FCC TEST REPORT (15.247)

REPORT NO.:	RF140707E06
MODEL NO.:	IBR1100LPE
FCC ID:	UXX-S3A438A
RECEIVED:	July 07, 2014
TESTED:	July 17 to Aug. 08, 2014
ISSUED:	Aug. 15, 2014

APPLICANT:	Cradlepoint, Inc.
ADDRESS:	805W. Franklin Street, Boise, ID 83702-5560 USA

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

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140707E06	Original release	Aug. 15, 2014

1. CERTIFICATION

PRODUCT:	Industrial Broadband Router
BRAND NAME:	cradlepoint
MODEL NO.:	IBR1100LPE
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Cradlepoint, Inc.
TESTED:	July 17 to Aug. 08, 2014
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**
	ANSI C63.10-2009

The above equipment (Model: IBR1100LPE) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Phoenix Huang , **DATE:** *Aug. 15, 2014*
(Phoenix Huang, Specialist)

APPROVED BY : , **DATE:** *Aug. 15, 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 -5.37dB at 0.50000MHz
15.205 15.209 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2483.500MHz
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX not a standard connector.

NOTE: 1. 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 5.15~5.25GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.37 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	Industrial Broadband Router
MODEL NO.	IBR1100LPE
POWER SUPPLY	DC 12V from power adapter or DC 9-36V (with DC cable)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	**For 15.407** 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 184.927mW 802.11ac (VHT20): 355.379mW 802.11ac (VHT40): 226.793mW 802.11ac (VHT80): 45.869mW **For 15.247** 802.11b: 206.538mW 802.11g: 203.236mW 802.11n (HT20): 482.098mW 802.11n (HT40): 323.3mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1 DC cable (2m) x 1

Note:

1. There are WLAN, WWAN(2G/3G), LTE(4G) and GPS technology used for the EUT.
2. The EUT inside has one Cellular Modem which FCC ID: N7NMC7355.
3. WLAN/WWAN(2/3G)/LTE(4G) coexistence mode:

Condition	Technology		
1	WLAN(2.4GHz)	WLAN(5GHz)	WWAN(2/3G)
2	WLAN(2.4GHz)	WLAN(5GHz)	LTE(4G)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.			

4. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
Cincon	TRG70E120	Input: 100-240V, 1.5A, 47~63Hz AC input cable(1.9m, unshielded) Output: 12.0V, 5.5A DC output cable(0.72m, unshielded)

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

For WLAN used								
Ant. No.	Transmitter Circuit	Ant. Gain (dBi) <Excluding cable loss>	Cable Loss (dB)	Net. Gain (dBi)	Frequency range (MHz to MHz)	Ant. Type	Connecter Type	Cable Length (mm)
1 (beside DC Jack)	Chain (0)	4.5	1.1	3.4	2400~2500	Dipole	R-SMA	125
		5.0	1.7	3.3	5150~5900			
2 (beside RJ45)	Chain (1)	4.5	0.9	3.6	2400~2500	Dipole	R-SMA	70
		5.0	1.5	3.5	5150~5900			
For LTE used								
Ant. No.	Transmitter Circuit	Ant. Gain (dBi) <Excluding cable loss>	Cable Loss (dB)	Net. Gain (dBi)	Frequency range (MHz to MHz)	Ant. Type	Connecter Type	Cable Length (mm)
1	Main	3	1.0	2	700~2700	Dipole	SMA	135
2	Aux							85
3	Main	2	1.0	1	700~2700	Dipole	SMA	135
4	Aux							85
Note: 1. For WLAN: 1TX configuration mode will fix transmission on Chain (0). 2. For LTE: Antenna No.: 1~2 was selected as representative antenna for the test.								

6. The EUT incorporates a MIMO function without beamforming.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX Fixed Chain 0	2RX
802.11b	1 ~ 11Mbps	1TX Fixed Chain 0	2RX
802.11g	6 ~ 54Mbps	1TX Fixed Chain 0	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX (CDD)	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 (256QAM) Nss= 1	2TX (CDD)	2RX
	MCS0~8 (256QAM) Nss= 2	2TX	2RX
802.11ac (VHT40) & 802.11ac (VHT80)	MCS0~9 (256QAM) Nss= 1	2TX (CDD)	2RX
	MCS0~9 (256QAM) Nss= 2	2TX	2RX

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

7. EUT has been pre-tested under following pre-test modes.

Pre-test Mode	Power
A	Adapter
B	DC 9V (with DC cable)
C	DC 36V (with DC cable)
Note: From the above modes, the radiated emission worse case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.	

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

3.2 DESCRIPTION OF TEST MODES

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

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

7 channels are provided for 802.11n (HT40):

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

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

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

OB: Conducted Out-Band Emission Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-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.

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.

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.

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

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

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

CONDUCTED OUT-BAND EMISSION MEASUREMENT:

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

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

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	30deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	22deg. C, 62%RH	120Vac, 60Hz	Andy Ho
RE≥1G	25deg. C, 67%RH	120Vac, 60Hz	Tim Ho Gary Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan
OB	25deg. C, 60%RH	120Vac, 60Hz	James Chan

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r02

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DUTY CYCLE OF TEST SIGNAL

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

If duty cycle of test signal is < 98%, duty factor shall be considered.

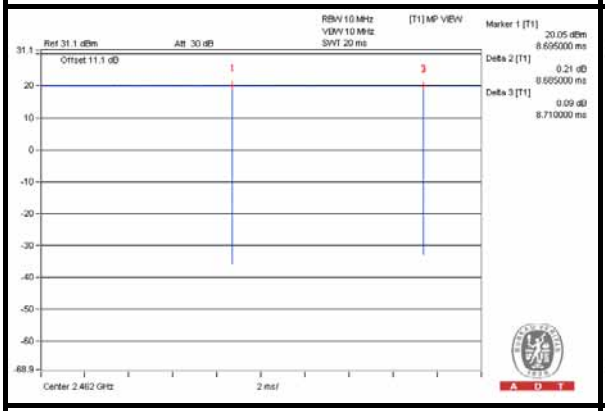
802.11b: Duty cycle = 8.685 ms/8.71 ms = 0.997

802.11g: Duty cycle = 1.438 ms/1.455 ms = 0.988

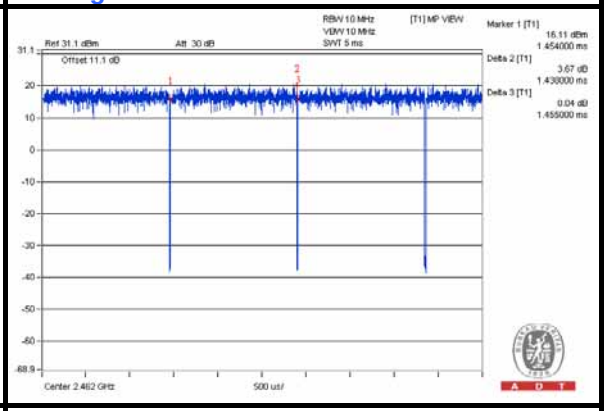
802.11n (HT20): Duty cycle = 1.347 ms/1.363 ms = 0.988

802.11n (HT40): Duty cycle = 0.666 ms/0.684 ms = 0.974, Duty factor = 10 * log(1/0.974) = 6.51

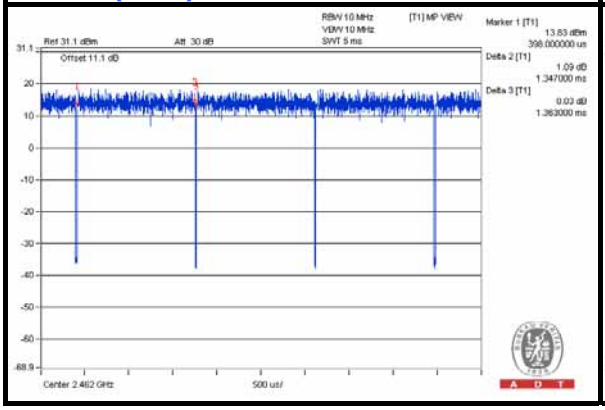
802.11b



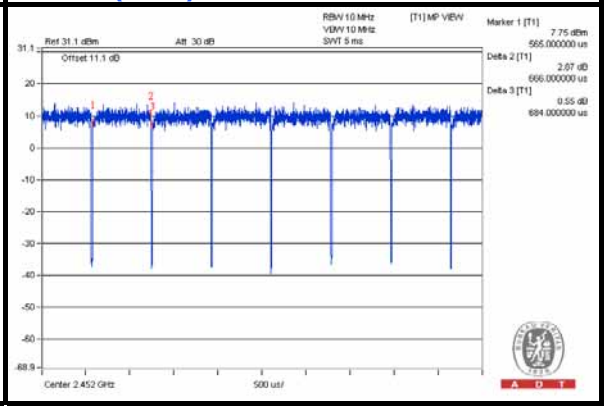
802.11g



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.

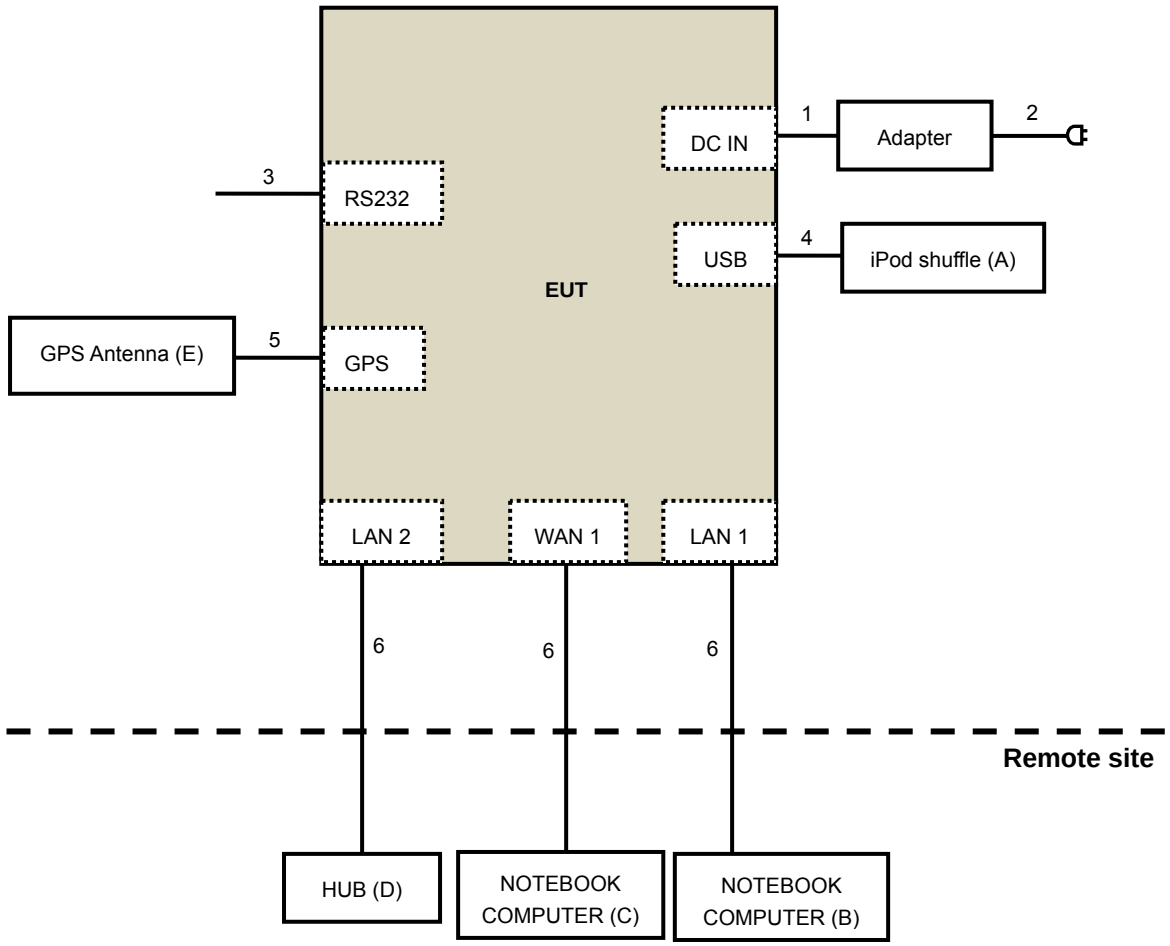
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	iPod shuffle	Apple	MC749TA/A	CC4DN29UDFDM	NA	Provided by Lab
B	NOTEBOOK COMPUTER	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
C	NOTEBOOK COMPUTER	DELL	E5420	CHHYLQ1	FCC DoC	Provided by Lab
D	HUB	ZyXEL	ES-116P	S060H02000215	FCC Doc	Provided by Lab
E	GPS Antenna	taoglas	AA.107.301111	AA107WT13120092	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.	DC	1	0.72	Yes	0	Provided by Lab
2.	AC	1	1.9	Yes	0	Provided by Lab
3.	RS232	1	1.8	Yes	0	Provided by Lab
4.	USB	1	0.1	Yes	0	Provided by Lab
5.	GPS	1	0.3	Yes	0	Supplied by client
6.	RJ-45	1	10	No	0	Provided by Lab

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	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: Aug. 04, 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.

