FCC TEST REPORT (15.247)

REPORT NO.: RF140430E05 R1

MODEL NO.: 1653

FCC ID: C3K1653

RECEIVED: Apr. 30, 2014

TESTED: June 19 to July 24, 2014

ISSUED: Sep. 02, 2014

APPLICANT: Microsoft Corporation

ADDRESS: One Microsoft Way Redmond WA 98052

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.

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

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Cancels and replaces the report No.: RF140430E05 dated Aug. 06, 2014.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140430E05	Original release	Aug. 06, 2014
RF140430E05 R1	Modified section 3.1: note 2 & 3.	Sep. 02, 2014

1. CERTIFICATION

PRODUCT:	802.11a/b/g/n 2T2R dual-band wireless LAN radio
BRAND NAME:	Microsoft
MODEL NO.:	1653
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Microsoft Corporation
TESTED:	June 19 to July 24, 2014
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: 1653) 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:** *Sep. 02, 2014*

(Elsie Hsu, Specialist)

APPROVED BY : _____ , **DATE:** *Sep. 02, 2014*

(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 -17.57dB at 0.17734MHz
15.205 15.209 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.3dB at 2390.00MHz & 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	For Accessory Radio: Antenna connector is i-PEX not a standard connector. For Network Radio: No antenna connector is used.

NOTE: The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2.400 ~ 2.4835GHz. For the 5.15~5.25GHzGHz 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)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	802.11a/b/g/n 2T2R dual-band wireless LAN radio
MODEL NO.	1653
POWER SUPPLY	3.3Vdc (from host equipment)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 300Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	**Accessory Radio** **For 15.407** 9 for 802.11a, 802.11n (HT20) **Network Radio** **For 15.407** 9 for 802.11a, 802.11n (HT20) 7 for 802.11n (HT40)
	Accessory Radio **For 15.247** 11 for 802.11b, 802.11g, 802.11n (HT20) **Network Radio** **For 15.247** 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)

MAXIMUM OUTPUT POWER	**Accessory Radio** **For 15.407** 802.11a: 36.898mW 802.11n (HT20): 36.898mW **For 15.247** 802.11b: 304.089mW 802.11g: 516.416mW 802.11n (HT20): 588.844mW **Network Radio** **For 15.407** 802.11a: 164.522mW 802.11n (HT20): 161..942mW 802.11n (HT40): 168.582mW **For 15.247** 802.11b: 196.085mW 802.11g: 616.788mW 802.11n (HT20): 629.359mW 802.11n (HT40): 217.651mW
ANTENNA TYPE	Refer to note as below
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. Features (WiFi) Accessory Radio (1x1) and Features (WiFi) Network Radio (2x2) coexistence mode:

Condition	Technology	
	Networking Radio(2x2)	**Accessory radio(1x1)**
1	2.4GHz Band	5GHz U-NII-1 Band
2	2.4GHz Band	5GHz U-NII-3 Band
3	5GHz U-NII-1 Band	2.4GHz Band
4	5GHz U-NII-1 Band	5GHz U-NII-3 Band
5	5GHz U-NII-3 Band	2.4GHz Band
6	5GHz U-NII-3 Band	5GHz U-NII-1 Band
The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

2. The EUT has two different component configuration as following table:

Configuration	Different
Config-1	different vendor
Config-2	
From the above RF layers designs, Config-2 was selected as the representative mode for the test and its data is recorded in this report.	

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

Accessory Radio							
Ant. No.	Brand	Model	Ant. Gain(dBi) <including cable loss>	Frequency range (GHz ~ GHz)	Ant. Type	Connecter Type	Cable Length (mm)
1	Microsoft	NA	2.2	2.4~2.5	PCB	i-PEX	295
	Microsoft	NA	3.14	5.15~5.85	PCB	i-PEX	295

Network Radio							
Ant. No.	Transmitter Circuit	Brand	Model	Ant. Gain(dBi) <including cable loss>	Frequency range (GHz ~ GHz)	Ant. Type	Connecter Type
1	Chain (0)	Microsoft	NA	4.79	2.4~2.5	PCB	NA
				3.49	5.15~5.85		
2	Chain (1)	Microsoft	NA	1.87	2.4~2.5	PCB	NA
				2.63	5.15~5.85		

4. The EUT incorporates a MIMO function without beamforming.

Accessory Radio			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	1TX	1RX
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX
Network Radio			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX CDD	2RX
802.11b	1 ~ 11Mbps	2TX CDD	2RX
802.11g	6 ~ 54Mbps	2TX CDD	2RX
802.11n (HT20)	MCS 0~7	2TX CDD	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX CDD	2RX
	MCS 8~15	2TX	2RX

5. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

For Accessory Radio

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		

For Network Radio

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 ³ 1G	APCM	OB	
1	√	√	√	√	√	Accessory Radio
2	√	√	√	√	√	Network Radio

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's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

POWER LINE CONDUCTED EMISSION TEST:

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

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

Accessory Radio					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5
Network Radio					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

Accessory Radio					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5
Network Radio					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

Accessory Radio					
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
Network Radio					
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.

Accessory Radio					
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
Network Radio					
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.

Accessory Radio					
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
Network Radio					
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 (SYSTEM)	TESTED BY
PLC	25deg. C, 70,%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	24deg. C, 68%RH	120Vac, 60Hz	Tim Ho
RE³1G	25deg. C, 65%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee
OB	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee

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.

3.4 DUTY CYCLE OF TEST SIGNAL

For Accessory Radio

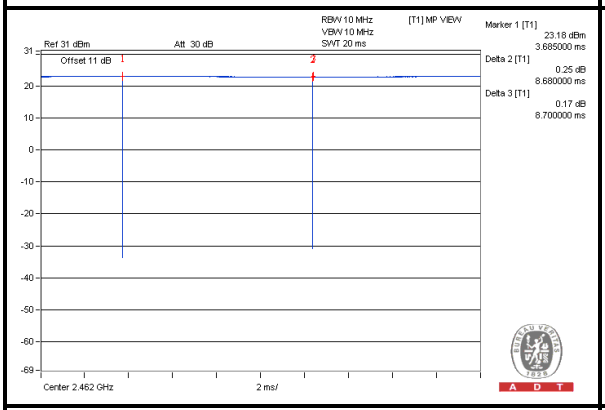
Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11b: Duty cycle = 8.68 ms/8.7 ms = 0.998

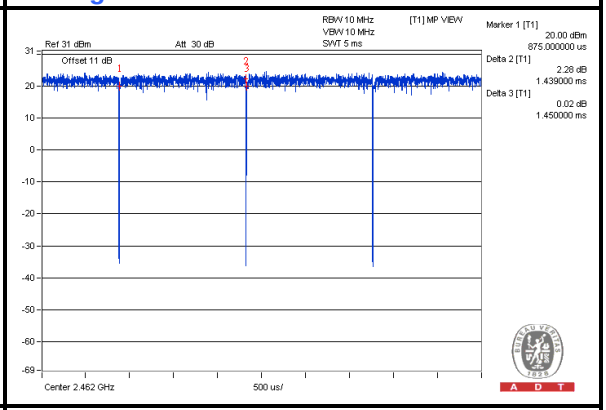
802.11g: Duty cycle = 1.439 ms/1.45 ms = 0.992

802.11n (HT20): Duty cycle = 1.346 ms/1.356 ms = 0.993

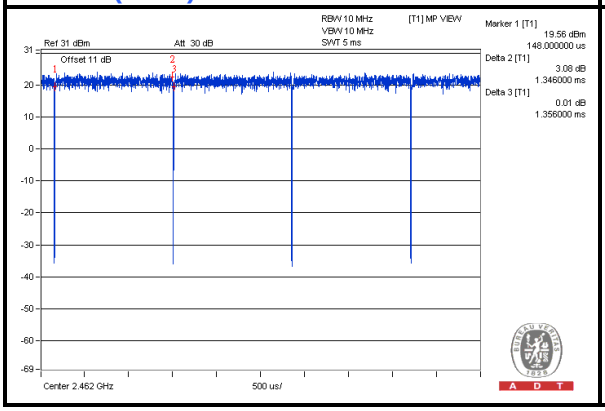
802.11b



802.11g



802.11n (HT20)



For Network Radio

Duty cycle of test signal is ≥ 98 %, duty factor is not required.

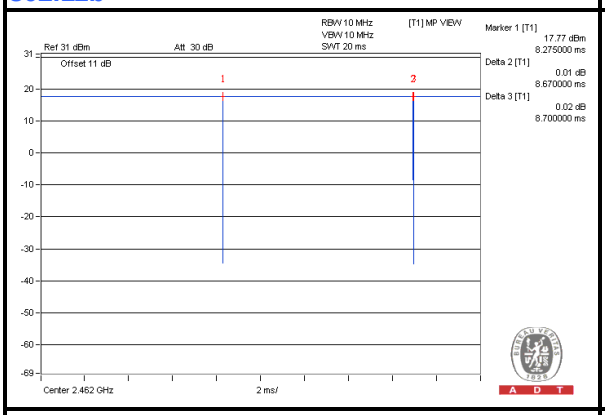
802.11b: Duty cycle = 8.67 ms/8.7 ms = 0.997

802.11g: Duty cycle = 1.439 ms/1.45 ms = 0.992

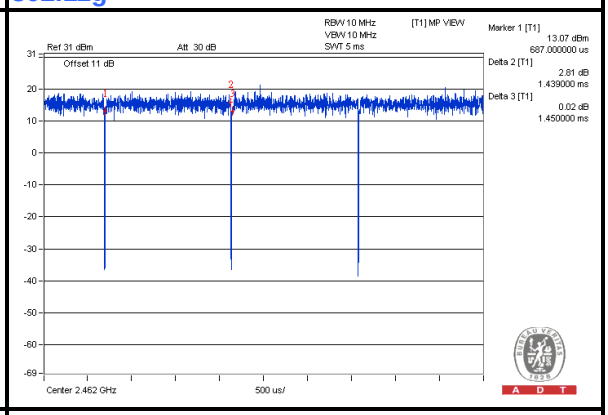
802.11n (HT20): Duty cycle = 1.346 ms/1.357 ms = 0.992

802.11n (HT40): Duty cycle = 0.666 ms/0.678 ms = 0.982

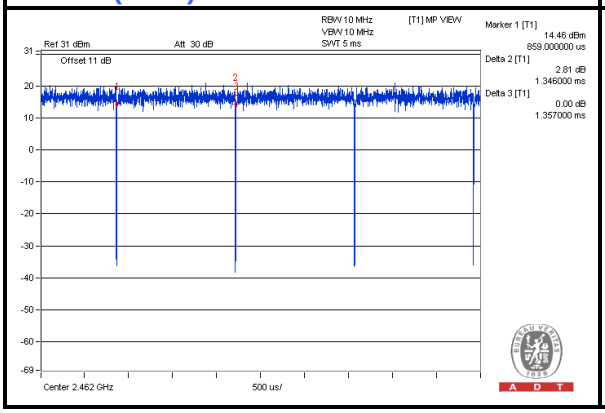
802.11b



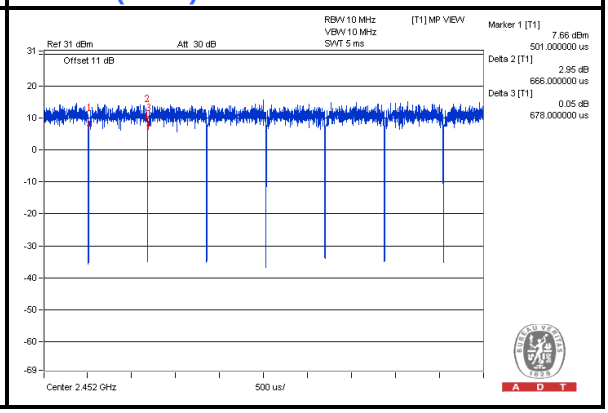
802.11g



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.

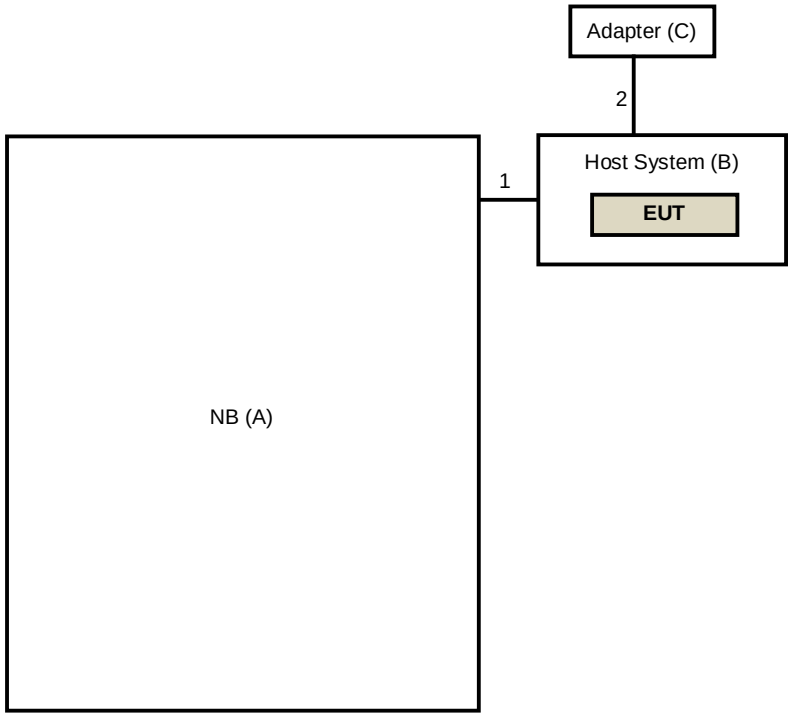
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B	Host System	Microsoft	1540	NA	NA	Supplied by client
C	Adapter	Volgen	KTPS10-03300W9	NA	NA	Supplied by Client

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	USB Cable	2	1.8	Yes	0	Provided by Lab
2	DC	1	1.3	No	1	Supplied by Client

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	NSLK8127	8127-522	Sep. 12, 2013	Sep. 11, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 24, 2013	Sep. 23, 2014
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2013	Sep. 30, 2014
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: June 19, 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.

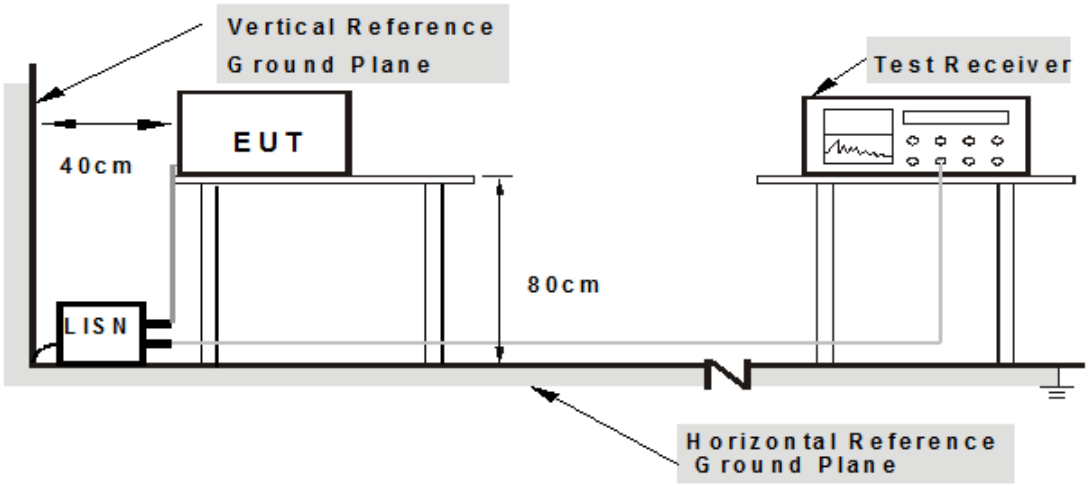
NOTE:

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 B (Host System) which is placed on a testing table.
2. The support unit A (Notebook Computer) runs test program “MT7662UQA.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

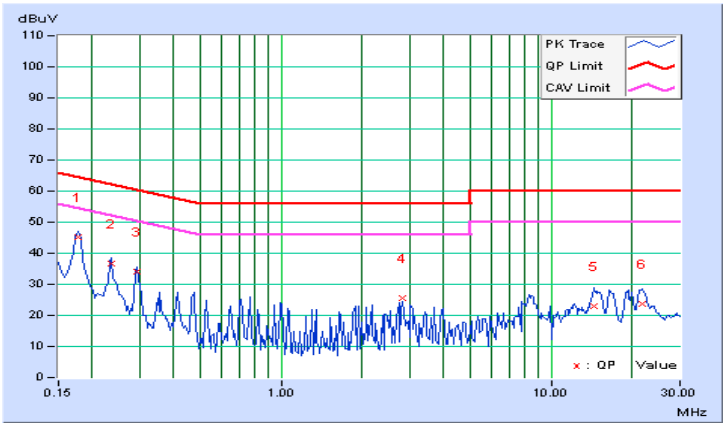
4.1.7 TEST RESULTS (ACCESSORY RADIO)

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

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.17734**	**0.07**	**45.28**	**36.97**	**45.35**	**37.04**	**64.61**	**54.61**	**-19.26**	**-17.57**
2	0.23594	0.07	36.54	28.74	36.61	28.81	62.24	52.24	-25.62	-23.42
3	0.29453	0.08	33.81	25.97	33.89	26.05	60.40	50.40	-26.51	-24.35
4	2.82881	0.21	25.45	12.92	25.66	13.13	56.00	46.00	-30.34	-32.87
5	14.43359	0.57	22.46	14.74	23.03	15.31	60.00	50.00	-36.97	-34.69
6	21.78516	0.76	23.00	15.38	23.76	16.14	60.00	50.00	-36.24	-33.86

Remarks:

