

FCC Test Report

Report No.: RF131029E03I

FCC ID: MQT-T103WIFIT

Test Model: xAPT-103WiFi

Series Model: xCE_T103WiFi

Received Date: Aug. 17, 2016

Test Date: Aug. 24 to 25 and Nov. 16 to 24, 2016

Issued Date: Dec. 09, 2016

Applicant: XAC AUTOMATION CORP.

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Release Control Record

Issue No.	Description	Date Issued
RF131029E03I	Original release.	Dec. 09, 2016

1 Certificate of Conformity

Product: Terminal

Brand: XAC

Test Model: xAPT-103WiFi

Series Model: xCE_T103WiFi

Sample Status: MASS-PRODUCTION

Applicant: XAC AUTOMATION CORP.

Test Date: Aug. 24 to 25 and Nov. 16 to 24, 2016

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10: 2013

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 : Wendy Wu , **Date:** Dec. 09, 2016
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Dec. 09, 2016
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 -17.10dB at 0.15000MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.3dB at 2483.50MHz.
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	No antenna connector is used.

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	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.47 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	Terminal
Brand	XAC
Test Model	xAPT-103WiFi
Series Model	xCE_T103WiFi
Status of EUT	MASS-PRODUCTION
Power Supply Rating	DC 12V from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 150Mbps
Operating Frequency	2.412GHz ~ 2.462GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	151.705mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter (Optional) x 1
Data Cable Supplied	NA

Note:

1. All models are listed as below.

Brand	Model	Difference
XAC	xAPT-103WiFi	For marketing requirement
	xCE_T103WiFi	

From the above models, model: **xAPT-103WiFi** was selected as representative model for the test and its data was recorded in this report.

2. The EUT is a WLAN and RFID device.

3. WLAN and RFID technology cannot transmit at same time.

4. The EUT power needs to be supplied from one power adapter, the information is as below table:

Brand:	DELTA
Model No.:	ADP-36PH B
Input power :	AC100-240V, 1A, 50-60Hz AC input cable (Unshielded, 1.75m)
Output power :	DC 12V, 3A DC output cable (Unshielded, 0.9 m with one core)

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

RFID Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	Loop Antenna	NA	13	13.56
WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Antenna Gain(dBi) <Including cable loss>	Frequency (MHz)
ACX	AT3216-T2R4 PAA	Chip	NA	1.5	2400-2500

6. The EUT incorporates a SISO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX
802.11n (HT40)	MCS 0~7	1TX	1RX

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		

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission
 APCM: Antenna Port Conducted Measurement

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
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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
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.

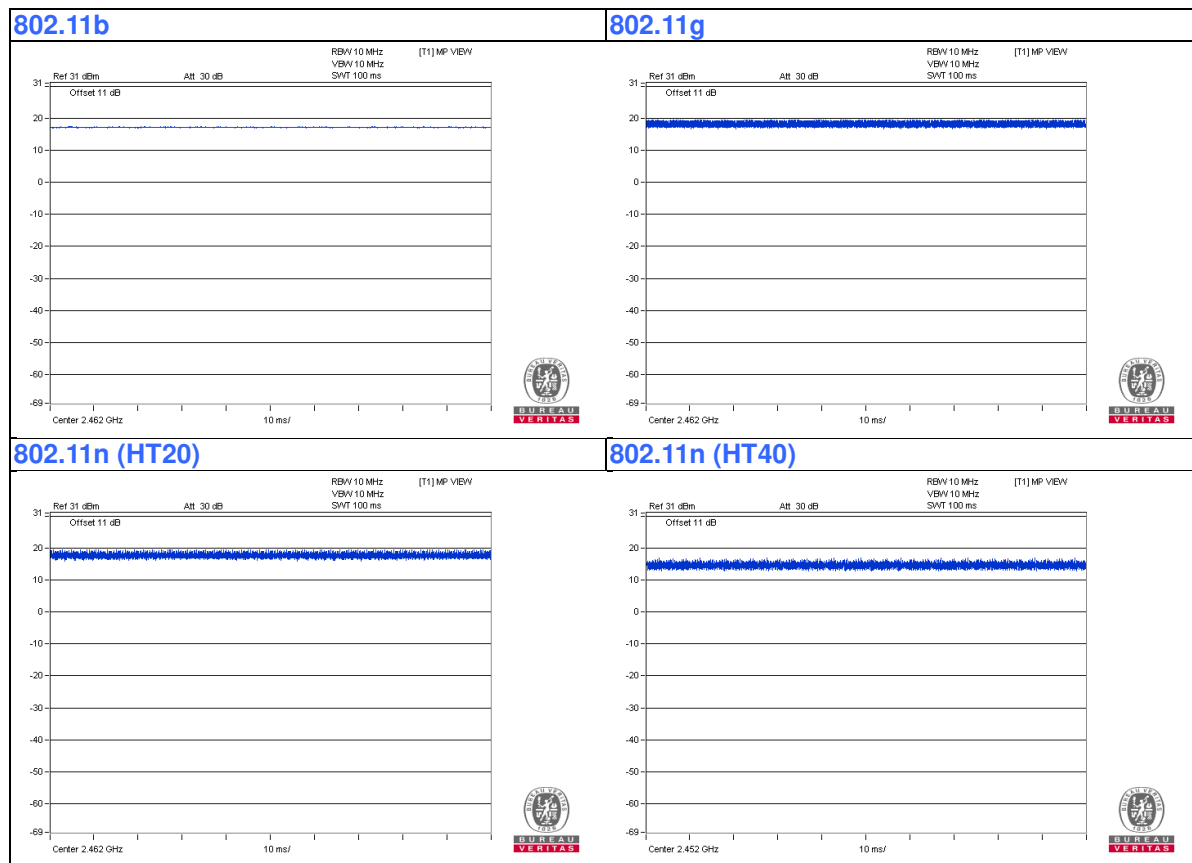
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	24deg. C, 69%RH	120Vac, 60Hz	Weiwei Lo
RE $<$ 1G	25deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo
PLC	24deg. C, 71%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

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



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	Adapter	DELTA	ADP-36PH B	NA	NA	Supplied by Client
B	iPod shuffle	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
C	iPod shuffle	Apple	MD778TA/A	CC4JMA9KF4T1	NA	Provided by Lab
D	Laptop	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
E	Telephone	WONDER	WD-303	7C17KA 05211	NA	Provided by Lab

Note:

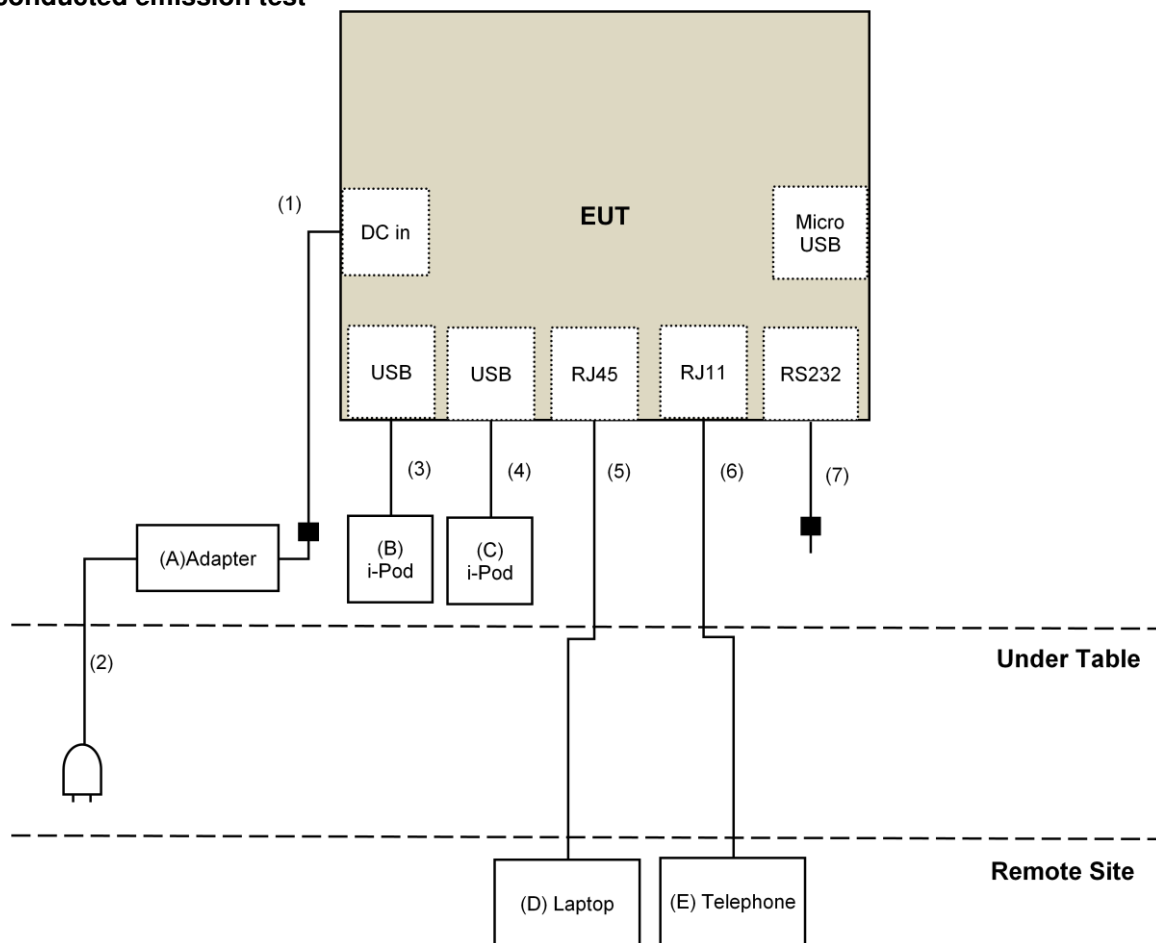
All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC Cable	1	0.9	No	1	Supplied by client
2	AC Cable	1	1.75	No	0	Supplied by client
3	USB Cable	1	0.1	Yes	0	Provided by Lab
4	USB Cable	1	0.1	Yes	0	Provided by Lab
5	RJ-45 Cable	1	10	No	0	Provided by Lab
6	RJ-11 Cable	1	10	No	0	Provided by Lab
7	Console Cable	1	1.5	No	1	Supplied by client

