



# RADIO TEST REPORT

FCC ID

: 2AYRA-03639

Equipment

: Velop AX5400 WiFi 6 System

**Brand Name** 

: LINKSYS

Model Name

: MX5500, MX55EC, MX55MS, MX55WH

Applicant

: Linksys USA, Inc.

12045 East Waterfront Drive Playa Vista, CA 90094,

United States.

Standard

: 47 CFR FCC Part 15.247

The product was received on Feb. 03, 2021, and testing was started from Feb. 03, 2021 and completed on May 11, 2021. 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: Cliff Chang

Sporton International Inc. Hsinchu Laboratory

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

TEL: 886-3-656-9065 FAX: 886-3-656-9085

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# History of this test report

Report No.: FR122657AA

Report No.	Version	Description	Issued Date
FR122657AA	01	Initial issue of report	May 27, 2021

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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.

#### **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: Vicky Huang

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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	Band Mode		Nant
2.4-2.4835GHz	2.4-2.4835GHz 802.11b		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	VHT 20	20	2TX
2.4-2.4835GHz	VHT 20-BF	20	2TX
2.4-2.4835GHz	802.11ax (HEW20)	20	2TX
2.4-2.4835GHz	2.4-2.4835GHz 802.11ax (HEW20)-BF		2TX
2.4-2.4835GHz	802.11n (HT40)	40	2TX
2.4-2.4835GHz	2.4-2.4835GHz 802.11n (HT40)-BF		2TX
2.4-2.4835GHz	2.4-2.4835GHz VHT 40		2TX
2.4-2.4835GHz	2.4-2.4835GHz VHT 40-BF		2TX
2.4-2.4835GHz	2.4-2.4835GHz 802.11ax (HEW40)		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

		Port						Gain
Ant.	2.4GHz	5GHz	Bluetooth	Brand	Model Name	Antenna Type	Connector	(dBi)
1	2	1	-	Galtronics	02102140-07315-1	PCB	U.FL	
2	1	2	-	Galtronics	02102140-07315-2	PCB	U.FL	
3	-	3	-	Galtronics	02102142-07315-1	PCB	U.FL	Note
4	-	4	-	Galtronics	02102142-07315-2	PCB	U.FL	
5	-	-	1	Galtronics	02036073-07315	PCBA Launched	N/A	

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Note:

#### <Antenna Gain>

A 1			WLAN Gain (dBi)	
Ant.	Port	2.4 GHz	5GHz Band 1	5GHz Band 4
1	1	1.67	2.85	2.84
2	2	1.67	2.85	2.84
3	3	-	4.90	4.60
4	4	-	4.90	4.60

Ant.	Bluetooth Gain (dBi)
5	5.3

#### < Directional Gain>

			Gain	(dBi)	
Ant.	Port	4T	15	4T4S	
		5GHz Band 1	5GHz Band 4	5GHz Band 1	5GHz Band 4
1	1				
2	2	5.48	F. F.	4.50	2.02
3	3		5.5	1.58	2.03
4	4				

Note: 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 (4TX/4RX):

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

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

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#### For Bluetooth Function:

### For Bluetooth mode (1TX/1RX)

Only Port 1 can be use as transmit and receive antenna.

#### 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.917	0.38	12.625m	100
802.11g	0.938	0.28	1.98m	1k
802.11ax HEW20-BF	0.933	0.3	1.855m	1k
802.11ax HEW40-BF	0.917	0.38	1.955m	1k

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#### Note:

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

### 1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter				
	$\boxtimes$	With beamforming		Without beamforming	
Beamforming Function	The product has beamforming function for n/VHT/ax in 2.4GHz and n/ac/ax in 5GHz				
Function	☑ Point-to-multipoint   ☐ Point-to-point				
	non-beamforming mode: QSPR V5.0-00196 beamforming mode: DOS V6.1.7601				

Note: The above information was declared by manufacturer.

#### 1.1.5 Table for Multiple Listing

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

Brand Name	Model Name	Description
	MX5500	
LINIKOVO	MX55EC	All the models are identical, the difference model served as marketing
LINKSYS	MX55MS	strategy.
	MX55WH	

Note 1: From the above models, model: MX5500 was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

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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
- ANSI C63.10-2013

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

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

# 1.3 Testing Location Information

#### **Testing Location Information**

Test Lab.: Sporton International Inc. Hsinchu Laboratory

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

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

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH01-CB	Serway Li	21.2-23.2 / 54-57	Feb. 03, 2021~ Mar. 10, 2021
Radiated (Below 1GHz)	03CH06-CB	Eason Chen	20.1-21.3 / 56-58	Feb. 26, 2021~ May 07, 2021
Radiated (Radiated Emission Co-location)	03CH05-CB	Eason Chen	21.5-22.6 / 55-58	Feb. 26, 2021~ May 07, 2021
Radiated (Above 1GHz)	03CH01-CB	Eason Chen	21-22.2 / 55-57	Feb. 26, 2021~ May 07, 2021
AC Conduction	CO02-CB	Wei Li	23~24 / 57~60	Mar. 26, 2021~ May 11, 2021

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

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Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.8 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.0 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.9 dB	Confidence levels of 95%
Conducted Emission	2.8 dB	Confidence levels of 95%
Output Power Measurement	1.4 dB	Confidence levels of 95%
Power Density Measurement	2.8 dB	Confidence levels of 95%
Bandwidth Measurement	0.4%	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	23.5
2437MHz	25
2462MHz	23
802.11g_Nss1,(6Mbps)_2TX	-
2412MHz	21
2417MHz	22.5
2437MHz	25
2457MHz	22
2462MHz	20.5
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-
2412MHz	23
2417MHz	25
2437MHz	27
2457MHz	24
2462MHz	24
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-
2422MHz	22
2437MHz	24
2452MHz	22

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#### Note:

- There are two modes of EUT for n/VHT/ax in 2.4GHz and n/ac/ax in 5GHz. One is beamforming mode, and the other is non-beamforming mode, after evaluating, beamforming mode has been evaluated to be the worst case, so it was selected to test and record in this test report.
- Evaluated HEW20/HEW40 mode only, due to similar modulation. The power setting of HT20/HT40/VHT20/VHT40 mode are the same or lower than HEW20/HEW40.

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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	Condition AC power-line conducted measurement for line and neutral		
Operating Mode Normal Link			
1 EUT + Adapter 1 + RJ-45 cable 1			
2 EUT + Adapter 2 + RJ-45 cable 1			
3	EUT + Adapter 3 + RJ-45 cable 1		
4	4 EUT + Adapter 4 + RJ-45 cable 1		
For operating mode 2 is the worst case and it was record in this test report.			

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Th	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			

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Th	The Worst Case Mode for Following Conformance Tests				
Tests Item	Emissions in Restricted Frequency Bands				
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.				
Operating Mode < 1GHz	CTX				
1	EUT-WLAN 2.4GHz + Adapter 1 + RJ-45 cable 1				
2	EUT-WLAN 2.4GHz + Adapter 2 + RJ-45 cable 1				
Mode 1 has been evaluate follow this same test mode	ed to be the worst case between Mode 1~2, thus measurement for Mode 3~4 will				
3	EUT-Bluetooth + Adapter 1 + RJ-45 cable 1				
4	EUT-WLAN 5GHz + Adapter 1 + RJ-45 cable 1				
Mode 1 has been evaluate follow this same test mode	ed to be the worst case between Mode 1~4, thus measurement for Mode 5~6 will				
5	EUT-WLAN 2.4GHz + Adapter 3 + RJ-45 cable 1				
6	EUT-WLAN 2.4GHz + Adapter 4 + RJ-45 cable 1				
Mode 1 has been evaluated to be the worst case between Mode 1~6, thus measurement for Mode 7 wil follow this same test mode.					
7	EUT-WLAN 2.4GHz + Adapter 1 + RJ-45 cable 2				
For operating mode 1 is th	e worst case and it was record in this test report.				
Operating Mode > 1GHz	Operating Mode > 1GHz CTX				

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The Worst Case Mode for Following Conformance Tests			
Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location			
Test Condition Radiated measurement			
Operating Mode Normal Link			
1 WLAN 2.4GHz+WLAN 5GHz			
Refer to Appendix G for Radiated Emission Co-location.			

The Worst Case Mode for Following Conformance Tests				
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation				
Operating Mode	Operating Mode			
1 WLAN 2.4GHz+WLAN 5GHz+Bluetooth				
Refer to Sporton Test Report No.: FA122657 for Co-location RF Exposure Evaluation.				

Note: The EUT can only be used at Z axis position.

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# 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 V6.1.7601.
- 3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by Client and transmit duty cycle no less than 98%.

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For Normal Link:

During the test, the EUT operation to normal function.

#### 2.4 Accessories

Accessories					
<b>Equipment Name</b>	Brand Name	Model Name	Rating		
Adapter 1 (Fixed plug)	Ktec	KSA-24W-120200HU	INPUT: 100-240V~50/60Hz, 0.6A OUTPUT: 12V, 2.0A		
Adapter 2 (Fixed plug)	APD	WB-24J12FU	INPUT: 100-240V~50-60Hz, 0.7A Max. OUTPUT: 12V, 2A		
Adapter 3 (Removable plug)	Ktec	KSA-24W-120200D5	INPUT: 100-240V~50/60Hz, 0.6A OUTPUT: 12.0V, 2.0A 24.0W		
Adapter 4 (Removable plug)	APD	WB-24J12R	INPUT: 100-240V~50-60Hz, 0.7A Max. OUTPUT: 12.0V, 2.0A 24.0W		
		Other			
US plug*2 (for adapter 3 and adapter 4 use)					
RJ-45 cable 1*1, non-shielded, 1.8m, Type: flat wire					
RJ-45 cable 2*1, non-shielded, 1.8m, Type:round wire					

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# 2.5 Support Equipment

#### For AC Conduction:

	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
Α	WAN NB	DELL	E6430	N/A		
В	LAN NB	DELL	E6430	N/A		
С	2.4G NB	DELL	E6430	N/A		
D	5G NB	DELL	E6430	N/A		
Е	iPad	Apple	A1430	N/A		

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For Radiated (below 1GHz):

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

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

For non-beamforming mode:

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

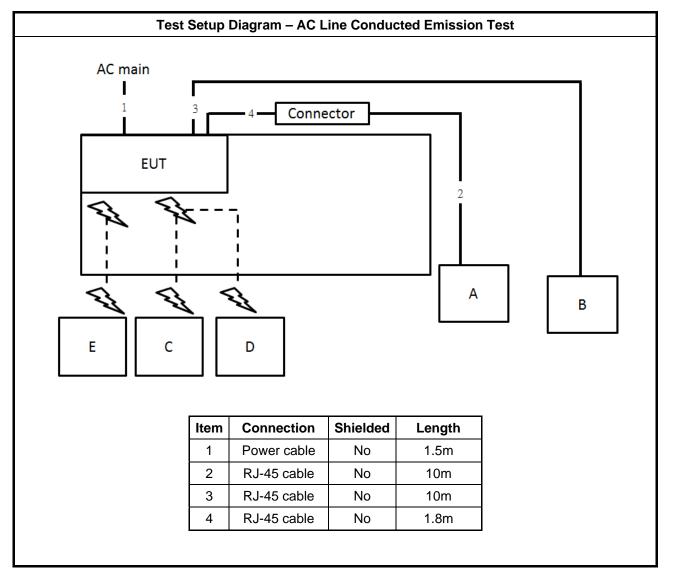
For beamforming mode:

	Support Equipment							
No. Equipment Brand Name Model Name FCC II								
Α	A NB DELL		E4300	N/A				
В	C NB DELL		Dominica	N/A				
С			E4300	N/A				

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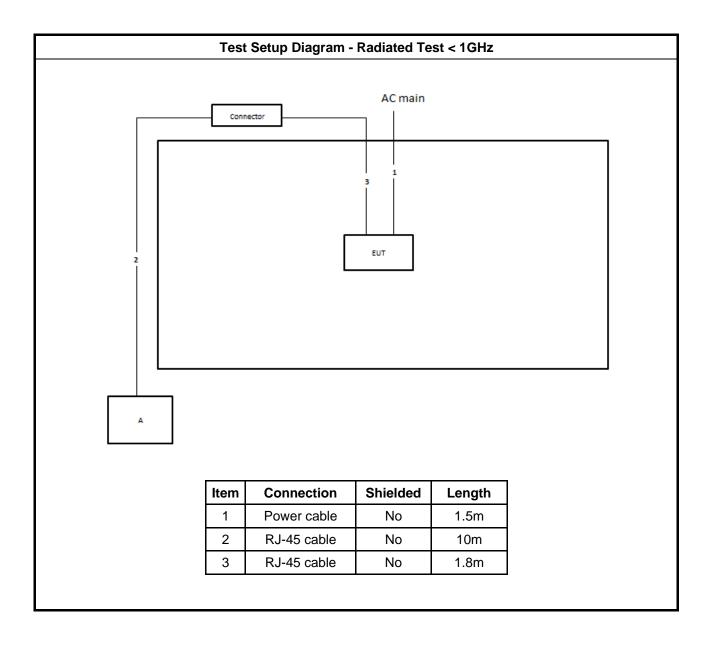


# 2.6 Test Setup Diagram



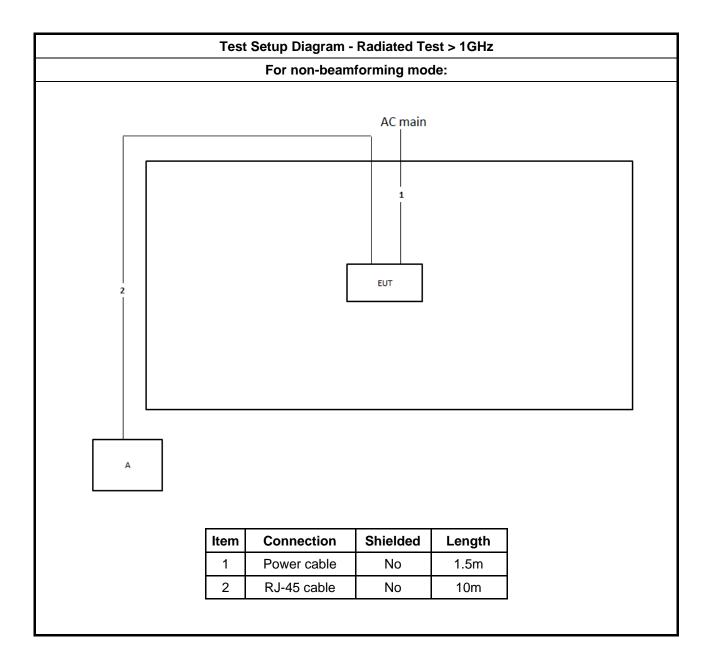
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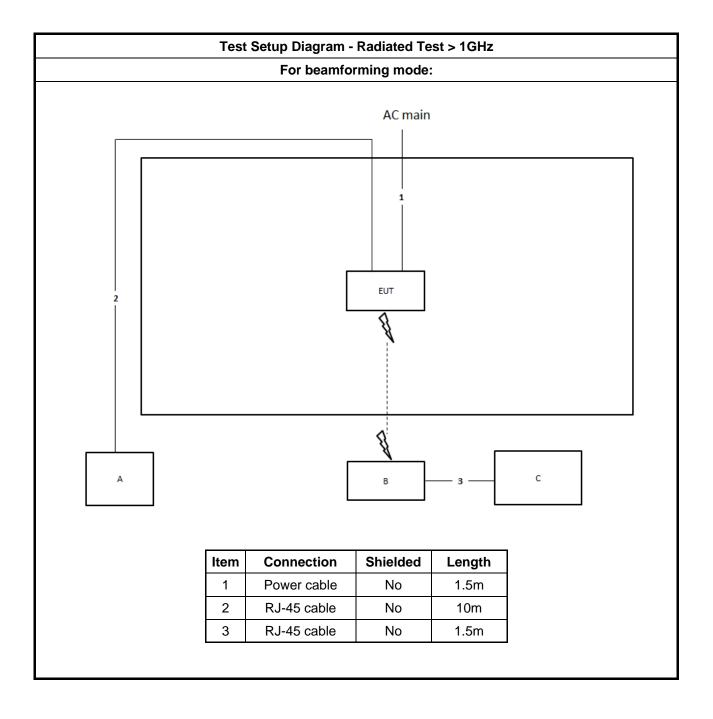
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# 3 Transmitter Test Result

# 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

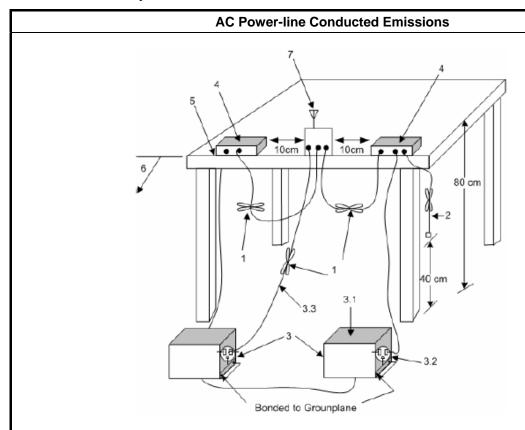
Refer a test equipment and calibration data table in this test report.

### 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 u	Systems using digital modulation techniques:				
■ 6 dB b	andwidth ≥ 500 kHz.				

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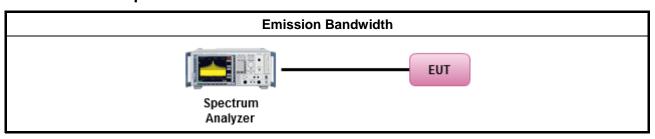
### 3.2.2 Measuring Instruments

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

### 3.3.2 Measuring Instruments

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

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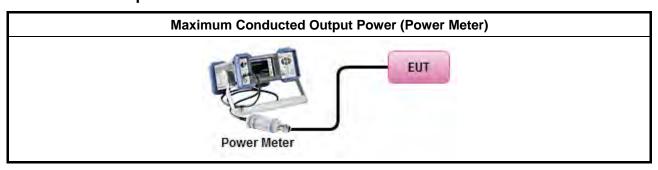
### 3.3.3 Test Procedures

	Test Method					
•	Max	imum Peak Conducted Output Power				
		Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).				
		Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).				
•	Max	imum Conducted Output Power				
	[duty	/ cycle ≥ 98% or external video / power trigger]				
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.				
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)				
	duty	cycle < 98% and average over on/off periods with duty factor				
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.				
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)				
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3				
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)				
	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).				
	$\boxtimes$	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: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$				

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# 3.3.4 Test Setup



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# 3.3.5 Test Result of Maximum Conducted Output Power

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

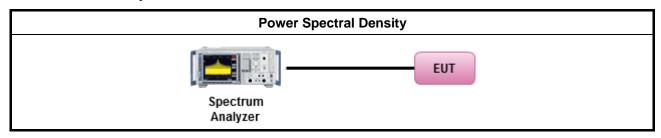
Refer a test equipment and calibration data table in this test report.

#### 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.

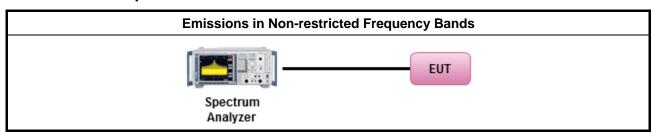
#### 3.5.2 Measuring Instruments

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 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

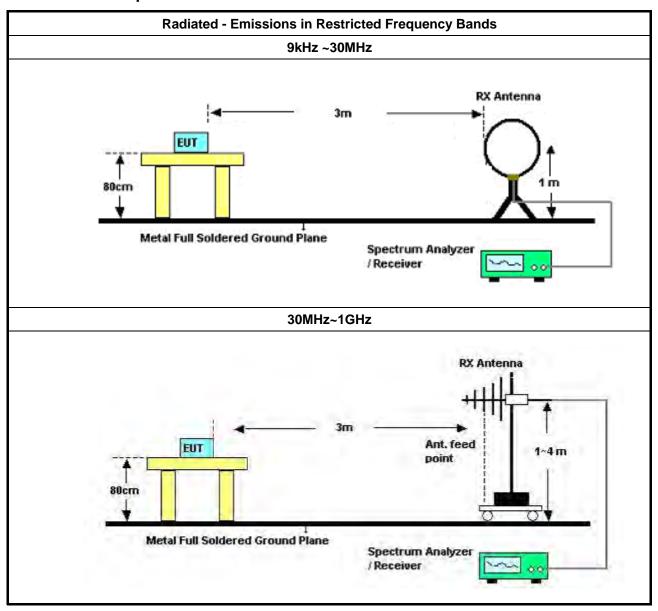
		Test Method			
•	The a	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].			
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.				
•	For the	he transmitter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

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# 3.6.4 Test Setup



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#### 3.6.5 Measurement Results Calculation

The measured Level is calculated using:

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

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

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

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

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

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

Refer as Appendix F

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# 4 Test Equipment and Calibration Data

• •							
Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Dec. 04, 2020	Dec. 03, 2021	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 20, 2020	Nov. 19, 2021	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Mar. 03, 2021	Mar. 02, 2022	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz~30MHz	Oct. 20, 2020	Oct. 19, 2021	Conduction (CO02-CB)
Pulse Limiter	Schwarzbeck	VTSD 9561F-N	00378	9kHz ~ 30MHz	Mar. 18, 2021	Mar. 17, 2022	Conduction (CO02-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH06-CB	30 MHz ~ 1 GHz	Aug. 10, 2020	Aug. 09. 2021	Radiation (03CH06-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Aug. 02, 2020	Aug. 01, 2021	Radiation (03CH06-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Radiation (03CH06-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 16, 2021	Mar. 15, 2022	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Nov. 05, 2020	Nov. 04, 2021	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Dec. 15, 2020	Dec. 14, 2021	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	Radiation (03CH06-CB)
RF Cable-low	Woken	RG402	Low Cable-05+24	30MHz~1GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH05-CB	1GHz ~18GHz 3m	Nov. 08, 2020	Nov. 07, 2021	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	BBHA 9120 D-1291	1GHz~18GHz	Sep. 05, 2020	Sep. 04, 2021	Radiation (03CH05-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2020	Jul. 20, 2021	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC12630SE	980287	1GHz – 26.5GHz	Jul. 03, 2020	Jul. 02, 2021	Radiation (03CH05-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 08, 2020	Jul. 07, 2021	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Nov. 10, 2020	Nov. 09, 2021	Radiation (03CH05-CB)

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Calibration Calibration Instrument **Brand** Model No. Serial No. Characteristics Remark Date **Due Date** Radiation RG402 High Cable-28 1GHz~18GHz Oct. 05, 2020 Oct. 04, 2021 RF Cable-high Woken (03CH05-CB) High Radiation RF Cable-high Woken RG402 1GHz~18GHz Oct. 05, 2020 Oct. 04, 2021 Cable-04+28 (03CH05-CB) High Radiation 18GHz ~ 40 GHz RF Cable-high Woken RG402 Jul. 16, 2020 Jul. 15, 2021 Cable-40G#1 (03CH05-CB) High Radiation RF Cable-high RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Woken Cable-40G#2 (03CH05-CB) Radiation **SPORTON Test Software** SENSE V5.10 N.C.R. N.C.R. (03CH05-CB) 3m Semi 1GHz ~18GHz Anechoic Radiation TDK SAC-3M 03CH01-CB May 29, 2020 May 28, 2021 Chamber (03CH01-CB) 3m **VSWR** Radiation **ETS-LINDGRE** Horn Antenna 3115 00075790 750MHz ~ 18GHz Nov. 06, 2020 Nov. 05, 2021 (03CH01-CB) Radiation Schwarzbeck **BBHA 9170** BBHA9170252 15GHz ~ 40GHz Jul. 21, 2020 Jul. 20, 2021 Horn Antenna (03CH01-CB) Radiation Pre-Amplifier Agilent 8449B 3008A02310 1GHz ~ 26.5GHz Jan. 07, 2021 Jan. 06, 2022 (03CH01-CB) TTA1840-35-H Radiation Pre-Amplifier MITEQ 1864479 18GHz ~ 40GHz Jul. 08, 2020 Jul. 07, 2021 G (03CH01-CB) Spectrum Radiation FSP40 100056 9kHz ~ 40GHz R&S Apr. 16, 2020 Apr. 15, 2021 Analyzer (03CH01-CB) Spectrum Radiation R&S FSP40 100056 9kHz ~ 40GHz May 03, 2021 May 02, 2023 Analyzer (03CH01-CB) Radiation RF Cable-high Woken RG402 High Cable-16 1 GHz ~ 18 GHz Oct. 05, 2020 Oct. 04, 2021 (03CH01-CB) High Radiation 1 GHz ~ 18 GHz RF Cable-high Woken RG402 Oct. 05, 2020 Oct. 04, 2021 Cable-16+17 (03CH01-CB) High Radiation 18GHz ~ 40 GHz RG402 RF Cable-high Woken Jul. 16, 2020 Jul. 15, 2021 Cable-40G#1 (03CH01-CB) High Radiation RF Cable-high Woken RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Cable-40G#2 (03CH01-CB) Radiation Test Software **SPORTON** SENSE V5.10 N.C.R. N.C.R. (03CH01-CB) Spectrum Conducted R&S FSV40 9kHz~40GHz 100979 May 05, 2020 May 04, 2021 (TH01-CB) analvzer Conducted Woken RG402 High Cable-06 1 GHz - 26.5 GHz Oct. 05, 2020 Oct. 04, 2021 RF Cable-high (TH01-CB) Conducted RF Cable-high Woken RG402 High Cable-07 1 GHz -26.5 GHz Oct. 05, 2020 Oct. 04, 2021 (TH01-CB) Conducted RF Cable-high Woken RG402 High Cable-08 1 GHz -26.5 GHz Oct. 05, 2020 Oct. 04, 2021 (TH01-CB) Conducted RF Cable-high Woken RG402 High Cable-09 1 GHz -26.5 GHz Oct. 05, 2020 Oct. 04, 2021 (TH01-CB) Conducted RF Cable-high Woken RG402 High Cable-10 1 GHz -26.5 GHz Oct. 05, 2020 Oct. 04, 2021 (TH01-CB) Conducted RF Cable-high Woken RG402 High Cable-30 1 GHz -26.5 GHz Oct. 05, 2020 Oct. 04, 2021 (TH01-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Power Sensor	Anritsu	MA2411B	1339408	300MHz~40GHz	Sep. 02, 2020	Sep. 01, 2021	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1517009	300MHz~40GHz	Sep. 02, 2020	Sep. 01, 2021	Conducted (TH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH01-CB)

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Note: Calibration Interval of instruments listed above is one year. NCR means Non-Calibration required.