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

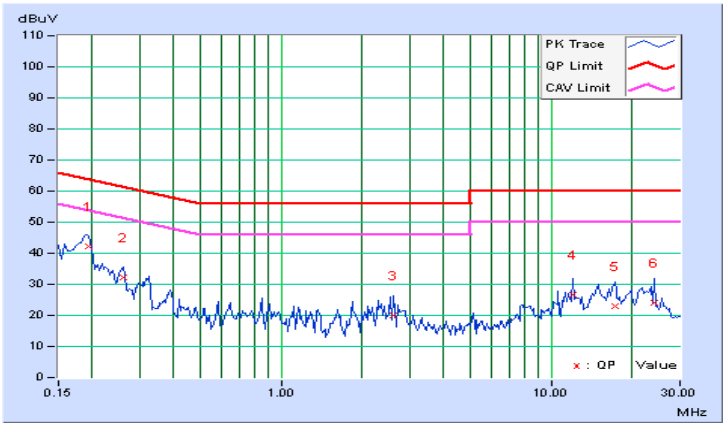


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19297	0.07	42.32	33.56	42.39	33.63	63.91	53.91	-21.52	-20.28
2	0.25938	0.08	32.11	20.91	32.19	20.99	61.45	51.45	-29.27	-30.47
3	2.60547	0.20	19.65	9.27	19.85	9.47	56.00	46.00	-36.15	-36.53
4	12.07031	0.51	26.06	16.91	26.57	17.42	60.00	50.00	-33.43	-32.58
5	17.15234	0.63	22.50	16.11	23.13	16.74	60.00	50.00	-36.87	-33.26
6	24.14453	0.82	23.22	14.81	24.04	15.63	60.00	50.00	-35.96	-34.37

Remarks:

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



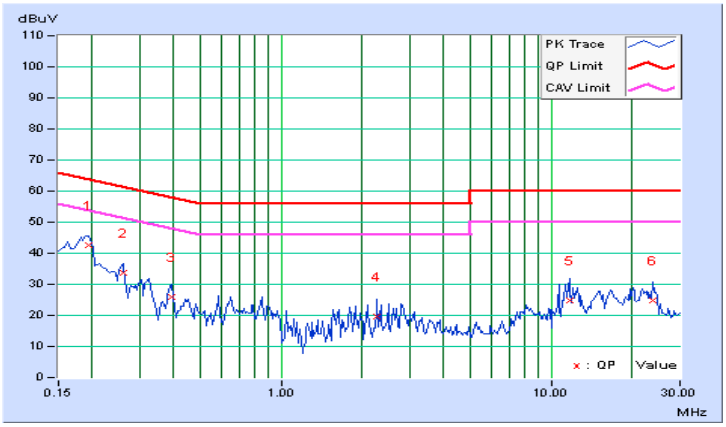
4.1.8 TEST RESULTS (NETWORK RADIO)

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

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19297	0.07	42.34	33.97	42.41	34.04	63.91	53.91	-21.50	-19.87
2	0.25938	0.08	33.55	22.55	33.63	22.63	61.45	51.45	-27.83	-28.83
3	0.39219	0.09	25.86	18.52	25.95	18.61	58.02	48.02	-32.07	-29.41
4	2.26953	0.18	19.44	10.03	19.62	10.21	56.00	46.00	-36.38	-35.79
5	11.69922	0.50	24.24	16.36	24.74	16.86	60.00	50.00	-35.26	-33.14
6	23.78125	0.82	24.04	15.33	24.86	16.15	60.00	50.00	-35.14	-33.85

Remarks:

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

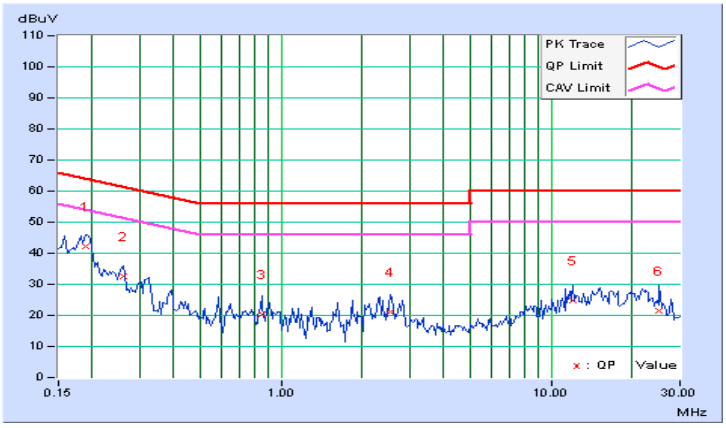


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18906	0.07	42.02	31.67	42.09	31.74	64.08	54.08	-21.99	-22.34
2	0.25938	0.08	32.46	21.33	32.54	21.41	61.45	51.45	-28.92	-30.05
3	0.84922	0.12	20.21	11.50	20.33	11.62	56.00	46.00	-35.67	-34.38
4	2.54297	0.20	20.93	10.23	21.13	10.43	56.00	46.00	-34.87	-35.57
5	12.07813	0.51	24.42	16.46	24.93	16.97	60.00	50.00	-35.07	-33.03
6	25.16797	0.85	20.48	12.22	21.33	13.07	60.00	50.00	-38.67	-36.93

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
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 15, 2014	Jan. 14, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Dec. 06, 2013	Dec. 05, 2014
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 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: July 11 to 14, 2014

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:

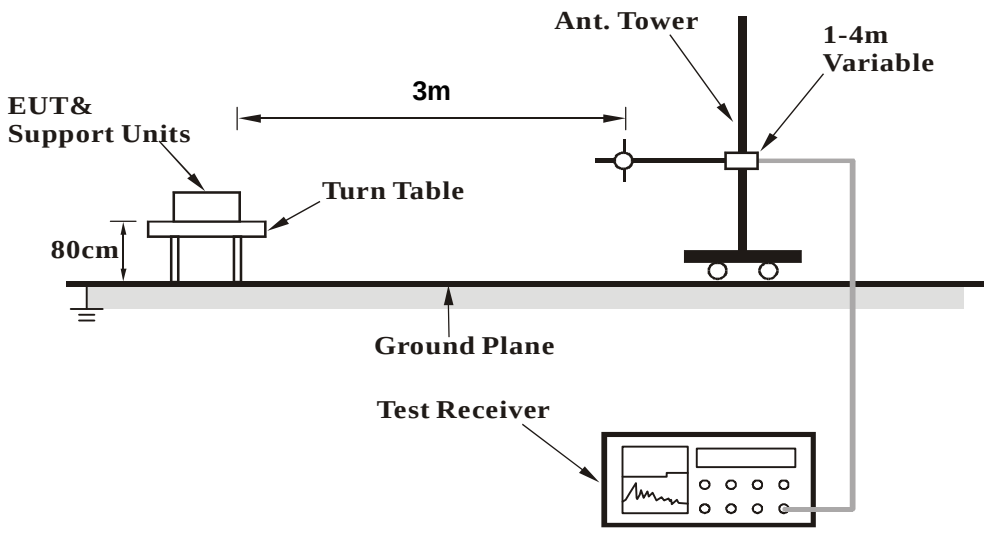
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 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

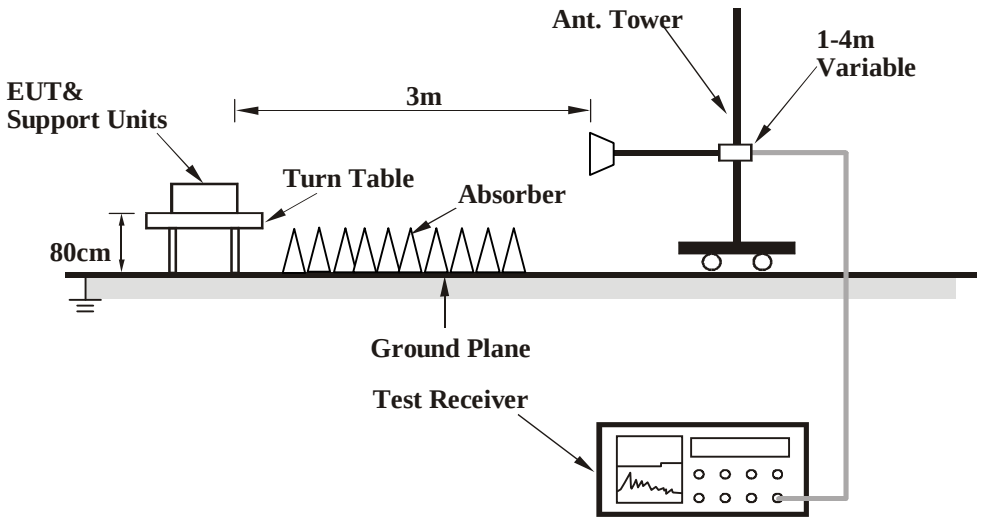
No deviation

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(ACCESSORY RADIO)

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	84.90	32.9 QP	40.0	-7.1	1.00 H	22	51.26	-18.36
2	113.86	26.6 QP	43.5	-16.9	2.00 H	0	41.87	-15.24
3	211.20	35.7 QP	43.5	-7.8	1.00 H	99	51.54	-15.81
4	345.01	32.5 QP	46.0	-13.5	2.00 H	109	43.11	-10.57
5	447.63	28.1 QP	46.0	-17.9	2.00 H	68	35.86	-7.80
6	732.33	24.8 QP	46.0	-21.2	1.00 H	176	27.26	-2.42
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	33.30	35.5 QP	40.0	-4.5	1.00 V	72	49.65	-14.15
2	80.59	30.2 QP	40.0	-9.8	1.00 V	279	47.85	-17.63
3	201.16	26.1 QP	43.5	-17.4	1.00 V	67	41.88	-15.79
4	345.01	29.7 QP	46.0	-16.3	1.50 V	60	40.25	-10.57
5	444.43	28.0 QP	46.0	-18.1	1.00 V	121	35.78	-7.83
6	940.54	29.5 QP	46.0	-16.5	1.00 V	79	28.16	1.37

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	2387.00	55.6 PK	74.0	-18.4	1.00 H	144	23.99	31.61
2	2387.00	45.9 AV	54.0	-8.1	1.00 H	144	14.29	31.61
3	*2412.00	103.0 PK			1.00 H	144	71.32	31.68
4	*2412.00	100.2 AV			1.00 H	144	68.52	31.68
5	4824.00	50.3 PK	74.0	-23.7	1.21 H	11	9.91	40.39
6	4824.00	42.4 AV	54.0	-11.6	1.21 H	11	2.01	40.39
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2387.00	57.8 PK	74.0	-16.2	1.19 V	360	26.19	31.61
2	2387.00	52.2 AV	54.0	-1.8	1.19 V	360	20.59	31.61
3	*2412.00	109.8 PK			1.18 V	360	78.12	31.68
4	*2412.00	107.3 AV			1.18 V	360	75.62	31.68
5	4824.00	51.2 PK	74.0	-22.8	1.07 V	360	10.81	40.39
6	4824.00	42.6 AV	54.0	-11.4	1.07 V	360	2.21	40.39

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	102.9 PK			1.00 H	135	71.17	31.73
2	*2437.00	100.3 AV			1.00 H	135	68.57	31.73
3	4874.00	51.1 PK	74.0	-22.9	1.21 H	15	10.74	40.36
4	4874.00	43.0 AV	54.0	-11.0	1.21 H	15	2.64	40.36
5	7311.00	52.2 PK	74.0	-21.8	1.02 H	279	7.23	44.97
6	7311.00	40.3 AV	54.0	-13.7	1.02 H	279	-4.67	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	52.1 PK	74.0	-21.9	1.18 V	35	20.47	31.63
2	2390.00	42.1 AV	54.0	-11.9	1.18 V	35	10.47	31.63
3	*2437.00	110.5 PK			1.18 V	35	78.77	31.73
4	*2437.00	108.0 AV			1.18 V	35	76.27	31.73
5	2483.50	53.9 PK	74.0	-20.1	1.18 V	35	22.06	31.84
6	2483.50	41.4 AV	54.0	-12.6	1.18 V	35	9.56	31.84
7	4874.00	50.4 PK	74.0	-23.6	1.04 V	360	10.04	40.36
8	4874.00	41.9 AV	54.0	-12.1	1.04 V	360	1.54	40.36
9	7311.00	51.7 PK	74.0	-22.3	1.02 V	16	6.73	44.97
10	7311.00	40.7 AV	54.0	-13.3	1.02 V	16	-4.27	44.97

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.9 PK			1.03 H	139	71.11	31.79
2	*2462.00	100.4 AV			1.03 H	139	68.61	31.79
3	2486.80	55.9 PK	74.0	-18.1	1.03 H	139	24.06	31.84
4	2486.80	46.0 AV	54.0	-8.0	1.03 H	139	14.16	31.84
5	4924.00	50.7 PK	74.0	-23.3	1.24 H	15	10.38	40.32
6	4924.00	42.6 AV	54.0	-11.4	1.24 H	15	2.28	40.32
7	7386.00	51.9 PK	74.0	-22.1	1.00 H	272	6.71	45.19
8	7386.00	40.3 AV	54.0	-13.7	1.00 H	272	-4.89	45.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.6 PK			1.15 V	35	78.81	31.79
2	*2462.00	108.0 AV			1.15 V	35	76.21	31.79
3	2486.80	66.6 PK	74.0	-7.4	1.15 V	35	34.76	31.84
4	2486.80	50.5 AV	54.0	-3.5	1.15 V	35	18.66	31.84
5	4924.00	50.6 PK	74.0	-23.4	1.05 V	360	10.28	40.32
6	4924.00	42.1 AV	54.0	-11.9	1.05 V	360	1.78	40.32
7	7386.00	51.4 PK	74.0	-22.6	1.00 V	22	6.21	45.19
8	7386.00	40.3 AV	54.0	-13.7	1.00 V	22	-4.89	45.19

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	56.1 PK	74.0	-17.9	1.00 H	126	24.47	31.63
2	2390.00	46.3 AV	54.0	-7.7	1.00 H	126	14.67	31.63
3	*2412.00	103.0 PK			1.00 H	126	71.32	31.68
4	*2412.00	92.3 AV			1.00 H	126	60.62	31.68
5	4824.00	51.7 PK	74.0	-22.3	1.05 H	264	11.31	40.39
6	4824.00	40.4 AV	54.0	-13.6	1.05 H	264	0.01	40.39
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.7 PK	74.0	-6.3	1.00 V	354	36.07	31.63
2	2390.00	53.4 AV	54.0	-0.6	1.00 V	354	21.77	31.63
3	*2412.00	109.2 PK			1.00 V	354	77.52	31.68
4	*2412.00	97.8 AV			1.00 V	354	66.12	31.68
5	4824.00	50.8 PK	74.0	-23.2	1.02 V	305	10.41	40.39
6	4824.00	39.9 AV	54.0	-14.1	1.02 V	305	-0.49	40.39

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.9 PK			1.05 H	137	73.17	31.73
2	*2437.00	96.5 AV			1.05 H	137	64.77	31.73
3	4874.00	52.3 PK	74.0	-21.7	1.08 H	238	11.94	40.36
4	4874.00	41.1 AV	54.0	-12.9	1.08 H	238	0.74	40.36
5	7311.00	51.7 PK	74.0	-22.3	1.00 H	271	6.73	44.97
6	7311.00	39.9 AV	54.0	-14.1	1.00 H	271	-5.07	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.5 PK	74.0	-12.5	1.00 V	355	29.87	31.63
2	2390.00	42.0 AV	54.0	-12.0	1.00 V	355	10.37	31.63
3	*2437.00	111.7 PK			1.00 V	355	79.97	31.73
4	*2437.00	101.5 AV			1.00 V	355	69.77	31.73
5	2483.50	61.0 PK	74.0	-13.0	1.00 V	355	29.16	31.84
6	2483.50	39.8 AV	54.0	-14.2	1.00 V	355	7.96	31.84
7	4874.00	50.2 PK	74.0	-23.8	1.09 V	317	9.84	40.36
8	4874.00	41.7 AV	54.0	-12.3	1.09 V	317	1.34	40.36
9	7311.00	51.8 PK	74.0	-22.2	1.06 V	21	6.83	44.97
10	7311.00	40.5 AV	54.0	-13.5	1.06 V	21	-4.47	44.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.1 PK			1.00 H	121	72.31	31.79
2	*2462.00	93.5 AV			1.00 H	121	61.71	31.79
3	2483.50	57.5 PK	74.0	-16.5	1.00 H	121	25.66	31.84
4	2483.50	47.7 AV	54.0	-6.3	1.00 H	121	15.86	31.84
5	4924.00	51.8 PK	74.0	-22.2	1.09 H	251	11.48	40.32
6	4924.00	40.8 AV	54.0	-13.2	1.09 H	251	0.48	40.32
7	7386.00	51.6 PK	74.0	-22.4	1.00 H	265	6.41	45.19
8	7386.00	40.1 AV	54.0	-13.9	1.00 H	265	-5.09	45.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.1 PK			1.00 V	356	78.31	31.79
2	*2462.00	99.3 AV			1.00 V	356	67.51	31.79
3	2483.50	73.3 PK	74.0	-0.7	1.00 V	356	41.46	31.84
4	2483.50	52.2 AV	54.0	-1.8	1.00 V	356	20.36	31.84
5	4924.00	50.5 PK	74.0	-23.5	1.03 V	331	10.18	40.32
6	4924.00	41.8 AV	54.0	-12.2	1.03 V	331	1.48	40.32
7	7386.00	52.1 PK	74.0	-21.9	1.01 V	28	6.91	45.19
8	7386.00	40.7 AV	54.0	-13.3	1.01 V	28	-4.49	45.19

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	56.1 PK	74.0	-17.9	1.02 H	115	24.47	31.63
2	2390.00	46.1 AV	54.0	-7.9	1.02 H	115	14.47	31.63
3	*2412.00	102.9 PK			1.05 H	127	71.22	31.68
4	*2412.00	92.2 AV			1.05 H	127	60.52	31.68
5	4824.00	51.2 PK	74.0	-22.8	1.04 H	260	10.81	40.39
6	4824.00	40.0 AV	54.0	-14.0	1.04 H	260	-0.39	40.39
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	71.1 PK	74.0	-2.9	1.00 V	354	39.47	31.63
2	2390.00	51.5 AV	54.0	-2.5	1.00 V	354	19.87	31.63
3	*2412.00	108.7 PK			1.00 V	354	77.02	31.68
4	*2412.00	97.6 AV			1.00 V	354	65.92	31.68
5	4824.00	52.5 PK	74.0	-21.5	1.02 V	346	12.11	40.39
6	4824.00	40.8 AV	54.0	-13.2	1.02 V	346	0.41	40.39

