

FCC TEST REPORT

REPORT NO.: RF120531E03

MODEL NO.: RV215W

FCC ID: N89-RV215W

RECEIVED: Apr. 26, 2012

TESTED: Apr. 26 to June 11, 2012

ISSUED: July 25, 2012

APPLICANT: CyberTAN Technology, Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd.,
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120531E03	Original release	July 25, 2012

1. CERTIFICATION

PRODUCT: Wireless-N VPN Firewall
BRAND NAME: CISCO
MODEL NO.: RV215W
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: CyberTAN Technology, Inc.
TESTED: Apr. 26 to June 11, 2012
STANDARDS: **FCC Part 15: 2009, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (Model: RV215W) 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:** July 25, 2012
(Elsie Hsu, Specialist)

APPROVED BY :  , **DATE:** July 25, 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: 2009, 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 -11.19dB at 0.49766MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.8dB at 4824.00MHz
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	No antenna connector is used.

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	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	2.98dB
Radiated emission	30MHz ~ 1GHz	5.59 dB
	1GHz ~6GHz	3.84 dB
	6GHz ~ 18GHz	4.09 dB
	18GHz ~ 40GHz	4.24 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless-N VPN Firewall
MODEL NO.	RV215W
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n (20MHz, 800ns GI): up to 130 Mbps 802.11n (40MHz, 800ns GI): up to 270 Mbps 802.11n (20MHz, 400ns GI): up to 144.4 Mbps 802.11n (40MHz, 400ns GI): up to 300 Mbps
OPERATING FREQUENCY	2.412 ~ 2.462GHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
MAXIMUM OUTPUT POWER	802.11b: 144.544mW 802.11g: 204.174mW 802.11n (20MHz): 408.348mW 802.11n (40MHz): 307.213mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter × 1

NOTE:

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

Transmitter Circuit	Gain (dBi) (Include cable loss)	Antenna Type	Freq. range (MHz to MHz)	Connector Type
Chain (0)	2	Dipole	2400~2483.5	NA
Chain (1)	2			

2. The EUT must be supplied with a power adapter as following table:

BRAND:	Hon-Kwang
MODEL NO.:	HK-AX-120A150-US
INPUT POWER:	AC 100-240V, 50/60Hz, 0.8A
OUTPUT POWER:	DC 12V, 1.5A DC output cable: Unshielded, 1.8m

3. The EUT could be applied with one USB Cellular Modem, therefore emission tests are added for simultaneously transmit between wireless LAN and USB Cellular Modem. The emission tests have been performed at the worst channel of both WLAN and USB Cellular Modem, the spurious emission of the simultaneous operation (WLAN & USB Cellular Modem) has been evaluated and no non-compliance found. < USB Cellular Modem only for test, not for sale >

Brand name	Model name	FCC ID	Spec.	Testing mode
HUAWEI	E169	QISE169	GSM/GPRS/EDGE 850/1900MHz	GPRS ch192, 837MHz
D-Link	DWM-156	KA2WM156 A2	UMTS(3G):850 MHz 1900 MHz GSM (EDGE/GPRS):850 MHz,1900 MHz	GPRS ch128, 824.2MHz
HUAWEI	E220	QISE220	HSUPA / HSDPA / UMTS 850 / 1900 MHz EDGE / GPRS / GSM 850 / 1900 MHz	GPRS ch661, 1880MHz

From the above USB Cellular Modems, USB Cellular Modem: **E169** was selected for final testing.

4. The EMISSIONS DESIGNATOR of the EUT, please refer to the following table:

MODULATION MODE	EMISSIONS DESIGNATOR
802.11b	11M5G1D
802.11g	15MD1D
802.11n (20MHz)	17M8D1D
802.11n (40MHz)	36M8D1D

5. The EUT incorporates a MIMO function.

MODULATION MODE	TX/RX FUNCTION
802.11b	1Tx <Chain (0)>/1Rx
802.11g	1Tx <Diversity>/1Rx
802.11n (20MHz)	2Tx/2Rx
802.11n (40MHz)	2Tx/2Rx

6. The EUT is 2 * 2 spatial MIMO (2Tx & 2Rx) without beam forming function.

7. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.

8. 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

Eleven channels are provided for 802.11b, 802.11g, 802.11n (20MHz):

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

Seven channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

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 (20MHz)	1 to 11	6	OFDM	BPSK	6.5

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	MODULATIO N TYPE	DATA RATE (Mbps)
802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5

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)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (40MHz)	3 to 9	3, 6, 9	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)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

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)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C, 75%RH	120Vac, 60Hz	Gavin Peng
RE<1G	20deg. C, 63%RH	120Vac, 60Hz	Amos Chuang
RE ³ 1G	27deg. C, 75%RH	120Vac, 60Hz	Frank Liu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Evan Huang
OB	25deg. C, 60%RH	120Vac, 60Hz	Evan 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: 2009, 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

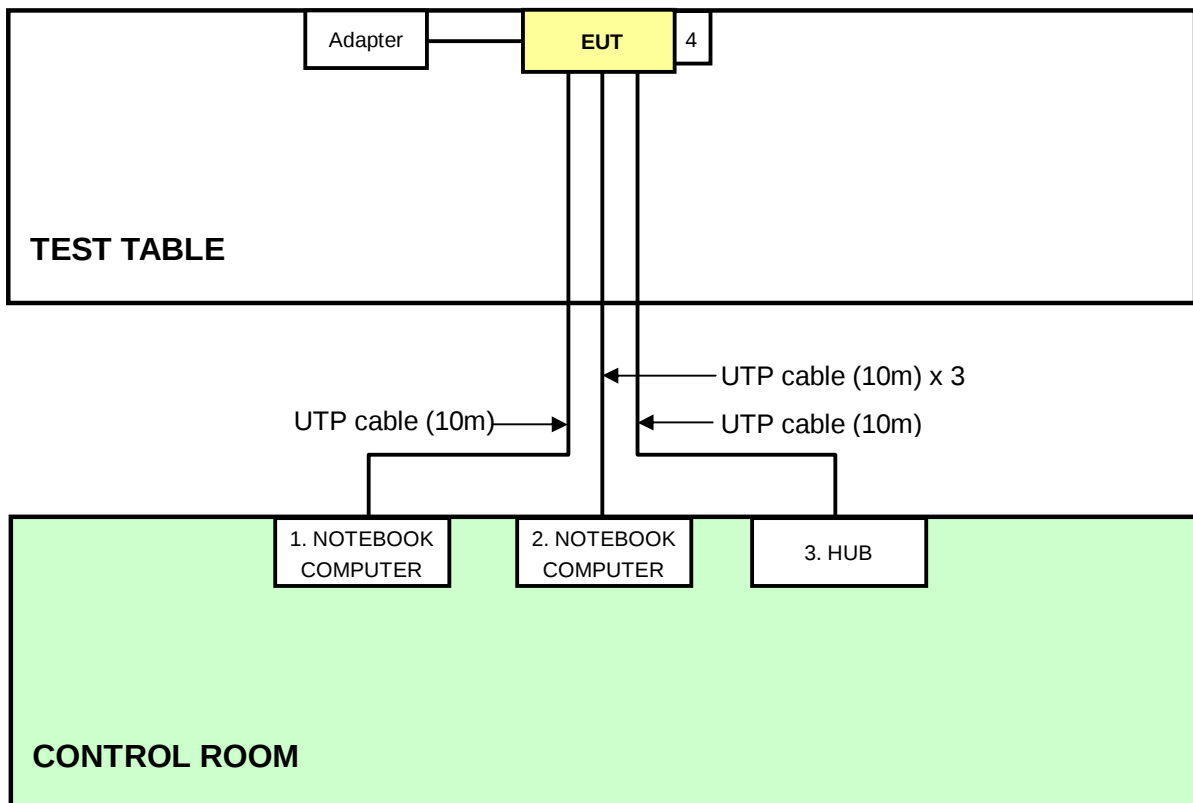
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
3	HUB	ZyXEL	ES-116P	S060H0200021 5	FCC DoC
4	USB Cellular Modem	HUAWEI	E169	Q54CAB104240 4880	QISE169

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

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



NOTE: Item 4 is a USB Cellular Modem.

