

FCC Test Report (WLAN)

Report No.: RF130902E05G

FCC ID: MQT-XAPT103PUWT

Test Model: xAPT-103PUW

Series Model: FD410, xCE_T103PUW

Received Date: Aug. 17, 2016

Test Date: Aug. 24 to 25, 2016

Issued Date: Sep. 09, 2016

Applicant: XAC AUTOMATION CORP.

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PARK,HSINCHU,TAIWAN

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Release Control Record

Issue No.	Description	Date Issued
RF130902E05G	Original release.	Sep. 09, 2016

1 Certificate of Conformity

Product: Terminal

Brand: XAC, First Data

Test Model: xAPT-103PUW

Series Model: FD410, xCE_T103PUW

Sample Status: ENGINEERING SAMPLE

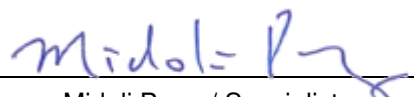
Applicant: XAC AUTOMATION CORP.

Test Date: Aug. 24 to 25, 2016

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

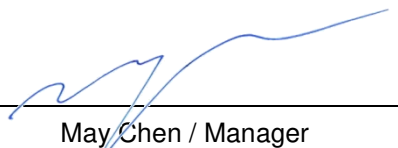
The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts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

Prepared by :


Midoli Peng / Specialist

Date: Sep. 09, 2016

Approved by :


May Chen / Manager

Date: Sep. 09, 2016

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 -14.83dB at 0.17391MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB 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	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	Terminal
Brand	XAC, First Data
Test Model	xAPT-103PUW
Series Model	FD410, xCE_T103PUW
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 7.4V from Battery 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	2.412 ~ 2.462GHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
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:

- The EUT could be supplied with DC 7.4V battery or power adapter as the following table:

Battery		
Brand	Model No.	Spec.
Foxlink	FD400	DC 7.4V, 2300mAh (17.02Wh)
Adapter (only for test, not for sale)		
Brand	Model No.	Spec.
DELTA	ADP-36JH B	AC I/P: 100-240V, 50-60Hz, 1.0A AC input cable: Unshielded, 1.85m DC O/P: 12V, 3A DC output cable: Unshielded, 1.8m with one core

- All models are listed as below table:

Brand	Model	Difference
XAC	xAPT-103PUW	For marketing requirement
XAC	xCE_T103PUW	
First Data	FD410	

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

- The EUT is a WLAN, RFID, GSM and WCDMA device.
- WLAN, RFID, GSM and WCDMA technology cannot transmit at same time.

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

GPRS, EDGE, WCDMA, HSDPA and HSUPA Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
Ethertronics Inc.	T-000084-01	FPCB	IPEX	0.14	850
				2.57	1900
WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
ACX	AT3216-T2R4PAA	Chip	NA	1.5	2400-2500
RFID Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	Loop	NA	13	13.56

6. The EUT is pre-tested under following test modes :

Pre-test Mode	Description
Mode A	Battery mode
Mode B	Adapter mode

For the above modes, the worse radiated emissions test was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

7. 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

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

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g 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.

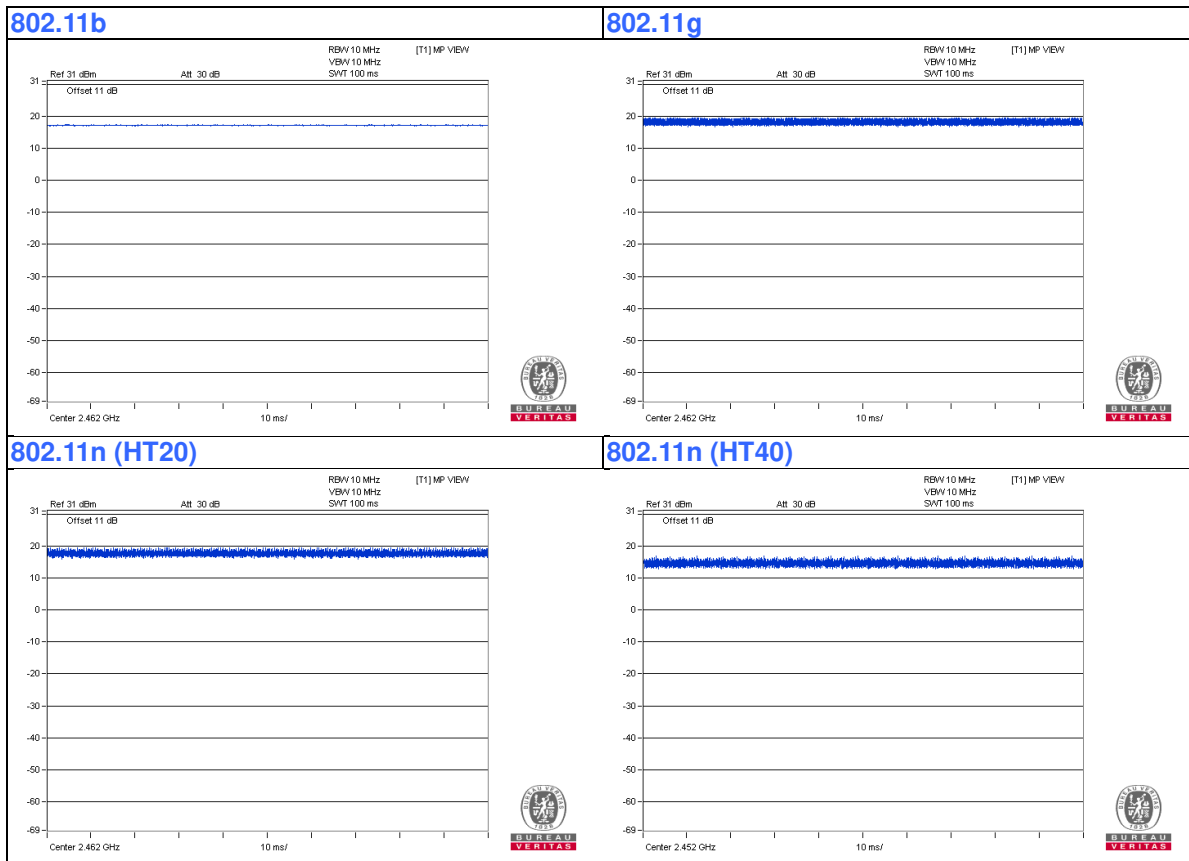
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test 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	25deg. C, 75%RH	120Vac, 60Hz	Barry Lee
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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	DELTA	ADP-36JH B	NA	NA	Supplied by Client
B.	SIM Card	R&S	CRT-Z3	NA	NA	Provided by Lab

Note:

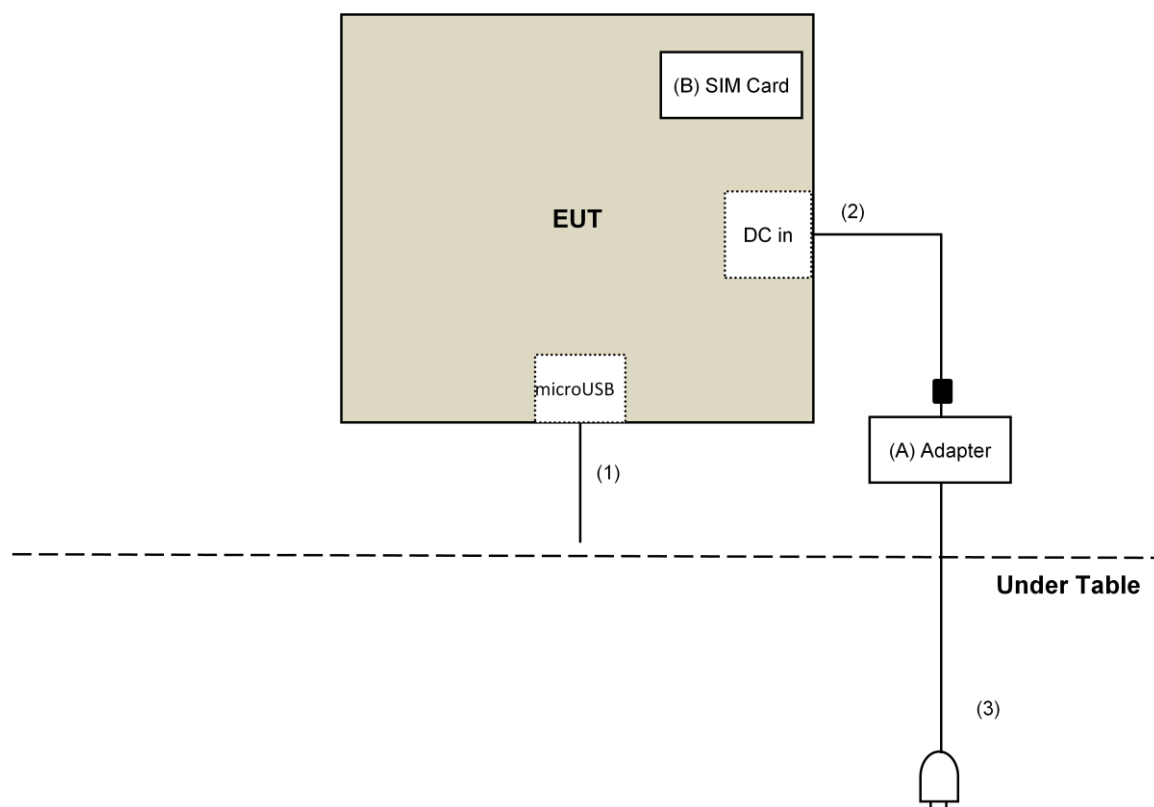
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	microUSB Cable	1	1	No	0	Provided by Lab
2.	DC Cable	1	1.8	No	1	Supplied by client
3.	AC Cable	1	1.85	No	0	Supplied by client

