



# RADIO TEST REPORT

FCC ID : 2AHKM-CODA5814Q1

: DOCIS 3.1 Wi-Fi 6 EMTA Gateway Equipment

**Brand Name** : Hitron

: CODA5814Q, CODA5810Q Model Name

**Applicant** : Hitron Technologies Inc.

No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,

Hsinchu 30078, Taiwan

Manufacturer : Hitron Technologies Inc.

No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,

Hsinchu 30078, Taiwan

Standard : 47 CFR FCC Part 15.247

The product was received on Jun. 28, 2022, and testing was started from Oct. 18, 2022 and completed on Nov. 04, 2022. We. Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

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

TEL: 886-3-656-9065

FAX: 886-3-656-9085

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

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Issued Date

: Nov. 18, 2022

Report Version

: 01

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# History of this test report

Report No.: FR193028-02AA

Report No.	Version	Description	Issued Date
FR193028-02AA	01	Initial issue of report	Nov. 18, 2022

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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	-

#### **Declaration of Conformity:**

- The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
- 2. The measurement uncertainty please refer to report "Measurement Uncertainty".

#### **Comments and Explanations:**

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

Reviewed by: Sam Chen Report Producer: Penny Kao

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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	2.4-2.4835GHz 802.11b		4TX
2.4-2.4835GHz	802.11g	20	4TX
2.4-2.4835GHz	802.11n HT20	20	4TX
2.4-2.4835GHz	802.11n HT20-BF	20	4TX
2.4-2.4835GHz	VHT20	20	4TX
2.4-2.4835GHz	VHT20-BF	20	4TX
2.4-2.4835GHz	802.11ax HEW20	20	4TX
2.4-2.4835GHz	802.11ax HEW20-BF	20	4TX
2.4-2.4835GHz	802.11n HT40	40	4TX
2.4-2.4835GHz	802.11n HT40-BF	40	4TX
2.4-2.4835GHz	VHT40	40	4TX
2.4-2.4835GHz	VHT40-BF	40	4TX
2.4-2.4835GHz	802.11ax HEW40	40	4TX
2.4-2.4835GHz	802.11ax HEW40-BF	40	4TX

#### 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)
1	1	Airgain	N03HTAFE-PK1-LA1X80BUR2	PCB Antenna	I-PEX	
2	2	Airgain	N03HTAFF-PK1-LB1X90BU	PCB Antenna	I-PEX	Note 1
3	3	Airgain	N03HTAFG-PK1-LG1X130BUR2	PCB Antenna	I-PEX	Note 1
4	4	Airgain	N03HTAFH-PK1-LW1X150BU	PCB Antenna	I-PEX	

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#### Note 1:

note 1							
A 4	Dowt			Antenna (	Gain (dBi)		
Ant.	Port	2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 4
1	1	3.13	2.72	2.24	2.67	2.28	2.95
2	2	1.42	2.14	2.8	3.46	3.95	4.03
3	3	3.4	2.82	2.58	1.87	3.38	3.3
4	4	3.26	2.82	3.83	3.78	4.93	5.47
			Dire	ectional Gain (	dBi)		
		2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 4
41	1S	5.92	5.44	6.34	6.46	6.27	6.54
41	2S	3.4	2.82	3.83	3.78	4.93	5.47
41	4S	3.4	2.82	3.83	3.78	4.93	5.47

Note 2: The above information (brand / model name / antenna type) was declared by the manufacturer.

Note 3: WLAN 2.4GHz/5GHz(UNII 1~4): The directional gain is measured which follows the procedure of KDB 662911 D03.

Note 4: The EUT has four antennas.

#### For 2.4GHz function:

#### For IEEE 802.11 b/g/n/VHT/ax mode (4TX/4RX)

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

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

#### For 5GHz function:

#### For IEEE 802.11a/n/ac/ax mode (4TX/4RX)

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

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

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## 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.615	2.11	692.5u	3k
802.11g	0.942	0.26	1.978m	1k
802.11ax HEW20	0.82	0.86	5.446m	300
802.11ax HEW40	0.833	0.79	5.447m	300

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

## 1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter				
	$\boxtimes$	With beamforming		Without beamforming	
Beamforming Function	The product has beamforming function for 11n/VHT/ax in 2.4GHz and 11n/ac/ax in 5GHz.				
Function	$\boxtimes$	Point-to-multipoint		Point-to-point	
Support RU		Full RU		Partial RU	
Test Software Version	Non-beamforming mode: QSPR Version 5.0-00197 Beamforming mode: Dos[10.0.10586]				

Note: The above information was declared by manufacturer.

## 1.1.5 Table for Multiple Listing

Model Name	Voice Interface	Case color of EUT	Battery Port
CODA5814Q	V	Black	V
CODA5810Q	X	Black	X

Note1: From the above models, model: CODA5814Q was selected as representative model for the test and its data was recorded in this report.

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 D03 v01
- 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	22.5~23.8 / 55~61	Oct. 29, 2022~ Nov. 04, 2022
Radiated Below 1GHz	03CH06-CB	Stim Sung	23.8-24.9 / 55-58	Oct. 18, 2022
Radiated Above 1GHz	03CH02-CB	Gordon Hung	22.6~24.2 / 56~60	Oct. 18, 2022~ Nov. 03, 2022
Radiated Co-location	03CH06-CB	Gordon Hung	24.3~25.6 / 60~63	Oct. 18, 2022~ Nov. 03, 2022
AC Conduction	CO01-CB	Tim Chen	21~22 / 56~58	Oct. 19, 2022

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

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

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# 2 Test Configuration of EUT

## 2.1 Test Channel Mode

Mode	Power Setting
802.11b_Nss1,(1Mbps)_4TX	-
2412MHz	17
2417MHz	17
2437MHz	23
2457MHz	17.5
2462MHz	17.5
802.11g_Nss1,(6Mbps)_4TX	-
2412MHz	23
2437MHz	23.5
2462MHz	24.5
802.11ax HEW20_Nss1,(MCS0)_4TX	-
2412MHz	22.5
2437MHz	23.5
2462MHz	23.5
802.11ax HEW40_Nss1,(MCS0)_4TX	-
2422MHz	22.5
2437MHz	23
2452MHz	22.5
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-
2412MHz	22.5
2437MHz	23.5
2462MHz	23.5
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-
2422MHz	22.5
2437MHz	23
2452MHz	22.5

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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 modes, after evaluating, the non-beamforming mode has been evaluated to be the worst case, so it was selected to test. The beamforming mode evaluates the output power only.

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# 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz		
Operating Mode Normal Link		
1	EUT + Adapter	

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

Th	The Worst Case Mode for Following Conformance Tests		
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition  Radiated measurement  If EUT consist of multiple antenna assembly (multiple antenna are u regardless of spatial multiplexing MIMO configuration), the radiated be performed with highest antenna gain of each antenna type.			
	Normal Link		
Operating Mode < 1GHz	After evaluating, the worst case was found at Y axis, thus the measurement will follow this same test configuration.		
1	EUT in Y axis + Adapter		
	СТХ		
Operating Mode > 1GHz	After evaluating, the worst case was found at Y axis, thus the measurement will follow this same test configuration.		
1	EUT in Y axis		

The Worst Case Mode for Following Conformance Tests		
Tests Item	Simultaneous Transmission Analysis - Radiated Emission Co-location	
Test Condition Radiated measurement		
	Normal Link	
Operating Mode	After evaluating, the worst case was found at Y axis, thus 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.		

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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.: FA193028-02 for Co-location RF Exposure Evaluation.			

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# 2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link Mode:

During the test, the EUT operation to normal function.

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# 2.4 Accessories

Accessories			
Equipment Brand Model Name Name		Rating	
Adapter	MOSO	MS-V4000R120-050A0-US	Input: 100-240V~, 50/60Hz, 1.3A max. Output: 12.0V, 4.0A
Others			
RJ-45 cable*1: Non-shielded, 1.5m			

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# 2.5 Support Equipment

#### For AC Conduction:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Phone1	SAMPO	HT-B 907WL	N/A	
В	Phone2	SAMPO	HT-B 907WL	N/A	
С	2.4G NB	DELL	E6430	N/A	
D	5G NB	DELL	E6430	N/A	
Е	WAN NB	DELL	E6430	N/A	
F	CO (Terminal System)	Jinghong	D3 CMTS JH-HE3416B	N/A	
G	LAN NB	DELL	E6430	N/A	

## For Radiated (below 1GHz):

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Terminal System	N/A	JH-HE3416B	N/A	
В	NB (LAN)	DELL	E4300	N/A	
С	NB (2.4G WIFI)	DELL	E4300	N/A	
D	NB (5G WIFI)	DELL	E4300	N/A	
Е	Phone1	H-T-T	F-689	N/A	
F	Phone2	H-T-T	F-689	N/A	
G	PC(2.5G WAN)	DELL	T3400	N/A	

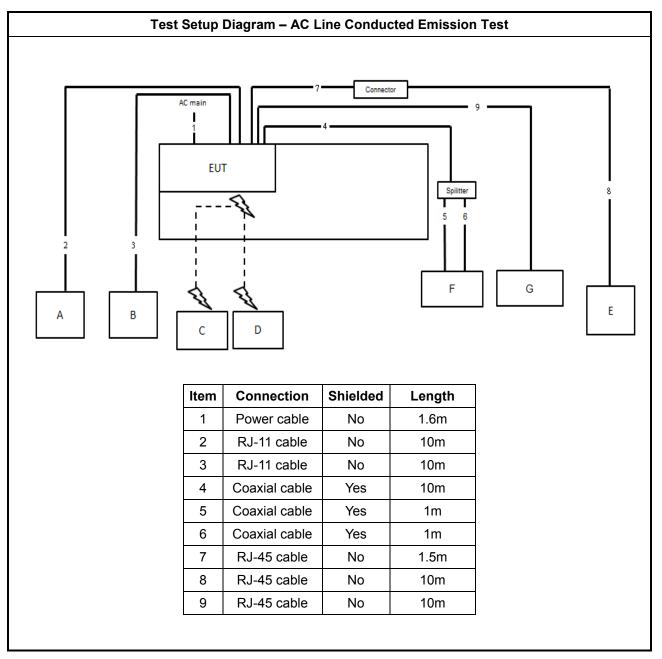
## For Radiated (above 1GHz) and RF Conducted:

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

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# 2.6 Test Setup Diagram



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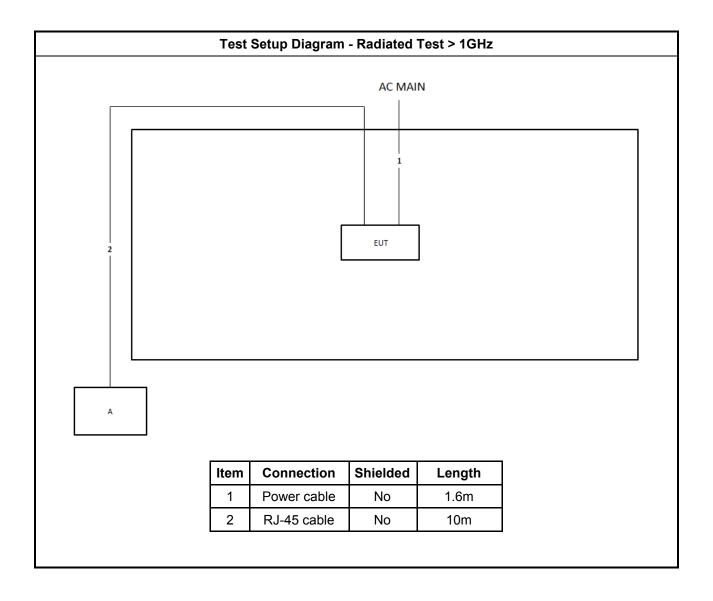


Test Setup Diagram - Radiated Test < 1GHz connector EUT G В Shielded Connection Length Item 1 Power cable No 1.6m 2 RJ-45 cable No 10m Coaxial cable 10m 3 Yes RJ-11 cable 4 No 1.5m 5 RJ-11 cable No 1.5m 6 RJ-45 cable 1.5m No 7 RJ-45 cable No 1.5m 8 RJ-45 cable No 10m

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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

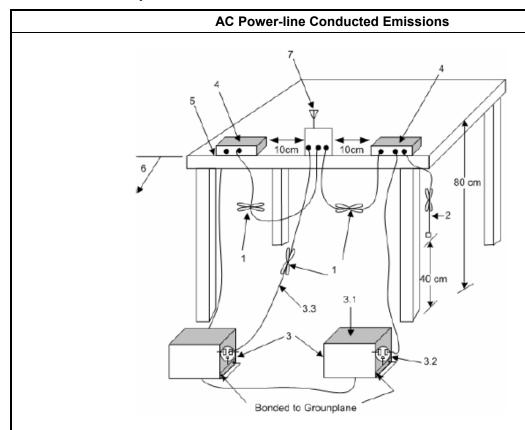
Refer a test equipment and calibration data table in this test report.

#### 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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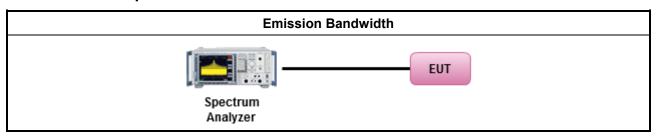
## 3.2.2 Measuring Instruments

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 Bandwidthz

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

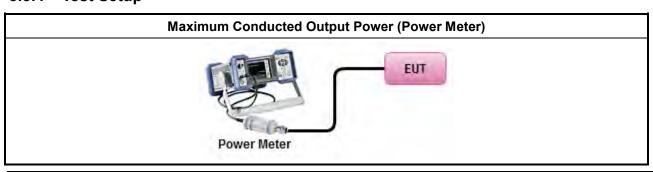
Refer a test equipment and calibration data table in this test report.

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

#### **Test Setup** 3.3.4



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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

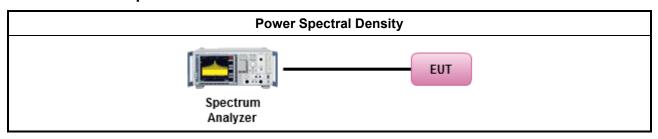
Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

	Test Method								
•	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.

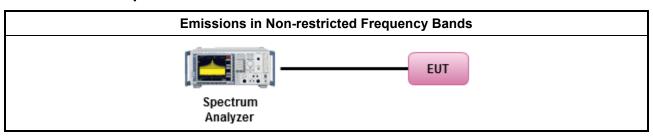
#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

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

#### 3.5.4 Test Setup



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

Refer as Appendix E

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# 3.6 Emissions in Restricted Frequency Bands

#### 3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

#### 3.6.2 Measuring Instruments

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

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## 3.6.3 Test Procedures

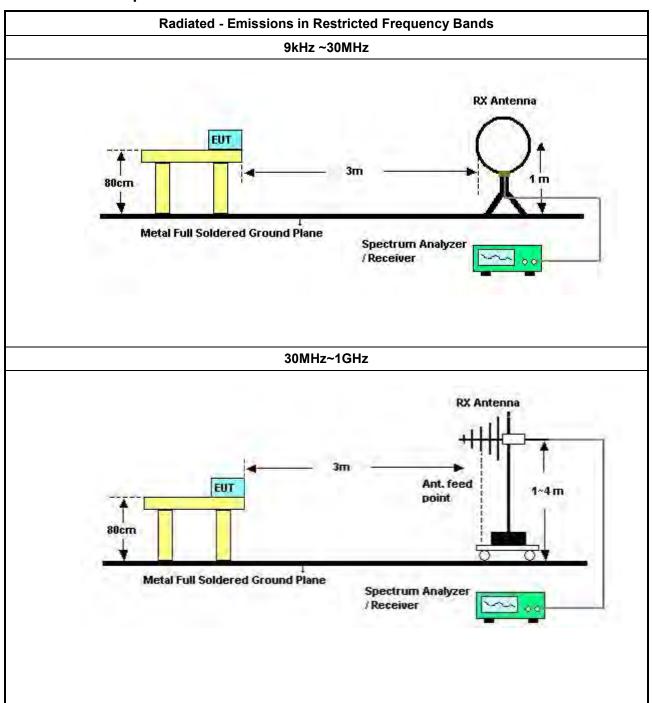
		Test Method							
•	The	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].							
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.								
•	For the transmitter unwanted emissions shall be measured using following options below:								
	<ul> <li>Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.</li> <li>□ Refer as FCC KDB 558074, clause 8.6 &amp; C63.10 clause 11.12.2.5.1(trace averaging for cycle ≥98%).</li> </ul>								
		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:							
_	<ul> <li>Refer as FCC KDB 558074 clause 8.7 &amp; C63.10 clause 11.13.1, When the performing peak average radiated measurements, emissions within 2 MHz of the authorized band edge may measured using the marker-delta method described below.</li> </ul>								
	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.								
	•	Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).							
<ul> <li>For conducted unwanted emissions into restricted bands (absolute emission limits).</li> <li>Devices with multiple transmit chains using options given below:         <ul> <li>(1) Measure and sum the spectra across the outputs or</li> <li>(2) Measure and add 10 log(N) dB</li> </ul> </li> </ul>									
	•	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

SM & 1M

AMAX 30cm

AMAX 30cm

AMAX 30cm

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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. 22, 2022	Feb. 21, 2023	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50- 16-2	04083	150kHz ~ 100MHz Feb. 09, 2022		Feb. 08, 2023	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 12, 2022	Apr. 11, 2023	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwa rz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 10, 2022	Feb. 09, 2023	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	Oct. 18, 2022	Oct. 17, 2023	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (03CH06-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH06-CB	30 MHz ~ 1 GHz	Aug. 04, 2022	Aug. 03. 2023	Radiation (03CH06-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH06-CB	1GHz ~18GHz 3m Sep. 30, 202		Sep. 29, 2023	Radiation (03CH06-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Jul. 31, 2022	Jul. 30, 2023	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Aug. 09, 2022	Aug. 08, 2023	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE AK	BBHA9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Nov. 04, 2021	Nov. 03, 2022	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	Aug 02, 2022	Aug 01, 2023	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 20, 2022	Jul. 19, 2023	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Dec. 24, 2021	Dec. 23, 2022	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH06-CB)
RF Cable-low	Woken	RG402	Low Cable-24+67	30MHz~1GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-67	1GHz~18GHz Oct. 03, 2022 Oct. 02, 20		Oct. 02, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05+67	1GHz~18GHz Oct. 03, 2022 Oct. 02, 2023		Oct. 02, 2023	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#5+7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH06-CB)