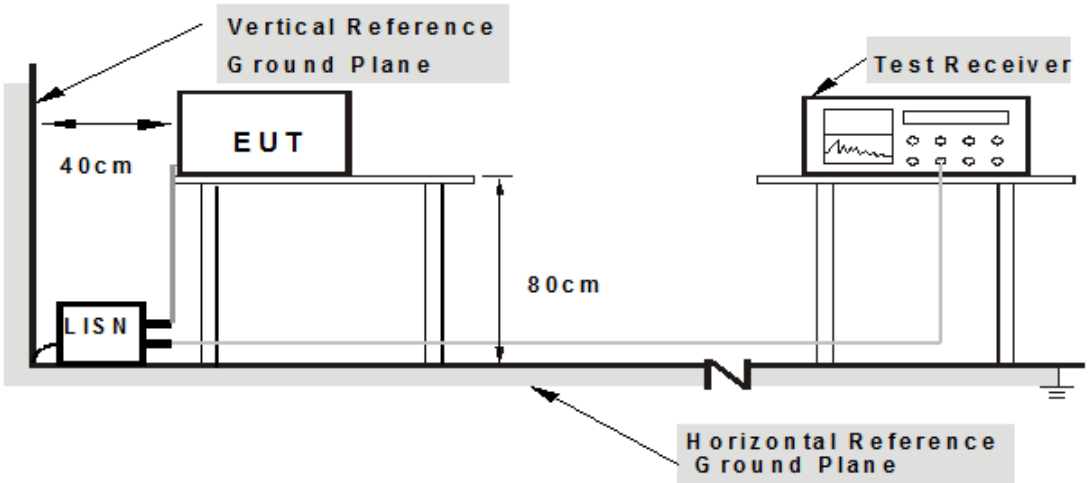
NOTE:

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 units B-C (Notebook Computer) which is placed on table in remote site.
2. The communication partner run test program “MT76xxE AP Version:0.0.2.3” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

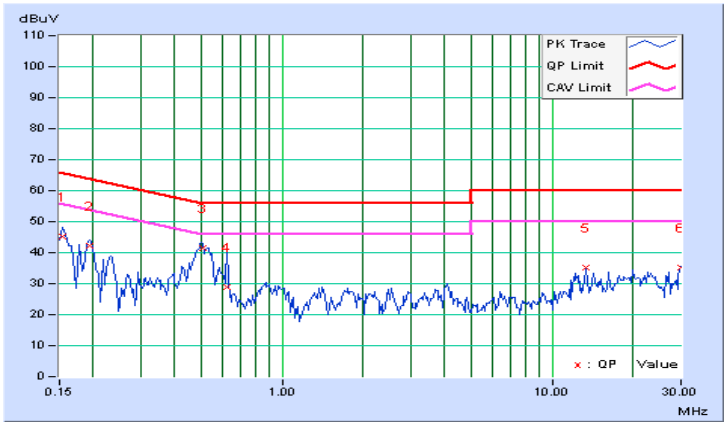
4.1.7 TEST RESULTS

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

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	45.18	39.52	45.25	39.59	65.79	55.79	-20.54	-16.20
2	0.19297	0.07	42.09	36.26	42.16	36.33	63.91	53.91	-21.75	-17.58
3	0.50938	0.10	41.35	38.91	41.45	39.01	56.00	46.00	-14.55	-6.99
4	0.62266	0.10	28.68	27.66	28.78	27.76	56.00	46.00	-27.22	-18.24
5	13.41797	0.55	34.72	31.38	35.27	31.93	60.00	50.00	-24.73	-18.07
6	29.90625	1.00	34.07	33.20	35.07	34.20	60.00	50.00	-24.93	-15.80

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

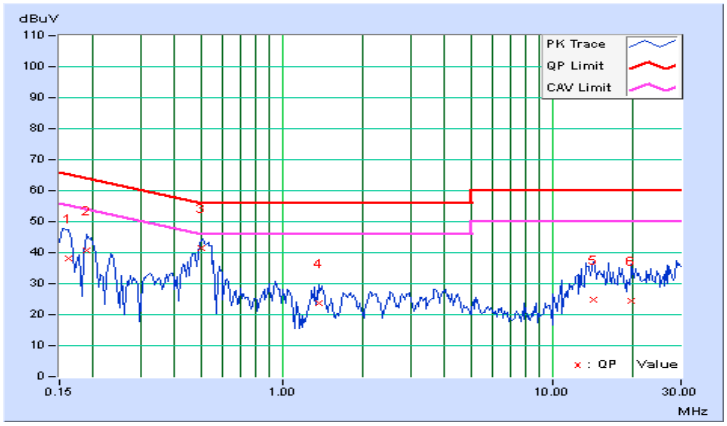


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.16172	0.07	38.19	28.08	38.26	28.15	65.38	55.38	-27.11	-27.22
2	0.18906	0.07	40.56	35.19	40.63	35.26	64.08	54.08	-23.45	-18.82
3	**0.50000**	**0.10**	**41.55**	**40.53**	**41.65**	**40.63**	**56.00**	**46.00**	**-14.35**	**-5.37**
4	1.36719	0.15	23.66	16.04	23.81	16.19	56.00	46.00	-32.19	-29.81
5	14.15234	0.56	24.36	18.96	24.92	19.52	60.00	50.00	-35.08	-30.48
6	19.71094	0.69	23.80	18.19	24.49	18.88	60.00	50.00	-35.51	-31.12

REMARKS:

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



4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

For below 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 21,2014	Jan. 20,2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 18, 2013	Nov. 17, 2014
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	RF104-201 RF104-203 RF104-204	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. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: July 17, 2014

For above 1GHz

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 05, 2014	July 04, 2015
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: Aug. 05, 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:

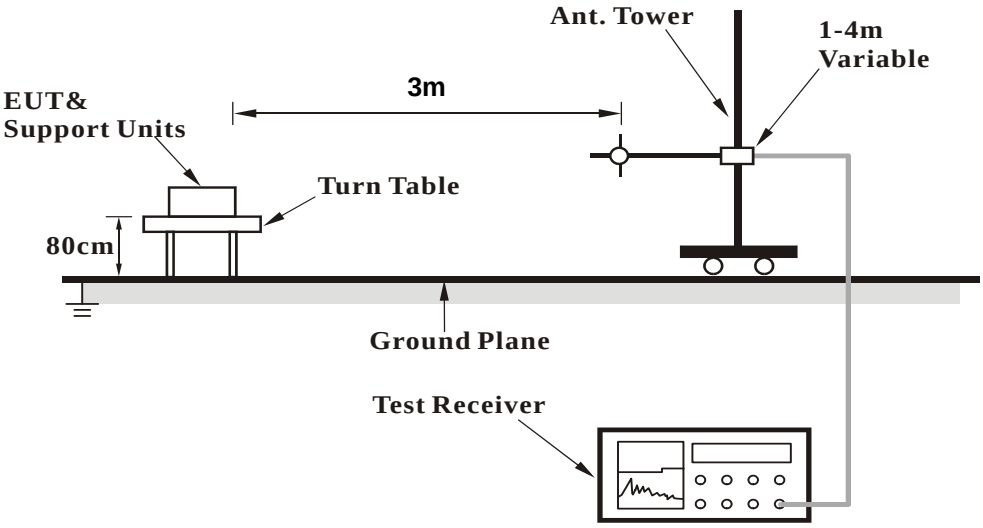
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

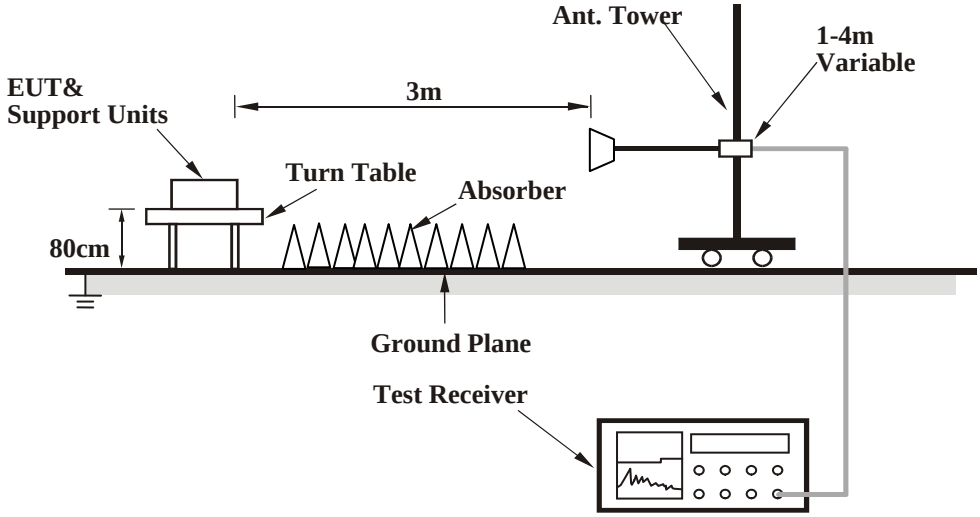
No deviation

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

BELOW 1GHz WORST-CASE DATA

802.11n (HT20)

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	51.05	31.6 QP	40.0	-8.4	1.50 H	272	45.17	-13.57
2	141.16	36.8 QP	43.5	-6.7	2.00 H	85	50.44	-13.61
3	254.85	35.3 QP	46.0	-10.7	1.50 H	329	49.40	-14.13
4	426.49	37.1 QP	46.0	-8.9	1.00 H	360	45.88	-8.81
5	848.78	38.1 QP	46.0	-7.9	1.50 H	0	38.96	-0.83
6	959.99	39.9 QP	46.0	-6.1	1.50 H	40	38.88	1.06
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	39.99	33.4 QP	40.0	-6.6	1.50 V	334	47.13	-13.75
2	47.80	36.9 QP	40.0	-3.1	1.00 V	127	50.36	-13.49
3	118.03	34.9 QP	43.5	-8.7	1.00 V	288	50.16	-15.31
4	141.26	31.6 QP	43.5	-12.0	1.00 V	98	45.14	-13.59
5	434.93	34.0 QP	46.0	-12.0	1.00 V	345	42.48	-8.52
6	959.99	41.0 QP	46.0	-5.0	1.00 V	360	39.90	1.06

