

# TEST REPORT

## CERTIFICATE OF CONFORMITY

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

**Report No.:** RFBEMI-WTW-P23090647-2

**FCC ID:** NOIKBN365

**Product:** Electronic Display Device

**Brand:** Rakuten kobo

**Model No.:** N365

**Received Date:** 2023/9/27

**Test Date:** 2023/10/27 ~ 2023/11/22

**Issued Date:** 2023/12/15

**Applicant:** NETRONIX, INC.

**Address:** No. 945, Boai St., Jubei City, Hsin-Chu, 30265, Taiwan

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

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**FCC Registration /** (1) 198487 / TW2021

**Designation Number:** (2) 788550 / TW0003

(3) 281270 / TW0032

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

*Jeremy Lin*

**Date:** \_\_\_\_\_

2023/12/15

Jeremy Lin / Project Engineer

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Prepared by : Vera Huang / 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 .....	16
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>51</b>
<b>9</b>	<b>Information of the Testing Laboratories.....</b>	<b>52</b>



## Release Control Record

Issue No.	Description	Date Issued
RFBEMI-WTW-P23090647-2	Original Release	2023/12/15

## 1 Certificate

**Product:** Electronic Display Device

**Brand:** Rakuten kobo

**Test Model:** N365

**Sample Status:** Engineering sample

**Applicant:** NETRONIX, INC.

**Test Date:** 2023/10/27 ~ 2023/11/22

**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 -11.89 dB at 1.77800 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -5.2 dB at 31.94 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -0.2 dB at 4924.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

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) (±)
RF Output Power	-	1.1 dB
Power Spectral Density	-	1.2 dB
6 dB Bandwidth	-	960 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.63 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.88 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3 dB
	30 MHz ~ 1 GHz	2.93 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 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	Electronic Display Device
Brand	Rakuten kobo
Test Model	N365
Status of EUT	Engineering sample
Power Supply Rating	3.7 Vdc from battery 5 Vdc from adapter or host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	Up to 72.2 Mbps
Operating Frequency	2.412 GHz ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20):11
Output Power	295.121 mW (24.70 dBm)

Note:

1. The EUT uses following accessories.

USB Cable	Brand	LUXSHARE-ICT
	Model	LB93US005-1H
	Material	TPE
	Signal Line	Shielded: Y, 1.0M, Core: N/A

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4 GHz)	Bluetooth
2	WLAN (5 GHz)	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

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.

Gain (dBi)	Antenna Type	Connector Type
3.91	Chip	N/A

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

2. The EUT provides 1 completed transmitter and 1 receiver.

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. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). 2. For Radiated, pre-scan Power from AC Adapter via USB Cable / Laptop via USB Cable / Battery and find the worst case as a representative test condition. 3. For AC conduction, pre-scan Power from AC Adapter via USB Cable / Laptop via USB Cable and find the worst case as a representative test condition. 4. 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. For Radiated Worst Condition: Power from Laptop via USB Cable 2. For AC conduction Worst Condition: Power from Laptop via USB Cable 3. X-axis/ Y-axis/ Z-axis Worst Condition: Y-axis

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

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

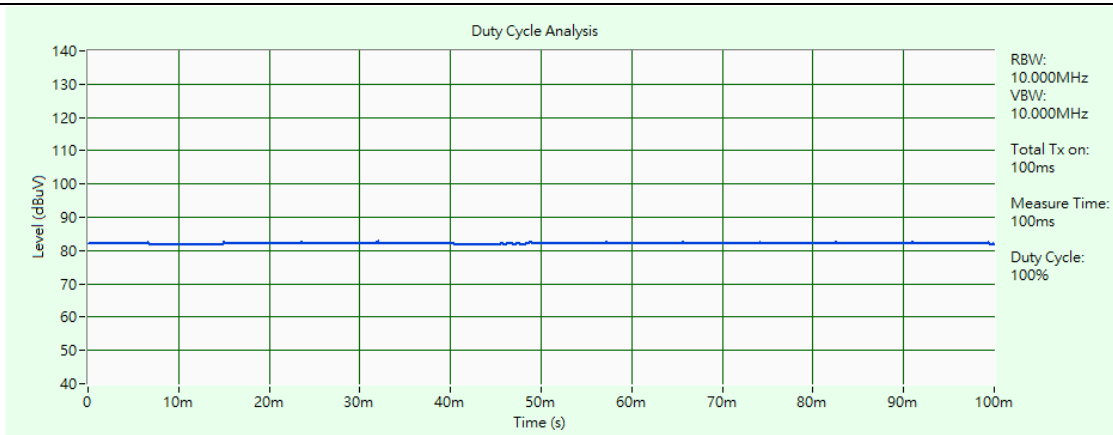


### 3.5 Duty Cycle of Test Signal

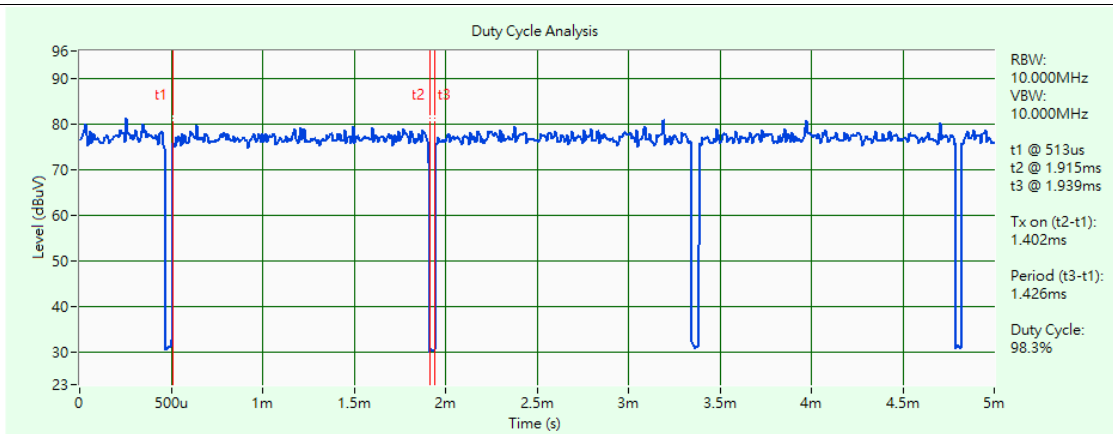
**802.11b:** Duty cycle = 100 ms / 100 ms x 100% = 100.0%

**802.11g:** Duty cycle = 1.402 ms / 1.426 ms x 100% = 98.3%

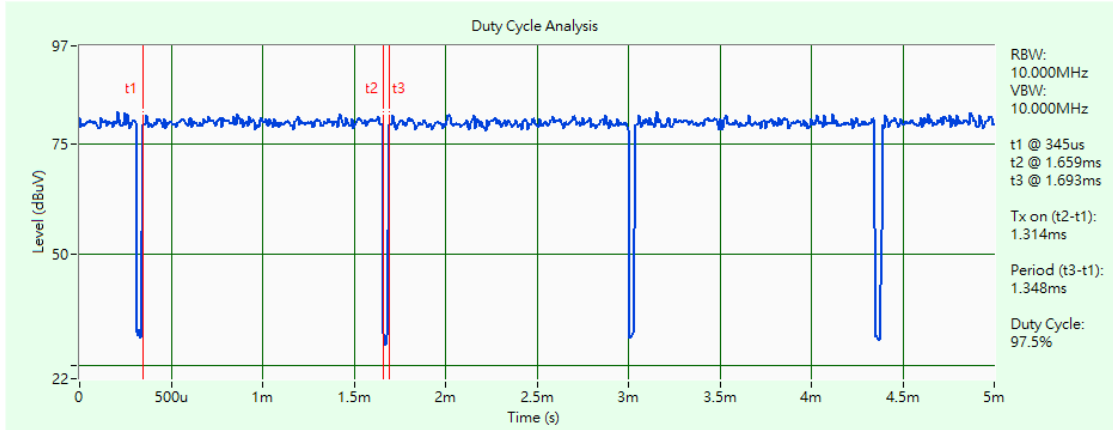
**802.11n (HT20):** Duty cycle = 1.314 ms / 1.348 ms x 100% = 97.5%, duty factor =  $10 * \log(1/\text{Duty cycle}) = 0.11 \text{ dB}$



802.11b



802.11g

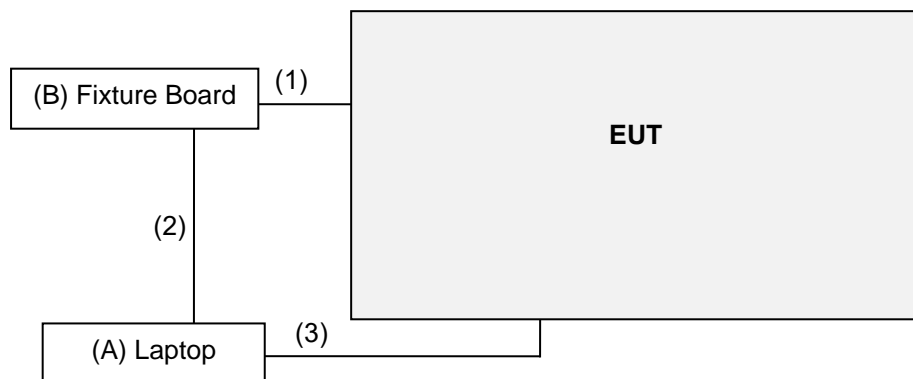


802.11n (HT20)

### 3.6 Test Program Used and Operation Descriptions

Controlling software teraterm v4.80 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.	Laptop	Lenovo	20J4 MD A003TW	PF-11H9AK	N/A	Provided by Lab
B.	Fixture Board	N/A	N/A	N/A	N/A	Supplied by applicant

No.	Cable Descriptions	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Qty.)	Remark
1.	Console Cable	1	0.6	No	0	Supplied by applicant (for RF Setup)
2.	USB Cable	1	1	Yes	0	Supplied by applicant
3.	USB Cable	1	1	Yes	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
Power Meter Anritsu	ML2495A	0842014	2023/5/5	2024/5/4
Pulse Power Sensor Anritsu	MA2411B	0738404	2023/5/5	2024/5/4
USB Wideband Power Sensor Keysight	U2021XA	U2021XA_001	2023/6/6	2024/6/5

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2023/11/22

### 4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030A	MY54490260	2023/7/13	2024/7/12
Signal Analyzer R&S	FSV40	101042	2023/9/5	2024/9/4
		101544	2023/5/9	2024/5/8
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2023/11/22