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

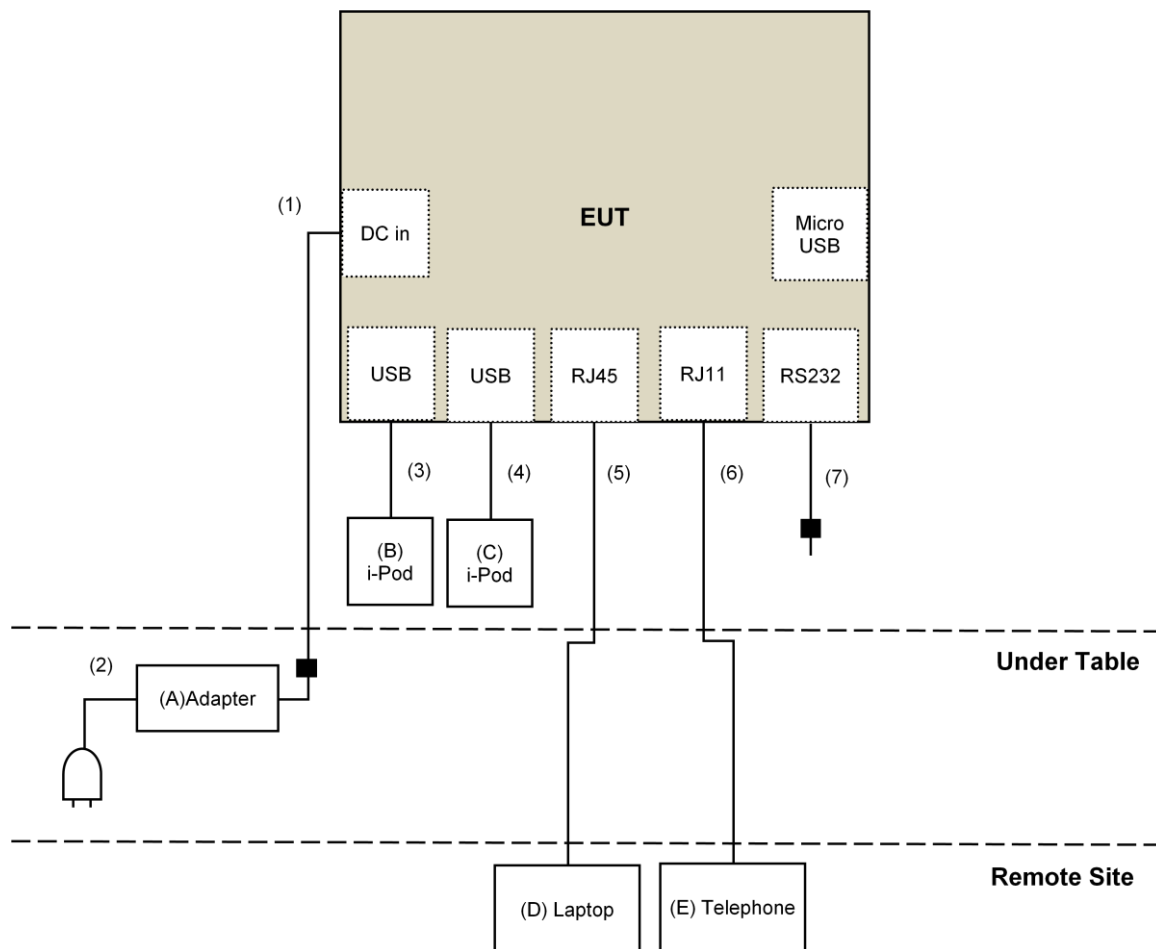
3.4.1 Configuration of System under Test

For conducted emission test



Note: Micro USB port for F/W update.

For radiated emission test



Note: Micro USB port for F/W update.

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)
KDB 558074 D01 DTS Meas Guidance v03r05
ANSI C63.10-2013

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-156	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 02, 2016	Apr. 01, 2017
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Jan. 20, 2016	Jan. 19, 2017
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 05, 2016	Apr. 04, 2017
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150317 150321 150322	Mar. 30, 2016	Mar. 29, 2017
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The FCC Site Registration No. is 147459
5. Loop antenna was used for all emissions below 30 MHz.
6. The CANADA Site Registration No. is 20331-1
7. Tested Date: Nov. 16, 2016

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

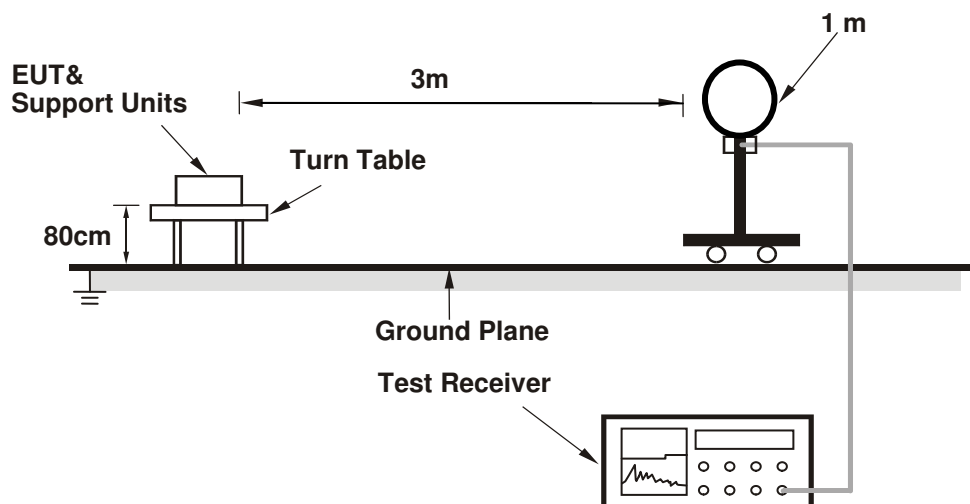
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

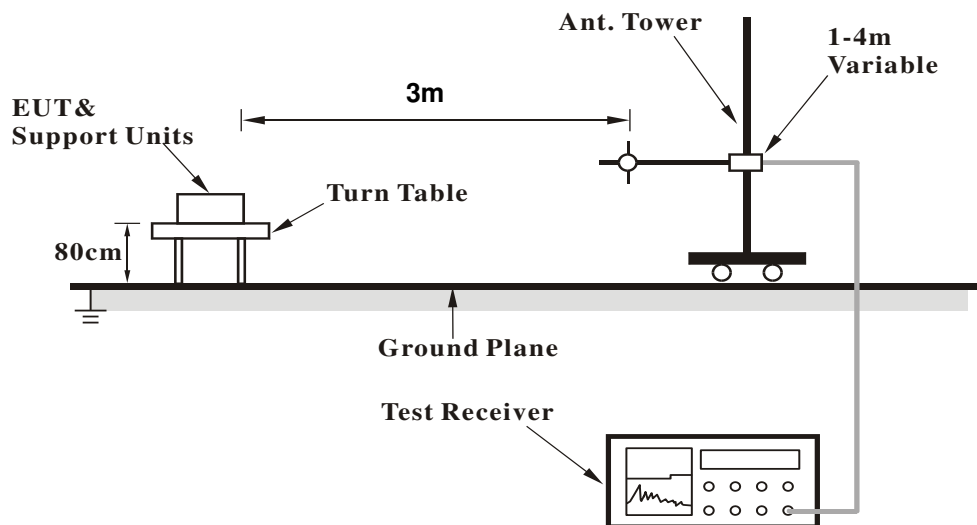
No deviation.

4.1.5 Test Setup

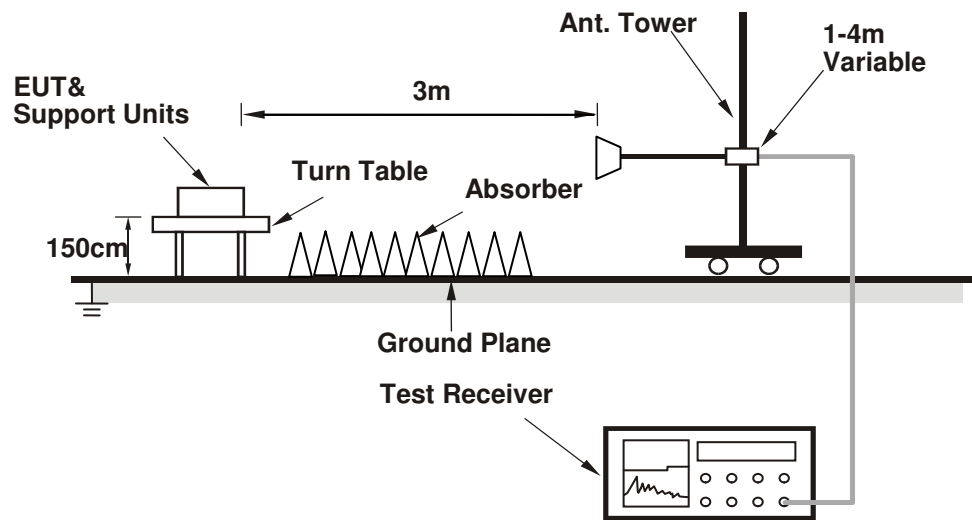
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