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# AC Power-line Conducted Emissions Result

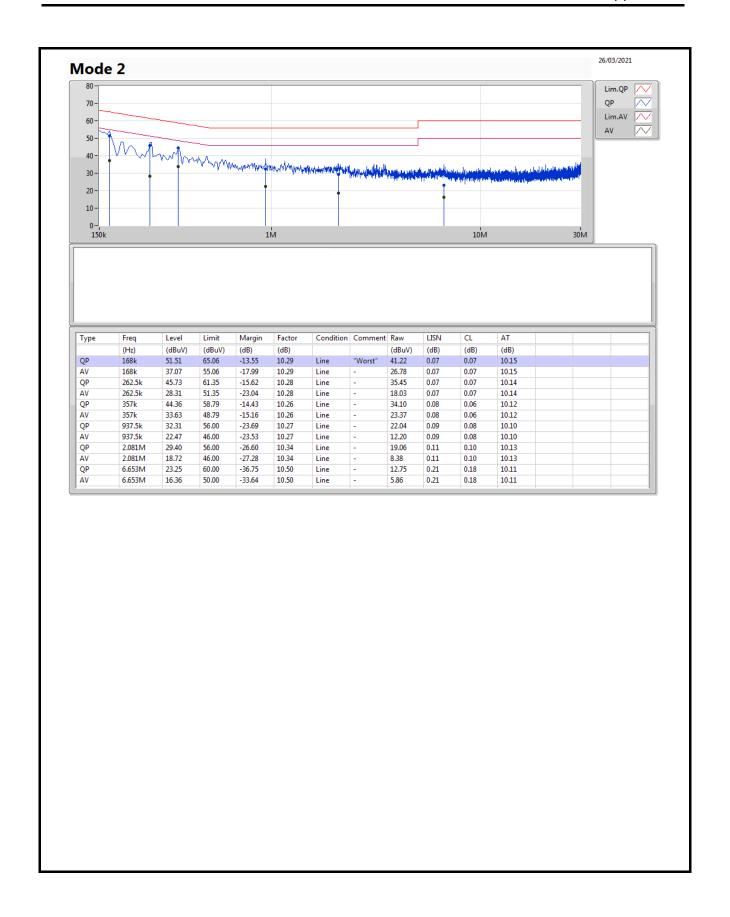
Appendix A

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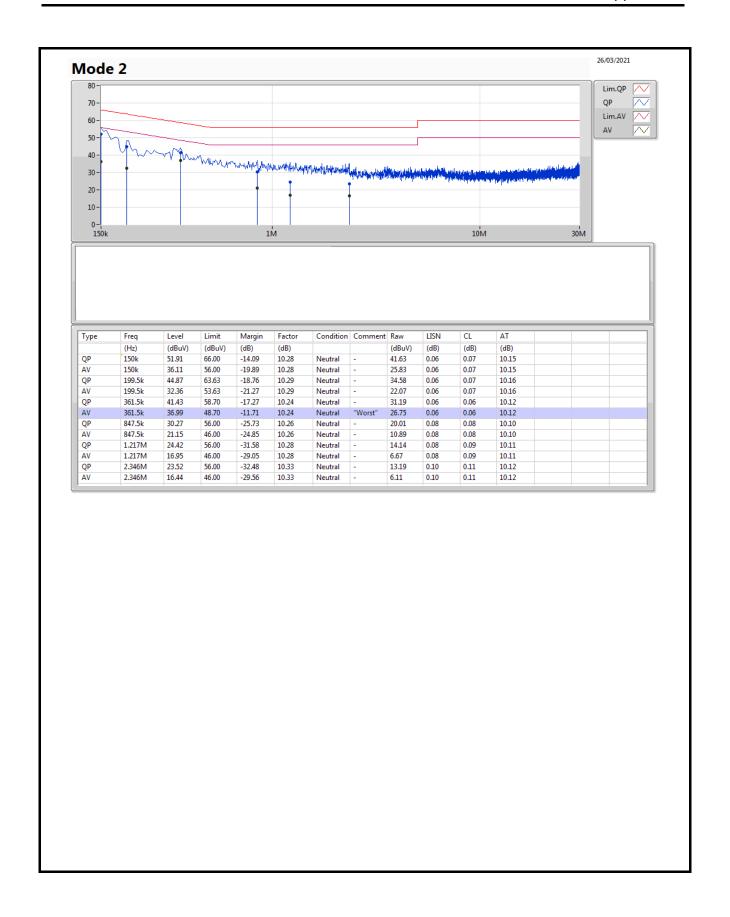
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 2	Pass	AV	361.5k	36.99	48.70	-11.71	Neutral











**Summary** 

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	8M	13.218M	13M2G1D	7.05M	12.869M
802.11g_Nss1,(6Mbps)_2TX	15.025M	17.391M	17M4D1D	12.575M	16.092M
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	15.075M	18.866M	18M9D1D	13.8M	18.641M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	33.8M	37.231M	37M2D1D	15.95M	37.131M

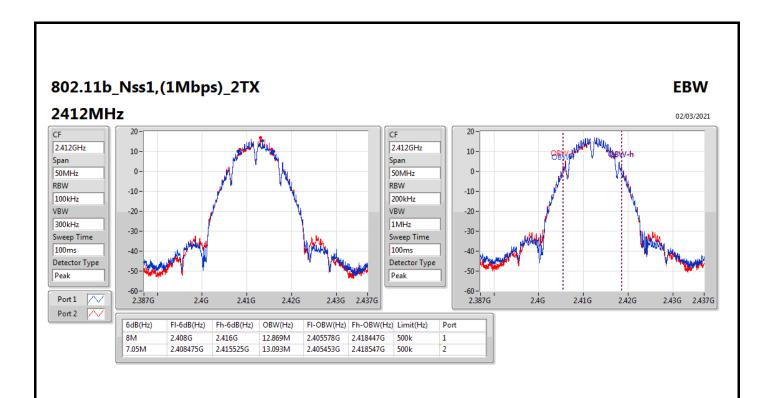
**Max-N dB** = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth; **Min-N dB** = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

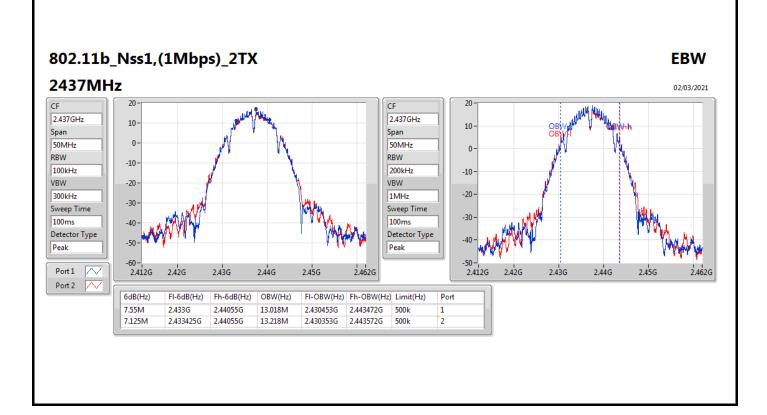


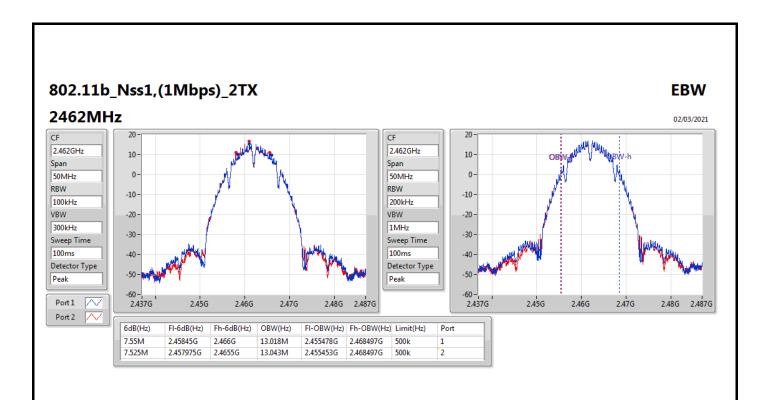
### Result

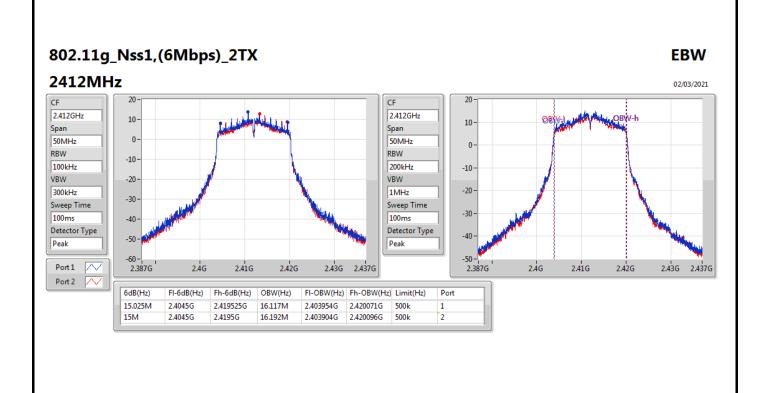
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	8M	12.869M	7.05M	13.093M
2437MHz	Pass	500k	7.55M	13.018M	7.125M	13.218M
2462MHz	Pass	500k	7.55M	13.018M	7.525M	13.043M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.025M	16.117M	15M	16.192M
2437MHz	Pass	500k	15M	16.542M	13.75M	17.391M
2462MHz	Pass	500k	15M	16.092M	12.575M	16.167M
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.025M	18.666M	15.075M	18.691M
2437MHz	Pass	500k	14.975M	18.866M	15.05M	18.791M
2462MHz	Pass	500k	13.8M	18.641M	13.85M	18.641M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	19.75M	37.131M	25.15M	37.181M
2437MHz	Pass	500k	19.8M	37.181M	15.95M	37.181M
2452MHz	Pass	500k	29.55M	37.181M	33.8M	37.231M

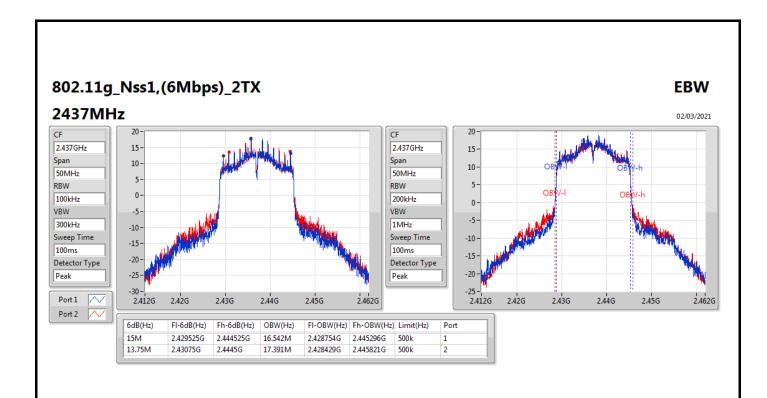
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth;

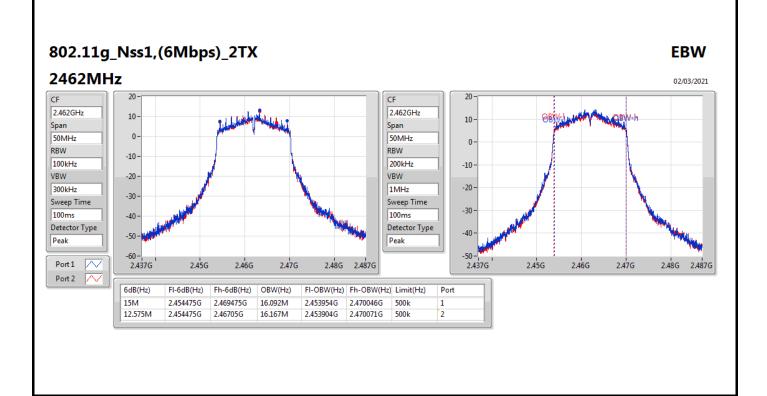


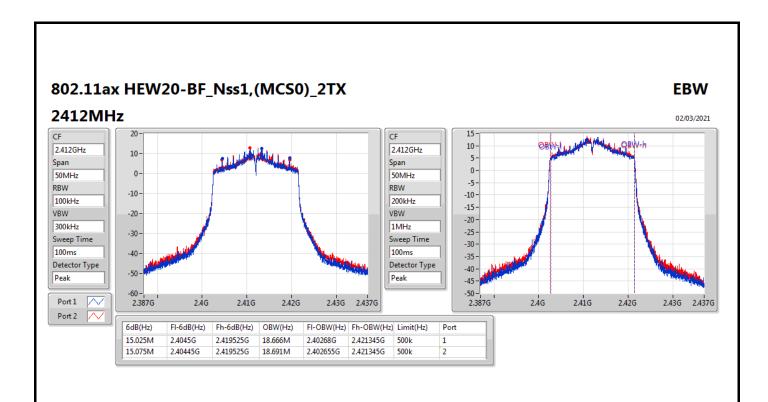


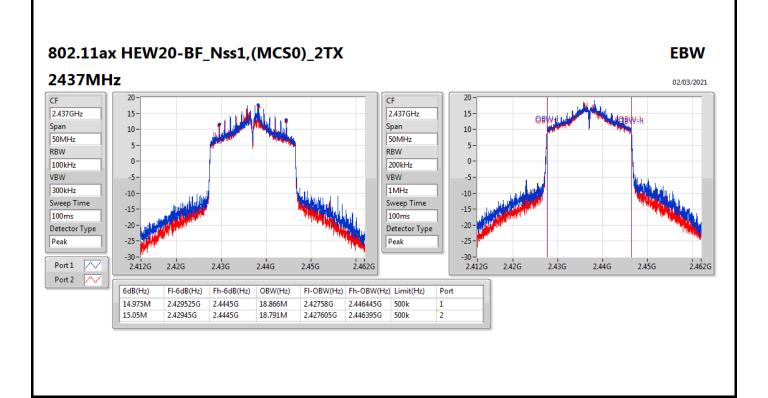


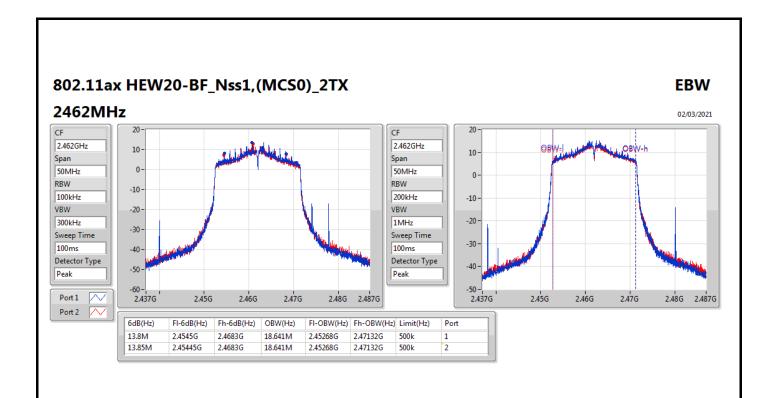


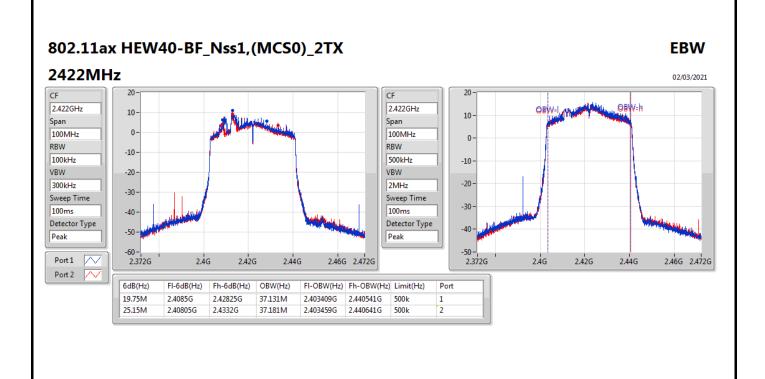


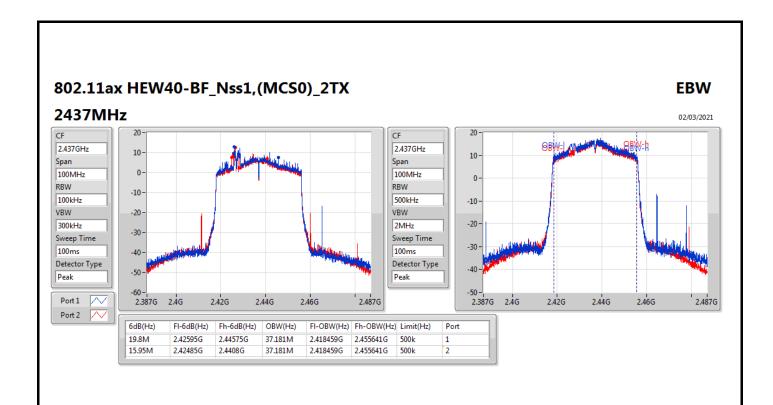


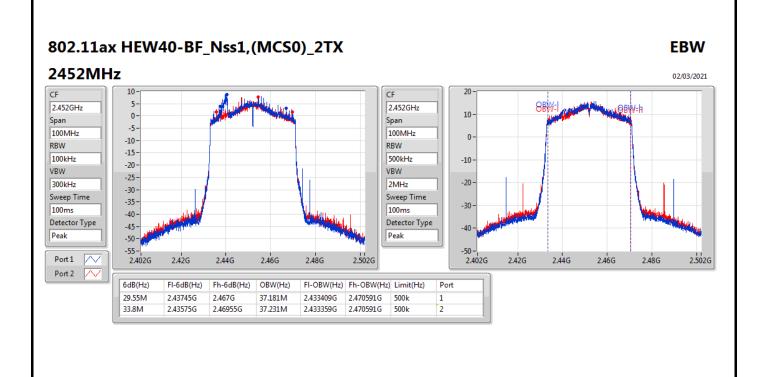














Average Power Appendix C

**Summary** 

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	28.52	0.71121
802.11g_Nss1,(6Mbps)_2TX	28.82	0.76208
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	27.75	0.59566
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	24.59	0.28774

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	1.67	24.18	24.03	27.12	30.00
2437MHz	Pass	1.67	25.68	25.33	28.52	30.00
2462MHz	Pass	1.67	23.89	23.67	26.79	30.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	1.67	22.09	21.53	24.83	30.00
2417MHz	Pass	1.67	23.47	22.87	26.19	30.00
2437MHz	Pass	1.67	25.78	25.84	28.82	30.00
2457MHz	Pass	1.67	23.13	22.96	26.06	30.00
2462MHz	Pass	1.67	21.52	21.19	24.37	30.00
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.68	20.46	20.39	23.44	30.00
2417MHz	Pass	4.68	22.09	22.31	25.21	30.00
2437MHz	Pass	4.68	25.02	24.45	27.75	30.00
2457MHz	Pass	4.68	21.45	21.29	24.38	30.00
2462MHz	Pass	4.68	21.29	21.05	24.18	30.00
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.68	20.02	19.48	22.77	30.00
2437MHz	Pass	4.68	21.63	21.53	24.59	30.00
2452MHz	Pass	4.68	19.83	19.88	22.87	30.00

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



**Summary** 

Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	
802.11b_Nss1,(1Mbps)_2TX	2.63
802.11g_Nss1,(6Mbps)_2TX	2.29
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	3.91
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-1.83

RBW = 500 kHz for 5.725-5.85GHz band / 1MHz for other band;

