FCC Test Report

(15.247, WLAN)

Report No.: RF150326E02-1

FCC ID: 2AD8UFZPFWIC01

Test Model: FWIC

Received Date: Mar. 26, 2015

Test Date: Apr. 14 to May 07, 2015

Issued Date: May 21, 2015

Applicant: Nokia Solutions and Networks

Address: 1455 West Shure Drive, Arlington Heights, IL 60004, 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.

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Release Control Record

Issue No.	Description	Date Issued
RF150326E02-1	Original release.	May 21, 2015

1 Certificate of Conformity

Product: Flexi Zone Indoor Pico BTS

Brand: Nokia

Test Model: FWIC

Sample Status: ENGINEERING SAMPLE

Applicant: Nokia Solutions and Networks

Test Date: Apr. 14 to May 07, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2009

The above equipment 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:** May 21, 2015
Midoli Peng / Specialist

Approved by : _____ , **Date:** May 21, 2015
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)				
FCC Clause	FCC KDB 558074	Test Item	Result	Remarks
15.207	-	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -2.9dB at 25.79688MHz.
15.205 / 15.209 / 15.247(d)	Section 11, 12 &13	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB at 2390.00MHz.
15.205 / 15.209 / 15.247(d)	Section 11, 12 &13	Conducted Emissions	PASS	Meet the requirement of limit.
15.247(d)	Section 11, 12 &13	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	Section 8.1	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Section 9.2.3.2	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Section 10.5	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	-	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

NOTE: 1. The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz, and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.25GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.72 dB
	6GHz ~ 18GHz	4.00 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (WLAN, 15.247)

Product	Flexi Zone Indoor Pico BTS
Brand	Nokia
Test Model	FWIC
Test Sample S/N	EA150710164
Hardware Version	472942A
Software Version	Operating SW: FB_FZM_PS_LFS_OS_2014_05_59-0-g927a301 WiFi module SW: 9.8.1.0.14302702
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter or 55Vdc from POE
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM VHT (20/40) mode in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 300Mbps VHT mode in 2.4GHz: up to 400Mbps
Operating Frequency	2.412GHz ~ 2.462GHz,
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20), VHT20 7 for 802.11n (HT40), VHT40
Output Power	802.11b: 200.387mW 802.11g: 213.108mW 802.11n (HT20): 209.648mW 802.11n (HT20): 140.486mW
Antenna Type	Refer to note as below
Antenna Connector	Refer to note as below
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. There are WLAN, BT, LTE and GPS technology used for the EUT.
2. The EUT's spec. as below table:

Model name	LTE			Wi-Fi	BT	GPS
	Freq.(MHz)		Band			
FWIC	DL	BW 5MHz : 2112.5~2152.5	4 (AWS)	✓	✓	✓
		BW 10MHz : 2115~2150				
		BW 15MHz : 2117.5~2174.5				
		BW 20MHz : 2120~2145				

3. The emission of the simultaneous operation (WLAN, BT & LTE) has been evaluated and no non-compliance was found.
4. The EUT must be supplied with a POE(option) or power adapter as following table:

Power adapter		
Brand	Model No.	Spec.
DVE	DSA-60PFE-12 1 120500	Input: 100-240V, 2.0A, 50/60Hz AC input cable(1.8m, unshielded) Output: 12V, 5A DC output cable(1.2m, unshielded, with one core)

5. The EUT was pre-tested under following test modes :

Test Mode	Description
Mode A	**With POE**
Mode B	With adapter

For the above modes, the worst radaited emission (above 1GHz) test was found in **Mode A**. Therefore only the test data of the modes were recorded in this report.

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

LTE Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
Internal LTE (Main)	TongDa	T-543-8141050-6	PIFA	i-pex(MHF)	4.9	50	1710~2390 (Band 4)
Internal LTE (Aux)		T-543-8141050-7			4.6	190	1710~2390 (Band 4)
WLAN Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
Internal WIFI (Main)	TongDa	T-543-8141037-3	PIFA	i-pex(MHF)	3.3	90	2412~2472
					2.4		5150~5825
Internal WIFI (Aux)	TongDa	T-543-8141037-4	PIFA	i-pex(MHF)	3	70	2412~2472
					2.9		5150~5825
GPS Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
External GPS Ant	TongDa	T-543-8141037-9	ElecPatch	SMA Male	4.0	9140 ± 100	GPS：1575.42 ± 3 MHz Glonass：1602 ± 8 MHz
BT Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
Internal BT Ant	INPAQ	Fz PICO	Chip	NA	-1.22	NA	2400~2500

7. The EUT incorporates a MIMO function with beamforming.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2Tx	2Rx
802.11g	6 ~ 54Mbps	2Tx	2Rx
802.11n (HT20)	MCS 0~7	2Tx	2Rx
	MCS 8~15	2Tx	2Rx
802.11n (HT40)	MCS 0~7	2Tx	2Rx
	MCS 8~15	2Tx	2Rx
VHT20	MCS 0~8, Nss=1	2Tx	2Rx
	MCS 0~8, Nss=2	2Tx	2Rx
VHT40	MCS 0~9, Nss=1	2Tx	2Rx
	MCS 0~9, Nss=2	2Tx	2Rx
Note: 1. For 802.11b/g, the EUT doesn't support beamforming mode.			

* 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)

8. The above EUT information is 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), VHT20:

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), VHT40:

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
	RE≥1G	RE<1G	PLC	APCM	
1	√	√	√	√	With POE
2	-	√	√	-	With adapter

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: 1. "-"means no effect.

2. This device can be installed in different orientations (wall mounted or tabletop), so had been investigated two different orientations. The worst case was found when positioned on Y-plane

Radiated Emission Test (Above 1GHz):

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
1	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

Radiated Emission Test (Below 1GHz):

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
1	802.11g	1 to 11	6	OFDM	BPSK	6
2	802.11g	1 to 11	6	OFDM	BPSK	6

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
1	802.11g	1 to 11	6	OFDM	BPSK	6
2	802.11g	1 to 11	6	OFDM	BPSK	6

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
1	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
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Gary Cheng
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Jason Huang
PLC	25deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

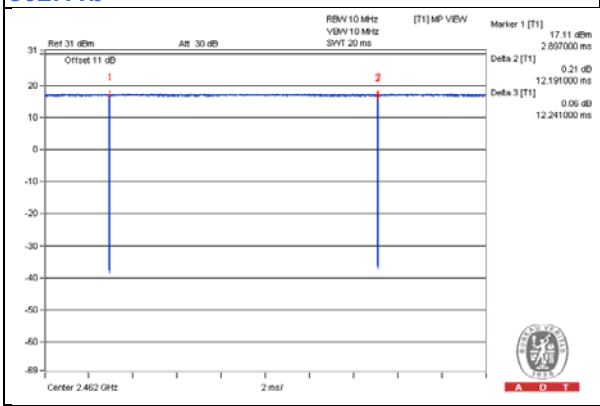
3.3 Duty Cycle of Test Signal

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.

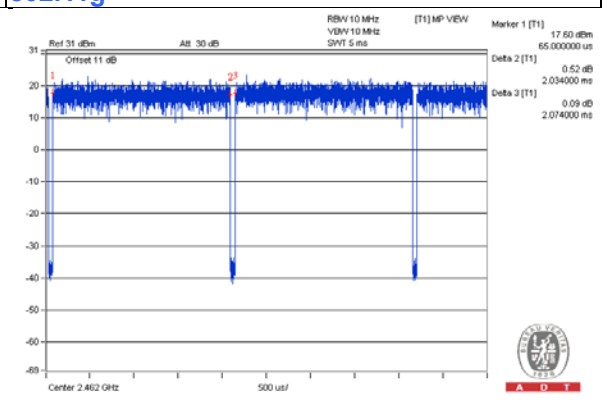
For 2.4GHz

802.11b: Duty cycle = 12.191 ms/12.241 ms = 0.996
802.11g: Duty cycle = 2.034 ms/2.074 ms = 0.981
802.11n (HT20): Duty cycle = 1.9 ms/1.938 ms = 0.98
802.11n (HT40): Duty cycle = 0.926 ms/0.982 ms = 0.943, Duty factor = 10 * log(1/0.943) = 0.26

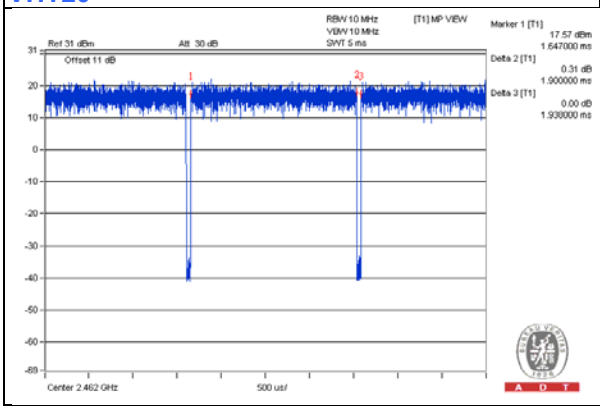
802.11b



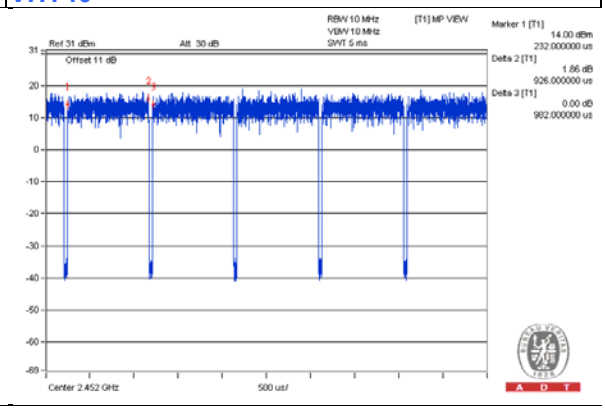
802.11g



VHT20



VHT40



3.4 Description of Support Units

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

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
B	NOTEBOOK COMPUTER	DELL	E6420	H62T3R1	FCC DoC	Provided by Lab
C	POE ADAPTER	NA	PD-7001G	D11326441001235A01	FCC DoC	Provided by Lab

NOTE:

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

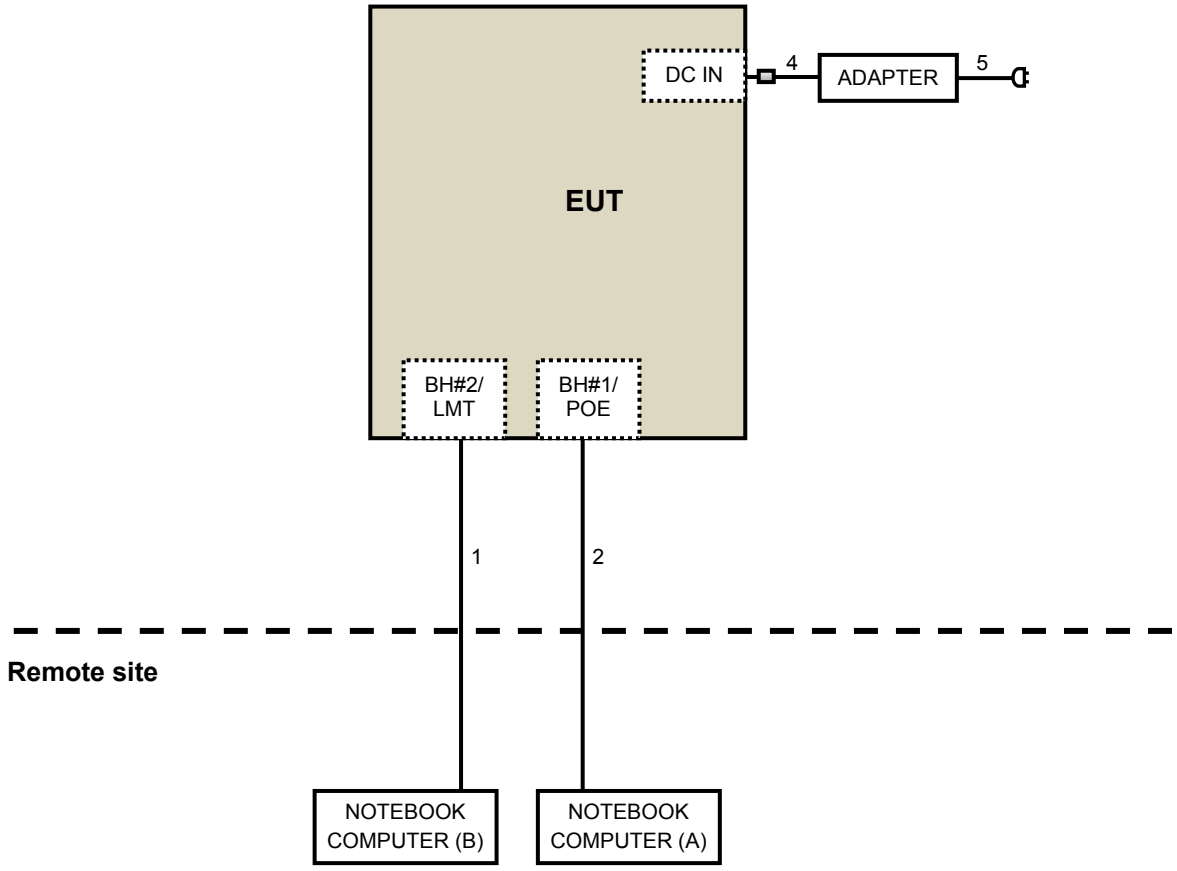
No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	RJ-45	1	10	No	0	Provided by Lab
2	RJ-45	1	10	No	0	Provided by Lab
3	RJ-45	1	1.5	No	0	Provided by Lab
4	DC	1	1.2	No	1	Supplied by Client
5	AC	1	1.8	Yes	0	Supplied by Client