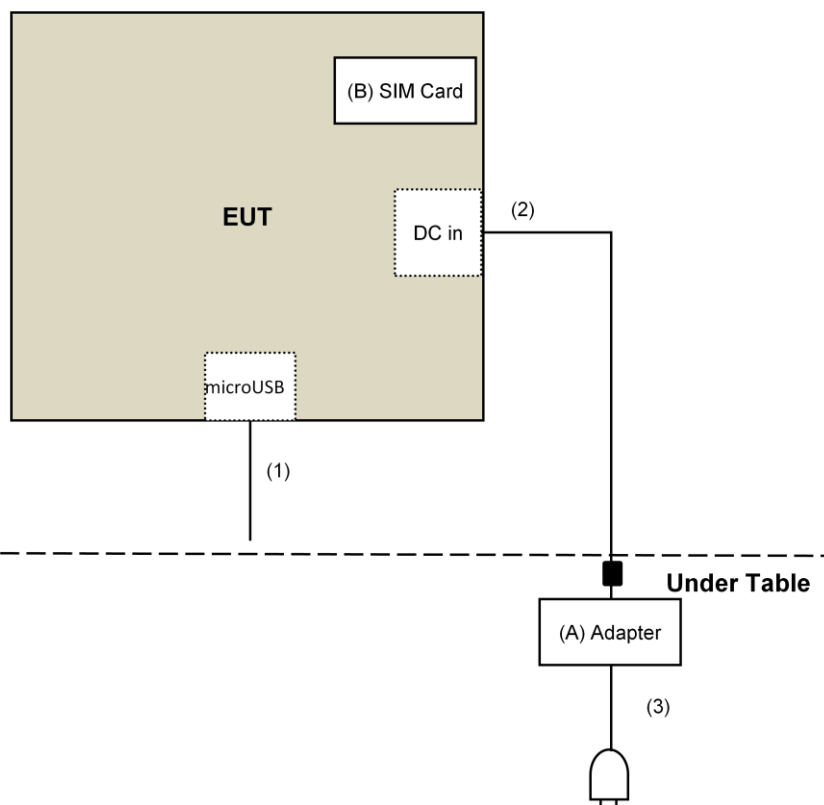
Note: The core(s) is(are) originally attached to the cable(s)

3.4.1 Configuration of System under Test

For conducted emission :



For radiated emission :



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	MY51210105	July 06, 2016	July 05, 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-03	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D-FB	CHGCAB-001-1 CHGCAB-001-2	Oct. 03, 2015	Oct. 02, 2016
	RF-141	CHGCAB-004	Oct. 03, 2015	Oct. 02, 2016
Horn_Antenna FT-RF	HA-07M18G-NF	0000320091110	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A02578	June 22, 2016	June 21, 2017
RF Cable	NA	131205 131216 131217 SNMY23684/4	Jan. 15, 2016	Jan. 14, 2017
Spectrum Analyzer Agilent	E4446A	MY48250254	Nov. 25, 2015	Nov. 24, 2016
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 11, 2015	Dec. 10, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Jan. 18, 2016	Jan. 17, 2017
RF Cable	SUCOFLEX 102	36442/2 36434/2	Dec. 10, 2015	Dec.09, 2016
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	CM100	NA	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-WD01	NA	NA
Spectrum Analyzer R&S	FSP40	100060	May 11, 2016	May 10, 2017
Power meter Anritsu	ML2495A	1014008	May 05, 2016	May 04, 2017
Power sensor Anritsu	MA2411B	0917122	May 05, 2016	May 04, 2017

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. 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.
- Tested Date: Aug. 24, 2016

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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:

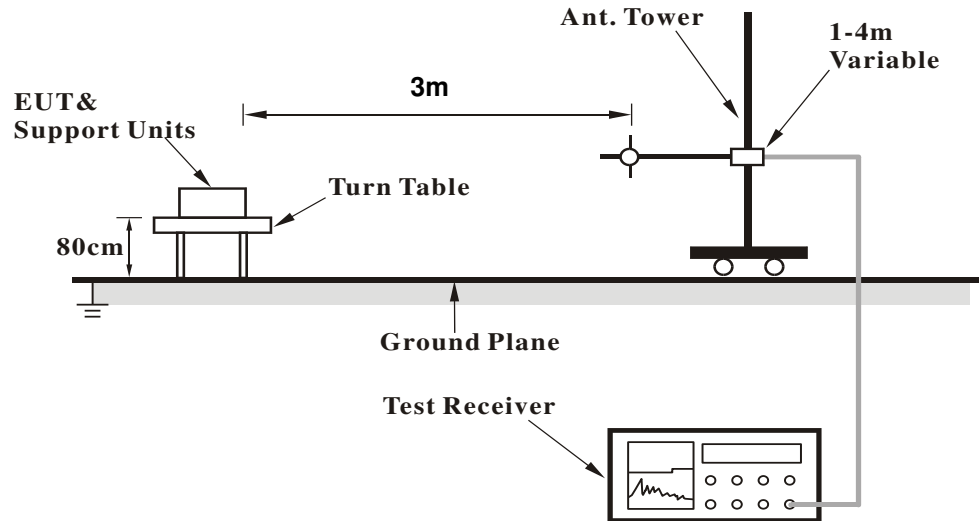
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

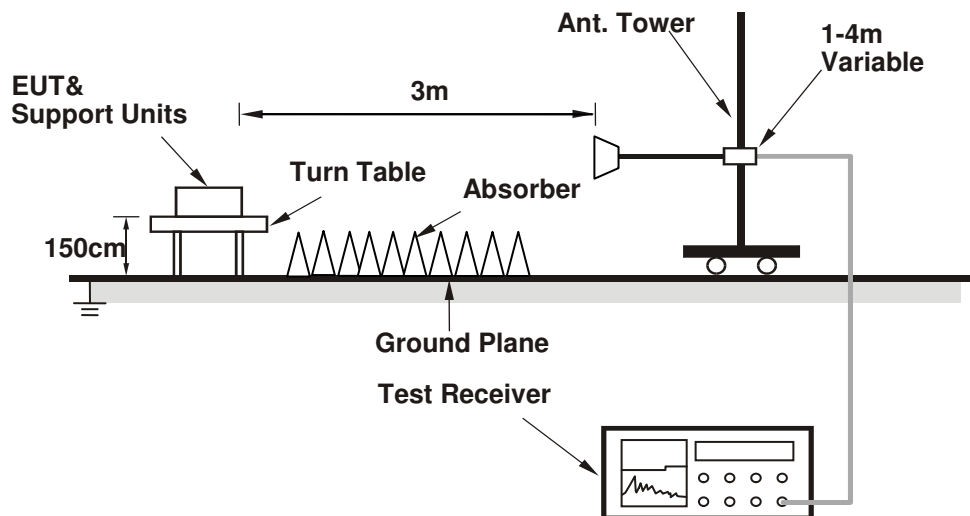
No deviation.

4.1.5 Test Setup

<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. 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	53.4 PK	74.0	-20.6	1.75 H	243	52.8	0.6
2	2390.00	45.9 AV	54.0	-8.1	1.75 H	243	45.3	0.6
3	*2412.00	105.1 PK			1.75 H	243	104.3	0.8
4	*2412.00	102.6 AV			1.75 H	243	101.8	0.8
5	4824.00	56.1 PK	74.0	-17.9	1.32 H	350	46.9	9.2
6	4824.00	53.6 AV	54.0	-0.4	1.32 H	350	44.4	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	2390.00	53.7 PK	74.0	-20.3	1.28 V	223	53.1	0.6
2	2390.00	45.3 AV	54.0	-8.7	1.28 V	223	44.7	0.6
3	*2412.00	105.9 PK			1.28 V	223	105.1	0.8
4	*2412.00	103.3 AV			1.28 V	223	102.5	0.8
5	4824.00	52.6 PK	74.0	-21.4	1.48 V	356	43.4	9.2
6	4824.00	46.2 AV	54.0	-7.8	1.48 V	356	37.0	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.

