FCC TEST REPORT (15.247)

REPORT NO.: RF141117E18E

MODEL NO.: EX6120

FCC ID: PY315200308

RECEIVED: Nov. 17, 2014

TESTED: Nov. 18, 2014 to Jan. 06, 2015

ISSUED: June 25, 2015

APPLICANT: NETGEAR, Inc.

ADDRESS: 350 East Plumeria Drive San Jose, CA 95134

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

LAB ADDRESS : No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

TEST LOCATION (1): No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

TEST LOCATION (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification

Table of Contents

RELEASE CONTROL RECORD 4
1. CERTIFICATION 5
2. SUMMARY OF TEST RESULTS 6
2.1 MEASUREMENT UNCERTAINTY 7
3. GENERAL INFORMATION 8
3.1 GENERAL DESCRIPTION OF EUT 8
3.2 DESCRIPTION OF TEST MODES 10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL 11
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS 14
3.4 DUTY CYCLE OF TEST SIGNAL 15
3.5 DESCRIPTION OF SUPPORT UNITS 16
3.6 CONFIGURATION OF SYSTEM UNDER TEST 17
4. TEST TYPES AND RESULTS 18
4.1 CONDUCTED EMISSION MEASUREMENT 18
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 18
4.1.2 TEST INSTRUMENTS 18
4.1.3 TEST PROCEDURES 19
4.1.4 DEVIATION FROM TEST STANDARD 19
4.1.5 TEST SETUP 19
4.1.6 EUT OPERATING CONDITIONS 20
4.1.7 TEST RESULTS 21
4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT 23
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT 23
4.2.2 TEST INSTRUMENTS 24
4.2.3 TEST PROCEDURES 26
4.2.4 DEVIATION FROM TEST STANDARD 26
4.2.5 TEST SETUP 27
4.2.6 EUT OPERATING CONDITIONS 27
4.2.7 TEST RESULTS 28
4.3 6DB BANDWIDTH MEASUREMENT 41
4.3.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT 41
4.3.2 TEST INSTRUMENTS 41
4.3.3 TEST PROCEDURE 41
4.3.4 DEVIATION FROM TEST STANDARD 41
4.3.5 TEST SETUP 41
4.3.6 EUT OPERATING CONDITIONS 41
4.3.7 TEST RESULTS 42
4.4 OCCUPIED BANDWIDTH MEASUREMENT 44
4.4.1 TEST INSTRUMENTS 44
4.4.2 TEST PROCEDURE 44
4.4.3 DEVIATION FROM TEST STANDARD 44
4.4.4 TEST SETUP 44
4.4.5 EUT OPERATING CONDITIONS 44
4.4.6 TEST RESULTS 45
4.5 CONDUCTED OUTPUT POWER MEASUREMENT 47
4.5.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT 47
4.5.2 TEST INSTRUMENTS 47
4.5.3 TEST PROCEDURES 47
4.5.4 DEVIATION FROM TEST STANDARD 48
4.5.5 TEST SETUP 48
4.5.6 EUT OPERATING CONDITIONS 48

4.5.7 TEST RESULTS 49
4.6 POWER SPECTRAL DENSITY MEASUREMENT 51
4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT 51
4.6.2 TEST INSTRUMENTS 51
4.6.3 TEST PROCEDURE 51
4.6.4 DEVIATION FROM TEST STANDARD 51
4.6.5 TEST SETUP 51
4.6.6 EUT OPERATING CONDITION 51
4.6.7 TEST RESULTS 52
4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT 55
4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT 55
4.7.2 TEST INSTRUMENTS 55
4.7.3 TEST PROCEDURE 55
4.7.4 DEVIATION FROM TEST STANDARD 56
4.7.5 TEST SETUP 56
4.7.6 EUT OPERATING CONDITION 56
4.7.7 TEST RESULTS 56
5. PHOTOGRAPHS OF THE TEST CONFIGURATION 65
6. INFORMATION ON THE TESTING LABORATORIES 66
7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 67

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141117E18E	Original release	June 25, 2015

1. CERTIFICATION

PRODUCT:	Wi-Fi Range Extender
BRAND NAME:	NETGEAR
MODEL NO.:	EX6120
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	NETGEAR, Inc.
TESTED:	Nov. 18, 2014 to Jan. 06, 2015
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: EX6120) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** June 25, 2015
(Midoli Peng, Specialist)

Approved by : _____ , **Date:** June 25, 2015
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -14.22dB at 21.66406MHz
15.205 15.209 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 4824.00MHz
15.247(d)	Antenna Port Emission	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: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.25GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wi-Fi Range Extender
MODEL NO.	EX6120
POWER SUPPLY	100-250Vac, 0.14A, 50-60Hz
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	**For 15.407** 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 306.426mW 802.11ac (VHT20): 281.355mW 802.11ac (VHT40): 152.769mW 802.11ac (VHT80): 45.764mW **For 15.247** 802.11b: 326.715mW 802.11g: 616.958mW 802.11n (HT20): 583.627mW 802.11n (HT40): 419.89mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. The antennas provided to the EUT, please refer to the following table:

Ant. No.	Brand	Model	Antenna Gain(dBi) <including cable loss>	Frequency range (GHz ~ GHz)	Antenna Type	Connecter Type	Cable Length (mm)
Antenna R	NETGEAR	NA	3.1	2.4~2.4835	Dipole	i-pex (MHF)	35
			3	5.15~5.25			
			3.2	5.25~5.35			
			3.2	5.47~5.725			
			3.3	5.725~5.85			
Antenna L	NETGEAR	NA	3.2	2.4~2.4835	Dipole	i-pex (MHF)	75
			4	5.15~5.25			
			4	5.25~5.35			
			3.9	5.47~5.725			
			3.1	5.725~5.85			

3. The EUT incorporates a MIMO function.

For 2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
For 5GHz Band			
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 Nss= 1	2TX	2RX
	MCS0~8 Nss= 2	2TX	2RX
802.11ac (VHT40) & 802.11ac (VHT80)	MCS0~9 Nss= 1	2TX	2RX
	MCS0~9 Nss= 2	2TX	2RX

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

4. 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

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

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

7 channels are provided for 802.11n (HT40):

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

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

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

OB: Conducted Out-Band Emission Measurement

NOTE: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane** (for below 1GHz) and **Y-plane** (for above 1GHz).

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

CONDUCTED OUT-BAND EMISSION MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	24deg. C, 71%RH	120Vac, 60Hz	Wythe Lin
RE<1G	25deg. C, 74%RH	120Vac, 60Hz	Gary Cheng
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Gary Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen
OB	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r02

662911 D01 Multiple Transmitter Output v02r01

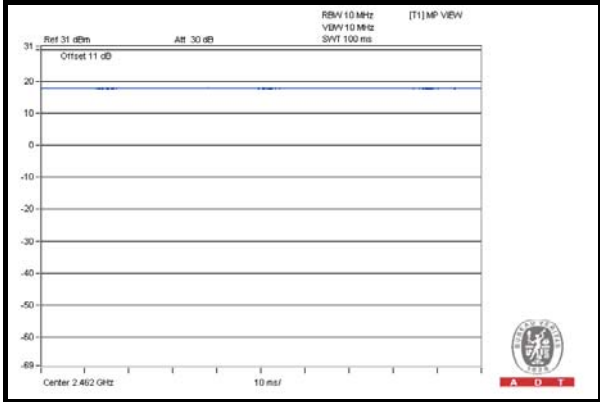
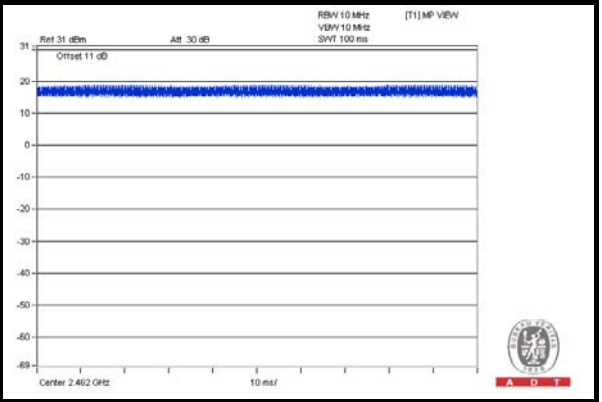
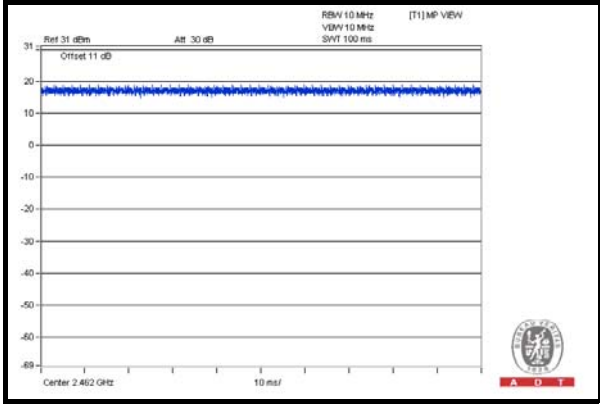
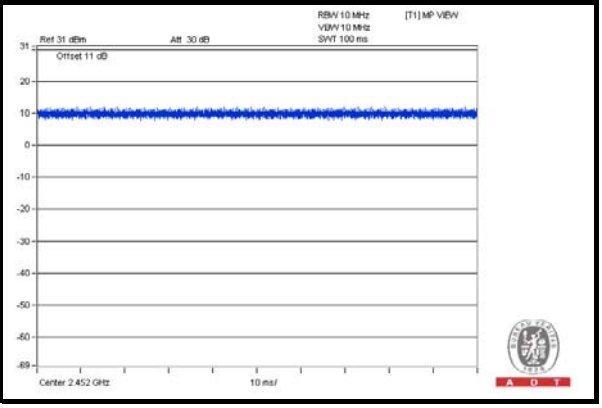
ANSI C63.10-2009

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 DUTY CYCLE OF TEST SIGNAL

Duty cycle of test signal is 100 %, duty factor is not required.

802.11b	802.11g
	
802.11n (HT20)	**802.11n (HT40)**
	

3.5 DESCRIPTION OF SUPPORT UNITS

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

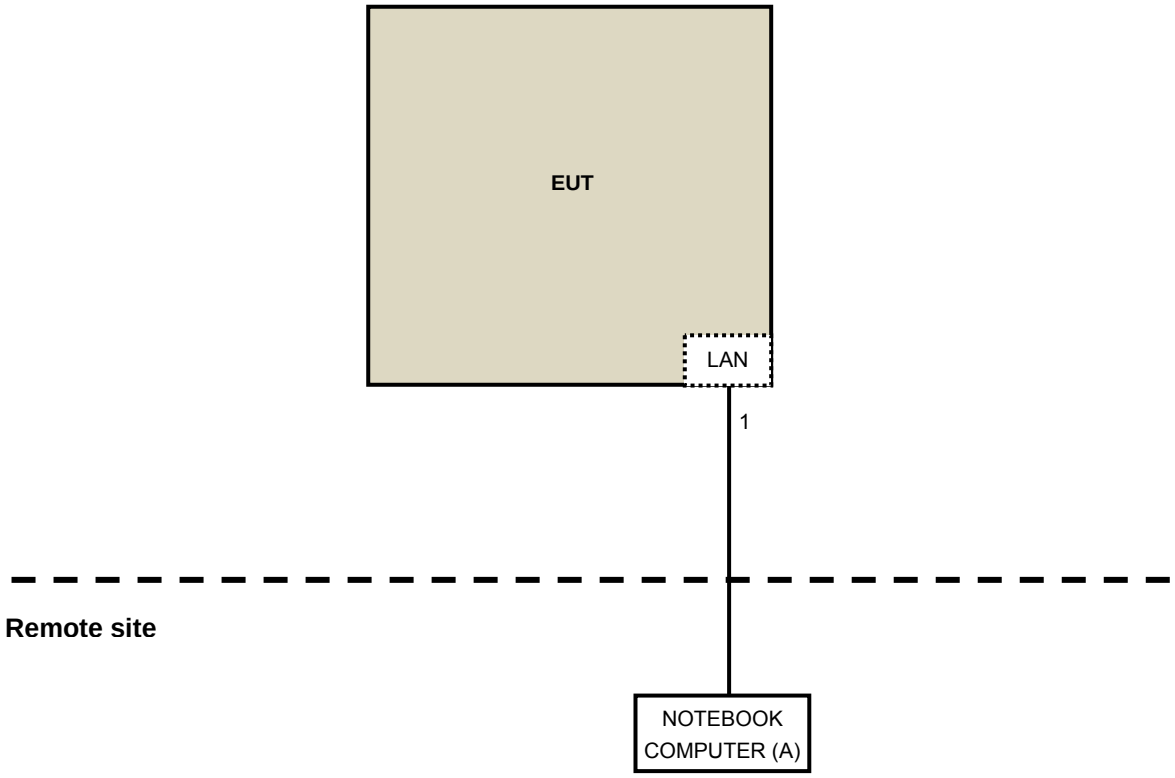
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	PP32LA	HSLB32S	FCC DoC	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	RJ45	1	10	No	0	Provided by Lab

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10, 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
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: Nov. 28, 2014

4.1.3 TEST PROCEDURES

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

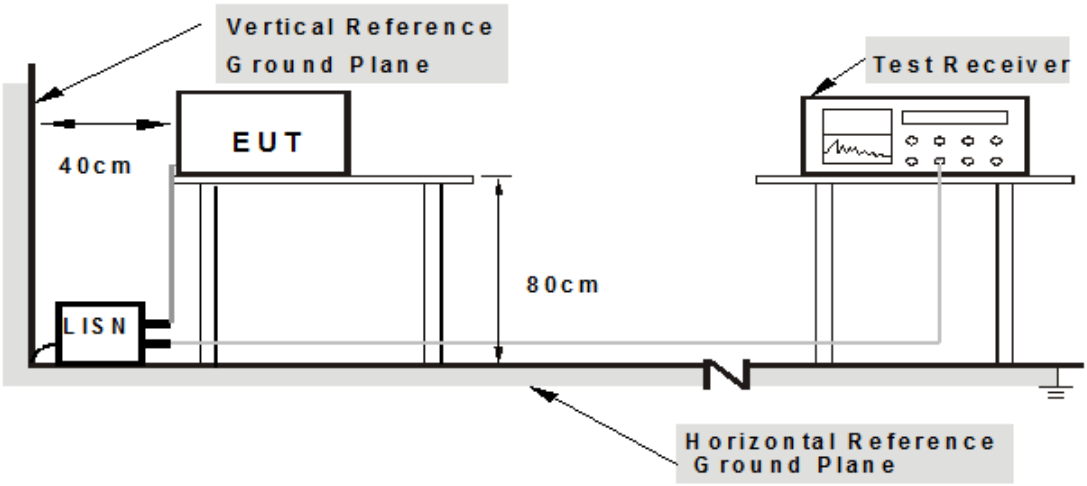
NOTE:

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed in remote site.
2. The communication partner run test program “QATool.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

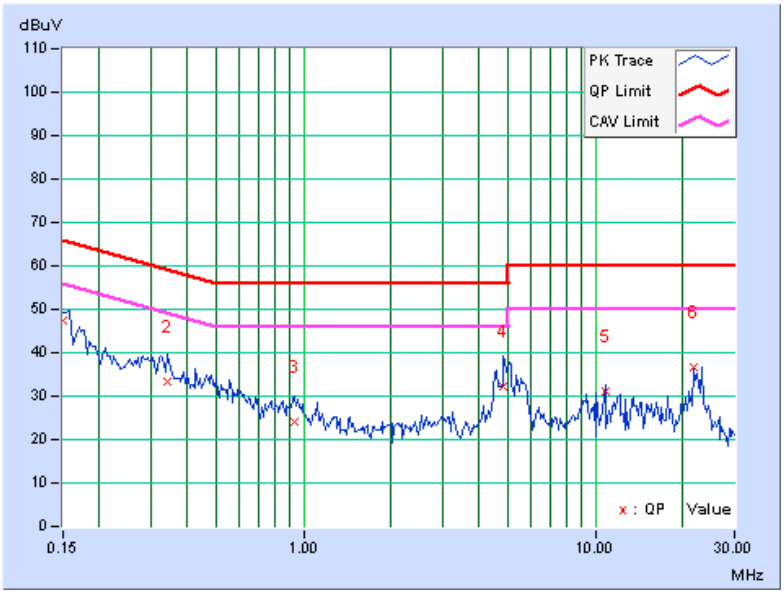
4.1.7 TEST RESULTS

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

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.07	47.39	39.07	47.46	39.14	66.00	56.00	-18.54	-16.86
2	0.34141	0.08	33.19	29.99	33.27	30.07	59.17	49.17	-25.89	-19.09
3	0.92734	0.13	24.01	20.27	24.14	20.40	56.00	46.00	-31.86	-25.60
4	4.82813	0.28	31.84	24.19	32.12	24.47	56.00	46.00	-23.88	-21.53
5	10.79297	0.47	30.54	28.51	31.01	28.98	60.00	50.00	-28.99	-21.02
6	21.66406	0.73	35.92	34.76	36.65	35.49	60.00	50.00	-23.35	-14.51

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

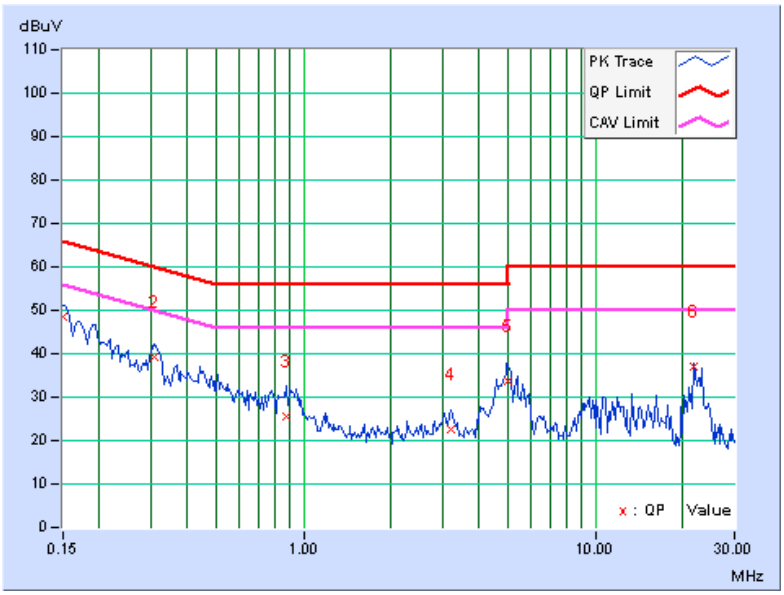


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

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	0.15000	0.07	48.39	39.76	48.46	39.83	66.00	56.00	-17.54	-16.17
2	0.30625	0.08	39.33	34.63	39.41	34.71	60.07	50.07	-20.67	-15.37
3	0.87266	0.12	25.34	21.41	25.46	21.53	56.00	46.00	-30.54	-24.47
4	3.19531	0.23	22.20	15.77	22.43	16.00	56.00	46.00	-33.57	-30.00
5	5.00781	0.29	33.24	24.83	33.53	25.12	60.00	50.00	-26.47	-24.88
6	**21.66406**	**0.78**	**36.21**	**35.00**	**36.99**	**35.78**	**60.00**	**50.00**	**-23.01**	**-14.22**

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

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 17, 2014	Jan. 16, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Nov. 18, 2014

For Above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 17, 2014	Jan. 16, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 11, 2014	Dec. 10, 2015
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: Jan. 05, 2015

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) 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:

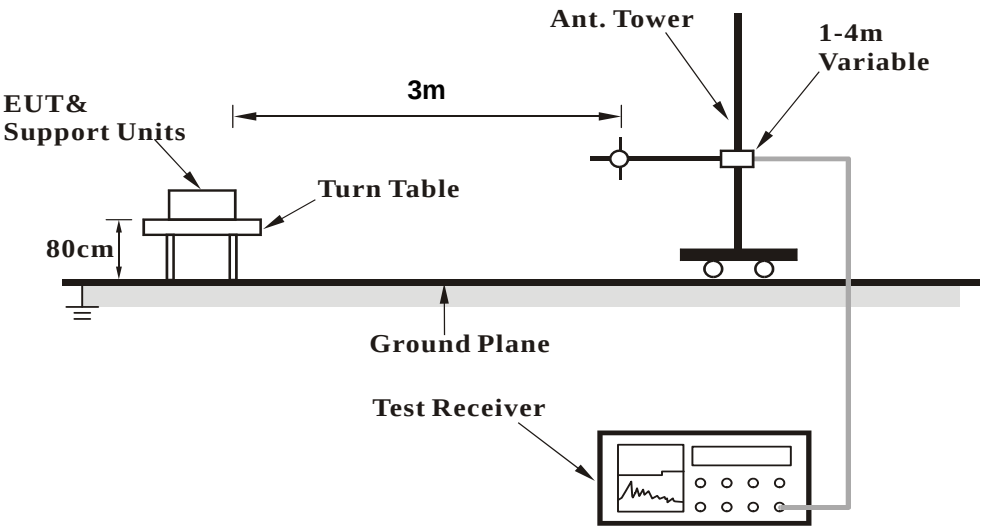
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

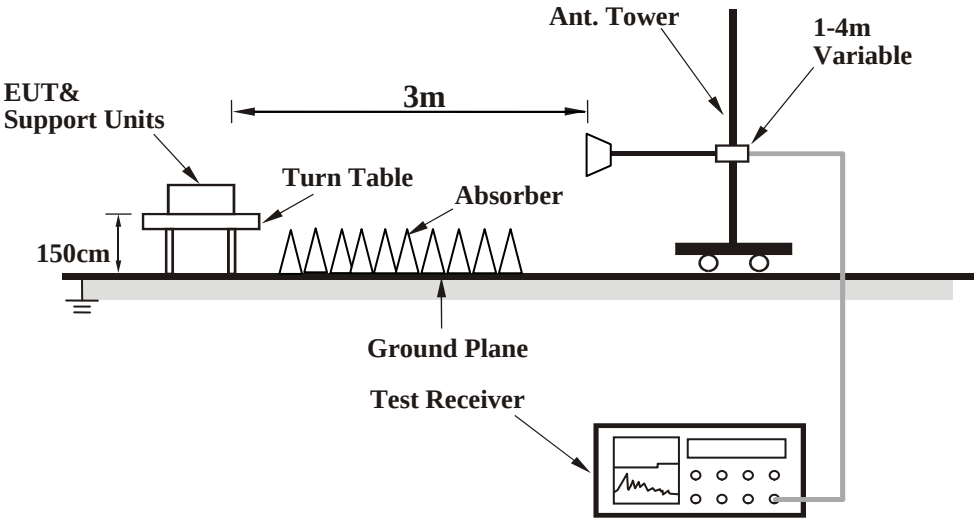
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

802.11g

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	101.88	28.2 QP	43.5	-15.3	1.50 H	287	45.32	-17.16
2	148.10	29.9 QP	43.5	-13.6	2.00 H	66	42.83	-12.93
3	161.82	27.0 QP	43.5	-16.5	2.00 H	360	40.10	-13.11
4	250.00	30.3 QP	46.0	-15.7	1.00 H	58	44.20	-13.91
5	913.52	37.8 QP	46.0	-8.2	1.00 H	360	37.26	0.55
6	927.01	36.2 QP	46.0	-9.8	1.00 H	360	35.36	0.83
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	34.71	34.8 QP	40.0	-5.2	1.00 V	173	49.13	-14.33
2	51.82	35.7 QP	40.0	-4.4	1.22 V	3	49.04	-13.39
3	58.71	35.1 QP	40.0	-4.9	1.00 V	247	48.82	-13.70
4	106.73	30.2 QP	43.5	-13.3	1.00 V	333	46.54	-16.38
5	912.89	34.5 QP	46.0	-11.5	1.00 V	100	33.93	0.54
6	956.98	35.1 QP	46.0	-10.9	1.50 V	243	33.89	1.17

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)
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	65.6 PK	74.0	-8.4	1.01 H	102	68.34	-2.74
2	2390.00	40.1 AV	54.0	-13.9	1.01 H	102	42.84	-2.74
3	*2412.00	106.1 PK			1.01 H	102	108.74	-2.64
4	*2412.00	103.0 AV			1.01 H	102	105.64	-2.64
5	4824.00	51.1 PK	74.0	-22.9	1.30 H	327	45.83	5.27
6	4824.00	47.0 AV	54.0	-7.0	1.30 H	327	41.73	5.27
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.1 PK	74.0	-17.9	1.04 V	9	58.84	-2.74
2	2390.00	43.8 AV	54.0	-10.2	1.04 V	9	46.54	-2.74
3	*2412.00	113.9 PK			1.04 V	9	116.54	-2.64
4	*2412.00	111.5 AV			1.04 V	9	114.14	-2.64
5	4824.00	56.7 PK	74.0	-17.3	1.11 V	360	51.43	5.27
6	**4824.00**	**53.9 AV**	**54.0**	**-0.1**	**1.11 V**	**360**	**48.63**	**5.27**

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) 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	59.8 PK	74.0	-14.2	1.03 H	24	62.54	-2.74
2	2390.00	35.6 AV	54.0	-18.4	1.03 H	24	38.34	-2.74
3	*2437.00	106.2 PK			1.03 H	24	108.73	-2.53
4	*2437.00	104.5 AV			1.03 H	24	107.03	-2.53
5	2483.50	61.4 PK	74.0	-12.6	1.03 H	24	63.72	-2.32
6	2483.50	41.2 AV	54.0	-12.8	1.03 H	24	43.52	-2.32
7	4874.00	51.3 PK	74.0	-22.7	1.10 H	35	45.81	5.49
8	4874.00	48.0 AV	54.0	-6.0	1.10 H	35	42.51	5.49
9	7311.00	53.2 PK	74.0	-20.8	1.08 H	283	40.50	12.70
10	7311.00	46.4 AV	54.0	-7.6	1.08 H	283	33.70	12.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.3 PK	74.0	-19.7	1.04 V	262	57.04	-2.74
2	2390.00	40.7 AV	54.0	-13.3	1.04 V	262	43.44	-2.74
3	*2437.00	115.2 PK			1.04 V	262	117.73	-2.53
4	*2437.00	112.7 AV			1.04 V	262	115.23	-2.53
5	2483.50	58.3 PK	74.0	-15.7	1.04 V	262	60.62	-2.32
6	2483.50	44.9 AV	54.0	-9.1	1.04 V	262	47.22	-2.32
7	4874.00	57.5 PK	74.0	-16.5	1.10 V	331	52.01	5.49
8	4874.00	53.1 AV	54.0	-0.9	1.10 V	331	47.61	5.49
9	7311.00	58.7 PK	74.0	-15.3	1.10 V	331	46.00	12.70
10	7311.00	53.8 AV	54.0	-0.2	1.10 V	331	41.10	12.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	106.3 PK			1.00 H	22	108.72	-2.42
2	*2462.00	103.3 AV			1.00 H	22	105.72	-2.42
3	2483.50	67.1 PK	74.0	-6.9	1.00 H	22	69.42	-2.32
4	2483.50	40.4 AV	54.0	-13.6	1.00 H	22	42.72	-2.32
5	4924.00	51.7 PK	74.0	-22.3	1.14 H	51	46.00	5.70
6	4924.00	47.6 AV	54.0	-6.4	1.14 H	51	41.90	5.70
7	7386.00	50.9 PK	74.0	-23.1	1.07 H	293	38.22	12.68
8	7386.00	43.1 AV	54.0	-10.9	1.07 H	293	30.42	12.68
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	114.1 PK			1.01 V	97	116.52	-2.42
2	*2462.00	111.7 AV			1.01 V	97	114.12	-2.42
3	4924.00	57.0 PK	74.0	-17.0	1.07 V	360	51.30	5.70
4	4924.00	53.8 AV	54.0	-0.2	1.07 V	360	48.10	5.70
5	7386.00	56.8 PK	74.0	-17.2	1.20 V	78	44.12	12.68
6	7386.00	53.5 AV	54.0	-0.5	1.20 V	78	40.82	12.68

