FCC Test Report

Report No.:	RF170713C17-5
FCC ID:	XHG-R910
Test Model:	FRKR910KIT
Received Date:	Jul. 13, 2017
Test Date:	Jul. 27, 2017 ~ Aug. 04, 2017
Issued Date:	Aug. 18, 2017
Applicant:	Franklin Technology Inc.
Address:	906 JEI Platz, 186, Gasan digital 1-ro,Gumcheon-Gu,Seoul, 08502 , South Korea
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 Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF170713C17-5	Original Release	Aug. 18, 2017

1 Certificate of Conformity

Product:	Mobile Hotspot
Brand:	Franklin Wireless
Test Model:	FRKR910KIT
Sample Status:	Production Unit
Applicant:	Franklin Technology Inc.
Test Date:	Jul. 27, 2017 ~ Aug. 04, 2017
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 : Gina Liu , **Date:** Aug. 18, 2017

Gina Liu / Specialist

Approved by : David Huang , **Date:** Aug. 18, 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 -17.78 dB at 0.56866 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.36 dB at 2483.68 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	Mobile Hotspot
Brand	Franklin Wireless
Test Model	FRKR910KIT
Status of EUT	Production Unit
Power Supply Rating	3.8 Vdc (Battery) 5 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 MCS15
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	106.477 mW
Antenna Type	PCB antenna with 3.38 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	JIANGSU CHENYANG ELECTRON	CYSE12-050200U	I/P: 100-240 Vac, 50/60 Hz, 0.35 mA O/P: 5 Vdc, 2000 mA
Battery	BAK	R910	3.8 Vdc, 3000 mAh
Main Board	BOMIN	R910	--
BT/WLAN Module	Qualcomm Atheros	QCA-6174A-1	--

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 **X-plane**.
NOTE: "-"means no effect.

Radiated Emission Test (Above 1 GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	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)	3 to 9	9	OFDM	BPSK	MCS0

Power Line Conducted Emission Test:

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

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

Bandedge Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	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	Getaz Yang, 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	Getaz Yang
APCM	25 deg. C, 65 % RH	3.8 Vdc	Carlos Chen

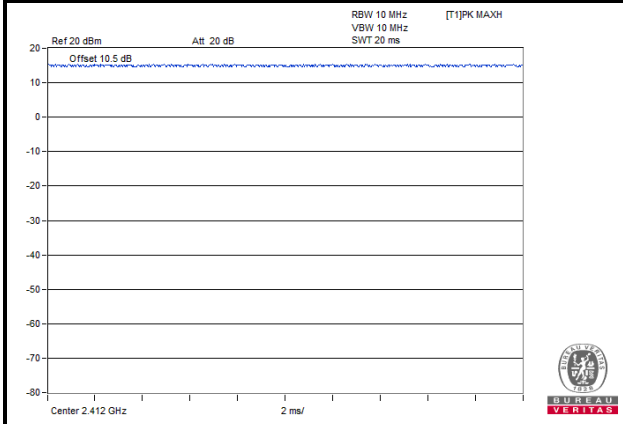
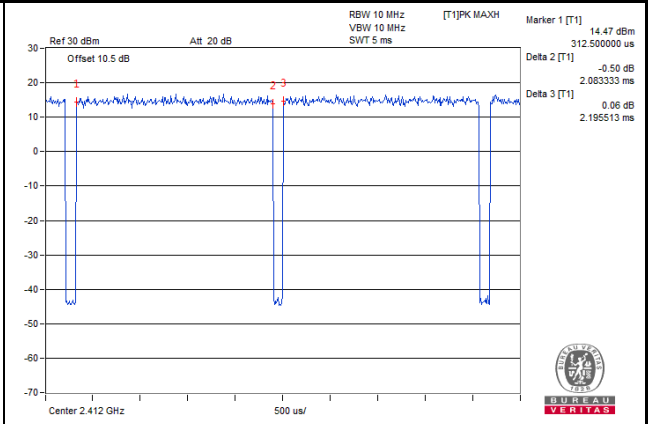
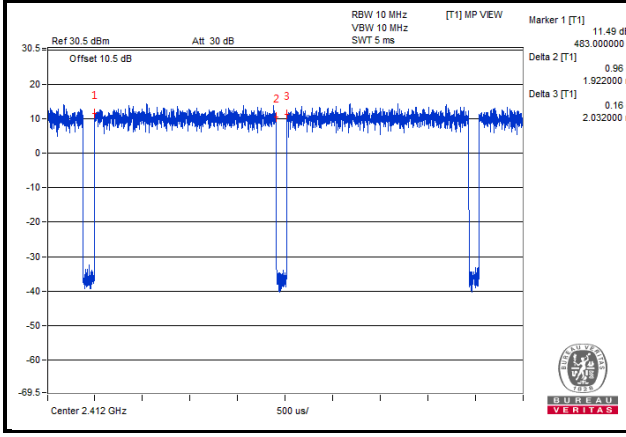
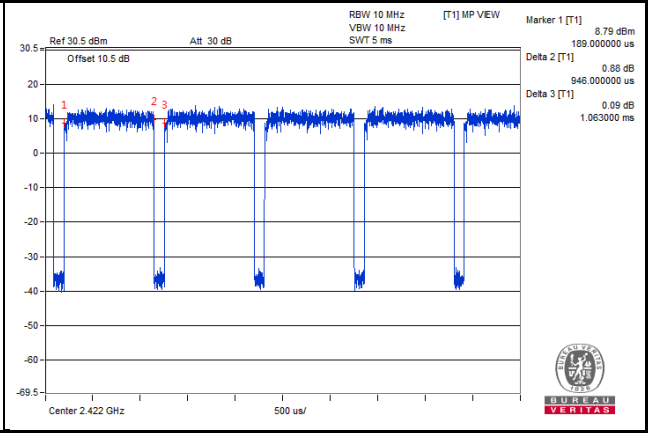
3.3 Duty Cycle of Test Signal

802.11b: Duty cycle of test signal is 100 %

802.11g: Duty cycle = 2.083333/2.195513 = 0.949, Duty factor = 10 * log(1/0.949) = 0.23

802.11n (HT20): Duty cycle = 1.922/2.032 = 0.946, Duty factor = 10 * log(1/0.946) = 0.24

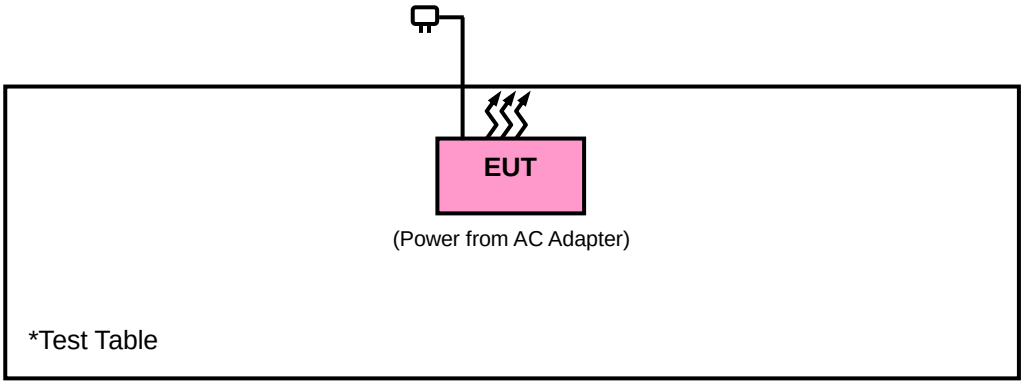
802.11n (HT40): Duty cycle = 0.946/1.063 = 0.89, Duty factor = 10 * log(1/0.89) = 0.51

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
662911 D01 Multiple Transmitter Output v02r01
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	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 16, 2016	Dec. 15, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 26, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2016	Dec. 13, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier EMCI	EMC 012645	980115	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 184045	980116	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 330H	980112	Oct. 21, 2016	Oct. 20, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 21, 2016	Oct. 20, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 21, 2016	Oct. 20, 2017
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 21, 2016	Oct. 20, 2017
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:

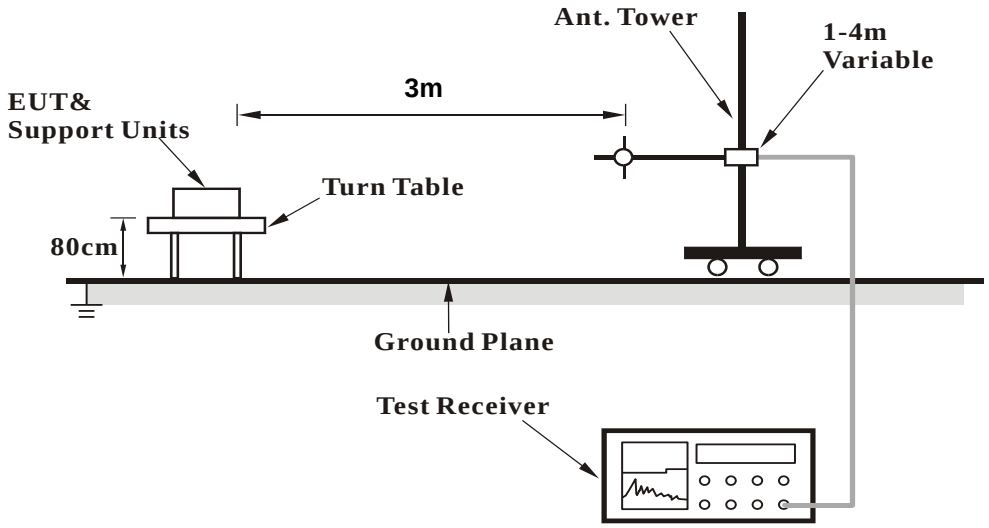
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency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

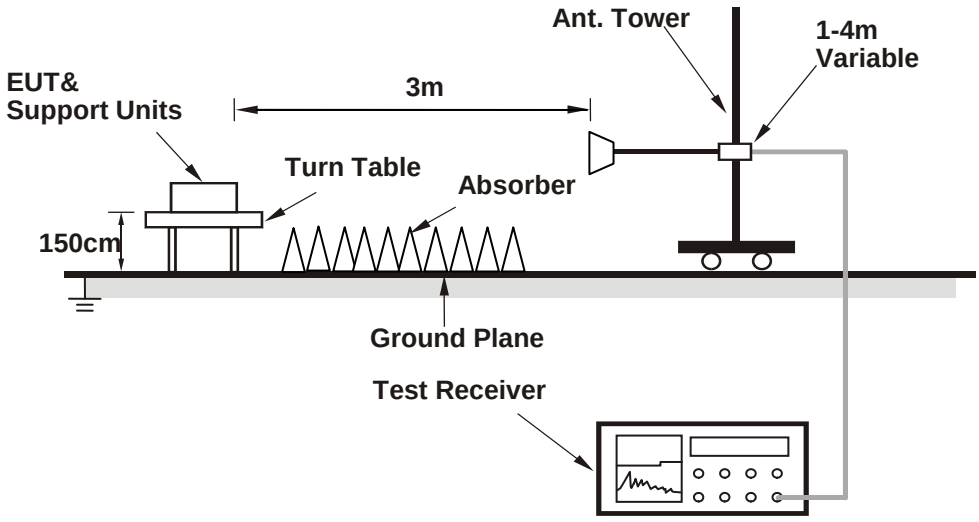
No deviation.

