

FCC Test Report (WLAN)

Report No.: RF140813E03C-3

FCC ID: MQT-TP72HUB2

Test Model: TP72-HUB2

Received Date: Apr. 18, 2016

Test Date: Apr. 18 to June 07, 2016

Issued Date: June 24, 2016

Applicant: XAC AUTOMATION CORP.

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Release Control Record

Issue No.	Description	Date Issued
RF140813E03C-3	Original release.	June 24, 2016

1 Certificate of Conformity

Product: HUB

Brand: XAC

Test Model: TP72-HUB2

Sample Status: ENGINEERING SAMPLE

Applicant: XAC AUTOMATION CORP.

Test Date: Apr. 18 to June 07, 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 :

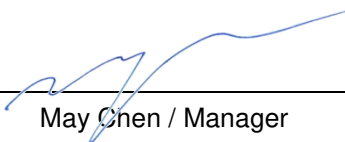


Date:

June 24, 2016

Claire Kuan / Specialist

Approved by :



Date:

June 24, 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 -20.42dB at 0.54063MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz and 4874.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	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	HUB
Brand	XAC
Test Model	TP72-HUB2
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 24V 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	69.183mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter (Optional) x 1
Data Cable Supplied	NA

Note:

- There are WLAN and Bluetooth technology used for the EUT.
- The antenna provided to the EUT, please refer to the following table:

For WLAN					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz to MHz)
Walsin Technology Corporation	RFANT8010080A3T	Chip	NA	2	2400~2500
For Bluetooth					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz to MHz)
ACX	AT3216-T24PAA	Chip	NA	1.5	2400~2500

- The EUT could be supplied with a power adapter (Only for test not for sale) as the following table:

Brand	Model No.	Spec.
FSP	FSP100-RTAAN2	AC input: 100-240V, 50/60Hz, 2.8A AC input cable: Shielded, 1.8m without core DC output: 24V, 4.17A DC output cable: Unshielded, 1.5m with one core

- 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

5. The emission of the simultaneous operation (WLAN & Bluetooth) has been evaluated and no non-compliance was found.
6. 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:

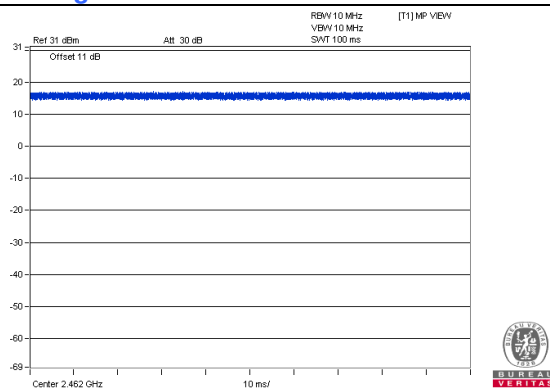
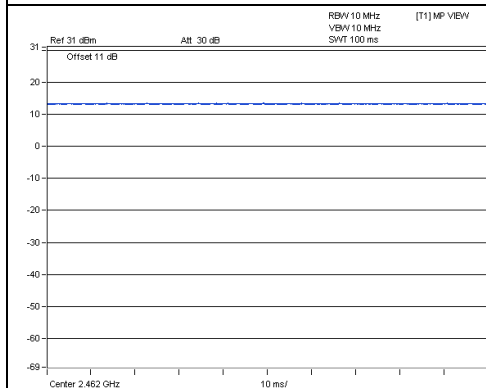
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE$\geq$1G	24deg. C, 71%RH	120Vac, 60Hz	Weiwei Lo
RE$<$1G	24deg. C, 67%RH	120Vac, 60Hz	JyunChun Lin
PLC	22deg. C, 75%RH	120Vac, 60Hz	Arthur Yang
APCM	23deg. C, 66%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

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

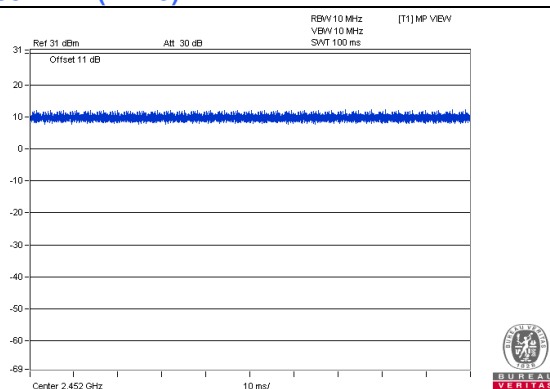
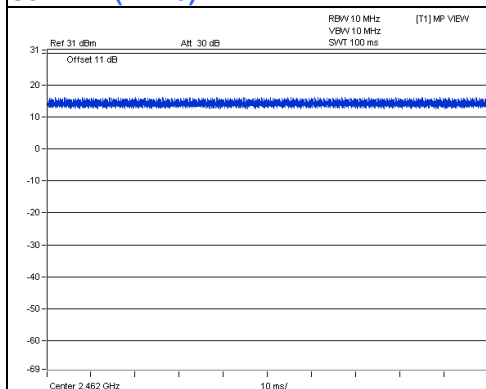
802.11b

802.11g



802.11n (HT20)

802.11n (HT40)



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.	iPod shuffle	Apple	MD778TA/A	CC4JMH7LF4T1	NA	Provided by Lab
B.	iPod shuffle	Apple	MD778TA/A	CC4JMA9KF4T1	NA	Provided by Lab
C.	iPod shuffle	Apple	MC749TA/A	CC4DMFJUDFDM	NA	Provided by Lab
D.	iPod shuffle	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
E.	USB Flash	Transcend	4G	NA	NA	Provided by Lab
F.	Notebook Computer	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
G.	Notebook Computer	DELL	PP32LA	GSLB32S	FCC DoC	Provided by Lab

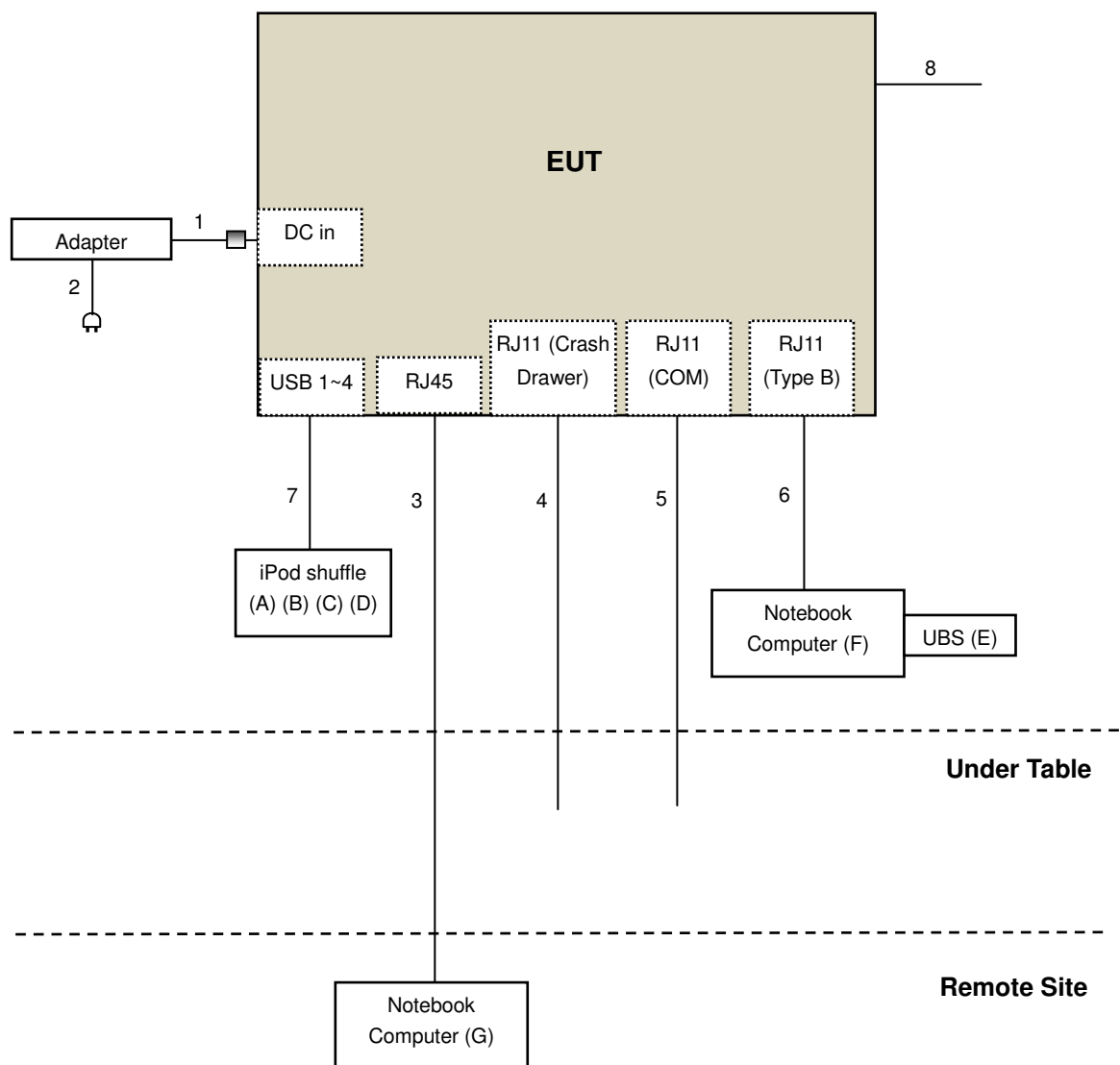
Note:

