

FCC Test Report (WLAN-15.247)

Report No.: RF141225E06

FCC ID: MCLT77H566

Test Model: T77H566

Received Date: Dec. 24, 2014

Test Date: Dec. 24, 2014 to Jan. 20, 2015

Issued Date: Feb. 10, 2015

Applicant: HON HAI PRECISION IND.CO.,LTD

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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A D T

Release Control Record

Issue No.	Description	Date Issued
RF141225E06	Original release.	Feb. 10, 2015



A D T

1 Certificate of Conformity

Product: WiFi/BT Module

Brand: FOXCONN

Test Model: T77H566

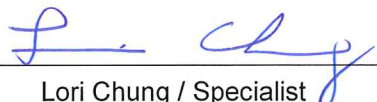
Sample Status: ENGINEERING SAMPLE

Applicant: HON HAI PRECISION IND.CO.,LTD

Test Date: Dec. 24, 2014 to Jan. 20, 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:** Feb. 10, 2015
Lori Chung / Specialist

Approved by : , **Date:** Feb. 10, 2015
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.08dB at 0.18906MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.37 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.65 dB
	6GHz ~ 18GHz	3.88 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)

Product	WiFi/BT Module
Brand	FOXCONN
Test Model	T77H566
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3±10%V from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
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, 5.26 ~ 5.32GHz, 5.5~5.70GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	For 15.407 24 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 11 for 802.11n (HT40), 802.11ac (VHT40) 5 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	For 15.407 802.11a: 162.194mW 802.11ac (VHT20): 167.513mW 802.11ac (VHT40): 154.719mW 802.11ac (VHT80): 125.758mW
	For 15.247 802.11b: 231.739mW 802.11g: 378.935mW 802.11n (HT20): 344.836mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. There are Bluetooth 4.0 and WLAN technology used for the EUT.
2. For WLAN, 2.4GHz and 5GHz technology can not transmit at same time.
3. WLAN and Bluetooth technology can transmit at same time.
4. The antennas provided to the EUT, please refer to the following table:

Antenna No	PCB Chain No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)
1	Chain (0) Main	NA	NA	1.88	PCB	i-pex(MHF)	2.4~2483.5
				2.51			5.15~5.25
				2.27			5.25~5.35
				1.77			5.47~5.725
				1.54			5.725~5.825
2	Chain (1) Aux	NA	NA	1.73	PCB	i-pex(MHF)	2.4~2483.5
				3.02			5.15~5.25
				3.4			5.25~5.35
				2.48			5.47~5.725
				-0.16			5.725~5.825

Note: For Bluetooth configuration mode will fix transmission on Chain (0).

5. WLAN/BT coexistence mode:

Condition	Technology	
1	WLAN(2.4GHz) 1TX only	BT
2	WLAN(5GHz) 2TX only	BT

From above coexistence mode, emission of the simultaneous operation has been evaluated and no non-compliance was found.

- ◆ 1x1 WLAN (2.4GHz) + BT: timely shared coexistence.
- ◆ 2x2 WLAN (5GHz) + BT: transmit concurrent with BT

6. The EUT incorporates a MIMO function, with beamforming for 5GHz.

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

7. 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 and 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		

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

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.

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

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

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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE<1G	23deg. C, 69%RH	120Vac, 60Hz	Gary Cheng
RE≥1G	24deg. C, 65%RH 23deg. C, 66%RH	120Vac, 60Hz	Gary Cheng
PLC	25deg. C, 65%RH	120Vac, 60Hz	Barry Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

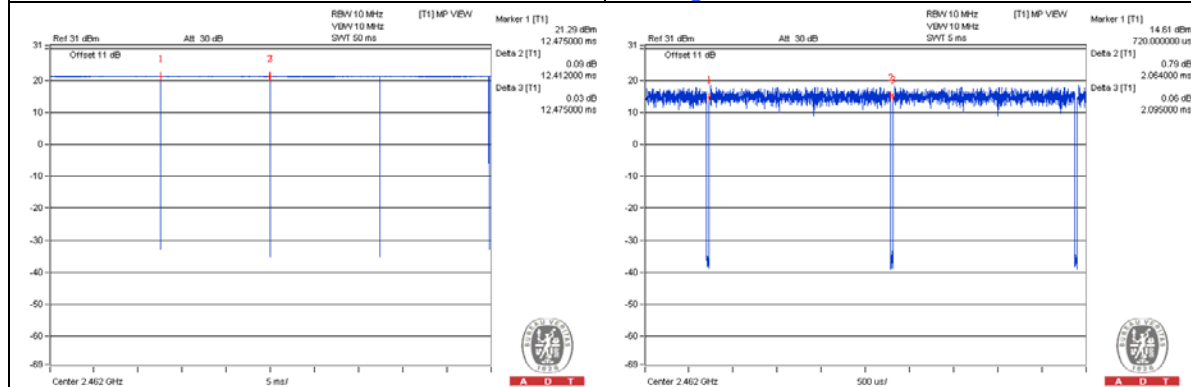
Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11b: Duty cycle = $12.412 \text{ ms} / 12.475 \text{ ms} = 0.995$

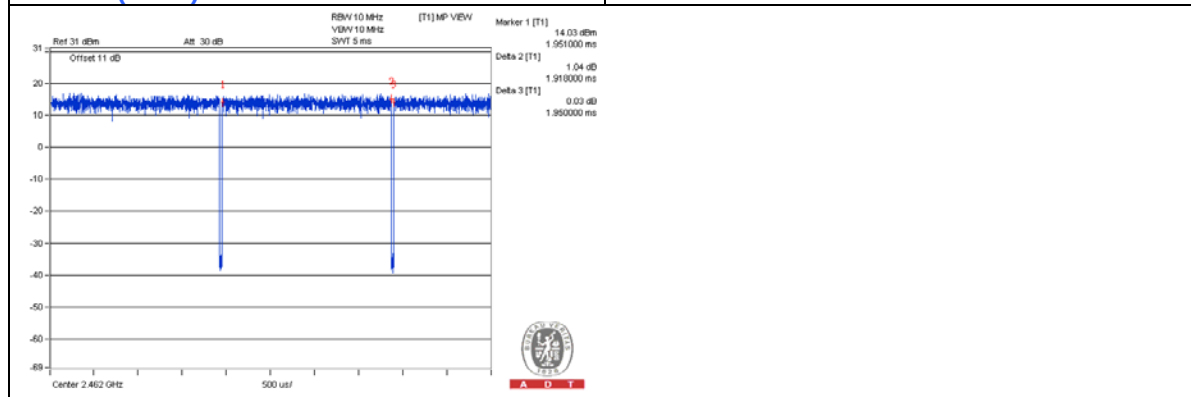
802.11g: Duty cycle = $2.064 \text{ ms} / 2.095 \text{ ms} = 0.985$

802.11n (HT20): Duty cycle = $1.918 \text{ ms} / 1.95 \text{ ms} = 0.984$

802.11b **802.11g**



802.11n (HT20)



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.

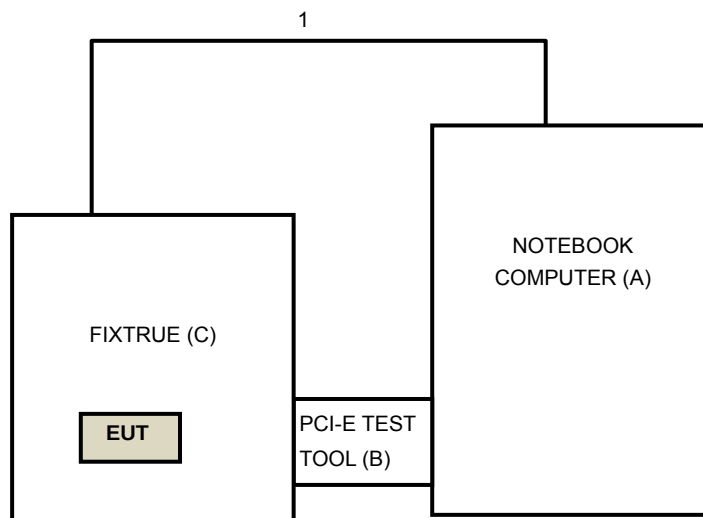
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
B	PCI-E TEST TOOL	FOXCONN	NA	NA	NA	Supplied by client
C	FIXTRUE	FOXCONN	NA	NA	NA	Supplied by client

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	Mini USB	1	1.8	No	0	Provided by Lab

3.4.1 Configuration of System under Test



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 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.

