

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

**Report No.:** RFBCUG-WTW-P23030304

**FCC ID:** B32M4250

**Product:** Point of Sale Terminal

**Brand:** Verifone

**Model No.:** M450-1

**Received Date:** 2023/3/9

**Test Date:** 2023/3/30 ~ 2023/4/24

**Issued Date:** 2023/5/8

**Applicant:** Verifone, Inc.

**Address:** 1400 West Stanford Ranch Road Suite 150 Rocklin CA 95765 USA

**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(1):** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan

**Test Location (2):** B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan

**FCC Registration /** 788550 / TW0003

**Designation Number:** 427177 / TW0011

Approved by: \_\_\_\_\_

*Jeremy Lin*

, Date: \_\_\_\_\_

2023/5/8

Jeremy Lin / Project Engineer

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Prepared by : Gina Liu / Specialist

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## Table of Contents

<b>Release Control Record .....</b>	<b>4</b>
<b>1 Certificate.....</b>	<b>5</b>
<b>2 Summary of Test Results .....</b>	<b>6</b>
2.1 Measurement Uncertainty .....	6
2.2 Supplementary Information .....	6
<b>3 General Information .....</b>	<b>7</b>
3.1 General Description .....	7
3.2 Antenna Description of EUT .....	7
3.3 Channel List.....	8
3.4 Test Mode Applicability and Tested Channel Detail.....	8
3.5 Duty Cycle of Test Signal.....	9
3.6 Test Program Used and Operation Descriptions .....	10
3.7 Connection Diagram of EUT and Peripheral Devices .....	10
3.8 Configuration of Peripheral Devices and Cable Connections .....	10
<b>4 Test Instruments .....</b>	<b>11</b>
4.1 RF Output Power.....	11
4.2 Power Spectral Density .....	11
4.3 6 dB Bandwidth .....	11
4.4 Conducted Out of Band Emissions .....	11
4.5 AC Power Conducted Emissions .....	12
4.6 Unwanted Emissions below 1 GHz .....	13
4.7 Unwanted Emissions above 1 GHz.....	14
<b>5 Limits of Test Items.....</b>	<b>15</b>
5.1 RF Output Power.....	15
5.2 Power Spectral Density .....	15
5.3 6 dB Bandwidth .....	15
5.4 Conducted Out of Band Emissions .....	15
5.5 AC Power Conducted Emissions .....	15
5.6 Unwanted Emissions below 1 GHz .....	15
5.7 Unwanted Emissions above 1 GHz.....	16
<b>6 Test Arrangements.....</b>	<b>17</b>
6.1 RF Output Power.....	17
6.1.1 Test Setup .....	17
6.1.2 Test Procedure.....	17
6.2 Power Spectral Density .....	17
6.2.1 Test Setup .....	17
6.2.2 Test Procedure.....	17
6.3 6 dB Bandwidth .....	18
6.3.1 Test Setup .....	18
6.3.2 Test Procedure.....	18
6.4 Conducted Out of Band Emissions .....	18
6.4.1 Test Setup .....	18
6.4.2 Test Procedure.....	18
6.5 AC Power Conducted Emissions .....	19
6.5.1 Test Setup .....	19
6.5.2 Test Procedure.....	19
6.6 Unwanted Emissions below 1 GHz .....	20
6.6.1 Test Setup .....	20
6.6.2 Test Procedure.....	21
6.7 Unwanted Emissions above 1 GHz.....	22
6.7.1 Test Setup .....	22
6.7.2 Test Procedure.....	22
<b>7 Test Results of Test Item .....</b>	<b>23</b>



7.1	RF Output Power .....	23
7.2	Power Spectral Density .....	25
7.3	6 dB Bandwidth .....	27
7.4	Conducted Out of Band Emissions .....	29
7.5	AC Power Conducted Emissions .....	32
7.6	Unwanted Emissions below 1 GHz .....	34
7.7	Unwanted Emissions above 1 GHz .....	36
<b>8</b>	<b>Pictures of Test Arrangements .....</b>	<b>48</b>
<b>9</b>	<b>Information of the Testing Laboratories .....</b>	<b>49</b>



## Release Control Record

Issue No.	Description	Date Issued
RFBCUG-WTW-P23030304	Original release.	2023/5/8

## 1 Certificate

**Product:** Point of Sale Terminal

**Brand:** Verifone

**Test Model:** M450-1

**Sample Status:** Engineering sample

**Applicant:** Verifone, Inc.

**Test Date:** 2023/3/30 ~ 2023/4/24

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

**Measurement** ANSI C63.10-2013

**procedure:** KDB 558074 D01 15.247 Meas Guidance v05r02

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 -18.00 dB at 0.35407 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -3.6 dB at 33.52 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -1.9 dB at 2390.00, 2483.50 MHz
15.203	Antenna Requirement	Pass	Antenna connector is ipex 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) (±)
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.79 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.79 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.44 dB
	30 MHz ~ 1 GHz	2.02 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	1.01 dB
	18 GHz ~ 40 GHz	1.15 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	Point of Sale Terminal
Brand	Verifone
Test Model	M450-1
Status of EUT	Engineering sample
Power Supply Rating	12 Vdc
Modulation Type	CCK, DQPSK, DBPSK for DSSS 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: up to 72.2Mbps
Operating Frequency	2.412 GHz ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20):11
Output Power	140.281 mW (21.47 dBm)

Note:

1. The accessory devices of EUT, please refer to external photo.
2. There are Bluetooth and WLAN (2.4 GHz & 5 GHz) technology used for the EUT. WLAN (2.4 GHz & 5 GHz) and Bluetooth technology cannot transmit at the same time, but use time slot technology to transmit at the same time.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

#### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	Gain (dBi)			Antenna Type	Connector Type
	2400 MHz	2440 MHz	2500 MHz		
1	3.4	4.5	4.6	PCB	ipex(MHF)

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

2. The EUT incorporates a SISO function:

2.4 GHz Band		
Modulation Mode	TX & RX Configuration	
802.11b	1TX	1RX
802.11g	1TX	1RX
802.11n (HT20)	1TX	1RX

### 3.3 Channel List

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

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		

### 3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	1. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	1. X-axis/ Y-axis/ Z-axis Worst Condition: Z-axis

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

Test Item	Mode	Signal Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power / Conducted Out of Band Emissions	802.11b	CDD	1, 6, 11	DBPSK	1Mb/s
	802.11g	CDD	1, 6, 11	BPSK	6Mb/s
	802.11n (HT20)	CDD	1, 6, 11	BPSK	MCS0
6 dB Bandwidth / Power Spectral Density	802.11b	CDD	1, 6, 11	DBPSK	1Mb/s
	802.11g	CDD	1, 6, 11	BPSK	6Mb/s
	802.11n (HT20)	CDD	1, 6, 11	BPSK	MCS0
AC Power Conducted Emissions	802.11g	CDD	6	BPSK	6Mb/s
Unwanted Emissions below 1 GHz	802.11g	CDD	6	BPSK	6Mb/s
Unwanted Emissions above 1 GHz	802.11b	CDD	1, 6, 11	DBPSK	1Mb/s
	802.11g	CDD	1, 6, 11	BPSK	6Mb/s
	802.11n (HT20)	CDD	1, 6, 11	BPSK	MCS0

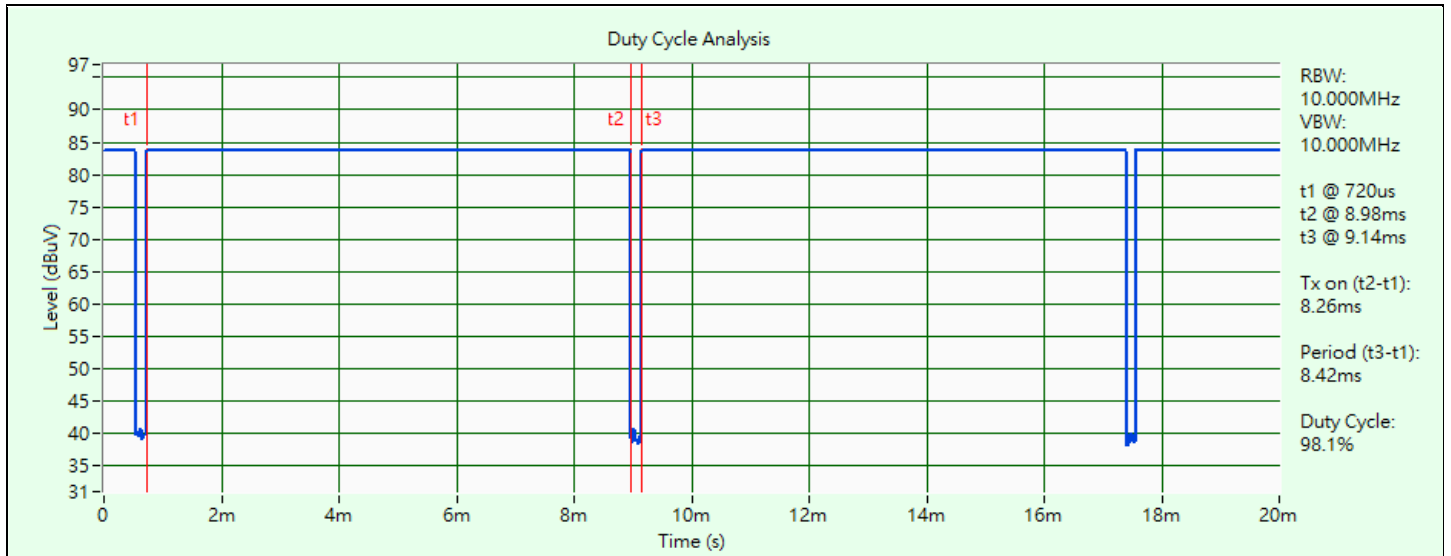


### 3.5 Duty Cycle of Test Signal

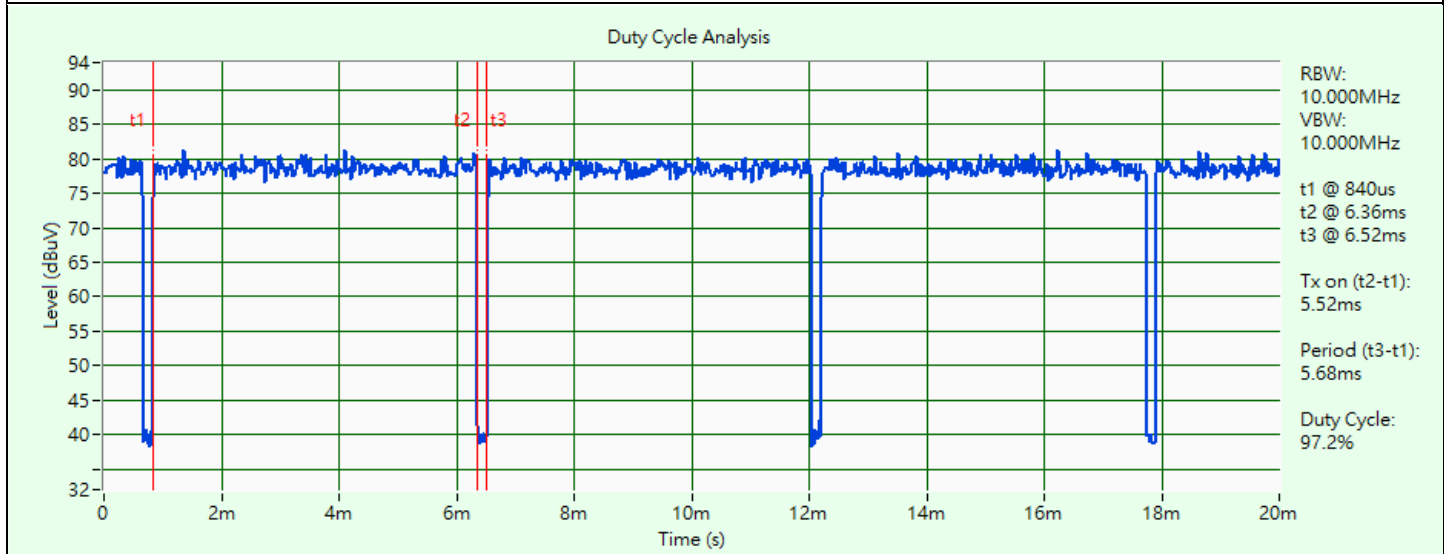
**802.11b:** Duty cycle = 8.26 ms / 8.42 ms x 100% = 98.1%