NOTE:

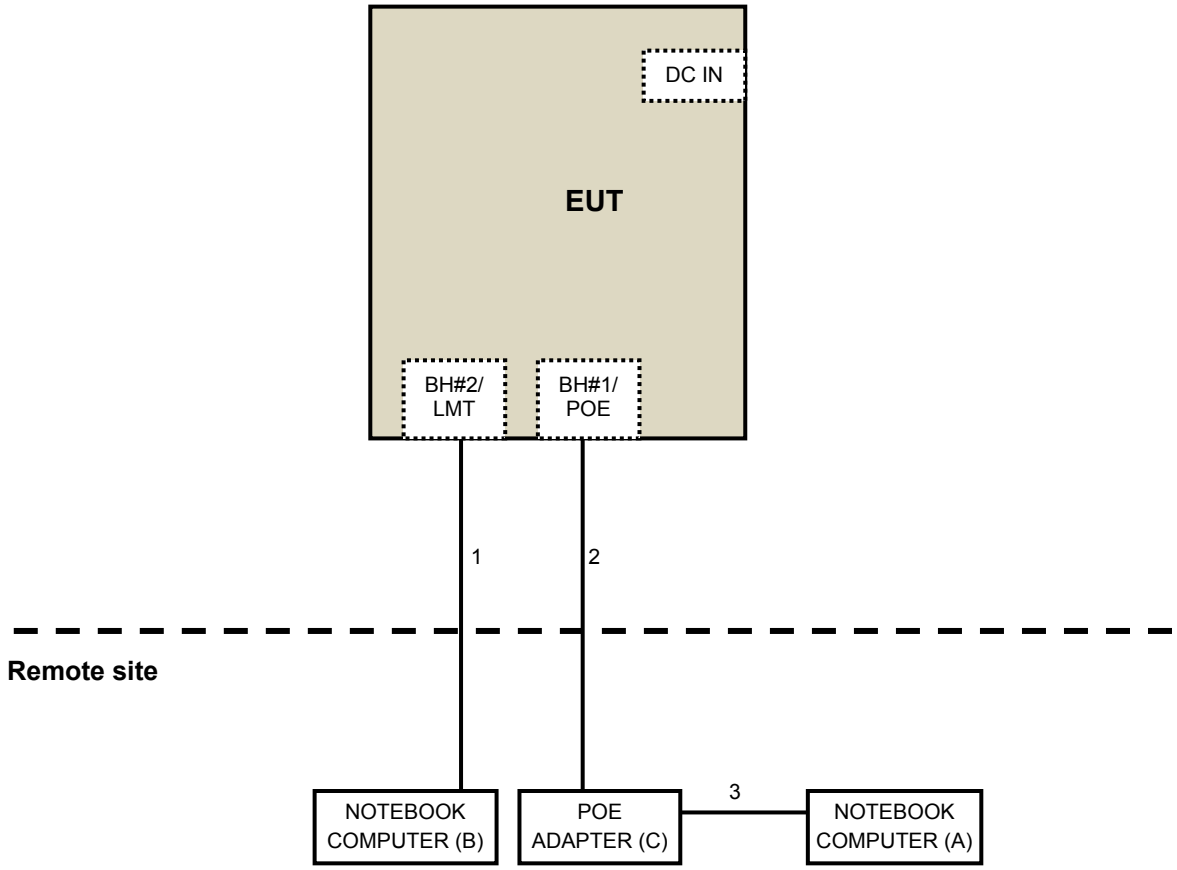
1. The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

For Adapter mode:



For POE mode:


DC IN
EUT
BH#2/
LMT
BH#1/
POE
1
2
Remote site
NOTEBOOK
COMPUTER (B)
POE
ADAPTER (C)
3
NOTEBOOK
COMPUTER (A)

3.5 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.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 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 30dB 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.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 06, 2015	Feb. 05, 2016
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
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: Apr. 14 to May 06, 2015

4.1.3 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:

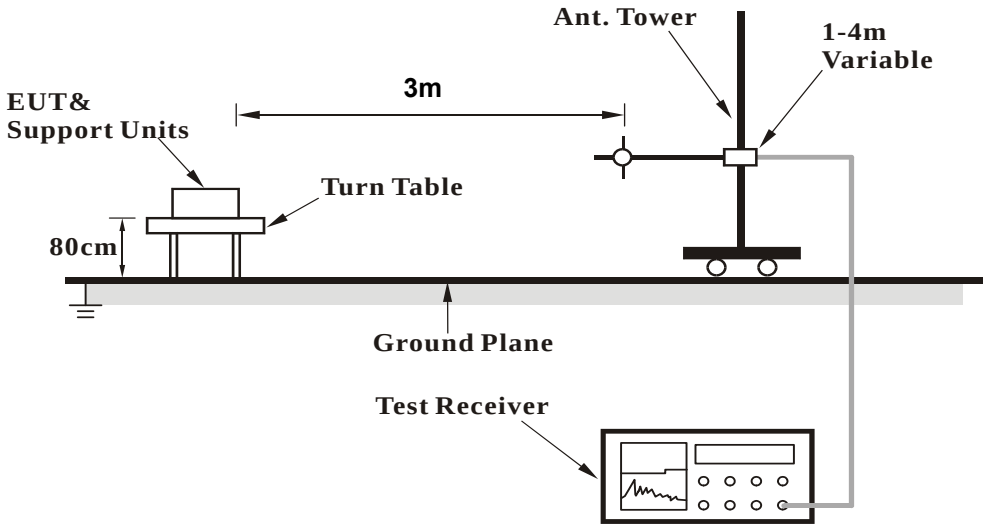
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. 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)).
5. 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.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

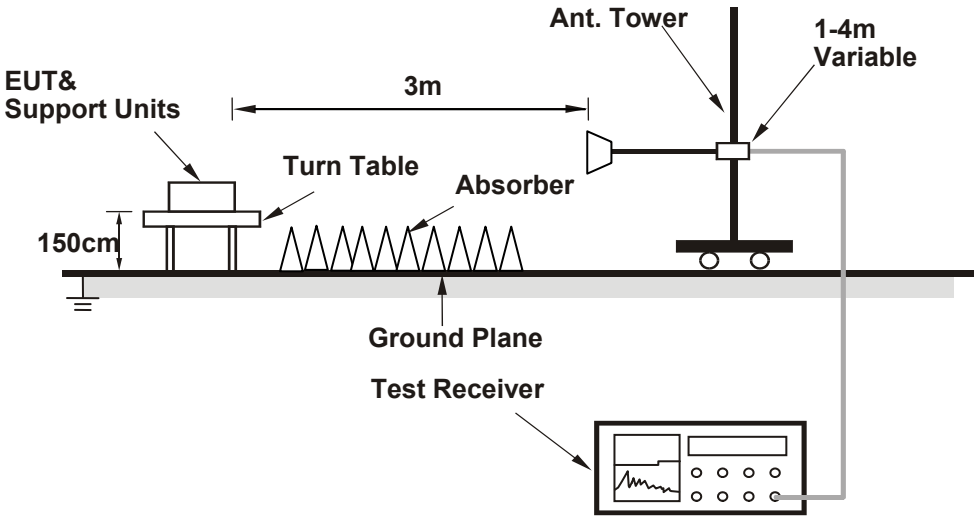
No deviation.

4.1.5 Test Set up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

1. Connect the EUT with the support units A-B (Notebook Computer) which is placed in remote site.
2. The communication partner run test program “cart.exe[art2_ver_4_9_575_5]” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results (Mode 1)

