FCC TEST REPORT

REPORT NO.:	RF130520E14
MODEL NO.:	WM-N-BM-11, WM-N-BM-14, WM-N-BM-14A
FCC ID:	COFWMNBM11
RECEIVED:	May 20, 2013
TESTED:	May 31 to June 06, 2013
ISSUED:	June 19, 2013
APPLICANT:	UNIVERSAL GLOBAL SCIENTIFIC INDUSTRIAL CO., LTD.
ADDRESS:	141, Lane 351, Sec. 1, Taiping Road., Tsaotuen, Nantou 54261, Taiwan
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
RF130520E14	Original release	June 19, 2013

1. CERTIFICATION

PRODUCT:	802.11bgn Wireless LAN Module
BRAND NAME:	USI
MODEL NO.:	WM-N-BM-11, WM-N-BM-14, WM-N-BM-14A
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	UNIVERSAL GLOBAL SCIENTIFIC INDUSTRIAL CO., LTD.
TESTED:	May 31 to June 06, 2013
STANDARDS:	FCC Part 15, Subpart C (Section 15.247)
	ANSI C63.10-2009

The above equipment (Model: WM-N-BM-11) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Phoenix Huang , **DATE:** *June 19, 2013*
(Phoenix Huang, Specialist)

APPROVED BY : , **DATE:** *June 19, 2013*
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.37dB at 14.62500MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -5.5dB at 72.00MHz
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 Output 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	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.46 dB
Radiated emissions (1GHz -6GHz)	3.54 dB
Radiated emissions (6GHz -18GHz)	4.08 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	802.11bgn Wireless LAN Module
MODEL NO.	WM-N-BM-11, WM-N-BM-14, WM-N-BM-14A
POWER SUPPLY	DC 3.3V ± 10% from host equipment
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: up to 72.2Mbps
OPERATING FREQUENCY	2.412 ~ 2.462GHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (HT20)
MAXIMUM OUTPUT POWER	802.11b: 92.47mW 802.11g: 233.346mW 802.11n (HT20): 237.137mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT has below model names, which are identical to each other in all aspects except for the following table:

Brand	Model No.	Difference
USI	WM-N-BM-11	With MFI AUTH IC
	WM-N-BM-14	Without MFI AUTH IC
	WM-N-BM-14A	Without MFI AUTH IC and with Ayla logo

For the final test, model: **WM-N-BM-11** was selected as the representative model for the test and its data is recorded in this report.

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

Brand	Model	Antenna Type	Antenna Gain (dBi)	Connector	Frequency range (MHz to MHz)
NA	WMNBM11-Printed	Printed	2	NA	2400 ~ 2484

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

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX/1RX
802.11g	1TX/1RX
802.11n (HT20)	1TX/1RX

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

5. 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

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

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

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

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 (HT20)	1 to 11	1	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	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	1	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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	25deg. C,65%RH	120Vac, 60Hz	Anderson Chen
RE<1G	25deg. C, 68%RH	120Vac, 60Hz	Andy Ho
RE≥1G	24deg. C, 67%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chen
OB	25deg. C, 60%RH	120Vac, 60Hz	James Chen

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.247)

558074 D01 DTS Meas Guidance v03r01

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.

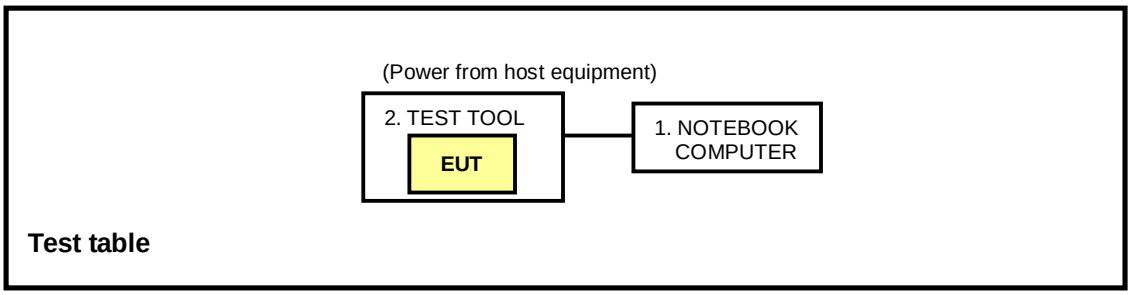
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	TEST TOOL	USI	NA	NA	NA
3	50ohm terminal resistor	NA	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	Mini USB to USB Cable, 1m
2	NA
3	NA

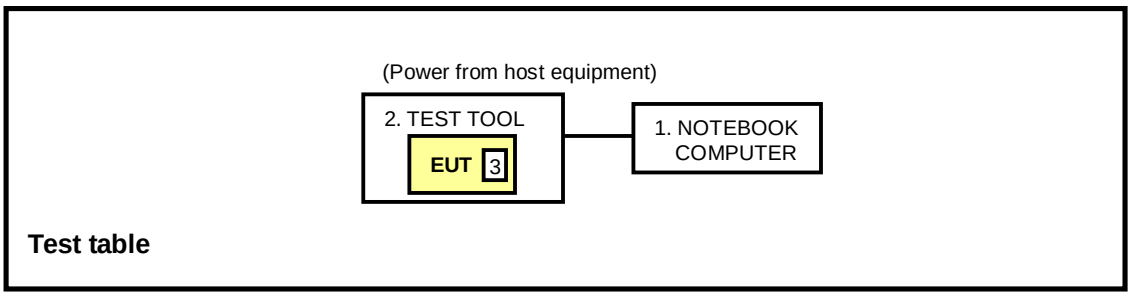
NOTE: All power cords of the above support units are non shielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST

For other test items:



For Radiated Emission test: (above 1GHz Tx mode radiated test)



Note: Support unit 3 is 50ohm terminal resistor.

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 08,2012	June 07,2013
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
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: May 31, 2013

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 levels under (Limit - 20dB) were not recorded.

