FCC TEST REPORT (15.247)

REPORT NO.:	RF130709E03
MODEL NO.:	DCAW1R1-01
FCC ID:	NKR-DTVDCCKII
RECEIVED:	July 09, 2013
TESTED:	July 11 to 30, 2013
ISSUED:	Nov. 04, 2013

APPLICANT:	Wistron NeWeb Corp.
ADDRESS:	20 Park Avenue II, Hsinchu Science Park,Hsinchu 308, Taiwan, R.O.C.

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
RF130709E03	Original release	Nov. 04, 2013

1. CERTIFICATION

PRODUCT:	DIRECTV Cinema Connection Kit
BRAND NAME:	DIRECTV
MODEL NO.:	DCAW1R1-01
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Wistron NeWeb Corp.
TESTED:	July 11 to 30, 2013
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: DCAW1R1-01) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Phoenix Huang , **DATE:** Nov. 04, 2013
(Phoenix Huang, Specialist)

APPROVED BY : , **DATE:** Nov. 04, 2013
(May Chen, 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 -14.55dB at 21.66406MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 2390.00MHz, 2483.50MHz, 4824.00MHz & 4924MHz.
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	Antenna connector is i-pex (MHF) not a standard connector.

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 -13.59dB at 23.12725MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.7dB at 5429.00MHz.
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	Antenna connector is i-pex (MHF) not a standard connector.

Note:

1. The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.35GHz, 5.47~5.6GHz, 5.65~5.725GHz and 5.725~5.85GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz and 5.725~5.85GHz. For the 5.15~5.35GHz, 5.47~5.6GHz and 5.65~5.725GHz 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)	5.63 dB
Radiated emissions (1GHz -6GHz)	3.73 dB
Radiated emissions (6GHz -18GHz)	3.90 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	DIRECTV Cinema Connection Kit
MODEL NO.	DCAW1R1-01
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: up to 450Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.58GHz, 5.66GHz ~ 5.70GHz
	For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 16 for 802.11a, 802.11n (HT20) 7 for 802.11n (HT40)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) **For 15.247 (5GHz)** 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)

MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 102.802mW 802.11n (HT20): 177.630mW 802.11n (HT40): 129.072mW **For 15.247 (2.4GHz)** 802.11b: 68.707mW 802.11g: 263.633mW 802.11n (HT20): 954.694mW **For 15.247 (5GHz)** 802.11a: 183.231mW 802.11n (HT20): 558.985mW 802.11n (HT40): 471.450mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	Ethernet cable (Unshielded, 1.8m) Coaxial cable (Shielded, 1.5m)
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter × 1 Stand × 1

NOTE:

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

Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi) (Include cable loss)	Connector	Frequency range (MHz to MHz)
Chain (0)	Airgain	N2420DS	PIFA	3.1	i-pex(MHF)	2400~2490
				2.8		4900~5900
Chain (1)	Airgain	N2420DS	PIFA	3.1	i-pex(MHF)	2400~2490
				2.8		4900~5900
Chain (2)	Airgain	N2420DS	PIFA	3.1	i-pex(MHF)	2400~2490
				2.8		4900~5900
Note:	1. For 802.11b mode will fix transmission on Chain (0). 2. For 802.11g the worst case was found in Chain (1). Therefore only the test data of the mode was recorded in this report. 3. For 802.11a the worst case was found in Chain (0). Therefore only the test data of the mode was recorded in this report.					

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

Brand	Model No.	Spec.
DIRECTV	EPS10R1-16	AC Input: 120Vac, 0.5A, 60Hz AC Input cable (shielded, 0.9m) DC Output: 12Vdc, 1.5A DC Output cable (unshielded, 1.8m, with one core)

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

MODULATION MODE	TX/RX FUNCTION
802.11a	1TX (Diversity) / 3RX
802.11b	1TX / 3RX
802.11g	1TX (Diversity) / 3RX
802.11n (HT20)	3TX/3RX
802.11n (HT40) (for 5G Band)	3TX/3RX

4. 2.4GHz and 5GHz technology cannot transmit at same time.
5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.
6. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications 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		

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

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	6	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	MODULATION TYPE	DATA RATE (Mbps)
For 2.4 GHz 802.11n (HT20)	1 to 11	6	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
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
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
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	26deg. C, 66%RH	120Vac, 60Hz	Jyunchun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chilin Lee
RE≥1G	22deg. C, 67%RH	120Vac, 60Hz	Tim Ho
	24deg. C, 63%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.247)

558074 D01 DTS Meas Guidance v03r01

662911 D01 Multiple Transmitter Output v01 r02

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

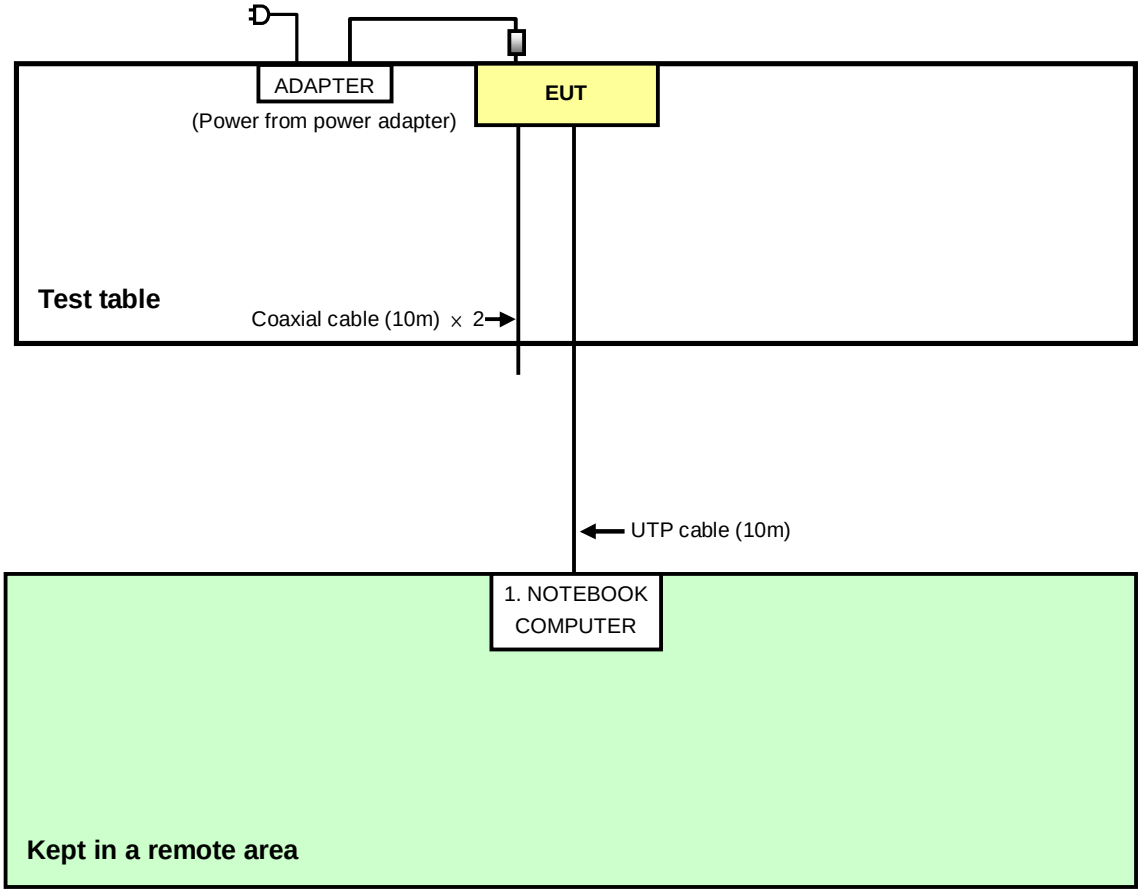
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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, 2.400 ~ 2.4835GHz 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	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 07,2013	June 06,2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: July 11, 2013

4.1.3 TEST PROCEDURES

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

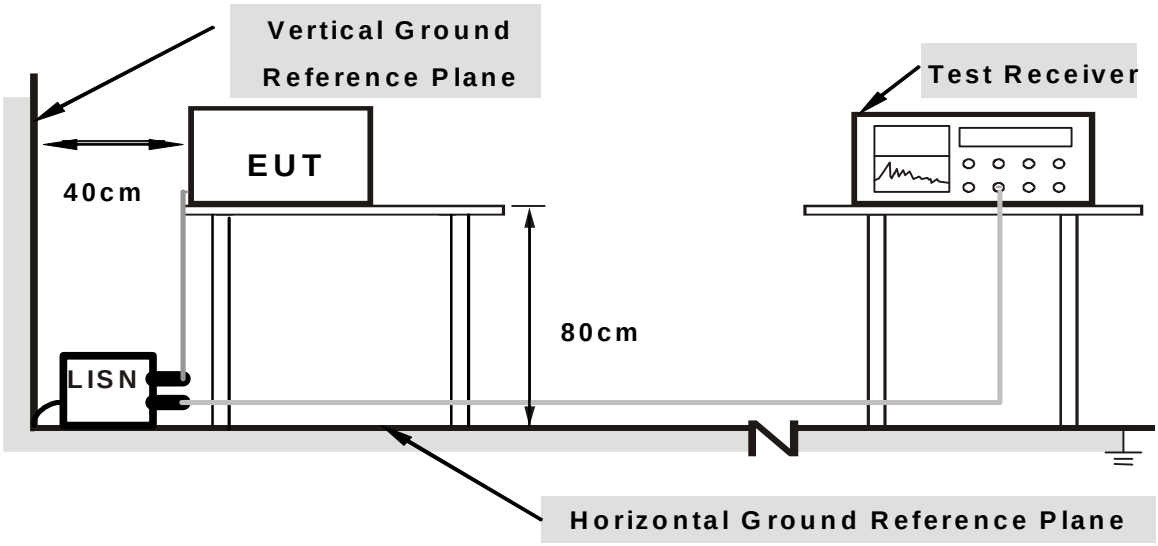
NOTE:

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of EUT.
2. The communication partner run test program “DUT GUI.exe[1.0.0.0]” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

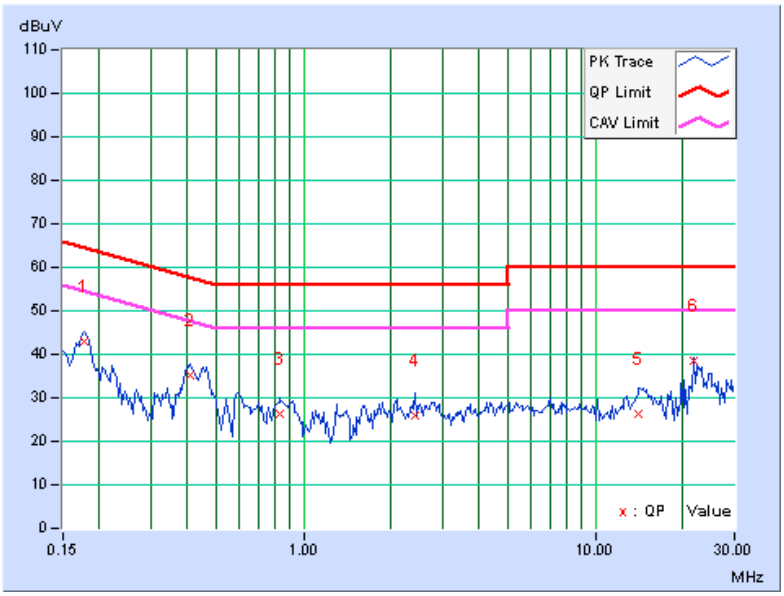
4.1.7 TEST RESULTS

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.13	42.71	33.43	42.84	33.56	64.61	54.61	-21.77	-21.05
2	0.40781	0.18	35.06	30.45	35.24	30.63	57.69	47.69	-22.45	-17.06
3	0.82969	0.21	25.97	21.37	26.18	21.58	56.00	46.00	-29.82	-24.42
4	2.39844	0.30	25.57	19.07	25.87	19.37	56.00	46.00	-30.13	-26.63
5	14.10938	0.84	25.49	20.15	26.33	20.99	60.00	50.00	-33.67	-29.01
6	**21.66406**	**1.08**	**37.31**	**34.37**	**38.39**	**35.45**	**60.00**	**50.00**	**-21.61**	**-14.55**

REMARKS:

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

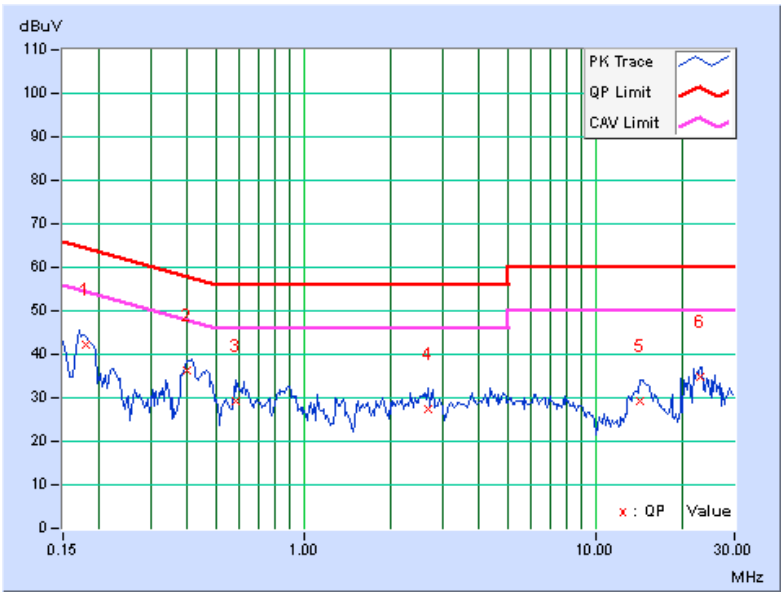


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17941	0.11	42.04	33.22	42.15	33.33	64.51	54.51	-22.36	-21.18
2	0.39609	0.17	35.95	29.07	36.12	29.24	57.93	47.93	-21.82	-18.70
3	0.58750	0.18	29.24	24.86	29.42	25.04	56.00	46.00	-26.58	-20.96
4	2.67578	0.28	27.02	21.33	27.30	21.61	56.00	46.00	-28.70	-24.39
5	14.17188	0.63	28.51	22.72	29.14	23.35	60.00	50.00	-30.86	-26.65
6	22.88281	0.79	34.15	30.92	34.94	31.71	60.00	50.00	-25.06	-18.29

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
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29,2013	Jan. 28,2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 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. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: July 19 to 30, 2013

