FCC Test Report

Report No.:	RF160106C02B
FCC ID:	HFS-H60
Test Model:	H60
Received Date:	Jan. 06, 2016
Test Date:	Jan. 08, 2016 ~ Jan. 28, 2016
Issued Date:	Aug. 09, 2017
Applicant:	Quanta Computer Inc.
Address:	No.188, Wenhua 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C.)
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:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan, R.O.C.

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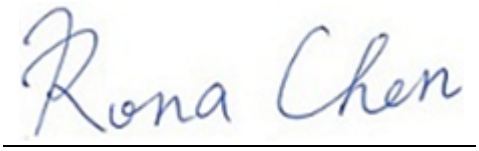
Release Control Record

Issue No.	Description	Date Issued
RF160106C02B	Original Release	Aug. 09, 2017

1 Certificate of Conformity

Product:	Pentagon Control
Brand:	EQL
Test Model:	H60
Sample Status:	Identical Prototype
Applicant:	Quanta Computer Inc.
Test Date:	Jan. 08, 2016 ~ Jan. 28, 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:** Aug. 09, 2017

Rona Chen / Specialist

Approved by :  , **Date:** Aug. 09, 2017

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 -5.08 dB at 0.46301 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.12 dB at 2484 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:
The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	**Frequency**	**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	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Pentagon Control
Brand	EQL
Test Model	H60
Status of EUT	Identical Prototype
Power Supply Rating	5.2 Vdc (Adapter)
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	289.068 mW
Antenna Type	Chip antenna with 1.8 dBi gain (Antenna 1) Chip antenna with -0.4 dBi gain (Antenna 2)
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT provides 1 completed transmitter and 1 receiver.

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

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	LITEON	PA-1050-39Q	I/P: 100-240Vac, 50/60Hz, 0.25A O/P: 5.2Vdc, 1A
WLAN Chip	MTK	MT7688AN	--
BT Chip	Nordic Semiconductor	NRF51822-QFAC	--

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	
-	√	√	√	√	-

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**.

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 (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)
-	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)
-	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	Gavin Wu
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Toby Tian
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin

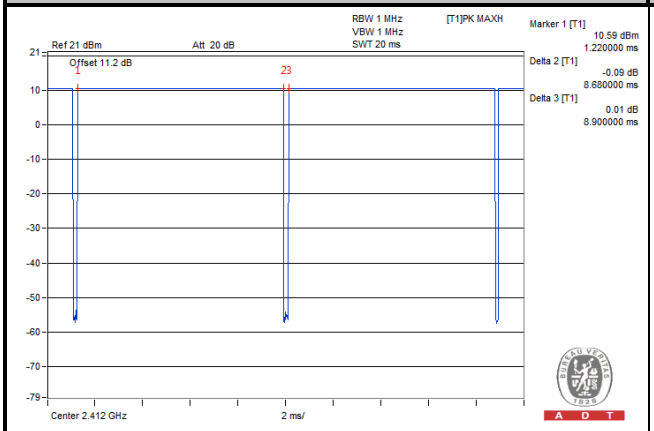
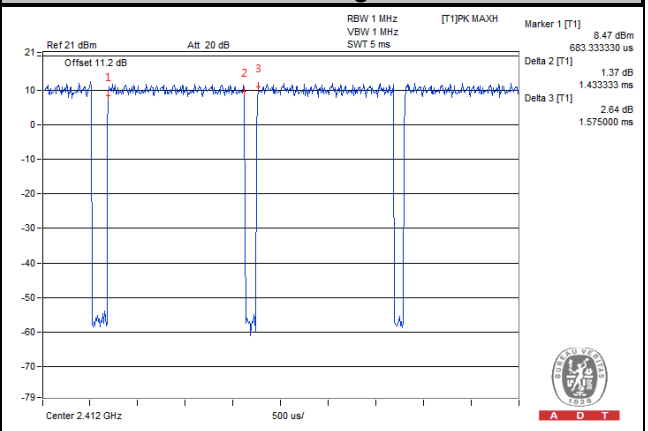
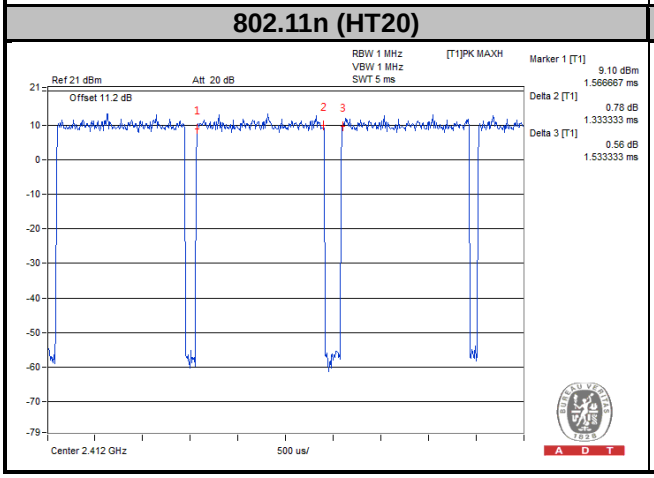
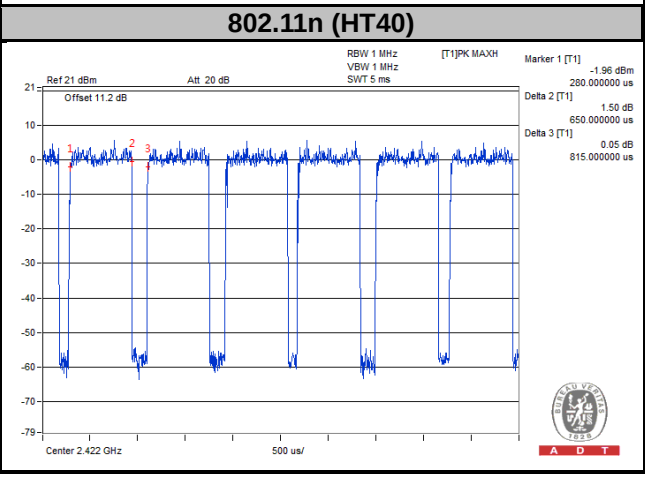
3.3 Duty Cycle of Test Signal

802.11b: Duty cycle = 8.680/8.900 = 0.975, Duty factor = 10 * log(1/0.975) = 0.11

802.11g: Duty cycle = 1.433/1.575 = 0.910, Duty factor = 10 * log(1/0.910) = 0.41

802.11n (HT20): Duty cycle = 1.333/1.533 = 0.869, Duty factor = 10 * log(1/0.869) = 0.61

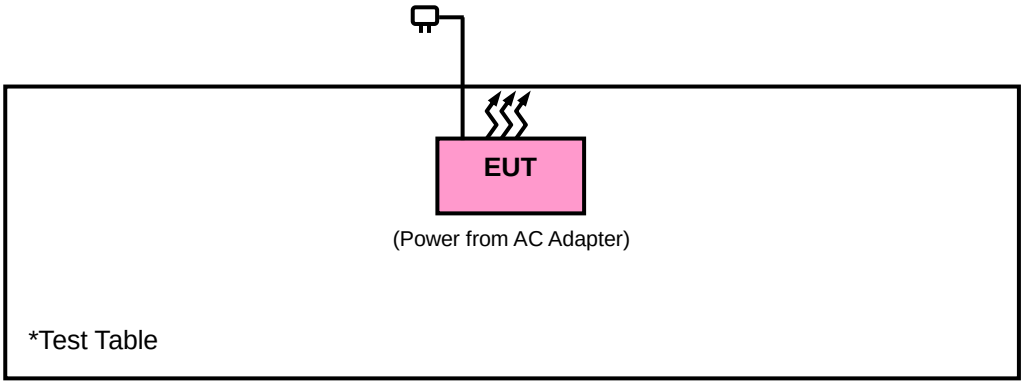
802.11n (HT40): Duty cycle = 0.650/0.815 = 0.797, Duty factor = 10 * log(1/0.797) = 0.98

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.

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 v04
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	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	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 184045	980116	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 28, 2015	Dec. 27, 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 HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 12, 2015	Oct. 11, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 12, 2015	Oct. 11, 2016
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2015	Oct. 11, 2016
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

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

2. The test was performed in HwaYa Chamber 10.

3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.

4. The IC Site Registration No. is IC7450F-10.

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:

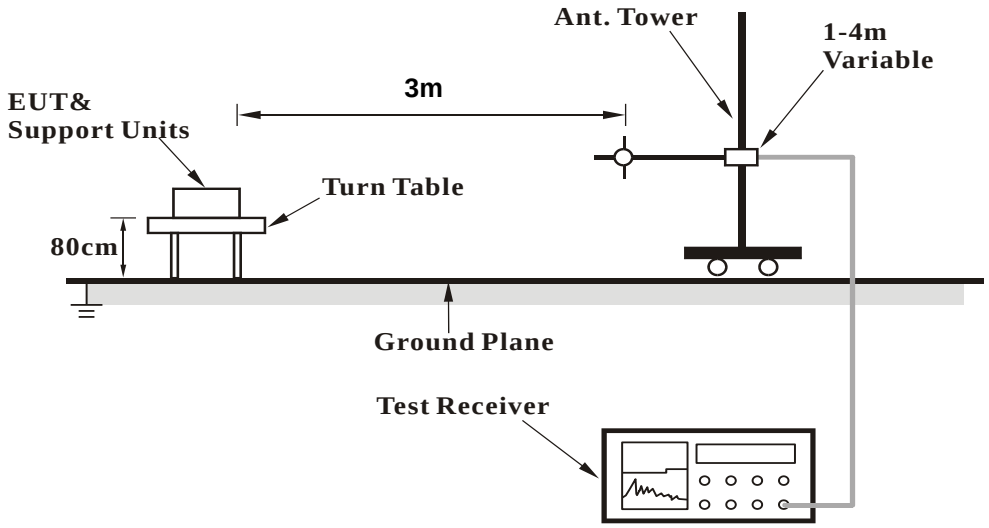
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz 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

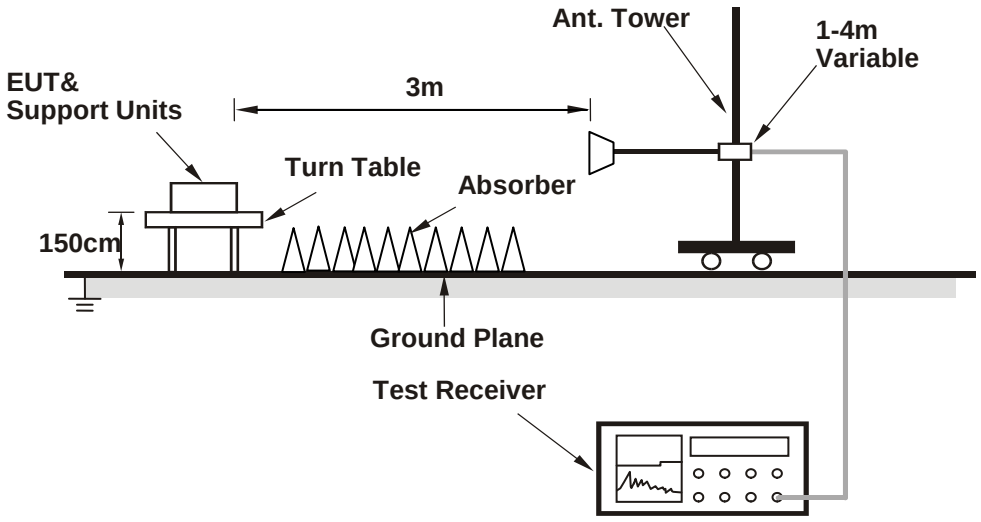
No deviation.