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	60.4 PK	74.0	-13.6	1.25 H	66	63.14	-2.74
2	2390.00	43.4 AV	54.0	-10.6	1.25 H	66	46.14	-2.74
3	*2412.00	106.2 PK			1.25 H	66	108.84	-2.64
4	*2412.00	96.8 AV			1.25 H	66	99.44	-2.64
5	4824.00	63.1 PK	74.0	-10.9	1.18 H	290	57.83	5.27
6	4824.00	43.4 AV	54.0	-10.6	1.18 H	290	38.13	5.27
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.5 PK	74.0	-3.5	1.30 V	216	73.24	-2.74
2	2390.00	53.4 AV	54.0	-0.6	1.30 V	216	56.14	-2.74
3	*2412.00	115.0 PK			1.30 V	216	117.64	-2.64
4	*2412.00	106.0 AV			1.30 V	216	108.64	-2.64
5	4824.00	63.9 PK	74.0	-10.1	1.09 V	350	58.63	5.27
6	4824.00	43.7 AV	54.0	-10.3	1.09 V	350	38.43	5.27

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	*2437.00	111.1 PK			1.13 H	26	113.63	-2.53
2	*2437.00	101.2 AV			1.13 H	26	103.73	-2.53
3	2483.50	62.2 PK	74.0	-11.8	1.13 H	26	64.52	-2.32
4	2483.50	44.4 AV	54.0	-9.6	1.13 H	26	46.72	-2.32
5	4874.00	62.8 PK	74.0	-11.2	1.16 H	275	57.31	5.49
6	4874.00	43.2 AV	54.0	-10.8	1.16 H	275	37.71	5.49
7	7311.00	58.9 PK	74.0	-15.1	1.00 H	17	46.20	12.70
8	7311.00	46.5 AV	54.0	-7.5	1.00 H	17	33.80	12.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.1 PK	74.0	-9.9	1.04 V	259	66.84	-2.74
2	2390.00	47.7 AV	54.0	-6.3	1.04 V	259	50.44	-2.74
3	*2437.00	119.6 PK			1.04 V	259	122.13	-2.53
4	*2437.00	110.6 AV			1.04 V	259	113.13	-2.53
5	2483.50	64.7 PK	74.0	-9.3	1.04 V	259	67.02	-2.32
6	2483.50	50.1 AV	54.0	-3.9	1.04 V	259	52.42	-2.32
7	4874.00	63.6 PK	74.0	-10.4	1.09 V	338	58.11	5.49
8	4874.00	43.6 AV	54.0	-10.4	1.09 V	338	38.11	5.49
9	7311.00	65.4 PK	74.0	-8.6	1.34 V	338	52.70	12.70
10	7311.00	53.8 AV	54.0	-0.2	1.34 V	338	41.10	12.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	106.3 PK			1.05 H	57	108.72	-2.42
2	*2462.00	95.1 AV			1.05 H	57	97.52	-2.42
3	2483.50	65.9 PK	74.0	-8.1	1.05 H	57	68.22	-2.32
4	2483.50	46.1 AV	54.0	-7.9	1.05 H	57	48.42	-2.32
5	4924.00	63.2 PK	74.0	-10.8	1.16 H	279	57.50	5.70
6	4924.00	43.4 AV	54.0	-10.6	1.16 H	279	37.70	5.70
7	7386.00	57.3 PK	74.0	-16.7	1.07 H	279	44.62	12.68
8	7386.00	45.2 AV	54.0	-8.8	1.07 H	279	32.52	12.68
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	115.7 PK			1.03 V	259	118.12	-2.42
2	*2462.00	106.4 AV			1.03 V	259	108.82	-2.42
3	2483.50	69.6 PK	74.0	-4.4	1.03 V	259	71.92	-2.32
4	2483.50	53.5 AV	54.0	-0.5	1.03 V	259	55.82	-2.32
5	4924.00	64.0 PK	74.0	-10.0	1.05 V	340	58.30	5.70
6	4924.00	43.8 AV	54.0	-10.2	1.05 V	340	38.10	5.70
7	7386.00	60.3 PK	74.0	-13.7	1.12 V	337	47.62	12.68
8	7386.00	48.9 AV	54.0	-5.1	1.12 V	337	36.22	12.68

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) 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	67.6 PK	74.0	-6.4	1.04 H	44	70.34	-2.74
2	2390.00	47.0 AV	54.0	-7.0	1.04 H	44	49.74	-2.74
3	*2412.00	104.4 PK			1.04 H	44	107.04	-2.64
4	*2412.00	92.6 AV			1.04 H	44	95.24	-2.64
5	4824.00	63.5 PK	74.0	-10.5	1.15 H	292	58.23	5.27
6	4824.00	43.9 AV	54.0	-10.1	1.15 H	292	38.63	5.27
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	73.6 PK	74.0	-0.4	1.05 V	259	76.34	-2.74
2	2390.00	53.2 AV	54.0	-0.8	1.05 V	259	55.94	-2.74
3	*2412.00	112.6 PK			1.05 V	259	115.24	-2.64
4	*2412.00	103.1 AV			1.05 V	259	105.74	-2.64
5	4824.00	63.9 PK	74.0	-10.1	1.09 V	346	58.63	5.27
6	4824.00	43.9 AV	54.0	-10.1	1.09 V	346	38.63	5.27

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	53.5 PK	74.0	-20.5	1.01 H	5	56.24	-2.74
2	2390.00	39.2 AV	54.0	-14.8	1.01 H	5	41.94	-2.74
3	*2437.00	112.0 PK			1.01 H	5	114.53	-2.53
4	*2437.00	99.4 AV			1.01 H	5	101.93	-2.53
5	2483.50	61.1 PK	74.0	-12.9	1.01 H	5	63.42	-2.32
6	2483.50	43.8 AV	54.0	-10.2	1.01 H	5	46.12	-2.32
7	4874.00	62.6 PK	74.0	-11.4	1.15 H	286	57.11	5.49
8	4874.00	43.0 AV	54.0	-11.0	1.15 H	286	37.51	5.49
9	7311.00	59.5 PK	74.0	-14.5	1.00 H	29	46.80	12.70
10	7311.00	46.9 AV	54.0	-7.1	1.00 H	29	34.20	12.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.5 PK	74.0	-9.5	1.00 V	271	67.24	-2.74
2	2390.00	47.9 AV	54.0	-6.1	1.00 V	271	50.64	-2.74
3	*2437.00	119.4 PK			1.00 V	271	121.93	-2.53
4	*2437.00	110.1 AV			1.00 V	271	112.63	-2.53
5	2483.50	69.2 PK	74.0	-4.8	1.00 V	271	71.52	-2.32
6	2483.50	51.2 AV	54.0	-2.8	1.00 V	271	53.52	-2.32
7	4874.00	54.5 PK	74.0	-19.5	1.09 V	356	49.01	5.49
8	4874.00	42.4 AV	54.0	-11.6	1.09 V	356	36.91	5.49
9	7311.00	67.5 PK	74.0	-6.5	1.01 V	330	54.80	12.70
10	7311.00	53.6 AV	54.0	-0.4	1.01 V	330	40.90	12.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	104.5 PK			1.04 H	70	106.92	-2.42
2	*2462.00	92.9 AV			1.04 H	70	95.32	-2.42
3	2483.50	67.1 PK	74.0	-6.9	1.04 H	70	69.42	-2.32
4	2483.50	46.6 AV	54.0	-7.4	1.04 H	70	48.92	-2.32
5	4924.00	62.7 PK	74.0	-11.3	1.19 H	293	57.00	5.70
6	4924.00	42.9 AV	54.0	-11.1	1.19 H	293	37.20	5.70
7	7386.00	56.9 PK	74.0	-17.1	1.10 H	269	44.22	12.68
8	7386.00	44.8 AV	54.0	-9.2	1.10 H	269	32.12	12.68
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	113.4 PK			1.01 V	268	115.82	-2.42
2	*2462.00	103.0 AV			1.01 V	268	105.42	-2.42
3	2483.50	71.4 PK	74.0	-2.6	1.01 V	268	73.72	-2.32
4	2483.50	53.3 AV	54.0	-0.7	1.01 V	268	55.62	-2.32
5	4924.00	64.1 PK	74.0	-9.9	1.12 V	352	58.40	5.70
6	4924.00	44.0 AV	54.0	-10.0	1.12 V	352	38.30	5.70
7	7386.00	61.0 PK	74.0	-13.0	1.03 V	318	48.32	12.68
8	7386.00	49.3 AV	54.0	-4.7	1.03 V	318	36.62	12.68

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 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.4 PK	74.0	-5.6	1.00 H	62	71.14	-2.74
2	2390.00	49.3 AV	54.0	-4.7	1.00 H	62	52.04	-2.74
3	*2422.00	101.8 PK			1.00 H	62	104.39	-2.59
4	*2422.00	92.8 AV			1.00 H	62	95.39	-2.59
5	4844.00	63.1 PK	74.0	-10.9	1.20 H	286	57.75	5.35
6	4844.00	43.2 AV	54.0	-10.8	1.20 H	286	37.85	5.35
7	7266.00	56.8 PK	74.0	-17.2	1.01 H	285	44.08	12.72
8	7266.00	42.5 AV	54.0	-11.5	1.01 H	285	29.78	12.72
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	69.1 PK	74.0	-4.9	1.03 V	271	71.84	-2.74
2	2390.00	53.6 AV	54.0	-0.4	1.03 V	271	56.34	-2.74
3	*2422.00	109.1 PK			1.03 V	271	111.69	-2.59
4	*2422.00	99.6 AV			1.03 V	271	102.19	-2.59
5	4844.00	63.4 PK	74.0	-10.6	1.05 V	342	58.05	5.35
6	4844.00	43.6 AV	54.0	-10.4	1.05 V	342	38.25	5.35
7	7266.00	58.4 PK	74.0	-15.6	1.13 V	314	45.68	12.72
8	7266.00	47.2 AV	54.0	-6.8	1.13 V	314	34.48	12.72

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	*2437.00	103.5 PK			1.07 H	61	106.03	-2.53
2	*2437.00	94.5 AV			1.07 H	61	97.03	-2.53
3	2483.50	66.1 PK	74.0	-7.9	1.07 H	61	68.42	-2.32
4	2483.50	45.9 AV	54.0	-8.1	1.07 H	61	48.22	-2.32
5	4874.00	63.3 PK	74.0	-10.7	1.21 H	297	57.81	5.49
6	4874.00	43.4 AV	54.0	-10.6	1.21 H	297	37.91	5.49
7	7311.00	56.8 PK	74.0	-17.2	1.02 H	272	44.10	12.70
8	7311.00	42.8 AV	54.0	-11.2	1.02 H	272	30.10	12.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.5 PK	74.0	-12.5	1.02 V	272	64.24	-2.74
2	2390.00	45.8 AV	54.0	-8.2	1.02 V	272	48.54	-2.74
3	*2437.00	111.3 PK			1.02 V	272	113.83	-2.53
4	*2437.00	102.1 AV			1.02 V	272	104.63	-2.53
5	2483.50	69.1 PK	74.0	-4.9	1.02 V	272	71.42	-2.32
6	2483.50	53.7 AV	54.0	-0.3	1.02 V	272	56.02	-2.32
7	4874.00	63.6 PK	74.0	-10.4	1.04 V	325	58.11	5.49
8	4874.00	43.4 AV	54.0	-10.6	1.04 V	325	37.91	5.49
9	7311.00	61.3 PK	74.0	-12.7	1.02 V	300	48.60	12.70
10	7311.00	49.5 AV	54.0	-4.5	1.02 V	300	36.80	12.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	102.1 PK			1.00 H	37	104.56	-2.46
2	*2452.00	92.5 AV			1.00 H	37	94.96	-2.46
3	2483.50	68.8 PK	74.0	-5.2	1.00 H	37	71.12	-2.32
4	2483.50	49.4 AV	54.0	-4.6	1.00 H	37	51.72	-2.32
5	4904.00	63.5 PK	74.0	-10.5	1.25 H	299	57.88	5.62
6	4904.00	43.6 AV	54.0	-10.4	1.25 H	299	37.98	5.62
7	7356.00	57.2 PK	74.0	-16.8	1.00 H	283	44.51	12.69
8	7356.00	42.8 AV	54.0	-11.2	1.00 H	283	30.11	12.69
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	109.2 PK			1.02 V	259	111.66	-2.46
2	*2452.00	99.4 AV			1.02 V	259	101.86	-2.46
3	2483.50	69.3 PK	74.0	-4.7	1.02 V	266	71.62	-2.32
4	2483.50	53.6 AV	54.0	-0.4	1.02 V	266	55.92	-2.32
5	4904.00	64.1 PK	74.0	-9.9	1.09 V	328	58.48	5.62
6	4904.00	44.0 AV	54.0	-10.0	1.09 V	328	38.38	5.62
7	7356.00	58.6 PK	74.0	-15.4	1.06 V	302	45.91	12.69
8	7356.00	47.5 AV	54.0	-6.5	1.06 V	302	34.81	12.69

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	100060	May 08, 2014	May 07, 2015