### 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
50 ohm terminal resistance HUBER+SUHNER	E1-011315	13	2022/11/17	2023/11/16
50 ohm terminal resistance	E1-011280	05	2022/11/21	2023/11/20
	E1-011311	09	2022/11/17	2023/11/16
EMI Test Receiver R&S	ESCI	100613	2022/12/5	2023/12/4
Fixed Attenuator Mini-Circuits	HAT-10+	PAD-COND1-01	2023/1/7	2024/1/6
LISN R&S	ENV216	101826	2023/3/23	2024/3/22
	ESH3-Z5	100311	2023/9/6	2024/9/5
RF Coaxial Cable Woken	5D-FB	Cable-cond1-01	2023/1/7	2024/1/6
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2023/8/31	2024/8/30

Notes:

1. The test was performed in HY - Conduction 1.
2. Tested Date: 2023/11/11

#### 4.6 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1213	2023/10/13	2024/10/12
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
Preamplifier EMCI	EMC330N	980782	2023/1/16	2024/1/15
	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
	EMCCFD400-NM-NM- 500	201233	2023/1/16	2024/1/15
	EMCCFD400-NM-NM- 3000	201235	2023/1/16	2024/1/15
	EMCCFD400-NM-NM- 9000	201236(with PAD)	2023/1/16	2024/1/15
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 Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2023/11/3

#### 4.7 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Horn Antenna RFSPIN	DRH18-E	210103A18E	2022/11/13	2023/11/12
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2022/11/13	2023/11/12
Preamplifier EMCI	EMC118A45SE	980808	2022/12/29	2023/12/28
	EMC184045SE	980788	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2023/1/16	2024/1/15
	EMC101G-KM-KM-3000	201257	2023/1/16	2024/1/15
	EMC101G-KM-KM-5000	201260	2023/1/16	2024/1/15
	EMC104-SM-SM-1000	210102	2023/1/16	2024/1/15
	EMC104-SM-SM-3000	201231	2023/1/16	2024/1/15
	EMC104-SM-SM-9000	201243	2023/1/16	2024/1/15
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 Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2023/10/27

## 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:

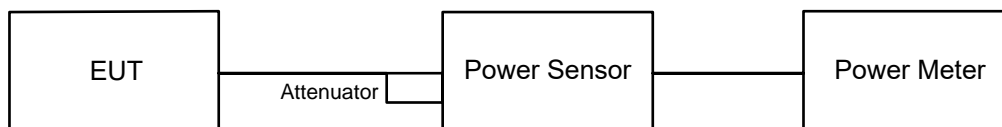
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted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

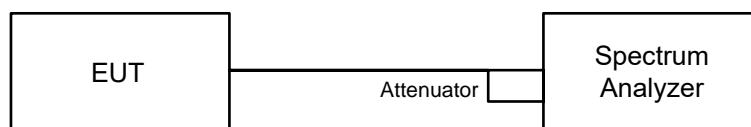
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

##### 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

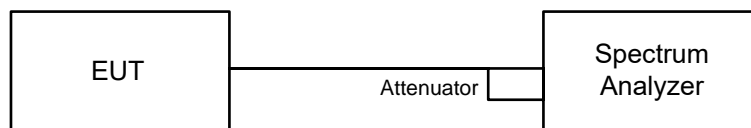


#### 6.2.2 Test Procedure

- 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

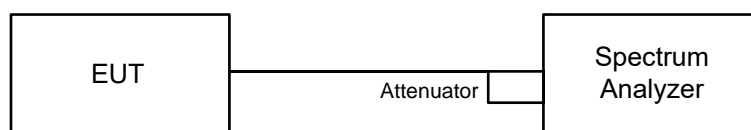


#### 6.3.2 Test Procedure

- 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

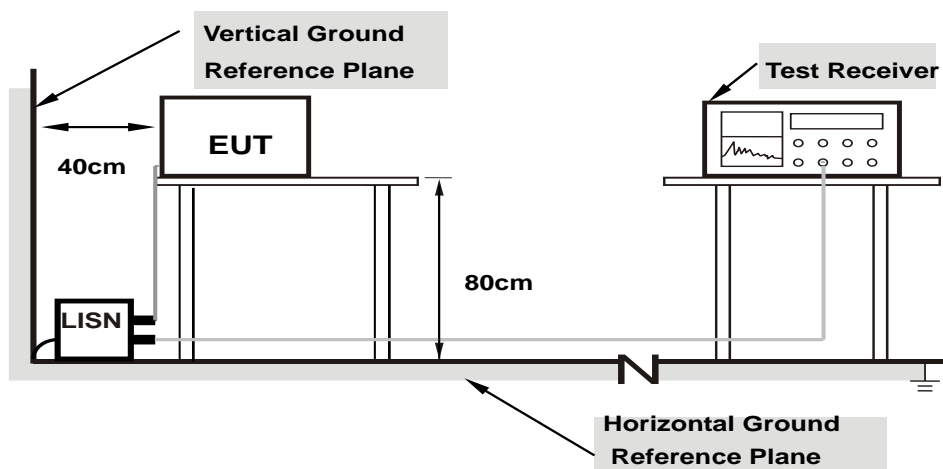
- Set the RBW = 100 kHz.
- Set the VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

##### 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

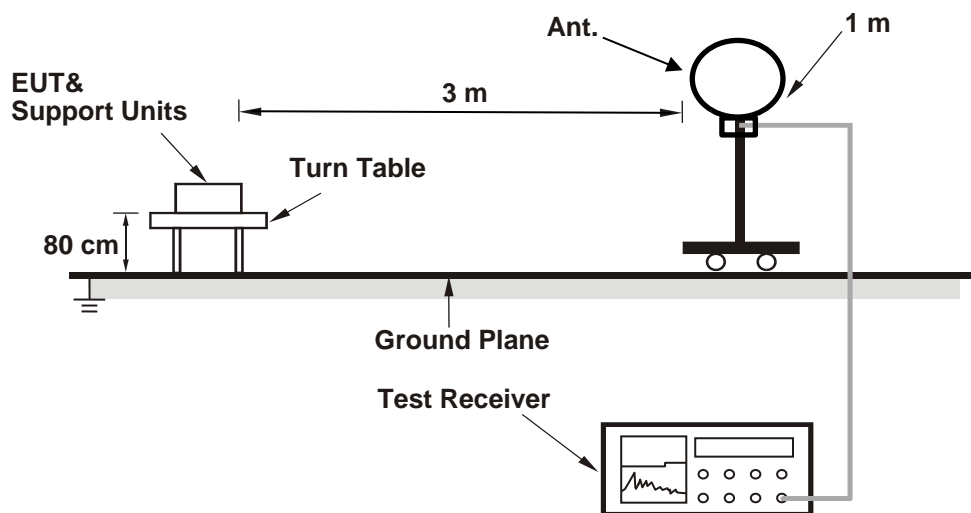
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The 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.

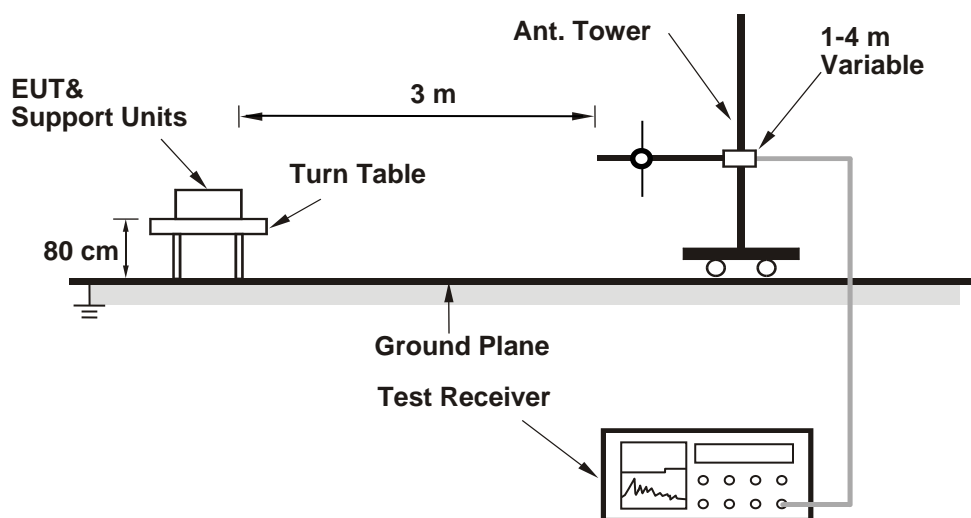
## 6.6 Unwanted Emissions below 1 GHz

### 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

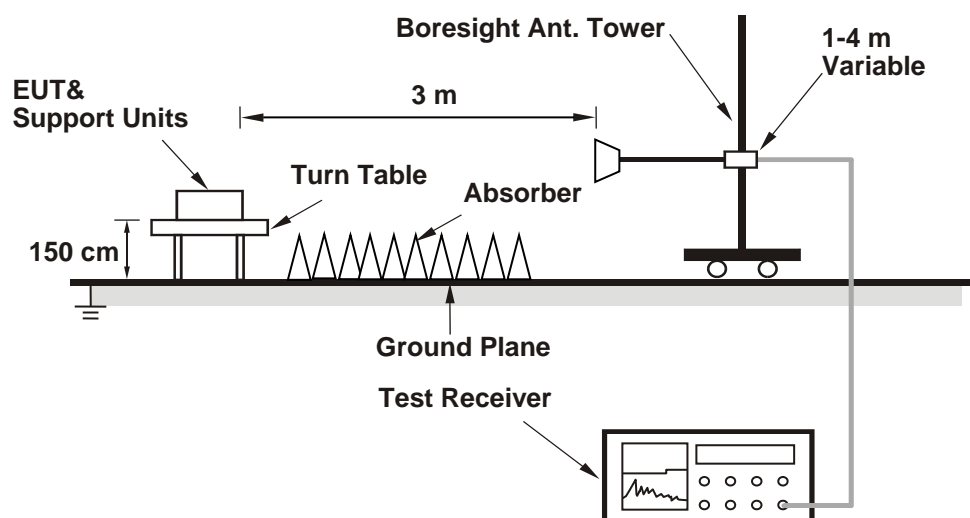
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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, 76% RH	Tested By:	Ted Chang
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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	86.497	19.37	30	Pass
6	2437	86.896	19.39	30	Pass
11	2462	87.297	19.41	30	Pass

Note: The antenna gain is 3.91 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	252.348	24.02	30	Pass
6	2437	243.22	23.86	30	Pass
11	2462	269.153	24.30	30	Pass

Note: The antenna gain is 3.91 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	212.814	23.28	30	Pass
6	2437	<b>295.121</b>	<b>24.70</b>	30	Pass
11	2462	178.238	22.51	30	Pass

Note: The antenna gain is 3.91 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	48.417	16.85
6	2437	48.195	16.83
11	2462	49.774	16.97

#### 802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	45.92	16.62
6	2437	46.666	16.69
11	2462	46.345	16.66

#### 802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	32.509	15.12
6	2437	45.29	16.56
11	2462	30.269	14.81



## 7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Ted Chang
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### 802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
Chain 0	1	2412	-3.56	8	Pass
	6	2437	-4.57	8	Pass
	11	2462	-4.68	8	Pass

Note: The antenna gain is 3.91 dBi < 6 dBi, so the power density limit shall not be reduced.

