FCC TEST REPORT (15.247)

REPORT NO.:	RF121129E05
MODEL NO.:	RE2000
FCC ID:	Q87-RE2000
RECEIVED:	Nov. 29, 2012
TESTED:	Dec. 05 to 19, 2012
ISSUED:	Jan. 17, 2013

APPLICANT:	Cisco Consumer Products LLC
ADDRESS:	121 Theory Drive Irvine, CA 92617(USA)

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121129E05	Original release	Jan. 17, 2013

1. CERTIFICATION

PRODUCT:	Wireless-N Range Extender
BRAND NAME:	Cisco
MODEL NO.:	RE2000
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Cisco Consumer Products LLC
TESTED:	Dec. 05 to 19, 2012
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: RE2000) 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:** *Jan. 17, 2013*
(Lori Chung, Specialist)

APPROVED BY : _____ , **DATE:** *Jan. 17, 2013*
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 2.4GHz, 2400~2483.5MHz Band

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 -6.56dB at 0.47031MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.6dB at 2384.00MHz
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.

For 5GHz, 5725~5850MHz Band

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 -6.96dB at 0.47422MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.9dB at 11490.00MHz.
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.

NOTE: The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2.400 ~ 2.4835GHz and 5.725~5.850GHz. For the 5.15~5.25GHz RF parameters was recorded in another test report.

2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.59 dB
Radiated emissions (1GHz -6GHz)	3.84 dB
Radiated emissions (6GHz -18GHz)	4.09 dB
Radiated emissions (18GHz -40GHz)	4.24 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless-N Range Extender
MODEL NO.	RE2000
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 802.11a/g: up to 54Mbps 802.11n (20MHz, 800ns GI): up to 130Mbps 802.11n (20MHz, 400ns GI): up to 144.444Mbps 802.11n (40MHz, 800ns GI)：up to 270Mbps 802.11n (40MHz, 400ns GI)：up to 300Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz
	For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) **For 15.247 (5GHz)** 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 45.709mW 802.11n (HT20): 36.818mW 802.11n (HT40): 43.280mW **For 15.247 (2.4GHz)** 802.11b: 114.815mW 802.11g: 257.040mW 802.11n (HT20): 438.597mW 802.11n (HT40): 320.841mW **For 15.247 (5GHz)** 802.11a: 295.121mW 802.11n (HT20): 486.127mW 802.11n (HT40): 317.315mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	RJ-45 cable (Unshielded, 1.5m)
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. There are 2.4GHz and 5GHz WLAN technology used for the EUT. The test report of EUT listed as below table:

Function	Report No.
WLAN	RF121129E05 (15.247) RF121129E05-1(15.407)

2. The EUT has two colors of the housing which are identical to each other in all aspects except for the following table:

Brand	Model Name	Color	Description
Cisco	RE2000	black	For marketing requirement
		white	

3. The EUT must be supplied with an internal power supply and following two different models could be chosen as following table:

No	Brand	Model No.	Spec.
1	HON-KWANG	HK-XX06-A12	Input: 100-240V, 0.8A, 50/60Hz AC input cable (Unshielded, 1.5m) Output: 12V, 0.5A
2	solytech	UOP0612A	Input: 100-240V, 0.5A, 50/60Hz AC input cable (Unshielded, 1.5m) Output: 12V, 0.5A
From the above power supply, the conducted emission worse case was found in **power 2** and the radiated emission worse case was found in **power 1**. Therefore only the test data of the mode was recorded in this report.			

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

Transmitter Circuit	Antenna Type	Antenna Gain (dBi)	Connector	Frequency range (MHz to MHz)
Chain (0)	PIFA	4.0	NA	2400~2500
		4.0		5150~5850
Chain (1)	PIFA	2.8	NA	2400~2500
		3.8		5150~5850
For 802.11b/g/a mode will fix transmission on Chain (0).				

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

MODULATION MODE	Tx/Rx FUNCTION
802.11b	1Tx/1Rx
802.11g	1Tx/1Rx
802.11a	1Tx/1Rx
802.11n (HT20)	2Tx/2Rx
802.11n (HT40)	2Tx/2Rx

6. 2.4GHz and 5GHz technology cannot transmit at same time.

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. For more detailed product features, please refer to manufacturer's specification or user's manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 2400 ~ 2483.5MHz band:

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		

7 channels are provided for 802.11n (HT40):

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

Operated in 5725 ~ 5850MHz band:

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

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

2 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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: 1."-"means no effect.

2. The EUT had been pre-tested on the positioned of each 3 axis. For 2.4GHz: The worst case was found when positioned on X-plane ; For 5GHz: The worst case was found when positioned on X-plane (for below 1GHz) and Y-plane (for above 1GHz). .

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)
For 2.4 GHz 802.11n (HT20)	1 to 11	1	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT20)	149 to 165	149	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)
For 2.4 GHz 802.11n (HT20)	1 to 11	11	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT20)	149 to 165	149	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
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT40)	151 to 159	151, 159	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
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT40)	151 to 159	151, 159	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
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	23deg. C, 71%RH	120Vac, 60Hz	Timmy Hu
RE<1G	27deg. C, 77%RH	120Vac, 60Hz	Amos Chuang
RE≥1G	27deg. C, 69%RH	120Vac, 60Hz	Amos Chuang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Amos Chuang
OB	25deg. C, 60%RH	120Vac, 60Hz	Amos Chuang

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

662911 D01 Multiple Transmitter Output

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

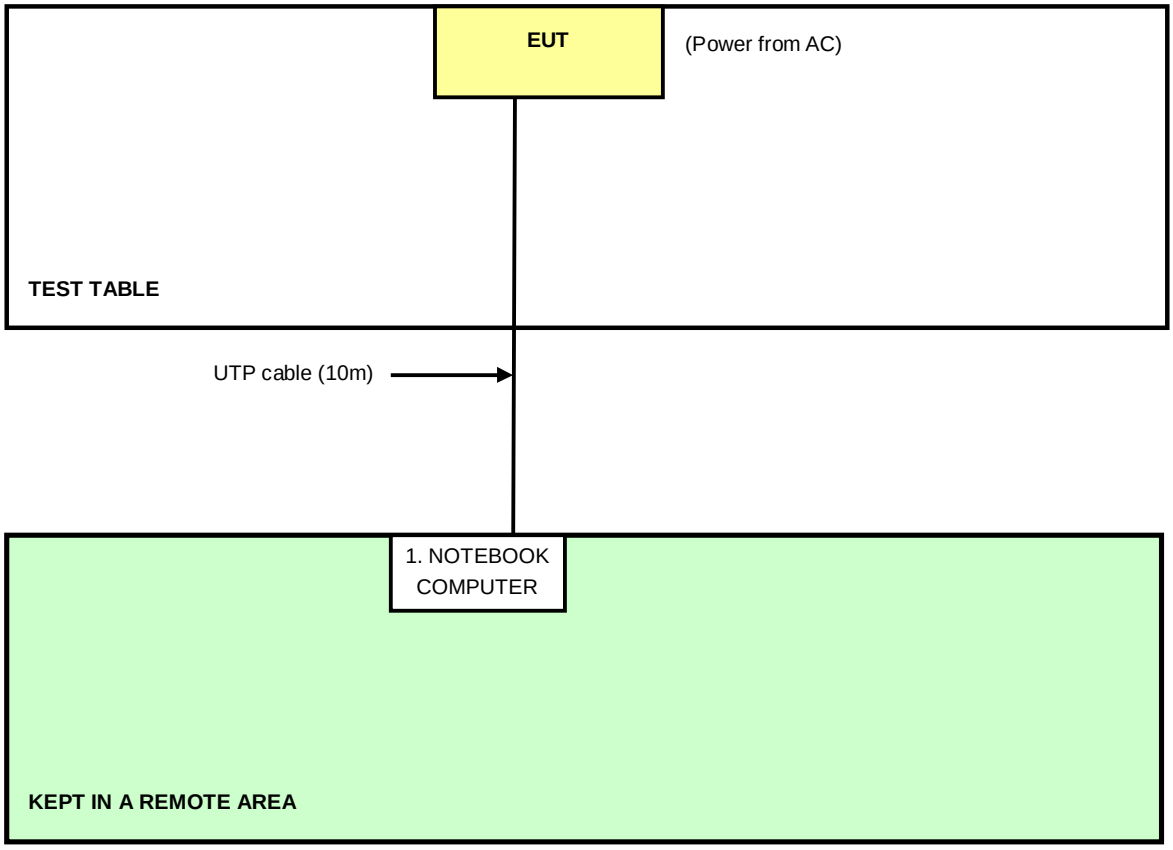
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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

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

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4.TEST TYPES AND RESULTS (FOR 2.4GHz, 2400 ~ 2483.5MHz Band)

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 12, 2012	Mar. 11, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 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	Aug. 28, 2012	Aug. 27, 2013
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: Dec. 05, 2012

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

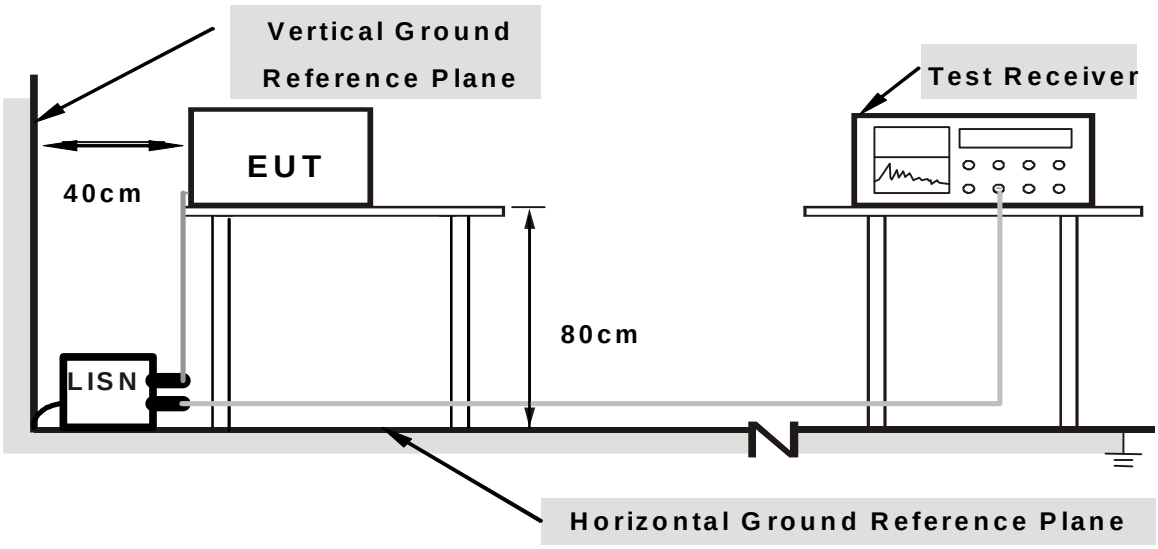
NOTE:

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

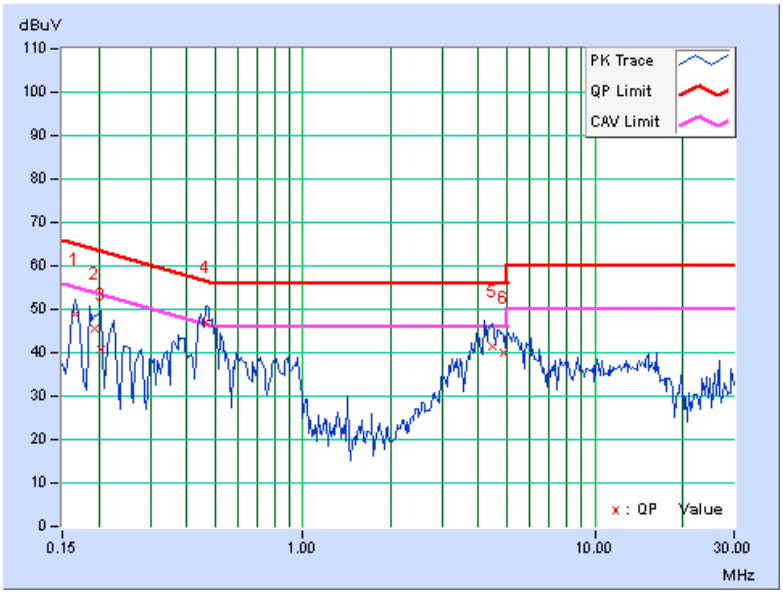
1. Turn on the power of EUT.
2. The communication partner run test program “RT5x9x V1.0.7.6 AP.rar” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

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

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.11	48.66	42.76	48.77	42.87	65.18	55.18	-16.41	-12.31
2	0.19391	0.12	45.62	38.59	45.74	38.71	63.87	53.87	-18.13	-15.16
3	0.20469	0.12	40.48	27.01	40.60	27.13	63.42	53.42	-22.82	-26.29
4	0.46641	0.16	46.89	39.02	47.05	39.18	56.58	46.58	-9.52	-7.39
5	4.47656	0.29	41.14	33.38	41.43	33.67	56.00	46.00	-14.57	-12.33
6	4.86328	0.31	39.57	30.74	39.88	31.05	56.00	46.00	-16.12	-14.95

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.

