

3787

Report No.: FR380925AA

# RADIO TEST REPORT

FCC ID : 2AYRA-03791

Equipment : Linksys Velop Micro-Router 6

Brand Name : LINKSYS

Model Name : LN1100, LN1110, LN1115

Applicant : Linksys USA, Inc.

121 Theory, Irvine, CA. 92617, USA

Standard : 47 CFR FCC Part 15.247

The product was received on Aug. 10, 2023, and testing was started from Aug. 14, 2023 and completed on Sep. 26, 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

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# History of this test report

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Report No.	Version	Description	Issued Date
FR380925AA	01	Initial issue of report	Nov. 29, 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: Cathy Chiu

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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 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

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Galtronics	02102140-07935E1(DB1)	PCB Antenna	I-PEX	
2	Galtronics	02102140-07935E2(DB2)	PCB Antenna	I-PEX	Note1
3	Gemtek	WRTQ-388AX	Printed Antenna	N/A	

#### Note1:

Dort			Antenna Gain (dBi)						
Ant.	Port			WI AN 2 40H-		WLAN	5GHz		Bluetooth
	2.4GHz	5GHz	Bluetooth	WLAN 2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3	
1	2	1	-	4.69	3.86	3.86	4.05	4.05	-
2	1	2	-	4.69	4.88	5.01	4.88	4.89	-
3	-	-	1	-	-	-	-	-	2.86

Note2: The above information was declared by manufacturer.

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	Directional Gain = $10 \cdot \log \left[ \sum_{j=1}^{N_{ex}} \left\{ \sum_{k=1}^{N_{ex}} g_{j,k} \right\}^{2} \right]$
BF	$Directional Gain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{eff}} \left\{ \sum_{k=1}^{N_{eff}} \mathbf{E}_{j,k} \right\}^{2}}{N_{ANT}} \right]$	$Directional Gain = 10 \cdot \log \frac{\sum\limits_{j=1}^{N_{st}} \left\{\sum\limits_{k=1}^{N_{st}} g_{j,k}\right\}^{2}}{N_{AST}}$

Ex.

Directional Gain (NSS1) formula:

$$Directional Gain = 10 \cdot \log \frac{\left[\sum_{j=1}^{N_{so}} \left[\sum_{k=1}^{N_{sov}} \mathbf{g}_{j,k}\right]^{2}\right]}{N_{AbT}}$$

$$\begin{split} \text{NSS1}(\text{g1,1}) = & \ 10^{\text{G1/20}} \ ; \text{NSS1}(\text{g1,2}) = \ 10^{\text{G2/20}} \ ; \text{NSS1}(\text{g1,2}) = \ 10^{\text{G3/20}}; \text{NSS1}(\text{g1,2}) = \ 10^{\text{G4/20}} \\ \text{gj,k} = & (\text{Nss1}(\text{g1,1}) \ + \ \text{Nss1}(\text{g1,2}) \ + \ \text{Nss1}(\text{g1,3}) \ + \ \text{Nss1}(\text{g1,4}) \ )^2 \end{split}$$

 $DG = 10 \log[(Nss1(g1,1) + Nss1(g1,2) + Nss1(g1,3) + Nss1(g1,4))^{2} / N_{ANT}] \Rightarrow 10$ 

 $log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$ 

Where;

2.4G G1= 4.69 dBi ;G2= 4.69 dBi ;

5G UNII-1 G1 = 3.86 dBi; G2 = 4.88 dBi;

5G UNII-2A G1 = 3.86 dBi; G2 = 5.01 dBi;

5G UNII-2C G1 = 4.05 dBi; G2 = 4.88 dBi;

5G UNII-3 G1 = 4.05 dBi; G2 = 4.89 dBi;

2.4G DG = 7.70 dBi

5G UNII-1 DG = 7.40 dBi

5G UNII-2A DG = 7.46 dBi

5G UNII-2C DG = 7.49 dB

5G UNII-3 DG = 7.49 dBi

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#### For 2.4GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

#### For 5GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

#### For Bluetooth function (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

#### 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.861	0.65	690u	3k
802.11g	0.992	0.03	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ax HEW20	0.972	0.12	5.13m	300
802.11ax HEW20-BF	0.966	0.15	3.88m	300
802.11ax HEW40	0.978	0.1	5.295m	300
802.11ax HEW40-BF	0.969	0.14	3.88m	300

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N	Oto.	

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

#### 1.1.4 EUT Operational Condition

<b>EUT Power Type</b>	From Power Adapter				
	$\boxtimes$	With beamforming		Without beamforming	
Beamforming Function	The product has beamforming function for 11n/VHT/ax in 2.4GHz and n/ac/a. 5GHz.				
Function	$\boxtimes$	Point-to-multipoint		Point-to-point	
Support RU	$\boxtimes$	Full RU		Partial RU	
Test Software Version	For Non-beamforming mode: QPSR Version 5.0-00202 For Beamforming mode: Tera Term Version 4.75				

Note: The above information was declared by manufacturer.

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#### 1.1.5 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	Description
LN1100	
LN1110	All the models are identical, the difference model served as marketing strategy.
LN1115	

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Note 1: From the above models, model: LN110 was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

#### 1.1.6 Table for EUT support function

Function
AP Router
Mesh

Note1: For above table list, only AP Router mode was tested and recorded in this test.

Note2: 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	TH03-CB	Owen Hsu	24.3-25.2 / 56-67	Aug. 21, 2023~ Sep. 26, 2023
Radiated (Below 1GHz / Co-location)	03CH04-CB	Roy Mai	23-24 / 56-59	Aug. 15, 2023~ Sep. 21, 2023
Radiated	03CH03-CB	Roy Mai	22.7-23.8 / 56-59	Aug. 15, 2023~ Sep. 21, 2023
(Above 1GHz)	03CH04-CB	Roy Mai	23-24 / 56-59	Aug. 15, 2023~ Sep. 21, 2023
AC Conduction	CO01-CB	Ryan Huang	21~22 / 61~62	Aug. 14, 2023~ Aug. 28, 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)	3.7 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.1 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%
Conducted Emission	3.1 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.1 dB	Confidence levels of 95%
Bandwidth Measurement	2.2%	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	17
2437MHz	17
2462MHz	17
802.11g_Nss1,(6Mbps)_2TX	-
2412MHz	17
2437MHz	19.5
2462MHz	17.5
802.11ax HEW20_Nss1,(MCS0)_2TX	-
2412MHz	17
2417MHz	18.5
2437MHz	20.5
2457MHz	18.5
2462MHz	17
802.11ax HEW40_Nss1,(MCS0)_2TX	-
2422MHz	15.5
2437MHz	17.5
2452MHz	16
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	-
2412MHz	16
2417MHz	16
2437MHz	19
2457MHz	17
2462MHz	16
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	-
2422MHz	16
2437MHz	17
2452MHz	15

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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 beamforming mode supports MCS3~9 for VHT and MCS3~11 for ax in 2.4GHz.

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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	Normal Link	
1	EUT + Adapter 1	
2	EUT + Adapter 2	
3	EUT + Adapter 3	
For operating mode 2 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

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	

For WLAN 2.4GHz/5GHz:

After evaluating, the worst case was found at Y axis from Emissions in Restricted Frequency Bands above 1GHz. So the measurement will follow this same test configuration.

For Bluetooth:

After evaluating, the worst case was found at Z axis from Emissions in Restricted Frequency Bands above 1GHz. So the measurement will follow this same test configuration.

1	EUT in Y axis + WLAN 2.4GHz + Adapter 1
2	EUT in Y axis + WLAN 2.4GHz + Adapter 2
3	EUT in Y axis + WLAN 2.4GHz + Adapter 3

Mode 3 has been evaluated to be the worst case among Mode 1  $\sim$  3, thus measurement for Mode 4  $\sim$  5 will follow this same test mode.

Tollow this sum test mode.		
4	EUT in Y axis + WLAN 5GHz + Adapter 3	
5	EUT in Z axis + Bluetooth + Adapter 3	
For an artist a good O in the count and and it was a good in this test and at		

For operating mode 3 is the worst case and it was record in this test report.

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Operating Mode > 1GHz	СТХ
After evaluating, the wors configuration.	t case was found at Y axis, thus the measurement will follow this same test
1	EUT in Y 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	
After evaluating, the worst case was found at Y axis from Emissions in Restricted Frequency Bands above 1GHz. So the measurement will follow this same test configuration.		
1	EUT in Y axis + WLAN 2.4GHz + WLAN 5GHz	
Refer to Appendix G for Radiated Emission Co-location.		

The Worst Case Mode for Following Conformance Tests		
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation	
Operating Mode		
1	WLAN 2.4GHz + WLAN 5GHz + Bluetooth	
Refer to Sporton Test Report No.: FA380925 for Co-location RF Exposure Evaluation.		

### 2.3 EUT Operation during Test

For CTX Mode:

non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

#### beamforming mode:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

During the test, the following programs under WIN 7 were executed.

The program was executed as follows:

- 1. During the test, the EUT operation to normal function.
- 2. Executed command fixed test channel under Tera Term Version 4.75.
- 3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by Client and transmit duty cycle no less than 98%.

For Normal Link Mode:

During the test, the EUT operation to normal function.

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#### 2.4 Accessories

	Accessories					
Equipment Name	Brand Name	Model Name	Rating			
Adapter 1	Ktec	KSA-18W-120150VU	INPUT: 100-240V ~ 50/60Hz, 0.5A OUTPUT: 12V, 1.5A			
Adapter 2	MOSO	MS-V1500R120-018H0-US	INPUT: 100-240V ~ 50/60Hz, 0.6A, max. OUTPUT: 12.0V, 1.5A			
Adapter 3	Ktec	KSA-18W-120150D5	INPUT: 100-240V ~ 50/60Hz, 0.5A OUTPUT: 12.0V, 1.5A, 18.0W			
		Others				
RJ-45 cable 1*1, non-shielded, 1m (Black)						
RJ-45 cable 2*1, non-shielded, 1m (White)						
Plug*1 (Only for ada	Plug*1 (Only for adapter 3 use)					

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Note: From the above, RJ-45 cable 2 was selected as representative cable for the test and its data was recorded in this report.

### 2.5 Support Equipment

#### For AC Conduction:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	LAN NB	DELL	E6430	N/A	
В	WAN NB	DELL	E6430	N/A	
С	2.4G NB	DELL	E6430	N/A	
D	5G NB	DELL	E6430	N/A	
Е	Smart Phone	Samsung	Galaxy J2	N/A	

# For Radiated (below 1GHz), Radiated (above 1GHz) / Non-beamforming mode and RF Conducted / Non-beamforming mode:

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

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For Radiated (above 1GHz) / Beamforming mode:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	NB	DELL	E4300	N/A	
В	Client	Linksys	ELM	N/A	
С	NB	DELL	E4300	N/A	

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For RF Conducted / Beamforming mode:

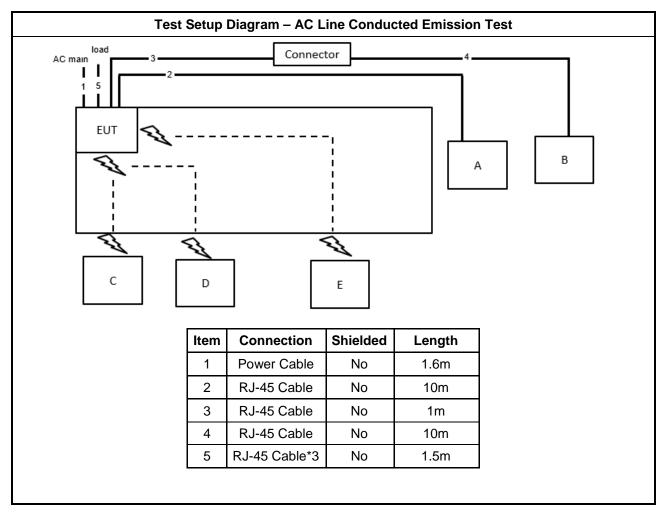
	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
Α	NB	DELL	E4300	N/A		
В	NB	DELL	E4300	N/A		
С	Client	Linksys	ELM	N/A		

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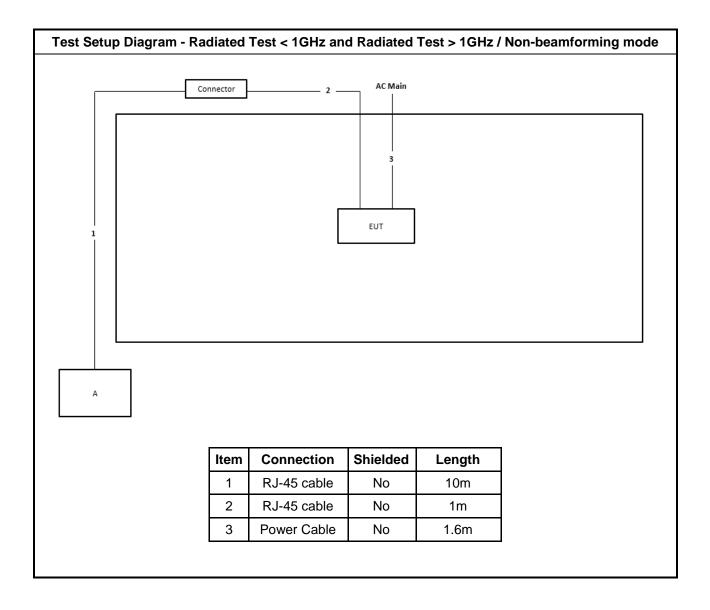


# 2.6 Test Setup Diagram

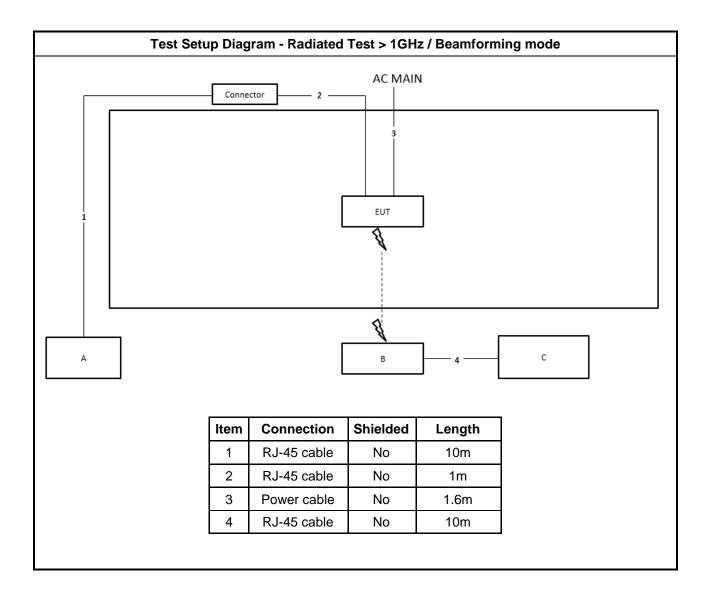


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### 3 Transmitter Test Result

### 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

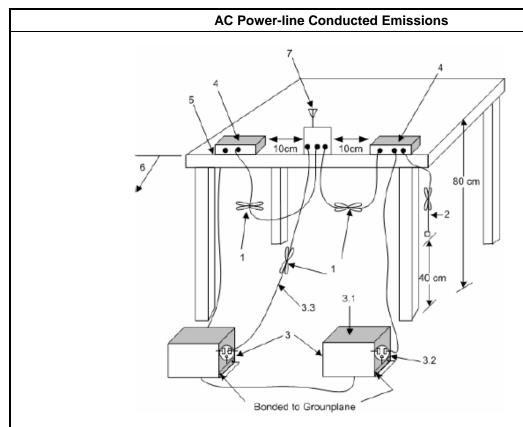
Refer a test equipment and calibration data table in this test report.

#### 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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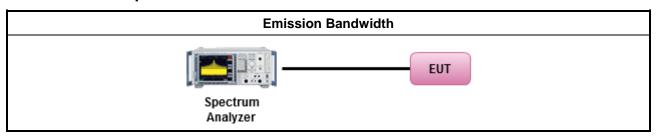
#### 3.2.2 Measuring Instruments

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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 $P_{Out}$  = maximum peak conducted output power or maximum conducted output power in dBm,  $G_{TX}$  = 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.

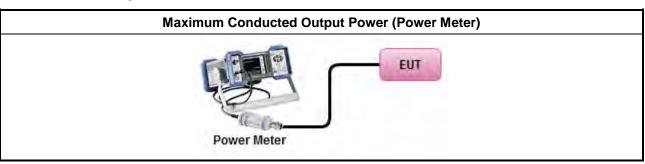
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#### 3.3.3 Test Procedures

		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		
	[dut	y 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)		
	Measurement 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).		
		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: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$		

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### 3.3.4 Test Setup



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### 3.3.5 Test Result of Maximum Conducted Output Power

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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

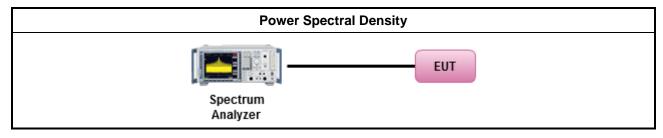
Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

	Test Method						
•	outp the c conc of th	ut po outpu lucte e av	wer spectral density procedures that the same method as used to determine the conducted ower. If maximum peak conducted output power was measured to demonstrate compliance to it power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum id output power was measured to demonstrate compliance to the output power limit, then one erage PSD procedures shall be used, as applicable based on the following criteria (the peak cedure is also an acceptable option).				
	$\boxtimes$	Ref	er as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.				
•	For o	cond	ucted measurement.				
	-	If Th	ne 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.

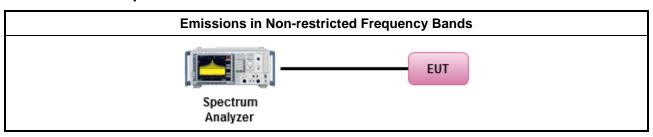
#### 3.5.2 Measuring Instruments

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

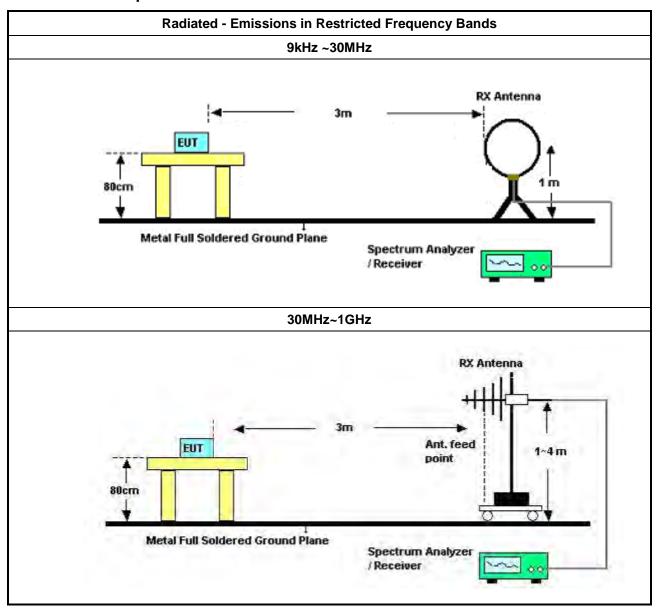
		Test Method							
•	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].								
•		er as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency and highest frequency channel within the allowed operating band.							
•	For the transmitter unwanted emissions shall be measured using following options below:								
		Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.							
	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 time.							
		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:							
	•	Refer as FCC KDB 558074 clause 8.7 & C63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.							
	•	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, 2024	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-5 0-16-2	04083	150kHz ~ 100MHz	Feb. 16, 2023	Feb. 15, 2024	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 27, 2023	Apr. 26, 2024	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	31244	9kHz - 30 MHz	Mar. 23, 2023	Mar. 22, 2024	Radiation (03CH04-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH04-CB	30 MHz ~ 1 GHz Aug. 01, 20		Jul. 31, 2024	Radiation (03CH04-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH04-CB	1GHz ~18GHz 3m	Feb. 23, 2023	Feb. 22, 2024	Radiation (03CH04-CB)
BILOG ANTENNA with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	22021&AT-N06 07	30MHz ~ 1GHz	Oct. 08, 2022	Oct. 07, 2023	Radiation (03CH04-CB)
Horn Antenna	ETS·Lindgren	3115	00143147	750MHz~18GHz	Oct. 12, 2022	Oct. 11, 2023	Radiation (03CH04-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 28, 2023	Jun. 27, 2024	Radiation (03CH04-CB)
Pre-Amplifier	EMCI	EMC330N	980391	20MHz ~ 3GHz May 23, 202		May 22, 2024	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	83017A	MY53270063	0.5GHz ~ 26.5GHz	Jun. 30, 2023	Jun. 29, 2024	Radiation (03CH04-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Mar. 21, 2023	Mar. 20, 2024	Radiation (03CH04-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH04-CB)
RF Cable-low	Woken	RG402	Low Cable-03+67	30MHz – 1GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-21	1GHz - 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-21+67	1GHz - 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH04-CB)

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Calibration Calibration Instrument Brand Model No. Serial No. Characteristics Remark Date **Due Date** Radiation High Cable Woken WCA0929M 40G#5+6 1GHz ~ 40 GHz Dec. 07, 2022 Dec. 06, 2023 (03CH04-CB) Radiation High Cable Woken WCA0929M 40G#5 1GHz ~ 40 GHz Dec. 07, 2022 Dec. 06, 2023 (03CH04-CB) Radiation WCA0929M 1GHz ~ 40 GHz Dec. 07, 2022 Dec. 06, 2023 High Cable Woken 40G#6 (03CH04-CB) Radiation Test Software SPORTON SENSE V5.10 N.C.R. N.C.R. (03CH04-CB) 3m Semi 1GHz ~18GHz Radiation Anechoic TDK 03CH03-CB SAC-3M May 04, 2023 May 03, 2024 (03CH03-CB) Chamber 3m **VSWR** Radiation Horn Antenna **ETS**·Lindgren 3115 6821 750MHz~18GHz Feb. 03, 2023 Feb. 02, 2024 (03CH03-CB) Radiation Horn Antenna SCHWARZBECK BBHA9170507 15GHz ~ 40GHz Jun. 28, 2023 Jun. 27, 2024 **BBHA 9170** (03CH03-CB) Radiation Pre-Amplifier Agilent 8449B 3008A02097 1GHz ~ 26.5GHz Jun. 30, 2023 Jun. 29, 2024 (03CH03-CB) Radiation Spectrum R&S FSP40 100019 9kHz ~ 40GHz Jun. 12, 2023 Jun. 11, 2024 Analyzer (03CH03-CB) High Radiation RF Cable-high 1GHz ~ 18GHz Woken RG402 Oct. 03, 2022 Oct. 02, 2023 Cable-20+29 (03CH03-CB) Radiation RF Cable-high Woken RG402 High Cable-29 1GHz ~ 18GHz Oct. 03, 2022 Oct. 02, 2023 (03CH03-CB) Radiation High Cable Woken WCA0929M 40G#5+6 1GHz ~ 40 GHz Dec. 07, 2022 Dec. 06, 2023 (03CH03-CB) Radiation 1GHz ~ 40 GHz High Cable Woken WCA0929M 40G#5 Dec. 07, 2022 Dec. 06, 2023 (03CH03-CB) Radiation High Cable Woken WCA0929M 40G#6 1GHz ~ 40 GHz Dec. 07, 2022 Dec. 06, 2023 (03CH03-CB) Radiation **Test Software SPORTON** SENSE V5.10 N.C.R. N.C.R. (03CH03-CB) Spectrum Conducted R&S FSV40 101028 9kHz~40GHz Dec. 30, 2022 Dec. 29, 2023 (TH03-CB) analyzer Conducted Power Sensor Anritsu MA2411B 1531344 300MHz~40GHz Aug. 01, 2023 Jul. 31, 2024 (TH03-CB) Conducted Power Meter Anritsu ML2495A 1728002 300MHz~40GHz Aug. 01, 2023 Jul. 31, 2024 (TH03-CB) Conducted RF Cable Woken RG402 High Cable-11 30MHz -18 GHz Feb. 14, 2023 Feb. 13, 2024 (TH03-CB) Conducted RF Cable Woken RG402 High Cable-12 30MHz -18 GHz Feb. 14, 2023 Feb. 13, 2024 (TH03-CB) Conducted RF Cable Woken RG402 High Cable-13 30MHz -18 GHz Feb. 14, 2023 Feb. 13, 2024 (TH03-CB)

1 GHz -18 GHz

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RF Cable-high

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Woken

RG402

High Cable-14

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Oct. 02, 2023

Conducted

(TH03-CB)

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Instrument	Brand	Model No.	Serial No. Characteristics		Calibration Calibration Date Due Date		Remark
RF Cable-high	Woken	RG402	High Cable-15	1 GHz –18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH03-CB)
Switch	SPTCB	SP-SWI	SWI-03	1 GHz –26.5 GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)

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

NCR means Non-Calibration required.

