





FCC Test Report

FCC ID : 18803785

Equipment : 802.11ax (WiFi 6) Dual-Radio Unified Pro

Outdoor Access Point

Model No. : WAX655E

Brand Name : ZYXEL

Applicant : Zyxel Communications Corporation

Address : No.2 Industry East RD. IX, Hsinchu Science

Park, Hsinchu 30075, Taiwan, R.O.C

Standard : 47 CFR FCC Part 15.247

Received Date : Sep. 27, 2022

Tested Date : Sep. 16 ~ Oct. 27, 2022

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: Approved by:

Along Cheld/ Assistant Manager Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR292702AC	Rev. 01	Initial issue	Nov. 15, 2022

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Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emission	[dBuV]: 0.476MHz 43.40 (Margin -3.02dB) - AV	Pass
15.247(d) 15.209	Unwanted Emissions	[dBuV/m at 3m]: 2483.50MHz 53.80 (Margin -0.20dB) - AV	Pass
15.247(b)(3)	Conducted Output Power	Max Power [dBm]: Non-beamforming mode 26.18 Beamforming mode 22.16	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

	RF General Information							
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N⊤x)	Data Rate / MCS			
2400-2483.5	b	2412-2462	1-11 [11]	2	1-11 Mbps			
2400-2483.5	g	2412-2462	1-11 [11]	2	6-54 Mbps			
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	MCS 0-15			
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	MCS 0-15			
2400-2483.5	ax (HE20)	2412-2462	1-11 [11]	2	MCS 0-11			
2400-2483.5	ax (HE40)	2422-2452	3-9 [7]	2	MCS 0-11			

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

Note 2: DBPSK, DQPSK, CCK modulation

BPSK, QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulation.

Note 3: 802.11n/ax supports beamforming function.

1.1.2 Antenna Details

Ant. Model	Type Connecto		Operating Frequencies (MHz) / Gain (dBi)				Bi)
Ant. Model	туре	Connector	2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850
RFA-25-T200-N1-C262	Dipole	N type	4	5.33	5.49	5.96	5.75

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	55Vdc from POE

Note: The above power supply is not bundled in market.

1.1.4 Accessories

N/A

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1.1.5 Channel List

Frequenc	y band (MHz)	2400~2483.5		
802.11 b/g/	n HT20 / ax HE20	802.11n HT40 / ax HE40		
Channel	Channel Frequency(MHz)		Frequency(MHz)	
1	2412	3	2422	
2	2417	4	2427	
3	2422	5	2432	
4	2427	6	2437	
5	2432	7	2442	
6	2437	8	2447	
7	2442	9	2452	
8	2447			
9	2452			
10	2457			
11	2462			

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1.1.6 Test Tool and Duty Cycle

Test Tool	QSPR, V 5.0-00200				
	Mode	Duty Cycle (%)	Duty Factor (dB)		
	11b	99.17%	0.04		
Duty Cycle and Duty Factor	11g	99.95%	0.00		
1 40101	ax HE20	99.99%	0.00		
	ax HE40	99.99%	0.00		



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1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	22.5
11b	2437	23
11b	2462	18
11g	2412	21.5
11g	2437	22
11g	2462	18.5
ax HE20	2412	21
ax HE20	2437	21.5
ax HE20	2462	18.5
ax HE40	2422	21
ax HE40	2437	19.5
ax HE40	2452	18

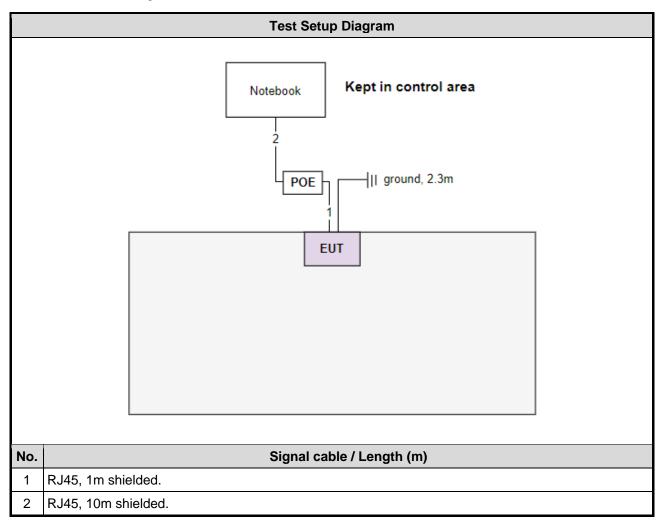
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1.2 Local Support Equipment List

	Support Equipment List							
No.	Equipment	Brand	Model	FCC ID	Remarks			
1	Notebook	DELL	Latitude 5400	DoC				
2	POE	ZYXEL	PoE12-30W		Provided by applicant.			
3	RJ45 cable	ICC	RJ45-10m					
4	RJ45 cable	ICC	RJ45-1m					
5	Ground cable	ICC	GC-2.3m					

1.3 Test Setup Chart



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1.4 The Equipment List

Test Item	Radiated Emission be	Radiated Emission below 1GHz						
Test Site	966 chamber1 / (03Cl	966 chamber1 / (03CH01-WS)						
Tested Date	Oct. 27, 2022	Oct. 27, 2022						
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until			
Receiver	R&S	ESR3	101657	Mar. 15, 2022	Mar. 14, 2023			
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 08, 2021	Nov. 07, 2022			
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 03, 2022	Aug. 02, 2023			
Preamplifier	EMC	EMC02325	980225	Jun. 28, 2022	Jun. 27, 2023			
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 04, 2022	Oct. 03, 2023			
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 04, 2022	Oct. 03, 2023			
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 04, 2022	Oct. 03, 2023			
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 04, 2022	Oct. 03, 2023			
Measurement Software	AUDIX	e3	6.120210g	NA	NA			
Note: Calibration Inter	rval of instruments liste	d above is one year.		•				

Test Item	Radiated Emission ab	Radiated Emission above 1GHz						
Test Site	966 chamber1 / (03Cl	966 chamber1 / (03CH01-WS)						
Tested Date	Sep. 16 ~ Sep. 19, 20	Sep. 16 ~ Sep. 19, 2022						
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until			
Spectrum Analyzer	R&S	FSV40	101498	Nov. 29, 2021	Nov. 28, 2022			
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 03, 2021	Dec. 02, 2022			
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2021	Nov. 03, 2022			
Preamplifier	EMC	EMC118A45SE	980898	Jul. 16, 2022	Jul. 15, 2023			
Preamplifier	EMC	EMC184045B	980192	Jul. 08, 2022	Jul. 07, 2023			
RF Cable	EMC	EMC104-35M-35M- 8000	210920	Oct. 05, 2021	Oct. 04, 2022			
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 05, 2021	Oct. 04, 2022			
Measurement Software	AUDIX	e3	6.120210g	NA	NA			
Note: Calibration Inte	rval of instruments liste	d above is one year.						

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Test Item	RF Conducted								
Test Site	(TH01-WS)	(TH01-WS)							
Tested Date	Oct. 25, 2022								
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until				
Spectrum Analyzer	R&S	FSV40	101910	Apr. 18, 2022	Apr. 17, 2023				
Power Meter	Anritsu	ML2495A	1241002	Nov. 07, 2021	Nov. 06, 2022				
Power Sensor	Anritsu	MA2411B	1207366	Nov. 07, 2021	Nov. 06, 2022				
Measurement Software	Sporton	SENSE-15247_DTS	V5.10.7.18	NA	NA				
Note: Calibration Interval of instruments listed above is one year.									

Test Item	Conducted Emission							
Test Site	Conduction room 1 / (CO01-WS)							
Tested Date	Oct. 27, 2022	Oct. 27, 2022						
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until			
Receiver	R&S	ESR3	101658	Feb. 16, 2022	Feb. 15, 2023			
LISN	R&S	ENV216	101579	Apr. 21, 2022	Apr. 20, 2023			
LISN (Support Unit)	SCHWARZBECK	NSLK 8127	8127667	Jan .07, 2022	Jan .06, 2023			
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 17, 2022	Oct. 16, 2023			
50 ohm terminal (Support Unit)	NA	50	04	May 10, 2022	May 09, 2023			
Measurement Software	AUDIX	e3	6.120210k	NA	NA			

1.5 Test Standards

47 CFR FCC Part 15.247 ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 FCC KDB 662911 D01 Multiple Transmitter Output v02r01

1.7 Deviation from Test Standard and Measurement Procedure

None

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1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty				
Parameters	Uncertainty			
Bandwidth	±34.130 Hz			
Conducted power	±0.808 dB			
Power density	±0.583 dB			
Conducted emission	±2.715 dB			
AC conducted emission	±2.92 dB			
Unwanted Emission ≤ 1GHz	±3.41 dB			
Unwanted Emission > 1GHz	±4.59 dB			

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2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS, TH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

FCC Designation No.: TW2732FCC site registration No.: 181692

➤ ISED#: 10807A

➤ CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration		
Non-beamforming mode						
AC Power Line Conducted Emission	11b	2437	1 Mbps			
Unwanted Emissions ≤ 1GHz	11b	2437	1 Mbps			
Unwanted Emissions >1GHz Conducted Output Power 6dB bandwidth Power Spectral Density	11b 11g ax HE20 ax HE40	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0			
Beamforming mode						
Conducted Output Power	ax HE20 ax HE40	2412 / 2437 / 2462 2422 / 2437 / 2452	MCS 0 MCS 0			

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3 Transmitter Test Results

3.1 6dB and Occupied Bandwidth

3.1.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.1.2 Test Procedures

6dB Bandwidth

- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- Detector = Peak, Trace mode = max hold.
- 3. Sweep = auto couple, Allow the trace to stabilize.
- 4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

- 1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
- 2. Detector = Sample, Trace mode = max hold.
- 3 Sweep = auto couple, Allow the trace to stabilize.
- 4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

3.1.3 Test Setup



3.1.4 Test Results

Ambient Condition	22°C / 63%	Tested By	Alex Huang

Refer to Appendix A.

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3.2 Conducted Output Power

3.2.1 Limit of Conducted Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

Antenna gain > 6dBi

Non Fixed, point to point operations.

The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

Fixed, point to point operations

Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.2.3 Test Setup



3.2.4 Test Results

Ambient Condition	22°C / 63%	Tested By	Alex Huang

Refer to Appendix B.

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3.3 Power Spectral Density

3.3.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.3.2 Test Procedures

Peak PSD

- 1. Set the RBW = 3 kHz, VBW = 10 kHz.
- 2. Detector = Peak, Sweep time = auto couple.
- 3. Trace mode = max hold, allow trace to fully stabilize.
- 4. Use the peak marker function to determine the maximum amplitude level.

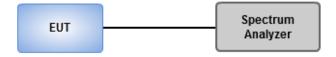
Average PSD, duty cycle ≥ 98%

- Set the RBW = 30 kHz, VBW = 100 kHz.
- 2. Detector = RMS, Sweep time = auto couple.
- 3. Sweep time = auto couple.
- 4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- 5. Use the peak marker function to determine the maximum amplitude level.

Average PSD, duty cycle < 98%

- 1 Set the RBW = 30 kHz, VBW = 100 kHz. Detector = RMS.
- Set the sweep time to: \geq 10 (number of measurement points in sweep) x (total on/off period of the transmitted signal).
- 3 Perform the measurement over a single sweep.
- 4 Use the peak marker function to determine the maximum amplitude level.
- 5 Add 10 log (1/x), where x is the duty cycle.

3.3.3 Test Setup



3.3.4 Test Results

Ambient Condition	22°C / 63%	Tested By	Alex Huang
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Refer to Appendix C.

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3.4 Unwanted Emissions into Restricted Frequency Bands

3.4.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit					
Frequency Range (MHz) Field Strength (uV/m) Field Strength (dBuV			Measure Distance (m)		
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300		
0.490~1.705	24000/F(kHz)	33.8 - 23	30		
1.705~30.0	30	29	30		
30~88	100	40	3		
88~216	150	43.5	3		
216~960	200	46	3		
Above 960	500	54	3		

Note 1:

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit **Note 2**:

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.4.2 Test Procedures

- 1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
- 2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
- 3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

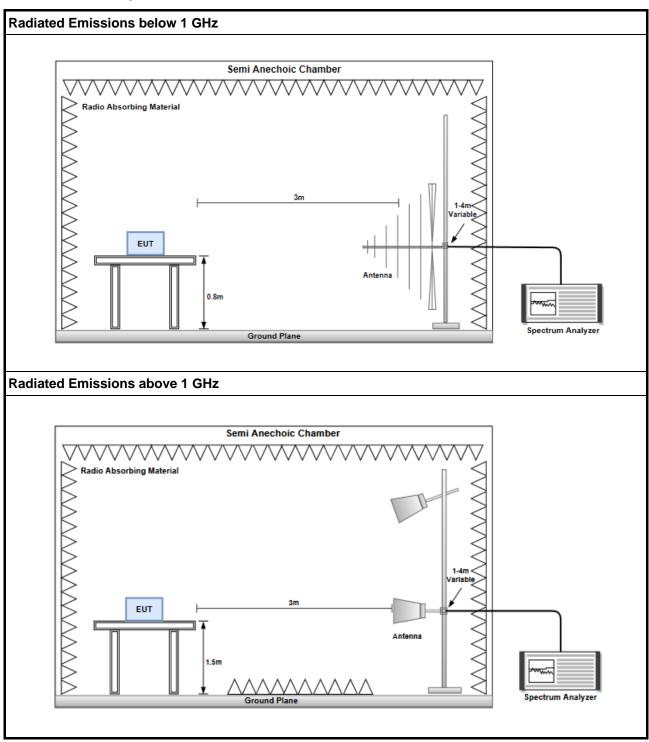
Note:

- 1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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3.4.3 Test Setup



3.4.4 Test Results

Refer to Appendix D.