ABOVE 1GHz DATA

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	53.6 PK	74.0	-20.4	1.36 H	144	59.47	-5.87
2	2390.00	41.6 AV	54.0	-12.4	1.36 H	144	47.47	-5.87
3	*2412.00	117.4 PK			1.36 H	54	123.20	-5.80
4	*2412.00	115.4 AV			1.36 H	54	121.20	-5.80
5	4824.00	52.2 PK	74.0	-21.8	2.08 H	27	48.78	3.42
6	4824.00	47.4 AV	54.0	-6.6	2.08 H	27	43.98	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	53.5 PK	74.0	-20.5	1.00 V	80	59.37	-5.87
2	2390.00	42.3 AV	54.0	-11.7	1.00 V	80	48.17	-5.87
3	*2412.00	113.2 PK			1.57 V	53	119.00	-5.80
4	*2412.00	110.6 AV			1.57 V	53	116.40	-5.80
5	4824.00	55.9 PK	74.0	-18.1	1.80 V	22	52.48	3.42
6	4824.00	53.2 AV	54.0	-0.8	1.80 V	22	49.78	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) 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	*2437.00	112.6 PK			1.35 H	49	118.30	-5.70
2	*2437.00	110.4 AV			1.35 H	49	116.10	-5.70
3	4874.00	48.1 PK	74.0	-25.9	2.27 H	360	44.70	3.40
4	4874.00	39.7 AV	54.0	-14.3	2.27 H	360	36.30	3.40
5	7311.00	58.2 PK	74.0	-15.8	2.25 H	324	50.44	7.76
6	7311.00	52.5 AV	54.0	-1.5	2.25 H	324	44.74	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	*2437.00	108.4 PK			1.49 V	34	114.10	-5.70
2	*2437.00	105.7 AV			1.49 V	34	111.40	-5.70
3	4874.00	50.7 PK	74.0	-23.3	2.14 V	9	47.30	3.40
4	4874.00	43.8 AV	54.0	-10.2	2.14 V	9	40.40	3.40
5	7311.00	58.8 PK	74.0	-15.2	2.36 V	0	51.04	7.76
6	7311.00	53.4 AV	54.0	-0.6	2.36 V	0	45.64	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) 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	*2462.00	113.4 PK			1.34 H	47	118.99	-5.59
2	*2462.00	110.8 AV			1.34 H	47	116.39	-5.59
3	2483.50	54.1 PK	74.0	-19.9	1.32 H	138	59.59	-5.49
4	2483.50	42.1 AV	54.0	-11.9	1.32 H	138	47.59	-5.49
5	4924.00	48.3 PK	74.0	-25.7	2.25 H	360	44.91	3.39
6	4924.00	40.0 AV	54.0	-14.0	2.25 H	360	36.61	3.39
7	7386.00	58.7 PK	74.0	-15.3	2.28 H	328	50.65	8.05
8	7386.00	52.8 AV	54.0	-1.2	2.28 H	328	44.75	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	108.5 PK			1.48 V	49	114.09	-5.59
2	*2462.00	105.8 AV			1.48 V	49	111.39	-5.59
3	2483.50	53.6 PK	74.0	-20.4	1.00 V	72	59.09	-5.49
4	2483.50	42.5 AV	54.0	-11.5	1.00 V	72	47.99	-5.49
5	4924.00	49.7 PK	74.0	-24.3	2.17 V	4	46.31	3.39
6	4924.00	43.0 AV	54.0	-11.0	2.17 V	4	39.61	3.39
7	7386.00	59.9 PK	74.0	-14.1	2.37 V	2	51.85	8.05
8	7386.00	53.5 AV	54.0	-0.5	2.37 V	2	45.45	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) 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	69.4 PK	74.0	-4.6	1.36 H	59	75.27	-5.87
2	2390.00	53.7 AV	54.0	-0.3	1.36 H	59	59.57	-5.87
3	*2412.00	116.0 PK			1.36 H	58	121.80	-5.80
4	*2412.00	104.7 AV			1.36 H	58	110.50	-5.80
5	4824.00	47.8 PK	74.0	-26.2	2.31 H	360	44.38	3.42
6	4824.00	39.5 AV	54.0	-14.5	2.31 H	360	36.08	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	64.9 PK	74.0	-9.1	1.39 V	64	70.77	-5.87
2	2390.00	49.2 AV	54.0	-4.8	1.39 V	64	55.07	-5.87
3	*2412.00	113.0 PK			1.39 V	64	118.80	-5.80
4	*2412.00	101.0 AV			1.39 V	64	106.80	-5.80
5	4824.00	51.5 PK	74.0	-22.5	1.95 V	33	48.08	3.42
6	4824.00	39.6 AV	54.0	-14.4	1.95 V	33	36.18	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) 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	*2437.00	118.2 PK			1.35 H	55	123.90	-5.70
2	*2437.00	106.9 AV			1.35 H	55	112.60	-5.70
3	4874.00	48.0 PK	74.0	-26.0	2.31 H	360	44.60	3.40
4	4874.00	39.5 AV	54.0	-14.5	2.31 H	360	36.10	3.40
5	7311.00	65.6 PK	74.0	-8.4	2.08 H	327	57.84	7.76
6	7311.00	53.1 AV	54.0	-0.9	2.08 H	327	45.34	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	*2437.00	114.8 PK			1.37 V	74	120.50	-5.70
2	*2437.00	103.2 AV			1.37 V	74	108.90	-5.70
3	4874.00	51.9 PK	74.0	-22.1	1.94 V	36	48.50	3.40
4	4874.00	40.1 AV	54.0	-13.9	1.94 V	36	36.70	3.40
5	7311.00	66.6 PK	74.0	-7.4	2.03 V	360	58.84	7.76
6	7311.00	53.6 AV	54.0	-0.4	2.03 V	360	45.84	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) 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	*2462.00	115.2 PK			1.48 H	61	120.79	-5.59
2	*2462.00	104.1 AV			1.48 H	61	109.69	-5.59
3	2483.50	72.3 PK	74.0	-1.7	1.48 H	61	77.79	-5.49
4	2483.50	53.5 AV	54.0	-0.5	1.48 H	61	58.99	-5.49
5	4924.00	47.8 PK	74.0	-26.2	2.26 H	360	44.41	3.39
6	4924.00	39.6 AV	54.0	-14.4	2.26 H	360	36.21	3.39
7	7386.00	60.7 PK	74.0	-13.3	2.09 H	311	52.65	8.05
8	7386.00	49.4 AV	54.0	-4.6	2.09 H	311	41.35	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	112.6 PK			1.38 V	62	118.19	-5.59
2	*2462.00	100.8 AV			1.38 V	62	106.39	-5.59
3	2483.50	64.2 PK	74.0	-9.8	1.45 V	58	69.69	-5.49
4	2483.50	49.0 AV	54.0	-5.0	1.45 V	58	54.49	-5.49
5	4924.00	51.7 PK	74.0	-22.3	1.89 V	32	48.31	3.39
6	4924.00	39.6 AV	54.0	-14.4	1.89 V	32	36.21	3.39
7	7386.00	61.1 PK	74.0	-12.9	1.84 V	45	53.05	8.05
8	7386.00	49.9 AV	54.0	-4.1	1.84 V	45	41.85	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) 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	72.6 PK	74.0	-1.4	1.22 H	63	78.47	-5.87
2	**2390.00**	**53.8 AV**	**54.0**	**-0.2**	**1.22 H**	**63**	**59.67**	**-5.87**
3	*2412.00	115.7 PK			1.22 H	63	121.50	-5.80
4	*2412.00	104.2 AV			1.22 H	63	110.00	-5.80
5	4824.00	48.2 PK	74.0	-25.8	2.30 H	360	44.78	3.42
6	4824.00	40.1 AV	54.0	-13.9	2.30 H	360	36.68	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	64.1 PK	74.0	-9.9	1.40 V	56	69.97	-5.87
2	2390.00	48.9 AV	54.0	-5.1	1.40 V	56	54.77	-5.87
3	*2412.00	112.7 PK			1.33 V	52	118.50	-5.80
4	*2412.00	100.6 AV			1.33 V	52	106.40	-5.80
5	4824.00	52.2 PK	74.0	-21.8	1.89 V	33	48.78	3.42
6	4824.00	40.4 AV	54.0	-13.6	1.89 V	33	36.98	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) 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	*2437.00	118.8 PK			1.20 H	47	124.50	-5.70
2	*2437.00	106.5 AV			1.20 H	47	112.20	-5.70
3	4874.00	54.9 PK	74.0	-19.1	2.41 H	360	51.50	3.40
4	4874.00	40.1 AV	54.0	-13.9	2.41 H	360	36.70	3.40
5	7311.00	67.2 PK	74.0	-6.8	2.29 H	323	59.44	7.76
6	7311.00	53.2 AV	54.0	-0.8	2.29 H	323	45.44	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	*2437.00	115.2 PK			1.44 V	71	120.90	-5.70
2	*2437.00	103.1 AV			1.44 V	71	108.80	-5.70
3	4874.00	52.5 PK	74.0	-21.5	1.95 V	45	49.10	3.40
4	4874.00	40.6 AV	54.0	-13.4	1.95 V	45	37.20	3.40
5	7311.00	65.6 PK	74.0	-8.4	2.16 V	360	57.84	7.76
6	7311.00	53.7 AV	54.0	-0.3	2.16 V	360	45.94	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) 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	*2462.00	114.7 PK			1.21 H	41	120.29	-5.59
2	*2462.00	103.8 AV			1.21 H	41	109.39	-5.59
3	2483.50	73.7 PK	74.0	-0.3	1.21 H	41	79.19	-5.49
4	2483.50	53.4 AV	54.0	-0.6	1.21 H	41	58.89	-5.49
5	4924.00	48.1 PK	74.0	-25.9	2.28 H	360	44.71	3.39
6	4924.00	39.9 AV	54.0	-14.1	2.28 H	360	36.51	3.39
7	7386.00	60.6 PK	74.0	-13.4	2.08 H	307	52.55	8.05
8	7386.00	49.4 AV	54.0	-4.6	2.08 H	307	41.35	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	112.5 PK			1.37 V	53	118.09	-5.59
2	*2462.00	100.8 AV			1.37 V	53	106.39	-5.59
3	2483.50	63.7 PK	74.0	-10.3	1.46 V	41	69.19	-5.49
4	2483.50	48.6 AV	54.0	-5.4	1.46 V	41	54.09	-5.49
5	4924.00	52.4 PK	74.0	-21.6	1.93 V	37	49.01	3.39
6	4924.00	40.5 AV	54.0	-13.5	1.93 V	37	37.11	3.39
7	7386.00	60.8 PK	74.0	-13.2	1.81 V	53	52.75	8.05
8	7386.00	49.7 AV	54.0	-4.3	1.81 V	53	41.65	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) 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	69.8 PK	74.0	-4.2	1.33 H	57	75.67	-5.87
2	2390.00	53.6 AV	54.0	-0.4	1.33 H	57	59.47	-5.87
3	*2422.00	109.4 PK			1.33 H	57	115.16	-5.76
4	*2422.00	97.5 AV			1.33 H	57	103.26	-5.76
5	4844.00	48.0 PK	74.0	-26.0	2.24 H	360	44.59	3.41
6	4844.00	39.7 AV	54.0	-14.3	2.24 H	360	36.29	3.41
7	7266.00	56.8 PK	74.0	-17.2	2.00 H	313	49.22	7.58
8	7266.00	43.2 AV	54.0	-10.8	2.00 H	313	35.62	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	64.3 PK	74.0	-9.7	1.45 V	57	70.17	-5.87
2	2390.00	49.1 AV	54.0	-4.9	1.45 V	57	54.97	-5.87
3	*2422.00	105.9 PK			1.34 V	54	111.66	-5.76
4	*2422.00	93.8 AV			1.34 V	54	99.56	-5.76
5	4844.00	52.5 PK	74.0	-21.5	1.93 V	38	49.09	3.41
6	4844.00	40.5 AV	54.0	-13.5	1.93 V	38	37.09	3.41
7	7266.00	57.2 PK	74.0	-16.8	1.78 V	52	49.62	7.58
8	7266.00	43.4 AV	54.0	-10.6	1.78 V	52	35.82	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) 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	70.7 PK	74.0	-3.3	1.35 H	55	76.57	-5.87
2	2390.00	51.6 AV	54.0	-2.4	1.35 H	55	57.47	-5.87
3	*2437.00	113.7 PK			1.35 H	55	119.40	-5.70
4	*2437.00	102.2 AV			1.35 H	55	107.90	-5.70
5	2483.50	72.2 PK	74.0	-1.8	1.35 H	55	77.69	-5.49
6	2483.50	53.6 AV	54.0	-0.4	1.35 H	55	59.09	-5.49
7	4874.00	48.1 PK	74.0	-25.9	2.30 H	360	44.70	3.40
8	4874.00	39.4 AV	54.0	-14.6	2.30 H	360	36.00	3.40
9	7311.00	57.9 PK	74.0	-16.1	2.00 H	314	50.14	7.76
10	7311.00	44.0 AV	54.0	-10.0	2.00 H	314	36.24	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	62.6 PK	74.0	-11.4	1.39 V	32	68.47	-5.87
2	2390.00	48.1 AV	54.0	-5.9	1.39 V	32	53.97	-5.87
3	*2437.00	110.1 PK			1.38 V	53	115.80	-5.70
4	*2437.00	98.1 AV			1.38 V	53	103.80	-5.70
5	2483.50	63.9 PK	74.0	-10.1	1.43 V	69	69.39	-5.49
6	2483.50	49.0 AV	54.0	-5.0	1.43 V	69	54.49	-5.49
7	4874.00	51.4 PK	74.0	-22.6	1.93 V	46	48.00	3.40
8	4874.00	39.9 AV	54.0	-14.1	1.93 V	46	36.50	3.40
9	7311.00	58.4 PK	74.0	-15.6	1.78 V	50	50.64	7.76
10	7311.00	44.3 AV	54.0	-9.7	1.78 V	50	36.54	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 9	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	*2452.00	110.8 PK			1.34 H	65	116.44	-5.64
2	*2452.00	98.7 AV			1.34 H	65	104.34	-5.64
3	2483.50	73.2 PK	74.0	-0.8	1.34 H	65	78.69	-5.49
4	2483.50	53.5 AV	54.0	-0.5	1.34 H	65	58.99	-5.49
5	4904.00	48.4 PK	74.0	-25.6	2.31 H	360	45.01	3.39
6	4904.00	39.7 AV	54.0	-14.3	2.31 H	360	36.31	3.39
7	7356.00	56.8 PK	74.0	-17.2	1.99 H	323	48.86	7.94
8	7356.00	43.1 AV	54.0	-10.9	1.99 H	323	35.16	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	107.2 PK			1.44 V	78	112.84	-5.64
2	*2452.00	95.1 AV			1.44 V	78	100.74	-5.64
3	2483.50	64.0 PK	74.0	-10.0	1.50 V	28	69.49	-5.49
4	2483.50	48.8 AV	54.0	-5.2	1.50 V	28	54.29	-5.49
5	4904.00	51.9 PK	74.0	-22.1	1.94 V	47	48.51	3.39
6	4904.00	40.0 AV	54.0	-14.0	1.94 V	47	36.61	3.39
7	7356.00	57.4 PK	74.0	-16.6	1.78 V	59	49.46	7.94
8	7356.00	43.8 AV	54.0	-10.2	1.78 V	59	35.86	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.