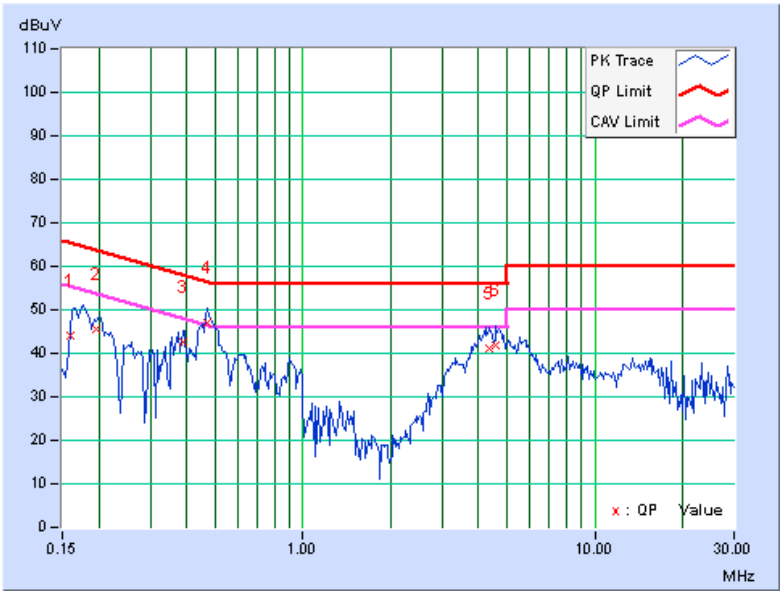


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15972	0.09	43.93	26.88	44.02	26.97	65.48	55.48	-21.46	-28.51
2	0.19497	0.10	45.46	38.82	45.56	38.92	63.82	53.82	-18.26	-14.90
3	0.38828	0.15	42.55	33.64	42.70	33.79	58.10	48.10	-15.40	-14.31
4	**0.47031**	**0.15**	**46.98**	**39.80**	**47.13**	**39.95**	**56.51**	**46.51**	**-9.38**	**-6.56**
5	4.36719	0.25	40.91	33.11	41.16	33.36	56.00	46.00	-14.84	-12.64
6	4.57422	0.26	41.42	33.12	41.68	33.38	56.00	46.00	-14.32	-12.62

REMARKS:

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



4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. 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
Pre-Selector Agilent	N9039A	MY46520310	Sep. 03, 2012	Sep. 02, 2013
Signal Generator Agilent	N5181A	MY49060347	July 24, 2012	July 23, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
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. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated_V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Dec. 11 to 19, 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 a 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

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

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

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

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

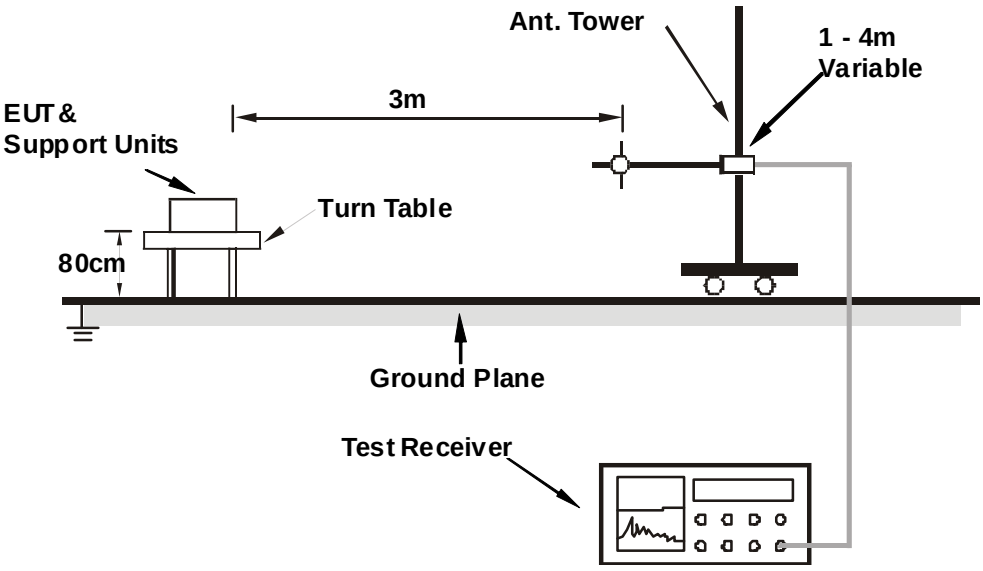
NOTE:

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

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	51.08	35.1 QP	40.0	-4.9	2.00 H	277	21.26	13.82
2	108.75	34.2 QP	43.5	-9.4	1.50 H	96	23.30	10.85
3	159.67	35.9 QP	43.5	-7.6	1.50 H	80	21.62	14.29
4	250.03	35.3 QP	46.0	-10.7	1.00 H	290	21.96	13.30
5	500.02	37.7 QP	46.0	-8.3	1.50 H	321	17.64	20.10
6	933.33	34.3 QP	46.0	-11.7	2.00 H	308	6.58	27.69
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	109.51	38.3 QP	43.5	-5.2	1.16 V	170	27.31	10.95
2	375.00	31.2 QP	46.0	-14.8	1.03 V	93	14.06	17.15
3	500.00	36.9 QP	46.0	-9.1	1.04 V	237	16.81	20.10
4	583.10	33.8 QP	46.0	-12.2	1.31 V	202	11.94	21.89
5	700.00	34.2 QP	46.0	-11.8	1.32 V	103	10.48	23.71
6	933.90	34.8 QP	46.0	-11.2	1.03 V	299	7.07	27.70

REMARKS:

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

ABOVE 1GHz DATA

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	2356.00	59.9 PK	74.0	-14.1	1.07 H	300	28.05	31.85
2	2356.00	49.4 AV	54.0	-4.6	1.07 H	300	17.55	31.85
3	*2412.00	109.3 PK			1.07 H	300	77.25	32.05
4	*2412.00	107.1 AV			1.07 H	300	75.05	32.05
5	4824.00	55.9 PK	74.0	-18.1	1.50 H	246	16.32	39.58
6	4824.00	52.9 AV	54.0	-1.1	1.50 H	246	13.32	39.58
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	59.9 PK	74.0	-14.1	1.00 V	317	27.92	31.98
2	2390.00	45.7 AV	54.0	-8.3	1.00 V	317	13.72	31.98
3	*2412.00	103.7 PK			1.67 V	20	71.65	32.05
4	*2412.00	101.1 AV			1.67 V	20	69.05	32.05
5	4824.00	54.6 PK	74.0	-19.4	1.01 V	96	15.02	39.58
6	4824.00	50.5 AV	54.0	-3.5	1.01 V	96	10.92	39.58

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	*2437.00	109.2 PK			1.03 H	310	77.08	32.12
2	*2437.00	106.5 AV			1.03 H	310	74.38	32.12
3	4874.00	56.6 PK	74.0	-17.4	1.50 H	252	16.90	39.70
4	4874.00	53.1 AV	54.0	-0.9	1.50 H	252	13.40	39.70
5	7311.00	56.3 PK	74.0	-17.7	1.35 H	42	8.71	47.59
6	7311.00	43.7 AV	54.0	-10.3	1.35 H	42	-3.89	47.59
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	*2437.00	103.1 PK			1.69 V	18	70.98	32.12
2	*2437.00	100.4 AV			1.69 V	18	68.28	32.12
3	4874.00	54.3 PK	74.0	-19.7	1.00 V	193	14.60	39.70
4	4874.00	50.4 AV	54.0	-3.6	1.00 V	193	10.70	39.70
5	7311.00	56.8 PK	74.0	-17.2	1.21 V	211	9.21	47.59
6	7311.00	43.5 AV	54.0	-10.5	1.21 V	211	-4.09	47.59

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	109.4 PK			1.05 H	303	77.22	32.18
2	*2462.00	107.2 AV			1.05 H	303	75.02	32.18
3	2483.50	61.1 PK	74.0	-12.9	1.05 H	303	28.86	32.24
4	2483.50	51.6 AV	54.0	-2.4	1.05 H	303	19.36	32.24
5	4924.00	56.7 PK	74.0	-17.3	1.49 H	249	16.86	39.84
6	4924.00	53.1 AV	54.0	-0.9	1.49 H	249	13.26	39.84
7	7386.00	56.8 PK	74.0	-17.2	1.34 H	39	9.28	47.52
8	7386.00	43.6 AV	54.0	-10.4	1.34 H	39	-3.92	47.52
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	101.7 PK			1.71 V	35	69.52	32.18
2	*2462.00	99.4 AV			1.71 V	35	67.22	32.18
3	2483.50	57.3 PK	74.0	-16.7	1.71 V	35	25.06	32.24
4	2483.50	45.6 AV	54.0	-8.4	1.71 V	35	13.36	32.24
5	4924.00	54.1 PK	74.0	-19.9	1.00 V	194	14.26	39.84
6	4924.00	50.3 AV	54.0	-3.7	1.00 V	194	10.46	39.84
7	7386.00	56.7 PK	74.0	-17.3	1.12 V	215	9.18	47.52
8	7386.00	43.5 AV	54.0	-10.5	1.12 V	215	-4.02	47.52

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	68.8 PK	74.0	-5.2	1.08 H	300	36.82	31.98
2	2390.00	53.1 AV	54.0	-0.9	1.08 H	300	21.12	31.98
3	*2412.00	111.3 PK			1.08 H	300	79.25	32.05
4	*2412.00	100.7 AV			1.08 H	300	68.65	32.05
5	4824.00	48.1 PK	74.0	-25.9	1.51 H	249	8.52	39.58
6	4824.00	37.6 AV	54.0	-16.4	1.51 H	249	-1.98	39.58
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	62.1 PK	74.0	-11.9	1.72 V	16	30.12	31.98
2	2390.00	48.6 AV	54.0	-5.4	1.72 V	16	16.62	31.98
3	*2412.00	103.8 PK			1.72 V	16	71.75	32.05
4	*2412.00	94.5 AV			1.72 V	16	62.45	32.05
5	4824.00	47.5 PK	74.0	-26.5	1.00 V	201	7.92	39.58
6	4824.00	37.3 AV	54.0	-16.7	1.00 V	201	-2.28	39.58

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	2384.00	63.6 PK	74.0	-10.4	1.06 H	301	31.64	31.96
2	**2384.00**	**53.4 AV**	**54.0**	**-0.6**	**1.06 H**	**301**	**21.44**	**31.96**
3	*2437.00	113.2 PK			1.06 H	301	81.08	32.12
4	*2437.00	103.1 AV			1.06 H	301	70.98	32.12
5	2489.00	63.5 PK	74.0	-10.5	1.06 H	301	31.25	32.25
6	2489.00	53.2 AV	54.0	-0.8	1.06 H	301	20.95	32.25
7	4874.00	47.9 PK	74.0	-26.1	1.50 H	253	8.20	39.70
8	4874.00	37.9 AV	54.0	-16.1	1.50 H	253	-1.80	39.70
9	7311.00	55.9 PK	74.0	-18.1	1.35 H	40	8.31	47.59
10	7311.00	44.2 AV	54.0	-9.8	1.35 H	40	-3.39	47.59
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	2384.00	57.9 PK	74.0	-16.1	1.69 V	15	25.94	31.96
2	2384.00	47.8 AV	54.0	-6.2	1.69 V	15	15.84	31.96
3	*2437.00	105.2 PK			1.69 V	15	73.08	32.12
4	*2437.00	95.6 AV			1.69 V	15	63.48	32.12
5	2489.00	58.4 PK	74.0	-15.6	1.69 V	15	26.15	32.25
6	2489.00	45.9 AV	54.0	-8.1	1.69 V	15	13.65	32.25
7	4874.00	47.7 PK	74.0	-26.3	1.00 V	203	8.00	39.70
8	4874.00	36.9 AV	54.0	-17.1	1.00 V	203	-2.80	39.70
9	7311.00	55.8 PK	74.0	-18.2	1.15 V	219	8.21	47.59
10	7311.00	44.1 AV	54.0	-9.9	1.15 V	219	-3.49	47.59

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	109.7 PK			1.04 H	302	77.52	32.18
2	*2462.00	99.5 AV			1.04 H	302	67.32	32.18
3	2483.50	68.4 PK	74.0	-5.6	1.04 H	302	36.16	32.24
4	2483.50	52.7 AV	54.0	-1.3	1.04 H	302	20.46	32.24
5	4924.00	47.1 PK	74.0	-26.9	1.51 H	251	7.26	39.84
6	4924.00	37.3 AV	54.0	-16.7	1.51 H	251	-2.54	39.84
7	7386.00	55.6 PK	74.0	-18.4	1.36 H	41	8.08	47.52
8	7386.00	44.6 AV	54.0	-9.4	1.36 H	41	-2.92	47.52
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	101.7 PK			1.70 V	18	69.52	32.18
2	*2462.00	91.3 AV			1.70 V	18	59.12	32.18
3	2483.50	60.5 PK	74.0	-13.5	1.70 V	18	28.26	32.24
4	2483.50	47.3 AV	54.0	-6.7	1.70 V	18	15.06	32.24
5	4924.00	46.9 PK	74.0	-27.1	1.00 V	196	7.06	39.84
6	4924.00	36.1 AV	54.0	-17.9	1.00 V	196	-3.74	39.84
7	7386.00	55.7 PK	74.0	-18.3	1.13 V	221	8.18	47.52
8	7386.00	44.3 AV	54.0	-9.7	1.13 V	221	-3.22	47.52

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 (HT20)

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	70.1 PK	74.0	-3.9	1.33 H	304	38.12	31.98
2	2390.00	53.3 AV	54.0	-0.7	1.33 H	304	21.32	31.98
3	*2412.00	110.8 PK			1.33 H	304	78.75	32.05
4	*2412.00	100.8 AV			1.33 H	304	68.75	32.05
5	4824.00	51.3 PK	74.0	-22.7	1.53 H	215	11.72	39.58
6	4824.00	38.5 AV	54.0	-15.5	1.53 H	215	-1.08	39.58
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	60.5 PK	74.0	-13.5	1.35 V	333	28.52	31.98
2	2390.00	47.8 AV	54.0	-6.2	1.35 V	333	15.82	31.98
3	*2412.00	103.4 PK			1.35 V	333	71.35	32.05
4	*2412.00	92.6 AV			1.35 V	333	60.55	32.05
5	4824.00	50.4 PK	74.0	-23.6	1.00 V	124	10.82	39.58
6	4824.00	37.3 AV	54.0	-16.7	1.00 V	124	-2.28	39.58