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Calibration Calibration Instrument Model No. Serial No. Characteristics Remark **Brand Date Due Date** Radiation WCA0929M 40G#5 1GHz ~ 40 GHz Dec. 08, 2021 Dec. 07, 2022 High Cable Woken (03CH06-CB) Radiation High Cable Woken WCA0929M 40G#7 1GHz ~ 40 GHz Dec. 14, 2021 Dec. 13, 2022 (03CH06-CB) Radiation Test Software **SPORTON SENSE** N.C.R. V5.10 N.C.R. (03CH06-CB) 3m Semi Anechoic Radiation RIKEN SAC-3M 03CH02-CB 1GHz ~18GHz Mar. 26, 2022 Mar. 25, 2023 Chamber (03CH02-CB) **VSWR** Radiation 1GHz ~ 18GHz Horn Antenna **EMCO** 3115 9610-4976 Apr. 19, 2022 Apr. 18, 2023 (03CH02-CB) **SCHWARZBE** Radiation BBHA9170 BBHA9170252 15GHz ~ 40GHz Horn Antenna Aug. 22, 2022 Aug. 21, 2023 ΑK (03CH02-CB) Radiation Pre-Amplifier Aailent 83017A MY39501305 1GHz ~ 26.5GHz Jul. 01, 2022 Jun. 30, 2023 (03CH02-CB) TTA1840-35-H Radiation Pre-Amplifier **MITEQ** 1864479 18GHz ~ 40GHz Jul. 20, 2022 Jul. 19, 2023 (03CH02-CB) G Spectrum Radiation R&S **FSP** 100593 9kHz~40GHz Apr. 08, 2022 Apr. 07, 2023 (03CH02-CB) analyzer Radiation High Cable-18 1GHz ~ 18GHz Oct. 03, 2022 Oct. 02, 2023 RF Cable-high Woken RG402 (03CH02-CB) High Radiation RF Cable-high Woken RG402 1GHz ~ 18GHz Oct. 03, 2022 Oct. 02, 2023 Cable-18+19 (03CH02-CB) Radiation 1GHz ~ 40 GHz High Cable Woken WCA0929M 40G#5+7 Dec. 14, 2021 Dec. 13, 2022 (03CH02-CB) Radiation High Cable Woken WCA0929M 40G#5 1GHz ~ 40 GHz Dec. 08, 2021 Dec. 07, 2022 (03CH02-CB) Radiation High Cable WCA0929M Woken 40G#7 1GHz ~ 40 GHz Dec. 14, 2021 Dec. 13, 2022 (03CH02-CB) Radiation Test Software **SPORTON SENSE** V5.10 N.C.R. N.C.R. (03CH02-CB) Spectrum Conducted R&S FSV40 101028 9kHz~40GHz Jan. 07, 2022 Jan. 06, 2023 analyzer (TH03-CB) Conducted Power Sensor Anritsu MA2411B 1531344 300MHz~40GHz Jul. 31, 2022 Jul. 30, 2023 (TH03-CB) Conducted Anritsu MI 2495A 1728002 300MHz~40GHz Jul 31 2022 Jul. 30, 2023 Power Meter (TH03-CB) Conducted RG402 Oct. 02, 2023 RF Cable-high Woken High Cable-11 1 GHz -18 GHz Oct. 03, 2022 (TH03-CB) Conducted RF Cable-high Woken RG402 High Cable-12 1 GHz -18 GHz Oct. 03, 2022 Oct. 02, 2023 (TH03-CB) Conducted RF Cable-high Woken RG402 High Cable-13 1 GHz -18 GHz Oct. 03, 2022 Oct. 02, 2023 (TH03-CB) Conducted RF Cable-high Woken RG402 High Cable-14 1 GHz -18 GHz Oct. 03, 2022 Oct. 02, 2023 (TH03-CB)

1 GHz -18 GHz

1 GHz -26.5 GHz

Oct 03 2022

Oct. 04, 2022

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RF Cable-high

Switch

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Woken

**SPTCB** 

RG402

SP-SWI

High Cable-15

**SWI-03** 

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Oct 02 2023

Oct. 03, 2023

Conducted

(TH03-CB)

(TH03-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
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

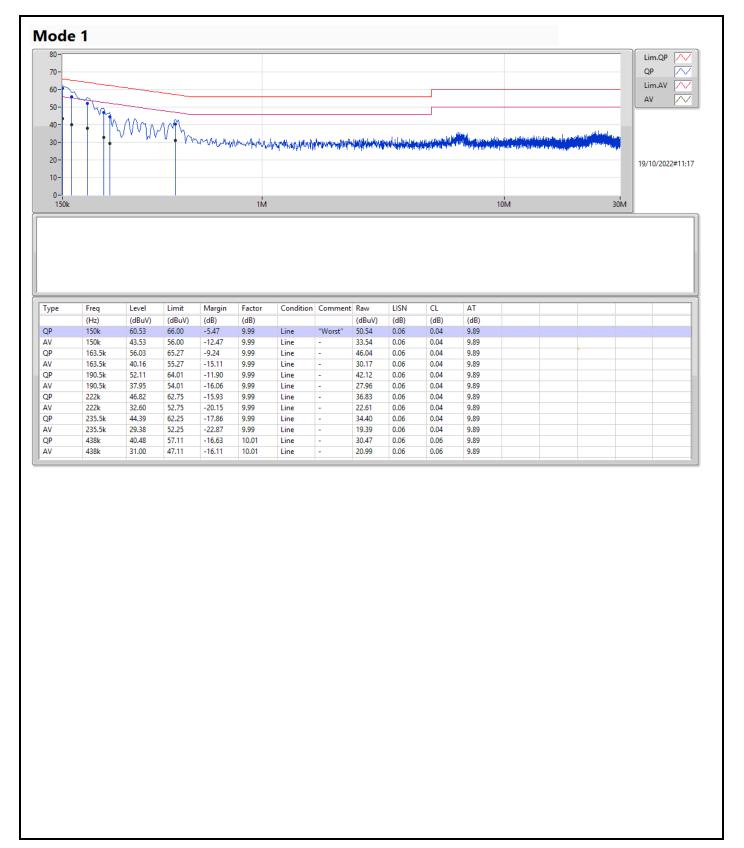
Appendix A

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	150k	60.53	66.00	-5.47	Line

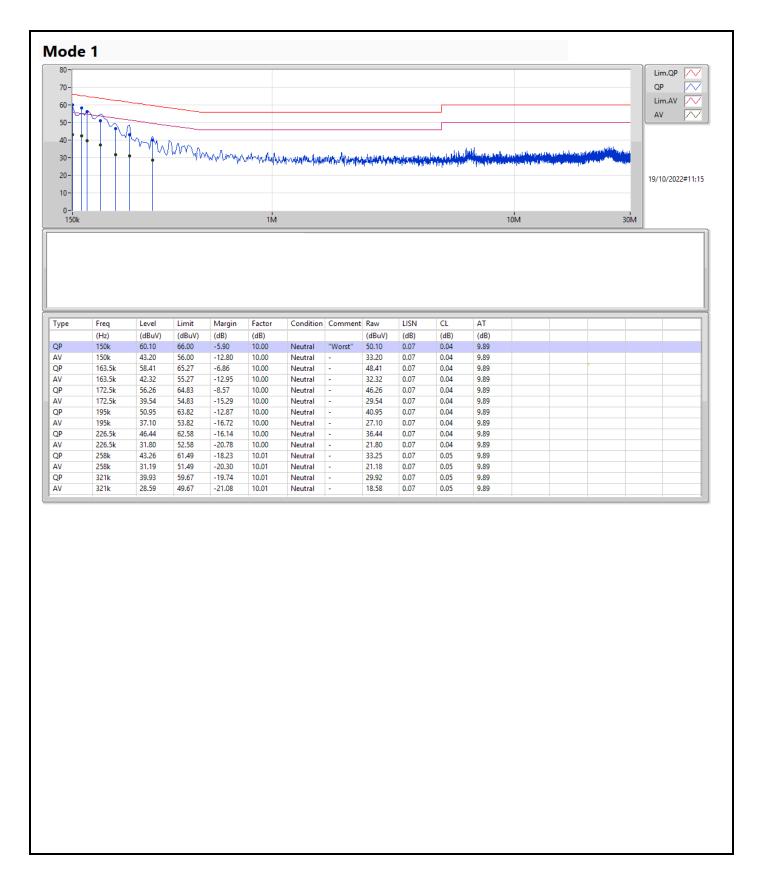
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EBW Appendix B

#### Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_4TX	9M	13.159M	13M2G1D	7.525M	12.942M
802.11g_Nss1,(6Mbps)_4TX	16.4M	16.715M	16M7D1D	16.3M	16.609M
802.11ax HEW20_Nss1,(MCS0)_4TX	19.2M	19.125M	19M1D1D	18.925M	19.027M
802.11ax HEW40_Nss1,(MCS0)_4TX	37.95M	37.711M	37M7D1D	35.35M	37.613M

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

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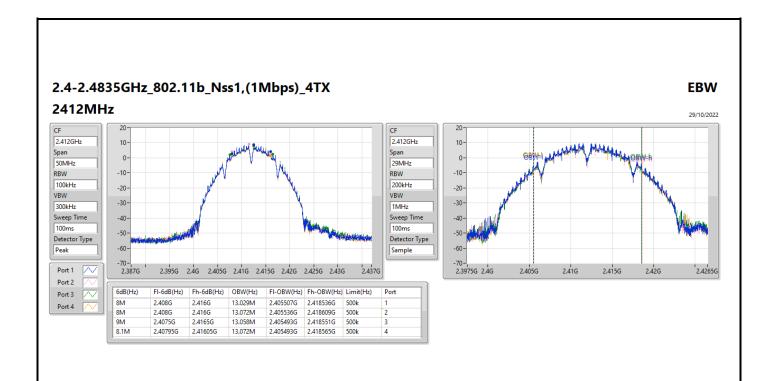
EBW Appendix B

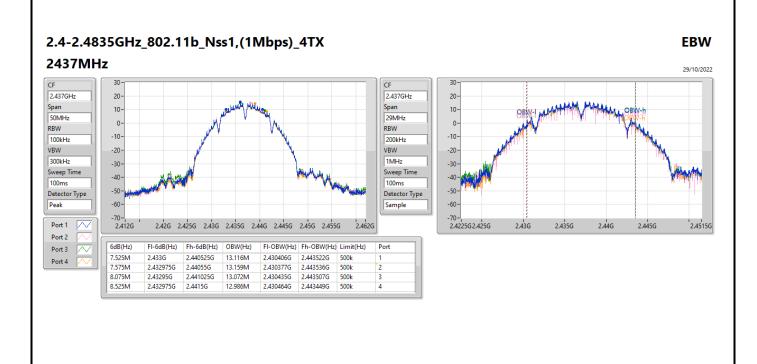
#### Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	500k	8M	13.029M	8M	13.072M	9M	13.058M	8.1M	13.072M
2437MHz	Pass	500k	7.525M	13.116M	7.575M	13.159M	8.075M	13.072M	8.525M	12.986M
2462MHz	Pass	500k	7.525M	13M	7.55M	12.986M	7.55M	12.971M	8M	12.942M
802.11g_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	500k	16.35M	16.63M	16.3M	16.609M	16.35M	16.694M	16.35M	16.63M
2437MHz	Pass	500k	16.325M	16.63M	16.325M	16.652M	16.325M	16.652M	16.325M	16.609M
2462MHz	Pass	500k	16.35M	16.673M	16.375M	16.715M	16.4M	16.694M	16.375M	16.673M
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	500k	18.925M	19.076M	19.05M	19.076M	18.975M	19.076M	19.2M	19.076M
2437MHz	Pass	500k	19.025M	19.125M	19.05M	19.125M	19.05M	19.1M	19M	19.076M
2462MHz	Pass	500k	19.075M	19.051M	19M	19.051M	18.95M	19.051M	18.975M	19.027M
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	500k	37.65M	37.613M	37.65M	37.613M	35.9M	37.662M	37.7M	37.613M
2437MHz	Pass	500k	37.8M	37.711M	37.15M	37.613M	37.95M	37.662M	36.65M	37.662M
2452MHz	Pass	500k	36.5M	37.711M	35.35M	37.662M	36.75M	37.662M	36.65M	37.711M

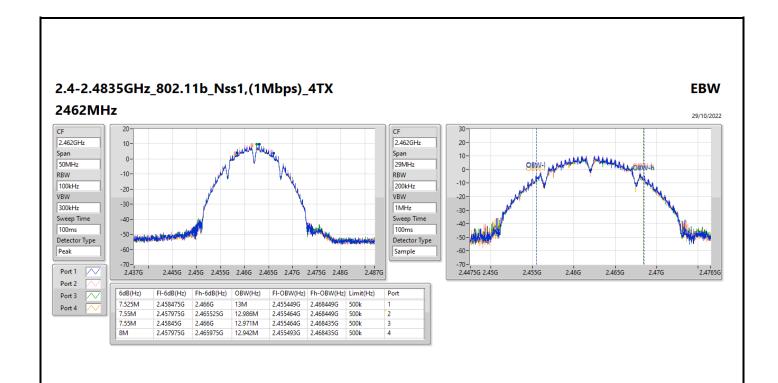
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

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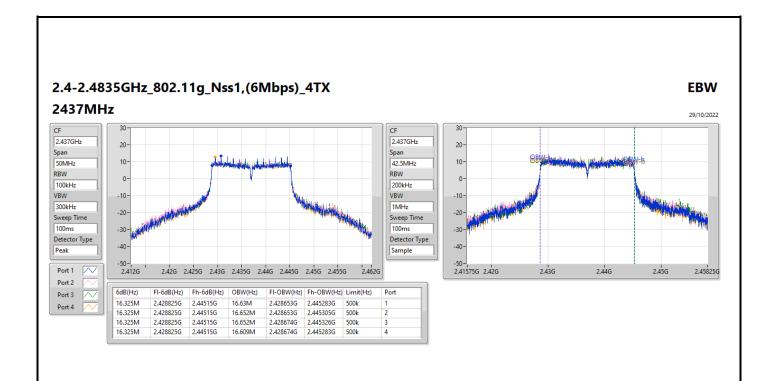


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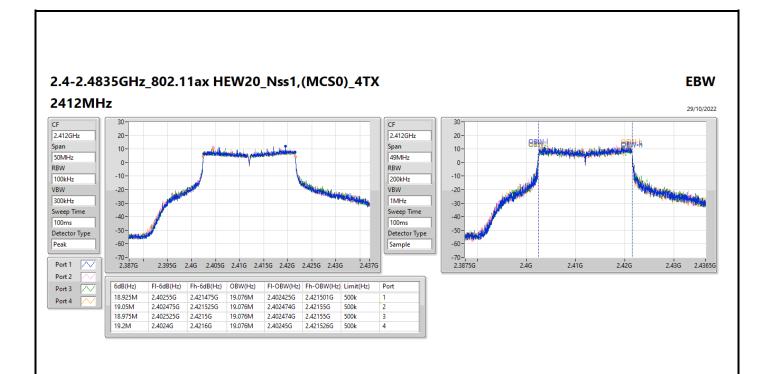
### 2.4-2.4835GHz\_802.11g\_Nss1,(6Mbps)\_4TX **EBW** 2412MHz 29/10/2022 2.412GHz 20-2.412GHz 20-10-10-50MHz 42.5MHz 0. RBW RBW -10--10-100kHz 200kHz -20-VBW -20 VBW 300kHz 1MHz -30--30 Sweep Time Sweep Tir -40 -40--50 -50 Detector Type Detector Type -60--60 -70 -2.387G 2.41G Port 1 2.395G 2.4G 2.405G 2.41G 2.415G 2.42G 2.425G 2.43G 2.4G 2.42G 2.43325G Port 2 FI-6dB(Hz) Port 3 16.35M 2.403825G 2.420175G 16.63M 2.403674G 2.420305G 16.3M 2.40385G 2.42015G 16.609M 2.403717G 2.420326G 500k 16.35M 2.403825G 2.420175G 2.403695G 2.42039G 16.35M 2.403825G 2.420175G 16.63M 2.403695G 2.420326G 500k

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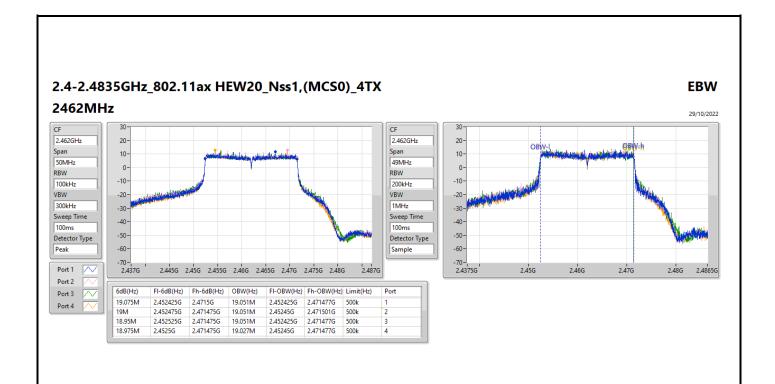
#### 2.4-2.4835GHz\_802.11g\_Nss1,(6Mbps)\_4TX **EBW** 2462MHz 29/10/2022 2.462GHz 20-2.462GHz 20 10-10-50MHz 42.5MHz 0. RBW RBW -10--10-100kHz 200kHz -20 VBW -20 VBW 300kHz 1MHz -30 Sweep Time Sweep Time -40 -40--50 -50 Detector Type Detector Type -60--60 -70-2.437G -70-2.44075G 2.46G Port 1 2.445G 2.45G 2.45G 2.46G 2.465G 2.47G 2.475G 2.48G 2.45G 2.47G 2,483250 Port 2 Port 3 16.35M 2.4538G 2.47015G 16.673M 2.453589G 2.470262G 16.375M 2.4538G 2.470175G 16.715M 2.453547G 2.470262G 500k 2.453775G 2.470175G 2.453589G 2.470283G 16.375M 2.4538G 2.470175G 16.673M 2.453589G 2.470262G 500k

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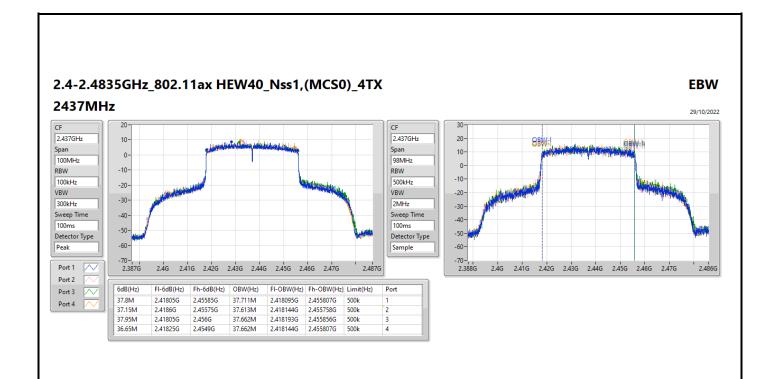
#### 2.4-2.4835GHz\_802.11ax HEW20\_Nss1,(MCS0)\_4TX **EBW** 2437MHz 29/10/2022 2.437GHz 2.437GHz 20-20 10-10-50MHz 49MHz RBW RBW 0-0 100kHz 200kHz -10-VBW -10-VBW 300kHz 1MHz -20--20 Sweep Time Sweep Time -30 -30 Detector Type Detector Type -40--40 -50-2.412G -50-2.4125G 2.44G Port 1 2.42G 2.425G 2.43G 2.435G 2.44G 2.445G 2.45G 2.455G 2.462G 2.42G 2.43G 2.45G 2.4615G Port 2 FI-6dB(Hz) Fh-6dB(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) Port 3 19.025M 2.427475G 2.4465G 19.125M 2.427401G 2.446526G 19.05M 2.427475G 2.446525G 19.125M 2.427401G 2.446526G 500k 19.05M 2.42745G 2.4465G 2.427425G 2.446526G 19M 2.427475G 2.446475G 19.076M 2.427425G 2.446501G 500k