BELOW 1GHz WORST-CASE DATA

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	108.38	28.9 QP	43.5	-14.6	1.50 H	72	45.07	-16.20
2	125.01	27.9 QP	43.5	-15.6	1.50 H	72	42.56	-14.62
3	250.00	24.4 QP	46.0	-21.6	1.00 H	72	38.30	-13.87
4	325.03	30.2 QP	46.0	-15.8	1.00 H	99	41.15	-10.93
5	608.02	35.5 QP	46.0	-10.5	1.50 H	326	40.00	-4.48
6	614.43	34.1 QP	46.0	-11.9	1.50 H	328	38.50	-4.39
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	37.61	35.1 QP	40.0	-4.9	1.00 V	156	49.12	-13.98
2	73.31	25.9 QP	40.0	-14.2	1.50 V	360	41.94	-16.09
3	125.01	26.3 QP	43.5	-17.2	1.50 V	0	40.95	-14.62
4	150.04	28.1 QP	43.5	-15.4	1.50 V	360	40.90	-12.82
5	608.02	34.0 QP	46.0	-12.0	1.00 V	328	38.51	-4.48
6	960.94	38.6 QP	54.0	-15.4	1.50 V	358	37.41	1.21

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

4.1.8 Test Results (Mode 2)

BELOW 1GHz WORST-CASE DATA

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	61.33	27.8 QP	40.0	-12.2	2.00 H	51	42.00	-14.20
2	174.63	35.1 QP	43.5	-8.4	1.50 H	65	48.94	-13.84
3	300.10	35.5 QP	46.0	-10.5	1.00 H	215	47.37	-11.90
4	450.01	28.5 QP	46.0	-17.5	1.00 H	65	36.59	-8.12
5	600.02	34.6 QP	46.0	-11.4	1.50 H	343	39.32	-4.69
6	921.62	42.5 QP	46.0	-3.5	1.50 H	58	41.63	0.86
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	49.06	34.7 QP	40.0	-5.3	1.00 V	149	47.99	-13.25
2	62.25	33.6 QP	40.0	-6.4	1.00 V	131	48.01	-14.41
3	174.39	33.4 QP	43.5	-10.1	1.00 V	88	47.17	-13.81
4	310.33	33.8 QP	46.0	-12.2	1.50 V	360	45.31	-11.49
5	600.02	34.4 QP	46.0	-11.6	1.00 V	35	39.09	-4.69
6	921.62	40.4 QP	46.0	-5.6	2.00 V	1	39.50	0.86

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	847124/029	Oct. 22, 2014	Oct. 21, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: May 07, 2015

4.2.3 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. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

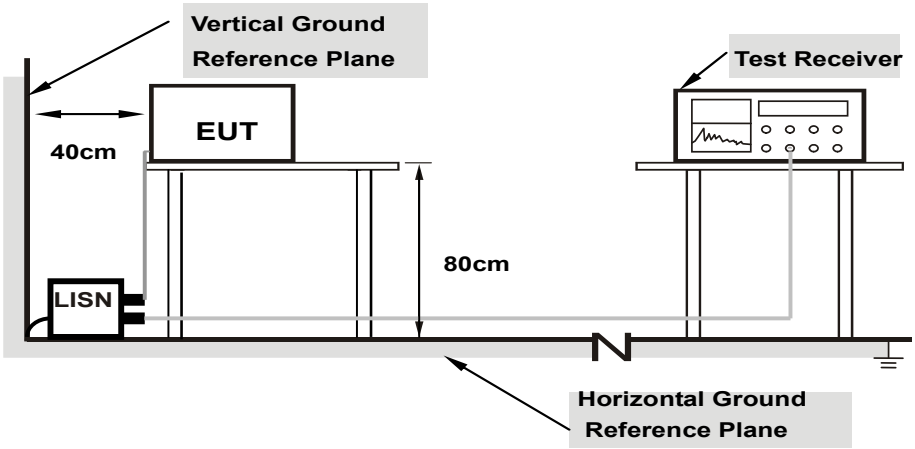
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

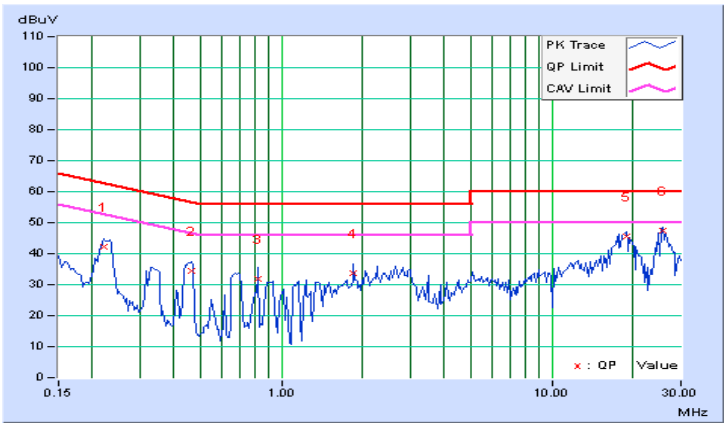
4.2.7 Test Results (Mode 1)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22031	0.09	42.18	31.02	42.27	31.11	62.81	52.81	-20.54	-21.70
2	0.46641	0.10	34.52	23.95	34.62	24.05	56.58	46.58	-21.95	-22.52
3	0.81797	0.12	31.78	31.42	31.90	31.54	56.00	46.00	-24.10	-14.46
4	1.83984	0.16	33.52	30.93	33.68	31.09	56.00	46.00	-22.32	-14.91
5	18.82422	0.67	44.88	44.34	45.55	45.01	60.00	50.00	-14.45	-4.99
6	25.77734	0.83	46.57	45.58	47.40	46.41	60.00	50.00	-12.60	-3.59

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

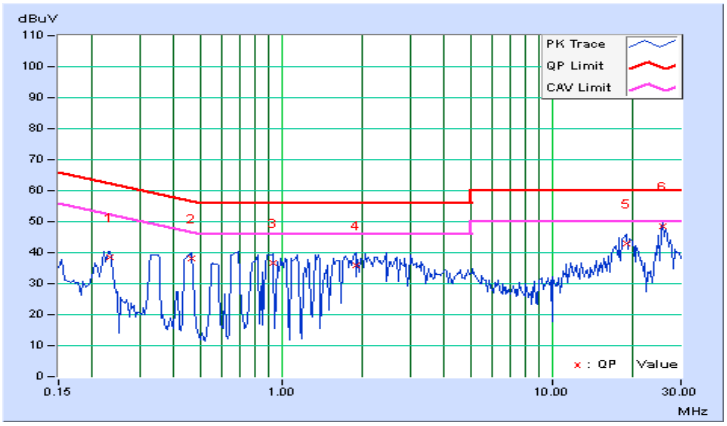


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23203	0.08	38.42	30.11	38.50	30.19	62.38	52.38	-23.87	-22.18
2	0.46250	0.10	37.89	30.26	37.99	30.36	56.65	46.65	-18.65	-16.28
3	0.93125	0.13	36.52	22.75	36.65	22.88	56.00	46.00	-19.35	-23.12
4	1.87891	0.17	35.85	20.89	36.02	21.06	56.00	46.00	-19.98	-24.94
5	18.83984	0.71	42.32	42.25	43.03	42.96	60.00	50.00	-16.97	-7.04
6	**25.79688**	**0.88**	**47.82**	**46.22**	**48.70**	**47.10**	**60.00**	**50.00**	**-11.30**	**-2.90**

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



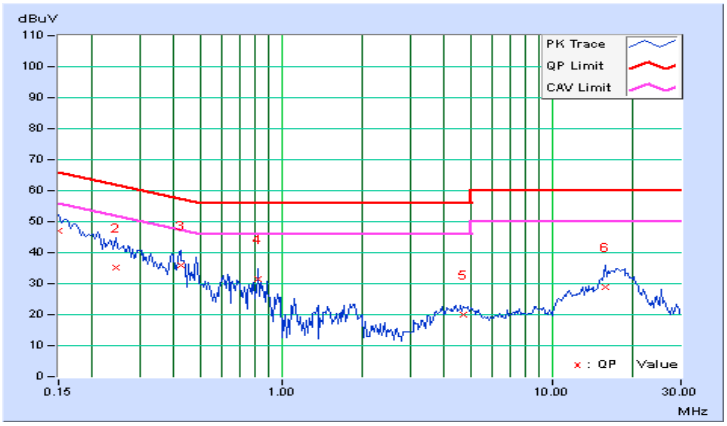
4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.08	47.11	37.16	47.19	37.24	66.00	56.00	-18.81	-18.76
2	0.24375	0.09	35.18	25.35	35.27	25.44	61.97	51.97	-26.70	-26.53
3	0.42344	0.10	35.71	29.00	35.81	29.10	57.38	47.38	-21.57	-18.28
4	0.81797	0.12	31.38	20.09	31.50	20.21	56.00	46.00	-24.50	-25.79
5	4.69922	0.25	19.72	14.17	19.97	14.42	56.00	46.00	-36.03	-31.58
6	15.74609	0.59	28.48	23.09	29.07	23.68	60.00	50.00	-30.93	-26.32

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

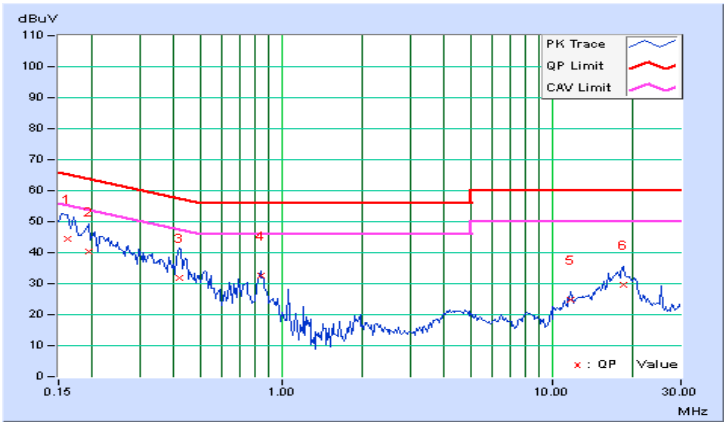


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.08	44.37	29.49	44.45	29.57	65.38	55.38	-20.93	-25.81
2	0.19297	0.08	40.22	24.39	40.30	24.47	63.91	53.91	-23.61	-29.44
3	0.41953	0.10	31.59	24.33	31.69	24.43	57.46	47.46	-25.77	-23.03
4	0.83750	0.12	32.65	23.35	32.77	23.47	56.00	46.00	-23.23	-22.53
5	11.80078	0.51	24.14	19.25	24.65	19.76	60.00	50.00	-35.35	-30.24
6	18.51563	0.70	28.81	23.67	29.51	24.37	60.00	50.00	-30.49	-25.63

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

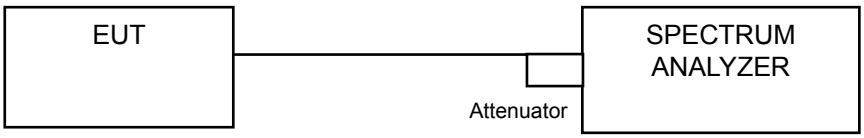


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

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

NOTE:
1. The test was performed in Oven room B.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Apr. 17, 2015

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Detector = peak.
e. Sweep = auto couple.
f. 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

4.3.5 Deviation fromTest Standard

No deviation.

