

3787

Report No.: FR321751AA

# RADIO TEST REPORT

FCC ID

: UIDG54

Equipment

: Cable Modem

**Brand Name** 

: ARRIS

Model Name

: G54

Applicant

: ARRIS

3871 Lakefield Drive Suite 300 SUWANEE Georgia

United States 30024

Manufacturer

: ARRIS

3871 Lakefield Drive Suite 300 SUWANEE Georgia

United States 30024

Standard

: 47 CFR FCC Part 15.247

The product was received on Feb. 27, 2023, and testing was started from Feb. 27, 2023 and completed on Mar. 24, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB-A10\_10 Ver1.3

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Issued Date

: May 15, 2023

Report Version : 01

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# History of this test report

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Report No.	Version	Description	Issued Date
FR321751AA	01	Initial issue of report	May 15, 2023

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# **Summary of Test Result**

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

#### **Conformity Assessment Condition:**

- 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

#### Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang

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# 1 General Description

#### 1.1 Information

#### 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), VHT20, ax (HEW20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40), VHT40, ax (HEW40)	2422-2452	3-9 [7]

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Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	2TX
2.4-2.4835GHz	802.11g	20	2TX
2.4-2.4835GHz	802.11n HT20	20	2TX
2.4-2.4835GHz	802.11n HT20-BF	20	2TX
2.4-2.4835GHz	VHT20	20	2TX
2.4-2.4835GHz	VHT20-BF	20	2TX
2.4-2.4835GHz	802.11ax HEW20	20	2TX
2.4-2.4835GHz	802.11ax HEW20-BF	20	2TX
2.4-2.4835GHz	802.11n HT40	40	2TX
2.4-2.4835GHz	802.11n HT40-BF	40	2TX
2.4-2.4835GHz	VHT40	40	2TX
2.4-2.4835GHz	VHT40-BF	40	2TX
2.4-2.4835GHz	802.11ax HEW40	40	2TX
2.4-2.4835GHz	802.11ax HEW40-BF	40	2TX

#### Note:

- ◆ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- HEW20, HEW40 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.

BWch is the nominal channel bandwidth.

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#### 1.1.2 Antenna Information

		Port	t						
A4		5G	Hz		Brand	Model	del Ant.		Support Band
Ant.	2.4GHz	UNII1 UNII2A	UNII2C UNII3	6GHz	Біапи	Name	Туре	Connector	Зирроп Вапи
1	-	2	-	-	Wanshih	WPB866	DIPOLE	I-PEX	5GHz UNII 1, 2A
2	1	-	1	-	Wanshih	WPB867	DIPOLE	I-PEX	2.4GHz/5GHz UNII 2C, 3
3	-	1	-	-	Wanshih	WPB868	DIPOLE	I-PEX	5GHz UNII 1, 2A
4	2	-	2	-	Wanshih	WPB869	DIPOLE	I-PEX	2.4GHz/5GHz UNII 2C, 3
5	-	-	-	2	Wanshih	WPB870	DIPOLE	I-PEX	6GHz
6	-	-	-	1	Wanshih	WPB871	DIPOLE	I-PEX	6GHz
7	-	-	-	4	Wanshih	WPB872	DIPOLE	I-PEX	6GHz
8	-	-	-	3	Wanshih	WPB873	DIPOLE	I-PEX	6GHz

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Ant.		Antenna Gain (	dBi)	A m t	Antenna Gain (dBi)
	2.4GHz	5GHz UNII1 / UNII2A	5GHz UNII2C / UNII3	Ant.	6GHz
1	-	4.92	-	5	4.94
2	4.14	-	4.75	6	5.68
3	-	4.78	-	7	4.77
4	2.64	-	4.60	8	5.83

Note 1: The above information was declared by manufacturer. Note 2: The DFS band and 6GHz doesn't enable at this time.

#### <For WLAN 2.4GHz>

#### For IEEE 802.11b/g/n/VHT mode (2TX/2RX)

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

#### <For WLAN 5GHz>

#### For IEEE 802.11a/n/ac/ax/be mode (2TX/2RX)

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

#### <For WLAN 6GHz>

#### For IEEE 802.11ax/be mode (4TX/4RX)

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

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#### Note3: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	Directiona lGain = $10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{at}} \left( \sum_{k=1}^{N_{atr}} \mathbf{g}_{j,k} \right)^{2}}{N_{ANT}} \right]$
BF	Directiona lGain = $10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{ait}} \left\{ \sum_{k=1}^{N_{ait}} \mathbf{g}_{j,k} \right\}^{2}}{N_{ANT}} \right]$	$Directiona\ lGain = 10 \cdot log \left[ \frac{\sum_{j=1}^{N_{ss}} \left\{ \sum_{k=1}^{N_{ssr}} \mathbf{S}_{j,k} \right\}^{2}}{N_{_{ANT}}} \right]$

Ex.

$$\begin{split} & \text{NSS1}(\text{g1,1}) = 10^{\text{G1/20}} \text{ ; NSS1}(\text{g1,2}) = 10^{\text{G2/20}} \text{ ; NSS1}(\text{g1,2}) = 10^{\text{G3/20}} \text{; NSS1}(\text{g1,2}) = 10^{\text{G4/20}} \\ & \text{gj,k} = & \text{(Nss1}(\text{g1,1}) + \text{Nss1}(\text{g1,2}) + \text{Nss1}(\text{g1,3}) + \text{Nss1}(\text{g1,4}) \text{ )}^2 \\ & \text{DG} = & 10 \text{ log[(Nss1}(\text{g1,1}) + \text{Nss1}(\text{g1,2}) + \text{Nss1}(\text{g1,3}) + \text{Nss1}(\text{g1,4}))^2 / \text{N}_{\text{ANT}}] => 10 \\ & \text{log[(}10^{\text{G1/20}} + 10^{\text{G2/20}} + 10^{\text{G3/20}} + 10^{\text{G4/20}} \text{ )}^2 / \text{N}_{\text{ANT}}] \\ & \text{Where ;} \end{split}$$

2.4G G1= 4.14 dBi ; G2= 2.64 dBi ;DG= 6.43dBi

5G UNII-1 G1= 4.92 dBi; G2= 4.78 dBi; DG= 7.86dBi

5G UNII-2A G1= 4.92 dBi; G2= 4.78 dBi; DG= 7.86dBi

5G UNII-2C G1= 4.75 dBi; G2= 4.60 dBi; DG= 7.69dBi

5G UNII-3 G1= 4.75 dBi; G2= 4.60 dBi; DG= 7.69dBi

6G UNII-4 G1= 4.94 dBi ; G2= 5.68 dBi ; G3= 4.77 dBi ; G4= 5.83 dBi ;DG= 11.34dBi

6G UNII-5 G1= 4.94 dBi ; G2= 5.68 dBi ; G3= 4.77 dBi ; G4= 5.83 dBi ;DG= 11.34dBi

6G UNII-6 G1= 4.94 dBi ; G2= 5.68 dBi ; G3= 4.77 dBi ; G4= 5.83 dBi ;DG= 11.34dBi

6G UNII-7 G1= 4.94 dBi; G2= 5.68 dBi; G3= 4.77 dBi; G4= 5.83 dBi; DG= 11.34dBi

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# 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.608	2.16	693.75u	3k
802.11g	0.939	0.27	1.984m	1k
802.11ax HEW20	0.79	1.02	5.449m	300
802.11ax HEW40	0.793	1.01	5.452m	300

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- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

# 1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter					
	$\boxtimes$	With beamforming		Without beamforming		
Beamforming Function		The product has beamforming function for n/VHT/ax in 2.4GHz, n/ac/ax/be in 5GHz UNII 1,3				
Function	$\boxtimes$	Point-to-multipoint		Point-to-point		
Support RU	☐ Partial RU					
<b>Test Software Version</b>	n QSPR(Version 5.0-00202)					

Note: The above information was declared by manufacturer.

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# 1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

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- 47 CFR FCC Part 15.247
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 558074 D01 v05r02
- FCC KDB 662911 D01 v02r01
- FCC KDB 414788 D01 v01r01

# 1.3 Testing Location Information

#### **Testing Location Information**

Test Lab.: Sporton International Inc. Hsinchu Laboratory

Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH01-CB	B Mason Chen 22~26 / 51~5		Mar. 02, 2023~ Mar. 03, 2023
Radiated <below 1ghz=""></below>	03CH01-CB	Ederson Huang	20.2-21.3 / 66-67	Feb. 27, 2023~ Mar. 24, 2023
Radiated <co-location></co-location>	03CH06-CB	Ederson Huang	20-21 / 65-68	Feb. 27, 2023~ Mar. 24, 2023
Radiated <above 1ghz=""></above>	03CH01-CB	Ederson Huang	20.6~22.6 / 63~66	Feb. 27, 2023~ Mar. 24, 2023
AC Conduction	CO01-CB	Elvin Yeh	22~23 / 50~51	Mar. 22, 2023

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# 1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence

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level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	3.2 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.2 dB	Confidence levels of 95%
Bandwidth Measurement	2.0 %	Confidence levels of 95%

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# 2 Test Configuration of EUT

# 2.1 Test Channel Mode

Mode	Power Setting
802.11b_Nss1,(1Mbps)_2TX	-
2412MHz	27
2437MHz	27
2462MHz	27
802.11g_Nss1,(6Mbps)_2TX	-
2412MHz	24
2417MHz	27.5
2437MHz	27.5
2457MHz	27.5
2462MHz	24.5
802.11ax HEW20_Nss1,(MCS0)_2TX	-
2412MHz	23.5
2417MHz	27.5
2437MHz	27.5
2457MHz	27.5
2462MHz	23.5
802.11ax HEW40_Nss1,(MCS0)_2TX	-
2422MHz	23
2437MHz	25
2452MHz	23
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-
2412MHz	23.5
2417MHz	27.5
2437MHz	27
2457MHz	27.5
2462MHz	23.5
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-
2422MHz	23
2437MHz	25
2452MHz	23

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#### Note:

- Evaluated HEW20/HEW40 mode only. Due to similar modulation, The power setting of HT20/HT40/VHT20/VHT40 mode are the same or lower than HEW20/HEW40.
- The EUT supports non-beamforming and beamforming modes, after evaluating, the non-beamforming mode has been evaluated to be the worst case, so it was selected to test. The beamforming mode evaluates the output power only.

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# 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item	AC power-line conducted emissions	
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz	
Operating Mode	СТХ	
1	EUT_WLAN 2.4GHz + Adapter 1	
2	EUT_WLAN 2.4GHz + Adapter 2	
Mode 1 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow this same test mode.		
3	EUT_WLAN 5GHz + Adapter 1	
For operating mode 3 is the worst case and it was record in this test report.		

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The Worst Case Mode for Following Conformance Tests		
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands	
Test Condition	Conducted measurement at transmit chains	

Th	The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands			
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.			
Operating Mode < 1GHz	СТХ			
The EUT was performed at X axis, Y axis and Z axis position for Radiated measurement <above 1ghz="">, and the worst case was found at X axis position for 2.4GHz, Y axis position for 5GHz. Thus the measurement will follow the same test configuration.</above>				
1	EUT in X axis_WLAN 2.4GHz + Adapter 1			
2	EUT in X axis_WLAN 2.4GHz + Adapter 2			
Mode 2 has been evaluate this same test mode.	d to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow			
3	EUT in Y axis: WLAN 5GHz + Adapter 2			
For operating mode 3 is the	e worst case and it was record in this test report.			
Operating Mode > 1GHz   CTX				
	t X axis, Y axis and Z axis position, and the worst case as below: I follow the same test configuration			
1	EUT in X axis			

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The Worst Case Mode for Following Conformance Tests			
Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location			
Test Condition	Radiated measurement		
Operating Mode	Normal Link		
The EUT was performed at X axis, Y axis and Z axis position for Radiated measurement <above 1ghz="">, the worst case was found at Y axis position. Thus the measurement will follow the same test configuration.</above>			
1	EUT in Y axis_WLAN 2.4GHz + WLAN 5GHz High Band		
Refer to Appendix G for Radiated Emission Co-location.			

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The Worst Case Mode for Following Conformance Tests			
Tests Item	Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode			
1	WLAN 2.4GHz + WLAN 5GHz		
Refer to Sporton Test Report No.: FA321751 for Co-location RF Exposure Evaluation.			

# 2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 2.4 Accessories

	Accessories			
Equipment Brand Model Name Name		***************************************	Rating	
Adapter 1	MOSO	MS-V4000R120-050A0-US	INPUT: 100-240V ~ 50/60Hz, 1.3A max. OUTPUT: 12.0V, 4.0A	
Adapter 2	Frecom	F48L1-120400SPAU	INPUT: 100-240V ~ 50/60Hz, 1.4A OUTPUT: 12.0V, 4.0A, 48.0W	

# 2.5 Support Equipment

#### For AC Conduction:

Support Equipment				
No. Equipment Brand Name Model Name FCC ID				FCC ID
Α	LAN NB	Lenovo	L440	N/A

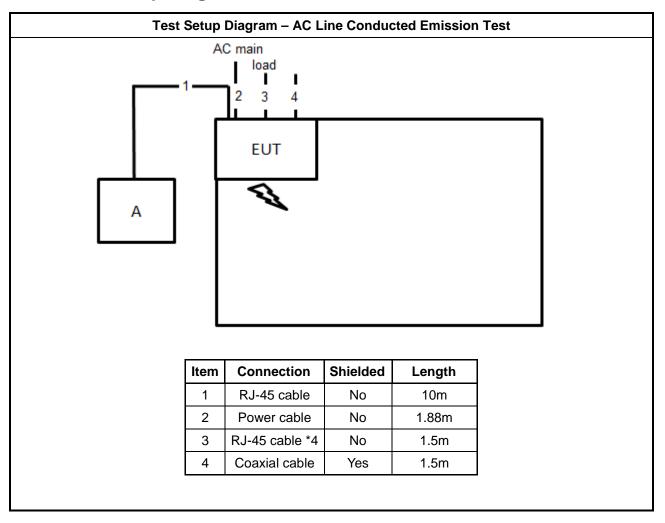
#### For Radiated and RF Conducted:

	dalated and iti condae			
Support Equipment				
No. Equipment Brand Name Model Name FCC ID				FCC ID
Α	NB	DELL	E4300	N/A

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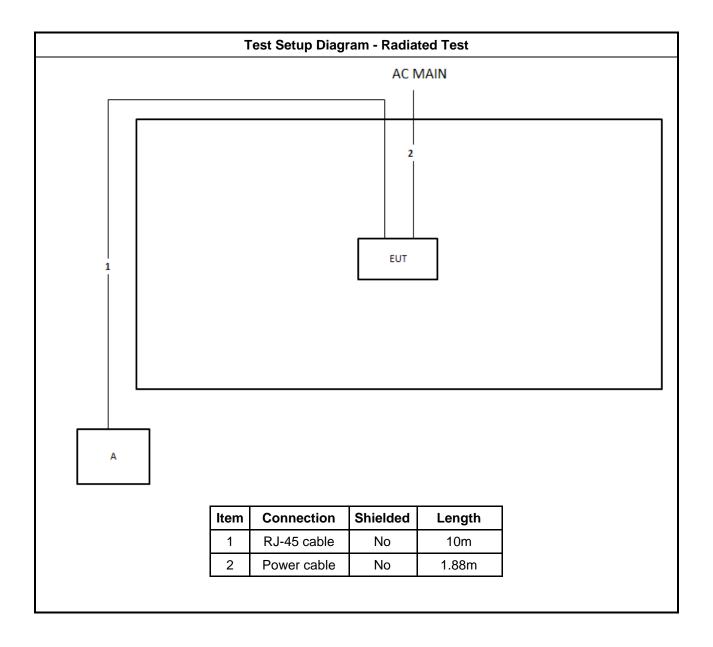
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# 2.6 Test Setup Diagram



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# 3 Transmitter Test Result

# 3.1 AC Power-line Conducted Emissions

#### 3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line 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.			

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## 3.1.2 Measuring Instruments

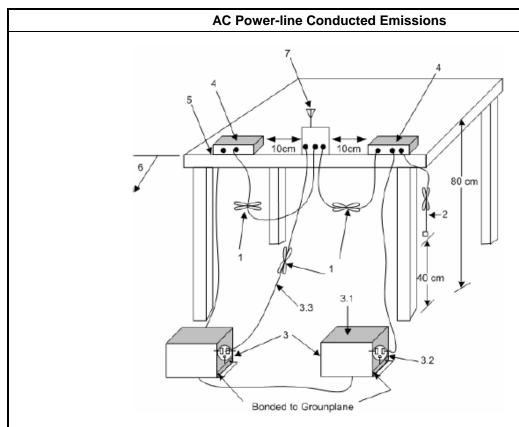
Refer a test equipment and calibration data table in this test report.

#### 3.1.3 Test Procedures

Test Method	
Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.	

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#### 3.1.4 Test Setup



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

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- 2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- 3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$  loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
- 3.1—All other equipment powered from additional LISN(s).
- 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
- 3.3—LISN at least 80 cm from nearest part of EUT chassis.
- 4—Non-EUT components of EUT system being tested.
- 5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

#### 3.1.5 Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

#### 3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

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# 3.2 DTS Bandwidth

#### 3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit					
Systems using digital modulation techniques:					
■ 6 dB bandwidth ≥ 500 kHz.					

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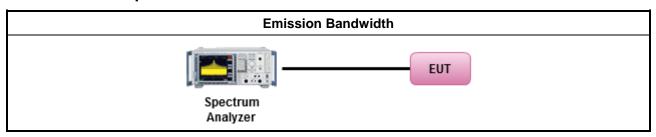
#### 3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

	Test Method										
•	For the emission bandwidth shall be measured using one of the options below:										
		Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.									
		Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.									
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.									

# 3.2.4 Test Setup



#### 3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

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# 3.3 Maximum Conducted Output Power

#### 3.3.1 Maximum Conducted Output Power Limit

#### **Maximum Conducted Output Power Limit**

- If G<sub>TX</sub> ≤ 6 dBi, then P<sub>Out</sub> ≤ 30 dBm (1 W)
- Point-to-multipoint systems (P2M): If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)$  dBm
- Point-to-point systems (P2P): If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
- Smart antenna system (SAS):
  - Single beam: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
  - Overlap beam: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
  - Aggregate power on all beams: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3 + 8$ dB dBm

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 $\mathbf{P}_{\text{Out}}$  = maximum peak conducted output power or maximum conducted output power in dBm,  $\mathbf{G}_{\text{TX}}$  = the maximum transmitting antenna directional gain in dBi.