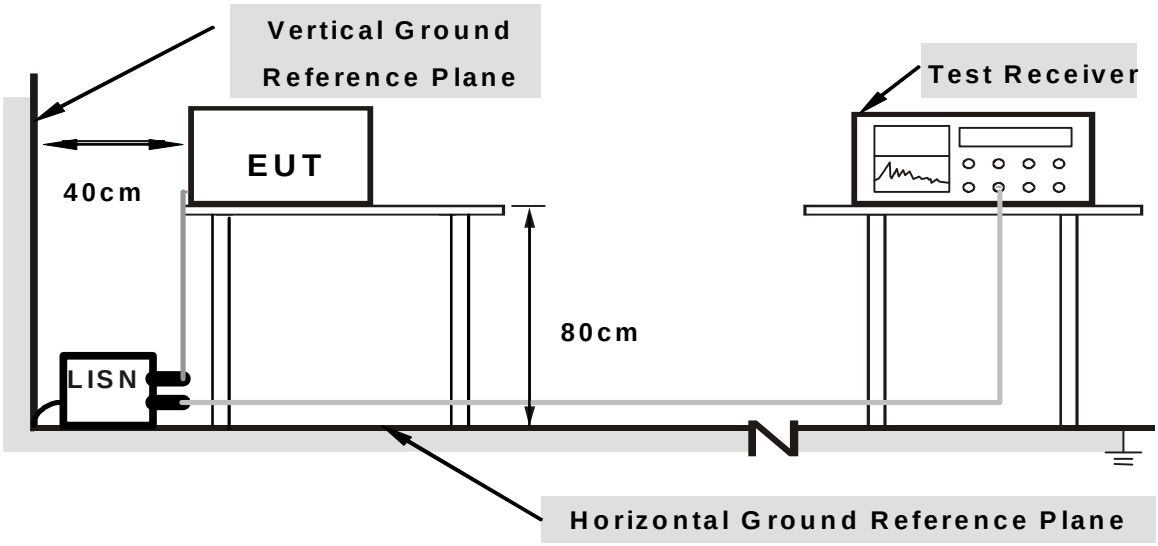
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a table in control room.
2. The communication partner run test program “paste wl command” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

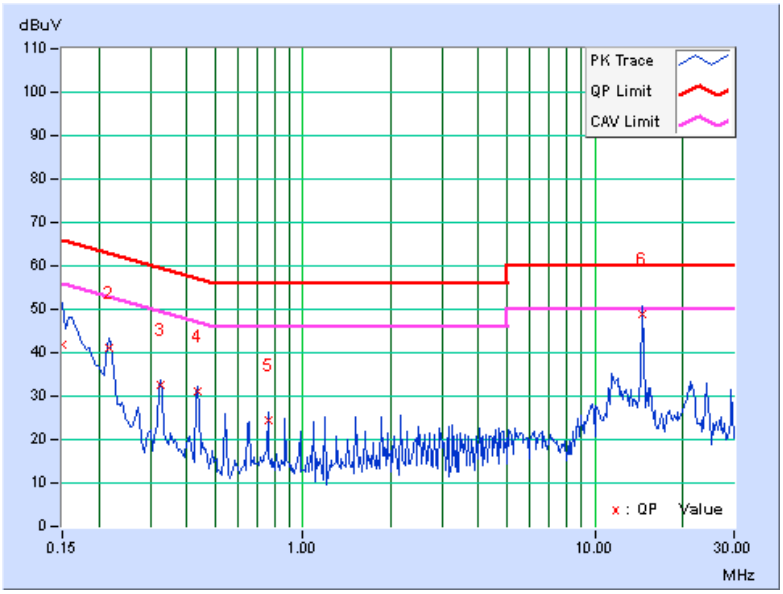
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

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	0.15000	0.12	41.59	22.90	41.71	23.02	66.00	56.00	-24.29	-32.98
2	0.21641	0.14	40.85	39.73	40.99	39.87	62.96	52.96	-21.96	-13.08
3	0.32578	0.17	32.55	31.58	32.72	31.75	59.56	49.56	-26.84	-17.81
4	0.43516	0.18	31.07	30.75	31.25	30.93	57.15	47.15	-25.90	-16.22
5	0.75938	0.20	24.26	23.81	24.46	24.01	56.00	46.00	-31.54	-21.99
6	**14.62500**	**0.86**	**47.97**	**41.77**	**48.83**	**42.63**	**60.00**	**50.00**	**-11.17**	**-7.37**

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

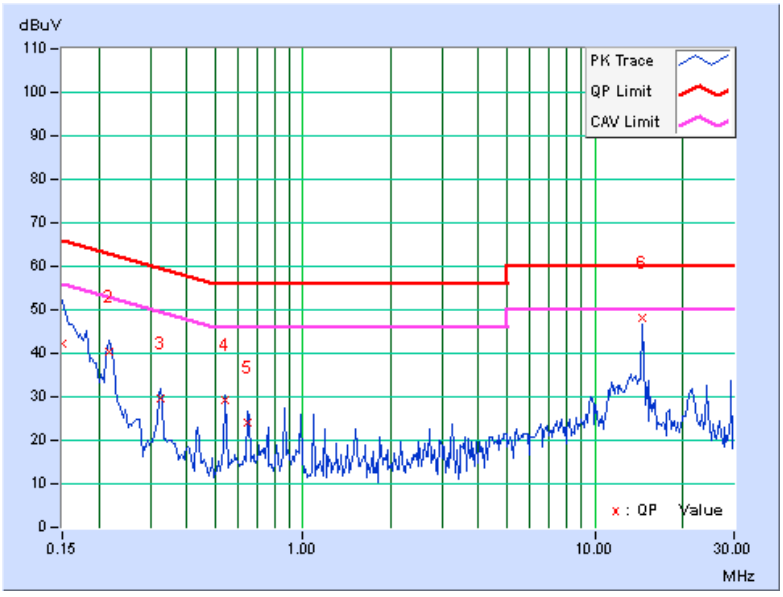


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	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	0.15000	0.10	42.10	23.87	42.20	23.97	66.00	56.00	-23.80	-32.03
2	0.21641	0.12	40.30	32.42	40.42	32.54	62.96	52.96	-22.53	-20.41
3	0.32578	0.15	29.61	28.96	29.76	29.11	59.56	49.56	-29.80	-20.45
4	0.54453	0.18	29.15	28.26	29.33	28.44	56.00	46.00	-26.67	-17.56
5	0.65000	0.18	23.87	23.86	24.05	24.04	56.00	46.00	-31.95	-21.96
6	14.62500	0.64	47.42	41.18	48.06	41.82	60.00	50.00	-11.94	-8.18

REMARKS:

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



4.2 UNWANTED EMISSION MEASUREMENT

4.2.1 LIMITS OF UNWANTED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 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.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated_V8.7.07	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: June 03 to 06, 2013

4.2.3 TEST PROCEDURES

For Below 1GHz test:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. 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 antenna is a broadband antenna, and its height 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.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

For Above 1GHz test:

Following FCC KDB 558074 D01 DTS Meas. Guidance:

Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.

