TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart C (Section 15.247)**
Report No.:	RFBGSN-WTW-P22060933A
FCC ID:	I4L-GRAX66
Product:	RadiX AX6600 WiFi 6 Tri-Band Gaming Router
Brand:	msi
Model No.:	GRAX66
Received Date:	2023/8/15
Test Date:	2023/8/15 ~ 2023/9/12
Issued Date:	2023/9/26
Applicant:	Micro-Star International Co., Ltd.
Address:	No.69, Lide St., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)
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., Kewi Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Approved by: Jeremy Lin , **Date:** 2023/9/26

Jeremy Lin / Project Engineer

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Prepared by : Polly Chien / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBGSN-WTW-P22060933A	Original release.	2023/9/26

1 Certificate

Product:	RadiX AX6600 WiFi 6 Tri-Band Gaming Router
Brand:	msi
Test Model:	GRAX66
Sample Status:	Identical Prototype
Applicant:	Micro-Star International Co., Ltd.
Test Date:	2023/8/15 ~ 2023/9/12
Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247)
Measurement procedure:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02 KDB 662911 D01 Multiple Transmitter Output v02r01

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.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247(b)	RF Output Power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	PASS	Meet the requirement of limit.
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -9.17 dB at 0.47435 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -5.5 dB at 69.36 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -0.3 dB at 2483.50 MHz
15.203	Antenna Requirement	Pass	Antenna connector is I-PEX not a standard connector.

Note: 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	Specification	Expanded Uncertainty (k=2) (±)
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.79 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.59 dB
	30 MHz ~ 1 GHz	3.64 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description

Product	RadiX AX6600 WiFi 6 Tri-Band Gaming Router
Brand	msi
Test Model	GRAX66
Status of EUT	Identical Prototype
Power Supply Rating	12 Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b:11/ 5.5/ 2/ 1 Mbps 802.11g: 54/ 48/ 36/ 24/ 18/ 12/ 9/ 6 Mbps 802.11n: up to 300Mbps VHT: up to 400Mbps 802.11ax: up to 573Mbps
Operating Frequency	2.412 GHz ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7
Output Power	**CDD Mode** 802.11b: 983.839 mW (29.93 dBm) 802.11g: 980.921 mW (29.92 dBm) NSS 1: 854.555 mW (29.32 dBm) NSS 2: 909.306 mW (29.59 dBm) **Beamforming Mode** NSS 1: 854.555 mW (29.32 dBm) NSS 2: 909.306 mW (29.59 dBm)

Note:

1. This is a supplementary report of BV CPS Report No.: RFBGSN-WTW-P22060933. The differences are changing antenna cable routing, channel output power and adding 2nd source PCBA manufacturer. Therefore, test item according to original worst case are performed for the addendum and presented in the test report (refer to test item 3.4). For other testing data, please refer to the original report.
2. The EUT uses following accessories.

AC Adapter 1		
Brand	Model	Specification
CWT	2AEJ042FC	AC Input : 100-240V, 50/60Hz, 1.3A DC Output : 12.0V, 3.5A, 42.0W
Ethernet cable		
Brand	Model	Specification
NA	NA	Signal Line : 0.96m non-shielded cable w/o core

3. There are WLAN (2.4 GHz & 5 GHz) technology used for the EUT.
4. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4 GHz)	WLAN (5 GHz)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

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 Antenna Description of EUT

1. The antenna information is listed as below.

RF Chain NO.	Type	Connector	Brand	Model	Frequency Range (MHz)	Gain (dBi)				Directional Gain (dBi)		
						Chain 0	Chain 1	Chain 2	Chain 3	NSS 1	NSS 2	NSS 4
2G	Dipole	I-PEX	Wieson	Chain 0: ARY121-0307-001-00 Chain 1: ARY121-0307-003-00	2400 ~ 2483.5	2.05	2.07	-	-	4.24	1.97	-
5G_L				Chain 0: ARY121-0307-001-00 Chain 1: ARY121-0307-003-00	5150 ~ 5250	4.54	4.59	-	-	5.68	3.21	-
					5250 ~ 5350	4.60	4.65	-	-	5.69	3.54	-
5G_H				Chain 0: ARY121-0307-002-00 Chain 1: ARY121-0307-004-00 Chain 2: ARY121-0307-005-00 Chain 3: ARY121-0307-006-00	5470 ~ 5725	3.02	3.69	2.89	3.02	7.59	5.56	2.47
					5725 ~ 5850	3.01	2.88	3.72	3.27	6.99	4.91	2.33

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

2. The EUT incorporates a MIMO function:

Modulation Mode	CDD Mode	Beamforming Mode	TX Function
802.11b	Support	Not Support	2TX
802.11g	Support	Not Support	2TX
802.11n (HT20)	Support	Not Support	2TX (NSS1 / NSS2)
802.11n (HT40)	Support	Not Support	2TX (NSS1 / NSS2)
VHT20	Support	Support	2TX (NSS1 / NSS2)
VHT40	Support	Support	2TX (NSS1 / NSS2)
802.11ax (HE20)	Support	Support	2TX (NSS1 / NSS2)
802.11ax (HE40)	Support	Support	2TX (NSS1 / NSS2)

Note:
1. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
2. The modulation and bandwidth are similar for 802.11n mode for 20 MHz (40 MHz) and VHT mode for 20 MHz (40 MHz), therefore the manufacturer will control the power for 802.11n/VHT mode is the same as the 802.11ax or more lower than it and investigated worst case to representative mode in test report.

3.3 Channel List

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), VHT20 and 802.11ax (HE20):

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

7 channels are provided for 802.11n (HT40), VHT40 and 802.11ax (HE40):

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

3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	1. EUT can be used in the following ways: X-axis/ Z-axis. Pre-scan in these ways and find the worst case as a representative test condition.
Worst Case:	The worst case was found when positioned on X-axis.

Following channel(s) was (were) selected for the final test as listed below:

Test Item	NSS	Mode	Signal Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	NA	802.11b	CDD	1, 6, 11	DBPSK	1Mb/s
		802.11g	CDD	1, 6, 11	BPSK	6Mb/s
	1, 2	802.11n (HT20)	CDD	1, 6, 11	BPSK	MCS0
		802.11n (HT40)	CDD	3, 6, 9	BPSK	MCS0
		VHT20	CDD & Beamforming	1, 6, 11	BPSK	MCS0
		VHT40	CDD & Beamforming	3, 6, 9	BPSK	MCS0
		802.11ax (HE20)	CDD & Beamforming	1, 6, 11	BPSK	MCS0
		802.11ax (HE40)	CDD & Beamforming	3, 6, 9	BPSK	MCS0
Power Spectral Density / 6 dB Bandwidth / Conducted Out of Band Emissions	1, 2	802.11ax (HE40)	CDD	9	BPSK	MCS0
AC Power Conducted Emissions	NA	802.11ax (HE40)	CDD	9	BPSK	MCS0
Unwanted Emissions below 1 GHz	NA	802.11ax (HE40)	CDD	9	BPSK	MCS0
Unwanted Emissions above 1 GHz	1, 2	802.11ax (HE40)	CDD	9	BPSK	MCS0

Note:

All the testing data are identical to the original report except the RF Output Power stated below.

