FCC Test Report

Report No.: RF160408C07-6

FCC ID: NM82PST230

Test Model: 2PST230

Received Date: Apr. 08, 2016

Test Date: Apr. 22, 2016 ~ May 18, 2016

Issued Date: May 23, 2016

Applicant: HTC Corporation

Address: 1F, 6-3 Baoqiang Road, Xindian City, Taipei County 231, Taiwan

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
RF160408C07-6	Original Release	May 23, 2016

1 Certificate of Conformity

Product: Smartphone

Brand: HTC

Test Model: 2PST230

Sample Status: Identical Prototype

Applicant: HTC Corporation

Test Date: Apr. 22, 2016 ~ May 18, 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:** May 23, 2016
Ivonne Wu / Supervisor

Approved by : _____ , **Date:** May 23, 2016
David Huang / Project Engineer

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 -7.00 dB at 0.18085 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.07 dB at 2484.00 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	Expended 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	Smartphone
Brand	HTC
Test Model	2PST230
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	224.91 mW
Antenna Type	PIFA antenna with -0.5 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. There're 2 configurations for the EUT listed as below.
   Main Sample: EUT + Battery 1 + LCM 1
   2nd Sample: EUT + Battery 2 + LCM 2
   ✧ Only the worst test data was presented in the report.
2. The EUT's accessories list refers to Ext. Pho.
3. 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≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Main Sample
B	√	√	√	-	2nd Sample

Where **RE≥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 **Y-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 (HT20)	1 to 11	11	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 (HT20)	1 to 11	11	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	802.11n (HT20)	1 to 11	11	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	Karl Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Anson Lin
APCM	25 deg. C, 65 % RH	3.85 Vdc	Luke Chen

3.3 Duty Cycle of Test Signal

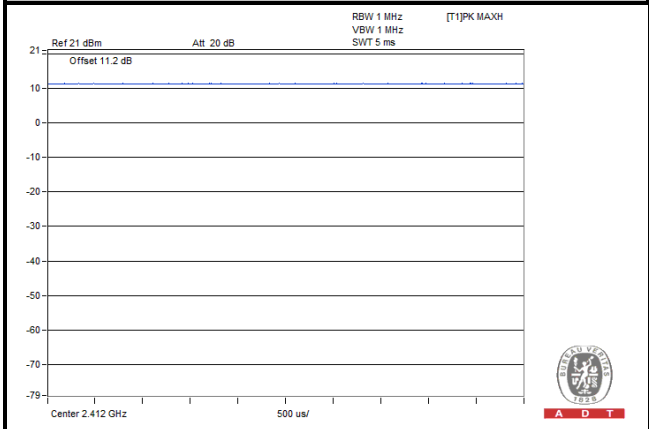
802.11b: Duty cycle of test signal is 100 %

802.11g: Duty cycle = 1.355/1.385 = 0.978, Duty factor = 10 * log(1/0.978) = 0.10

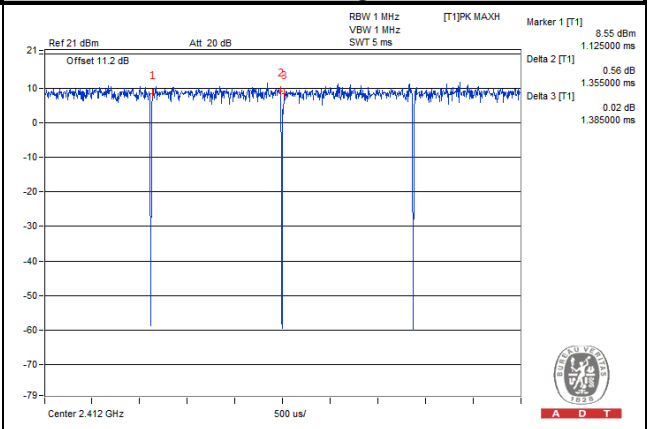
802.11n (HT20): Duty cycle of test signal is > 98 %

802.11n (HT40): Duty cycle of test signal is > 98 %

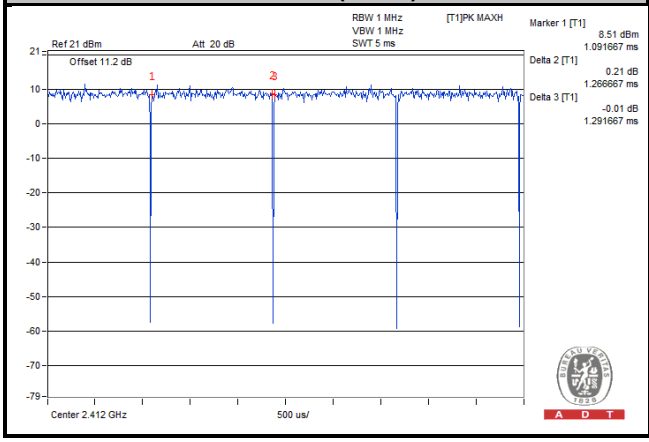
802.11b



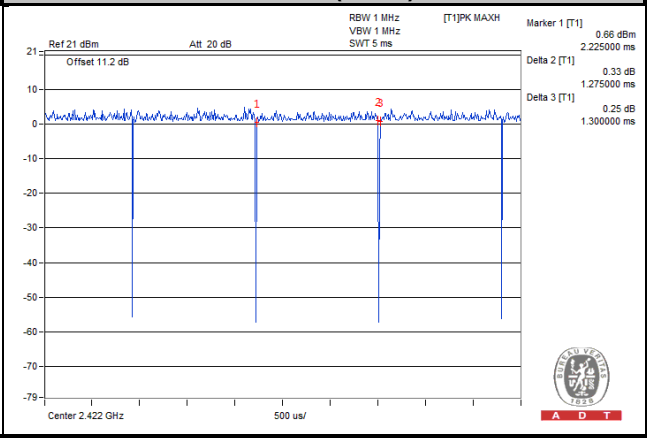
802.11g



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

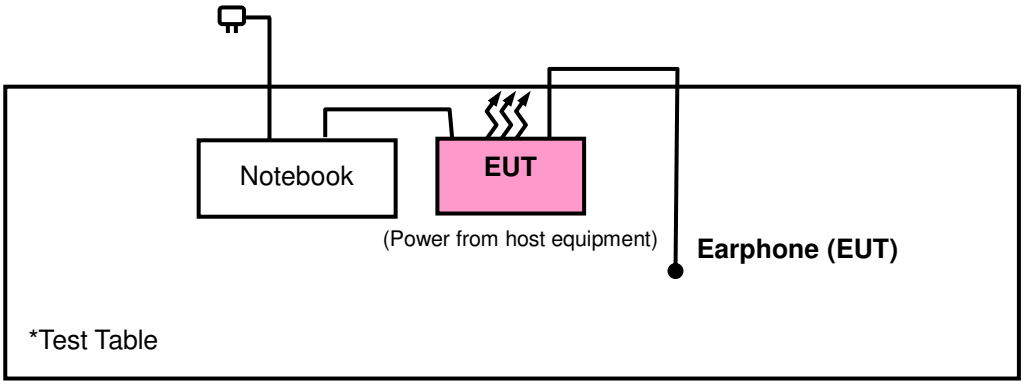
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook	DELL	E5420	8BHF5S1	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as communication partners to transfer data.

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 (DoC). 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 & Manaufacturer	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. 04, 2016	Jan. 03, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Jan. 04, 2016	Jan. 03, 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
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(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 27, 2015	Jun. 26, 2016
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-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 / 24 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:

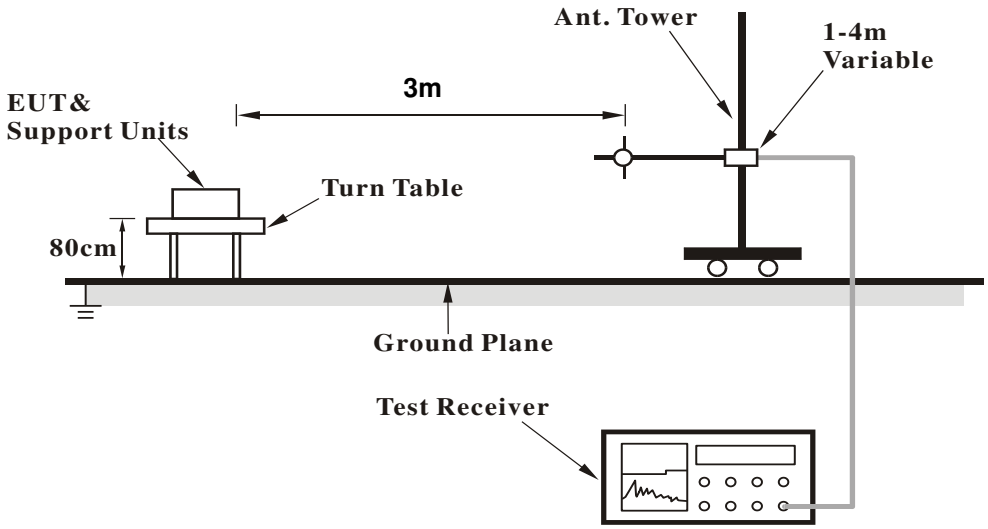
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
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/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 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

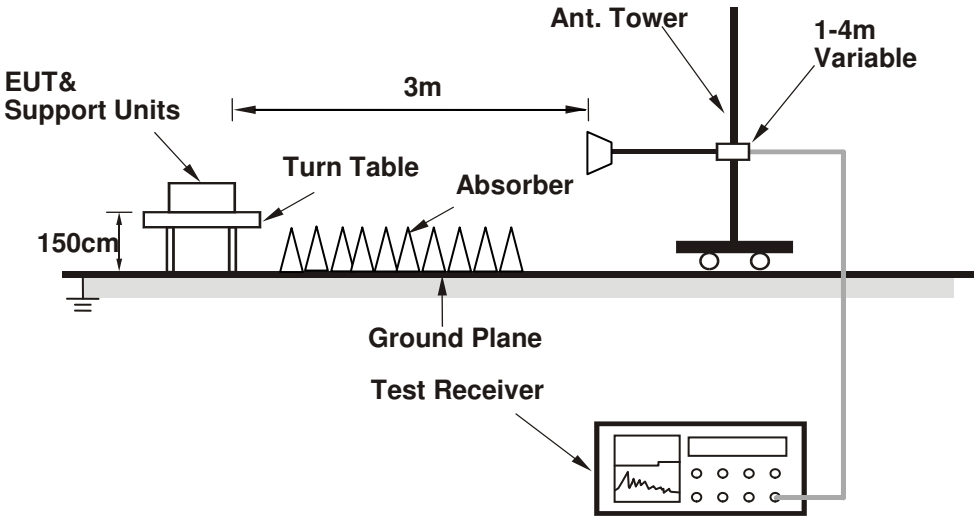
No deviation.

