FCC Test Report

Report No.:	RFBERD-WTW-P20110669-2 R1
FCC ID:	COF-WMBACAT49
Test Model:	WM-BAC-AT-49
Received Date:	Nov. 21, 2020
Test Date:	Dec. 10, 2020 ~ Dec. 24, 2020
Issued Date:	Mar. 04, 2021
Applicant:	Universal Global Scientific Industrial Co., Ltd.
Address:	141, Lane 351, Sec. 1, Taiping Road., Tsaotuen, Nantou 54261, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBERD-WTW-P20110669-2	Original Release	Dec. 31, 2020
RFBERD-WTW-P20110669-2 R1	Revise antenna type	Mar. 04, 2021

1 Certificate of Conformity

Product:	802.11a/b/g/n/ac 2x2 MIMO + BT 5.1 Combo Module
Brand:	USI
Test Model:	WM-BAC-AT-49
Sample Status:	Engineering Sample
Applicant:	Universal Global Scientific Industrial Co., Ltd.
Test Date:	Dec. 10, 2020 ~ Dec. 24, 2020
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 RF characteristics under the conditions specified in this report.

Prepared by : Vera Huang , **Date:** Mar. 04, 2021

Vera Huang / Specialist

Approved by : , **Date:** Mar. 04, 2021

Dylan Chiou / Senior 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 -5.27 dB at 0.15000 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.5 dB at 4874.00 MHz & 2390.00 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
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	Antenna connector is i-pex(MHF).

Note:

1. For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	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	802.11a/b/g/n/ac 2x2 MIMO + BT 5.1 Combo Module
Brand	USI
Test Model	WM-BAC-AT-49
Status of EUT	Engineering Sample
Power Supply Rating	3.6 Vdc (Power Supply) 5 Vdc (host equipment)
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 144.4 Mbps
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	145.990 mW for WLAN Ant. A 154.684 mW for WLAN Ant. B
Antenna Type	Refer to Note as below
Antenna Connector	i-pex(MHF)
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

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

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

2. The antenna information is listed as below.

WLAN Antenna	Antenna Type	Cable Length	Gain (dBi)
A	Dipole	150mm	-1.26 dBi @ 2.4 GHz -0.3 dBi @ 2.45 GHz 0.14 dBi @ 2.5 GHz
		1280mm	-4.77 dBi @ 2.4 GHz -3.87 dBi @ 2.45 GHz -3.44 dBi @ 2.5 GHz
B	Dipole	60mm	1.42 dBi @ 2.4 GHz 2.36 dBi @ 2.45 GHz 3.18 dBi @ 2.5 GHz
		700mm	0.59 dBi @ 2.4 GHz 1.38 dBi @ 2.45 GHz 1.84 dBi @ 2.5 GHz

3. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
5. The product WiFi 2.4G and WiFi 5G will not simultaneous transmissions , but 2.4G + BT & 5G + BT can operate at the simultaneous transmissions. The emission of the simultaneous operation has been evaluated and no non-compliance was found.

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		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	WLAN Ant. A (Dipole Antenna)
B	√	√	√	√	WLAN Ant. B (Dipole Antenna)

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

Radiated Emission Test (Above 1 GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A, B	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A, B	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

Radiated Emission Test (Below 1 GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 11	6	DSSS	DBPSK	1.0
B	802.11n (HT20)	1 to 11	1	OFDM	BPSK	6.5

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11b	1 to 11	6	DSSS	DBPSK	1.0
B	802.11n (HT20)	1 to 11	1	OFDM	BPSK	6.5

Bandedge Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
A, B	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
A, B	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	6.5

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A, B	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A, B	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A, B	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	23 deg. C, 67 % RH	120 Vac, 60 Hz	Adair Peng
RE<1G	23 deg. C, 67 % RH	120 Vac, 60 Hz	Adair Peng
PLC	24 deg. C, 70 % RH	120 Vac, 60 Hz	Willy Cheng
APCM	23 deg. C, 66 % RH	3.6 Vdc	Vincent Huang

3.3 Duty Cycle of Test Signal

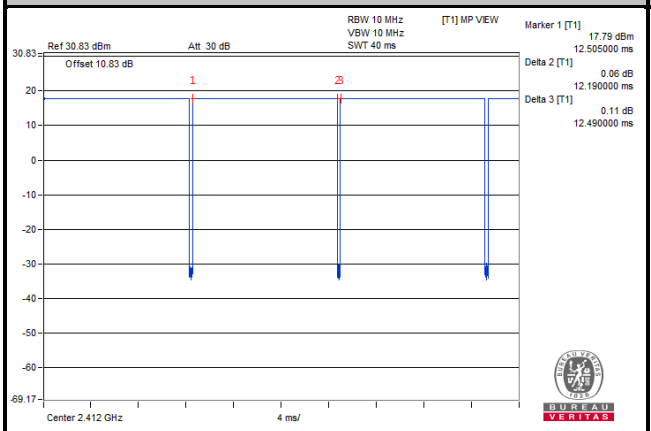
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11b: Duty cycle = 12.19/12.49 = 0.976, Duty factor = 10 * log(1/0.976) = 0.11

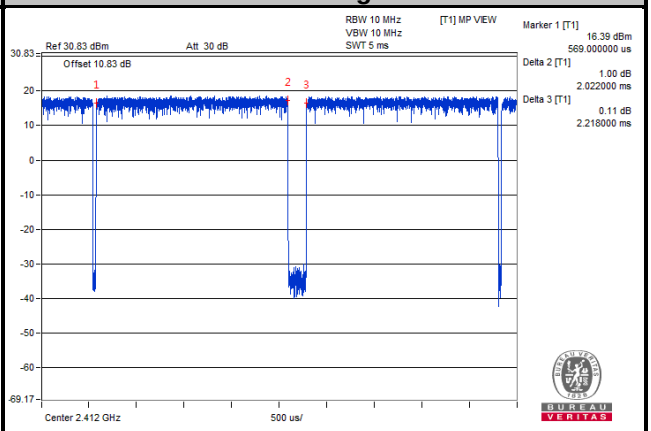
802.11g: Duty cycle = 2.022/2.218 = 0.912, Duty factor = 10 * log(1/0.912) = 0.40

802.11n (HT20): Duty cycle = 1.883/2.086 = 0.903, Duty factor = 10 * log(1/0.903) = 0.44

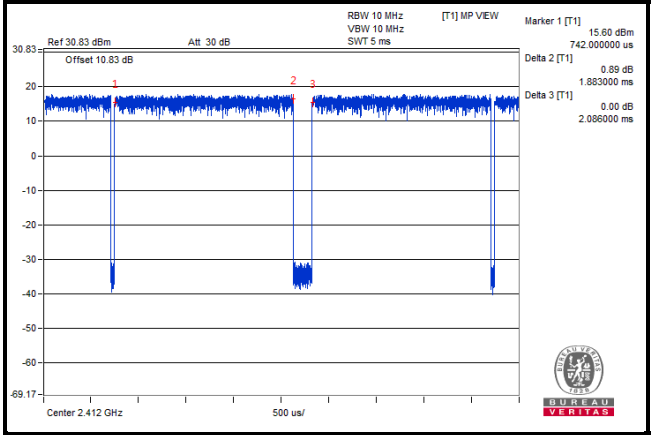
802.11b



802.11g



802.11n (HT20)



3.4 Description of Support Units

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

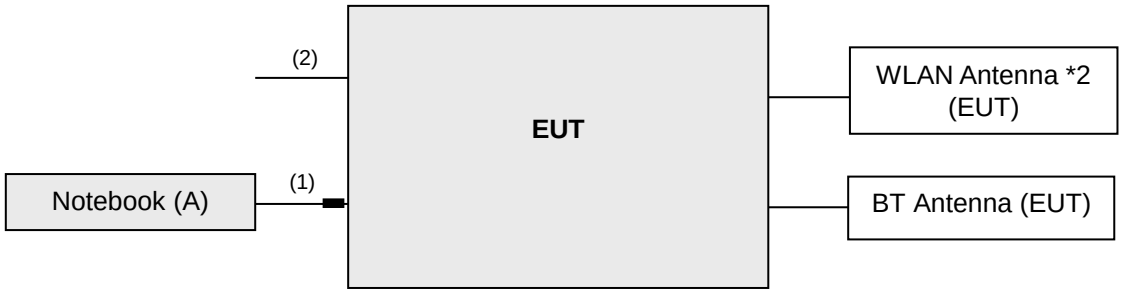
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Notebook	Acer	TMP238-G2-M-56S6	NA	NA	Provided by client

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Micro USB Cable	1	1	N	1	Provided by client
2.	Micro USB Cable	1	1.5	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102579	Jul. 07, 2020	Jul. 06, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jun. 09, 2020	Jun. 08, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSV40	100979	Mar. 18, 2020	Mar. 17, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 04, 2020	Nov. 03, 2021
HORN Antenna SCHWARZBECK	9120D	209	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Loop Antenna EMCI	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 16, 2020	Aug. 15, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 23, 2020	Mar. 22, 2021
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 16, 2020	Aug. 15, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 16, 2020	Aug. 15, 2021
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM-8000	Cable-CH3-03 (309224+170907)	Aug. 16, 2020	Aug. 15, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 13, 2020	Jul. 12, 2021

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 3.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

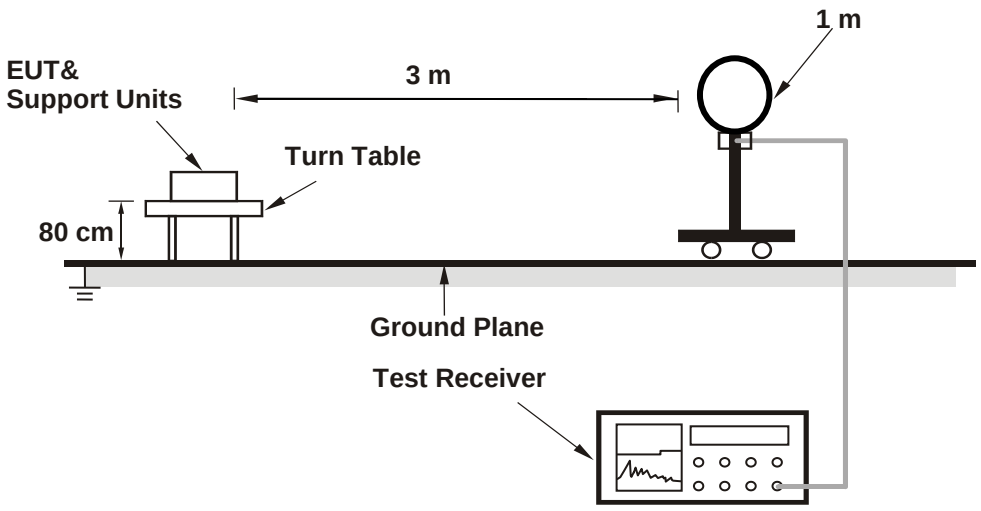
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (11b: RBW = 1 MHz, VBW = 100 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;
   11n (HT20): RBW = 1 MHz, VBW = 1 kHz
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

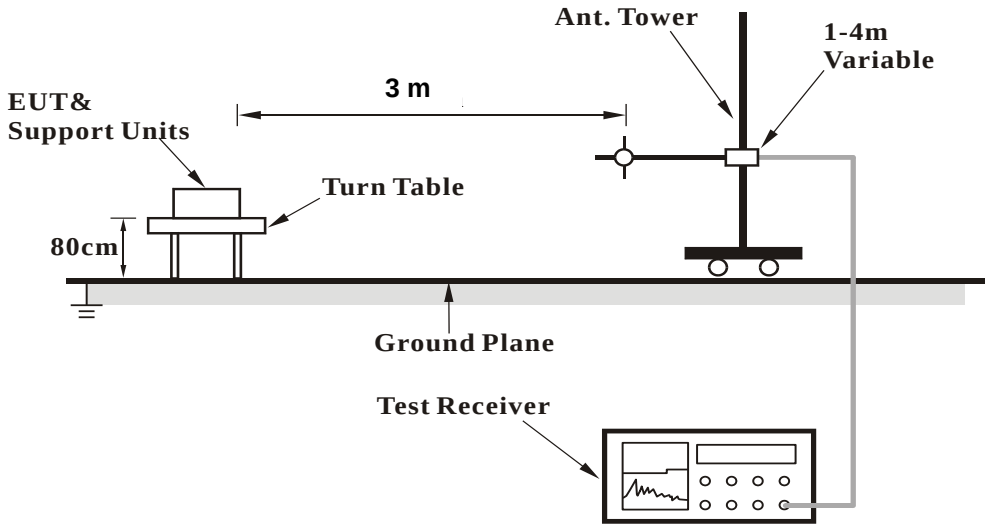
No deviation.

4.1.5 Test Set Up

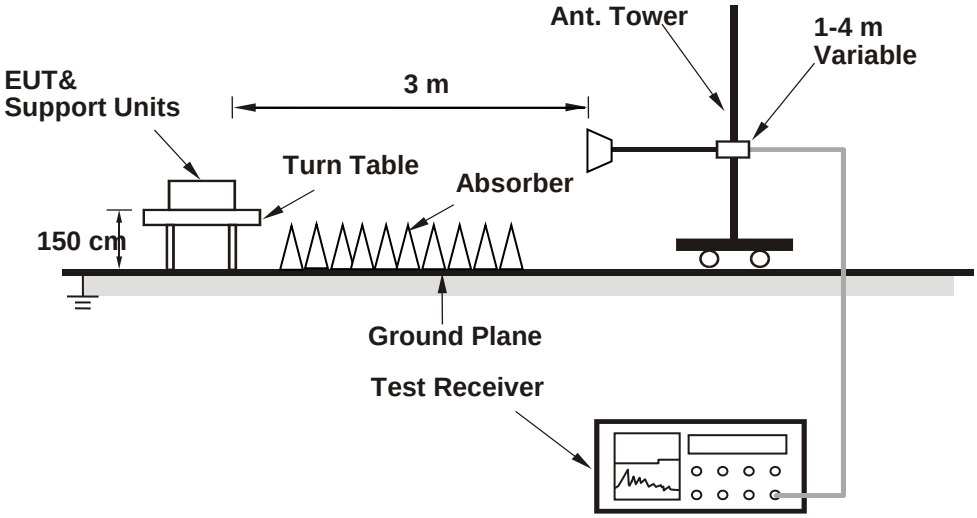
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission 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

Mode A

Above 1 GHz Data：

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.3 PK	74.0	-12.7	1.89 H	175	26.9	34.4
2	2390.00	48.8 AV	54.0	-5.2	1.89 H	175	14.4	34.4
3	*2412.00	102.9 PK	-	-	1.89 H	175	68.6	34.3
4	*2412.00	99.3 AV	-	-	1.89 H	175	65.0	34.3
5	4824.00	49.0 PK	74.0	-25.0	2.14 H	142	42.8	6.2
6	4824.00	39.0 AV	54.0	-15.0	2.14 H	142	32.8	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.8 PK	74.0	-13.2	1.47 V	326	26.4	34.4
2	2390.00	49.1 AV	54.0	-4.9	1.47 V	326	14.7	34.4
3	*2412.00	107.5 PK	-	-	1.47 V	326	73.2	34.3
4	*2412.00	103.9 AV	-	-	1.47 V	326	69.6	34.3
5	4824.00	61.2 PK	74.0	-12.8	1.14 V	59	55.0	6.2
6	4824.00	52.2 AV	54.0	-1.8	1.14 V	59	46.0	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	101.3 PK	-	-	1.93 H	188	67.0	34.3
2	*2437.00	97.8 AV	-	-	1.93 H	188	63.5	34.3
3	4874.00	46.2 PK	74.0	-27.8	2.22 H	149	40.1	6.1
4	4874.00	39.4 AV	54.0	-14.6	2.22 H	149	33.3	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	105.9 PK	-	-	1.54 V	285	71.6	34.3
2	*2437.00	102.3 AV	-	-	1.54 V	285	68.0	34.3
3	4874.00	56.3 PK	74.0	-17.7	1.30 V	60	50.2	6.1
4	**4874.00**	**52.5 AV**	**54.0**	**-1.5**	**1.30 V**	**60**	**46.4**	**6.1**