4.2.3 TEST PROCEDURES

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

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

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

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

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

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

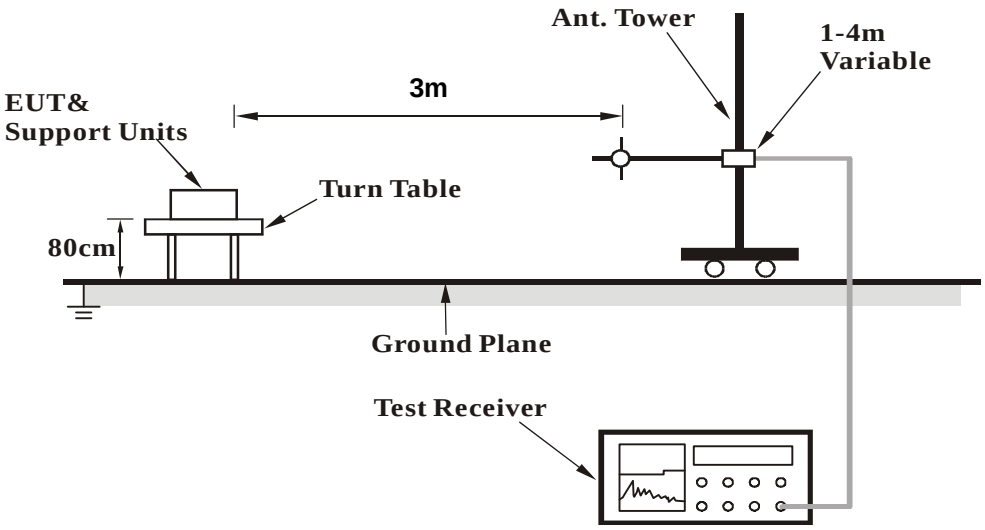
NOTE:

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11n (HT20)

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	56.67	35.2 QP	40.0	-4.8	1.00 H	360	49.19	-14.01
2	79.23	35.4 QP	40.0	-4.6	1.00 H	316	53.29	-17.89
3	143.34	34.1 QP	43.5	-9.5	2.00 H	90	47.37	-13.32
4	400.01	34.1 QP	46.0	-11.9	1.00 H	57	44.36	-10.25
5	572.28	40.3 QP	46.0	-5.7	2.00 H	256	46.74	-6.42
6	999.95	36.1 QP	54.0	-18.0	2.00 H	199	35.10	0.95
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	77.19	33.4 QP	40.0	-6.6	1.00 V	0	51.05	-17.65
2	94.41	33.2 QP	43.5	-10.3	1.00 V	136	52.04	-18.84
3	250.00	30.7 QP	46.0	-15.3	2.00 V	0	45.16	-14.44
4	400.01	36.0 QP	46.0	-10.0	1.00 V	0	46.23	-10.25
5	799.99	29.5 QP	46.0	-16.5	2.00 V	0	31.39	-1.91
6	999.95	39.1 QP	54.0	-14.9	1.00 V	310	38.14	0.95

REMARKS:

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

ABOVE 1GHz DATA

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	2390.00	63.1 PK	74.0	-10.9	1.24 H	115	64.29	-1.19
2	2390.00	49.5 AV	54.0	-4.5	1.24 H	115	50.69	-1.19
3	*2412.00	110.2 PK			1.24 H	115	111.29	-1.09
4	*2412.00	103.1 AV			1.24 H	115	104.19	-1.09
5	4824.00	57.0 PK	74.0	-17.0	1.52 H	82	49.41	7.59
6	**4824.00**	**53.5 AV**	**54.0**	**-0.5**	**1.52 H**	**82**	**45.91**	**7.59**
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	59.0 PK	74.0	-15.0	1.72 V	321	60.19	-1.19
2	2390.00	48.7 AV	54.0	-5.3	1.72 V	321	49.89	-1.19
3	*2412.00	106.2 PK			1.72 V	321	107.29	-1.09
4	*2412.00	99.2 AV			1.72 V	321	100.29	-1.09
5	4824.00	55.4 PK	74.0	-18.6	1.47 V	329	47.81	7.59
6	4824.00	50.4 AV	54.0	-3.6	1.47 V	329	42.81	7.59

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) – Pre-Amplifier 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	61.5 PK	74.0	-12.5	1.25 H	115	62.69	-1.19
2	2390.00	49.7 AV	54.0	-4.3	1.25 H	115	50.89	-1.19
3	*2437.00	111.3 PK			1.24 H	115	112.29	-0.99
4	*2437.00	104.2 AV			1.24 H	115	105.19	-0.99
5	2483.50	62.5 PK	74.0	-11.5	1.25 H	115	63.30	-0.80
6	2483.50	51.1 AV	54.0	-2.9	1.25 H	115	51.90	-0.80
7	4874.00	57.4 PK	74.0	-16.6	1.42 H	74	49.63	7.77
8	4874.00	52.5 AV	54.0	-1.5	1.42 H	74	44.73	7.77
9	7311.00	55.8 PK	74.0	-18.2	1.03 H	189	40.31	15.49
10	7311.00	44.3 AV	54.0	-9.7	1.03 H	189	28.81	15.49
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	56.7 PK	74.0	-17.3	1.69 V	319	57.89	-1.19
2	2390.00	46.7 AV	54.0	-7.3	1.69 V	319	47.89	-1.19
3	*2437.00	106.4 PK			1.69 V	319	107.39	-0.99
4	*2437.00	99.4 AV			1.69 V	319	100.39	-0.99
5	2483.50	57.5 PK	74.0	-16.5	1.69 V	319	58.30	-0.80
6	2483.50	47.9 AV	54.0	-6.1	1.69 V	319	48.70	-0.80
7	4874.00	55.7 PK	74.0	-18.3	1.38 V	323	47.93	7.77
8	4874.00	50.2 AV	54.0	-3.8	1.38 V	323	42.43	7.77
9	7311.00	55.7 PK	74.0	-18.3	1.00 V	42	40.21	15.49
10	7311.00	44.8 AV	54.0	-9.2	1.00 V	42	29.31	15.49

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	112.3 PK			1.23 H	114	113.19	-0.89
2	*2462.00	105.3 AV			1.23 H	114	106.19	-0.89
3	2483.50	65.4 PK	74.0	-8.6	1.23 H	114	66.20	-0.80
4	2483.50	50.9 AV	54.0	-3.1	1.23 H	114	51.70	-0.80
5	4924.00	57.2 PK	74.0	-16.8	1.47 H	73	49.26	7.94
6	**4924.00**	**53.5 AV**	**54.0**	**-0.5**	**1.47 H**	**73**	**45.56**	**7.94**
7	7386.00	55.7 PK	74.0	-18.3	1.00 H	200	40.19	15.51
8	7386.00	44.0 AV	54.0	-10.0	1.00 H	200	28.49	15.51
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.9 PK			1.78 V	307	107.79	-0.89
2	*2462.00	99.6 AV			1.78 V	307	100.49	-0.89
3	2483.50	59.4 PK	74.0	-14.6	1.78 V	307	60.20	-0.80
4	2483.50	48.9 AV	54.0	-5.1	1.78 V	307	49.70	-0.80
5	4924.00	55.2 PK	74.0	-18.8	1.41 V	319	47.26	7.94
6	4924.00	50.0 AV	54.0	-4.0	1.41 V	319	42.06	7.94
7	7386.00	55.6 PK	74.0	-18.4	1.00 V	28	40.09	15.51
8	7386.00	44.7 AV	54.0	-9.3	1.00 V	28	29.19	15.51

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	71.5 PK	74.0	-2.5	1.08 H	193	72.69	-1.19
2	2390.00	53.1 AV	54.0	-0.9	1.08 H	193	54.29	-1.19
3	*2412.00	112.0 PK			1.08 H	193	113.09	-1.09
4	*2412.00	102.1 AV			1.08 H	193	103.19	-1.09
5	4824.00	56.2 PK	74.0	-17.8	1.00 H	169	48.61	7.59
6	4824.00	42.8 AV	54.0	-11.2	1.00 H	169	35.21	7.59
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	53.5 PK	74.0	-20.5	1.05 V	305	54.69	-1.19
2	2390.00	40.7 AV	54.0	-13.3	1.05 V	305	41.89	-1.19
3	*2412.00	96.3 PK			1.05 V	305	97.39	-1.09
4	*2412.00	86.0 AV			1.05 V	305	87.09	-1.09
5	4824.00	51.4 PK	74.0	-22.6	1.00 V	97	43.81	7.59
6	4824.00	39.8 AV	54.0	-14.2	1.00 V	97	32.21	7.59

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) – Pre-Amplifier 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	65.5 PK	74.0	-8.5	1.09 H	188	66.69	-1.19
2	**2390.00**	**53.5 AV**	**54.0**	**-0.5**	**1.09 H**	**188**	**54.69**	**-1.19**
3	*2437.00	116.1 PK			1.09 H	188	117.09	-0.99
4	*2437.00	106.1 AV			1.09 H	188	107.09	-0.99
5	2483.50	64.1 PK	74.0	-9.9	1.09 H	188	64.90	-0.80
6	2483.50	51.3 AV	54.0	-2.7	1.09 H	188	52.10	-0.80
7	4874.00	56.6 PK	74.0	-17.4	1.00 H	171	48.83	7.77
8	4874.00	42.9 AV	54.0	-11.1	1.00 H	171	35.13	7.77
9	7311.00	56.9 PK	74.0	-17.1	1.00 H	185	41.41	15.49
10	7311.00	48.1 AV	54.0	-5.9	1.00 H	185	32.61	15.49
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	49.8 PK	74.0	-24.2	1.02 V	304	50.99	-1.19
2	2390.00	37.5 AV	54.0	-16.5	1.02 V	304	38.69	-1.19
3	*2437.00	101.0 PK			1.02 V	304	101.99	-0.99
4	*2437.00	89.1 AV			1.02 V	304	90.09	-0.99
5	2483.50	48.6 PK	74.0	-25.4	1.02 V	304	49.40	-0.80
6	2483.50	40.3 AV	54.0	-13.7	1.02 V	304	41.10	-0.80
7	4874.00	51.5 PK	74.0	-22.5	1.09 V	96	43.73	7.77
8	4874.00	40.1 AV	54.0	-13.9	1.09 V	96	32.33	7.77
9	7311.00	55.2 PK	74.0	-18.8	1.09 V	101	39.71	15.49
10	7311.00	43.6 AV	54.0	-10.4	1.09 V	101	28.11	15.49

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	112.1 PK			1.04 H	180	112.99	-0.89
2	*2462.00	102.1 AV			1.04 H	180	102.99	-0.89
3	2483.50	72.1 PK	74.0	-1.9	1.04 H	180	72.90	-0.80
4	2483.50	52.3 AV	54.0	-1.7	1.04 H	180	53.10	-0.80
5	4924.00	56.7 PK	74.0	-17.3	1.00 H	183	48.76	7.94
6	4924.00	43.1 AV	54.0	-10.9	1.00 H	183	35.16	7.94
7	7386.00	57.4 PK	74.0	-16.6	1.02 H	172	41.89	15.51
8	7386.00	48.4 AV	54.0	-5.6	1.02 H	172	32.89	15.51
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	98.2 PK			1.04 V	288	99.09	-0.89
2	*2462.00	86.2 AV			1.04 V	288	87.09	-0.89
3	2483.50	53.4 PK	74.0	-20.6	1.04 V	288	54.20	-0.80
4	2483.50	40.2 AV	54.0	-13.8	1.04 V	288	41.00	-0.80
5	4924.00	51.8 PK	74.0	-22.2	1.14 V	105	43.86	7.94
6	4924.00	40.2 AV	54.0	-13.8	1.14 V	105	32.26	7.94
7	7386.00	55.1 PK	74.0	-18.9	1.09 V	107	39.59	15.51
8	7386.00	43.6 AV	54.0	-10.4	1.09 V	107	28.09	15.51

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	69.4 PK	74.0	-4.6	1.32 H	86	70.59	-1.19
2	**2390.00**	**53.5 AV**	**54.0**	**-0.5**	**1.32 H**	**86**	**54.69**	**-1.19**
3	*2412.00	114.2 PK			1.28 H	118	115.29	-1.09
4	*2412.00	105.8 AV			1.28 H	118	106.89	-1.09
5	4824.00	50.1 PK	74.0	-23.9	1.49 H	229	42.51	7.59
6	4824.00	35.6 AV	54.0	-18.4	1.49 H	229	28.01	7.59
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	58.9 PK	74.0	-15.1	1.00 V	275	60.09	-1.19
2	2390.00	48.0 AV	54.0	-6.0	1.00 V	275	49.19	-1.19
3	*2412.00	100.0 PK			1.00 V	275	101.09	-1.09
4	*2412.00	90.1 AV			1.00 V	275	91.19	-1.09
5	4824.00	48.4 PK	74.0	-25.6	1.00 V	189	40.81	7.59
6	4824.00	35.2 AV	54.0	-18.8	1.00 V	189	27.61	7.59

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) – Pre-Amplifier 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	66.3 PK	74.0	-7.7	1.26 H	94	67.49	-1.19
2	2390.00	52.7 AV	54.0	-1.3	1.26 H	94	53.89	-1.19
3	*2437.00	119.0 PK			1.28 H	114	119.99	-0.99
4	*2437.00	110.8 AV			1.28 H	114	111.79	-0.99
5	2483.50	69.2 PK	74.0	-4.8	1.26 H	94	70.00	-0.80
6	**2483.50**	**53.5 AV**	**54.0**	**-0.5**	**1.26 H**	**94**	**54.30**	**-0.80**
7	4874.00	50.6 PK	74.0	-23.4	1.49 H	229	42.83	7.77
8	4874.00	36.2 AV	54.0	-17.8	1.49 H	229	28.43	7.77
9	7311.00	55.7 PK	74.0	-18.3	1.00 H	77	40.21	15.49
10	7311.00	43.3 AV	54.0	-10.7	1.00 H	77	27.81	15.49
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	57.9 PK	74.0	-16.1	1.00 V	288	59.09	-1.19
2	2390.00	43.6 AV	54.0	-10.4	1.00 V	288	44.79	-1.19
3	*2437.00	103.9 PK			1.00 V	288	104.89	-0.99
4	*2437.00	94.8 AV			1.00 V	288	95.79	-0.99
5	2483.50	54.7 PK	74.0	-19.3	1.00 V	288	55.50	-0.80
6	2483.50	42.4 AV	54.0	-11.6	1.00 V	288	43.20	-0.80
7	4874.00	48.7 PK	74.0	-25.3	1.00 V	190	40.93	7.77
8	4874.00	35.4 AV	54.0	-18.6	1.00 V	190	27.63	7.77
9	7311.00	55.9 PK	74.0	-18.1	1.00 V	15	40.41	15.49
10	7311.00	43.4 AV	54.0	-10.6	1.00 V	15	27.91	15.49

