

Report No. : FR052055AB



# FCC RADIO TEST REPORT

FCC ID		K7S-03571
Equipment		AX3200 Dual Band Gigabit WiFi 6 Router
Brand Name	i	LINKSYS
Model Name		E8450, E8420
Applicant		Belkin International, Inc.
		12045 East Waterfront Dr.Playa Vista California United States 90094
Standard	-	47 CFR FCC Part 15.407

The product was received on Jun. 22, 2020, and testing was started from Jun. 30, 2020 and completed on Jul. 20, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications 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. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Photographs of EUT v01



## History of this test report

Report No.	Version	Description	Issued Date
FR052055AB	01	Initial issue of report	Aug. 13, 2020



### Summary of Test Result

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	15.407(a)	Emission Bandwidth	PASS	-
3.3	15.407(a)	Maximum Conducted Output Power	PASS	-
3.4	15.407(a)	Peak Power Spectral Density	PASS	-
3.5	15.407(b)	Unwanted Emissions	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: Viola Huang** 



## **1** General Description

### 1.1 Information

#### 1.1.1 **RF General Information**

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	a, n (HT20), ac (VHT20),	5180-5240	36-48 [4]
5725-5850	ax (HEW20)	5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40),	5190-5230	38-46 [2]
5725-5850	ax (HEW40)	5755-5795	151-159 [2]
5150-5250	ac (VHT80), ax (HEW80)	5210	42 [1]
5725-5850		5775	155 [1]

Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	4
5.15-5.25GHz	11n HT20	20	4
5.15-5.25GHz	11n HT20-BF	20	4
5.15-5.25GHz	11ac VHT20	20	4
5.15-5.25GHz	11ac VHT20-BF	20	4
5.15-5.25GHz	1ax HEW20	20	4
5.15-5.25GHz	11ax HEW20-BF	20	4
5.15-5.25GHz	11n HT40	40	4
5.15-5.25GHz	11n HT40-BF	40	4
5.15-5.25GHz	11ac VHT40	40	4
5.15-5.25GHz	11ac VHT40-BF	40	4
5.15-5.25GHz	1ax HEW40	40	4
5.15-5.25GHz	15-5.25GHz 11ax HEW40-BF		4
5.15-5.25GHz	.15-5.25GHz 11ac VHT80		4
5.15-5.25GHz	5.15-5.25GHz 11ac VHT80-BF		4
5.15-5.25GHz	1ax HEW80	80	4
5.15-5.25GHz	11ax HEW80-BF	80	4
5.725-5.85GHz	802.11a	20	4
5.725-5.85GHz	11n HT20	20	4
5.725-5.85GHz	11n HT20-BF	20	4
5.725-5.85GHz	11ac VHT20	20	4
5.725-5.85GHz	11ac VHT20-BF	20	4

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Band	Band Mode		Nant
5.725-5.85GHz	1ax HEW20	20	4
5.725-5.85GHz	11ax HEW20-BF	20	4
5.725-5.85GHz	11n HT40	40	4
5.725-5.85GHz	11n HT40-BF	40	4
5.725-5.85GHz	11ac VHT40	40	4
5.725-5.85GHz	11ac VHT40-BF	40	4
5.725-5.85GHz	1ax HEW40	40	4
5.725-5.85GHz	11ax HEW40-BF	40	4
5.725-5.85GHz	11ac VHT80	80	4
5.725-5.85GHz	11ac VHT80-BF	80	4
5.725-5.85GHz	1ax HEW80	80	4
5.725-5.85GHz	11ax HEW80-BF	80	4

Note:

• 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

- VHT20, VHT40, VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, modulation.
- HEW20, HEW40, HEW80 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- BWch is the nominal channel bandwidth.



#### 1.1.2 Antenna Information

Ant. Port	Port Brand	Model Name	Antenna Type	Connector	Gain (dBi)			
Ant.	FUIL	Branu	woder name	Аптенна туре	Connector	2.4G	5G B1	5G B4
1	1	WNC	XKAM-N13	Dipole Antenna	U.FL	3.5	3.6	5.5
2	2	WNC	XKAM-N13	Dipole Antenna	U.FL	4.2	3.8	4.7
3	3	WNC	XKAM-N13	Dipole Antenna	U.FL	4.5	4.0	3.6
4	4	WNC	XKAM-N13	Dipole Antenna	U.FL	2.7	5.1	5.5
	Beamforming Gain (dBi)						5.7	4.8

Note: The above information was declared by manufacturer.

#### For 2.4GHz function:

#### IEEE 802.11b/g/n/VHT (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.

#### For 5GHz function:

#### 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.



### 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.972	0.12	1.033m	1k
802.11ax HEW20-BF	0.975	0.11	3.785m	300
802.11ax HEW40-BF	0.853	0.69	1.963m	1k
802.11ax HEW80-BF	0.914	0.39	948u	Зk

Note:

• DC is Duty Cycle.

DCF is Duty Cycle Factor.

#### 1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter					
Beamforming Function	$\boxtimes$	With beamforming		Without beamforming		
Beamorning runction	The product has beamforming function for11n/11ac/11ax in 5GHz.					
Function		Outdoor P2M	$\boxtimes$	Indoor P2M		
		Fixed P2P		Client		
Test Software Version	MT7915 Version 0.0.2.15					

Note: The above information was declared by manufacturer.

#### 1.1.5 Table for Multiple Listing

Model Name	USB Port
E8450	V
E8420	Х

From the above models, model: E8450 was selected as representative model for the test and its data was recorded in this report.

#### 1.1.6 Table Information for DDR and NAND Flash

The detail information for DDR and NAND Flash is as following:

ltem	I	DDR	NAND Flash		
	Brand Name	Model Name	Brand Name	Model Name	
Main source	Winbond	W634GG6NB-12	Fidelix	FM35Q1GA-IB	
Second source	KINGSTON	D2516ECMDXGJD-U	Winbond	W25N01GVZEIG	

The EUT has four types, which are identical to each other in all aspects except for the following table:

EUT	DDR	NAND Flash	
1	Main source	Main source	
2	Main source Second source		
3	Second source	Main source	
4	Second source Second source		



### **1.2 Applicable Standards**

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01
- The following reference test guidance is not within the scope of accreditation of TAF.
- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

### **1.3 Testing Location Information**

Testing Location					
	HWA YA ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)				
		TEL	:	886-3-327-3456 FAX : 886-3-327-0973	
$\boxtimes$	JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.	
		TEL	:	886-3-656-9065 FAX : 886-3-656-9085	

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-CB	Serway Li	25.9~27.1°C / 60~62%	Jul. 04, 2020 ~ Jul. 14, 2020
Radiated below 1GHz	03CH05-CB	JN Du	27.3~28.5°C / 58~60%	Jul. 17, 2020
Radiated above 1GHz	03CH02-CB	JN Du	29.5~30.9°C / 40~42%	Jul. 02, 2020 ~ Jul. 03, 2020
Radiated (For co-location)	03CH02-CB	JN Du	26.9~28.4°C / 56~60%	Jul. 20, 2020
AC Conduction	CO01-CB	Ryo Fan	22~23°C / 62~63%	Jun. 30, 2020 ~ Jul. 14, 2020

Test site Designation No. TW0006 with FCC

Test site registered number IC 4086D with Industry Canada.

### 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)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.6 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	0.39%	Confidence levels of 95%



## 2 Test Configuration of EUT

### 2.1 Test Channel Mode

Mode	Power Setting		
802.11a_Nss1,(6Mbps)_4TX	-		
5180MHz	16(20)		
5200MHz	18(24)		
5240MHz	19(26)		
5745MHz	21.5(2B)		
5785MHz	22(2C)		
5825MHz	21(2A)		
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-		
5180MHz	31		
5200MHz	35		
5240MHz	38		
5745MHz	44		
5785MHz	45		
5825MHz	45		
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-		
5190MHz	26		
5230MHz	35		
5755MHz	38		
5795MHz	41		
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-		
5210MHz	24		
5775MHz	35		

Note:

 VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.

 There are two modes of EUT for 802.11n/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.



## 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests				
Tests Item	Tests Item         AC power-line conducted emissions			
Condition AC power-line conducted measurement for line and neutral				
Operating Mode Normal Link				
1 Normal Link-EUT 1 + Adapter 1				
2	Normal Link-EUT 1 + Adapter 2			
3 Normal Link-EUT 1 + Adapter 3				
For operating mode 3 is the worst case and it was record in this test report.				

The Worst Case Mode for Following Conformance Tests			
Tests Item     Emission Bandwidth       Maximum Conducted Output Power     Peak Power Spectral Density			
Test Condition	Conducted measurement at transmit chains		



Th	The Worst Case Mode for Following Conformance Tests				
Tests Item	Unwanted Emissions				
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EU 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 1 + 2.4G + Adapter 1				
2	EUT 1 + 2.4G + Adapter 2				
3	EUT 1 + 2.4G + Adapter 3				
Mode 2 has been evaluate follow this same test mode	ed to be the worst case between Mode 1~3, thus measurement for Mode 4 will				
4	EUT 1 + 5G + Adapter 2				
Mode 2 has been evaluate follow this same test mode	d to be the worst case between Mode 1~4, thus measurement for Mode 5~10 will				
5	EUT 2 + 2.4G + Adapter 2				
6	EUT 2 + 5G + Adapter 2				
7	EUT 3 + 2.4G + Adapter 2				
8	EUT 3 + 5G + Adapter 2				
9	EUT 4 + 2.4G + Adapter 2				
10	EUT 4 + 5G + Adapter 2				
For operating mode 10 is t	For operating mode 10 is the worst case and it was record in this test report.				
Operating Mode > 1GHz CTX					

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 F for Radiated Emission Co-location.			

The Worst Case Mode for Following Conformance Tests				
Tests Item         Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation				
Operating Mode				
1 WLAN 2.4GHz + WLAN 5GHz				
Refer to Sporton Test Report No.: FA052055 for Co-location RF Exposure Evaluation.				
Noto: The ELIT can only use X axis position				

Note: The EUT can only use X axis position.



### 2.3 EUT Operation during Test

For CTX Mode:

non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

beamforming mode:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

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

The program was executed as follows:

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

For Normal Link:

During the test, the EUT operation to normal function.

### 2.4 Accessories

Accessories						
Equipment Name	Brand Name	Model Name Rating		Remark		
Adapter 1	APD	WB-24J12FU	Input: 100-240V ~ 50-60Hz, 0.7A MAX. Output: 12.0V, 2.0A, (Black)	Fixed adapter with US plug (Black)		
Adapter 2	CWT	2AAJ024F	Input: 100-240V ~ 50/60Hz, 0.8A Output: 12.0V, 2.0A, (Black)	Fixed adapter with US plug (Black)		
Adapter 3	APD	WB-24J12R	Input: 100-240V ~ 50-60Hz, 0.7A MAX. Output: 12.0V, 2.0A 24.0W, (Black)	Interchangeable adapter with US plug (Black)		



### 2.5 Support Equipment

#### For AC Conduction:

Support Equipment						
No.	Equipment	Brand Name	Model Name	FCC ID		
А	LAN1 NB	DELL	E6430	N/A		
В	2.4G NB	DELL	E6430	N/A		
С	5G NB	DELL	E6430	N/A		
D	WAN NB	DELL	E6430	N/A		
Е	Flash disk3.0	Transcend	JetFlash-700	N/A		

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

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

#### For Radiated (above 1GHz): Non-beamforming mode

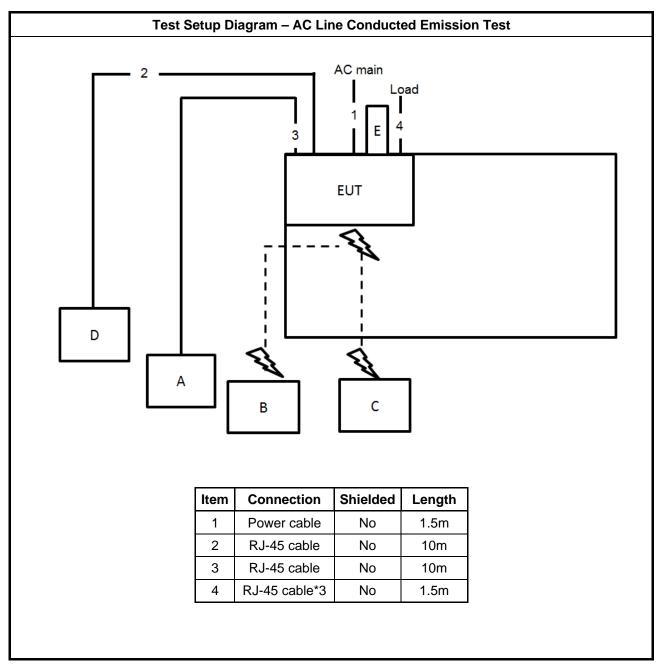
Support Equipment						
No.	No. Equipment Brand Name Model Name FCC ID					
А	Notebook	DELL	E4300	N/A		

#### Beamforming mode

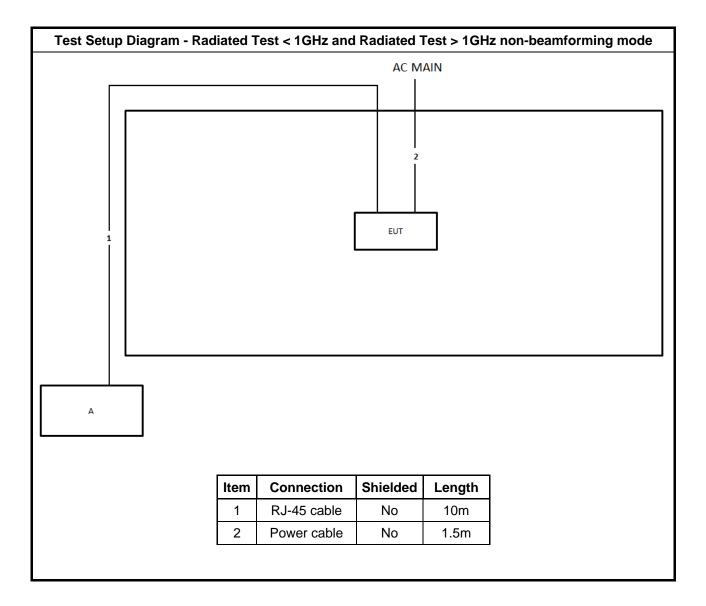
Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID	
А	Notebook	DELL	E4300	N/A	
В	Notebook	DELL	E4300	N/A	
С	RX Device	Linksys	E8450	N/A	



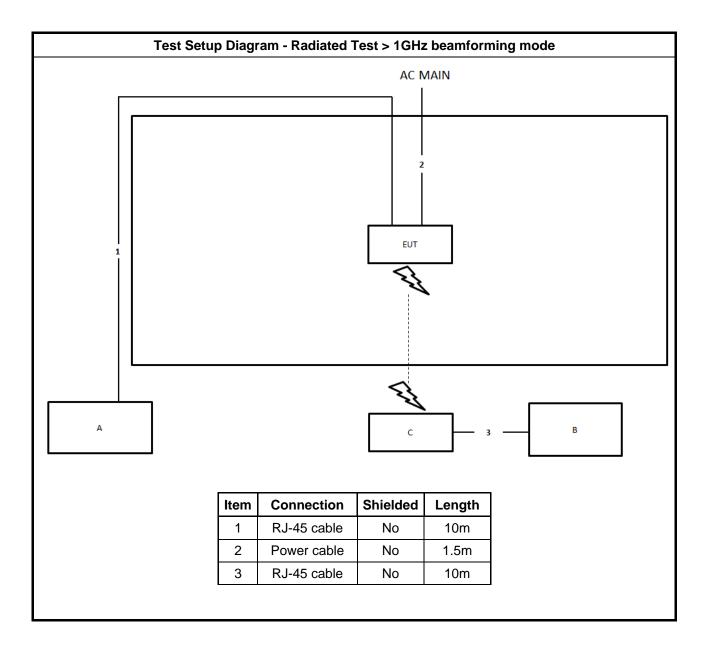
### 2.6 Test Setup Diagram













### 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.				

### 3.1.2 Measuring Instruments

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

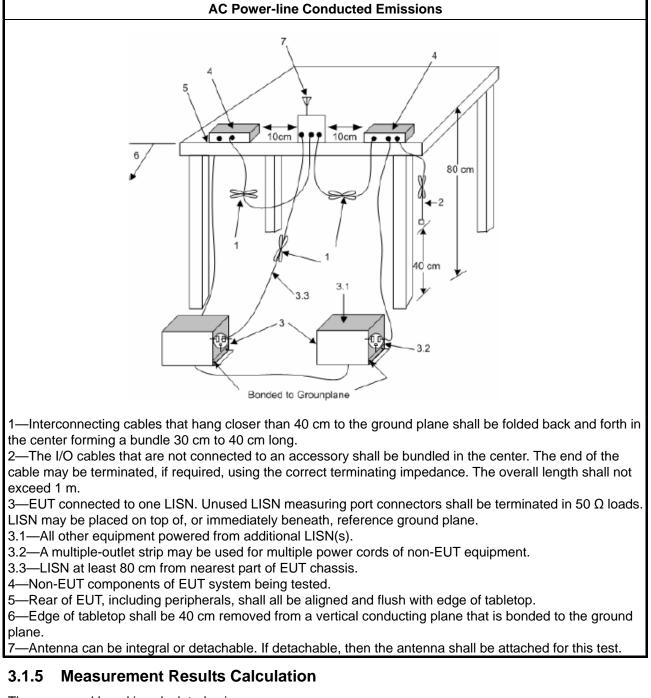
#### 3.1.3 Test Procedures

**Test Method** 

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



#### 3.1.4 Test Setup



The measured Level is calculated using:

- a. Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- b. Margin = Limit + (Read Level + LISN Factor + Cable Loss)

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

#### Refer as Appendix A



### 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

	Emission Bandwidth Limit			
UNI	I Devices			
$\boxtimes$	For the 5.15-5.25 GHz band, N/A			
	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.			
	For the 5.47-5.725 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.			
$\boxtimes$	For the 5.725-5.85 GHz band, 6 dB emission bandwidth $\geq$ 500kHz.			
LE-	LAN Devices			
	For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.			
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz			
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz			
	For the 5.725-5.85 GHz band, 6 dB emission bandwidth $\geq$ 500kHz.			
~ ~	2.2.2 Measuring Instruments			

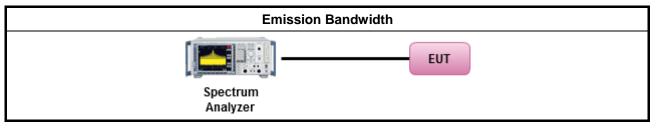
#### 3.2.2 Measuring Instruments

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 789033, clause C for EBW and clause D for OBW measurement.			
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.			
		Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.			

#### 3.2.4 Test Setup



#### 3.2.5 Test Result of Emission Bandwidth

#### Refer as Appendix B



### 3.3 Maximum Conducted Output Power

#### 3.3.1 Maximum Conducted Output Power Limit

	Maximum Conducted Output Power Limit				
UN	I Devices				
$\boxtimes$	Sor the 5.15-5.25 GHz band:				
	<ul> <li>Outdoor AP: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6). e.i.r.p. at any elevation angle above 30 degrees ≤ 125mW [21dBm]</li> </ul>				
	<ul> <li>Indoor AP: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6)</li> </ul>				
	<ul> <li>Point-to-point AP: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W If G<sub>TX</sub> &gt; 23 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 23).</li> </ul>				
	<ul> <li>Mobile or Portable Client: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 250 mW. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 24 - (G<sub>TX</sub> - 6).</li> </ul>				
	For the 5.25-5.35 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .				
	For the 5.47-5.725 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .				
$\boxtimes$	For the 5.725-5.85 GHz band:				
	<ul> <li>Point-to-multipoint systems (P2M): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6).</li> </ul>				
	<ul> <li>Point-to-point systems (P2P): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W.</li> </ul>				
LE-	LAN Devices				
	For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.				
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz				
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz				
	For the 5.725-5.85 GHz band:				
	<ul> <li>Point-to-multipoint systems (P2M): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6).</li> </ul>				
	<ul> <li>Point-to-point systems (P2P): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W.</li> </ul>				
P <sub>Ou</sub> G <sub>TX</sub>	$P_{out}$ = 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.

#### 3.3.3 Test Procedures

	Test Method				
•	Maximum Conducted Output Power				
	Average over on/off periods with duty factor				
	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).				
	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)				
	Wideband RF power meter and average over on/off periods with duty factor				
	Refer as FCC KDB 789033, clause E Method PM-G (using an RF average power meter).				
•	For conducted measurement.				
	<ul> <li>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.</li> </ul>				
	<ul> <li>If multiple transmit chains, EIRP calculation could be following as methods:</li> <li>P<sub>total</sub> = P<sub>1</sub> + P<sub>2</sub> + + P<sub>n</sub> (calculated in linear unit [mW] and transfer to log unit [dBm])</li> <li>EIRP<sub>total</sub> = P<sub>total</sub> + DG</li> </ul>				

#### 3.3.4 Test Setup

RF Output Power (Power Meter)			
Pow	EUT EUT er Meter		

#### 3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C



### 3.4 Peak Power Spectral Density

### 3.4.1 Peak Power Spectral Density Limit

	Peak Power Spectral Density Limit				
UNI	UNII Devices				
$\boxtimes$	For the 5.15-5.25 GHz band:				
	• Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .				
	• Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .				
	• Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of $17dBm/MHz$ . If $G_{TX} > 23 dBi$ , then $P_{Out} = 17 - (G_{TX} - 23)$ .				
	• Mobile or Portable Client: the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi, then PPSD= 11 - (G <sub>TX</sub> - 6)				
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi, then PPSD= 11 – (G <sub>TX</sub> – 6).				
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi, then PPSD= 11 – (G <sub>TX</sub> – 6).				
$\boxtimes$	For the 5.725-5.85 GHz band:				
	• Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= 30 - ( $G_{TX} - 6$ ).				
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.				
LE-I	LAN Devices				
	For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) $\leq$ 10 dBm/MHz.				
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz.				
	<ul> <li>e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:</li> <li>-13 dBW/MHz for 0° ≤ θ &lt; 8°; -13 - 0.716 (θ-8) dBW/MHz for 8° ≤ θ &lt; 40°</li> <li>-35.9 - 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ &gt; 45°</li> </ul>				
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz.				
	For the 5.725-5.85 GHz band:				
	• Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= 30 - ( $G_{TX} - 6$ ).				
	<ul> <li>Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.</li> </ul>				
pow	<b>PPSD</b> = peak power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz $G_{TX}$ = the maximum transmitting antenna directional gain in dBi.				

#### 3.4.2 Measuring Instruments

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

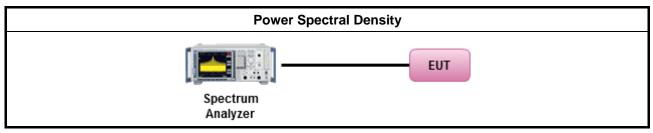


#### 3.4.3 Test Procedures

	Test Method			
•	Peak power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the peak power spectral density and use the peak search function on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density shall be measured using below options:			
		Refer as FCC KDB 789033, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth		
	[duty	v cycle ≥ 98% or external video / power trigger]		
	$\square$	Refer as FCC KDB 789033, clause E Method SA-1 (spectral trace averaging).		
		Refer as FCC KDB 789033, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)		
	duty	cycle < 98% and average over on/off periods with duty factor		
	$\square$	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).		
		Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)		
•	For	conducted measurement.		
	•	If the EUT supports multiple transmit chains using options given below:		
		☑ Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.		
		Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,		
		Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.		
	•	If multiple transmit chains, EIRP PPSD calculation could be following as methods: $PPSD_{total} = PPSD_1 + PPSD_2 + + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$		



### 3.4.4 Test Setup



#### 3.4.5 Test Result of Peak Power Spectral Density

Refer as Appendix D



### 3.5 Unwanted Emissions

#### 3.5.1 Transmitter Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz 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		

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.