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	98.9 PK	-	-	1.85 H	177	64.5	34.4
2	*2462.00	98.9 AV	-	-	1.85 H	177	64.5	34.4
3	2483.50	61.2 PK	74.0	-12.8	1.85 H	177	26.8	34.4
4	2483.50	48.8 AV	54.0	-5.2	1.85 H	177	14.4	34.4
5	4924.00	47.2 PK	74.0	-26.8	2.05 H	140	41.1	6.1
6	4924.00	39.9 AV	54.0	-14.1	2.05 H	140	33.8	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	107.3 PK	-	-	1.17 V	348	72.9	34.4
2	*2462.00	103.5 AV	-	-	1.17 V	348	69.1	34.4
3	2483.50	61.4 PK	74.0	-12.6	1.17 V	348	27.0	34.4
4	2483.50	49.0 AV	54.0	-5.0	1.17 V	348	14.6	34.4
5	4924.00	56.3 PK	74.0	-17.7	1.18 V	98	50.2	6.1
6	4924.00	52.3 AV	54.0	-1.7	1.18 V	98	46.2	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.9 PK	74.0	-13.1	3.72 H	268	26.5	34.4
2	2390.00	48.7 AV	54.0	-5.3	3.72 H	268	14.3	34.4
3	*2412.00	95.8 PK	-	-	3.72 H	268	61.5	34.3
4	*2412.00	86.4 AV	-	-	3.72 H	268	52.1	34.3
5	4824.00	48.5 PK	74.0	-25.5	1.99 H	211	42.3	6.2
6	4824.00	34.8 AV	54.0	-19.2	1.99 H	211	28.6	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.1 PK	74.0	-7.9	1.77 V	242	31.7	34.4
2	2390.00	52.1 AV	54.0	-1.9	1.77 V	242	17.7	34.4
3	*2412.00	111.3 PK	-	-	1.77 V	242	77.0	34.3
4	*2412.00	101.8 AV	-	-	1.77 V	242	67.5	34.3
5	4824.00	52.4 PK	74.0	-21.6	1.52 V	312	46.2	6.2
6	4824.00	38.8 AV	54.0	-15.2	1.52 V	312	32.6	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	96.5 PK	-	-	3.72 H	221	62.2	34.3
2	*2437.00	87.3 AV	-	-	3.72 H	221	53.0	34.3
3	4874.00	48.4 PK	74.0	-25.6	1.92 H	162	42.3	6.1
4	4874.00	34.5 AV	54.0	-19.5	1.92 H	162	28.4	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	111.3 PK	-	-	1.32 V	167	77.0	34.3
2	*2437.00	101.5 AV	-	-	1.32 V	167	67.2	34.3
3	4874.00	51.8 PK	74.0	-22.2	1.91 V	348	45.7	6.1
4	4874.00	38.9 AV	54.0	-15.1	1.91 V	348	32.8	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	100.7 PK	-	-	3.74 H	198	66.3	34.4
2	*2462.00	91.5 AV	-	-	3.74 H	198	57.1	34.4
3	2483.50	61.4 PK	74.0	-12.6	3.74 H	198	27.0	34.4
4	2483.50	49.0 AV	54.0	-5.0	3.74 H	198	14.6	34.4
5	4924.00	48.4 PK	74.0	-25.6	1.64 H	188	42.3	6.1
6	4924.00	34.6 AV	54.0	-19.4	1.64 H	188	28.5	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	111.2 PK	-	-	1.19 V	112	76.8	34.4
2	*2462.00	101.9 AV	-	-	1.19 V	112	67.5	34.4
3	2483.50	65.4 PK	74.0	-8.6	1.19 V	112	31.0	34.4
4	2483.50	52.2 AV	54.0	-1.8	1.19 V	112	17.8	34.4
5	4924.00	50.9 PK	74.0	-23.1	1.34 V	314	44.8	6.1
6	4924.00	38.8 AV	54.0	-15.2	1.34 V	314	32.7	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.6 PK	74.0	-13.4	3.89 H	224	26.2	34.4
2	2390.00	48.8 AV	54.0	-5.2	3.89 H	224	14.4	34.4
3	*2412.00	96.7 PK	-	-	3.89 H	224	62.4	34.3
4	*2412.00	86.9 AV	-	-	3.89 H	224	52.6	34.3
5	4824.00	48.4 PK	74.0	-25.6	1.86 H	135	42.2	6.2
6	4824.00	34.8 AV	54.0	-19.2	1.86 H	135	28.6	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.8 PK	74.0	-6.2	1.34 V	72	33.4	34.4
2	2390.00	52.4 AV	54.0	-1.6	1.34 V	72	18.0	34.4
3	*2412.00	109.6 PK	-	-	1.34 V	72	75.3	34.3
4	*2412.00	99.9 AV	-	-	1.34 V	72	65.6	34.3
5	4824.00	51.1 PK	74.0	-22.9	1.74 V	312	44.9	6.2
6	4824.00	36.8 AV	54.0	-17.2	1.74 V	312	30.6	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	98.0 PK	-	-	3.86 H	200	63.7	34.3
2	*2437.00	88.4 AV	-	-	3.86 H	200	54.1	34.3
3	4874.00	48.2 PK	74.0	-25.8	1.96 H	146	42.1	6.1
4	4874.00	35.9 AV	54.0	-18.1	1.96 H	146	29.8	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	110.1 PK	-	-	1.54 V	57	75.8	34.3
2	*2437.00	100.5 AV	-	-	1.54 V	57	66.2	34.3
3	4874.00	51.0 PK	74.0	-23.0	1.27 V	319	44.9	6.1
4	4874.00	38.7 AV	54.0	-15.3	1.27 V	319	32.6	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	96.7 PK	-	-	2.17 H	115	62.3	34.4
2	*2462.00	87.2 AV	-	-	2.17 H	115	52.8	34.4
3	2483.50	61.2 PK	74.0	-12.8	2.17 H	115	26.8	34.4
4	2483.50	49.0 AV	54.0	-5.0	2.17 H	115	14.6	34.4
5	4924.00	49.5 PK	74.0	-24.5	1.83 H	169	43.4	6.1
6	4924.00	35.9 AV	54.0	-18.1	1.83 H	169	29.8	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	111.2 PK	-	-	1.48 V	110	76.8	34.4
2	*2462.00	101.5 AV	-	-	1.48 V	110	67.1	34.4
3	2483.50	66.0 PK	74.0	-8.0	1.48 V	110	31.6	34.4
4	2483.50	52.2 AV	54.0	-1.8	1.48 V	110	17.8	34.4
5	4924.00	48.9 PK	74.0	-25.1	1.27 V	318	42.8	6.1
6	4924.00	36.6 AV	54.0	-17.4	1.27 V	318	30.5	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": 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:

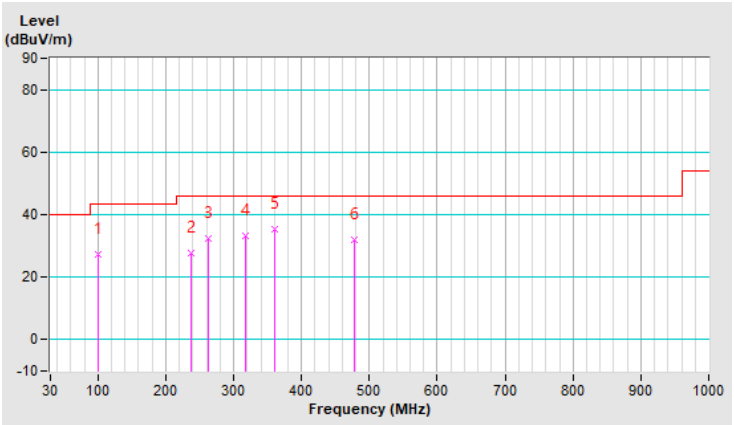
802.11b

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	100.29	27.3 QP	43.5	-16.2	1.50 H	5	40.5	-13.2
2	236.65	27.8 QP	46.0	-18.2	1.00 H	253	37.3	-9.5
3	263.36	32.5 QP	46.0	-13.5	1.50 H	133	40.3	-7.8
4	318.19	33.1 QP	46.0	-12.9	1.00 H	97	39.2	-6.1
5	360.36	35.3 QP	46.0	-10.7	1.00 H	128	40.7	-5.4
6	478.45	31.9 QP	46.0	-14.1	1.50 H	268	34.5	-2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

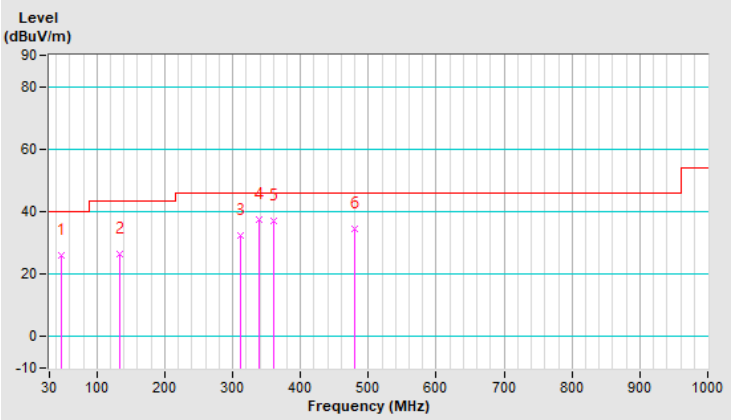


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.28	26.1 QP	40.0	-13.9	1.49 V	295	35.2	-9.1
2	134.03	26.5 QP	43.5	-17.0	1.49 V	72	36.0	-9.5
3	311.16	32.4 QP	46.0	-13.6	1.49 V	176	38.7	-6.3
4	339.28	37.3 QP	46.0	-8.7	2.00 V	347	43.1	-5.8
5	360.36	37.0 QP	46.0	-9.0	1.49 V	19	42.4	-5.4
6	479.86	34.5 QP	46.0	-11.5	2.00 V	331	37.1	-2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



Mode B

Above 1 GHz Data：

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	59.9 PK	74.0	-14.1	1.58 H	211	25.5	34.4
2	2390.00	48.5 AV	54.0	-5.5	1.58 H	211	14.1	34.4
3	*2412.00	107.8 PK	-	-	1.58 H	211	73.5	34.3
4	*2412.00	104.3 AV	-	-	1.58 H	211	70.0	34.3
5	4824.00	51.7 PK	74.0	-22.3	2.22 H	142	45.5	6.2
6	4824.00	39.5 AV	54.0	-14.5	2.22 H	142	33.3	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.0 PK	74.0	-11.0	1.59 V	192	28.6	34.4
2	2390.00	51.9 AV	54.0	-2.1	1.59 V	192	17.5	34.4
3	*2412.00	112.2 PK	-	-	1.59 V	192	77.9	34.3
4	*2412.00	108.9 AV	-	-	1.59 V	192	74.6	34.3
5	4824.00	55.9 PK	74.0	-18.1	2.55 V	93	49.7	6.2
6	4824.00	52.4 AV	54.0	-1.6	2.55 V	93	46.2	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	107.5 PK	-	-	1.63 H	205	73.2	34.3
2	*2437.00	104.0 AV	-	-	1.63 H	205	69.7	34.3
3	4874.00	53.1 PK	74.0	-20.9	1.97 H	140	47.0	6.1
4	4874.00	44.2 AV	54.0	-9.8	1.97 H	140	38.1	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	111.9 PK	-	-	1.30 V	185	77.6	34.3
2	*2437.00	108.2 AV	-	-	1.30 V	185	73.9	34.3
3	4874.00	56.2 PK	74.0	-17.8	2.14 V	340	50.1	6.1
4	4874.00	51.0 AV	54.0	-3.0	2.14 V	340	44.9	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	107.5 PK	-	-	1.47 H	189	73.1	34.4
2	*2462.00	104.1 AV	-	-	1.47 H	189	69.7	34.4
3	2483.50	60.4 PK	74.0	-13.6	1.47 H	189	26.0	34.4
4	2483.50	49.5 AV	54.0	-4.5	1.47 H	189	15.1	34.4
5	4924.00	57.8 PK	74.0	-16.2	1.93 H	156	51.7	6.1
6	4924.00	44.3 AV	54.0	-9.7	1.93 H	156	38.2	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	111.8 PK	-	-	1.53 V	181	77.4	34.4
2	*2462.00	108.3 AV	-	-	1.53 V	181	73.9	34.4
3	2483.50	62.6 PK	74.0	-11.4	1.53 V	181	28.2	34.4
4	2483.50	51.3 AV	54.0	-2.7	1.53 V	181	16.9	34.4
5	4924.00	61.1 PK	74.0	-12.9	3.00 V	167	55.0	6.1
6	4924.00	52.2 AV	54.0	-1.8	3.00 V	167	46.1	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.9 PK	74.0	-12.1	1.50 H	163	27.5	34.4
2	2390.00	49.7 AV	54.0	-4.3	1.50 H	163	15.3	34.4
3	*2412.00	107.4 PK	-	-	1.50 H	163	73.1	34.3
4	*2412.00	97.8 AV	-	-	1.50 H	163	63.5	34.3
5	4824.00	49.3 PK	74.0	-24.7	1.97 H	136	43.1	6.2
6	4824.00	36.0 AV	54.0	-18.0	1.97 H	136	29.8	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.0 PK	74.0	-10.0	1.64 V	342	29.6	34.4
2	2390.00	52.3 AV	54.0	-1.7	1.64 V	342	17.9	34.4
3	*2412.00	112.3 PK	-	-	1.64 V	342	78.0	34.3
4	*2412.00	102.7 AV	-	-	1.64 V	342	68.4	34.3
5	4824.00	50.6 PK	74.0	-23.4	1.57 V	21	44.4	6.2
6	4824.00	37.2 AV	54.0	-16.8	1.57 V	21	31.0	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	106.1 PK	-	-	1.50 H	163	71.8	34.3
2	*2437.00	96.5 AV	-	-	1.50 H	163	62.2	34.3
3	4874.00	49.4 PK	74.0	-24.6	2.15 H	128	43.3	6.1
4	4874.00	36.2 AV	54.0	-17.8	2.15 H	128	30.1	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	111.3 PK	-	-	1.85 V	336	77.0	34.3
2	*2437.00	101.7 AV	-	-	1.85 V	336	67.4	34.3
3	4874.00	51.7 PK	74.0	-22.3	1.61 V	23	45.6	6.1
4	4874.00	38.4 AV	54.0	-15.6	1.61 V	23	32.3	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	106.2 PK	-	-	1.43 H	168	71.8	34.4
2	*2462.00	96.6 AV	-	-	1.43 H	168	62.2	34.4
3	2483.50	66.4 PK	74.0	-7.6	1.43 H	168	32.0	34.4
4	2483.50	49.6 AV	54.0	-4.4	1.43 H	168	15.2	34.4
5	4924.00	48.1 PK	74.0	-25.9	2.15 H	133	42.0	6.1
6	4924.00	34.9 AV	54.0	-19.1	2.15 H	133	28.8	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	111.4 PK	-	-	2.45 V	329	77.0	34.4
2	*2462.00	101.8 AV	-	-	2.45 V	329	67.4	34.4
3	2483.50	68.4 PK	74.0	-5.6	2.45 V	329	34.0	34.4
4	2483.50	52.3 AV	54.0	-1.7	2.45 V	329	17.9	34.4
5	4924.00	50.4 PK	74.0	-23.6	1.58 V	20	44.3	6.1
6	4924.00	36.9 AV	54.0	-17.1	1.58 V	20	30.8	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.9 PK	74.0	-9.1	1.53 H	175	30.5	34.4
2	2390.00	49.9 AV	54.0	-4.1	1.53 H	175	15.5	34.4
3	*2412.00	106.5 PK	-	-	1.53 H	175	72.2	34.3
4	*2412.00	96.8 AV	-	-	1.53 H	175	62.5	34.3
5	4824.00	48.7 PK	74.0	-25.3	2.15 H	135	42.5	6.2
6	4824.00	35.8 AV	54.0	-18.2	2.15 H	135	29.6	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.2 PK	74.0	-6.8	2.10 V	338	32.8	34.4
2	**2390.00**	**52.5 AV**	**54.0**	**-1.5**	**2.10 V**	**338**	**18.1**	**34.4**
3	*2412.00	111.3 PK	-	-	2.10 V	338	77.0	34.3
4	*2412.00	101.6 AV	-	-	2.10 V	338	67.3	34.3
5	4824.00	49.9 PK	74.0	-24.1	1.50 V	20	43.7	6.2
6	4824.00	36.7 AV	54.0	-17.3	1.50 V	20	30.5	6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	106.4 PK	-	-	1.42 H	163	72.1	34.3
2	*2437.00	96.7 AV	-	-	1.42 H	163	62.4	34.3
3	4874.00	47.9 PK	74.0	-26.1	2.11 H	130	41.8	6.1
4	4874.00	34.9 AV	54.0	-19.1	2.11 H	130	28.8	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	111.3 PK	-	-	1.88 V	342	77.0	34.3
2	*2437.00	101.6 AV	-	-	1.88 V	342	67.3	34.3
3	4874.00	50.1 PK	74.0	-23.9	1.53 V	22	44.0	6.1
4	4874.00	36.8 AV	54.0	-17.2	1.53 V	22	30.7	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	106.2 PK	-	-	1.59 H	171	71.8	34.4
2	*2462.00	96.7 AV	-	-	1.59 H	171	62.3	34.4
3	2483.50	64.5 PK	74.0	-9.5	1.59 H	171	30.1	34.4
4	2483.50	49.7 AV	54.0	-4.3	1.59 H	171	15.3	34.4
5	4924.00	49.0 PK	74.0	-25.0	1.99 H	129	42.9	6.1
6	4924.00	35.8 AV	54.0	-18.2	1.99 H	129	29.7	6.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	111.3 PK	-	-	2.05 V	338	76.9	34.4
2	*2462.00	101.9 AV	-	-	2.05 V	338	67.5	34.4
3	2483.50	66.6 PK	74.0	-7.4	2.05 V	338	32.2	34.4
4	2483.50	52.3 AV	54.0	-1.7	2.05 V	338	17.9	34.4
5	4924.00	49.3 PK	74.0	-24.7	1.58 V	18	43.2	6.1
6	4924.00	36.2 AV	54.0	-17.8	1.58 V	18	30.1	6.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": 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:

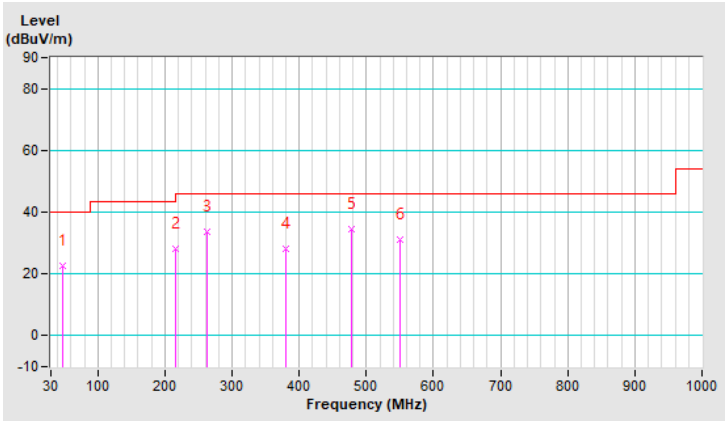
802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.28	22.7 QP	40.0	-17.3	1.00 H	272	31.8	-9.1
2	215.57	28.0 QP	43.5	-15.5	1.50 H	259	38.7	-10.7
3	263.36	33.6 QP	46.0	-12.4	1.50 H	284	41.4	-7.8
4	380.04	28.3 QP	46.0	-17.7	1.50 H	200	33.3	-5.0
5	478.45	34.3 QP	46.0	-11.7	2.00 H	246	36.9	-2.6
6	550.14	31.1 QP	46.0	-14.9	1.00 H	279	32.3	-1.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