4.1.2 Test Instruments

Below 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 17, 2014	Jan. 16, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 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: Dec. 24, 2014

Above 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 16, 2015	Jan. 15, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
- 5 The VCCI Site Registration No. is G-137.
- 6 The CANADA Site Registration No. is IC 7450H-2.
- 7 Tested Date: Jan. 20, 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:

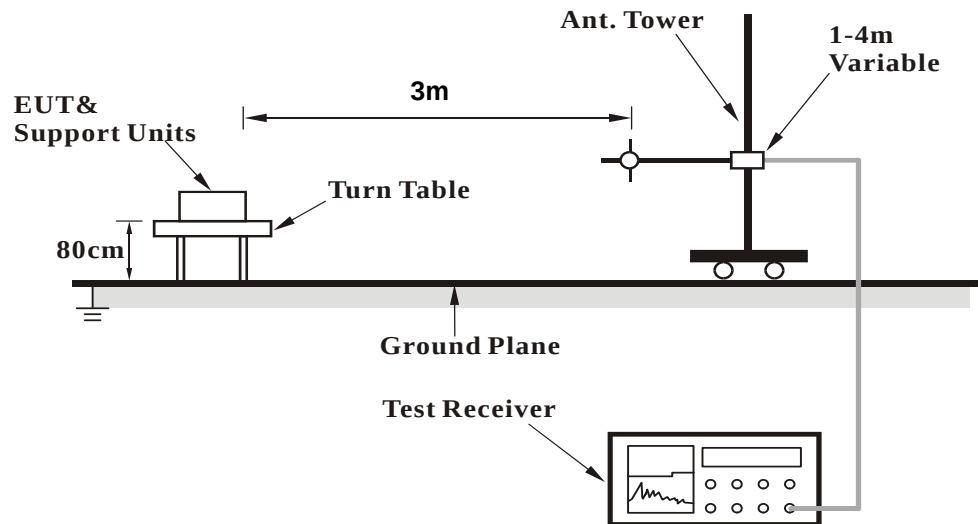
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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 ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

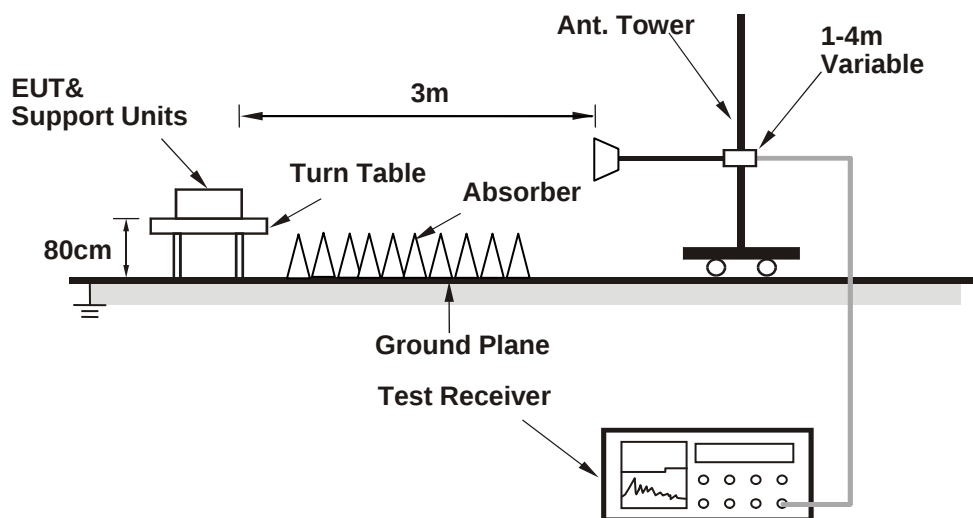
No deviation.

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 unit A (Notebook computer) which is placed on a testing table.
2. The communication partner run test program "MTOOL 2.0.2.1.msi" to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

ABOVE 1GHz DATA

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.2 PK	74.0	-15.8	1.33 H	267	60.67	-2.47
2	2390.00	53.4 AV	54.0	-0.6	1.33 H	267	55.87	-2.47
3	*2412.00	110.5 PK			1.33 H	267	112.87	-2.37
4	*2412.00	108.2 AV			1.33 H	267	110.57	-2.37
5	4824.00	47.4 PK	74.0	-26.6	1.67 H	360	41.69	5.71
6	4824.00	35.4 AV	54.0	-18.6	1.67 H	360	29.69	5.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.3 PK	74.0	-19.7	1.07 V	127	56.77	-2.47
2	2390.00	48.3 AV	54.0	-5.7	1.07 V	127	50.77	-2.47
3	*2412.00	105.4 PK			1.07 V	127	107.77	-2.37
4	*2412.00	103.1 AV			1.07 V	127	105.47	-2.37
5	4824.00	46.8 PK	74.0	-27.2	1.00 V	120	41.09	5.71
6	4824.00	35.3 AV	54.0	-18.7	1.00 V	120	29.59	5.71

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.5 PK	74.0	-19.5	1.37 H	306	56.97	-2.47
2	2390.00	44.8 AV	54.0	-9.2	1.37 H	306	47.27	-2.47
3	*2437.00	114.5 PK			1.37 H	306	116.75	-2.25
4	*2437.00	112.3 AV			1.37 H	306	114.55	-2.25
5	2483.50	53.8 PK	74.0	-20.2	1.37 H	306	55.83	-2.03
6	2483.50	41.8 AV	54.0	-12.2	1.37 H	306	43.83	-2.03
7	4874.00	47.9 PK	74.0	-26.1	1.62 H	360	42.00	5.90
8	4874.00	35.8 AV	54.0	-18.2	1.62 H	360	29.90	5.90
9	7311.00	52.9 PK	74.0	-21.1	1.35 H	270	39.73	13.17
10	7311.00	41.5 AV	54.0	-12.5	1.35 H	270	28.33	13.17

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	48.8 PK	74.0	-25.2	1.68 V	331	51.27	-2.47
2	2390.00	37.2 AV	54.0	-16.8	1.68 V	331	39.67	-2.47
3	*2437.00	107.8 PK			1.68 V	331	110.05	-2.25
4	*2437.00	105.4 AV			1.68 V	331	107.65	-2.25
5	2483.50	50.0 PK	74.0	-24.0	1.68 V	331	52.03	-2.03
6	2483.50	36.8 AV	54.0	-17.2	1.68 V	331	38.83	-2.03
7	4874.00	47.2 PK	74.0	-26.8	1.23 V	100	41.30	5.90
8	4874.00	34.2 AV	54.0	-19.8	1.23 V	100	28.30	5.90
9	7311.00	53.6 PK	74.0	-20.4	1.65 V	190	40.43	13.17
10	7311.00	43.8 AV	54.0	-10.2	1.65 V	190	30.63	13.17

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	111.7 PK			1.34 H	265	113.84	-2.14
2	*2462.00	109.4 AV			1.34 H	265	111.54	-2.14
3	2483.50	59.7 PK	74.0	-14.3	1.34 H	265	61.73	-2.03
4	2483.50	53.3 AV	54.0	-0.7	1.34 H	265	55.33	-2.03
5	4924.00	48.1 PK	74.0	-25.9	1.59 H	360	41.99	6.11
6	4924.00	36.2 AV	54.0	-17.8	1.59 H	360	30.09	6.11
7	7386.00	52.6 PK	74.0	-21.4	1.41 H	260	39.42	13.18
8	7386.00	41.2 AV	54.0	-12.8	1.41 H	260	28.02	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.0 PK			1.63 V	337	108.14	-2.14
2	*2462.00	103.8 AV			1.63 V	337	105.94	-2.14
3	2483.50	53.8 PK	74.0	-20.2	1.63 V	337	55.83	-2.03
4	2483.50	47.2 AV	54.0	-6.8	1.63 V	337	49.23	-2.03
5	4924.00	46.4 PK	74.0	-27.6	1.25 V	92	40.29	6.11
6	4924.00	33.7 AV	54.0	-20.3	1.25 V	92	27.59	6.11
7	7386.00	54.2 PK	74.0	-19.8	1.64 V	189	41.02	13.18
8	7386.00	44.3 AV	54.0	-9.7	1.64 V	189	31.12	13.18

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	69.1 PK	74.0	-4.9	1.37 H	303	74.70	-5.60
2	2390.00	53.7 AV	54.0	-0.3	1.37 H	303	59.30	-5.60
3	*2412.00	110.5 PK			1.37 H	304	116.03	-5.53
4	*2412.00	100.6 AV			1.37 H	304	106.13	-5.53
5	4824.00	48.5 PK	74.0	-25.5	1.58 H	360	44.64	3.86
6	4824.00	36.2 AV	54.0	-17.8	1.58 H	360	32.34	3.86
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	2390.00	64.9 PK	74.0	-9.1	1.11 V	36	67.37	-2.47
2	2390.00	48.4 AV	54.0	-5.6	1.11 V	36	50.87	-2.47
3	*2412.00	103.4 PK			1.11 V	36	105.77	-2.37
4	*2412.00	93.5 AV			1.11 V	36	95.87	-2.37
5	4824.00	46.9 PK	74.0	-27.1	1.21 V	81	41.19	5.71
6	4824.00	34.2 AV	54.0	-19.8	1.21 V	81	28.49	5.71