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	114.2 PK			1.28 H	118	115.09	-0.89
2	*2462.00	105.8 AV			1.28 H	118	106.69	-0.89
3	2483.50	69.4 PK	74.0	-4.6	1.32 H	86	70.20	-0.80
4	**2483.50**	**53.5 AV**	**54.0**	**-0.5**	**1.32 H**	**86**	**54.30**	**-0.80**
5	4924.00	49.6 PK	74.0	-24.4	1.45 H	211	41.66	7.94
6	4924.00	35.2 AV	54.0	-18.8	1.45 H	211	27.26	7.94
7	7386.00	55.4 PK	74.0	-18.6	1.01 H	74	39.89	15.51
8	7386.00	42.9 AV	54.0	-11.1	1.01 H	74	27.39	15.51
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	100.2 PK			1.00 V	276	101.09	-0.89
2	*2462.00	90.5 AV			1.00 V	276	91.39	-0.89
3	2483.50	60.2 PK	74.0	-13.8	1.00 V	276	61.00	-0.80
4	2483.50	48.4 AV	54.0	-5.6	1.00 V	276	49.20	-0.80
5	4924.00	48.1 PK	74.0	-25.9	1.02 V	203	40.16	7.94
6	4924.00	35.0 AV	54.0	-19.0	1.02 V	203	27.06	7.94
7	7386.00	55.2 PK	74.0	-18.8	1.00 V	23	39.69	15.51
8	7386.00	42.5 AV	54.0	-11.5	1.00 V	23	26.99	15.51

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

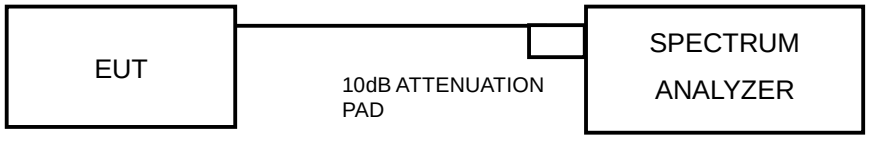
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	12.41	0.5	PASS
6	2437	12.39	0.5	PASS
11	2462	12.39	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.66	0.5	PASS
6	2437	16.66	0.5	PASS
11	2462	16.62	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.88	17.86	17.86	0.5	PASS
6	2437	17.89	17.87	17.86	0.5	PASS
11	2462	17.87	17.87	17.87	0.5	PASS

4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz bands: 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 Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

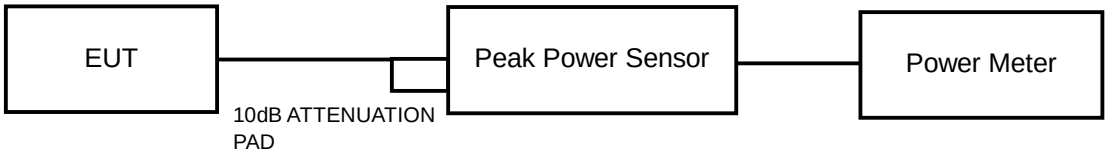
4.4.3 TEST PROCEDURES

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	66.527	18.23	30	PASS
6	2437	68.707	18.37	30	PASS
11	2462	68.391	18.35	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	140.929	21.49	30	PASS
6	2437	263.633	24.21	30	PASS
11	2462	138.676	21.42	30	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	23.42	22.84	22.85	604.847	27.82	30	PASS
6	2437	25.62	24.43	24.95	954.694	29.80	30	PASS
11	2462	22.56	21.62	21.72	474.107	26.76	30	PASS

4.5 AVERAGE OUTPUT POWER

4.5.1 FOR REFERENCE.

4.5.2 TEST INSTRUMENTS

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

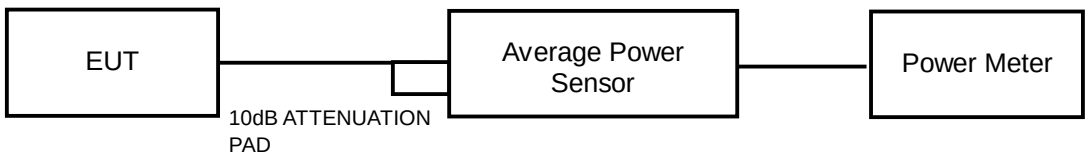
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

4.5.3 TEST PROCEDURES

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

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.5.6 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	34.514	15.38
6	2437	35.645	15.52
11	2462	35.318	15.48

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	19.815	12.97
6	2437	55.847	17.47
11	2462	19.543	12.91

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	15.68	14.82	15.17	100.207	20.01
6	2437	20.52	18.92	19.34	276.604	24.42
11	2462	14.54	14.02	13.52	76.171	18.82

4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

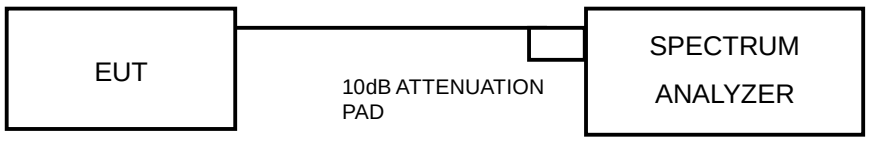
4.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS /FAIL
1	2412	-11.04	8	PASS
6	2437	-10.79	8	PASS
11	2462	-10.91	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS /FAIL
1	2412	-17.03	8	PASS
6	2437	-12.51	8	PASS
11	2462	-16.25	8	PASS

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-13.80	4.77	-9.03	6.13	PASS
	6	2437	-9.55	4.77	-4.78	6.13	PASS
	11	2462	-14.77	4.77	-10.00	6.13	PASS
1	1	2412	-14.53	4.77	-9.76	6.13	PASS
	6	2437	-10.74	4.77	-5.97	6.13	PASS
	11	2462	-15.57	4.77	-10.80	6.13	PASS
2	1	2412	-16.57	4.77	-11.80	6.13	PASS
	6	2437	-12.01	4.77	-7.24	6.13	PASS
	11	2462	-15.93	4.77	-11.16	6.13	PASS

NOTE: Directional gain = 3.1dBi + 10log(3) = 7.87dBi > 6dBi , so the power density limit shall be reduced to 8-(7.87-6) = 6.13dBm.

4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

4.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

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

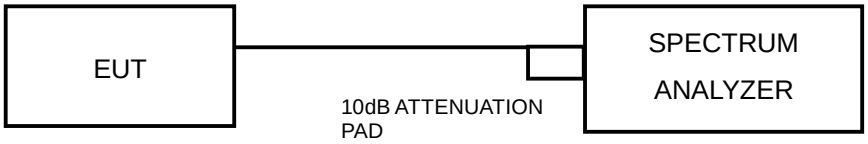
Measurement Procedure –Unwanted Emission Level

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

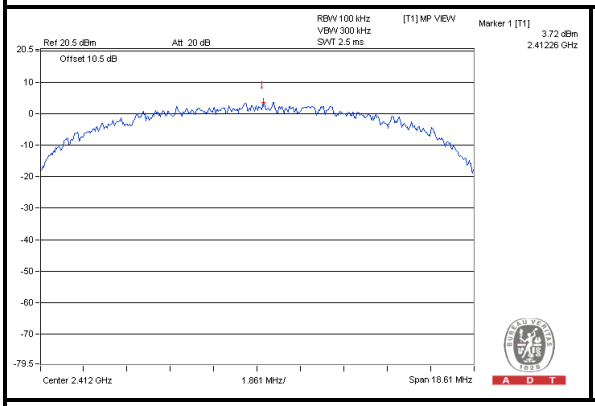
Same as Item 4.3.6

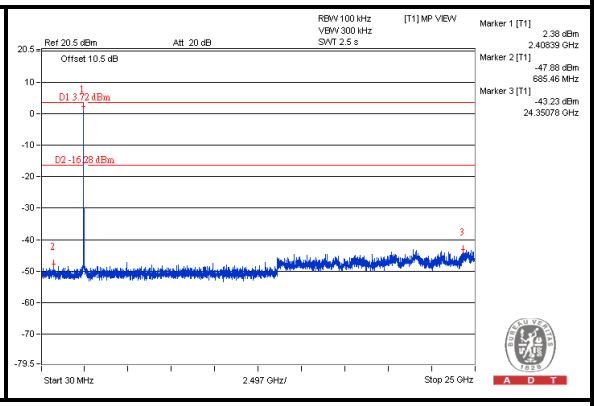
4.7.7 TEST RESULTS

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

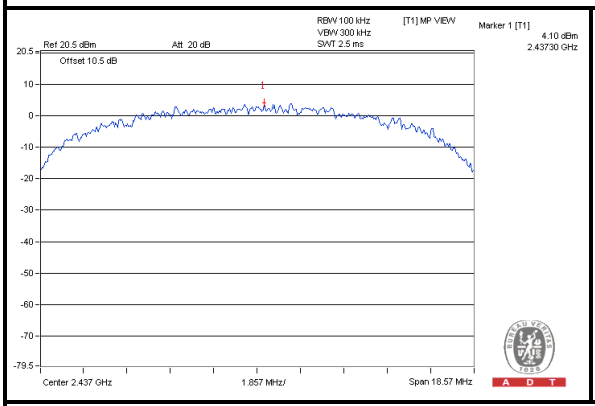
802.11b:

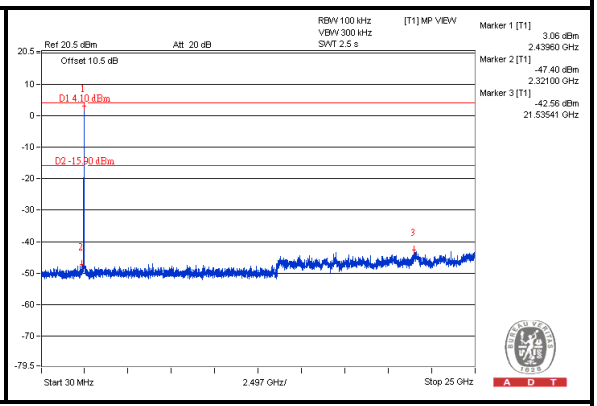
CH 1



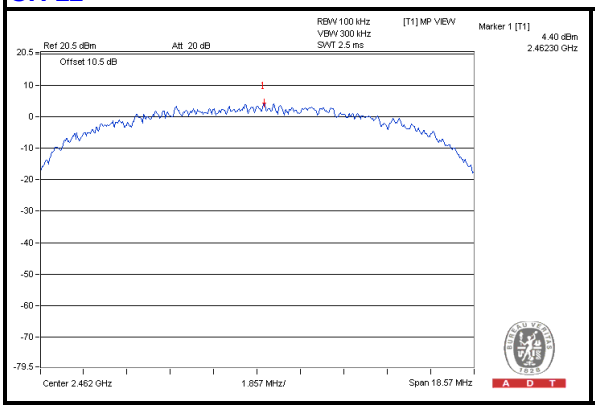


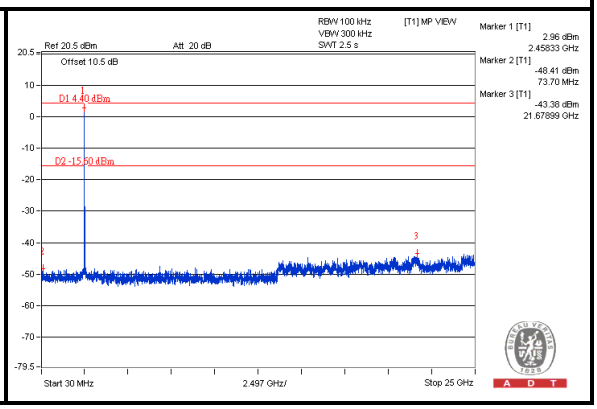
CH 6





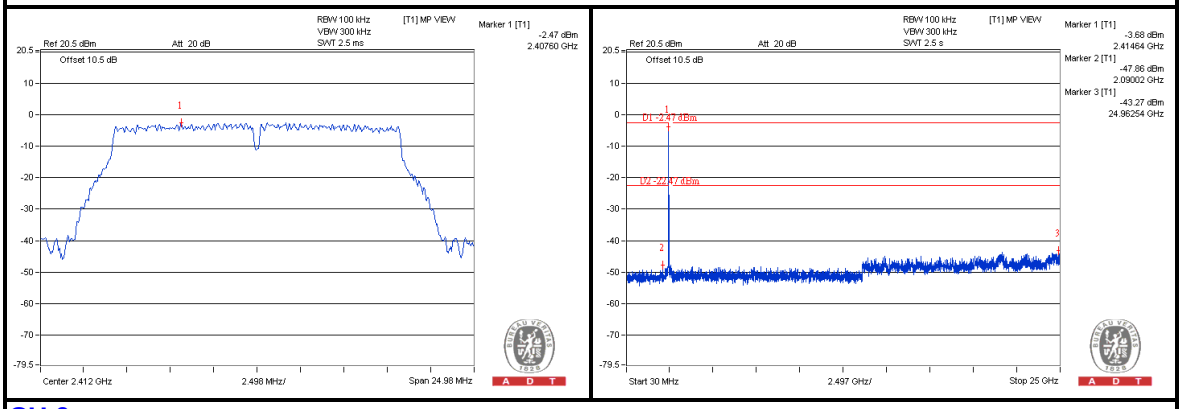
CH 11



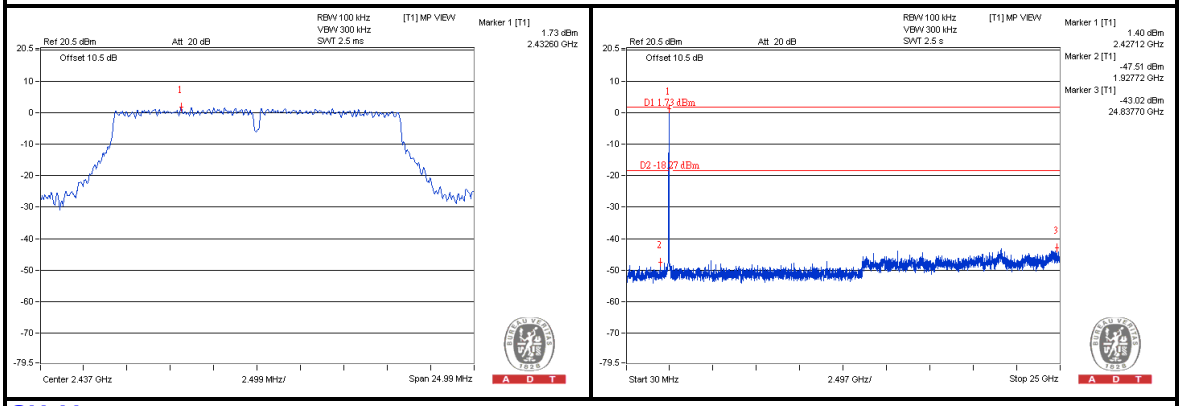


802.11g:

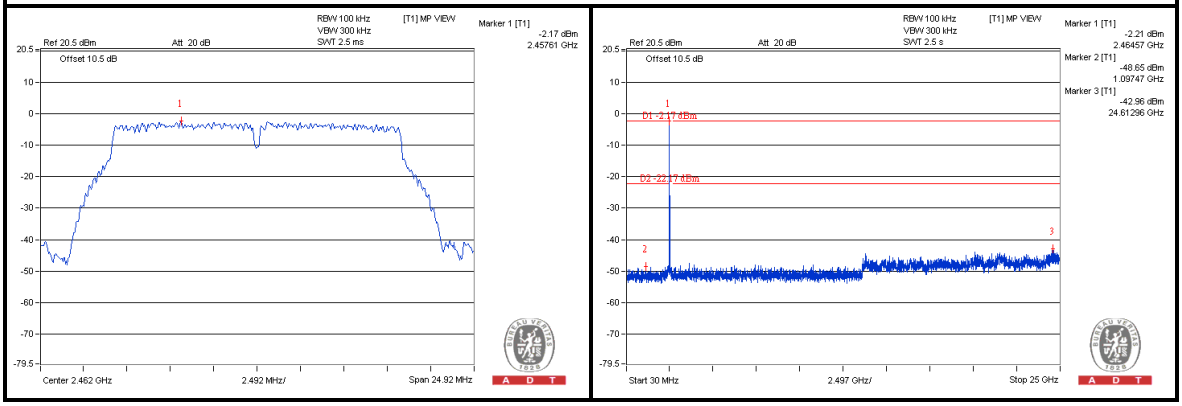
CH 1



CH 6



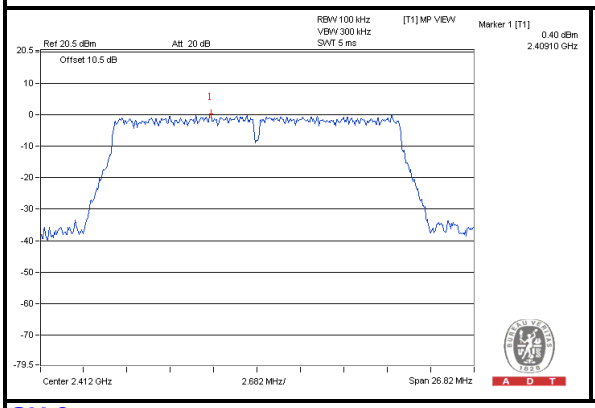
CH 11

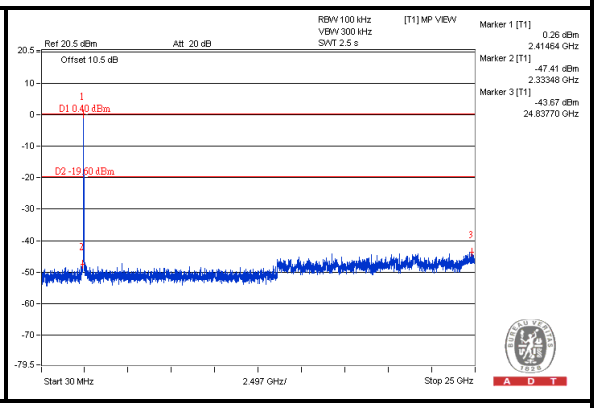


802.11n (HT20):