REMARKS:

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

ABOVE 1GHz DATA

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2389.30	50.5 PK	74.0	-23.5	1.04 H	334	56.37	-5.87
2	2389.30	43.0 AV	54.0	-11.0	1.04 H	334	48.87	-5.87
3	*2412.00	100.3 PK			1.04 H	334	106.10	-5.80
4	*2412.00	97.5 AV			1.04 H	334	103.30	-5.80
5	4824.00	50.5 PK	74.0	-23.5	1.17 H	333	47.08	3.42
6	4824.00	39.6 AV	54.0	-14.4	1.17 H	333	36.18	3.42
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	2389.30	61.2 PK	74.0	-12.8	1.00 V	342	67.07	-5.87
2	2389.30	53.3 AV	54.0	-0.7	1.00 V	342	59.17	-5.87
3	*2412.00	107.7 PK			1.00 V	342	113.50	-5.80
4	*2412.00	105.2 AV			1.00 V	342	111.00	-5.80
5	4824.00	49.9 PK	74.0	-24.1	1.00 V	328	46.48	3.42
6	4824.00	38.7 AV	54.0	-15.3	1.00 V	328	35.28	3.42

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	2374.80	49.9 PK	74.0	-24.1	1.02 H	338	55.80	-5.90
2	2374.80	42.6 AV	54.0	-11.4	1.02 H	338	48.50	-5.90
3	*2437.00	105.8 PK			1.02 H	338	111.50	-5.70
4	*2437.00	103.6 AV			1.02 H	338	109.30	-5.70
5	2499.30	49.8 PK	74.0	-24.2	1.02 H	338	55.23	-5.43
6	2499.30	42.6 AV	54.0	-11.4	1.02 H	338	48.03	-5.43
7	4874.00	47.0 PK	74.0	-27.0	1.07 H	360	43.60	3.40
8	4874.00	35.2 AV	54.0	-18.8	1.07 H	360	31.80	3.40
9	7311.00	53.6 PK	74.0	-20.4	1.34 H	49	45.84	7.76
10	7311.00	41.0 AV	54.0	-13.0	1.34 H	49	33.24	7.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2374.80	59.5 PK	74.0	-14.5	1.12 V	94	65.40	-5.90
2	2374.80	46.4 AV	54.0	-7.6	1.12 V	94	52.30	-5.90
3	*2437.00	112.4 PK			1.12 V	94	118.10	-5.70
4	*2437.00	110.1 AV			1.12 V	94	115.80	-5.70
5	2499.30	58.0 PK	74.0	-16.0	1.12 V	94	63.43	-5.43
6	2499.30	46.7 AV	54.0	-7.3	1.12 V	94	52.13	-5.43
7	4874.00	45.8 PK	74.0	-28.2	1.28 V	346	42.40	3.40
8	4874.00	34.3 AV	54.0	-19.7	1.28 V	346	30.90	3.40
9	7311.00	54.6 PK	74.0	-19.4	1.61 V	216	46.84	7.76
10	7311.00	45.3 AV	54.0	-8.7	1.61 V	216	37.54	7.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	102.4 PK			1.09 H	335	107.99	-5.59
2	*2462.00	99.7 AV			1.09 H	335	105.29	-5.59
3	2483.50	54.7 PK	74.0	-19.3	1.09 H	335	60.19	-5.49
4	2483.50	46.3 AV	54.0	-7.7	1.09 H	335	51.79	-5.49
5	4924.00	47.2 PK	74.0	-26.8	1.11 H	360	43.81	3.39
6	4924.00	35.5 AV	54.0	-18.5	1.11 H	360	32.11	3.39
7	7386.00	53.7 PK	74.0	-20.3	1.33 H	61	45.65	8.05
8	7386.00	41.1 AV	54.0	-12.9	1.33 H	61	33.05	8.05
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	109.5 PK			1.12 V	96	115.09	-5.59
2	*2462.00	107.1 AV			1.12 V	96	112.69	-5.59
3	2483.50	61.5 PK	74.0	-12.5	1.11 V	93	66.99	-5.49
4	2483.50	53.0 AV	54.0	-1.0	1.11 V	93	58.49	-5.49
5	4924.00	46.2 PK	74.0	-27.8	1.33 V	353	42.81	3.39
6	4924.00	34.5 AV	54.0	-19.5	1.33 V	353	31.11	3.39
7	7386.00	54.4 PK	74.0	-19.6	1.64 V	229	46.35	8.05
8	7386.00	45.3 AV	54.0	-8.7	1.64 V	229	37.25	8.05

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	65.8 PK	74.0	-8.2	1.08 H	347	71.67	-5.87
2	2390.00	46.7 AV	54.0	-7.3	1.08 H	347	52.57	-5.87
3	*2412.00	102.3 PK			1.08 H	347	108.10	-5.80
4	*2412.00	92.2 AV			1.08 H	347	98.00	-5.80
5	4824.00	47.7 PK	74.0	-26.3	1.08 H	360	44.28	3.42
6	4824.00	35.7 AV	54.0	-18.3	1.08 H	360	32.28	3.42
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	2390.00	72.6 PK	74.0	-1.4	1.18 V	95	78.47	-5.87
2	2390.00	53.5 AV	54.0	-0.5	1.18 V	95	59.37	-5.87
3	*2412.00	109.4 PK			1.18 V	95	115.20	-5.80
4	*2412.00	99.0 AV			1.18 V	95	104.80	-5.80
5	4824.00	45.2 PK	74.0	-28.8	1.25 V	336	41.78	3.42
6	4824.00	33.8 AV	54.0	-20.2	1.25 V	336	30.38	3.42

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	59.1 PK	74.0	-14.9	1.08 H	340	64.97	-5.87
2	2390.00	42.2 AV	54.0	-11.8	1.08 H	340	48.07	-5.87
3	*2437.00	106.8 PK			1.08 H	340	112.50	-5.70
4	*2437.00	96.8 AV			1.08 H	340	102.50	-5.70
5	2483.50	58.4 PK	74.0	-15.6	1.08 H	340	63.89	-5.49
6	2483.50	41.5 AV	54.0	-12.5	1.08 H	340	46.99	-5.49
7	4874.00	47.2 PK	74.0	-26.8	1.09 H	360	43.80	3.40
8	4874.00	35.3 AV	54.0	-18.7	1.09 H	360	31.90	3.40
9	7311.00	53.7 PK	74.0	-20.3	1.34 H	35	45.94	7.76
10	7311.00	41.3 AV	54.0	-12.7	1.34 H	35	33.54	7.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.7 PK	74.0	-8.3	1.11 V	94	71.57	-5.87
2	2390.00	48.6 AV	54.0	-5.4	1.11 V	94	54.47	-5.87
3	*2437.00	113.6 PK			1.11 V	94	119.30	-5.70
4	*2437.00	103.8 AV			1.11 V	94	109.50	-5.70
5	2483.50	65.9 PK	74.0	-8.1	1.11 V	94	71.39	-5.49
6	2483.50	48.8 AV	54.0	-5.2	1.11 V	94	54.29	-5.49
7	4874.00	45.6 PK	74.0	-28.4	1.23 V	334	42.20	3.40
8	4874.00	34.3 AV	54.0	-19.7	1.23 V	334	30.90	3.40
9	7311.00	54.3 PK	74.0	-19.7	1.66 V	228	46.54	7.76
10	7311.00	45.2 AV	54.0	-8.8	1.66 V	228	37.44	7.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	102.8 PK			1.00 H	345	108.39	-5.59
2	*2462.00	92.2 AV			1.00 H	345	97.79	-5.59
3	2483.50	66.6 PK	74.0	-7.4	1.00 H	345	72.09	-5.49
4	2483.50	47.1 AV	54.0	-6.9	1.00 H	345	52.59	-5.49
5	4924.00	47.2 PK	74.0	-26.8	1.03 H	360	43.81	3.39
6	4924.00	35.1 AV	54.0	-18.9	1.03 H	360	31.71	3.39
7	7386.00	53.9 PK	74.0	-20.1	1.36 H	54	45.85	8.05
8	7386.00	41.0 AV	54.0	-13.0	1.36 H	54	32.95	8.05
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	109.3 PK			1.10 V	93	114.89	-5.59
2	*2462.00	98.9 AV			1.10 V	93	104.49	-5.59
3	2483.50	73.5 PK	74.0	-0.5	1.10 V	93	78.99	-5.49
4	2483.50	53.7 AV	54.0	-0.3	1.10 V	93	59.19	-5.49
5	4924.00	45.6 PK	74.0	-28.4	1.27 V	331	42.21	3.39
6	4924.00	33.9 AV	54.0	-20.1	1.27 V	331	30.51	3.39
7	7386.00	54.6 PK	74.0	-19.4	1.61 V	222	46.55	8.05
8	7386.00	45.3 AV	54.0	-8.7	1.61 V	222	37.25	8.05

REMARKS:

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

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.8 PK	74.0	-7.2	1.00 H	338	72.67	-5.87
2	2390.00	46.8 AV	54.0	-7.2	1.00 H	338	52.67	-5.87
3	*2412.00	105.9 PK			1.00 H	338	111.70	-5.80
4	*2412.00	93.3 AV			1.00 H	338	99.10	-5.80
5	4824.00	47.2 PK	74.0	-26.8	1.01 H	360	43.78	3.42
6	4824.00	35.4 AV	54.0	-18.6	1.01 H	360	31.98	3.42
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	2390.00	73.8 PK	74.0	-0.2	1.17 V	310	79.67	-5.87
2	2390.00	53.6 AV	54.0	-0.4	1.17 V	310	59.47	-5.87
3	*2412.00	112.5 PK			1.17 V	310	118.30	-5.80
4	*2412.00	99.9 AV			1.17 V	310	105.70	-5.80
5	4824.00	45.4 PK	74.0	-28.6	1.25 V	353	41.98	3.42
6	4824.00	34.1 AV	54.0	-19.9	1.25 V	353	30.68	3.42