The following steps was performed:

a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.
b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT
c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater
d. EIRP adjustments for multiple outputs. (Follow the procedures specified in FCC KDB Publication 662911)

e. For all of Radiation emission test

e-1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

e-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

e-3. 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.

e-4. 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-5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

e-6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

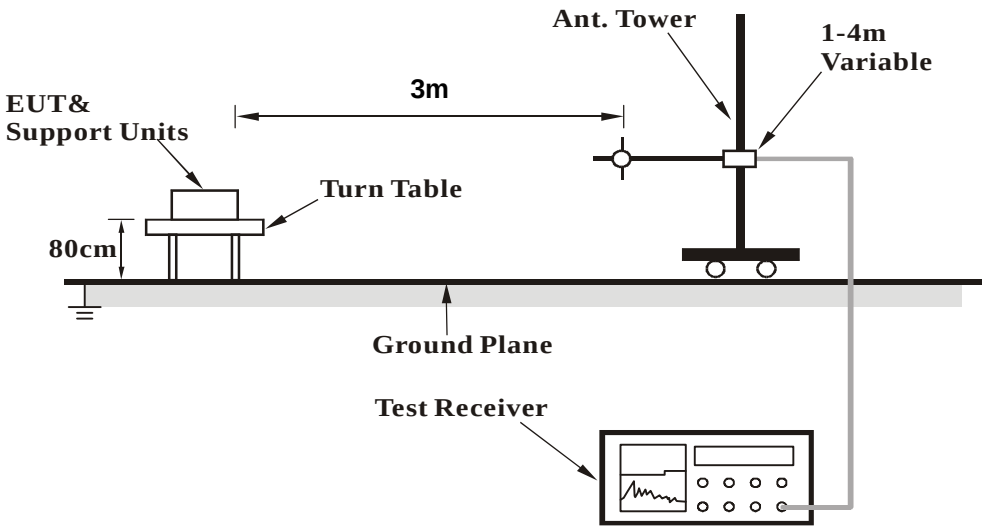
1. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above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

4.2.4 DEVIATION FROM TEST STANDARD

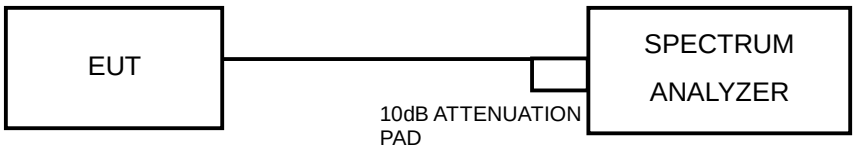
No deviation

4.2.5 TEST SETUP

For radiated test



For conducted test



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 (RADIATED TEST)

BELOW 1GHz WORST-CASE DATA

802.11n (HT20)

CHANNEL	TX Channel 1	**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	**72.00**	**34.5 QP**	**40.0**	**-5.5**	**2.00 H**	**217**	**50.26**	**-15.74**
2	160.95	34.9 QP	43.5	-8.6	1.50 H	242	48.18	-13.32
3	168.03	37.5 QP	43.5	-6.0	1.50 H	250	51.35	-13.89
4	265.81	35.5 QP	46.0	-10.5	1.00 H	344	49.17	-13.65
5	389.53	37.1 QP	46.0	-8.9	2.00 H	338	47.28	-10.14
6	849.12	32.3 QP	46.0	-13.7	1.50 H	232	33.58	-1.27
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	49.98	29.4 QP	40.0	-10.6	1.50 V	198	43.08	-13.65
2	105.51	34.8 QP	43.5	-8.7	1.00 V	115	51.66	-16.85
3	144.41	30.9 QP	43.5	-12.6	1.00 V	231	44.04	-13.14
4	271.19	36.2 QP	46.0	-9.8	1.00 V	123	49.55	-13.34
5	410.58	34.4 QP	46.0	-11.6	2.00 V	260	44.13	-9.72
6	947.77	39.4 QP	46.0	-6.6	1.00 V	297	38.81	0.62

REMARKS:

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

ABOVE 1GHz DATA

Radiated versus Conducted Measurement	
☐Conducted measurement	☒Radiated measurement
For Radiated measurement: The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) For Conducted measurement: The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

802.11b

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	4824.00	50.5 PK	74.0	-23.5	1.52 H	107	44.11	6.39
2	4824.00	41.1 AV	54.0	-12.9	1.52 H	107	34.71	6.39
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	4824.00	47.5 PK	74.0	-26.5	1.25 V	136	41.11	6.39
2	4824.00	40.5 AV	54.0	-13.5	1.25 V	136	34.11	6.39

REMARKS:

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

CHANNEL	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	4874.00	49.5 PK	74.0	-24.5	1.61 H	103	43.08	6.42
2	4874.00	40.2 AV	54.0	-13.8	1.61 H	103	33.78	6.42
3	7311.00	55.1 PK	74.0	-18.9	1.00 H	287	44.13	10.97
4	7311.00	44.1 AV	54.0	-9.9	1.00 H	287	33.13	10.97
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	4874.00	47.4 PK	74.0	-26.6	1.22 V	123	40.98	6.42
2	4874.00	40.6 AV	54.0	-13.4	1.22 V	123	34.18	6.42
3	7311.00	55.2 PK	74.0	-18.8	1.00 V	233	44.23	10.97
4	7311.00	44.1 AV	54.0	-9.9	1.00 V	233	33.13	10.97