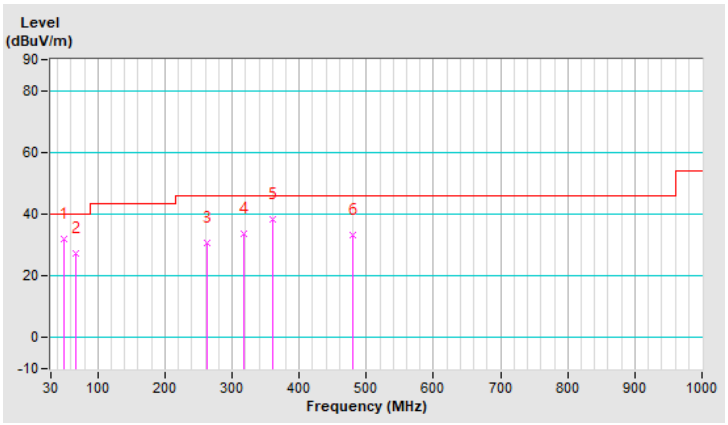


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	49.68	31.9 QP	40.0	-8.1	1.49 V	15	41.0	-9.1
2	66.55	27.4 QP	40.0	-12.6	1.00 V	19	37.7	-10.3
3	263.36	30.8 QP	46.0	-15.2	1.49 V	162	38.6	-7.8
4	318.19	33.5 QP	46.0	-12.5	1.99 V	8	39.6	-6.1
5	360.36	38.1 QP	46.0	-7.9	1.49 V	15	43.5	-5.4
6	479.86	33.1 QP	46.0	-12.9	1.00 V	314	35.7	-2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 17, 2020	Feb. 16, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 20, 2020	Jan. 19, 2021
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 18, 2020	Aug. 17, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	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 2 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

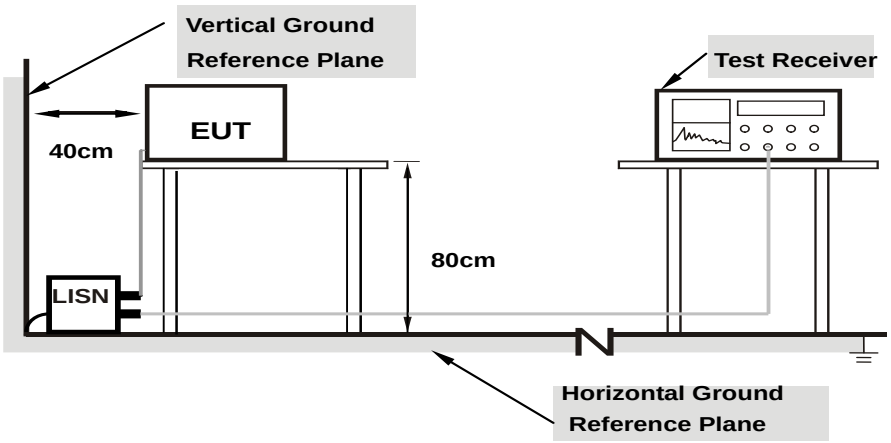
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling 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: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

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

4.2.7 Test Results

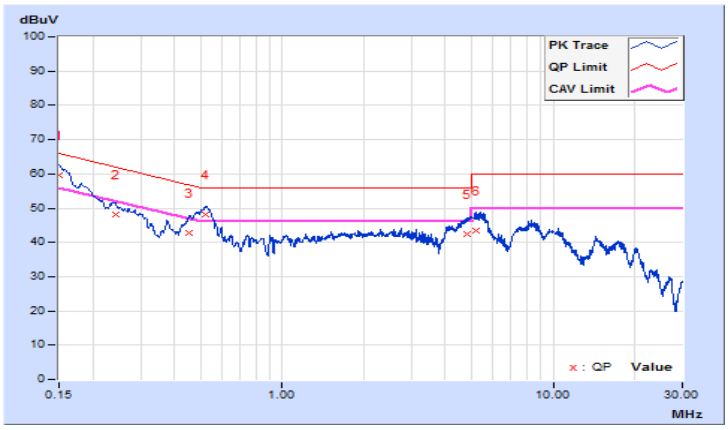
Mode A

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24℃, 70%RH
Tested by	Willy Cheng	Test Date	2020/12/19

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.09	49.38	34.91	59.47	45.00	66.00	56.00	-6.53	-11.00
2	0.24167	10.10	38.06	26.65	48.16	36.75	62.04	52.04	-13.88	-15.29
3	0.45544	10.10	32.50	22.05	42.60	32.15	56.78	46.78	-14.18	-14.63
4	0.52109	10.11	38.18	29.52	48.29	39.63	56.00	46.00	-7.71	-6.37
5	4.78950	10.24	32.21	25.67	42.45	35.91	56.00	46.00	-13.55	-10.09
6	5.18550	10.24	33.23	26.19	43.47	36.43	60.00	50.00	-16.53	-13.57

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

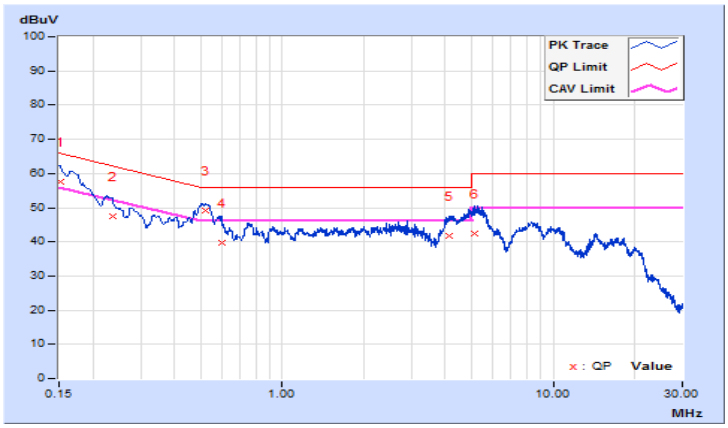


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24℃, 70%RH
Tested by	Willy Cheng	Test Date	2020/12/19

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15225	10.06	47.64	32.68	57.70	42.74	65.88	55.88	-8.18	-13.14
2	0.23550	10.06	37.28	25.26	47.34	35.32	62.25	52.25	-14.91	-16.93
3	0.52246	10.09	39.16	30.42	49.25	40.51	56.00	46.00	-6.75	-5.49
4	0.59550	10.10	29.58	19.72	39.68	29.82	56.00	46.00	-16.32	-16.18
5	4.14825	10.23	31.58	23.79	41.81	34.02	56.00	46.00	-14.19	-11.98
6	5.10675	10.26	32.24	25.91	42.50	36.17	60.00	50.00	-17.50	-13.83

Remarks:

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



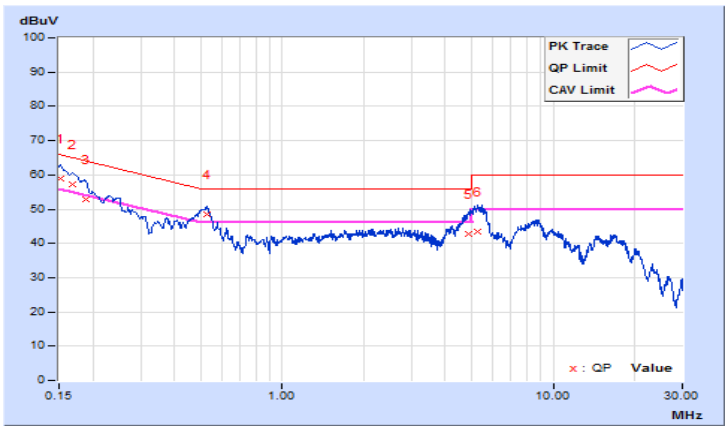
Mode B

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24℃, 70%RH
Tested by	Willy Cheng	Test Date	2020/12/19

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15225	10.09	48.98	34.64	59.07	44.73	65.88	55.88	-6.81	-11.15
2	0.16743	10.09	47.15	25.62	57.24	35.71	65.09	55.09	-7.85	-19.38
3	0.18825	10.10	42.69	28.83	52.79	38.93	64.11	54.11	-11.32	-15.18
4	0.52800	10.11	38.53	30.39	48.64	40.50	56.00	46.00	-7.36	-5.50
5	4.87697	10.24	32.68	26.35	42.92	36.59	56.00	46.00	-13.08	-9.41
6	5.28000	10.24	33.21	26.23	43.45	36.47	60.00	50.00	-16.55	-13.53

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

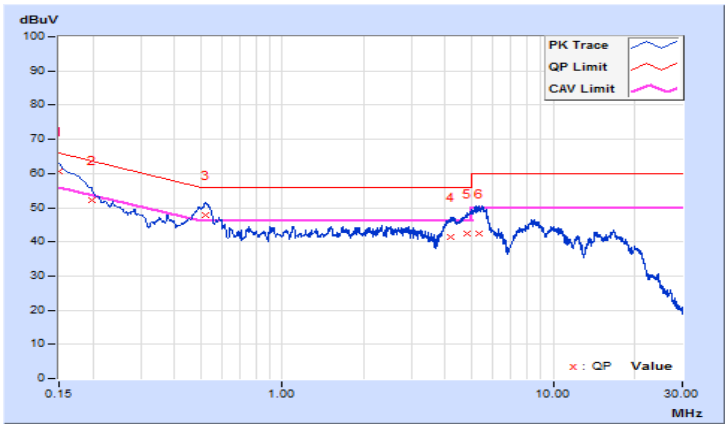


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	24℃, 70%RH
Tested by	Willy Cheng	Test Date	2020/12/19

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**10.06**	**50.67**	**37.83**	**60.73**	**47.89**	**66.00**	**56.00**	**-5.27**	**-8.11**
2	0.19725	10.06	42.12	30.65	52.18	40.71	63.73	53.73	-11.55	-13.02
3	0.51834	10.09	37.85	28.05	47.94	38.14	56.00	46.00	-8.06	-7.86
4	4.16175	10.23	31.17	23.47	41.40	33.70	56.00	46.00	-14.60	-12.30
5	4.79175	10.25	32.34	26.16	42.59	36.41	56.00	46.00	-13.41	-9.59
6	5.30025	10.26	32.26	25.82	42.52	36.08	60.00	50.00	-17.48	-13.92

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

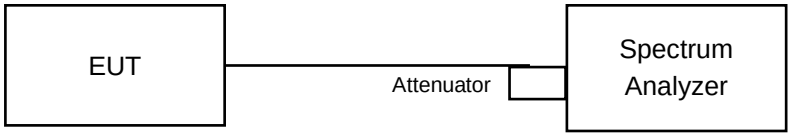


4.3 6 dB Bandwidth Measurement

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 from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	9.05	9.06	0.5	Pass
6	2437	9.09	9.05	0.5	Pass
11	2462	9.10	9.03	0.5	Pass

802.11g

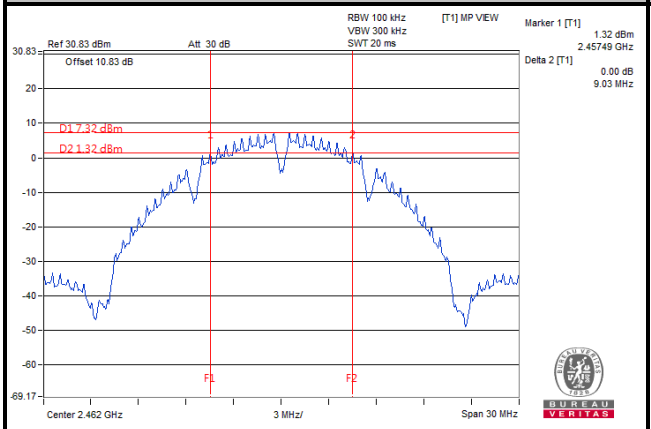
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.13	15.09	0.5	Pass
6	2437	15.10	15.10	0.5	Pass
11	2462	15.11	15.10	0.5	Pass

802.11n (HT20)

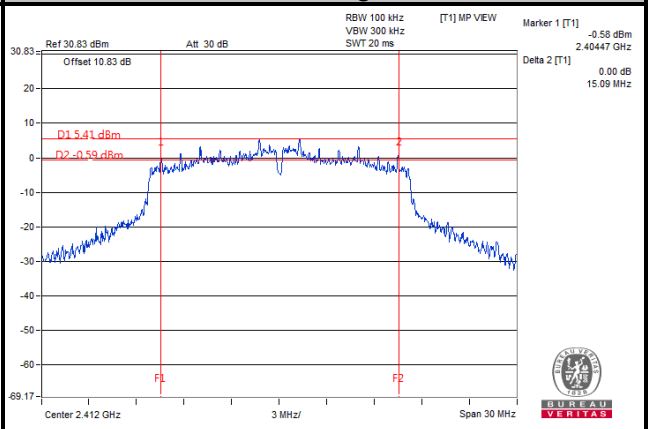
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.11	15.07	0.5	Pass
6	2437	15.09	15.07	0.5	Pass
11	2462	15.14	15.11	0.5	Pass

Spectrum Plot of Worst Value

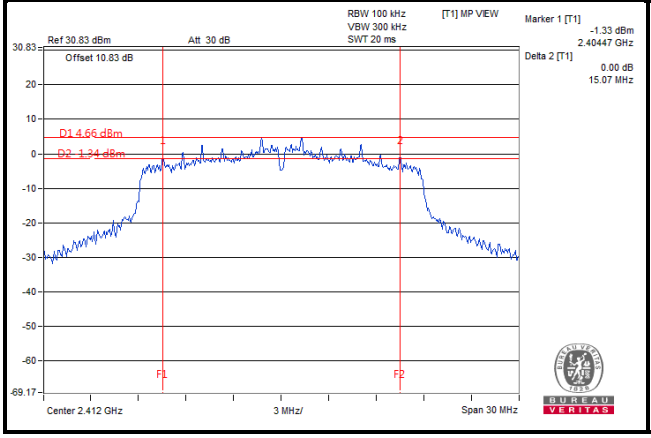
802.11b



802.11g

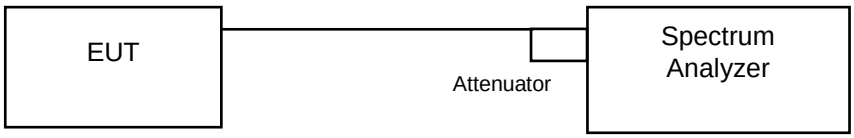


802.11n (HT20)



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.4.4 Deviation from Test Standard

No deviation.

4.4.5 EUT Operating Conditions

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

4.4.6 Test Results

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	14.22	14.22	Pass
6	2437	14.16	14.16	Pass
11	2462	14.28	14.28	Pass

802.11g

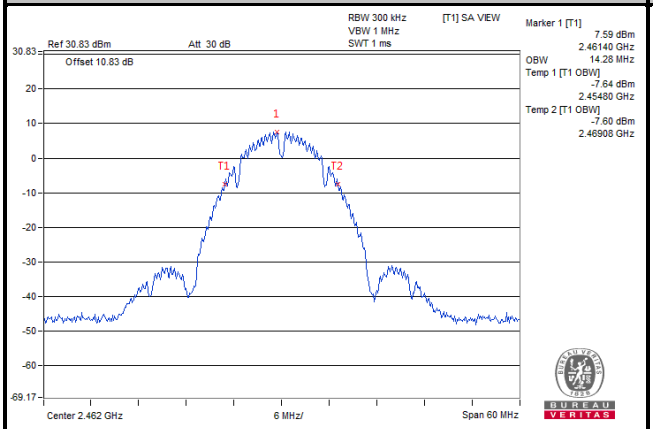
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	16.56	16.68	Pass
6	2437	16.56	16.68	Pass
11	2462	16.56	16.56	Pass

802.11n (HT20)

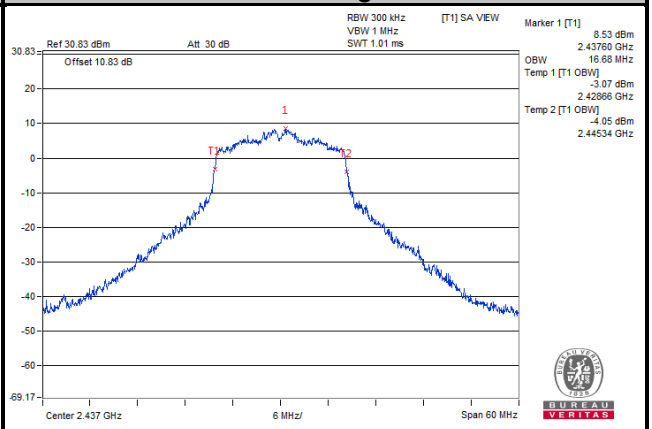
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	17.76	17.76	Pass
6	2437	17.82	17.76	Pass
11	2462	17.64	17.76	Pass

Spectrum Plot of Worst Value

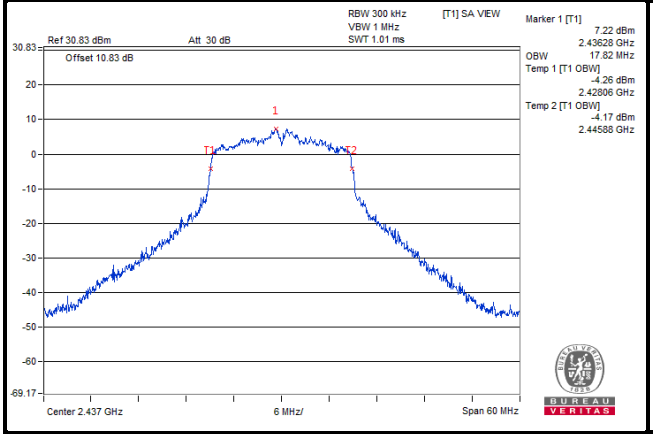
802.11b



802.11g



802.11n (HT20)



4.5 Conducted Output Power Measurement

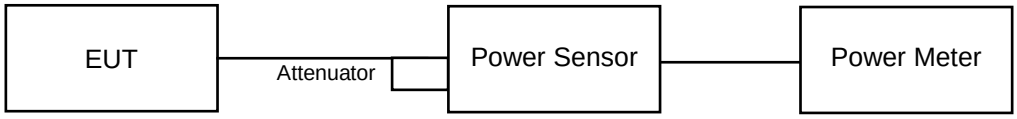
4.5.1 Limits of Conducted Output Power Measurement

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.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test 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.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

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

4.5.7 Test Results

Mode A

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	16.71	17.10	98.167	19.92	30	Pass
6	2437	17.12	17.60	109.067	20.38	30	Pass
11	2462	17.33	17.75	113.642	20.56	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	14.92	15.03	62.888	17.99
6	2437	15.39	15.62	71.069	18.52
11	2462	15.51	15.88	74.289	18.71

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.56	17.64	115.093	20.61	30	Pass
6	2437	18.22	19.01	**145.990**	**21.64**	30	Pass
11	2462	17.63	17.99	120.893	20.82	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	13.45	13.76	45.899	16.62
6	2437	14.52	14.98	59.791	17.77
11	2462	13.58	13.94	47.578	16.77

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	15.77	16.02	77.752	18.91	30	Pass
6	2437	18.22	18.34	134.608	21.29	30	Pass
11	2462	16.28	16.46	86.721	19.38	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	11.49	11.96	29.797	14.74
6	2437	13.52	13.99	47.552	16.77
11	2462	11.97	12.34	32.879	15.17

Mode B

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.71	17.92	136.246	21.34	30	Pass
6	2437	18.69	19.07	**154.684**	**21.89**	30	Pass
11	2462	18.54	18.95	149.973	21.76	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	16.88	16.98	98.641	19.94
6	2437	16.85	17.13	100.059	20.00
11	2462	16.64	17.02	96.482	19.84

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.45	17.86	116.685	20.67	30	Pass
6	2437	18.22	19.01	145.990	21.64	30	Pass
11	2462	16.53	16.64	91.110	19.60	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	13.78	13.88	48.312	16.84
6	2437	14.52	14.98	59.791	17.77
11	2462	12.68	12.83	37.722	15.77

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	17.34	17.42	109.408	20.39	30	Pass
6	2437	18.22	18.34	134.608	21.29	30	Pass
11	2462	17.12	17.21	104.125	20.18	30	Pass

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	12.85	12.93	38.909	15.90
6	2437	13.52	13.99	47.552	16.77
11	2462	12.33	12.43	34.599	15.39

4.6 Power Spectral Density Measurement

4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band during any time interval of continuous transmission.

