

FCC Test Report

Report No.: RF160316C04-3

FCC ID: 2AFZZ-RT3161

Test Model: 2015161

Received Date: Mar. 16, 2016

Test Date: Mar. 19, 2016 ~ Apr. 15, 2016

Issued Date: Apr. 22, 2016

Applicant: Xiaomi Communications Co., Ltd.

Address: The Rainbow City of China Resources, NO.68, Qinghe Middle Street,
Haidian District, Beijing, China

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
(R.O.C)

Test Location (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan
Hsien 333, Taiwan, R.O.C.

Test Location (2): No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan,
R.O.C



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Release Control Record

Issue No.	Description	Date Issued
RF160316C04-3	Original Release	Apr. 22, 2016

1 Certificate of Conformity

Product: Mobile phone

Brand: MI

Test Model: 2015161

Sample Status: Identical Prototype

Applicant: Xiaomi Communications Co., Ltd.

Test Date: Mar. 19, 2016 ~ Apr. 15, 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 : Evonne Liu , **Date:** Apr. 22, 2016
Evonne Liu / Specialist

Approved by : Stanley Wu , **Date:** Apr. 22, 2016
Stanley Wu / Assistant 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 -5.05 dB at 0.16200 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.97 dB at 2484 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB 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:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Mobile phone
Brand	MI
Test Model	2015161
Status of EUT	Identical Prototype
Power Supply Rating	5.0 Vdc (adapter or host equipment) 3.85 Vdc (Li-ion battery)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	120.50 mW
Antenna Type	LDS antenna with -3.95 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

- The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	MI	MDY-08-EF	I/P: 100-240Vac, 50/60Hz, 500mA O/P: 5Vdc, 2A
Battery	MI	BM46	3.85Vdc, 4000mAh
USB Cable	MI	N/A	1.15m shielded cable w/o core
eMMC 1 (=ROM 1)	N/A	N/A	16G
eMMC 2 (=ROM 2)	N/A	N/A	32G

- There're 2 configurations for the EUT listed as below.

Main sample: EUT + eMMC 1 (16G)

2nd sample: EUT + eMMC 1 (32G)

✧ Only the worst case data was presented in the report.

- 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 (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

7 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE \geq 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Main sample
B	√	√	√	-	2nd sample

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
NOTE: "-" means no effect.

Radiated Emission Test (Above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
B	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Radiated Emission Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B	802.11n (HT40)	3 to 9	9	OFDM	BPSK	MCS0

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B	802.11n (HT40)	1 to 11	9	OFDM	BPSK	MCS0

Bandedge Measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	MCS0
	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	MCS0

Antenna Port Conducted Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Charles Hsiao
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Toby Tian
APCM	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin

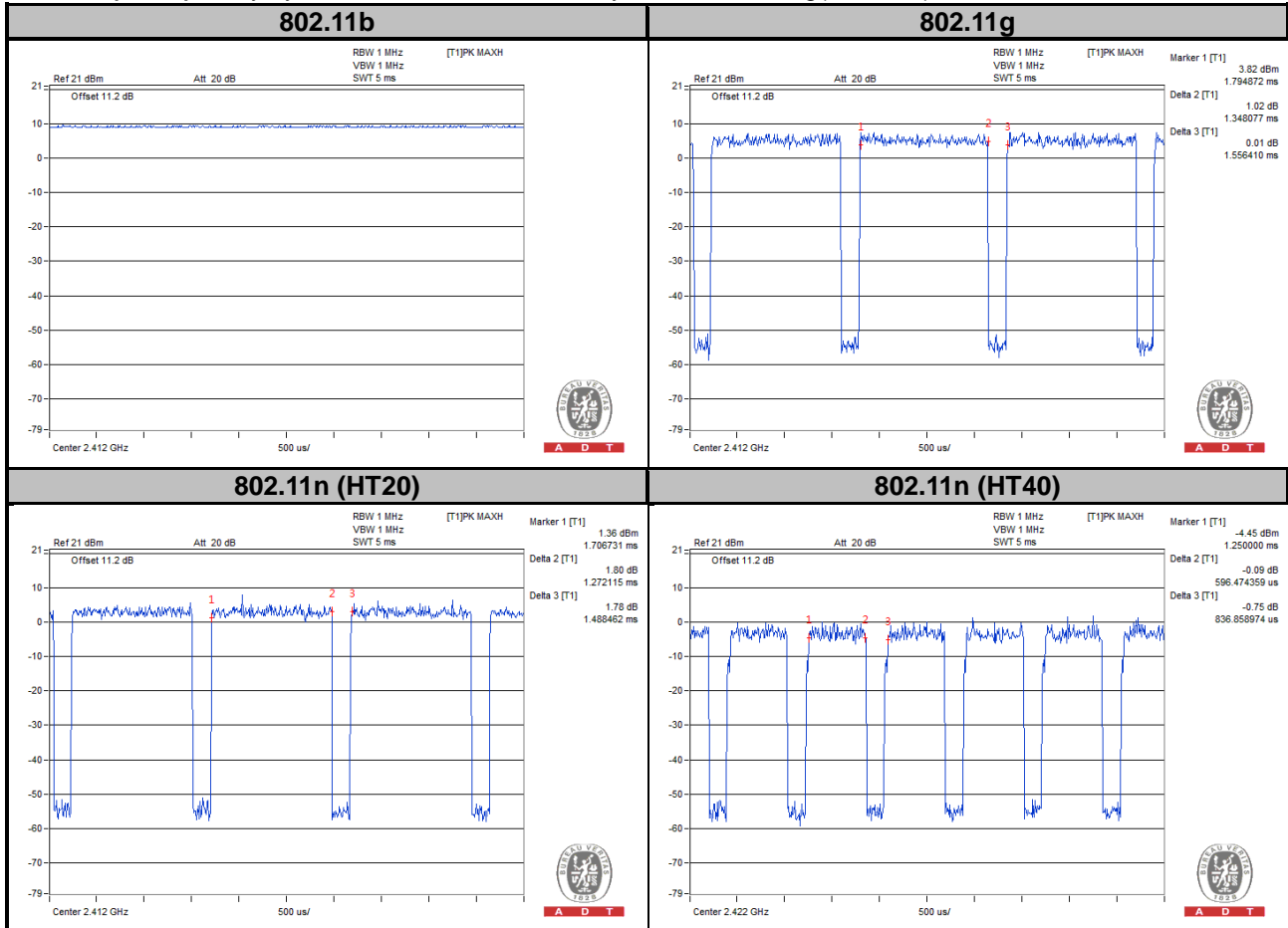
3.3 Duty Cycle of Test Signal

802.11b: Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11g: Duty cycle = $1.348/1.556 = 0.866$, Duty factor = $10 * \log(1/0.866) = 0.62$

802.11n (HT20): Duty cycle = $1.272/1.488 = 0.854$, Duty factor = $10 * \log(1/0.854) = 0.69$

802.11n (HT40): Duty cycle = $596/836 = 0.712$, Duty factor = $10 * \log(1/0.712) = 1.48$



3.4 Description of Support Units

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

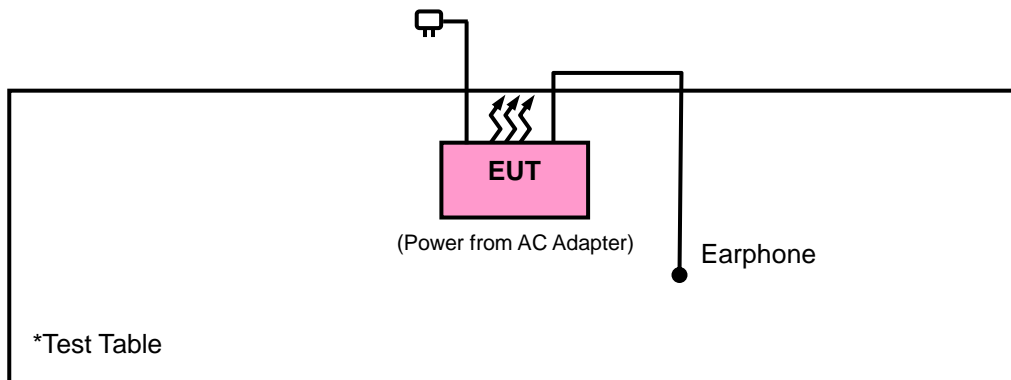
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Earphone	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	1.2m non-shielded cable w/o core

Note:

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r05

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (FCC ID). The test report has been issued separately.