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

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	4924.00	49.3 PK	74.0	-24.7	1.58 H	87	42.86	6.44
2	4924.00	39.8 AV	54.0	-14.2	1.58 H	87	33.36	6.44
3	7386.00	55.2 PK	74.0	-18.8	1.00 H	281	44.01	11.19
4	7386.00	44.2 AV	54.0	-9.8	1.00 H	281	33.01	11.19
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	4924.00	47.0 PK	74.0	-27.0	1.20 V	112	40.56	6.44
2	4924.00	40.5 AV	54.0	-13.5	1.20 V	112	34.06	6.44
3	7386.00	55.5 PK	74.0	-18.5	1.00 V	226	44.31	11.19
4	7386.00	44.6 AV	54.0	-9.4	1.00 V	226	33.41	11.19

REMARKS:

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

802.11g

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	4824.00	54.6 PK	74.0	-19.4	1.19 H	199	48.21	6.39
2	4824.00	35.7 AV	54.0	-18.3	1.19 H	199	29.31	6.39
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	4824.00	54.4 PK	74.0	-19.6	1.17 V	182	48.01	6.39
2	4824.00	36.1 AV	54.0	-17.9	1.17 V	182	29.71	6.39

REMARKS:

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

CHANNEL	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	4874.00	54.9 PK	74.0	-19.1	1.22 H	198	48.48	6.42
2	4874.00	36.2 AV	54.0	-17.8	1.22 H	198	29.78	6.42
3	7311.00	55.6 PK	74.0	-18.4	1.04 H	266	44.63	10.97
4	7311.00	44.4 AV	54.0	-9.6	1.04 H	266	33.43	10.97
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	4874.00	54.8 PK	74.0	-19.2	1.17 V	196	48.38	6.42
2	4874.00	35.9 AV	54.0	-18.1	1.17 V	196	29.48	6.42
3	7311.00	55.8 PK	74.0	-18.2	1.10 V	264	44.83	10.97
4	7311.00	44.3 AV	54.0	-9.7	1.10 V	264	33.33	10.97

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

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	4924.00	54.7 PK	74.0	-19.3	1.19 H	210	48.26	6.44
2	4924.00	35.9 AV	54.0	-18.1	1.19 H	210	29.46	6.44
3	7386.00	55.4 PK	74.0	-18.6	1.07 H	271	44.21	11.19
4	7386.00	44.2 AV	54.0	-9.8	1.07 H	271	33.01	11.19
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	4924.00	54.5 PK	74.0	-19.5	1.17 V	197	48.06	6.44
2	4924.00	35.9 AV	54.0	-18.1	1.17 V	197	29.46	6.44
3	7386.00	55.3 PK	74.0	-18.7	1.01 V	276	44.11	11.19
4	7386.00	44.3 AV	54.0	-9.7	1.01 V	276	33.11	11.19

REMARKS:

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

802.11n (HT20)

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	4824.00	54.7 PK	74.0	-19.3	1.14 H	182	48.31	6.39
2	4824.00	36.0 AV	54.0	-18.0	1.14 H	182	29.61	6.39
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	4824.00	54.5 PK	74.0	-19.5	1.18 V	199	48.11	6.39
2	4824.00	35.7 AV	54.0	-18.3	1.18 V	199	29.31	6.39

REMARKS:

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

CHANNEL	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	4874.00	54.7 PK	74.0	-19.3	1.21 H	213	48.28	6.42
2	4874.00	36.0 AV	54.0	-18.0	1.21 H	213	29.58	6.42
3	7311.00	55.9 PK	74.0	-18.1	1.06 H	279	44.93	10.97
4	7311.00	44.6 AV	54.0	-9.4	1.06 H	279	33.63	10.97
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	4874.00	55.0 PK	74.0	-19.0	1.20 V	214	48.58	6.42
2	4874.00	36.3 AV	54.0	-17.7	1.20 V	214	29.88	6.42
3	7311.00	55.4 PK	74.0	-18.6	1.00 V	263	44.43	10.97
4	7311.00	44.0 AV	54.0	-10.0	1.00 V	263	33.03	10.97

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

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	4924.00	54.1 PK	74.0	-19.9	1.27 H	188	47.66	6.44
2	4924.00	35.7 AV	54.0	-18.3	1.27 H	188	29.26	6.44
3	7386.00	55.1 PK	74.0	-18.9	1.01 H	256	43.91	11.19
4	7386.00	44.2 AV	54.0	-9.8	1.01 H	256	33.01	11.19
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	4924.00	54.5 PK	74.0	-19.5	1.16 V	210	48.06	6.44
2	4924.00	35.8 AV	54.0	-18.2	1.16 V	210	29.36	6.44
3	7386.00	55.9 PK	74.0	-18.1	1.09 V	251	44.71	11.19
4	7386.00	44.5 AV	54.0	-9.5	1.09 V	251	33.31	11.19

REMARKS:

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

4.2.8 TEST RESULTS (CONDUCTED TEST)

Radiated versus Conducted Measurement	
☒Conducted measurement	☐Radiated measurement

For Radiated measurement:

The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)

For Conducted measurement:

The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).

Conducted Measurement Factor

a. The antenna gain will be used. (antenna gain = 2dBi)
b. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands.
c. For the band edge the gain for the specific band may have been used.
d. In restricted bands below 1000 MHz, add upper bound on ground plane reflection:

For f = 30 – 1000 MHz, add 4.7 dB.

Note: The conducted emission test was considered some factor to compute test result.