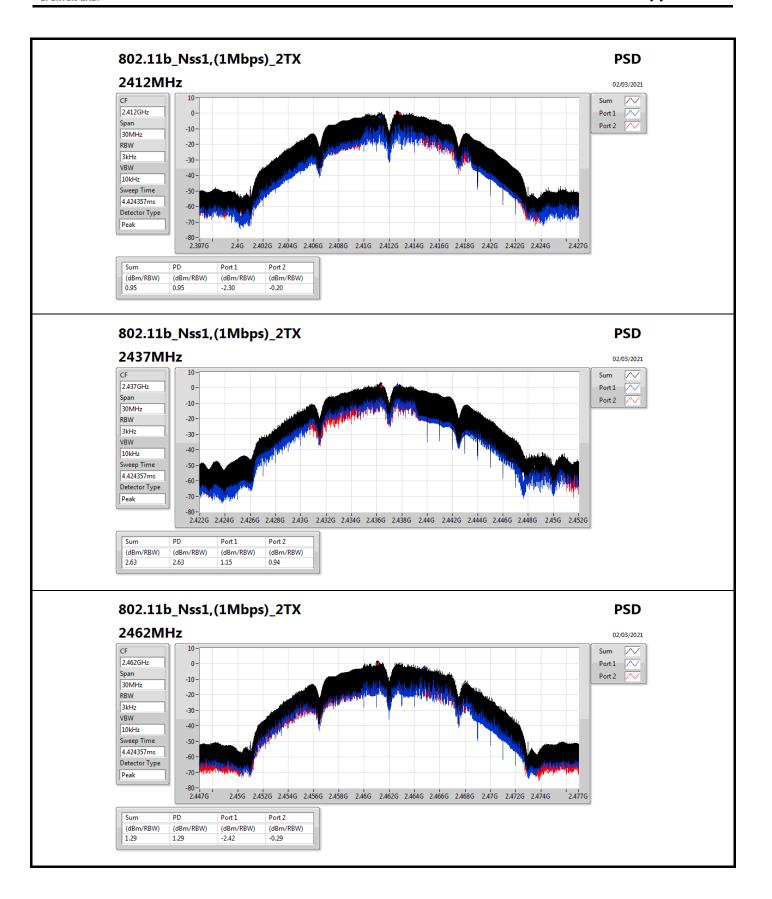


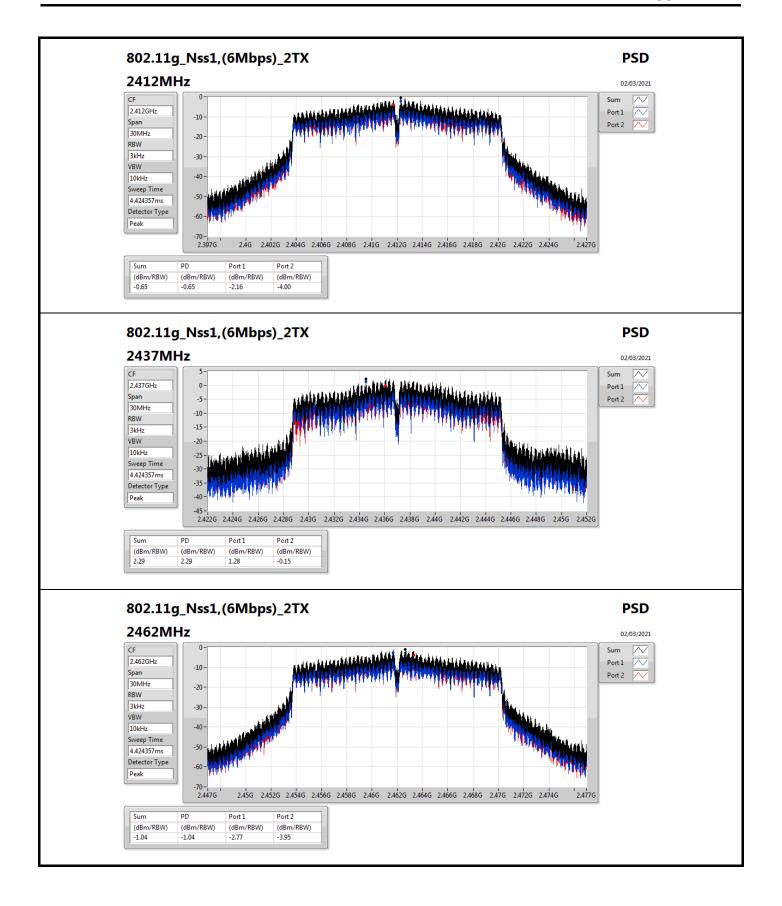
Appendix D **PSD** 

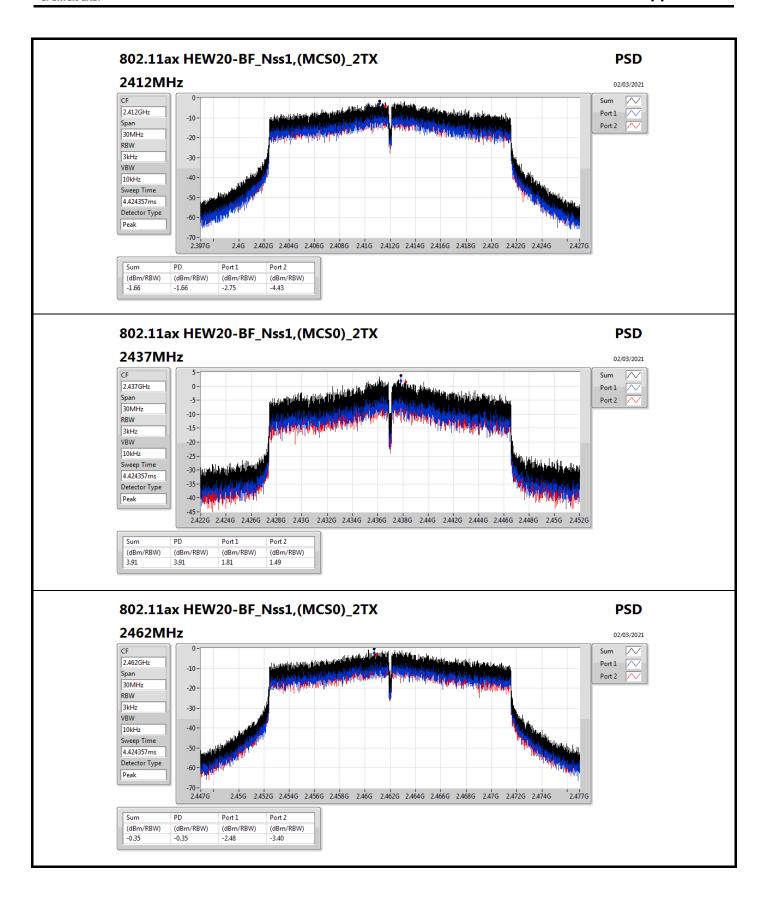
### Result

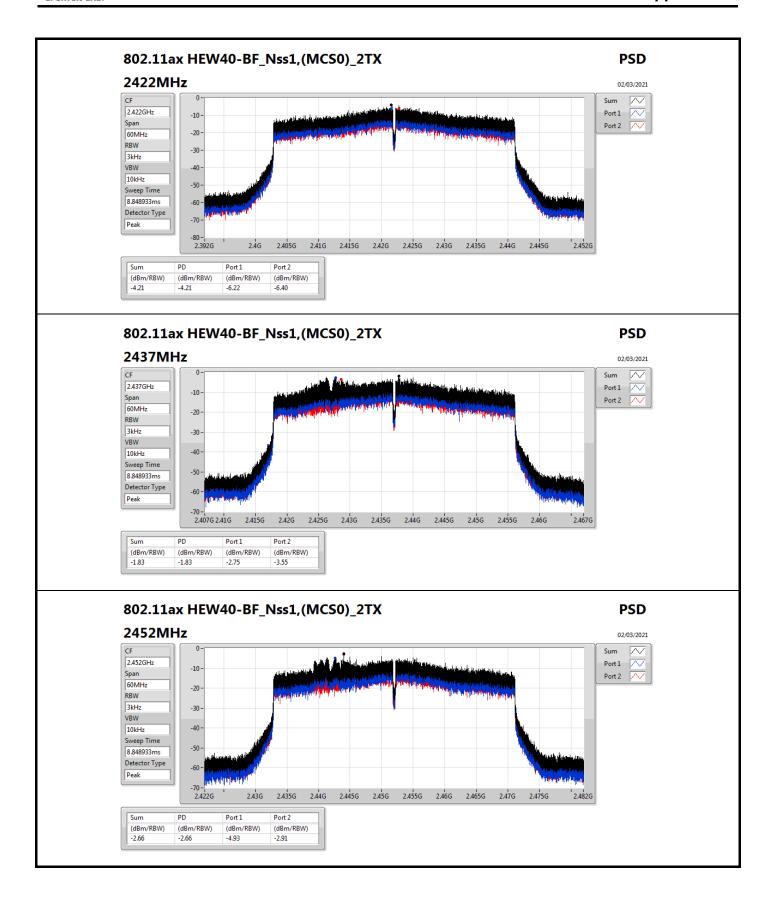
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.68	-2.30	-0.20	0.95	8.00
2437MHz	Pass	4.68	1.15	0.94	2.63	8.00
2462MHz	Pass	4.68	-2.42	-0.29	1.29	8.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.68	-2.16	-4.00	-0.65	8.00
2437MHz	Pass	4.68	1.28	-0.15	2.29	8.00
2462MHz	Pass	4.68	-2.77	-3.95	-1.04	8.00
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.68	-2.75	-4.43	-1.66	8.00
2437MHz	Pass	4.68	1.81	1.49	3.91	8.00
2462MHz	Pass	4.68	-2.48	-3.40	-0.35	8.00
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.68	-6.22	-6.40	-4.21	8.00
2437MHz	Pass	4.68	-2.75	-3.55	-1.83	8.00
2452MHz	Pass	4.68	-4.93	-2.91	-2.66	8.00

DG = Directional Gain; RBW = 500 kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X power density;











# CSE(Non-restricted Band)

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	2.43749G	16.96	-13.04	49.81M	-46.02	2.39848G	-31.66	2.4G	-36.60	2.51036G	-45.48	24.42685G	-40.60	2
802.11g_Nss1,(6Mbps)_2TX	Pass	2.43824G	17.25	-12.75	85.34M	-46.29	2.39974G	-28.08	2.4G	-27.95	2.5102G	-45.26	15.1862G	-40.17	1
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	Pass	2.4357G	17.32	-12.68	84.46M	-44.77	2.39984G	-27.10	2.4G	-33.13	2.48442G	-37.33	21.91229G	-41.05	1
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	Pass	2.42597G	11.84	-18.16	83.82M	-46.73	2.39572G	-40.30	2.4835G	-42.83	2.48846G	-26.23	24.45031G	-40.18	1



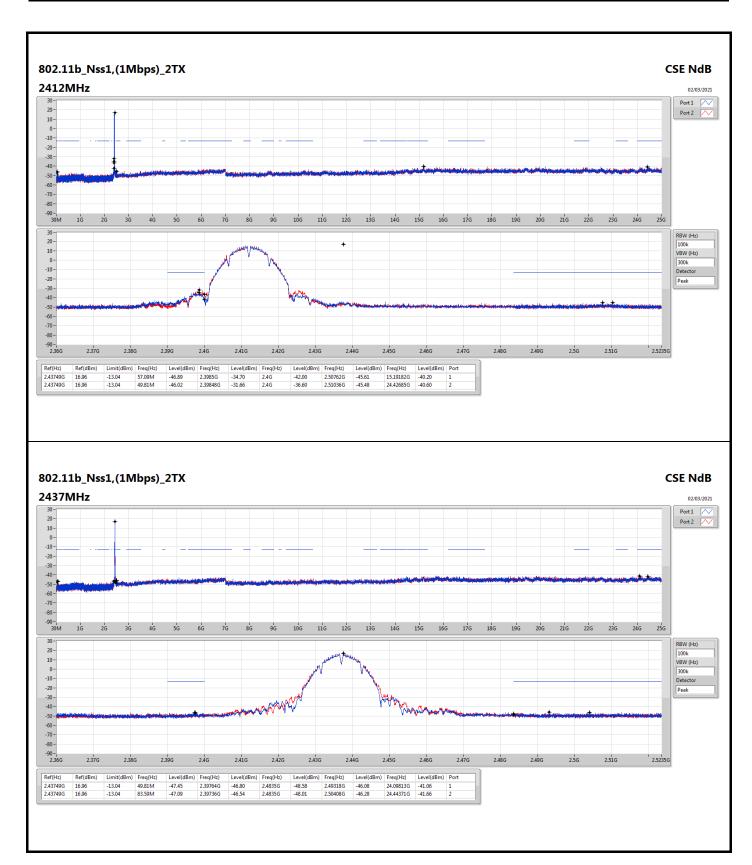
# CSE(Non-restricted Band)

# Appendix E

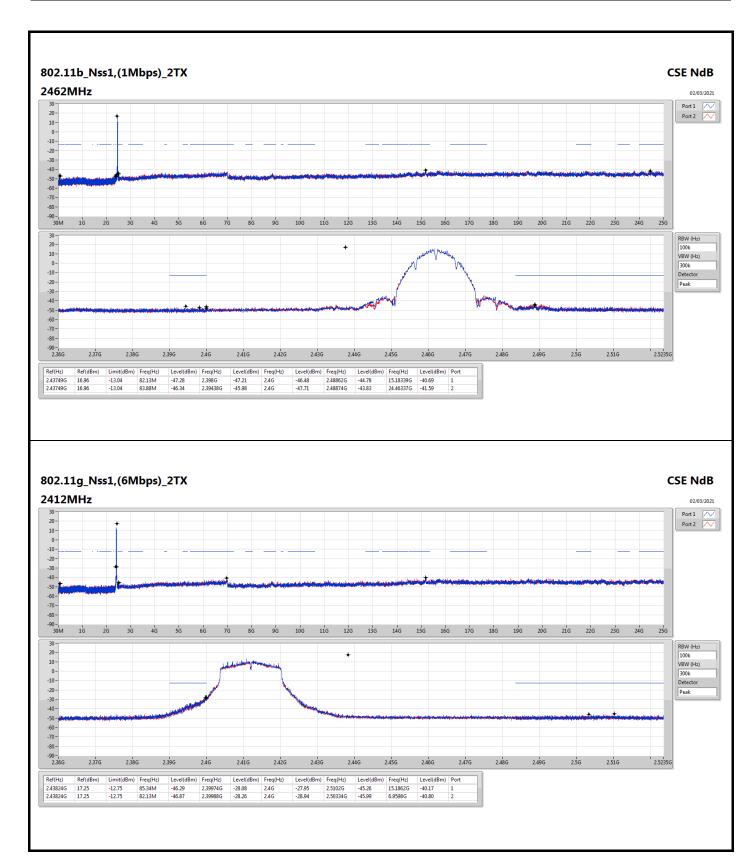
### Result

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	2.43749G	16.96	-13.04	57.09M	-46.89	2.3985G	-34.70	2.4G	-42.00	2.50762G	-45.61	15.19182G	-40.20	1
2412MHz	Pass	2.43749G	16.96	-13.04	49.81M	-46.02	2.39848G	-31.66	2.4G	-36.60	2.51036G	-45.48	24.42685G	-40.60	2
2437MHz	Pass	2.43749G	16.96	-13.04	49.81M	-47.45	2.39764G	-46.80	2.4835G	-48.58	2.49318G	-46.08	24.09813G	-41.06	1
2437MHz	Pass	2.43749G	16.96	-13.04	83.59M	-47.09	2.39736G	-46.54	2.4835G	-48.01	2.50408G	-46.28	24.44371G	-41.66	2
2462MHz	Pass	2.43749G	16.96	-13.04	82.13M	-47.28	2.398G	-47.21	2.4G	-46.48	2.48862G	-44.78	15.18339G	-40.69	1
2462MHz	Pass	2.43749G	16.96	-13.04	83.88M	-46.34	2.39438G	-45.98	2.4G	-47.71	2.48874G	-43.83	24.46337G	-41.59	2
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2412MHz	Pass	2.43824G	17.25	-12.75	85.34M	-46.29	2.39974G	-28.08	2.4G	-27.95	2.5102G	-45.26	15.1862G	-40.17	1
2412MHz	Pass	2.43824G	17.25	-12.75	82.13M	-46.87	2.39988G	-28.26	2.4G	-28.94	2.50334G	-45.99	6.9598G	-40.80	2
2437MHz	Pass	2.43824G	17.25	-12.75	868.8M	-47.31	2.39946G	-31.98	2.4G	-36.19	2.4851G	-36.87	15.19463G	-40.78	1
2437MHz	Pass	2.43824G	17.25	-12.75	86.21M	-45.70	2.39926G	-31.43	2.4G	-33.79	2.48386G	-36.39	24.55328G	-41.53	2
2462MHz	Pass	2.43824G	17.25	-12.75	85.34M	-46.55	2.39902G	-45.30	2.4835G	-46.33	2.4835G	-43.12	15.19182G	-41.25	1
2462MHz	Pass	2.43824G	17.25	-12.75	211.74M	-47.51	2.39208G	-47.76	2.4835G	-46.04	2.48412G	-44.12	15.19744G	-40.69	2
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.4357G	17.32	-12.68	49.81M	-46.25	2.4G	-29.80	2.4G	-30.49	2.51074G	-46.52	21.83924G	-40.65	1
2412MHz	Pass	2.4357G	17.32	-12.68	83.01M	-46.47	2.39978G	-28.59	2.4G	-28.75	2.49074G	-45.81	24.1768G	-40.01	2
2437MHz	Pass	2.4357G	17.32	-12.68	84.46M	-44.77	2.39984G	-27.10	2.4G	-33.13	2.48442G	-37.33	21.91229G	-41.05	1
2437MHz	Pass	2.4357G	17.32	-12.68	83.59M	-46.52	2.39948G	-32.28	2.4G	-38.42	2.48422G	-40.98	15.14686G	-41.36	2
2462MHz	Pass	2.4357G	17.32	-12.68	83.01M	-46.08	2.39296G	-46.57	2.4835G	-44.43	2.49292G	-35.44	6.97104G	-40.95	1
2462MHz	Pass	2.4357G	17.32	-12.68	76.6M	-46.28	2.39314G	-46.92	2.4835G	-44.57	2.48486G	-41.26	15.18901G	-40.44	2
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.42597G	11.84	-18.16	78.95M	-46.72	2.3998G	-34.37	2.4G	-36.51	2.48718G	-46.80	15.17562G	-40.24	1
2422MHz	Pass	2.42597G	11.84	-18.16	75.8M	-46.65	2.39992G	-35.46	2.4G	-35.80	2.52658G	-46.15	24.78966G	-41.46	2
2437MHz	Pass	2.42597G	11.84	-18.16	76.37M	-47.13	2.39676G	-39.22	2.4G	-42.07	2.49818G	-31.17	24.7532G	-40.60	1
2437MHz	Pass	2.42597G	11.84	-18.16	78.95M	-46.66	2.3974G	-38.65	2.4G	-41.22	2.48538G	-44.51	24.43909G	-40.88	2
2452MHz	Pass	2.42597G	11.84	-18.16	83.82M	-46.73	2.39572G	-40.30	2.4835G	-42.83	2.48846G	-26.23	24.45031G	-40.18	1
2452MHz	Pass	2.42597G	11.84	-18.16	84.67M	-46.20	2.39368G	-47.63	2.4835G	-42.31	2.4845G	-39.63	15.19525G	-40.81	2