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 : Jan. 06, 2015

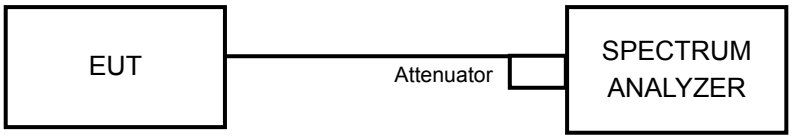
4.3.3 TEST PROCEDURE

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

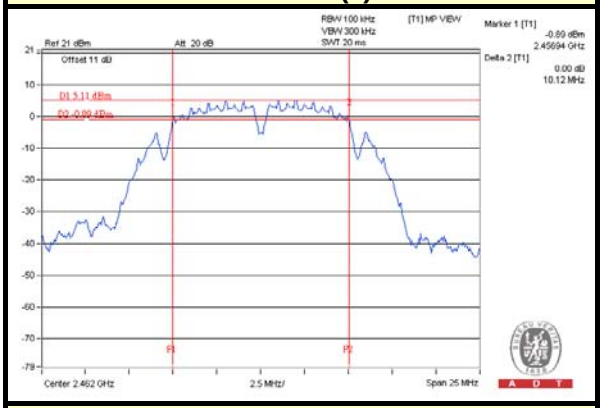
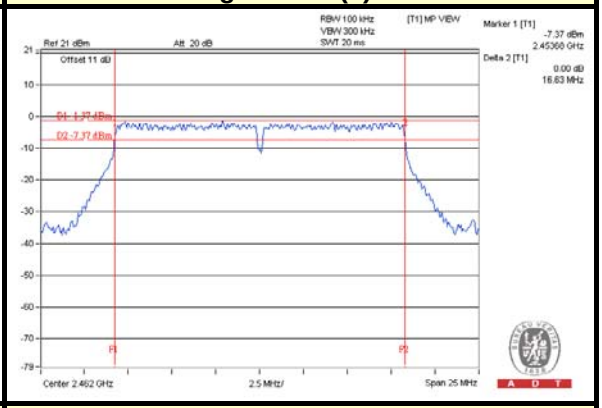
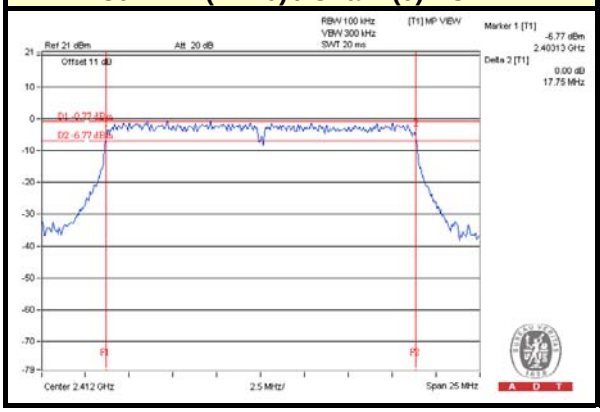
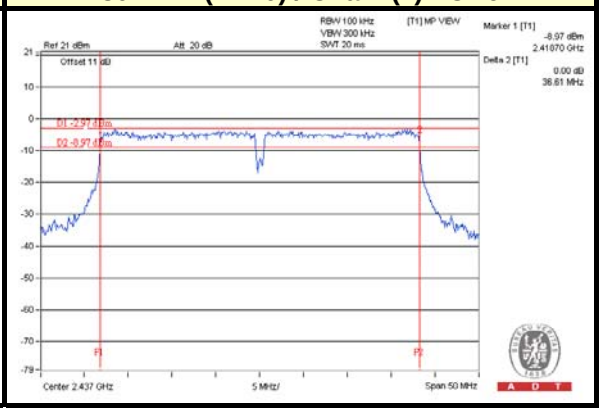


4.3.6 EUT OPERATING CONDITIONS

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

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
802.11b					
1	2412	10.14	10.13	0.5	PASS
6	2437	10.13	10.13	0.5	PASS
11	2462	10.12	10.12	0.5	PASS
802.11g					
1	2412	16.65	16.65	0.5	PASS
6	2437	16.64	16.64	0.5	PASS
11	2462	16.65	16.63	0.5	PASS
802.11n (HT20)					
1	2412	17.75	17.76	0.5	PASS
6	2437	17.85	17.82	0.5	PASS
11	2462	17.80	17.80	0.5	PASS
802.11n (HT40)					
3	2422	36.63	36.63	0.5	PASS
6	2437	36.63	36.61	0.5	PASS
9	2452	36.63	36.62	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11b / Chain (0) : CH11	**802.11g / Chain (1) : CH11**
	
802.11n (HT20) / Chain (0) : CH1	**802.11n (HT40) / Chain (1) : CH6**
	

4.4 OCCUPIED BANDWIDTH MEASUREMENT

4.4.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 2015

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 : Jan. 06, 2015

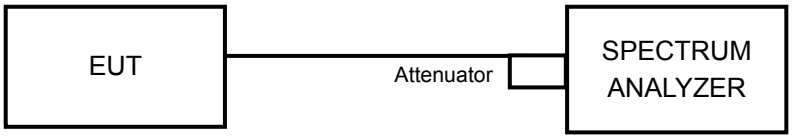
4.4.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.3 DEVIATION FROM TEST STANDARD

No deviation

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITIONS

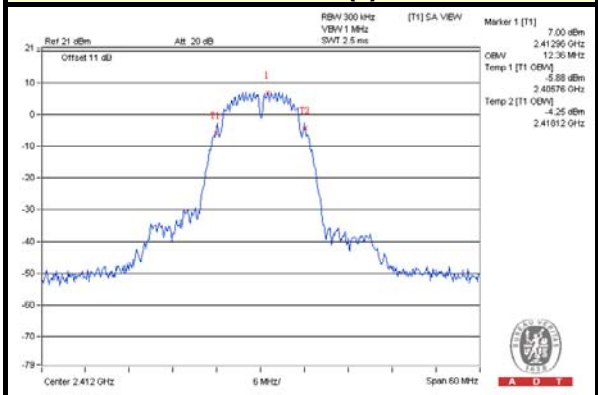
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.6 TEST RESULTS

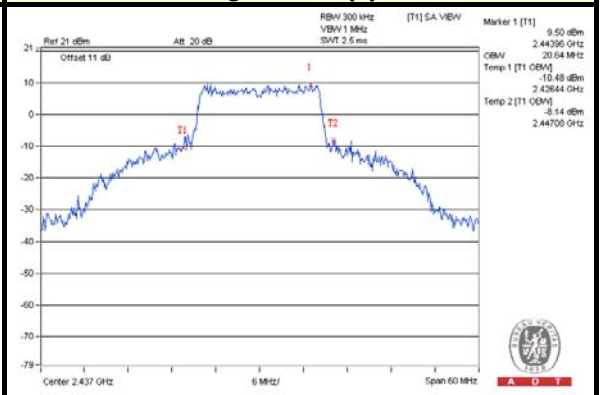
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
802.11b			
1	2412	12.36	12.24
6	2437	12.36	12.36
11	2462	12.24	12.24
802.11g			
1	2412	17.04	16.80
6	2437	18.48	20.64
11	2462	16.80	16.92
802.11n (HT20)			
1	2412	17.76	17.76
6	2437	22.44	24.36
11	2462	17.76	17.76
802.11n (HT40)			
3	2422	36.80	37.00
6	2437	36.80	37.00
9	2452	36.80	36.80

SPECTRUM PLOT OF WORST VALUE

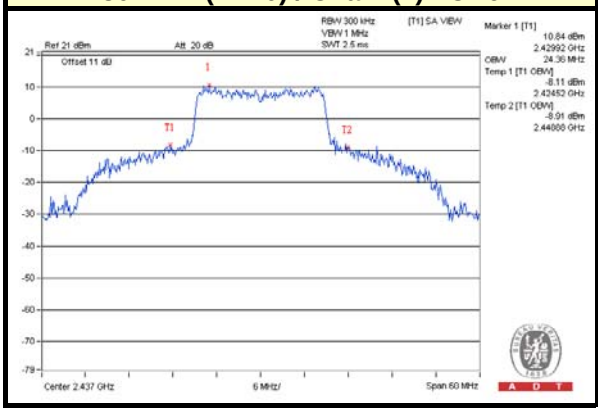
802.11b / Chain (0) : CH1



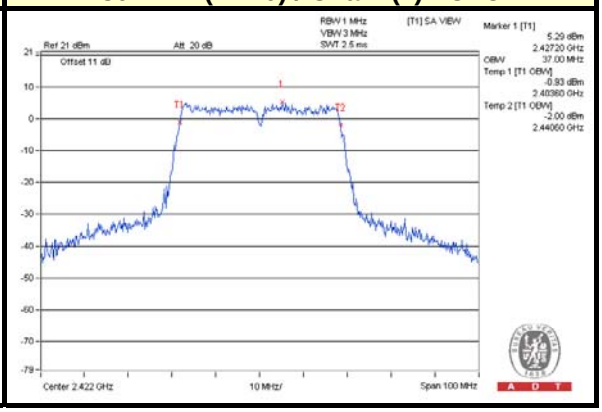
802.11g / Chain (1) : CH6



802.11n (HT20) / Chain (1) : CH6



802.11n (HT40) / Chain (1) : CH3



4.5 CONDUCTED OUTPUT POWER MEASUREMENT

4.5.1 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 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.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 2015

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 : Jan. 06, 2015

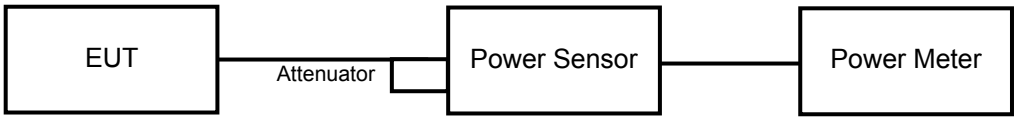
4.5.3 TEST PROCEDURES

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.5.7 TEST RESULTS

FOR PEAK POWER

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
802.11b							
1	2412	22.22	21.96	323.761	25.10	30	PASS
6	2437	22.02	22.24	326.715	25.14	30	PASS
11	2462	21.60	21.72	293.138	24.67	30	PASS
802.11g							
1	2412	24.58	24.38	561.235	27.49	30	PASS
6	2437	25.03	24.75	616.958	27.90	30	PASS
11	2462	23.82	23.15	447.529	26.51	30	PASS
802.11n (HT20)							
1	2412	22.60	22.45	357.762	25.54	30	PASS
6	2437	24.95	24.33	583.627	27.66	30	PASS
11	2462	22.28	21.08	297.277	24.73	30	PASS
802.11n (HT40)							
3	2422	21.51	21.21	273.709	24.37	30	PASS
6	2437	23.71	22.67	419.89	26.23	30	PASS
9	2452	20.56	19.66	206.233	23.14	30	PASS

FOR AVERAGE POWER

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
802.11b					
1	2412	18.76	18.48	145.631	21.63
6	2437	18.58	18.83	148.495	21.72
11	2462	17.60	17.85	118.498	20.74
802.11g					
1	2412	16.85	16.39	91.968	19.64
6	2437	21.33	21.32	271.350	24.34
11	2462	16.08	16.24	82.624	19.17
802.1n (HT20)					
1	2412	14.93	14.57	59.759	17.76
6	2437	21.85	20.52	265.829	24.25
11	2462	13.96	14.20	51.192	17.09
802.1n (HT40)					
3	2422	13.75	13.85	47.980	16.81
6	2437	16.02	16.57	85.388	19.31
9	2452	12.54	12.93	37.581	15.75

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	100060	May 08, 2014	May 07, 2015

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 : Jan. 06, 2015

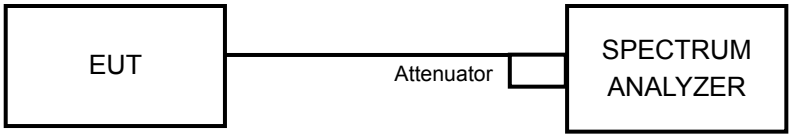
4.6.3 TEST PROCEDURE

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



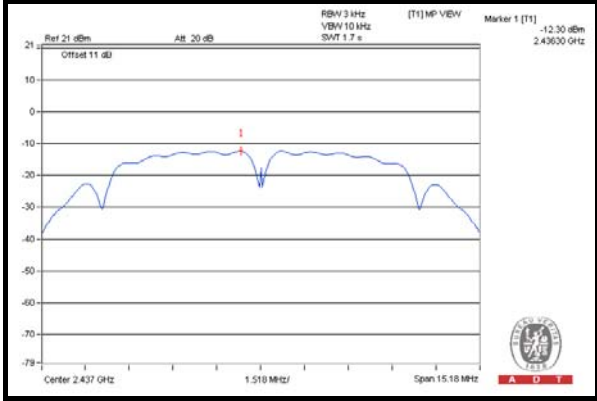
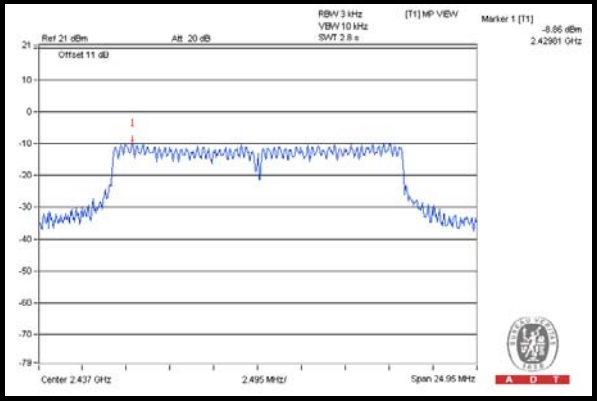
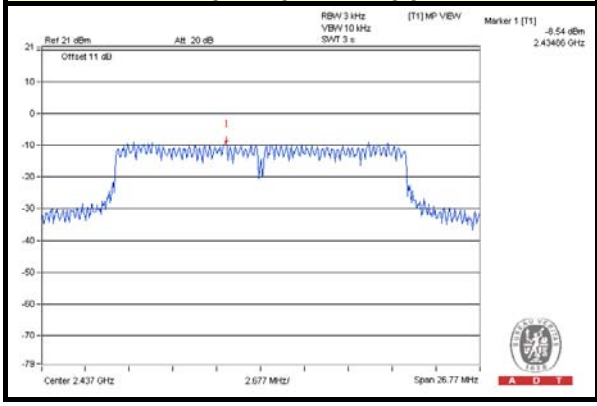
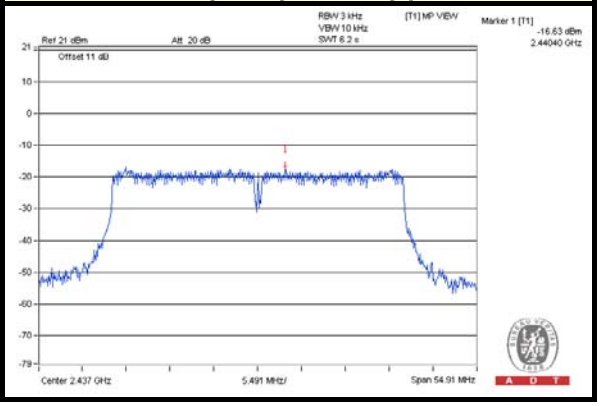
4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

802.11b							
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-12.97	3.01	-9.96	7.84	PASS
	6	2437	-12.44	3.01	-9.43	7.84	PASS
	11	2462	-13.40	3.01	-10.39	7.84	PASS
1	1	2412	-12.73	3.01	-9.72	7.84	PASS
	6	2437	-12.30	3.01	-9.29	7.84	PASS
	11	2462	-12.93	3.01	-9.92	7.84	PASS
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.							
802.11g							
0	1	2412	-13.63	3.01	-10.62	7.84	PASS
	6	2437	-8.86	3.01	-5.85	7.84	PASS
	11	2462	-13.07	3.01	-10.06	7.84	PASS
1	1	2412	-14.28	3.01	-11.27	7.84	PASS
	6	2437	-8.91	3.01	-5.90	7.84	PASS
	11	2462	-15.96	3.01	-12.95	7.84	PASS
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.							

