

TEST REPORT

CERTIFICATE OF CONFORMITY

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

Report No.: RFBEDV-WTW-P23010251

FCC ID: 2AWD3ESRMKV2C

Product: ESR-M

Brand: Aetheros (AOS)

Model No.: ESRM10V2

Received Date: 2023/1/11

Test Date: 2023/2/2 ~ 2023/3/8

Issued Date: 2023/4/19

Applicant: Aetheros Inc

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

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FCC Registration /

Designation Number(1): 788550 / TW0003

Test Location(2): No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

FCC Registration /

Designation Number(2): 281270 / TW0032

Approved by:

Jeremy Lin

, Date:

2023/4/19

Jeremy Lin / Project Engineer

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Prepared by : Pettie Chen / Senior Specialist



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Table of Contents

Release Control Record	4
1 Certificate.....	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Supplementary Information	6
3 General Information	7
3.1 General Description.....	7
3.2 Antenna Description of EUT.....	8
3.3 Channel List.....	9
3.4 Test Mode Applicability and Tested Channel Detail.....	10
3.5 Duty Cycle of Test Signal.....	11
3.6 Test Program Used and Operation Descriptions	13
3.7 Connection Diagram of EUT and Peripheral Devices	13
3.8 Configuration of Peripheral Devices and Cable Connections	13
4 Test Instruments	14
4.1 RF Output Power.....	14
4.2 Power Spectral Density	14
4.3 6 dB Bandwidth	14
4.4 Conducted Out of Band Emissions	14
4.5 AC Power Conducted Emissions	15
4.6 Unwanted Emissions below 1 GHz	15
4.7 Unwanted Emissions above 1 GHz.....	16
5 Limits of Test Items.....	17
5.1 RF Output Power.....	17
5.2 Power Spectral Density	17
5.3 6 dB Bandwidth	17
5.4 Conducted Out of Band Emissions	17
5.5 AC Power Conducted Emissions	17
5.6 Unwanted Emissions below 1 GHz	17
5.7 Unwanted Emissions above 1 GHz.....	18
6 Test Arrangements.....	19
6.1 RF Output Power.....	19
6.1.1 Test Setup	19
6.1.2 Test Procedure.....	19
6.2 Power Spectral Density	19
6.2.1 Test Setup	19
6.2.2 Test Procedure.....	19
6.3 6 dB Bandwidth	20
6.3.1 Test Setup	20
6.3.2 Test Procedure.....	20
6.4 Conducted Out of Band Emissions	20
6.4.1 Test Setup	20
6.4.2 Test Procedure.....	20
6.5 AC Power Conducted Emissions	21
6.5.1 Test Setup	21
6.5.2 Test Procedure.....	21
6.6 Unwanted Emissions below 1 GHz	22
6.6.1 Test Setup	22
6.6.2 Test Procedure.....	23
6.7 Unwanted Emissions above 1 GHz.....	24
6.7.1 Test Setup	24
6.7.2 Test Procedure.....	24
7 Test Results of Test Item	25

7.1	RF Output Power.....	25
7.2	Power Spectral Density	26
7.3	6 dB Bandwidth	28
7.4	Conducted Out of Band Emissions	30
7.5	AC Power Conducted Emissions	34
7.6	Unwanted Emissions below 1 GHz	36
7.7	Unwanted Emissions above 1 GHz.....	38
8	Pictures of Test Arrangements	54
9	Information of the Testing Laboratories	55

Release Control Record

Issue No.	Description	Date Issued
RFBEDV-WTW-P23010251	Original release.	2023/4/19

1 Certificate

Product: ESR-M

Brand: Aetheros (AOS)

Test Model: ESRM10V2

Sample Status: Engineering sample

Applicant: Aetheros Inc

Test Date: 2023/2/2 ~ 2023/3/8

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 -19.93 dB at 0.46446 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -8.8 dB at 39.70 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -0.4 dB at 2483.50 MHz
15.203	Antenna Requirement	Pass	Antenna connector is MMCX 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	2.99 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	ESR-M
Brand	Aetheros (AOS)
Test Model	ESRM10V2
Status of EUT	Engineering sample
Power Supply Rating	108-132Vac
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	Up to 150Mbps
Operating Frequency	2.412 GHz ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 9
Output Power	187.932 mW (22.74 dBm)

Note: 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
2400~2483.5 MHz		
3.47	Dipole	MMCX

* 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
802.11n (HT40)	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		

7 channels are provided for 802.11n (HT40):

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

3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis / Y-axis / Z-axis. Pre-scan in these ways and find the worst case as a representative test condition.
Worst Case:	Worst Condition: Z-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
	802.11n (HT40)	3, 6, 9	BPSK	MCS0
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
	802.11n (HT40)	3, 6, 9	BPSK	MCS0
6 dB Bandwidth	802.11b	1, 6, 11	DBPSK	1Mb/s
	802.11g	1, 6, 11	BPSK	6Mb/s
	802.11n (HT20)	1, 6, 11	BPSK	MCS0
	802.11n (HT40)	3, 6, 9	BPSK	MCS0
Conducted Out of Band Emissions	802.11b	1, 6, 11	DBPSK	1Mb/s
	802.11g	1, 6, 11	BPSK	6Mb/s
	802.11n (HT20)	1, 6, 11	BPSK	MCS0
	802.11n (HT40)	3, 6, 9	BPSK	MCS0
AC Power Conducted Emissions	802.11g	6	BPSK	6Mb/s
Unwanted Emissions below 1 GHz	802.11g	6	BPSK	6Mb/s
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
	802.11n (HT40)	3, 6, 9	BPSK	MCS0

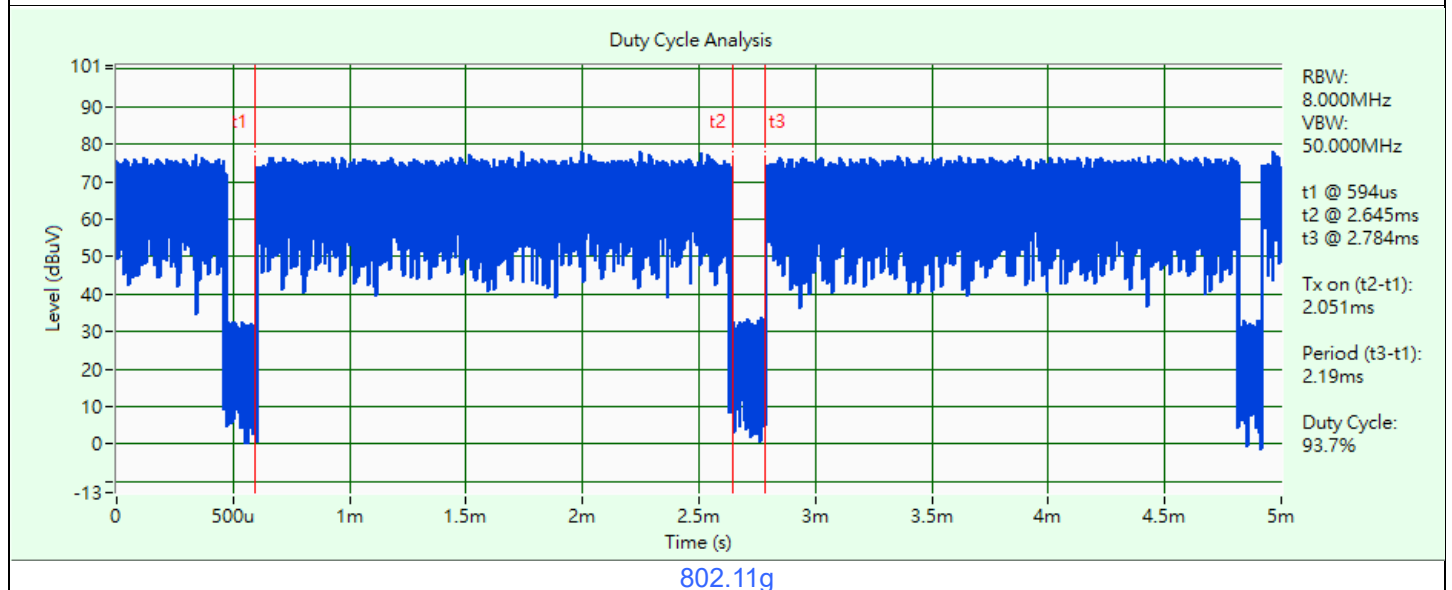
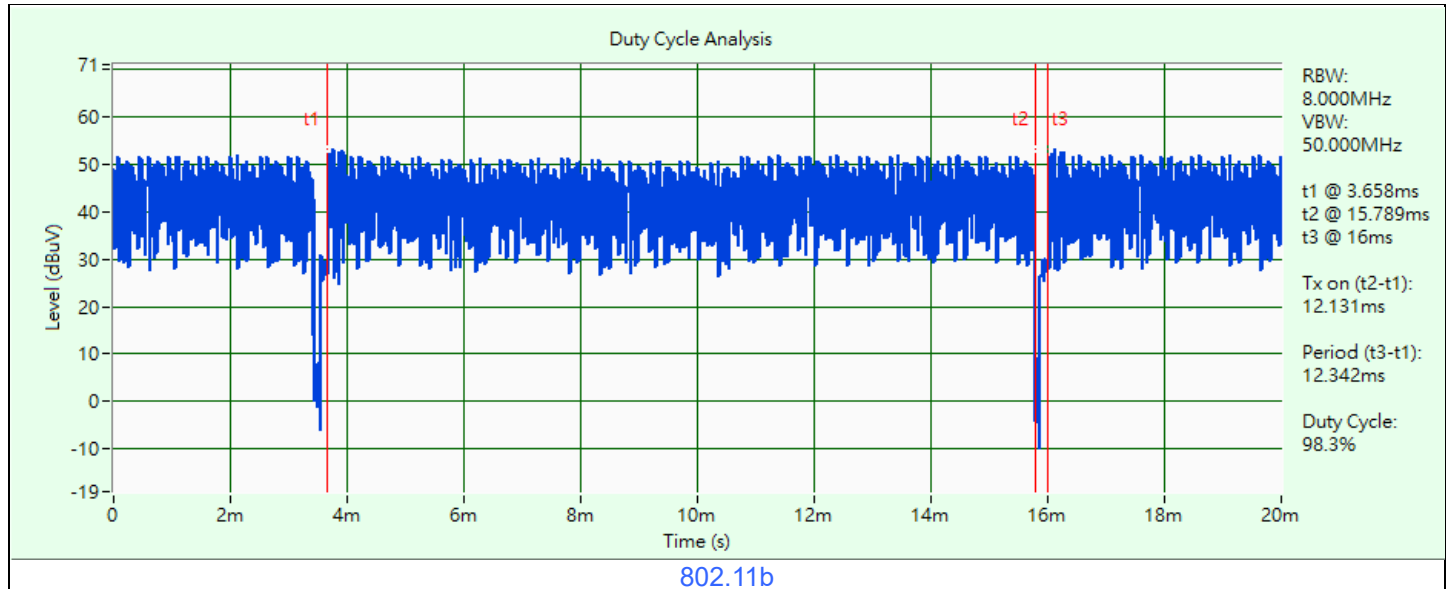
3.5 Duty Cycle of Test Signal

802.11b: Duty cycle = 12.131 ms / 12.342 ms x 100% = 98.3%

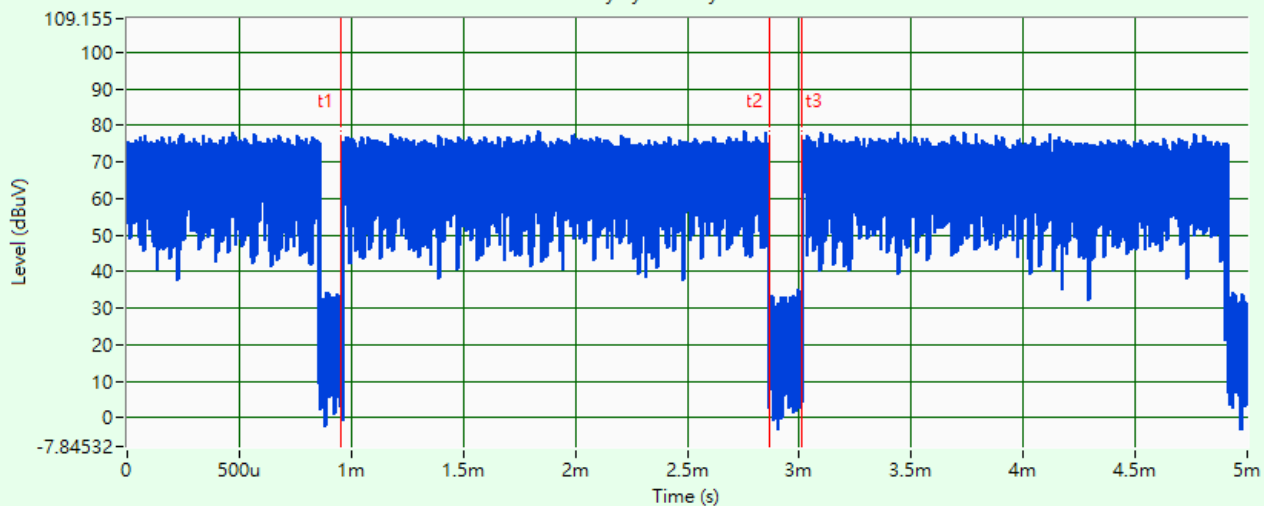
802.11g: Duty cycle = 2.051 ms / 2.19 ms x 100% = 93.7%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.28 \text{ dB}$