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.7 PK			1.06 H	121	72.97	31.73
2	*2437.00	96.4 AV			1.06 H	121	64.67	31.73
3	4874.00	52.7 PK	74.0	-21.3	1.13 H	240	12.34	40.36
4	4874.00	41.4 AV	54.0	-12.6	1.13 H	240	1.04	40.36
5	7311.00	52.1 PK	74.0	-21.9	1.00 H	277	7.13	44.97
6	7311.00	40.3 AV	54.0	-13.7	1.00 H	277	-4.67	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.7 PK	74.0	-12.3	1.20 V	354	30.07	31.63
2	2390.00	42.1 AV	54.0	-11.9	1.20 V	354	10.47	31.63
3	*2437.00	111.6 PK			1.20 V	354	79.87	31.73
4	*2437.00	101.3 AV			1.20 V	354	69.57	31.73
5	2483.50	63.1 PK	74.0	-10.9	1.20 V	354	31.26	31.84
6	2483.50	41.9 AV	54.0	-12.1	1.20 V	354	10.06	31.84
7	4874.00	50.3 PK	74.0	-23.7	1.06 V	337	9.94	40.36
8	4874.00	41.4 AV	54.0	-12.6	1.06 V	337	1.04	40.36
9	7311.00	51.9 PK	74.0	-22.1	1.03 V	53	6.93	44.97
10	7311.00	40.6 AV	54.0	-13.4	1.03 V	53	-4.37	44.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.2 PK			1.01 H	127	72.41	31.79
2	*2462.00	93.6 AV			1.01 H	127	61.81	31.79
3	2483.50	57.6 PK	74.0	-16.4	1.01 H	127	25.76	31.84
4	2483.50	47.5 AV	54.0	-6.5	1.01 H	127	15.66	31.84
5	4924.00	52.0 PK	74.0	-22.0	1.12 H	247	11.68	40.32
6	4924.00	40.7 AV	54.0	-13.3	1.12 H	247	0.38	40.32
7	7386.00	51.6 PK	74.0	-22.4	1.02 H	255	6.41	45.19
8	7386.00	40.1 AV	54.0	-13.9	1.02 H	255	-5.09	45.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.6 PK			1.19 V	360	77.81	31.79
2	*2462.00	98.9 AV			1.19 V	360	67.11	31.79
3	2483.50	73.1 PK	74.0	-0.9	1.19 V	360	41.26	31.84
4	2483.50	53.4 AV	54.0	-0.6	1.19 V	360	21.56	31.84
5	4924.00	49.8 PK	74.0	-24.2	1.11 V	337	9.48	40.32
6	4924.00	41.2 AV	54.0	-12.8	1.11 V	337	0.88	40.32
7	7386.00	51.9 PK	74.0	-22.1	1.07 V	40	6.71	45.19
8	7386.00	40.8 AV	54.0	-13.2	1.07 V	40	-4.39	45.19

REMARKS:

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

4.2.8 TEST RESULTS (NETWORT RADIO)

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	89.70	31.1 QP	43.5	-12.4	2.00 H	83	49.61	-18.49
2	107.75	28.8 QP	43.5	-14.7	1.50 H	240	44.60	-15.84
3	204.31	34.5 QP	43.5	-9.0	1.00 H	99	50.34	-15.85
4	238.60	32.6 QP	46.0	-13.4	1.00 H	108	46.42	-13.85
5	345.01	32.5 QP	46.0	-13.5	2.00 H	118	43.11	-10.57
6	444.00	30.0 QP	46.0	-16.0	1.50 H	118	37.86	-7.83
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	34.07	33.6 QP	40.0	-6.4	1.00 V	96	47.64	-14.05
2	59.49	27.9 QP	40.0	-12.1	1.00 V	322	41.29	-13.41
3	88.49	27.4 QP	43.5	-16.1	2.00 V	126	45.89	-18.45
4	144.32	22.0 QP	43.5	-21.5	2.00 V	360	34.63	-12.67
5	215.37	18.3 QP	43.5	-25.2	1.00 V	119	34.04	-15.74
6	940.68	26.8 QP	46.0	-19.2	1.00 V	360	25.41	1.37

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	2387.00	64.3 PK	74.0	-9.7	1.05 H	21	32.69	31.61
2	2387.00	51.2 AV	54.0	-2.8	1.05 H	21	19.59	31.61
3	*2412.00	112.5 PK			1.05 H	21	80.82	31.68
4	*2412.00	109.8 AV			1.05 H	21	78.12	31.68
5	4824.00	54.9 PK	74.0	-19.1	1.76 H	87	14.51	40.39
6	4824.00	50.1 AV	54.0	-3.9	1.76 H	87	9.71	40.39
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2387.00	62.3 PK	74.0	-11.7	1.94 V	342	30.69	31.61
2	2387.00	47.9 AV	54.0	-6.1	1.94 V	342	16.29	31.61
3	*2412.00	107.5 PK			1.94 V	360	75.82	31.68
4	*2412.00	104.7 AV			1.94 V	360	73.02	31.68
5	4824.00	56.5 PK	74.0	-17.5	1.44 V	97	16.11	40.39
6	**4824.00**	**53.7 AV**	**54.0**	**-0.3**	**1.44 V**	**97**	**13.31**	**40.39**

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	54.1 PK	74.0	-19.9	1.04 H	20	22.47	31.63
2	2390.00	44.6 AV	54.0	-9.4	1.04 H	20	12.97	31.63
3	*2437.00	112.1 PK			1.04 H	20	80.37	31.73
4	*2437.00	109.4 AV			1.04 H	20	77.67	31.73
5	2483.50	53.2 PK	74.0	-20.8	1.04 H	20	21.36	31.84
6	2483.50	41.8 AV	54.0	-12.2	1.04 H	20	9.96	31.84
7	4874.00	55.3 PK	74.0	-18.7	1.69 H	93	14.94	40.36
8	4874.00	50.5 AV	54.0	-3.5	1.69 H	93	10.14	40.36
9	7311.00	52.0 PK	74.0	-22.0	1.00 H	247	7.03	44.97
10	7311.00	38.5 AV	54.0	-15.5	1.00 H	247	-6.47	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.6 PK			1.91 V	349	75.87	31.73
2	*2437.00	104.9 AV			1.91 V	349	73.17	31.73
3	4874.00	56.5 PK	74.0	-17.5	1.45 V	103	16.14	40.36
4	4874.00	53.3 AV	54.0	-0.7	1.45 V	103	12.94	40.36
5	7311.00	51.3 PK	74.0	-22.7	1.00 V	360	6.33	44.97
6	7311.00	38.4 AV	54.0	-15.6	1.00 V	360	-6.57	44.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	112.4 PK			1.25 H	17	80.61	31.79
2	*2462.00	109.8 AV			1.25 H	17	78.01	31.79
3	2483.50	67.3 PK	74.0	-6.7	1.25 H	17	35.46	31.84
4	2483.50	50.7 AV	54.0	-3.3	1.25 H	17	18.86	31.84
5	4924.00	54.6 PK	74.0	-19.4	1.74 H	99	14.28	40.32
6	4924.00	50.1 AV	54.0	-3.9	1.74 H	99	9.78	40.32
7	7386.00	51.7 PK	74.0	-22.3	1.04 H	249	6.51	45.19
8	7386.00	38.1 AV	54.0	-15.9	1.04 H	249	-7.09	45.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.0 PK			1.88 V	352	75.21	31.79
2	*2462.00	104.5 AV			1.88 V	352	72.71	31.79
3	2483.50	62.0 PK	74.0	-12.0	1.88 V	352	30.16	31.84
4	2483.50	47.5 AV	54.0	-6.5	1.88 V	352	15.66	31.84
5	4924.00	56.0 PK	74.0	-18.0	1.00 V	101	15.68	40.32
6	4924.00	53.0 AV	54.0	-1.0	1.00 V	101	12.68	40.32
7	7386.00	50.9 PK	74.0	-23.1	1.02 V	315	5.71	45.19
8	7386.00	38.1 AV	54.0	-15.9	1.02 V	315	-7.09	45.19

REMARKS:

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

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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	72.3 PK	74.0	-1.7	1.26 H	17	40.67	31.63
2	2390.00	53.4 AV	54.0	-0.6	1.26 H	17	21.77	31.63
3	*2412.00	113.1 PK			1.26 H	17	81.42	31.68
4	*2412.00	103.0 AV			1.26 H	17	71.32	31.68
5	4824.00	49.8 PK	74.0	-24.2	1.75 H	93	9.41	40.39
6	4824.00	37.1 AV	54.0	-16.9	1.75 H	93	-3.29	40.39
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.8 PK	74.0	-10.2	1.84 V	348	32.17	31.63
2	2390.00	49.4 AV	54.0	-4.6	1.84 V	348	17.77	31.63
3	*2412.00	108.1 PK			1.84 V	348	76.42	31.68
4	*2412.00	97.9 AV			1.84 V	348	66.22	31.68
5	4824.00	50.7 PK	74.0	-23.3	1.03 V	89	10.31	40.39
6	4824.00	37.9 AV	54.0	-16.1	1.03 V	89	-2.49	40.39

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	70.8 PK	74.0	-3.2	1.04 H	21	39.17	31.63
2	2390.00	52.4 AV	54.0	-1.6	1.04 H	21	20.77	31.63
3	*2437.00	118.9 PK			1.04 H	21	87.17	31.73
4	*2437.00	109.1 AV			1.04 H	21	77.37	31.73
5	2483.50	64.8 PK	74.0	-9.2	1.04 H	21	32.96	31.84
6	2483.50	46.1 AV	54.0	-7.9	1.04 H	21	14.26	31.84
7	4874.00	50.3 PK	74.0	-23.7	1.72 H	97	9.94	40.36
8	4874.00	37.5 AV	54.0	-16.5	1.72 H	97	-2.86	40.36
9	7311.00	51.8 PK	74.0	-22.2	1.09 H	253	6.83	44.97
10	7311.00	37.9 AV	54.0	-16.1	1.09 H	253	-7.07	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	113.5 PK			1.94 V	320	81.77	31.73
2	*2437.00	103.5 AV			1.94 V	320	71.77	31.73
3	4874.00	50.6 PK	74.0	-23.4	1.01 V	92	10.24	40.36
4	4874.00	37.6 AV	54.0	-16.4	1.01 V	92	-2.76	40.36
5	7311.00	50.0 PK	74.0	-24.0	1.01 V	330	5.03	44.97
6	7311.00	37.2 AV	54.0	-16.8	1.01 V	330	-7.77	44.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	113.8 PK			1.04 H	20	82.01	31.79
2	*2462.00	103.3 AV			1.04 H	20	71.51	31.79
3	2483.50	68.9 PK	74.0	-5.1	1.04 H	20	37.06	31.84
4	2483.50	53.1 AV	54.0	-0.9	1.04 H	20	21.26	31.84
5	4924.00	50.5 PK	74.0	-23.5	1.68 H	105	10.18	40.32
6	4924.00	37.7 AV	54.0	-16.3	1.68 H	105	-2.62	40.32
7	7386.00	52.0 PK	74.0	-22.0	1.05 H	268	6.81	45.19
8	7386.00	37.9 AV	54.0	-16.1	1.05 H	268	-7.29	45.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.5 PK			1.88 V	334	75.71	31.79
2	*2462.00	97.4 AV			1.88 V	334	65.61	31.79
3	2483.50	64.4 PK	74.0	-9.6	1.88 V	334	32.56	31.84
4	2483.50	49.7 AV	54.0	-4.3	1.88 V	334	17.86	31.84
5	4924.00	50.8 PK	74.0	-23.2	1.01 V	88	10.48	40.32
6	4924.00	38.0 AV	54.0	-16.0	1.01 V	88	-2.32	40.32
7	7386.00	50.4 PK	74.0	-23.6	1.00 V	321	5.21	45.19
8	7386.00	37.7 AV	54.0	-16.3	1.00 V	321	-7.49	45.19

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	69.6 PK	74.0	-4.4	1.06 H	42	37.97	31.63
2	2390.00	53.1 AV	54.0	-0.9	1.06 H	42	21.47	31.63
3	*2412.00	111.7 PK			1.06 H	42	80.02	31.68
4	*2412.00	101.6 AV			1.06 H	42	69.92	31.68
5	4824.00	50.5 PK	74.0	-23.5	1.63 H	104	10.11	40.39
6	4824.00	37.8 AV	54.0	-16.2	1.63 H	104	-2.59	40.39
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	63.8 PK	74.0	-10.2	1.83 V	335	32.17	31.63
2	2390.00	49.6 AV	54.0	-4.4	1.83 V	335	17.97	31.63
3	*2412.00	105.4 PK			1.83 V	335	73.72	31.68
4	*2412.00	95.4 AV			1.83 V	335	63.72	31.68
5	4824.00	50.4 PK	74.0	-23.6	1.00 V	75	10.01	40.39
6	4824.00	37.6 AV	54.0	-16.4	1.00 V	75	-2.79	40.39

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	70.3 PK	74.0	-3.7	1.05 H	44	38.67	31.63
2	2390.00	52.7 AV	54.0	-1.3	1.05 H	44	21.07	31.63
3	*2437.00	118.7 PK			1.05 H	44	86.97	31.73
4	*2437.00	108.0 AV			1.05 H	44	76.27	31.73
5	2483.50	64.6 PK	74.0	-9.4	1.05 H	44	32.76	31.84
6	2483.50	44.6 AV	54.0	-9.4	1.05 H	44	12.76	31.84
7	4874.00	50.2 PK	74.0	-23.8	1.74 H	82	9.84	40.36
8	4874.00	37.1 AV	54.0	-16.9	1.74 H	82	-3.26	40.36
9	7311.00	51.7 PK	74.0	-22.3	1.03 H	248	6.73	44.97
10	7311.00	38.0 AV	54.0	-16.0	1.03 H	248	-6.97	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	113.3 PK			1.97 V	332	81.57	31.73
2	*2437.00	103.1 AV			1.97 V	332	71.37	31.73
3	4874.00	50.7 PK	74.0	-23.3	1.04 V	105	10.34	40.36
4	4874.00	37.4 AV	54.0	-16.6	1.04 V	105	-2.96	40.36
5	7311.00	49.6 PK	74.0	-24.4	1.05 V	324	4.63	44.97
6	7311.00	37.1 AV	54.0	-16.9	1.05 V	324	-7.87	44.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	113.3 PK			1.04 H	20	81.51	31.79
2	*2462.00	102.4 AV			1.04 H	20	70.61	31.79
3	2483.50	69.0 PK	74.0	-5.0	1.04 H	20	37.16	31.84
4	2483.50	53.1 AV	54.0	-0.9	1.04 H	20	21.26	31.84
5	4924.00	50.0 PK	74.0	-24.0	1.80 H	68	9.68	40.32
6	4924.00	36.6 AV	54.0	-17.4	1.80 H	68	-3.72	40.32
7	7386.00	52.2 PK	74.0	-21.8	1.00 H	236	7.01	45.19
8	7386.00	38.4 AV	54.0	-15.6	1.00 H	236	-6.79	45.19
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.4 PK			1.80 V	337	73.61	31.79
2	*2462.00	95.5 AV			1.80 V	337	63.71	31.79
3	2483.50	64.1 PK	74.0	-9.9	1.80 V	337	32.26	31.84
4	2483.50	50.1 AV	54.0	-3.9	1.80 V	337	18.26	31.84
5	4924.00	50.5 PK	74.0	-23.5	1.08 V	118	10.18	40.32
6	4924.00	37.1 AV	54.0	-16.9	1.08 V	118	-3.22	40.32
7	7386.00	49.3 PK	74.0	-24.7	1.07 V	330	4.11	45.19
8	7386.00	36.8 AV	54.0	-17.2	1.07 V	330	-8.39	45.19

REMARKS:

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

802.11n (HT40)

CHANNEL	TX Channel 3	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	68.4 PK	74.0	-5.6	1.03 H	21	36.77	31.63
2	**2390.00**	**53.7 AV**	**54.0**	**-0.3**	**1.03 H**	**21**	**22.07**	**31.63**
3	*2422.00	106.3 PK			1.03 H	21	74.60	31.70
4	*2422.00	95.2 AV			1.03 H	21	63.50	31.70
5	4844.00	50.2 PK	74.0	-23.8	1.74 H	73	9.82	40.38
6	4844.00	36.8 AV	54.0	-17.2	1.74 H	73	-3.58	40.38
7	7266.00	51.3 PK	74.0	-22.7	1.10 H	257	6.47	44.83
8	7266.00	37.8 AV	54.0	-16.2	1.10 H	257	-7.03	44.83
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	2390.00	63.4 PK	74.0	-10.6	1.26 V	354	31.77	31.63
2	2390.00	47.9 AV	54.0	-6.1	1.26 V	354	16.27	31.63
3	*2422.00	101.6 PK			1.26 V	354	69.90	31.70
4	*2422.00	92.2 AV			1.26 V	354	60.50	31.70
5	4844.00	51.4 PK	74.0	-22.6	1.09 V	104	11.02	40.38
6	4844.00	37.6 AV	54.0	-16.4	1.09 V	104	-2.78	40.38
7	7266.00	50.8 PK	74.0	-23.2	1.00 V	323	5.97	44.83
8	7266.00	37.4 AV	54.0	-16.6	1.00 V	323	-7.43	44.83

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	71.0 PK	74.0	-3.0	1.04 H	21	39.37	31.63
2	2390.00	53.5 AV	54.0	-0.5	1.04 H	21	21.87	31.63
3	*2437.00	110.0 PK			1.04 H	21	78.27	31.73
4	*2437.00	99.4 AV			1.04 H	21	67.67	31.73
5	2483.50	63.5 PK	74.0	-10.5	1.04 H	21	31.66	31.84
6	2483.50	47.4 AV	54.0	-6.6	1.04 H	21	15.56	31.84
7	4874.00	50.7 PK	74.0	-23.3	1.79 H	71	10.34	40.36
8	4874.00	37.0 AV	54.0	-17.0	1.79 H	71	-3.36	40.36
9	7311.00	51.2 PK	74.0	-22.8	1.04 H	250	6.23	44.97
10	7311.00	37.7 AV	54.0	-16.3	1.04 H	250	-7.27	44.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.1 PK			1.26 V	347	75.37	31.73
2	*2437.00	96.3 AV			1.26 V	347	64.57	31.73
3	4874.00	50.9 PK	74.0	-23.1	1.07 V	111	10.54	40.36
4	4874.00	37.0 AV	54.0	-17.0	1.07 V	111	-3.36	40.36
5	7311.00	51.1 PK	74.0	-22.9	1.09 V	306	6.13	44.97
6	7311.00	37.5 AV	54.0	-16.5	1.09 V	306	-7.47	44.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	108.3 PK			1.03 H	19	76.54	31.76
2	*2452.00	97.5 AV			1.03 H	19	65.74	31.76
3	2483.50	67.6 PK	74.0	-6.4	1.03 H	19	35.76	31.84
4	2483.50	53.5 AV	54.0	-0.5	1.03 H	19	21.66	31.84
5	4904.00	50.6 PK	74.0	-23.4	1.70 H	75	10.26	40.34
6	4904.00	37.1 AV	54.0	-16.9	1.70 H	75	-3.24	40.34
7	7356.00	50.8 PK	74.0	-23.2	1.14 H	269	5.69	45.11
8	7356.00	37.4 AV	54.0	-16.6	1.14 H	269	-7.71	45.11
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	103.6 PK			1.27 V	350	71.84	31.76
2	*2452.00	93.9 AV			1.27 V	350	62.14	31.76
3	2483.50	63.9 PK	74.0	-10.1	1.27 V	350	32.06	31.84
4	2483.50	48.2 AV	54.0	-5.8	1.27 V	350	16.36	31.84
5	4904.00	51.1 PK	74.0	-22.9	1.10 V	104	10.76	40.34
6	4904.00	37.2 AV	54.0	-16.8	1.10 V	104	-3.14	40.34
7	7356.00	51.2 PK	74.0	-22.8	1.04 V	316	6.09	45.11
8	7356.00	37.7 AV	54.0	-16.3	1.04 V	316	-7.41	45.11