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 Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	6.11	6.11	0.5	PASS
6	2437	6.08	6.10	0.5	PASS
11	2462	6.07	6.53	0.5	PASS

802.11g

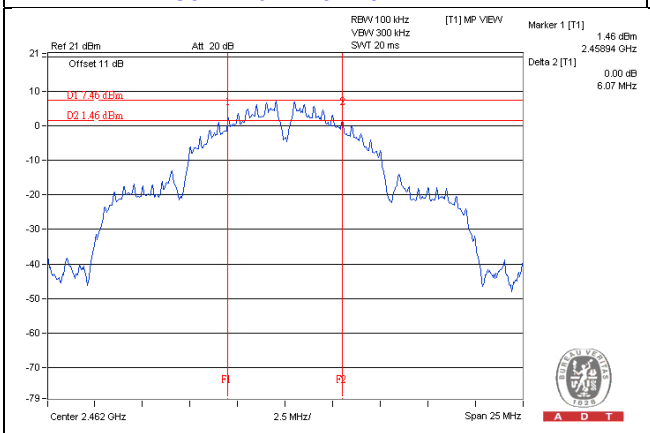
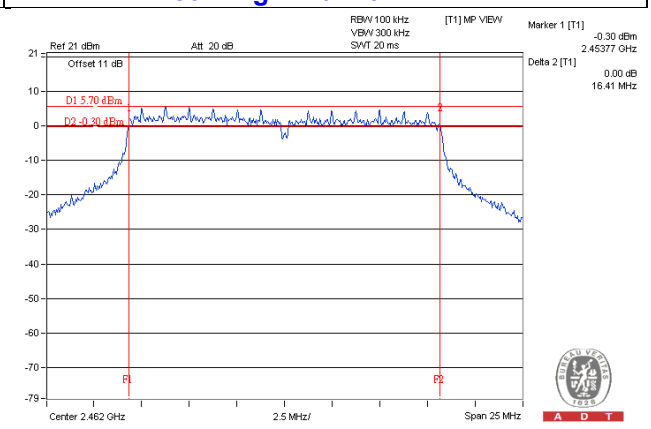
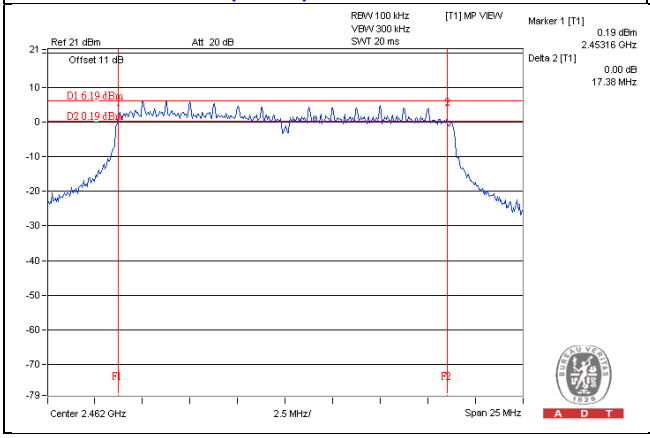
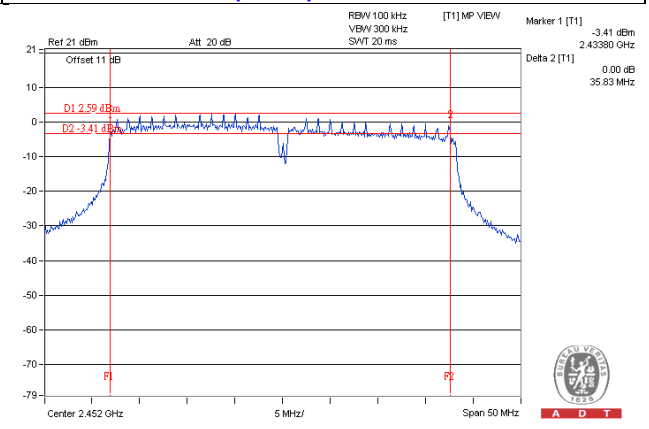
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.43	16.43	0.5	PASS
6	2437	16.43	16.41	0.5	PASS
11	2462	16.41	16.41	0.5	PASS

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.63	17.62	0.5	PASS
6	2437	17.63	17.63	0.5	PASS
11	2462	17.64	17.38	0.5	PASS

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.43	36.45	0.5	PASS
6	2437	36.44	36.24	0.5	PASS
9	2452	36.41	35.83	0.5	PASS

Spectrum Plot of Worst Value	
802.11b: Chain 0 / CH 11	**802.11g: Chain 0 / CH 11**
	
802.11n(HT20): Chain 1 / CH 11	**802.11n(HT40): Chain 1 / CH 9**
	

4.4 Conducted Output Power

4.4.1 Limits of Conducted Output Power Measurement

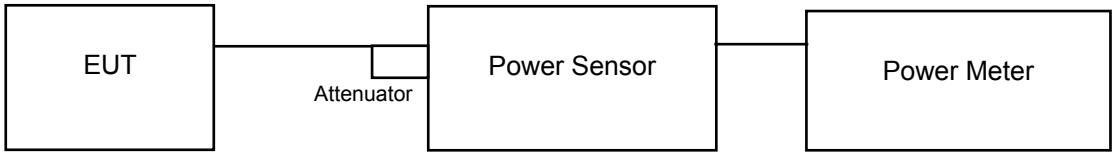
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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 Setup



4.4.3 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 test was performed in Oven room B.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Apr. 17, 2015

4.4.4 Test Procedures

A average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power senso and set the detector to AVERAGE. Record the power level.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.59	20.39	200.387	23.02	30	Pass
6	2437	15.23	15.60	69.651	18.43	30	Pass
11	2462	15.19	15.02	64.806	18.12	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.62	17.85	118.764	20.75	30	Pass
6	2437	19.96	20.57	213.108	23.29	30	Pass
11	2462	18.48	18.18	136.235	21.34	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.60	18.96	151.149	21.79	29.84	Pass
6	2437	20.00	20.40	209.648	23.21	29.84	Pass
11	2462	18.32	18.19	133.837	21.27	29.84	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power limit shall be reduced to 30-(6.16-6) = 29.84dBm.

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	14.20	14.57	54.945	17.40	29.84	Pass
6	2437	18.56	18.37	140.486	21.48	29.84	Pass
9	2452	17.00	16.65	96.357	19.84	29.84	Pass

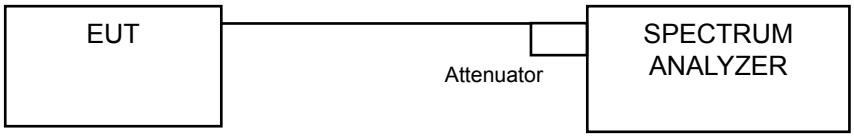
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power limit shall be reduced to 30-(6.16-6) = 29.84dBm.

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 Setup



4.5.3 Test Instruments

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

NOTE:
1. The test was performed in Oven room B.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Apr. 17, 2015

4.5.4 Test Procedure

For AVG. power (duty cycle ≥ 98%)

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

For AVG. power (duty cycle < 98%)

a) Measure the duty cycle (x) of the transmitter output signal as described in 6.0.
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz..
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-7.45	3.01	-4.44	7.84	Pass
	6	2437	-11.93	3.01	-8.92	7.84	Pass
	11	2462	-11.64	3.01	-8.63	7.84	Pass
1	1	2412	-7.06	3.01	-4.05	7.84	Pass
	6	2437	-10.80	3.01	-7.79	7.84	Pass
	11	2462	-11.61	3.01	-8.60	7.84	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-10.36	3.01	-7.35	7.84	Pass
	6	2437	-10.05	3.01	-7.04	7.84	Pass
	11	2462	-11.54	3.01	-8.53	7.84	Pass
1	1	2412	-11.08	3.01	-8.07	7.84	Pass
	6	2437	-8.61	3.01	-5.60	7.84	Pass
	11	2462	-12.63	3.01	-9.62	7.84	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-13.01	3.01	-10.00	7.84	Pass
	6	2437	-11.79	3.01	-8.78	7.84	Pass
	11	2462	-10.91	3.01	-7.90	7.84	Pass
1	1	2412	-11.40	3.01	-8.39	7.84	Pass
	6	2437	-8.31	3.01	-5.30	7.84	Pass
	11	2462	-8.21	3.01	-5.20	7.84	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD w/o Duty Factor (dBm)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-10.98	3.01	0.26	-7.71	7.84	PASS
	6	2437	-14.85	3.01	0.26	-11.58	7.84	PASS
	9	2452	-16.11	3.01	0.26	-12.84	7.84	PASS
1	3	2422	-18.48	3.01	0.26	-15.21	7.84	PASS
	6	2437	-12.88	3.01	0.26	-9.61	7.84	PASS
	9	2452	-14.20	3.01	0.26	-10.93	7.84	PASS

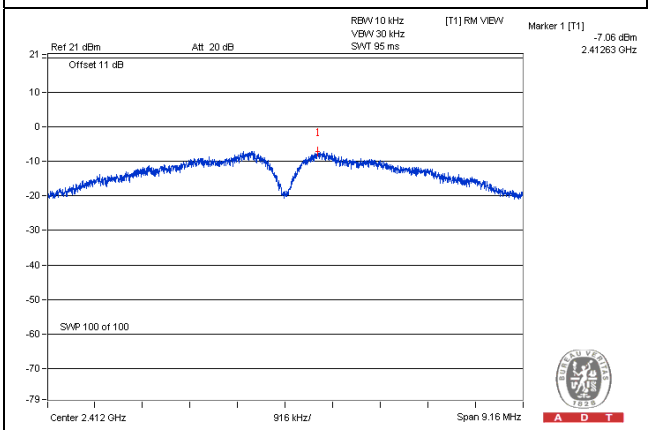
NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.16dBi > 6dBi , so the power density limit shall be reduced to 8-(6.16-6) = 7.84dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

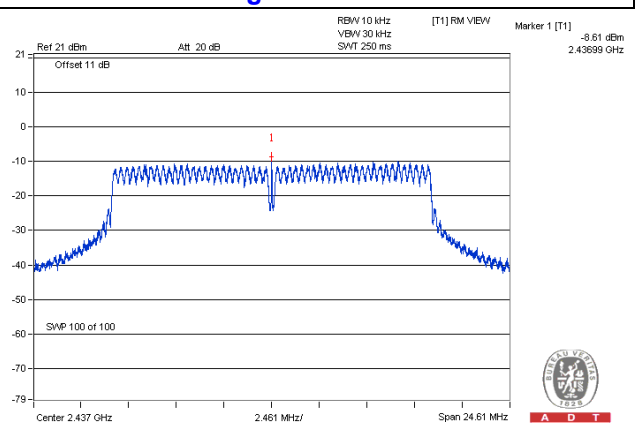
.