#### 3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

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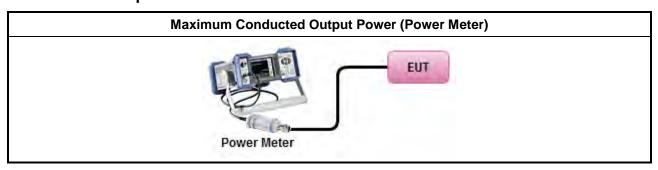
#### 3.3.3 Test Procedures

		Test Method							
•	Max	imum Peak Conducted Output Power							
		Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).							
		Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).							
•	Max	imum Conducted Output Power							
	[duty cycle ≥ 98% or external video / power trigger]								
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.							
		Refer as FCC KDB 558074, clause $8.3.2.2$ & C63.10 clause $11.9.2.2.3$ Method AVGSA-1A. (alternative)							
	duty	cycle < 98% and average over on/off periods with duty factor							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)							
	Mea	surement using a power meter (PM)							
		Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).							
	$\boxtimes$	Refer as FCC KDB 558074, clause $8.3.2.3 \& C63.10$ clause $11.9.2.3.2$ Method AVGPM-G (using an gate RF average power meter).							
•	For	conducted measurement.							
	•	If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.							
	•	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n \\ \text{(calculated in linear unit [mW] and transfer to log unit [dBm])} \\ \text{EIRP}_{total} = P_{total} + DG$							

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# 3.3.4 Test Setup



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# 3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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# 3.4 Power Spectral Density

# 3.4.1 Power Spectral Density Limit

# Power Spectral Density Limit Power Spectral Density (PSD) ≤ 8 dBm/3kHz

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#### 3.4.2 Measuring Instruments

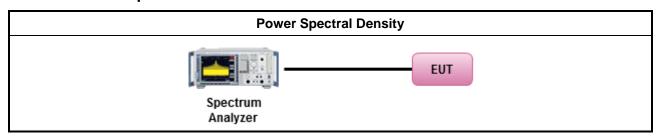
Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

		Test Method									
•	Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).										
	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.										
•	For o	nducted measurement.									
	•	The EUT supports multiple transmit chains using options given below:									
		Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.									
		Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,									
		Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.									

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# 3.4.4 Test Setup



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# 3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

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# 3.5 Emissions in Non-restricted Frequency Bands

#### 3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit						
RF output power procedure	Limit (dBc)					
Peak output power procedure	20					
Average output power procedure	30					

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- Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.
- Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

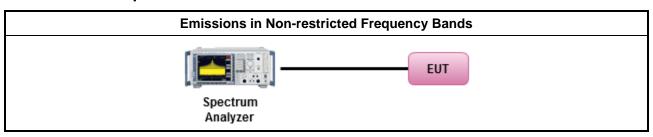
#### 3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.5.3 Test Procedures

Test Method	
<ul> <li>Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.</li> </ul>	

#### 3.5.4 Test Setup



#### 3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

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## 3.6 Emissions in Restricted Frequency Bands

#### 3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit									
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	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						

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- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

#### 3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

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#### 3.6.3 Test Procedures

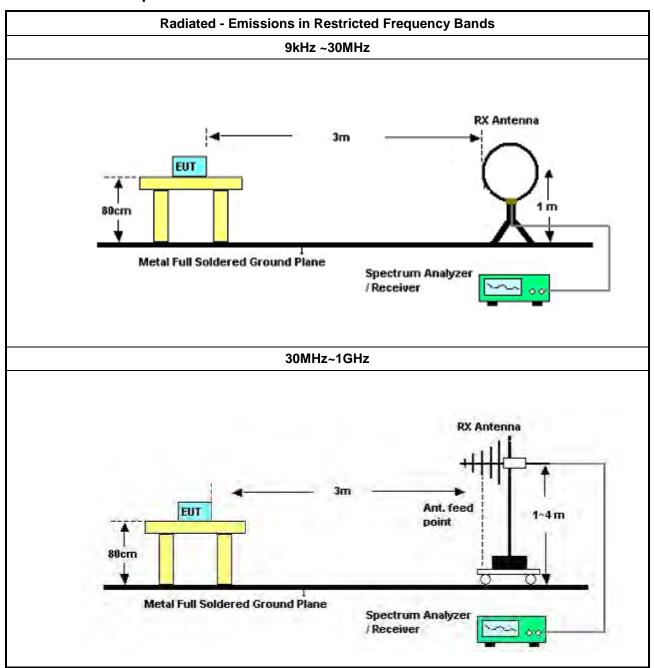
		Test Method									
•	The	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].									
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.										
•	For the transmitter unwanted emissions shall be measured using following options below:										
	<ul> <li>Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.</li> </ul>										
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for cycle ≥98%).										
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).									
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).									
	☐ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse till										
		Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.									
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.									
•	For the transmitter band-edge emissions shall be measured using following options below:										
	<ul> <li>Refer as FCC KDB 558074 clause 8.7 &amp; C63.10 clause 11.13.1, When the performing peak average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.</li> </ul>										
	•	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.									
		Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).									
	•	For conducted unwanted emissions into restricted bands (absolute emission limits).  Devices with multiple transmit chains using options given below:  (1) Measure and sum the spectra across the outputs or  (2) Measure and add 10 log(N) dB									
	•	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.									

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# 3.6.4 Test Setup



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#### 3.6.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

#### 3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

#### 3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

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# 4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz Feb. 20, 2023 Feb. 19		Feb. 19, 2024	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Dec. 20, 2022	Dec. 19, 2023	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 12, 2022	Apr. 11, 2023	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 09, 2023	Feb. 08, 2024	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	Oct. 18, 2022	Oct. 17, 2023	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (03CH01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH01-CB	30 MHz ~ 1 GHz	Jan. 16, 2023	Jan. 15, 2024	Radiation (03CH01-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH01-CB	1GHz ~18GHz 3m	May 06, 2022	May 05, 2023	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Feb. 19, 2023	Feb. 18, 2024	Radiation (03CH01-CB)
Horn Antenna	ETS-LINDGREN	3115	00075790	750MHz ~ 18GHz	Nov. 04, 2022	Nov. 03, 2023	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH01-CB)
Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	Jul. 01, 2022	Jun. 30, 2023	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02121	1GHz ~ 26.5GHz	May 19, 2022	May 18, 2023	Radiation (03CH01-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	May 06, 2022	May 05, 2023	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH01-CB)
RF Cable-low	Woken	RG402	Low Cable-16+17	30 MHz ~ 1 GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16	1 GHz ~ 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16+17	1 GHz ~ 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH01-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH01-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH01-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH01-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH06-CB	1GHz ~18GHz 3m	Sep. 30, 2022	Sep. 29, 2023	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Aug. 09, 2022	Aug. 08, 2023	Radiation (03CH06-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	Aug 02, 2022	Aug 01, 2023	Radiation (03CH06-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH06-CB)
Signal Analyzer	R&S	FSV40	101904	9kHz ~ 40GHz	Apr. 26, 2022	Apr. 25, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-68	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05+68	1GHz~18GHz	Dec. 21, 2022	Dec. 20, 2023	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	May 27, 2022	May 26, 2023	Conducted (TH01-CB)
Switch	SPTCB	SP-SWI	SWI-01	1 GHz –26.5 GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-30	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Power Sensor	Agilent	E9327A	US40442088	50MHz~18GHz	Feb. 22, 2023	Feb. 21, 2024	Conducted (TH01-CB)
Power Meter	Agilent	E4416A	GB41291199	50MHz~18GHz	Feb. 22, 2023	Feb. 21, 2024	Conducted (TH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH01-CB)

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Note: Calibration Interval of instruments listed above is one year.

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# **Conducted Emissions at Powerline**

Appendix A

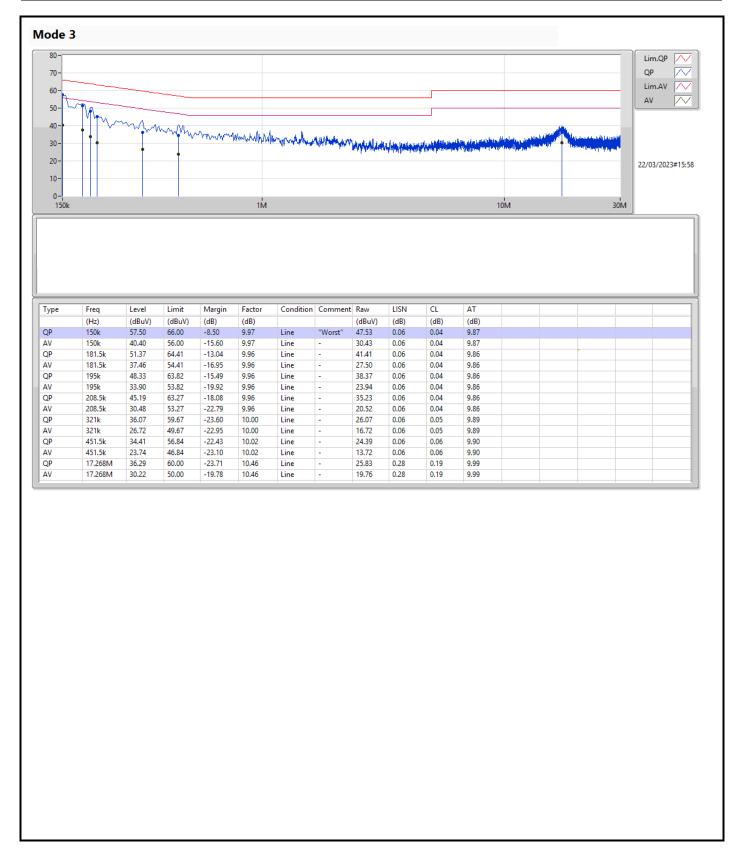
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 3	Pass	QP	150k	57.50	66.00	-8.50	Line

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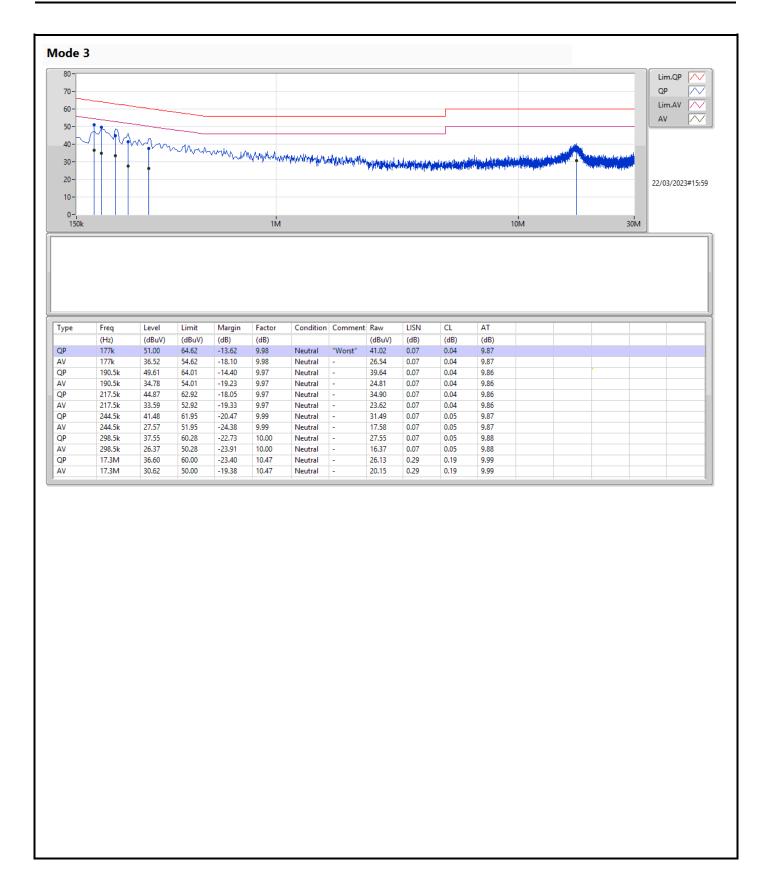
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EBW Appendix B

#### Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	=	ū	=	ī	=
802.11b_Nss1,(1Mbps)_2TX	9.075M	15.377M	15M4G1D	7.525M	13.029M
802.11g_Nss1,(6Mbps)_2TX	16.275M	26.124M	26M1D1D	15.7M	16.397M
802.11ax HEW20_Nss1,(MCS0)_2TX	18.8M	26.398M	26M4D1D	18.2M	18.856M
802.11ax HEW40_Nss1,(MCS0)_2TX	37.9M	38.201M	38M2D1D	36.55M	37.662M

 $Max-N\ dB=Maximum\ 6dB\ down\ bandwidth;\ Max-OBW=Maximum\ 99\%\ occupied\ bandwidth;\ Min-OBW=Minimum\ 99\%\ occupied\ bandwidth;\ Min-OBW=Minimum\ 99\%\ occupied\ bandwidth;\ Min-OBW=Minimum\ 99\%\ occupied\ bandwidth;\ Min-OBW=Maximum\ 99\%\$ 

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EBW Appendix B

#### Result

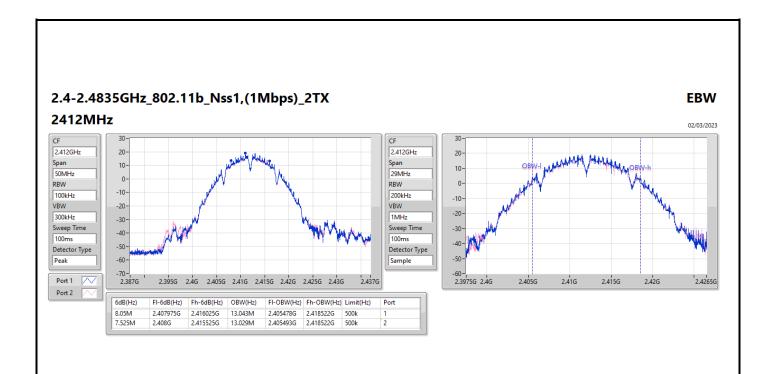
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	8.05M	13.043M	7.525M	13.029M
2437MHz	Pass	500k	9.075M	15.377M	9.025M	14.884M
2462MHz	Pass	500k	8.075M	13.725M	8.55M	14.058M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.9M	16.397M	16.275M	16.439M
2437MHz	Pass	500k	16.275M	26.124M	15.8M	24.765M
2462MHz	Pass	500k	15.9M	16.439M	15.7M	16.439M
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	18.8M	18.905M	18.675M	18.856M
2437MHz	Pass	500k	18.8M	26.398M	18.2M	24.463M
2462MHz	Pass	500k	18.575M	18.856M	18.5M	18.88M
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	37.9M	37.76M	37.8M	37.809M
2437MHz	Pass	500k	37.75M	37.907M	37.5M	38.201M
2452MHz	Pass	500k	37.55M	37.76M	36.55M	37.662M

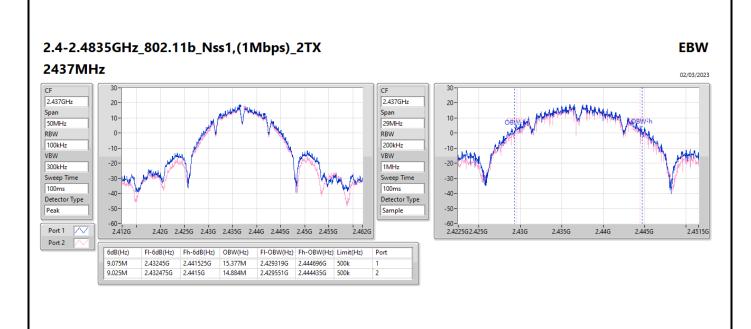
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

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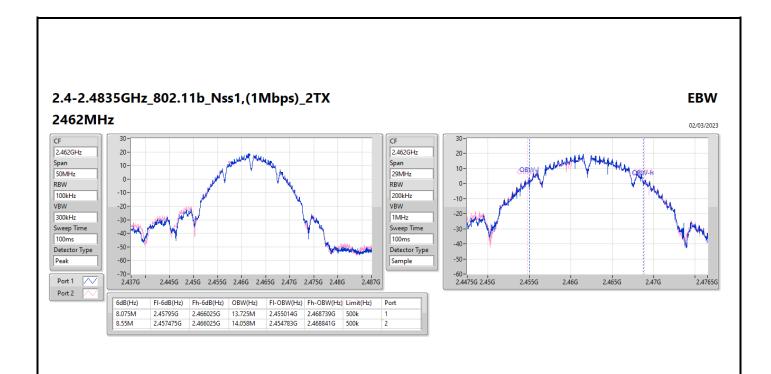
Report No. : FR321751AA

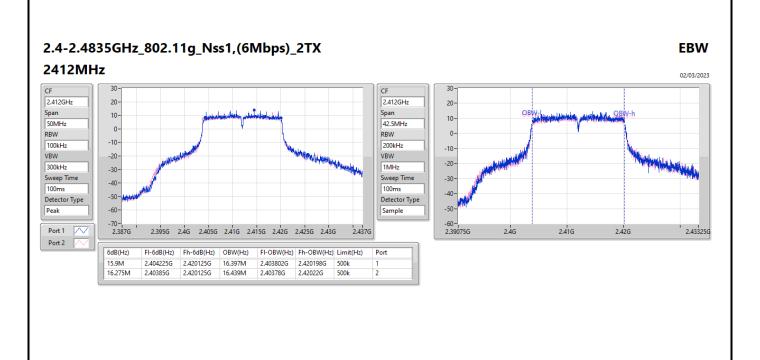




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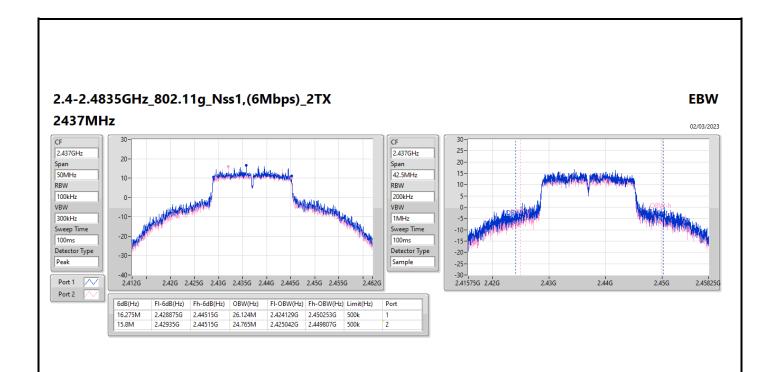
Report No. : FR321751AA