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	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	Mar. 01, 2012	Apr. 30, 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	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: Apr. 26, 2012

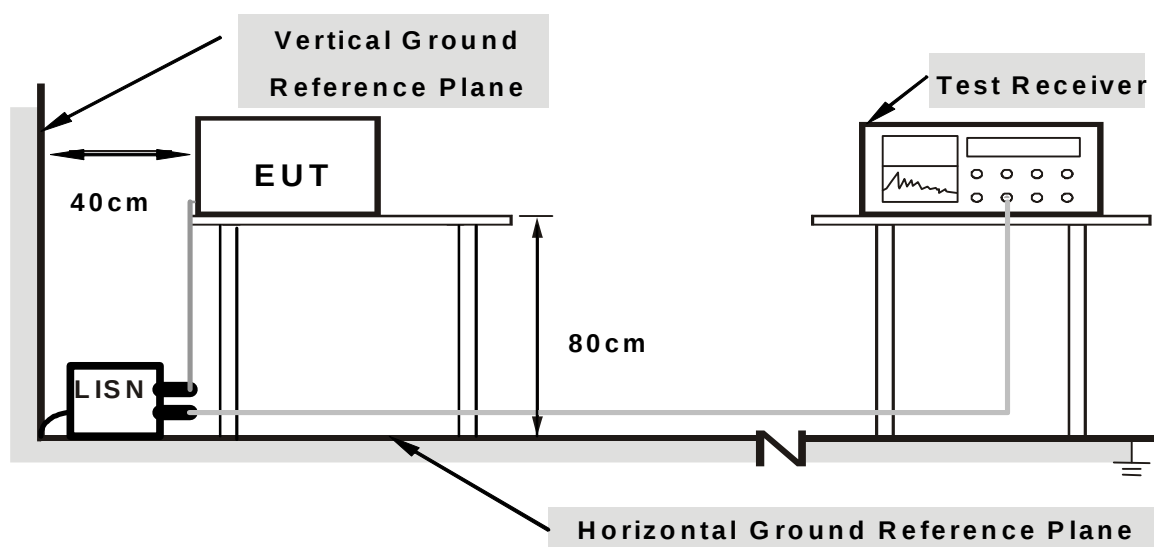
4.1.3 TEST PROCEDURES

- The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.



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4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared computer system (support units 1 ~ 2) to act as communication partner.
3. The communication partner ran test program "telnet paste command" to enable EUT under transmission/receiving condition continuously.

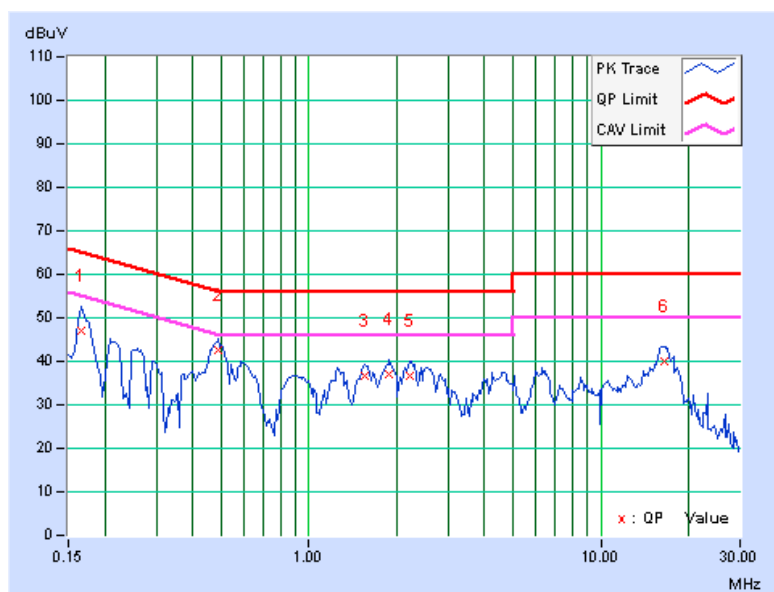
4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.06	46.90	40.81	46.96	40.87	65.18	55.18	-18.22	-14.31
2	0.48594	0.08	42.38	33.76	42.46	33.84	56.24	46.24	-13.78	-12.40
3	1.55859	0.16	36.43	29.54	36.59	29.70	56.00	46.00	-19.41	-16.30
4	1.89063	0.18	36.93	29.89	37.11	30.07	56.00	46.00	-18.89	-15.93
5	2.21094	0.20	36.56	29.79	36.76	29.99	56.00	46.00	-19.24	-16.01
6	16.44141	0.55	39.44	33.91	39.99	34.46	60.00	50.00	-20.01	-15.54

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.

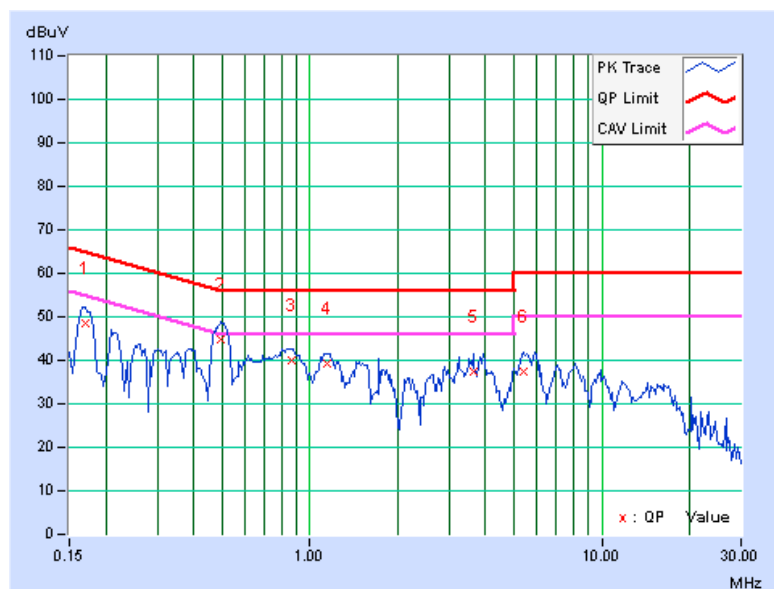


PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	0.07	48.63	40.96	48.70	41.03	64.98	54.98	-16.28	-13.95
2	0.49766	0.09	44.76	32.46	44.85	32.55	56.04	46.04	-11.19	-13.49
3	0.86484	0.11	39.81	31.06	39.92	31.17	56.00	46.00	-16.08	-14.83
4	1.14453	0.13	39.22	31.99	39.35	32.12	56.00	46.00	-16.65	-13.88
5	3.63672	0.24	36.99	30.84	37.23	31.08	56.00	46.00	-18.77	-14.92
6	5.39453	0.28	36.97	31.45	37.25	31.73	60.00	50.00	-22.75	-18.27

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 BANDEGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEGE MEASUREMENT

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

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

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

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4.2.2 TEST INSTRUMENTS

Below 1GHz test

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
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 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. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
8. Tested Date: June 04, 2012



A D T

Above 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Agilent Pre-Selector	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Agilent Signal Generator	N5181A	MY49060347	July 25, 2011	July 24, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-04	Nov. 15, 2011	Nov. 14, 2012
Agilent Pre-Amplifier	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
AISI Horn_Antenna	AIH.8018	0000220091110	Nov. 23, 2011	Nov. 22, 2012
SCHWARZBECK Horn_Antenna	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
CT Antenna Tower & Turn Table	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: June 04, 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. 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.