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 20 dB 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 1000 MHz, 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 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	May 19, 2015	May 18, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2015	Dec. 16, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Jan. 19, 2016	Jan. 18, 2017
Bluetooth Tester	CBT	100980	Apr. 27, 2015	Apr. 26, 2017
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Preamplifier Agilent	310N	187226	Jun. 29, 2015	Jun. 28, 2016
Preamplifier Agilent	83017A	MY39501357	Jun. 29, 2015	Jun. 28, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Jan. 20, 2016	Jan. 19, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor Anritsu	MA2411B	1207325	Sep. 21, 2015	Sep. 20, 2016
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 27, 2015	Jun. 26, 2016
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 27, 2015	Jun. 26, 2016
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 149147.
5. The IC Site Registration No. is IC7450I-1.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

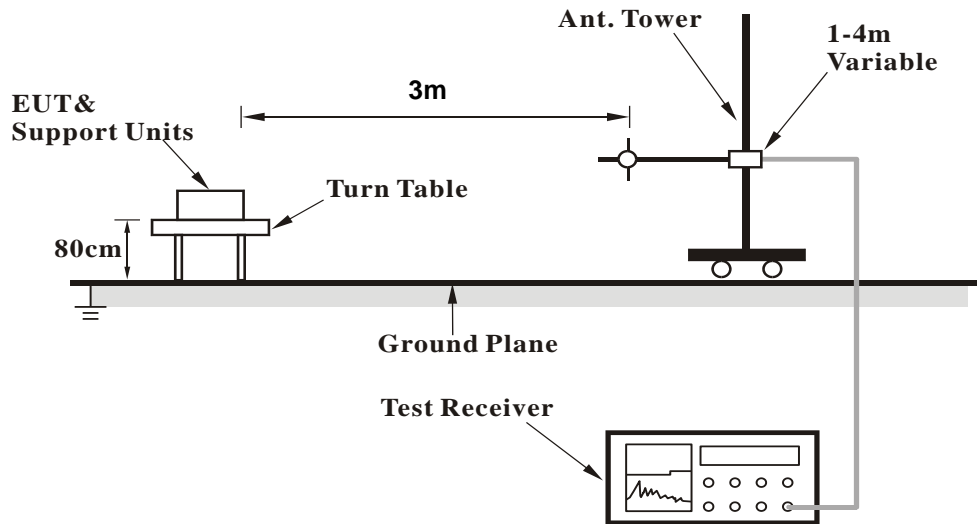
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.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

4.1.4 Deviation from Test Standard

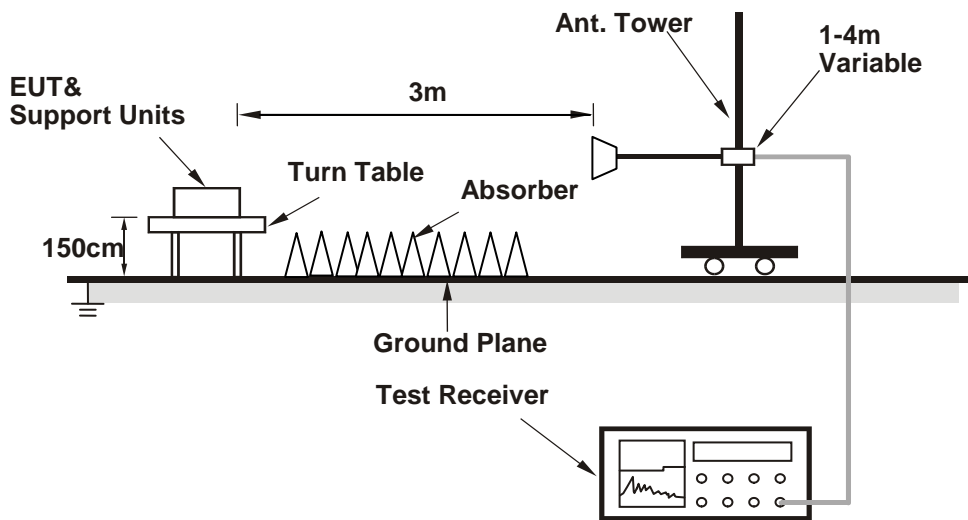
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



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

4.1.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data :

802.11b

Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	39.54	37.81	54	-14.46	31.8	5.4	35.47	111	0	Average
2390	55.84	54.11	74	-18.16	31.8	5.4	35.47	111	0	Peak
2412	103.66	101.89			31.81	5.43	35.47	111	0	Average
2412	106.56	104.79			31.81	5.43	35.47	111	0	Peak
2492	39.79	37.77	54	-14.21	31.9	5.53	35.41	111	0	Average
2492	56.24	54.22	74	-17.76	31.9	5.53	35.41	111	0	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2368	39.21	37.57	54	-14.79	31.76	5.37	35.49	118	19	Average
2368	56.09	54.45	74	-17.91	31.76	5.37	35.49	118	19	Peak
2412	101.9	100.13			31.81	5.43	35.47	118	19	Average
2412	104.84	103.07			31.81	5.43	35.47	118	19	Peak
2490	39.74	37.73	54	-14.26	31.9	5.53	35.42	118	19	Average
2490	56.28	54.27	74	-17.72	31.9	5.53	35.42	118	19	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.



EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	39.6	37.94	54	-14.4	31.78	5.37	35.49	110	335	Average
2376	55.3	53.64	74	-18.7	31.78	5.37	35.49	110	335	Peak
2437	103.23	101.38			31.85	5.46	35.46	110	335	Average
2437	106.26	104.41			31.85	5.46	35.46	110	335	Peak
2492	40.72	38.7	54	-13.28	31.9	5.53	35.41	110	335	Average
2492	55.89	53.87	74	-18.11	31.9	5.53	35.41	110	335	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2362	39.25	37.62	54	-14.75	31.76	5.37	35.5	102	18	Average
2362	56.11	54.48	74	-17.89	31.76	5.37	35.5	102	18	Peak
2437	101.78	99.93			31.85	5.46	35.46	102	18	Average
2437	104.77	102.92			31.85	5.46	35.46	102	18	Peak
2484	39.57	37.61	54	-14.43	31.88	5.5	35.42	102	18	Average
2484	56.06	54.1	74	-17.94	31.88	5.5	35.42	102	18	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.



A D T

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2370	39.28	37.62	54	-14.72	31.78	5.37	35.49	109	344	Average
2370	55.79	54.13	74	-18.21	31.78	5.37	35.49	109	344	Peak
2462	103.8	101.87			31.87	5.5	35.44	109	344	Average
2462	106.79	104.86			31.87	5.5	35.44	109	344	Peak
2490	41.24	39.23	54	-12.76	31.9	5.53	35.42	109	344	Average
2490	56.38	54.37	74	-17.62	31.9	5.53	35.42	109	344	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384	39.23	37.54	54	-14.77	31.78	5.4	35.49	100	32	Average
2384	56.35	54.66	74	-17.65	31.78	5.4	35.49	100	32	Peak
2462	101.43	99.5			31.87	5.5	35.44	100	32	Average
2462	104.49	102.56			31.87	5.5	35.44	100	32	Peak
2488	40.44	38.43	54	-13.56	31.9	5.53	35.42	100	32	Average
2488	56.36	54.35	74	-17.64	31.9	5.53	35.42	100	32	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42	40.27	54	-12	31.8	5.4	35.47	111	0	Average
2390	58.2	56.47	74	-15.8	31.8	5.4	35.47	111	0	Peak
2412	97.56	95.79			31.81	5.43	35.47	111	0	Average
2412	106.33	104.56			31.81	5.43	35.47	111	0	Peak
2494	40.69	38.67	54	-13.31	31.9	5.53	35.41	111	0	Average
2494	56.8	54.78	74	-17.2	31.9	5.53	35.41	111	0	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	40.7	38.97	54	-13.3	31.8	5.4	35.47	118	19	Average
2390	57.43	55.7	74	-16.57	31.8	5.4	35.47	118	19	Peak
2412	95.67	93.9			31.81	5.43	35.47	118	19	Average
2412	104.49	102.72			31.81	5.43	35.47	118	19	Peak
2484	40.67	38.71	54	-13.33	31.88	5.5	35.42	118	19	Average
2484	56.46	54.5	74	-17.54	31.88	5.5	35.42	118	19	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2380	40.13	38.47	54	-13.87	31.78	5.37	35.49	126	344	Average
2380	55.45	53.79	74	-18.55	31.78	5.37	35.49	126	344	Peak
2437	98.31	96.46			31.85	5.46	35.46	126	344	Average
2437	106.57	104.72			31.85	5.46	35.46	126	344	Peak
2490	45.41	43.4	54	-8.59	31.9	5.53	35.42	126	344	Average
2490	57.87	55.86	74	-16.13	31.9	5.53	35.42	126	344	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	40.13	38.42	54	-13.87	31.8	5.4	35.49	101	18	Average
2386	56.24	54.53	74	-17.76	31.8	5.4	35.49	101	18	Peak
2437	96.38	94.53			31.85	5.46	35.46	101	18	Average
2437	104.11	102.26			31.85	5.46	35.46	101	18	Peak
2490	43.55	41.54	54	-10.45	31.9	5.53	35.42	101	18	Average
2490	56.67	54.66	74	-17.33	31.9	5.53	35.42	101	18	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.