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	49.0 PK	74.0	-25.0	1.78 H	251	48.4	0.6
2	2390.00	36.4 AV	54.0	-17.6	1.78 H	251	35.8	0.6
3	*2437.00	105.2 PK			1.78 H	251	104.4	0.8
4	*2437.00	102.2 AV			1.78 H	251	101.4	0.8
5	2483.50	50.0 PK	74.0	-24.0	1.78 H	251	49.1	0.9
6	2483.50	36.8 AV	54.0	-17.2	1.78 H	251	35.9	0.9
7	4874.00	54.0 PK	74.0	-20.0	1.65 H	30	44.7	9.3
8	4874.00	46.7 AV	54.0	-7.3	1.65 H	30	37.4	9.3
9	7311.00	58.8 PK	74.0	-15.2	1.50 H	10	42.3	16.5
10	7311.00	44.5 AV	54.0	-9.5	1.50 H	10	28.0	16.5

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	2390.00	48.7 PK	74.0	-25.3	1.45 V	217	48.1	0.6
2	2390.00	36.0 AV	54.0	-18.0	1.45 V	217	35.4	0.6
3	*2437.00	105.9 PK			1.45 V	217	105.1	0.8
4	*2437.00	103.4 AV			1.45 V	217	102.6	0.8
5	2483.50	50.1 PK	74.0	-23.9	1.45 V	217	49.2	0.9
6	2483.50	36.9 AV	54.0	-17.1	1.45 V	217	36.0	0.9
7	4874.00	51.7 PK	74.0	-22.3	1.02 V	356	42.4	9.3
8	4874.00	41.9 AV	54.0	-12.1	1.02 V	356	32.6	9.3
9	7311.00	56.9 PK	74.0	-17.1	1.50 V	32	40.4	16.5
10	7311.00	45.0 AV	54.0	-9.0	1.50 V	32	28.5	16.5

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
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			1.80 H	231	102.3	0.9
2	*2462.00	101.7 AV			1.80 H	231	100.8	0.9
3	2483.50	52.7 PK	74.0	-21.3	1.80 H	231	51.8	0.9
4	2483.50	41.8 AV	54.0	-12.2	1.80 H	231	40.9	0.9
5	4924.00	55.1 PK	74.0	-18.9	1.50 H	30	45.7	9.4
6	4924.00	49.6 AV	54.0	-4.4	1.50 H	30	40.2	9.4
7	7386.00	57.2 PK	74.0	-16.8	1.50 H	30	41.2	16.0
8	7386.00	44.6 AV	54.0	-9.4	1.50 H	30	28.6	16.0
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			1.21 V	222	103.6	0.9
2	*2462.00	102.8 AV			1.21 V	222	101.9	0.9
3	2483.50	53.1 PK	74.0	-20.9	1.21 V	222	52.2	0.9
4	2483.50	42.0 AV	54.0	-12.0	1.21 V	222	41.1	0.9
5	4924.00	51.6 PK	74.0	-22.4	1.05 V	352	42.2	9.4
6	4924.00	42.0 AV	54.0	-12.0	1.05 V	352	32.6	9.4
7	7386.00	57.5 PK	74.0	-16.5	1.50 V	48	41.5	16.0
8	7386.00	45.5 AV	54.0	-8.5	1.50 V	48	29.5	16.0

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	66.6 PK	74.0	-7.4	1.77 H	241	66.0	0.6
2	2390.00	49.1 AV	54.0	-4.9	1.77 H	241	48.5	0.6
3	*2412.00	103.8 PK			1.77 H	241	103.0	0.8
4	*2412.00	94.5 AV			1.77 H	241	93.7	0.8
5	4824.00	52.4 PK	74.0	-21.6	1.32 H	356	43.2	9.2
6	4824.00	39.6 AV	54.0	-14.4	1.32 H	356	30.4	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	2390.00	69.9 PK	74.0	-4.1	1.56 V	190	69.3	0.6
2	2390.00	51.6 AV	54.0	-2.4	1.56 V	190	51.0	0.6
3	*2412.00	105.2 PK			1.56 V	190	104.4	0.8
4	*2412.00	95.5 AV			1.56 V	190	94.7	0.8
5	4824.00	50.1 PK	74.0	-23.9	1.29 V	10	40.9	9.2
6	4824.00	37.9 AV	54.0	-16.1	1.29 V	10	28.7	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.

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	50.1 PK	74.0	-23.9	1.70 H	240	49.5	0.6
2	2390.00	40.7 AV	54.0	-13.3	1.70 H	240	40.1	0.6
3	*2437.00	105.4 PK			1.70 H	240	104.6	0.8
4	*2437.00	96.7 AV			1.70 H	240	95.9	0.8
5	2483.50	51.2 PK	74.0	-22.8	1.70 H	240	50.3	0.9
6	2483.50	38.2 AV	54.0	-15.8	1.70 H	240	37.3	0.9
7	4874.00	52.4 PK	74.0	-21.6	1.34 H	360	43.1	9.3
8	4874.00	39.5 AV	54.0	-14.5	1.34 H	360	30.2	9.3
9	7311.00	58.7 PK	74.0	-15.3	1.30 H	350	42.2	16.5
10	7311.00	44.4 AV	54.0	-9.6	1.30 H	350	27.9	16.5

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	2390.00	51.1 PK	74.0	-22.9	1.45 V	188	50.5	0.6
2	2390.00	41.0 AV	54.0	-13.0	1.45 V	188	40.4	0.6
3	*2437.00	107.3 PK			1.45 V	188	106.5	0.8
4	*2437.00	97.9 AV			1.45 V	188	97.1	0.8
5	2483.50	53.2 PK	74.0	-20.8	1.45 V	188	52.3	0.9
6	2483.50	38.5 AV	54.0	-15.5	1.45 V	188	37.6	0.9
7	4874.00	50.2 PK	74.0	-23.8	1.24 V	5	40.9	9.3
8	4874.00	37.5 AV	54.0	-16.5	1.24 V	5	28.2	9.3
9	7311.00	58.2 PK	74.0	-15.8	1.20 V	20	41.7	16.5
10	7311.00	44.5 AV	54.0	-9.5	1.20 V	20	28.0	16.5

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
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	105.1 PK			1.78 H	260	104.2	0.9
2	*2462.00	96.5 AV			1.78 H	260	95.6	0.9
3	2483.50	70.4 PK	74.0	-3.6	1.78 H	260	69.5	0.9
4	2483.50	51.2 AV	54.0	-2.8	1.78 H	260	50.3	0.9
5	4924.00	52.0 PK	74.0	-22.0	1.37 H	350	42.6	9.4
6	4924.00	39.2 AV	54.0	-14.8	1.37 H	350	29.8	9.4
7	7386.00	58.5 PK	74.0	-15.5	1.35 H	357	42.5	16.0
8	7386.00	44.3 AV	54.0	-9.7	1.35 H	357	28.3	16.0

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.7 PK			1.60 V	194	106.8	0.9
2	*2462.00	97.8 AV			1.60 V	194	96.9	0.9
3	2483.50	72.1 PK	74.0	-1.9	1.60 V	194	71.2	0.9
4	2483.50	53.3 AV	54.0	-0.7	1.60 V	194	52.4	0.9
5	4924.00	50.3 PK	74.0	-23.7	1.30 V	10	40.9	9.4
6	4924.00	37.8 AV	54.0	-16.2	1.30 V	10	28.4	9.4
7	7386.00	58.6 PK	74.0	-15.4	1.18 V	8	42.6	16.0
8	7386.00	44.7 AV	54.0	-9.3	1.18 V	8	28.7	16.0

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	68.4 PK	74.0	-5.6	1.94 H	197	67.8	0.6
2	2390.00	46.6 AV	54.0	-7.4	1.94 H	197	46.0	0.6
3	*2412.00	100.2 PK			1.94 H	197	99.4	0.8
4	*2412.00	90.9 AV			1.94 H	197	90.1	0.8
5	4824.00	52.6 PK	74.0	-21.4	1.28 H	360	43.4	9.2
6	4824.00	39.9 AV	54.0	-14.1	1.28 H	360	30.7	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	2390.00	72.4 PK	74.0	-1.6	1.58 V	191	71.8	0.6
2	2390.00	49.7 AV	54.0	-4.3	1.58 V	191	49.1	0.6
3	*2412.00	103.6 PK			1.58 V	191	102.8	0.8
4	*2412.00	94.3 AV			1.58 V	191	93.5	0.8
5	4824.00	50.2 PK	74.0	-23.8	1.26 V	8	41.0	9.2
6	4824.00	38.3 AV	54.0	-15.7	1.26 V	8	29.1	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.

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	58.3 PK	74.0	-15.7	1.33 H	344	57.7	0.6
2	2390.00	44.0 AV	54.0	-10.0	1.33 H	344	43.4	0.6
3	*2437.00	102.0 PK			1.33 H	344	101.2	0.8
4	*2437.00	92.5 AV			1.33 H	344	91.7	0.8
5	2483.50	50.0 PK	74.0	-24.0	1.33 H	344	49.1	0.9
6	2483.50	40.4 AV	54.0	-13.6	1.33 H	344	39.5	0.9
7	4874.00	52.5 PK	74.0	-21.5	1.36 H	360	43.2	9.3
8	4874.00	39.7 AV	54.0	-14.3	1.36 H	360	30.4	9.3
9	7311.00	58.4 PK	74.0	-15.6	1.36 H	340	41.9	16.5
10	7311.00	44.0 AV	54.0	-10.0	1.36 H	340	27.5	16.5

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	2390.00	50.8 PK	74.0	-23.2	1.47 V	190	50.2	0.6
2	2390.00	40.9 AV	54.0	-13.1	1.47 V	190	40.3	0.6
3	*2437.00	105.5 PK			1.47 V	190	104.7	0.8
4	*2437.00	96.1 AV			1.47 V	190	95.3	0.8
5	2483.50	51.3 PK	74.0	-22.7	1.47 V	190	50.4	0.9
6	2483.50	37.9 AV	54.0	-16.1	1.47 V	190	37.0	0.9
7	4874.00	49.8 PK	74.0	-24.2	1.20 V	14	40.5	9.3
8	4874.00	37.1 AV	54.0	-16.9	1.20 V	14	27.8	9.3
9	7311.00	58.7 PK	74.0	-15.3	1.19 V	17	42.2	16.5
10	7311.00	44.8 AV	54.0	-9.2	1.19 V	17	28.3	16.5

