

3787

Report No.: FR381815AA

## RADIO TEST REPORT

FCC ID : N89-EWW631A1V1

Equipment : AX3000 Wireless Dual Band Ceiling Mount Access Point

Brand Name : SonicFi, CyberTAN

Model Name : EWW631-A1

Applicant : CyberTAN Technology Inc.

No. 99, Park Avenue III Science-based Industrial Park

Hsinchu Taiwan 308

Manufacturer : CyberTAN Technology Inc.

No. 99, Park Avenue III Science-based Industrial Park

Hsinchu Taiwan 308

Standard: 47 CFR FCC Part 15.247

The product was received on Aug. 18, 2023, and testing was started from Aug. 18, 2023 and completed on Oct. 16, 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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Appendix H. Test Photos

Photographs of EUT v01

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## History of this test report

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Report No.	Version	Description	Issued Date
FR381815AA	01	Initial issue of report	Nov. 17, 2023
FR381815AA	02	Revising the Antenna information on section 1.1.2	Dec. 12, 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 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.	Port		Brand	Model Name	Antenna Type	Connector	Gain (dBi)
Ant.	2.4GHz	5GHz	Dialia	Woder Name	Antenna Type	Connector	Gaill (GBI)
1	1	1	HONGBO	290-50265	Metal Antenna	I-PEX	Note 1
2	2	2	HONGBO	290-50265	Metal Antenna	I-PEX	Note 1

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#### Note 1:

Ant	Antenna Gain (dBi)							
Ant.	2.4GHz	5GHz UNII 1	5GHz UNII 2A	5GHz UNII 2C	5GHz UNII 3			
1	3.9	4.5	4.5	4.4	4.4			
2	3.9	4.7	4.7	4.4	4.5			

Note 2: The above information was declared by manufacturer.

#### 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.

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#### Note 3: 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 deviœs Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	DirectionalGain = $10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{cor}} \left\{ \sum_{k=1}^{N_{cor}} g_{j,k} \right\}^{2}}{N_{ANT}} \right]$
BF	Directiona   Gain = 10 - log $ \frac{\sum_{j=1}^{N_{cot}} \left\{ \sum_{k=1}^{N_{cot}} g_{j,k} \right\}^{2}}{N_{sNT}} $	Directional Gain = $10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{col}} \left\{ \sum_{k=1}^{N_{col}} g_{j,k} \right\}^{2}}{N_{col}} \right]$

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Ex.

Directional Gain (NSS1) formula : 
$$Directiona~ \mathit{IGain} = 10 \cdot \log \left[ \frac{\sum\limits_{j=1}^{N_{max}} \left\{ \sum\limits_{k=1}^{N_{max}} g_{j,k} \right\}^{2}}{N_{\mathit{ANT}}} \right]$$

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

```
2.4G DG = 6.91 dBi

5G UNII-1 DG = 7.61 dBi

5G UNII-2A DG = 7.61 dBi

5G UNII-2C DG = 7.41 dB

5G UNII-3 DG = 7.46 dBi
```

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## 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.973	0.12	12.626m	100
802.11g	0.943	0.25	1.98m	1k
802.11ax HEW20-BF	0.961	0.17	1.784m	1k
802.11ax HEW40-BF	0.934	0.3	1.784m	1k

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V	o	7.

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

### 1.1.4 EUT Operational Condition

EUT Power Type	From PoE				
	$\boxtimes$	With beamforming		Without beamforming	
Beamforming Function	The product has beamforming function for n/VHT/ax in 2.4GHz and n/ac/ax in 5GHz.				
Function	$\boxtimes$	Point-to-multipoint		Point-to-point	
Support RU		Full RU Partial RU			
Test Software Version QRCT.exe Version 4.0.00204.0					

Note: The above information was declared by manufacturer.

## 1.1.5 Table for Multiple Listing

EUT	Brand Name	Description
1	CyberTAN	All the brands are identical, the difference brand served as marketing
2	SonicFi	strategy.

#### Note:

- 1. From the above EUTs, EUT 1: CyberTAN was selected as representative model for the test and its data was recorded in this report.
- 2. 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	TH02-CB	Nyle Chang	22.4~23.1 / 62~67	Sep. 01, 2023~ Oct. 04, 2023
Radiated below 1GHz	03CH05-CB	Mark Hsu	22.2-23.3 / 56-59	Aug. 18, 2023~ Oct. 16, 2023
Radiated above 1GHz	03CH03-CB	Mark Hsu	22.4-23.5 / 55-58	Aug. 18, 2023~ Oct. 16, 2023
	03CH04-CB	Mark Hsu	22.7-23.8 / 56-59	Aug. 18, 2023~ Oct. 16, 2023
Radiated Co-location	03CH05-CB	Mark Hsu	22.2-23.3 / 56-59	Aug. 18, 2023~ Oct. 16, 2023
AC Conduction	CO01-CB	Ryan Huang	22~23 / 57~58	Aug. 29, 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	22.5
2417MHz	25
2437MHz	26
2462MHz	23.5
802.11g_Nss1,(6Mbps)_2TX	-
2412MHz	21
2417MHz	22.5
2437MHz	24
2462MHz	22
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-
2412MHz	24
2417MHz	26
2437MHz	27
2457MHz	25
2462MHz	23
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-
2422MHz	23
2437MHz	24
2452MHz	22

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#### Note:

- Evaluated HEW20/HEW40 mode only due to the 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 mode, only beamforming mode has been selected to test.

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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 1 + PoE	

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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			
1	EUT 1		

Th	The Worst Case Mode for Following Conformance Tests				
Tests Item Emissions in Restricted Frequency Bands					
Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in regardless of spatial multiplexing MIMO configuration), the radiated test sl be performed with highest antenna gain of each antenna type.					
Operating Mode < 1GHz	СТХ				
The EUT can be placed in X axis, Y axis and Z axis. EUT Y axis has been evaluated to be the worst case Emissions in Emissions in Restricted Frequency Bands <above 1ghz="">; thus, the measurement will follow this same test configuration.</above>					
1	EUT 1 in Y axis + WLAN 2.4GHz + PoE				
2	EUT 1 in Y axis + WLAN 5GHz + PoE				
For operating mode 2 is the worst case and it was record in this test report.					
Operating Mode > 1GHz CTX					
	The EUT was performed at $X$ axis, $Y$ axis and $Z$ axis position, and the worst case was found at $Y$ axis. Thus the measurement will follow this same test configuration.				
1	EUT 1 in Y axis				

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The Worst Case Mode for Following Conformance Tests			
Tests Item	Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location		
Test Condition Radiated measurement			
Operating Mode Normal Link			
The EUT can be placed in X axis, Y axis and Z axis. EUT Y axis has been evaluated to be the worst case at Emissions in Restricted Frequency Bands <above 1ghz="">; thus, the measurement will follow this same test configuration.</above>			
1 EUT 1 in Y axis + WLAN 2.4GHz + WLAN 5GHz			
Refer to Appendix G for Radiated Emission Co-location.			

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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			
Refer to Sporton Test Report No.: FA381815 for Co-location RF Exposure Evaluation.			

Note: The PoE are for measurement only, would not be marketed.

The PoE information as below:

Power	Brand	Model
PoE	Microsemi	PD-9501-10GC/AC

## 2.3 EUT Operation during Test

#### For CTX Mode:

<non-beamforming mode>

The EUT was programmed to be in continuously transmitting mode.

<Beamforming 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 DOS.
- 3. Executed "Lantest" to link with the remote workstation to transmit and receive packet by Client and transmit duty cycle no less than 98%.

#### For Normal Link:

During the test, the EUT operation to normal function.

#### 2.4 Accessories

Accessories	
Cradle*1	

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## 2.5 Support Equipment

#### For AC Conduction:

Support Equipment				
No. Equipment Brand Name Model Name FCC ID				
Α	PoE	Microsemi	PD-9501-10GC/AC	N/A
В	LAN NB	DELL	E6430	N/A
С	2.4G NB	DELL	E6430	N/A
D	5G NB	DELL	E6430	N/A

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#### For Radiated Emission below 1GHz:

Support Equipment						
No.	No. Equipment Brand Name Model Name FCC ID					
Α	Notebook	DELL	E4300	N/A		
В	PoE	Microsemi	PD-9501-10GC/AC	N/A		

### For Radiated Emission above 1GHz and RF conducted:

<Non-beamforming mode>

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Notebook	DELL	E4300	N/A
В	PoE	Microsemi	PD-9501-10GC/AC	N/A

#### For Radiated Emission above 1GHz and RF conducted:

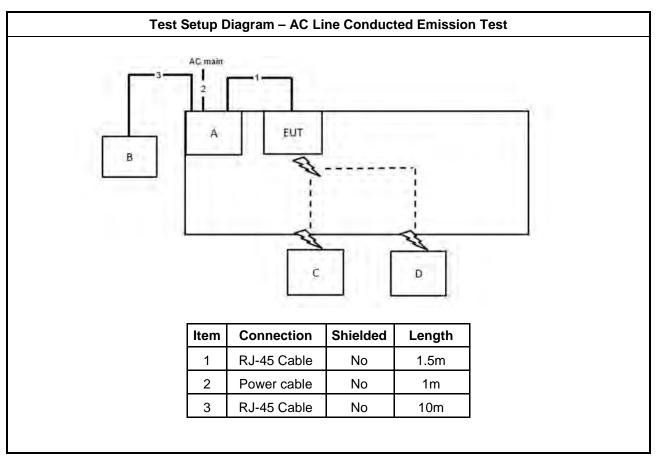
<Beamforming mode>

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Notebook	DELL	E4300	N/A
В	Client	Cybertan	EWW631-A1	N/A
С	Notebook	DELL	E4300	N/A
D	PoE	Microsemi	PD-9501-10GC/AC	N/A

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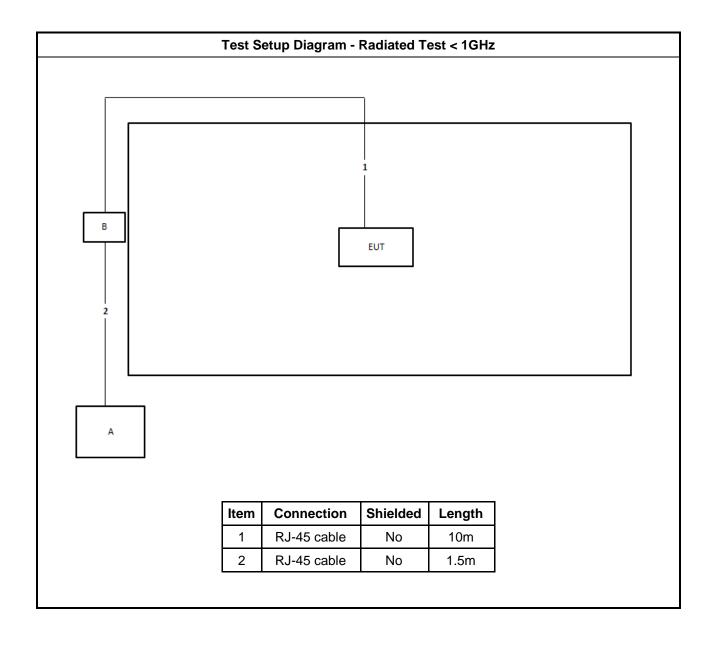


## 2.6 Test Setup Diagram



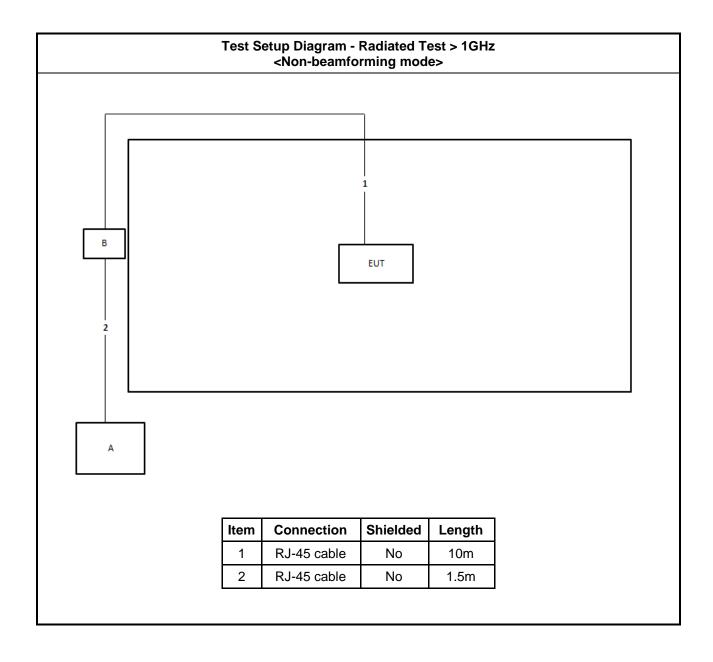
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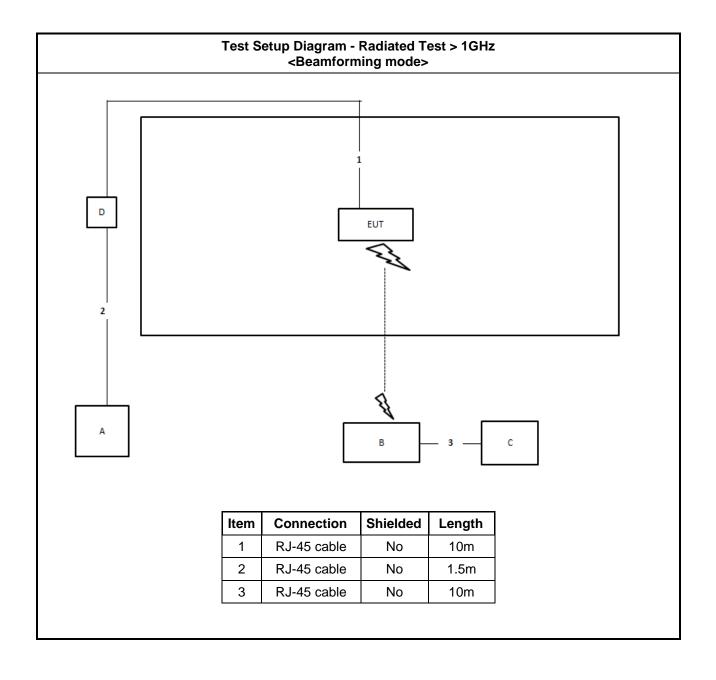




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## 3 Transmitter Test Result

## 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

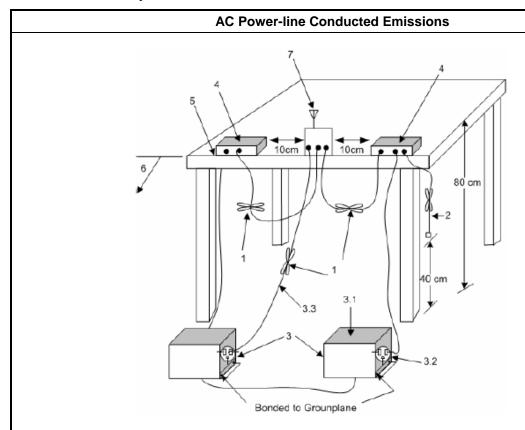
Refer a test equipment and calibration data table in this test report.

#### 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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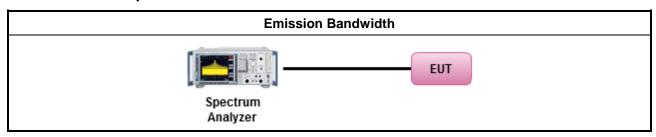
### 3.2.2 Measuring Instruments

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  $G_{TX} \le 6$  dBi, then  $P_{Out} \le 30$  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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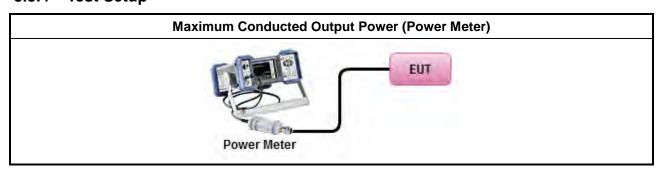
### 3.3.3 Test Procedures

		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		
	[duty	v 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: $P_{total} = P_1 + P_2 + \ldots + P_n \\ \text{(calculated in linear unit [mW] and transfer to log unit [dBm])} \\ \text{EIRP}_{total} = P_{total} + DG$		

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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

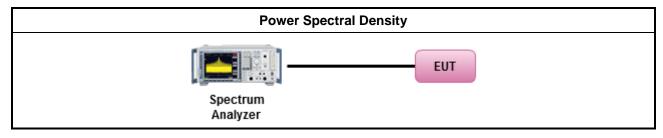
Refer a test equipment and calibration data table in this test report.

#### 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).			
	$\boxtimes$	Ref	er as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.	
•	For	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.

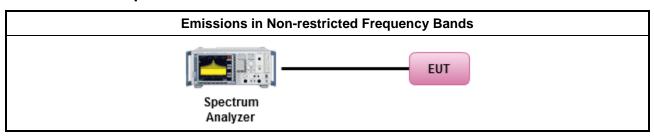
#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

	Test Method
•	Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.

#### 3.5.4 Test Setup



#### 3.5.5 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.

#### 3.5.6 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

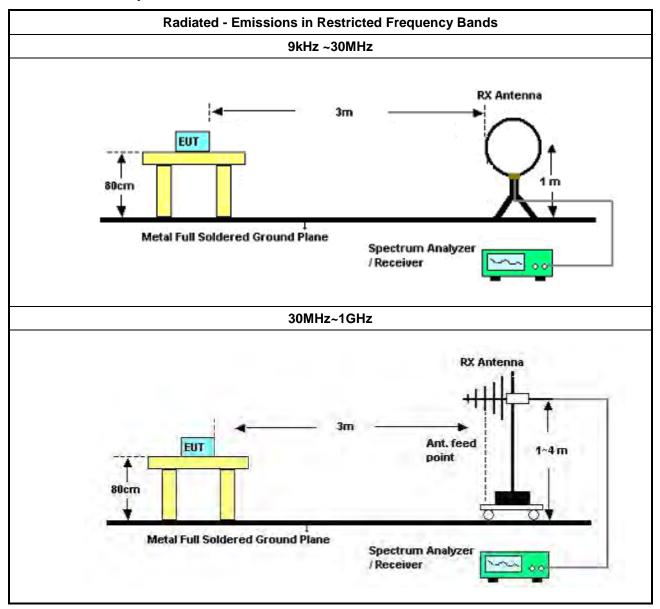
		Test Method	
•	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].		
•		er as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency nnel and highest frequency channel within the allowed operating band.	
•	For	the transmitter unwanted emissions 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 duty 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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Above 1GHz

3M & 1M

1.5M

Max 30cm

Above 1GHz

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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.