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：

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**	Gavin Wu

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**
2378	38.48	45.05	54	-15.52	26.86	4.07	37.5	203	162	Average
2378	57.37	63.94	74	-16.63	26.86	4.07	37.5	203	162	Peak
2412	99.27	105.74			26.96	4.09	37.52	203	162	Average
2412	104.05	110.52			26.96	4.09	37.52	203	162	Peak
2492	38.62	44.51	54	-15.38	27.2	4.16	37.25	203	162	Average
2492	58.69	64.58	74	-15.31	27.2	4.16	37.25	203	162	Peak
4824	46.19	61.49	54	-7.81	30.99	6.79	53.08	102	352	Average
4824	49.4	64.7	74	-24.6	30.99	6.79	53.08	102	352	Peak
*7236	47.9	56.06	79.27	-31.37	35.68	8.17	52.01	198	135	Average
*7236	55.45	63.61	84.05	-28.6	35.68	8.17	52.01	198	135	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	40.68	47.24	54	-13.32	26.86	4.08	37.5	195	332	Average
2380	57.59	64.15	74	-16.41	26.86	4.08	37.5	195	332	Peak
2412	102.12	108.59			26.96	4.09	37.52	195	332	Average
2412	107.08	113.55			26.96	4.09	37.52	195	332	Peak
2500	39.99	45.88	54	-14.01	27.2	4.16	37.25	195	332	Average
2500	58.24	64.13	74	-15.76	27.2	4.16	37.25	195	332	Peak
4824	50.9	66.2	54	-3.1	30.99	6.79	53.08	132	13	Average
4824	51.84	67.14	74	-22.16	30.99	6.79	53.08	132	13	Peak
*7236	51.27	59.43	82.12	-30.85	35.68	8.17	52.01	100	323	Average
*7236	56.18	64.34	87.08	-30.9	35.68	8.17	52.01	100	323	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. 7236 MHz: Out of restricted band.

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**	Gavin Wu

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	33.97	40.53	54	-20.03	26.86	4.08	37.5	200	205	Average
2380	56.91	63.47	74	-17.09	26.86	4.08	37.5	200	205	Peak
2437	99.32	105.6			27.06	4.12	37.46	200	205	Average
2437	104.03	110.31			27.06	4.12	37.46	200	205	Peak
2486	39.76	45.78	54	-14.24	27.15	4.15	37.32	200	205	Average
2486	57.91	63.93	74	-16.09	27.15	4.15	37.32	200	205	Peak
4874	44.05	59.19	54	-9.95	31.06	6.85	53.05	177	164	Average
4874	47.17	62.31	74	-26.83	31.06	6.85	53.05	177	164	Peak
7311	46	53.77	54	-8	35.84	8.24	51.85	138	129	Average
7311	53.99	61.76	74	-20.01	35.84	8.24	51.85	138	129	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	35.37	41.94	54	-18.63	26.86	4.07	37.5	196	322	Average
2370	58.17	64.74	74	-15.83	26.86	4.07	37.5	196	322	Peak
2437	102.2	108.48			27.06	4.12	37.46	196	322	Average
2437	106.91	113.19			27.06	4.12	37.46	196	322	Peak
2486	42.77	48.79	54	-11.23	27.15	4.15	37.32	196	322	Average
2486	57.94	63.96	74	-16.06	27.15	4.15	37.32	196	322	Peak
4874	48.11	63.25	54	-5.89	31.06	6.85	53.05	158	9	Average
4874	50.11	65.25	74	-23.89	31.06	6.85	53.05	158	9	Peak
7311	49.07	56.84	54	-4.93	35.84	8.24	51.85	100	353	Average
7311	54.73	62.5	74	-19.27	35.84	8.24	51.85	100	353	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**	Gavin Wu

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**
2346	33.27	39.94	54	-20.73	26.77	4.05	37.49	200	182	Average
2346	56.76	63.43	74	-17.24	26.77	4.05	37.49	200	182	Peak
2462	99.48	105.64			27.1	4.13	37.39	200	182	Average
2462	104.06	110.22			27.1	4.13	37.39	200	182	Peak
2486	38.52	44.54	54	-15.48	27.15	4.15	37.32	200	182	Average
2486	57.17	63.19	74	-16.83	27.15	4.15	37.32	200	182	Peak
4924	43.18	58.21	54	-10.82	31.12	6.88	53.03	105	341	Average
4924	46.5	61.53	74	-27.5	31.12	6.88	53.03	105	341	Peak
7386	45.01	52.32	54	-8.99	36.01	8.28	51.6	187	120	Average
7386	52.07	59.38	74	-21.93	36.01	8.28	51.6	187	120	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**
2356	33.82	40.45	54	-20.18	26.81	4.05	37.49	196	304	Average
2356	56.51	63.14	74	-17.49	26.81	4.05	37.49	196	304	Peak
2462	102.28	108.44			27.1	4.13	37.39	196	304	Average
2462	107.01	113.17			27.1	4.13	37.39	196	304	Peak
2500	40.07	45.96	54	-13.93	27.2	4.16	37.25	196	304	Average
2500	58.17	64.06	74	-15.83	27.2	4.16	37.25	196	304	Peak
4924	45.16	60.19	54	-8.84	31.12	6.88	53.03	155	2	Average
4924	47.64	62.67	74	-26.36	31.12	6.88	53.03	155	2	Peak
7386	47.15	54.42	54	-6.85	36.05	8.28	51.6	100	342	Average
7386	52.08	59.35	74	-21.92	36.05	8.28	51.6	100	342	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**	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Factor (dB/m)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	45.34	51.87	54	-8.66	26.91	4.08	37.52	204	171	Average
2390	62.87	69.4	74	-11.13	26.91	4.08	37.52	204	171	Peak
2412	97.06	103.53			26.96	4.09	37.52	204	171	Average
2412	106.44	112.91			26.96	4.09	37.52	204	171	Peak
2490	42.18	48.14	54	-11.82	27.2	4.16	37.32	204	171	Average
2490	60.29	66.25	74	-13.71	27.2	4.16	37.32	204	171	Peak
4824	37.29	52.59	54	-16.71	30.99	6.79	53.08	202	32	Average
4824	47.77	63.07	74	-26.23	30.99	6.79	53.08	202	32	Peak
*7236	45.09	53.25	77.06	-31.97	35.68	8.17	52.01	198	123	Average
*7236	57.11	65.27	86.44	-29.33	35.68	8.17	52.01	198	123	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	48.65	55.18	54	-5.35	26.91	4.08	37.52	200	301	Average
2390	65.02	71.55	74	-8.98	26.91	4.08	37.52	200	301	Peak
2412	100.01	106.48			26.96	4.09	37.52	200	301	Average
2412	109.27	115.74			26.96	4.09	37.52	200	301	Peak
2492	45.1	50.99	54	-8.9	27.2	4.16	37.25	200	301	Average
2492	59.56	65.45	74	-14.44	27.2	4.16	37.25	200	301	Peak
4824	39.84	55.14	54	-14.16	30.99	6.79	53.08	150	10	Average
4824	50.89	66.19	74	-23.11	30.99	6.79	53.08	150	10	Peak
*7236	47.93	56.09	80.01	-32.08	35.68	8.17	52.01	101	323	Average
*7236	59.14	67.3	89.27	-30.13	35.68	8.17	52.01	101	323	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. 7236 MHz: Out of restricted band.