Un-restricted band emissions above 1GHz Limit						
Operating Band	Limit					
🔀 5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
🔲 5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
🔲 5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
⊠ 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.					
Note 1: 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 shal be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of						



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linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

#### 3.5.2 **Measuring Instruments**

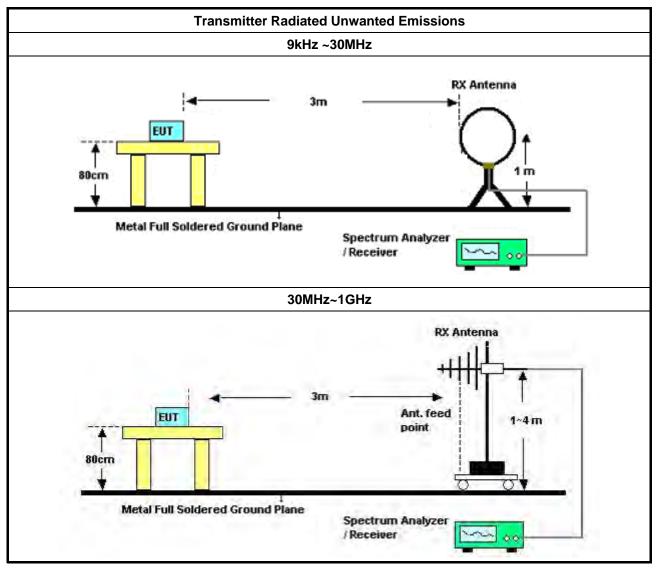
Refer a test equipment and calibration data table in this test report.

#### 3.5.3 **Test Procedures**

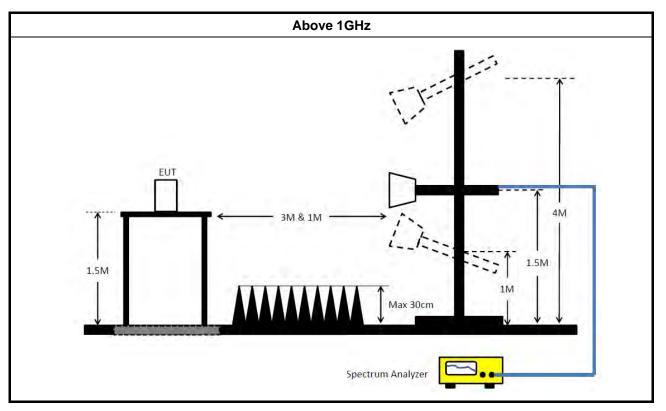
		Test Method
•	perf equ abo are be e dista	asurements may be performed at a distance other than the limit distance provided they are not formed in the near field and the emissions to be measured can be detected by the measurement ipment. Measurements shall not be performed at a distance greater than 30 m for frequencies ve 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less impractical. When performing measurements at a distance other than that specified, the results shall extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear ance for field-strength measurements, inverse of linear distance-squared for power-density asurements).
•	The	average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
•	For	the transmitter unwanted emissions shall be measured using following options below:
	•	Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.
	•	Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
		Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
		Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
		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 789033, clause G)5) measurement procedure peak limit.
		Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
•	For	radiated measurement.
	•	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
	•	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
	•	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
•	The	any unwanted emissions level shall not exceed the fundamental emission level.
•		amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value no need to be reported.



### 3.5.4 Test Setup







#### 3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor (if applicable) = Level.

#### 3.5.6 Transmitter Unwanted Emissions (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 10 harmonic or 40 GHz, whichever is appropriate.

#### 3.5.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E



#### **Test Equipment and Calibration Data** 4

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Feb. 26, 2020	Feb. 25, 2021	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50- 16-2	04083	150kHz ~ 100MHz	Dec. 25, 2019	Dec. 24, 2020	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Feb. 25, 2020	Feb. 24, 2021	Conduction (CO01-CB)
Pulse Limiter	Rohde& Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 31, 2020	Jan. 30, 2021	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 20, 2020	May 19, 2021	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	Apr. 21, 2020	Apr. 20, 2021	Radiation (03CH02-CB)
Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 11, 2020	Jun. 10, 2021	Radiation (03CH02-CB)
Pre-Amplifier	Agilent	83017A	MY39501305	1GHz ~ 26.5GHz	Jul. 13, 2020	Jul. 12, 2021	Radiation (03CH02-CB)
Amplifier	-	-	TF-130N-R1	18GHz ~ 40GHz	Jun. 19, 2020	Jun. 18, 2021	Radiation (03CH02-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Aug. 15, 2019	Aug. 14, 2020	Radiation (03CH02-CB)
High Cable	Woken	RG402	High Cable-18	1GHz ~ 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH02-CB)
High Cable	Woken	RG402	High Cable-18+19	1GHz ~ 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH02-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 27, 2020	Mar. 26, 2021	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 28, 2020	Apr. 27, 2021	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Aug. 15, 2019	Aug. 14, 2020	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	LOW Cable-04+23	30MHz~1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH05-CB)

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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	May 05, 2020	May 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-28	1 GHz –26.5 GHz	Nov. 18, 2019	Nov. 17, 2020	Conducted (TH01-CB)
Power Sensor	Agilent	E9327A	US40442088	50MHz~18GHz	Feb. 07, 2020	Feb. 06, 2021	Conducted (TH01-CB)
Power Meter	Agilent	E4416A	GB41291199	50MHz~18GHz	Feb. 07, 2020	Feb. 06, 2021	Conducted (TH01-CB)

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

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

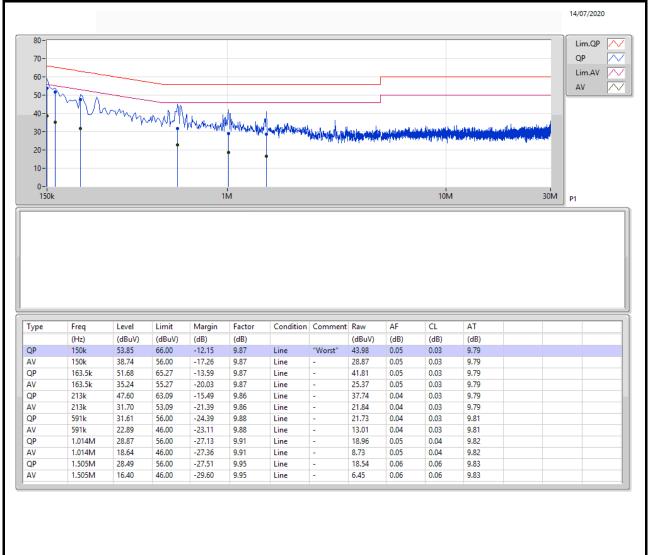


#### Summary

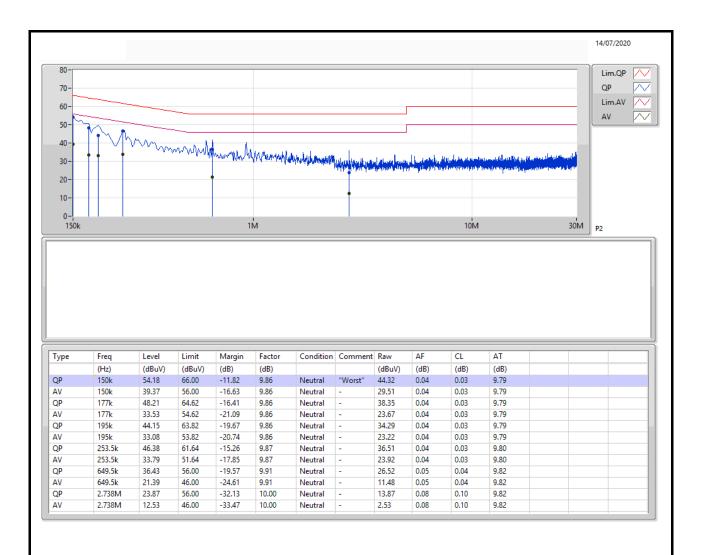
• annial y								
Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Condition
			(Hz)	(dBuV)	(dBuV)	(dB)	(dB)	
Mode 3	Pass	QP	150k	54.18	66.00	-11.82	9.86	Neutral



#### Test Mode: Mode 3









#### Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.15-5.25GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	34.41M	18.411M	18M4D1D	19.95M	16.522M
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	38.07M	19.52M	19M5D1D	22.56M	19.01M
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	52.62M	37.721M	37M7D1D	39.54M	37.421M
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	80.16M	75.442M	75M4D1D	79.68M	75.322M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	16.29M	35.382M	35M4D1D	15.06M	24.288M
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	18.93M	39.01M	39M0D1D	17.1M	28.186M
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	35.58M	58.411M	58M4D1D	33.42M	37.901M
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	75.12M	77.121M	77M1D1D	70.08M	76.882M

Max-N dB = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;

**Max-OBW** = Maximum99% occupied bandwidth;

**Min-N dB** = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band; **Min-OBW** = Minimum 99% occupied bandwidth;



#### Result

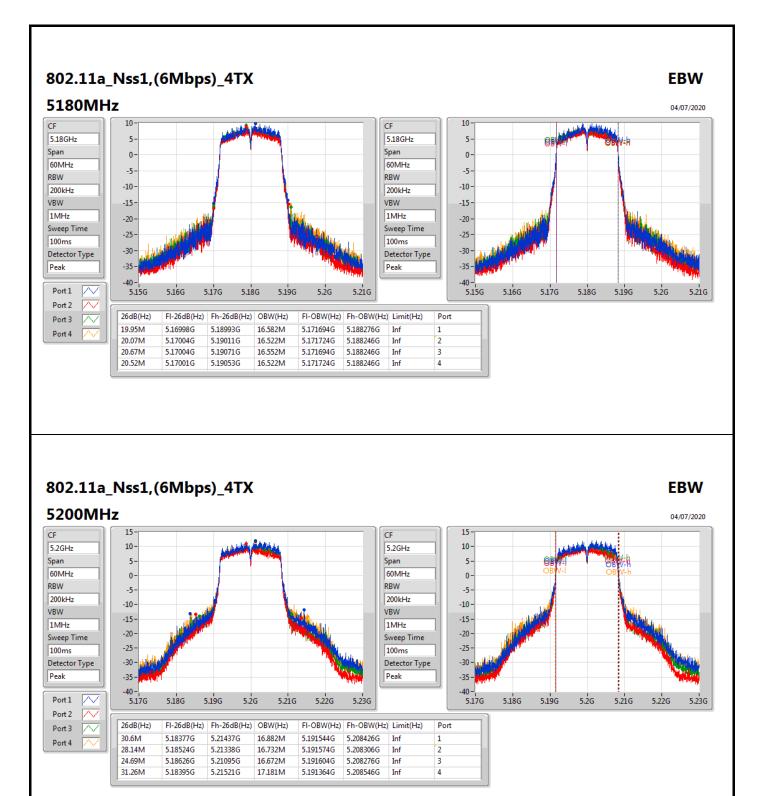
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	19.95M	16.582M	20.07M	16.522M	20.67M	16.552M	20.52M	16.522M
5200MHz	Pass	Inf	30.6M	16.882M	28.14M	16.732M	24.69M	16.672M	31.26M	17.181M
5240MHz	Pass	Inf	32.85M	17.721M	31.68M	17.451M	32.73M	18.411M	34.41M	18.021M
5745MHz	Pass	500k	16.29M	29.805M	15.39M	26.477M	15.39M	26.777M	15.81M	25.457M
5785MHz	Pass	500k	16.26M	35.382M	15.69M	32.294M	16.23M	32.744M	15.72M	29.925M
5825MHz	Pass	500k	15.63M	28.096M	15.09M	25.547M	15.06M	25.937M	15.66M	24.288M
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	24.36M	19.01M	24.45M	19.1M	23.37M	19.04M	22.56M	19.07M
5200MHz	Pass	Inf	30.12M	19.1M	27.69M	19.04M	30.27M	19.1M	34.5M	19.16M
5240MHz	Pass	Inf	37.92M	19.37M	36.75M	19.34M	36.87M	19.4M	38.07M	19.52M
5745MHz	Pass	500k	18.48M	33.793M	18.09M	30.615M	18.09M	30.135M	18.54M	28.186M
5785MHz	Pass	500k	18.93M	38.831M	18.72M	38.831M	17.1M	38.411M	18M	34.303M
5825MHz	Pass	500k	18.78M	38.381M	18.66M	39.01M	17.94M	37.961M	17.91M	34.363M
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	39.6M	37.481M	39.6M	37.421M	39.72M	37.601M	39.54M	37.421M
5230MHz	Pass	Inf	45.9M	37.661M	49.56M	37.601M	40.92M	37.721M	52.62M	37.661M
5755MHz	Pass	500k	33.72M	38.141M	33.78M	38.021M	33.78M	37.961M	35.1M	37.901M
5795MHz	Pass	500k	33.42M	58.411M	34.98M	50.735M	35.58M	48.756M	34.98M	42.639M
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	79.92M	75.322M	80.16M	75.442M	79.92M	75.322M	79.68M	75.442M
5775MHz	Pass	500k	72.6M	77.121M	75.12M	76.882M	70.08M	77.001M	73.8M	77.001M

Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band

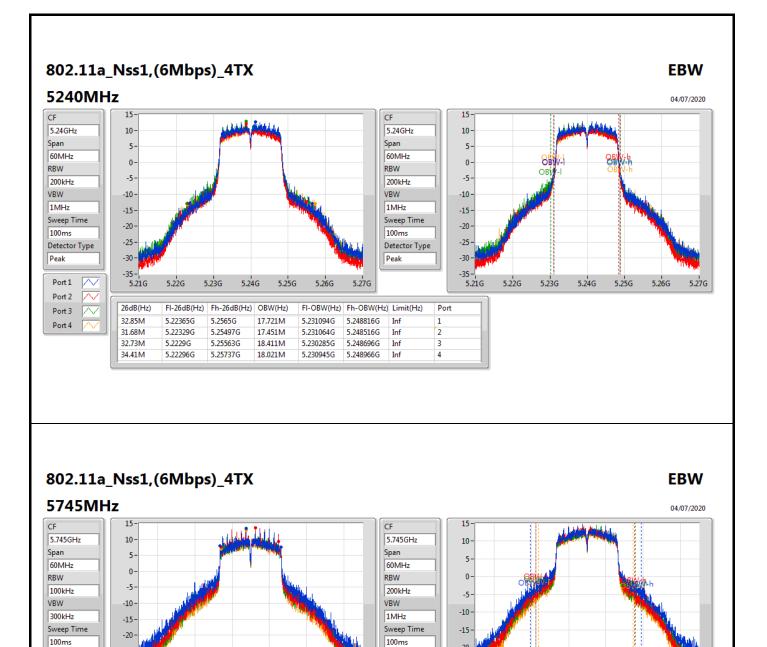
Port X-OBW = Port X 99% occupied bandwidth;











-20

-25

-30

Port

1

2

3

4

5.715G

5.73G

5.74G

5.75G

5.76G

5.775G

Detector Type

Peak

500k

500k

500k

500k

5.775G

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

5.759483G

5.757264G

#### Port 4 15.39M 5.73711G 5.7525G 26.477M 5.731207G 5.757684G 15.39M 5.73768G 5.75307G 26.777M 5.731147G 5.757924G

5.73G

FI-6dB(Hz)

5.73681G

5.73705G

5.74G

Fh-6dB(Hz)

5.7531G

5.75286G

5.75G

OBW(Hz)

29.805M

25.457M

5.76G

5.729678G

5.731807G

-25

-30

-35-5.715G

6dB(Hz)