Spectrum Analyzer

#### 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-50- 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 (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 02, 2023	Aug. 01, 2024	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH05-CB	1GHz ~18GHz 3m	Nov. 06, 2022	Nov. 05, 2023	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 24, 2023	Mar. 23, 2024	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120 D-1291	1GHz~18GHz	Jun. 08, 2023	Jun. 07, 2024	Radiation (03CH05-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 28, 2023	Jun. 27, 2024	Radiation (03CH05-CB)
Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	May 03, 2023	May 02, 2024	Radiation (03CH05-CB)
Pre-Amplifier	Agilent	8449B	3008A02121	1GHz ~ 26.5GHz	May 18, 2023	May 17, 2024	Radiation (03CH05-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Apr. 18, 2023	Apr. 17, 2024	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Aug. 16, 2023	Aug. 15, 2024	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH05-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH05-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH05-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH05-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH03-CB	1GHz ~18GHz 3m	May 04, 2023	May 03, 2024	Radiation (03CH03-CB)
Horn Antenna	ETS • Lindgren	3115	6821	750MHz~18GHz	Feb. 03, 2023	Feb. 02, 2024	Radiation (03CH03-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 28, 2023	Jun. 27, 2024	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Jun. 30, 2023	Jun. 29, 2024	Radiation (03CH03-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 12, 2023	Jun. 11, 2024	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-20+29	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-29	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH03-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH04-CB	1GHz ~18GHz 3m	Feb. 23, 2023	Feb. 22, 2024	Radiation (03CH04-CB)
Horn Antenna	ETS · Lindgren	3115	00143147	750MHz~18GHz	Oct. 12, 2022	Oct. 11, 2023	Radiation (03CH04-CB)
Horn Antenna	ETS · Lindgren	3115	00143147	750MHz~18GHz	Oct. 04, 2023	Oct. 03, 2024	Radiation (03CH04-CB)

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RF Cable-high

RF Cable-high

Woken

Woken

RG402

RG402

Calibration Calibration Instrument **Brand** Model No. Serial No. Characteristics Remark **Date Due Date** Radiation SCHWARZBECK **BBHA 9170** BBHA9170507 15GHz ~ 40GHz Jun. 28, 2023 Jun. 27, 2024 Horn Antenna (03CH04-CB) 0.5GHz ~ Radiation Pre-Amplifier Agilent 83017A MY53270063 Jun. 30, 2023 Jun. 29, 2024 (03CH04-CB) 26.5GHz Radiation Pre-Amplifier 18GHz ~ 40GHz SGH **SGH184** 20221107-3 Nov. 16, 2022 Nov. 15, 2023 (03CH04-CB) Spectrum Radiation 9kHz~40GHz FSP40 100142 R&S Mar. 21, 2023 Mar. 20, 2024 (03CH04-CB Analyzer Radiation 1GHz - 18GHz RF Cable-high Woken RG402 High Cable-21 Oct. 03, 2022 Oct. 02, 2023 (03CH04-CB) Radiation RF Cable-high Woken RG402 High Cable-28 1GHz~18GHz Oct. 02, 2023 Oct. 01, 2024 (03CH04-CB High Radiation RF Cable-high Woken RG402 1GHz - 18GHz Oct. 03, 2022 Oct. 02, 2023 (03CH04-CB) Cable-21+67 Radiation High RF Cable-high RG402 1GHz~18GHz Oct. 02, 2023 Woken Oct. 01, 2024 Cable-04+28 (03CH04-CB Radiation 1GHz ~ 40 GHz High Cable Woken WCA0929M 40G#5+6 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 High Cable Woken WCA0929M 40G#6 1GHz ~ 40 GHz Dec. 07, 2022 Dec. 06, 2023 (03CH04-CB) Radiation **SPORTON** Test Software SENSE N.C.R. N.C.R. V5.10 (03CH04-CB) Spectrum Conducted R&S FSV40 101027 9kHz~40GHz Aug. 14, 2023 Aug. 13, 2024 analyzer (TH02-CB) Conducted Power Sensor Anritsu MA2411B 1126203 300MHz~40GHz Oct. 17, 2022 Oct. 16, 2023 (TH02-CB) Conducted Power Meter Anritsu ML2495A 1210004 300MHz~40GHz Oct. 17, 2022 Oct. 16, 2023 (TH02-CB) Conducted RF Cable-high RG402 High Cable-01 1 GHz - 18 GHz Oct. 03, 2022 Oct. 02, 2023 Woken (TH02-CB) Conducted RF Cable-high Woken RG402 High Cable-01 1 GHz - 18 GHz Oct. 02, 2023 Oct. 01, 2024 (TH02-CB) Conducted RG402 1 GHz - 18 GHz RF Cable-high Woken High Cable-02 Oct. 03, 2022 Oct. 02, 2023 (TH02-CB) Conducted RF Cable-high Woken RG402 High Cable-02 1 GHz - 18 GHz Oct. 02, 2023 Oct. 01, 2024 (TH02-CB) Conducted RG402 High Cable-03 1 GHz - 18 GHz Oct. 03, 2022 Oct. 02, 2023 RF Cable-high Woken (TH02-CB) Conducted RG402 1 GHz - 18 GHz Oct. 02, 2023 RF Cable-high Woken High Cable-03 Oct. 01, 2024 (TH02-CB) Conducted RF Cable-high Woken RG402 High Cable-04 1 GHz - 18 GHz Oct. 03, 2022 Oct. 02, 2023 (TH02-CB)

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Conducted

(TH02-CB)
Conducted

(TH02-CB)

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1 GHz - 18 GHz

1 GHz - 18 GHz

Oct. 02, 2023

Oct. 03, 2022

Oct. 01, 2024

Oct. 02, 2023

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High Cable-04

High Cable-05

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-05	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH02-CB)
Switch	SPTCB	SP-SWI	SWI-02	1 GHz –26.5 GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH02-CB)
Switch	SPTCB	SP-SWI	SWI-02	1 –26.5 GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (TH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH02-CB)

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

N.C.R. means Non-Calibration required.

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FAX: 886-3-656-9085 Issued Date : Dec. 12, 2023



# **Conducted Emissions at Powerline**

Appendix A

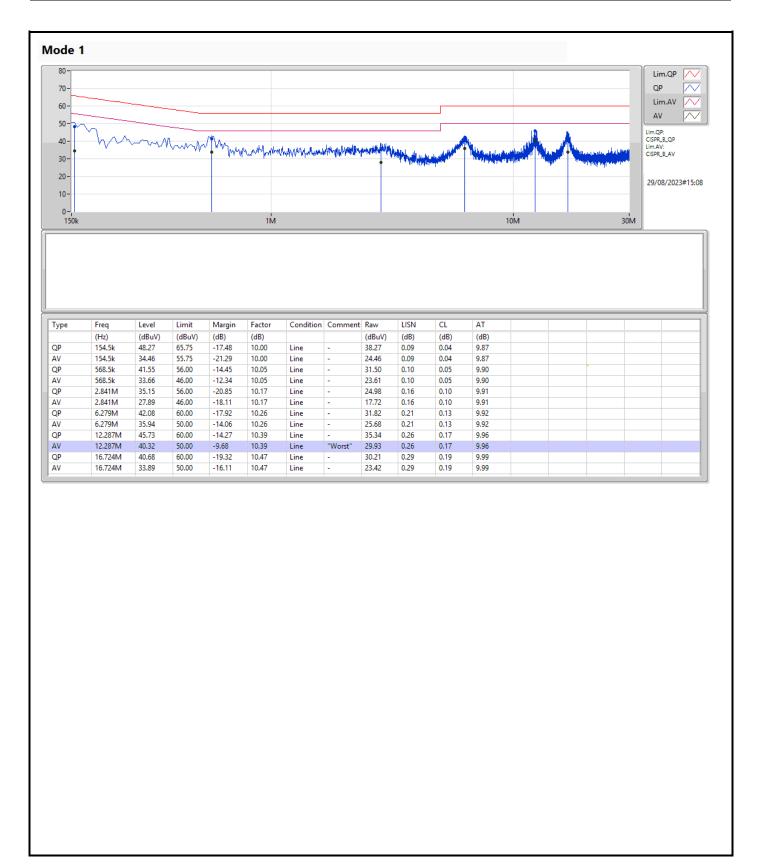
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	12.287M	40.32	50.00	-9.68	Line

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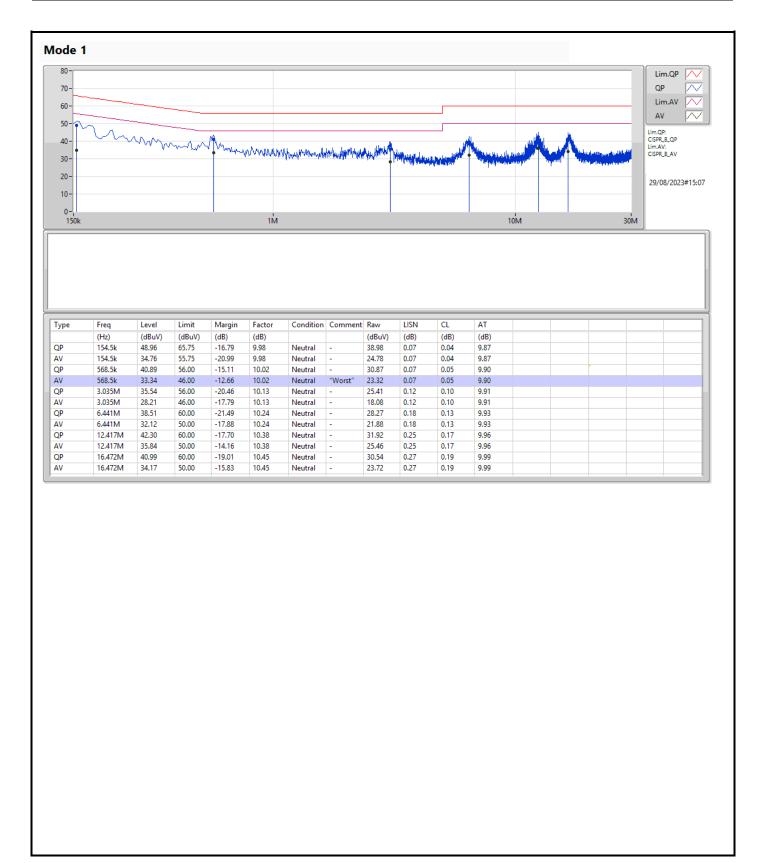




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### Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	ū	-	÷	ï	-
802.11b_Nss1,(1Mbps)_2TX	8.525M	13.741M	13M7G1D	7.075M	12.964M
802.11g_Nss1,(6Mbps)_2TX	15.1M	16.289M	16M3D1D	13.775M	16.21M
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	16.25M	18.827M	18M8D1D	13.75M	18.761M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	34.95M	37.851M	37M9D1D	16.95M	37.438M

 $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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#### Result

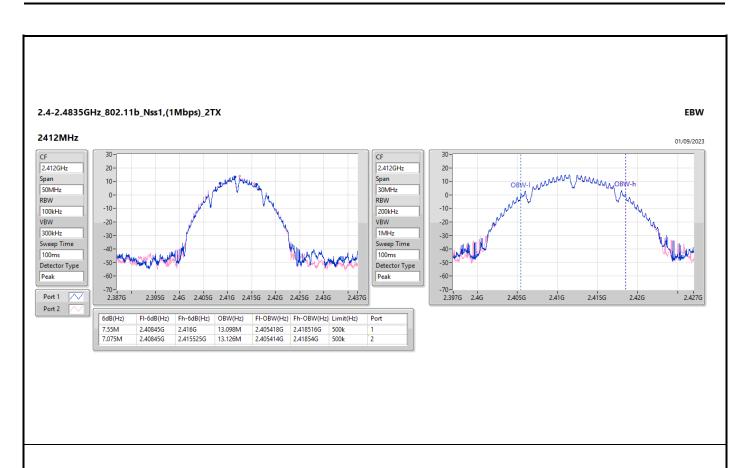
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	7.55M	13.098M	7.075M	13.126M
2437MHz	Pass	500k	7.6M	13.741M	8.025M	13.275M
2462MHz	Pass	500k	7.55M	13.064M	8.525M	12.964M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15M	16.222M	15.1M	16.266M
2437MHz	Pass	500k	13.825M	16.278M	13.775M	16.289M
2462MHz	Pass	500k	15.05M	16.21M	15.025M	16.258M
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	13.75M	18.796M	15.05M	18.761M
2437MHz	Pass	500k	16.25M	18.821M	15.075M	18.827M
2462MHz	Pass	500k	15.025M	18.8M	15.075M	18.766M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	16.95M	37.461M	33.75M	37.536M
2437MHz	Pass	500k	32.55M	37.475M	34.95M	37.525M
2452MHz	Pass	500k	23.85M	37.851M	18.5M	37.438M

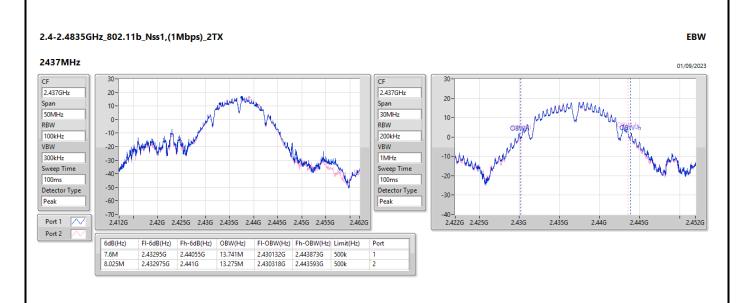
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

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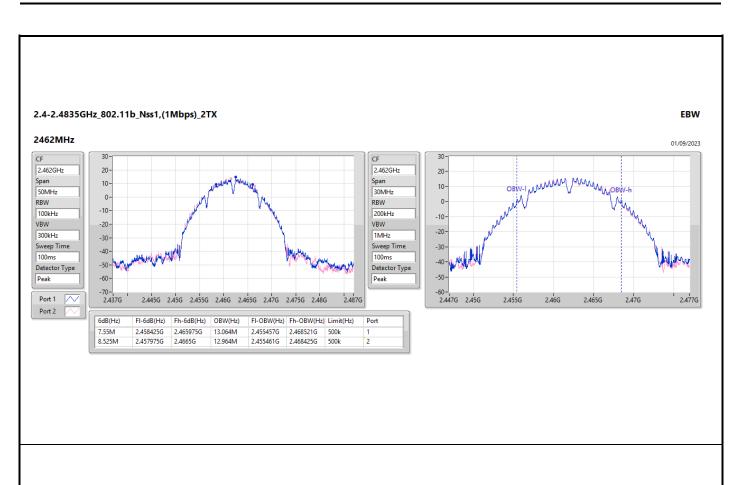
Report No. : FR381815AA

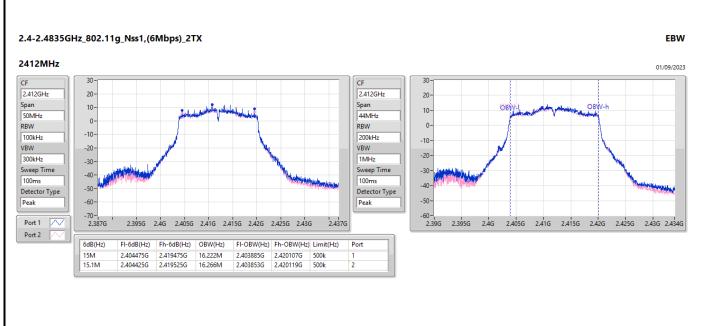




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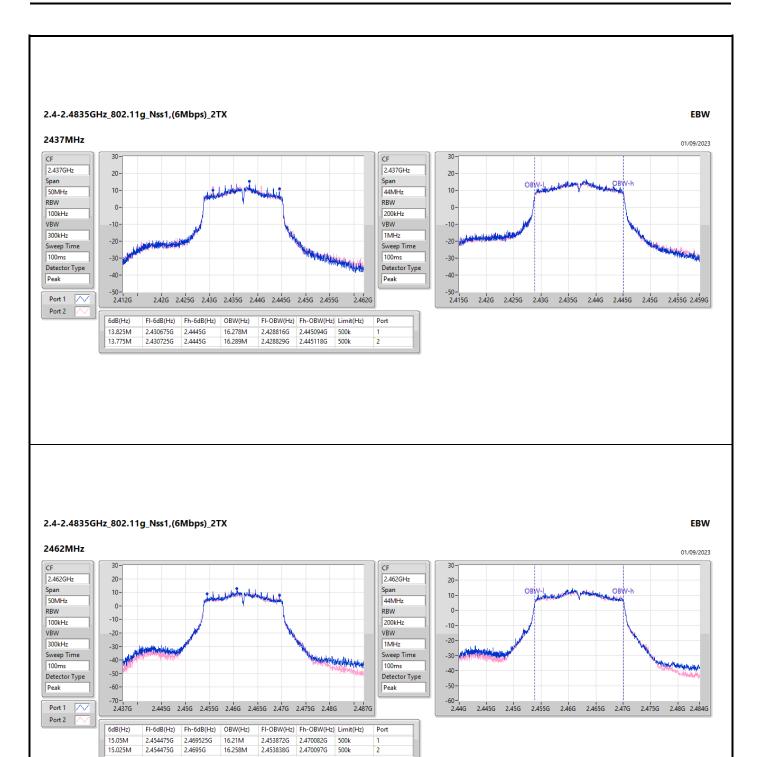
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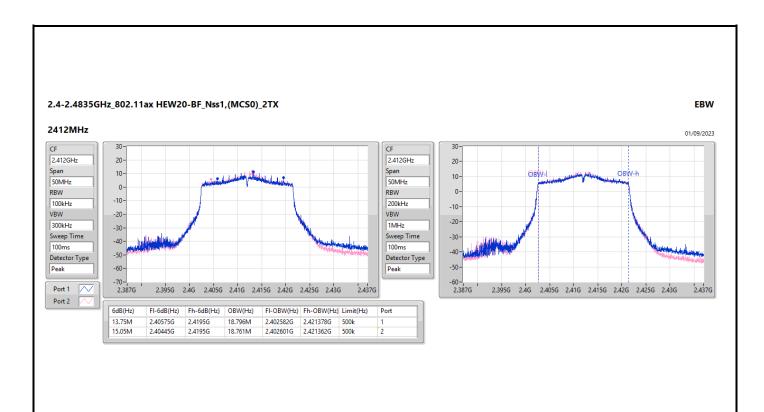
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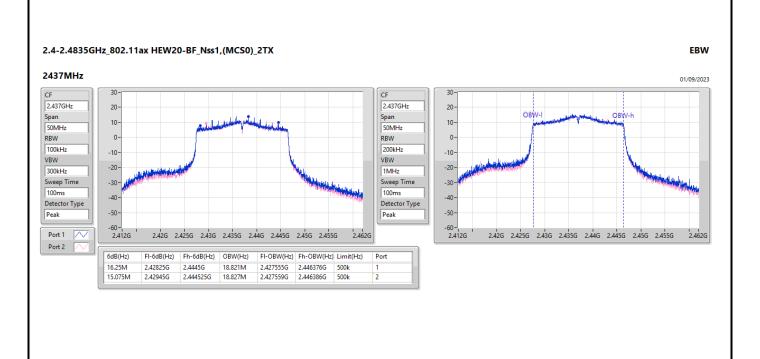
Report No. : FR381815AA