**802.11g:** Duty cycle = 5.52 ms / 5.68 ms x 100% = 97.2%, duty factor = 10 \* log (1/Duty cycle) = 0.12 dB

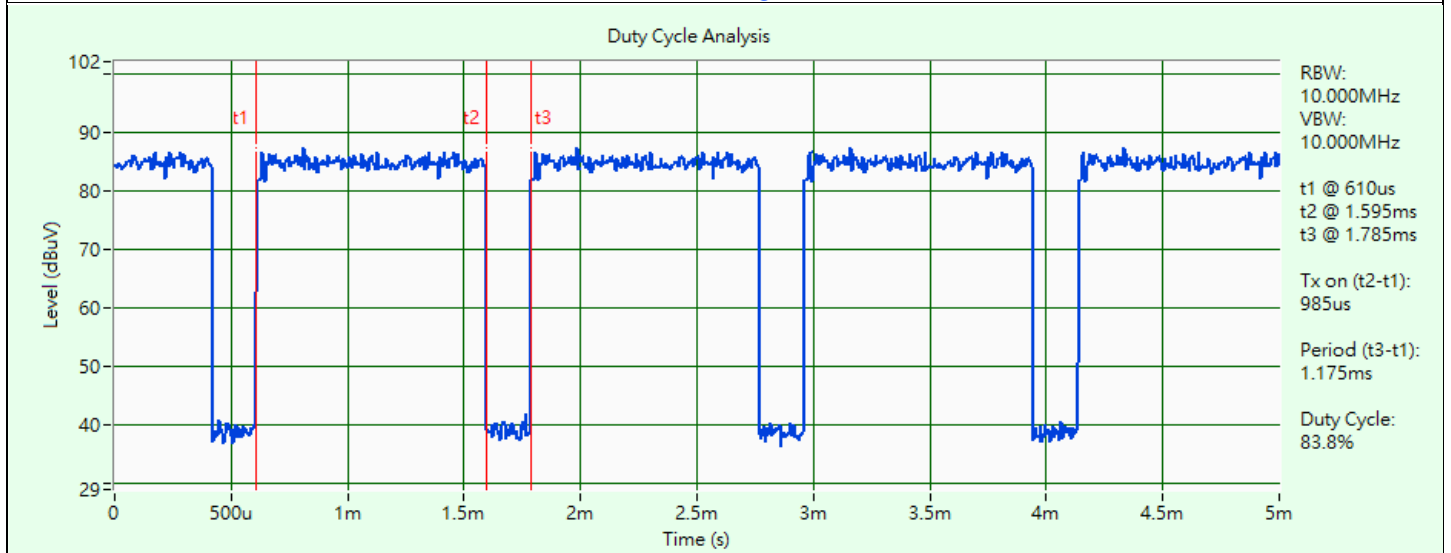
**802.11n (HT20):** Duty cycle = 0.985 ms / 1.175 ms x 100% = 83.8%, duty factor = 10 \* log (1/Duty cycle) = 0.77 dB



802.11b



802.11g

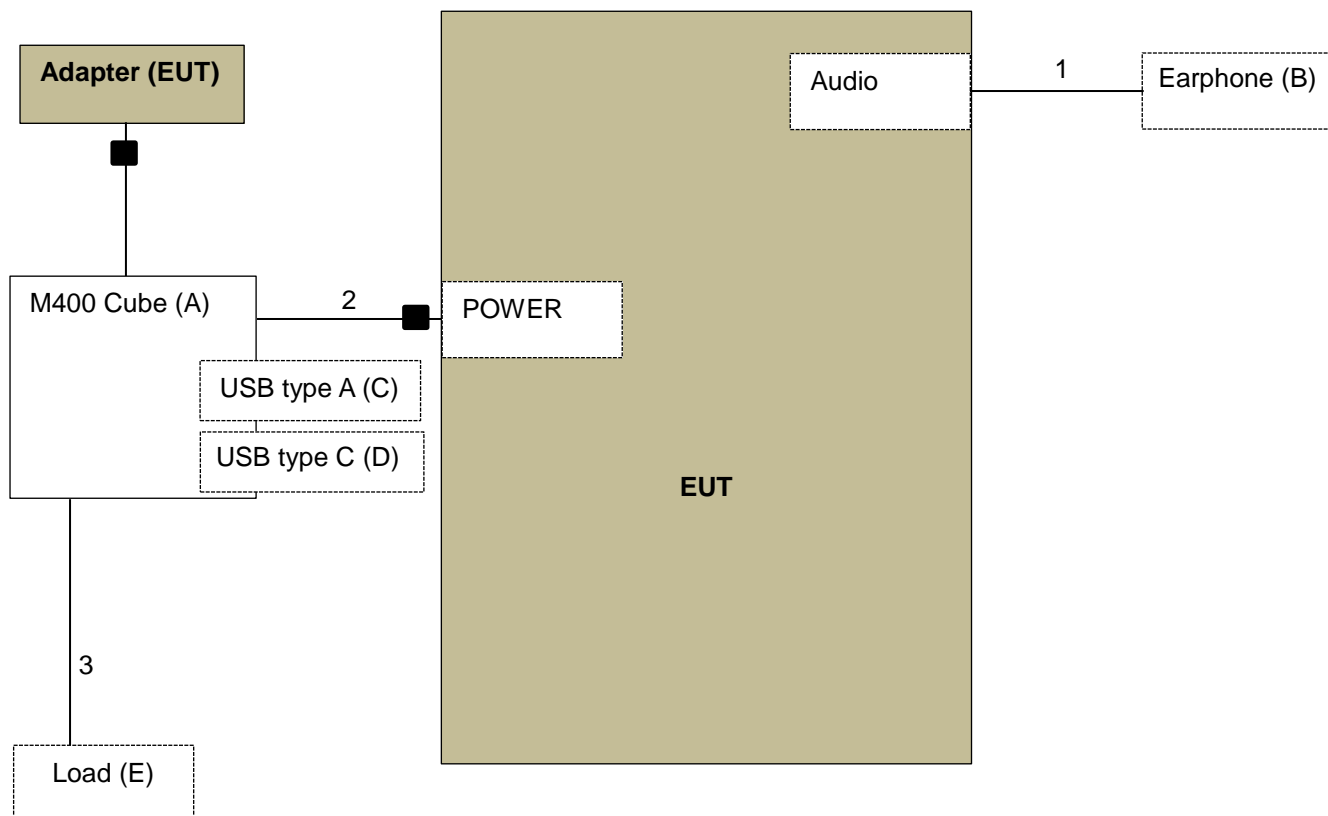


802.11n (HT20)

### 3.6 Test Program Used and Operation Descriptions

Controlling software QRCT 3 Version 3.0.264.0 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

### 3.7 Connection Diagram of EUT and Peripheral Devices



Under Table

### 3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	M400 Cube	VeriFone	N/A	N/A	N/A	Supplied by applicant
B	Earphone	apple	MB77PFEB	N/A	N/A	Provided by Lab
C	USB Dongle	SanDisk	SDDDC3-032G	N/A	N/A	Provided by Lab
D	USB Dongle	SanDisk	SDDDC3-032G	N/A	N/A	Provided by Lab
E	Load	N/A	N/A	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	Audio Cable	1	1.0	N	0	Provided by Lab
2	USB Cable	1	1.3	Y	1	Supplied by applicant
3	LAN Cable	2	1.5	N	0	Provided by Lab

## 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
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	2022/7/13	2023/7/12

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/4/24

### 4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Signal and spectrum analyzer R&S	FSV3044	101105	2023/2/22	2024/2/21
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/4/24

### 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 MESS- ELETRONIK	NNBM 8126G	8126G-069	2022/11/9	2023/11/8
LISN R&S	ESH2-Z5	100100	2023/3/7	2024/3/6
	ESH3-Z5	100116	2023/2/15	2024/2/14
LISN Schwarzbeck	NNLK 8121	8121-731	2022/5/26	2023/5/25
RF Coaxial Cable WORKEN	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
Test Receiver R&S	ESR3	102783	2022/12/21	2023/12/20
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: 2023/4/20

#### 4.6 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-616	2022/10/26	2023/10/25
Loop Antenna EMCI	EM-6879	269	2022/9/19	2023/9/18
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-amplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
Preamplifier Agilent	310N	187226	2022/6/14	2023/6/13
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	2022/6/14	2023/6/13
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2022/6/14	2023/6/13
Software BV ADT	ADT_Radiated_V7.6.15.9.5	N/A	N/A	N/A
Test Receiver Agilent	N9038A	MY52260177	2022/9/19	2023/9/18
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2023/4/8

#### 4.7 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	8	N/A	N/A
Horn Antenna ETS-Lindgren	3117	00143293	2022/11/13	2023/11/12
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170241	2022/10/20	2023/10/19
Pre-Amplifier EMCI	EMC 184045	980116	2022/10/1	2023/9/30
Preamplifier Agilent	83017A	MY39501373	2022/6/14	2023/6/13
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	2022/6/14	2023/6/13
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2022/6/14	2023/6/13
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2023/1/7	2024/1/6
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2023/1/7	2024/1/6
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver Agilent	N9038A	MY52260177	2022/9/19	2023/9/18
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2023/3/30 ~ 2023/4/15

## 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)

### 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 20 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 20 dB below the highest level of the desired power:

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

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 20 dB below the highest level of the desired power:

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

### Notes:

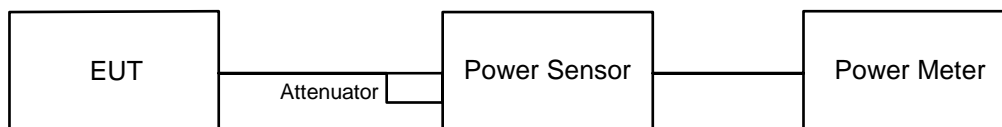
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted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

##### Peak Power:

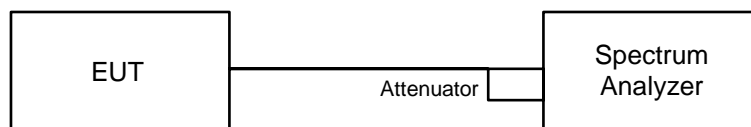
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

##### Average Power:

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

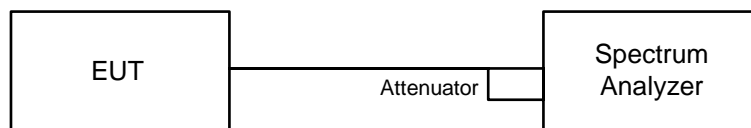


#### 6.2.2 Test Procedure

- a. 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.
- d. Set the VBW  $\geq 3 \times$  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.

### 6.3 6 dB Bandwidth

#### 6.3.1 Test Setup

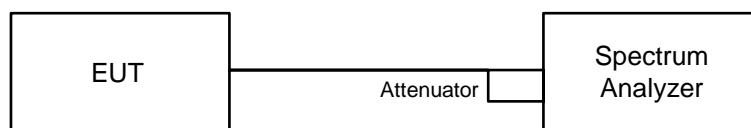


#### 6.3.2 Test Procedure

- Set resolution bandwidth (RBW) = 100 kHz.
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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

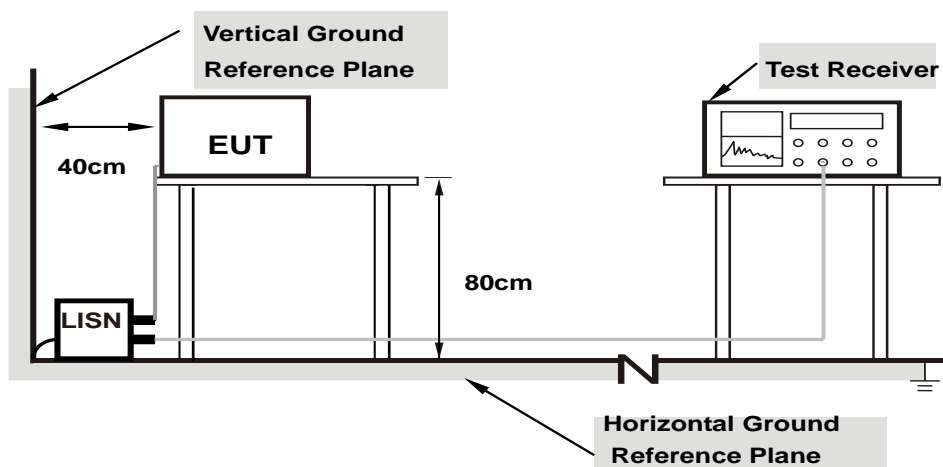
- Set the RBW = 100 kHz.
- Set the VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

##### MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- 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

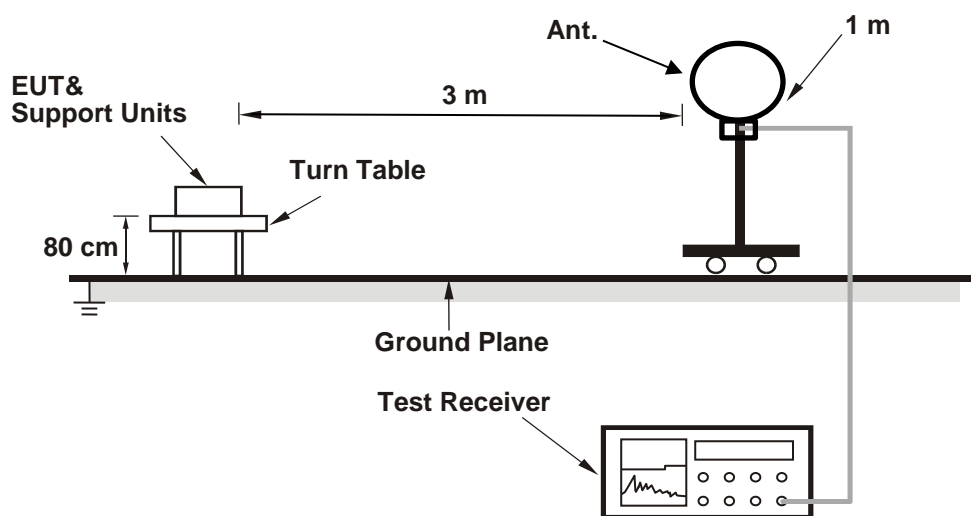
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

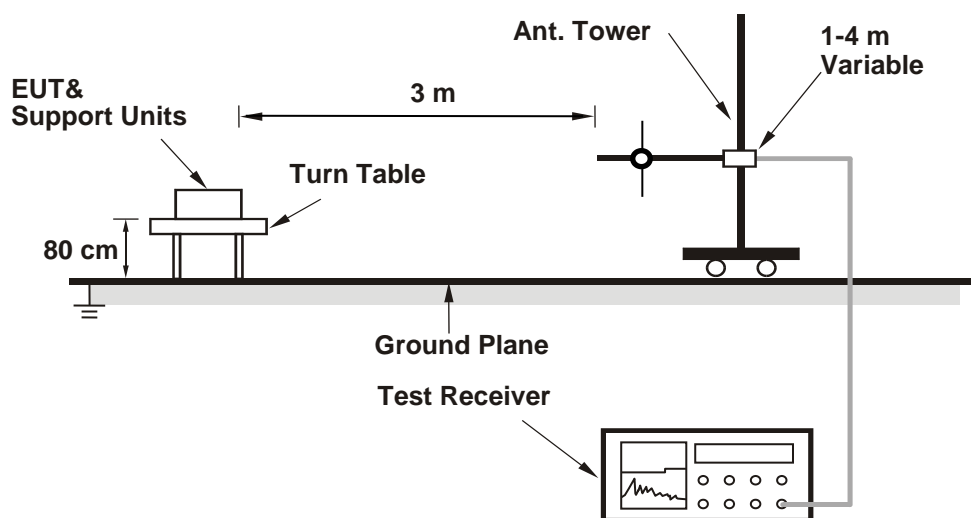
## 6.6 Unwanted Emissions below 1 GHz

### 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

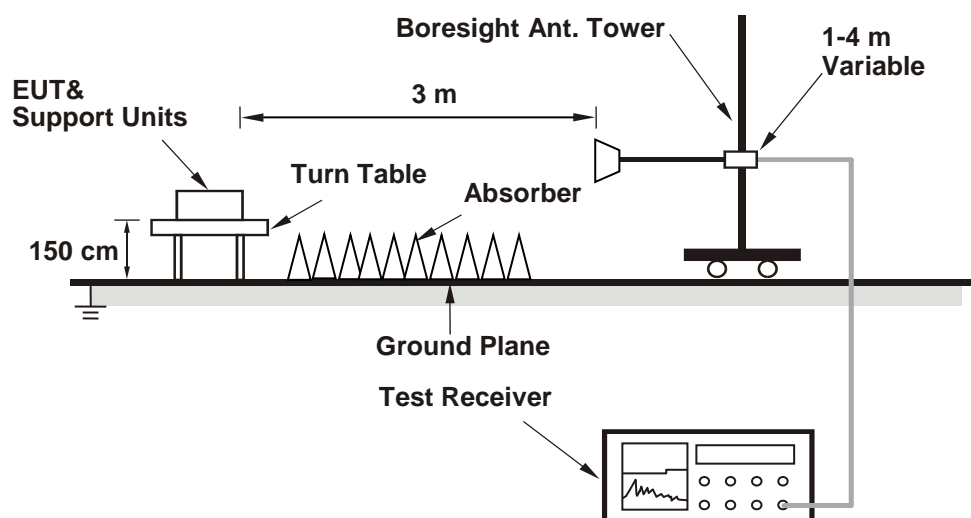
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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:

- 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.
- For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10 Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1 GHz.
- 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:	Ivan Tseng
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#### For Peak Power

##### 802.11b

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2412	54.576	17.37	30	Pass
6	2437	59.841	17.77	30	Pass
11	2462	58.749	17.69	30	Pass

Note: The antenna gain is 4.6 dBi < 6 dBi, so the output power limit shall not be reduced.

##### 802.11g

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2412	111.944	20.49	30	Pass
6	2437	140.281	21.47	30	Pass
11	2462	73.79	18.68	30	Pass

Note: The antenna gain is 4.6 dBi < 6 dBi, so the output power limit shall not be reduced.

##### 802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2412	101.158	20.05	30	Pass
6	2437	130.317	21.15	30	Pass
11	2462	68.234	18.34	30	Pass

Note: The antenna gain is 4.6 dBi < 6 dBi, so the output power limit shall not be reduced.

## For Average Power

### 802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	28.119	14.49
6	2437	30.69	14.87
11	2462	30.13	14.79

### 802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	24.322	13.86
6	2437	30.69	14.87
11	2462	15.631	11.94

### 802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	20.137	13.04
6	2437	25.41	14.05
11	2462	13.183	11.20



## 7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Ivan Tseng
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### 802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2412	-5.31	8	Pass
6	2437	-5.07	8	Pass
11	2462	-5.13	8	Pass

Note: The antenna gain is 4.6 dBi < 6 dBi, so the power density limit shall not be reduced.

### 802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2412	-9.33	8	Pass
6	2437	-8.44	8	Pass
11	2462	-10.91	8	Pass

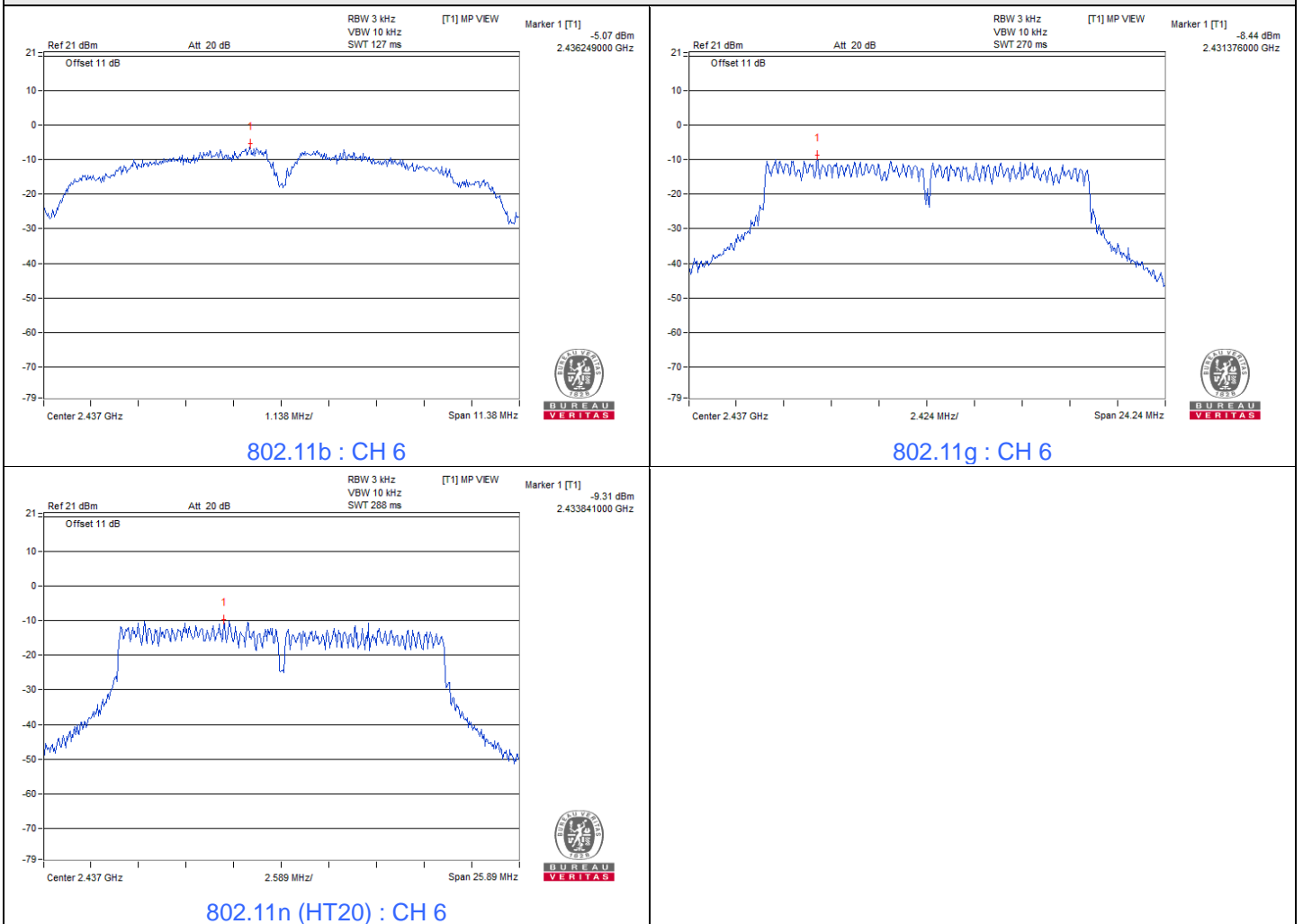
Note: The antenna gain is 4.6 dBi < 6 dBi, so the power density limit shall not be reduced.

### 802.11n (HT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2412	-10.42	8	Pass
6	2437	-9.31	8	Pass
11	2462	-12.11	8	Pass

Note: The antenna gain is 4.6 dBi < 6 dBi, so the power density limit shall not be reduced.