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	64.7 PK	74.0	-9.3	1.05 H	334	70.57	-5.87
2	2390.00	46.3 AV	54.0	-7.7	1.05 H	334	52.17	-5.87
3	*2437.00	111.9 PK			1.05 H	334	117.60	-5.70
4	*2437.00	100.2 AV			1.05 H	334	105.90	-5.70
5	2483.50	63.2 PK	74.0	-10.8	1.05 H	334	68.69	-5.49
6	2483.50	43.4 AV	54.0	-10.6	1.05 H	334	48.89	-5.49
7	4874.00	47.1 PK	74.0	-26.9	1.08 H	357	43.70	3.40
8	4874.00	35.5 AV	54.0	-18.5	1.08 H	357	32.10	3.40
9	7311.00	53.8 PK	74.0	-20.2	1.31 H	38	46.04	7.76
10	7311.00	41.0 AV	54.0	-13.0	1.31 H	38	33.24	7.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.6 PK	74.0	-2.4	1.13 V	308	77.47	-5.87
2	2390.00	53.3 AV	54.0	-0.7	1.13 V	308	59.17	-5.87
3	*2437.00	119.1 PK			1.13 V	308	124.80	-5.70
4	*2437.00	107.5 AV			1.13 V	308	113.20	-5.70
5	2483.50	70.4 PK	74.0	-3.6	1.13 V	308	75.89	-5.49
6	2483.50	50.9 AV	54.0	-3.1	1.13 V	308	56.39	-5.49
7	4874.00	46.1 PK	74.0	-27.9	1.27 V	351	42.70	3.40
8	4874.00	34.6 AV	54.0	-19.4	1.27 V	351	31.20	3.40
9	7311.00	54.6 PK	74.0	-19.4	1.59 V	226	46.84	7.76
10	7311.00	45.1 AV	54.0	-8.9	1.59 V	226	37.34	7.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	105.8 PK			1.00 H	321	111.39	-5.59
2	*2462.00	93.9 AV			1.00 H	321	99.49	-5.59
3	2483.50	66.9 PK	74.0	-7.1	1.00 H	321	72.39	-5.49
4	2483.50	46.8 AV	54.0	-7.2	1.00 H	321	52.29	-5.49
5	4924.00	47.4 PK	74.0	-26.6	1.07 H	360	44.01	3.39
6	4924.00	35.5 AV	54.0	-18.5	1.07 H	360	32.11	3.39
7	7386.00	53.5 PK	74.0	-20.5	1.36 H	38	45.45	8.05
8	7386.00	41.2 AV	54.0	-12.8	1.36 H	38	33.15	8.05
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	112.4 PK			1.12 V	304	117.99	-5.59
2	*2462.00	100.6 AV			1.12 V	304	106.19	-5.59
3	**2483.50**	**73.9 PK**	**74.0**	**-0.1**	**1.12 V**	**304**	**79.39**	**-5.49**
4	2483.50	53.8 AV	54.0	-0.2	1.12 V	304	59.29	-5.49
5	4924.00	45.4 PK	74.0	-28.6	1.31 V	343	42.01	3.39
6	4924.00	34.1 AV	54.0	-19.9	1.31 V	343	30.71	3.39
7	7386.00	54.3 PK	74.0	-19.7	1.61 V	215	46.25	8.05
8	7386.00	45.3 AV	54.0	-8.7	1.61 V	215	37.25	8.05

REMARKS:

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.7 PK	74.0	-7.3	1.08 H	346	72.57	-5.87
2	2390.00	46.6 AV	54.0	-7.4	1.08 H	346	52.47	-5.87
3	*2422.00	99.9 PK			1.08 H	346	105.66	-5.76
4	*2422.00	87.2 AV			1.08 H	346	92.96	-5.76
5	4844.00	47.2 PK	74.0	-26.8	1.11 H	360	43.79	3.41
6	4844.00	35.5 AV	54.0	-18.5	1.11 H	360	32.09	3.41
7	7266.00	53.2 PK	74.0	-20.8	1.30 H	53	45.62	7.58
8	7266.00	40.9 AV	54.0	-13.1	1.30 H	53	33.32	7.58
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	73.7 PK	74.0	-0.3	1.16 V	308	79.57	-5.87
2	2390.00	53.8 AV	54.0	-0.2	1.16 V	308	59.67	-5.87
3	*2422.00	107.4 PK			1.16 V	308	113.16	-5.76
4	*2422.00	94.5 AV			1.16 V	308	100.26	-5.76
5	4844.00	46.0 PK	74.0	-28.0	1.29 V	330	42.59	3.41
6	4844.00	34.7 AV	54.0	-19.3	1.29 V	330	31.29	3.41
7	7266.00	54.0 PK	74.0	-20.0	1.56 V	223	46.42	7.58
8	7266.00	44.9 AV	54.0	-9.1	1.56 V	223	37.32	7.58

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.2 PK	74.0	-7.8	1.12 H	340	72.07	-5.87
2	2390.00	46.4 AV	54.0	-7.6	1.12 H	340	52.27	-5.87
3	*2437.00	103.3 PK			1.12 H	340	109.00	-5.70
4	*2437.00	90.2 AV			1.12 H	340	95.90	-5.70
5	2483.50	63.0 PK	74.0	-11.0	1.12 H	340	68.49	-5.49
6	2483.50	43.2 AV	54.0	-10.8	1.12 H	340	48.69	-5.49
7	4874.00	46.7 PK	74.0	-27.3	1.10 H	360	43.30	3.40
8	4874.00	35.0 AV	54.0	-19.0	1.10 H	360	31.60	3.40
9	7311.00	53.6 PK	74.0	-20.4	1.33 H	62	45.84	7.76
10	7311.00	40.8 AV	54.0	-13.2	1.33 H	62	33.04	7.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	73.6 PK	74.0	-0.4	1.14 V	323	79.47	-5.87
2	2390.00	53.6 AV	54.0	-0.4	1.14 V	323	59.47	-5.87
3	*2437.00	110.5 PK			1.14 V	323	116.20	-5.70
4	*2437.00	97.6 AV			1.14 V	323	103.30	-5.70
5	2483.50	70.4 PK	74.0	-3.6	1.14 V	323	75.89	-5.49
6	2483.50	50.6 AV	54.0	-3.4	1.14 V	323	56.09	-5.49
7	4874.00	45.7 PK	74.0	-28.3	1.28 V	353	42.30	3.40
8	4874.00	34.3 AV	54.0	-19.7	1.28 V	353	30.90	3.40
9	7311.00	54.4 PK	74.0	-19.6	1.66 V	223	46.64	7.76
10	7311.00	44.9 AV	54.0	-9.1	1.66 V	223	37.14	7.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	100.6 PK			1.13 H	345	106.24	-5.64
2	*2452.00	88.0 AV			1.13 H	345	93.64	-5.64
3	2483.50	65.7 PK	74.0	-8.3	1.13 H	345	71.19	-5.49
4	2483.50	46.7 AV	54.0	-7.3	1.13 H	345	52.19	-5.49
5	4904.00	46.9 PK	74.0	-27.1	1.11 H	360	43.51	3.39
6	4904.00	35.3 AV	54.0	-18.7	1.11 H	360	31.91	3.39
7	7356.00	53.8 PK	74.0	-20.2	1.29 H	64	45.86	7.94
8	7356.00	41.2 AV	54.0	-12.8	1.29 H	64	33.26	7.94
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	107.5 PK			1.14 V	322	113.14	-5.64
2	*2452.00	94.9 AV			1.14 V	322	100.54	-5.64
3	2483.50	72.4 PK	74.0	-1.6	1.14 V	323	77.89	-5.49
4	2483.50	53.6 AV	54.0	-0.4	1.14 V	323	59.09	-5.49
5	4904.00	45.5 PK	74.0	-28.5	1.27 V	351	42.11	3.39
6	4904.00	34.0 AV	54.0	-20.0	1.27 V	351	30.61	3.39
7	7356.00	54.1 PK	74.0	-19.9	1.60 V	228	46.16	7.94
8	7356.00	45.0 AV	54.0	-9.0	1.60 V	228	37.06	7.94

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 05, 2014	July 04, 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 : Aug. 06, 2014

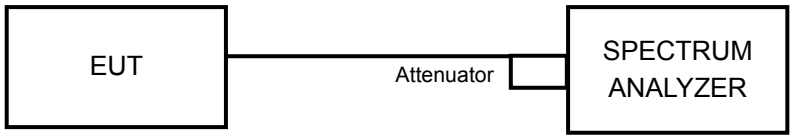
4.3.3 TEST PROCEDURE

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

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.10	0.5	PASS
6	2437	10.12	0.5	PASS
11	2462	10.07	0.5	PASS

802.11g

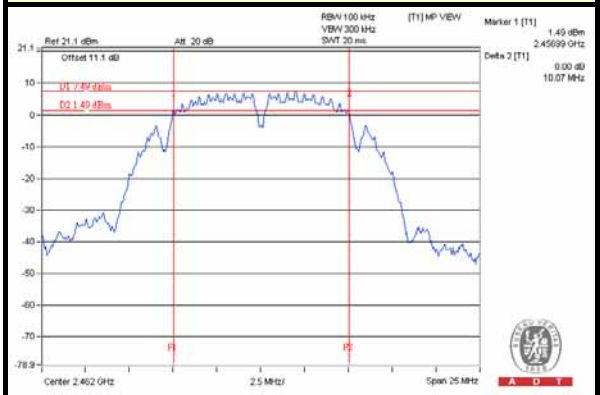
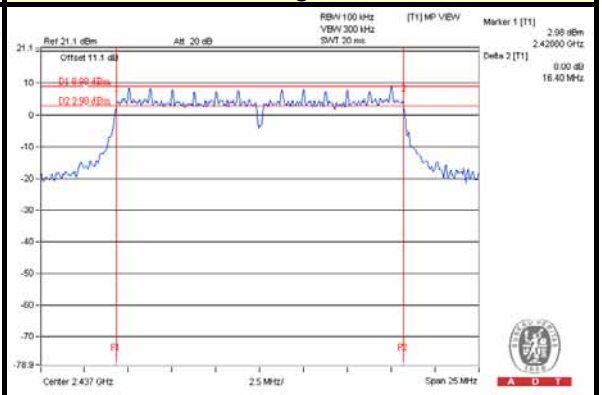
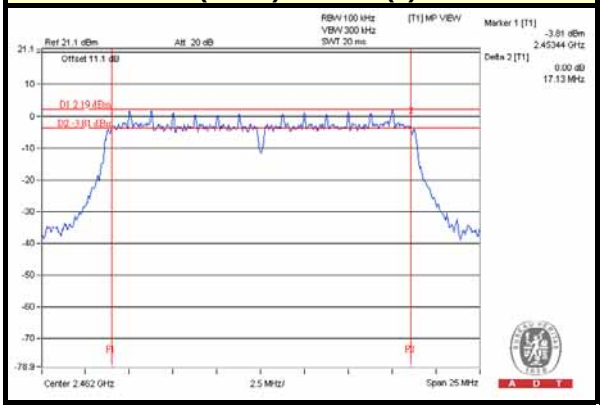
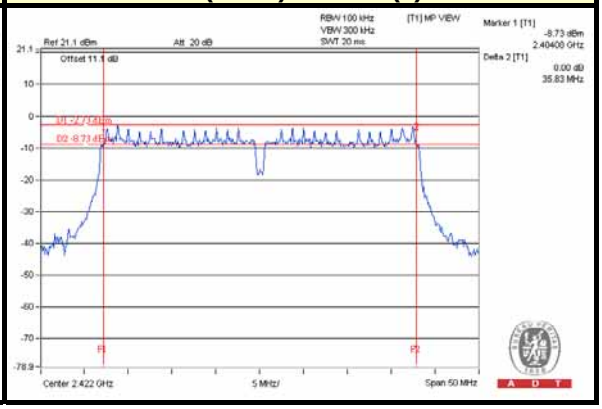
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.41	0.5	PASS
6	2437	16.40	0.5	PASS
11	2462	16.41	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.34	17.32	0.5	PASS
6	2437	17.15	17.35	0.5	PASS
11	2462	17.13	17.33	0.5	PASS

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	35.83	36.41	0.5	PASS
6	2437	36.36	36.10	0.5	PASS
9	2452	36.13	36.09	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11b : CH11	**802.11g : CH6**
	
802.11n (HT20) / Chain (0) : CH11	**802.11n (HT40) / Chain (0) : 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 : Aug. 06, 2014