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### 2.4-2.4835GHz\_802.11ax HEW40\_Nss1,(MCS0)\_4TX **EBW** 2422MHz 29/10/2022 2.422GHz 2.422GHz 20 10-0-100MHz 98MHz -10-RBW RBW -10-No. of the Control of 100kHz 500kHz biddeling by the second -20 VBW -20 VBW -30-300kHz 2MHz -30 Sweep Time Sweep Time -40 -40 -50 -50-Detector Type Detector Type -60 -60 -70 - 2.373G2.38G 2.39G 2.4G 2.41G 2.42G 2.43G 2.44G 2.45G 2.46G 2.471G -70 -2.372G 2.38G 2.39G 2.4G 2.41G 2.42G 2.43G 2.44G 2.45G 2.46G 2.472G Port 1 Port 2 Fh-6dB(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) Port 3 37.65M 2.4033G 2.44095G 37.613M 2.403193G 2.440807G 37.65M 2.4032G 2.44085G 37.613M 2.403193G 2.440807G 500k 2.4046G 2.4405G 37.662M 2.403193G 2.440856G 37.7M 2.40315G 2.44085G 37.613M 2.403193G 2.440807G 500k

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#### 2.4-2.4835GHz\_802.11ax HEW40\_Nss1,(MCS0)\_4TX **EBW** 2452MHz 29/10/2022 2.452GHz 2.452GHz 20 10-0-100MHz 98MHz 0. -10-RBW RBW -10-100kHz 500kHz -20 VBW VBW -20 -30-300kHz 2MHz -30 Sweep Time Sweep Time -40 -40--50--50 Detector Type Detector Type -60 -60 -70 - 2.403G2.41G 2.42G 2.43G 2.44G 2.45G 2.46G 2.47G 2.48G 2.49G 2.501G -70 -2.402G 2.41G 2.42G 2.43G 2.44G 2.45G 2.46G 2.47G 2.48G 2.49G 2.502G Port 1 Port 2 Fh-6dB(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) Port 3 36.5M 2.4331G 2.4696G 37.711M 2.433095G 2.470807G 35.35M 2.4341G 2.46945G 37.662M 2.433095G 2.470758G 500k 2.43305G 2.4698G 37.662M 2.433095G 2.470758G 36.65M 2.4331G 2.46975G 37.711M 2.433046G 2.470758G 500k

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Average Power Appendix C

### Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_4TX	29.56	0.90365
802.11g_Nss1,(6Mbps)_4TX	29.97	0.99312
802.11ax HEW20_Nss1,(MCS0)_4TX	29.99	0.99770
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	29.99	0.99770
802.11ax HEW40_Nss1,(MCS0)_4TX	29.87	0.97051
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	29.87	0.97051

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Average Power Appendix C

## Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_4TX	-	-	-	-	-	-	-	-
2412MHz	Pass	3.26	17.12	17.27	17.14	16.82	23.11	30.00
2417MHz	Pass	3.26	17.15	17.31	17.10	16.95	23.15	30.00
2437MHz	Pass	3.26	23.44	23.73	23.78	23.19	29.56	30.00
2457MHz	Pass	3.26	17.68	18.33	17.75	17.25	23.79	30.00
2462MHz	Pass	3.26	17.75	18.14	17.96	17.12	23.78	30.00
802.11g_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
2412MHz	Pass	3.26	22.45	22.54	22.15	22.29	28.38	30.00
2437MHz	Pass	3.26	23.5	23.89	23.77	23.68	29.73	30.00
2462MHz	Pass	3.26	23.77	24.12	23.81	24.07	29.97	30.00
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
2412MHz	Pass	3.26	22.42	22.47	22.21	22.36	28.39	30.00
2437MHz	Pass	3.26	23.94	24.01	24.03	23.91	29.99	30.00
2462MHz	Pass	3.26	23.5	23.64	23.49	23.52	29.56	30.00
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
2422MHz	Pass	3.26	22.22	22.74	23.13	23.01	28.81	30.00
2437MHz	Pass	3.26	23.74	23.74	23.96	23.95	29.87	30.00
2452MHz	Pass	3.26	23.01	23.17	23.47	23.56	29.33	30.00
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
2412MHz	Pass	5.92	22.42	22.47	22.21	22.36	28.39	30.00
2437MHz	Pass	5.92	23.94	24.01	24.03	23.91	29.99	30.00
2462MHz	Pass	5.92	23.5	23.64	23.49	23.52	29.56	30.00
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
2422MHz	Pass	5.92	22.22	22.74	23.13	23.01	28.81	30.00
2437MHz	Pass	5.92	23.74	23.74	23.96	23.95	29.87	30.00
2452MHz	Pass	5.92	23.01	23.17	23.47	23.56	29.33	30.00

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

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PSD Appendix D

Summary

Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_4TX	5.56
802.11g_Nss1,(6Mbps)_4TX	1.33
802.11ax HEW20_Nss1,(MCS0)_4TX	1.27
802.11ax HEW40_Nss1,(MCS0)_4TX	-1.08

RBW = 3kHz;

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Appendix D **PSD** 

### Result

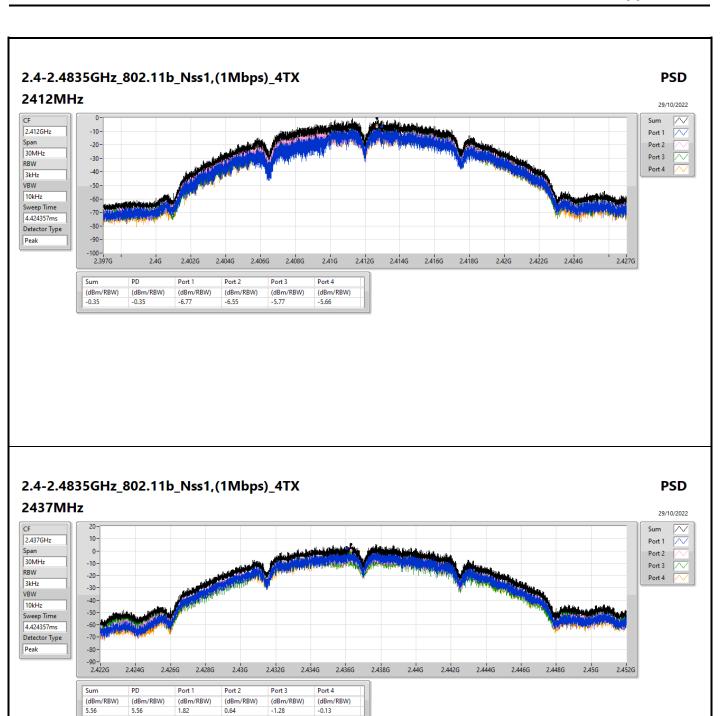
Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_4TX	=	-	-	=	-	-	-	-
2412MHz	Pass	5.92	-6.77	-6.55	-5.77	-5.66	-0.35	8.00
2437MHz	Pass	5.92	1.82	0.64	-1.28	-0.13	5.56	8.00
2462MHz	Pass	5.92	-5.86	-5.62	-5.76	-4.86	-0.53	8.00
802.11g_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
2412MHz	Pass	5.92	-4.39	-5.05	-5.14	-4.27	0.12	8.00
2437MHz	Pass	5.92	-3.53	-2.72	-4.15	-3.59	1.08	8.00
2462MHz	Pass	5.92	-2.71	-4.04	-4.07	-3.14	1.33	8.00
802.11ax HEW20_Nss1,(MCS0)_4TX	=	-	-	=	-	-	-	-
2412MHz	Pass	5.92	-4.58	-4.16	-5.02	-4.37	0.09	8.00
2437MHz	Pass	5.92	-2.07	-2.52	-2.63	-2.81	1.27	8.00
2462MHz	Pass	5.92	-3.37	-3.07	-3.05	-3.34	0.64	8.00
802.11ax HEW40_Nss1,(MCS0)_4TX	=	-	-	=	-	-	-	-
2422MHz	Pass	5.92	-6.33	-6.08	-5.06	-6.19	-1.79	8.00
2437MHz	Pass	5.92	-5.13	-5.19	-5.29	-5.25	-1.58	8.00
2452MHz	Pass	5.92	-4.86	-5.58	-5.97	-6.05	-1.08	8.00

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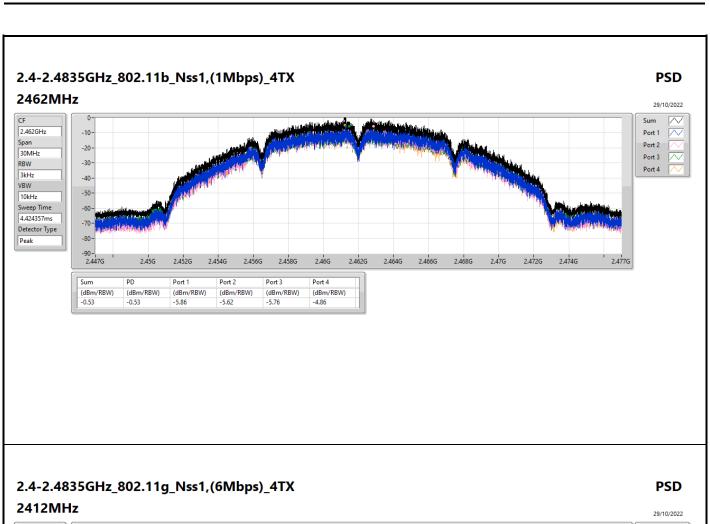
DG = Directional Gain; RBW = 3kHz; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;

PSD Appendix D



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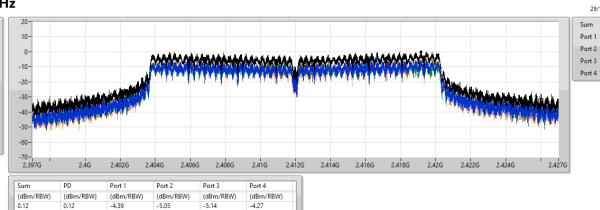
**PSD** Appendix D





0.12

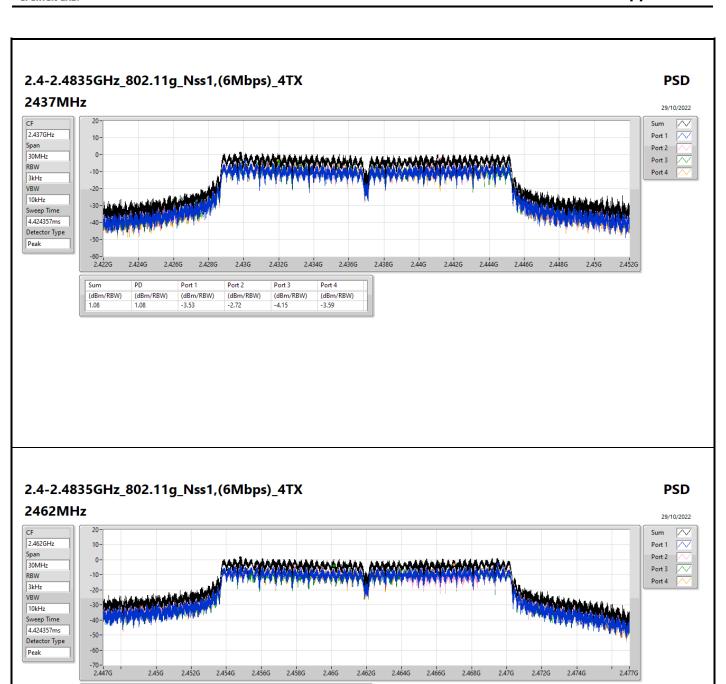
-4.39



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PSD Appendix D



Sum

1.33

Port 1

-2.71

(dBm/RBW)

1.33

Port 2

-4.04

Port 3

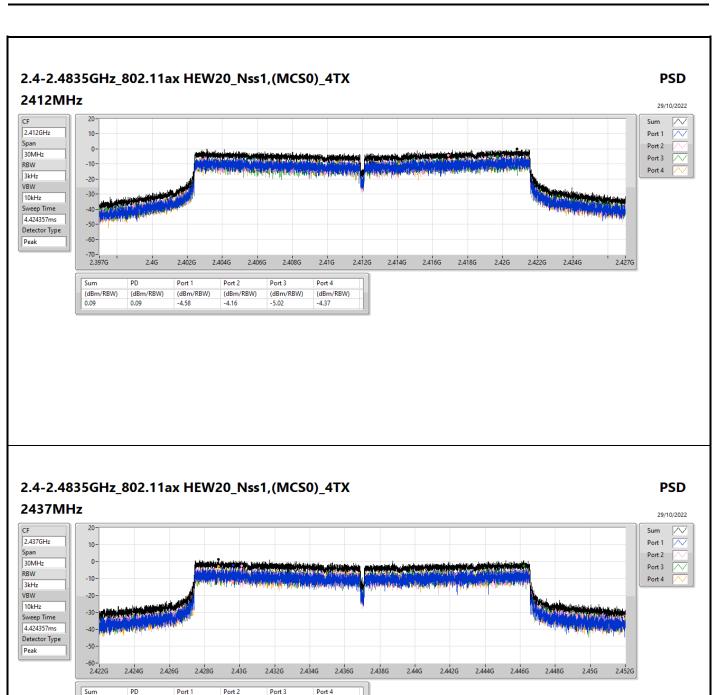
-4.07

Port 4

-3.14

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PSD Appendix D



(dBm/RBW)

-2.07

1.27

1.27

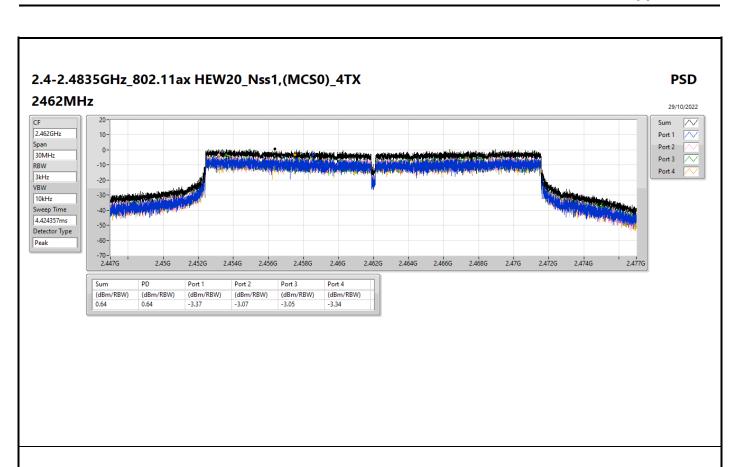
(dBm/RBW) -2.52

-2.63

-2.81

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Appendix D **PSD** 



# 2.4-2.4835GHz\_802.11ax HEW40\_Nss1,(MCS0)\_4TX

-6.33

-6.08

-5.06

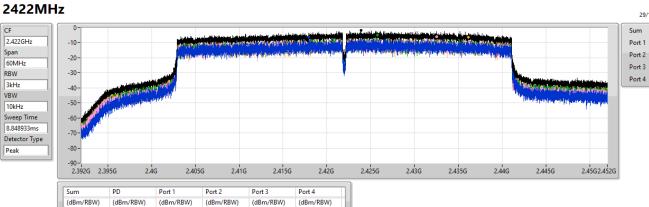
-6.19

# **PSD**



-1.79

-1.79

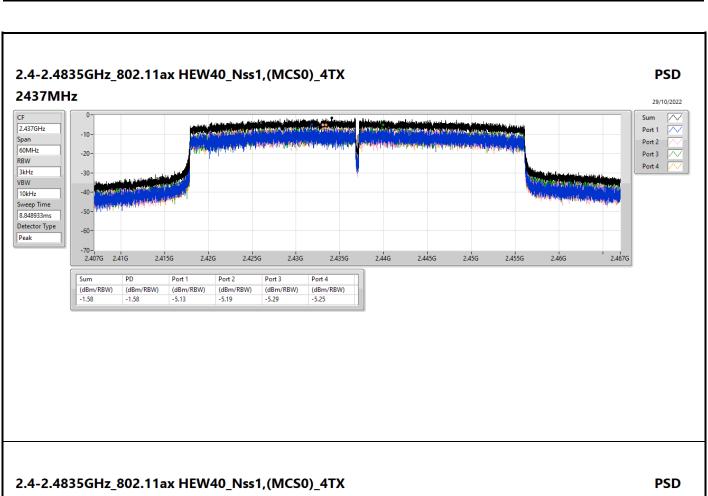


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Appendix D **PSD** 



# 2452MHz

-4.86

-5.58

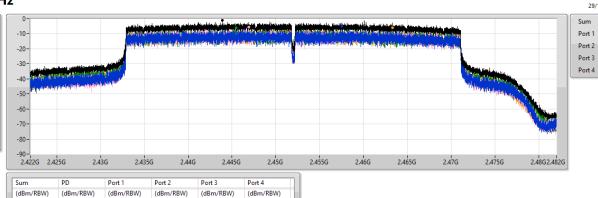
-5.97

-6.05



-1.08

-1.08



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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)_4TX	Pass	2.43591G	15.61	-14.39	2.10603G	-53.07	2.4G	-44.25	2.4G	-45.33	2.51766G	-51.06	6.96261G	-47.27	2
802.11g_Nss1,(6Mbps)_4TX	Pass	2.45695G	13.30	-16.70	2.16195G	-51.24	2.3992G	-18.68	2.4G	-16.82	2.51166G	-51.52	24.18804G	-47.06	4
802.11ax HEW20_Nss1,(MCS0)_4TX	Pass	2.4319G	13.33	-16.67	867.64M	-52.94	2.39984G	-18.43	2.4G	-16.81	2.51478G	-51.46	21.51614G	-46.52	2
802.11ax HEW40_Nss1,(MCS0)_4TX	Pass	2.44075G	10.17	-19.83	876.16M	-53.07	2.39984G	-20.73	2.4G	-23.14	2.53502G	-51.26	21.94022G	-47.38	3

