FCC Test Report
(2.4GHz WLAN)

Report No.:	RFBHKO-WTW-P21091072
FCC ID:	A94435689
Test Model:	435689
Received Date:	2021/9/29
Test Date:	2021/10/8 ~ 2021/11/19
Issued Date:	2021/12/20
Applicant:	Bose Corporation
Address:	100 The Mountain Road Framingham Massachusetts 01701-9168 United States
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
FCC Registration / Designation Number:	198487 / TW2021

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBHKO-WTW-P21091072	Original release.	2021/12/20

1 Certificate of Conformity

Product:	Video Soundbar
Brand:	BOSE
Test Model:	435689
Sample Status:	Engineering sample
Applicant:	Bose Corporation
Test Date:	2021/10/8 ~ 2021/11/19
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 : Annie Chang , **Date:** 2021/12/20

Annie Chang / Senior Specialist

Approved by : Jeremy Lin , **Date:** 2021/12/20

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -17.03dB at 4.90587MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.13dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is ipex not a standard connector.

Note:
1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. For 2.4GHz 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.

2.1 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	150kHz ~ 30MHz	2.94 dB
Conducted Emissions	9kHz ~ 40GHz	2.63 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.70 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.21 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Video Soundbar
Brand	BOSE
Test Model	435689
Status of EUT	Engineering sample
Power Supply Rating	24Vdc from Adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n (HT20/HT40): up to 150Mbps VHT20/VHT40: up to 200Mbps
Operating Frequency	2412MHz ~ 2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7
Output Power	150.661mW
Antenna Type	PCB antenna with 3.45dBi gain
Antenna Connector	ipex
Accessory Device	Adapter, Remote controller, USB Type C to A Adapter
Data Cable Supplied	Shielded USB Type C to A cable (5.0m)

Note:

1. WLAN 2.4GHz & WLAN 5GHz & Bluetooth technologies cannot transmit at same time.
2. The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function	RX Function
802.11b	1TX	1RX
802.11g	1TX	1RX
802.11n (HT20)	1TX	1RX
802.11n (HT40)	1TX	1RX
VHT20	1TX	1RX
VHT40	1TX	1RX

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40 on 256QAM mode.Therefore the investigated worst case is the representative mode in test report. (Final test mode refer section 3.2.1)

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 EUT uses following adapter.

Brand	BOSE
Model	DT24V-1.8C-DC
Input Power	100-240Vac, 50/60Hz, 1.5A MAX
Output Power	24Vdc, 1.875A, 45W
Power Line	Non-shielded AC 2-Pin cable (1.8m), Non-shielded DC cable (1.5m)

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), VHT20:

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40), VHT40:

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

Radiated Emission Test (Above 1GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
-	VHT20	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	VHT40	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Radiated Emission Test (Below 1GHz):

☒ 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)
-	VHT40	3 to 9	6	OFDM	BPSK	MCS0

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	VHT40	3 to 9	6	OFDM	BPSK	MCS0

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
-	VHT20	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	VHT40	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Test Condition:

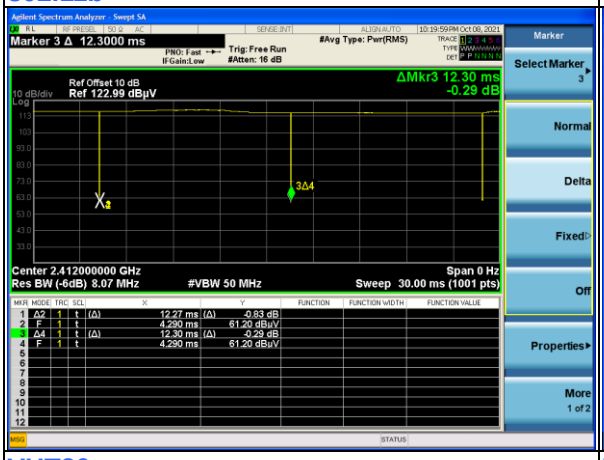
Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	26deg. C, 60%RH	120Vac, 60Hz	Jed Wu
RE<1G	26deg. C, 60%RH	120Vac, 60Hz	Jed Wu
PLC	25deg. C, 75%RH	120Vac, 60Hz	Pirar Hsieh
APCM	25deg. C, 76%RH	120Vac, 60Hz	Dalen Dai

3.3 Duty Cycle of Test Signal

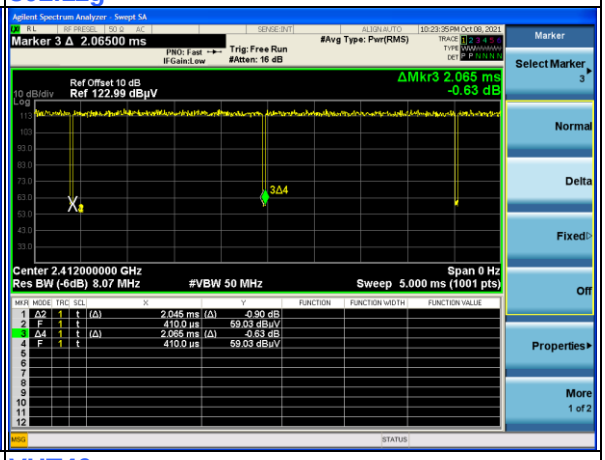
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.27/12.3 = 0.998
802.11g: Duty cycle = 2.045/2.065 = 0.99
VHT20: Duty cycle = 1.92/1.94 = 0.99
VHT40: Duty cycle = 0.933/0.978 = 0.954, Duty factor = 10 * log(1/0.954) = 0.20

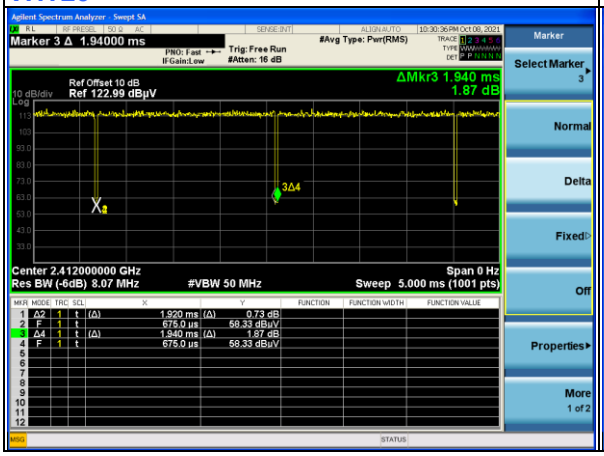
802.11b



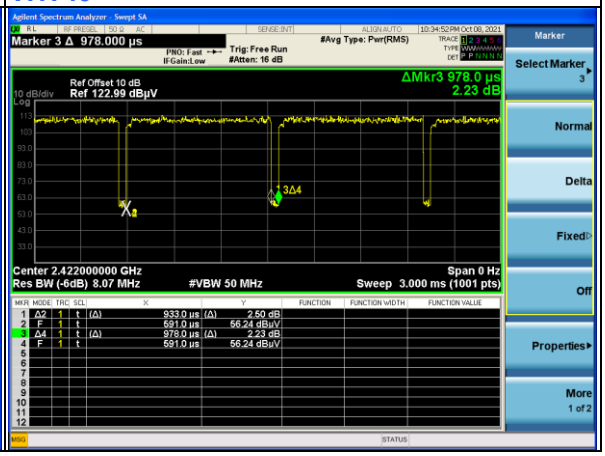
802.11g



VHT20



VHT40



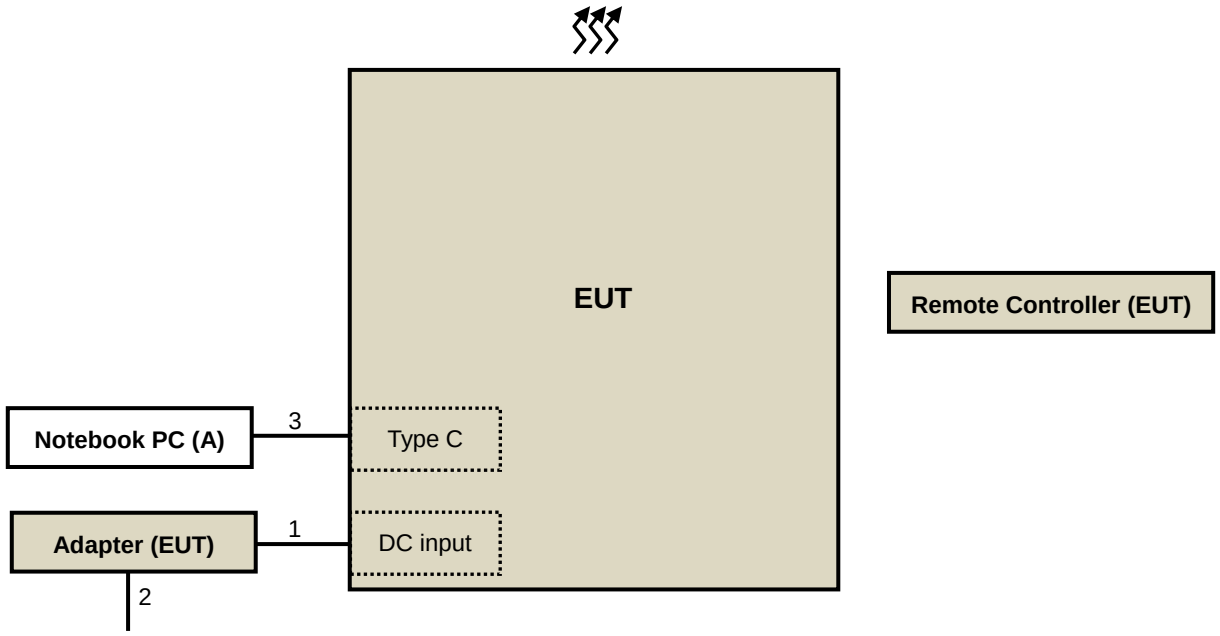
3.4 Description of Support Units

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 PC	Lenovo	IdeaPad5 15ITL05	NA	NA	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	N	0	Supplied by applicant
2.	AC cable	1	1.8	N	0	Supplied by applicant
3.	USB Type C to A cable	1	5	Y	0	Supplied by applicant

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 15.247 Meas Guidance v05r02
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 20dB 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 1000MHz, 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 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver Agilent	N9038A	MY51210129	2021/3/12	2022/3/11
Software BVADT	ADT_Radiated_V8.7.08	NA	NA	NA
Software BVADT	ADT_RF Test Software V6.6.5.4	NA	NA	NA
Auto Control System(Antenna Tower, Table, Controller) ADT	SC100+AT100+TT100	0306	NA	NA
Pre_Amplifier EMCI	EMC001340	980269	2021/6/29	2022/6/28
LOOP ANTENNA EMCI	LPA600	270	2021/9/2	2023/9/1
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12
Pre_Amplifier HP	8447D	2432A03504	2021/2/18	2022/2/17
Bi-log Broadband Antenna Schwarzbeck	VULB9168	139	2020/11/6	2021/11/5
Attenuator Mini-Circuits	UNAT-5+	PAD-CH6-01	2021/7/13	2022/7/12
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12
Antenna(Horn) EMCO	3115	00028257	2020/11/22	2021/11/21
Test Receiver Agilent	N9038A	MY51210129	2021/3/12	2022/3/11
Pre-amplifier HP	8449B	3008A01201	2021/2/19	2022/2/18
RF Coaxial Cable HUBER SUHNER	SF-102	Cable-CH6-01	2021/7/8	2022/7/7
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	2021/5/28	2022/5/27
Fix tool for Boresight	BAF-01	5	NA	NA
Pre_Amplifier MITEQ	AMF-6F-260400-33-8P	892164	2021/2/19	2022/2/18
Antenna(Horn) Schwarzbeck	BBHA-9170	BBHA9170190	2020/11/22	2021/11/21
Spectrum Analyzer R&S	FSV40	101544	2021/5/24	2022/5/23
RF Coaxial Cable WOKEN	WC01	Cable-CH10-03	2021/7/8	2022/7/7
RF Coaxial Cable Rosnol	K1K50-UP0279-K1K50-3000	Cable-CH10(3m)-04	2021/7/8	2022/7/7
Highpass filter SUHNER	11SH10-7000/T18000-O/OP	SN 4	2021/5/28	2022/5/27

NOTE: 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in LK - 966 chamber 1.
4. Tested Date: 2021/10/8 ~ 2021/10/28

4.1.3 Test Procedures

For Radiated emission below 30MHz

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 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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 detects 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:

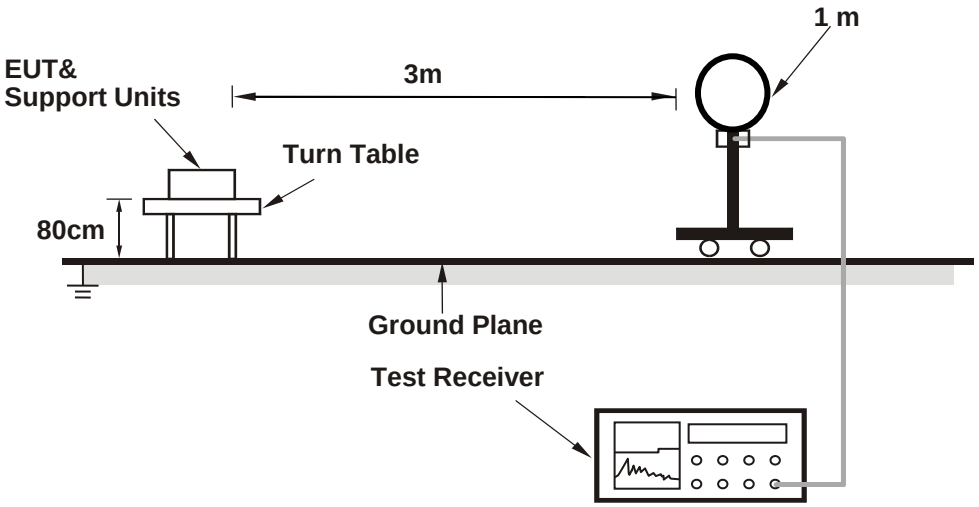
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz. (802.11b: RBW = 1MHz, VBW = 10Hz; 802.11g: RBW = 1MHz, VBW = 10Hz; VHT20: RBW = 1MHz, VBW = 10Hz; VHT40: RBW = 1MHz, VBW = 1.1kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

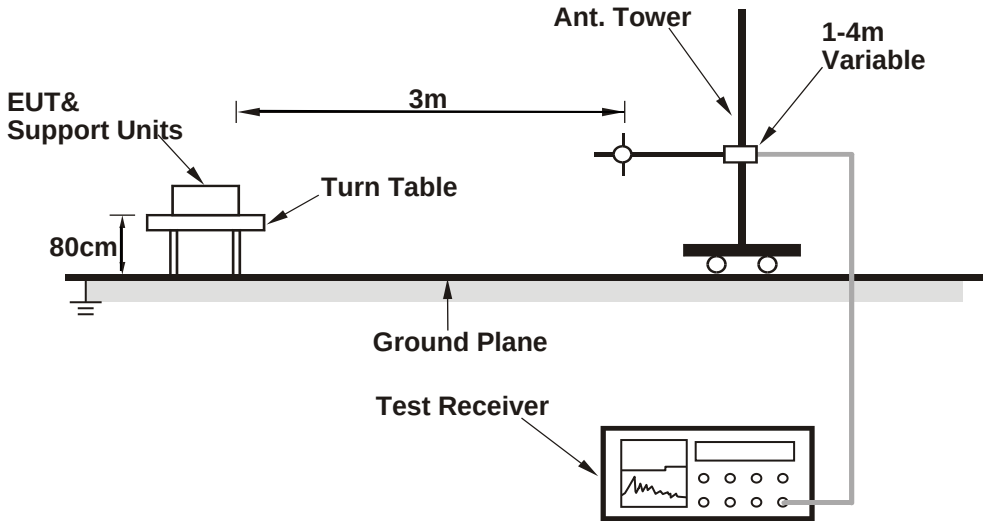
No deviation.

4.1.5 Test Setup

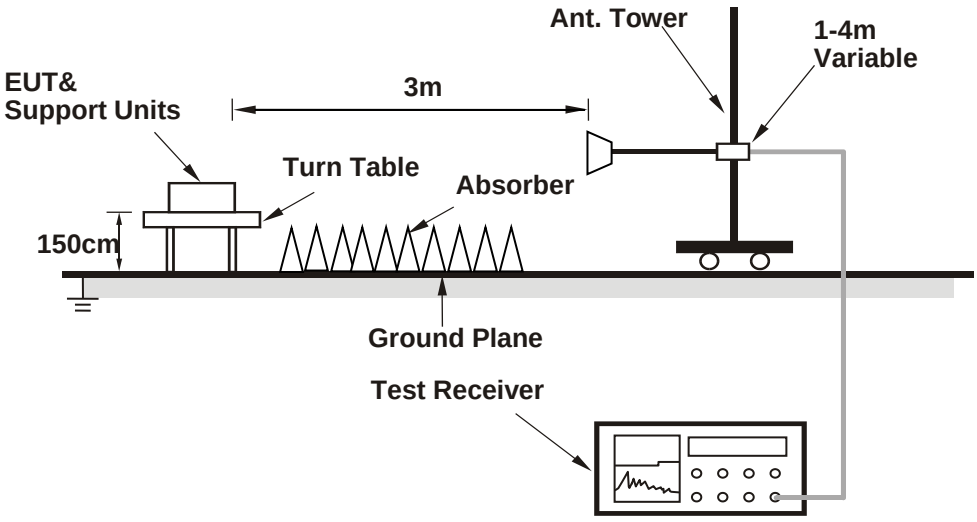
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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 the testing table.
b. Notebook sent messages to EUT and the EUT played it out
c. The necessary accessories enable the system in full functions.

4.1.7 Test Results

ABOVE 1GHz DATA

RF Mode	TX 802.11b	Channel	CH 1：2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	53.74 PK	74.00	-20.26	2.19 H	257	56.02	-2.28
2	2390.00	40.76 AV	54.00	-13.24	2.19 H	257	43.04	-2.28
3	*2412.00	102.86 PK			2.19 H	257	105.05	-2.19
4	*2412.00	100.92 AV			2.19 H	257	103.11	-2.19
5	4824.00	51.85 PK	74.00	-22.15	2.12 H	109	46.19	5.66
6	4824.00	46.98 AV	54.00	-7.02	2.12 H	109	41.32	5.66
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	51.40 PK	74.00	-22.60	1.69 V	147	53.68	-2.28
2	2390.00	39.80 AV	54.00	-14.20	1.69 V	147	42.08	-2.28
3	*2412.00	100.23 PK			1.69 V	147	102.42	-2.19
4	*2412.00	98.21 AV			1.69 V	147	100.40	-2.19
5	4824.00	50.20 PK	74.00	-23.80	1.26 V	204	44.54	5.66
6	4824.00	44.41 AV	54.00	-9.59	1.26 V	204	38.75	5.66

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.

RF Mode	TX 802.11b	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	105.36 PK			3.12 H	248	107.51	-2.15
2	*2437.00	103.30 AV			3.12 H	248	105.45	-2.15
3	4874.00	51.16 PK	74.00	-22.84	2.55 H	111	45.47	5.69
4	4874.00	45.65 AV	54.00	-8.35	2.55 H	111	39.96	5.69
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	102.55 PK			1.86 V	151	104.70	-2.15
2	*2437.00	100.46 AV			1.86 V	151	102.61	-2.15
3	4874.00	49.56 PK	74.00	-24.44	1.27 V	202	43.87	5.69
4	4874.00	42.63 AV	54.00	-11.37	1.27 V	202	36.94	5.69

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.

RF Mode	TX 802.11b	Channel	CH 11：2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	107.85 PK			1.07 H	259	109.91	-2.06
2	*2462.00	105.87 AV			1.07 H	259	107.93	-2.06
3	2483.50	57.34 PK	74.00	-16.66	1.07 H	259	59.28	-1.94
4	2483.50	45.85 AV	54.00	-8.15	1.07 H	259	47.79	-1.94
5	4924.00	52.64 PK	74.00	-21.36	2.23 H	111	46.87	5.77
6	4924.00	47.76 AV	54.00	-6.24	2.23 H	111	41.99	5.77
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	103.91 PK			1.65 V	150	105.97	-2.06
2	*2462.00	101.93 AV			1.65 V	150	103.99	-2.06
3	2483.50	54.47 PK	74.00	-19.53	1.65 V	150	56.41	-1.94
4	2483.50	42.98 AV	54.00	-11.02	1.65 V	150	44.92	-1.94
5	4924.00	50.99 PK	74.00	-23.01	1.33 V	215	45.22	5.77
6	4924.00	45.25 AV	54.00	-8.75	1.33 V	215	39.48	5.77

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.

RF Mode	TX 802.11g	Channel	CH 1：2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	59.82 PK	74.00	-14.18	2.18 H	111	62.10	-2.28
2	2390.00	45.52 AV	54.00	-8.48	2.18 H	111	47.80	-2.28
3	*2412.00	106.31 PK			2.18 H	111	108.50	-2.19
4	*2412.00	97.60 AV			2.18 H	111	99.79	-2.19
5	4824.00	50.07 PK	74.00	-23.93	2.13 H	109	44.41	5.66
6	4824.00	37.88 AV	54.00	-16.12	2.13 H	109	32.22	5.66
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	56.78 PK	74.00	-17.22	1.68 V	148	59.06	-2.28
2	2390.00	44.41 AV	54.00	-9.59	1.68 V	148	46.69	-2.28
3	*2412.00	104.66 PK			1.68 V	148	106.85	-2.19
4	*2412.00	95.93 AV			1.68 V	148	98.12	-2.19
5	4824.00	47.70 PK	74.00	-26.30	1.11 V	201	42.04	5.66
6	4824.00	35.67 AV	54.00	-18.33	1.11 V	201	30.01	5.66

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.

RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	109.24 PK			3.10 H	248	111.39	-2.15
2	*2437.00	100.69 AV			3.10 H	248	102.84	-2.15
3	4874.00	51.36 PK	74.00	-22.64	2.09 H	121	45.67	5.69
4	4874.00	38.58 AV	54.00	-15.42	2.09 H	121	32.89	5.69
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	106.57 PK			1.86 V	151	108.72	-2.15
2	*2437.00	98.08 AV			1.86 V	151	100.23	-2.15
3	4874.00	48.51 PK	74.00	-25.49	1.08 V	206	42.82	5.69
4	4874.00	36.90 AV	54.00	-17.10	1.08 V	206	31.21	5.69

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.

RF Mode	TX 802.11g	Channel	CH 11：2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	111.84 PK			1.09 H	258	113.90	-2.06
2	*2462.00	103.33 AV			1.09 H	258	105.39	-2.06
3	2483.50	65.71 PK	74.00	-8.29	1.09 H	258	67.65	-1.94
4	2483.50	52.71 AV	54.00	-1.29	1.09 H	258	54.65	-1.94
5	4924.00	51.32 PK	74.00	-22.68	2.08 H	114	45.55	5.77
6	4924.00	39.41 AV	54.00	-14.59	2.08 H	114	33.64	5.77
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	107.09 PK			1.84 V	149	109.15	-2.06
2	*2462.00	98.65 AV			1.84 V	149	100.71	-2.06
3	2483.50	60.57 PK	74.00	-13.43	1.84 V	149	62.51	-1.94
4	2483.50	48.87 AV	54.00	-5.13	1.84 V	149	50.81	-1.94
5	4924.00	49.00 PK	74.00	-25.00	1.05 V	207	43.23	5.77
6	4924.00	36.34 AV	54.00	-17.66	1.05 V	207	30.57	5.77

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.

RF Mode	TX VHT20	Channel	CH 1：2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	60.31 PK	74.00	-13.69	2.18 H	110	62.59	-2.28
2	2390.00	46.84 AV	54.00	-7.16	2.18 H	110	49.12	-2.28
3	*2412.00	105.68 PK			2.18 H	110	107.87	-2.19
4	*2412.00	97.13 AV			2.18 H	110	99.32	-2.19
5	4824.00	49.53 PK	74.00	-24.47	2.16 H	125	43.87	5.66
6	4824.00	38.59 AV	54.00	-15.41	2.16 H	125	32.93	5.66
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	59.75 PK	74.00	-14.25	1.69 V	148	62.03	-2.28
2	2390.00	46.48 AV	54.00	-7.52	1.69 V	148	48.76	-2.28
3	*2412.00	103.17 PK			1.69 V	148	105.36	-2.19
4	*2412.00	94.82 AV			1.69 V	148	97.01	-2.19
5	4824.00	47.77 PK	74.00	-26.23	1.18 V	230	42.11	5.66
6	4824.00	36.31 AV	54.00	-17.69	1.18 V	230	30.65	5.66

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.

RF Mode	TX VHT20	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	108.87 PK			3.13 H	248	111.02	-2.15
2	*2437.00	100.26 AV			3.13 H	248	102.41	-2.15
3	4874.00	50.03 PK	74.00	-23.97	2.25 H	134	44.34	5.69
4	4874.00	39.10 AV	54.00	-14.90	2.25 H	134	33.41	5.69
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	105.15 PK			1.65 V	148	107.30	-2.15
2	*2437.00	96.58 AV			1.65 V	148	98.73	-2.15
3	4874.00	48.11 PK	74.00	-25.89	1.26 V	227	42.42	5.69
4	4874.00	36.60 AV	54.00	-17.40	1.26 V	227	30.91	5.69

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.