16.29M

15.81M

Detector Type

 $\sim$ 

 $\sim$ 

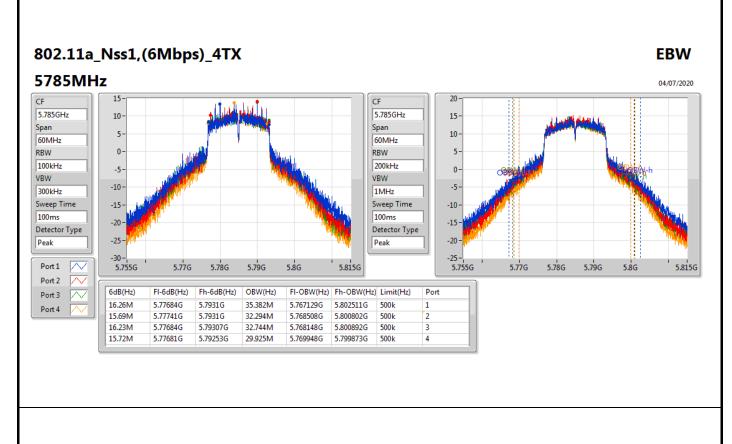
Peak

Port 1

Port 2

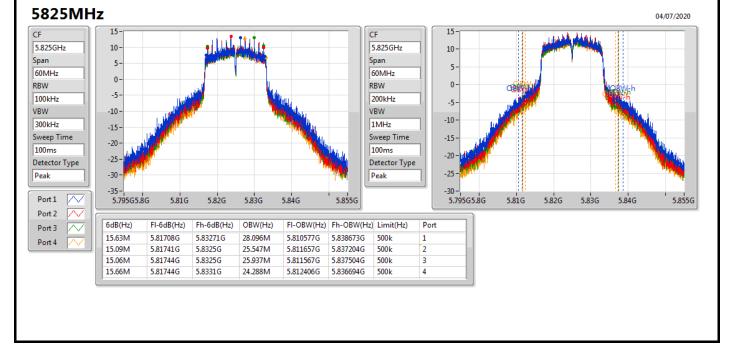
Port 3



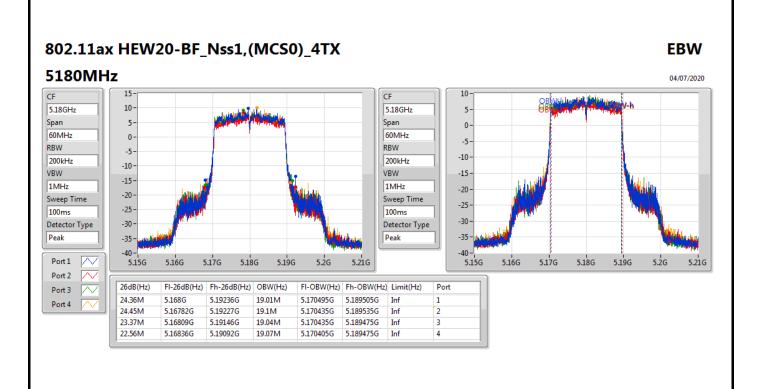


# 802.11a\_Nss1,(6Mbps)\_4TX



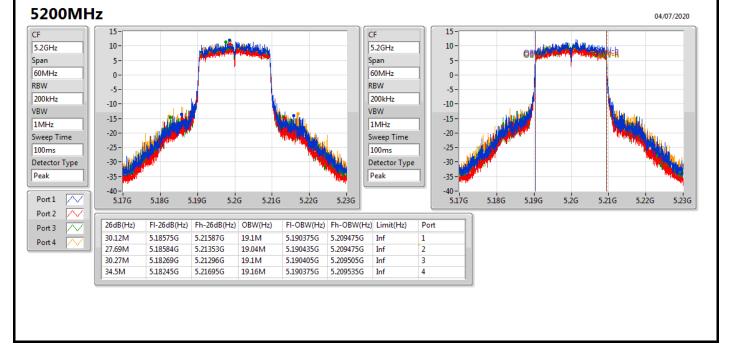




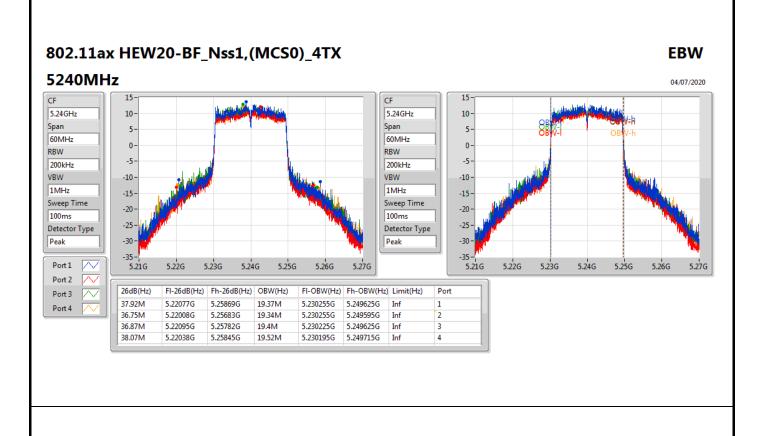


### 802.11ax HEW20-BF\_Nss1,(MCS0)\_4TX



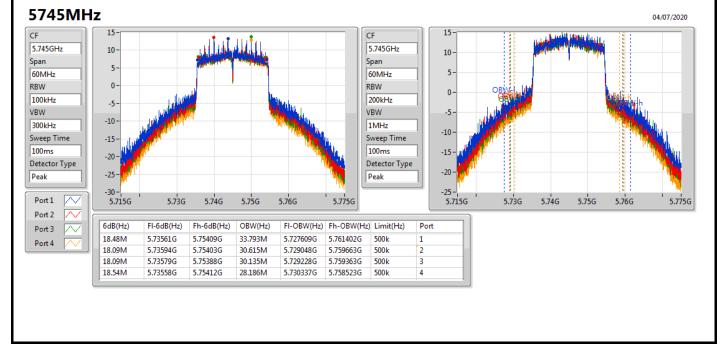




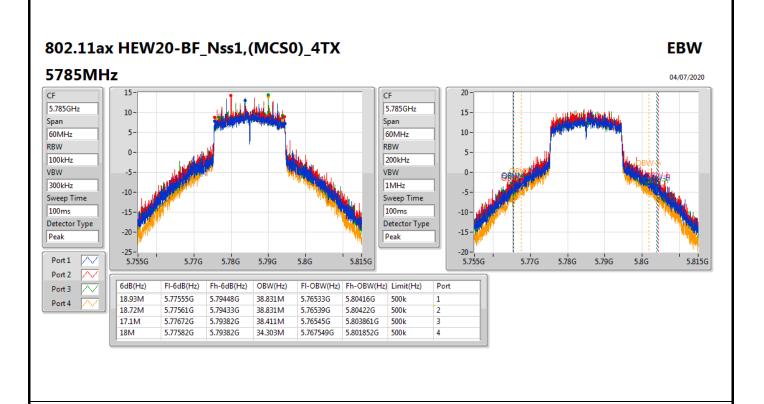


## 802.11ax HEW20-BF\_Nss1,(MCS0)\_4TX



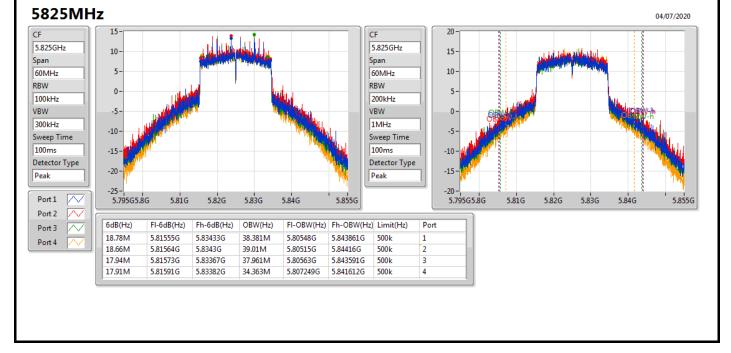




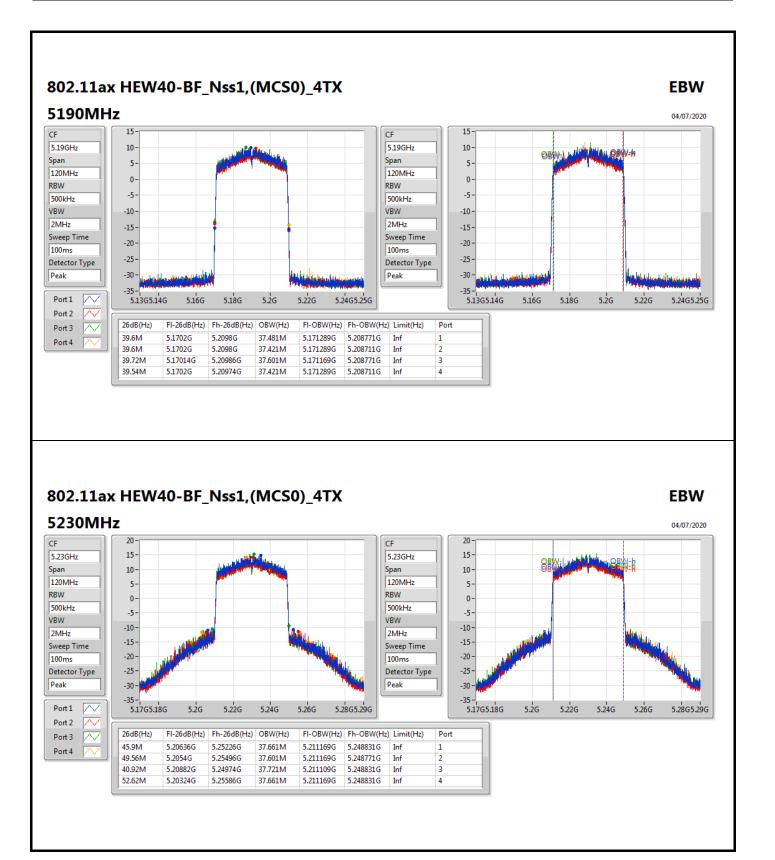


### 802.11ax HEW20-BF\_Nss1,(MCS0)\_4TX





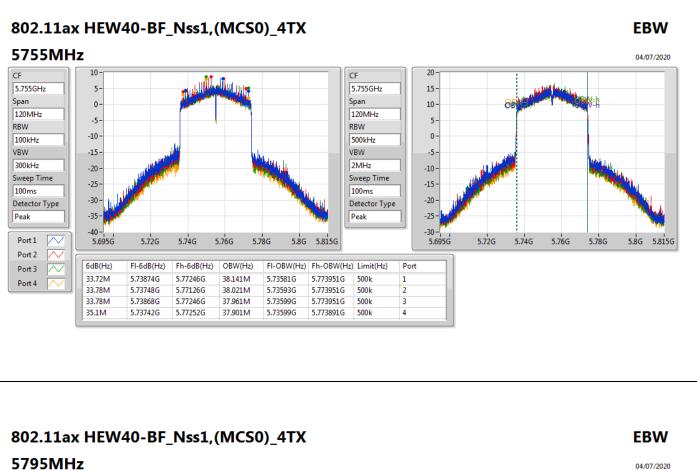


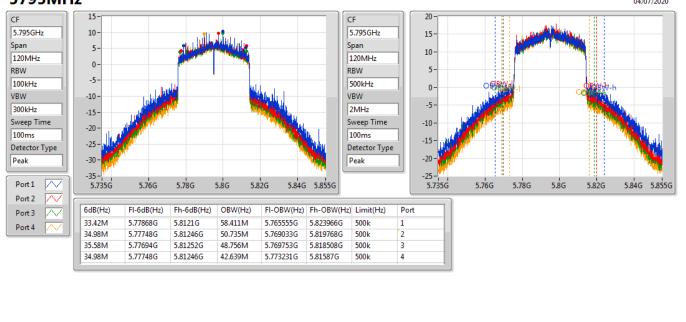


### SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory.



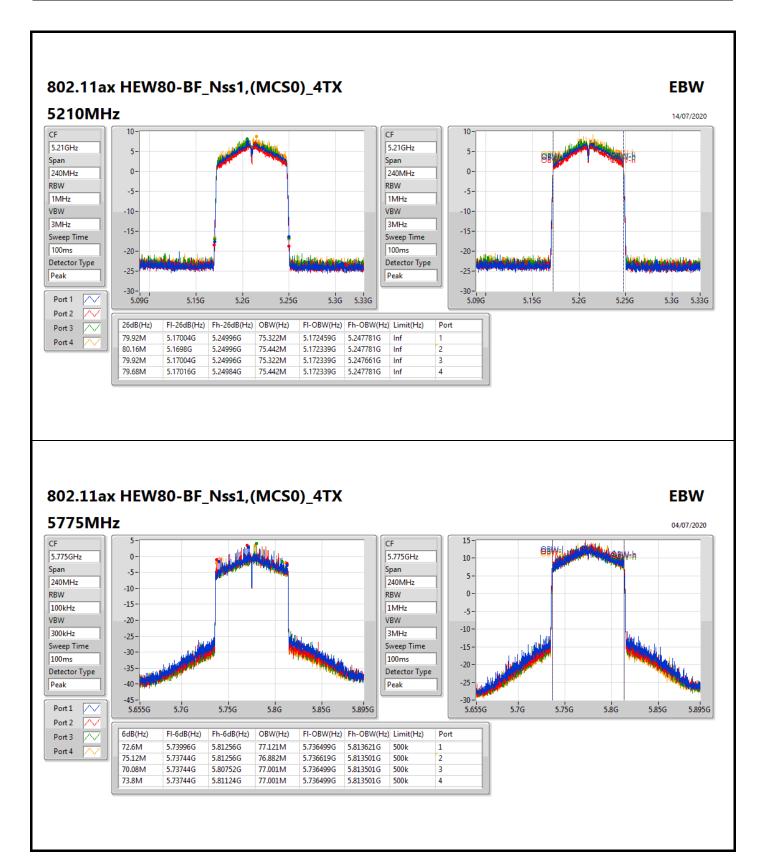














### Summary

Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11a_Nss1,(6Mbps)_4TX	27.33	0.54075
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	27.28	0.53456
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	26.15	0.41210
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	20.23	0.10544
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_4TX	29.84	0.96383
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	29.98	0.99541
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	28.80	0.75858
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	25.61	0.36392



### 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)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.10	18.83	18.18	18.58	18.97	24.67	30.00
5200MHz	Pass	5.10	21.28	20.02	20.71	20.68	26.72	30.00
5240MHz	Pass	5.10	21.41	20.89	21.63	21.29	27.33	30.00
5745MHz	Pass	5.50	23.66	23.70	23.52	23.20	29.54	30.00
5785MHz	Pass	5.50	23.76	24.05	23.80	23.64	29.84	30.00
5825MHz	Pass	5.50	22.87	23.18	22.81	22.70	28.91	30.00
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.70	18.11	17.12	17.70	18.05	23.78	30.00
5200MHz	Pass	5.70	20.43	19.25	19.85	20.19	25.97	30.00
5240MHz	Pass	5.70	21.79	20.83	21.47	20.86	27.28	30.00
5745MHz	Pass	4.80	23.83	23.92	23.72	23.38	29.74	30.00
5785MHz	Pass	4.80	23.59	24.26	24.05	23.84	29.96	30.00
5825MHz	Pass	4.80	23.70	24.37	23.91	23.81	29.98	30.00
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	5.70	16.14	15.24	15.54	15.86	21.73	30.00
5230MHz	Pass	5.70	20.57	19.77	20.35	19.76	26.15	30.00
5755MHz	Pass	4.80	21.52	21.73	21.43	21.21	27.50	30.00
5795MHz	Pass	4.80	22.90	23.12	22.59	22.48	28.80	30.00
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	5.70	14.55	13.20	14.34	14.59	20.23	30.00
5775MHz	Pass	4.80	19.74	19.83	19.43	19.35	25.61	30.00

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



### Summary

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	
802.11a_Nss1,(6Mbps)_4TX	15.24
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	14.64
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	11.43
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	3.15
5.725-5.85GHz	
802.11a_Nss1,(6Mbps)_4TX	16.26
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	15.62
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	12.64
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	6.42

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

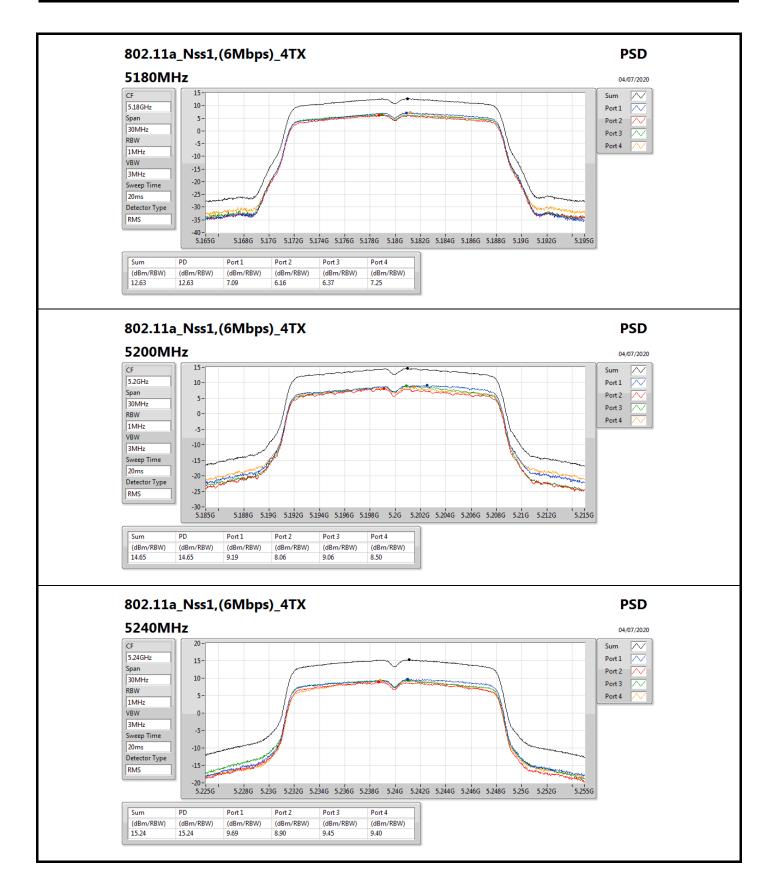


#### Result

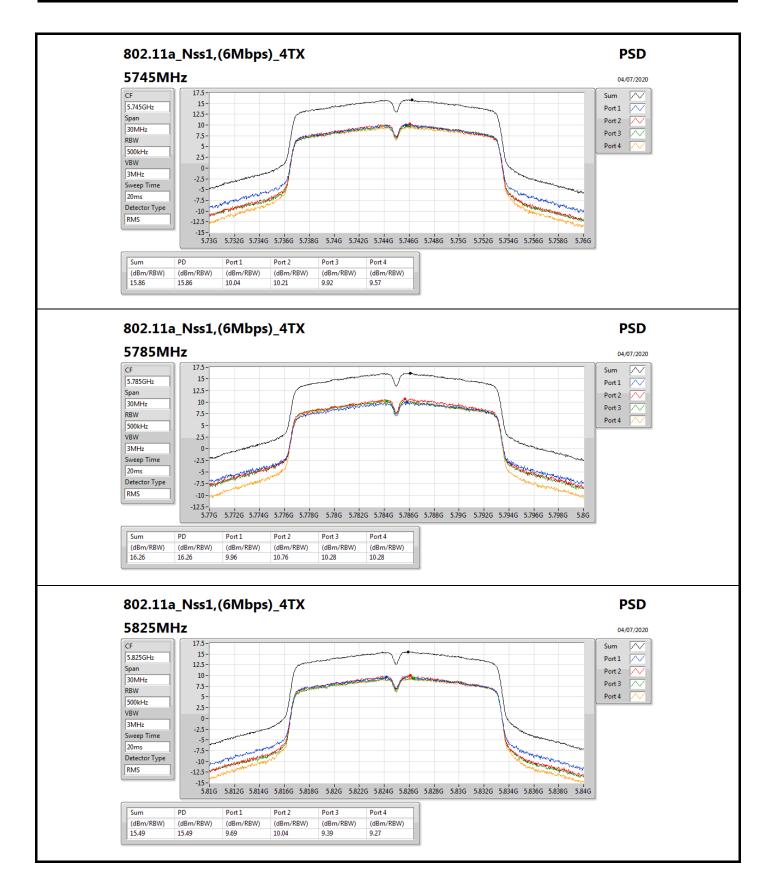
Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.70	7.09	6.16	6.37	7.25	12.63	17.00
5200MHz	Pass	5.70	9.19	8.06	9.06	8.50	14.65	17.00
5240MHz	Pass	5.70	9.69	8.90	9.45	9.40	15.24	17.00
5745MHz	Pass	4.80	10.04	10.21	9.92	9.57	15.86	30.00
5785MHz	Pass	4.80	9.96	10.76	10.28	10.28	16.26	30.00
5825MHz	Pass	4.80	9.69	10.04	9.39	9.27	15.49	30.00
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.70	5.84	4.42	5.24	5.42	11.02	17.00
5200MHz	Pass	5.70	8.02	6.42	6.98	7.44	13.10	17.00
5240MHz	Pass	5.70	9.36	8.28	8.97	8.33	14.64	17.00
5745MHz	Pass	4.80	9.42	9.66	9.36	9.13	15.32	30.00
5785MHz	Pass	4.80	9.10	10.12	9.71	9.70	15.56	30.00
5825MHz	Pass	4.80	9.39	10.00	9.67	9.67	15.62	30.00
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	5.70	1.46	0.52	1.02	1.07	6.89	17.00
5230MHz	Pass	5.70	6.02	5.22	6.01	5.30	11.43	17.00
5755MHz	Pass	4.80	5.36	5.45	5.24	4.84	11.11	30.00
5795MHz	Pass	4.80	6.80	6.93	6.57	6.54	12.64	30.00
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	5.70	-2.15	-3.51	-3.01	-2.40	3.15	17.00
5775MHz	Pass	4.80	0.48	0.80	0.44	0.30	6.42	30.00

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;

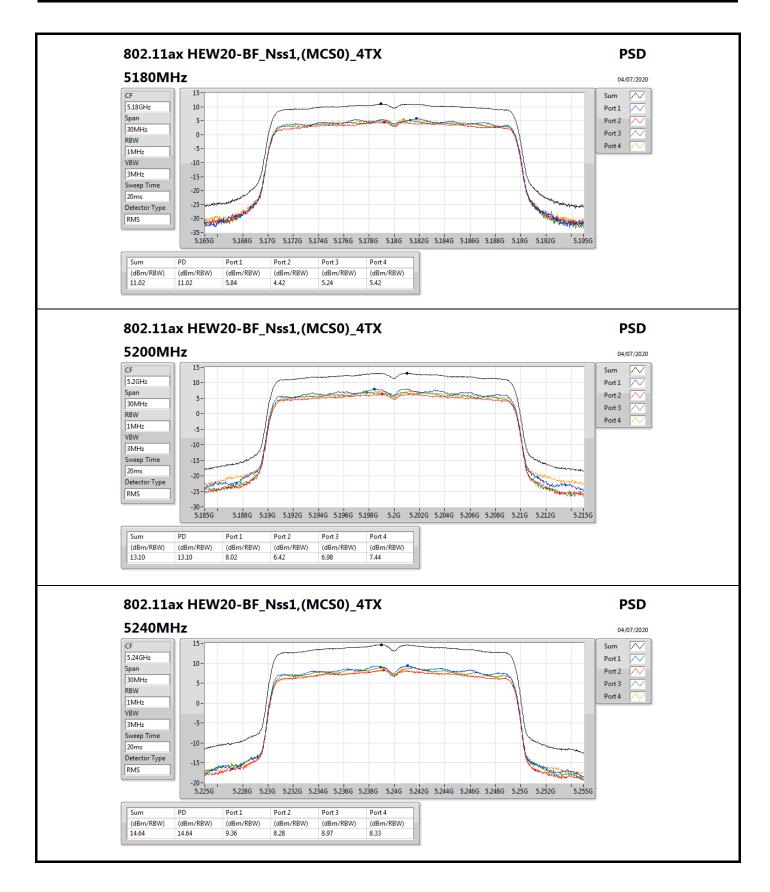




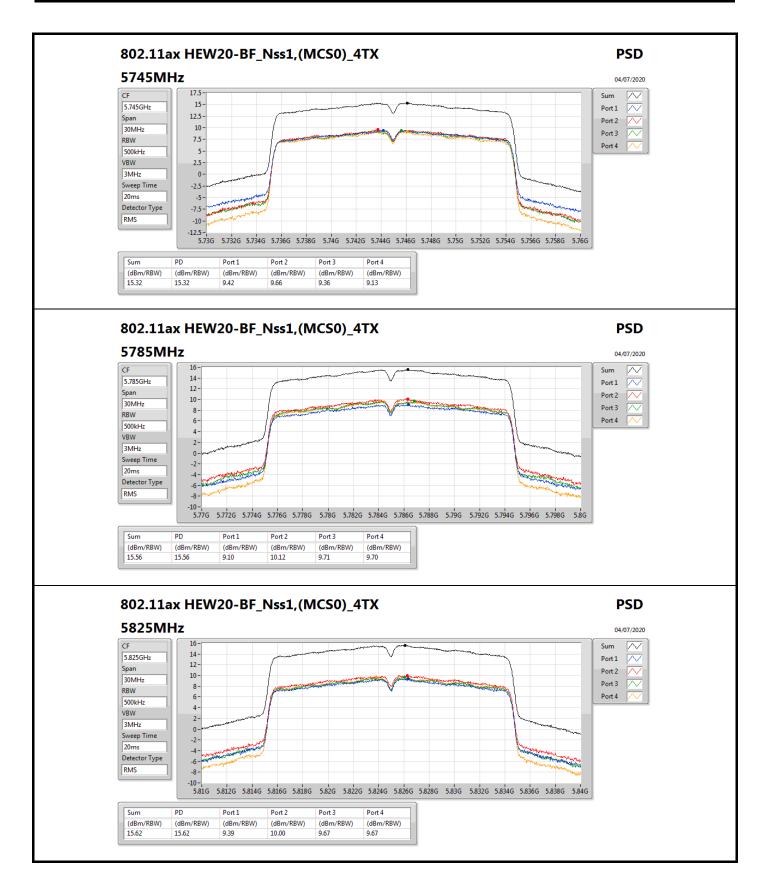




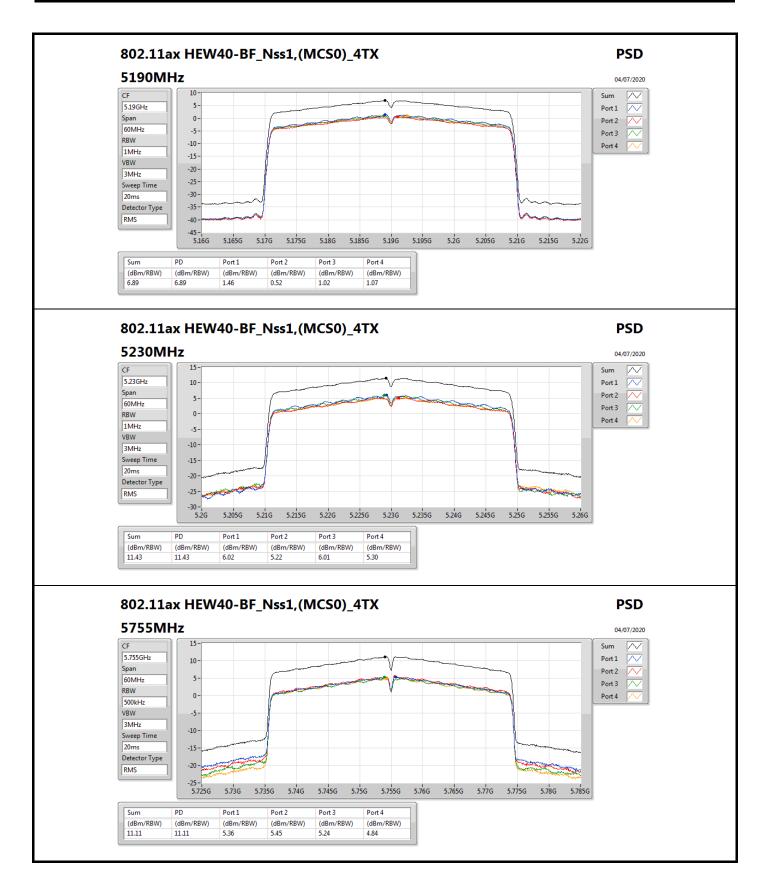




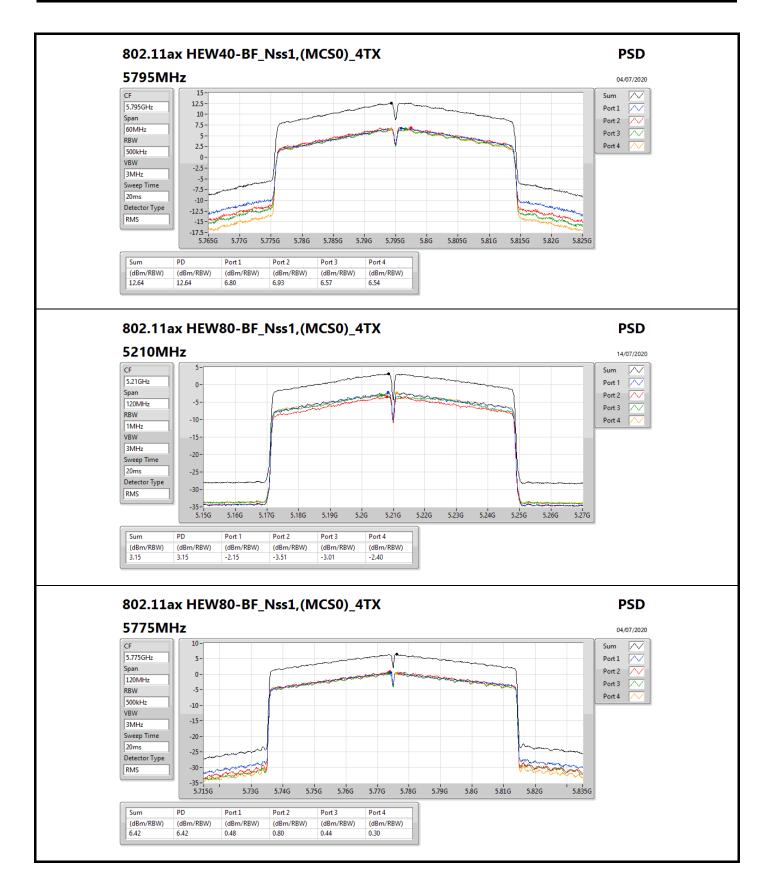














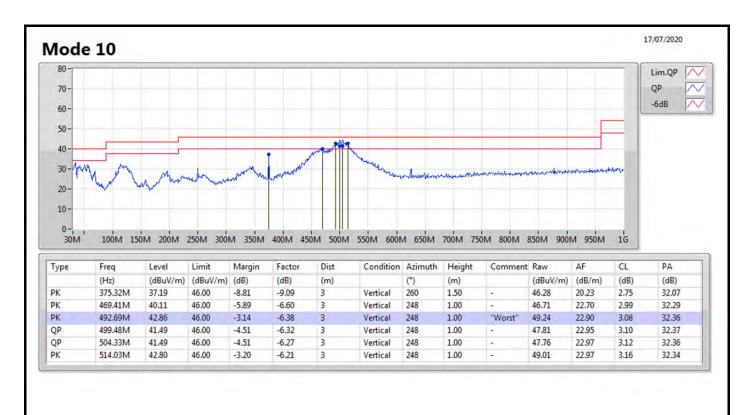
# Radiated Emissions below 1GHz

# Appendix E.1

Summary											
Mode	Result	Туре	Freq	Level	Limit	Margin	Condition				
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)					
Mode 10	Pass	PK	492.69M	42.86	46.00	-3.14	Vertical				