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3.5 Emissions in Non-Restricted Frequency Bands

3.5.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.5.2 Test Procedures

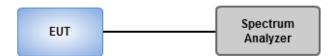
Reference level measurement

- 1. Set RBW=100kHz, VBW = 300kHz, Detector = Peak, Sweep time = Auto
- 2. Trace = max hold, Allow Trace to fully stabilize
- 3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

- 1. Set RBW=100kHz, VBW = 300kHz, Detector = Peak, Sweep time = Auto
- 2. Trace = max hold, Allow Trace to fully stabilize
- 3. Scan Frequency range is up to 25GHz
- 4. Use the peak marker function to determine the maximum amplitude level

3.5.3 Test Setup



3.5.4 Test Results

Ambient Condition	22°C / 63%	Tested By	Alex Huang
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Refer to Appendix E.

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3.6 AC Power Line Conducted Emissions

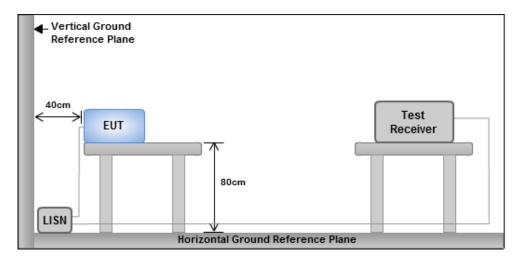
3.6.1 Limit of AC Power Line Conducted Emissions

Conducted Emissions Limit						
Frequency Emission (MHz) Quasi-Peak Average						
0.15-0.5	66 - 56 *	56 - 46 *				
0.5-5	56	46				
5-30 60 50						
Note 1: * Decreases with the logarithm of the frequency.						

3.6.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- 2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V / 60Hz.

3.6.3 Test Setup



Note: 1. Support units were connected to second LISN.

Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.6.4 Test Results

Refer to Appendix F.

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4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou

Tel: 886-2-2601-1640 No.30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan (R.O.C.)

Kwei Shan

Tel: 886-3-271-8666
No.3-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640 No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 333, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666 Fax: 886-3-318-0345

Email: ICC Service@icertifi.com.tw

==END==

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Appendix A

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	8.05M	12.969M	13M0G1D	7.05M	12.719M
802.11g_Nss1,(6Mbps)_2TX	15.1M	16.392M	16M4D1D	10.3M	16.167M
802.11ax HEW20_Nss2,(MCS0)_2TX	16.4M	18.891M	18M9D1D	11.275M	18.741M
802.11ax HEW40_Nss2,(MCS0)_2TX	36.35M	37.781M	37M8D1D	20.35M	37.381M

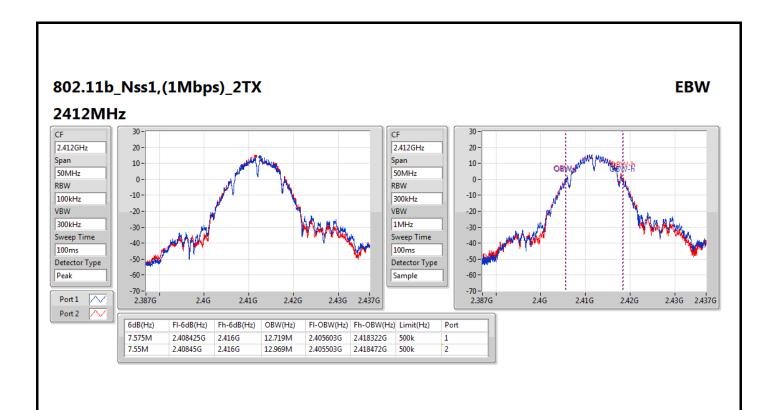
 $\label{eq:max-N} \ dB = Maximum \ 6dB \ down \ bandwidth; \ Max-OBW = Maximum \ 99\% \ occupied \ bandwidth; \\ Min-N \ dB = Minimum \ 6dB \ down \ bandwidth; \ Min-OBW = Minimum \ 99\% \ occupied \ bandwidth$

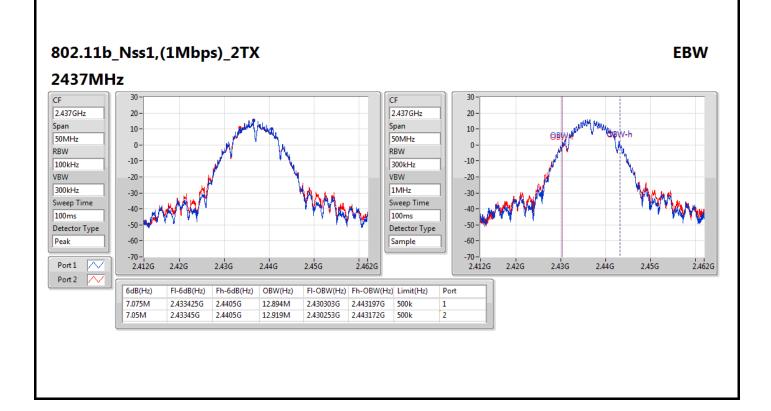
Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	7.575M	12.719M	7.55M	12.969M
2437MHz	Pass	500k	7.075M	12.894M	7.05M	12.919M
2462MHz	Pass	500k	8.025M	12.944M	8.05M	12.769M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.1M	16.392M	15.05M	16.342M
2437MHz	Pass	500k	15.05M	16.367M	15.025M	16.392M
2462MHz	Pass	500k	10.3M	16.217M	13.825M	16.167M
802.11ax HEW20_Nss2,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.1M	18.841M	16.4M	18.891M
2437MHz	Pass	500k	16.1M	18.816M	15.875M	18.841M
2462MHz	Pass	500k	12.45M	18.741M	11.275M	18.741M
802.11ax HEW40_Nss2,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	21.95M	37.431M	30M	37.381M
2437MHz	Pass	500k	20.35M	37.531M	32.95M	37.681M
2452MHz	Pass	500k	33.85M	37.781M	36.35M	37.731M

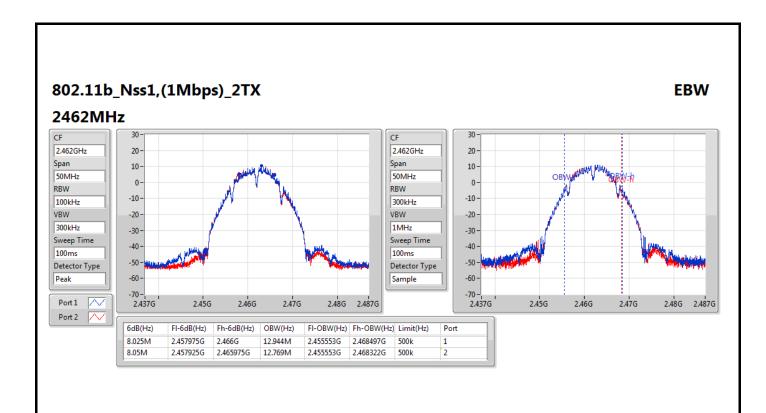
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