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	2385.00	64.6 PK	74.0	-9.4	1.34 H	302	32.64	31.96
2	2385.00	53.1 AV	54.0	-0.9	1.34 H	302	21.14	31.96
3	*2437.00	110.8 PK			1.33 H	303	78.68	32.12
4	*2437.00	100.6 AV			1.33 H	303	68.48	32.12
5	2488.00	61.3 PK	74.0	-12.7	1.34 H	302	29.05	32.25
6	2488.00	51.2 AV	54.0	-2.8	1.34 H	302	18.95	32.25
7	4874.00	51.6 PK	74.0	-22.4	1.56 H	214	11.90	39.70
8	4874.00	38.9 AV	54.0	-15.1	1.56 H	214	-0.80	39.70
9	7311.00	54.8 PK	74.0	-19.2	1.09 H	312	7.21	47.59
10	7311.00	43.7 AV	54.0	-10.3	1.09 H	312	-3.89	47.59
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	2385.00	57.8 PK	74.0	-16.2	1.33 V	331	25.84	31.96
2	2385.00	47.9 AV	54.0	-6.1	1.33 V	331	15.94	31.96
3	*2437.00	103.6 PK			1.33 V	331	71.48	32.12
4	*2437.00	92.8 AV			1.33 V	331	60.65	32.12
5	2488.00	58.3 PK	74.0	-15.7	1.33 V	331	26.05	32.25
6	2488.00	45.6 AV	54.0	-8.4	1.33 V	331	13.35	32.25
7	4874.00	50.9 PK	74.0	-23.1	1.00 V	125	11.20	39.70
8	4874.00	38.1 AV	54.0	-15.9	1.00 V	125	-1.60	39.70
9	7311.00	55.8 PK	74.0	-18.2	1.21 V	56	8.21	47.59
10	7311.00	43.8 AV	54.0	-10.2	1.21 V	56	-3.79	47.59

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	109.9 PK			1.30 H	301	77.72	32.18
2	*2462.00	99.7 AV			1.30 H	301	67.52	32.18
3	2483.50	70.3 PK	74.0	-3.7	1.30 H	301	38.06	32.24
4	2483.50	52.9 AV	54.0	-1.1	1.30 H	301	20.66	32.24
5	4924.00	50.9 PK	74.0	-23.1	1.55 H	213	11.06	39.84
6	4924.00	38.1 AV	54.0	-15.9	1.55 H	213	-1.74	39.84
7	7386.00	54.6 PK	74.0	-19.4	1.09 H	313	7.08	47.52
8	7386.00	43.5 AV	54.0	-10.5	1.09 H	313	-4.02	47.52
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	102.5 PK			1.35 V	332	70.32	32.18
2	*2462.00	91.3 AV			1.35 V	332	59.12	32.18
3	2483.50	60.3 PK	74.0	-13.7	1.35 V	332	28.06	32.24
4	2483.50	47.5 AV	54.0	-6.5	1.35 V	332	15.26	32.24
5	4924.00	50.6 PK	74.0	-23.4	1.00 V	123	10.76	39.84
6	4924.00	37.4 AV	54.0	-16.6	1.00 V	123	-2.44	39.84
7	7386.00	55.9 PK	74.0	-18.1	1.21 V	62	8.38	47.52
8	7386.00	43.9 AV	54.0	-10.1	1.21 V	62	-3.62	47.52

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 (HT40)

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	68.8 PK	74.0	-5.2	1.32 H	301	36.82	31.98
2	2390.00	52.8 AV	54.0	-1.2	1.32 H	301	20.82	31.98
3	*2422.00	105.8 PK			1.32 H	301	73.72	32.08
4	*2422.00	94.8 AV			1.32 H	301	62.72	32.08
5	4844.00	50.1 PK	74.0	-23.9	1.00 H	16	10.47	39.63
6	4844.00	38.3 AV	54.0	-15.7	1.00 H	16	-1.33	39.63
7	7266.00	55.8 PK	74.0	-18.2	1.00 H	254	8.20	47.60
8	7266.00	44.2 AV	54.0	-9.8	1.00 H	254	-3.40	47.60
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	61.3 PK	74.0	-12.7	1.33 V	143	29.32	31.98
2	2390.00	46.9 AV	54.0	-7.1	1.33 V	143	14.92	31.98
3	*2422.00	97.5 PK			1.33 V	143	65.42	32.08
4	*2422.00	86.4 AV			1.33 V	143	54.32	32.08
5	4844.00	49.3 PK	74.0	-24.7	1.00 V	53	9.67	39.63
6	4844.00	37.3 AV	54.0	-16.7	1.00 V	53	-2.33	39.63
7	7266.00	55.7 PK	74.0	-18.3	1.00 V	161	8.10	47.60
8	7266.00	44.2 AV	54.0	-9.8	1.00 V	161	-3.40	47.60

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
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	65.9 PK	74.0	-8.1	1.31 H	300	33.92	31.98
2	2390.00	53.1 AV	54.0	-0.9	1.31 H	300	21.12	31.98
3	*2437.00	107.7 PK			1.31 H	300	75.58	32.12
4	*2437.00	97.8 AV			1.31 H	300	65.68	32.12
5	2483.50	67.6 PK	74.0	-6.4	1.31 H	300	35.36	32.24
6	2483.50	52.6 AV	54.0	-1.4	1.31 H	300	20.36	32.24
7	4874.00	51.3 PK	74.0	-22.7	1.00 H	15	11.60	39.70
8	4874.00	39.6 AV	54.0	-14.4	1.00 H	15	-0.10	39.70
9	7311.00	55.5 PK	74.0	-18.5	1.00 H	251	7.91	47.59
10	7311.00	44.3 AV	54.0	-9.7	1.00 H	251	-3.29	47.59
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	1.33 V	145	26.32	31.98
2	2390.00	47.4 AV	54.0	-6.6	1.33 V	145	15.42	31.98
3	*2437.00	100.6 PK			1.33 V	145	68.48	32.12
4	*2437.00	89.5 AV			1.33 V	145	57.38	32.12
5	2483.50	62.9 PK	74.0	-11.1	1.33 V	145	30.66	32.24
6	2483.50	47.8 AV	54.0	-6.2	1.33 V	145	15.56	32.24
7	4874.00	50.2 PK	74.0	-23.8	1.00 V	55	10.50	39.70
8	4874.00	38.6 AV	54.0	-15.4	1.00 V	55	-1.10	39.70
9	7311.00	55.9 PK	74.0	-18.1	1.00 V	163	8.31	47.59
10	7311.00	44.3 AV	54.0	-9.7	1.00 V	163	-3.29	47.59

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	104.5 PK			1.30 H	303	72.34	32.16
2	*2452.00	94.3 AV			1.30 H	303	62.14	32.16
3	2483.50	70.2 PK	74.0	-3.8	1.30 H	303	37.96	32.24
4	2483.50	52.6 AV	54.0	-1.4	1.30 H	303	20.36	32.24
5	4904.00	50.6 PK	74.0	-23.4	1.00 H	12	10.83	39.77
6	4904.00	38.6 AV	54.0	-15.4	1.00 H	12	-1.17	39.77
7	7356.00	55.6 PK	74.0	-18.4	1.00 H	253	8.05	47.55
8	7356.00	44.4 AV	54.0	-9.6	1.00 H	253	-3.15	47.55
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	97.8 PK			1.35 V	146	65.64	32.16
2	*2452.00	86.6 AV			1.35 V	146	54.44	32.16
3	2483.50	61.5 PK	74.0	-12.5	1.35 V	146	29.26	32.24
4	2483.50	46.7 AV	54.0	-7.3	1.35 V	146	14.46	32.24
5	4904.00	49.6 PK	74.0	-24.4	1.00 V	56	9.83	39.77
6	4904.00	37.6 AV	54.0	-16.4	1.00 V	56	-2.17	39.77
7	7356.00	55.6 PK	74.0	-18.4	1.00 V	169	8.05	47.55
8	7356.00	44.2 AV	54.0	-9.8	1.00 V	169	-3.35	47.55

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	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 12, 2012

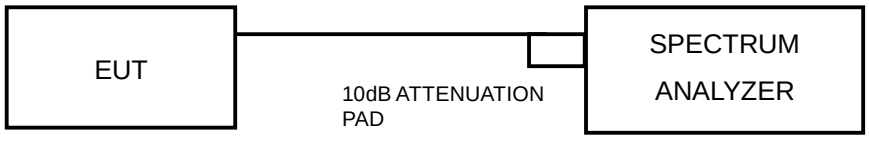
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.62	0.5	PASS
6	2437	10.21	0.5	PASS
11	2462	10.18	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.37	0.5	PASS
6	2437	16.47	0.5	PASS
11	2462	16.41	0.5	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.38	16.32	0.5	PASS
6	2437	17.26	17.00	0.5	PASS
11	2462	16.36	16.97	0.5	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	35.61	35.34	0.5	PASS
6	2437	35.35	35.31	0.5	PASS
9	2452	35.36	35.49	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)

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Peak 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 : Dec. 12, 2012

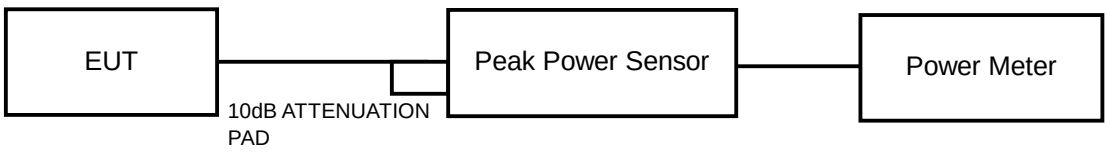
4.4.3 TEST PROCEDURES

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)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	114.815	20.60	30	PASS
6	2437	114.815	20.60	30	PASS
11	2462	95.499	19.80	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	239.883	23.80	30	PASS
6	2437	257.040	24.10	30	PASS
11	2462	181.970	22.60	30	PASS

802.11n (HT20)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	23.1	23.7	438.597	26.42	30	PASS
6	2437	23.2	23.6	438.017	26.41	30	PASS
11	2462	22.6	22.4	355.750	25.51	30	PASS

802.11n (HT40)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	19.1	20.0	181.283	22.58	30	PASS
6	2437	22.2	21.9	320.841	25.06	30	PASS
9	2452	19.4	19.6	178.297	22.51	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 12, 2012

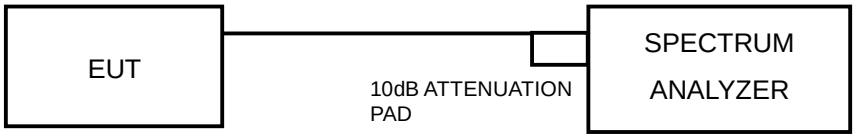
4.5.3 TEST PROCEDURE

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.

4.5.4 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

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-4.45	8	PASS
6	2437	-5.09	8	PASS
11	2462	-4.64	8	PASS

802.11g

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.86	8	PASS
6	2437	-8.79	8	PASS
11	2462	-13.08	8	PASS

802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-12.28	3.01	-9.27	7.57	PASS
	6	2437	-10.56	3.01	-7.55	7.57	PASS
	11	2462	-13.93	3.01	-10.92	7.57	PASS
1	1	2412	-7.06	3.01	-4.05	7.57	PASS
	6	2437	-7.51	3.01	-4.50	7.57	PASS
	11	2462	-8.45	3.01	-5.44	7.57	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.43dBi > 6dBi , so the power density limit shall be reduced to 8-(6.43-6) = 7.57dBm.

802.11n (HT40)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-13.77	3.01	-10.76	7.57	PASS
	6	2437	-11.06	3.01	-8.05	7.57	PASS
	9	2452	-14.32	3.01	-11.31	7.57	PASS
1	3	2422	-8.66	3.01	-5.65	7.57	PASS
	6	2437	-5.17	3.01	-2.16	7.57	PASS
	9	2452	-8.25	3.01	-5.24	7.57	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.43dBi > 6dBi , so the power density limit shall be reduced to 8-(6.43-6) = 7.57dBm.

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	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 12, 2012

4.6.3 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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 OOBE

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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP

4.6.6 EUT OPERATING CONDITION

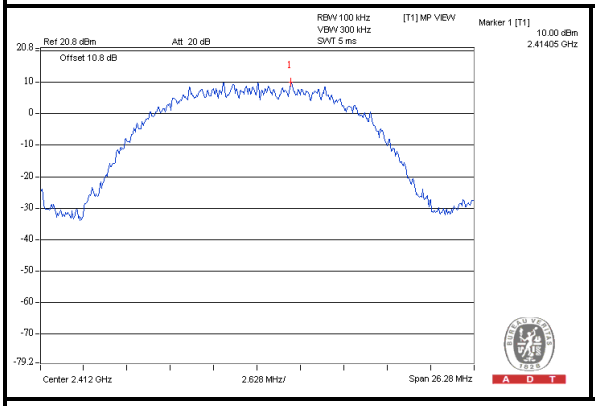
Same as Item 4.3.6

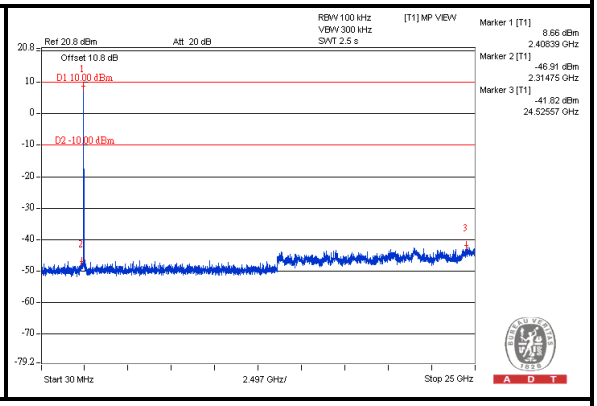
4.6.7 TEST RESULTS

The 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.