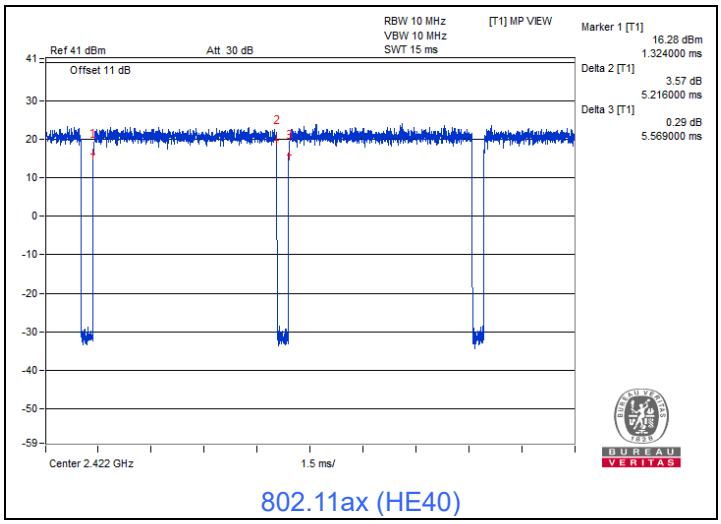
Test Item	NSS	Mode	Signal Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	1, 2	802.11n (HT40)	CDD	9	BPSK	MCS0
		VHT40	CDD & Beamforming	9	BPSK	MCS0
		802.11ax (HE40)	CDD & Beamforming	9	BPSK	MCS0

3.5 Duty Cycle of Test Signal

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

NSS 1

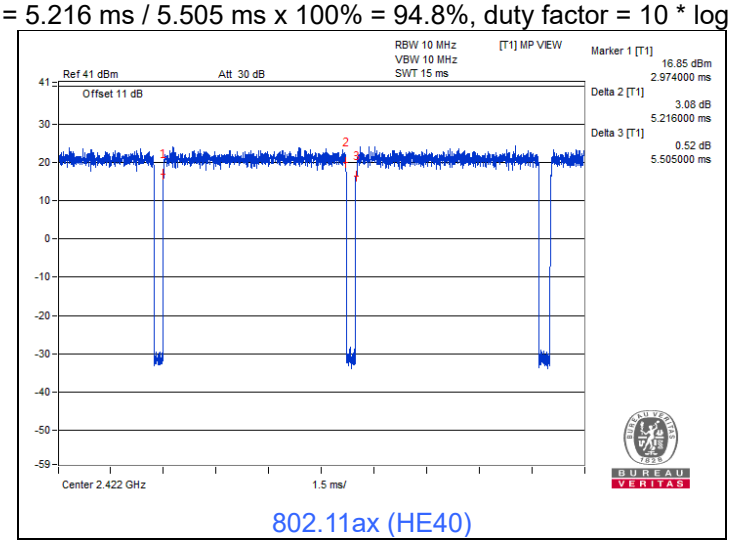
802.11ax (HE40): Duty cycle = 5.216 ms / 5.569 ms x 100% = 93.7%, duty factor = 10 * log (1/Duty cycle) = 0.28 dB



802.11ax (HE40)

NSS 2

802.11ax (HE40): Duty cycle = 5.216 ms / 5.505 ms x 100% = 94.8%, duty factor = 10 * log (1/Duty cycle) = 0.23 dB

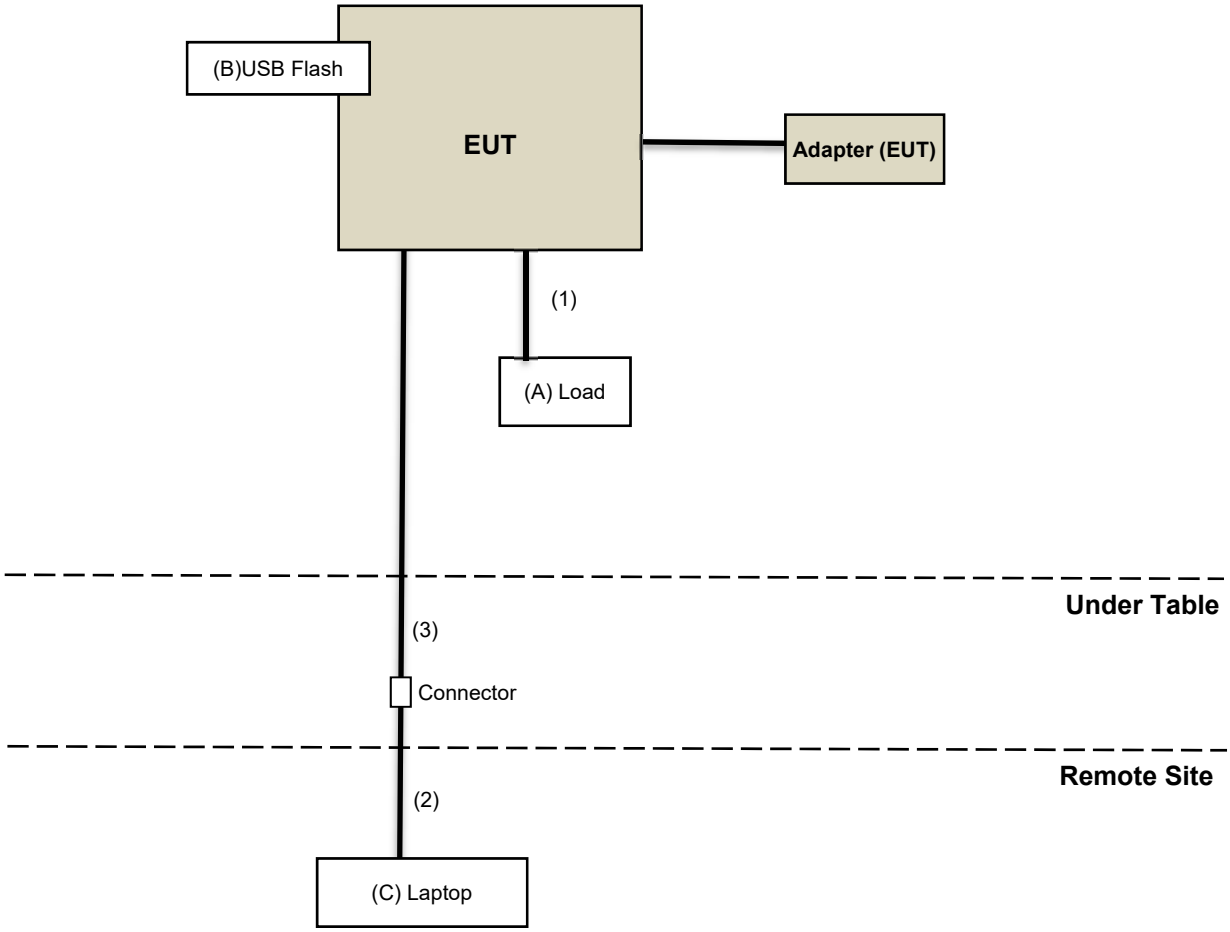


802.11ax (HE40)

3.6 Test Program Used and Operation Descriptions

Controlling software Qualcomm Radio Control Tool Version 4.0.00192.0 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Load	BV	LP-4	N/A	N/A	Provided by Lab
B	USB Flash	sandisk	SDDDC3-032G	N/A	N/A	Provided by Lab
C	Laptop	Lenovo	L440	R90J29AA	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	LAN cable	4	1.5	No	0	Provided by Lab
2	LAN cable	1	7	No	0	Provided by Lab
3	Ethernet cable	1	0.96	No	0	Accessory of EUT

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Peak Power Analyzer Keysight	8990B	MY51000485	2023/1/19	2024/1/18
Wideband Power Sensor Keysight	N1923A	MY58020002	2023/1/18	2024/1/17
		MY58140009	2023/1/18	2024/1/17

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/9/12

4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Signal & Spectrum Analyzer R&S	FSV3044	101105	2023/2/22	2024/2/21
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/9/12

4.3 6 dB Bandwidth

Refer to section 4.2 to get information of the instruments.

4.4 Conducted Out of Band Emissions

Refer to section 4.2 to get information of the instruments.

4.5 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
DC-LISN Schwarzbeck	NNBM 8126G	8126G-069	2022/11/9	2023/11/8
EMI Test Receiver R&S	ESR3	102783	2022/12/21	2023/12/20
LISN R&S	ESH2-Z5	100100	2023/3/7	2024/3/6
	ESH3-Z5	100116	2023/2/15	2024/2/14
RF Coaxial Cable Woken	5D-FB	Cable-cond2-01	2022/9/3	2023/9/2
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2022/8/31	2023/8/30

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2023/8/17

4.6 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-155	2022/10/21	2023/10/20
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Loop Antenna Electro-Metrics	EM-6879	269	2022/9/19	2023/9/18
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
Preamplifier Agilent	8447D	2944A10631	2023/5/7	2024/5/6
Preamplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
RF Coaxial Cable Woken	8D-FB	Cable-CH4-01	2023/7/8	2024/7/7
Signal & Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2023/8/17

4.7 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-408	2022/11/13	2023/11/12
	BBHA 9170	9170-480	2022/11/13	2023/11/12
		BBHA9170241	2022/10/20	2023/10/19
		BBHA9170243	2022/11/13	2023/11/12
Preamplifier EMCI	EMC 184045	980116	2022/10/1	2023/9/30
Preamplifier Keysight	83017A	MY53270295	2023/5/7	2024/5/6
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2023/7/8	2024/7/7
	EMC102-KM-KM-3000	150929	2023/7/8	2024/7/7
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	2023/5/7	2024/5/6
	Sucoflex 104	MY 13380+295012/04	2023/5/7	2024/5/6
Signal & Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2023/8/15 ~ 2023/8/18

5 Limits of Test Items

5.1 RF Output Power

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 $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

5.2 Power Spectral Density

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

5.3 6 dB Bandwidth

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

5.4 Conducted Out of Band Emissions

Below 30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

5.5 AC Power Conducted Emissions

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

Notes:

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.