### 802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
Chain 0	1	2412	-6.5	8	Pass
	6	2437	-7.05	8	Pass
	11	2462	-6.54	8	Pass

Note: The antenna gain is 3.91 dBi < 6 dBi, so the power density limit shall not be reduced.

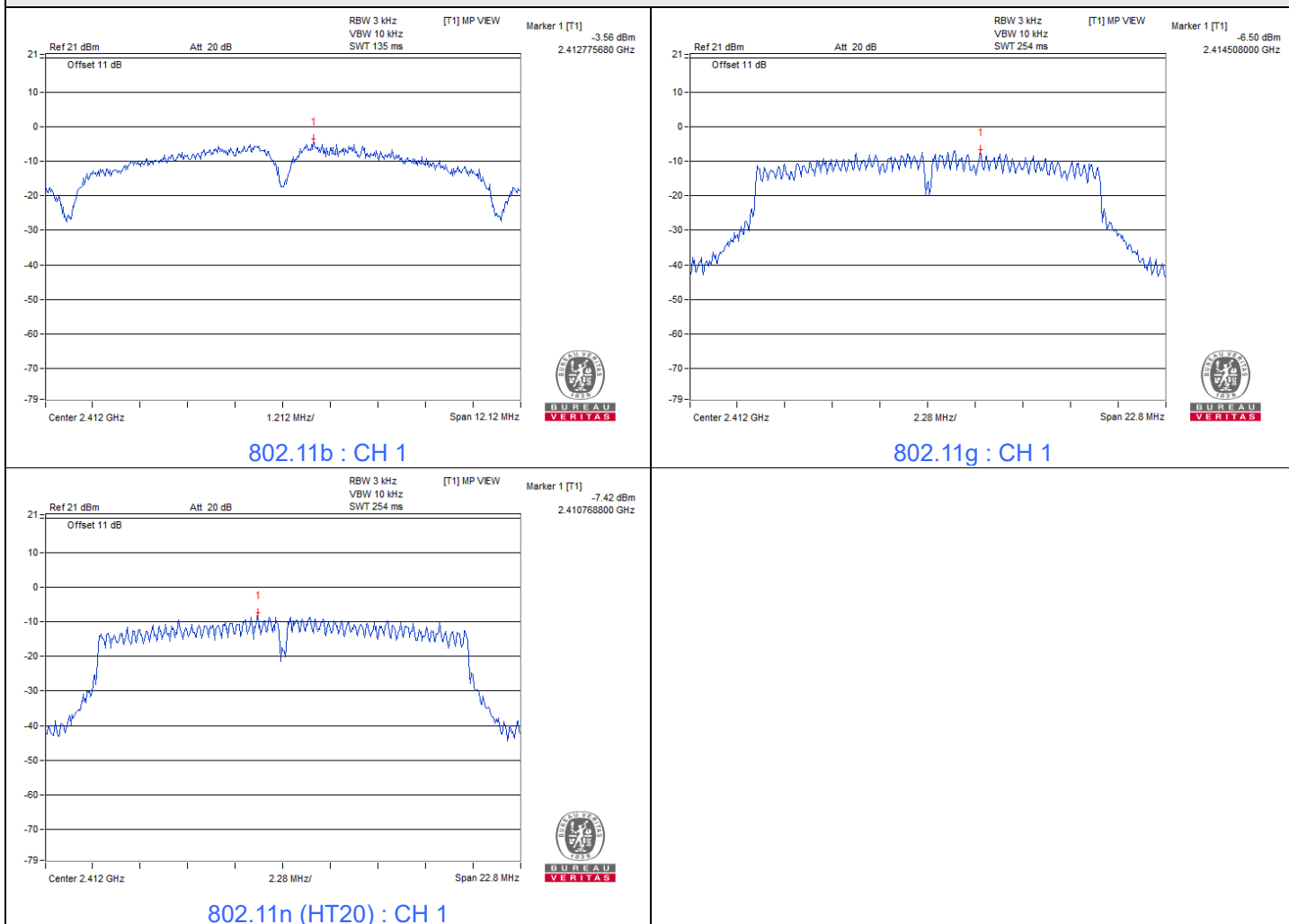
### 802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
Chain 0	1	2412	-7.42	8	Pass
	6	2437	-8.23	8	Pass
	11	2462	-8.06	8	Pass

Note: The antenna gain is 3.91 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, 76% RH	Tested By:	Ted Chang
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#### 802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	8.08	0.5	Pass
6	2437	8.1	0.5	Pass
11	2462	8.1	0.5	Pass

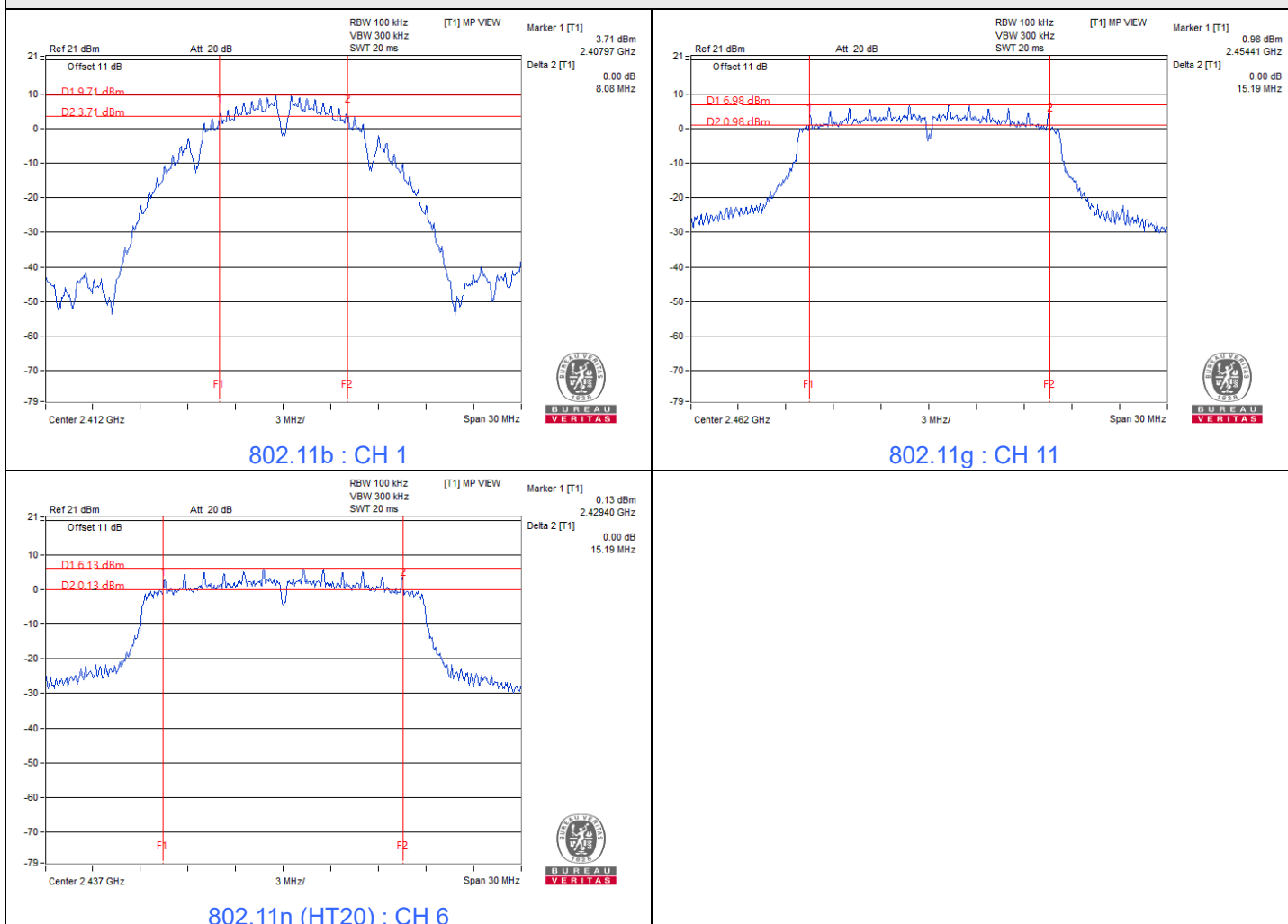
#### 802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	15.2	0.5	Pass
6	2437	15.41	0.5	Pass
11	2462	15.19	0.5	Pass