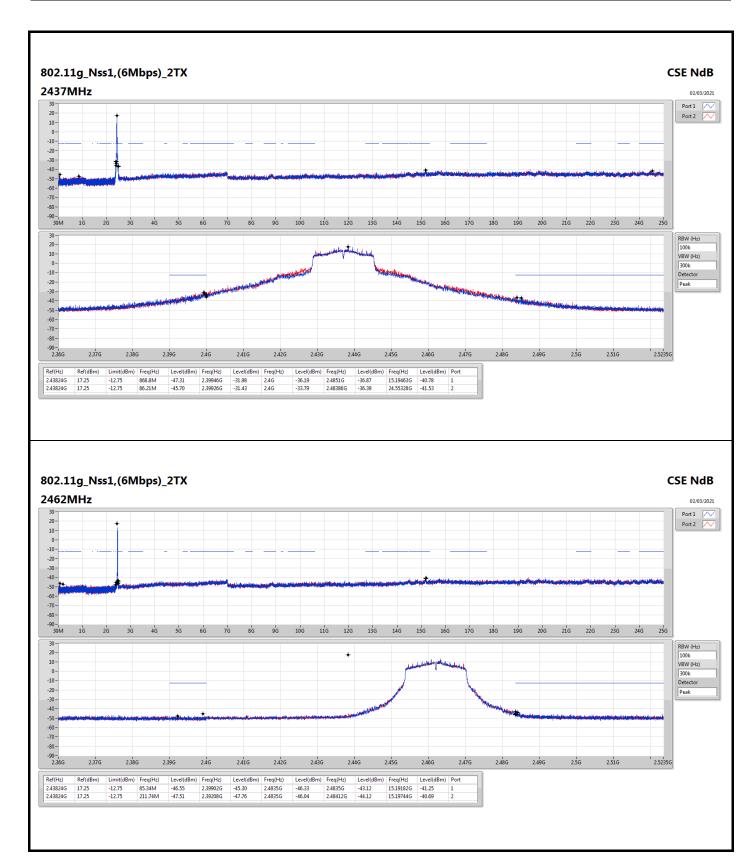




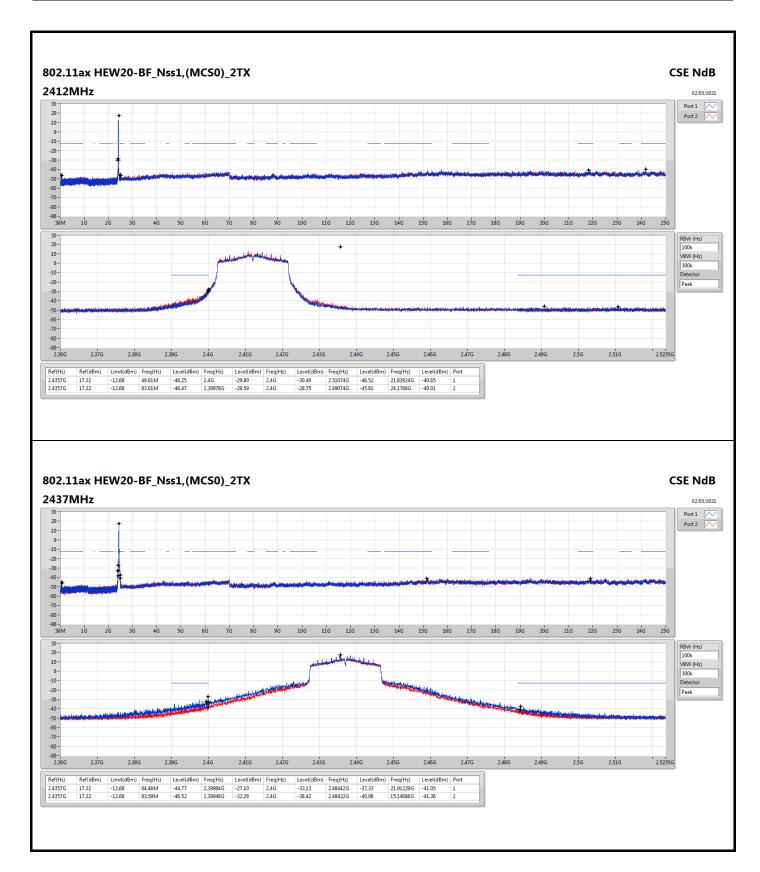




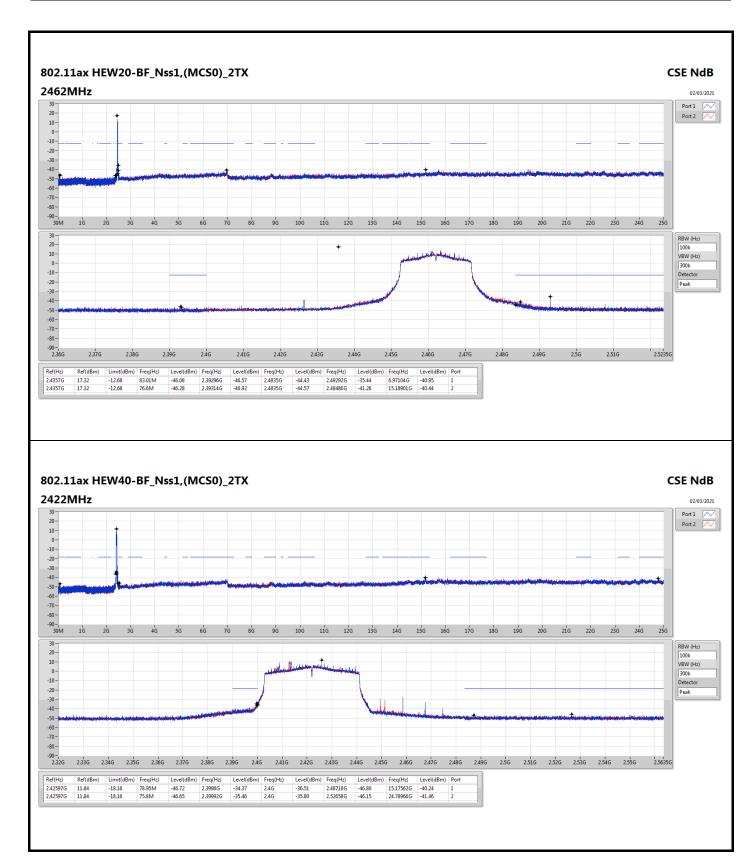




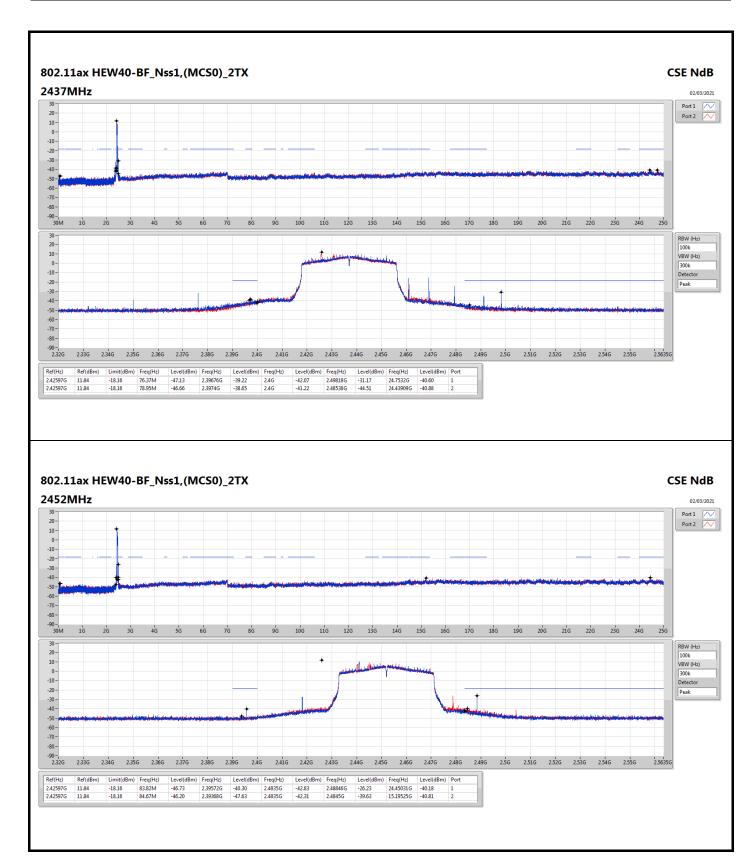












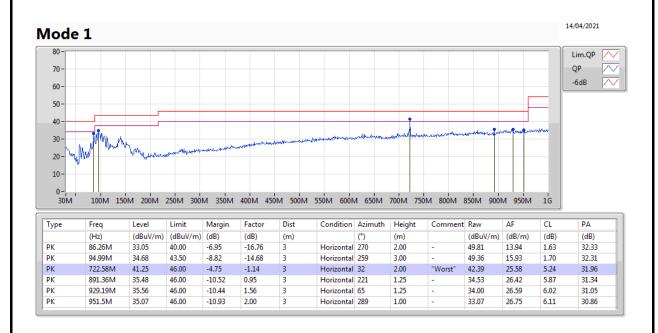
## RSE below 1GHz Result

anatina M						RSE belo	ow 1GH	z Resul	t					
erating M	ode				1			Polar	ization		Ve	ertical		
perating Fu	unction				CTX									
<b>Mode</b> 80- 70- 60- 50-	1													14/04/2021  Lim.QP QP QP -6dB
40 - 40 - 40 - 40 - 40 - 40 - 40 - 40 -	Martin	Whendpolynon	Redirectory	Quant Vice	graph and a second		netrick family de State de Marie Spra	and with diseased	mal have			et marine Rawyon	entings.	
30 - 10 - 10 - 30 M	100M 150N	V 200M 2	250M 300l	Quant Vice			550M 600I			M 800M 8	350M 900		1G	PA
30 - 20 - 10 -	Freq		Limit	M 350M Margin	400M 45	о́м 500́м			700M 750	Comment	350M 900	M 950M		PA (dB)
30 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	Freq (Hz) 41.64M	Level (dBuV/m) 34.50	Limit (dBuV/m) 40.00	M 350M Margin (dB) -5.50	400M 45   Factor (dB) -13.80	Dist (m) 3	Condition	Azimuth (°) 357	700M 750 Height (m) 1.00	Comment	Raw (dBuV/m) 48.30	M 950M  AF (dB/m) 17.47	CL (dB) 1.10	(dB) 32.37
30 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	Freq (Hz) 41.64M 58.13M	Level (dBuV/m) 34.50 35.73	Limit (dBuV/m) 40.00 40.00	M 350M Margin (dB) -5.50 -4.27	400M 45 Factor (dB) -13.80 -18.57	Dist (m) 3 3	Condition  Vertical  Vertical	Azimuth (°) 357 209	700M 750  Height (m) 1.00 1.00	Comment " "Worst"	Raw (dBuV/m) 48.30 54.30	M 950M  AF (dB/m) 17.47 12.45	CL (dB) 1.10 1.36	(dB) 32.37 32.38
30 – 10 – 20 – 10 – 0 – 30 M <sup>1</sup> Type  QP  QP  PK	Freq (Hz) 41.64M 58.13M 86.26M	Level (dBuV/m) 34.50 35.73 35.71	Limit (dBuV/m) 40.00 40.00 40.00	Margin (dB) -5.50 -4.27 -4.29	400M 45  Factor (dB) -13.80 -18.57 -16.76	Dist (m) 3 3 3 3	Condition  Vertical  Vertical  Vertical	Azimuth (°) 357 209 127	700M 750  Height (m) 1.00 1.00 1.00	Comment " "Worst"	Raw (dBuV/m) 48.30 54.30 52.47	M 950M  AF (dB/m) 17.47 12.45 13.94	CL (dB) 1.10 1.36 1.63	(dB) 32.37 32.38 32.33
30 - 10 - 20 - 10 - 0 - 30M Type  QP QP PK PK	Freq (Hz) 41.64M 58.13M 86.26M 87.23M	Level (dBuV/m) 34.50 35.73 35.71 32.14	Limit (dBuV/m) 40.00 40.00 40.00 40.00	Margin (dB) -5.50 -4.27 -4.29 -7.86	400M 45 Factor (dB) -13.80 -18.57 -16.76 -16.48	Dist (m) 3 3 3 3 3 3	Vertical Vertical Vertical Vertical Vertical	Azimuth (°) 357 209 127 189	700M 750  Height (m) 1.00 1.00 1.25	Comment  " "Worst"  -	Raw (dBuV/m) 48.30 54.30 52.47 48.62	AF (dB/m) 17.47 12.45 13.94 14.21	CL (dB) 1.10 1.36 1.63 1.64	(dB) 32.37 32.38 32.33 32.33
30 - 10 - 20 - 10 - 0 - 30M	Freq (Hz) 41.64M 58.13M 86.26M 87.23M 716.76M	Level (dBuV/m) 34.50 35.73 35.71	Limit (dBuV/m) 40.00 40.00 40.00	Margin (dB) -5.50 -4.27 -4.29	400M 45  Factor (dB) -13.80 -18.57 -16.76	Dist (m) 3 3 3 3	Condition  Vertical  Vertical  Vertical	Azimuth (°) 357 209 127	700M 750  Height (m) 1.00 1.00 1.00	Comment " "Worst"	Raw (dBuV/m) 48.30 54.30 52.47	M 950M  AF (dB/m) 17.47 12.45 13.94	CL (dB) 1.10 1.36 1.63	(dB) 32.37 32.38 32.33

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit. Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

### RSE below 1GHz Result

RSE below 1GHz Result										
Operating Mode	1	Polarization	Horizontal							
Operating Function	CTX									



Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)



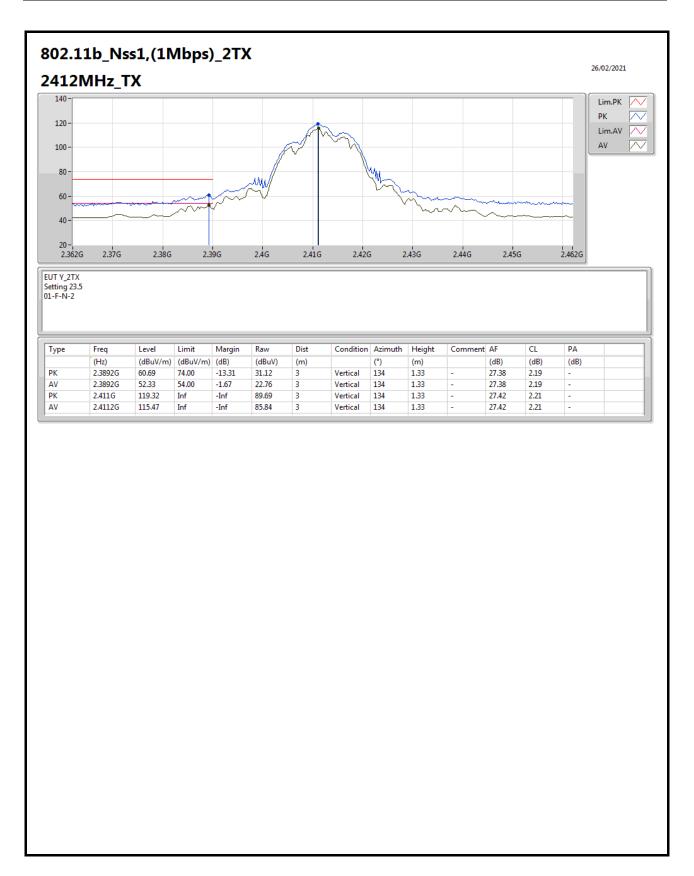
## RSE TX above 1GHz

Appendix F.2

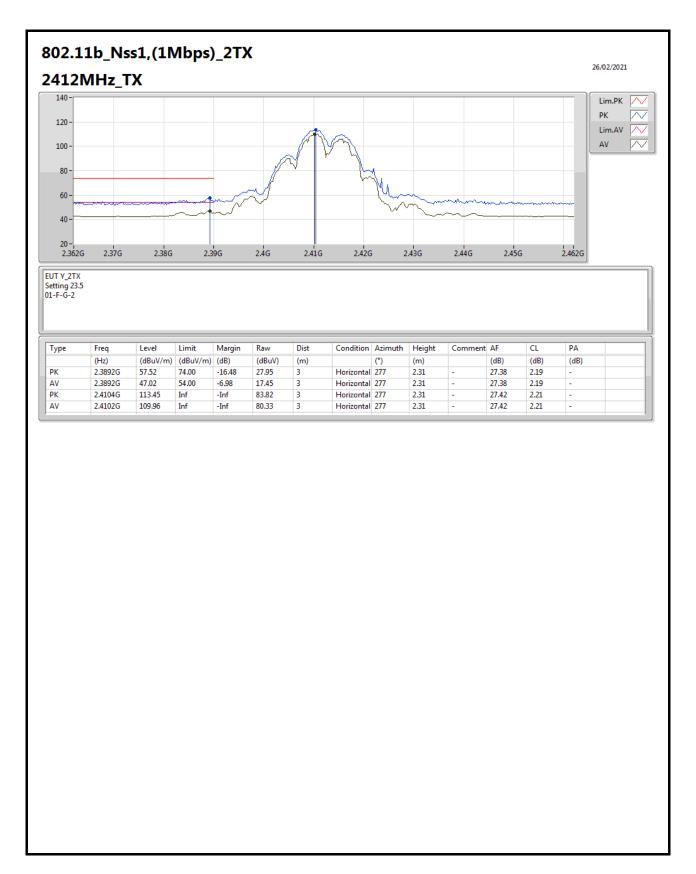
**Summary** 

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	Pass	AV	2.4835G	52.96	54.00	-1.04	3	Vertical	133	2.15	-