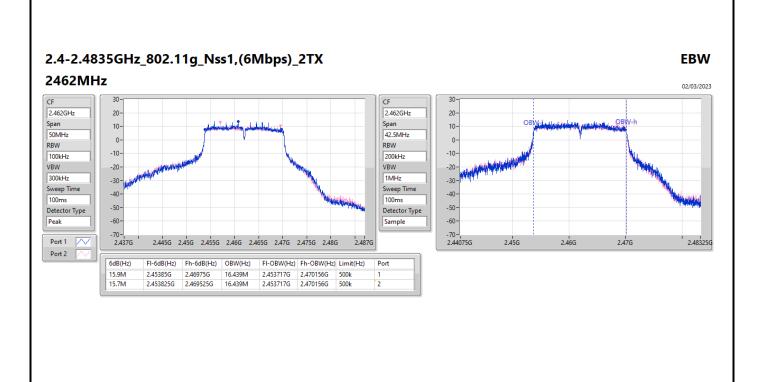




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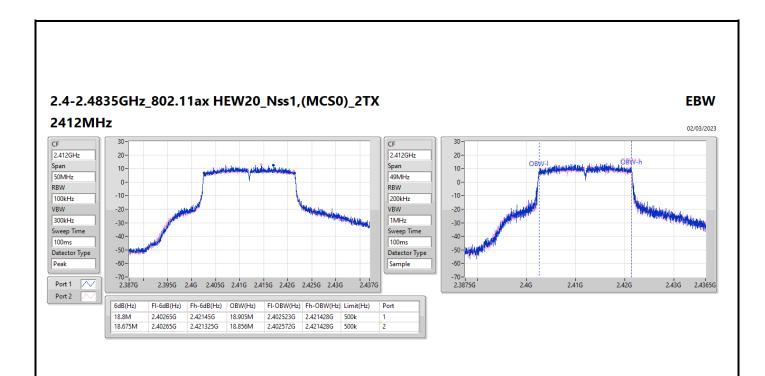
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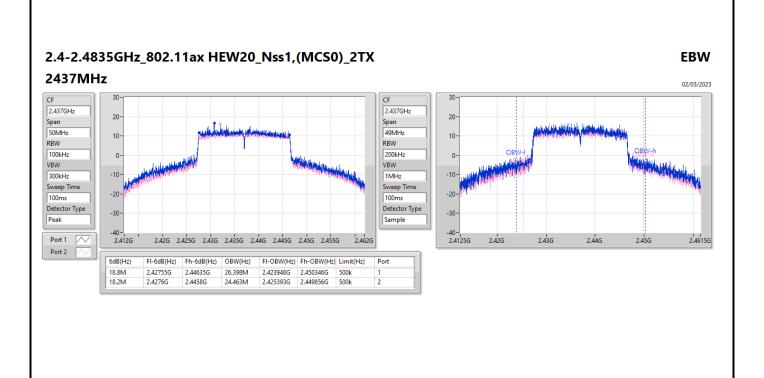




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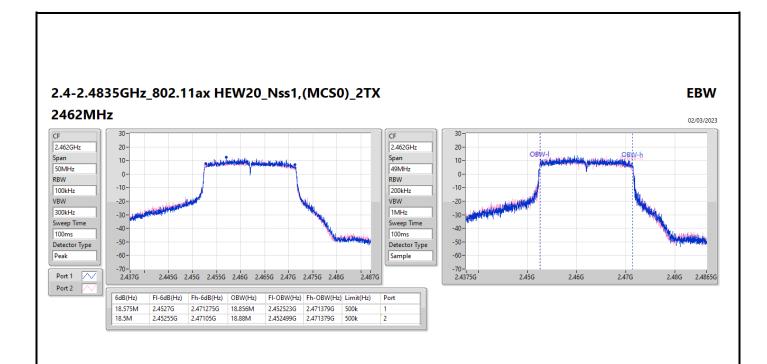
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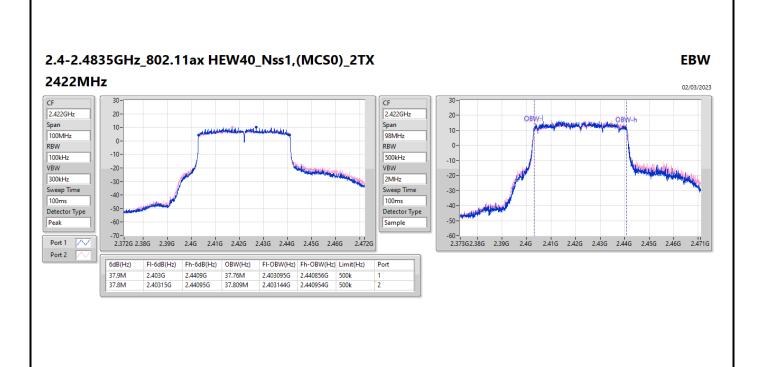




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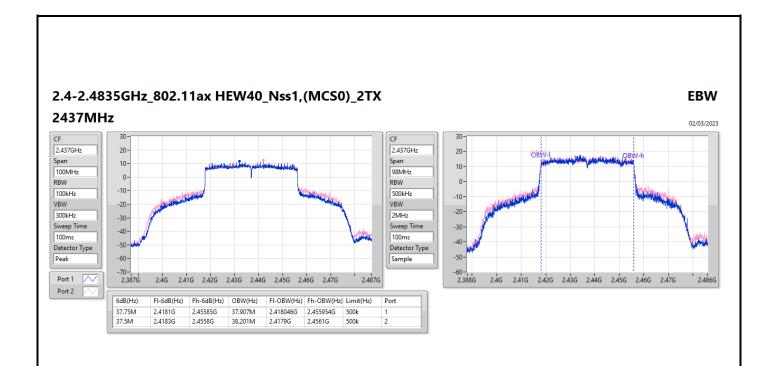
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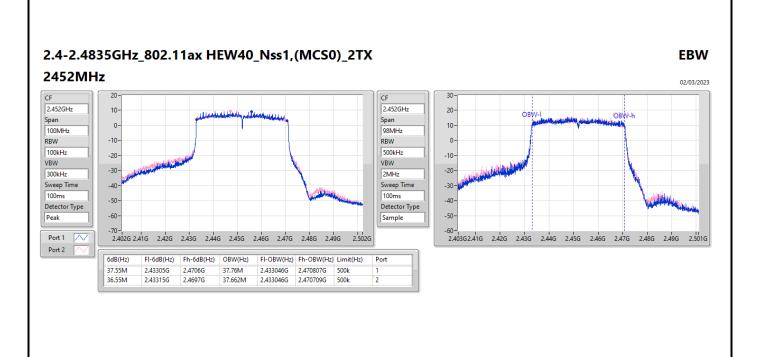




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Average Power Appendix C

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	29.98	0.99541
802.11g_Nss1,(6Mbps)_2TX	29.68	0.92897
802.11ax HEW20_Nss1,(MCS0)_2TX	29.79	0.95280
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	29.32	0.85507
802.11ax HEW40_Nss1,(MCS0)_2TX	28.46	0.70146
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	28.46	0.70146

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Average Power Appendix C

### Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.14	26.72	26.53	29.64	30.00
2437MHz	Pass	4.14	27.19	26.73	29.98	30.00
2462MHz	Pass	4.14	26.84	26.75	29.81	30.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.14	24.48	24.16	27.33	30.00
2417MHz	Pass	4.14	26.25	25.92	29.10	30.00
2437MHz	Pass	4.14	27.04	26.27	29.68	30.00
2457MHz	Pass	4.14	26.45	25.52	29.02	30.00
2462MHz	Pass	4.14	24.14	23.85	27.01	30.00
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.14	24.12	23.81	26.98	30.00
2417MHz	Pass	4.14	26.42	26.03	29.24	30.00
2437MHz	Pass	4.14	27.18	26.34	29.79	30.00
2457MHz	Pass	4.14	26.49	25.62	29.09	30.00
2462MHz	Pass	4.14	23.33	23.19	26.27	30.00
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.14	23.75	23.63	26.70	30.00
2437MHz	Pass	4.14	25.32	25.57	28.46	30.00
2452MHz	Pass	4.14	22.74	22.81	25.79	30.00
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.43	24.12	23.81	26.98	29.57
2417MHz	Pass	6.43	26.42	26.03	29.24	29.57
2437MHz	Pass	6.43	26.73	25.84	29.32	29.57
2457MHz	Pass	6.43	26.49	25.62	29.09	29.57
2462MHz	Pass	6.43	23.33	23.19	26.27	29.57
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	6.43	23.75	23.63	26.70	29.57
2437MHz	Pass	6.43	25.32	25.57	28.46	29.57
2452MHz	Pass	6.43	22.74	22.81	25.79	29.57

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

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Summary

Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	6.20
802.11g_Nss1,(6Mbps)_2TX	1.20
802.11ax HEW20_Nss1,(MCS0)_2TX	1.90
802.11ax HEW40_Nss1,(MCS0)_2TX	-2.14

RBW = 3kHz;

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Appendix D **PSD** 

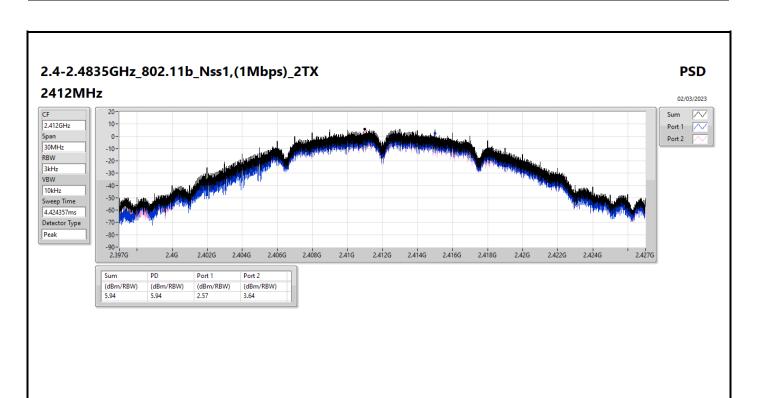
#### Result

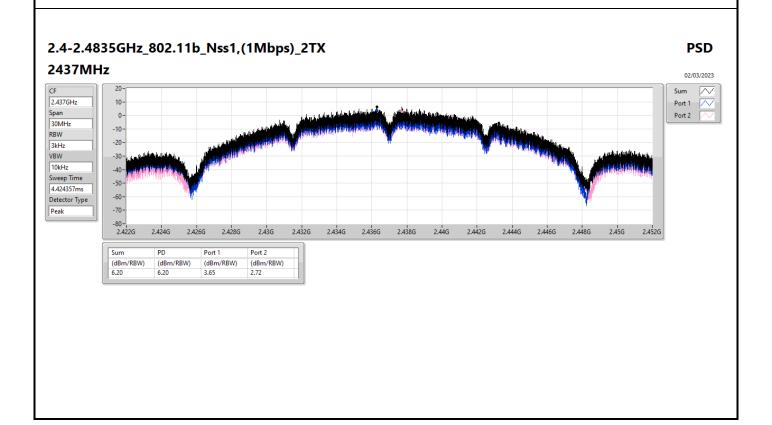
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.43	2.57	3.64	5.94	7.57
2437MHz	Pass	6.43	3.65	2.72	6.20	7.57
2462MHz	Pass	6.43	3.34	2.91	6.14	7.57
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.43	-2.79	-2.89	0.15	7.57
2437MHz	Pass	6.43	-1.01	-1.74	1.20	7.57
2462MHz	Pass	6.43	-2.51	-2.76	-0.91	7.57
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.43	-1.98	-2.46	-0.72	7.57
2437MHz	Pass	6.43	0.76	0.18	1.90	7.57
2462MHz	Pass	6.43	-2.50	-3.85	-0.94	7.57
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	6.43	-4.79	-5.71	-3.55	7.57
2437MHz	Pass	6.43	-3.71	-3.82	-2.14	7.57
2452MHz	Pass	6.43	-5.14	-5.90	-3.98	7.57

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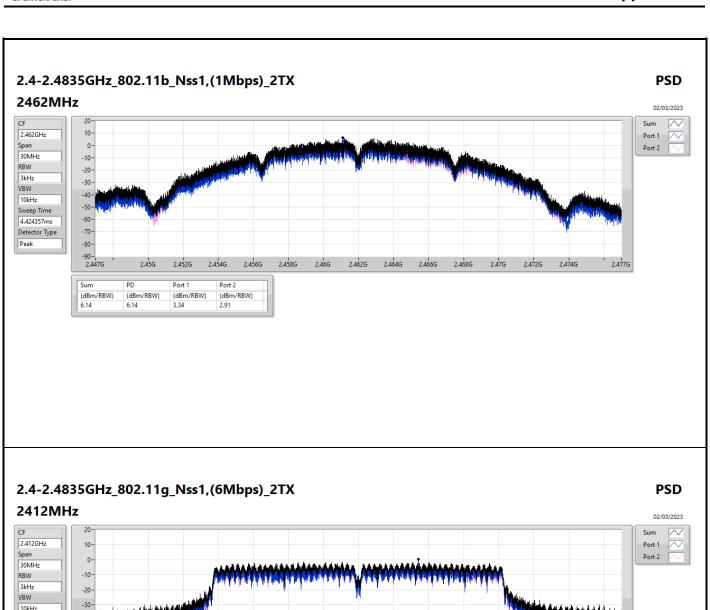
DG = Directional Gain; RBW = 3kHz; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;

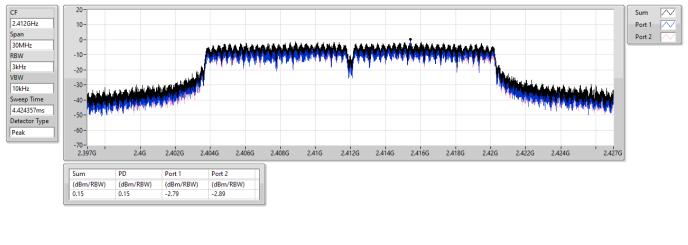




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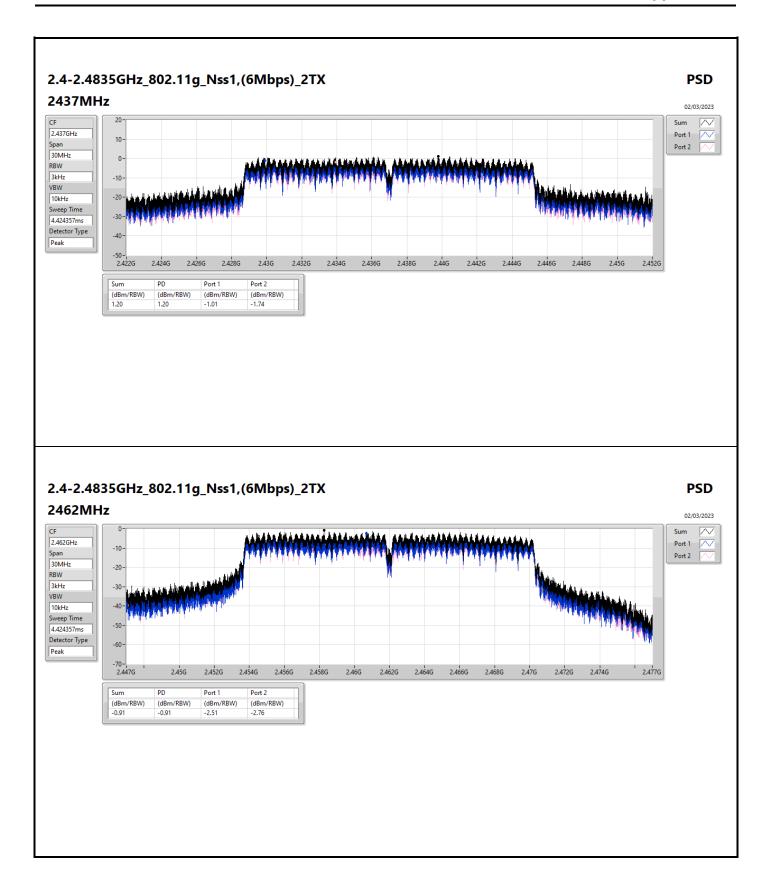
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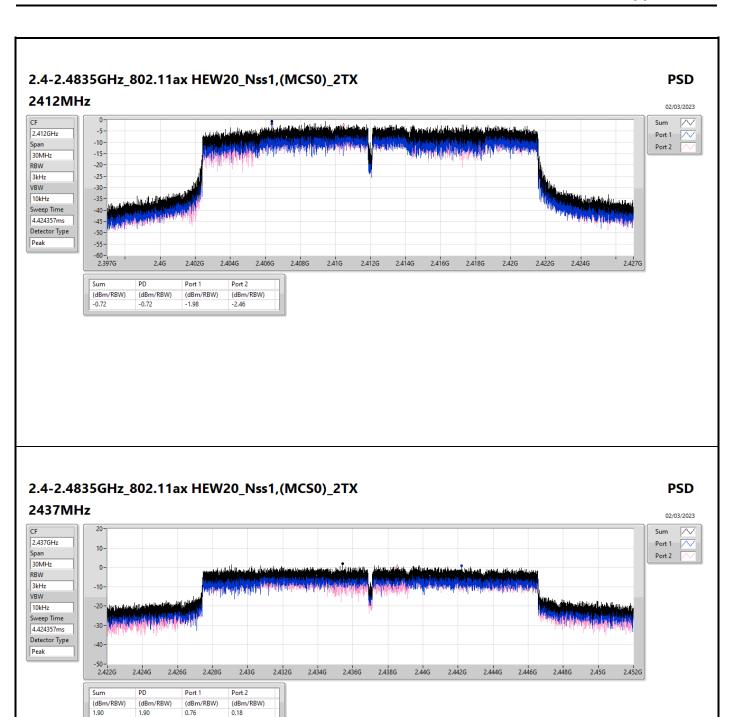
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 Sum
 PD
 Port 1
 Port 2

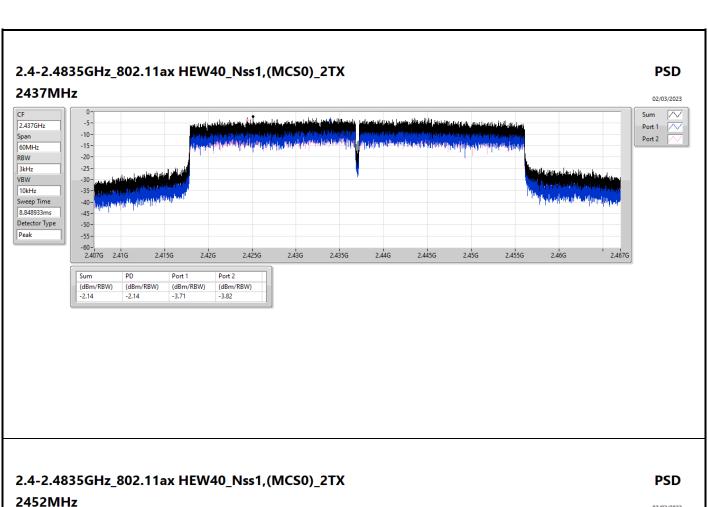
 (dBm/RBW)
 (dBm/RBW)
 (dBm/RBW)
 (dBm/RBW)

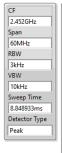
 -3.55
 -3.55
 -4.79
 -5.71

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Appendix D **PSD** 

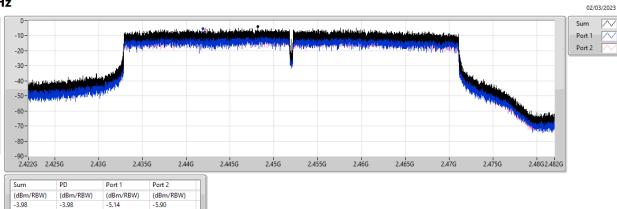




-3.98

-3.98

-5.14



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CSE (NdB Down) Appendix E

### Summary

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-		-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	Pass	2.43641G	18.01	-11.99	2.18875G	-52.67	2.4G	-30.77	2.4G	-29.26	2.50206G	-52.24	7.23514G	-28.72	1
802.11g_Nss1,(6Mbps)_2TX	Pass	2.43574G	16.71	-13.29	816.38M	-53.03	2.3992G	-17.34	2.4G	-16.49	2.52166G	-51.75	7.24076G	-33.48	1
802.11ax HEW20_Nss1,(MCS0)_2TX	Pass	2.43323G	15.52	-14.48	887.44M	-52.71	2.39976G	-17.60	2.4G	-16.50	2.52046G	-51.82	7.23795G	-34.58	2
802.11ax HEW40_Nss1,(MCS0)_2TX	Pass	2.4344G	11.77	-18.23	825.78M	-52.06	2.39888G	-19.70	2.4G	-19.88	2.50318G	-50.38	16.25537G	-47.20	2