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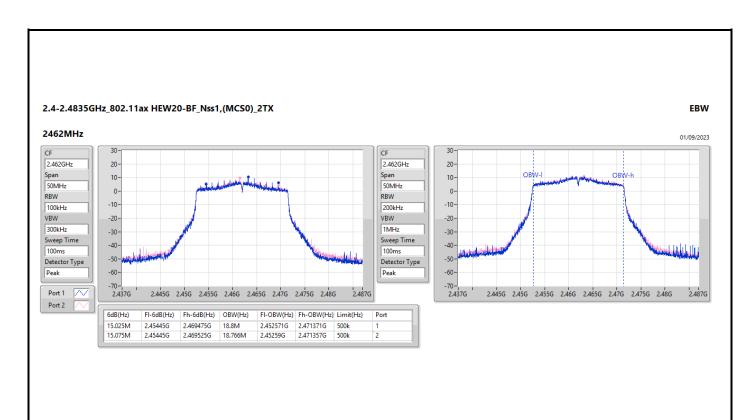
Report No. : FR381815AA

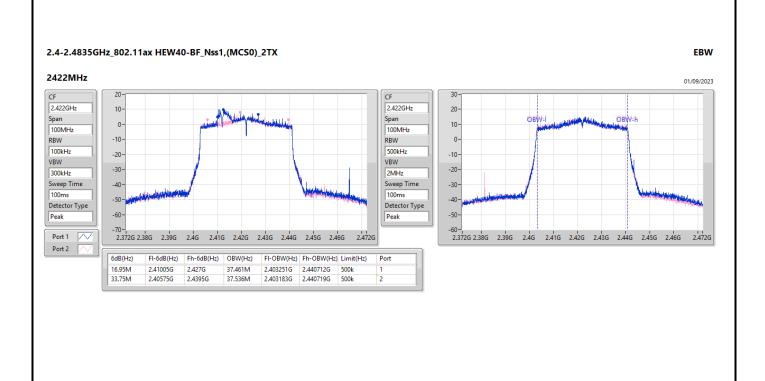




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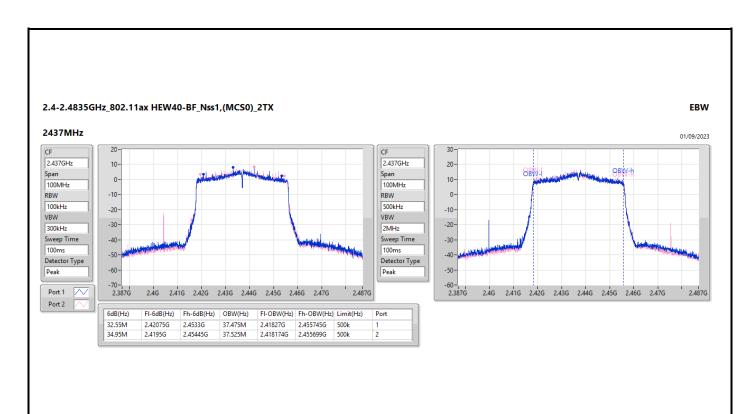
Report No. : FR381815AA

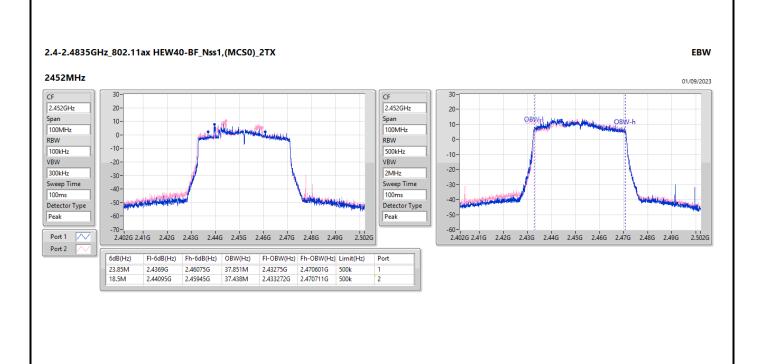




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Average Power Appendix C

### Summary

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	28.85	0.76736
802.11g_Nss1,(6Mbps)_2TX	26.93	0.49317
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	26.12	0.40926
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	23.83	0.24155

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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	3.90	22.29	22.36	25.34	30.00
2417MHz	Pass	3.90	25.03	24.89	27.97	30.00
2437MHz	Pass	3.90	26.03	25.65	28.85	30.00
2457MHz						
2462MHz	Pass	3.90	23.25	23.37	26.32	30.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	3.90	21.33	21.16	24.26	30.00
2417MHz	Pass	3.90	22.56	22.58	25.58	30.00
2437MHz	Pass	3.90	23.87	23.97	26.93	30.00
2457MHz						
2462MHz	Pass	3.90	22.03	21.86	24.96	30.00
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.91	20.01	20.00	23.02	29.09
2417MHz	Pass	6.91	22.04	22.04	25.05	29.09
2437MHz	Pass	6.91	23.19	23.02	26.12	29.09
2457MHz	Pass	6.91	20.82	21.10	23.97	29.09
2462MHz	Pass	6.91	19.03	19.10	22.08	29.09
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	6.91	19.97	19.87	22.93	29.09
2437MHz	Pass	6.91	20.76	20.88	23.83	29.09
2452MHz	Pass	6.91	18.88	18.96	21.93	29.09

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

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Appendix D **PSD** 

**Summary** 

Mode Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	4.07
802.11g_Nss1,(6Mbps)_2TX	0.21
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	0.32
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-5.22

RBW = 3kHz;

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Appendix D **PSD** 

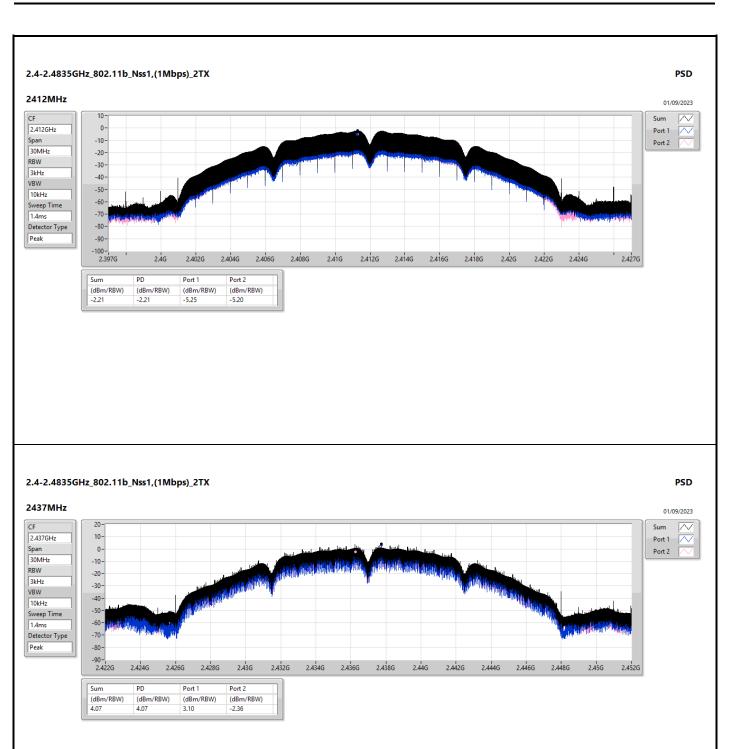
#### Result

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	6.91	-5.25	-5.20	-2.21	7.09
2437MHz	Pass	6.91	3.10	-2.36	4.07	7.09
2462MHz	Pass	6.91	-4.36	0.41	1.34	7.09
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.91	-4.48	-4.08	-2.57	7.09
2437MHz	Pass	6.91	-3.25	-1.89	0.21	7.09
2462MHz	Pass	6.91	-5.03	-4.16	-2.30	7.09
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	6.91	-4.69	-5.28	-2.54	7.09
2437MHz	Pass	6.91	-0.41	-2.47	0.32	7.09
2462MHz	Pass	6.91	-5.77	-5.30	-4.27	7.09
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	6.91	-5.50	-7.56	-5.22	7.09
2437MHz	Pass	6.91	-7.19	-7.37	-5.30	7.09
2452MHz	Pass	6.91	-8.13	-8.46	-6.55	7.09

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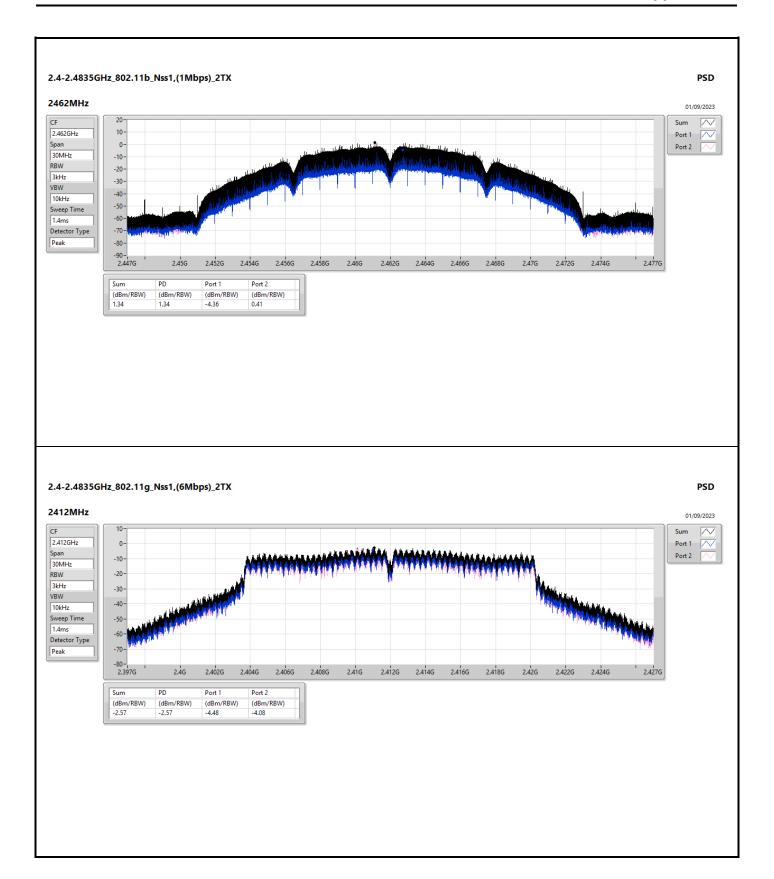
Page No. : FR381815AA Report No.

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;



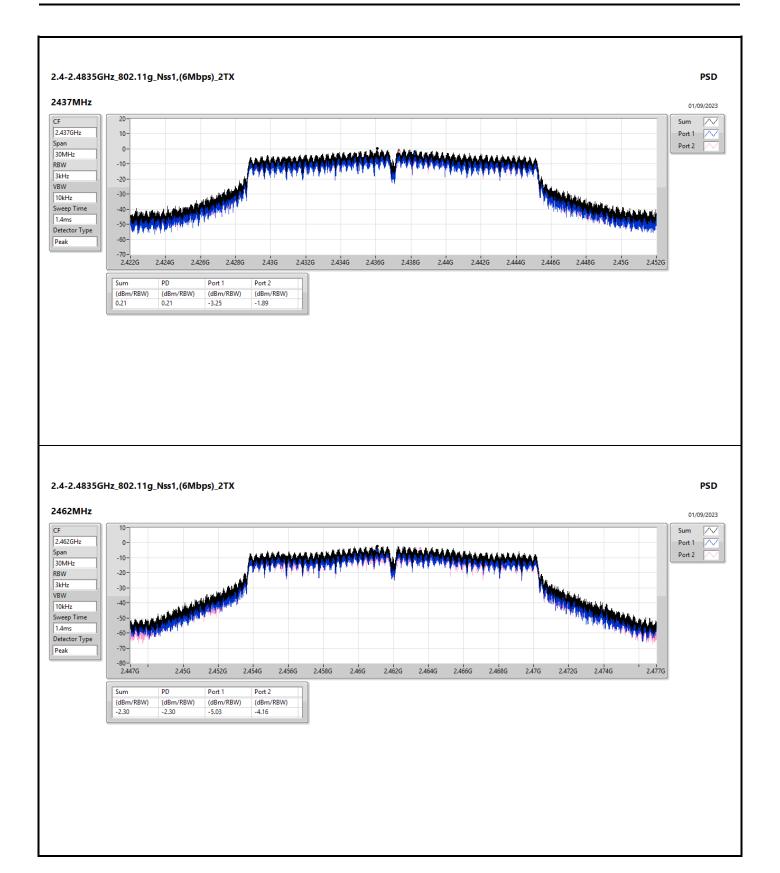
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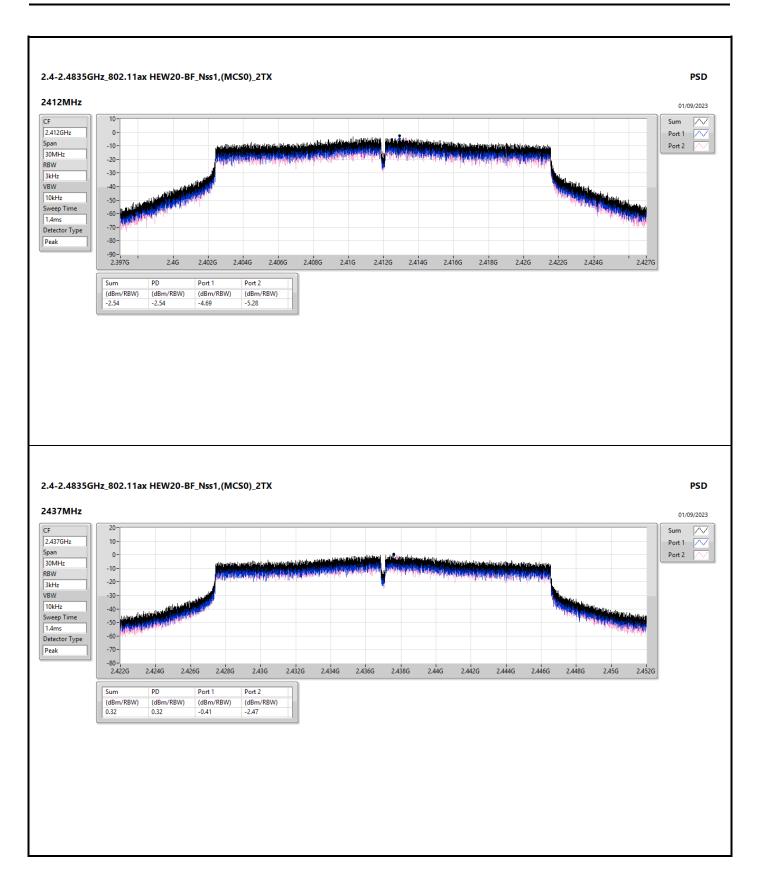
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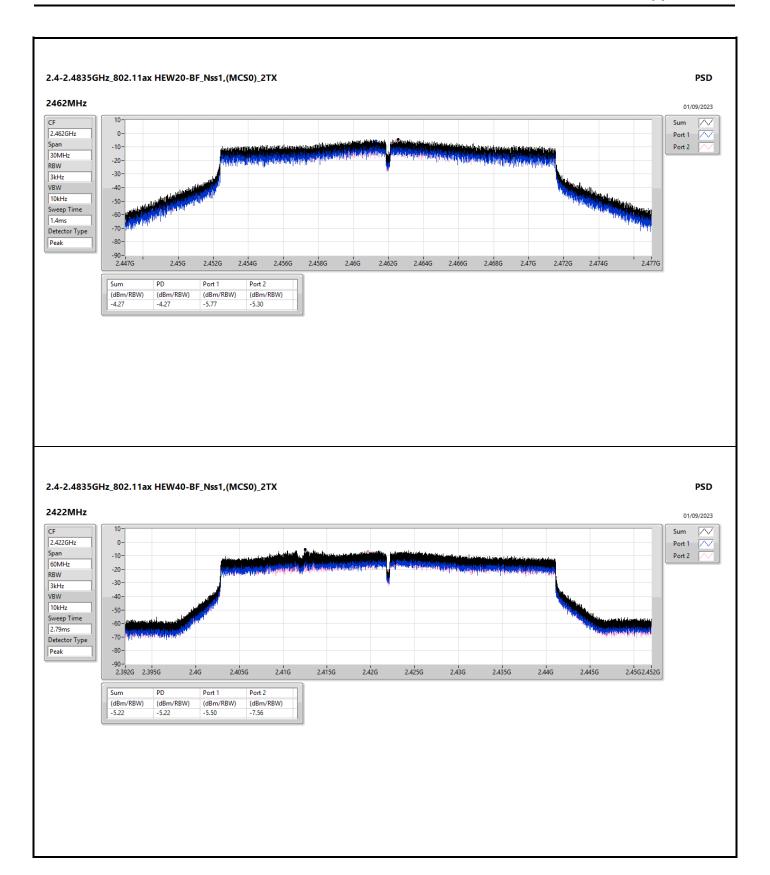
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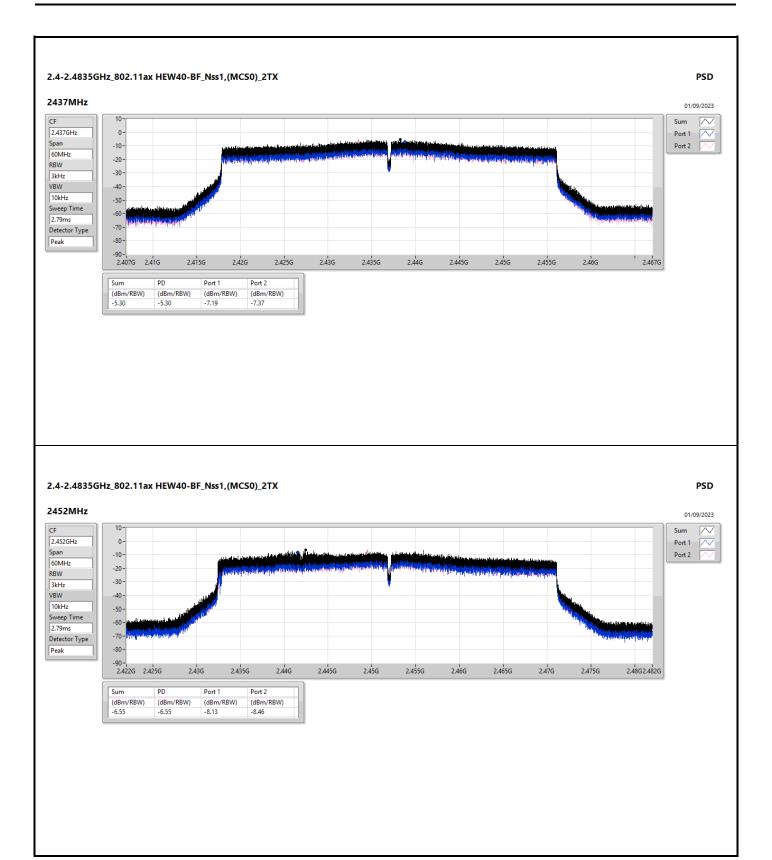
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CSE (NdB Down) Appendix E