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**	Gavin Wu

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	36.37	43	54	-17.63	26.81	4.05	37.49	226	181	Average
2352	56.87	63.5	74	-17.13	26.81	4.05	37.49	226	181	Peak
2437	96.78	103.06			27.06	4.12	37.46	226	181	Average
2437	106.15	112.43			27.06	4.12	37.46	226	181	Peak
2492	43.72	49.61	54	-10.28	27.2	4.16	37.25	226	181	Average
2492	59.2	65.09	74	-14.8	27.2	4.16	37.25	226	181	Peak
4874	35.74	50.88	54	-18.26	31.06	6.85	53.05	111	340	Average
4874	45.74	60.88	74	-28.26	31.06	6.85	53.05	111	340	Peak
7311	46.07	53.84	54	-7.93	35.84	8.24	51.85	195	147	Average
7311	55.27	63.04	74	-18.73	35.84	8.24	51.85	195	147	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	38.59	45.15	54	-15.41	26.86	4.08	37.5	198	324	Average
2382	56.8	63.36	74	-17.2	26.86	4.08	37.5	198	324	Peak
2437	99.83	106.11			27.06	4.12	37.46	198	324	Average
2437	109.03	115.31			27.06	4.12	37.46	198	324	Peak
2494	45.58	51.47	54	-8.42	27.2	4.16	37.25	198	324	Average
2494	59.9	65.79	74	-14.1	27.2	4.16	37.25	198	324	Peak
4874	36.84	51.98	54	-17.16	31.06	6.85	53.05	140	29	Average
4874	46.75	61.89	74	-27.25	31.06	6.85	53.05	140	29	Peak
7311	46.52	54.29	54	-7.48	35.84	8.24	51.85	100	301	Average
7311	56.23	64	74	-17.77	35.84	8.24	51.85	100	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**	Gavin Wu

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**
2310	34.84	41.61	54	-19.16	26.67	4.01	37.45	220	190	Average
2310	56.85	63.62	74	-17.15	26.67	4.01	37.45	220	190	Peak
2462	96.58	102.74			27.1	4.13	37.39	220	190	Average
2462	105.85	112.01			27.1	4.13	37.39	220	190	Peak
2484	50.14	56.16	54	-3.86	27.15	4.15	37.32	220	190	Average
2484	66.24	72.26	74	-7.76	27.15	4.15	37.32	220	190	Peak
4924	35.55	50.58	54	-18.45	31.12	6.88	53.03	105	336	Average
4924	45.34	60.37	74	-28.66	31.12	6.88	53.03	105	336	Peak
7386	43.39	50.66	54	-10.61	36.05	8.28	51.6	192	158	Average
7386	53.08	60.35	74	-20.92	36.05	8.28	51.6	192	158	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Factor (dB/m)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2386	36.71	43.22	54	-17.29	26.91	4.08	37.5	199	314	Average
2386	56.78	63.29	74	-17.22	26.91	4.08	37.5	199	314	Peak
2462	99.45	105.61			27.1	4.13	37.39	199	314	Average
2462	108.8	114.96			27.1	4.13	37.39	199	314	Peak
2484	51.62	57.64	54	-2.38	27.15	4.15	37.32	199	314	Average
2484	69.06	75.08	74	-4.94	27.15	4.15	37.32	199	314	Peak
4924	35.95	50.98	54	-18.05	31.12	6.88	53.03	127	27	Average
4924	45.44	60.47	74	-28.56	31.12	6.88	53.03	127	27	Peak
7386	44.16	51.47	54	-9.84	36.01	8.28	51.6	100	312	Average
7386	52.9	60.21	74	-21.1	36.01	8.28	51.6	100	312	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**	Gavin Wu

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	49.12	55.65	54	-4.88	26.91	4.08	37.52	205	176	Average
2390	68.17	74.7	74	-5.83	26.91	4.08	37.52	205	176	Peak
2412	97.08	103.55			26.96	4.09	37.52	205	176	Average
2412	106.5	112.97			26.96	4.09	37.52	205	176	Peak
2492	41.37	47.26	54	-12.63	27.2	4.16	37.25	205	176	Average
2492	58.66	64.55	74	-15.34	27.2	4.16	37.25	205	176	Peak
4824	38.61	53.91	54	-15.39	30.99	6.79	53.08	106	349	Average
4824	48.17	63.47	74	-25.83	30.99	6.79	53.08	106	349	Peak
*7236	43.91	52.07	77.08	-33.17	35.68	8.17	52.01	112	119	Average
*7236	55.54	63.7	86.5	-30.96	35.68	8.17	52.01	112	119	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	51.76	58.29	54	-2.24	26.91	4.08	37.52	198	307	Average
2390	68.26	74.79	74	-5.74	26.91	4.08	37.52	198	307	Peak
2412	100.04	106.51			26.96	4.09	37.52	198	307	Average
2412	109.53	116			26.96	4.09	37.52	198	307	Peak
2494	44.71	50.6	54	-9.29	27.2	4.16	37.25	198	307	Average
2494	60	65.89	74	-14	27.2	4.16	37.25	198	307	Peak
4824	39.33	54.63	54	-14.67	30.99	6.79	53.08	133	22	Average
4824	49.08	64.38	74	-24.92	30.99	6.79	53.08	133	22	Peak
*7236	47.5	55.66	80.04	-32.54	35.68	8.17	52.01	100	310	Average
*7236	58.46	66.62	89.53	-31.07	35.68	8.17	52.01	100	310	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. 7236 MHz: Out of restricted band.

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**	Gavin Wu

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	36.5	43.12	54	-17.5	26.81	4.07	37.5	202	207	Average
2366	56.56	63.18	74	-17.44	26.81	4.07	37.5	202	207	Peak
2437	97.09	103.37			27.06	4.12	37.46	202	207	Average
2437	106.46	112.74			27.06	4.12	37.46	202	207	Peak
2484	43.72	49.74	54	-10.28	27.15	4.15	37.32	202	207	Average
2484	59.1	65.12	74	-14.9	27.15	4.15	37.32	202	207	Peak
4874	35.64	50.78	54	-18.36	31.06	6.85	53.05	111	340	Average
4874	45.86	61	74	-28.14	31.06	6.85	53.05	111	340	Peak
7311	45.86	53.63	54	-8.14	35.84	8.24	51.85	195	147	Average
7311	55.62	63.39	74	-18.38	35.84	8.24	51.85	195	147	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**
2334	38.53	45.24	54	-15.47	26.72	4.04	37.47	200	334	Average
2334	56.99	63.7	74	-17.01	26.72	4.04	37.47	200	334	Peak
2437	99.96	106.24			27.06	4.12	37.46	200	334	Average
2437	109.11	115.39			27.06	4.12	37.46	200	334	Peak
2484	45.91	51.93	54	-8.09	27.15	4.15	37.32	200	334	Average
2484	60.6	66.62	74	-13.4	27.15	4.15	37.32	200	334	Peak
4874	36.11	51.25	54	-17.89	31.06	6.85	53.05	140	29	Average
4874	45.79	60.93	74	-28.21	31.06	6.85	53.05	140	29	Peak
7311	45.54	53.31	54	-8.46	35.84	8.24	51.85	100	301	Average
7311	55	62.77	74	-19	35.84	8.24	51.85	100	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**	Gavin Wu

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**
2374	35.07	41.64	54	-18.93	26.86	4.07	37.5	200	199	Average
2374	57.12	63.69	74	-16.88	26.86	4.07	37.5	200	199	Peak
2462	96.68	102.84			27.1	4.13	37.39	200	199	Average
2462	105.99	112.15			27.1	4.13	37.39	200	199	Peak
2484	52.15	58.17	54	-1.85	27.15	4.15	37.32	200	199	Average
2484	71.37	77.39	74	-2.63	27.15	4.15	37.32	200	199	Peak
4924	34.32	49.35	54	-19.68	31.12	6.88	53.03	105	336	Average
4924	44.47	59.5	74	-29.53	31.12	6.88	53.03	105	336	Peak
7386	42.21	49.52	54	-11.79	36.01	8.28	51.6	190	157	Average
7386	52.57	59.88	74	-21.43	36.01	8.28	51.6	190	157	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	36.22	42.89	54	-17.78	26.77	4.05	37.49	194	321	Average
2348	57.09	63.76	74	-16.91	26.77	4.05	37.49	194	321	Peak
2462	99.57	105.73			27.1	4.13	37.39	194	321	Average
2462	108.92	115.08			27.1	4.13	37.39	194	321	Peak
2484	**52.88**	**58.9**	**54**	**-1.12**	**27.15**	**4.15**	**37.32**	**194**	**321**	**Average**
2484	72.1	78.12	74	-1.9	27.15	4.15	37.32	194	321	Peak
4924	34.74	49.77	54	-19.26	31.12	6.88	53.03	127	27	Average
4924	45.59	60.62	74	-28.41	31.12	6.88	53.03	127	27	Peak
7386	43.12	50.43	54	-10.88	36.01	8.28	51.6	100	311	Average
7386	53.55	60.86	74	-20.45	36.01	8.28	51.6	100	311	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**	Gavin Wu

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	50.1	56.63	54	-3.9	26.91	4.08	37.52	222	164	Average
2390	67.28	73.81	74	-6.72	26.91	4.08	37.52	222	164	Peak
2422	93.28	99.62			27.01	4.11	37.46	222	164	Average
2422	102.33	108.67			27.01	4.11	37.46	222	164	Peak
2486	42.88	48.9	54	-11.12	27.15	4.15	37.32	222	164	Average
2486	58.87	64.89	74	-15.13	27.15	4.15	37.32	222	164	Peak
4844	37.33	52.63	54	-16.67	30.99	6.79	53.08	106	349	Average
4844	46.59	61.89	74	-27.41	30.99	6.79	53.08	300	360	Peak
7266	41.77	49.93	54	-12.23	35.68	8.17	52.01	112	119	Average
7266	52.44	60.6	74	-21.56	35.68	8.17	52.01	112	119	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	52.45	58.96	54	-1.55	26.91	4.08	37.5	197	318	Average
2388	67.78	74.29	74	-6.22	26.91	4.08	37.5	197	318	Peak
2422	95.6	101.94			27.01	4.11	37.46	197	318	Average
2422	104.97	111.31			27.01	4.11	37.46	197	318	Peak
2494	45.09	50.98	54	-8.91	27.2	4.16	37.25	197	318	Average
2494	59.25	65.14	74	-14.75	27.2	4.16	37.25	197	318	Peak
4844	38.59	53.89	54	-15.41	30.99	6.79	53.08	133	22	Average
4844	47.13	62.43	74	-26.87	30.99	6.79	53.08	133	22	Peak
7266	44.45	52.61	54	-9.55	35.68	8.17	52.01	100	310	Average
7266	56.33	64.49	74	-17.67	35.68	8.17	52.01	100	310	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**	Gavin Wu