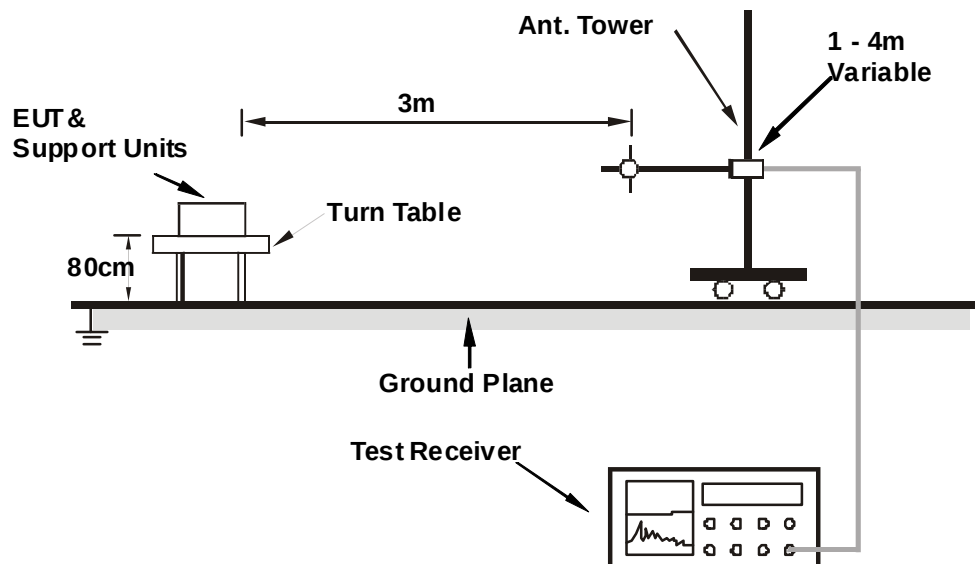
NOTE:

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 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11n (20MHz)

CHANNEL	TX Channel 6	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	47.76	29.2 QP	40.0	-10.8	1.50 H	260	15.09	14.13
2	250.03	30.9 QP	46.0	-15.1	1.00 H	285	17.55	13.35
3	374.97	32.9 QP	46.0	-13.1	1.00 H	301	15.64	17.22
4	529.98	32.0 QP	46.0	-14.1	1.50 H	342	10.86	21.09
5	624.96	32.5 QP	46.0	-13.5	1.00 H	85	9.56	22.97
6	706.67	32.5 QP	46.0	-13.5	1.50 H	360	8.38	24.09
7	831.48	38.0 QP	46.0	-8.0	1.00 H	360	11.60	26.44
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	64.82	35.6 QP	40.0	-4.4	1.00 V	359	22.40	13.16
2	125.57	28.9 QP	43.5	-14.6	1.00 V	355	15.99	12.95
3	374.97	30.9 QP	46.0	-15.1	1.50 V	360	13.71	17.22
4	529.98	32.8 QP	46.0	-13.2	1.00 V	74	11.74	21.09
5	624.96	32.1 QP	46.0	-13.9	1.50 V	355	9.15	22.97
6	706.67	32.6 QP	46.0	-13.4	1.50 V	249	8.53	24.09

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

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	57.9 PK	74.0	-16.1	1.00 H	334	26.69	31.21
2	2390.00	45.6 AV	54.0	-8.4	1.00 H	334	14.39	31.21
3	*2412.00	102.6 PK			1.00 H	334	71.33	31.27
4	*2412.00	99.9 AV			1.00 H	334	68.63	31.27
5	4824.00	52.1 PK	74.0	-21.9	1.04 H	46	12.68	39.42
6	4824.00	46.1 AV	54.0	-7.9	1.04 H	46	6.68	39.42

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.3 PK	74.0	-13.7	1.14 V	185	29.09	31.21
2	2390.00	47.9 AV	54.0	-6.1	1.14 V	185	16.69	31.21
3	*2412.00	106.9 PK			1.14 V	185	75.63	31.27
4	*2412.00	104.1 AV			1.14 V	185	72.83	31.27
5	4824.00	54.4 PK	74.0	-19.6	1.00 V	132	14.98	39.42
6	4824.00	50.2 AV	54.0	-3.8	1.00 V	132	10.78	39.42

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	56.6 PK	74.0	-17.4	1.00 H	315	25.39	31.21
2	2390.00	44.6 AV	54.0	-9.4	1.00 H	315	13.39	31.21
3	*2437.00	101.7 PK			1.00 H	315	70.36	31.34
4	*2437.00	99.6 AV			1.00 H	315	68.26	31.34
5	2483.50	56.5 PK	74.0	-17.5	1.00 H	315	25.04	31.46
6	2483.50	44.4 AV	54.0	-9.6	1.00 H	315	12.94	31.46
7	4874.00	52.2 PK	74.0	-21.8	1.06 H	58	12.58	39.62
8	4874.00	46.3 AV	54.0	-7.7	1.06 H	58	6.68	39.62
9	7311.00	48.8 PK	74.0	-25.2	1.00 H	186	4.70	44.10
10	7311.00	37.9 AV	54.0	-16.1	1.00 H	186	-6.20	44.10
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	2390.00	59.7 PK	74.0	-14.3	1.15 V	194	28.49	31.21
2	2390.00	46.7 AV	54.0	-7.3	1.15 V	194	15.49	31.21
3	*2437.00	106.6 PK			1.15 V	194	75.26	31.34
4	*2437.00	103.7 AV			1.15 V	194	72.36	31.34
5	2483.50	59.1 PK	74.0	-14.9	1.15 V	194	27.64	31.46
6	2483.50	46.2 AV	54.0	-7.8	1.15 V	194	14.74	31.46
7	4874.00	54.1 PK	74.0	-19.9	1.00 V	131	14.48	39.62
8	4874.00	50.1 AV	54.0	-3.9	1.00 V	131	10.48	39.62
9	7311.00	53.0 PK	74.0	-21.0	1.00 V	174	8.90	44.10
10	7311.00	40.6 AV	54.0	-13.4	1.00 V	174	-3.50	44.10

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2462.00	102.4 PK			1.00 H	321	71.00	31.40
2	*2462.00	99.7 AV			1.00 H	321	68.30	31.40
3	2483.50	57.5 PK	74.0	-16.5	1.00 H	321	26.04	31.46
4	2483.50	45.2 AV	54.0	-8.8	1.00 H	321	13.74	31.46
5	4924.00	52.1 PK	74.0	-21.9	1.00 H	45	12.28	39.82
6	4924.00	45.9 AV	54.0	-8.1	1.00 H	45	6.08	39.82
7	7386.00	48.6 PK	74.0	-25.4	1.00 H	197	4.42	44.18
8	7386.00	37.5 AV	54.0	-16.5	1.00 H	197	-6.68	44.18
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	*2462.00	106.4 PK			1.12 V	191	75.00	31.40
2	*2462.00	104.1 AV			1.12 V	191	72.70	31.40
3	2483.50	59.9 PK	74.0	-14.1	1.12 V	191	28.44	31.46
4	2483.50	47.4 AV	54.0	-6.6	1.12 V	191	15.94	31.46
5	4924.00	53.6 PK	74.0	-20.4	1.00 V	131	13.78	39.82
6	4924.00	49.8 AV	54.0	-4.2	1.00 V	131	9.98	39.82
7	7386.00	52.8 PK	74.0	-21.2	1.05 V	161	8.62	44.18
8	7386.00	40.7 AV	54.0	-13.3	1.05 V	161	-3.48	44.18

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.