### Spectrum Plot of Maximum Value



### 7.3 6 dB Bandwidth

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Ivan Tseng
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#### 802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	7.6	0.5	Pass
6	2437	7.59	0.5	Pass
11	2462	7.16	0.5	Pass

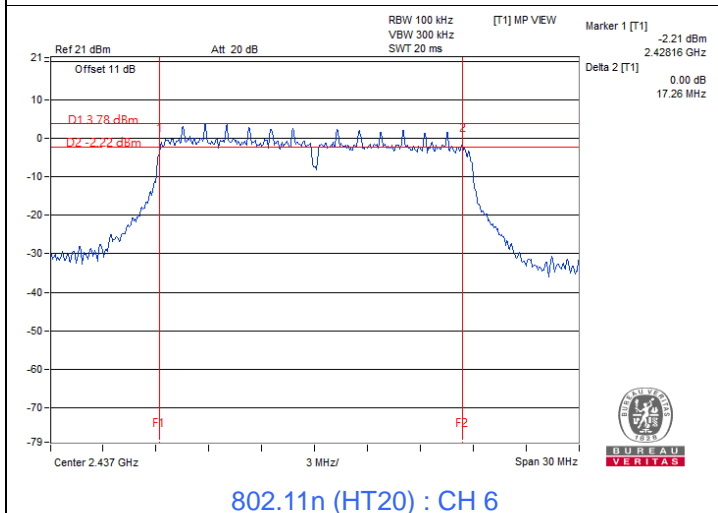
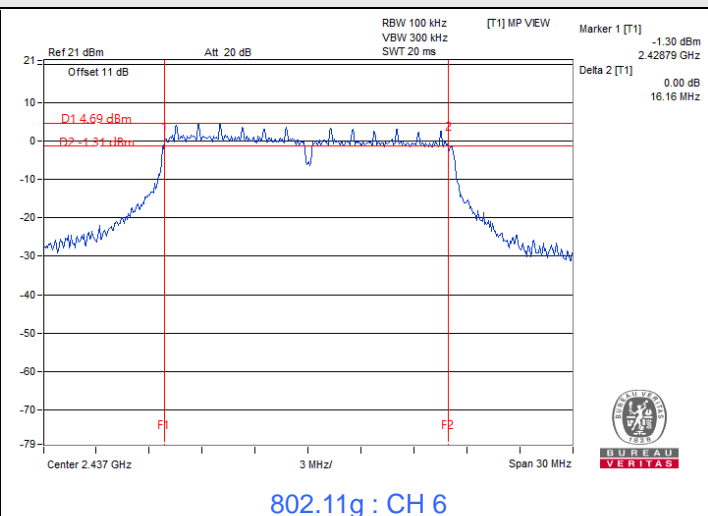
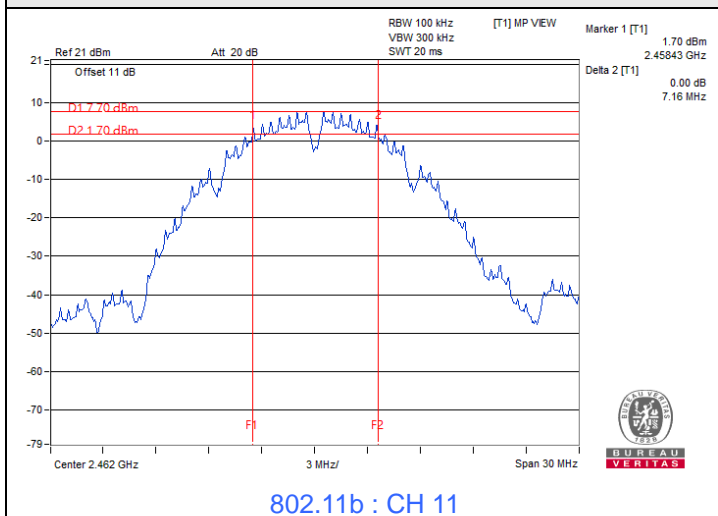
#### 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	16.42	0.5	Pass
6	2437	16.16	0.5	Pass
11	2462	16.38	0.5	Pass

#### 802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	17.65	0.5	Pass
6	2437	17.26	0.5	Pass
11	2462	17.35	0.5	Pass

### Spectrum Plot of Minimum Value

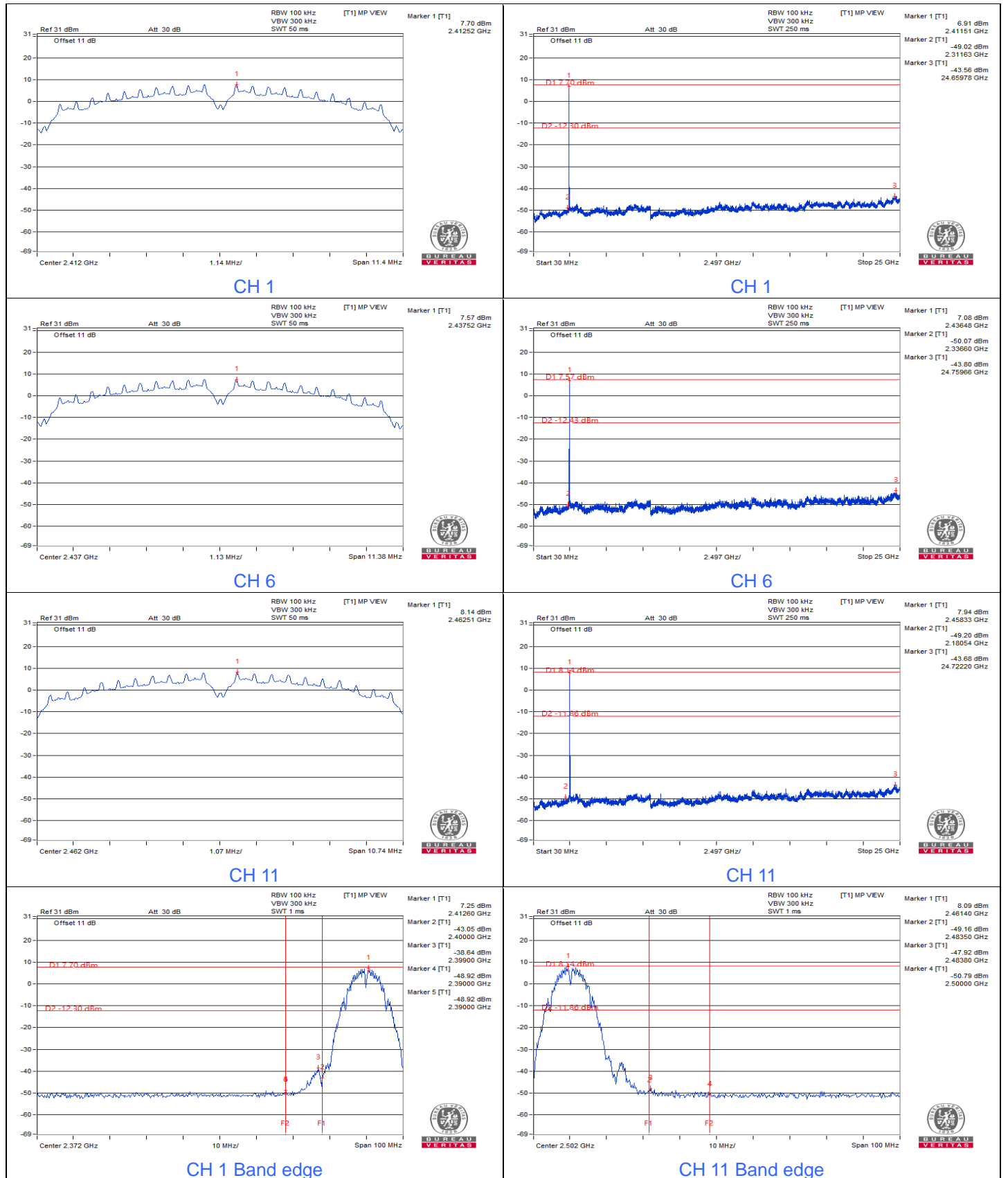




### 7.4 Conducted Out of Band Emissions

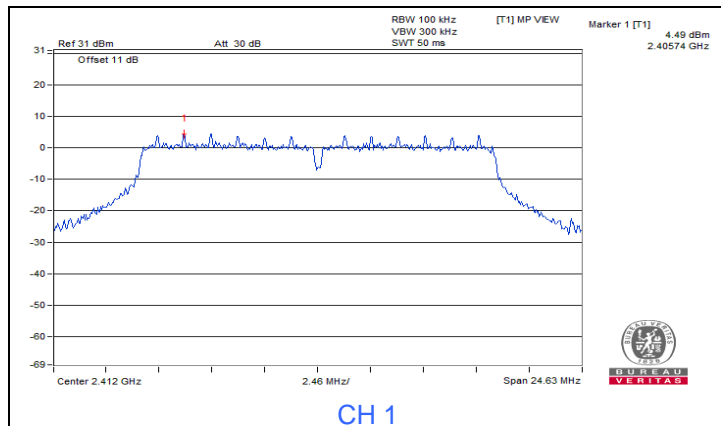
Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Ivan Tseng
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#### 802.11b