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	FSV 40	100964	July 15, 2013	July 14, 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 11, 2014

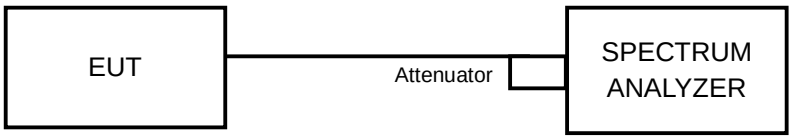
4.3.3 TEST PROCEDURE

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 (ACCESSORY RADIO)

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.09	0.5	PASS
6	2437	10.07	0.5	PASS
11	2462	10.11	0.5	PASS

802.11g

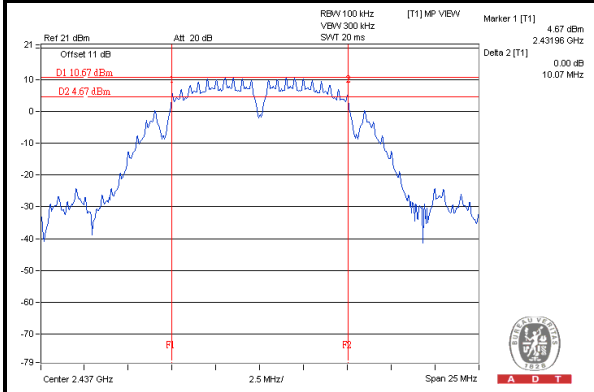
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.34	0.5	PASS
6	2437	16.33	0.5	PASS
11	2462	16.33	0.5	PASS

802.11n (HT20)

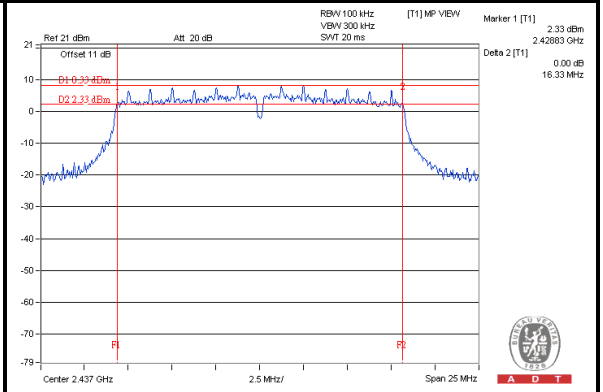
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.10	0.5	PASS
6	2437	17.12	0.5	PASS
11	2462	17.09	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

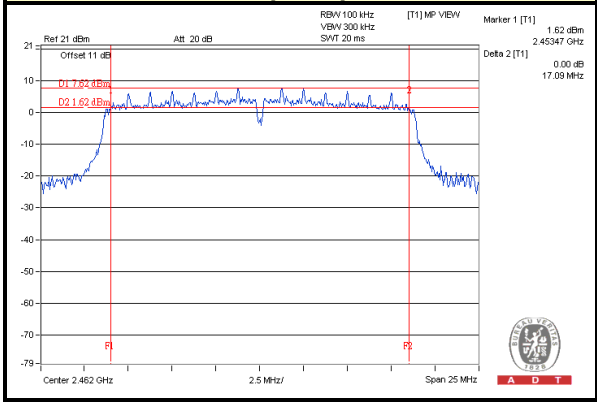
802.11b : CH6



802.11g : CH6



802.11n (HT20) : CH11



4.3.8 TEST RESULTS (NETWORK RADIO)

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	10.07	10.09	0.5	PASS
6	2437	10.07	10.10	0.5	PASS
11	2462	10.07	10.09	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.36	16.38	0.5	PASS
6	2437	16.12	16.37	0.5	PASS
11	2462	16.37	16.36	0.5	PASS

802.11n (HT20)

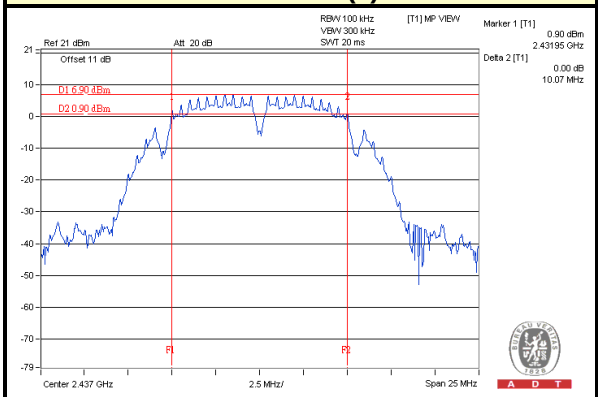
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.15	16.98	0.5	PASS
6	2437	17.08	16.97	0.5	PASS
11	2462	17.10	17.29	0.5	PASS

802.11n (HT40)

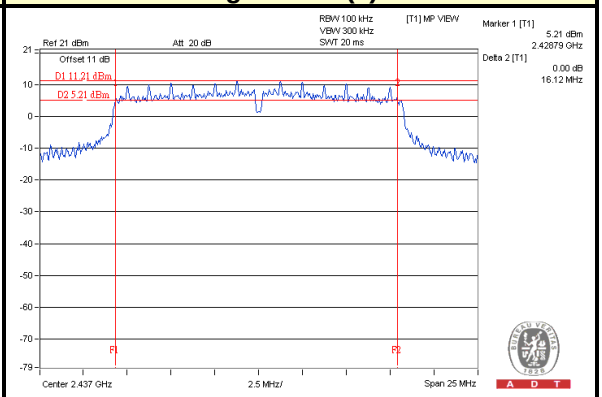
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	35.62	35.46	0.5	PASS
6	2437	35.57	35.56	0.5	PASS
9	2452	35.57	35.50	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

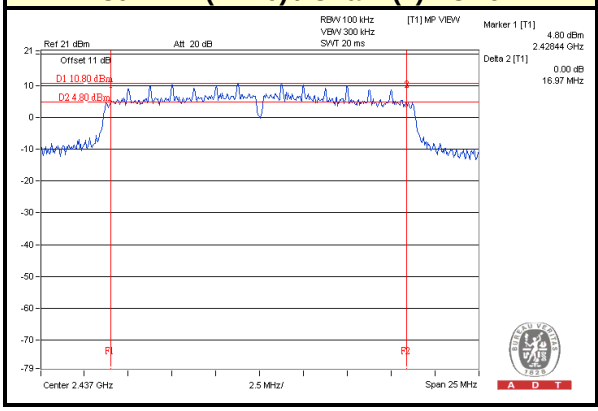
802.11b / Chain (0) : CH6



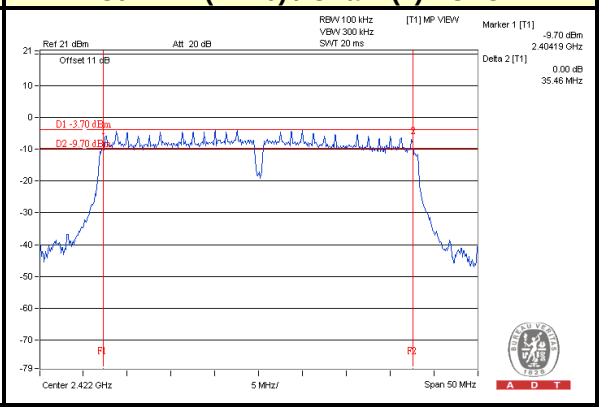
802.11g / Chain (0) : CH6



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



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



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 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 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 : July 11, 2014

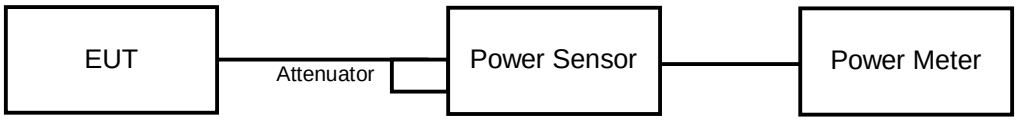
4.4.3 TEST PROCEDURES

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.

4.4.4 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 (ACCESSORY RADIO)

FOR PEAK POWER

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	192.309	22.84	30	PASS
6	2437	179.061	22.53	30	PASS
11	2462	304.089	24.83	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	295.801	24.71	30	PASS
6	2437	516.416	27.13	30	PASS
11	2462	287.078	24.58	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	287.078	24.58	30	PASS
6	2437	588.844	27.70	30	PASS
11	2462	292.415	24.66	30	PASS

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	87.297	19.41
6	2437	81.658	19.12
11	2462	187.932	22.74

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	74.989	18.75
6	2437	84.528	19.27
11	2462	76.560	18.84

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	74.473	18.72
6	2437	85.704	19.33
11	2462	68.549	18.36

4.4.8 TEST RESULTS (NETWORK RADIO)

FOR PEAK POWER

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	19.72	20.10	196.085	22.92	30	PASS
6	2437	18.62	17.62	130.588	21.16	30	PASS
11	2462	17.36	18.87	131.54	21.19	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	21.48	22.89	335.141	25.25	30	PASS
6	2437	25.19	24.57	616.788	27.90	30	PASS
11	2462	20.15	21.72	252.108	24.02	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	21.08	21.53	270.466	24.32	30	PASS
6	2437	25.31	24.62	629.359	27.99	30	PASS
11	2462	22.21	21.82	318.396	25.03	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	19.12	20.63	197.269	22.95	30	PASS
6	2437	19.76	20.90	217.651	23.38	30	PASS
9	2452	19.65	19.97	191.569	22.82	30	PASS

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	16.52	16.13	85.895	19.34
6	2437	15.73	14.56	65.987	18.19
11	2462	14.61	15.21	62.096	17.93

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.60	14.79	53.039	17.25
6	2437	21.28	21.04	261.333	24.17
11	2462	12.38	14.39	44.777	16.51

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.41	14.72	51.576	17.12
6	2437	21.21	21.37	269.218	24.30
11	2462	13.21	13.85	45.207	16.55

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
3	2422	9.64	9.79	18.732	12.73
6	2437	11.64	12.72	33.295	15.22
9	2452	10.48	11.03	23.846	13.77

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 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 11, 2014

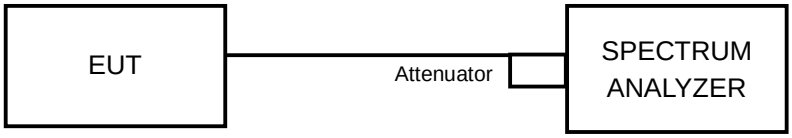
4.5.3 TEST PROCEDURE

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS (ACCESSORY RADIO)

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-4.35	8	PASS
6	2437	-1.77	8	PASS
11	2462	-1.14	8	PASS

802.11g

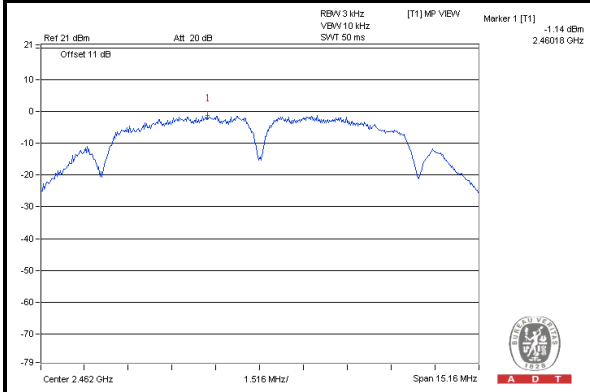
CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-5.05	8	PASS
6	2437	-4.48	8	PASS
11	2462	-3.28	8	PASS

802.11n (HT20)

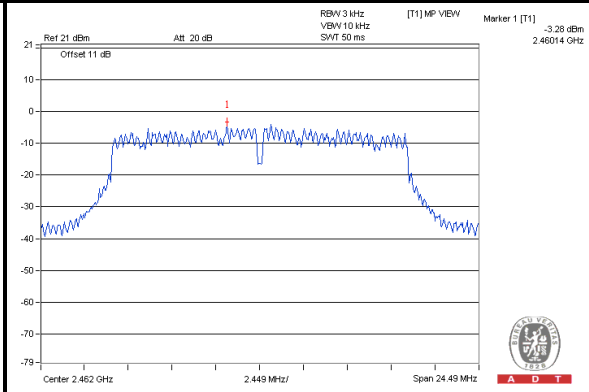
CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-4.16	8	PASS
6	2437	-3.91	8	PASS
11	2462	-4.44	8	PASS

SPECTRUM PLOT OF WORST VALUE

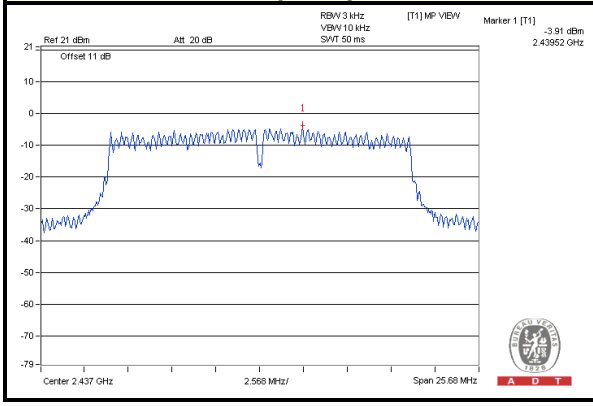
802.11b : CH11



802.11g : CH11



802.11n (HT20) : CH6



4.5.8 TEST RESULTS (NETWORK RADIO)

802.11b

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-6.87	3.01	-3.86	7.54	PASS
	6	2437	-6.42	3.01	-3.41	7.54	PASS
	11	2462	-8.19	3.01	-5.18	7.54	PASS
1	1	2412	-7.63	3.01	-4.62	7.54	PASS
	6	2437	-9.22	3.01	-6.21	7.54	PASS
	11	2462	-8.12	3.01	-5.11	7.54	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.46dBi > 6dBi , so the power density limit shall be reduced to 8-(6.46-6) = 7.54dBm.

802.11g

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-11.41	3.01	-8.40	7.54	PASS
	6	2437	-4.12	3.01	-1.11	7.54	PASS
	11	2462	-12.90	3.01	-9.89	7.54	PASS
1	1	2412	-10.61	3.01	-7.60	7.54	PASS
	6	2437	-4.97	3.01	-1.96	7.54	PASS
	11	2462	-9.98	3.01	-6.97	7.54	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.46dBi > 6dBi , so the power density limit shall be reduced to 8-(6.46-6) = 7.54dBm.

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	-12.22	3.01	-9.21	7.54	PASS
	6	2437	-2.98	3.01	0.03	7.54	PASS
	11	2462	-10.29	3.01	-7.28	7.54	PASS
1	1	2412	-10.48	3.01	-7.47	7.54	PASS
	6	2437	-5.31	3.01	-2.30	7.54	PASS
	11	2462	-12.32	3.01	-9.31	7.54	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.46dBi > 6dBi , so the power density limit shall be reduced to 8-(6.46-6) = 7.54dBm.

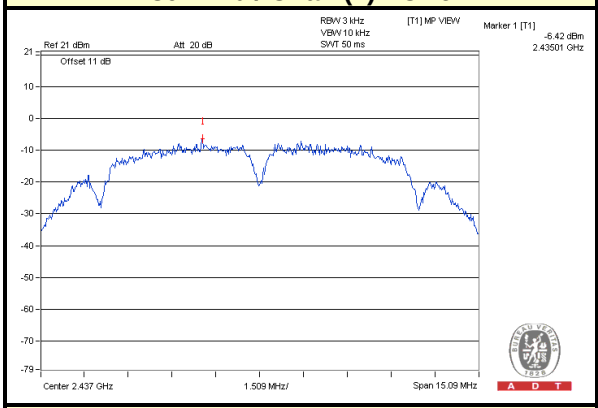
802.11n (HT40)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-18.50	3.01	-15.49	7.54	PASS
	6	2437	-17.16	3.01	-14.15	7.54	PASS
	9	2452	-18.46	3.01	-15.45	7.54	PASS
1	3	2422	-18.80	3.01	-15.79	7.54	PASS
	6	2437	-15.75	3.01	-12.74	7.54	PASS
	9	2452	-16.79	3.01	-13.78	7.54	PASS

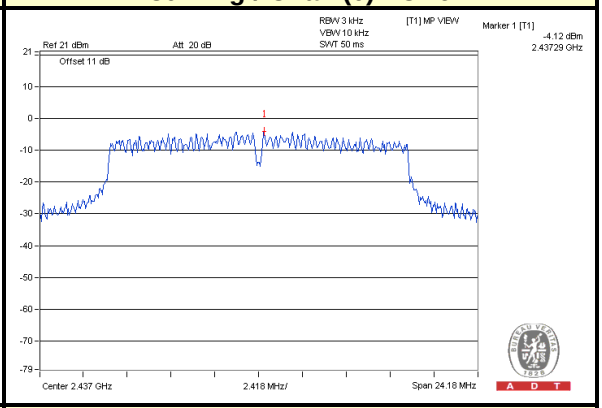
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.46dBi > 6dBi , so the power density limit shall be reduced to 8-(6.46-6) = 7.54dBm.