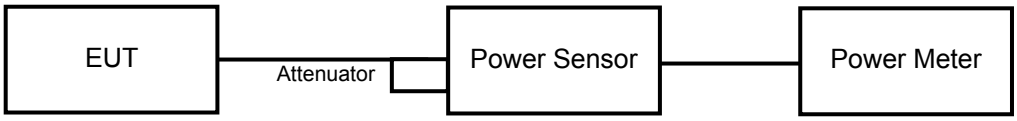
4.4.3 TEST PROCEDURES

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	125.603	20.99	30	PASS
6	2437	206.538	23.15	30	PASS
11	2462	138.357	21.41	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	157.761	21.98	30	PASS
6	2437	203.236	23.08	30	PASS
11	2462	138.676	21.42	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	20.31	21.09	235.928	23.73	30	PASS
6	2437	23.50	24.12	482.098	26.83	30	PASS
11	2462	19.75	21.26	228.066	23.58	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	18.37	19.93	167.108	22.23	30	PASS
6	2437	21.64	22.49	323.3	25.10	30	PASS
9	2452	18.77	19.47	163.848	22.14	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 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 : Aug. 06, 2014

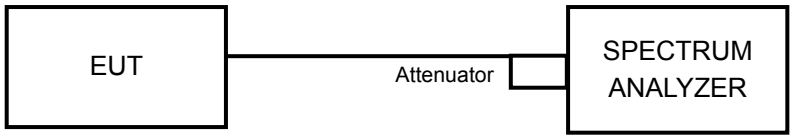
4.5.3 TEST PROCEDURE

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

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-3.23	8	PASS
6	2437	-6.09	8	PASS
11	2462	-7.46	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-12.70	8	PASS
6	2437	-6.70	8	PASS
11	2462	-11.88	8	PASS

802.11n (HT20)

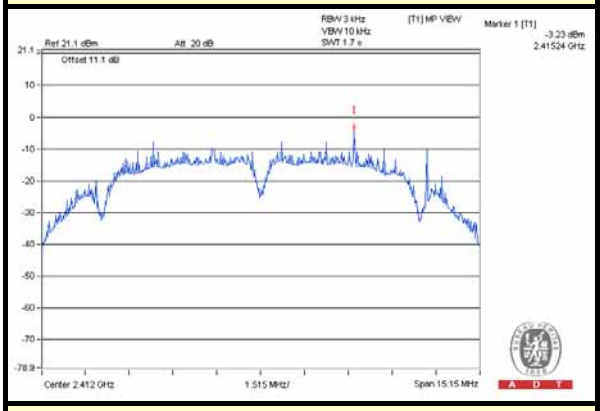
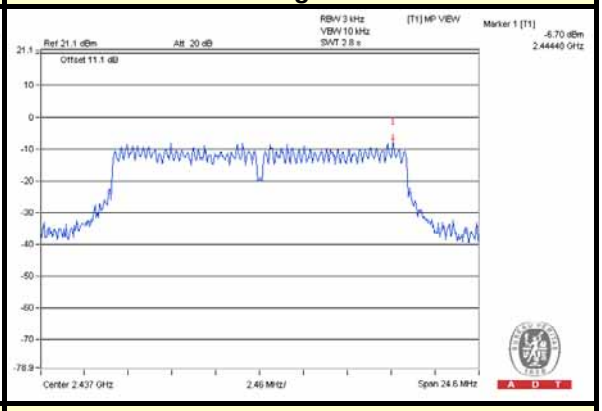
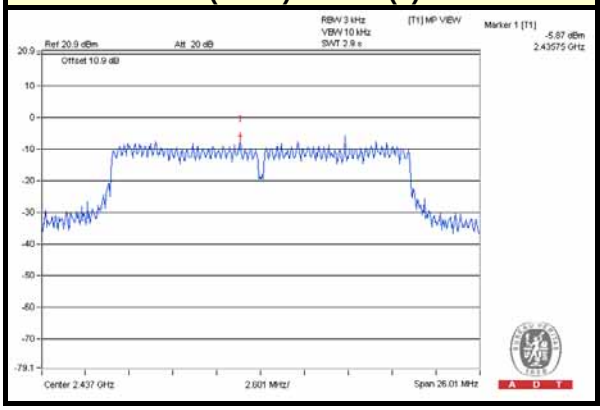
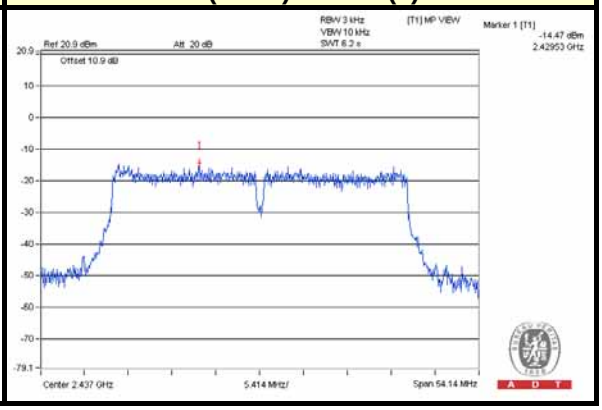
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-15.69	3.01	-12.68	7.49	PASS
	6	2437	-8.21	3.01	-5.20	7.49	PASS
	11	2462	-14.59	3.01	-11.58	7.49	PASS
1	1	2412	-13.19	3.01	-10.18	7.49	PASS
	6	2437	-5.87	3.01	-2.86	7.49	PASS
	11	2462	-13.20	3.01	-10.19	7.49	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.51dBi > 6dBi , so the power density limit shall be reduced to 8-(6.51-6) = 7.49dBm.

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	-19.73	3.01	-16.72	7.49	PASS
	6	2437	-16.20	3.01	-13.19	7.49	PASS
	9	2452	-18.62	3.01	-15.61	7.49	PASS
1	3	2422	-17.63	3.01	-14.62	7.49	PASS
	6	2437	-14.47	3.01	-11.46	7.49	PASS
	9	2452	-17.70	3.01	-14.69	7.49	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.51dBi > 6dBi , so the power density limit shall be reduced to 8-(6.51-6) = 7.49dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11b : CH1	**802.11g : CH6**
	
802.11n (HT20) / Chain(1) : 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 05, 2014	July 04, 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 : Aug. 06, 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.

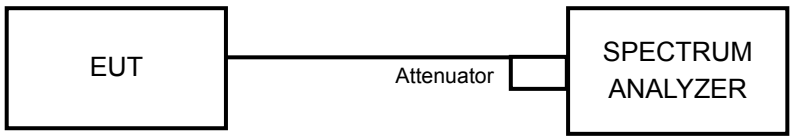
Measurement Procedure –Unwanted Emission Level

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

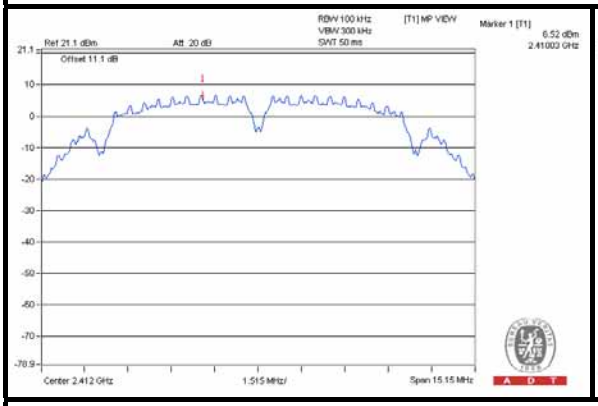
Same as Item 4.3.6

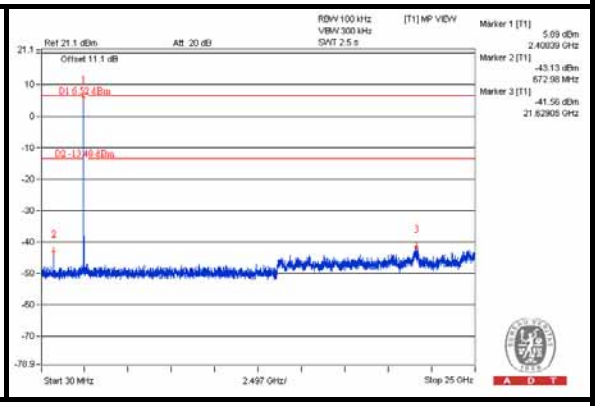
4.6.7 TEST RESULTS

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.