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**
2387.22	51.19	57.42	74	-22.81	26.91	4.36	37.5	214	327	Peak
2387.94	39.99	46.22	54	-14.01	26.91	4.36	37.5	214	327	Average
2412	104.19	110.37			26.96	4.38	37.52	214	327	Average
2412	107.28	113.46			26.96	4.38	37.52	214	327	Peak
4824	41.36	56.45	54	-12.64	30.99	6.81	52.89	144	264	Average
4824	46.6	61.69	74	-27.4	30.99	6.81	52.89	144	264	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	35.44	41.67	54	-18.56	26.91	4.36	37.5	199	261	Average
2388.66	47.71	53.94	74	-26.29	26.91	4.36	37.5	199	261	Peak
2412	97.63	103.81			26.96	4.38	37.52	199	261	Average
2412	101.56	107.74			26.96	4.38	37.52	199	261	Peak
4824	45.53	60.62	54	-8.47	30.99	6.81	52.89	154	185	Average
4824	48.96	64.05	74	-25.04	30.99	6.81	52.89	154	185	Peak

Remarks:

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

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

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**
2388.84	49.62	55.85	74	-24.38	26.91	4.36	37.5	217	335	Peak
2389.47	38.3	44.53	54	-15.7	26.91	4.36	37.5	217	335	Average
2437	103.76	109.76			27.06	4.4	37.46	217	335	Average
2437	107.35	113.35			27.06	4.4	37.46	217	335	Peak
2483.6	38.64	44.38	54	-15.36	27.15	4.43	37.32	217	335	Average
2483.8	50.75	56.49	74	-23.25	27.15	4.43	37.32	217	335	Peak
4874	41.15	56.09	54	-12.85	31.06	6.86	52.86	142	265	Average
4874	45.18	60.12	74	-28.82	31.06	6.86	52.86	142	265	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**
2386.5	47.39	53.62	74	-26.61	26.91	4.36	37.5	201	258	Peak
2389.2	35.11	41.34	54	-18.89	26.91	4.36	37.5	201	258	Average
2437	98.19	104.19			27.06	4.4	37.46	201	258	Average
2437	101.88	107.88			27.06	4.4	37.46	201	258	Peak
2483.52	35.69	41.43	54	-18.31	27.15	4.43	37.32	201	258	Average
2496.28	48.09	53.7	74	-25.91	27.2	4.44	37.25	201	258	Peak
4874	42.07	57.2	54	-11.93	31.06	6.86	53.05	152	188	Average
4874	47.47	62.6	74	-26.53	31.06	6.86	53.05	152	188	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**	Getaz Yang

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**
2462	103.72	109.6			27.1	4.41	37.39	213	335	Average
2462	107.21	113.09			27.1	4.41	37.39	213	335	Peak
2483.6	41.3	47.04	54	-12.7	27.15	4.43	37.32	213	335	Average
2484.08	53.32	59.06	74	-20.68	27.15	4.43	37.32	213	335	Peak
4924	43.42	58.3	54	-10.58	31.12	6.89	52.89	147	264	Average
4924	48.15	63.03	74	-25.85	31.12	6.89	52.89	147	264	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**
2462	97.76	103.64			27.1	4.41	37.39	198	260	Average
2462	101.38	107.26			27.1	4.41	37.39	198	260	Peak
2483.88	36.77	42.51	54	-17.23	27.15	4.43	37.32	198	260	Average
2483.96	48.64	54.38	74	-25.36	27.15	4.43	37.32	198	260	Peak
4924	43.55	58.43	54	-10.45	31.12	6.89	52.89	148	185	Average
4924	48.25	63.13	74	-25.75	31.12	6.89	52.89	148	185	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**
2389.74	39.99	46.22	54	-14.01	26.91	4.36	37.5	190	330	Average
2389.83	51.2	57.45	74	-22.8	26.91	4.36	37.52	190	330	Peak
2412	99.21	105.39			26.96	4.38	37.52	190	330	Average
2412	108.31	114.49			26.96	4.38	37.52	190	330	Peak
4824	34.06	49.15	54	-19.94	30.99	6.81	52.89	149	266	Average
4824	43.2	58.29	74	-30.8	30.99	6.81	52.89	149	266	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**
2386.95	48.35	54.58	74	-25.65	26.91	4.36	37.5	191	260	Peak
2389.74	35.83	42.06	54	-18.17	26.91	4.36	37.5	191	260	Average
2412	92.53	98.71			26.96	4.38	37.52	191	260	Average
2412	102.56	108.74			26.96	4.38	37.52	191	260	Peak
4824	36.2	51.29	54	-17.8	30.99	6.81	52.89	151	185	Average
4824	44.94	60.03	74	-29.06	30.99	6.81	52.89	151	185	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	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**
2389.11	37.5	43.73	54	-16.5	26.91	4.36	37.5	214	331	Average
2389.56	49.55	55.78	74	-24.45	26.91	4.36	37.5	214	331	Peak
2437	98.1	104.1			27.06	4.4	37.46	214	331	Average
2437	107.41	113.41			27.06	4.4	37.46	214	331	Peak
2483.92	51.16	56.9	74	-22.84	27.15	4.43	37.32	214	331	Peak
2484.08	39.32	45.06	54	-14.68	27.15	4.43	37.32	214	331	Average
4874	34.17	49.11	54	-19.83	31.06	6.86	52.86	147	261	Average
4874	44.69	59.63	74	-29.31	31.06	6.86	52.86	147	261	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**
2385.42	47.46	53.75	74	-26.54	26.86	4.35	37.5	184	259	Peak
2389.83	35	41.25	54	-19	26.91	4.36	37.52	184	259	Average
2437	92.02	98.02			27.06	4.4	37.46	184	259	Average
2437	101.72	107.72			27.06	4.4	37.46	184	259	Peak
2483.64	36	41.74	54	-18	27.15	4.43	37.32	184	259	Average
2484.88	48.88	54.62	74	-25.12	27.15	4.43	37.32	184	259	Peak
4874	35.85	50.98	54	-18.15	31.06	6.86	53.05	151	184	Average
4874	43.62	58.75	74	-30.38	31.06	6.86	53.05	151	184	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**
2462	98.71	104.59			27.1	4.41	37.39	170	343	Average
2462	108.23	114.11			27.1	4.41	37.39	170	343	Peak
2483.52	47.47	53.21	54	-6.53	27.15	4.43	37.32	170	343	Average
2483.68	60.26	66	74	-13.74	27.15	4.43	37.32	170	343	Peak
4924	34.14	49.02	54	-19.86	31.12	6.89	52.89	151	267	Average
4924	43.16	58.04	74	-30.84	31.12	6.89	52.89	151	267	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**
2462	92.72	98.6			27.1	4.41	37.39	141	261	Average
2462	102.68	108.56			27.1	4.41	37.39	141	261	Peak
2483.52	39.88	45.62	54	-14.12	27.15	4.43	37.32	141	261	Average
2483.64	52.98	58.72	74	-21.02	27.15	4.43	37.32	141	261	Peak
4924	36.18	51.2	54	-17.82	31.12	6.89	53.03	153	189	Average
4924	43.07	58.09	74	-30.93	31.12	6.89	53.03	153	189	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**	Getaz Yang

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**
2389.11	39.08	45.31	54	-14.92	26.91	4.36	37.5	213	346	Average
2389.65	50.77	57	74	-23.23	26.91	4.36	37.5	213	346	Peak
2412	97.86	104.04			26.96	4.38	37.52	213	346	Average
2412	106.59	112.77			26.96	4.38	37.52	213	346	Peak
4824	33.86	48.95	54	-20.14	30.99	6.81	52.89	111	35	Average
4824	43.66	58.75	74	-30.34	30.99	6.81	52.89	111	35	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**
2320.62	50.89	57.36	74	-23.11	26.72	4.28	37.47	213	322	Peak
2349.51	37.09	43.5	54	-16.91	26.77	4.31	37.49	213	322	Average
2412	91.13	97.31			26.96	4.38	37.52	213	322	Average
2412	100.87	107.05			26.96	4.38	37.52	213	322	Peak
4824	34.57	49.85	54	-19.43	30.99	6.81	53.08	104	291	Average
4824	43.05	58.33	74	-30.95	30.99	6.81	53.08	104	291	Peak

Remarks:

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

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

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**
2388.75	49.72	55.95	74	-24.28	26.91	4.36	37.5	210	348	Peak
2389.47	37.75	43.98	54	-16.25	26.91	4.36	37.5	210	348	Average
2437	97.91	103.91			27.06	4.4	37.46	210	348	Average
2437	106.89	112.89			27.06	4.4	37.46	210	348	Peak
2483.6	39.67	45.41	54	-14.33	27.15	4.43	37.32	210	348	Average
2483.92	52.14	57.88	74	-21.86	27.15	4.43	37.32	210	348	Peak
4874	34.5	49.44	54	-19.5	31.06	6.86	52.86	117	35	Average
4874	43.64	58.58	74	-30.36	31.06	6.86	52.86	117	35	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**
2389.83	36.2	42.45	54	-17.8	26.91	4.36	37.52	207	322	Average
2389.92	50.52	56.77	74	-23.48	26.91	4.36	37.52	207	322	Peak
2437	90.59	96.59			27.06	4.4	37.46	207	322	Average
2437	100.49	106.49			27.06	4.4	37.46	207	322	Peak
2483.6	49.53	55.27	74	-24.47	27.15	4.43	37.32	207	322	Peak
2483.76	36.58	42.32	54	-17.42	27.15	4.43	37.32	207	322	Average
4874	34.6	49.73	54	-19.4	31.06	6.86	53.05	106	300	Average
4874	43.61	58.74	74	-30.39	31.06	6.86	53.05	106	300	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**	Getaz Yang

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**
2462	98.82	104.7			27.1	4.41	37.39	207	346	Average
2462	108.25	114.13			27.1	4.41	37.39	207	346	Peak
2483.52	44.3	50.04	54	-9.7	27.15	4.43	37.32	207	346	Average
2484.36	56.03	61.77	74	-17.97	27.15	4.43	37.32	207	346	Peak
4924	34.77	49.65	54	-19.23	31.12	6.89	52.89	112	25	Average
4924	44.23	59.11	74	-29.77	31.12	6.89	52.89	112	25	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**
2462	92.51	98.39			27.1	4.41	37.39	204	322	Average
2462	102.19	108.07			27.1	4.41	37.39	204	322	Peak
2483.6	40.61	46.35	54	-13.39	27.15	4.43	37.32	204	322	Average
2483.8	52.37	58.11	74	-21.63	27.15	4.43	37.32	204	322	Peak
4924	34.81	49.83	54	-19.19	31.12	6.89	53.03	109	291	Average
4924	42.88	57.9	74	-31.12	31.12	6.89	53.03	109	291	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**	Getaz Yang