802.11n (HT20): Duty cycle = 1.914 ms / 2.058 ms x 100% = 93.0%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.32 \text{ dB}$

802.11n (HT40): Duty cycle = 0.934 ms / 1.057 ms x 100% = 88.4%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.54 \text{ dB}$

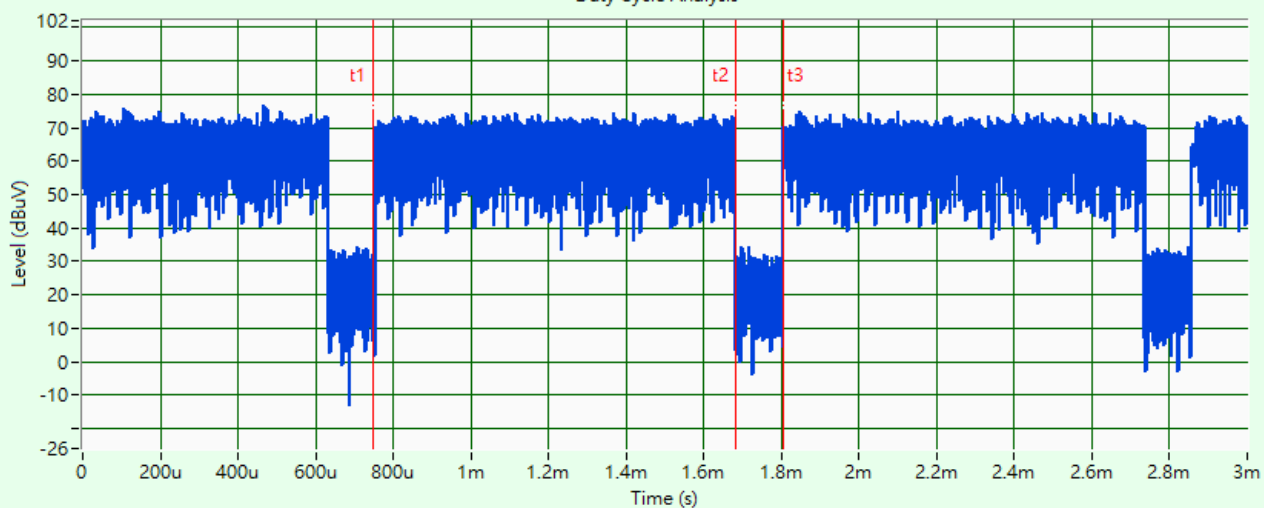


Duty Cycle Analysis



802.11n (HT20)

Duty Cycle Analysis

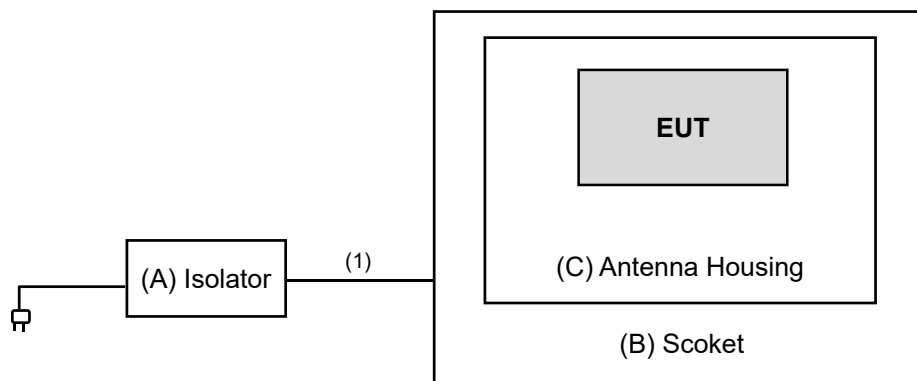


802.11n (HT40)

3.6 Test Program Used and Operation Descriptions

Controlling software (QRCT4 version 4.0.209.0) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Isolator	NA	NA	NA	NA	Supplied by applicant
B	Socket	NA	NA	NA	NA	Supplied by applicant
C	Antenna Housing	Aclara	kV2c	NA	NA	Supplied by applicant

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	AC Cable	1	1.5	No	0	Supplied by applicant

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/M Y55190007/MY55210005	2022/7/13	2023/7/12

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/2/23

4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	100980	2022/4/20	2023/4/19

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/2/23

4.3 6 dB Bandwidth

Refer to section 4.2 to get information of the instruments.

4.4 Conducted Out of Band Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	100979	2022/3/25	2023/3/24

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/2/23

4.5 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
LISN R&S	ESH3-Z5	100311	2022/9/12	2023/9/11
LISN ROHDE & SCHWARZ	ENV216	101826	2022/3/14	2023/3/13
RF Coaxial Cable WOKEN	5D-FB	Cable-cond1-01	2023/1/7	2024/1/6
Software BVADT	BVADT_Conf_ V7.3.7.4	N/A	N/A	N/A
Test Receiver Rohde&Schwarz	ESCI	100613	2022/12/5	2023/12/4
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2022/8/31	2023/8/30

Notes:

1. The test was performed in HY - Conduction 1.
2. Tested Date: 2023/2/7

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 Broadband Antenna Schwarzbeck	VULB9168	9168-1213	2022/10/20	2023/10/19
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
Pre_Amplifier EMCI	EMC330N	980782	2023/1/16	2024/1/15
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
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Test Receiver R&S	ESR3+	102782	2022/12/12	2023/12/11
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: 2023/3/8

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
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
Pre_Amplifier 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
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Test Receiver R&S	ESR3+	102782	2022/12/12	2023/12/11
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: 2023/2/2 ~ 2023/2/3

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

5.5 AC Power Conducted Emissions

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

Notes:

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

5.6 Unwanted Emissions below 1 GHz

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

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

Notes:

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

5.7 Unwanted Emissions above 1 GHz

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

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

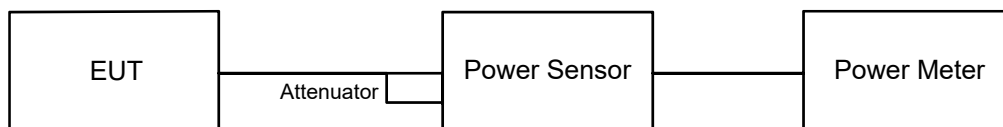
Notes:

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

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



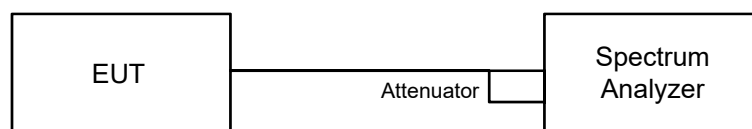
6.1.2 Test Procedure

Average Power:

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

6.2 Power Spectral Density

6.2.1 Test Setup

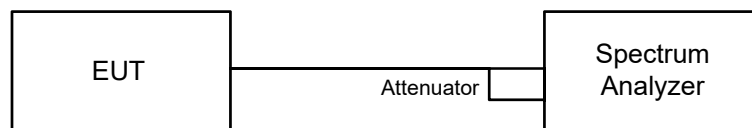


6.2.2 Test Procedure

- a. Measure the duty cycle (x).
- b. Set instrument center frequency to DTS channel center frequency.
- c. Set span to at least 1.5 times the OBW.
- d. Set RBW to: 3 kHz.
- e. Set VBW $\geq 3 \times$ RBW.
- f. Detector = power averaging (RMS) or sample detector (when RMS not available).
- g. Ensure that the number of measurement points in the sweep $\geq 2 \times$ span/RBW.
- h. Sweep time = auto couple.
- i. Do not use sweep triggering. Allow sweep to "free run".
- j. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k. Use the peak marker function to determine the maximum amplitude level.
- l. Note: If Duty cycle < 98%, Add $10 \log (1/x)$, where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

6.3 6 dB Bandwidth

6.3.1 Test Setup

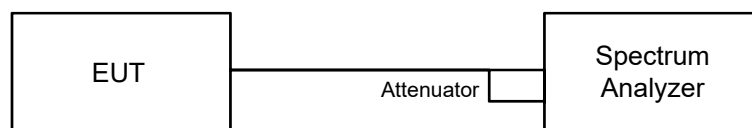


6.3.2 Test Procedure

- 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

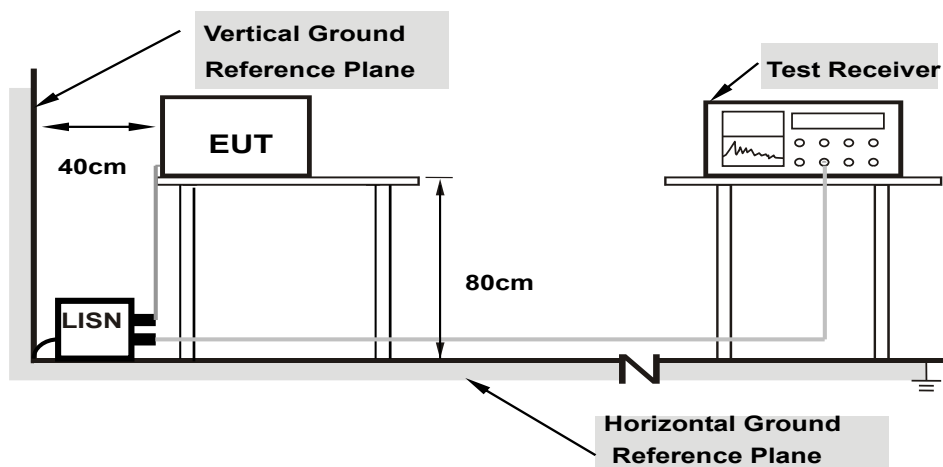
- Set the RBW = 100 kHz.
- Set the VBW ≥ 300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

- Set RBW = 100 kHz.
- Set VBW ≥ 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

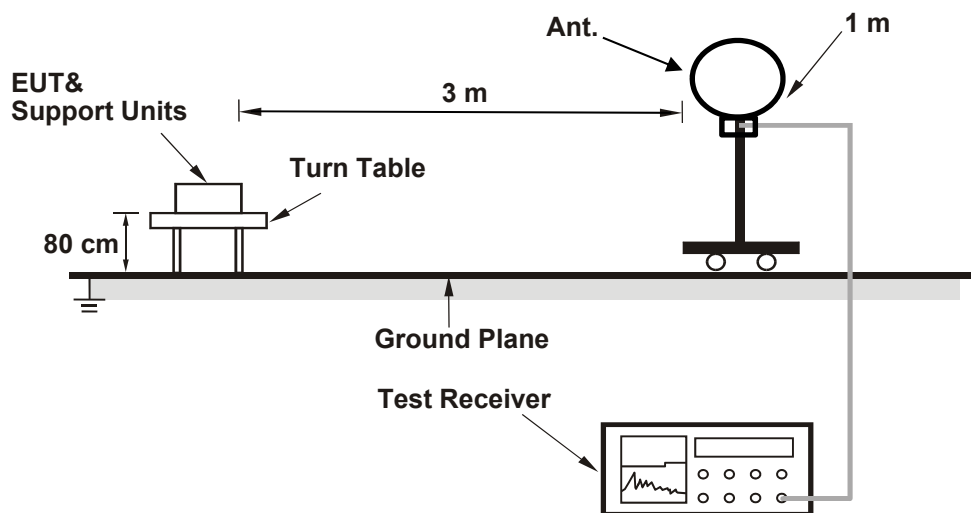
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The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

