



FCC RADIO TEST REPORT

FCC ID	:	TLZ-CM390SM
Equipment	:	IEEE 802.11a/b/g/n/ac WiFi with Bluetooth 5.0 Combo Stamp Module
Brand Name	:	AzureWave
Model Name	:	AW-CM390SM
Applicant	:	AzureWave Technologies, Inc.
		8F., No.94, Baozhong Rd., Xindian Dist., New Taipei City 23144, Taiwan
Standard	:	47 CFR FCC Part 15.407

The product was received on Mar. 12, 2020, and testing was started from Mar. 19, 2020 and completed on Jun. 02, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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.

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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
FR030609AB	01	Initial issue of report	Jun. 10, 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: Sandy Chuang



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		5180-5240	36-48 [4]
5250-5350	a = (UT20) = a (V(UT20)	5260-5320	52-64 [4]
5470-5725	a, n (HT20), ac (VHT20)	5500-5720	100-144 [12]
5725-5850		5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40)	5190-5230	38-46 [2]
5250-5350		5270-5310	54-62 [2]
5470-5725		5510-5710	102-142 [6]
5725-5850		5755-5795	151-159 [2]
5150-5250		5210	42 [1]
5250-5350		5290	58 [1]
5470-5725	ac (VHT80)	5530-5690	106-138 [3]
5725-5850		5775	155 [1]



Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	1TX
5.15-5.25GHz	802.11n HT20	20	1TX
5.15-5.25GHz	802.11ac VHT20	20	1TX
5.15-5.25GHz	802.11n HT40	40	1TX
5.15-5.25GHz	802.11ac VHT40	40	1TX
5.15-5.25GHz	802.11ac VHT80	80	1TX
5.25-5.35GHz	802.11a	20	1TX
5.25-5.35GHz	802.11n HT20	20	1TX
5.25-5.35GHz	802.11ac VHT20	20	1TX
5.25-5.35GHz	802.11n HT40	40	1TX
5.25-5.35GHz	802.11ac VHT40	40	1TX
5.25-5.35GHz	802.11ac VHT80	80	1TX
5.47-5.725GHz	802.11a	20	1TX
5.47-5.725GHz	802.11n HT20	20	1TX
5.47-5.725GHz	802.11ac VHT20	20	1TX
5.47-5.725GHz	802.11n HT40	40	1TX
5.47-5.725GHz	802.11ac VHT40	40	1TX
5.47-5.725GHz	802.11ac VHT80	80	1TX
5.725-5.85GHz	802.11a	20	1TX
5.725-5.85GHz	802.11n HT20	20	1TX
5.725-5.85GHz	802.11ac VHT20	20	1TX
5.725-5.85GHz	802.11n HT40	40	1TX
5.725-5.85GHz	802.11ac VHT40	40	1TX
5.725-5.85GHz	802.11ac VHT80	80	1TX

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.

• BWch is the nominal channel bandwidth.



1.1.2 Antenna Information

							Gain (dBi)		
Ant.	Port	Brand	I P/N	Antenna Type	Connector	WLAN		Diverse	
				туре		2.4GHz	5GHz	Bluetooth	
1	1	MAG.LAYERS	MSA-4008-25GC1-A1	PIFA	I-PEX	2.98	5.16	2.98	

Note: The above information was declared by manufacturer.

For 2.4GHz function:

For IEEE 802.11b/g/n (1TX/1RX):

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

For 5GHz function:

For IEEE 802.11a/n/ac (1TX/1RX):

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

For Bluetooth function:

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

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.989	0.05	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT20	0.95	0.22	1.933m	1k
802.11ac VHT40	0.909	0.41	953.75u	3k
802.11ac VHT80	0.822	0.85	461.875u	3k

Note:

• DC is Duty Cycle.

DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

EUT Power Type	From host system				
Beamforming Function		With beamforming Image: Without beamforming			
Weather Band	With 5600~5650MHz U Without 5600~5650MHz			Without 5600~5650MHz	
Function		Outdoor P2M		Indoor P2M	
		Fixed P2P	\square	Client	
TPC Function	With TPC Without TPC				
Test Software Version	Version 7.45.173(r707987 CY WLTEST)FWID 01-6c82dde4				

Note: The above information was declared by manufacturer.



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 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	TH03-CB	Lucas Huangs	22-22.4°C / 45-47%	Mar. 25, 2020~ Jun. 02, 2020
Radiated <below 1ghz=""></below>	03CH04-CB	Stim Sung	21.1-22.7°C / 45-47%	Mar. 25, 2020~ Apr. 29, 2020
Radiated <above 1ghz=""></above>	03CH03-CB	Brian Sun	21.3-22.7°C / 47-49%	Mar. 19, 2020 May 29, 2020
AC Conduction	CO01-CB	Max Lin	23~24°C / 59~60%	Apr. 16, 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)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	2.4 dB	Confidence levels of 95%
Output Power Measurement	1.5 dB	Confidence levels of 95%
Power Density Measurement	2.4 dB	Confidence levels of 95%
Bandwidth Measurement	2%	Confidence levels of 95%



2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.11a_Nss1,(6Mbps)_1TX	-
5180MHz	15
5200MHz	21
5240MHz	23
5260MHz	20
5300MHz	20
5320MHz	18
5500MHz	16
5580MHz	21
5700MHz	18
5745MHz	24
5785MHz	24
5825MHz	24
802.11ac VHT20_Nss1,(MCS0)_1TX	-
5180MHz	16
5200MHz	20
5240MHz	20
5260MHz	21
5300MHz	20
5320MHz	19
5500MHz	16
5580MHz	21
5700MHz	19
5745MHz	24
5785MHz	24
5825MHz	24
802.11ac VHT40_Nss1,(MCS0)_1TX	-
5190MHz	13
5230MHz	19
5270MHz	20
5310MHz	12
5510MHz	14
5550MHz	20
5670MHz	19
5755MHz	18
5795MHz	24

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Mode	Power Setting
802.11ac VHT80_Nss1,(MCS0)_1TX	-
5210MHz	13
5290MHz	12.5
5530MHz	13.5
5610MHz	21
5690MHz Straddle 5.47-5.725GHz	21
5690MHz Straddle 5.725-5.85GHz	21
5775MHz	17

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.



2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral		
Operating Mode Normal Link		
1	1 EUT + 2.4GHz + Bluetooth with Ant.	
2 EUT + 5GHz + Bluetooth with Ant.		
For operating mode 1 is the worst case and it was record in this test report		

For operating mode 1 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 Unwanted Emissions	
Test Condition Conducted measurement at transmit chains		

The Worst Case Mode for Following Conformance Tests			
Tests Item	Unwanted Emissions		
Test ConditionRadiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in regardless of spatial multiplexing MIMO configuration), the radiated test sh be performed with highest antenna gain of each antenna type.			
Operating Mode < 1GHz	erating Mode < 1GHz Normal Link		
1	EUT in Z axis + 2.4GHz + Bluetooth with Ant.		
2	EUT in Z axis + 5GHz + Bluetooth with Ant.		
For operating mode 2 is the worst case and it was record in this test report.			
Operating Mode > 1GHz CTX			
The EUT was performed at X axis, Y axis and Z axis position test, and the worst case was found at X axis So the measurement will follow this same test configuration.			
1	EUT in X axis + Ant.		



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	1 EUT in Z axis: Bluetooth+WLAN 2.4GHz		
2	2 EUT in Z axis: Bluetooth+WLAN 5GHz		
For operating mode 1 was the worst case and it was record in this test report.			
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	1 Bluetooth+WLAN 2.4GHz	
2 Bluetooth+WLAN 5GHz		
Refer to Sporton Test Report No.: FA030609 for Co-location RF Exposure Evaluation.		

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

N/A



2.5 Support Equipment

For AC Conduction:

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
А	Fixture	AzureWave	CK77 94V-0	N/A
В	Notebook	DELL	E6430	N/A
С	Earphone	e-Power	S90W	N/A
D	Mouse	HP	FM100	N/A
E Smart phone Samsung Galaxy J2 A3LSMJ20		A3LSMJ200F		
F	AP	ASUS	RP-N53	MSQ-RPN53

For Radiated (below 1GHz):

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
А	Notebook	DELL	E4300	N/A
В	WLAN AP	ASUS	RT-AX88U	MSQ-RTAXHP00
С	Smart phone	Samsung	Galaxy J2	A3LSMJ200F
D	Fixture AzureWave CK77 94V-0 N/A		N/A	
E Earphone e-Power S90W N/A		N/A		
F	Mouse	HP	FM100	N/A

For Radiated (above 1GHz):

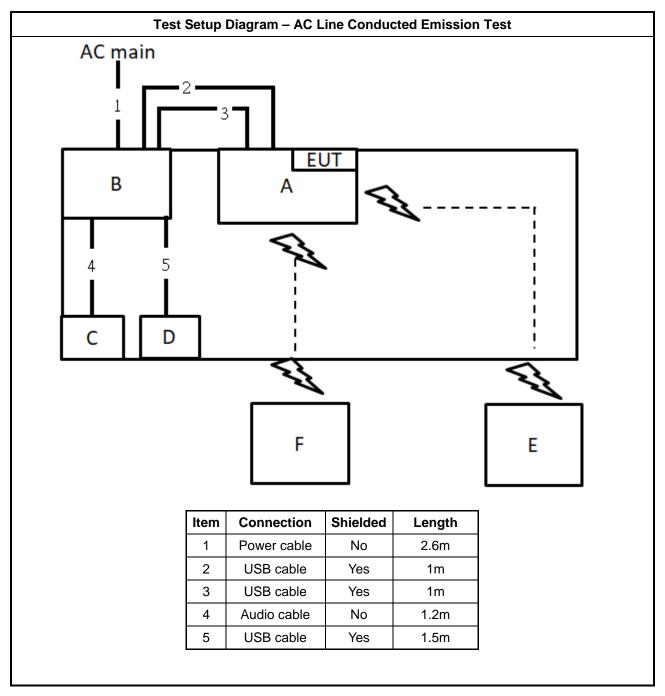
Support Equipment				
No.	No. Equipment Brand Name Model Name FCC ID			
А	Notebook	DELL	E4300	N/A
B Fixture AzureWave CK77 94V-0 N/A		N/A		

For RF Conducted:

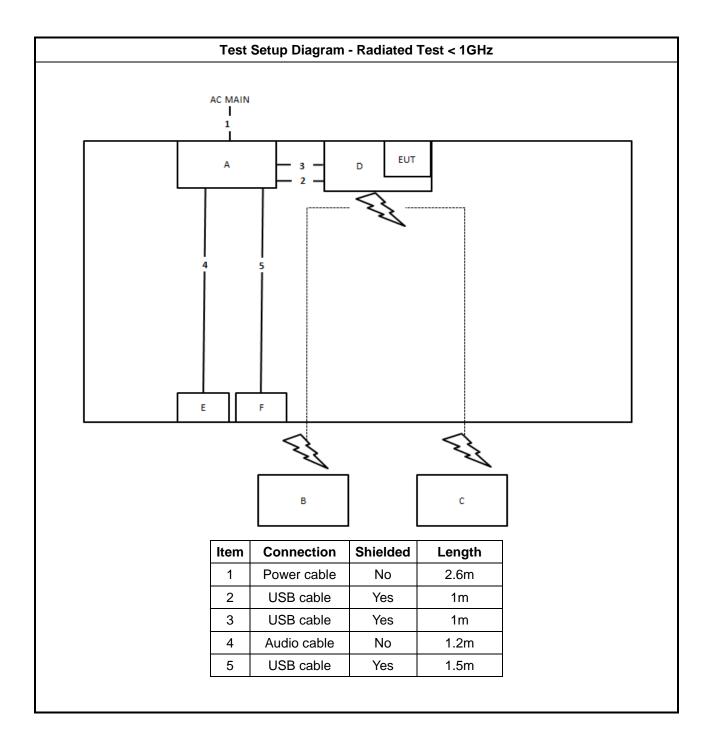
	Support Equipment			
No.	No. Equipment Brand Name Model Name FCC ID			
А	Notebook	DELL	E4300	N/A
B Fixture AzureWave CK77 94V-0 N/A		N/A		



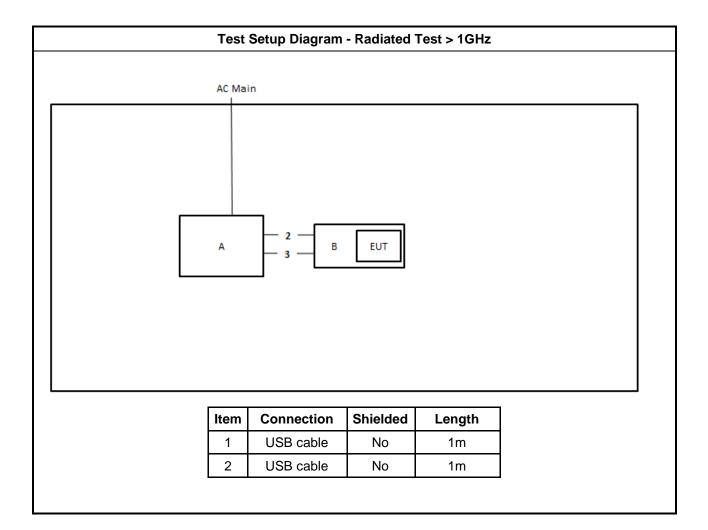
2.6 Test Setup Diagram













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.

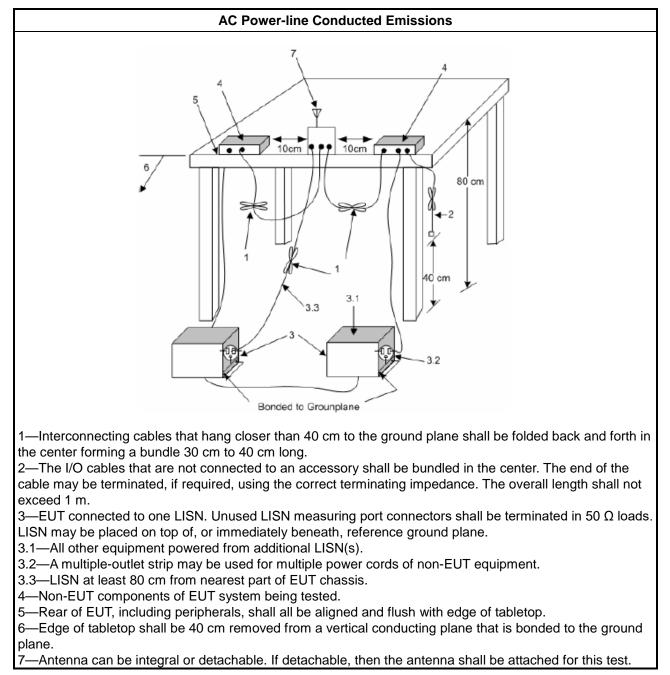
3.1.3 Test Procedures

Test Method

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



3.1.4 Test Setup



3.1.5 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
UN	II Devices
\boxtimes	For the 5.15-5.25 GHz band, N/A
\boxtimes	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.
\boxtimes	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. Measuring Instruments

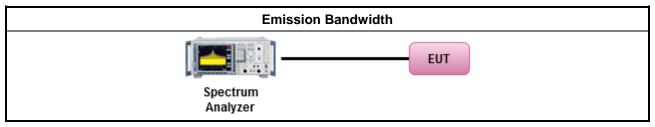
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

		Test Method
•	For t	he emission bandwidth shall be measured using one of the options below:
	\square	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
UNI	I Devices
\boxtimes	For the 5.15-5.25 GHz band:
	 Outdoor AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6). e.i.r.p. at any elevation angle above 30 degrees ≤ 125mW [21dBm]
	 Indoor AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6)
	 Point-to-point AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W If G_{TX} > 23 dBi, then P_{Out} = 30 - (G_{TX} - 23).
	 Mobile or Portable Client: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW. If G_{TX} > 6 dBi, then P_{Out} = 24 - (G_{TX} - 6).
\boxtimes	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 $P_{Out} = 24 - (G_{TX} - 6)$.
\boxtimes	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:
	 Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6).
	 Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W.
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:
	 Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6).
	 Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W.
	t = maximum conducted output power in dBm, = the maximum transmitting antenna directional gain in dBi.



3.3.2 Measuring Instruments

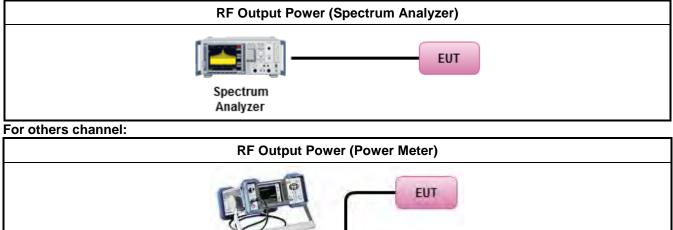
Refer a test equipment and calibration data table in this test report.

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.						
	 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} = P₁ + P₂ + + P_n (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP_{total} = P_{total} + DG 						

3.3.4 Test Setup

For straddle channel:



3.3.5 Test Result of Maximum Conducted Output Power

Power Meter

Refer as Appendix C



3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

	Peak Power Spectral Density Limit
UNI	I 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) ≤ 11 dBm/MHz. If G_{TX} > 6 dBi, then PPSD= 11 - (G_{TX} - 6)
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If G _{TX} > 6 dBi, then PPSD= 11 – (G _{TX} – 6).
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If G _{TX} > 6 dBi, then PPSD= 11 – (G _{TX} – 6).
\square	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-	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.
	 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: -13 dBW/MHz for 0° ≤ θ < 8°; -13 - 0.716 (θ-8) dBW/MHz for 8° ≤ θ < 40° -35.9 - 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ > 45°
	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 - ($G_{TX} - 6$).
	 Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
pow	SD = peak power spectral density that he same method as used to determine the conducted output rer shall be used to determine the power spectral density. And power spectral density in dBm/MHz = 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.

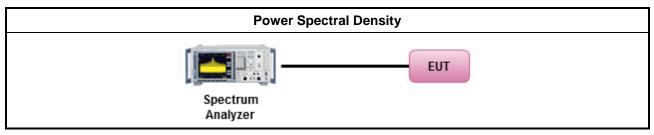


3.4.3 Test Procedures

	Test Method								
•	outp func	c power spectral density procedures that the same method as used to determine the conducted ut power shall be used to determine the peak power spectral density and use the peak search tion on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density 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 emiss	sions below 1 GHz and re	estricted band emissions a	bove 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.							
performed in the n equipment. When	y be performed at a distance other than the limit distance provided they are not ear field and the emissions to be measured can be detected by the measurement performing measurements at a distance other than that specified, the results shall 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**

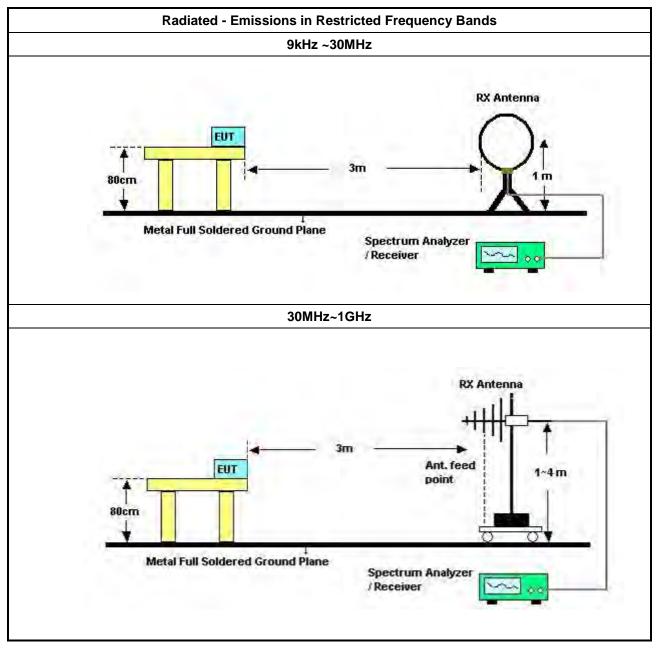
Refer a test equipment and calibration data table in this test report.

