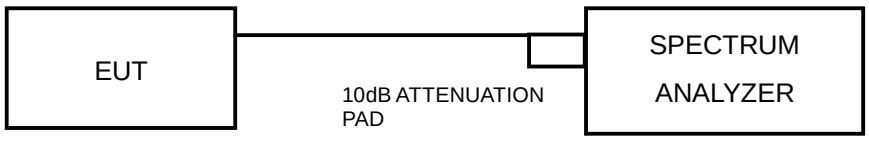
4.5.3 TEST PROCEDURE

1. Set RBW = 1 MHz, VBW ≥ 3 MHz, Detector = peak.
2. Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
3. Use the peak search function to find the peak of the spectrum.
4. Measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

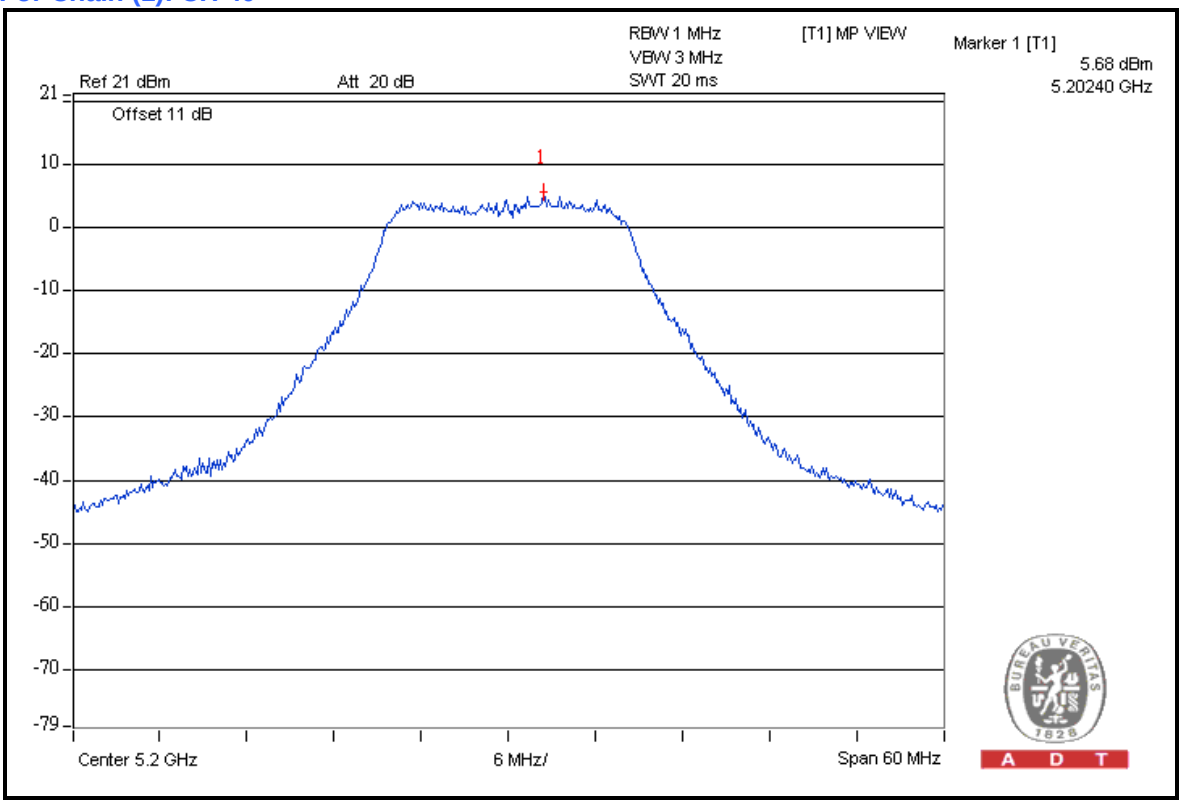
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