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	69.1 PK	74.0	-4.9	1.38 H	243	71.57	-2.47
2	2390.00	53.6 AV	54.0	-0.4	1.38 H	243	56.07	-2.47
3	*2437.00	114.3 PK			1.35 H	299	116.55	-2.25
4	*2437.00	104.2 AV			1.35 H	299	106.45	-2.25
5	2483.50	67.7 PK	74.0	-6.3	1.35 H	299	69.73	-2.03
6	2483.50	49.2 AV	54.0	-4.8	1.35 H	299	51.23	-2.03
7	4874.00	47.6 PK	74.0	-26.4	1.65 H	360	41.70	5.90
8	4874.00	35.7 AV	54.0	-18.3	1.65 H	360	29.80	5.90
9	7311.00	52.8 PK	74.0	-21.2	1.40 H	284	39.63	13.17
10	7311.00	41.4 AV	54.0	-12.6	1.40 H	284	28.23	13.17

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.4 PK	74.0	-10.6	1.14 V	51	65.87	-2.47
2	2390.00	47.7 AV	54.0	-6.3	1.14 V	51	50.17	-2.47
3	*2437.00	108.3 PK			1.14 V	51	110.55	-2.25
4	*2437.00	98.3 AV			1.14 V	51	100.55	-2.25
5	2483.50	61.5 PK	74.0	-12.5	1.14 V	51	63.53	-2.03
6	2483.50	42.8 AV	54.0	-11.2	1.14 V	51	44.83	-2.03
7	4874.00	47.2 PK	74.0	-26.8	1.19 V	96	41.30	5.90
8	4874.00	34.4 AV	54.0	-19.6	1.19 V	96	28.50	5.90
9	7311.00	54.1 PK	74.0	-19.9	1.60 V	203	40.93	13.17
10	7311.00	44.2 AV	54.0	-9.8	1.60 V	203	31.03	13.17

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	111.2 PK			1.32 H	307	113.34	-2.14
2	*2462.00	101.7 AV			1.32 H	307	103.84	-2.14
3	2483.50	69.1 PK	74.0	-4.9	1.33 H	261	71.13	-2.03
4	2483.50	53.2 AV	54.0	-0.8	1.33 H	261	55.23	-2.03
5	4924.00	47.8 PK	74.0	-26.2	1.57 H	360	41.69	6.11
6	4924.00	35.5 AV	54.0	-18.5	1.57 H	360	29.39	6.11
7	7386.00	52.9 PK	74.0	-21.1	1.36 H	263	39.72	13.18
8	7386.00	41.6 AV	54.0	-12.4	1.36 H	263	28.42	13.18
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	104.7 PK			1.12 V	25	106.84	-2.14
2	*2462.00	95.3 AV			1.12 V	25	97.44	-2.14
3	2483.50	63.0 PK	74.0	-11.0	1.12 V	25	65.03	-2.03
4	2483.50	46.8 AV	54.0	-7.2	1.12 V	25	48.83	-2.03
5	4924.00	46.8 PK	74.0	-27.2	1.26 V	109	40.69	6.11
6	4924.00	33.9 AV	54.0	-20.1	1.26 V	109	27.79	6.11
7	7386.00	53.6 PK	74.0	-20.4	1.59 V	184	40.42	13.18
8	7386.00	44.1 AV	54.0	-9.9	1.59 V	184	30.92	13.18

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	73.2 PK	74.0	-0.8	1.08 H	354	75.67	-2.47
2	2390.00	53.9 AV	54.0	-0.1	1.08 H	354	56.37	-2.47
3	*2412.00	110.4 PK			1.33 H	304	112.77	-2.37
4	*2412.00	100.7 AV			1.33 H	304	103.07	-2.37
5	4824.00	47.8 PK	74.0	-26.2	1.60 H	360	42.09	5.71
6	4824.00	35.7 AV	54.0	-18.3	1.60 H	360	29.99	5.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.4 PK	74.0	-6.6	1.15 V	29	69.87	-2.47
2	2390.00	48.3 AV	54.0	-5.7	1.15 V	29	50.77	-2.47
3	*2412.00	105.0 PK			1.15 V	29	107.37	-2.37
4	*2412.00	95.0 AV			1.15 V	29	97.37	-2.37
5	4824.00	47.5 PK	74.0	-26.5	1.19 V	105	41.79	5.71
6	4824.00	34.3 AV	54.0	-19.7	1.19 V	105	28.59	5.71

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	66.5 PK	74.0	-7.5	1.37 H	240	68.97	-2.47
2	2390.00	52.2 AV	54.0	-1.8	1.37 H	240	54.67	-2.47
3	*2437.00	115.5 PK			1.37 H	204	117.75	-2.25
4	*2437.00	104.9 AV			1.37 H	204	107.15	-2.25
5	2483.50	59.5 PK	74.0	-14.5	1.37 H	240	61.53	-2.03
6	2483.50	45.0 AV	54.0	-9.0	1.37 H	240	47.03	-2.03
7	4874.00	47.3 PK	74.0	-26.7	1.67 H	360	41.40	5.90
8	4874.00	35.4 AV	54.0	-18.6	1.67 H	360	29.50	5.90
9	7311.00	52.5 PK	74.0	-21.5	1.36 H	276	39.33	13.17
10	7311.00	41.2 AV	54.0	-12.8	1.36 H	276	28.03	13.17

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	60.0 PK	74.0	-14.0	1.11 V	26	62.47	-2.47
2	2390.00	45.9 AV	54.0	-8.1	1.11 V	26	48.37	-2.47
3	*2437.00	109.8 PK			1.11 V	26	112.05	-2.25
4	*2437.00	99.3 AV			1.11 V	26	101.55	-2.25
5	2483.50	53.5 PK	74.0	-20.5	1.11 V	26	55.53	-2.03
6	2483.50	39.0 AV	54.0	-15.0	1.11 V	26	41.03	-2.03
7	4874.00	47.0 PK	74.0	-27.0	1.22 V	85	41.10	5.90
8	4874.00	34.2 AV	54.0	-19.8	1.22 V	85	28.30	5.90
9	7311.00	53.7 PK	74.0	-20.3	1.65 V	176	40.53	13.17
10	7311.00	43.8 AV	54.0	-10.2	1.65 V	176	30.63	13.17

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	109.7 PK			1.33 H	306	111.84	-2.14
2	*2462.00	99.4 AV			1.33 H	306	101.54	-2.14
3	2483.50	69.3 PK	74.0	-4.7	1.34 H	305	71.33	-2.03
4	2483.50	53.8 AV	54.0	-0.2	1.34 H	305	55.83	-2.03
5	4924.00	48.6 PK	74.0	-25.4	1.57 H	360	42.49	6.11
6	4924.00	36.3 AV	54.0	-17.7	1.57 H	360	30.19	6.11
7	7386.00	52.8 PK	74.0	-21.2	1.39 H	284	39.62	13.18
8	7386.00	41.4 AV	54.0	-12.6	1.39 H	284	28.22	13.18
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	103.8 PK			1.05 V	34	105.94	-2.14
2	*2462.00	93.6 AV			1.05 V	34	95.74	-2.14
3	2483.50	63.6 PK	74.0	-10.4	1.05 V	34	65.63	-2.03
4	2483.50	48.3 AV	54.0	-5.7	1.05 V	34	50.33	-2.03
5	4924.00	47.7 PK	74.0	-26.3	1.20 V	100	41.59	6.11
6	4924.00	34.5 AV	54.0	-19.5	1.20 V	100	28.39	6.11
7	7386.00	53.8 PK	74.0	-20.2	1.67 V	180	40.62	13.18
8	7386.00	44.1 AV	54.0	-9.9	1.67 V	180	30.92	13.18

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 1	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	99.84	37.1 QP	43.5	-6.4	2.00 H	54	54.80	-17.71
2	335.99	37.9 QP	46.0	-8.1	1.00 H	87	48.74	-10.80
3	365.86	35.0 QP	46.0	-11.0	1.00 H	230	45.33	-10.31
4	432.02	42.0 QP	46.0	-4.0	1.50 H	360	50.37	-8.41
5	497.88	40.3 QP	46.0	-5.7	1.50 H	46	47.55	-7.25
6	698.43	38.8 QP	46.0	-7.2	1.00 H	148	42.23	-3.46
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	32.67	30.3 QP	40.0	-9.7	1.00 V	54	44.76	-14.50
2	90.72	33.3 QP	43.5	-10.2	1.50 V	96	52.14	-18.87
3	240.01	34.2 QP	46.0	-11.9	1.00 V	160	48.22	-14.07
4	298.79	38.4 QP	46.0	-7.6	1.00 V	112	50.34	-11.94
5	432.02	40.9 QP	46.0	-5.1	1.00 V	52	49.35	-8.41
6	498.85	38.6 QP	46.0	-7.4	2.00 V	116	45.86	-7.22

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	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10, 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

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

4.2.3 Test Procedures

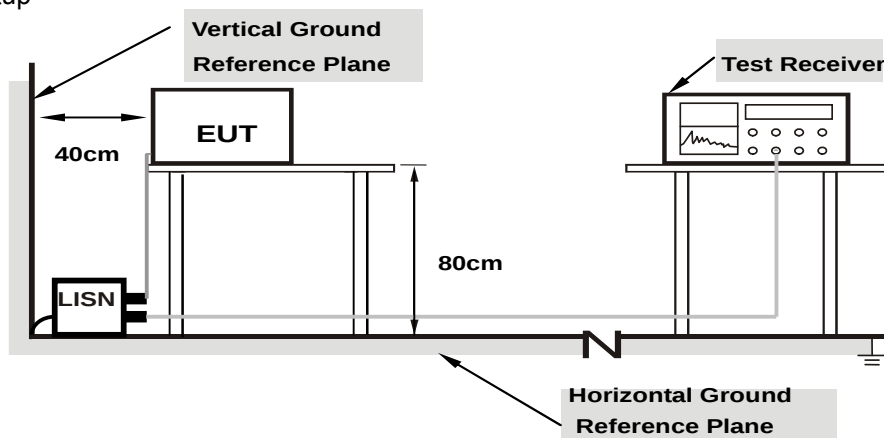
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

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.