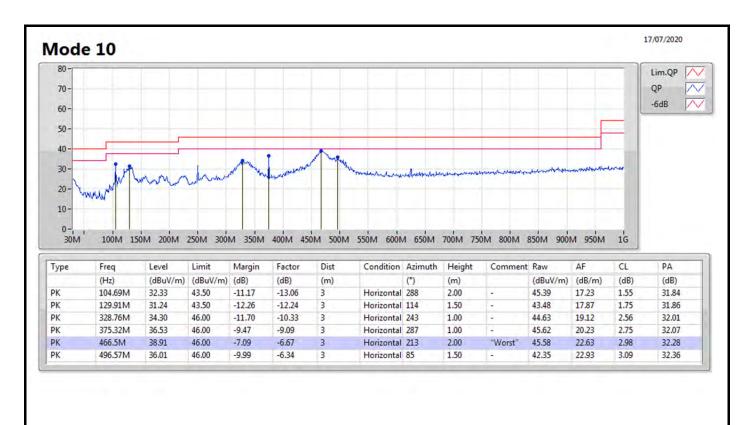
### Appendix E.1





### Radiated Emissions below 1GHz

### Appendix E.1

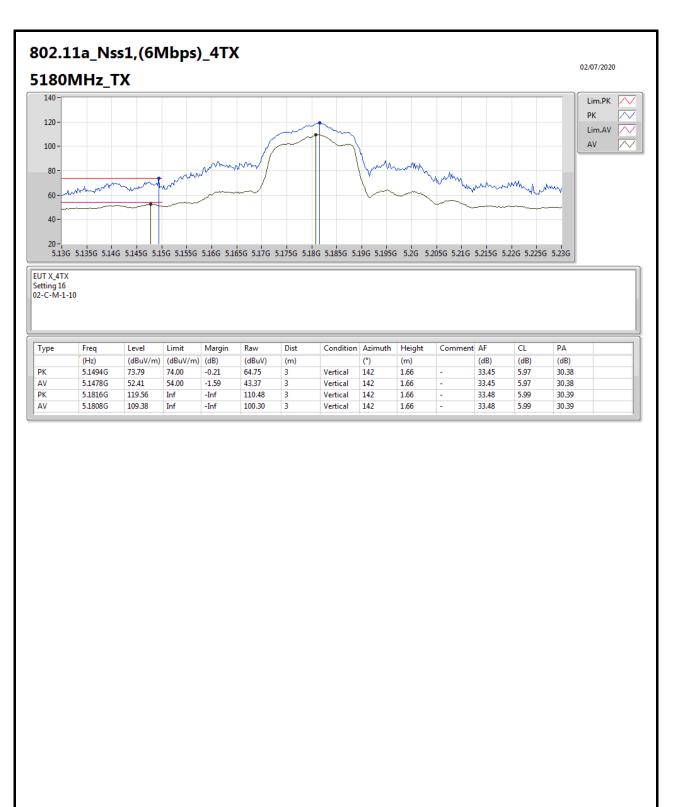




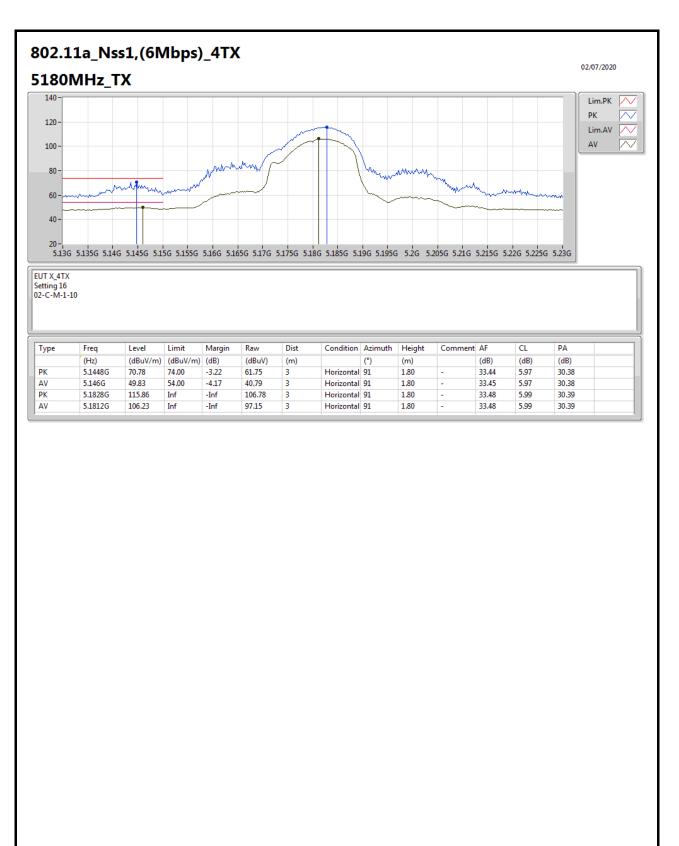
### Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)
5.15-5.25GHz	-	-	-	-	-		-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	Pass	AV	5.1476G	53.98	54.00	-0.02	3	Vertical	187	1.34

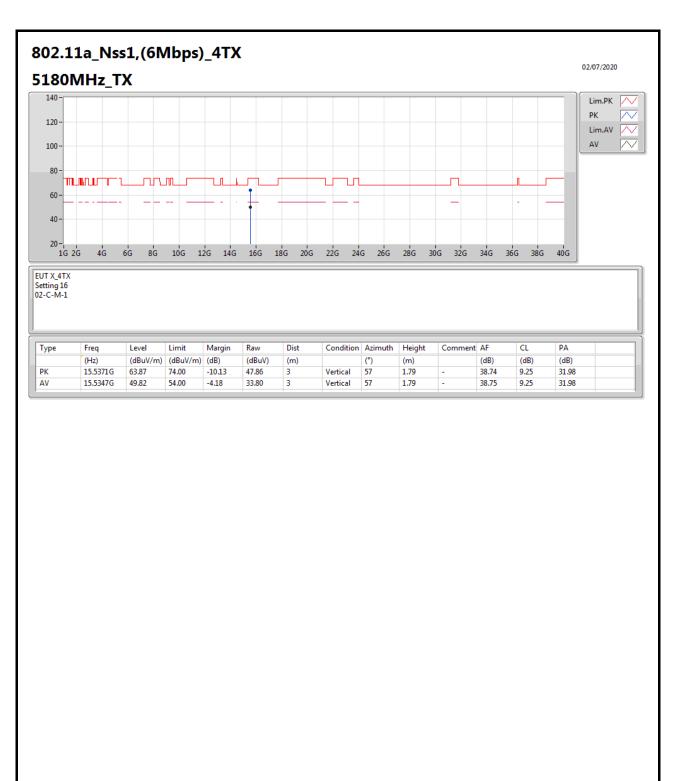




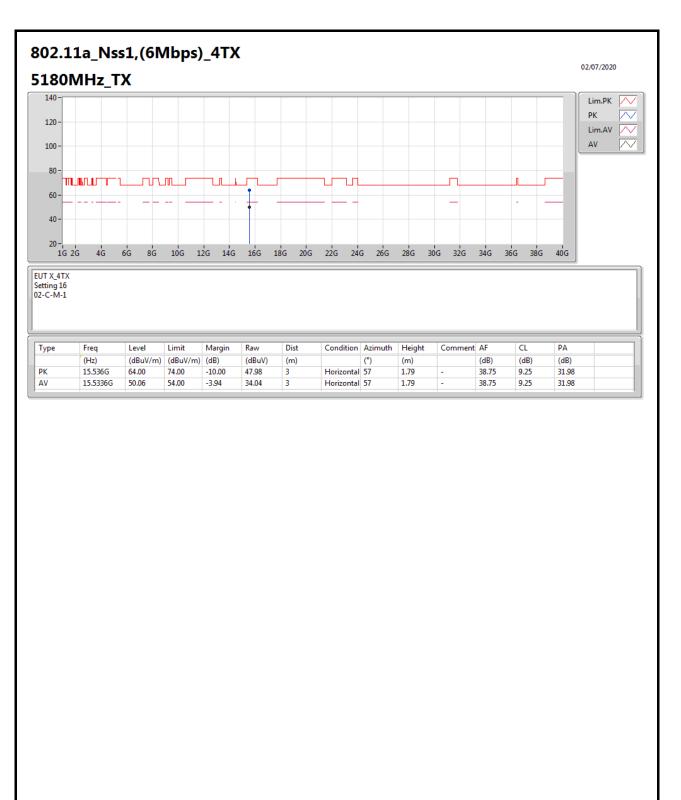




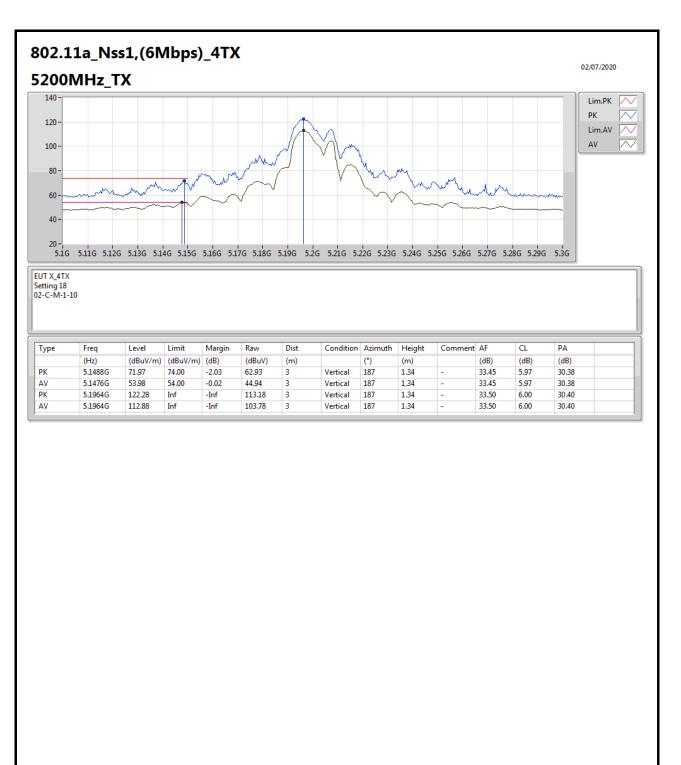




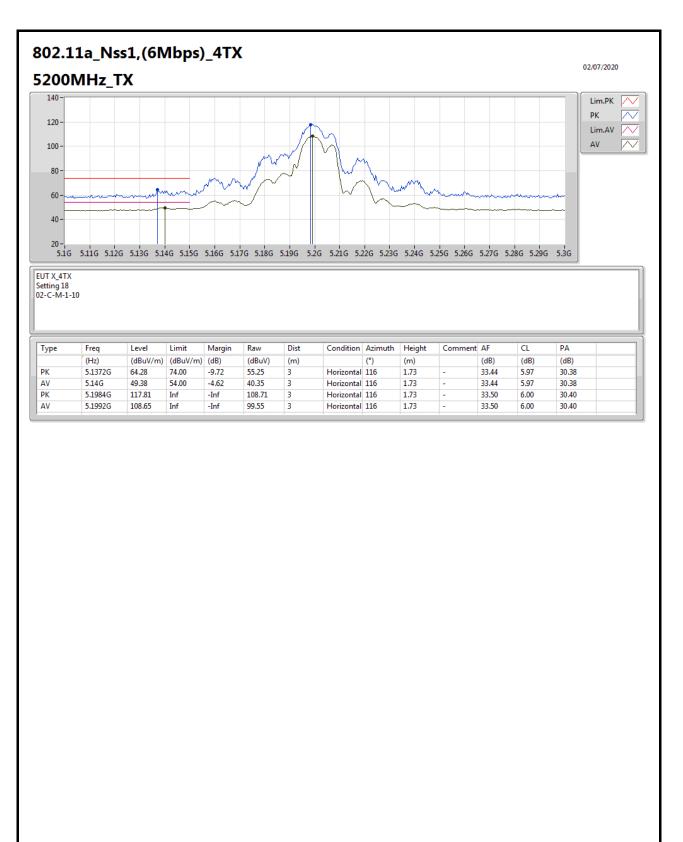




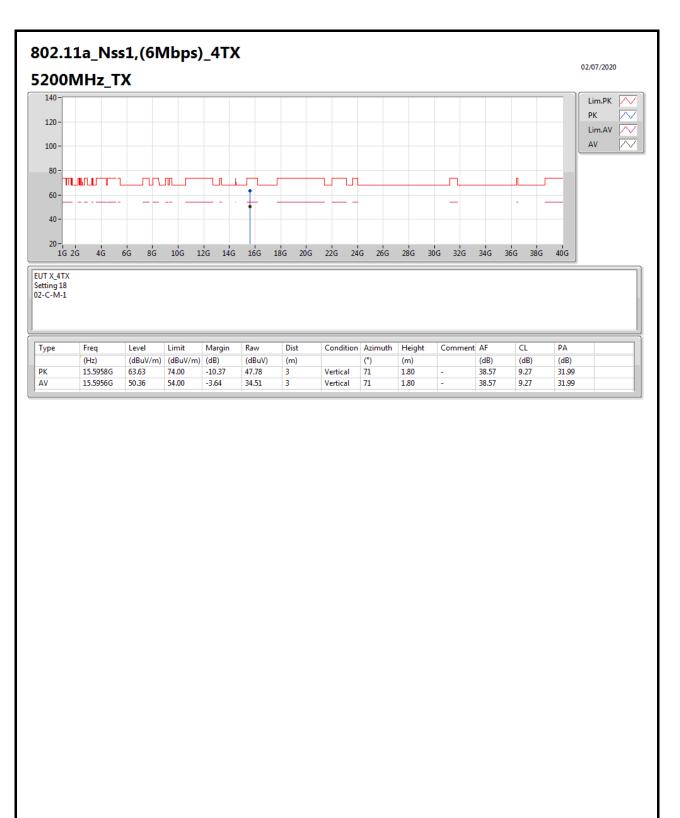




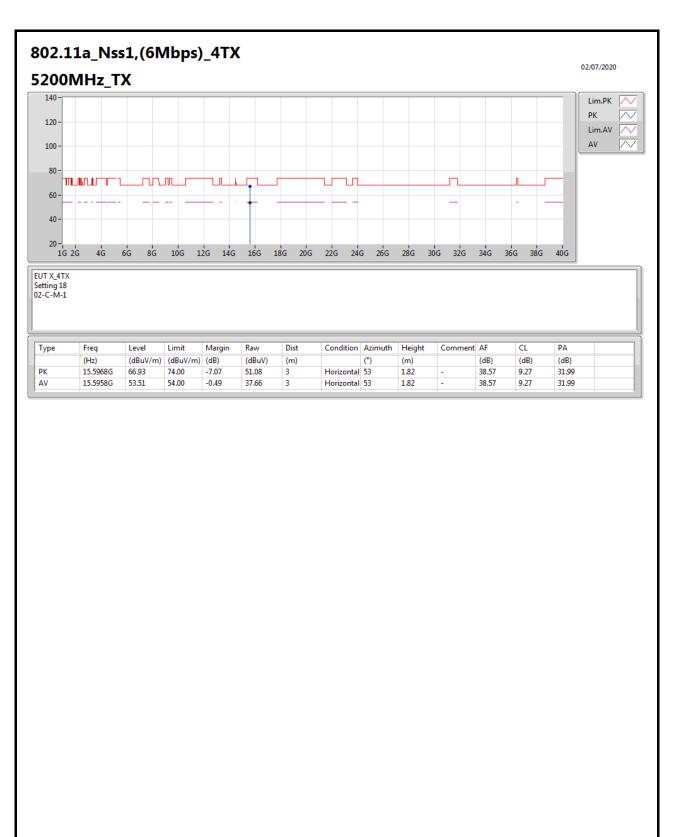




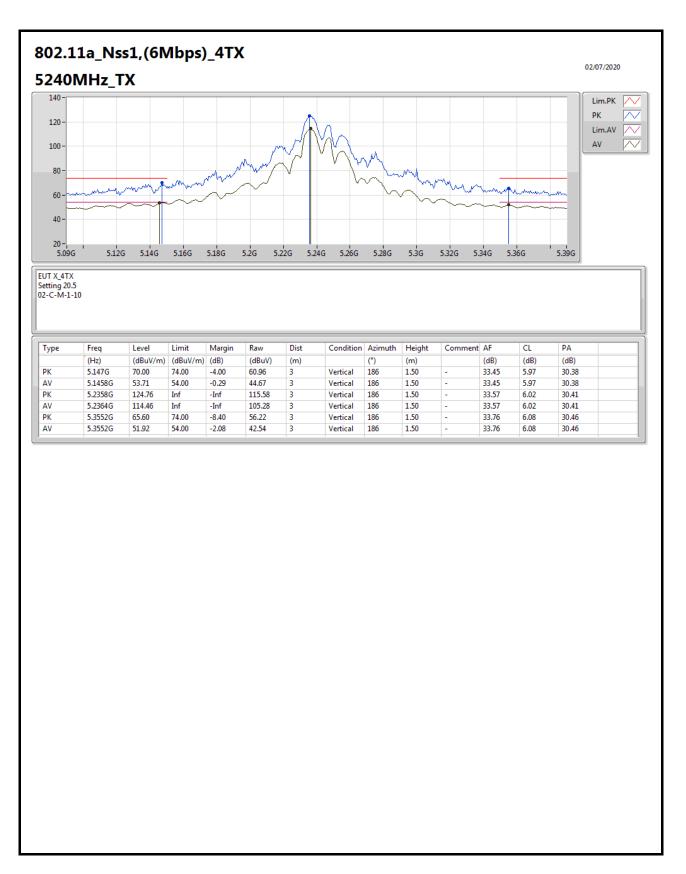




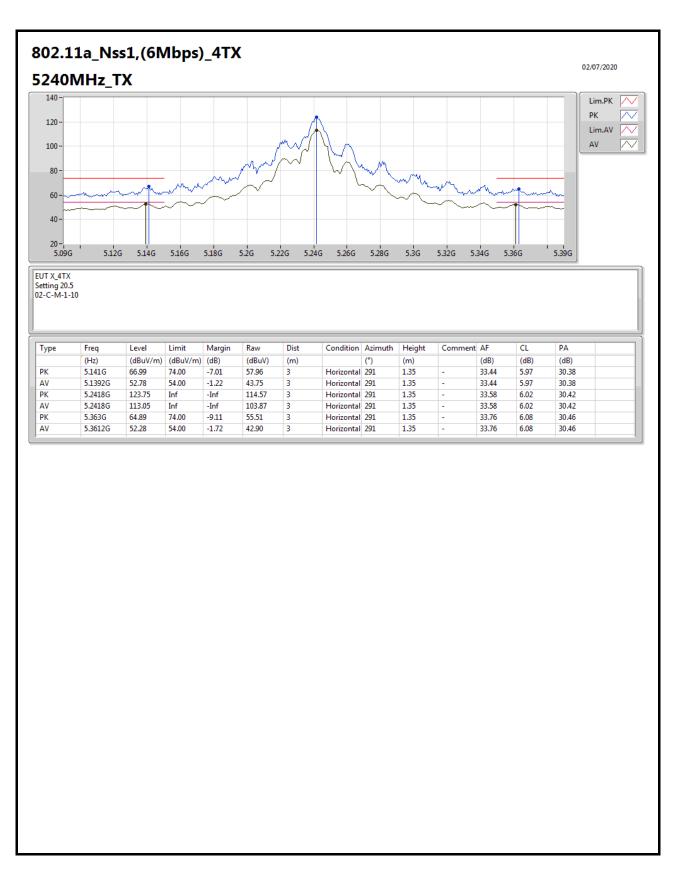




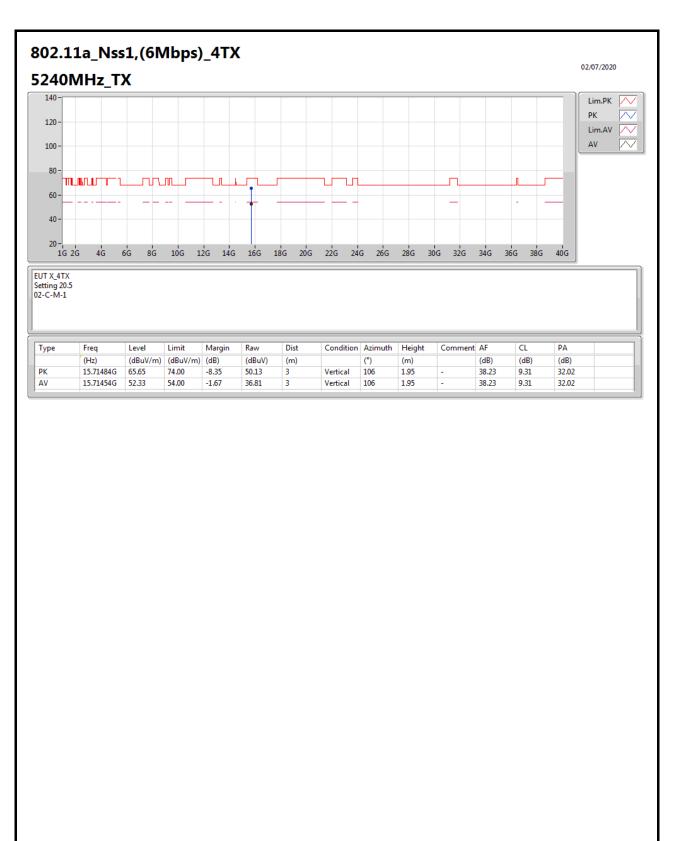




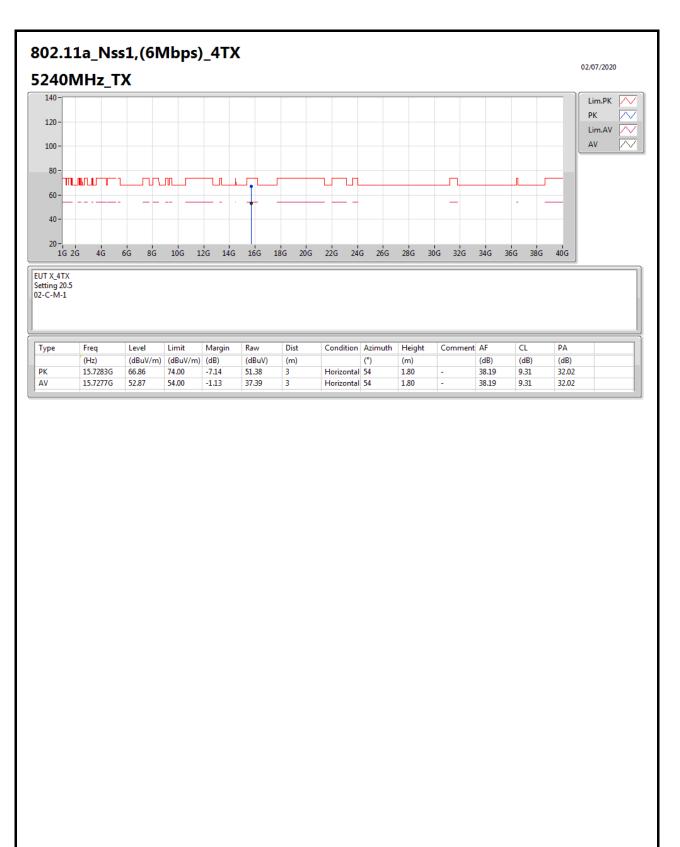




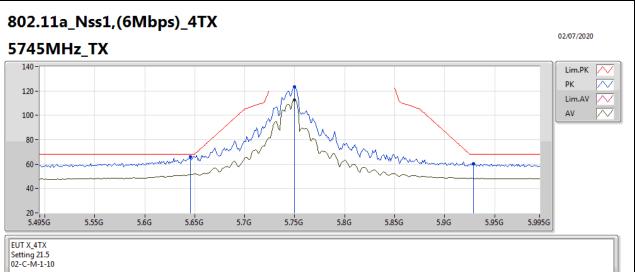






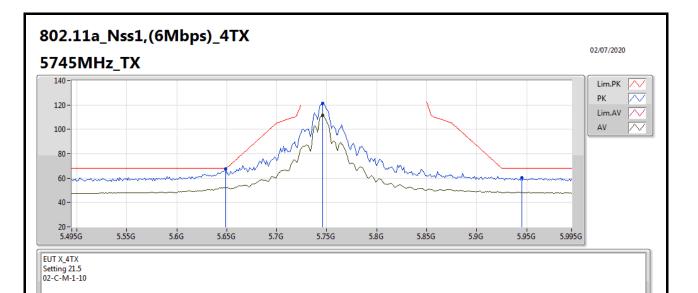






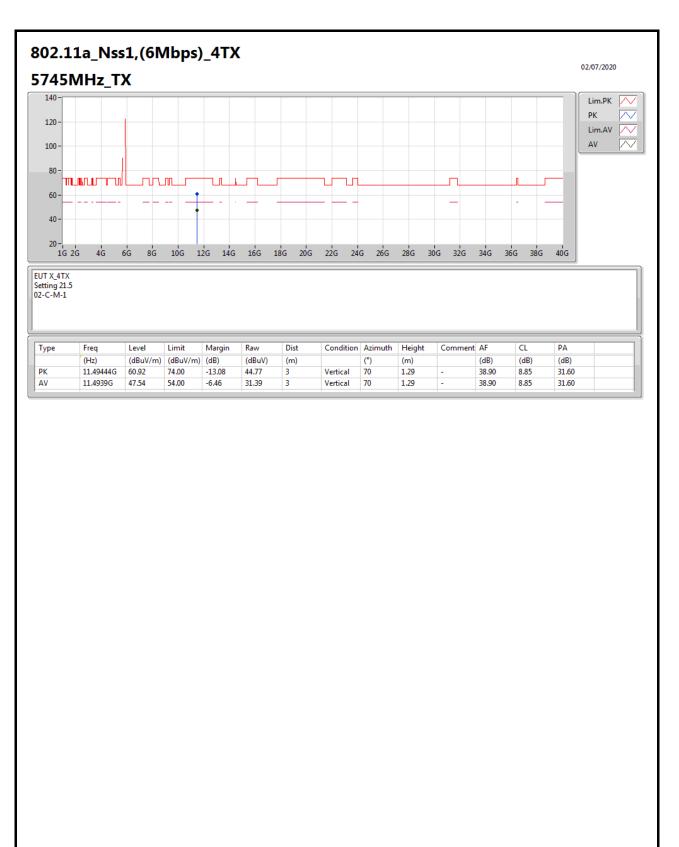
Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
РК	5.646G	66.13	68.20	-2.07	56.50	3	Vertical	360	1.38	-	33.85	6.32	30.54
РК	5.75G	123.33	Inf	-Inf	113.73	3	Vertical	360	1.38	-	33.80	6.37	30.57
AV	5.75G	112.77	Inf	-Inf	103.17	3	Vertical	360	1.38	-	33.80	6.37	30.57
РК	5.929G	60.40	68.20	-7.80	50.55	3	Vertical	360	1.38	-	34.13	6.34	30.62