1. The communication partner run test program "REALTEK 11n 8188EUS USB WLAN NIC Massproduction Kit" 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	53.3 PK	74.0	-20.7	1.78 H	238	57.5	-4.2
2	2390.00	45.8 AV	54.0	-8.2	1.78 H	238	50.0	-4.2
3	*2412.00	104.4 PK			1.74 H	228	108.5	-4.1
4	*2412.00	102.2 AV			1.74 H	228	106.3	-4.1
5	4824.00	54.3 PK	74.0	-19.7	1.30 H	340	52.0	2.3
6	4824.00	51.4 AV	54.0	-2.6	1.30 H	340	49.1	2.3
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	1.31 V	235	57.7	-4.2
2	2390.00	44.9 AV	54.0	-9.1	1.31 V	235	49.1	-4.2
3	*2412.00	105.5 PK			1.29 V	218	109.6	-4.1
4	*2412.00	102.8 AV			1.29 V	218	106.9	-4.1
5	4824.00	52.8 PK	74.0	-21.2	1.42 V	342	50.5	2.3
6	4824.00	46.5 AV	54.0	-7.5	1.42 V	342	44.2	2.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	104.6 PK			1.74 H	246	108.6	-4.0
2	*2437.00	101.9 AV			1.74 H	246	105.9	-4.0
3	4874.00	54.5 PK	74.0	-19.5	1.64 H	32	52.0	2.5
4	4874.00	47.1 AV	54.0	-6.9	1.64 H	32	44.6	2.5
5	7311.00	58.3 PK	74.0	-15.7	1.47 H	22	49.4	8.9
6	7311.00	44.3 AV	54.0	-9.7	1.47 H	22	35.4	8.9
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	105.5 PK			1.49 V	221	109.5	-4.0
2	*2437.00	103.1 AV			1.49 V	221	107.1	-4.0
3	4874.00	52.4 PK	74.0	-21.6	1.06 V	360	49.9	2.5
4	4874.00	42.3 AV	54.0	-11.7	1.06 V	360	39.8	2.5
5	7311.00	56.4 PK	74.0	-17.6	1.46 V	25	47.5	8.9
6	7311.00	44.6 AV	54.0	-9.4	1.46 V	25	35.7	8.9

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	103.2 PK			1.83 H	238	107.3	-4.1
2	*2462.00	101.8 AV			1.83 H	238	105.9	-4.1
3	2483.50	53.2 PK	74.0	-20.8	1.75 H	243	57.2	-4.0
4	2483.50	42.2 AV	54.0	-11.8	1.75 H	243	46.2	-4.0
5	4924.00	55.1 PK	74.0	-18.9	1.47 H	40	52.6	2.5
6	4924.00	49.4 AV	54.0	-4.6	1.47 H	40	46.9	2.5
7	7386.00	57.8 PK	74.0	-16.2	1.48 H	42	48.5	9.3
8	7386.00	44.9 AV	54.0	-9.1	1.48 H	42	35.6	9.3
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	104.5 PK			1.27 V	219	108.6	-4.1
2	*2462.00	102.6 AV			1.27 V	219	106.7	-4.1
3	2483.50	53.6 PK	74.0	-20.4	1.18 V	208	57.6	-4.0
4	2483.50	42.4 AV	54.0	-11.6	1.18 V	208	46.4	-4.0
5	4924.00	51.1 PK	74.0	-22.9	1.01 V	352	48.6	2.5
6	4924.00	41.6 AV	54.0	-12.4	1.01 V	352	39.1	2.5
7	7386.00	58.0 PK	74.0	-16.0	1.51 V	46	48.7	9.3
8	7386.00	45.7 AV	54.0	-8.3	1.51 V	46	36.4	9.3

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	66.4 PK	74.0	-7.6	1.75 H	247	70.6	-4.2
2	2390.00	49.0 AV	54.0	-5.0	1.75 H	247	53.2	-4.2
3	*2412.00	104.4 PK			1.81 H	252	108.5	-4.1
4	*2412.00	95.0 AV			1.81 H	252	99.1	-4.1
5	4824.00	52.4 PK	74.0	-21.6	1.34 H	345	50.1	2.3
6	4824.00	39.4 AV	54.0	-14.6	1.34 H	345	37.1	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.1 PK	74.0	-3.9	1.51 V	191	74.3	-4.2
2	2390.00	51.8 AV	54.0	-2.2	1.51 V	191	56.0	-4.2
3	*2412.00	105.8 PK			1.54 V	200	109.9	-4.1
4	*2412.00	95.9 AV			1.54 V	200	100.0	-4.1
5	4824.00	50.4 PK	74.0	-23.6	1.33 V	10	48.1	2.3
6	4824.00	38.3 AV	54.0	-15.7	1.33 V	10	36.0	2.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.5 PK			1.71 H	252	109.5	-4.0
2	*2437.00	96.7 AV			1.71 H	252	100.7	-4.0
3	4874.00	52.6 PK	74.0	-21.4	1.31 H	360	50.1	2.5
4	4874.00	40.0 AV	54.0	-14.0	1.31 H	360	37.5	2.5
5	7311.00	58.4 PK	74.0	-15.6	1.34 H	348	49.5	8.9
6	7311.00	44.2 AV	54.0	-9.8	1.34 H	348	35.3	8.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.7 PK			1.46 V	172	111.7	-4.0
2	*2437.00	98.2 AV			1.46 V	172	102.2	-4.0
3	4874.00	50.8 PK	74.0	-23.2	1.26 V	7	48.3	2.5
4	4874.00	37.9 AV	54.0	-16.1	1.26 V	7	35.4	2.5
5	7311.00	57.9 PK	74.0	-16.1	1.23 V	26	49.0	8.9
6	7311.00	44.0 AV	54.0	-10.0	1.23 V	26	35.1	8.9

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.3 PK			1.79 H	267	109.4	-4.1
2	*2462.00	96.4 AV			1.79 H	267	100.5	-4.1
3	2483.50	70.8 PK	74.0	-3.2	1.72 H	275	74.8	-4.0
4	2483.50	51.4 AV	54.0	-2.6	1.72 H	275	55.4	-4.0
5	4924.00	51.5 PK	74.0	-22.5	1.33 H	337	49.0	2.5
6	4924.00	38.8 AV	54.0	-15.2	1.33 H	337	36.3	2.5
7	7386.00	58.9 PK	74.0	-15.1	1.40 H	360	49.6	9.3
8	7386.00	44.6 AV	54.0	-9.4	1.40 H	360	35.3	9.3
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	108.1 PK			1.55 V	200	112.2	-4.1
2	*2462.00	98.1 AV			1.55 V	200	102.2	-4.1
3	2483.50	72.0 PK	74.0	-2.0	1.66 V	195	76.0	-4.0
4	2483.50	53.2 AV	54.0	-0.8	1.66 V	195	57.2	-4.0
5	4924.00	50.3 PK	74.0	-23.7	1.27 V	21	47.8	2.5
6	4924.00	37.7 AV	54.0	-16.3	1.27 V	21	35.2	2.5
7	7386.00	58.3 PK	74.0	-15.7	1.15 V	11	49.0	9.3
8	7386.00	44.5 AV	54.0	-9.5	1.15 V	11	35.2	9.3

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	68.1 PK	74.0	-5.9	1.93 H	203	72.3	-4.2
2	2390.00	46.5 AV	54.0	-7.5	1.93 H	203	50.7	-4.2
3	*2412.00	100.7 PK			1.98 H	206	104.8	-4.1
4	*2412.00	91.1 AV			1.98 H	206	95.2	-4.1
5	4824.00	52.6 PK	74.0	-21.4	1.27 H	360	50.3	2.3
6	4824.00	39.7 AV	54.0	-14.3	1.27 H	360	37.4	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.8 PK	74.0	-2.2	1.61 V	190	76.0	-4.2
2	2390.00	49.3 AV	54.0	-4.7	1.61 V	190	53.5	-4.2
3	*2412.00	103.6 PK			1.62 V	203	107.7	-4.1
4	*2412.00	94.3 AV			1.62 V	203	98.4	-4.1
5	4824.00	50.4 PK	74.0	-23.6	1.32 V	3	48.1	2.3
6	4824.00	38.5 AV	54.0	-15.5	1.32 V	3	36.2	2.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.4 PK			1.36 H	329	106.4	-4.0
2	*2437.00	92.7 AV			1.36 H	329	96.7	-4.0
3	4874.00	52.9 PK	74.0	-21.1	1.35 H	352	50.4	2.5
4	4874.00	40.0 AV	54.0	-14.0	1.35 H	352	37.5	2.5
5	7311.00	58.3 PK	74.0	-15.7	1.32 H	341	49.4	8.9
6	7311.00	43.6 AV	54.0	-10.4	1.32 H	341	34.7	8.9
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	105.1 PK			1.47 V	183	109.1	-4.0
2	*2437.00	95.8 AV			1.47 V	183	99.8	-4.0
3	4874.00	49.9 PK	74.0	-24.1	1.25 V	17	47.4	2.5
4	4874.00	37.0 AV	54.0	-17.0	1.25 V	17	34.5	2.5
5	7311.00	59.1 PK	74.0	-14.9	1.16 V	10	50.2	8.9
6	7311.00	44.9 AV	54.0	-9.1	1.16 V	10	36.0	8.9

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	103.1 PK			1.36 H	337	107.2	-4.1
2	*2462.00	93.5 AV			1.36 H	337	97.6	-4.1
3	2483.50	68.0 PK	74.0	-6.0	1.39 H	346	72.0	-4.0
4	2483.50	49.8 AV	54.0	-4.2	1.39 H	346	53.8	-4.0
5	4924.00	52.8 PK	74.0	-21.2	1.34 H	360	50.3	2.5
6	4924.00	39.5 AV	54.0	-14.5	1.34 H	360	37.0	2.5
7	7386.00	59.1 PK	74.0	-14.9	1.32 H	339	49.8	9.3
8	7386.00	44.5 AV	54.0	-9.5	1.32 H	339	35.2	9.3
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			1.50 V	190	110.1	-4.1
2	*2462.00	96.6 AV			1.50 V	190	100.7	-4.1
3	2483.50	72.1 PK	74.0	-1.9	1.56 V	184	76.1	-4.0
4	2483.50	53.7 AV	54.0	-0.3	1.56 V	184	57.7	-4.0
5	4924.00	50.4 PK	74.0	-23.6	1.26 V	24	47.9	2.5
6	4924.00	38.0 AV	54.0	-16.0	1.26 V	24	35.5	2.5
7	7386.00	58.3 PK	74.0	-15.7	1.19 V	11	49.0	9.3
8	7386.00	44.5 AV	54.0	-9.5	1.19 V	11	35.2	9.3