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

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

4.1.7 Test Results

Above 1 GHz Data：

Mode A

802.11b

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	46.84	45.11	54	-7.16	31.8	5.4	35.47	114	214	Average
2390	57.11	55.38	74	-16.89	31.8	5.4	35.47	114	214	Peak
2412	106.78	105.01			31.81	5.43	35.47	114	214	Average
2412	109.38	107.61			31.81	5.43	35.47	114	214	Peak
2496	40.36	38.34	54	-13.64	31.9	5.53	35.41	114	214	Average
2496	57.12	55.1	74	-16.88	31.9	5.53	35.41	114	214	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**
2312	43.75	42.27	54	-10.25	31.71	5.3	35.53	208	301	Average
2312	55.63	54.15	74	-18.37	31.71	5.3	35.53	208	301	Peak
2412	103.7	101.93			31.81	5.43	35.47	208	301	Average
2412	105.98	104.21			31.81	5.43	35.47	208	301	Peak
2486	40.86	38.87	54	-13.14	31.88	5.53	35.42	208	301	Average
2486	55.36	53.37	74	-18.64	31.88	5.53	35.42	208	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2388	40.26	38.55	54	-13.74	31.8	5.4	35.49	114	214	Average
2388	55.76	54.05	74	-18.24	31.8	5.4	35.49	114	214	Peak
2437	107.23	105.38			31.85	5.46	35.46	114	214	Average
2437	109.94	108.09			31.85	5.46	35.46	114	214	Peak
2484	40.07	38.11	54	-13.93	31.88	5.5	35.42	114	214	Average
2484	56.58	54.62	74	-17.42	31.88	5.5	35.42	114	214	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	39.5	37.84	54	-14.5	31.78	5.37	35.49	205	301	Average
2376	56.14	54.48	74	-17.86	31.78	5.37	35.49	205	301	Peak
2437	104.06	102.21			31.85	5.46	35.46	205	301	Average
2437	106.71	104.86			31.85	5.46	35.46	205	301	Peak
2496	39.86	37.84	54	-14.14	31.9	5.53	35.41	205	301	Average
2496	55.71	53.69	74	-18.29	31.9	5.53	35.41	205	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2324	39.71	38.2	54	-14.29	31.73	5.3	35.52	111	214	Average
2324	55.78	54.27	74	-18.22	31.73	5.3	35.52	111	214	Peak
2462	107.14	105.21			31.87	5.5	35.44	111	214	Average
2462	109.61	107.68			31.87	5.5	35.44	111	214	Peak
2484	51.08	49.12	54	-2.92	31.88	5.5	35.42	111	214	Average
2484	59.73	57.77	74	-14.27	31.88	5.5	35.42	111	214	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	39.5	37.77	54	-14.5	31.8	5.4	35.47	187	270	Average
2390	55.86	54.13	74	-18.14	31.8	5.4	35.47	187	270	Peak
2462	103.51	101.58			31.87	5.5	35.44	187	270	Average
2462	106.08	104.15			31.87	5.5	35.44	187	270	Peak
2488	40.28	38.27	54	-13.72	31.9	5.53	35.42	187	270	Average
2488	57.32	55.31	74	-16.68	31.9	5.53	35.42	187	270	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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	52.07	50.34	54	-1.93	31.8	5.4	35.47	114	214	Average
2390	66.59	64.86	74	-7.41	31.8	5.4	35.47	114	214	Peak
2412	99.6	97.83			31.81	5.43	35.47	114	214	Average
2412	107.91	106.14			31.81	5.43	35.47	114	214	Peak
2490	40.88	38.87	54	-13.12	31.9	5.53	35.42	114	214	Average
2490	55.93	53.92	74	-18.07	31.9	5.53	35.42	114	214	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	47.9	46.17	54	-6.1	31.8	5.4	35.47	208	301	Average
2390	63.46	61.73	74	-10.54	31.8	5.4	35.47	208	301	Peak
2412	96.03	94.26			31.81	5.43	35.47	208	301	Average
2412	104.94	103.17			31.81	5.43	35.47	208	301	Peak
2500	40.79	38.77	54	-13.21	31.9	5.53	35.41	208	301	Average
2500	55.6	53.58	74	-18.4	31.9	5.53	35.41	208	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2372	42.45	40.79	54	-11.55	31.78	5.37	35.49	114	214	Average
2372	56.53	54.87	74	-17.47	31.78	5.37	35.49	114	214	Peak
2437	102.08	100.23			31.85	5.46	35.46	114	214	Average
2437	110.34	108.49			31.85	5.46	35.46	114	214	Peak
2490	41.88	39.87	54	-12.12	31.9	5.53	35.42	114	214	Average
2490	57.35	55.34	74	-16.65	31.9	5.53	35.42	114	214	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**
2366	40.23	38.59	54	-13.77	31.76	5.37	35.49	204	301	Average
2366	56.38	54.74	74	-17.62	31.76	5.37	35.49	204	301	Peak
2437	97.93	96.08			31.85	5.46	35.46	204	301	Average
2437	106.13	104.28			31.85	5.46	35.46	204	301	Peak
2494	40.97	38.95	54	-13.03	31.9	5.53	35.41	204	301	Average
2494	55.84	53.82	74	-18.16	31.9	5.53	35.41	204	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2352	40.4	38.81	54	-13.6	31.76	5.33	35.5	111	214	Average
2352	55.39	53.8	74	-18.61	31.76	5.33	35.5	111	214	Peak
2462	99.9	97.97			31.87	5.5	35.44	111	214	Average
2462	108.41	106.48			31.87	5.5	35.44	111	214	Peak
2484	52.21	50.25	54	-1.79	31.88	5.5	35.42	111	214	Average
2484	71.95	69.99	74	-2.05	31.88	5.5	35.42	111	214	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	40.31	38.58	54	-13.69	31.8	5.4	35.47	132	268	Average
2390	55.8	54.07	74	-18.2	31.8	5.4	35.47	132	268	Peak
2462	96.88	94.95			31.87	5.5	35.44	132	268	Average
2462	105.87	103.94			31.87	5.5	35.44	132	268	Peak
2484	49.72	47.76	54	-4.28	31.88	5.5	35.42	132	268	Average
2484	71.89	69.93	74	-2.11	31.88	5.5	35.42	132	268	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2390	52.87	51.14	54	-1.13	31.8	5.4	35.47	114	214	Average
2390	71.58	69.85	74	-2.42	31.8	5.4	35.47	114	214	Peak
2412	99.02	97.25			31.81	5.43	35.47	114	214	Average
2412	107.14	105.37			31.81	5.43	35.47	114	214	Peak
2498	40.84	38.82	54	-13.16	31.9	5.53	35.41	114	214	Average
2498	56.32	54.3	74	-17.68	31.9	5.53	35.41	114	214	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	48.89	47.16	54	-5.11	31.8	5.4	35.47	208	301	Average
2390	67.35	65.62	74	-6.65	31.8	5.4	35.47	208	301	Peak
2412	95.37	93.6			31.81	5.43	35.47	208	301	Average
2412	103.94	102.17			31.81	5.43	35.47	208	301	Peak
2488	40.69	38.68	54	-13.31	31.9	5.53	35.42	208	301	Average
2488	56.45	54.44	74	-17.55	31.9	5.53	35.42	208	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2390	43.29	41.56	54	-10.71	31.8	5.4	35.47	114	214	Average
2390	55.58	53.85	74	-18.42	31.8	5.4	35.47	114	214	Peak
2437	101.94	100.09			31.85	5.46	35.46	114	214	Average
2437	110.07	108.22			31.85	5.46	35.46	114	214	Peak
2490	42.22	40.21	54	-11.78	31.9	5.53	35.42	114	214	Average
2490	56.73	54.72	74	-17.27	31.9	5.53	35.42	114	214	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	40.45	38.82	54	-13.55	31.76	5.37	35.5	204	301	Average
2362	55.97	54.34	74	-18.03	31.76	5.37	35.5	204	301	Peak
2437	97.72	95.87			31.85	5.46	35.46	204	301	Average
2437	105.94	104.09			31.85	5.46	35.46	204	301	Peak
2486	40.96	38.97	54	-13.04	31.88	5.53	35.42	204	301	Average
2486	56.12	54.13	74	-17.88	31.88	5.53	35.42	204	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2362	40.49	38.86	54	-13.51	31.76	5.37	35.5	111	214	Average
2362	55.32	53.69	74	-18.68	31.76	5.37	35.5	111	214	Peak
2462	99.24	97.31			31.87	5.5	35.44	111	214	Average
2462	107.25	105.32			31.87	5.5	35.44	111	214	Peak
2484	52.93	50.97	54	-1.07	31.88	5.5	35.42	111	214	Average
2484	71.73	69.77	74	-2.27	31.88	5.5	35.42	111	214	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	40.11	38.45	54	-13.89	31.78	5.37	35.49	187	270	Average
2374	55.62	53.96	74	-18.38	31.78	5.37	35.49	187	270	Peak
2462	95.88	93.95			31.87	5.5	35.44	187	270	Average
2462	104.22	102.29			31.87	5.5	35.44	187	270	Peak
2484	49.45	47.49	54	-4.55	31.88	5.5	35.42	187	270	Average
2484	68.41	66.45	74	-5.59	31.88	5.5	35.42	187	270	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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	52.16	50.43	54	-1.84	31.8	5.4	35.47	113	214	Average
2390	67.11	65.38	74	-6.89	31.8	5.4	35.47	113	214	Peak
2422	96.23	94.43			31.83	5.43	35.46	113	214	Average
2422	104.38	102.58			31.83	5.43	35.46	113	214	Peak
2484	41.82	39.86	54	-12.18	31.88	5.5	35.42	113	214	Average
2484	56.62	54.66	74	-17.38	31.88	5.5	35.42	113	214	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	47.68	45.95	54	-6.32	31.8	5.4	35.47	208	301	Average
2390	60.79	59.06	74	-13.21	31.8	5.4	35.47	208	301	Peak
2422	92.62	90.82			31.83	5.43	35.46	208	301	Average
2422	101.37	99.57			31.83	5.43	35.46	208	301	Peak
2490	41.38	39.37	54	-12.62	31.9	5.53	35.42	208	301	Average
2490	56.36	54.35	74	-17.64	31.9	5.53	35.42	208	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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**
2390	52.83	51.1	54	-1.17	31.8	5.4	35.47	114	214	Average
2390	66.84	65.11	74	-7.16	31.8	5.4	35.47	114	214	Peak
2437	98.28	96.43			31.85	5.46	35.46	114	214	Average
2437	106.41	104.56			31.85	5.46	35.46	114	214	Peak
2484	51.28	49.32	54	-2.72	31.88	5.5	35.42	114	214	Average
2484	67.45	65.49	74	-6.55	31.88	5.5	35.42	114	214	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	45.59	43.86	54	-8.41	31.8	5.4	35.47	204	301	Average
2390	57.38	55.65	74	-16.62	31.8	5.4	35.47	204	301	Peak
2437	94.46	92.61			31.85	5.46	35.46	204	301	Average
2437	102.11	100.26			31.85	5.46	35.46	204	301	Peak
2484	47	45.04	54	-7	31.88	5.5	35.42	204	301	Average
2484	61.65	59.69	74	-12.35	31.88	5.5	35.42	204	301	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.

