

## FCC Test Report

**Report No.:** RF160511C17-3

**FCC ID:** MSQP027

**Test Model:** P027

**Received Date:** May 11, 2016

**Test Date:** May 19, 2016 ~ Jun. 06, 2016

**Issued Date:** Jun. 13, 2016

**Applicant:** ASUSTek COMPUTER INC.

**Address:** 4F, No. 150, LI-TE Rd., PEITOU, TAIPEI 112, 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
RF160511C17-3	Original Release	Jun. 13, 2016

## 1 Certificate of Conformity

**Product:** ASUS Tablet

**Brand:** ASUS

**Test Model:** P027

**Sample Status:** Identical Prototype

**Applicant:** ASUSTek COMPUTER INC.

**Test Date:** May 19, 2016 ~ Jun. 06, 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:**

Jun. 13, 2016

Ivonne Wu / Supervisor

**Approved by :**



**Date:**

Jun. 13, 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 -18.85 dB at 0.89400 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.86 dB at 2390 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

<b>Product</b>	ASUS Tablet
<b>Brand</b>	ASUS
<b>Test Model</b>	P027
<b>Status of EUT</b>	Identical Prototype
<b>Power Supply Rating</b>	5.0 Vdc (adapter or host equipment) 3.8 Vdc (Li-ion battery)
<b>Modulation Type</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>Modulation Technology</b>	DSSS, OFDM
<b>Transfer Rate</b>	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
<b>Operating Frequency</b>	2412 ~ 2462 MHz
<b>Number of Channel</b>	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
<b>Output Power</b>	160.32 mW
<b>Antenna Type</b>	PIFA antenna with -1.25 dBi gain
<b>Antenna Connector</b>	N/A
<b>Accessory Device</b>	Refer to Note as below
<b>Data Cable Supplied</b>	Refer to Note as below

Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1 (Variable Plug)	ASUS	AD2037M20	I/P: 100-240Vac, 0.3A O/P: 5.0Vdc, 2A
Adapter 2 (US Plug)	ASUS	AD2037320	I/P: 100-240Vac, 0.3A O/P: 5.0Vdc, 2A
Adapter 3 (US Plug)	ASUS	W12-010N3A	I/P: 100-240Vac, 0.3A O/P: 5.0Vdc, 2A
Battery	SIMPLO TECHNOLOGY CO LTD	C12P1601	3.8Vdc, 22Wh or 5900mAh or 5790mAh
USB Cable 1	ASAP	LA05US014-1N	0.9m shielded cable without core
USB Cable 2	FOXCONN	CUDU01B-AJ004-DF	0.9m shielded cable without core
USB Cable 3	ASAP	LA05US025-AN	0.9m shielded cable without core
USB Cable 4	FOXCONN	CUDU01B-AJ009-DF	0.9m shielded cable without core
USB Cable 5	HONGLIN	130-27217	0.9m shielded cable without core
Touch pen	ASUS	PAD-22 Z STYLUS	214 kHz
LCD Panel	TIANMA	TM097QDSP01-00	9.7"

Product	Brand	Model	Description
Front Camera	CHICONY	CBFE55720003870LH	5M
Rear Camera	CHICONY	CJAF83020003871LH	8M
CPU	MTK	C.S MT8176V	825 Pin, 2.1GHz / 1MB
LPDDR 1	Hynix	H9CCNNBJTMLAR-NUM	4G
LPDDR 2	MICRON	MT52L512M32D2PF-107WT: B	4G
eMMC 1	Samsung	KLMDG8JENB-B041	128GB
eMMC 2	Sandisk	SDINADF4-128G-L	128GB
eMMC 3	Toshiba	THGBMHG9C4LBAIR	64G
eMMC 4	Hynix	H26M78208CMR	64G
Main Board	ASUS	Z500M	--
BT/WLAN Module	MTK	MT6630QP	--

\* LPDDR2 and eMMC 1 were chosen as a representative for final test.

- 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	
-	√	√	√	√	-

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 **Z-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)
-	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

#### **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)
-	802.11n (HT40)	1 to 11	3	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)
-	802.11n (HT40)	1 to 11	3	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)
-	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)
-	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	Charles Hsiao
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	3.8 Vdc	Taylor Liu

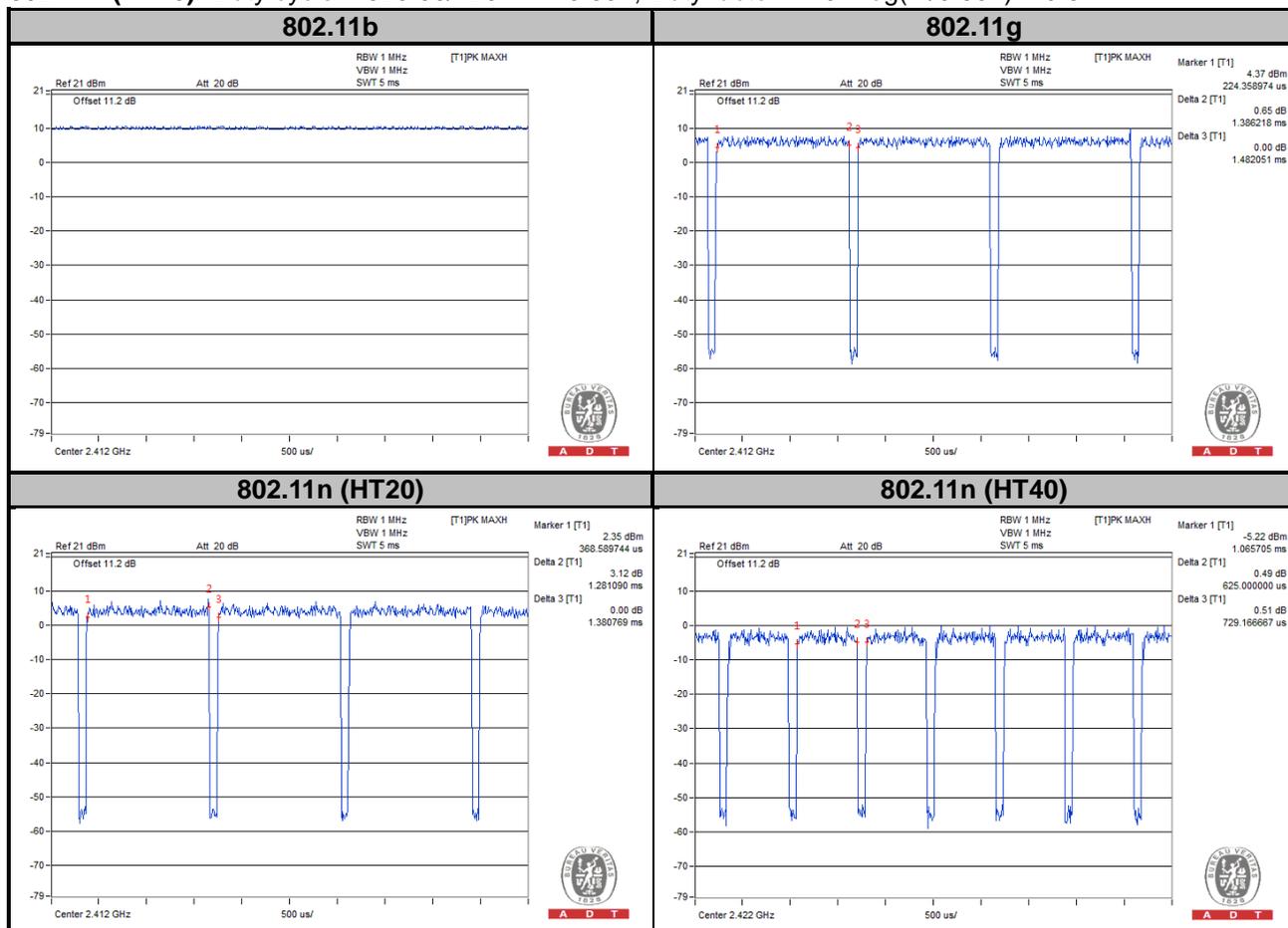
### 3.3 Duty Cycle of Test Signal

**802.11b:** Duty cycle of test signal is 100 %

**802.11g:** Duty cycle =  $1.386/1.482 = 0.935$ , Duty factor =  $10 * \log(1/0.935) = 0.29$

**802.11n (HT20):** Duty cycle =  $1.281/1.381 = 0.928$ , Duty factor =  $10 * \log(1/0.928) = 0.32$

**802.11n (HT40):** Duty cycle =  $625.00/729.17 = 0.857$ , Duty factor =  $10 * \log(1/0.857) = 0.67$



### 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.

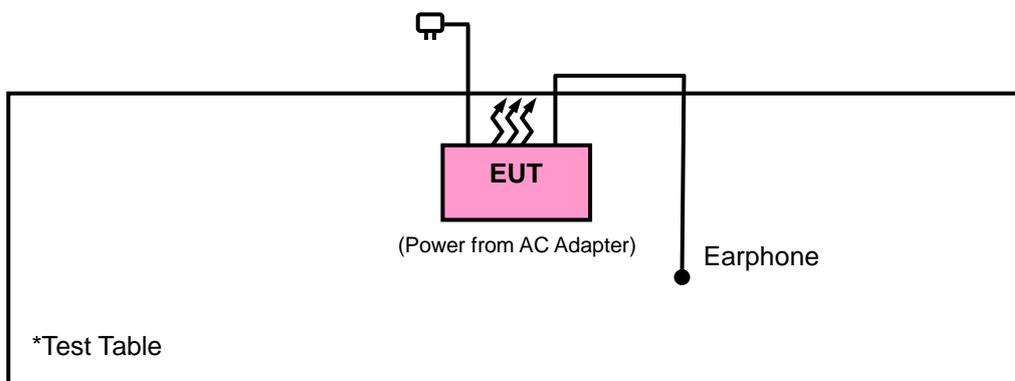
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Earphone	N/A	N/A	N/A	N/A