5.6 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30 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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.7 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

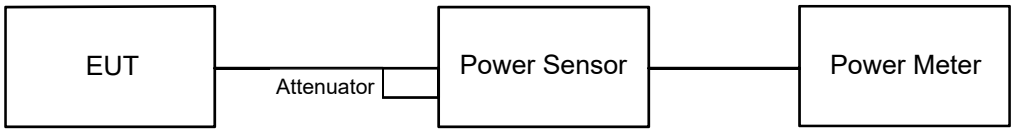
Notes:

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.

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup

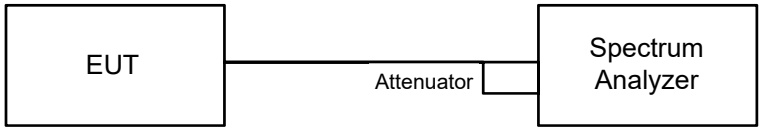


6.1.2 Test Procedure

Average Power:
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.

6.2 Power Spectral Density

6.2.1 Test Setup



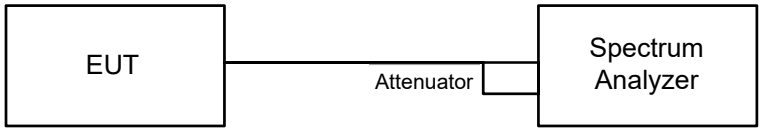
6.2.2 Test Procedure

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.
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.

Note: If Duty cycle < 98%, 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.

6.3 6 dB Bandwidth

6.3.1 Test Setup

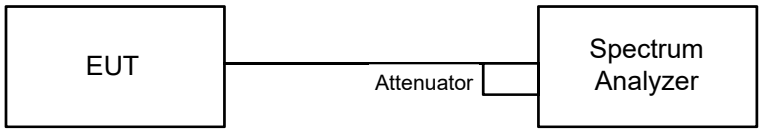


6.3.2 Test Procedure

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.

6.4 Conducted Out of Band Emissions

6.4.1 Test Setup



6.4.2 Test Procedure

MEASUREMENT PROCEDURE REF

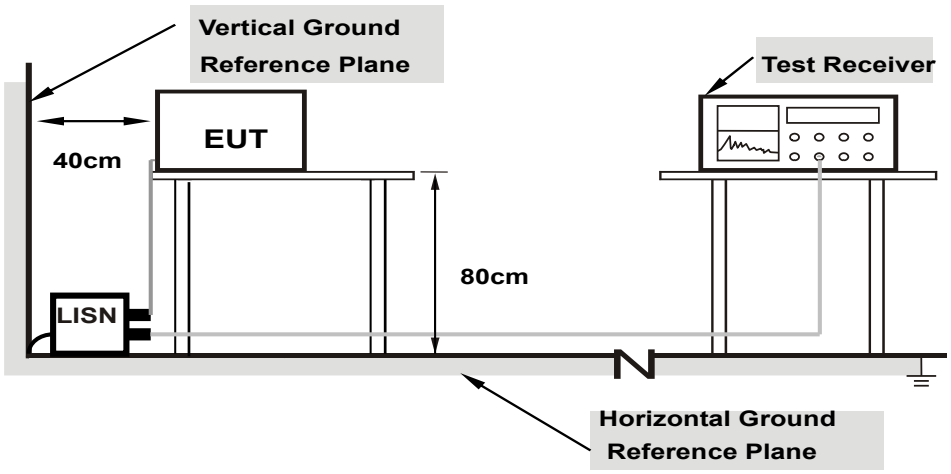
a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

6.5 AC Power Conducted Emissions

6.5.1 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).

6.5.2 Test Procedure

a. The EUT was placed on a 0.8 meter to the top of table and 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.

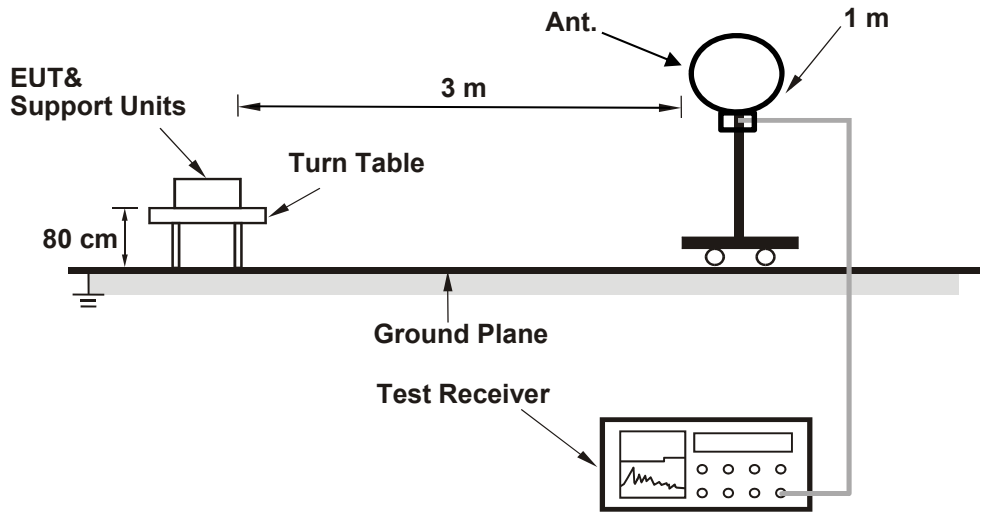
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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.

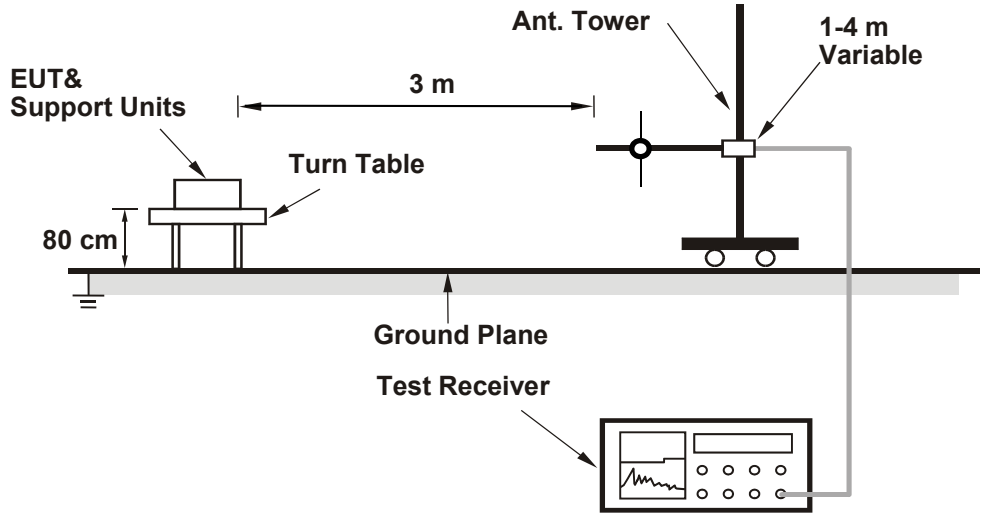
6.6 Unwanted Emissions below 1 GHz

6.6.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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

6.6.2 Test Procedure

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 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters 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.