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CSE (NdB Down) Appendix E

## Result

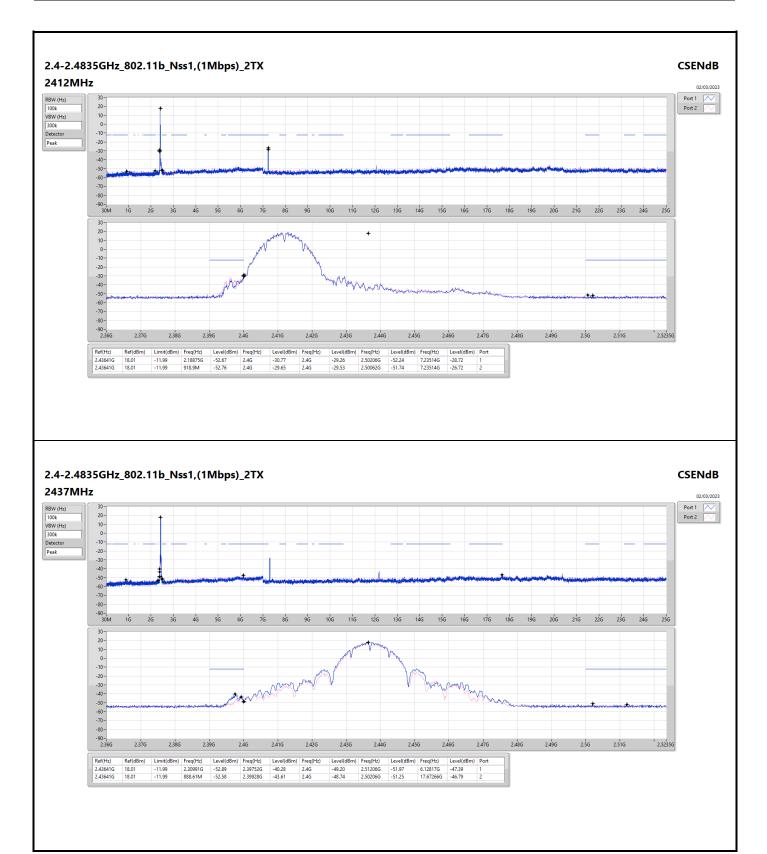
Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43641G	18.01	-11.99	2.18875G	-52.67	2.4G	-30.77	2.4G	-29.26	2.50206G	-52.24	7.23514G	-28.72	1
2412MHz	Pass	2.43641G	18.01	-11.99	918.9M	-52.76	2.4G	-29.65	2.4G	-29.53	2.50062G	-51.74	7.23514G	-26.72	2
2437MHz	Pass	2.43641G	18.01	-11.99	2.30991G	-52.89	2.39752G	-40.28	2.4G	-49.20	2.51206G	-51.97	6.12817G	-47.39	1
2437MHz	Pass	2.43641G	18.01	-11.99	888.61M	-52.58	2.39928G	-43.61	2.4G	-48.74	2.50206G	-51.25	17.67266G	-46.79	2
2462MHz	Pass	2.43641G	18.01	-11.99	1.94293G	-52.85	2.39912G	-47.67	2.4G	-49.49	2.51286G	-51.67	16.37745G	-47.96	1
2462MHz	Pass	2.43641G	18.01	-11.99	1.79498G	-52.67	2.4G	-48.46	2.4G	-47.90	2.50766G	-51.69	16.20045G	-47.12	2
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43574G	16.71	-13.29	816.38M	-53.03	2.3992G	-17.34	2.4G	-16.49	2.52166G	-51.75	7.24076G	-33.48	1
2412MHz	Pass	2.43574G	16.71	-13.29	2.30175G	-52.54	2.3992G	-17.75	2.4G	-16.69	2.51118G	-49.31	7.24637G	-33.63	2
2437MHz	Pass	2.43574G	16.71	-13.29	1.781G	-52.91	2.39952G	-30.51	2.4G	-32.06	2.5191G	-51.51	6.98228G	-47.21	1
2437MHz	Pass	2.43574G	16.71	-13.29	1.65984G	-52.86	2.39704G	-31.91	2.4G	-32.86	2.50094G	-51.85	17.68671G	-45.86	2
2462MHz	Pass	2.43574G	16.71	-13.29	853.66M	-51.97	2.39976G	-48.75	2.4G	-49.71	2.52294G	-51.49	5.98488G	-47.31	1
2462MHz	Pass	2.43574G	16.71	-13.29	1.80896G	-52.63	2.39832G	-49.65	2.4G	-50.09	2.50886G	-50.36	6.96823G	-47.10	2
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43323G	15.52	-14.48	924.72M	-52.71	2.3996G	-18.91	2.4G	-18.71	2.52078G	-51.38	7.24357G	-32.94	1
2412MHz	Pass	2.43323G	15.52	-14.48	887.44M	-52.71	2.39976G	-17.60	2.4G	-16.50	2.52046G	-51.82	7.23795G	-34.58	2
2437MHz	Pass	2.43323G	15.52	-14.48	948.02M	-53.15	2.39944G	-28.37	2.4G	-30.51	2.5007G	-51.30	17.0967G	-47.26	1
2437MHz	Pass	2.43323G	15.52	-14.48	773.27M	-52.05	2.39904G	-31.51	2.4G	-32.77	2.51406G	-50.87	5.8135G	-46.96	2
2462MHz	Pass	2.43323G	15.52	-14.48	2.30641G	-52.66	2.39896G	-49.31	2.4G	-50.83	2.51846G	-51.90	15.21148G	-47.46	1
2462MHz	Pass	2.43323G	15.52	-14.48	472.7M	-52.63	2.39696G	-49.37	2.4G	-51.02	2.50886G	-51.45	17.67547G	-47.29	2
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.4344G	11.77	-18.23	1.79101G	-52.58	2.39968G	-25.01	2.4G	-25.31	2.50318G	-51.61	7.24992G	-39.52	1
2422MHz	Pass	2.4344G	11.77	-18.23	2.12192G	-52.99	2.4G	-22.73	2.4G	-22.93	2.50638G	-51.53	7.24992G	-37.59	2
2437MHz	Pass	2.4344G	11.77	-18.23	1.64331G	-52.79	2.39984G	-21.11	2.4G	-22.35	2.50462G	-51.59	16.33951G	-46.49	1
2437MHz	Pass	2.4344G	11.77	-18.23	825.78M	-52.06	2.39888G	-19.70	2.4G	-19.88	2.50318G	-50.38	16.25537G	-47.20	2
2452MHz	Pass	2.4344G	11.77	-18.23	2.1139G	-53.13	2.39968G	-38.99	2.4G	-38.31	2.50094G	-50.97	17.66887G	-47.69	1
2452MHz	Pass	2.4344G	11.77	-18.23	2.30397G	-53.08	2.4G	-38.36	2.4G	-37.84	2.53246G	-51.60	21.86169G	-47.57	2

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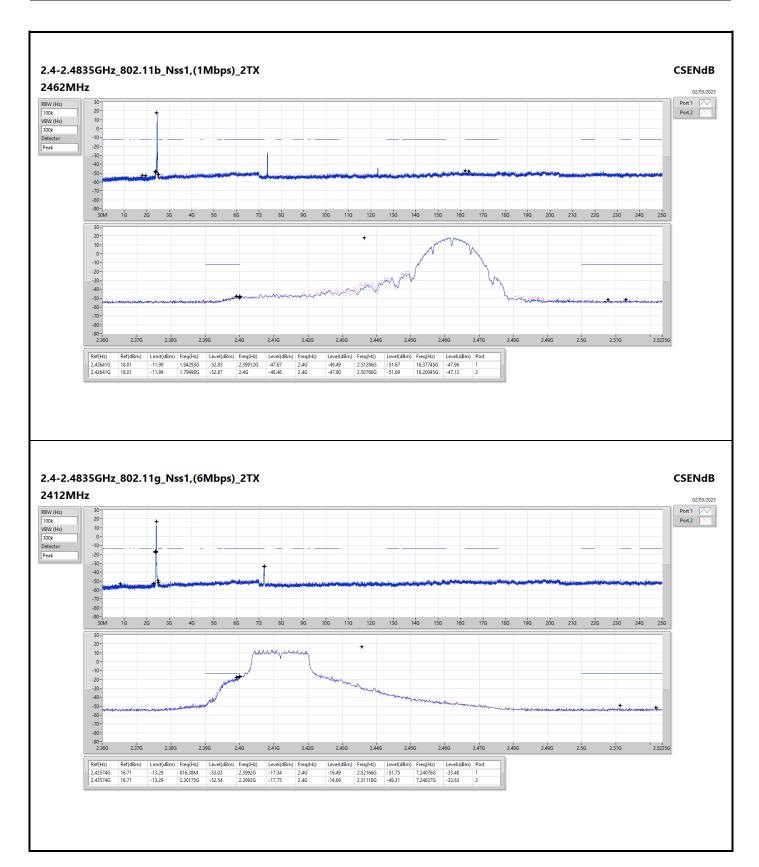




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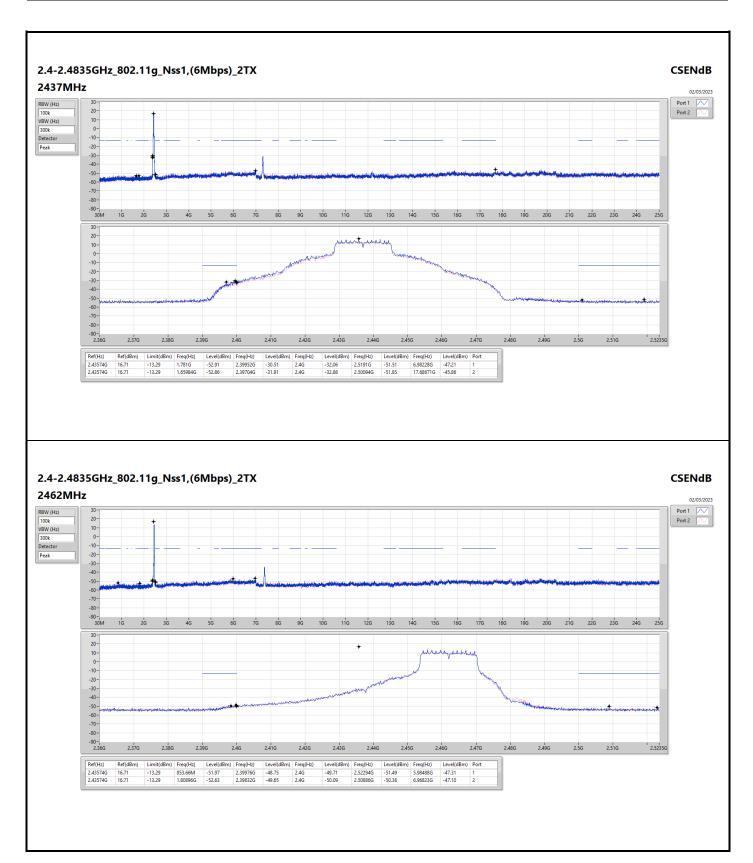




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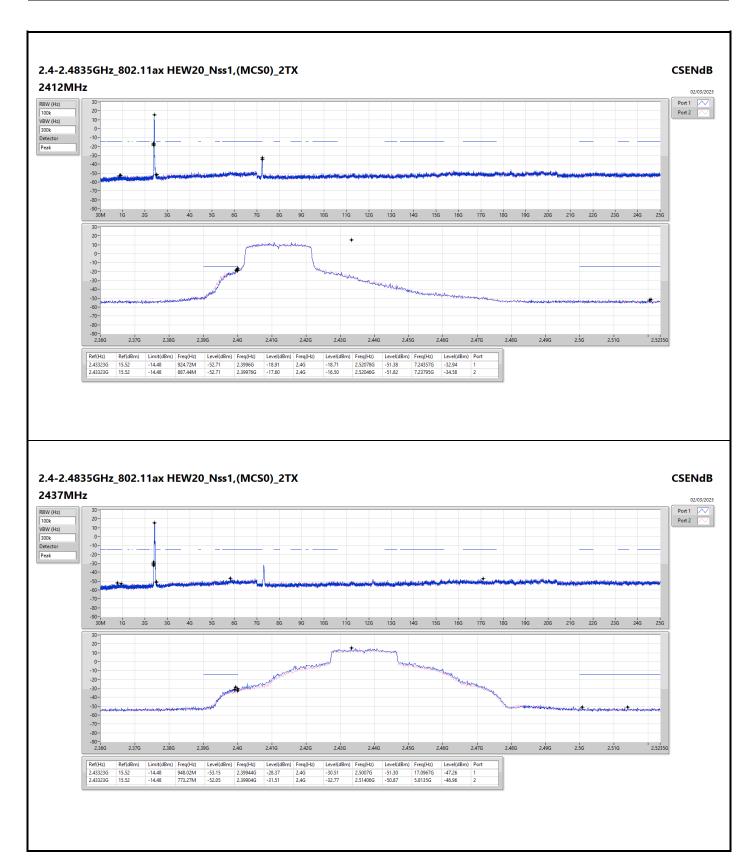




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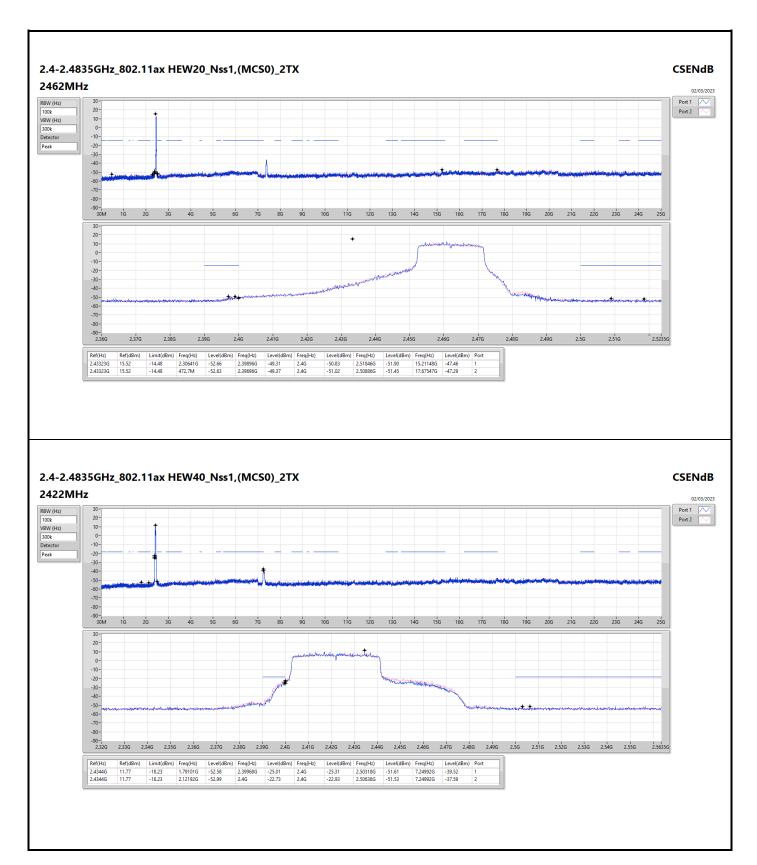




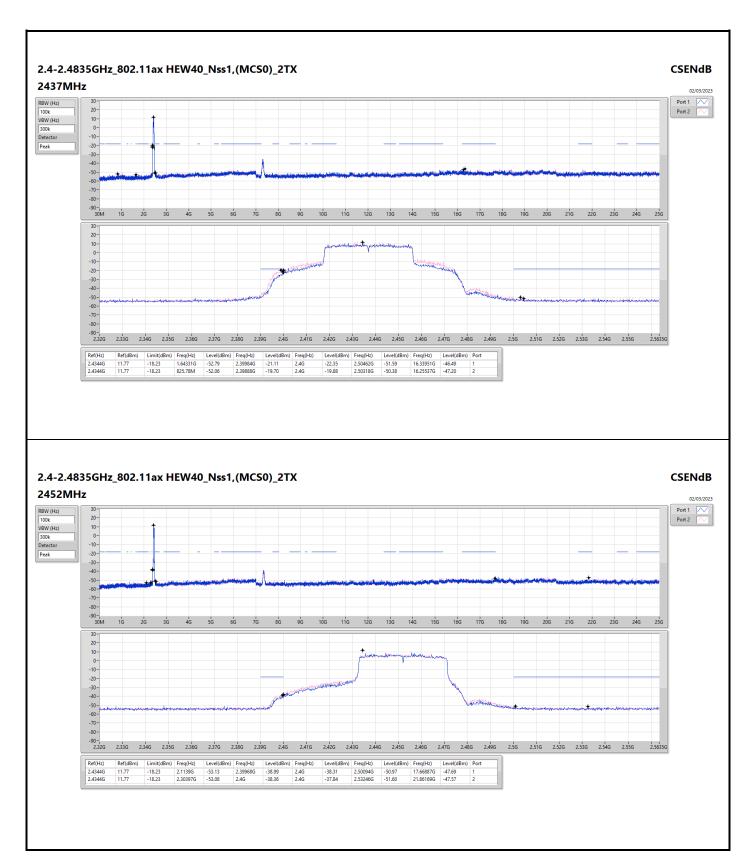
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# Radiated Emissions below 1GHz

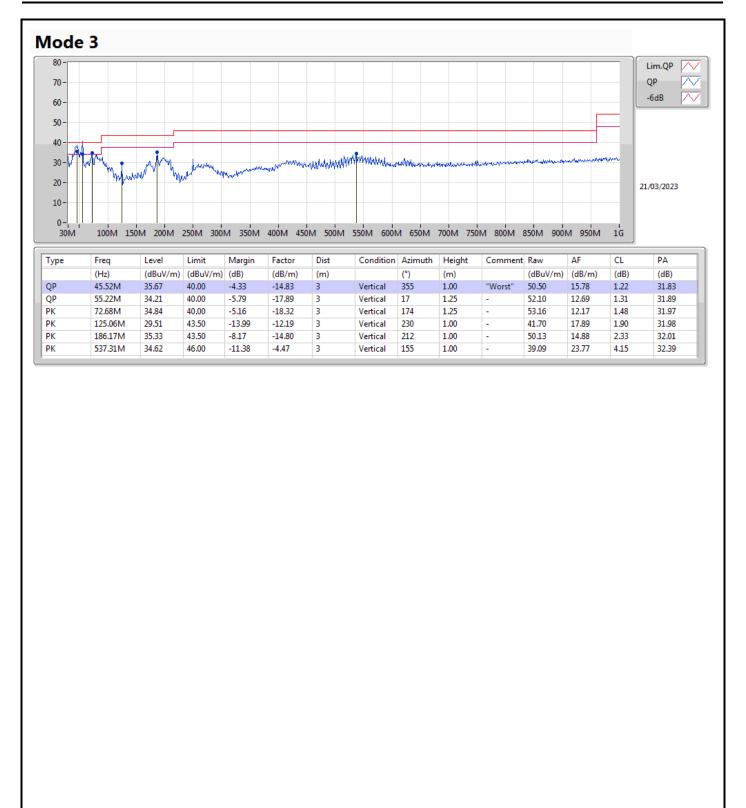
Appendix F.1

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 3	Pass	QP	45.52M	35.67	40.00	-4.33	Vertical