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CSE (NdB Down) Appendix E

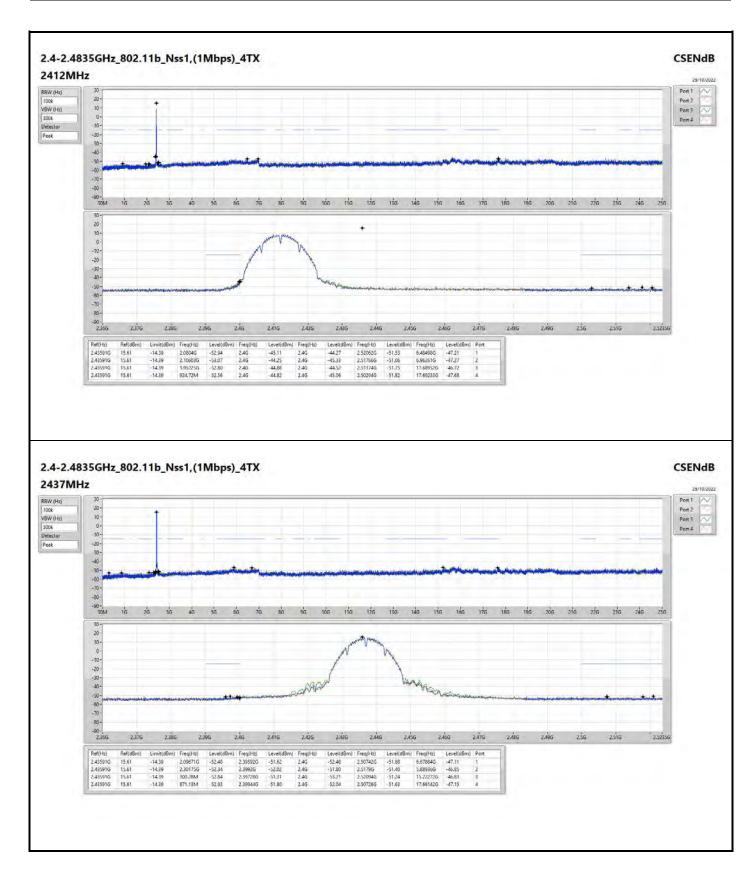
### Result

INCOUR															
Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
802.11b_Nss1,(1Mbps)_4TX		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2412MHz	Pass	2.43591G	15.61	-14.39	2.0804G	-52.94	2.4G	-45.11	2.4G	-44.27	2.52062G	-51.53	6.48498G	-47.21	1
2412MHz	Pass	2.43591G 2.43591G		-14.39		-52.94	2.4G	-44.25	2.4G 2.4G	-44.27		-51.06		-47.27	2
2412MHz	Pass		15.61	-14.39	2.10603G	-53.07	2.4G 2.4G	-44.25	2.4G 2.4G		2.51766G		6.96261G	-46.72	3
		2.43591G	15.61		1.95225G					-44.52	2.51374G	-51.75	17.68952G		4
2412MHz	Pass	2.43591G	15.61	-14.39	924.72M	-52.56	2.4G	-44.82	2.4G	-45.06	2.50294G	-51.82	17.69233G	-47.68	
2437MHz	Pass	2.43591G	15.61	-14.39	2.09671G	-52.48	2.39592G	-51.62	2.4G	-52.48	2.50742G	-51.68	6.67884G	-47.11	1
2437MHz	Pass	2.43591G	15.61	-14.39	2.30175G	-52.34	2.3992G	-52.02	2.4G	-51.80	2.5179G	-51.40	5.88936G	-46.85	2
2437MHz	Pass	2.43591G	15.61	-14.39	300.28M	-52.84	2.39728G	-51.31	2.4G	-53.21	2.52094G	-51.24	15.22272G	-46.83	3
2437MHz	Pass	2.43591G	15.61	-14.39	871.13M	-52.93	2.39944G	-51.80	2.4G	-52.04	2.50726G	-51.63	17.66142G	-47.15	4
2462MHz	Pass	2.43591G	15.61	-14.39	894.43M	-52.33	2.39728G	-52.14	2.4G	-52.38	2.51358G	-51.81	17.66985G	-47.25	1
2462MHz	Pass	2.43591G	15.61	-14.39	2.19923G	-53.36	2.3912G	-50.85	2.4G	-54.80	2.5215G	-51.06	24.58418G	-46.49	2
2462MHz	Pass	2.43591G	15.61	-14.39	2.13865G	-53.29	2.39576G	-51.14	2.4G	-54.29	2.50966G	-51.44	16.5376G	-47.66	3
2462MHz	Pass	2.43591G	15.61	-14.39	819.87M	-53.51	2.398G	-52.78	2.4G	-53.57	2.51486G	-51.57	16.72022G	-47.81	4
802.11g_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.45695G	13.30	-16.70	1.93711G	-53.07	2.39984G	-19.11	2.4G	-18.28	2.52142G	-52.23	17.67547G	-46.90	1
2412MHz	Pass	2.45695G	13.30	-16.70	1.98837G	-52.63	2.39992G	-18.46	2.4G	-17.94	2.51118G	-51.75	17.66985G	-46.58	2
2412MHz	Pass	2.45695G	13.30	-16.70	737.16M	-52.82	2.3992G	-18.33	2.4G	-17.82	2.50982G	-51.66	17.68109G	-47.84	3
2412MHz	Pass	2.45695G	13.30	-16.70	2.16195G	-51.24	2.3992G	-18.68	2.4G	-16.82	2.51166G	-51.52	24.18804G	-47.06	4
2437MHz	Pass	2.45695G	13.30	-16.70	2.05943G	-53.03	2.39984G	-42.23	2.4G	-42.58	2.51398G	-51.49	16.73708G	-47.30	1
2437MHz	Pass	2.45695G	13.30	-16.70	878.12M	-53.10	2.39984G	-39.09	2.4G	-39.70	2.52086G	-51.12	16.20045G	-47.15	2
2437MHz	Pass	2.45695G	13.30	-16.70	2.04079G	-52.35	2.39992G	-40.28	2.4G	-41.75	2.5039G	-51.98	5.83316G	-47.22	3
2437MHz	Pass	2.45695G	13.30	-16.70	925.89M	-53.13	2.39984G	-42.87	2.4G	-42.68	2.50206G	-51.13	15.33511G	-46.35	4
2462MHz	Pass	2.45695G	13.30	-16.70	618.33M	-53.37	2.39344G	-51.61	2.4G	-52.03	2.51878G	-51.88	15.23115G	-47.37	1
2462MHz	Pass	2.45695G	13.30	-16.70	2.30059G	-52.36	2.39752G	-51.48	2.4G	-51.31	2.50094G	-51.61	17.65299G	-46.71	2
2462MHz	Pass	2.45695G	13.30	-16.70	1.83575G	-53.21	2.39984G	-50.43	2.4G	-53.24	2.51926G	-52.02	6.96823G	-47.46	3
2462MHz	Pass	2.45695G	13.30	-16.70	2.05128G	-52.68	2.39928G	-51.53	2.4G	-51.70	2.50054G	-51.40	17.6839G	-47.30	4
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.4319G	13.33	-16.67	1.99769G	-52.72	2.4G	-18.16	2.4G	-17.95	2.52062G	-51.71	17.6839G	-47.07	1
2412MHz	Pass	2.4319G	13.33	-16.67	867.64M	-52.94	2.39984G	-18.43	2.4G	-16.81	2.51478G	-51.46	21.51614G	-46.52	2
2412MHz	Pass	2.4319G	13.33	-16.67	902.59M	-52.83	2.39976G	-16.87	2.4G	-18.27	2.51118G	-51.96	6.96542G	-46.90	3
2412MHz	Pass	2.4319G	13.33	-16.67	920.06M	-53.15	2.39968G	-17.86	2.4G	-17.85	2.50782G	-51.11	17.68671G	-47.59	4
2437MHz	Pass	2.4319G	13.33	-16.67	930.55M	-53.10	2.4G	-36.23	2.4G	-36.78	2.51198G	-50.94	15.21148G	-47.67	1
2437MHz	Pass	2.4319G	13.33	-16.67	1.63071G	-52.85	2.39992G	-34.78	2.4G	-35.82	2.50214G	-51.60	17.67266G	-47.31	2
2437MHz	Pass	2.4319G	13.33	-16.67	2.17244G	-53.24	2.39984G	-35.78	2.4G	-36.11	2.50294G	-51.14	6.85023G	-47.15	3
2437MHz	Pass	2.4319G	13.33	-16.67	2.30641G	-53.24	2.39912G	-35.93	2.4G	-36.67	2.5143G	-51.19	17.68109G	-46.90	4
2462MHz	Pass	2.4319G	13.33	-16.67	1.75653G	-51.57	2.3996G	-51.24	2.4G	-51.00	2.50654G	-50.92	17.66704G	-47.29	1
2462MHz	Pass	2.4319G	13.33	-16.67	2.12467G	-52.96	2.39952G	-50.73	2.4G	-52.41	2.50518G	-51.39	17.0967G	-47.51	2
2462MHz	Pass	2.4319G	13.33	-16.67	776.77M	-52.70	2.39744G	-51.19	2.4G	-51.94	2.50582G	-51.38	5.86126G	-45.98	3
2462MHz	Pass	2.4319G	13.33	-16.67	2.05594G	-53.12	2.39904G	-51.76	2.4G	-51.47	2.50086G	-52.16	16.72022G	-47.25	4
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-		-	-	-	-	-	-	-		-		-	-
2422MHz	Pass	2.44075G	10.17	-19.83	954.02M	-52.10	2.4G	-24.78	2.4G	-25.45	2.55518G	-51.12	17.6857G	-47.42	1
2422MHz	Pass	2.44075G	10.17	-19.83	2.16543G	-52.64	2.39968G	-23.47	2.4G	-24.11	2.52046G	-51.52	17.68009G	-46.66	2
2422MHz	Pass	2.44075G	10.17	-19.83	876.16M	-53.07	2.39984G	-20.73	2.4G	-23.14	2.53502G	-51.26	21.94022G	-47.38	3
2422MHz	Pass	2.44075G	10.17	-19.83	902.49M	-52.61	2.4G	-22.60	2.4G	-22.00	2.55166G	-50.80	17.15564G	-46.56	4
2427MHz	Pass	2.44075G	10.17	-19.83	908.22M	-52.72	2.39968G	-27.58	2.4G	-27.22	2.53100G	-50.62	6.71425G	-46.86	1
2437MHz	Pass	2.44075G	10.17	-19.83	512.05M	-52.88	2.39952G	-24.78	2.4G 2.4G	-27.22	2.55302G 2.55214G	-51.46	17.67448G	-46.35	2
2437MHz	Pass	2.44075G	10.17	-19.83	1.94788G	-53.14	2.39904G	-26.50	2.4G	-26.03	2.53806G	-51.40	17.68851G	-47.32	3
2437MHz	Pass	2.44075G	10.17	-19.83	30M	-53.14	2.39904G 2.39952G	-25.96	2.4G	-20.03	2.55611G	-50.96	6.71706G	-46.59	4
2452MHz	Pass	2.44075G	10.17	-19.83	2.30626G	-52.62	2.39952G 2.39968G	-34.43	2.4G	-37.43	2.5111G	-51.57	16.68728G	-47.03	1
			10.17						2.4G 2.4G			-51.02		-47.46	2
2452MHz	Pass	2.44075G		-19.83	854.4M	-52.73	2.39952G	-30.69		-35.77	2.5387G		6.99471G		3
2452MHz	Pass	2.44075G	10.17	-19.83	2.16772G	-52.98	2.39952G	-34.41	2.4G	-36.89	2.52558G	-50.70	15.20086G	-47.10	
2452MHz	Pass	2.44075G	10.17	-19.83	848.68M	-52.61	2.39952G	-29.52	2.4G	-36.17	2.55806G	-51.60	17.68851G	-46.81	4

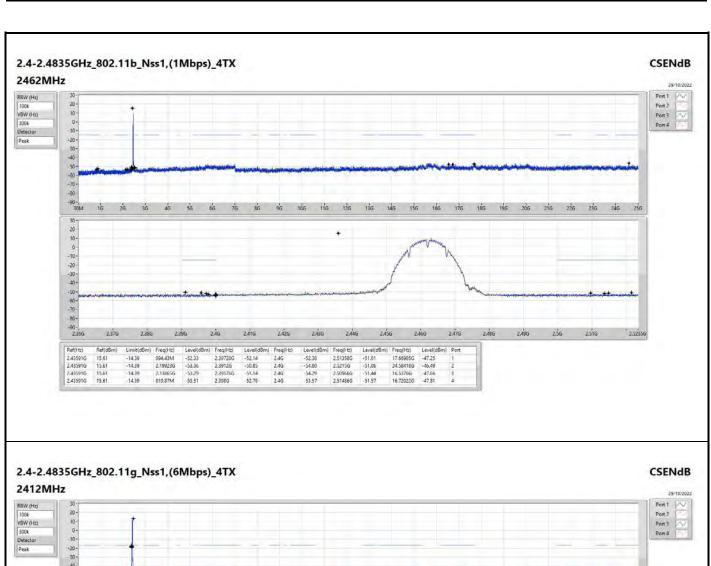
Sporton International Inc. Hsinchu Laboratory

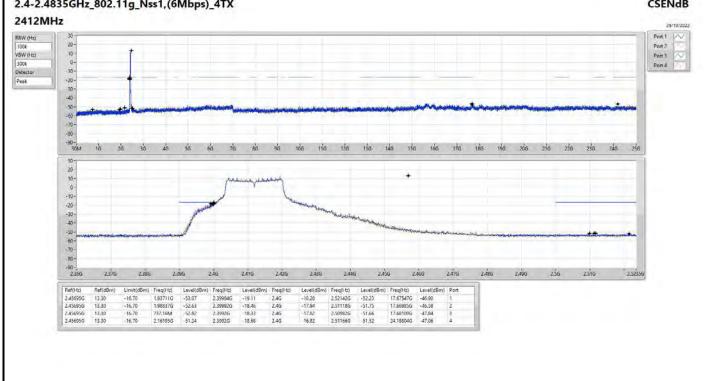
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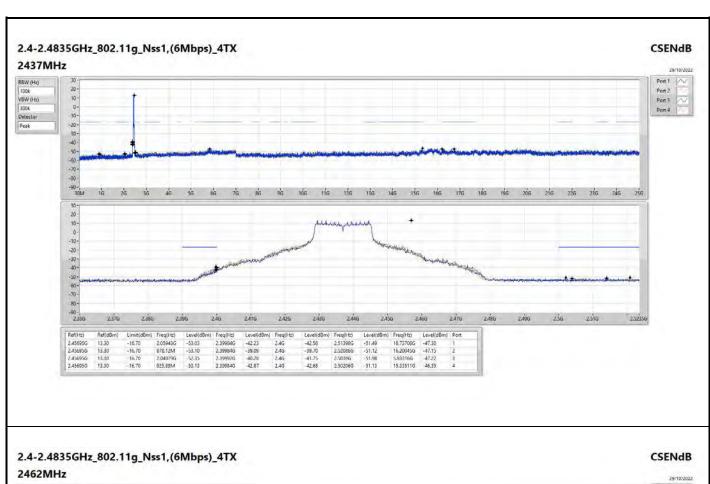


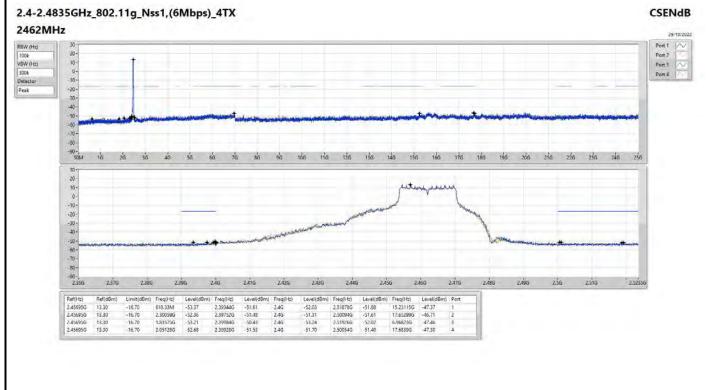
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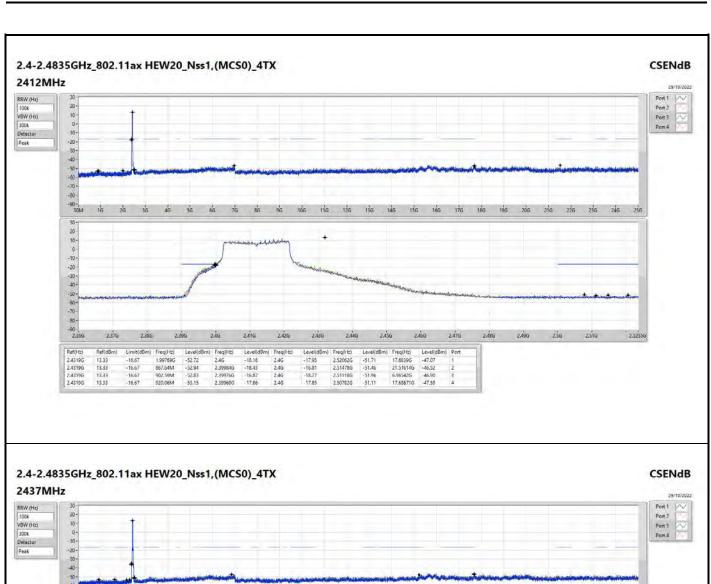
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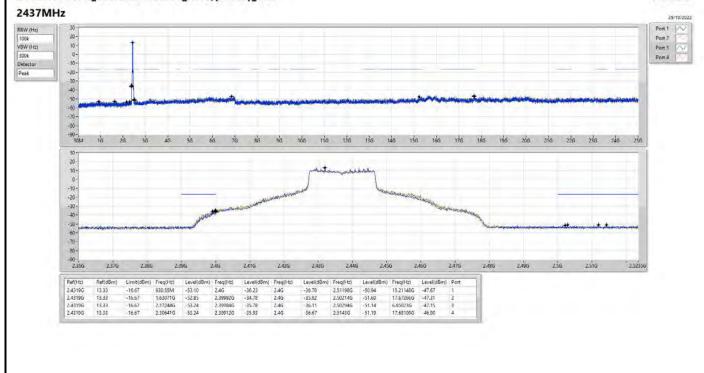




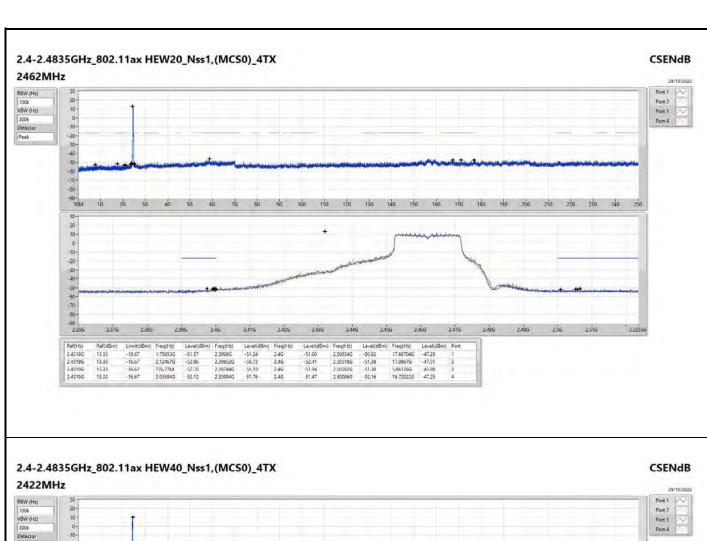
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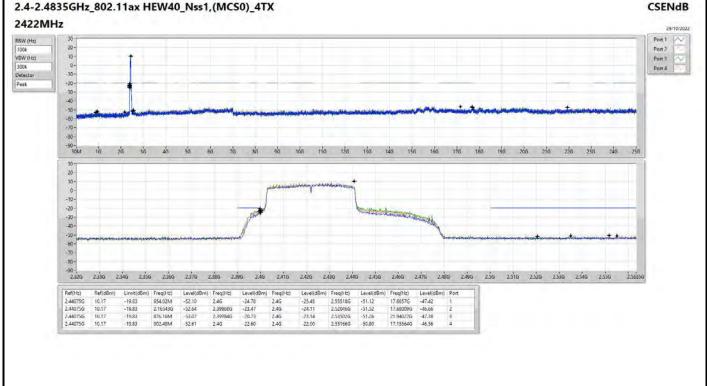






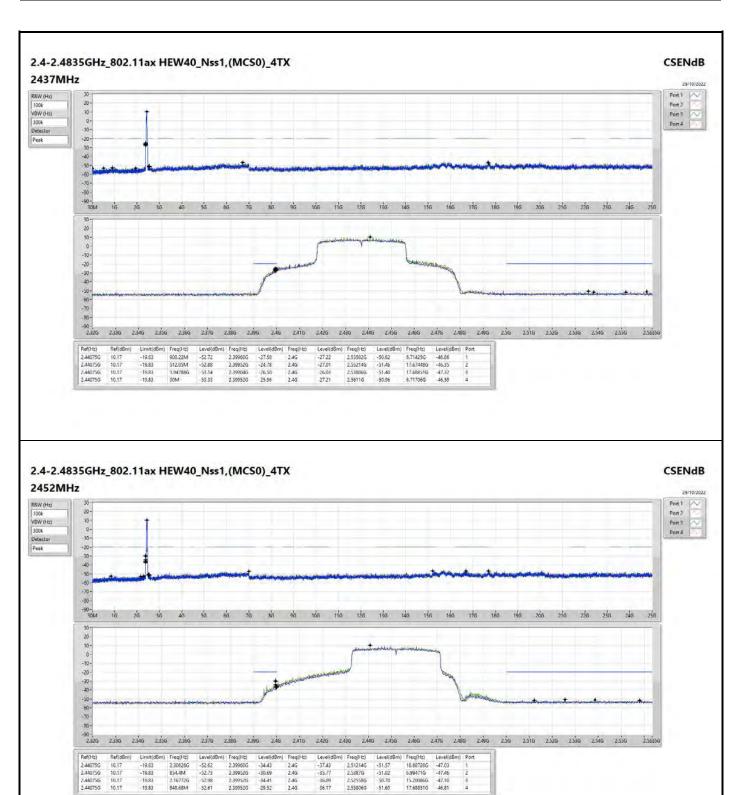
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2.52558G 2.55806G