RF Mode	TX VHT20	Channel	CH 11：2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	111.61 PK			1.08 H	259	113.67	-2.06
2	*2462.00	102.95 AV			1.08 H	259	105.01	-2.06
3	2483.50	65.05 PK	74.00	-8.95	1.08 H	259	66.99	-1.94
4	**2483.50**	**53.87 AV**	**54.00**	**-0.13**	**1.08 H**	**259**	**55.81**	**-1.94**
5	4924.00	50.28 PK	74.00	-23.72	2.10 H	133	44.51	5.77
6	4924.00	39.45 AV	54.00	-14.55	2.10 H	133	33.68	5.77
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	107.50 PK			1.83 V	151	109.56	-2.06
2	*2462.00	98.99 AV			1.83 V	151	101.05	-2.06
3	2483.50	61.67 PK	74.00	-12.33	1.83 V	151	63.61	-1.94
4	2483.50	50.43 AV	54.00	-3.57	1.83 V	151	52.37	-1.94
5	4924.00	48.32 PK	74.00	-25.68	1.21 V	224	42.55	5.77
6	4924.00	36.50 AV	54.00	-17.50	1.21 V	224	30.73	5.77

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.

RF Mode	TX VHT40	Channel	CH 3：2422 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	59.00 PK	74.00	-15.00	1.50 H	321	61.28	-2.28
2	2390.00	48.66 AV	54.00	-5.34	1.50 H	321	50.94	-2.28
3	*2422.00	99.28 PK			1.50 H	321	101.45	-2.17
4	*2422.00	91.00 AV			1.50 H	321	93.17	-2.17
5	4844.00	46.33 PK	74.00	-27.67	2.11 H	142	40.64	5.69
6	4844.00	35.68 AV	54.00	-18.32	2.11 H	142	29.99	5.69
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	58.42 PK	74.00	-15.58	1.66 V	147	60.70	-2.28
2	2390.00	48.30 AV	54.00	-5.70	1.66 V	147	50.58	-2.28
3	*2422.00	98.83 PK			1.66 V	147	101.00	-2.17
4	*2422.00	90.70 AV			1.66 V	147	92.87	-2.17
5	4844.00	46.00 PK	74.00	-28.00	2.18 V	152	40.31	5.69
6	4844.00	34.91 AV	54.00	-19.09	2.18 V	152	29.22	5.69

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.

RF Mode	TX VHT40	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	100.56 PK			1.48 H	320	102.71	-2.15
2	*2437.00	93.38 AV			1.48 H	320	95.53	-2.15
3	4874.00	45.55 PK	74.00	-28.45	2.07 H	158	39.86	5.69
4	4874.00	34.63 AV	54.00	-19.37	2.07 H	158	28.94	5.69
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	100.23 PK			1.65 V	147	102.38	-2.15
2	*2437.00	93.17 AV			1.65 V	147	95.32	-2.15
3	4874.00	45.93 PK	74.00	-28.07	2.11 V	148	40.24	5.69
4	4874.00	34.78 AV	54.00	-19.22	2.11 V	148	29.09	5.69

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.

RF Mode	TX VHT40	Channel	CH 9：2452 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2452.00	104.48 PK			1.08 H	258	106.59	-2.11
2	*2452.00	96.15 AV			1.08 H	258	98.26	-2.11
3	2483.50	66.86 PK	74.00	-7.14	1.08 H	258	68.80	-1.94
4	2483.50	52.32 AV	54.00	-1.68	1.08 H	258	54.26	-1.94
5	4904.00	46.23 PK	74.00	-27.77	2.21 H	143	40.52	5.71
6	4904.00	35.76 AV	54.00	-18.24	2.21 H	143	30.05	5.71
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	*2452.00	103.69 PK			1.83 V	149	105.80	-2.11
2	*2452.00	95.18 AV			1.83 V	149	97.29	-2.11
3	2483.50	60.31 PK	74.00	-13.69	1.83 V	149	62.25	-1.94
4	2483.50	49.90 AV	54.00	-4.10	1.83 V	149	51.84	-1.94
5	4904.00	45.82 PK	74.00	-28.18	2.20 V	148	40.11	5.71
6	4904.00	35.47 AV	54.00	-18.53	2.20 V	148	29.76	5.71

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.

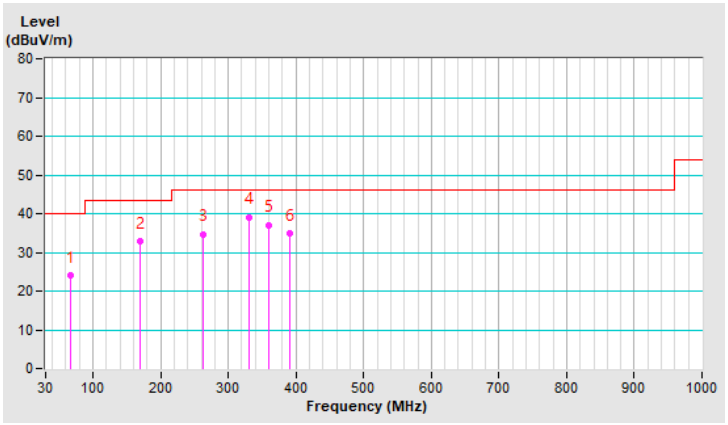
BELOW 1GHz WORST-CASE DATA

RF Mode	TX VHT40	Channel	CH 6：2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	66.71	23.96 QP	40.00	-16.04	1.28 H	87	32.24	-8.28
2	169.10	32.77 QP	43.50	-10.73	1.31 H	171	38.67	-5.90
3	261.88	34.74 QP	46.00	-11.26	1.54 H	325	40.55	-5.81
4	330.46	38.98 QP	46.00	-7.02	2.46 H	73	42.25	-3.27
5	360.53	37.05 QP	46.00	-8.95	2.71 H	316	40.10	-3.05
6	390.11	34.80 QP	46.00	-11.20	2.05 H	12	37.01	-2.21

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.

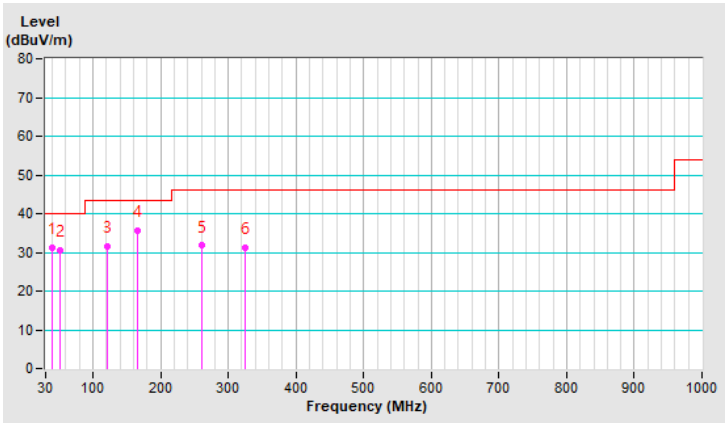


RF Mode	TX VHT40	Channel	CH 6：2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	39.07	31.22 QP	40.00	-8.78	1.18 V	167	38.49	-7.27
2	51.34	30.56 QP	40.00	-9.44	2.43 V	75	37.20	-6.64
3	121.47	31.48 QP	43.50	-12.02	2.13 V	177	39.63	-8.15
4	165.36	35.61 QP	43.50	-7.89	2.27 V	99	41.45	-5.84
5	260.37	31.75 QP	46.00	-14.25	2.76 V	133	37.65	-5.90
6	324.06	31.32 QP	46.00	-14.68	1.06 V	343	34.71	-3.39

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 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver R&S	ESR3	102414	2021/1/5	2022/1/4
LISN R&S	ENV216	101195	2021/5/25	2022/5/24
LISN R&S	ENV216	101197	2021/6/23	2022/6/22
LISN SCHWARZBECK	NNLK8129	8129229	2021/5/20	2022/5/19
DC LISN SCHWARZBECK	NNLK 8121	8121-808	2021/4/18	2022/4/17
LISN SCHWARZBECK	NNLK 8121	8121-731	2021/4/28	2022/4/27
LISN R&S	ESH3-Z5	100218	2020/12/2	2021/12/1
LISN R&S	ENV216	101196	2021/4/26	2022/4/25
LISN R&S	ESH3-Z6	844950/018	2021/7/25	2022/7/24
DC LISN R&S	ESH3-Z6	100219	2021/7/25	2022/7/24
RF Coaxial Cable Commate	5D-FB	Cable-CO10-01	2021/2/10	2022/2/9
Attenuator STI	STI02-2200-10	NO.1	2021/9/15	2022/9/14
50 ohm terminal LYNICS	0900510	E1-011484	2021/5/25	2022/5/24
Isolation Transformer Erika Fiedler	D-65396	017	2021/9/9	2022/9/8
Software BVADT	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 Linkou Conduction10
3. The VCCI Site Registration No. C-11852.
4. Tested Date: 2021/11/19

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/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

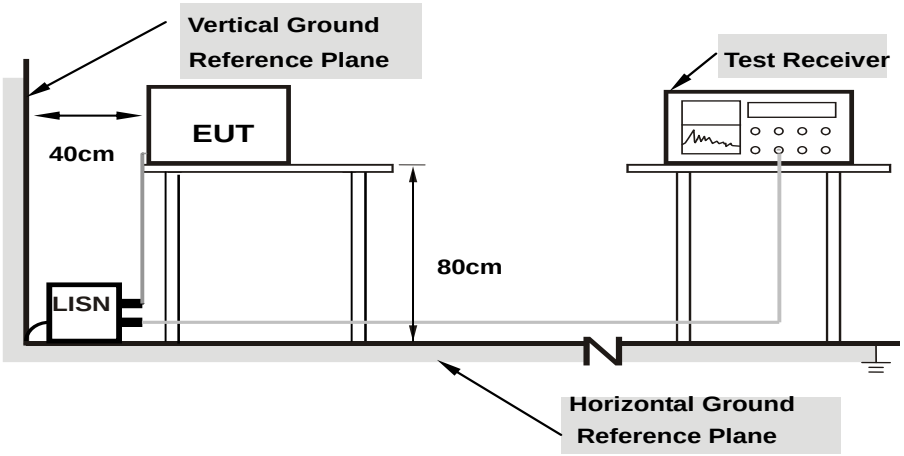
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

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

Same as Item 4.1.6.

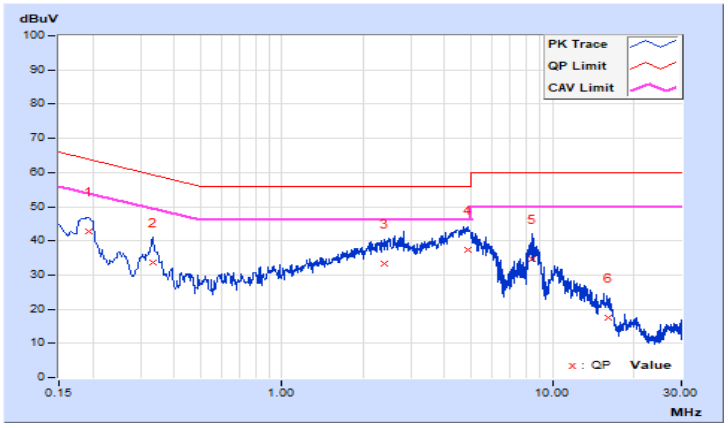
4.2.7 Test Results

RF Mode	TX VHT40	Channel	CH 6：2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	0.19255	9.63	33.22	24.27	42.85	33.90	63.93	53.93	-21.08	-20.03
2	0.33382	9.64	24.01	13.45	33.65	23.09	59.36	49.36	-25.71	-26.27
3	2.40283	9.72	23.62	10.87	33.34	20.59	56.00	46.00	-22.66	-25.41
4	**4.90587**	**9.78**	**27.75**	**19.19**	**37.53**	**28.97**	**56.00**	**46.00**	**-18.47**	**-17.03**
5	8.45732	9.83	24.78	16.40	34.61	26.23	60.00	50.00	-25.39	-23.77
6	16.02902	9.92	7.50	2.39	17.42	12.31	60.00	50.00	-42.58	-37.69