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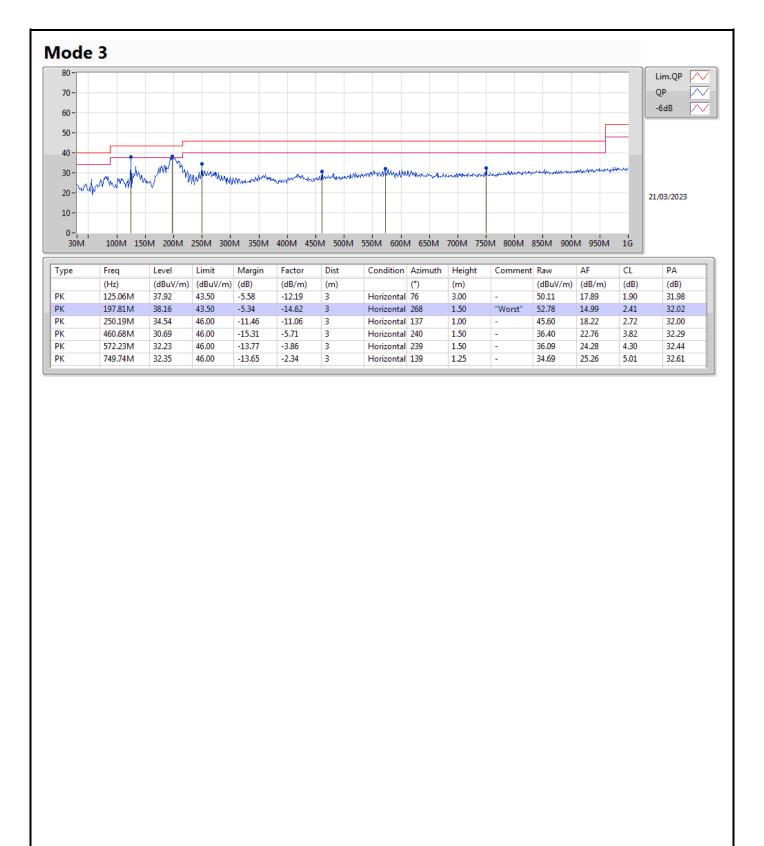
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# RSE TX above 1GHz

Appendix F.2

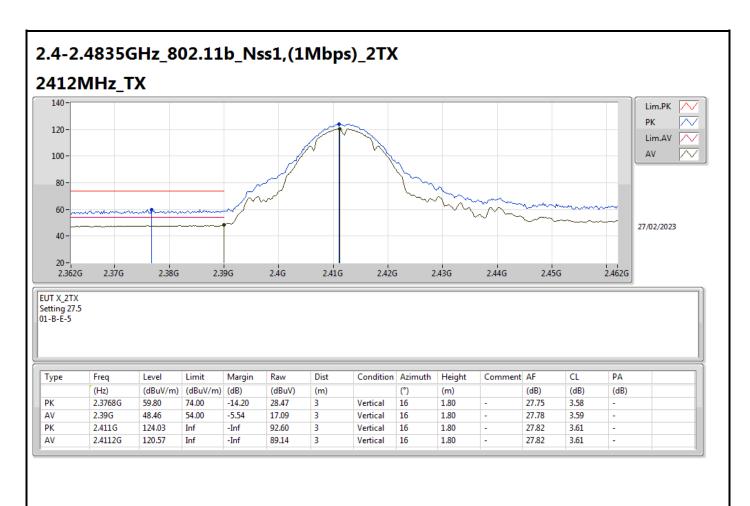
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.11g_Nss1,(6Mbps)_2TX	Pass	AV	2.4835G	53.75	54.00	-0.25	3	Vertical	314	1.80	-

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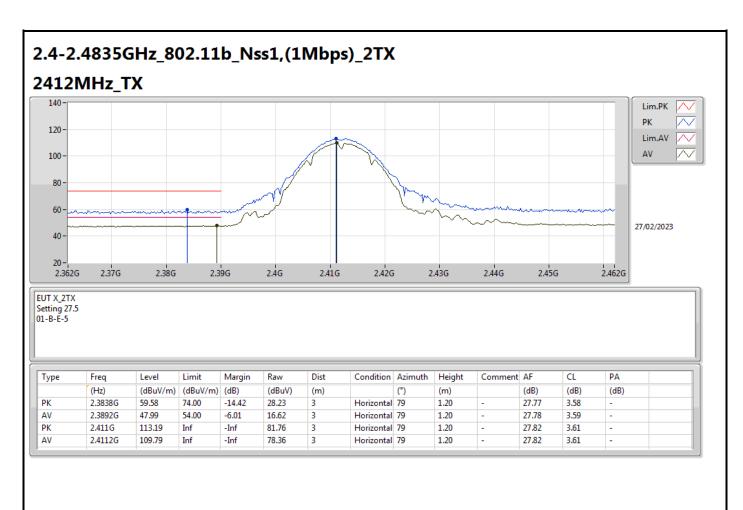




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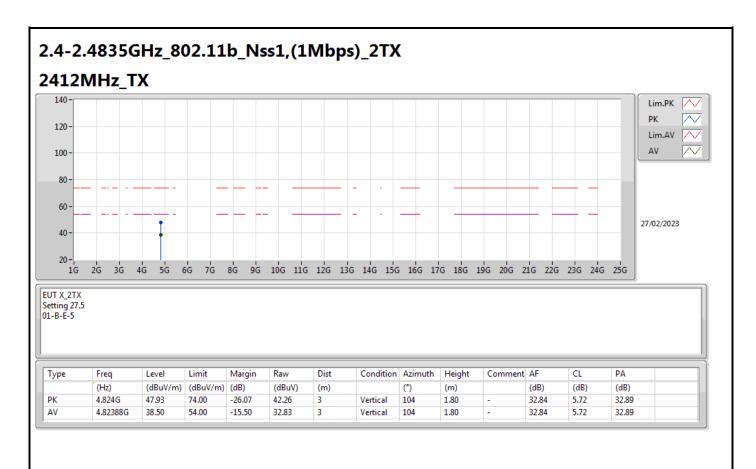




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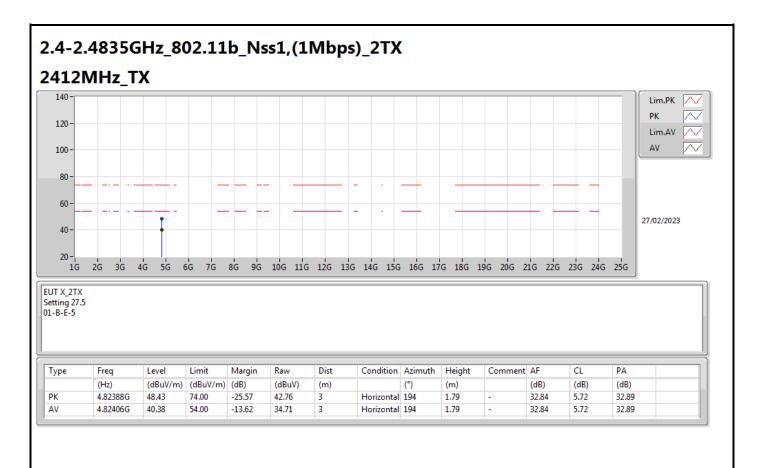




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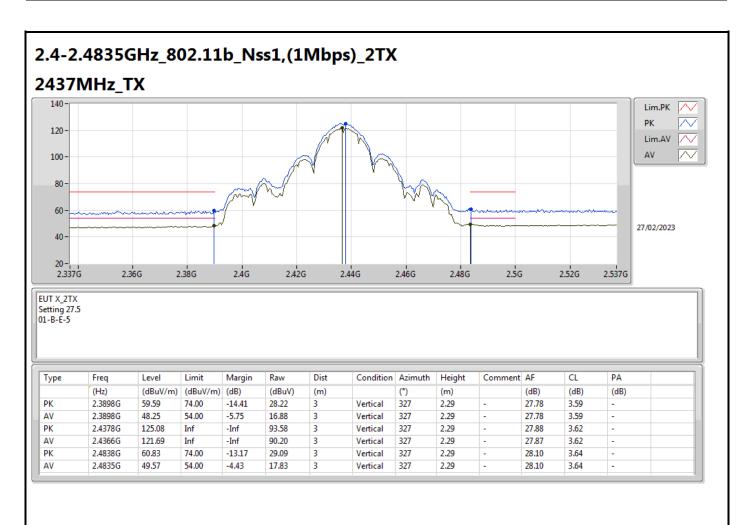




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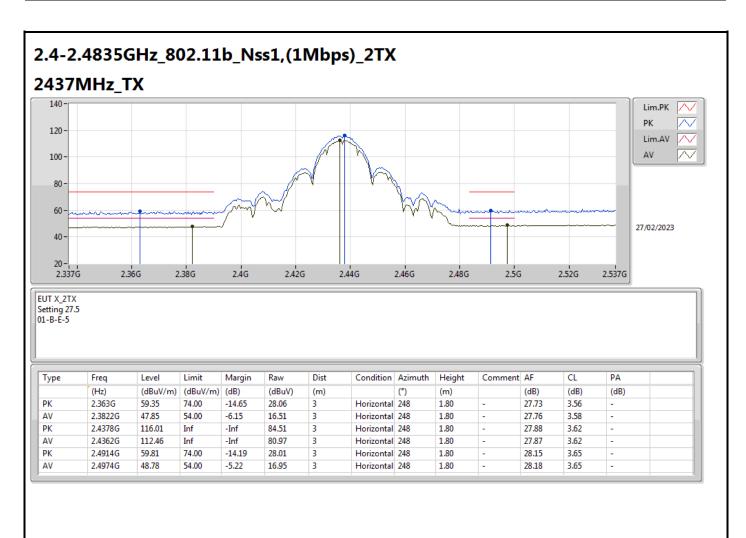




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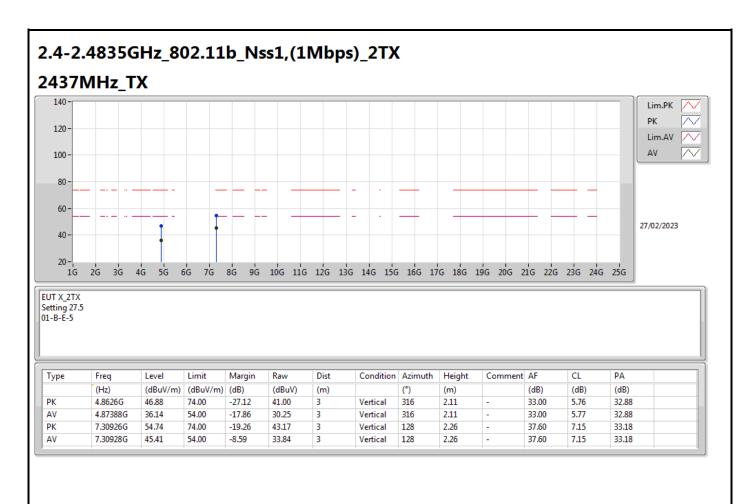




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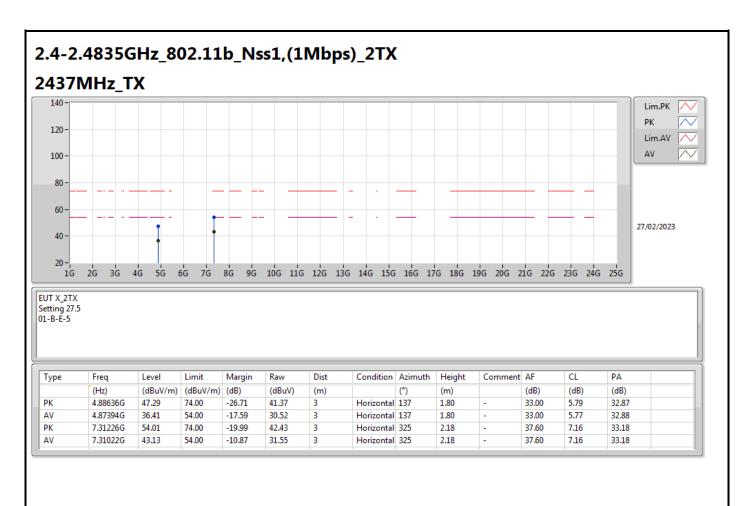




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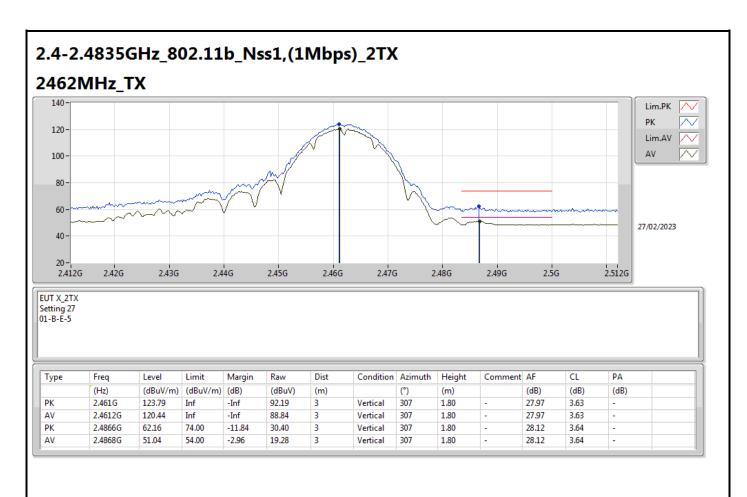




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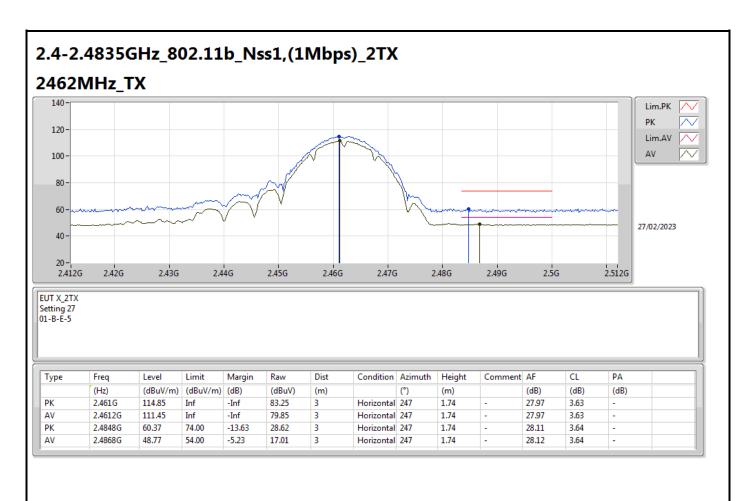




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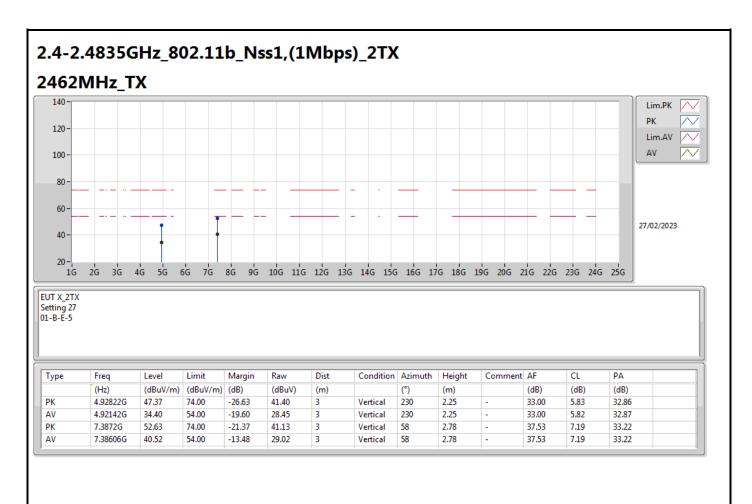




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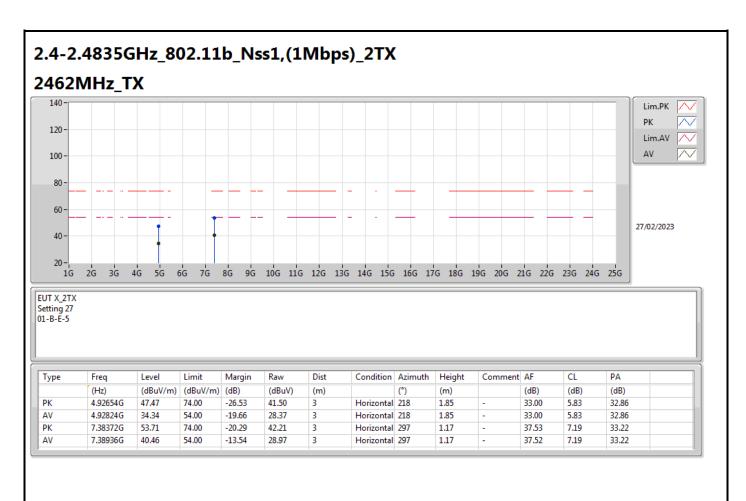




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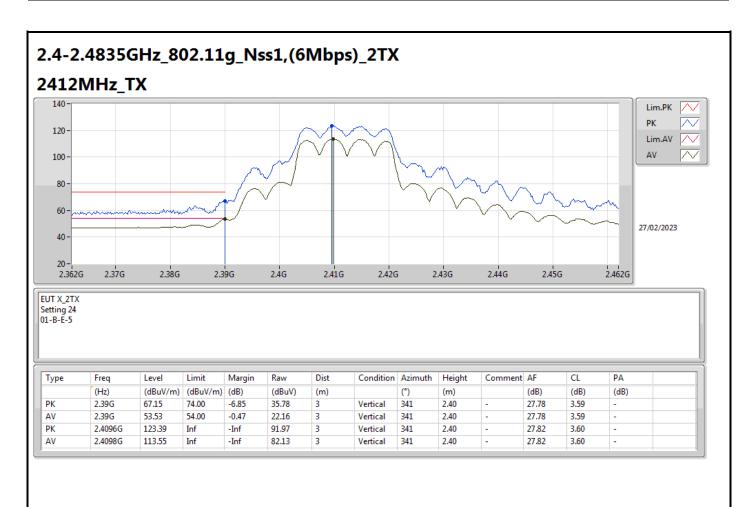