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	59.2 PK	74.0	-14.8	1.00 H	343	27.99	31.21
2	2390.00	44.3 AV	54.0	-9.7	1.00 H	343	13.09	31.21
3	*2412.00	101.0 PK			1.00 H	343	69.73	31.27
4	*2412.00	89.9 AV			1.00 H	343	58.63	31.27
5	4824.00	49.9 PK	74.0	-24.1	1.18 H	125	10.48	39.42
6	4824.00	38.8 AV	54.0	-15.2	1.18 H	125	-0.62	39.42
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.3 PK	74.0	-11.7	1.14 V	175	31.09	31.21
2	2390.00	46.1 AV	54.0	-7.9	1.14 V	175	14.89	31.21
3	*2412.00	105.3 PK			1.14 V	175	74.03	31.27
4	*2412.00	92.8 AV			1.14 V	175	61.53	31.27
5	4824.00	49.8 PK	74.0	-24.2	1.00 V	132	10.38	39.42
6	4824.00	40.5 AV	54.0	-13.5	1.00 V	132	1.08	39.42

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	58.1 PK	74.0	-15.9	1.00 H	335	26.89	31.21
2	2390.00	44.3 AV	54.0	-9.7	1.00 H	335	13.09	31.21
3	*2437.00	100.7 PK			1.00 H	335	69.36	31.34
4	*2437.00	88.7 AV			1.00 H	335	57.36	31.34
5	2483.50	58.8 PK	74.0	-15.2	1.00 H	335	27.34	31.46
6	2483.50	44.1 AV	54.0	-9.9	1.00 H	335	12.64	31.46
7	4874.00	50.0 PK	74.0	-24.0	1.17 H	141	10.38	39.62
8	4874.00	38.6 AV	54.0	-15.4	1.17 H	141	-1.02	39.62
9	7311.00	51.7 PK	74.0	-22.3	1.08 H	149	7.60	44.10
10	7311.00	40.4 AV	54.0	-13.6	1.08 H	149	-3.70	44.10
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	2390.00	58.6 PK	74.0	-15.4	1.12 V	193	27.39	31.21
2	2390.00	45.4 AV	54.0	-8.6	1.12 V	193	14.19	31.21
3	*2437.00	104.7 PK			1.12 V	193	73.36	31.34
4	*2437.00	93.0 AV			1.12 V	193	61.66	31.34
5	2483.50	58.6 PK	74.0	-15.4	1.12 V	193	27.14	31.46
6	2483.50	45.1 AV	54.0	-8.9	1.12 V	193	13.64	31.46
7	4874.00	49.8 PK	74.0	-24.2	1.00 V	118	10.18	39.62
8	4874.00	40.2 AV	54.0	-13.8	1.00 V	118	0.58	39.62
9	7311.00	53.1 PK	74.0	-20.9	1.05 V	167	9.00	44.10
10	7311.00	40.6 AV	54.0	-13.4	1.05 V	167	-3.50	44.10

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2462.00	101.0 PK			1.00 H	335	69.60	31.40
2	*2462.00	88.9 AV			1.00 H	335	57.50	31.40
3	2483.50	59.1 PK	74.0	-14.9	1.00 H	335	27.64	31.46
4	2483.50	44.3 AV	54.0	-9.7	1.00 H	335	12.84	31.46
5	4924.00	49.4 PK	74.0	-24.6	1.21 H	139	9.58	39.82
6	4924.00	38.3 AV	54.0	-15.7	1.21 H	139	-1.52	39.82
7	7386.00	52.3 PK	74.0	-21.7	1.05 H	137	8.12	44.18
8	7386.00	40.7 AV	54.0	-13.3	1.05 H	137	-3.48	44.18
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	*2462.00	105.8 PK			1.15 V	191	74.40	31.40
2	*2462.00	93.2 AV			1.15 V	191	61.80	31.40
3	2483.50	62.1 PK	74.0	-11.9	1.15 V	191	30.64	31.46
4	2483.50	46.6 AV	54.0	-7.4	1.15 V	191	15.14	31.46
5	4924.00	49.5 PK	74.0	-24.5	1.00 V	129	9.68	39.82
6	4924.00	40.1 AV	54.0	-13.9	1.00 V	129	0.28	39.82
7	7386.00	53.4 PK	74.0	-20.6	1.09 V	180	9.22	44.18
8	7386.00	40.7 AV	54.0	-13.3	1.09 V	180	-3.48	44.18

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.

802.11n (20MHz)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	58.9 PK	74.0	-15.1	1.00 H	321	27.69	31.21
2	2390.00	44.2 AV	54.0	-9.8	1.00 H	321	12.99	31.21
3	*2412.00	104.1 PK			1.00 H	321	72.83	31.27
4	*2412.00	92.3 AV			1.00 H	321	61.03	31.27
5	4824.00	49.4 PK	74.0	-24.6	1.17 H	135	9.98	39.42
6	4824.00	38.1 AV	54.0	-15.9	1.17 H	135	-1.32	39.42
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.6 PK	74.0	-9.4	1.17 V	165	33.39	31.21
2	2390.00	49.0 AV	54.0	-5.0	1.17 V	165	17.79	31.21
3	*2412.00	108.5 PK			1.17 V	165	77.23	31.27
4	*2412.00	96.8 AV			1.17 V	165	65.53	31.27
5	4824.00	49.2 PK	74.0	-24.8	1.00 V	138	9.78	39.42
6	4824.00	40.1 AV	54.0	-13.9	1.00 V	138	0.68	39.42