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	67.66	73.89	74	-6.34	26.91	4.36	37.5	217	347	Peak
2389.92	42.97	49.22	54	-11.03	26.91	4.36	37.52	217	347	Average
2422	97.3	103.36			27.01	4.39	37.46	217	347	Average
2422	107.13	113.19			27.01	4.39	37.46	217	347	Peak
2483.8	40.6	46.34	54	-13.4	27.15	4.43	37.32	217	347	Average
2484.44	58.24	63.98	74	-15.76	27.15	4.43	37.32	217	347	Peak
4844	34.09	49.13	54	-19.91	31.01	6.83	52.88	109	37	Average
4844	42.95	57.99	74	-31.05	31.01	6.83	52.88	109	37	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	61.57	67.8	74	-12.43	26.91	4.36	37.5	210	323	Peak
2389.74	39.81	46.04	54	-14.19	26.91	4.36	37.5	210	323	Average
2422	91.92	97.98	54	37.92	27.01	4.39	37.46	210	323	Average
2422	101.15	107.21	74	27.15	27.01	4.39	37.46	210	323	Peak
2483.52	51.02	56.76	74	-22.98	27.15	4.43	37.32	210	323	Peak
2483.68	37.38	43.12	54	-16.62	27.15	4.43	37.32	210	323	Average
4844	35.96	51.18	54	-18.04	31.01	6.83	53.06	107	295	Average
4844	44.04	59.26	74	-29.96	31.01	6.83	53.06	107	295	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**	Getaz Yang

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**
2386.86	61.37	67.6	74	-12.63	26.91	4.36	37.5	207	348	Peak
2389.83	39.81	46.06	54	-14.19	26.91	4.36	37.52	207	348	Average
2437	95.76	101.76			27.06	4.4	37.46	207	348	Average
2437	104.98	110.98			27.06	4.4	37.46	207	348	Peak
2483.6	42.16	47.9	54	-11.84	27.15	4.43	37.32	207	348	Average
2483.68	59.76	65.5	74	-14.24	27.15	4.43	37.32	207	348	Peak
4874	33.11	48.05	54	-20.89	31.06	6.86	52.86	111	29	Average
4874	42.62	57.56	74	-31.38	31.06	6.86	52.86	111	29	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**
2388.75	38.26	44.49	54	-15.74	26.91	4.36	37.5	207	322	Average
2388.84	54.74	60.97	74	-19.26	26.91	4.36	37.5	207	322	Peak
2437	89.24	95.24			27.06	4.4	37.46	207	322	Average
2437	98.12	104.12			27.06	4.4	37.46	207	322	Peak
2483.68	37.73	43.47	54	-16.27	27.15	4.43	37.32	207	322	Average
2484.24	51.88	57.62	74	-22.12	27.15	4.43	37.32	207	322	Peak
4874	33.81	48.94	54	-20.19	31.06	6.86	53.05	106	294	Average
4874	42.75	57.88	74	-31.25	31.06	6.86	53.05	106	294	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**	Getaz Yang

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**
2388.03	39.15	45.38	54	-14.85	26.91	4.36	37.5	210	348	Average
2388.3	62.73	68.96	74	-11.27	26.91	4.36	37.5	210	348	Peak
2452	99.82	105.74			27.06	4.41	37.39	210	348	Average
2452	109.06	114.98			27.06	4.41	37.39	210	348	Peak
2483.68	50.64	56.38	54	-3.36	27.15	4.43	37.32	210	348	Average
2484.04	64.27	70.01	74	-9.73	27.15	4.43	37.32	210	348	Peak
4904	34.68	49.55	54	-19.32	31.1	6.88	52.85	111	28	Average
4904	45.93	60.8	74	-28.07	31.1	6.88	52.85	111	28	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**
2379.03	37.19	43.48	54	-16.81	26.86	4.35	37.5	206	319	Average
2389.92	56.87	63.12	74	-17.13	26.91	4.36	37.52	206	319	Peak
2452	92.41	98.33			27.06	4.41	37.39	206	319	Average
2452	101.24	107.16			27.06	4.41	37.39	206	319	Peak
2483.52	44.12	49.86	54	-9.88	27.15	4.43	37.32	206	319	Average
2485.44	56.06	61.8	74	-17.94	27.15	4.43	37.32	206	319	Peak
4904	34.92	49.97	54	-19.08	31.1	6.88	53.03	105	289	Average
4904	45.3	60.35	74	-28.7	31.1	6.88	53.03	105	289	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 (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 9	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	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**
129.91	24.08	43.14	43.5	-19.42	11.68	1.14	31.88	107	146	Peak
180.35	23.63	43.51	43.5	-19.87	10.74	1.22	31.84	125	61	Peak
216.24	27.94	48.19	46	-18.06	10.05	1.36	31.66	121	34	Peak
600.36	23.01	33.39	46	-22.99	19.61	2.26	32.25	133	97	Peak
668.26	23.45	32.47	46	-22.55	20.43	2.39	31.84	131	116	Peak
777.87	25.67	32.57	46	-20.33	21.92	2.58	31.4	119	226	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**
36.79	29.3	46.62	40	-10.7	13.09	0.62	31.03	115	82	Peak
70.74	24.5	44.91	40	-15.5	10.53	0.85	31.79	119	25	Peak
129.91	24.78	43.84	43.5	-18.72	11.68	1.14	31.88	109	358	Peak
506.27	20.77	32.8	46	-25.23	17.46	2.11	31.6	136	181	Peak
668.26	23.4	32.42	46	-22.6	20.43	2.39	31.84	107	353	Peak
777.87	26.57	33.47	46	-19.43	21.92	2.58	31.4	118	278	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. 21, 2016	Nov. 20, 2017
RF signal cable Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 28, 2016	Jul. 27, 2017
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

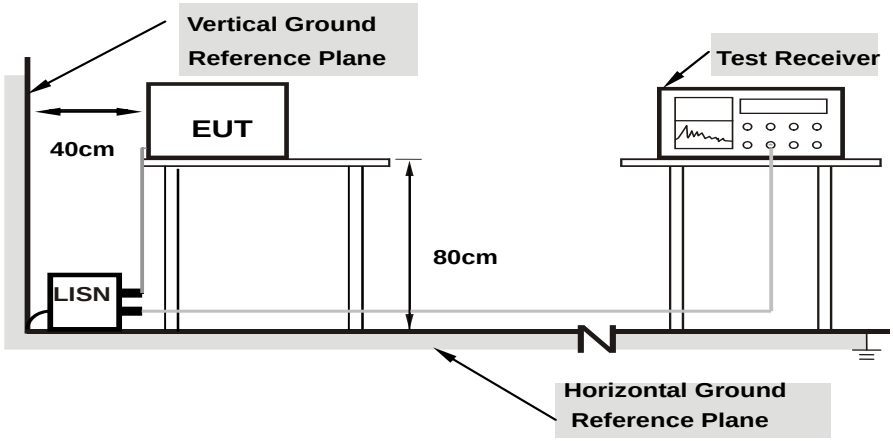
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

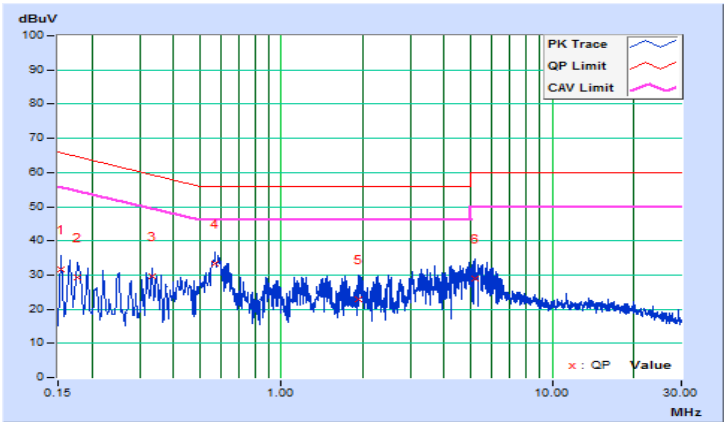
4.2.7 Test Results

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	Getaz Yang	Test Date	2017/7/27

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.35	21.44	9.49	31.79	19.84	65.79	55.79	-34.00	-35.95
2	0.17744	10.36	19.10	8.43	29.46	18.79	64.60	54.60	-35.14	-35.81
3	0.33377	10.39	19.10	10.24	29.49	20.63	59.36	49.36	-29.87	-28.73
4	**0.56866**	**10.40**	**22.94**	**17.82**	**33.34**	**28.22**	**56.00**	**46.00**	**-22.66**	**-17.78**
5	1.93296	10.46	12.37	4.13	22.83	14.59	56.00	46.00	-33.17	-31.41
6	5.19781	10.62	18.29	8.31	28.91	18.93	60.00	50.00	-31.09	-31.07

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

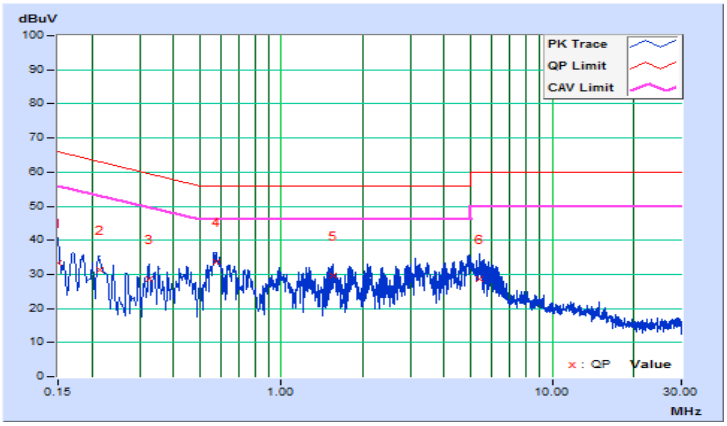


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Getaz Yang	Test Date	2017/7/27

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.10	23.15	12.60	33.25	22.70	66.00	56.00	-32.75	-33.30
2	0.21282	10.14	21.30	13.39	31.44	23.53	63.09	53.09	-31.65	-29.56
3	0.32528	10.15	18.35	10.12	28.50	20.27	59.57	49.57	-31.07	-29.30
4	0.57317	10.16	23.53	16.89	33.69	27.05	56.00	46.00	-22.31	-18.95
5	1.54587	10.20	19.29	11.18	29.49	21.38	56.00	46.00	-26.51	-24.62
6	5.40895	10.39	18.27	8.52	28.66	18.91	60.00	50.00	-31.34	-31.09

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

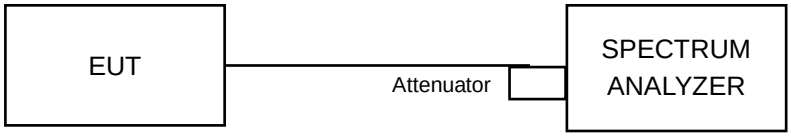


4.3 6 dB Bandwidth Measurement

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	7.59	0.5	Pass
6	2437	8.11	0.5	Pass
11	2462	8.11	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.32	0.5	Pass
6	2437	15.40	0.5	Pass
11	2462	15.39	0.5	Pass

802.11n (HT20)

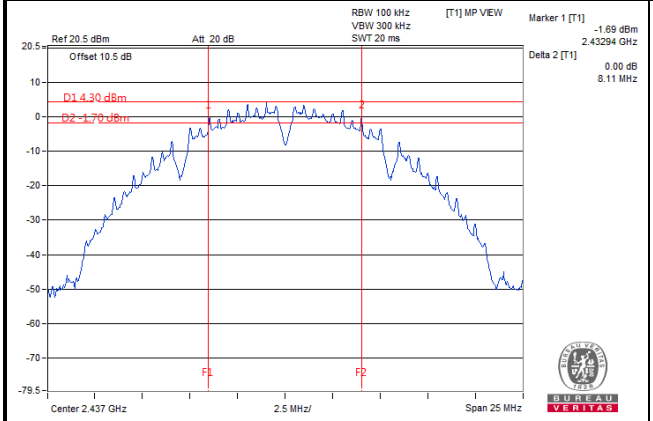
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.10	15.12	0.5	Pass
6	2437	15.75	15.74	0.5	Pass
11	2462	15.70	16.56	0.5	Pass