3.5.3 **Test Procedures**

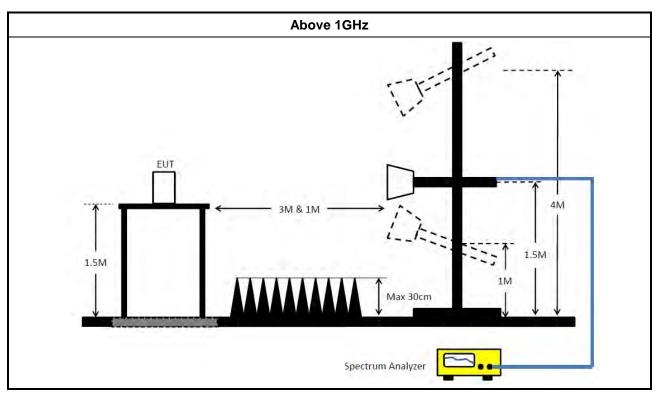
		Test Method
•	perf equi abo are be e dista	extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear ance for field-strength measurements, inverse of linear distance-squared for power-density
•	The	average emission levels shall be measured in [duty cycle \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.
are impractical. 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 linead distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). • The average emission levels shall be measured in [duty cycle ≥ 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 ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. • 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.		
•		



3.5.4 Test Setup







3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna Factor + Čable Loss + Read Level - Preamp Factor = 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)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH04-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Radiation (03CH04-CB)
BILOG ANTENNA with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	22021&AT-N06 07	30MHz ~ 1GHz	Oct. 12, 2019	Oct. 11, 2020	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	310N	187291	0.1MHz ~ 1GHz	Mar. 19, 2020	Mar. 18, 2021	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Dec. 18, 2019	Dec. 17, 2020	Radiation (03CH04-CB
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH04-CB)
RF Cable-low	Woken	RG402	Low Cable-03+22	30MHz – 1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH04-CB)
Horn Antenna	ETS · Lindgren	3115	6821	750MHz~18GHz	Jan. 20, 2020	Jan. 19, 2021	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 27, 2019	Jun. 26, 2020	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Dec. 19, 2019	Dec. 18, 2020	Radiation (03CH03-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 19, 2019	Jun. 18, 2020	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-20+27	1GHz ~ 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH03-CB)

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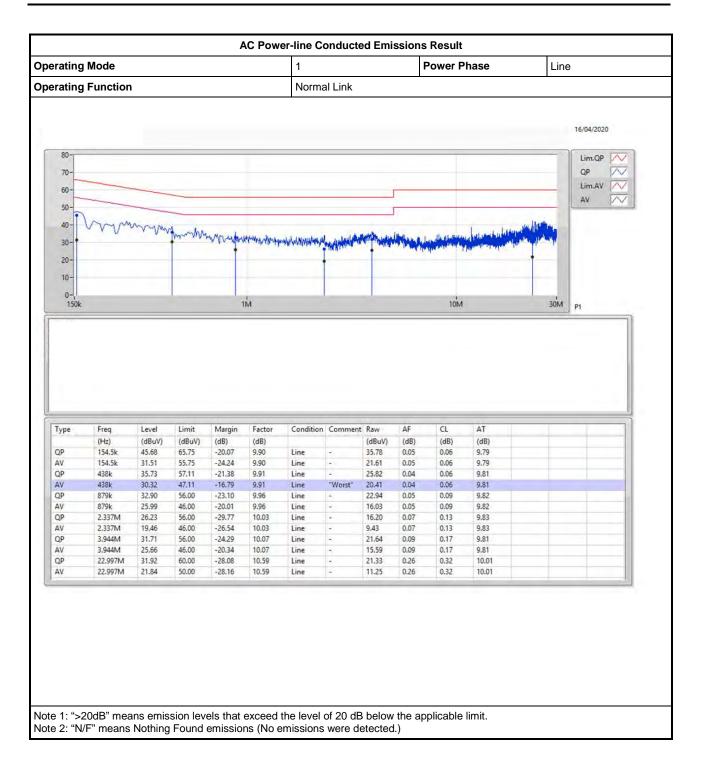


Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-27	1GHz ~ 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH03-CB)
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz	Nov. 01, 2019	Oct. 31, 2020	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1726195	300MHz~40GHz	Aug. 13, 2019	Aug. 12, 2020	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Aug. 13, 2019	Aug. 12, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-13	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)

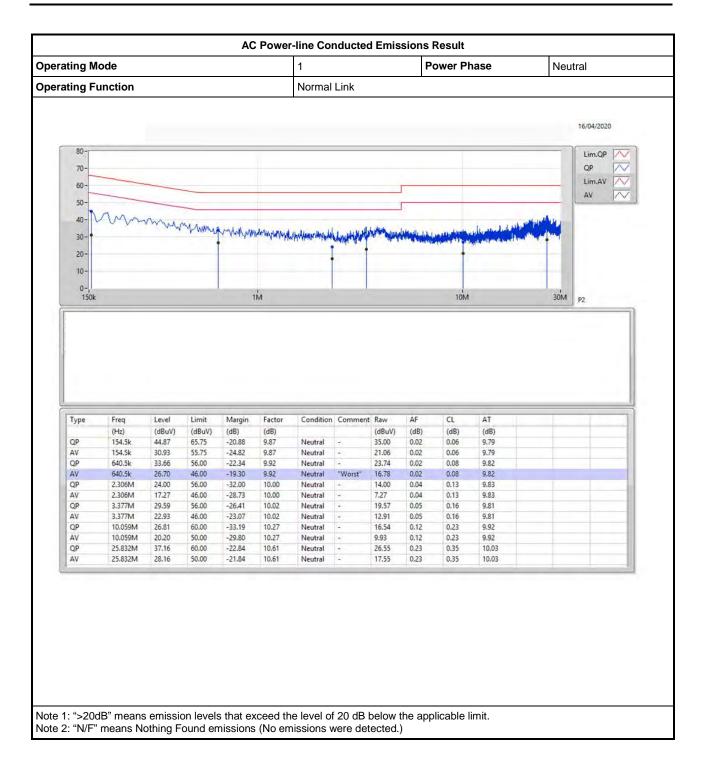
Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.











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)_1TX	33.96M	20.69M	20M7D1D	21.18M	16.702M
802.11ac VHT20_Nss1,(MCS0)_1TX	31.86M	18.681M	18M7D1D	22.56M	17.841M
802.11ac VHT40_Nss1,(MCS0)_1TX	64.02M	37.061M	37M1D1D	39.9M	36.342M
802.11ac VHT80_Nss1,(MCS0)_1TX	81.36M	75.562M	75M6D1D	81.36M	75.562M
5.25-5.35GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_1TX	31.68M	18.231M	18M2D1D	23.91M	17.001M
802.11ac VHT20_Nss1,(MCS0)_1TX	34.89M	19.31M	19M3D1D	27.93M	18.081M
802.11ac VHT40_Nss1,(MCS0)_1TX	73.8M	38.321M	38M3D1D	40.14M	36.342M
802.11ac VHT80_Nss1,(MCS0)_1TX	81.72M	75.562M	75M6D1D	81.72M	75.562M
5.47-5.725GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_1TX	33.15M	19.01M	19M0D1D	21.12M	16.702M
802.11ac VHT20_Nss1,(MCS0)_1TX	33.57M	18.771M	18M8D1D	21.96M	17.841M
802.11ac VHT40_Nss1,(MCS0)_1TX	72.54M	37.481M	37M5D1D	40.08M	36.402M
802.11ac VHT80_Nss1,(MCS0)_1TX	150.12M	76.882M	76M9D1D	81.72M	73.123M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_1TX	16.32M	30.555M	30M6D1D	15.42M	29.655M
802.11ac VHT20_Nss1,(MCS0)_1TX	17.22M	33.163M	33M2D1D	16.68M	31.994M
802.11ac VHT40_Nss1,(MCS0)_1TX	36.24M	66.087M	66M1D1D	35.1M	60.03M
802.11ac VHT80_Nss1,(MCS0)_1TX	75.24M	77.121M	77M1D1D	2.685M	27.301M

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

Result				
Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-
5180MHz	Pass	Inf	21.18M	16.702M
5200MHz	Pass	Inf	33.96M	20.69M
5240MHz	Pass	Inf	32.07M	18.501M
5260MHz	Pass	Inf	31.02M	18.231M
5300MHz	Pass	Inf	31.68M	18.111M
5320MHz	Pass	Inf	23.91M	17.001M
5500MHz	Pass	Inf	21.12M	16.702M
5580MHz	Pass	Inf	33.15M	19.01M
5700MHz	Pass	Inf	22.77M	16.852M
5745MHz	Pass	500k	15.42M	30.555M
5785MHz	Pass	500k	15.78M	29.655M
5825MHz	Pass	500k	16.32M	29.835M
802.11ac VHT20_Nss1,(MCS0)_1TX	-	-	-	-
5180MHz	Pass	Inf	22.56M	17.841M
5200MHz	Pass	Inf	31.86M	18.681M
5240MHz	Pass	Inf	31.56M	18.621M
5260MHz	Pass	Inf	34.89M	19.31M
5300MHz	Pass	Inf	30.9M	18.531M
5320MHz	Pass	Inf	27.93M	18.081M
5500MHz	Pass	Inf	21.96M	17.841M
5580MHz	Pass	Inf	33.57M	18.771M
5700MHz	Pass	Inf	27.21M	18.021M
5745MHz	Pass	500k	17.22M	33.163M
5785MHz	Pass	500k	16.98M	32.114M
5825MHz	Pass	500k	16.68M	31.994M
802.11ac VHT40_Nss1,(MCS0)_1TX	-	-	-	-
5190MHz	Pass	Inf	39.9M	36.342M
5230MHz	Pass	Inf	64.02M	37.061M
5270MHz	Pass	Inf	73.8M	38.321M
5310MHz	Pass	Inf	40.14M	36.342M
5510MHz	Pass	Inf	40.08M	36.402M
5550MHz	Pass	Inf	72.54M	37.481M
5670MHz	Pass	Inf	62.1M	36.822M
5755MHz	Pass	500k	36.24M	60.03M
5795MHz	Pass	500k	35.1M	66.087M
802.11ac VHT80_Nss1,(MCS0)_1TX		-	-	-
5210MHz	Pass	Inf	81.36M	75.562M
5290MHz	Pass	Inf	81.72M	75.562M
5530MHz	Pass	Inf	81.72M	75.562M
5610MHz	Pass	Inf	150.12M	76.882M

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Appendix B

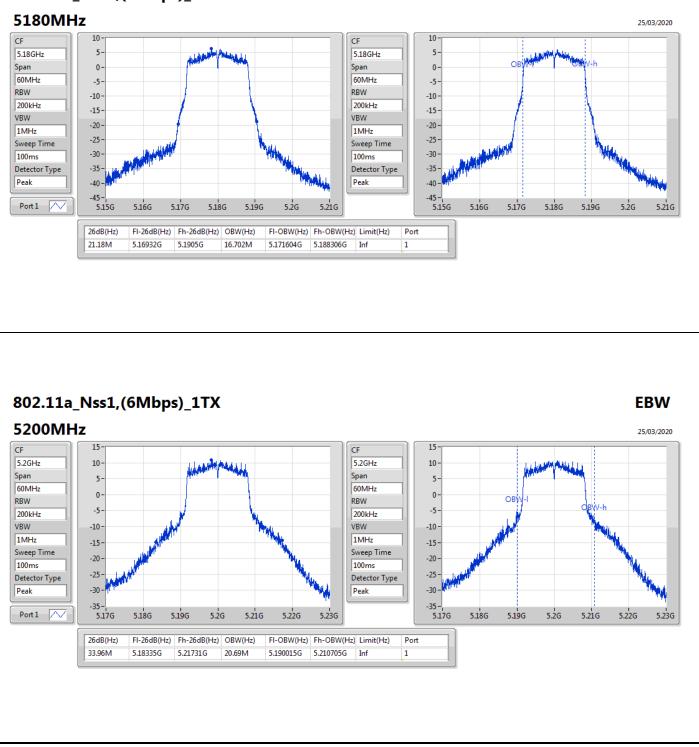
Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
5690MHz Straddle 5.47-5.725GHz	Pass	Inf	117.955M	73.123M
5690MHz Straddle 5.725-5.85GHz	Pass	500k	2.685M	27.301M
5775MHz	Pass	500k	75.24M	77.121M

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;

EBW

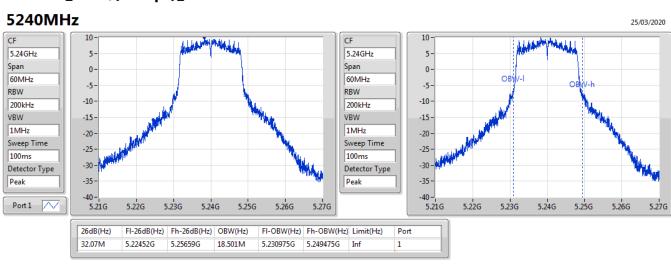


802.11a_Nss1,(6Mbps)_1TX

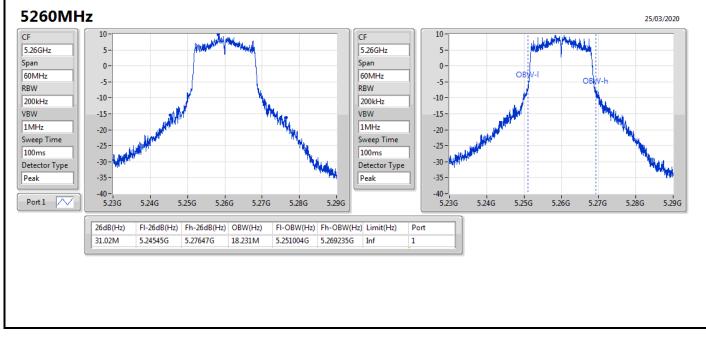




802.11a_Nss1,(6Mbps)_1TX

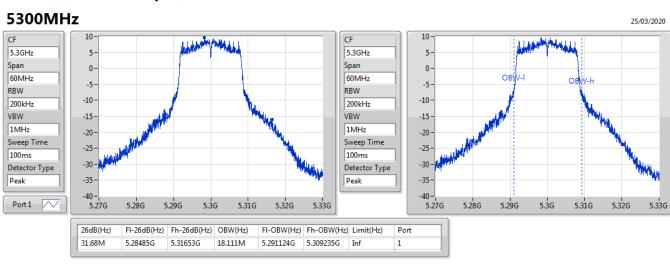


802.11a_Nss1,(6Mbps)_1TX

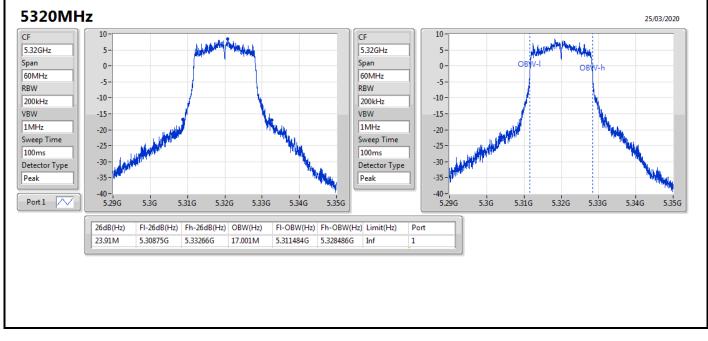




802.11a_Nss1,(6Mbps)_1TX



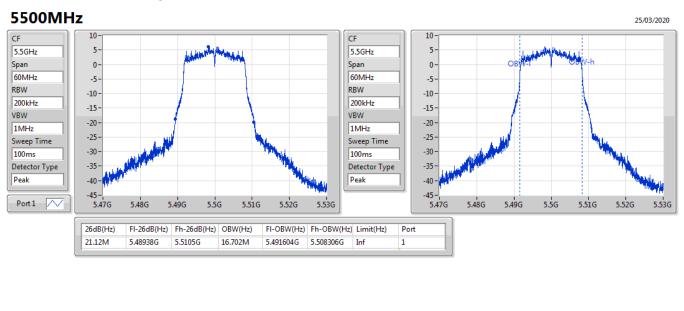
802.11a_Nss1,(6Mbps)_1TX



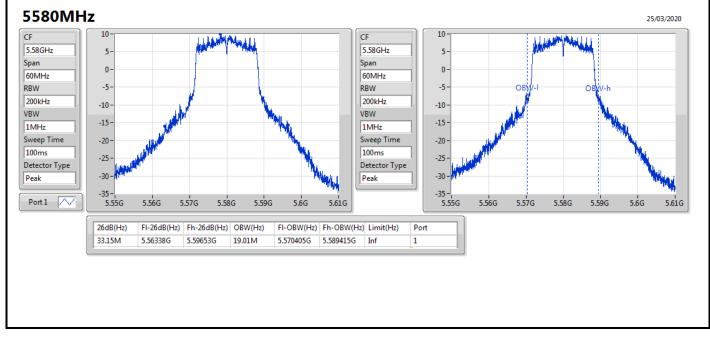


EBW

802.11a_Nss1,(6Mbps)_1TX



802.11a_Nss1,(6Mbps)_1TX





802.11a_Nss1,(6Mbps)_1TX

-5-

-10-

-15-

-20

-25

-30

5.715G

6dB(Hz)