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### **Conducted Emissions at Powerline**

Appendix A

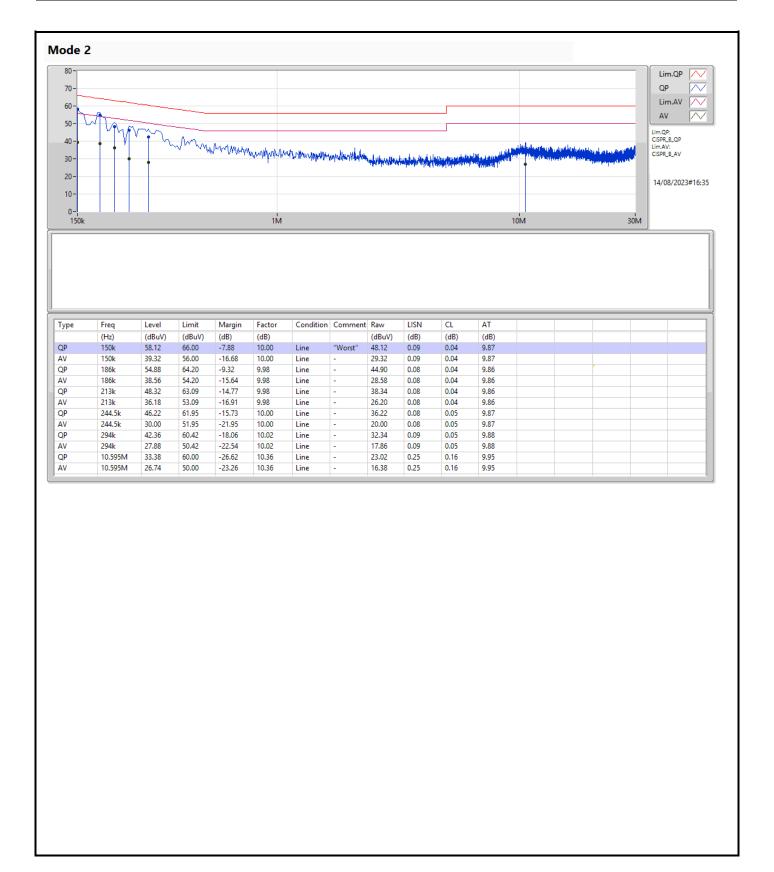
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 2	Pass	QP	159k	58.53	65.52	-6.99	Neutral

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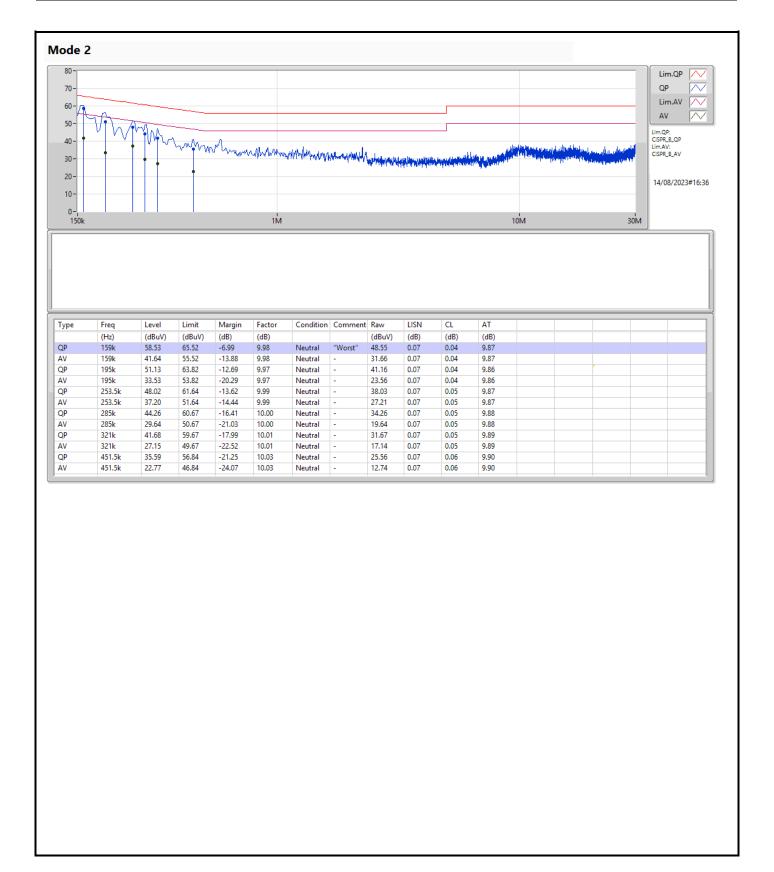




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Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	ï	-	=	4	-
802.11b_Nss1,(1Mbps)_2TX	8.025M	13.103M	13M1G1D	7.75M	13.028M
802.11g_Nss1,(6Mbps)_2TX	15.05M	16.25M	16M3D1D	13.775M	16.206M
802.11ax HEW20_Nss1,(MCS0)_2TX	16.375M	19.065M	19M1D1D	12.575M	18.791M
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	17.825M	18.941M	18M9D1D	11.7M	18.816M
802.11ax HEW40_Nss1,(MCS0)_2TX	36.15M	37.531M	37M5D1D	28.1M	37.481M
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	37.55M	39.88M	39M9D1D	3.8M	37.281M

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

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# Result

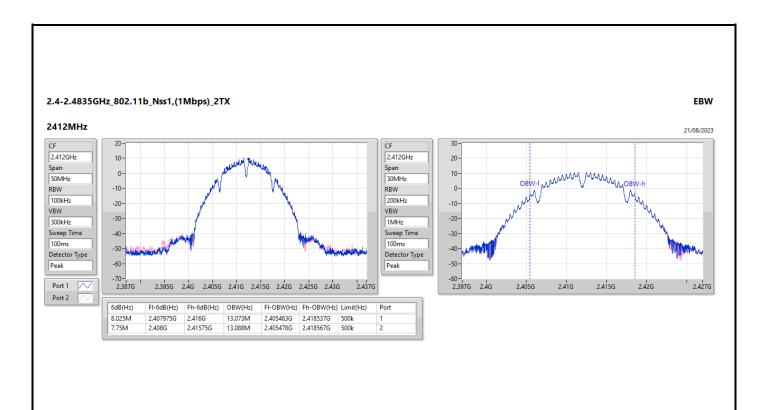
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	8.025M	13.073M	7.75M	13.088M
2437MHz	Pass	500k	8M	13.043M	8.025M	13.103M
2462MHz	Pass	500k	8.025M	13.028M	8.025M	13.073M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	13.775M	16.25M	15.025M	16.206M
2437MHz	Pass	500k	15.025M	16.25M	15.05M	16.25M
2462MHz	Pass	500k	14.975M	16.25M	13.775M	16.228M
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	13.725M	18.791M	13.825M	18.791M
2437MHz	Pass	500k	16.375M	18.891M	13.8M	19.065M
2462MHz	Pass	500k	12.575M	18.791M	13.85M	18.791M
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	33.85M	37.531M	32.25M	37.481M
2437MHz	Pass	500k	28.1M	37.481M	32.5M	37.531M
2452MHz	Pass	500k	34.9M	37.531M	36.15M	37.481M
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	11.7M	18.941M	15.675M	18.891M
2437MHz	Pass	500k	15.9M	18.891M	17.575M	18.916M
2462MHz	Pass	500k	13.725M	18.941M	17.825M	18.816M
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	37.55M	37.731M	25.75M	37.531M
2437MHz	Pass	500k	15.25M	37.581M	35.6M	39.88M
2452MHz	Pass	500k	3.8M	37.281M	35M	37.531M

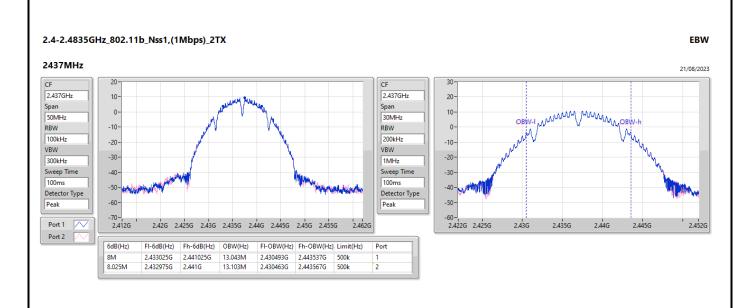
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

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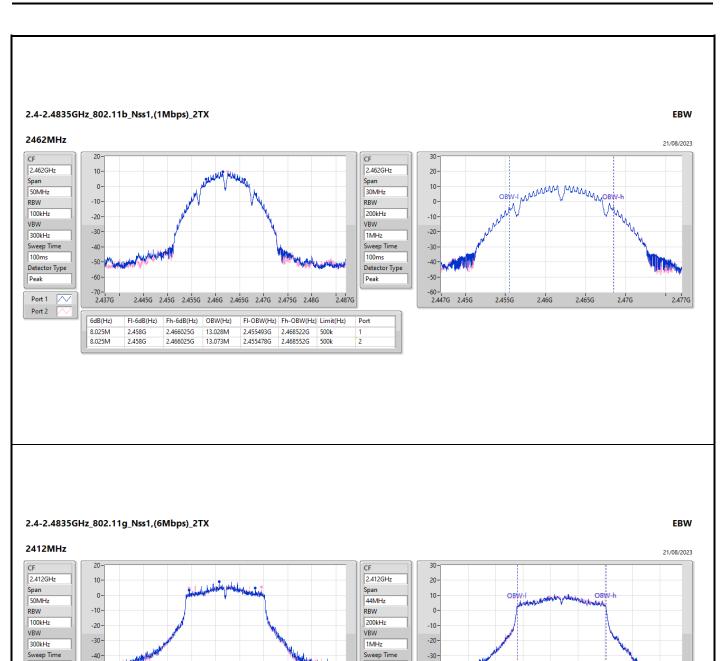
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100ms

Peak

Detector Type

-40

-50



100ms

Peak

Port 1

Detector Type

-50-

-60

6dB(Hz)

13.775M

2.40445G

2.404475G

2.395G 2.4G 2.405G 2.41G 2.415G 2.42G 2.425G 2.43G

2.403886G

2.403908G

16.25M

FI-6dB(Hz) Fh-6dB(Hz) OBW(Hz)

2.418225G

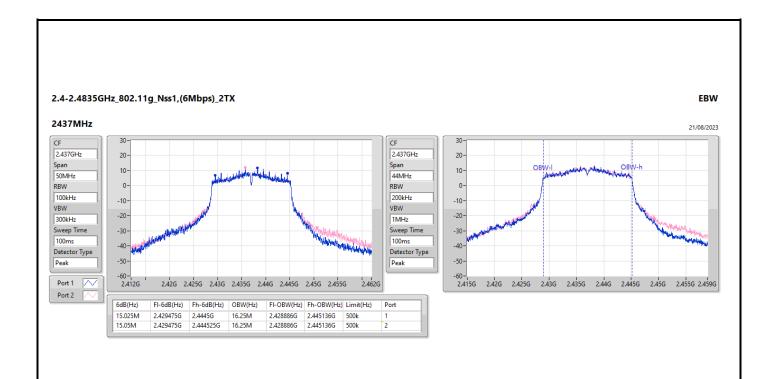
FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz)

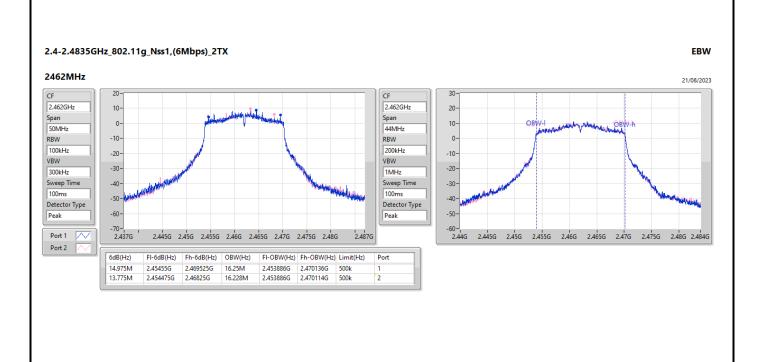
2.420136G 2.420114G

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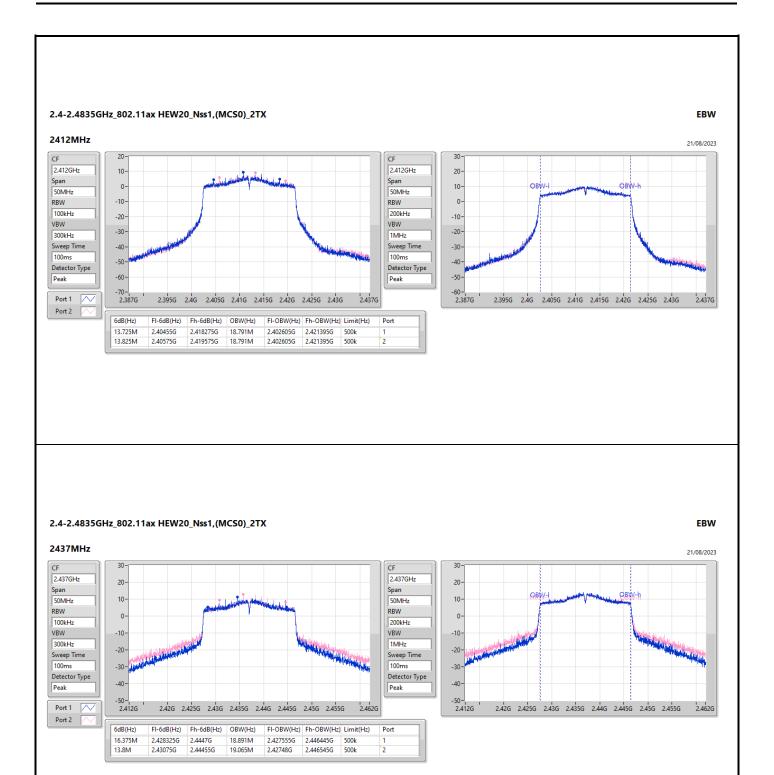
2.4G 2.405G 2.41G 2.415G 2.42G 2.425G 2.43G 2.434G





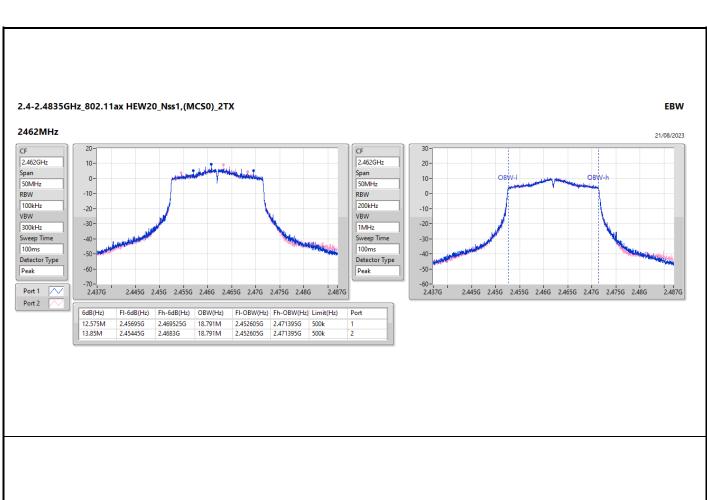
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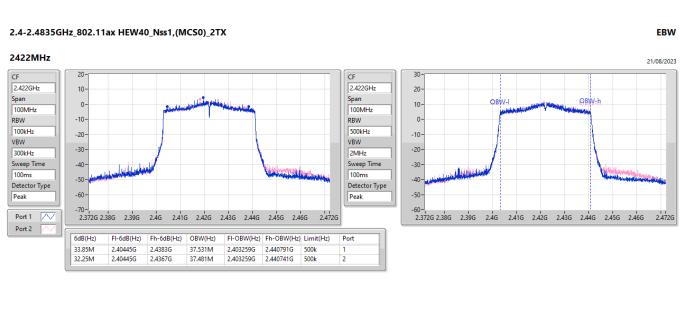
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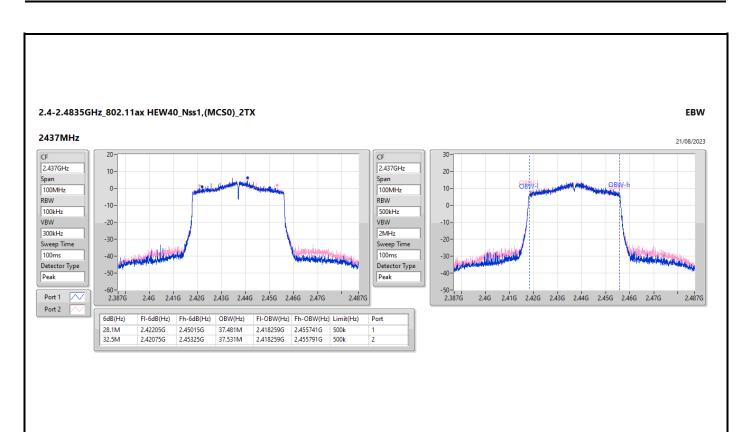
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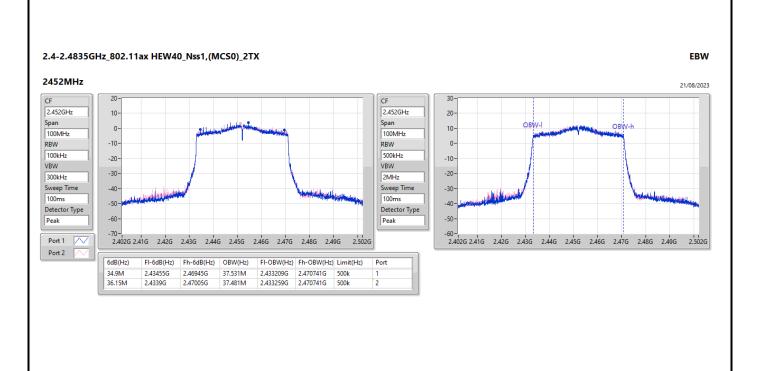




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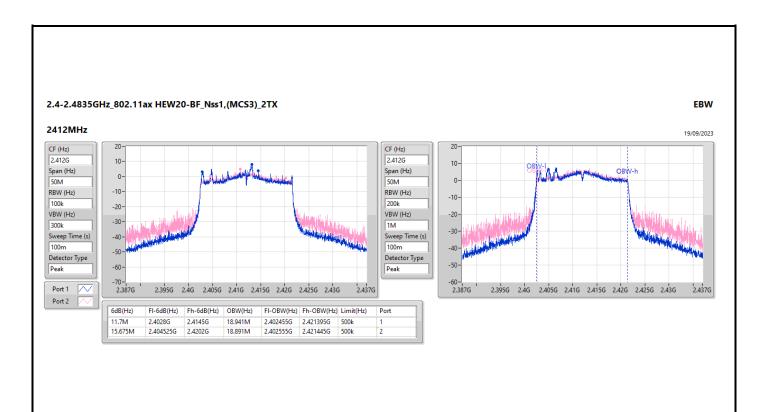
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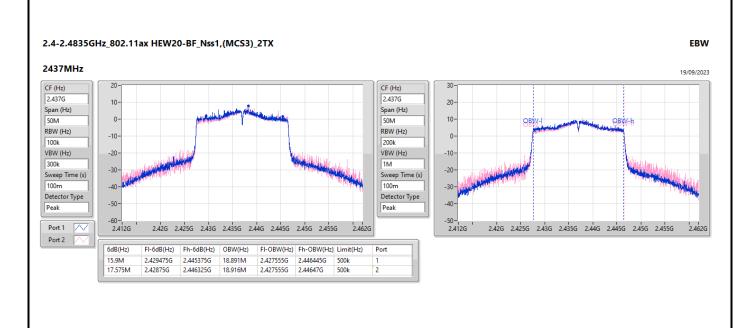




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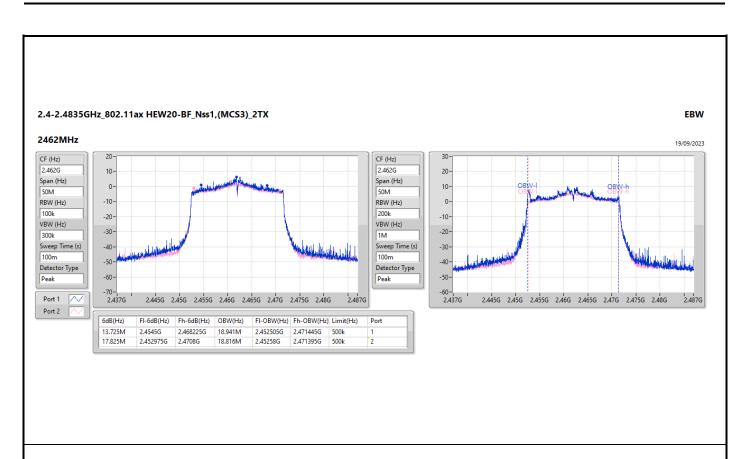
Report No. : FR380925AA

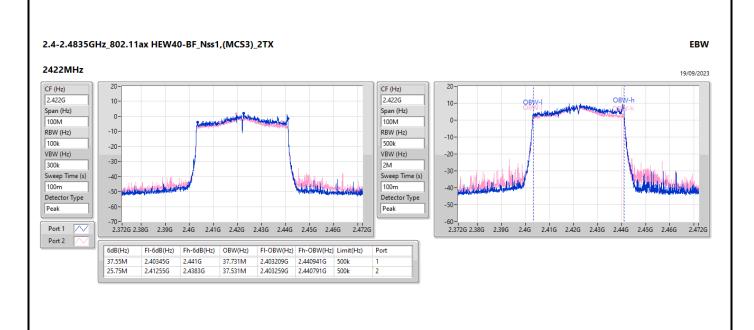




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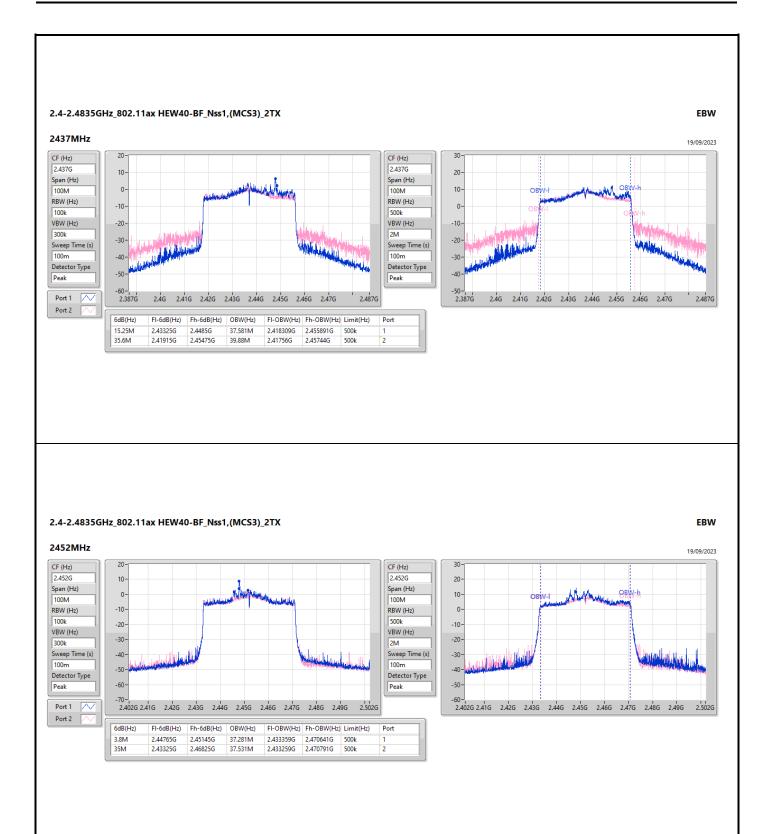
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Average Power Appendix C

# Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	20.83	0.12106
802.11g_Nss1,(6Mbps)_2TX	23.26	0.21184
802.11ax HEW20_Nss1,(MCS0)_2TX	24.05	0.25410
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	18.92	0.07798
802.11ax HEW40_Nss1,(MCS0)_2TX	21.25	0.13335
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	17.38	0.05470

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Average Power Appendix C

# Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)
802.11b_Nss1,(1Mbps)_2TX	_	(UDI)	(UDIII)	(UDIII)	(ubili)	(UBIII)
2412MHz	Pass	4.69	17.58	17.75	20.68	30.00
241ZWIFZ 2437MHz	Pass	4.69	17.30	17.75	20.83	30.00
2462MHz	Pass	4.69	17.62	17.61	20.63	30.00
			-		20.03	
802.11g_Nss1,(6Mbps)_2TX	- D	- 4.40		17.00		- 20.00
2412MHz	Pass	4.69	17.93	17.99	20.97	30.00
2437MHz	Pass	4.69	20.22	20.27	23.26	30.00
2462MHz	Pass	4.69	18.30	18.32	21.32	30.00
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.69	17.70	17.81	20.77	30.00
2417MHz	Pass	4.69	18.61	19.43	22.05	30.00
2437MHz	Pass	4.69	20.97	21.10	24.05	30.00
2457MHz	Pass	4.69	18.99	19.15	22.08	30.00
2462MHz	Pass	4.69	17.66	17.73	20.71	30.00
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.69	16.24	16.25	19.26	30.00
2437MHz	Pass	4.69	18.22	18.25	21.25	30.00
2452MHz	Pass	4.69	16.66	16.57	19.63	30.00
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	-	-	-	-	÷	=
2412MHz	Pass	7.70	14.42	14.30	17.37	28.30
2417MHz	Pass	7.70	14.22	14.04	17.14	28.30
2437MHz	Pass	7.70	16.19	15.61	18.92	28.30
2457MHz	Pass	7.70	15.19	14.52	17.88	28.30
2462MHz	Pass	7.70	14.79	14.13	17.48	28.30
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-
2422MHz	Pass	7.70	13.23	13.53	16.39	28.30
2437MHz	Pass	7.70	14.32	14.42	17.38	28.30
2452MHz	Pass	7.70	14.02	13.89	16.97	28.30