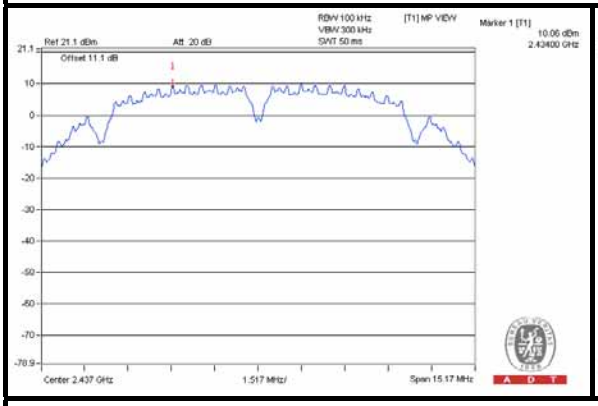
802.11b

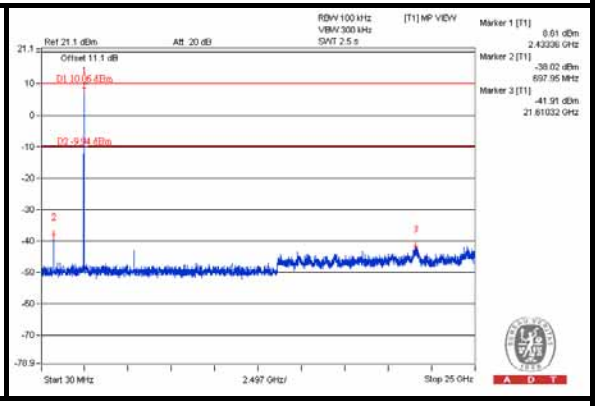
CH 1



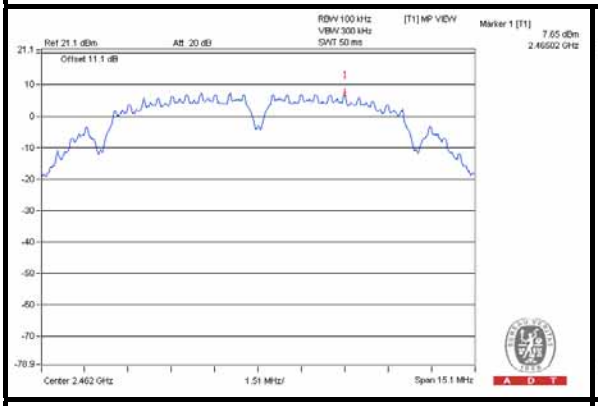


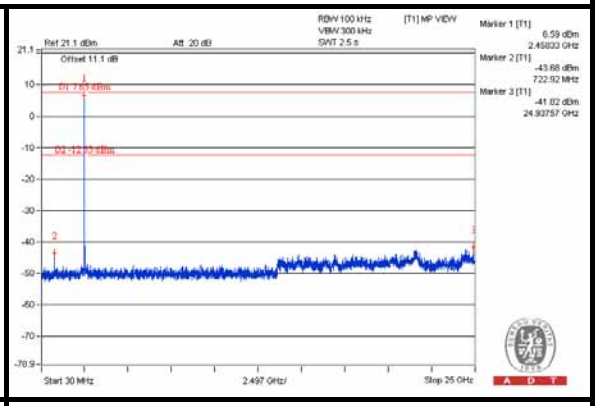
CH 6



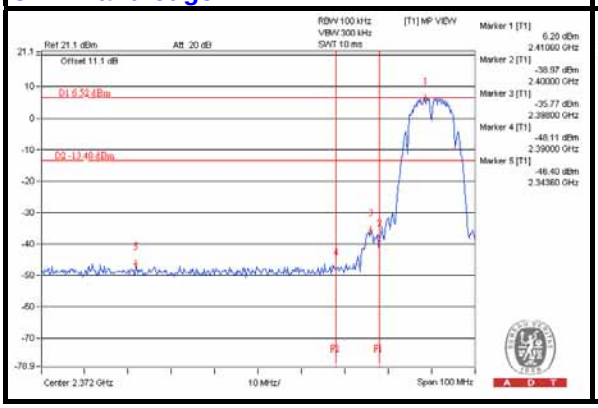


CH 11

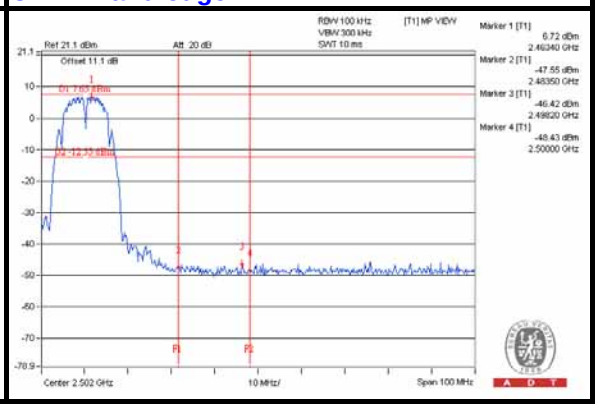




CH 1 Band edge

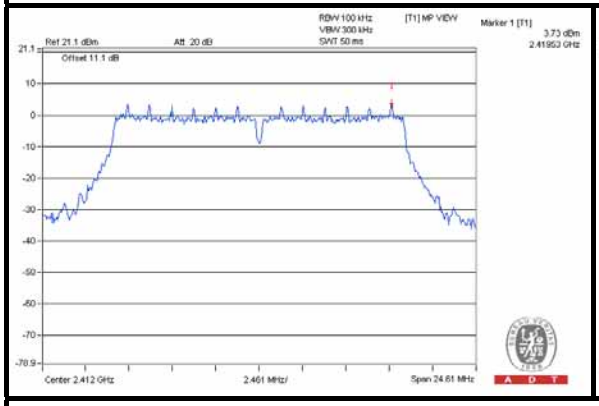


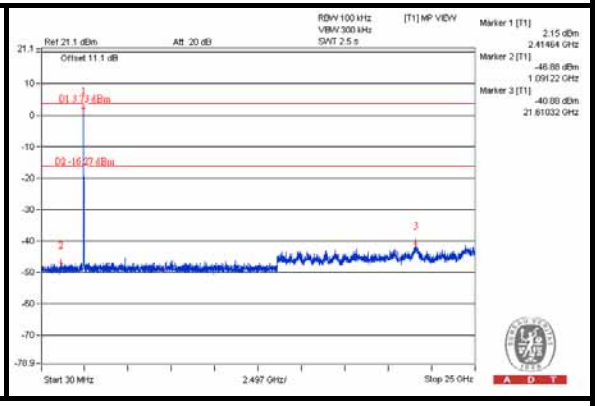
CH 11 Band edge



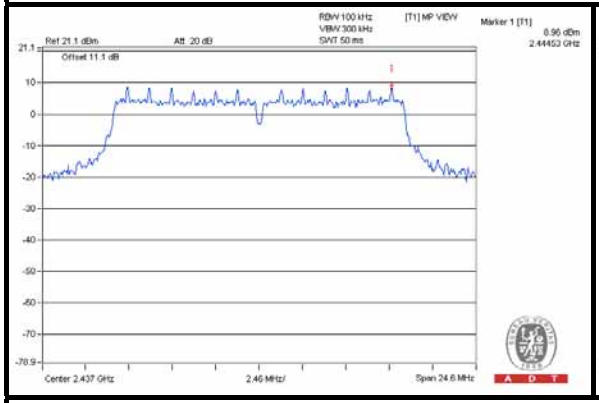
802.11g

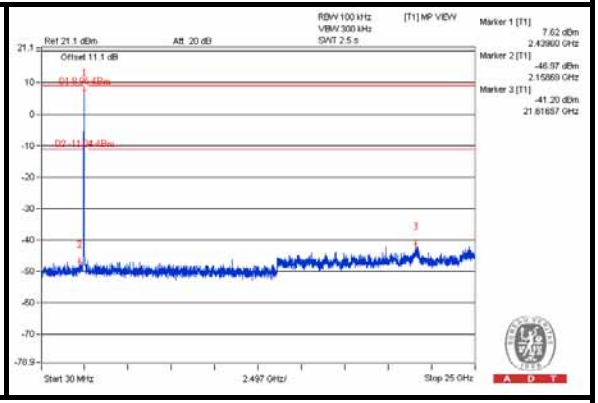
CH 1



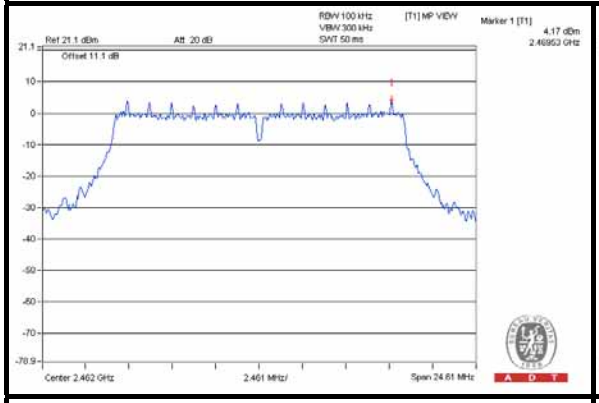


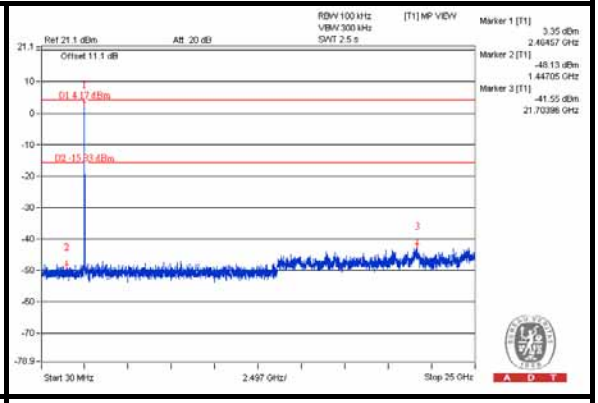
CH 6



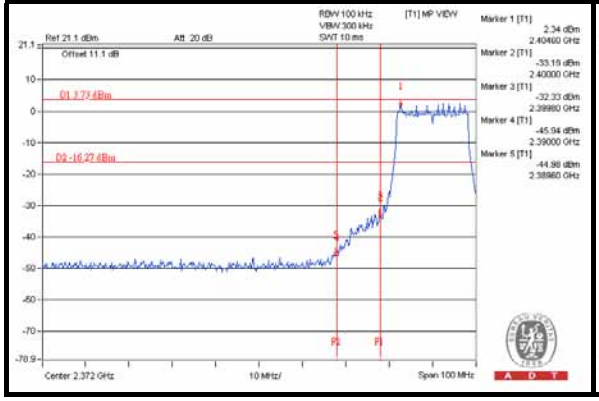


CH 11

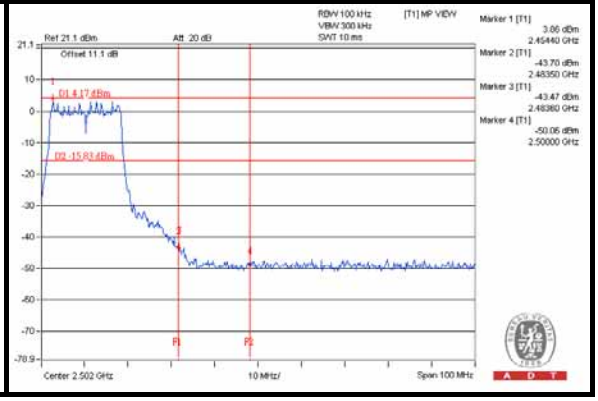




CH 1 Band edge



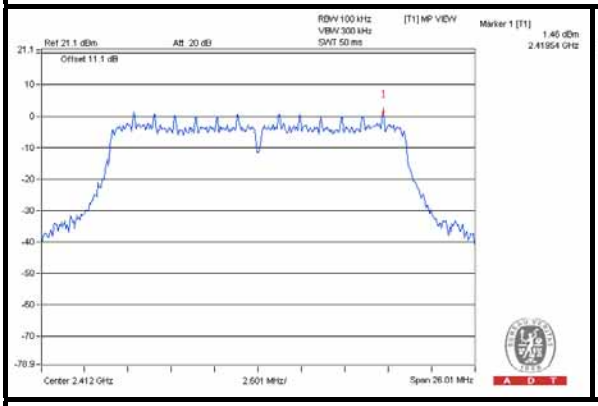
CH 11 Band edge

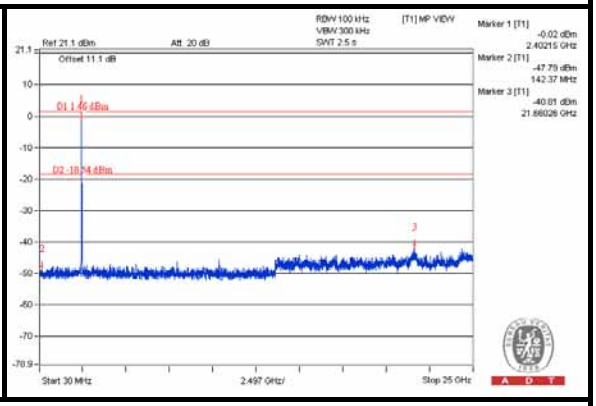


802.11n (HT20)

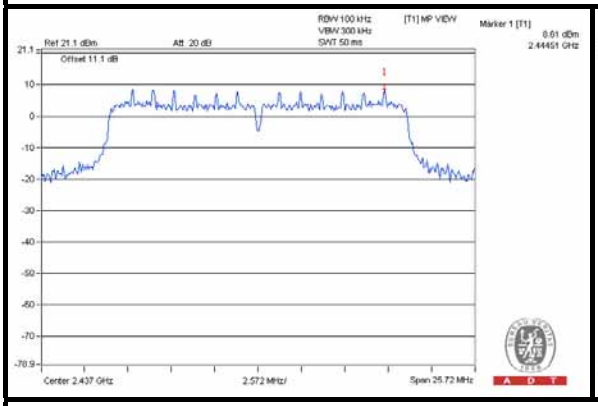
Chain (0)