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**
2342	41.14	39.57	54	-12.86	31.74	5.33	35.5	111	214	Average
2342	55.34	53.77	74	-18.66	31.74	5.33	35.5	111	214	Peak
2452	95.77	93.9			31.85	5.46	35.44	111	214	Average
2452	104.18	102.31			31.85	5.46	35.44	111	214	Peak
2484	52.31	50.35	54	-1.69	31.88	5.5	35.42	111	214	Average
2484	69.21	67.25	74	-4.79	31.88	5.5	35.42	111	214	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**
2382	40.65	38.96	54	-13.35	31.78	5.4	35.49	187	270	Average
2382	55.65	53.96	74	-18.35	31.78	5.4	35.49	187	270	Peak
2452	92.47	90.6			31.85	5.46	35.44	187	270	Average
2452	101.07	99.2			31.85	5.46	35.44	187	270	Peak
2484	48.23	46.27	54	-5.77	31.88	5.5	35.42	187	270	Average
2484	63.54	61.58	74	-10.46	31.88	5.5	35.42	187	270	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.

Mode B

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**
2388	42.26	40.55	54	-11.74	31.8	5.4	35.49	127	202	Average
2388	55.83	54.12	74	-18.17	31.8	5.4	35.49	127	202	Peak
2462	93.79	91.86			31.87	5.5	35.44	127	202	Average
2462	101.53	99.6			31.87	5.5	35.44	127	202	Peak
2484	41.28	39.32	54	-12.72	31.88	5.5	35.42	127	202	Average
2484	60.35	58.39	74	-13.65	31.88	5.5	35.42	127	202	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**
2380	40.28	38.62	54	-13.72	31.78	5.37	35.49	103	299	Average
2380	56.23	54.57	74	-17.77	31.78	5.37	35.49	103	299	Peak
2462	91.54	89.61			31.87	5.5	35.44	103	299	Average
2462	99.24	97.31			31.87	5.5	35.44	103	299	Peak
2486	41.43	39.44	54	-12.57	31.88	5.53	35.42	103	299	Average
2486	56.6	54.61	74	-17.4	31.88	5.53	35.42	103	299	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 2462 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:

Mode A

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**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**	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**
94.8	19.78	41.36	43.5	-23.72	9.3	1.11	31.99	142	24	Peak
143.94	20.77	42.05	43.5	-22.73	9.61	1.38	32.27	160	9	Peak
200.1	18.55	38.3	43.5	-24.95	10.9	1.65	32.3	198	298	Peak
384	31.77	44.56	46	-14.23	17.05	2.34	32.18	170	213	Peak
628.3	23.17	30.31	46	-22.83	22.1	2.93	32.17	180	228	Peak
720.7	24.63	30.22	46	-21.37	23.36	3.16	32.11	111	112	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**
31.62	30.65	45.6	40	-9.35	16.57	0.74	32.26	180	315	Peak
48.63	25.96	49.05	40	-14.04	8.23	0.9	32.22	109	223	Peak
91.02	12.23	33.91	43.5	-31.27	8.98	1.11	31.77	150	190	Peak
384	23.97	36.76	46	-22.03	17.05	2.34	32.18	133	68	Peak
604.5	22.52	30.6	46	-23.48	21.24	2.87	32.19	122	306	Peak
792.8	25.96	30.53	46	-20.04	24.23	3.27	32.07	120	70	Peak

Remarks:

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

Mode B

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**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**	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**
92.37	27.74	49.35	43.5	-15.76	9.1	1.11	31.82	192	28	Peak
148.26	21.87	42.64	43.5	-21.63	9.98	1.52	32.27	152	245	Peak
196.86	19.16	39.1	43.5	-24.34	10.73	1.61	32.28	102	337	Peak
384	30.23	43.02	46	-15.77	17.05	2.34	32.18	105	275	Peak
605.2	21.63	29.71	46	-24.37	21.24	2.87	32.19	173	175	Peak
713	24.62	30.34	46	-21.38	23.27	3.11	32.1	173	210	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**
34.59	33.92	50.81	40	-6.08	14.61	0.74	32.24	180	30	Peak
45.93	32.28	54.52	40	-7.72	9.08	0.9	32.22	200	111	Peak
90.75	23.85	45.53	43.5	-19.65	8.98	1.11	31.77	105	205	Peak
493.9	18.95	29.44	46	-27.05	18.98	2.63	32.1	119	36	Peak
654.9	23.06	29.89	46	-22.94	22.32	2.99	32.14	188	143	Peak
780.2	25.25	30.39	46	-20.75	23.68	3.27	32.09	168	236	Peak

Remarks:

2. 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 & Manaufacturer	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

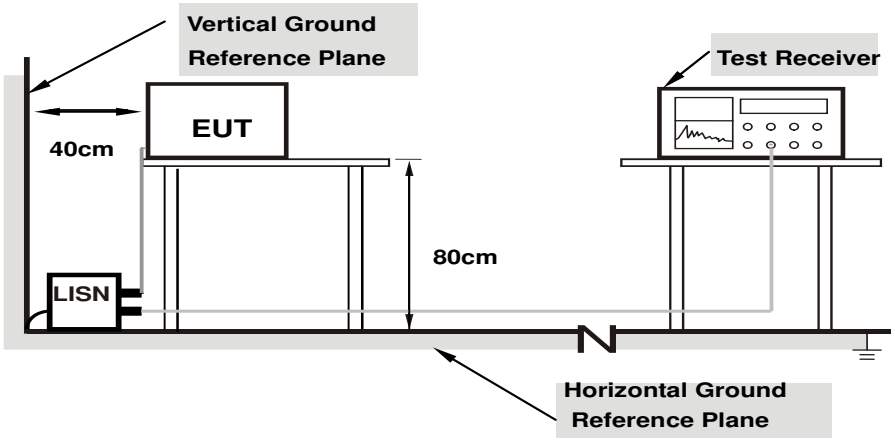
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

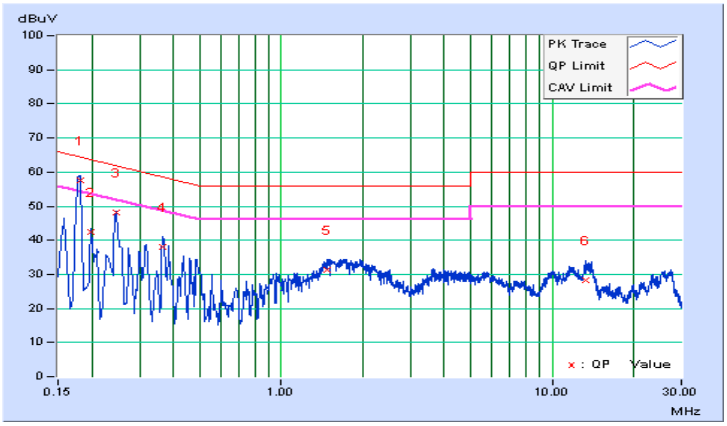
Mode A

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Toby Tian	Test Date	2016/5/18