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	58.3 PK	74.0	-15.7	1.00 H	315	27.09	31.21
2	2390.00	43.9 AV	54.0	-10.1	1.00 H	315	12.69	31.21
3	*2437.00	104.7 PK			1.00 H	315	73.36	31.34
4	*2437.00	93.1 AV			1.00 H	315	61.76	31.34
5	2483.50	59.0 PK	74.0	-15.0	1.00 H	315	27.54	31.46
6	2483.50	44.5 AV	54.0	-9.5	1.00 H	315	13.04	31.46
7	4874.00	49.4 PK	74.0	-24.6	1.21 H	128	9.78	39.62
8	4874.00	38.1 AV	54.0	-15.9	1.21 H	128	-1.52	39.62
9	7311.00	52.2 PK	74.0	-21.8	1.09 H	142	8.10	44.10
10	7311.00	40.8 AV	54.0	-13.2	1.09 H	142	-3.30	44.10
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	2390.00	58.3 PK	74.0	-15.7	1.12 V	165	27.09	31.21
2	2390.00	45.8 AV	54.0	-8.2	1.12 V	165	14.59	31.21
3	*2437.00	108.8 PK			1.12 V	165	77.46	31.34
4	*2437.00	97.3 AV			1.12 V	165	65.96	31.34
5	2483.50	59.3 PK	74.0	-14.7	1.12 V	165	27.84	31.46
6	2483.50	45.7 AV	54.0	-8.3	1.12 V	165	14.24	31.46
7	4874.00	49.3 PK	74.0	-24.7	1.00 V	132	9.68	39.62
8	4874.00	39.8 AV	54.0	-14.2	1.00 V	132	0.18	39.62
9	7311.00	52.5 PK	74.0	-21.5	1.03 V	179	8.40	44.10
10	7311.00	40.1 AV	54.0	-13.9	1.03 V	179	-4.00	44.10

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2462.00	105.8 PK			1.00 H	302	74.40	31.40
2	*2462.00	93.1 AV			1.00 H	302	61.70	31.40
3	2483.50	59.3 PK	74.0	-14.7	1.00 H	302	27.84	31.46
4	2483.50	44.6 AV	54.0	-9.4	1.00 H	302	13.14	31.46
5	4924.00	49.1 PK	74.0	-24.9	1.16 H	137	9.28	39.82
6	4924.00	37.9 AV	54.0	-16.1	1.16 H	137	-1.92	39.82
7	7386.00	52.2 PK	74.0	-21.8	1.10 H	156	8.02	44.18
8	7386.00	40.6 AV	54.0	-13.4	1.10 H	156	-3.58	44.18
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	*2462.00	109.2 PK			1.13 V	166	77.80	31.40
2	*2462.00	96.9 AV			1.13 V	166	65.50	31.40
3	2483.50	63.5 PK	74.0	-10.5	1.13 V	166	32.04	31.46
4	2483.50	47.8 AV	54.0	-6.2	1.13 V	166	16.34	31.46
5	4924.00	49.1 PK	74.0	-24.9	1.00 V	140	9.28	39.82
6	4924.00	39.4 AV	54.0	-14.6	1.00 V	140	-0.42	39.82
7	7386.00	52.3 PK	74.0	-21.7	1.08 V	166	8.12	44.18
8	7386.00	40.1 AV	54.0	-13.9	1.08 V	166	-4.08	44.18

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.

802.11n (40MHz)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	59.0 PK	74.0	-15.0	1.00 H	321	27.79	31.21
2	2390.00	44.5 AV	54.0	-9.5	1.00 H	321	13.29	31.21
3	*2422.00	100.1 PK			1.00 H	321	68.80	31.30
4	*2422.00	87.1 AV			1.00 H	321	55.80	31.30
5	4844.00	48.7 PK	74.0	-25.3	1.11 H	150	9.20	39.50
6	4844.00	37.6 AV	54.0	-16.4	1.11 H	150	-1.90	39.50
7	7266.00	52.1 PK	74.0	-21.9	1.05 H	160	8.04	44.06
8	7266.00	40.6 AV	54.0	-13.4	1.05 H	160	-3.46	44.06
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.3 PK	74.0	-11.7	1.16 V	165	31.09	31.21
2	2390.00	49.7 AV	54.0	-4.3	1.16 V	165	18.49	31.21
3	*2422.00	104.5 PK			1.16 V	165	73.20	31.30
4	*2422.00	91.1 AV			1.16 V	165	59.80	31.30
5	4844.00	48.7 PK	74.0	-25.3	1.00 V	136	9.20	39.50
6	4844.00	37.4 AV	54.0	-16.6	1.00 V	136	-2.10	39.50
7	7266.00	52.7 PK	74.0	-21.3	1.00 V	171	8.64	44.06
8	7266.00	40.3 AV	54.0	-13.7	1.00 V	171	-3.76	44.06

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	57.8 PK	74.0	-16.2	1.00 H	332	26.59	31.21
2	2390.00	43.7 AV	54.0	-10.3	1.00 H	332	12.49	31.21
3	*2437.00	100.8 PK			1.00 H	332	69.46	31.34
4	*2437.00	87.2 AV			1.00 H	332	55.86	31.34
5	2483.50	58.8 PK	74.0	-15.2	1.00 H	332	27.34	31.46
6	2483.50	44.2 AV	54.0	-9.8	1.00 H	332	12.74	31.46
7	4874.00	48.6 PK	74.0	-25.4	1.06 H	137	8.98	39.62
8	4874.00	37.3 AV	54.0	-16.7	1.06 H	137	-2.32	39.62
9	7311.00	52.0 PK	74.0	-22.0	1.03 H	168	7.90	44.10
10	7311.00	40.3 AV	54.0	-13.7	1.03 H	168	-3.80	44.10
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	2390.00	59.6 PK	74.0	-14.4	1.15 V	166	28.39	31.21
2	2390.00	46.4 AV	54.0	-7.6	1.15 V	166	15.19	31.21
3	*2437.00	105.2 PK			1.15 V	166	73.86	31.34
4	*2437.00	91.4 AV			1.15 V	166	60.06	31.34
5	2483.50	58.7 PK	74.0	-15.3	1.15 V	166	27.24	31.46
6	2483.50	46.3 AV	54.0	-7.7	1.15 V	166	14.84	31.46
7	4874.00	49.3 PK	74.0	-24.7	1.04 V	139	9.68	39.62
8	4874.00	37.8 AV	54.0	-16.2	1.04 V	139	-1.82	39.62
9	7311.00	53.0 PK	74.0	-21.0	1.00 V	179	8.90	44.10
10	7311.00	40.7 AV	54.0	-13.3	1.00 V	179	-3.40	44.10

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.

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2452.00	100.5 PK			1.00 H	328	69.12	31.38
2	*2452.00	86.9 AV			1.00 H	328	55.52	31.38
3	2483.50	58.8 PK	74.0	-15.2	1.00 H	328	27.34	31.46
4	2483.50	44.0 AV	54.0	-10.0	1.00 H	328	12.54	31.46
5	4904.00	48.4 PK	74.0	-25.6	1.01 H	148	8.66	39.74
6	4904.00	37.2 AV	54.0	-16.8	1.01 H	148	-2.54	39.74
7	7356.00	51.9 PK	74.0	-22.1	1.00 H	170	7.75	44.15
8	7356.00	40.4 AV	54.0	-13.6	1.00 H	170	-3.75	44.15
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	*2452.00	104.4 PK			1.12 V	163	73.02	31.38
2	*2452.00	90.7 AV			1.12 V	163	59.32	31.38
3	2483.50	59.9 PK	74.0	-14.1	1.12 V	163	28.44	31.46
4	2483.50	47.7 AV	54.0	-6.3	1.12 V	163	16.24	31.46
5	4904.00	48.8 PK	74.0	-25.2	1.02 V	147	9.06	39.74
6	4904.00	37.3 AV	54.0	-16.7	1.02 V	147	-2.44	39.74
7	7356.00	52.1 PK	74.0	-21.9	1.00 V	181	7.95	44.15
8	7356.00	40.8 AV	54.0	-13.2	1.00 V	181	-3.35	44.15

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.