802.11n (HT20)							
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-12.32	3.01	-9.31	7.84	PASS
	6	2437	-8.54	3.01	-5.53	7.84	PASS
	11	2462	-13.59	3.01	-10.58	7.84	PASS
1	1	2412	-15.40	3.01	-12.39	7.84	PASS
	6	2437	-8.76	3.01	-5.75	7.84	PASS
	11	2462	-13.59	3.01	-10.58	7.84	PASS
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.							
802.11n (HT40)							
0	3	2422	-17.49	3.01	-14.48	7.84	PASS
	6	2437	-16.69	3.01	-13.68	7.84	PASS
	9	2452	-20.29	3.01	-17.28	7.84	PASS
1	3	2422	-18.31	3.01	-15.30	7.84	PASS
	6	2437	-16.63	3.01	-13.62	7.84	PASS
	9	2452	-21.43	3.01	-18.42	7.84	PASS
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.							

SPECTRUM PLOT OF WORST VALUE	
802.11b / Chain(0) : CH11	**802.11g / Chain(0) : CH6**
	
802.11n (HT20) / Chain(0) : CH6	**802.11n (HT40) / Chain(1) : CH6**
	

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	100060	May 08, 2014	May 07, 2015

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 : Jan. 06, 2015

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.

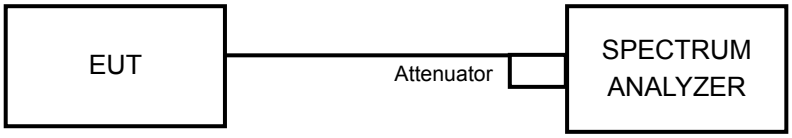
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

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

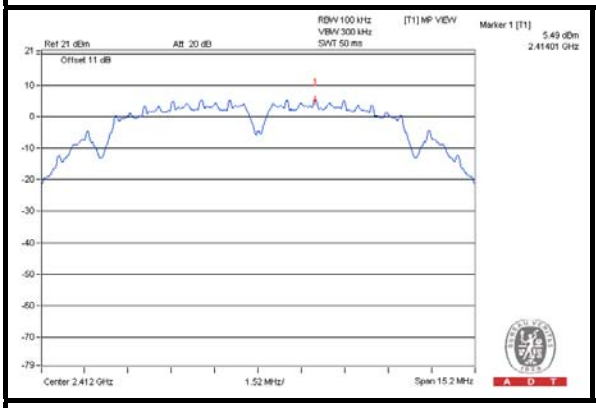
4.7.7 TEST RESULTS

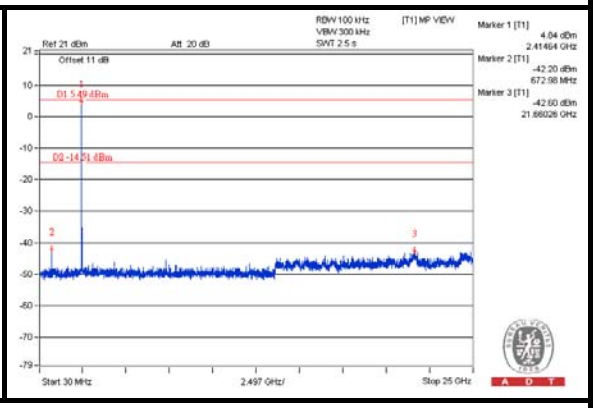
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

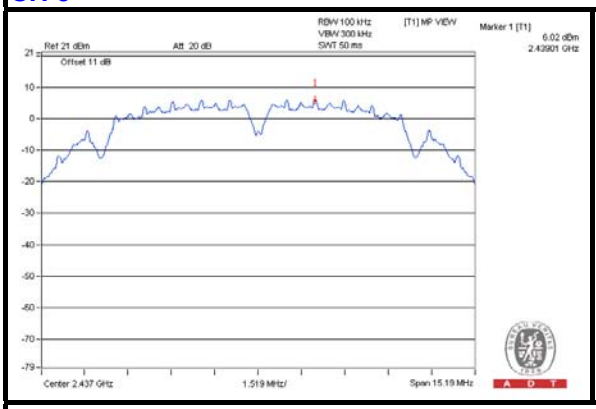
Chain (0)

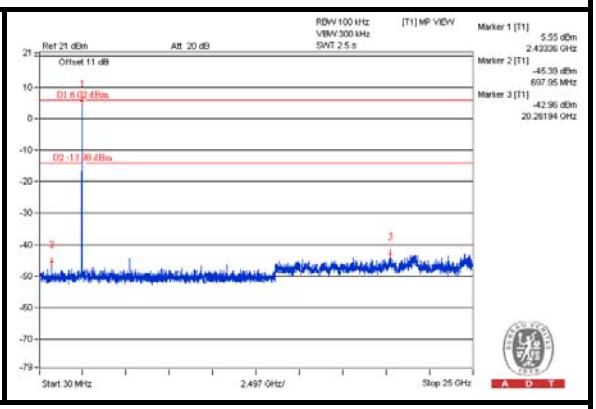
CH 1



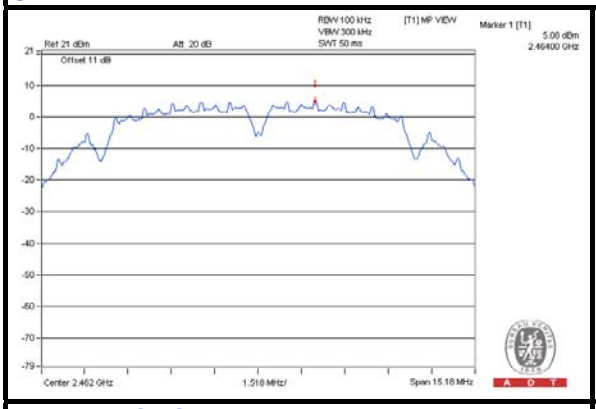


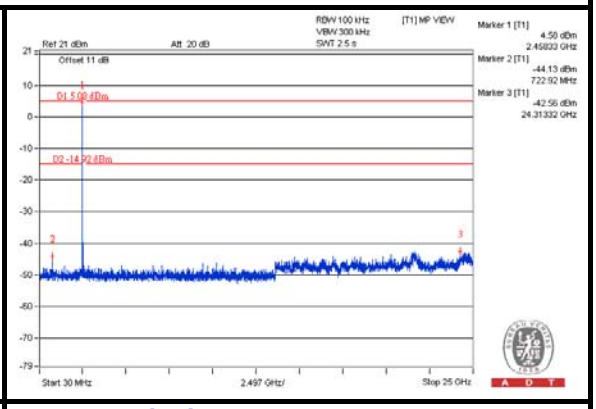
CH 6



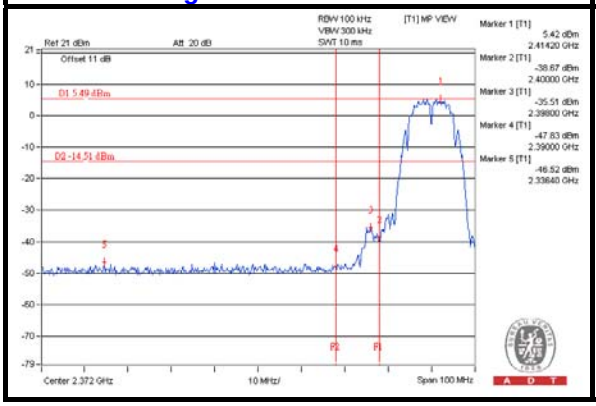


CH 11

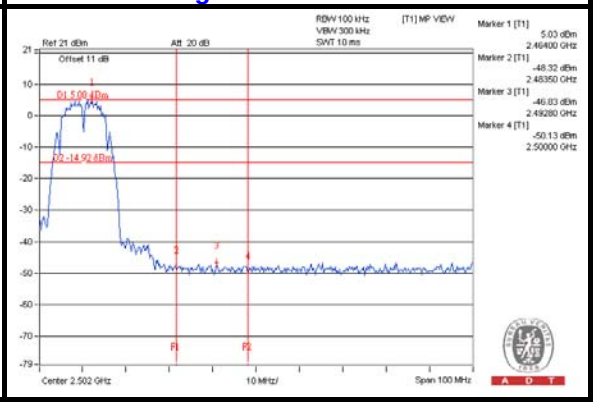




CH 1 Band edge

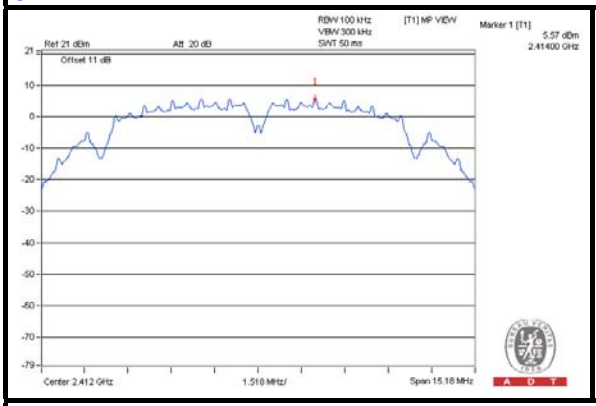


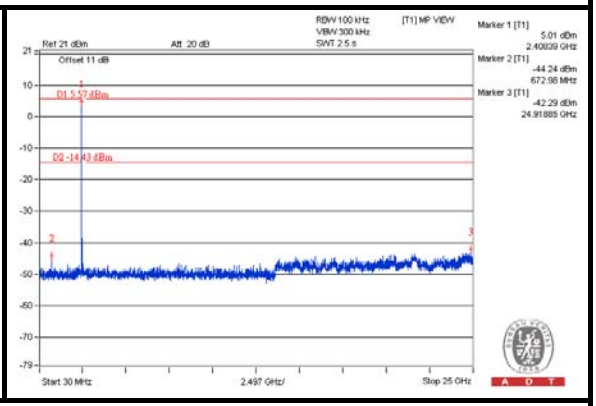
CH 11 Band edge



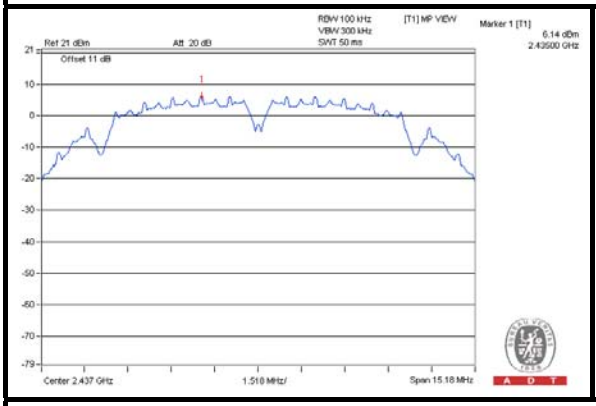
Chain (1)