REMARKS:

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.6 PK	74.0	-4.4	2.02 H	199	73.8	-4.2
2	2390.00	51.0 AV	54.0	-3.0	2.02 H	199	55.2	-4.2
3	*2422.00	99.7 PK			1.99 H	214	103.8	-4.1
4	*2422.00	89.6 AV			1.99 H	214	93.7	-4.1
5	4844.00	51.9 PK	74.0	-22.1	1.28 H	360	49.6	2.3
6	4844.00	38.9 AV	54.0	-15.1	1.28 H	360	36.6	2.3
7	7266.00	59.1 PK	74.0	-14.9	1.33 H	360	50.3	8.8
8	7266.00	45.0 AV	54.0	-9.0	1.33 H	360	36.2	8.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.3 PK	74.0	-3.7	1.60 V	203	74.5	-4.2
2	2390.00	53.3 AV	54.0	-0.7	1.60 V	203	57.5	-4.2
3	*2422.00	104.3 PK			1.51 V	185	108.4	-4.1
4	*2422.00	94.5 AV			1.51 V	185	98.6	-4.1
5	4844.00	50.9 PK	74.0	-23.1	1.20 V	0	48.6	2.3
6	4844.00	38.0 AV	54.0	-16.0	1.20 V	0	35.7	2.3
7	7266.00	58.1 PK	74.0	-15.9	1.22 V	31	49.3	8.8
8	7266.00	44.1 AV	54.0	-9.9	1.22 V	31	35.3	8.8

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	99.0 PK			2.14 H	208	103.0	-4.0
2	*2437.00	89.4 AV			2.14 H	208	93.4	-4.0
3	4874.00	52.4 PK	74.0	-21.6	1.37 H	357	49.9	2.5
4	4874.00	39.4 AV	54.0	-14.6	1.37 H	357	36.9	2.5
5	7311.00	58.8 PK	74.0	-15.2	1.31 H	360	49.9	8.9
6	7311.00	44.4 AV	54.0	-9.6	1.31 H	360	35.5	8.9
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	102.7 PK			1.43 V	191	106.7	-4.0
2	*2437.00	92.8 AV			1.43 V	191	96.8	-4.0
3	4874.00	49.9 PK	74.0	-24.1	1.15 V	5	47.4	2.5
4	4874.00	37.5 AV	54.0	-16.5	1.15 V	5	35.0	2.5
5	7311.00	59.3 PK	74.0	-14.7	1.23 V	32	50.4	8.9
6	7311.00	45.4 AV	54.0	-8.6	1.23 V	32	36.5	8.9

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	99.7 PK			1.95 H	204	103.8	-4.1
2	*2452.00	89.4 AV			1.95 H	204	93.5	-4.1
3	2483.50	70.0 PK	74.0	-4.0	1.99 H	202	74.0	-4.0
4	2483.50	50.8 AV	54.0	-3.2	1.99 H	202	54.8	-4.0
5	4904.00	53.3 PK	74.0	-20.7	1.39 H	360	50.8	2.5
6	4904.00	39.8 AV	54.0	-14.2	1.39 H	360	37.3	2.5
7	7356.00	58.1 PK	74.0	-15.9	1.32 H	346	48.9	9.2
8	7356.00	44.1 AV	54.0	-9.9	1.32 H	346	34.9	9.2

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	103.1 PK			1.41 V	190	107.2	-4.1
2	*2452.00	93.2 AV			1.41 V	190	97.3	-4.1
3	2483.50	71.7 PK	74.0	-2.3	1.41 V	190	75.7	-4.0
4	2483.50	53.2 AV	54.0	-0.8	1.41 V	190	57.2	-4.0
5	4904.00	49.9 PK	74.0	-24.1	1.26 V	25	47.4	2.5
6	4904.00	37.6 AV	54.0	-16.4	1.26 V	25	35.1	2.5
7	7356.00	58.4 PK	74.0	-15.6	1.22 V	28	49.2	9.2
8	7356.00	44.2 AV	54.0	-9.8	1.22 V	28	35.0	9.2

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 Data:

802.11g

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	108.01	36.1 QP	43.5	-7.4	2.00 H	256	47.8	-11.7
2	228.00	38.4 QP	46.0	-7.6	1.50 H	294	49.7	-11.3
3	480.01	38.0 QP	46.0	-8.0	1.00 H	290	40.9	-2.9
4	560.01	37.1 QP	46.0	-8.9	1.50 H	79	38.5	-1.4
5	639.98	34.2 QP	46.0	-11.8	1.50 H	360	33.5	0.7
6	750.01	36.7 QP	46.0	-9.3	1.00 H	288	34.2	2.5
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	108.01	37.0 QP	43.5	-6.5	1.00 V	344	48.7	-11.7
2	240.00	39.7 QP	46.0	-6.3	1.00 V	191	49.6	-9.9
3	426.68	40.4 QP	46.0	-5.6	1.50 V	62	44.4	-4.0
4	528.85	38.9 QP	46.0	-7.1	1.00 V	276	40.8	-1.9
5	560.01	37.7 QP	46.0	-8.3	1.00 V	49	39.1	-1.4
6	750.06	34.2 QP	46.0	-11.8	1.50 V	353	31.7	2.5

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 R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
- 3 Tested Date:Nov. 24, 2016

4.2.3 Test Procedures

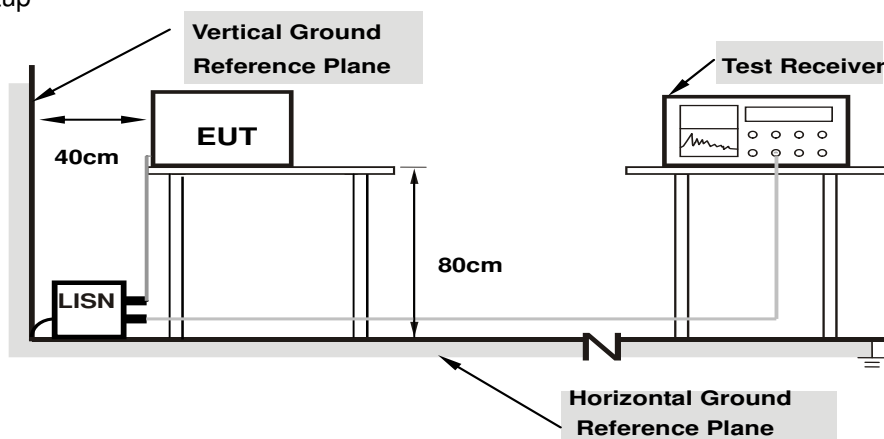
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

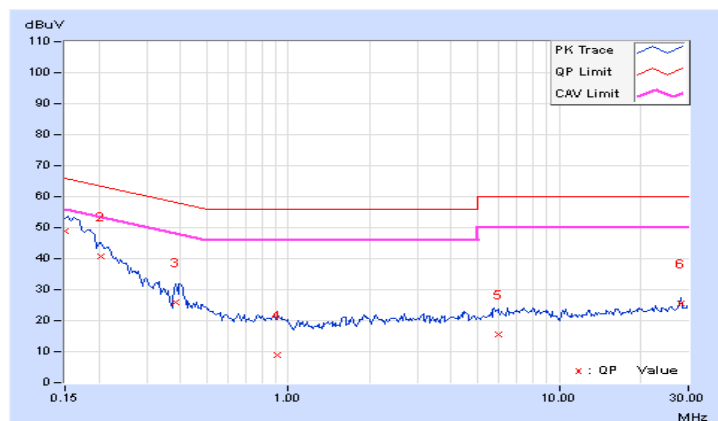
4.2.7 Test Results

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

No	Freq. [MHz]	Corr.	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	0.15000	10.19	38.71	21.91	48.90	32.10	66.00	56.00	-17.10	-23.90
2	0.20469	10.19	30.53	14.85	40.72	25.04	63.42	53.42	-22.70	-28.38
3	0.38438	10.22	15.66	6.58	25.88	16.80	58.18	48.18	-32.30	-31.38
4	0.91172	10.25	-1.46	-4.87	8.79	5.38	56.00	46.00	-47.21	-40.62
5	5.94141	10.34	5.37	-0.47	15.71	9.87	60.00	50.00	-44.29	-40.13
6	28.00000	11.45	14.12	10.94	25.57	22.39	60.00	50.00	-34.43	-27.61

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.

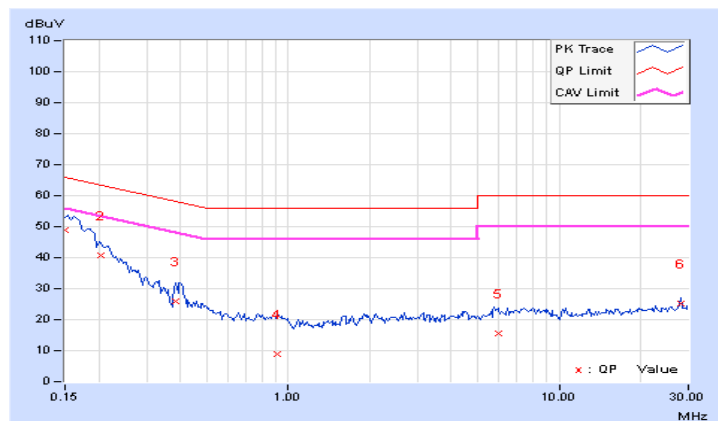


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.18	38.71	21.91	48.89	32.09	66.00	56.00	-17.11	-23.91
2	0.20469	10.16	30.53	14.85	40.69	25.01	63.42	53.42	-22.73	-28.41
3	0.38438	10.21	15.66	6.58	25.87	16.79	58.18	48.18	-32.31	-31.39
4	0.91172	10.23	-1.46	-4.87	8.77	5.36	56.00	46.00	-47.23	-40.64
5	5.94141	10.27	5.37	-0.47	15.64	9.80	60.00	50.00	-44.36	-40.20
6	28.00000	11.06	14.12	10.94	25.18	22.00	60.00	50.00	-34.82	-28.00

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.