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.	DC cable	1	1	Yes	1	Supplied by Client
2.	AC cable	1	1.8	Yes	0	Supplied by Client
3.	RJ45 cable	1	10	No	0	Provided by Lab
4.	RJ11 Cash Drawer cable	1	1.8	No	0	Provided by Lab
5.	RJ11	1	1.5	No	0	Supplied by Client
6.	USB type B cable	1	1.8	Yes	0	Supplied by Client
7.	USB cable	4	0.1	Yes	0	Provided by Lab
8.	Console cable	1	0.1	No	0	Provided by Lab (For RF Setup)

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
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

For above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
Horn_Antenna AISI	AIH.8018	0000320091110	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A02578	June 23, 2015	June 22, 2016
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_V8.7.07	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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The CANADA Site Registration No. is IC 7450H-2.
5. Tested Date: May 27, 2016

For below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
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
Software	ADT_Radiated_V8.7.07	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 08, 2015	May 07, 2016

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The CANADA Site Registration No. is IC 7450H-2.
5. Tested Date: Apr. 18, 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:

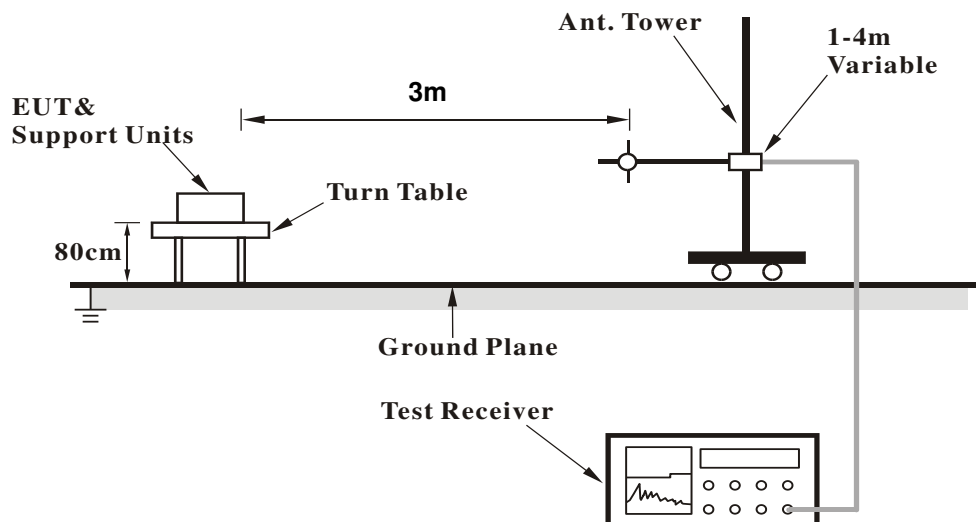
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

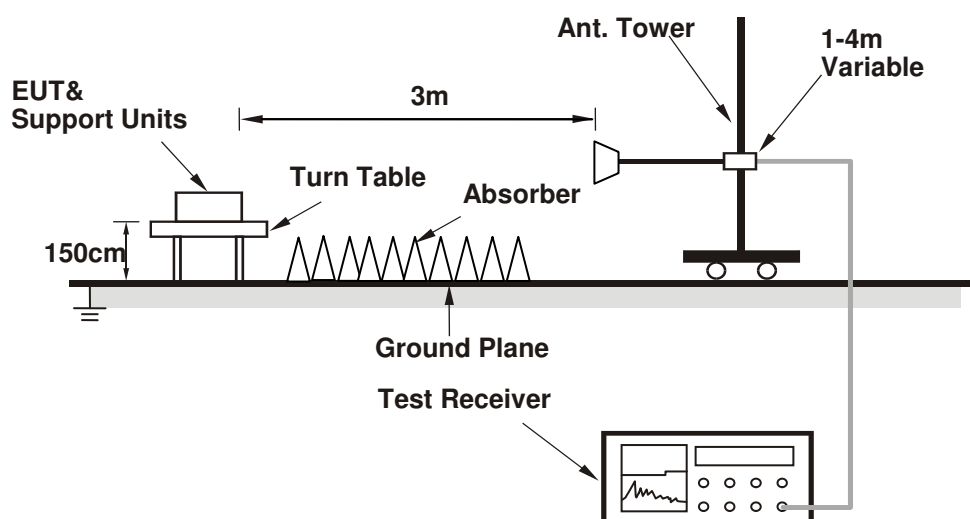
No deviation.

4.1.5 Test 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. Turn on the power of all equipment.
2. The communication partner runs a test program "EDR_RF_test_Customer_080812.exe[ver1.0.0.1]" to EUT under transmission condition continuously.

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	54.3 PK	74.0	-19.7	1.04 H	153	53.7	0.6
2	2390.00	40.5 AV	54.0	-13.5	1.04 H	153	39.9	0.6
3	*2412.00	101.0 PK			1.04 H	153	100.2	0.8
4	*2412.00	99.7 AV			1.04 H	153	98.9	0.8
5	4824.00	54.3 PK	74.0	-19.7	1.36 H	46	45.1	9.2
6	4824.00	44.7 AV	54.0	-9.3	1.36 H	46	35.5	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	55.2 PK	74.0	-18.8	1.40 V	111	54.6	0.6
2	2390.00	41.6 AV	54.0	-12.4	1.40 V	111	41.0	0.6
3	*2412.00	104.1 PK			1.40 V	111	103.3	0.8
4	*2412.00	101.8 AV			1.40 V	111	101.0	0.8
5	4824.00	59.2 PK	74.0	-14.8	1.35 V	70	50.0	9.2
6	4824.00	53.6 AV	54.0	-0.4	1.35 V	70	44.4	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	*2437.00	102.8 PK			1.12 H	166	102.0	0.8
2	*2437.00	100.2 AV			1.12 H	166	99.4	0.8
3	4874.00	54.7 PK	74.0	-19.3	1.34 H	52	45.4	9.3
4	4874.00	45.1 AV	54.0	-8.9	1.34 H	52	35.8	9.3
5	7311.00	59.5 PK	74.0	-14.5	1.45 H	164	43.0	16.5
6	7311.00	45.6 AV	54.0	-8.4	1.45 H	164	29.1	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	*2437.00	105.9 PK			1.47 V	110	105.1	0.8
2	*2437.00	102.3 AV			1.47 V	110	101.5	0.8
3	4874.00	60.7 PK	74.0	-13.3	1.28 V	73	51.4	9.3
4	4874.00	53.9 AV	54.0	-0.1	1.28 V	73	44.6	9.3
5	7311.00	59.9 PK	74.0	-14.1	1.56 V	223	43.4	16.5
6	7311.00	46.1 AV	54.0	-7.9	1.56 V	223	29.6	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	102.2 PK			1.10 H	163	101.3	0.9
2	*2462.00	99.2 AV			1.10 H	163	98.3	0.9
3	2483.50	54.8 PK	74.0	-19.2	1.10 H	163	53.9	0.9
4	2483.50	41.5 AV	54.0	-12.5	1.10 H	163	40.6	0.9
5	4924.00	54.4 PK	74.0	-19.6	1.38 H	47	45.0	9.4
6	4924.00	44.8 AV	54.0	-9.2	1.38 H	47	35.4	9.4
7	7386.00	59.4 PK	74.0	-14.6	1.43 H	158	43.4	16.0
8	7386.00	45.7 AV	54.0	-8.3	1.43 H	158	29.7	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	105.3 PK			1.27 V	107	104.4	0.9
2	*2462.00	101.3 AV			1.27 V	107	100.4	0.9
3	2483.50	54.5 PK	74.0	-19.5	1.27 V	107	53.6	0.9
4	2483.50	42.1 AV	54.0	-11.9	1.27 V	107	41.2	0.9
5	4924.00	58.9 PK	74.0	-15.1	1.31 V	317	49.5	9.4
6	4924.00	53.3 AV	54.0	-0.7	1.31 V	317	43.9	9.4
7	7386.00	59.6 PK	74.0	-14.4	1.61 V	221	43.6	16.0
8	7386.00	46.1 AV	54.0	-7.9	1.61 V	221	30.1	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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.8 PK	74.0	-7.2	1.26 H	149	66.2	0.6
2	2390.00	48.8 AV	54.0	-5.2	1.26 H	149	48.2	0.6
3	*2412.00	104.0 PK			1.26 H	149	103.2	0.8
4	*2412.00	94.5 AV			1.26 H	149	93.7	0.8
5	4824.00	54.8 PK	74.0	-19.2	1.41 H	42	45.6	9.2
6	4824.00	44.9 AV	54.0	-9.1	1.41 H	42	35.7	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	70.1 PK	74.0	-3.9	1.55 V	115	69.5	0.6
2	2390.00	53.5 AV	54.0	-0.5	1.55 V	115	52.9	0.6
3	*2412.00	107.5 PK			1.55 V	115	106.7	0.8
4	*2412.00	98.1 AV			1.55 V	115	97.3	0.8
5	4824.00	60.1 PK	74.0	-13.9	1.65 V	209	50.9	9.2
6	4824.00	46.5 AV	54.0	-7.5	1.65 V	209	37.3	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	57.4 PK	74.0	-16.6	1.23 H	150	56.8	0.6
2	2390.00	42.9 AV	54.0	-11.1	1.23 H	150	42.3	0.6
3	*2437.00	107.4 PK			1.23 H	150	106.6	0.8
4	*2437.00	98.0 AV			1.23 H	150	97.2	0.8
5	2483.50	61.6 PK	74.0	-12.4	1.23 H	150	60.7	0.9
6	2483.50	47.2 AV	54.0	-6.8	1.23 H	150	46.3	0.9
7	4874.00	54.1 PK	74.0	-19.9	1.43 H	57	44.8	9.3
8	4874.00	44.7 AV	54.0	-9.3	1.43 H	57	35.4	9.3
9	7311.00	59.4 PK	74.0	-14.6	1.40 H	147	42.9	16.5
10	7311.00	45.5 AV	54.0	-8.5	1.40 H	147	29.0	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	60.6 PK	74.0	-13.4	1.40 V	111	60.0	0.6
2	2390.00	47.7 AV	54.0	-6.3	1.40 V	111	47.1	0.6
3	*2437.00	110.9 PK			1.40 V	111	110.1	0.8
4	*2437.00	101.6 AV			1.40 V	111	100.8	0.8
5	2483.50	64.8 PK	74.0	-9.2	1.40 V	111	63.9	0.9
6	2483.50	52.0 AV	54.0	-2.0	1.40 V	111	51.1	0.9
7	4874.00	65.3 PK	74.0	-8.7	1.30 V	72	56.0	9.3
8	4874.00	53.2 AV	54.0	-0.8	1.30 V	72	43.9	9.3
9	7311.00	60.2 PK	74.0	-13.8	1.86 V	74	43.7	16.5
10	7311.00	48.1 AV	54.0	-5.9	1.86 V	74	31.6	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			1.21 H	155	104.2	0.9
2	*2462.00	95.4 AV			1.21 H	155	94.5	0.9
3	2483.50	68.4 PK	74.0	-5.6	1.21 H	155	67.5	0.9
4	2483.50	49.3 AV	54.0	-4.7	1.21 H	155	48.4	0.9
5	4924.00	54.9 PK	74.0	-19.1	1.37 H	35	45.5	9.4
6	4924.00	42.1 AV	54.0	-11.9	1.37 H	35	32.7	9.4
7	7386.00	59.3 PK	74.0	-14.7	1.44 H	155	43.3	16.0
8	7386.00	45.9 AV	54.0	-8.1	1.44 H	155	29.9	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	108.2 PK			1.63 V	122	107.3	0.9
2	*2462.00	98.8 AV			1.63 V	122	97.9	0.9
3	2483.50	71.3 PK	74.0	-2.7	1.63 V	122	70.4	0.9
4	2483.50	53.8 AV	54.0	-0.2	1.63 V	122	52.9	0.9
5	4924.00	59.6 PK	74.0	-14.4	1.70 V	211	50.2	9.4
6	4924.00	46.3 AV	54.0	-7.7	1.70 V	211	36.9	9.4
7	7386.00	60.2 PK	74.0	-13.8	1.64 V	209	44.2	16.0
8	7386.00	46.5 AV	54.0	-7.5	1.64 V	209	30.5	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.