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

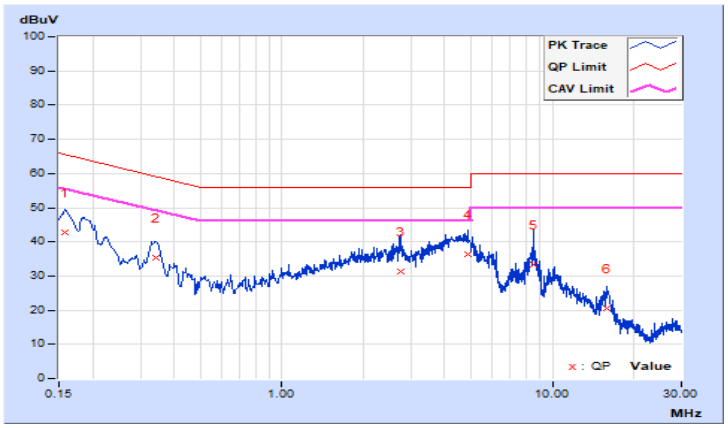


RF Mode	TX VHT40	Channel	CH 6：2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	9.63	33.20	13.81	42.83	23.44	65.58	55.58	-22.75	-32.14
2	0.34108	9.64	25.73	17.91	35.37	27.55	59.18	49.18	-23.81	-21.63
3	2.73527	9.74	21.53	11.02	31.27	20.76	56.00	46.00	-24.73	-25.24
4	4.88632	9.79	26.44	19.11	36.23	28.90	56.00	46.00	-19.77	-17.10
5	8.54337	9.85	23.46	15.75	33.31	25.60	60.00	50.00	-26.69	-24.40
6	15.79827	9.97	10.41	5.30	20.38	15.27	60.00	50.00	-39.62	-34.73

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

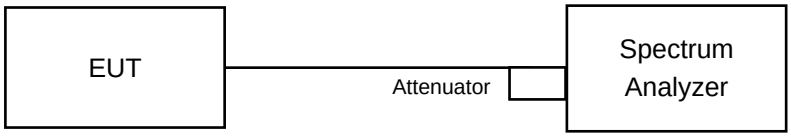


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Spectrum Analyzer R&S	FSV40	101042	2021/9/9	2022/9/8

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 LK - Oven
3. Tested Date: 2021/11/2

4.3.4 Test Procedure

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

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.04	0.5	Pass
6	2437	8.59	0.5	Pass
11	2462	9.04	0.5	Pass

802.11g

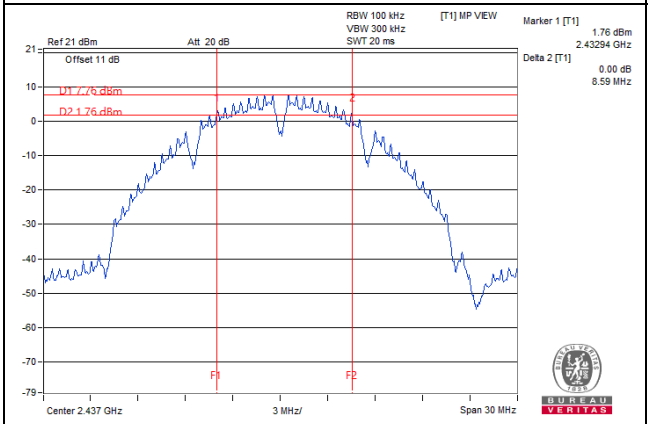
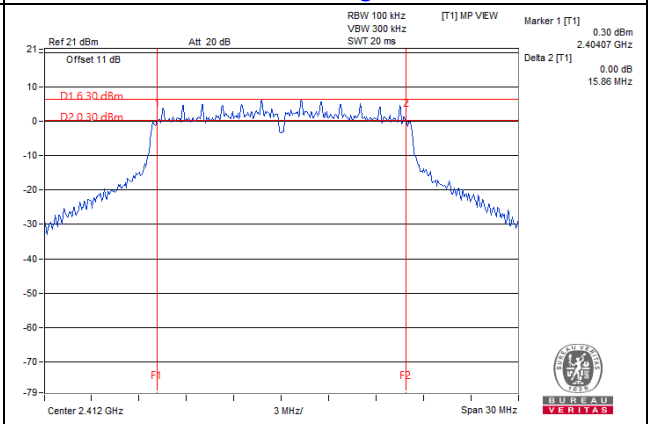
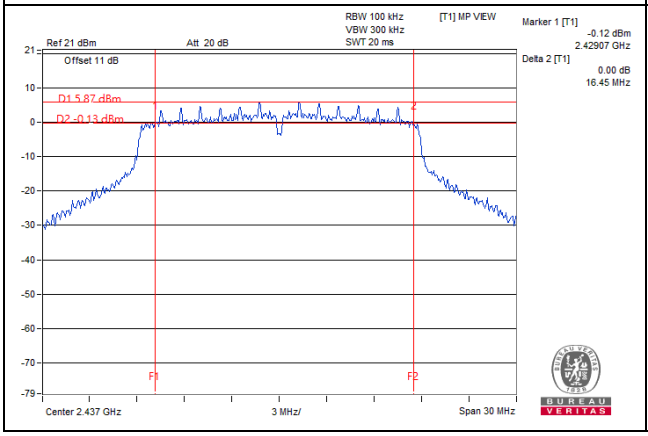
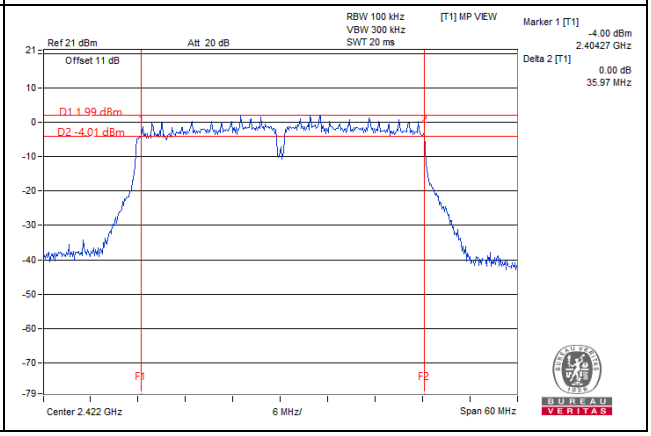
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.86	0.5	Pass
6	2437	16.34	0.5	Pass
11	2462	16.34	0.5	Pass

VHT20

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.59	0.5	Pass
6	2437	16.45	0.5	Pass
11	2462	16.45	0.5	Pass

VHT40

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.97	0.5	Pass
6	2437	36.15	0.5	Pass
9	2452	36.00	0.5	Pass

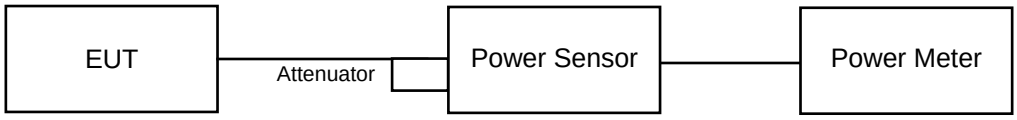
Spectrum Plot of Worst Value	
802.11b	**802.11g**
	
VHT20	**VHT40**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

4.4.2 Test Setup



4.4.3 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Pulse Power Sensor Anritsu	MA2411B	0738404	2021/4/15	2022/4/14
Peak Power meter Anritsu	ML2495A	0842014	2021/4/15	2022/4/14

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 LK - Oven
3. Tested Date: 2021/11/2

4.4.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

FOR PEAK POWER

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	70.469	18.48	30	Pass
6	2437	69.984	18.45	30	Pass
11	2462	77.090	18.87	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	126.765	21.03	30	Pass
6	2437	128.825	21.10	30	Pass
11	2462	137.721	21.39	30	Pass

VHT20

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	129.718	21.13	30	Pass
6	2437	128.825	21.10	30	Pass
11	2462	139.316	21.44	30	Pass

VHT40

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	148.252	21.71	30	Pass
6	2437	**150.661**	21.78	30	Pass
9	2452	90.991	19.59	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	41.687	16.20
6	2437	41.591	16.19
11	2462	43.551	16.39

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	44.875	16.52
6	2437	45.186	16.55
11	2462	47.534	16.77

VHT20

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	44.463	16.48
6	2437	44.157	16.45
11	2462	46.345	16.66

VHT40

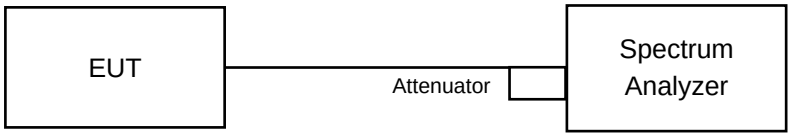
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	35.727	15.53
6	2437	35.892	15.55
9	2452	23.335	13.68

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.3.3 to get information of above instrument.

4.5.4 Test Procedure

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-6.06	8.00	Pass
6	2437	-6.07	8.00	Pass
11	2462	-5.53	8.00	Pass

802.11g

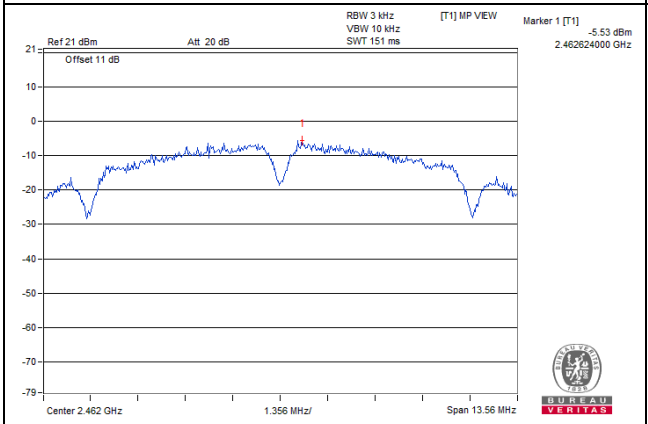
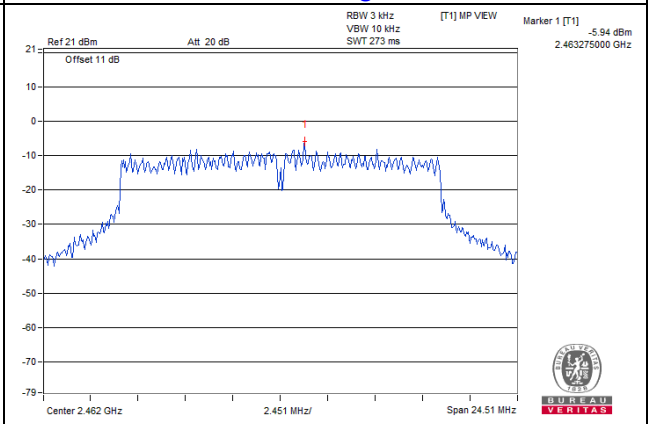
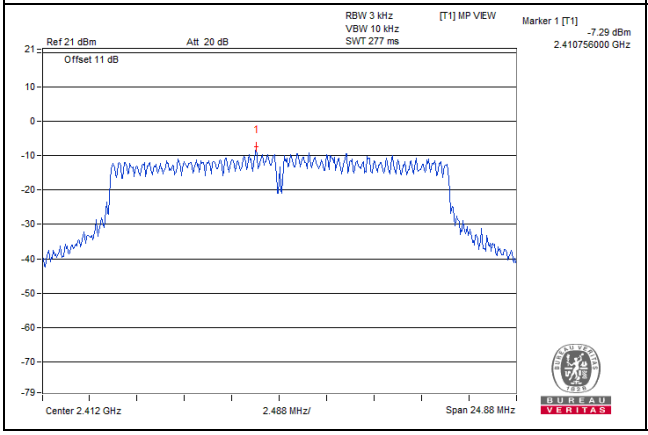
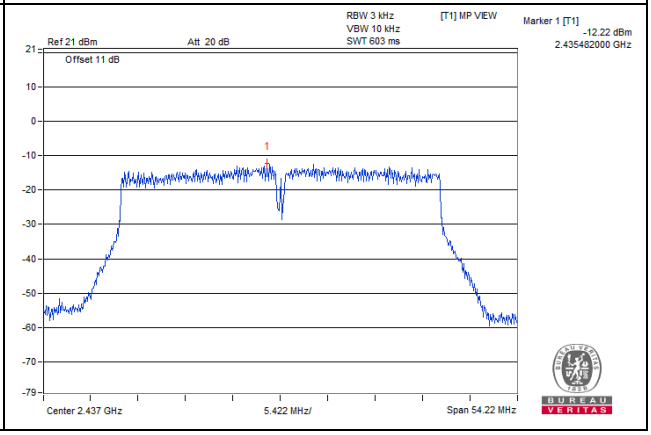
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-7.46	8.00	Pass
6	2437	-6.51	8.00	Pass
11	2462	-5.94	8.00	Pass

VHT20

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-7.29	8.00	Pass
6	2437	-8.47	8.00	Pass
11	2462	-8.18	8.00	Pass

VHT40

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-12.34	8.00	Pass
6	2437	-12.22	8.00	Pass
9	2452	-14.54	8.00	Pass