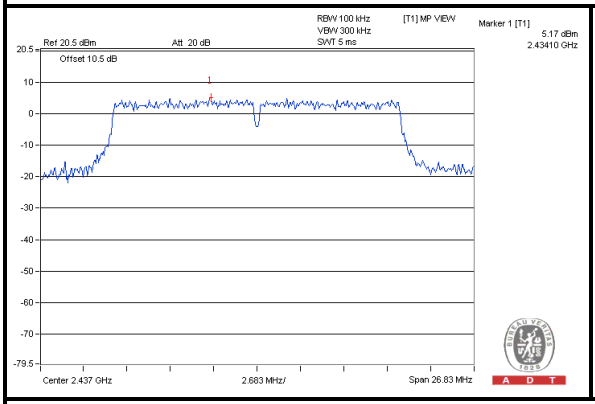
For Chain 0

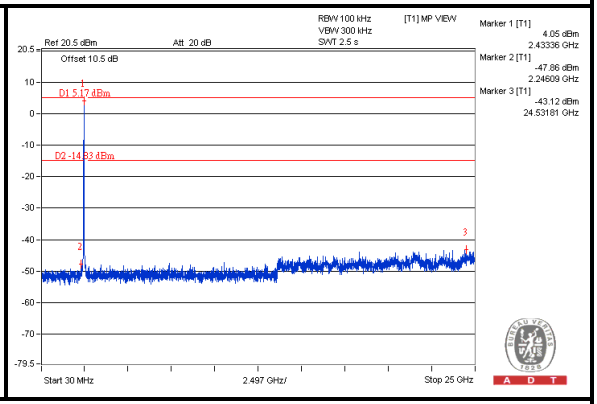
CH 1



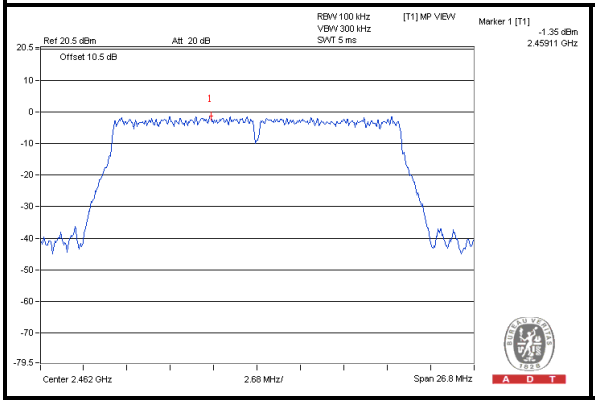


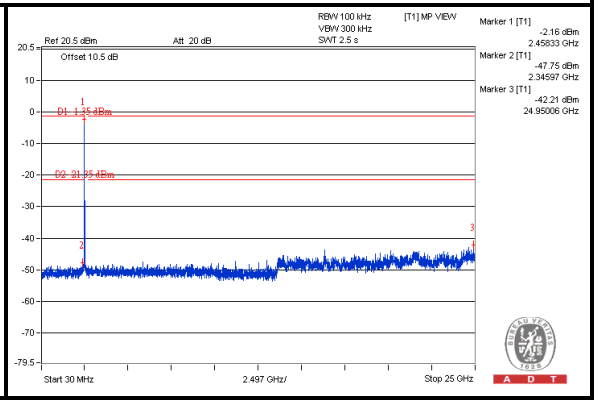
CH 6





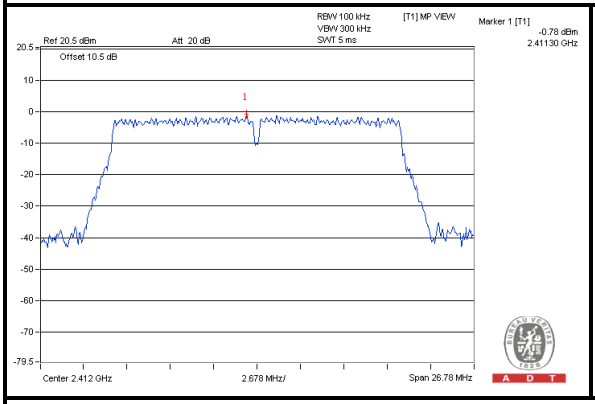
CH 11

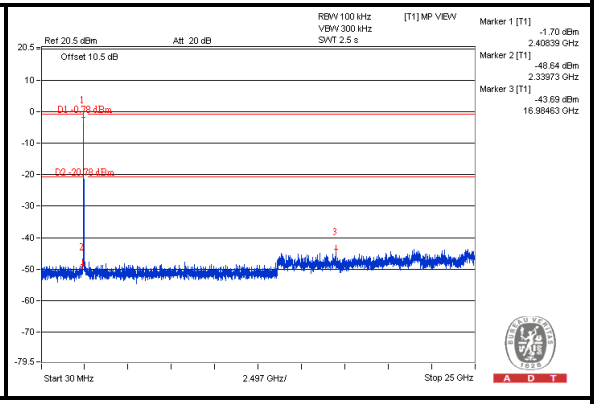




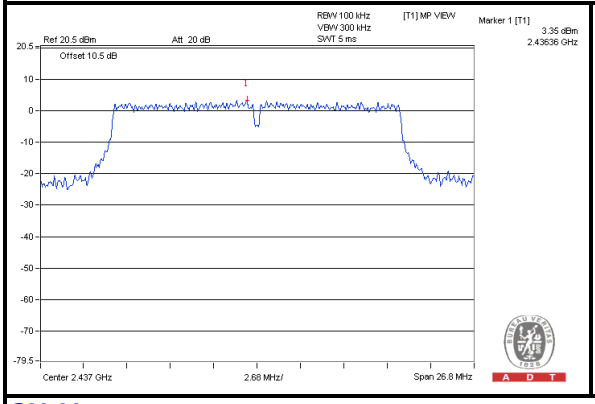
For Chain 1

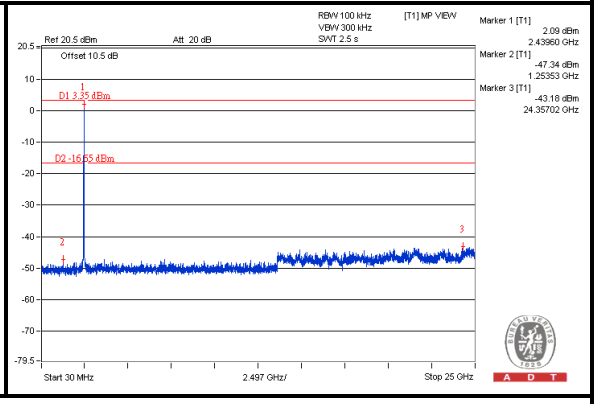
CH 1



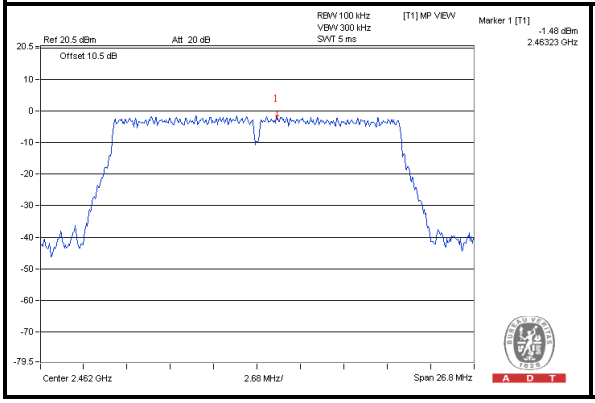


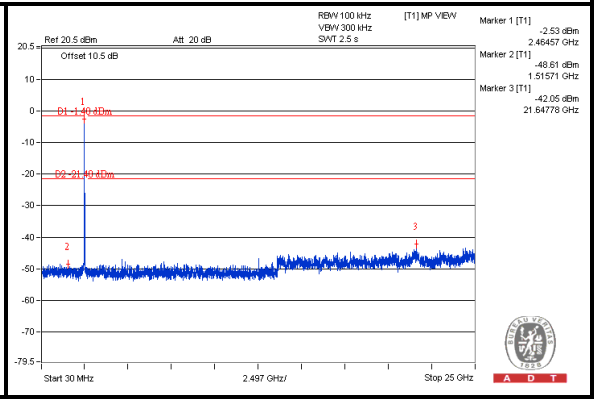
CH 6





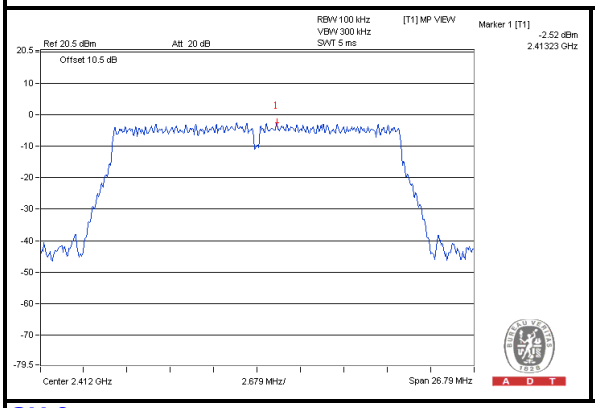
CH 11

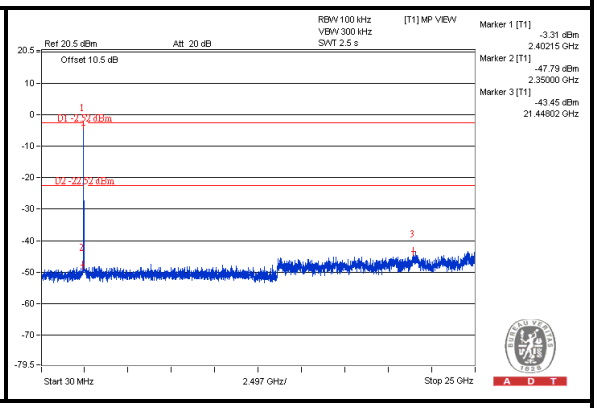




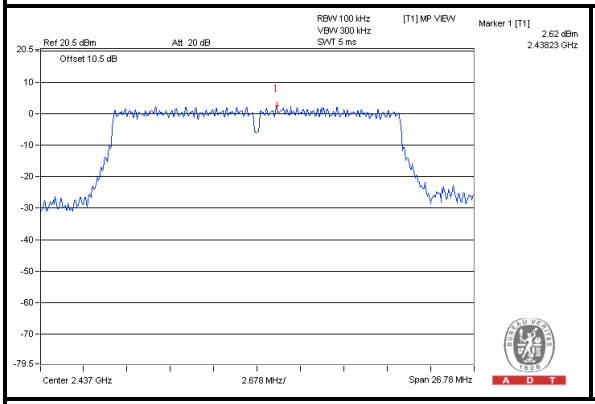
For Chain 2

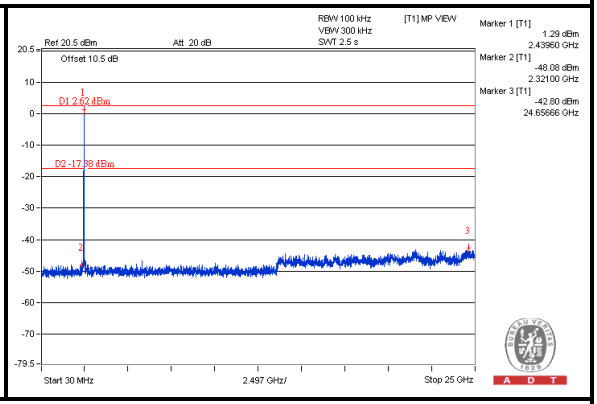
CH 1



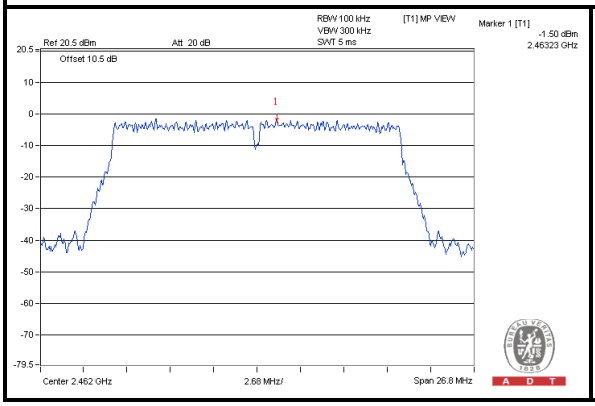


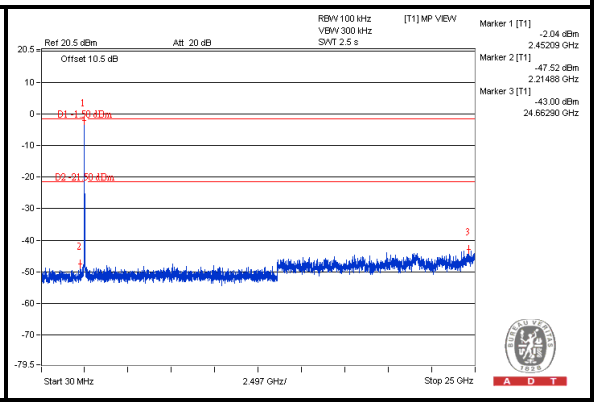
CH 6





CH 11





5. TEST TYPES AND RESULTS (FOR 5GHz, 5.725~5.850GHz 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 ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 07,2013	June 06,2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: July 11, 2013

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.

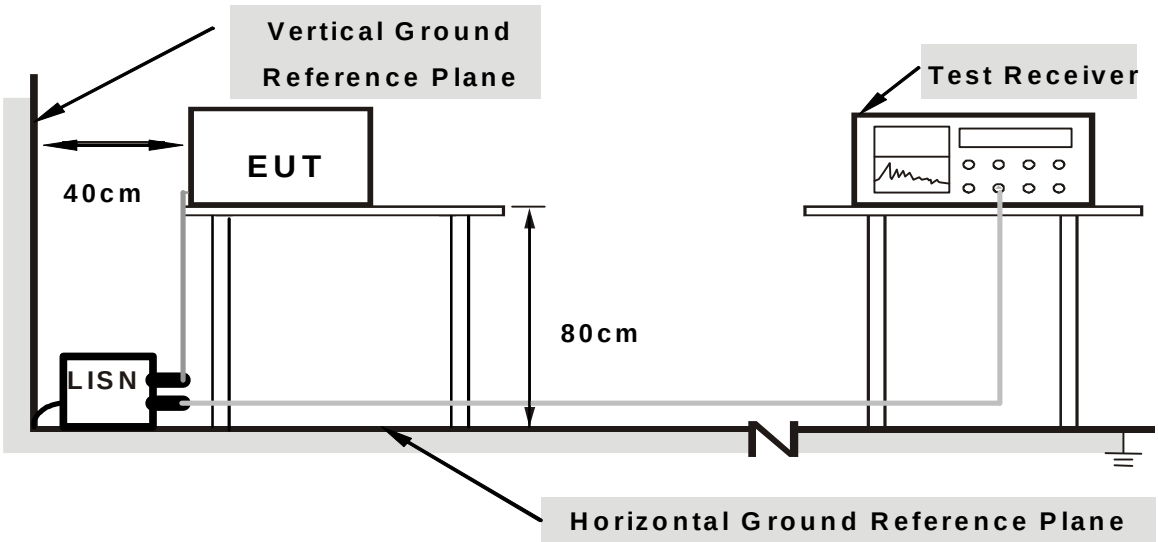
NOTE:

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

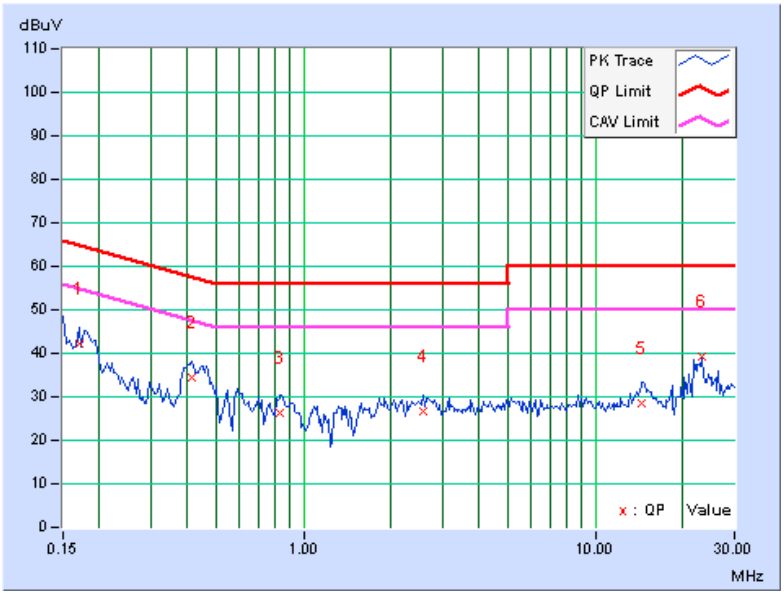
5.1.7 TEST RESULTS

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	0.13	41.96	25.67	42.09	25.80	64.98	54.98	-22.90	-29.19
2	0.41563	0.18	34.44	26.66	34.62	26.84	57.54	47.54	-22.91	-20.69
3	0.83359	0.21	26.04	21.38	26.25	21.59	56.00	46.00	-29.75	-24.41
4	2.57031	0.30	26.20	20.27	26.50	20.57	56.00	46.00	-29.50	-25.43
5	14.49219	0.85	27.79	21.36	28.64	22.21	60.00	50.00	-31.36	-27.79
6	**23.12725**	**1.13**	**38.21**	**35.31**	**39.34**	**36.44**	**60.00**	**50.00**	**-20.66**	**-13.56**

REMARKS:

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

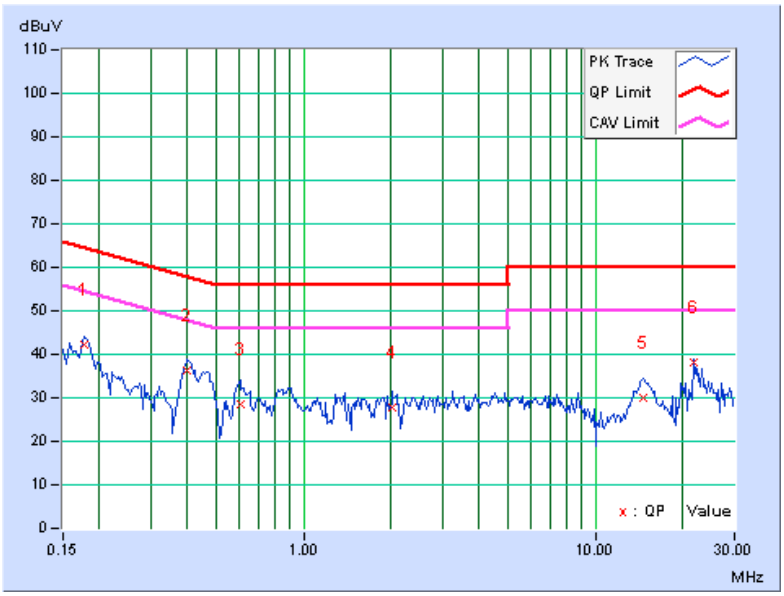


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.11	42.00	32.74	42.11	32.85	64.61	54.61	-22.50	-21.76
2	0.40000	0.17	36.18	31.04	36.35	31.21	57.85	47.85	-21.50	-16.64
3	0.60703	0.18	28.31	23.04	28.49	23.22	56.00	46.00	-27.51	-22.78
4	2.02344	0.26	27.46	22.50	27.72	22.76	56.00	46.00	-28.28	-23.24
5	14.60156	0.64	29.31	23.51	29.95	24.15	60.00	50.00	-30.05	-25.85
6	21.66178	0.76	37.31	34.23	38.07	34.99	60.00	50.00	-21.93	-15.01

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
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29,2013	Jan. 28,2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 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. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: July 19 to 30, 2013

5.2.3 TEST PROCEDURES

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

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

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

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

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

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

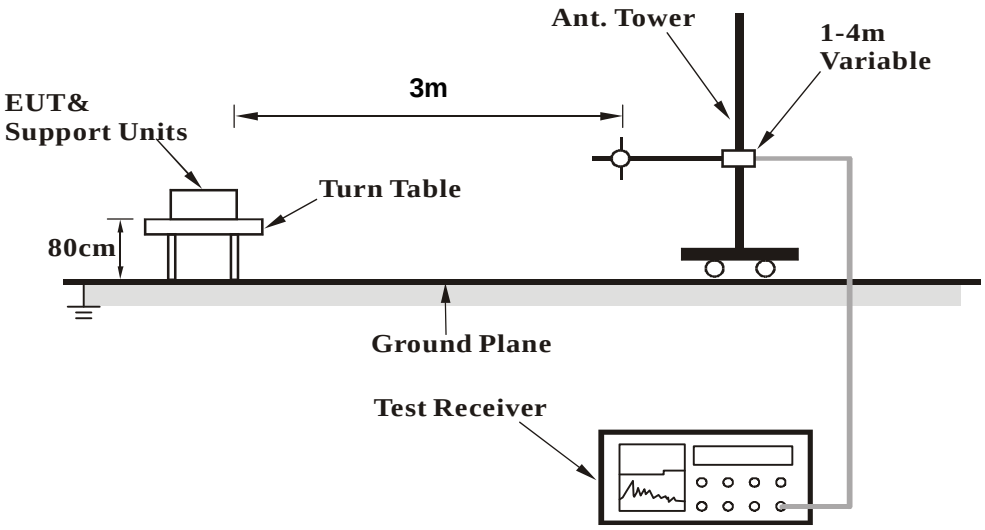
NOTE:

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

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 4.1.6

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	59.00	35.4 QP	40.0	-4.6	1.00 H	340	49.54	-14.18
2	75.00	35.5 QP	40.0	-4.5	1.00 H	296	52.60	-17.11
3	143.40	34.2 QP	43.5	-9.3	2.00 H	70	47.55	-13.32
4	400.01	34.3 QP	46.0	-11.7	1.00 H	61	44.54	-10.25
5	572.10	40.5 QP	46.0	-5.5	2.00 H	236	46.92	-6.43
6	999.40	36.3 QP	54.0	-17.7	2.00 H	219	35.40	0.94
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	77.80	33.6 QP	40.0	-6.4	1.00 V	0	51.36	-17.72
2	94.46	33.5 QP	43.5	-10.0	1.00 V	146	52.34	-18.84
3	270.00	30.9 QP	46.0	-15.2	2.00 V	3	44.68	-13.83
4	394.00	36.1 QP	46.0	-10.0	1.00 V	2	46.43	-10.38
5	806.00	29.8 QP	46.0	-16.2	2.00 V	9	31.63	-1.85
6	999.95	39.3 QP	54.0	-14.7	1.00 V	330	38.32	0.95

REMARKS:

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

ABOVE 1GHz DATA

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	5373.00	63.3 PK	74.0	-10.7	1.00 H	271	53.95	9.35
2	5373.00	52.1 AV	54.0	-1.9	1.00 H	271	42.75	9.35
3	*5745.00	112.1 PK			1.00 H	271	101.68	10.42
4	*5745.00	104.5 AV			1.00 H	271	94.08	10.42
5	7660.00	61.9 PK	74.0	-12.1	1.13 H	241	46.71	15.19
6	7660.00	50.8 AV	54.0	-3.2	1.13 H	241	35.61	15.19
7	11490.00	59.8 PK	74.0	-14.2	1.28 H	308	42.54	17.26
8	11490.00	48.3 AV	54.0	-5.7	1.28 H	308	31.04	17.26
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	5373.00	57.0 PK	74.0	-17.0	1.00 V	245	47.65	9.35
2	5373.00	44.0 AV	54.0	-10.0	1.00 V	245	34.65	9.35
3	*5745.00	104.6 PK			1.00 V	245	94.18	10.42
4	*5745.00	96.6 AV			1.00 V	245	86.18	10.42
5	7660.00	56.4 PK	74.0	-17.6	1.08 V	305	41.21	15.19
6	7660.00	47.2 AV	54.0	-6.8	1.08 V	305	32.01	15.19
7	11490.00	59.3 PK	74.0	-14.7	1.11 V	262	42.04	17.26
8	11490.00	47.8 AV	54.0	-6.2	1.11 V	262	30.54	17.26

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	5417.00	63.9 PK	74.0	-10.1	1.00 H	269	54.43	9.47
2	5417.00	52.3 AV	54.0	-1.7	1.00 H	269	42.83	9.47
3	*5785.00	112.3 PK			1.00 H	269	101.81	10.49
4	*5785.00	104.6 AV			1.00 H	269	94.11	10.49
5	7713.33	61.8 PK	74.0	-12.2	1.14 H	241	46.67	15.13
6	7713.33	50.9 AV	54.0	-3.1	1.14 H	241	35.77	15.13
7	11570.00	60.2 PK	74.0	-13.8	1.31 H	312	42.91	17.29
8	11570.00	48.1 AV	54.0	-5.9	1.31 H	312	30.81	17.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5417.00	57.4 PK	74.0	-16.6	1.00 V	237	47.93	9.47
2	5417.00	44.3 AV	54.0	-9.7	1.00 V	237	34.83	9.47
3	*5785.00	104.2 PK			1.00 V	237	93.71	10.49
4	*5785.00	96.0 AV			1.00 V	237	85.51	10.49
5	7713.33	56.2 PK	74.0	-17.8	1.12 V	297	41.07	15.13
6	7713.33	47.0 AV	54.0	-7.0	1.12 V	297	31.87	15.13
7	11570.00	58.8 PK	74.0	-15.2	1.07 V	262	41.51	17.29
8	11570.00	47.9 AV	54.0	-6.1	1.07 V	262	30.61	17.29