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	FSP 40	100060	May 09, 2012	May 08, 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 : June 11, 2012

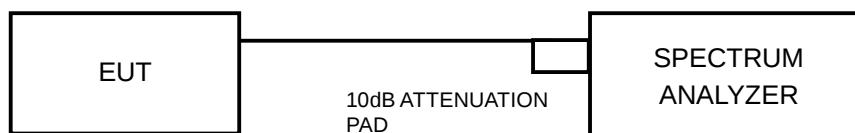
4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
2. Set the video bandwidth (VBW) $\geq 3 \times$ 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

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.06	0.5	PASS
6	2437	8.19	0.5	PASS
11	2462	8.30	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.25	0.5	PASS
6	2437	16.41	0.5	PASS
11	2462	16.56	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.60	17.55	0.5	PASS
6	2437	17.70	17.74	0.5	PASS
11	2462	17.68	17.67	0.5	PASS

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	35.48	35.83	0.5	PASS
6	2437	35.78	35.90	0.5	PASS
9	2452	36.01	35.93	0.5	PASS

4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Peak Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Power Sensor	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 : June 11, 2012

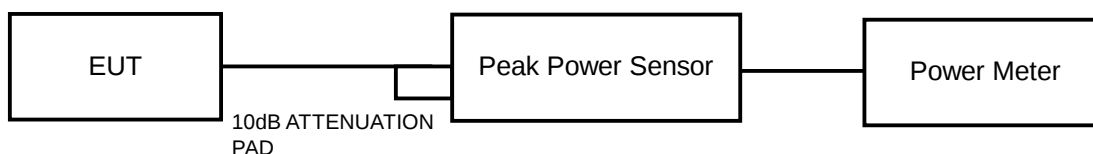
4.4.3 TEST PROCEDURES

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

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

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	141.254	21.5	30	PASS
6	2437	144.544	21.6	30	PASS
11	2462	141.254	21.5	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	199.526	23.0	30	PASS
6	2437	194.984	22.9	30	PASS
11	2462	204.174	23.1	30	PASS

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	23.6	22.4	402.867	26.05	30	PASS
6	2437	23.1	23.1	408.348	26.11	30	PASS
11	2462	22.1	22.8	352.727	25.47	30	PASS

802.11n (40MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	22.2	21.5	307.213	24.87	30	PASS
6	2437	20.9	21.1	251.852	24.01	30	PASS
9	2452	21.1	20.7	246.315	23.91	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	FSP 40	100060	May 09, 2012	May 08, 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 : June 11, 2012

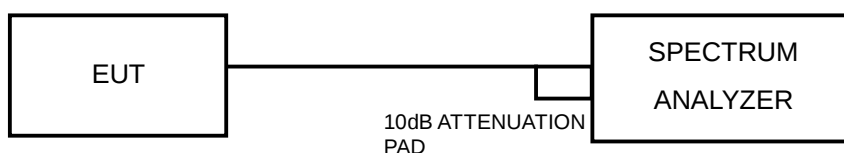
4.5.3 TEST PROCEDURE

1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
4. 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 $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

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

802.11b

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	9.91	-5.32	8	PASS
	6	2437	10.64	-4.59	8	PASS
	11	2462	10.59	-4.64	8	PASS

802.11g

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	3.36	-11.87	8	PASS
	6	2437	3.37	-11.86	8	PASS
	11	2462	3.60	-11.63	8	PASS

802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	4.94	-10.29	3.01	-7.28	8	PASS
	6	2437	4.19	-11.04	3.01	-8.03	8	PASS
	11	2462	4.30	-10.93	3.01	-7.92	8	PASS
1	1	2412	2.68	-12.55	3.01	-9.54	8	PASS
	6	2437	2.78	-12.45	3.01	-9.44	8	PASS
	11	2462	2.53	-12.70	3.01	-9.69	8	PASS

802.11n (40MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-1.49	-16.72	3.01	-13.71	8	PASS
	6	2437	-1.64	-16.87	3.01	-13.86	8	PASS
	9	2452	-1.27	-16.50	3.01	-13.49	8	PASS
1	3	2422	-0.60	-15.83	3.01	-12.82	8	PASS
	6	2437	-1.65	-16.88	3.01	-13.87	8	PASS
	9	2452	-1.84	-17.07	3.01	-14.06	8	PASS



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4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below -20dB 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	FSP 40	100060	May 09, 2012	May 08, 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 : June 11, 2012

4.6.3 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

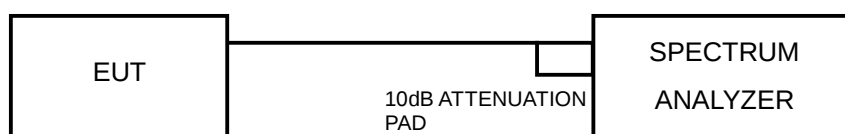
MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

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 $10\log(N)$ since the limit is relative emission limit. Only worst data of each operating mode is presented.

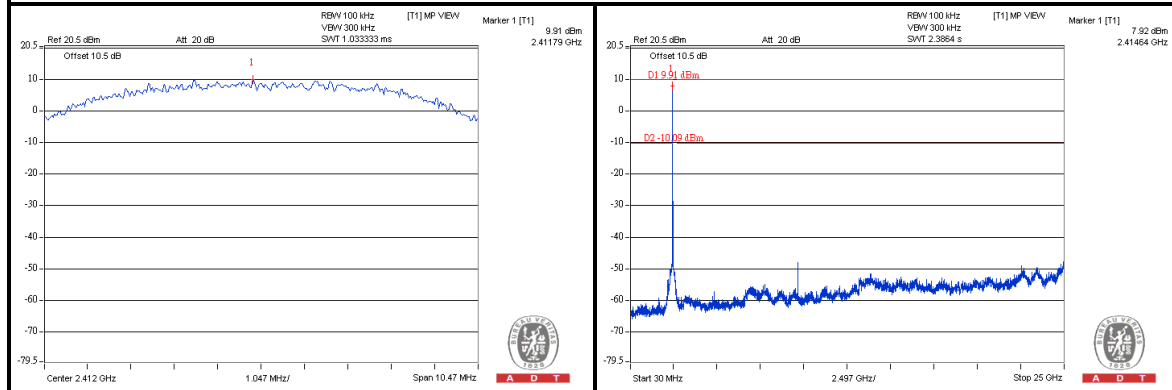
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



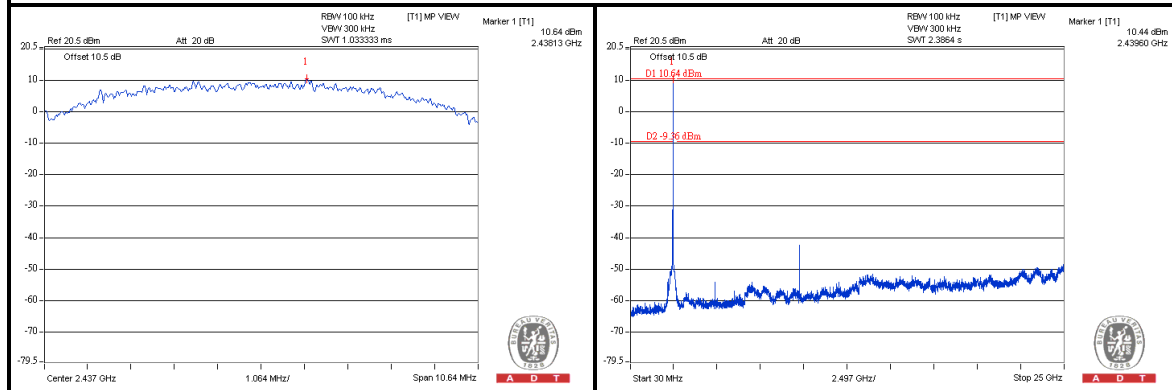
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802.11b