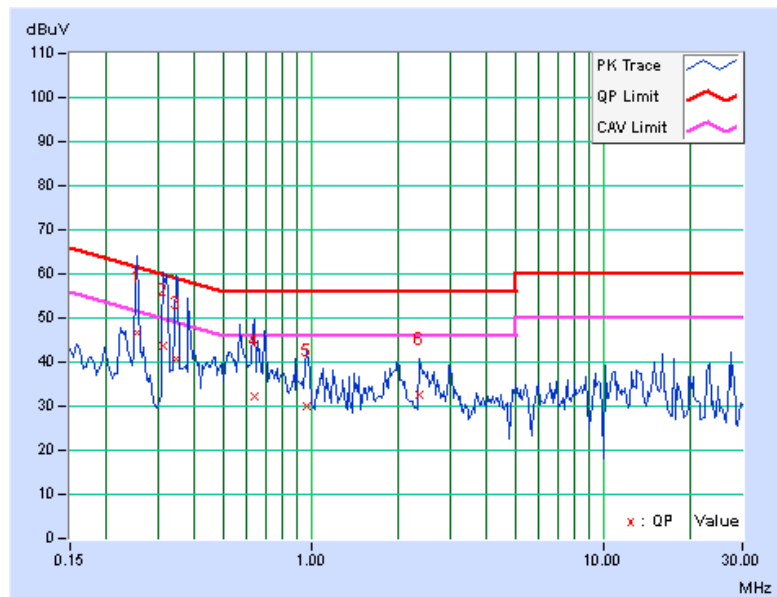
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
		(dB)								
1	0.25547	0.08	46.66	26.99	46.74	27.07	61.58	51.58	-14.84	-24.51
2	0.31406	0.08	43.49	24.95	43.57	25.03	59.86	49.86	-16.29	-24.83
3	0.34531	0.08	40.69	27.83	40.77	27.91	59.07	49.07	-18.30	-21.16
4	0.63828	0.11	31.95	24.32	32.06	24.43	56.00	46.00	-23.94	-21.57
5	0.96250	0.13	29.81	21.11	29.94	21.24	56.00	46.00	-26.06	-24.76
6	2.33984	0.19	32.48	26.33	32.67	26.52	56.00	46.00	-23.33	-19.48

REMARKS:

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

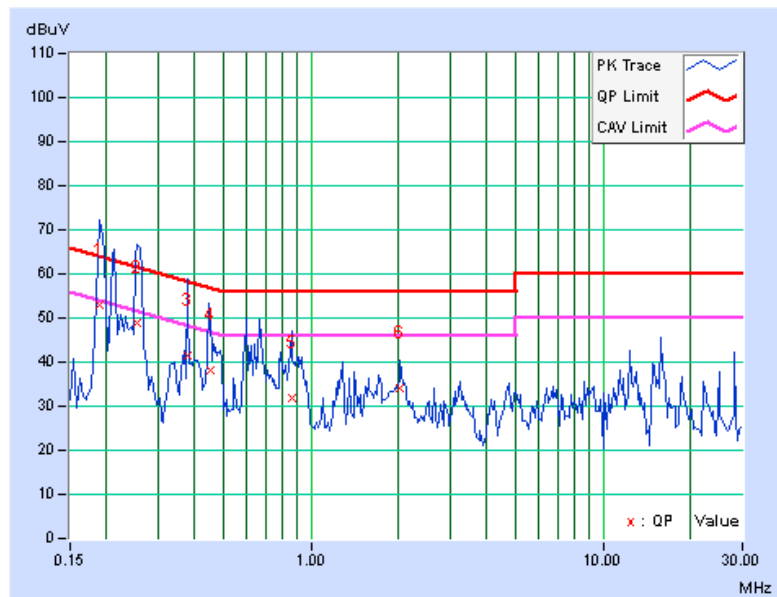


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18906	0.06	52.94	30.68	53.00	30.74	64.08	54.08	-11.08	-23.34
2	0.25547	0.07	48.98	31.30	49.05	31.37	61.58	51.58	-12.53	-20.21
3	0.37656	0.09	41.36	25.41	41.45	25.50	58.35	48.35	-16.91	-22.86
4	0.45078	0.09	38.05	22.50	38.14	22.59	56.86	46.86	-18.72	-24.27
5	0.85703	0.12	31.61	23.05	31.73	23.17	56.00	46.00	-24.27	-22.83
6	2.01563	0.18	33.74	29.47	33.92	29.65	56.00	46.00	-22.08	-16.35

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.

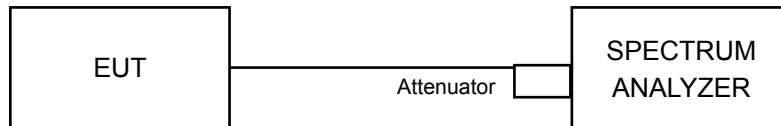


4.3 6dB Bandwidth Measurement

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: Jan. 20, 2015

4.3.4 Test Procedure

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. 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 from Test 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
1	2412	8.08	0.5	PASS
6	2437	8.06	0.5	PASS
11	2462	8.05	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.40	16.44	0.5	PASS
6	2437	16.41	16.44	0.5	PASS
11	2462	16.41	16.44	0.5	PASS

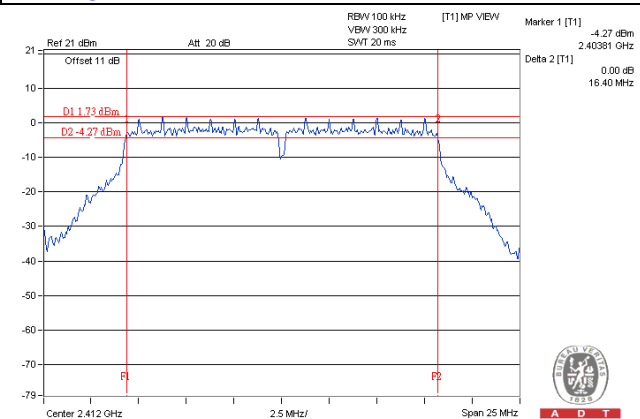
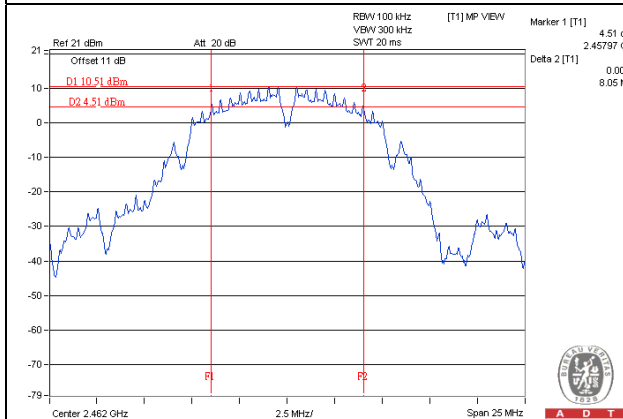
802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.63	17.67	0.5	PASS
6	2437	17.63	17.65	0.5	PASS
11	2462	17.64	17.67	0.5	PASS

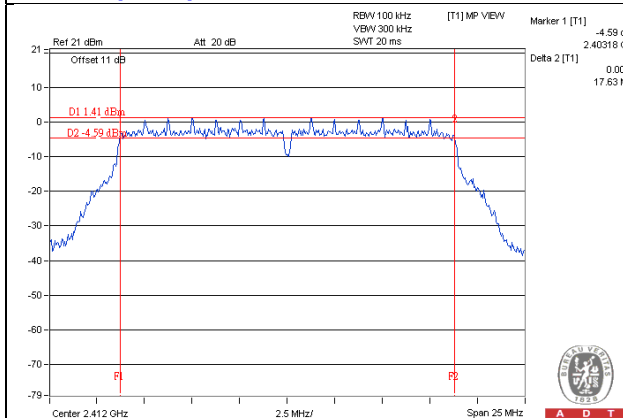
SPECTRUM PLOT OF WORST VALUE

802.11b / CH11

802.11g / Chain 0 : CH1



802.11n (HT20) / Chain 0 : CH1



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,

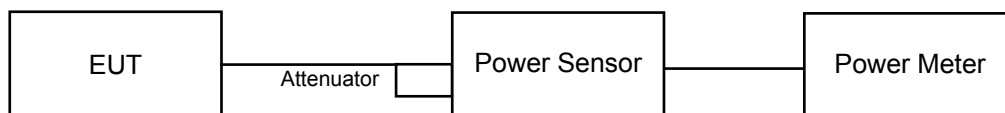
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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 $NANT \geq 5$.