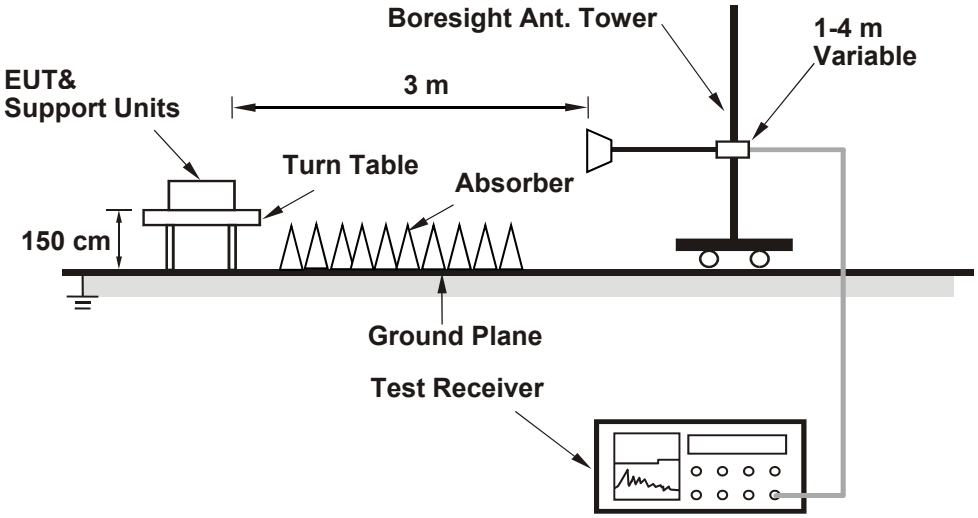
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

6.7 Unwanted Emissions above 1 GHz

6.7.1 Test Setup



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

6.7.2 Test Procedure

a. The EUT was placed on the top of a rotating table 1.5 meters 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 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.

Notes:

1. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
2. For fundamental and harmonic signal measurement, 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.
3. All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Wayne Lin

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	26.88	26.54	938.345	29.72	30	Pass
6	2437	27.10	26.73	983.839	29.93	30	Pass
11	2462	26.91	26.62	950.106	29.78	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.49	21.14	270.946	24.33	30	Pass
6	2437	27.00	26.81	980.921	29.92	30	Pass
11	2462	20.53	20.42	223.134	23.49	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

NSS 1

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.54	21.14	272.578	24.35	30	Pass
6	2437	26.34	26.08	836.035	29.22	30	Pass
11	2462	18.90	18.89	155.071	21.91	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.54	19.31	175.26	22.44	30	Pass
6	2437	24.42	24.17	537.91	27.31	30	Pass
9	2452	17.28	17.91	115.258	20.62	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.60	21.23	277.283	24.43	30	Pass
6	2437	26.40	26.14	847.666	29.28	30	Pass
11	2462	18.98	18.94	157.411	21.97	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.60	19.38	177.897	22.50	30	Pass
6	2437	24.55	24.30	554.255	27.44	30	Pass
9	2452	17.31	17.95	116.2	20.65	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.69	21.28	281.847	24.50	30	Pass
6	2437	26.44	26.17	854.555	29.32	30	Pass
11	2462	19.04	18.99	159.418	22.03	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.65	19.44	180.159	22.56	30	Pass
6	2437	24.70	24.42	571.815	27.57	30	Pass
9	2452	17.36	18.02	117.837	20.71	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT20 Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.60	21.23	277.283	24.43	30	Pass
6	2437	26.40	26.14	847.666	29.28	30	Pass
11	2462	18.98	18.94	157.411	21.97	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 4.24 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT40 Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.60	19.38	177.897	22.50	30	Pass
6	2437	24.55	24.30	554.255	27.44	30	Pass
9	2452	17.31	17.95	116.2	20.65	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 4.24 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE20) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.69	21.28	281.847	24.50	30	Pass
6	2437	26.44	26.17	854.555	29.32	30	Pass
11	2462	19.04	18.99	159.418	22.03	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 4.24 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE40) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.65	19.44	180.159	22.56	30	Pass
6	2437	24.70	24.42	571.815	27.57	30	Pass
9	2452	17.36	18.02	117.837	20.71	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 4.24 dBi < 6 dBi, so the output power limit shall not be reduced.

NSS 2

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.60	21.22	276.978	24.42	30	Pass
6	2437	26.58	26.31	882.551	29.46	30	Pass
11	2462	19.51	19.48	178.046	22.51	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.41	19.32	172.804	22.38	30	Pass
6	2437	24.63	24.35	562.672	27.50	30	Pass
9	2452	18.23	18.91	144.331	21.59	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.65	21.28	280.494	24.48	30	Pass
6	2437	26.62	26.37	892.709	29.51	30	Pass
11	2462	19.58	19.56	181.147	22.58	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.48	19.40	175.812	22.45	30	Pass
6	2437	24.76	24.47	579.125	27.63	30	Pass
9	2452	18.27	18.94	145.486	21.63	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.72	21.36	285.366	24.55	30	Pass
6	2437	26.70	26.45	909.306	29.59	30	Pass
11	2462	19.64	19.61	183.456	22.64	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.56	19.48	179.081	22.53	30	Pass
6	2437	24.90	24.59	596.769	27.76	30	Pass
9	2452	18.32	19.05	148.273	21.71	30	Pass

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is 2.07 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT20 Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.65	21.28	280.494	24.48	30	Pass
6	2437	26.62	26.37	892.709	29.51	30	Pass
11	2462	19.58	19.56	181.147	22.58	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 1.97 dBi < 6 dBi, so the output power limit shall not be reduced.

VHT40 Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.48	19.40	175.812	22.45	30	Pass
6	2437	24.76	24.47	579.125	27.63	30	Pass
9	2452	18.27	18.94	145.486	21.63	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 1.97 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE20) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	21.72	21.36	285.366	24.55	30	Pass
6	2437	26.70	26.45	909.306	29.59	30	Pass
11	2462	19.64	19.61	183.456	22.64	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 1.97 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11ax (HE40) Beamforming

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Test Result
		Chain 0	Chain 1				
3	2422	19.56	19.48	179.081	22.53	30	Pass
6	2437	24.90	24.59	596.769	27.76	30	Pass
9	2452	18.32	19.05	148.273	21.71	30	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 1.97 dBi < 6 dBi, so the output power limit shall not be reduced.

7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Wayne Lin

NSS 1

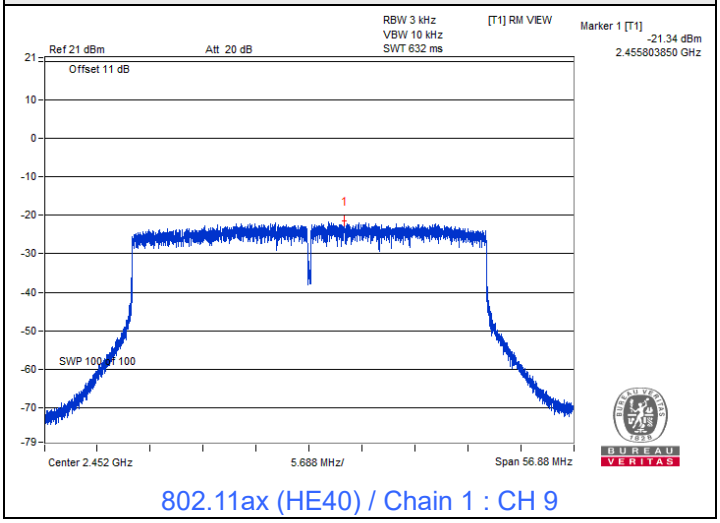
802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
		Chain 0	Chain 1				
9	2452	-21.70	-21.34	0.28	-18.22	8.00	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 4.24 dBi < 6 dBi, so the power density limit shall not be reduced.

Spectrum Plot of Maximum Value



802.11ax (HE40) / Chain 1 : CH 9

NSS 2

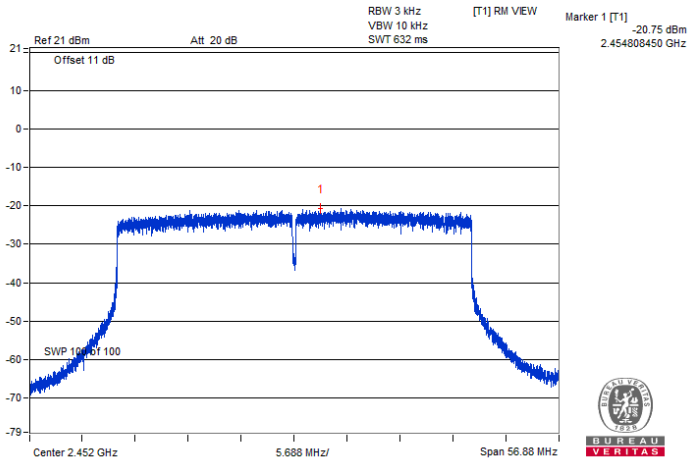
802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
		Chain 0	Chain 1				
9	2452	-21.12	-20.75	0.23	-17.69	8.00	Pass

Notes:

1. Please refer to 3.2 section for directional gain
2. The directional gain is 1.97 dBi < 6 dBi, so the power density limit shall not be reduced.