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	39.91	46.42	54	-14.09	26.91	4.08	37.5	223	210	Average
2388	56.99	63.5	74	-17.01	26.91	4.08	37.5	223	210	Peak
2437	94.12	100.4			27.06	4.12	37.46	223	210	Average
2437	103.03	109.31			27.06	4.12	37.46	223	210	Peak
2484	47.08	53.1	54	-6.92	27.15	4.15	37.32	223	210	Average
2484	62.03	68.05	74	-11.97	27.15	4.15	37.32	223	210	Peak
4874	34.55	49.69	54	-19.45	31.06	6.85	53.05	106	328	Average
4874	43.76	58.9	74	-30.24	31.06	6.85	53.05	106	328	Peak
7311	43.64	51.41	54	-10.36	35.84	8.24	51.85	201	146	Average
7311	53.52	61.29	74	-20.48	35.84	8.24	51.85	201	146	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	42.09	48.65	54	-11.91	26.86	4.08	37.5	201	297	Average
2382	58.87	65.43	74	-15.13	26.86	4.08	37.5	201	297	Peak
2437	96.56	102.84			27.06	4.12	37.46	201	297	Average
2437	105.89	112.17			27.06	4.12	37.46	201	297	Peak
2494	49.05	54.94	54	-4.95	27.2	4.16	37.25	201	297	Average
2494	63.11	69	74	-10.89	27.2	4.16	37.25	201	297	Peak
4874	35.45	50.59	54	-18.55	31.06	6.85	53.05	140	28	Average
4874	44.44	59.58	74	-29.56	31.06	6.85	53.05	140	28	Peak
7311	43.71	51.48	54	-10.29	35.84	8.24	51.85	100	301	Average
7311	53.62	61.39	74	-20.38	35.84	8.24	51.85	100	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**	Gavin Wu

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Factor (dB/m)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2376	35.32	41.89	54	-18.68	26.86	4.07	37.5	199	187	Average
2376	56.79	63.36	74	-17.21	26.86	4.07	37.5	199	187	Peak
2452	92.72	98.92			27.06	4.13	37.39	199	187	Average
2452	102.13	108.33			27.06	4.13	37.39	199	187	Peak
2486	51.8	57.82	54	-2.2	27.15	4.15	37.32	199	187	Average
2486	67.85	73.87	74	-6.15	27.15	4.15	37.32	199	187	Peak
4904	33.29	48.32	54	-20.71	31.12	6.88	53.03	105	331	Average
4904	44.7	59.73	74	-29.3	31.12	6.88	53.03	105	331	Peak
7356	39.28	47.05	54	-14.72	35.84	8.24	51.85	192	155	Average
7356	50.78	58.55	74	-23.22	35.84	8.24	51.85	192	155	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	36.88	43.51	54	-17.12	26.81	4.05	37.49	192	313	Average
2362	56.94	63.57	74	-17.06	26.81	4.05	37.49	192	313	Peak
2452	95.66	101.86			27.06	4.13	37.39	192	313	Average
2452	104.96	111.16			27.06	4.13	37.39	192	313	Peak
2484	52.59	58.61	54	-1.41	27.15	4.15	37.32	192	313	Average
2484	68.72	74.74	74	-5.28	27.15	4.15	37.32	192	313	Peak
4904	33.67	48.7	54	-20.33	31.12	6.88	53.03	124	25	Average
4904	44.51	59.54	74	-29.49	31.12	6.88	53.03	124	25	Peak
7356	39.78	47.55	54	-14.22	35.84	8.24	51.85	100	308	Average
7356	49.59	57.36	74	-24.41	35.84	8.24	51.85	100	308	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
   Margin value = Emission level – Limit value
2. 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 (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**	Gavin Wu

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**
70.74	18.81	39.22	40	-21.19	10.53	0.85	31.79	111	165	Peak
168.71	18.27	36.99	43.5	-25.23	11.86	1.16	31.74	109	218	Peak
250.19	19.67	38.64	46	-26.33	11.48	1.49	31.94	133	220	Peak
383.08	20.5	35.68	46	-25.5	14.94	1.86	31.98	103	190	Peak
480.08	22.15	35.02	46	-23.85	16.93	2.05	31.85	101	272	Peak
575.14	25.62	36.47	46	-20.38	19.03	2.22	32.1	126	2	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Factor (dB/m)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
32.91	29.3	47.32	40	-10.7	12.47	0.6	31.09	133	237	Peak
41.64	27.61	44.44	40	-12.39	13.56	0.66	31.05	108	296	Peak
67.83	21.8	41.68	40	-18.2	11	0.85	31.73	109	221	Peak
134.76	18.71	37.32	43.5	-24.79	12.01	1.14	31.76	124	354	Peak
250.19	19.7	38.67	46	-26.3	11.48	1.49	31.94	107	66	Peak
575.14	26.48	37.33	46	-19.52	19.03	2.22	32.1	103	217	Peak

Remarks:

1. 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 Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
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

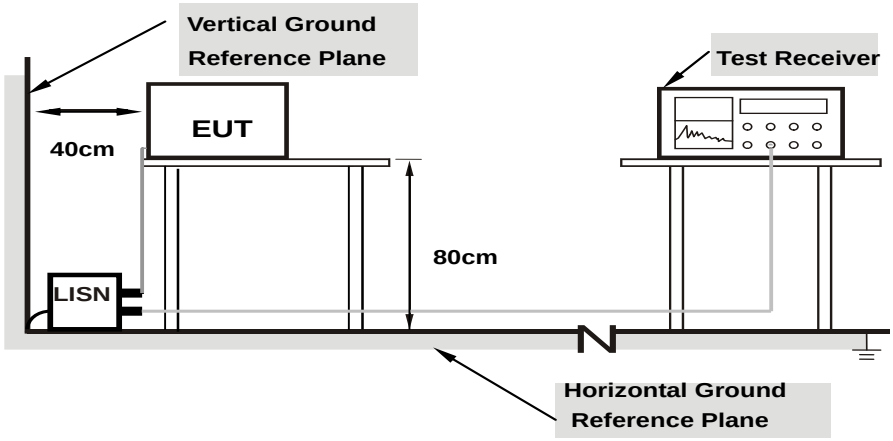
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

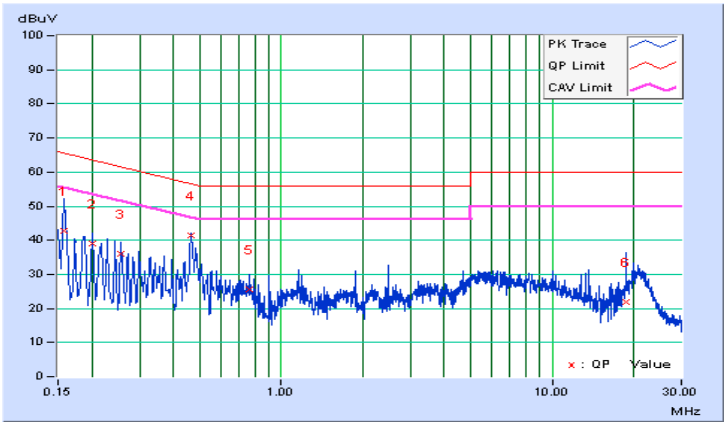
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Toby Tian	Test Date	2016/1/29

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	0.15782	10.03	32.57	20.55	42.60	30.58	65.58	55.58	-22.98	-25.00
2	0.20084	10.12	28.84	15.54	38.96	25.66	63.58	53.58	-24.62	-27.92
3	0.25557	10.12	25.99	12.12	36.11	22.24	61.57	51.57	-25.46	-29.33
4	0.46301	10.15	31.36	28.79	41.51	38.94	56.64	46.64	-15.13	-7.70
5	0.76386	10.23	15.25	8.75	25.48	18.98	56.00	46.00	-30.52	-27.02
6	18.76552	11.12	10.62	2.51	21.74	13.63	60.00	50.00	-38.26	-36.37

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

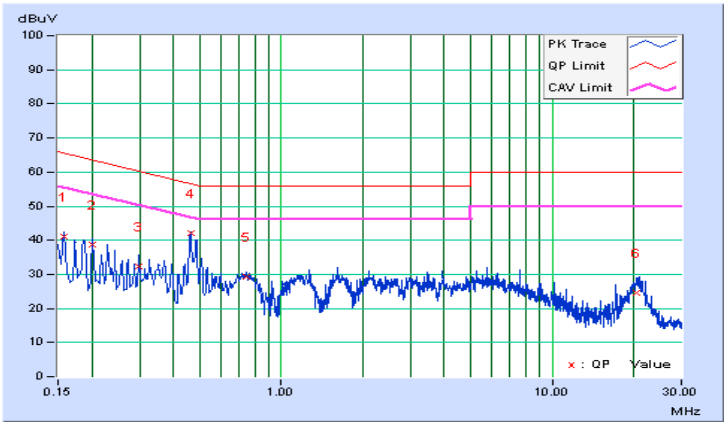


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Toby Tian	Test Date	2016/1/29

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	0.15782	10.01	30.90	20.91	40.91	30.92	65.58	55.58	-24.67	-24.66
2	0.20084	10.04	28.69	17.25	38.73	27.29	63.58	53.58	-24.85	-26.29
3	0.29858	10.09	22.37	14.60	32.46	24.69	60.28	50.28	-27.82	-25.59
4	**0.46301**	**10.16**	**31.99**	**31.40**	**42.15**	**41.56**	**56.64**	**46.64**	**-14.49**	**-5.08**
5	0.74041	10.20	19.02	14.09	29.22	24.29	56.00	46.00	-26.78	-21.71
6	20.53283	11.01	13.67	4.87	24.68	15.88	60.00	50.00	-35.32	-34.12

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

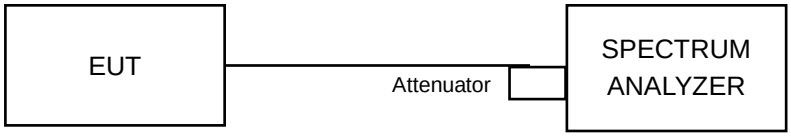


4.3 6 dB Bandwidth Measurement

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	9.10	0.5	Pass
6	2437	9.14	0.5	Pass
11	2462	9.09	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.12	0.5	Pass
6	2437	15.14	0.5	Pass
11	2462	15.15	0.5	Pass

802.11n (HT20)

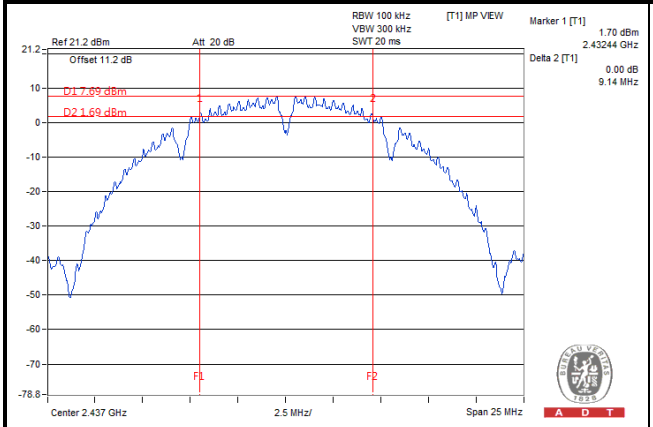
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.13	0.5	Pass
6	2437	15.15	0.5	Pass
11	2462	15.14	0.5	Pass