### 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	2.43891G	17.42	-12.58	1.85323G	-50.26	2.39992G	-37.90	2.4G	-44.59	2.50678G	-47.12	21.62291G	-43.79	2
802.11g_Nss1,(6Mbps)_2TX	Pass	2.43824G	15.87	-14.13	2.30059G	-50.01	2.39992G	-28.92	2.4G	-27.41	2.5015G	-47.34	21.54143G	-42.62	1
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	Pass	2.43574G	14.56	-15.44	2.09089G	-49.48	2.39992G	-27.32	2.4G	-26.68	2.50606G	-46.94	21.82519G	-44.04	1
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	Pass	2.42639G	11.39	-18.61	107.86M	-49.61	2.4G	-35.48	2.4G	-33.19	2.5131G	-44.86	21.48027G	-43.06	1

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CSE (NdB Down) Appendix E

#### Result

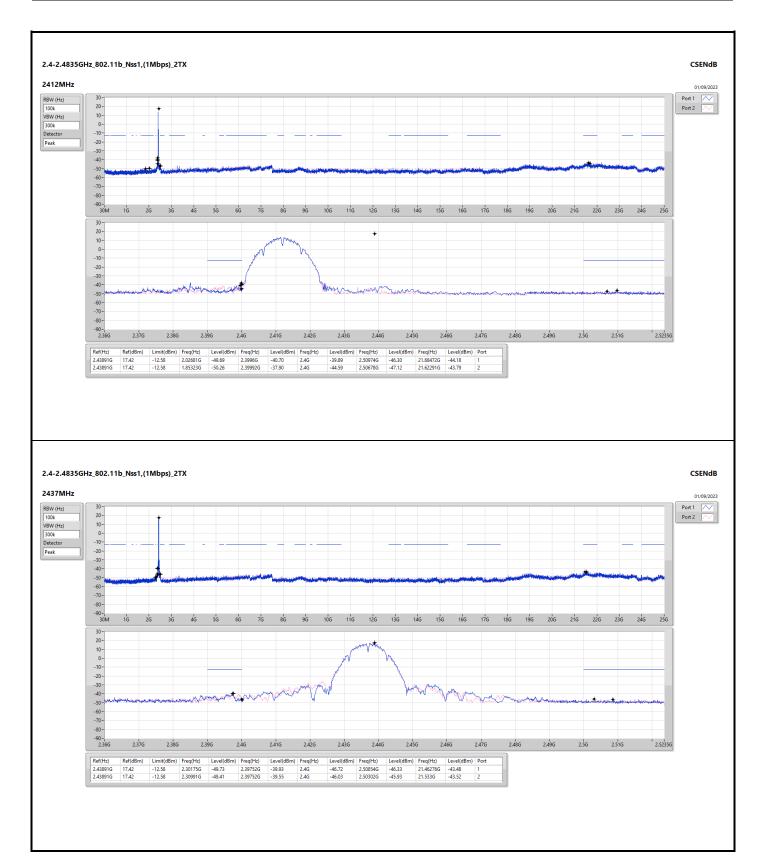
Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43891G	17.42	-12.58	2.02681G	-49.69	2.3996G	-40.70	2.4G	-39.89	2.50974G	-46.30	21.68472G	-44.18	1
2412MHz	Pass	2.43891G	17.42	-12.58	1.85323G	-50.26	2.39992G	-37.90	2.4G	-44.59	2.50678G	-47.12	21.62291G	-43.79	2
2417MHz															
2437MHz	Pass	2.43891G	17.42	-12.58	2.30175G	-49.73	2.39752G	-39.93	2.4G	-46.72	2.50854G	-46.33	21.46276G	-43.48	1
2437MHz	Pass	2.43891G	17.42	-12.58	2.30991G	-49.41	2.39752G	-39.55	2.4G	-46.03	2.50302G	-45.93	21.533G	-43.52	2
2457MHz															
2462MHz	Pass	2.43891G	17.42	-12.58	2.16661G	-49.56	2.39664G	-46.45	2.4G	-50.13	2.50006G	-43.15	21.47119G	-43.82	1
2462MHz	Pass	2.43891G	17.42	-12.58	2.30175G	-49.33	2.39304G	-46.06	2.4G	-48.29	2.5059G	-46.00	21.54986G	-43.64	2
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43824G	15.87	-14.13	2.30059G	-50.01	2.39992G	-28.92	2.4G	-27.41	2.5015G	-47.34	21.54143G	-42.62	1
2412MHz	Pass	2.43824G	15.87	-14.13	2.30991G	-48.39	2.4G	-27.92	2.4G	-27.53	2.50054G	-47.01	21.80272G	-43.15	2
2417MHz															
2437MHz	Pass	2.43824G	15.87	-14.13	2.03147G	-49.97	2.39888G	-39.63	2.4G	-42.12	2.50086G	-46.43	21.43747G	-43.41	1
2437MHz	Pass	2.43824G	15.87	-14.13	2.30874G	-49.92	2.39912G	-38.09	2.4G	-39.47	2.50046G	-46.37	21.61167G	-43.51	2
2457MHz															
2462MHz	Pass	2.43824G	15.87	-14.13	2.09555G	-49.21	2.3948G	-46.13	2.4G	-49.43	2.50126G	-44.57	21.99658G	-42.82	1
2462MHz	Pass	2.43824G	15.87	-14.13	48.64M	-49.87	2.39952G	-45.57	2.4G	-47.14	2.5123G	-46.10	21.60324G	-43.93	2
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43574G	14.56	-15.44	2.09089G	-49.48	2.39992G	-27.32	2.4G	-26.68	2.50606G	-46.94	21.82519G	-44.04	1
2412MHz	Pass	2.43574G	14.56	-15.44	2.13982G	-50.33	2.39992G	-28.35	2.4G	-28.78	2.50158G	-46.41	21.48243G	-43.06	2
2417MHz															
2437MHz	Pass	2.43574G	14.56	-15.44	2.30059G	-49.50	2.4G	-41.42	2.4G	-41.32	2.50302G	-28.60	21.48524G	-43.58	1
2437MHz	Pass	2.43574G	14.56	-15.44	2.30292G	-50.18	2.39568G	-42.05	2.4G	-44.68	2.5147G	-45.97	21.71G	-43.56	2
2457MHz															
2462MHz	Pass	2.43574G	14.56	-15.44	1.94177G	-49.62	2.39104G	-47.70	2.4G	-49.20	2.5227G	-46.79	21.52738G	-43.69	1
2462MHz	Pass	2.43574G	14.56	-15.44	1.91614G	-49.71	2.39944G	-46.14	2.4G	-48.72	2.50022G	-43.92	21.45714G	-43.30	2
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.42639G	11.39	-18.61	107.86M	-49.61	2.4G	-35.48	2.4G	-33.19	2.5131G	-44.86	21.48027G	-43.06	1
2422MHz	Pass	2.42639G	11.39	-18.61	2.30168G	-49.28	2.4G	-34.95	2.4G	-33.42	2.55022G	-49.17	21.53356G	-42.75	2
2437MHz	Pass	2.42639G	11.39	-18.61	2.30512G	-49.25	2.3984G	-41.94	2.4G	-42.80	2.50158G	-37.29	21.57843G	-43.33	1
2437MHz	Pass	2.42639G	11.39	-18.61	44.89M	-48.95	2.3984G	-43.32	2.4G	-44.31	2.5035G	-48.21	21.51393G	-43.50	2
2452MHz	Pass	2.42639G	11.39	-18.61	2.11161G	-49.20	2.39648G	-37.67	2.4G	-48.18	2.51566G	-47.45	21.63172G	-42.52	1
2452MHz	Pass	2.42639G	11.39	-18.61	2.30626G	-49.11	2.39008G	-42.63	2.4G	-48.29	2.5187G	-47.48	21.50271G	-43.29	2

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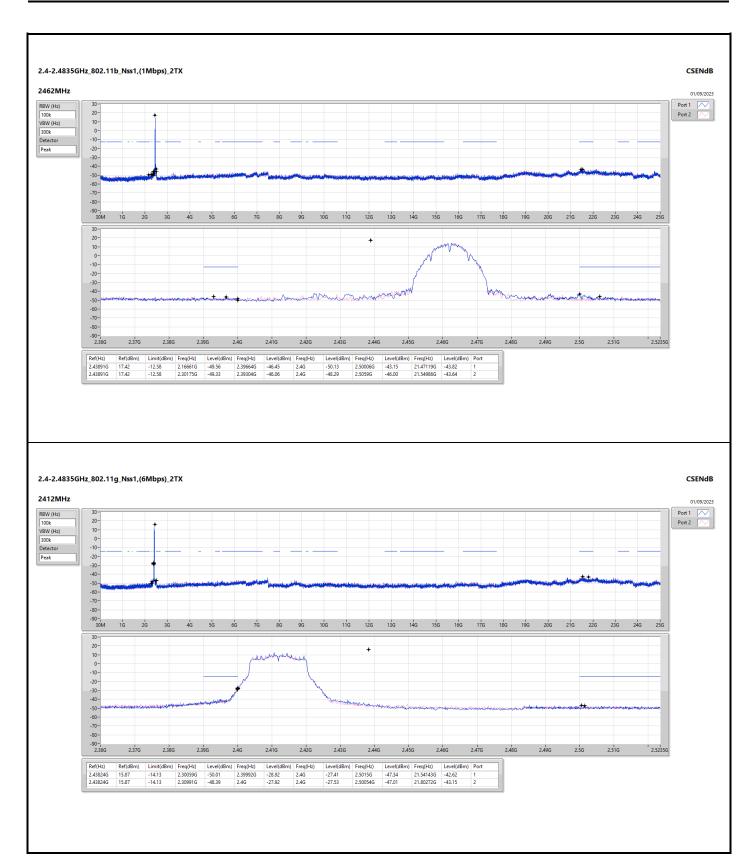
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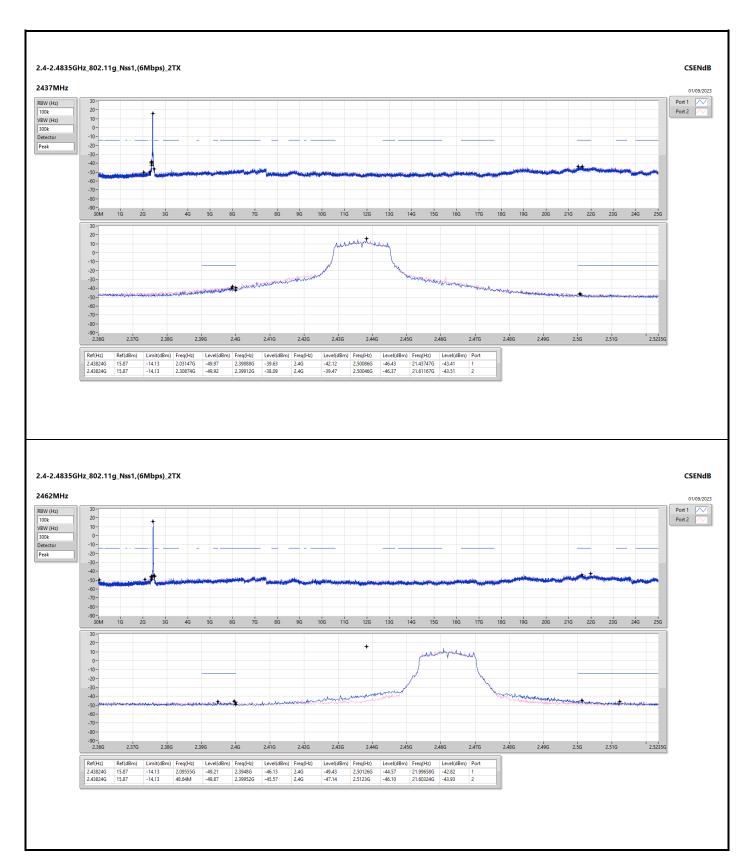
Report No. : FR381815AA



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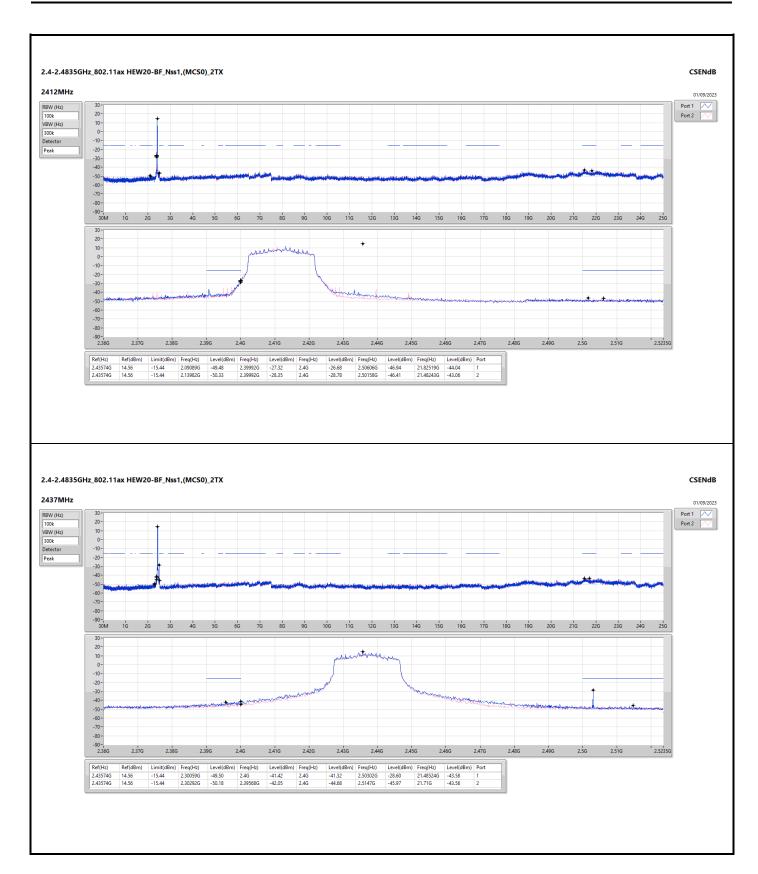
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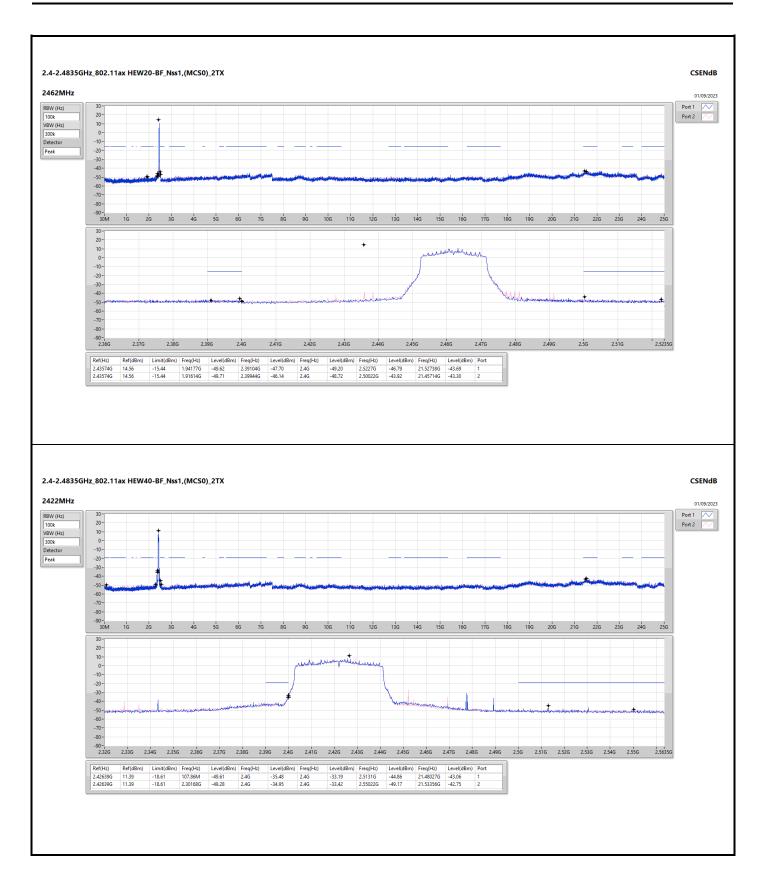
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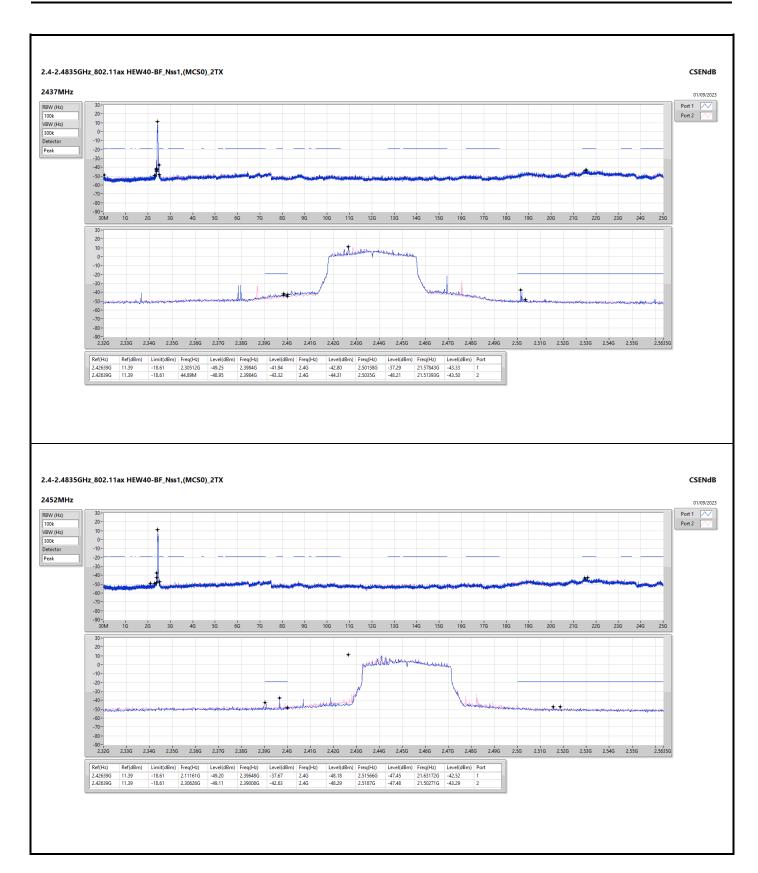
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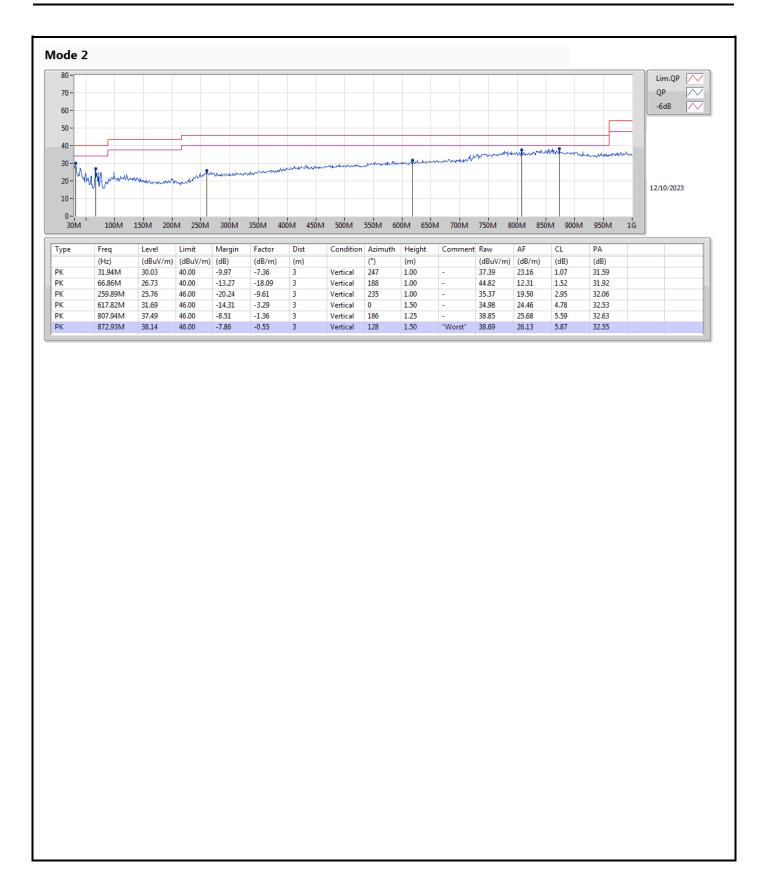
# Radiated Emissions below 1GHz