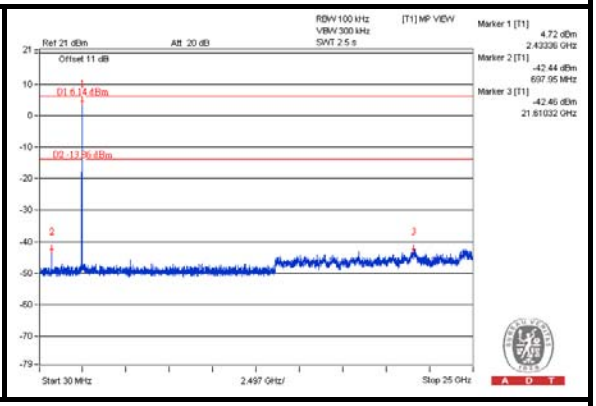
CH 1



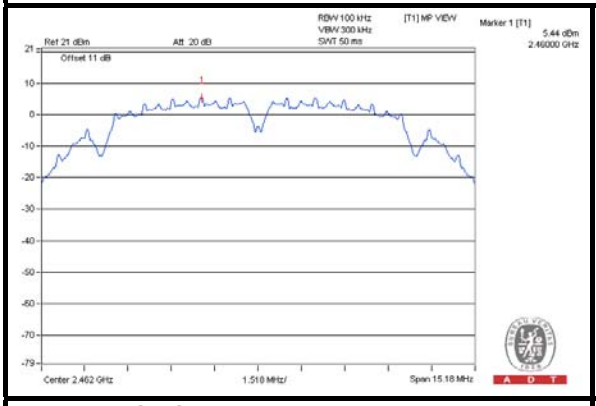


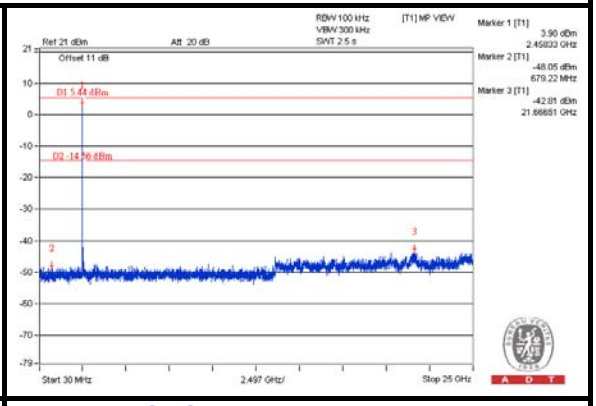
CH 6



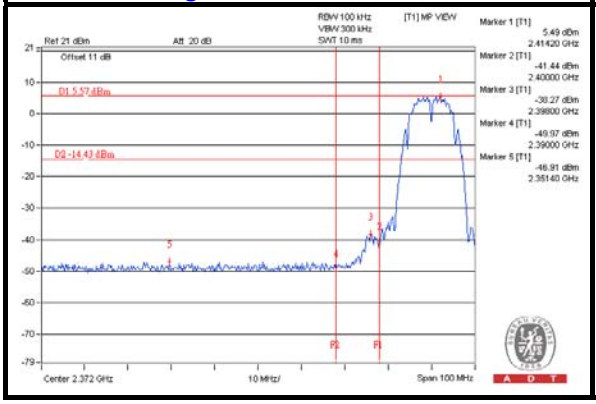


CH 11

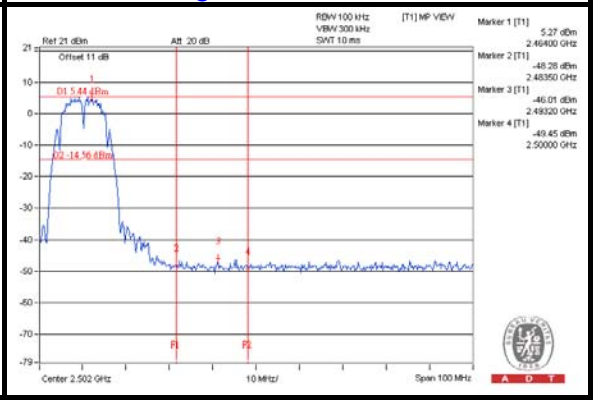




CH 1 Band edge



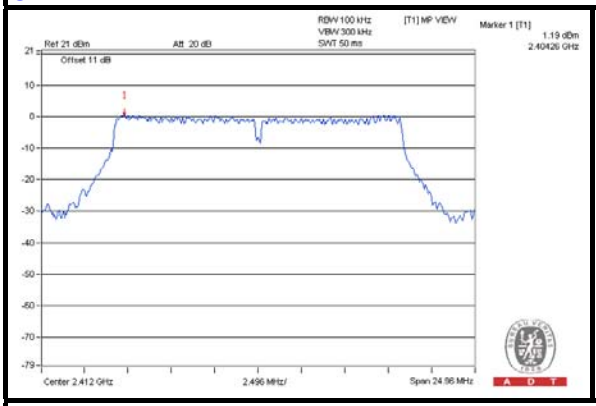
CH 11 Band edge

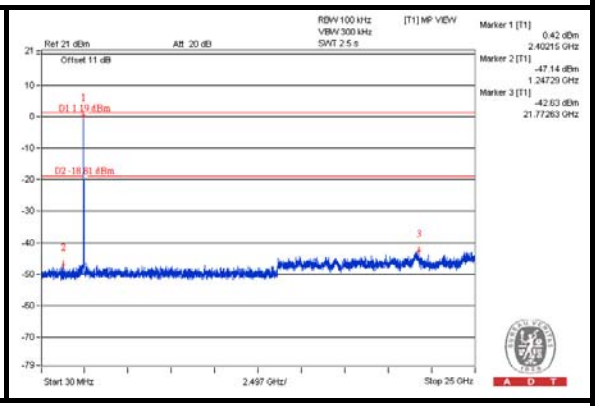


802.11g

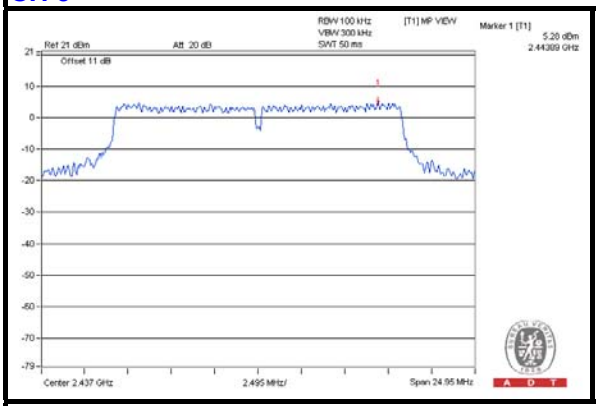
Chain (0)

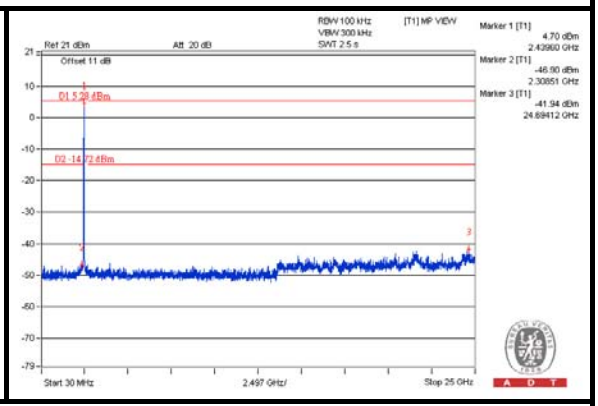
CH 1



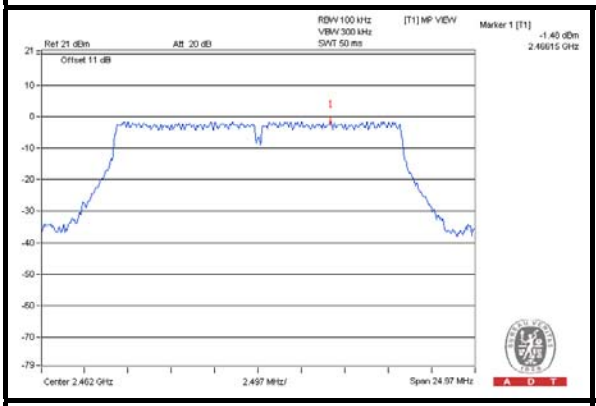


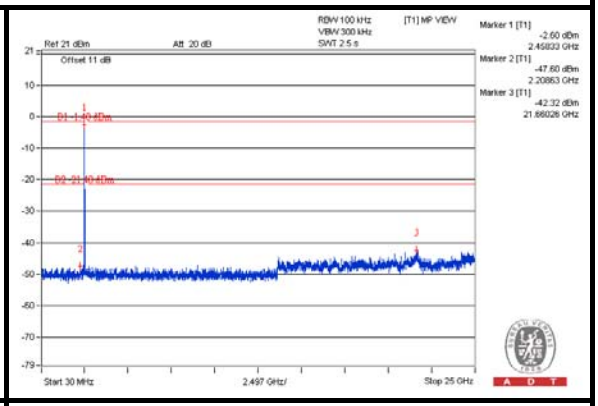
CH 6



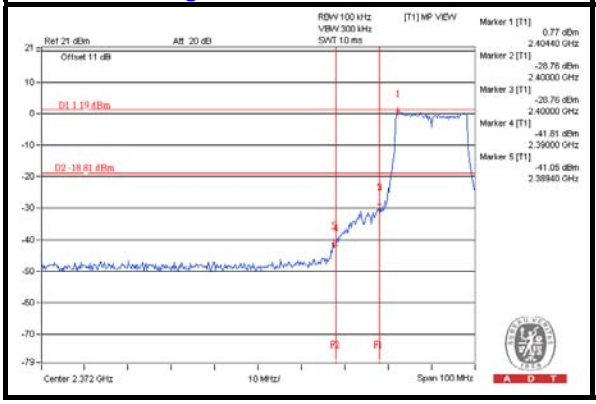


CH 11

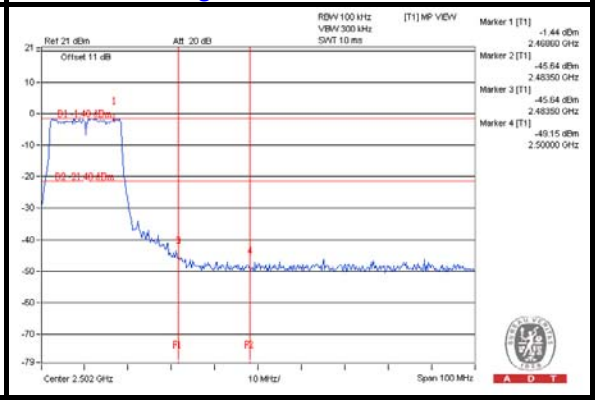




CH 1 Band edge

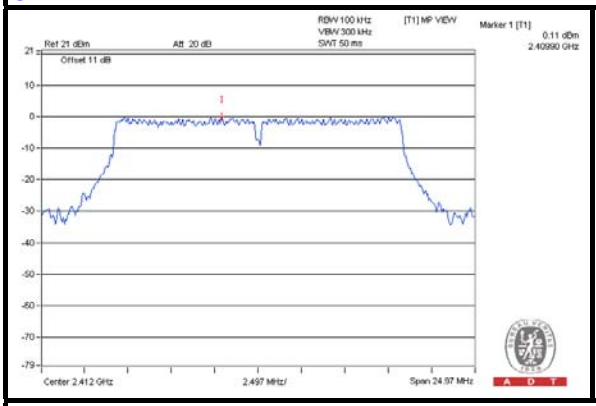


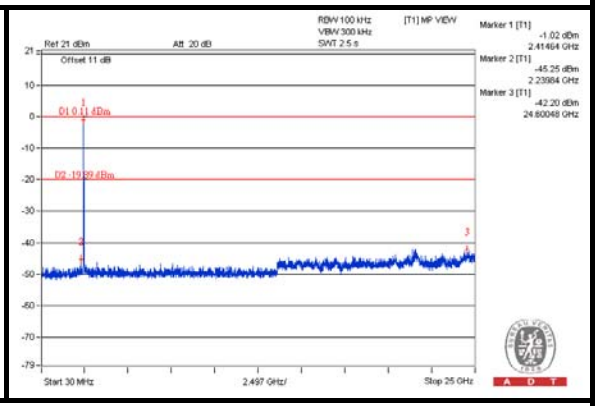
CH 11 Band edge



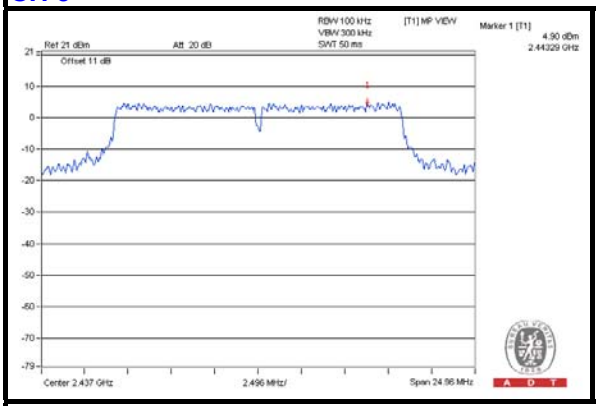
Chain (1)