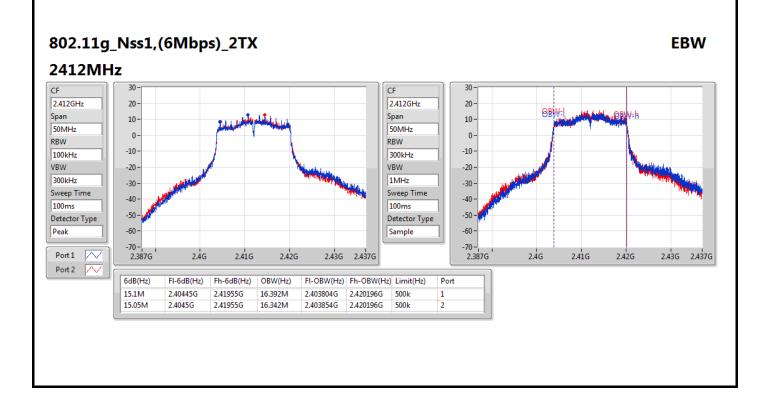




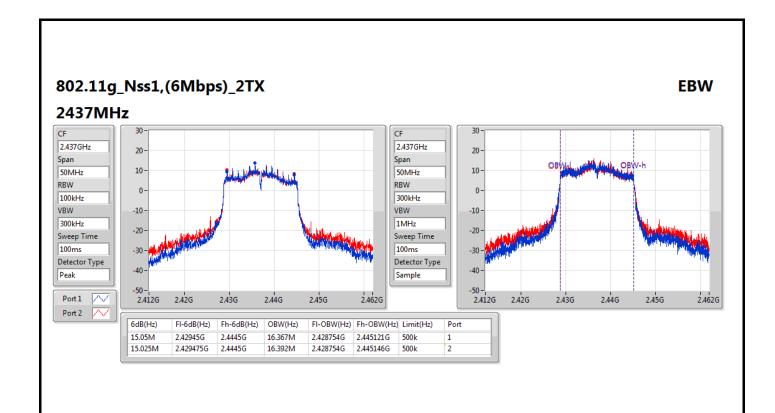


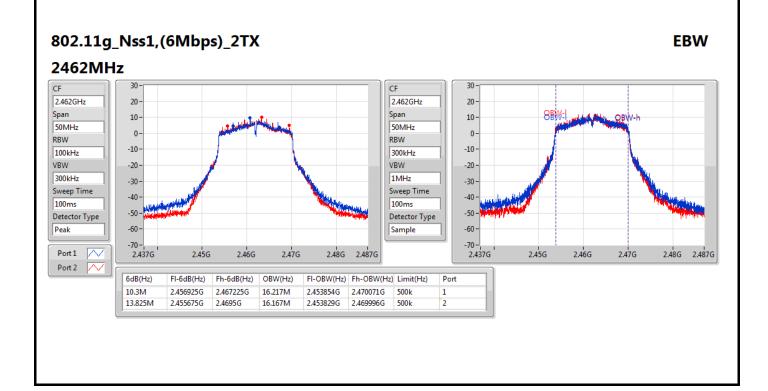




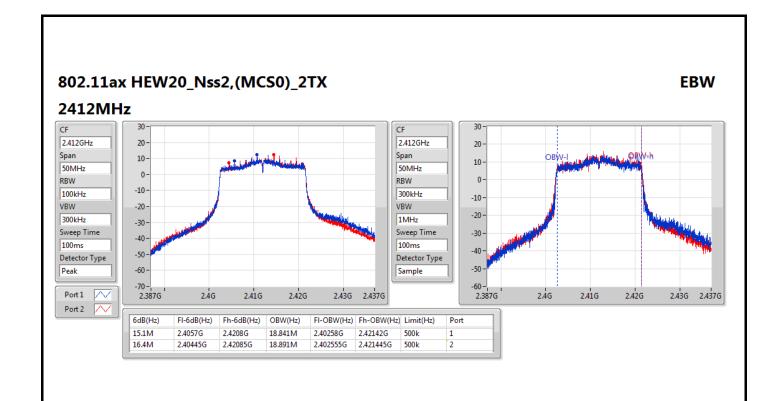


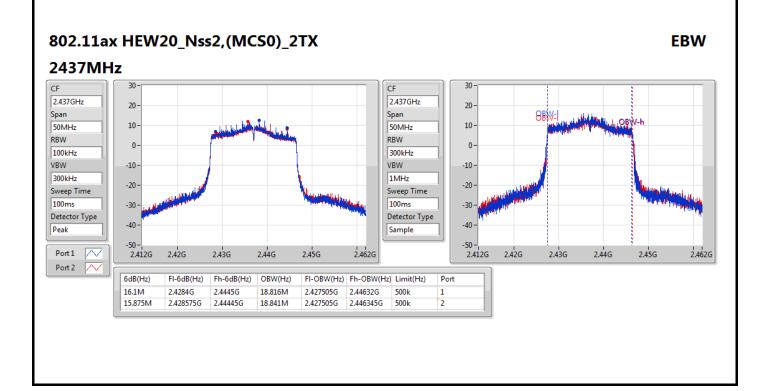




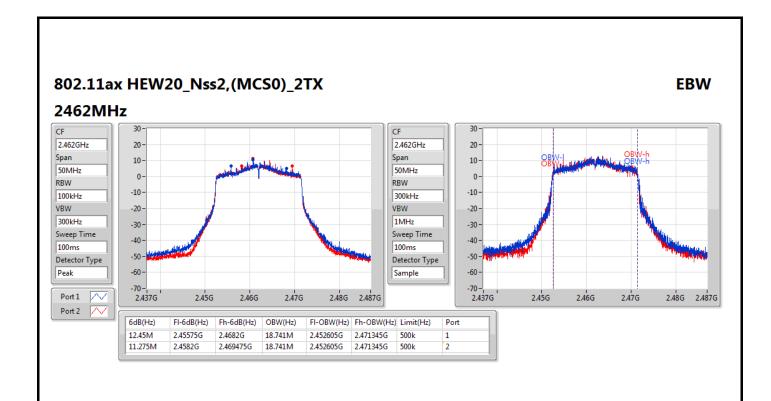


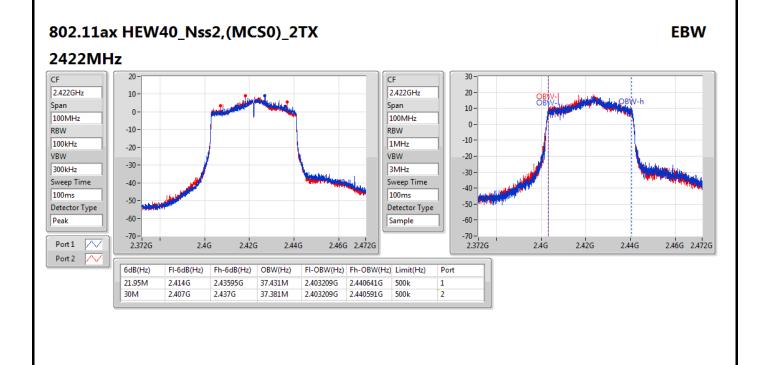




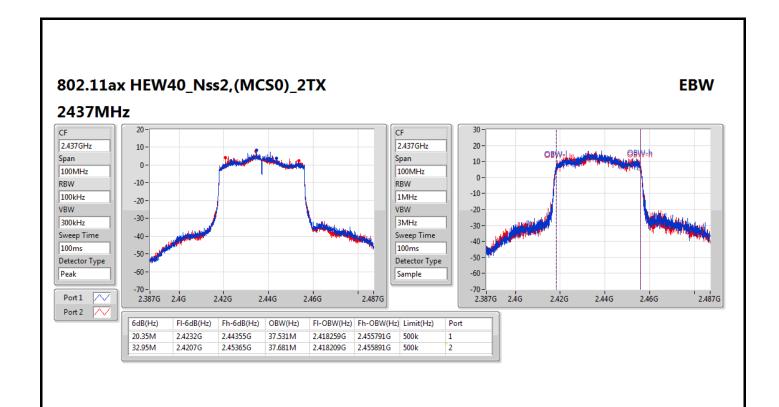


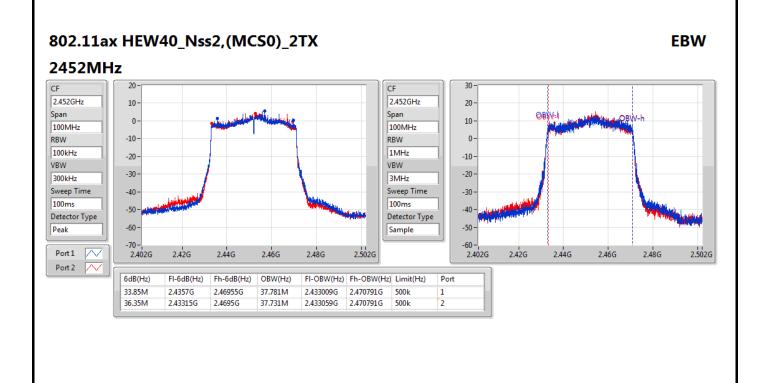














Appendix B.1



Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	26.18	0.41495
802.11g_Nss1,(6Mbps)_2TX	25.64	0.36644
802.11ax HEW20_Nss2,(MCS0)_2TX	25.17	0.32885
802.11ax HEW40_Nss2,(MCS0)_2TX	24.51	0.28249

Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit	EIRP	EIRP Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.00	22.94	23.13	26.05	30.00	30.05	36.00
2437MHz	Pass	4.00	23.12	23.22	26.18	30.00	30.18	36.00
2462MHz	Pass	4.00	18.66	18.75	21.72	30.00	25.72	36.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.00	22.32	22.14	25.24	30.00	29.24	36.00
2437MHz	Pass	4.00	22.65	22.61	25.64	30.00	29.64	36.00
2462MHz	Pass	4.00	19.35	19.55	22.46	30.00	26.46	36.00
802.11ax HEW20_Nss2,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.00	21.63	22.25	24.96	30.00	28.96	36.00
2437MHz	Pass	4.00	22.25	22.07	25.17	30.00	29.17	36.00
2462MHz	Pass	4.00	19.33	19.45	22.40	30.00	26.40	36.00
802.11ax HEW40_Nss2,(MCS0)_2TX	-	-	-	-	-	-	-	-
2422MHz	Pass	4.00	21.48	21.51	24.51	30.00	28.51	36.00
2437MHz	Pass	4.00	20.27	20.25	23.27	30.00	27.27	36.00
2452MHz	Pass	4.00	18.23	18.35	21.30	30.00	25.30	36.00

DG = Directional Gain; Port X = Port X output power



Conducted Output Power(Average)

Appendix B.2

Summary

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11ax HEW20-BF_Nss2,(MCS0)_2TX	22.16	0.16444
802.11ax HEW40-BF_Nss2,(MCS0)_2TX	21.50	0.14125

Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit	EIRP	EIRP Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11ax HEW20-BF_Nss2,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.00	18.62	19.24	21.95	30.00	25.95	36.00
2437MHz	Pass	4.00	19.24	19.06	22.16	30.00	26.16	36.00
2462MHz	Pass	4.00	16.32	16.44	19.39	30.00	23.39	36.00
802.11ax HEW40-BF_Nss2,(MCS0)_2TX	-	-	-	-	-	-	-	-
2422MHz	Pass	4.00	18.47	18.5	21.50	30.00	25.50	36.00
2437MHz	Pass	4.00	17.26	17.24	20.26	30.00	24.26	36.00
2452MHz	Pass	4.00	15.22	15.34	18.29	30.00	22.29	36.00

DG = Directional Gain; Port X = Port X output power Directional gain = 10 log $[(10^{4/10} + 10^{4/10})/2] = 4$ dBi



Appendix C



Summary

Mode	PD		
	(dBm/RBW)		
2.4-2.4835GHz	-		
802.11b_Nss1,(1Mbps)_2TX	-0.36		
802.11g_Nss1,(6Mbps)_2TX	-4.43		
802.11ax HEW20_Nss2,(MCS0)_2TX	-7.59		
802.11ax HEW40_Nss2,(MCS0)_2TX	-9.70		

RBW = 3kHz;

Result

Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.01	-3.27	-3.47	-0.36	6.99
2437MHz	Pass	7.01	-3.41	-2.79	-0.58	6.99
2462MHz	Pass	7.01	-8.66	-8.64	-5.69	6.99
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.01	-8.15	-6.71	-4.53	6.99
2437MHz	Pass	7.01	-7.16	-7.52	-4.43	6.99
2462MHz	Pass	7.01	-10.07	-9.31	-7.23	6.99
802.11ax HEW20_Nss2,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.00	-10.88	-9.64	-7.59	8.00
2437MHz	Pass	4.00	-9.95	-10.14	-7.78	8.00
2462MHz	Pass	4.00	-12.22	-12.39	-10.01	8.00
802.11ax HEW40_Nss2,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.00	-12.14	-11.34	-9.70	8.00
2437MHz	Pass	4.00	-14.23	-14.32	-11.96	8.00
2452MHz	Pass	4.00	-16.96	-15.53	-13.92	8.00

DG = Directional Gain

For 802.11b/g

Directional gain = 4 + 10*log(2/1) = 7.01 dBi

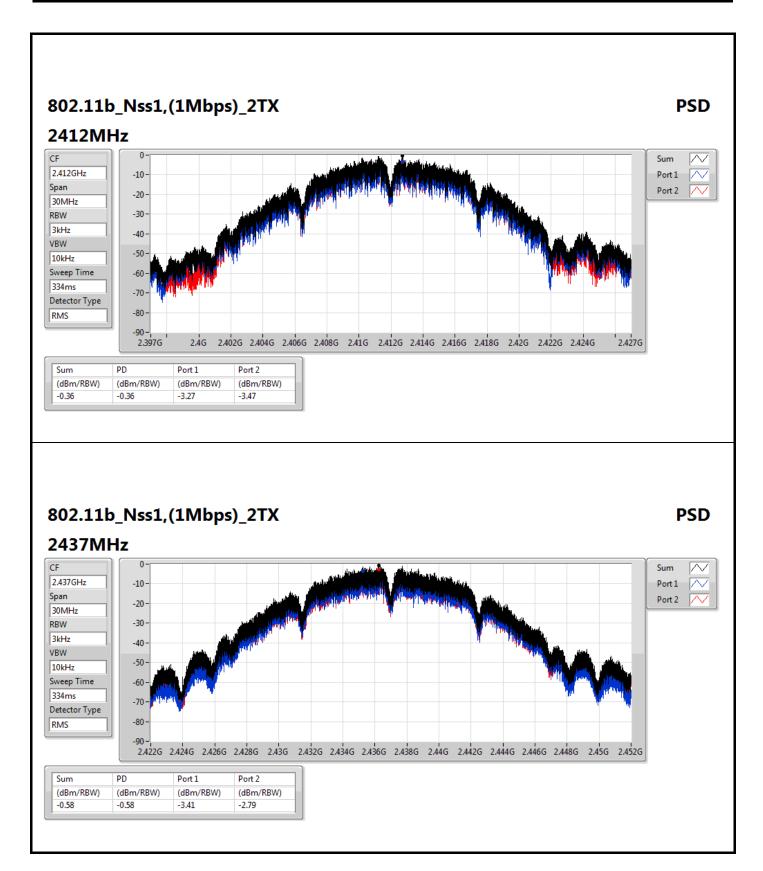
For 802.11ax

Directional gain = $10 \log [(10^{4/10} + 10^{4/10}) / 2] = 4 dBi$

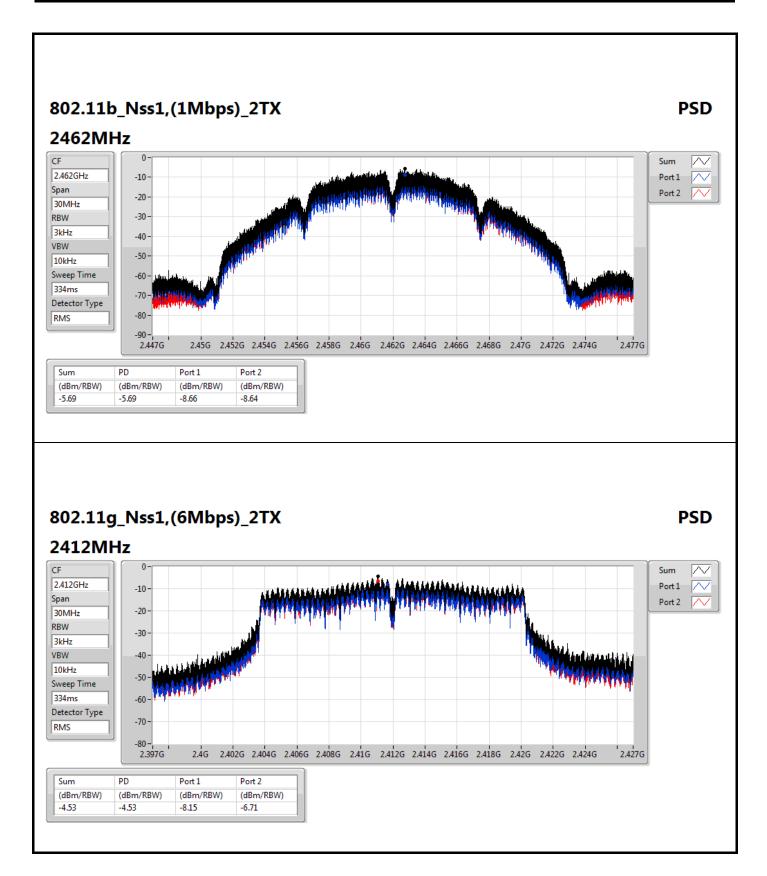
RBW = 3kHz;

PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;

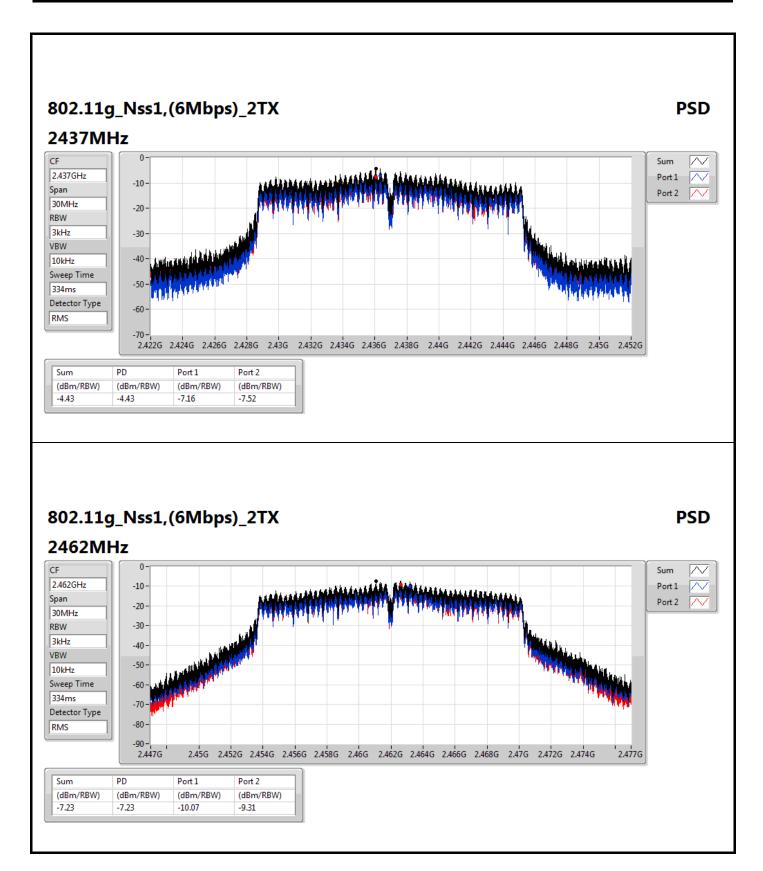




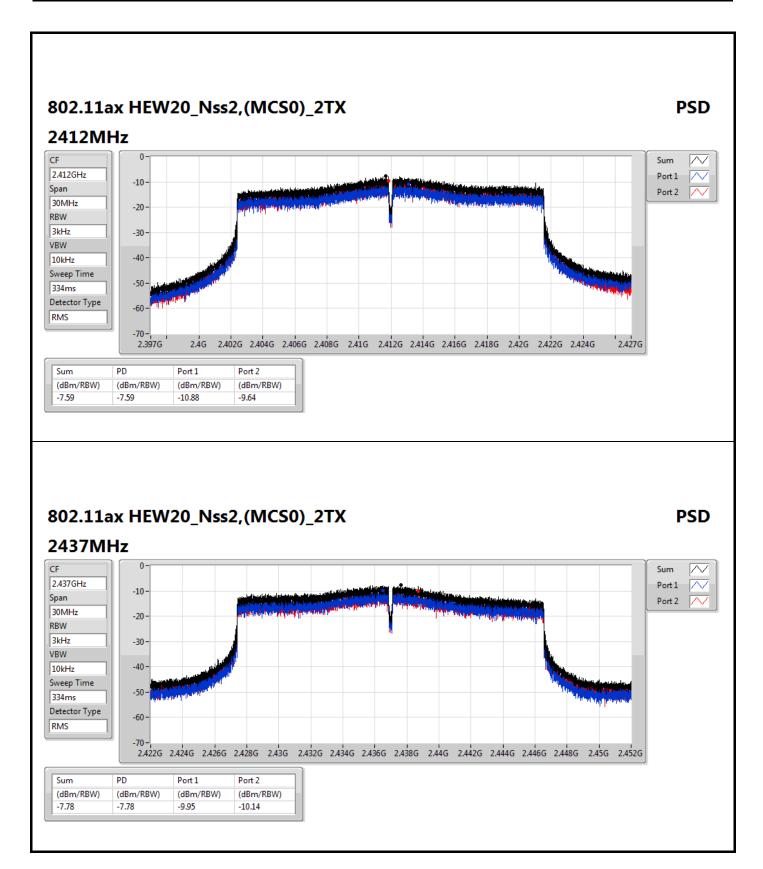




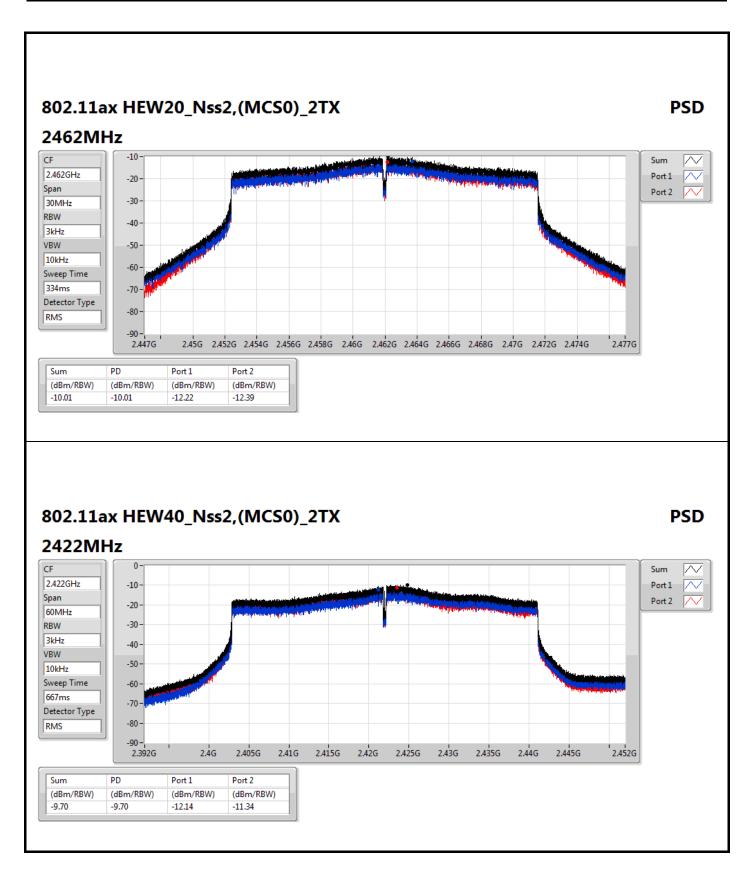




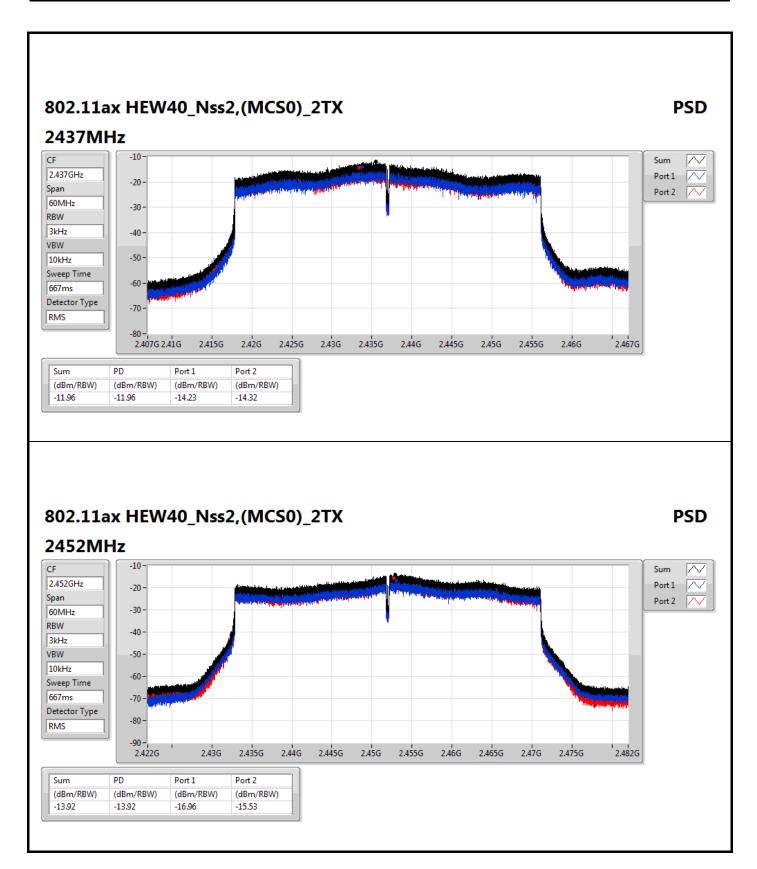






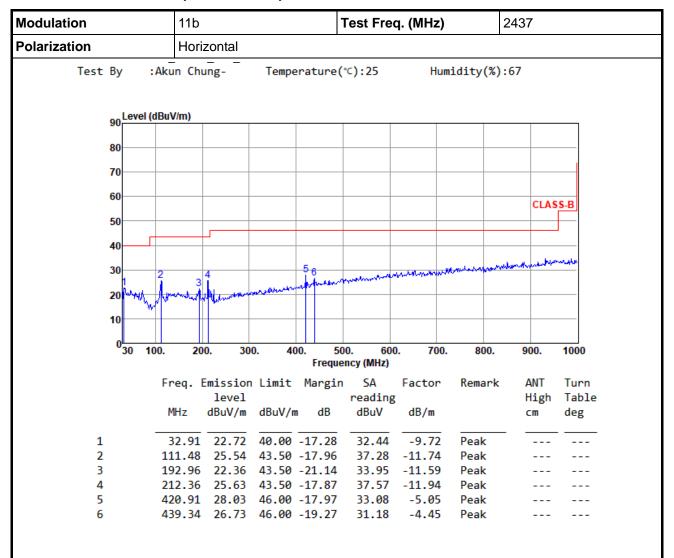








Unwanted Emissions (Below 1GHz)



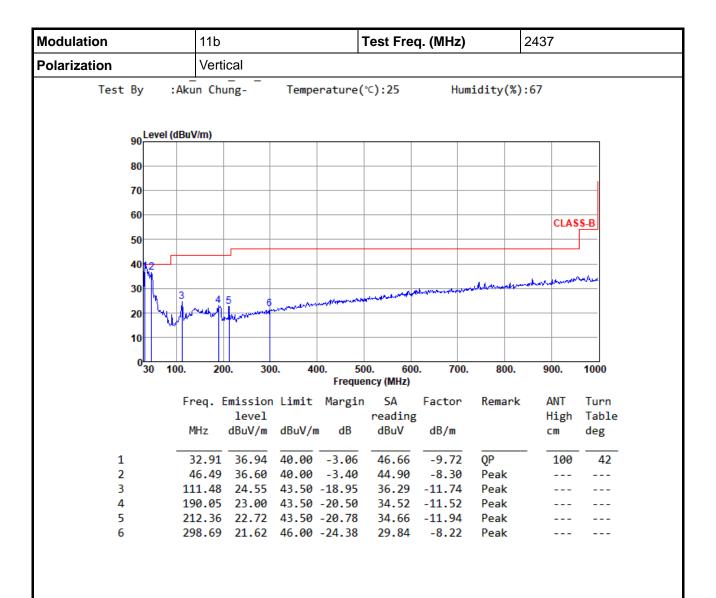
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.