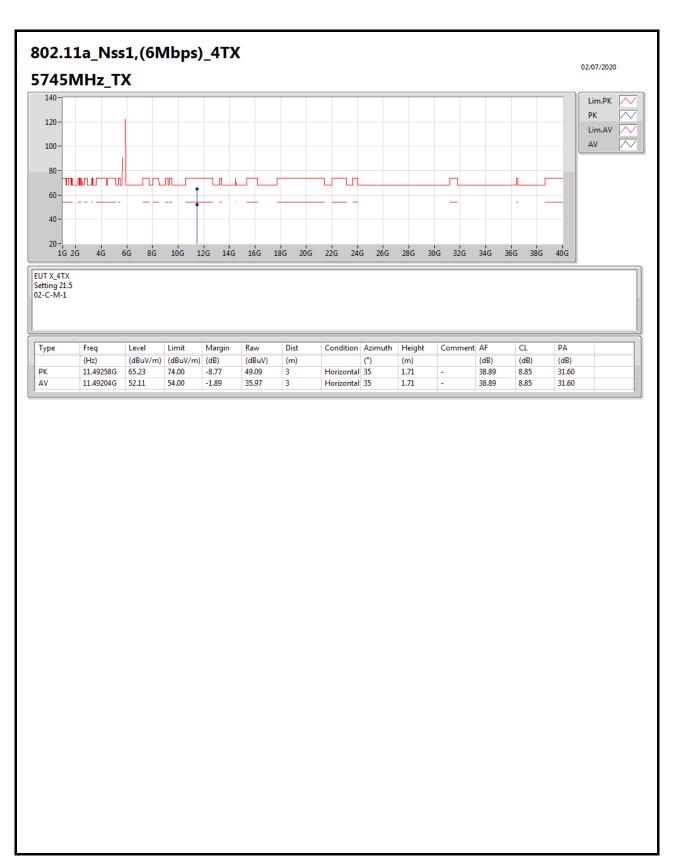


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	5.649G	67.81	68.20	-0.39	58.18	3	Horizontal	84	2.95	-	33.85	6.32	30.54
PK	5.746G	121.45	Inf	-Inf	111.85	3	Horizontal	84	2.95	-	33.80	6.37	30.57
AV	5.746G	111.59	Inf	-Inf	101.99	3	Horizontal	84	2.95	-	33.80	6.37	30.57
РК	5.945G	60.14	68.20	-8.06	50.28	3	Horizontal	84	2.95	-	34.15	6.33	30.62

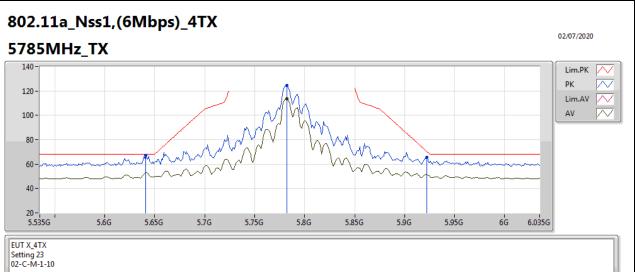






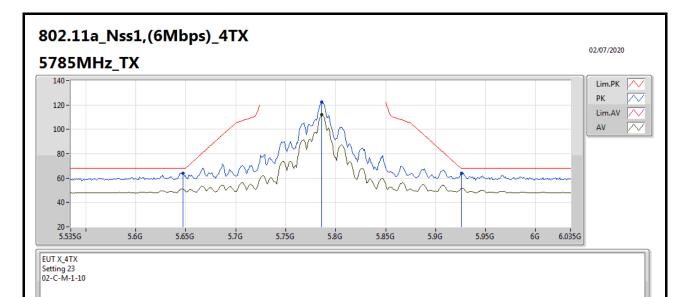






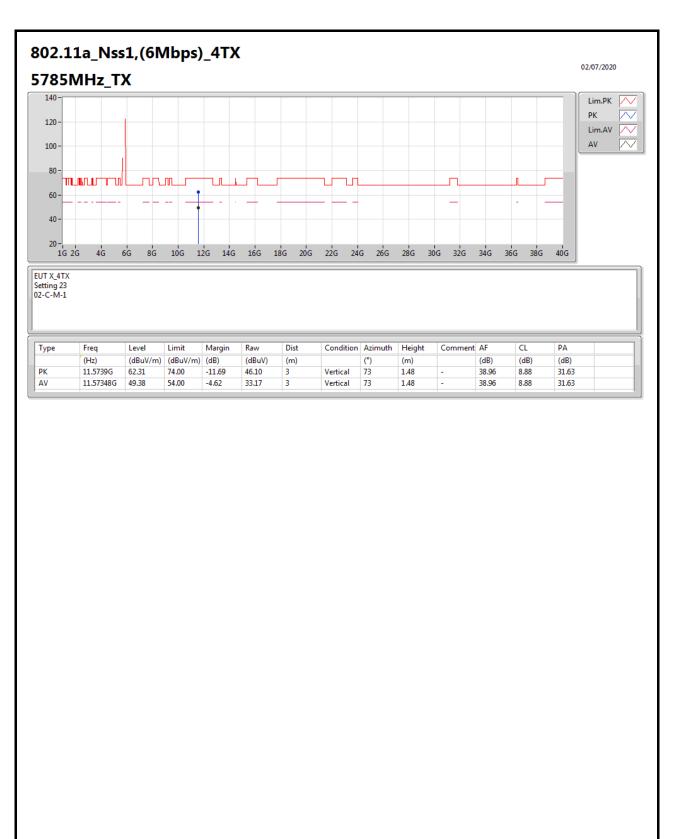
Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	5.641G	67.20	68.20	-1.00	57.56	3	Vertical	117	2.07	-	33.86	6.32	30.54
PK	5.782G	124.62	Inf	-Inf	115.01	3	Vertical	117	2.07	-	33.80	6.39	30.58
AV	5.782G	113.83	Inf	-Inf	104.22	3	Vertical	117	2.07	-	33.80	6.39	30.58
PK	5.922G	65.54	70.42	-4.88	55.69	3	Vertical	117	2.07	-	34.12	6.34	30.61



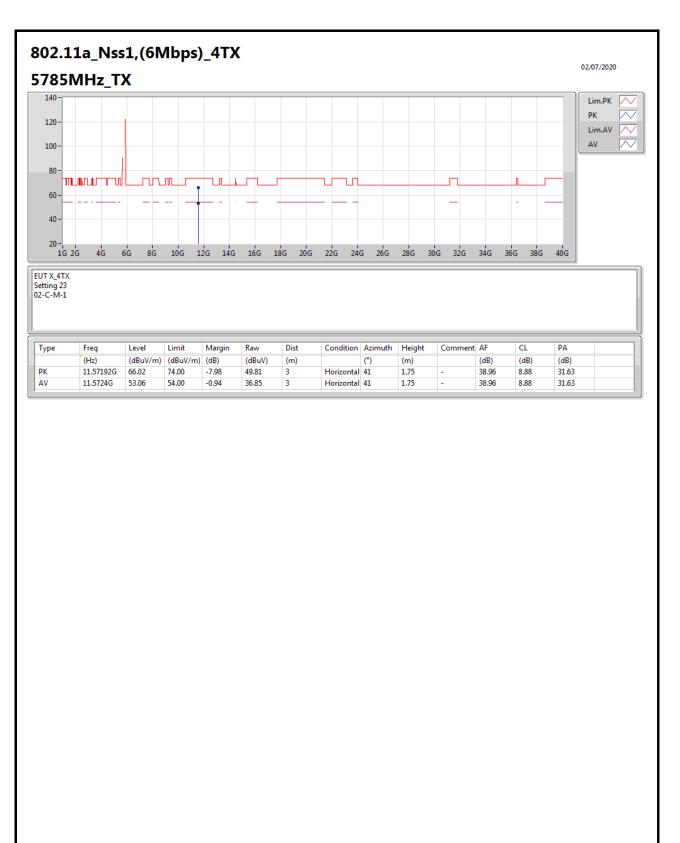


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
РК	5.647G	64.14	68.20	-4.06	54.51	3	Horizontal	73	2.93	-	33.85	6.32	30.54	
PK	5.786G	122.42	Inf	-Inf	112.81	3	Horizontal	73	2.93	-	33.80	6.39	30.58	
AV	5.786G	111.96	Inf	-Inf	102.35	3	Horizontal	73	2.93	-	33.80	6.39	30.58	
PK	5.926G	64.07	68.20	-4.13	54.22	3	Horizontal	73	2.93	-	34.13	6.34	30.62	

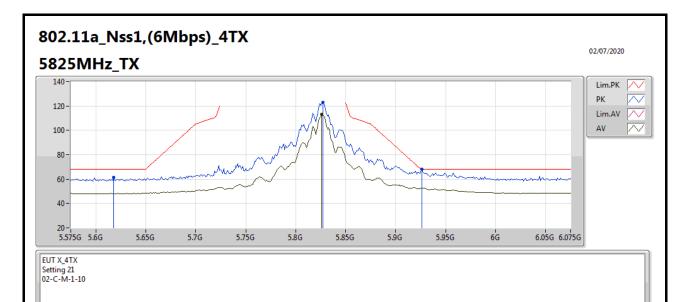






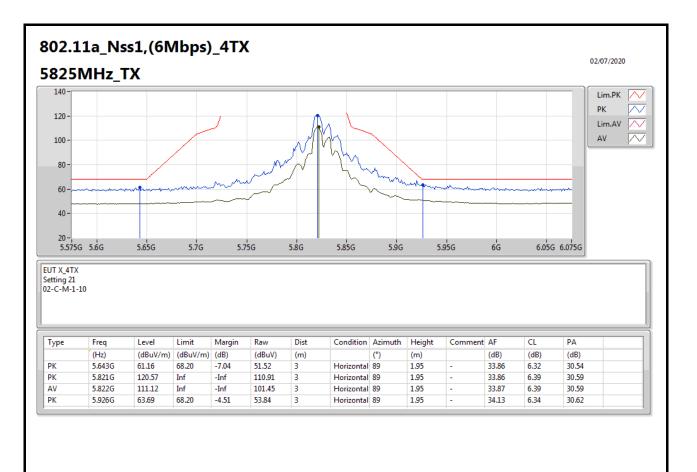




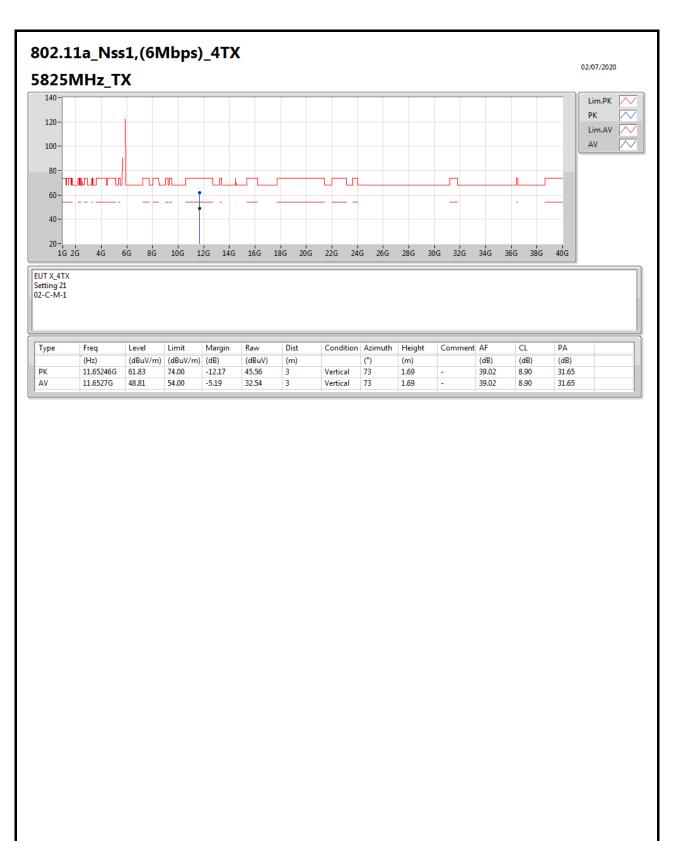


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
РК	5.618G	61.60	68.20	-6.60	51.95	3	Vertical	195	1.89	-	33.88	6.31	30.54
РК	5.827G	123.15	Inf	-Inf	113.47	3	Vertical	195	1.89	-	33.88	6.39	30.59
AV	5.826G	112.92	Inf	-Inf	103.24	3	Vertical	195	1.89	-	33.88	6.39	30.59
PK	5.926G	67.92	68.20	-0.28	58.07	3	Vertical	195	1.89	-	34.13	6.34	30.62