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: Jan. 20, 2015

4.4.4 Test Procedures

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

FOR PEAK POWER

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	174.582	22.42	30	PASS
6	2437	231.739	23.65	30	PASS
11	2462	164.816	22.17	30	PASS

802.11g

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	21.04	20.99	252.66	24.03	30	PASS
6	2437	22.83	22.72	378.935	25.79	30	PASS
11	2462	21.11	21.07	257.06	24.10	30	PASS

802.11n (HT20)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	20.42	20.34	218.297	23.39	30	PASS
6	2437	22.45	22.28	344.836	25.38	30	PASS
11	2462	19.68	19.55	183.054	22.63	30	PASS

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	85.310	19.31
6	2437	124.165	20.94
11	2462	79.616	19.01

802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.70	13.62	46.456	16.67
6	2437	17.53	17.38	111.326	20.47
11	2462	13.96	13.96	49.778	16.97

802.11n (HT20)

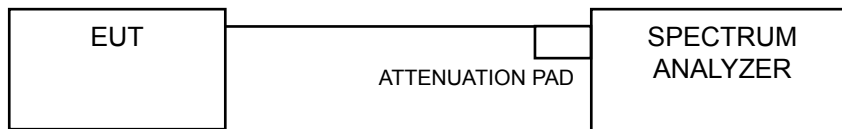
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.31	12.75	40.265	16.05
6	2437	17.01	16.90	99.212	19.97
11	2462	13.56	13.27	43.931	16.43

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: Jan. 20, 2015

4.5.4 Test Procedure

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.

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

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-3.30	8	PASS
6	2437	-0.84	8	PASS
11	2462	-2.79	8	PASS

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-11.45	3.01	-8.44	8	PASS
	6	2437	-7.57	3.01	-4.56	8	PASS
	11	2462	-10.90	3.01	-7.89	8	PASS
1	1	2412	-12.72	3.01	-9.71	8	PASS
	6	2437	-9.58	3.01	-6.57	8	PASS
	11	2462	-12.20	3.01	-9.19	8	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 4.82\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11n (HT20)

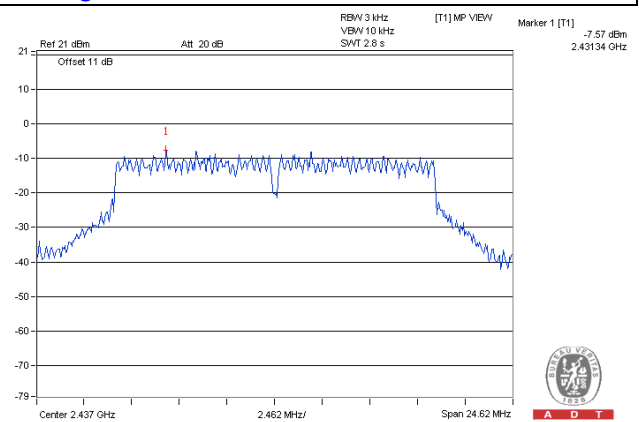
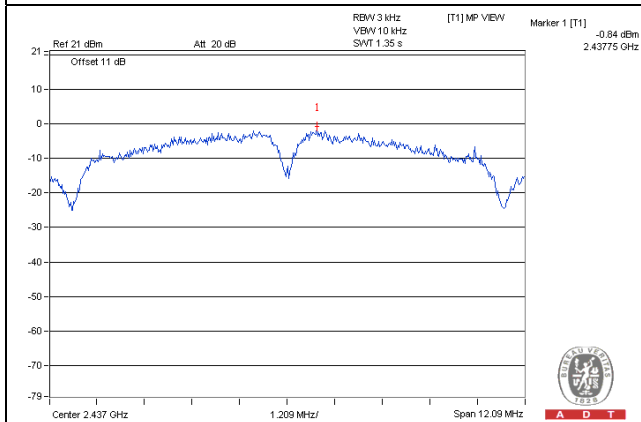
TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-11.90	3.01	-8.89	8	PASS
	6	2437	-8.11	3.01	-5.10	8	PASS
	11	2462	-11.37	3.01	-8.36	8	PASS
1	1	2412	-13.55	3.01	-10.54	8	PASS
	6	2437	-8.09	3.01	-5.08	8	PASS
	11	2462	-12.58	3.01	-9.57	8	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 4.82\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

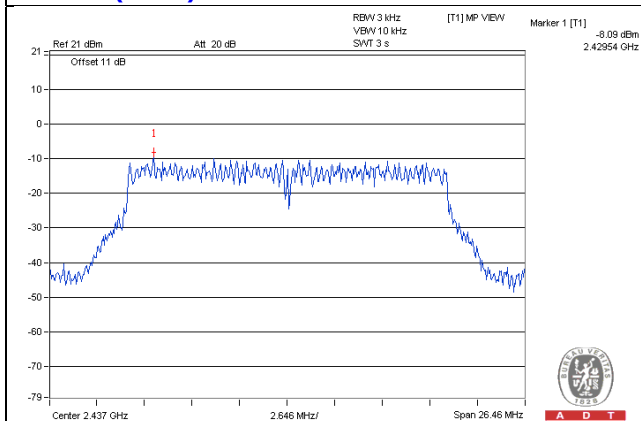
SPECTRUM PLOT OF WORST VALUE

802.11b / CH6

802.11g / Chain 0 : CH6



802.11n (HT20) / Chain 1 : CH6

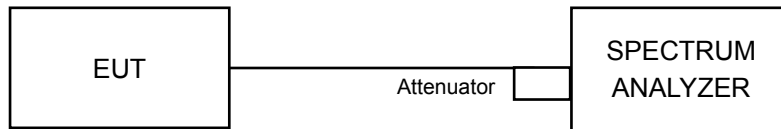


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB 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: Jan. 20, 2015

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 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 OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 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.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

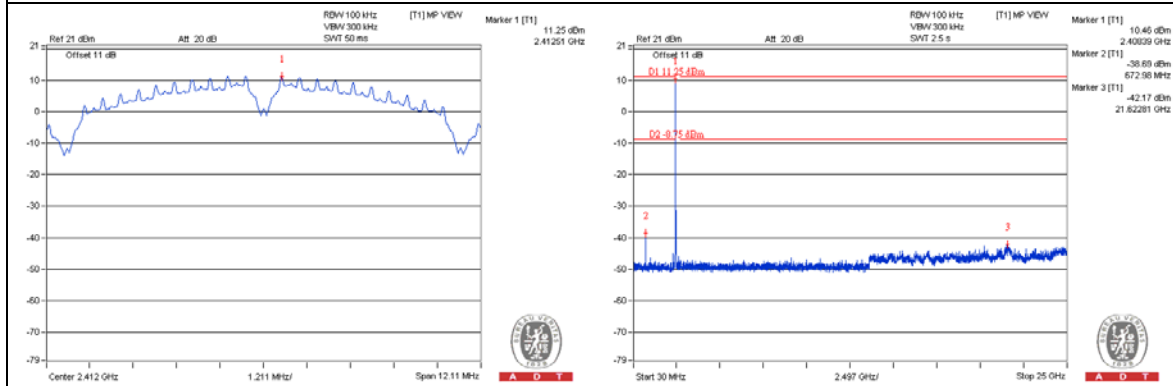
Same as Item 4.3.6

4.6.7 Test Results

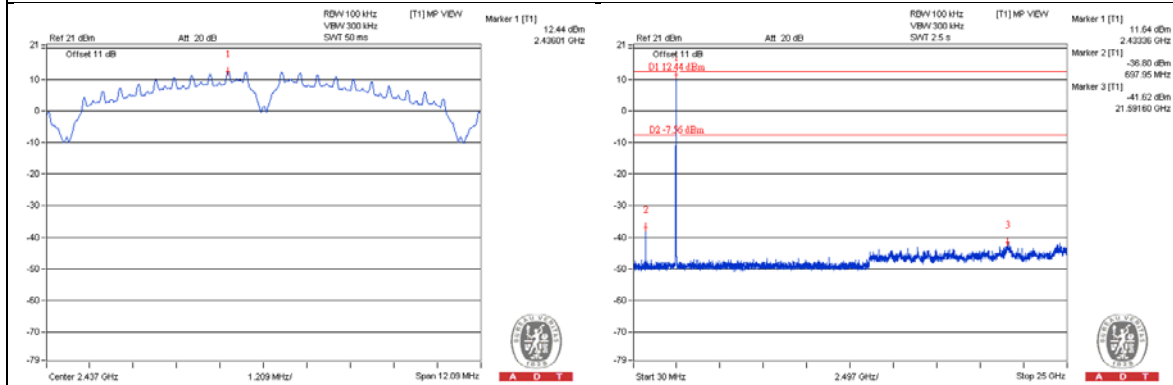
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