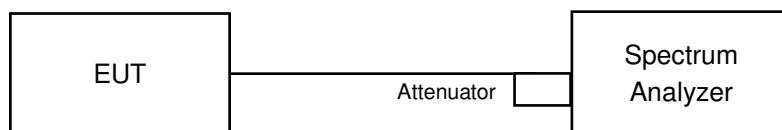


4.3 6dB Bandwidth Measurement

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

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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	10.11	0.5	PASS
6	2437	10.11	0.5	PASS
11	2462	10.12	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.61	0.5	PASS
6	2437	16.62	0.5	PASS
11	2462	16.63	0.5	PASS

802.11n (HT20)

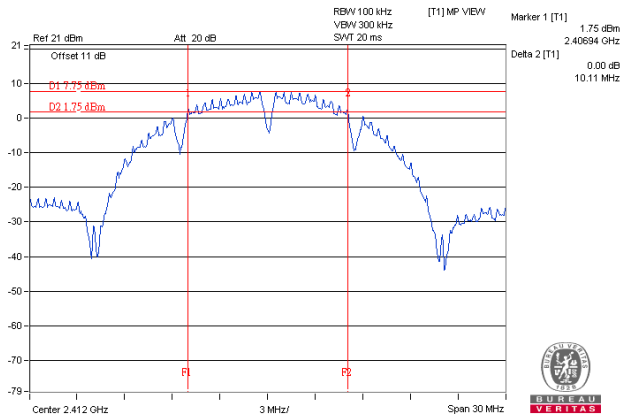
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.89	0.5	PASS
6	2437	17.88	0.5	PASS
11	2462	17.89	0.5	PASS

802.11n (HT40)

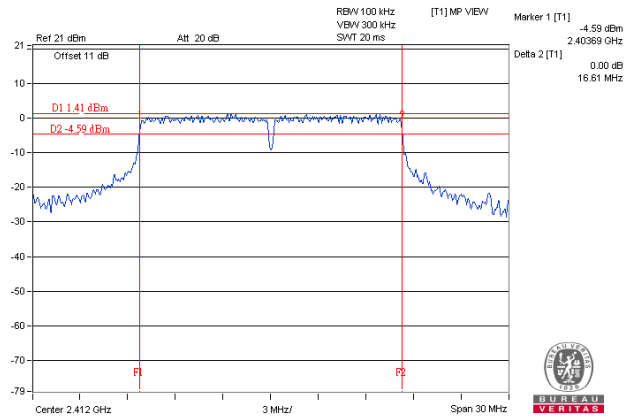
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.47	0.5	PASS
6	2437	36.55	0.5	PASS
9	2452	36.56	0.5	PASS

Spectrum Plot of Worst Value

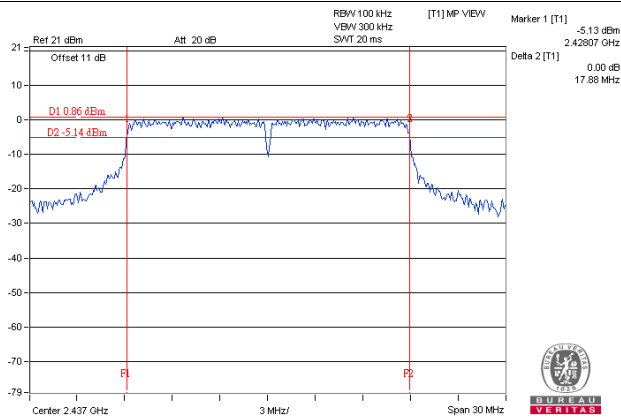
802.11b / CH1



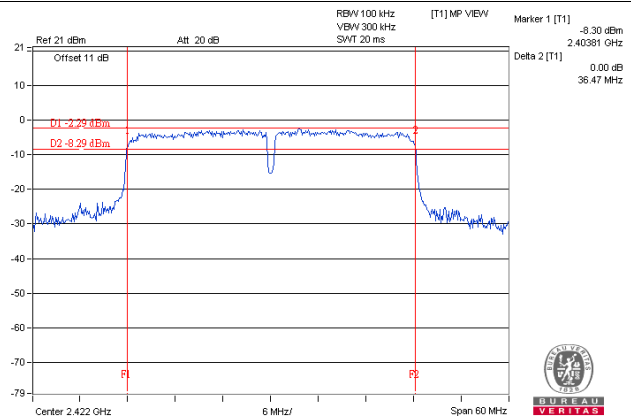
802.11g / CH1



802.11n (HT20) / CH6



802.11n (HT40) / CH3

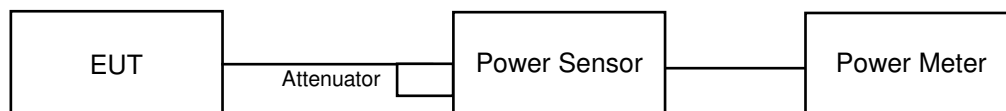


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

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

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	87.297	19.41	30	Pass
6	2437	89.743	19.53	30	Pass
11	2462	88.92	19.49	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	151.356	21.80	30	Pass
6	2437	151.705	21.81	30	Pass
11	2462	148.594	21.72	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	126.474	21.02	30	Pass
6	2437	128.825	21.10	30	Pass
11	2462	127.938	21.07	30	Pass

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	130.317	21.15	30	Pass
6	2437	130.918	21.17	30	Pass
9	2452	128.825	21.10	30	Pass

FOR AVERAGE POWER

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	56.624	17.53
6	2437	58.076	17.64
11	2462	57.016	17.56

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	45.29	16.56
6	2437	45.394	16.57
11	2462	43.954	16.43

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	33.884	15.30
6	2437	34.834	15.42
11	2462	34.674	15.40

802.11n (HT40)

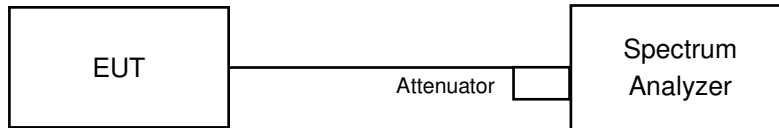
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	34.356	15.36
6	2437	34.674	15.40
9	2452	34.119	15.33

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

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- 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	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-12.60	8	Pass
6	2437	-14.79	8	Pass
11	2462	-14.95	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-13.25	8	Pass
6	2437	-12.05	8	Pass
11	2462	-12.67	8	Pass

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-13.44	8	Pass
6	2437	-13.79	8	Pass
11	2462	-13.80	8	Pass

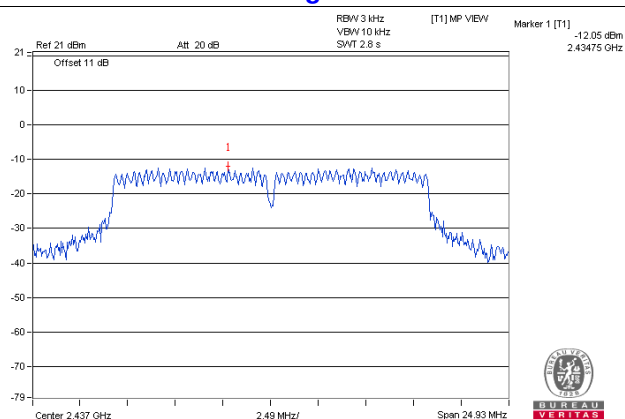
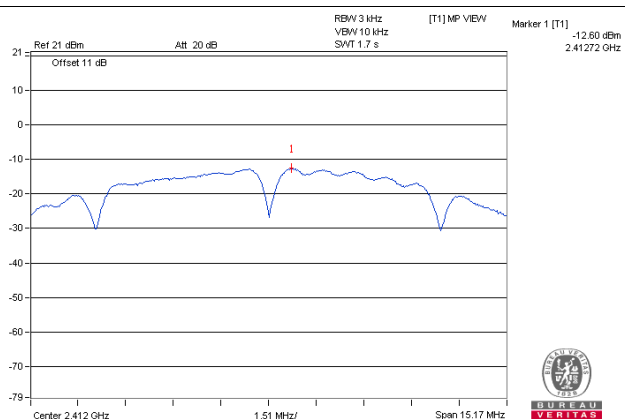
802.11n (HT40)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-15.94	8	Pass
6	2437	-13.81	8	Pass
9	2452	-14.76	8	Pass

Spectrum Plot of Worst Value

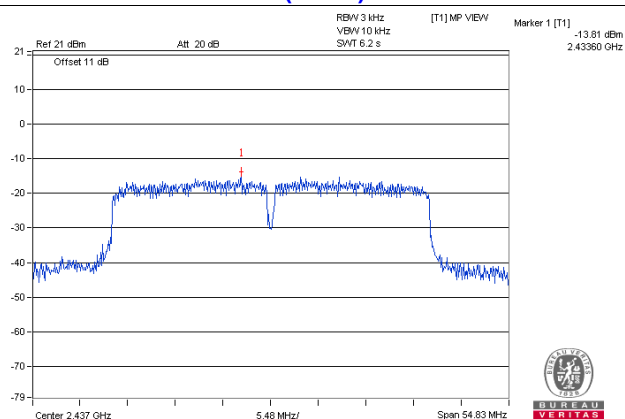
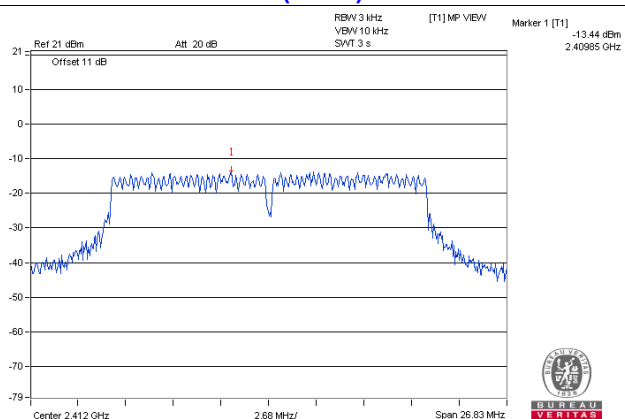
802.11b / CH1

802.11g / CH6



802.11n (HT20) / CH1

802.11n (HT40) / CH6

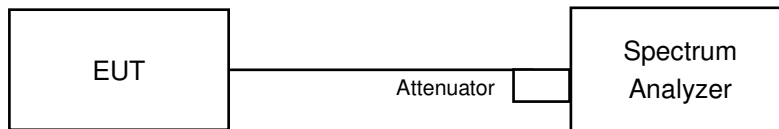


4.6 Conducted Out of Band Emission Measurement

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

Refer to section 4.1.2 to get information of above instrument.