15.42M

5.73G

5.73708G

5.74G

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

5.7525G

5.75G

30.555M

5.76G

VBW

300kHz

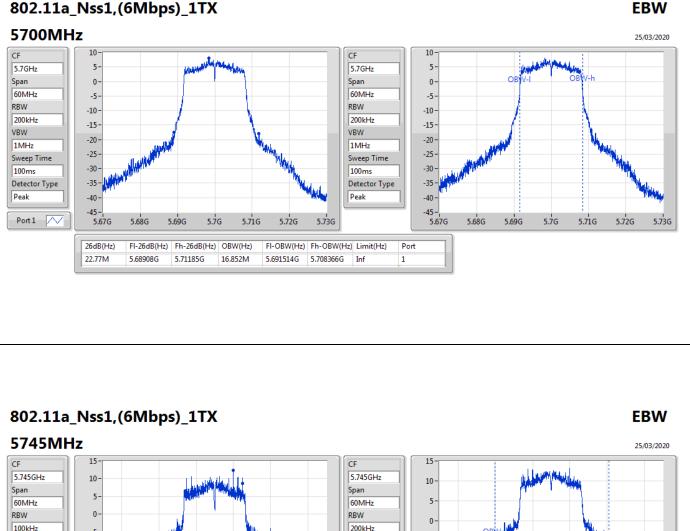
100ms

Peak

Sweep Time

Detector Type

Port1 ///



VBW

1MHz

100ms

Peak

5.775G

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

5.729888G 5.760442G 500k

Sweep Time

Detector Type

-5

-10-

-15-

-20

-25

Port

1

5.715G

5.73G

5.74G

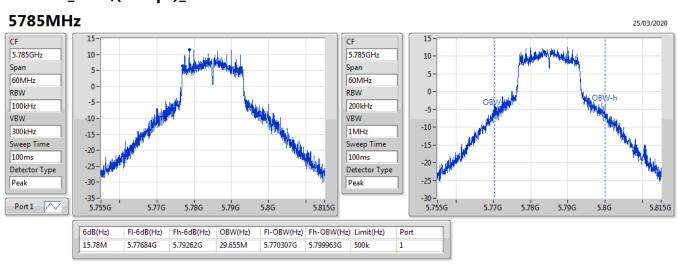
5.75G

5.76G

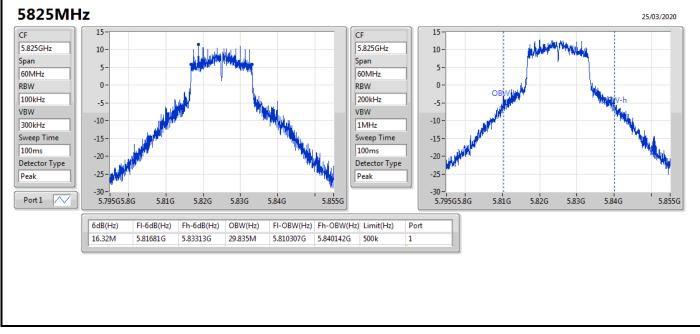
5.775G



802.11a_Nss1,(6Mbps)_1TX



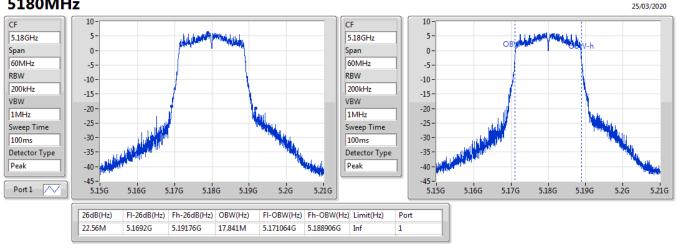
802.11a_Nss1,(6Mbps)_1TX



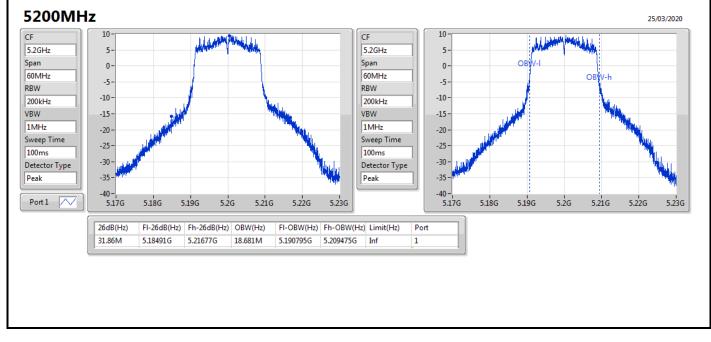




5180MHz



802.11ac VHT20_Nss1,(MCS0)_1TX

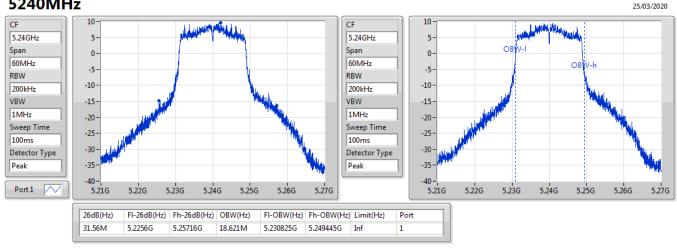




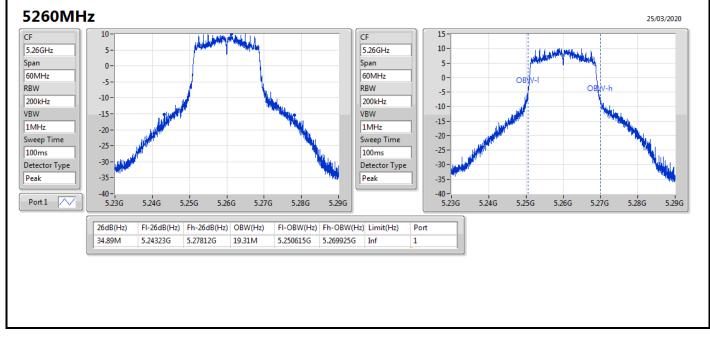
802.11ac VHT20_Nss1,(MCS0)_1TX

EBW

5240MHz



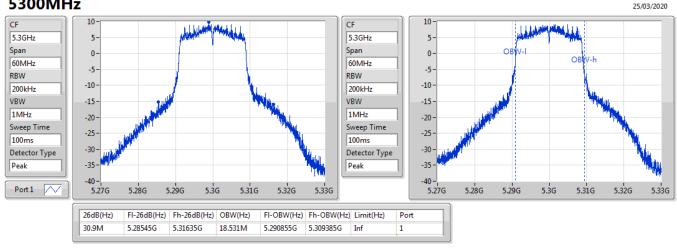
802.11ac VHT20_Nss1,(MCS0)_1TX



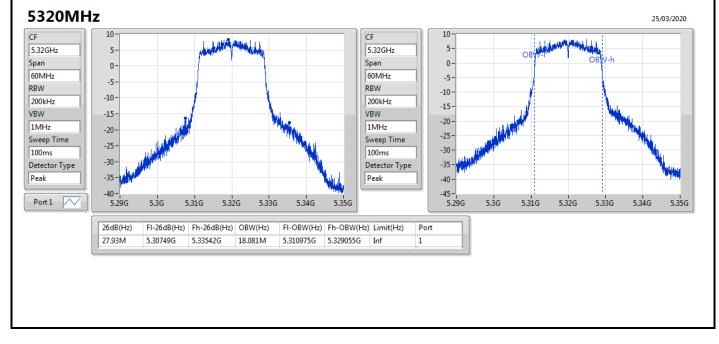


EBW

5300MHz



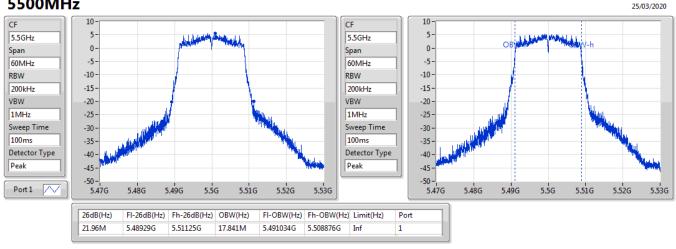
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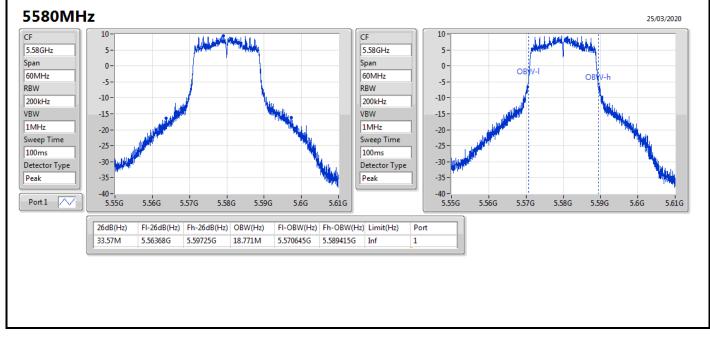




5500MHz



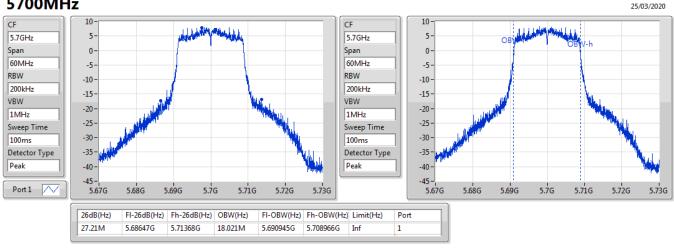
802.11ac VHT20_Nss1,(MCS0)_1TX



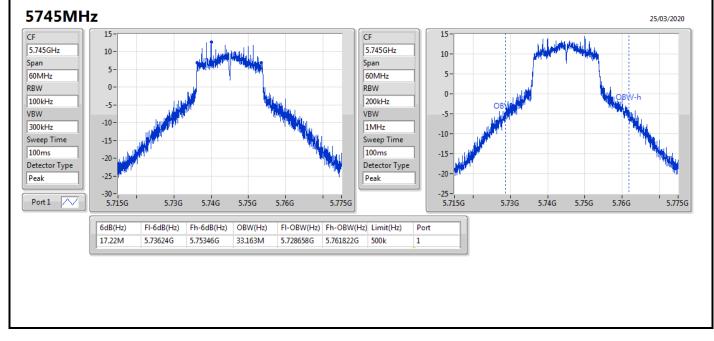


EBW





802.11ac VHT20_Nss1,(MCS0)_1TX

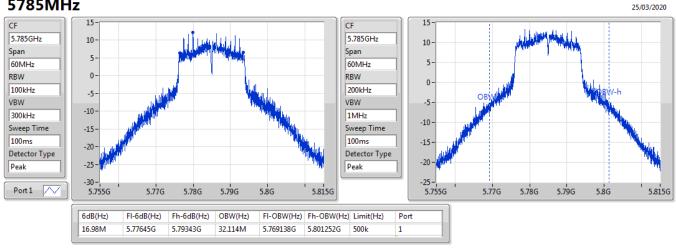




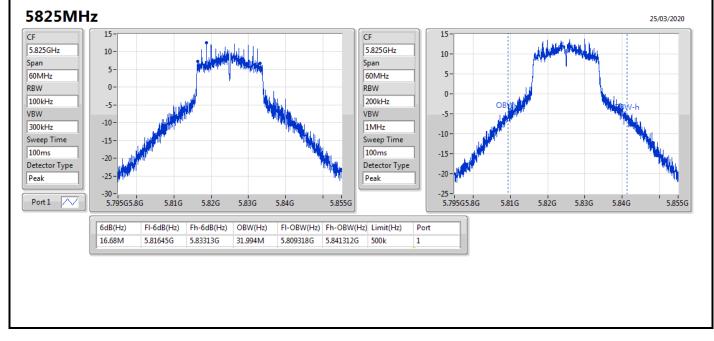
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EBW



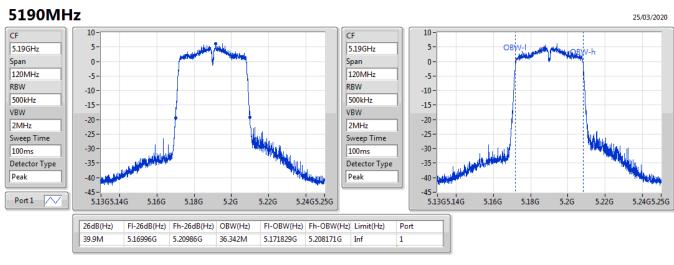


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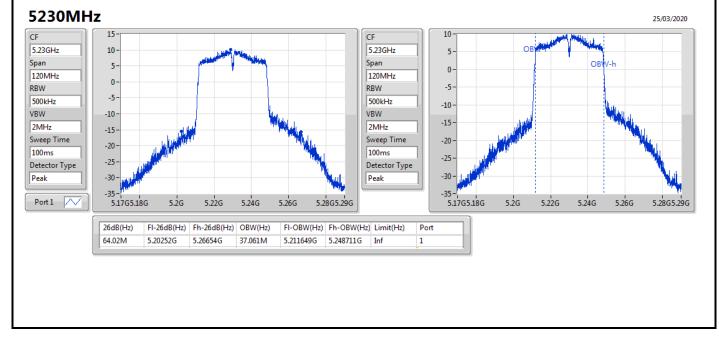


802.11ac VHT40_Nss1,(MCS0)_1TX



802.11ac VHT40_Nss1,(MCS0)_1TX

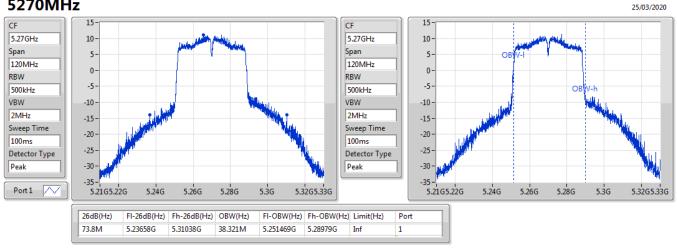




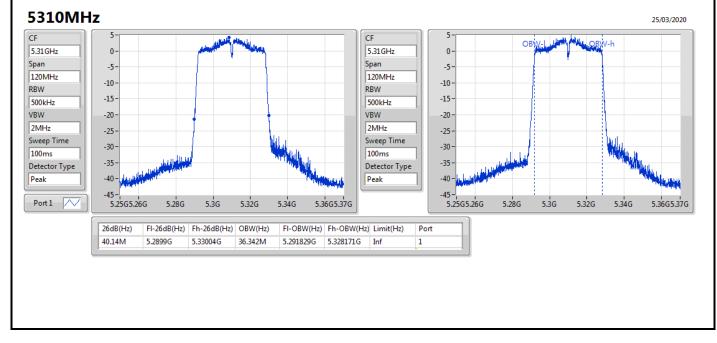


EBW

5270MHz

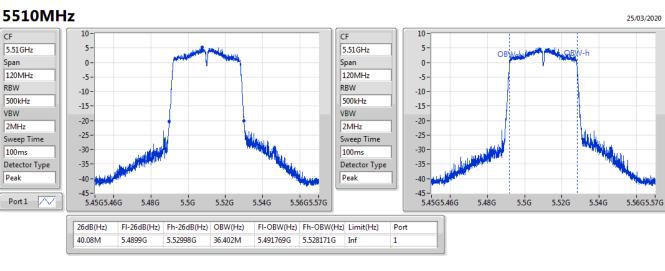


802.11ac VHT40_Nss1,(MCS0)_1TX



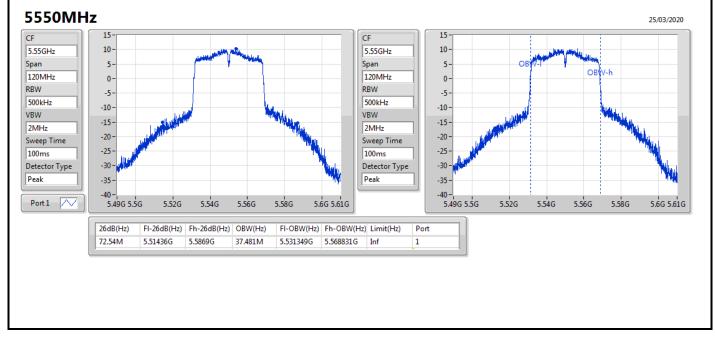


802.11ac VHT40_Nss1,(MCS0)_1TX



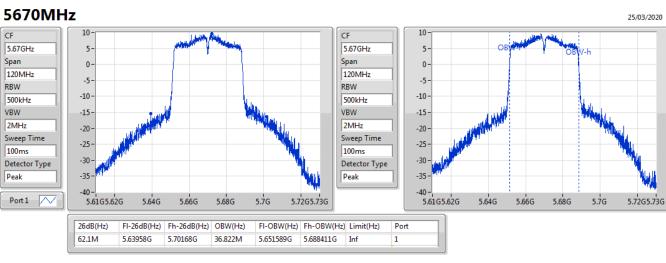
802.11ac VHT40_Nss1,(MCS0)_1TX





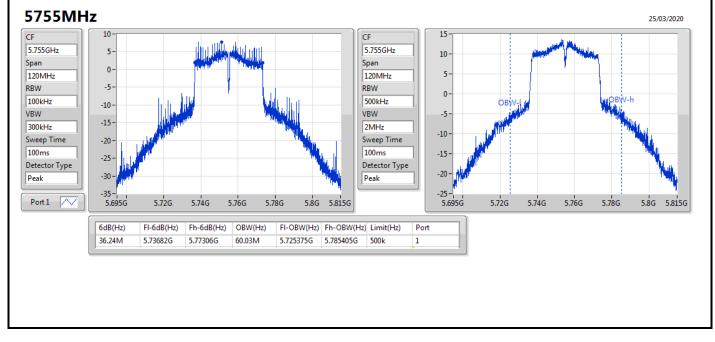


802.11ac VHT40_Nss1,(MCS0)_1TX



802.11ac VHT40_Nss1,(MCS0)_1TX



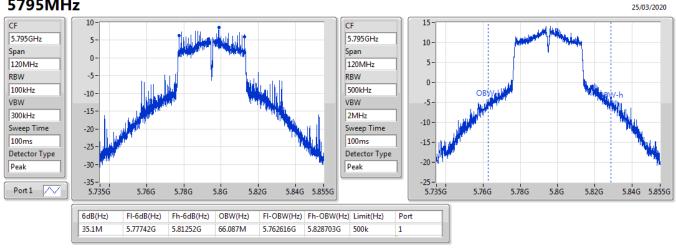




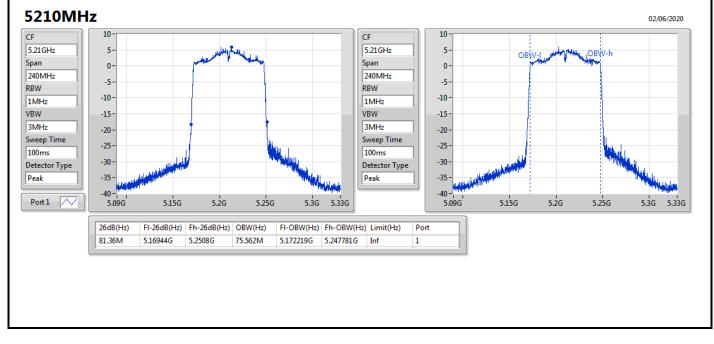
802.11ac VHT40_Nss1,(MCS0)_1TX

EBW

5795MHz



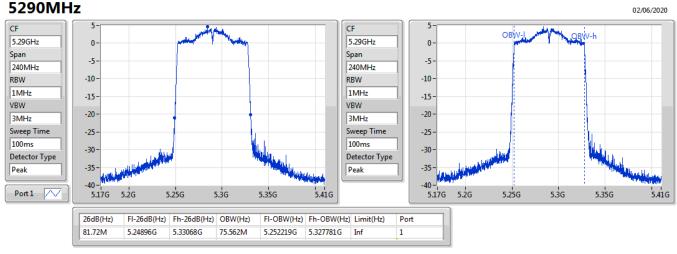
802.11ac VHT80_Nss1,(MCS0)_1TX





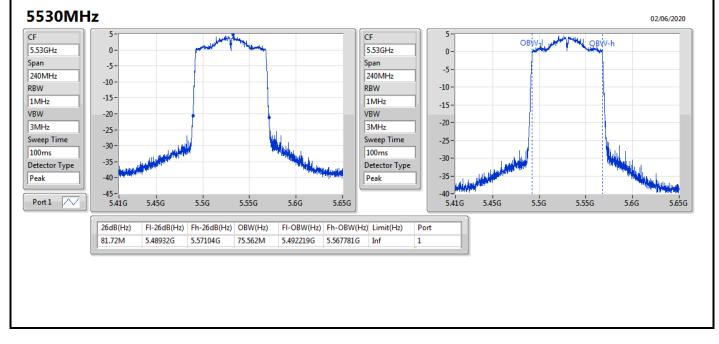
EBW





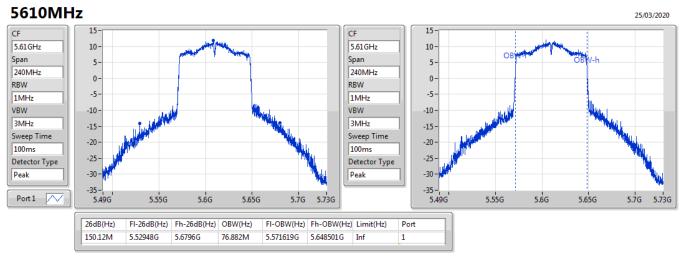
802.11ac VHT80_Nss1,(MCS0)_1TX







EBW



802.11ac VHT80_Nss1,(MCS0)_1TX

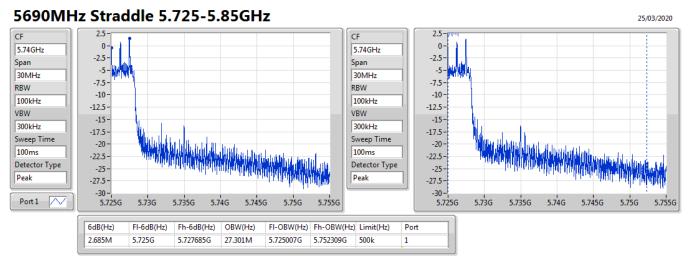
EBW

5690MHz Straddle 5.47-5.725GHz 25/03/2020 15 15 CF CF OB\ 5.6475GHz 10-5.6475GHz 10-Span Span 5-OB 5-155MHz 155MHz 0-0-RBW RBW -5--5-1MHz 1MH₇ VBW -10 -VBW -10 -MAN WHITE 3MHz 3MHz -15 --15-Sweep Time Sweep Time -20 --20-100ms 100ms -25 -25 Detector Type Detector Type -30· -30 Peak Peak -35 -35 5.6G Port1 / 5.62G 5.64G 5.66G 5.68G 5.7G 5.6G 5.62G 5.64G 5.66G 5.68G 5.7G 5.725G 5.57G 5.725G 5.57G 26dB(Hz) FI-26dB(Hz) Fh-26dB(Hz) OBW(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) Port 117.955M 5.607045G 5.725G 73.123M 5.651373G 5.724497G Inf 1