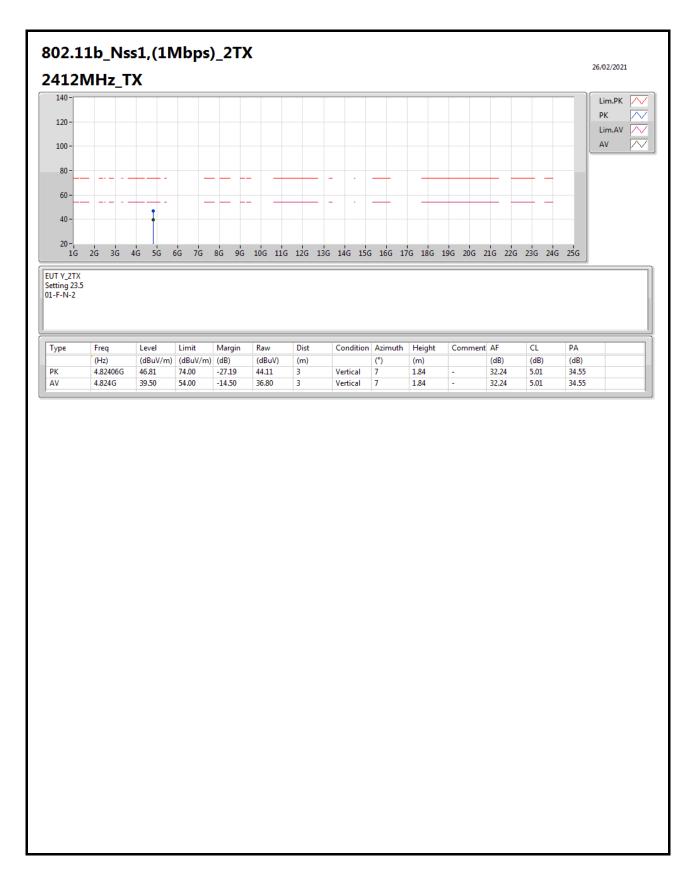




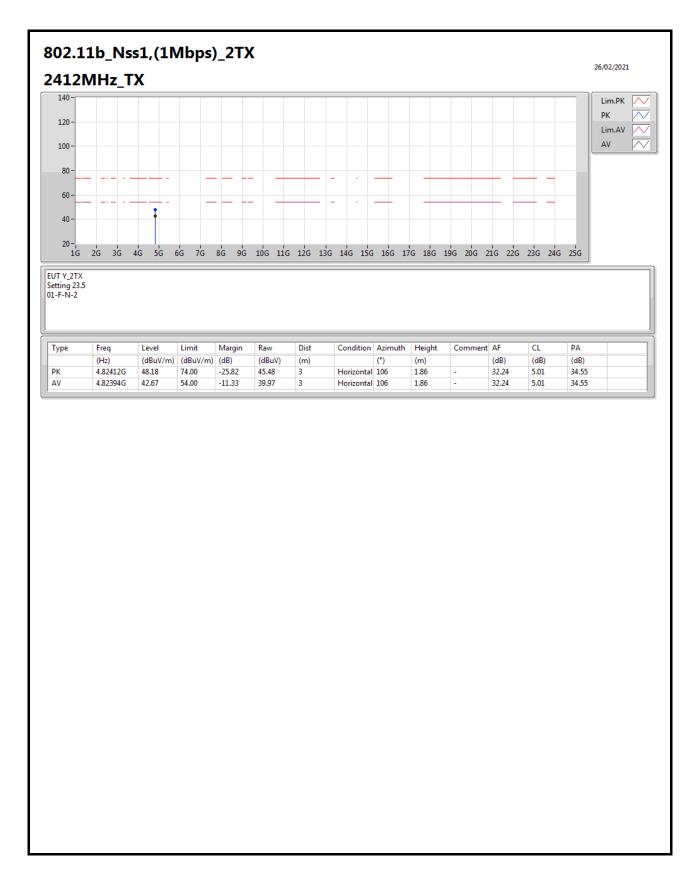




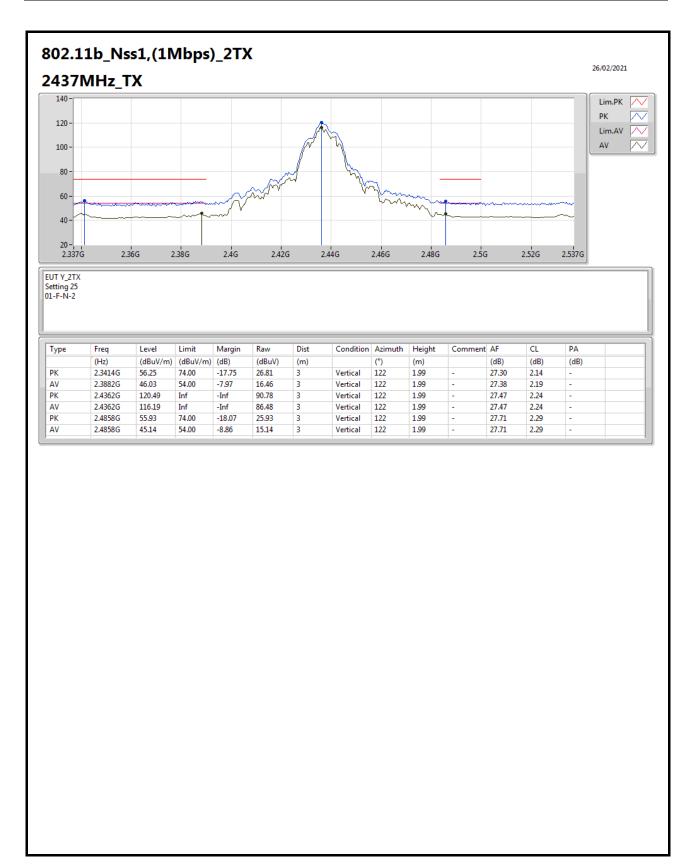




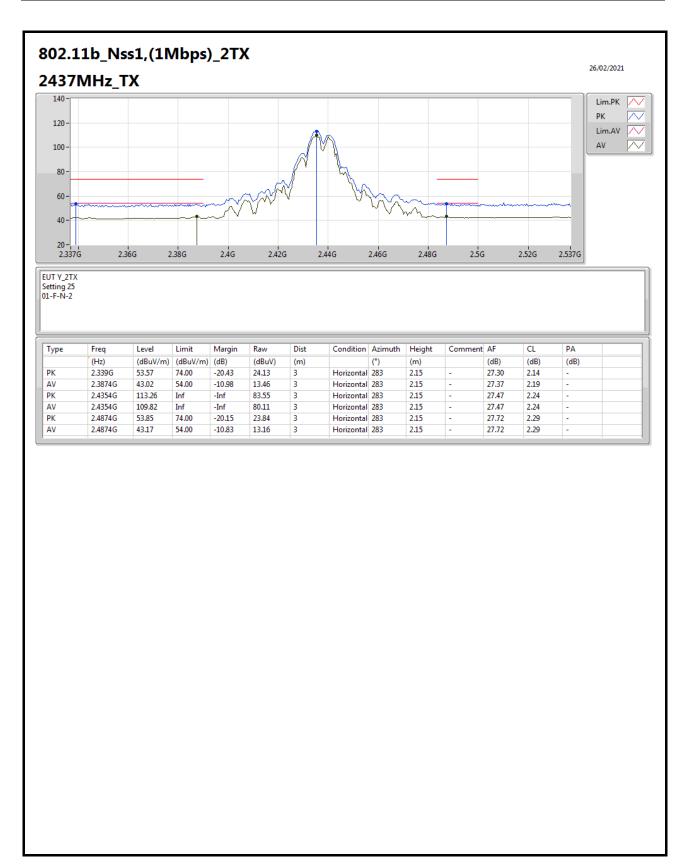




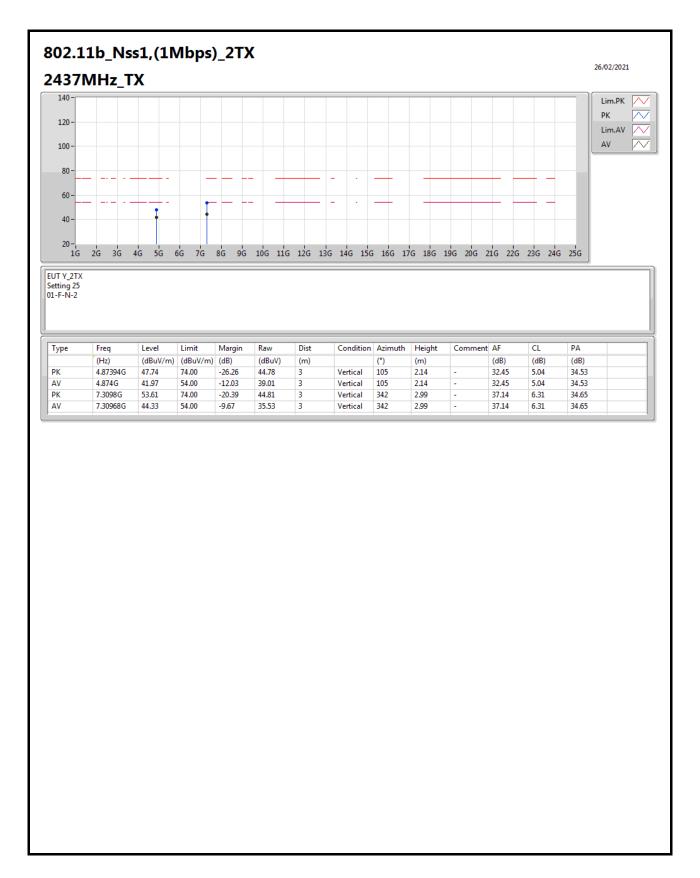




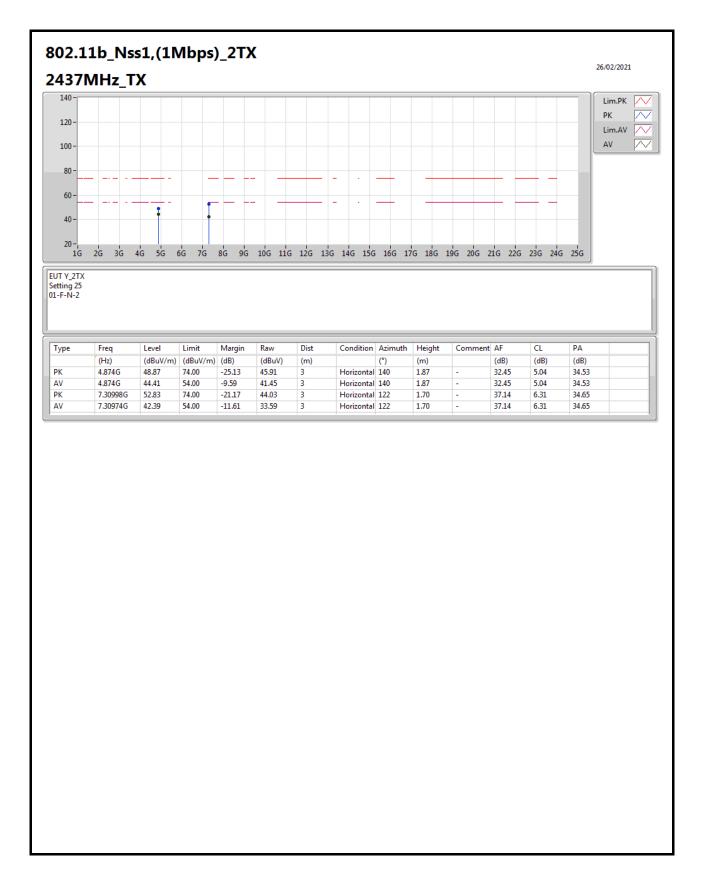




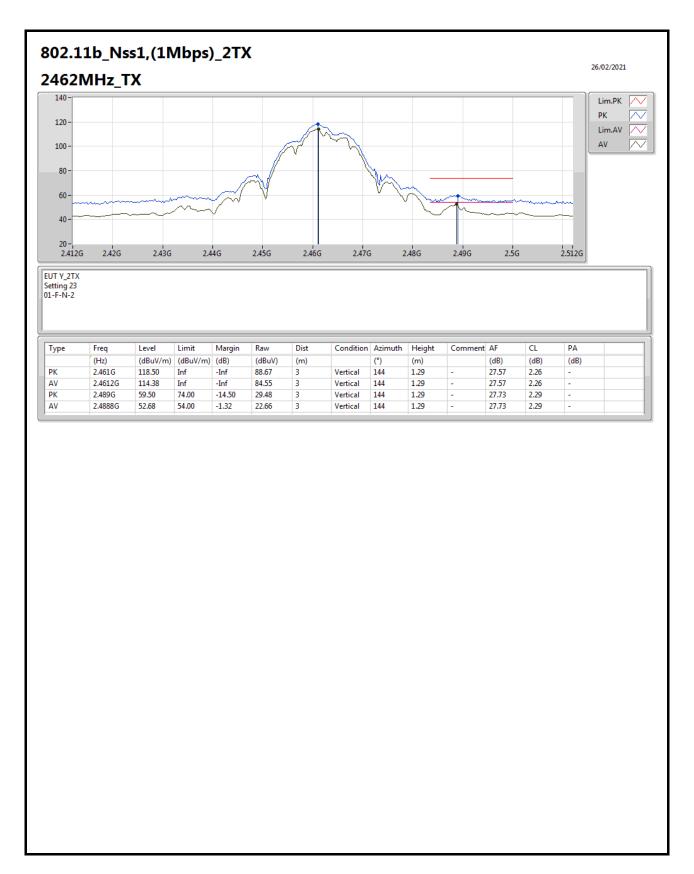




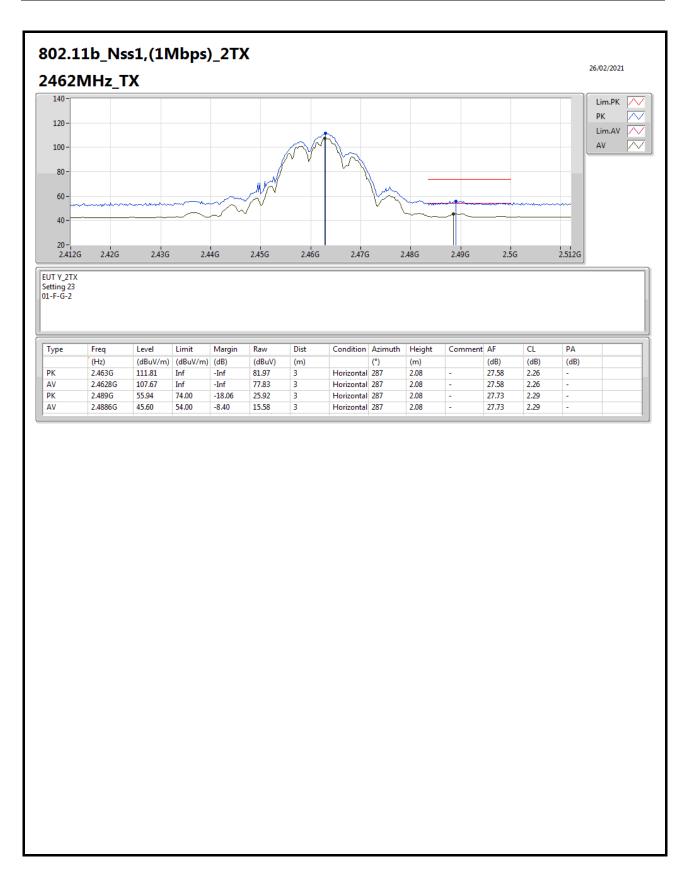




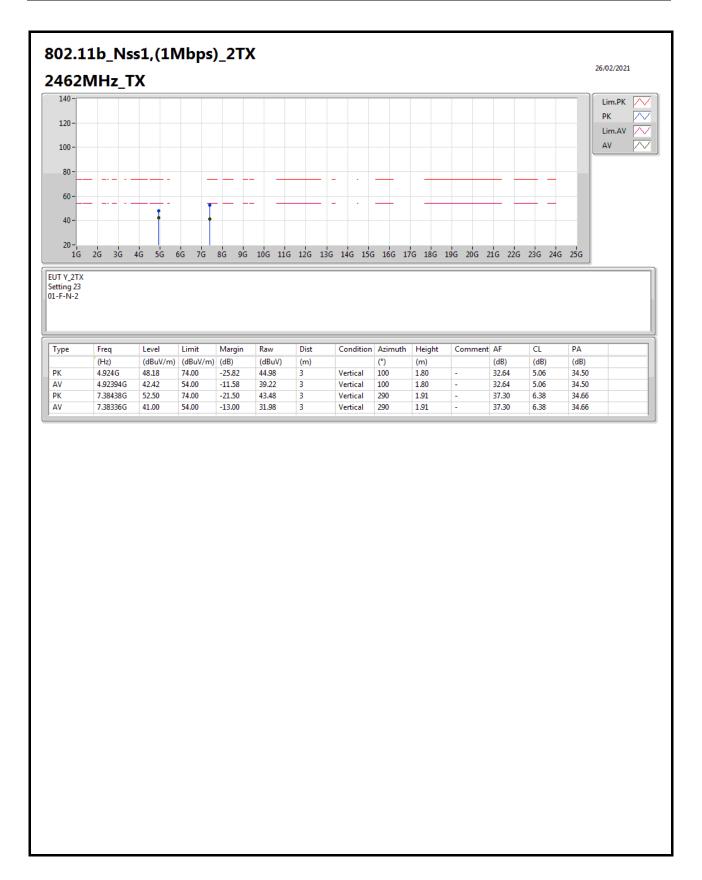




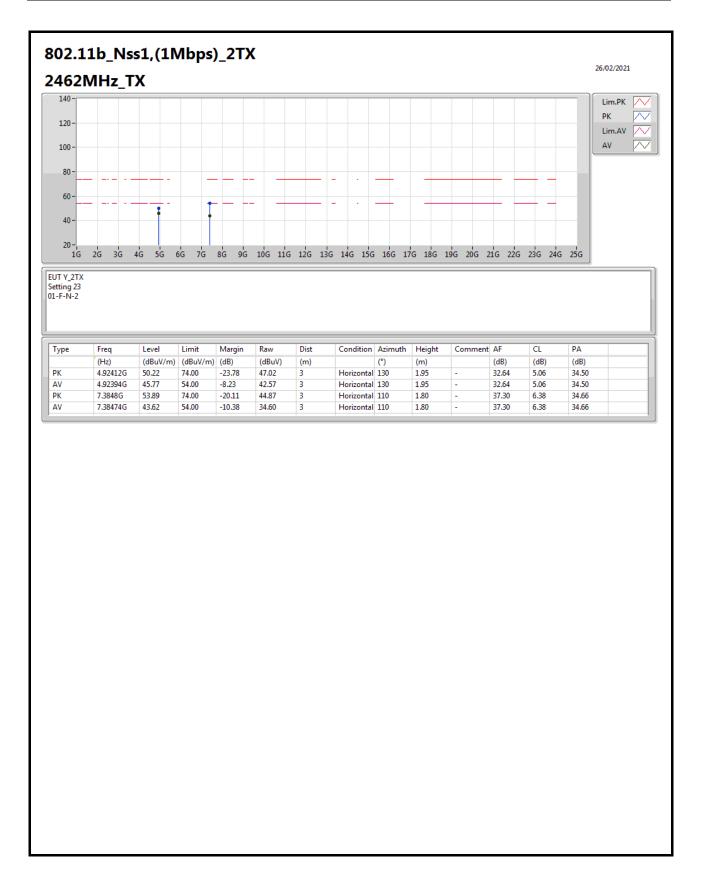




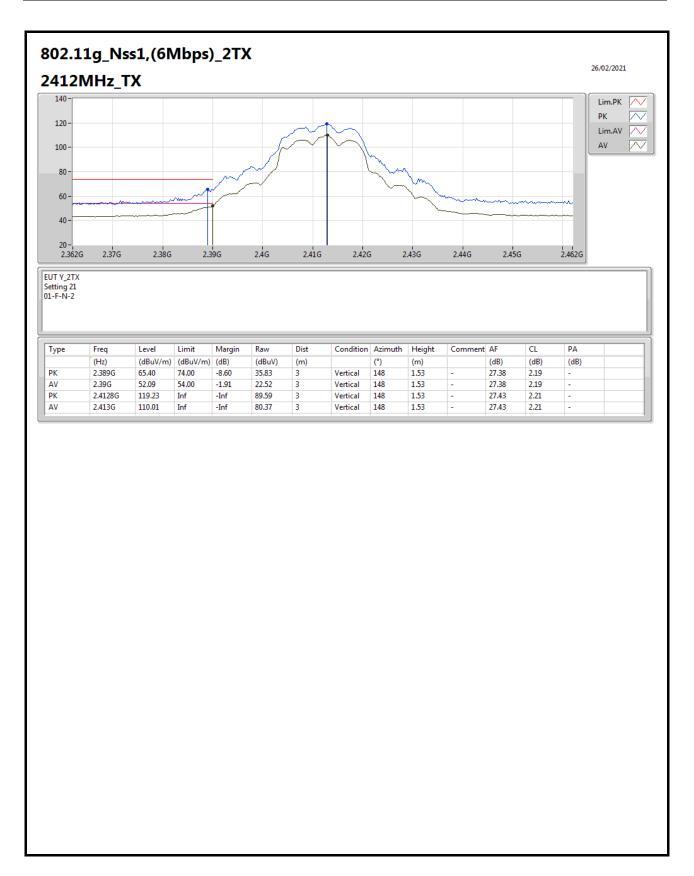




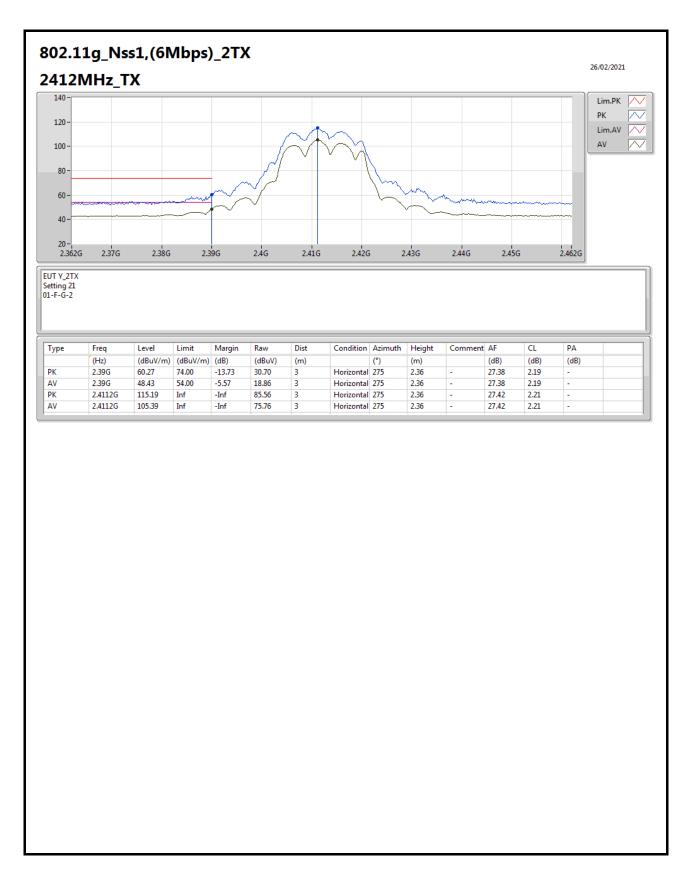




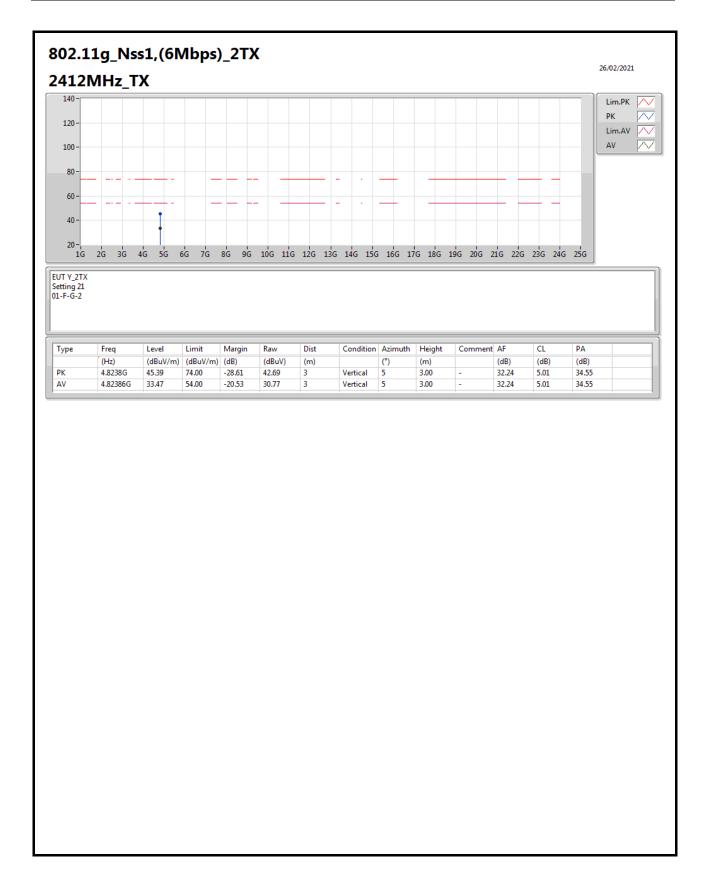




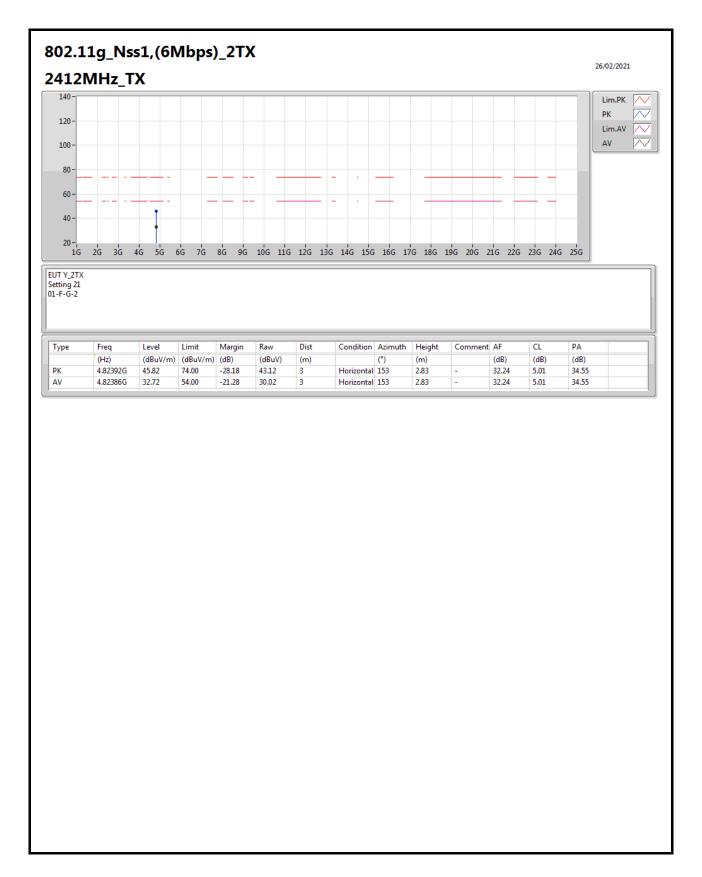




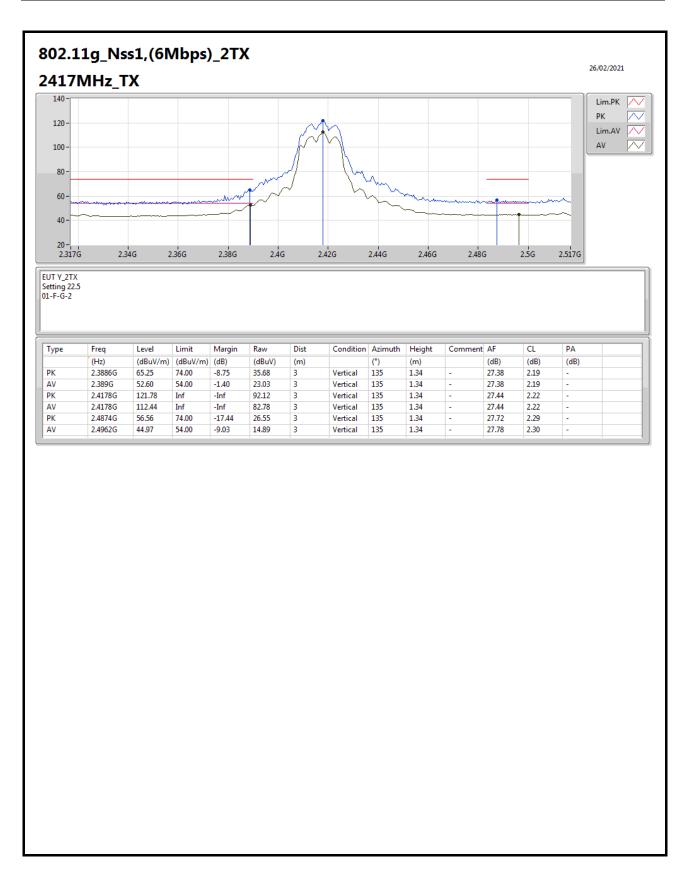




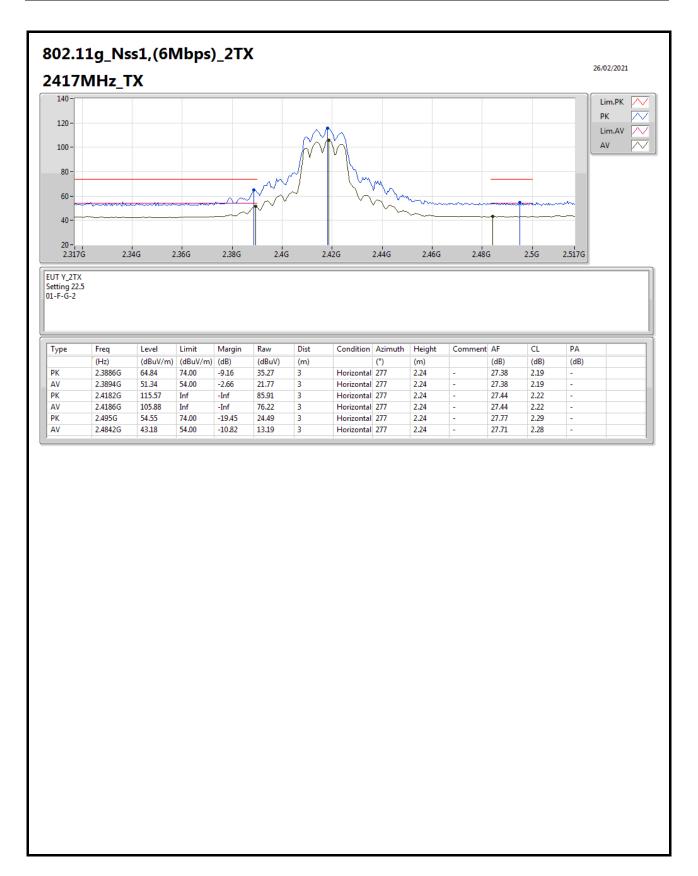




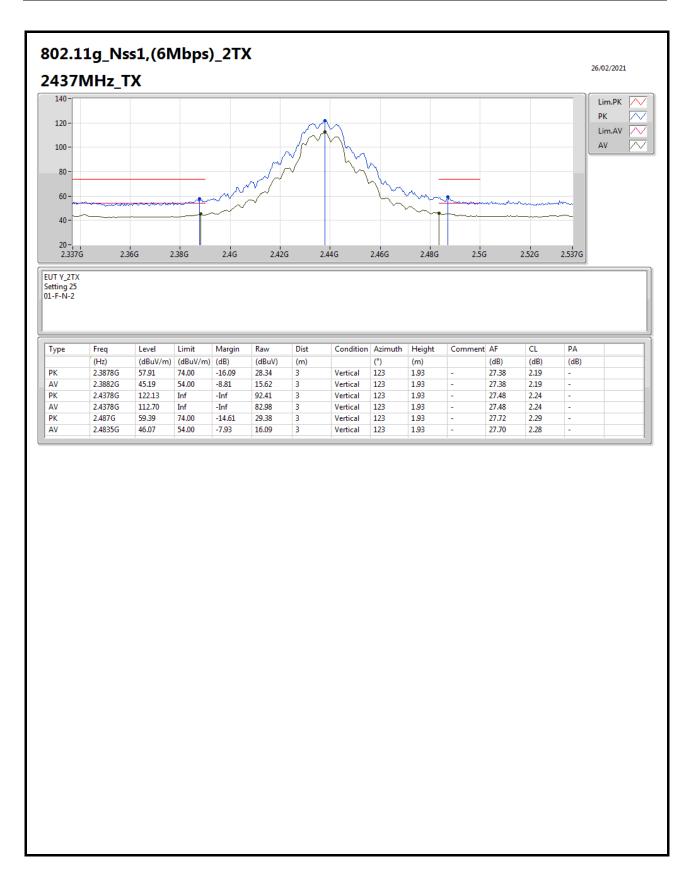




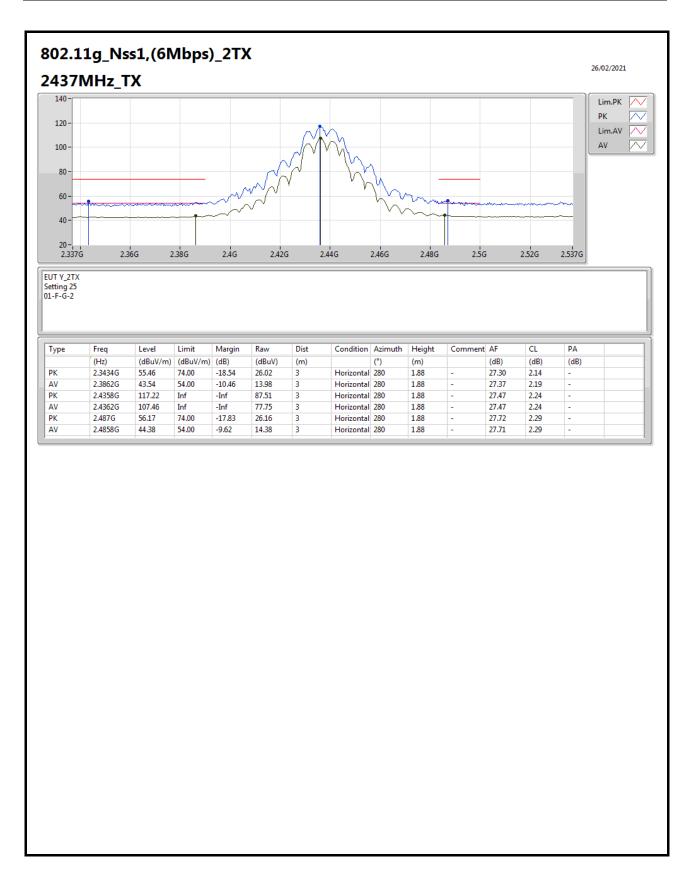




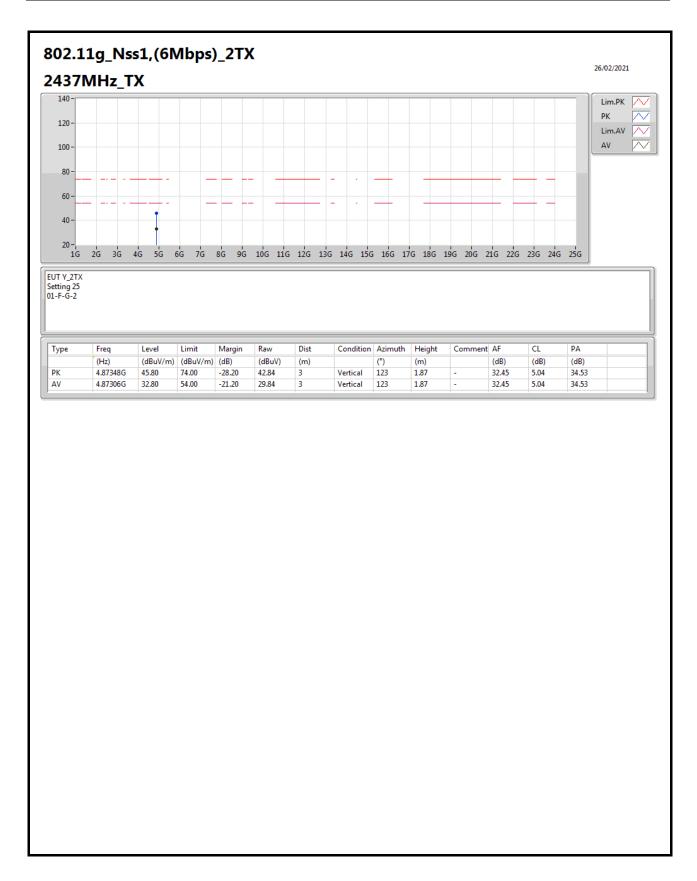




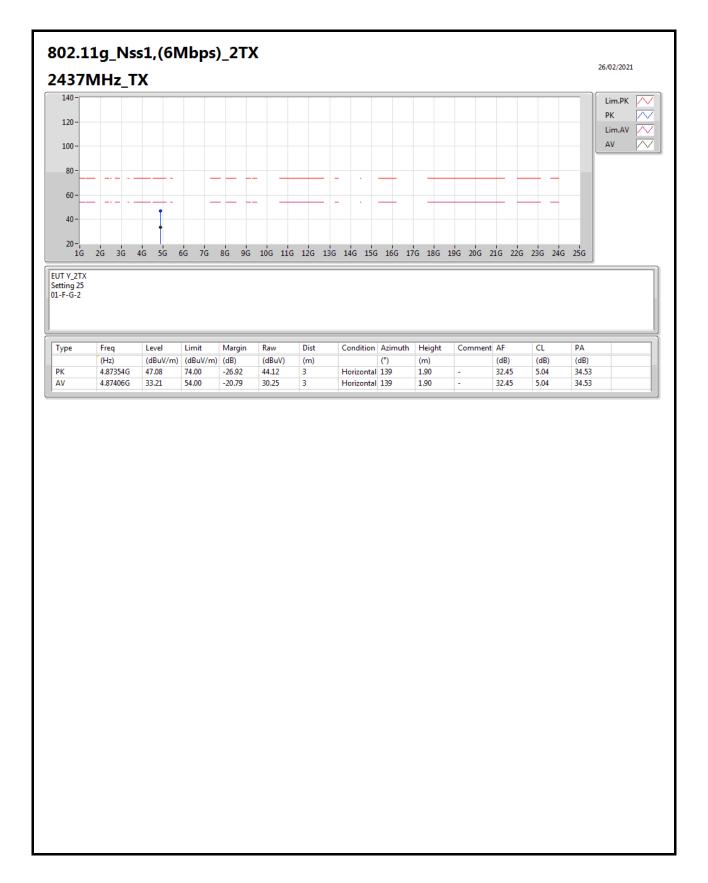




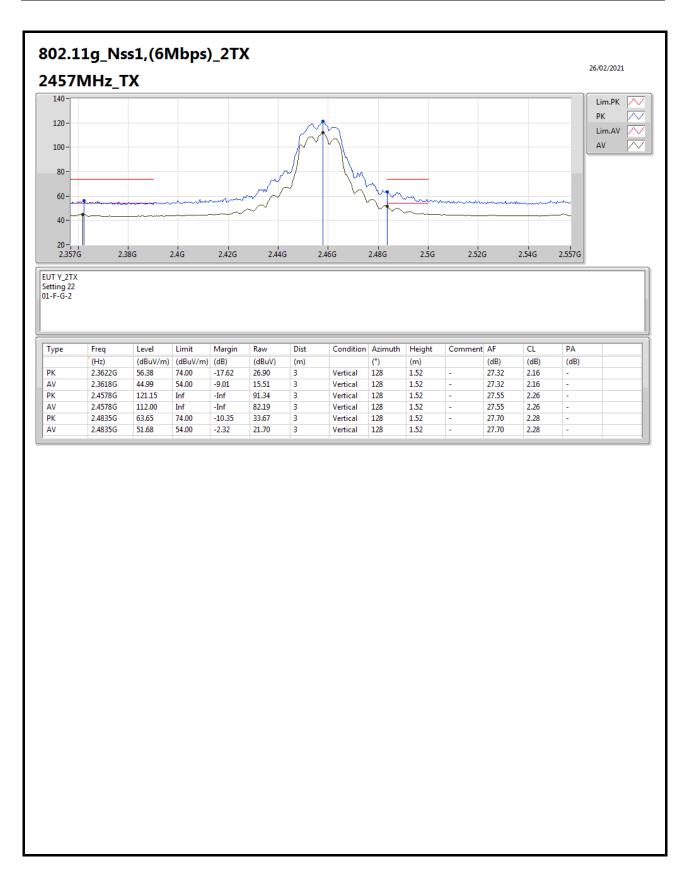