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

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 (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 & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2016	Jan. 20, 2017
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep. 03, 2015	Sep. 02, 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(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 / 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:**

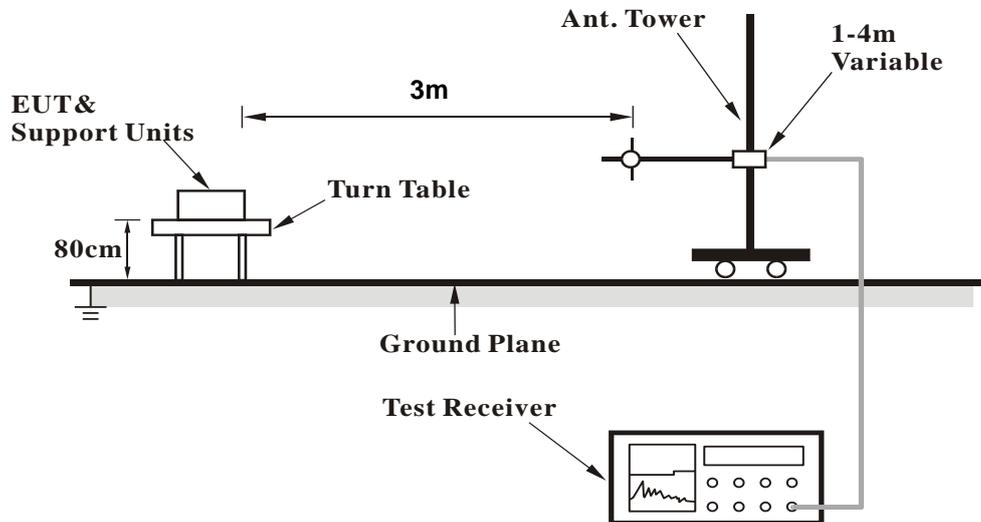
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
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 ( $10 \log(1/\text{duty cycle})$ ).
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

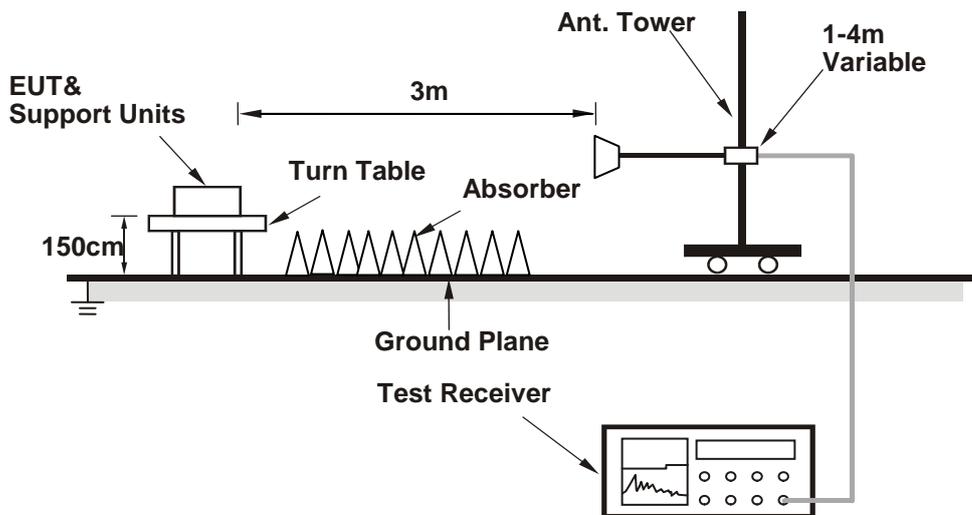
No deviation.

#### 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

- 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 :