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	0.18085	10.02	47.42	33.99	57.44	44.01	64.45	54.45	-7.00	-10.43
2	0.19800	10.03	32.38	21.03	42.41	31.06	63.69	53.69	-21.28	-22.63
3	0.24600	10.05	38.15	27.21	48.20	37.26	61.89	51.89	-13.69	-14.63
4	0.36640	10.10	28.00	17.45	38.10	27.55	58.58	48.58	-20.48	-21.03
5	1.48200	10.23	21.03	11.61	31.26	21.84	56.00	46.00	-24.74	-24.16
6	13.26600	10.92	17.44	12.25	28.36	23.17	60.00	50.00	-31.64	-26.83

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

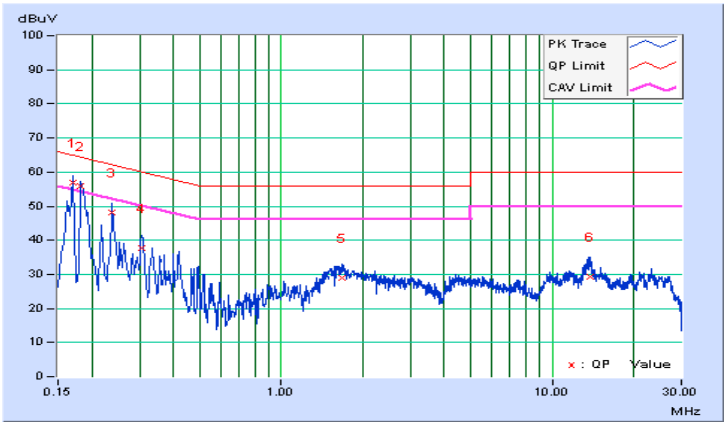


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Toby Tian	Test Date	2016/5/18

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	0.17000	10.03	46.98	29.56	57.01	39.59	64.96	54.96	-7.95	-15.37
2	0.18200	10.03	45.96	29.80	55.99	39.83	64.39	54.39	-8.40	-14.56
3	0.23800	10.06	38.03	21.62	48.09	31.68	62.17	52.17	-14.08	-20.49
4	0.30630	10.09	27.72	13.54	37.81	23.63	60.07	50.07	-22.26	-26.44
5	1.68200	10.26	18.78	9.69	29.04	19.95	56.00	46.00	-26.96	-26.05
6	13.84600	11.04	18.09	10.94	29.13	21.98	60.00	50.00	-30.87	-28.02

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



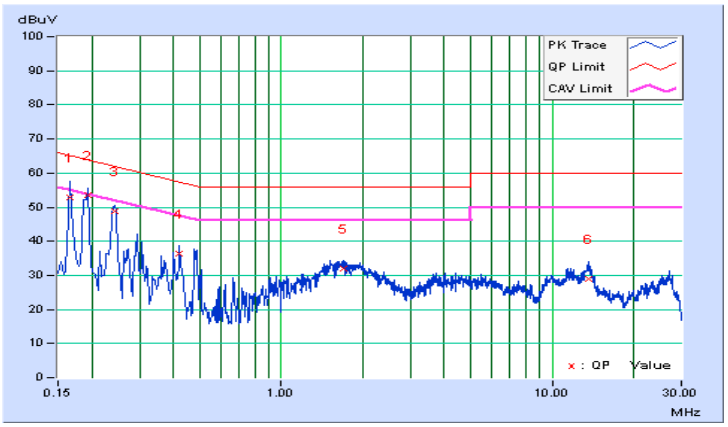
Mode B

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Toby Tian	Test Date	2016/5/18

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	0.16600	10.02	42.72	16.83	52.74	26.85	65.16	55.16	-12.42	-28.31
2	0.19400	10.03	43.66	16.95	53.69	26.98	63.86	53.86	-10.18	-26.89
3	0.24164	10.05	38.66	27.09	48.71	37.14	62.04	52.04	-13.33	-14.90
4	0.42200	10.12	26.25	16.04	36.37	26.16	57.41	47.41	-21.04	-21.25
5	1.70600	10.25	21.73	12.86	31.98	23.11	56.00	46.00	-24.02	-22.89
6	13.63800	10.94	17.97	12.61	28.91	23.55	60.00	50.00	-31.09	-26.45

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

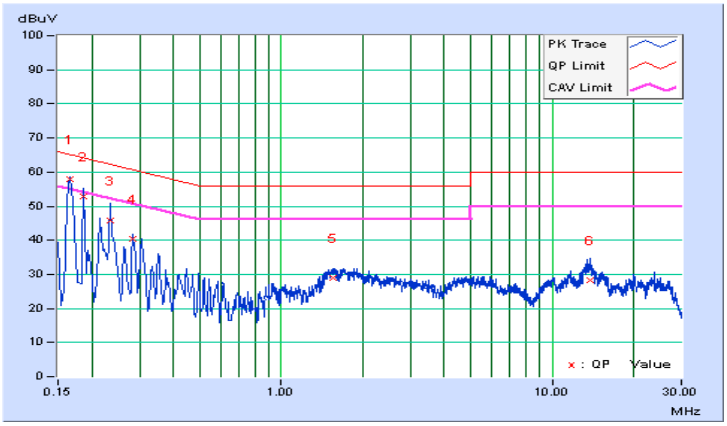


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Toby Tian	Test Date	2016/5/18

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	0.16600	10.03	47.89	34.88	57.92	44.91	65.16	55.16	-7.24	-10.25
2	0.18600	10.04	42.68	20.98	52.72	31.02	64.21	54.21	-11.50	-23.20
3	0.23400	10.06	35.57	17.34	45.63	27.40	62.31	52.31	-16.68	-24.91
4	0.28200	10.08	30.45	19.39	40.53	29.47	60.76	50.76	-20.23	-21.29
5	1.54600	10.25	18.68	9.93	28.93	20.18	56.00	46.00	-27.07	-25.82
6	13.85800	11.04	17.17	10.10	28.21	21.14	60.00	50.00	-31.79	-28.86

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

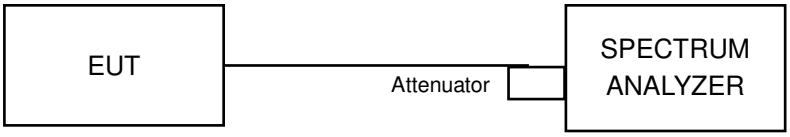


4.3 6 dB Bandwidth Measurement

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

a. Set resolution bandwidth (RBW) = 100 kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation fromTest 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	8.56	0.5	Pass
6	2437	8.56	0.5	Pass
11	2462	8.57	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.37	0.5	Pass
6	2437	16.43	0.5	Pass
11	2462	16.35	0.5	Pass

802.11n (HT20)

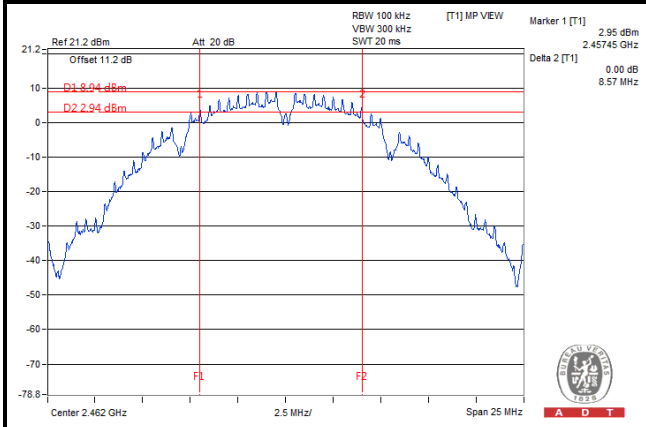
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.59	0.5	Pass
6	2437	17.63	0.5	Pass
11	2462	17.21	0.5	Pass

802.11n (HT40)

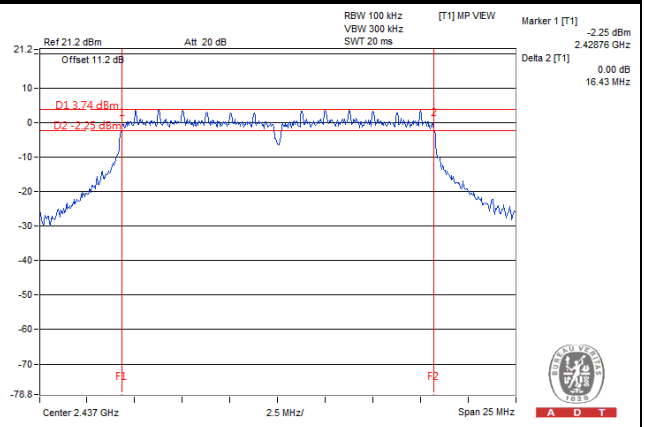
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.21	0.5	Pass
6	2437	35.28	0.5	Pass
9	2452	35.24	0.5	Pass