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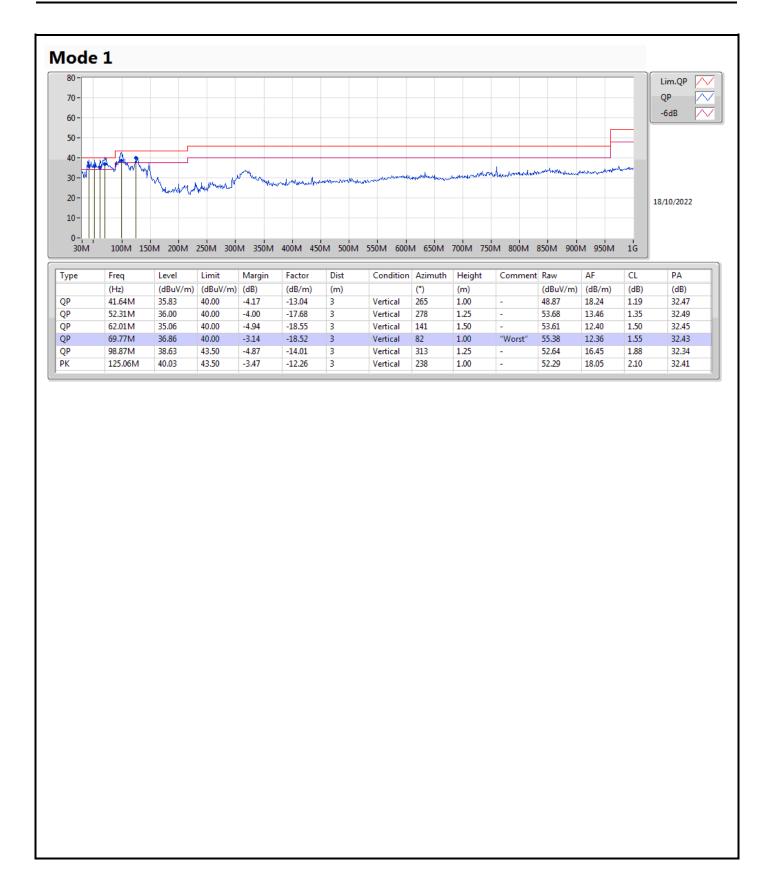
# Radiated Emissions below 1GHz

Appendix F.1

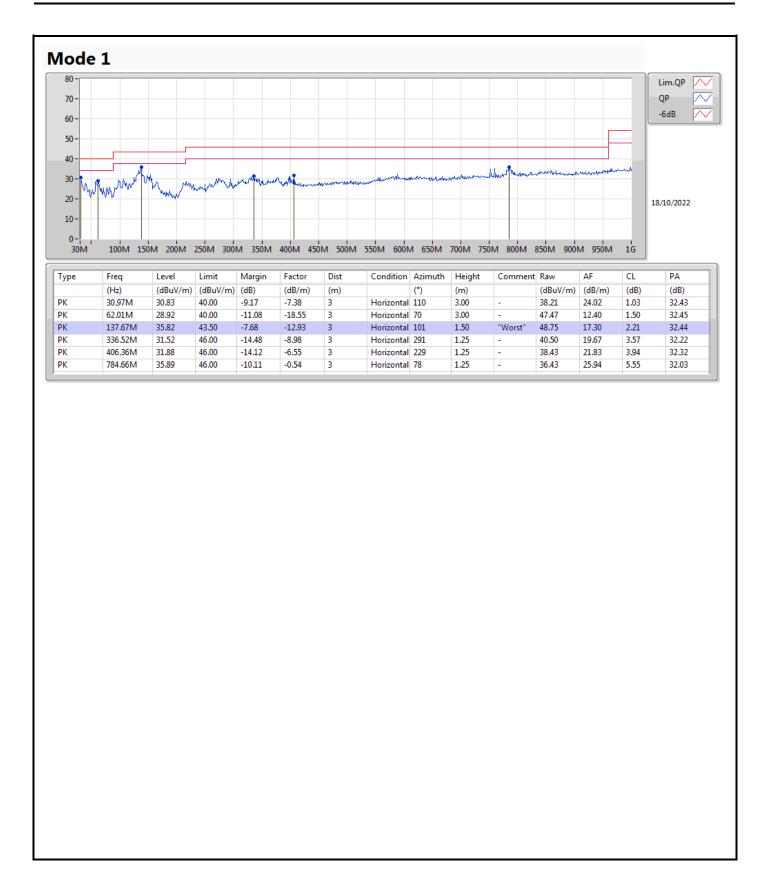
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	69.77M	36.86	40.00	-3.14	Vertical

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# RSE TX above 1GHz

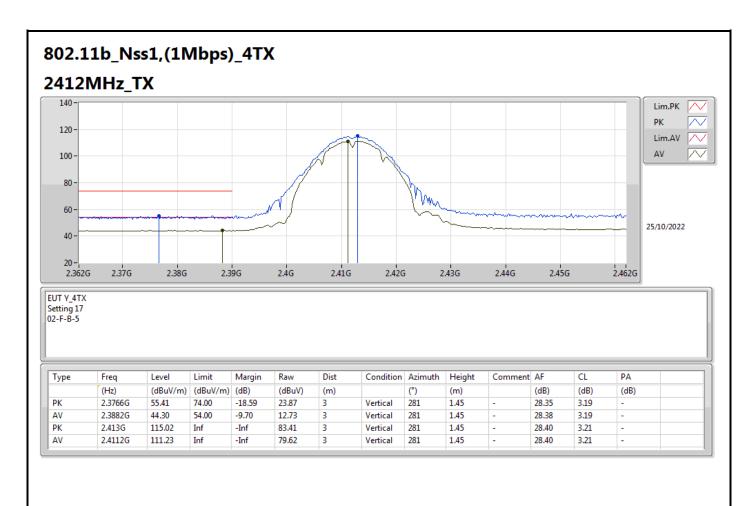
Appendix F.2

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	-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_4TX	Pass	AV	4.824G	53.99	54.00	-0.01	3	Vertical	83	1.98	-

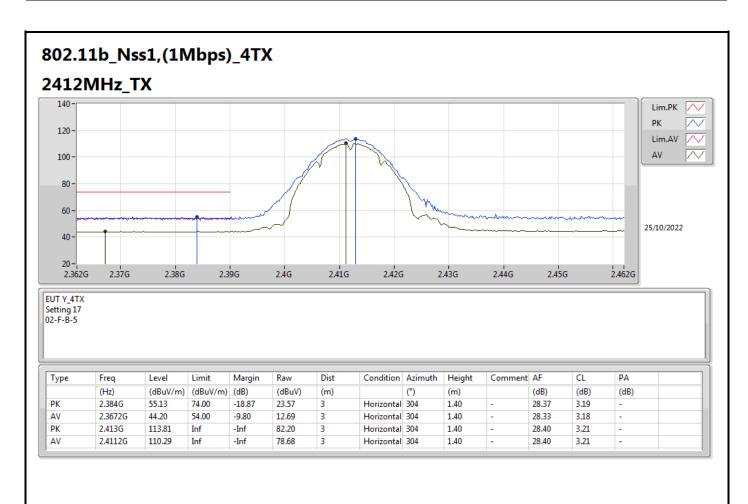
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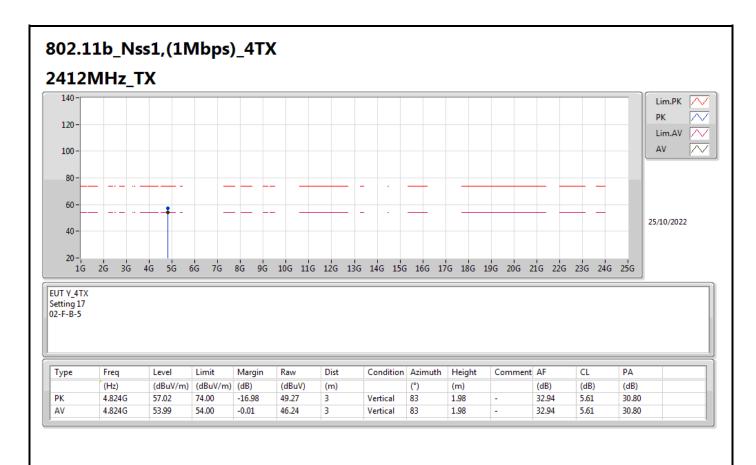




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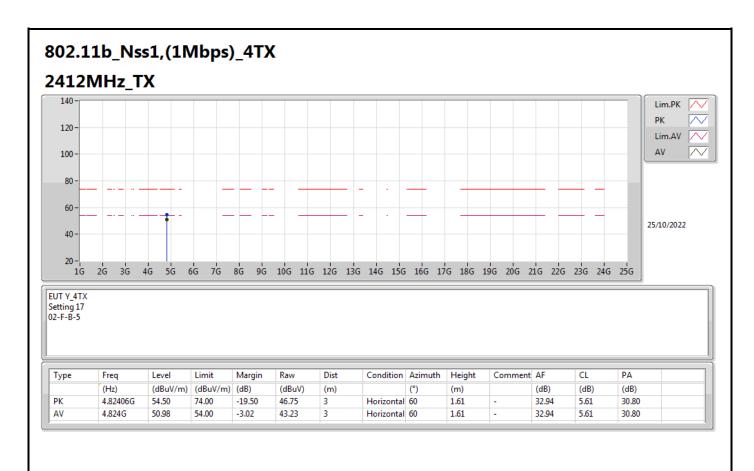




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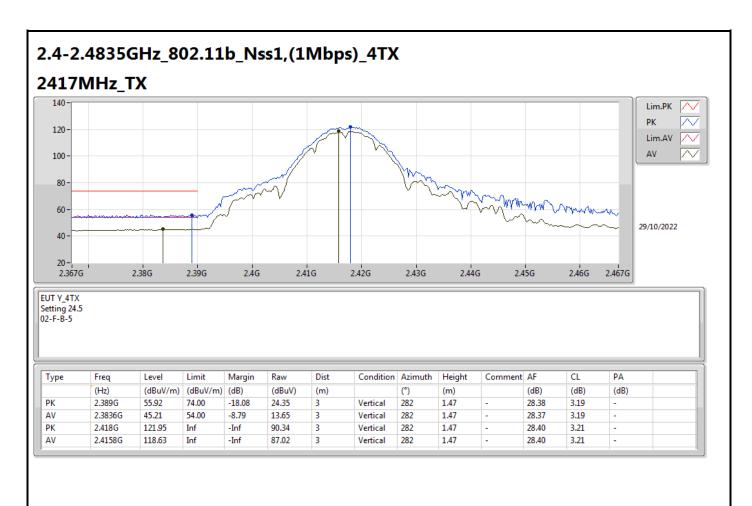






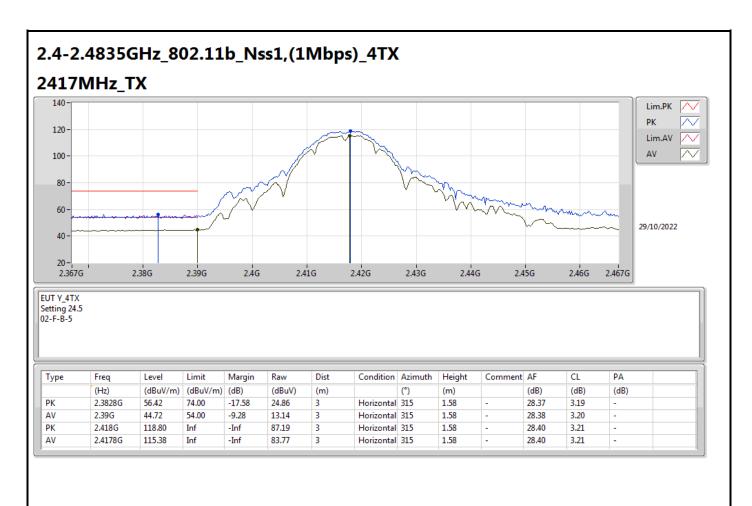
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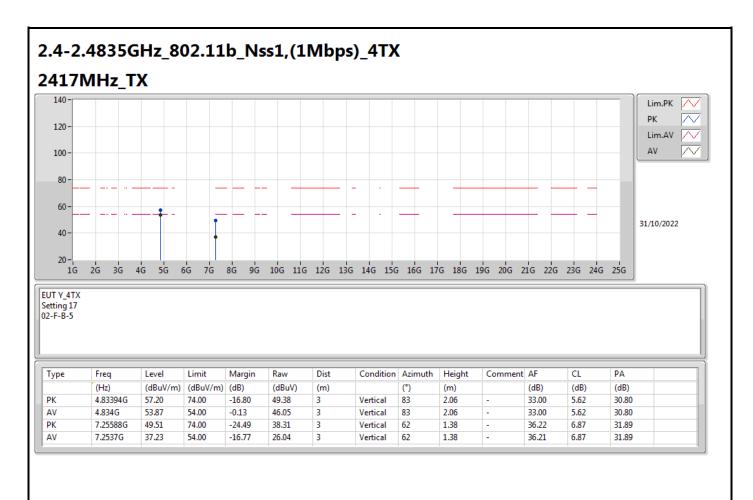
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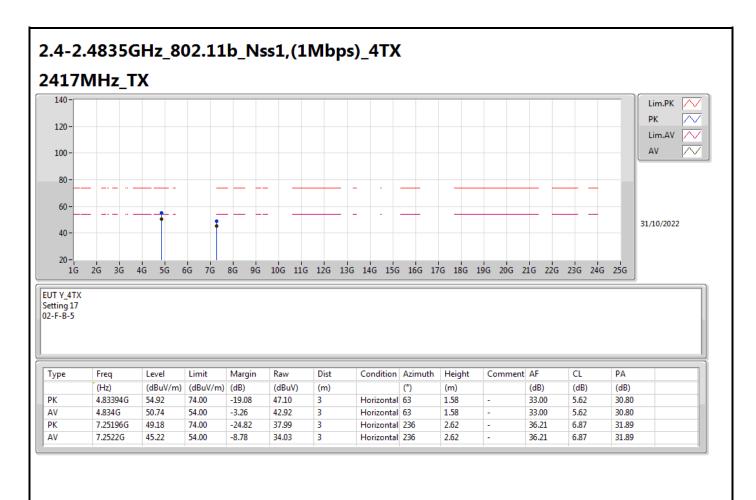
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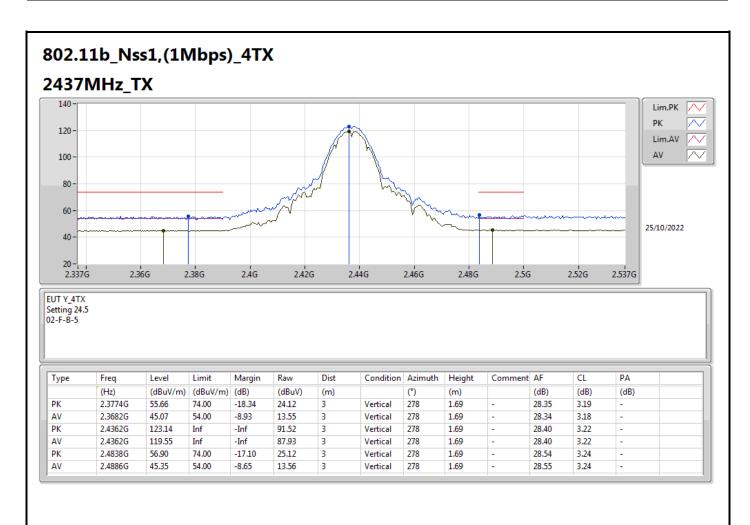
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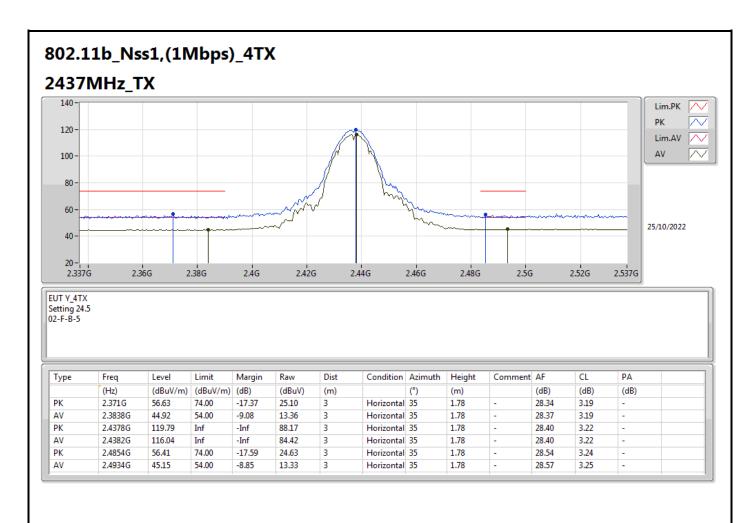




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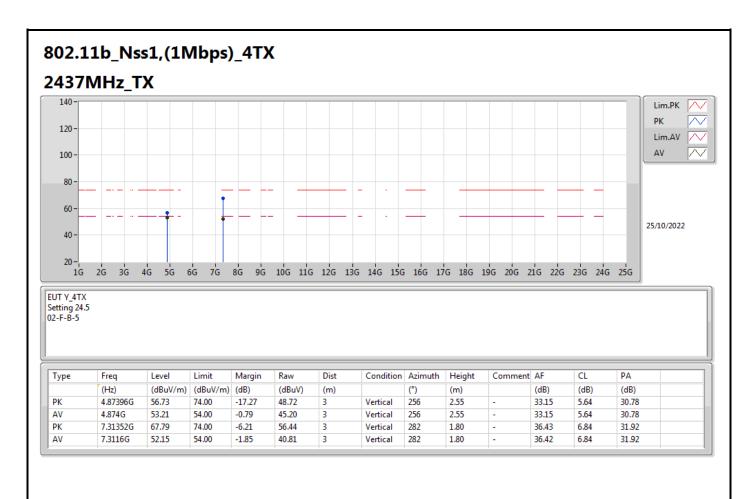
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Appendix F.2