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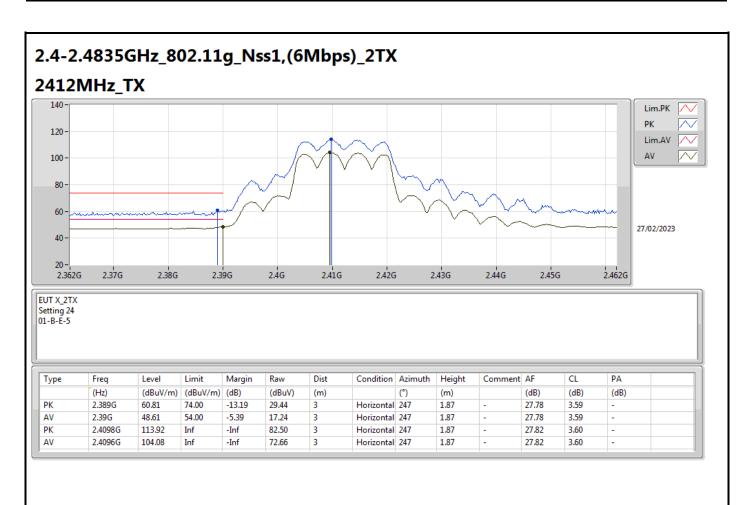




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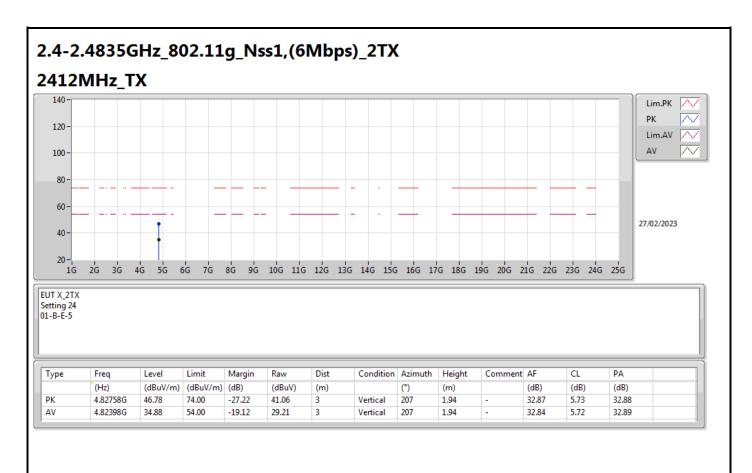




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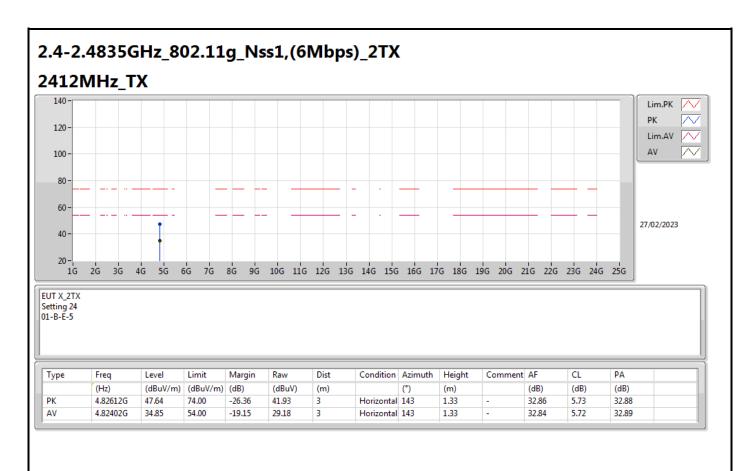




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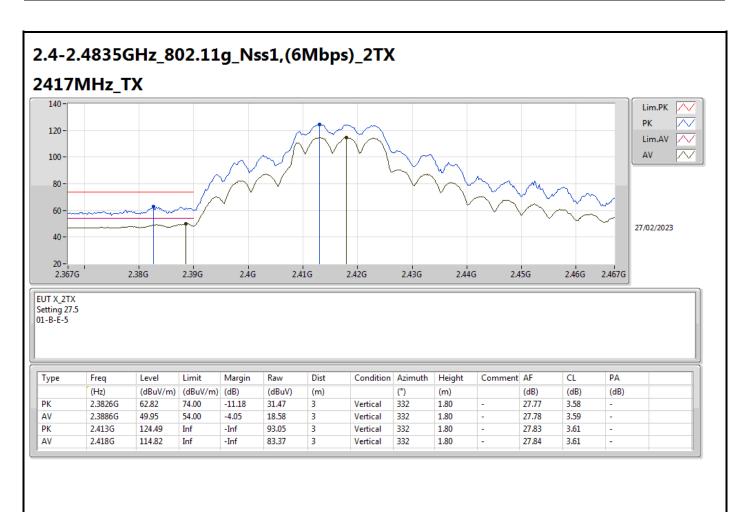




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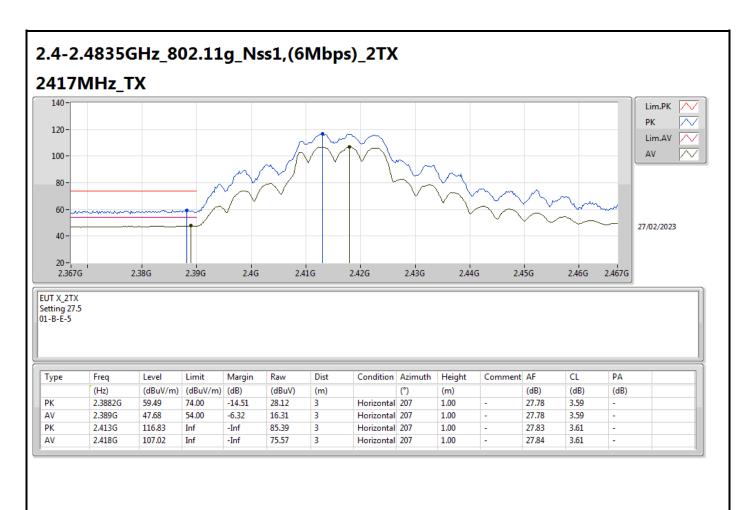




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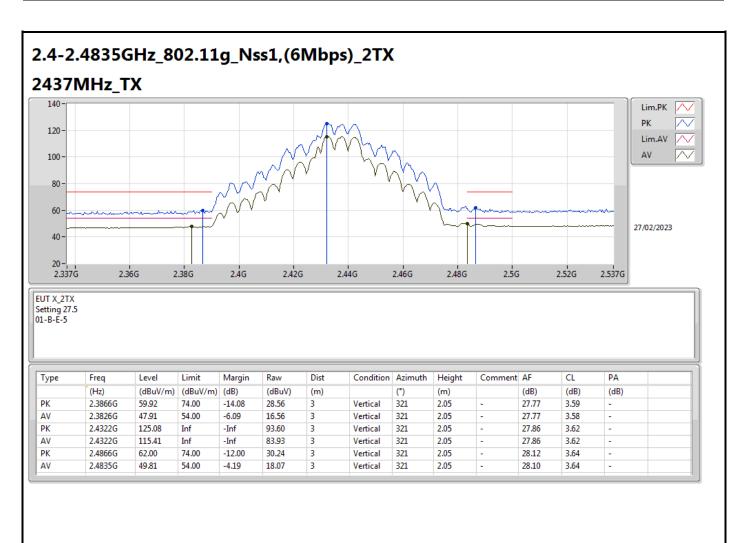




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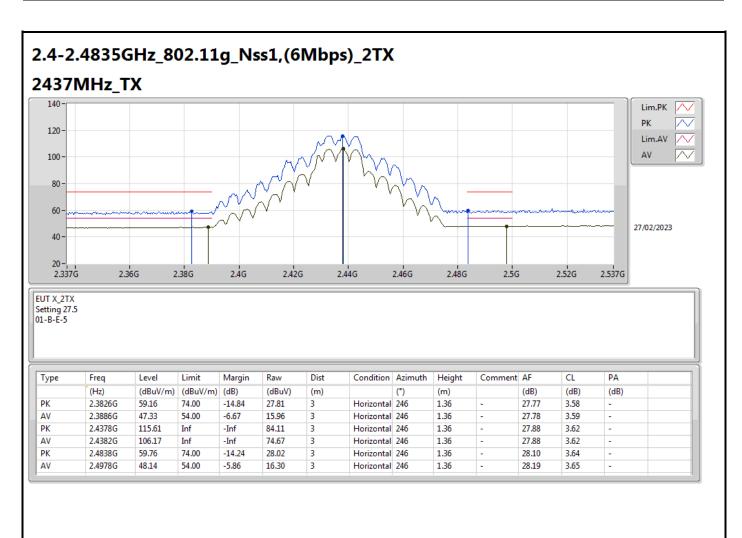




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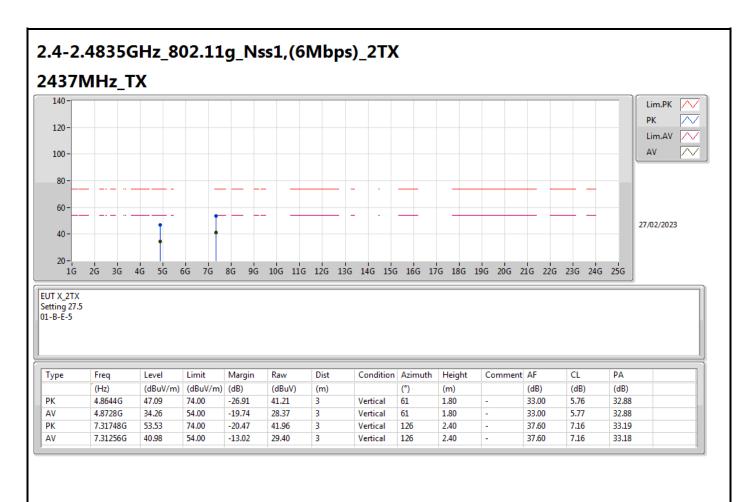




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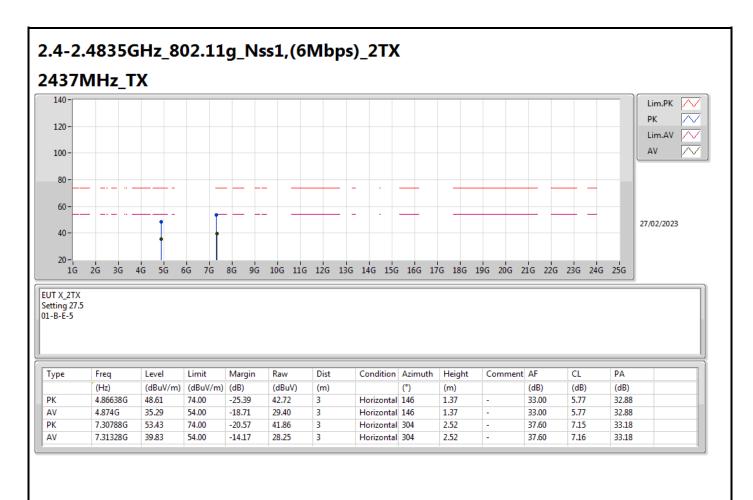




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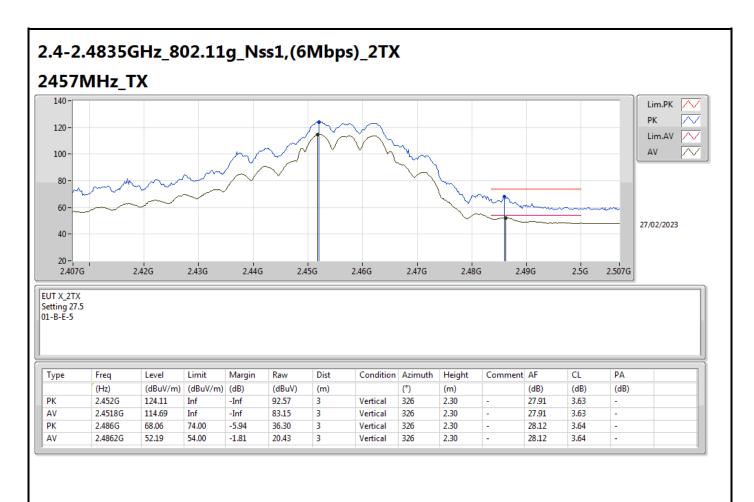




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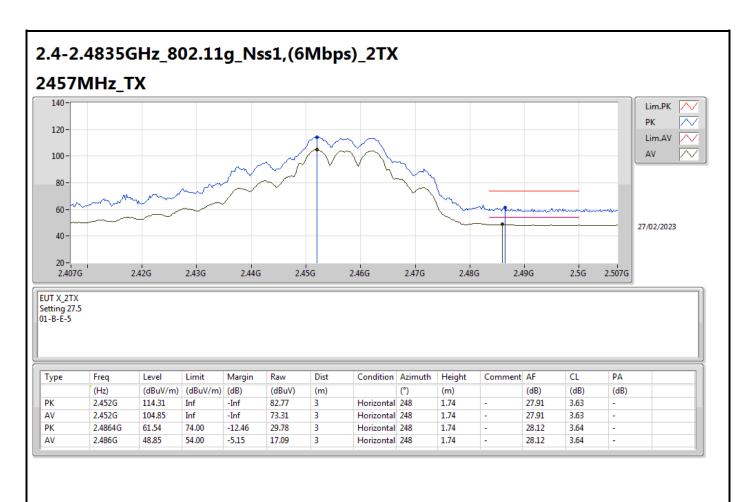




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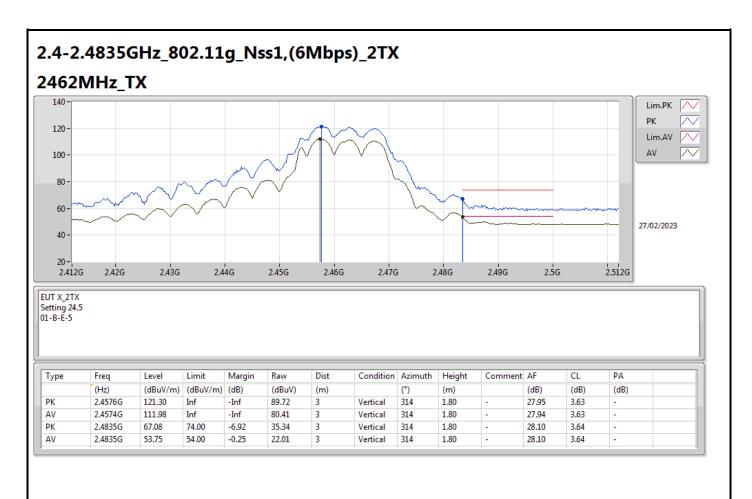




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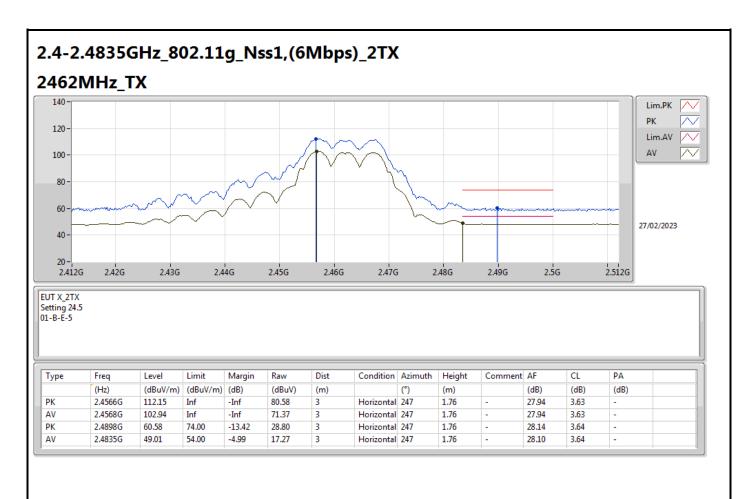




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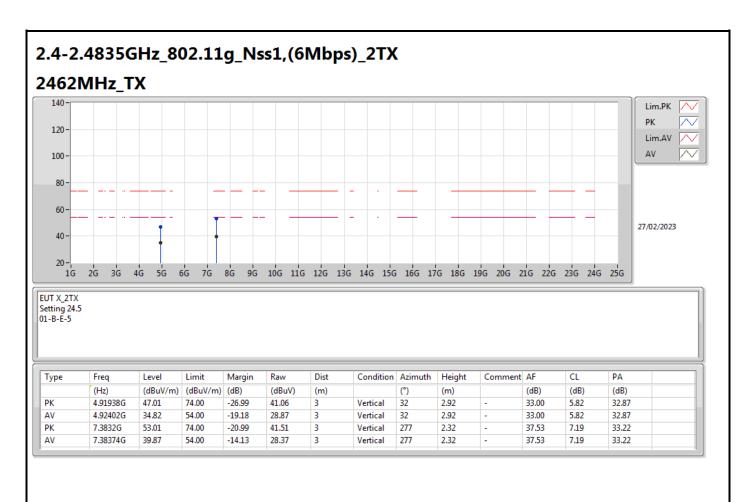




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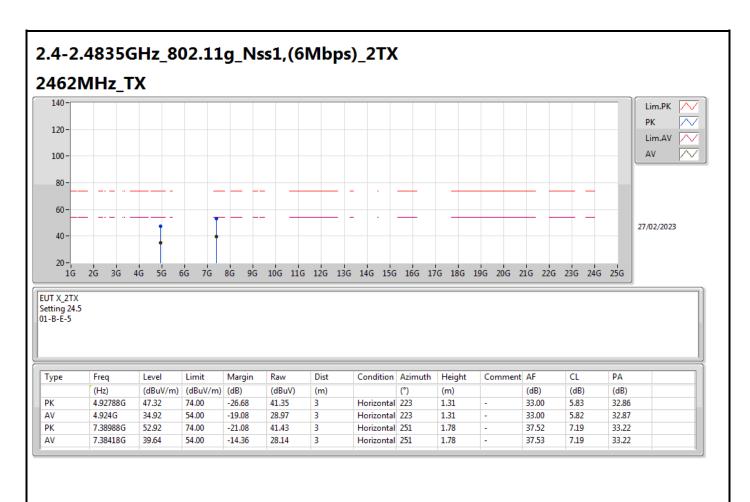




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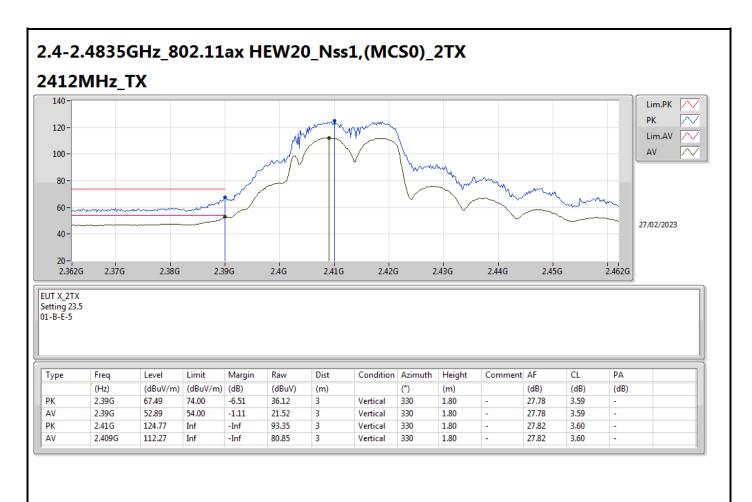