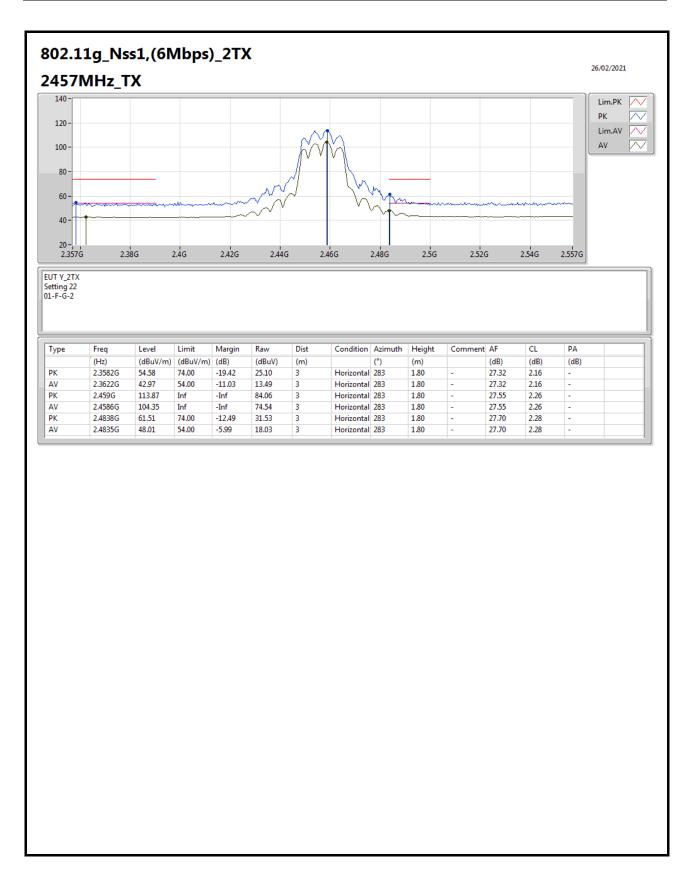




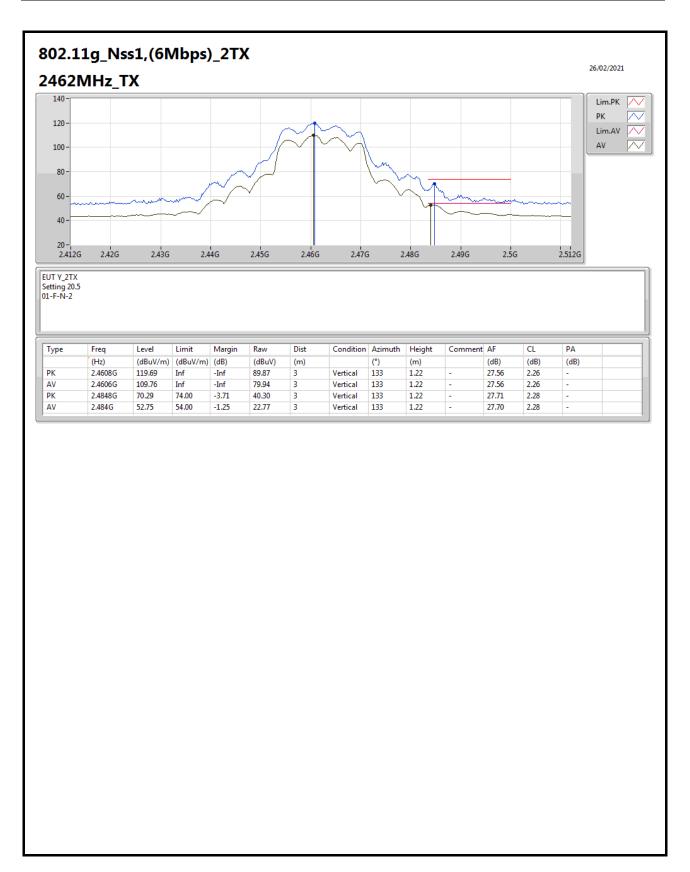




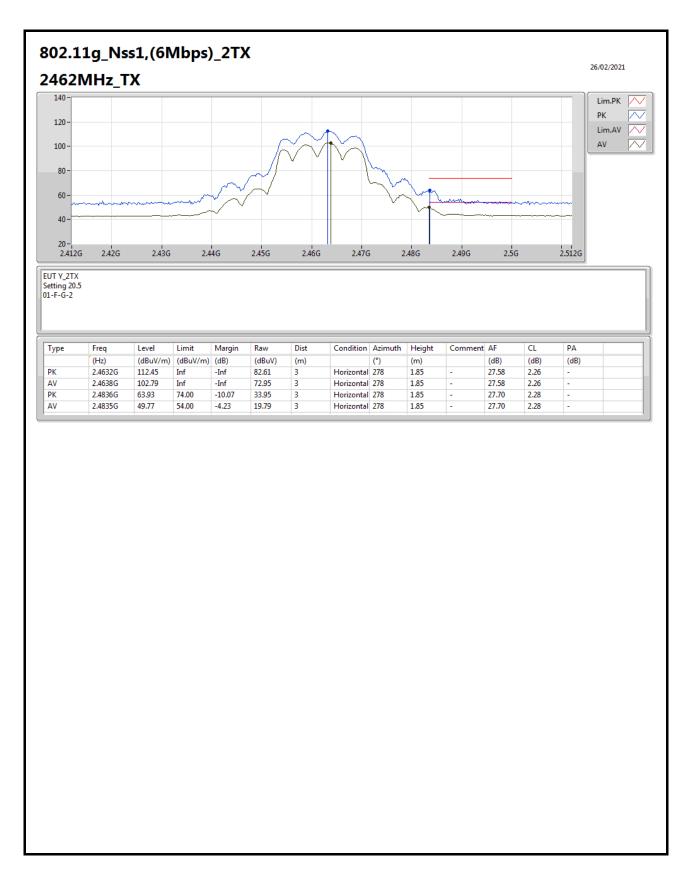




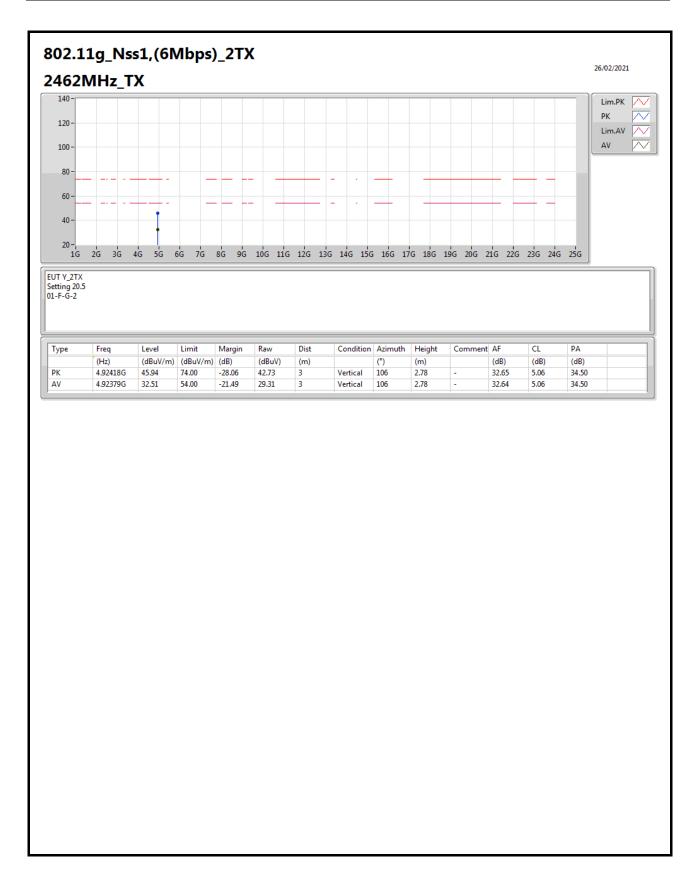




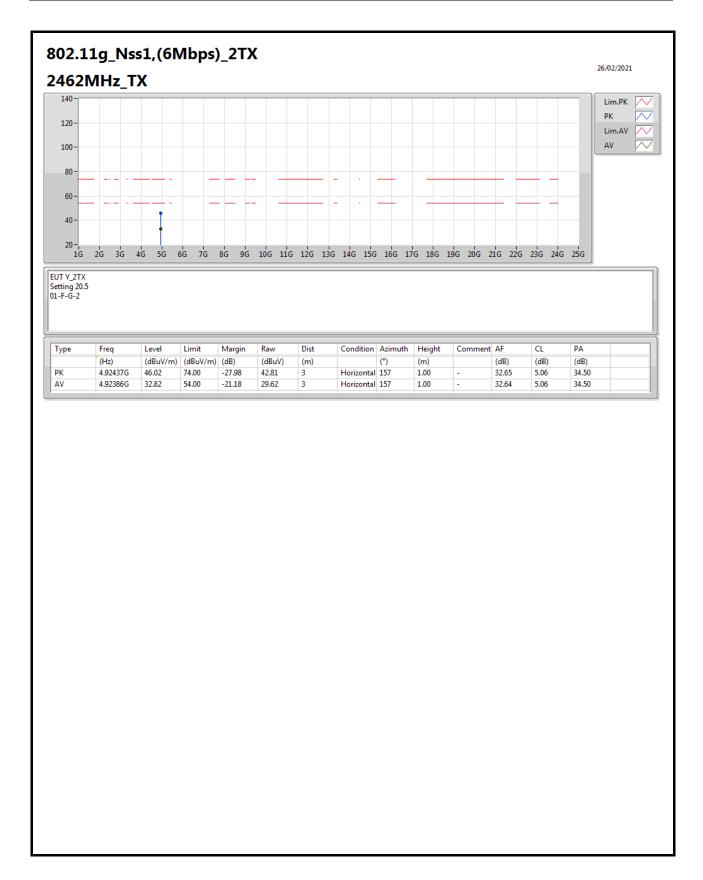




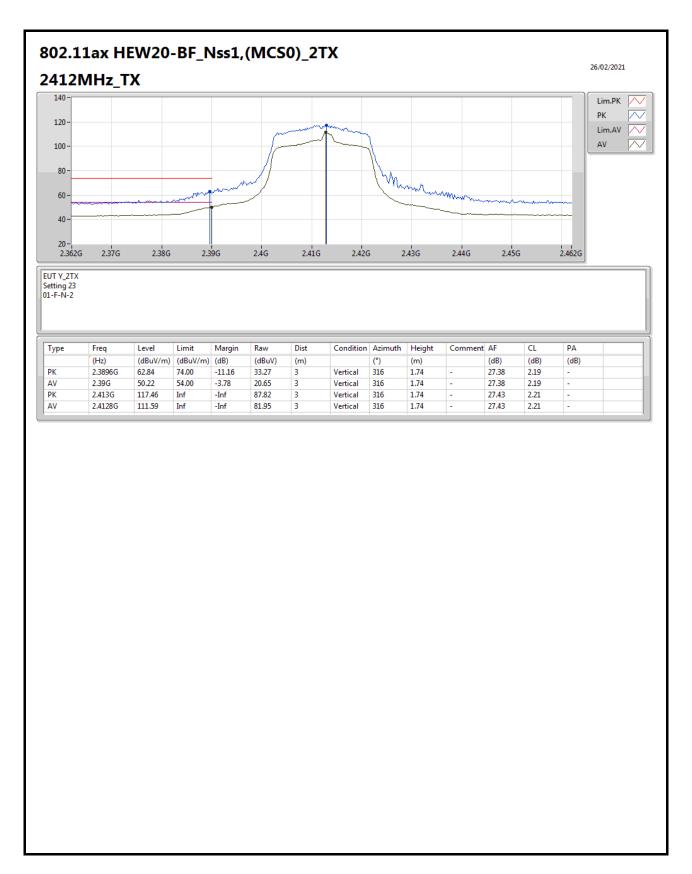




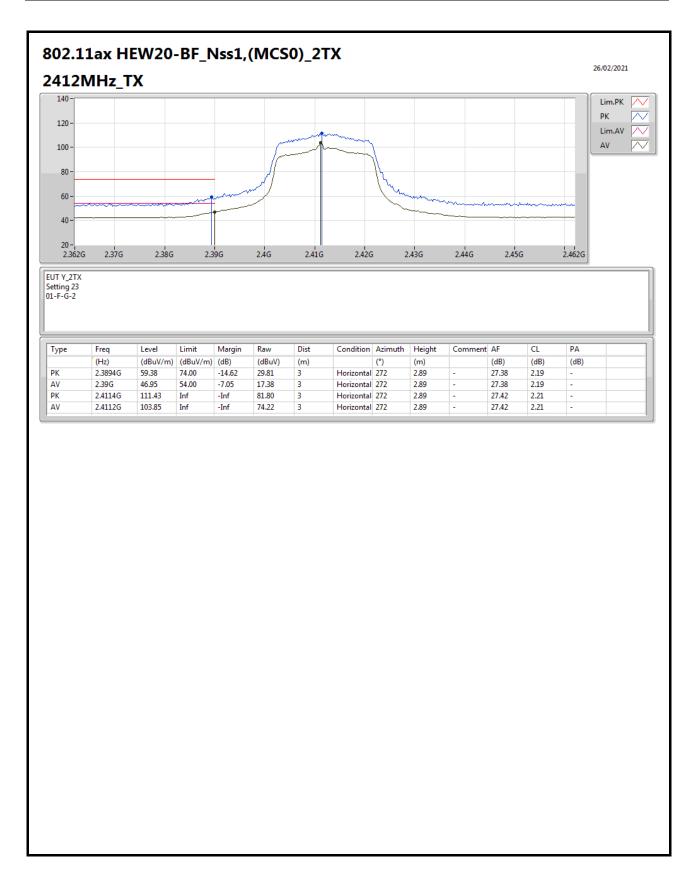




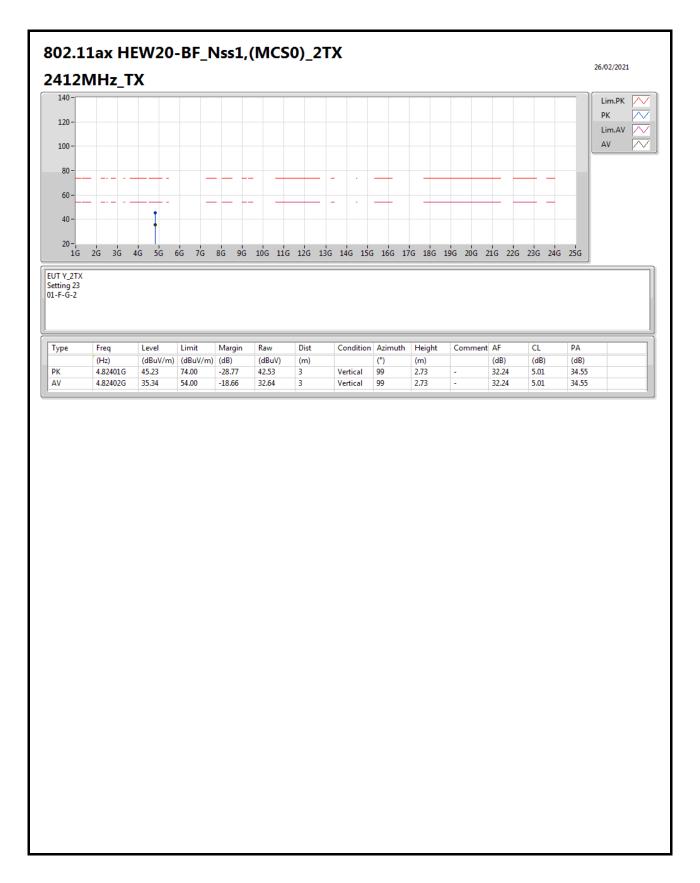




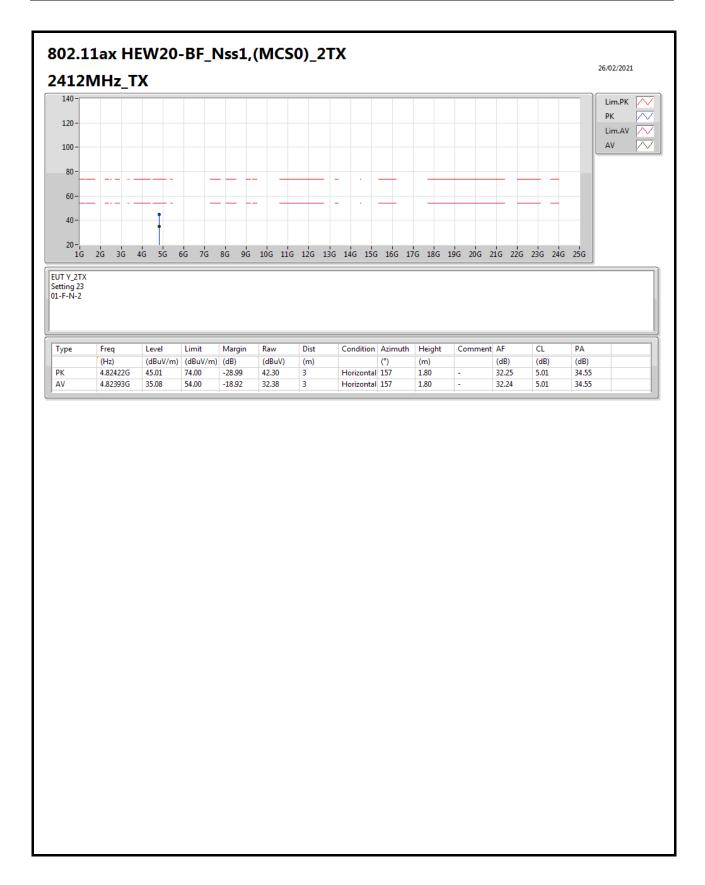




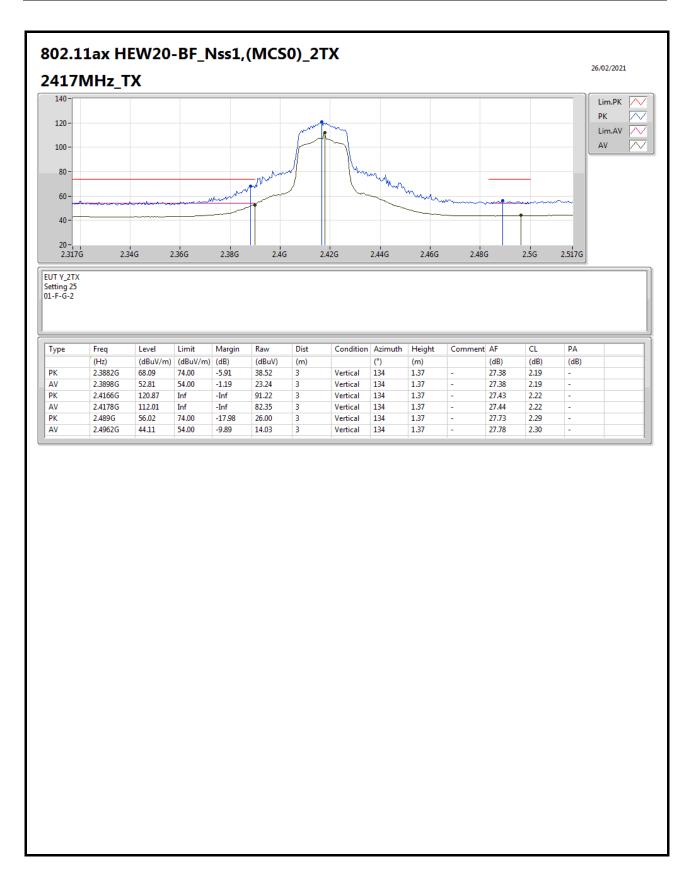




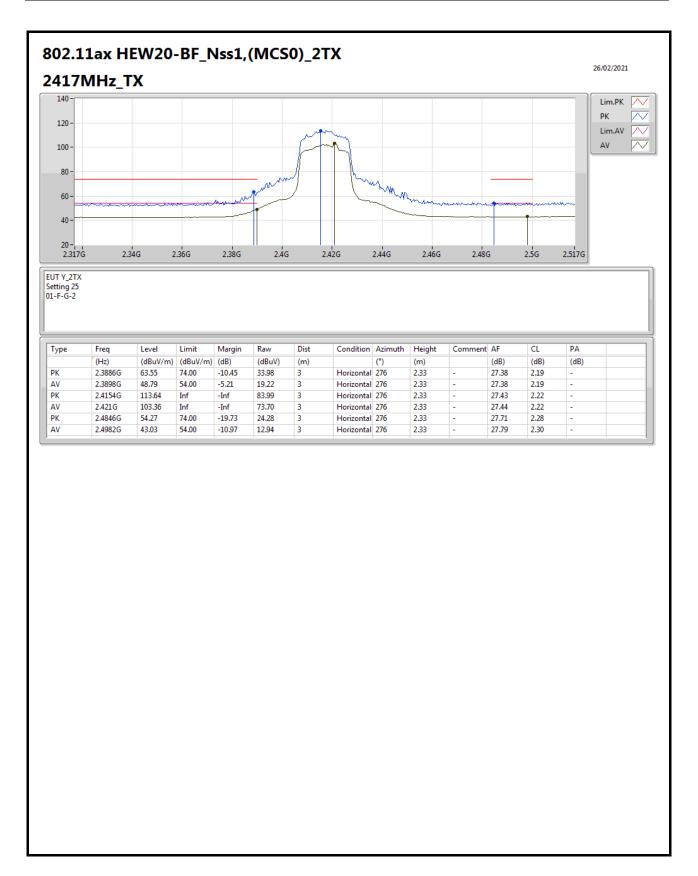




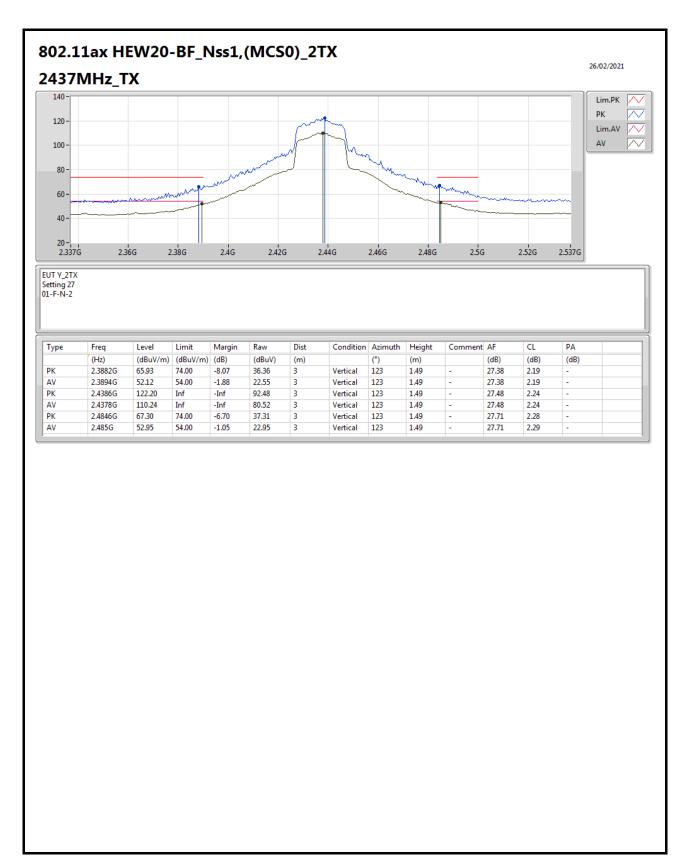




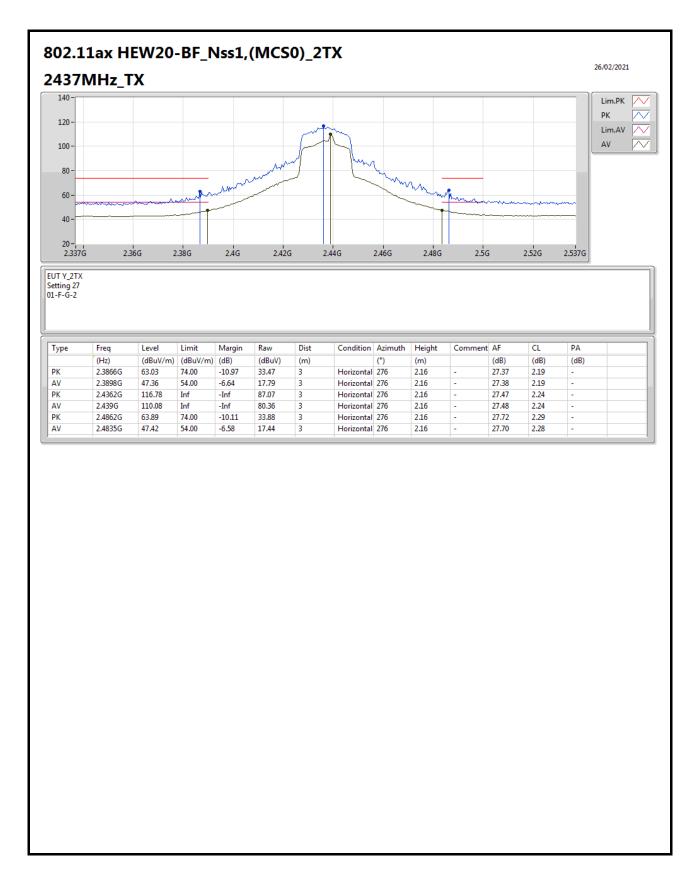




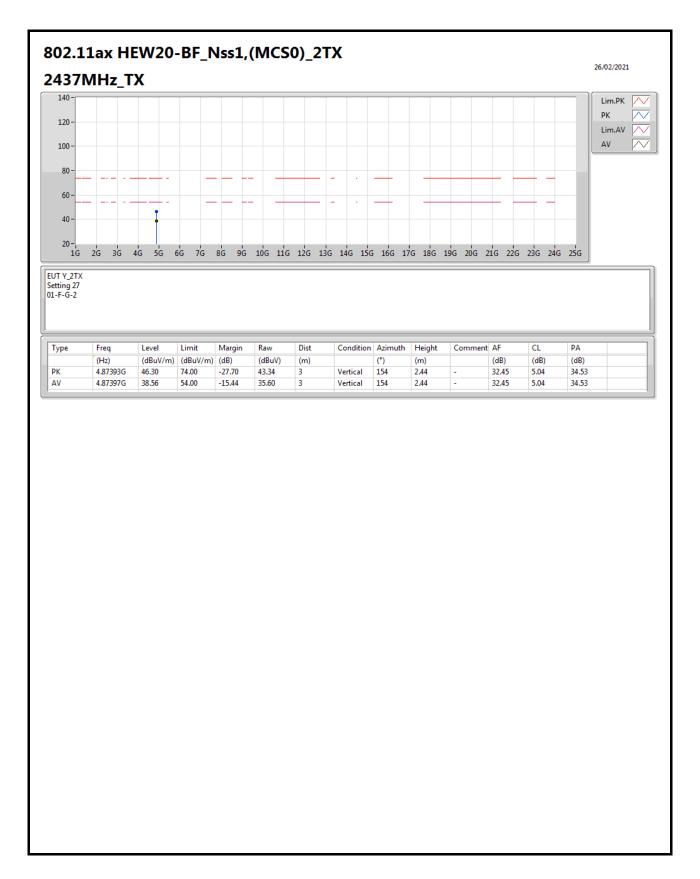




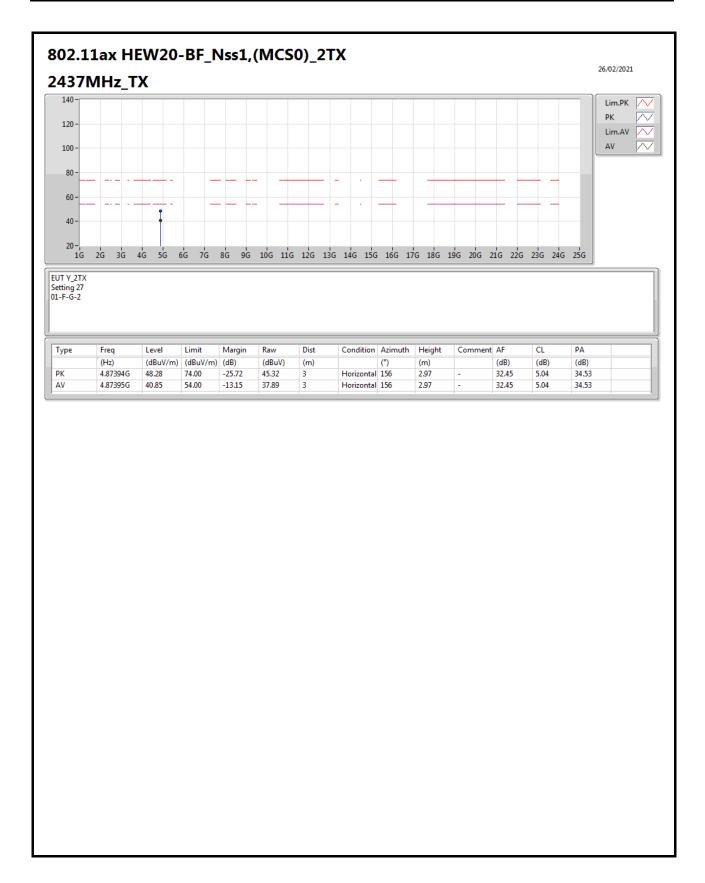




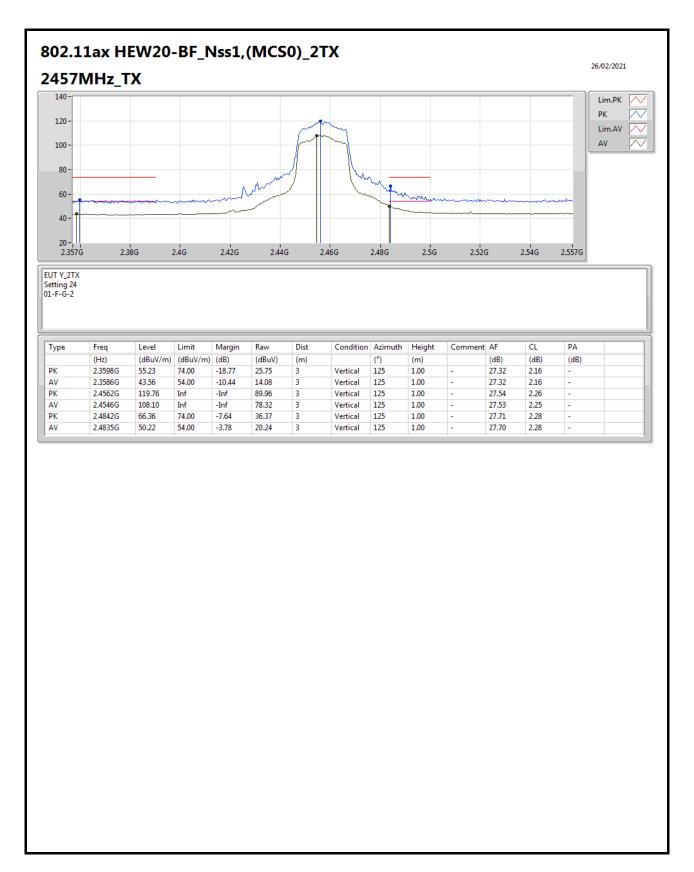




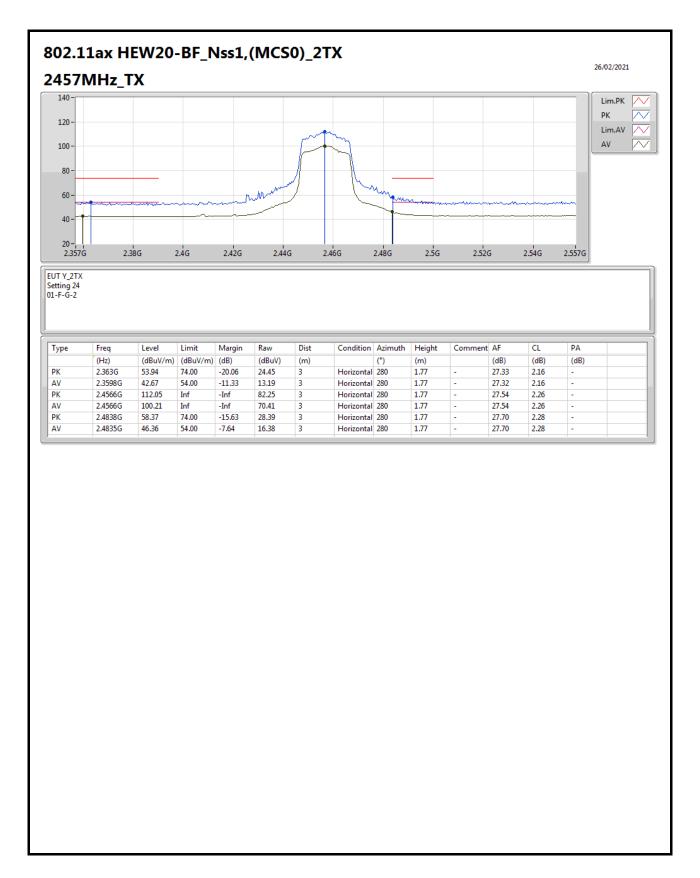




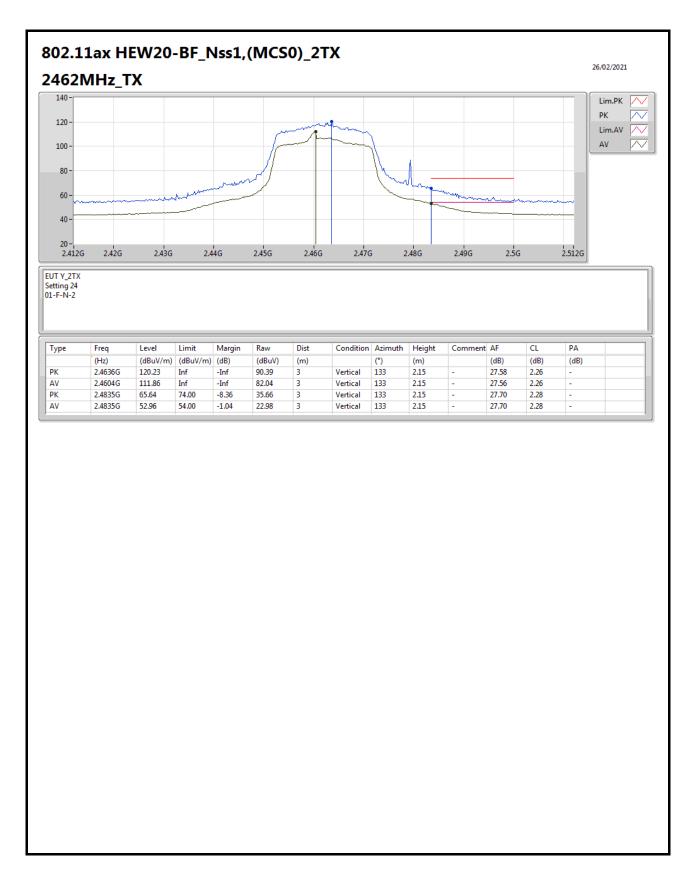




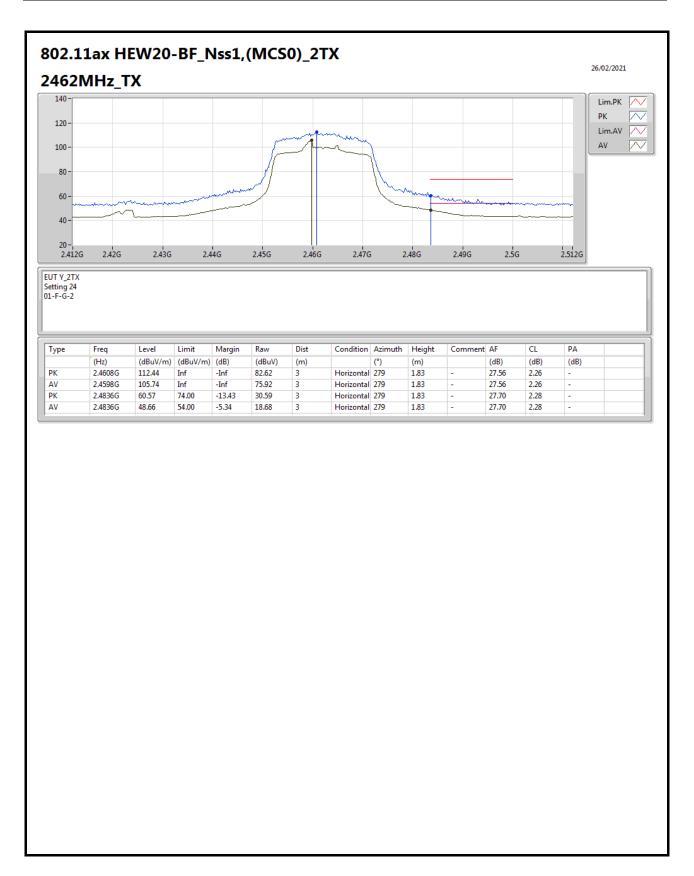




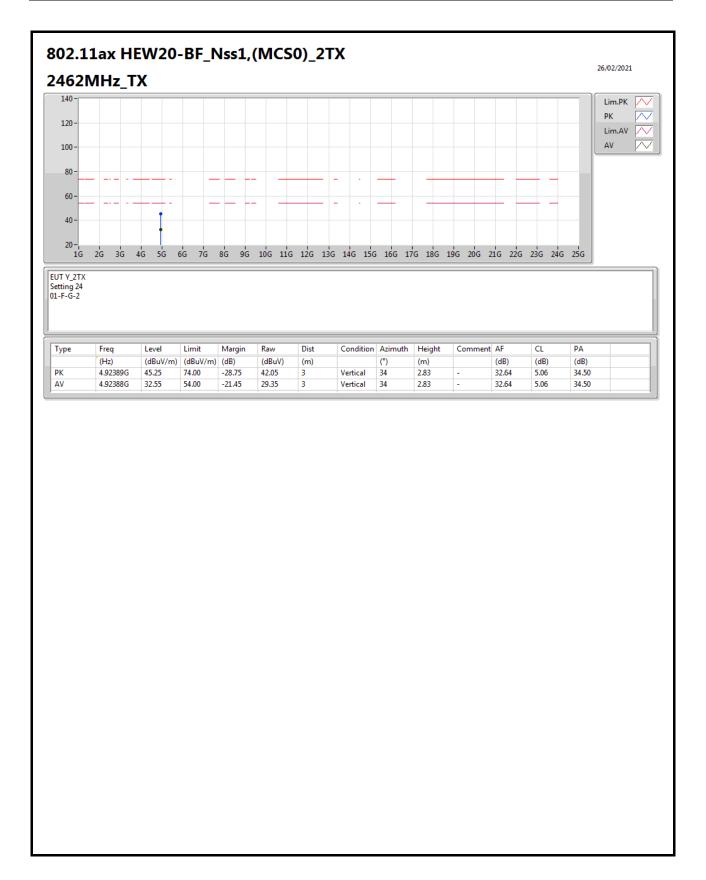




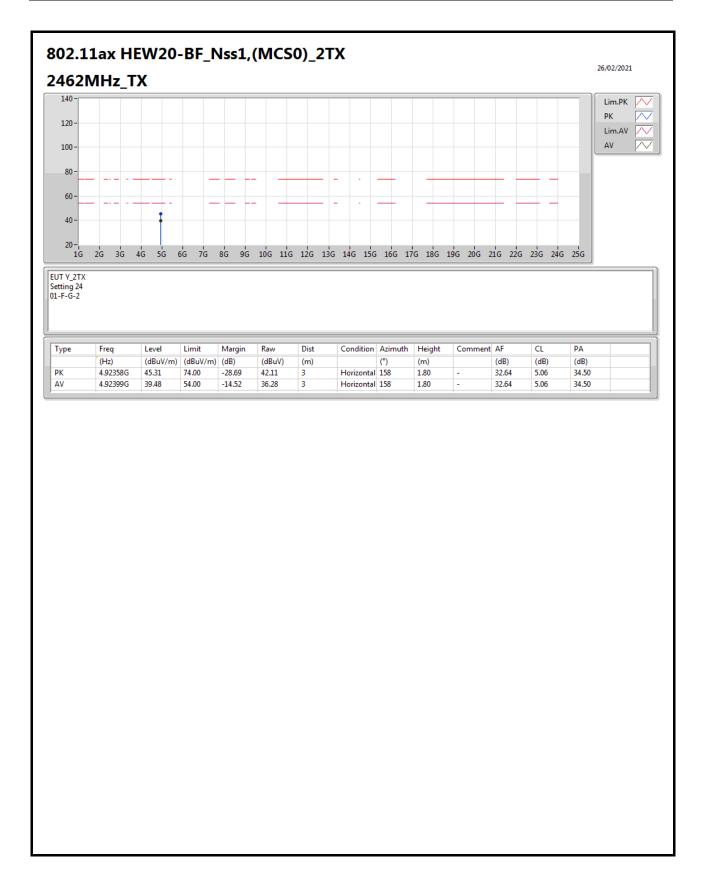