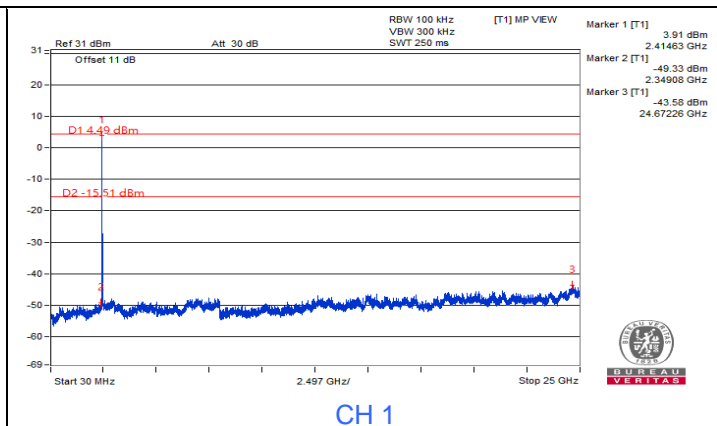




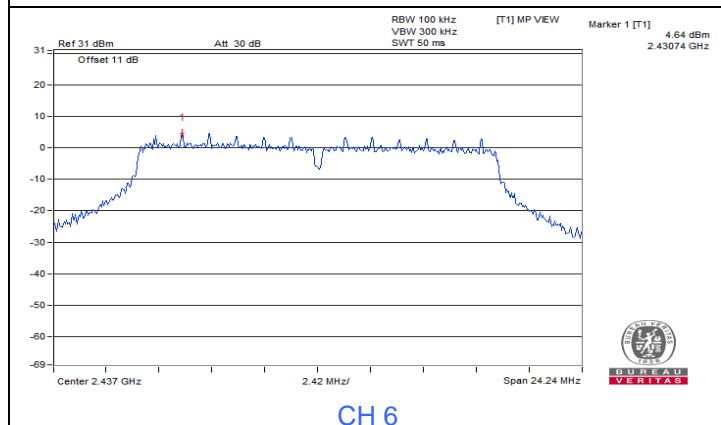
# 802.11g



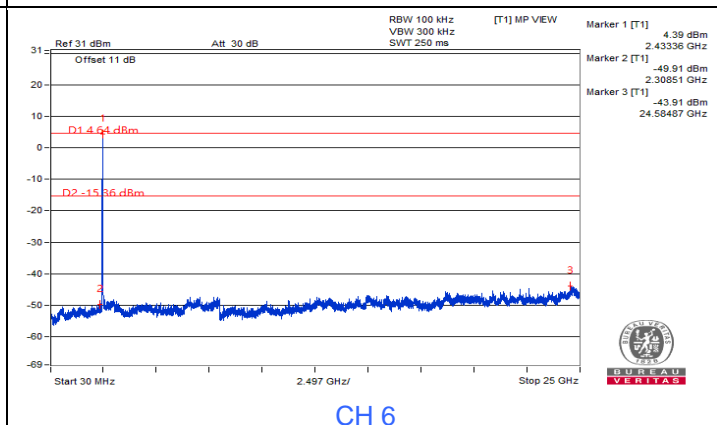
CH 1



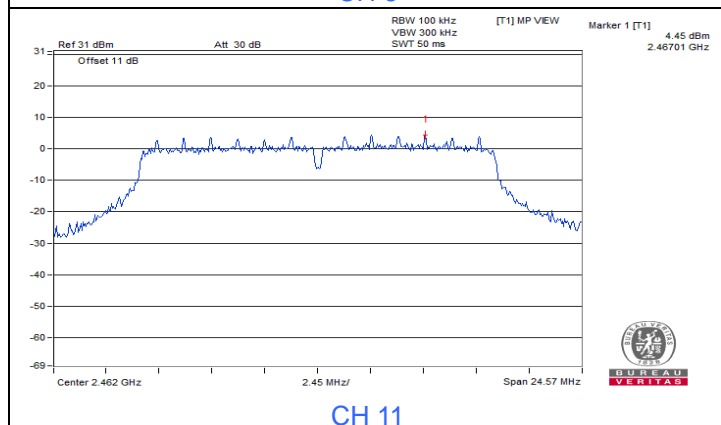
CH 1



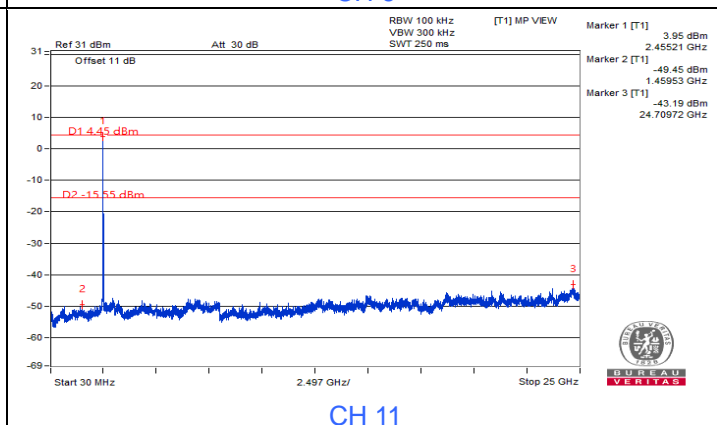
CH 6



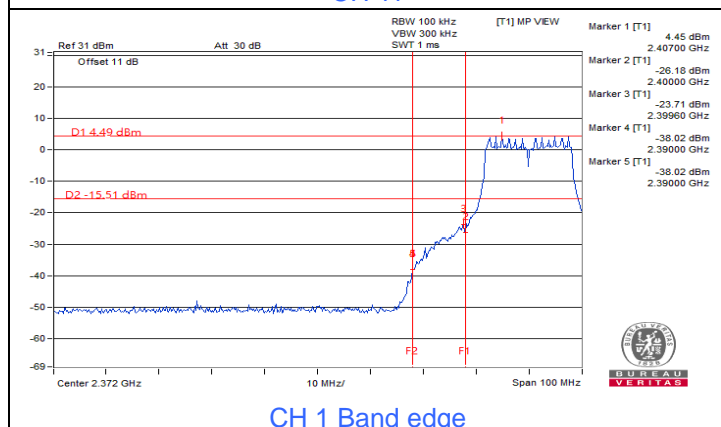
CH 6



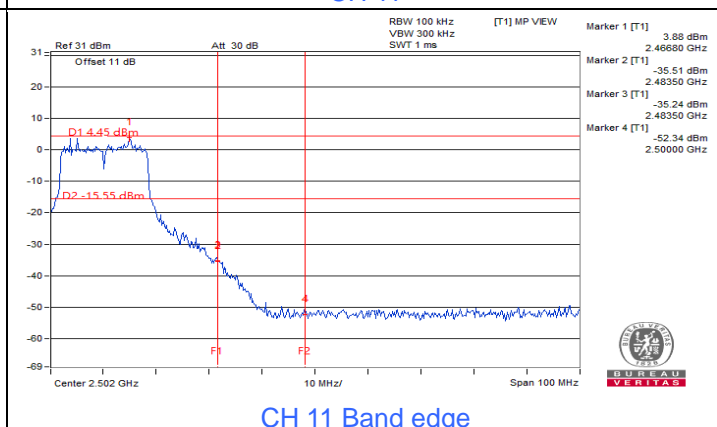
CH 11



CH 11



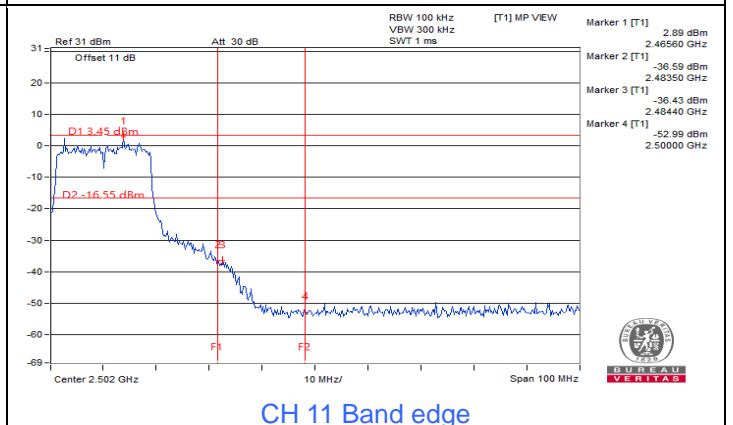
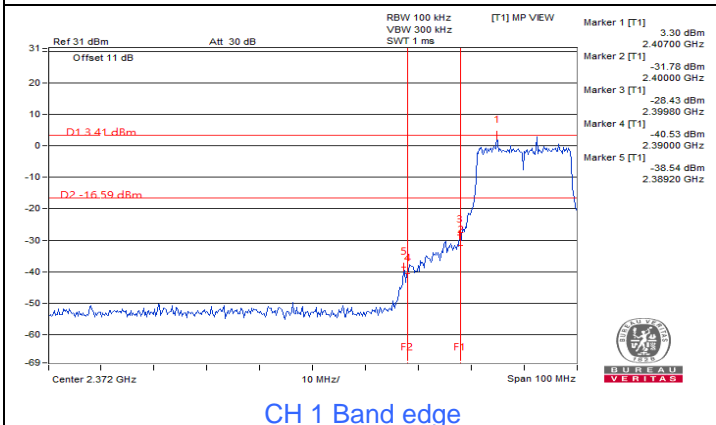
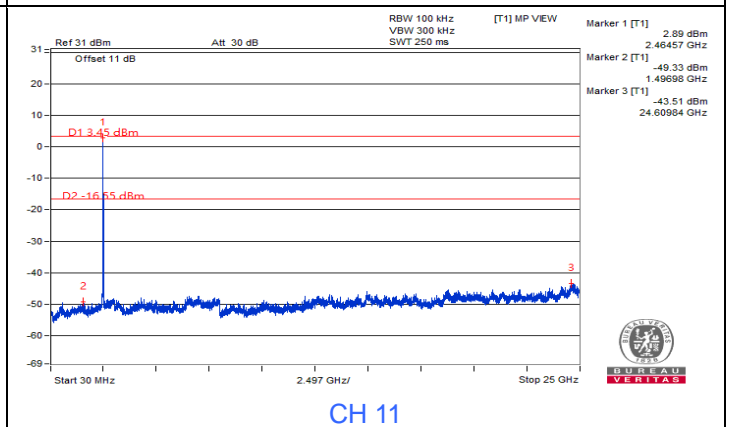
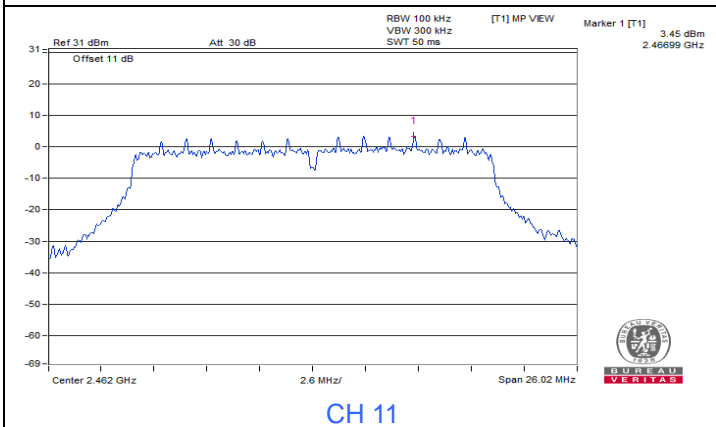
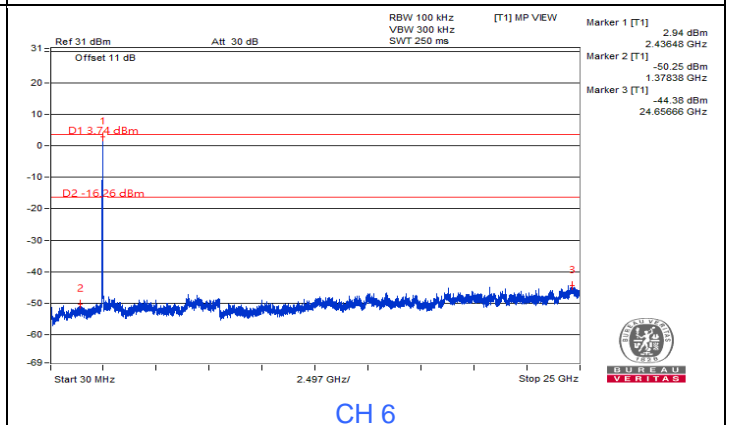
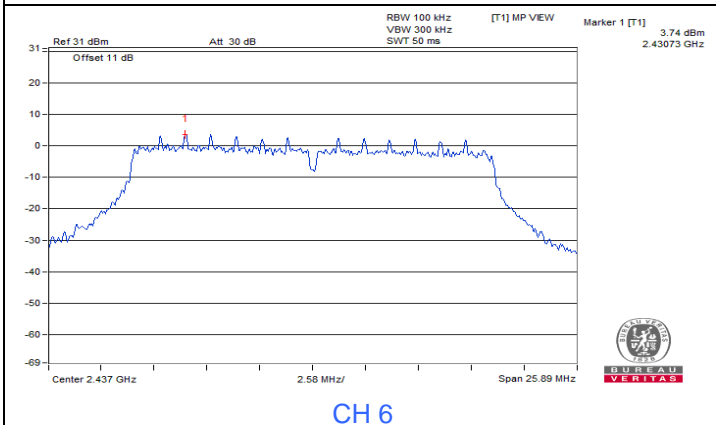
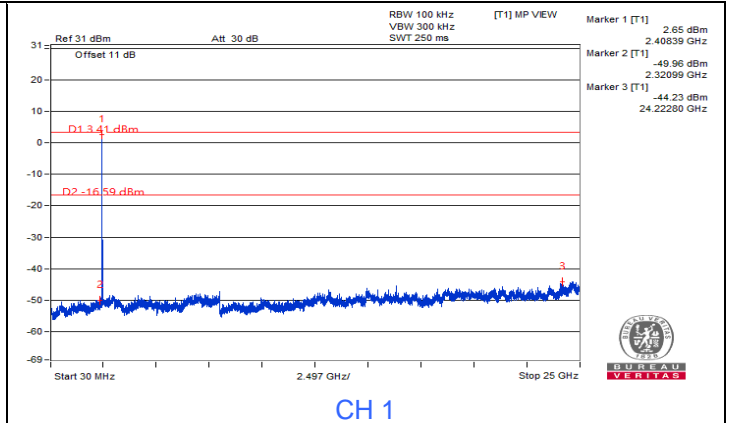
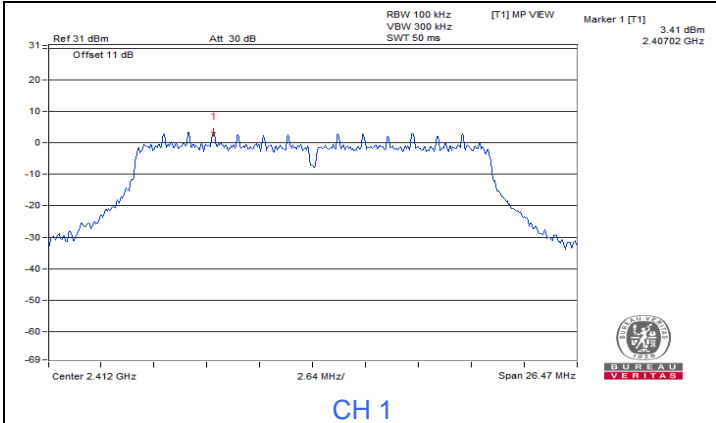
CH 1 Band edge



CH 11 Band edge



# 802.11n (HT20)



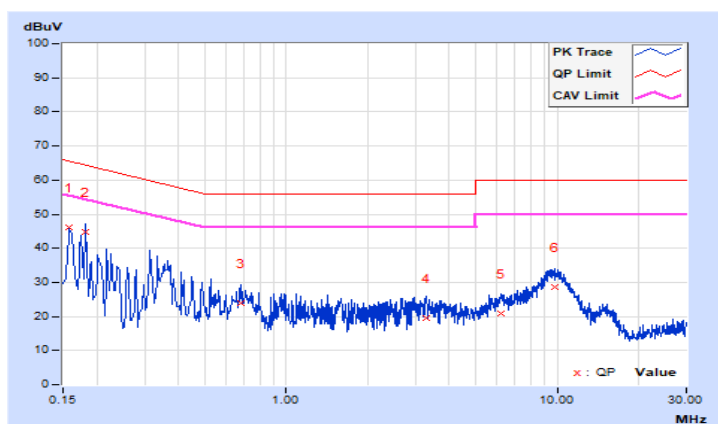
## 7.5 AC Power Conducted Emissions

RF Mode	802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23.5°C, 72.3% RH
Tested By	Thomas Cheng		

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	0.15800	10.11	36.11	18.28	46.22	28.39	65.57	55.57	-19.35	-27.18
2	0.18200	10.12	34.73	15.69	44.85	25.81	64.39	54.39	-19.54	-28.58
3	0.67800	10.15	13.88	7.92	24.03	18.07	56.00	46.00	-31.97	-27.93
4	3.29800	10.23	9.19	1.84	19.42	12.07	56.00	46.00	-36.58	-33.93
5	6.19000	10.26	10.62	1.38	20.88	11.64	60.00	50.00	-39.12	-38.36
6	9.75000	10.27	18.32	8.44	28.59	18.71	60.00	50.00	-31.41	-31.29