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	-1.32
802.11g_Nss1,(6Mbps)_2TX	-2.76
802.11ax HEW20_Nss1,(MCS0)_2TX	-1.18
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	-4.28
802.11ax HEW40_Nss1,(MCS0)_2TX	-6.60
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	-3.61

RBW = 3kHz;

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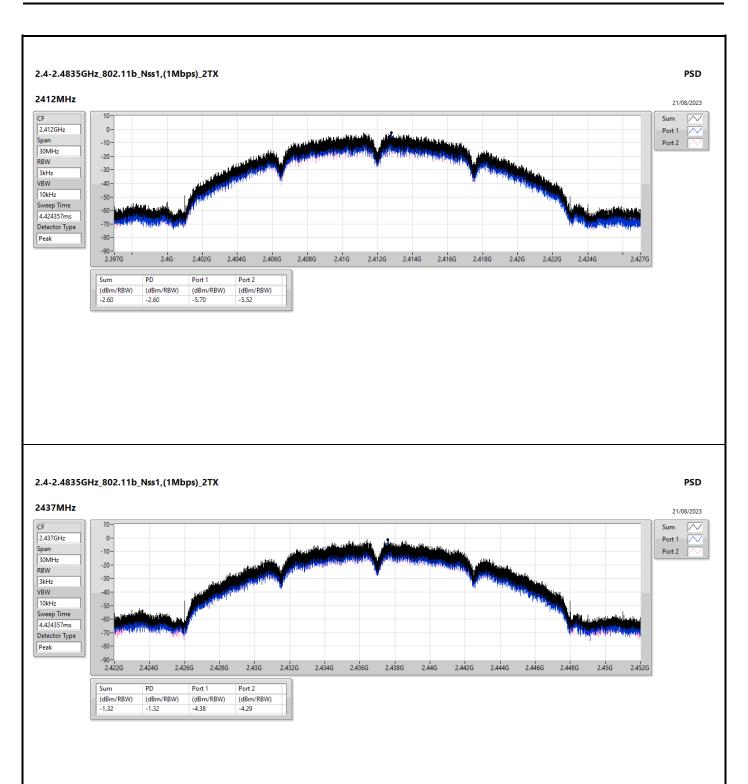
Appendix D **PSD** 

# Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	Port 2 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.70	-5.70	-5.52	-2.60	6.30
2437MHz	Pass	7.70	-4.38	-4.29	-1.32	6.30
2462MHz	Pass	7.70	-5.80	-6.04	-2.97	6.30
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.70	-7.70	-6.82	-4.99	6.30
2437MHz	Pass	7.70	-4.98	-4.57	-2.76	6.30
2462MHz	Pass	7.70	-6.93	-5.09	-4.39	6.30
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.70	-5.79	-6.42	-3.64	6.30
2437MHz	Pass	7.70	-2.79	-3.14	-1.18	6.30
2462MHz	Pass	7.70	-6.40	-6.70	-3.59	6.30
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	=	-	-	-
2422MHz	Pass	7.70	-10.10	-10.01	-8.03	6.30
2437MHz	Pass	7.70	-8.78	-8.01	-6.60	6.30
2452MHz	Pass	7.70	-10.61	-10.24	-8.42	6.30
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.70	-5.90	-9.21	-4.28	6.30
2437MHz	Pass	7.70	-8.59	-7.09	-6.94	6.30
2462MHz	Pass	7.70	-5.55	-9.71	-4.87	6.30
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-
2422MHz	Pass	7.70	-10.81	-12.61	-9.29	6.30
2437MHz	Pass	7.70	-9.53	-13.58	-9.34	6.30
2452MHz	Pass	7.70	-3.95	-12.29	-3.61	6.30

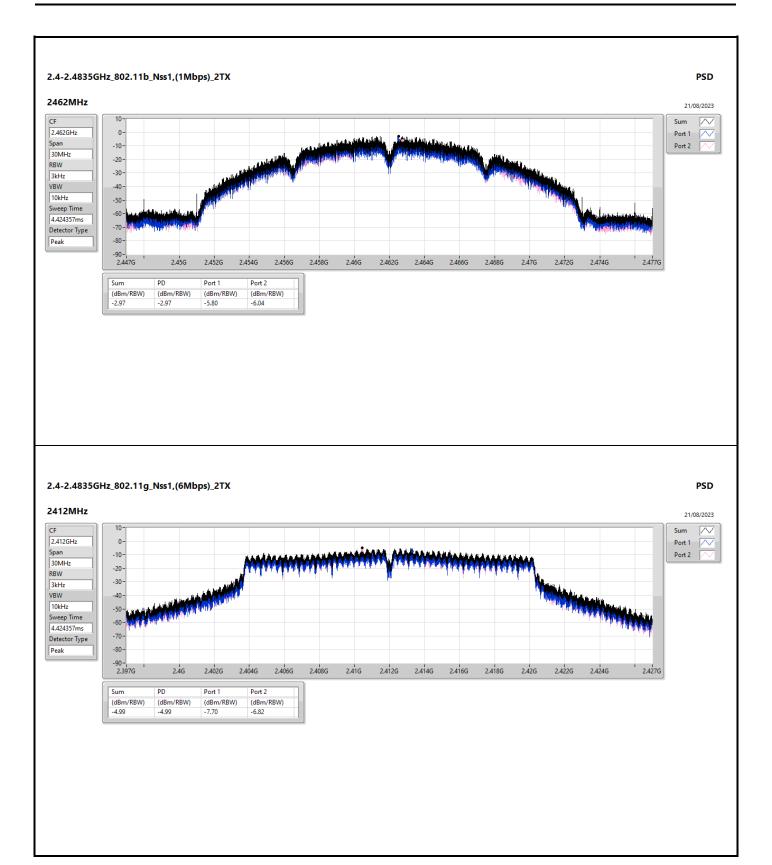
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DG = Directional Gain; RBW = 3kHz; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;



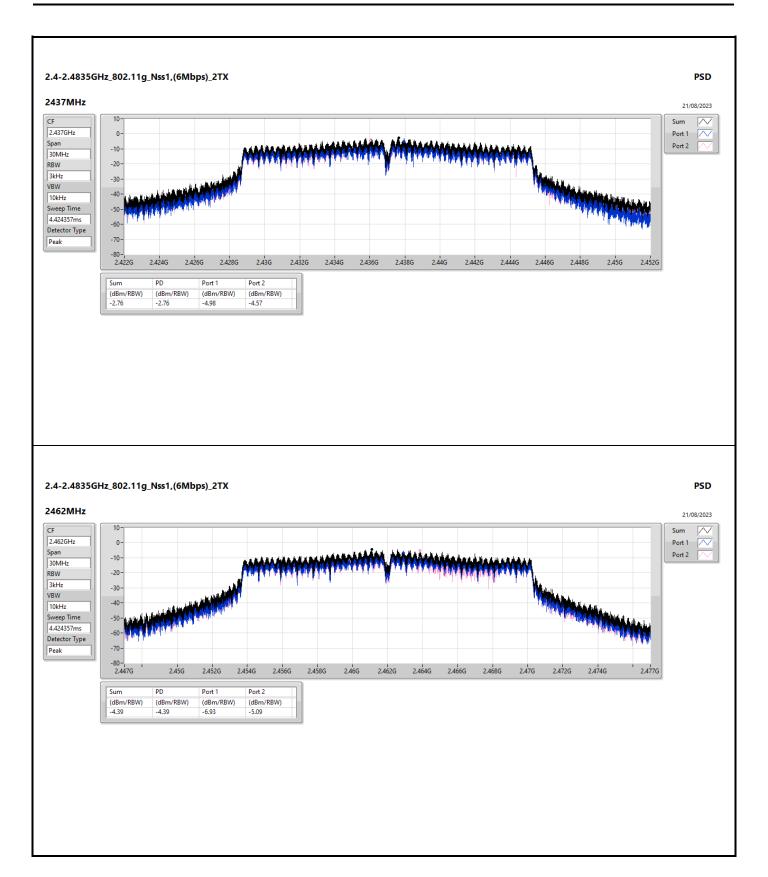
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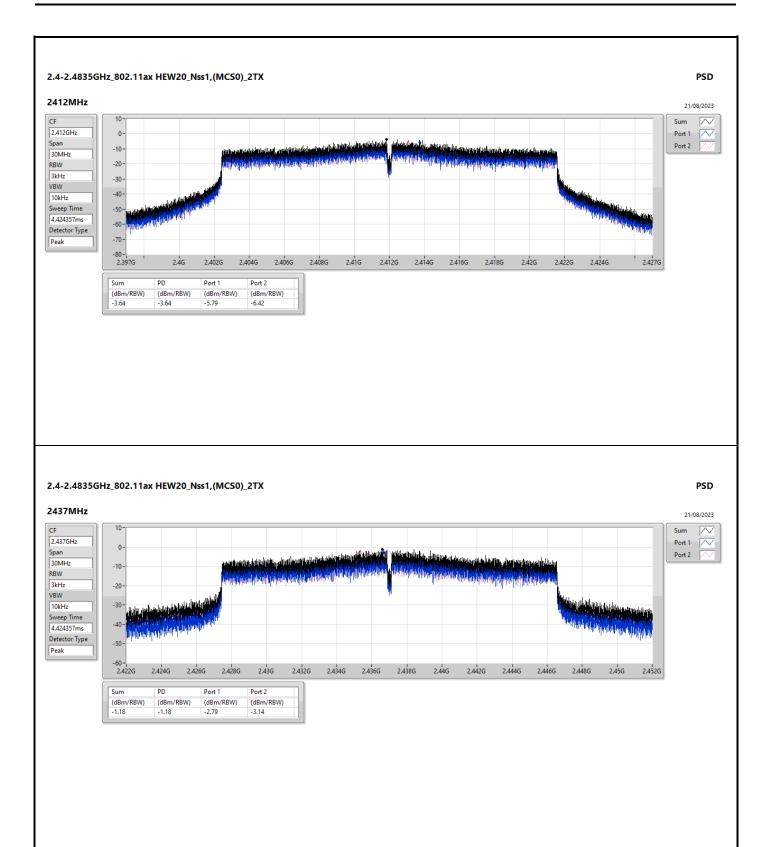
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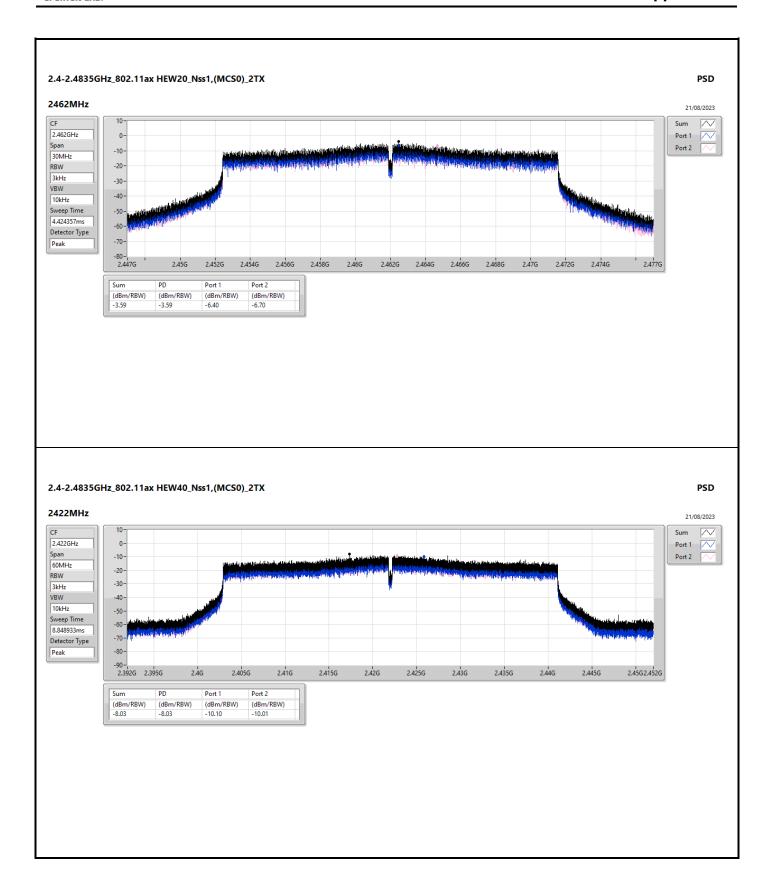
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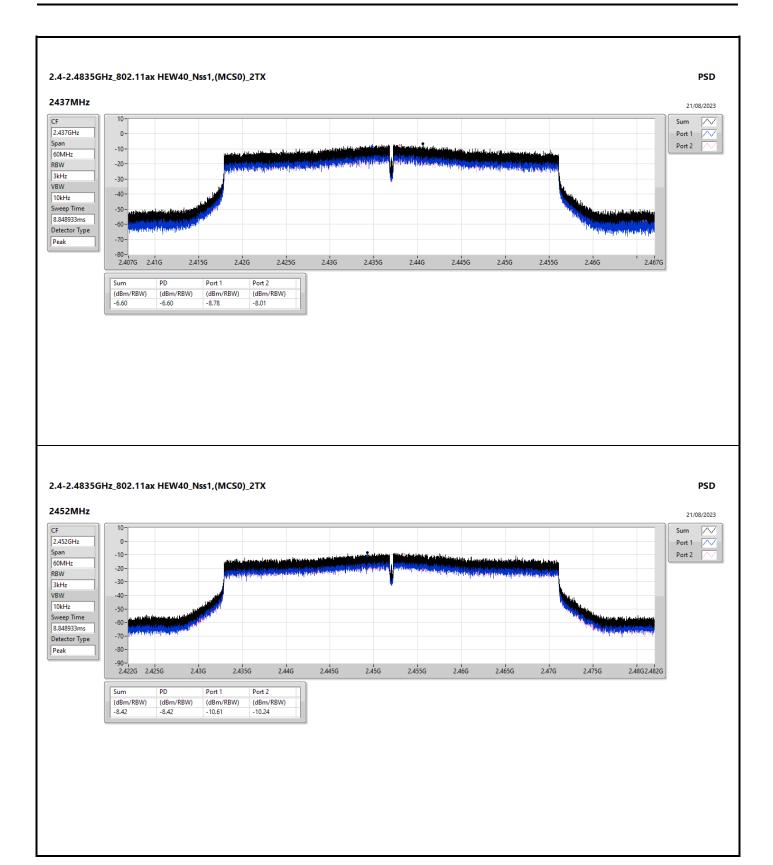
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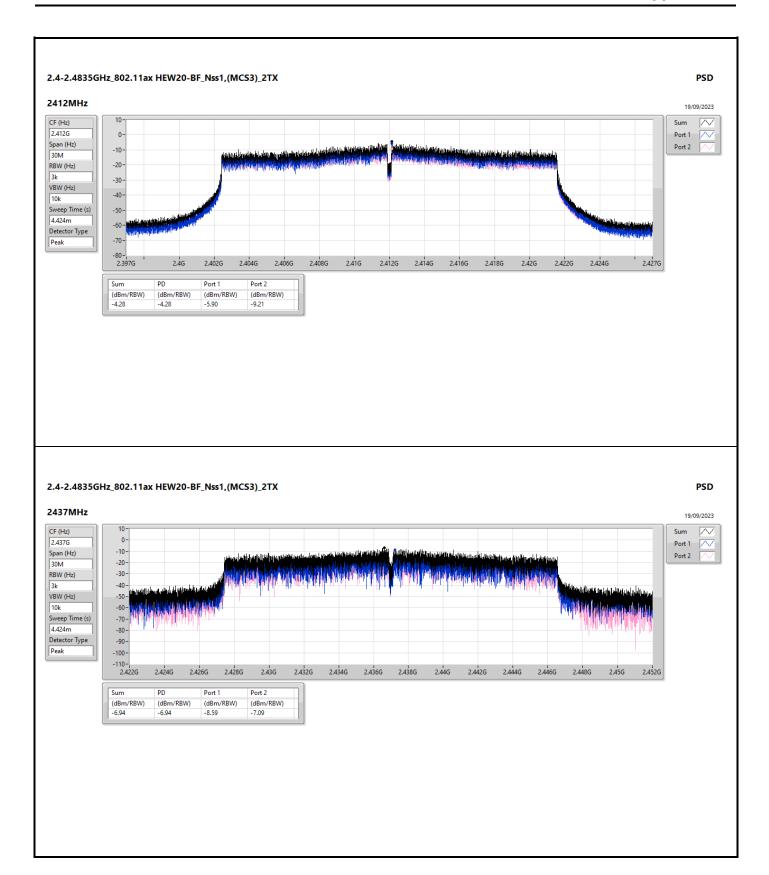
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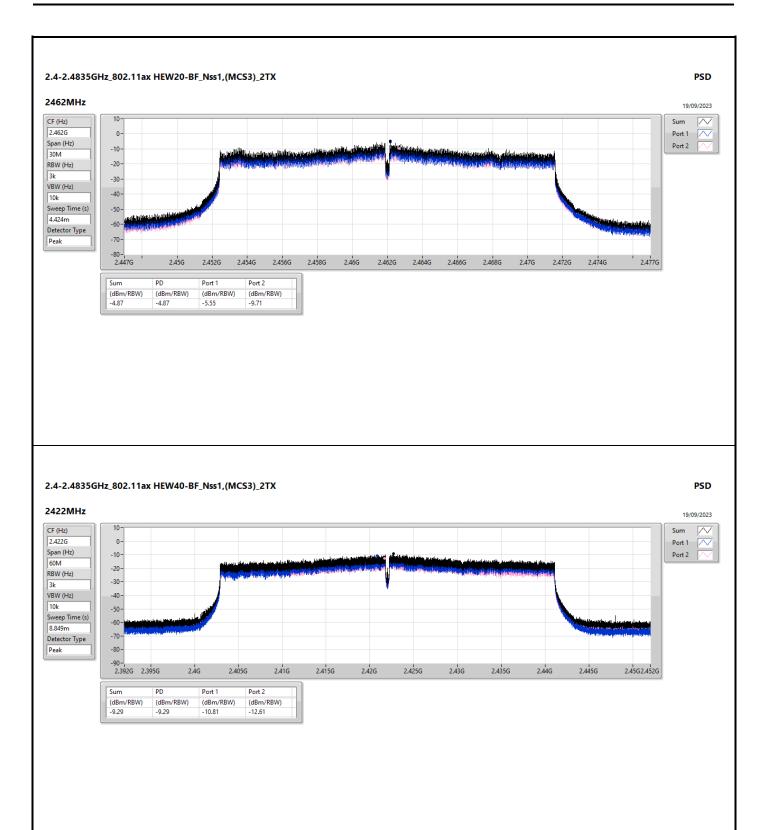
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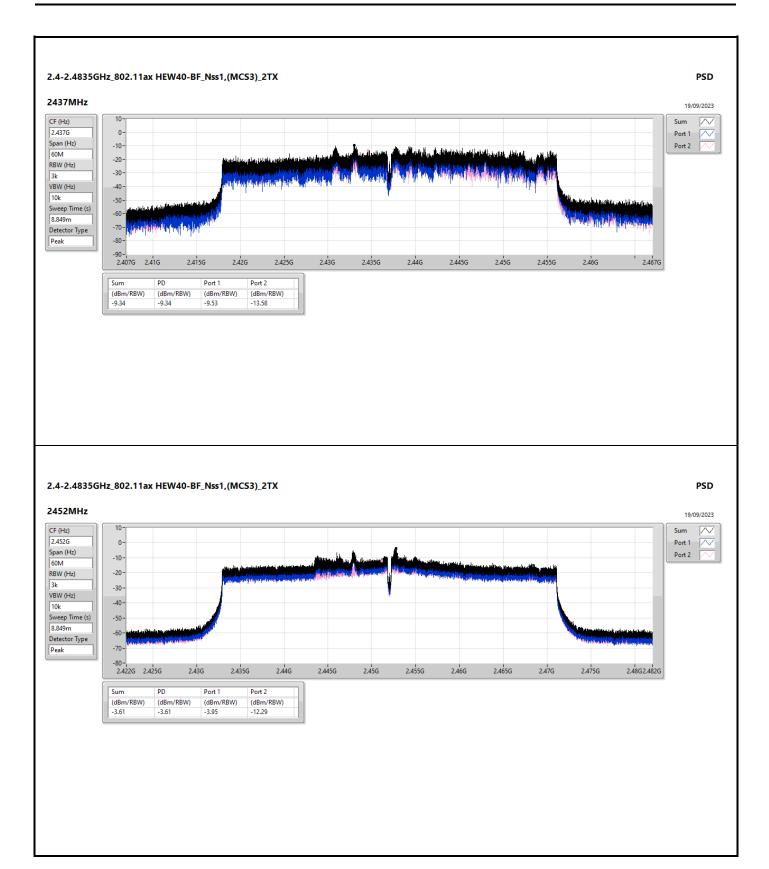
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CSE (NdB Down) Appendix E

# 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	2.43758G	9.54	-20.46	1.96623G	-52.09	2.39976G	-40.23	2.4G	-42.94	2.50862G	-50.03	24.46899G	-46.73	2
802.11g_Nss1,(6Mbps)_2TX	Pass	2.43824G	12.04	-17.96	2.1969G	-51.35	2.4G	-28.92	2.4G	-28.19	2.50526G	-50.67	16.30721G	-47.02	2
802.11ax HEW20_Nss1,(MCS0)_2TX	Pass	2.43824G	11.77	-18.23	2.30408G	-51.15	2.39992G	-28.85	2.4G	-28.32	2.51502G	-49.97	15.27891G	-46.39	2
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	Pass	2.43574G	7.20	-22.80	2.15496G	-46.92	2.39912G	-23.33	2.4G	-24.57	2.50326G	-46.73	24.99157G	-40.29	2
802.11ax HEW40_Nss1,(MCS0)_2TX	Pass	2.43457G	6.30	-23.70	2.30283G	-51.49	2.39936G	-34.13	2.4G	-36.82	2.5171G	-48.51	5.99348G	-46.61	2
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	Pass	2.44793G	5.12	-24.88	937.99M	-46.87	2.39808G	-29.50	2.4G	-32.57	2.50254G	-36.98	16.48535G	-39.96	2