A D T

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	40.17	38.51	54	-13.83	31.78	5.37	35.49	109	342	Average
2376	56.13	54.47	74	-17.87	31.78	5.37	35.49	109	342	Peak
2462	98.44	96.51			31.87	5.5	35.44	109	342	Average
2462	106.07	104.14			31.87	5.5	35.44	109	342	Peak
2484	49.35	47.39	54	-4.65	31.88	5.5	35.42	109	342	Average
2484	66.6	64.64	74	-7.4	31.88	5.5	35.42	109	342	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2374	40.09	38.43	54	-13.91	31.78	5.37	35.49	100	32	Average
2374	57.07	55.41	74	-16.93	31.78	5.37	35.49	100	32	Peak
2462	96.28	94.35			31.87	5.5	35.44	100	32	Average
2462	104	102.07			31.87	5.5	35.44	100	32	Peak
2484	46.23	44.27	54	-7.77	31.88	5.5	35.42	100	32	Average
2484	64.12	62.16	74	-9.88	31.88	5.5	35.42	100	32	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2362	40.73	39.1	54	-13.27	31.76	5.37	35.5	111	0	Average
2362	56.5	54.87	74	-17.5	31.76	5.37	35.5	111	0	Peak
2412	96.26	94.49			31.81	5.43	35.47	111	0	Average
2412	104.25	102.48			31.81	5.43	35.47	111	0	Peak
2498	40.81	38.79	54	-13.19	31.9	5.53	35.41	111	0	Average
2498	55.64	53.62	74	-18.36	31.9	5.53	35.41	111	0	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2342	40.23	38.66	54	-13.77	31.74	5.33	35.5	118	19	Average
2342	55.73	54.16	74	-18.27	31.74	5.33	35.5	118	19	Peak
2412	95.28	93.51			31.81	5.43	35.47	118	19	Average
2412	102.96	101.19			31.81	5.43	35.47	118	19	Peak
2494	40.69	38.67	54	-13.31	31.9	5.53	35.41	118	19	Average
2494	56.08	54.06	74	-17.92	31.9	5.53	35.41	118	19	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	40.25	38.54	54	-13.75	31.8	5.4	35.49	126	344	Average
2386	56.6	54.89	74	-17.4	31.8	5.4	35.49	126	344	Peak
2437	96.32	94.47			31.85	5.46	35.46	126	344	Average
2437	104.82	102.97			31.85	5.46	35.46	126	344	Peak
2490	45.58	43.57	54	-8.42	31.9	5.53	35.42	126	344	Average
2490	58.01	56	74	-15.99	31.9	5.53	35.42	126	344	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	40.12	38.41	54	-13.88	31.8	5.4	35.49	101	32	Average
2388	56.15	54.44	74	-17.85	31.8	5.4	35.49	101	32	Peak
2437	94.64	92.79			31.85	5.46	35.46	101	32	Average
2437	102.85	101			31.85	5.46	35.46	101	32	Peak
2490	43.58	41.57	54	-10.42	31.9	5.53	35.42	101	32	Average
2490	56.78	54.77	74	-17.22	31.9	5.53	35.42	101	32	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384	40.1	38.41	54	-13.9	31.78	5.4	35.49	109	335	Average
2384	55.63	53.94	74	-18.37	31.78	5.4	35.49	109	335	Peak
2462	96.81	94.88			31.87	5.5	35.44	109	335	Average
2462	104.35	102.42			31.87	5.5	35.44	109	335	Peak
2484	48.73	46.77	54	-5.27	31.88	5.5	35.42	109	335	Average
2484	66.88	64.92	74	-7.12	31.88	5.5	35.42	109	335	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2360	41.99	40.36	54	-12.01	31.76	5.37	35.5	100	32	Average
2360	55.61	53.98	74	-18.39	31.76	5.37	35.5	100	32	Peak
2462	93.61	91.68			31.87	5.5	35.44	100	32	Average
2462	102.28	100.35			31.87	5.5	35.44	100	32	Peak
2484	46.9	44.94	54	-7.1	31.88	5.5	35.42	100	32	Average
2484	62.86	60.9	74	-11.14	31.88	5.5	35.42	100	32	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.13	43.4	54	-8.87	31.8	5.4	35.47	110	360	Average
2390	63.31	61.58	74	-10.69	31.8	5.4	35.47	110	360	Peak
2422	95.14	93.34			31.83	5.43	35.46	110	360	Average
2422	103.67	101.87			31.83	5.43	35.46	110	360	Peak
2486	41.66	39.67	54	-12.34	31.88	5.53	35.42	110	360	Average
2486	56.27	54.28	74	-17.73	31.88	5.53	35.42	110	360	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	43.18	41.45	54	-10.82	31.8	5.4	35.47	118	19	Average
2390	59.21	57.48	74	-14.79	31.8	5.4	35.47	118	19	Peak
2422	93.06	91.26			31.83	5.43	35.46	118	19	Average
2422	101.42	99.62			31.83	5.43	35.46	118	19	Peak
2490	41.47	39.46	54	-12.53	31.9	5.53	35.42	118	19	Average
2490	56.08	54.07	74	-17.92	31.9	5.53	35.42	118	19	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2422 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	41.08	39.42	54	-12.92	31.78	5.37	35.49	109	344	Average
2376	56.09	54.43	74	-17.91	31.78	5.37	35.49	109	344	Peak
2437	94.98	93.13			31.85	5.46	35.46	109	344	Average
2437	103.98	102.13			31.85	5.46	35.46	109	344	Peak
2484	45.6	43.64	54	-8.4	31.88	5.5	35.42	109	344	Average
2484	63.33	61.37	74	-10.67	31.88	5.5	35.42	109	344	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2354	40.69	39.1	54	-13.31	31.76	5.33	35.5	101	32	Average
2354	55.85	54.26	74	-18.15	31.76	5.33	35.5	101	32	Peak
2437	92.65	90.8			31.85	5.46	35.46	101	32	Average
2437	101.63	99.78			31.85	5.46	35.46	101	32	Peak
2484	43.46	41.5	54	-10.54	31.88	5.5	35.42	101	32	Average
2484	58.27	56.31	74	-15.73	31.88	5.5	35.42	101	32	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.



A D T

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382	40.84	39.15	54	-13.16	31.78	5.4	35.49	109	343	Average
2382	56.18	54.49	74	-17.82	31.78	5.4	35.49	109	343	Peak
2452	95.3	93.43			31.85	5.46	35.44	109	343	Average
2452	103.74	101.87			31.85	5.46	35.44	109	343	Peak
2484	52.03	50.07	54	-1.97	31.88	5.5	35.42	109	343	Average
2484	68.66	66.7	74	-5.34	31.88	5.5	35.42	109	343	Peak

Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	40.85	39.19	54	-13.15	31.78	5.37	35.49	100	32	Average
2376	55.57	53.91	74	-18.43	31.78	5.37	35.49	100	32	Peak
2452	93.59	91.72			31.85	5.46	35.44	100	32	Average
2452	101.76	99.89			31.85	5.46	35.44	100	32	Peak
2484	49.14	47.18	54	-4.86	31.88	5.5	35.42	100	32	Average
2484	65.21	63.25	74	-8.79	31.88	5.5	35.42	100	32	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2452 MHz: Fundamental frequency.

Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2349	40.71	39.14	54	-13.29	31.74	5.33	35.5	154	296	Average
2349	56.24	54.67	74	-17.76	31.74	5.33	35.5	154	296	Peak
2452	93.16	91.29			31.85	5.46	35.44	154	296	Average
2452	101.84	99.97			31.85	5.46	35.44	154	296	Peak
2484	51.98	50.02	54	-2.02	31.88	5.5	35.42	154	296	Average
2484	68.51	66.55	74	-5.49	31.88	5.5	35.42	154	296	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384	40.97	39.28	54	-13.03	31.78	5.4	35.49	129	174	Average
2384	55.16	53.47	74	-18.84	31.78	5.4	35.49	129	174	Peak
2452	91.26	89.39			31.85	5.46	35.44	129	174	Average
2452	99.61	97.74			31.85	5.46	35.44	129	174	Peak
2484	49.14	47.18	54	-4.86	31.88	5.5	35.42	129	174	Average
2484	65.21	63.25	74	-8.79	31.88	5.5	35.42	129	174	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2452 MHz: Fundamental frequency.

9 kHz ~ 30 MHz DATA:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz WORST-CASE DATA:
802.11n (HT40)
Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
96.69	19.69	41.09	43.5	-23.81	9.42	1.28	32.1	166	199	Peak
150.15	19.92	40.57	43.5	-23.58	10.1	1.52	32.27	164	350	Peak
219	18.1	37	46	-27.9	11.67	1.65	32.22	188	219	Peak
504.4	20.24	30.33	46	-25.76	19.38	2.63	32.1	170	120	Peak
653.5	23.06	29.89	46	-22.94	22.32	2.99	32.14	144	320	Peak
792.1	26.04	30.61	46	-19.96	24.23	3.27	32.07	179	23	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
32.43	30.42	45.97	40	-9.58	15.96	0.74	32.25	130	341	Peak
46.47	29.46	51.87	40	-10.54	8.91	0.9	32.22	189	9	Peak
131.79	11.28	32.92	43.5	-32.22	9.22	1.38	32.24	112	112	Peak
522.6	21.61	30.54	46	-24.39	20.51	2.7	32.14	150	205	Peak
576.5	21.31	30.59	46	-24.69	20.1	2.82	32.2	108	109	Peak
699.7	24.9	30.78	46	-21.1	23.1	3.11	32.09	132	309	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value



Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antennal Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
46.47	12.54	34.95	40	-27.46	8.91	0.9	32.22	115	176	Peak
91.29	18.64	40.28	43.5	-24.86	9.02	1.11	31.77	169	132	Peak
189.84	20.68	40.92	43.5	-22.82	10.4	1.61	32.25	145	117	Peak
410.6	17.68	29.56	46	-28.32	17.92	2.41	32.21	157	164	Peak
619.2	22.09	29.38	46	-23.91	21.96	2.93	32.18	129	124	Peak
846	26.43	31.12	46	-19.57	23.75	3.38	31.82	108	154	Peak

Antennal Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
54.03	19.61	43.55	40	-20.39	7.39	0.9	32.23	107	141	Peak
145.02	13.63	34.79	43.5	-29.87	9.73	1.38	32.27	139	128	Peak
232.23	11.61	29.74	46	-34.39	12.19	1.85	32.17	175	146	Peak
395.2	17.25	29.32	46	-28.75	17.8	2.34	32.21	138	112	Peak
589.8	21.25	29.84	46	-24.75	20.73	2.87	32.19	156	104	Peak
916.7	28.6	30.47	46	-17.4	25.96	3.53	31.36	139	117	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
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 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2016	Feb. 25, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