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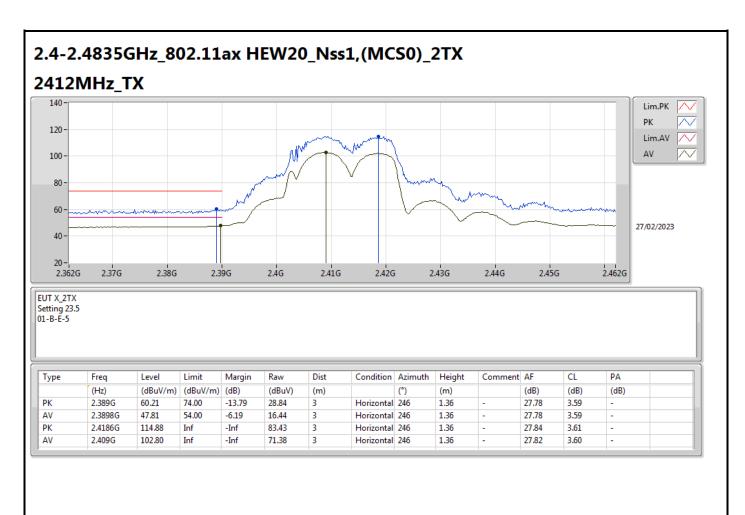




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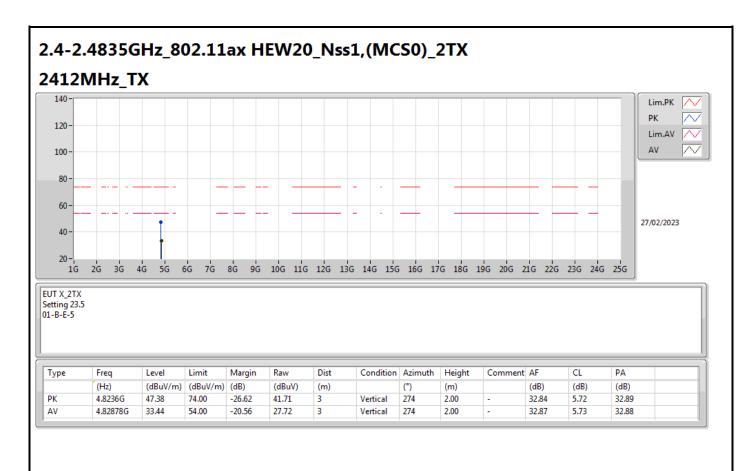




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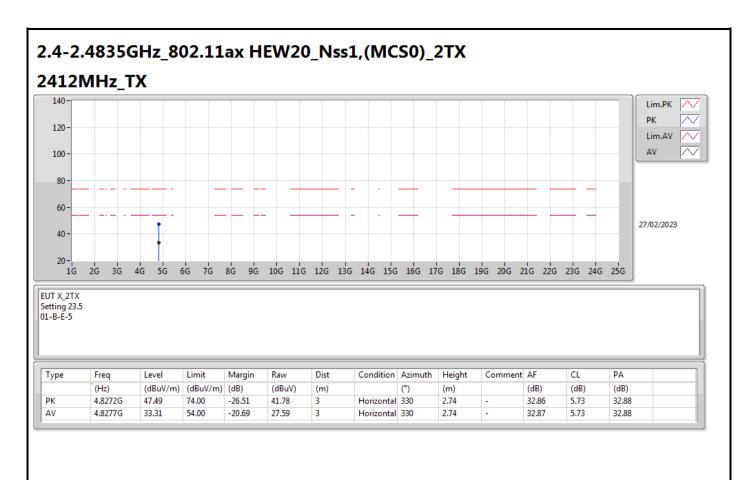




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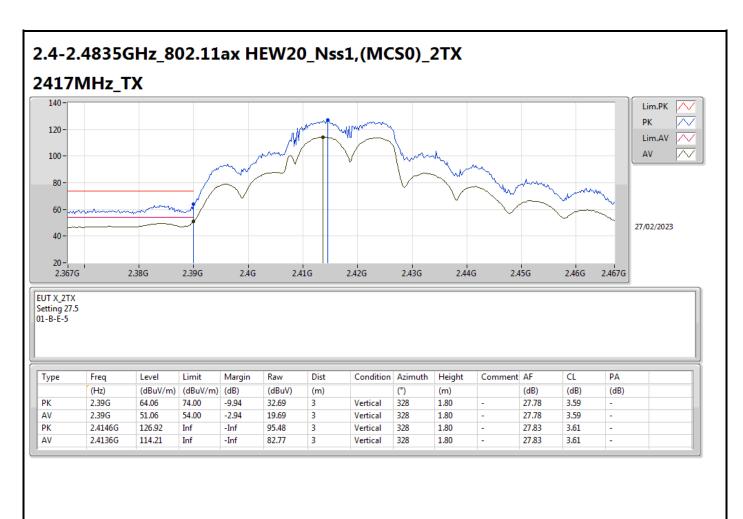




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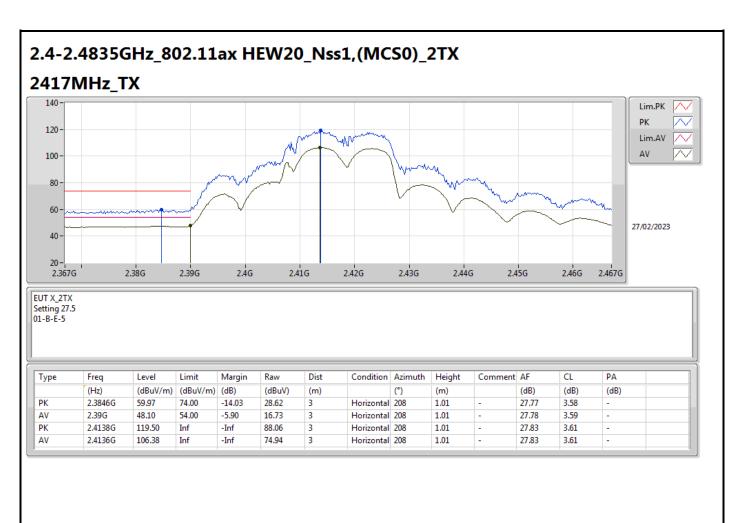




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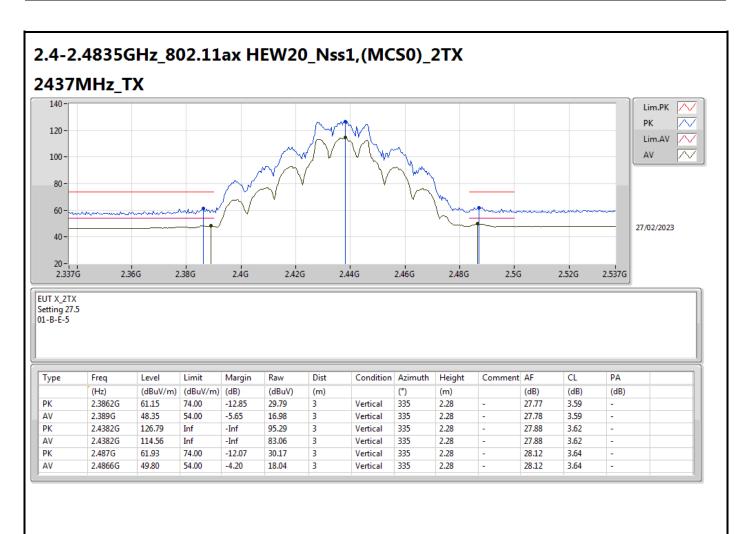
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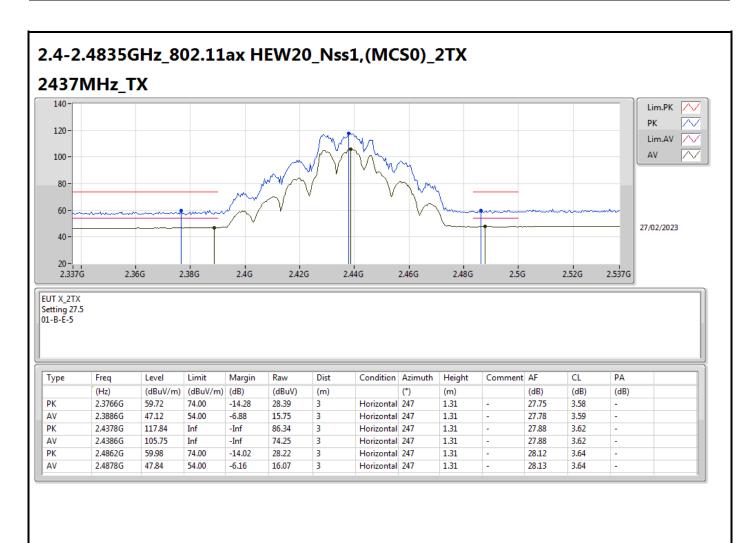




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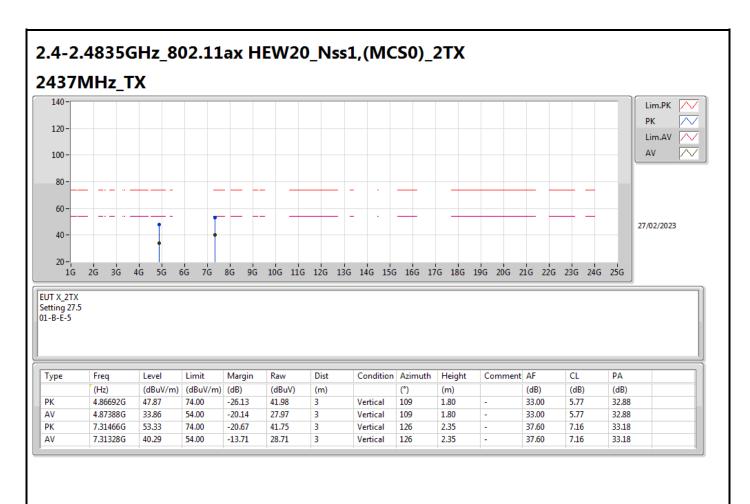




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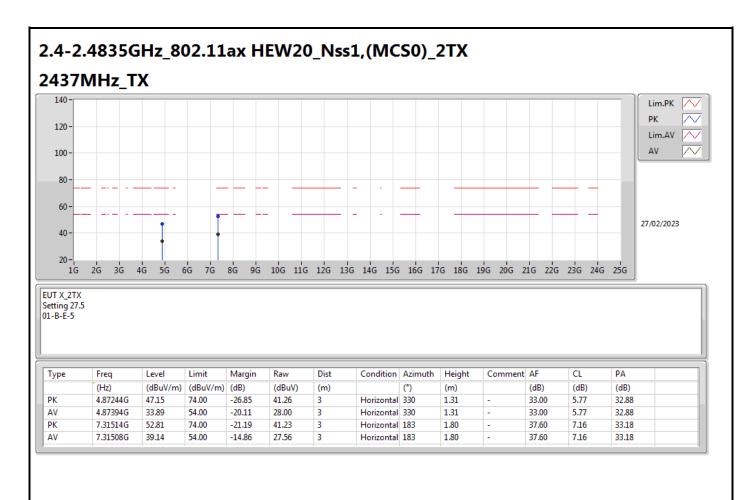




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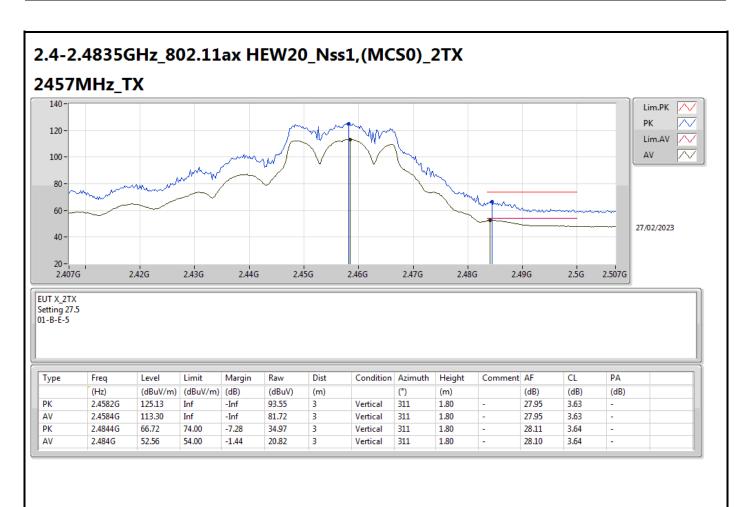




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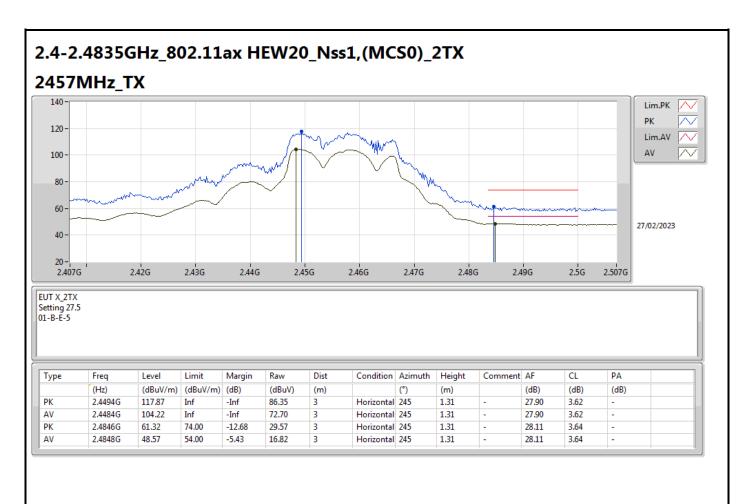




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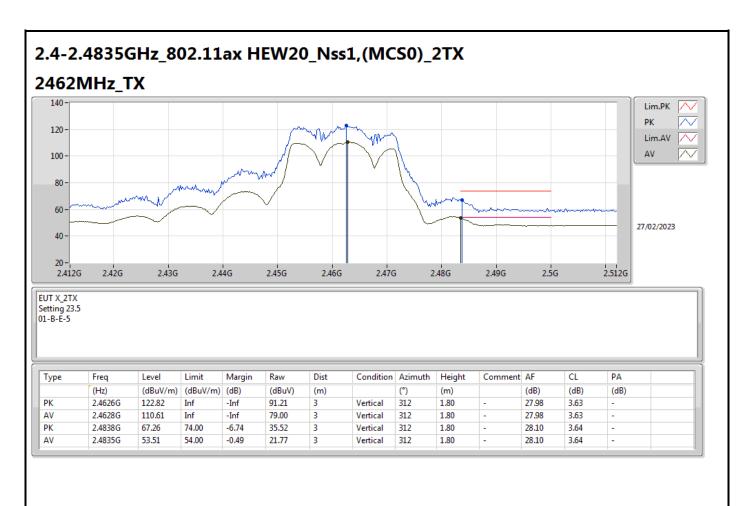




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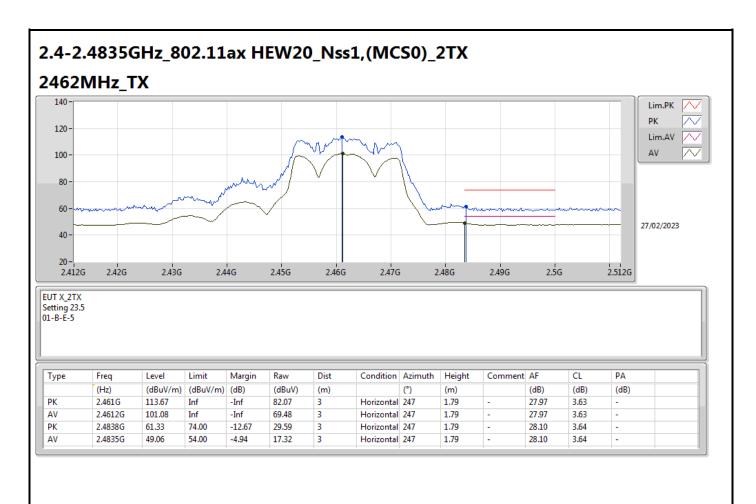




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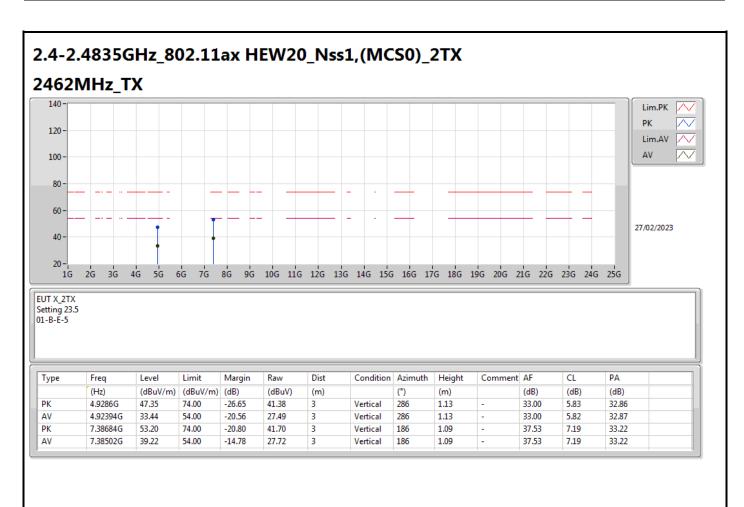




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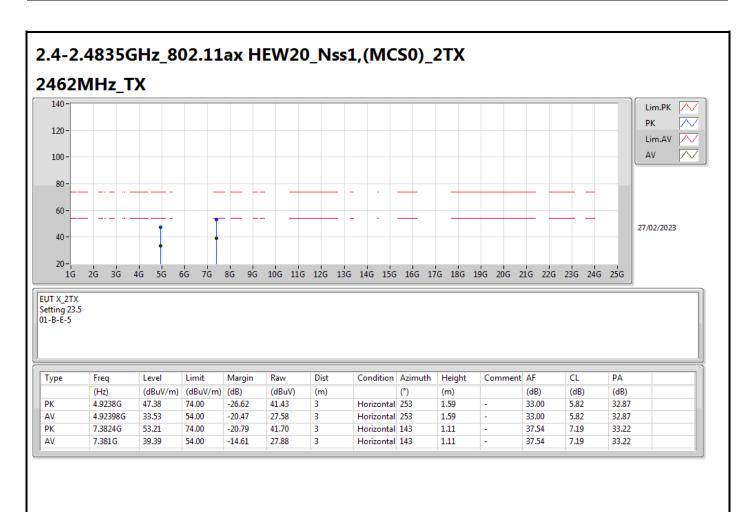