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier 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	5448.00	63.6 PK	74.0	-10.4	1.00 H	278	54.00	9.60
2	5448.00	52.6 AV	54.0	-1.4	1.00 H	278	43.00	9.60
3	*5825.00	111.7 PK			1.00 H	278	101.05	10.65
4	*5825.00	104.2 AV			1.00 H	278	93.55	10.65
5	11650.00	59.6 PK	74.0	-14.4	1.22 H	303	41.94	17.66
6	11650.00	47.7 AV	54.0	-6.3	1.22 H	303	30.04	17.66
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5448.00	57.9 PK	74.0	-16.1	1.00 V	235	48.30	9.60
2	5448.00	44.6 AV	54.0	-9.4	1.00 V	235	35.00	9.60
3	*5825.00	104.1 PK			1.00 V	235	93.45	10.65
4	*5825.00	95.9 AV			1.00 V	235	85.25	10.65
5	11650.00	59.0 PK	74.0	-15.0	1.11 V	232	41.34	17.66
6	11650.00	47.7 AV	54.0	-6.3	1.11 V	232	30.04	17.66

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier 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)
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	5361.00	64.6 PK	74.0	-9.4	1.00 H	284	55.26	9.34
2	5361.00	53.2 AV	54.0	-0.8	1.00 H	284	43.86	9.34
3	*5745.00	116.8 PK			1.00 H	284	106.38	10.42
4	*5745.00	109.5 AV			1.00 H	284	99.08	10.42
5	7660.00	61.6 PK	74.0	-12.4	1.18 H	231	46.41	15.19
6	7660.00	50.4 AV	54.0	-3.6	1.18 H	231	35.21	15.19
7	11490.00	61.6 PK	74.0	-12.4	1.35 H	306	44.34	17.26
8	11490.00	50.7 AV	54.0	-3.3	1.35 H	306	33.44	17.26
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	5361.00	62.2 PK	74.0	-11.8	1.14 V	173	52.86	9.34
2	5361.00	50.8 AV	54.0	-3.2	1.14 V	173	41.46	9.34
3	*5745.00	114.0 PK			1.14 V	173	103.58	10.42
4	*5745.00	107.0 AV			1.14 V	173	96.58	10.42
5	7660.00	56.4 PK	74.0	-17.6	1.10 V	310	41.21	15.19
6	7660.00	47.2 AV	54.0	-6.8	1.10 V	310	32.01	15.19
7	11490.00	61.3 PK	74.0	-12.7	1.21 V	281	44.04	17.26
8	11490.00	49.7 AV	54.0	-4.3	1.21 V	281	32.44	17.26

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	5428.00	64.6 PK	74.0	-9.4	1.00 H	284	55.07	9.51
2	5428.00	53.1 AV	54.0	-0.9	1.00 H	284	43.59	9.51
3	*5785.00	116.1 PK			1.00 H	284	105.61	10.49
4	*5785.00	108.8 AV			1.00 H	284	98.31	10.49
5	7713.33	61.9 PK	74.0	-12.1	1.18 H	231	46.77	15.13
6	7713.33	50.9 AV	54.0	-3.1	1.18 H	231	35.77	15.13
7	11570.00	60.3 PK	74.0	-13.7	1.38 H	318	43.01	17.29
8	11570.00	49.8 AV	54.0	-4.2	1.38 H	318	32.51	17.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5428.00	62.0 PK	74.0	-12.0	1.07 V	176	52.49	9.51
2	5428.00	50.8 AV	54.0	-3.2	1.07 V	176	41.29	9.51
3	*5785.00	114.3 PK			1.07 V	176	103.81	10.49
4	*5785.00	107.1 AV			1.07 V	176	96.61	10.49
5	7713.33	56.8 PK	74.0	-17.2	1.13 V	284	41.67	15.13
6	7713.33	47.5 AV	54.0	-6.5	1.13 V	284	32.37	15.13
7	11570.00	61.7 PK	74.0	-12.3	1.10 V	278	44.41	17.29
8	11570.00	49.9 AV	54.0	-4.1	1.10 V	278	32.61	17.29

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier 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	5429.00	64.9 PK	74.0	-9.1	1.00 H	283	55.38	9.52
2	**5429.00**	**53.3 AV**	**54.0**	**-0.7**	**1.00 H**	**283**	**43.78**	**9.52**
3	*5825.00	116.3 PK			1.00 H	283	105.65	10.65
4	*5825.00	109.0 AV			1.00 H	283	98.35	10.65
5	11650.00	60.3 PK	74.0	-13.7	1.35 H	289	42.64	17.66
6	11650.00	50.1 AV	54.0	-3.9	1.35 H	289	32.44	17.66
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5429.00	62.3 PK	74.0	-11.7	1.13 V	182	52.78	9.52
2	5429.00	51.0 AV	54.0	-3.0	1.13 V	182	41.48	9.52
3	*5825.00	114.0 PK			1.13 V	182	103.35	10.65
4	*5825.00	107.1 AV			1.13 V	182	96.45	10.65
5	11650.00	61.8 PK	74.0	-12.2	1.20 V	290	44.14	17.66
6	11650.00	50.0 AV	54.0	-4.0	1.20 V	290	32.34	17.66

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier 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	5382.00	64.2 PK	74.0	-9.8	1.07 H	258	54.82	9.38
2	5382.00	52.9 AV	54.0	-1.1	1.07 H	258	43.52	9.38
3	*5755.00	114.0 PK			1.00 H	284	103.57	10.43
4	*5755.00	106.4 AV			1.00 H	284	95.97	10.43
5	7673.33	62.5 PK	74.0	-11.5	1.19 H	233	47.32	15.18
6	7673.33	51.4 AV	54.0	-2.6	1.19 H	233	36.22	15.18
7	11510.00	59.2 PK	74.0	-14.8	1.34 H	315	41.97	17.23
8	11510.00	49.0 AV	54.0	-5.0	1.34 H	315	31.77	17.23
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	5382.00	62.4 PK	74.0	-11.6	1.16 V	191	53.02	9.38
2	5382.00	51.0 AV	54.0	-3.0	1.16 V	191	41.62	9.38
3	*5755.00	112.4 PK			1.04 V	192	101.97	10.43
4	*5755.00	104.7 AV			1.04 V	192	94.27	10.43
5	7673.33	56.9 PK	74.0	-17.1	1.13 V	271	41.72	15.18
6	7673.33	47.4 AV	54.0	-6.6	1.13 V	271	32.22	15.18
7	11510.00	61.6 PK	74.0	-12.4	1.15 V	302	44.37	17.23
8	11510.00	50.0 AV	54.0	-4.0	1.15 V	302	32.77	17.23

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	5395.00	65.2 PK	74.0	-8.8	1.05 H	258	55.81	9.39
2	5395.00	53.2 AV	54.0	-0.8	1.05 H	258	43.81	9.39
3	*5795.00	113.7 PK			1.00 H	282	103.20	10.50
4	*5795.00	106.4 AV			1.00 H	282	95.90	10.50
5	7726.67	62.9 PK	74.0	-11.1	1.22 H	231	47.79	15.11
6	7726.67	51.7 AV	54.0	-2.3	1.22 H	231	36.59	15.11
7	11590.00	59.8 PK	74.0	-14.2	1.39 H	302	42.49	17.31
8	11590.00	49.5 AV	54.0	-4.5	1.39 H	302	32.19	17.31
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	5395.00	63.0 PK	74.0	-11.0	1.13 V	155	53.61	9.39
2	5395.00	51.4 AV	54.0	-2.6	1.13 V	155	42.01	9.39
3	*5795.00	111.7 PK			1.09 V	180	101.20	10.50
4	*5795.00	104.2 AV			1.09 V	180	93.70	10.50
5	7726.67	56.6 PK	74.0	-17.4	1.15 V	271	41.49	15.11
6	7726.67	47.0 AV	54.0	-7.0	1.15 V	271	31.89	15.11
7	11590.00	61.5 PK	74.0	-12.5	1.19 V	296	44.19	17.31
8	11590.00	50.0 AV	54.0	-4.0	1.19 V	296	32.69	17.31

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

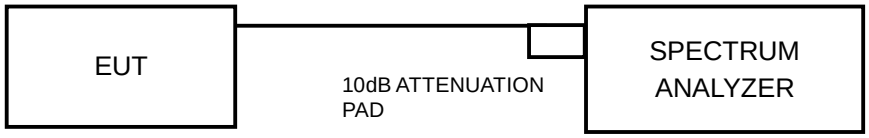
5.3.3 TEST PROCEDURE

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

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	16.61	0.5	PASS
157	5785	16.55	0.5	PASS
165	5825	16.61	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.89	17.89	17.85	0.5	PASS
157	5785	17.89	17.88	17.83	0.5	PASS
165	5825	17.86	17.88	17.81	0.5	PASS

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.60	36.58	36.61	0.5	PASS
159	5795	36.58	36.61	36.59	0.5	PASS

5.4 CONDUCTED OUTPUT POWER MEASUREMENT

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 Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

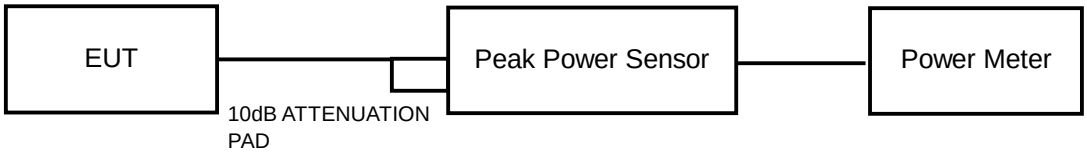
5.4.3 TEST PROCEDURES

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

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6

5.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	180.717	22.57	30	PASS
157	5785	182.390	22.61	30	PASS
165	5825	183.231	22.63	30	PASS

802.11n (HT20)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	22.29	22.95	22.84	558.985	27.47	30	PASS
157	5785	22.31	22.74	22.88	552.237	27.42	30	PASS
165	5825	22.19	22.47	22.31	512.397	27.10	30	PASS

802.11n (HT40)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	21.51	22.07	22.02	461.865	26.65	30	PASS
159	5795	21.54	22.12	22.20	471.450	26.73	30	PASS

5.5 AVERAGE OUTPUT POWER

5.5.1 FOR REFERENCE.

5.5.2 TEST INSTRUMENTS

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

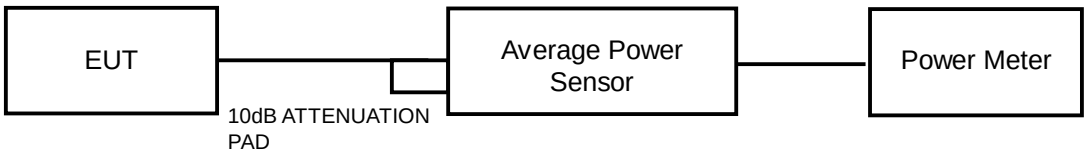
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

5.5.3 TEST PROCEDURES

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

5.5.4 TEST SETUP



5.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6

5.5.6 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
149	5745	68.234	18.34
157	5785	69.502	18.42
165	5825	70.307	18.47

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	18.32	18.77	18.58	215.367	23.33
157	5785	18.31	18.21	18.91	211.790	23.26
165	5825	18.29	18.26	18.23	200.968	23.03

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	18.27	18.46	18.16	202.753	23.07
159	5795	18.35	18.51	18.14	204.512	23.11

5.6 POWER SPECTRAL DENSITY MEASUREMENT

5.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

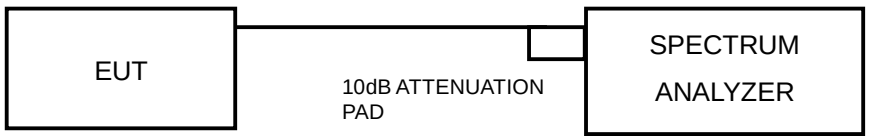
5.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

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

802.11a

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	-10.66	8	PASS
157	5785	-8.88	8	PASS
165	5825	-10.98	8	PASS

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-10.04	4.77	-5.27	6.43	PASS
	157	5785	-9.36	4.77	-4.59	6.43	PASS
	165	5825	-9.78	4.77	-5.01	6.43	PASS
1	149	5745	-9.67	4.77	-4.90	6.43	PASS
	157	5785	-10.41	4.77	-5.64	6.43	PASS
	165	5825	-10.82	4.77	-6.05	6.43	PASS
2	149	5745	-10.18	4.77	-5.41	6.43	PASS
	157	5785	-10.47	4.77	-5.70	6.43	PASS
	165	5825	-10.19	4.77	-5.42	6.43	PASS

NOTE: Directional gain = 2.8dBi + 10log(3) = 7.57dBi > 6dBi , so the power density limit shall be reduced to 8-(7.57-6) = 6.43dBm.

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TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-12.20	4.77	-7.43	6.43	PASS
	159	5795	-12.13	4.77	-7.36	6.43	PASS
1	151	5755	-11.74	4.77	-6.97	6.43	PASS
	159	5795	-11.42	4.77	-6.65	6.43	PASS
2	151	5755	-12.08	4.77	-7.31	6.43	PASS
	159	5795	-13.77	4.77	-9.00	6.43	PASS

NOTE: Directional gain = 2.8dBi + 10log(3) = 7.57dBi > 6dBi , so the power density limit shall be reduced to 8-(7.57-6) = 6.43dBm.