Spectrum Plot of Worst Value

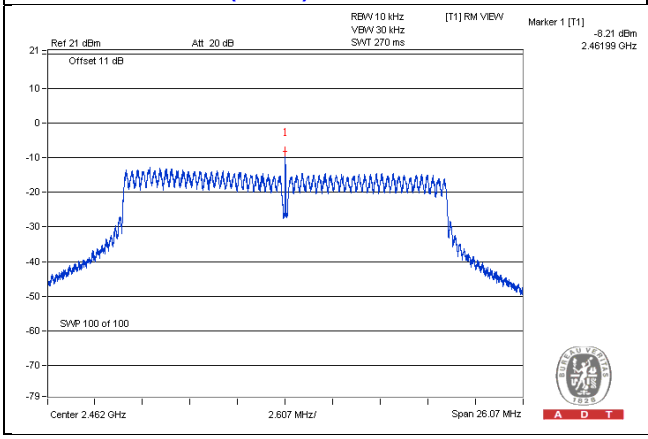
802.11b: Chain 1 / CH 1



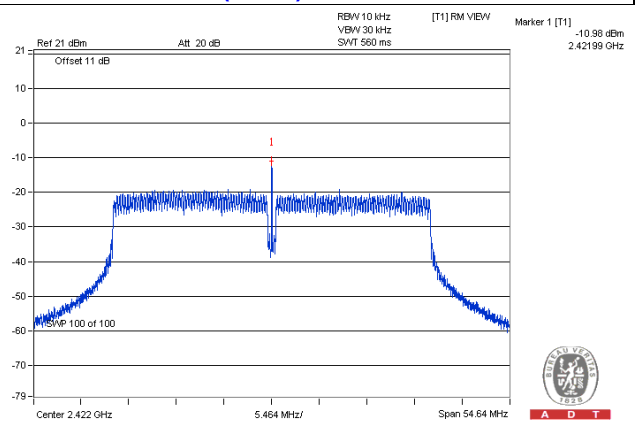
802.11g: Chain 1 / CH 6



802.11n(HT20): Chain 1 / CH 11



802.11n(HT40): Chain 0 / CH 3

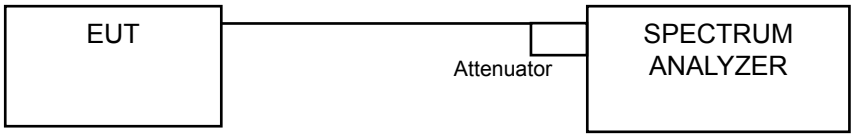


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

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

NOTE:
1. The test was performed in Oven room B.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Apr. 17, 2015

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Ensure that the number of measurement points ≥ span/RBW
4. According to measurement points to set differ measurement span.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

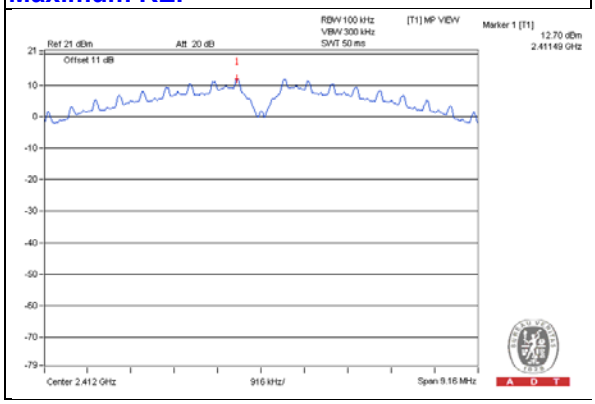
Same as Item 4.3.6

4.6.7 Test Results (Overall Spurious Emission Test)

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

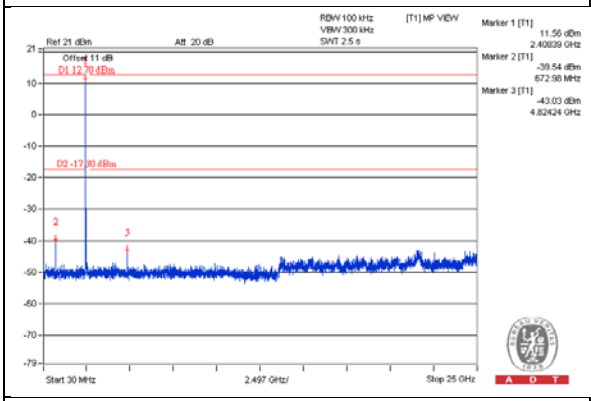
802.11b

Maximum REF

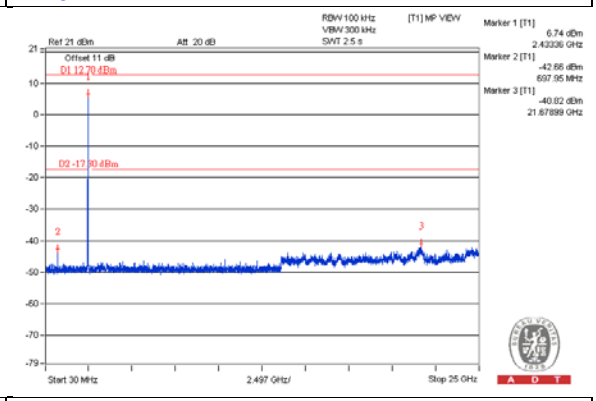


Chain 0

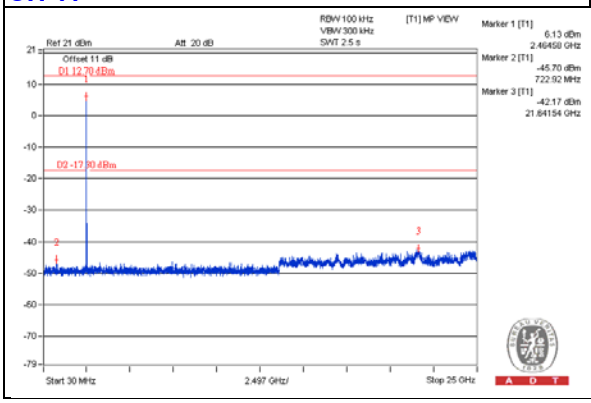
CH 1



CH 6

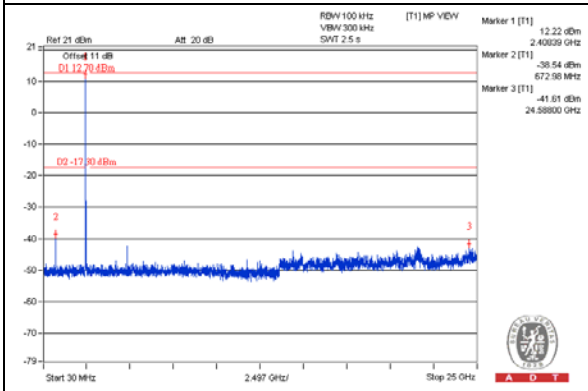


CH 11

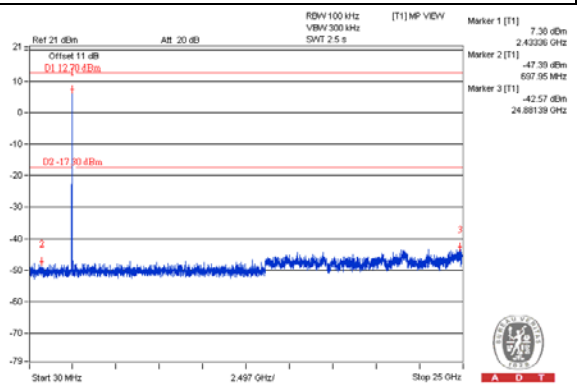


Chain 1

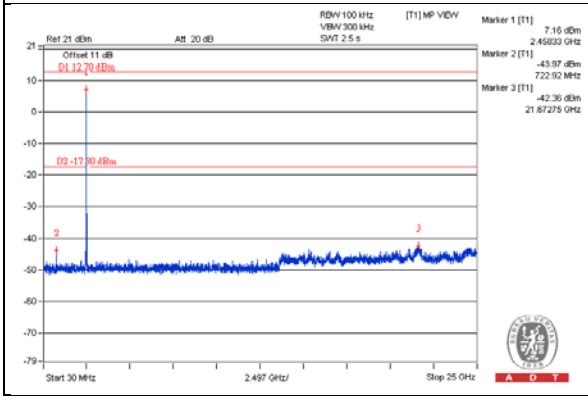
CH 1



CH 6

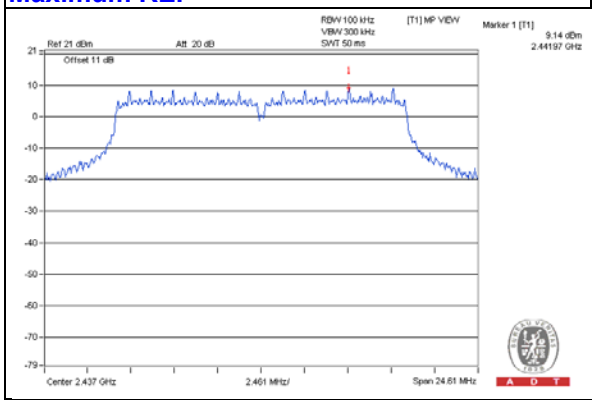


CH 11



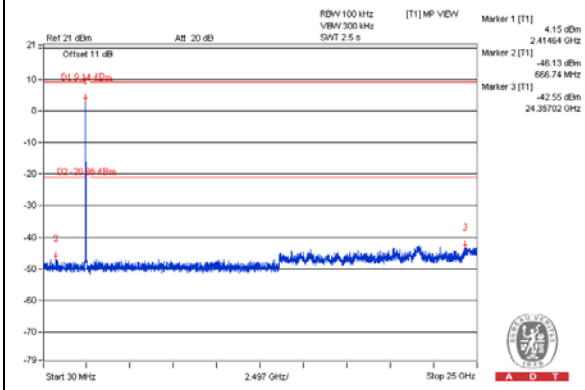
802.11g

Maximum REF

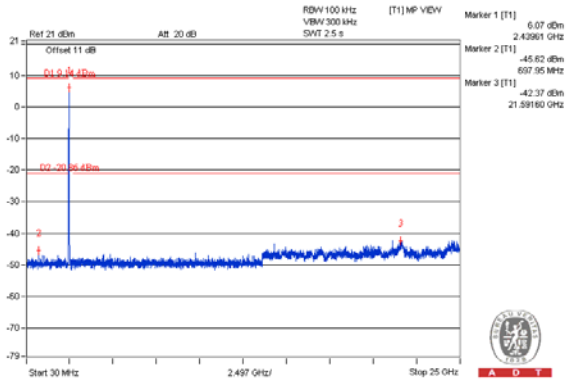


Chain 0

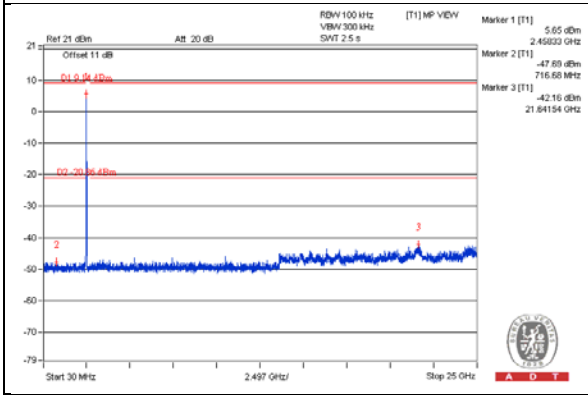
CH 1



CH 6

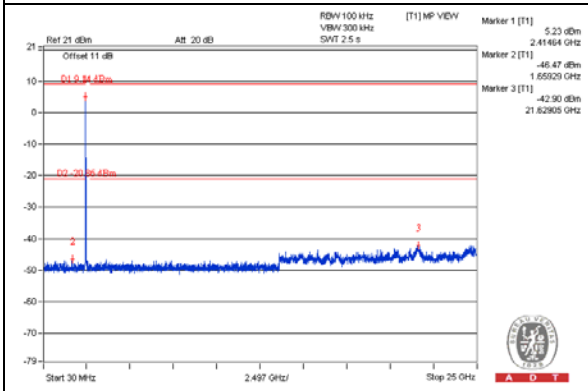


CH 11

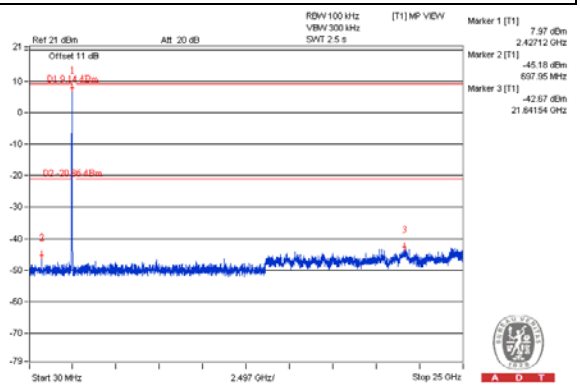


Chain 1

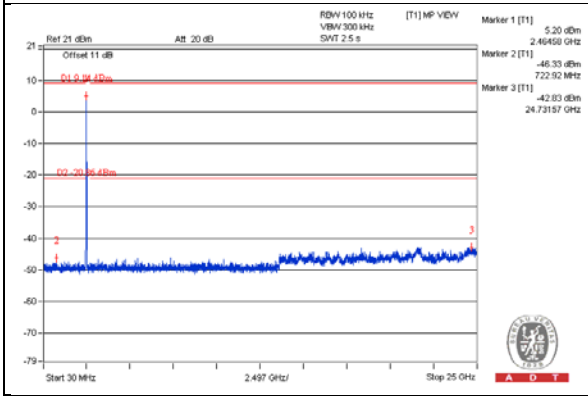
CH 1



CH 6

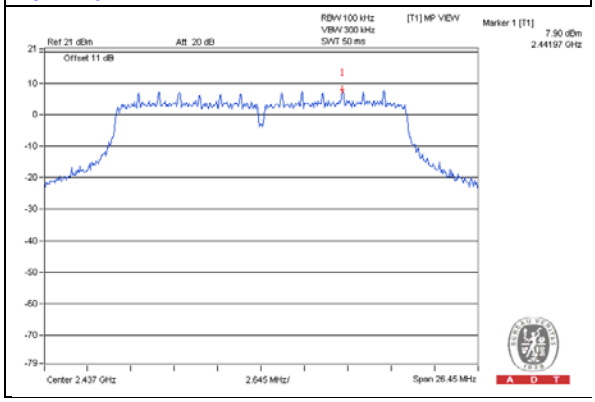


CH 11



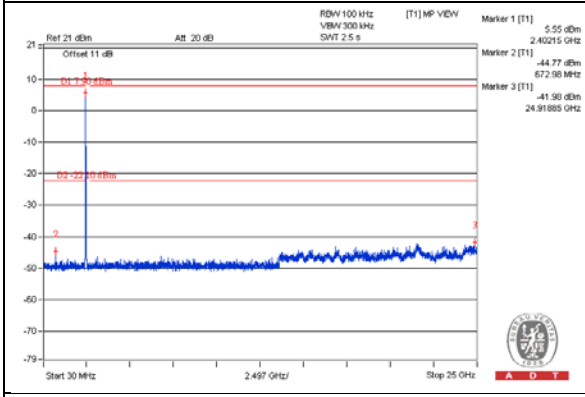
802.11n (HT20)