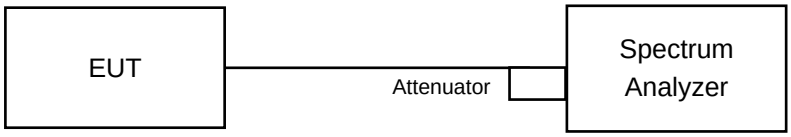
Spectrum Plot of Worst Value	
802.11b	**802.11g**
	
VHT20	**VHT40**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.3.3 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

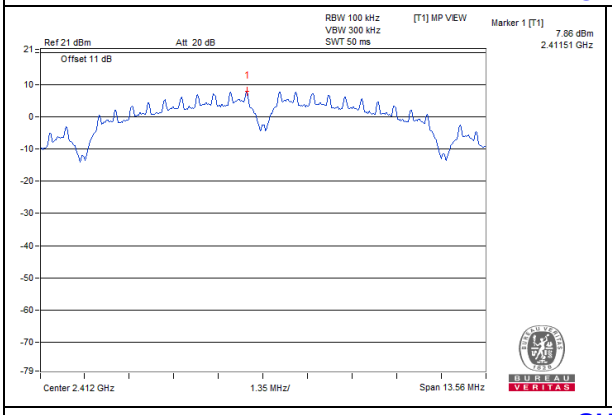
Same as Item 4.3.6

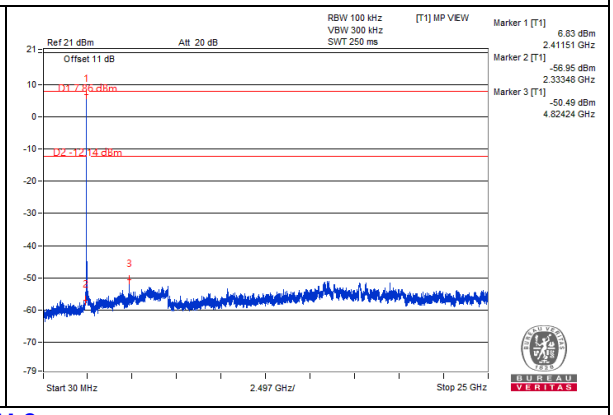
4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