#### 802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	15.2	0.5	Pass
6	2437	15.19	0.5	Pass
11	2462	15.35	0.5	Pass

### Spectrum Plot of Minimum Value

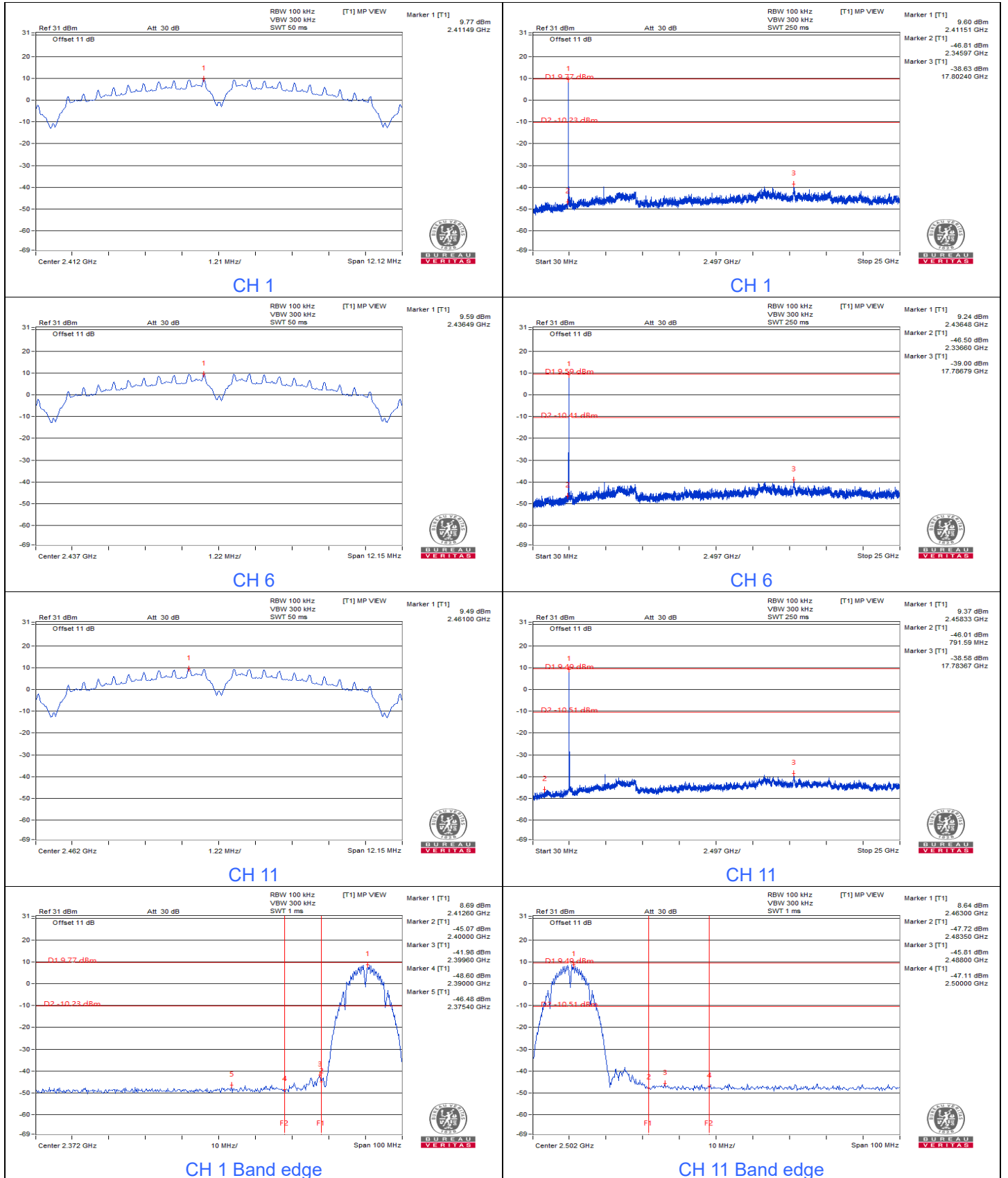




### 7.4 Conducted Out of Band Emissions

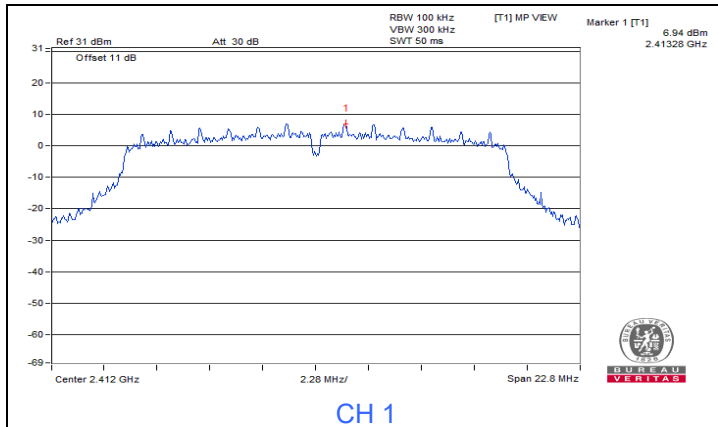
Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Ted Chang
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#### 802.11b