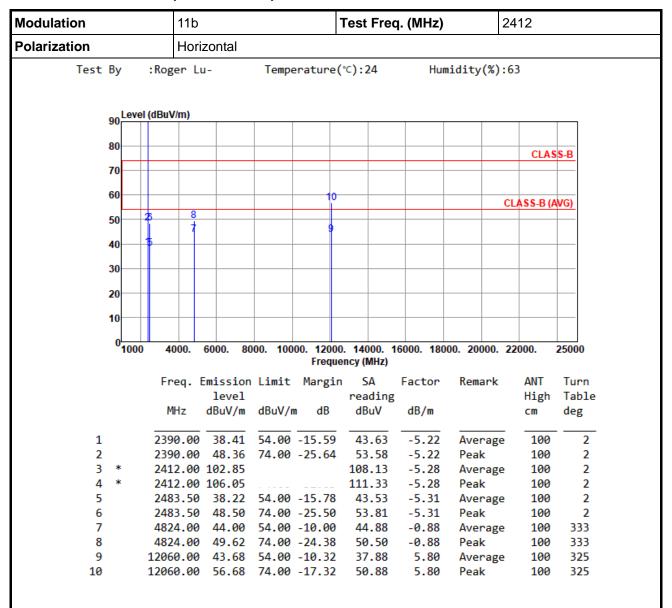
*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



Unwanted Emission (Above 1GHz) for 11b

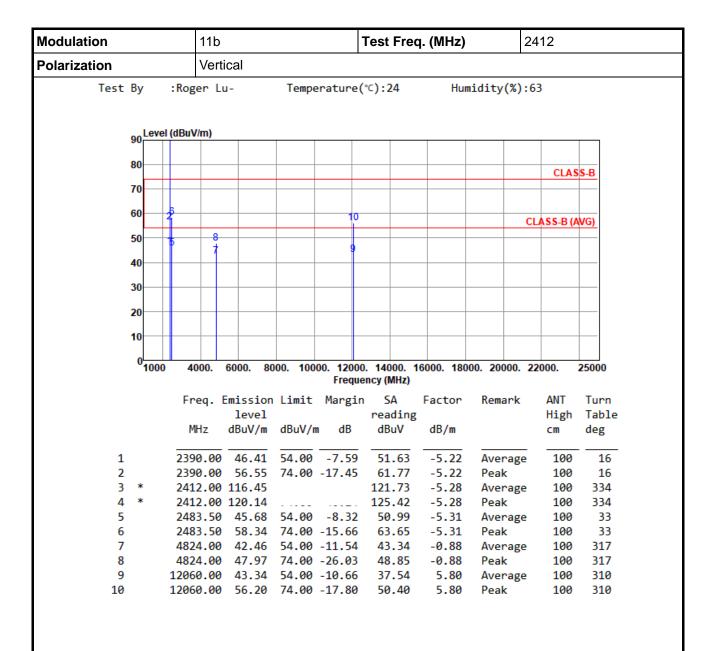


Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

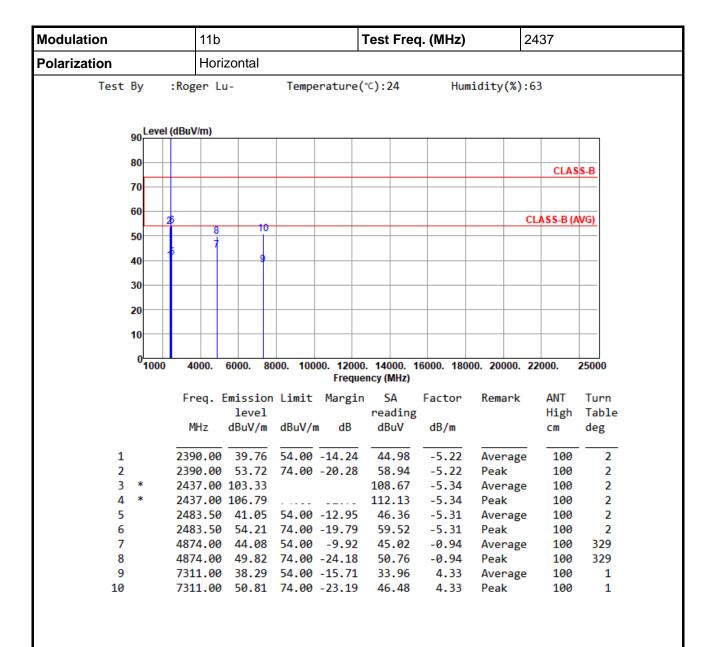




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

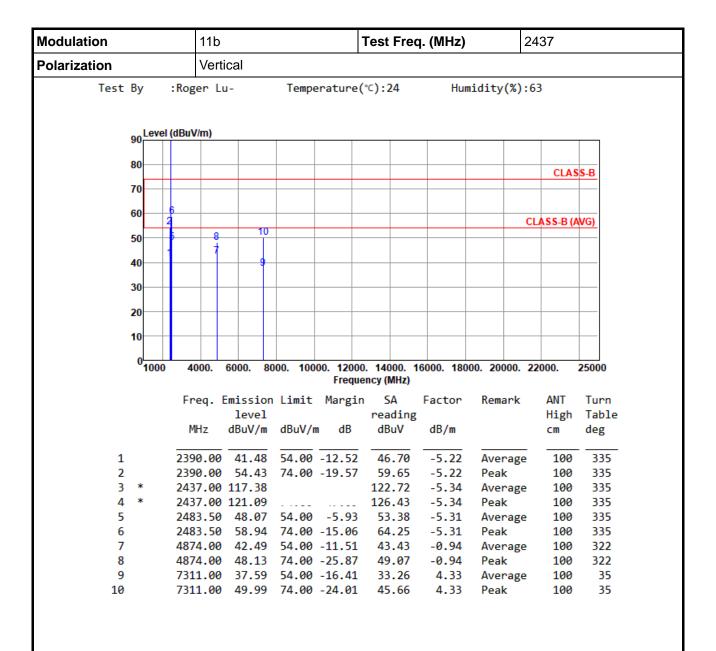




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

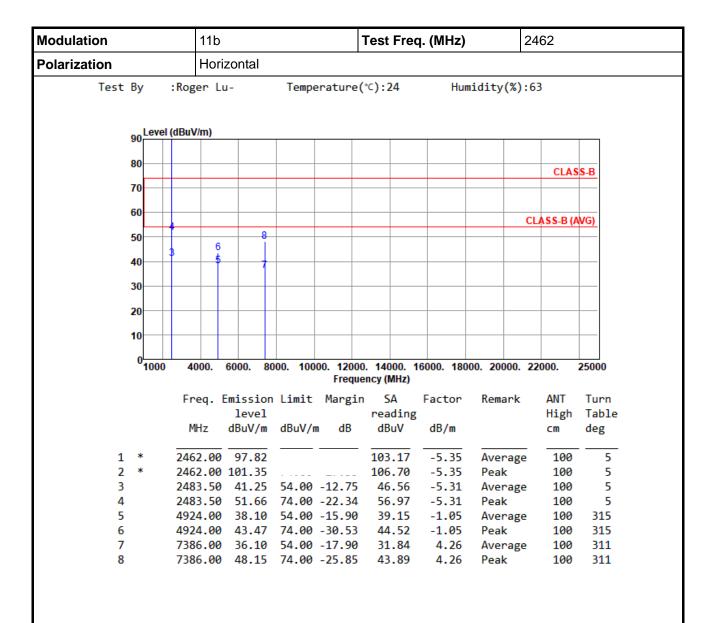




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

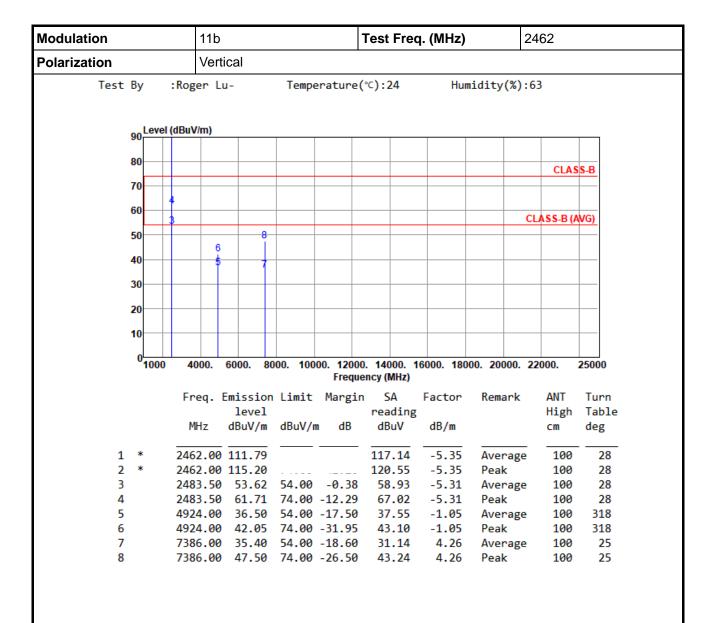




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



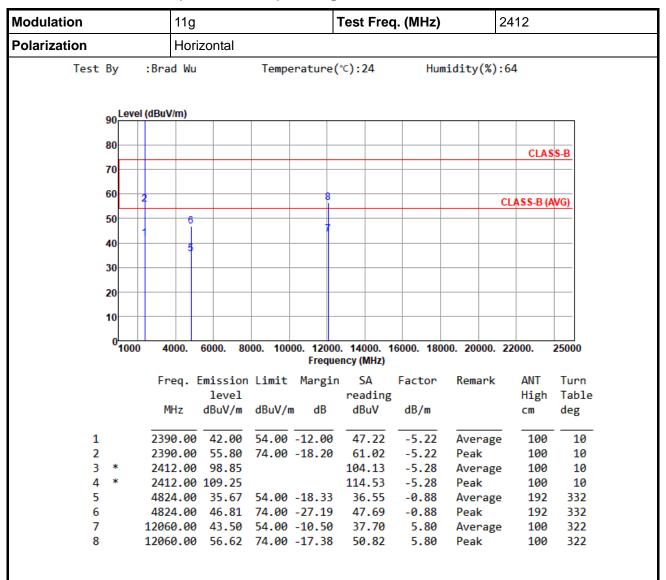


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).