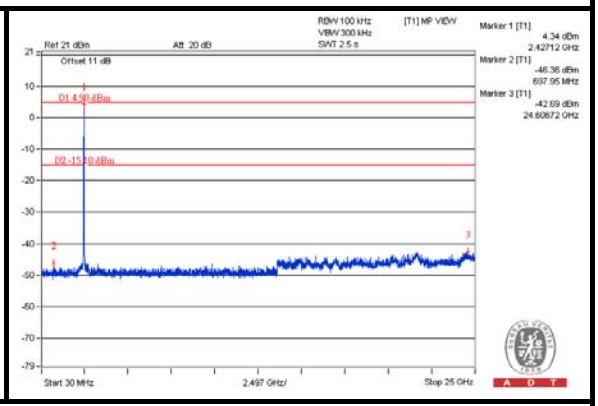
CH 1



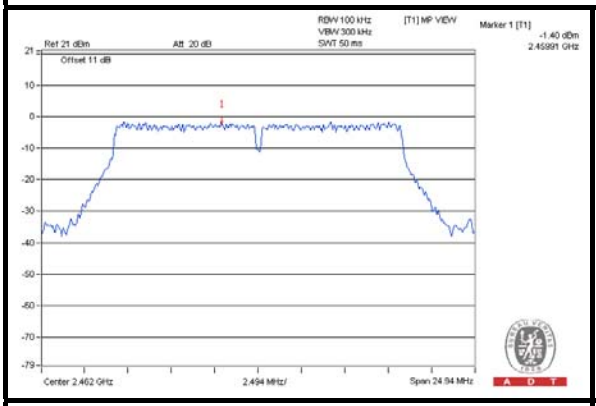


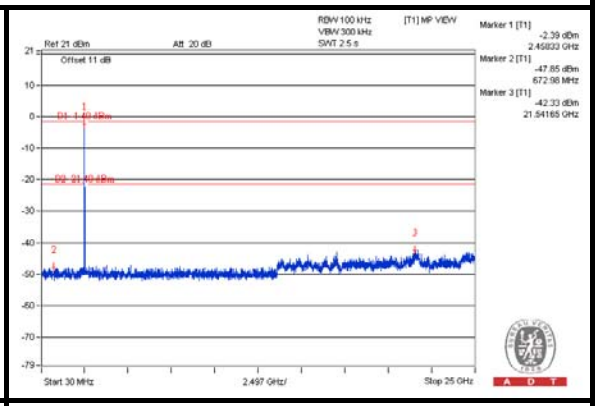
CH 6



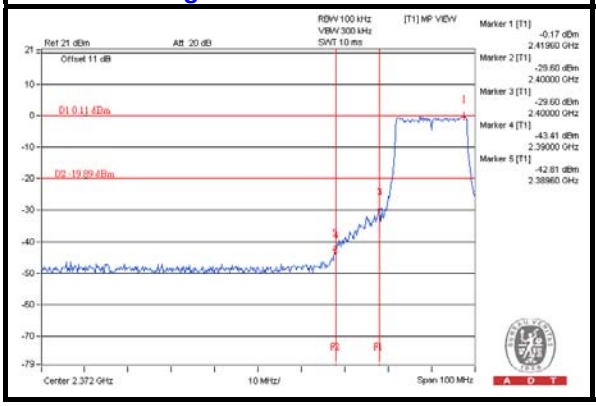


CH 11

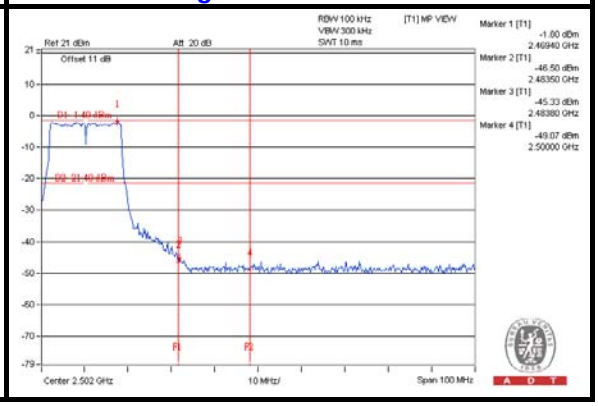




CH 1 Band edge



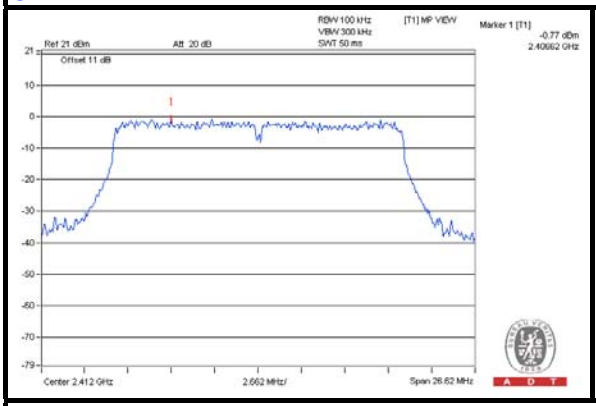
CH 11 Band edge

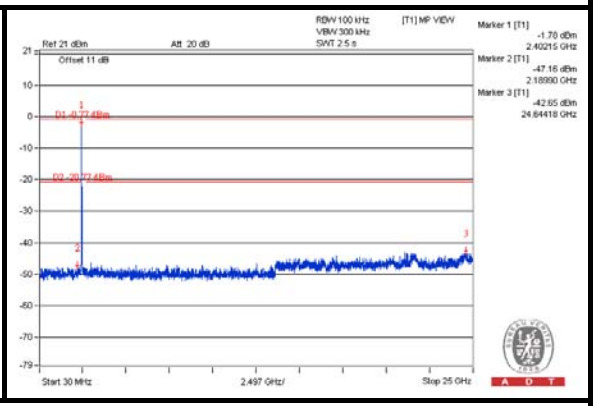


802.11n (HT20)

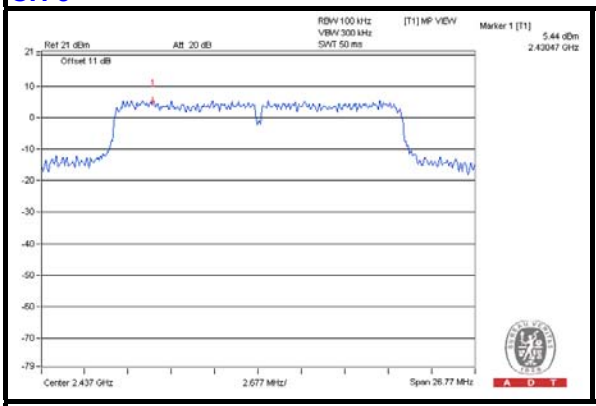
Chain (0)

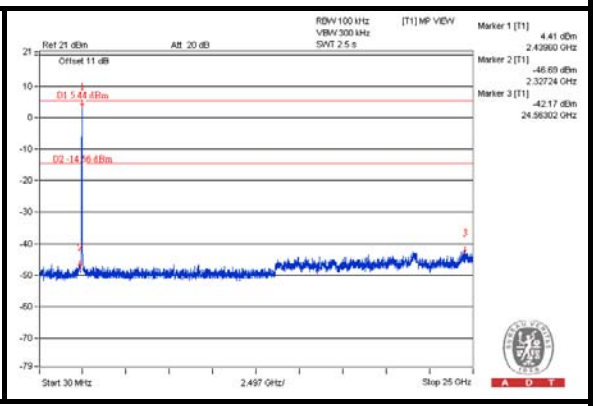
CH 1



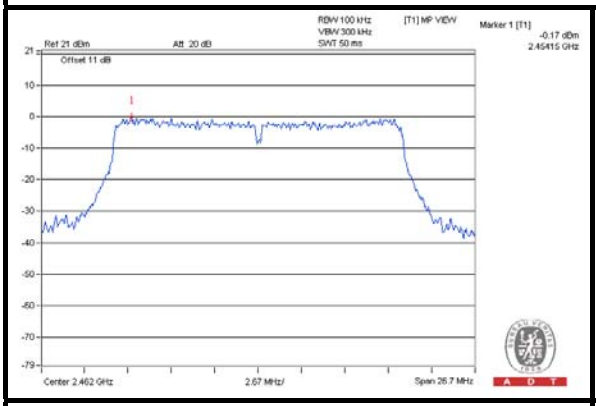


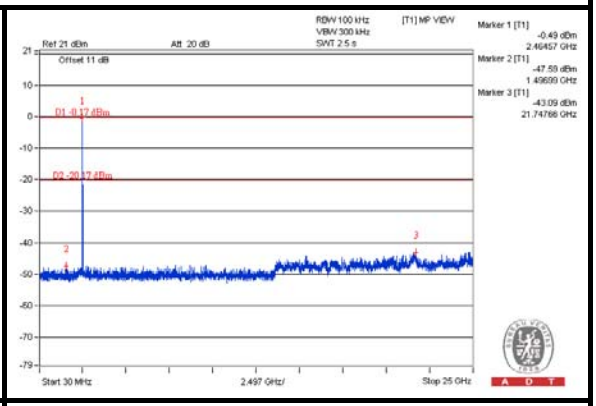
CH 6



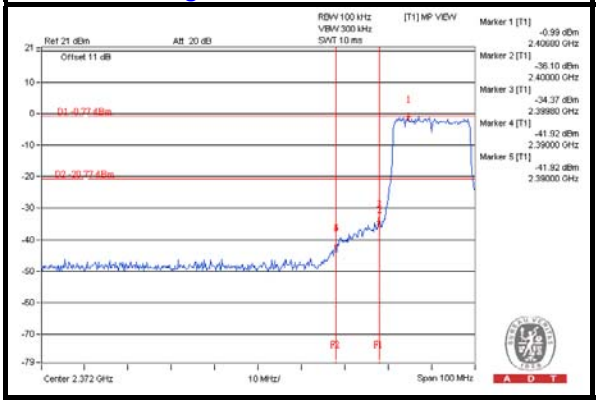


CH 11

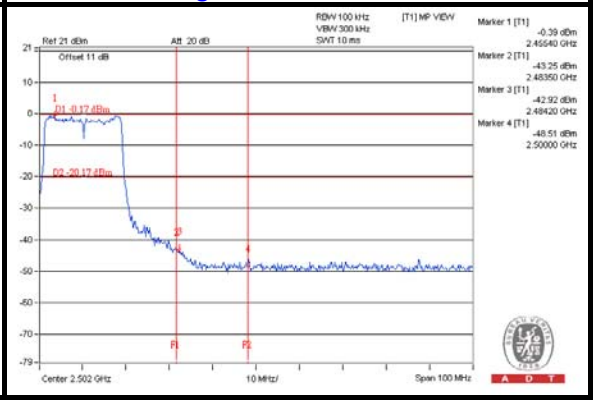




CH 1 Band edge

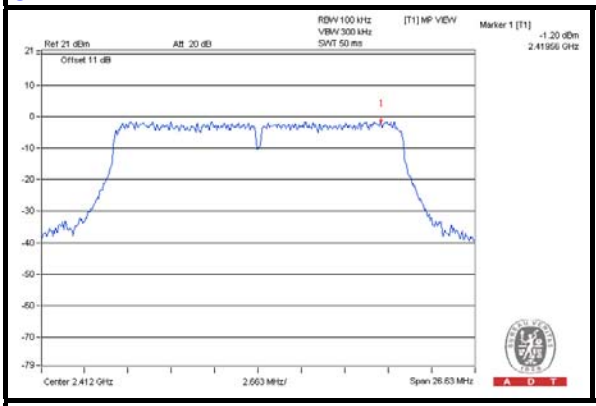


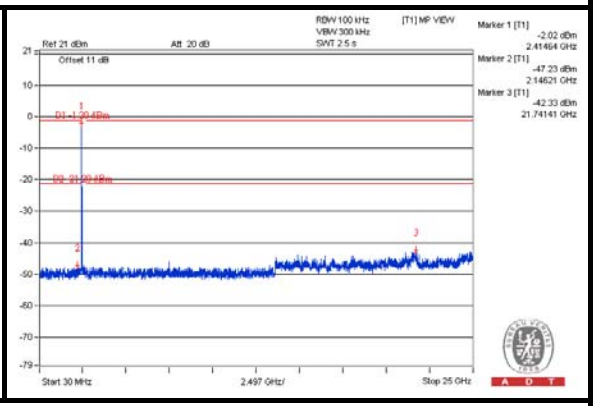
CH 11 Band edge



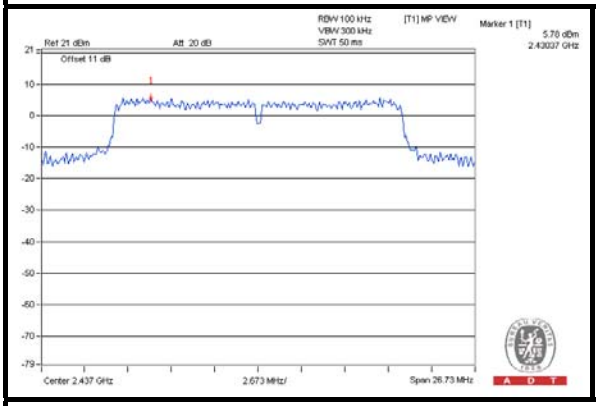
Chain (1)