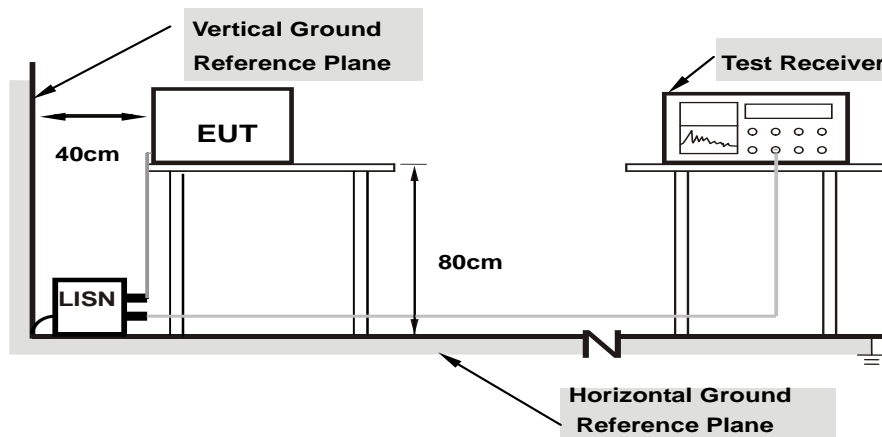
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

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

- a. Placed the EUT on a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

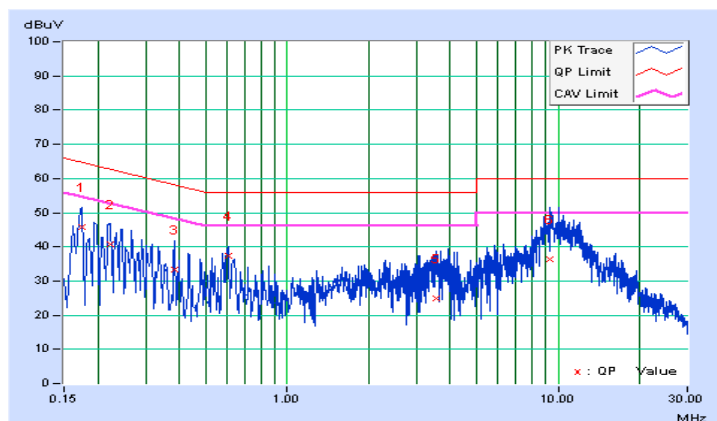
Mode A

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/4/15

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	0.17384	10.02	35.61	21.04	45.63	31.06	64.77	54.77	-19.14	-23.71
2	0.22152	10.04	30.65	18.03	40.69	28.07	62.76	52.76	-22.07	-24.69
3	0.38218	10.11	23.36	8.48	33.47	18.59	58.23	48.23	-24.76	-29.64
4	0.60603	10.15	27.18	22.54	37.33	32.69	56.00	46.00	-18.67	-13.31
5	3.54200	10.38	14.59	5.85	24.97	16.23	56.00	46.00	-31.03	-29.77
6	9.27800	10.69	25.62	11.31	36.31	22.00	60.00	50.00	-23.69	-28.00

Remarks:

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

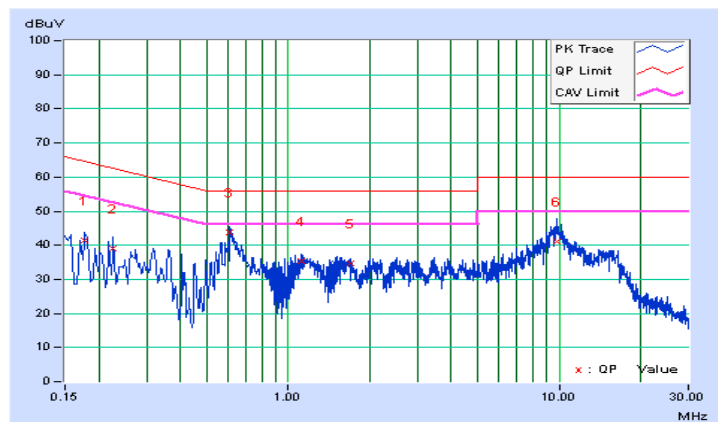


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/4/15

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	0.17801	10.03	31.45	20.18	41.48	30.21	64.58	54.58	-23.09	-24.36
2	0.22600	10.05	28.90	16.27	38.95	26.32	62.60	52.60	-23.64	-26.27
3	0.61000	10.16	33.70	30.12	43.86	40.28	56.00	46.00	-12.14	-5.72
4	1.12200	10.22	25.12	22.44	35.34	32.66	56.00	46.00	-20.66	-13.34
5	1.69400	10.26	24.36	15.47	34.62	25.73	56.00	46.00	-21.38	-20.27
6	9.81000	10.79	30.41	17.00	41.20	27.79	60.00	50.00	-18.80	-22.21

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



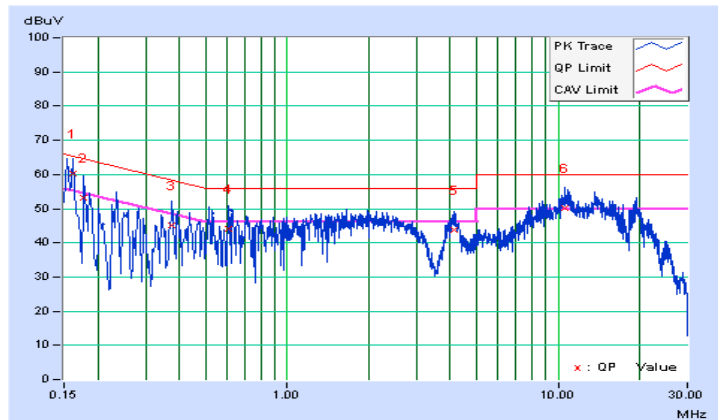
Mode B

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/4/14

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	0.16200	10.02	50.29	32.48	60.31	42.50	65.36	55.36	-5.05	-12.86
2	0.17801	10.02	43.12	24.36	53.14	34.38	64.58	54.58	-11.43	-20.19
3	0.37400	10.11	34.95	22.37	45.06	32.48	58.41	48.41	-13.35	-15.93
4	0.61000	10.15	34.05	21.71	44.20	31.86	56.00	46.00	-11.80	-14.14
5	4.12600	10.42	33.38	24.73	43.80	35.15	56.00	46.00	-12.20	-10.85
6	10.64600	10.77	39.39	26.81	50.16	37.58	60.00	50.00	-9.84	-12.42

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

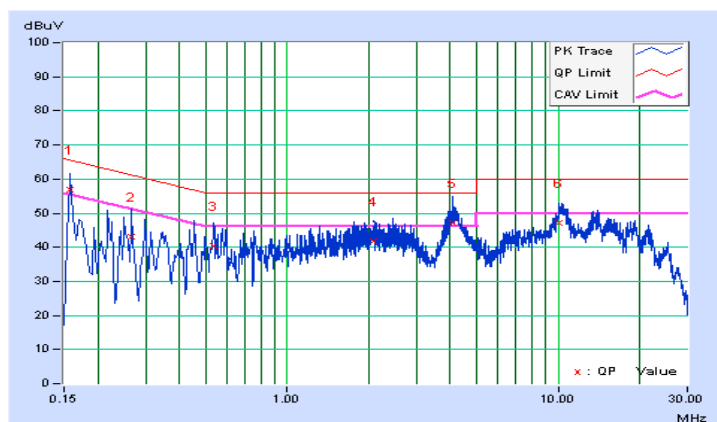


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/4/14

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	0.15800	10.03	46.81	28.69	56.84	38.72	65.57	55.57	-8.73	-16.85
2	0.26600	10.07	32.92	16.89	42.99	26.96	61.24	51.24	-18.25	-24.28
3	0.53404	10.15	30.36	18.12	40.51	28.27	56.00	46.00	-15.49	-17.73
4	2.09400	10.29	31.36	20.25	41.65	30.54	56.00	46.00	-14.35	-15.46
5	4.09800	10.44	36.79	26.42	47.23	36.86	56.00	46.00	-8.77	-9.14
6	10.11000	10.81	36.19	25.02	47.00	35.83	60.00	50.00	-13.00	-14.17

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

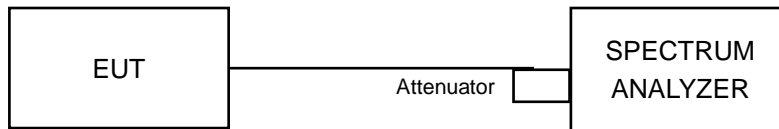


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB 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) = 100 kHz
- 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)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.59	0.5	Pass
6	2437	8.58	0.5	Pass
11	2462	8.55	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.38	0.5	Pass
6	2437	16.39	0.5	Pass
11	2462	16.38	0.5	Pass

802.11n (HT20)

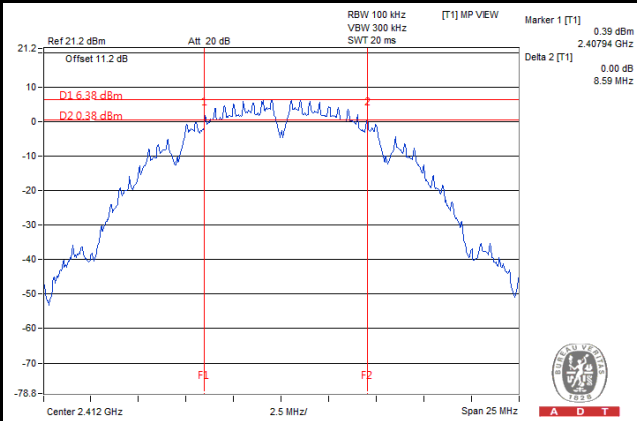
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.60	0.5	Pass
6	2437	17.60	0.5	Pass
11	2462	17.61	0.5	Pass