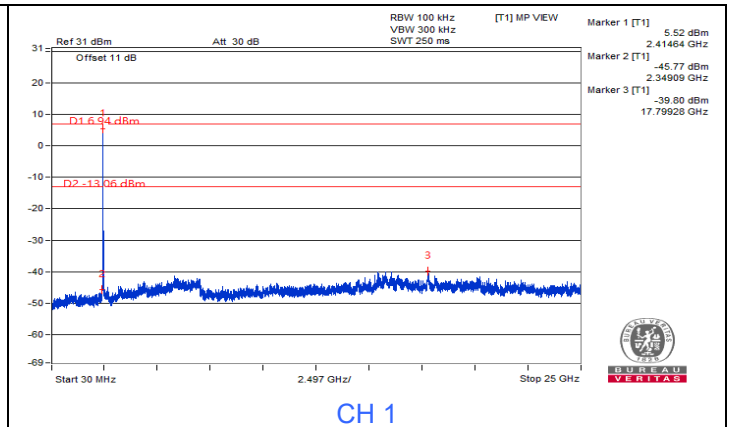




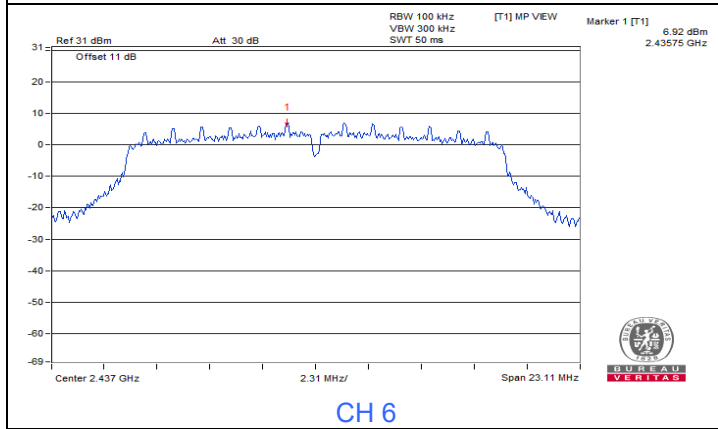
# 802.11g



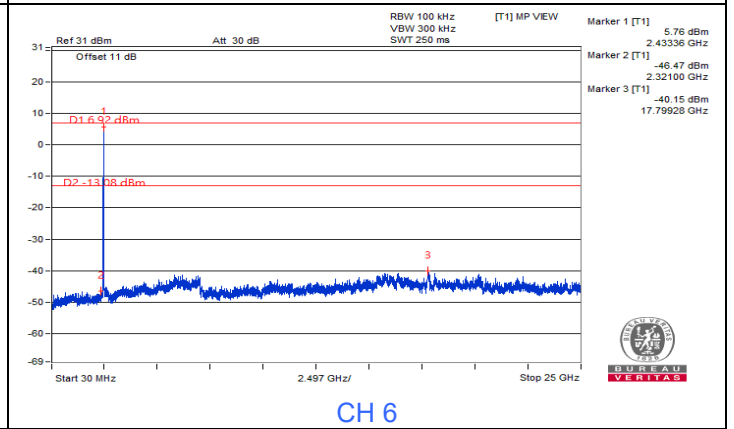
CH 1



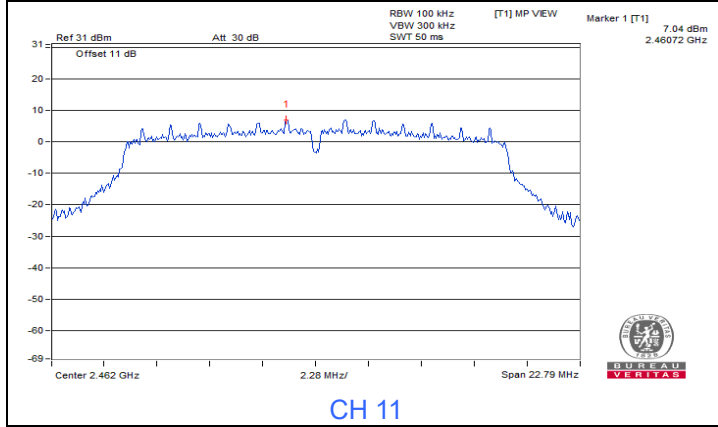
CH 1



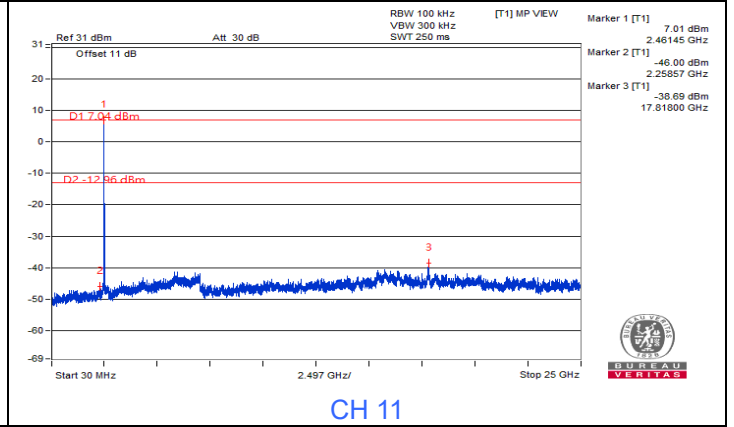
CH 6



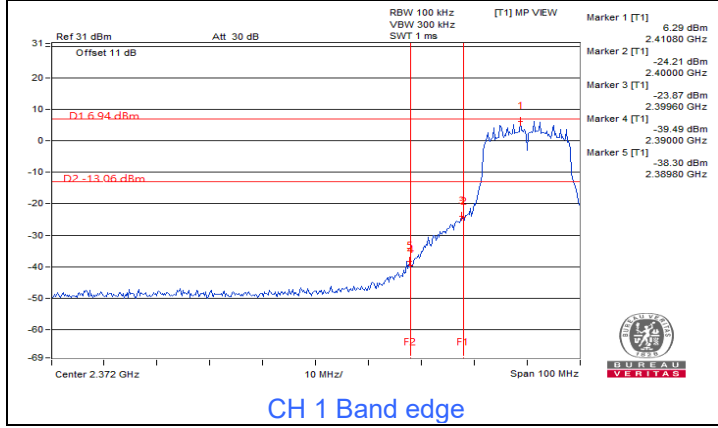
CH 6



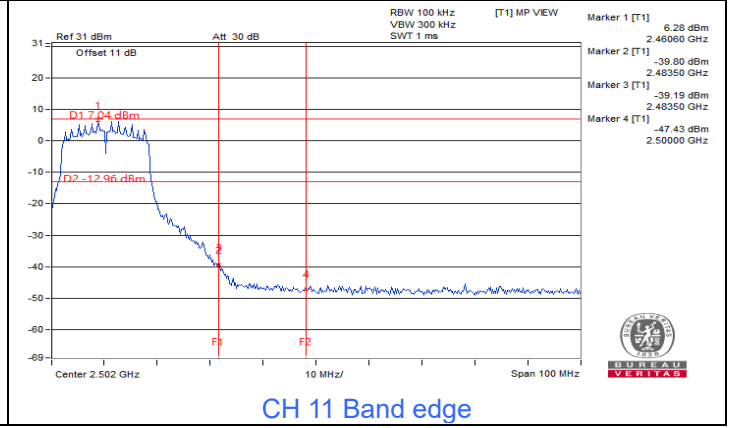
CH 11



CH 11

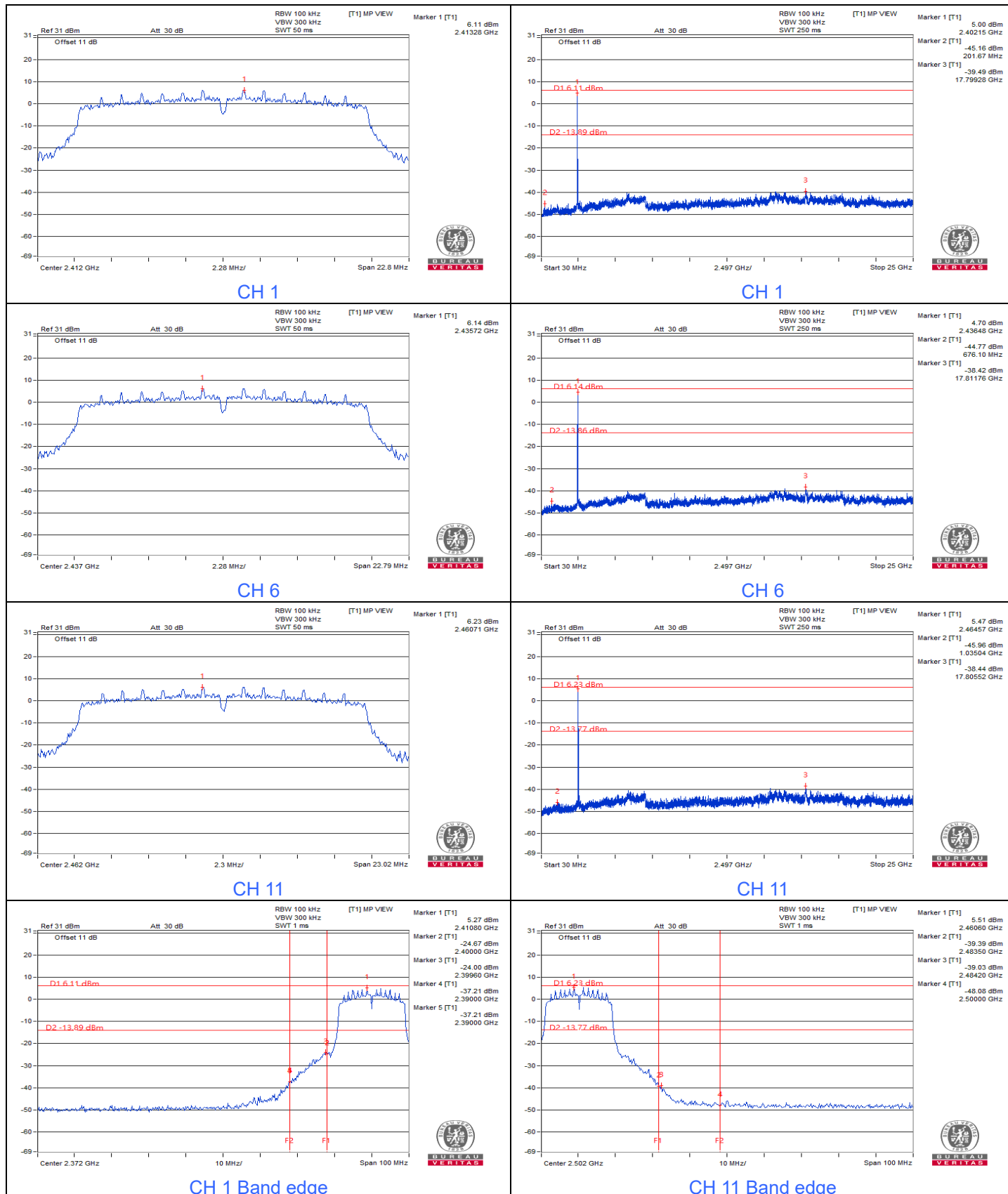


CH 1 Band edge



CH 11 Band edge

# 802.11n (HT20)



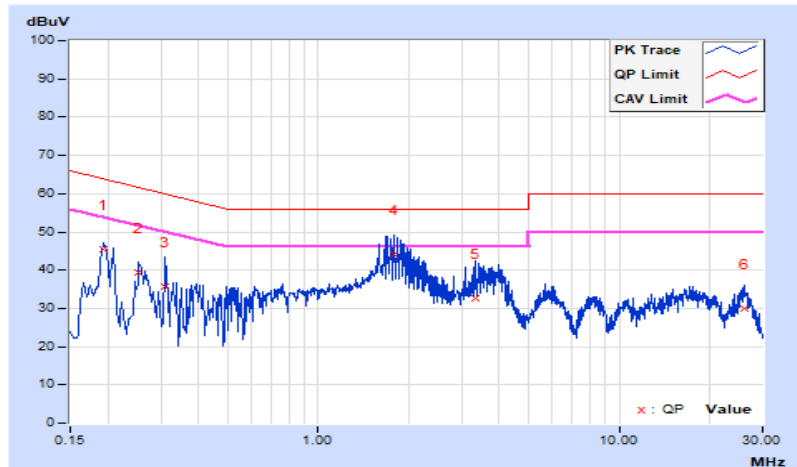
## 7.5 AC Power Conducted Emissions

RF Mode	802.11n (HT20)	Channel	CH 6 : 2437 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, 73% RH
Tested By	Greg Lin		

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	0.19400	9.64	35.89	22.64	45.53	32.28	63.86	53.86	-18.33	-21.58
2	0.25400	9.65	29.65	19.70	39.30	29.35	61.63	51.63	-22.33	-22.28
3	0.31000	9.66	26.14	14.51	35.80	24.17	59.97	49.97	-24.17	-25.80
<b>4</b>	<b>1.77800</b>	<b>9.71</b>	<b>34.40</b>	<b>19.33</b>	<b>44.11</b>	<b>29.04</b>	<b>56.00</b>	<b>46.00</b>	<b>-11.89</b>	<b>-16.96</b>
5	3.31000	9.73	23.03	13.80	32.76	23.53	56.00	46.00	-23.24	-22.47
6	26.01400	9.75	20.06	11.61	29.81	21.36	60.00	50.00	-30.19	-28.64

### 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



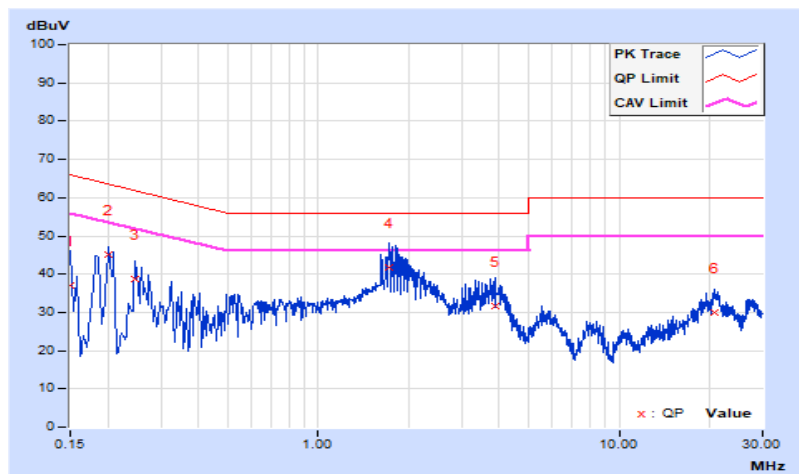


RF Mode	802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 73% RH
Tested By	Greg Lin		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.62	27.39	8.59	37.01	18.21	66.00	56.00	-28.99	-37.79
2	0.20200	9.64	35.58	20.53	45.22	30.17	63.53	53.53	-18.31	-23.36
3	0.24600	9.65	28.94	15.51	38.59	25.16	61.89	51.89	-23.30	-26.73
4	1.73000	9.71	31.91	17.43	41.62	27.14	56.00	46.00	-14.38	-18.86
5	3.88200	9.75	21.97	11.67	31.72	21.42	56.00	46.00	-24.28	-24.58
6	20.67400	9.88	20.24	13.28	30.12	23.16	60.00	50.00	-29.88	-26.84

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



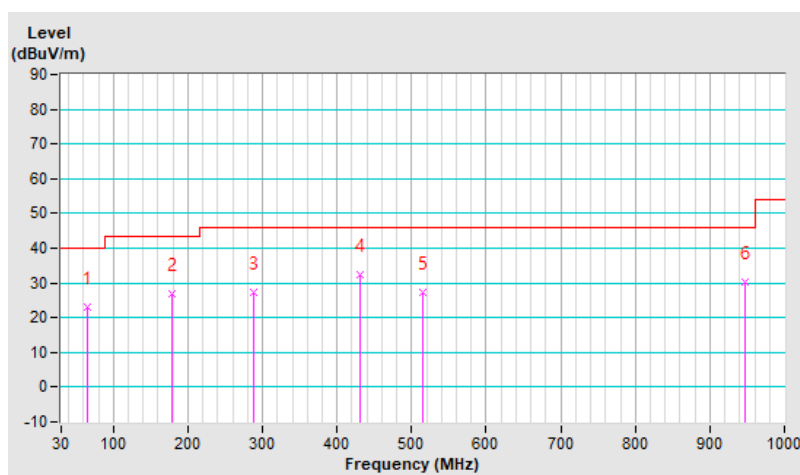
## 7.6 Unwanted Emissions below 1 GHz

RF Mode	802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 69% RH
Tested By	Greg Lin		

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	65.89	23.1 QP	40.0	-16.9	1.00 H	2	37.8	-14.7
2	179.38	26.7 QP	43.5	-16.8	1.50 H	57	41.1	-14.4
3	288.99	27.1 QP	46.0	-18.9	1.25 H	190	39.9	-12.8
4	431.58	32.5 QP	46.0	-13.5	1.00 H	2	41.6	-9.1
5	514.03	27.1 QP	46.0	-18.9	1.25 H	57	34.5	-7.4
6	946.65	30.3 QP	46.0	-15.7	1.50 H	27	30.8	-0.5

### 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.

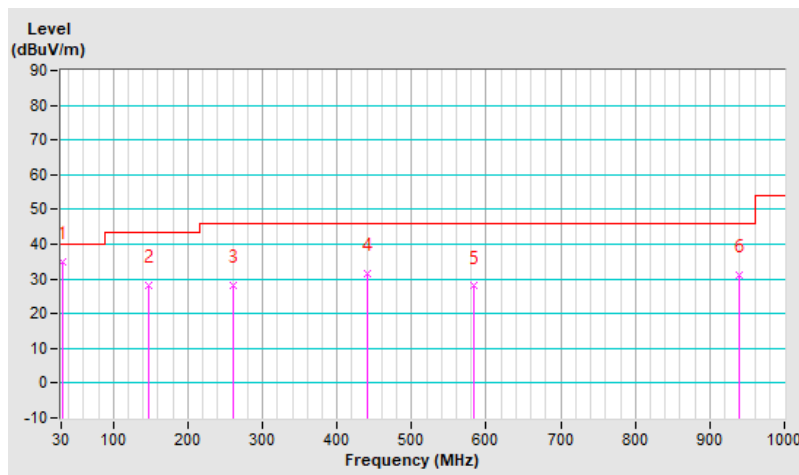


RF Mode	802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 69% RH
Tested By	Greg Lin		