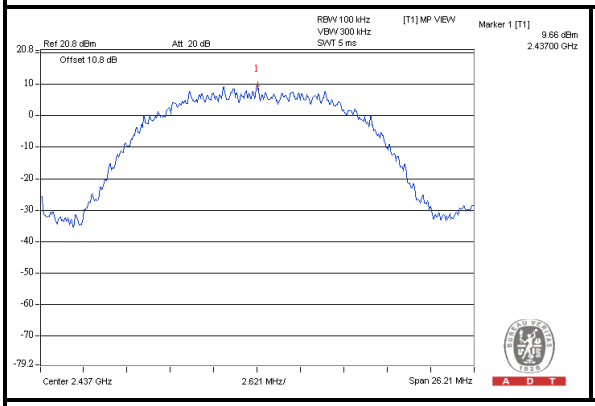
802.11b

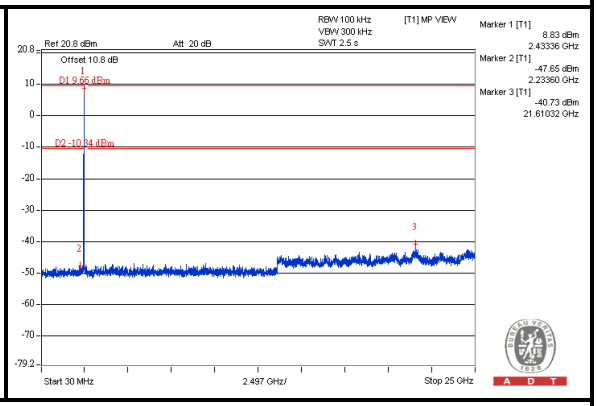
CH 1



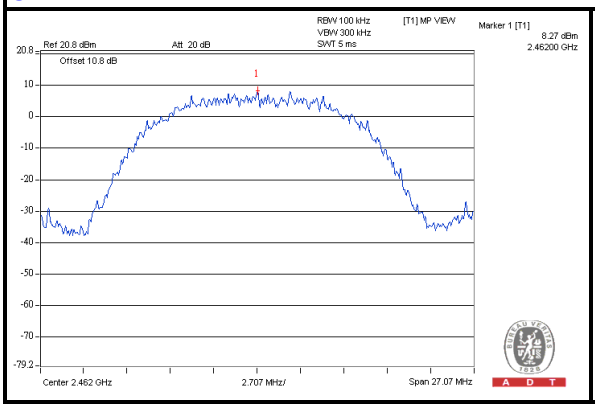


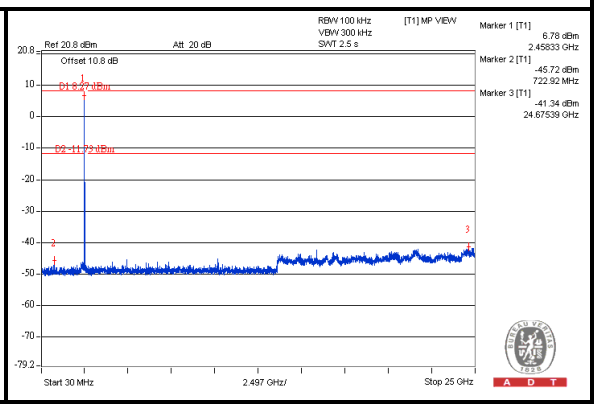
CH 6





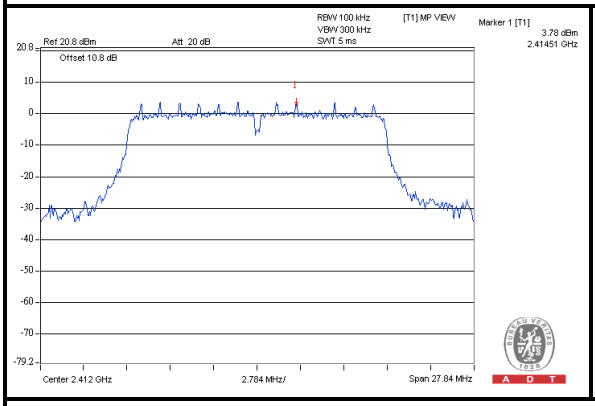
CH 11

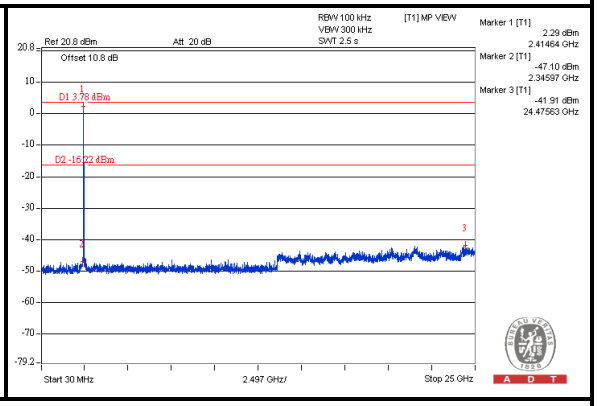




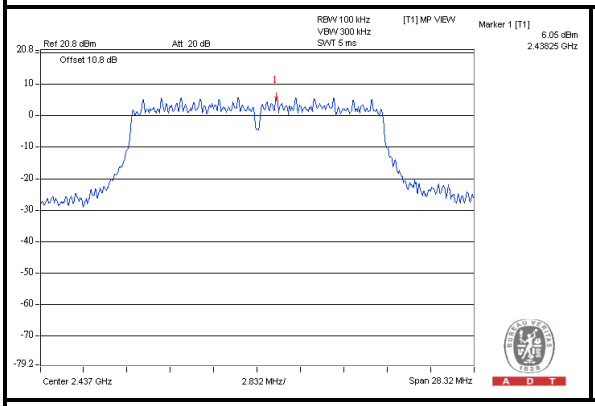
802.11g

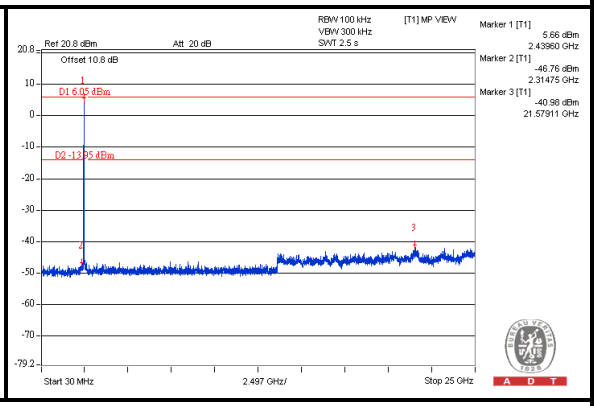
CH 1



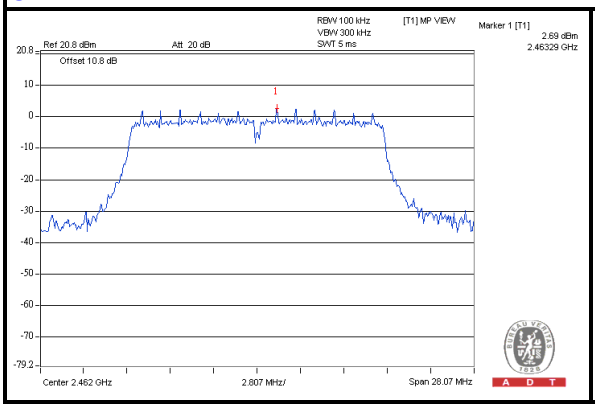


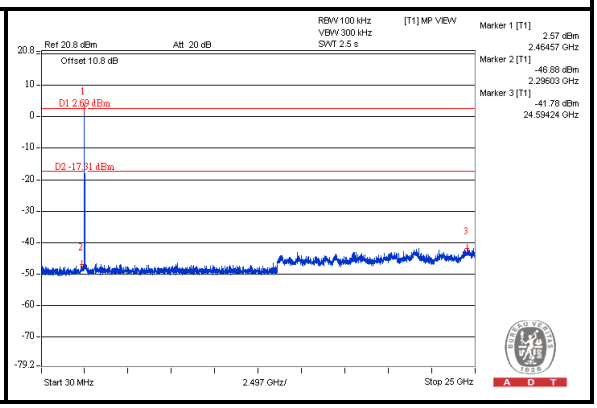
CH 6





CH 11

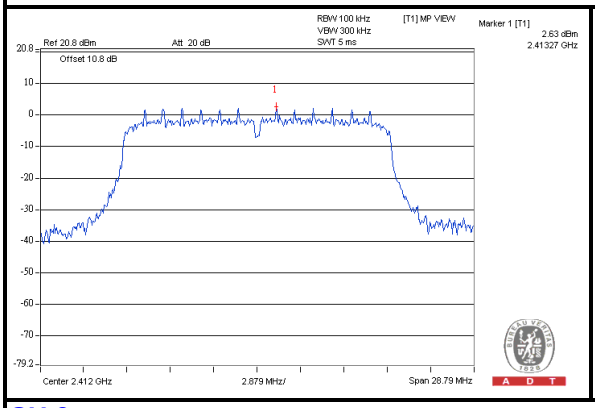


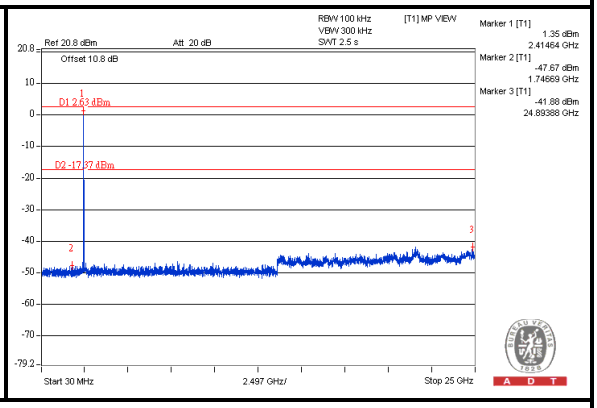


802.11n (HT20)

Chain 0

CH 1





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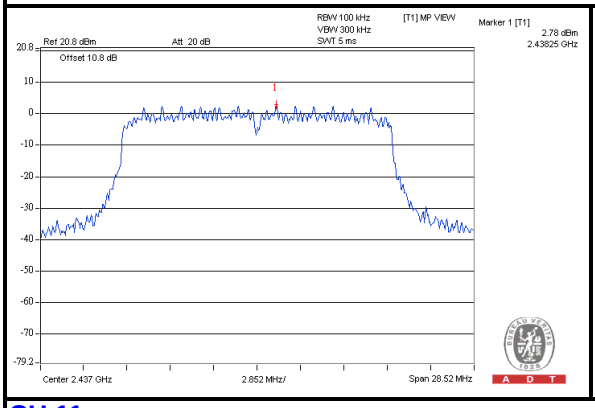

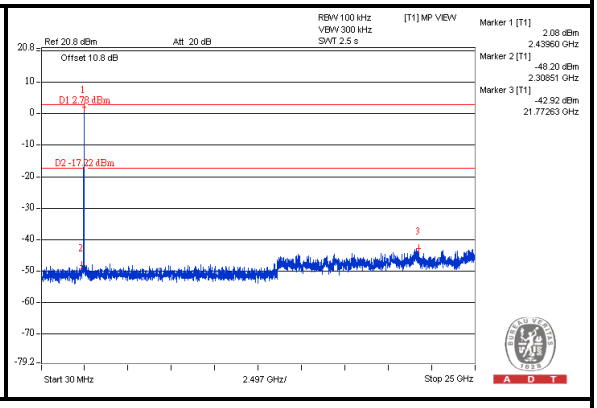

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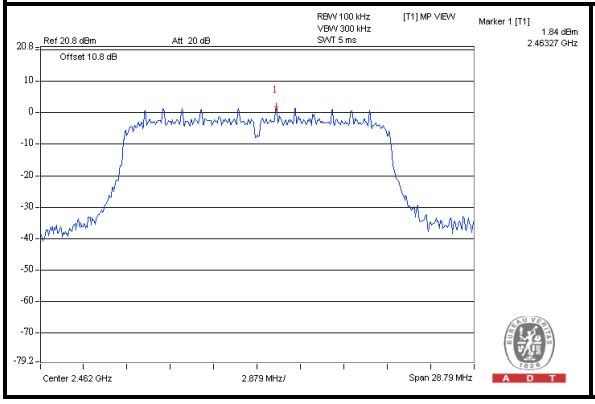
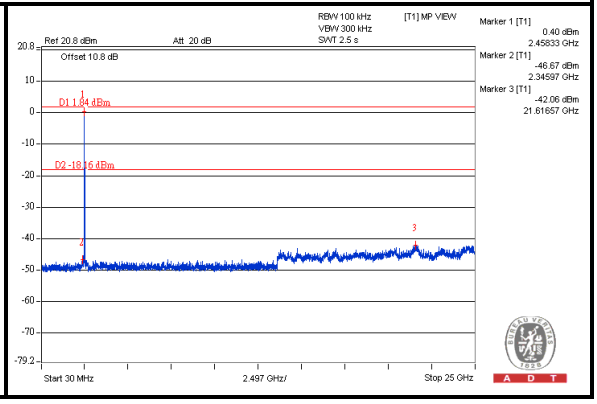
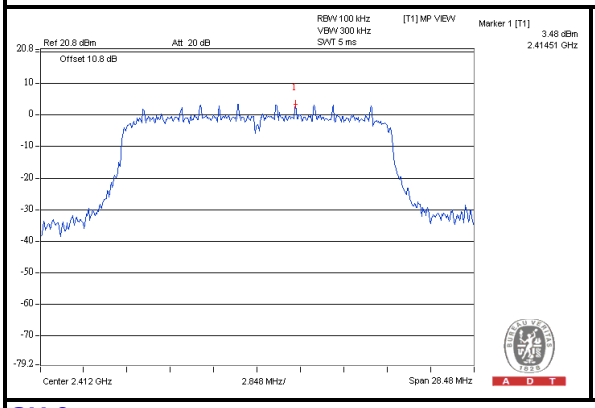
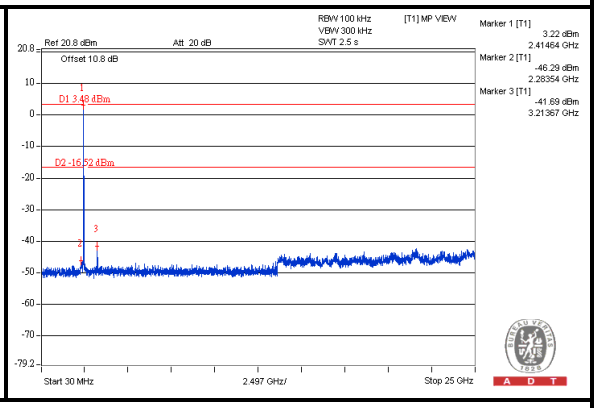