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	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
2362	41.93	40.3	54	-12.07	31.76	5.37	35.5	100	48	Average
2362	56.2	54.57	74	-17.8	31.76	5.37	35.5	100	48	Peak
2412	103.96	102.19			31.81	5.43	35.47	100	48	Average
2412	106.75	104.98			31.81	5.43	35.47	100	48	Peak
2500	40.93	38.91	54	-13.07	31.9	5.53	35.41	100	48	Average
2500	55.55	53.53	74	-18.45	31.9	5.53	35.41	100	48	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	41.33	39.76	54	-12.67	31.74	5.33	35.5	196	103	Average
2342	56.17	54.6	74	-17.83	31.74	5.33	35.5	196	103	Peak
2412	99.75	97.98			31.81	5.43	35.47	196	103	Average
2412	102.11	100.34			31.81	5.43	35.47	196	103	Peak
2486	40.58	38.59	54	-13.42	31.88	5.53	35.42	196	103	Average
2486	55.71	53.72	74	-18.29	31.88	5.53	35.42	196	103	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	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
2366	40.35	38.71	54	-13.65	31.76	5.37	35.49	100	48	Average
2366	56.95	55.31	74	-17.05	31.76	5.37	35.49	100	48	Peak
2437	103.97	102.12			31.85	5.46	35.46	100	48	Average
2437	106.64	104.79			31.85	5.46	35.46	100	48	Peak
2490	40.63	38.62	54	-13.37	31.9	5.53	35.42	100	48	Average
2490	56.17	54.16	74	-17.83	31.9	5.53	35.42	100	48	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	174	103	Average
2390	55.81	54.08	74	-18.19	31.8	5.4	35.47	174	103	Peak
2437	99.31	97.46			31.85	5.46	35.46	174	103	Average
2437	102.88	101.03			31.85	5.46	35.46	174	103	Peak
2494	40.48	38.46	54	-13.52	31.9	5.53	35.41	174	103	Average
2494	55.03	53.01	74	-18.97	31.9	5.53	35.41	174	103	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	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
2316	40.15	38.66	54	-13.85	31.71	5.3	35.52	100	48	Average
2316	55.58	54.09	74	-18.42	31.71	5.3	35.52	100	48	Peak
2462	103.64	101.71			31.87	5.5	35.44	100	48	Average
2462	106.82	104.89			31.87	5.5	35.44	100	48	Peak
2500	41.03	39.01	54	-12.97	31.9	5.53	35.41	100	48	Average
2500	55.46	53.44	74	-18.54	31.9	5.53	35.41	100	48	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
2340	40.5	38.93	54	-13.5	31.74	5.33	35.5	224	103	Average
2340	55.35	53.78	74	-18.65	31.74	5.33	35.5	224	103	Peak
2462	99.86	97.93			31.87	5.5	35.44	224	103	Average
2462	102.47	100.54			31.87	5.5	35.44	224	103	Peak
2484	40.93	38.97	54	-13.07	31.88	5.5	35.42	224	103	Average
2484	56.73	54.77	74	-17.27	31.88	5.5	35.42	224	103	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	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
2390	48.24	46.51	54	-5.76	31.8	5.4	35.47	100	48	Average
2390	63.74	62.01	74	-10.26	31.8	5.4	35.47	100	48	Peak
2412	99.47	97.7			31.81	5.43	35.47	100	48	Average
2412	106.74	104.97			31.81	5.43	35.47	100	48	Peak
2484	40.77	38.81	54	-13.23	31.88	5.5	35.42	100	48	Average
2484	56.16	54.2	74	-17.84	31.88	5.5	35.42	100	48	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	44.6	42.87	54	-9.4	31.8	5.4	35.47	196	103	Average
2390	59.75	58.02	74	-14.25	31.8	5.4	35.47	196	103	Peak
2412	95.92	94.15			31.81	5.43	35.47	196	103	Average
2412	102.24	100.47			31.81	5.43	35.47	196	103	Peak
2492	40.51	38.49	54	-13.49	31.9	5.53	35.41	196	103	Average
2492	56.37	54.35	74	-17.63	31.9	5.53	35.41	196	103	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	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
2386	40.37	38.66	54	-13.63	31.8	5.4	35.49	100	48	Average
2386	56.74	55.03	74	-17.26	31.8	5.4	35.49	100	48	Peak
2437	98.59	96.74			31.85	5.46	35.46	100	48	Average
2437	106.74	104.89			31.85	5.46	35.46	100	48	Peak
2484	40.58	38.62	54	-13.42	31.88	5.5	35.42	100	48	Average
2484	55.84	53.88	74	-18.16	31.88	5.5	35.42	100	48	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	40.18	38.49	54	-13.82	31.78	5.4	35.49	174	103	Average
2384	55.91	54.22	74	-18.09	31.78	5.4	35.49	174	103	Peak
2437	95.78	93.93			31.85	5.46	35.46	174	103	Average
2437	102.3	100.45			31.85	5.46	35.46	174	103	Peak
2496	40.45	38.43	54	-13.55	31.9	5.53	35.41	174	103	Average
2496	55.59	53.57	74	-18.41	31.9	5.53	35.41	174	103	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	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
2320	40.48	38.97	54	-13.52	31.73	5.3	35.52	112	48	Average
2320	55.52	54.01	74	-18.48	31.73	5.3	35.52	112	48	Peak
2462	99.28	97.35	54			5.5	35.44	112	48	Average
2462	106.38	104.45	74			5.5	35.44	112	48	Peak
2484	49.01	47.05	54	-4.99	31.88	5.5	35.42	112	48	Average
2484	65.28	63.32	74	-8.72	31.88	5.5	35.42	112	48	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
2348	40.36	38.79	54	-13.64	31.74	5.33	35.5	224	103	Average
2348	55.6	54.03	74	-18.4	31.74	5.33	35.5	224	103	Peak
2462	95.16	93.23	54			5.5	35.44	224	103	Average
2462	102.79	100.86	74			5.5	35.44	224	103	Peak
2484	44.19	42.23	54	-9.81	31.88	5.5	35.42	224	103	Average
2484	61.45	59.49	74	-12.55	31.88	5.5	35.42	224	103	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	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
2390	46.34	44.61	54	-7.66	31.8	5.4	35.47	100	48	Average
2390	62.89	61.16	74	-11.11	31.8	5.4	35.47	100	48	Peak
2412	96.4	94.63			31.81	5.43	35.47	100	48	Average
2412	104.07	102.3			31.81	5.43	35.47	100	48	Peak
2500	40.8	38.78	54	-13.2	31.9	5.53	35.41	100	48	Average
2500	55.83	53.81	74	-18.17	31.9	5.53	35.41	100	48	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	43.3	41.57	54	-10.7	31.8	5.4	35.47	196	103	Average
2390	59.48	57.75	74	-14.52	31.8	5.4	35.47	196	103	Peak
2412	92.03	90.26			31.81	5.43	35.47	196	103	Average
2412	100.71	98.94			31.81	5.43	35.47	196	103	Peak
2494	40.49	38.47	54	-13.51	31.9	5.53	35.41	196	103	Average
2494	55.73	53.71	74	-18.27	31.9	5.53	35.41	196	103	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	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
2380	40.56	38.9	54	-13.44	31.78	5.37	35.49	100	48	Average
2380	56.39	54.73	74	-17.61	31.78	5.37	35.49	100	48	Peak
2437	96.21	94.36			31.85	5.46	35.46	100	48	Average
2437	104.07	102.22			31.85	5.46	35.46	100	48	Peak
2494	40.86	38.84	54	-13.14	31.9	5.53	35.41	100	48	Average
2494	56.07	54.05	74	-17.93	31.9	5.53	35.41	100	48	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
2370	40.51	38.85	54	-13.49	31.78	5.37	35.49	174	103	Average
2370	55.86	54.2	74	-18.14	31.78	5.37	35.49	174	103	Peak
2437	92.61	90.76			31.85	5.46	35.46	174	103	Average
2437	100.31	98.46			31.85	5.46	35.46	174	103	Peak
2492	40.77	38.75	54	-13.23	31.9	5.53	35.41	174	103	Average
2492	56.31	54.29	74	-17.69	31.9	5.53	35.41	174	103	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	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
2382	40.17	38.48	54	-13.83	31.78	5.4	35.49	112	48	Average
2382	55.53	53.84	74	-18.47	31.78	5.4	35.49	112	48	Peak
2462	96.48	94.55			31.87	5.5	35.44	112	48	Average
2462	104.34	102.41			31.87	5.5	35.44	112	48	Peak
2484	46.53	44.57	54	-7.47	31.88	5.5	35.42	112	48	Average
2484	63.98	62.02	74	-10.02	31.88	5.5	35.42	112	48	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
2370	40.45	38.79	54	-13.55	31.78	5.37	35.49	224	103	Average
2370	56.02	54.36	74	-17.98	31.78	5.37	35.49	224	103	Peak
2462	92.16	90.23			31.87	5.5	35.44	224	103	Average
2462	100.57	98.64			31.87	5.5	35.44	224	103	Peak
2484	43.48	41.52	54	-10.52	31.88	5.5	35.42	224	103	Average
2484	56.2	54.24	74	-17.8	31.88	5.5	35.42	224	103	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	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
2390	50.14	48.41	54	-3.86	31.8	5.4	35.47	136	214	Average
2390	69.87	68.14	74	-4.13	31.8	5.4	35.47	136	214	Peak
2422	92.36	90.56			31.83	5.43	35.46	136	214	Average
2422	100.81	99.01			31.83	5.43	35.46	136	214	Peak
2488	40.66	38.65	54	-13.34	31.9	5.53	35.42	136	214	Average
2488	53.58	51.57	74	-20.42	31.9	5.53	35.42	136	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	46.58	44.85	54	-7.42	31.8	5.4	35.47	111	105	Average
2390	65.48	63.75	74	-8.52	31.8	5.4	35.47	111	105	Peak
2422	88.52	86.72			31.83	5.43	35.46	111	105	Average
2422	95.82	94.02			31.83	5.43	35.46	111	105	Peak
2486	38.79	36.8	54	-15.21	31.88	5.53	35.42	111	105	Average
2486	54.21	52.22	74	-19.79	31.88	5.53	35.42	111	105	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	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
2390	39.85	38.12	54	-14.15	31.8	5.4	35.47	166	142	Average
2390	56.55	54.82	74	-17.45	31.8	5.4	35.47	166	142	Peak
2437	92.81	90.96			31.85	5.46	35.46	166	142	Average
2437	100.77	98.92			31.85	5.46	35.46	166	142	Peak
2484	39.67	37.71	54	-14.33	31.88	5.5	35.42	166	142	Average
2484	55.47	53.51	74	-18.53	31.88	5.5	35.42	166	142	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	39.57	37.91	54	-14.43	31.78	5.37	35.49	103	265	Average
2376	55.26	53.6	74	-18.74	31.78	5.37	35.49	103	265	Peak
2437	88.72	86.87			31.85	5.46	35.46	103	265	Average
2437	96.42	94.57			31.85	5.46	35.46	103	265	Peak
2498	39.62	37.6	54	-14.38	31.9	5.53	35.41	103	265	Average
2498	55.38	53.36	74	-18.62	31.9	5.53	35.41	103	265	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 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	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
2380	39.55	37.89	54	-14.45	31.78	5.37	35.49	196	143	Average
2380	55.47	53.81	74	-18.53	31.78	5.37	35.49	196	143	Peak
2452	92.56	90.69			31.85	5.46	35.44	196	143	Average
2452	100.59	98.72			31.85	5.46	35.44	196	143	Peak
2484	49.54	47.58	54	-4.46	31.88	5.5	35.42	196	143	Average
2484	69.45	67.49	74	-4.55	31.88	5.5	35.42	196	143	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	39.67	37.96	54	-14.33	31.8	5.4	35.49	119	215	Average
2388	54.75	53.04	74	-19.25	31.8	5.4	35.49	119	215	Peak
2452	88.56	86.69			31.85	5.46	35.44	119	215	Average
2452	96.71	94.84			31.85	5.46	35.44	119	215	Peak
2484	45.91	43.95	54	-8.09	31.88	5.5	35.42	119	215	Average
2484	64.77	62.81	74	-9.23	31.88	5.5	35.42	119	215	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)**

EUT Test Condition		Measurement Detail	
Channel	Channel 3	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
88.32	26.35	48.22	43.5	-17.15	8.83	1.11	31.81	195	0	Peak
144.75	23.37	44.53	43.5	-20.13	9.73	1.38	32.27	197	138	Peak
182.55	21.49	41.72	43.5	-22.01	10.4	1.61	32.24	116	119	Peak
419.7	28.05	40.06	46	-17.95	17.77	2.41	32.19	119	360	Peak
610.1	21.42	29.2	46	-24.58	21.53	2.87	32.18	121	161	Peak
844.6	25.26	29.95	46	-20.74	23.75	3.38	31.82	184	244	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
30	29.98	43.71	40	-10.02	17.8	0.74	32.27	130	30	Peak
47.55	25.46	48.21	40	-14.54	8.57	0.9	32.22	125	146	Peak
143.13	17.77	39.11	43.5	-25.73	9.55	1.38	32.27	138	271	Peak
419.7	29.13	41.14	46	-16.87	17.77	2.41	32.19	162	192	Peak
687.1	24.02	29.84	46	-21.98	23.23	3.05	32.1	122	211	Peak
790	25.78	30.53	46	-20.22	24.05	3.27	32.07	124	205	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