802.11n (HT40)

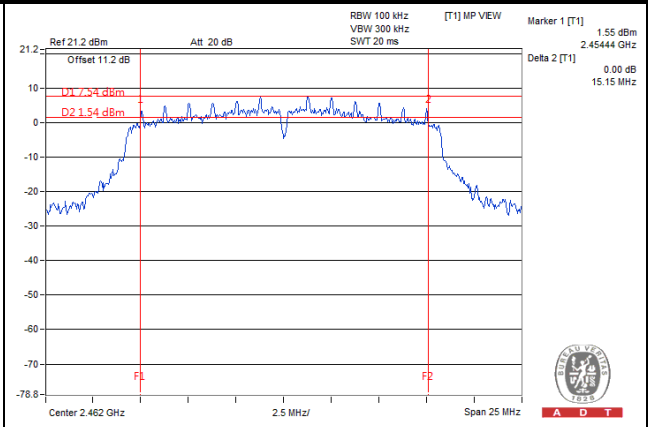
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.13	0.5	Pass
6	2437	35.17	0.5	Pass
9	2452	35.16	0.5	Pass

Spectrum Plot of Worst Value

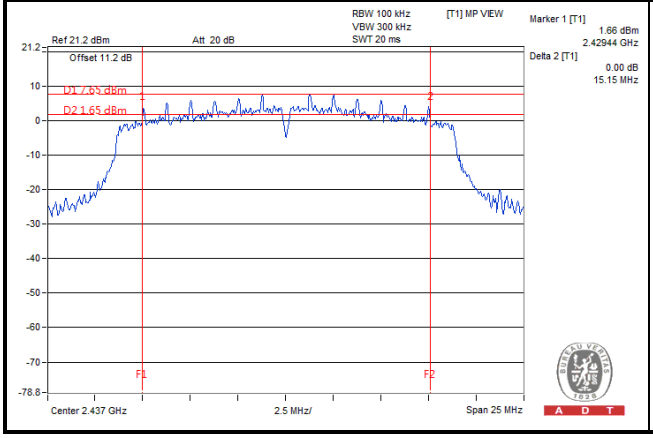
802.11b



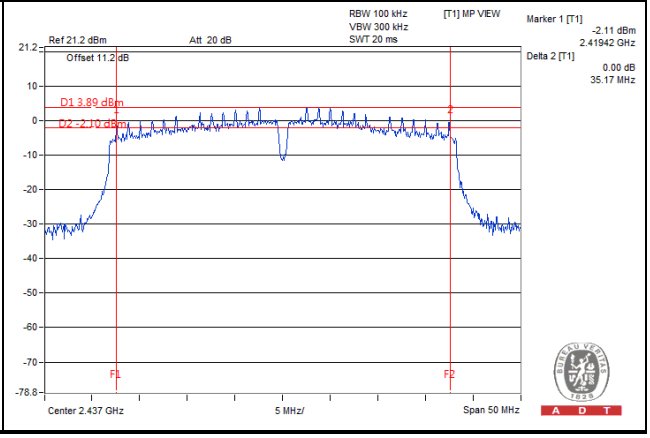
802.11g



802.11n (HT20)



802.11n (HT40)

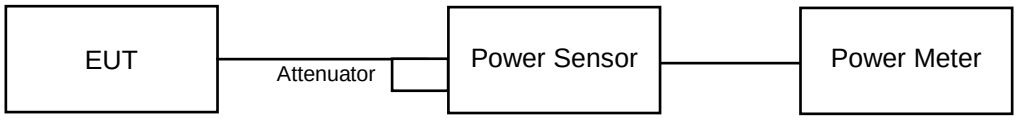


4.4 Conducted Output Power Measurement

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	85.31	19.31	30	Pass
6	2437	86.497	19.37	30	Pass
11	2462	81.283	19.10	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	279.898	24.47	30	Pass
6	2437	289.068	24.61	30	Pass
11	2462	268.534	24.29	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	273.527	24.37	30	Pass
6	2437	281.19	24.49	30	Pass
11	2462	270.396	24.32	30	Pass

802.11n (HT40)

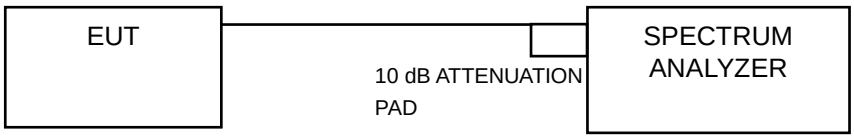
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	198.153	22.97	30	Pass
6	2437	221.309	23.45	30	Pass
9	2452	173.78	22.40	30	Pass

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/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-8.80	8	Pass
6	2437	-8.89	8	Pass
11	2462	-8.40	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-9.17	8	Pass
6	2437	-8.96	8	Pass
11	2462	-8.85	8	Pass

802.11n (HT20)

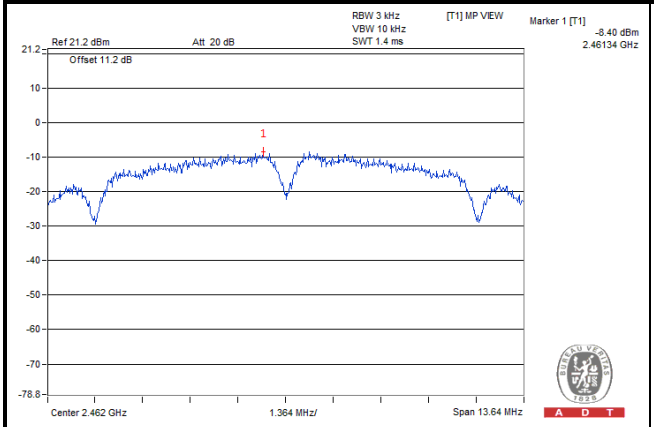
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-8.56	8	Pass
6	2437	-8.98	8	Pass
11	2462	-8.48	8	Pass

802.11n (HT40)

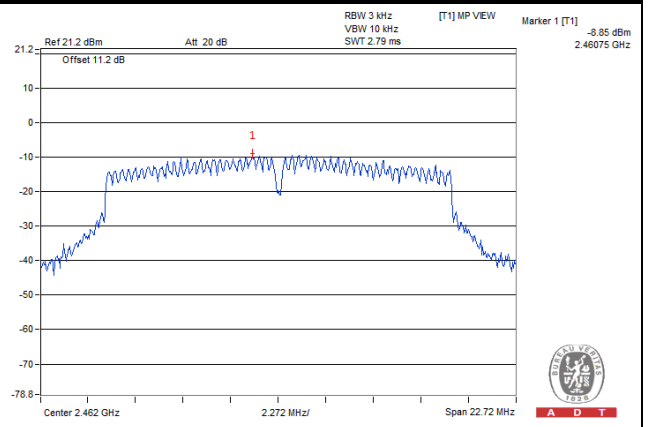
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
3	2422	-13.50	8	Pass
6	2437	-11.13	8	Pass
9	2452	-14.47	8	Pass

Spectrum Plot of Worst Value

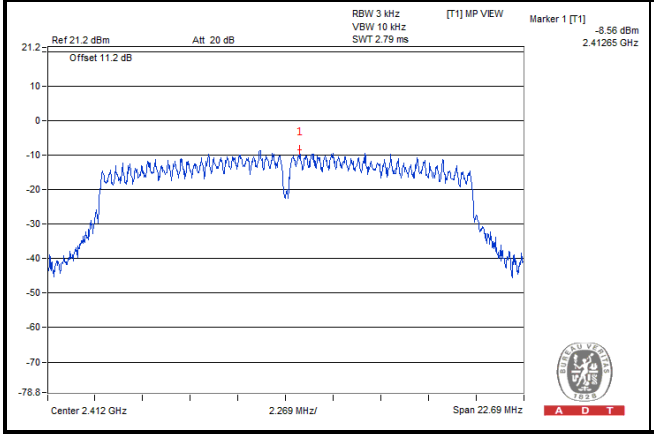
802.11b



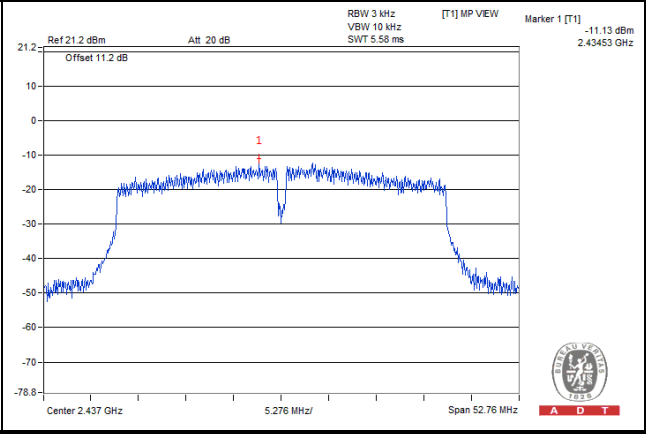
802.11g



802.11n (HT20)



802.11n (HT40)

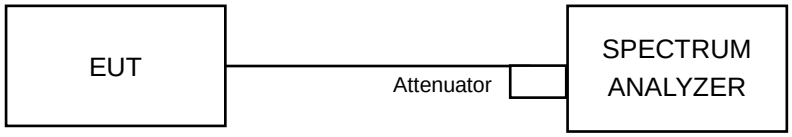


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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