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

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.

For Average Power (Duty cycle < 98%)

a. Measure the duty cycle (x).
b. Set instrument center frequency to DTS channel center frequency.
c. Set span to at least 1.5 times the OBW.
d. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e. Set VBW ≥3 x RBW.
f. Detector = power averaging (RMS) or sample detector (when RMS not available).
g. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h. Sweep time = auto couple.
i. Do not use sweep triggering. Allow sweep to “free run”.
j. Employ trace averaging (RMS) mode over a minimum of 100 traces.
k. Use the peak marker function to determine the maximum amplitude level.
l. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

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

802.11b

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	-6.03	3.01	-3.02	7.81	Pass
	6	2437	-6.71	3.01	-3.7	7.81	Pass
	11	2462	-6.76	3.01	-3.75	7.81	Pass
1	1	2412	-6.01	3.01	-3	7.81	Pass
	6	2437	-6.87	3.01	-3.86	7.81	Pass
	11	2462	-6.82	3.01	-3.81	7.81	Pass

NOTE:

1. Directional gain = 3.18 dBi + 10log(2) = 6.19 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.19-6) = 7.81 dBm.
2. Method 2) C) of power density measurement of KDB 662911 is using for calculating total power density.

802.11g

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	-8.39	3.01	-5.38	7.81	Pass
	6	2437	-7.43	3.01	-4.42	7.81	Pass
	11	2462	-9.46	3.01	-6.45	7.81	Pass
1	1	2412	-8.17	3.01	-5.16	7.81	Pass
	6	2437	-7.77	3.01	-4.76	7.81	Pass
	11	2462	-9.01	3.01	-6	7.81	Pass

NOTE:

1. Directional gain = 3.18 dBi + 10log(2) = 6.19 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.19-6) = 7.81 dBm.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

802.11n (HT20)

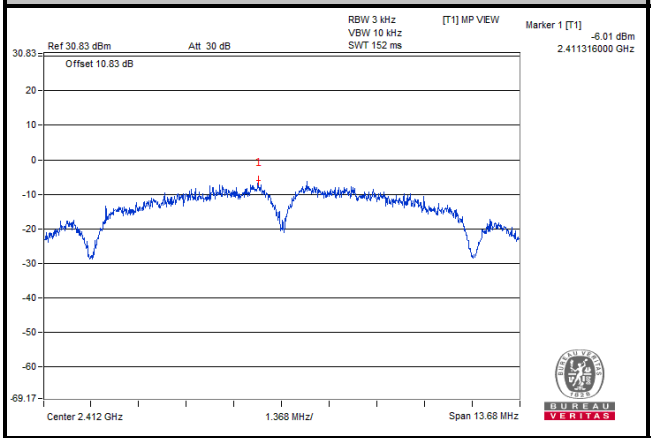
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-10.12	3.01	-7.11	7.81	Pass
	6	2437	-9.54	3.01	-6.53	7.81	Pass
	11	2462	-10.62	3.01	-7.61	7.81	Pass
1	1	2412	-10.47	3.01	-7.46	7.81	Pass
	6	2437	-9.26	3.01	-6.25	7.81	Pass
	11	2462	-10.44	3.01	-7.43	7.81	Pass

NOTE:

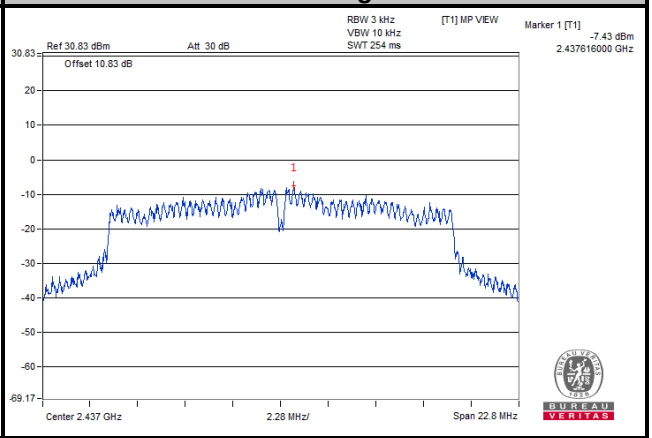
1. Directional gain = 3.18 dBi + 10log(2) = 6.19 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.19-6) = 7.81 dBm.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

Spectrum Plot of Worst Value

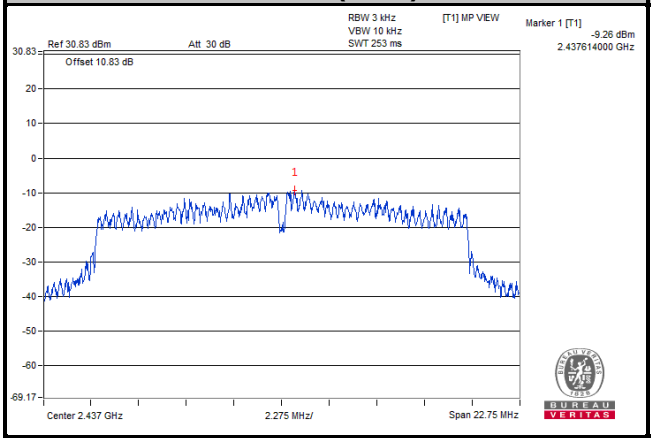
802.11b



802.11g



802.11n (HT20)

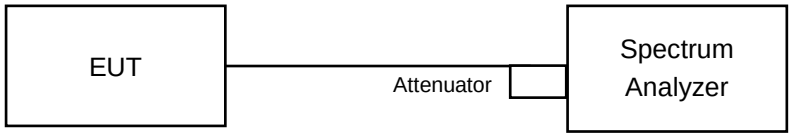


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

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

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 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.

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

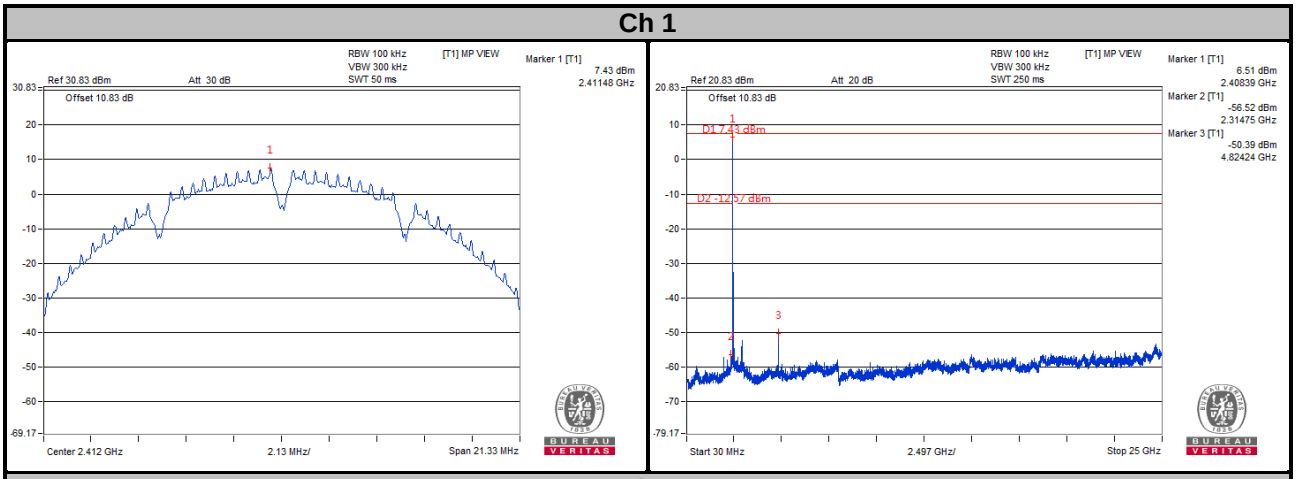
4.7.7 Test Results

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.

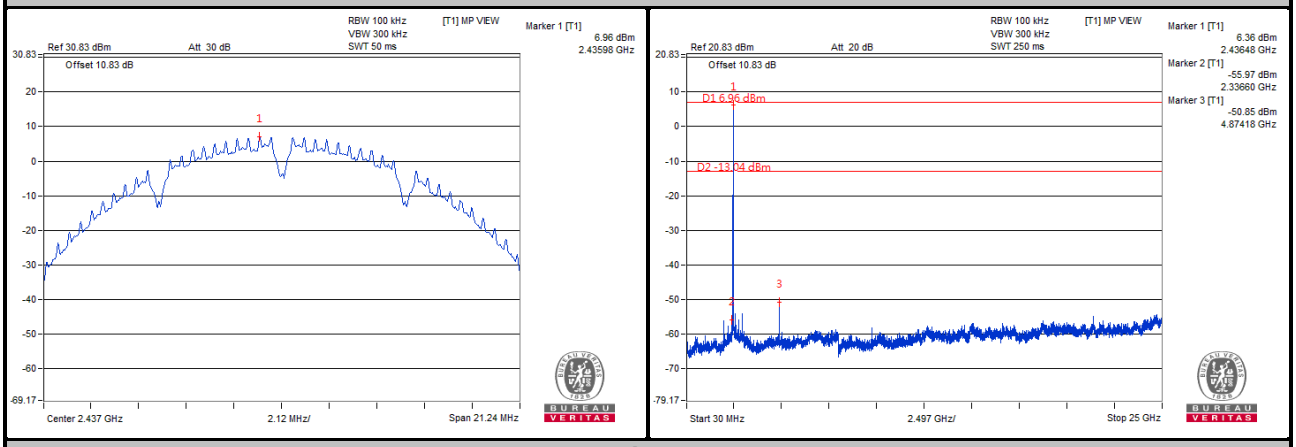
802.11b

CHAIN 0

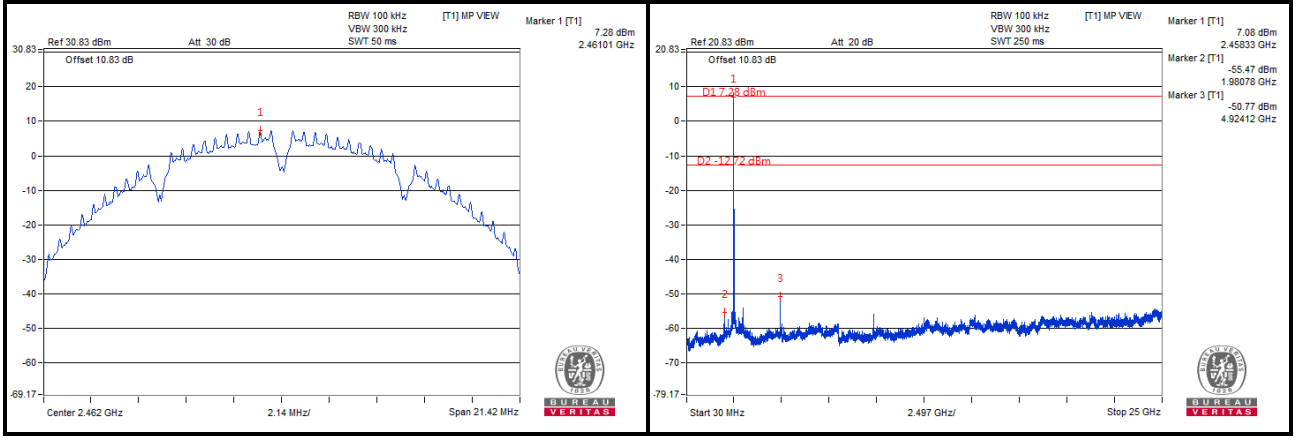
Ch 1

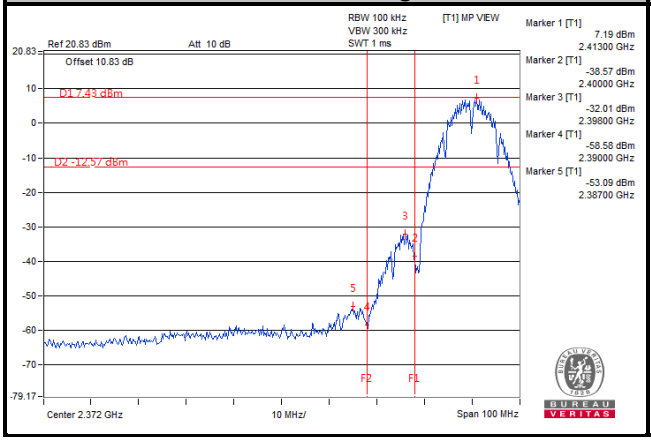
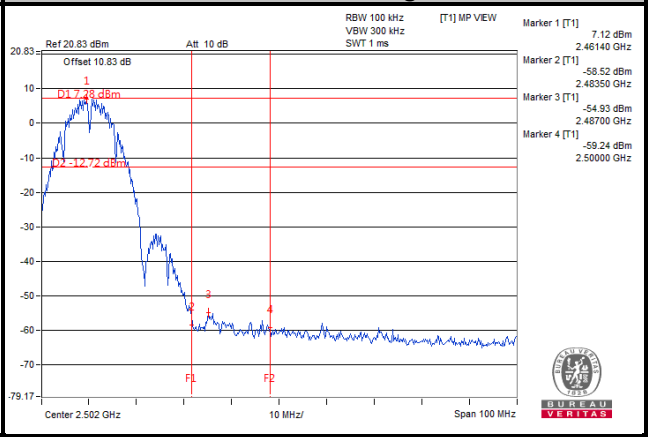