802.11n (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	71.4 PK	74.0	-2.6	1.14 H	160	70.8	0.6
2	2390.00	50.8 AV	54.0	-3.2	1.14 H	160	50.2	0.6
3	*2412.00	105.2 PK			1.14 H	160	104.4	0.8
4	*2412.00	95.2 AV			1.14 H	160	94.4	0.8
5	4824.00	54.9 PK	74.0	-19.1	1.37 H	48	45.7	9.2
6	4824.00	45.0 AV	54.0	-9.0	1.37 H	48	35.8	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	72.7 PK	74.0	-1.3	1.25 V	119	72.1	0.6
2	2390.00	53.9 AV	54.0	-0.1	1.25 V	119	53.3	0.6
3	*2412.00	107.9 PK			1.25 V	119	107.1	0.8
4	*2412.00	98.2 AV			1.25 V	119	97.4	0.8
5	4824.00	60.5 PK	74.0	-13.5	1.67 V	213	51.3	9.2
6	4824.00	46.8 AV	54.0	-7.2	1.67 V	213	37.6	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	59.9 PK	74.0	-14.1	1.20 H	150	59.3	0.6
2	2390.00	44.8 AV	54.0	-9.2	1.20 H	150	44.2	0.6
3	*2437.00	108.2 PK			1.20 H	150	107.4	0.8
4	*2437.00	95.4 AV			1.20 H	150	94.6	0.8
5	2483.50	64.9 PK	74.0	-9.1	1.20 H	150	64.0	0.9
6	2483.50	49.0 AV	54.0	-5.0	1.20 H	150	48.1	0.9
7	4874.00	54.6 PK	74.0	-19.4	1.40 H	54	45.3	9.3
8	4874.00	44.9 AV	54.0	-9.1	1.40 H	54	35.6	9.3
9	7311.00	58.7 PK	74.0	-15.3	1.45 H	144	42.2	16.5
10	7311.00	45.4 AV	54.0	-8.6	1.45 H	144	28.9	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	61.3 PK	74.0	-12.7	1.34 V	116	60.7	0.6
2	2390.00	47.7 AV	54.0	-6.3	1.34 V	116	47.1	0.6
3	*2437.00	110.9 PK			1.34 V	116	110.1	0.8
4	*2437.00	101.5 AV			1.34 V	116	100.7	0.8
5	2483.50	66.2 PK	74.0	-7.8	1.34 V	116	65.3	0.9
6	2483.50	52.4 AV	54.0	-1.6	1.34 V	116	51.5	0.9
7	4874.00	62.6 PK	74.0	-11.4	1.46 V	135	53.3	9.3
8	4874.00	53.1 AV	54.0	-0.9	1.46 V	135	43.8	9.3
9	7311.00	59.9 PK	74.0	-14.1	1.46 V	135	43.4	16.5
10	7311.00	48.5 AV	54.0	-5.5	1.46 V	135	32.0	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	105.4 PK			1.21 H	155	104.5	0.9
2	*2462.00	94.8 AV			1.21 H	155	93.9	0.9
3	2483.50	69.4 PK	74.0	-4.6	1.21 H	155	68.5	0.9
4	2483.50	50.8 AV	54.0	-3.2	1.21 H	155	49.9	0.9
5	4924.00	54.5 PK	74.0	-19.5	1.34 H	57	45.1	9.4
6	4924.00	44.5 AV	54.0	-9.5	1.34 H	57	35.1	9.4
7	7386.00	58.6 PK	74.0	-15.4	1.39 H	137	42.6	16.0
8	7386.00	45.2 AV	54.0	-8.8	1.39 H	137	29.2	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	108.2 PK			1.25 V	111	107.3	0.9
2	*2462.00	98.1 AV			1.25 V	111	97.2	0.9
3	2483.50	70.6 PK	74.0	-3.4	1.25 V	111	69.7	0.9
4	2483.50	53.6 AV	54.0	-0.4	1.25 V	111	52.7	0.9
5	4924.00	59.5 PK	74.0	-14.5	1.66 V	100	50.1	9.4
6	4924.00	46.0 AV	54.0	-8.0	1.66 V	100	36.6	9.4
7	7386.00	60.4 PK	74.0	-13.6	1.64 V	30	44.4	16.0
8	7386.00	46.5 AV	54.0	-7.5	1.64 V	30	30.5	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.

802.11n (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	65.0 PK	74.0	-9.0	1.22 H	144	64.4	0.6
2	2390.00	49.6 AV	54.0	-4.4	1.22 H	144	49.0	0.6
3	*2422.00	101.0 PK			1.22 H	144	100.2	0.8
4	*2422.00	90.9 AV			1.22 H	144	90.1	0.8
5	4844.00	53.9 PK	74.0	-20.1	1.30 H	73	44.7	9.2
6	4844.00	44.1 AV	54.0	-9.9	1.30 H	73	34.9	9.2
7	7266.00	58.7 PK	74.0	-15.3	1.44 H	123	42.1	16.6
8	7266.00	45.3 AV	54.0	-8.7	1.44 H	123	28.7	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	69.1 PK	74.0	-4.9	1.35 V	114	68.5	0.6
2	2390.00	53.5 AV	54.0	-0.5	1.35 V	114	52.9	0.6
3	*2422.00	104.2 PK			1.35 V	114	103.4	0.8
4	*2422.00	94.2 AV			1.35 V	114	93.4	0.8
5	4844.00	59.2 PK	74.0	-14.8	1.66 V	107	50.0	9.2
6	4844.00	45.8 AV	54.0	-8.2	1.66 V	107	36.6	9.2
7	7266.00	60.3 PK	74.0	-13.7	1.59 V	45	43.7	16.6
8	7266.00	46.1 AV	54.0	-7.9	1.59 V	45	29.5	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	60.6 PK	74.0	-13.4	1.21 H	149	60.0	0.6
2	2390.00	47.5 AV	54.0	-6.5	1.21 H	149	46.9	0.6
3	*2437.00	103.2 PK			1.21 H	149	102.4	0.8
4	*2437.00	93.4 AV			1.21 H	149	92.6	0.8
5	2483.50	66.2 PK	74.0	-7.8	1.21 H	149	65.3	0.9
6	2483.50	50.1 AV	54.0	-3.9	1.21 H	149	49.2	0.9
7	4874.00	54.0 PK	74.0	-20.0	1.44 H	42	44.7	9.3
8	4874.00	44.1 AV	54.0	-9.9	1.44 H	42	34.8	9.3
9	7311.00	59.0 PK	74.0	-15.0	1.45 H	135	42.5	16.5
10	7311.00	45.5 AV	54.0	-8.5	1.45 H	135	29.0	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	65.4 PK	74.0	-8.6	1.36 V	112	64.8	0.6
2	2390.00	50.1 AV	54.0	-3.9	1.36 V	112	49.5	0.6
3	*2437.00	106.5 PK			1.36 V	112	105.7	0.8
4	*2437.00	96.8 AV			1.36 V	112	96.0	0.8
5	2483.50	69.5 PK	74.0	-4.5	1.36 V	112	68.6	0.9
6	2483.50	53.5 AV	54.0	-0.5	1.36 V	112	52.6	0.9
7	4874.00	58.3 PK	74.0	-15.7	1.55 V	143	49.0	9.3
8	4874.00	47.6 AV	54.0	-6.4	1.55 V	143	38.3	9.3
9	7311.00	62.2 PK	74.0	-11.8	1.56 V	145	45.7	16.5
10	7311.00	48.2 AV	54.0	-5.8	1.56 V	145	31.7	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	100.2 PK			1.20 H	150	99.3	0.9
2	*2452.00	90.3 AV			1.20 H	150	89.4	0.9
3	2483.50	63.5 PK	74.0	-10.5	1.20 H	150	62.6	0.9
4	2483.50	50.5 AV	54.0	-3.5	1.20 H	150	49.6	0.9
5	4904.00	54.5 PK	74.0	-19.5	1.33 H	68	45.1	9.4
6	4904.00	44.2 AV	54.0	-9.8	1.33 H	68	34.8	9.4
7	7356.00	59.0 PK	74.0	-15.0	1.35 H	149	42.8	16.2
8	7356.00	45.4 AV	54.0	-8.6	1.35 H	149	29.2	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	103.6 PK			1.25 V	120	102.7	0.9
2	*2452.00	93.7 AV			1.25 V	120	92.8	0.9
3	2483.50	66.3 PK	74.0	-7.7	1.25 V	120	65.4	0.9
4	2483.50	53.6 AV	54.0	-0.4	1.25 V	120	52.7	0.9
5	4904.00	59.2 PK	74.0	-14.8	1.69 V	114	49.8	9.4
6	4904.00	45.5 AV	54.0	-8.5	1.69 V	114	36.1	9.4
7	7356.00	61.1 PK	74.0	-12.9	1.70 V	26	44.9	16.2
8	7356.00	47.0 AV	54.0	-7.0	1.70 V	26	30.8	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 WORST-CASE DATA