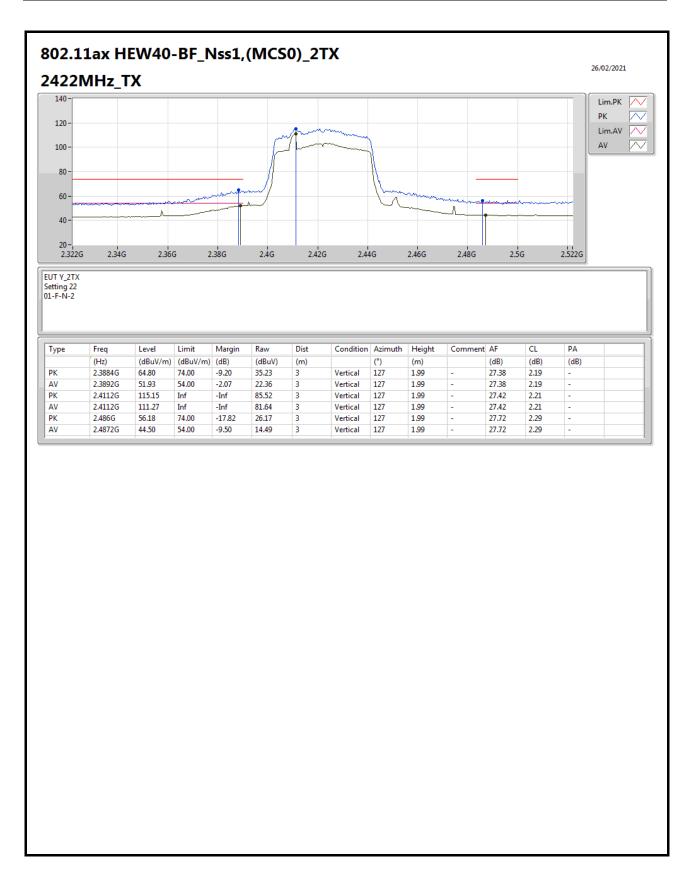




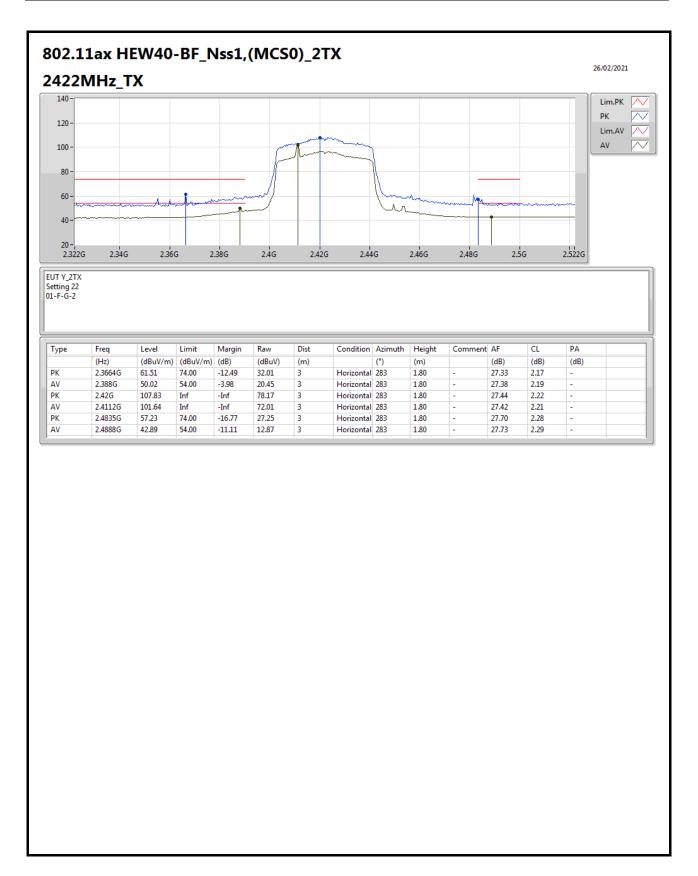




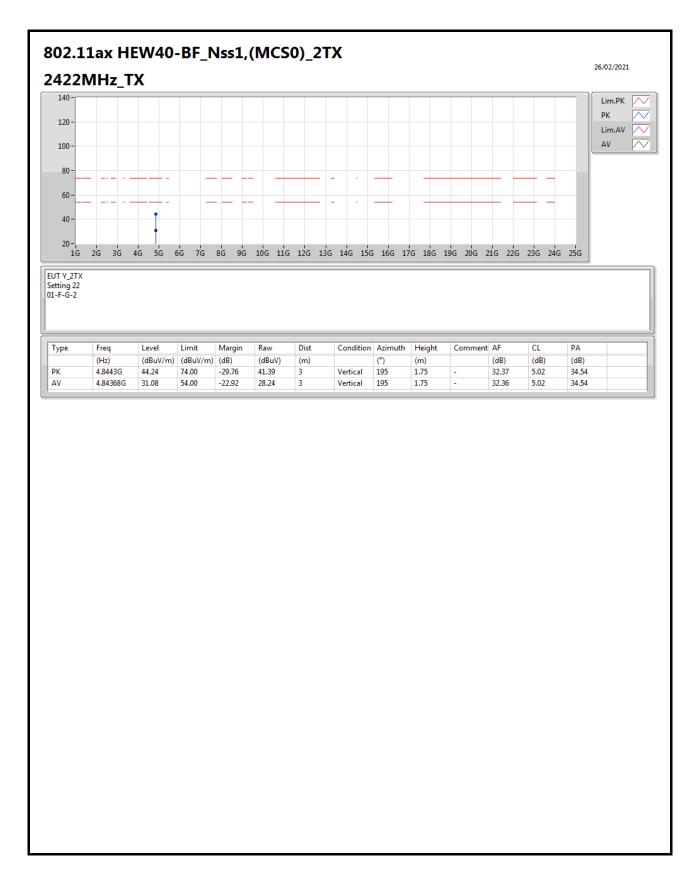




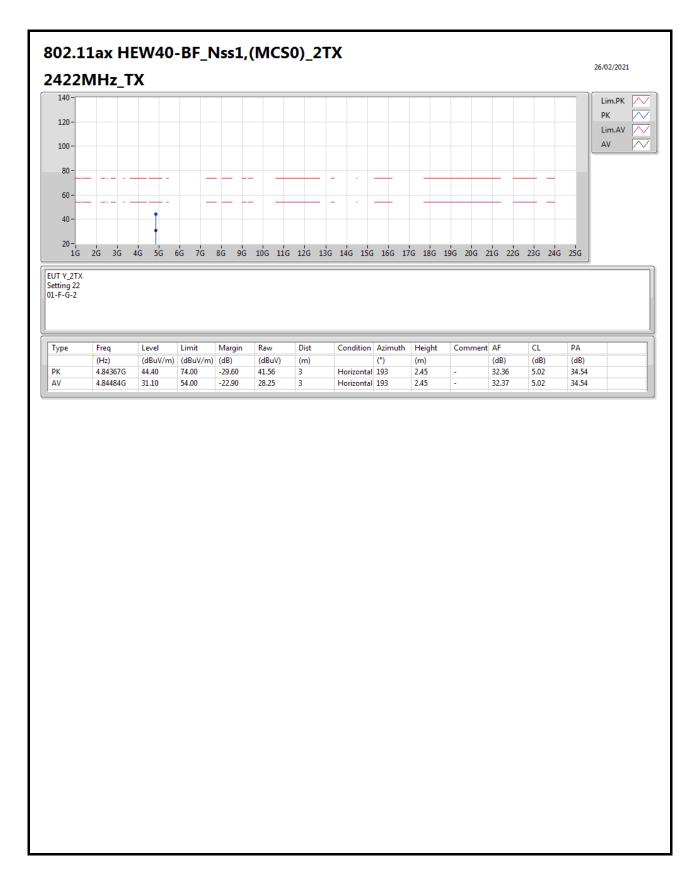




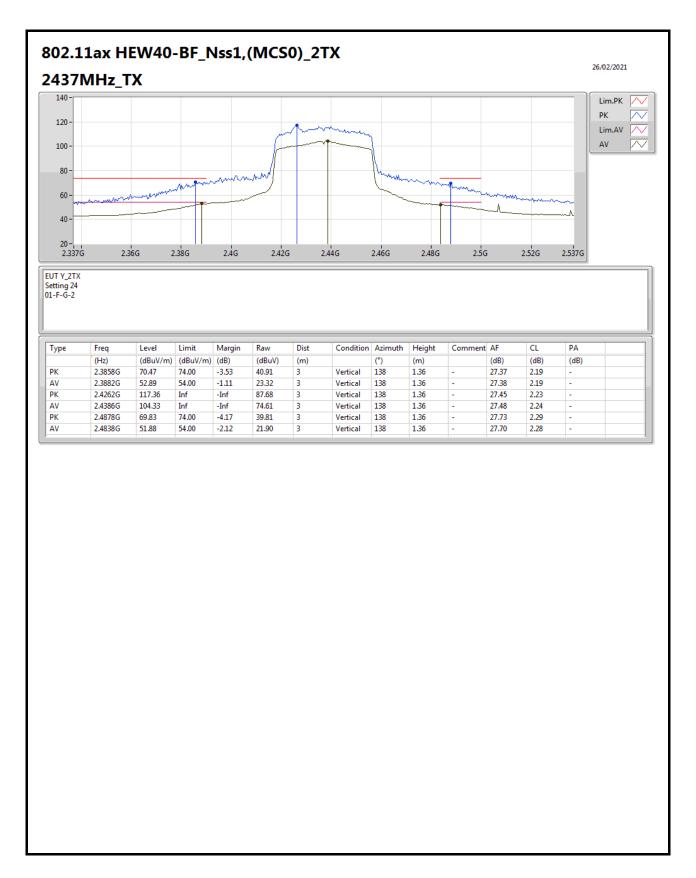




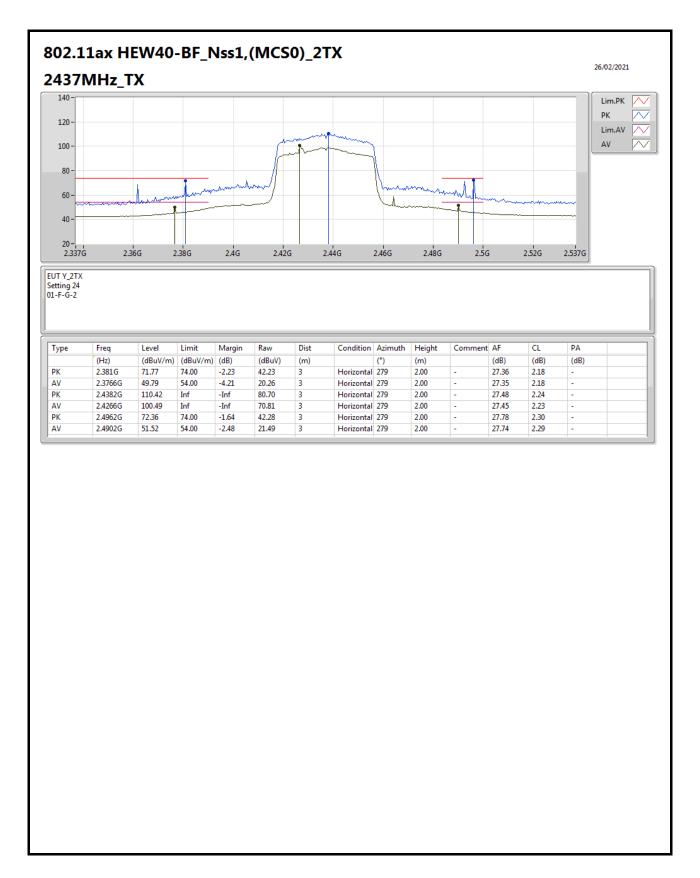




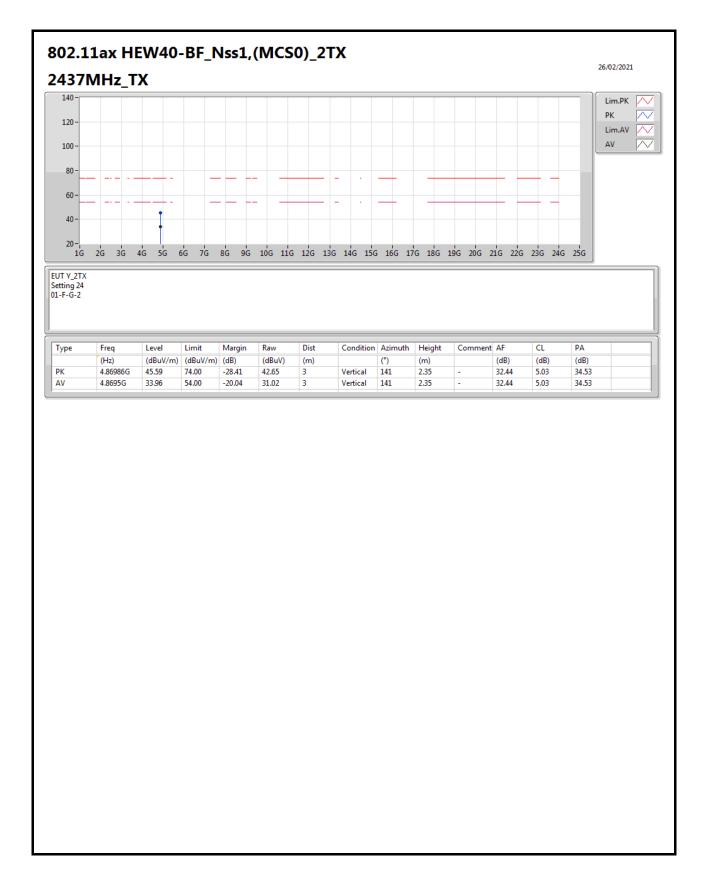




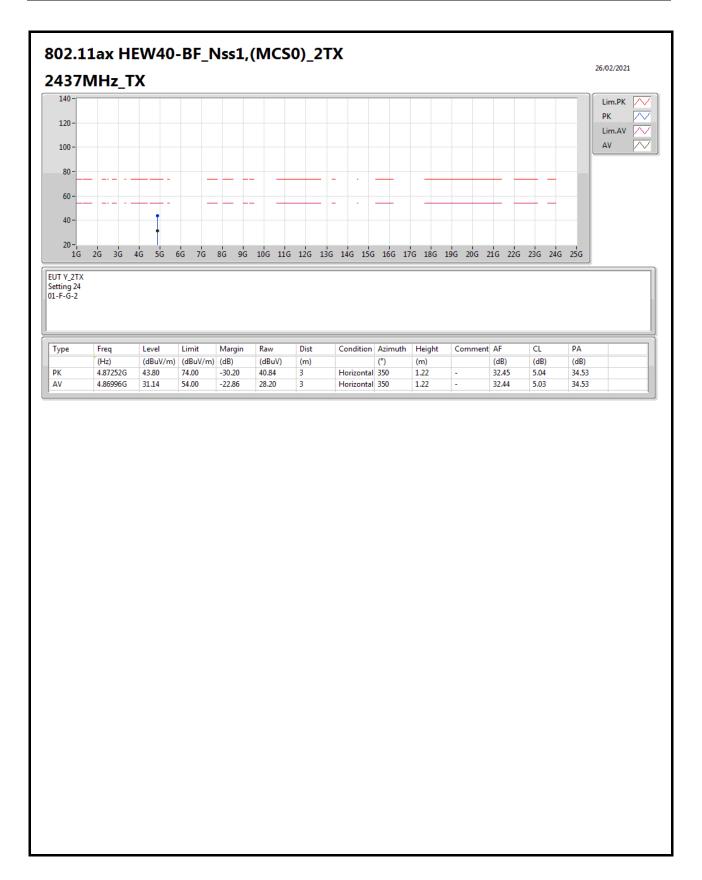




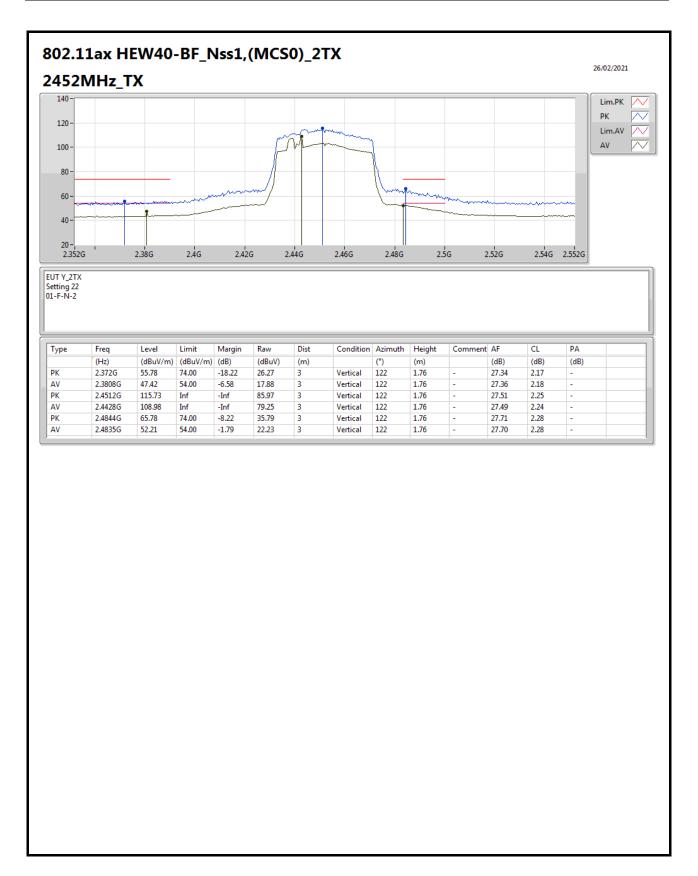




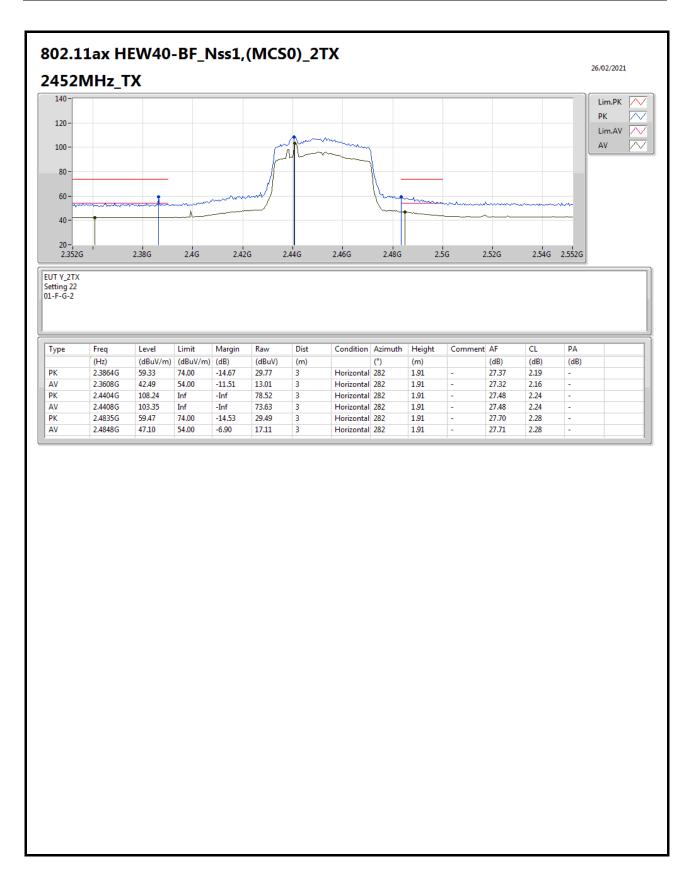




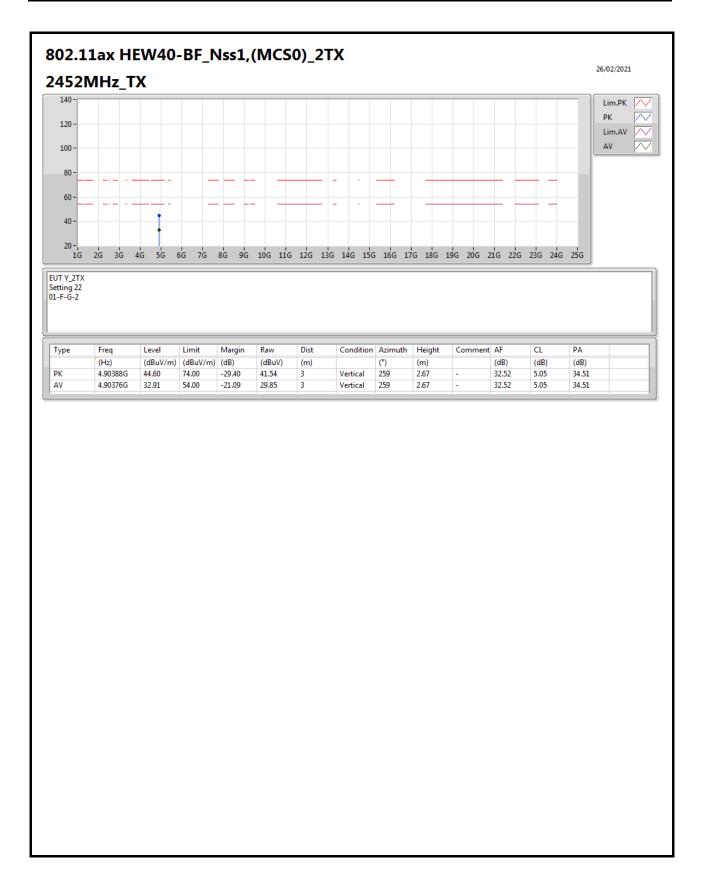




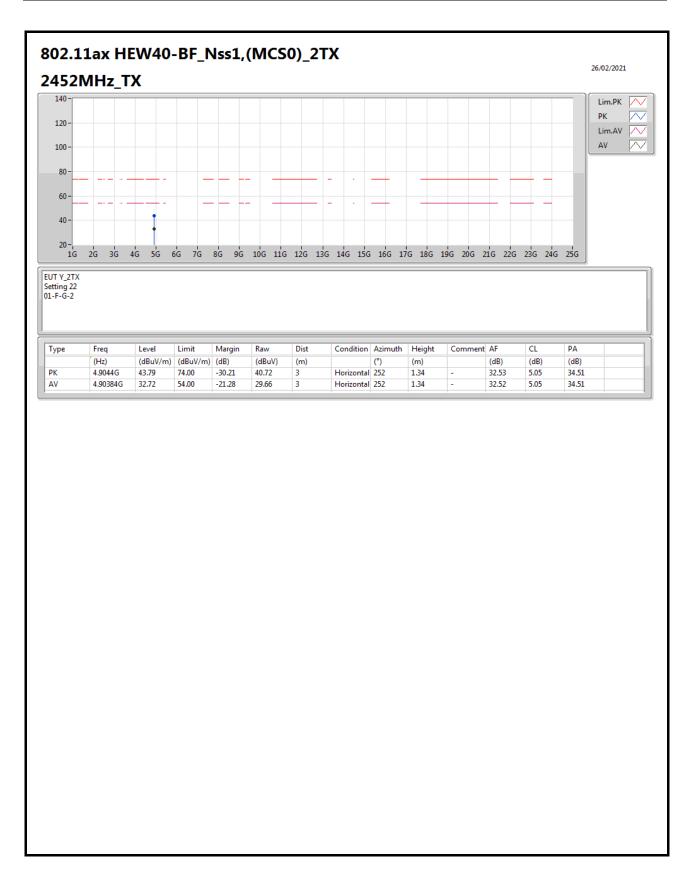












## RSE Co-location Result

perating Mode											Polarization Vertical							
erating Function						No	Normal Link											
Mode  100- 90- 80- 70- 60- 50- 40- 30- 20- 10- 0-	1																	31/03/2021  Lim.PK
1G 20		6G 8G		12G 14G		18G	20G			26G					36G	38G	40G	J
Туре	Freq (Hz)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Di:		Condition	on Az		Height (m)	Com	ment	Raw (dBuV)	Al (d	B)	CL (dB)	PA (dB)