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CSE (NdB Down) Appendix E

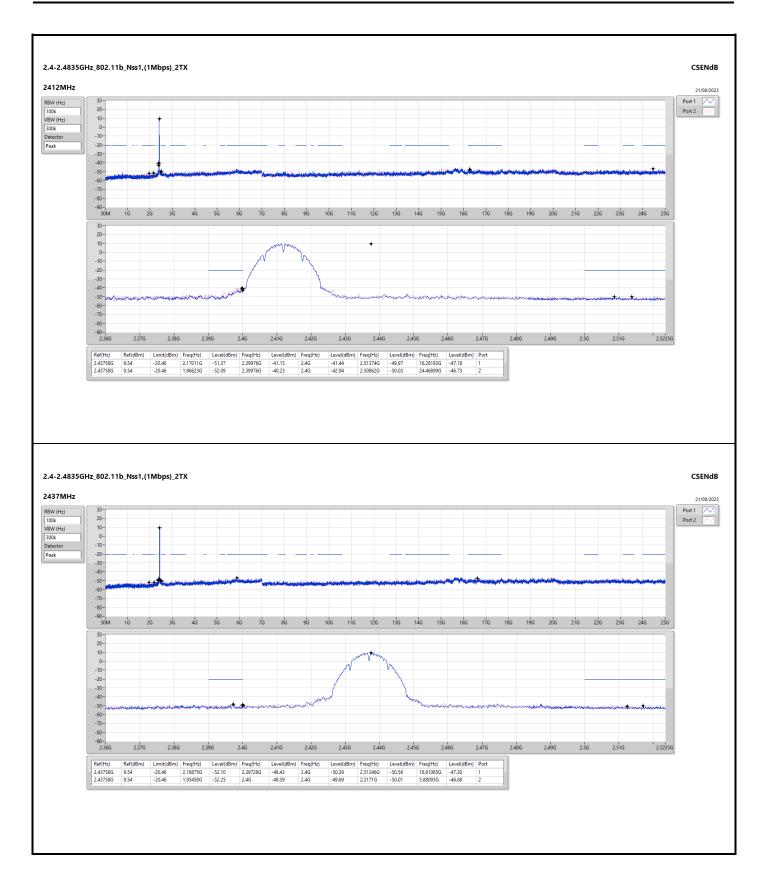
### Result

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	2.43758G	9.54	-20.46	2.17011G	-51.37	2.39976G	-41.15	2.4G	-41.44	2.51374G	-49.97	16.28193G	-47.18	1
2412MHz	Pass	2.43758G	9.54	-20.46	1.96623G	-52.09	2.39976G	-40.23	2.4G	-42.94	2.50862G	-50.03	24.46899G	-46.73	2
2437MHz	Pass	2.43758G	9.54	-20.46	2.18875G	-52.10	2.39728G	-48.43	2.4G	-50.39	2.51246G	-50.56	16.61065G	-47.30	1
2437MHz	Pass	2.43758G	9.54	-20.46	1.95458G	-52.25	2.4G	-48.59	2.4G	-49.69	2.5171G	-50.01	5.88093G	-46.88	2
2462MHz	Pass	2.43758G	9.54	-20.46	2.15147G	-51.61	2.3988G	-50.01	2.4G	-51.04	2.50102G	-46.46	6.99351G	-46.53	1
2462MHz	Pass	2.43758G	9.54	-20.46	2.30874G	-50.97	2.39952G	-49.85	2.4G	-49.99	2.50982G	-48.63	17.66985G	-46.71	2
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-		-	-	-	-	-	-
2412MHz	Pass	2.43824G	12.04	-17.96	2.07225G	-51.30	2.39984G	-28.58	2.4G	-29.10	2.5123G	-49.74	15.25082G	-46.61	1
2412MHz	Pass	2.43824G	12.04	-17.96	2.1969G	-51.35	2.4G	-28.92	2.4G	-28.19	2.50526G	-50.67	16.30721G	-47.02	2
2437MHz	Pass	2.43824G	12.04	-17.96	2.30874G	-51.46	2.39576G	-42.35	2.4G	-44.82	2.50574G	-47.14	6.95699G	-45.61	1
2437MHz	Pass	2.43824G	12.04	-17.96	2.30292G	-52.04	2.39888G	-43.93	2.4G	-43.36	2.50582G	-48.19	5.94274G	-47.01	2
2462MHz	Pass	2.43824G	12.04	-17.96	2.17593G	-52.18	2.39496G	-50.35	2.4G	-49.68	2.51398G	-48.85	6.96823G	-46.25	1
2462MHz	Pass	2.43824G	12.04	-17.96	2.13399G	-51.69	2.3988G	-50.39	2.4G	-50.04	2.5079G	-49.17	15.26487G	-46.08	2
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43824G	11.77	-18.23	958.51M	-51.74	2.4G	-29.04	2.4G	-29.70	2.51134G	-49.98	16.61346G	-46.62	1
2412MHz	Pass	2.43824G	11.77	-18.23	2.30408G	-51.15	2.39992G	-28.85	2.4G	-28.32	2.51502G	-49.97	15.27891G	-46.39	2
2437MHz	Pass	2.43824G	11.77	-18.23	2.30525G	-51.47	2.3992G	-37.45	2.4G	-38.92	2.50022G	-47.60	5.80788G	-46.89	1
2437MHz	Pass	2.43824G	11.77	-18.23	2.16428G	-51.76	2.39952G	-31.93	2.4G	-32.74	2.50366G	-44.00	5.93993G	-46.45	2
2462MHz	Pass	2.43824G	11.77	-18.23	2.30641G	-52.14	2.39128G	-50.29	2.4G	-50.91	2.50398G	-48.68	5.8444G	-46.49	1
2462MHz	Pass	2.43824G	11.77	-18.23	2.19457G	-52.03	2.4G	-49.33	2.4G	-50.29	2.51006G	-48.22	24.72747G	-47.03	2
802.11ax HEW40_Nss1,(MCS0)_2TX	-	-	-	-		-		-	-	-	-	-	-	-	-
2422MHz	Pass	2.43457G	6.30	-23.70	2.17688G	-52.36	2.39984G	-37.05	2.4G	-35.32	2.53646G	-49.47	17.66046G	-46.80	1
2422MHz	Pass	2.43457G	6.30	-23.70	2.10818G	-51.95	2.39984G	-35.76	2.4G	-35.89	2.54398G	-49.53	5.77753G	-47.24	2
2437MHz	Pass	2.43457G	6.30	-23.70	1.63186G	-51.48	2.39664G	-41.24	2.4G	-42.55	2.53534G	-47.72	6.07762G	-46.80	1
2437MHz	Pass	2.43457G	6.30	-23.70	2.30283G	-51.49	2.39936G	-34.13	2.4G	-36.82	2.5171G	-48.51	5.99348G	-46.61	2
2452MHz	Pass	2.43457G	6.30	-23.70	2.12535G	-51.36	2.39648G	-48.84	2.4G	-49.94	2.5003G	-46.84	6.99471G	-46.67	1
2452MHz	Pass	2.43457G	6.30	-23.70	2.30397G	-51.24	2.4G	-47.53	2.4G	-47.86	2.50126G	-46.76	6.98069G	-46.45	2
802.11ax HEW20-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43574G	7.20	-22.80	2.14448G	-47.73	2.39928G	-27.51	2.4G	-26.70	2.50158G	-46.49	16.43645G	-39.82	1
2412MHz	Pass	2.43574G	7.20	-22.80	2.15496G	-46.92	2.39912G	-23.33	2.4G	-24.57	2.50326G	-46.73	24.99157G	-40.29	2
2437MHz	Pass	2.43574G	7.20	-22.80	2.12817G	-47.31	2.4G	-45.17	2.4G	-46.70	2.50078G	-46.29	16.45893G	-40.35	1
2437MHz	Pass	2.43574G	7.20	-22.80	949.19M	-47.69	2.39656G	-36.18	2.4G	-46.07	2.51886G	-46.27	16.4786G	-40.55	2
2462MHz	Pass	2.43574G	7.20	-22.80	2.10254G	-47.73	2.39272G	-46.74	2.4G	-48.07	2.50598G	-44.39	16.43926G	-40.03	1
2462MHz	Pass	2.43574G	7.20	-22.80	876.96M	-46.77	2.39272G	-46.76	2.4G	-48.80	2.50038G	-46.27	16.42522G	-40.80	2
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.44793G	5.12	-24.88	694.1M	-47.14	2.39984G	-42.82	2.4G	-44.43	2.53534G	-46.63	16.38719G	-40.30	1
2422MHz	Pass	2.44793G	5.12	-24.88	2.04864G	-47.33	2.39488G	-40.66	2.4G	-44.04	2.5075G	-46.34	16.43487G	-40.28	2
2437MHz	Pass	2.44793G	5.12	-24.88	1.86086G	-48.04	2.39952G	-33.43	2.4G	-36.52	2.54174G	-45.89	24.27081G	-40.94	1
2437MHz	Pass	2.44793G	5.12	-24.88	937.99M	-46.87	2.39808G	-29.50	2.4G	-32.57	2.50254G	-36.98	16.48535G	-39.96	2
2452MHz	Pass	2.44793G	5.12	-24.88	959.74M	-47.26	2.4G	-46.71	2.4G	-46.98	2.50334G	-44.70	24.52322G	-40.90	1
2452MHz	Pass	2.44793G	5.12	-24.88	1.99253G	-47.81	2.39424G	-45.89	2.4G	-47.17	2.50414G	-44.61	24.83734G	-40.50	2

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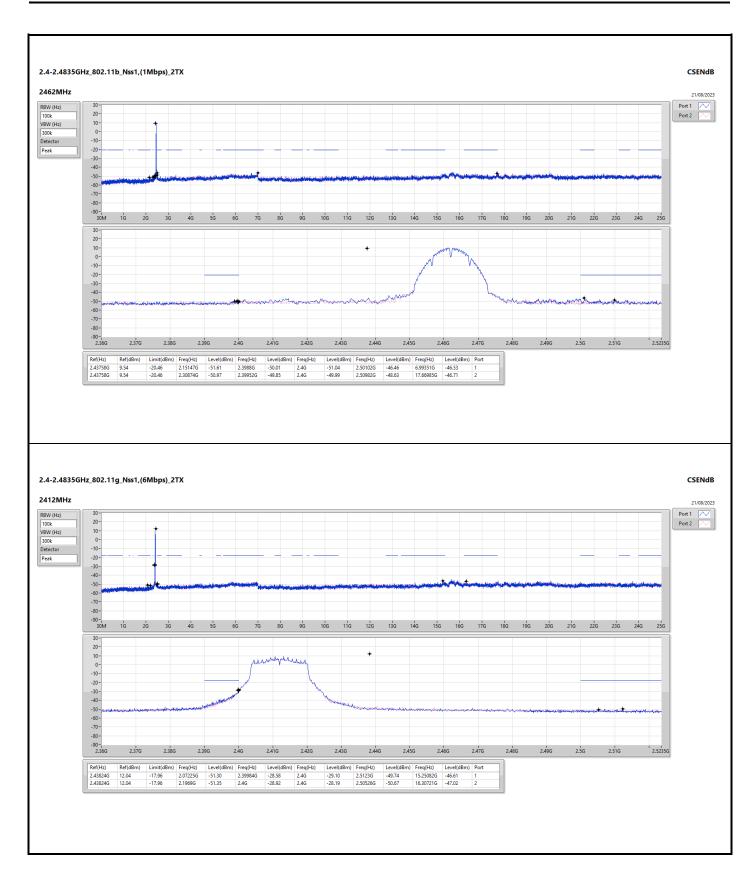
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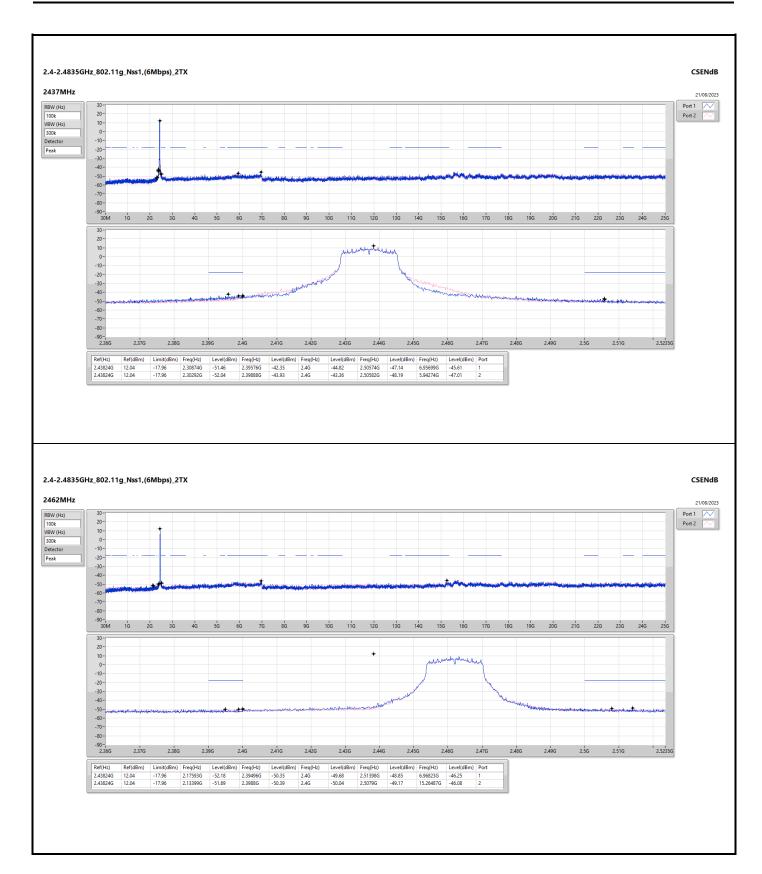
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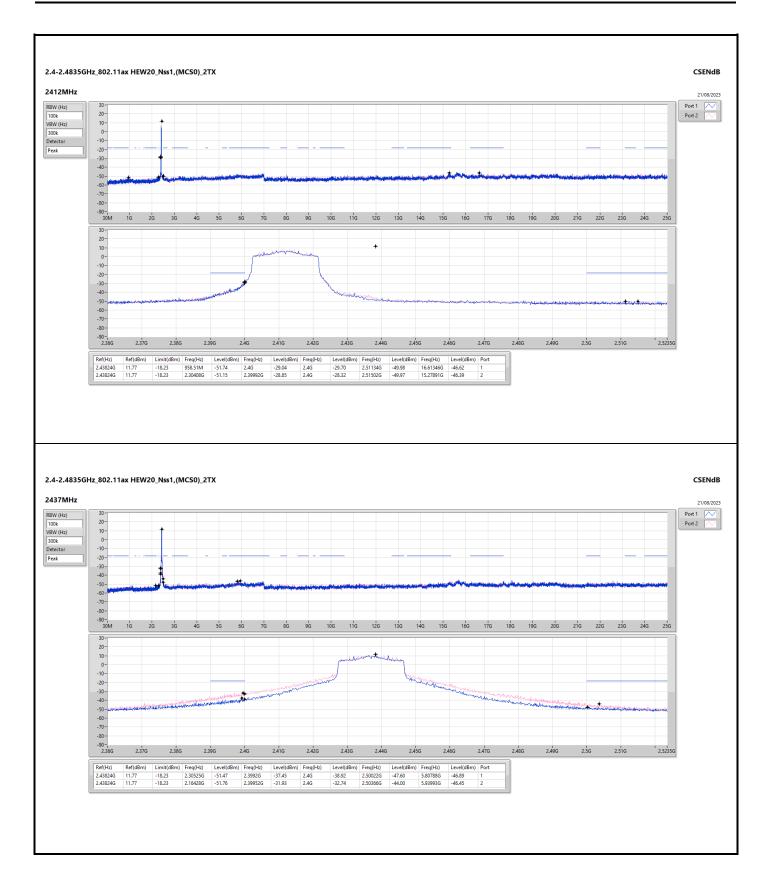
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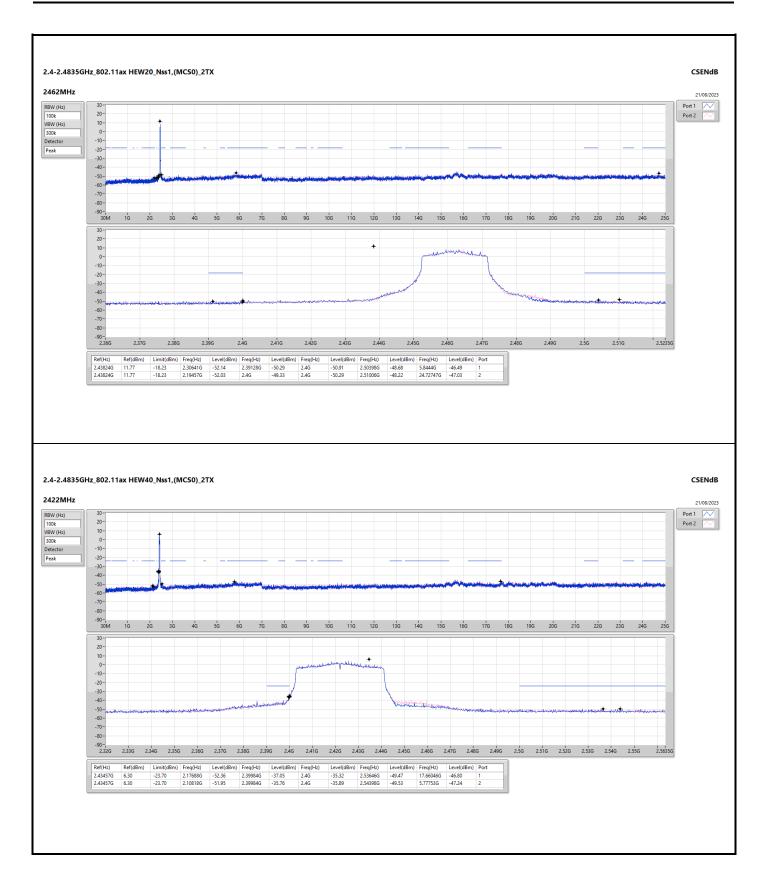
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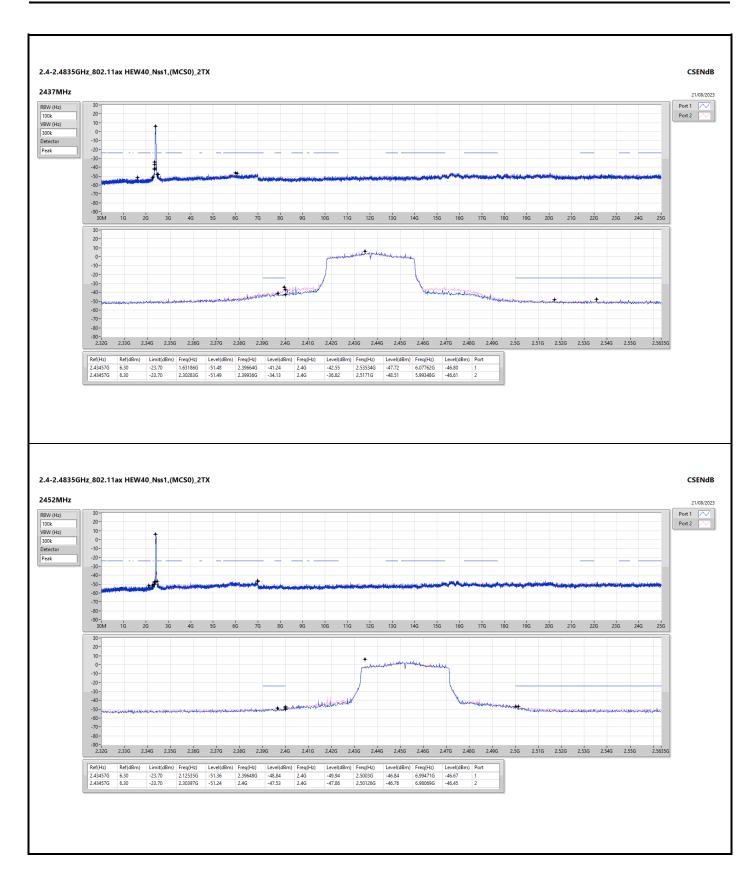
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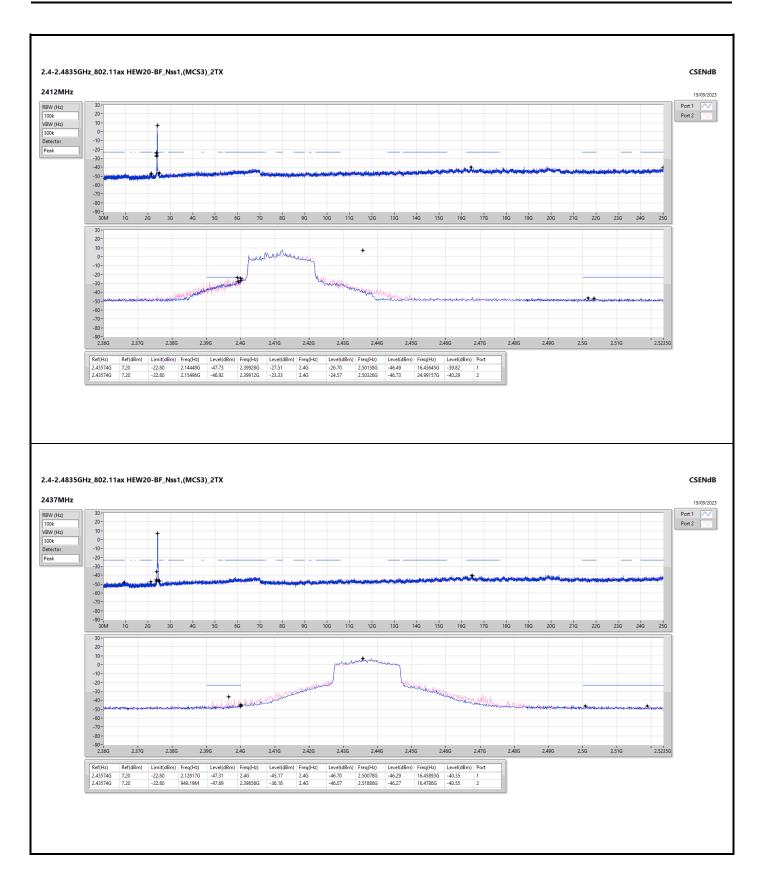
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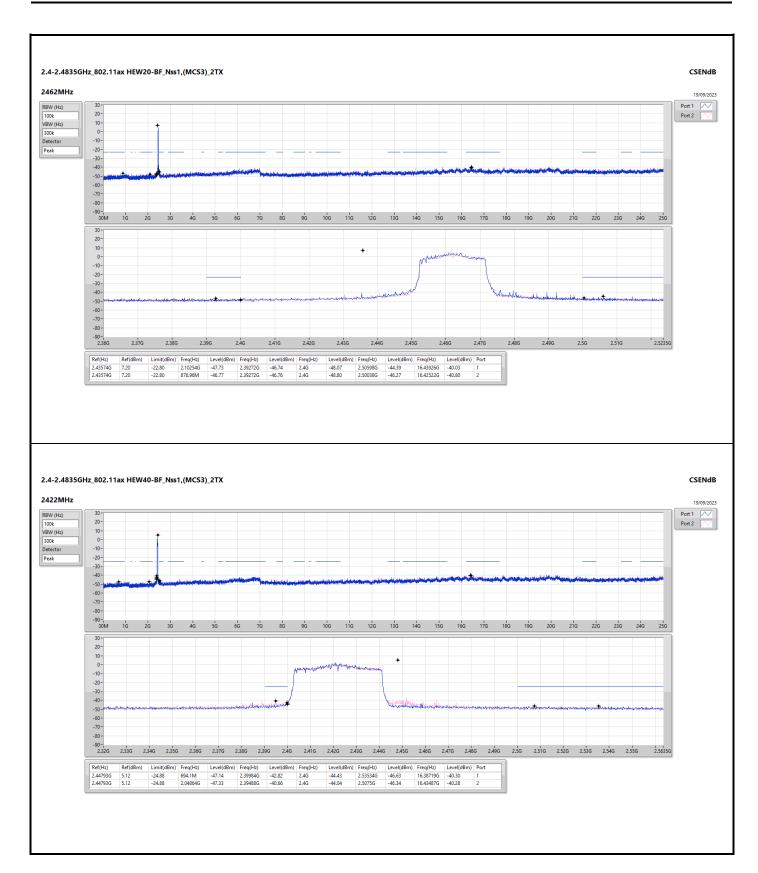
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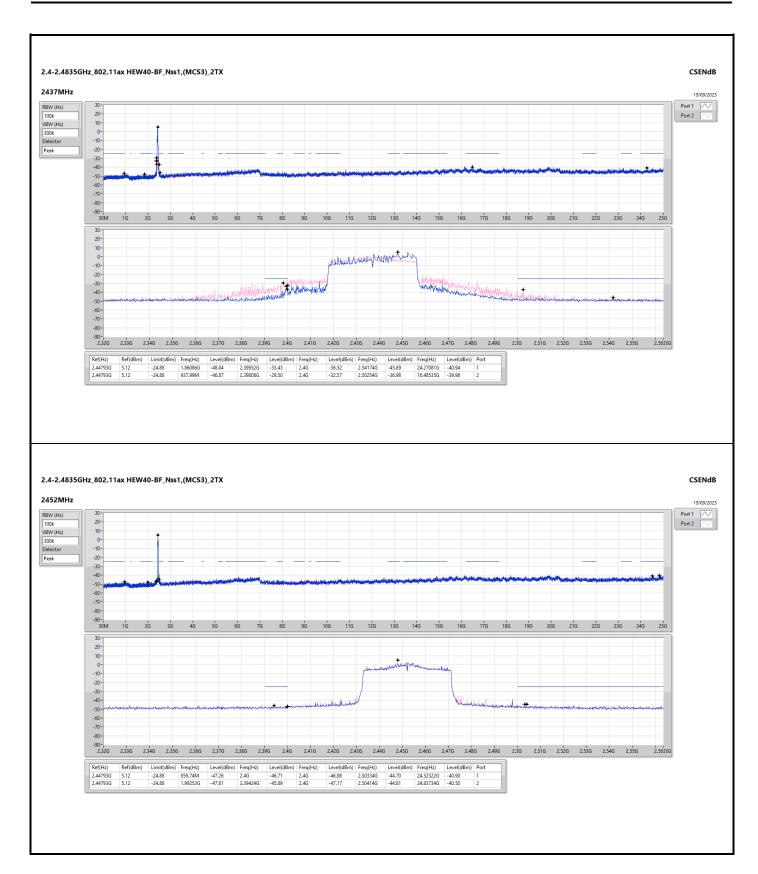
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## Radiated Emissions below 1GHz

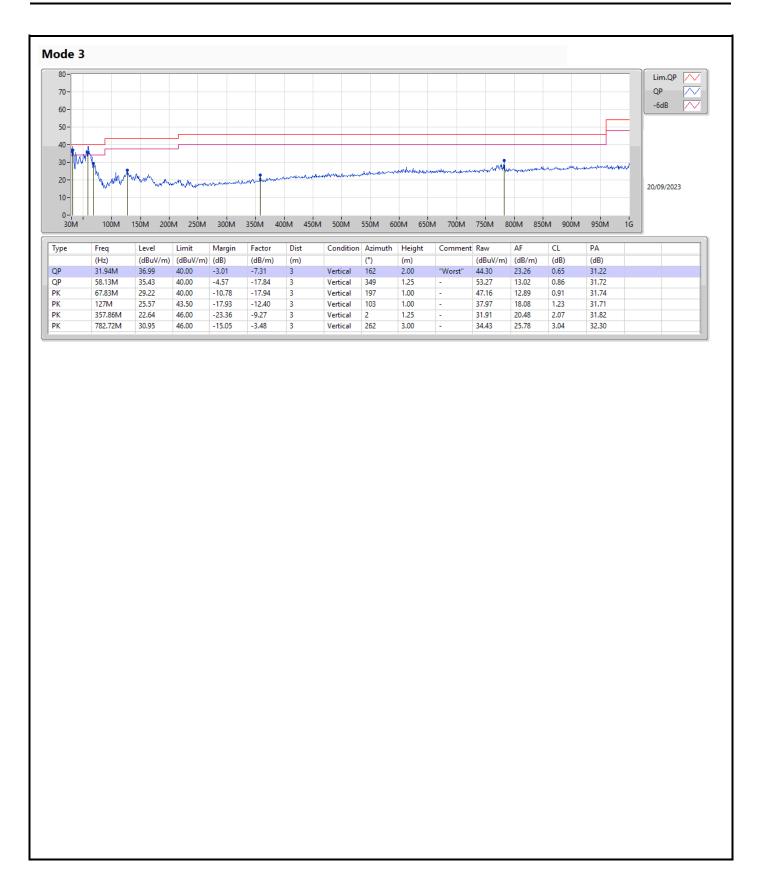
Appendix F.1

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition	
Mode 3	Pass	QP	31.94M	36.99	40.00	-3.01	Vertical	