Spectrum Plot of Maximum Value



802.11ax (HE40) / Chain 1 : CH 9

7.3 6 dB Bandwidth

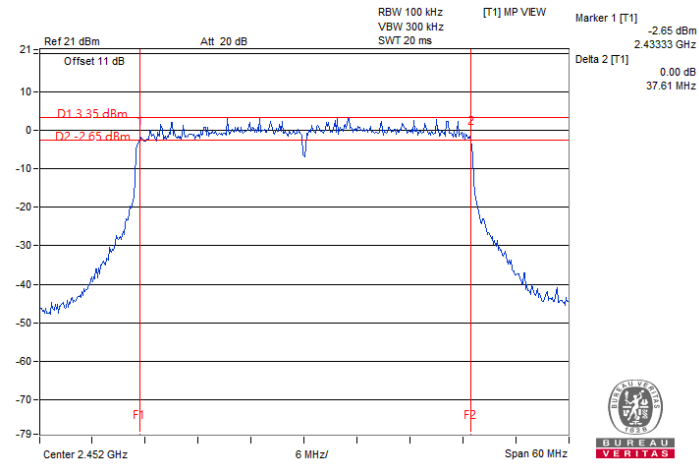
Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Wayne Lin

NSS 1

802.11ax (HE40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Test Result
		Chain 0	Chain 1		
9	2452	37.61	37.61	0.5	Pass

Spectrum Plot of Minimum Value



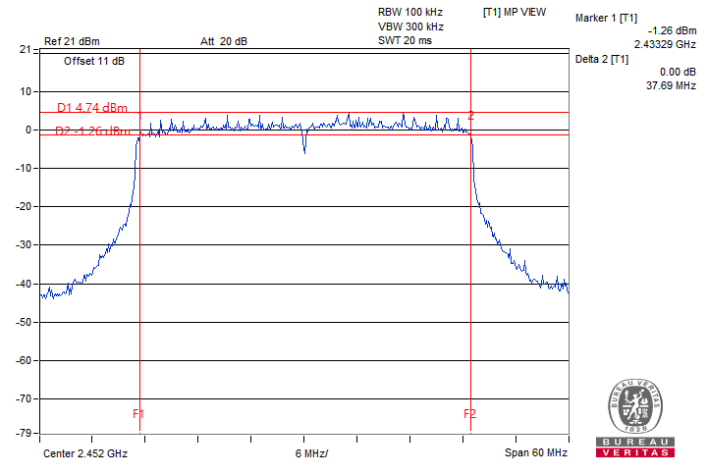
802.11ax (HE40) / Chain 0 : CH 9

NSS 2

802.11ax (HE40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Test Result
		Chain 0	Chain 1		
9	2452	37.69	37.87	0.5	Pass

Spectrum Plot of Minimum Value



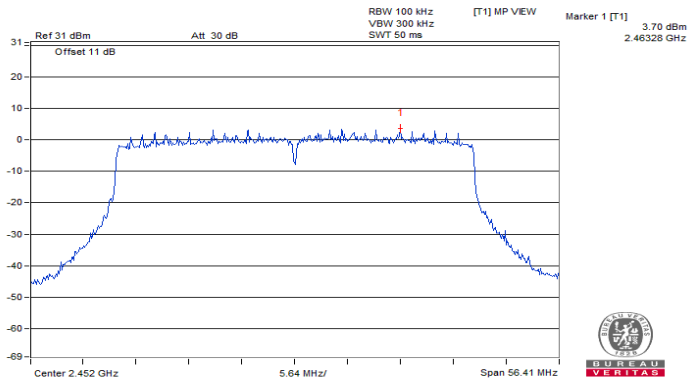
802.11ax (HE40) / Chain 0 : CH 9

7.4 Conducted Out of Band Emissions

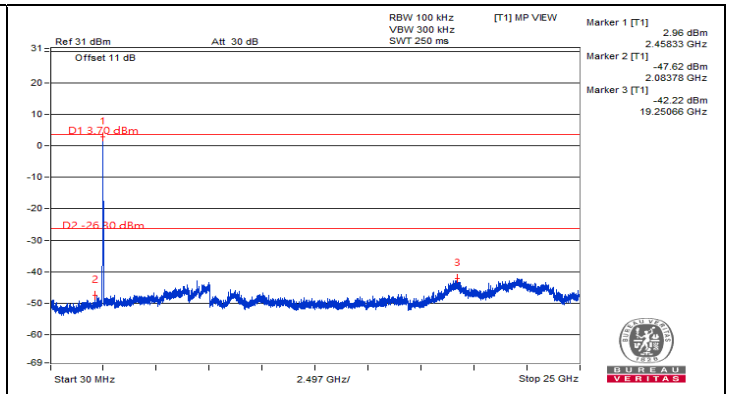
Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Wayne Lin

NSS 1

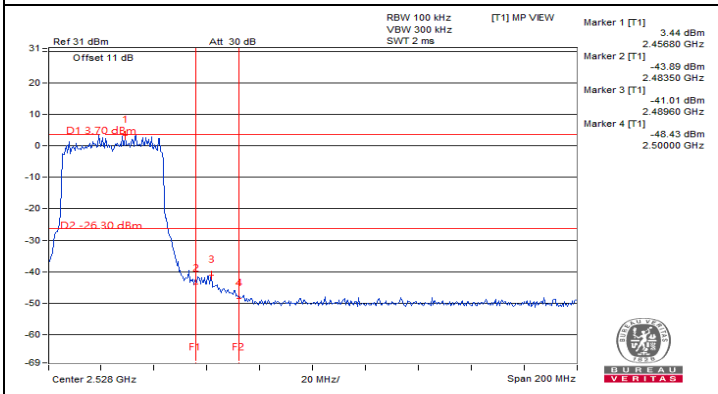
802.11ax (HE40)