Spectrum Plot of Worst Value

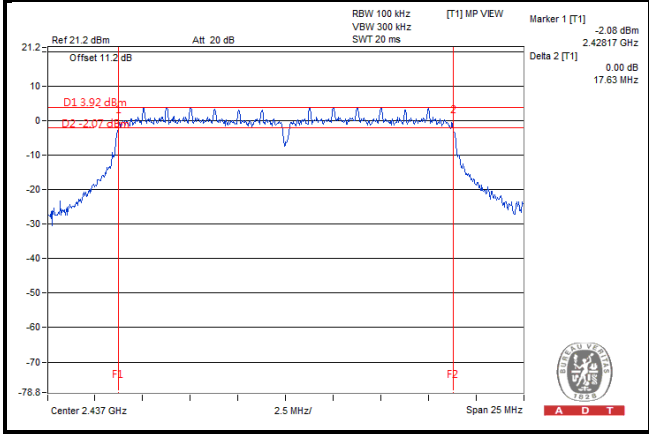
802.11b



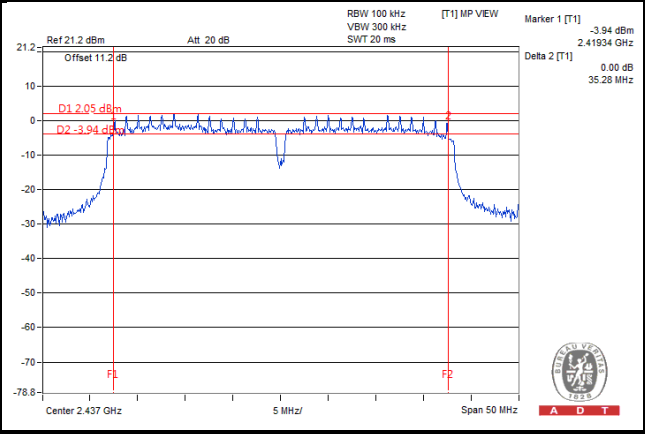
802.11g



802.11n (HT20)



802.11n (HT40)

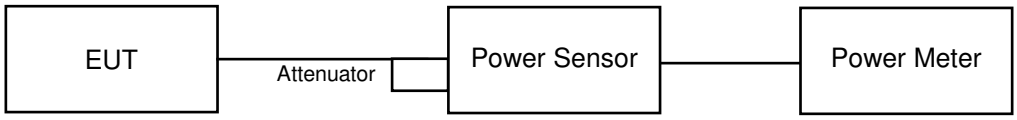


4.4 Conducted Output Power Measurement

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	105.44	20.23	30	Pass
6	2437	118.85	20.75	30	Pass
11	2462	111.69	20.48	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	172.19	22.36	30	Pass
6	2437	220.29	23.43	30	Pass
11	2462	169.43	22.29	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	167.11	22.23	30	Pass
6	2437	224.91	23.52	30	Pass
11	2462	163.68	22.14	30	Pass

802.11n (HT40)

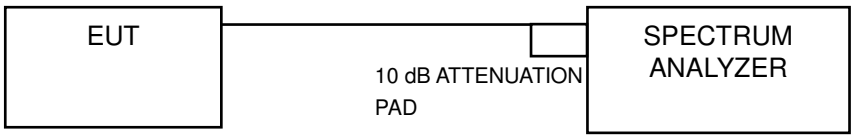
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	189.67	22.78	30	Pass
6	2437	210.86	23.24	30	Pass
9	2452	188.36	22.75	30	Pass

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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	-5.24	8	Pass
6	2437	-5.63	8	Pass
11	2462	-5.16	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-10.27	8	Pass
6	2437	-9.85	8	Pass
11	2462	-10.80	8	Pass

802.11n (HT20)

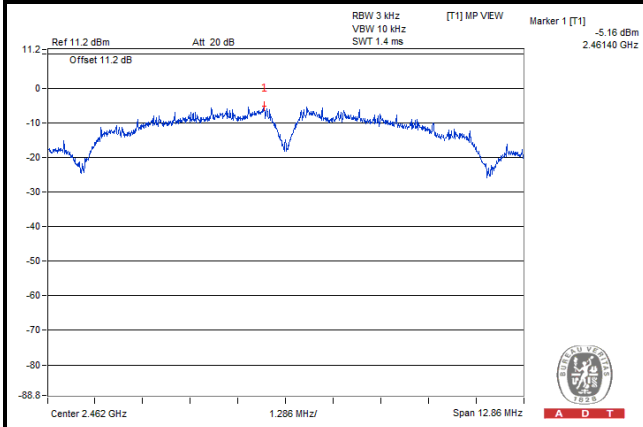
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-11.41	8	Pass
6	2437	-9.85	8	Pass
11	2462	-11.92	8	Pass

802.11n (HT40)

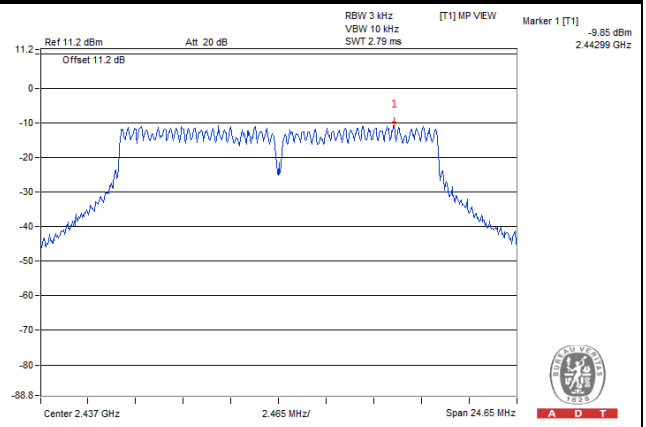
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
3	2422	-15.14	8	Pass
6	2437	-13.26	8	Pass
9	2452	-15.32	8	Pass

Spectrum Plot of Worst Value

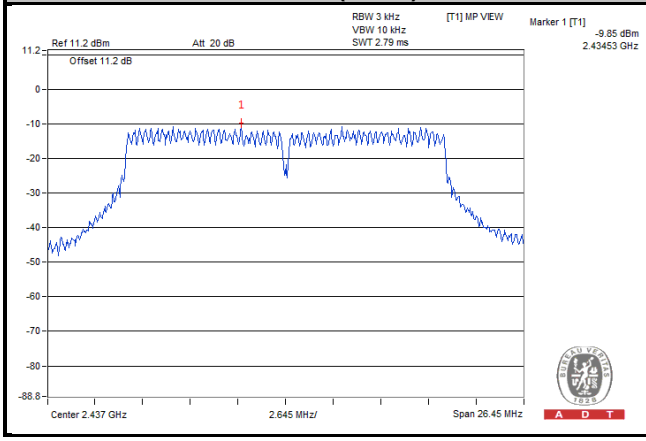
802.11b



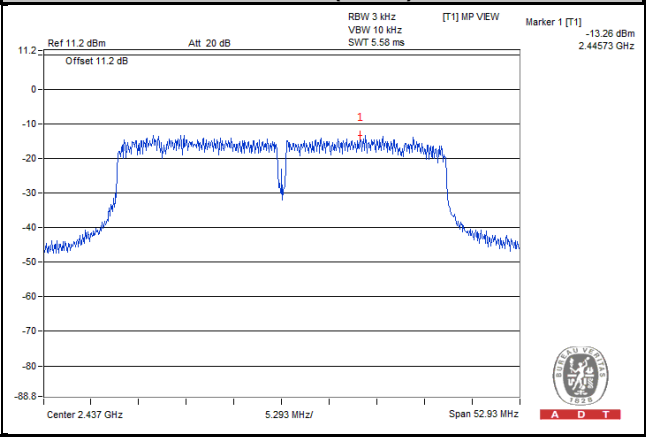
802.11g



802.11n (HT20)



802.11n (HT40)

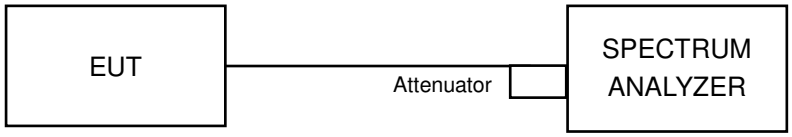


4.6 Conducted Out of Band Emission Measurement

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 ≥ 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 OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 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

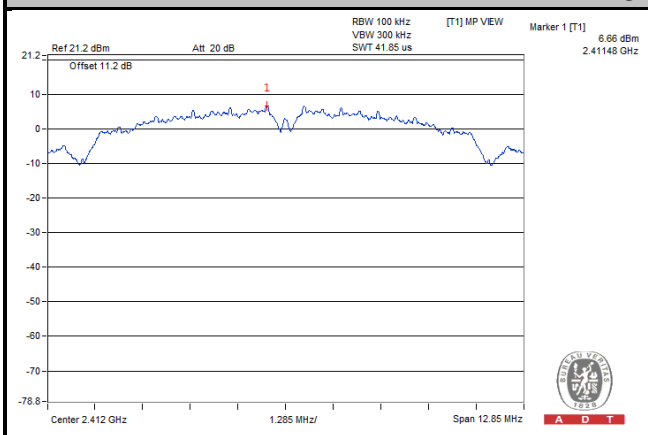
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

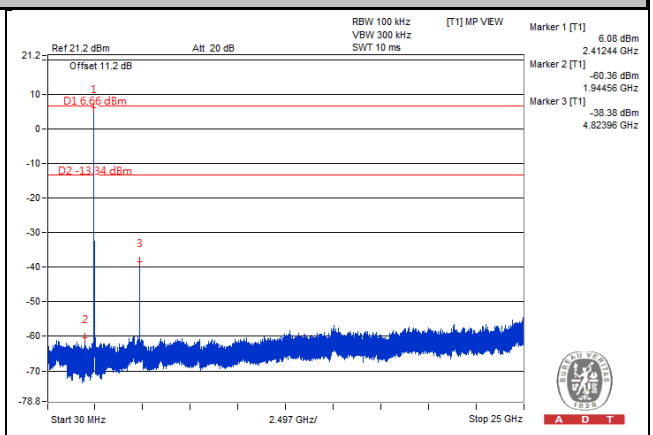
4.6.7 Test Results

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.