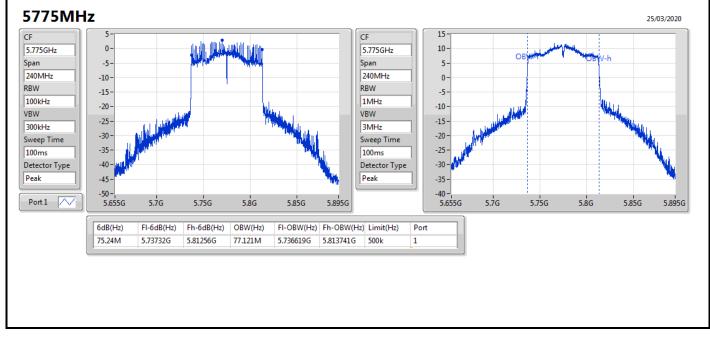


EBW

802.11ac VHT80_Nss1,(MCS0)_1TX



802.11ac VHT80_Nss1,(MCS0)_1TX





Summary

Mode	Total Power	Total Power		
	(dBm)	(W)		
5.15-5.25GHz	-	-		
802.11a_Nss1,(6Mbps)_1TX	20.19	0.10447		
802.11ac VHT20_Nss1,(MCS0)_1TX	19.10	0.08128		
802.11ac VHT40_Nss1,(MCS0)_1TX	18.68	0.07379		
802.11ac VHT80_Nss1,(MCS0)_1TX	13.37	0.02173		
5.25-5.35GHz	-	-		
802.11a_Nss1,(6Mbps)_1TX	19.01	0.07962		
802.11ac VHT20_Nss1,(MCS0)_1TX	19.55	0.09016		
802.11ac VHT40_Nss1,(MCS0)_1TX	19.03	0.07998		
802.11ac VHT80_Nss1,(MCS0)_1TX	12.25	0.01679		
5.47-5.725GHz	-	-		
802.11a_Nss1,(6Mbps)_1TX	19.22	0.08356		
802.11ac VHT20_Nss1,(MCS0)_1TX	18.99	0.07925		
802.11ac VHT40_Nss1,(MCS0)_1TX	18.54	0.07145		
802.11ac VHT80_Nss1,(MCS0)_1TX	19.24	0.08395		
5.725-5.85GHz	-	-		
802.11a_Nss1,(6Mbps)_1TX	22.15	0.16406		
802.11ac VHT20_Nss1,(MCS0)_1TX	22.73	0.18750		
802.11ac VHT40_Nss1,(MCS0)_1TX	21.73	0.14894		
802.11ac VHT80_Nss1,(MCS0)_1TX	18.71	0.07430		



Result

Mode	Result	DG	Port 1	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-	-
5180MHz	Pass	5.16	15.55	15.55	23.98
5200MHz	Pass	5.16	20.19	20.19	23.98
5240MHz	Pass	5.16	19.29	19.29	23.98
5260MHz	Pass	5.16	19.01	19.01	23.98
5300MHz	Pass	5.16	18.83	18.83	23.98
5320MHz	Pass	5.16	17.32	17.32	23.98
5500MHz	Pass	5.16	15.40	15.40	23.98
5580MHz	Pass	5.16	19.22	19.22	23.98
5700MHz	Pass	5.16	17.27	17.27	23.98
5745MHz	Pass	5.16	22.15	22.15	30.00
5785MHz	Pass	5.16	21.70	21.70	30.00
5825MHz	Pass	5.16	21.81	21.81	30.00
802.11ac VHT20_Nss1,(MCS0)_1TX	-	-	-	-	-
5180MHz	Pass	5.16	16.01	16.01	23.98
5200MHz	Pass	5.16	19.10	19.10	23.98
5240MHz	Pass	5.16	18.99	18.99	23.98
5260MHz	Pass	5.16	19.55	19.55	23.98
5300MHz	Pass	5.16	18.55	18.55	23.98
5320MHz	Pass	5.16	17.85	17.85	23.98
5500MHz	Pass	5.16	15.02	15.02	23.98
5580MHz	Pass	5.16	18.99	18.99	23.98
5700MHz	Pass	5.16	17.75	17.75	23.98
5745MHz	Pass	5.16	22.73	22.73	30.00
5785MHz	Pass	5.16	22.22	22.22	30.00
5825MHz	Pass	5.16	22.20	22.20	30.00
802.11ac VHT40_Nss1,(MCS0)_1TX	-	-	-	-	-
5190MHz	Pass	5.16	13.84	13.84	23.98
5230MHz	Pass	5.16	18.68	18.68	23.98
5270MHz	Pass	5.16	19.03	19.03	23.98
5310MHz	Pass	5.16	12.38	12.38	23.98
5510MHz	Pass	5.16	13.50	13.50	23.98
5550MHz	Pass	5.16	18.54	18.54	23.98
5670MHz	Pass	5.16	17.72	17.72	23.98
5755MHz	Pass	5.16	21.52	21.52	30.00
5795MHz	Pass	5.16	21.73	21.73	30.00
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-	-
5210MHz	Pass	5.16	13.37	13.37	23.98
5290MHz	Pass	5.16	12.25	12.25	23.98
5530MHz	Pass	5.16	12.60	12.60	23.98
5610MHz	Pass	5.16	18.68	18.68	23.98

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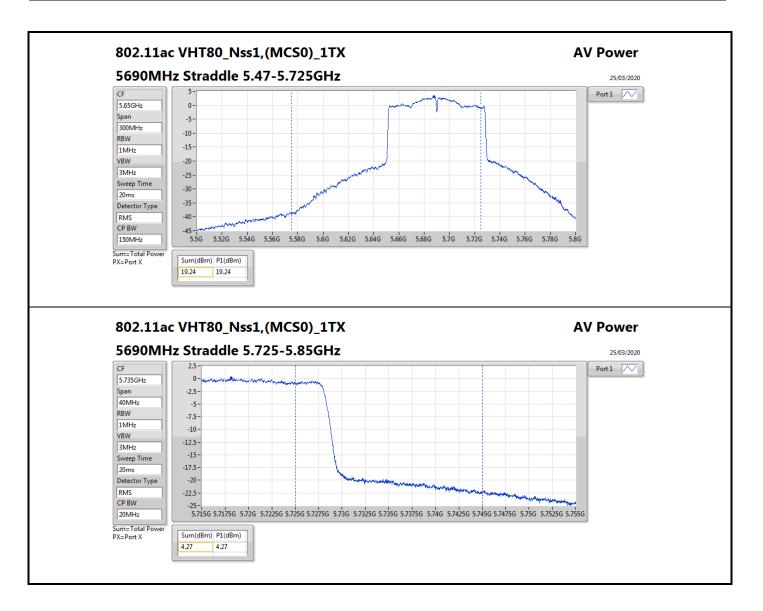
Average Power

Appendix C

Mode	Result	DG	Port 1	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)
5690MHz Straddle 5.47-5.725GHz	Pass	5.16	19.24	19.24	23.98
5690MHz Straddle 5.725-5.85GHz	Pass	5.16	4.27	4.27	30.00
5775MHz	Pass	5.16	18.71	18.71	30.00

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







Summary

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	-
802.11a_Nss1,(6Mbps)_1TX	8.63
802.11ac VHT20_Nss1,(MCS0)_1TX	7.36
802.11ac VHT40_Nss1,(MCS0)_1TX	3.94
802.11ac VHT80_Nss1,(MCS0)_1TX	-4.65
5.25-5.35GHz	-
802.11a_Nss1,(6Mbps)_1TX	7.50
802.11ac VHT20_Nss1,(MCS0)_1TX	7.80
802.11ac VHT40_Nss1,(MCS0)_1TX	4.57
802.11ac VHT80_Nss1,(MCS0)_1TX	-5.66
5.47-5.725GHz	-
802.11a_Nss1,(6Mbps)_1TX	7.66
802.11ac VHT20_Nss1,(MCS0)_1TX	7.15
802.11ac VHT40_Nss1,(MCS0)_1TX	4.08
802.11ac VHT80_Nss1,(MCS0)_1TX	1.55
5.725-5.85GHz	-
802.11a_Nss1,(6Mbps)_1TX	9.01
802.11ac VHT20_Nss1,(MCS0)_1TX	9.74
802.11ac VHT40_Nss1,(MCS0)_1TX	5.68
802.11ac VHT80_Nss1,(MCS0)_1TX	-0.24

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



Result

Mode	Result	DG	Port 1	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBV
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-	-
5180MHz	Pass	5.16	3.99	3.99	11.00
5200MHz	Pass	5.16	8.63	8.63	11.00
5240MHz	Pass	5.16	7.74	7.74	11.00
5260MHz	Pass	5.16	7.50	7.50	11.00
5300MHz	Pass	5.16	7.30	7.30	11.00
5320MHz	Pass	5.16	6.02	6.02	11.00
5500MHz	Pass	5.16	3.88	3.88	11.00
5580MHz	Pass	5.16	7.66	7.66	11.00
5700MHz	Pass	5.16	5.55	5.55	11.00
5745MHz	Pass	5.16	9.01	9.01	30.00
5785MHz	Pass	5.16	8.63	8.63	30.00
5825MHz	Pass	5.16	8.71	8.71	30.00
802.11ac VHT20_Nss1,(MCS0)_1TX	-	-	-	-	-
5180MHz	Pass	5.16	4.09	4.09	11.00
5200MHz	Pass	5.16	7.36	7.36	11.00
5240MHz	Pass	5.16	7.15	7.15	11.00
5260MHz	Pass	5.16	7.80	7.80	11.00
5300MHz	Pass	5.16	7.08	7.08	11.00
5320MHz	Pass	5.16	6.10	6.10	11.00
5500MHz	Pass	5.16	3.31	3.31	11.00
5580MHz	Pass	5.16	7.15	7.15	11.00
5700MHz	Pass	5.16	6.05	6.05	11.00
5745MHz	Pass	5.16	9.74	9.74	30.00
5785MHz	Pass	5.16	9.02	9.02	30.00
5825MHz	Pass	5.16	9.19	9.19	30.00
802.11ac VHT40_Nss1,(MCS0)_1TX	-	-	-	-	-
5190MHz	Pass	5.16	-0.85	-0.85	11.00
5230MHz	Pass	5.16	3.94	3.94	11.00
5270MHz	Pass	5.16	4.57	4.57	11.00
5310MHz	Pass	5.16	-2.22	-2.22	11.00
5510MHz	Pass	5.16	-0.97	-0.97	11.00
5550MHz	Pass	5.16	4.08	4.08	11.00
5670MHz	Pass	5.16	3.18	3.18	11.00
5755MHz	Pass	5.16	5.21	5.21	30.00
5795MHz	Pass	5.16	5.68	5.68	30.00
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-	-
5210MHz	Pass	5.16	-4.65	-4.65	11.00
5290MHz	Pass	5.16	-5.66	-5.66	11.00
5530MHz	Pass	5.16	-5.30	-5.30	11.00
5610MHz	Pass	5.16	1.55	1.55	11.00

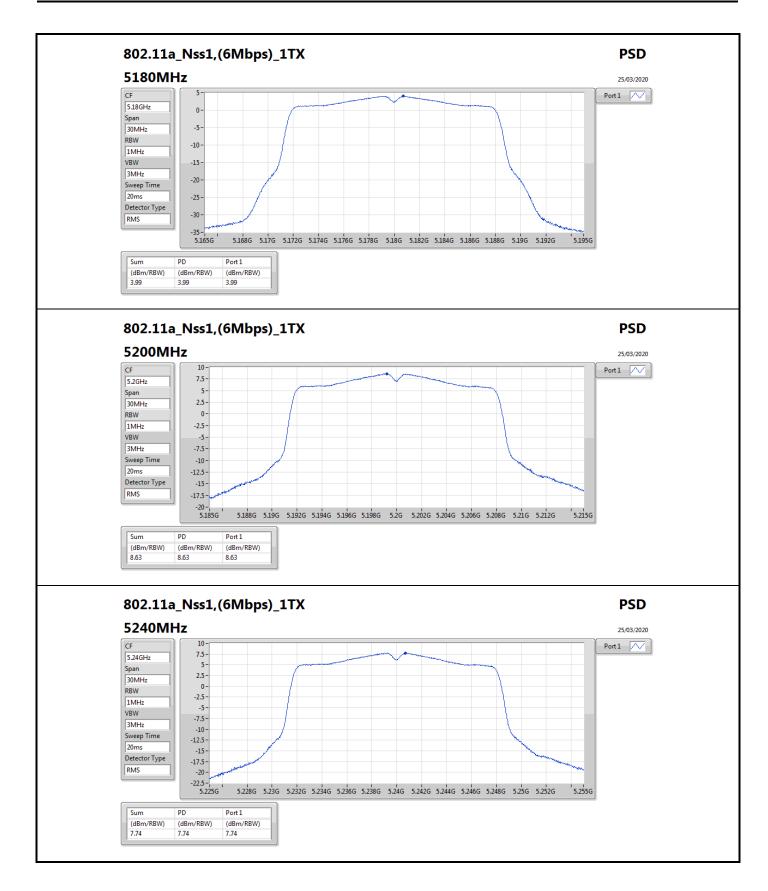
SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory.



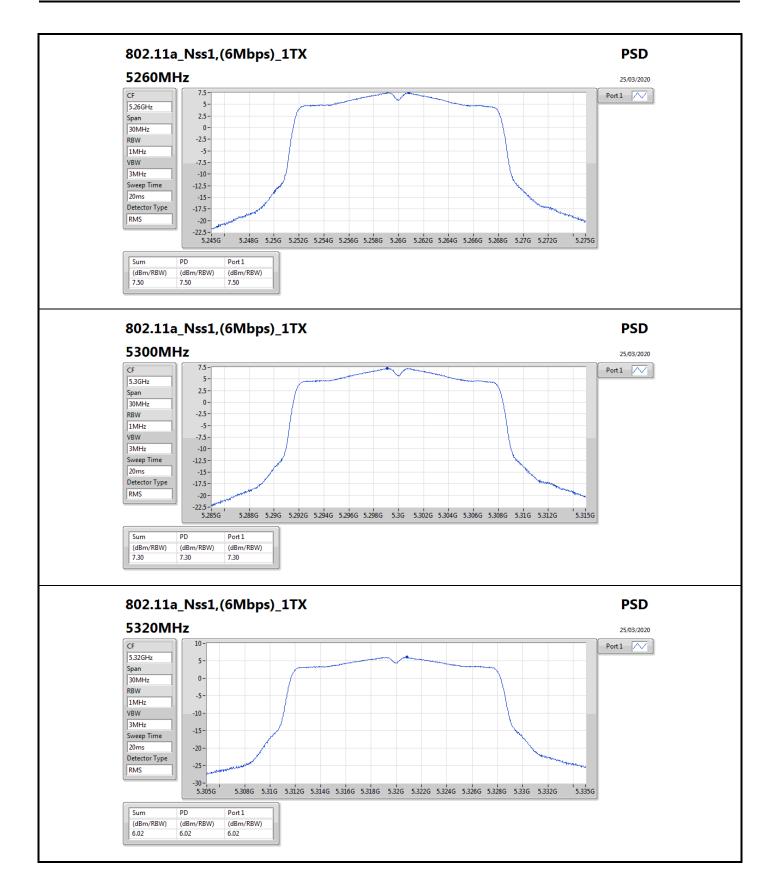
Mode	Result	DG	Port 1	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
5690MHz Straddle 5.47-5.725GHz	Pass	5.16	1.31	1.31	11.00
5690MHz Straddle 5.725-5.85GHz	Pass	5.16	-3.23	-3.23	30.00
5775MHz	Pass	5.16	-0.24	-0.24	30.00

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;