5.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

5.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 30, 2013

5.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

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

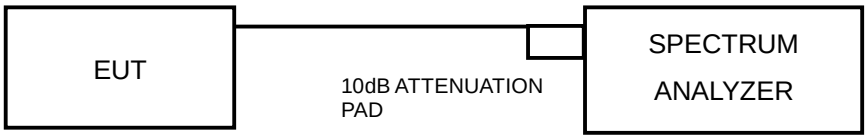
Measurement Procedure –Unwanted Emission Level

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

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP



5.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.7.7 TEST RESULTS

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

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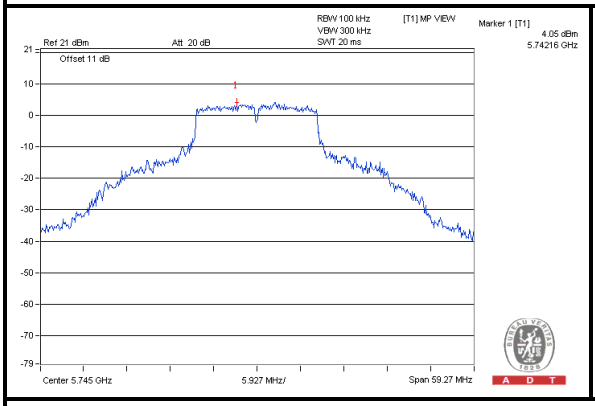

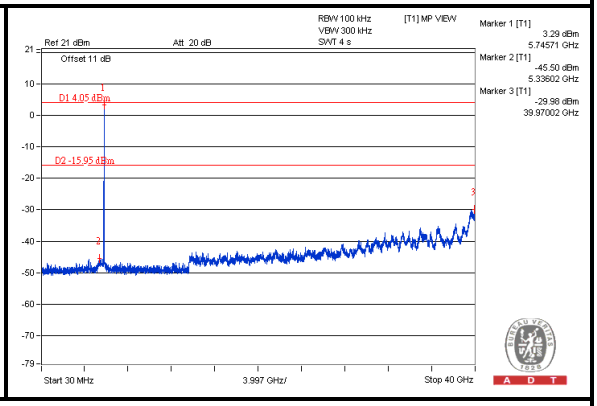

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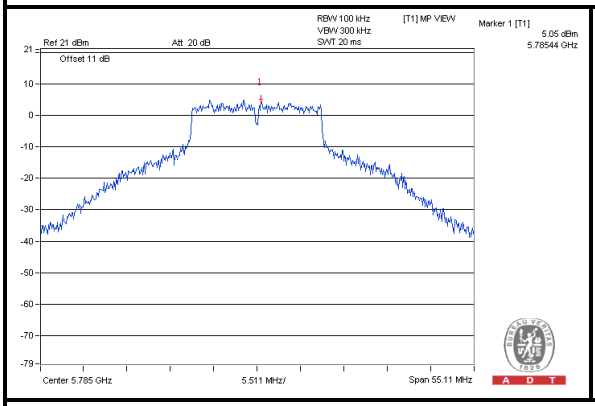

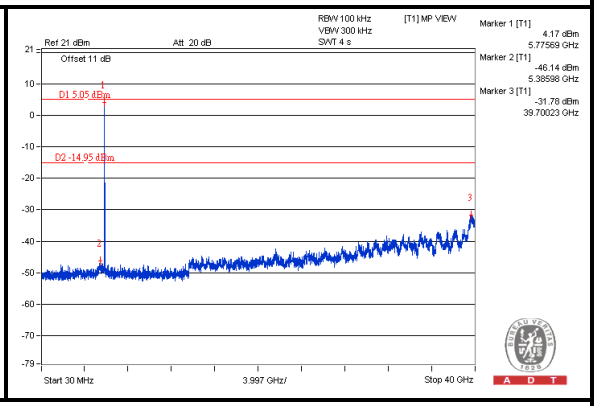

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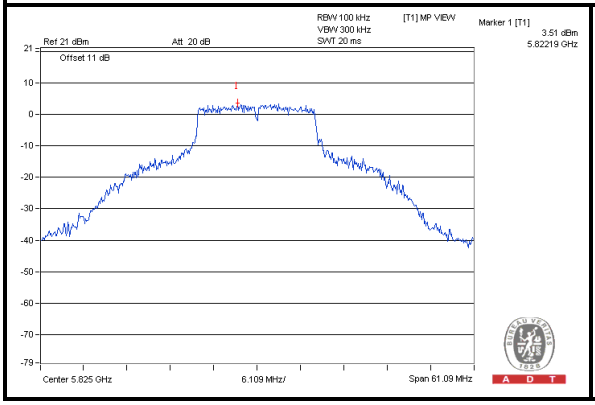

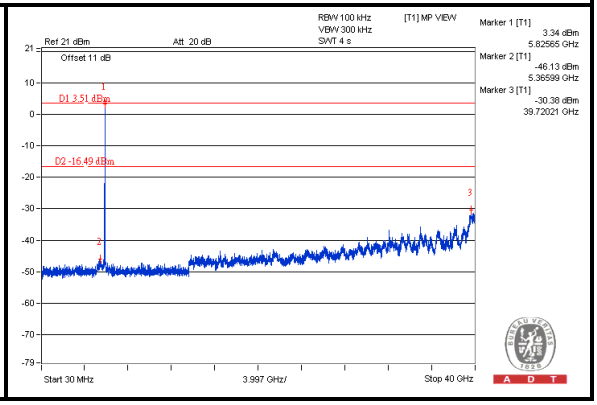

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For Chain 0

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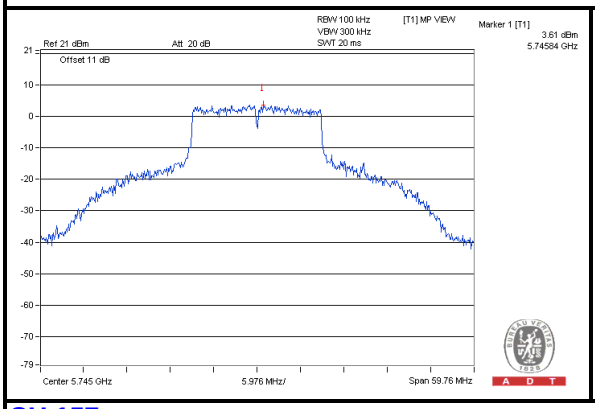
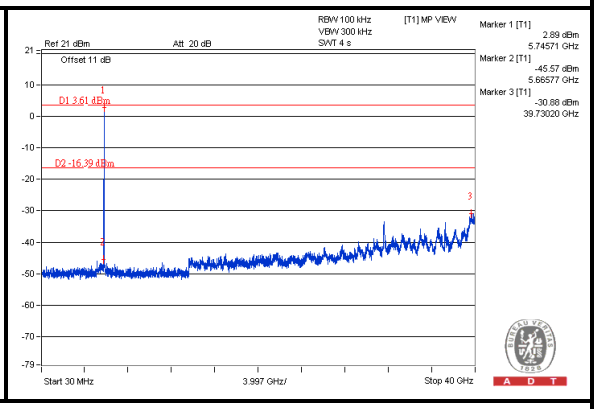
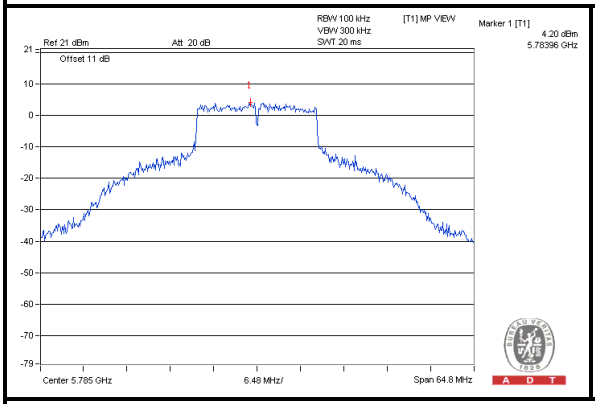
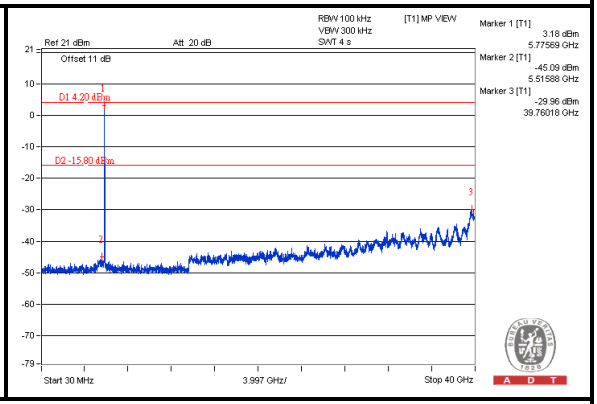




CH 157





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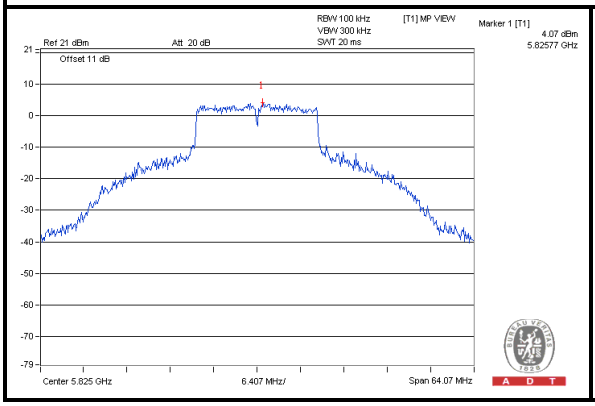
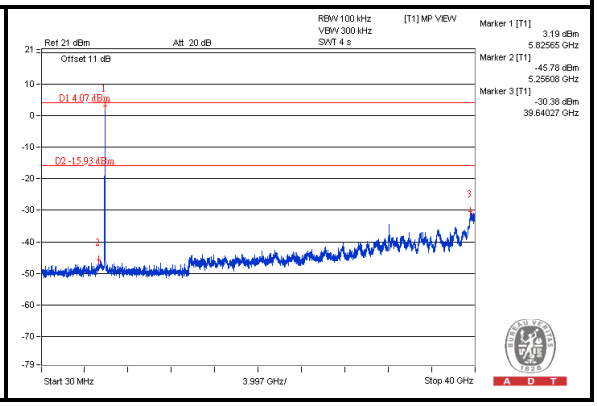
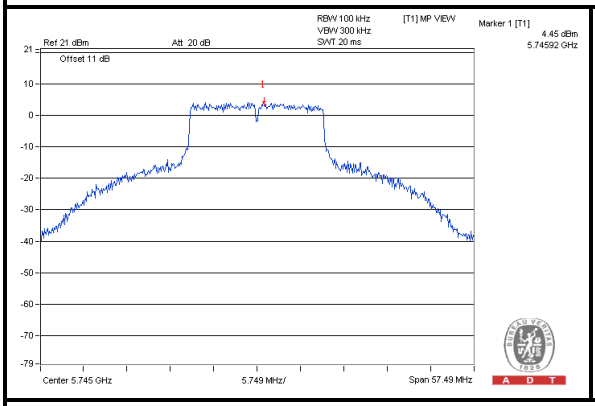
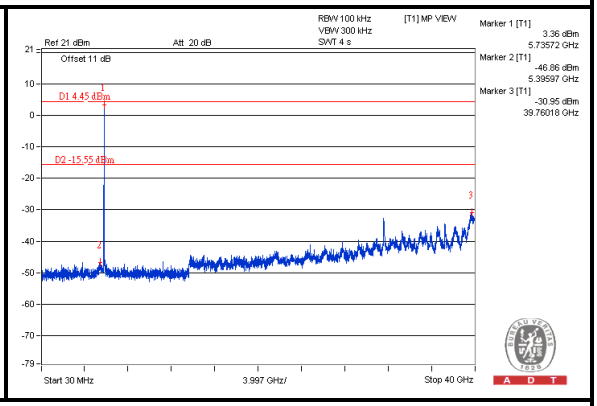