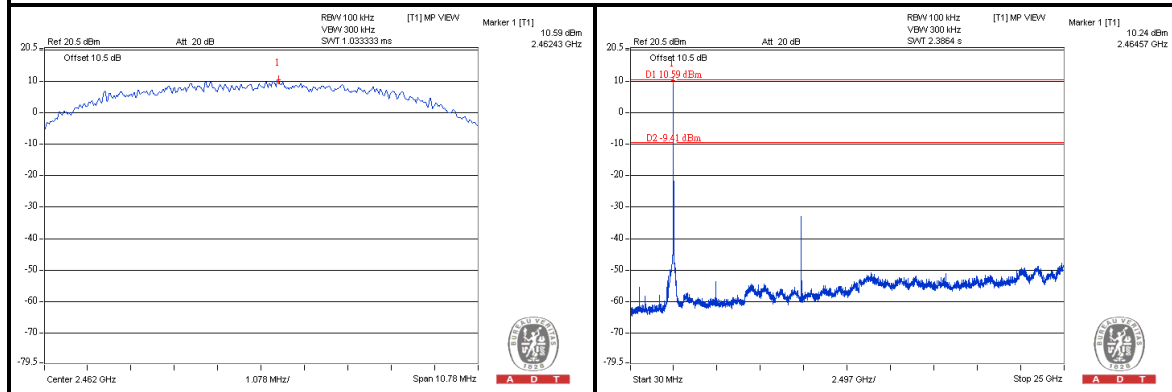
CH 1



CH 6



CH 11

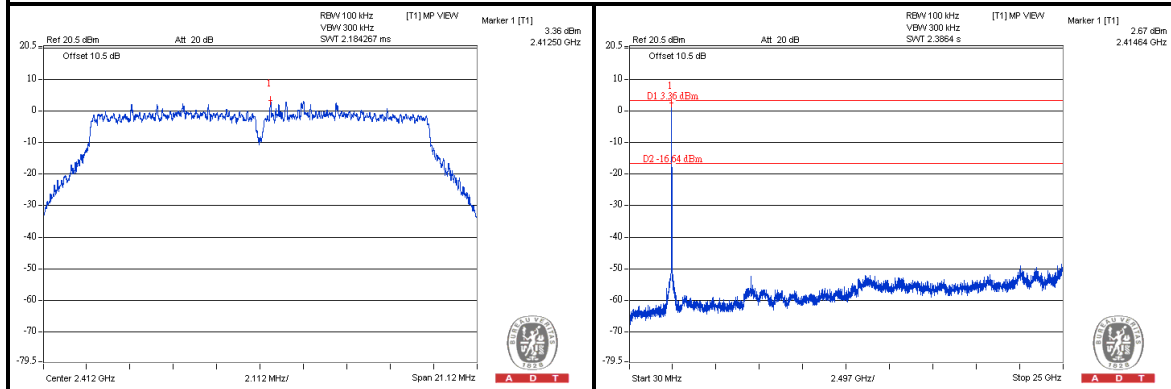




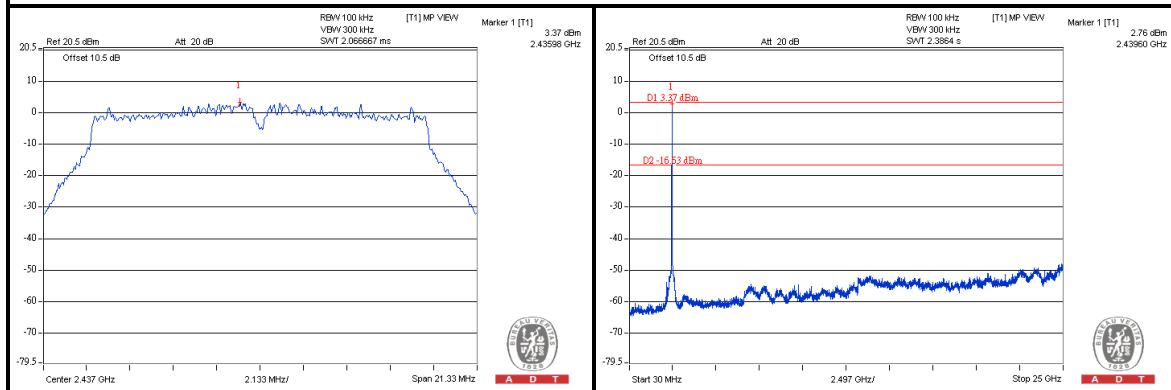
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802.11g