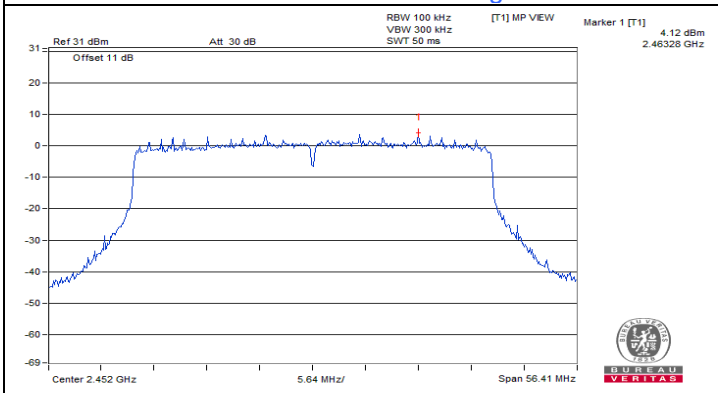
Chain 0 : CH 9



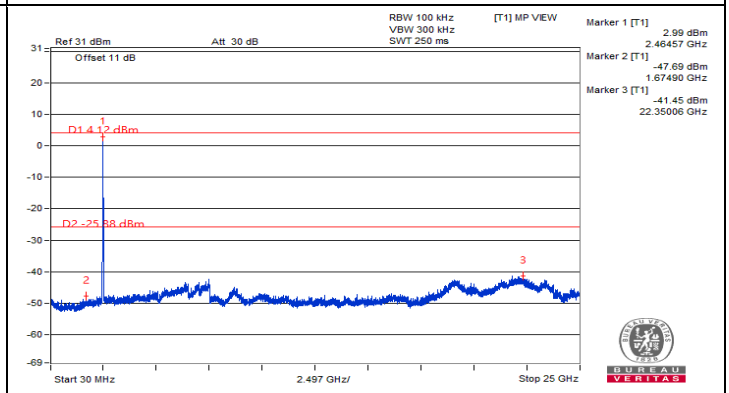
Chain 0 : CH 9



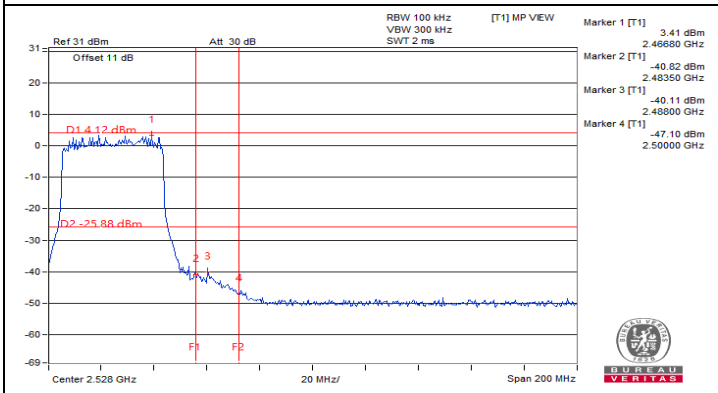
Chain 0 : CH 9 Band edge



Chain 1 : CH 9



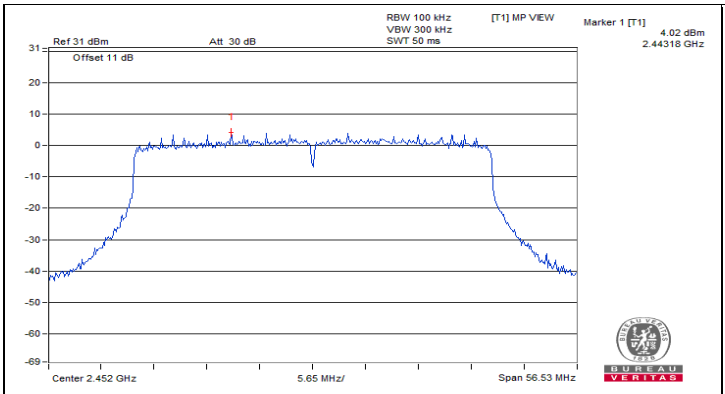
Chain 1 : CH 9



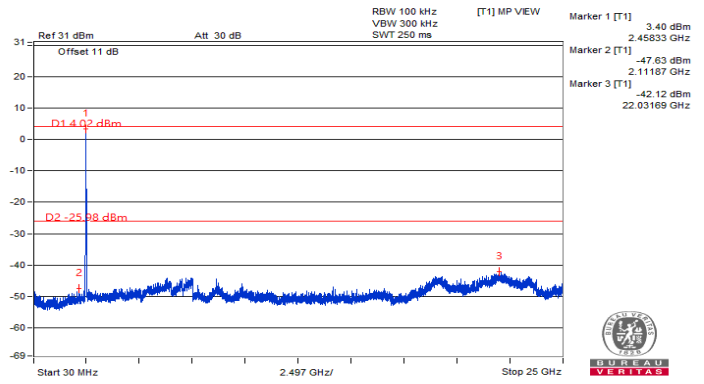
Chain 1 : CH 9 Band edge

NSS 2

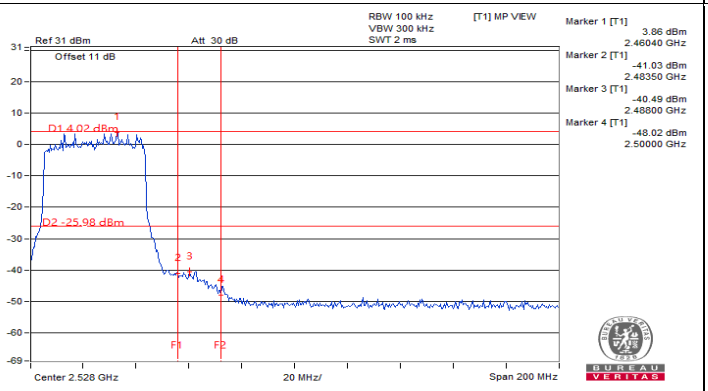
802.11ax (HE40)



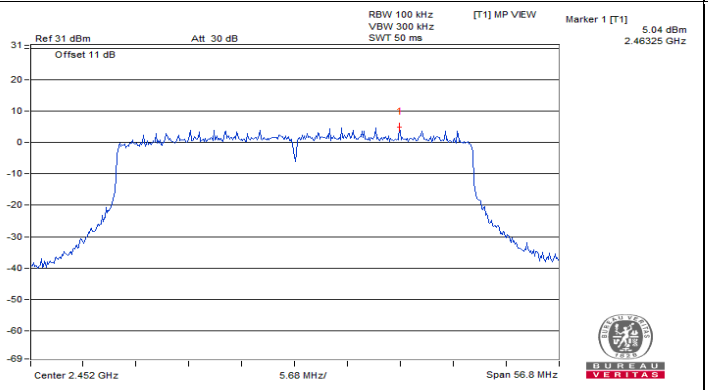
Chain 0 : CH 9



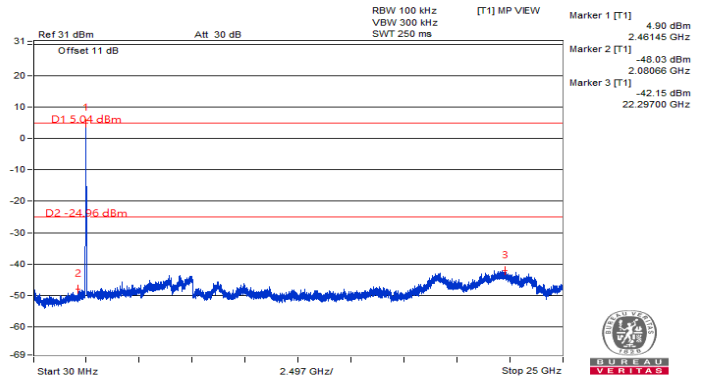
Chain 0 : CH 9



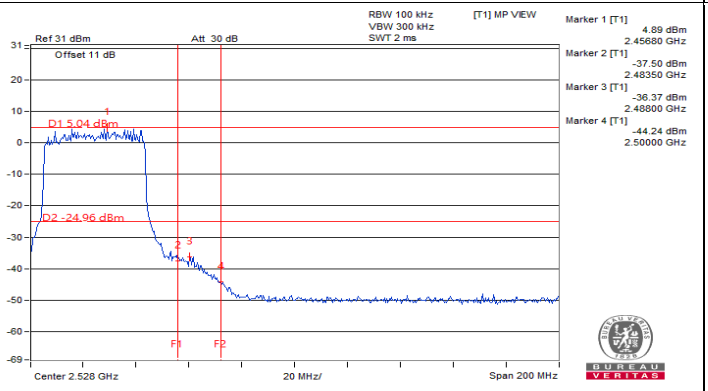
Chain 0 : CH 9 Band edge



Chain 1 : CH 9



Chain 1 : CH 9



Chain 1 : CH 9 Band edge

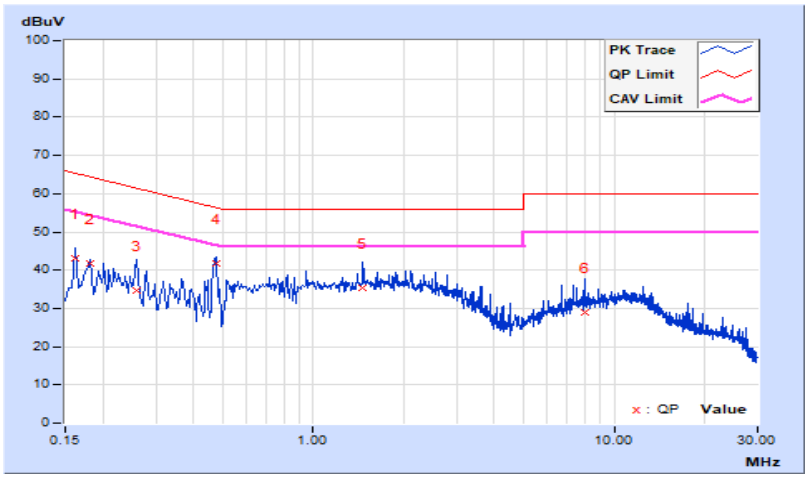
7.5 AC Power Conducted Emissions

RF Mode	802.11ax (HE40)	**Channel**	CH 9：2452 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 66% RH
Tested By	Titan HSU		

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	0.16200	10.19	33.05	19.98	43.24	30.17	65.36	55.36	-22.12	-25.19
2	0.18180	10.20	31.46	18.66	41.66	28.86	64.40	54.40	-22.74	-25.54
3	0.25800	10.22	24.59	17.03	34.81	27.25	61.50	51.50	-26.69	-24.25
4	**0.47435**	**10.23**	**31.68**	**27.04**	**41.91**	**37.27**	**56.44**	**46.44**	**-14.53**	**-9.17**
5	1.46600	10.29	25.21	17.48	35.50	27.77	56.00	46.00	-20.50	-18.23
6	7.96600	10.44	18.37	11.32	28.81	21.76	60.00	50.00	-31.19	-28.24