ABOVE 1GHz DATA

802.11b

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4825 PK	-46.1	-21.26	-24.84	-48.1	2
2	4821.875 AV	-52.69	-41.26	-11.43	-54.69	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2386 PK	-38.22	-21.26	-16.96	-40.22	2
2	2386 AV	-49.12	-41.26	-7.86	-51.12	2
3	2493.16 PK	-46.85	-21.26	-25.59	-48.85	2
4	2483.66 AV	-59.98	-41.26	-18.72	-61.98	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11b

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4875 PK	-47.72	-21.26	-26.46	-49.72	2
2	4875 AV	-54.17	-41.26	-12.91	-56.17	2
3	7312.5 PK	-46.18	-21.26	-24.92	-48.18	2
4	7309.375 AV	-57.95	-41.26	-16.69	-59.95	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2388.66 PK	-42.34	-21.26	-21.08	-44.34	2
2	2319.88 AV	-53.35	-41.26	-12.09	-55.35	2
3	2486.7 PK	-45.69	-21.26	-24.43	-47.69	2
4	2483.66 AV	-58.44	-41.26	-17.18	-60.11	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

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CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4925 PK	-47.45	-21.26	-26.19	-49.45	2
2	4921.875 AV	-56.01	-41.26	-14.75	-58.01	2
3	7387.5 PK	-46.66	-21.26	-25.4	-48.66	2
4	7390.625 AV	-57.82	-41.26	-16.56	-59.82	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2319.88 PK	-43.61	-21.26	-22.35	-45.61	2
2	2319.88 AV	-53.18	-41.26	-11.92	-55.18	2
3	2487.84 PK	-42.04	-21.26	-20.78	-44.04	2
4	2483.66 AV	-52.88	-41.26	-11.62	-54.88	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11g

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4828.125 PK	-46.92	-21.26	-25.66	-48.92	2
2	4818.75 AV	-58.85	-41.26	-17.59	-60.85	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2389.8 PK	-25.8	-21.26	-4.54	-27.8	2
2	2389.8 AV	-43.92	-41.26	-2.66	-45.93	2
3	2487.46 PK	-48.13	-21.26	-26.87	-50.13	2
4	2483.66 AV	-60.32	-41.26	-19.06	-62.32	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11g

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4865.625 PK	-47.5	-21.26	-26.24	-49.5	2
2	4868.75 AV	-59.26	-41.26	-18	-61.26	2
3	7315.625 PK	-47.23	-21.26	-25.97	-49.23	2
4	7312.5 AV	-57.94	-41.26	-16.68	-59.94	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2388.66 PK	-42.07	-21.26	-20.81	-44.07	2
2	2319.88 AV	-54.33	-41.26	-13.07	-56.33	2
3	2484.42 PK	-43.16	-21.26	-21.9	-45.16	2
4	2483.66 AV	-57.88	-41.26	-16.62	-59.88	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11g

CHANNEL	TX Channel 11	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4931.25 PK	-48.03	-21.26	-26.77	-50.03	2
2	4921.875 AV	-59.32	-41.26	-18.06	-61.32	2
3	7384.375 PK	-45.68	-21.26	-24.42	-47.68	2
4	7384.375 AV	-57.85	-41.26	-16.59	-59.85	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2319.88 PK	-44.62	-21.26	-23.36	-46.62	2
2	2319.88 AV	-54.01	-41.26	-12.75	-56.01	2
3	2483.66 PK	-24.86	-21.26	-3.6	-26.86	2
4	2483.66 AV	-43.68	-41.26	-2.42	-45.68	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11n(HT20)

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4818.75 PK	-47.26	-21.26	-26	-49.26	2
2	4818.75 AV	-58.79	-41.26	-17.53	-60.79	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2389.8 PK	-24.41	-21.26	-3.15	-26.41	2
2	2389.8 AV	-43.5	-41.26	-2.24	-45.5	2
3	2483.66 PK	-48.09	-21.26	-26.83	-50.09	2
4	2483.66 AV	-60.36	-41.26	-19.1	-62.36	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11n(HT20)

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4871.875 PK	-48.16	-21.26	-26.9	-50.16	2
2	4868.75 AV	-59.23	-41.26	-17.97	-61.23	2
3	7303.125 PK	-46.94	-21.26	-25.68	-48.94	2
4	7309.375 AV	-57.99	-41.26	-16.73	-59.99	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2389.04 PK	-41.53	-21.26	-20.27	-43.53	2
2	2319.88 AV	-54.37	-41.26	-13.11	-56.37	2
3	2486.7 PK	-43.18	-21.26	-21.92	-45.18	2
4	2483.66 AV	-57.52	-41.26	-16.26	-59.52	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

802.11n(HT20)

CHANNEL	TX Channel 11	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Conducted spurious emission table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	4921.875 PK	-47.51	-21.26	-26.25	-49.51	2
2	4918.75 AV	-59.28	-41.26	-18.02	-61.28	2
3	7381.25 PK	-46.73	-21.26	-25.47	-48.73	2
4	7390.625 AV	-57.83	-41.26	-16.57	-59.83	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

Bandedge table

NO.	FREQ. (MHz)	EMISSION LEVEL (dBm)	LIMIT (dBm)	MARGIN (dB)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)
1	2319.88 PK	-44.51	-21.26	-23.25	-46.51	2
2	2319.88 AV	-54.34	-41.26	-13.08	-56.34	2
3	2484.42 PK	-24.05	-21.26	-2.79	-26.05	2
4	2483.66 AV	-43.41	-41.26	-2.15	-45.41	2

REMARKS:

1. Emission level (dBm) = Raw Value (dBuV) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Nov. 01, 2012	Oct. 31, 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 05, 2013

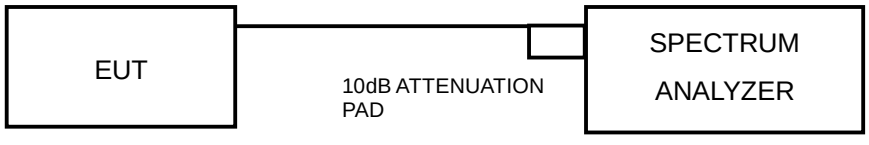
4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	7.17	0.5	PASS
6	2437	7.14	0.5	PASS
11	2462	7.71	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.77	0.5	PASS
6	2437	15.12	0.5	PASS
11	2462	15.17	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.13	0.5	PASS
6	2437	15.15	0.5	PASS
11	2462	16.18	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
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