Appendix F.1

Summary

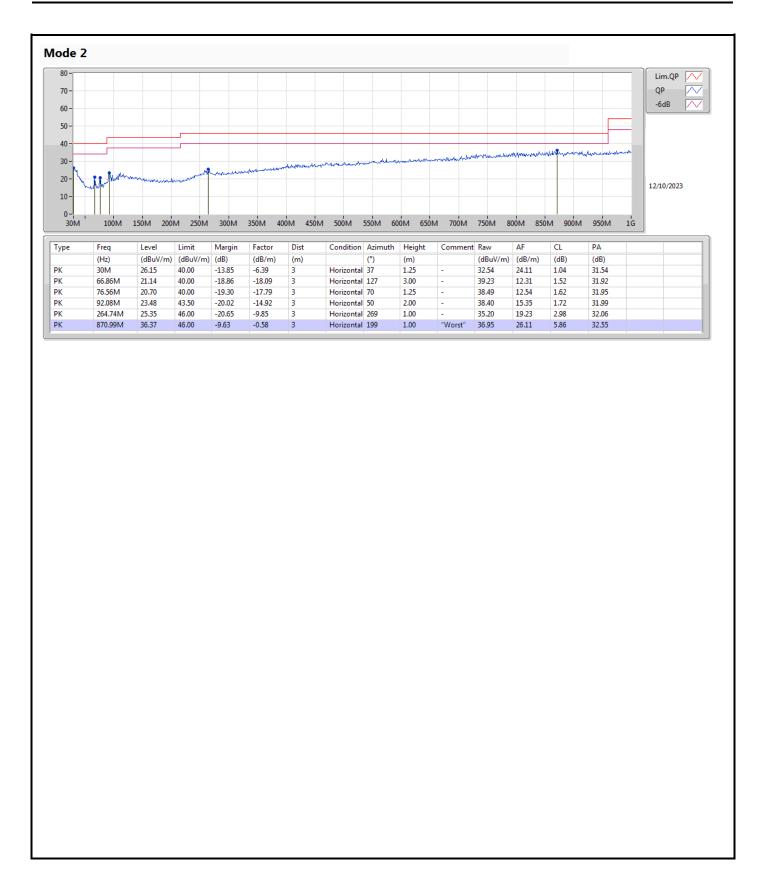
Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 2	Pass	PK	872.93M	38.14	46.00	-7.86	Vertical

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# RSE TX above 1GHz

Appendix F.2

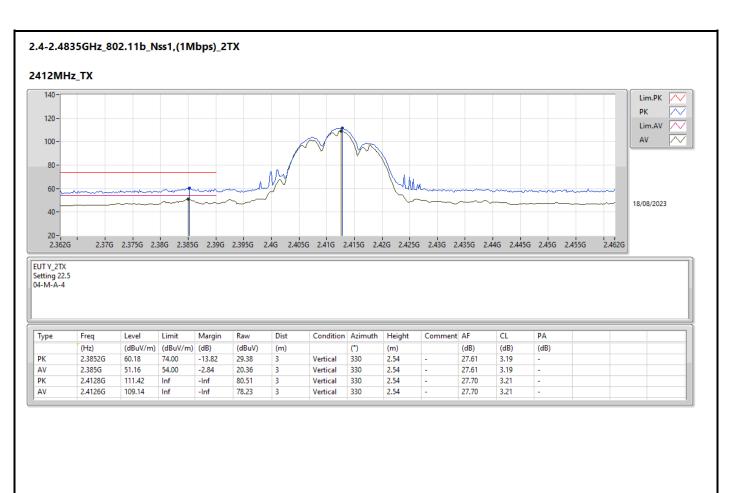
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	Pass	AV	2.3898G	52.92	54.00	-1.08	3	Horizontal	299	1.80	-

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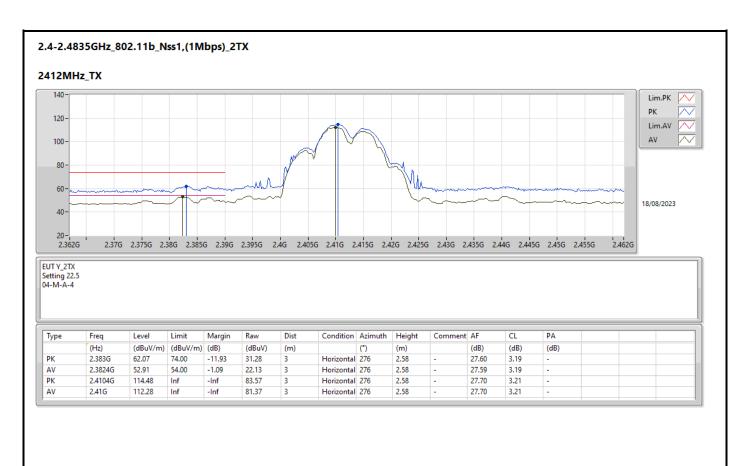
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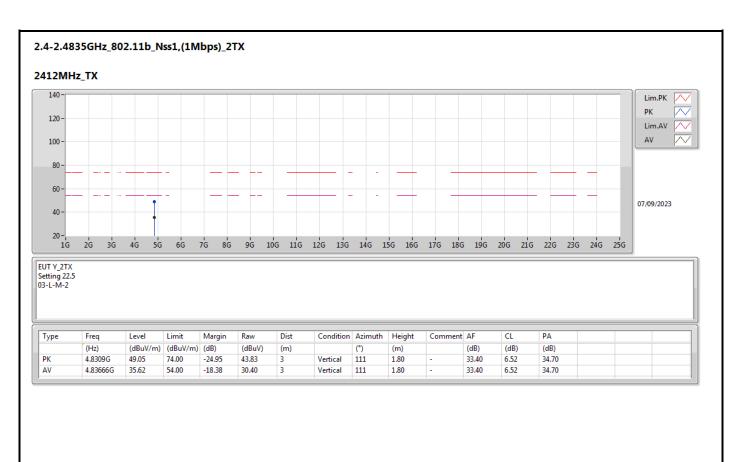




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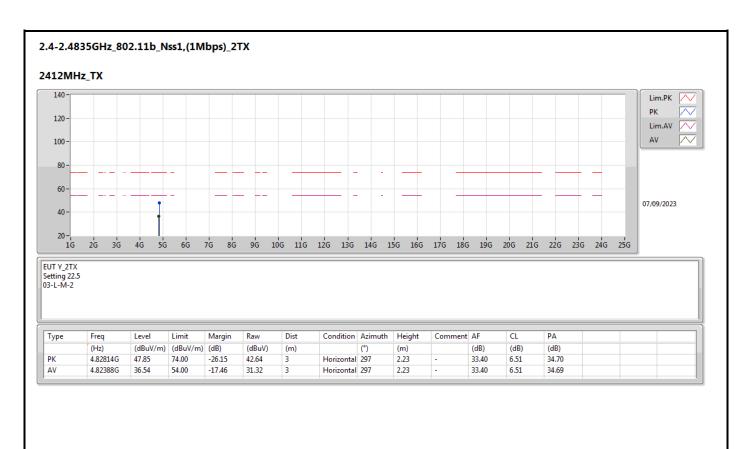




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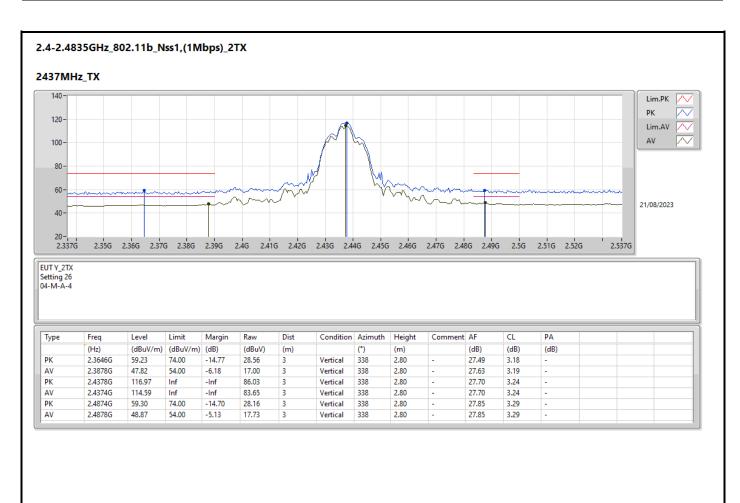




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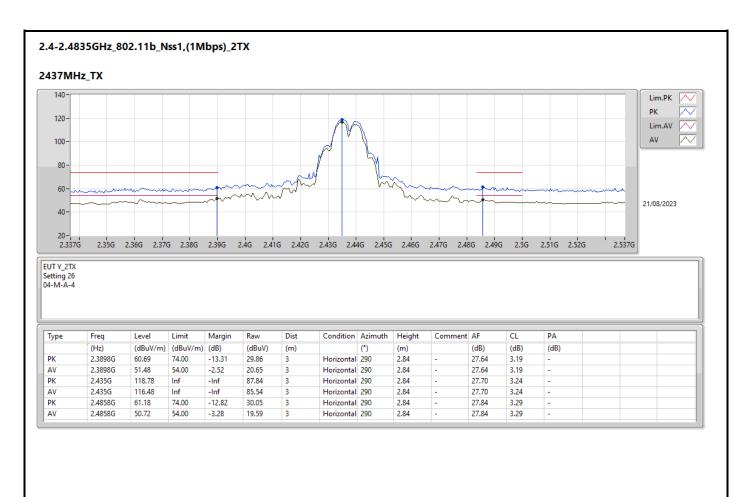




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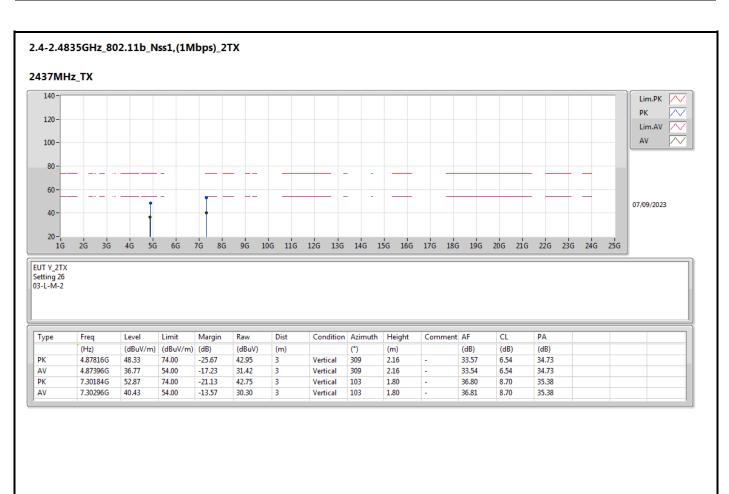




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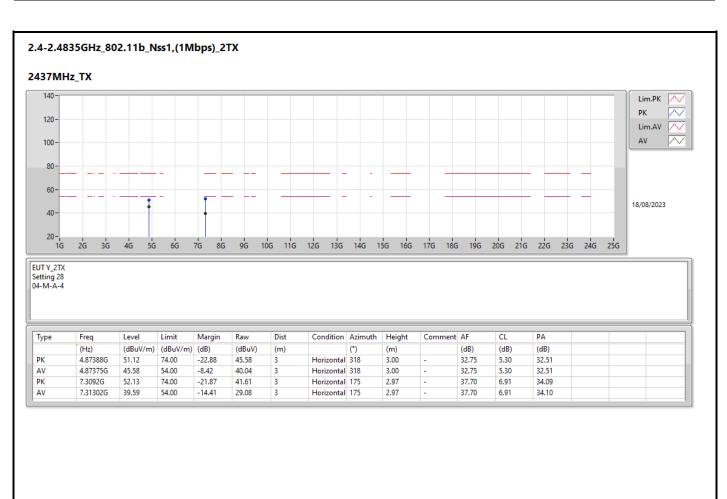




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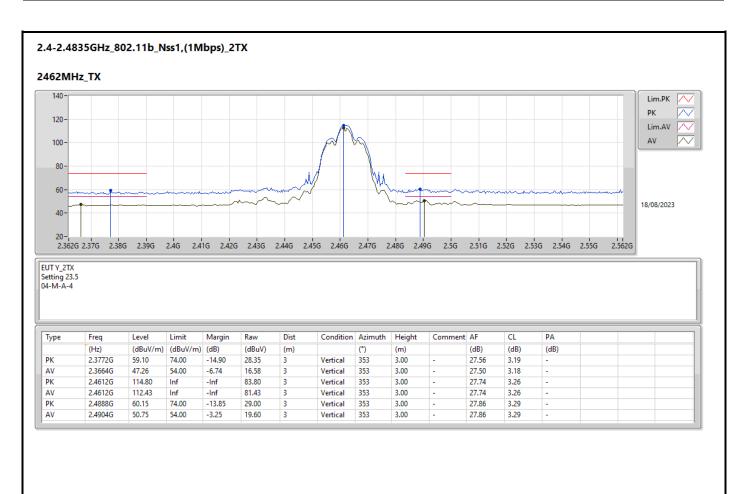
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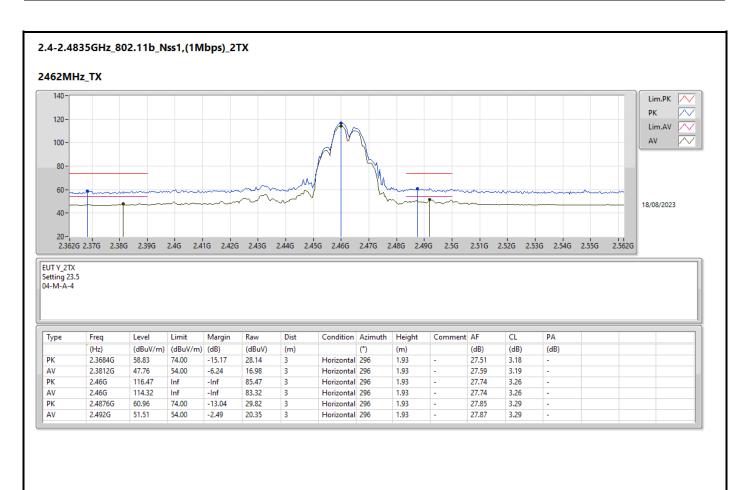




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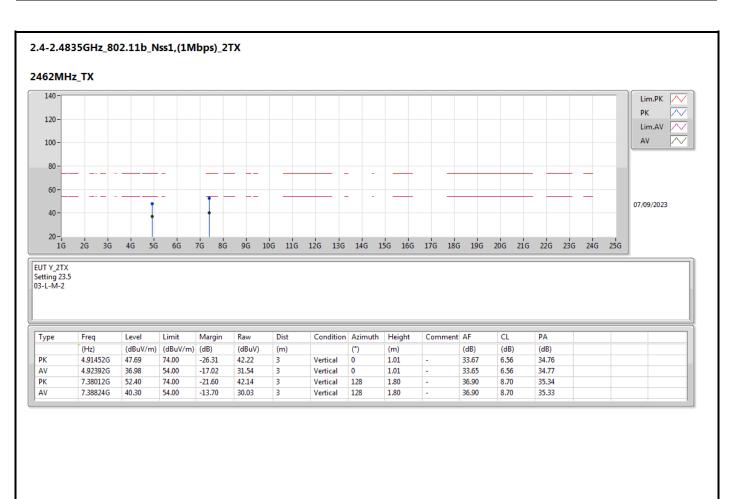




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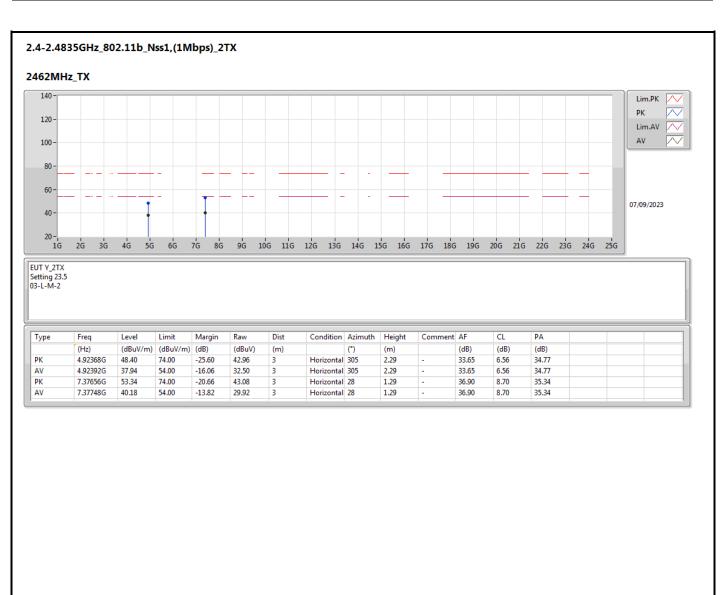