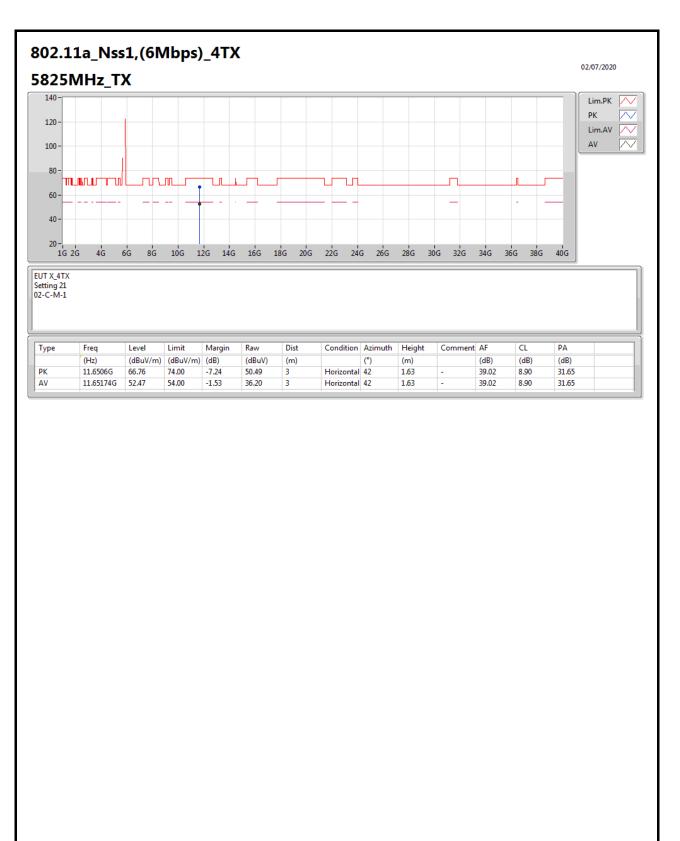




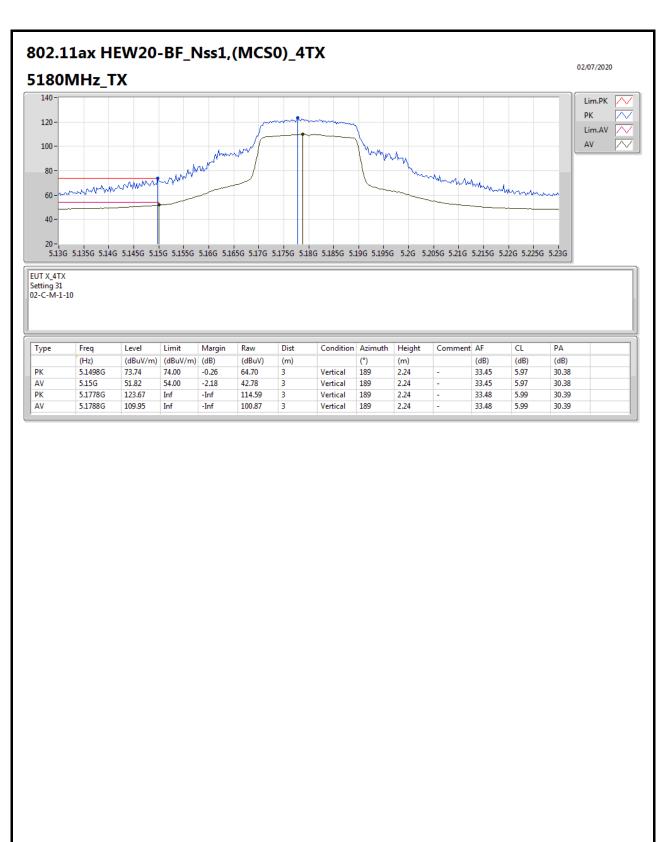




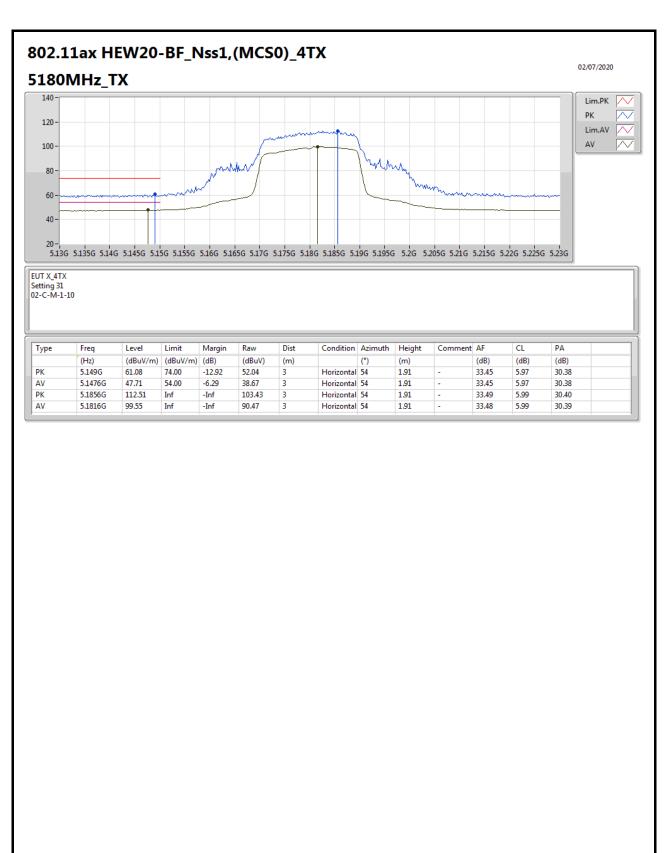




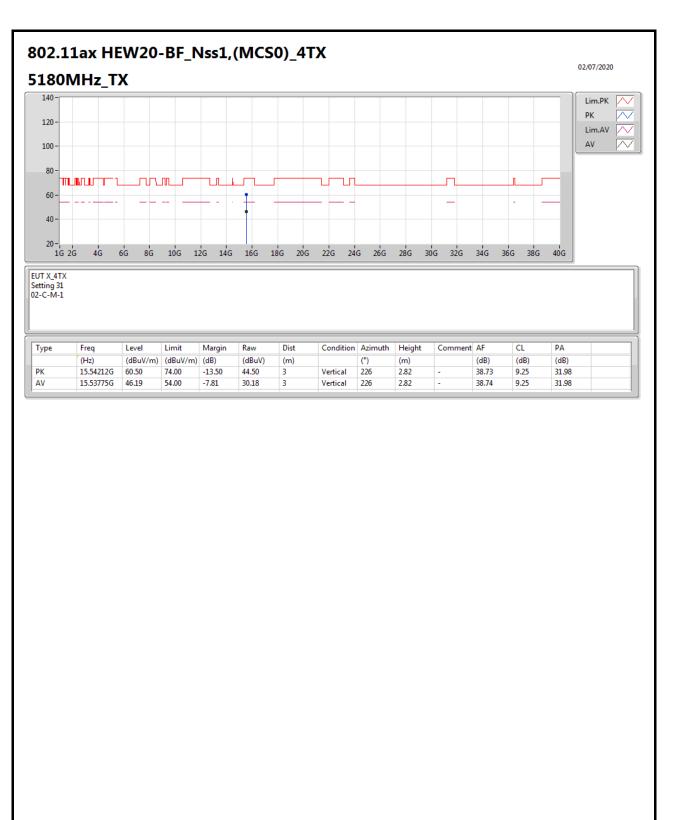




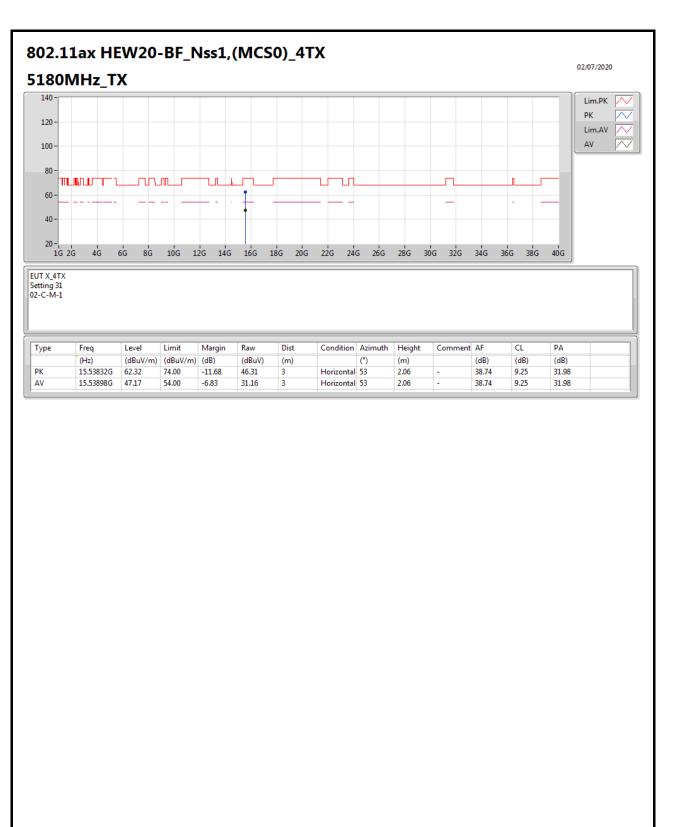




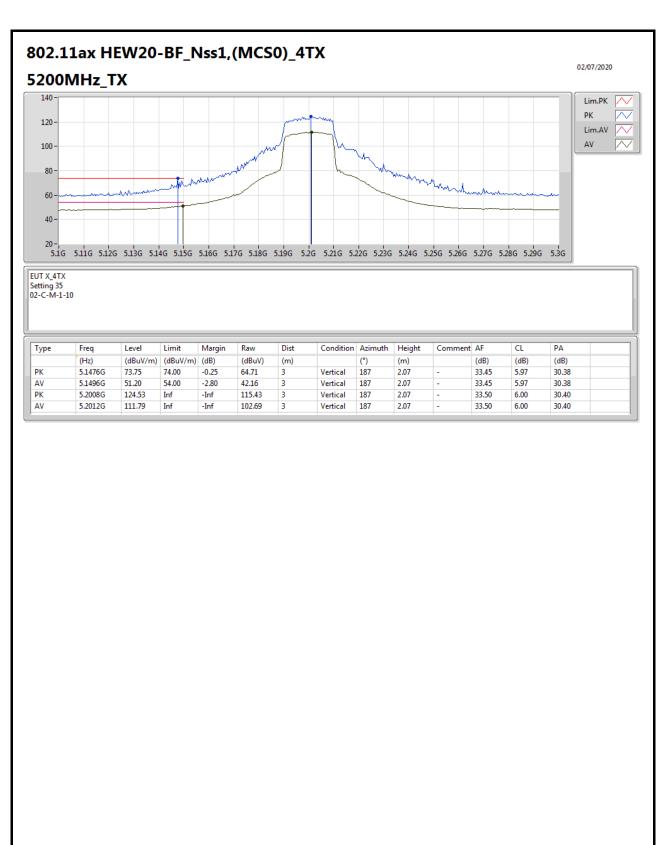




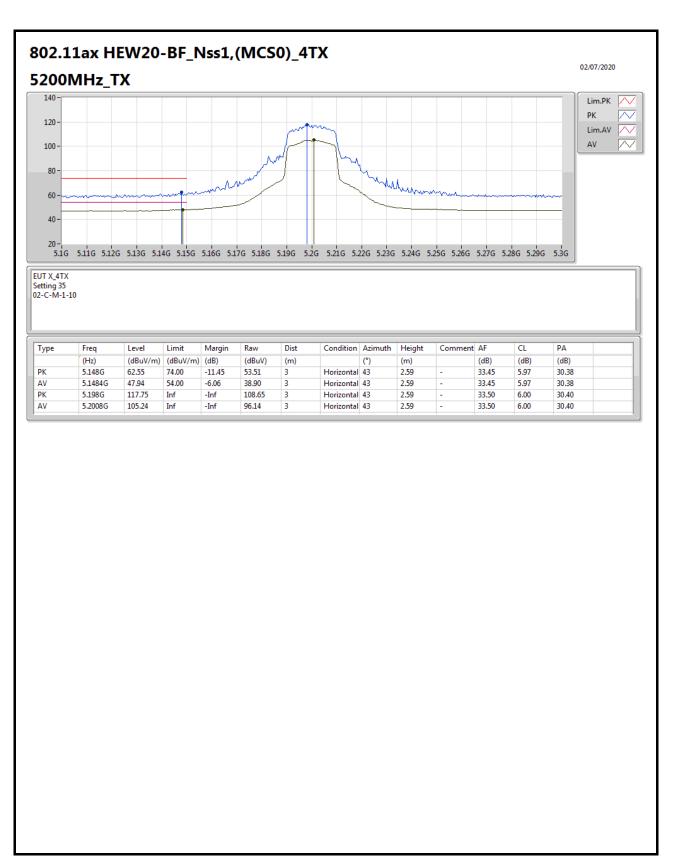




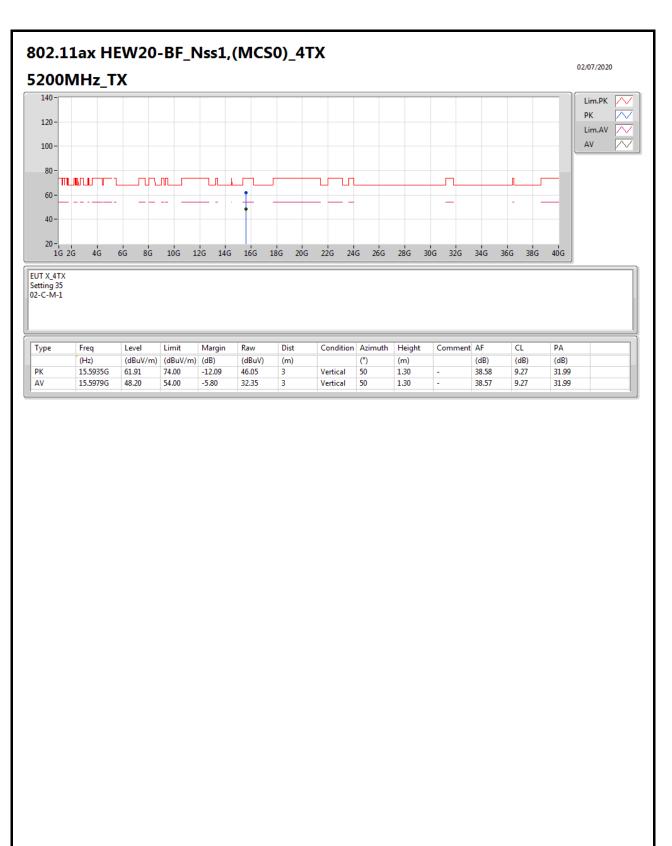




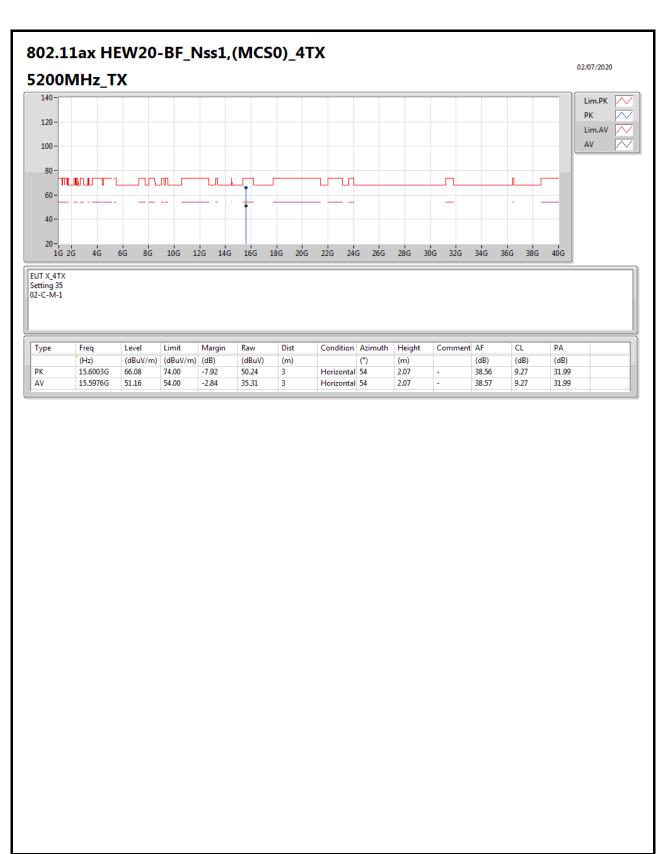




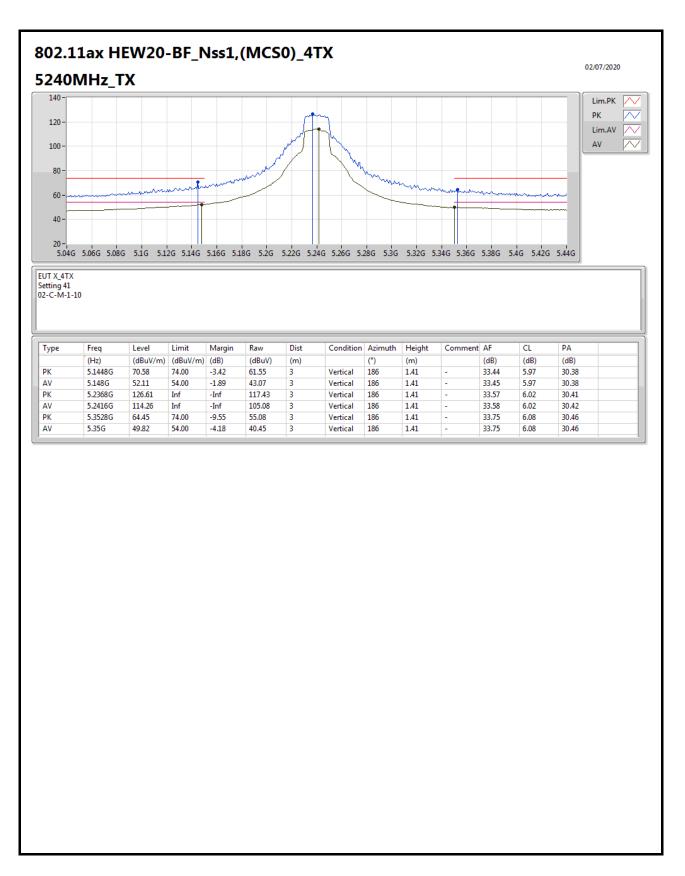




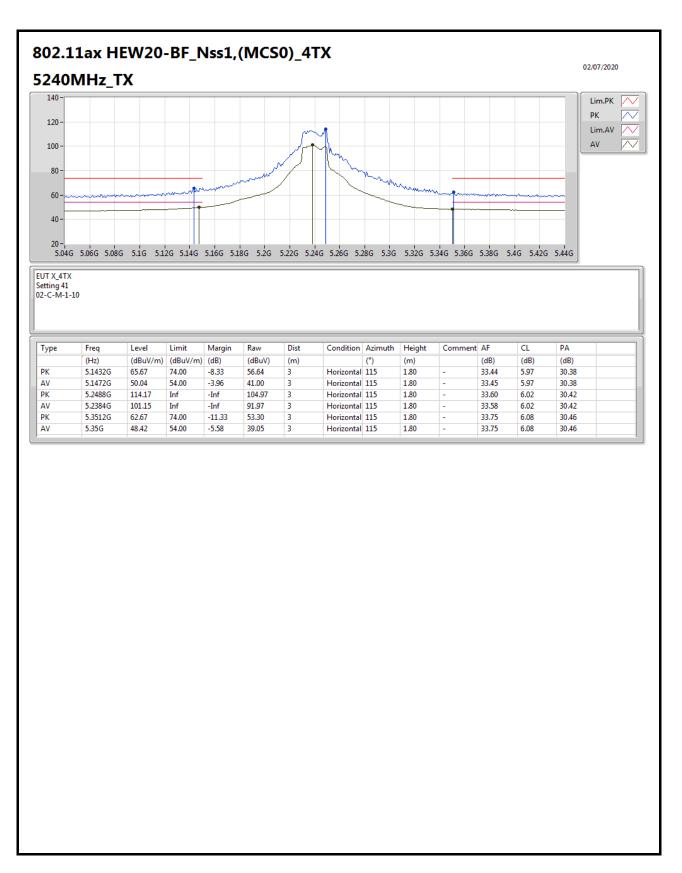




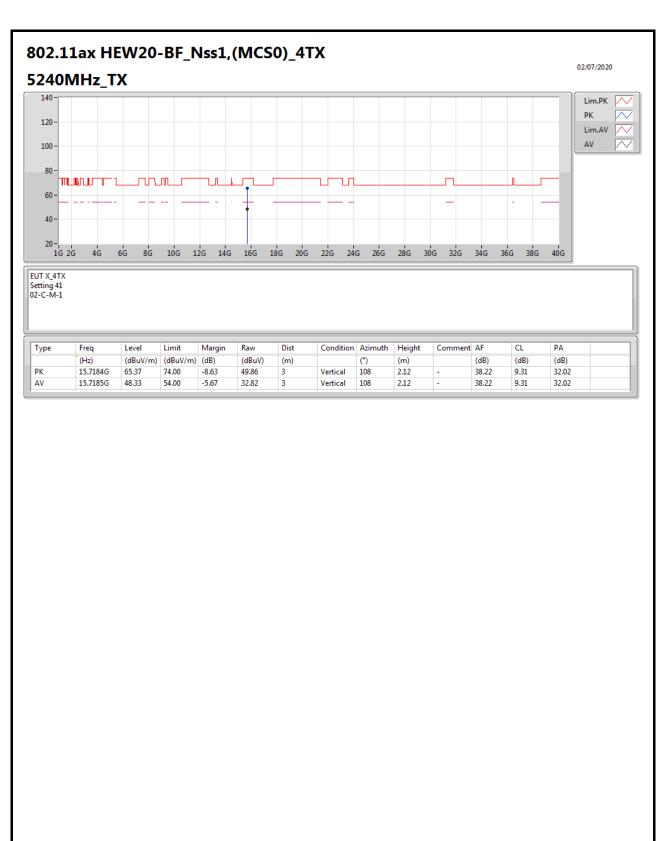




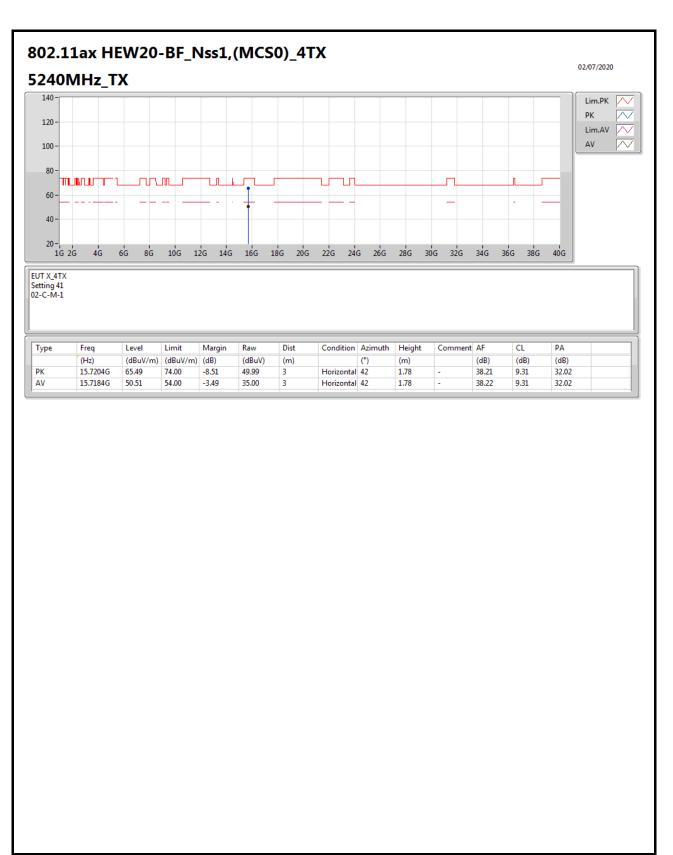




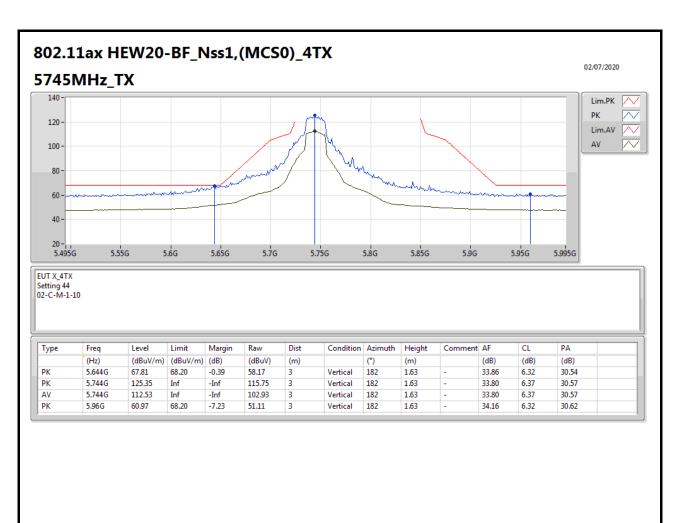




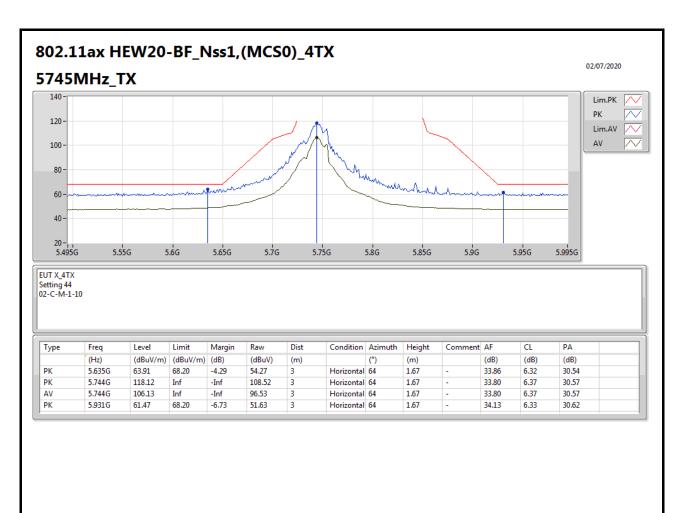




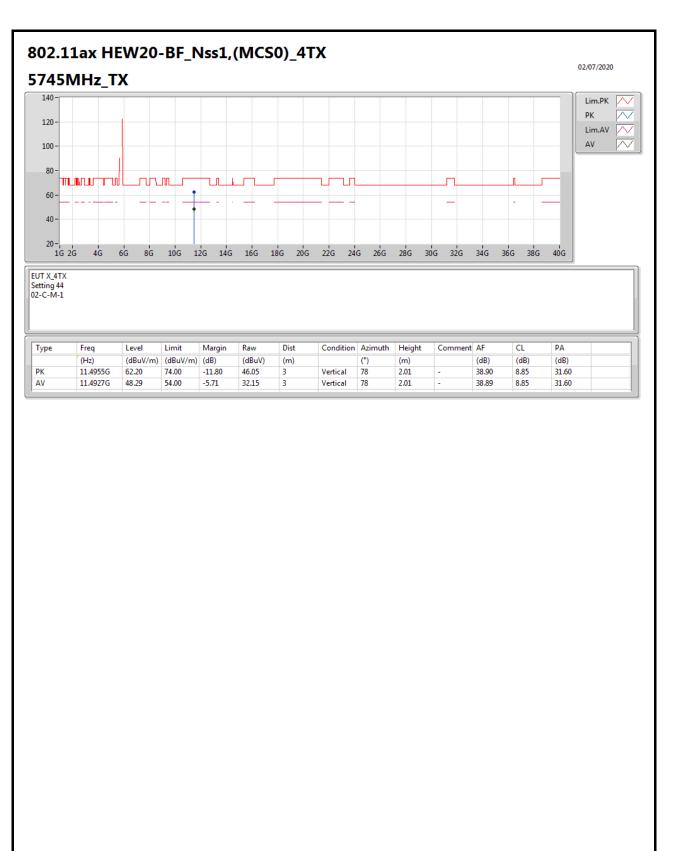




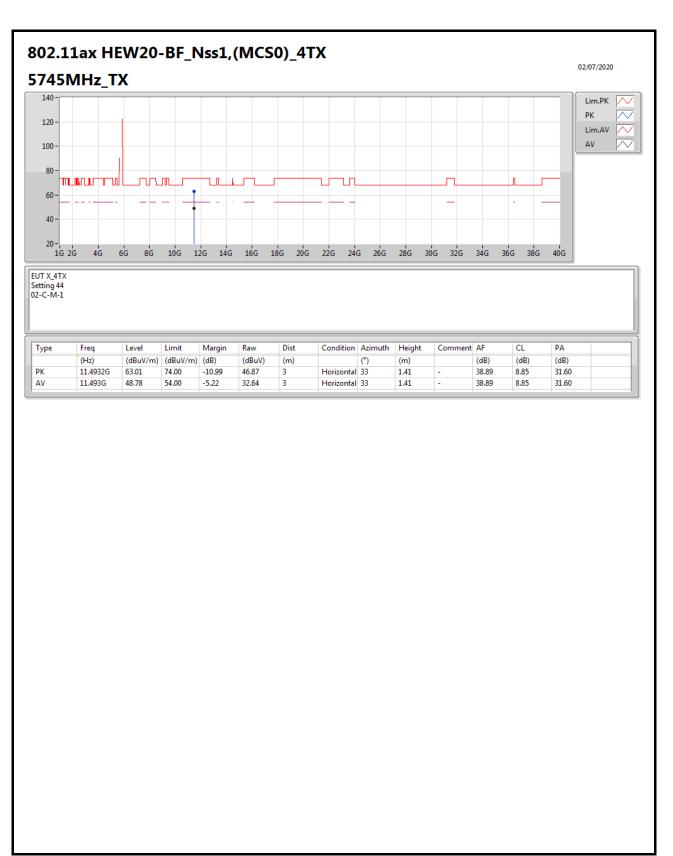




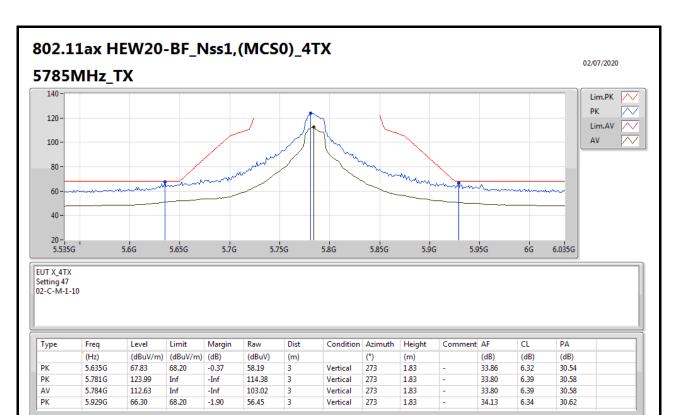




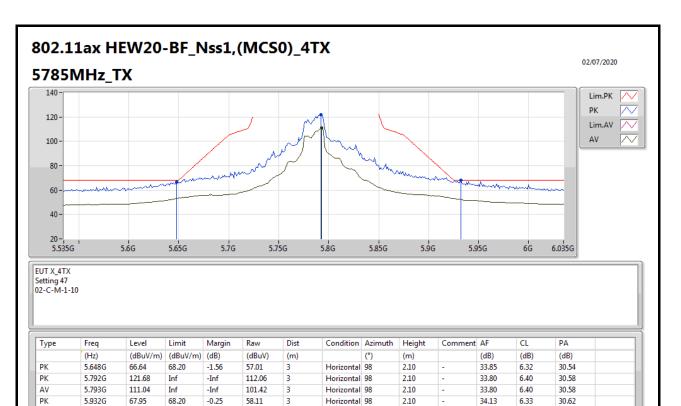




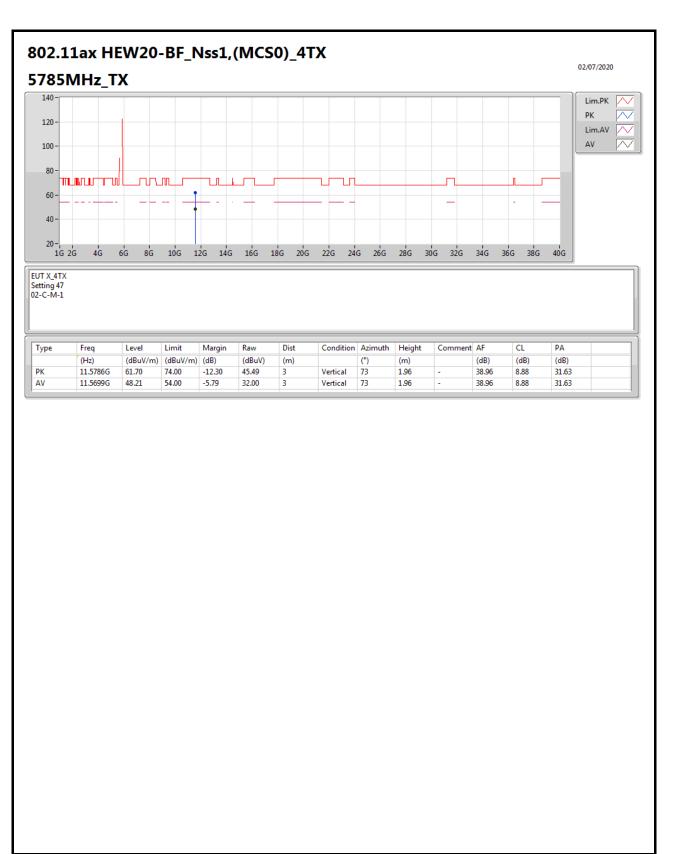




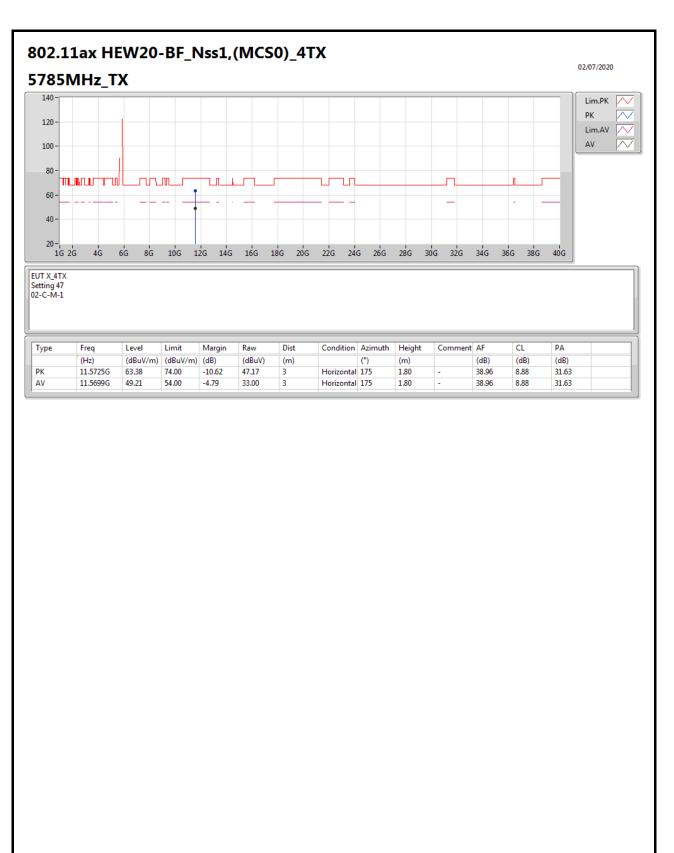