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 05, 2013

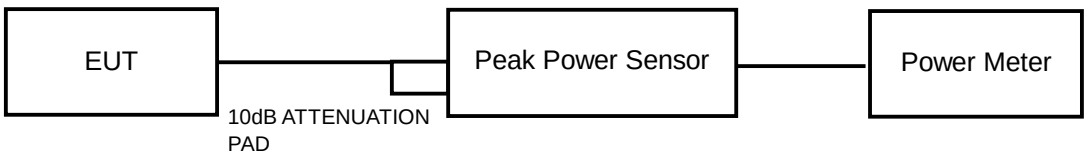
4.4.3 TEST PROCEDURES

The 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	92.470	19.66	30	PASS
6	2437	88.512	19.47	30	PASS
11	2462	88.920	19.49	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	233.346	23.68	30	PASS
6	2437	218.273	23.39	30	PASS
11	2462	209.894	23.22	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	237.137	23.75	30	PASS
6	2437	224.388	23.51	30	PASS
11	2462	212.324	23.27	30	PASS

4.5 AVERAGE OUTPUT POWER

4.5.1 FOR REFERENCE.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

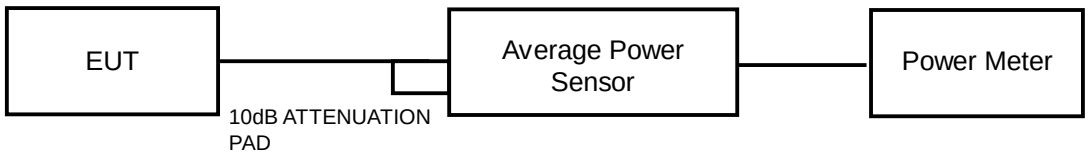
Note:

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 05, 2013

4.5.3 TEST PROCEDURES

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

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.5.6 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	45.814	16.61
6	2437	47.315	16.75
11	2462	46.881	16.71

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	31.333	14.96
6	2437	33.189	15.21
11	2462	30.974	14.91

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	29.309	14.67
6	2437	33.037	15.19
11	2462	28.510	14.55

4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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 05, 2013

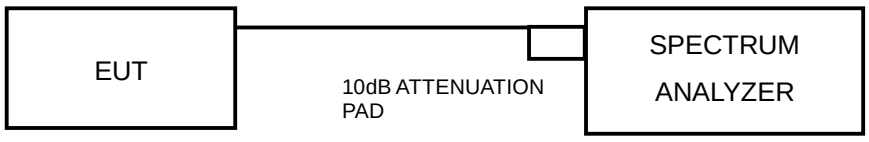
4.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 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 amplitude level.

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

802.11b

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-6.56	8	PASS
6	2437	-7.56	8	PASS
11	2462	-7.16	8	PASS

802.11g

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.25	8	PASS
6	2437	-10.14	8	PASS
11	2462	-10.52	8	PASS

802.11n (HT20)

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.65	8	PASS
6	2437	-10.71	8	PASS
11	2462	-11.62	8	PASS

4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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 05, 2013

4.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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.

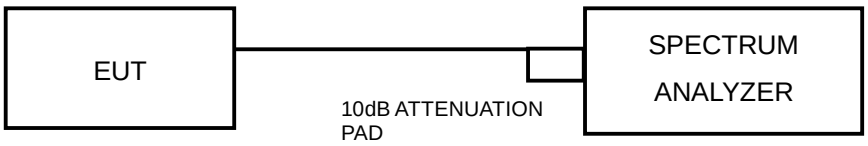
Measurement Procedure –Unwanted Emission Level

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

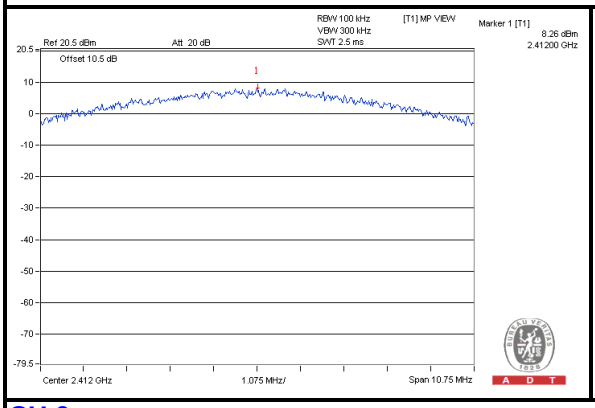
Same as Item 4.3.6

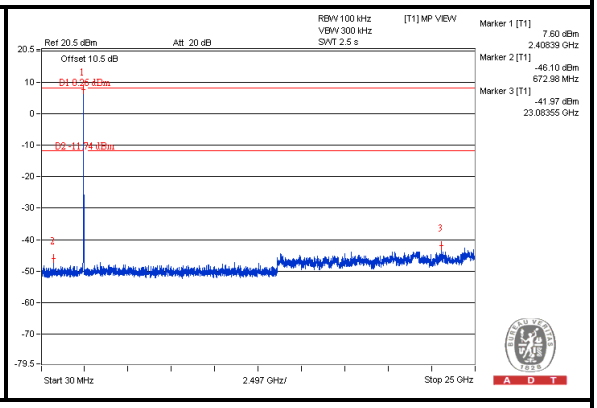
4.7.7 TEST RESULTS

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

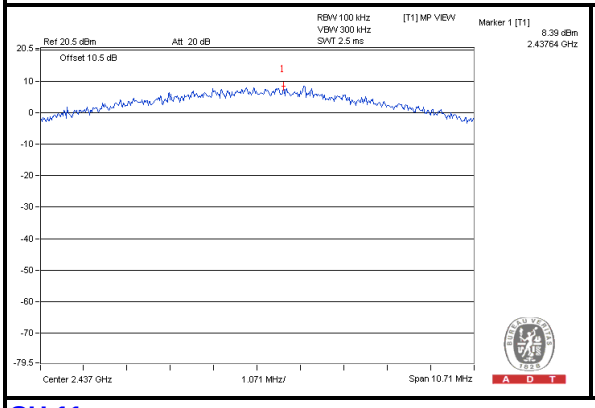
802.11b:

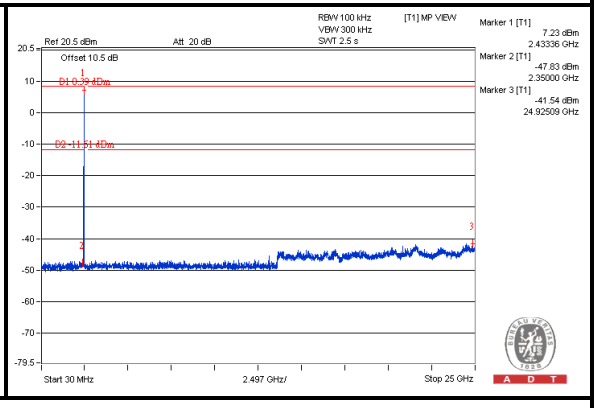
CH 1



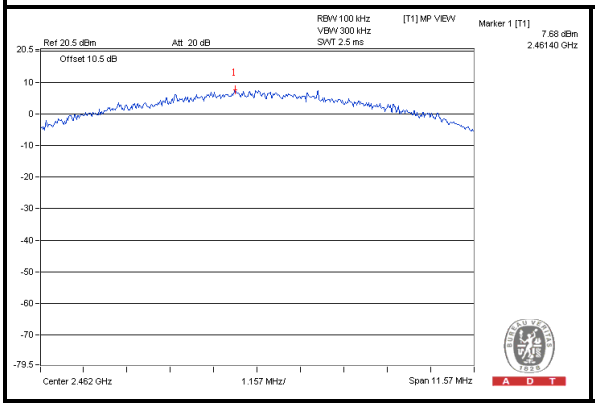


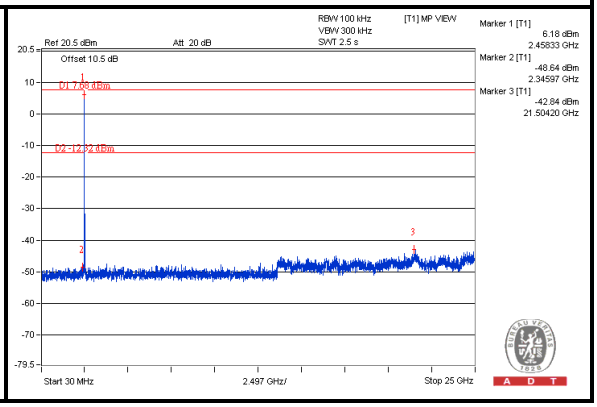
CH 6





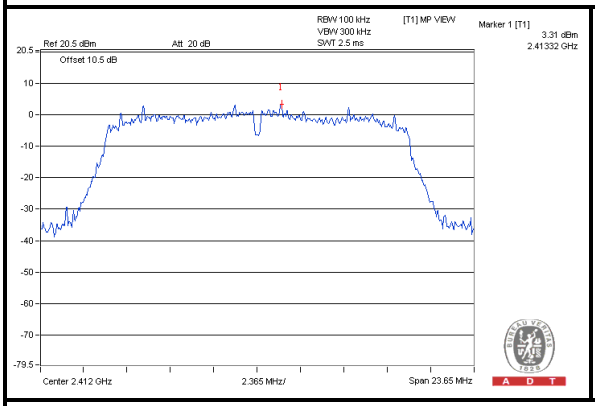
CH 11

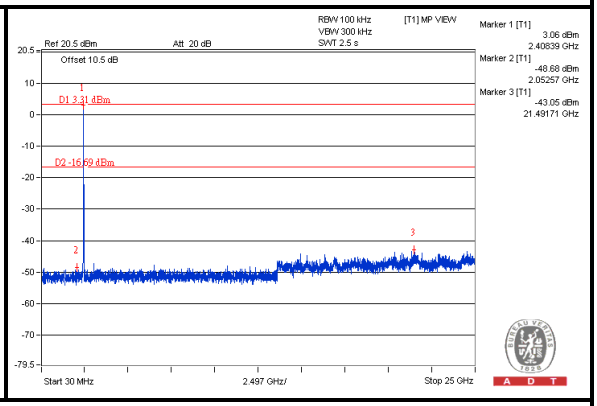




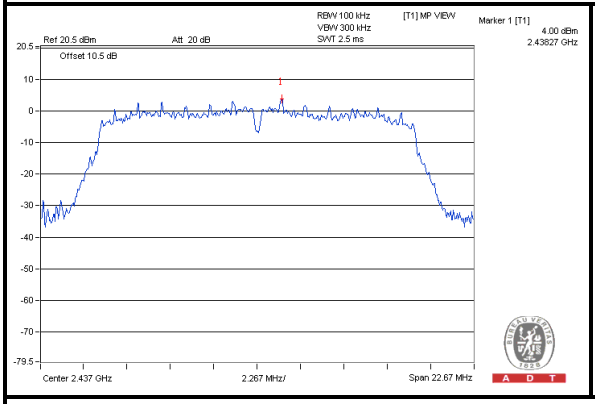
802.11g:

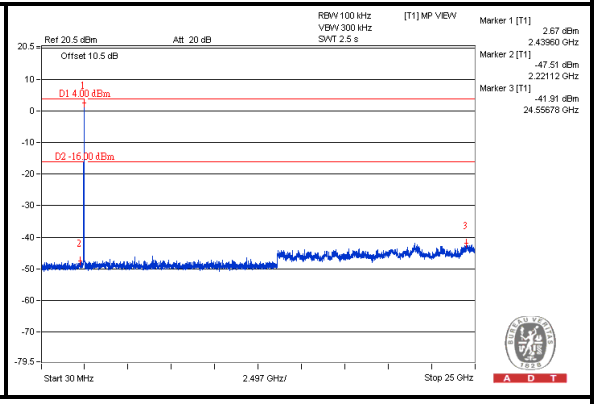
CH 1



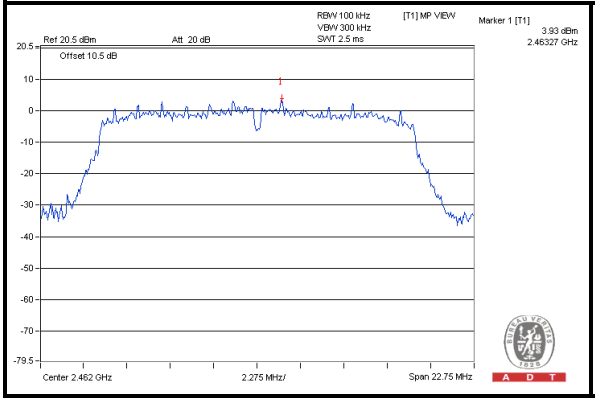


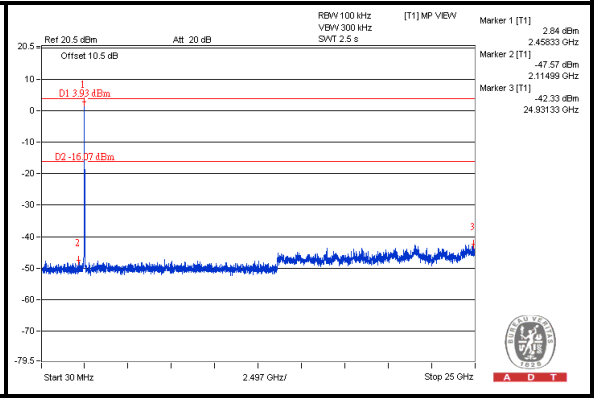
CH 6





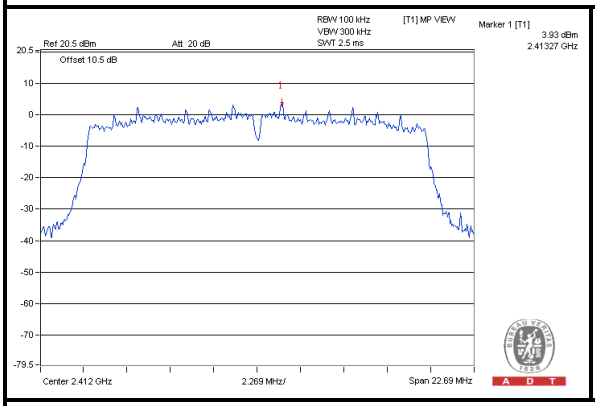
CH 11

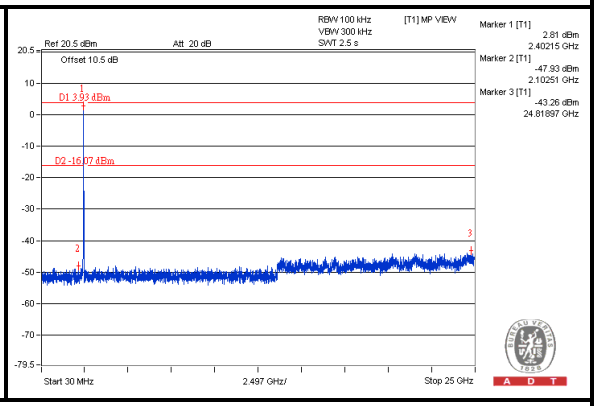




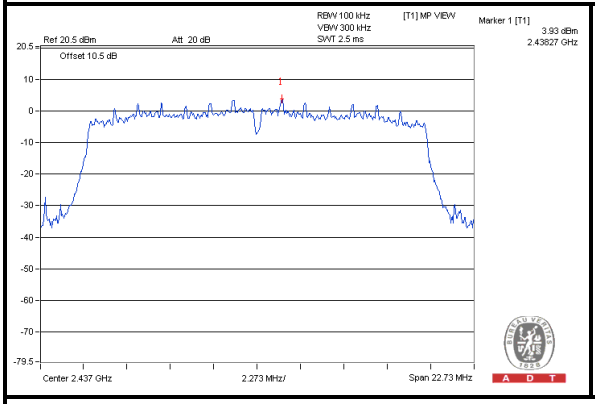
802.11n (HT20):

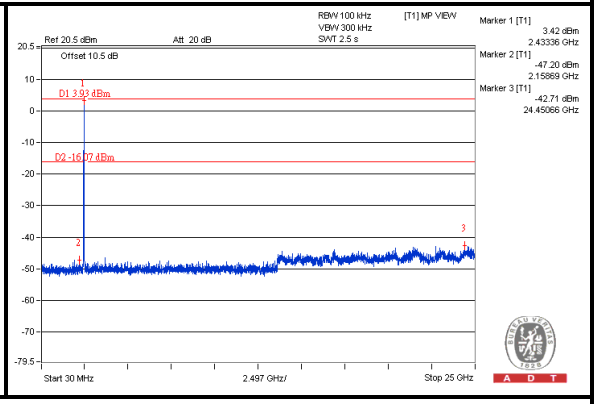
CH 1



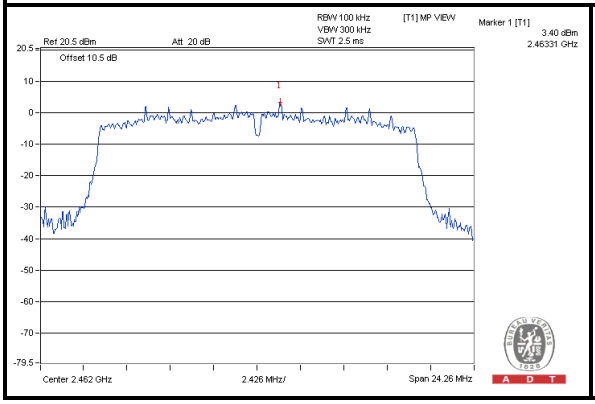


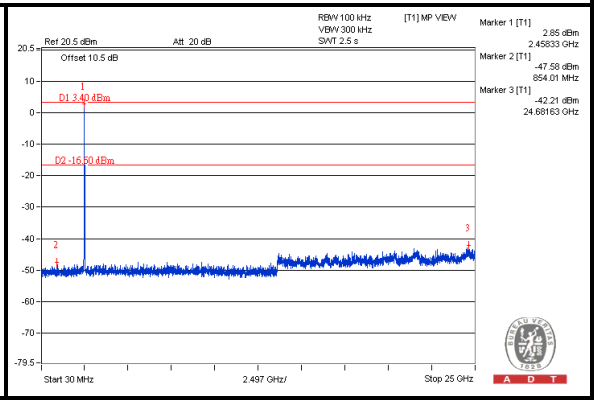
CH 6





CH 11





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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