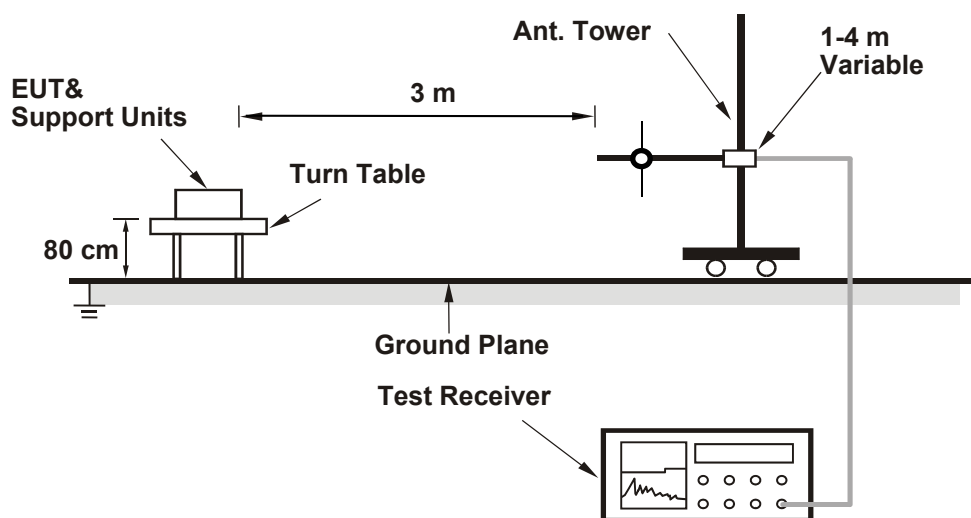
6.6 Unwanted Emissions below 1 GHz

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

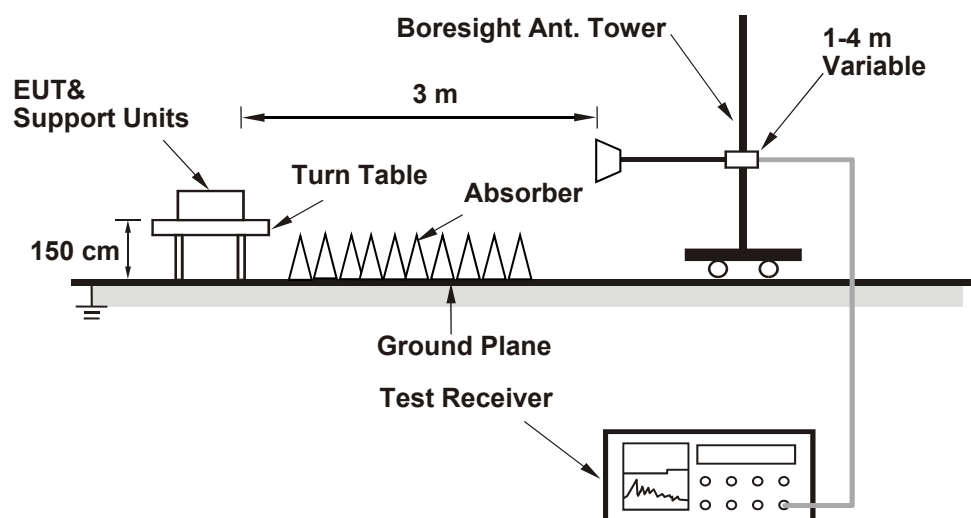
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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:	23°C, 64% RH	Tested By:	Matthew Yang
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802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	55.463	17.44	30	Pass
6	2437	51.05	17.08	30	Pass
11	2462	43.954	16.43	30	Pass

Note: The antenna gain is 3.47 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	54.2	17.34	30	Pass
6	2437	187.932	22.74	30	Pass
11	2462	30.479	14.84	30	Pass

Note: The antenna gain is 3.47 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	53.456	17.28	30	Pass
6	2437	167.494	22.24	30	Pass
11	2462	31.55	14.99	30	Pass

Note: The antenna gain is 3.47 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
3	2422	31.046	14.92	30	Pass
6	2437	38.815	15.89	30	Pass
9	2452	16.904	12.28	30	Pass

Note: The antenna gain is 3.47 dBi < 6 dBi, so the output power limit shall not be reduced.

7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	23°C, 64% RH	Tested By:	Matthew Yang
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802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2412	-12.84	8	Pass
6	2437	-13.30	8	Pass
11	2462	-13.81	8	Pass

Note: The antenna gain is 3.47 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)	Duty Factor (dB)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2412	-11.2	0.28	-10.92	8	Pass
6	2437	-7.9	0.28	-7.61	8	Pass
11	2462	-11.36	0.28	-11.08	8	Pass

Note: The antenna gain is 3.47 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)	Duty Factor (dB)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
1	2412	-10.52	0.32	-10.20	8	Pass
6	2437	-8.58	0.32	-8.27	8	Pass
11	2462	-17.62	0.32	-17.30	8	Pass

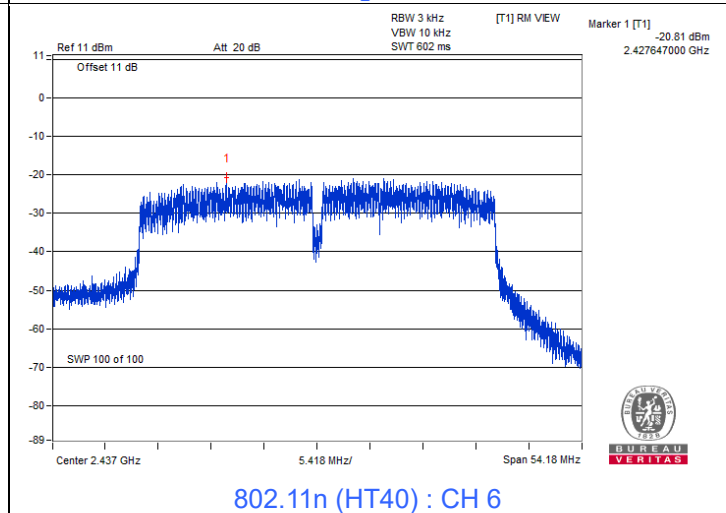
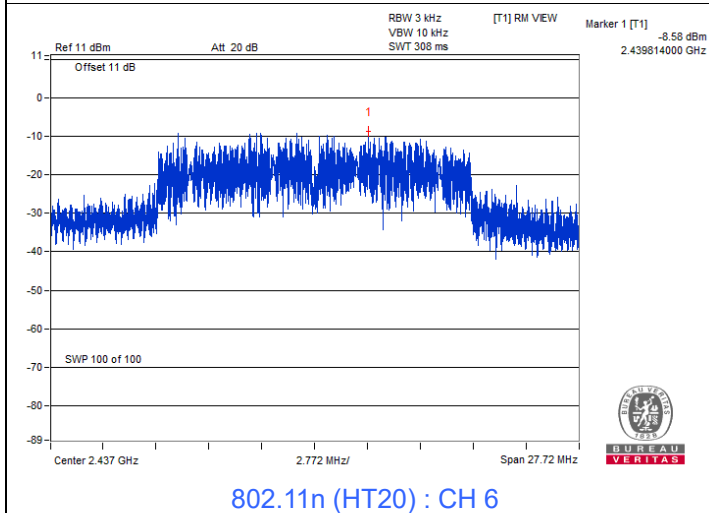
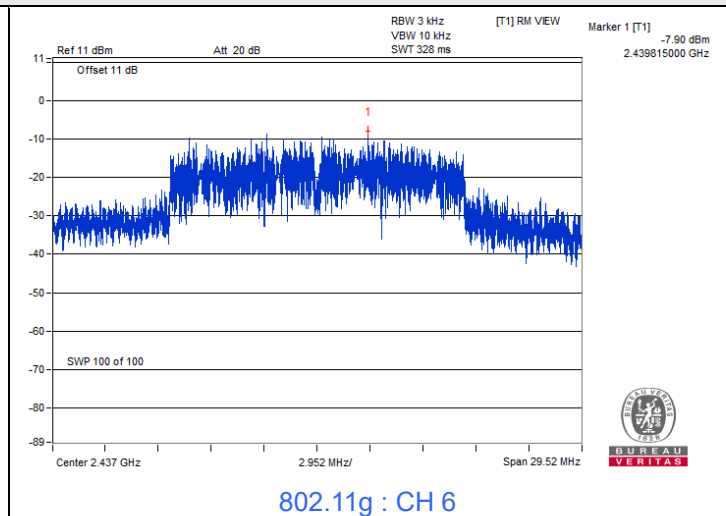
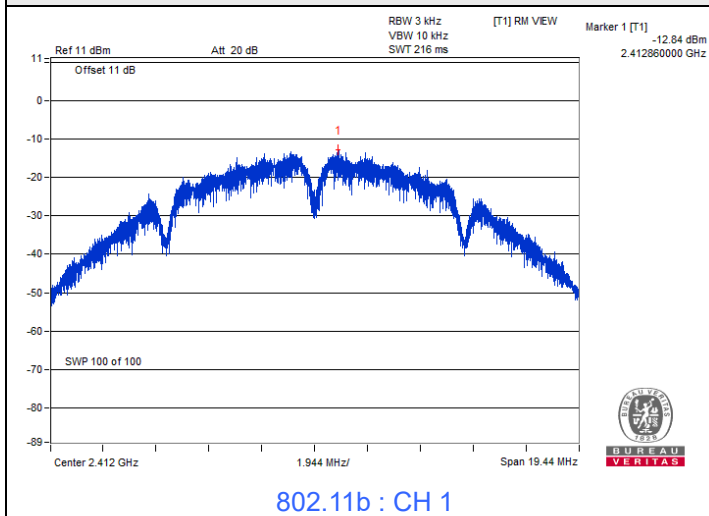
Note: The antenna gain is 3.47 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)	Duty Factor (dB)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
3	2422	-21.53	0.54	-20.99	8	Pass
6	2437	-20.81	0.54	-20.27	8	Pass
9	2452	-24.27	0.54	-23.73	8	Pass

Note: The antenna gain is 3.47 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:	23°C, 64% RH	Tested By:	Matthew Yang
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802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	8.07	0.5	Pass
6	2437	8.11	0.5	Pass
11	2462	7.61	0.5	Pass

802.11g

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

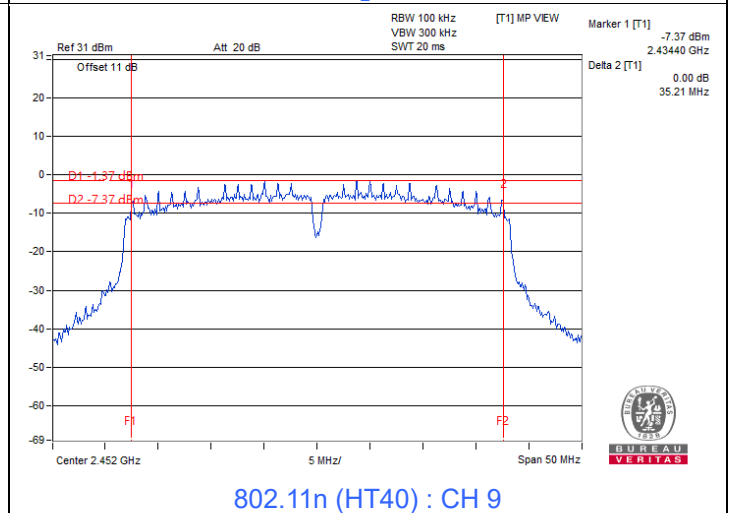
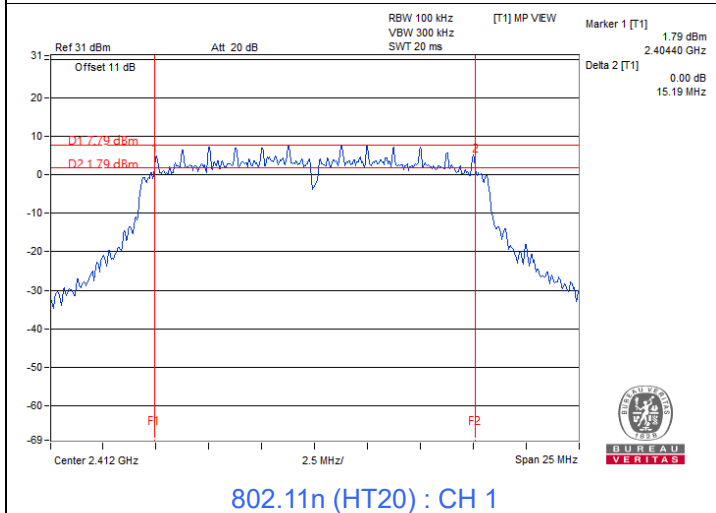
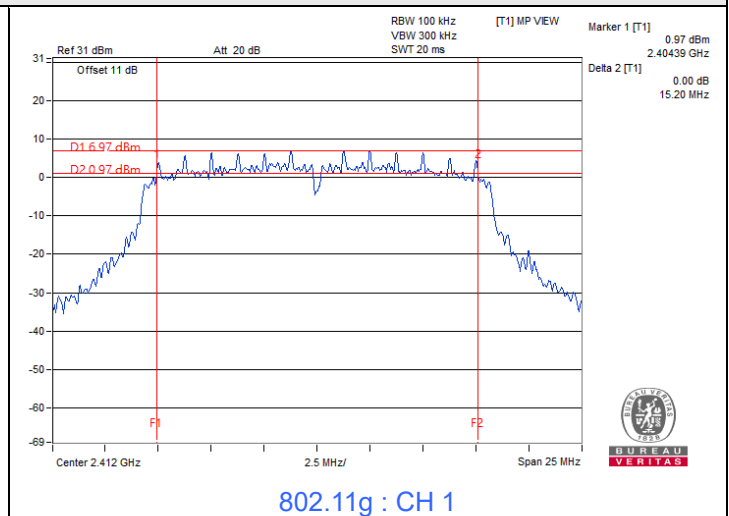
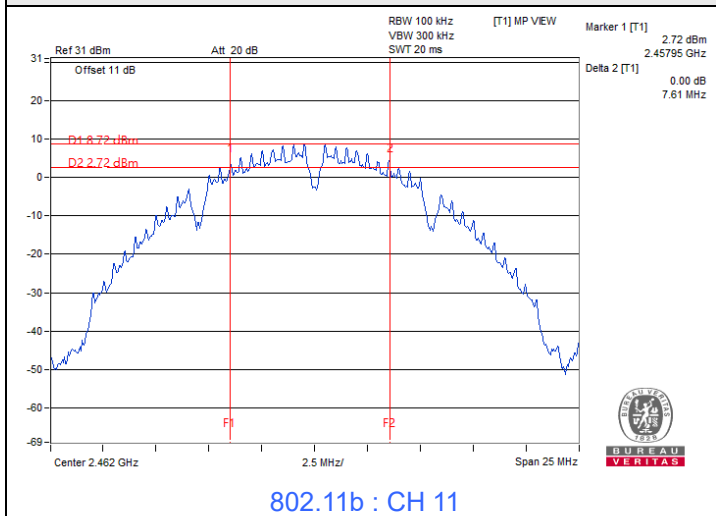
802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	2412	15.19	0.5	Pass
6	2437	15.2	0.5	Pass
11	2462	15.21	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
3	2422	35.27	0.5	Pass
6	2437	35.28	0.5	Pass
9	2452	35.21	0.5	Pass