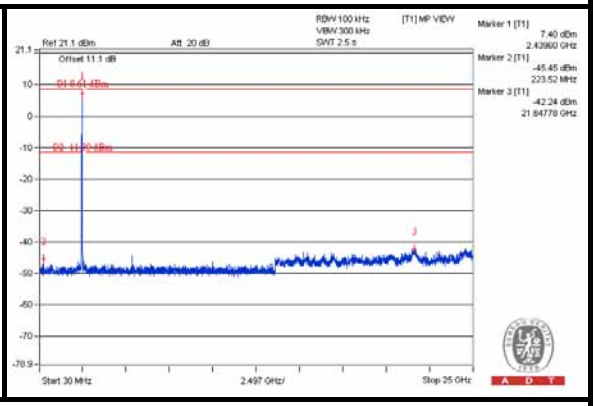
CH 1



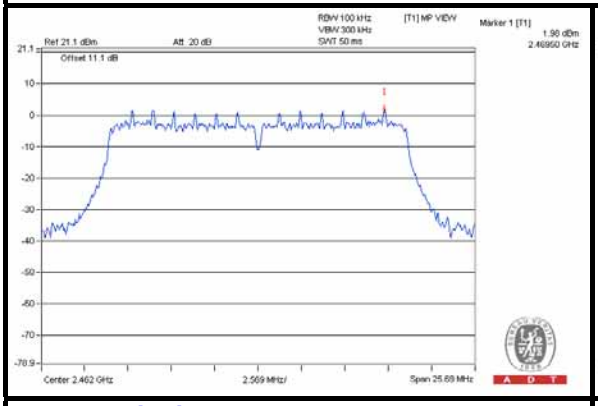


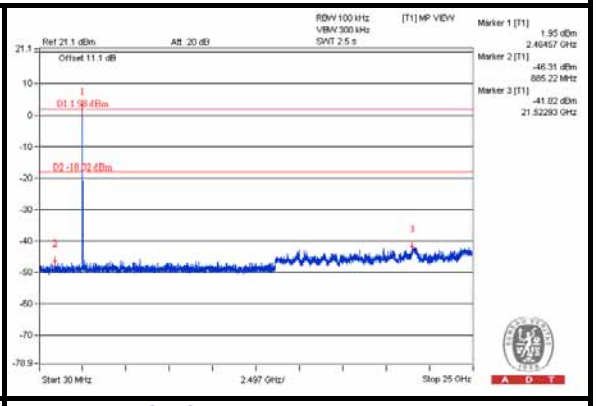
CH 6



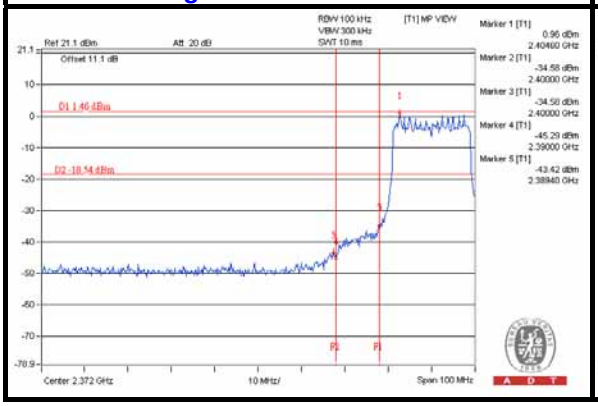


CH 11

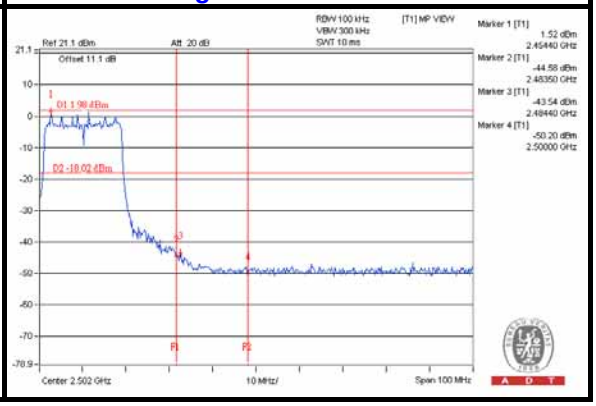




CH 1 Band edge

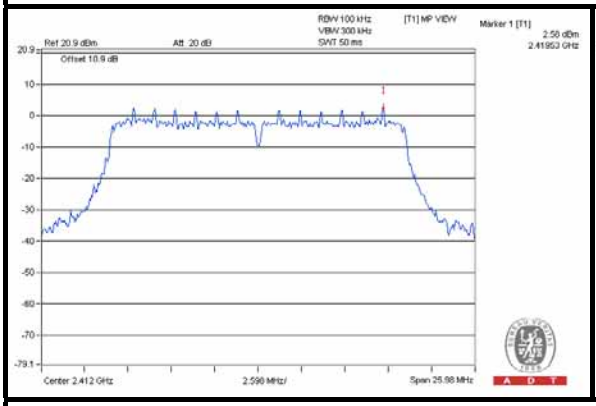


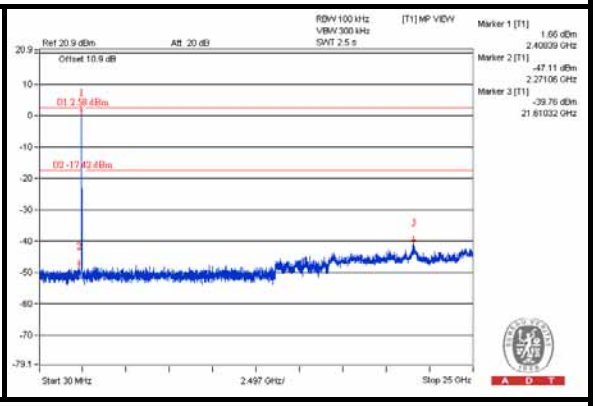
CH 11 Band edge



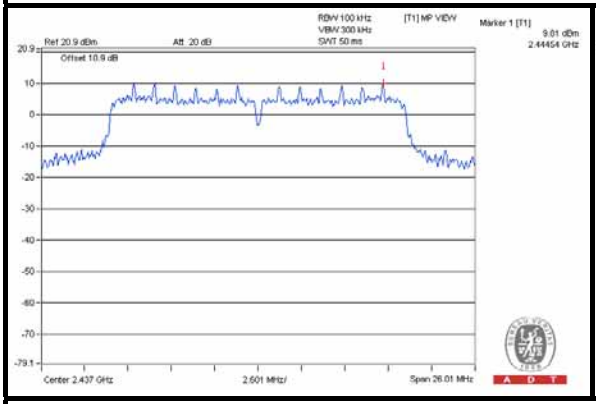
Chain (1)

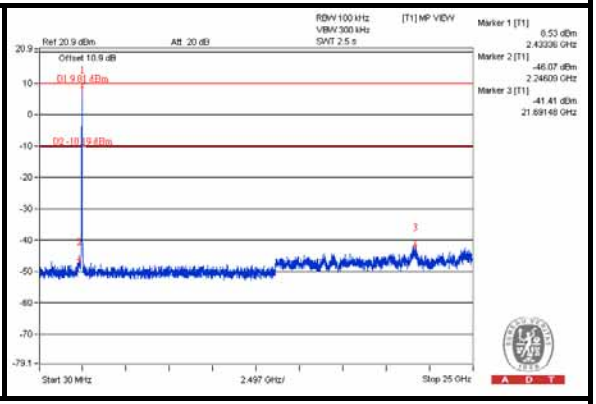
CH 1



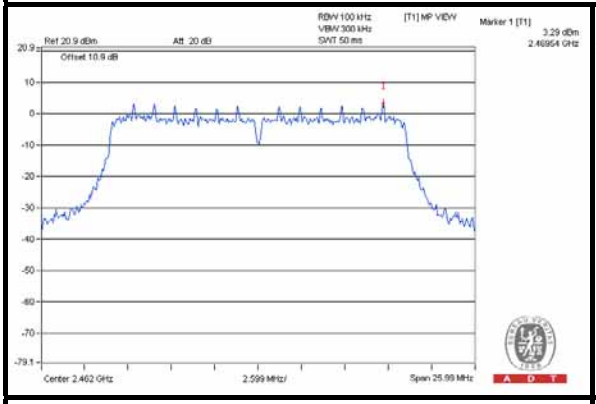


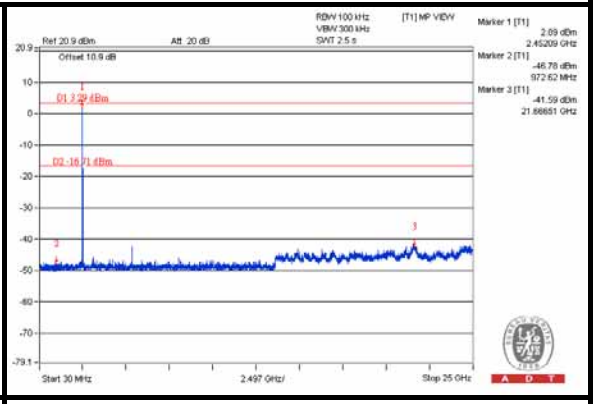
CH 6



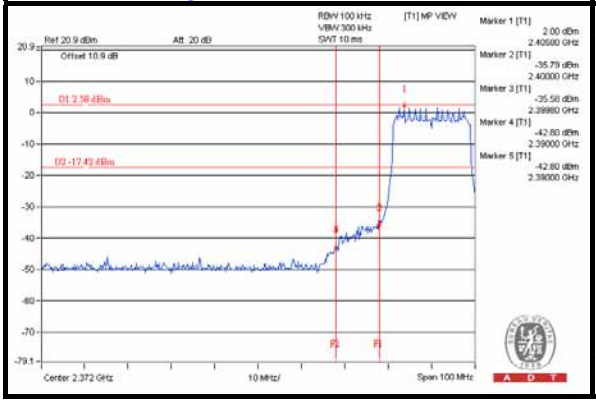


CH 11

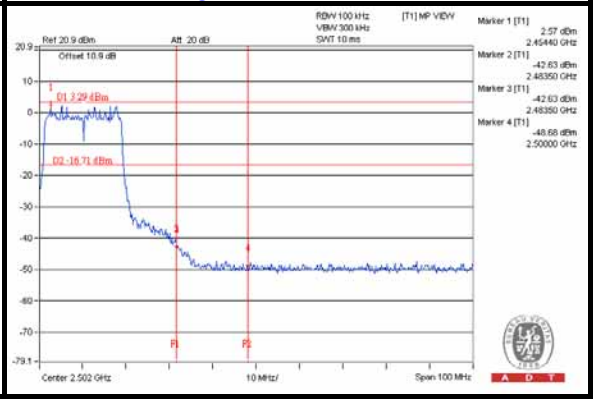




CH 1 Band edge



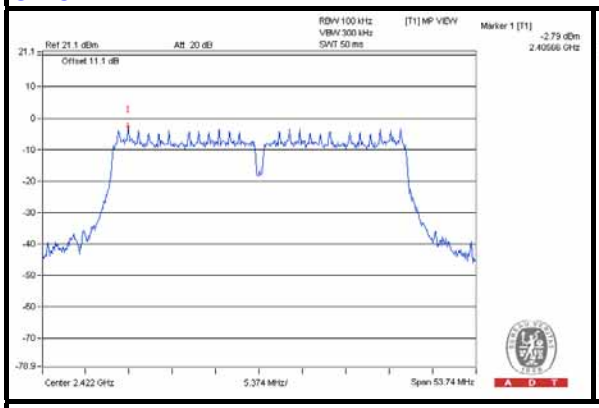
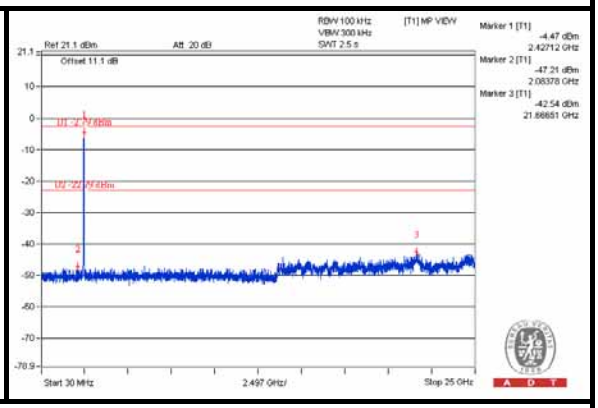
CH 11 Band edge