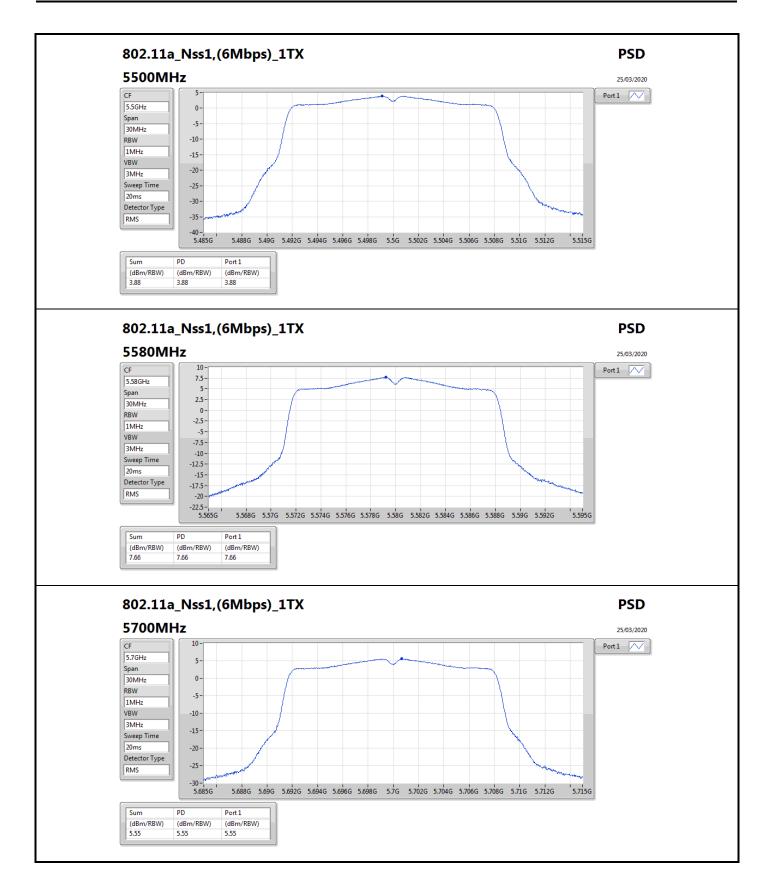




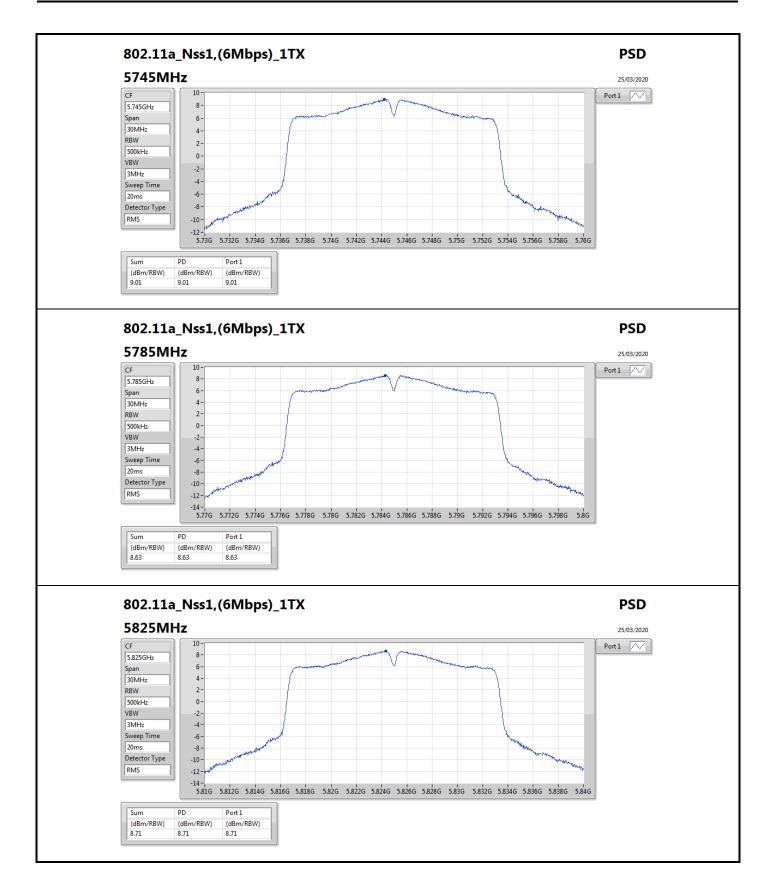




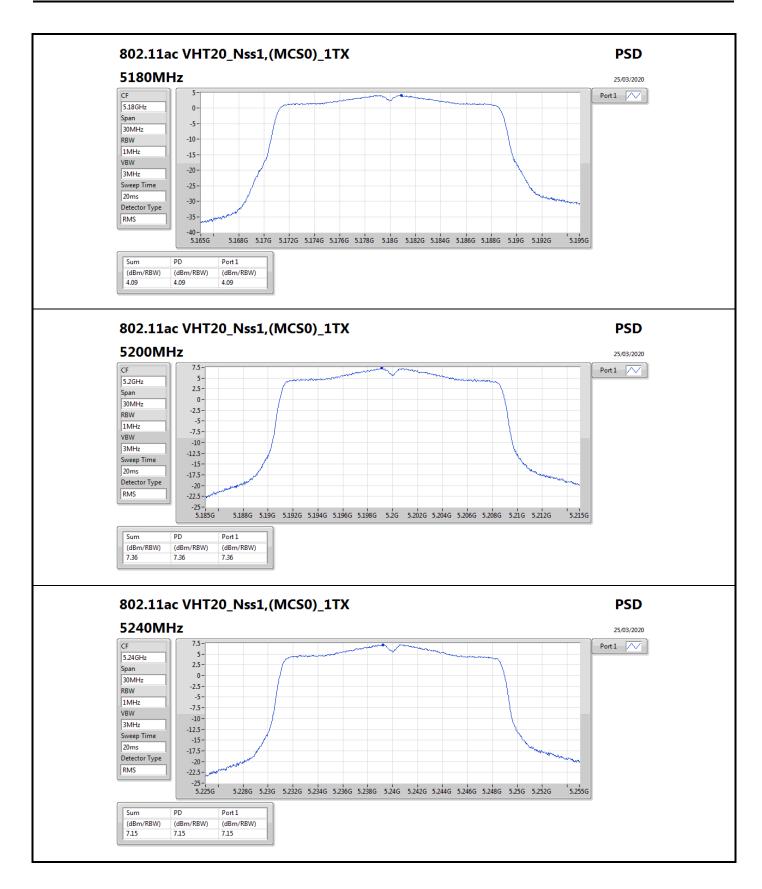




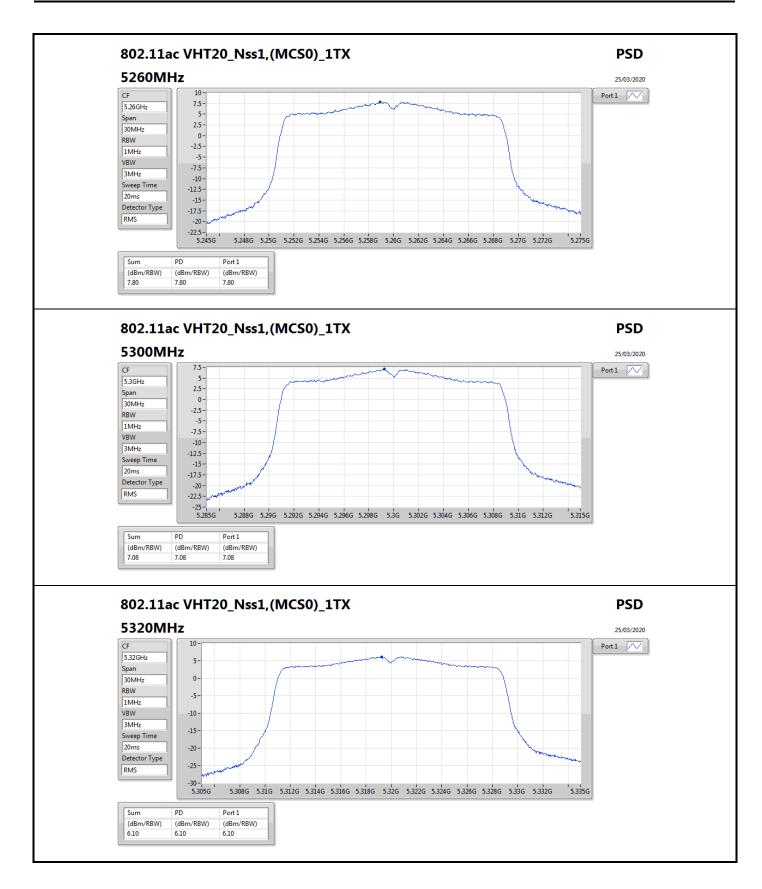




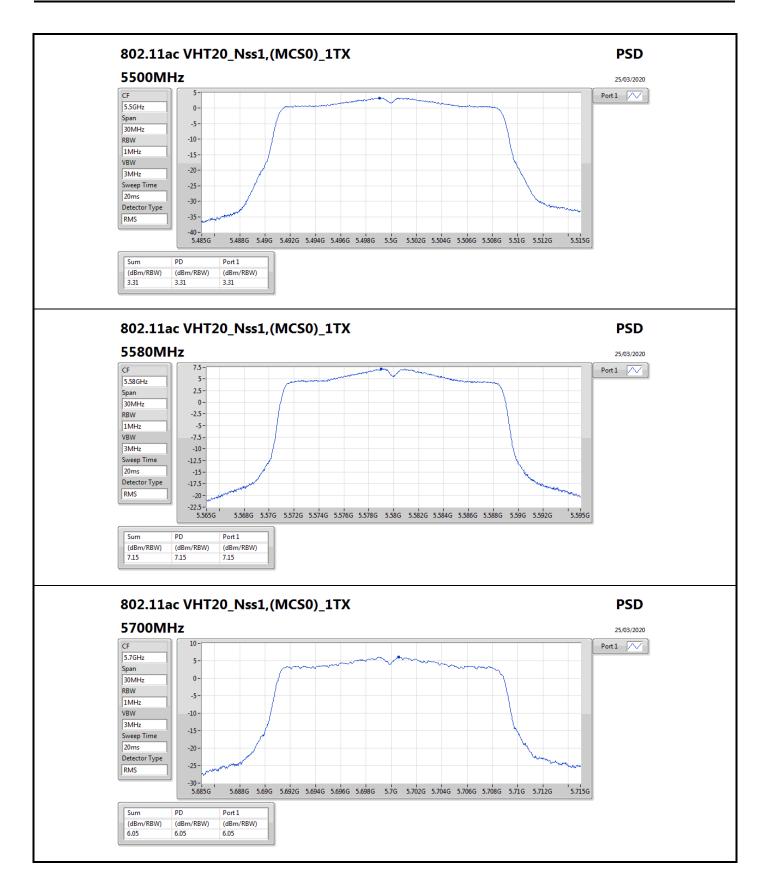




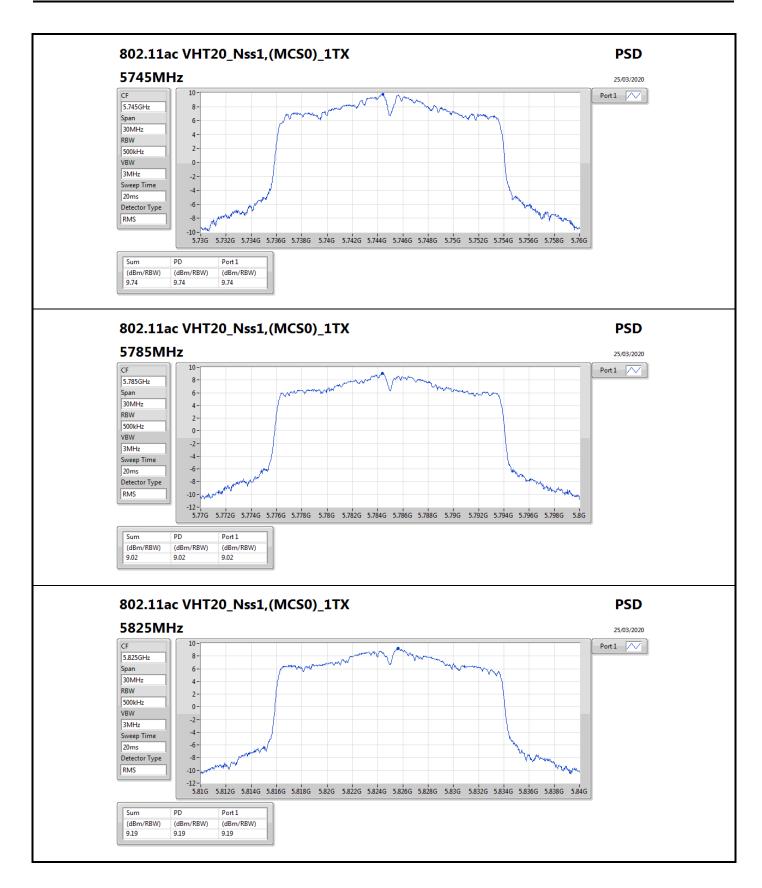




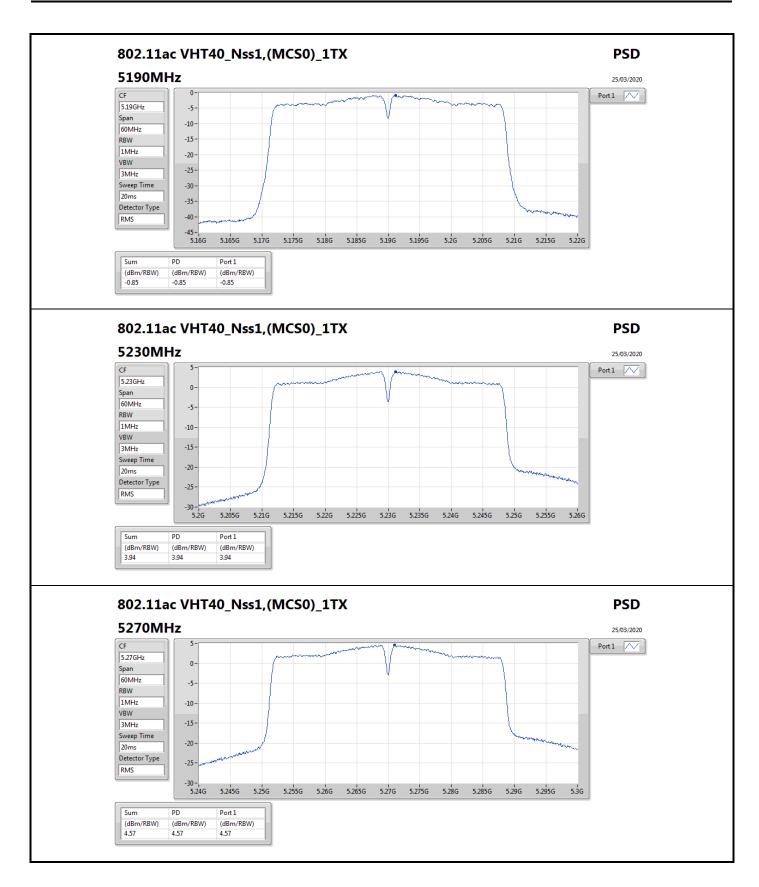




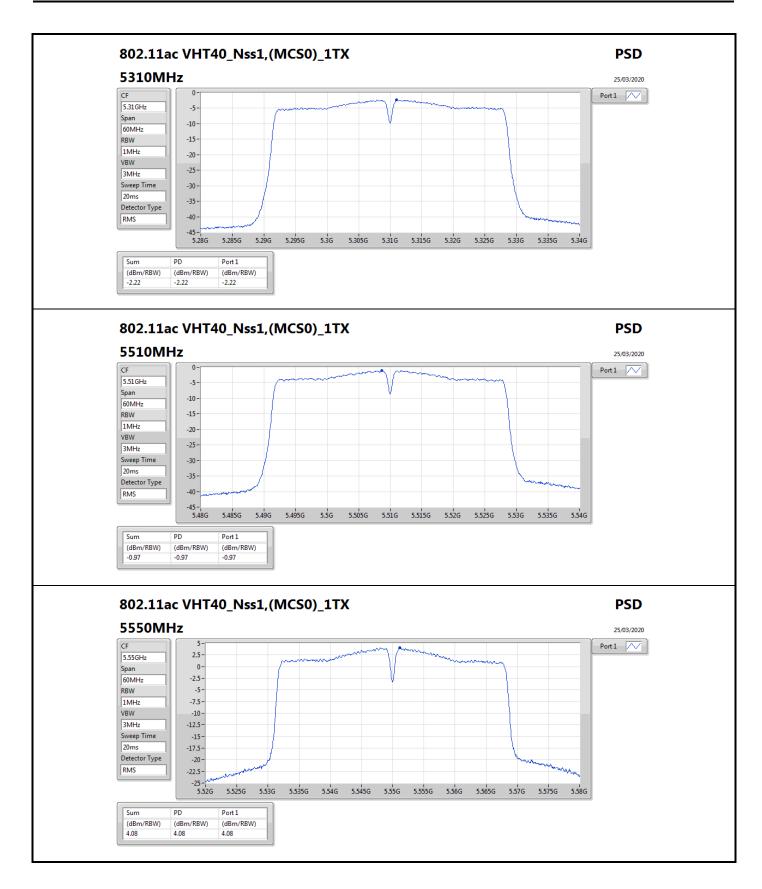




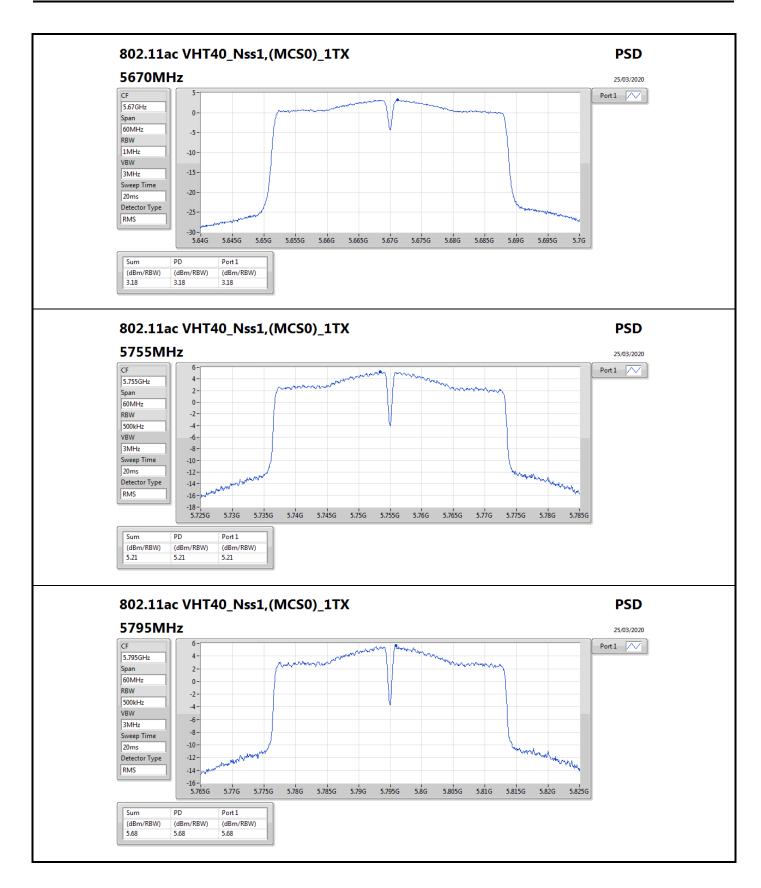




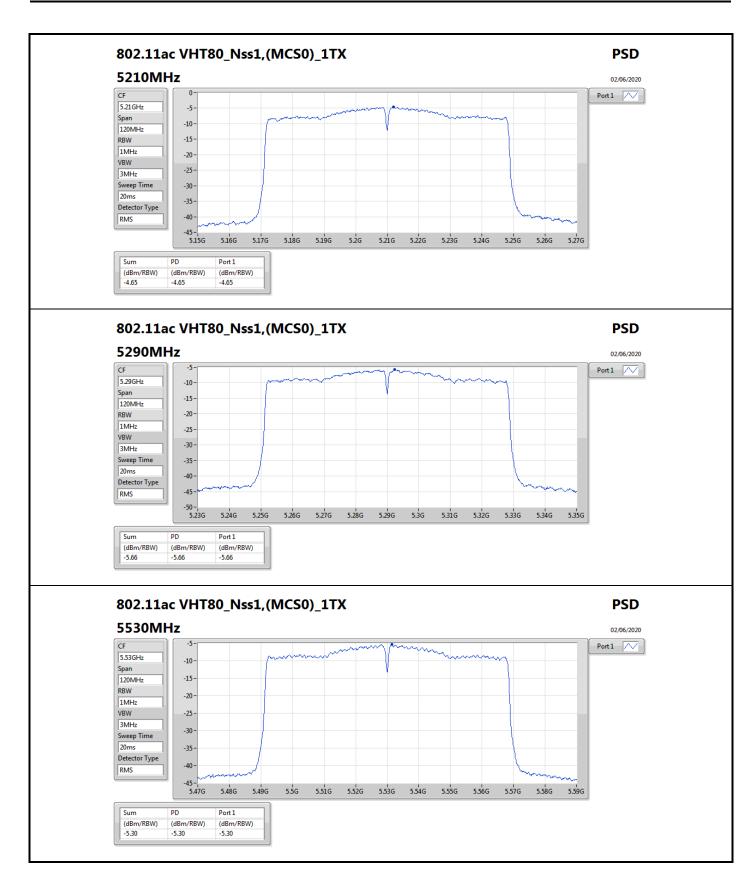