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
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.6 PK			1.37 H	339	101.7	0.9
2	*2462.00	93.0 AV			1.37 H	339	92.1	0.9
3	2483.50	68.6 PK	74.0	-5.4	1.37 H	339	67.7	0.9
4	2483.50	50.2 AV	54.0	-3.8	1.37 H	339	49.3	0.9
5	4924.00	52.7 PK	74.0	-21.3	1.34 H	360	43.3	9.4
6	4924.00	39.6 AV	54.0	-14.4	1.34 H	360	30.2	9.4
7	7386.00	59.1 PK	74.0	-14.9	1.28 H	339	43.1	16.0
8	7386.00	44.6 AV	54.0	-9.4	1.28 H	339	28.6	16.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.6 PK			1.53 V	191	104.7	0.9
2	*2462.00	96.4 AV			1.53 V	191	95.5	0.9
3	2483.50	71.8 PK	74.0	-2.2	1.53 V	191	70.9	0.9
4	2483.50	53.3 AV	54.0	-0.7	1.53 V	191	52.4	0.9
5	4924.00	50.4 PK	74.0	-23.6	1.27 V	14	41.0	9.4
6	4924.00	37.8 AV	54.0	-16.2	1.27 V	14	28.4	9.4
7	7386.00	58.3 PK	74.0	-15.7	1.18 V	25	42.3	16.0
8	7386.00	44.3 AV	54.0	-9.7	1.18 V	25	28.3	16.0

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	69.4 PK	74.0	-4.6	2.01 H	199	68.8	0.6
2	2390.00	50.6 AV	54.0	-3.4	2.01 H	199	50.0	0.6
3	*2422.00	99.4 PK			2.01 H	199	98.6	0.8
4	*2422.00	89.2 AV			2.01 H	199	88.4	0.8
5	4844.00	52.3 PK	74.0	-21.7	1.32 H	360	43.1	9.2
6	4844.00	39.3 AV	54.0	-14.7	1.32 H	360	30.1	9.2
7	7266.00	58.8 PK	74.0	-15.2	1.34 H	359	42.2	16.6
8	7266.00	44.7 AV	54.0	-9.3	1.34 H	359	28.1	16.6
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	70.5 PK	74.0	-3.5	1.57 V	188	69.9	0.6
2	2390.00	53.4 AV	54.0	-0.6	1.57 V	188	52.8	0.6
3	*2422.00	104.2 PK			1.57 V	188	103.4	0.8
4	*2422.00	94.3 AV			1.57 V	188	93.5	0.8
5	4844.00	50.6 PK	74.0	-23.4	1.20 V	8	41.4	9.2
6	4844.00	37.7 AV	54.0	-16.3	1.20 V	8	28.5	9.2
7	7266.00	58.2 PK	74.0	-15.8	1.18 V	32	41.6	16.6
8	7266.00	44.2 AV	54.0	-9.8	1.18 V	32	27.6	16.6

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	58.1 PK	74.0	-15.9	2.14 H	197	57.5	0.6
2	2390.00	42.7 AV	54.0	-11.3	2.14 H	197	42.1	0.6
3	*2437.00	99.2 PK			2.14 H	197	98.4	0.8
4	*2437.00	89.3 AV			2.14 H	197	88.5	0.8
5	2483.50	60.2 PK	74.0	-13.8	2.14 H	197	59.3	0.9
6	2483.50	45.2 AV	54.0	-8.8	2.14 H	197	44.3	0.9
7	4874.00	52.1 PK	74.0	-21.9	1.34 H	356	42.8	9.3
8	4874.00	39.0 AV	54.0	-15.0	1.34 H	356	29.7	9.3
9	7311.00	58.7 PK	74.0	-15.3	1.34 H	360	42.2	16.5
10	7311.00	44.1 AV	54.0	-9.9	1.34 H	360	27.6	16.5

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	2390.00	61.6 PK	74.0	-12.4	1.48 V	190	61.0	0.6
2	2390.00	45.8 AV	54.0	-8.2	1.48 V	190	45.2	0.6
3	*2437.00	103.2 PK			1.48 V	190	102.4	0.8
4	*2437.00	93.1 AV			1.48 V	190	92.3	0.8
5	2483.50	63.7 PK	74.0	-10.3	1.48 V	190	62.8	0.9
6	2483.50	48.2 AV	54.0	-5.8	1.48 V	190	47.3	0.9
7	4874.00	50.4 PK	74.0	-23.6	1.21 V	16	41.1	9.3
8	4874.00	37.8 AV	54.0	-16.2	1.21 V	16	28.5	9.3
9	7311.00	58.6 PK	74.0	-15.4	1.18 V	20	42.1	16.5
10	7311.00	45.0 AV	54.0	-9.0	1.18 V	20	28.5	16.5

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
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			2.00 H	200	98.8	0.9
2	*2452.00	89.5 AV			2.00 H	200	88.6	0.9
3	2483.50	69.8 PK	74.0	-4.2	2.00 H	200	68.9	0.9
4	2483.50	50.4 AV	54.0	-3.6	2.00 H	200	49.5	0.9
5	4904.00	52.7 PK	74.0	-21.3	1.34 H	360	43.3	9.4
6	4904.00	39.5 AV	54.0	-14.5	1.34 H	360	30.1	9.4
7	7356.00	58.2 PK	74.0	-15.8	1.26 H	336	42.0	16.2
8	7356.00	44.0 AV	54.0	-10.0	1.26 H	336	27.8	16.2
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	103.5 PK			1.43 V	185	102.6	0.9
2	*2452.00	93.5 AV			1.43 V	185	92.6	0.9
3	2483.50	71.5 PK	74.0	-2.5	1.43 V	185	70.6	0.9
4	2483.50	53.8 AV	54.0	-0.2	1.43 V	185	52.9	0.9
5	4904.00	50.4 PK	74.0	-23.6	1.28 V	20	41.0	9.4
6	4904.00	38.0 AV	54.0	-16.0	1.28 V	20	28.6	9.4
7	7356.00	58.4 PK	74.0	-15.6	1.20 V	22	42.2	16.2
8	7356.00	44.5 AV	54.0	-9.5	1.20 V	22	28.3	16.2

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	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	94.92	34.0 QP	43.5	-9.5	2.00 H	258	47.3	-13.3
2	222.15	39.0 QP	46.0	-7.0	1.50 H	357	49.7	-10.7
3	601.71	37.2 QP	46.0	-8.8	2.00 H	143	36.2	1.0
4	630.21	34.8 QP	46.0	-11.2	1.50 H	352	33.1	1.7
5	813.64	37.5 QP	46.0	-8.5	1.00 H	110	32.8	4.7
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	41.67	36.3 QP	40.0	-3.7	1.00 V	353	44.8	-8.5
2	149.16	38.3 QP	43.5	-5.2	1.00 V	154	46.0	-7.7
3	223.03	32.5 QP	46.0	-13.5	1.00 V	74	43.2	-10.7
4	356.22	31.4 QP	46.0	-14.6	1.50 V	193	36.7	-5.3
5	610.23	34.0 QP	46.0	-12.0	1.00 V	358	32.6	1.4
6	625.29	33.4 QP	46.0	-12.6	1.00 V	6	31.7	1.7

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	100375	May 09, 2016	May 08, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ENV216	100072	June 13, 2016	June 12, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	848773/004	Oct. 28, 2015	Oct. 27, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 08, 2016	Mar. 07, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-003	Sep. 14, 2015	Sep. 13, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 23, 2015	Sep. 22, 2016
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2015	Sep. 30, 2016
Software BVADT	BVADT_Cond_ V7.3.7.3	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. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Aug. 24, 2016

4.2.3 Test Procedures

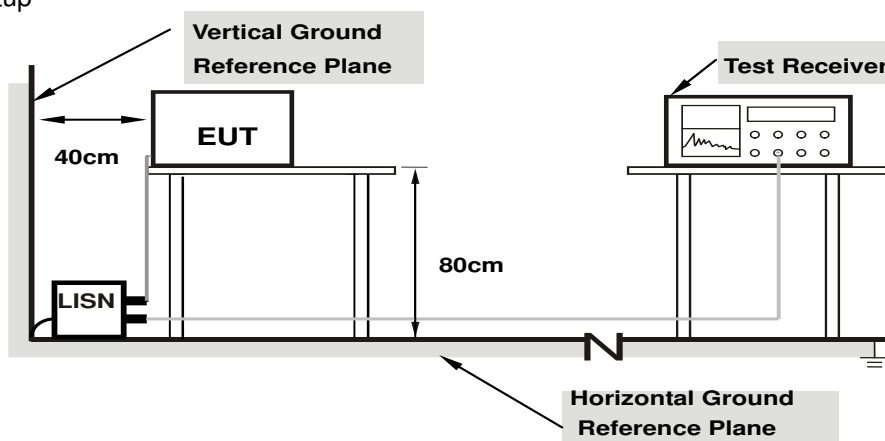
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

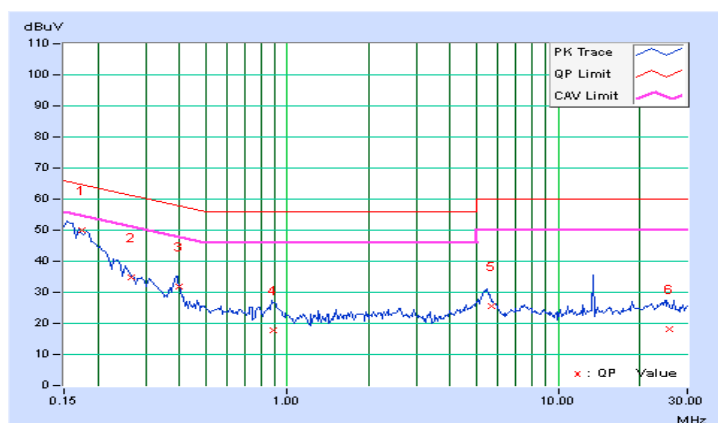
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17391	10.30	39.64	23.34	49.94	33.64	64.77	54.77	-14.83	-21.13
2	0.26641	10.29	24.40	8.90	34.69	19.19	61.23	51.23	-26.54	-32.04
3	0.39828	10.30	21.63	11.27	31.93	21.57	57.89	47.89	-25.96	-26.32
4	0.88652	10.24	7.64	2.68	17.88	12.92	56.00	46.00	-38.12	-33.08
5	5.66359	10.46	15.14	8.22	25.60	18.68	60.00	50.00	-34.40	-31.32
6	25.69844	11.12	6.87	1.26	17.99	12.38	60.00	50.00	-42.01	-37.62