SPECTRUM PLOT OF WORST VALUE

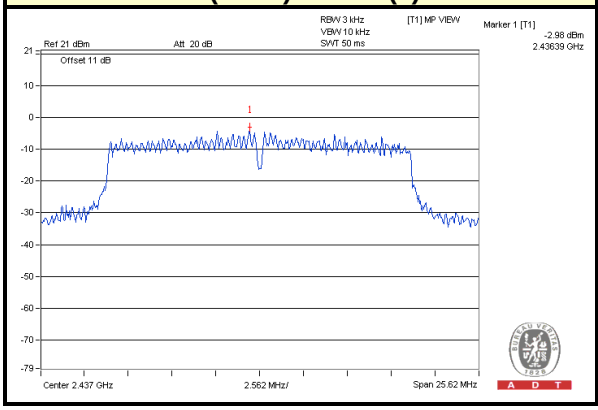
802.11b / Chain(1) : CH6



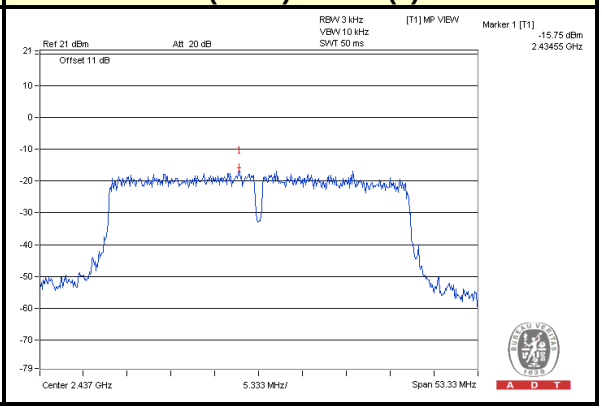
802.11g / Chain(0) : CH6



802.11n (HT20) / Chain(0) : CH6



802.11n (HT40) / Chain(1) : CH6



4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 15, 2013	July 14, 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 11, 2014

4.6.3 TEST PROCEDURE

Measurement Procedure - Reference Level

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

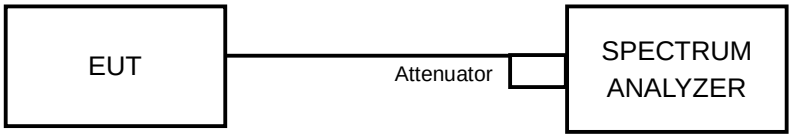
Measurement Procedure –Unwanted Emission Level

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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

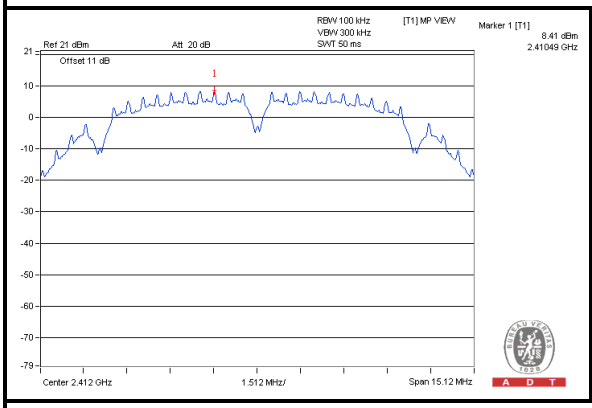
4.6.7 TEST RESULTS

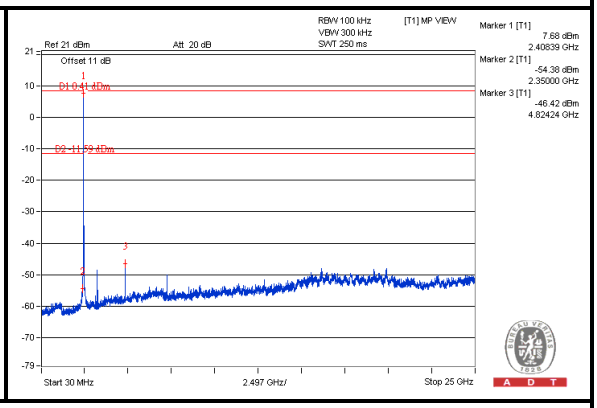
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

For Accessory Radio:

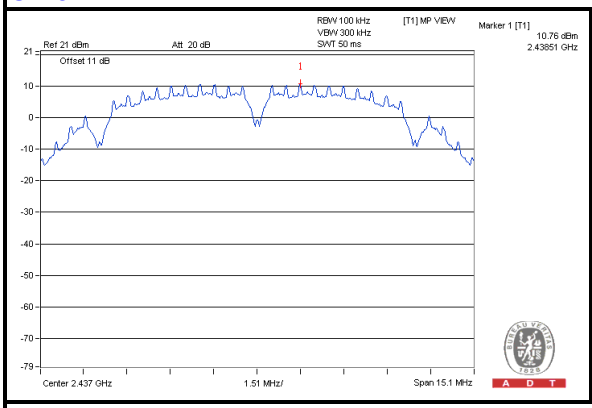
802.11b

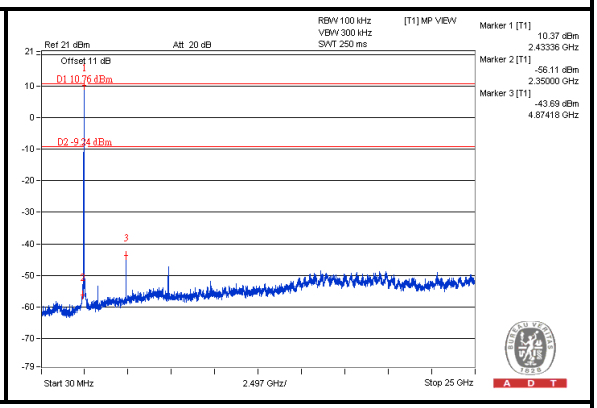
CH 1



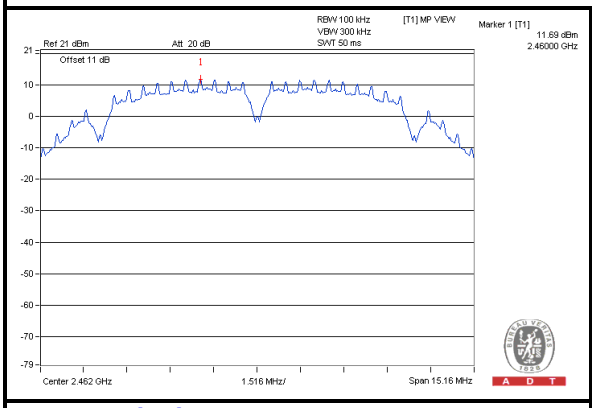


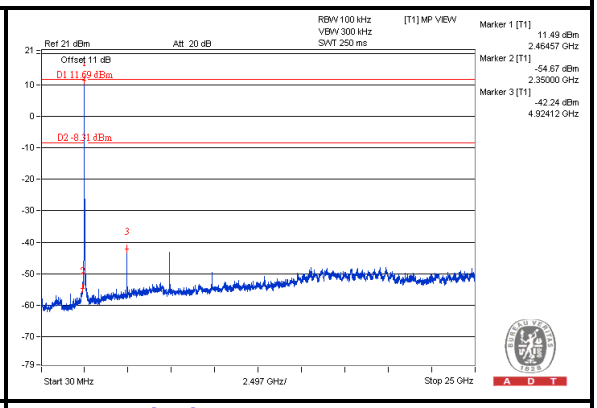
CH 6



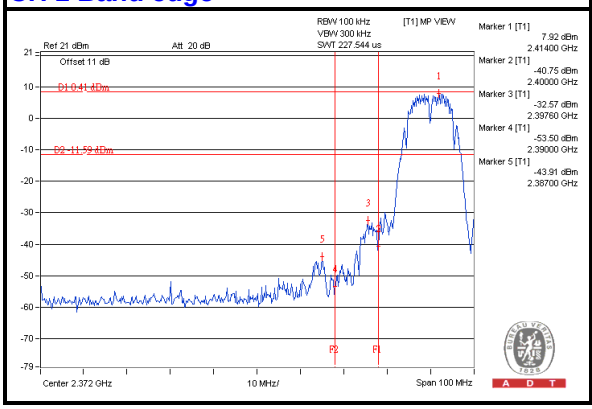


CH 11





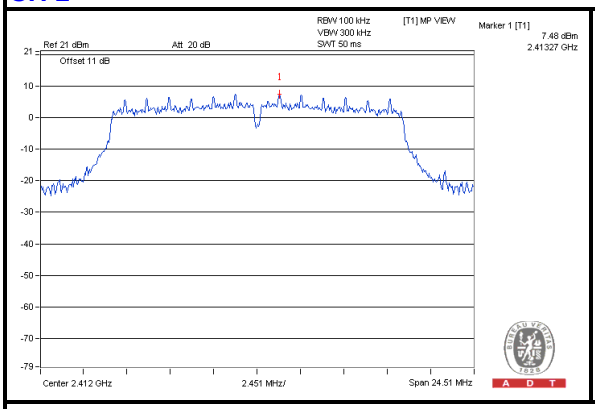
CH 1 Band edge

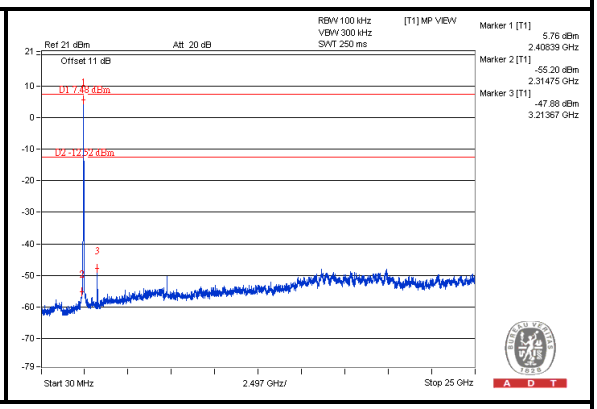


CH 11 Band edge

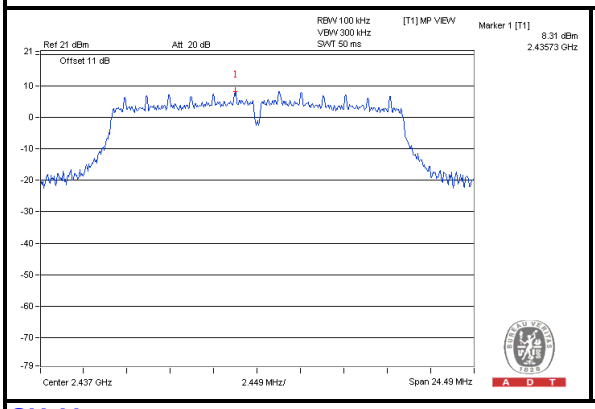
802.11g

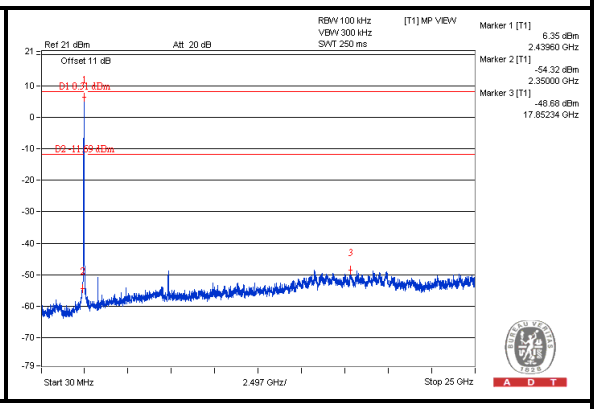
CH 1



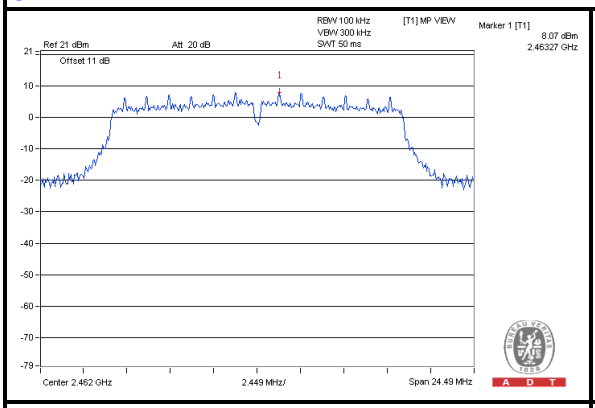


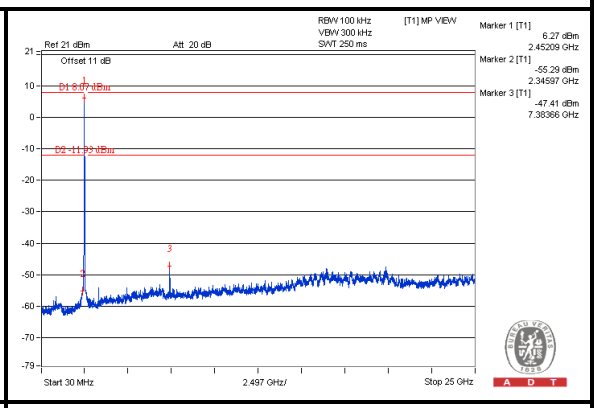
CH 6



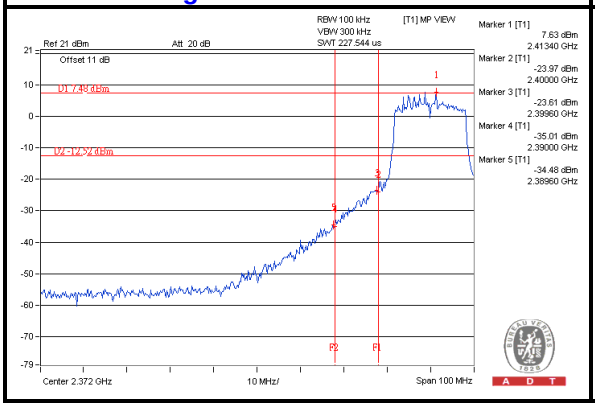


CH 11

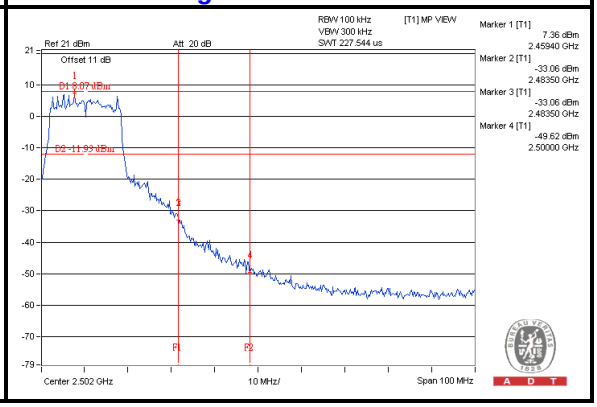




CH 1 Band edge

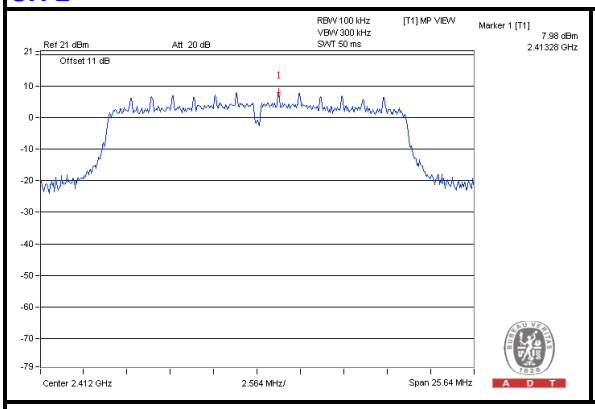


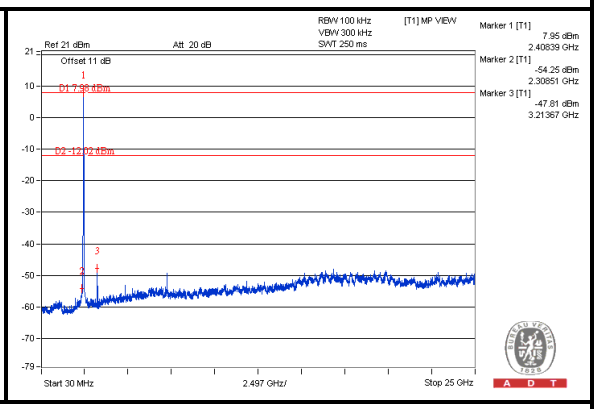
CH 11 Band edge



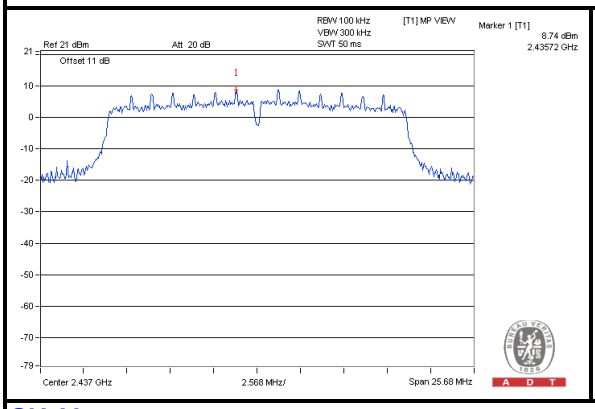
802.11n (HT20)