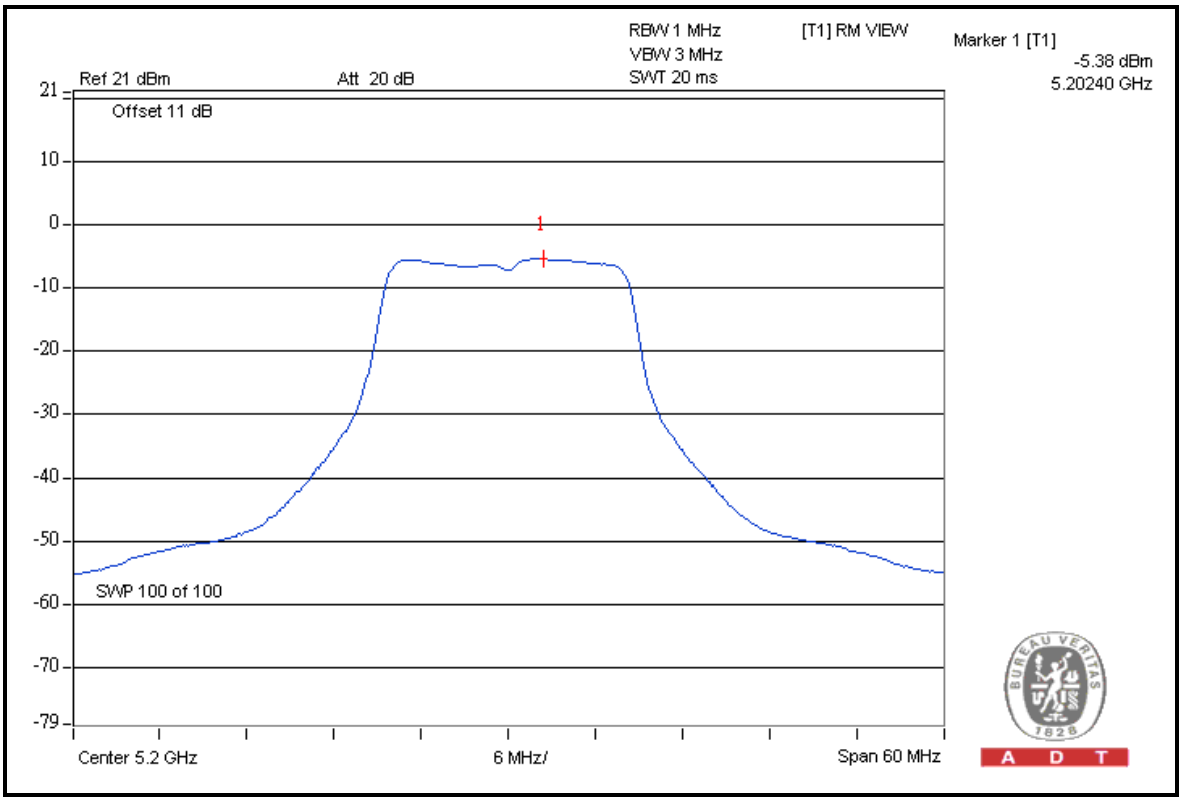
4.5.7 TEST RESULTS

802.11a

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
36	5180	4.46	4.86	6.06	-4.54	-4.54	-4.60	9.00	9.40	10.66	13	PASS
40	5200	5.01	5.68	6.05	-4.37	-5.38	-4.28	9.38	11.06	10.33	13	PASS
48	5240	4.47	4.98	5.77	-4.69	-4.91	-4.75	9.16	9.89	10.52	13	PASS