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

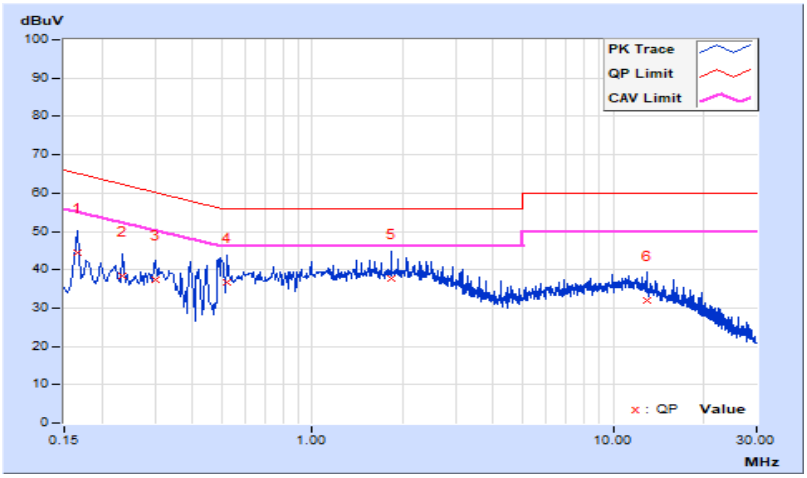


RF Mode	802.11ax (HE40)	**Channel**	CH 9：2452 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 66% RH
Tested By	Titan HSU		

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	0.16600	10.18	34.24	21.53	44.42	31.71	65.16	55.16	-20.74	-23.45
2	0.23400	10.22	28.05	18.74	38.27	28.96	62.31	52.31	-24.04	-23.35
3	0.30151	10.23	27.14	16.99	37.37	27.22	60.20	50.20	-22.83	-22.98
4	0.52200	10.25	26.47	19.58	36.72	29.83	56.00	46.00	-19.28	-16.17
5	1.83400	10.34	27.31	20.17	37.65	30.51	56.00	46.00	-18.35	-15.49
6	12.94600	10.63	21.26	15.31	31.89	25.94	60.00	50.00	-28.11	-24.06

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



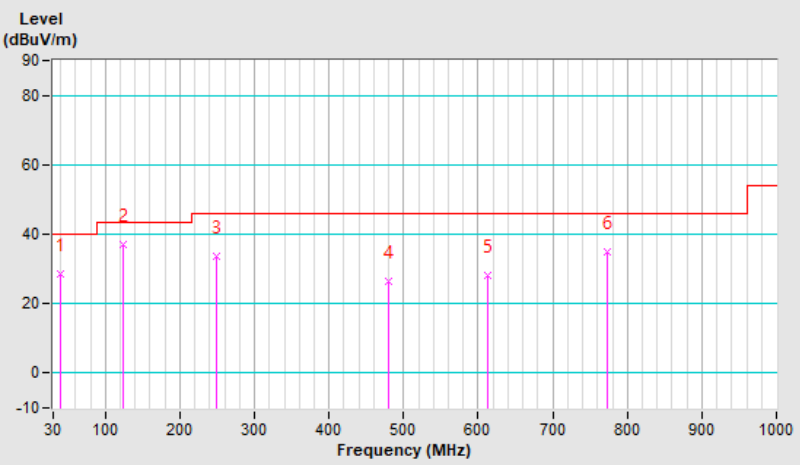
7.6 Unwanted Emissions below 1 GHz

RF Mode	802.11ax (HE40)	**Channel**	CH 9：2452 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 66% RH
Tested By	Titan HSU		

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	39.84	28.5 QP	40.0	-11.5	1.49 H	282	37.8	-9.3
2	124.19	37.0 QP	43.5	-6.5	1.49 H	93	47.6	-10.6
3	249.30	33.7 QP	46.0	-12.3	1.00 H	134	42.9	-9.2
4	479.86	26.5 QP	46.0	-19.5	1.00 H	180	30.7	-4.2
5	613.41	28.1 QP	46.0	-17.9	1.49 H	6	29.0	-0.9
6	772.26	35.0 QP	46.0	-11.0	1.00 H	75	32.5	2.5

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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

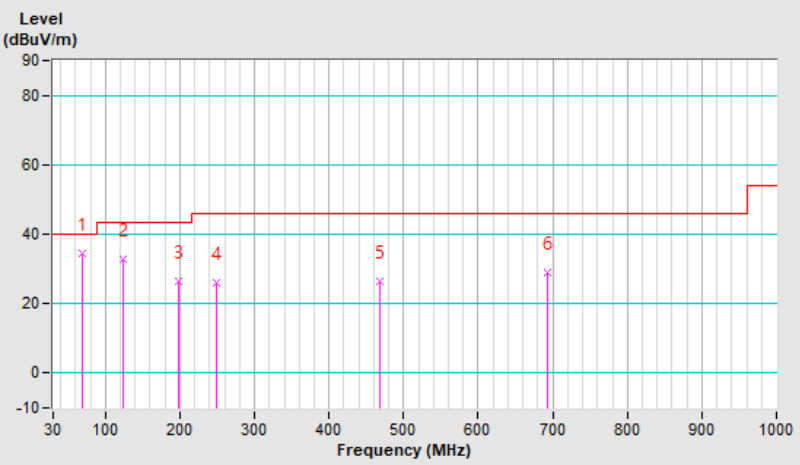


RF Mode	802.11ax (HE40)	**Channel**	CH 9：2452 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 66% RH
Tested By	Titan HSU		

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	**69.36**	**34.5 QP**	**40.0**	**-5.5**	**1.00 V**	**168**	**45.1**	**-10.6**
2	124.19	32.9 QP	43.5	-10.6	1.00 V	287	43.5	-10.6
3	197.29	26.4 QP	43.5	-17.1	1.50 V	285	37.9	-11.5
4	249.30	25.9 QP	46.0	-20.1	1.50 V	202	35.1	-9.2
5	467.20	26.3 QP	46.0	-19.7	1.50 V	19	30.7	-4.4
6	693.54	29.1 QP	46.0	-16.9	1.99 V	221	28.8	0.3

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 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



7.7 Unwanted Emissions above 1 GHz

NSS 1

RF Mode	802.11ax (HE40)	**Channel**	CH 9：2452 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 66% RH
Tested By	Titan HSU		

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	100.7 PK			1.54 H	18	66.9	33.8
2	*2452.00	88.7 AV			1.54 H	18	54.9	33.8
3	2483.50	58.8 PK	74.0	-15.2	1.54 H	18	24.9	33.9
4	2483.50	47.8 AV	54.0	-6.2	1.54 H	18	13.9	33.9
5	4904.00	50.9 PK	74.0	-23.1	1.95 H	315	37.5	13.4
6	4904.00	37.9 AV	54.0	-16.1	1.95 H	315	24.5	13.4
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	114.7 PK			1.53 V	339	80.9	33.8
2	*2452.00	101.7 AV			1.53 V	339	67.9	33.8
3	2483.50	66.6 PK	74.0	-7.4	1.53 V	339	32.7	33.9
4	2483.50	53.4 AV	54.0	-0.6	1.53 V	339	19.5	33.9
5	4904.00	51.4 PK	74.0	-22.6	2.25 V	195	38.0	13.4
6	4904.00	38.1 AV	54.0	-15.9	2.25 V	195	24.7	13.4

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, the limit was restricted at the RF Output Power.