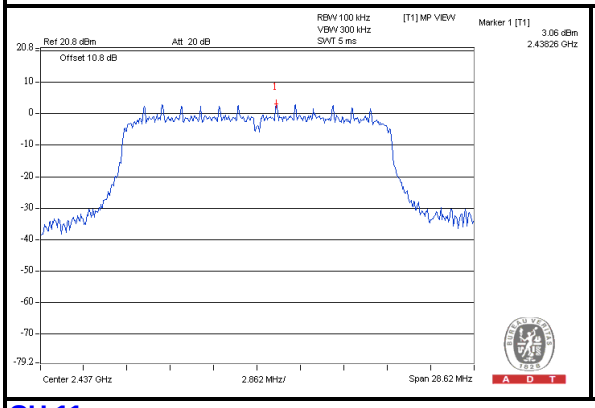
Chain 1

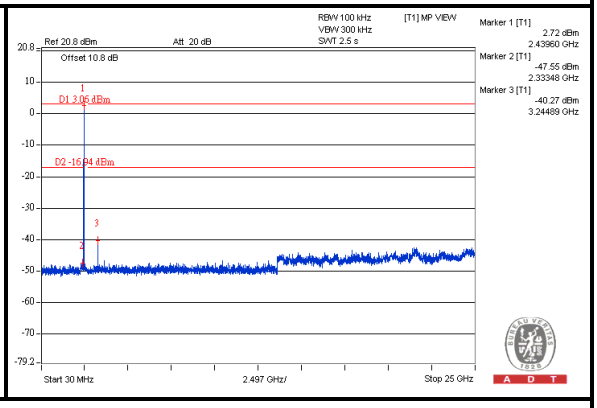
CH 1



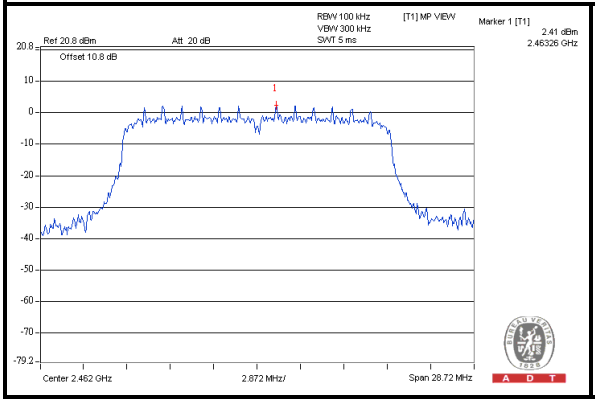


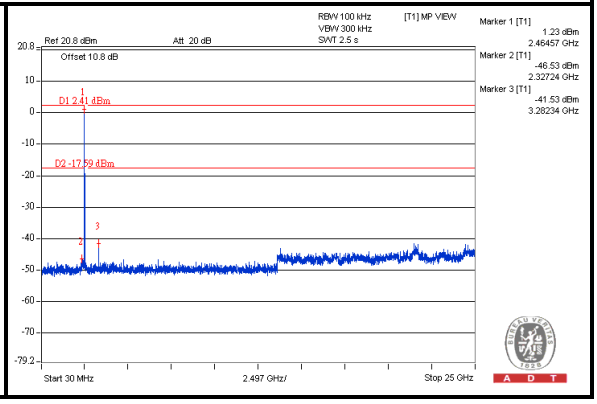
CH 6





CH 11

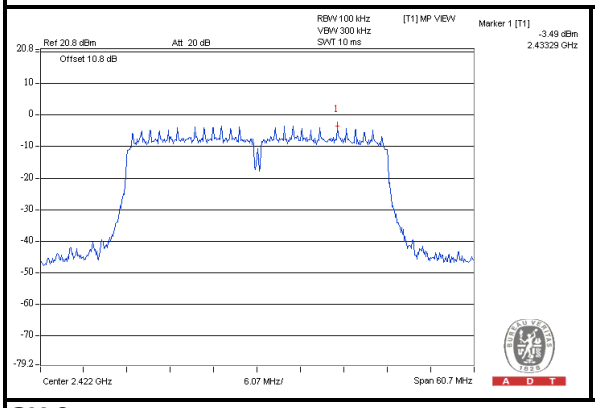


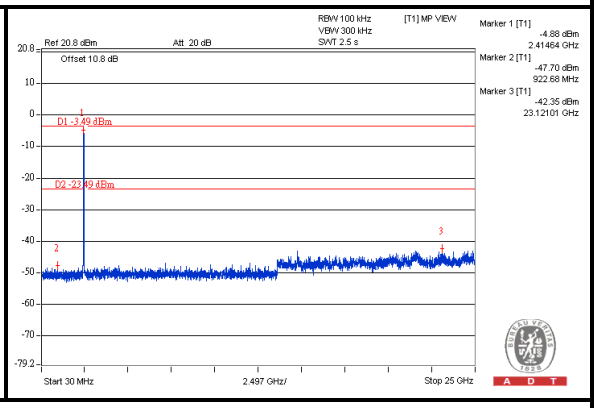


802.11n (HT40)

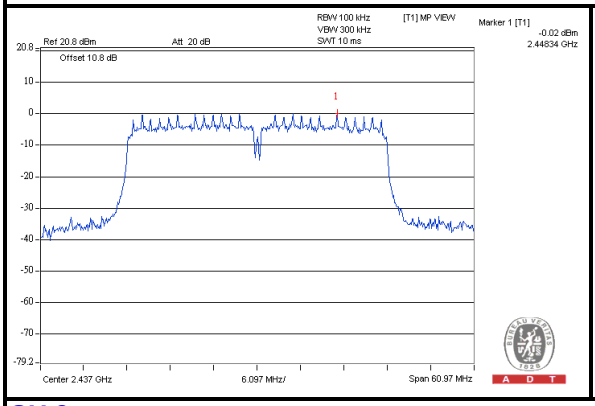
Chain 0

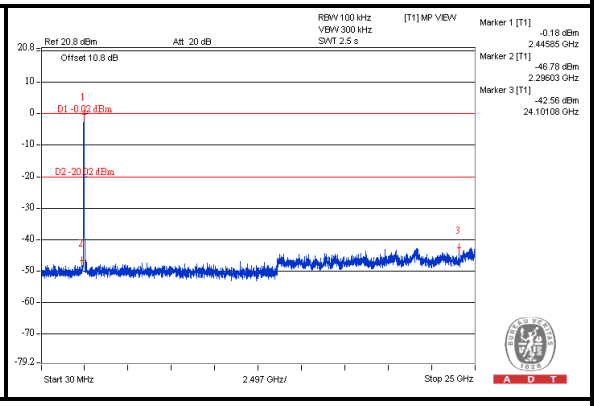
CH 3



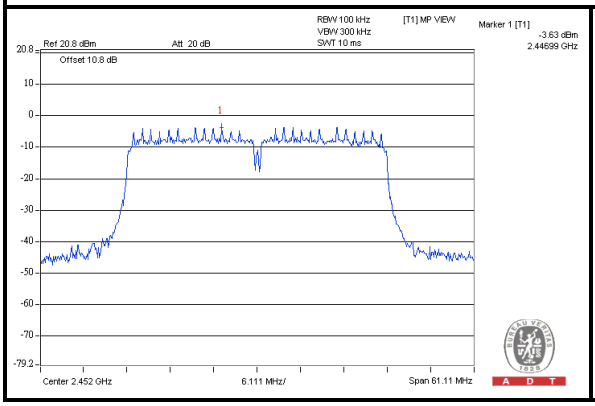


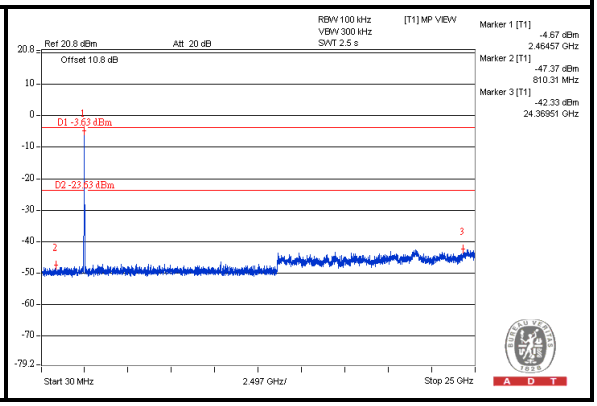
CH 6





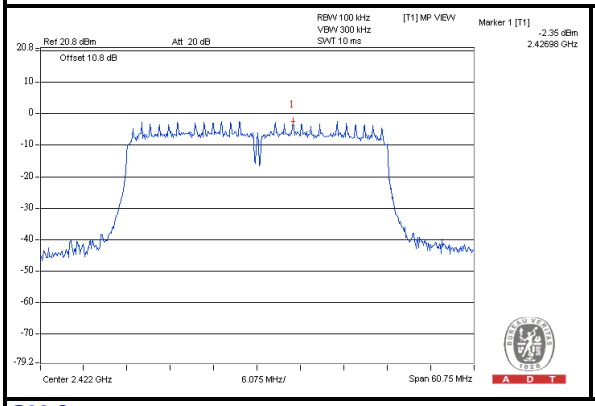
CH 9

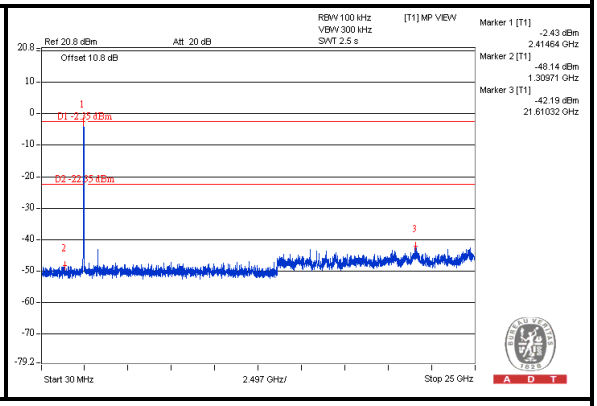




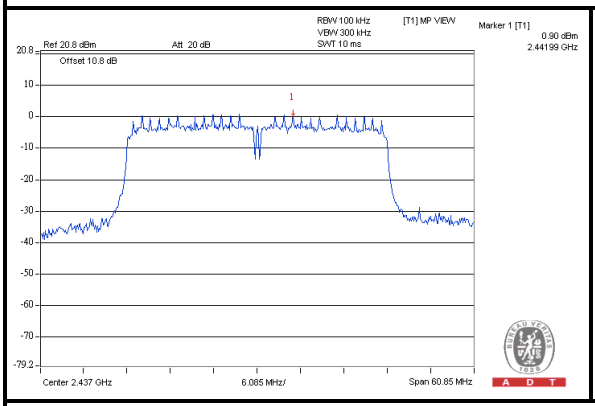
Chain 1

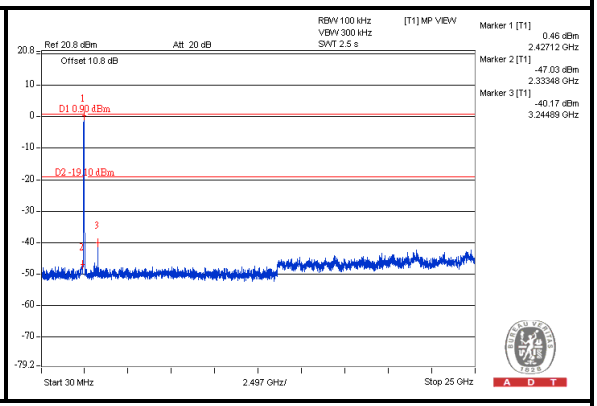
CH 3



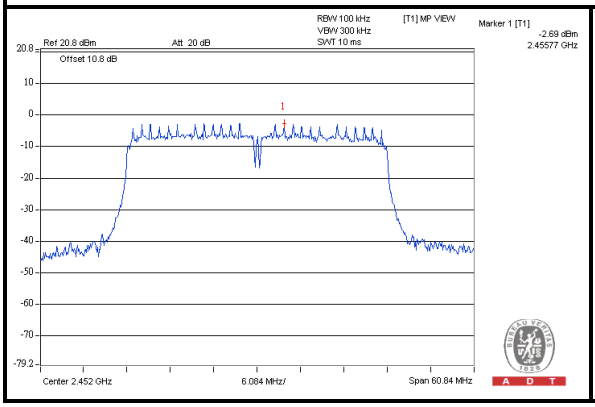


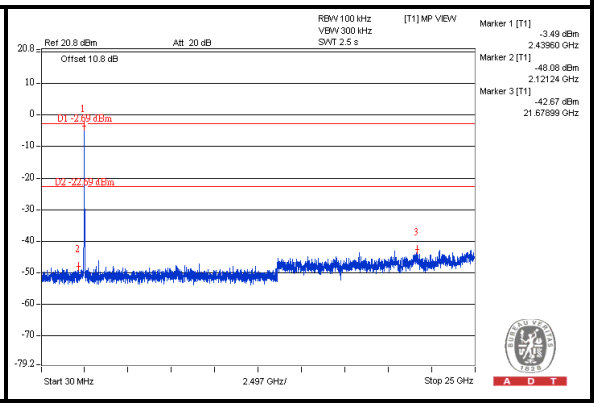
CH 6





CH 9





5. TEST TYPES AND RESULTS (FOR 5GHz, 5725~5850MHz Band)

5.1 CONDUCTED EMISSION MEASUREMENT

5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 12, 2012	Mar. 11, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 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	Aug. 28, 2012	Aug. 27, 2013
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: Dec. 05, 2012

5.1.3 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.