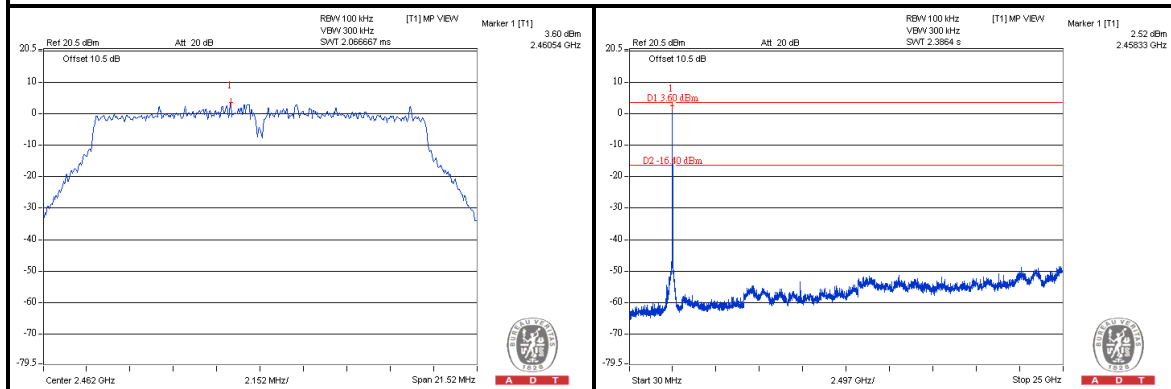
CH 1



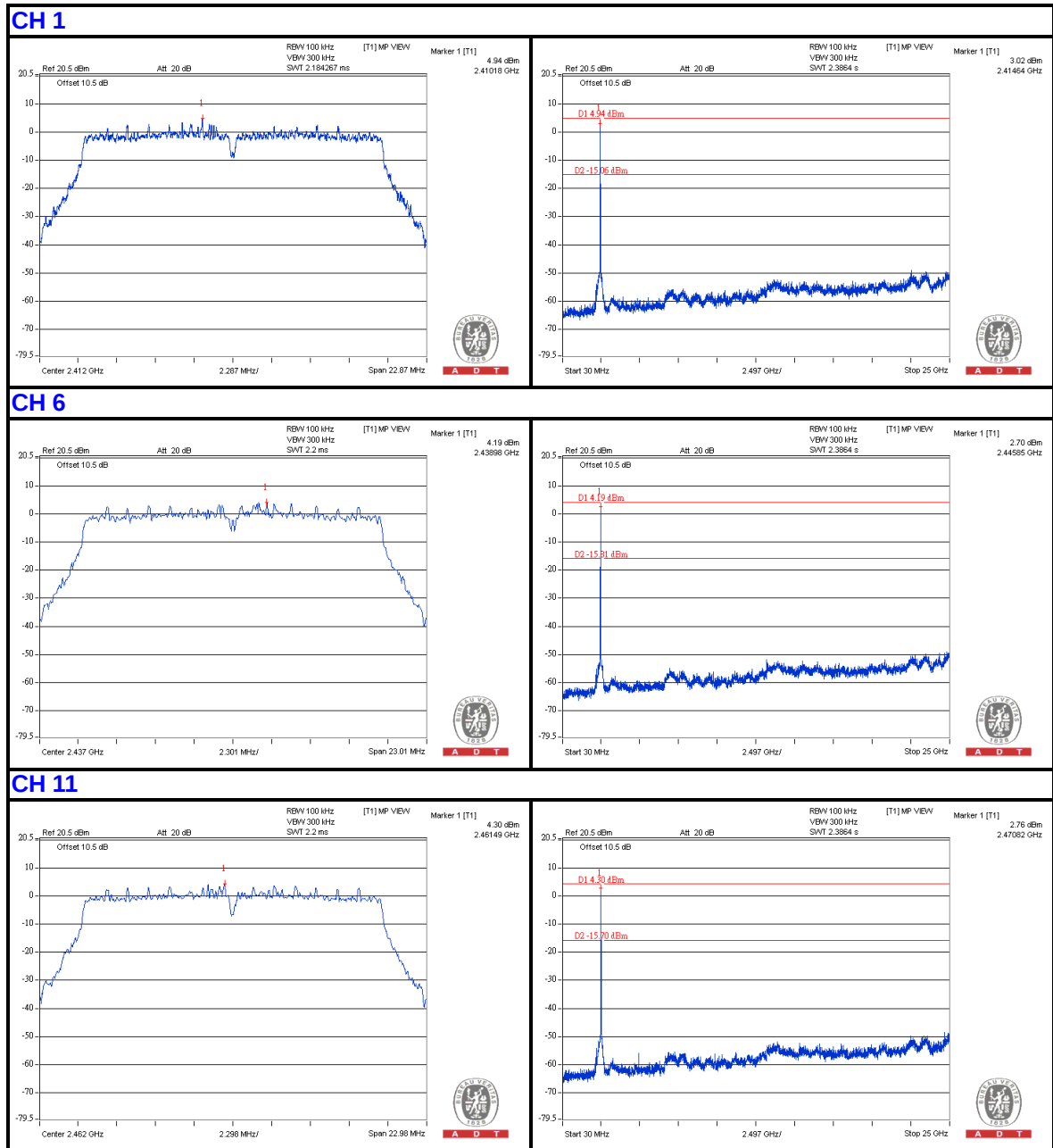
CH 6



CH 11

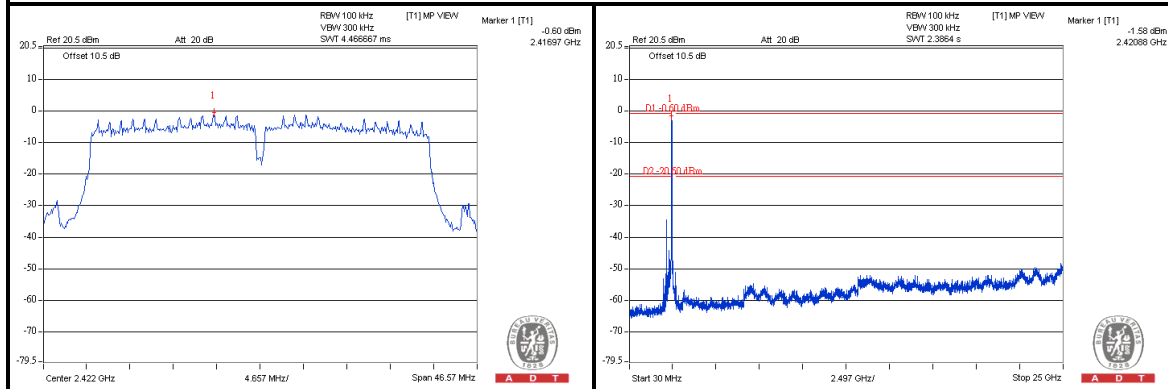


802.11n (20MHz)

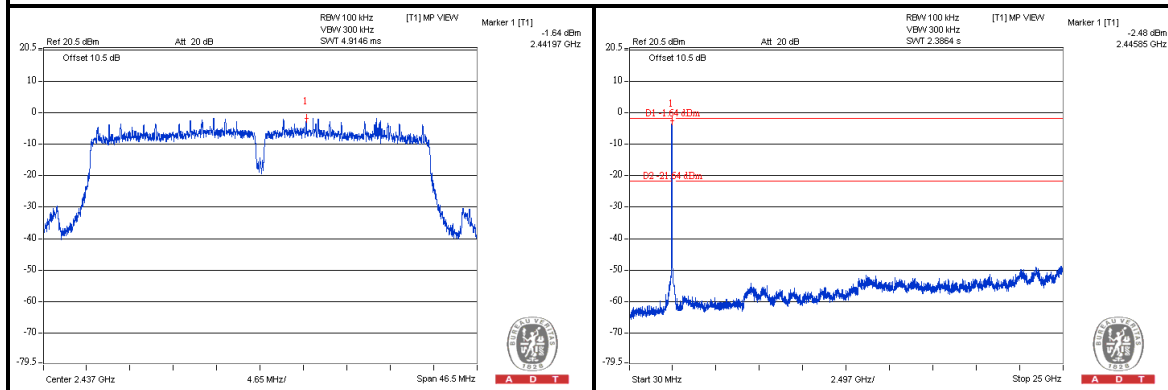


802.11n (40MHz)

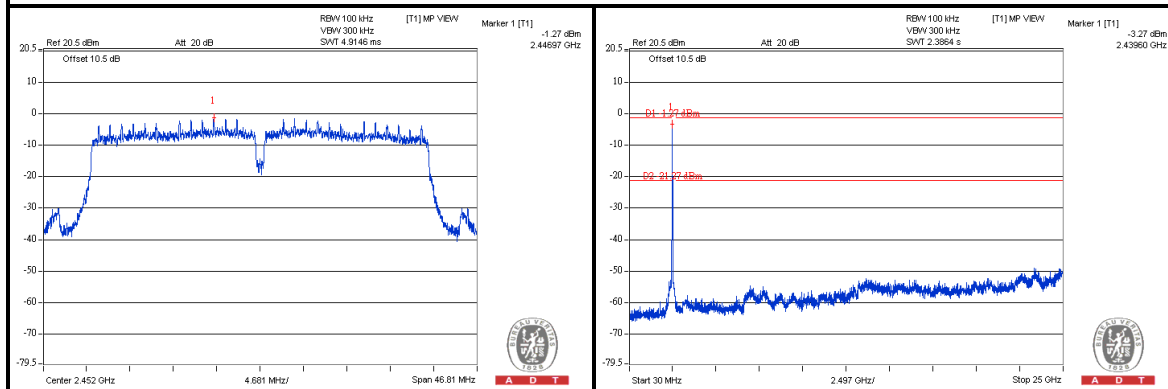
CH 3



CH 6



CH 9



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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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

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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.



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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 ---