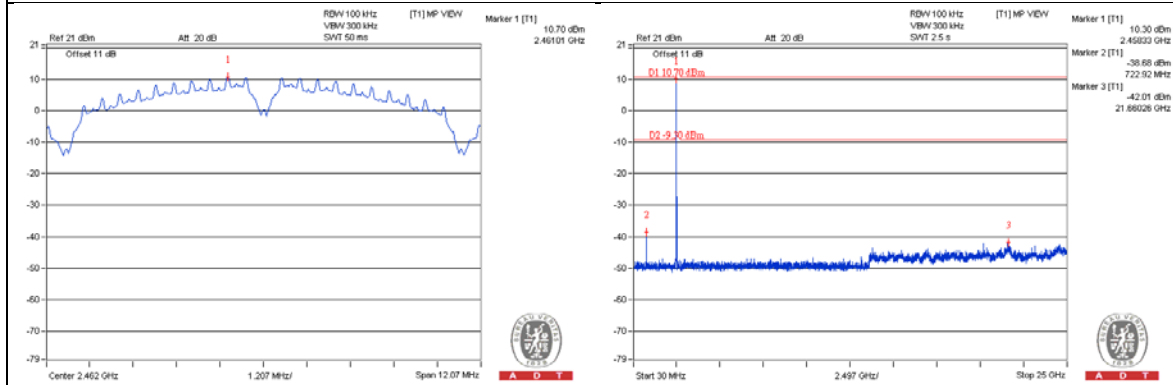
CH 1



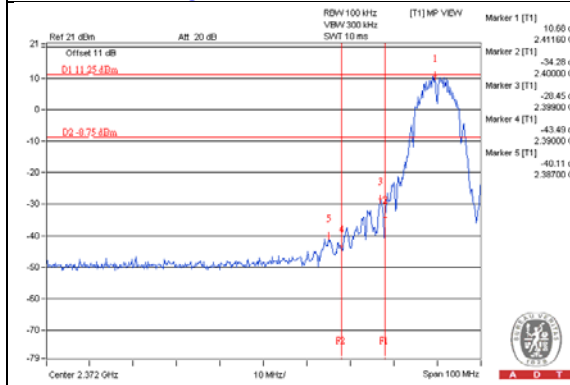
CH 6



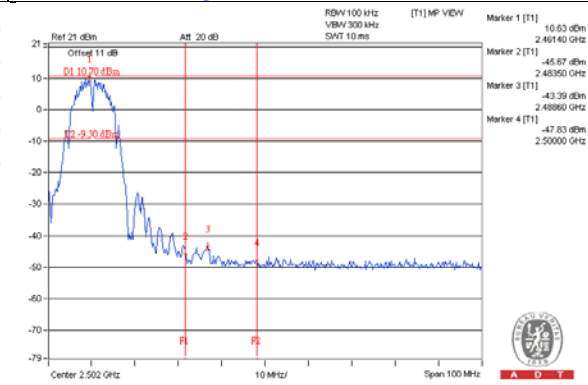
CH 11



CH 1 Band edge

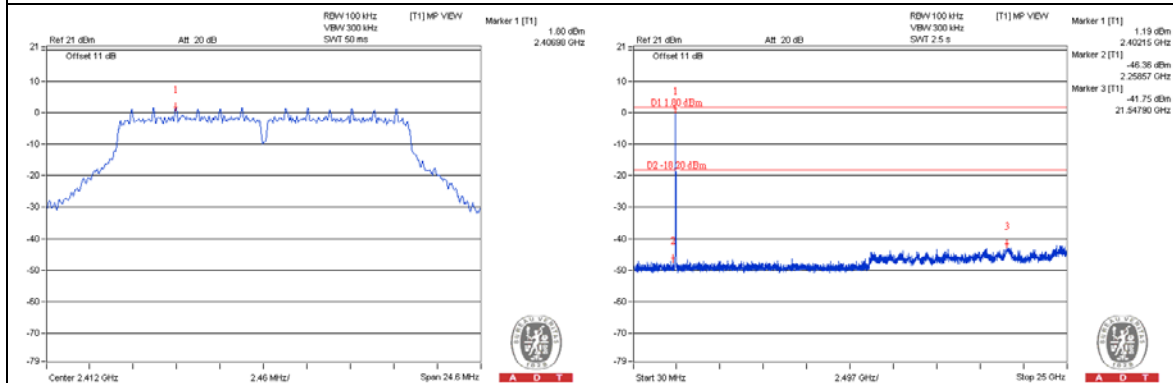


CH 11 Band edge

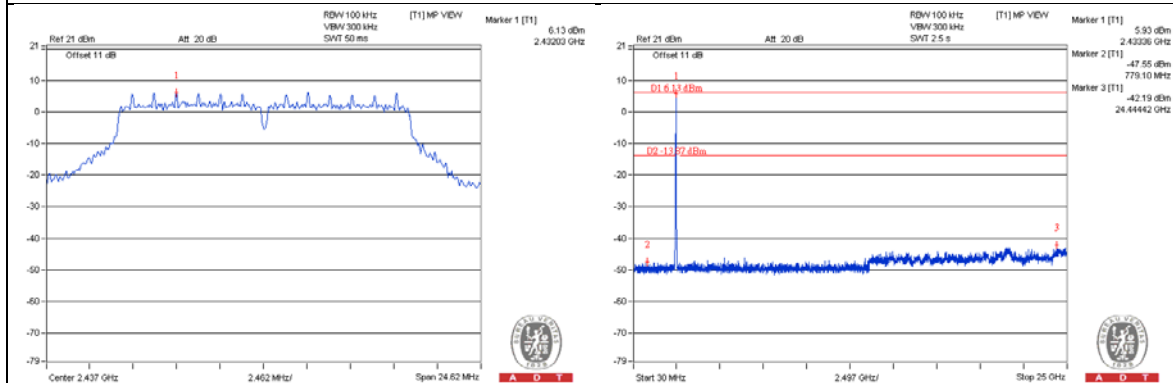


802.11g
CHAIN 0

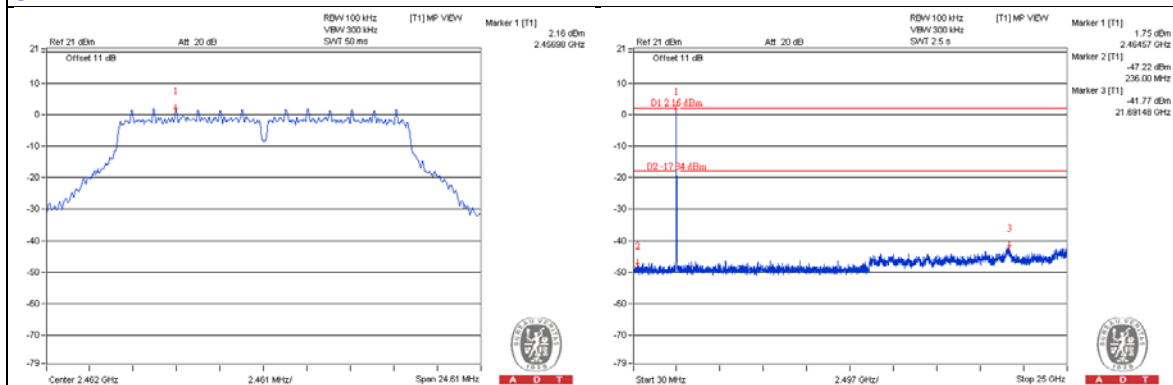
CH 1



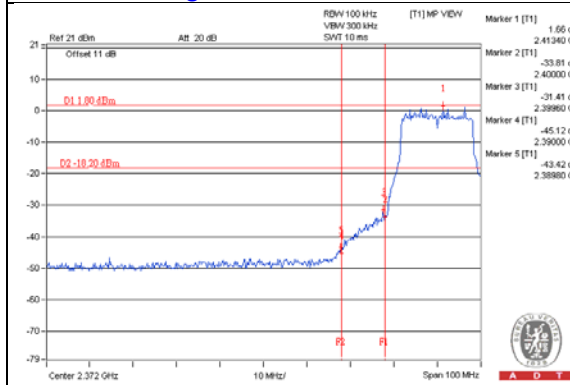
CH 6



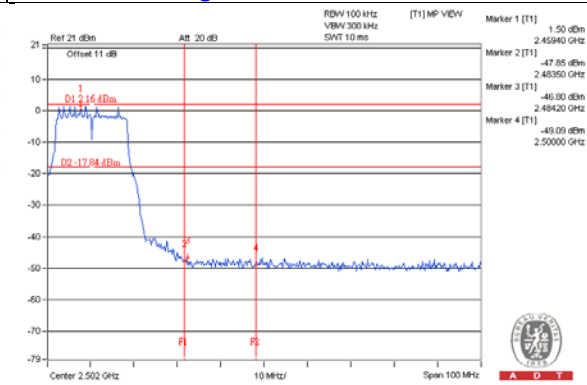
CH 11