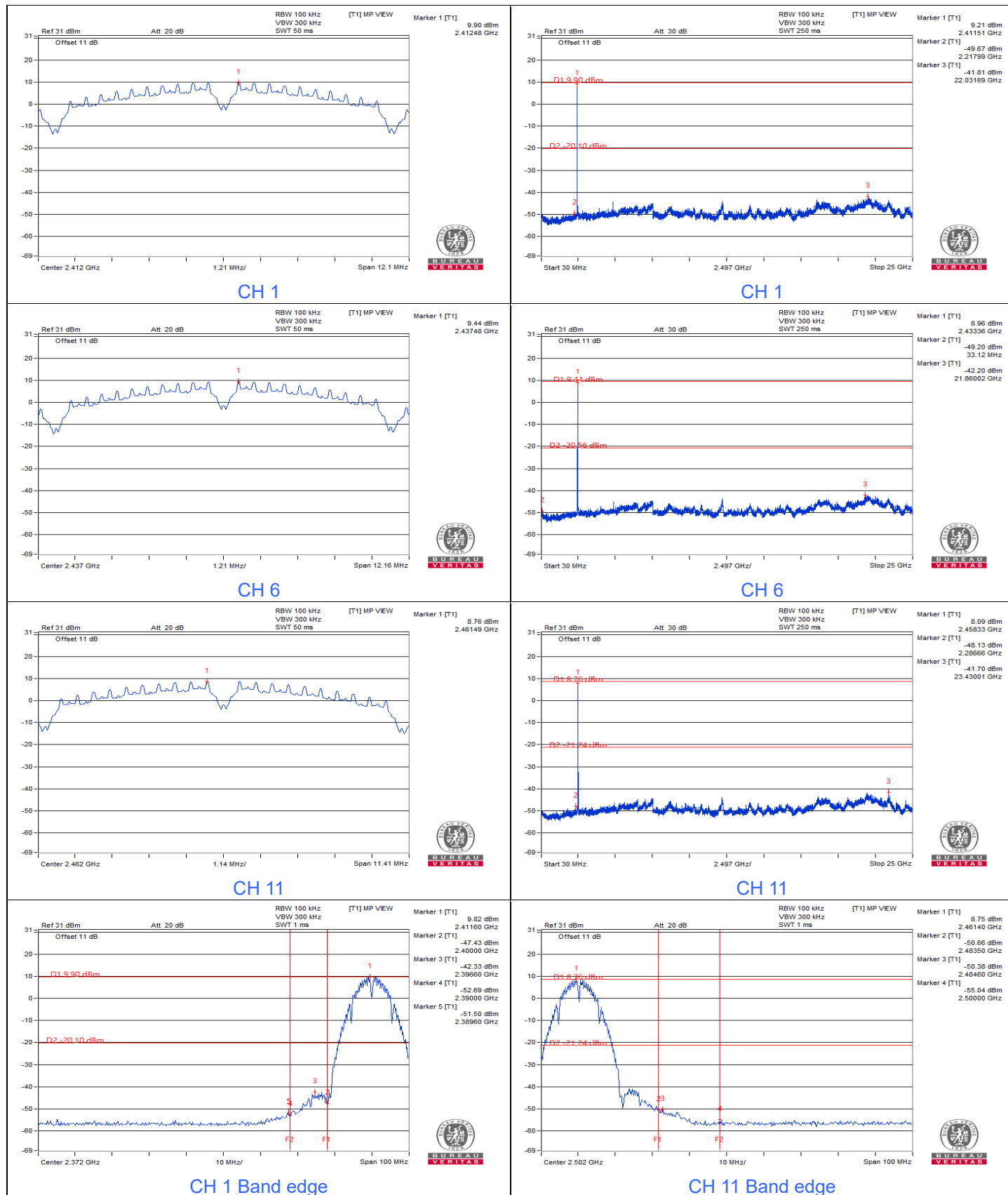
Spectrum Plot of Minimum Value



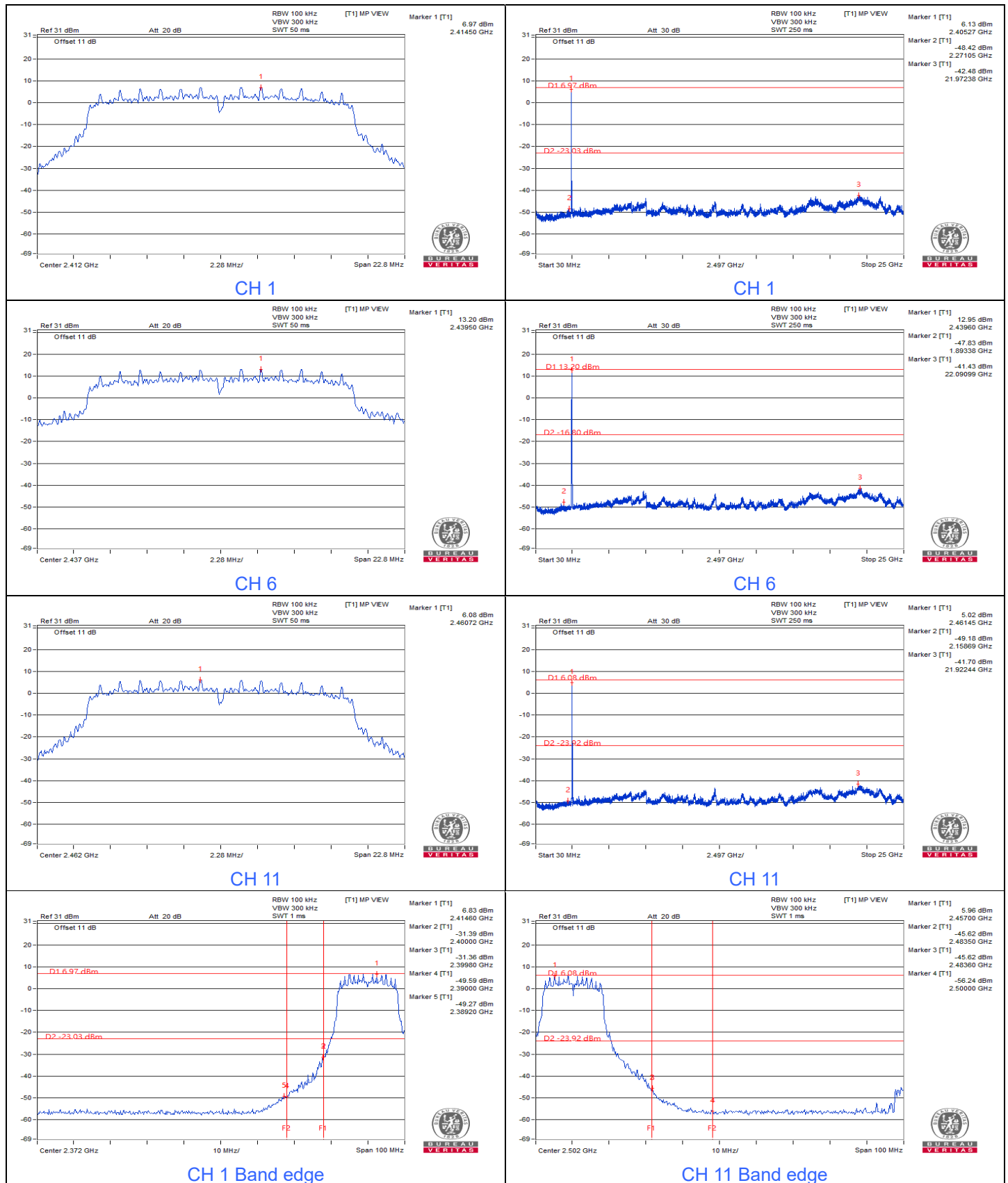
7.4 Conducted Out of Band Emissions

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	23°C, 64% RH	Tested By:	Matthew Yang
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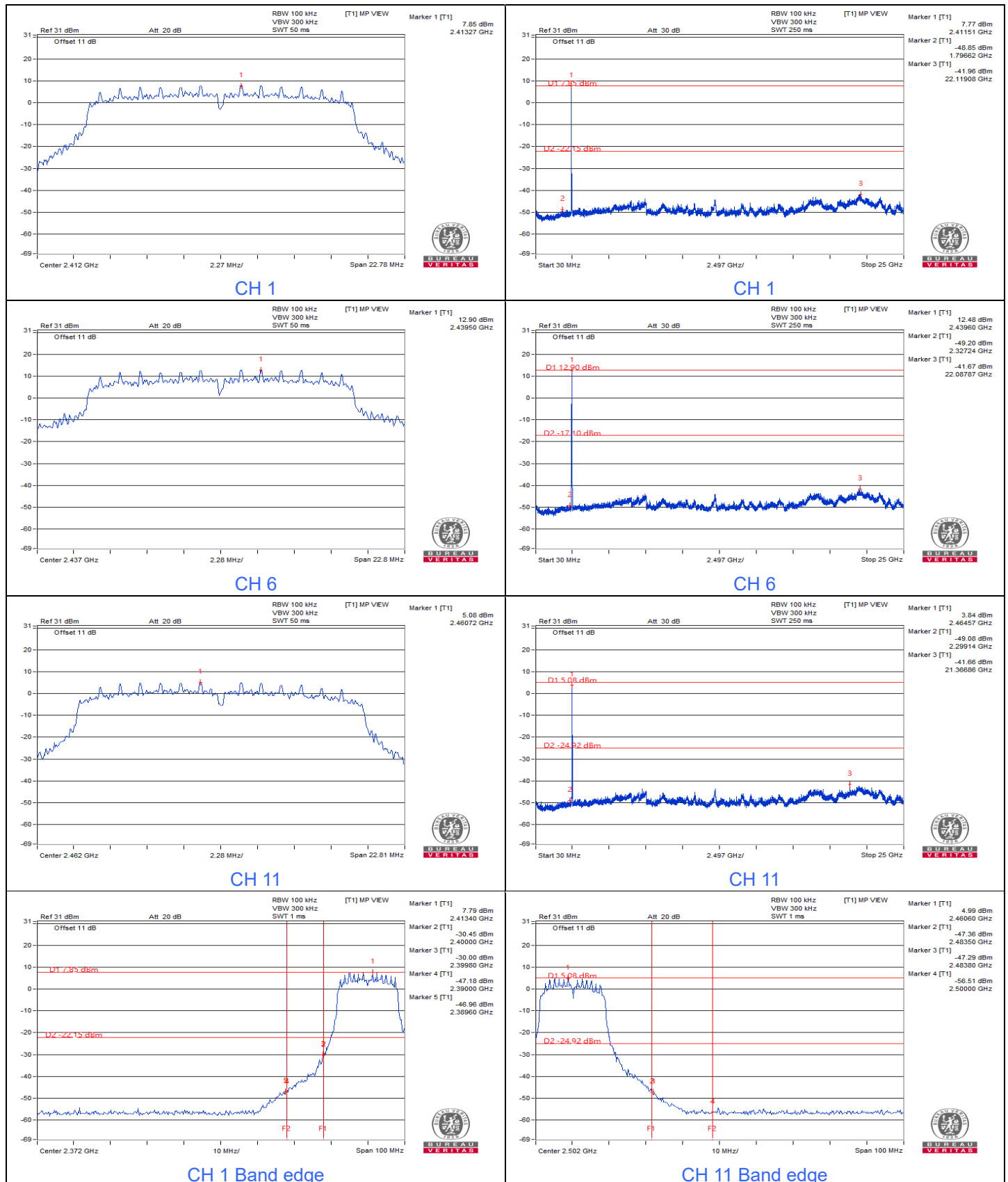
802.11b