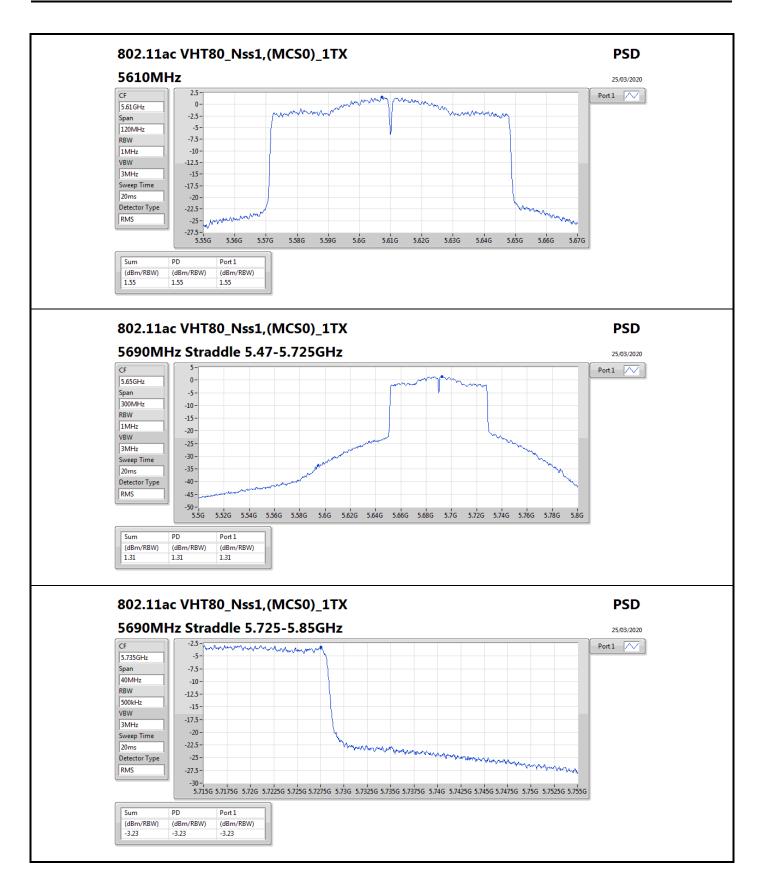




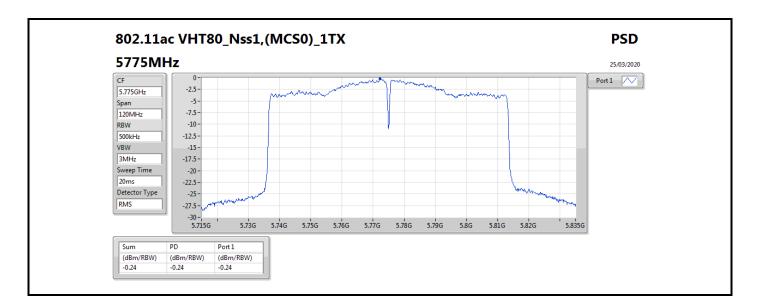




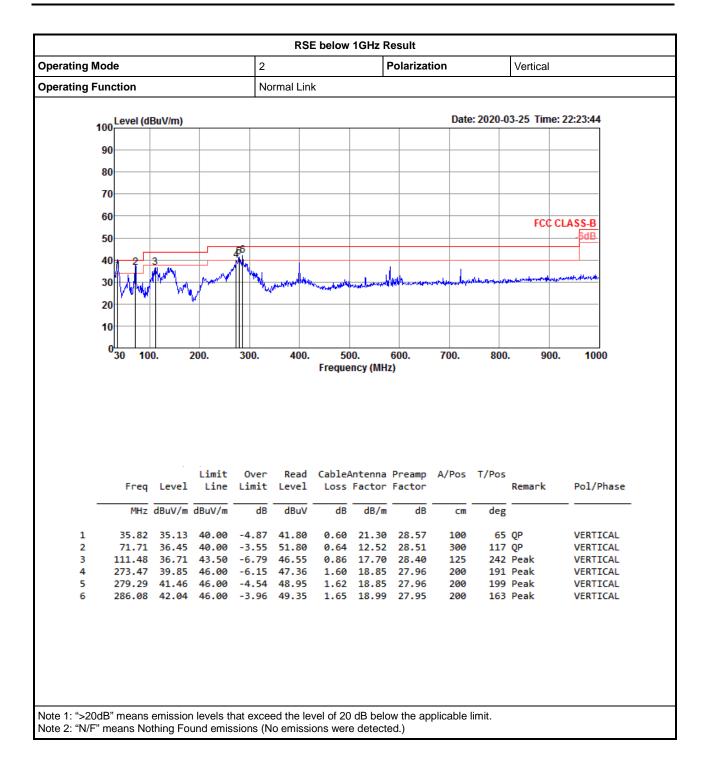




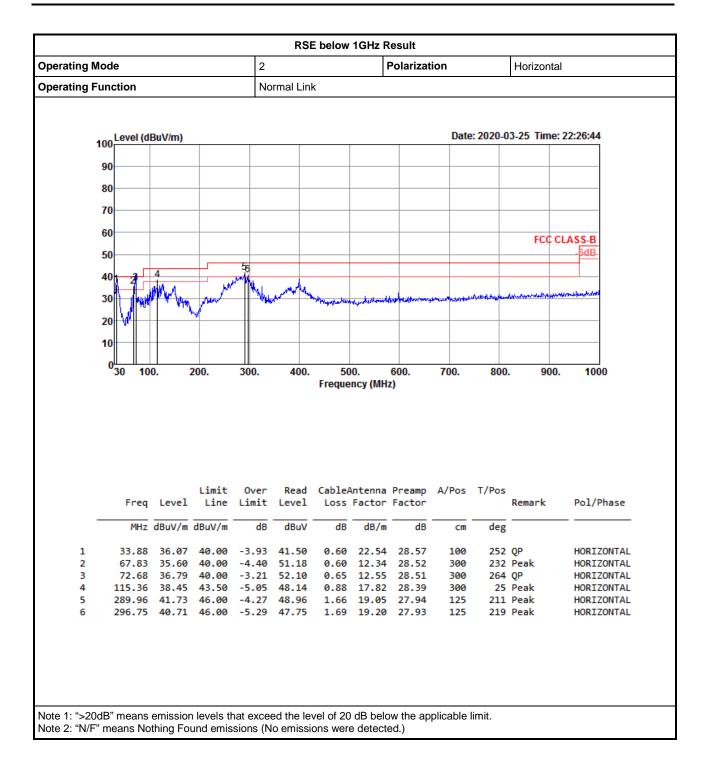












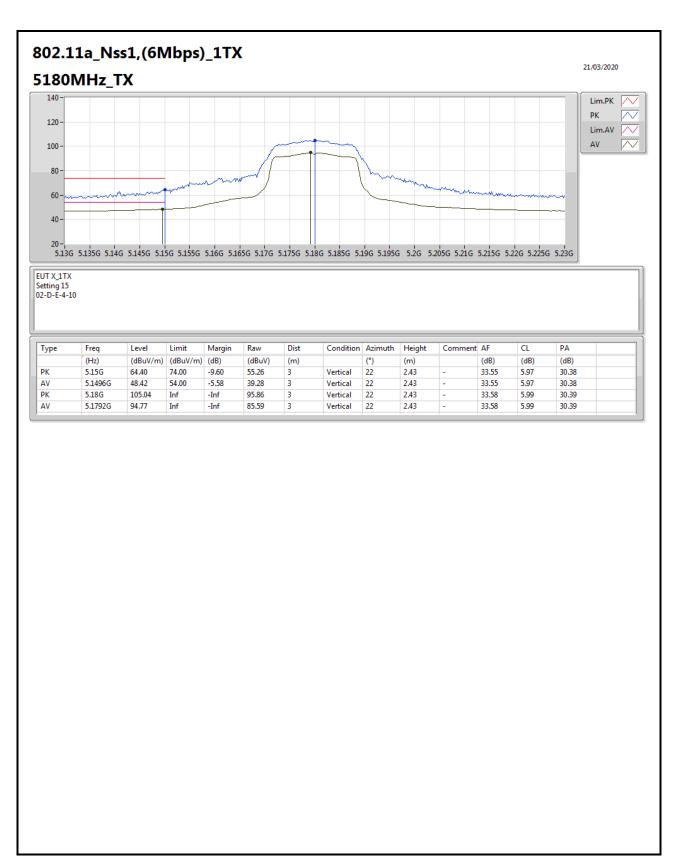


Appendix E.2

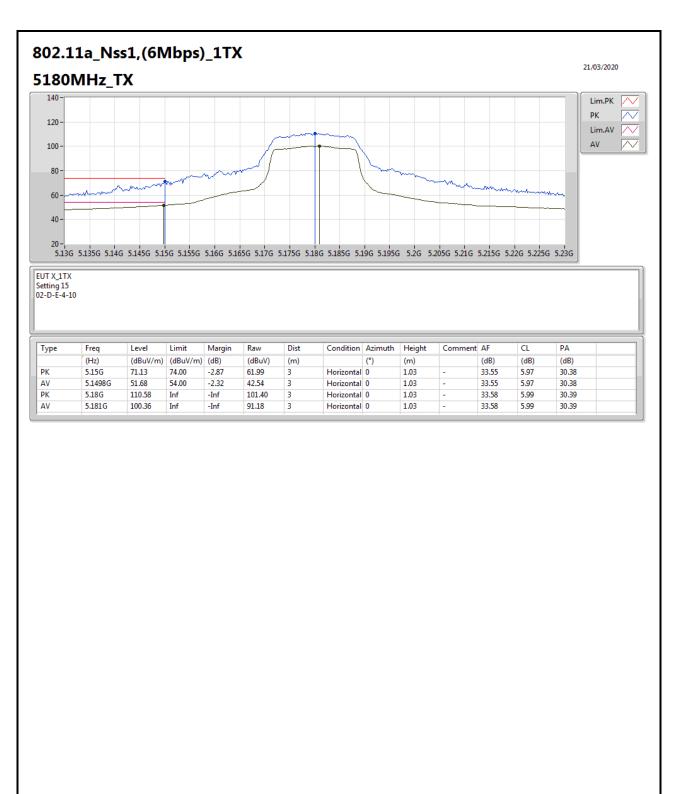
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
5.15-5.25GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT40_Nss1,(MCS0)_1TX	Pass	AV	5.1496G	52.94	54.00	-1.06	3	Horizontal	0	1.01	-