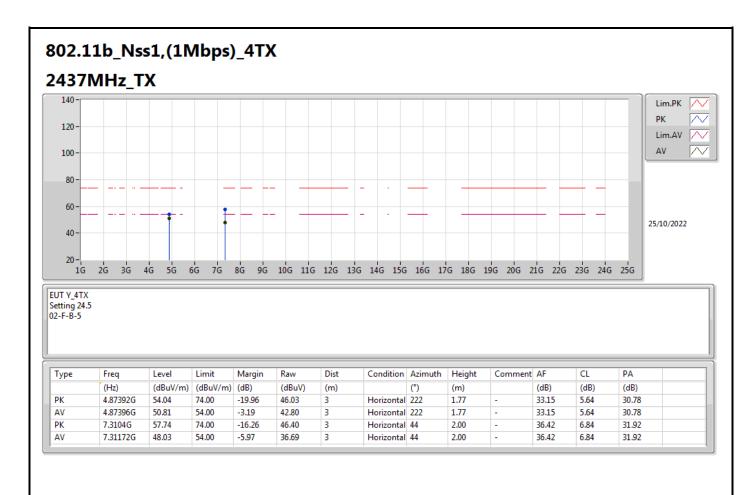
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Appendix F.2

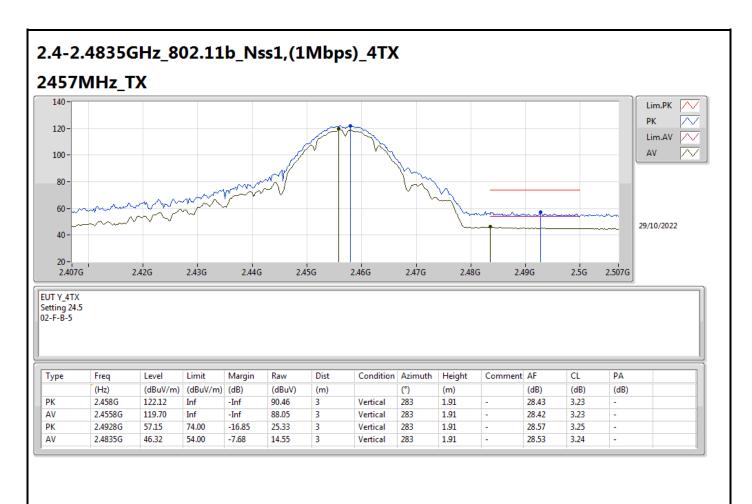




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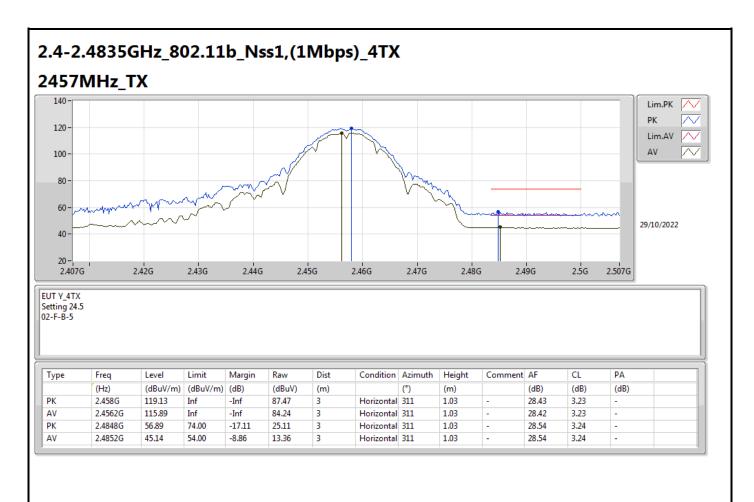




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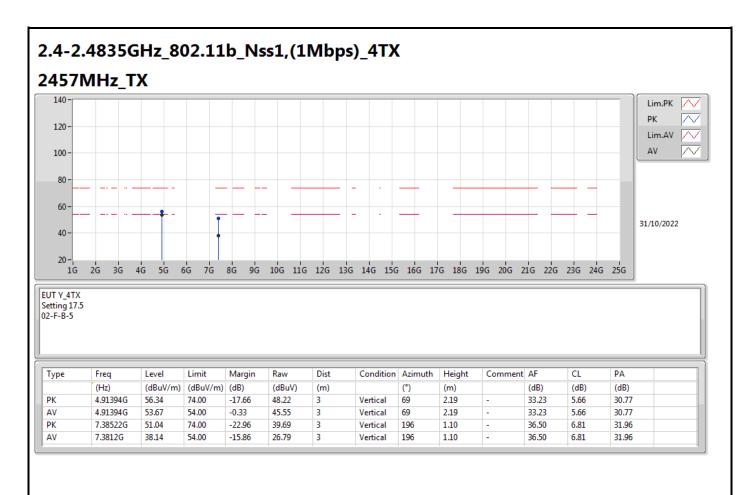




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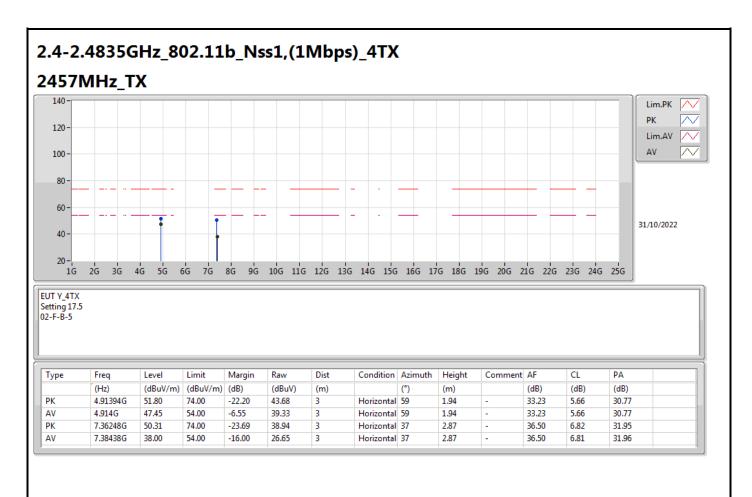
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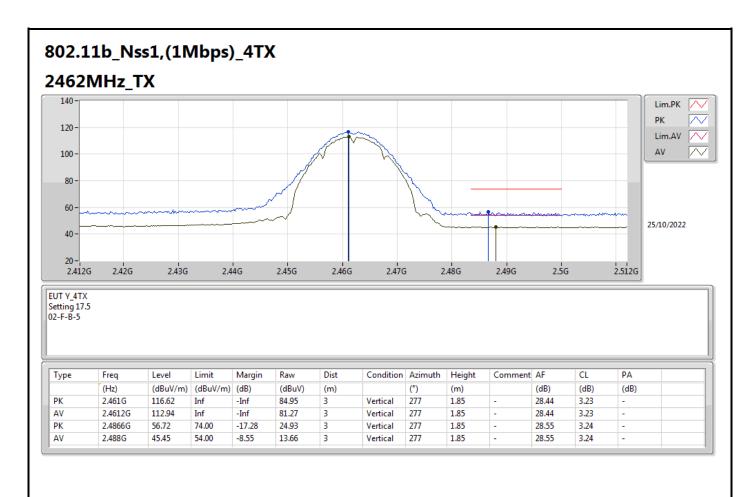
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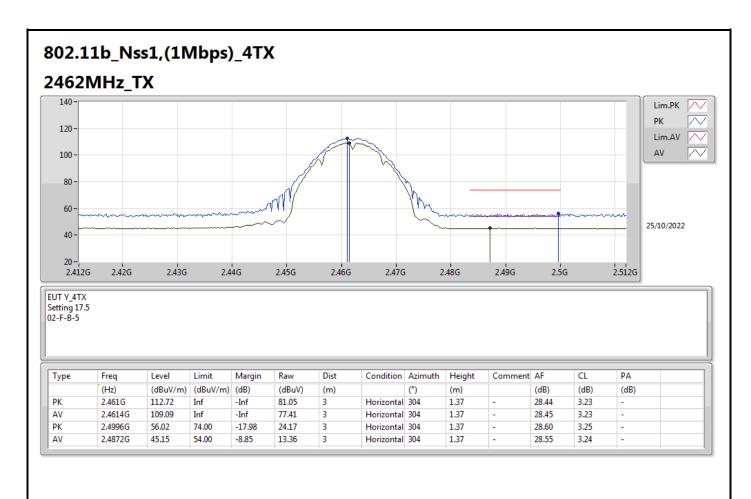




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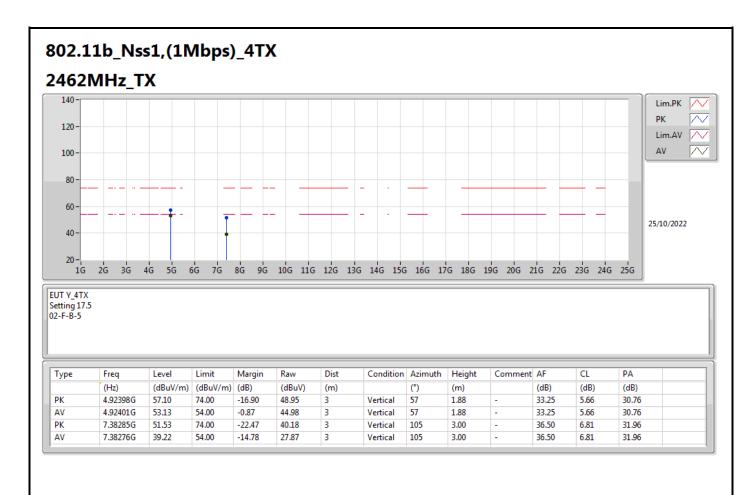
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Appendix F.2





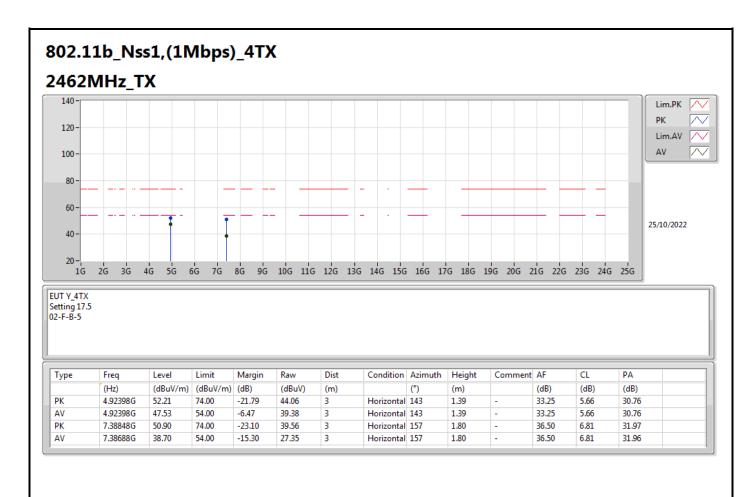
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Appendix F.2

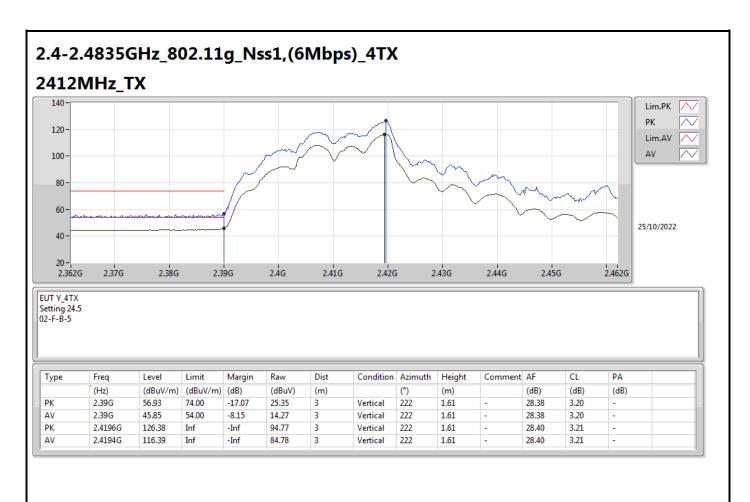




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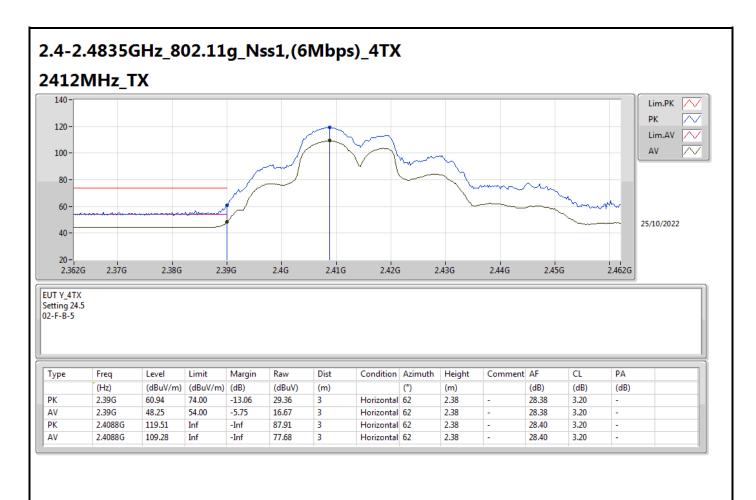




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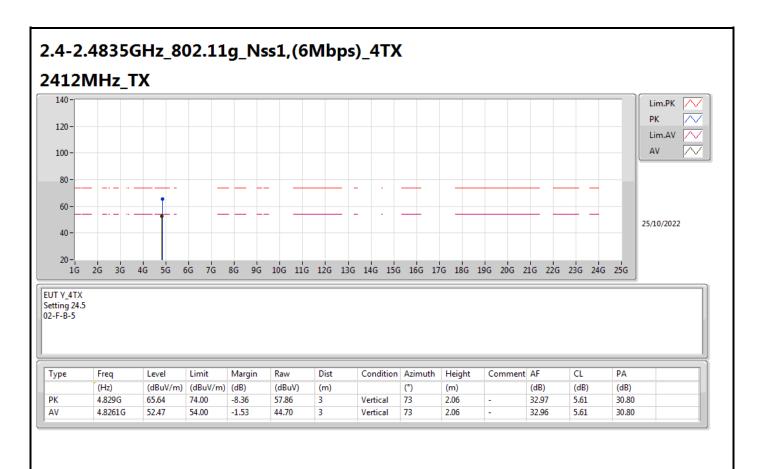




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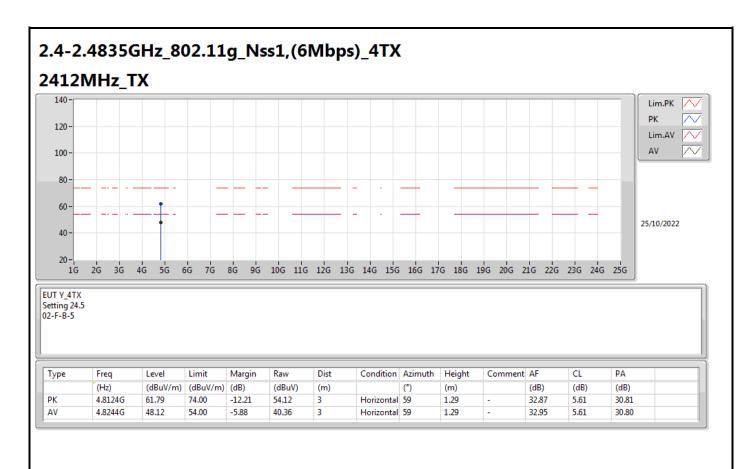




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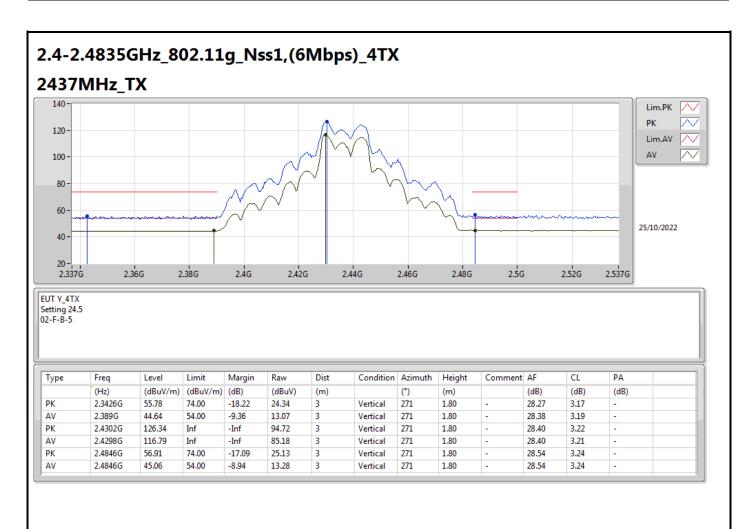




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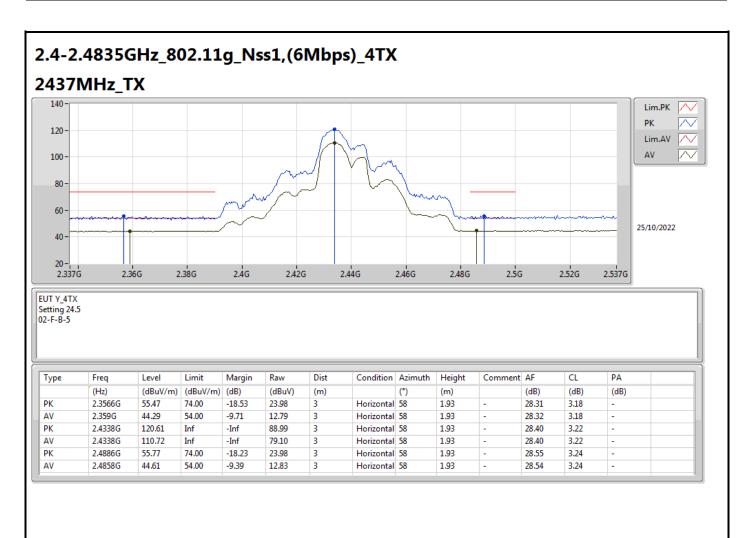




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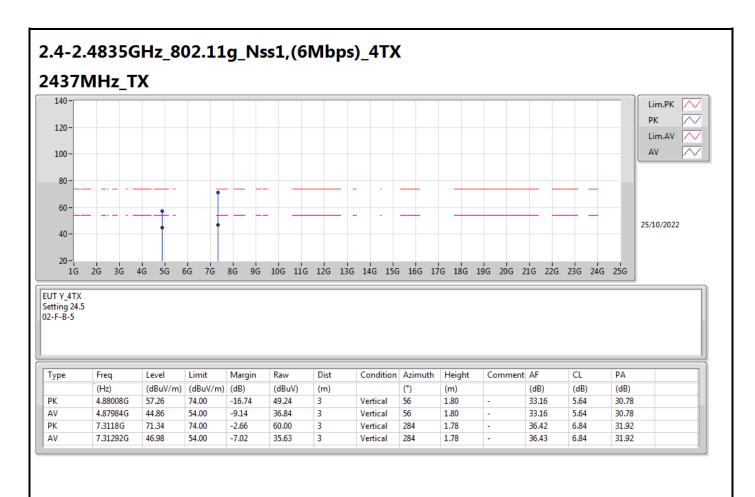
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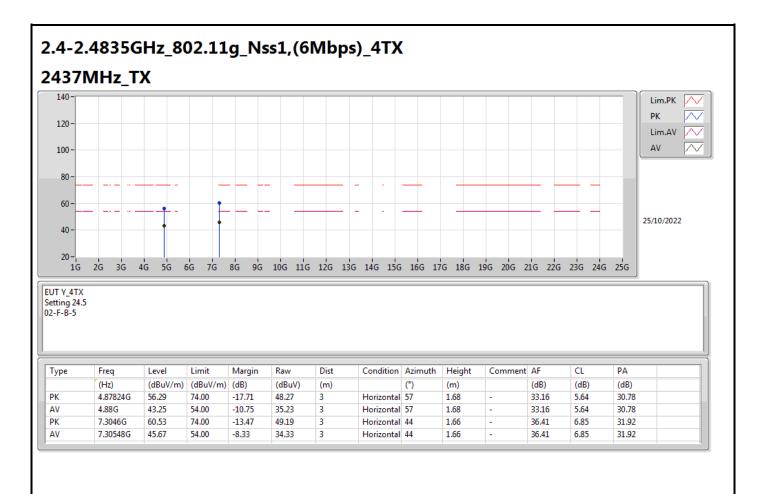