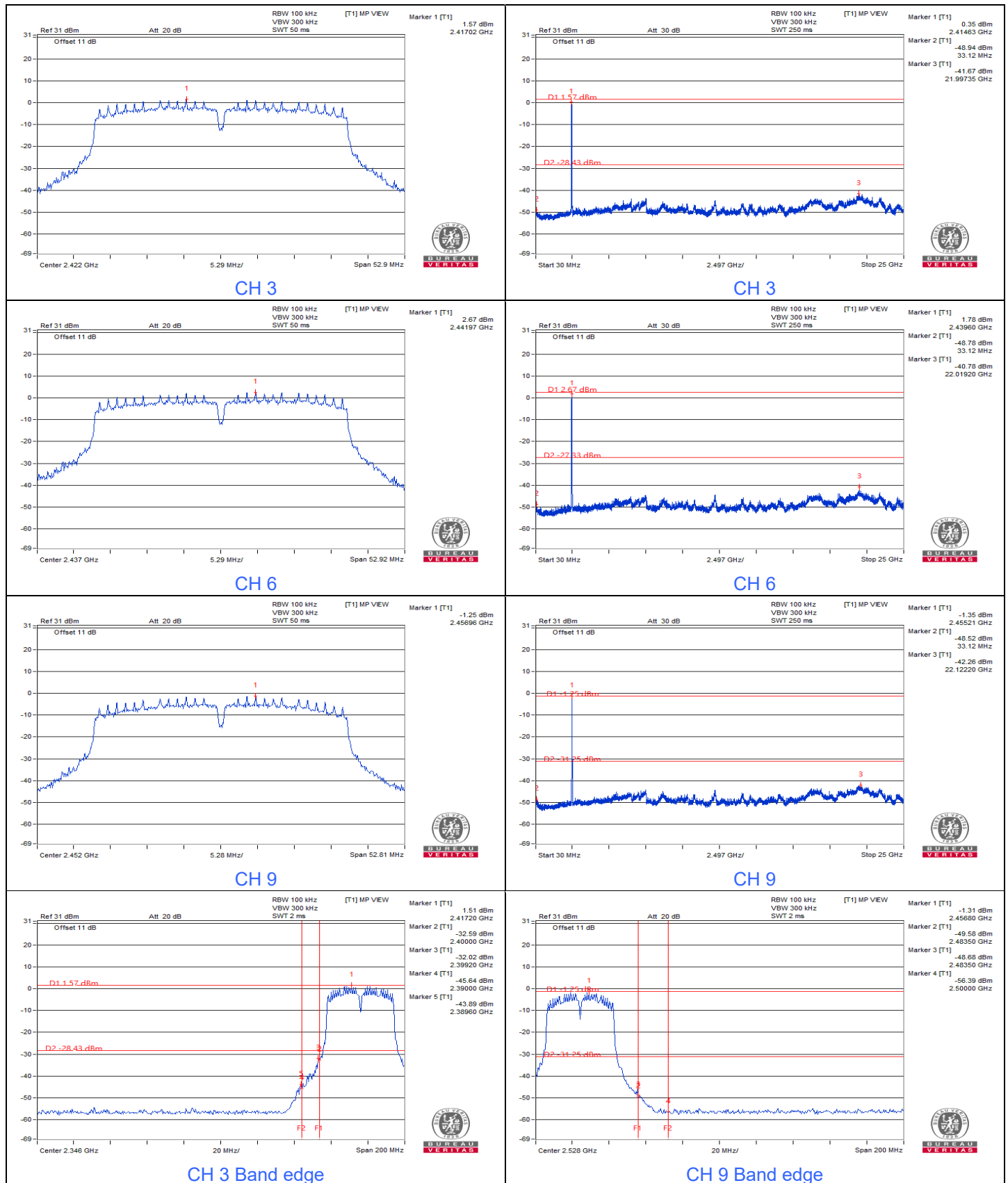
802.11g



802.11n (HT20)



802.11n (HT40)



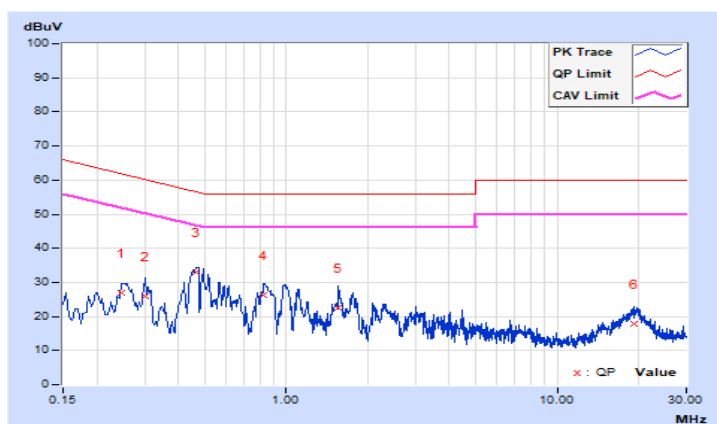
7.5 AC Power Conducted Emissions

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	24°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	0.24600	9.67	17.39	11.53	27.06	21.20	61.89	51.89	-34.83	-30.69
2	0.30200	9.68	16.27	10.93	25.95	20.61	60.19	50.19	-34.24	-29.58
3	0.46446	9.69	23.32	16.99	33.01	26.68	56.61	46.61	-23.60	-19.93
4	0.82200	9.70	16.69	10.03	26.39	19.73	56.00	46.00	-29.61	-26.27
5	1.56200	9.72	12.75	7.92	22.47	17.64	56.00	46.00	-33.53	-28.36
6	19.21000	9.88	8.01	3.23	17.89	13.11	60.00	50.00	-42.11	-36.89

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

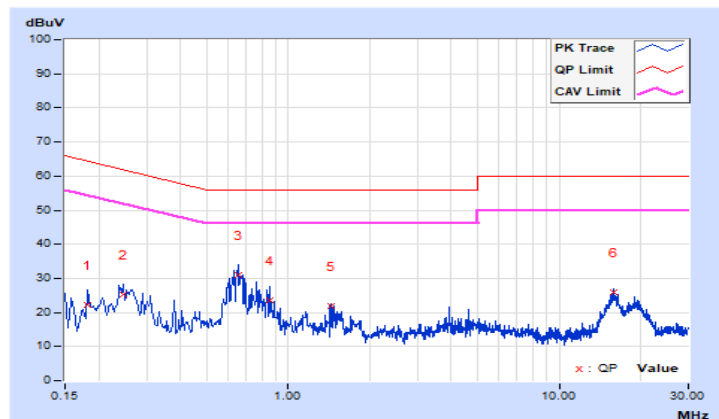


RF Mode	802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	24°C, 73% RH
Tested By	Greg Lin		

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	0.18200	9.65	12.67	6.93	22.32	16.58	64.39	54.39	-42.07	-37.81
2	0.24600	9.67	15.47	9.80	25.14	19.47	61.89	51.89	-36.75	-32.42
3	0.65400	9.70	21.38	15.01	31.08	24.71	56.00	46.00	-24.92	-21.29
4	0.85400	9.71	13.79	6.99	23.50	16.70	56.00	46.00	-32.50	-29.30
5	1.44198	9.72	12.17	5.91	21.89	15.63	56.00	46.00	-34.11	-30.37
6	15.82600	9.88	15.92	8.80	25.80	18.68	60.00	50.00	-34.20	-31.32

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



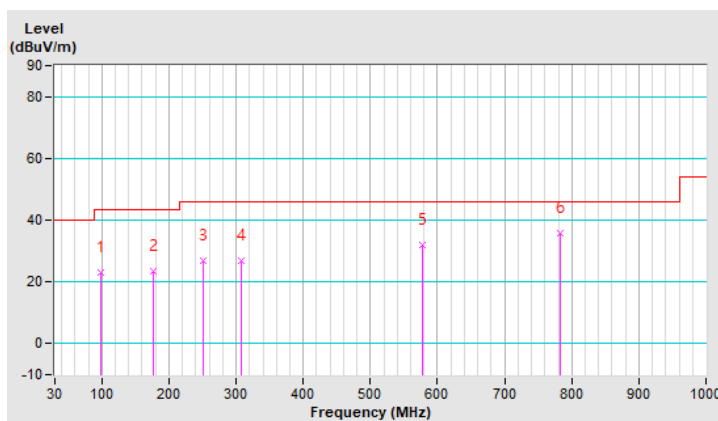
7.6 Unwanted Emissions below 1 GHz

RF Mode	802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
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	97.90	23.1 QP	43.5	-20.4	2.00 H	212	41.2	-18.1
2	176.47	23.4 QP	43.5	-20.1	1.00 H	78	37.6	-14.2
3	251.16	27.0 QP	46.0	-19.0	1.00 H	278	41.6	-14.6
4	307.42	27.0 QP	46.0	-19.0	1.50 H	62	39.4	-12.4
5	577.08	31.9 QP	46.0	-14.1	1.00 H	278	38.2	-6.3
6	783.69	35.6 QP	46.0	-10.4	1.00 H	292	38.2	-2.6

Remarks:

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

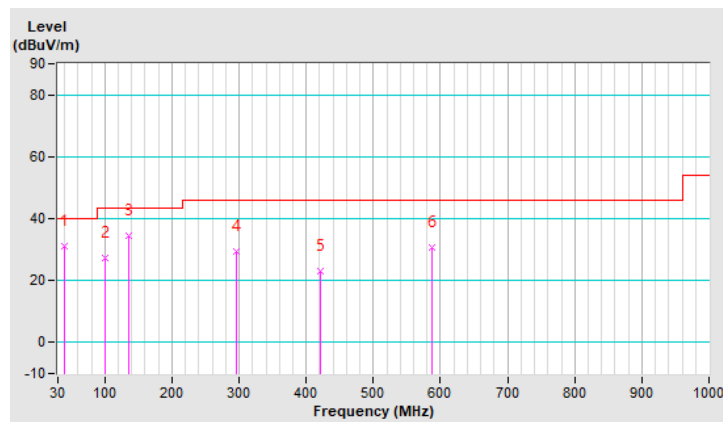


RF Mode	802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	23°C, 67% RH
Tested By	Greg Lin		

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	39.70	31.2 QP	40.0	-8.8	2.00 V	231	45.0	-13.8
2	99.84	27.4 QP	43.5	-16.1	1.00 V	235	45.1	-17.7
3	134.76	34.4 QP	43.5	-9.1	1.50 V	44	48.4	-14.0
4	296.75	29.5 QP	46.0	-16.5	1.00 V	17	42.2	-12.7
5	421.88	23.2 QP	46.0	-22.8	1.50 V	168	33.0	-9.8
6	586.78	30.6 QP	46.0	-15.4	1.00 V	4	36.5	-5.9