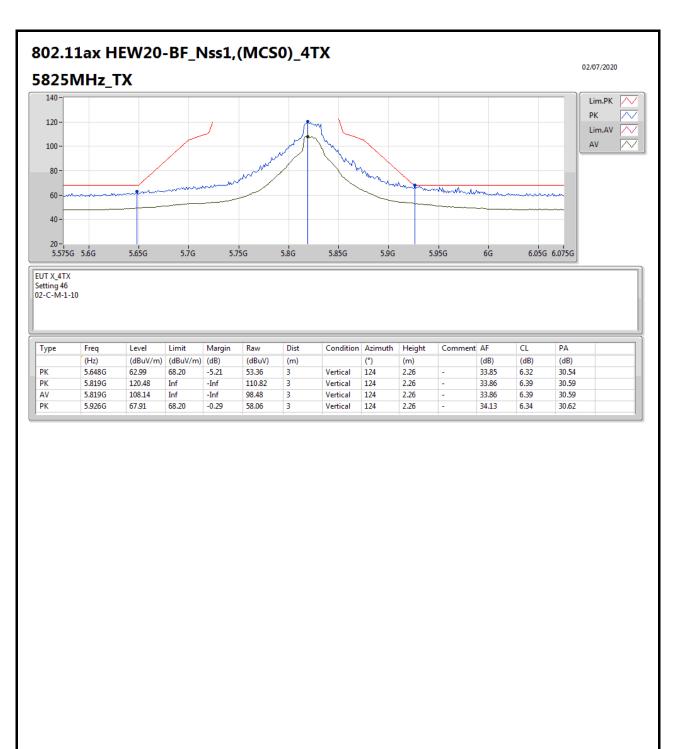




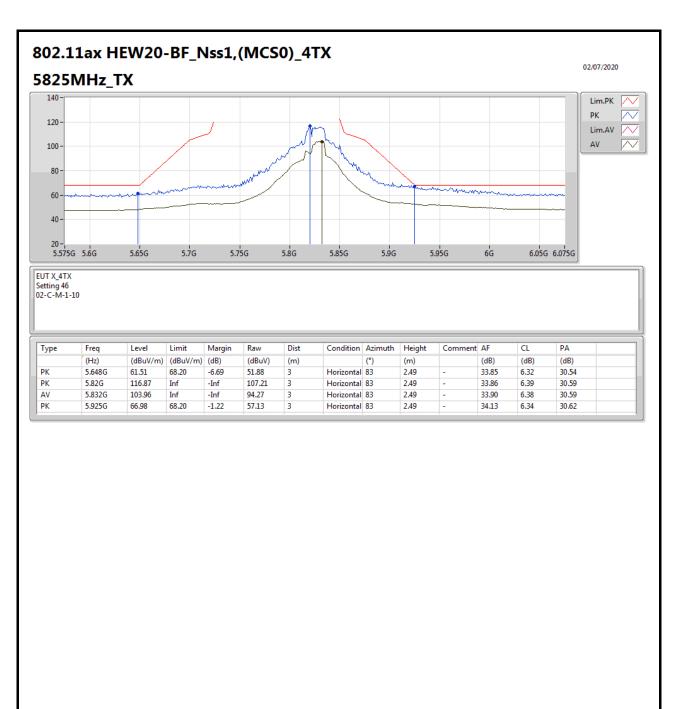




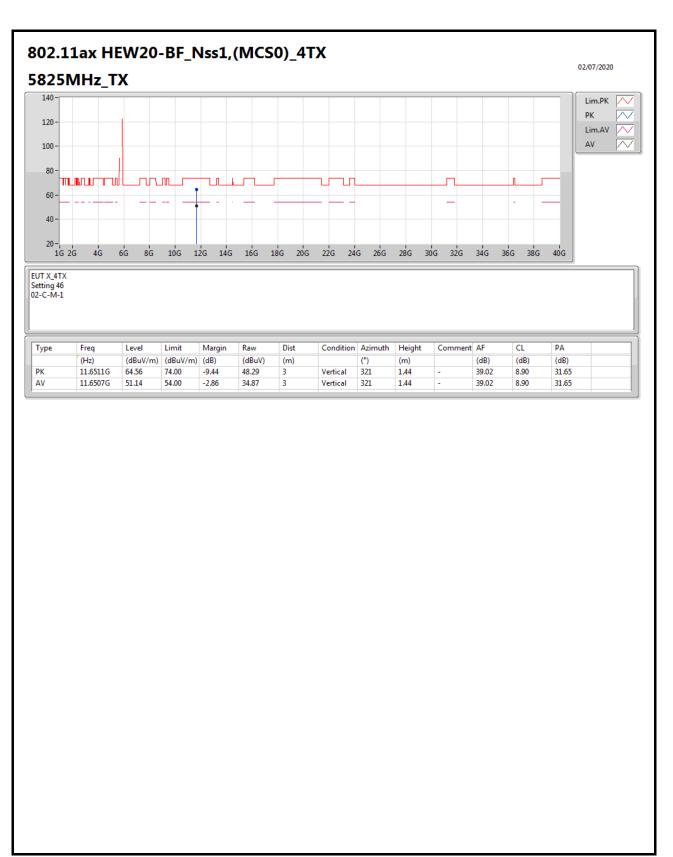




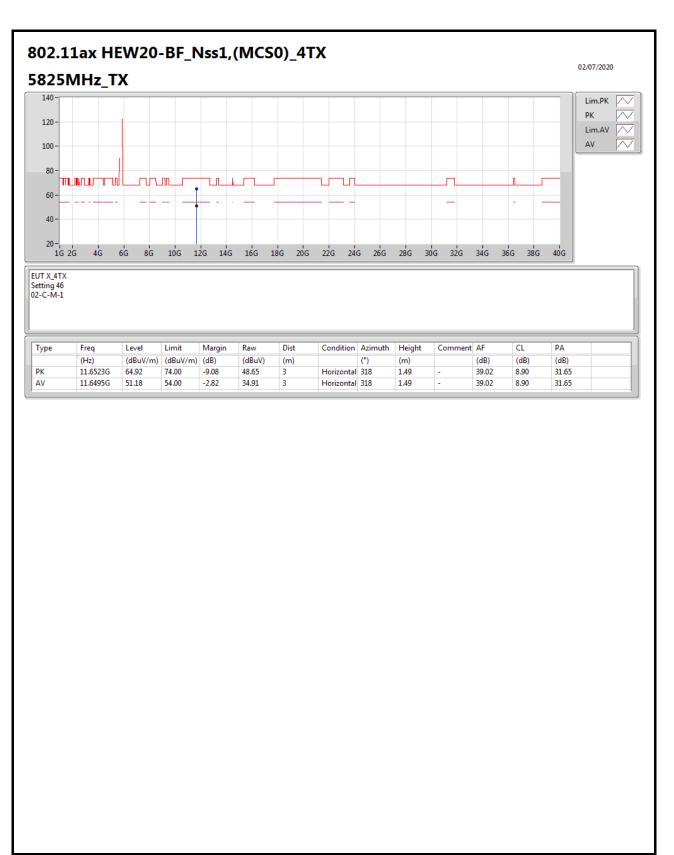




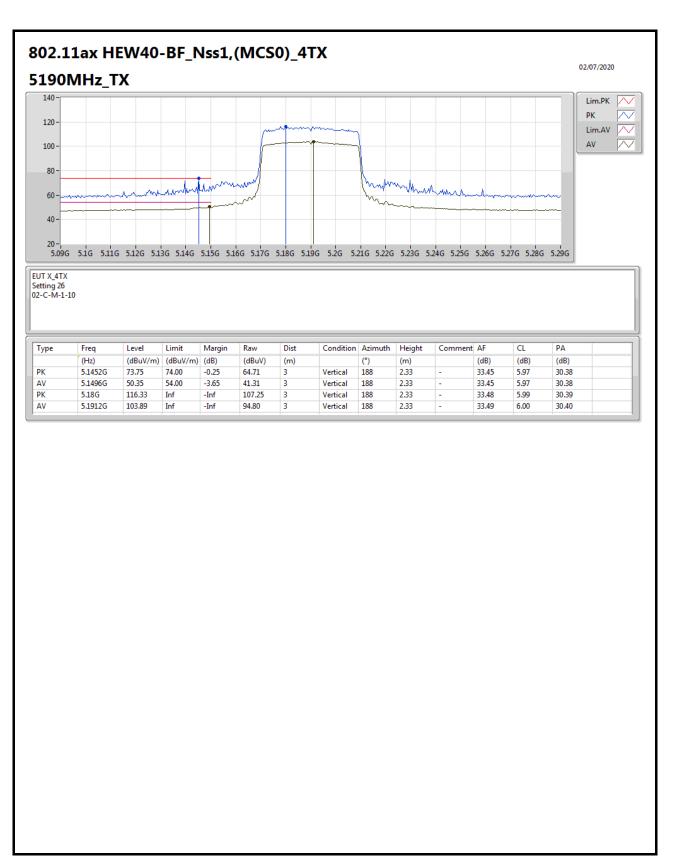




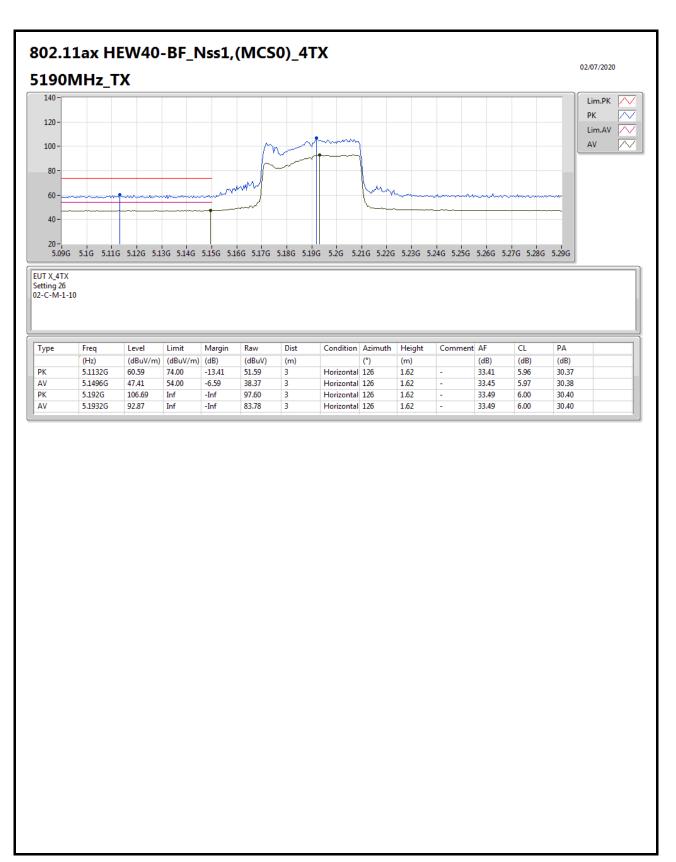




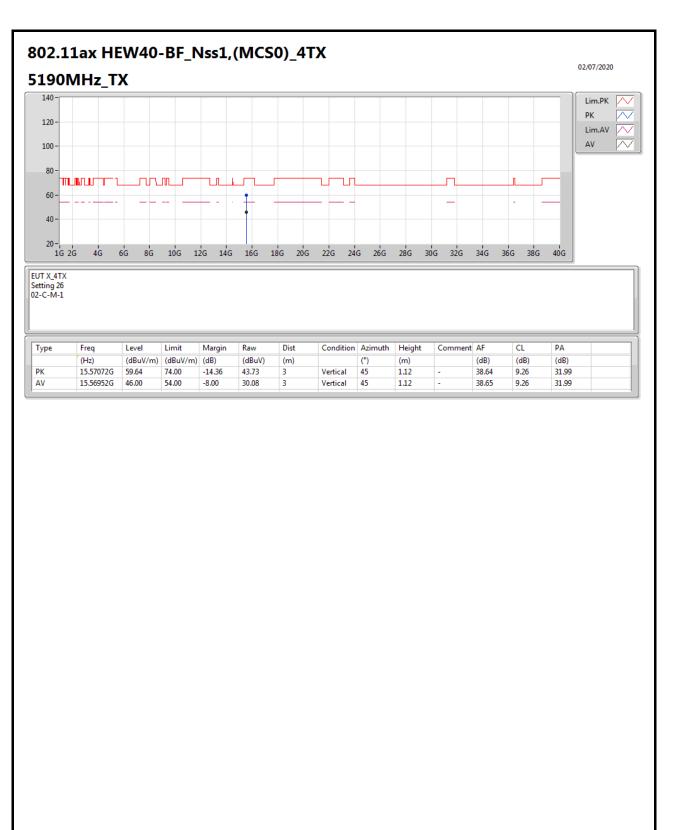




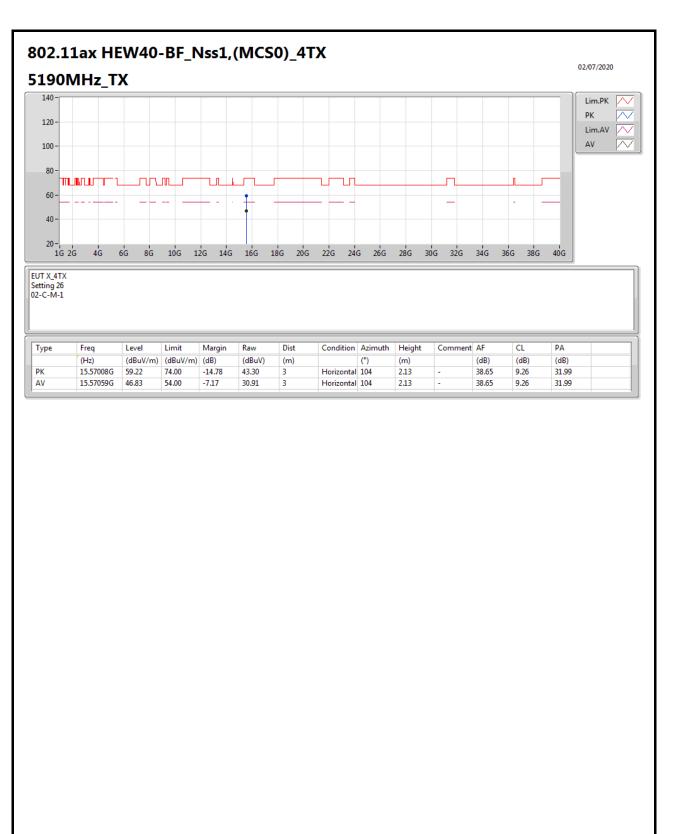




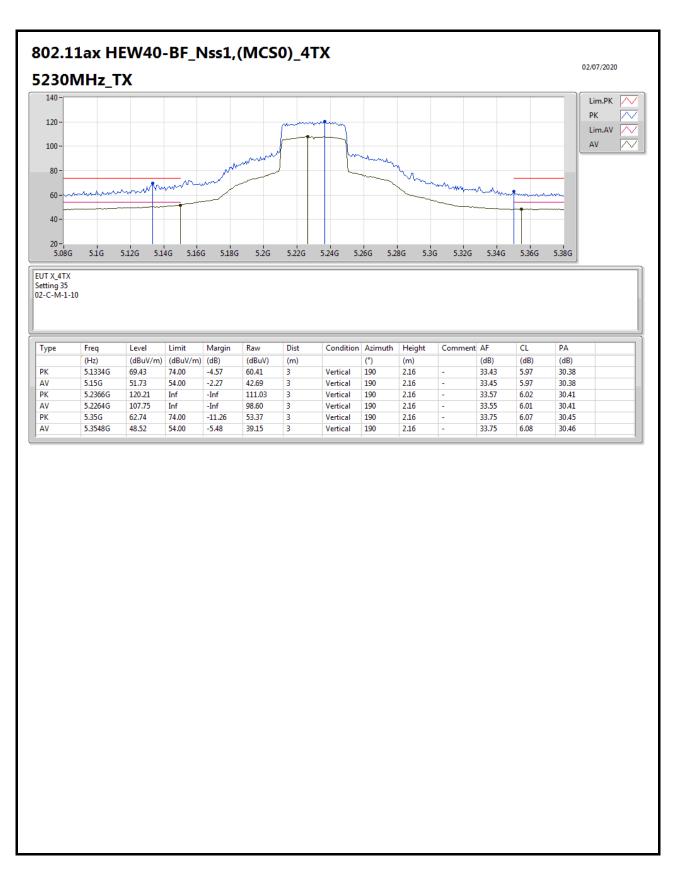




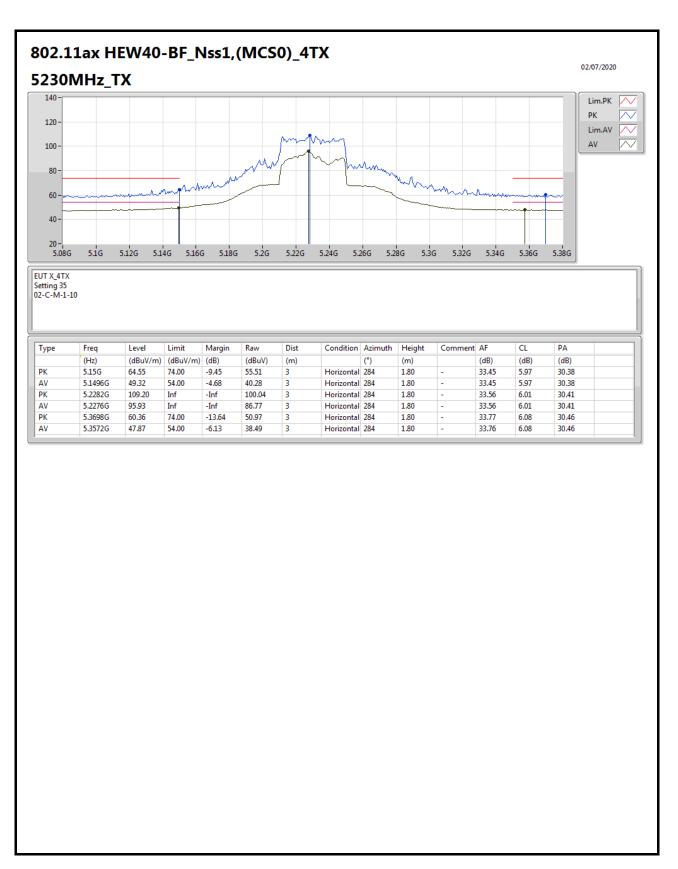




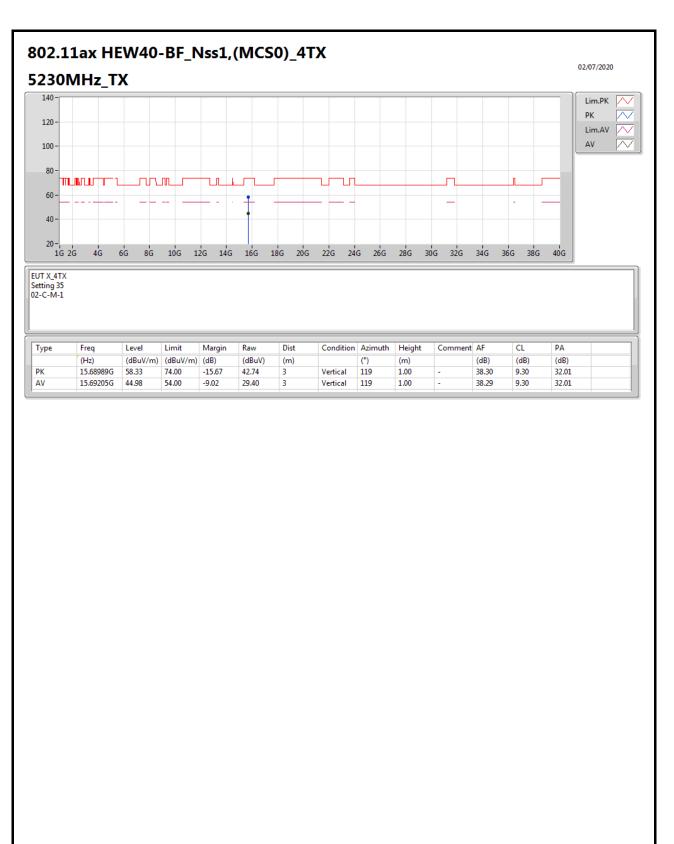




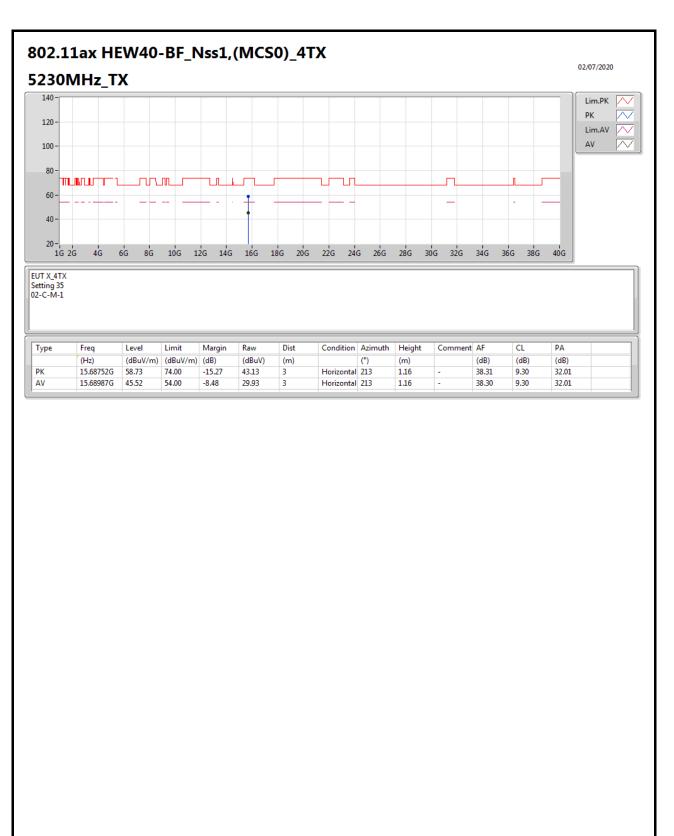




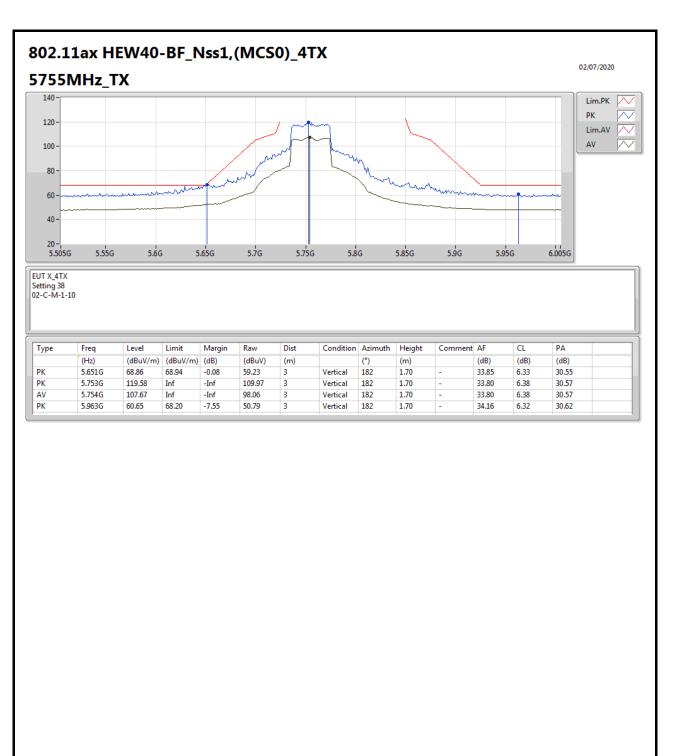




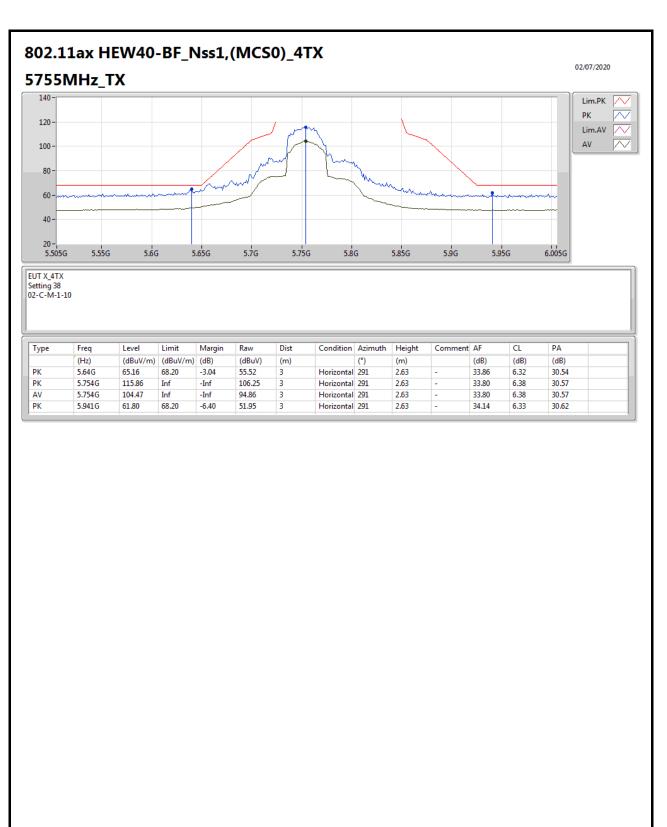




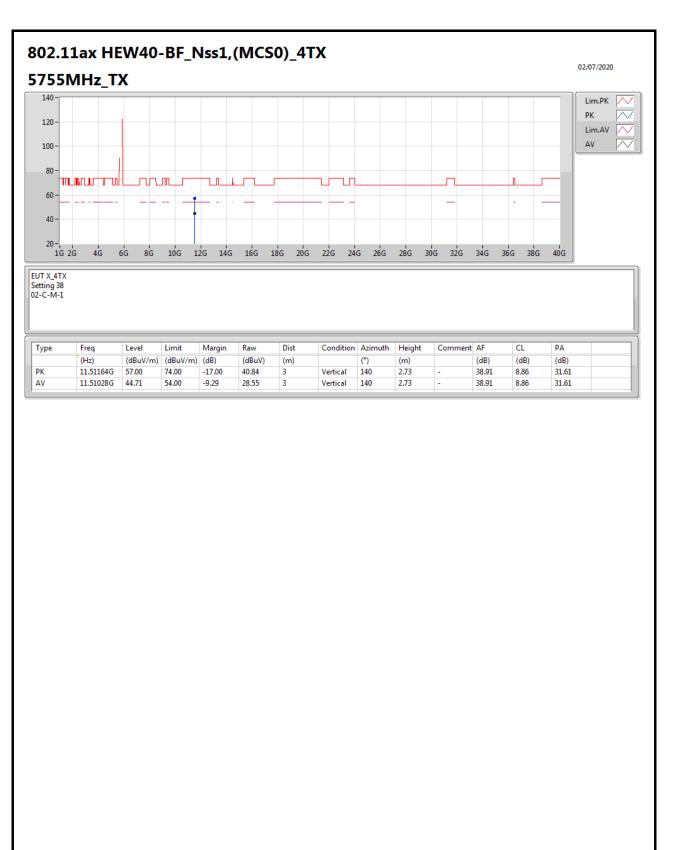




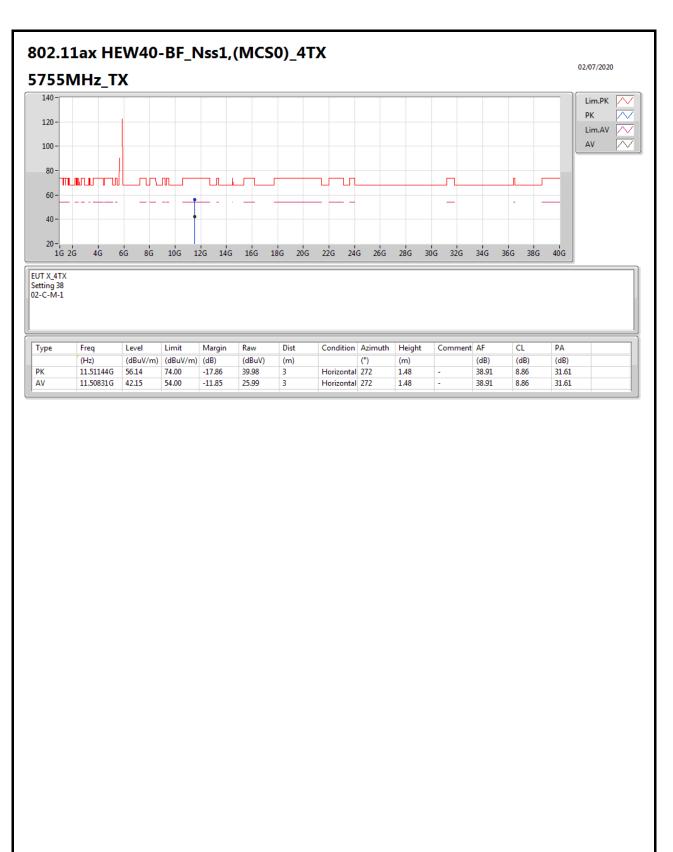




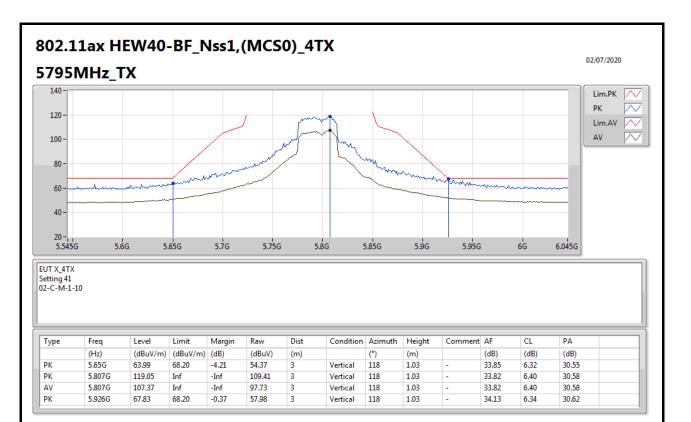




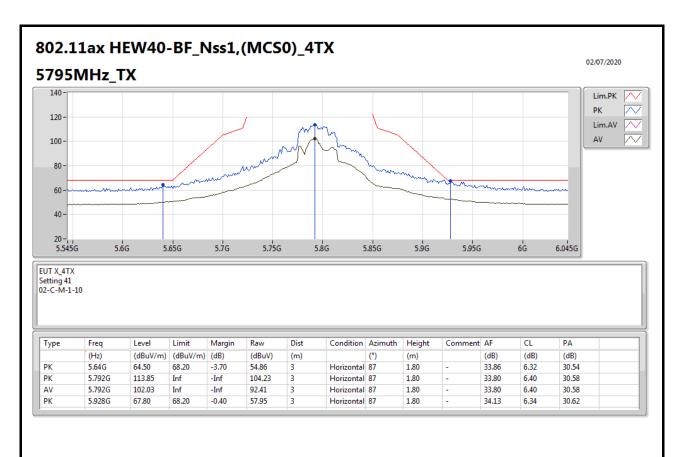




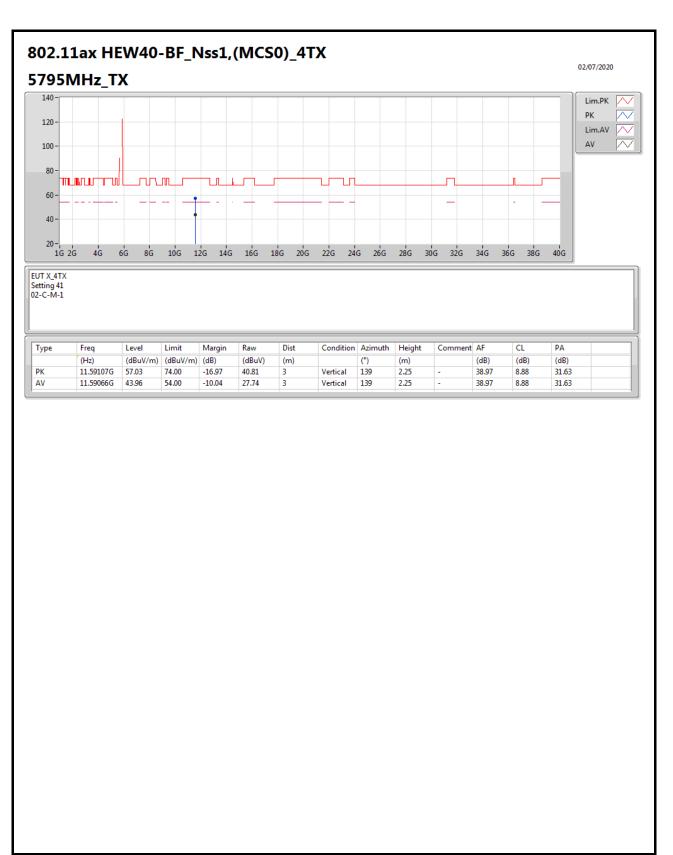




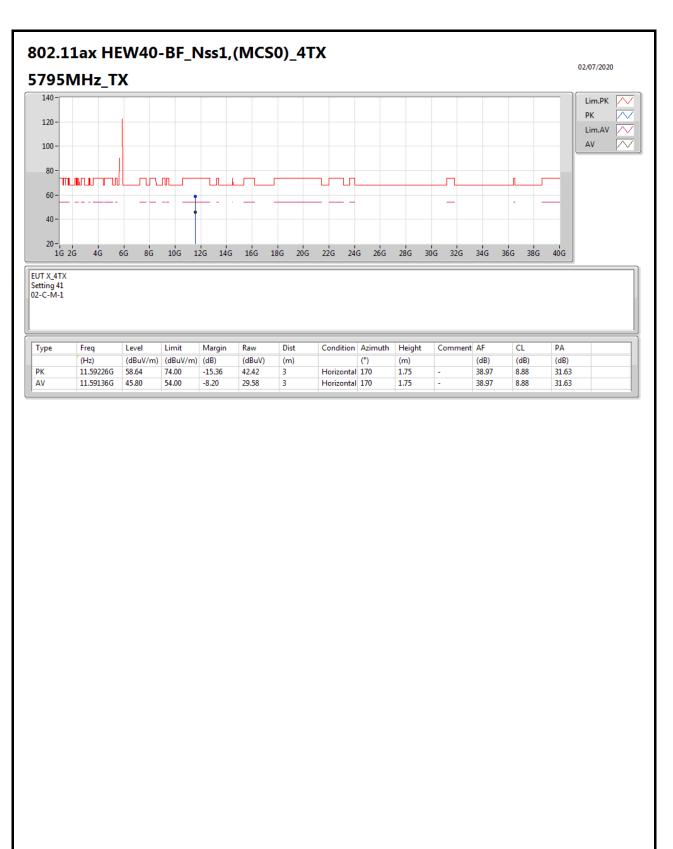




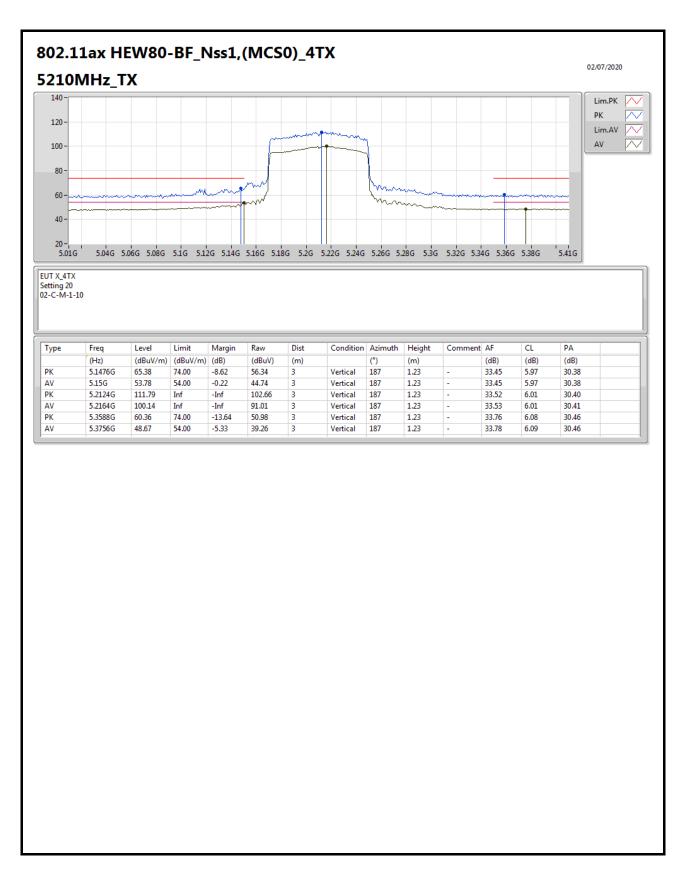