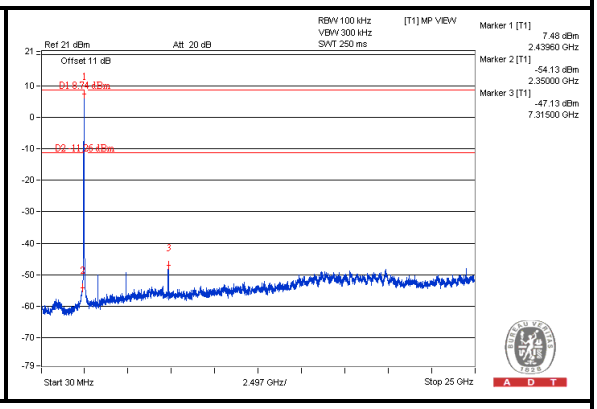
CH 1



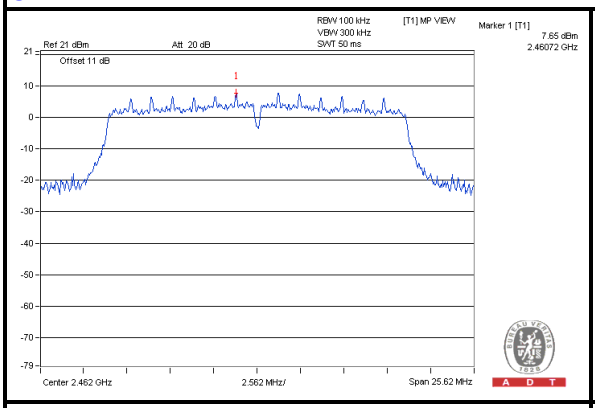


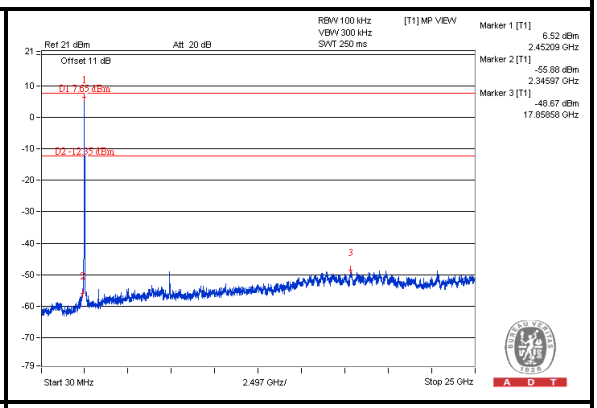
CH 6



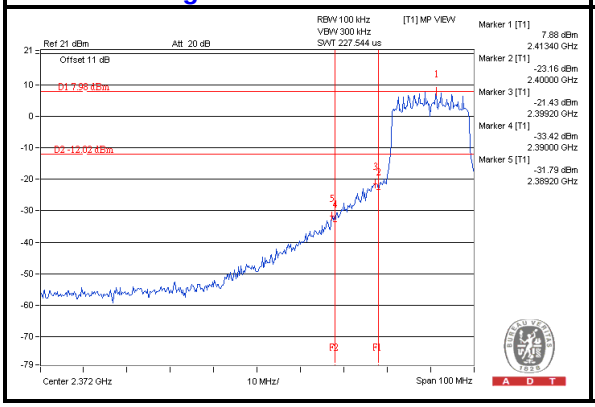


CH 11

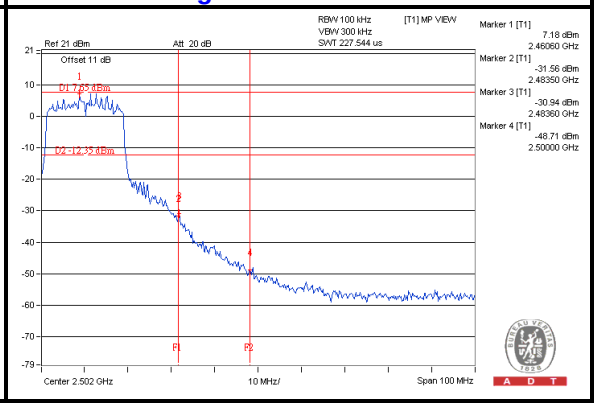




CH 1 Band edge



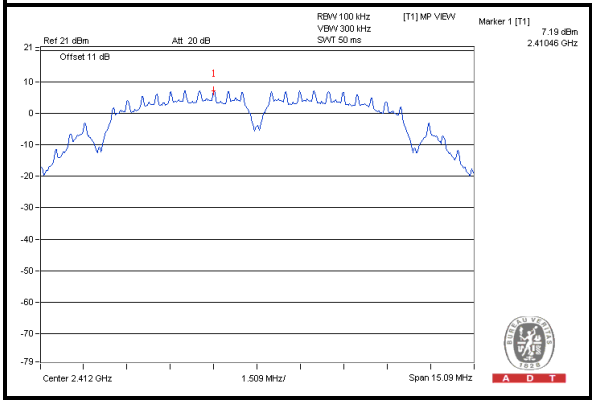
CH 11 Band edge

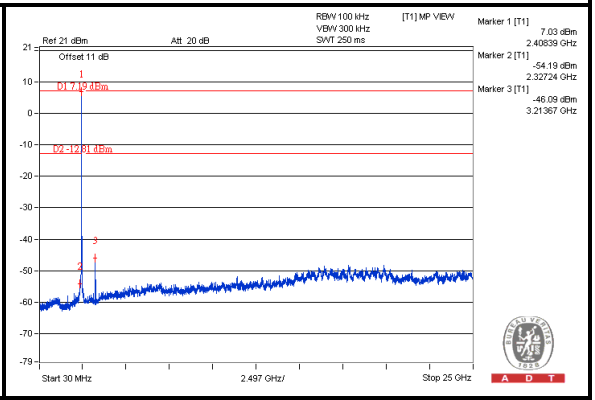


For Network Radio:
802.11b

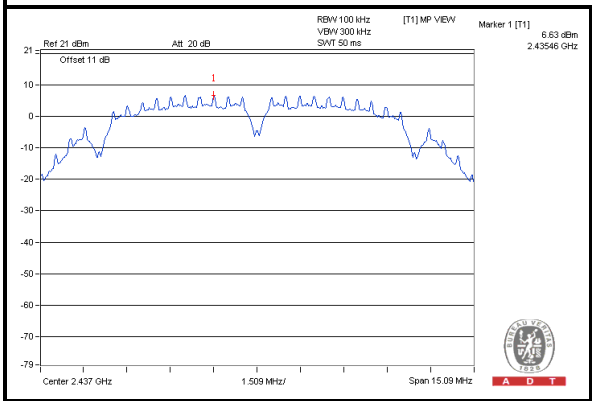
Chain (0)

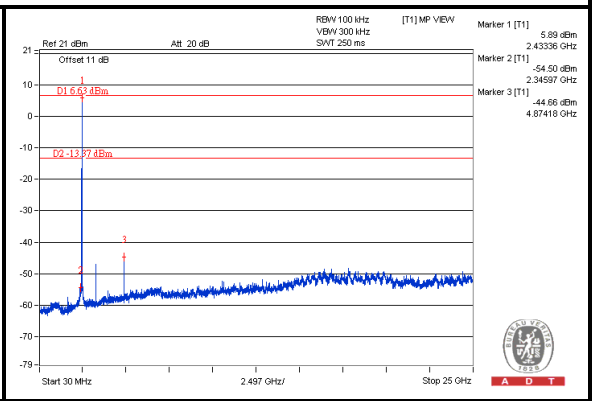
CH 1





CH 6





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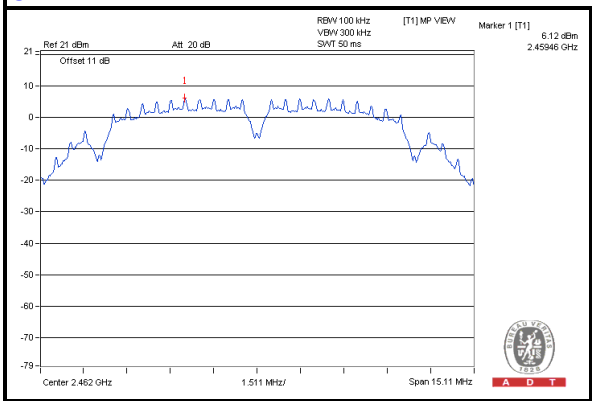
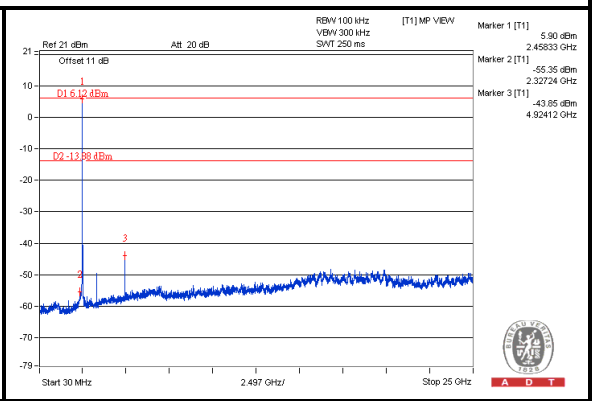
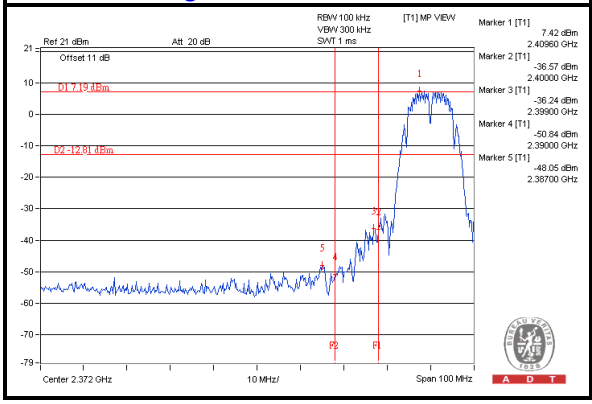
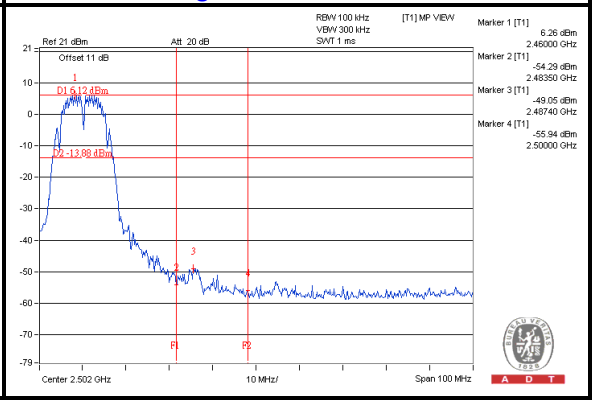




CH 1 Band edge

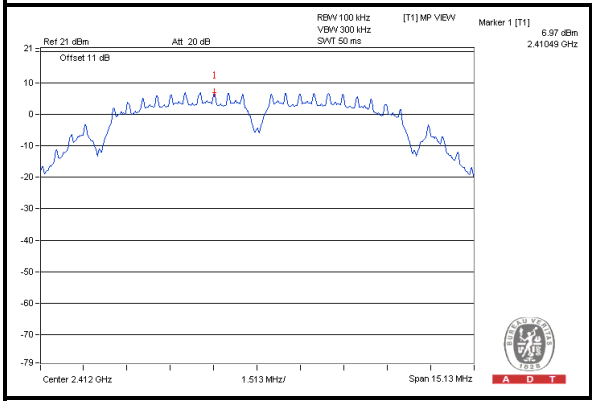


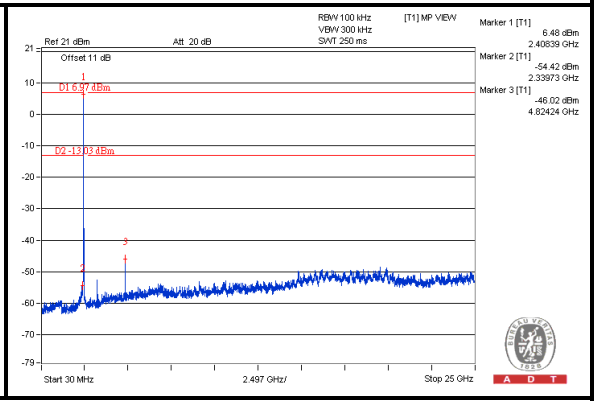
CH 11 Band edge



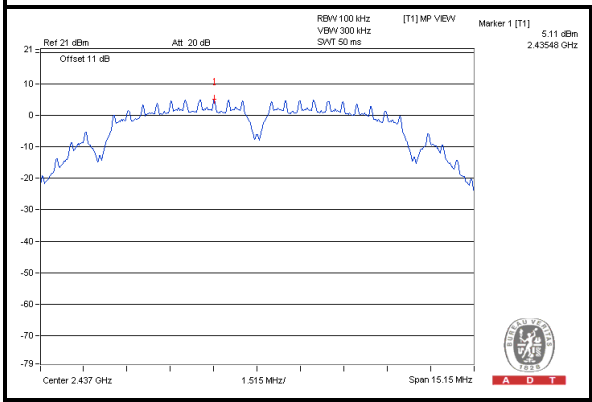
Chain (1)

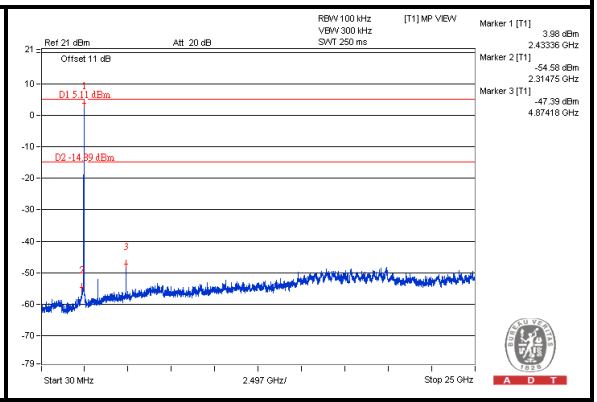
CH 1



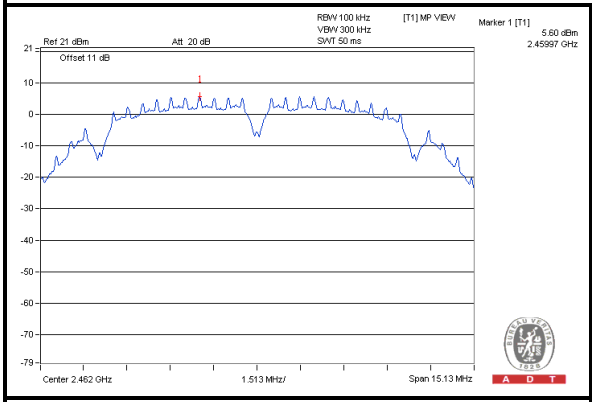


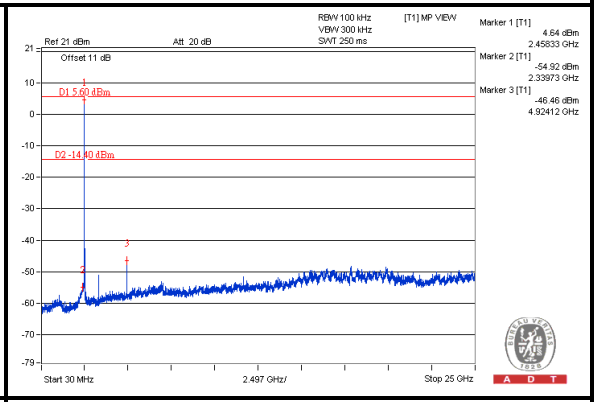
CH 6



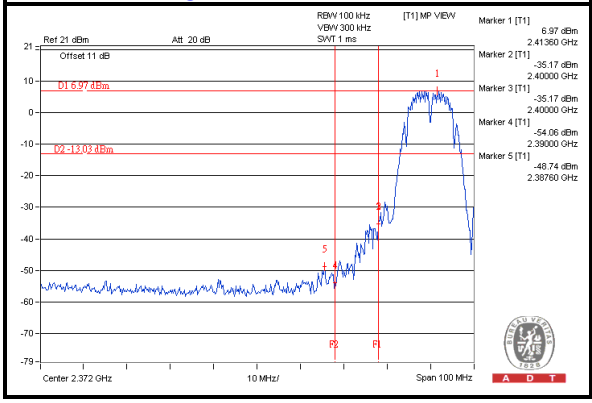


CH 11

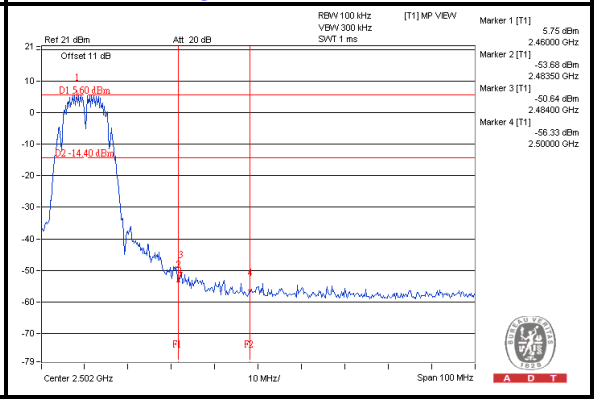




CH 1 Band edge



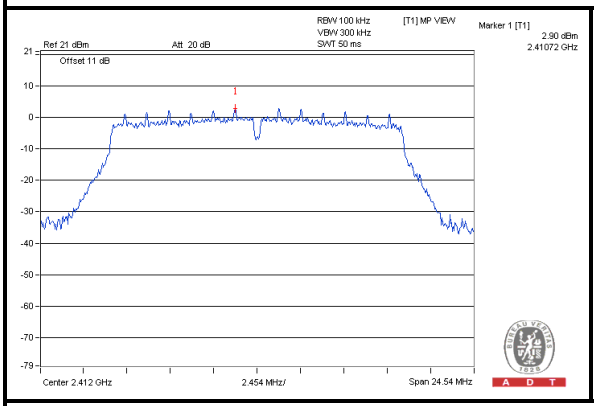
CH 11 Band edge

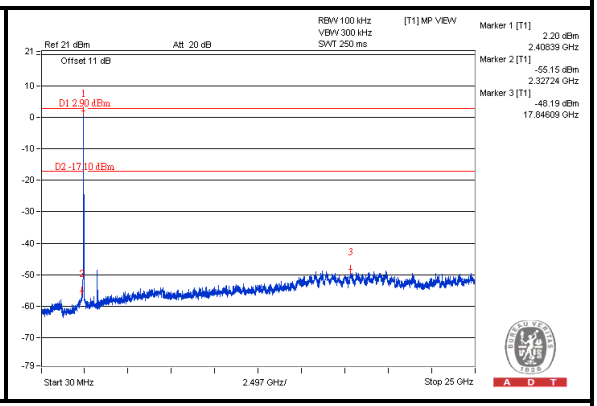


802.11g

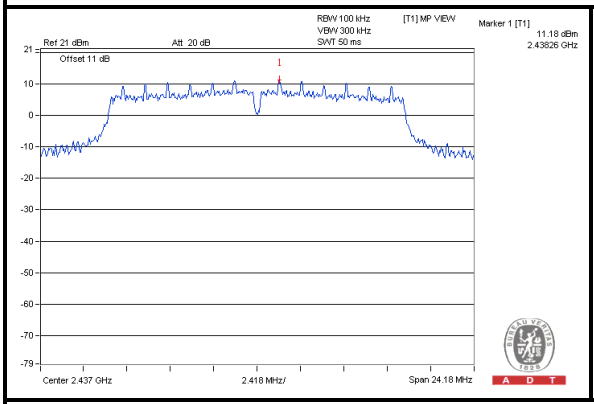
Chain (0)