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	31.94	34.8 QP	40.0	-5.2	1.25 V	348	49.1	-14.3
2	147.37	28.1 QP	43.5	-15.4	1.00 V	272	41.1	-13.0
3	259.89	28.1 QP	46.0	-17.9	1.50 V	230	42.2	-14.1
4	441.28	31.7 QP	46.0	-14.3	1.50 V	219	40.5	-8.8
5	582.90	27.9 QP	46.0	-18.1	1.00 V	26	33.8	-5.9
6	939.86	31.3 QP	46.0	-14.7	1.50 V	189	32.0	-0.7

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 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

RF Mode	802.11b	Channel	CH 1 : 2412 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	59.0 PK	74.0	-15.0	1.13 H	188	26.7	32.3
2	2390.00	47.0 AV	54.0	-7.0	1.13 H	188	14.7	32.3
3	*2412.00	105.4 PK			1.13 H	188	73.1	32.3
4	*2412.00	101.9 AV			1.13 H	188	69.6	32.3
5	4824.00	55.6 PK	74.0	-18.4	1.28 H	159	52.0	3.6
6	4824.00	51.5 AV	54.0	-2.5	1.28 H	159	47.9	3.6
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	59.4 PK	74.0	-14.6	1.00 V	71	27.1	32.3
2	2390.00	47.4 AV	54.0	-6.6	1.00 V	71	15.1	32.3
3	*2412.00	108.7 PK			1.00 V	71	76.4	32.3
4	*2412.00	105.2 AV			1.00 V	71	72.9	32.3
5	4824.00	56.3 PK	74.0	-17.7	1.06 V	113	52.7	3.6
6	4824.00	52.2 AV	54.0	-1.8	1.06 V	113	48.6	3.6

### 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.



RF Mode	802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	105.7 PK			1.13 H	192	73.4	32.3
2	*2437.00	102.1 AV			1.13 H	192	69.8	32.3
3	4874.00	56.4 PK	74.0	-17.6	1.24 H	156	52.9	3.5
4	4874.00	52.8 AV	54.0	-1.2	1.24 H	156	49.3	3.5

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	108.9 PK			1.03 V	121	76.6	32.3
2	*2437.00	105.5 AV			1.03 V	121	73.2	32.3
3	4874.00	56.6 PK	74.0	-17.4	1.01 V	118	53.1	3.5
4	4874.00	53.3 AV	54.0	-0.7	1.01 V	118	49.8	3.5

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	802.11b	Channel	CH 11 : 2462 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

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	104.9 PK			1.17 H	186	72.6	32.3
2	*2462.00	101.4 AV			1.17 H	186	69.1	32.3
3	2483.50	59.7 PK	74.0	-14.3	1.17 H	186	27.3	32.4
4	2483.50	47.3 AV	54.0	-6.7	1.17 H	186	14.9	32.4
5	4924.00	57.0 PK	74.0	-17.0	1.29 H	162	53.2	3.8
6	4924.00	53.4 AV	54.0	-0.6	1.29 H	162	49.6	3.8
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	108.1 PK			1.04 V	67	75.8	32.3
2	*2462.00	104.7 AV			1.04 V	67	72.4	32.3
3	2483.50	60.3 PK	74.0	-13.7	1.04 V	67	27.9	32.4
4	2483.50	47.7 AV	54.0	-6.3	1.04 V	67	15.3	32.4
5	4924.00	57.5 PK	74.0	-16.5	1.00 V	116	53.7	3.8
<b>6</b>	<b>4924.00</b>	<b>53.8 AV</b>	<b>54.0</b>	<b>-0.2</b>	<b>1.00 V</b>	<b>116</b>	<b>50.0</b>	<b>3.8</b>

## 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 1 : 2412 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

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	66.1 PK	74.0	-7.9	1.16 H	190	33.8	32.3
2	2390.00	49.6 AV	54.0	-4.4	1.16 H	190	17.3	32.3
3	*2412.00	106.2 PK			1.16 H	190	73.9	32.3
4	*2412.00	96.1 AV			1.16 H	190	63.8	32.3
5	4824.00	50.3 PK	74.0	-23.7	1.32 H	158	46.7	3.6
6	4824.00	36.2 AV	54.0	-17.8	1.32 H	158	32.6	3.6
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	69.0 PK	74.0	-5.0	1.01 V	64	36.7	32.3
2	2390.00	51.8 AV	54.0	-2.2	1.01 V	64	19.5	32.3
3	*2412.00	109.7 PK			1.01 V	64	77.4	32.3
4	*2412.00	99.5 AV			1.01 V	64	67.2	32.3
5	4824.00	51.0 PK	74.0	-23.0	1.06 V	114	47.4	3.6
6	4824.00	37.3 AV	54.0	-16.7	1.06 V	114	33.7	3.6

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.



RF Mode	802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	106.5 PK			1.17 H	196	74.2	32.3
2	*2437.00	96.4 AV			1.17 H	196	64.1	32.3
3	4874.00	50.3 PK	74.0	-23.7	1.39 H	161	46.8	3.5
4	4874.00	36.3 AV	54.0	-17.7	1.39 H	161	32.8	3.5
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	110.1 PK			1.06 V	114	77.8	32.3
2	*2437.00	99.9 AV			1.06 V	114	67.6	32.3
3	4874.00	51.1 PK	74.0	-22.9	1.09 V	107	47.6	3.5
4	4874.00	37.4 AV	54.0	-16.6	1.09 V	107	33.9	3.5

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, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

## Antenna Polarity &amp; Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	106.2 PK			1.17 H	185	73.9	32.3
2	*2462.00	96.0 AV			1.17 H	185	63.7	32.3
3	2483.50	67.0 PK	74.0	-7.0	1.17 H	185	34.6	32.4
4	2483.50	51.2 AV	54.0	-2.8	1.17 H	185	18.8	32.4
5	4924.00	50.2 PK	74.0	-23.8	1.28 H	149	46.4	3.8
6	4924.00	40.1 AV	54.0	-13.9	1.28 H	149	36.3	3.8

## Antenna Polarity &amp; 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	110.0 PK			1.15 V	139	77.7	32.3
2	*2462.00	99.5 AV			1.15 V	139	67.2	32.3
3	2483.50	68.6 PK	74.0	-5.4	1.15 V	139	36.2	32.4
4	2483.50	52.5 AV	54.0	-1.5	1.15 V	139	20.1	32.4
5	4924.00	51.1 PK	74.0	-22.9	1.08 V	127	47.3	3.8
6	4924.00	37.3 AV	54.0	-16.7	1.08 V	127	33.5	3.8

## 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	802.11n (HT20)	Channel	CH 1 : 2412 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

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	69.6 PK	74.0	-4.4	1.13 H	187	37.3	32.3
2	2390.00	52.0 AV	54.0	-2.0	1.13 H	187	19.7	32.3
3	*2412.00	105.8 PK			1.13 H	187	73.5	32.3
4	*2412.00	95.7 AV			1.13 H	187	63.4	32.3
5	4824.00	50.3 PK	74.0	-23.7	1.34 H	167	46.7	3.6
6	4824.00	36.1 AV	54.0	-17.9	1.34 H	167	32.5	3.6
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	71.1 PK	74.0	-2.9	1.06 V	67	38.8	32.3
2	2390.00	53.4 AV	54.0	-0.6	1.06 V	67	21.1	32.3
3	*2412.00	109.0 PK			1.06 V	67	76.7	32.3
4	*2412.00	99.0 AV			1.06 V	67	66.7	32.3
5	4824.00	51.1 PK	74.0	-22.9	1.08 V	126	47.5	3.6
6	4824.00	37.0 AV	54.0	-17.0	1.08 V	126	33.4	3.6

**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.



RF Mode	802.11n (HT20)	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	108.0 PK			1.16 H	197	75.7	32.3
2	*2437.00	97.9 AV			1.16 H	197	65.6	32.3
3	4874.00	50.3 PK	74.0	-23.7	1.38 H	171	46.8	3.5
4	4874.00	36.1 AV	54.0	-17.9	1.38 H	171	32.6	3.5

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	111.3 PK			1.05 V	113	79.0	32.3
2	*2437.00	101.2 AV			1.05 V	113	68.9	32.3
3	4874.00	51.1 PK	74.0	-22.9	1.13 V	128	47.6	3.5
4	4874.00	37.0 AV	54.0	-17.0	1.13 V	128	33.5	3.5

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	802.11n (HT20)	Channel	CH 11 : 2462 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

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	105.8 PK			1.14 H	190	73.5	32.3
2	*2462.00	95.7 AV			1.14 H	190	63.4	32.3
3	2483.50	70.7 PK	74.0	-3.3	1.14 H	190	38.3	32.4
4	2483.50	52.0 AV	54.0	-2.0	1.14 H	190	19.6	32.4
5	4924.00	50.4 PK	74.0	-23.6	1.21 H	154	46.6	3.8
6	4924.00	36.2 AV	54.0	-17.8	1.21 H	154	32.4	3.8