802.11n (HT40)

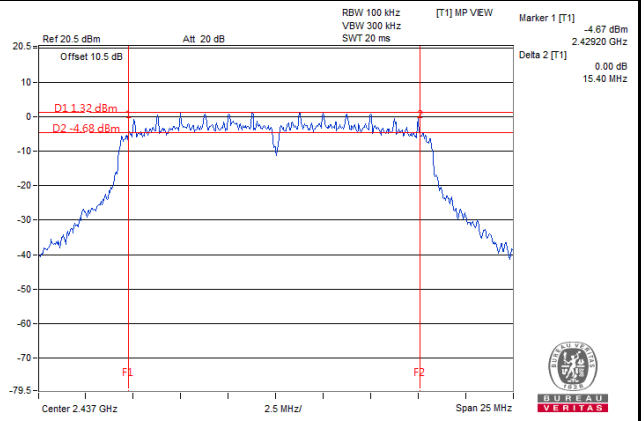
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	33.86	32.65	0.5	Pass
6	2437	35.18	35.19	0.5	Pass
9	2452	33.94	33.84	0.5	Pass

Spectrum Plot of Worst Value

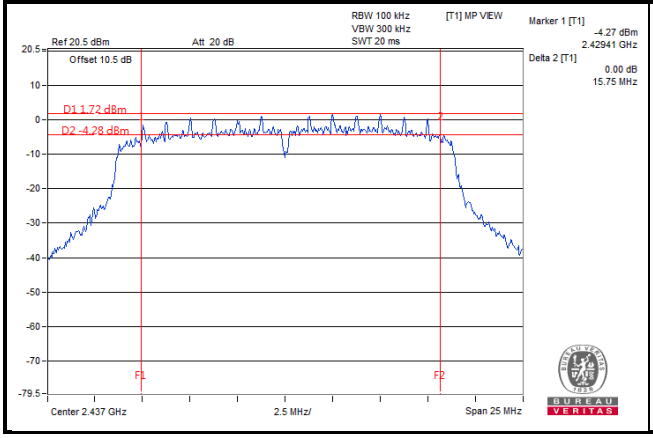
802.11b



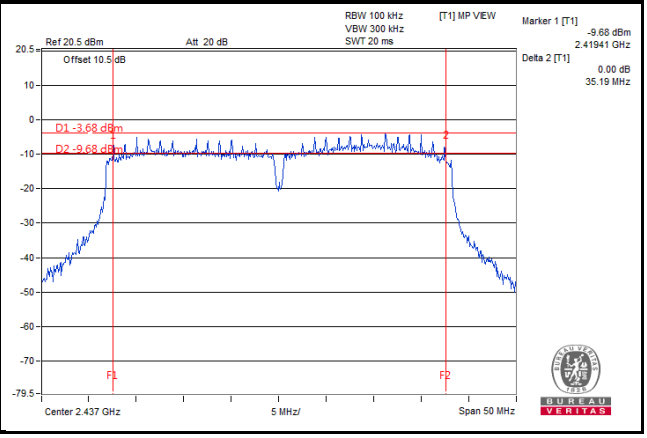
802.11g



802.11n (HT20)



802.11n (HT40)



4.4 Conducted Output Power Measurement

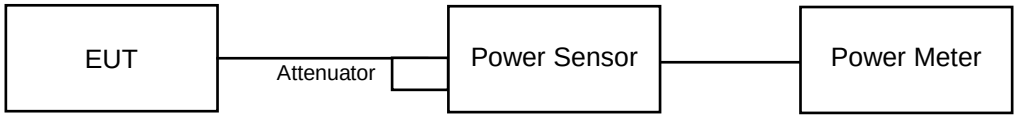
4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)
Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20 MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

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	37.239	15.71	30	Pass
6	2437	39.084	15.92	30	Pass
11	2462	35.4	15.49	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	21.627	13.35	30	Pass
6	2437	20.654	13.15	30	Pass
11	2462	21.979	13.42	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.40	17.12	106.477	20.27	30	Pass
6	2437	17.33	15.15	86.809	19.39	30	Pass
11	2462	16.62	15.96	85.366	19.31	30	Pass

802.11n (HT40)

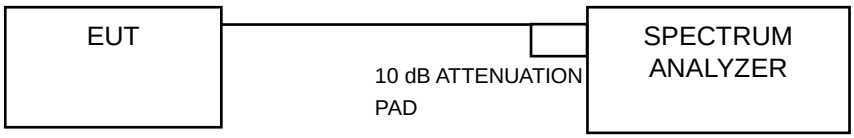
Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.31	16.99	103.83	20.16	30	Pass
6	2437	16.62	15.40	80.594	19.06	30	Pass
9	2452	17.31	17.06	104.643	20.20	30	Pass

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	-12.43	8	Pass
6	2437	-11.99	8	Pass
11	2462	-12.77	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-14.68	8	Pass
6	2437	-14.91	8	Pass
11	2462	-14.17	8	Pass

802.11n (HT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-17.22	3.01	-14.21	7.61	Pass
	6	2437	-16.72	3.01	-13.71	7.61	Pass
	11	2462	-17.35	3.01	-14.34	7.61	Pass
1	1	2412	-16.43	3.01	-13.42	7.61	Pass
	6	2437	-16.87	3.01	-13.86	7.61	Pass
	11	2462	-16.55	3.01	-13.54	7.61	Pass

NOTE: Directional gain = 3.38 dBi + 10log(2) = 6.39 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.39-6) = 7.61 dBm.

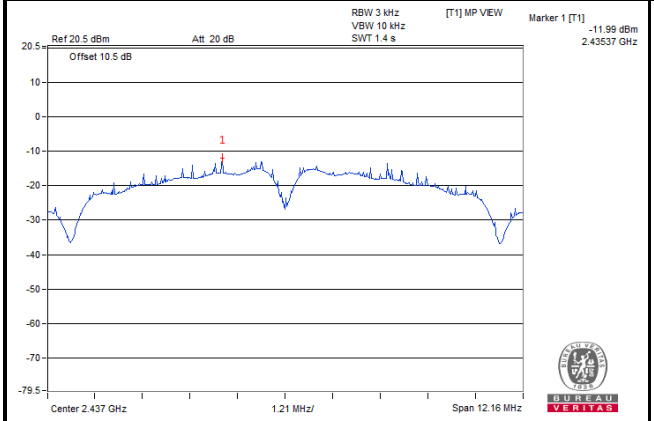
802.11n (HT40)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-17.24	3.01	-14.23	7.61	Pass
	6	2437	-17.36	3.01	-14.35	7.61	Pass
	9	2452	-16.66	3.01	-13.65	7.61	Pass
1	3	2422	-16.85	3.01	-13.84	7.61	Pass
	6	2437	-16.77	3.01	-13.76	7.61	Pass
	9	2452	-16.19	3.01	-13.18	7.61	Pass

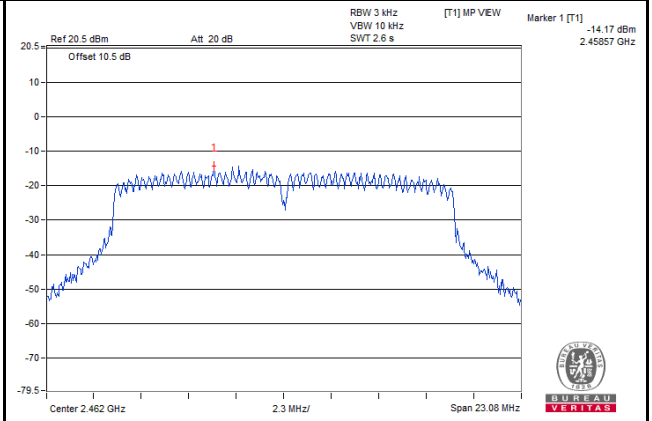
NOTE: Directional gain = 3.38 dBi + 10log(2) = 6.39 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.39-6) = 7.61 dBm.

Spectrum Plot of Worst Value

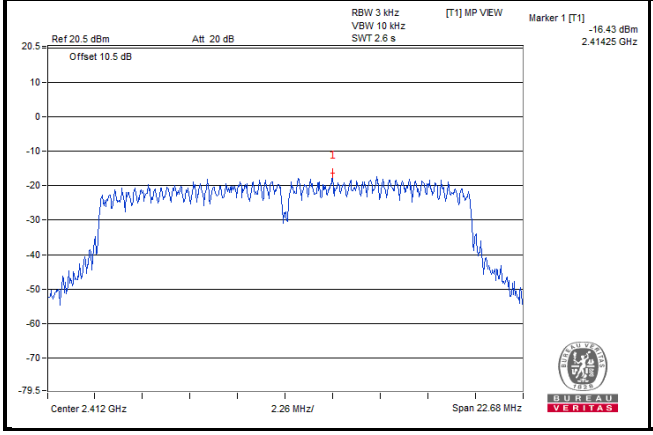
802.11b



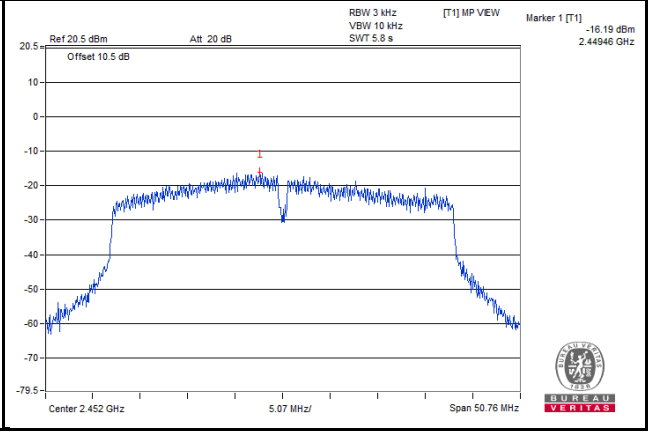
802.11g



802.11n (HT20)



802.11n (HT40)

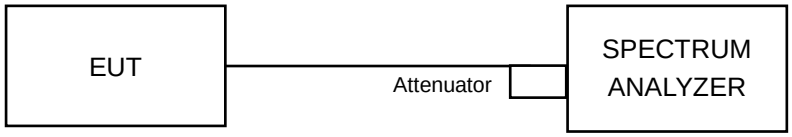


4.6 Conducted Out of Band Emission Measurement

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.