802.11n (HT40)

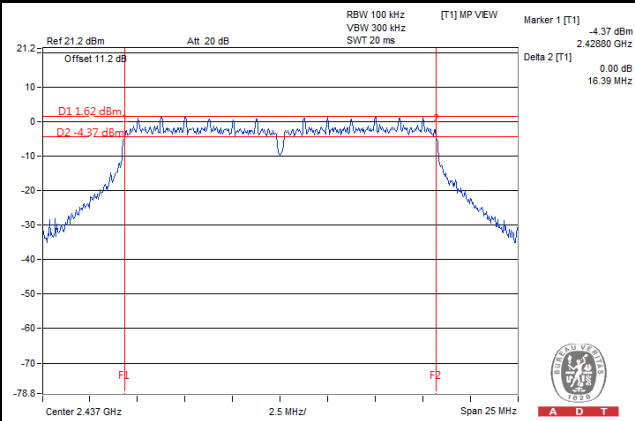
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.45	0.5	Pass
6	2437	35.26	0.5	Pass
9	2452	35.25	0.5	Pass

Spectrum Plot of Worst Value

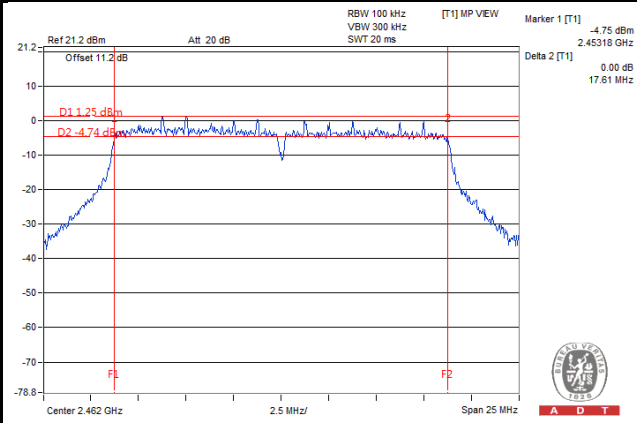
802.11b



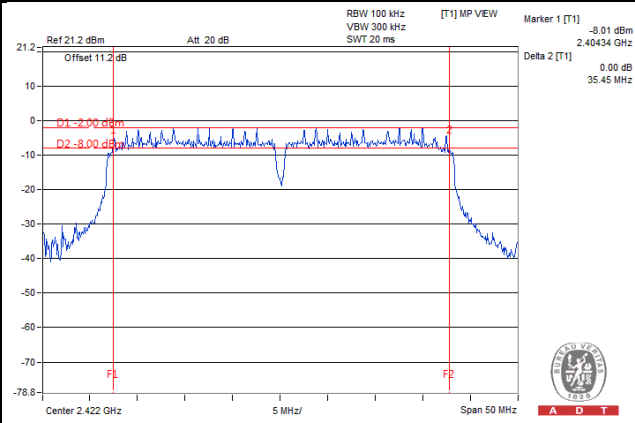
802.11g



802.11n (HT20)



802.11n (HT40)

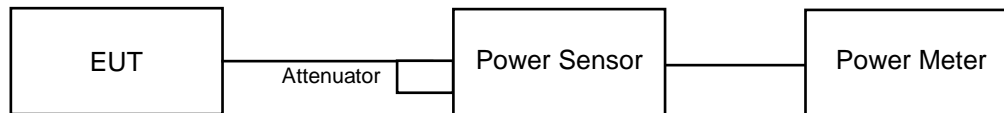


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.7 Test Results

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	52.36	17.19	30	Pass
6	2437	53.58	17.29	30	Pass
11	2462	52.84	17.23	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	119.67	20.78	30	Pass
6	2437	120.50	20.81	30	Pass
11	2462	117.76	20.71	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	101.16	20.05	30	Pass
6	2437	103.99	20.17	30	Pass
11	2462	102.09	20.09	30	Pass

802.11n (HT40)

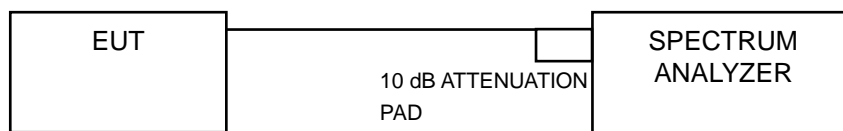
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	103.04	20.13	30	Pass
6	2437	104.71	20.2	30	Pass
9	2452	103.75	20.16	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm.

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

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-8.01	8	Pass
6	2437	-8.03	8	Pass
11	2462	-8.35	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-12.76	8	Pass
6	2437	-12.33	8	Pass
11	2462	-12.59	8	Pass

802.11n (HT20)

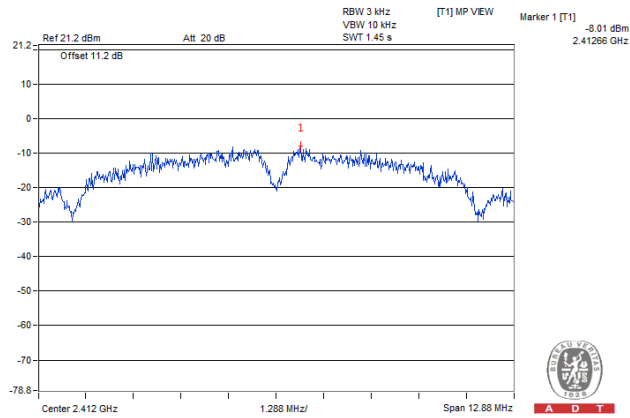
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-14.28	8	Pass
6	2437	-14.38	8	Pass
11	2462	-13.96	8	Pass

802.11n (HT40)

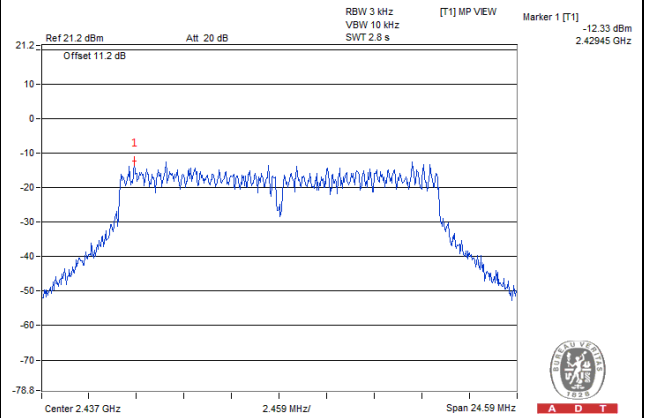
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
3	2422	-17.37	8	Pass
6	2437	-16.95	8	Pass
9	2452	-16.47	8	Pass

Spectrum Plot of Worst Value

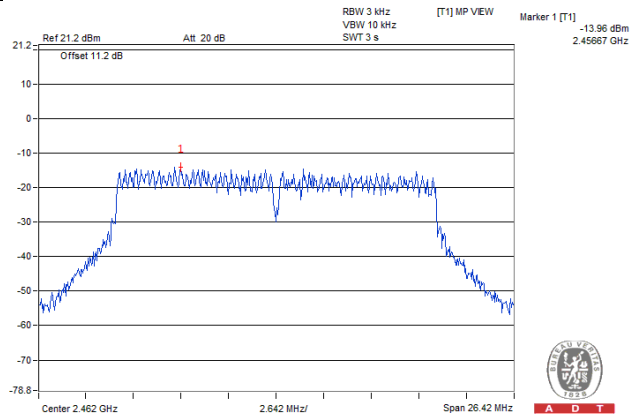
802.11b



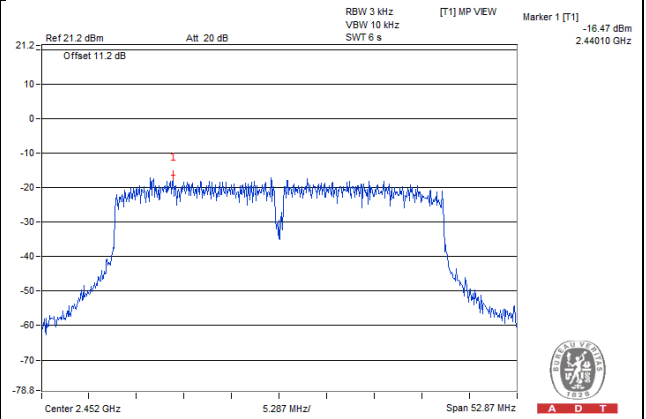
802.11g



802.11n (HT20)



802.11n (HT40)

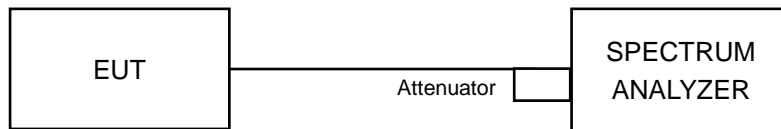


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20 dB of the highest emission level of operating band (in 100 kHz 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.