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	43.80	25.73 QP	40.00	-14.27	1.00 H	277	33.93	-8.20
2	98.43	29.01 QP	43.50	-14.49	2.00 H	86	41.75	-12.74
3	216.05	34.61 QP	46.00	-11.39	1.50 H	259	45.42	-10.81
4	250.00	33.32 QP	46.00	-12.68	1.50 H	71	42.05	-8.73
5	500.01	39.38 QP	46.00	-6.62	2.00 H	99	40.87	-1.49
6	666.68	28.45 QP	46.00	-17.55	1.00 H	92	26.54	1.91
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	54.18	34.85 QP	40.00	-5.15	1.00 V	236	43.03	-8.18
2	94.36	31.64 QP	43.50	-11.86	1.50 V	225	44.99	-13.35
3	219.78	27.65 QP	46.00	-18.35	1.00 V	243	38.36	-10.71
4	500.01	40.37 QP	46.00	-5.63	1.00 V	183	41.86	-1.49
5	533.36	29.94 QP	46.00	-16.06	1.50 V	0	30.88	-0.94
6	666.71	29.62 QP	46.00	-16.38	1.50 V	311	27.71	1.91

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 23, 2015	Oct. 22, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 01, 2015	Aug. 31, 2016
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 11, 2015	June 10, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 08, 2016	Mar. 07, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-002	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
50 ohms Terminator	E1-011315	13	Dec. 11, 2015	Dec. 10, 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: Apr. 19, 2016

4.2.3 Test Procedures

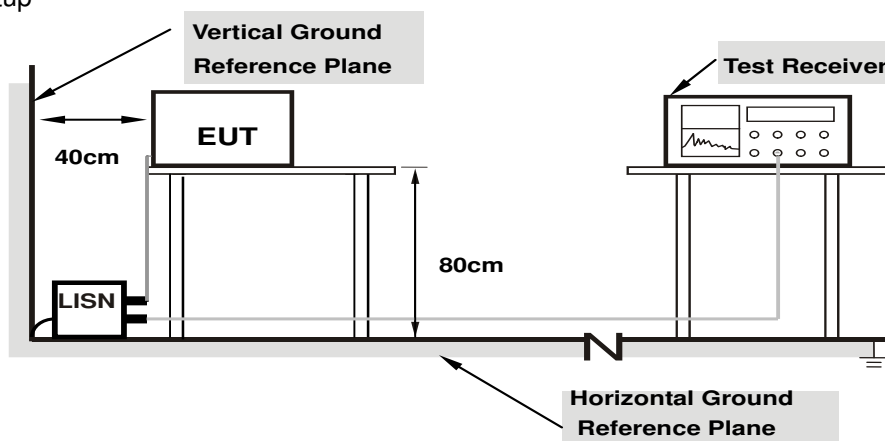
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

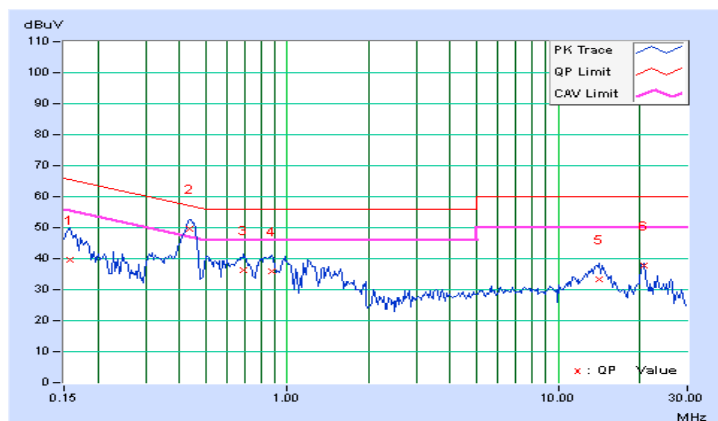
4.2.7 Test Results (Mode 1)

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	0.15781	10.32	29.37	14.90	39.69	25.22	65.58	55.58	-25.89	-30.36
2	0.43516	10.30	39.48	33.38	49.78	43.68	57.15	47.15	-7.37	-3.47
3	0.68906	10.27	26.02	21.52	36.29	31.79	56.00	46.00	-19.71	-14.21
4	0.87266	10.24	25.86	20.68	36.10	30.92	56.00	46.00	-19.90	-15.08
5	14.12891	10.75	22.55	17.51	33.30	28.26	60.00	50.00	-26.70	-21.74
6	20.80859	10.97	26.75	24.44	37.72	35.41	60.00	50.00	-22.28	-14.59

Remarks:

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

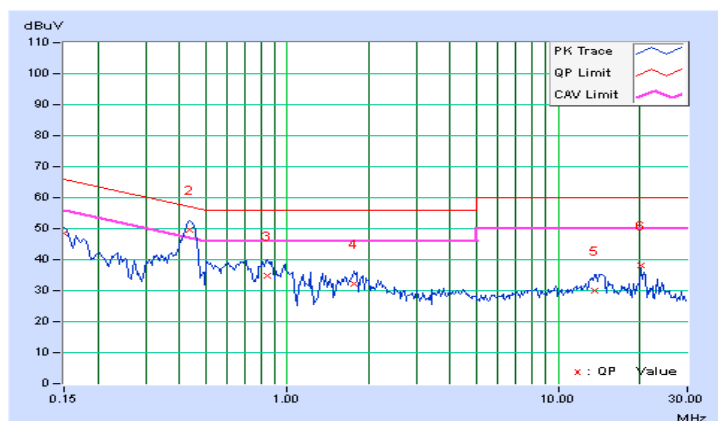


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.30	38.06	23.10	48.36	33.40	66.00	56.00	-17.64	-22.60
2	0.43516	10.28	39.37	33.13	49.65	43.41	57.15	47.15	-7.50	-3.74
3	0.84922	10.24	24.43	19.84	34.67	30.08	56.00	46.00	-21.33	-15.92
4	1.76172	10.25	21.96	17.50	32.21	27.75	56.00	46.00	-23.79	-18.25
5	13.64453	10.74	19.34	12.60	30.08	23.34	60.00	50.00	-29.92	-26.66
6	20.25781	10.99	27.14	25.29	38.13	36.28	60.00	50.00	-21.87	-13.72

Remarks:

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



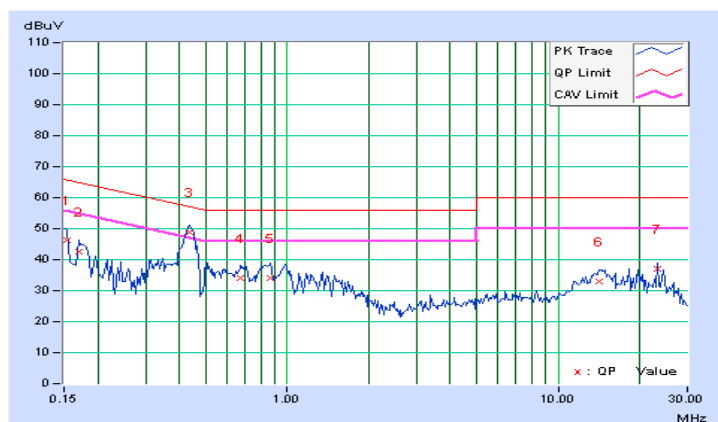
4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	0.15391	10.32	36.15	21.12	46.47	31.44	65.79	55.79	-19.32	-24.35
2	0.16953	10.31	32.46	17.42	42.77	27.73	64.98	54.98	-22.21	-27.25
3	0.43516	10.30	38.56	33.08	48.86	43.38	57.15	47.15	-8.29	-3.77
4	0.67344	10.27	23.64	18.20	33.91	28.47	56.00	46.00	-22.09	-17.53
5	0.86484	10.25	23.90	18.40	34.15	28.65	56.00	46.00	-21.85	-17.35
6	14.23047	10.75	22.23	15.76	32.98	26.51	60.00	50.00	-27.02	-23.49
7	23.12891	11.04	26.15	23.42	37.19	34.46	60.00	50.00	-22.81	-15.54