For Chain (1): CH 40

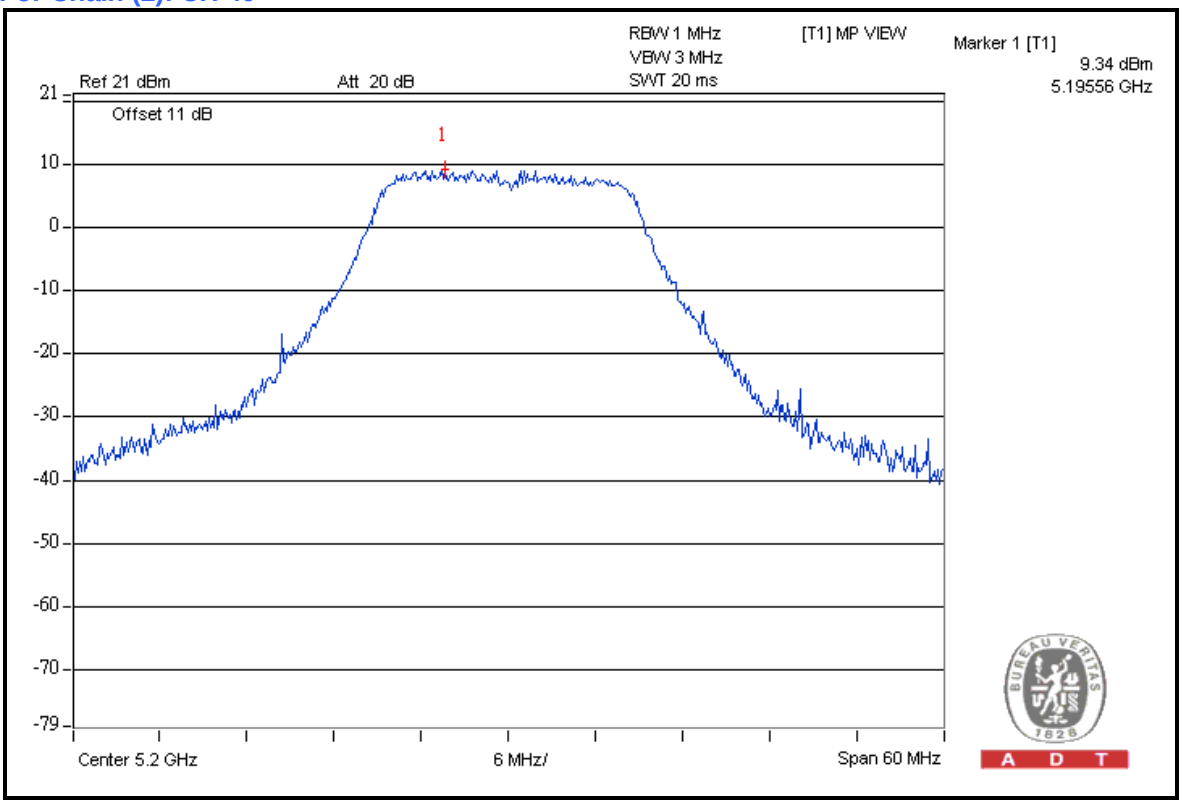


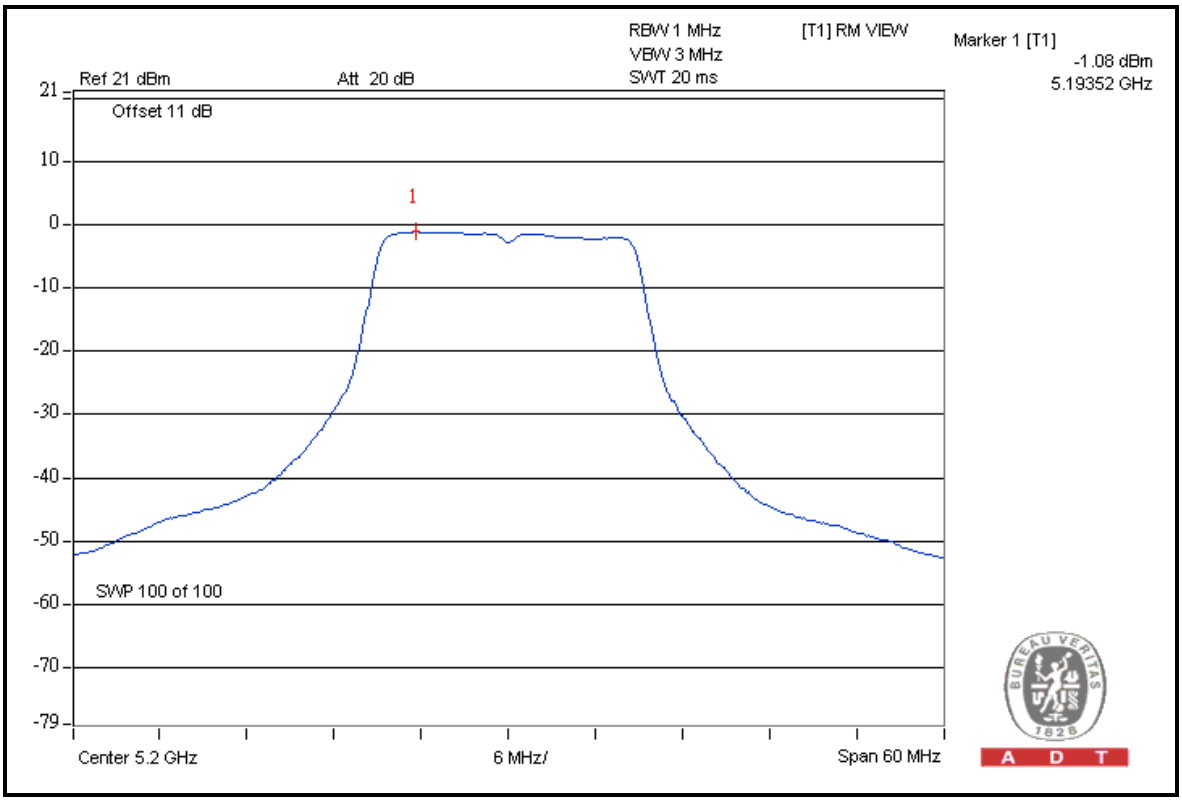


802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
36	5180	8.42	8.46	9.39	-0.86	-1.33	-0.45	9.28	9.79	9.84	13	PASS
40	5200	9.12	7.90	9.34	-0.38	-1.54	-1.08	9.50	9.44	10.42	13	PASS
48	5240	8.75	8.46	9.53	-0.66	-1.81	-0.78	9.41	10.27	10.31	13	PASS