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

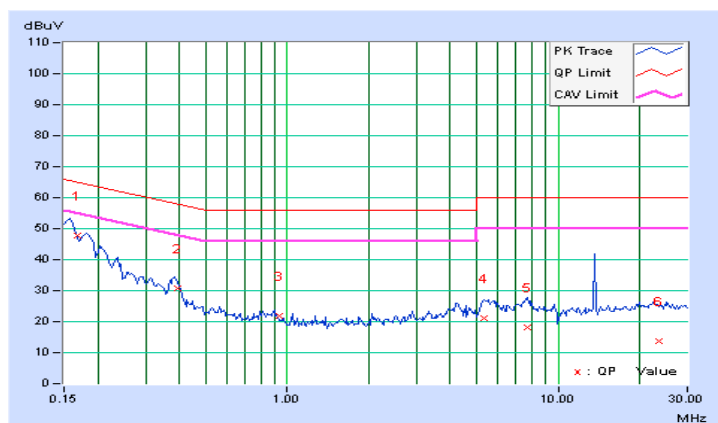


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16781	10.29	37.49	20.68	47.78	30.97	65.07	55.07	-17.29	-24.10
2	0.39413	10.28	20.43	12.68	30.71	22.96	57.98	47.98	-27.27	-25.02
3	0.93510	10.23	11.67	10.22	21.90	20.45	56.00	46.00	-34.10	-25.55
4	5.31247	10.46	10.69	2.98	21.15	13.44	60.00	50.00	-38.85	-36.56
5	7.71186	10.51	7.54	1.62	18.05	12.13	60.00	50.00	-41.95	-37.87
6	23.48764	11.07	2.69	-2.71	13.76	8.36	60.00	50.00	-46.24	-41.64

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

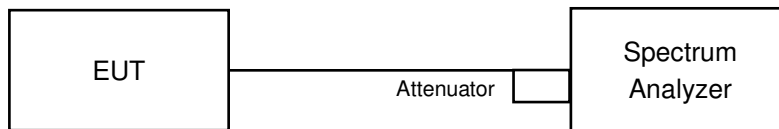


4.3 6dB Bandwidth Measurement

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

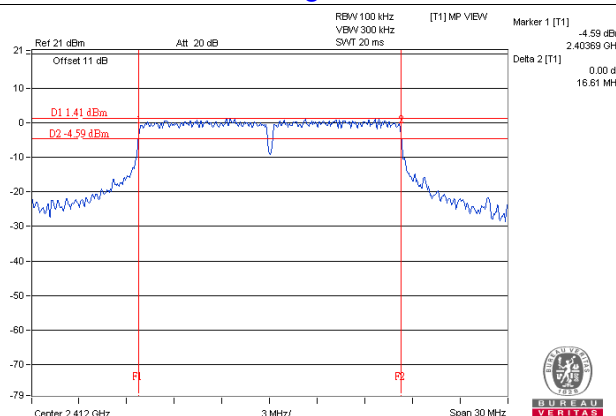
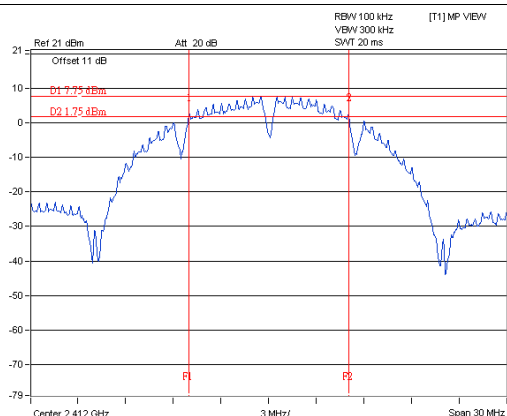
802.11n (HT40)

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

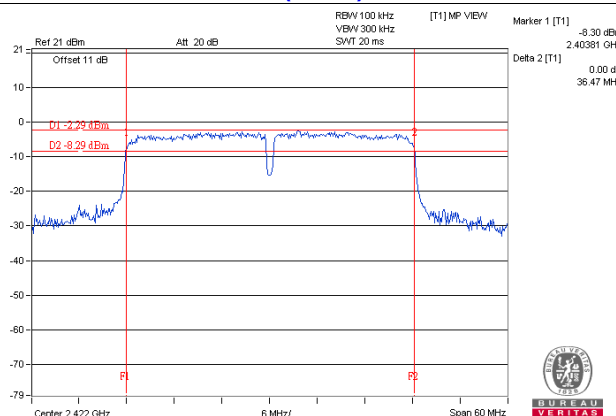
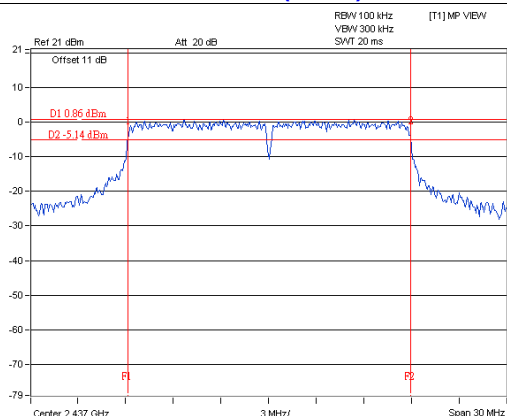
802.11b / CH1

802.11g / CH1



802.11n (HT20) / CH6

802.11n (HT40) / CH3

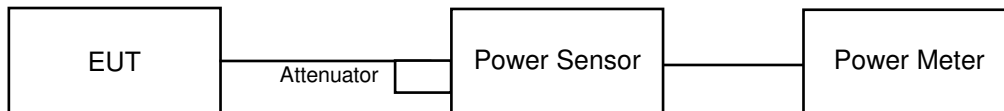


4.4 Conducted Output Power Measurement

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)

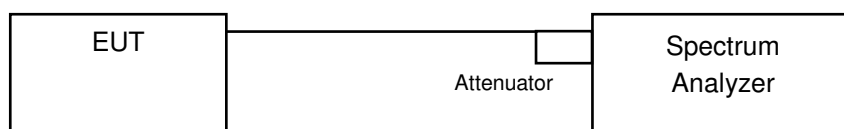
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	34.356	15.36
6	2437	34.674	15.40
9	2452	34.119	15.33

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)

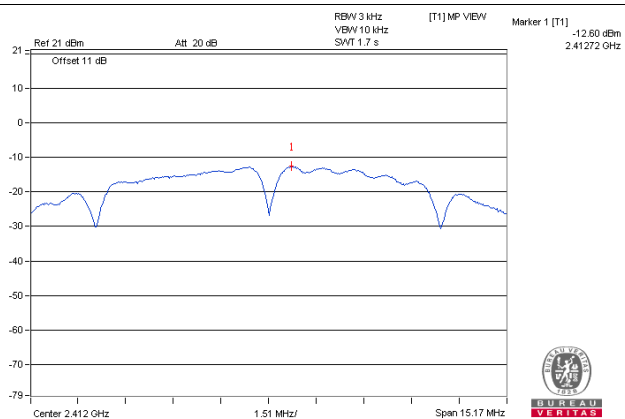
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-13.44	8	Pass
6	2437	-13.79	8	Pass
11	2462	-13.80	8	Pass

802.11n (HT40)

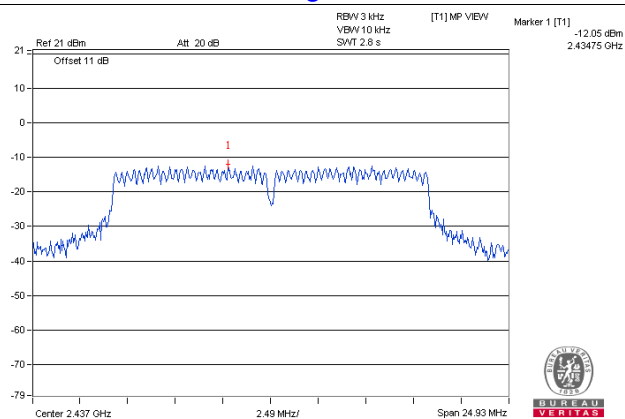
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-15.94	8	Pass
6	2437	-13.81	8	Pass
9	2452	-14.76	8	Pass