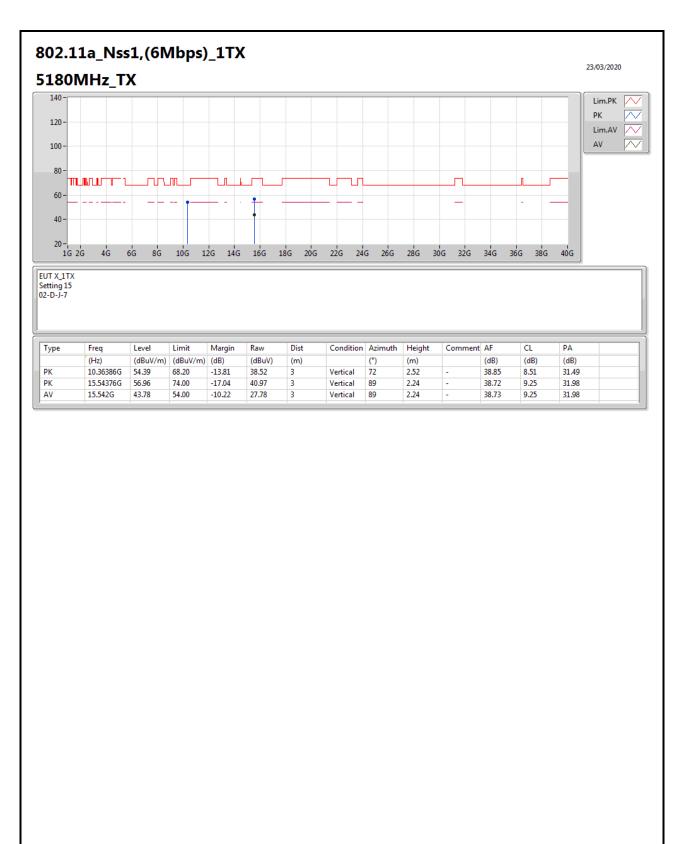




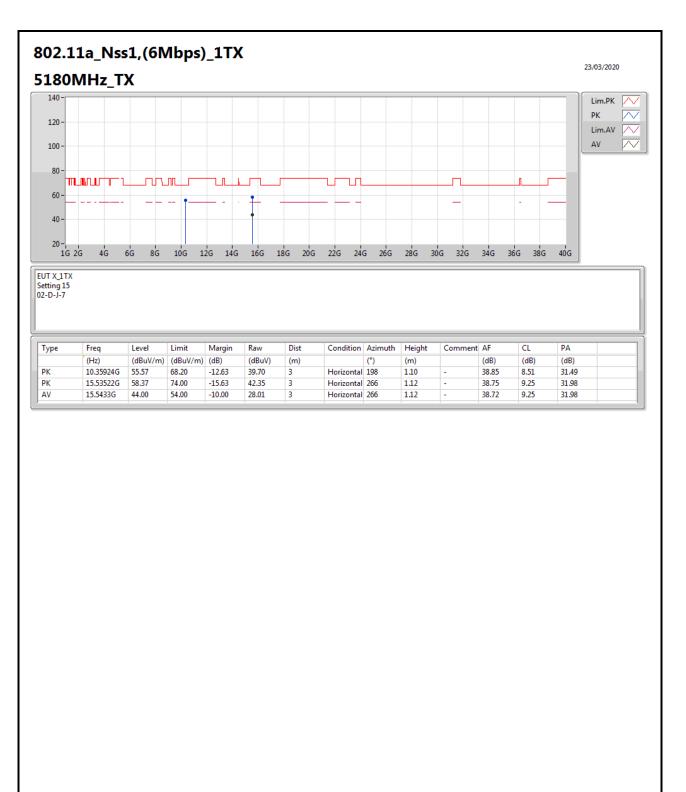




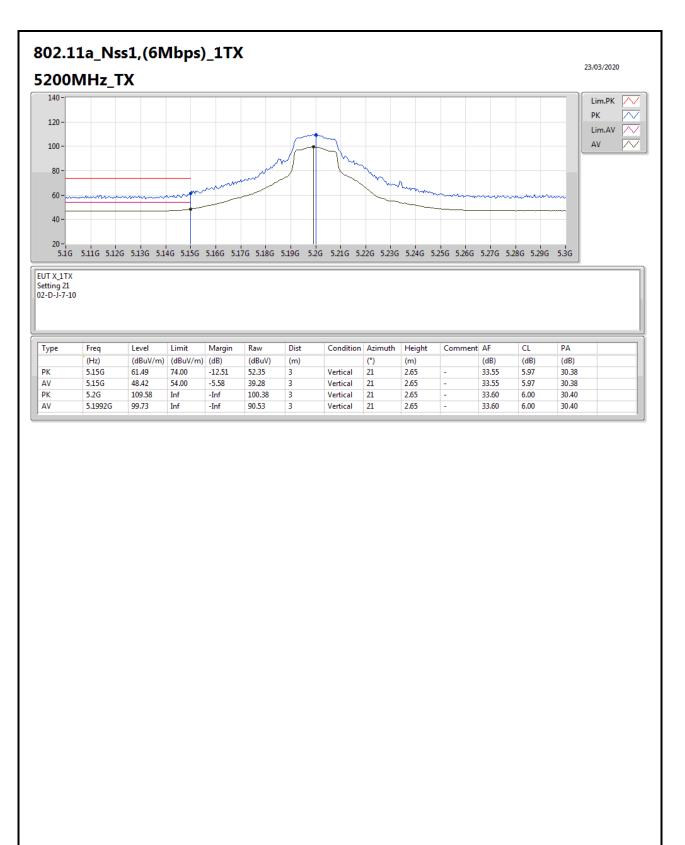




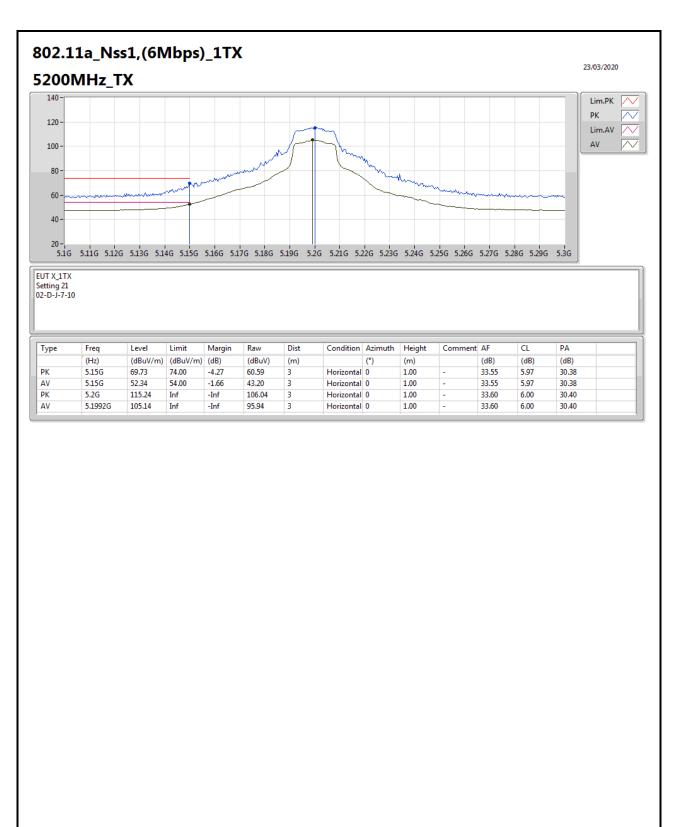




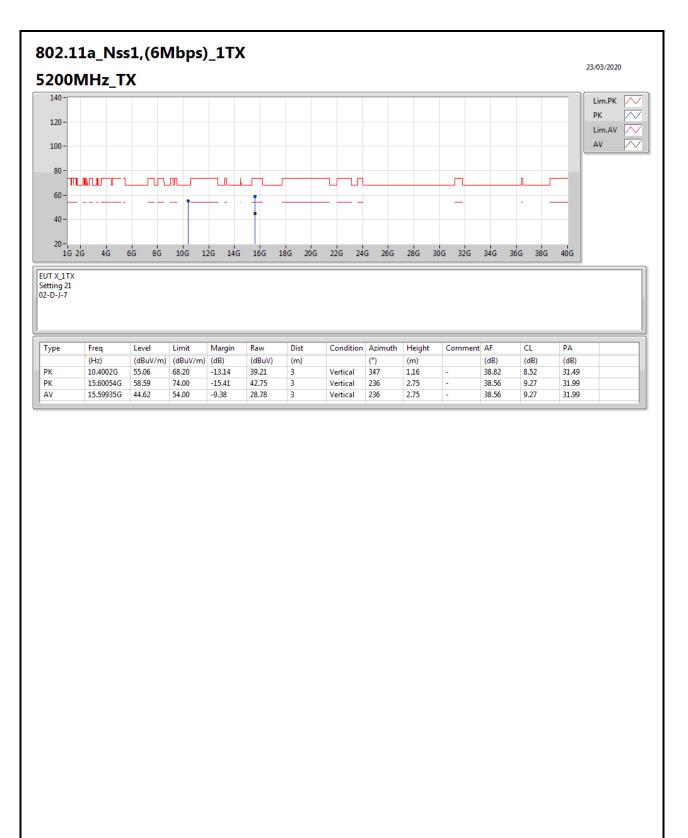




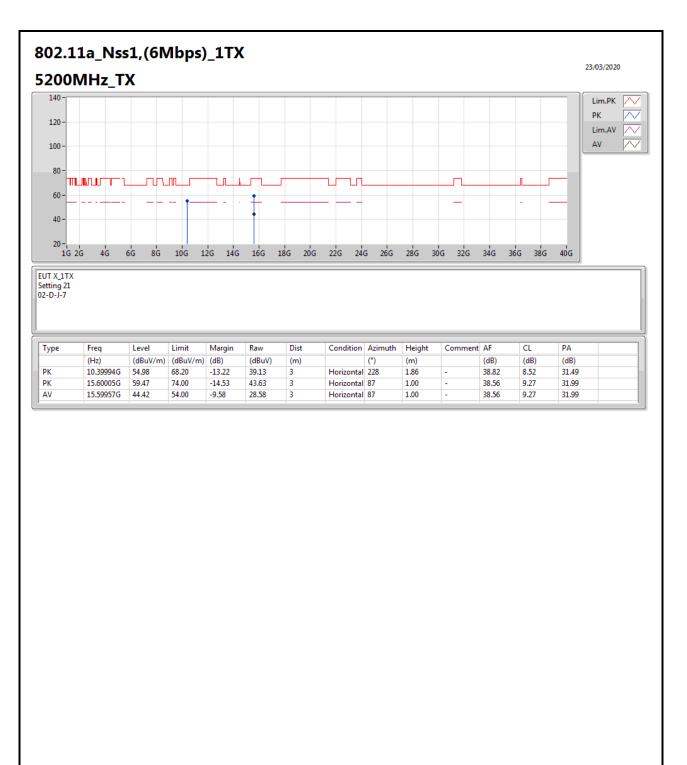




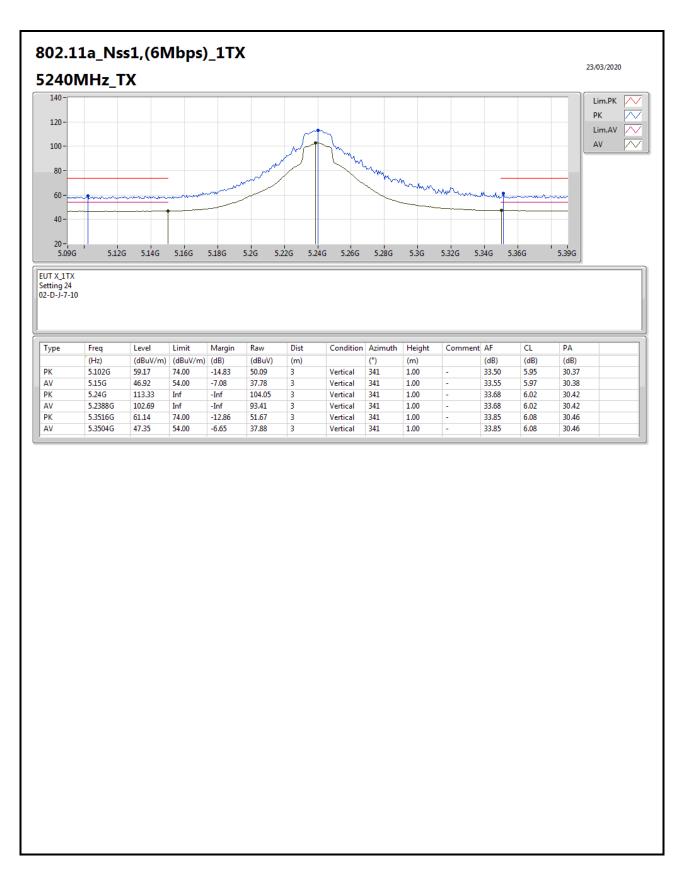




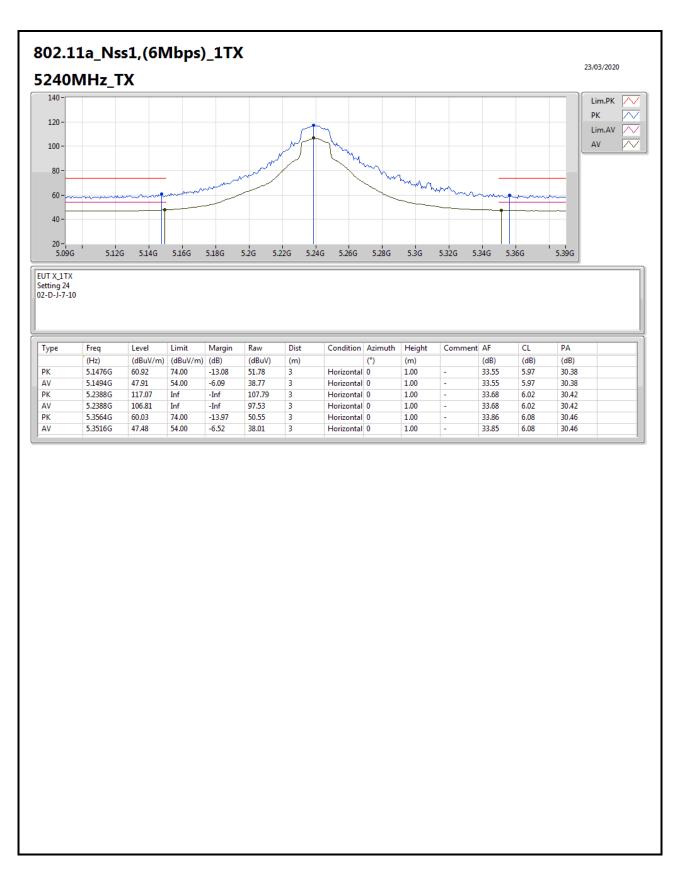




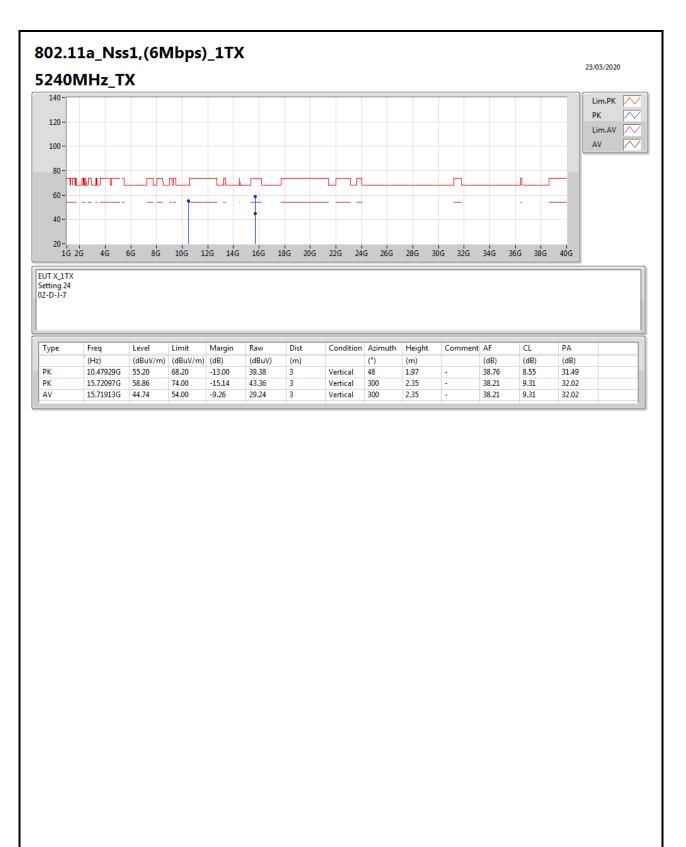




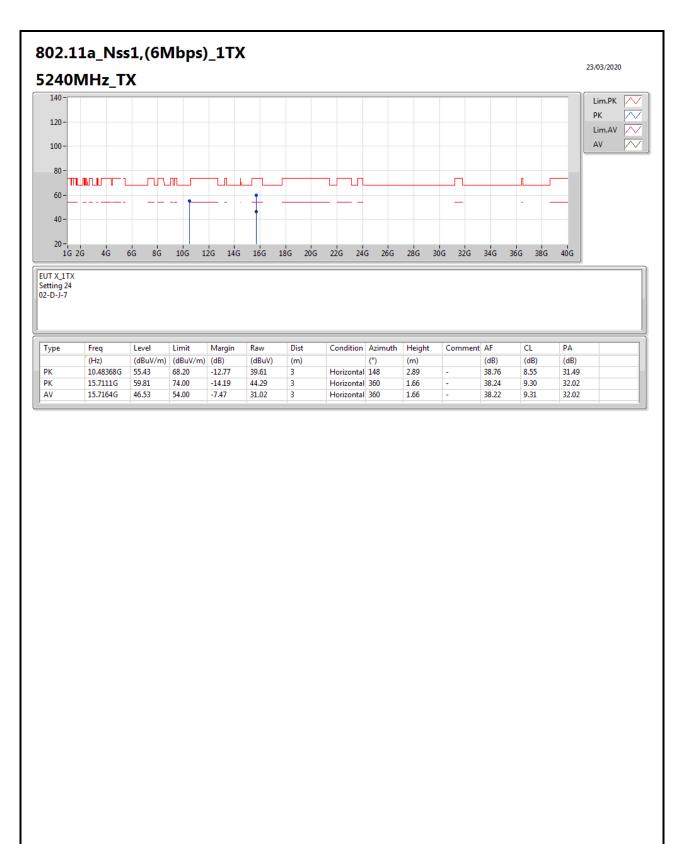




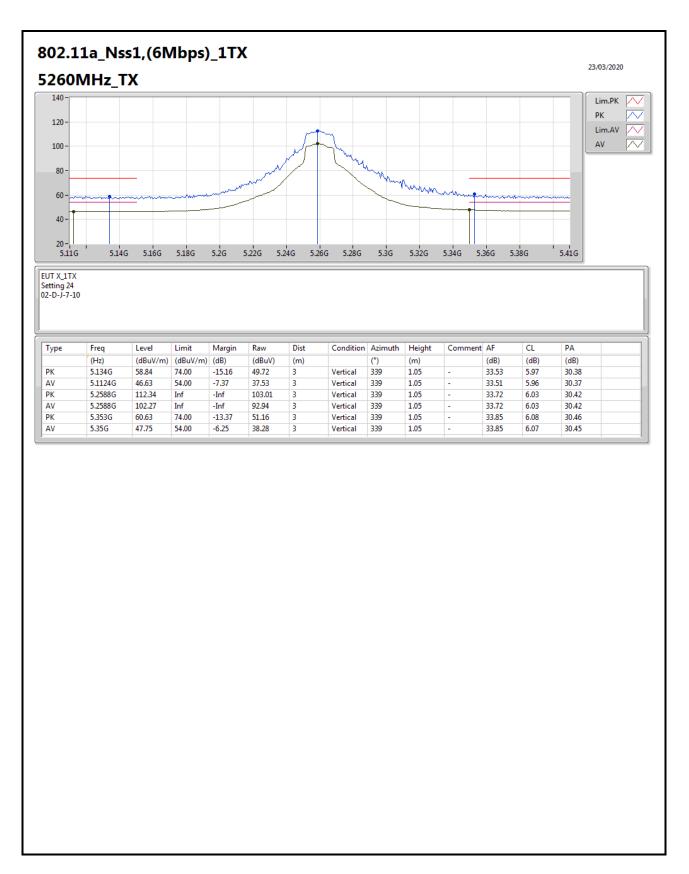




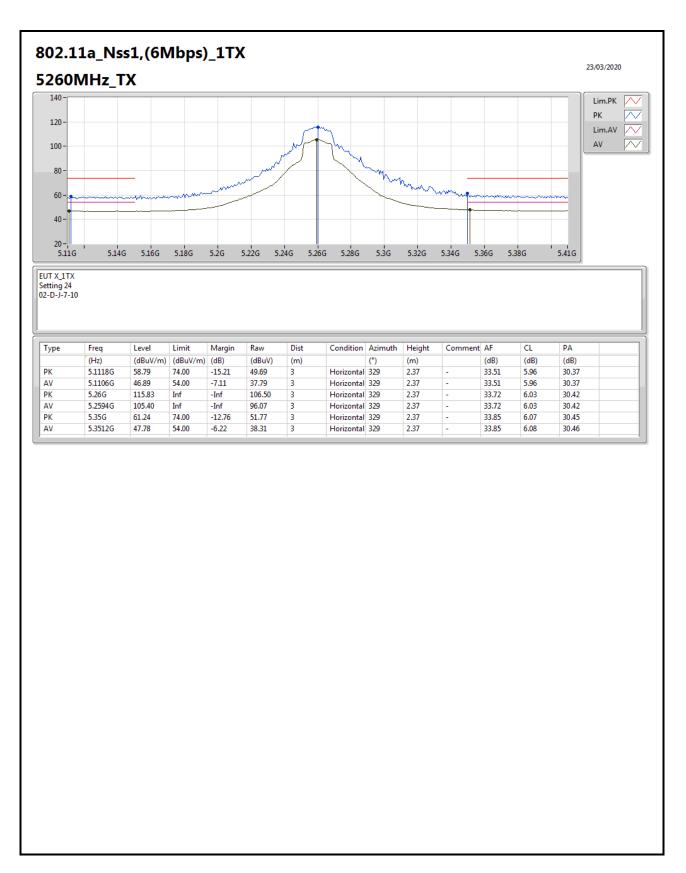




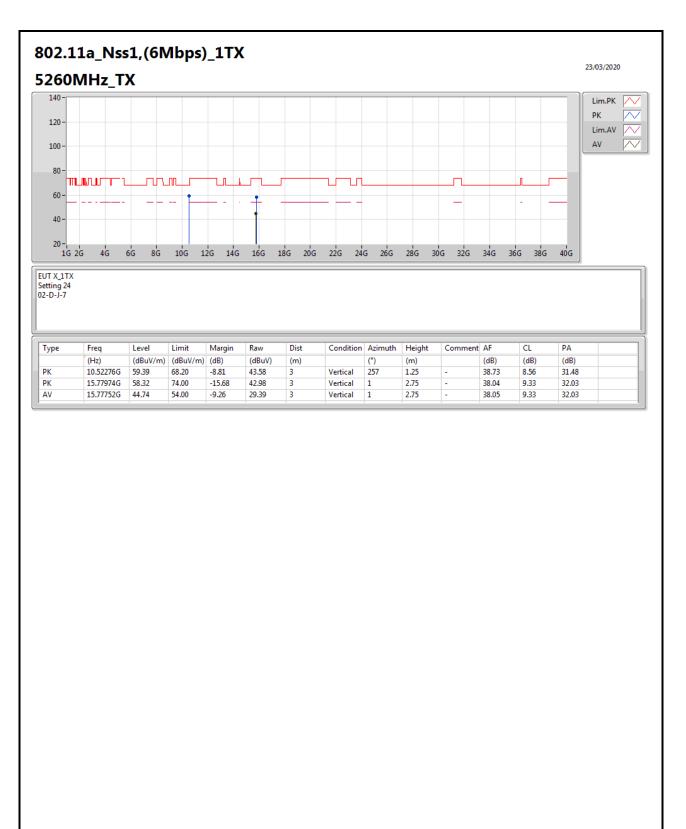