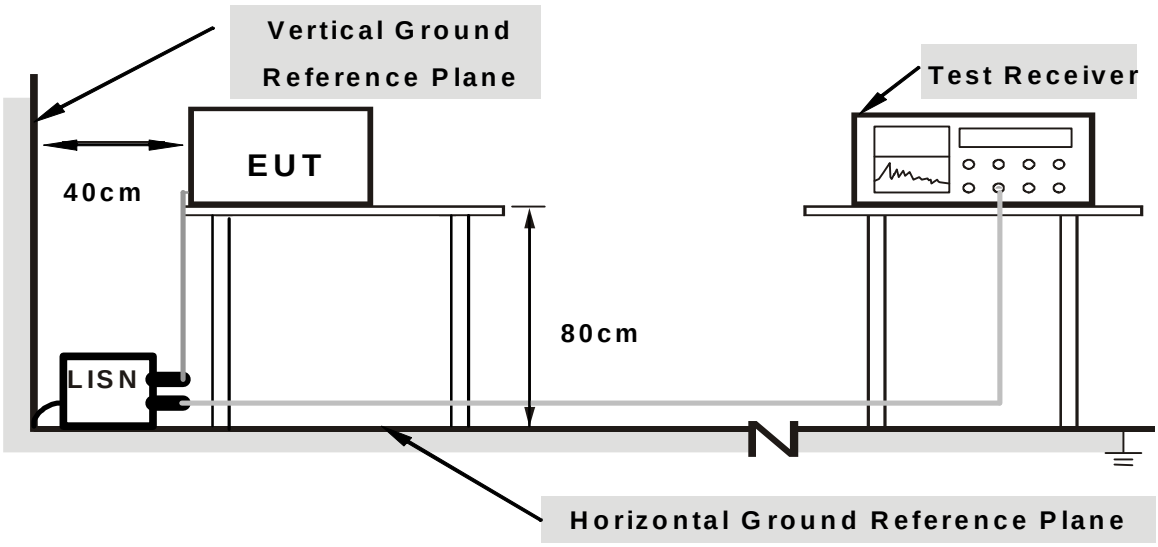
NOTE:

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

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 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.

5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

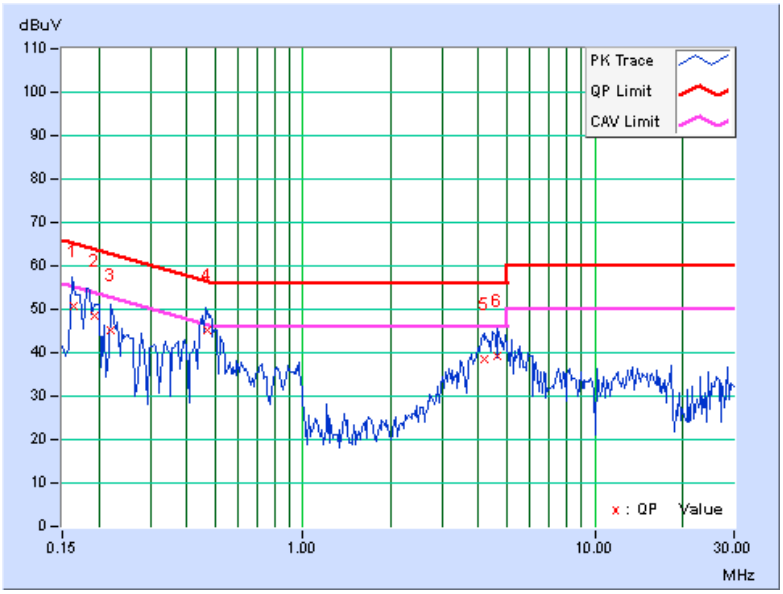
5.1.7 TEST RESULTS

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

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16384	0.11	50.49	42.80	50.60	42.91	65.27	55.27	-14.67	-12.36
2	0.19253	0.12	48.51	41.30	48.63	41.42	63.93	53.93	-15.30	-12.51
3	0.22031	0.12	45.15	37.85	45.27	37.97	62.81	52.81	-17.53	-14.83
4	0.47028	0.16	45.16	36.81	45.32	36.97	56.51	46.51	-11.19	-9.54
5	4.16406	0.28	38.37	30.27	38.65	30.55	56.00	46.00	-17.35	-15.45
6	4.64844	0.30	38.78	29.95	39.08	30.25	56.00	46.00	-16.92	-15.75

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.

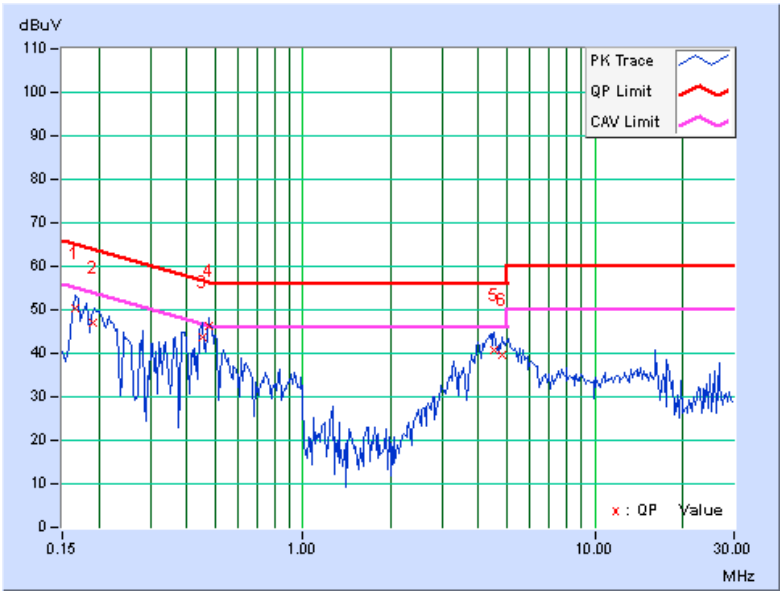


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.09	50.43	44.00	50.52	44.09	65.18	55.18	-14.66	-11.09
2	0.19087	0.10	46.91	38.94	47.01	39.04	64.00	54.00	-16.99	-14.96
3	0.45078	0.15	43.70	32.30	43.85	32.45	56.86	46.86	-13.01	-14.41
4	**0.47422**	**0.15**	**46.22**	**39.33**	**46.37**	**39.48**	**56.44**	**46.44**	**-10.07**	**-6.96**
5	4.54297	0.26	40.42	32.74	40.68	33.00	56.00	46.00	-15.32	-13.00
6	4.83594	0.27	39.34	31.48	39.61	31.75	56.00	46.00	-16.39	-14.25

REMARKS:

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



5.2 RADIATED AND BANDEDGE EMISSION MEASUREMENT

5.2.1 LIMITS OF RADIATED AND BANDEDGE EMISSION MEASUREMENT

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

5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
Pre-Selector Agilent	N9039A	MY46520310	Sep. 03, 2012	Sep. 02, 2013
Signal Generator Agilent	N5181A	MY49060347	July 24, 2012	July 23, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
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. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Dec. 11 to 19, 2012

5.2.3 TEST PROCEDURES

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

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

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

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

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

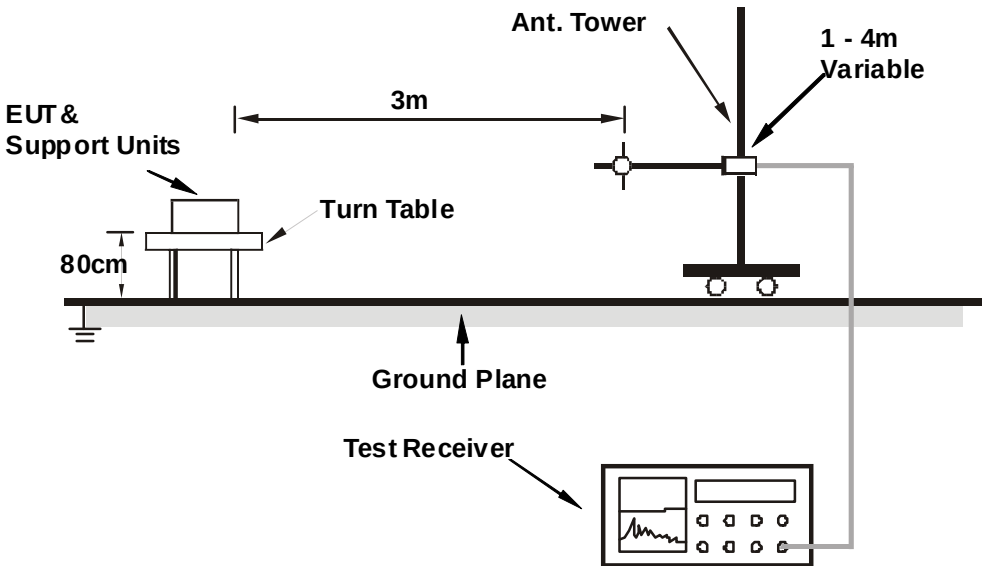
NOTE:

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

5.2.4 DEVIATION FROM TEST STANDARD

No deviation

5.2.5 TEST SETUP



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

5.2.6 EUT OPERATING CONDITIONS

Same as the 4.2.6

5.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	51.50	35.0 QP	40.0	-5.0	1.74 H	261	21.17	13.81
2	108.40	34.2 QP	43.5	-9.3	1.30 H	118	23.41	10.80
3	158.00	35.9 QP	43.5	-7.6	1.30 H	71	21.54	14.33
4	250.00	35.3 QP	46.0	-10.7	1.20 H	205	22.04	13.30
5	500.06	37.7 QP	46.0	-8.4	1.51 H	308	17.55	20.10
6	933.10	34.4 QP	46.0	-11.7	1.96 H	284	6.67	27.68
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	109.00	38.3 QP	43.5	-5.2	1.08 V	184	27.40	10.88
2	375.00	31.1 QP	46.0	-14.9	1.15 V	76	13.98	17.15
3	500.00	37.0 QP	46.0	-9.0	1.11 V	220	16.89	20.10
4	583.40	33.9 QP	46.0	-12.1	1.38 V	240	12.02	21.90
5	700.30	34.3 QP	46.0	-11.7	1.11 V	119	10.60	23.72
6	933.40	34.7 QP	46.0	-11.3	1.08 V	311	6.99	27.69

REMARKS:

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

ABOVE 1GHz DATA

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*5745.00	113.2 PK			1.11 H	349	70.83	42.37
2	*5745.00	103.4 AV			1.11 H	349	61.03	42.37
3	11490.00	64.1 PK	74.0	-9.9	1.31 H	109	15.34	48.76
4	11490.00	51.9 AV	54.0	-2.1	1.31 H	109	3.14	48.76
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	*5745.00	115.1 PK			1.11 V	285	72.73	42.37
2	*5745.00	105.5 AV			1.11 V	285	63.13	42.37
3	11490.00	64.3 PK	74.0	-9.7	1.44 V	200	15.54	48.76
4	**11490.00**	**52.1 AV**	**54.0**	**-1.9**	**1.44 V**	**200**	**3.34**	**48.76**

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	111.8 PK			1.12 H	344	69.36	42.44
2	*5785.00	102.8 AV			1.12 H	344	60.36	42.44
3	11570.00	61.2 PK	74.0	-12.8	1.00 H	123	12.49	48.71
4	11570.00	49.9 AV	54.0	-4.1	1.00 H	123	1.19	48.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	113.9 PK			1.08 V	285	71.46	42.44
2	*5785.00	103.9 AV			1.08 V	285	61.46	42.44
3	11570.00	60.8 PK	74.0	-13.2	1.01 V	349	12.09	48.71
4	11570.00	49.8 AV	54.0	-4.2	1.01 V	349	1.09	48.71

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	110.4 PK			1.10 H	350	67.83	42.57
2	*5825.00	101.1 AV			1.10 H	350	58.53	42.57
3	11650.00	62.1 PK	74.0	-11.9	1.03 H	116	13.18	48.92
4	11650.00	49.7 AV	54.0	-4.3	1.03 H	116	0.78	48.92
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	111.3 PK			1.10 V	304	68.73	42.57
2	*5825.00	102.1 AV			1.10 V	304	59.53	42.57
3	11650.00	62.5 PK	74.0	-11.5	1.35 V	200	13.58	48.92
4	11650.00	49.6 AV	54.0	-4.4	1.35 V	200	0.68	48.92

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 (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*5745.00	110.3 PK			1.00 H	357	67.93	42.37
2	*5745.00	101.3 AV			1.00 H	357	58.93	42.37
3	11490.00	61.6 PK	74.0	-12.4	1.06 H	111	12.84	48.76
4	11490.00	48.9 AV	54.0	-5.1	1.06 H	111	0.14	48.76
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	*5745.00	111.7 PK			1.09 V	283	69.33	42.37
2	*5745.00	103.4 AV			1.09 V	283	61.03	42.37
3	11490.00	58.5 PK	74.0	-15.5	1.35 V	219	9.74	48.76
4	11490.00	46.8 AV	54.0	-7.2	1.35 V	219	-1.96	48.76

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	110.4 PK			1.09 H	355	67.96	42.44
2	*5785.00	101.5 AV			1.09 H	355	59.06	42.44
3	11570.00	61.1 PK	74.0	-12.9	1.05 H	107	12.39	48.71
4	11570.00	48.6 AV	54.0	-5.4	1.05 H	107	-0.11	48.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	110.3 PK			1.09 V	285	67.86	42.44
2	*5785.00	101.4 AV			1.09 V	285	58.96	42.44
3	11570.00	58.5 PK	74.0	-15.5	1.34 V	214	9.79	48.71
4	11570.00	46.5 AV	54.0	-7.5	1.34 V	214	-2.21	48.71