For Chain (2): CH 40

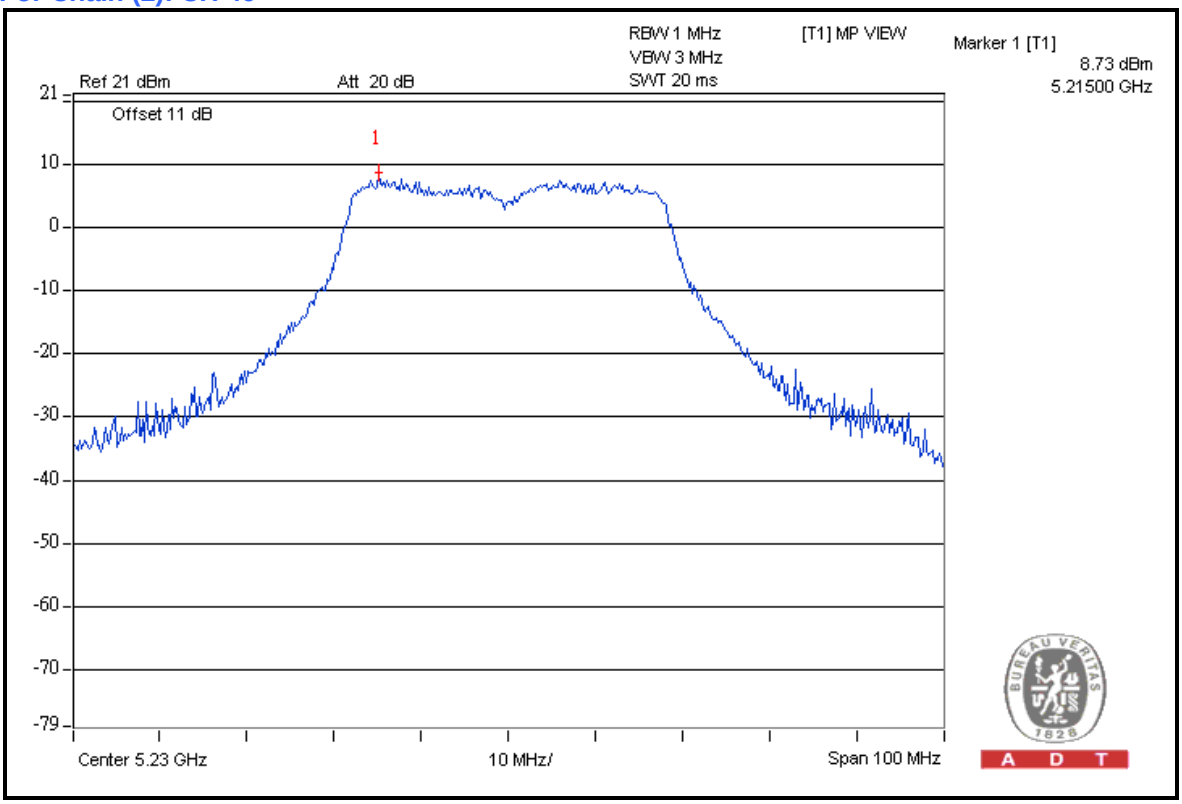


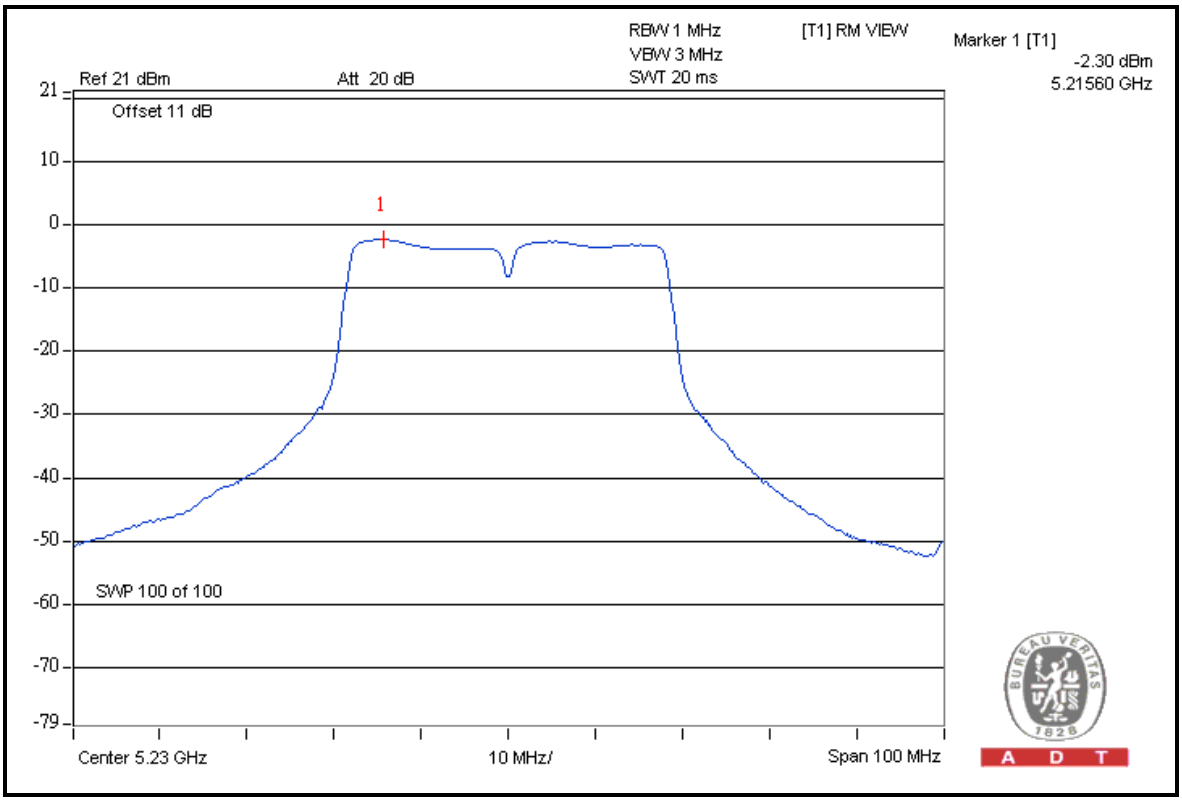


802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
38	5190	6.65	6.19	7.96	-2.69	-3.50	-2.34	9.34	9.69	10.30	13	PASS
46	5230	7.47	6.85	8.73	-2.44	-3.01	-2.30	9.91	9.86	11.03	13	PASS