Antenna Polarity & Test Distance : Vertical at 3 m

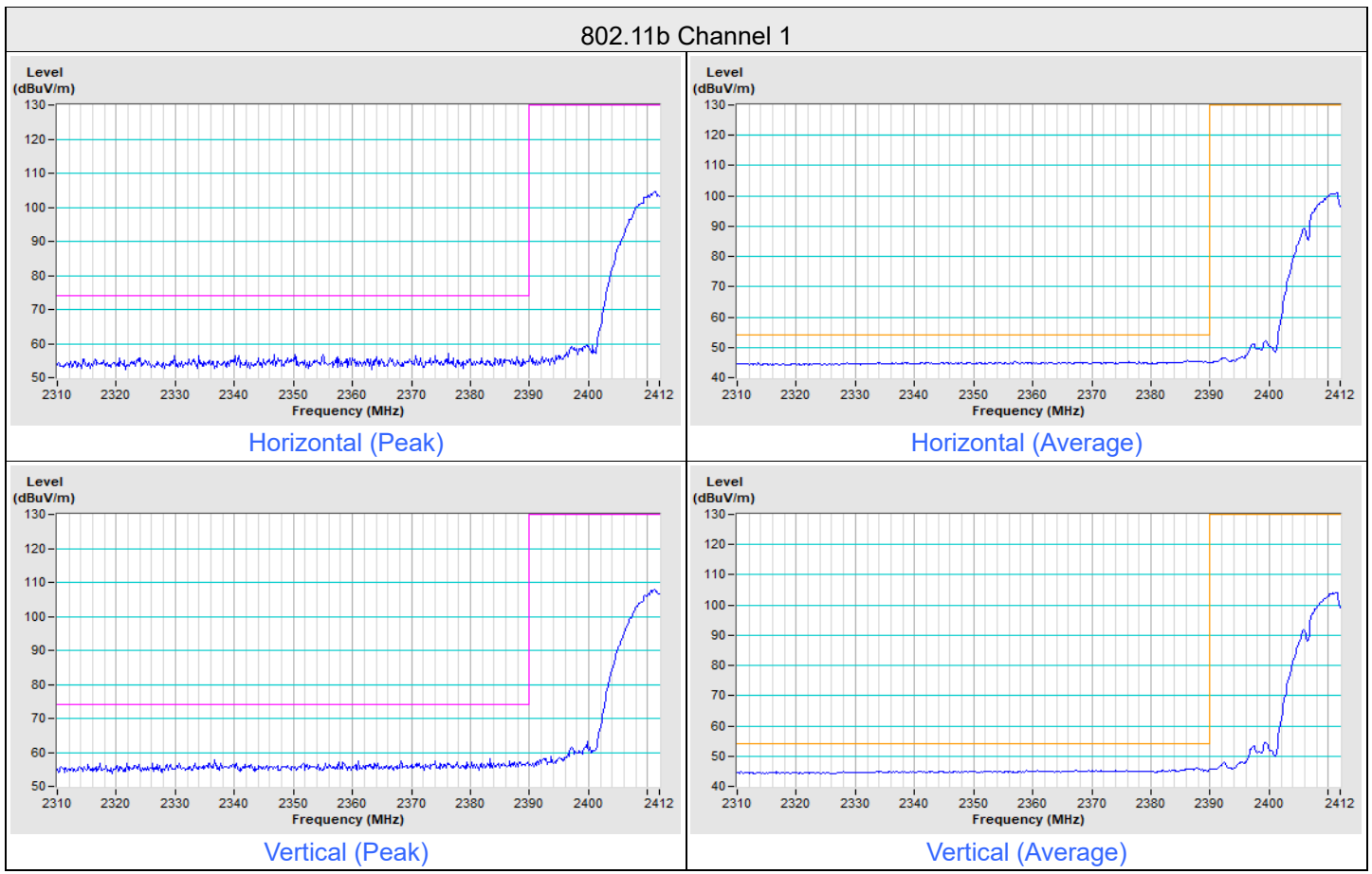
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.1 PK			1.32 V	140	76.8	32.3
2	*2462.00	99.1 AV			1.32 V	140	66.8	32.3
3	2483.50	72.0 PK	74.0	-2.0	1.32 V	140	39.6	32.4
4	2483.50	53.2 AV	54.0	-0.8	1.32 V	140	20.8	32.4
5	4924.00	51.4 PK	74.0	-22.6	1.06 V	114	47.6	3.8
6	4924.00	37.3 AV	54.0	-16.7	1.06 V	114	33.5	3.8

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.

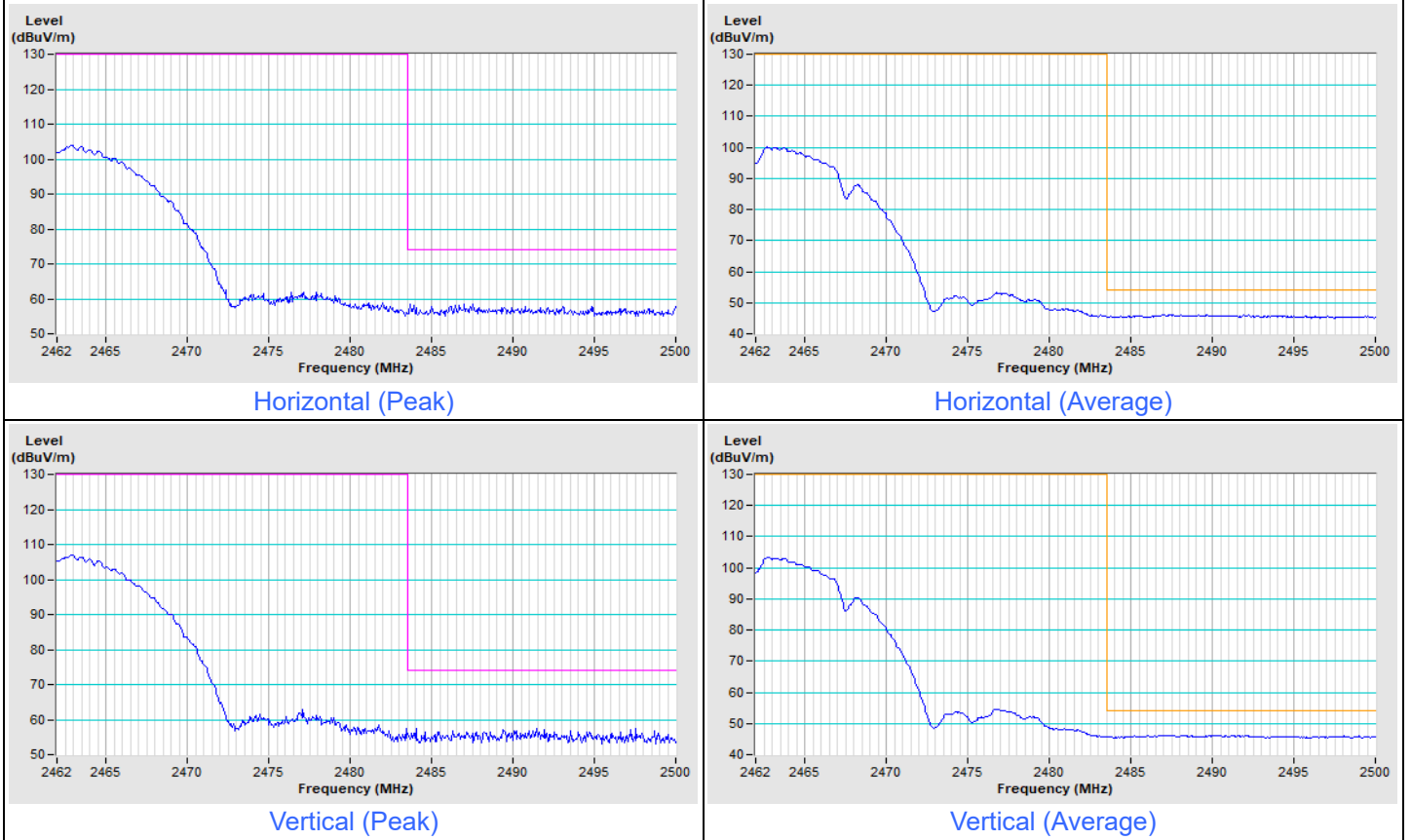
**Plot of Band Edge**

Frequency Range	2.31 GHz ~ 2.412 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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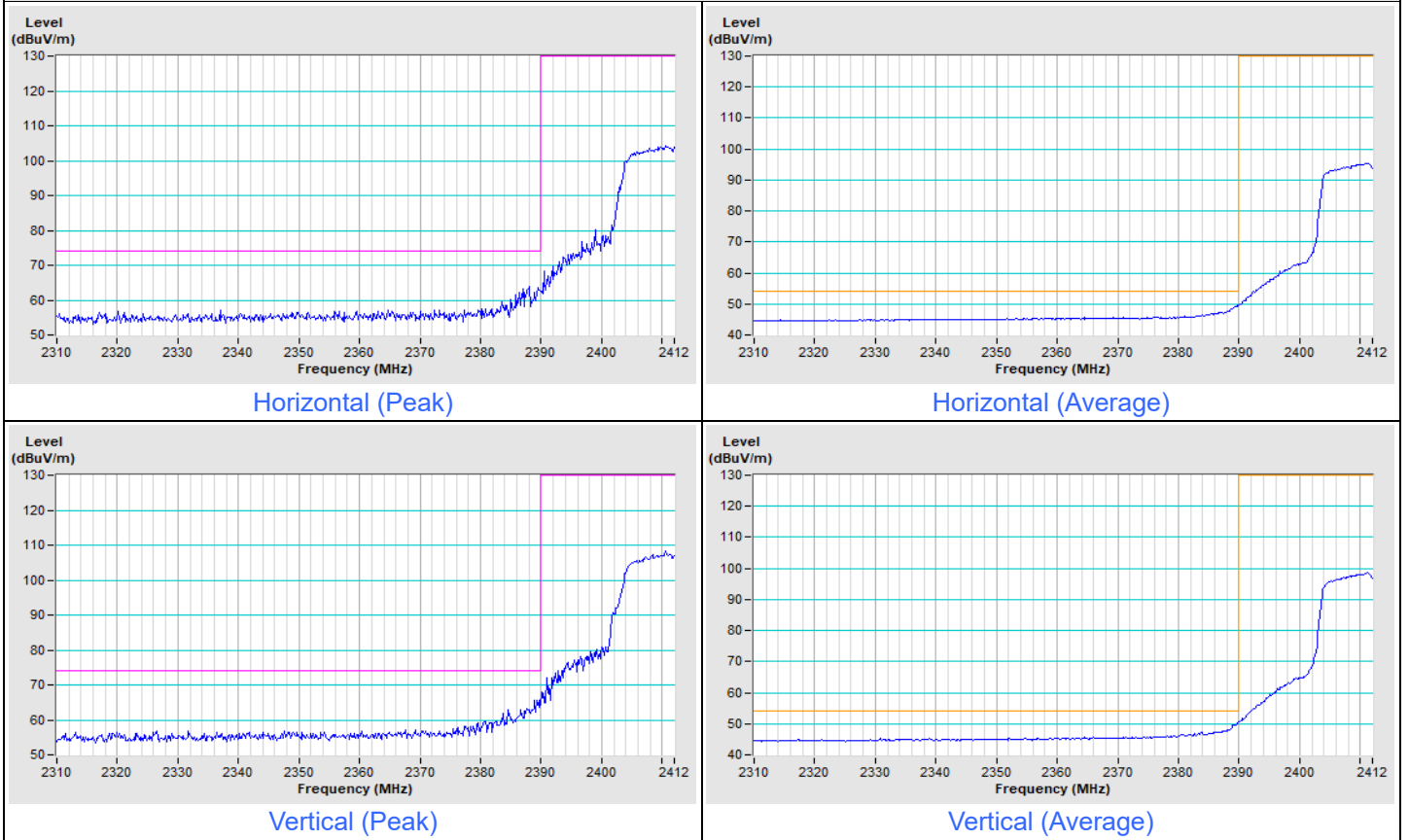
Frequency Range	2.462 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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802.11b Channel 11