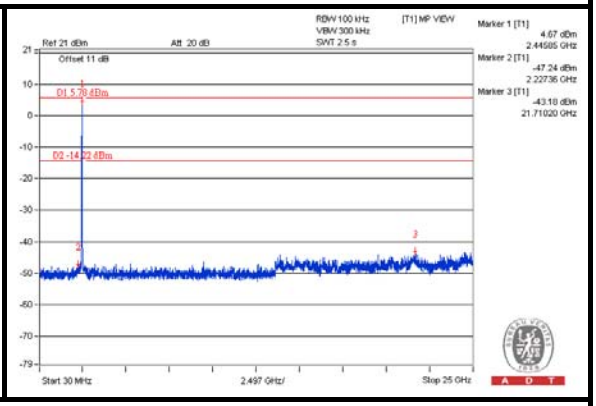
CH 1



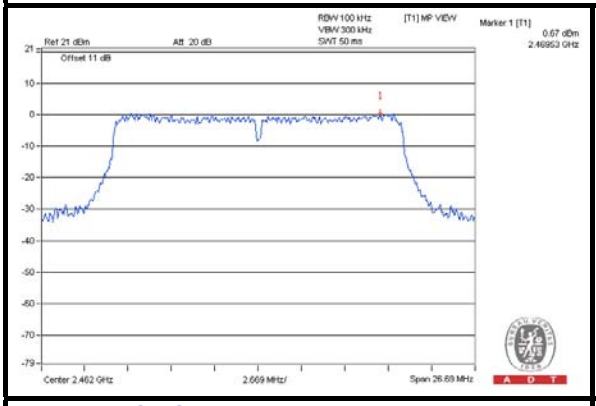


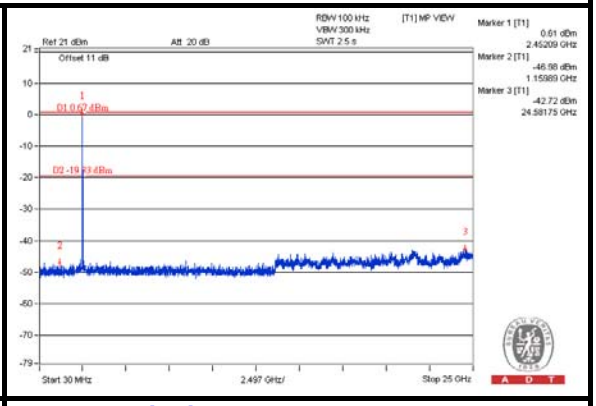
CH 6



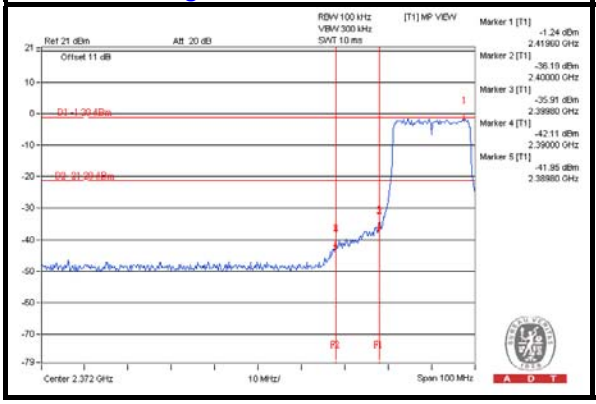


CH 11

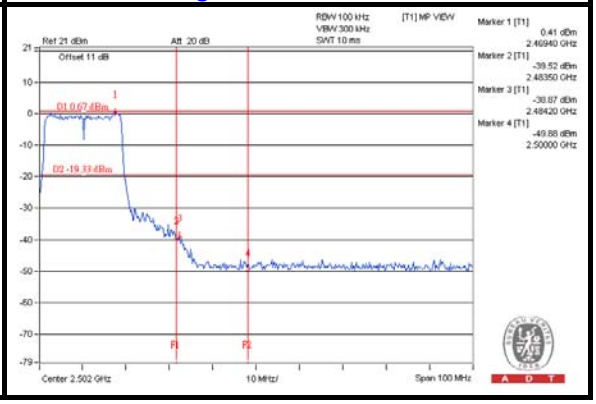




CH 1 Band edge



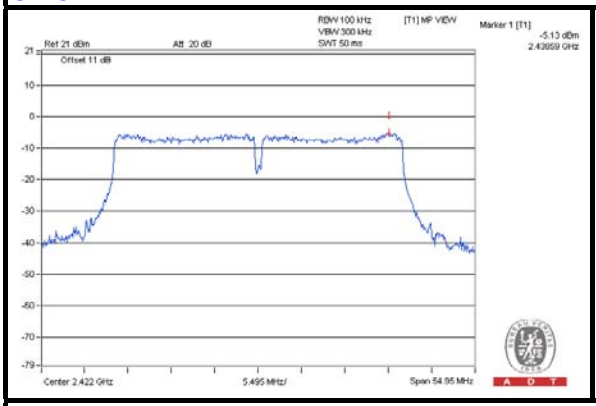
CH 11 Band edge

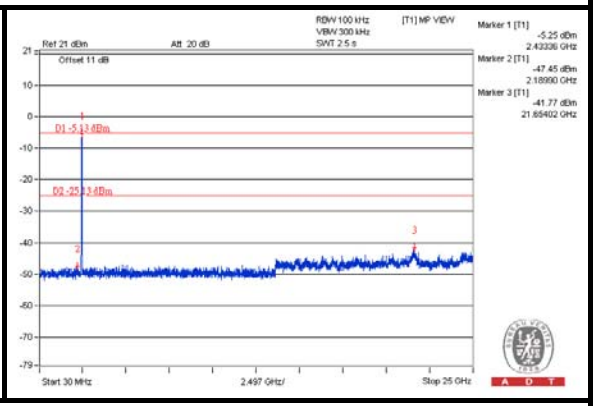


802.11n (HT40)

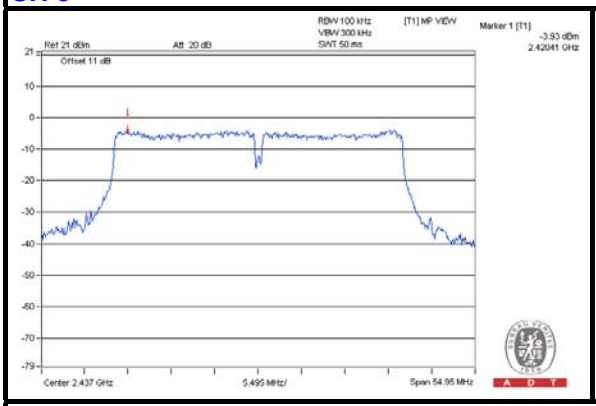
Chain (0)

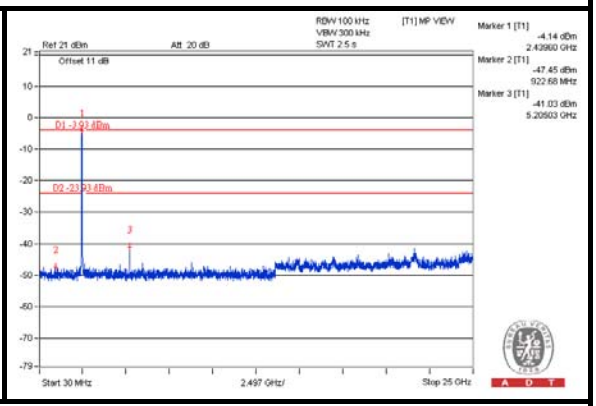
CH 3



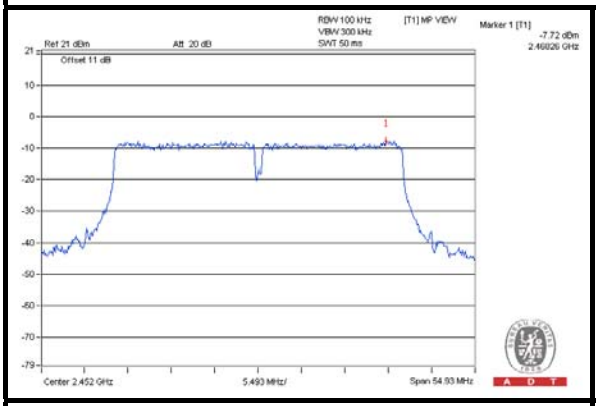


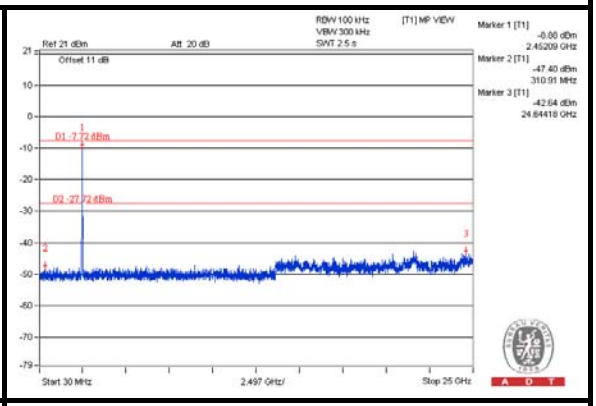
CH 6



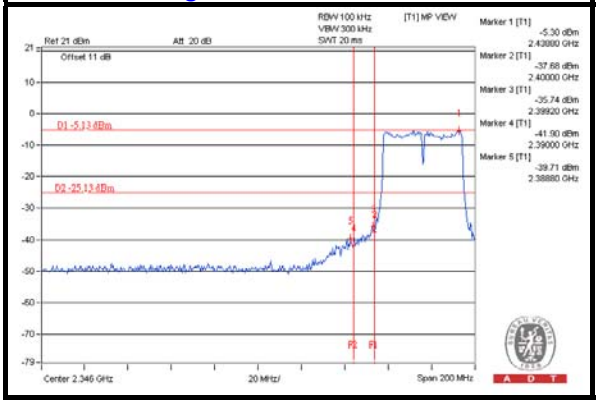


CH 9

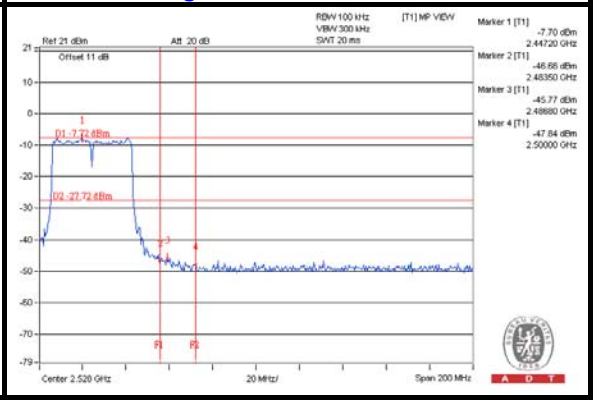




CH 3 Band edge

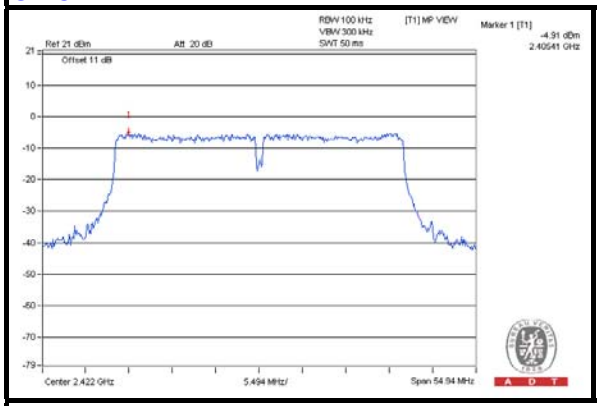


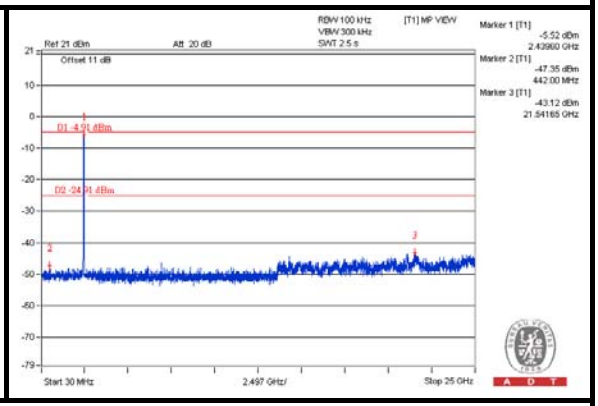
CH 9 Band edge



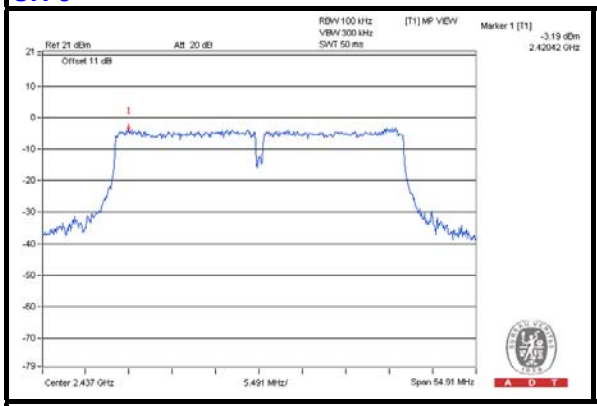
Chain (1)

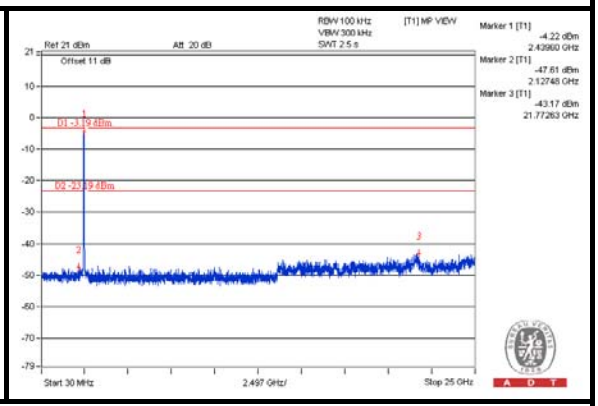
CH 3



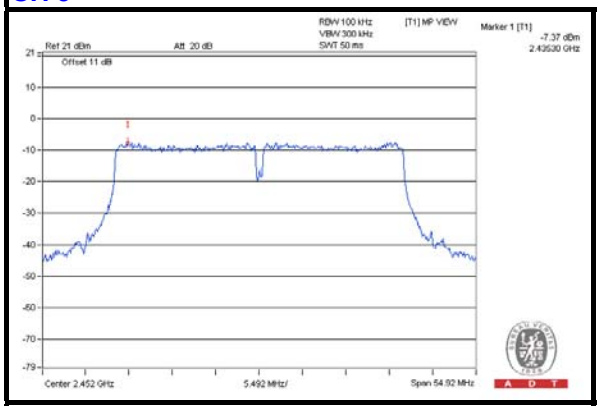


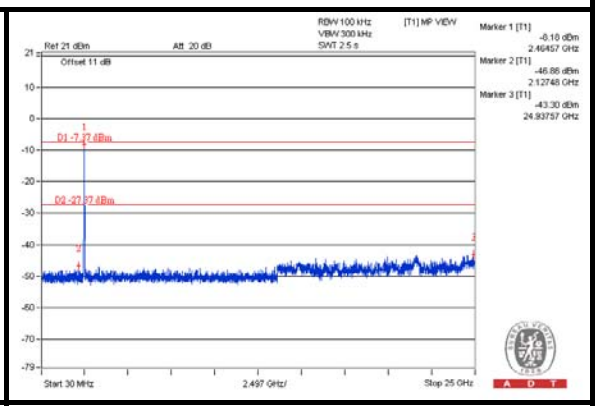
CH 6



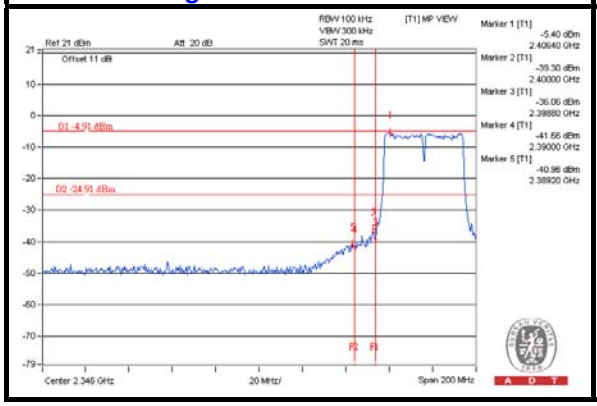


CH 9

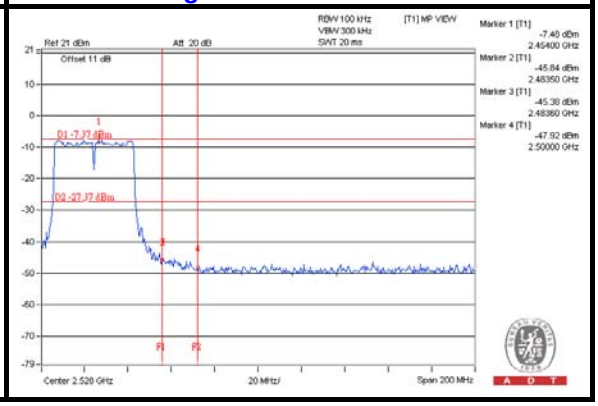




CH 3 Band edge



CH 9 Band edge



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

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

Hwa Ya EMC/RF/Safety 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.

7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

--- END ---