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

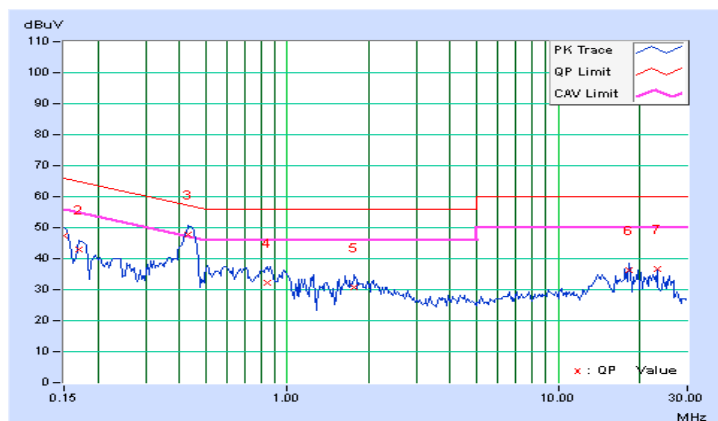


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.30	37.22	23.51	47.52	33.81	66.00	56.00	-18.48	-22.19
2	0.16953	10.29	32.53	18.20	42.82	28.49	64.98	54.98	-22.16	-26.49
3	0.43125	10.28	37.52	32.20	47.80	42.48	57.23	47.23	-9.43	-4.75
4	0.84531	10.24	22.02	16.51	32.26	26.75	56.00	46.00	-23.74	-19.25
5	1.76953	10.25	20.63	15.24	30.88	25.49	56.00	46.00	-25.12	-20.51
6	18.24219	10.92	25.42	23.00	36.34	33.92	60.00	50.00	-23.66	-16.08
7	23.12891	11.06	25.53	22.23	36.59	33.29	60.00	50.00	-23.41	-16.71

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

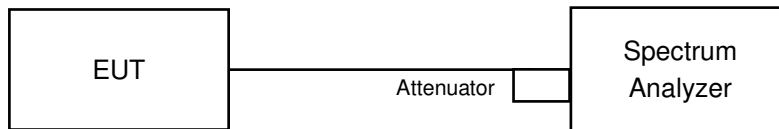


4.3 6dB Bandwidth Measurement

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	10.14	0.5	PASS
6	2437	10.12	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	16.62	0.5	PASS
6	2437	16.63	0.5	PASS
11	2462	16.60	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	17.89	0.5	PASS
11	2462	17.86	0.5	PASS

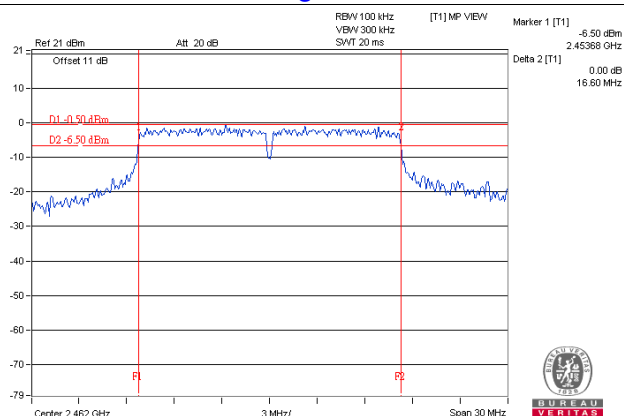
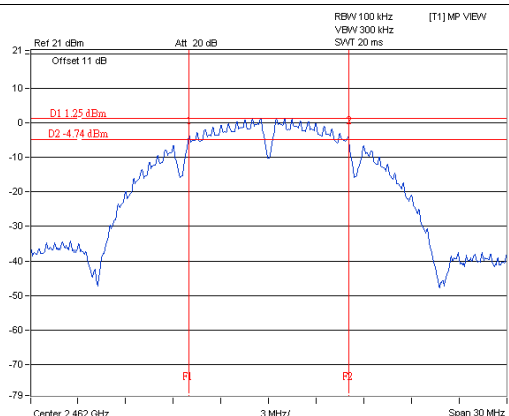
802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.51	0.5	PASS
6	2437	36.52	0.5	PASS
9	2452	36.50	0.5	PASS

Spectrum Plot of Worst Value

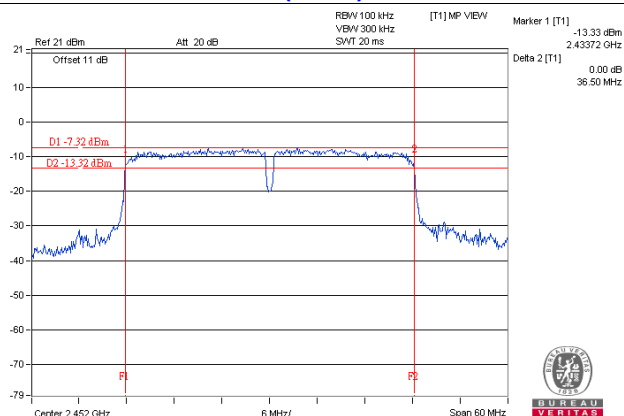
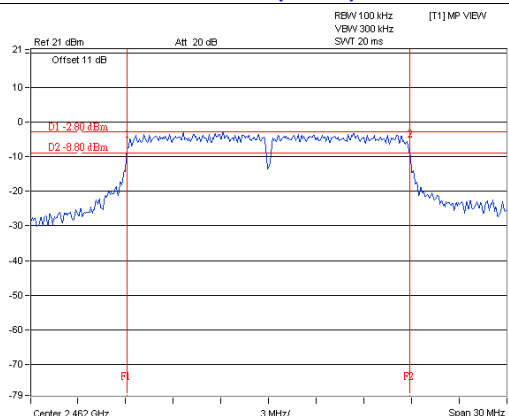
802.11b / CH11

802.11g / CH11



802.11n (HT20) / CH11

802.11n (HT40) / CH9

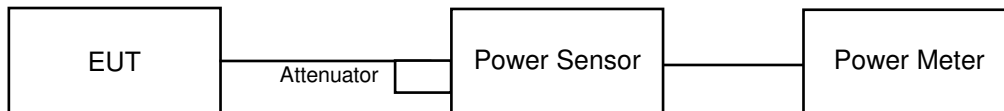


4.4 Conducted Output Power Measurement

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	31.117	14.93	30	Pass
6	2437	26.424	14.22	30	Pass
11	2462	23.227	13.66	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	68.077	18.33	30	Pass
6	2437	69.183	18.40	30	Pass
11	2462	52	17.16	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	67.143	18.27	30	Pass
6	2437	67.298	18.28	30	Pass
11	2462	50.582	17.04	30	Pass

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	53.703	17.30	30	Pass
6	2437	58.479	17.67	30	Pass
9	2452	44.157	16.45	30	Pass

FOR AVERAGE POWER

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	19.679	12.94
6	2437	16.634	12.21
11	2462	14.825	11.71

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	23.659	13.74
6	2437	32.509	15.12
11	2462	16.293	12.12

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	20.324	13.08
6	2437	32.211	15.08
11	2462	15.488	11.90

802.11n (HT40)

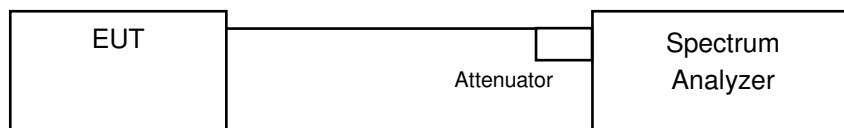
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	13.274	11.23
6	2437	20.417	13.10
9	2452	11.22	10.50

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/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-18.19	8	Pass
6	2437	-19.14	8	Pass
11	2462	-19.09	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-15.48	8	Pass
6	2437	-14.09	8	Pass
11	2462	-16.26	8	Pass

802.11n (HT20)

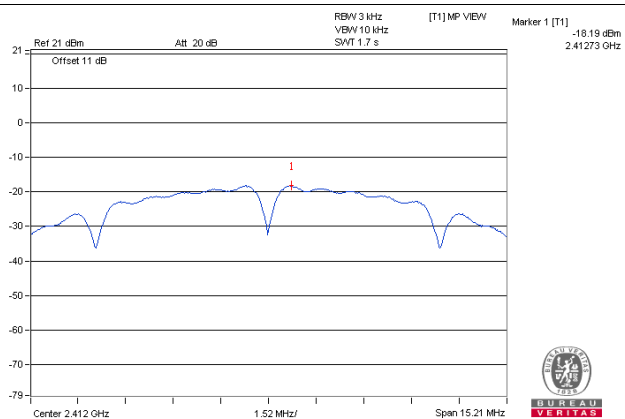
Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-16.20	8	Pass
6	2437	-13.18	8	Pass
11	2462	-17.45	8	Pass

802.11n (HT40)

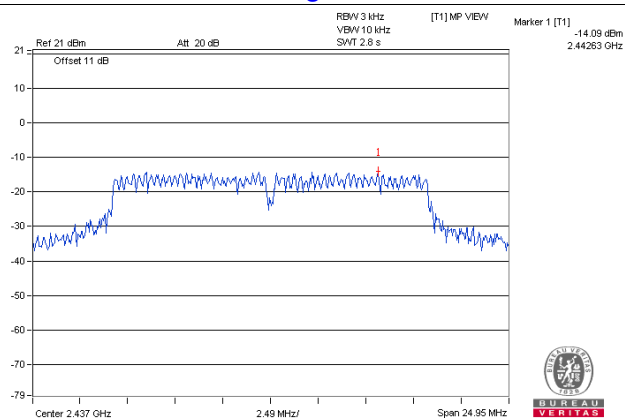
Channel	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-19.98	8	Pass
6	2437	-17.54	8	Pass
9	2452	-18.13	8	Pass