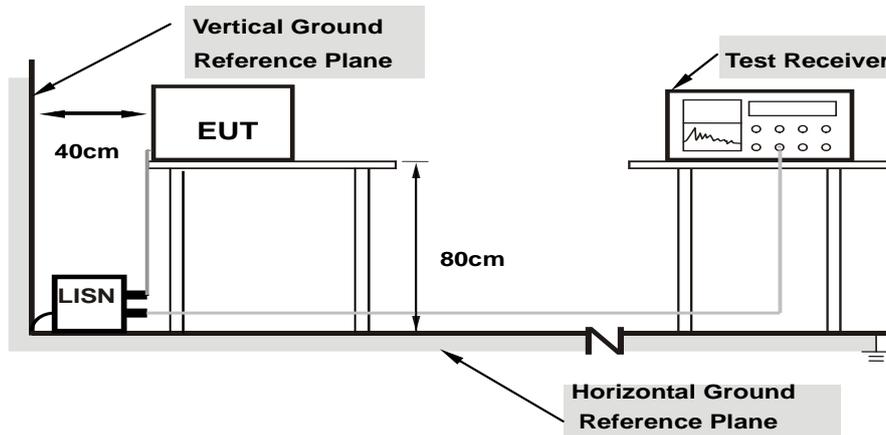
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

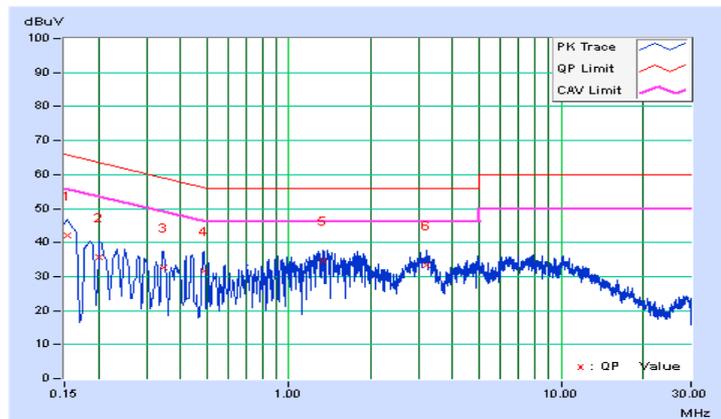
#### 4.2.7 Test Results

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	2016/5/19

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	0.15400	10.02	31.93	21.56	41.95	31.58	65.78	55.78	-23.84	-24.21
2	0.20201	10.03	25.68	14.11	35.71	24.14	63.53	53.53	-27.82	-29.39
3	0.34486	10.10	22.40	10.69	32.50	20.79	59.09	49.09	-26.59	-28.30
4	0.48600	10.13	21.57	9.42	31.70	19.55	56.24	46.24	-24.53	-26.68
5	1.33800	10.22	24.59	12.70	34.81	22.92	56.00	46.00	-21.19	-23.08
6	3.21800	10.36	22.84	12.17	33.20	22.53	56.00	46.00	-22.80	-23.47

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

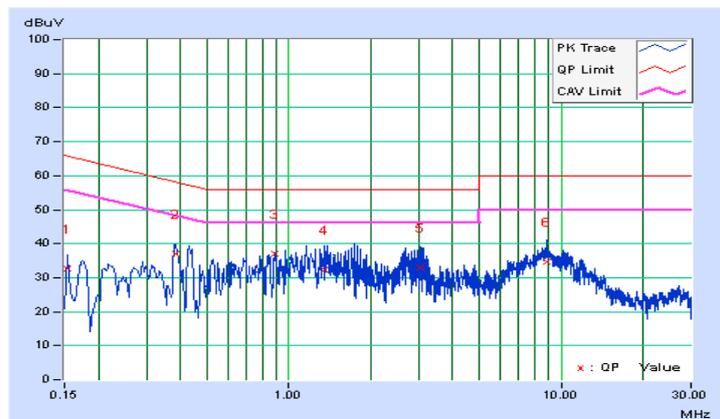


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2016/5/19

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	0.15400	10.03	22.50	13.22	32.53	23.25	65.78	55.78	-33.26	-32.54
2	0.38623	10.12	26.82	17.96	36.94	28.08	58.14	48.14	-21.20	-20.06
3	0.89400	10.20	26.95	15.34	37.15	25.54	56.00	46.00	-18.85	-20.46
4	1.34600	10.23	22.05	8.26	32.28	18.49	56.00	46.00	-23.72	-27.51
5	3.03400	10.36	22.77	10.66	33.13	21.02	56.00	46.00	-22.87	-24.98
6	8.86600	10.73	23.92	16.67	34.65	27.40	60.00	50.00	-25.35	-22.60

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

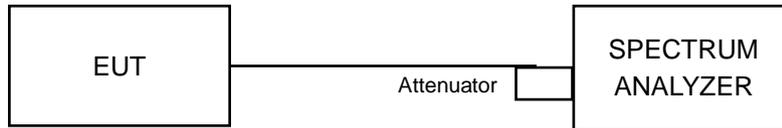


### 4.3 6 dB Bandwidth Measurement

#### 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	8.03	0.5	Pass
6	2437	9.04	0.5	Pass
11	2462	9.03	0.5	Pass

## 802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.57	0.5	Pass
6	2437	15.66	0.5	Pass
11	2462	15.57	0.5	Pass

## 802.11n (HT20)

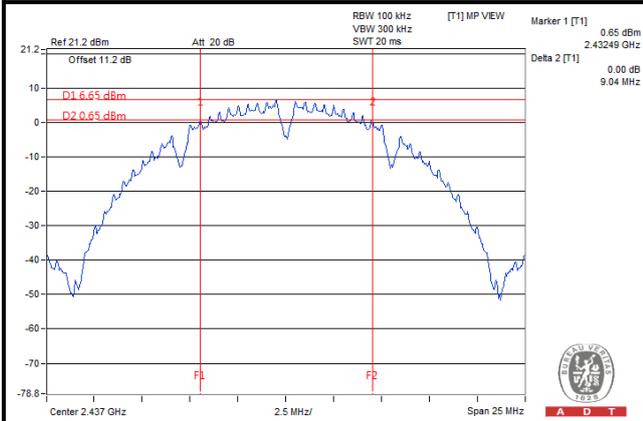
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.82	0.5	Pass
6	2437	16.93	0.5	Pass
11	2462	16.80	0.5	Pass

## 802.11n (HT40)

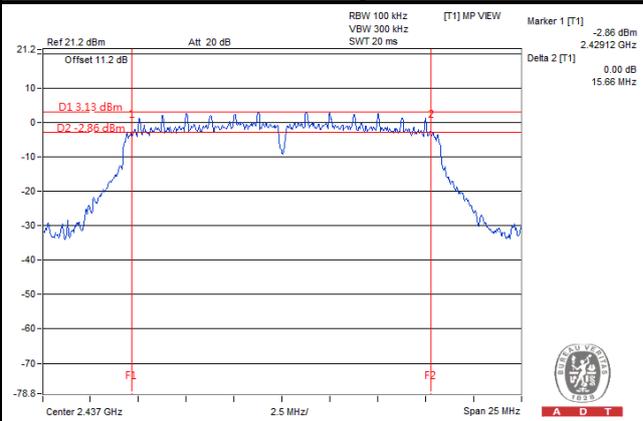
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.19	0.5	Pass
6	2437	35.27	0.5	Pass
9	2452	35.26	0.5	Pass