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	109.5 PK			1.14 H	1	66.93	42.57
2	*5825.00	99.9 AV			1.14 H	1	57.33	42.57
3	11650.00	61.7 PK	74.0	-12.3	1.08 H	104	12.78	48.92
4	11650.00	49.3 AV	54.0	-4.7	1.08 H	104	0.38	48.92
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	109.8 PK			1.08 V	283	67.23	42.57
2	*5825.00	100.8 AV			1.08 V	283	58.23	42.57
3	11650.00	58.2 PK	74.0	-15.8	1.40 V	204	9.28	48.92
4	11650.00	46.4 AV	54.0	-7.6	1.40 V	204	-2.52	48.92

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 (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*5755.00	107.8 PK			1.00 H	1	65.41	42.39
2	*5755.00	99.6 AV			1.00 H	1	57.21	42.39
3	11510.00	59.3 PK	74.0	-14.7	1.00 H	38	10.56	48.74
4	11510.00	47.3 AV	54.0	-6.7	1.00 H	38	-1.44	48.74
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	*5755.00	109.5 PK			1.05 V	348	67.11	42.39
2	*5755.00	99.6 AV			1.05 V	348	57.21	42.39
3	11510.00	57.4 PK	74.0	-16.6	1.00 V	151	8.66	48.74
4	11510.00	46.3 AV	54.0	-7.7	1.00 V	151	-2.44	48.74

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	107.3 PK			1.00 H	354	64.85	42.45
2	*5795.00	98.5 AV			1.00 H	354	56.05	42.45
3	11590.00	59.7 PK	74.0	-14.3	1.00 H	43	11.00	48.70
4	11590.00	47.6 AV	54.0	-6.4	1.00 H	43	-1.10	48.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	107.3 PK			1.03 V	15	64.85	42.45
2	*5795.00	98.4 AV			1.03 V	15	55.95	42.45
3	11590.00	57.0 PK	74.0	-17.0	1.06 V	146	8.30	48.70
4	11590.00	46.1 AV	54.0	-7.9	1.06 V	146	-2.60	48.70

REMARKS:

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

5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 12, 2012

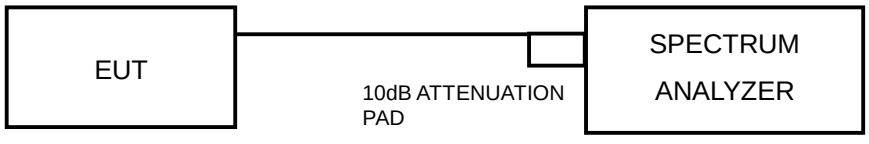
5.3.3 TEST PROCEDURE

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

5.3.4 DEVIATION FROM TEST STANDARD

No deviation

5.3.5 TEST SETUP



5.3.6 EUT OPERATING CONDITIONS

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

5.3.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.82	0.5	PASS
157	5785	15.84	0.5	PASS
165	5825	15.84	0.5	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.32	16.18	0.5	PASS
157	5785	16.08	16.32	0.5	PASS
165	5825	16.16	16.37	0.5	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	35.32	35.29	0.5	PASS
159	5795	35.32	35.31	0.5	PASS

5.4 CONDUCTED OUTPUT POWER

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

5.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Peak 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 : Dec. 12, 2012

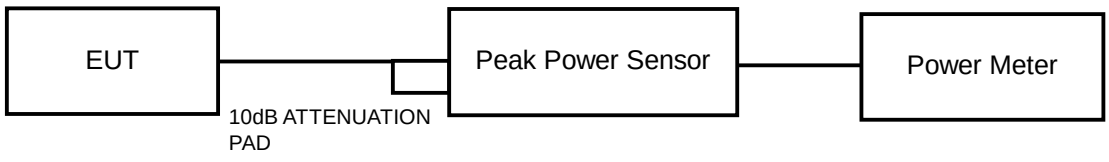
5.4.3 TEST PROCEDURES

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.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

5.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
149	5745	295.121	24.7	30	PASS
157	5785	281.838	24.5	30	PASS
165	5825	269.153	24.3	30	PASS

802.11n (HT20)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	24.1	23.6	486.127	26.87	30	PASS
157	5785	23.3	23.1	417.970	26.21	30	PASS
165	5825	23.1	22.9	399.158	26.01	30	PASS

802.11n (HT40)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	22.1	21.7	310.092	24.91	30	PASS
159	5795	22.2	21.8	317.315	25.01	30	PASS

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 12, 2012

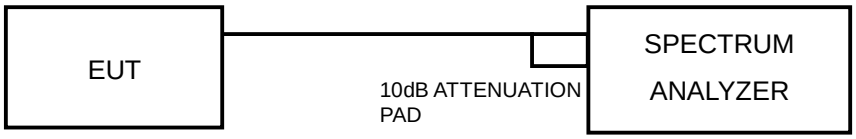
5.5.3 TEST PROCEDURE

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.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 TEST SETUP



5.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.5.7 TEST RESULTS

802.11a

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	-4.70	8	PASS
157	5785	-4.47	8	PASS
165	5825	-6.37	8	PASS

802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-7.91	3.01	-4.90	7.09	PASS
	157	5785	-9.12	3.01	-6.11	7.09	PASS
	165	5825	-9.42	3.01	-6.41	7.09	PASS
1	149	5745	-6.03	3.01	-3.02	7.09	PASS
	157	5785	-6.67	3.01	-3.66	7.09	PASS
	165	5825	-8.10	3.01	-5.09	7.09	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.91dBi > 6dBi , so the power density limit shall be reduced to 8-(6.91-6) = 7.09dBm.

802.11n (HT40)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-10.07	3.01	-7.06	7.09	PASS
	159	5795	-11.98	3.01	-8.97	7.09	PASS
1	151	5755	-6.32	3.01	-3.31	7.09	PASS
	159	5795	-7.68	3.01	-4.67	7.09	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.91dBi > 6dBi , so the power density limit shall be reduced to 8-(6.91-6) = 7.09dBm.

5.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

5.6.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 12, 2012

5.6.3 TEST PROCEDURE

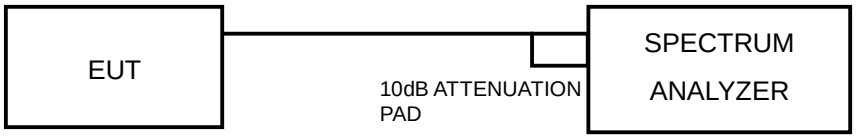
Measurement Procedure - Reference Level

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.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



5.6.6 EUT OPERATING CONDITION

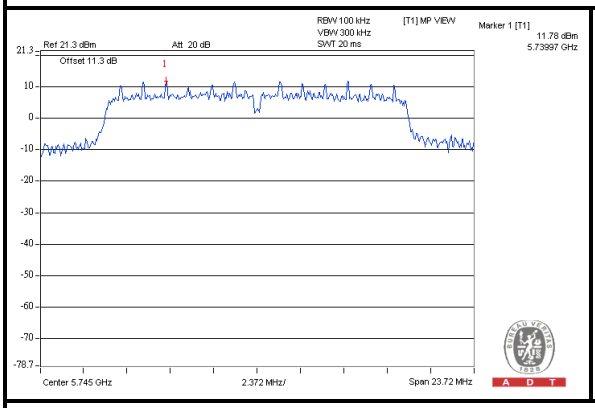
Same as Item 4.3.6

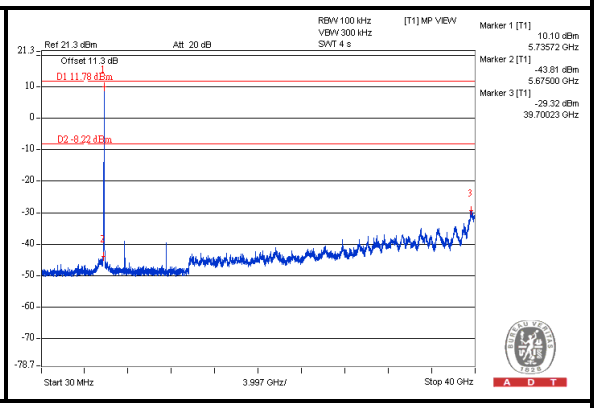
5.6.7 TEST RESULTS

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.

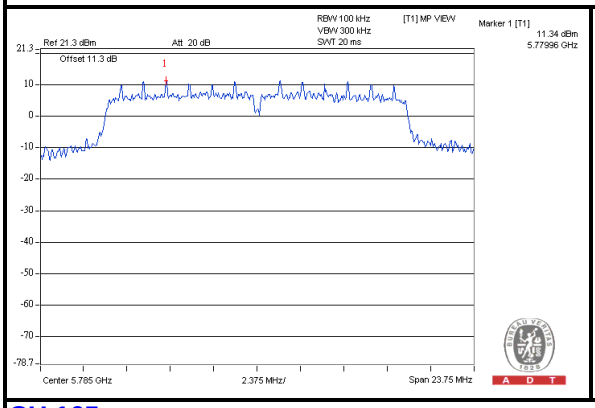
802.11a

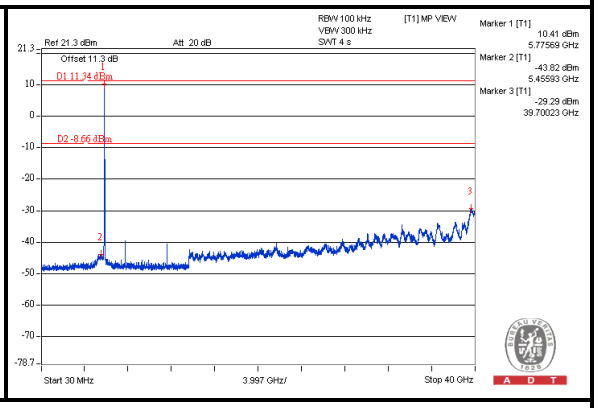
CH 149



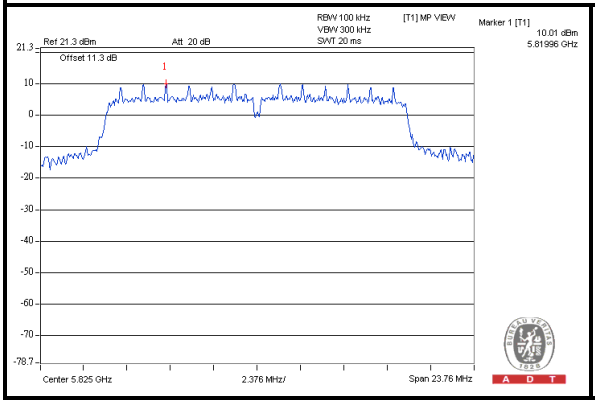


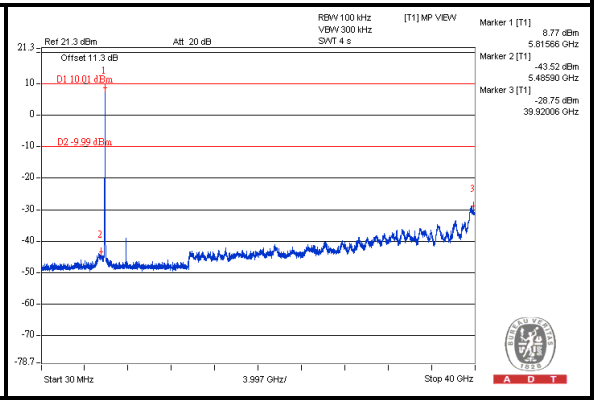
CH 157





CH 165

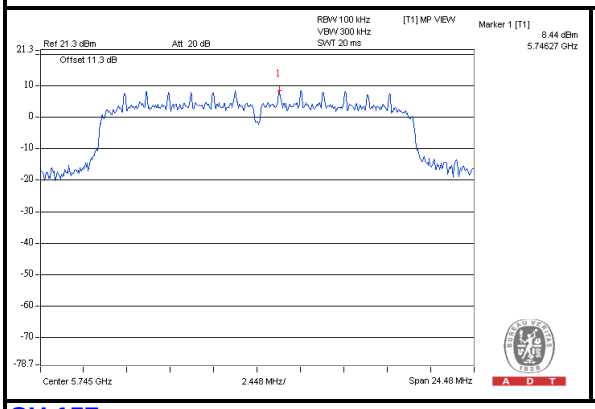


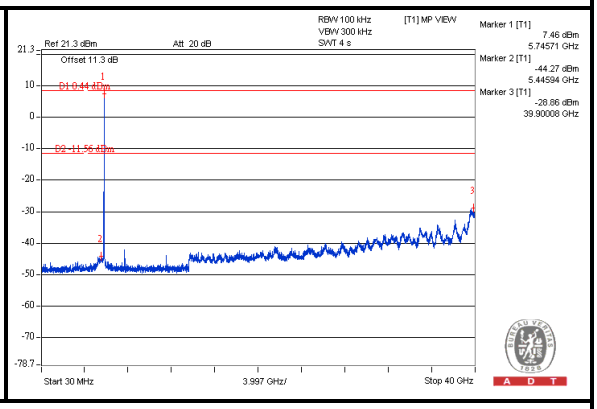


802.11n (HT20)