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

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 (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	59.2 PK	74.0	-14.8	2.07 H	6	26.9	32.3
2	2390.00	45.5 AV	54.0	-8.5	2.07 H	6	13.2	32.3
3	*2412.00	109.2 PK			2.07 H	6	76.9	32.3
4	*2412.00	106.9 AV			2.07 H	6	74.6	32.3
5	4824.00	54.9 PK	74.0	-19.1	3.10 H	342	51.3	3.6
6	4824.00	51.8 AV	54.0	-2.2	3.10 H	342	48.2	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	58.9 PK	74.0	-15.1	1.31 V	270	26.6	32.3
2	2390.00	44.5 AV	54.0	-9.5	1.31 V	270	12.2	32.3
3	*2412.00	106.1 PK			1.31 V	270	73.8	32.3
4	*2412.00	103.7 AV			1.31 V	270	71.4	32.3
5	4824.00	53.7 PK	74.0	-20.3	1.58 V	339	50.1	3.6
6	4824.00	48.5 AV	54.0	-5.5	1.58 V	339	44.9	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 (AV) RB = 1 MHz, VB = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	109.5 PK			1.96 H	5	77.2	32.3
2	*2437.00	107.1 AV			1.96 H	5	74.8	32.3
3	4874.00	56.6 PK	74.0	-17.4	2.99 H	341	53.1	3.5
4	4874.00	53.1 AV	54.0	-0.9	2.99 H	341	49.6	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	106.5 PK			2.34 V	259	74.2	32.3
2	*2437.00	104.0 AV			2.34 V	259	71.7	32.3
3	4874.00	55.9 PK	74.0	-18.1	1.53 V	332	52.4	3.5
4	4874.00	50.4 AV	54.0	-3.6	1.53 V	332	46.9	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	802.11b	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 = 10 Hz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	110.4 PK			1.78 H	5	78.1	32.3
2	*2462.00	108.0 AV			1.78 H	5	75.7	32.3
3	2483.50	64.2 PK	74.0	-9.8	1.78 H	5	31.8	32.4
4	2483.50	50.0 AV	54.0	-4.0	1.78 H	5	17.6	32.4
5	4924.00	55.9 PK	74.0	-18.1	2.96 H	339	52.1	3.8
6	4924.00	53.2 AV	54.0	-0.8	2.96 H	339	49.4	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	107.3 PK			1.27 V	253	75.0	32.3
2	*2462.00	104.9 AV			1.27 V	253	72.6	32.3
3	2483.50	60.6 PK	74.0	-13.4	1.27 V	253	28.2	32.4
4	2483.50	47.5 AV	54.0	-6.5	1.27 V	253	15.1	32.4
5	4924.00	54.6 PK	74.0	-19.4	1.57 V	331	50.8	3.8
6	4924.00	49.1 AV	54.0	-4.9	1.57 V	331	45.3	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	802.11g	Channel	CH 1 : 2412 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	22°C, 68% 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	61.5 PK	74.0	-12.5	2.06 H	7	29.2	32.3
2	2390.00	49.0 AV	54.0	-5.0	2.06 H	7	16.7	32.3
3	*2412.00	111.6 PK			2.06 H	7	79.3	32.3
4	*2412.00	103.5 AV			2.06 H	7	71.2	32.3
5	4824.00	53.3 PK	74.0	-20.7	3.03 H	346	49.7	3.6
6	4824.00	42.9 AV	54.0	-11.1	3.03 H	346	39.3	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	60.2 PK	74.0	-13.8	1.26 V	261	27.9	32.3
2	2390.00	47.8 AV	54.0	-6.2	1.26 V	261	15.5	32.3
3	*2412.00	108.5 PK			1.26 V	261	76.2	32.3
4	*2412.00	100.4 AV			1.26 V	261	68.1	32.3
5	4824.00	50.8 PK	74.0	-23.2	1.58 V	331	47.2	3.6
6	4824.00	40.3 AV	54.0	-13.7	1.58 V	331	36.7	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 (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	118.6 PK			1.97 H	3	86.3	32.3
2	*2437.00	110.6 AV			1.97 H	3	78.3	32.3
3	4874.00	58.7 PK	74.0	-15.3	3.12 H	342	55.2	3.5
4	4874.00	49.8 AV	54.0	-4.2	3.12 H	342	46.3	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	115.5 PK			1.36 V	259	83.2	32.3
2	*2437.00	107.4 AV			1.36 V	259	75.1	32.3
3	4874.00	56.4 PK	74.0	-17.6	1.64 V	328	52.9	3.5
4	4874.00	47.1 AV	54.0	-6.9	1.64 V	328	43.6	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 (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	111.6 PK			1.95 H	4	79.3	32.3
2	*2462.00	103.4 AV			1.95 H	4	71.1	32.3
3	2483.50	64.6 PK	74.0	-9.4	1.95 H	4	32.2	32.4
4	2483.50	53.1 AV	54.0	-0.9	1.95 H	4	20.7	32.4
5	4924.00	52.0 PK	74.0	-22.0	2.97 H	343	48.2	3.8
6	4924.00	41.6 AV	54.0	-12.4	2.97 H	343	37.8	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	108.4 PK			1.37 V	258	76.1	32.3
2	*2462.00	100.5 AV			1.37 V	258	68.2	32.3
3	2483.50	63.6 PK	74.0	-10.4	1.37 V	258	31.2	32.4
4	2483.50	50.5 AV	54.0	-3.5	1.37 V	258	18.1	32.4
5	4924.00	48.1 PK	74.0	-25.9	1.62 V	329	44.3	3.8
6	4924.00	39.2 AV	54.0	-14.8	1.62 V	329	35.4	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 (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	62.8 PK	74.0	-11.2	2.05 H	8	30.5	32.3
2	2390.00	51.7 AV	54.0	-2.3	2.05 H	8	19.4	32.3
3	*2412.00	111.9 PK			2.05 H	7	79.6	32.3
4	*2412.00	104.1 AV			2.05 H	7	71.8	32.3
5	4824.00	53.7 PK	74.0	-20.3	2.93 H	347	50.1	3.6
6	4824.00	43.2 AV	54.0	-10.8	2.93 H	347	39.6	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	61.7 PK	74.0	-12.3	1.32 V	251	29.4	32.3
2	2390.00	49.9 AV	54.0	-4.1	1.32 V	251	17.6	32.3
3	*2412.00	108.9 PK			1.32 V	251	76.6	32.3
4	*2412.00	101.2 AV			1.32 V	251	68.9	32.3
5	4824.00	52.0 PK	74.0	-22.0	1.54 V	330	48.4	3.6
6	4824.00	40.9 AV	54.0	-13.1	1.54 V	330	37.3	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 (AV) RB = 1 MHz, VB = 1 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	117.5 PK			1.98 H	3	85.2	32.3
2	*2437.00	109.7 AV			1.98 H	3	77.4	32.3
3	2483.50	65.0 PK	74.0	-9.0	1.98 H	3	32.6	32.4
4	2483.50	53.2 AV	54.0	-0.8	1.98 H	3	20.8	32.4
5	4874.00	59.0 PK	74.0	-15.0	3.11 H	340	55.5	3.5
6	4874.00	49.3 AV	54.0	-4.7	3.11 H	340	45.8	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	114.4 PK			1.37 V	254	82.1	32.3
2	*2437.00	106.7 AV			1.37 V	254	74.4	32.3
3	2483.50	62.8 PK	74.0	-11.2	1.37 V	254	30.4	32.4
4	2483.50	51.1 AV	54.0	-2.9	1.37 V	254	18.7	32.4
5	4874.00	56.8 PK	74.0	-17.2	1.72 V	324	53.3	3.5
6	4874.00	46.4 AV	54.0	-7.6	1.72 V	324	42.9	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	802.11n (HT20)	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	22°C, 68% 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	111.2 PK			1.86 H	3	78.9	32.3
2	*2462.00	103.4 AV			1.86 H	3	71.1	32.3
3	2483.50	64.3 PK	74.0	-9.7	1.86 H	3	31.9	32.4
4	2483.50	53.6 AV	54.0	-0.4	1.86 H	3	21.2	32.4
5	4924.00	52.2 PK	74.0	-21.8	3.04 H	345	48.4	3.8
6	4924.00	42.1 AV	54.0	-11.9	3.04 H	345	38.3	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	108.4 PK			1.26 V	263	76.1	32.3
2	*2462.00	100.4 AV			1.26 V	263	68.1	32.3
3	2483.50	63.1 PK	74.0	-10.9	1.26 V	263	30.7	32.4
4	2483.50	51.1 AV	54.0	-2.9	1.26 V	263	18.7	32.4
5	4924.00	48.1 PK	74.0	-25.9	1.64 V	338	44.3	3.8
6	4924.00	39.0 AV	54.0	-15.0	1.64 V	338	35.2	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 (HT40)	Channel	CH 3 : 2422 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 2 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	63.5 PK	74.0	-10.5	2.01 H	6	31.2	32.3
2	2390.00	49.8 AV	54.0	-4.2	2.01 H	6	17.5	32.3
3	*2422.00	106.3 PK			2.01 H	6	73.9	32.4
4	*2422.00	98.6 AV			2.01 H	6	66.2	32.4
5	4844.00	51.8 PK	74.0	-22.2	2.89 H	352	48.2	3.6
6	4844.00	41.1 AV	54.0	-12.9	2.89 H	352	37.5	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	61.6 PK	74.0	-12.4	1.32 V	255	29.3	32.3
2	2390.00	48.1 AV	54.0	-5.9	1.32 V	255	15.8	32.3
3	*2422.00	103.5 PK			1.32 V	255	71.1	32.4
4	*2422.00	95.7 AV			1.32 V	255	63.3	32.4
5	4844.00	47.4 PK	74.0	-26.6	1.54 V	326	43.8	3.6
6	4844.00	38.5 AV	54.0	-15.5	1.54 V	326	34.9	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 (HT40)	Channel	CH 6 : 2437 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 2 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% 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	107.6 PK			1.96 H	2	75.3	32.3
2	*2437.00	99.7 AV			1.96 H	2	67.4	32.3
3	4874.00	52.8 PK	74.0	-21.2	3.07 H	347	49.3	3.5
4	4874.00	42.3 AV	54.0	-11.7	3.07 H	347	38.8	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	104.5 PK			1.33 V	261	72.2	32.3
2	*2437.00	96.6 AV			1.33 V	261	64.3	32.3
3	4874.00	50.1 PK	74.0	-23.9	1.57 V	331	46.6	3.5
4	4874.00	39.8 AV	54.0	-14.2	1.57 V	331	36.3	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 (HT40)	Channel	CH 9 : 2452 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 2 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	22°C, 68% RH
Tested By	Greg Lin		

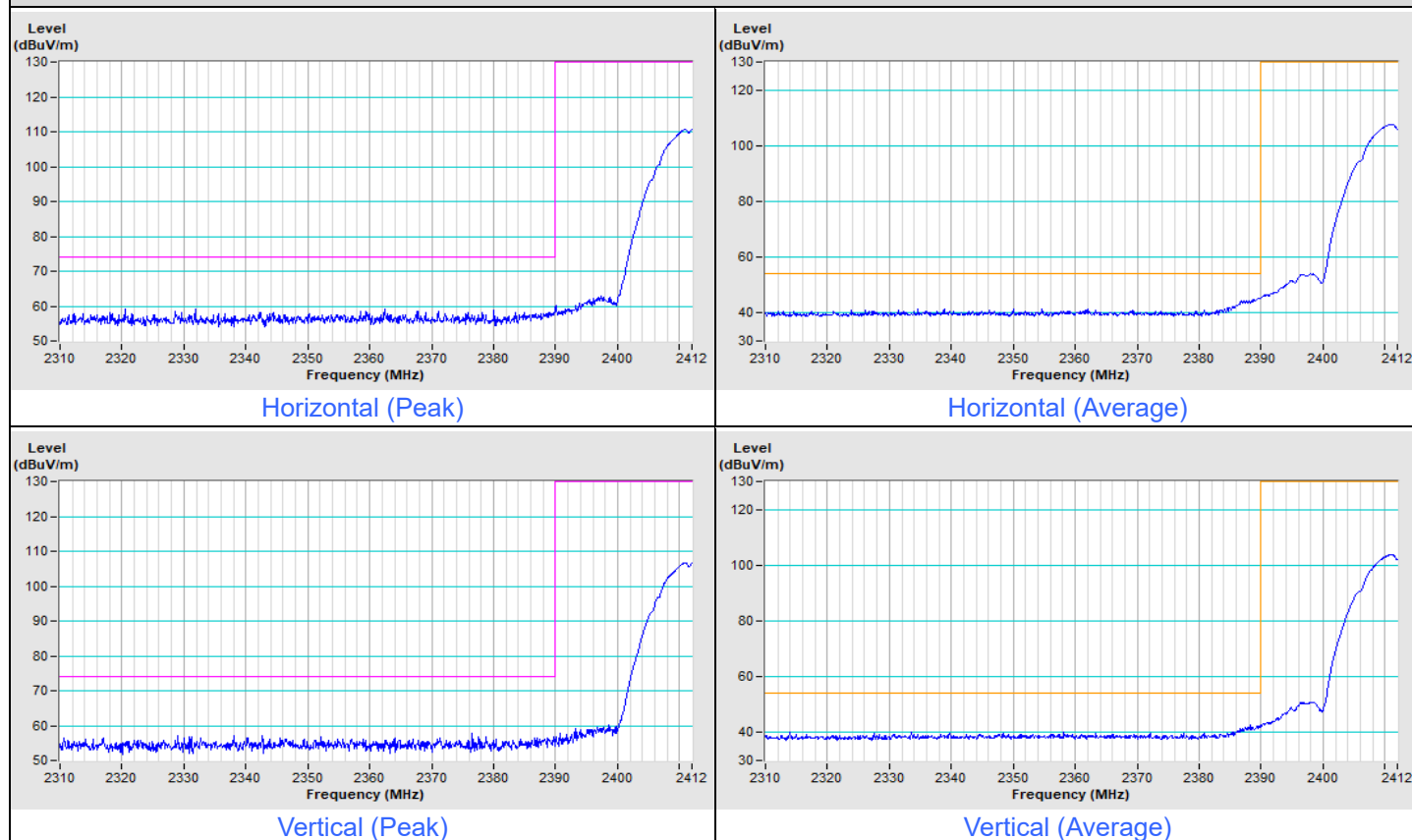
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	104.9 PK			1.81 H	1	72.6	32.3
2	*2452.00	97.1 AV			1.81 H	1	64.8	32.3
3	2483.50	68.3 PK	74.0	-5.7	1.81 H	1	35.9	32.4
4	2483.50	51.9 AV	54.0	-2.1	1.81 H	1	19.5	32.4
5	4904.00	50.4 PK	74.0	-23.6	2.97 H	346	46.8	3.6
6	4904.00	40.0 AV	54.0	-14.0	2.97 H	346	36.4	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	*2452.00	101.8 PK			1.35 V	257	69.5	32.3
2	*2452.00	94.0 AV			1.35 V	257	61.7	32.3
3	2483.50	64.5 PK	74.0	-9.5	1.35 V	257	32.1	32.4
4	2483.50	48.7 AV	54.0	-5.3	1.35 V	257	16.3	32.4
5	4904.00	47.4 PK	74.0	-26.6	1.65 V	341	43.8	3.6
6	4904.00	38.3 AV	54.0	-15.7	1.65 V	341	34.7	3.6

Remarks:

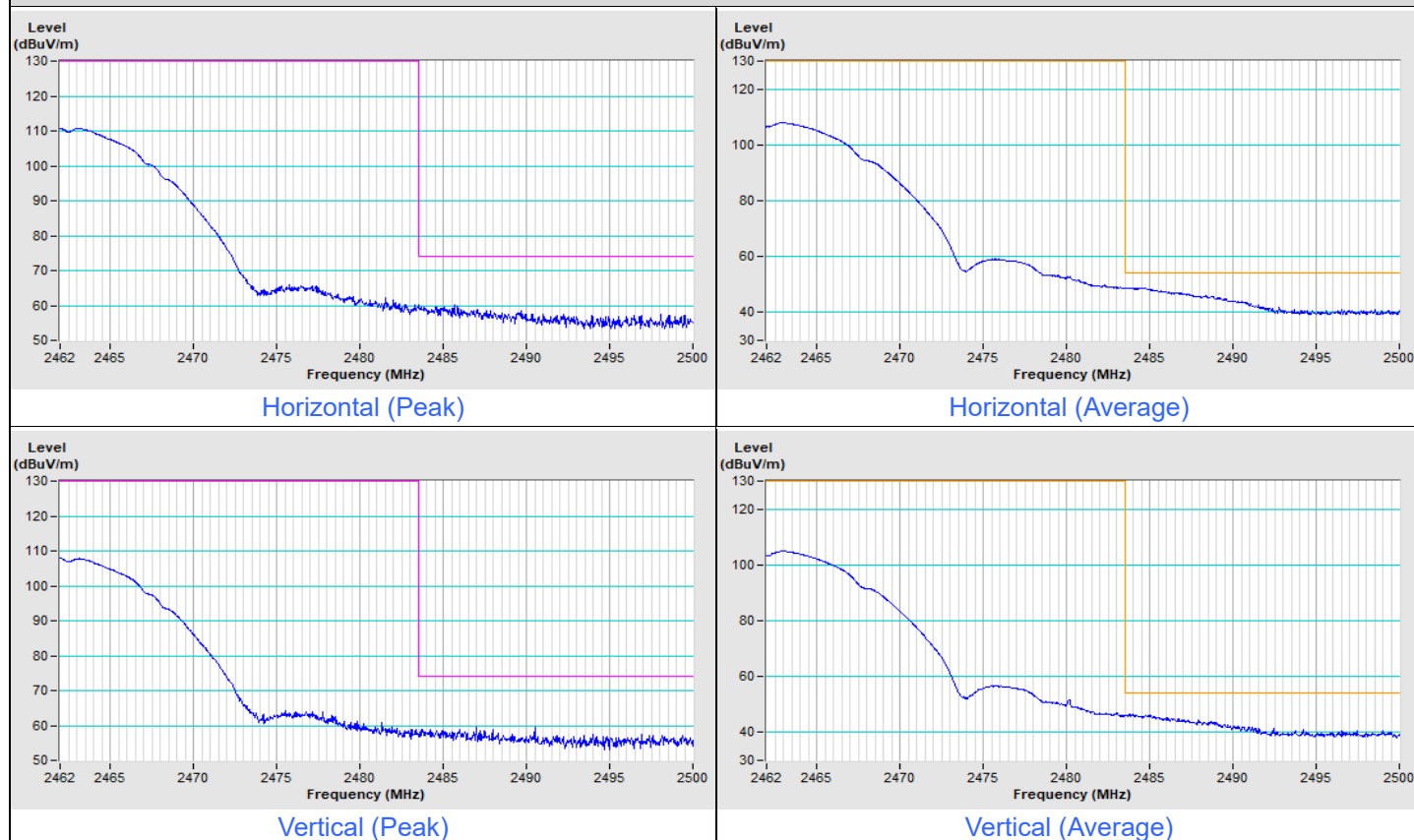
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2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit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

Plot of Band Edge

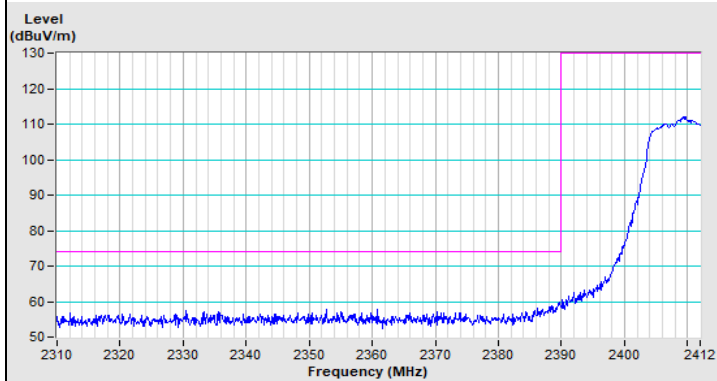
802.11b Channel 1



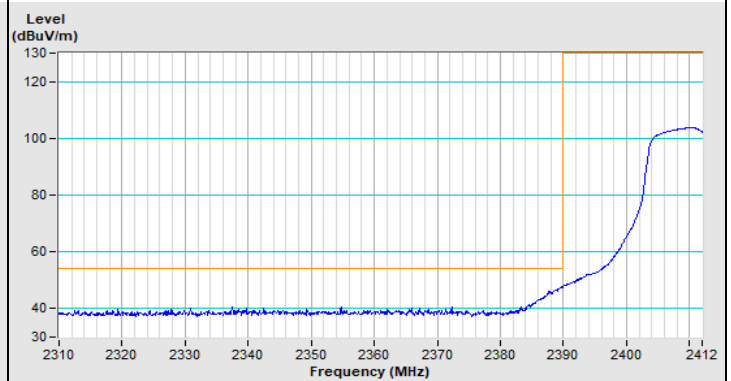
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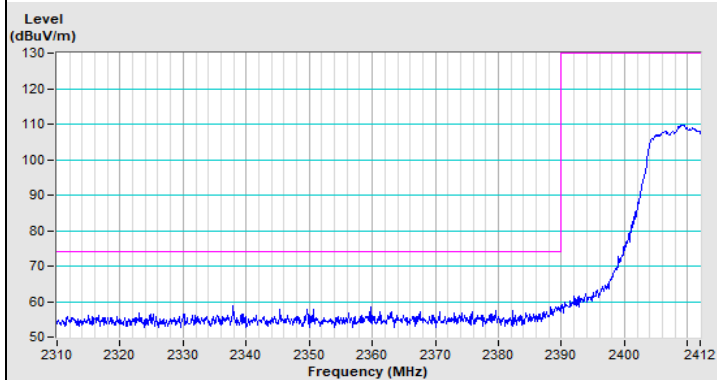
802.11g Channel 1



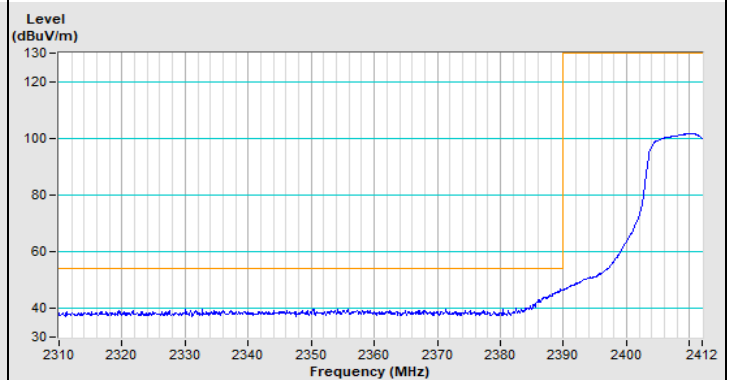
Horizontal (Peak)



Horizontal (Average)

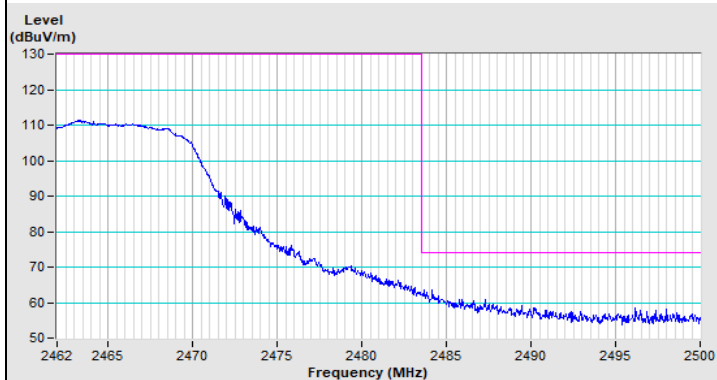


Vertical (Peak)

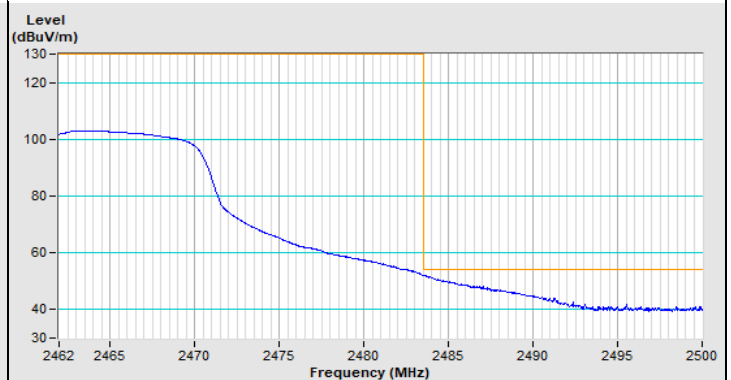


Vertical (Average)

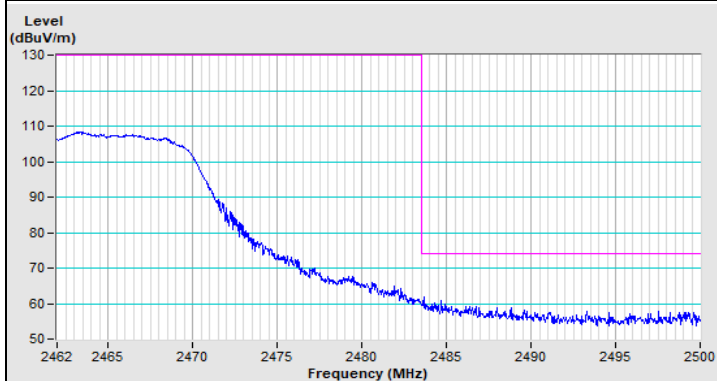
802.11g Channel 11



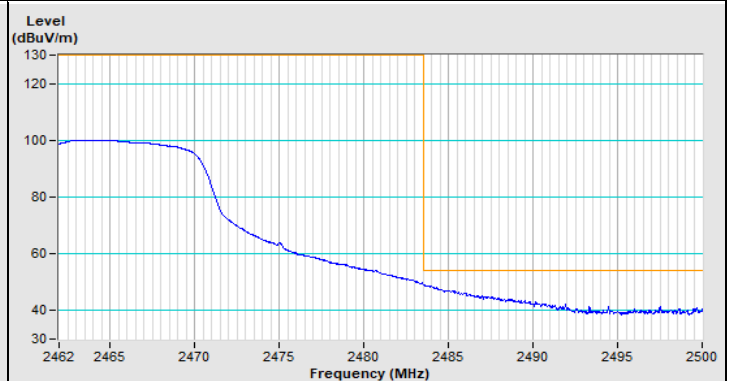
Horizontal (Peak)



Horizontal (Average)

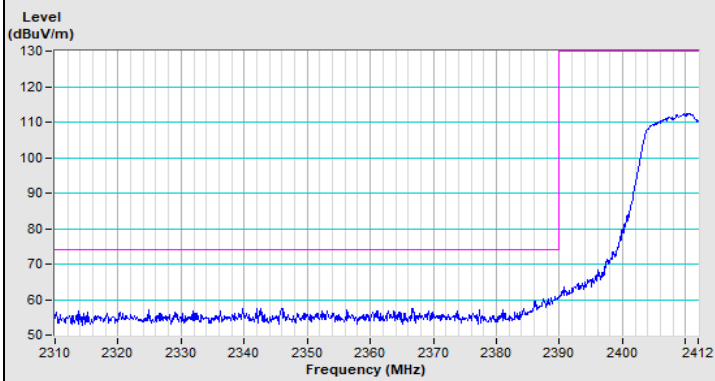


Vertical (Peak)

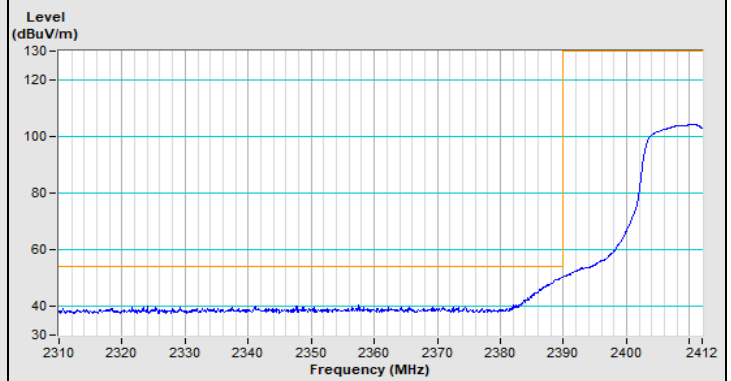


Vertical (Average)