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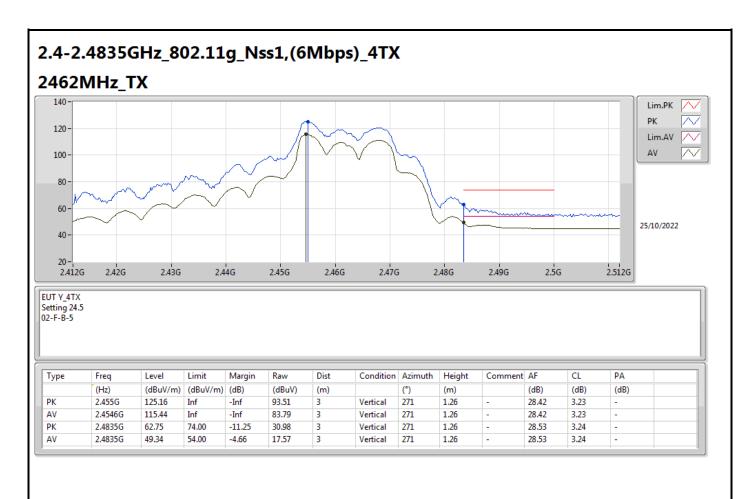
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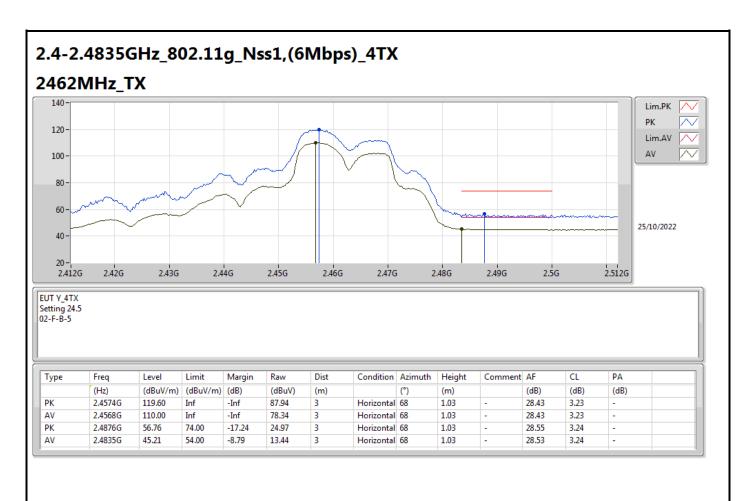




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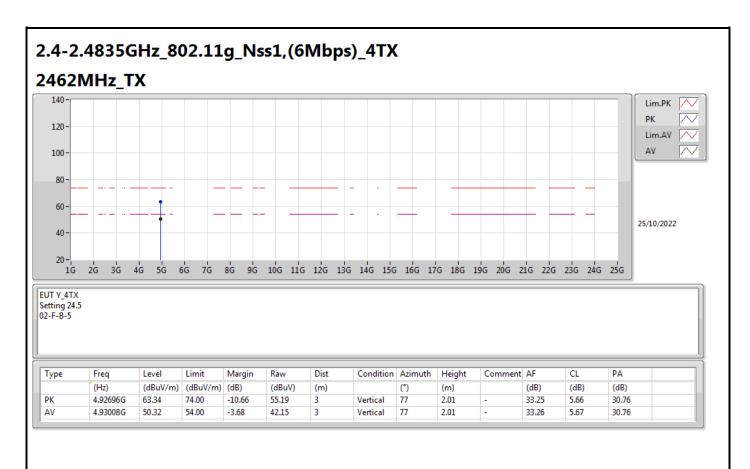
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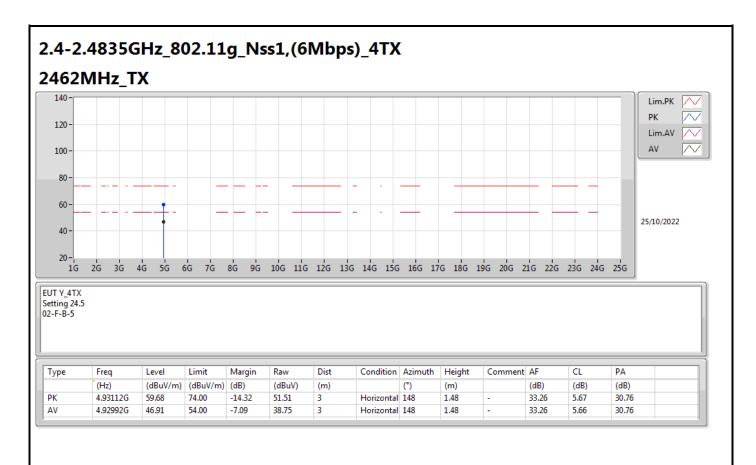




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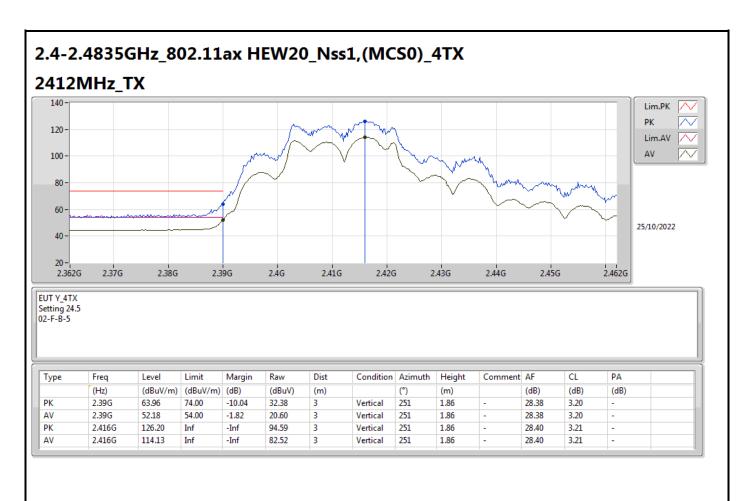




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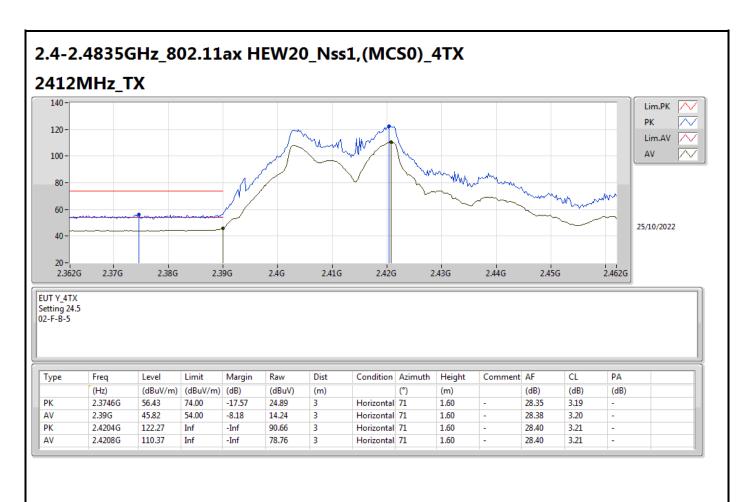




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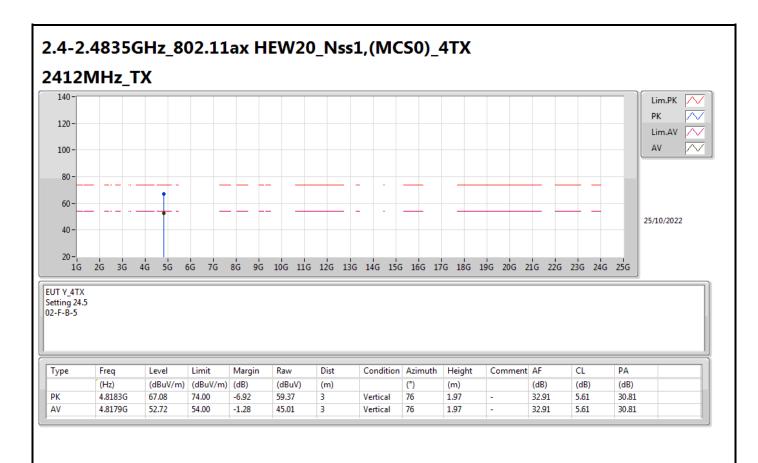




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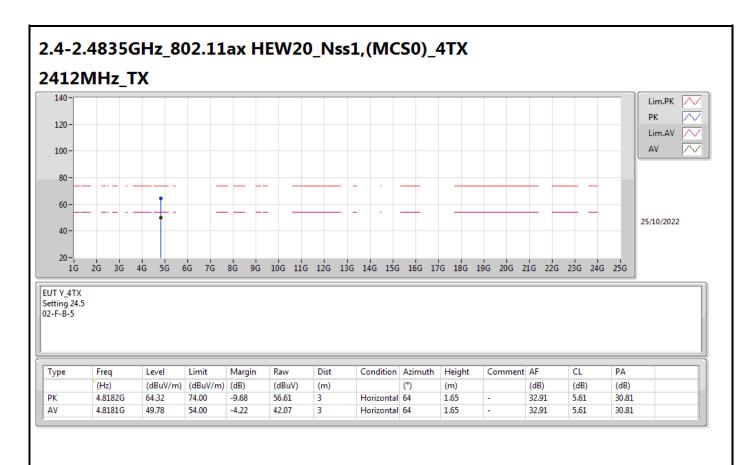




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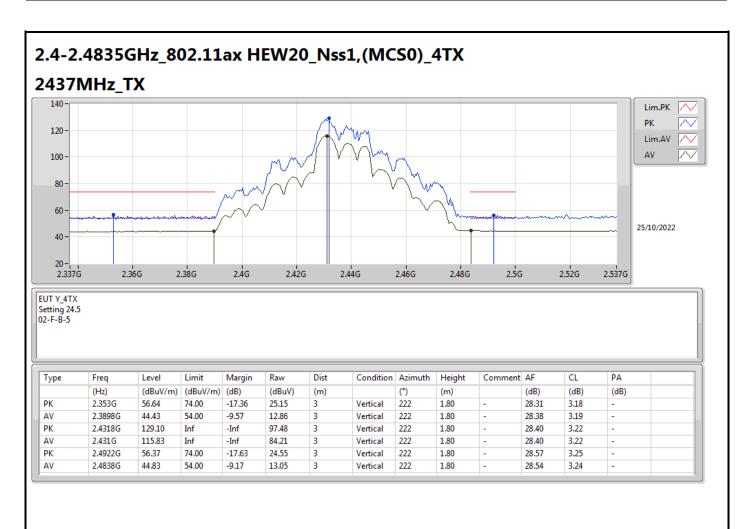
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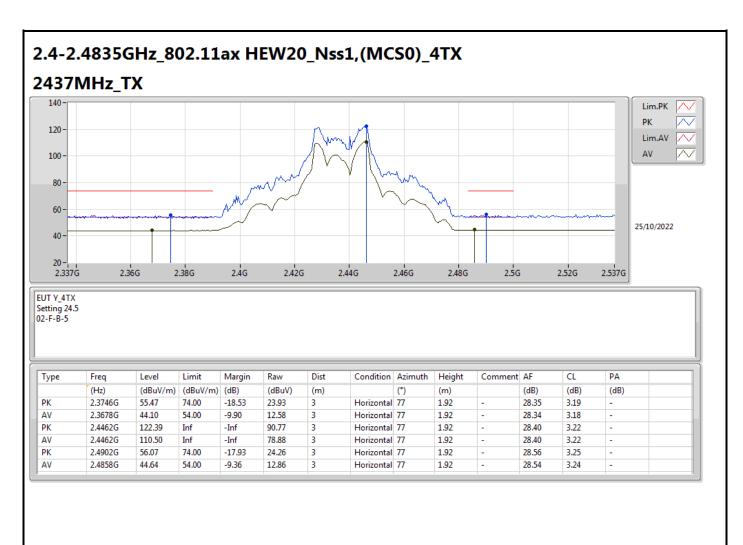
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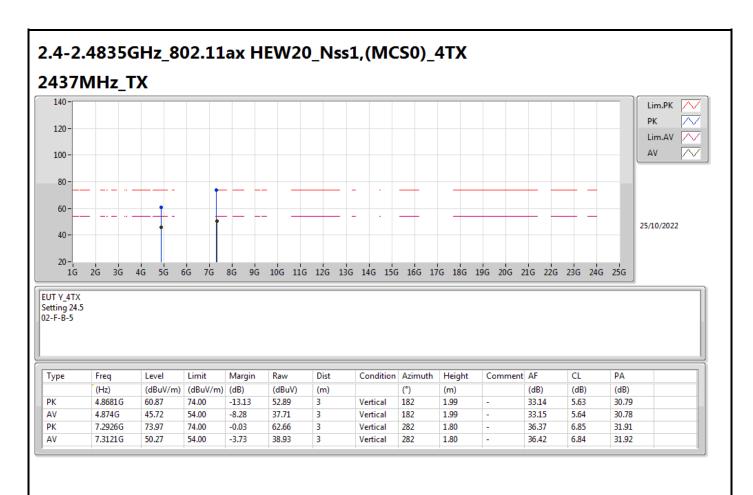
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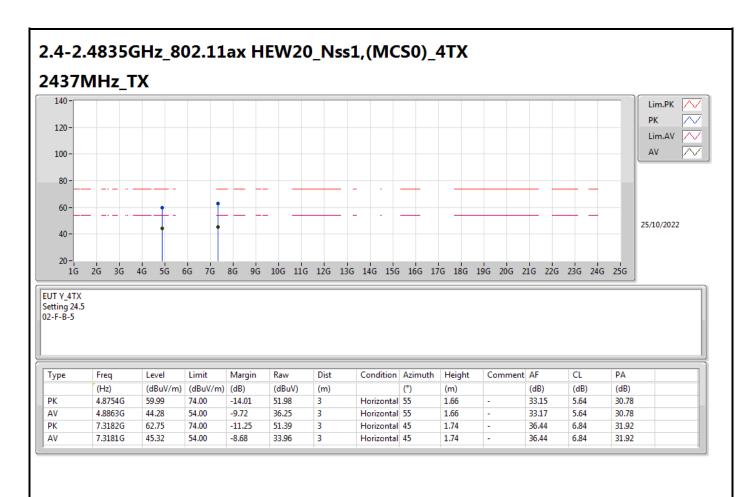




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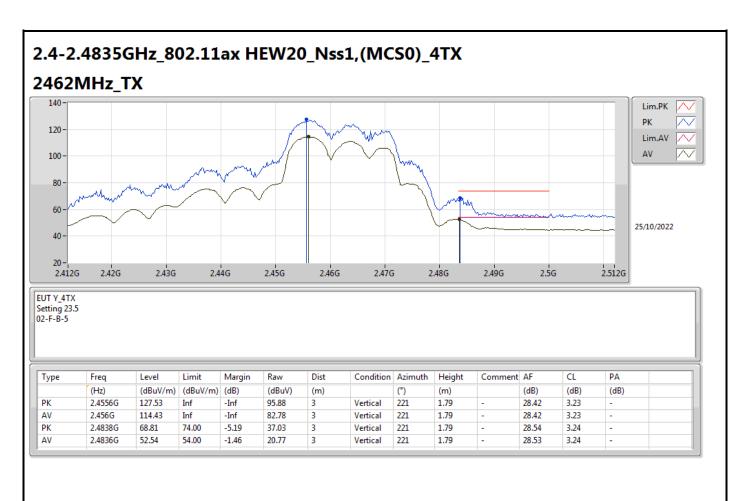




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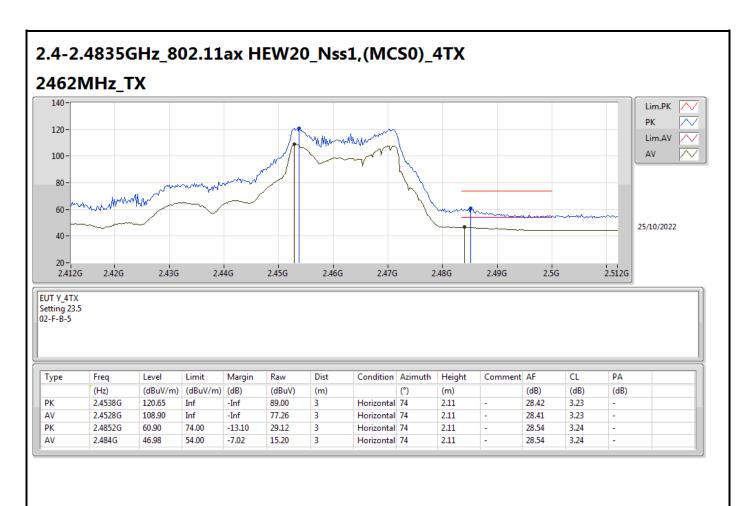




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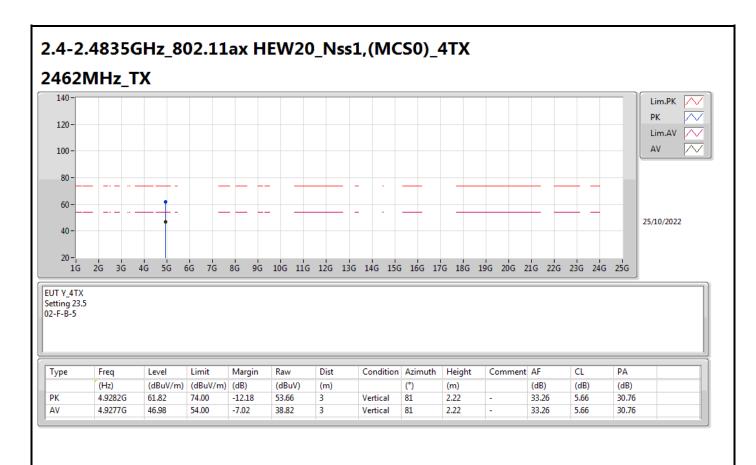




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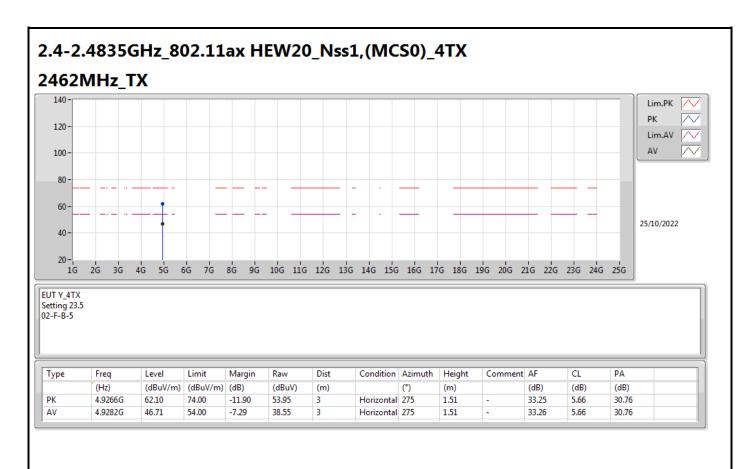