CH 1 Band edge

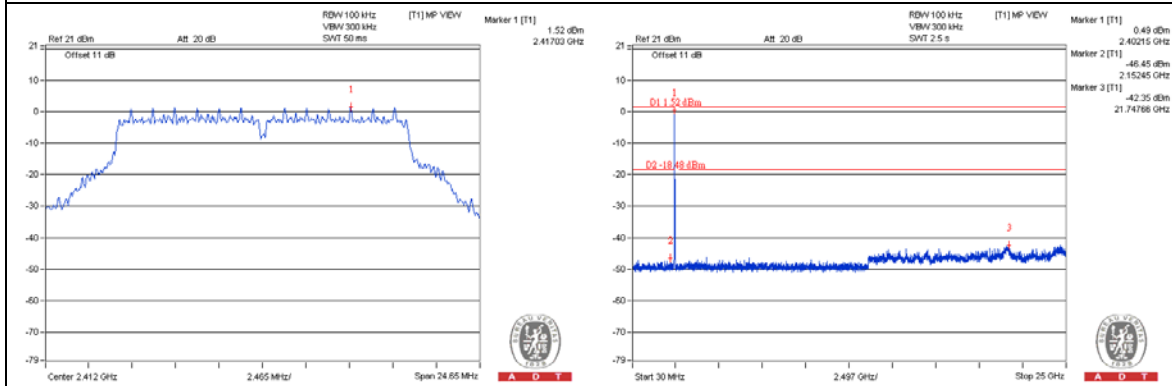


CH 11 Band edge

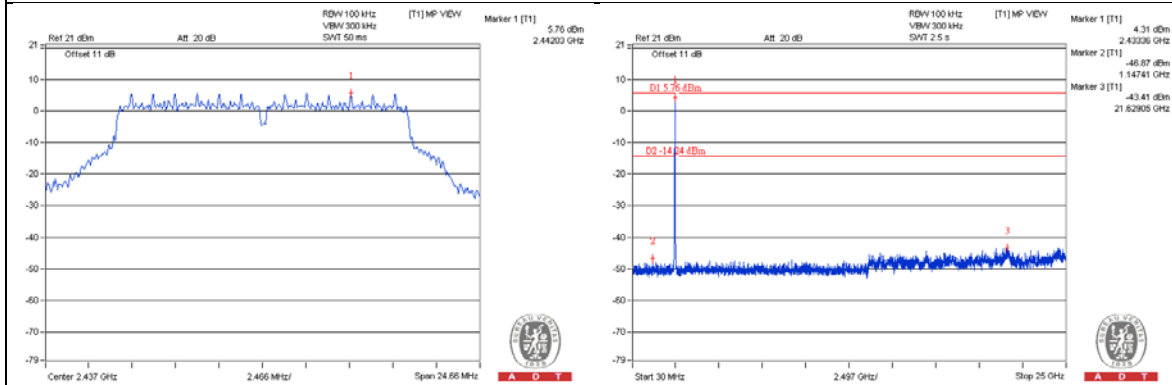


CHAIN 1

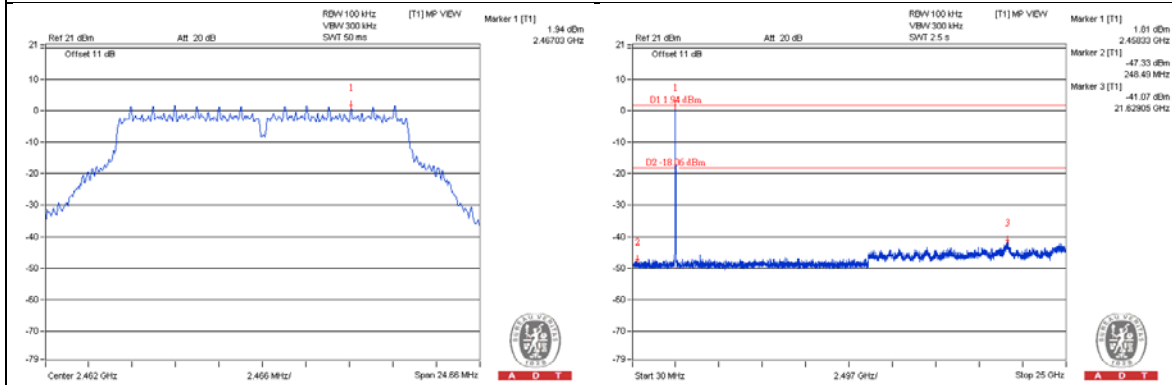
CH 1



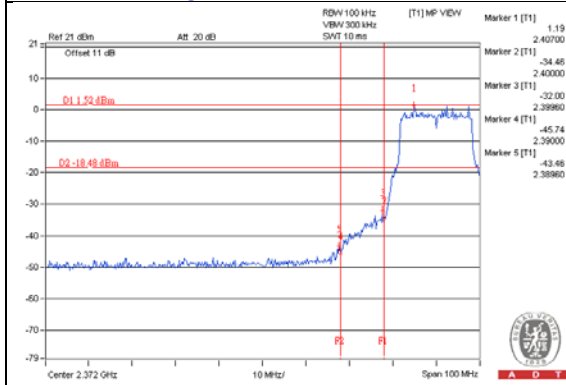
CH 6



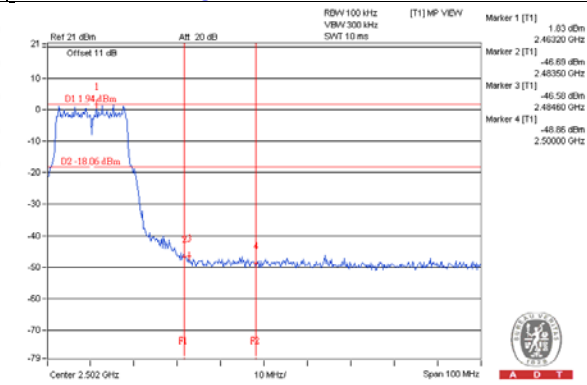
CH 11



CH 1 Band edge

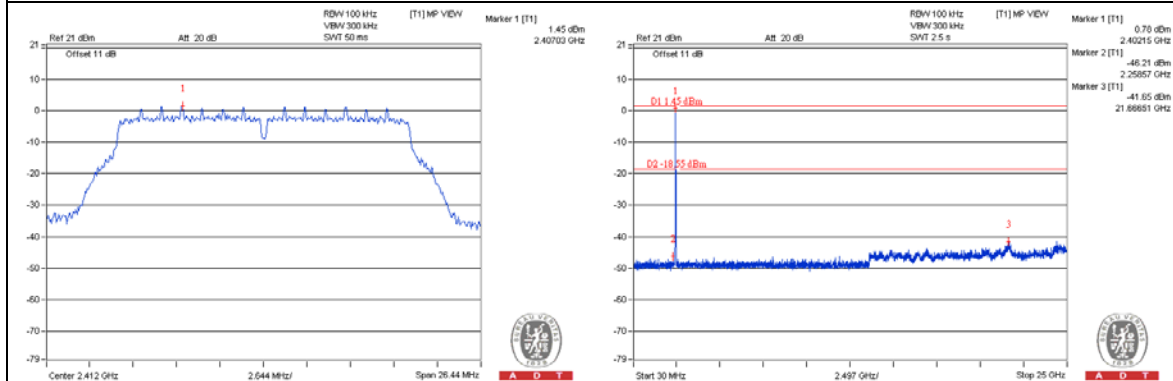


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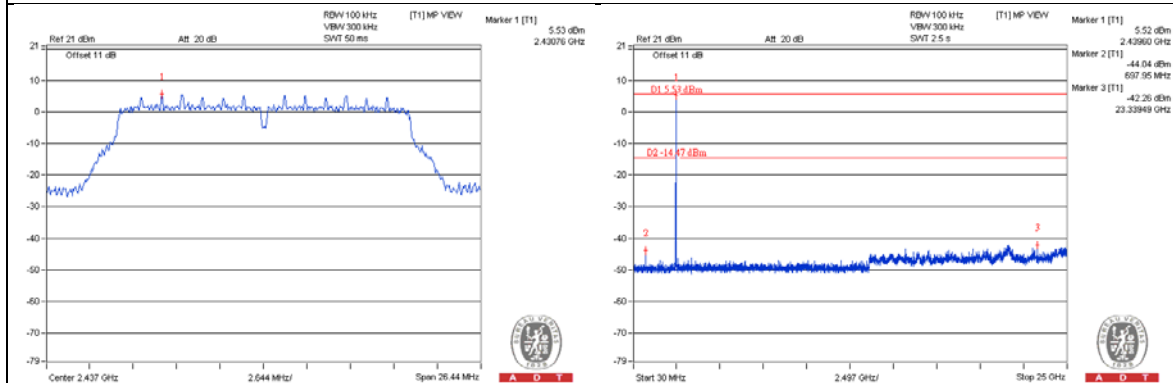