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

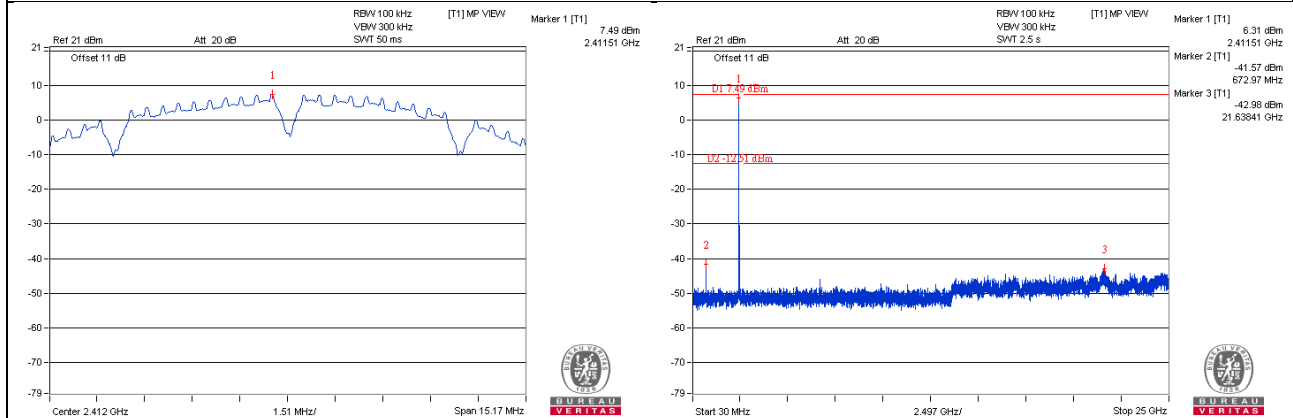
Same as Item 4.3.6

4.6.7 Test Results

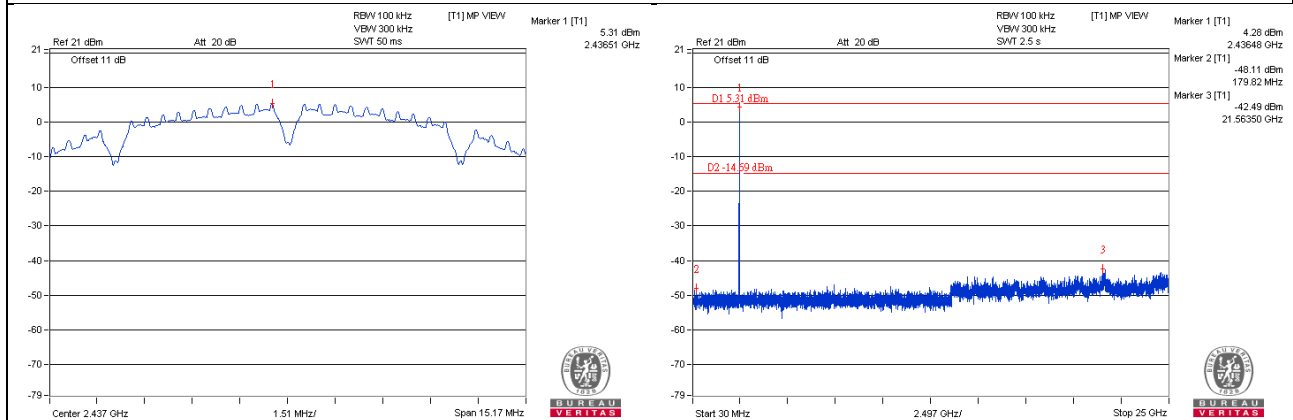
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

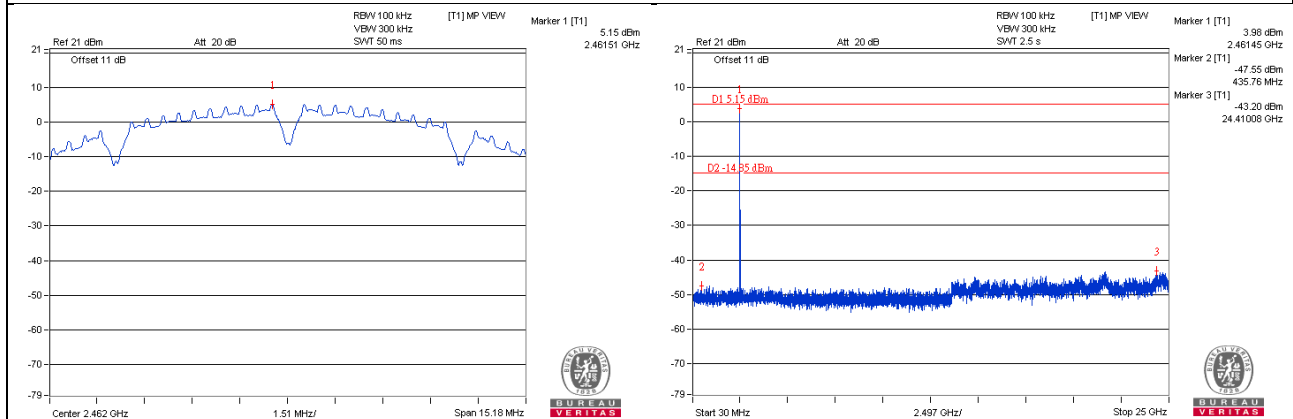
CH 1



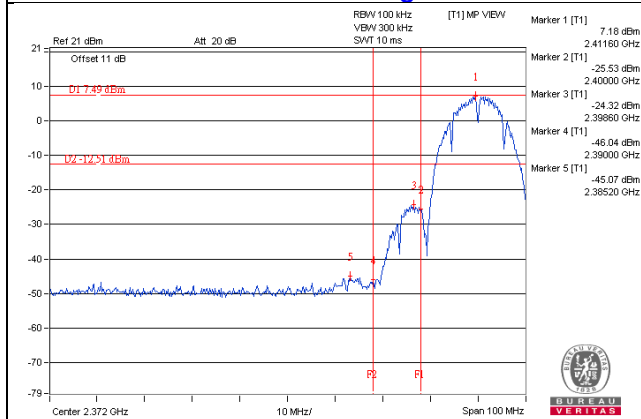
CH 6



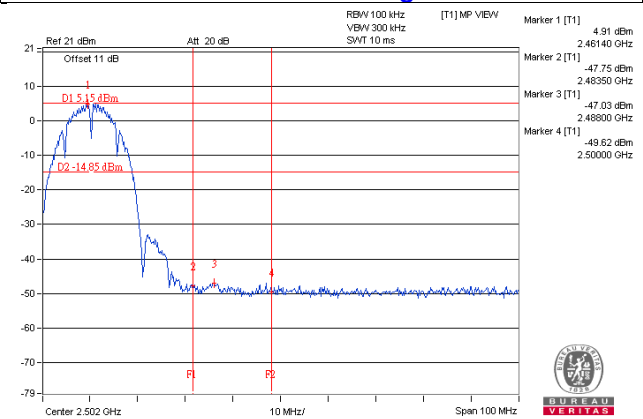
CH 11



CH 1 Band edge

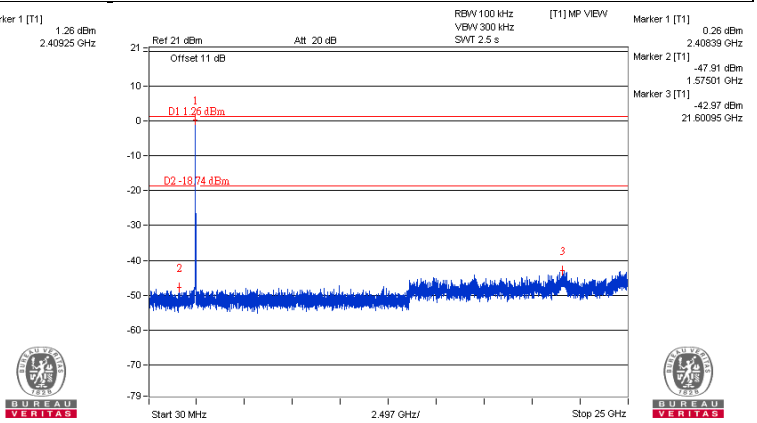
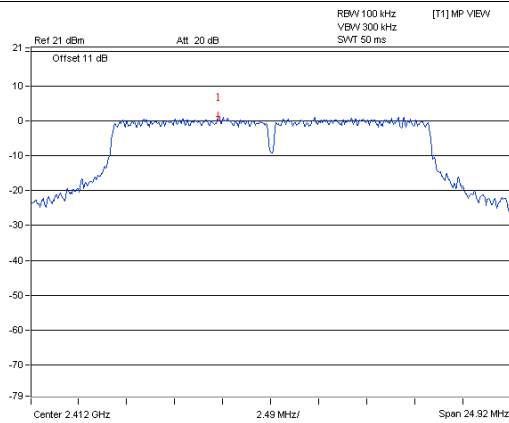