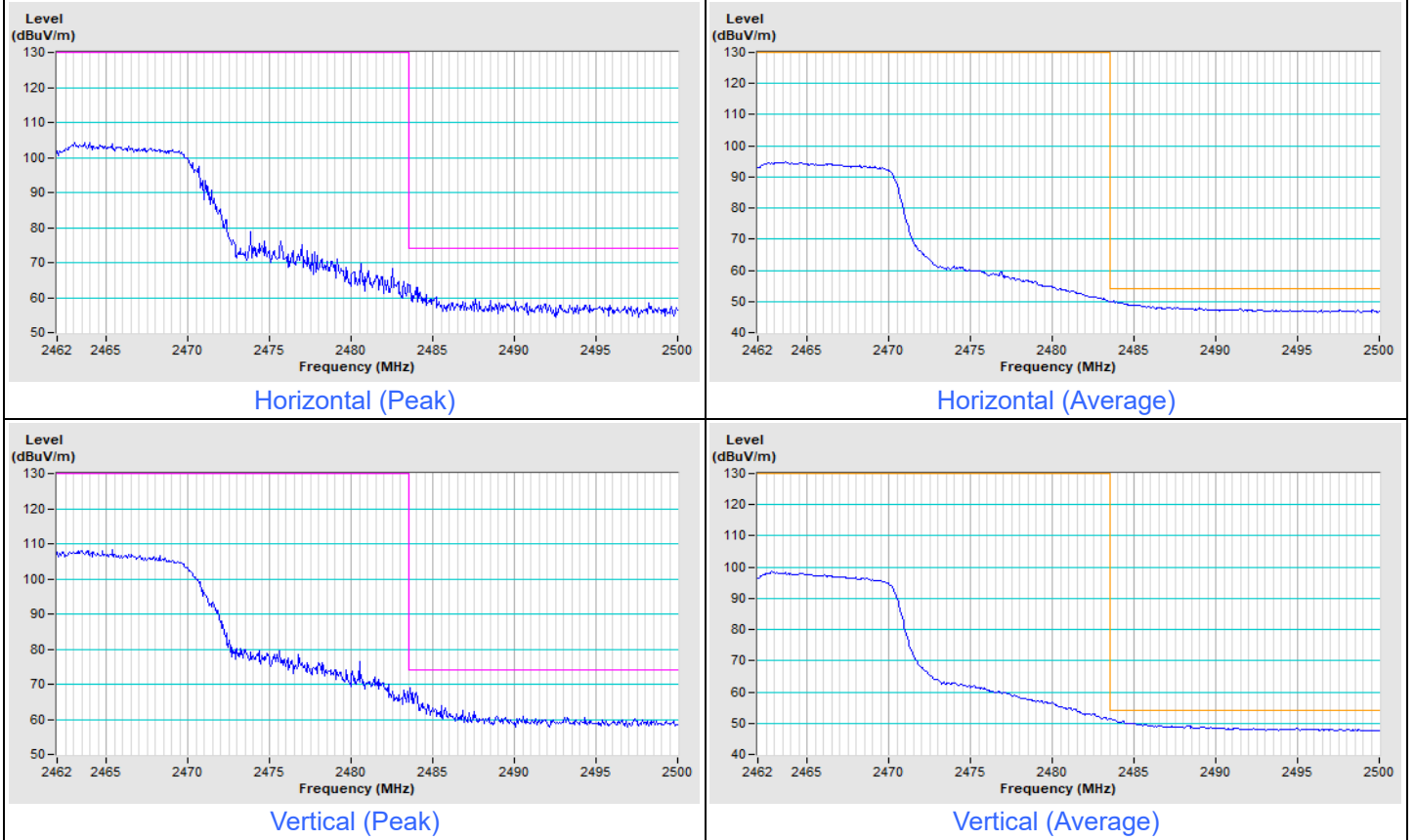
Frequency Range	2.31 GHz ~ 2.412 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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802.11g Channel 1



Frequency Range	2.462 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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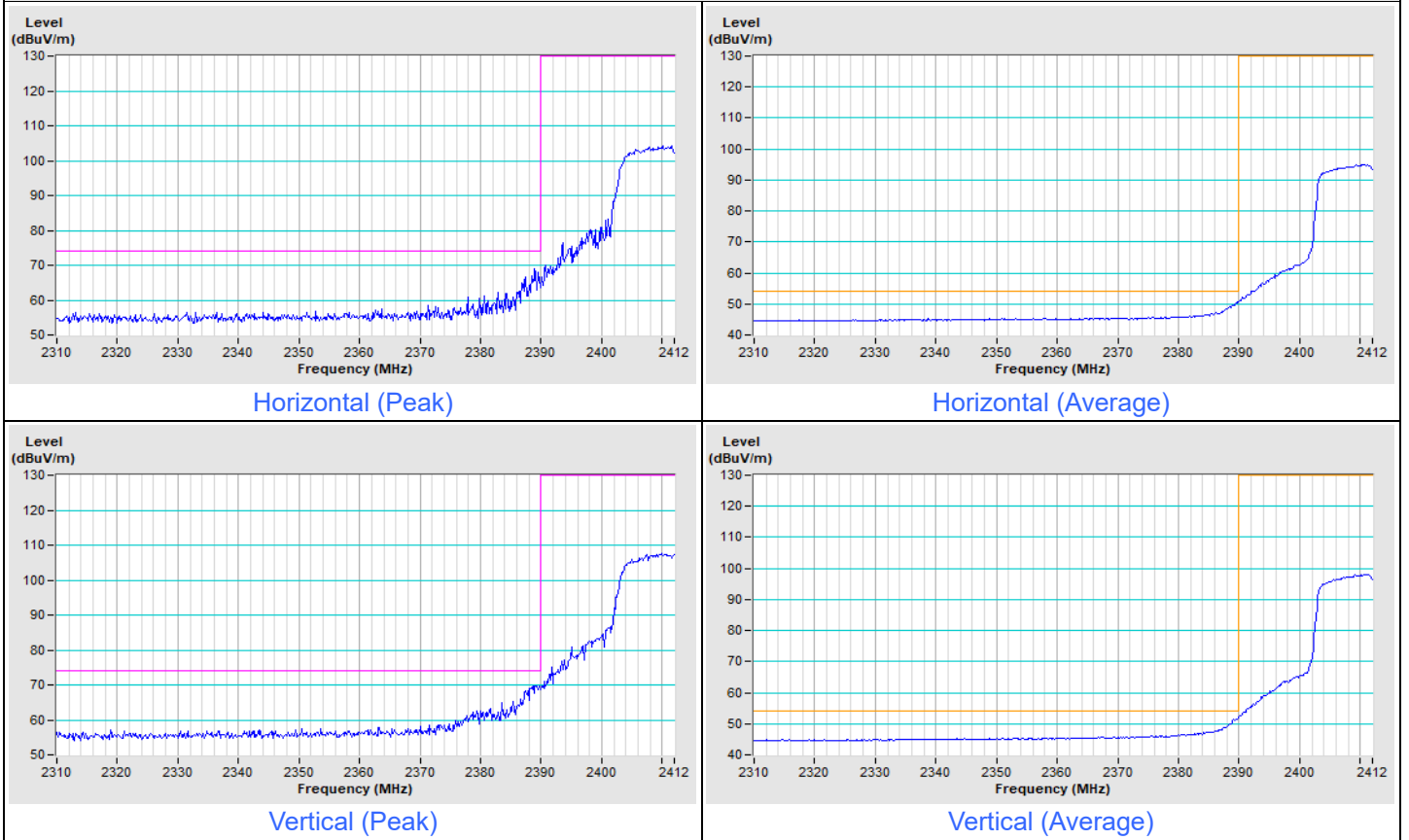
### 802.11g Channel 11





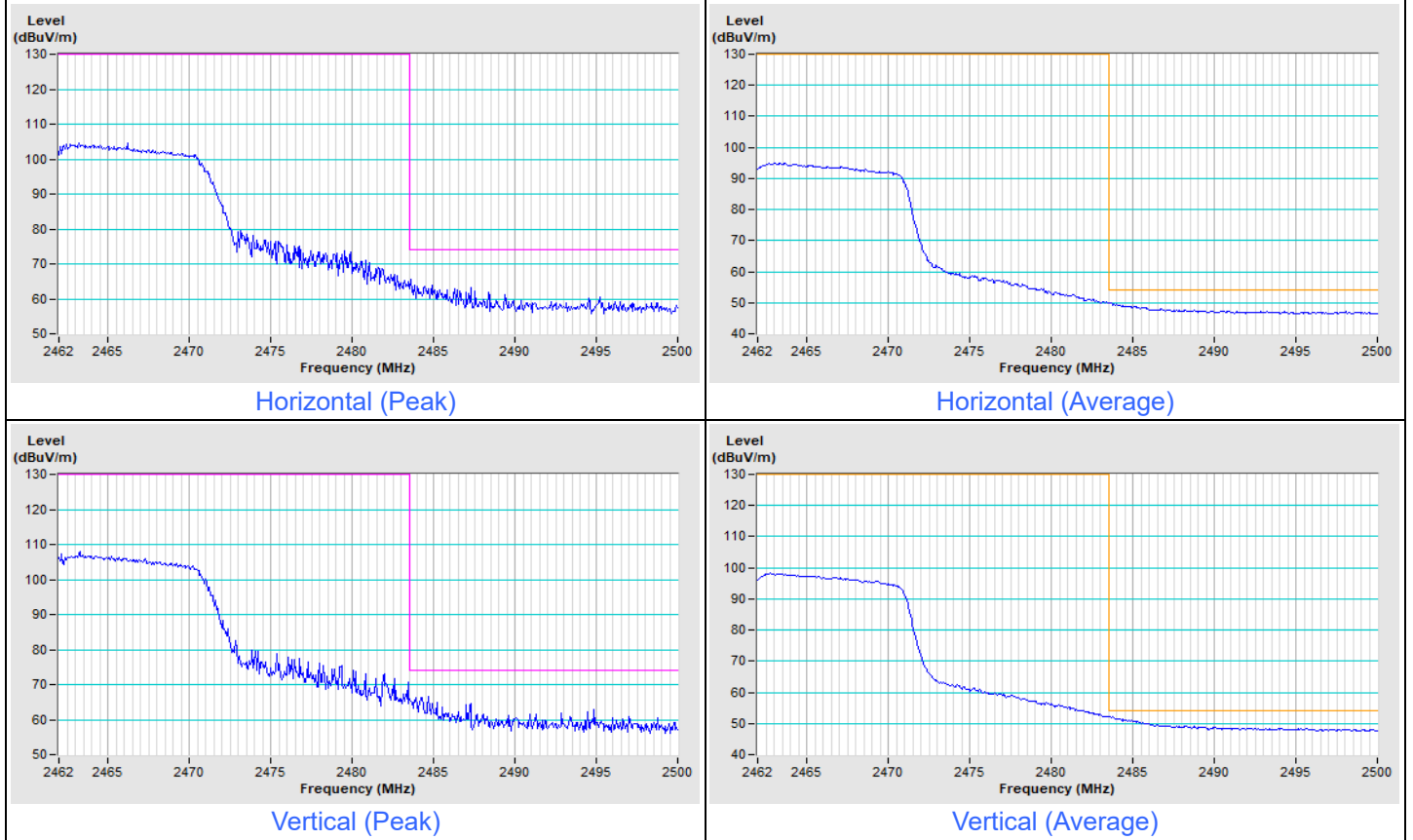
Frequency Range	2.31 GHz ~ 2.412 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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802.11n (HT20) Channel 1



Frequency Range	2.462 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
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802.11n (HT20) Channel 11



## 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.

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**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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