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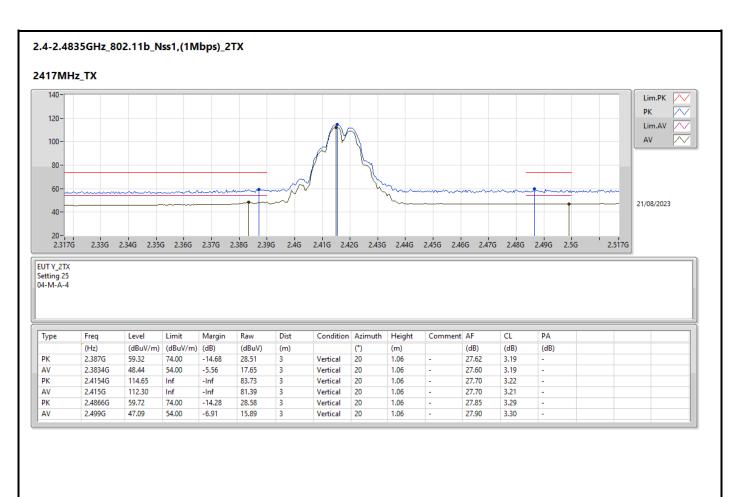




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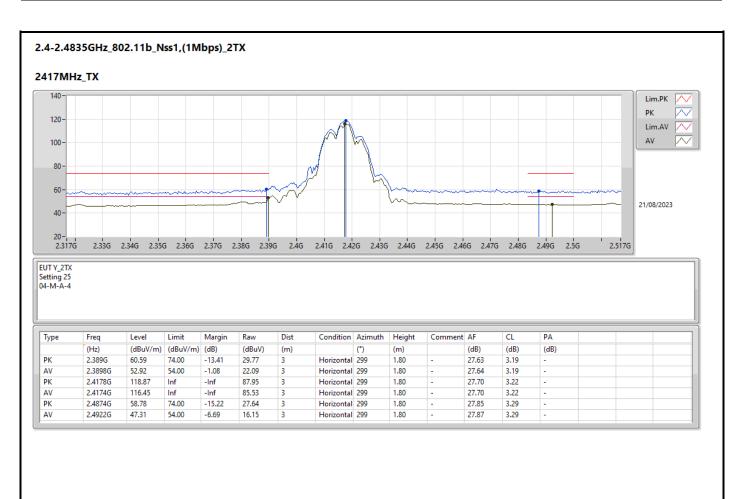




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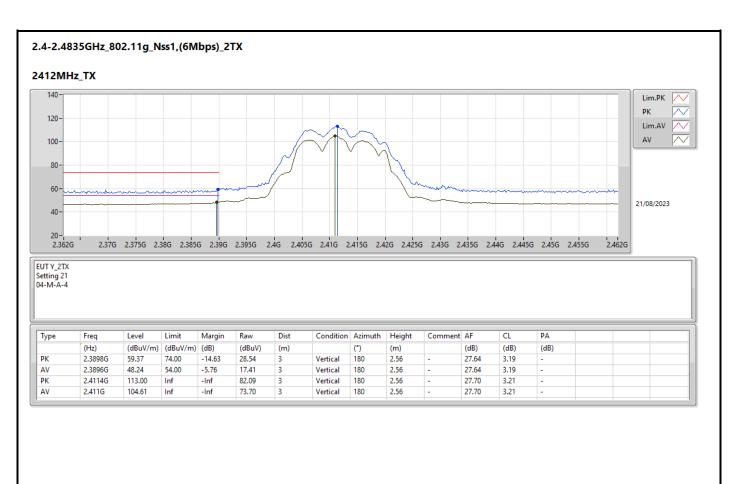




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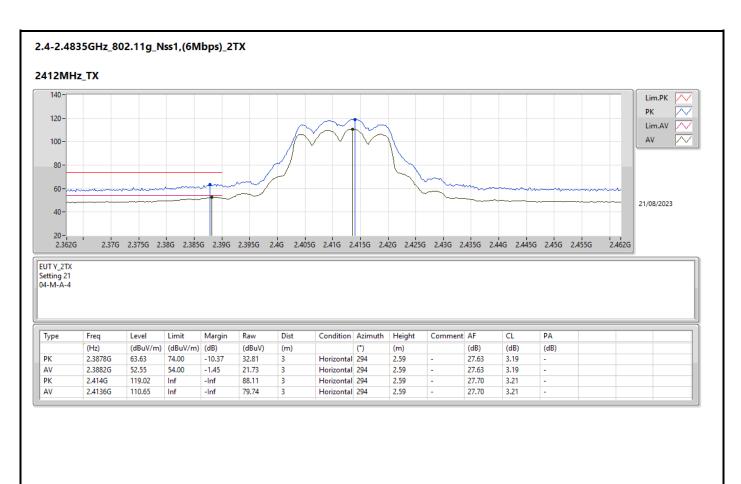




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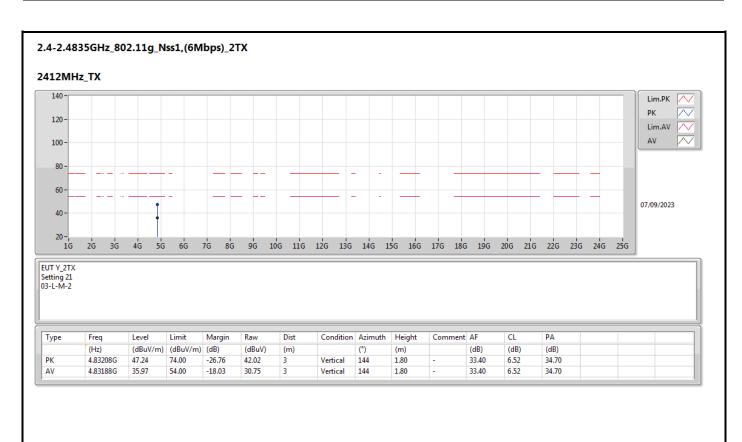




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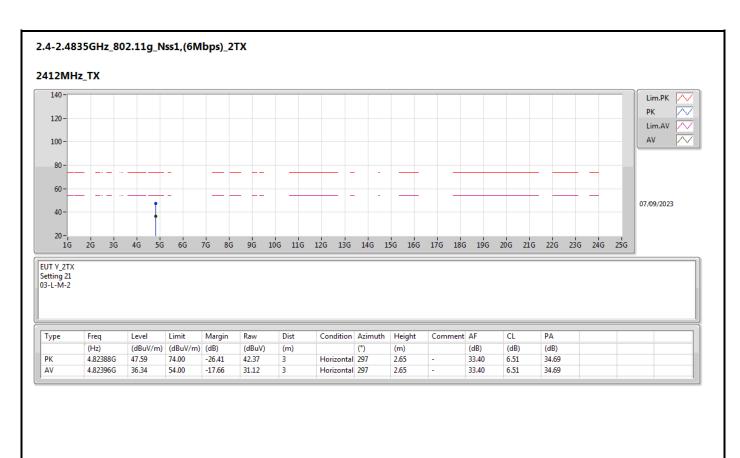




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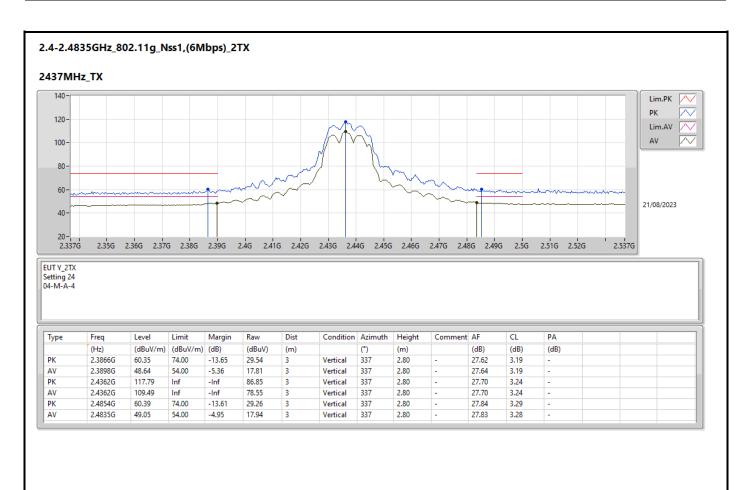




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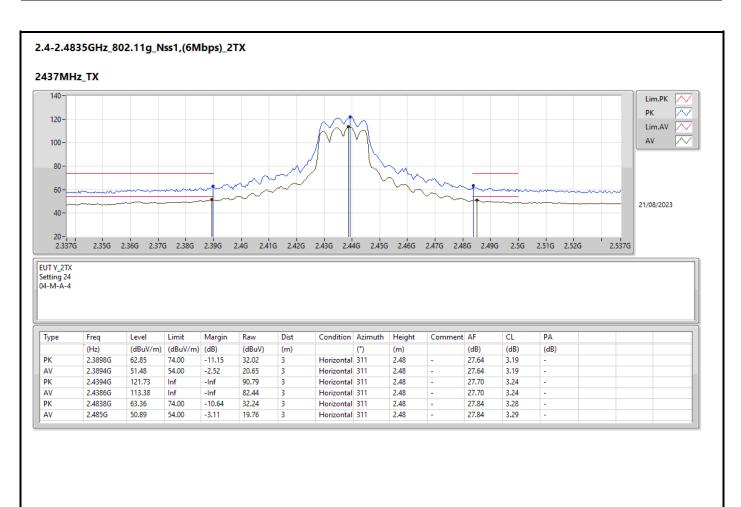




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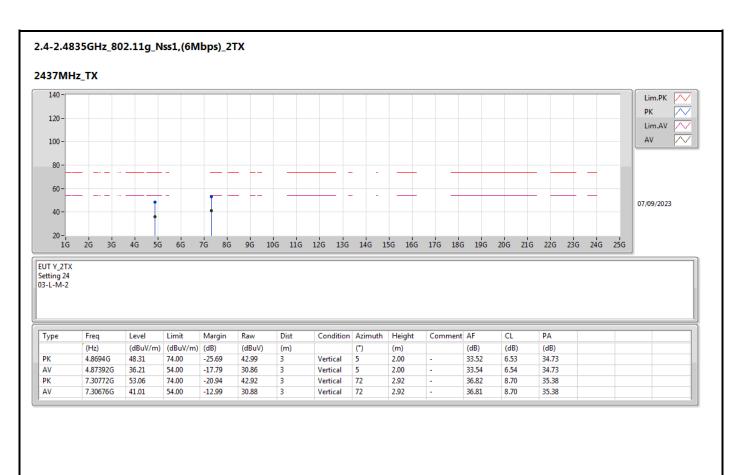




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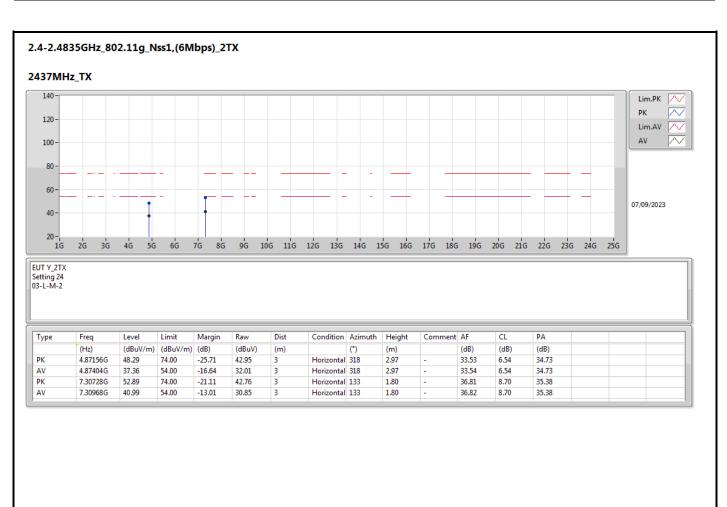




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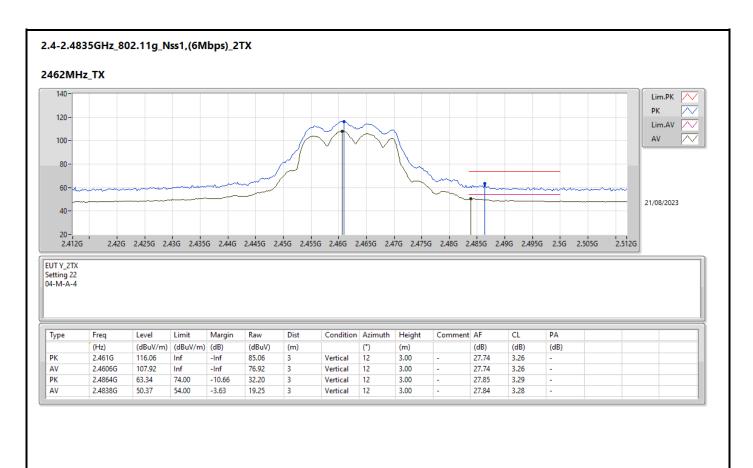




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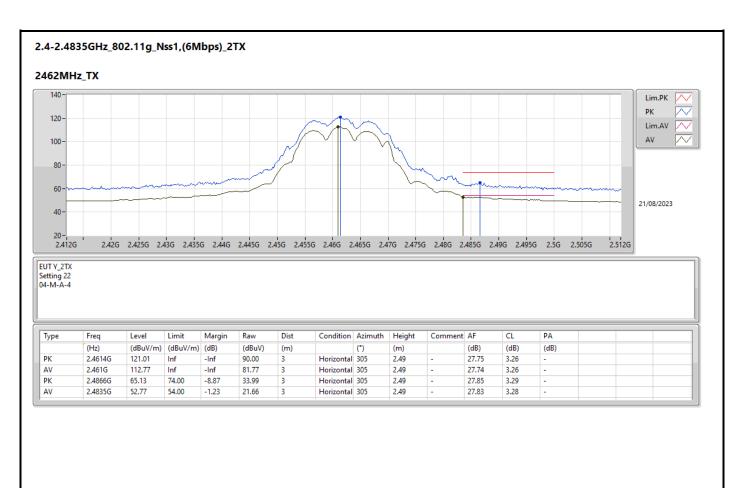




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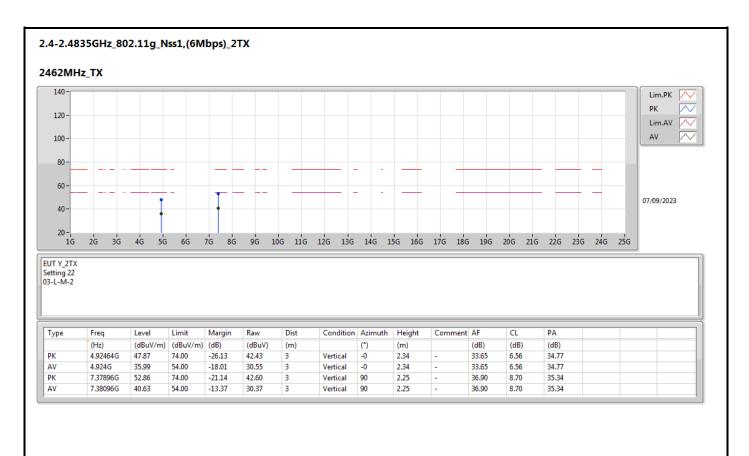




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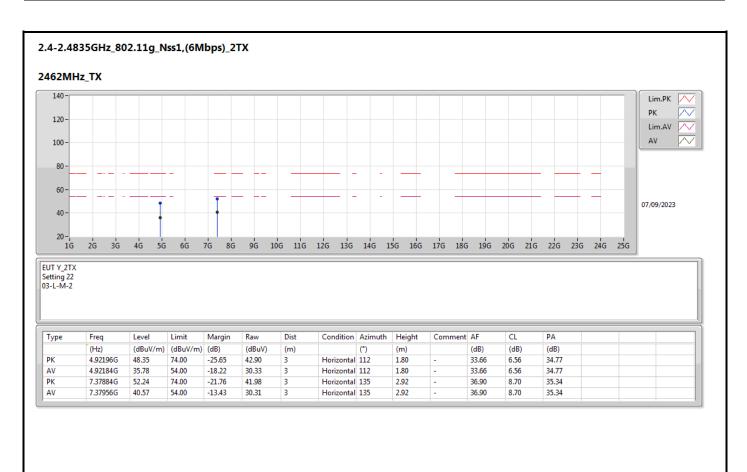




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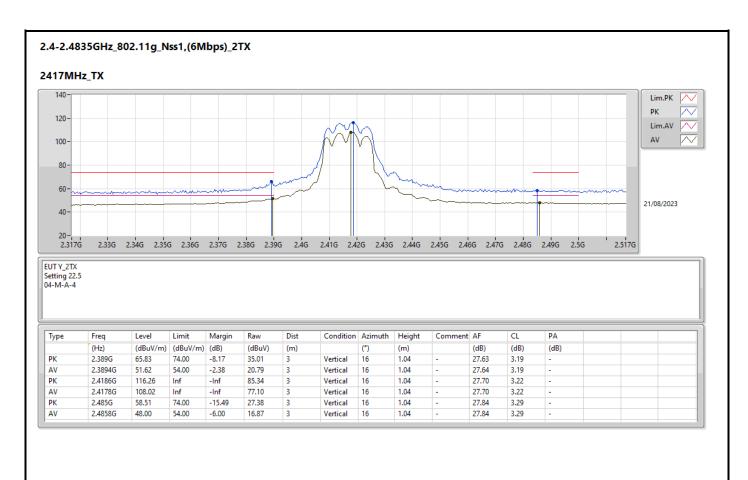




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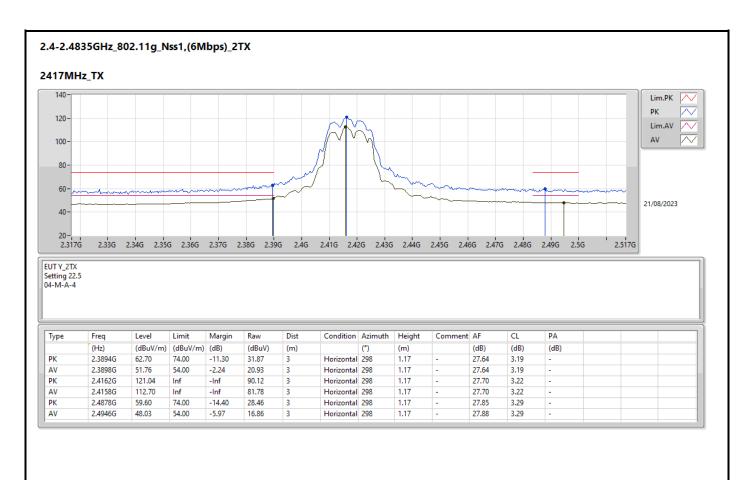