Spectrum Plot of Worst Value

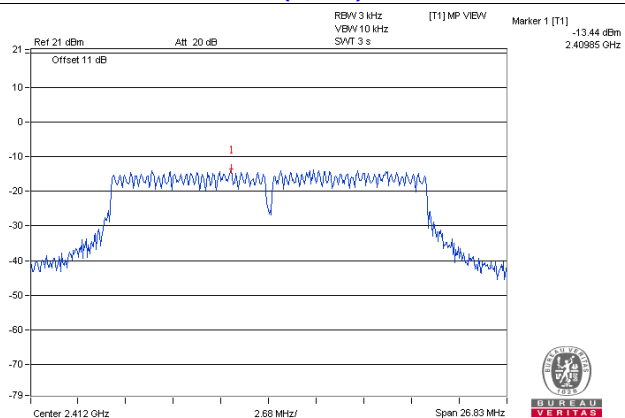
802.11b / CH1



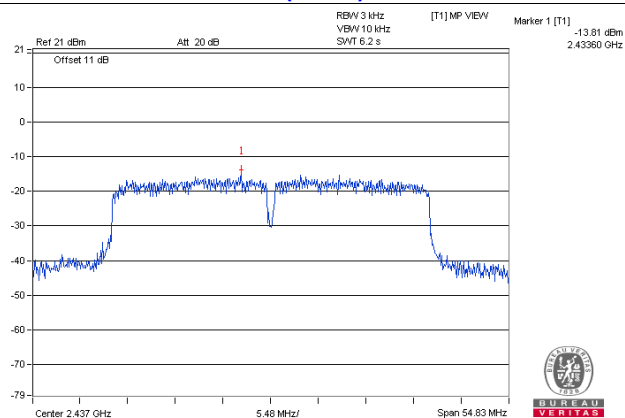
802.11g / CH6



802.11n (HT20) / CH1



802.11n (HT40) / CH6

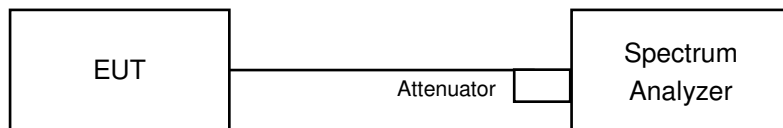


4.6 Conducted Out of Band Emission Measurement

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

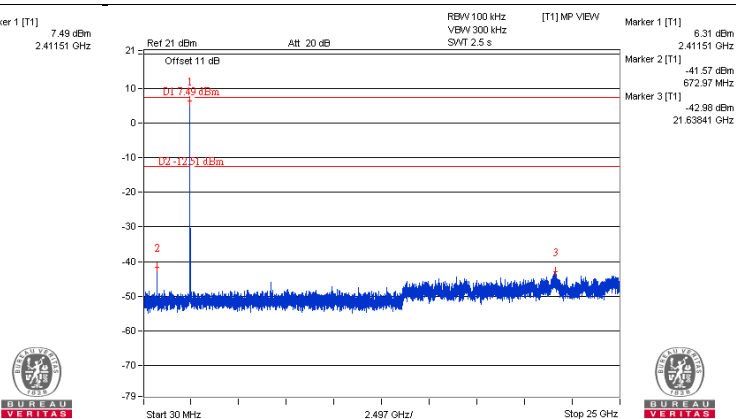
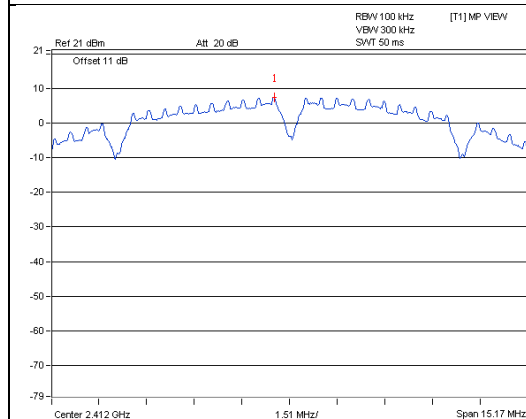
Same as Item 4.3.6

4.6.7 Test Results

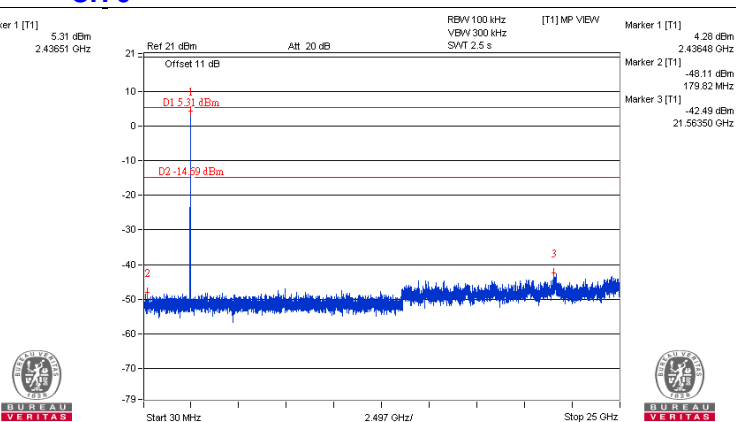
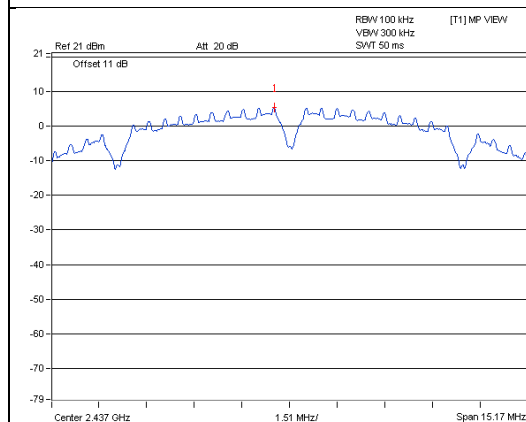
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

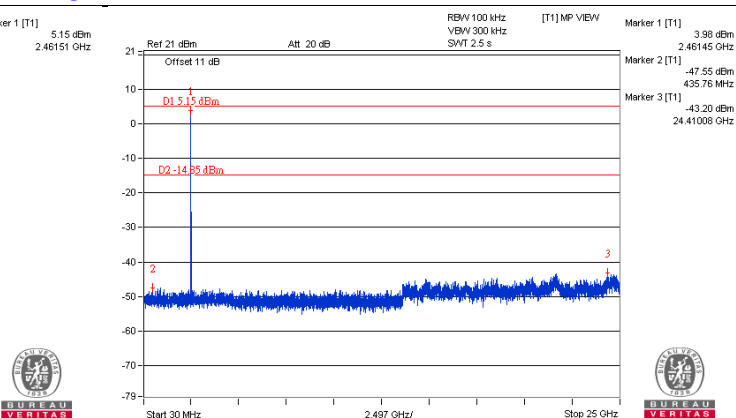
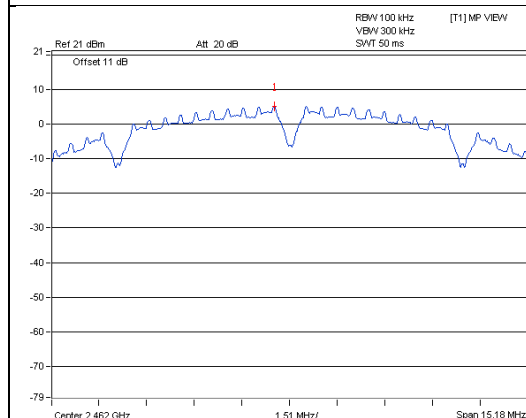
CH 1



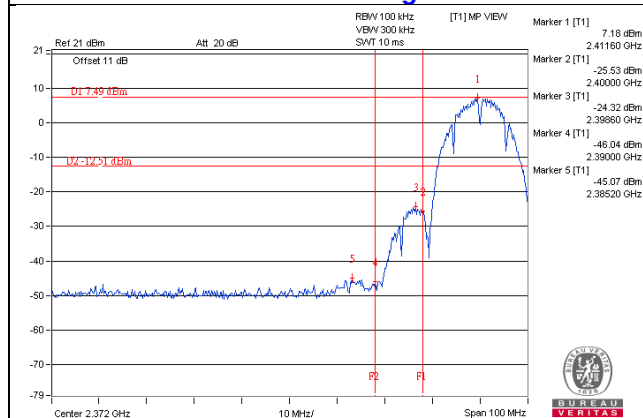
CH 6



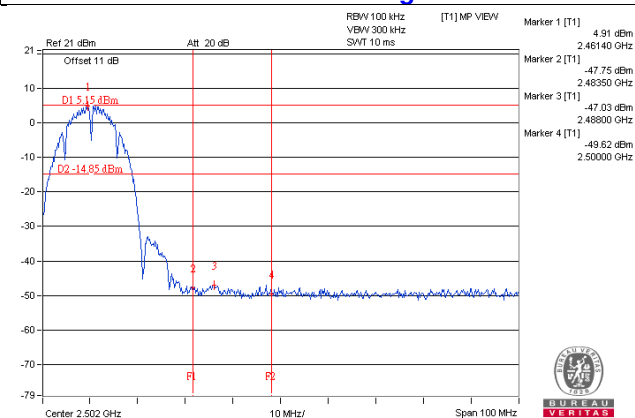
CH 11



CH 1 Band edge

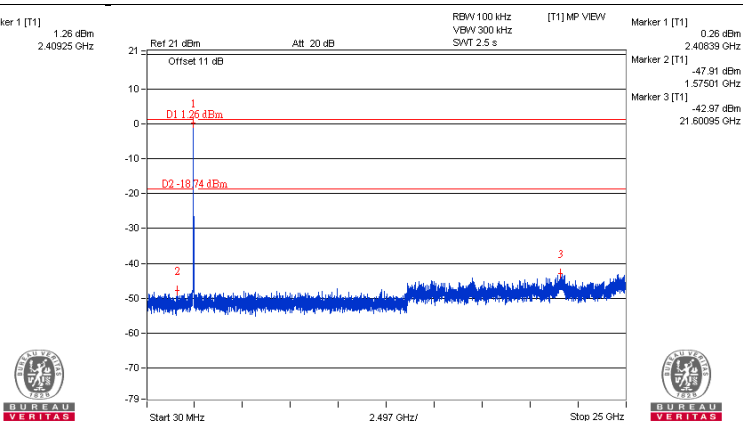
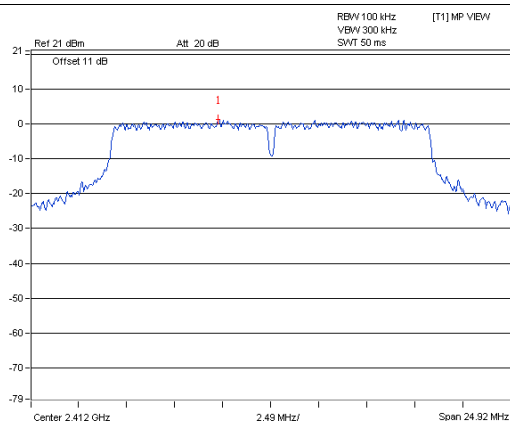