### Spectrum Plot of Worst Value

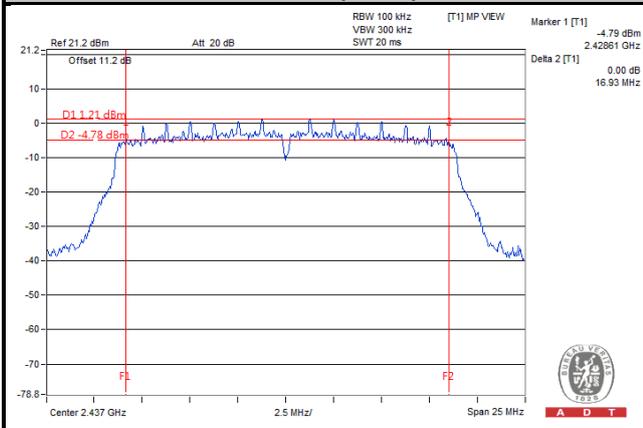
#### 802.11b



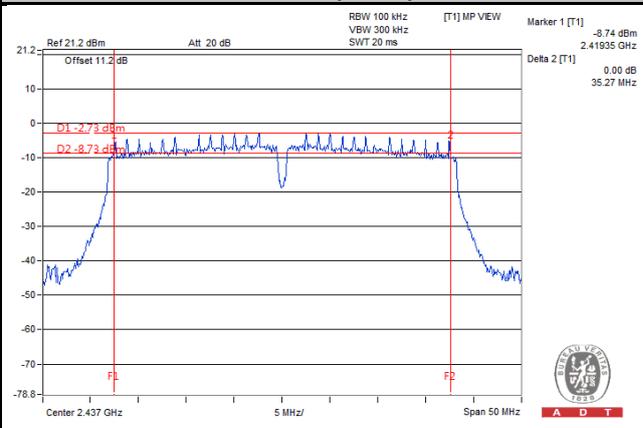
#### 802.11g



#### 802.11n (HT20)



#### 802.11n (HT40)

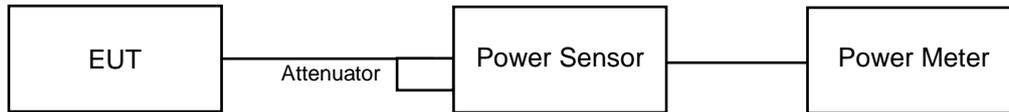


#### 4.4 Conducted Output Power Measurement

##### 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	63.39	18.02	30	Pass
6	2437	64.71	18.11	30	Pass
11	2462	64.86	18.12	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	156.31	21.94	30	Pass
6	2437	160.32	22.05	30	Pass
11	2462	158.85	22.01	30	Pass

##### 802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	147.23	21.68	30	Pass
6	2437	151.36	21.8	30	Pass
11	2462	150.31	21.77	30	Pass

##### 802.11n (HT40)

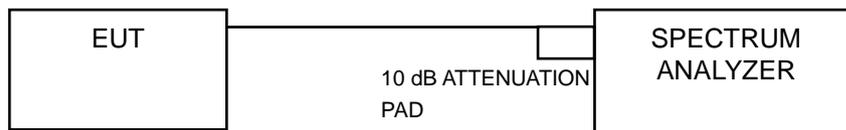
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	128.82	21.1	30	Pass
6	2437	126.47	21.02	30	Pass
9	2452	127.94	21.07	30	Pass

## 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:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set the VBW  $\geq 3 \times \text{RBW}$ .
- 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	-10.25	8	Pass
6	2437	-10.55	8	Pass
11	2462	-10.58	8	Pass

##### 802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-13.80	8	Pass
6	2437	-14.14	8	Pass
11	2462	-13.63	8	Pass

##### 802.11n (HT20)

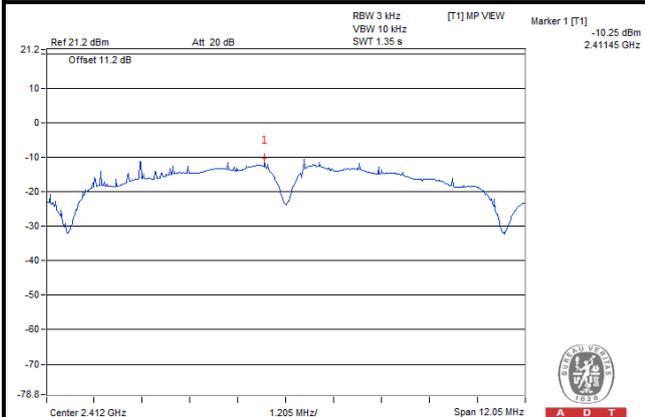
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-15.53	8	Pass
6	2437	-15.19	8	Pass
11	2462	-15.09	8	Pass

##### 802.11n (HT40)

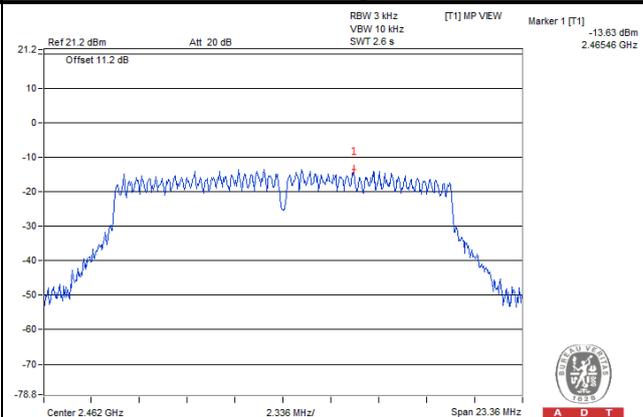
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
3	2422	-18.79	8	Pass
6	2437	-18.22	8	Pass
9	2452	-18.12	8	Pass