### 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



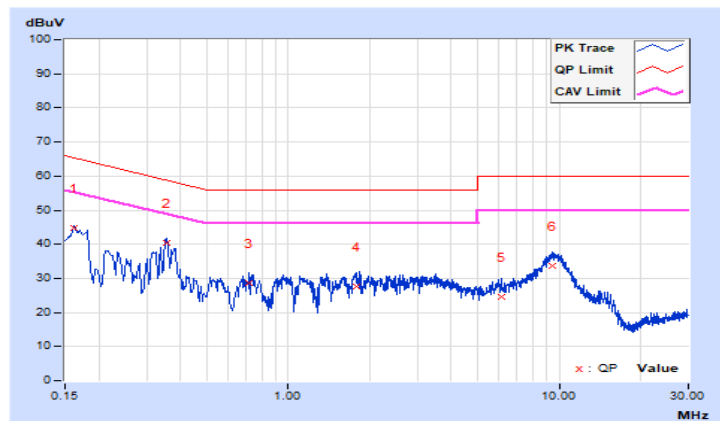


RF Mode	802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23.5°C, 72.3% RH
Tested By	Thomas Cheng		

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	0.16190	10.13	34.77	23.00	44.90	33.13	65.37	55.37	-20.47	-22.24
<b>2</b>	<b>0.35407</b>	<b>10.16</b>	<b>30.38</b>	<b>20.71</b>	<b>40.54</b>	<b>30.87</b>	<b>58.87</b>	<b>48.87</b>	<b>-18.33</b>	<b>-18.00</b>
3	0.71400	10.17	18.29	10.37	28.46	20.54	56.00	46.00	-27.54	-25.46
4	1.77800	10.21	17.33	7.60	27.54	17.81	56.00	46.00	-28.46	-28.19
5	6.12200	10.31	14.30	5.78	24.61	16.09	60.00	50.00	-35.39	-33.91
6	9.47400	10.35	23.39	14.72	33.74	25.07	60.00	50.00	-26.26	-24.93

**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



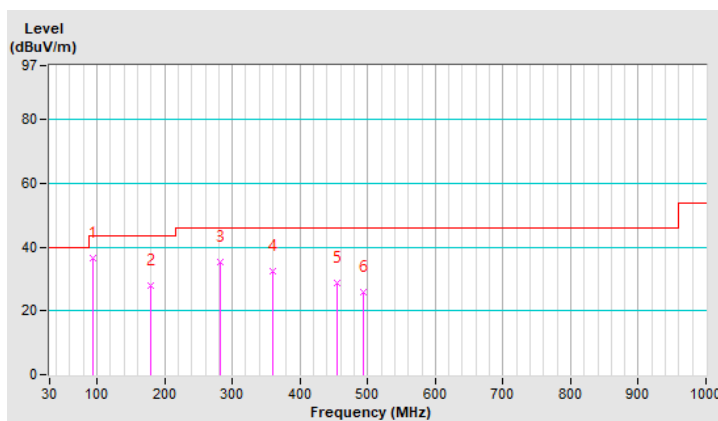
### 7.6 Unwanted Emissions below 1 GHz

<b>RF Mode</b>	802.11g	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	(QP) RB = 120kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

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	94.48	36.4 QP	43.5	-7.1	1.15 H	138	39.8	-3.4
2	178.81	28.0 QP	43.5	-15.5	1.05 H	107	31.4	-3.4
3	282.22	35.3 QP	46.0	-10.7	1.56 H	299	38.7	-3.4
4	358.94	32.6 QP	46.0	-13.4	1.63 H	9	36.0	-3.4
5	455.82	28.8 QP	46.0	-17.2	1.57 H	100	32.2	-3.4
6	494.41	26.0 QP	46.0	-20.0	1.64 H	110	29.4	-3.4

**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 of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

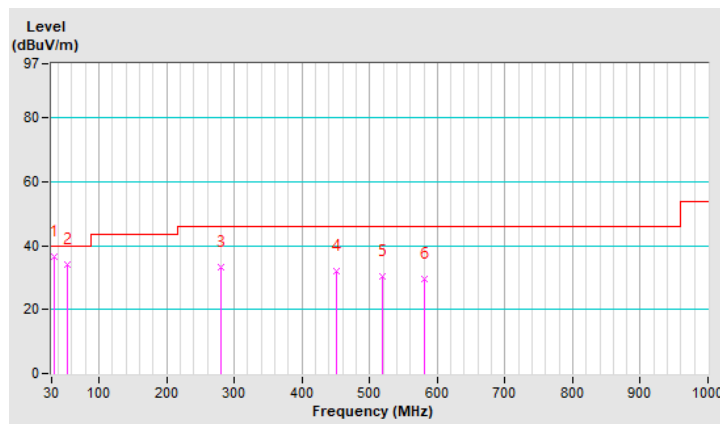


<b>RF Mode</b>	802.11g	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	(QP) RB = 120kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

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	33.52	36.4 QP	40.0	-3.6	1.54 V	118	39.8	-3.4
2	53.29	34.2 QP	40.0	-5.8	1.05 V	200	37.6	-3.4
3	279.82	33.3 QP	46.0	-12.7	1.66 V	291	36.7	-3.4
4	450.10	31.9 QP	46.0	-14.1	1.54 V	202	35.3	-3.4
5	518.81	30.4 QP	46.0	-15.6	1.15 V	241	33.8	-3.4
6	580.26	29.4 QP	46.0	-16.6	1.45 V	18	32.8	-3.4

**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 of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 7.7 Unwanted Emissions above 1 GHz

<b>RF Mode</b>	802.11b	<b>Channel</b>	CH 1 : 2412 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

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	58.5 PK	74.0	-15.5	1.00 H	171	51.9	6.6
2	2390.00	47.8 AV	54.0	-6.2	1.00 H	171	41.2	6.6
3	*2412.00	107.4 PK			1.00 H	171	69.3	38.1
4	*2412.00	104.2 AV			1.00 H	171	66.1	38.1
5	4824.00	49.0 PK	74.0	-25.0	1.14 H	151	37.4	11.6
6	4824.00	41.1 AV	54.0	-12.9	1.14 H	151	29.5	11.6
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	58.4 PK	74.0	-15.6	1.31 V	238	51.8	6.6
2	2390.00	47.6 AV	54.0	-6.4	1.31 V	238	41.0	6.6
3	*2412.00	105.3 PK			1.31 V	238	67.2	38.1
4	*2412.00	102.5 AV			1.31 V	238	64.4	38.1
5	4824.00	48.8 PK	74.0	-25.2	1.85 V	57	37.2	11.6
6	4824.00	40.8 AV	54.0	-13.2	1.85 V	57	29.2	11.6

### Remarks:

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



<b>RF Mode</b>	802.11b	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	107.0 PK			1.00 H	171	69.0	38.0
2	*2437.00	104.3 AV			1.00 H	171	66.3	38.0
3	4874.00	49.0 PK	74.0	-25.0	1.35 H	205	37.5	11.5
4	4874.00	41.1 AV	54.0	-12.9	1.35 H	205	29.6	11.5

**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	105.2 PK			1.31 V	238	67.2	38.0
2	*2437.00	102.1 AV			1.31 V	238	64.1	38.0
3	4874.00	49.1 PK	74.0	-24.9	1.64 V	115	37.6	11.5
4	4874.00	41.3 AV	54.0	-12.7	1.64 V	115	29.8	11.5

**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.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.



<b>RF Mode</b>	802.11b	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	106.5 PK			1.00 H	171	68.6	37.9
2	*2462.00	103.7 AV			1.00 H	171	65.8	37.9
3	2483.50	58.7 PK	74.0	-15.3	1.00 H	171	52.1	6.6
4	2483.50	47.7 AV	54.0	-6.3	1.00 H	171	41.1	6.6
5	4924.00	49.3 PK	74.0	-24.7	1.53 H	2	37.6	11.7
6	4924.00	41.4 AV	54.0	-12.6	1.53 H	2	29.7	11.7

**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	104.1 PK			1.31 V	238	66.2	37.9
2	*2462.00	101.3 AV			1.31 V	238	63.4	37.9
3	2483.50	58.6 PK	74.0	-15.4	1.31 V	238	52.0	6.6
4	2483.50	47.6 AV	54.0	-6.4	1.31 V	238	41.0	6.6
5	4924.00	49.2 PK	74.0	-24.8	1.15 V	142	37.5	11.7
6	4924.00	41.4 AV	54.0	-12.6	1.15 V	142	29.7	11.7

**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.



<b>RF Mode</b>	802.11g	<b>Channel</b>	CH 1 : 2412 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

**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	66.5 PK	74.0	-7.5	1.00 H	171	59.9	6.6
2	<b>2390.00</b>	<b>52.1 AV</b>	<b>54.0</b>	<b>-1.9</b>	<b>1.00 H</b>	<b>171</b>	<b>45.5</b>	<b>6.6</b>
3	*2412.00	107.3 PK			1.00 H	171	69.2	38.1
4	*2412.00	99.2 AV			1.00 H	171	61.1	38.1
5	4824.00	48.9 PK	74.0	-25.1	1.05 H	116	37.3	11.6
6	4824.00	41.2 AV	54.0	-12.8	1.05 H	116	29.6	11.6

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.3 PK	74.0	-13.7	1.31 V	238	53.7	6.6
2	2390.00	49.0 AV	54.0	-5.0	1.31 V	238	42.4	6.6
3	*2412.00	105.3 PK			1.31 V	238	67.2	38.1
4	*2412.00	97.8 AV			1.31 V	238	59.7	38.1
5	4824.00	48.7 PK	74.0	-25.3	1.05 V	247	37.1	11.6
6	4824.00	41.0 AV	54.0	-13.0	1.05 V	247	29.4	11.6

**Remarks:**

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



<b>RF Mode</b>	802.11g	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	107.7 PK			1.00 H	171	69.7	38.0
2	*2437.00	99.5 AV			1.00 H	171	61.5	38.0
3	4874.00	49.5 PK	74.0	-24.5	1.95 H	328	38.0	11.5
4	4874.00	41.4 AV	54.0	-12.6	1.95 H	328	29.9	11.5

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	106.5 PK			1.31 V	238	68.5	38.0
2	*2437.00	98.8 AV			1.31 V	238	60.8	38.0
3	4874.00	49.2 PK	74.0	-24.8	1.05 V	280	37.7	11.5
4	4874.00	41.4 AV	54.0	-12.6	1.05 V	280	29.9	11.5

**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.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.





RF Mode	802.11g	Channel	CH 11 : 2462 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 60% RH
Tested By	Charles Hsiao		

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	106.0 PK			1.00 H	171	68.1	37.9
2	*2462.00	98.3 AV			1.00 H	171	60.4	37.9
3	2483.50	66.6 PK	74.0	-7.4	1.00 H	171	60.0	6.6
4	<b>2483.50</b>	<b>52.1 AV</b>	<b>54.0</b>	<b>-1.9</b>	<b>1.00 H</b>	<b>171</b>	<b>45.5</b>	<b>6.6</b>
5	4924.00	49.0 PK	74.0	-25.0	1.28 H	317	37.3	11.7
6	4924.00	41.1 AV	54.0	-12.9	1.28 H	317	29.4	11.7

**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	103.1 PK			1.31 V	238	65.2	37.9
2	*2462.00	95.4 AV			1.31 V	238	57.5	37.9
3	2483.50	65.0 PK	74.0	-9.0	1.31 V	238	58.4	6.6
4	2483.50	50.2 AV	54.0	-3.8	1.31 V	238	43.6	6.6
5	4924.00	49.1 PK	74.0	-24.9	1.62 V	209	37.4	11.7
6	4924.00	40.9 AV	54.0	-13.1	1.62 V	209	29.2	11.7

**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.



<b>RF Mode</b>	802.11n (HT20)	<b>Channel</b>	CH 1 : 2412 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

**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	67.1 PK	74.0	-6.9	1.00 H	171	60.5	6.6
2	2390.00	52.0 AV	54.0	-2.0	1.00 H	171	45.4	6.6
3	*2412.00	106.1 PK			1.00 H	171	68.0	38.1
4	*2412.00	98.6 AV			1.00 H	171	60.5	38.1
5	4824.00	49.3 PK	74.0	-24.7	1.05 H	116	37.7	11.6
6	4824.00	41.2 AV	54.0	-12.8	1.05 H	116	29.6	11.6