Ch 6



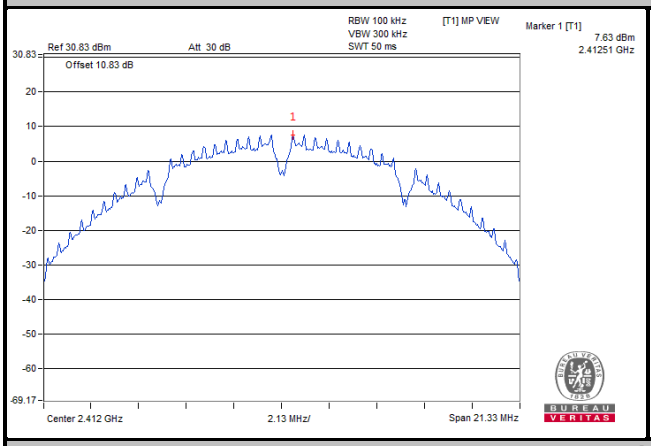
Ch 11

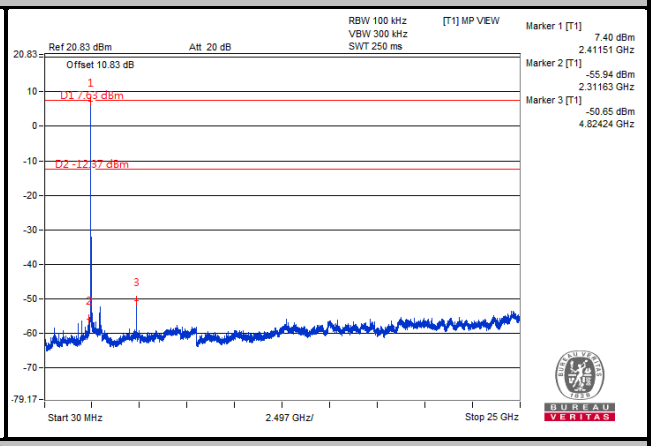


Ch 1 Band Edge	Ch 11 Band Edge
	

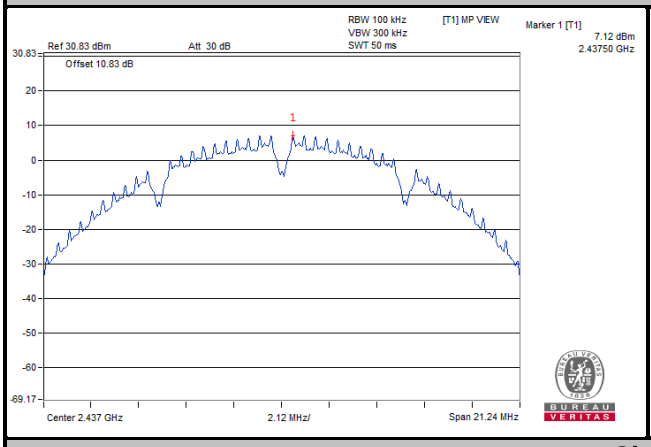
CHAIN 1

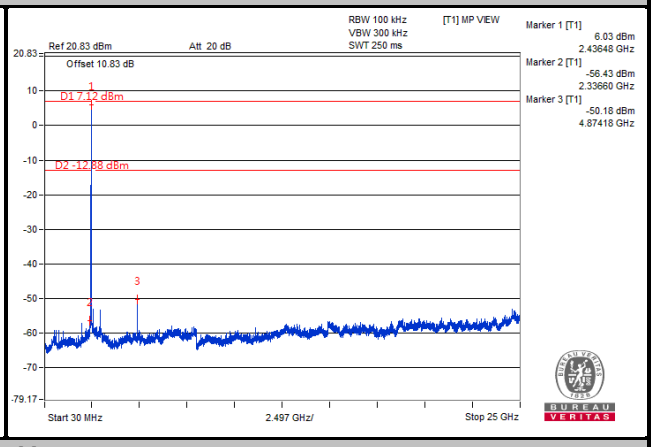
Ch 1



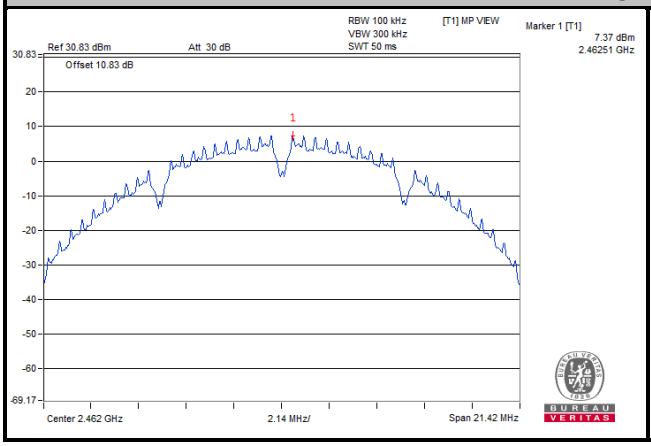


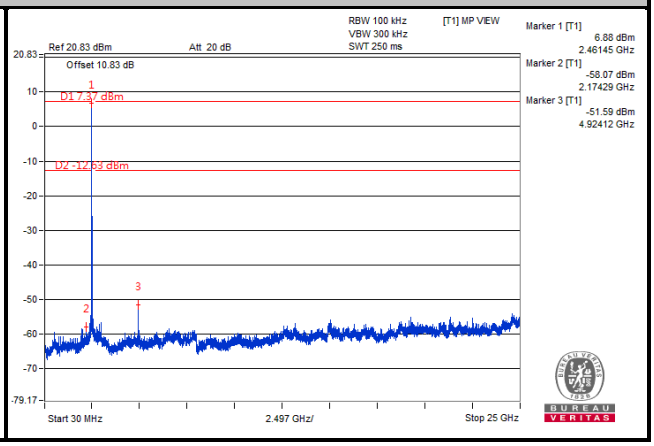
Ch 6

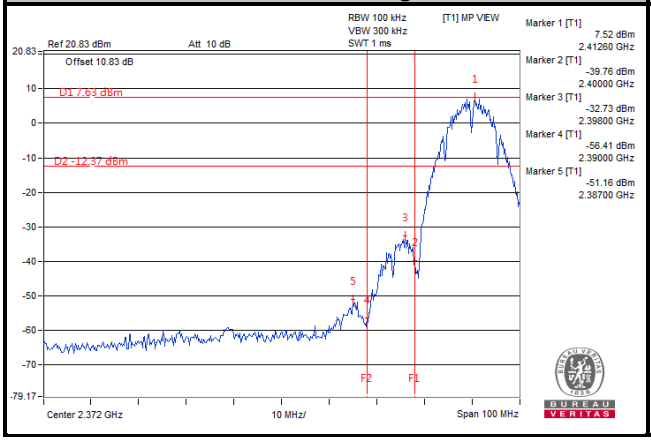
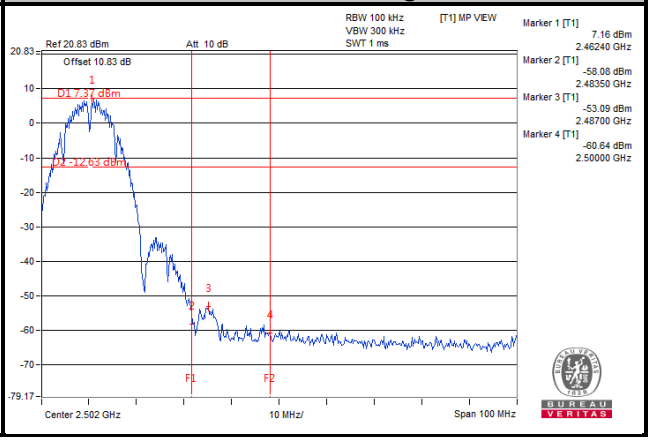




Ch 11



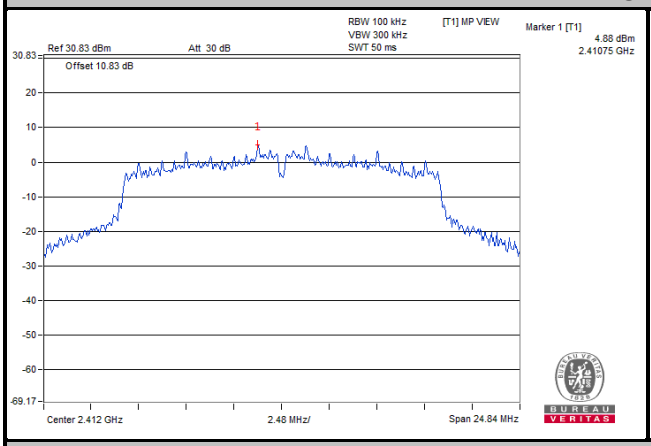


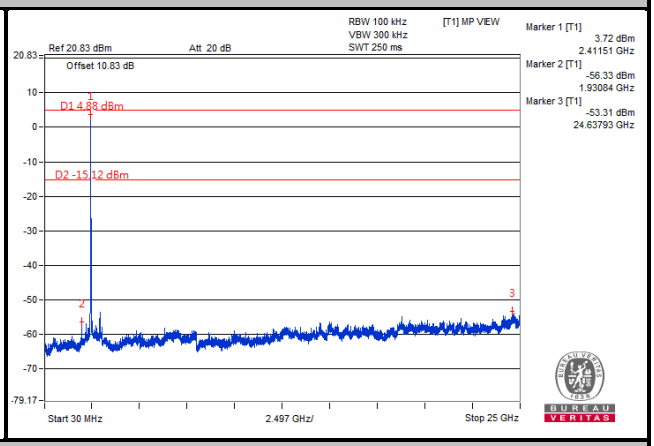
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11g

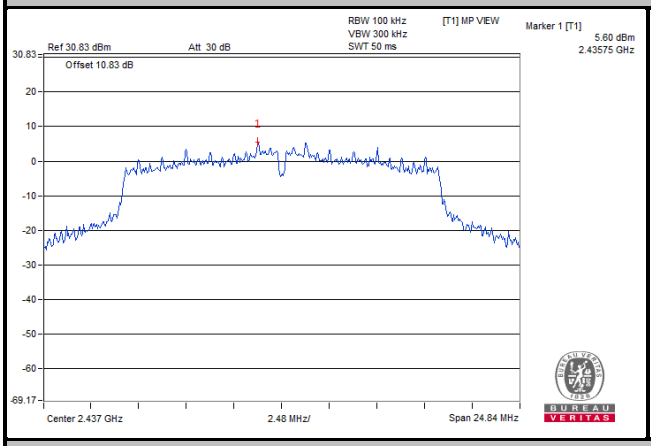
CHAIN 0

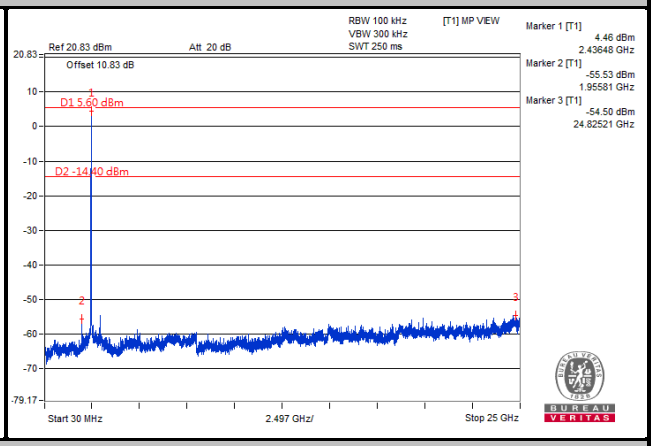
Ch 1



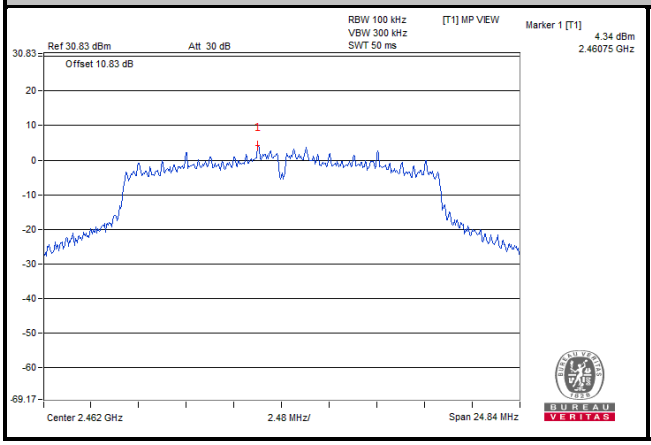


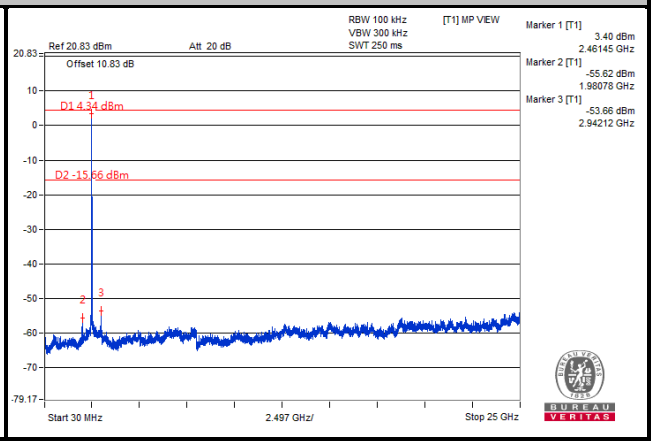
Ch 6

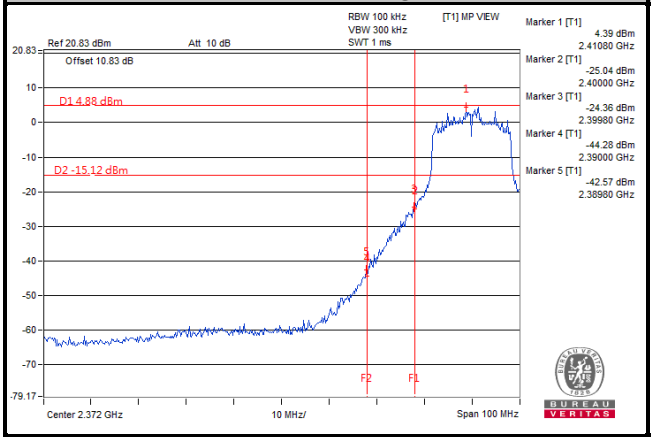
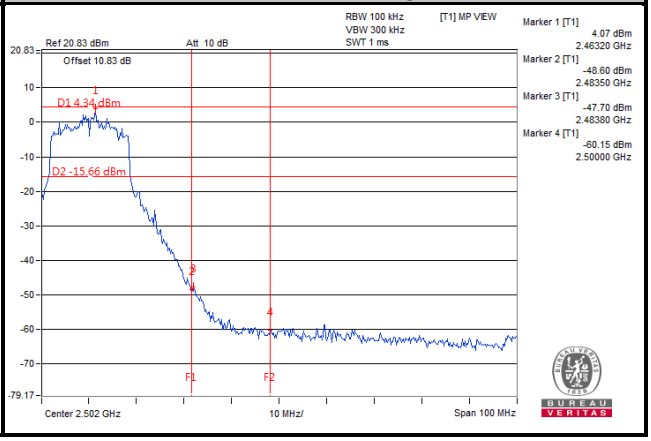