### Spectrum Plot of Worst Value

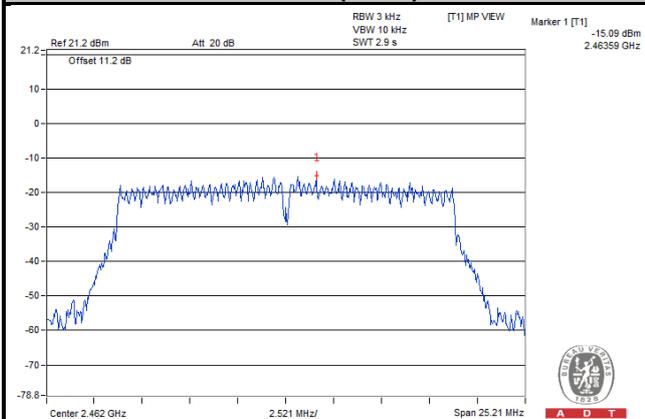
#### 802.11b



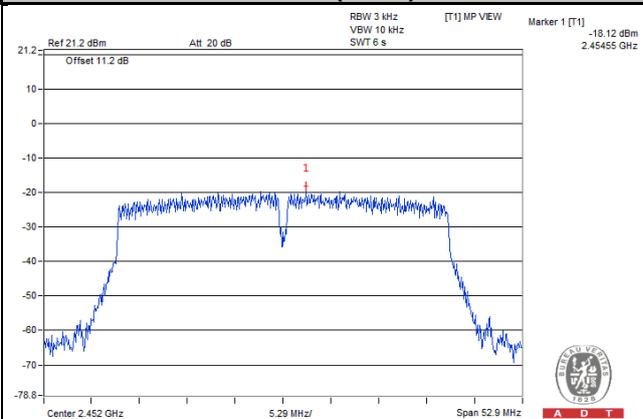
#### 802.11g



#### 802.11n (HT20)



#### 802.11n (HT40)

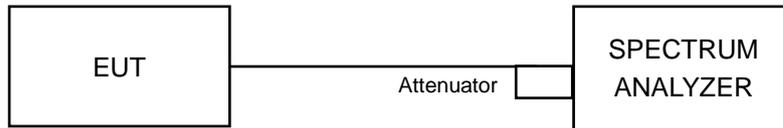


## 4.6 Conducted Out of Band Emission Measurement

### 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.

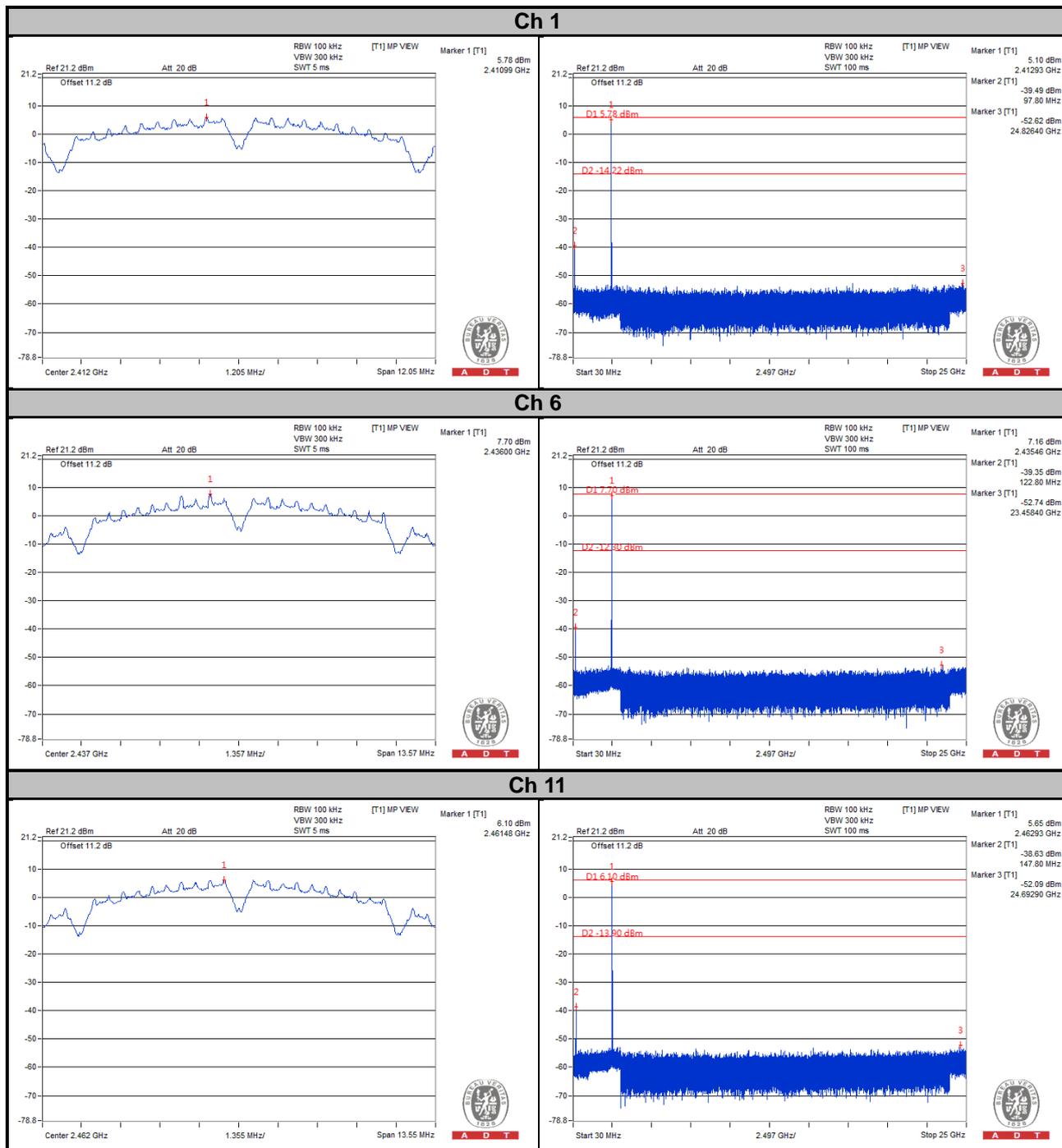
### 4.6.6 EUT Operating Condition

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

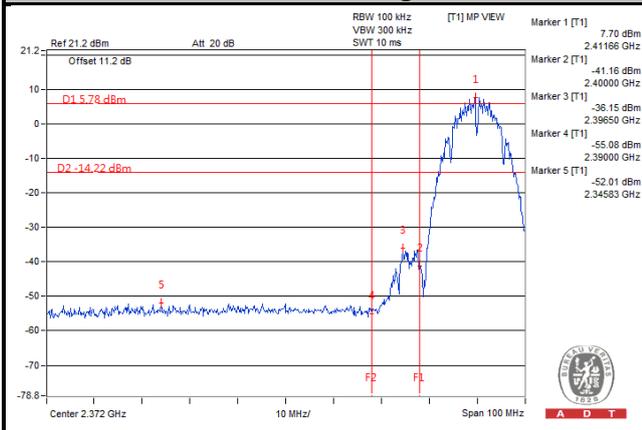
### 4.6.7 Test Results

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.

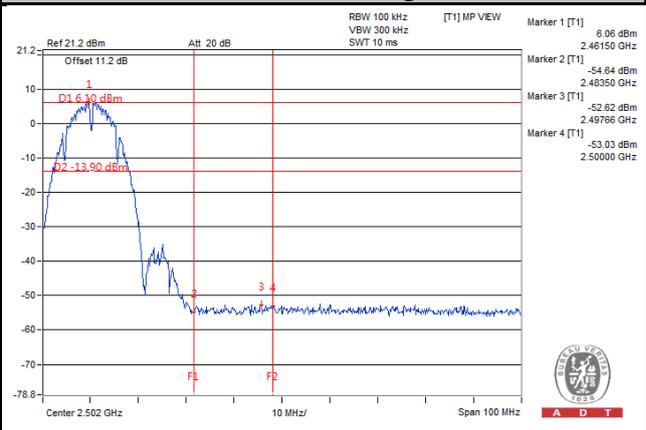
#### 802.11b



### Ch 1 Band Edge

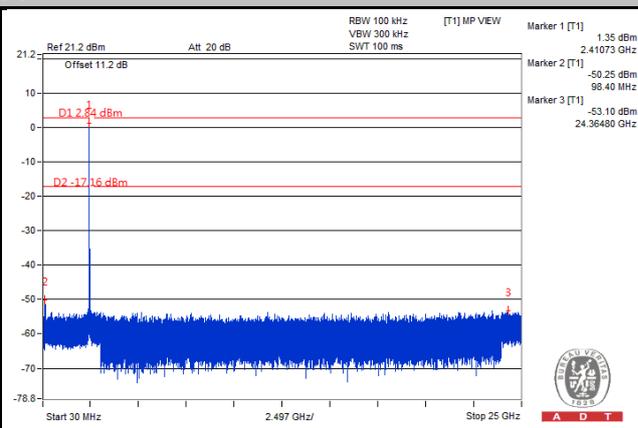
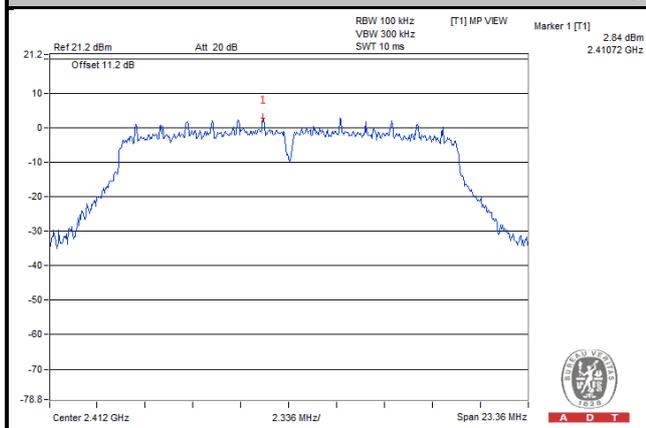


### Ch 11 Band Edge

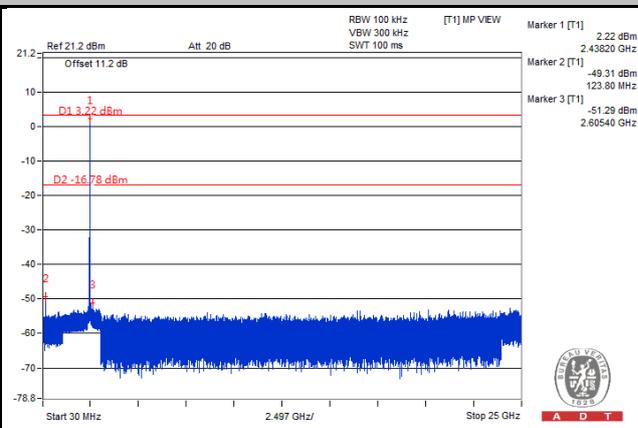
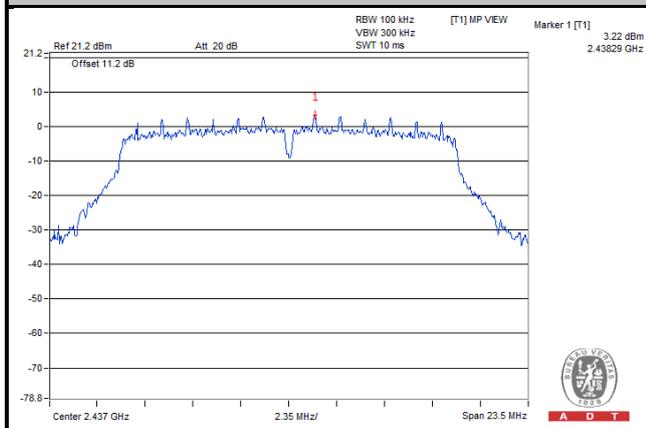


# 802.11g

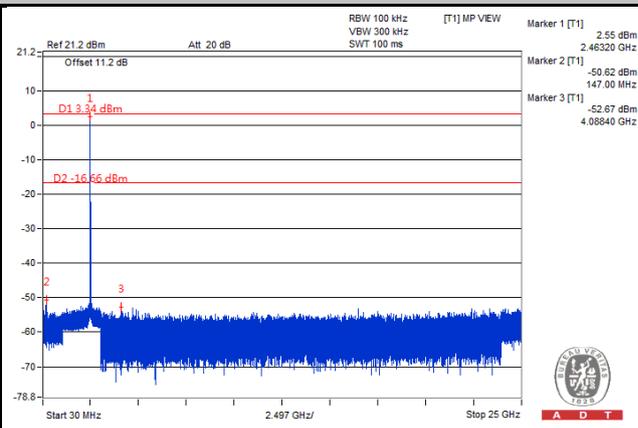
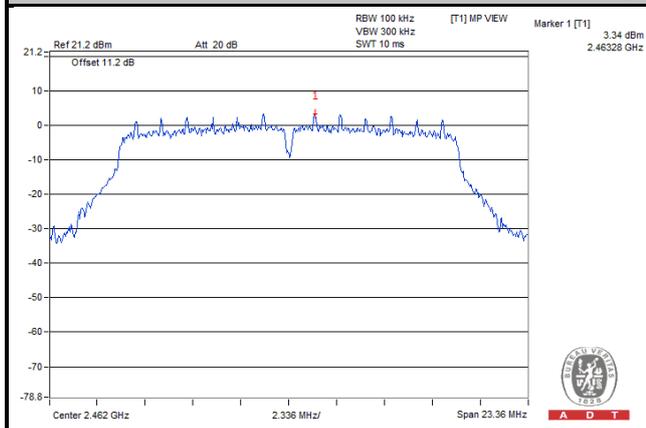
## Ch 1