802.11n (HT20) CHAIN 0

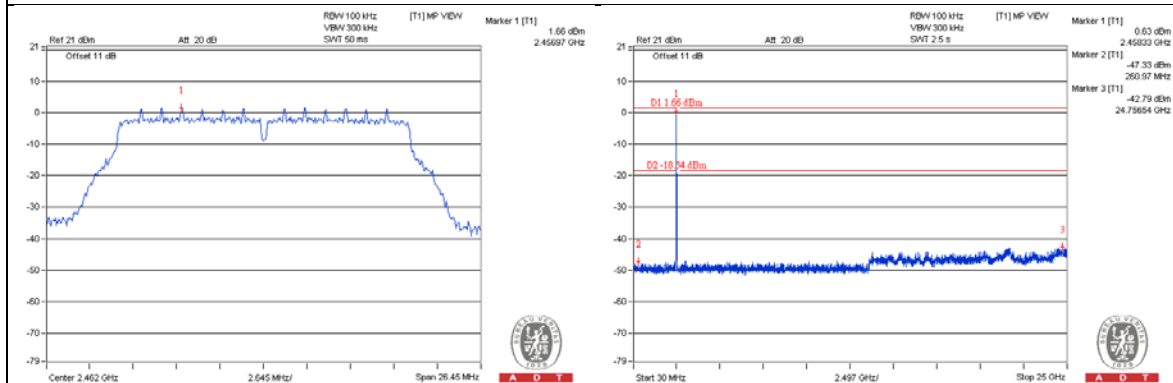
CH 1



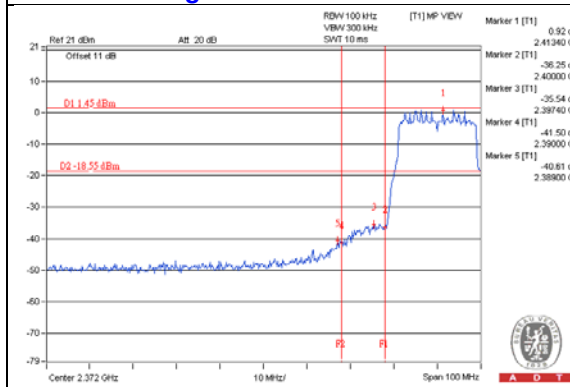
CH 6



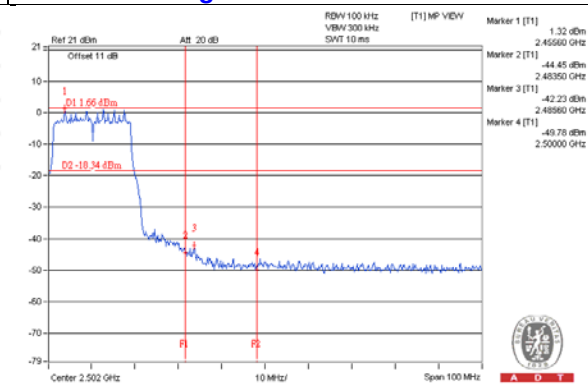
CH 11



CH 1 Band edge

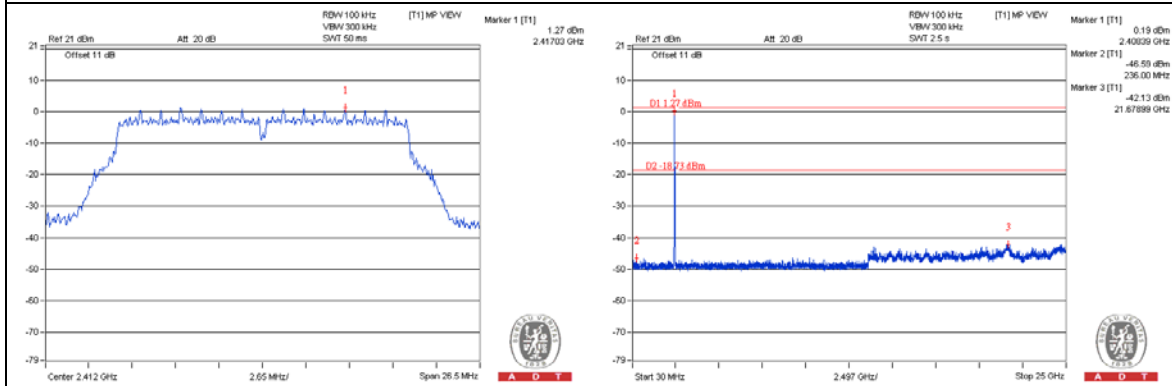


CH 11 Band edge

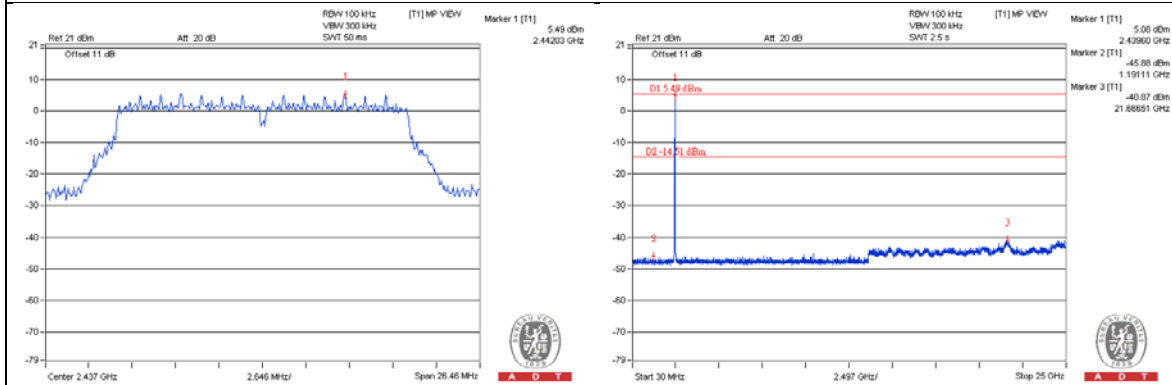


CHAIN 1

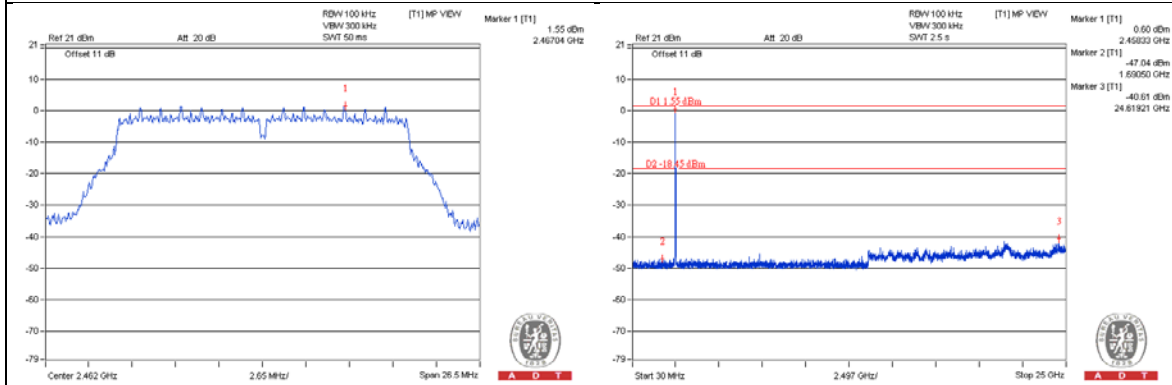
CH 1



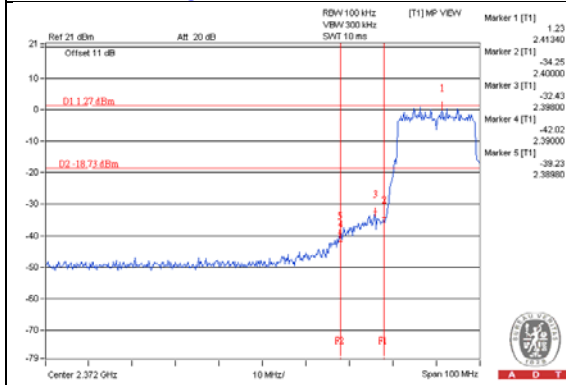
CH 6



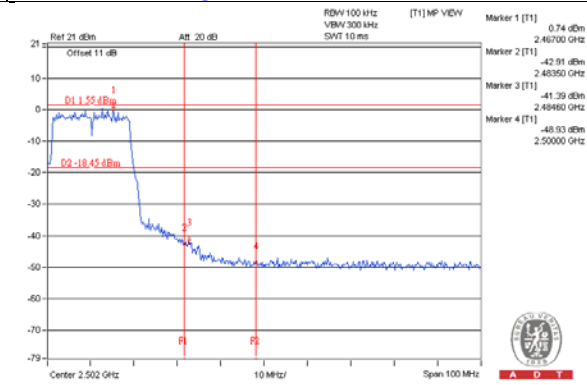
CH 11



CH 1 Band edge



CH 11 Band edge



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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