Spectrum Plot of Worst Value

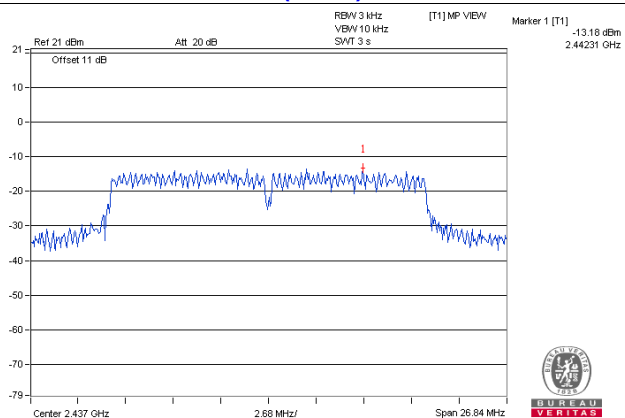
802.11b / CH1



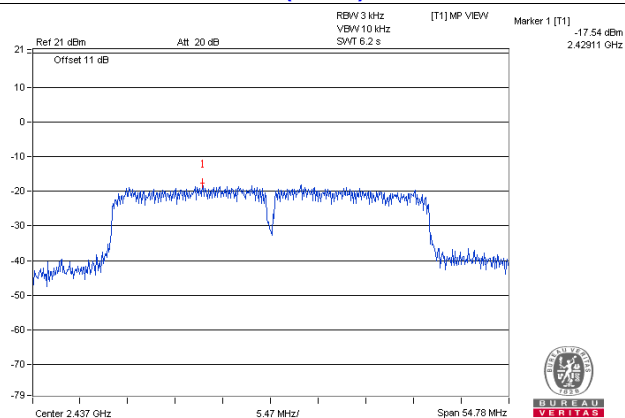
802.11g / CH6



802.11n (HT20) / CH6



802.11n (HT40) / CH6

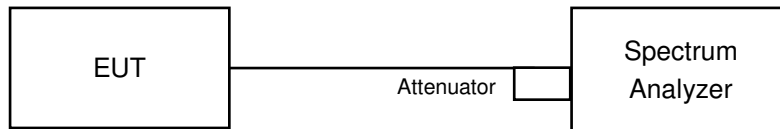


4.6 Conducted Out of Band Emission Measurement

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

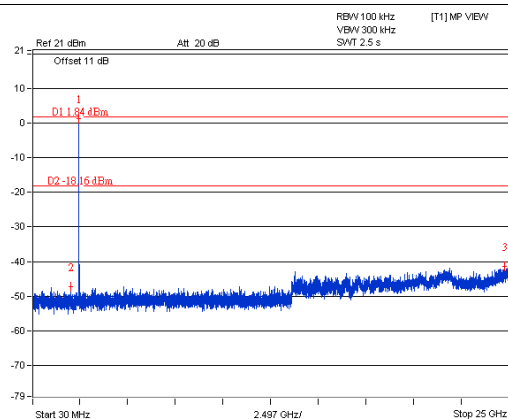
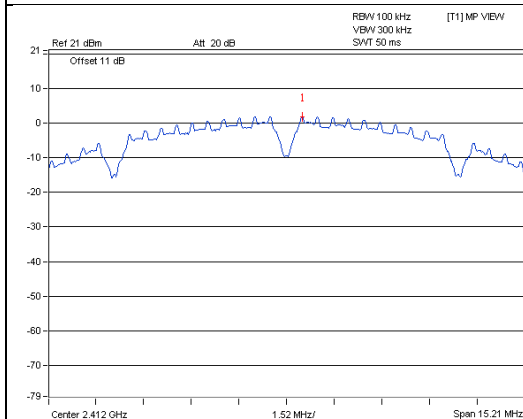
Same as Item 4.3.6

4.6.7 Test Results

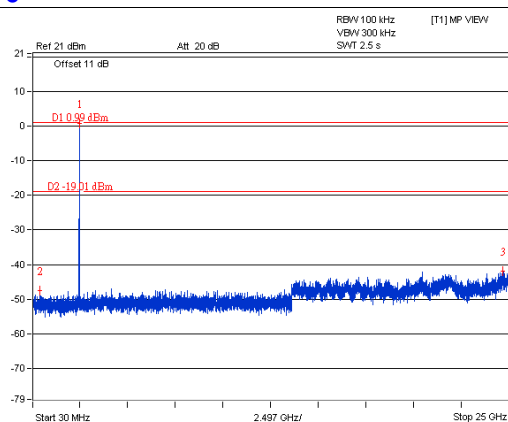
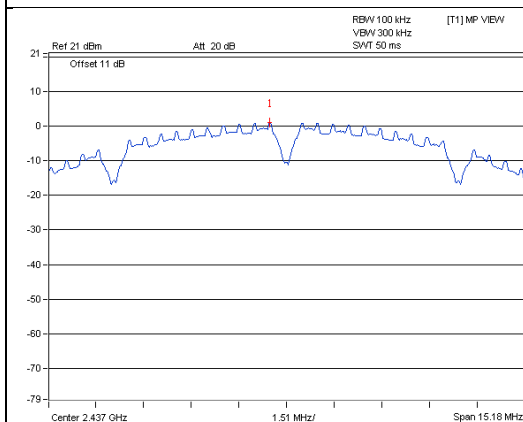
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

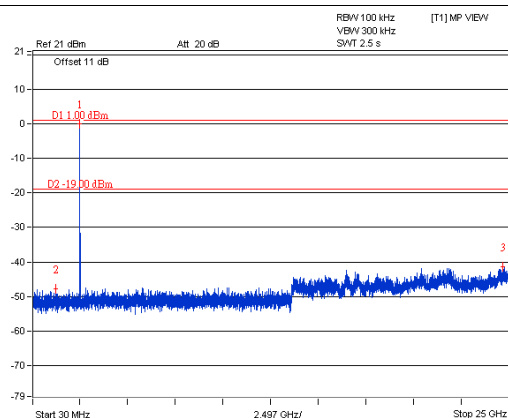
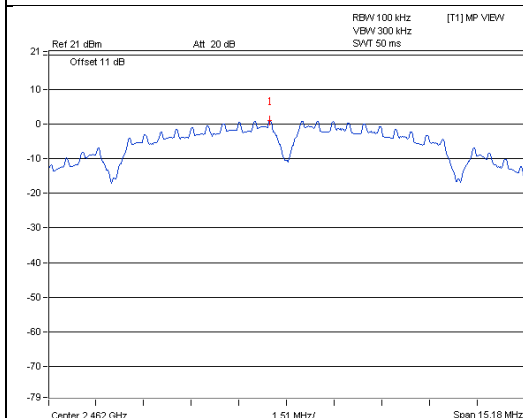
CH 1