Unwanted Emissions (Above 1GHz) for 11g

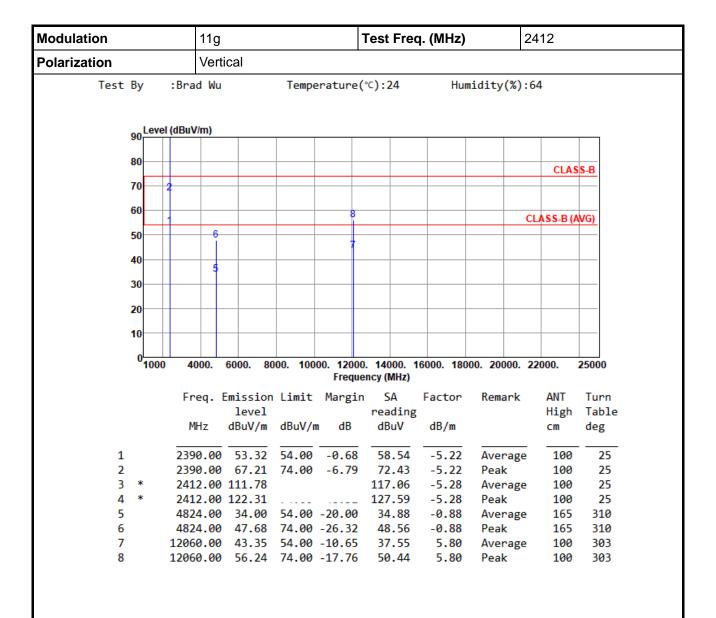


Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

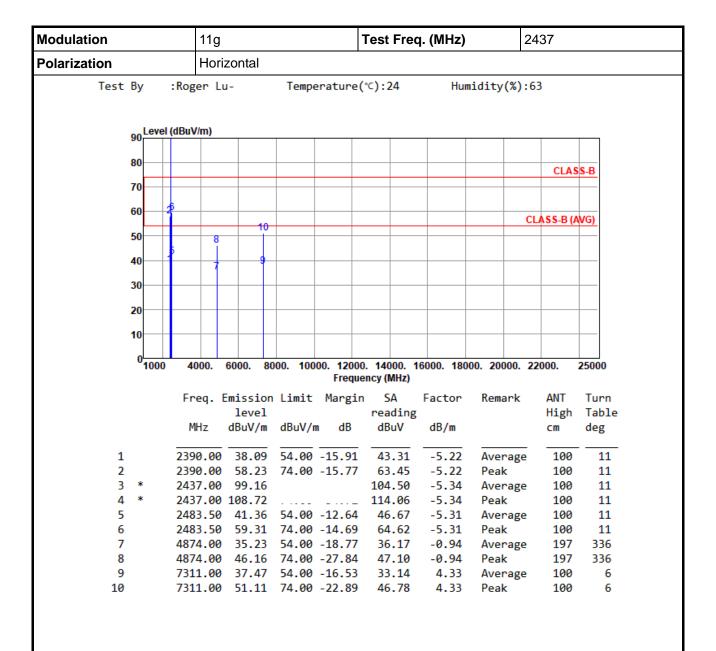




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

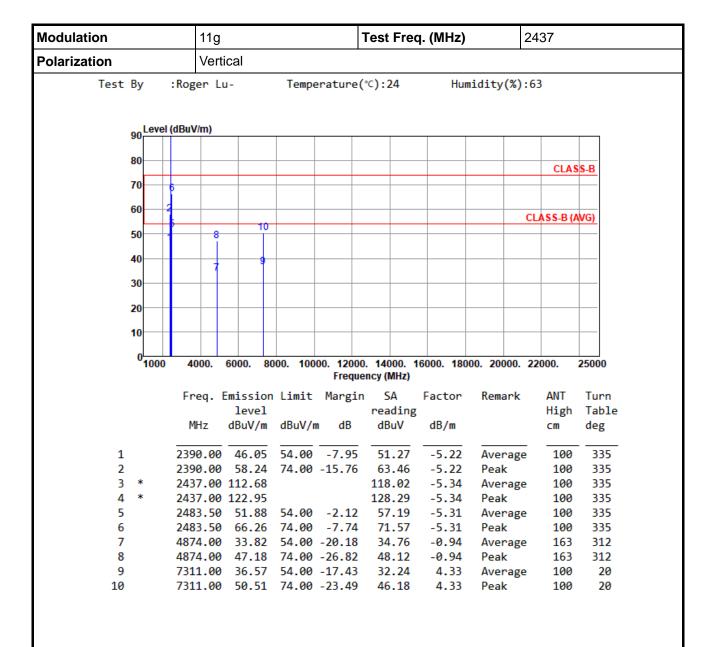




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

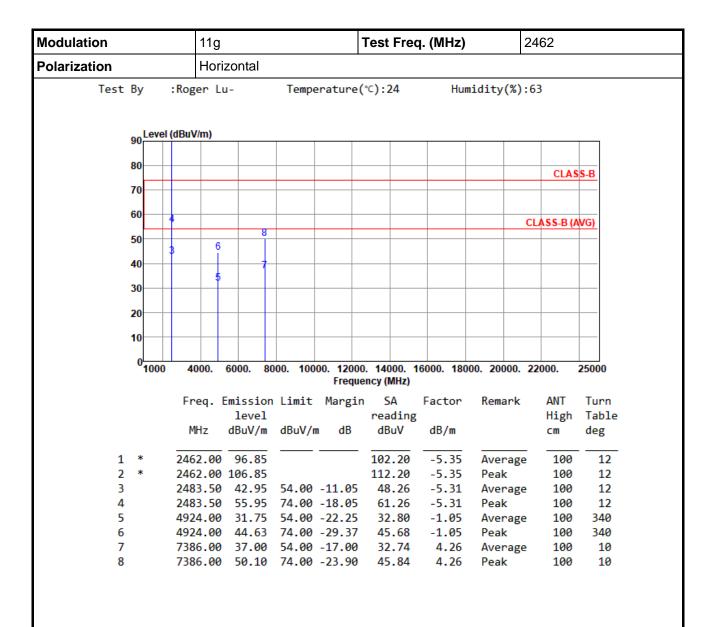




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

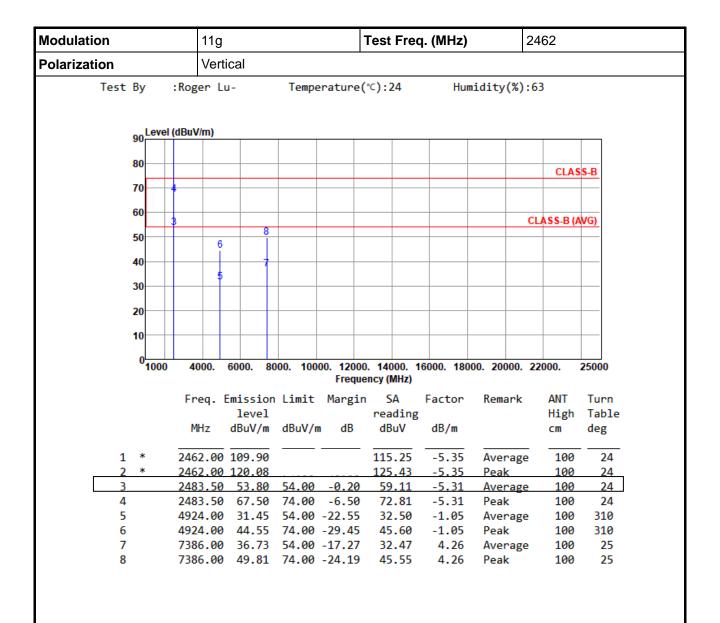




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



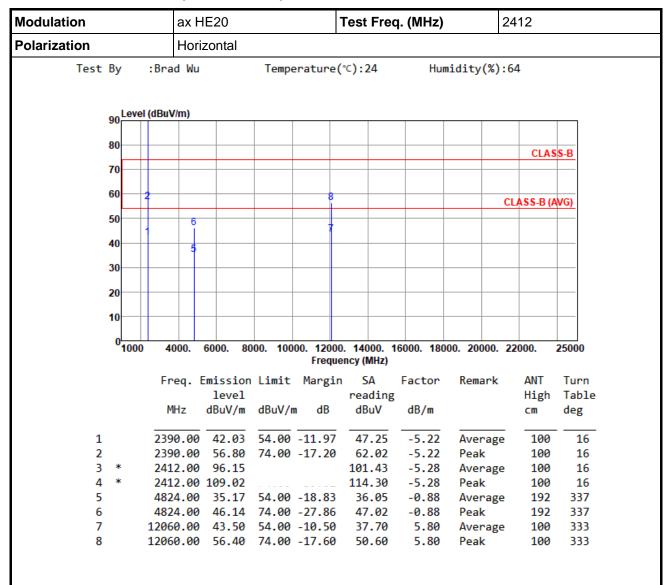


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).



Unwanted Emissions (Above 1GHz) for ax HE20

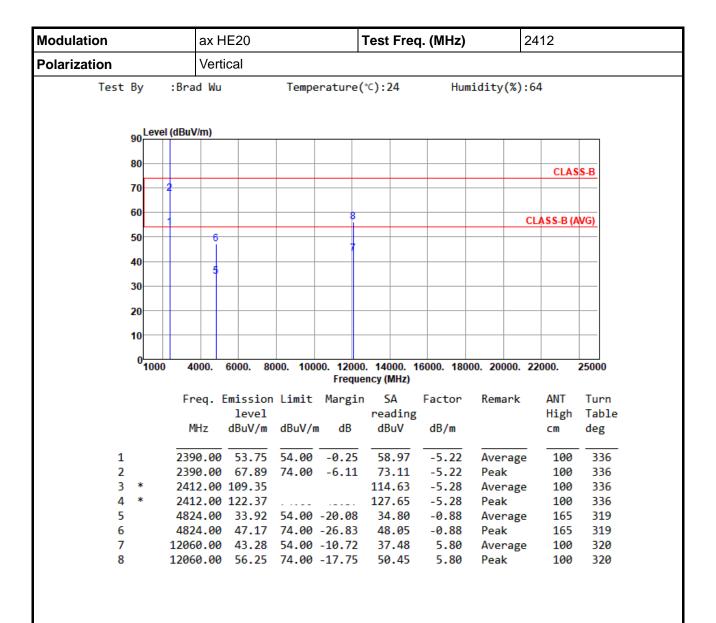


Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

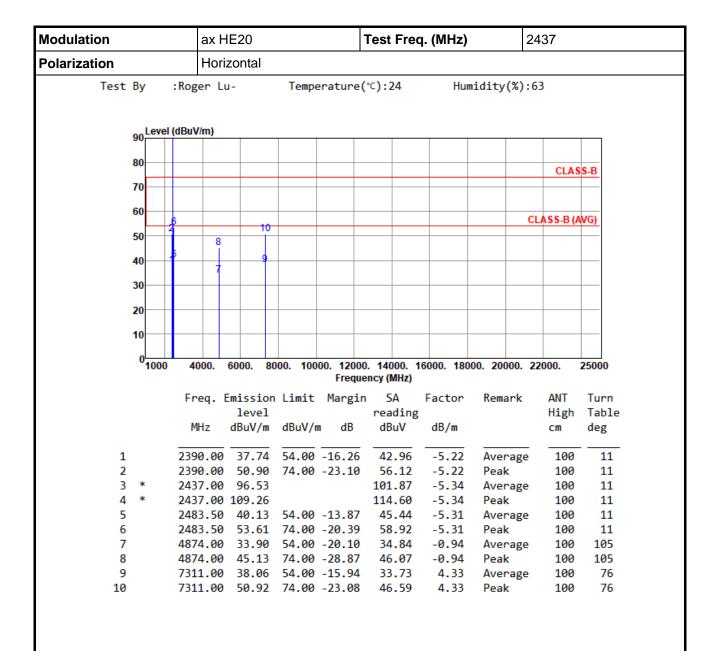




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

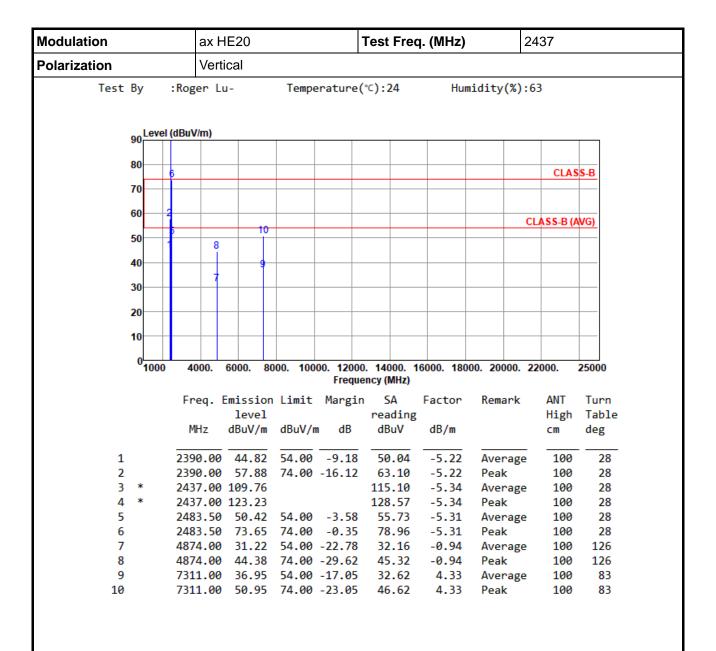




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

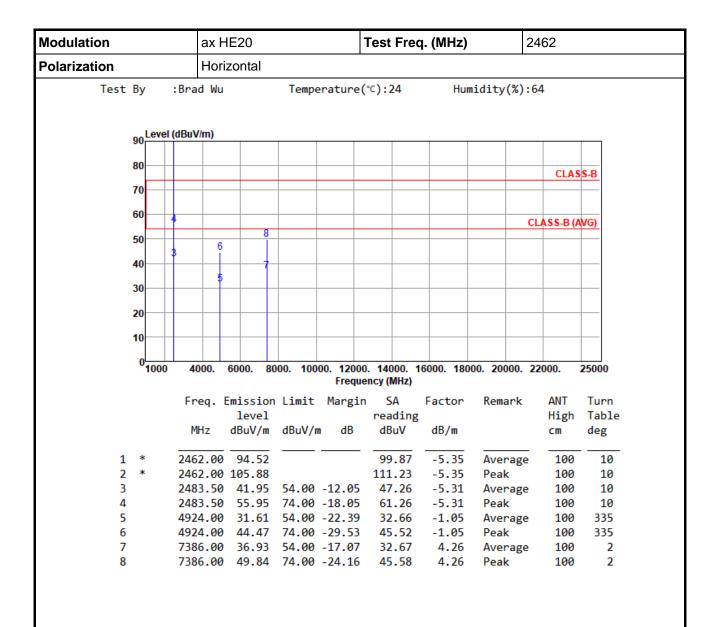




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

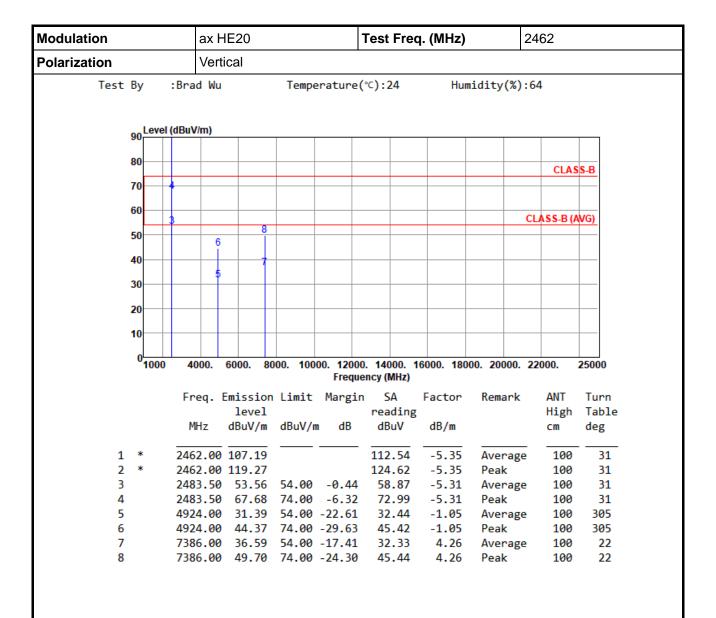




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



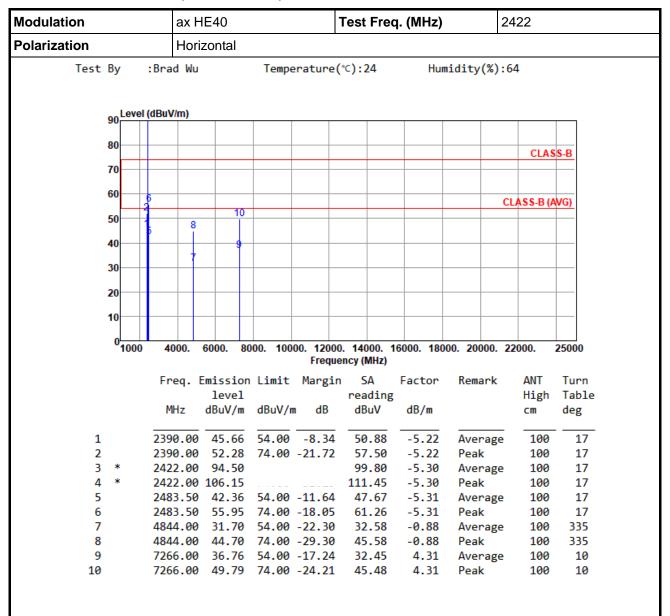


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).