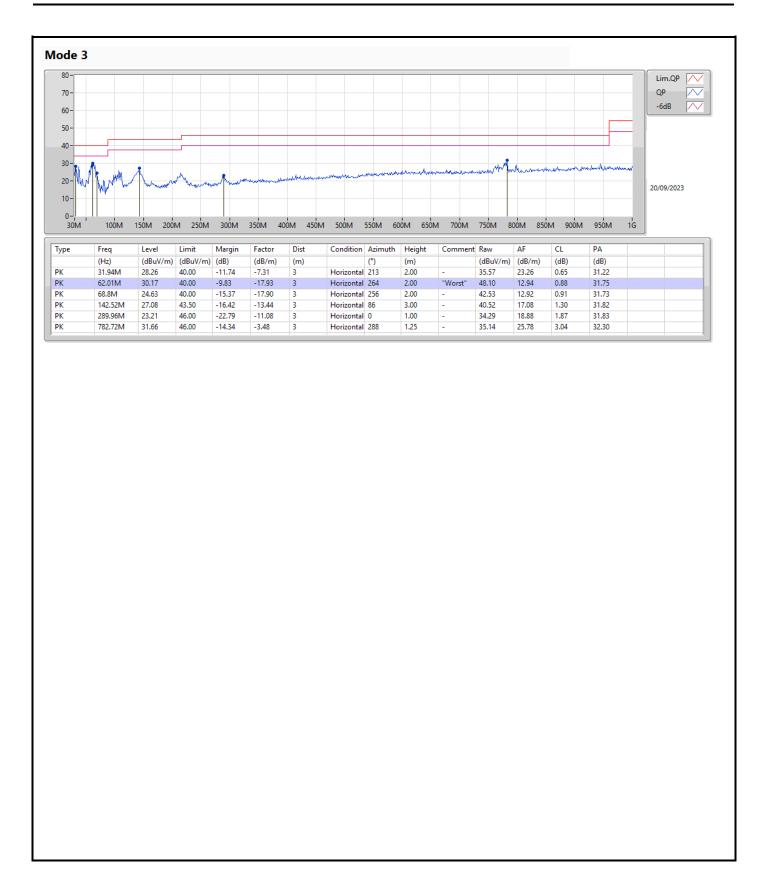
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## RSE TX above 1GHz

Appendix F.2

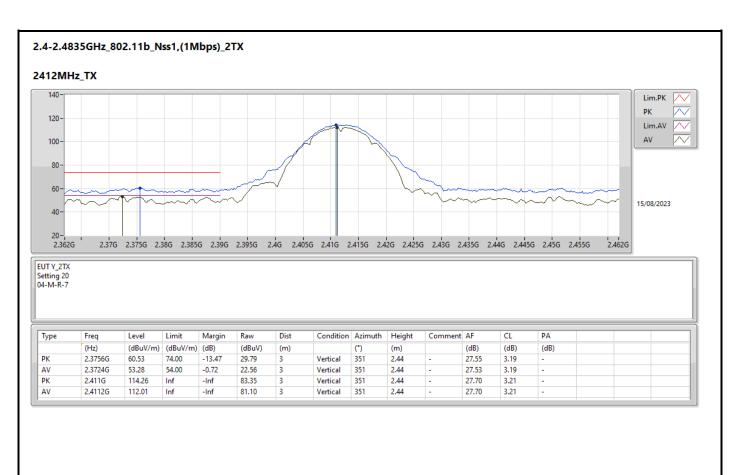
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ax HEW40-BF_Nss1,(MCS3)_2TX	Pass	PK	2.3824G	73.97	74.00	-0.03	3	Horizontal	360	1.72	-

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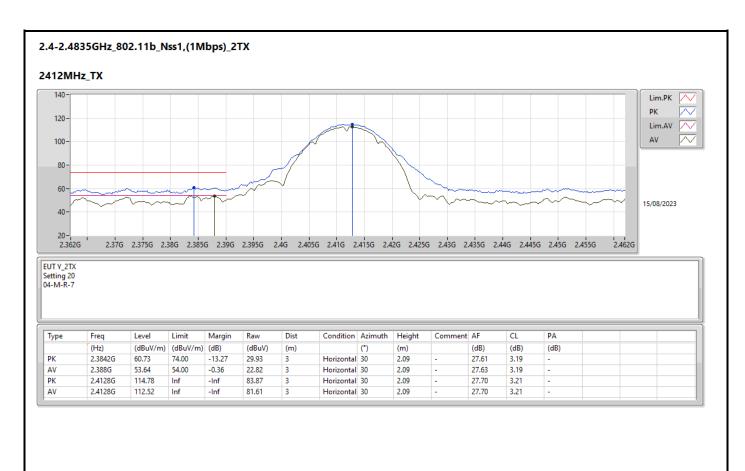




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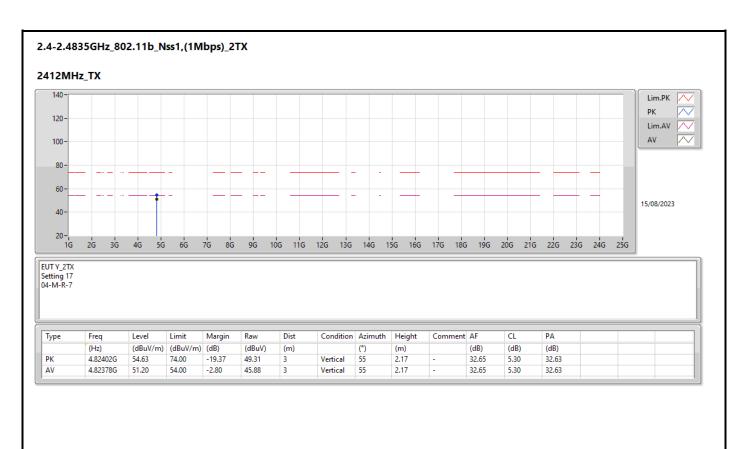




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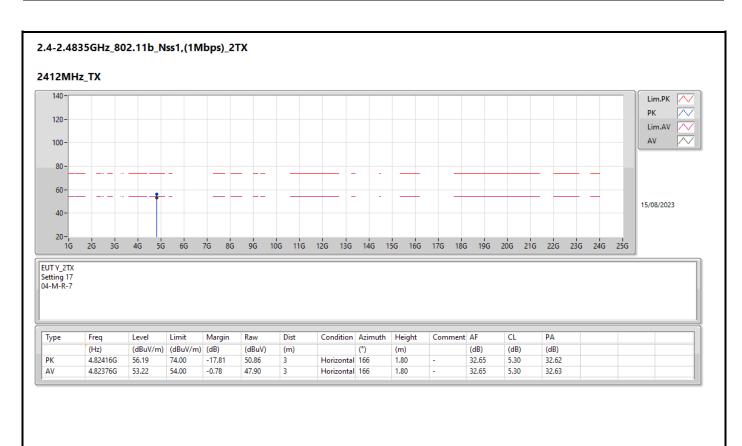




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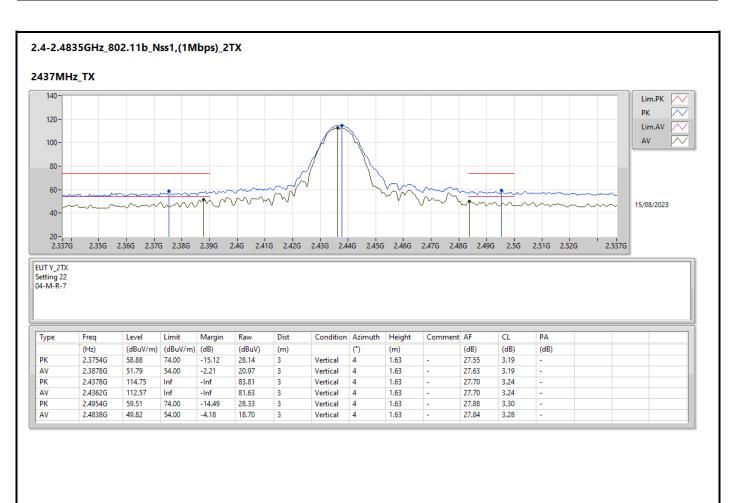




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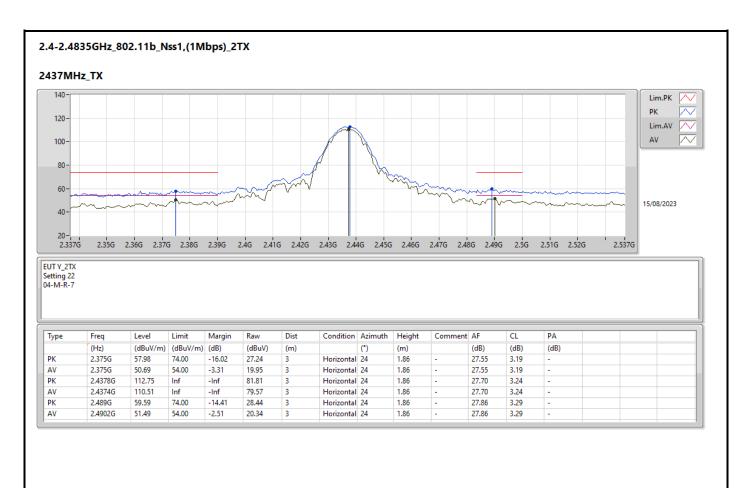




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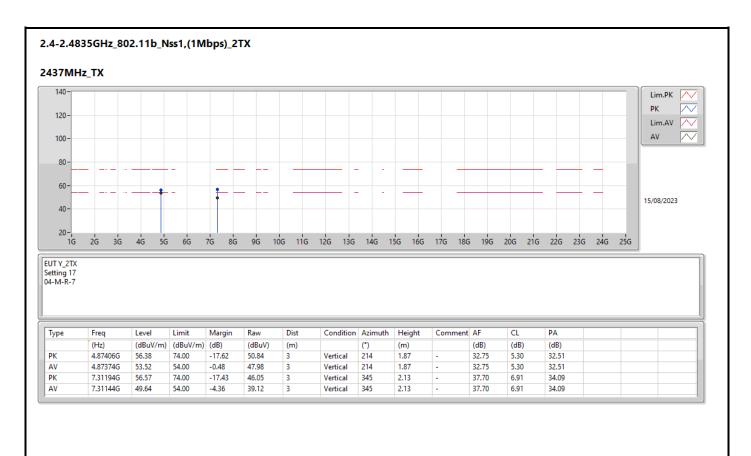




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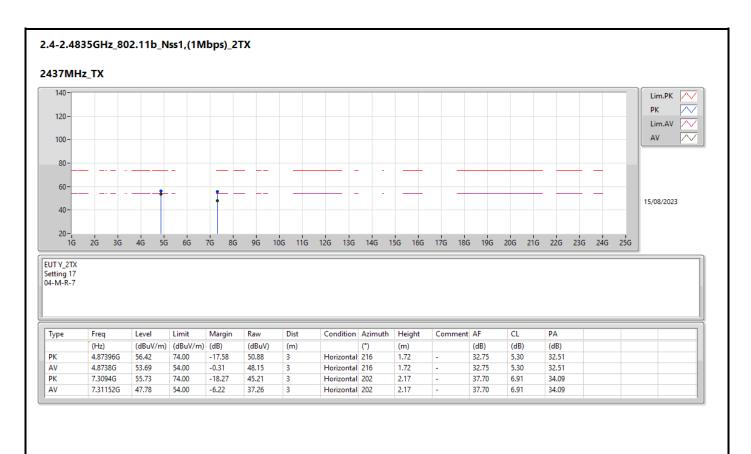




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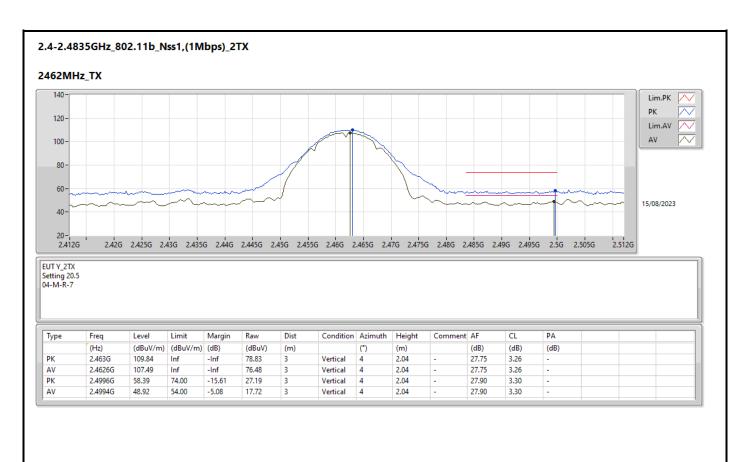




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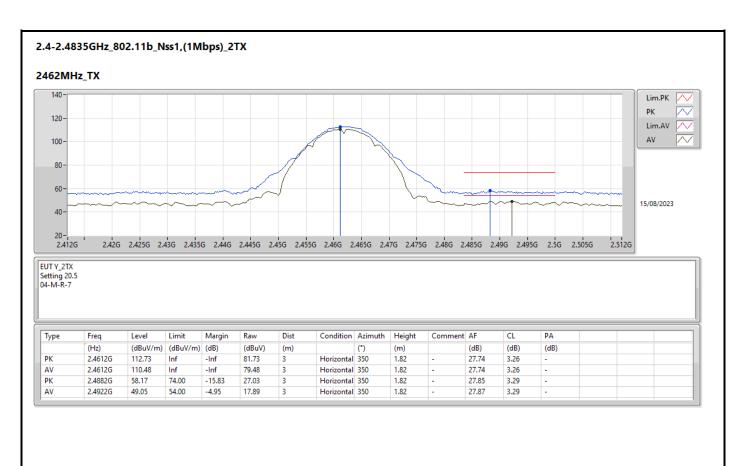




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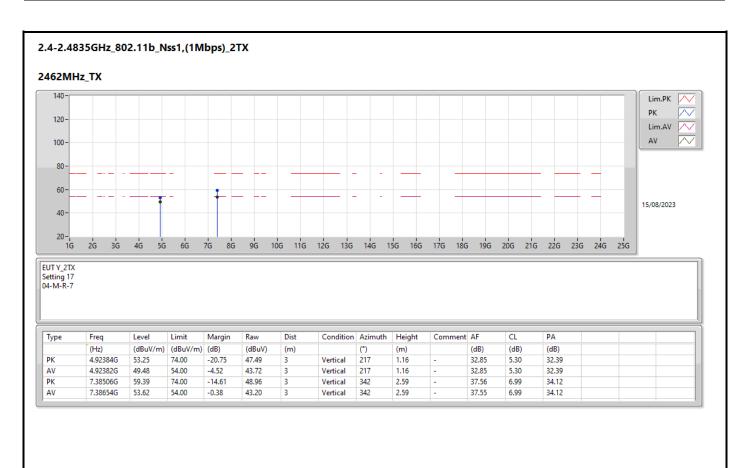




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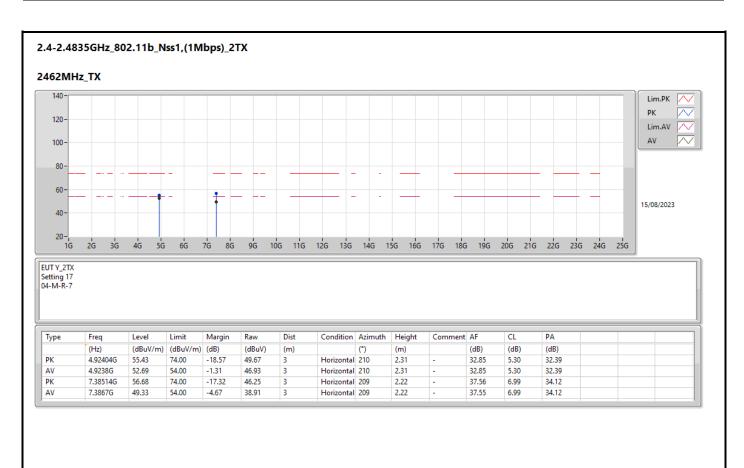




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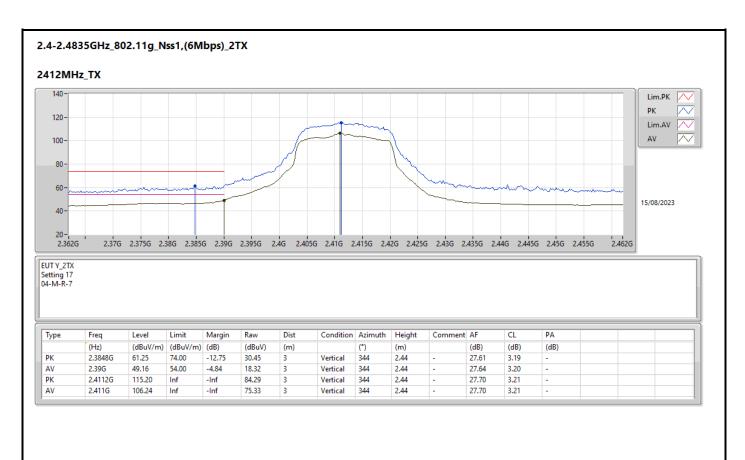




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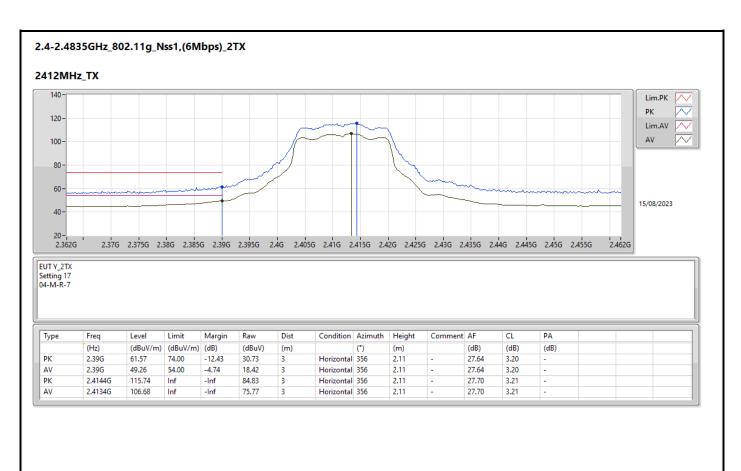




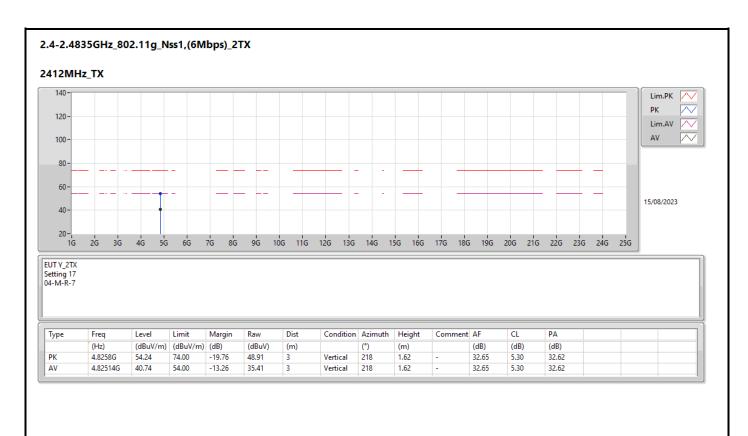
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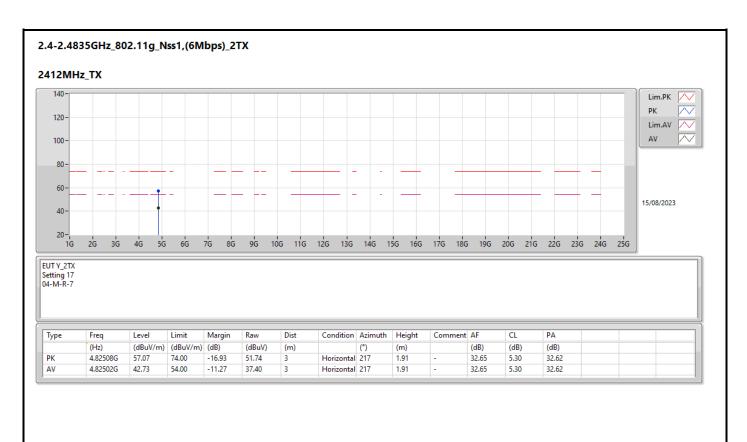




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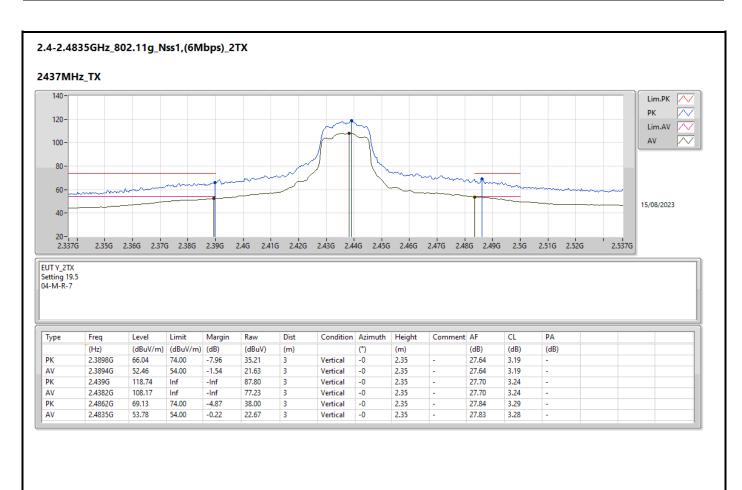




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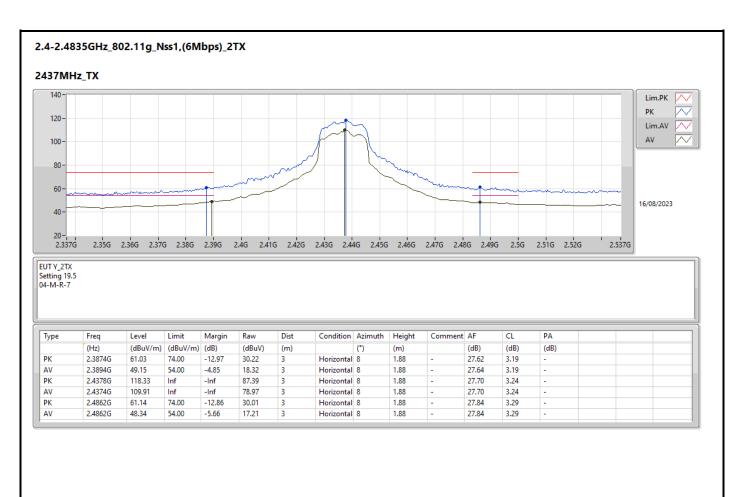




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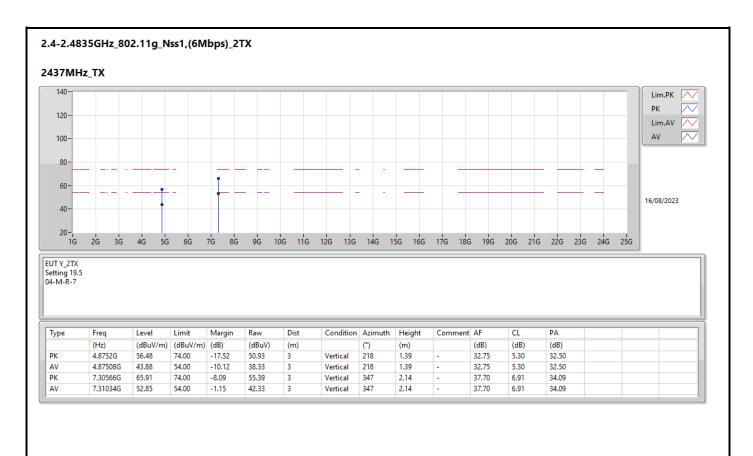




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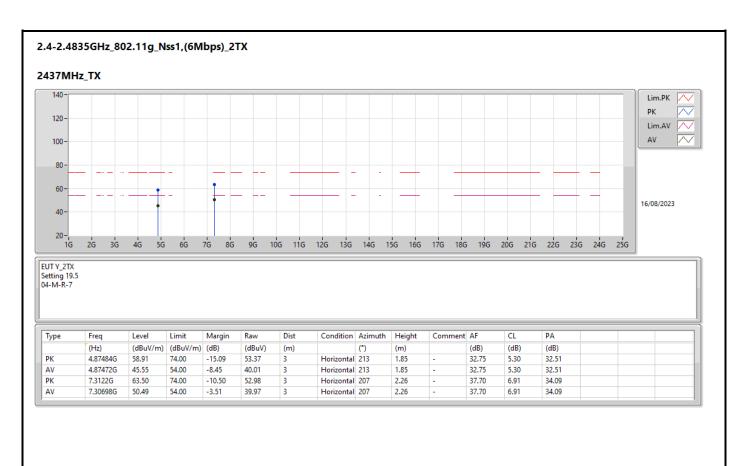