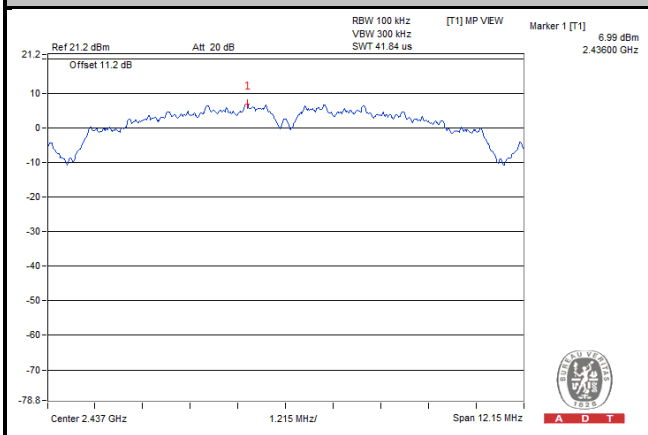
802.11b

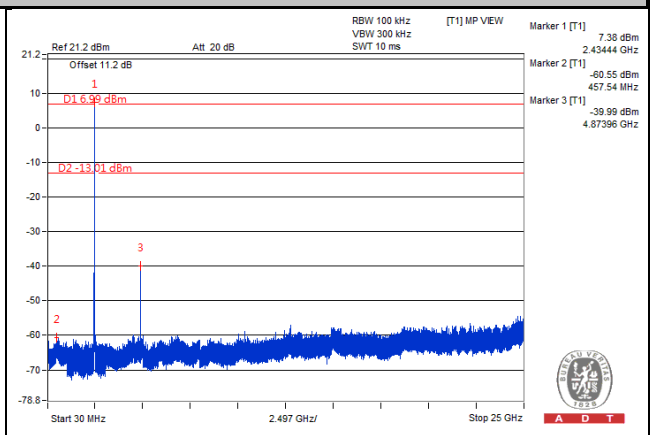
Ch 1



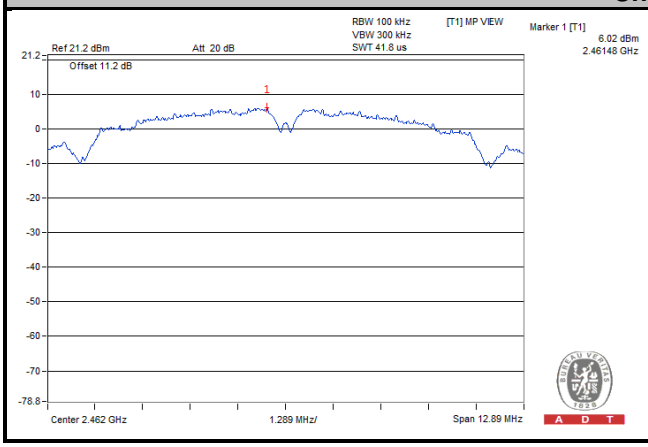


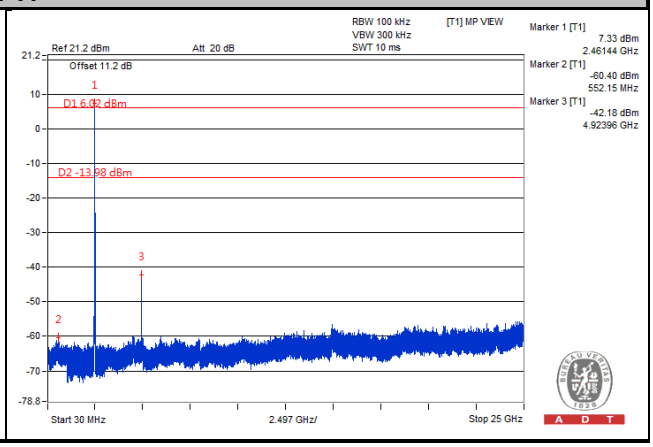
Ch 6

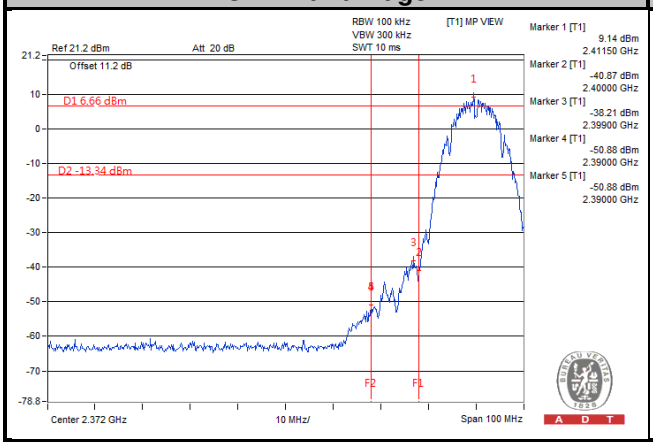
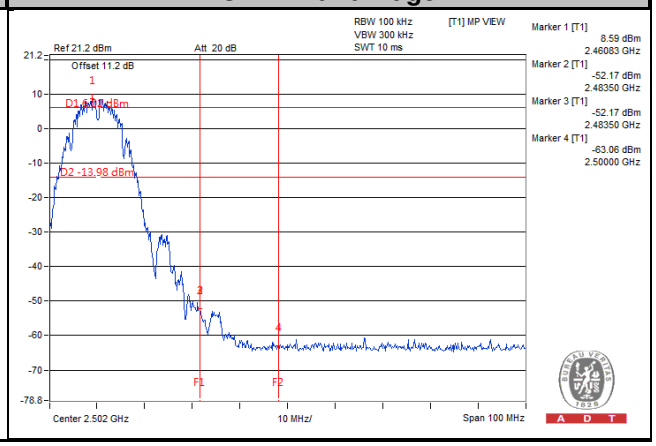




Ch 11



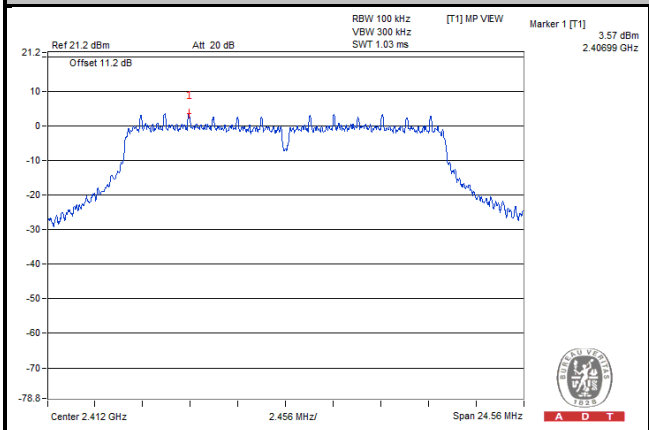


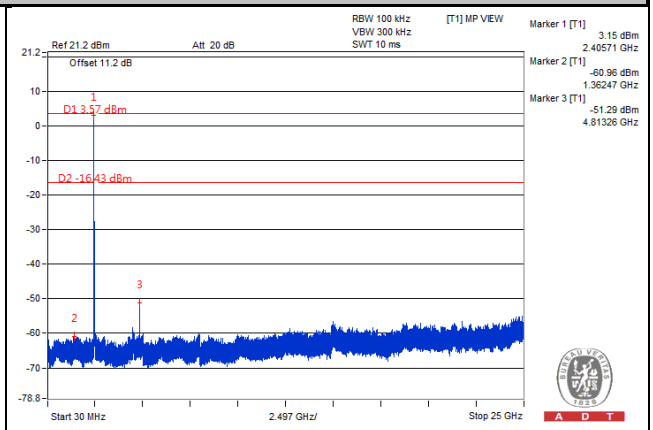
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11g