CH 11 Band edge

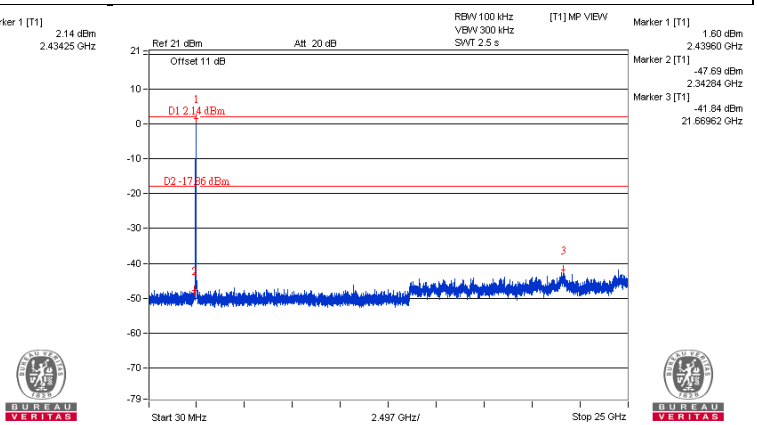
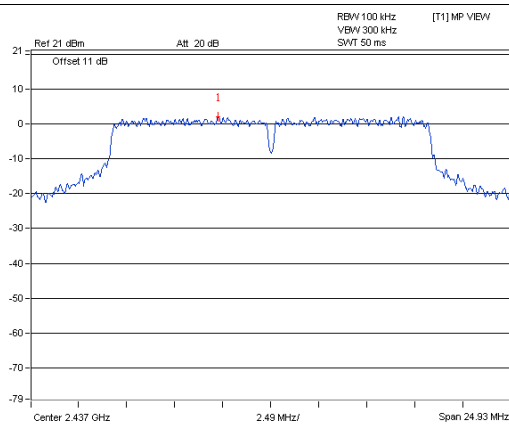


802.11g

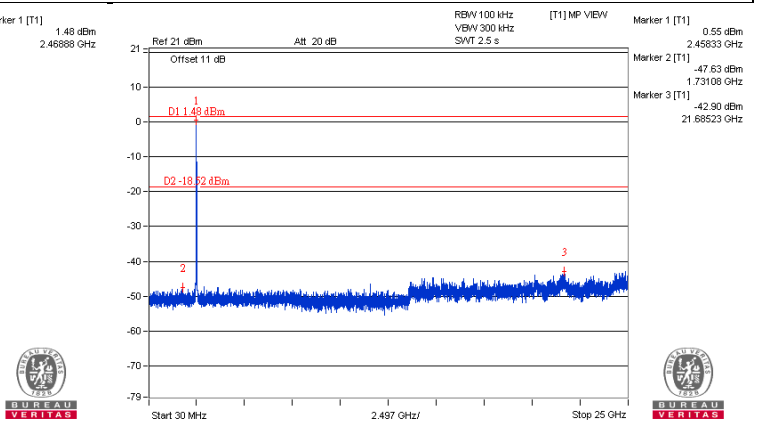
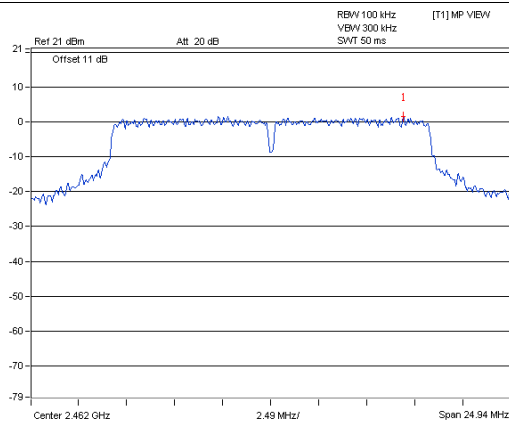
CH 1



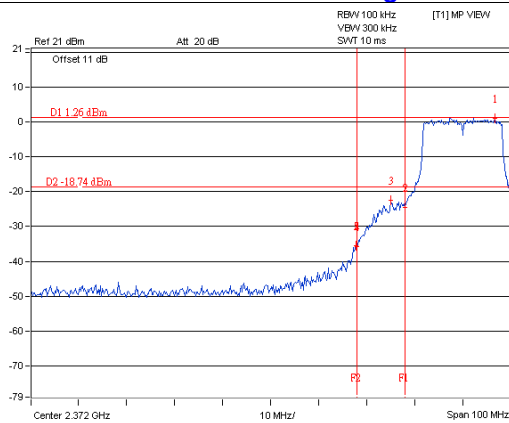
CH 6



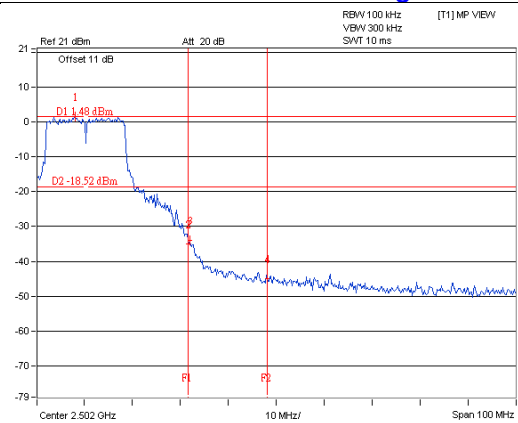
CH 11



CH 1 Band edge

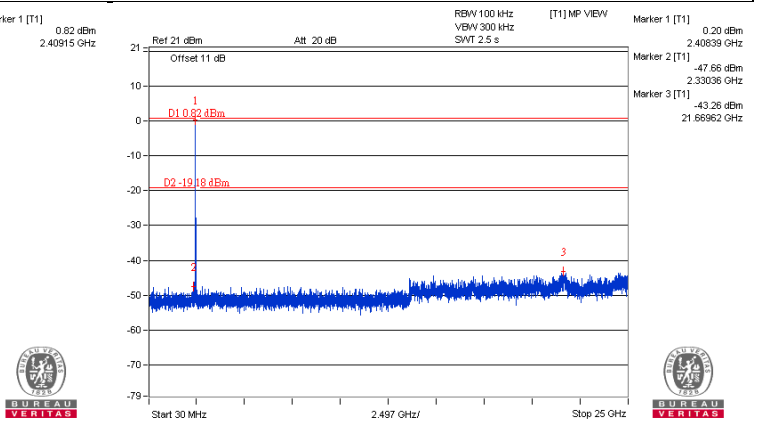
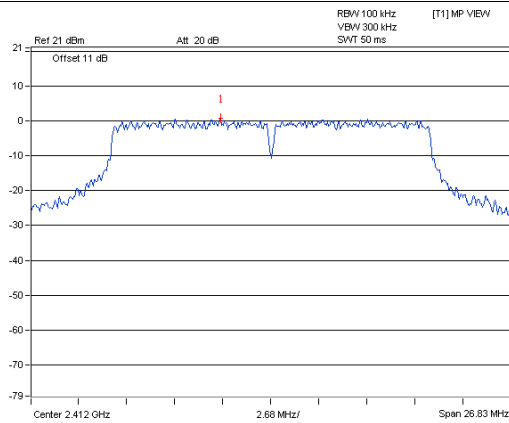


CH 11 Band edge

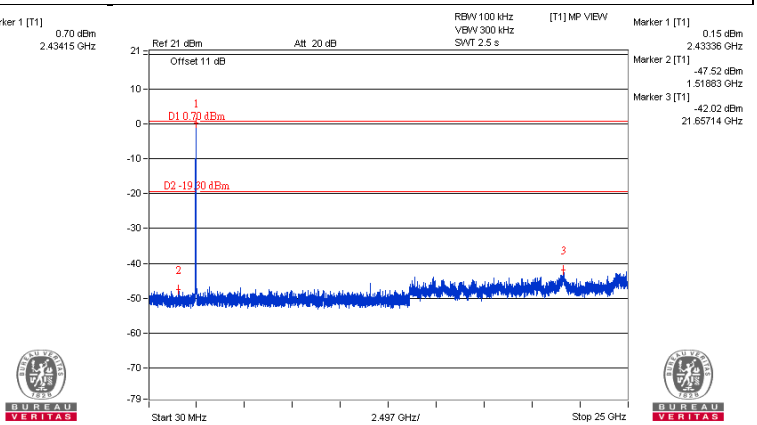
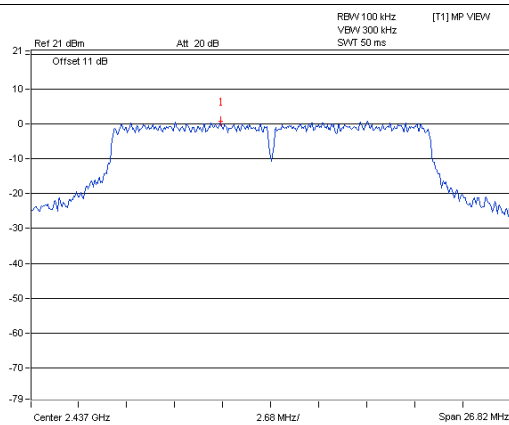


802.11n (HT20)