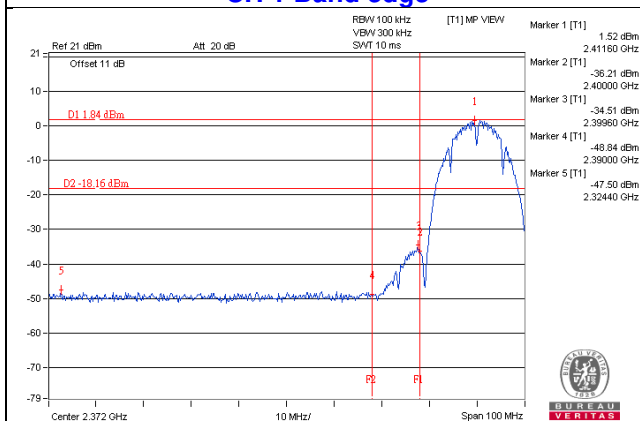
CH 6



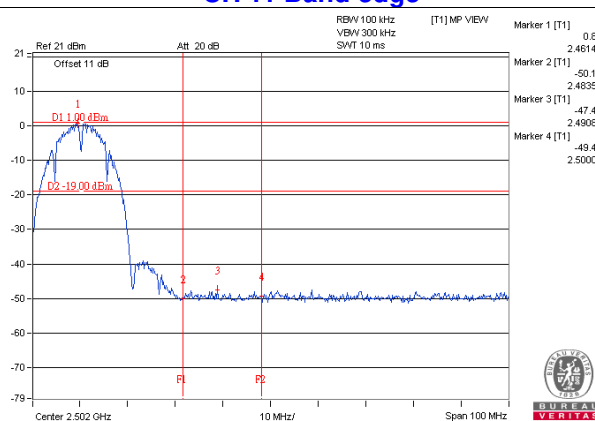
CH 11



CH 1 Band edge

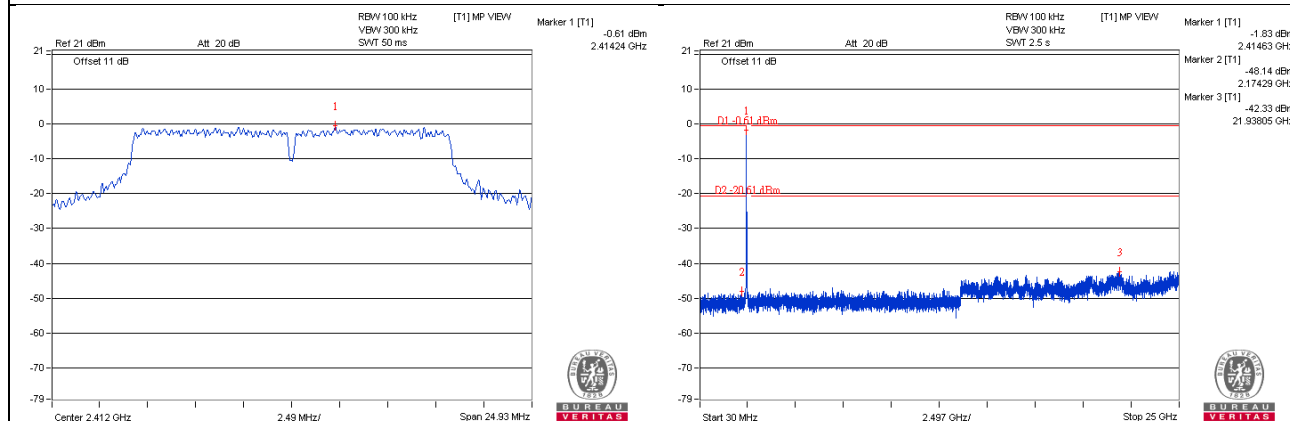


CH 11 Band edge

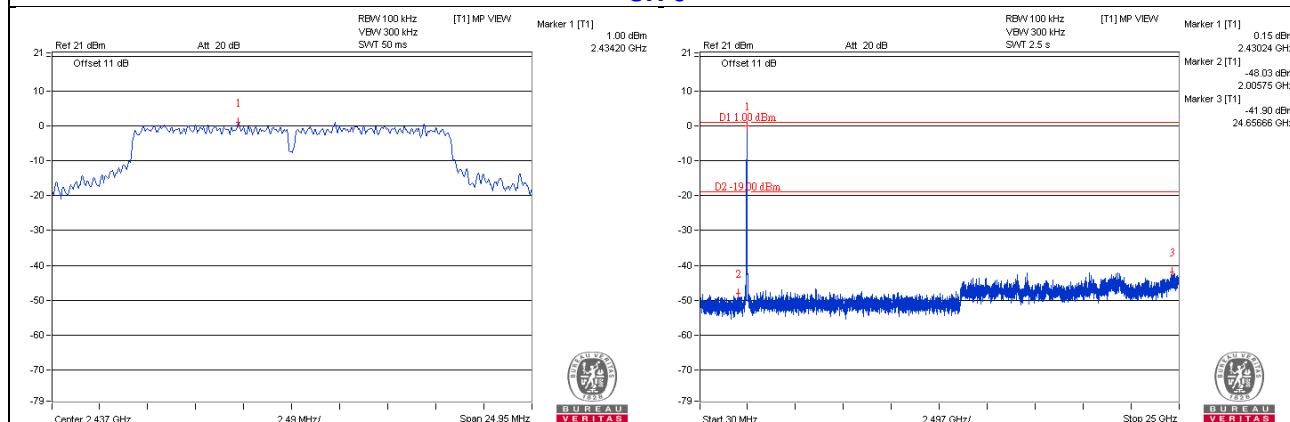


802.11g

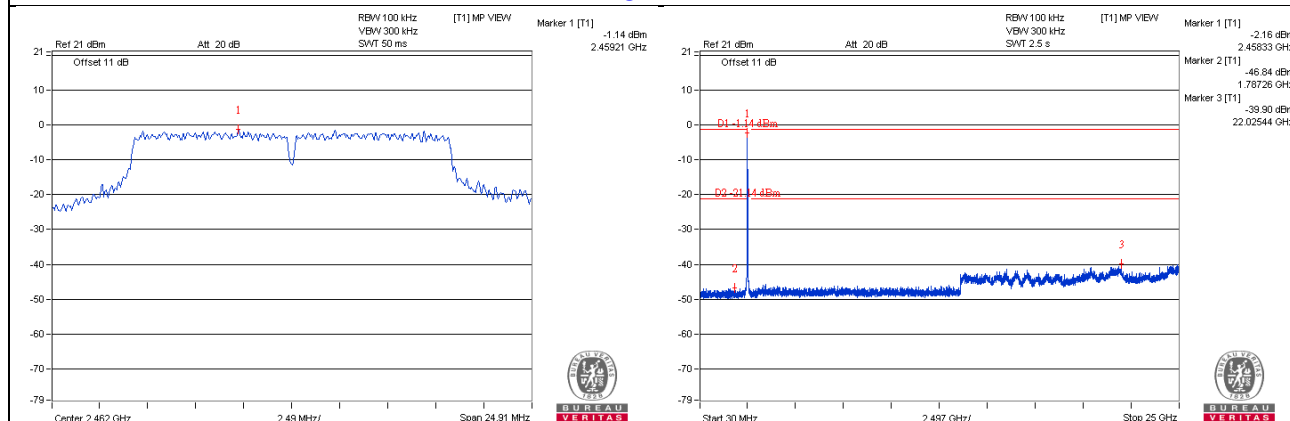
CH 1



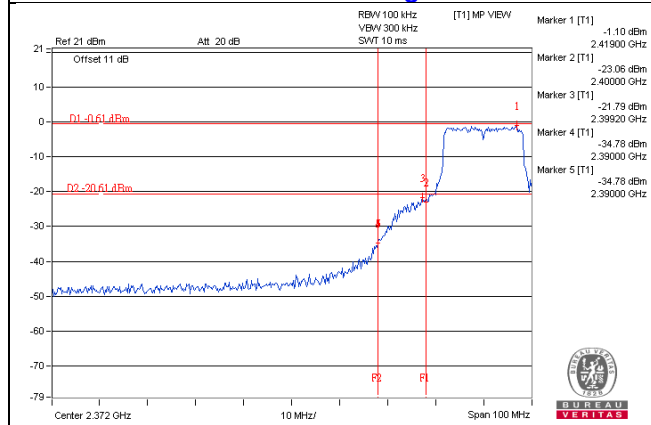
CH 6



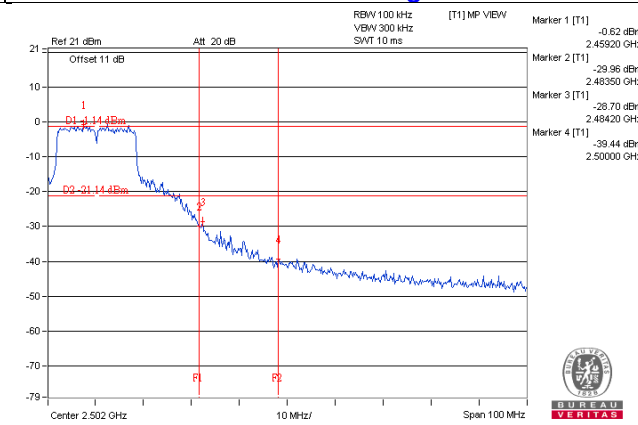
CH 11



CH 1 Band edge

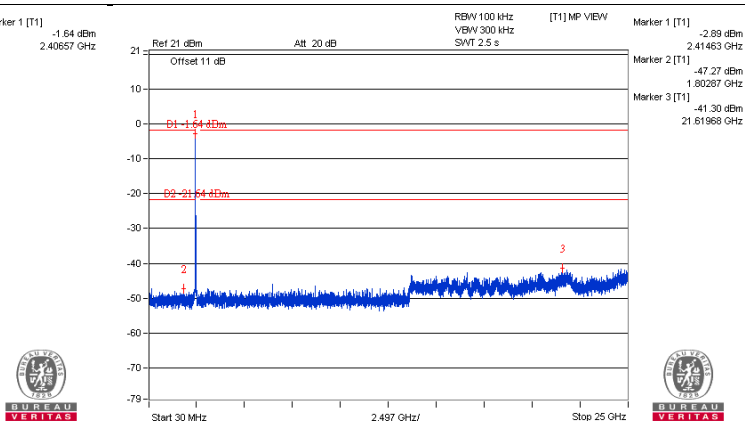
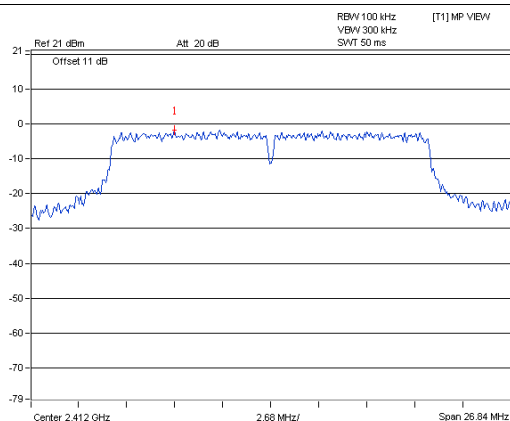


CH 11 Band edge

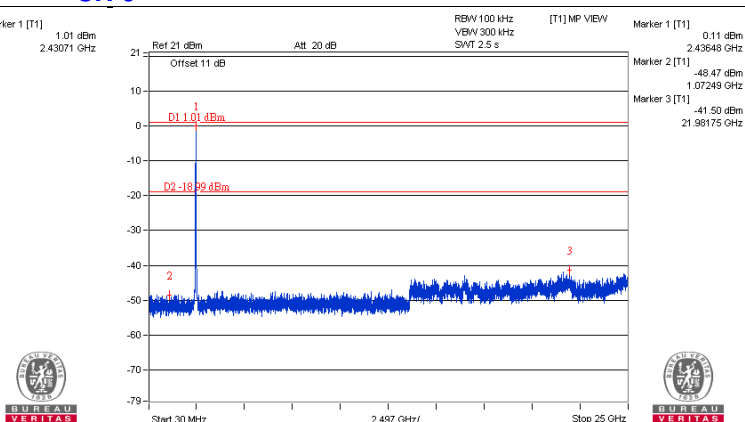
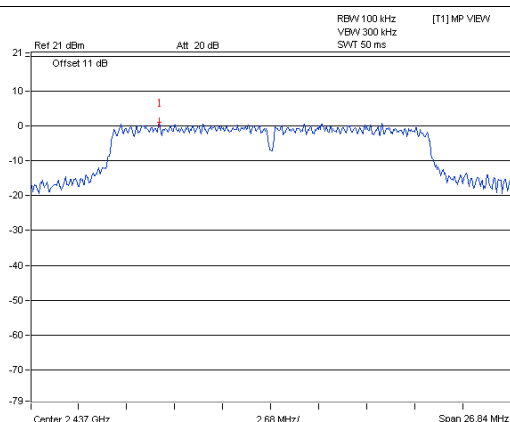