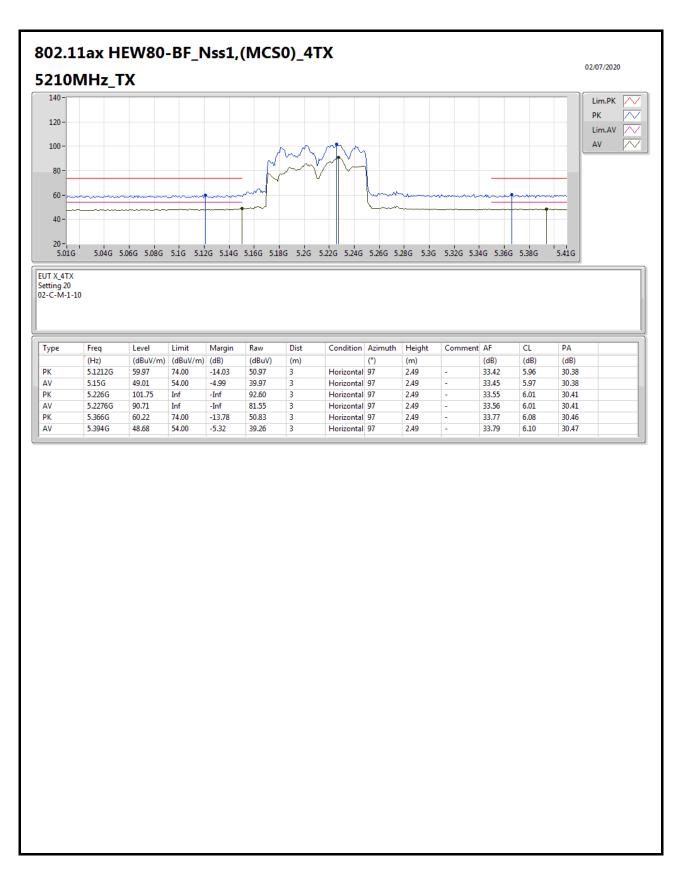




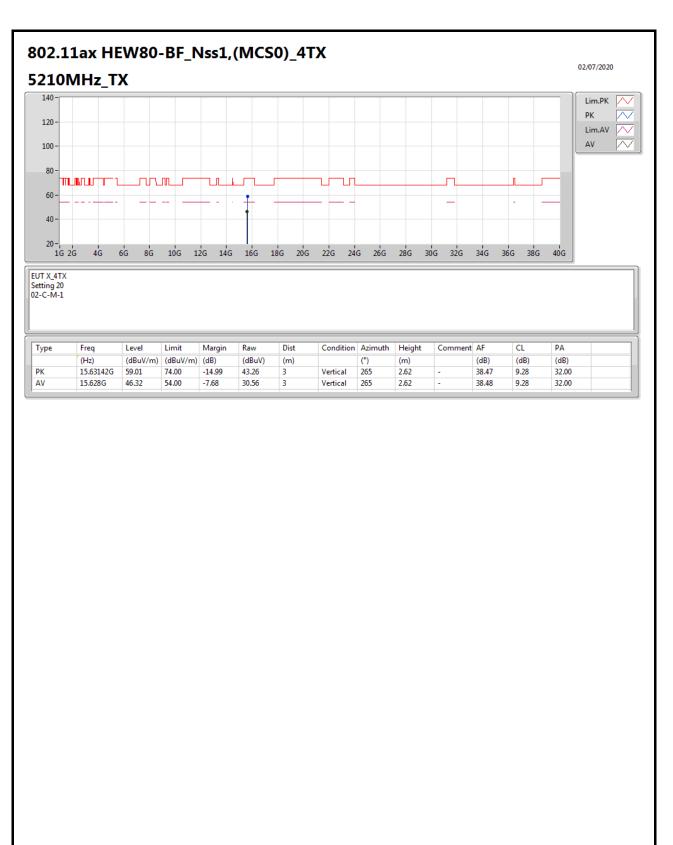




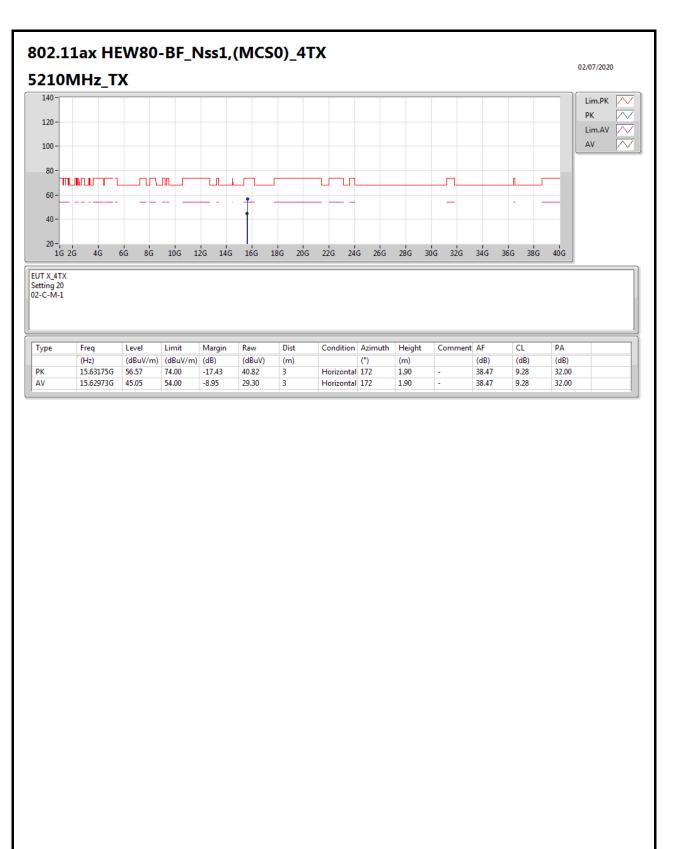




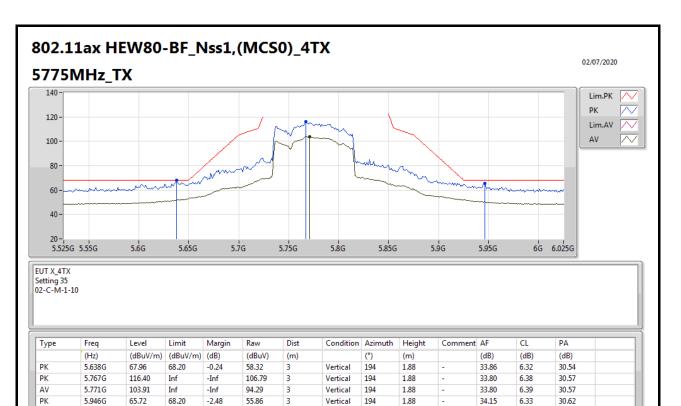












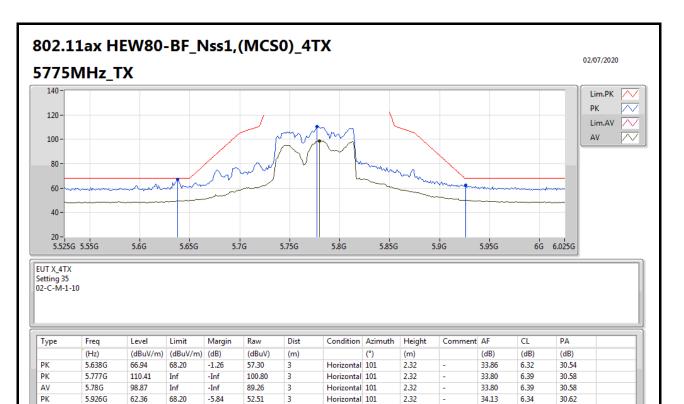


5.926G

62.36

68.20

-5.84



Horizontal 101

.

2.32

34.13

6.34

30.62

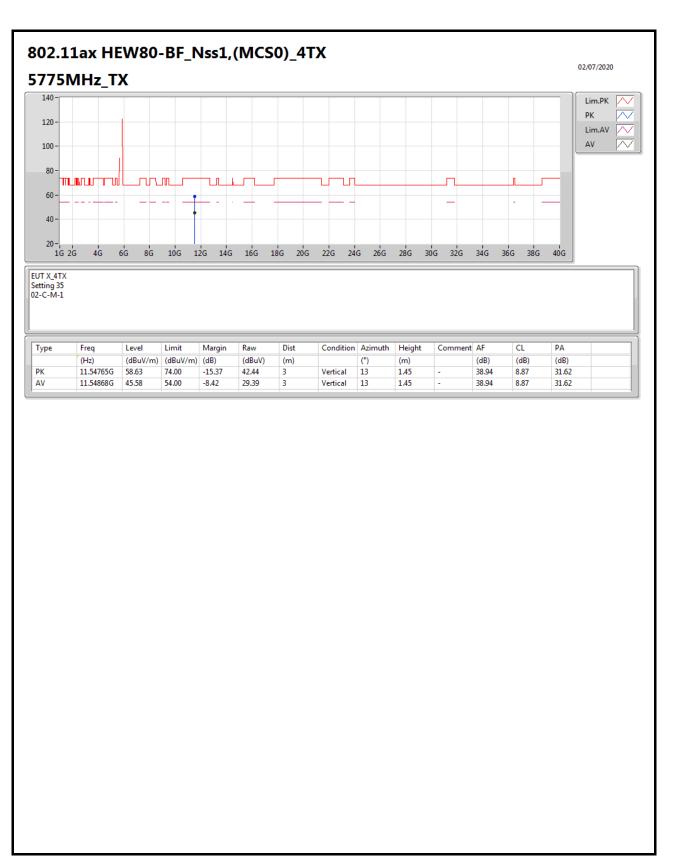
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3

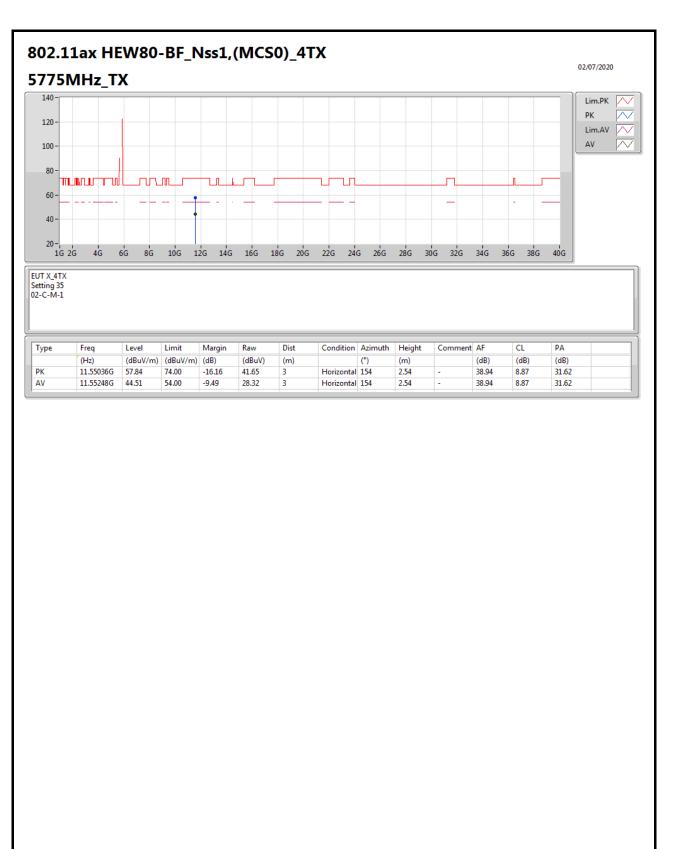
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SPORTON INTERNATIONAL INC. EMC & Wireless Commun	ications Laboratory.











## Radiated Emission Co-location

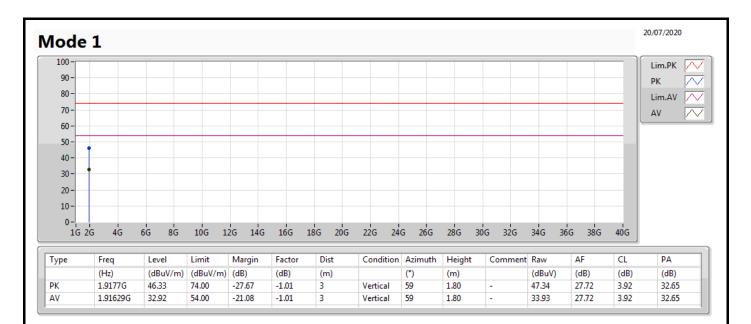
# Appendix F

Summary							
Mode	Result	Туре	Freq	Level	Limit	Margin	Condition
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	
Mode 1	Pass	AV	1.91629G	32.92	54.00	-21.08	Vertical



### **Radiated Emission Co-location**

### Appendix F





### **Radiated Emission Co-location**

### Appendix F