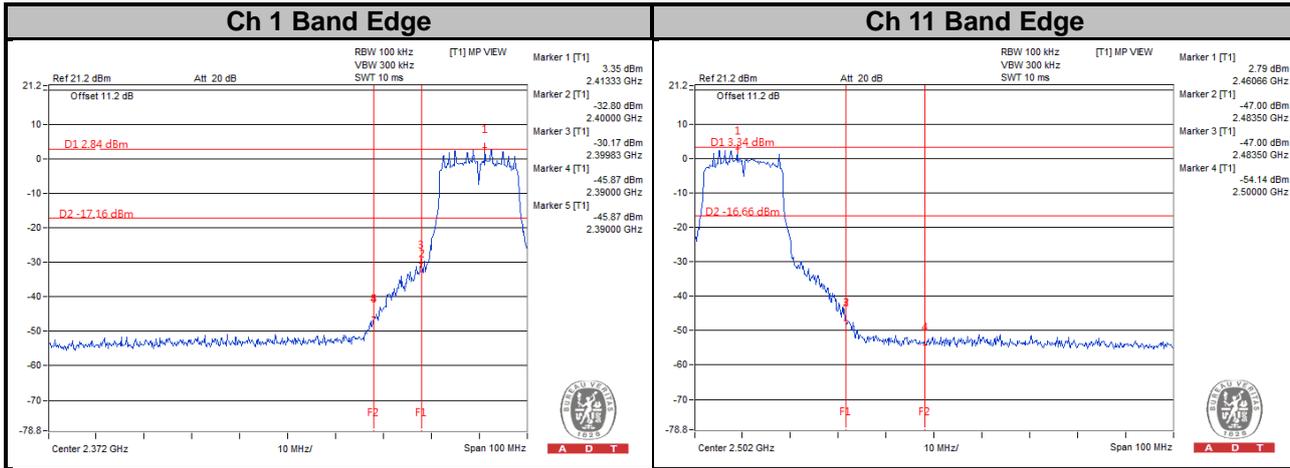


## Ch 6



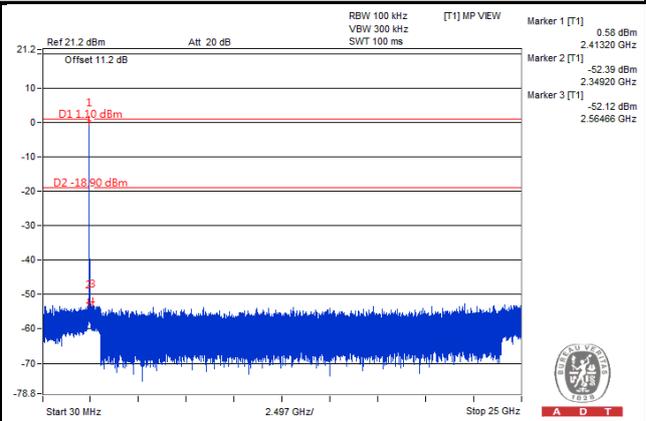
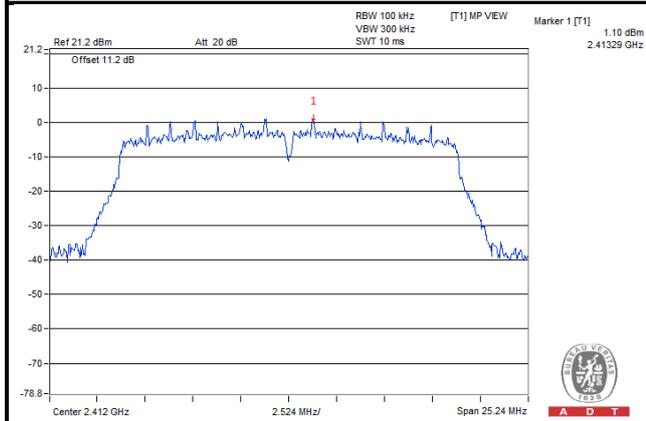
## Ch 11



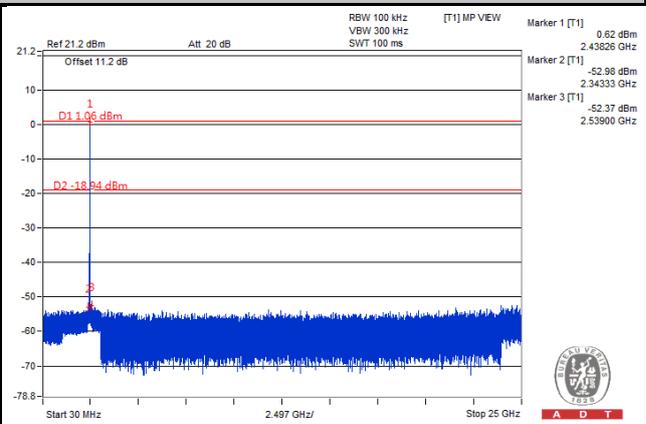
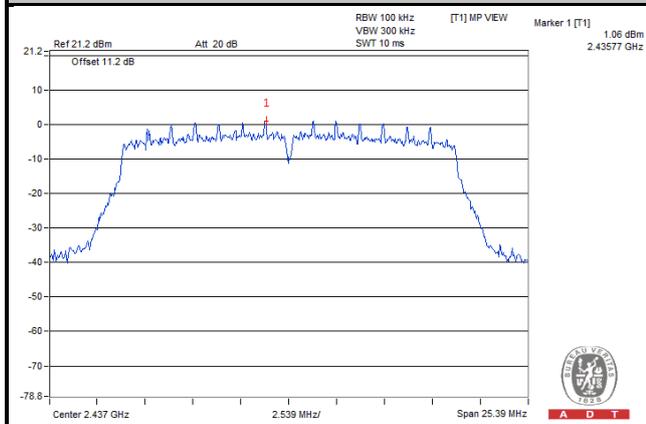


# 802.11n (HT20)

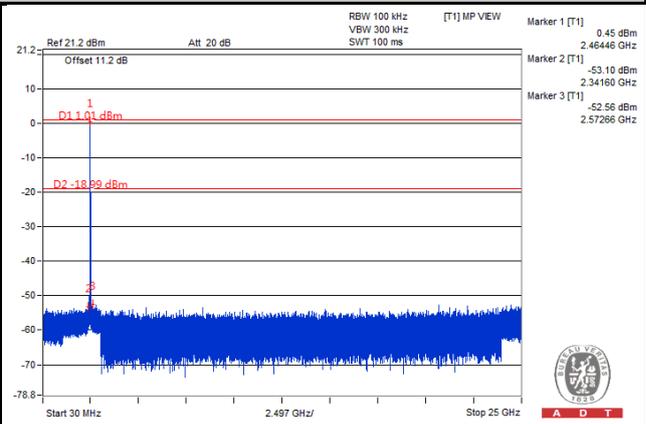
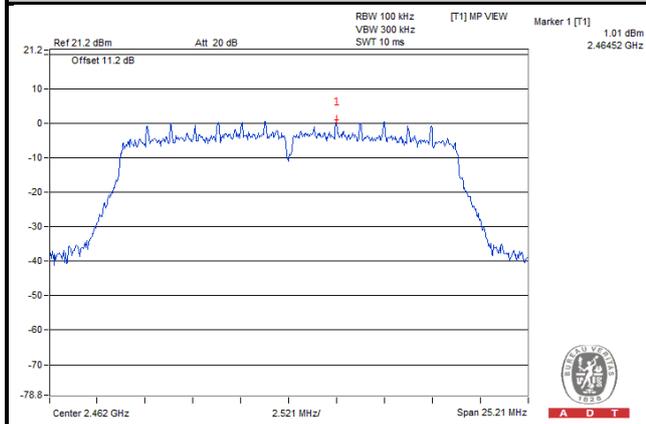
## Ch 1