Unwanted Emissions (Above 1GHz) for ax HE40

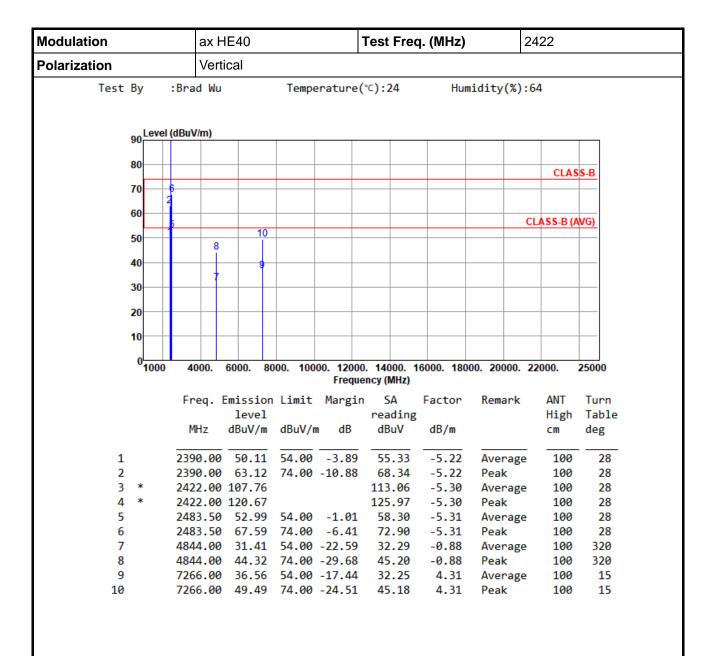


Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

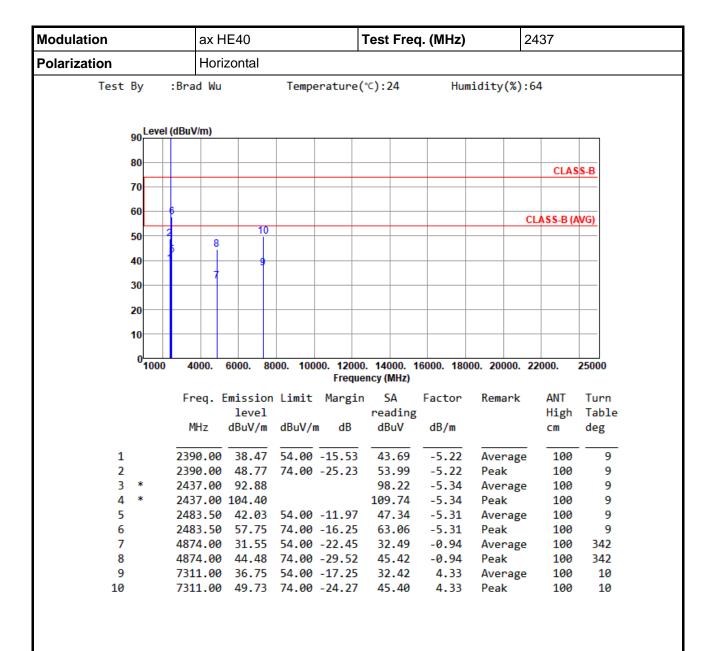




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

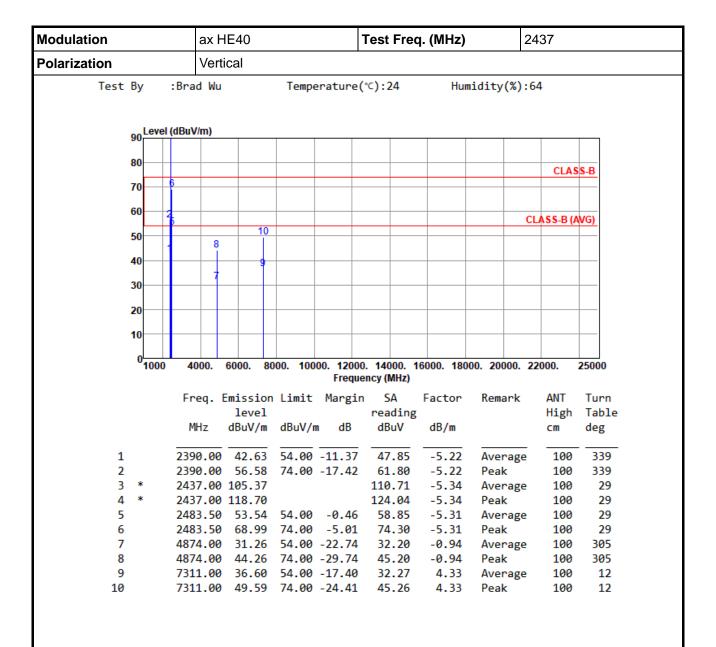




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

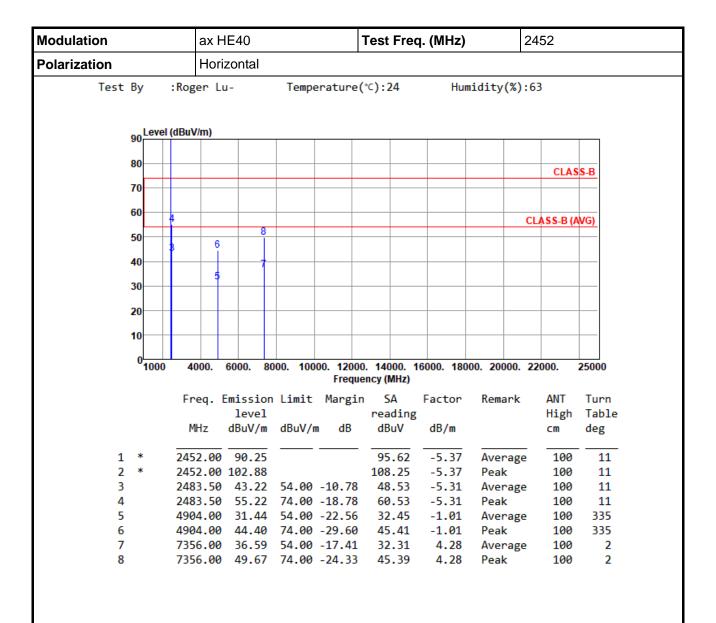




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

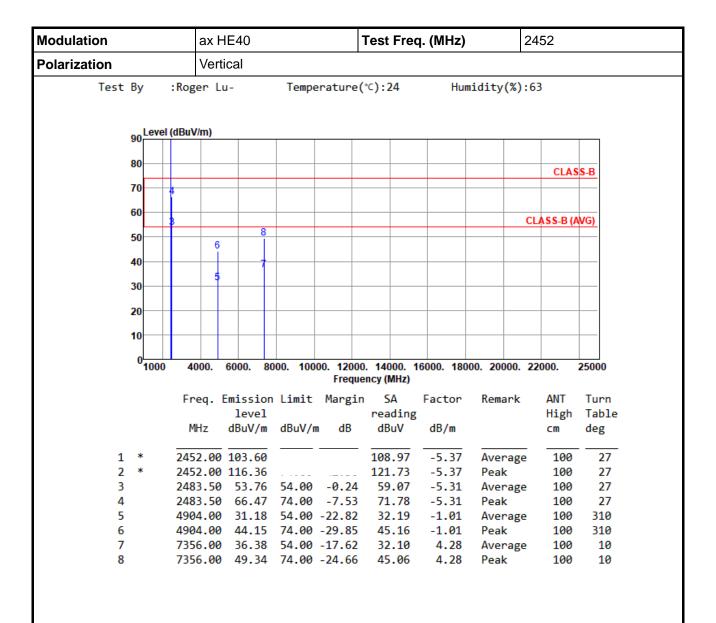




*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

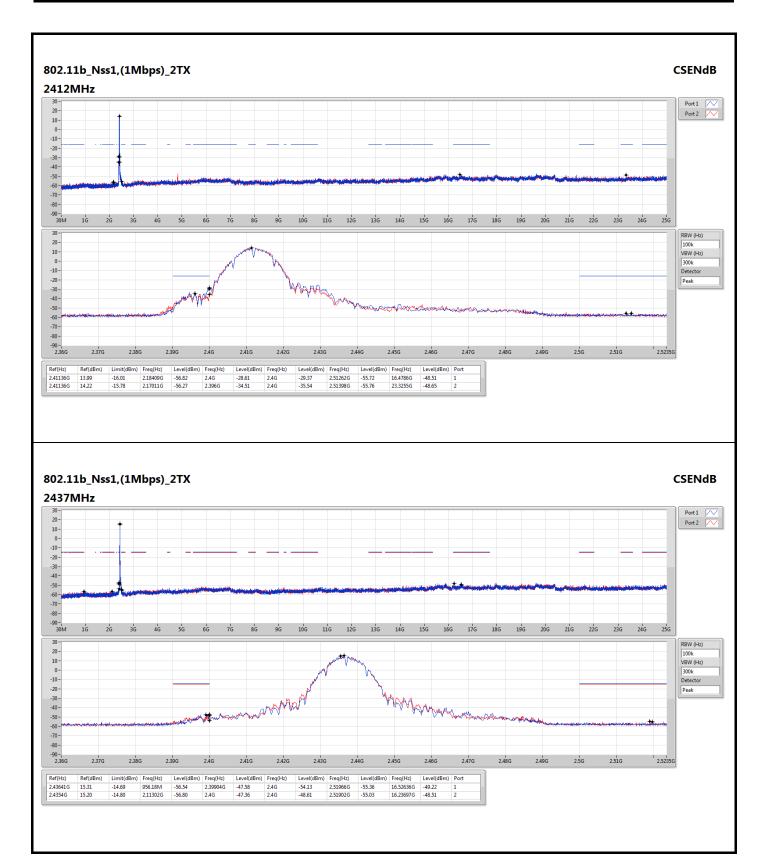




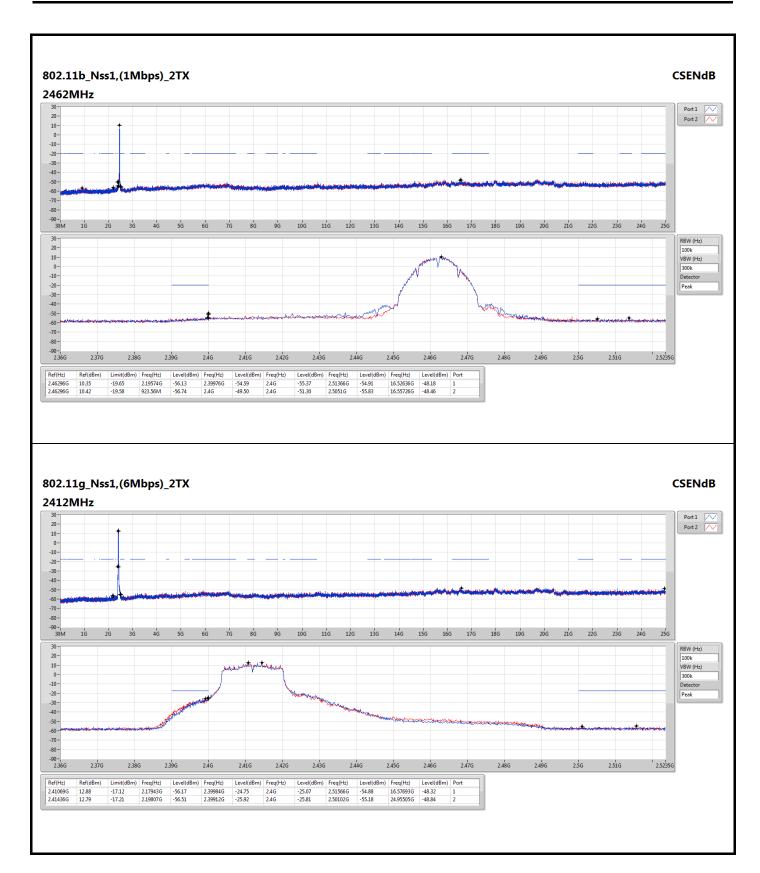
*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