Ch 11

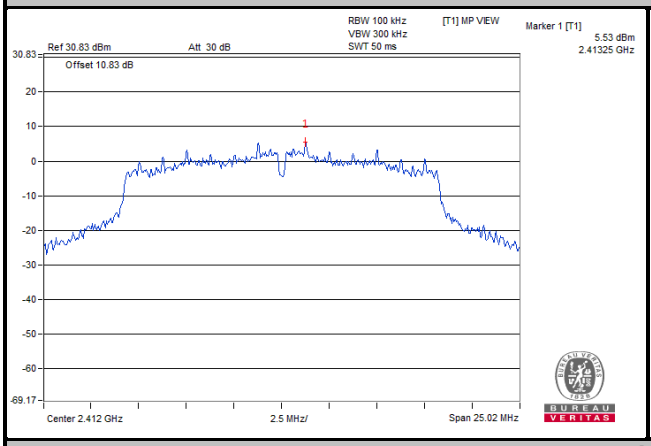


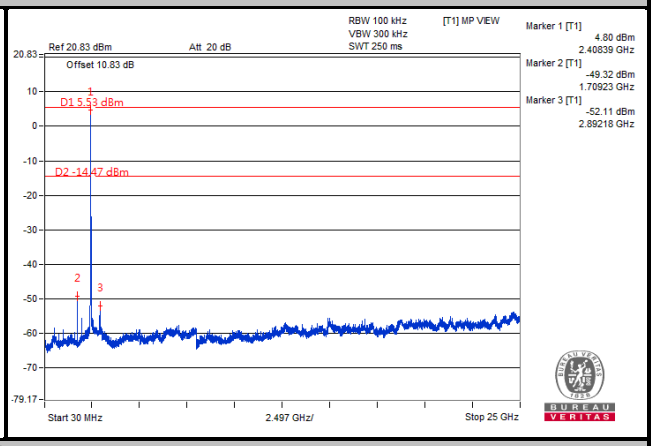


Ch 1 Band Edge	Ch 11 Band Edge
	

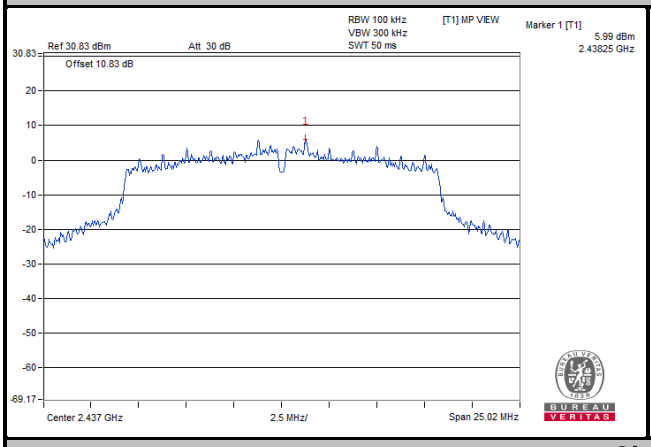
CHAIN 1

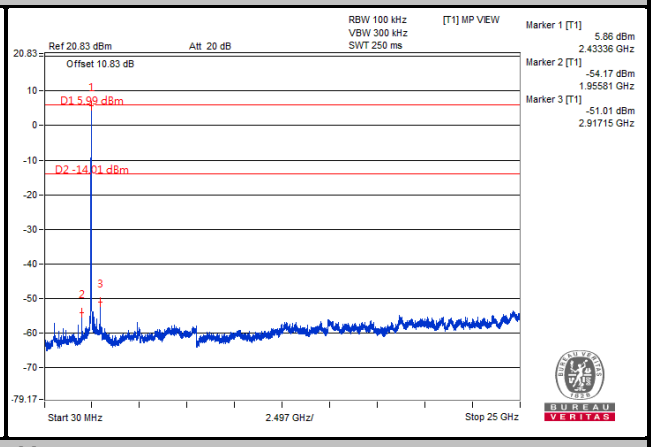
Ch 1



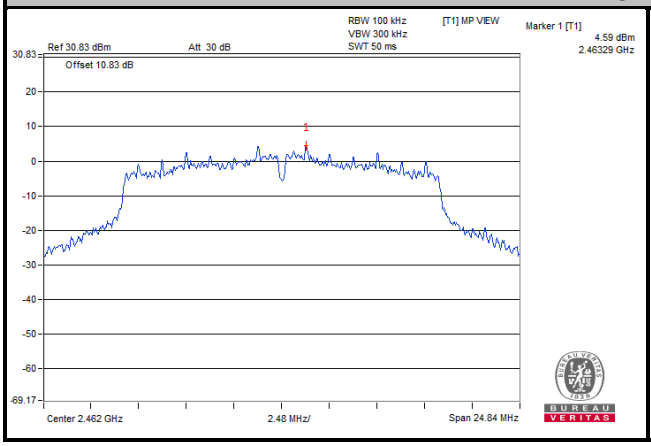


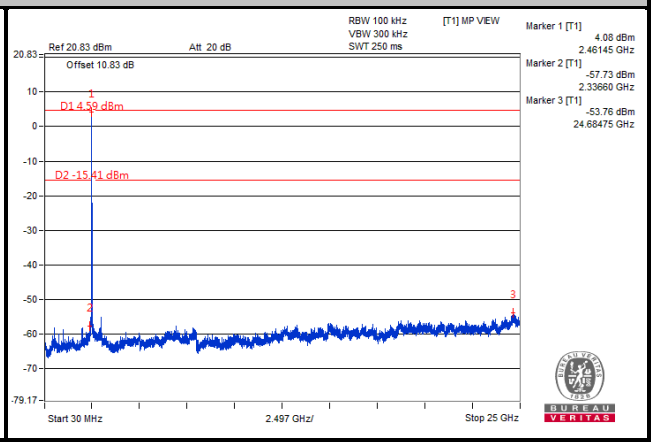
Ch 6

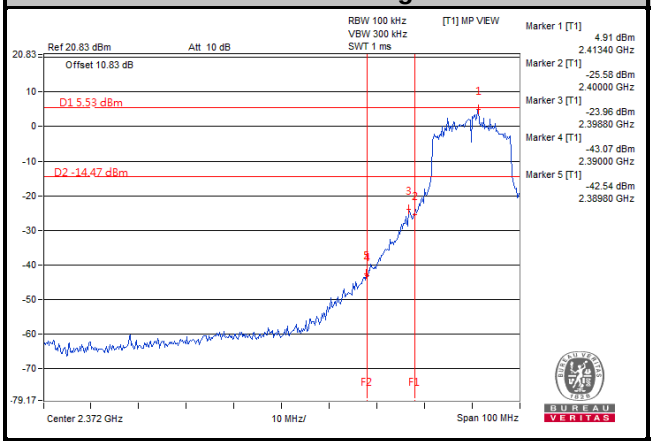
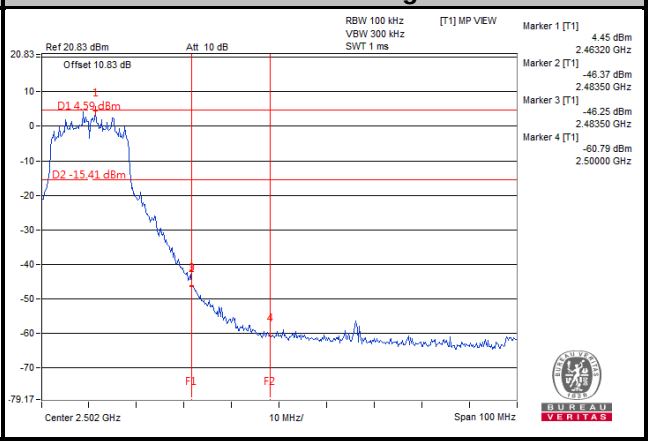




Ch 11



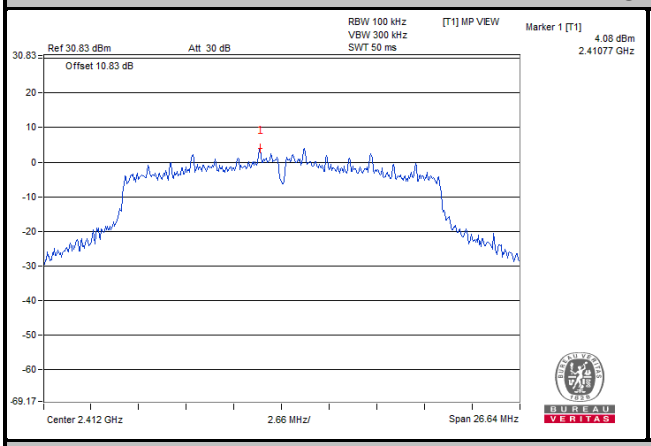


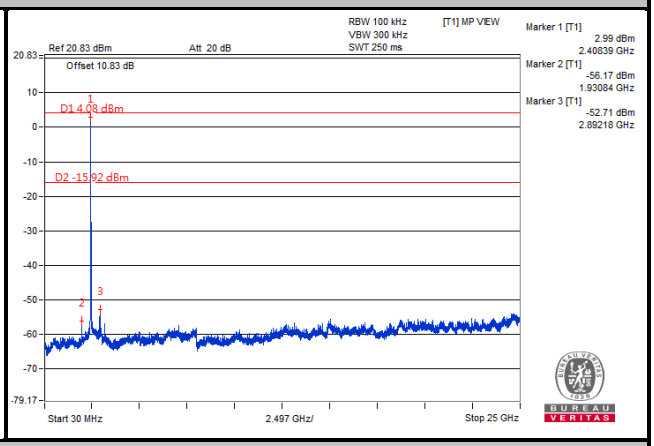
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11n (HT20)

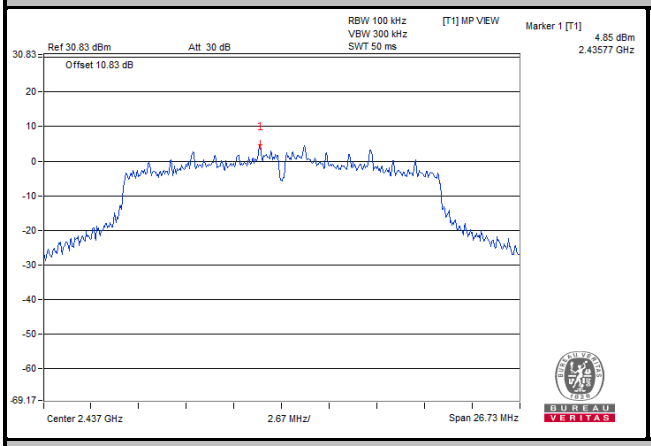
CHAIN 0

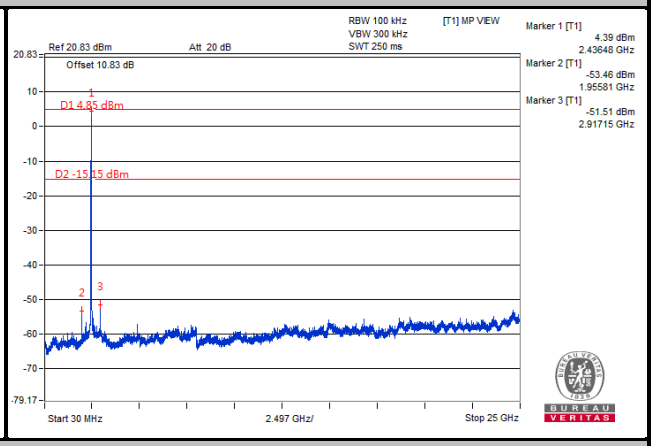
Ch 1



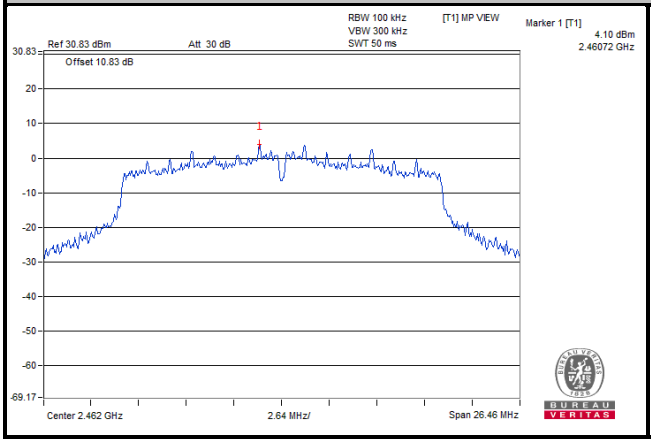


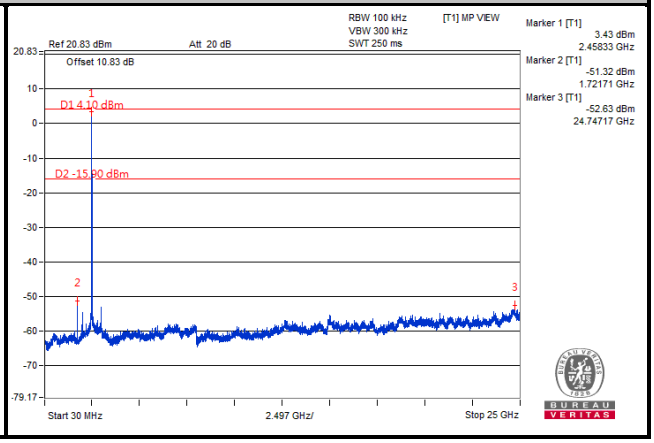
Ch 6

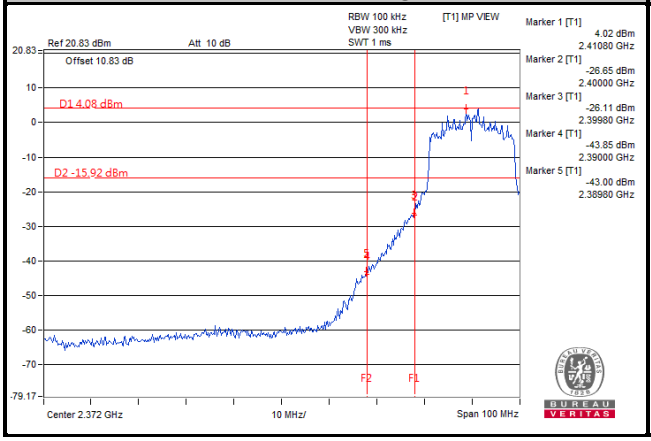
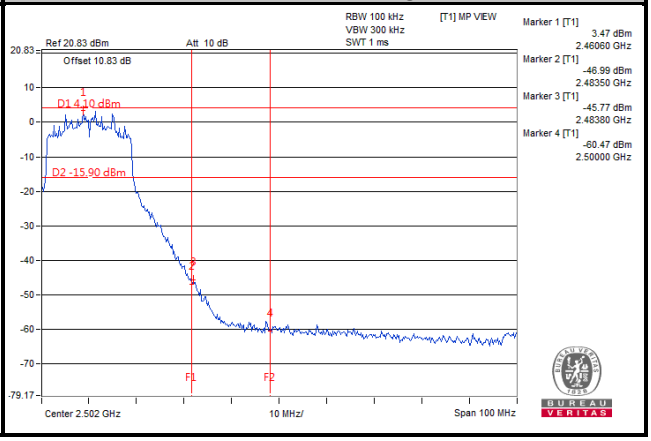




Ch 11

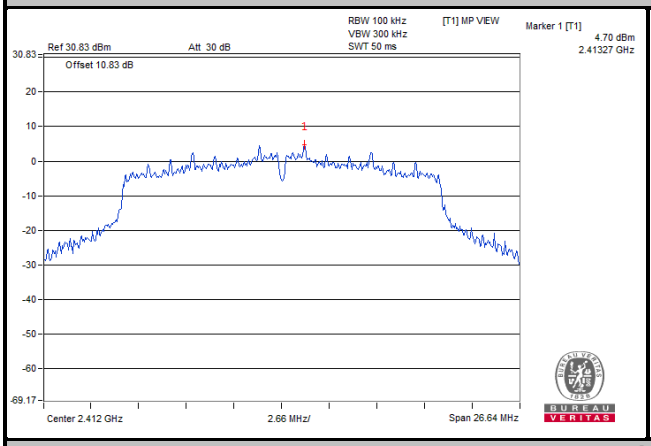


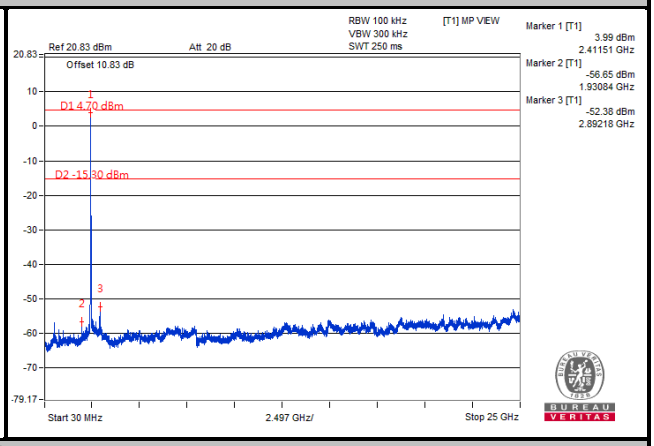


Ch 1 Band Edge	Ch 11 Band Edge
	

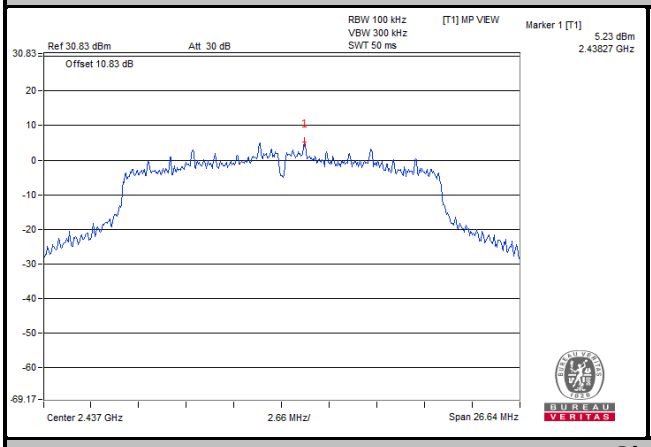
CHAIN 1

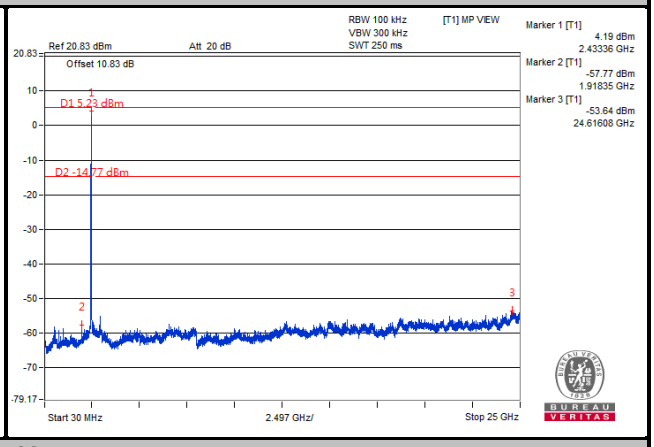
Ch 1



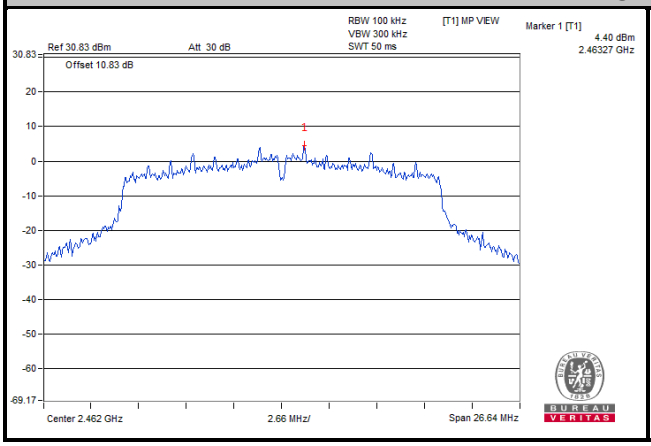


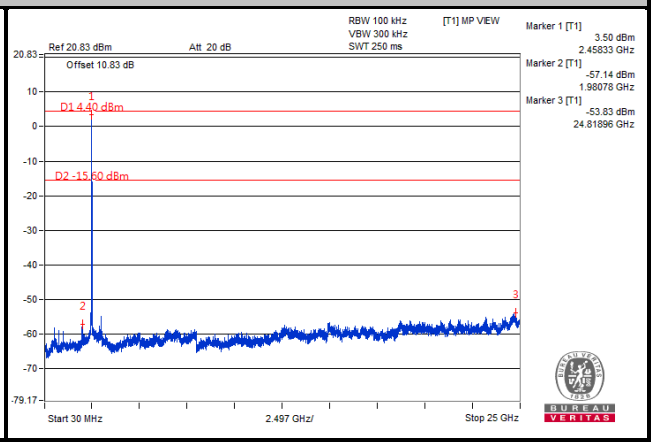
Ch 6

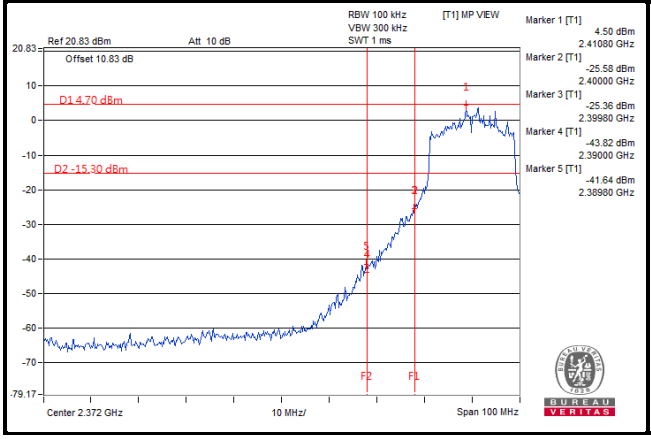
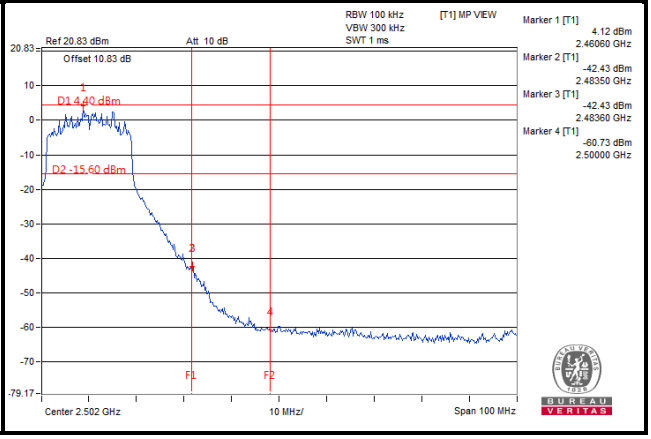