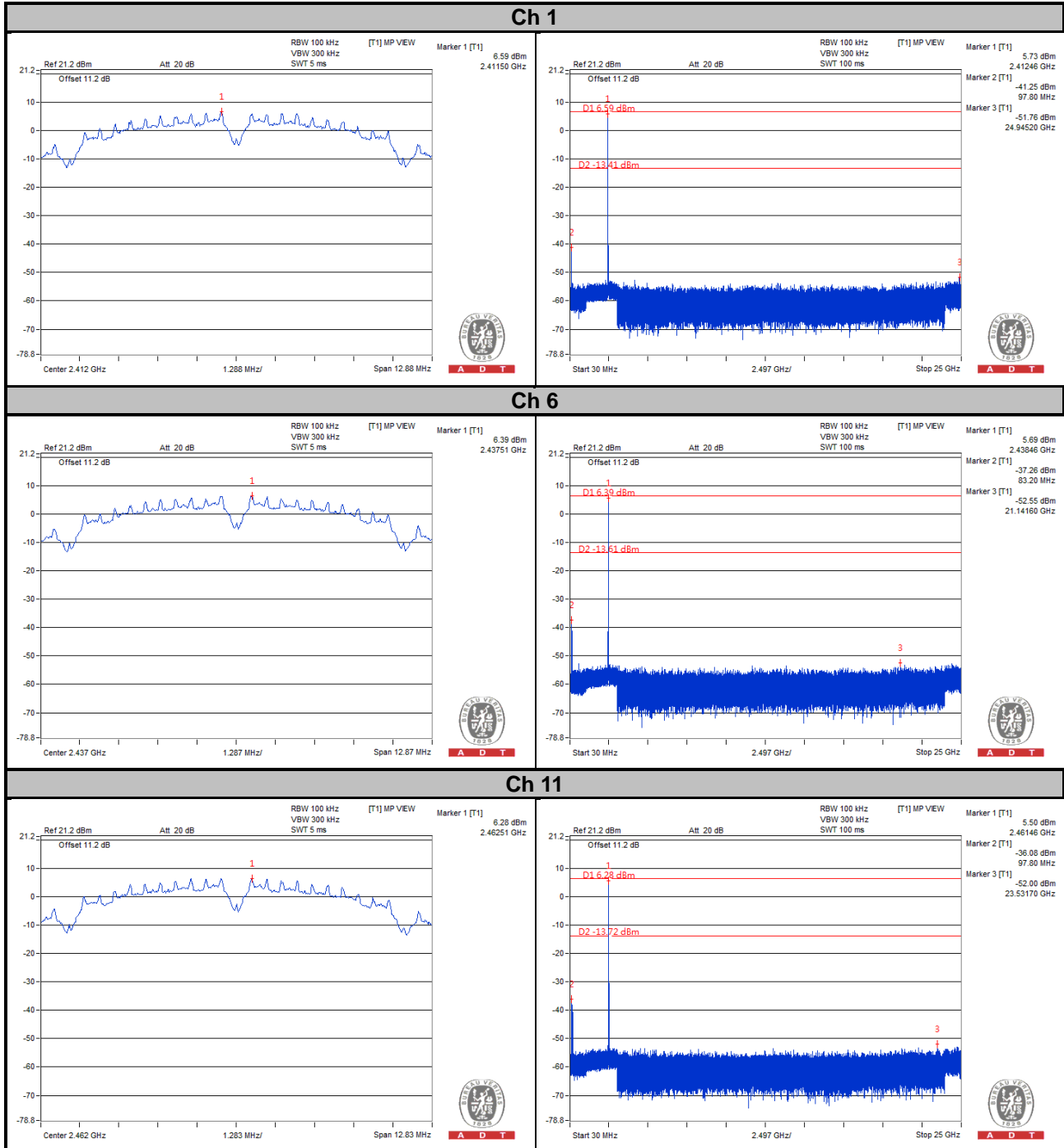
4.6.6 EUT Operating Condition

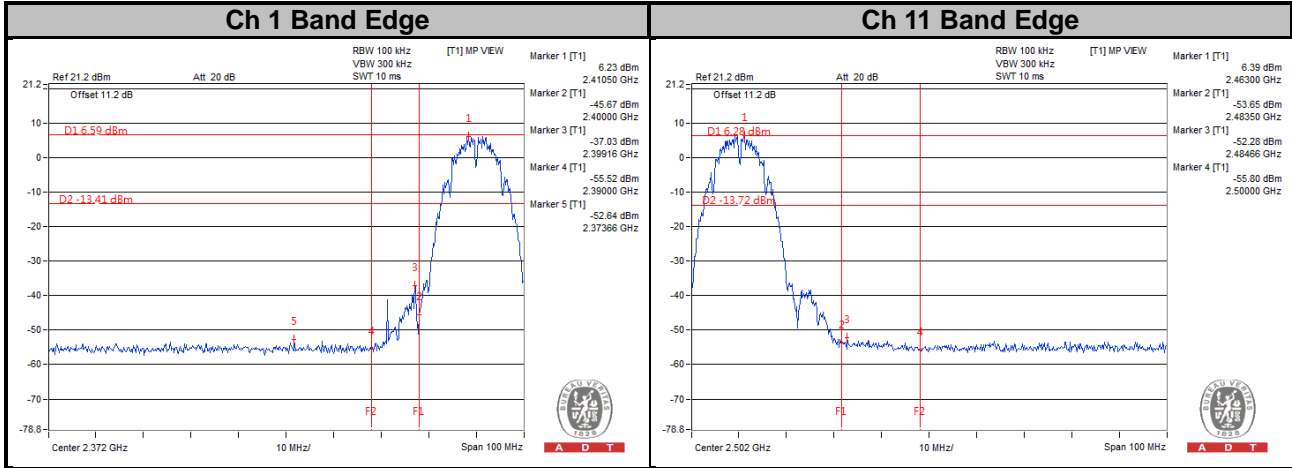
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.6.7 Test Results

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

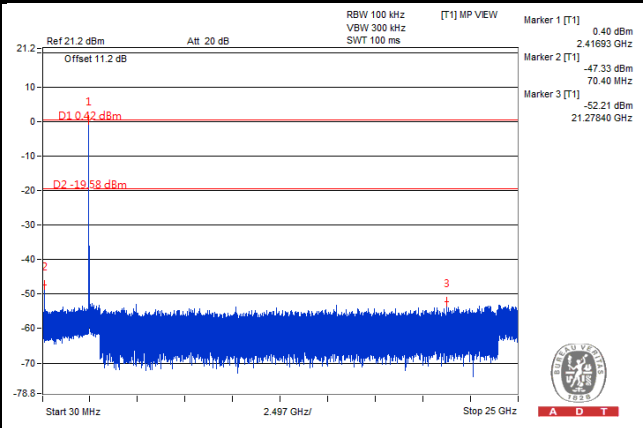
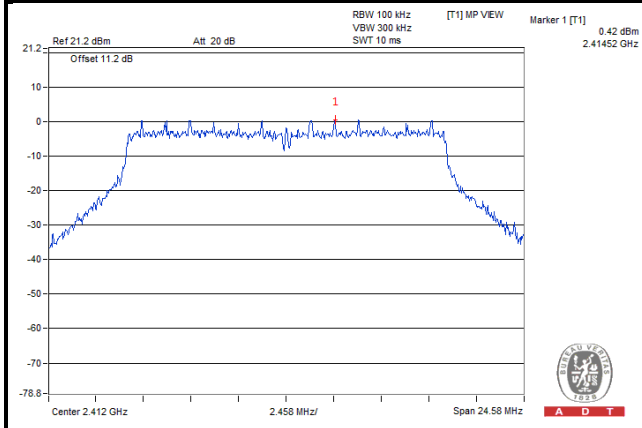
802.11b



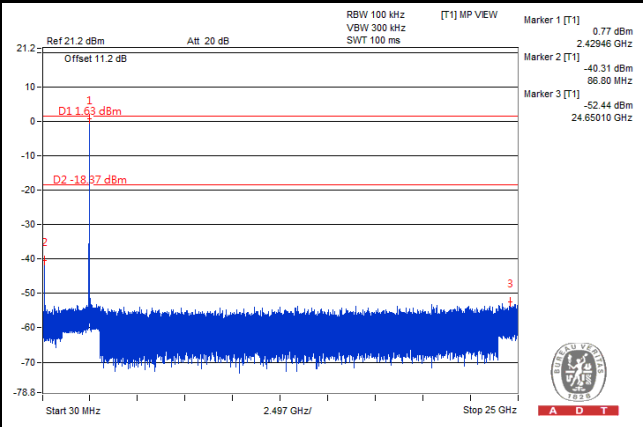
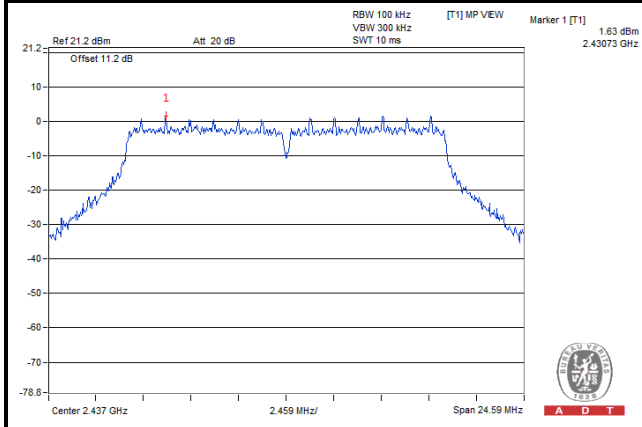