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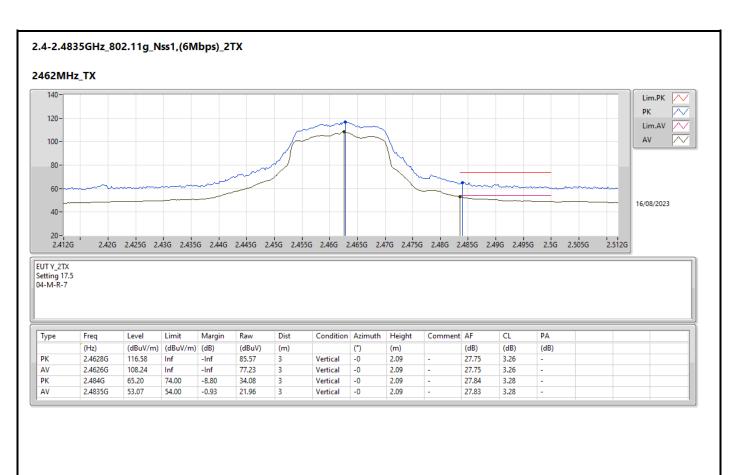




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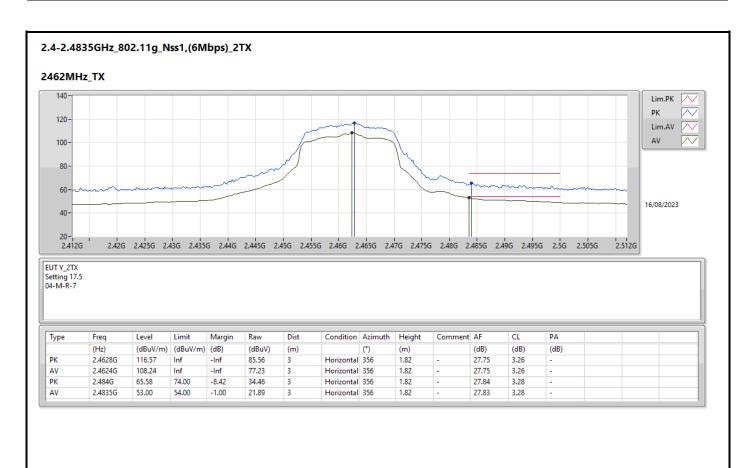




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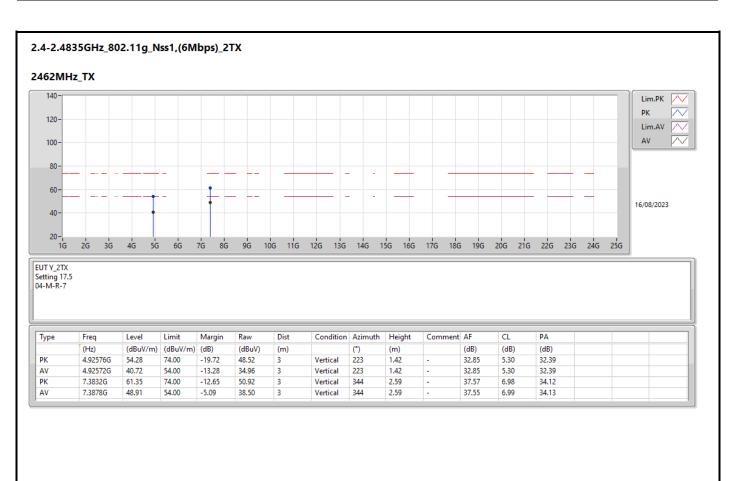




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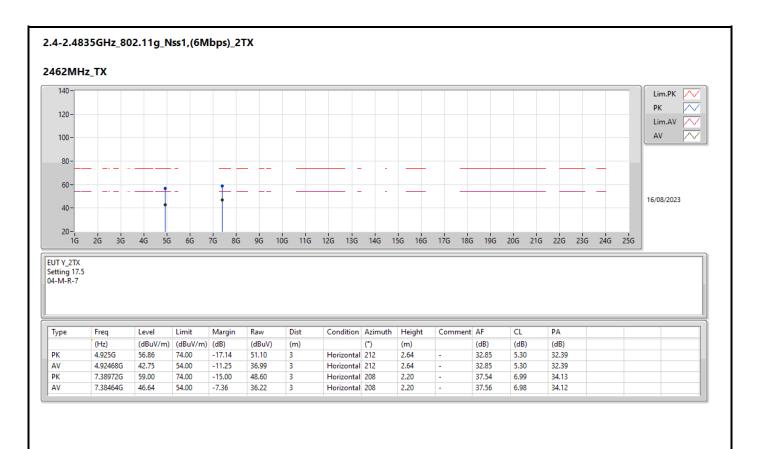




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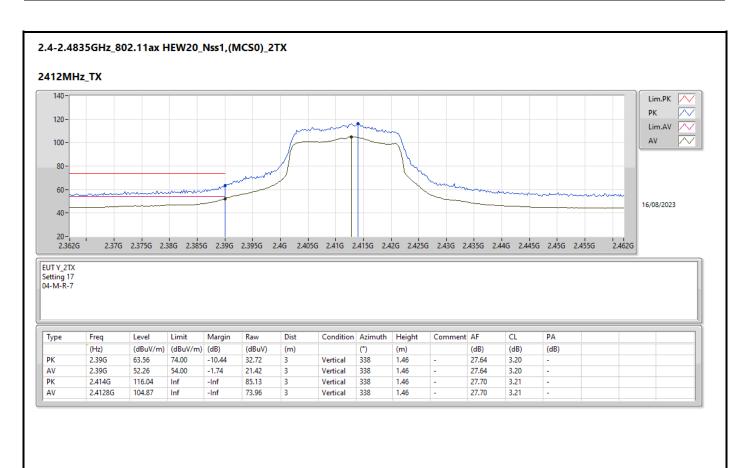




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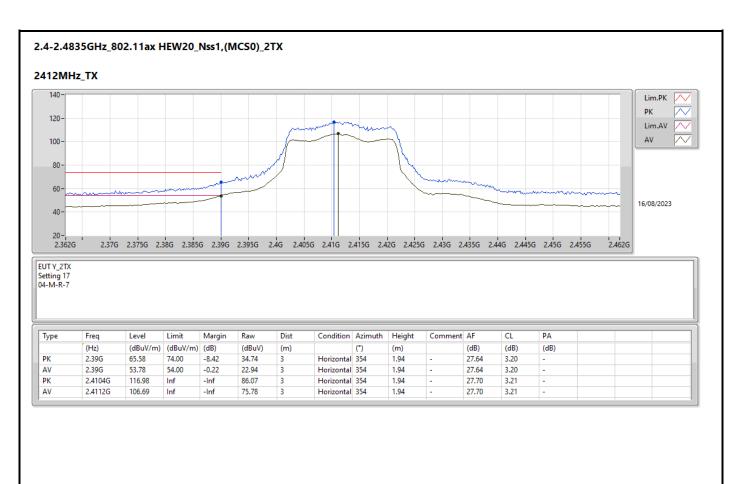




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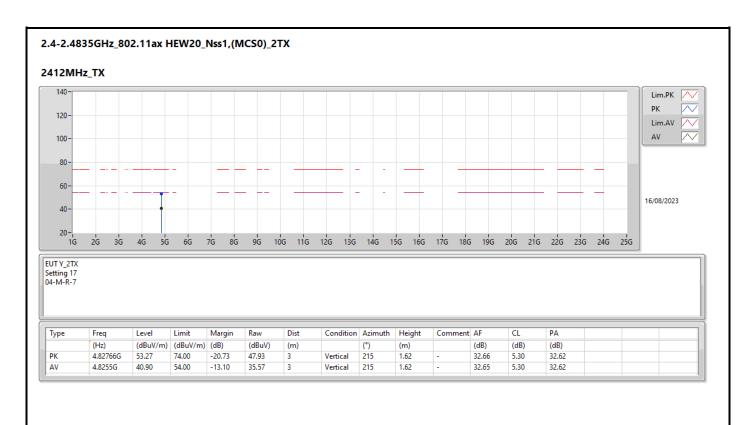




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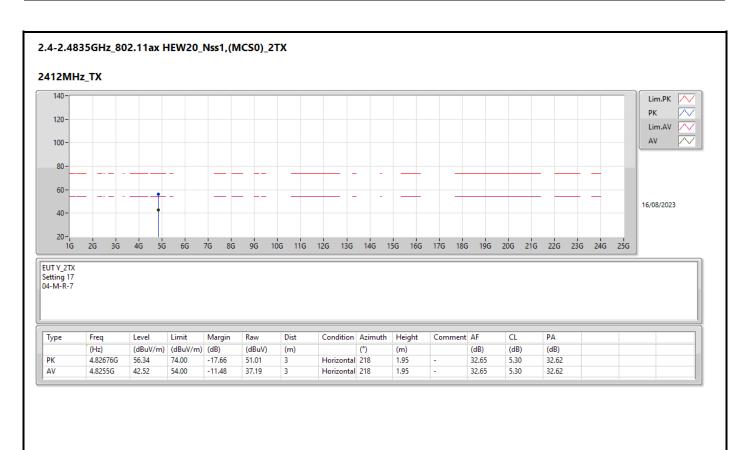




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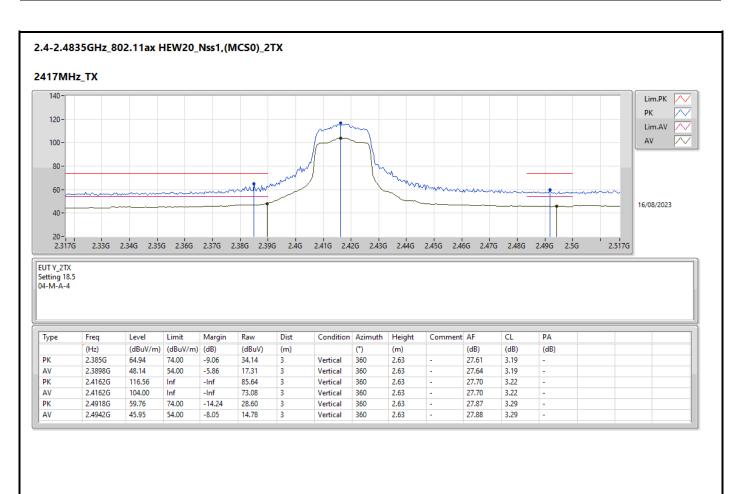




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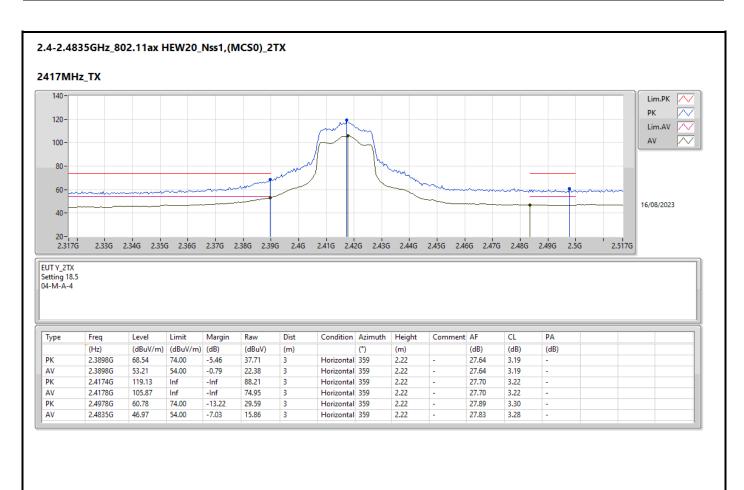




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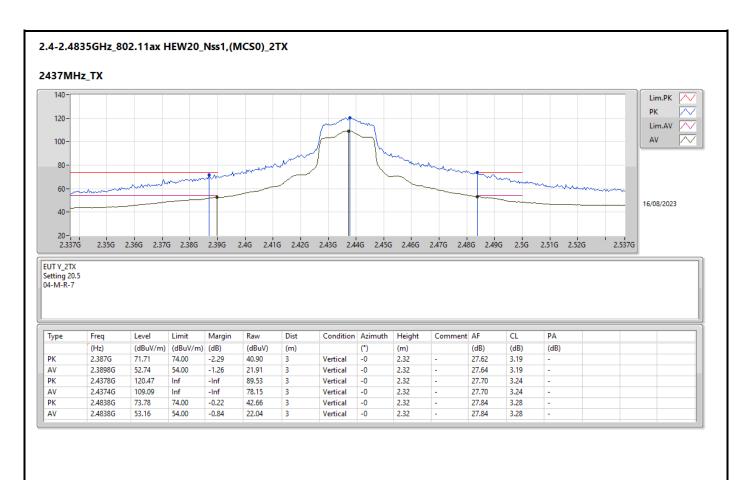




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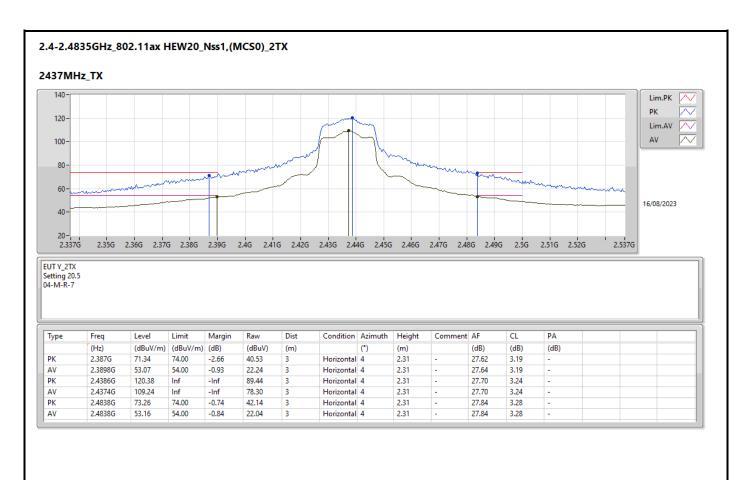




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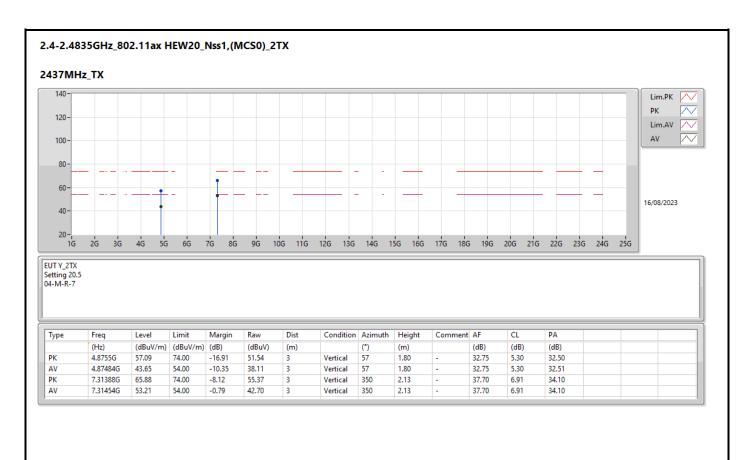




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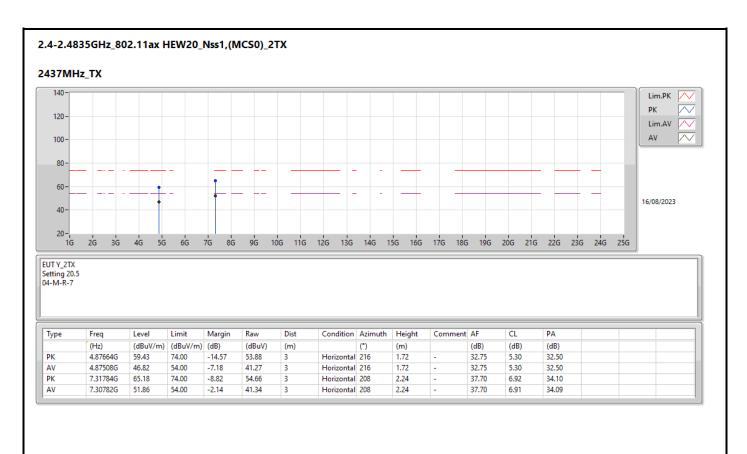




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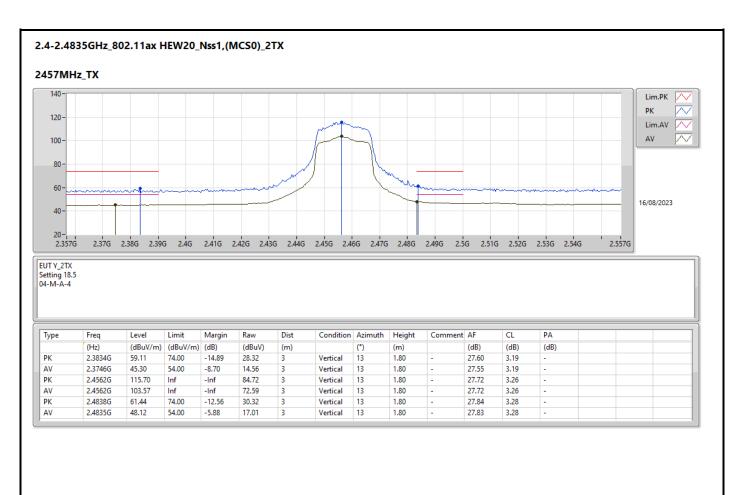




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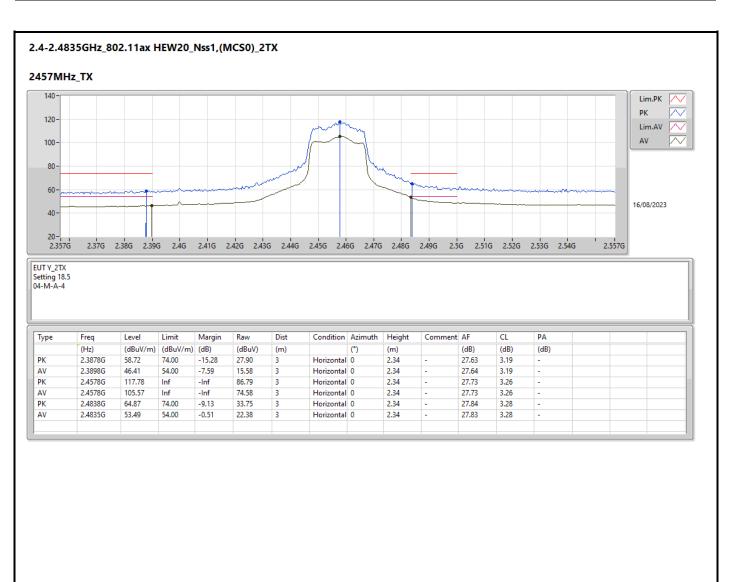




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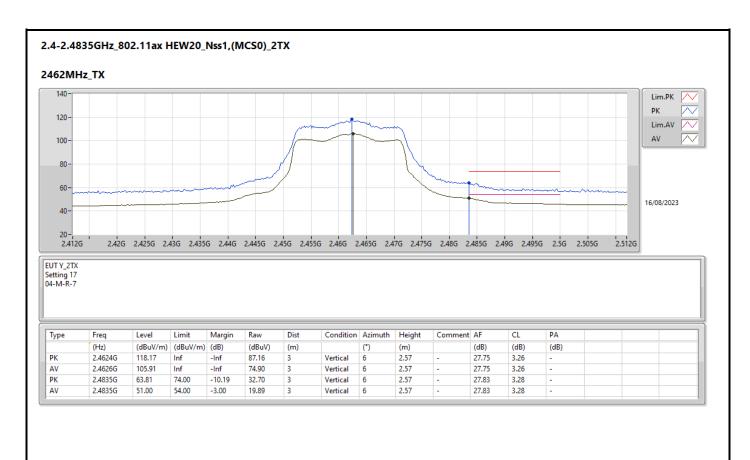




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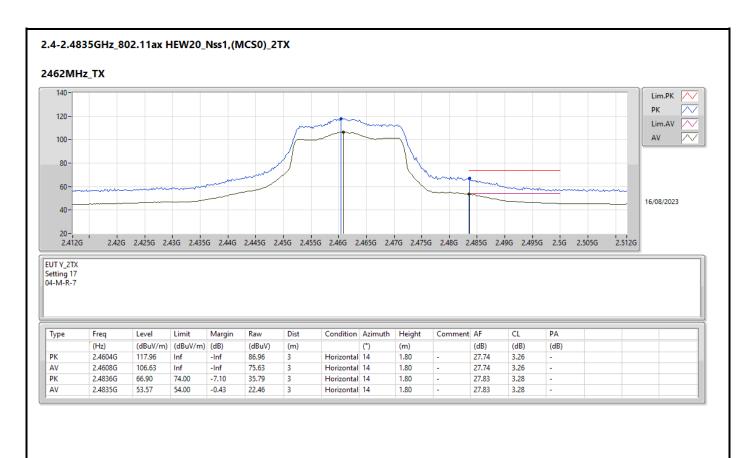




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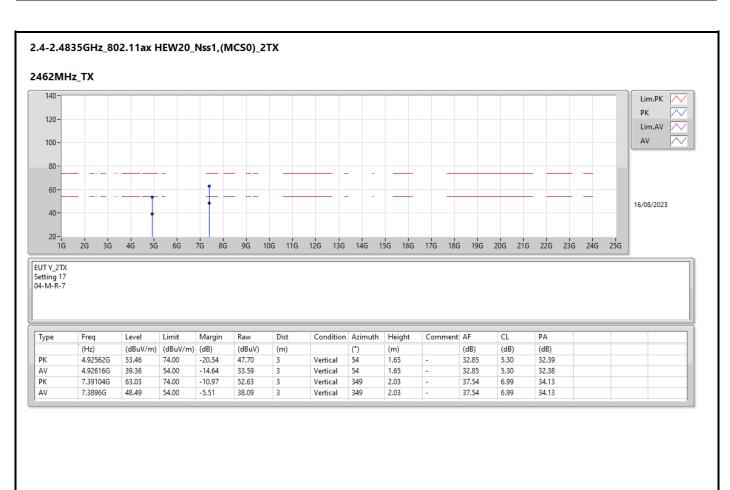




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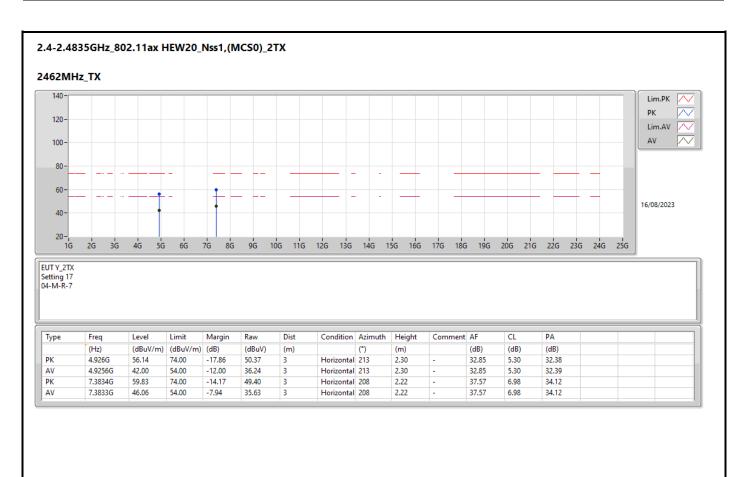




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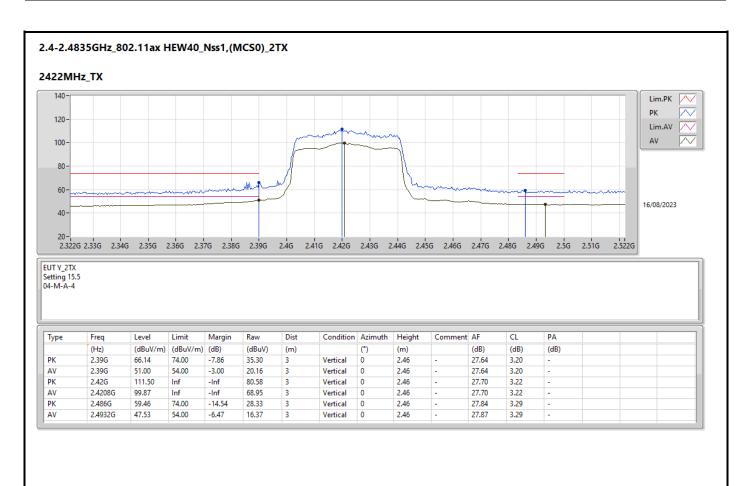




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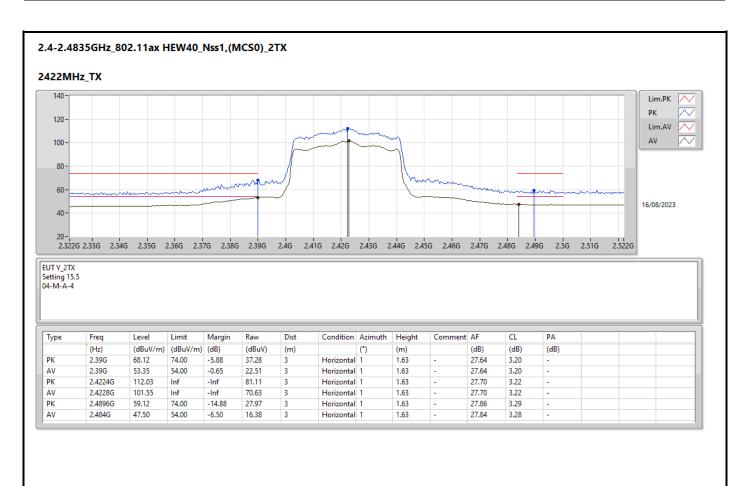