**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	62.1 PK	74.0	-11.9	1.31 V	238	55.5	6.6
2	2390.00	49.0 AV	54.0	-5.0	1.31 V	238	42.4	6.6
3	*2412.00	103.3 PK			1.31 V	238	65.2	38.1
4	*2412.00	95.6 AV			1.31 V	238	57.5	38.1
5	4824.00	48.7 PK	74.0	-25.3	1.95 V	309	37.1	11.6
6	4824.00	40.8 AV	54.0	-13.2	1.95 V	309	29.2	11.6

**Remarks:**

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



<b>RF Mode</b>	802.11n (HT20)	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	107.4 PK			1.00 H	171	69.4	38.0
2	*2437.00	99.4 AV			1.00 H	171	61.4	38.0
3	4874.00	49.0 PK	74.0	-25.0	1.63 H	3	37.5	11.5
4	4874.00	41.3 AV	54.0	-12.7	1.63 H	3	29.8	11.5

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	105.0 PK			1.31 V	238	67.0	38.0
2	*2437.00	97.4 AV			1.31 V	238	59.4	38.0
3	4874.00	48.9 PK	74.0	-25.1	1.45 V	192	37.4	11.5
4	4874.00	40.7 AV	54.0	-13.3	1.45 V	192	29.2	11.5

**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.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.



<b>RF Mode</b>	802.11n (HT20)	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 kHz
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	25°C, 60% RH
<b>Tested By</b>	Charles Hsiao		

**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	103.8 PK			1.00 H	171	65.9	37.9
2	*2462.00	95.7 AV			1.00 H	171	57.8	37.9
3	2483.50	65.3 PK	74.0	-8.7	1.00 H	171	58.7	6.6
4	<b>2483.50</b>	<b>52.1 AV</b>	<b>54.0</b>	<b>-1.9</b>	<b>1.00 H</b>	<b>171</b>	<b>45.5</b>	<b>6.6</b>
5	4924.00	48.8 PK	74.0	-25.2	1.45 H	117	37.1	11.7
6	4924.00	40.7 AV	54.0	-13.3	1.45 H	117	29.0	11.7

**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	101.2 PK			1.31 V	238	63.3	37.9
2	*2462.00	93.6 AV			1.31 V	238	55.7	37.9
3	2483.50	63.4 PK	74.0	-10.6	1.31 V	238	56.8	6.6
4	2483.50	49.4 AV	54.0	-4.6	1.31 V	238	42.8	6.6
5	4924.00	48.6 PK	74.0	-25.4	1.66 V	63	36.9	11.7
6	4924.00	40.6 AV	54.0	-13.4	1.66 V	63	28.9	11.7

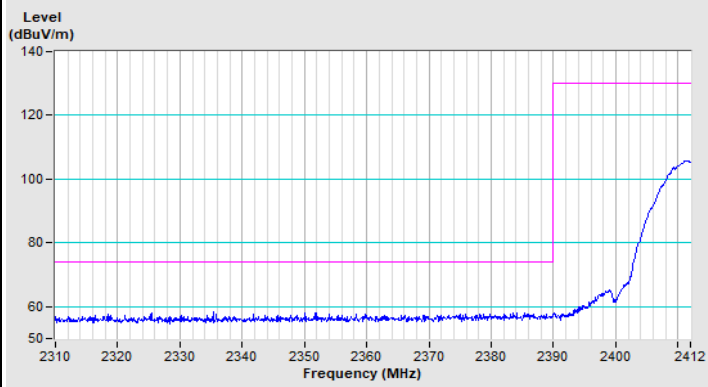
**Remarks:**

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.

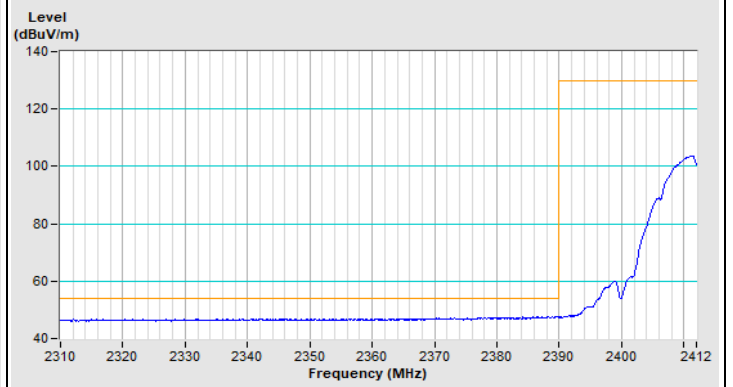


### Plot of Band Edge

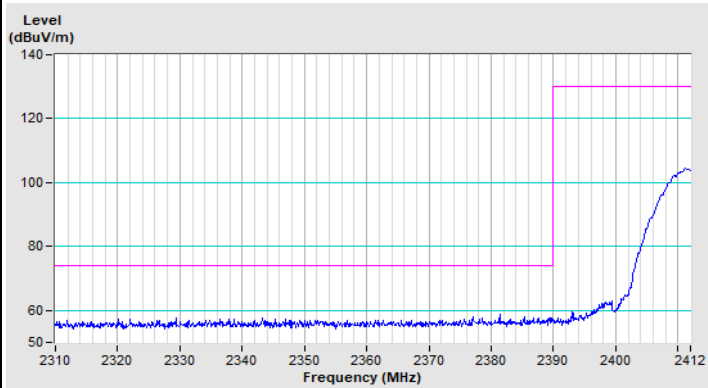
#### 802.11b Channel 1



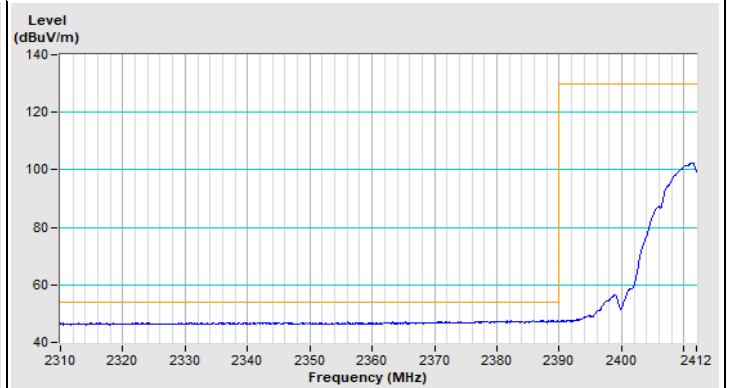
Horizontal (Peak)



Horizontal (Average)

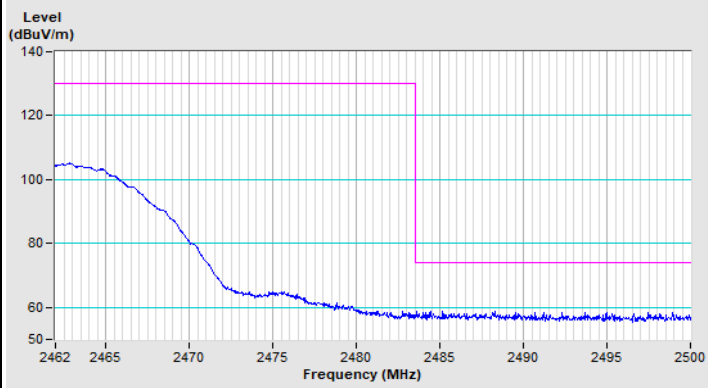


Vertical (Peak)

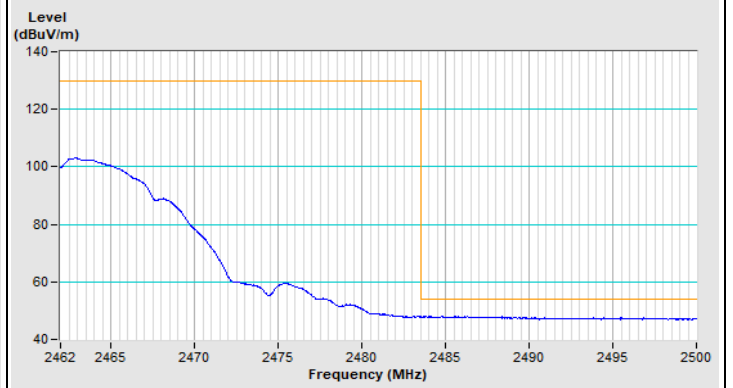


Vertical (Average)

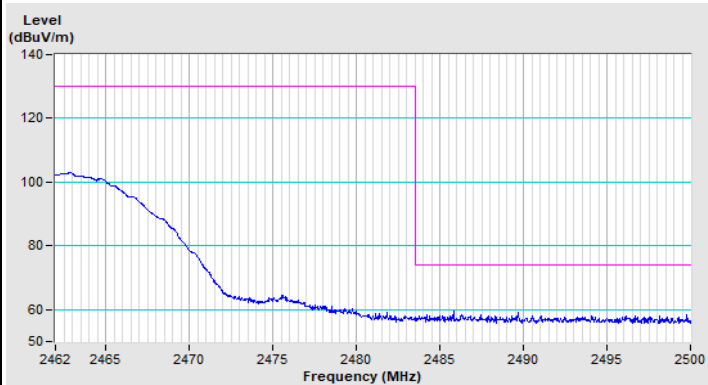
#### 802.11b Channel 11



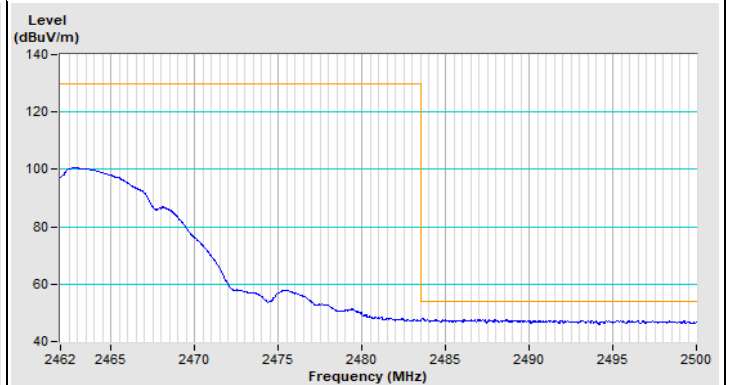
Horizontal (Peak)



Horizontal (Average)

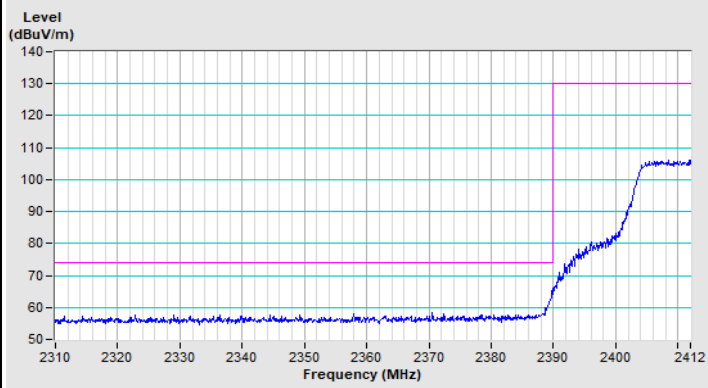


Vertical (Peak)

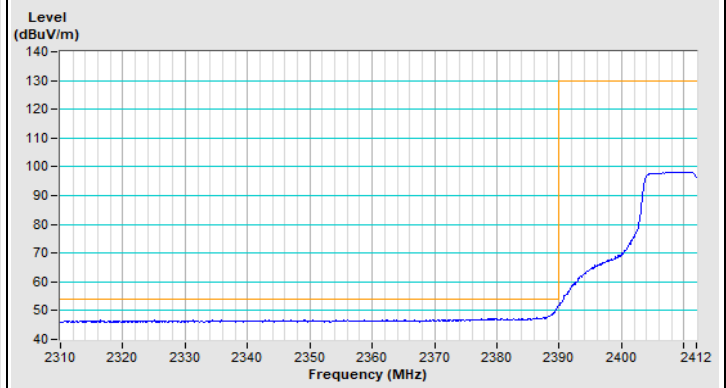


Vertical (Average)