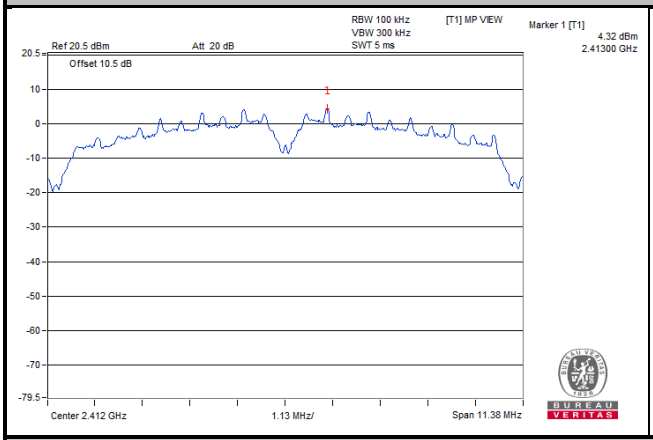
4.6.7 Test Results

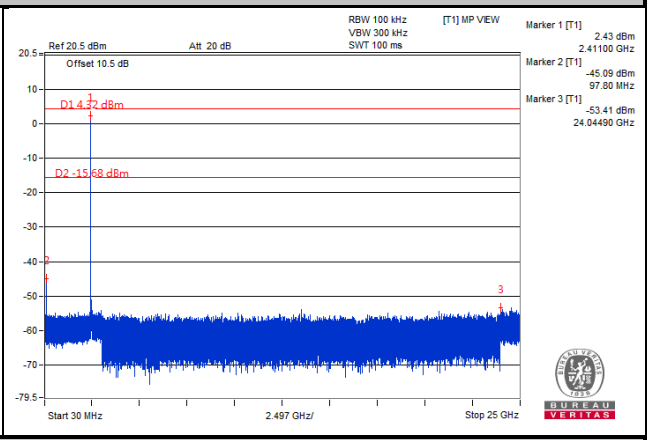
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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.

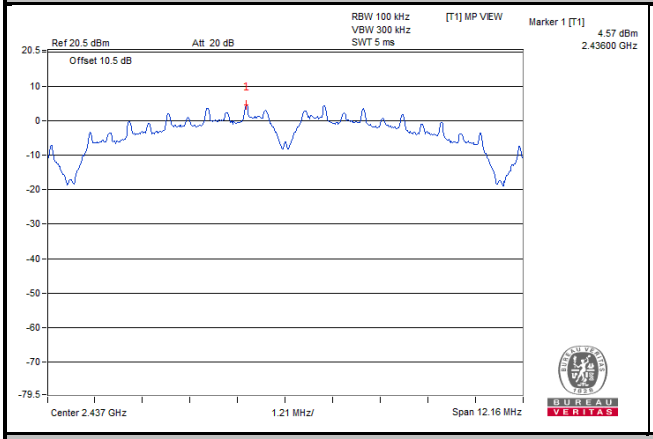
802.11b

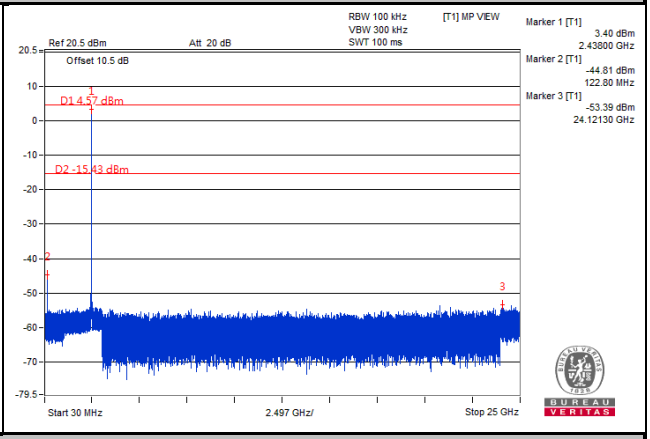
Ch 1



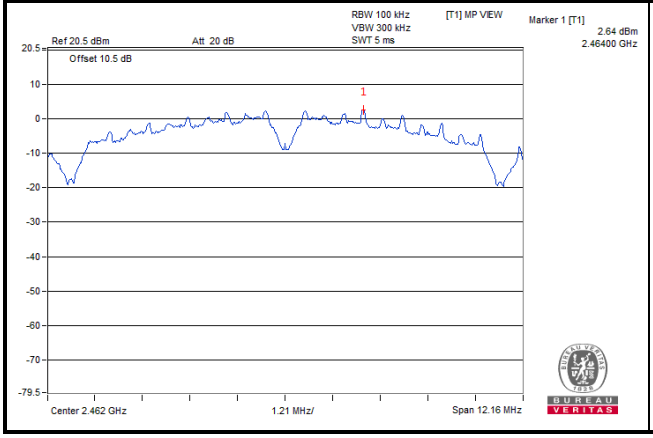


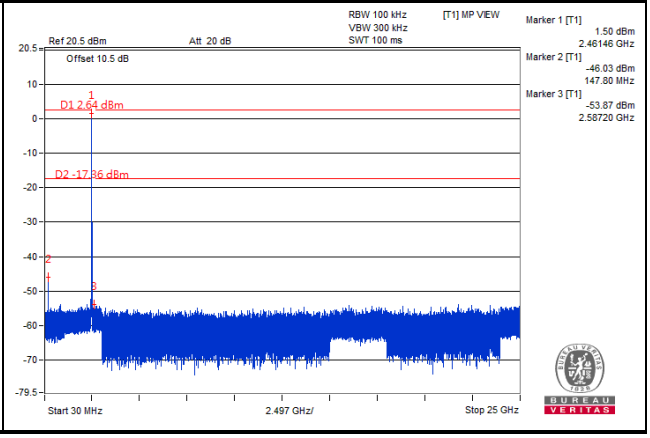
Ch 6

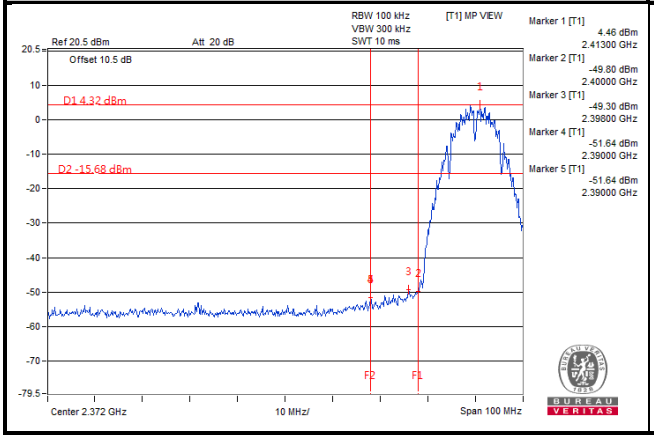
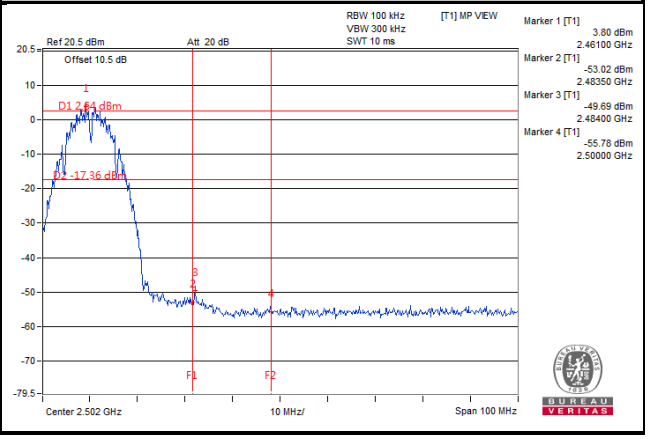




Ch 11

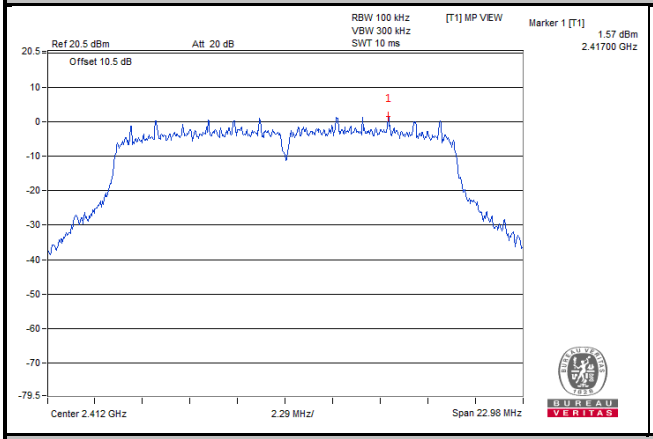


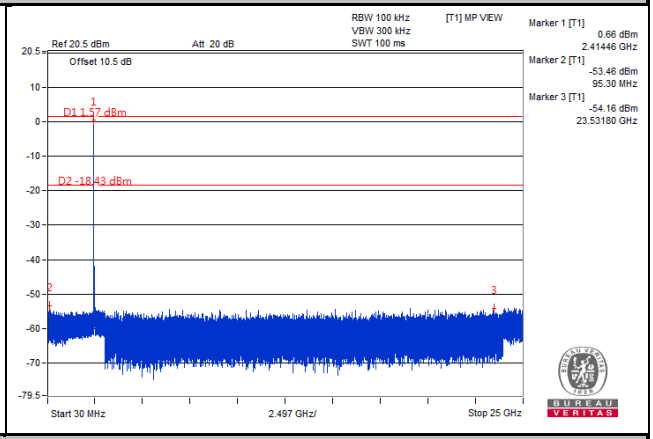


Ch 1 Band Edge	Ch 11 Band Edge
	

802.11g

Ch 1





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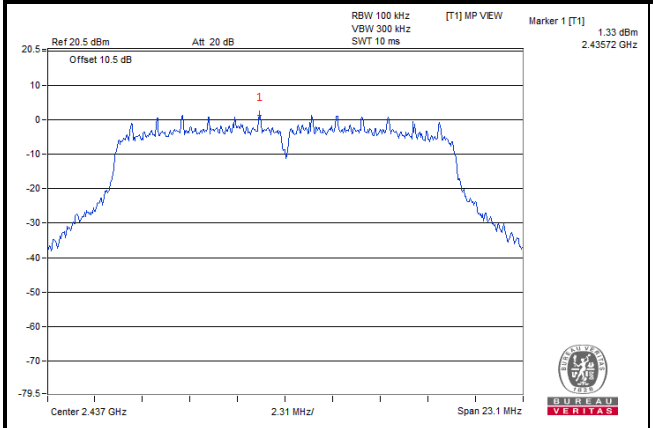