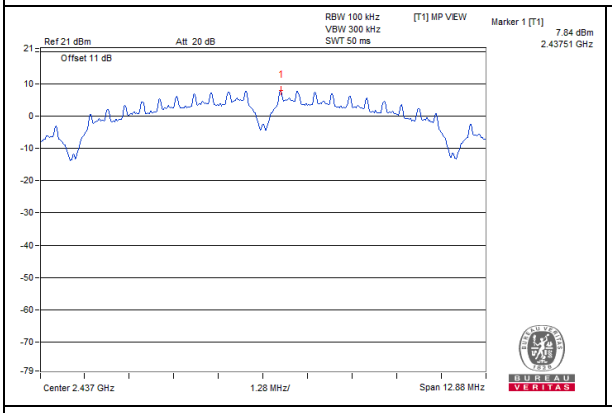
802.11b

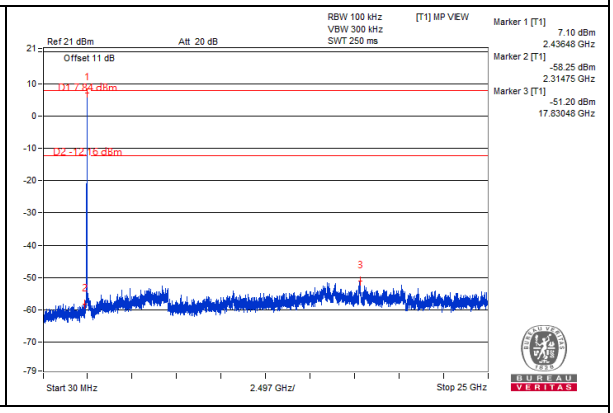
CH 1



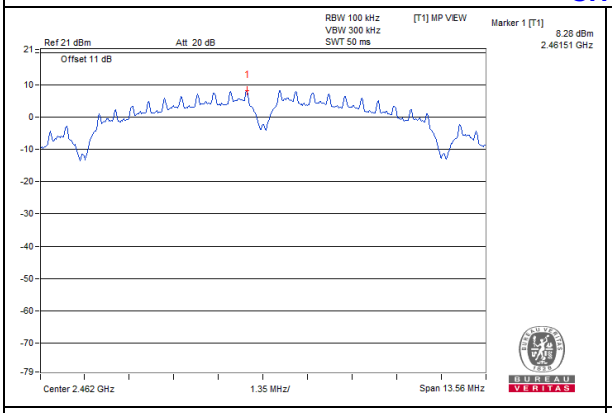


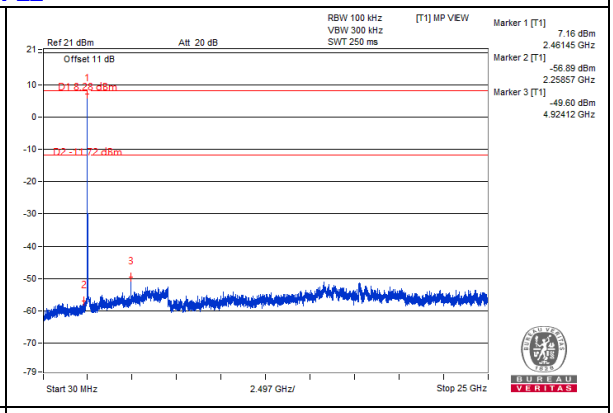
CH 6



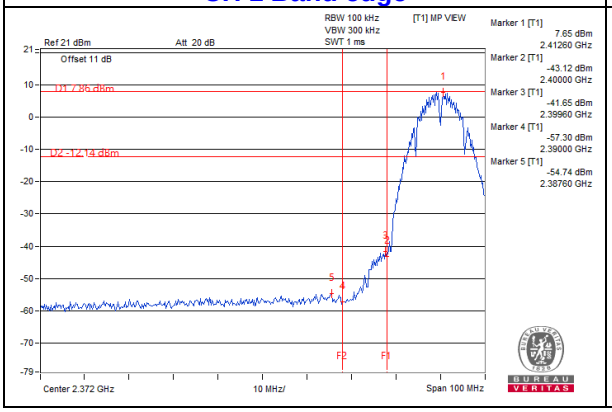


CH 11

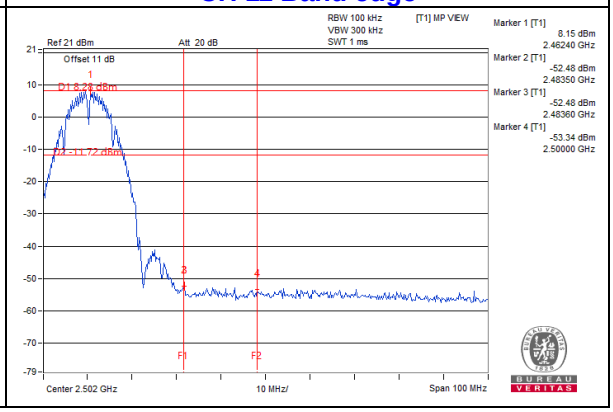




CH 1 Band edge

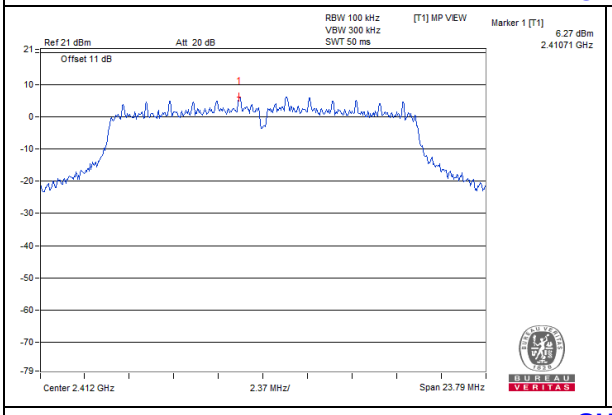


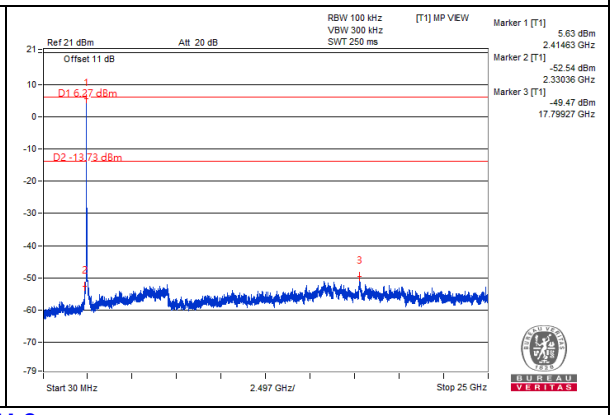
CH 11 Band edge



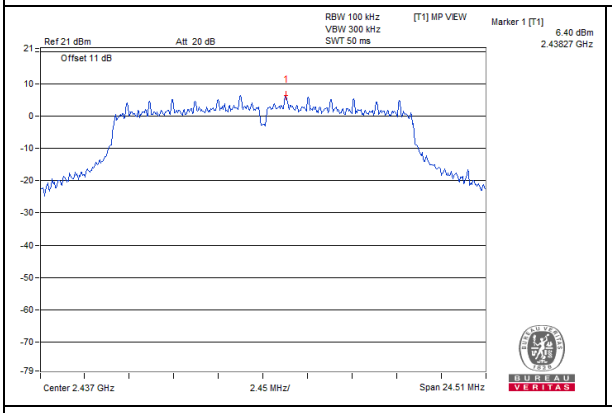
802.11g

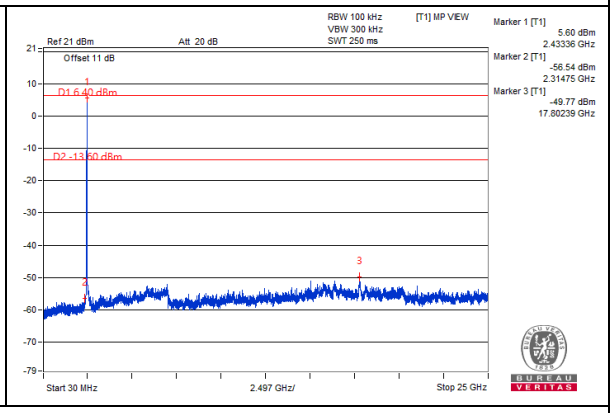
CH 1



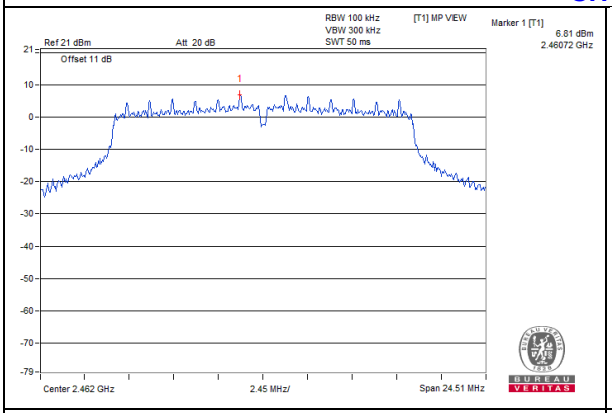


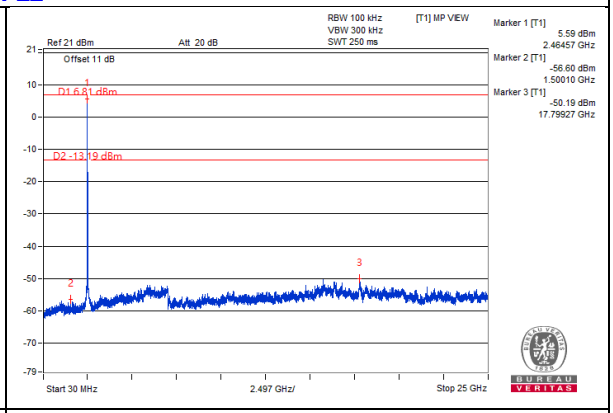
CH 6



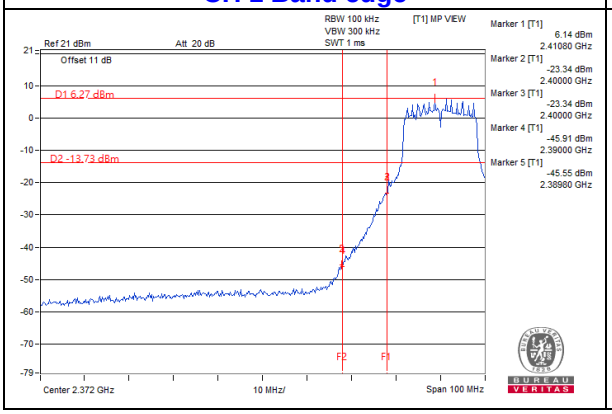


CH 11

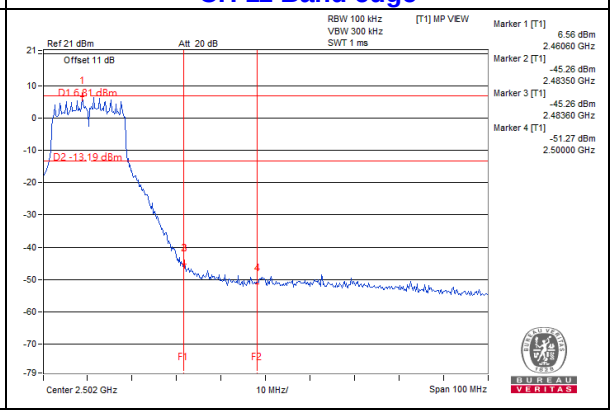




CH 1 Band edge

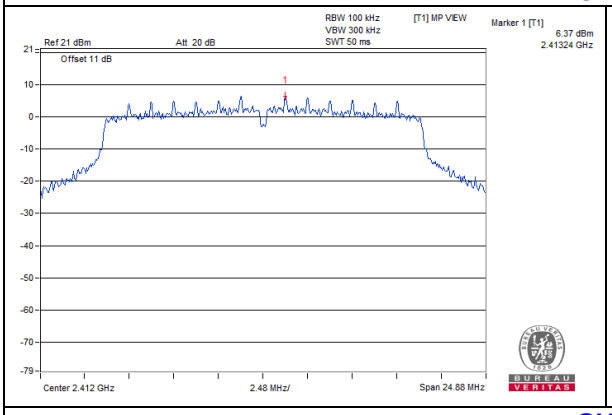


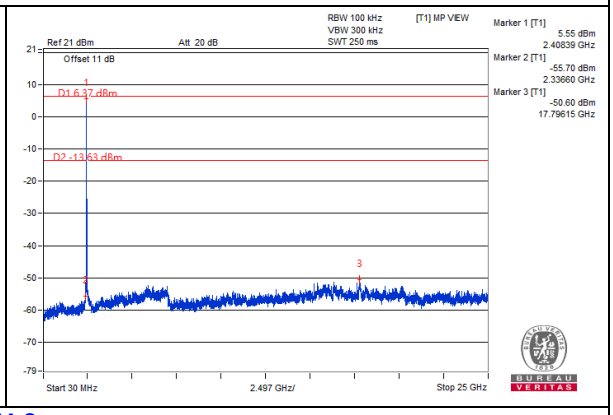
CH 11 Band edge



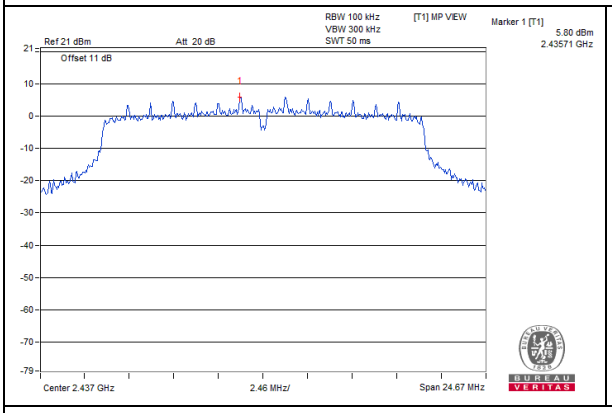
VHT20

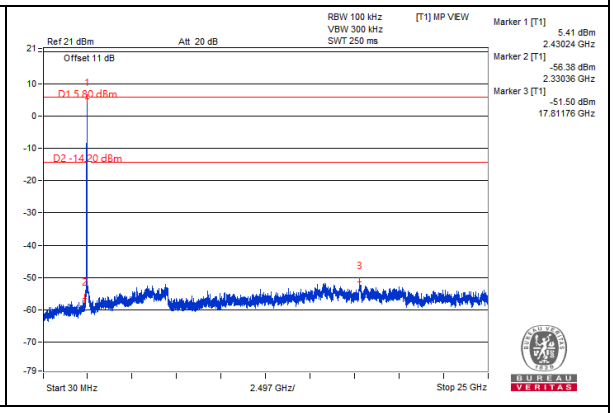
CH 1



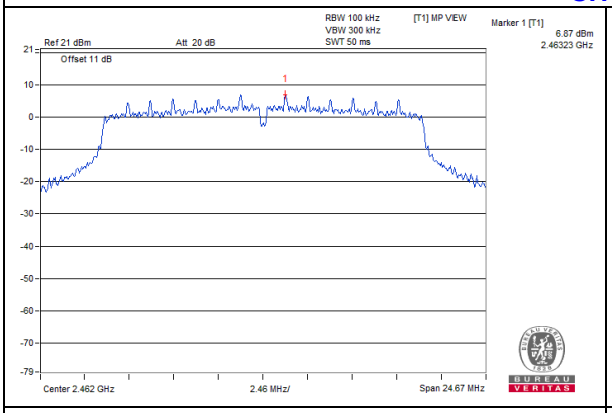


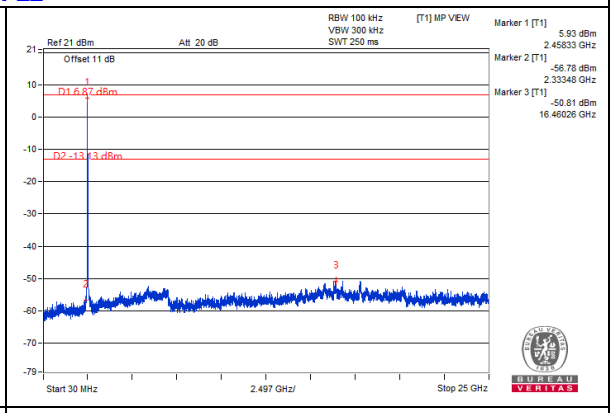
CH 6



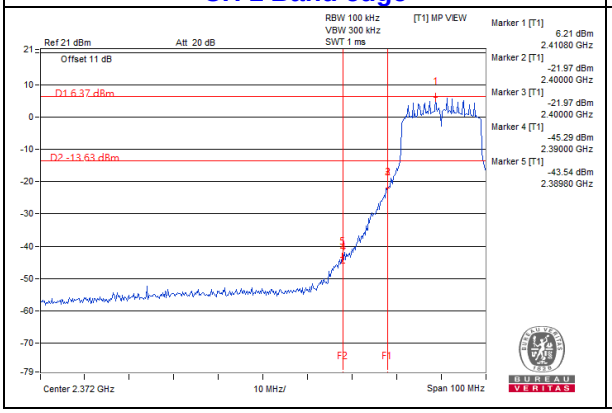


CH 11

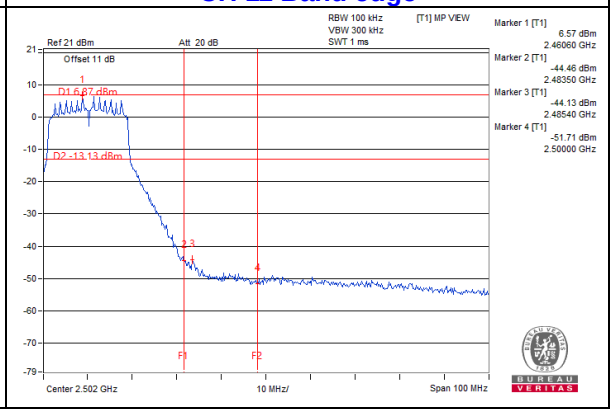




CH 1 Band edge

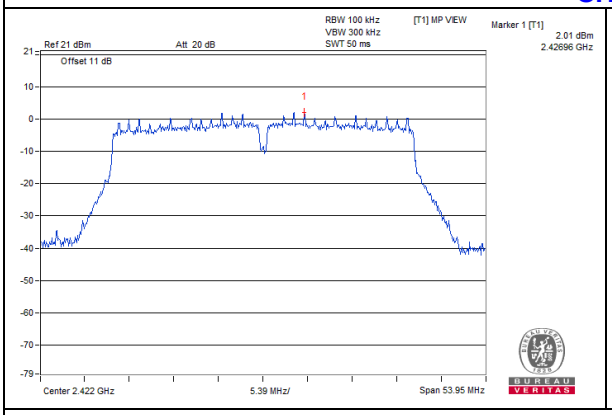


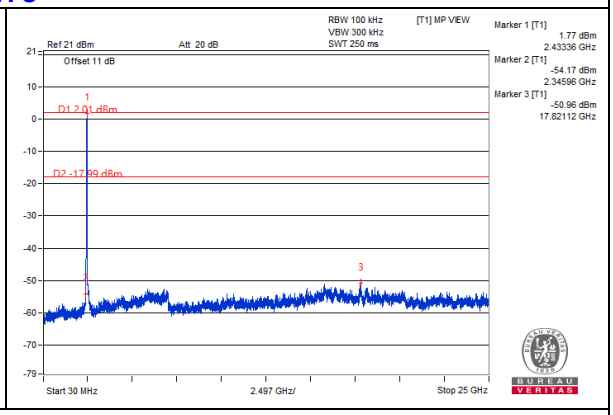
CH 11 Band edge



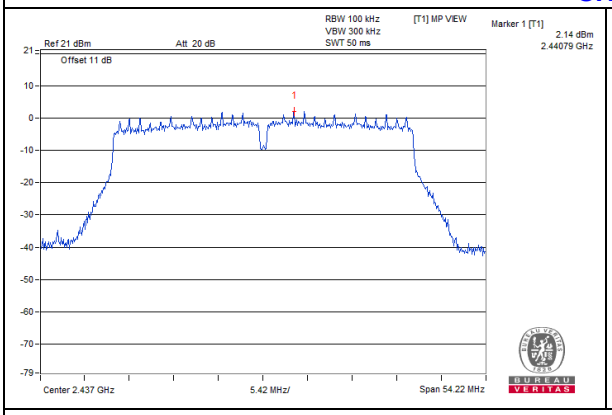
VHT40

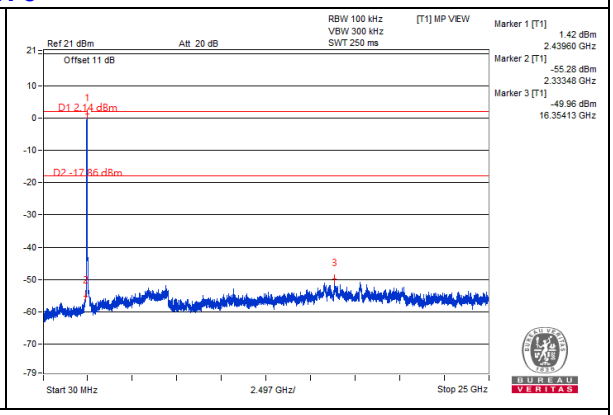
CH 3