Ch 11





Ch 1 Band Edge	Ch 11 Band Edge
	

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

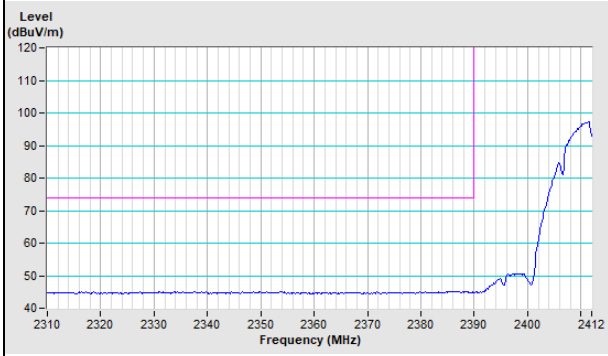
Annex A- Band Edge Measurement

Mode A

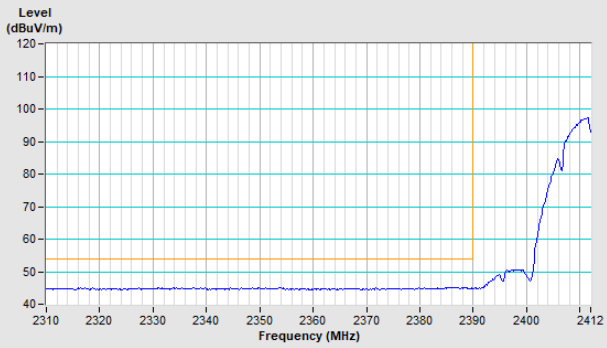
802.11b

Channel 1

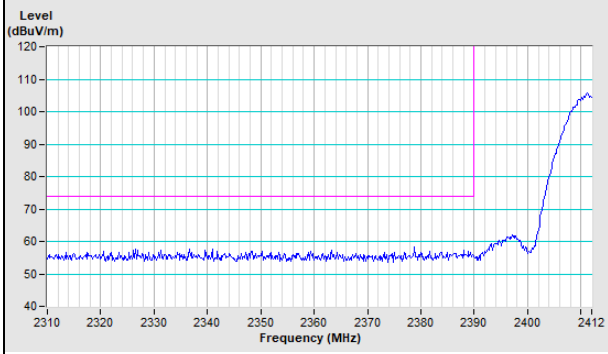
Horizontal (Peak)



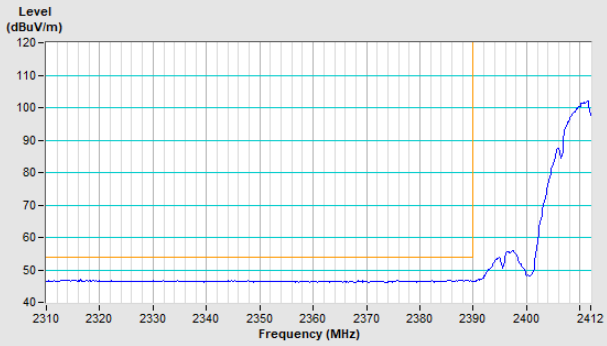
Horizontal (Average)



Vertical (Peak)

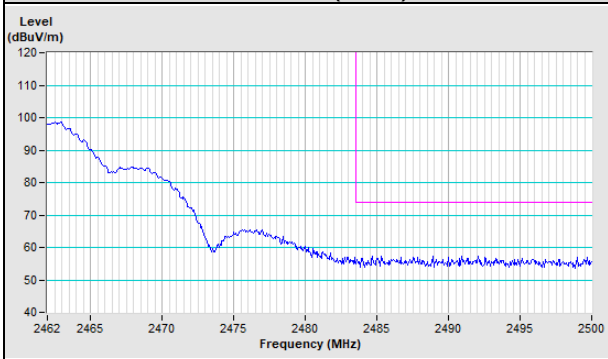


Vertical (Average)

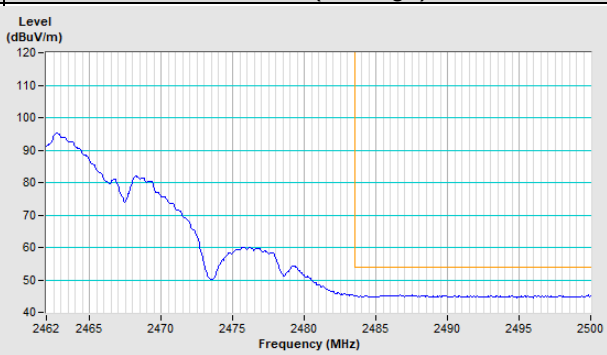


Channel 11

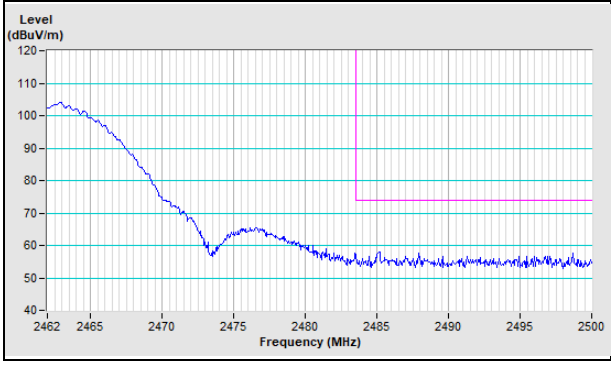
Horizontal (Peak)



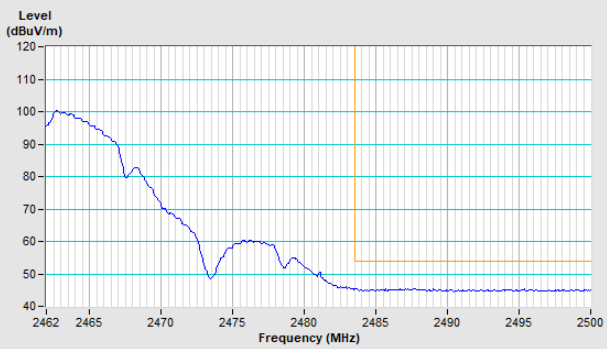
Horizontal (Average)



Vertical (Peak)



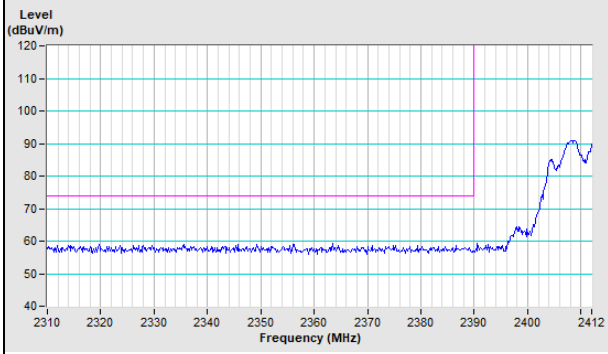
Vertical (Average)



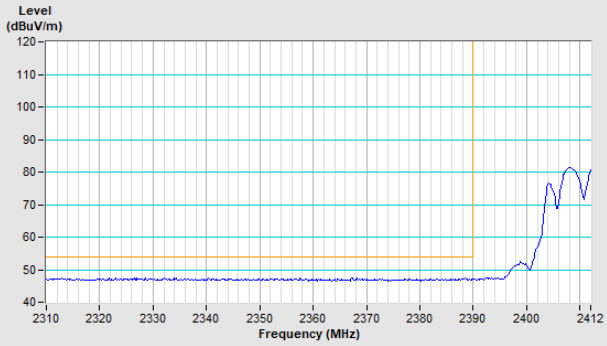
802.11g

Channel 1

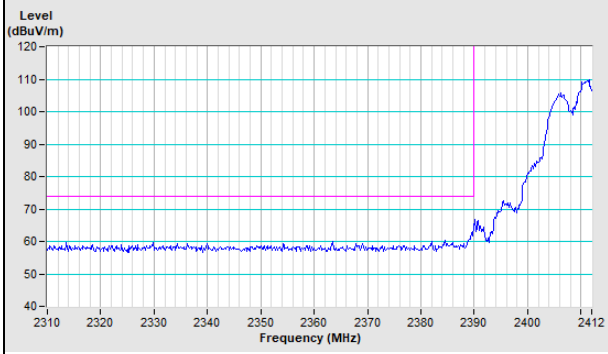
Horizontal (Peak)



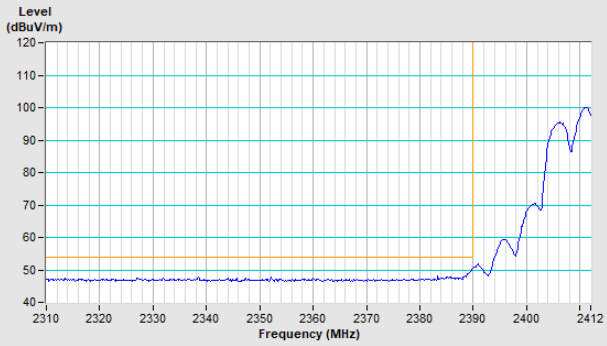
Horizontal (Average)



Vertical (Peak)

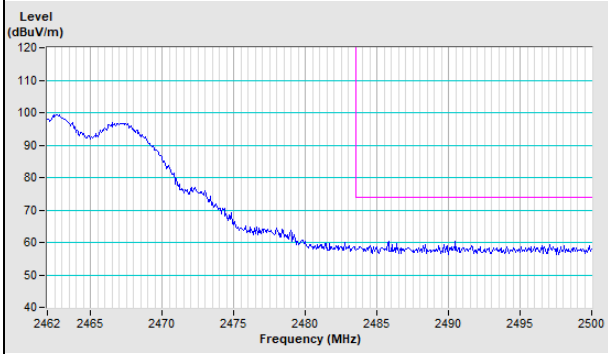


Vertical (Average)

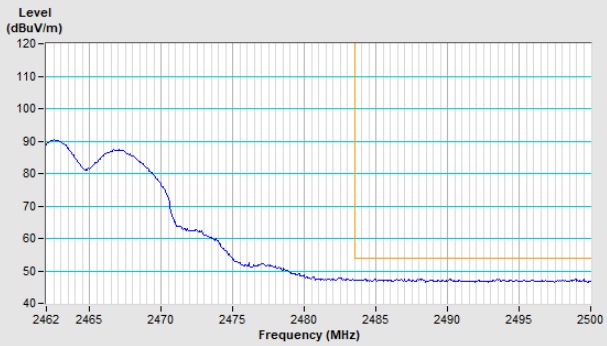


Channel 11

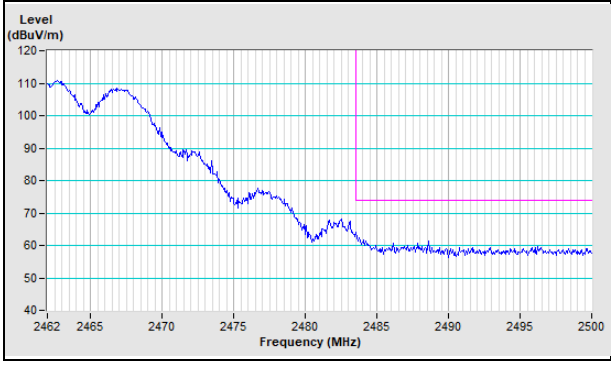
Horizontal (Peak)



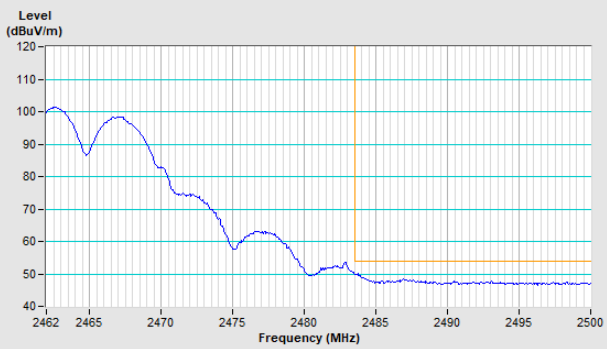
Horizontal (Average)



Vertical (Peak)



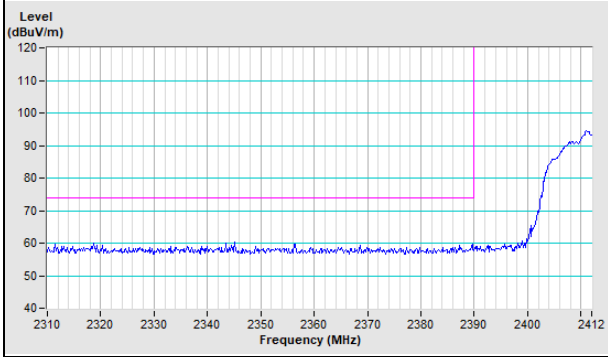
Vertical (Average)



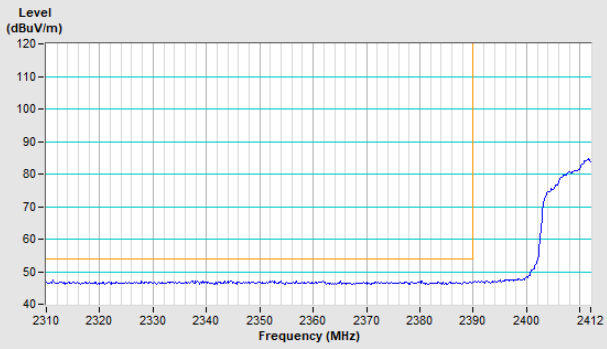
802.11n (HT20)

Channel 1

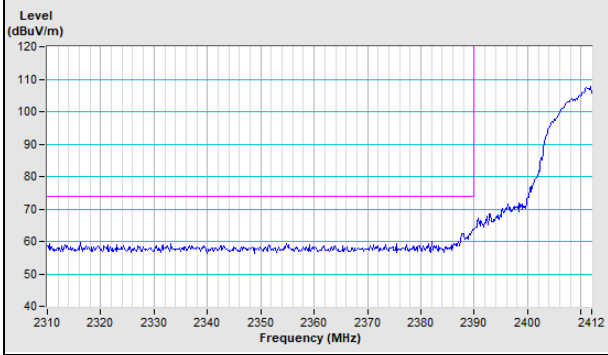
Horizontal (Peak)



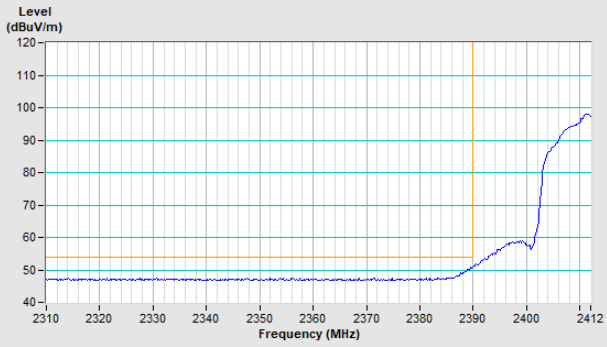
Horizontal (Average)



Vertical (Peak)

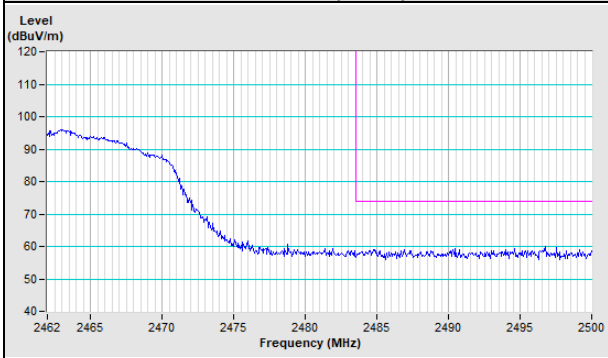


Vertical (Average)

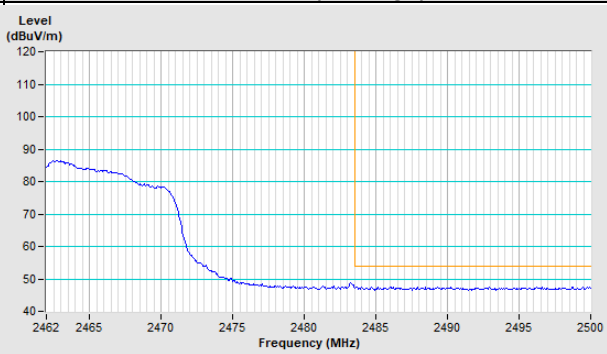


Channel 11

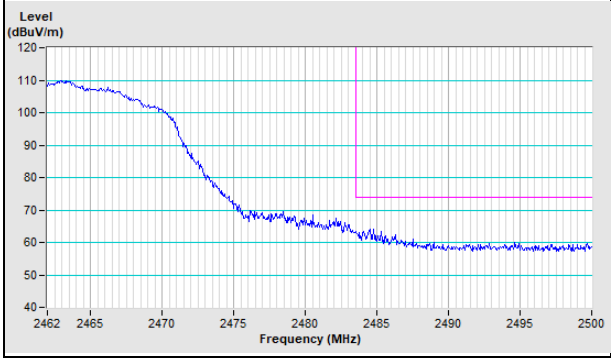
Horizontal (Peak)