802.11g

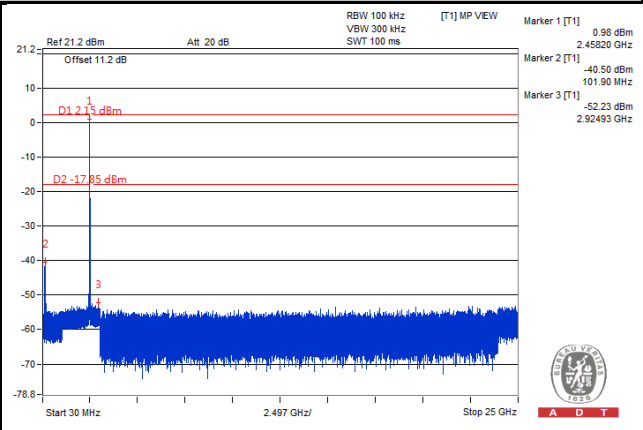
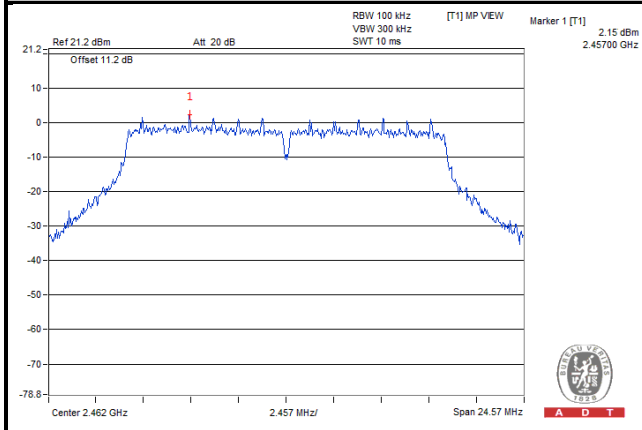
Ch 1

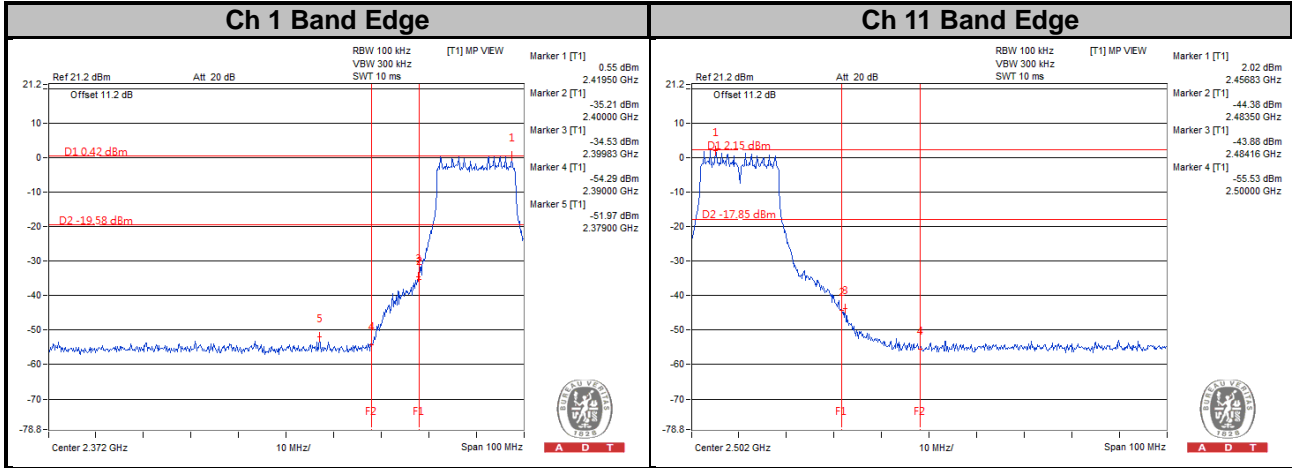


Ch 6



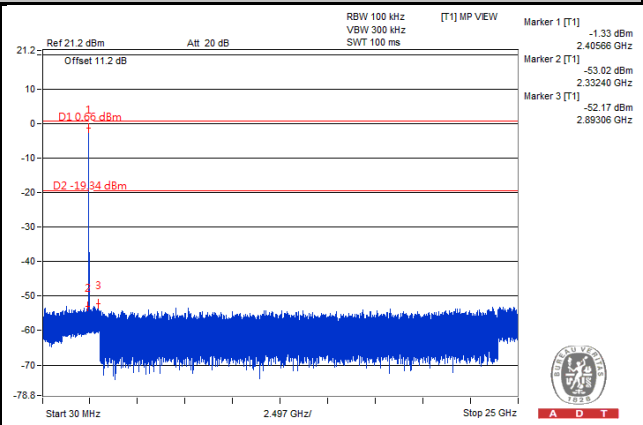
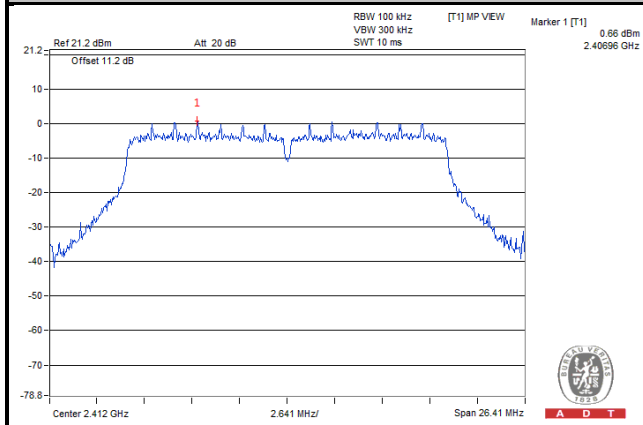
Ch 11



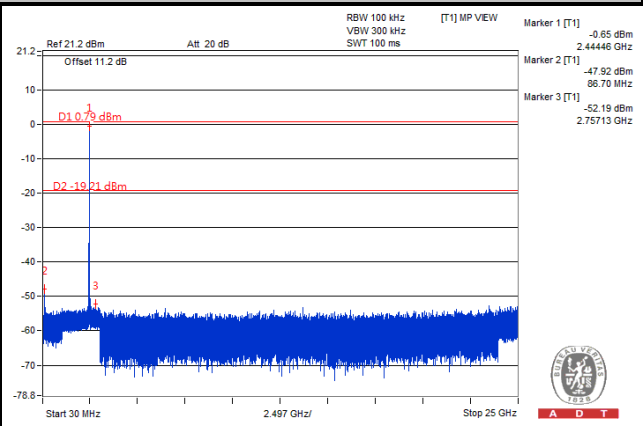
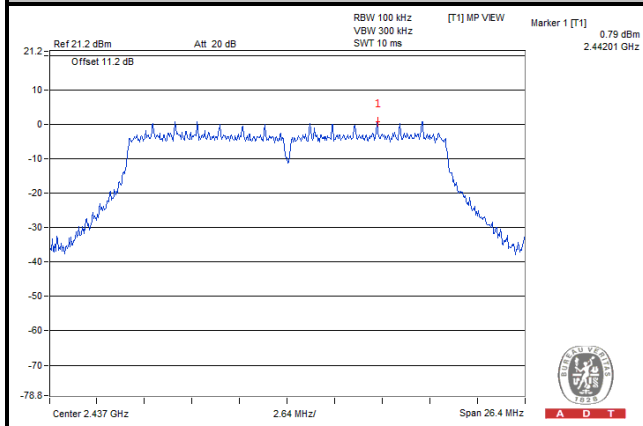


802.11n (HT20)

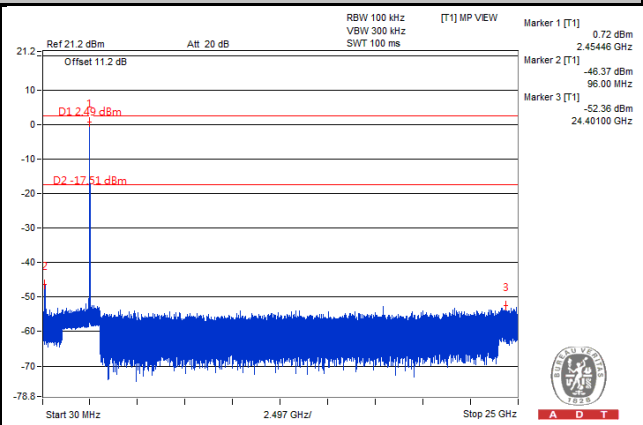
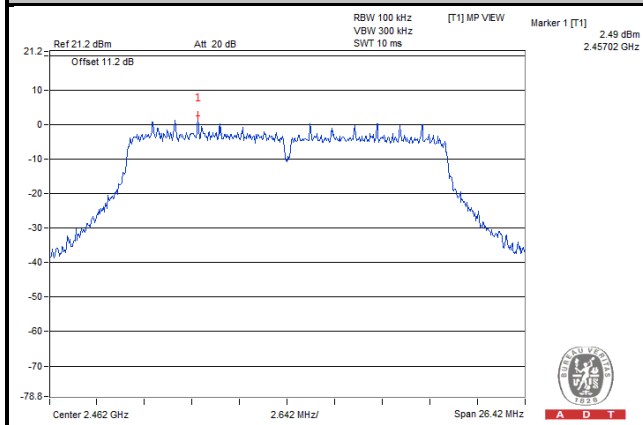
Ch 1