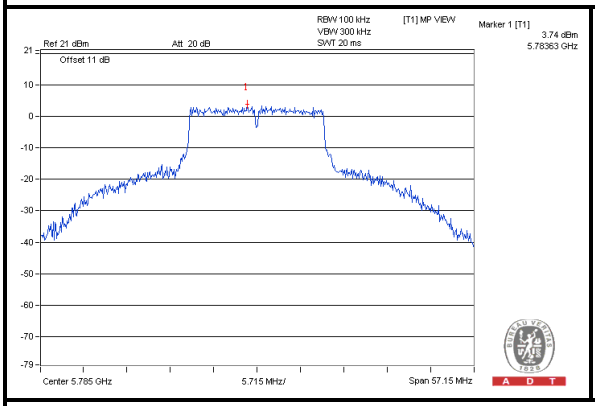
For Chain 1

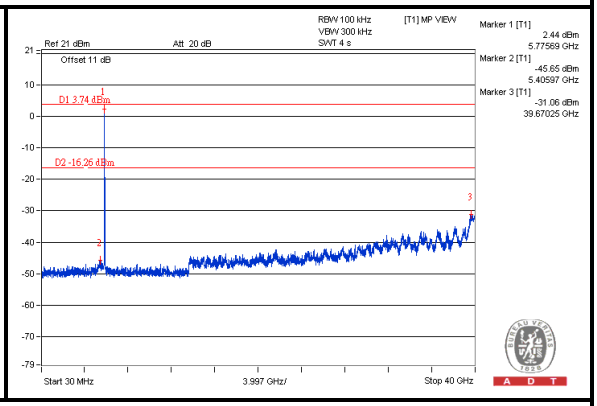
CH 149



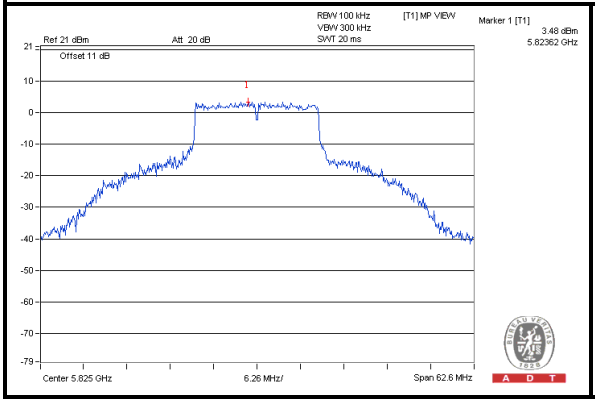


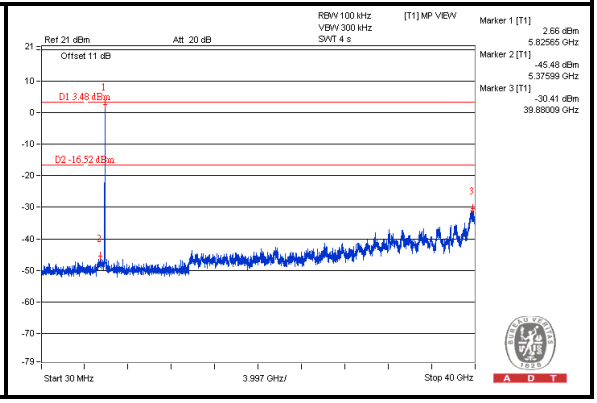
CH 157





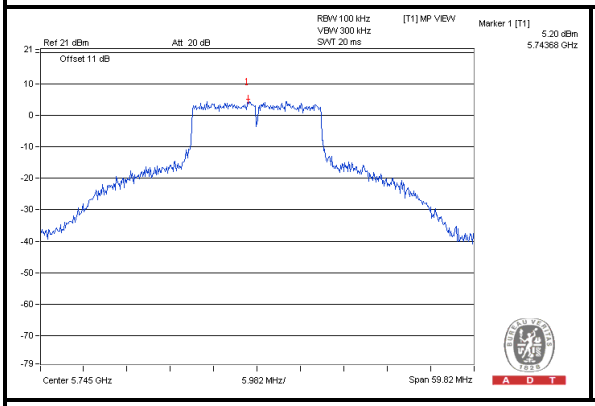
CH 165

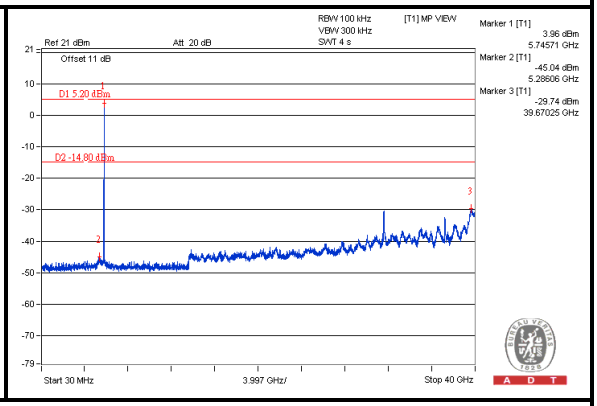




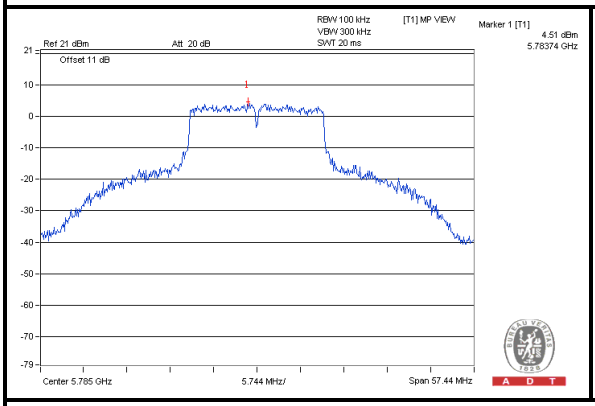
For Chain 2

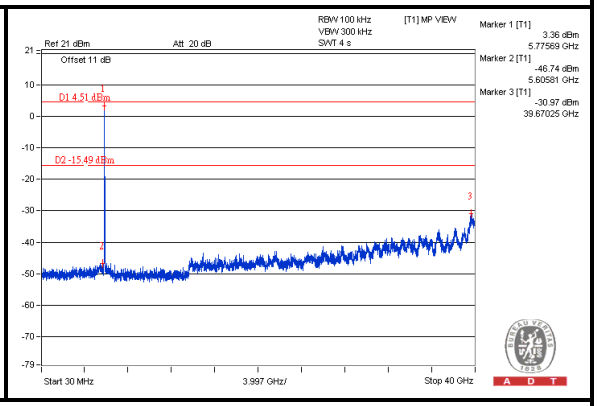
CH 149



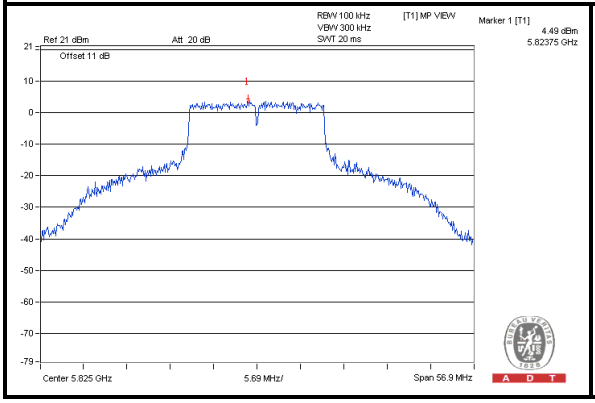


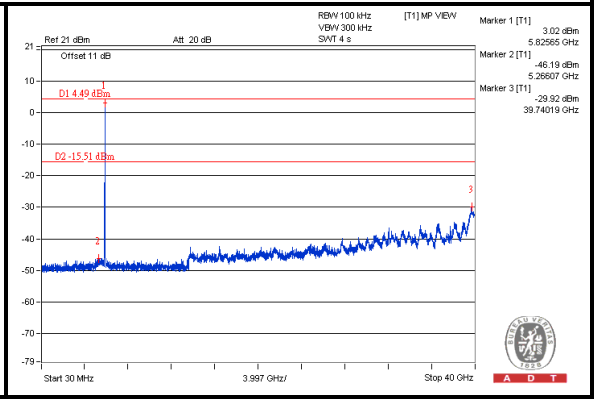
CH 157





CH 165

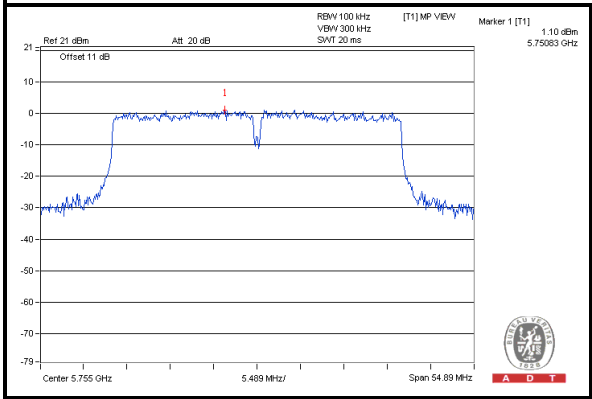


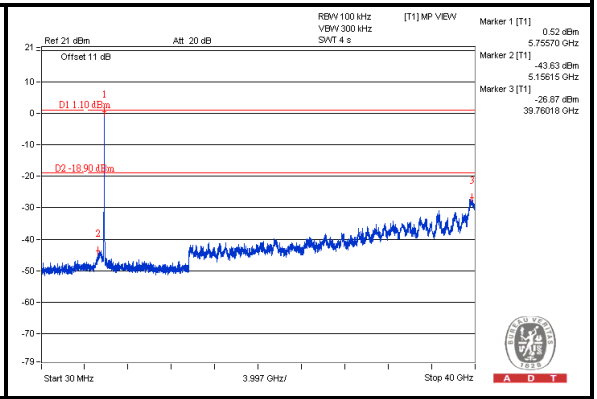


802.11n (HT40)

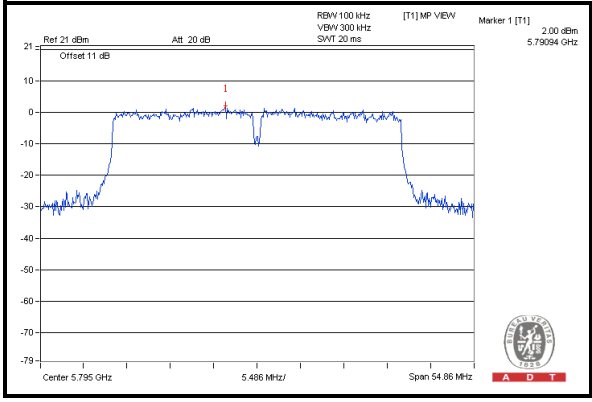
For Chain 0

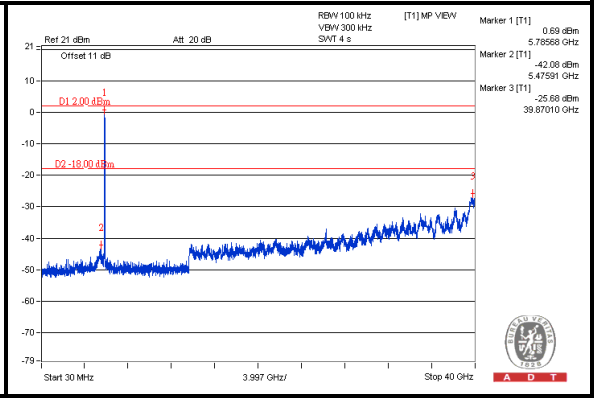
CH 151





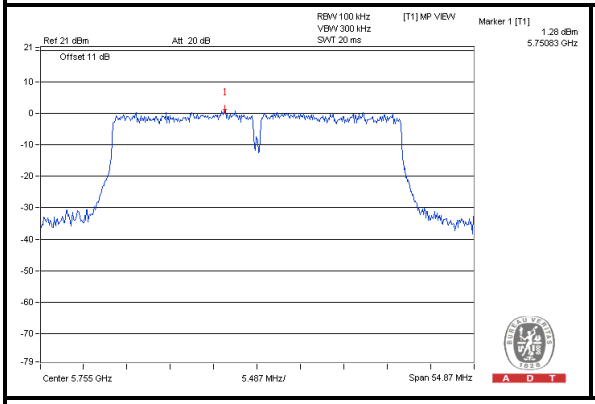
CH 159

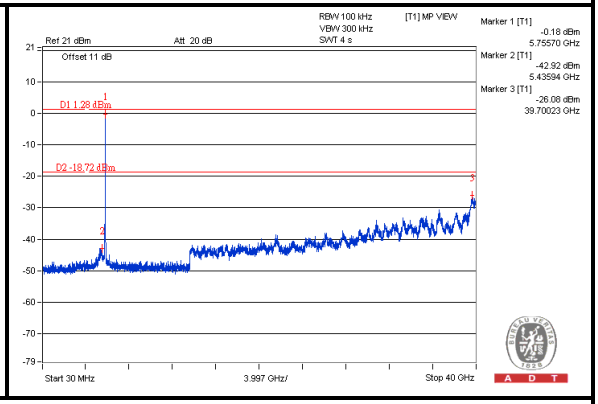




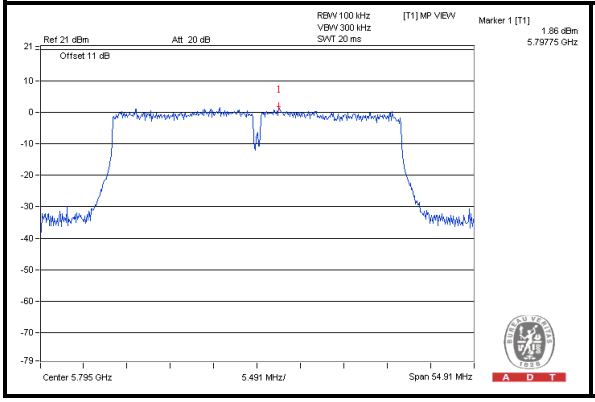
For Chain 1

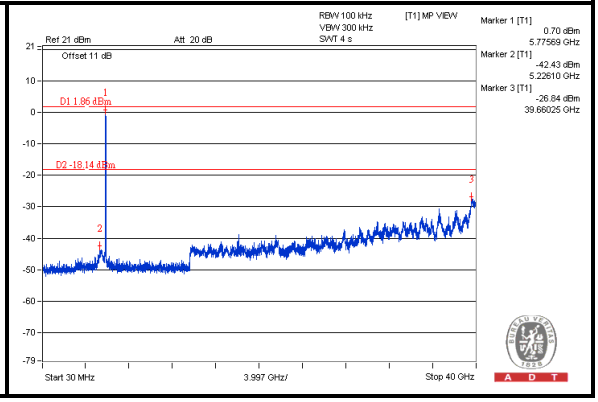
CH 151





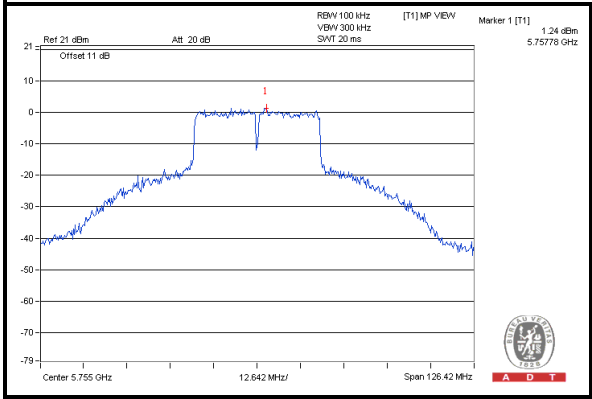
CH 159

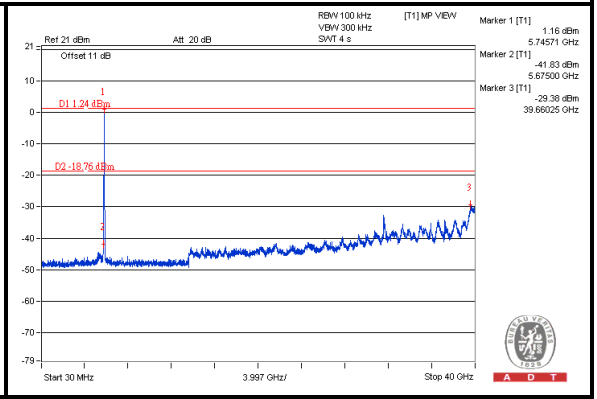




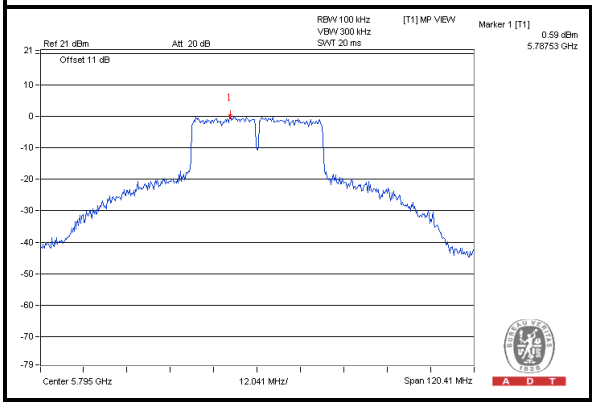
For Chain 2

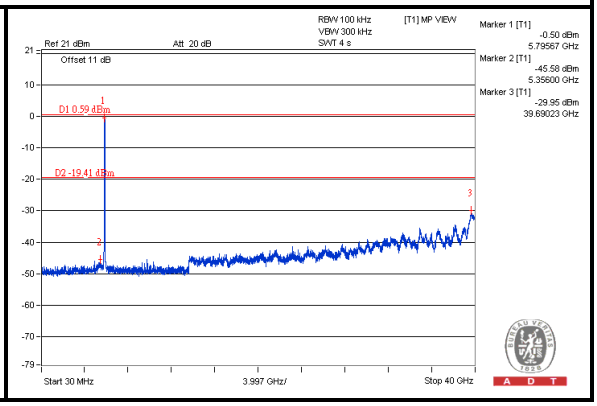
CH 151





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:
Tel: 886-2-26052180
Fax: 886-2-26052943

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

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

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