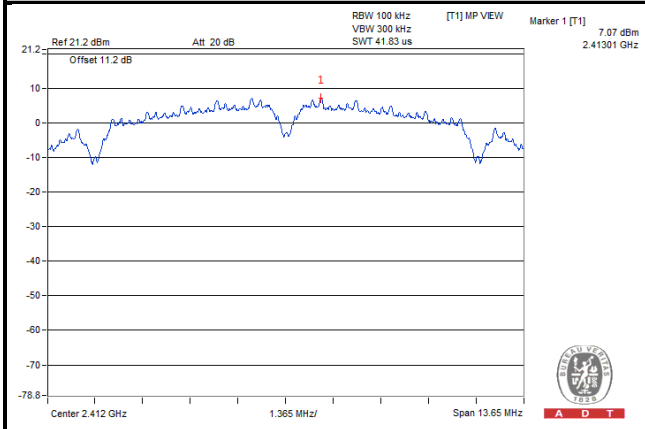
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

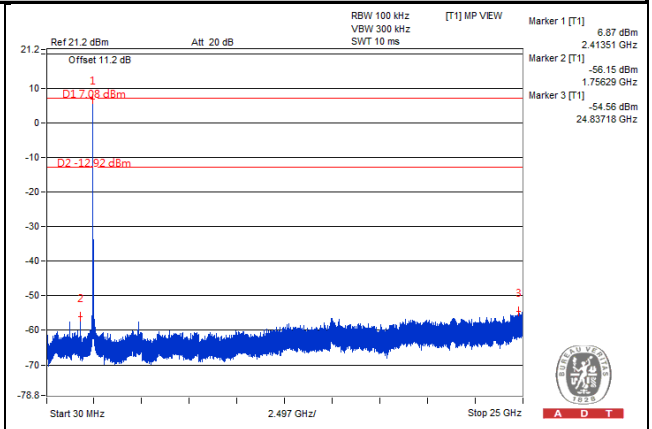
4.6.7 Test Results

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.

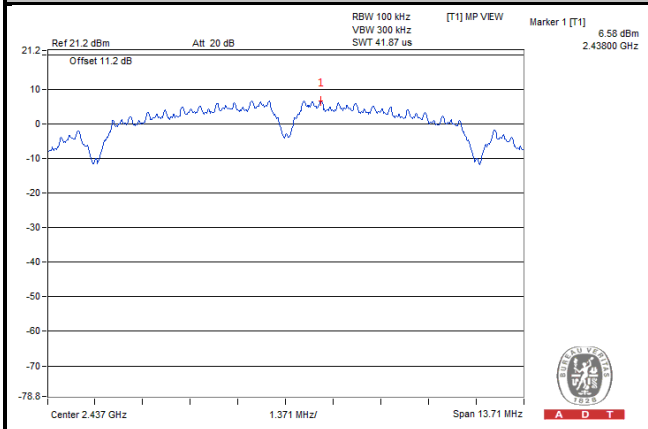
802.11b

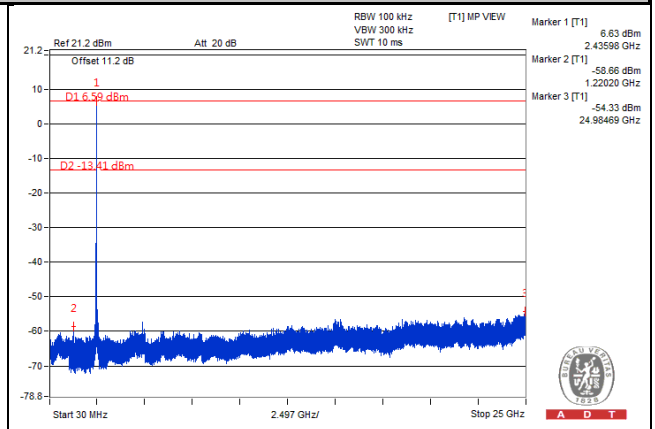
Ch 1



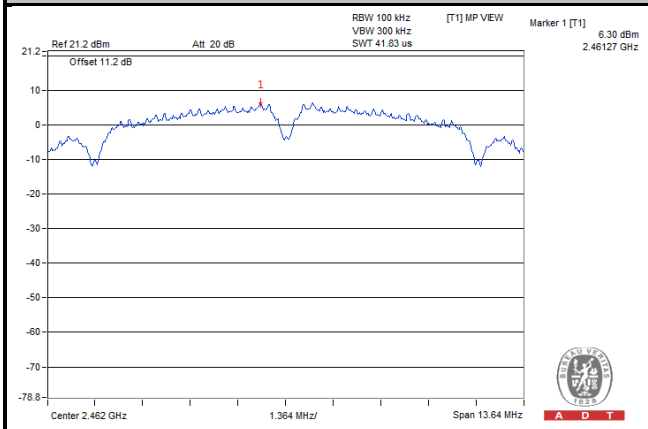


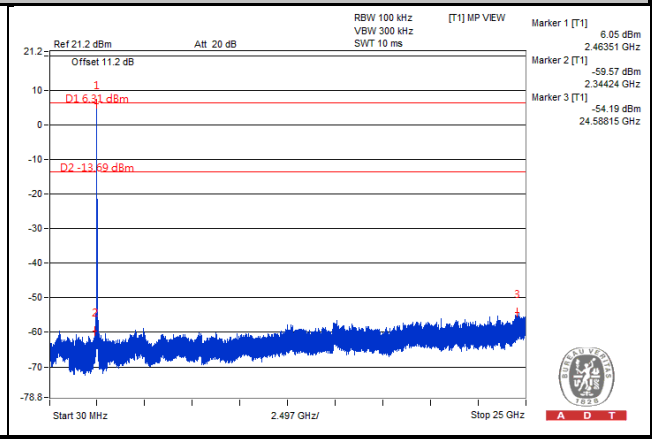
Ch 6

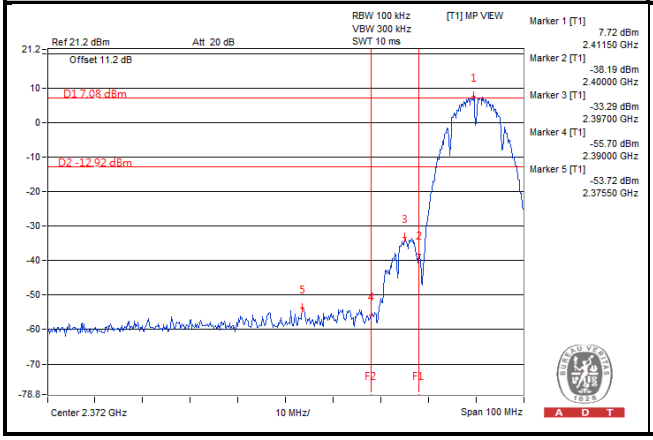
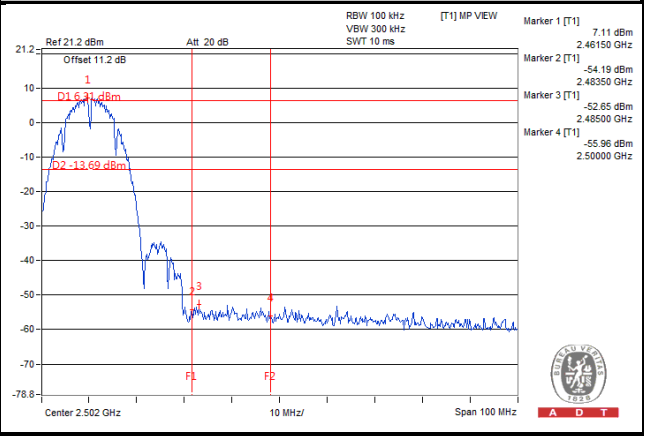