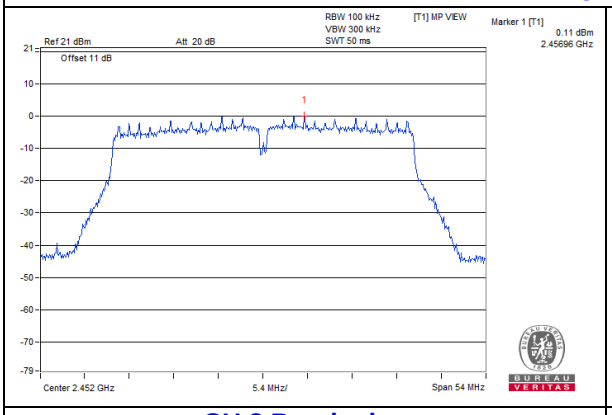


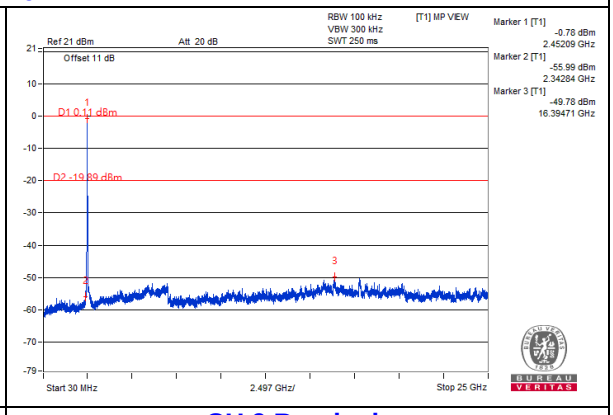
CH 6



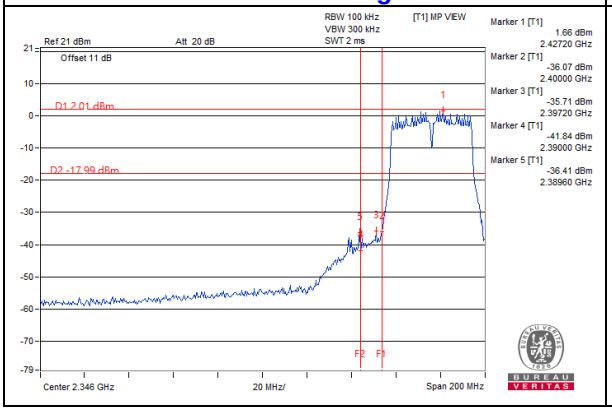


CH 9

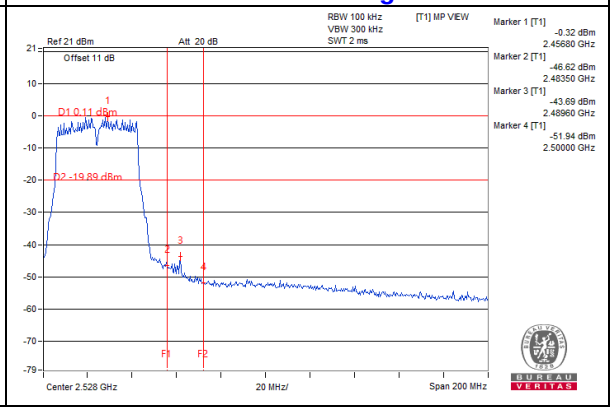




CH 3 Band edge



CH 9 Band edge



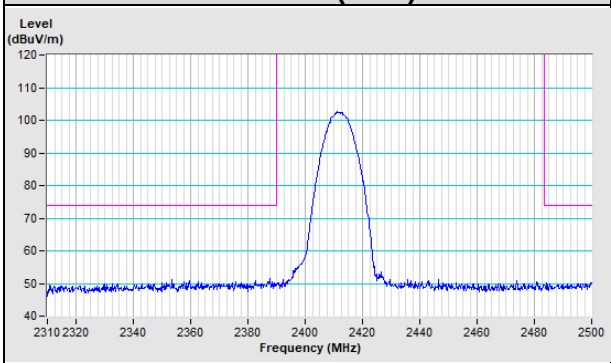
5 Pictures of Test Arrangements

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

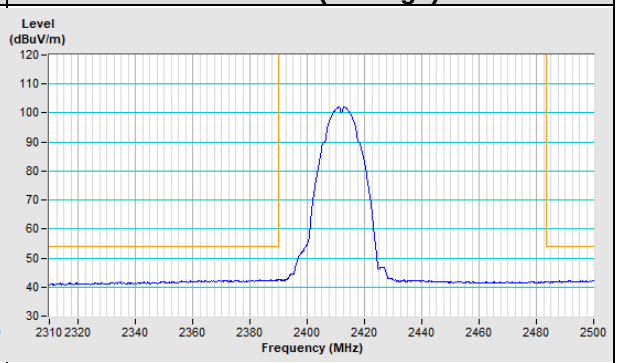
Annex A- Band Edge Measurement

802.11b Channel 1

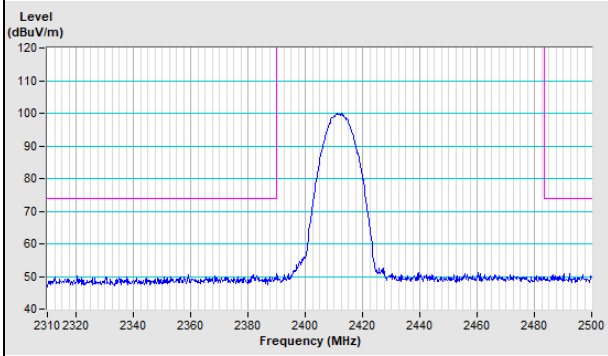
Horizontal (Peak)



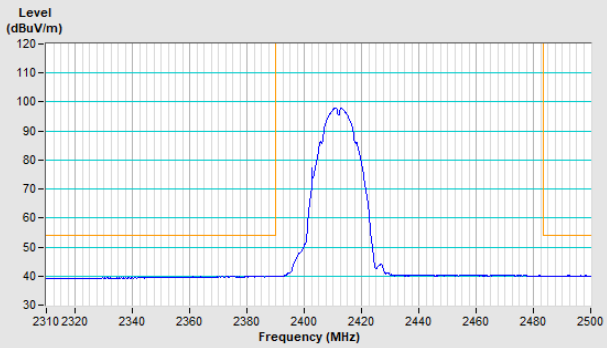
Horizontal (Average)



Vertical (Peak)

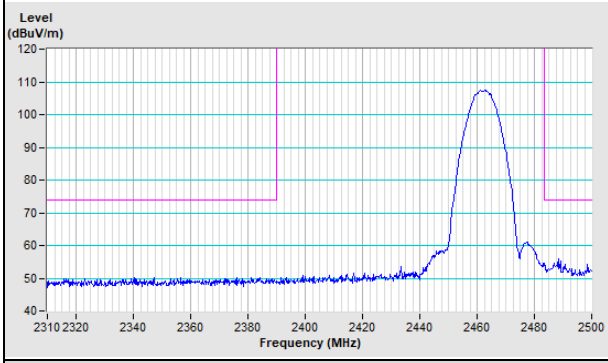


Vertical (Average)

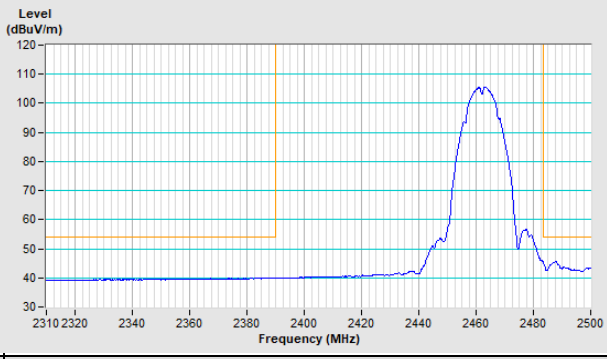


802.11b Channel 11

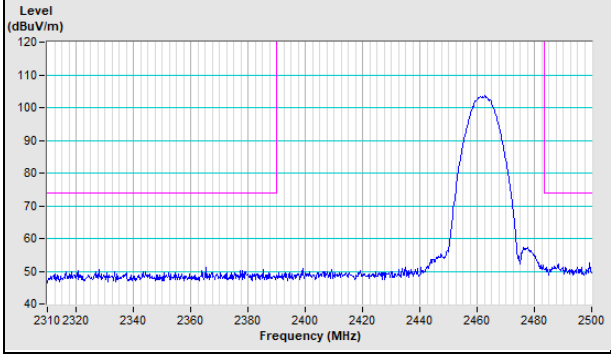
Horizontal (Peak)



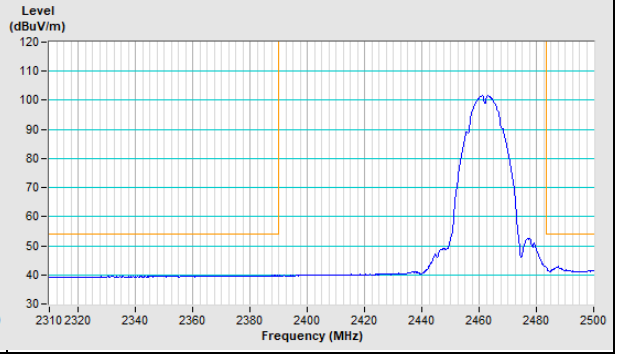
Horizontal (Average)



Vertical (Peak)

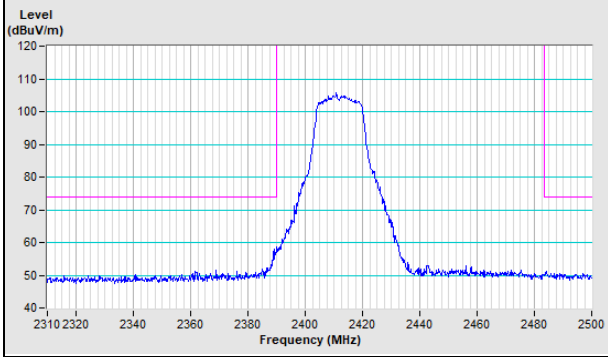


Vertical (Average)

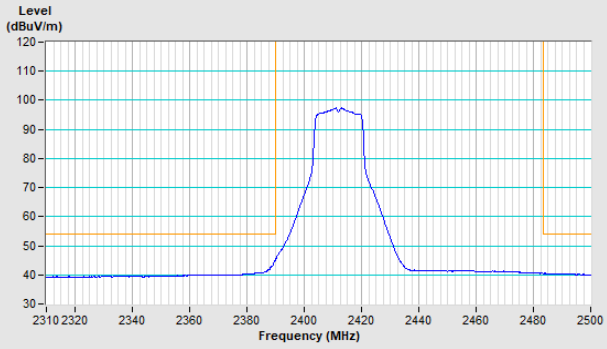


802.11g Channel 1

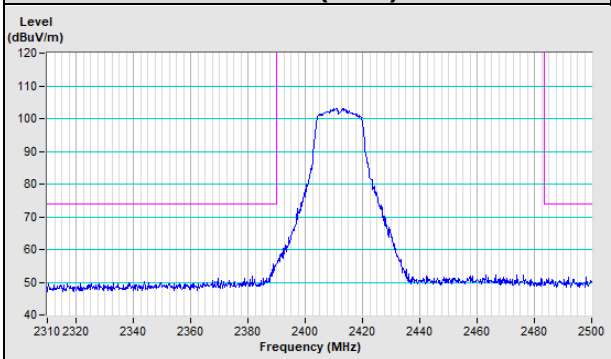
Horizontal (Peak)



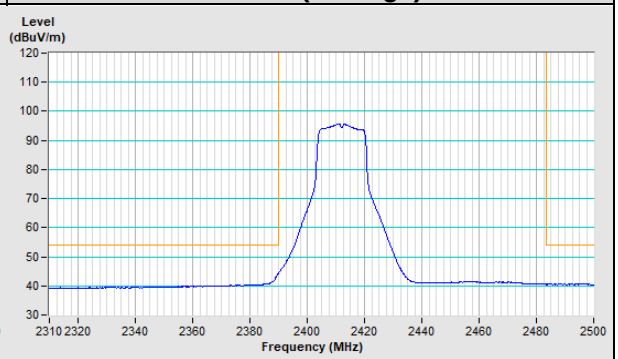
Horizontal (Average)



Vertical (Peak)

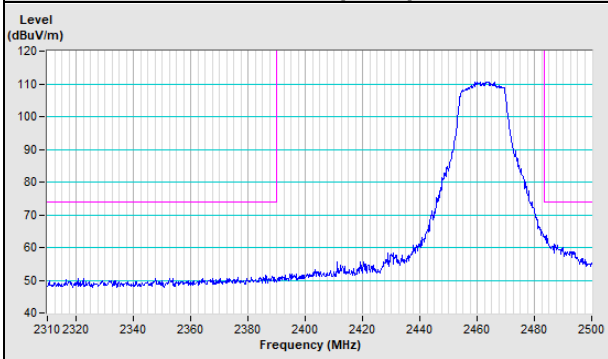


Vertical (Average)

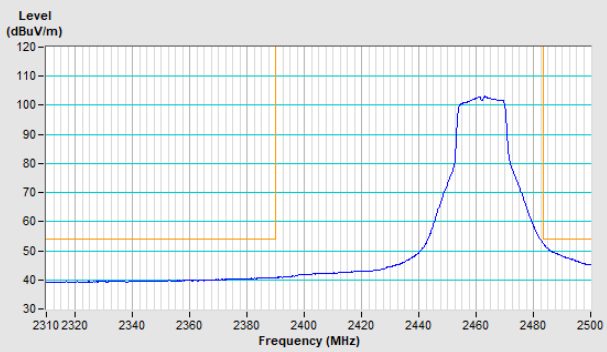


802.11g Channel 11

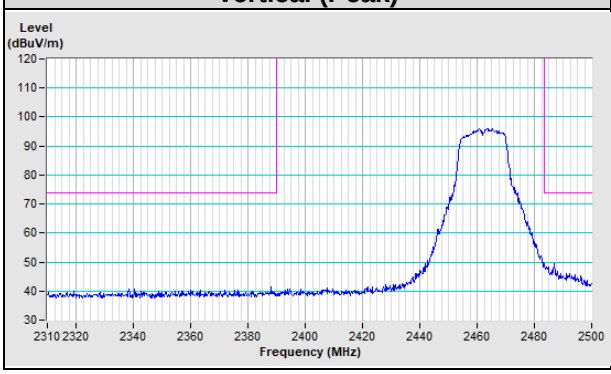
Horizontal (Peak)