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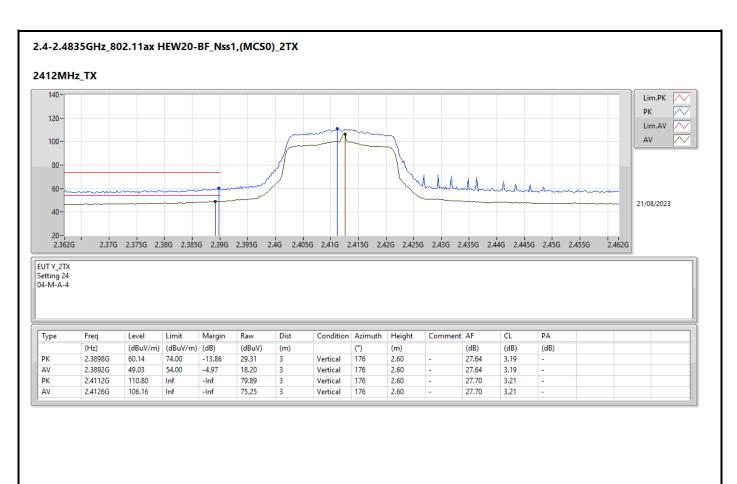




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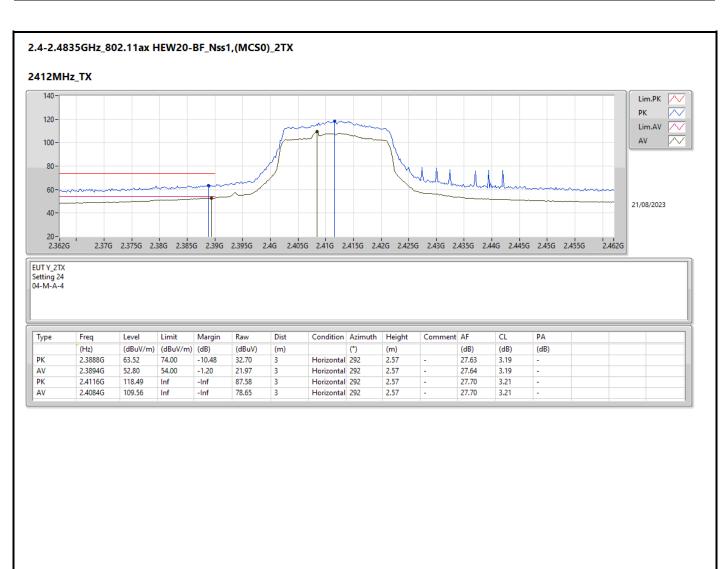




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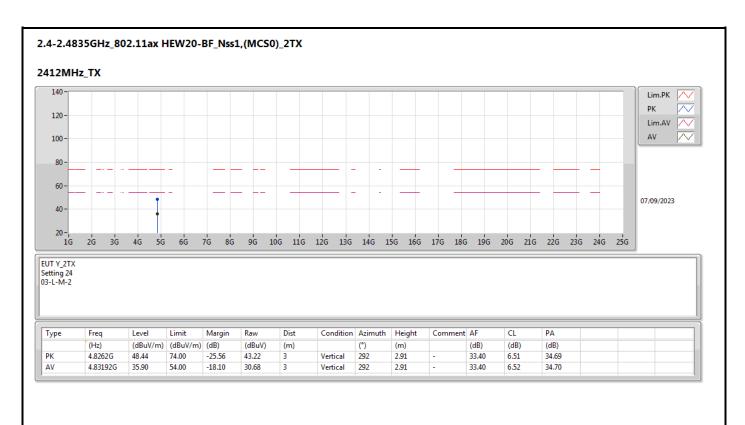




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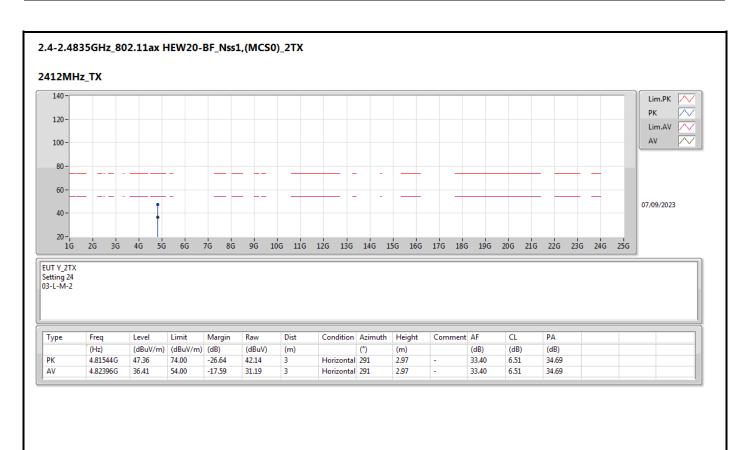




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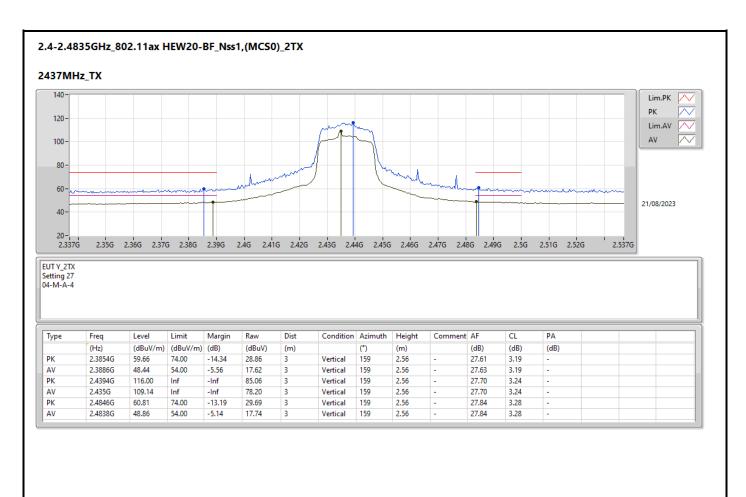




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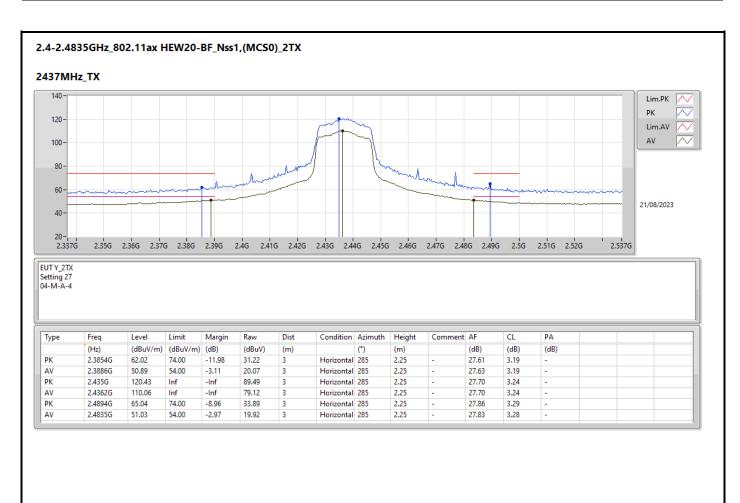




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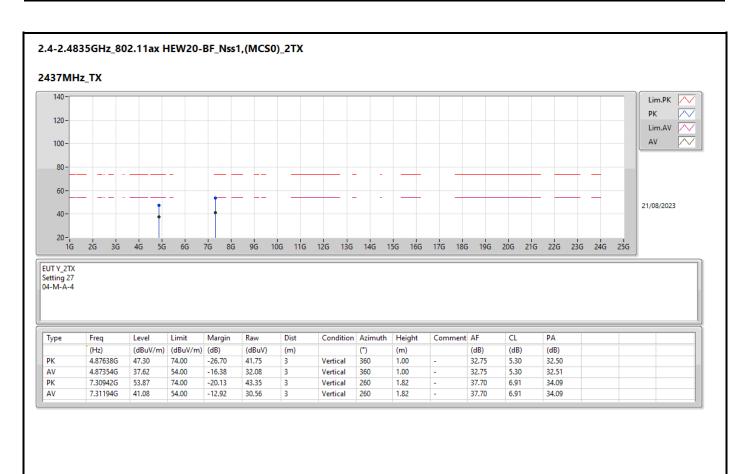




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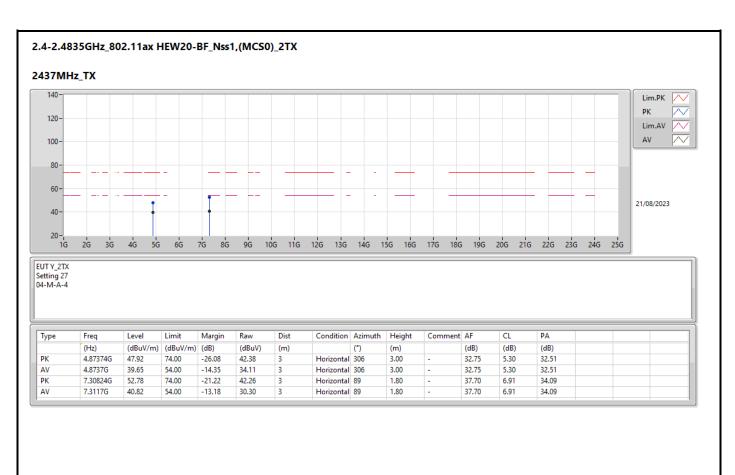




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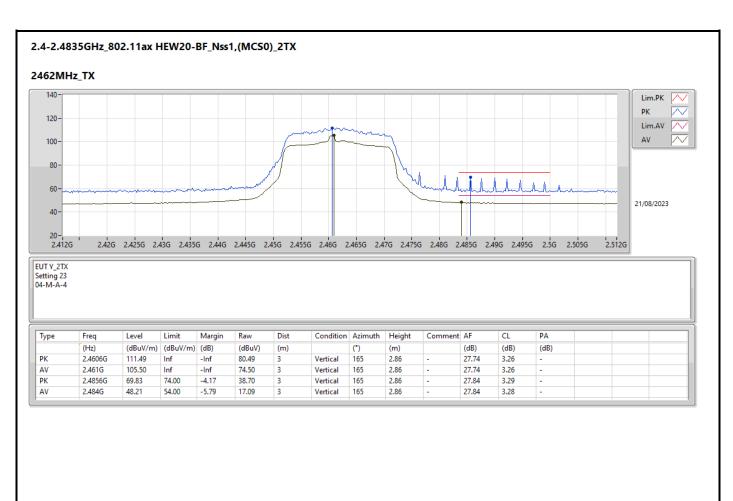




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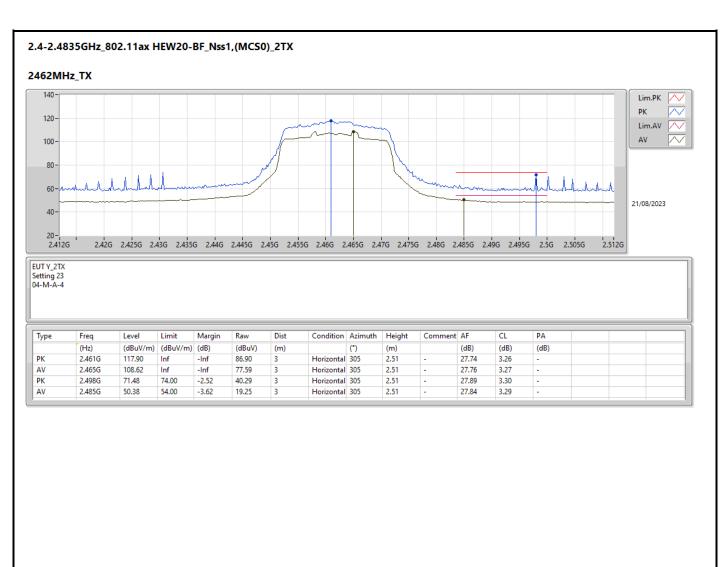




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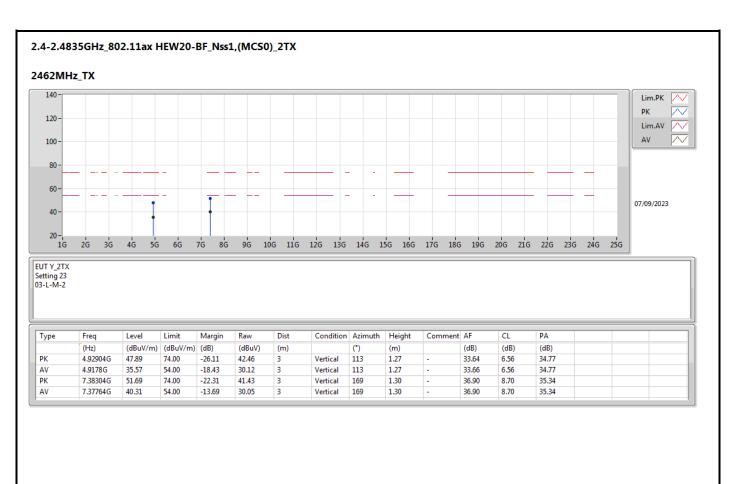




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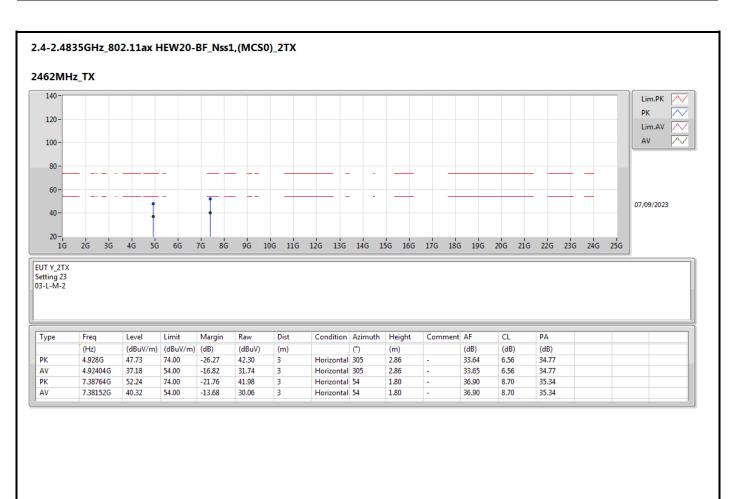




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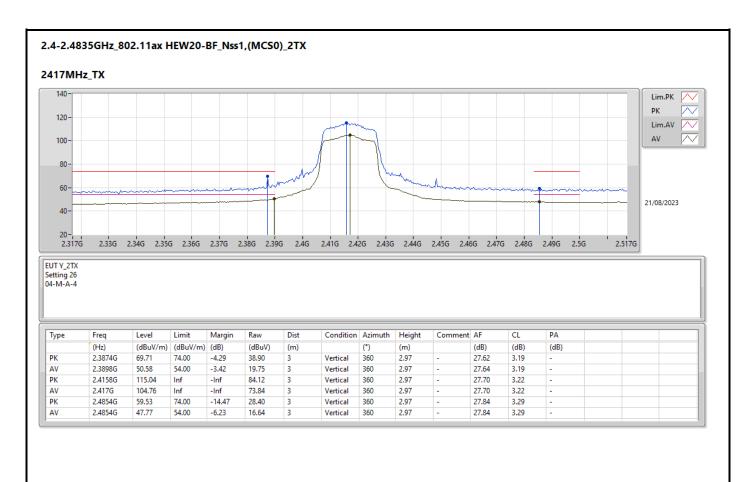




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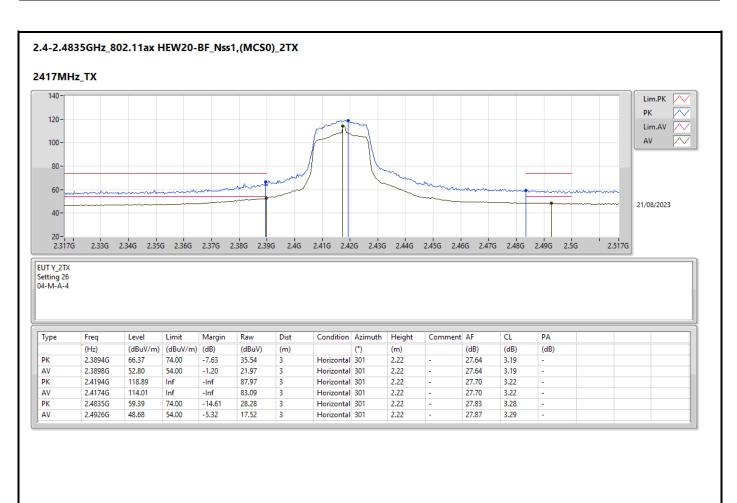




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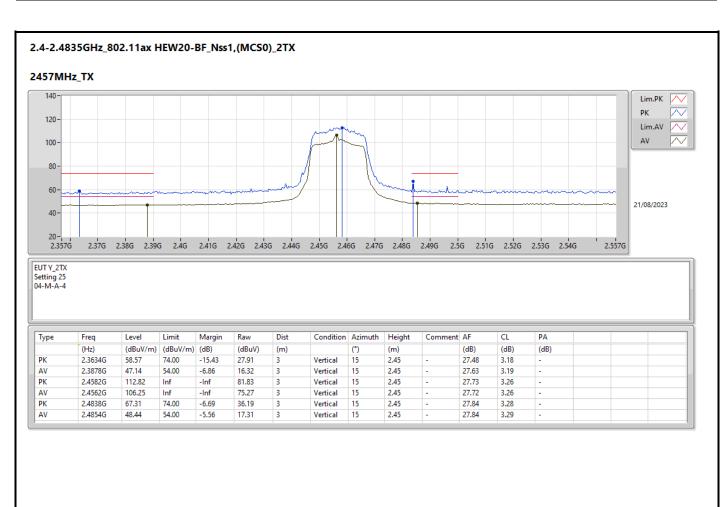




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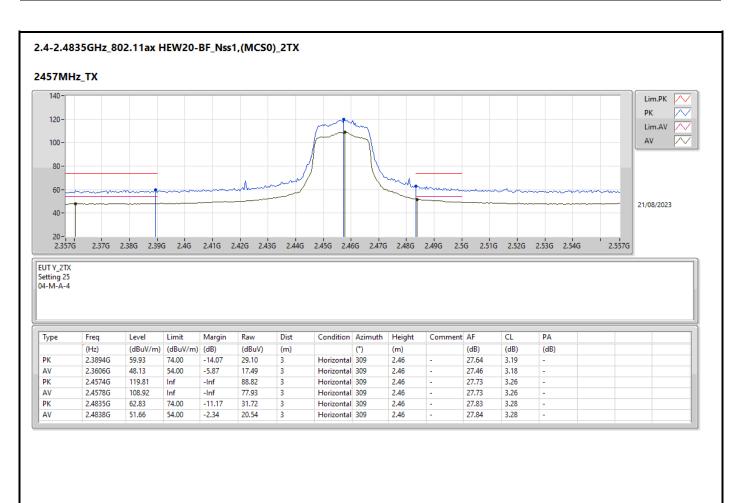