802.11n (HT20)

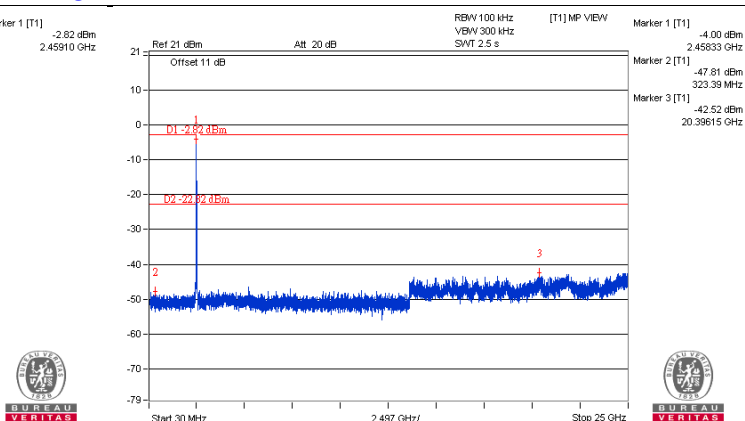
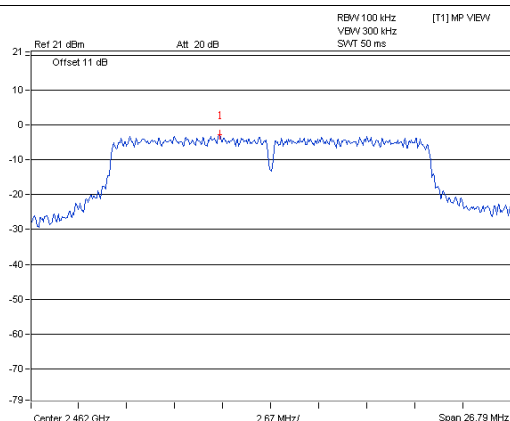
CH 1



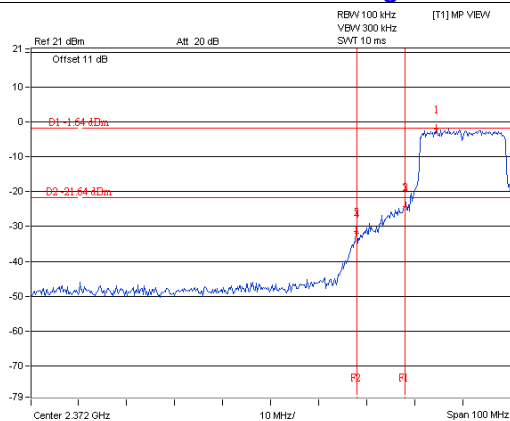
CH 6



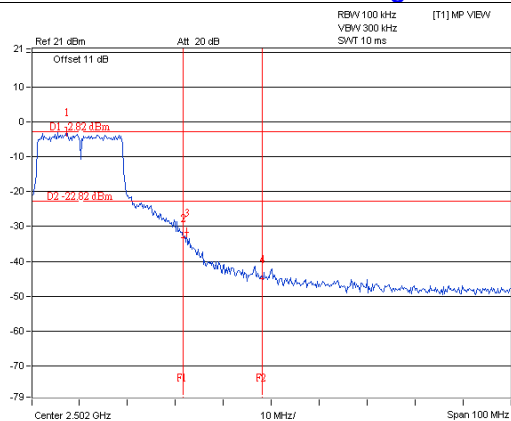
CH 11



CH 1 Band edge

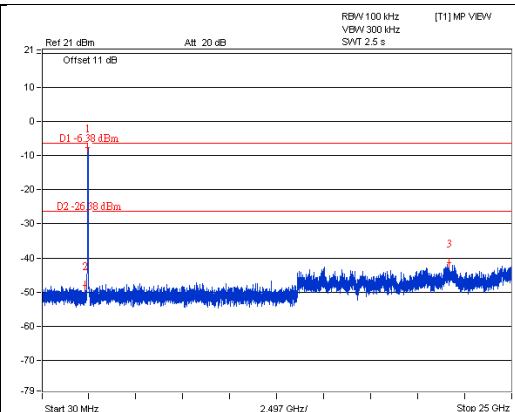
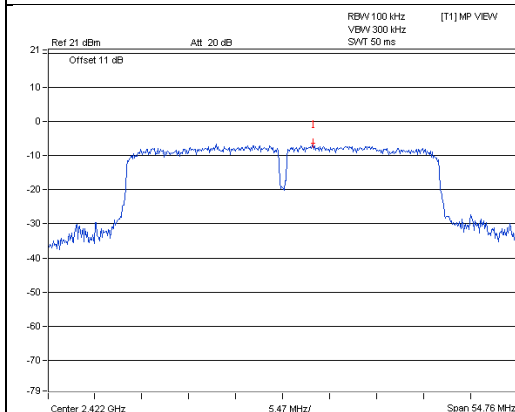


CH 11 Band edge

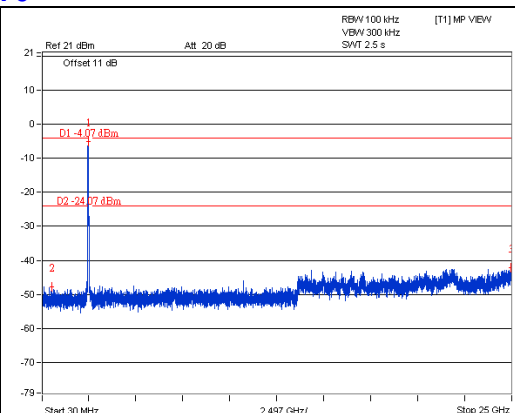
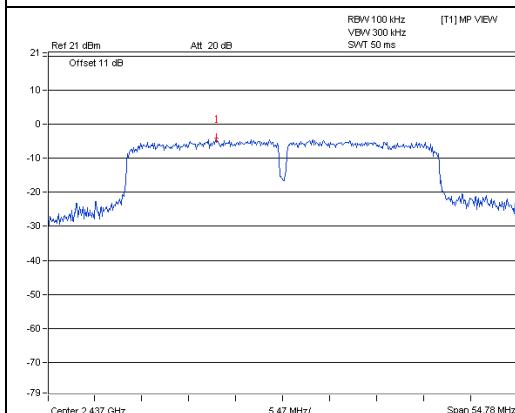


802.11n (HT40)

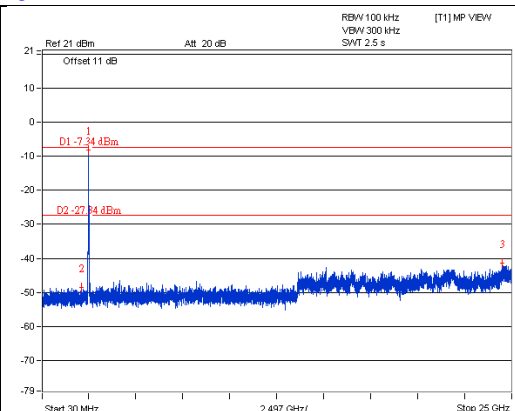
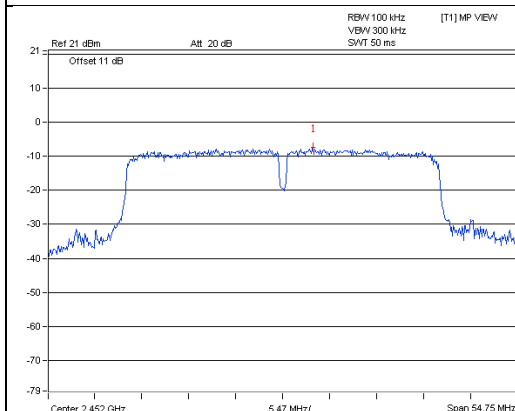
CH 3



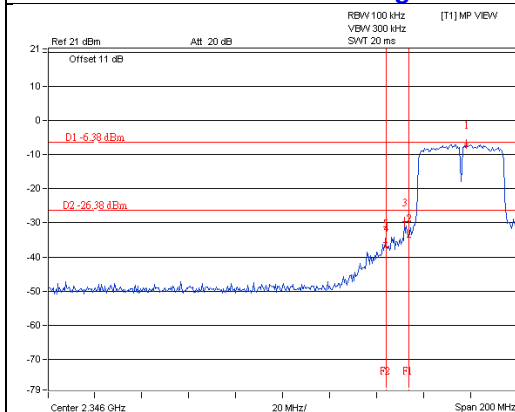
CH 6



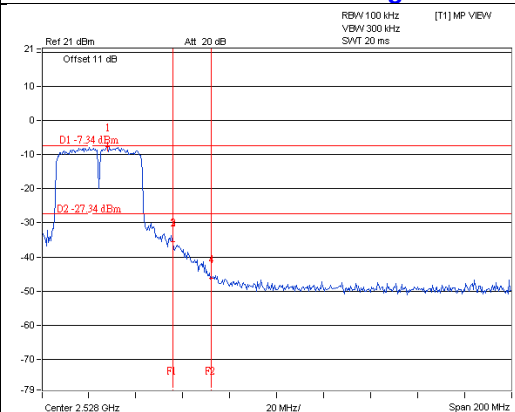
CH 9



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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