CH 11 Band edge

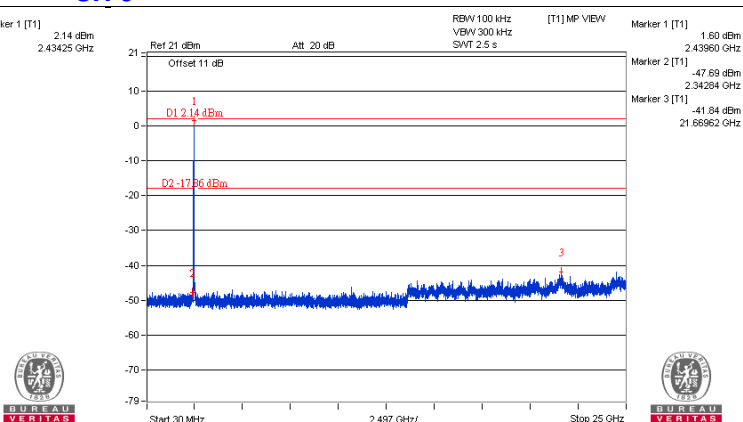
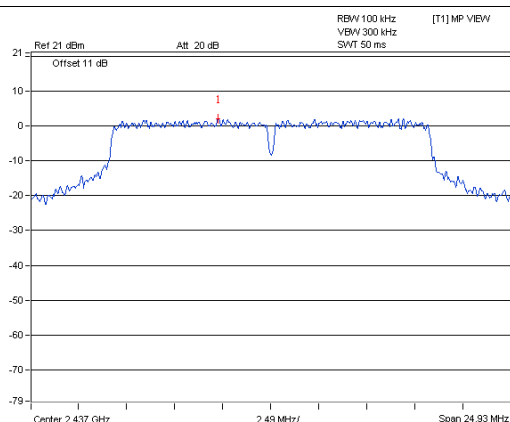


802.11g

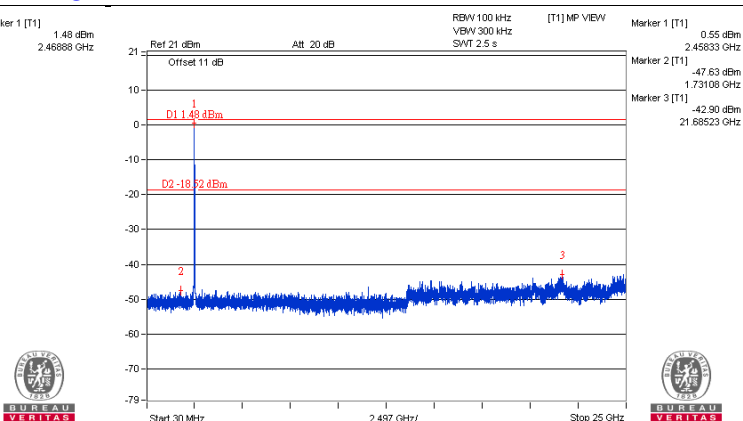
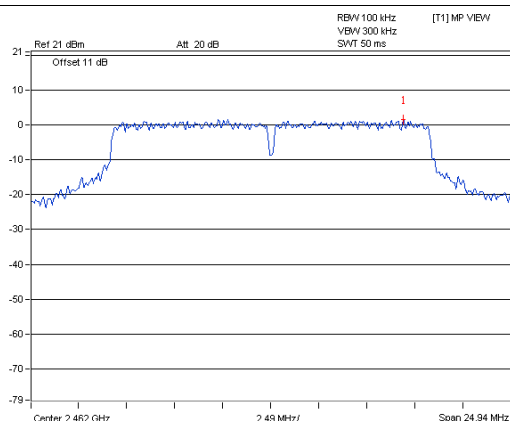
CH 1



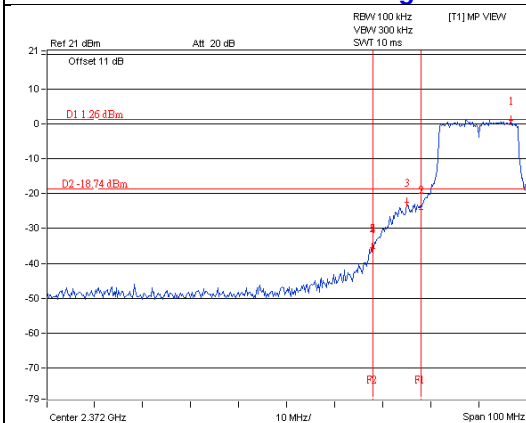
CH 6



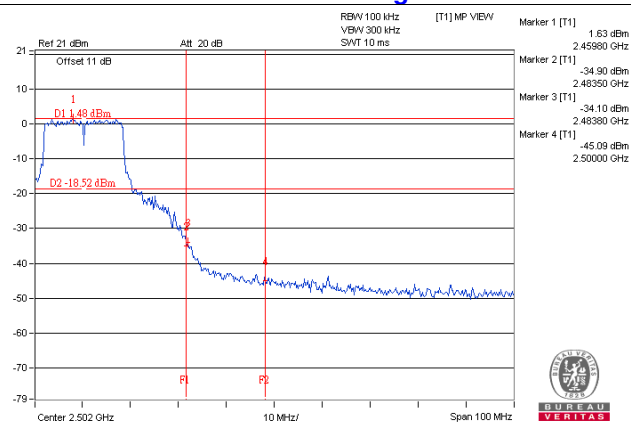
CH 11



CH 1 Band edge

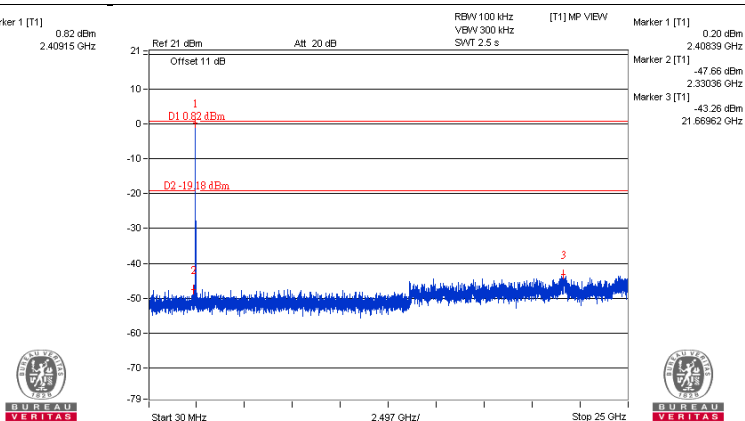
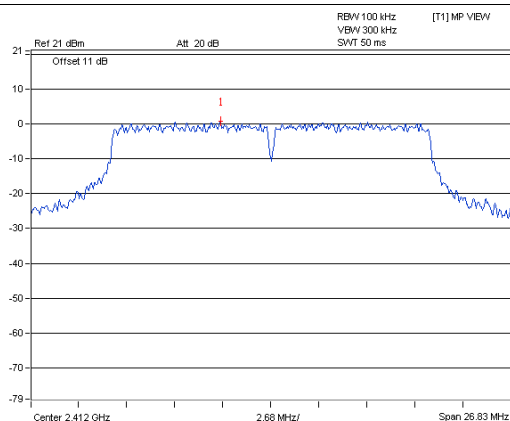


CH 11 Band edge

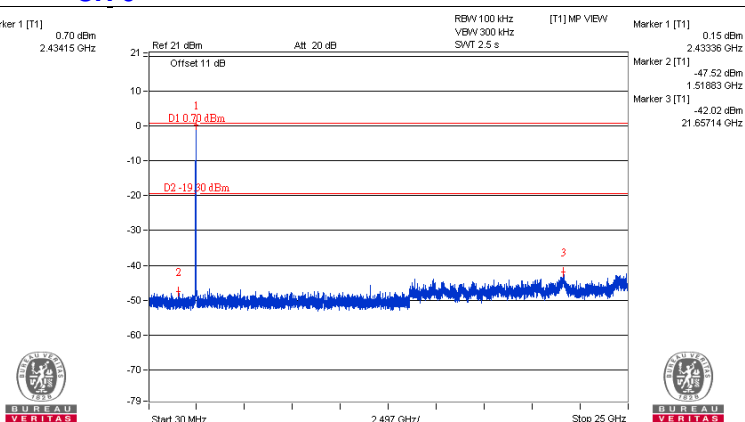
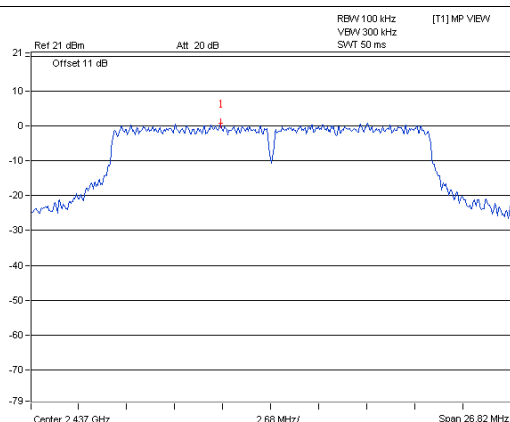