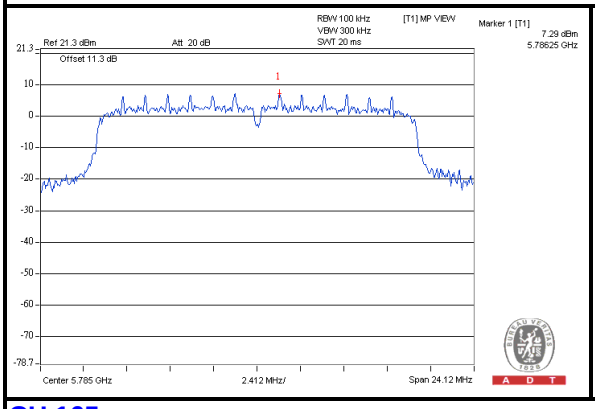
Chain 0

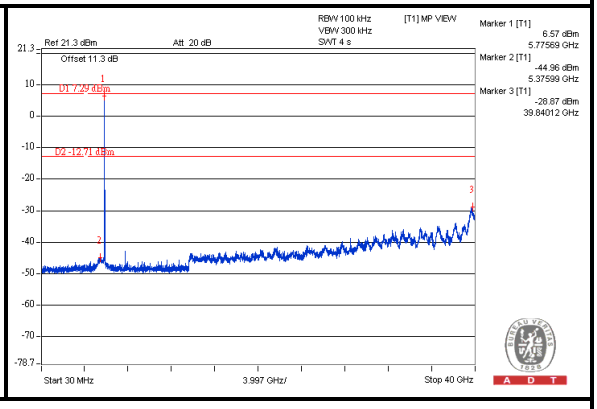
CH 149



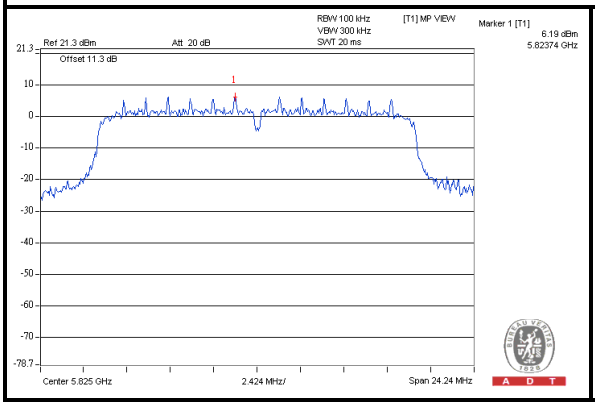


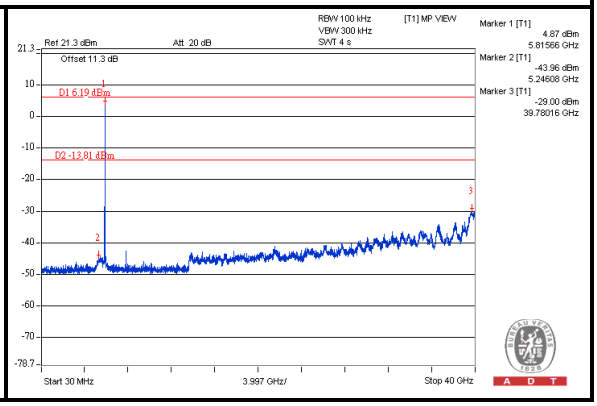
CH 157





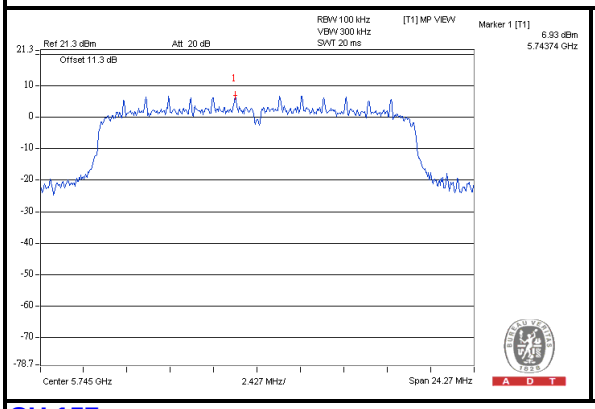
CH 165

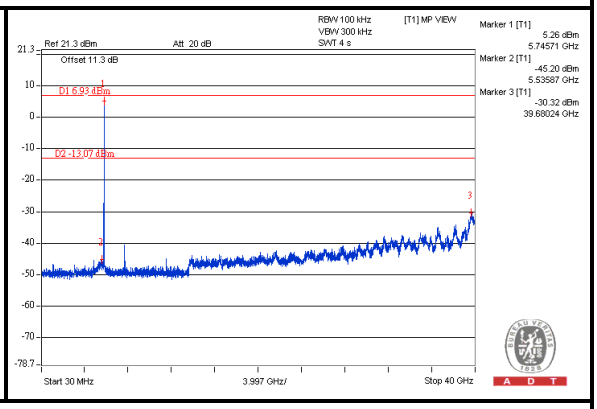




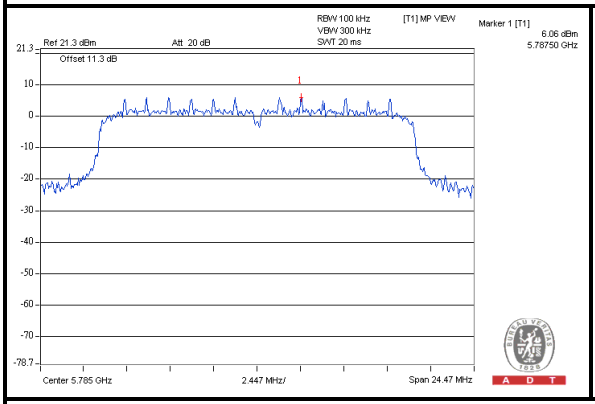
Chain 1

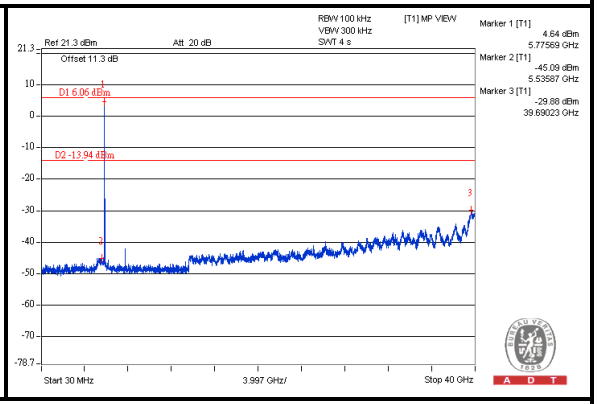
CH 149



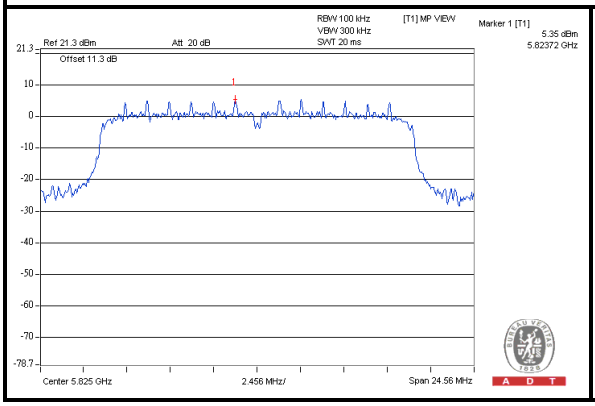


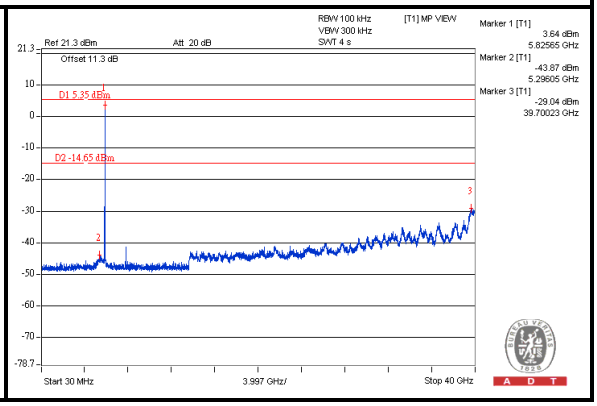
CH 157





CH 165

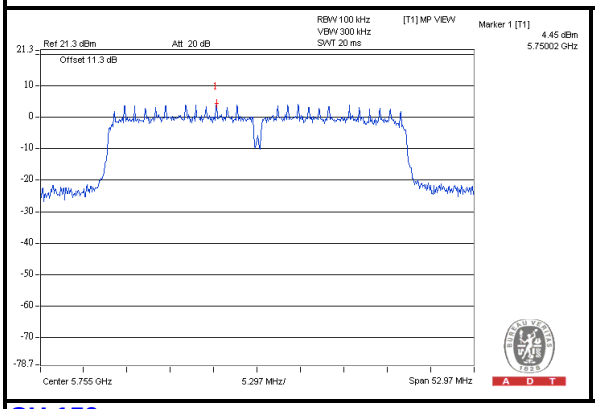


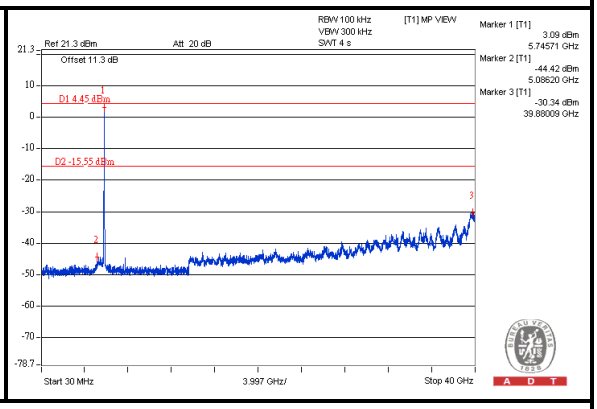


802.11n (HT40)

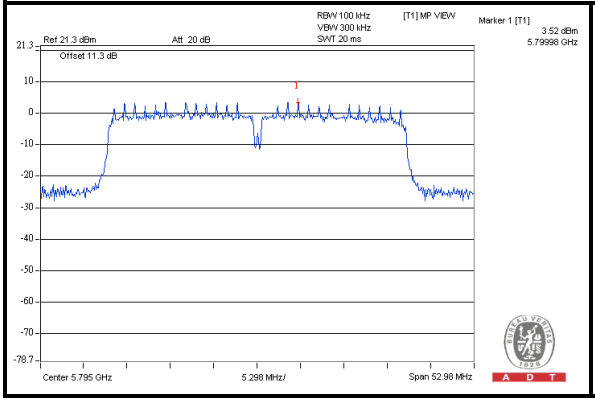
Chain 0

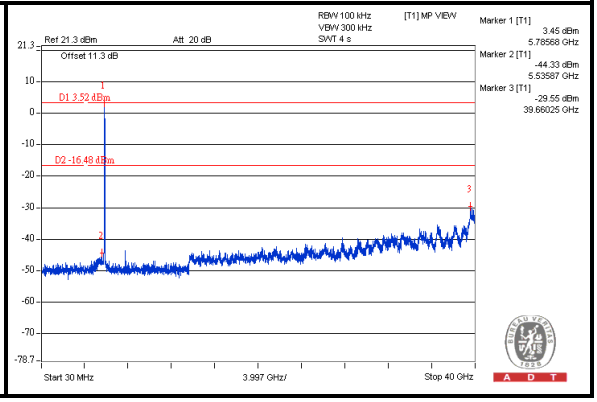
CH 151





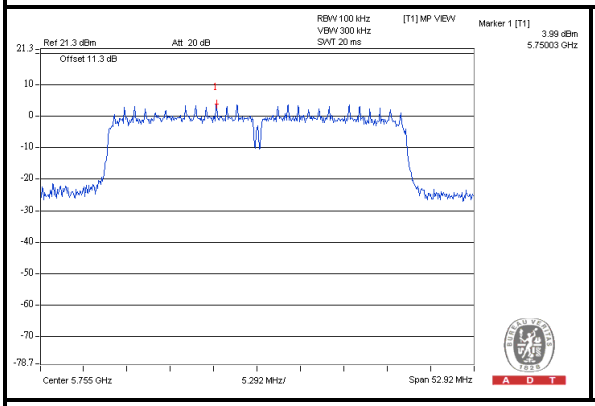
CH 159

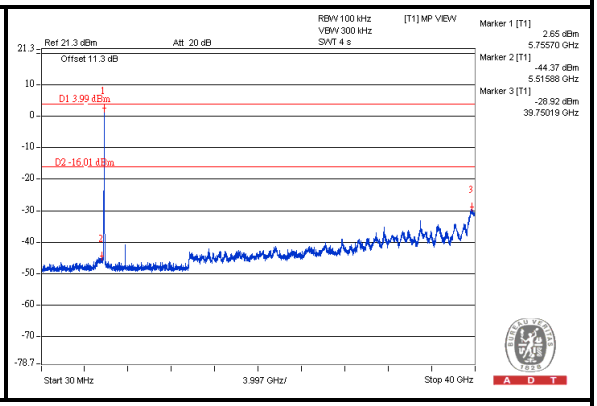




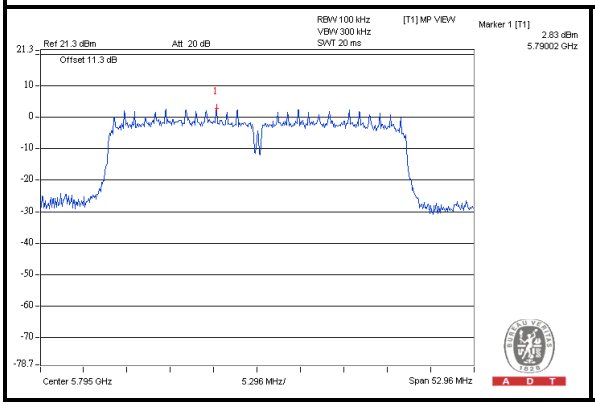
Chain 1

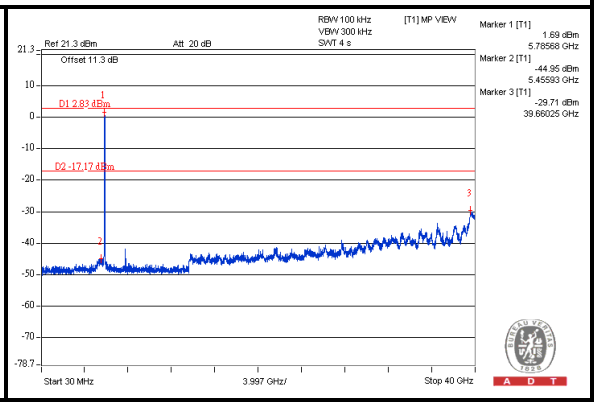
CH 151





CH 159





6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

7. 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:
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Fax: 886-2-26052943

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

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

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

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

8. 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 ---