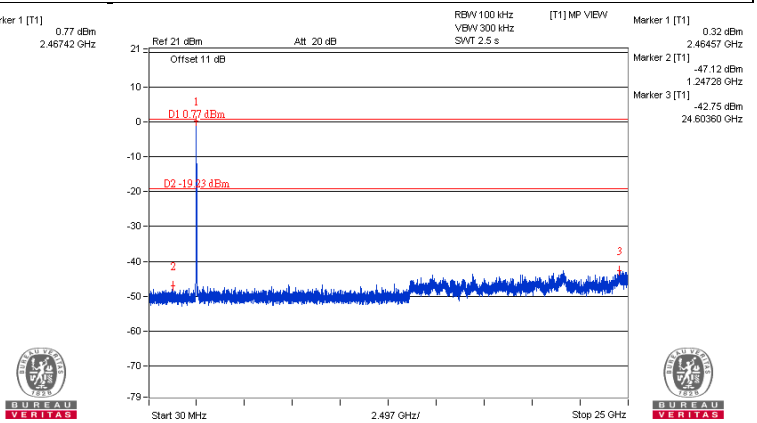
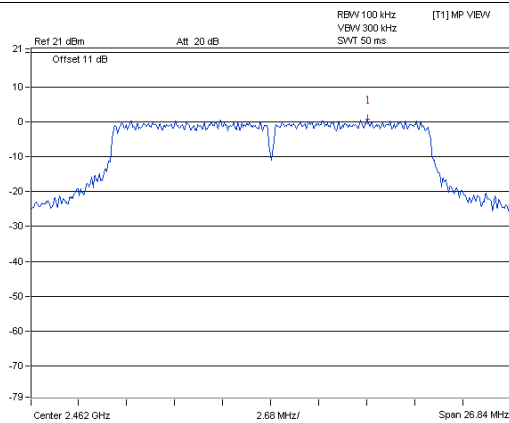
CH 1



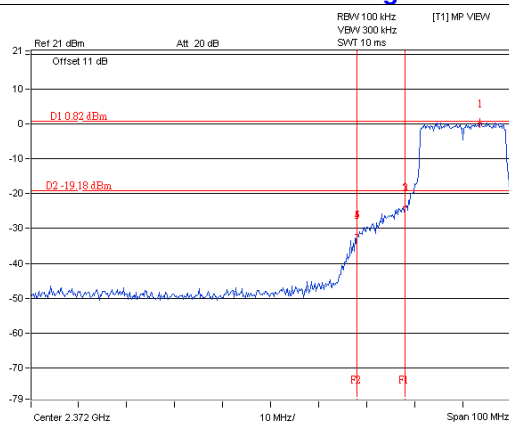
CH 6



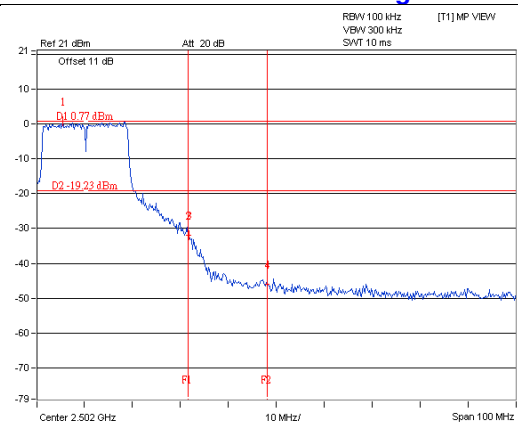
CH 11



CH 1 Band edge

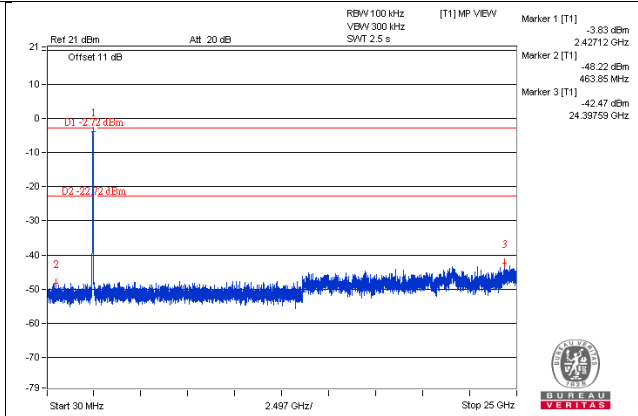
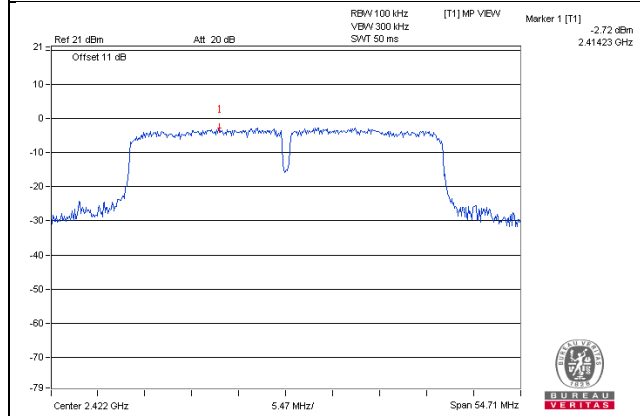


CH 11 Band edge

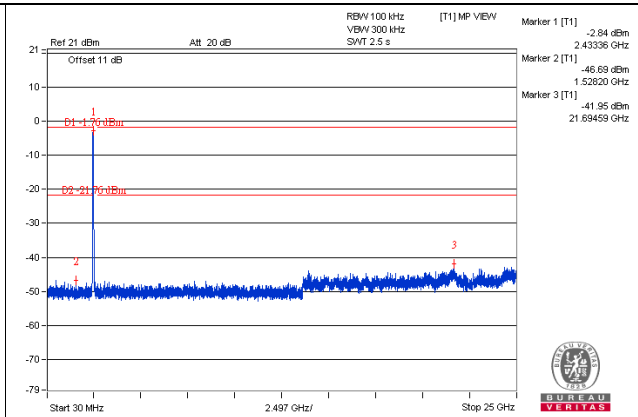
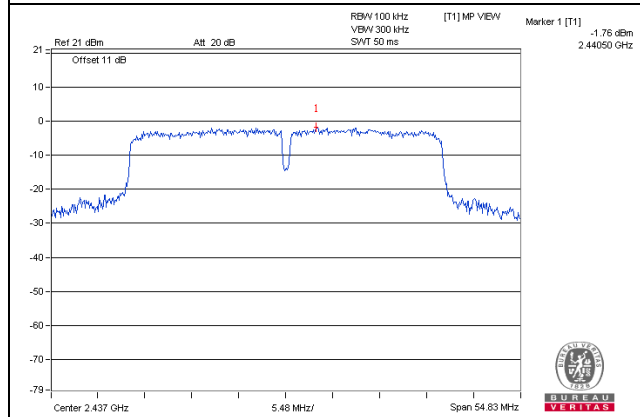


802.11n (HT40)

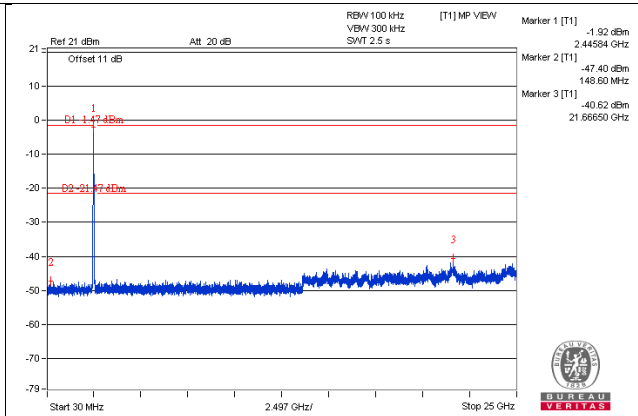
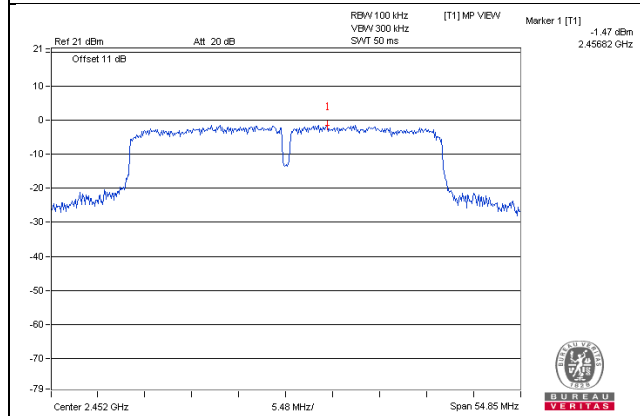
CH 3



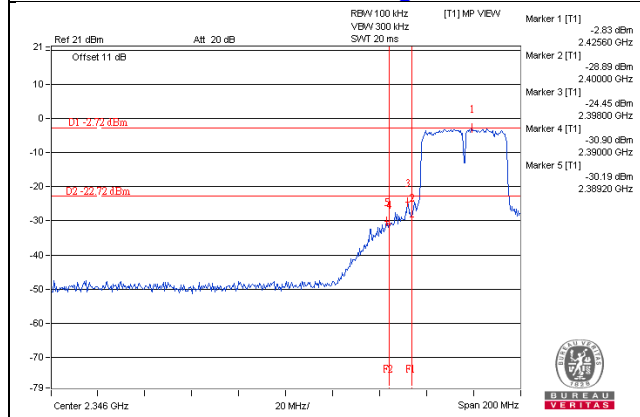
CH 6



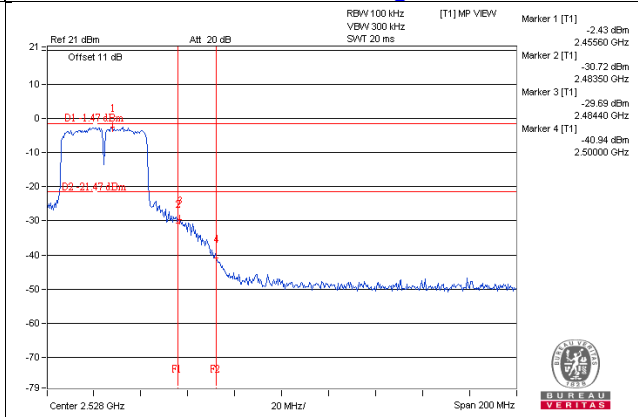
CH 9



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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