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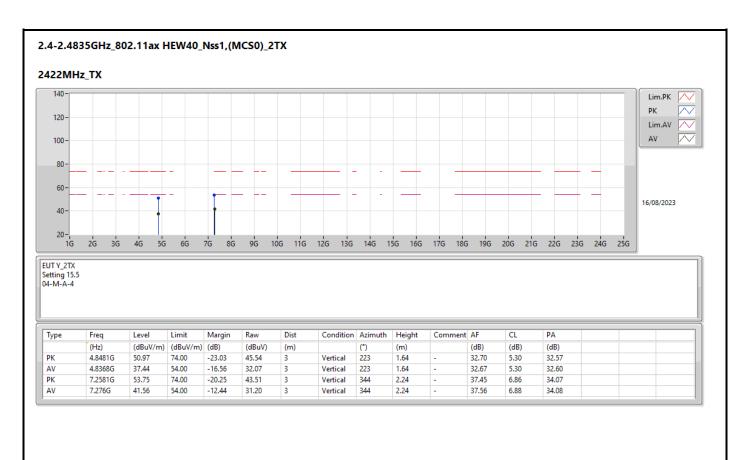




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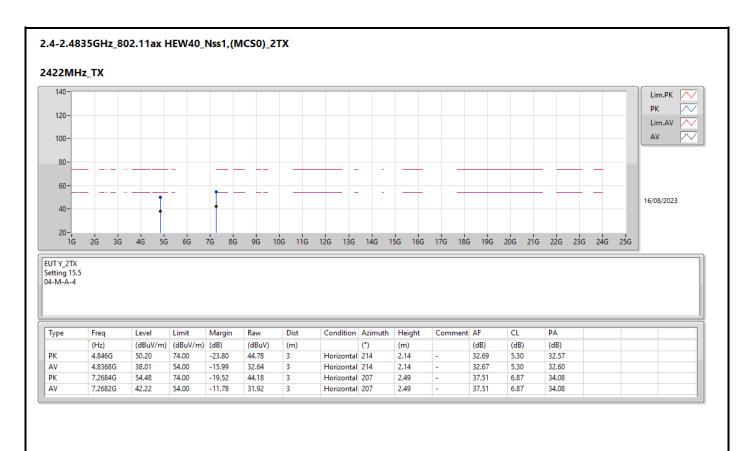




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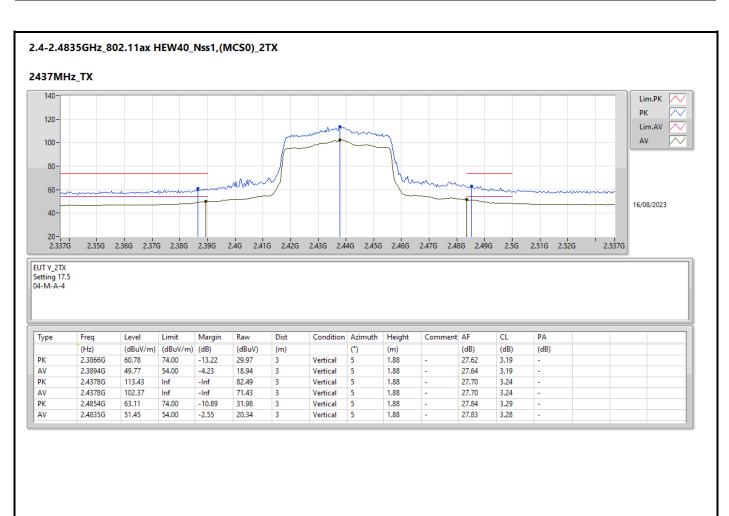




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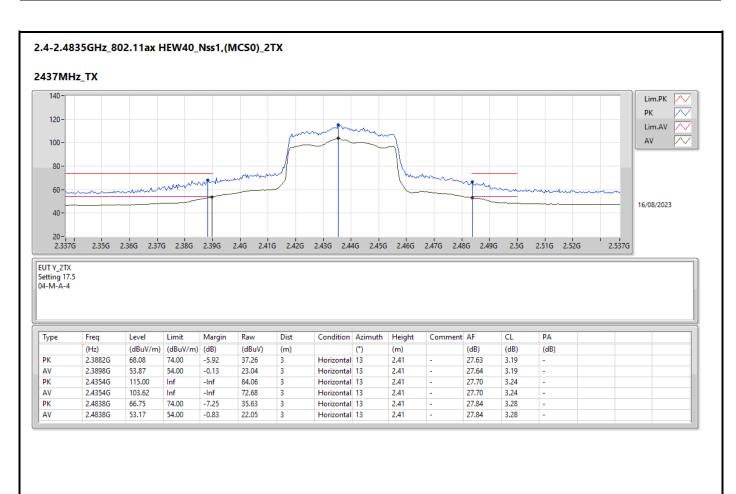




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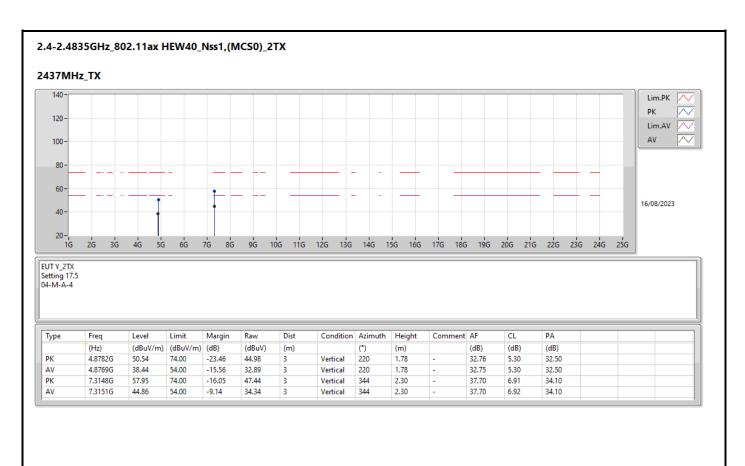




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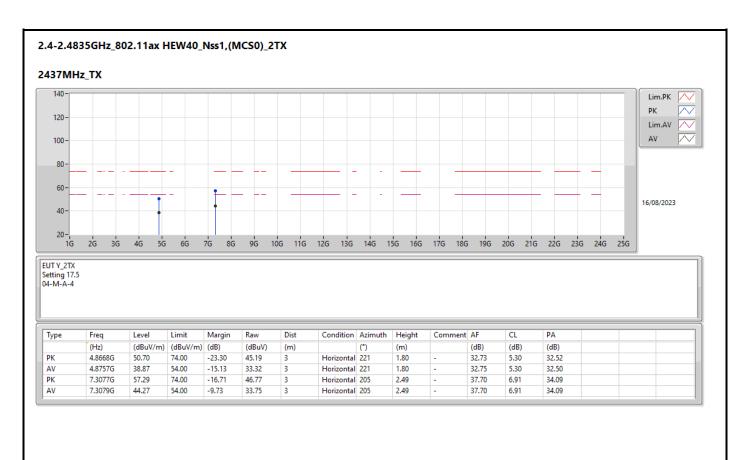




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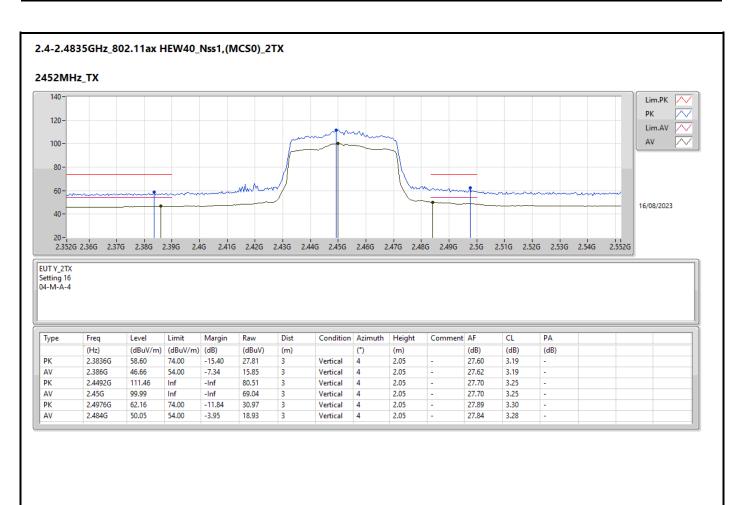




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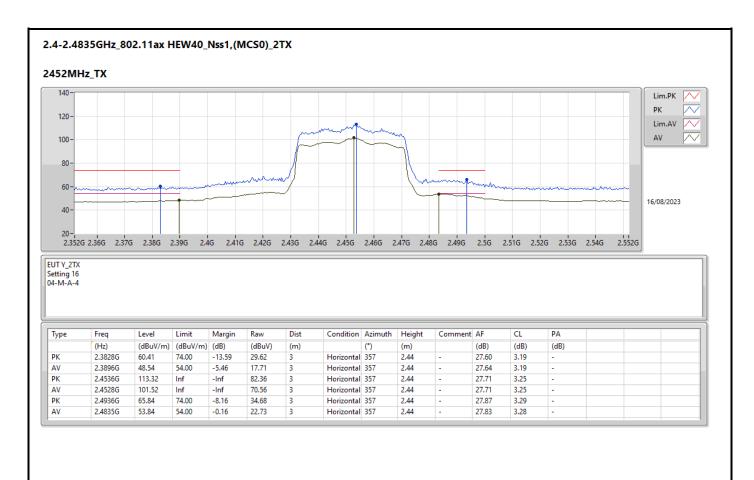




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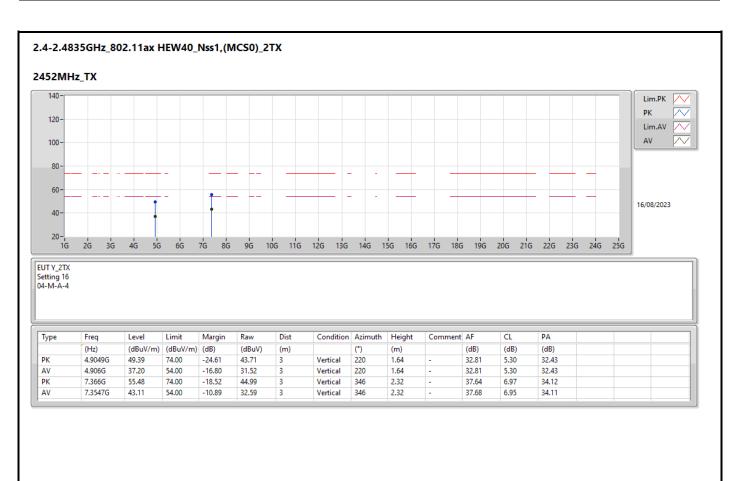




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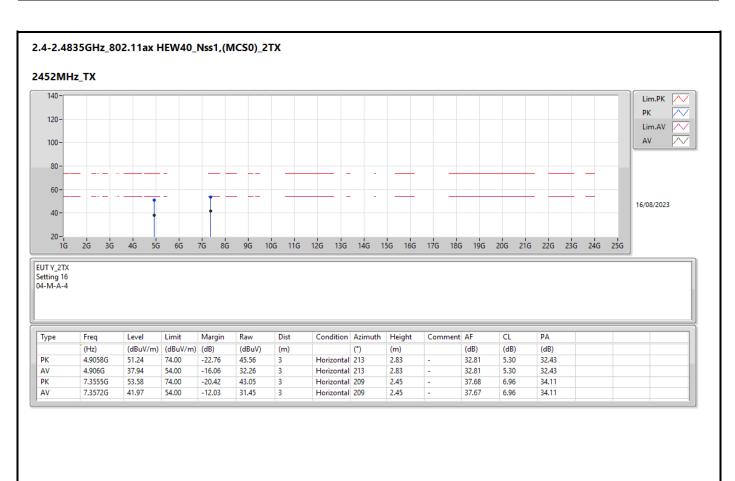




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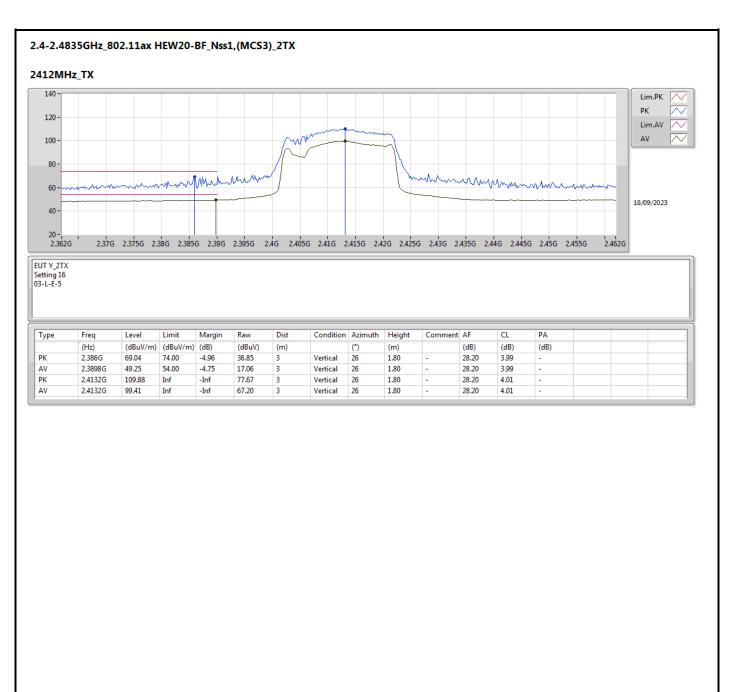




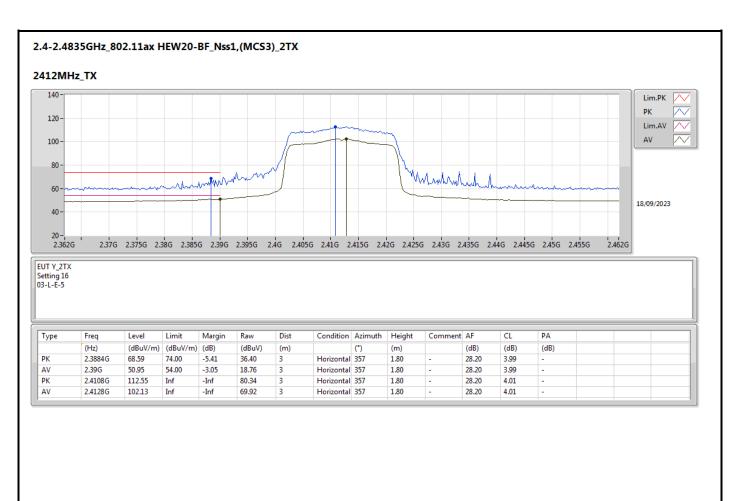
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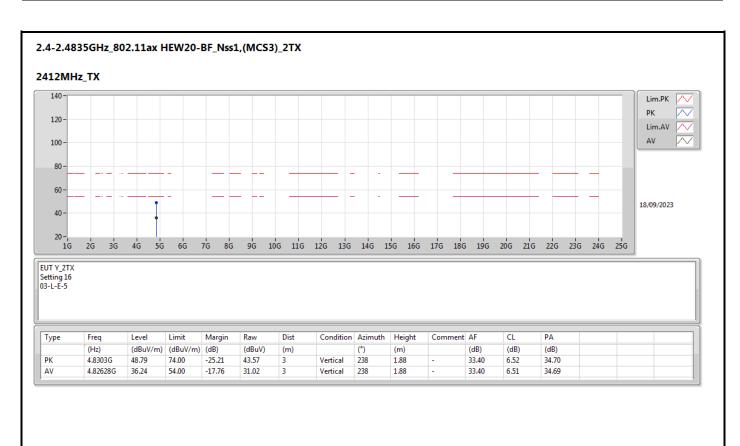




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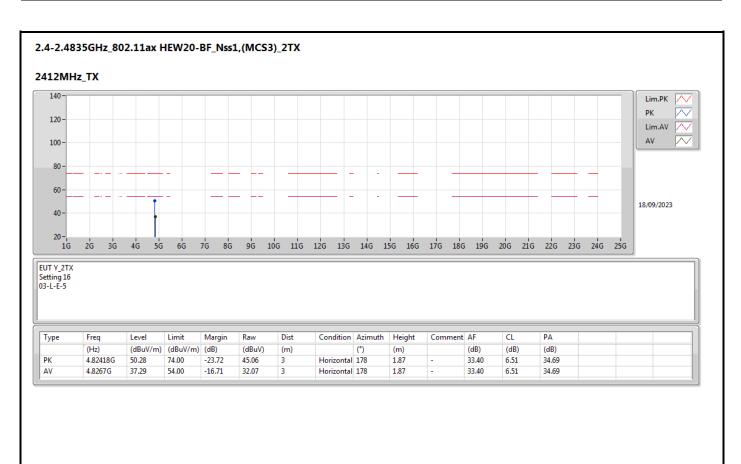




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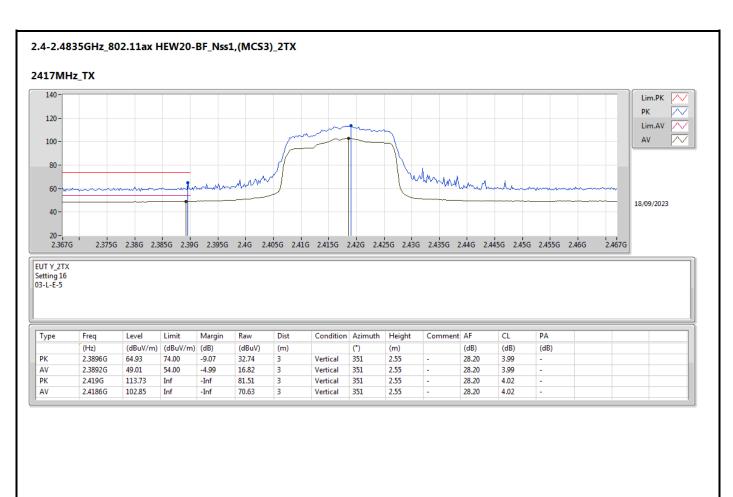




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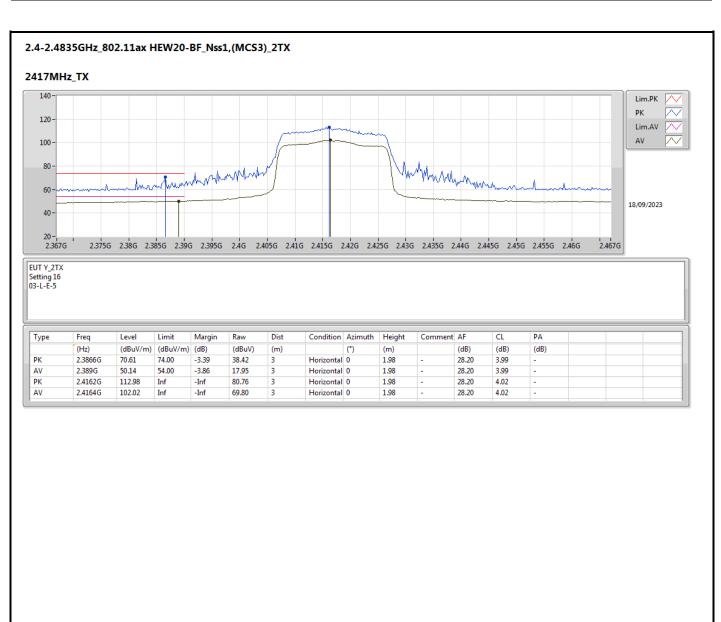




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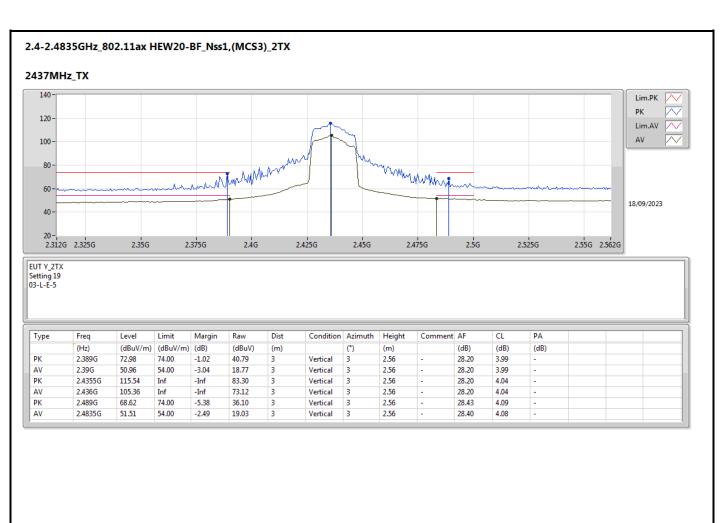




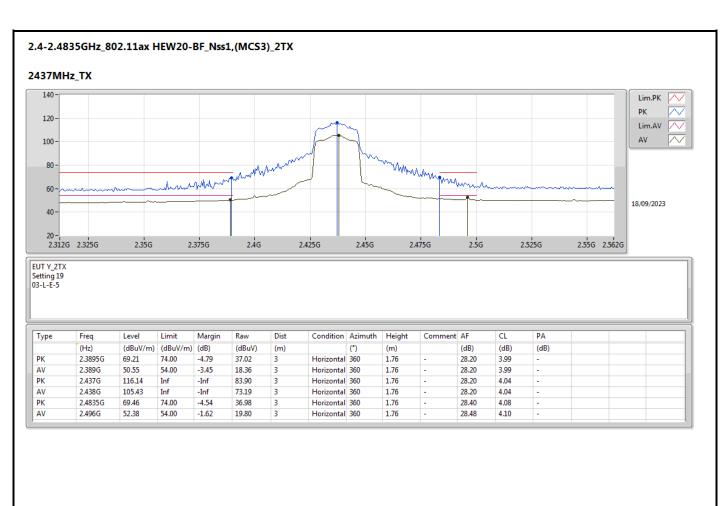
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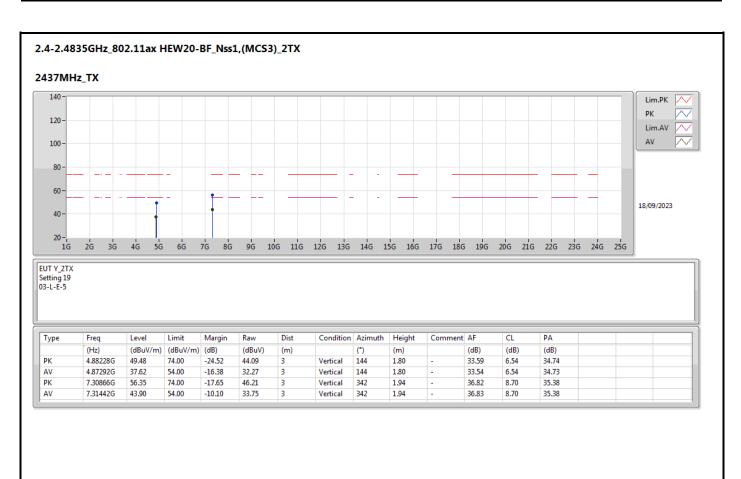








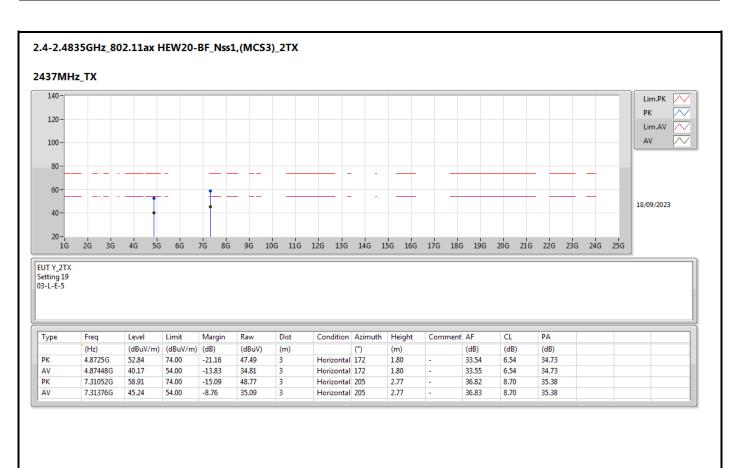




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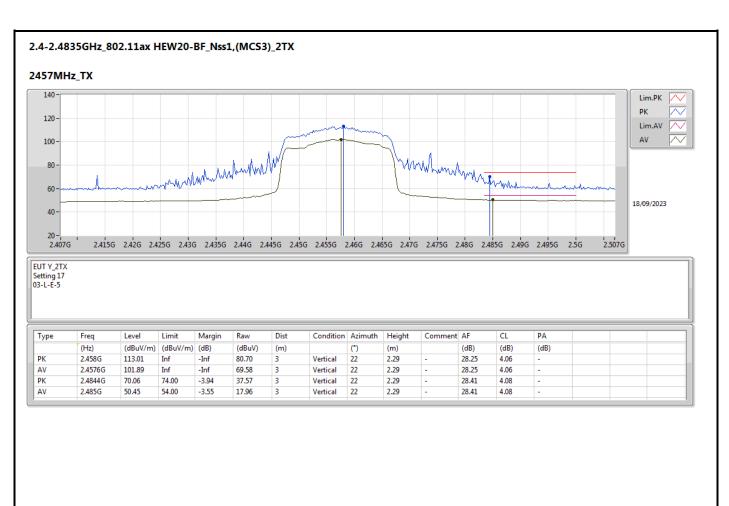