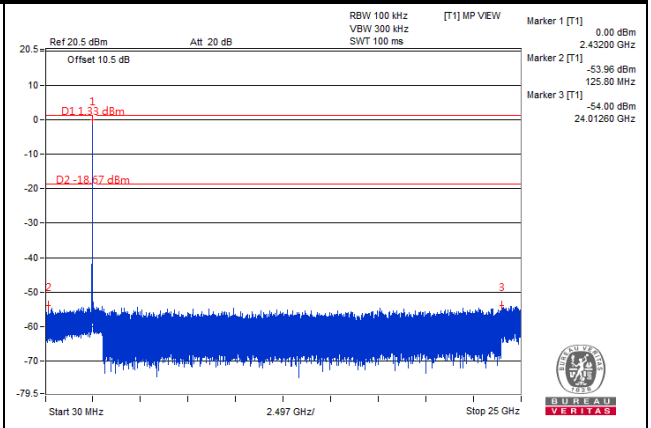

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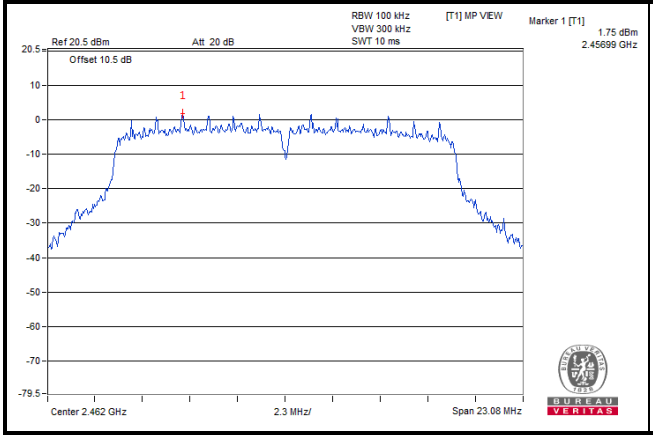
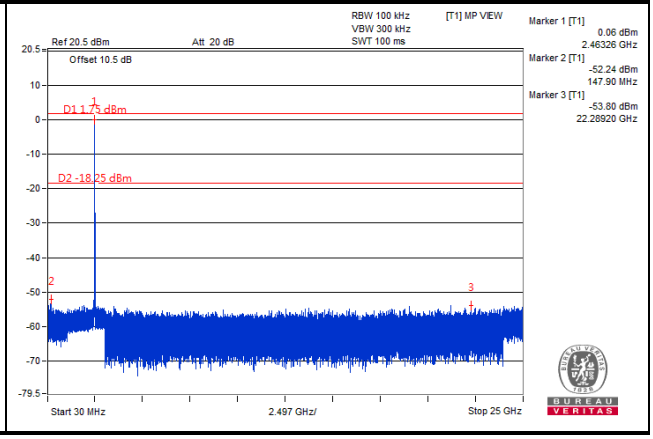
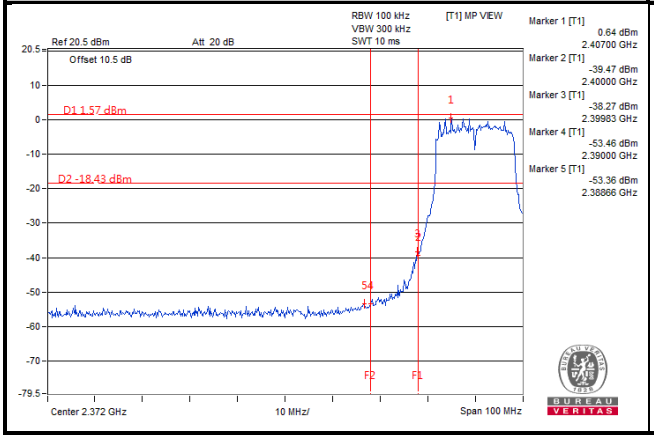
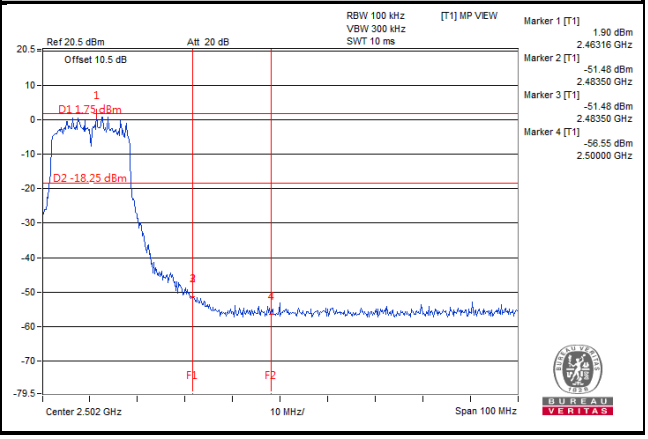


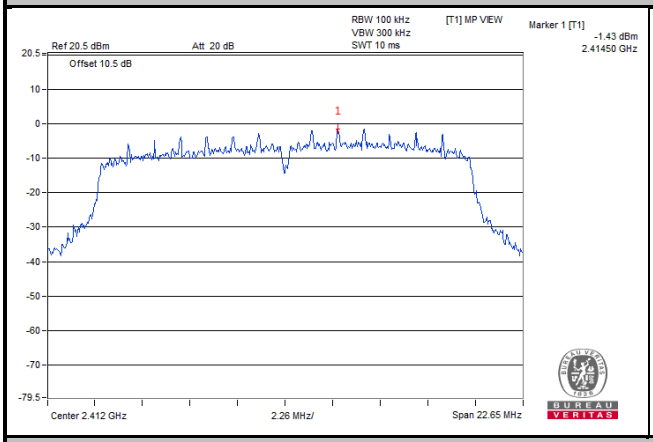


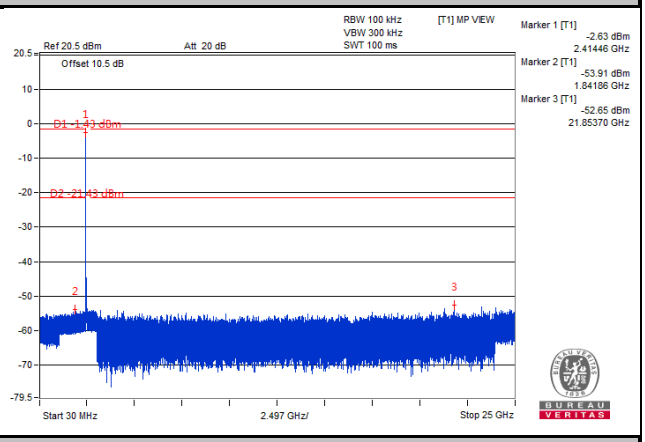
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11n (HT20)

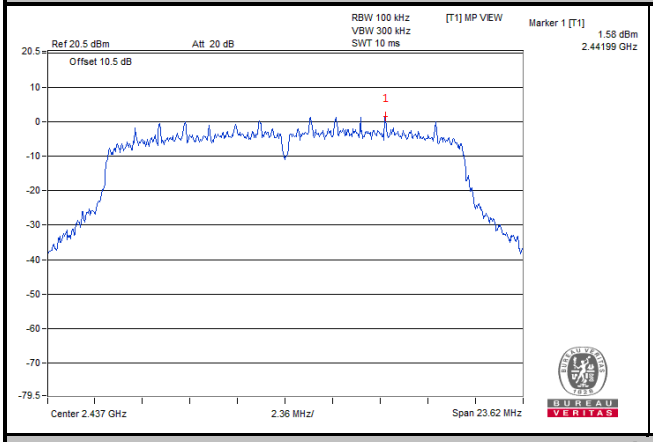
CHAIN 0

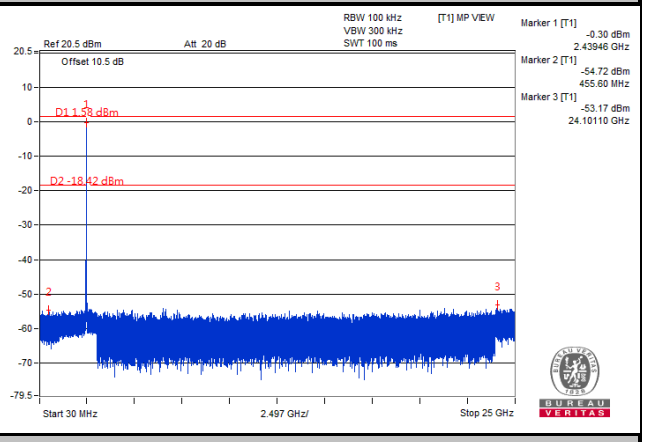
Ch 1



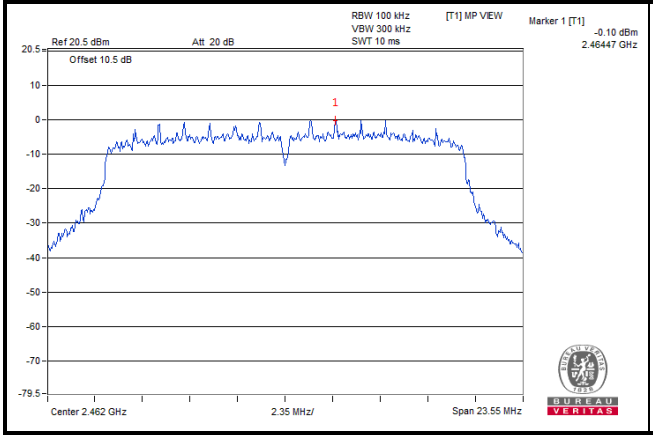


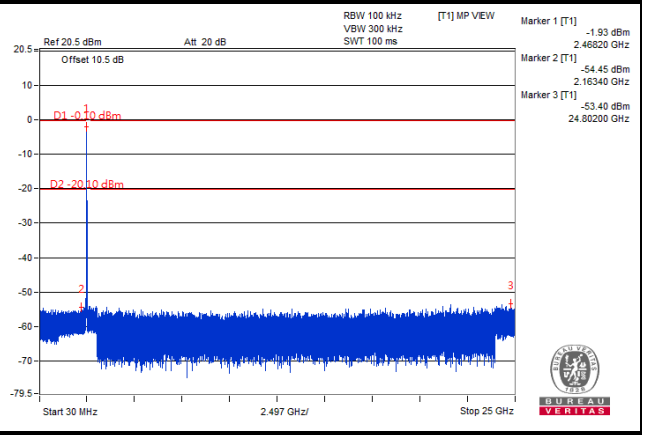
Ch 6

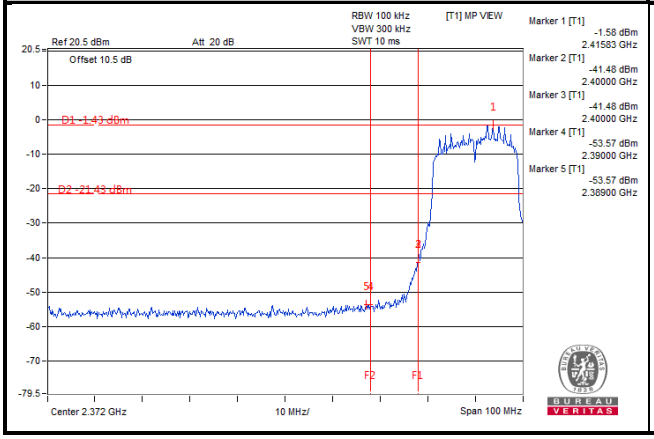
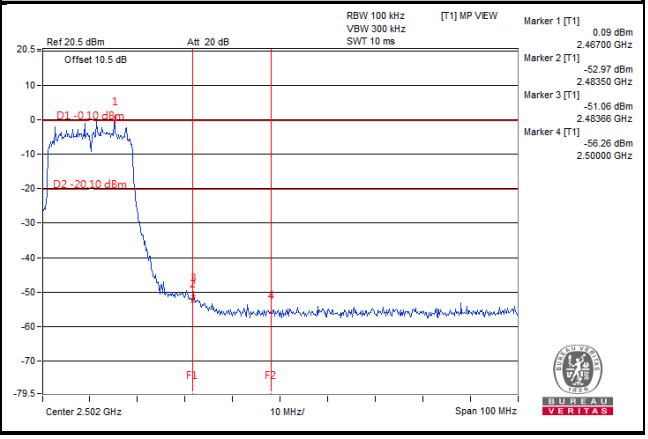