Maximum REF

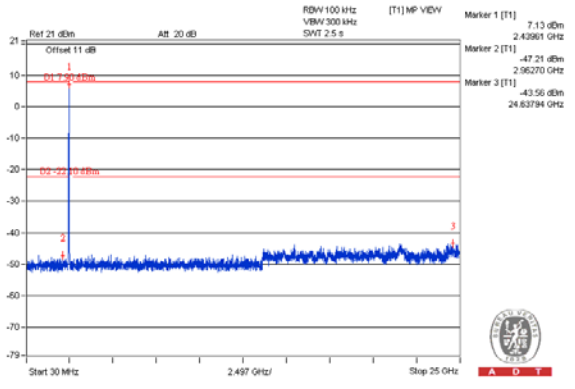


Chain 0

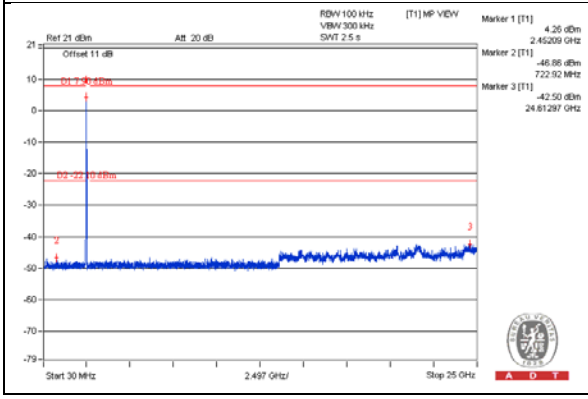
CH 1



CH 6

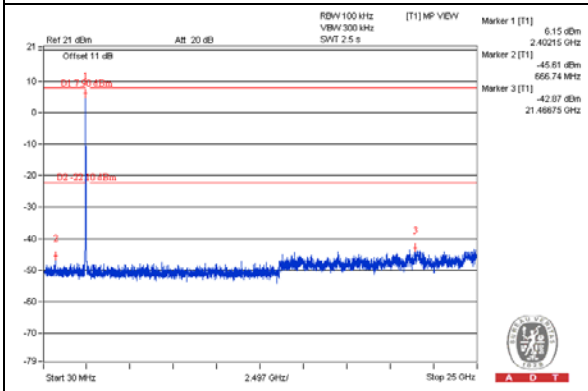


CH 11

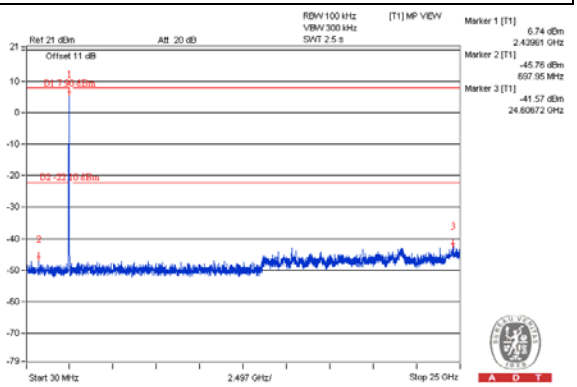


Chain 1

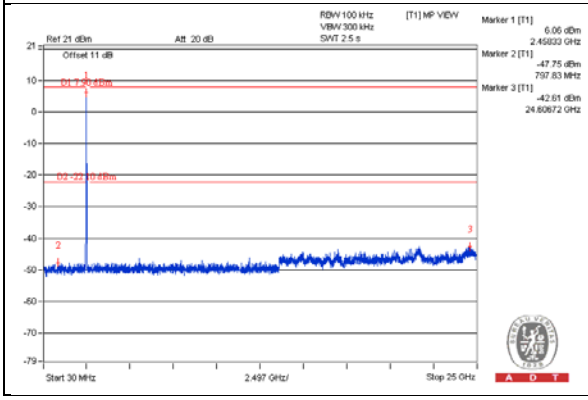
CH 1



CH 6

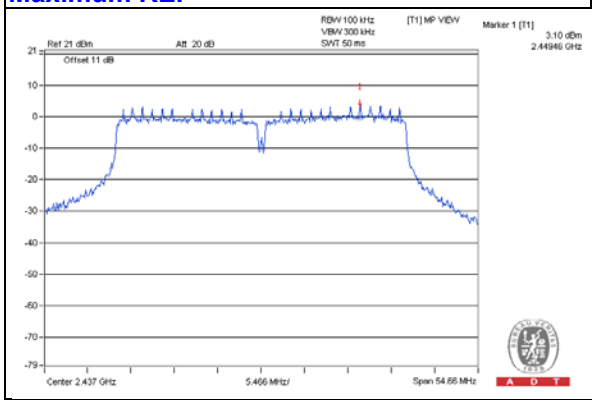


CH 11



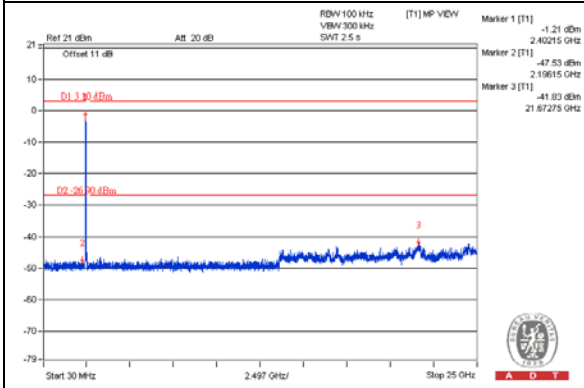
802.11n (HT40)

Maximum REF

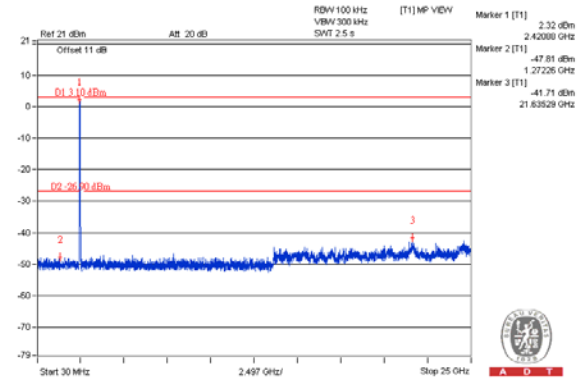


Chain 0

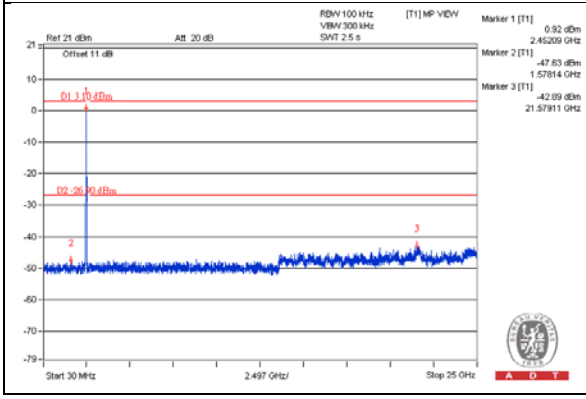
CH 3



CH 6

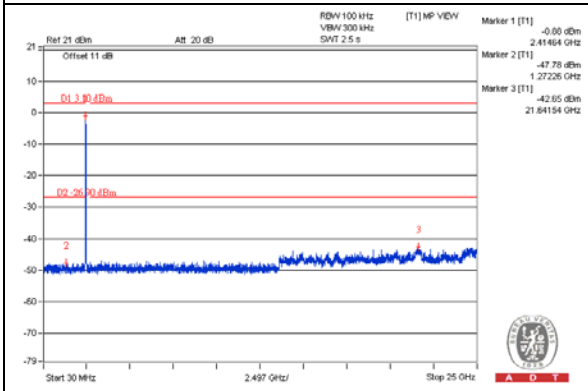


CH 9

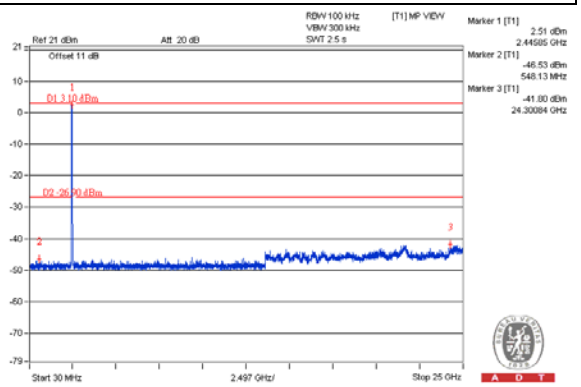


Chain 1

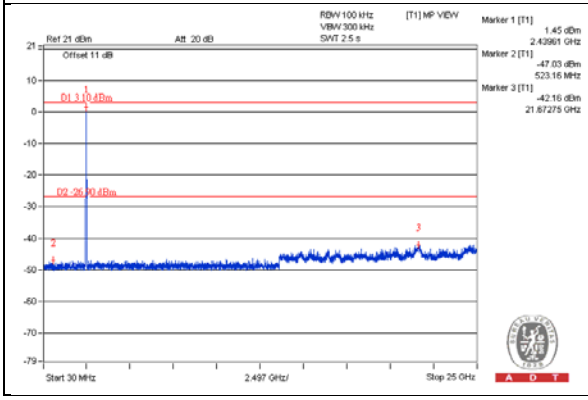
CH 3



CH 6



CH 9



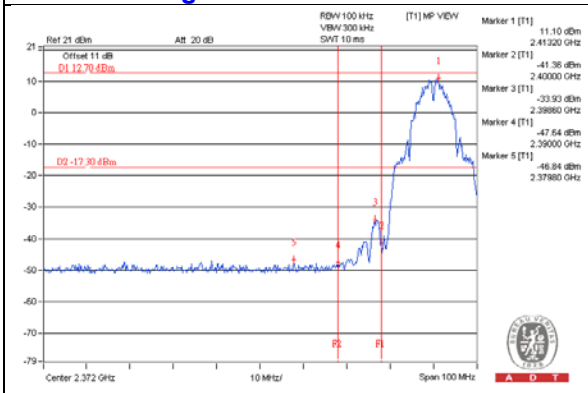
4.6.8 Test Results (Band Edge Test)