For Chain (2): CH 46





4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation

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 31, 2012

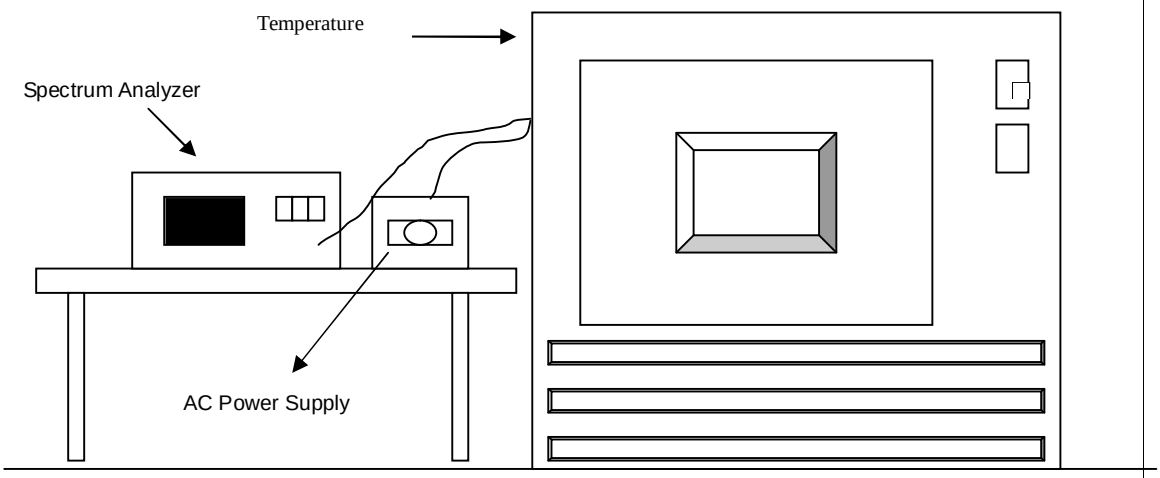
4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
50	120	5240.0109	2.0802	5240.0134	2.5573	5240.0141	2.6908	5240.009	1.7176
40	120	5240.0101	1.9275	5240.0103	1.9656	5240.0057	1.0878	5240.0029	0.5534
30	120	5239.9999	-0.0191	5239.999	-0.1908	5239.9961	-0.7443	5239.9931	-1.3168
20	120	5240.0155	2.9580	5240.0167	3.1870	5240.0185	3.5305	5240.0243	4.6374
10	120	5240.0119	2.2710	5240.0136	2.5954	5240.0194	3.7023	5240.0236	4.5038
0	120	5240.0157	2.9962	5240.0149	2.8435	5240.0156	2.9771	5240.0221	4.2176
-10	120	5240.0013	0.2481	5239.9964	-0.6870	5240.0015	0.2863	5239.9981	-0.3626
-20	120	5240.0181	3.4542	5240.023	4.3893	5240.0194	3.7023	5240.0241	4.5992
-30	120	5239.9929	-1.3550	5239.9969	-0.5916	5239.9999	-0.0191	5239.9998	-0.0382

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5320MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
20	138	5240.0154	2.9389	5240.0178	3.3969	5240.0195	3.7214	5240.0235	4.4847
	120	5240.0155	2.9580	5240.0167	3.1870	5240.0185	3.5305	5240.0243	4.6374
	102	5240.0153	2.9198	5240.0161	3.0725	5240.0193	3.6832	5240.0236	4.5038

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:

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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.

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