Ch 11

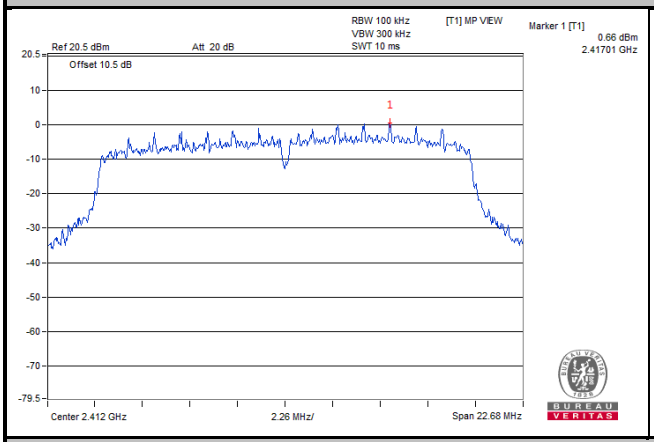


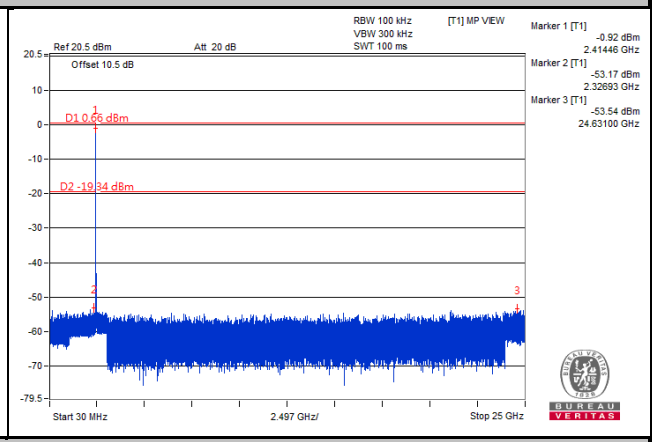


Ch 1 Band Edge	Ch 11 Band Edge
	

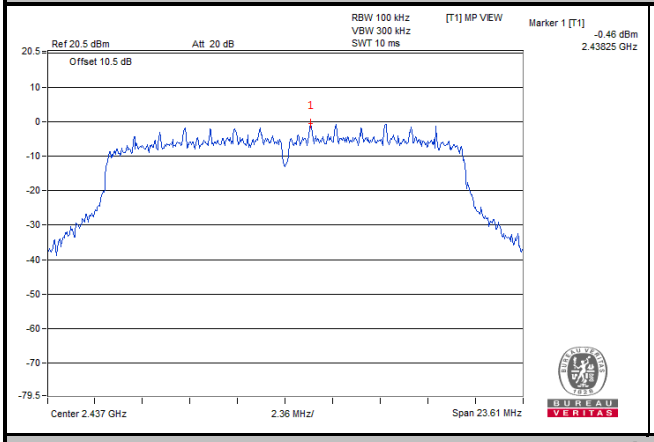
CHAIN 1

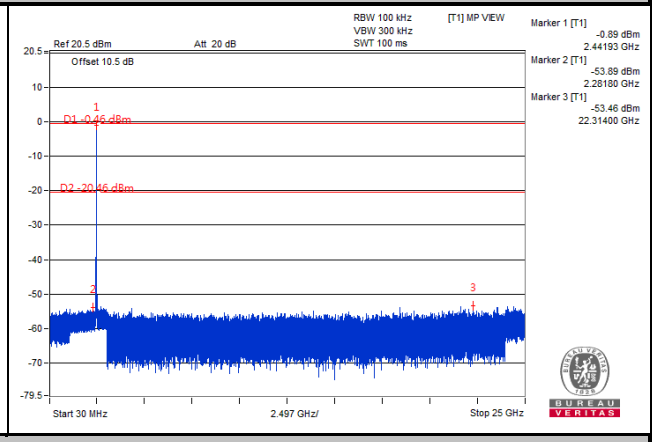
Ch 1



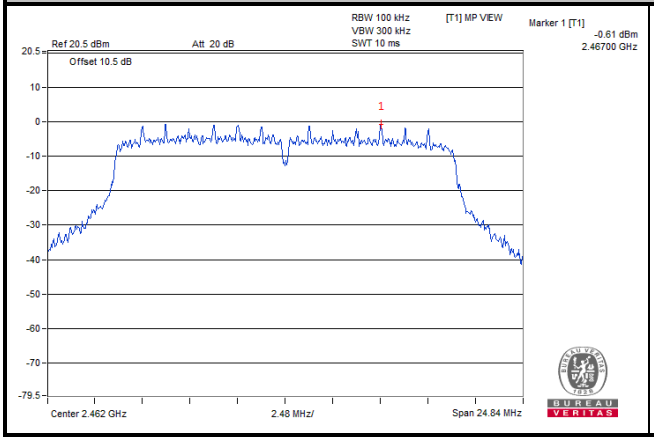


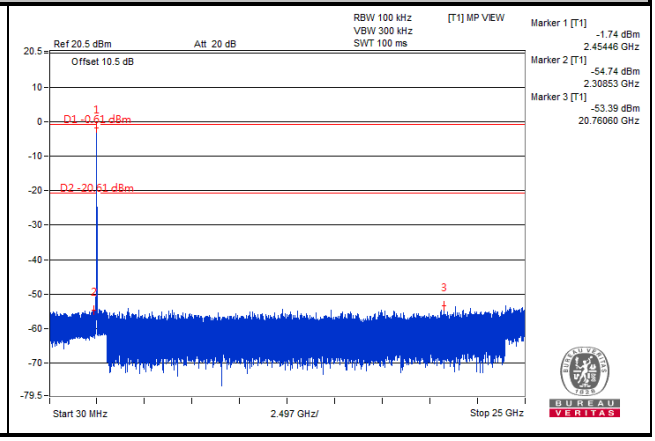
Ch 6

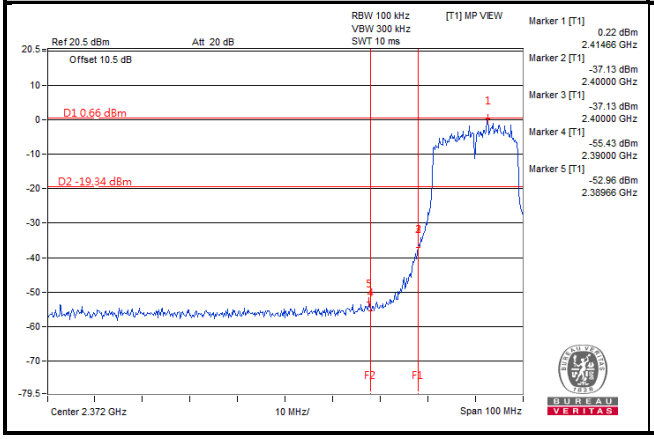
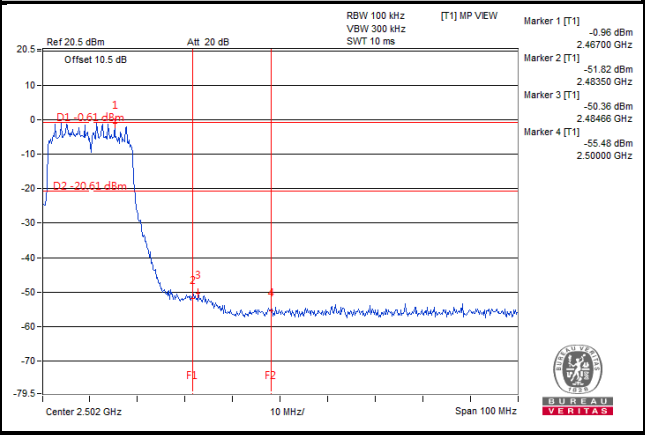




Ch 11



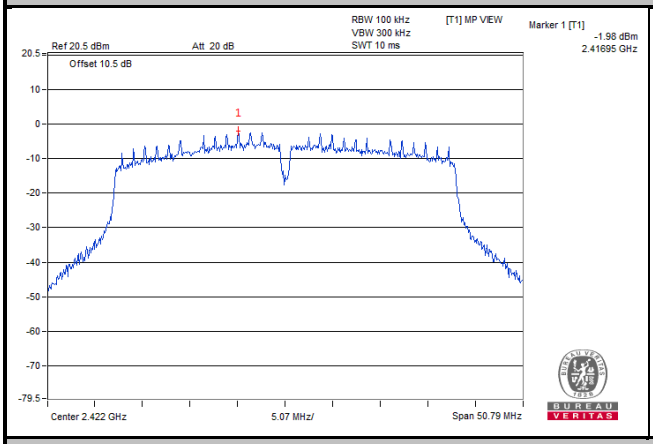


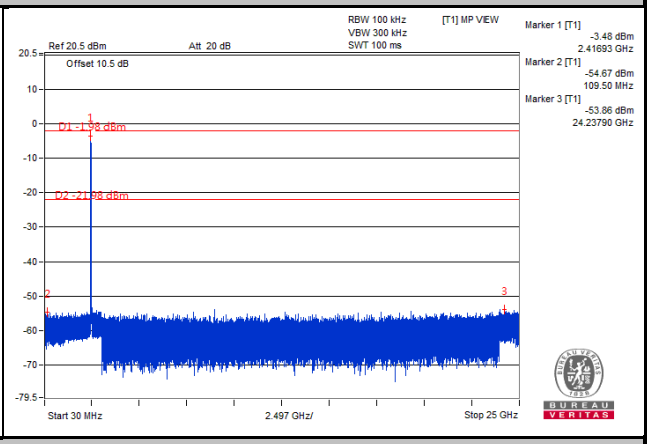
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11n (HT40)