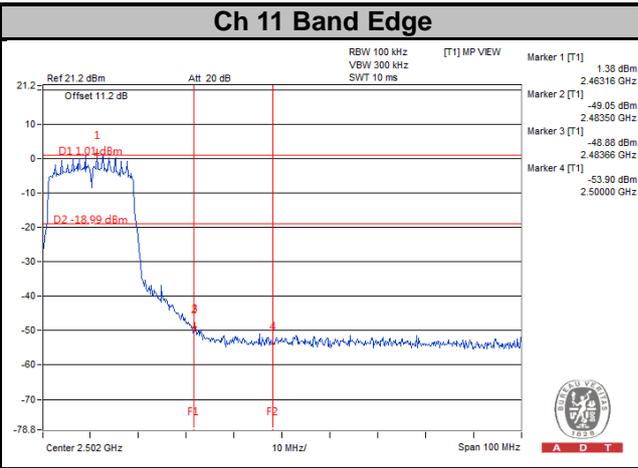
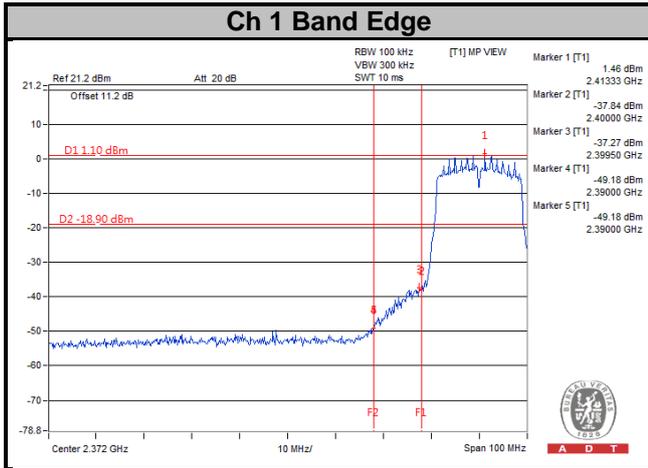


## Ch 6



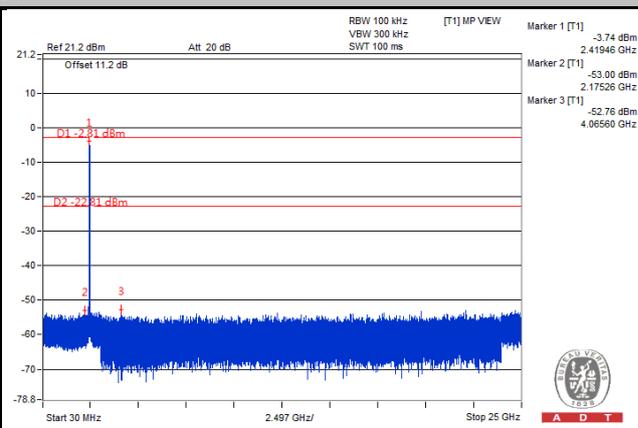
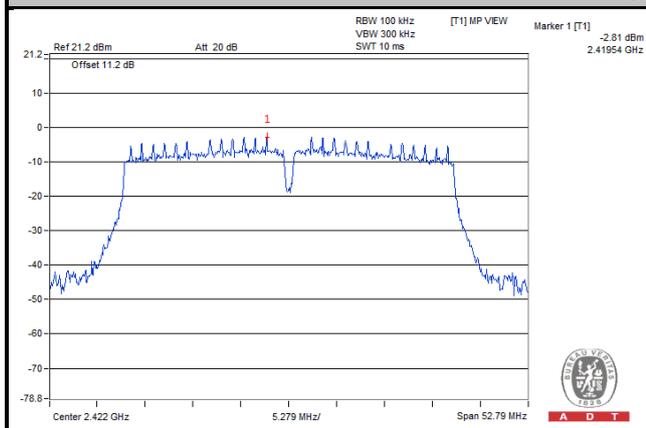
## Ch 11



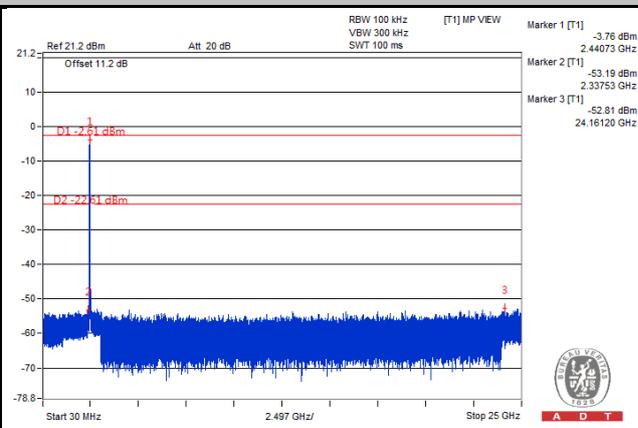
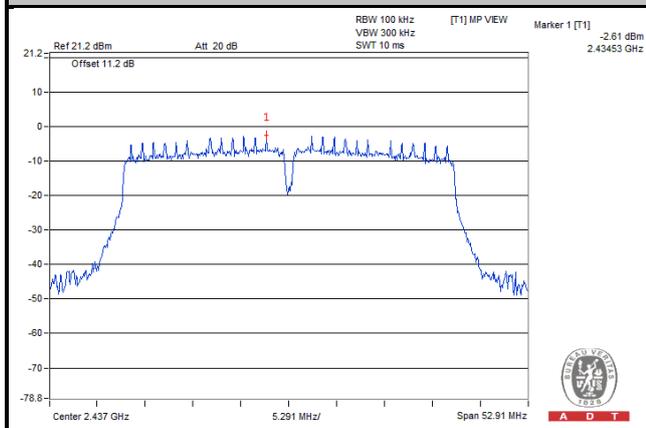


# 802.11n (HT40)

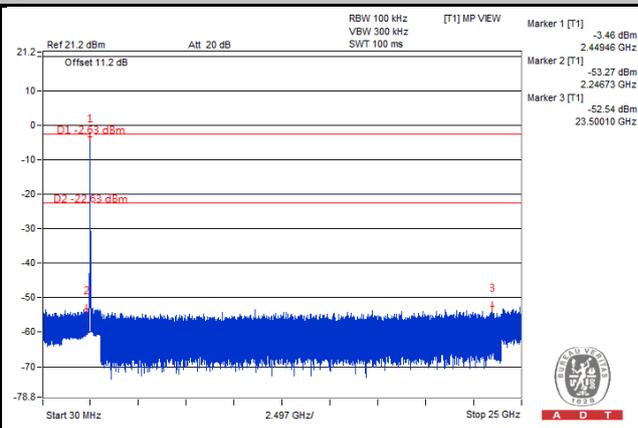
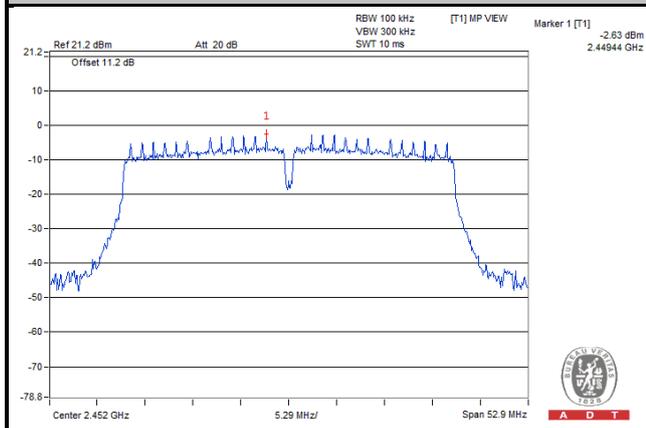
## Ch 3



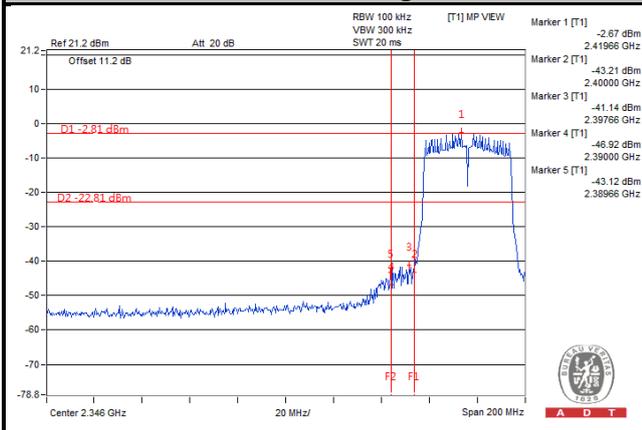
## Ch 6



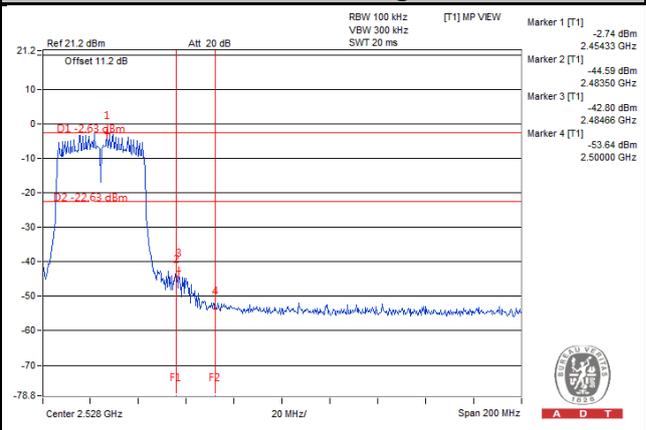
## Ch 9



### 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.

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The address and road map of all our labs can be found in our web site also.

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