NSS 2

RF Mode	802.11ax (HE40)	**Channel**	CH 9：2452 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23°C, 66% RH
Tested By	Titan HSU		

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	99.2 PK			1.54 H	21	65.4	33.8
2	*2452.00	85.8 AV			1.54 H	21	52.0	33.8
3	2483.50	29.2 PK	74.0	-44.8	1.54 H	21	27.0	2.2
4	2483.50	15.9 AV	54.0	-38.1	1.54 H	21	13.7	2.2
5	4904.00	51.0 PK	74.0	-23.0	1.92 H	318	37.6	13.4
6	4904.00	38.1 AV	54.0	-15.9	1.92 H	318	24.7	13.4
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	111.9 PK			1.51 V	359	78.1	33.8
2	*2452.00	99.0 AV			1.51 V	359	65.2	33.8
3	2483.50	67.3 PK	74.0	-6.7	1.50 V	359	33.4	33.9
4	**2483.50**	**53.7 AV**	**54.0**	**-0.3**	**1.50 V**	**359**	**19.8**	**33.9**
5	4904.00	51.6 PK	74.0	-22.4	2.28 V	192	38.2	13.4
6	4904.00	38.2 AV	54.0	-15.8	2.28 V	192	24.8	13.4

Remarks:

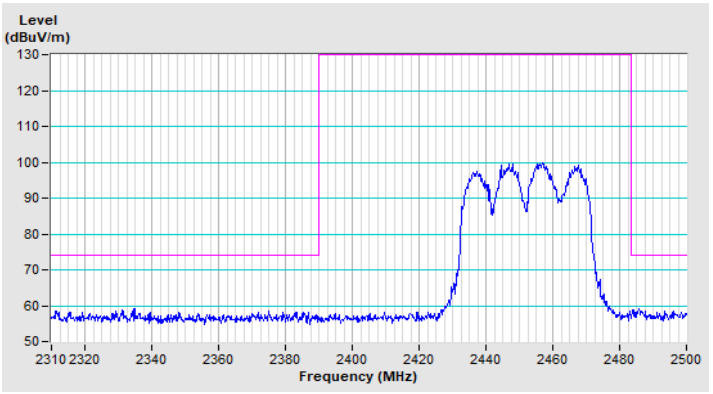
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency,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

Plot of Band Edge

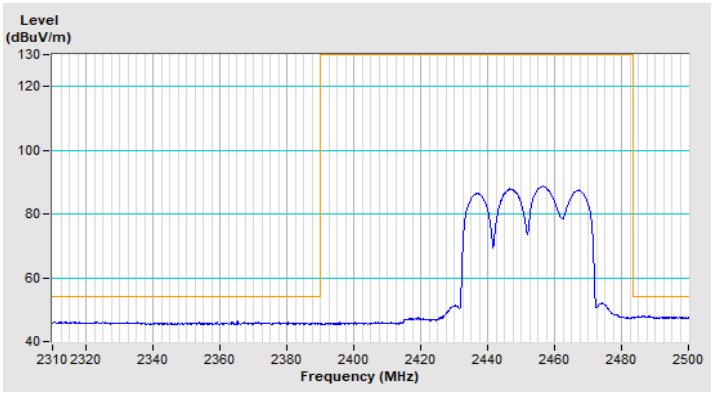
NSS 2

Frequency Range	2.310 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak

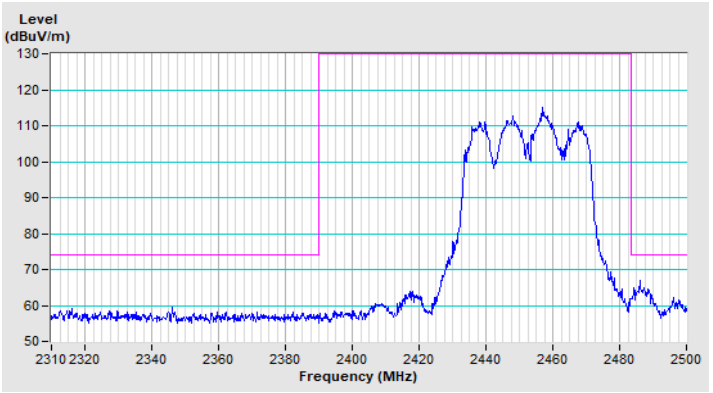
802.11ax (HE40) Channel 9



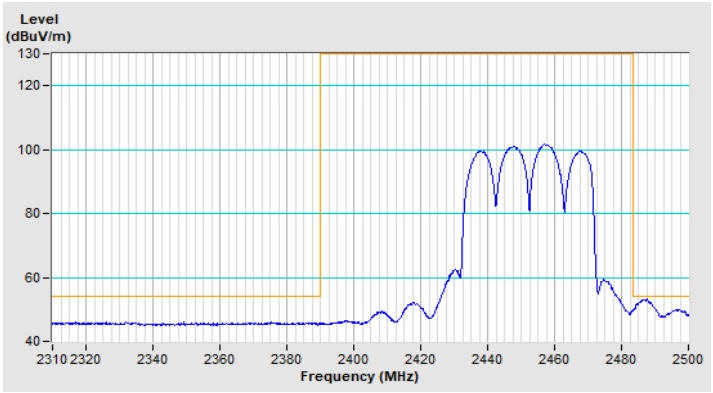
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)

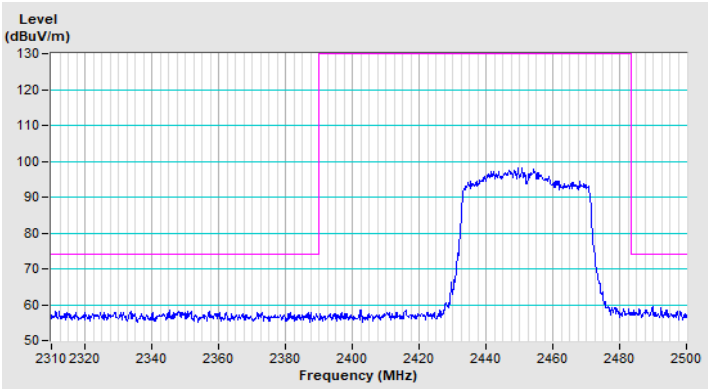


Vertical (Average)

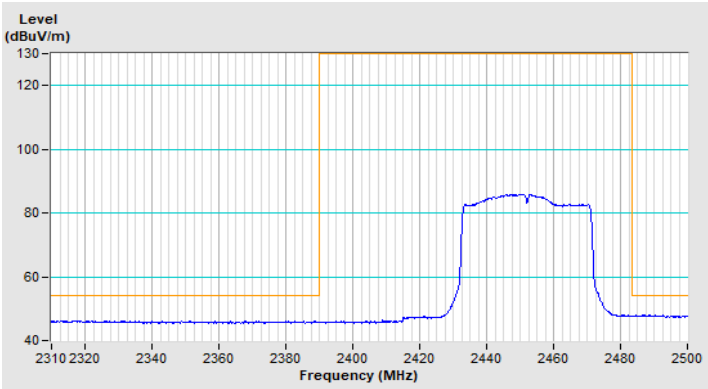
NSS 2

Frequency Range	2.310 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=1 kHz, DET=Peak

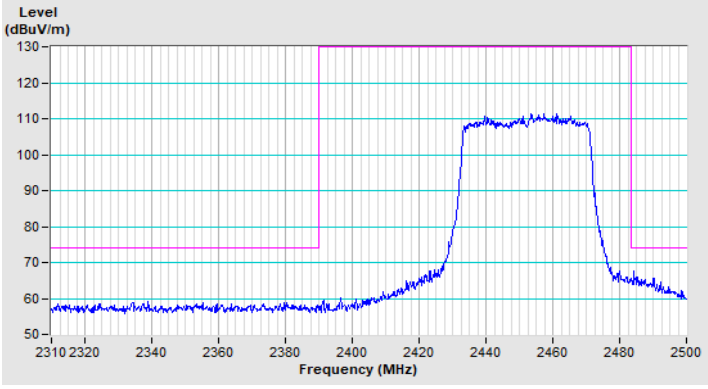
802.11ax (HE40) Channel 9



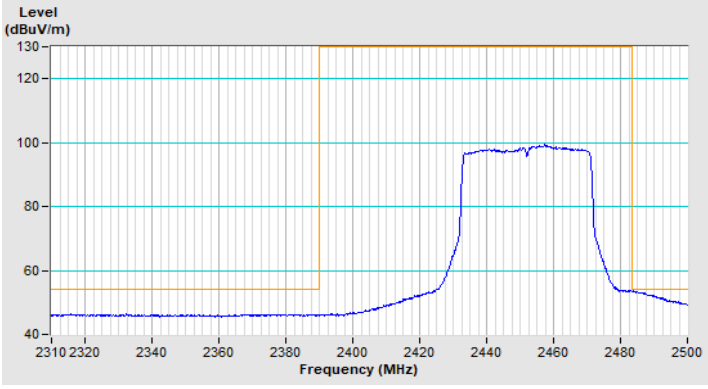
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)



Vertical (Average)

8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 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:

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
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Email: service.adt@bureauveritas.com
Web Site: http://ee.bureauveritas.com.tw

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

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