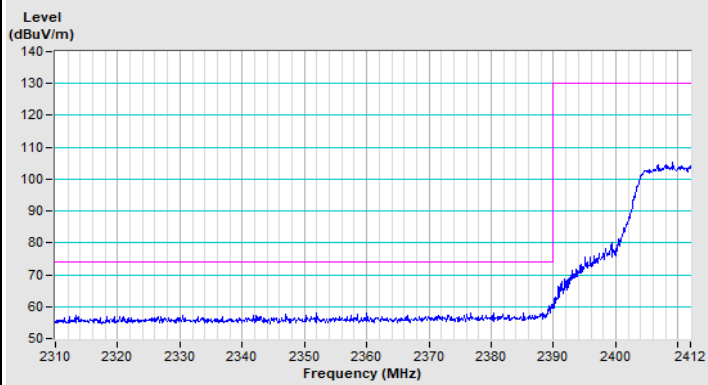
### 802.11g Channel 1



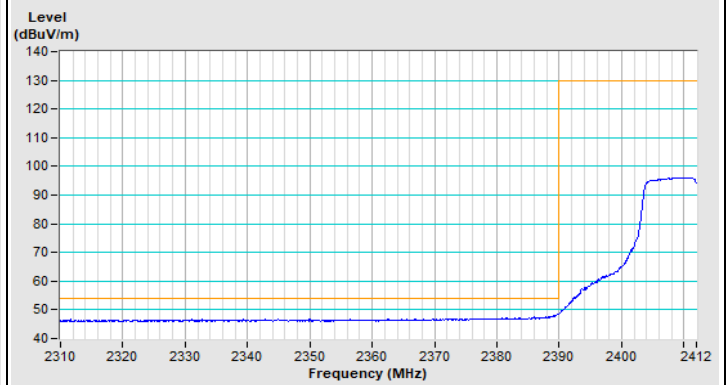
Horizontal (Peak)



Horizontal (Average)

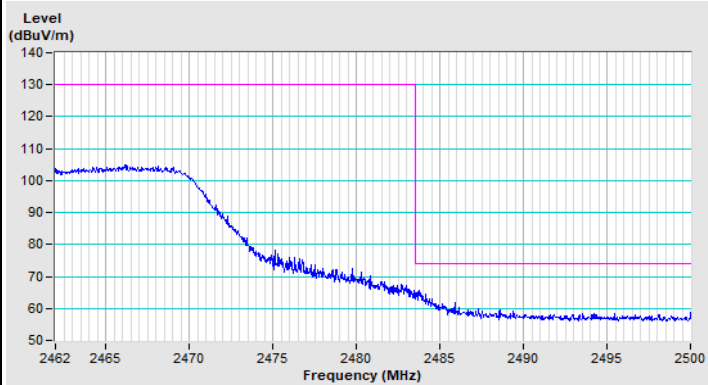


Vertical (Peak)

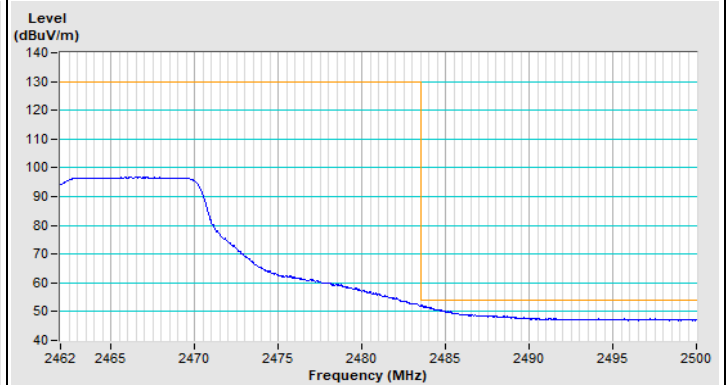


Vertical (Average)

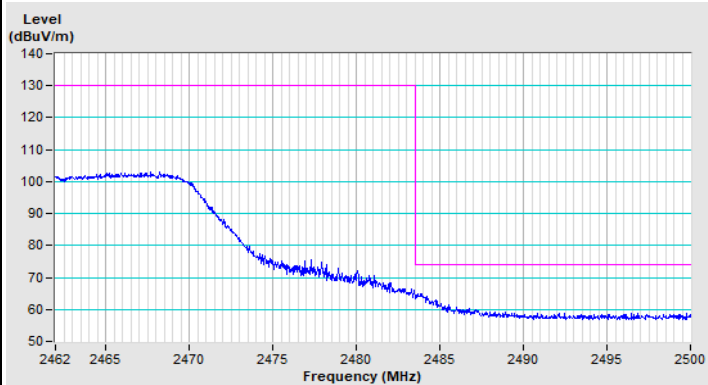
### 802.11g Channel 11



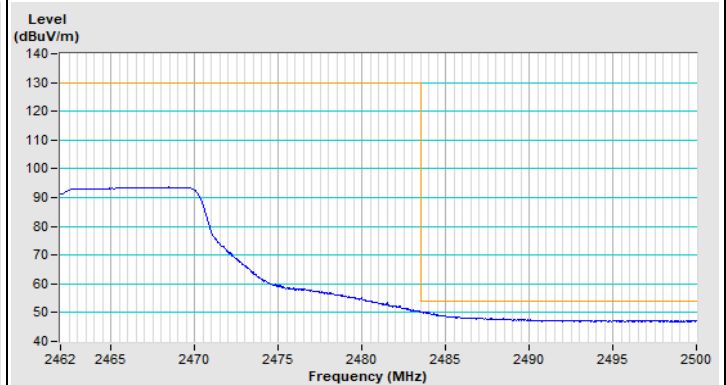
Horizontal (Peak)



Horizontal (Average)

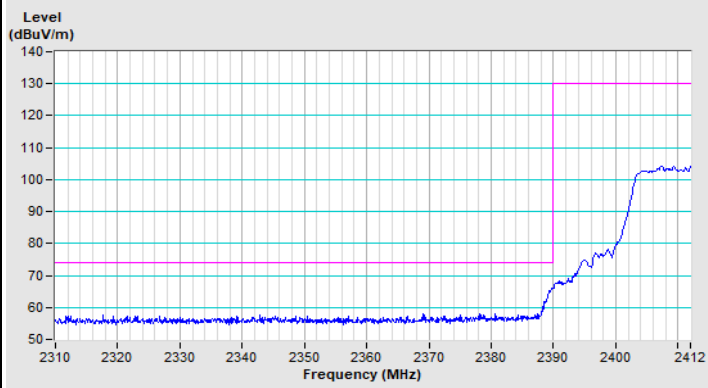


Vertical (Peak)

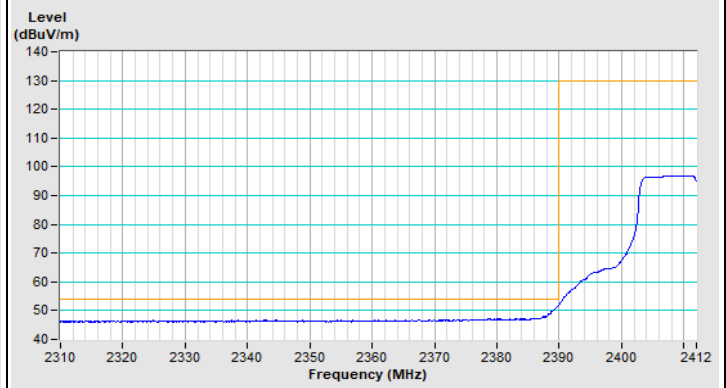


Vertical (Average)

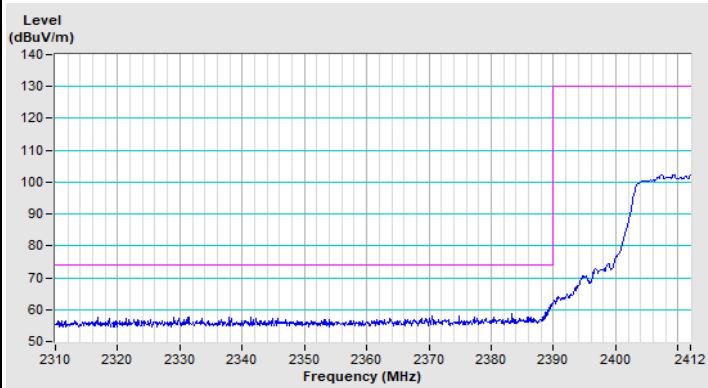
### 802.11n (HT20) Channel 1



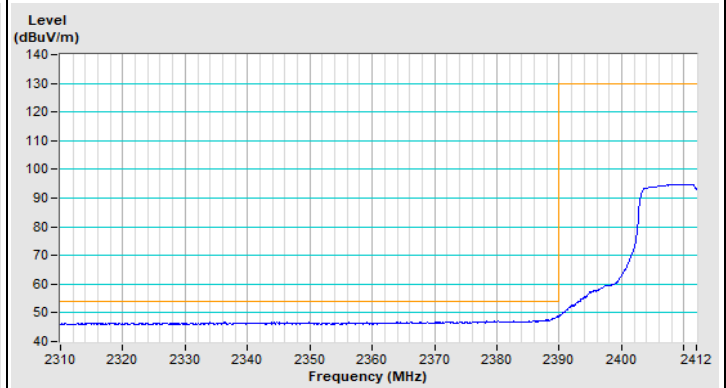
Horizontal (Peak)



Horizontal (Average)

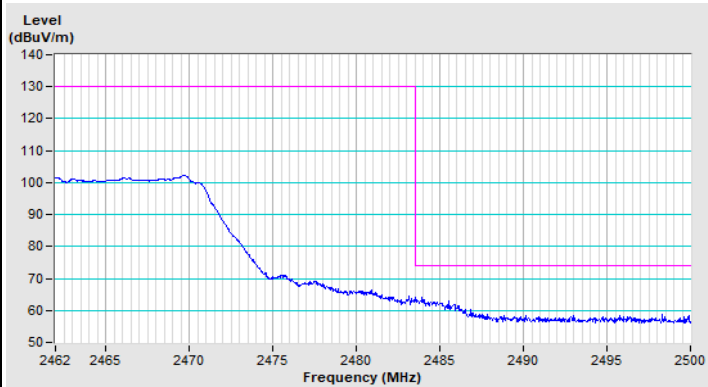


Vertical (Peak)

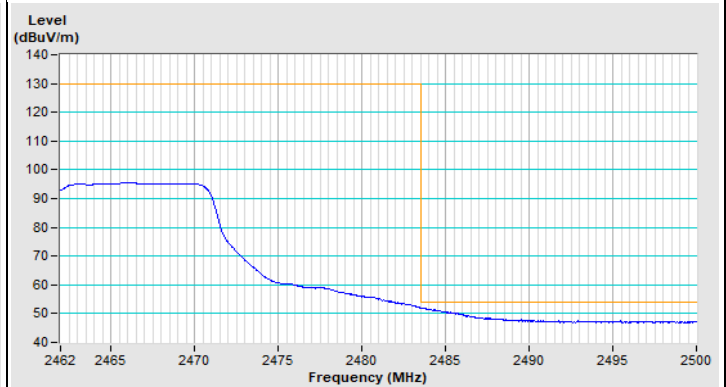


Vertical (Average)

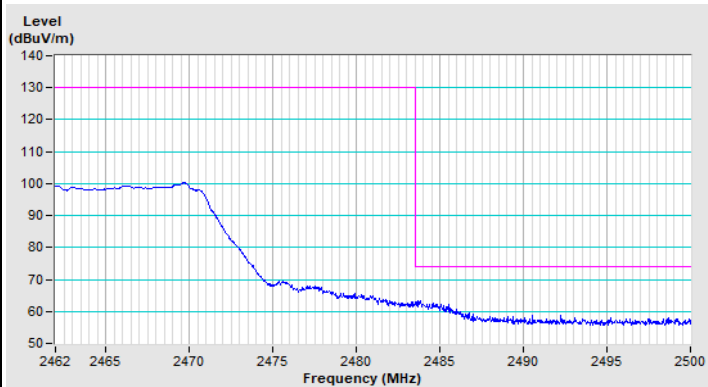
### 802.11n (HT20) Channel 11



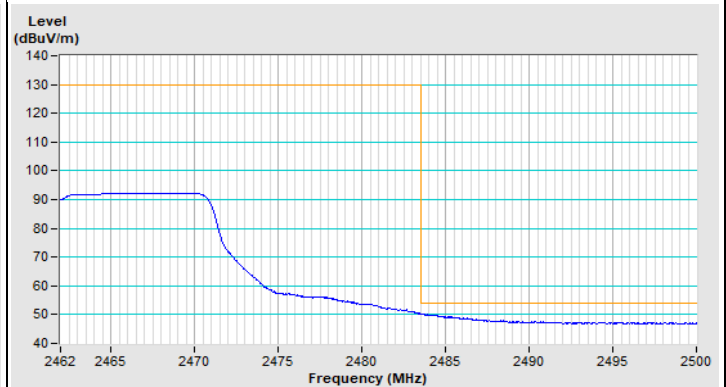
Horizontal (Peak)



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:

**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@bureauveritas.com](mailto: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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