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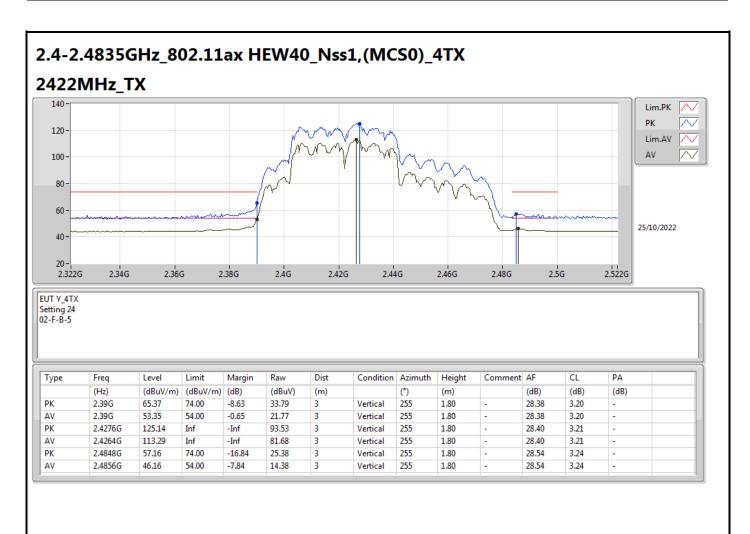




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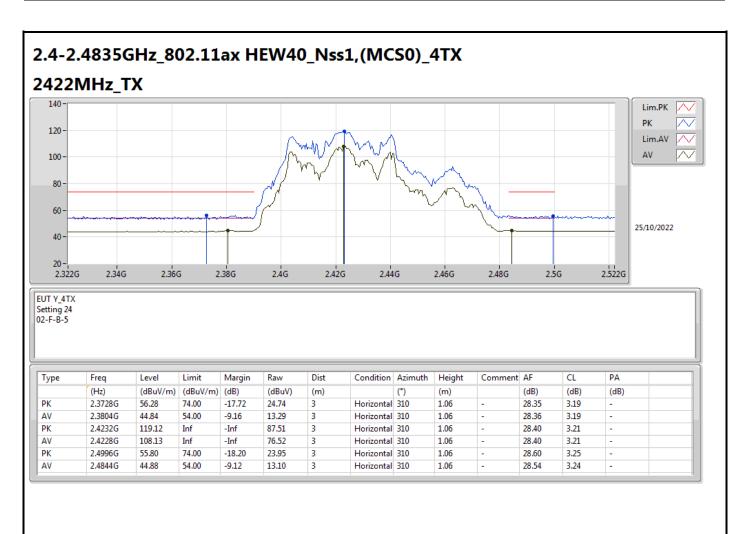




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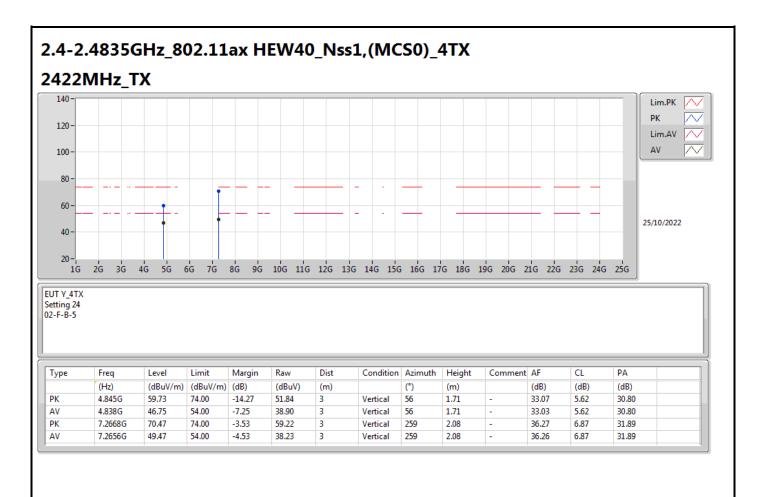
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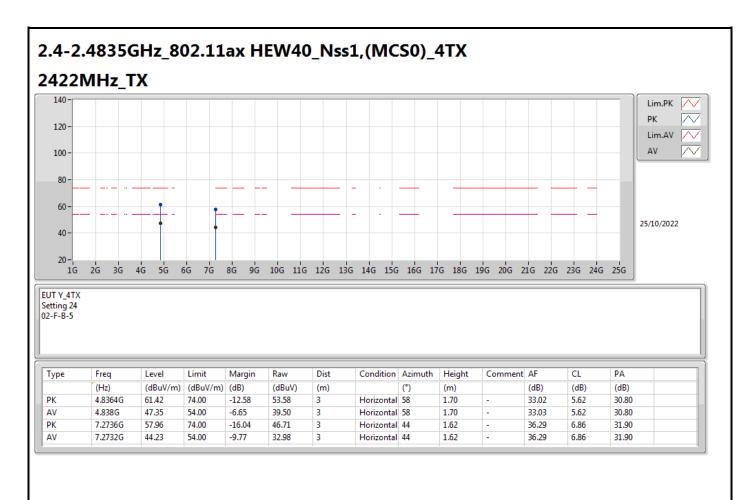
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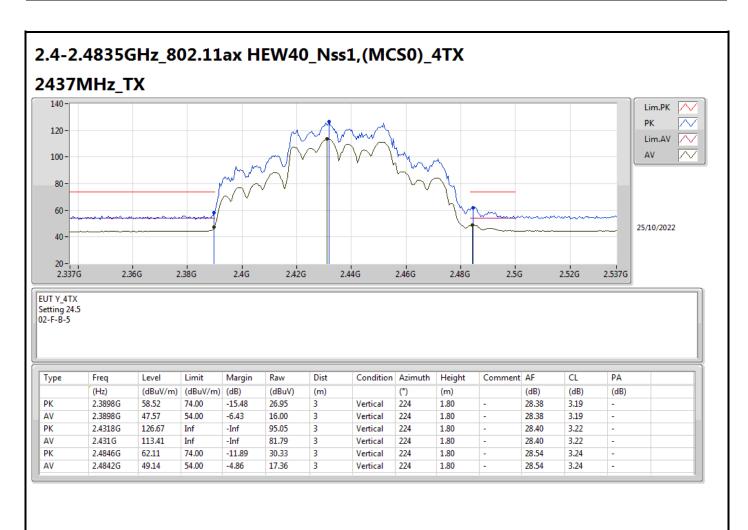




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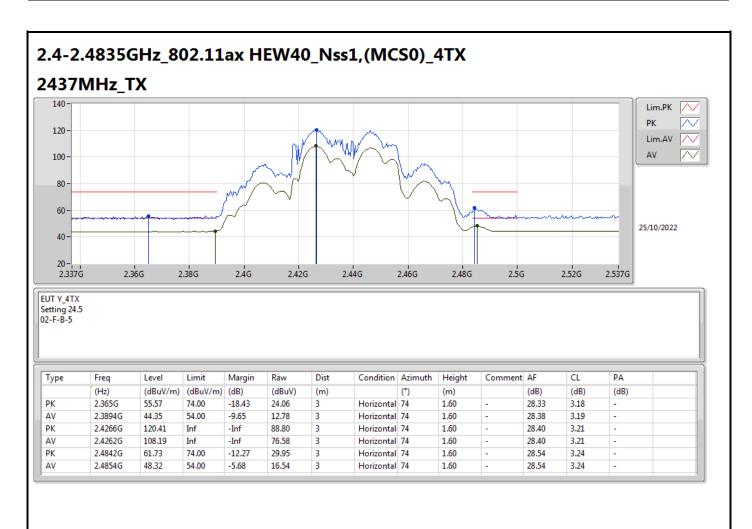




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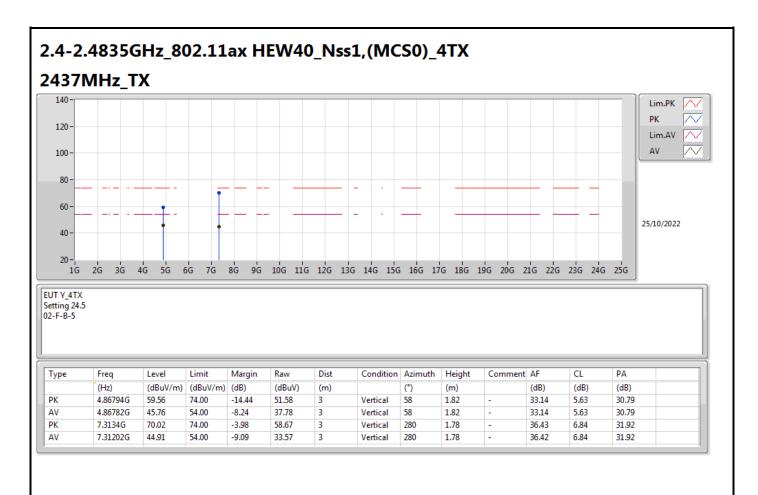
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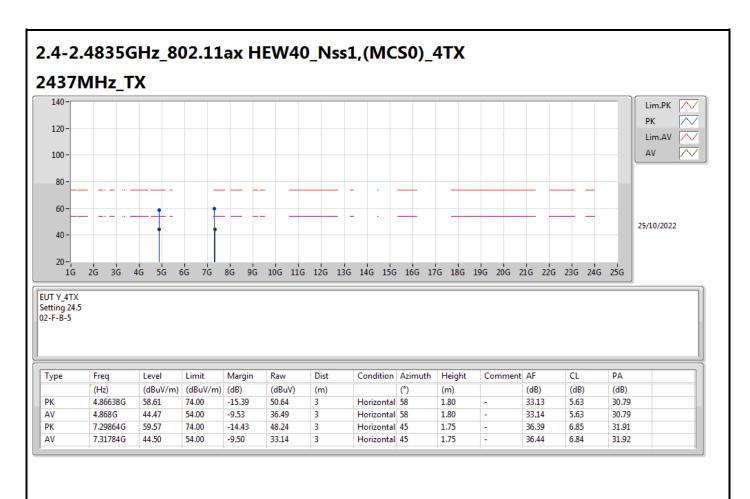




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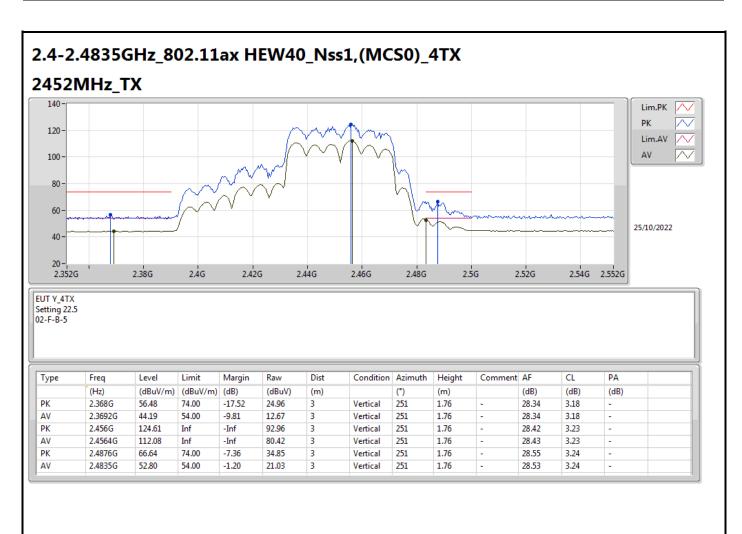




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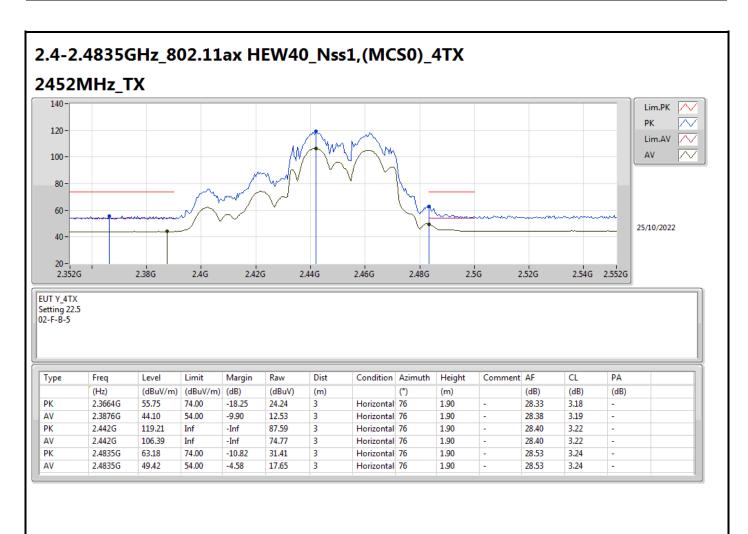




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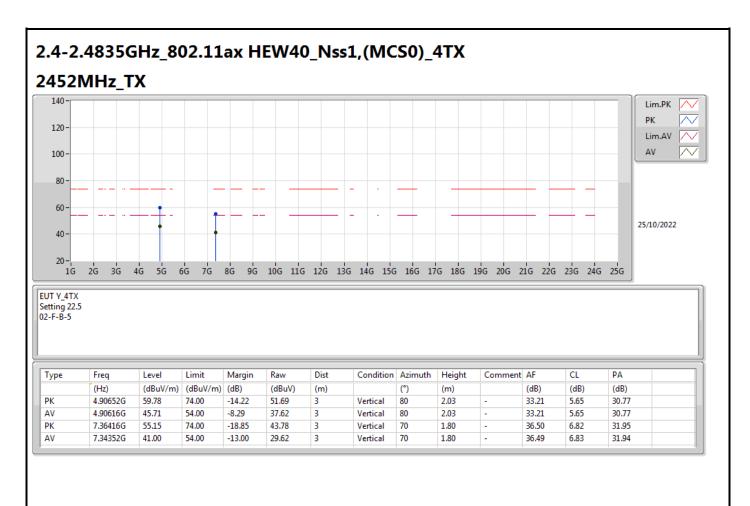
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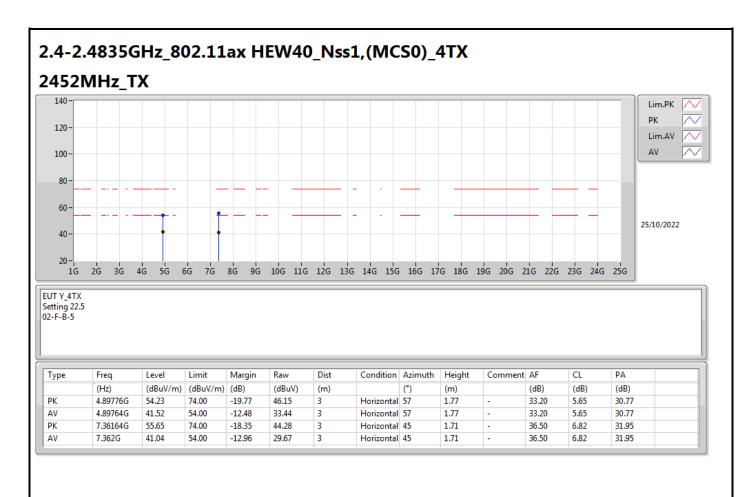




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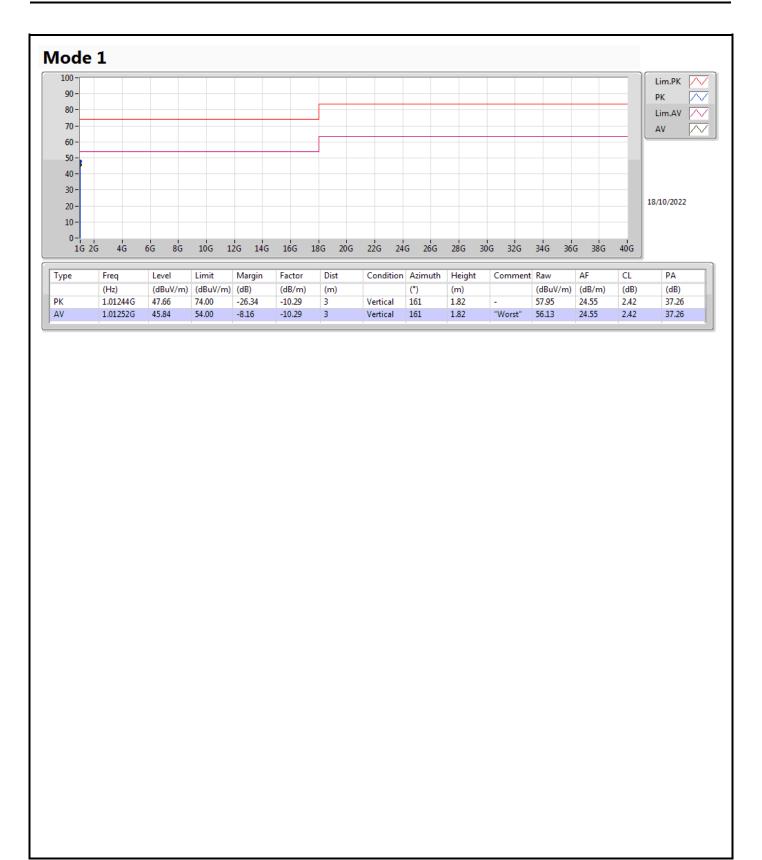
## Radiated Emissions above 1GHz\_Co-location

Appendix G

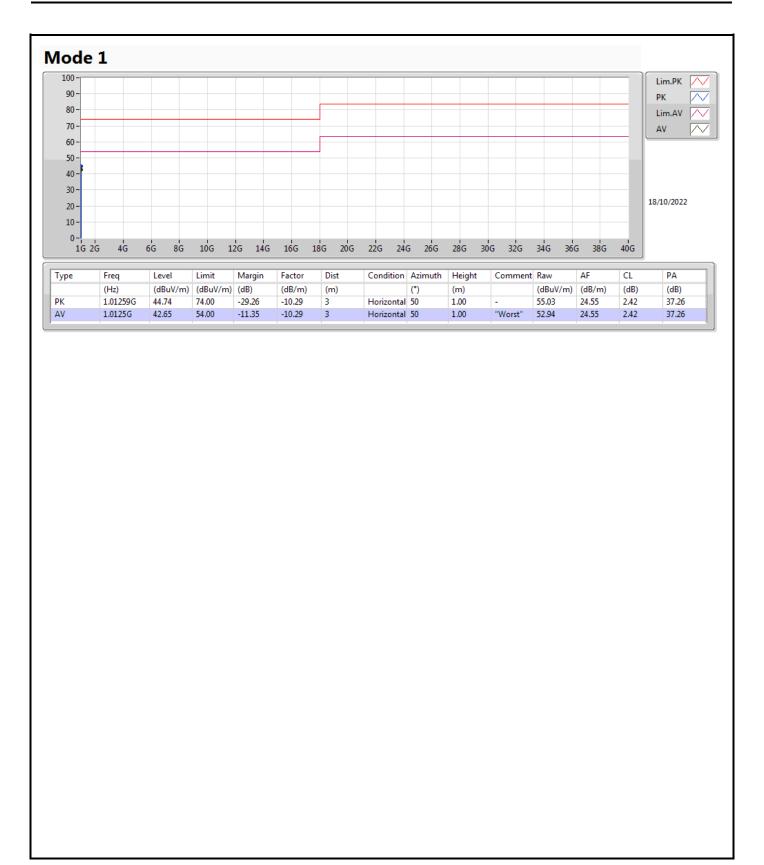
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	1.01252G	45.84	54.00	-8.16	Vertical

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