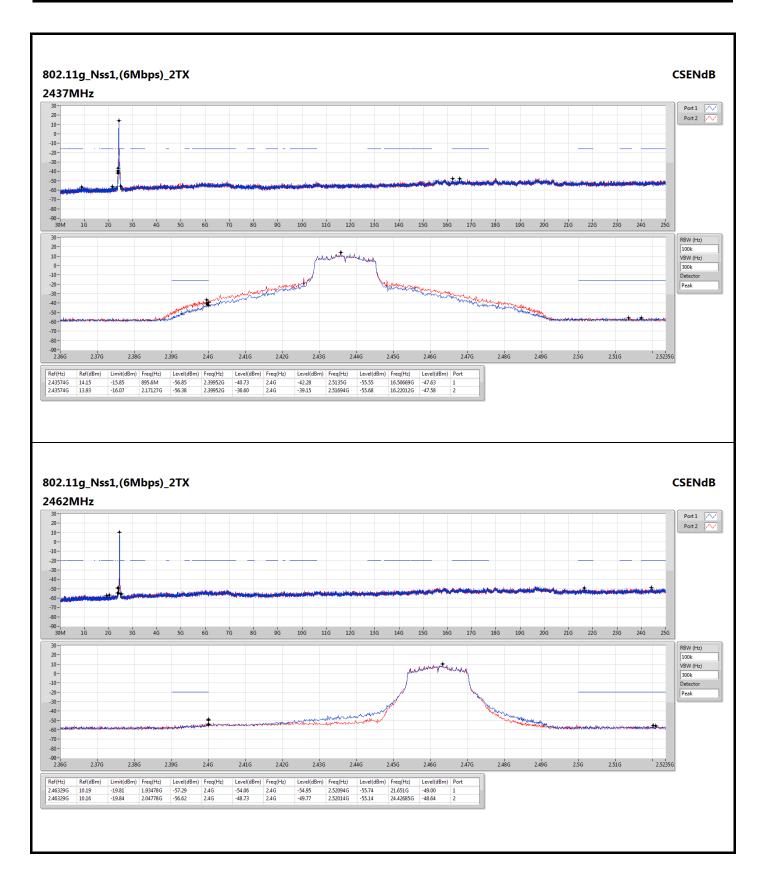




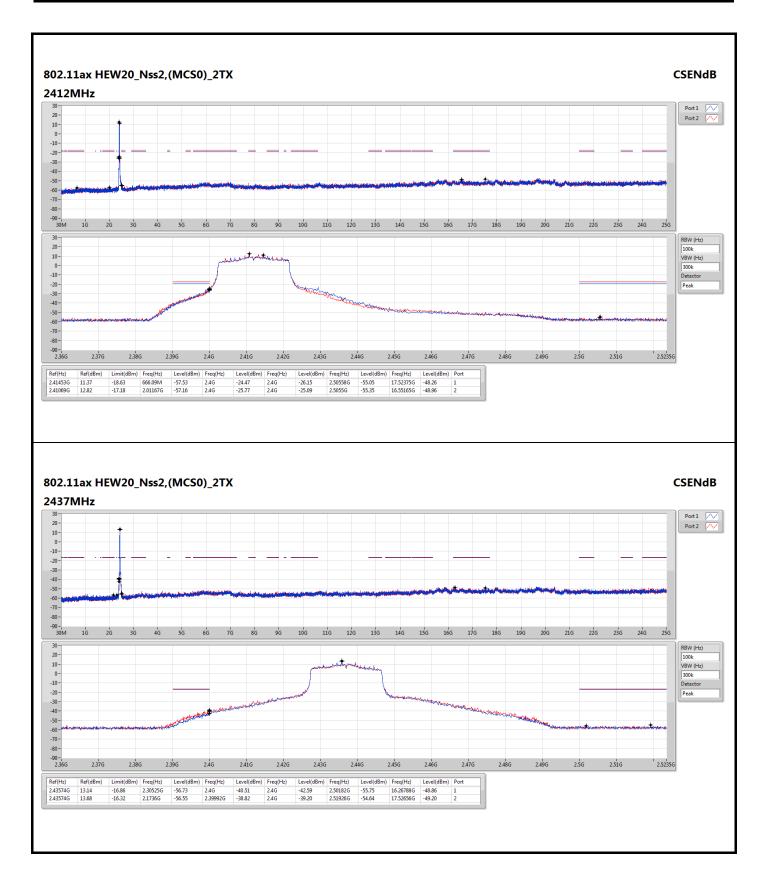




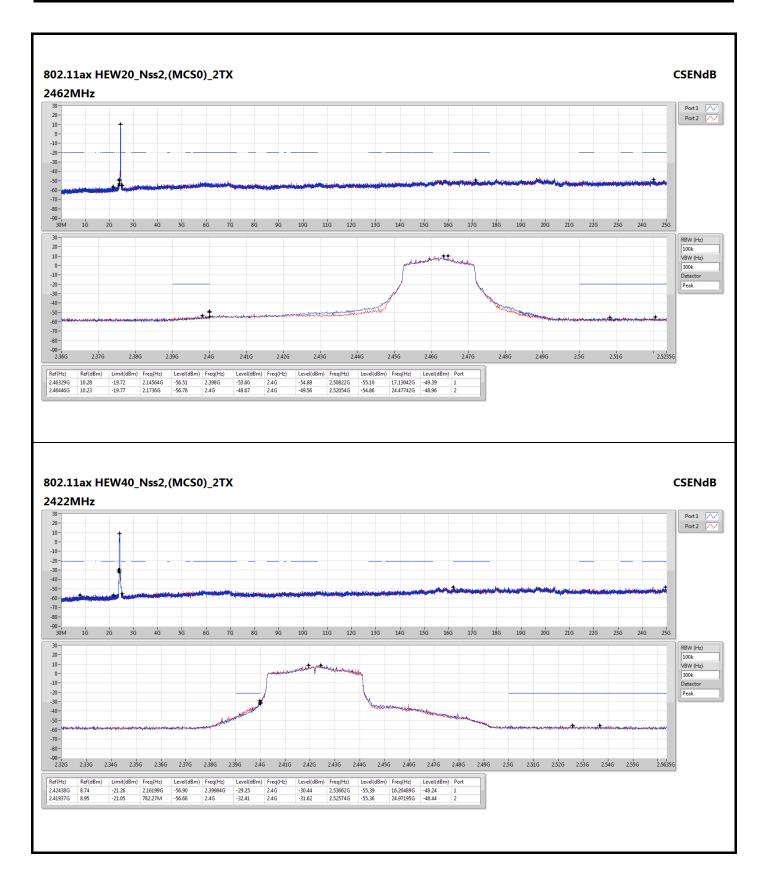




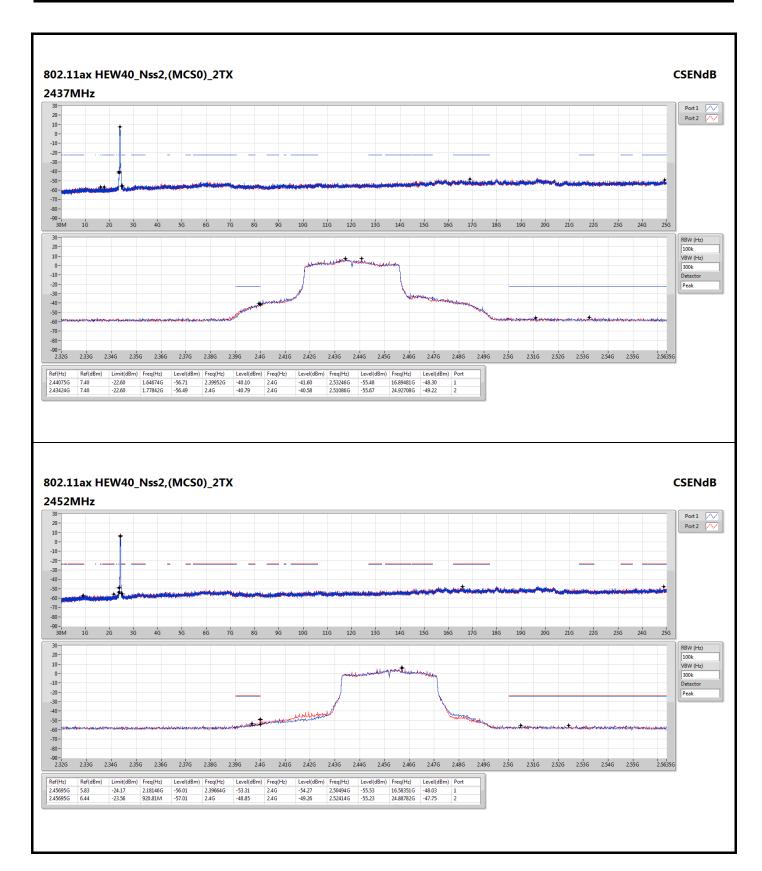




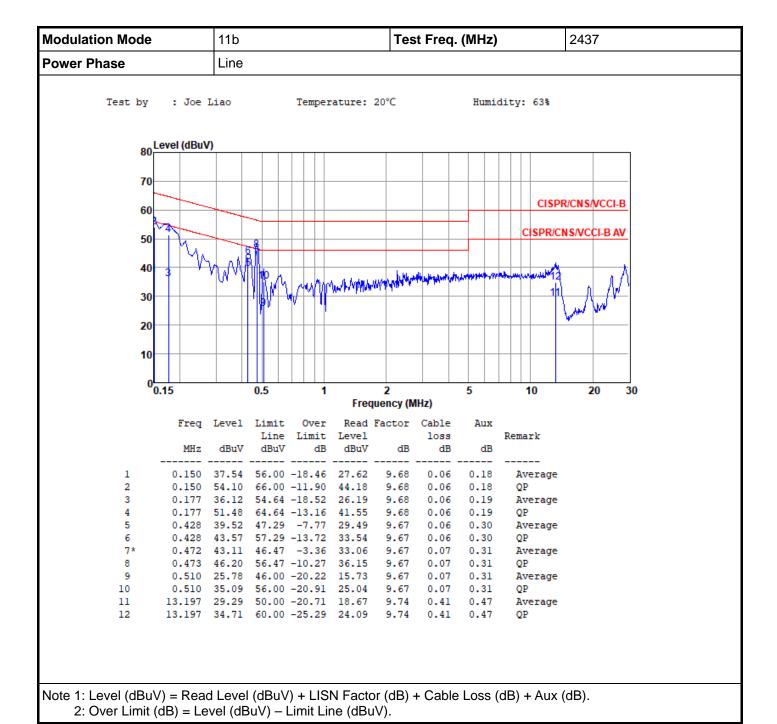






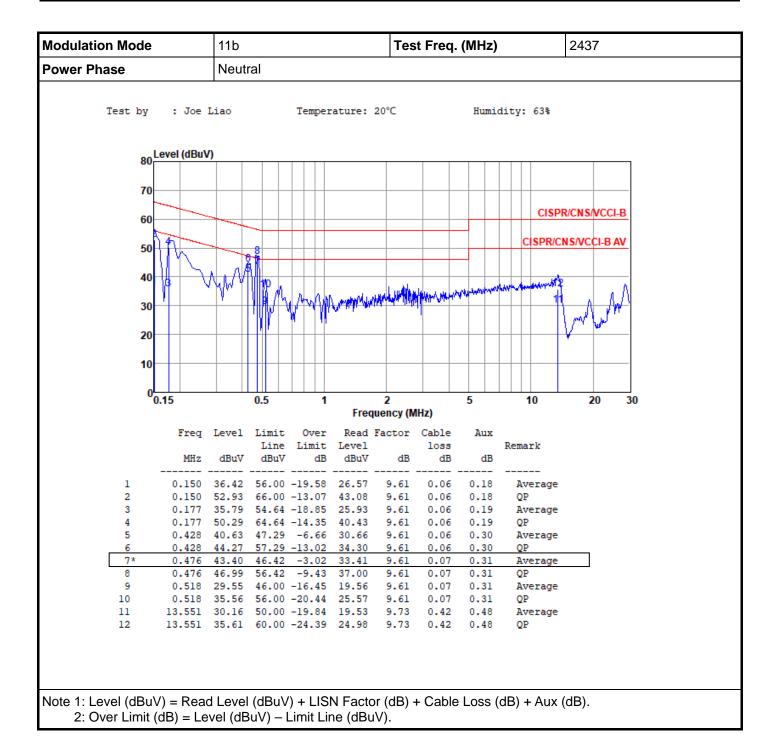






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