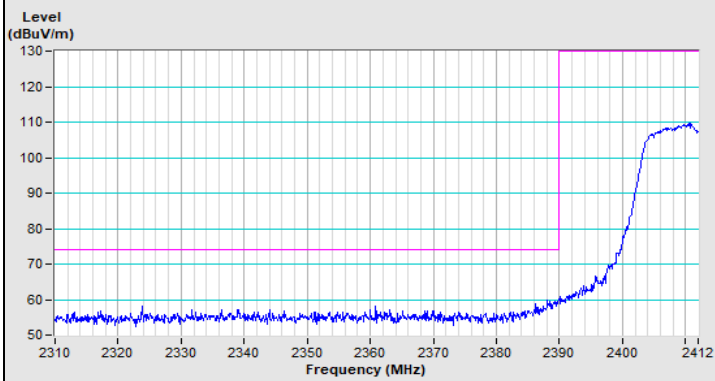
802.11n (HT20) Channel 1



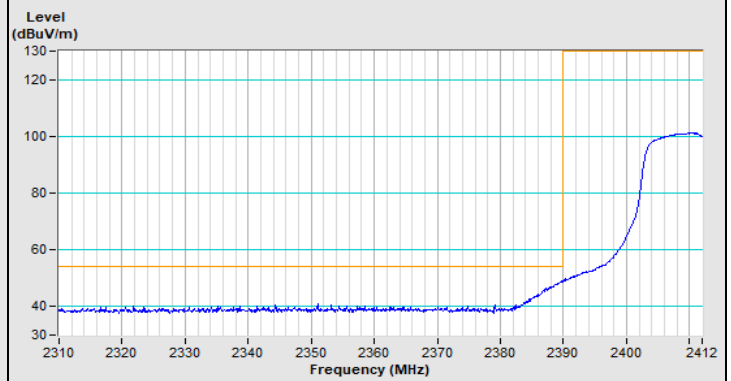
Horizontal (Peak)



Horizontal (Average)

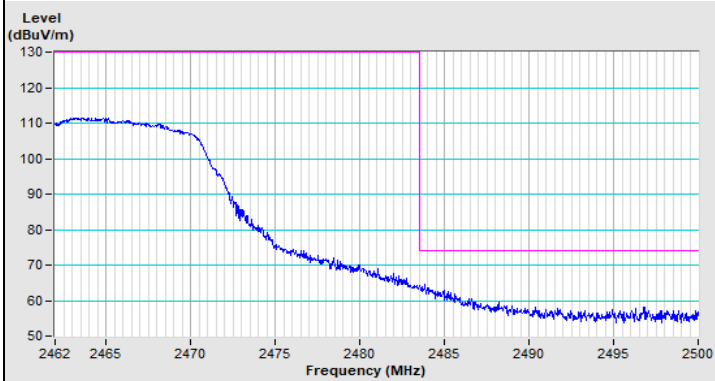


Vertical (Peak)

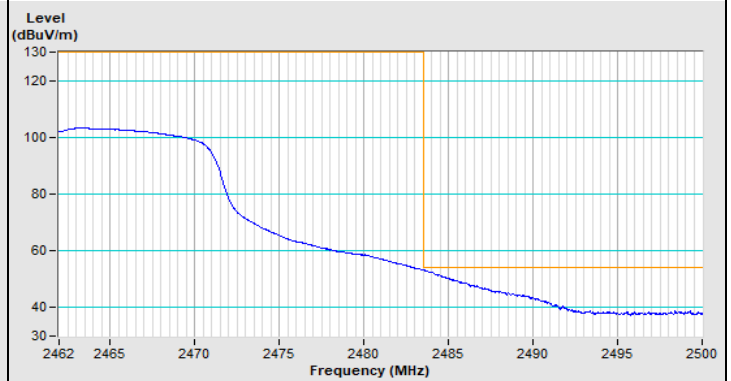


Vertical (Average)

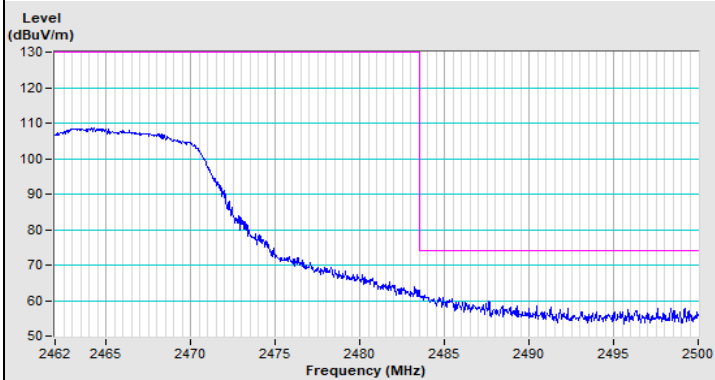
802.11n (HT20) Channel 11



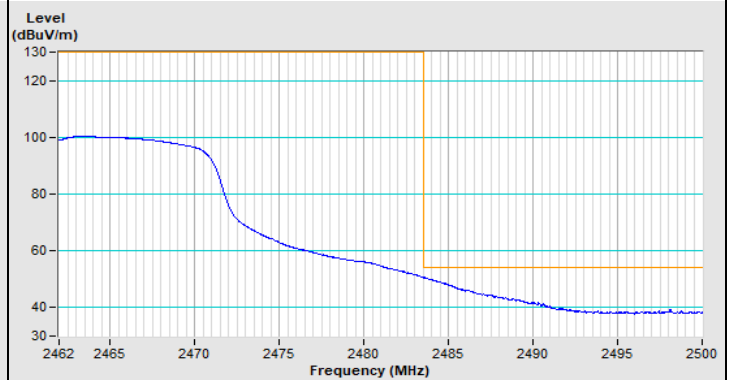
Horizontal (Peak)



Horizontal (Average)

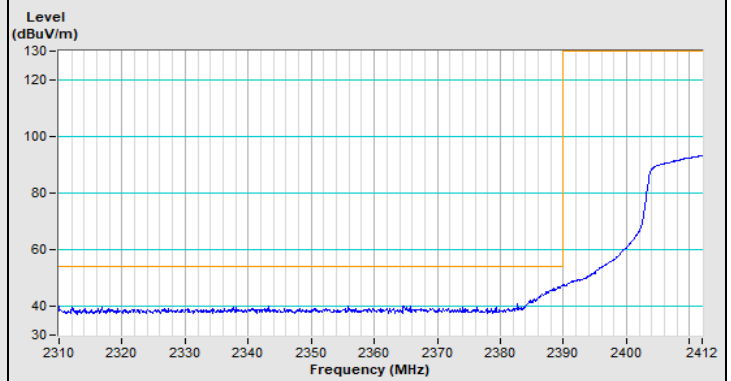
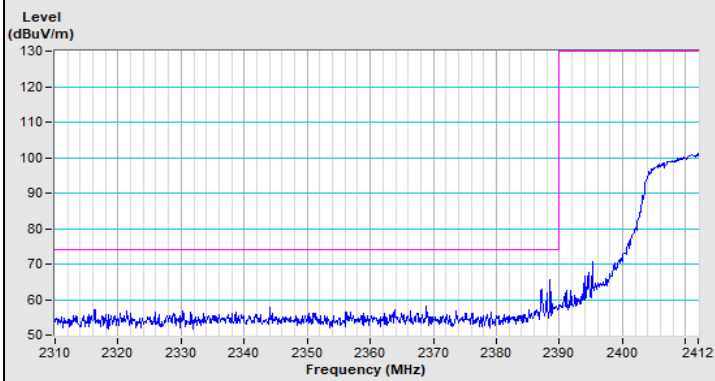
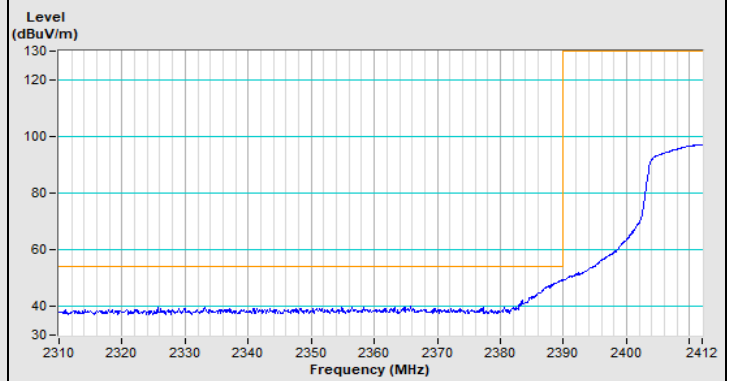
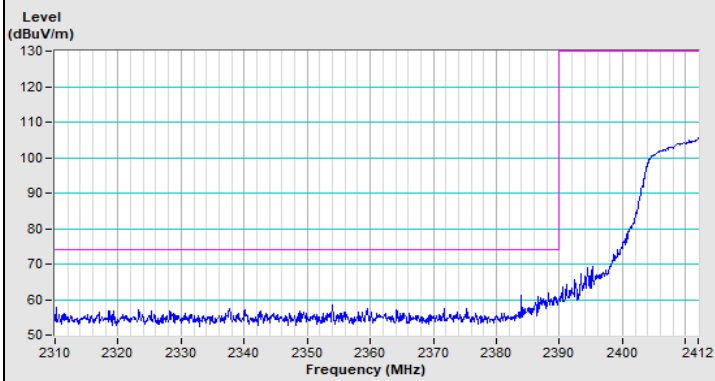


Vertical (Peak)

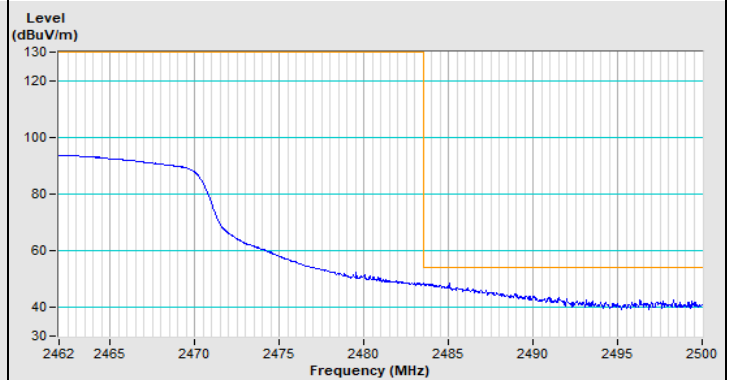
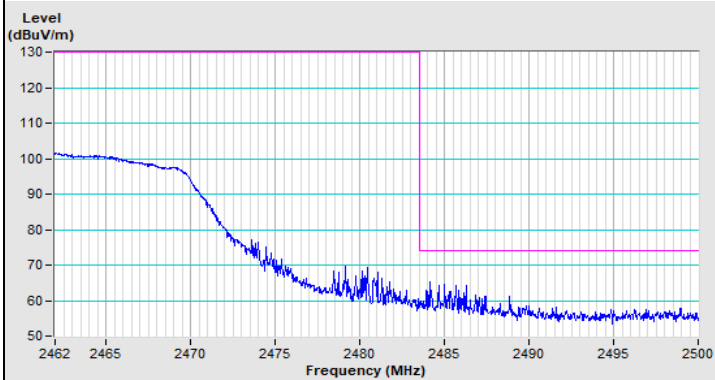
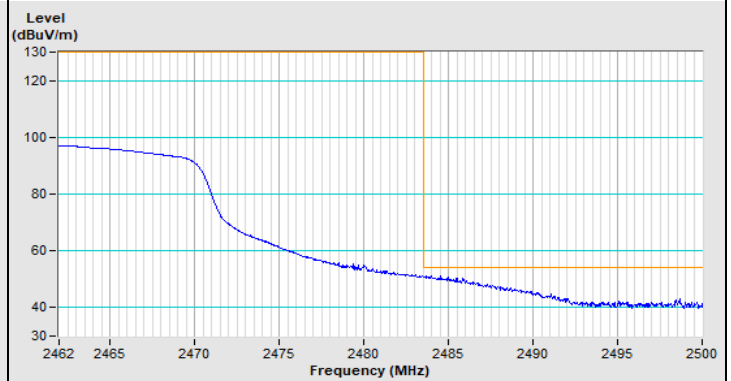
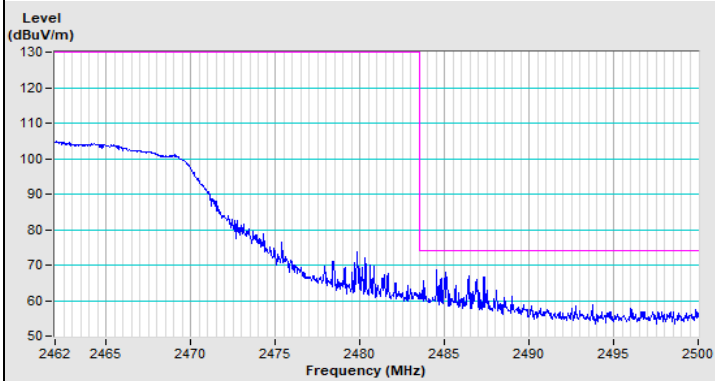


Vertical (Average)

802.11n (HT40) Channel 3



802.11n (HT40) Channel 9



8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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

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