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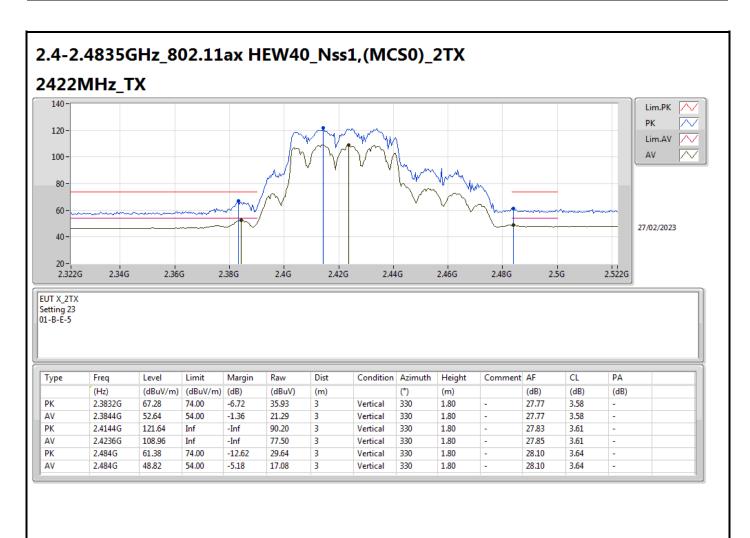




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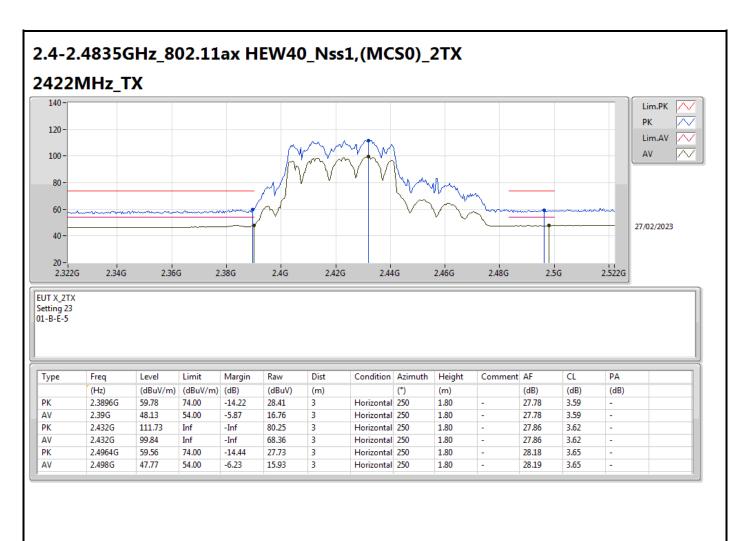




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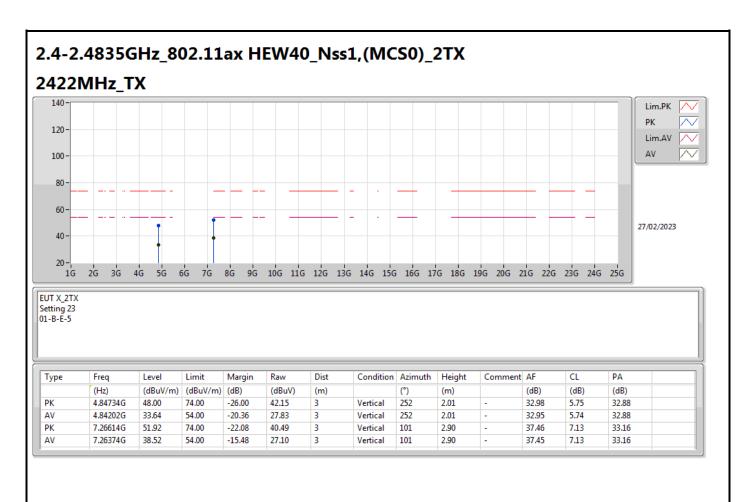




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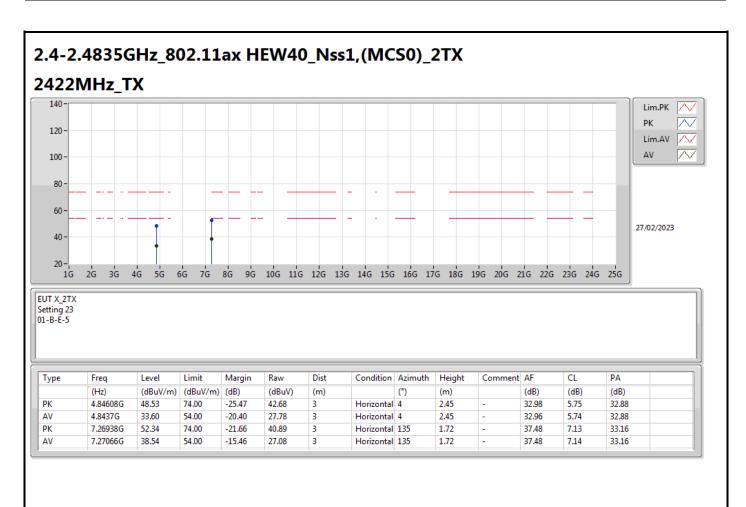




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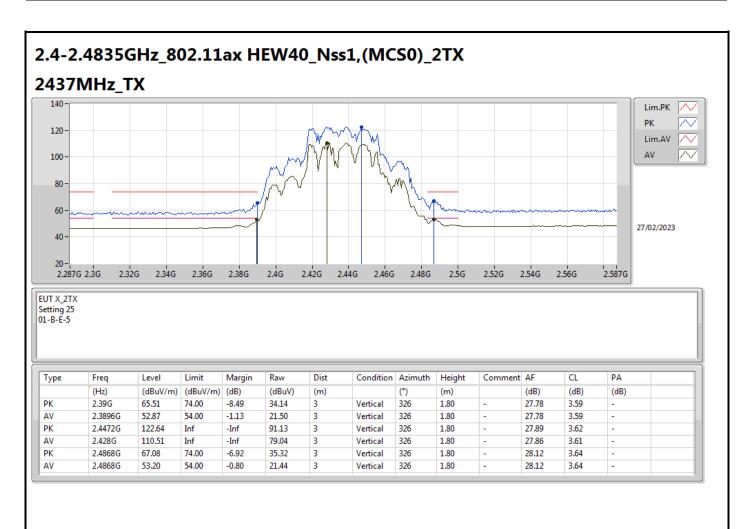




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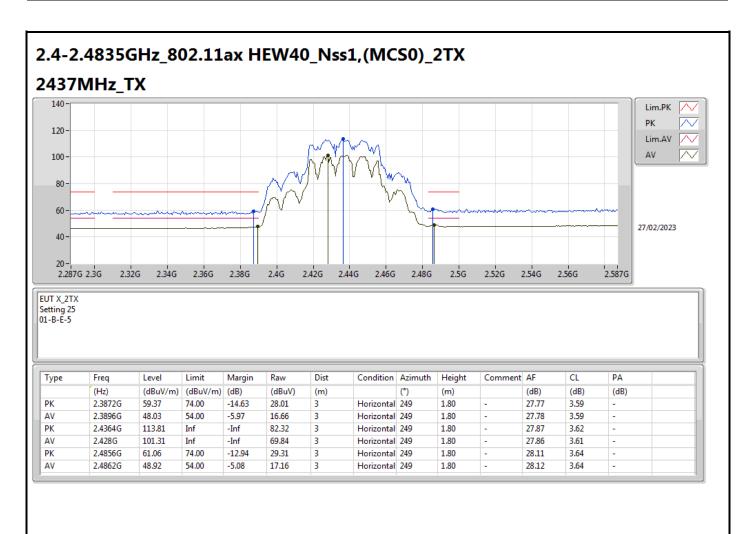




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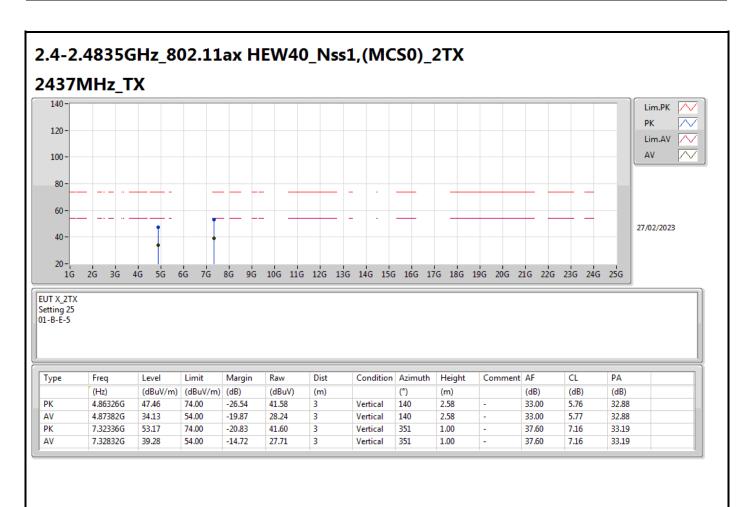




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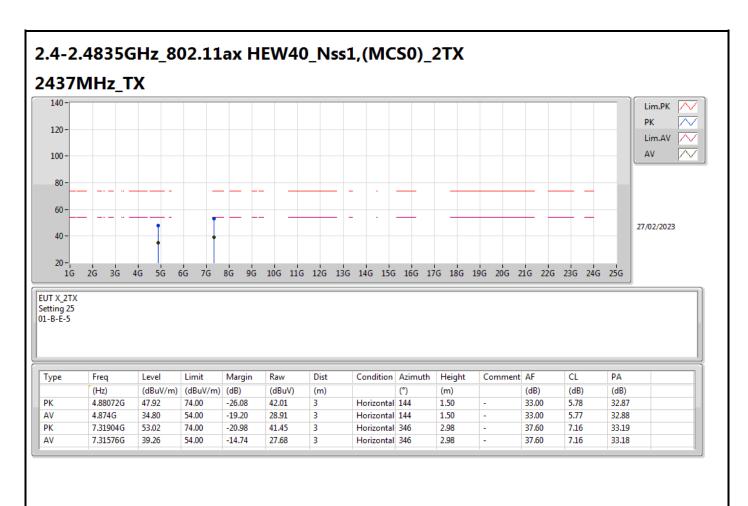




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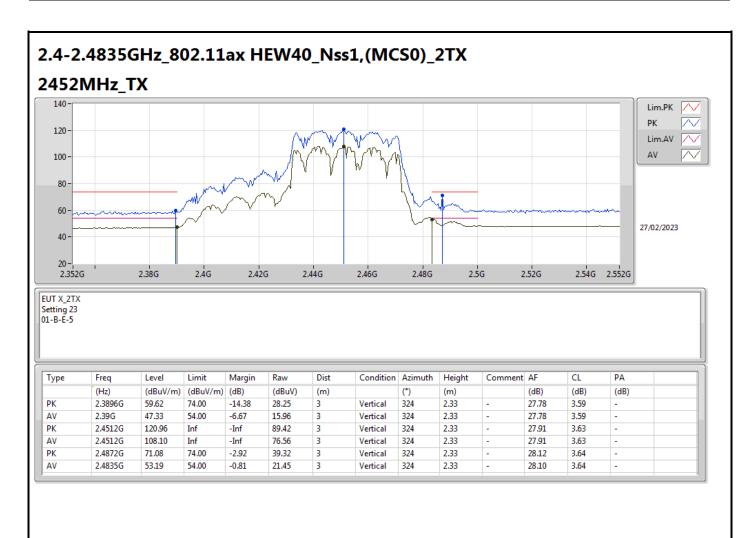




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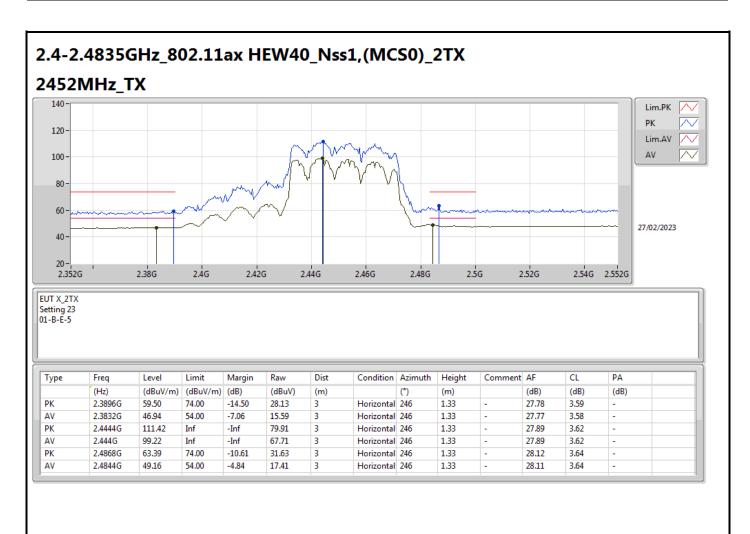




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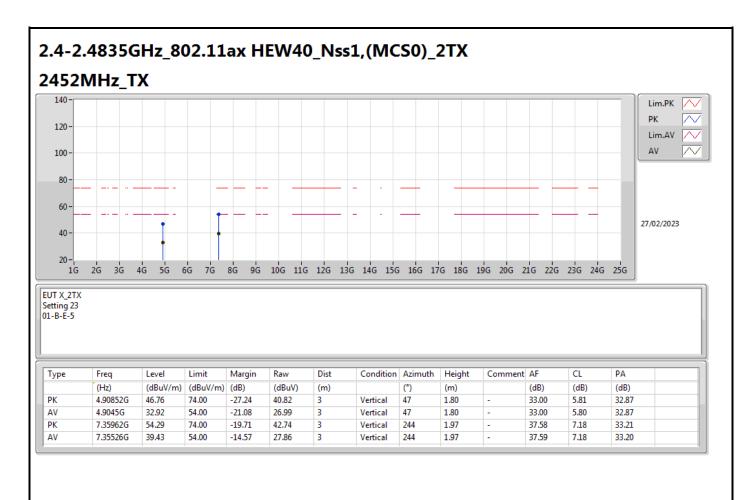




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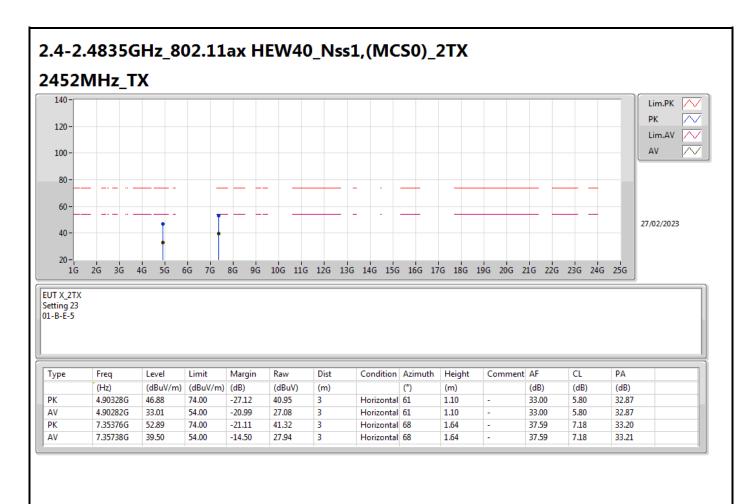




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## Radiated Emissions Co-location

Appendix G

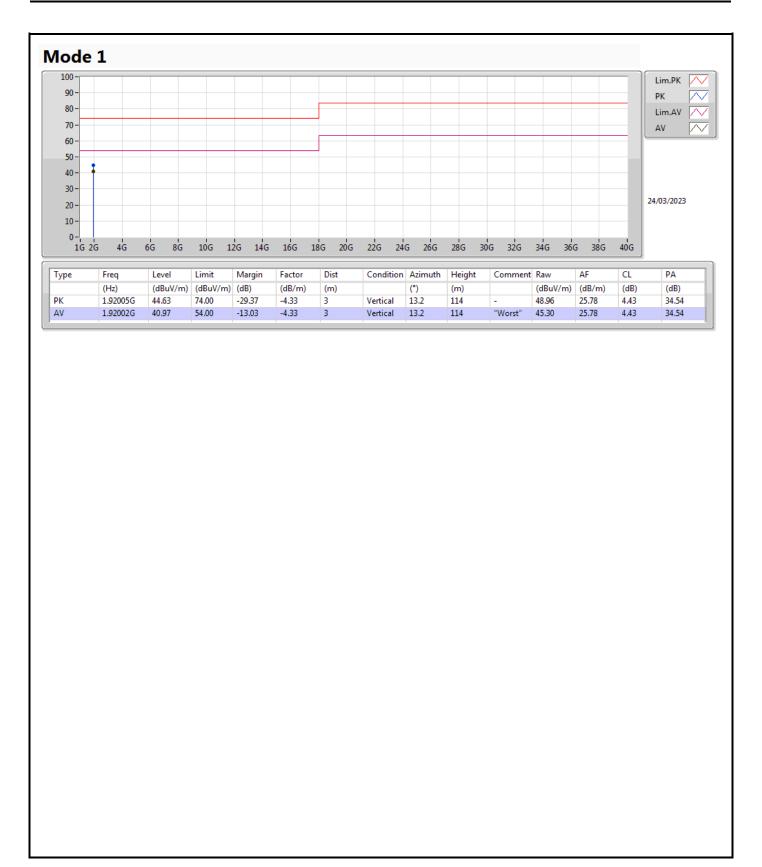
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	1.92002G	40.97	54.00	-13.03	Vertical

Sporton International Inc. Hsinchu Laboratory

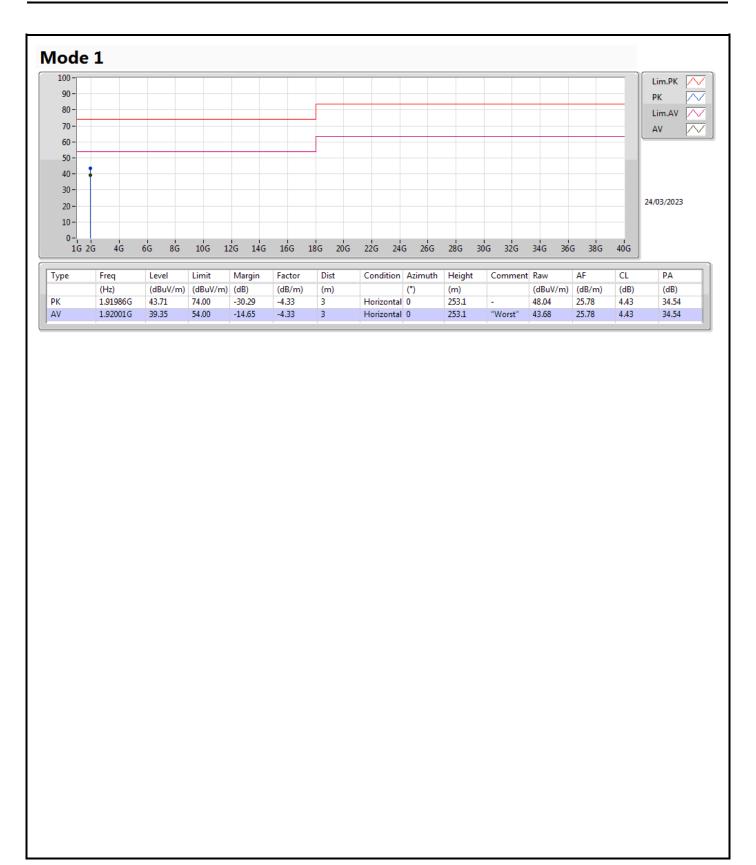
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