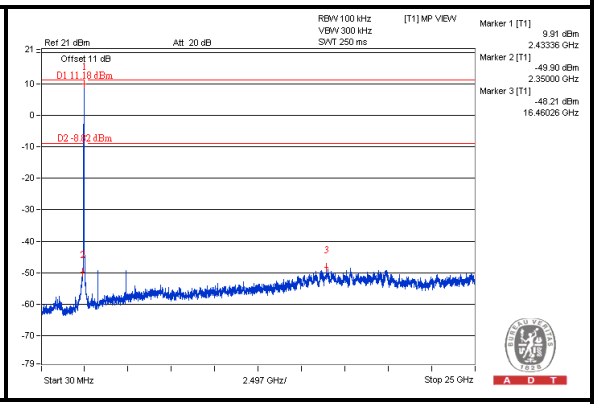
CH 1



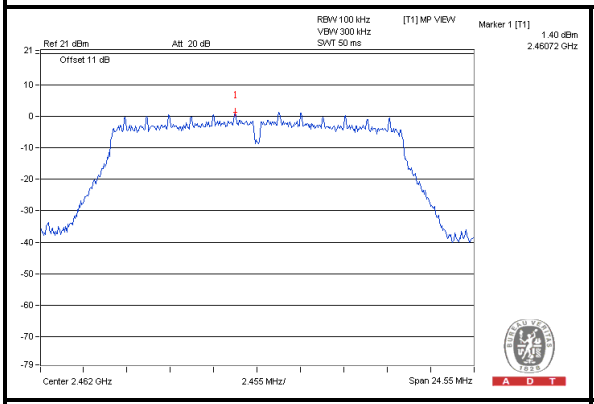


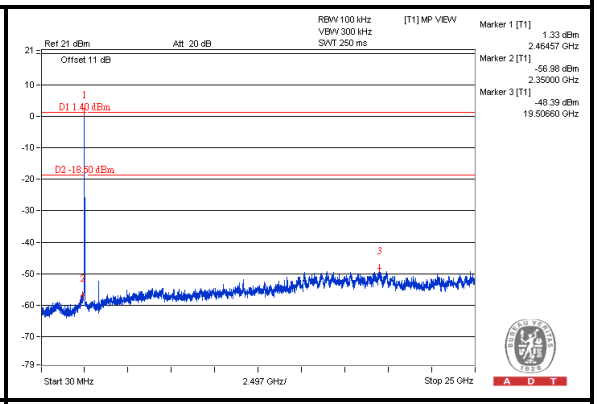
CH 6



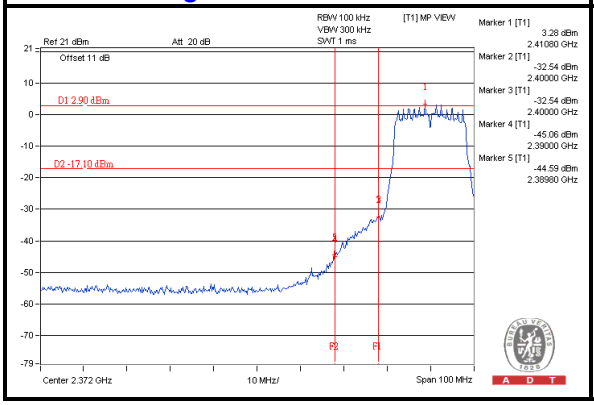


CH 11

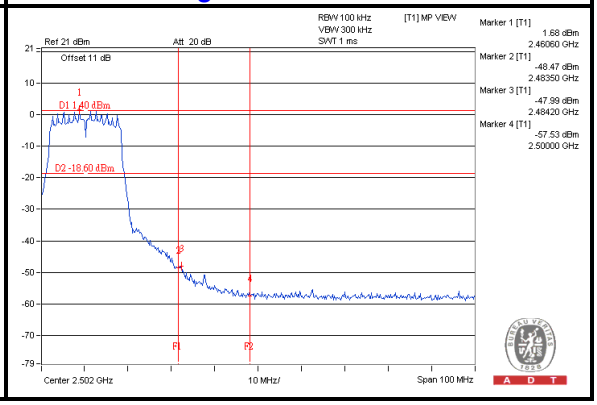




CH 1 Band edge

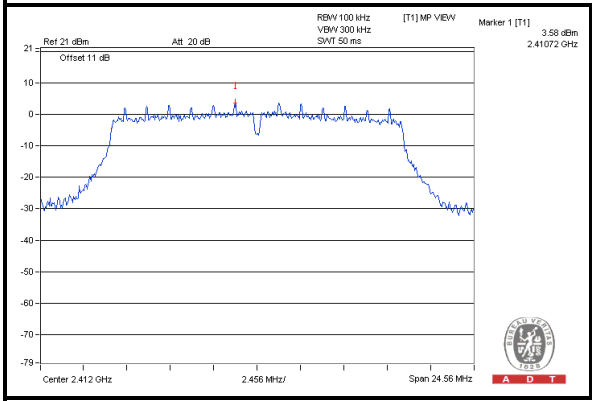


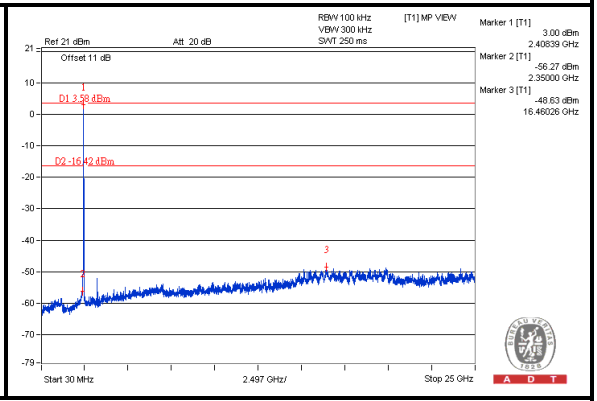
CH 11 Band edge



Chain (1)

CH 1





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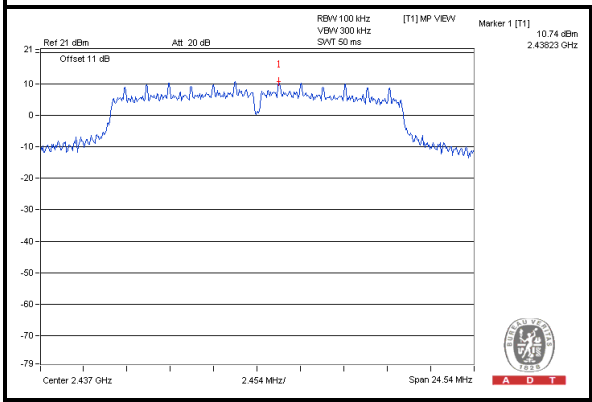

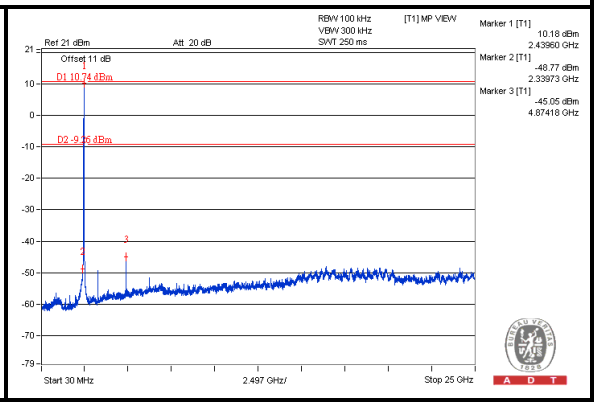

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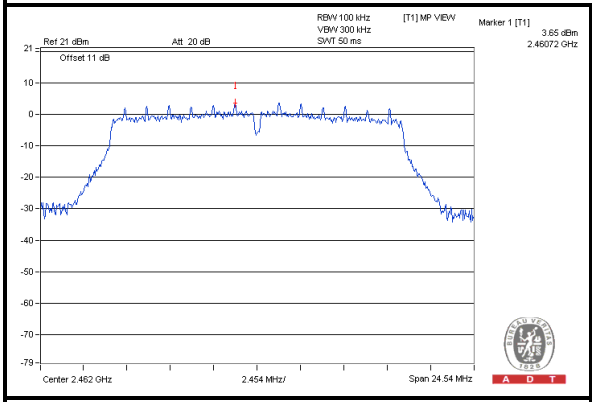
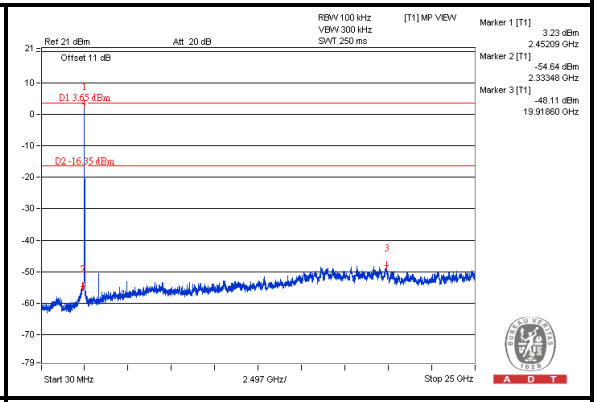
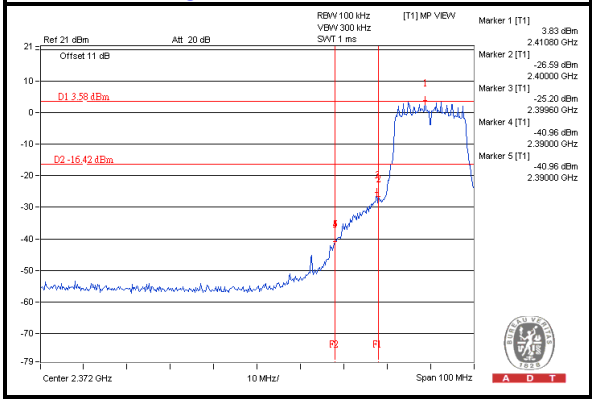
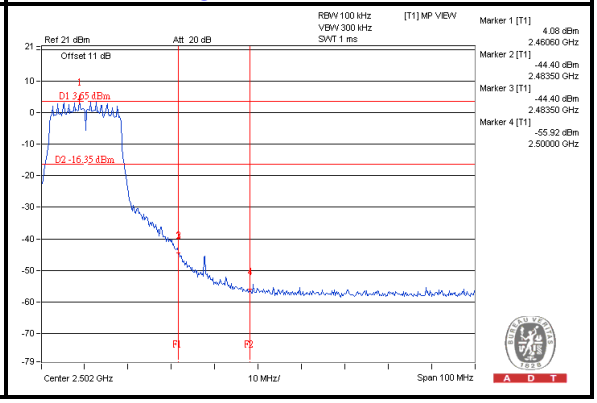




CH 1 Band edge



CH 11 Band edge



802.11n (HT20)

Chain (0)

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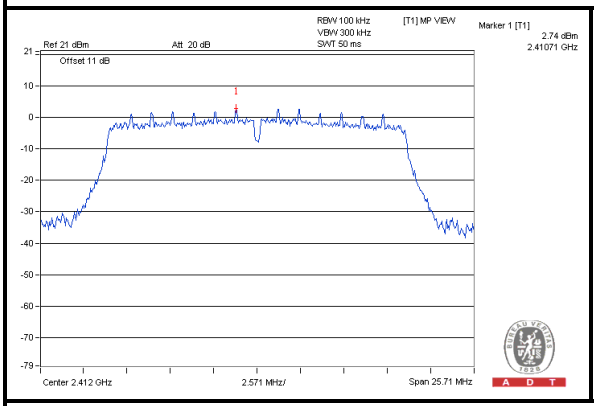

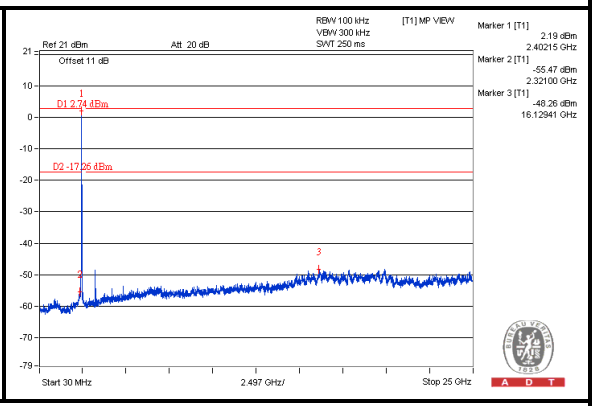

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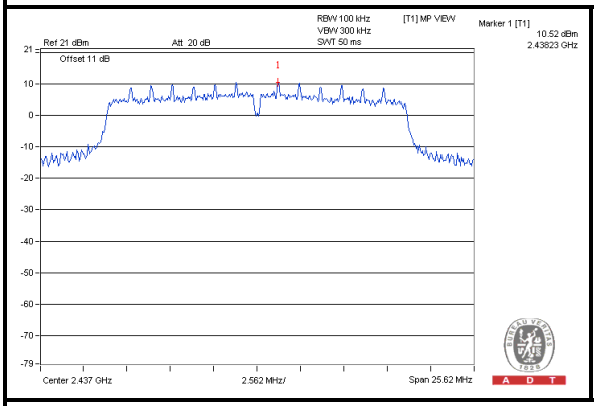

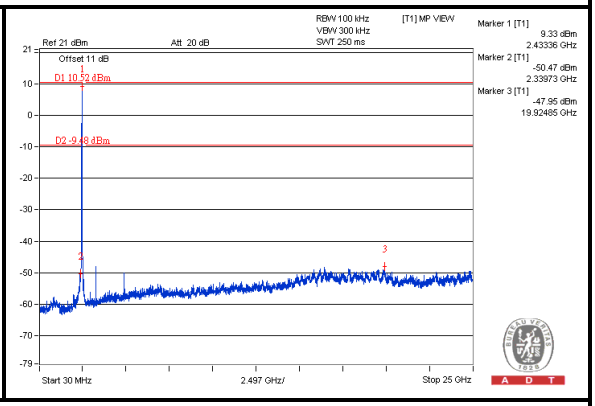

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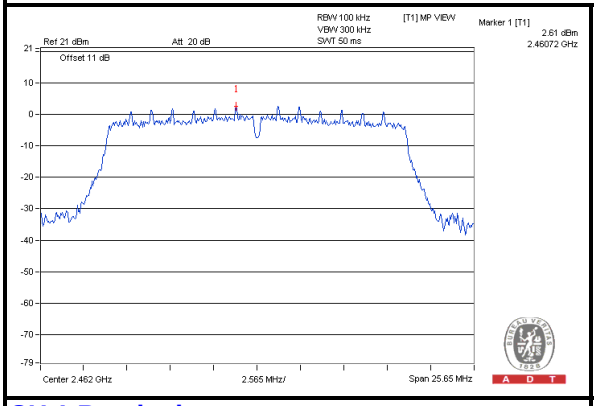

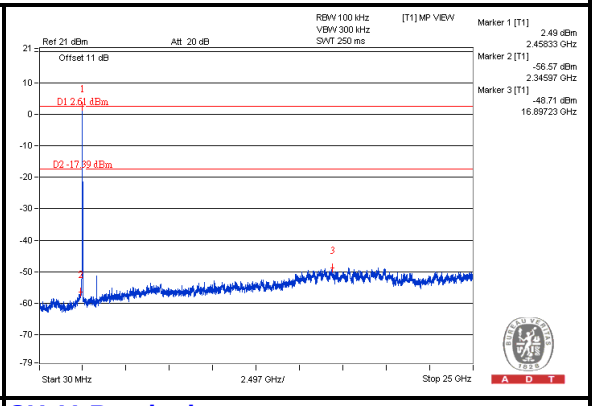

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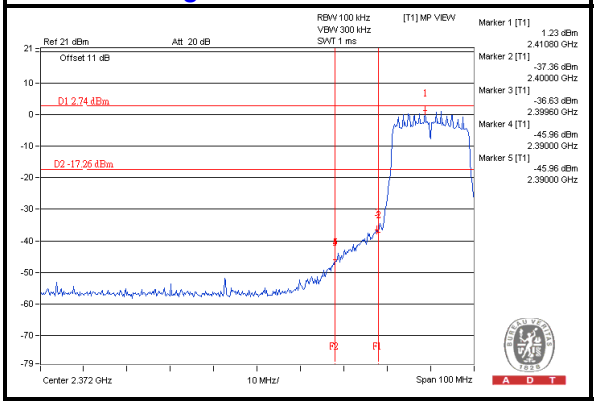

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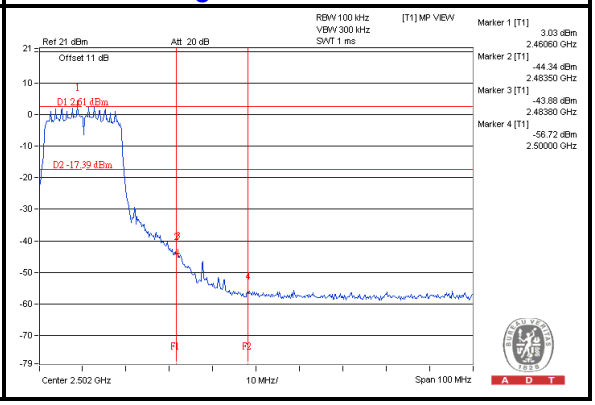
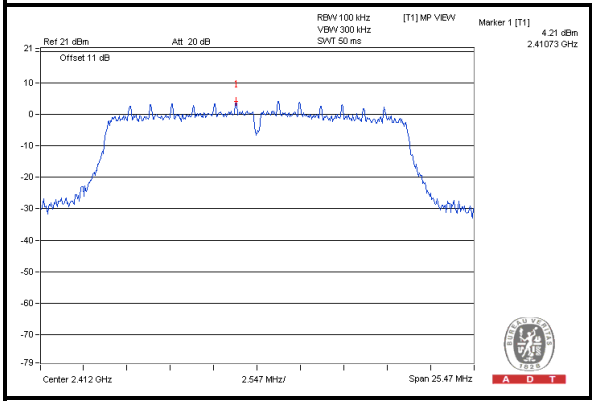
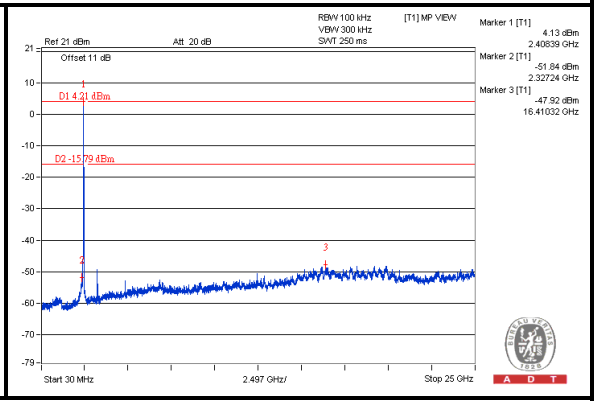