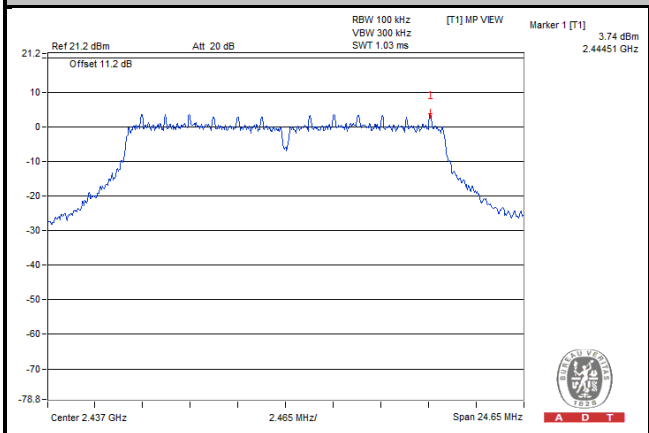
1TX

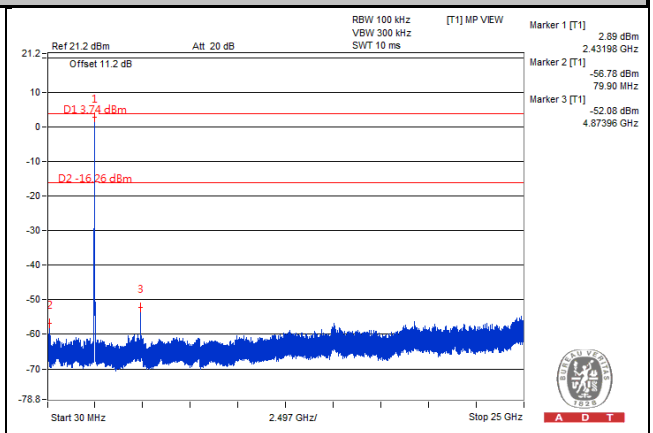
Ch 1



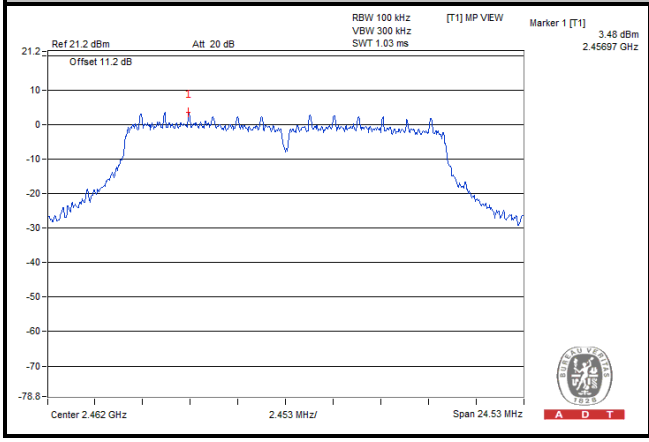


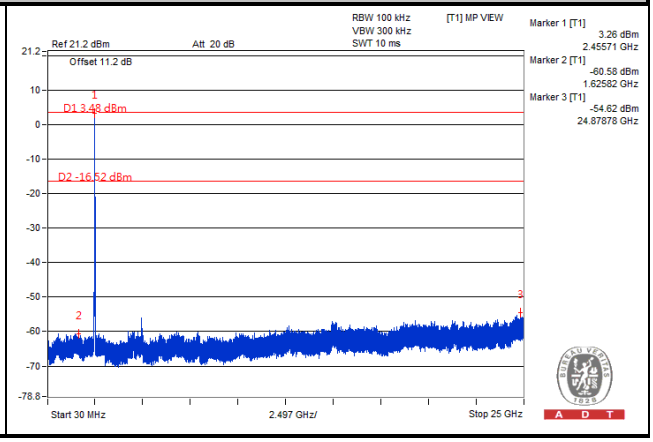
Ch 6

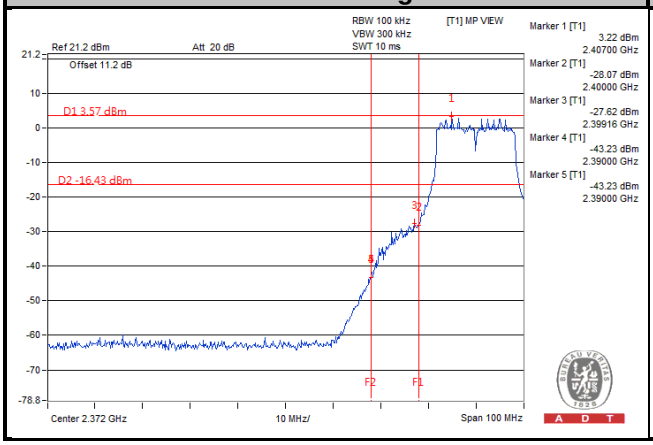
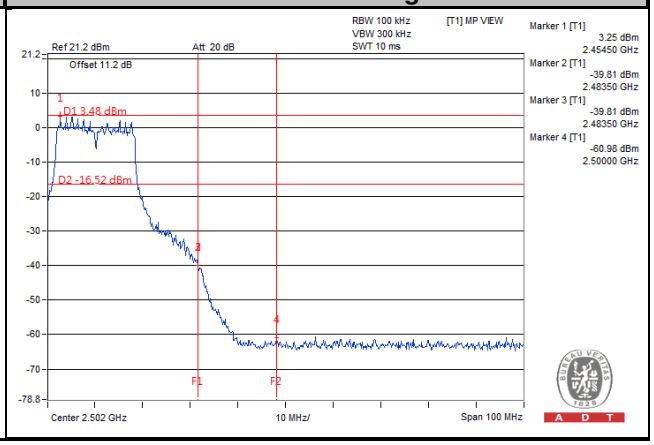




Ch 11

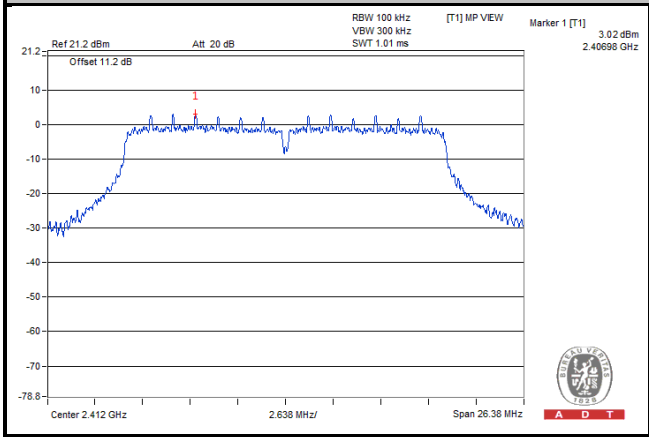


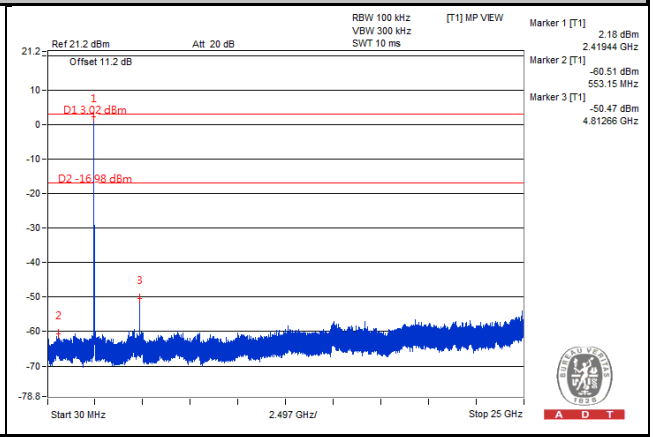


Ch 1 Band Edge	Ch 11 Band Edge
	

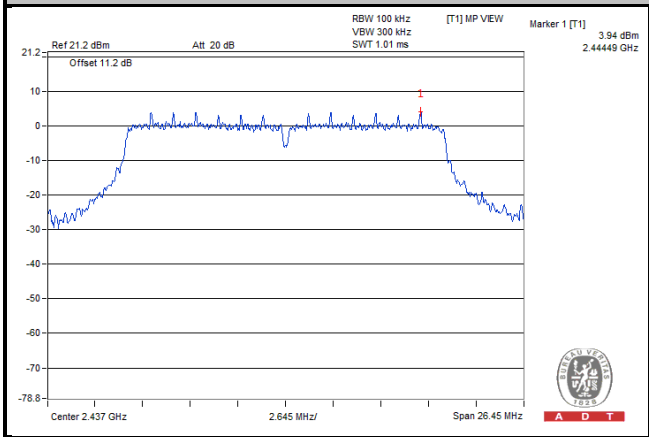
802.11n (HT20)