Ch 11

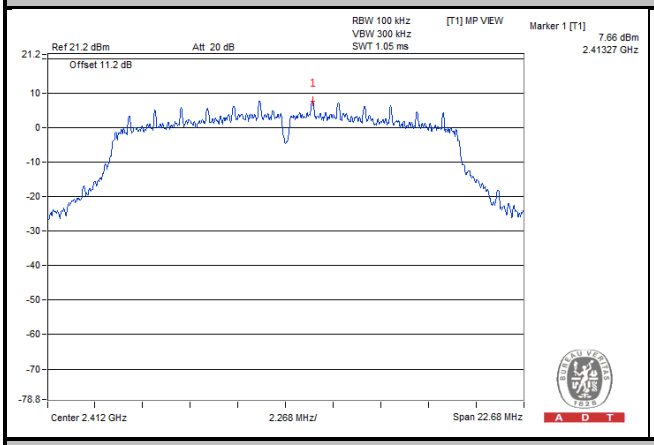


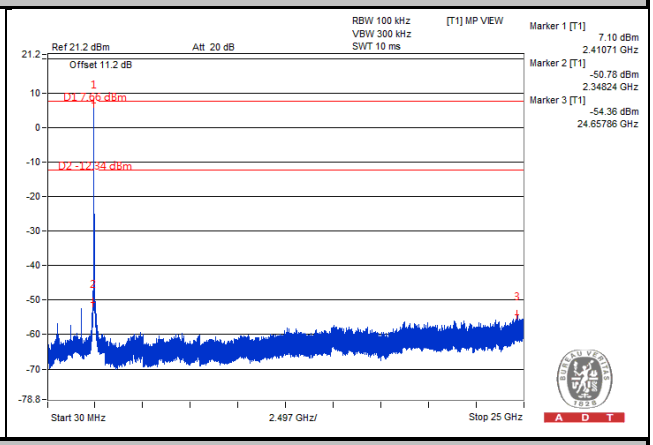


Ch 1 Band Edge	Ch 11 Band Edge
	

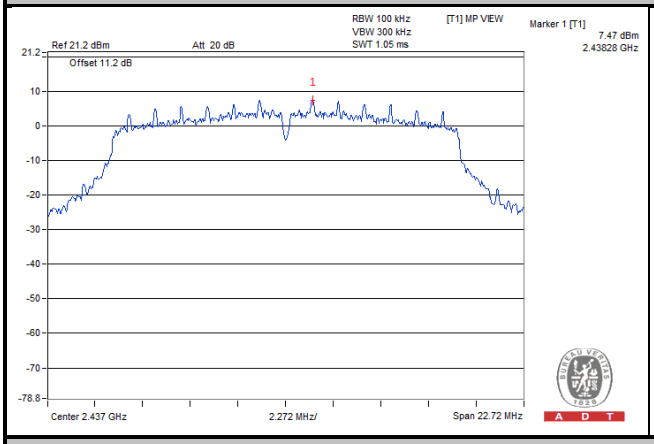
802.11g

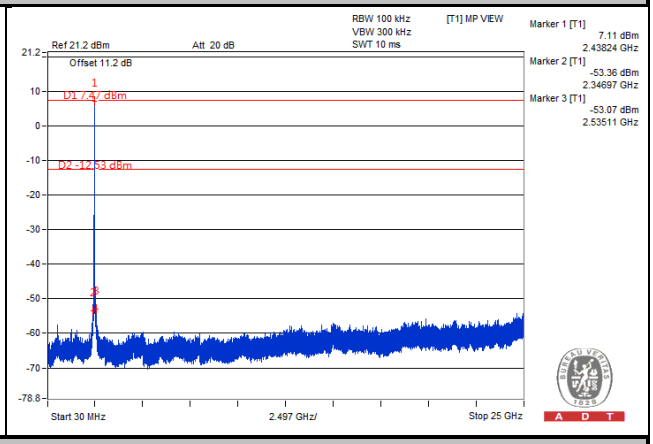
Ch 1



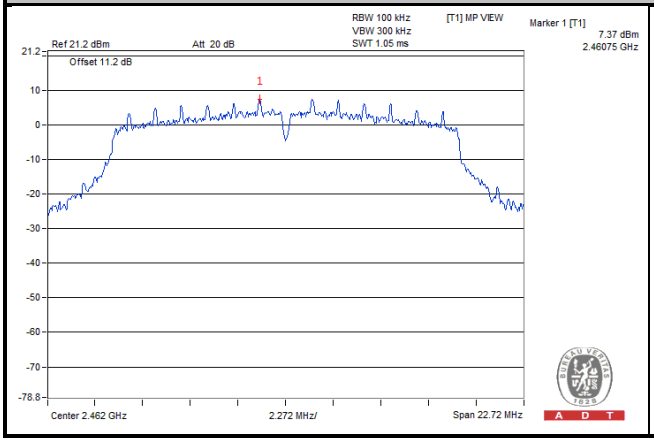


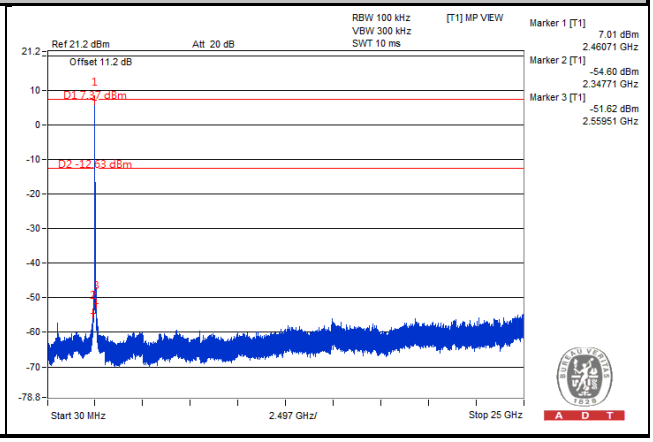
Ch 6

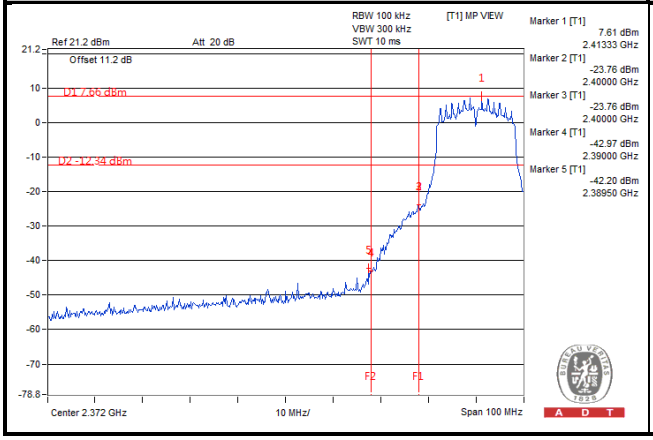
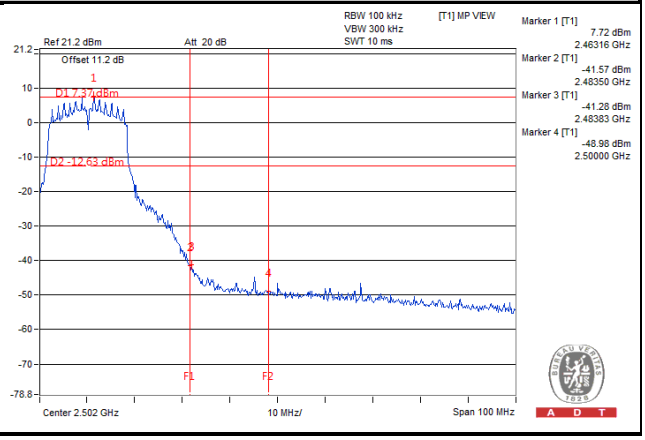




Ch 11

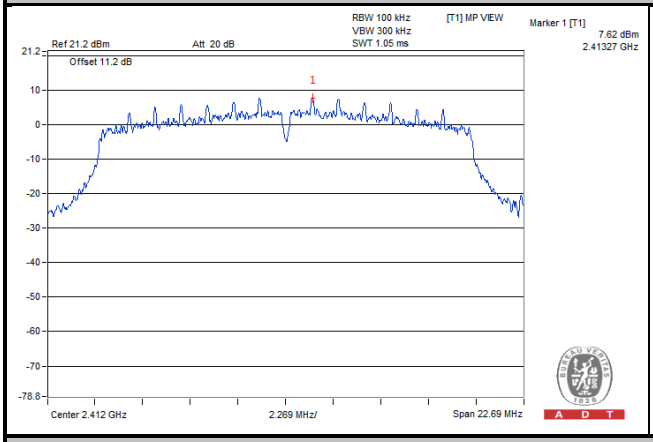


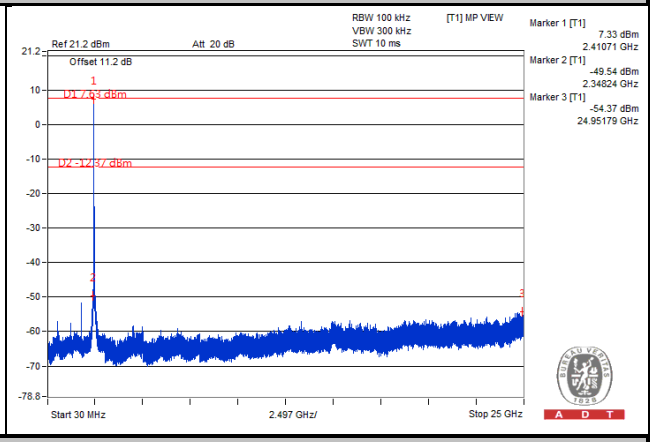


Ch 1 Band Edge	Ch 11 Band Edge
	

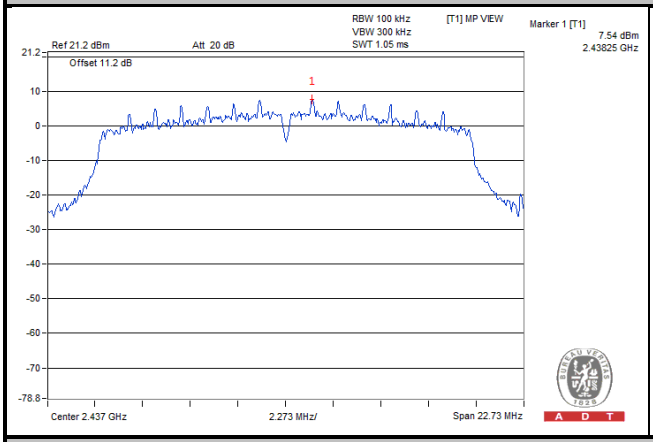
802.11n (HT20)