Chain (1)

CH 1





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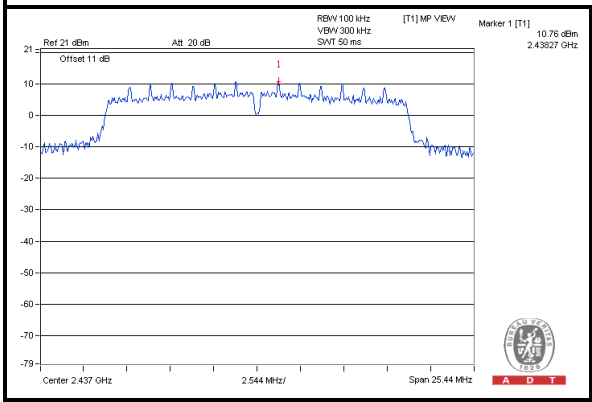
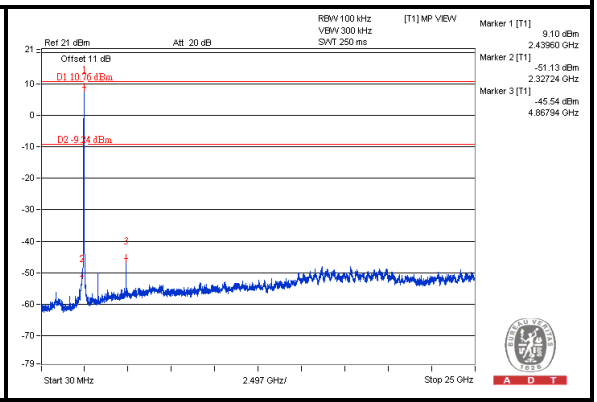
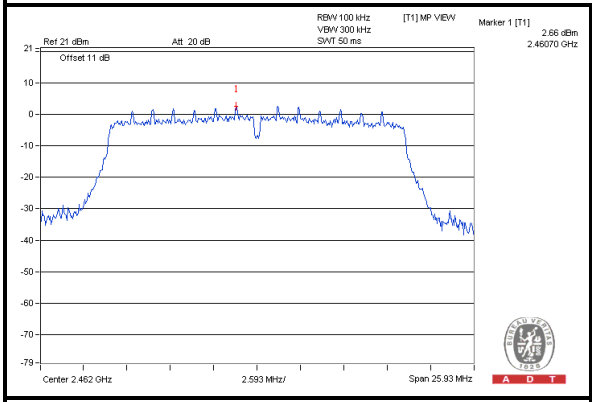
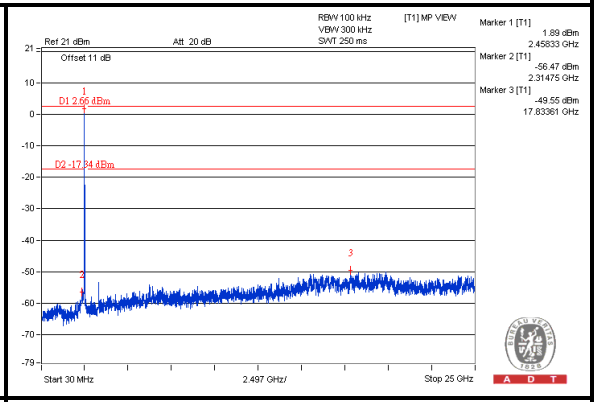


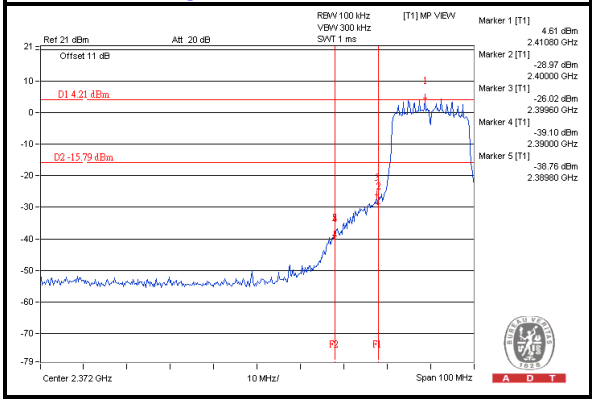


CH 11





CH 1 Band edge



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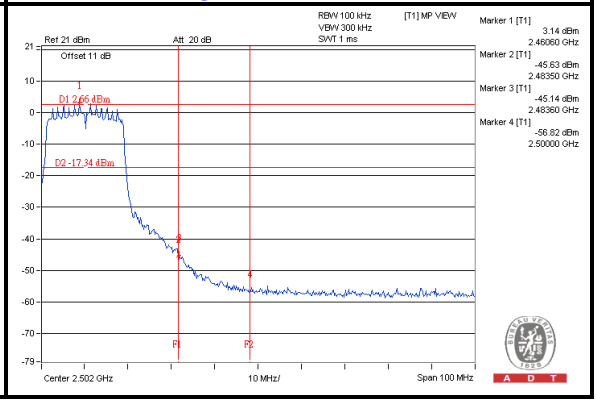

802.11n (HT40)

Chain (0)

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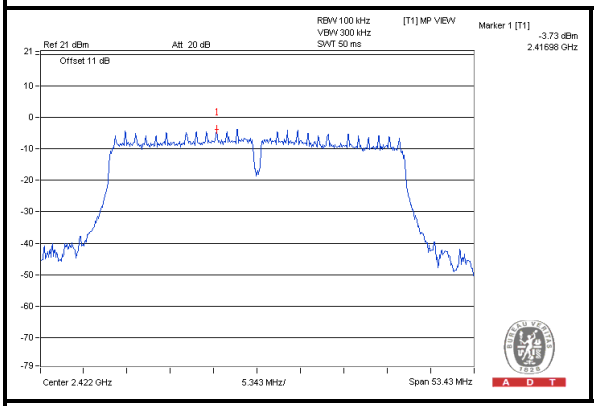

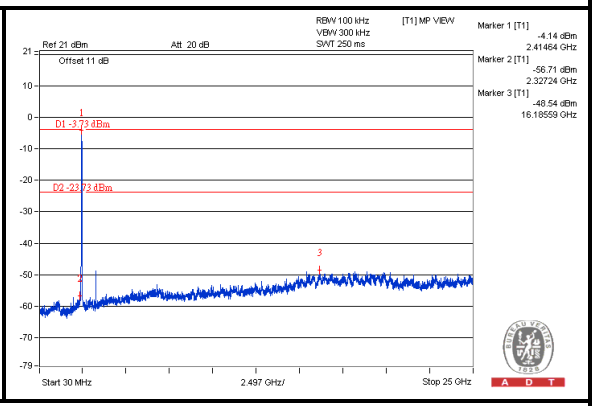

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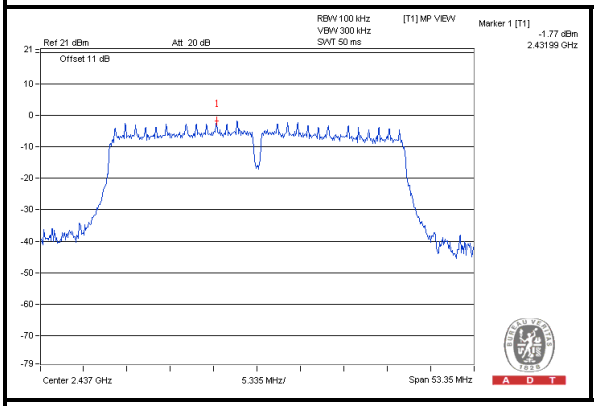
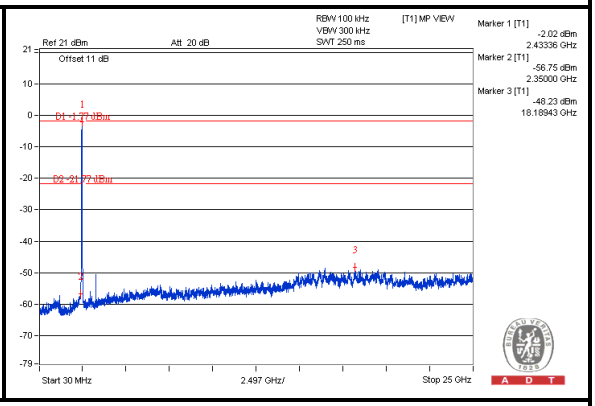
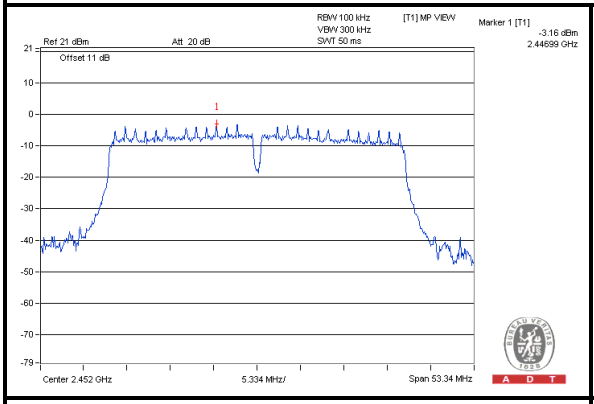
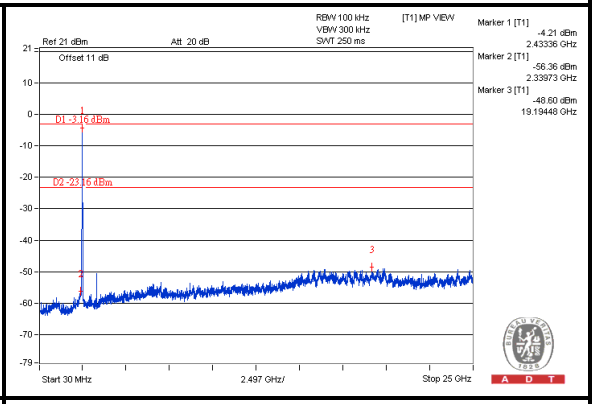




CH 9





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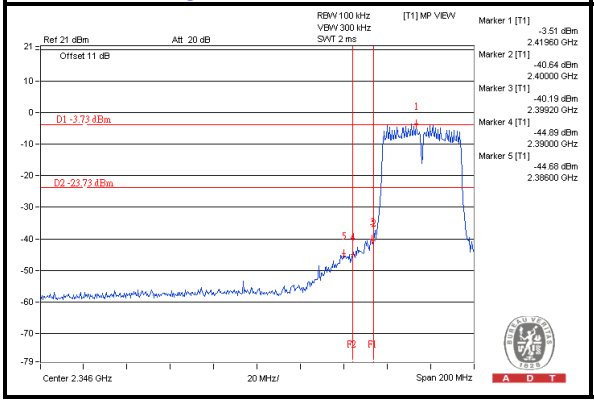
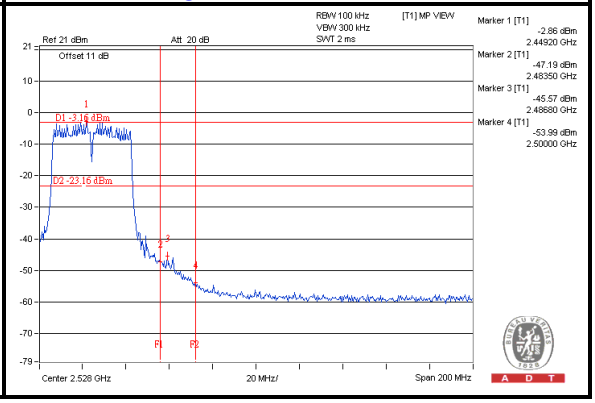
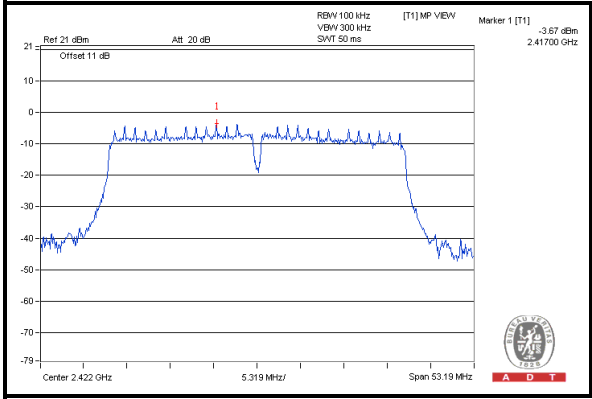


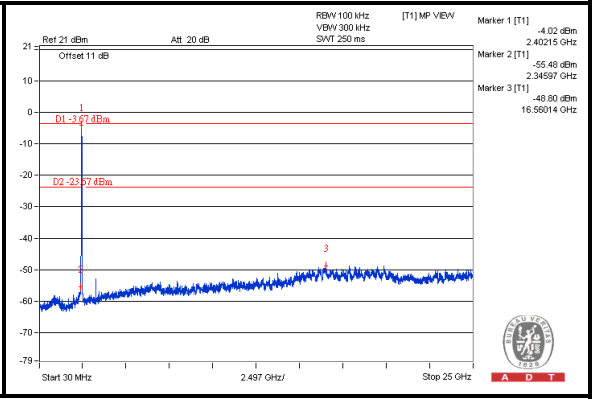
CH 9 Band edge



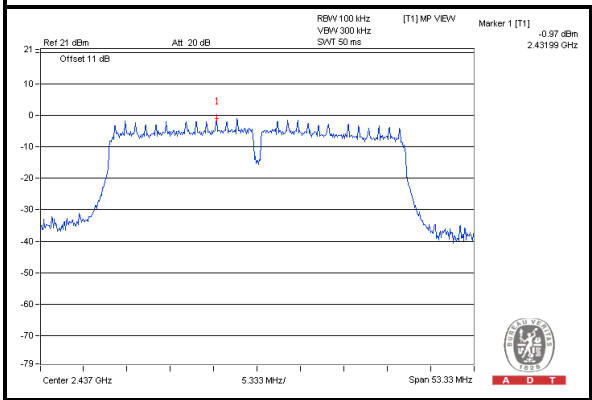
Chain (1)

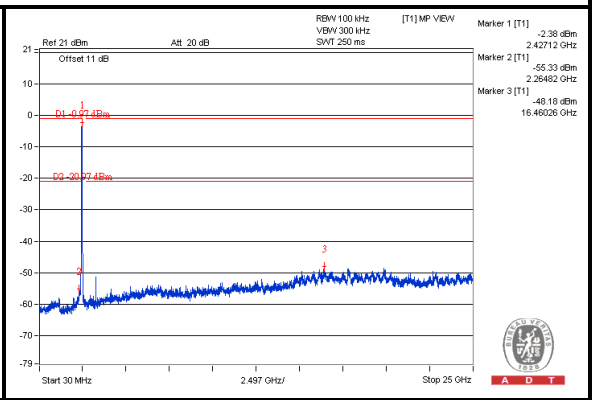
CH 3



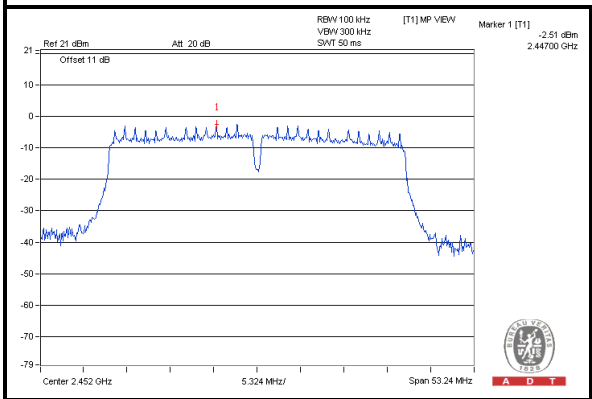


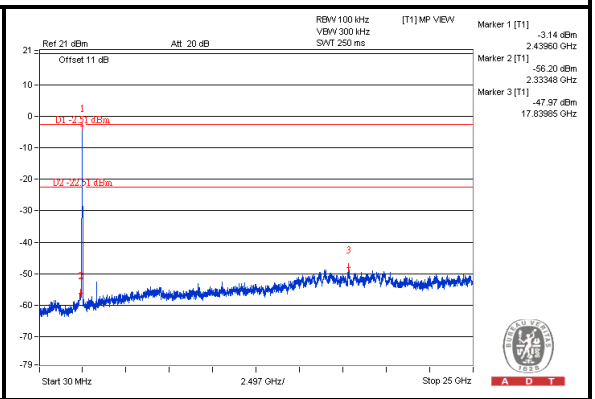
CH 6



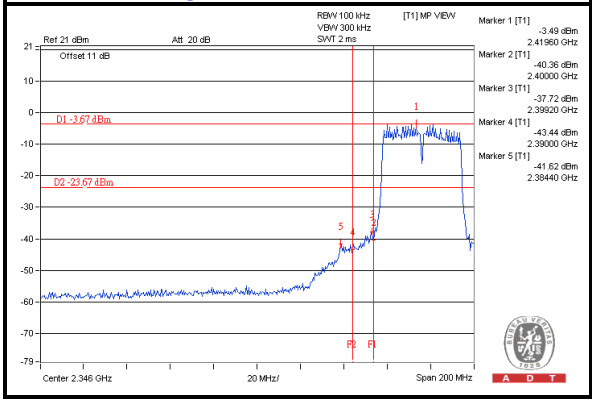


CH 9

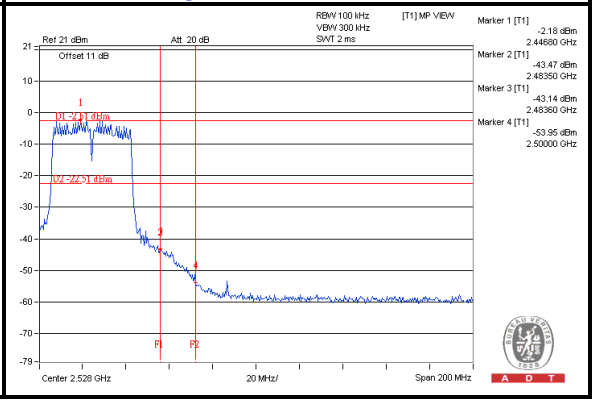




CH 3 Band edge



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 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.

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 ---