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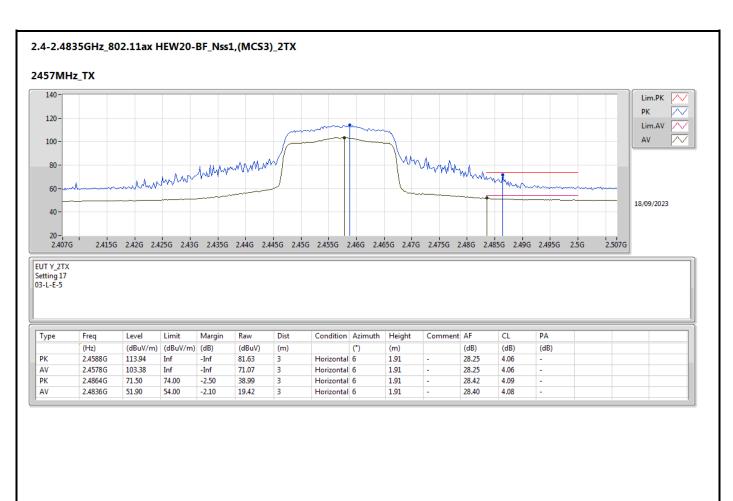




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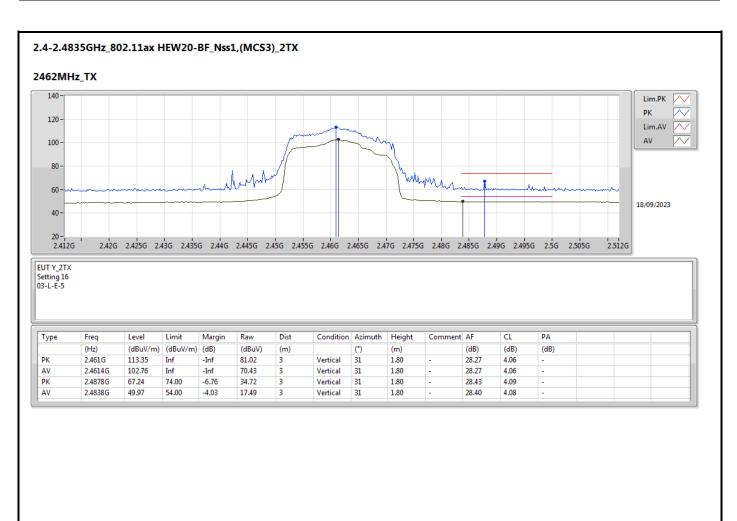




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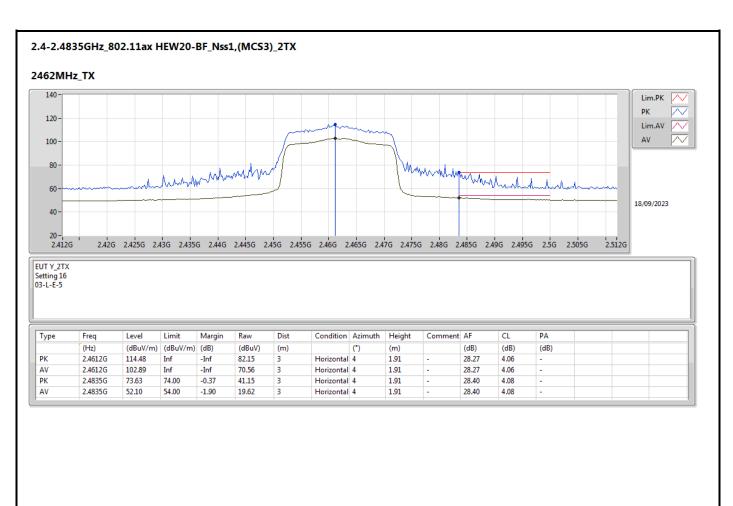




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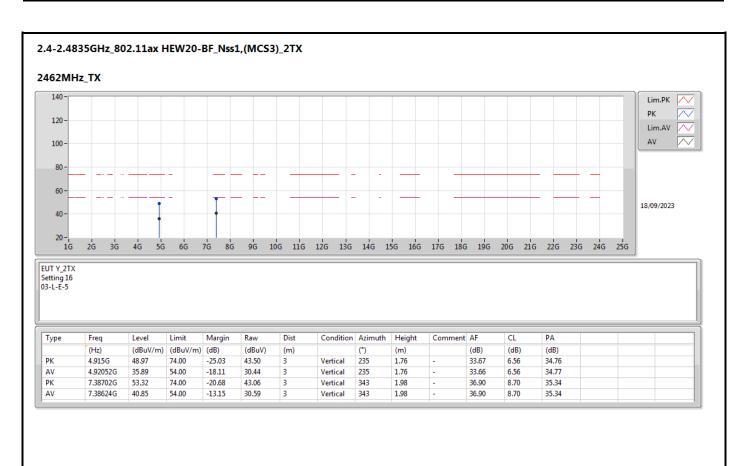




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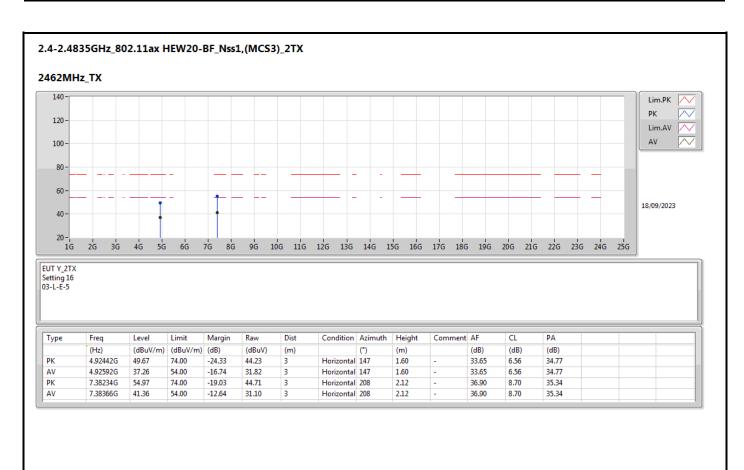




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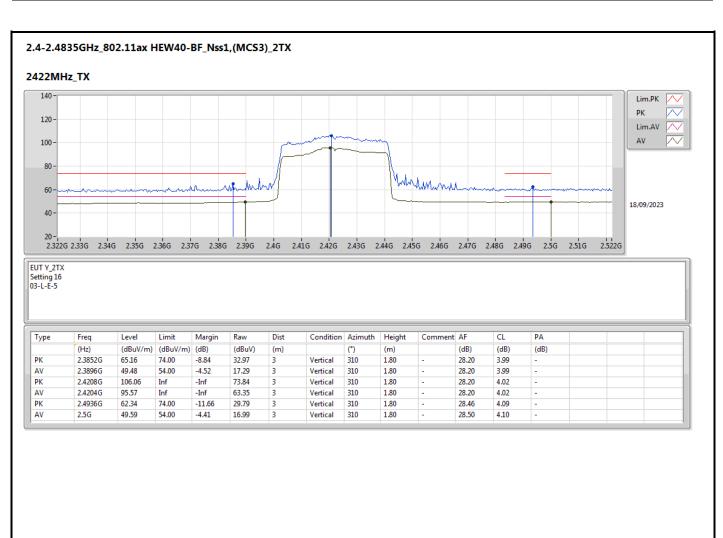




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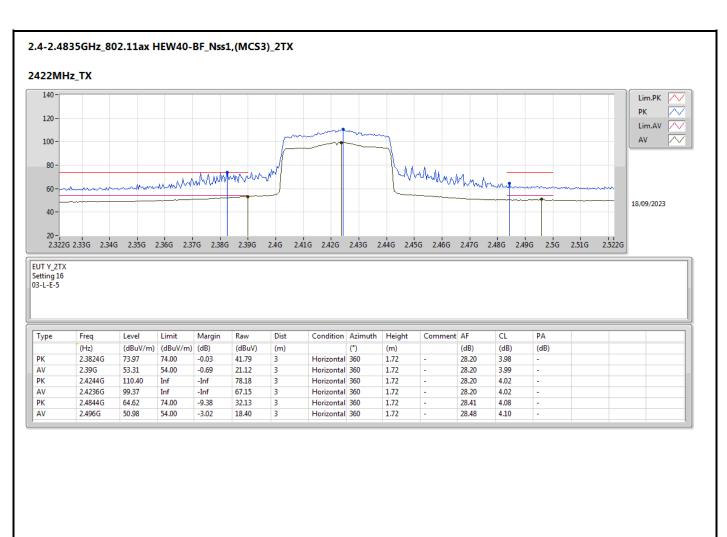




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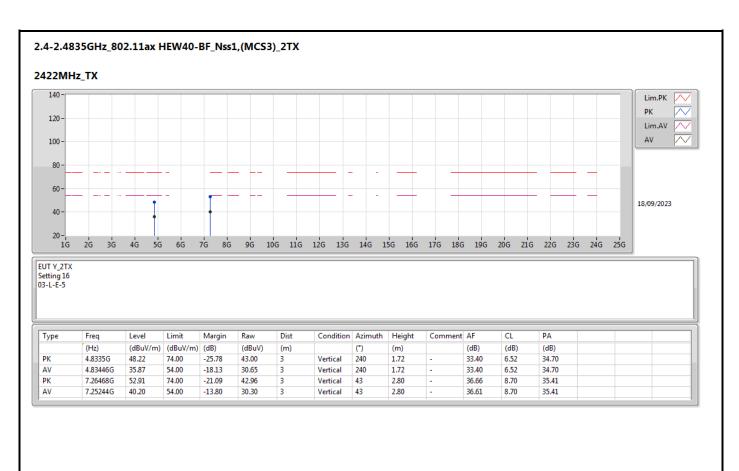




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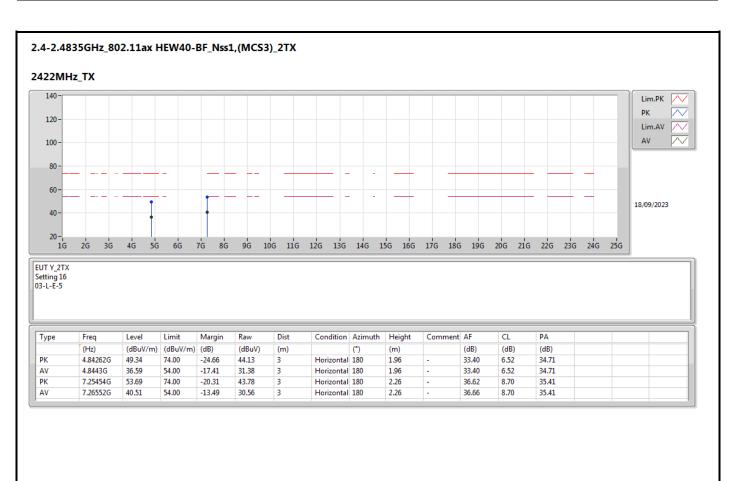




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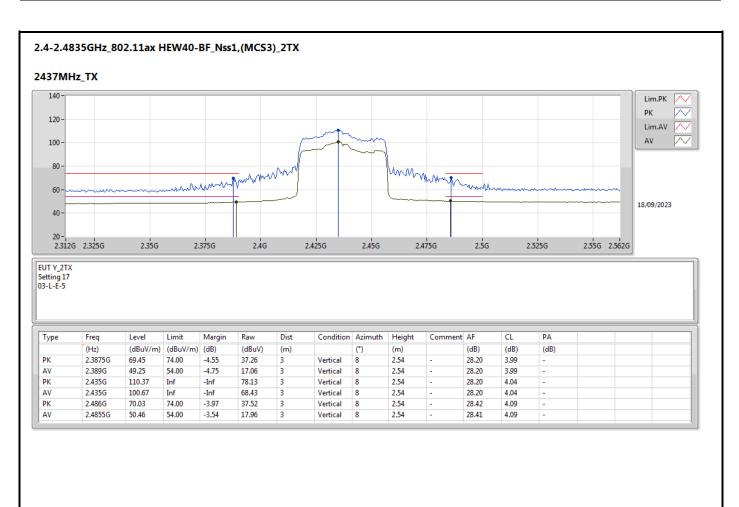




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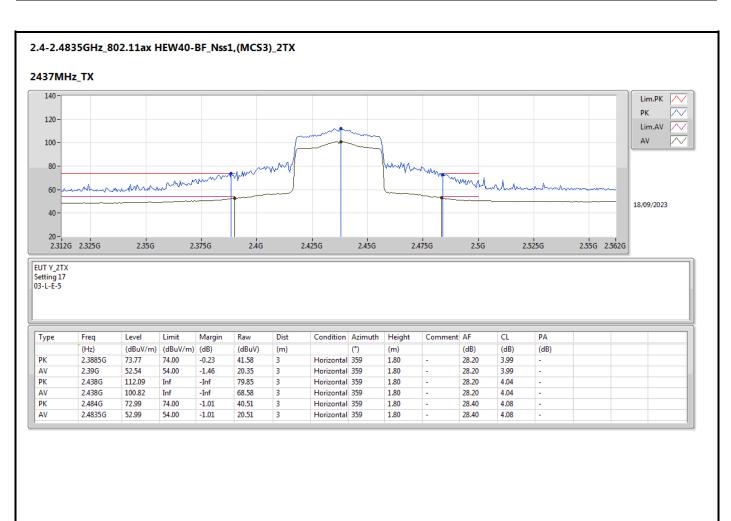




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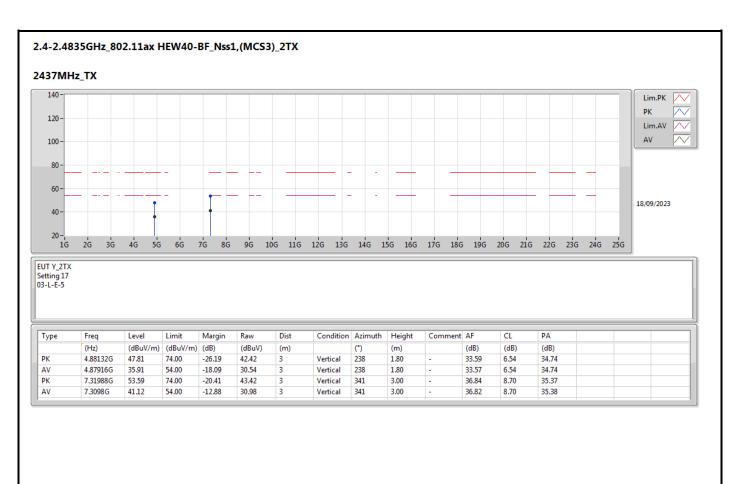




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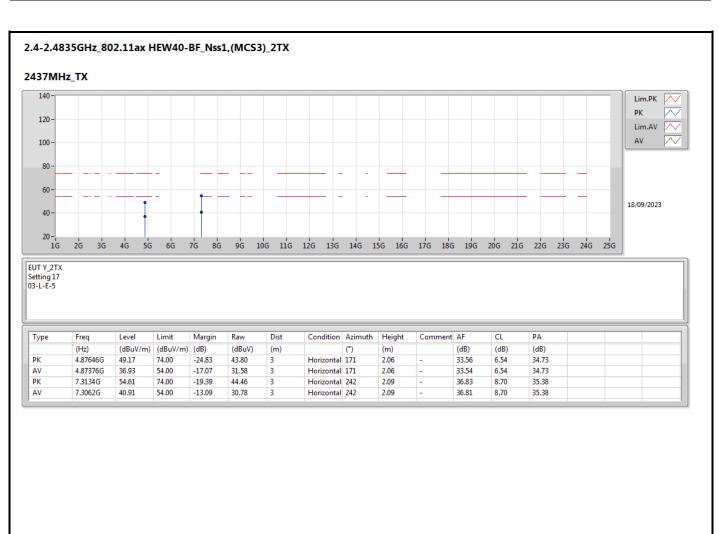




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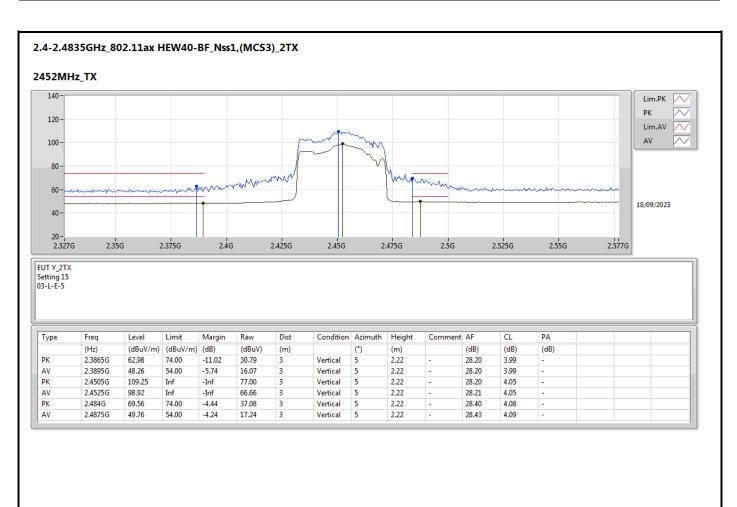




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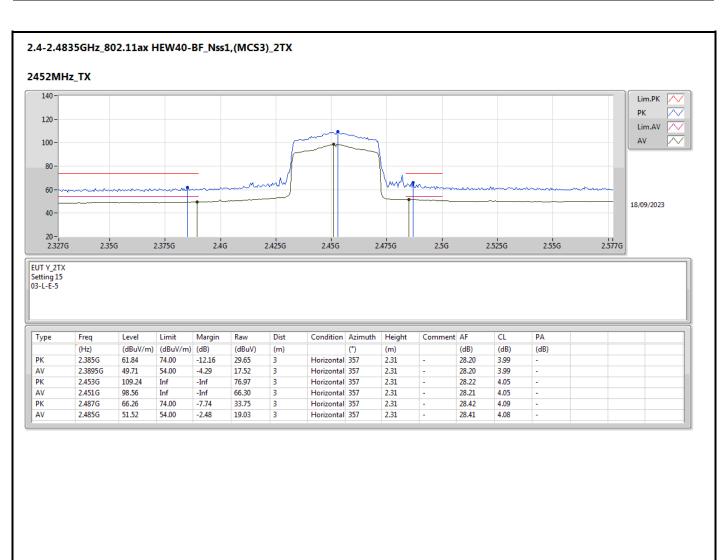




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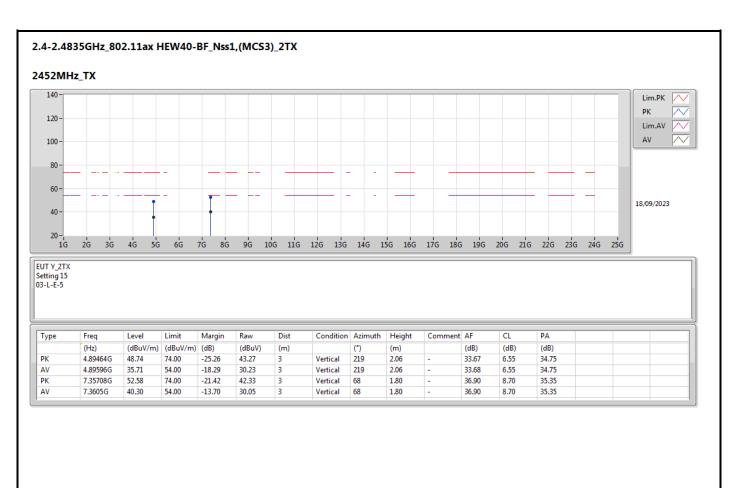




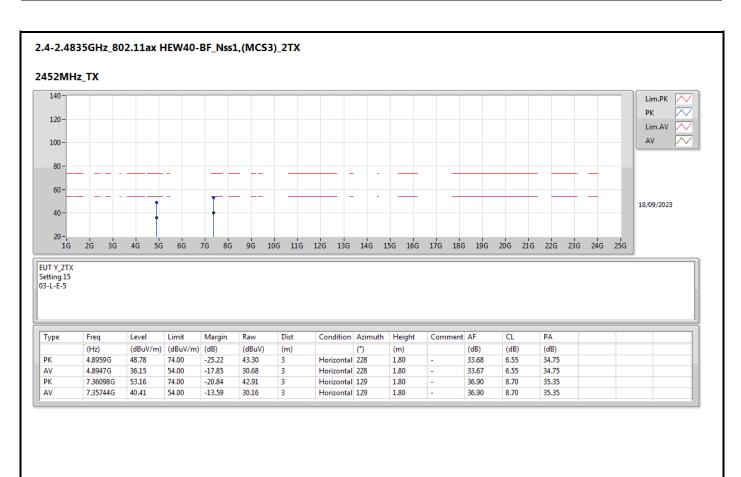
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## Radiated Emissions above 1GHz\_ Co-location

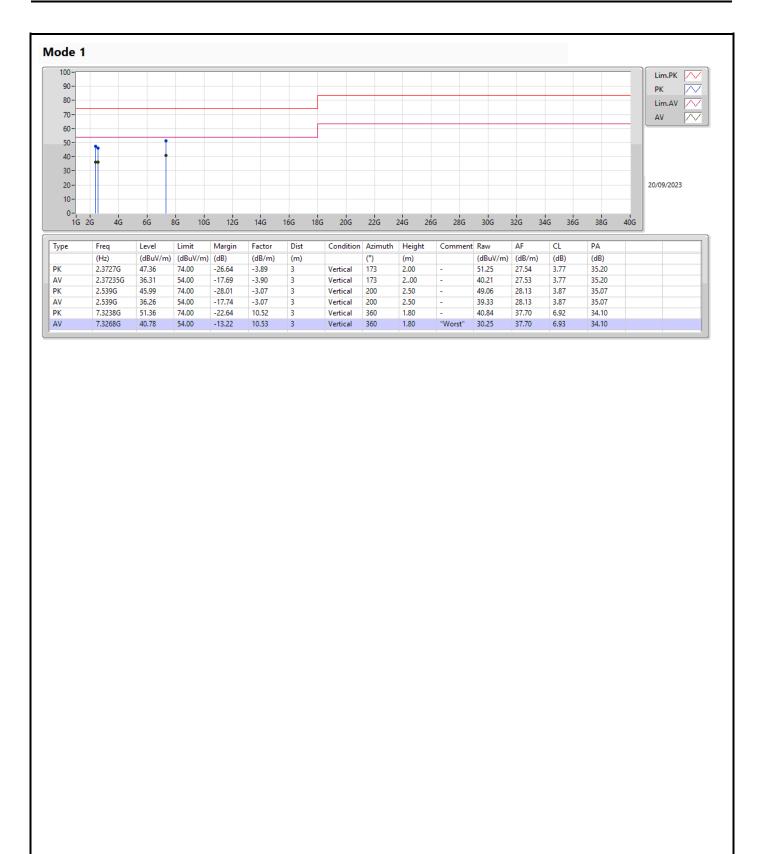
Appendix G

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	7.3268G	40.78	54.00	-13.22	Vertical

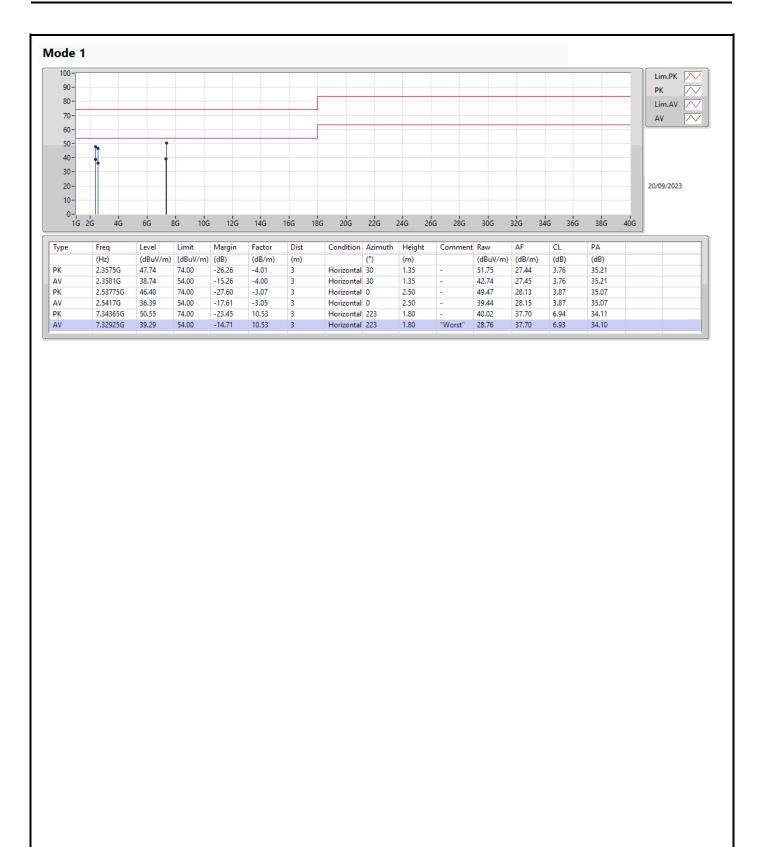
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