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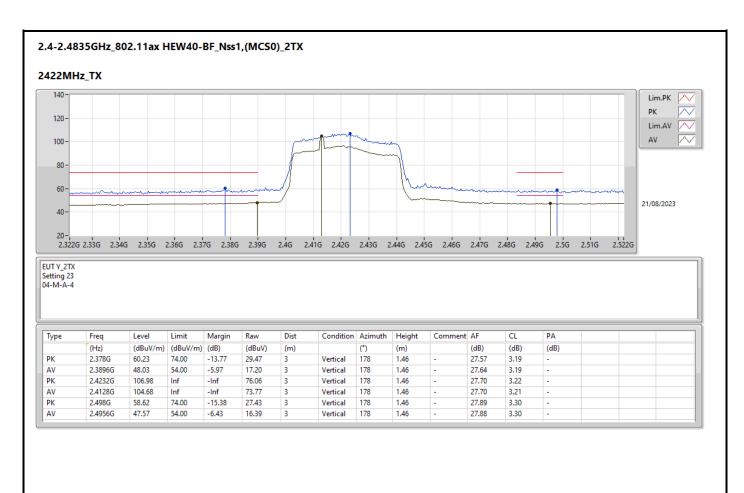




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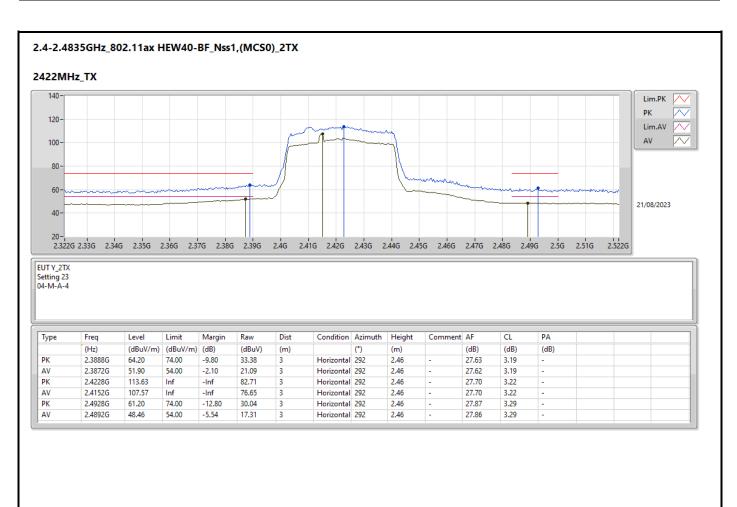




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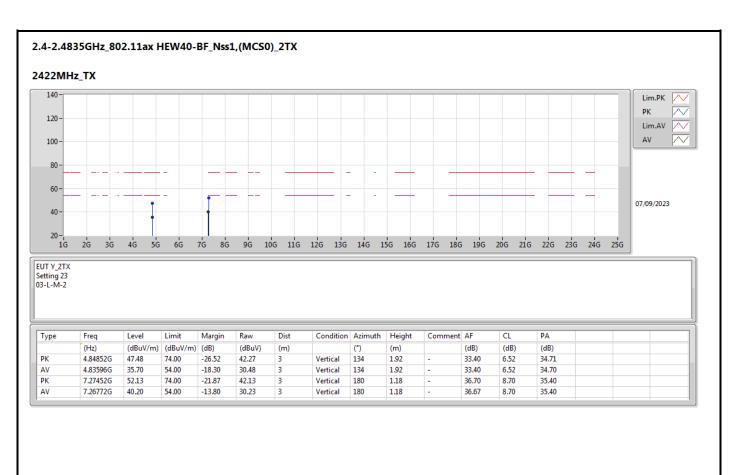




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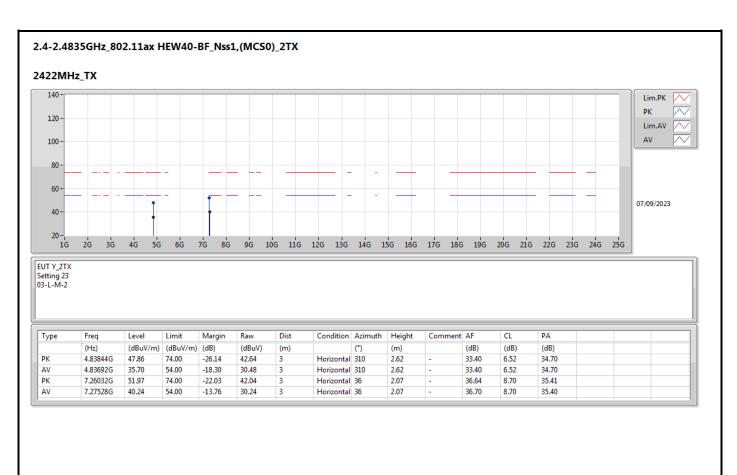




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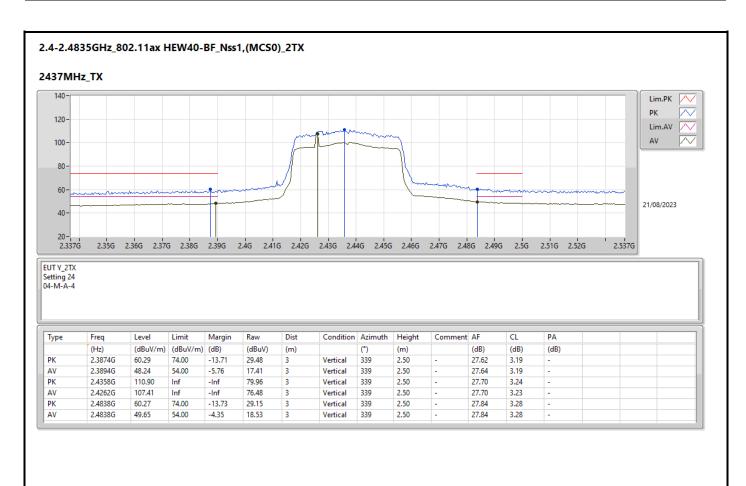




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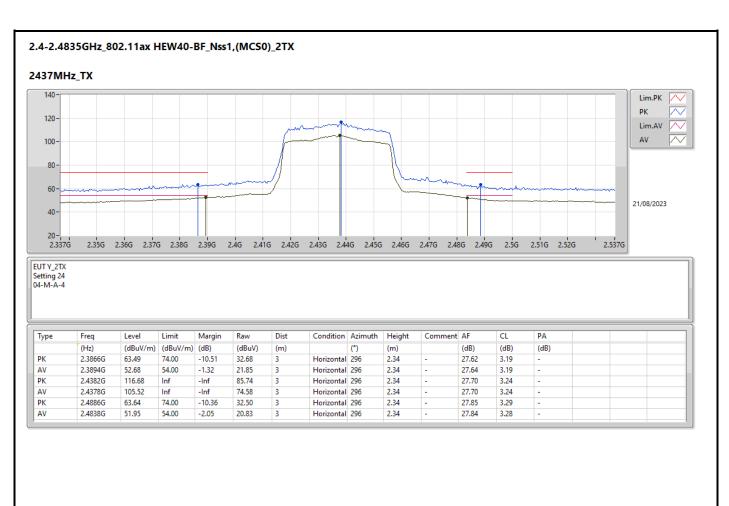




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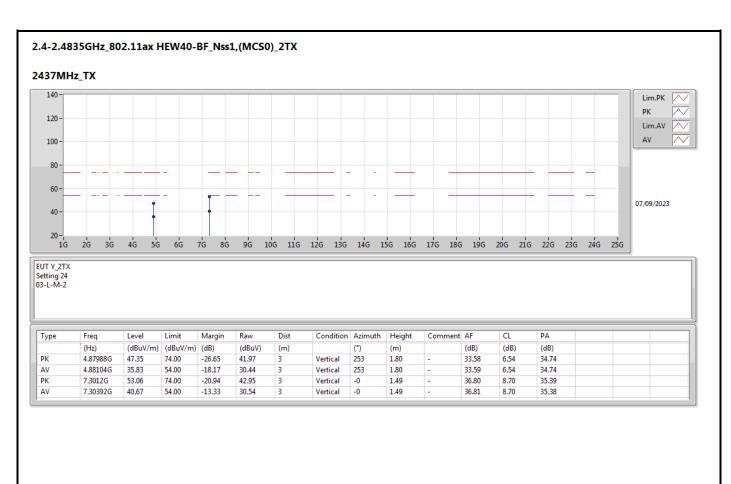




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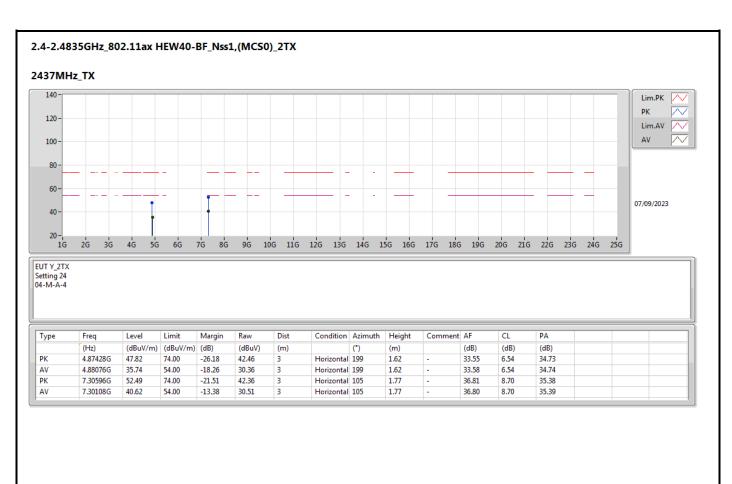




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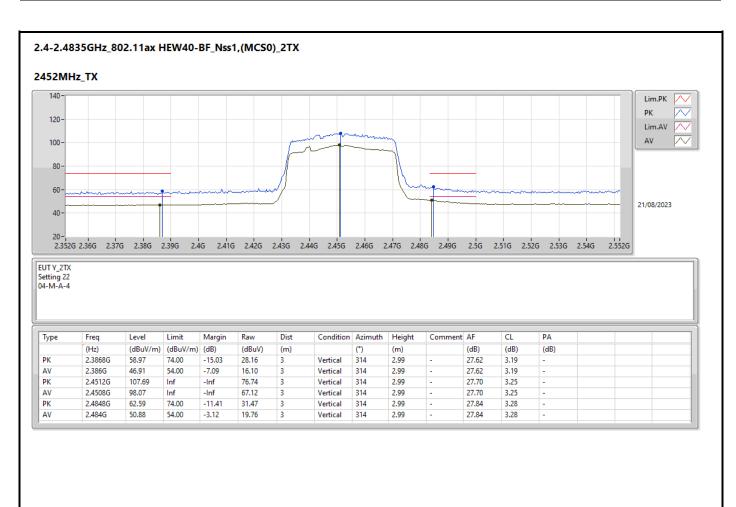




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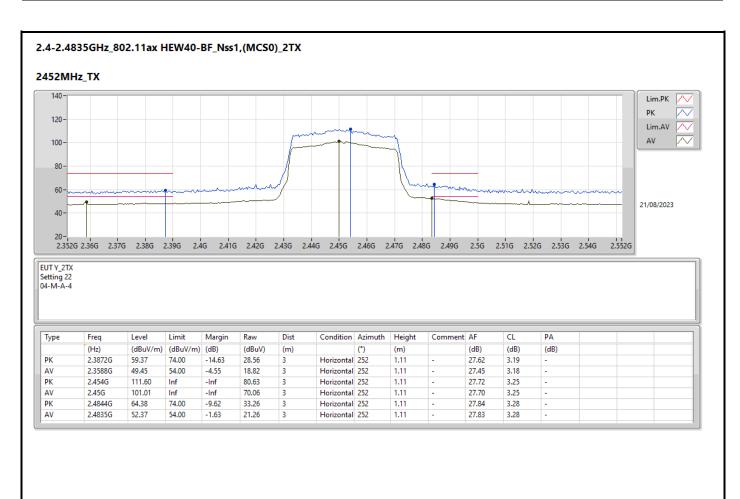




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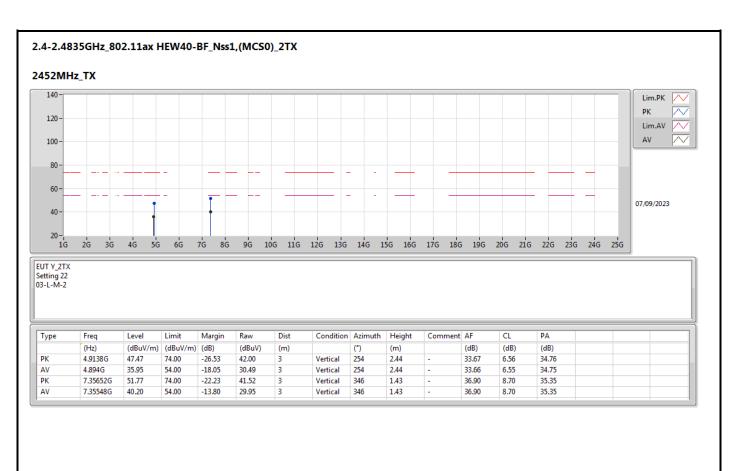




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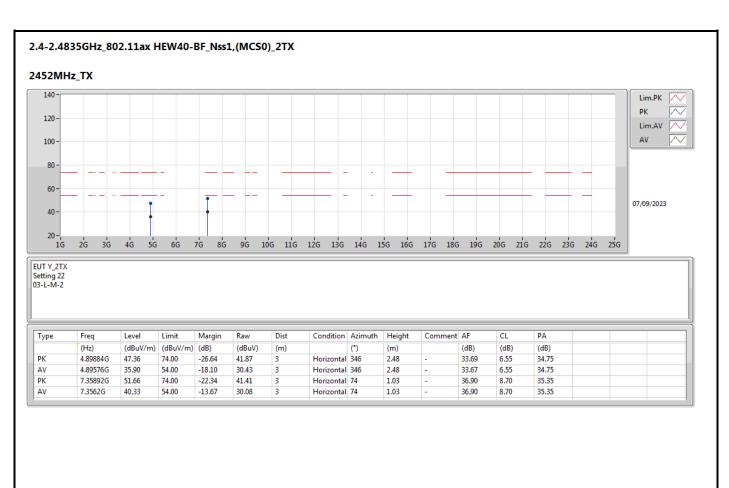




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## Radiated Emission Co-location

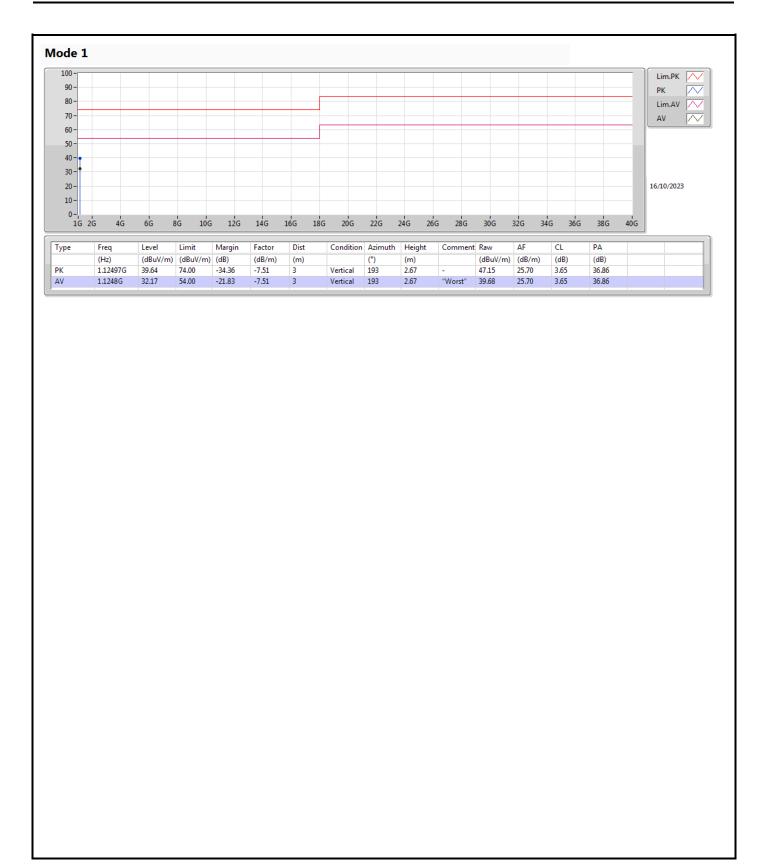
Appendix G

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	1.12477G	33.36	54.00	-20.64	Horizontal

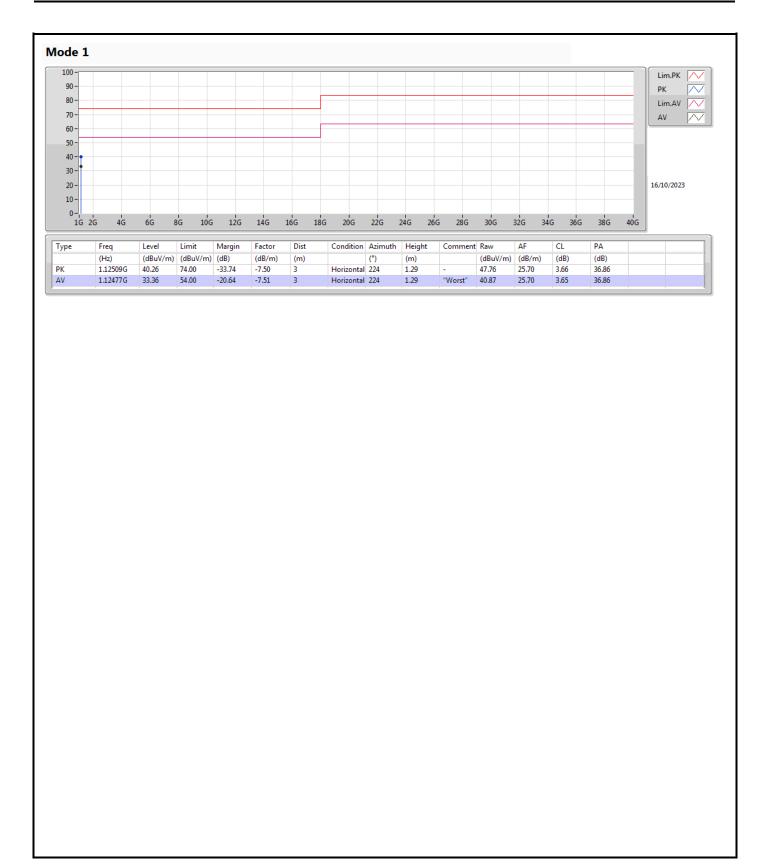
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