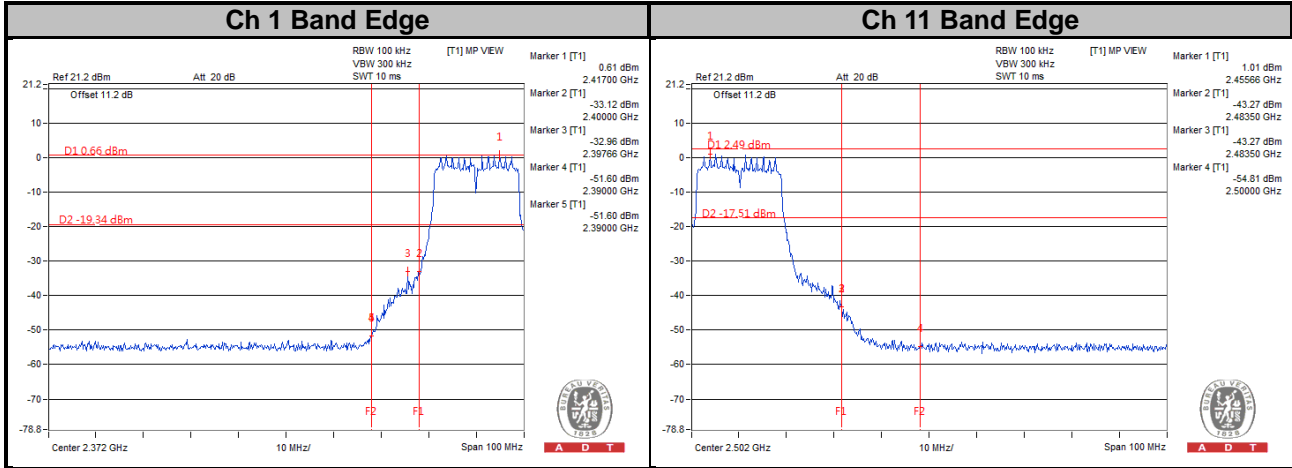


Ch 6



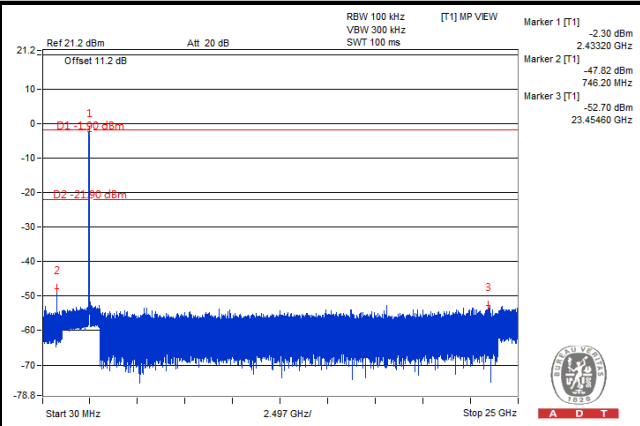
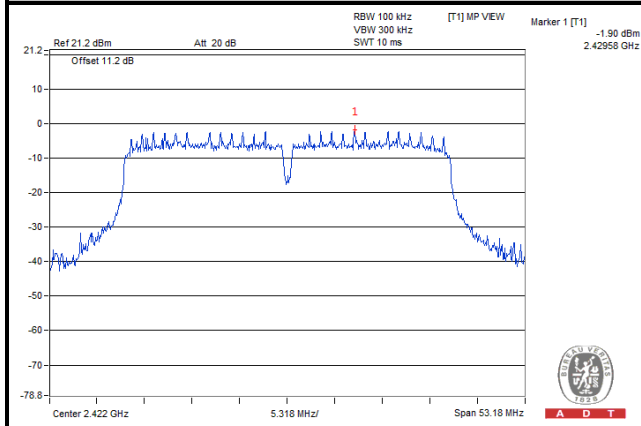
Ch 11



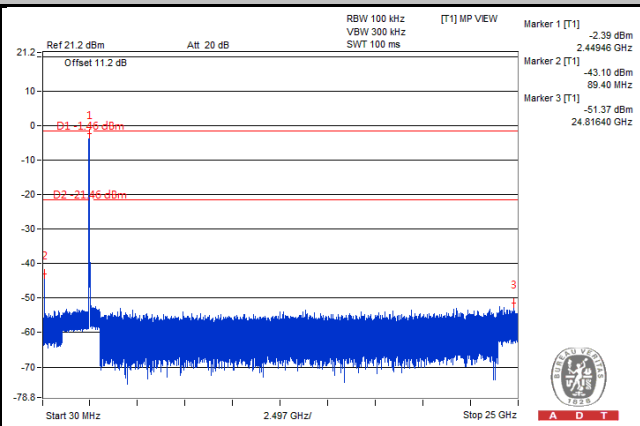
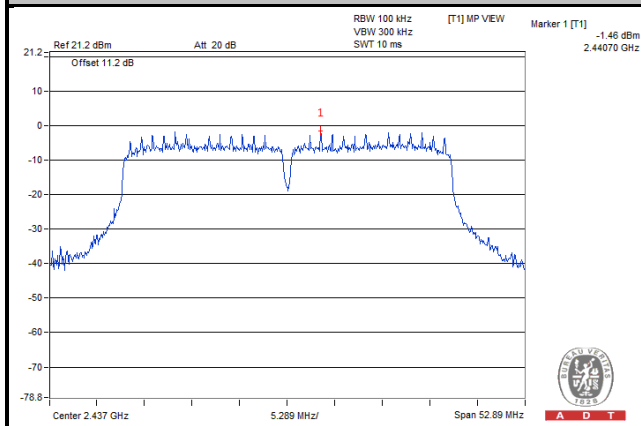


802.11n (HT40)

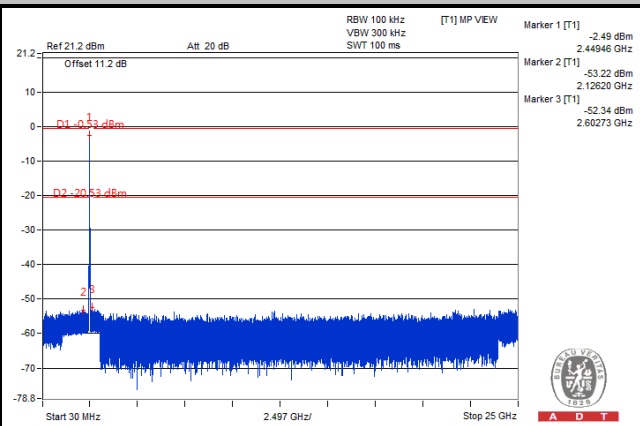
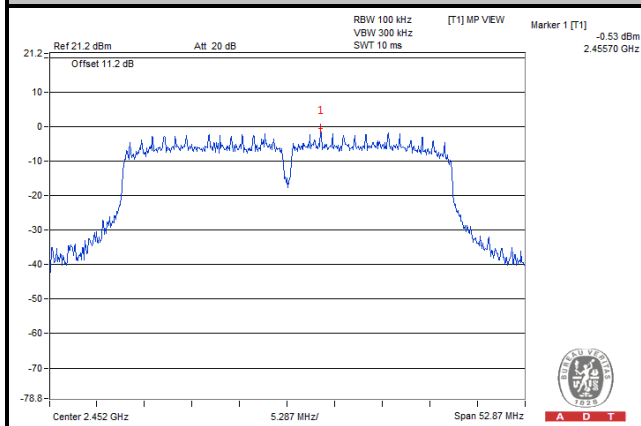
Ch 3

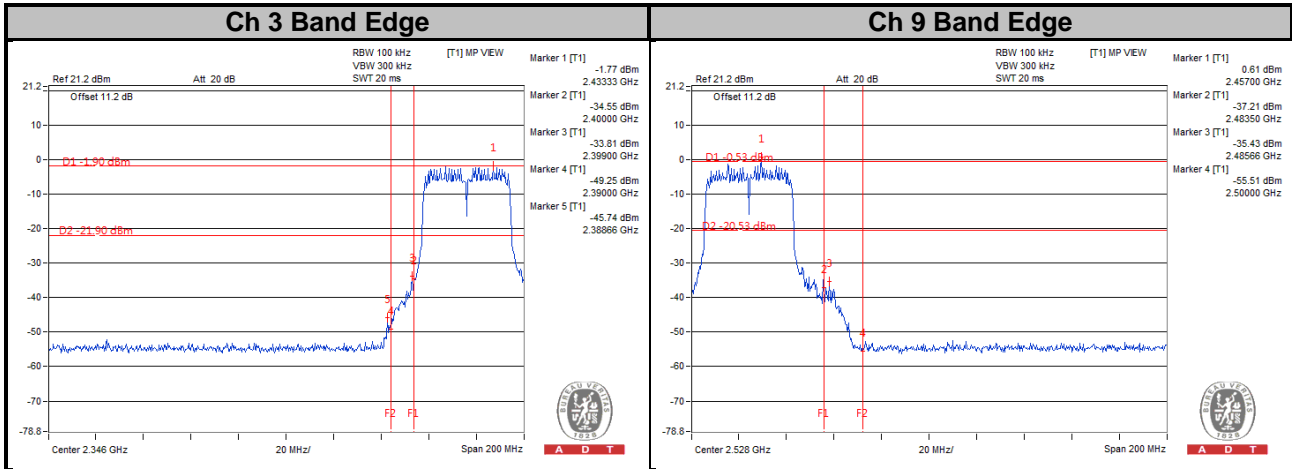


Ch 6



Ch 9





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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

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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