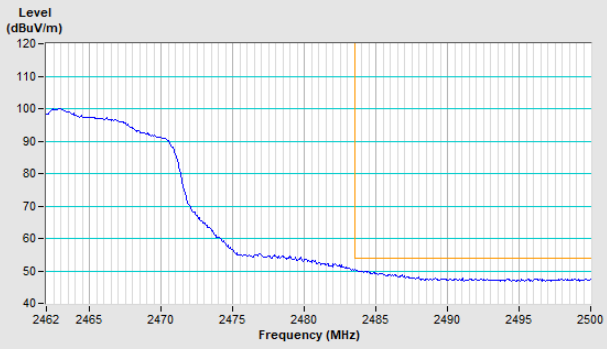
Horizontal (Average)



Vertical (Peak)

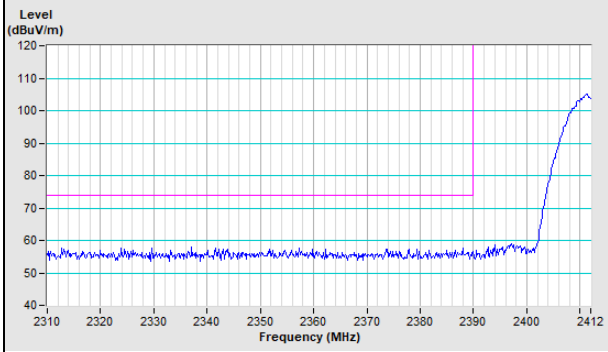
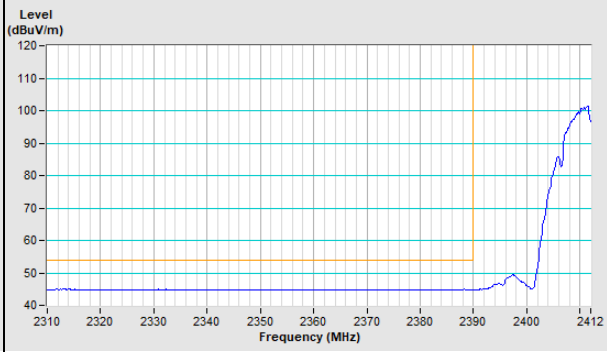
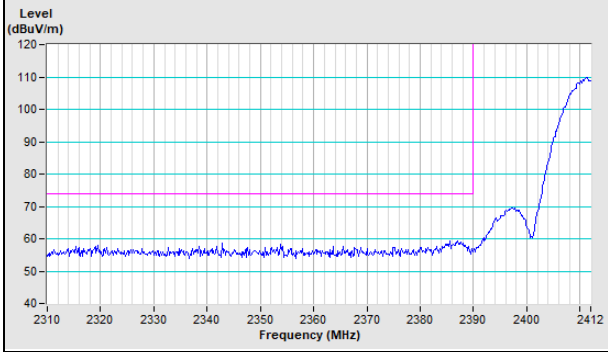
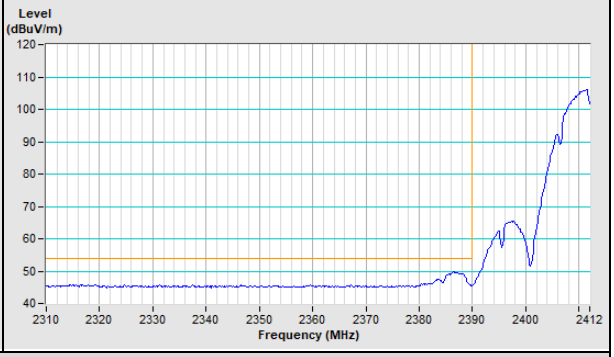
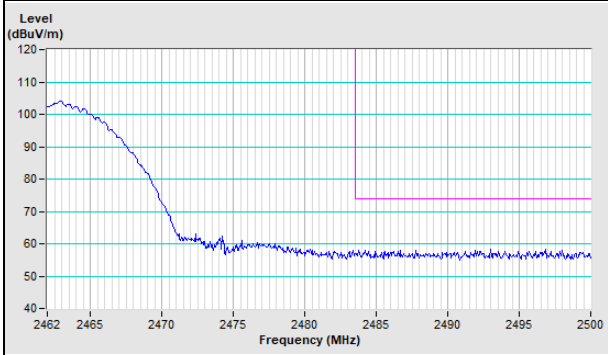
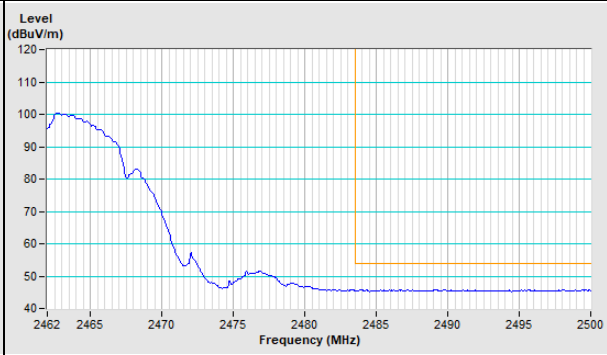
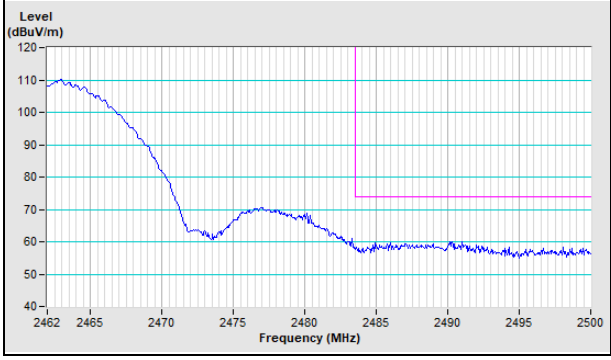
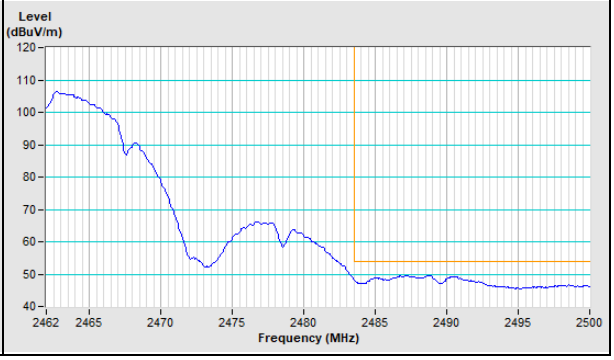


Vertical (Average)



Mode B

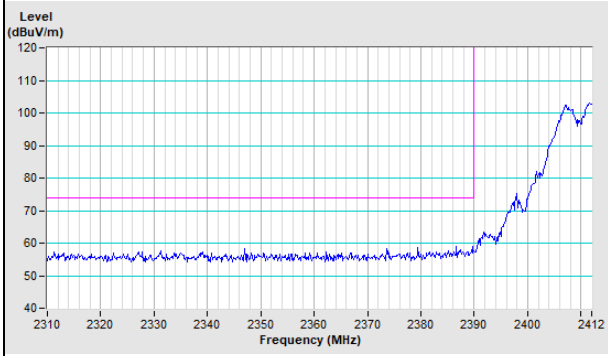
802.11b

Channel 1	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	
Channel 11	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	

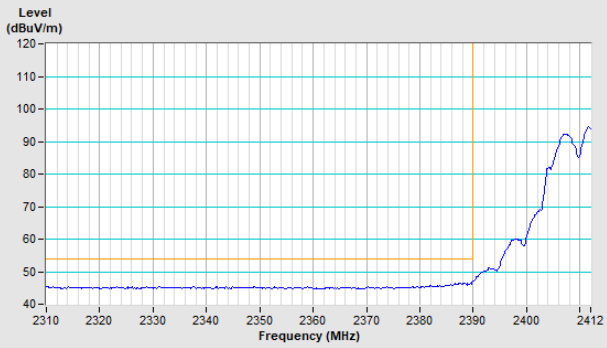
802.11g

Channel 1

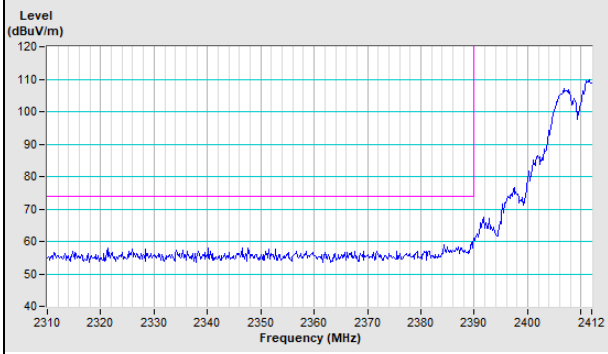
Horizontal (Peak)



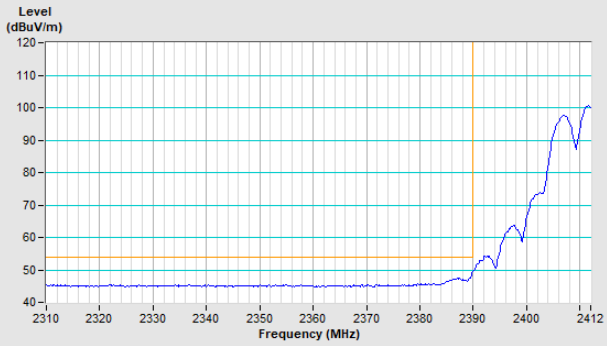
Horizontal (Average)



Vertical (Peak)

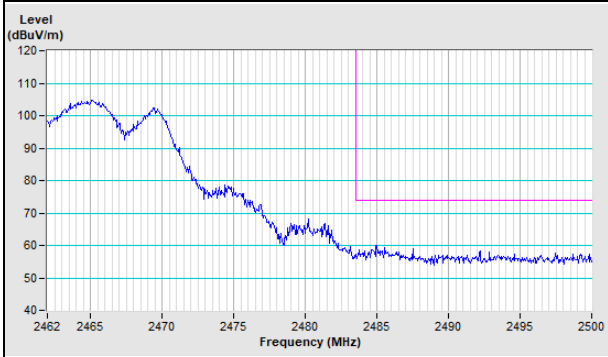


Vertical (Average)

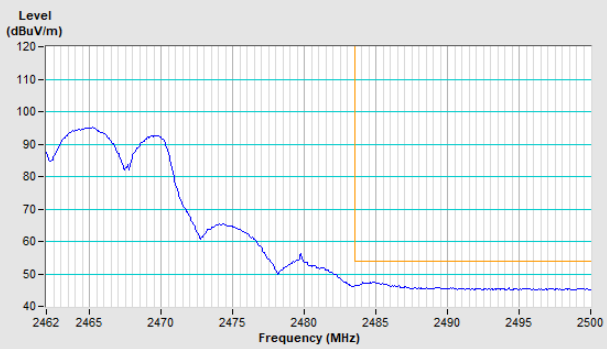


Channel 11

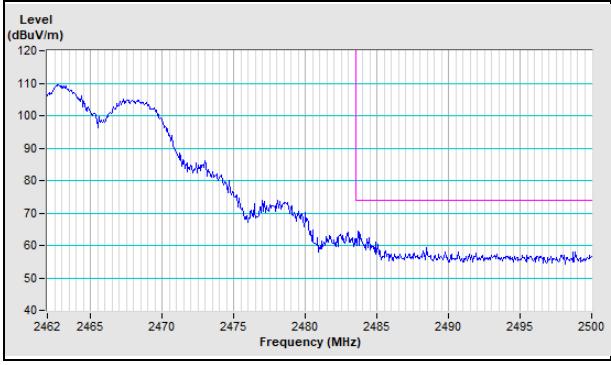
Horizontal (Peak)



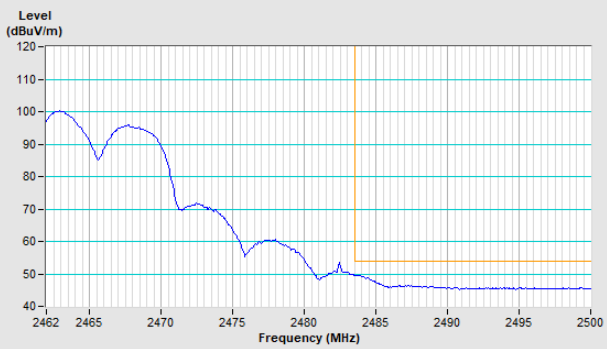
Horizontal (Average)



Vertical (Peak)



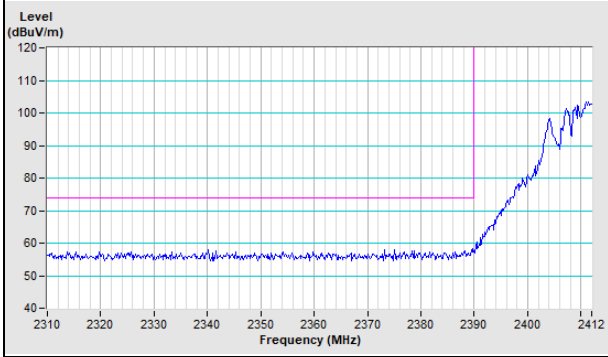
Vertical (Average)



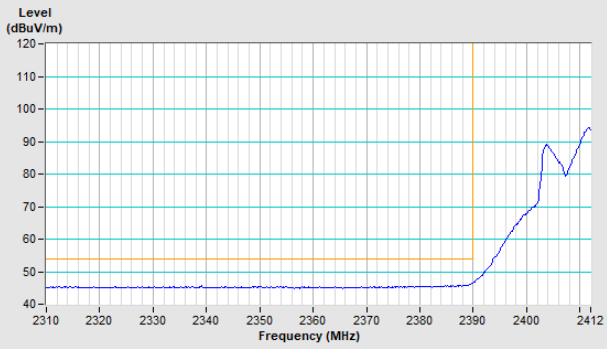
802.11n (HT20)

Channel 1

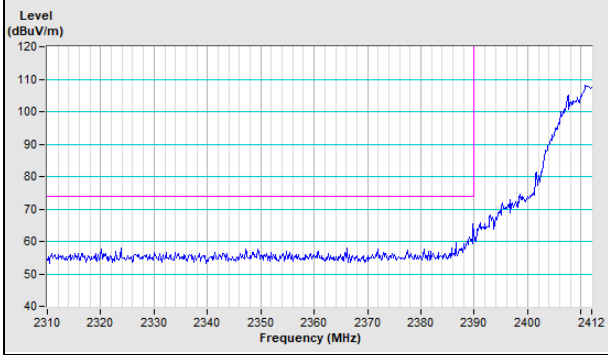
Horizontal (Peak)



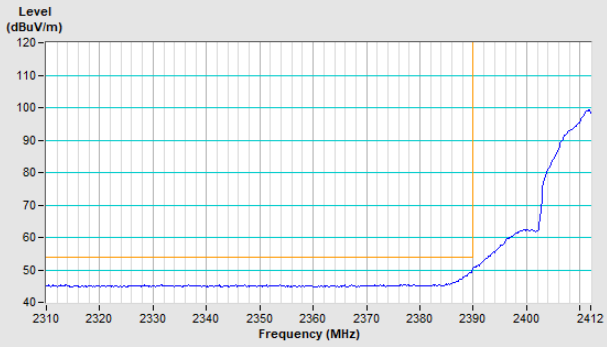
Horizontal (Average)



Vertical (Peak)

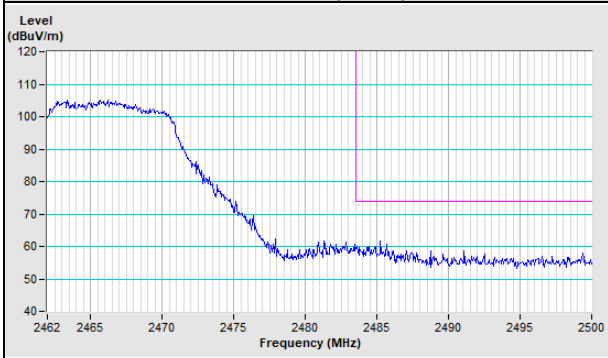


Vertical (Average)

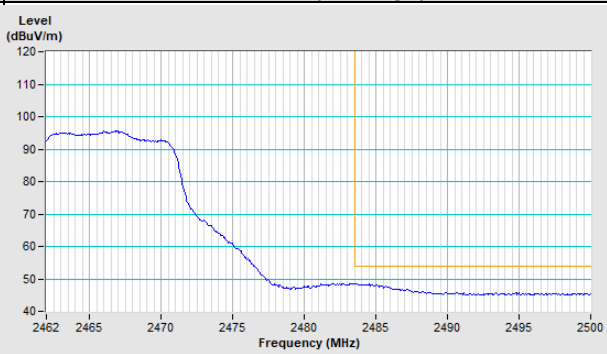


Channel 11

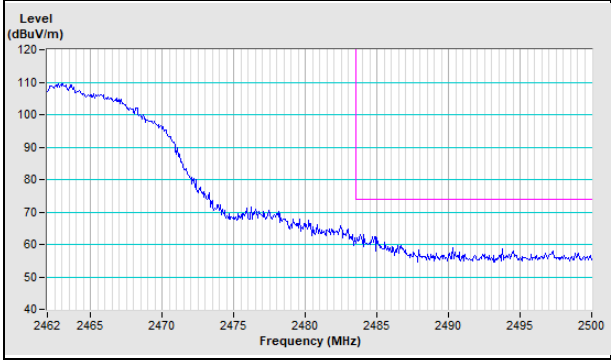
Horizontal (Peak)



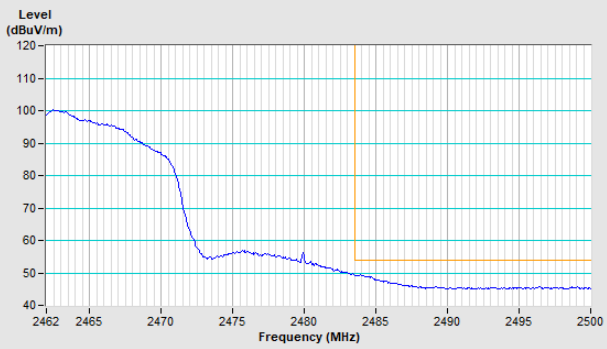
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



Appendix – Information of 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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

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

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

--- END ---