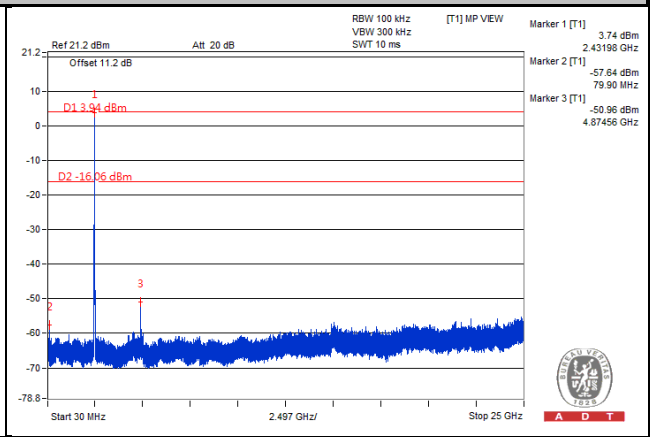
Ch 1



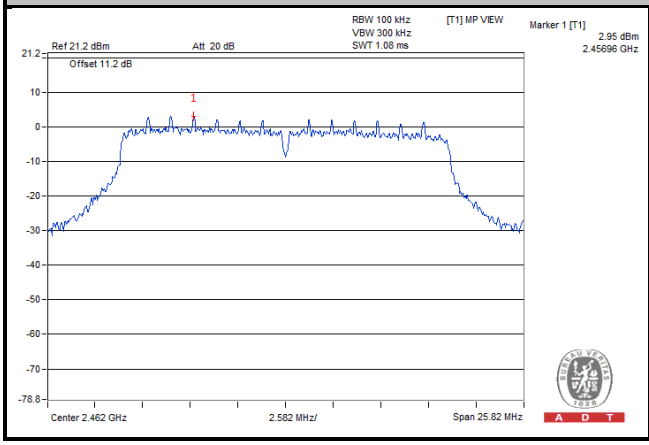


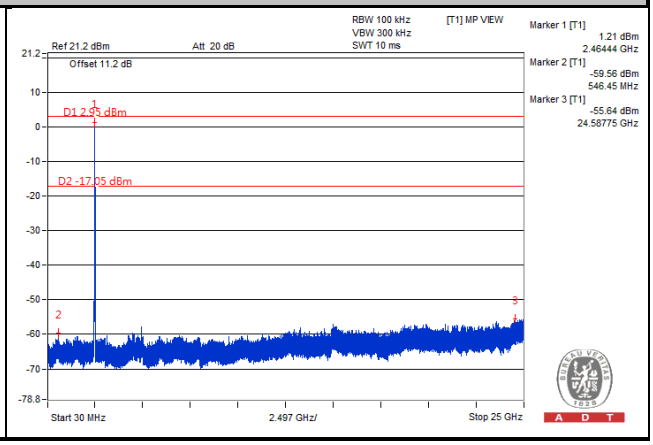
Ch 6

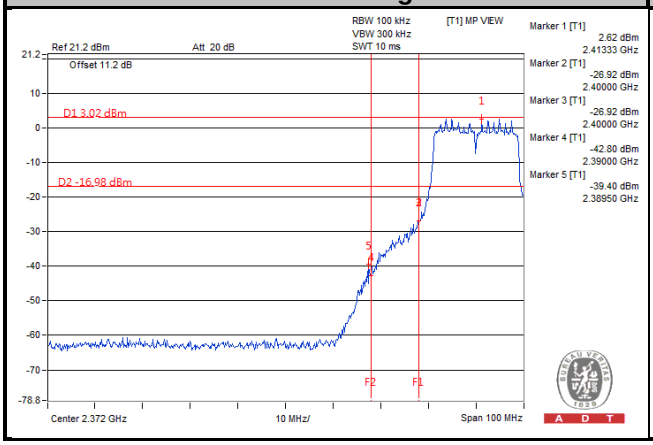
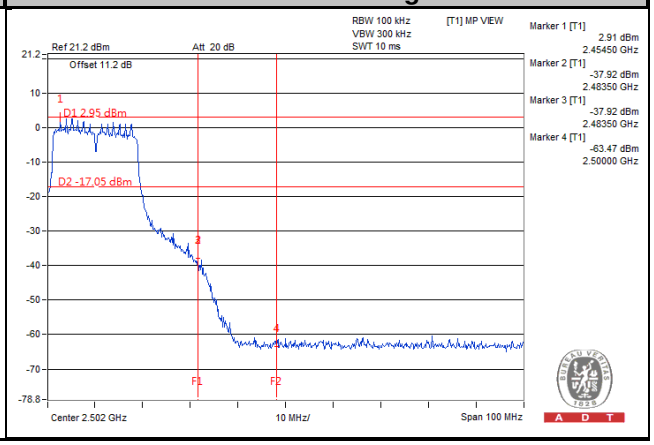




Ch 11

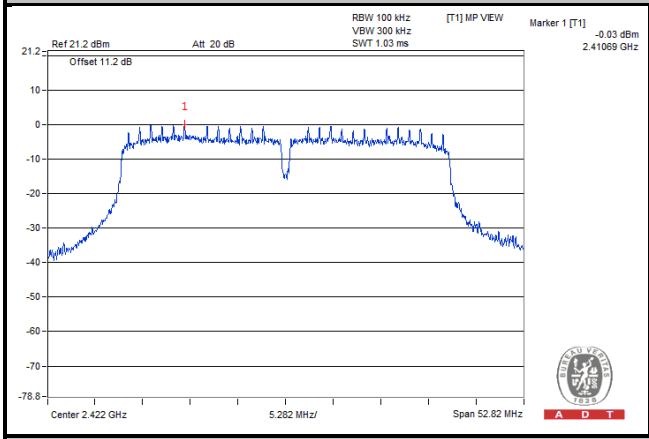


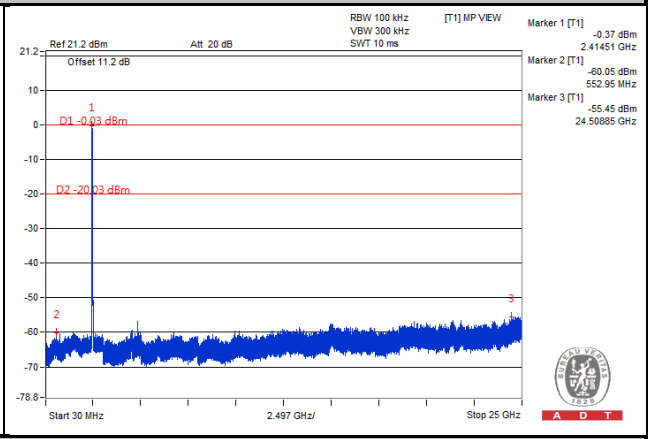


Ch 1 Band Edge	Ch 11 Band Edge
	

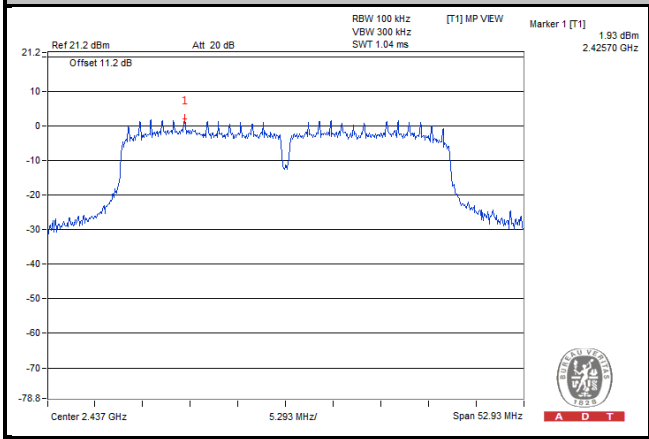
802.11n (HT40)

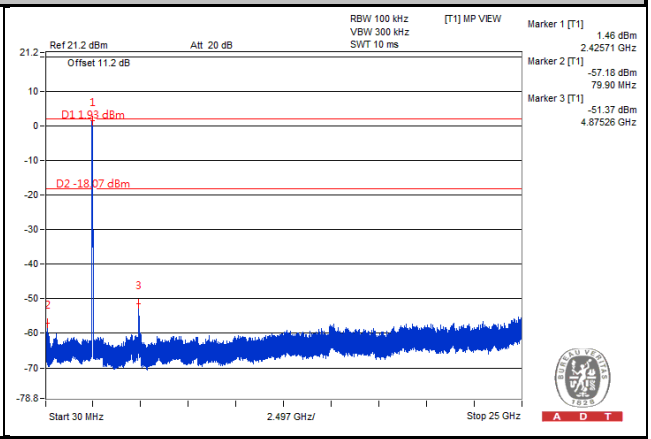
Ch 3



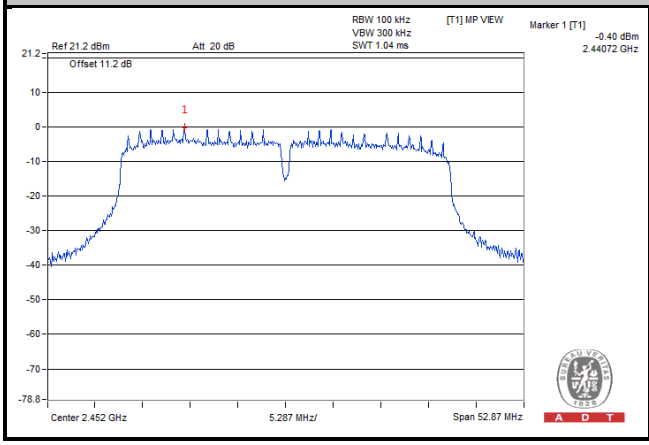


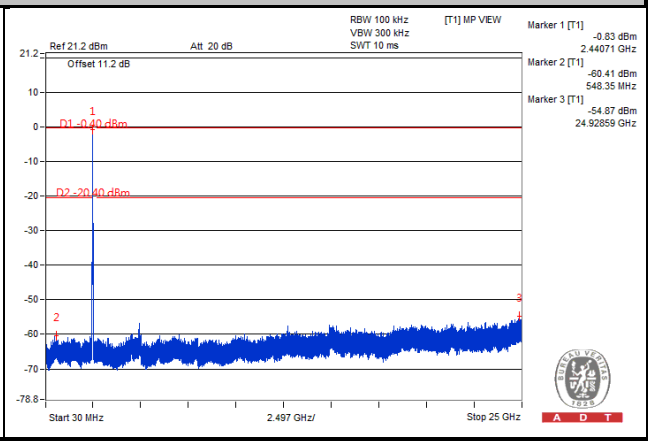
Ch 6

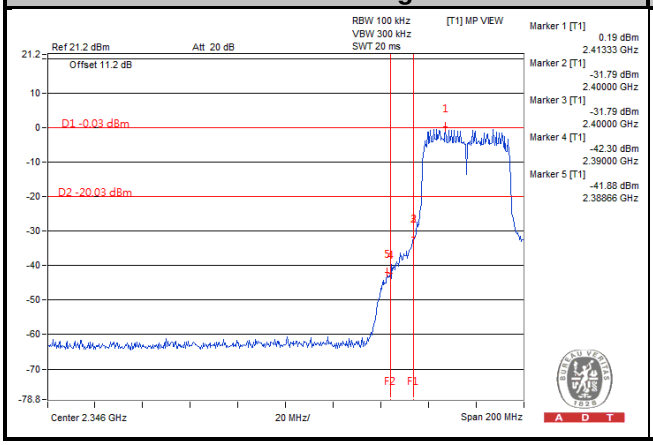
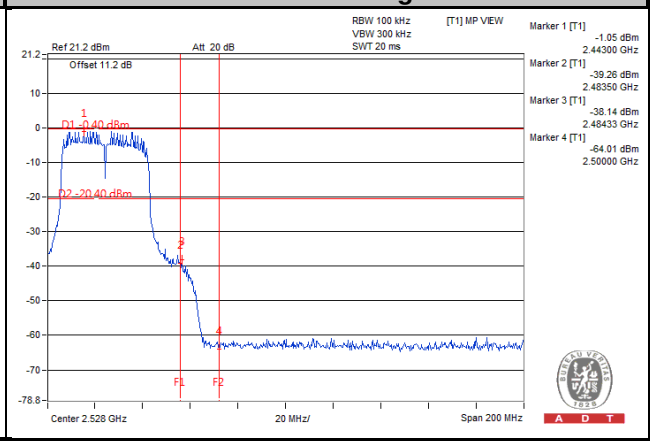




Ch 9





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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