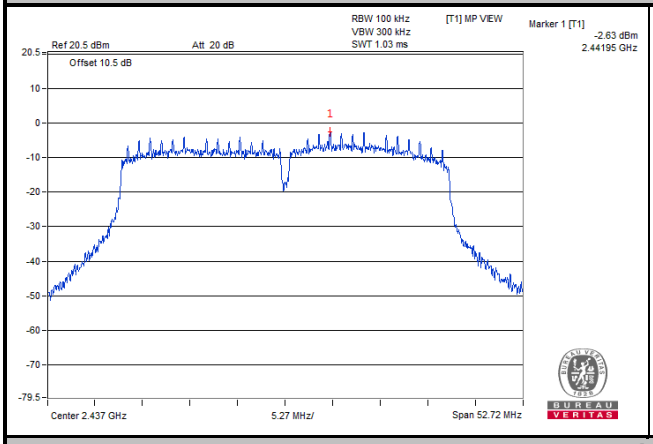
CHAIN 0

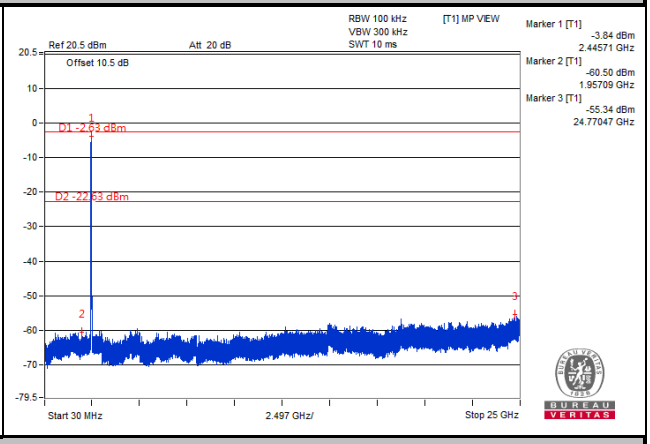
Ch 3



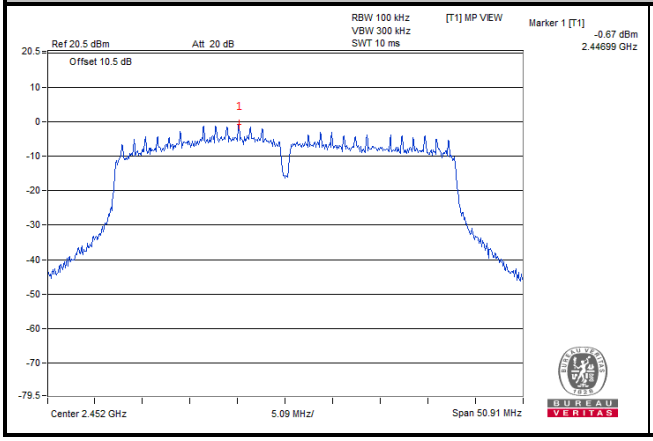


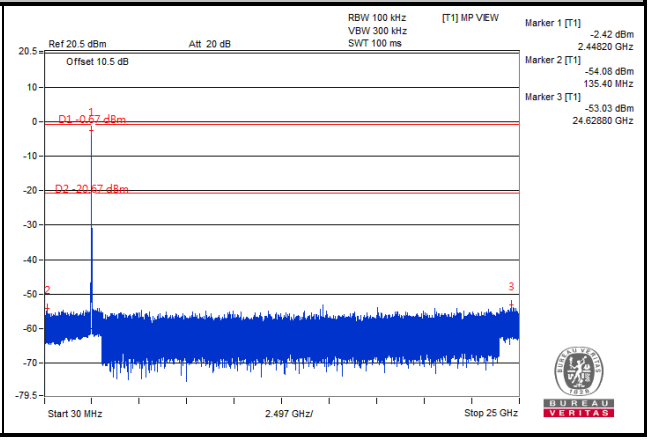
Ch 6

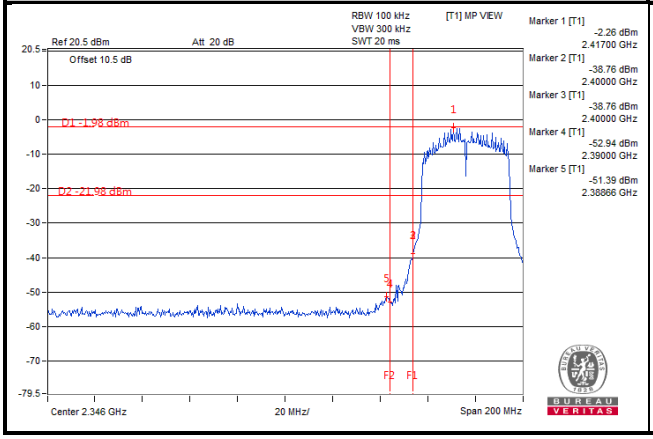
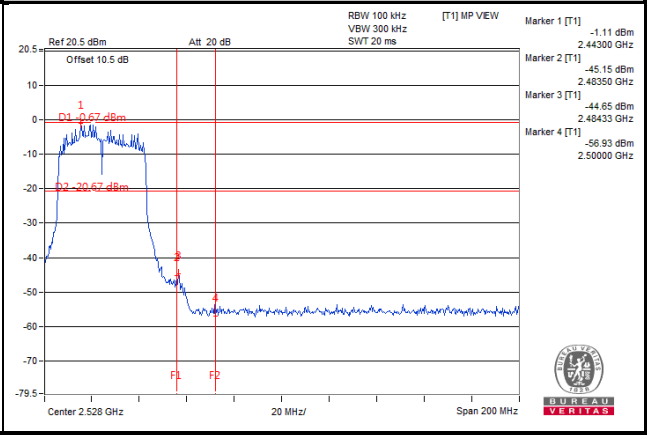




Ch 9

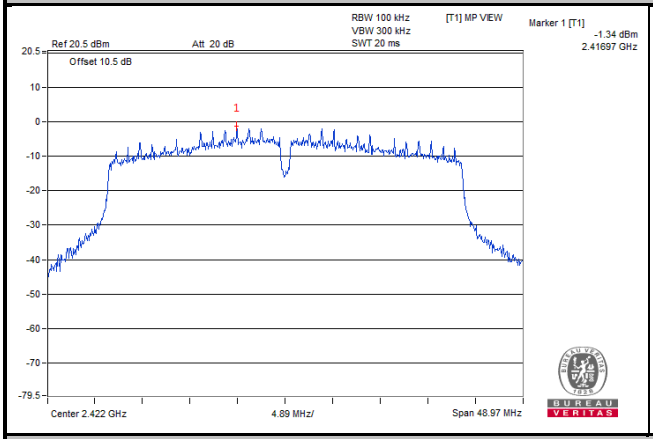


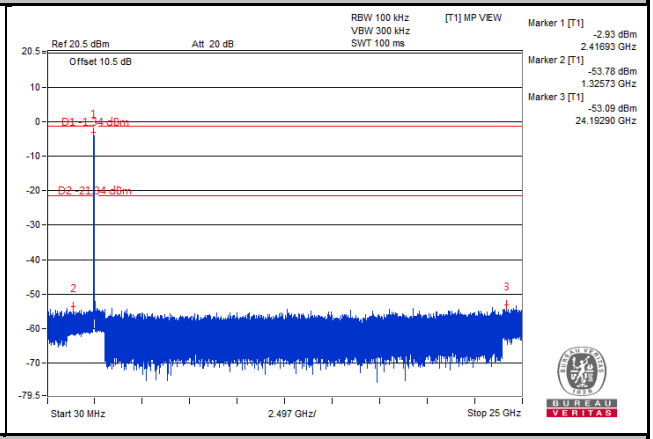


Ch 3 Band Edge	Ch 9 Band Edge
	

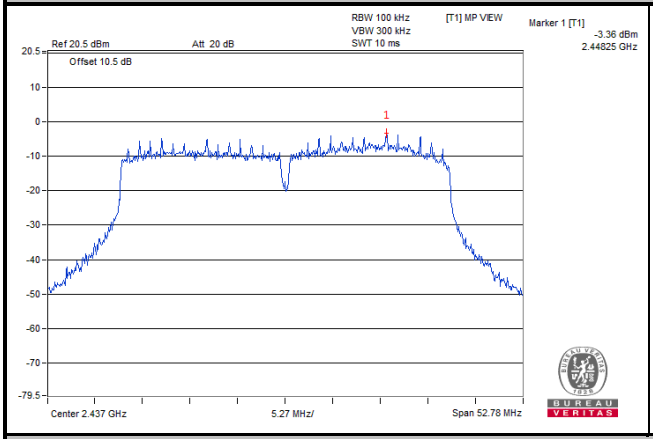
CHAIN 1

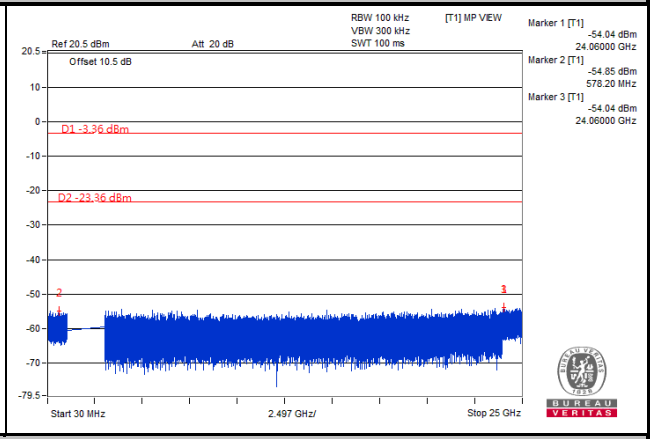
Ch 3



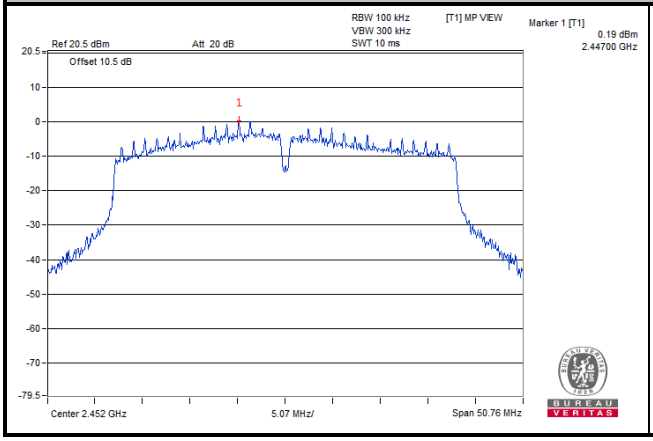


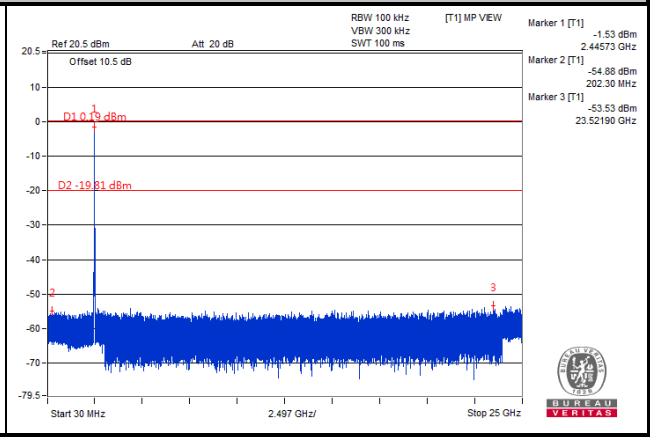
Ch 6

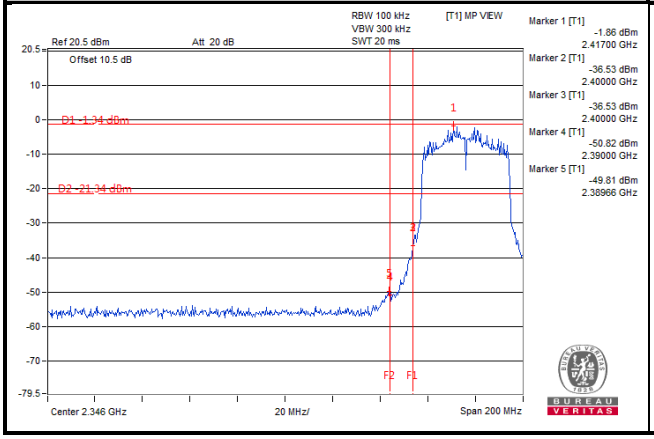
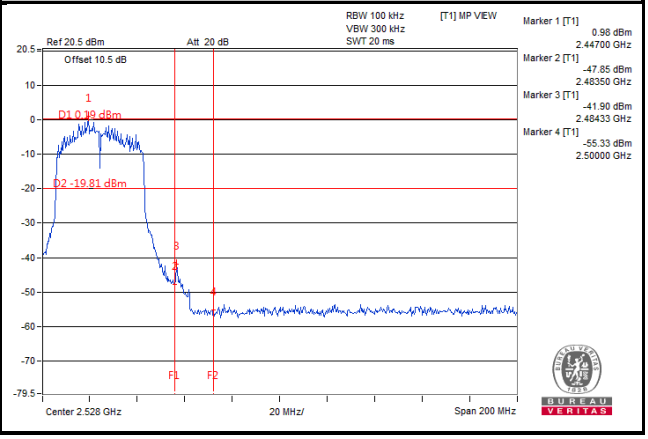




Ch 9





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:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

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Hwa Ya EMC/RF/Safety Lab
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Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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