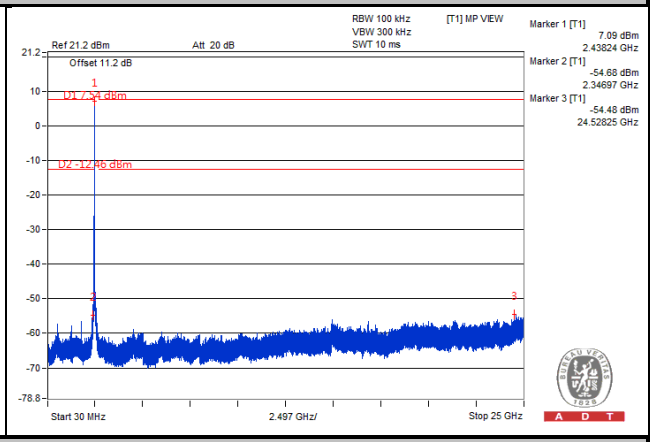
Ch 1



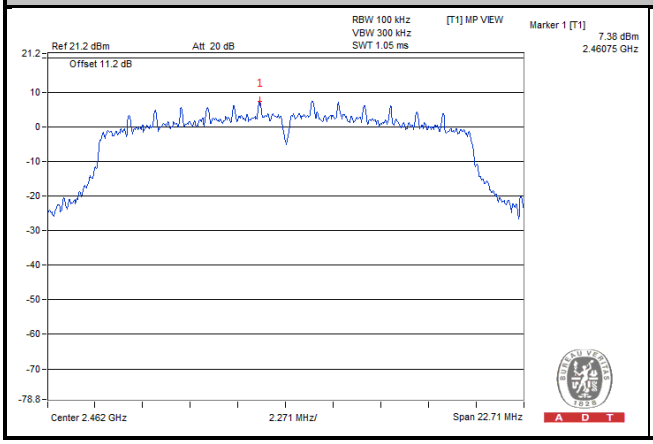


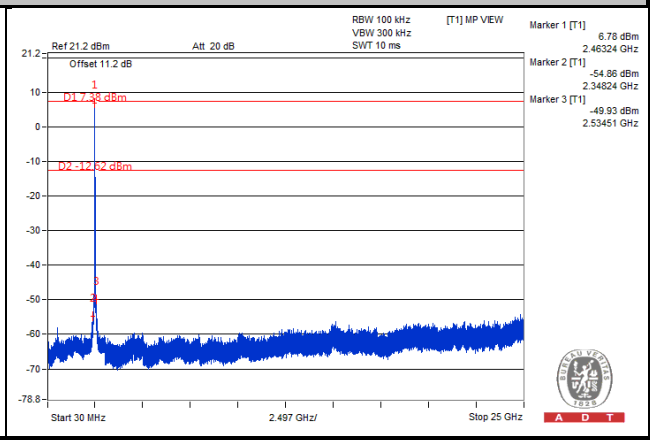
Ch 6

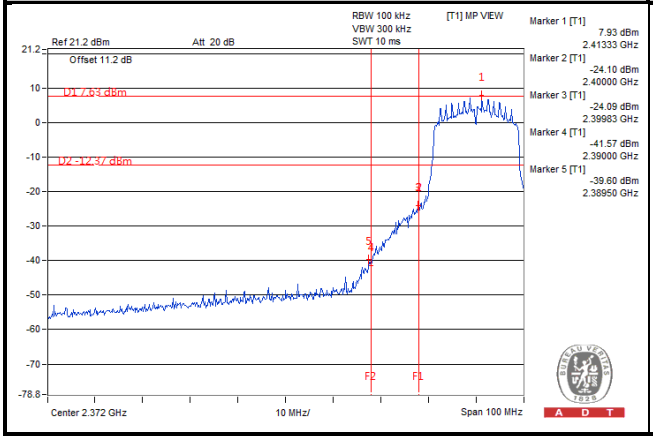
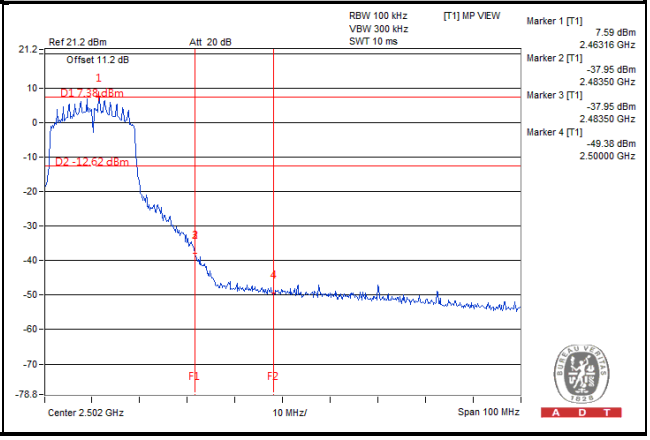




Ch 11

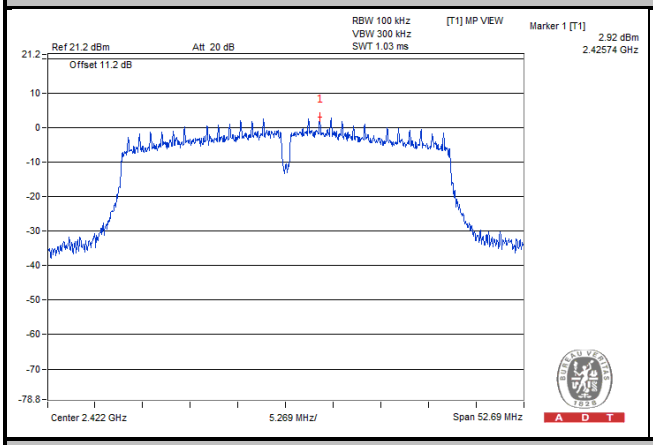


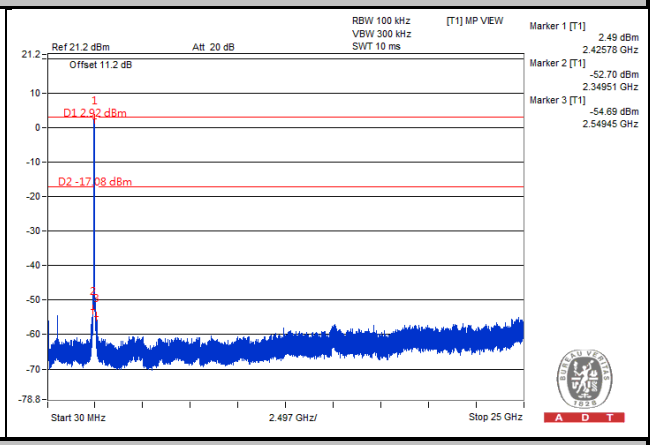


Ch 1 Band Edge	Ch 11 Band Edge
	

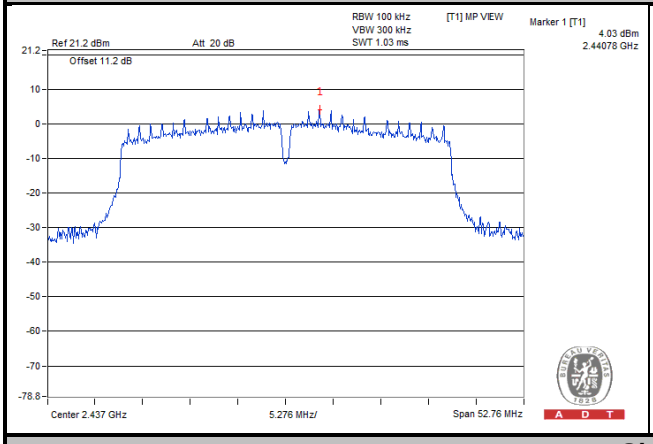
802.11n (HT40)

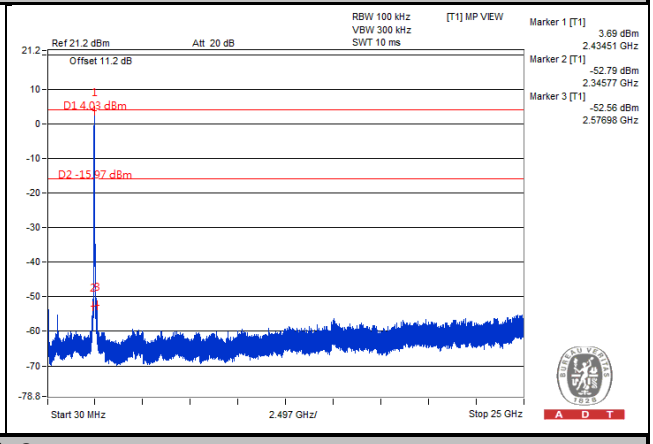
Ch 3



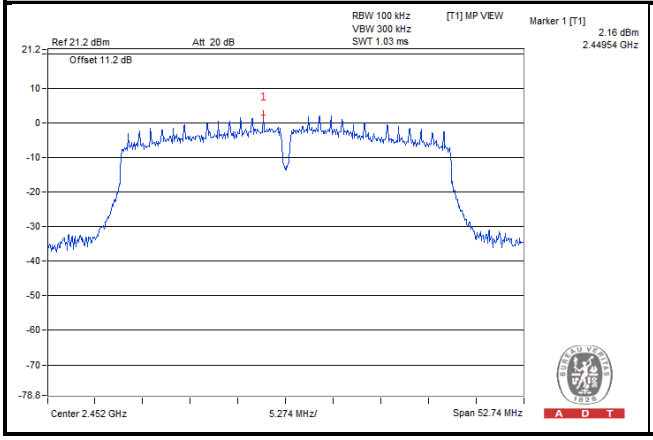


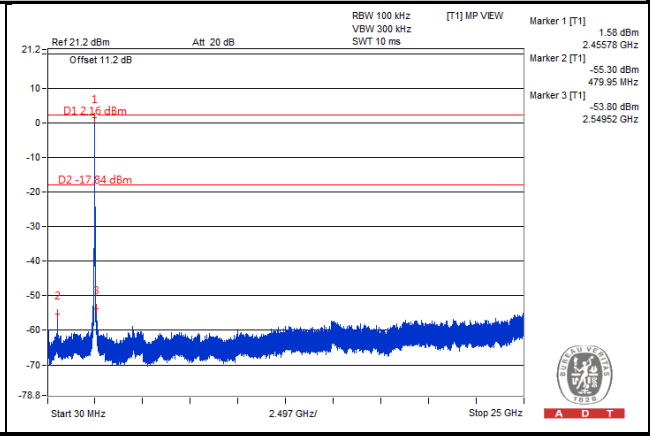
Ch 6

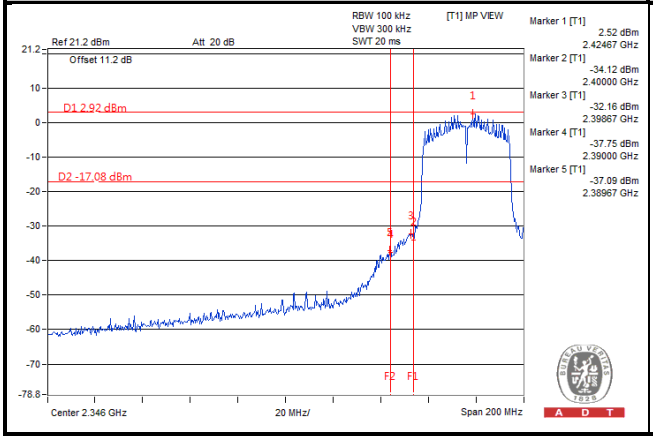
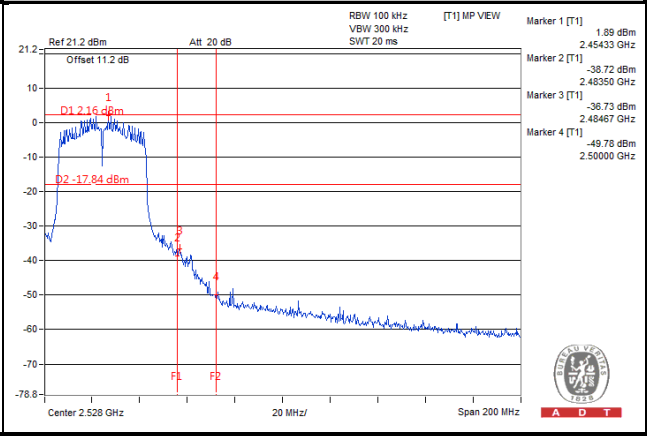




Ch 9





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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