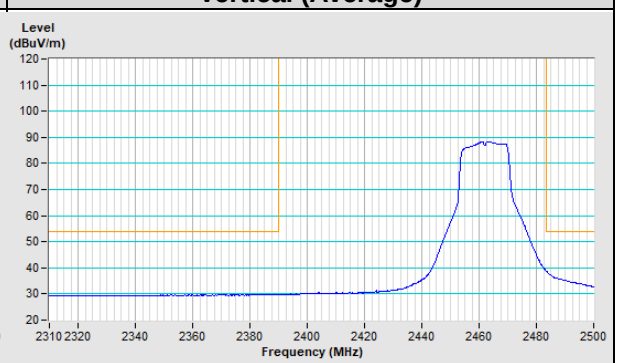
Horizontal (Average)

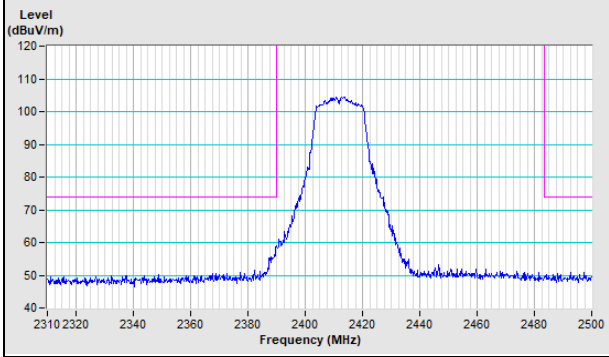
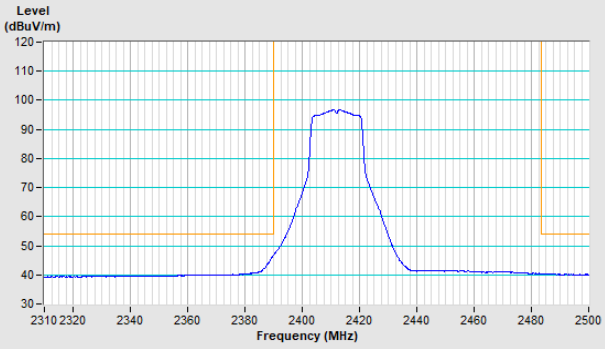
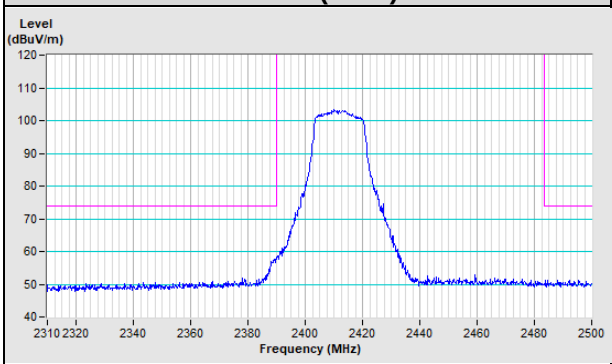
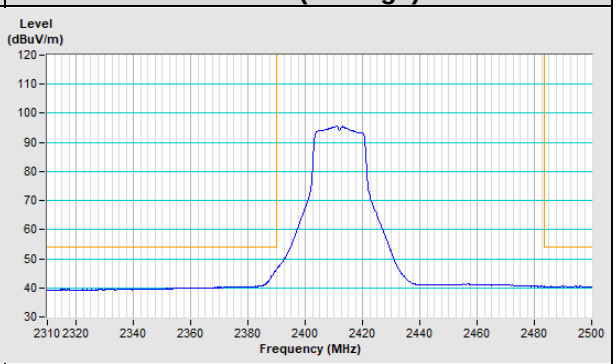
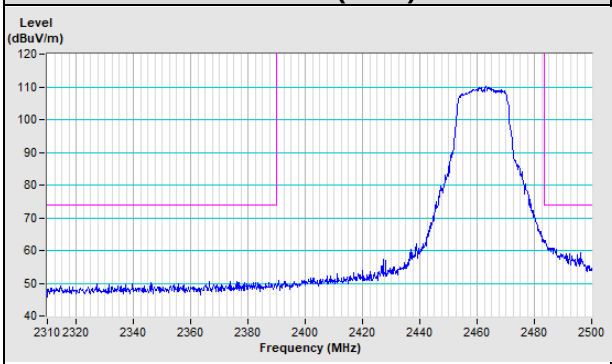
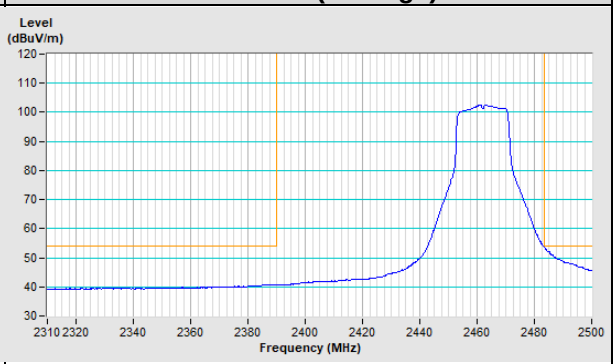
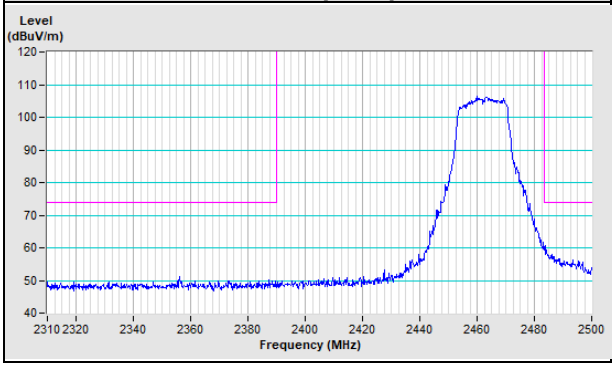
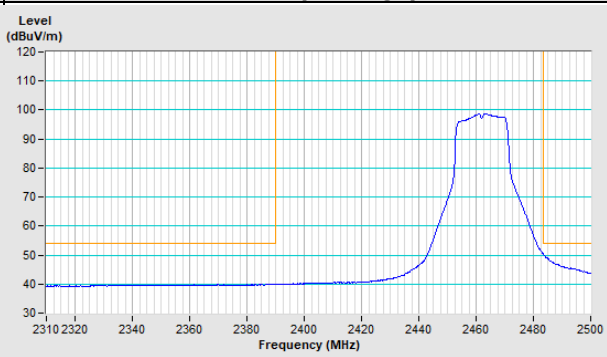


Vertical (Peak)



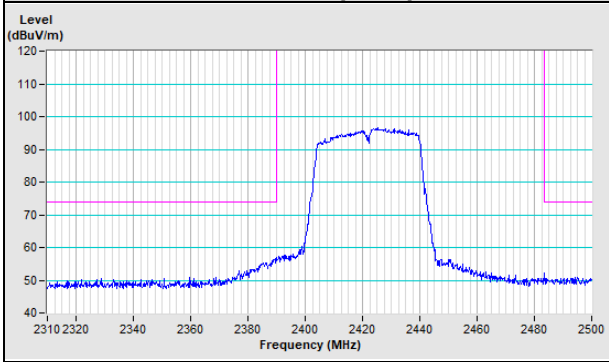
Vertical (Average)



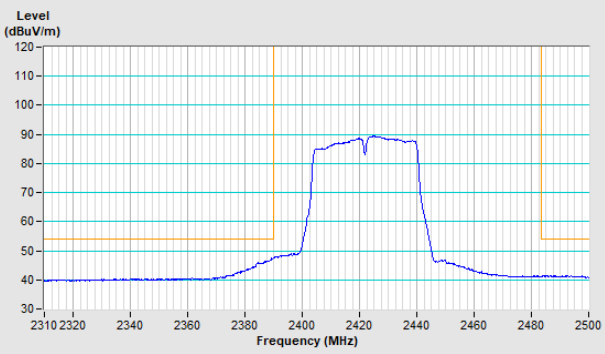
VHT20 Channel 1	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	
VHT20 Channel 11	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	

VHT40 Channel 3

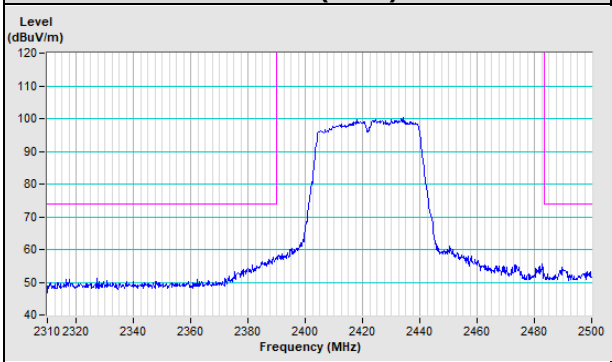
Horizontal (Peak)



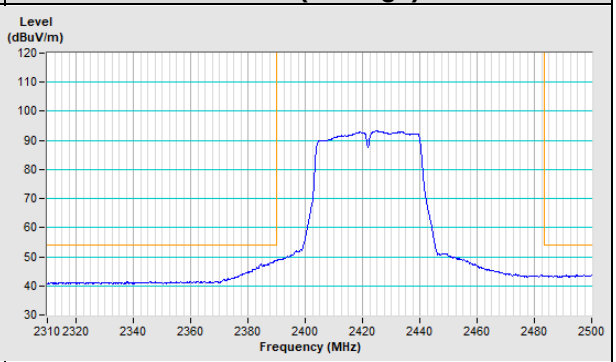
Horizontal (Average)



Vertical (Peak)

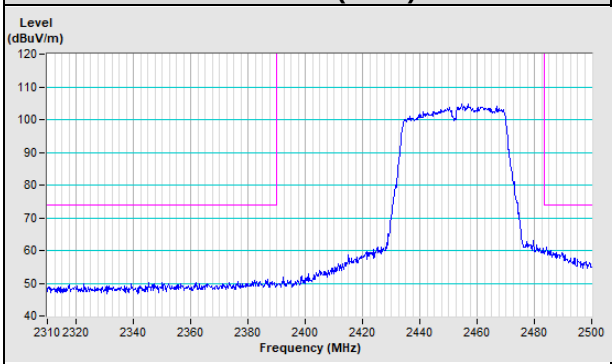


Vertical (Average)

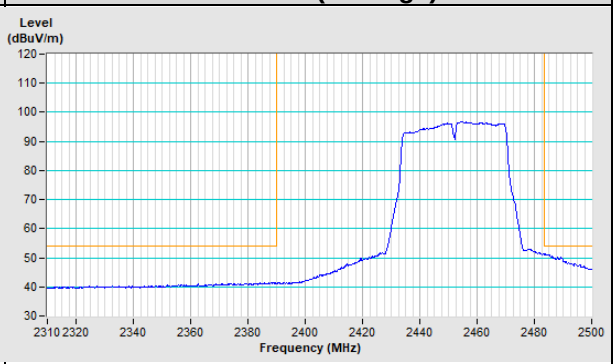


VHT40 Channel 9

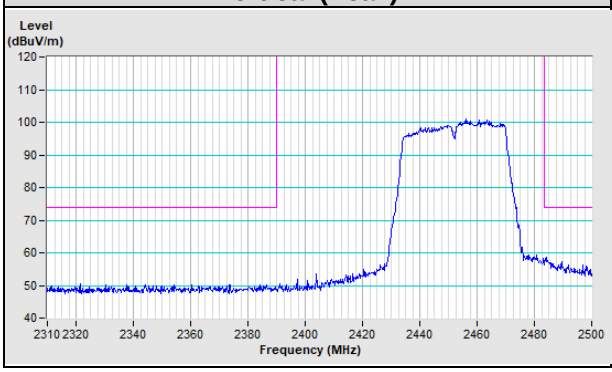
Horizontal (Peak)



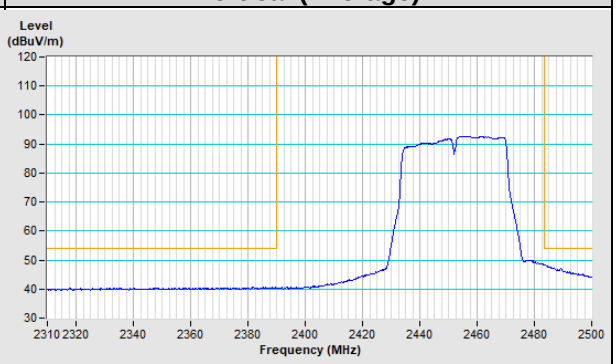
Horizontal (Average)



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 ---