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

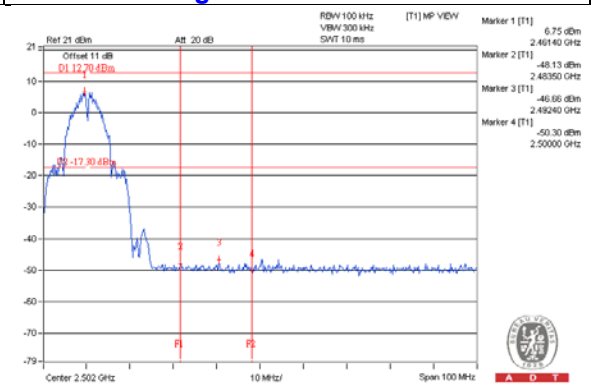
802.11b

Chain 0

CH 1 Band edge

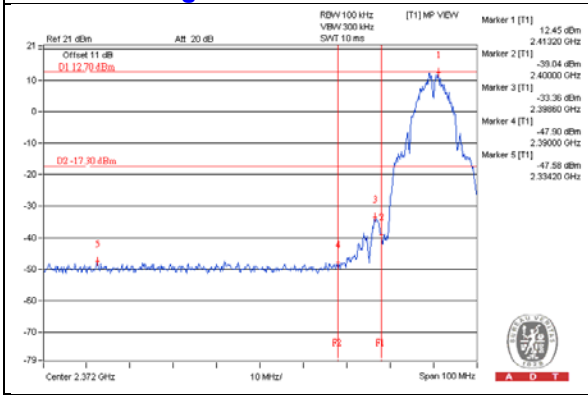


CH 11 Band edge

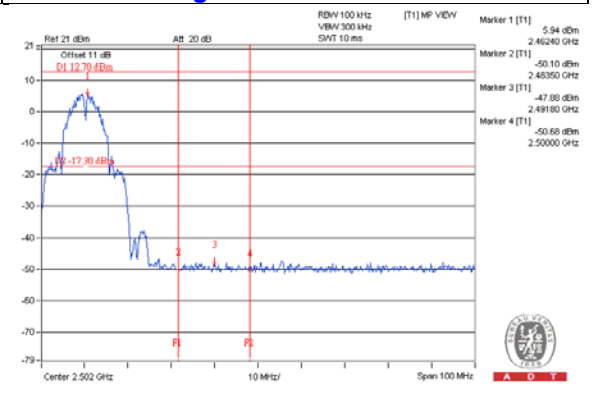


Chain 1

CH 1 Band edge

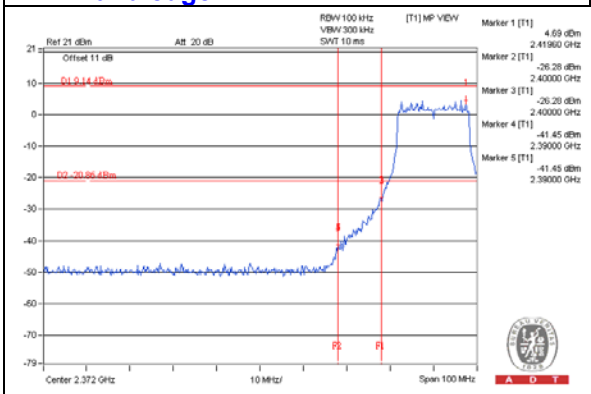
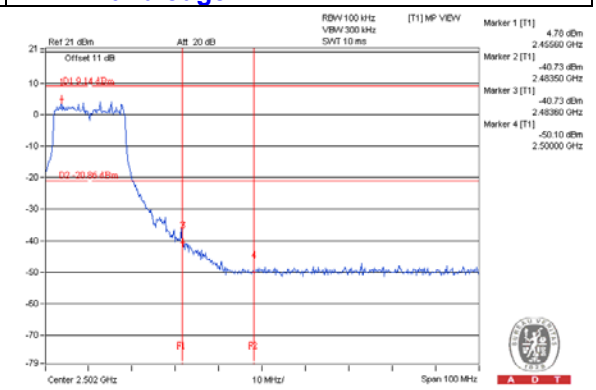


CH 11 Band edge

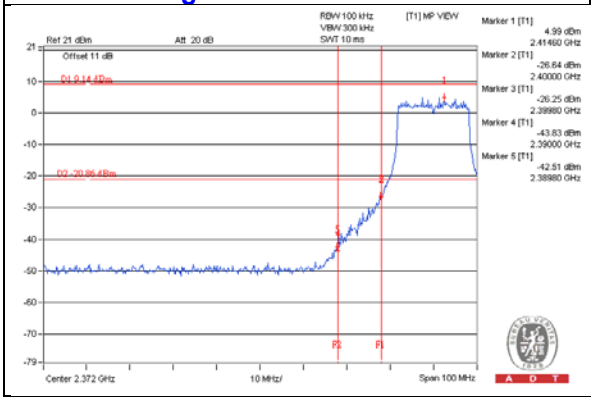
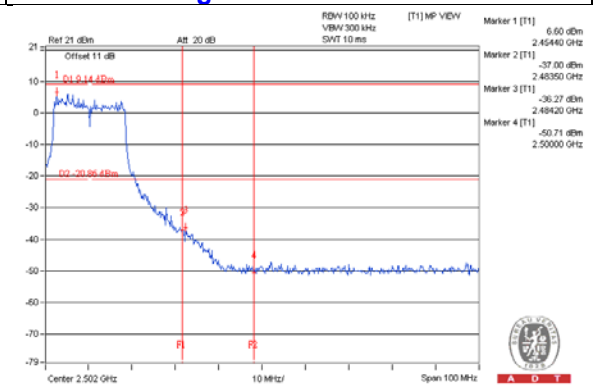


802.11g

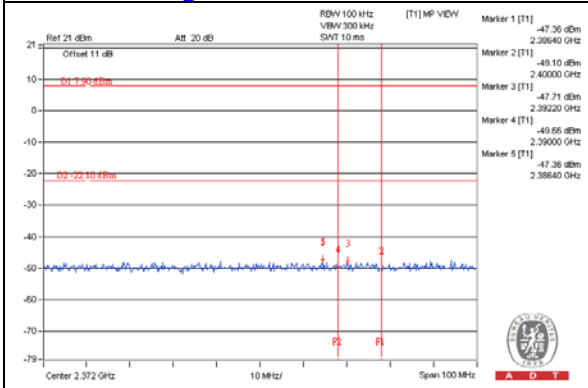
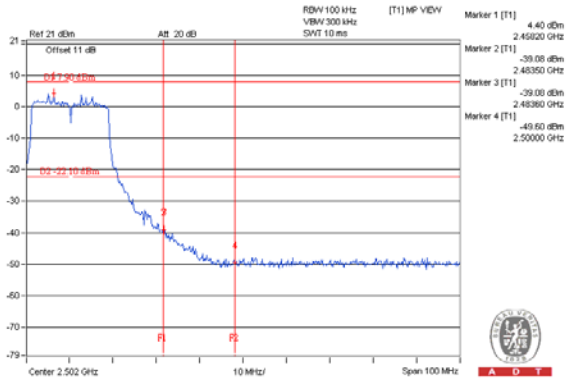
Chain 0

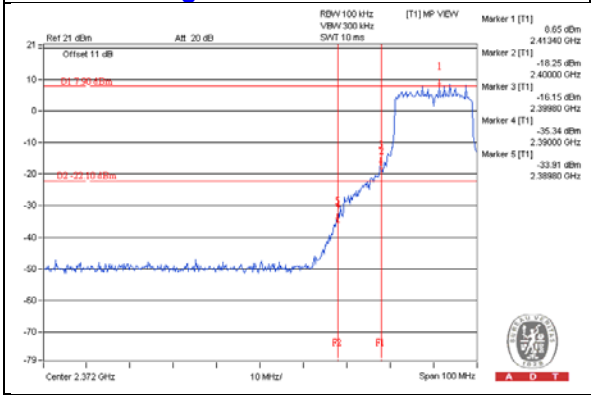
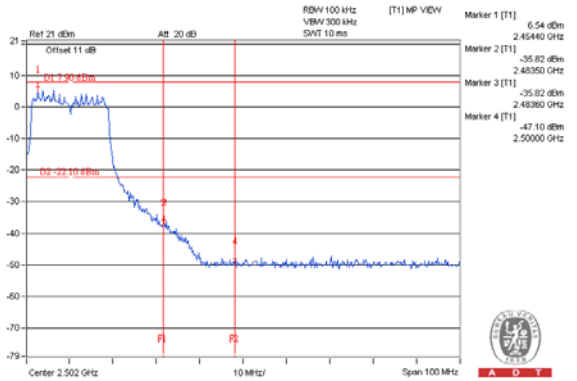
CH 1 Band edge	CH 11 Band edge
	

Chain 1

CH 1 Band edge	CH 11 Band edge
	

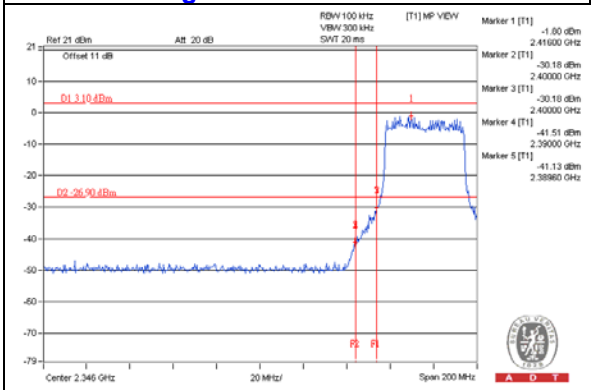
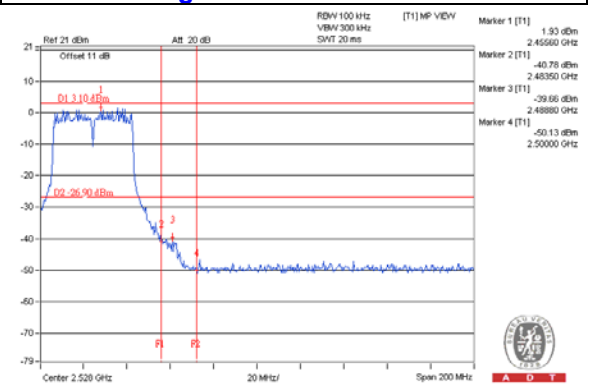
802.11n (HT20)

Chain 0	
CH 1 Band edge	CH 11 Band edge
	

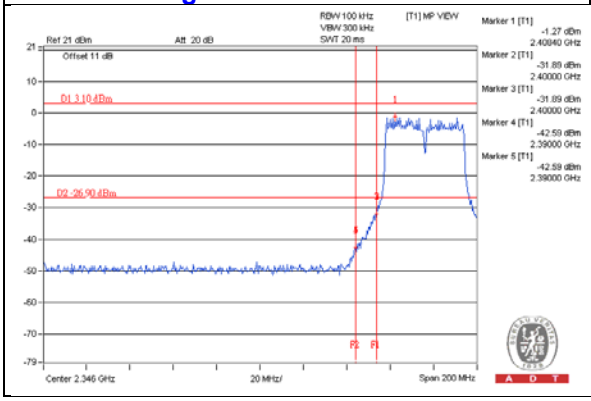
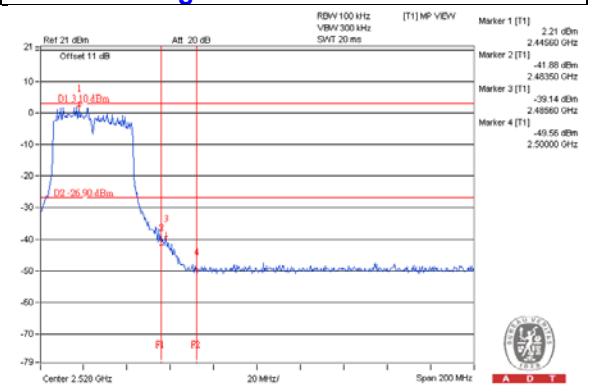
Chain 1	
CH 1 Band edge	CH 11 Band edge
	

802.11n (HT40)

Chain 0

CH 3 Band edge	CH 9 Band edge
	

Chain 1

CH 3 Band edge	CH 9 Band edge
	

5 Pictures of Test Arrangements

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

Appendix – 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.

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