DV	1.12501G	39.72	74.00	-34.28	-9.01	3		Vertical	36		1.00	-		48.73	24	.85	2.69	36.55
PK AV	1.12492G	35.17	54.00	-18.83	-9.01	3		Vertical	36		1.00	"Wor	st"	44.18	24	.85	2.69	36.55

## RSE Co-location Result

						KSE CO	-locatior	ı Kesu	Ιτ					
erating Mode erating Function						1		Horiz	Horizontal					
						Norma	Normal Link							
Mode  100 - 90 - 80 - 70 - 60 - 50 - 40 - 30 - 90 - 90 - 90 - 90 - 90 - 90 - 9	1													31/03/2021  Lim.PK // PK // Lim.AV // AV // AV
20 -							-1	G 26G	28G 3	0G 32G	34G 3	36G 38G	40G	
20 - 10 - 0 - 1G 20	6 4G	6G 8G	10G 1	2G 14G	16G	18G 20G	22G 24	G 20G	200 3	320				
10-	G 4G	6G 8G	10G 1	2G 14G Margin	16G Factor	Dist	Condition			Commen	t Raw	AF	CL	PA
10- 0- 1G 20	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth	Height (m)	Commen	(dBuV)	(dB)	(dB)	(dB)
10- 0- 1G 20	Freq	Level	Limit	Margin	Factor	Dist		Azimuth (°) 1 40	Height					