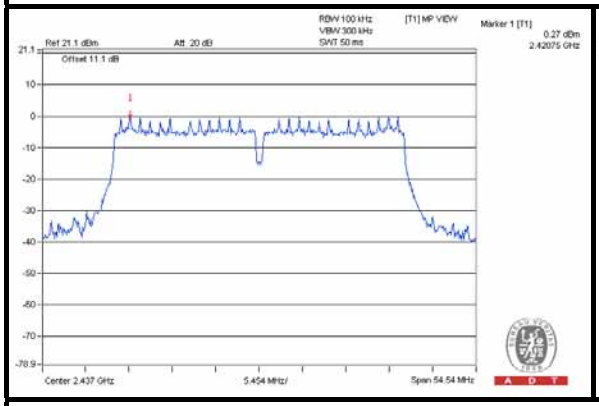
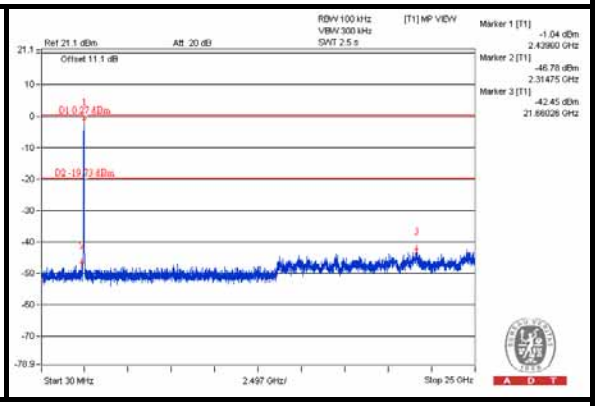
802.11n (HT40)

Chain (0)

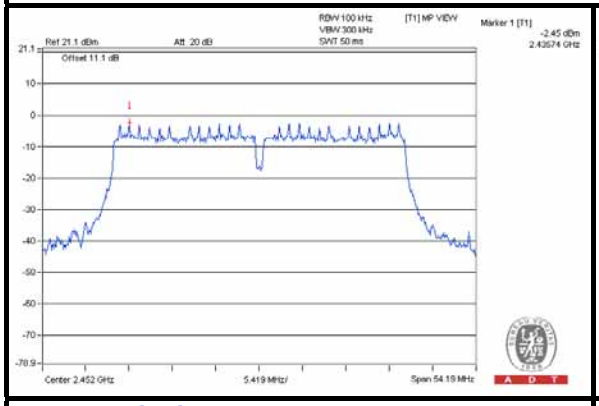
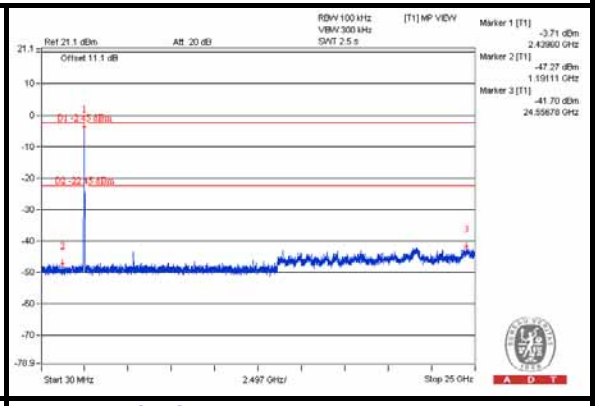
CH 3

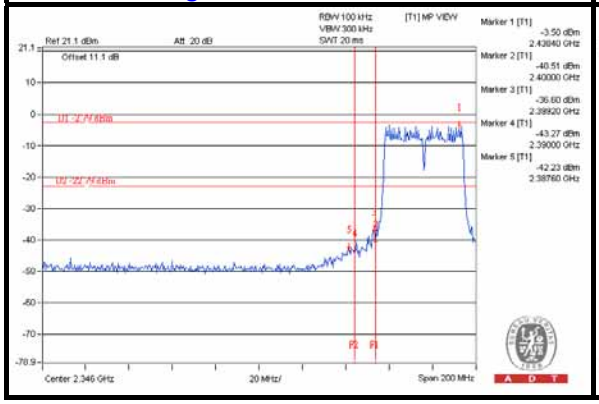
CH 6

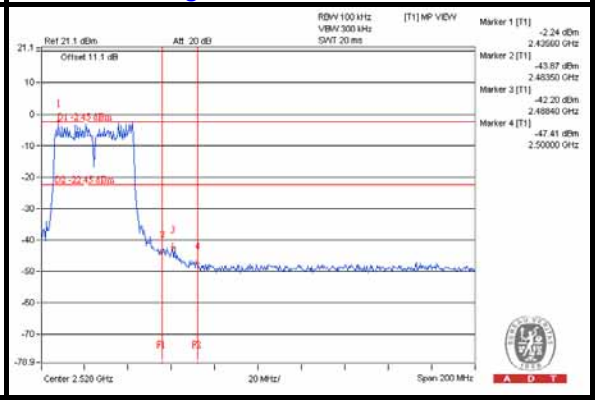
CH 9

CH 3 Band edge

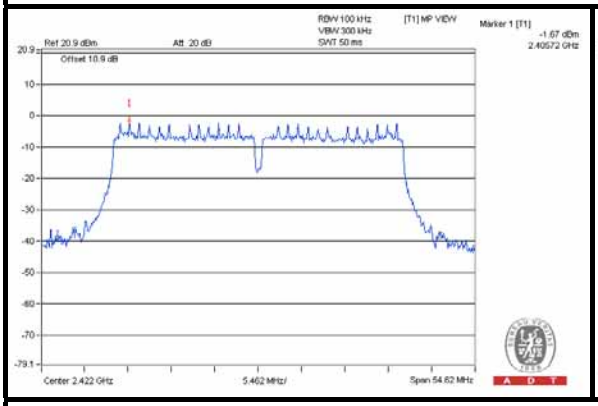


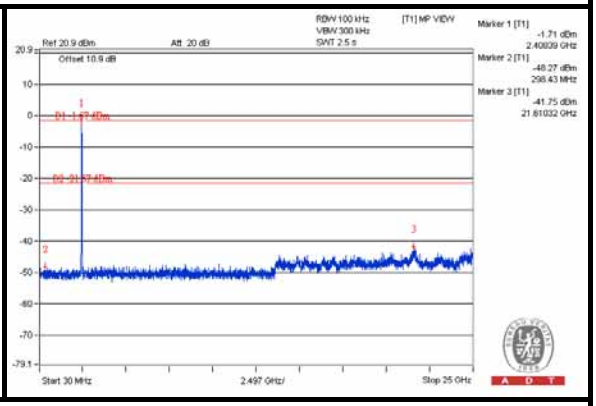
CH 9 Band edge



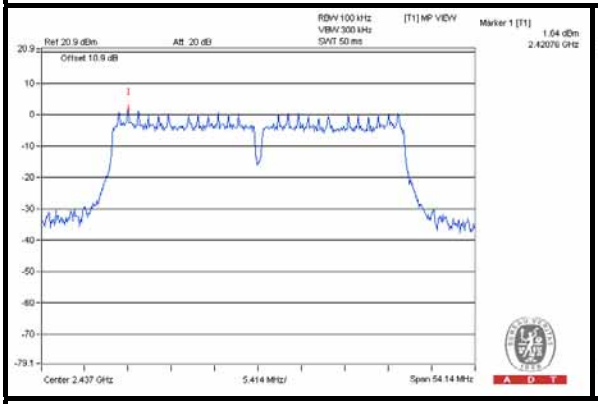
Chain (1)

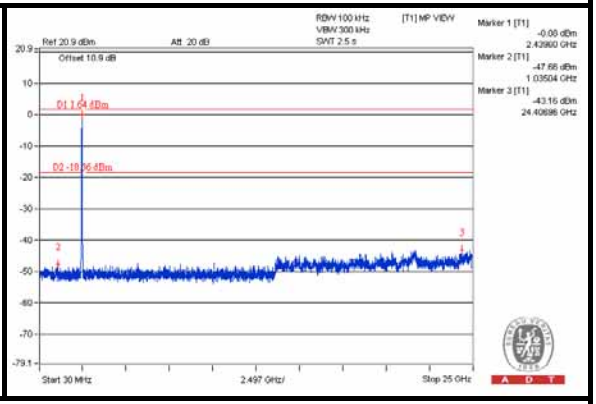
CH 3



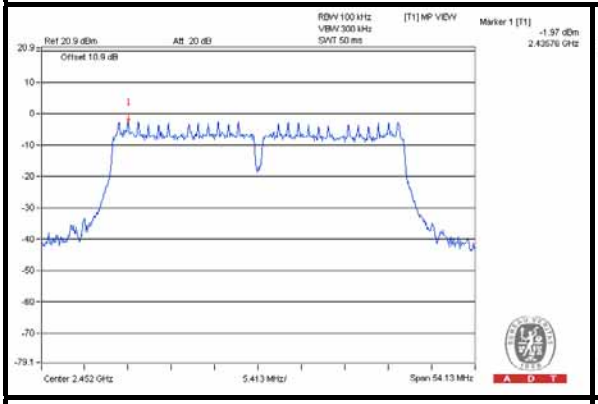


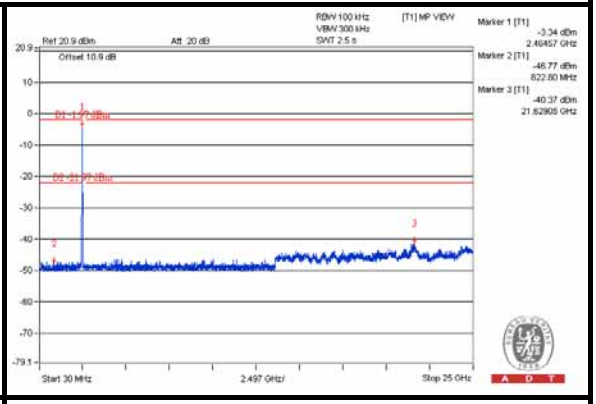
CH 6



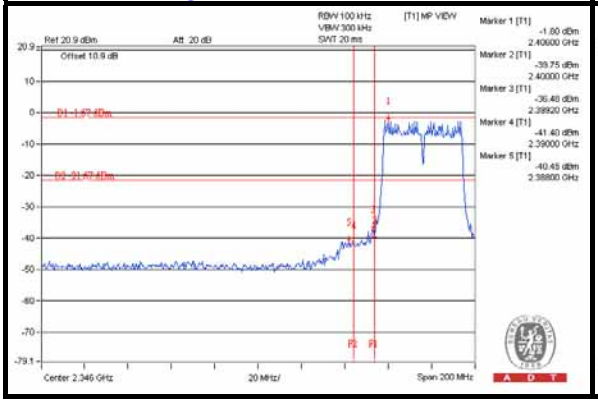


CH 9

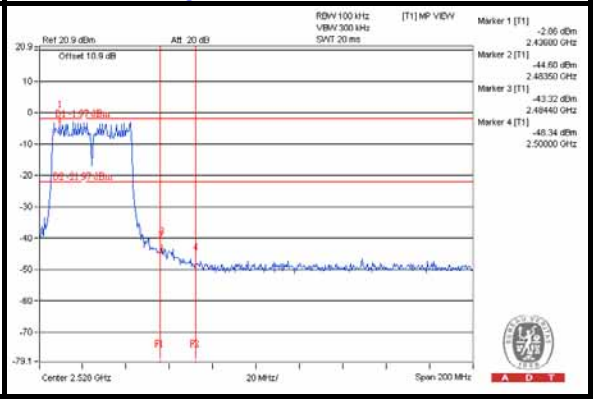




CH 3 Band edge



CH 9 Band edge



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. INFORMATION ON THE TESTING LABORATORIES

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

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

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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.

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