802.11n (HT20)

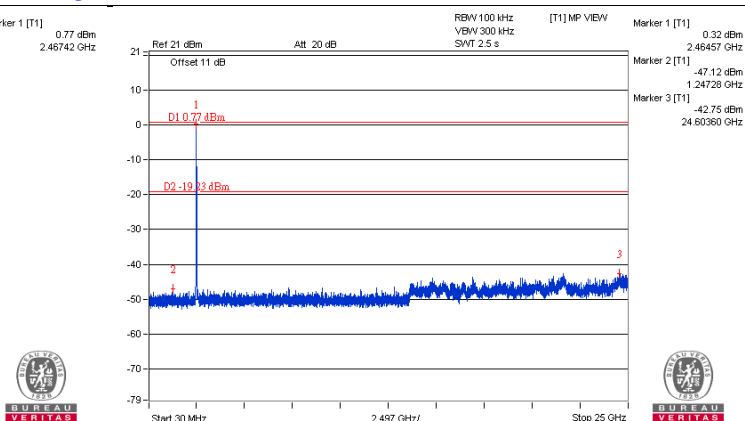
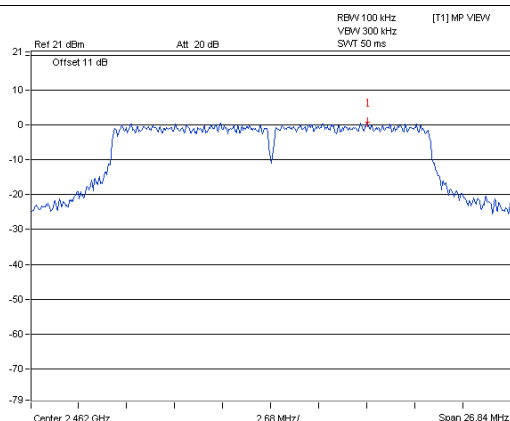
CH 1



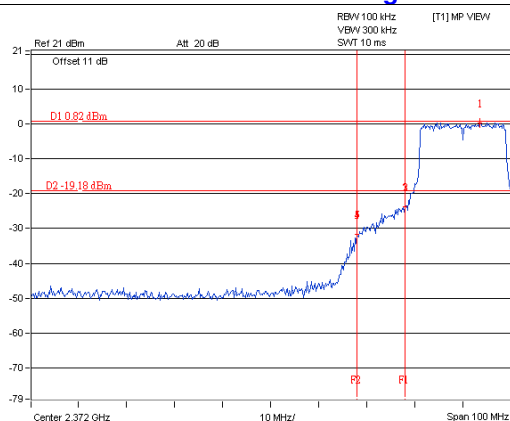
CH 6



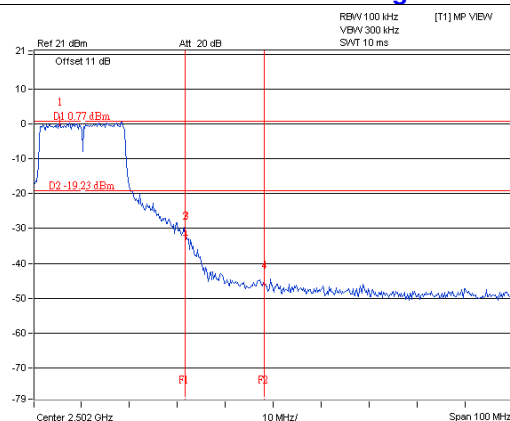
CH 11



CH 1 Band edge

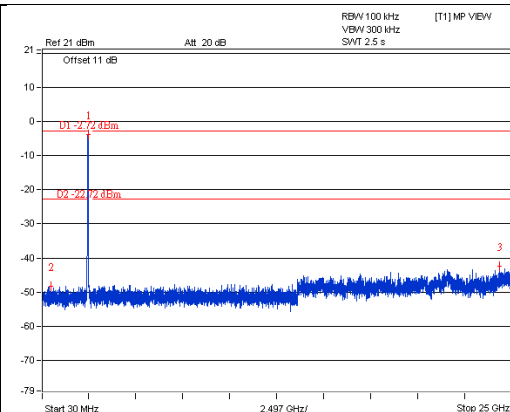
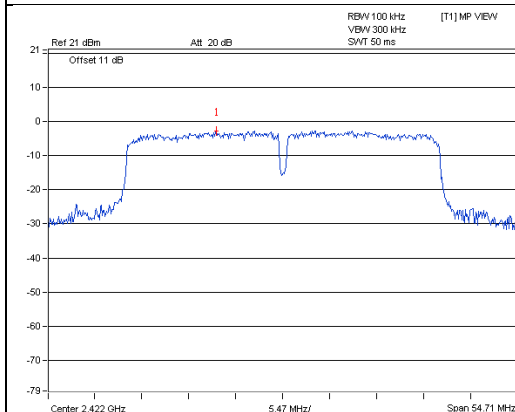


CH 11 Band edge

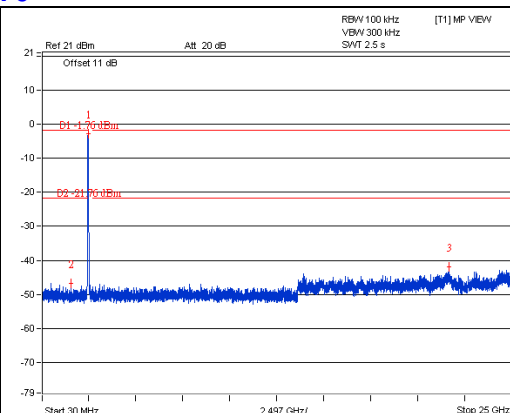
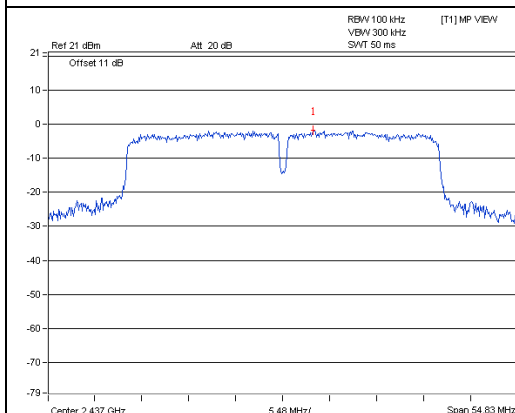


802.11n (HT40)

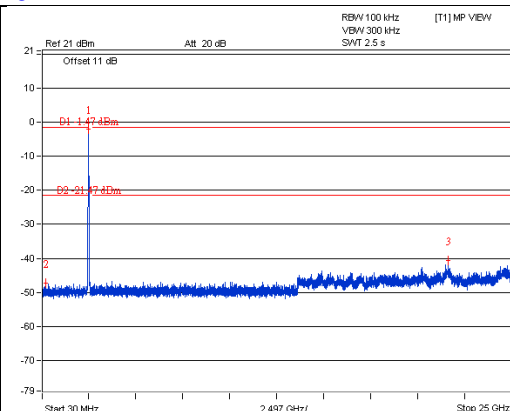
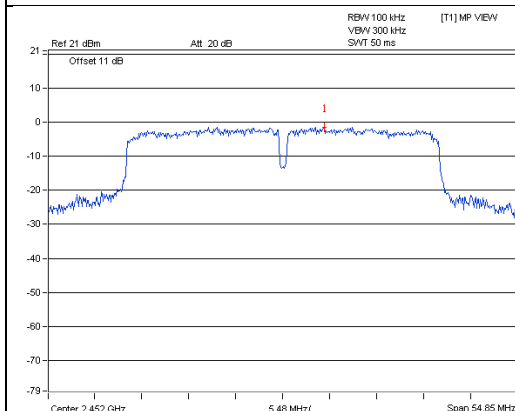
CH 3



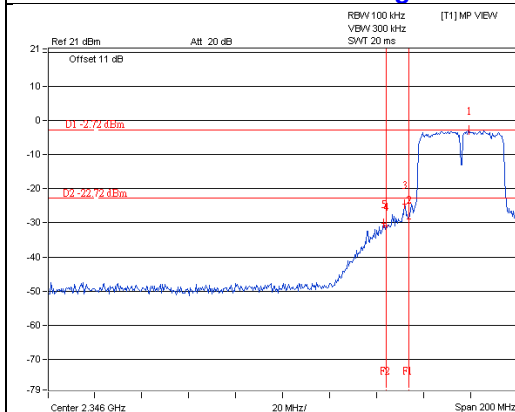
CH 6



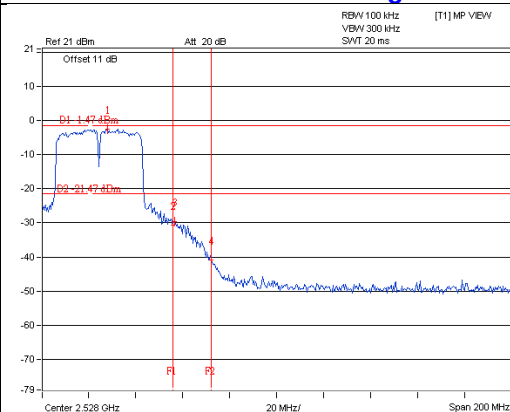
CH 9



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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