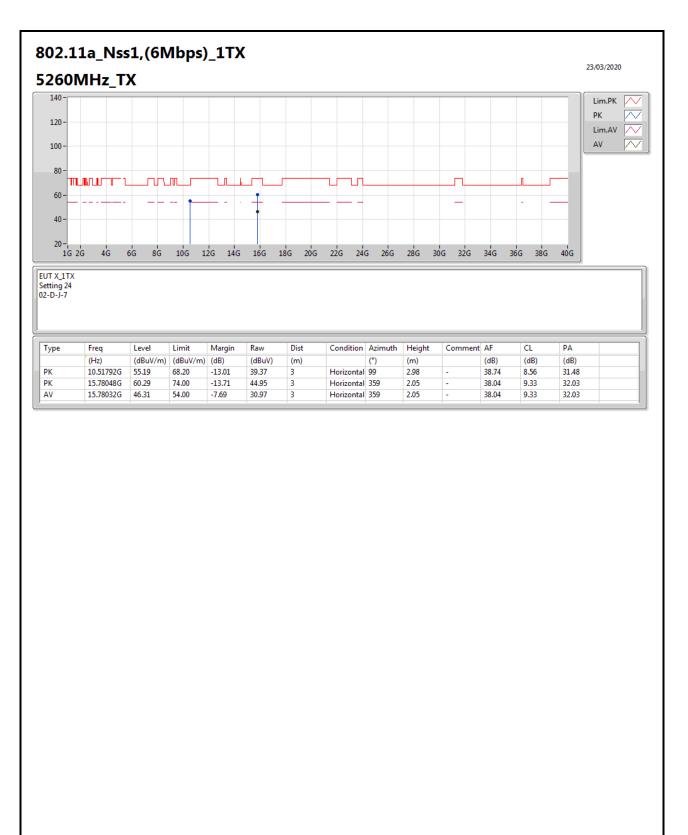




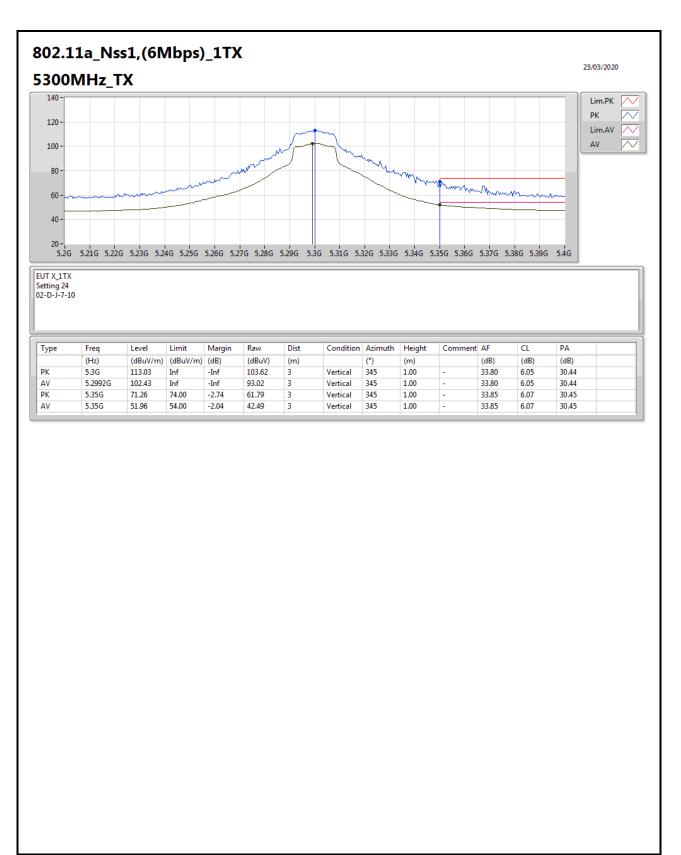




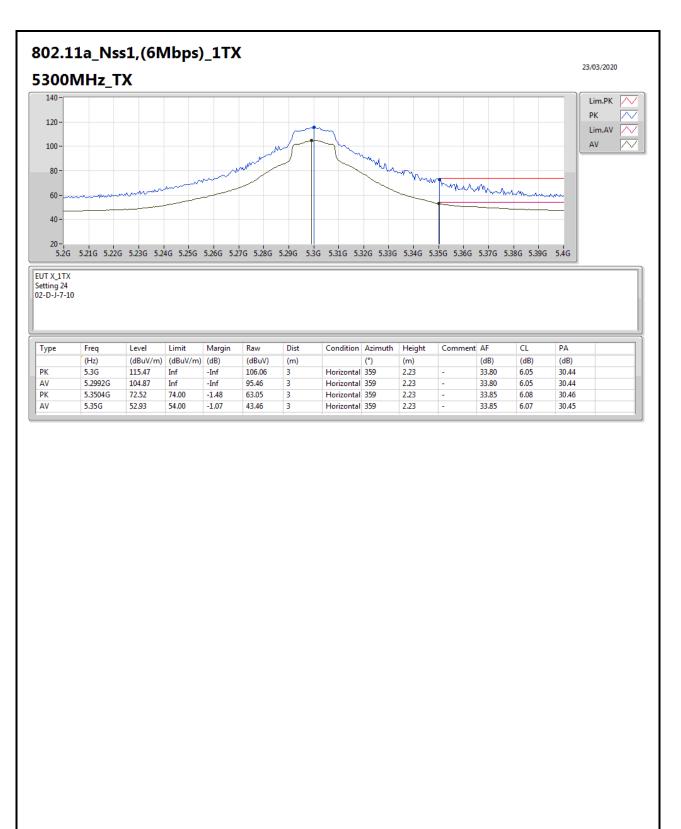




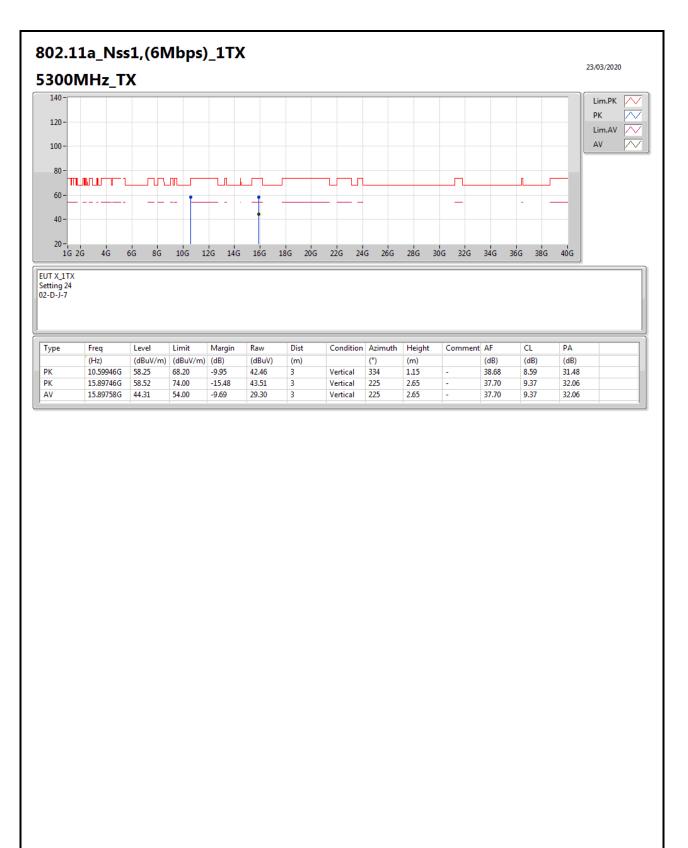




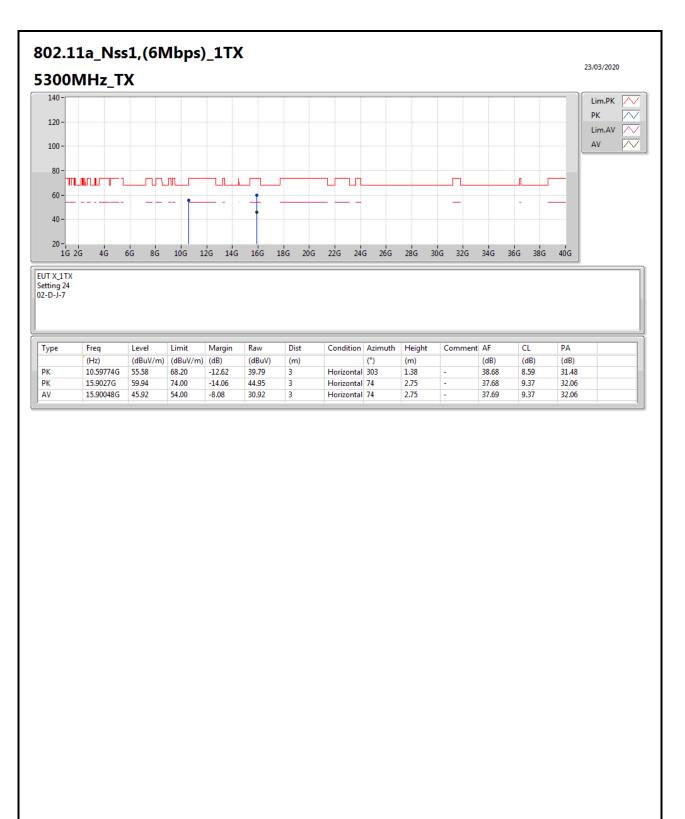




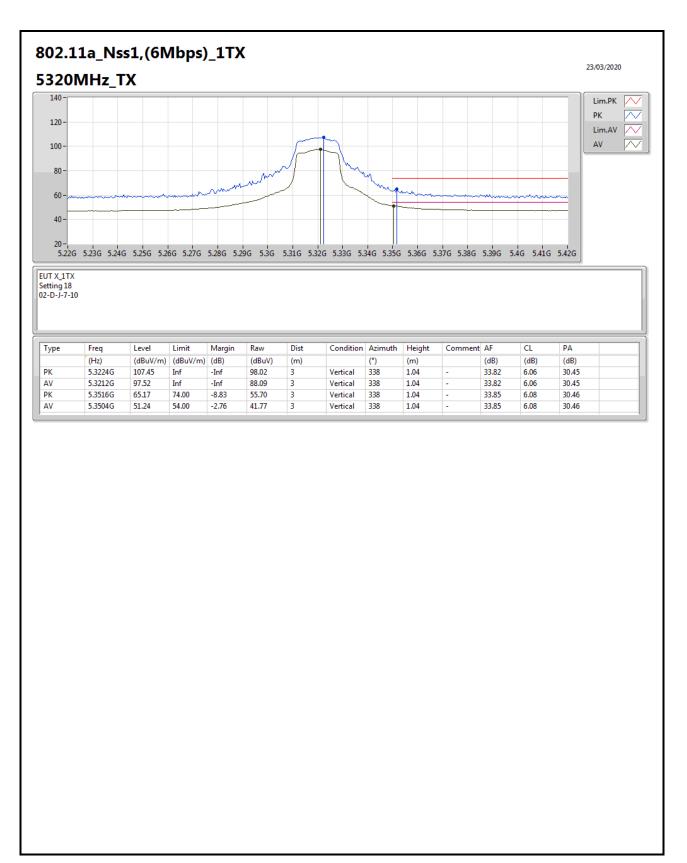




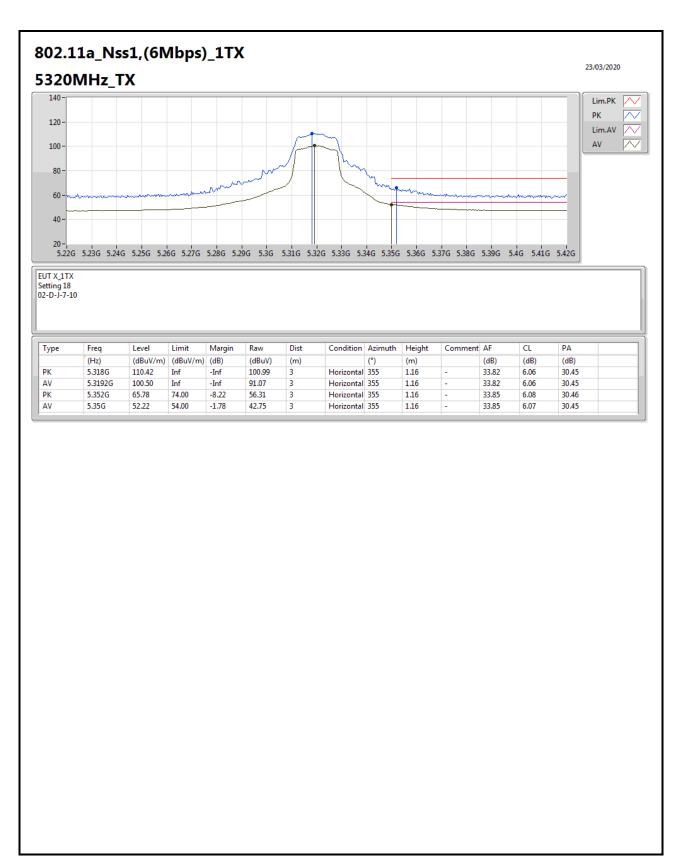




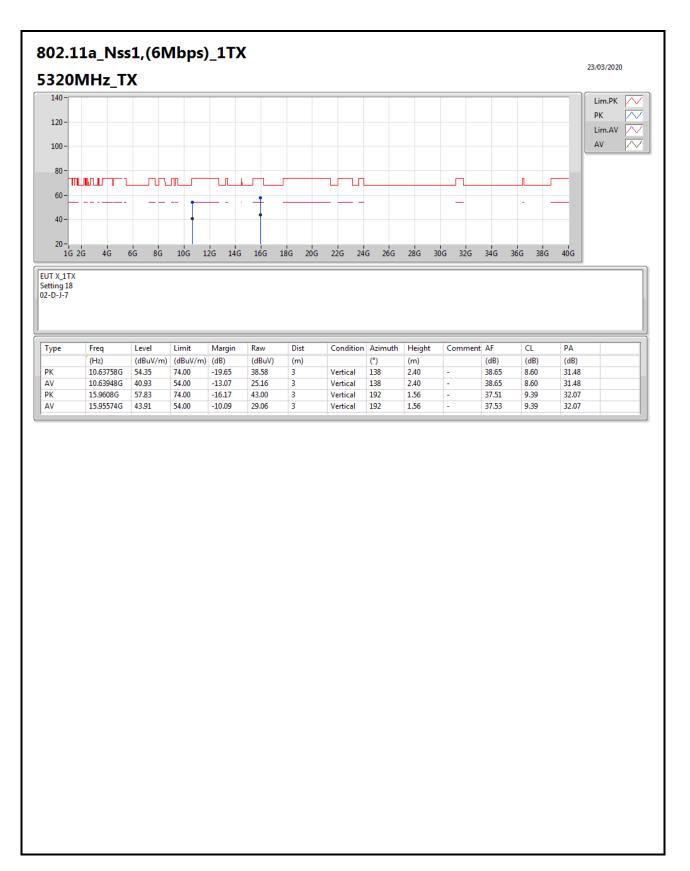




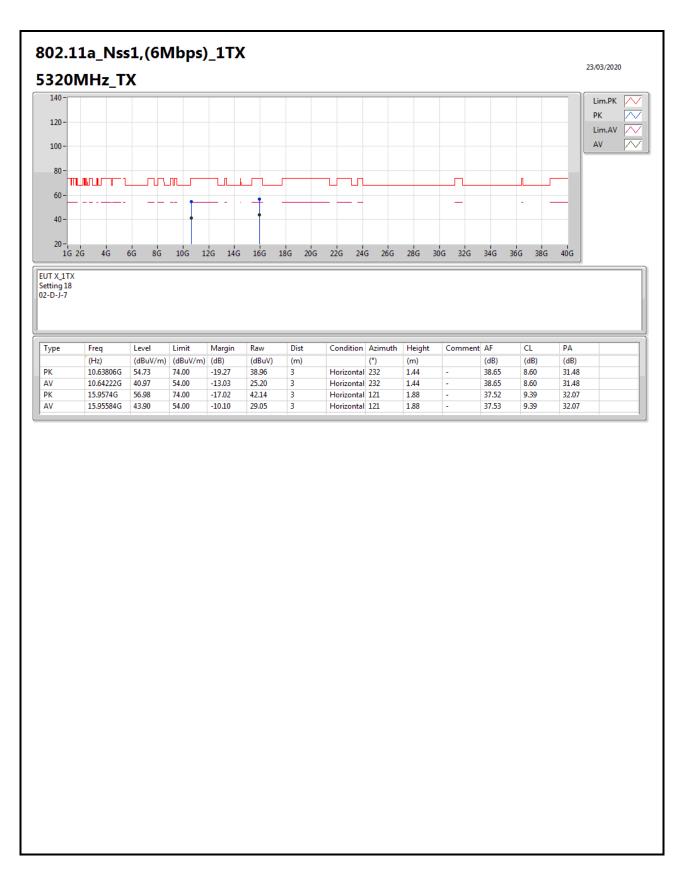




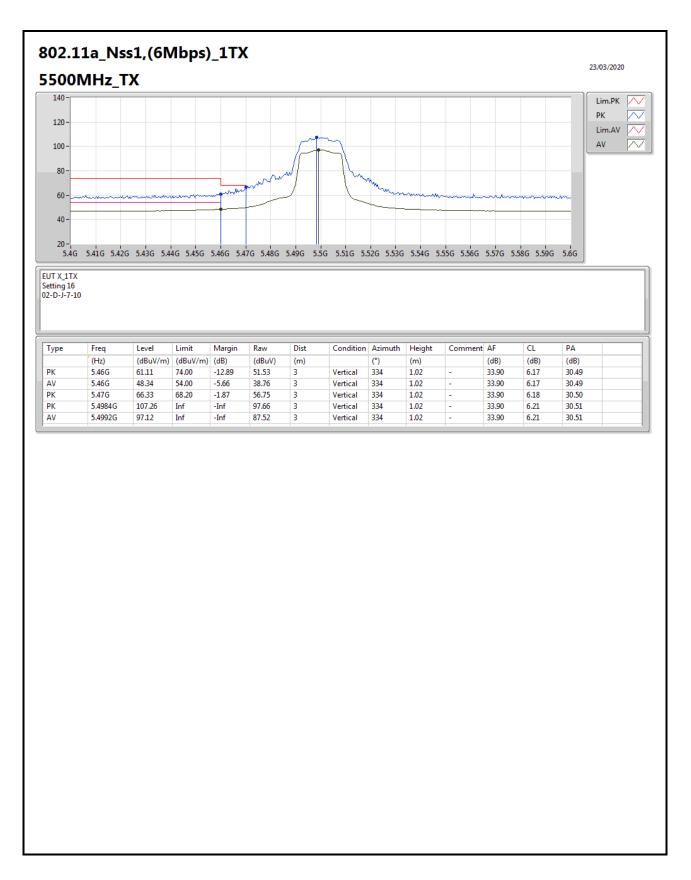




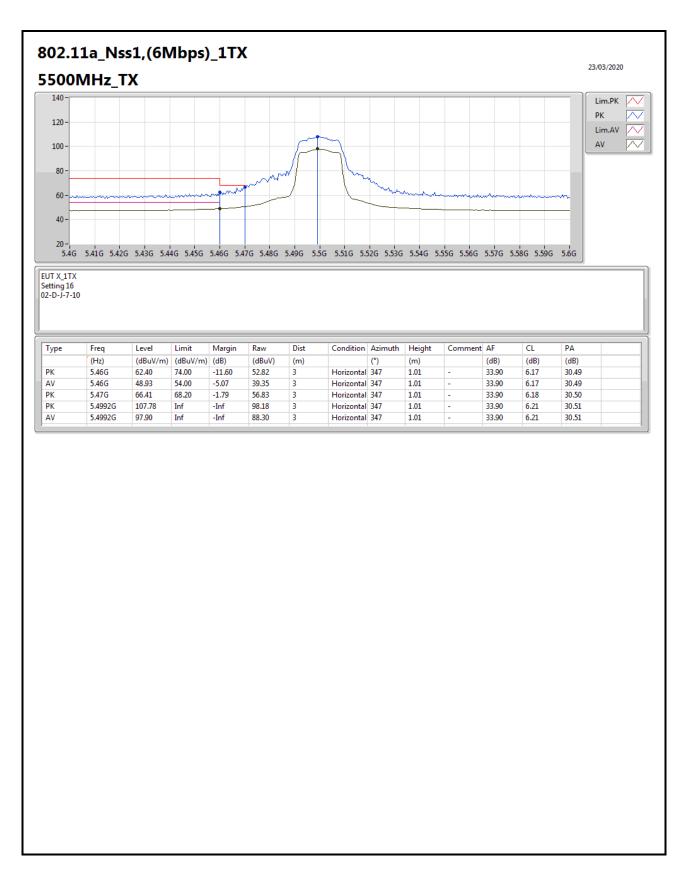




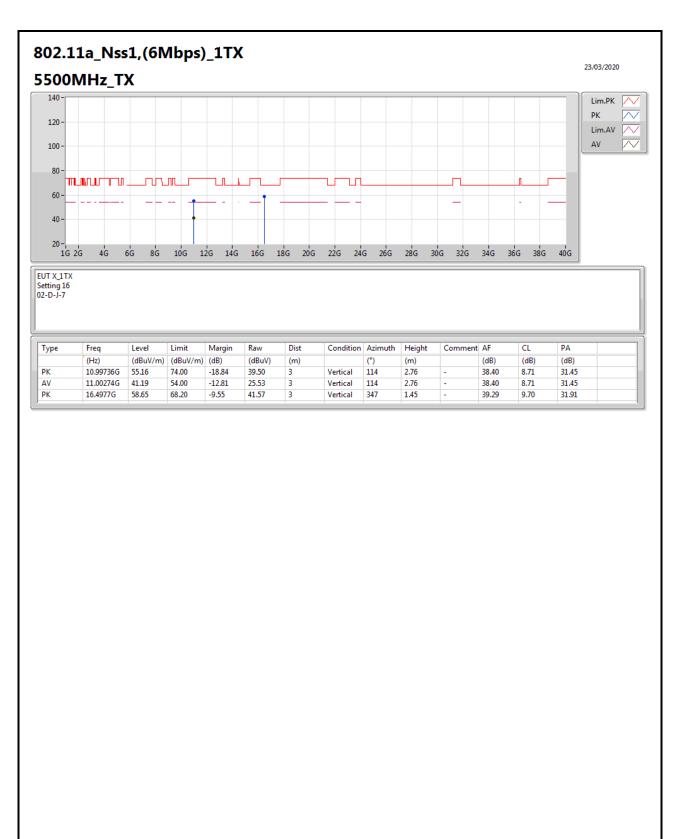




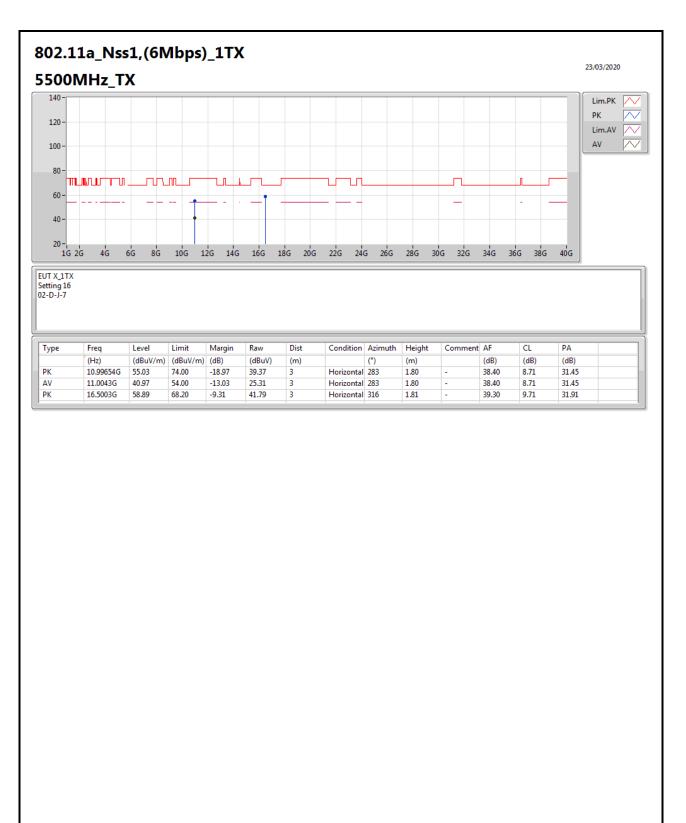




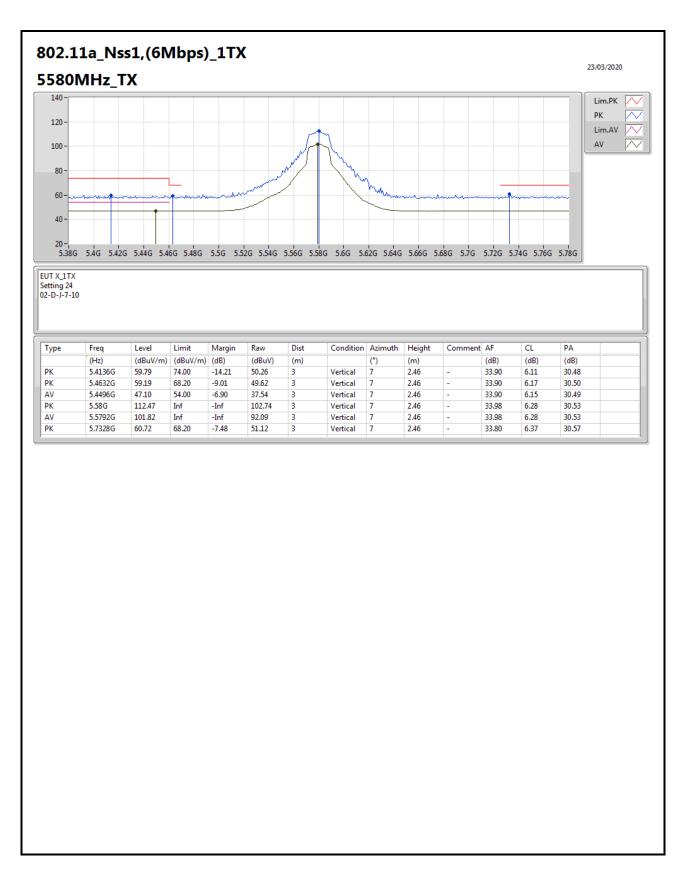




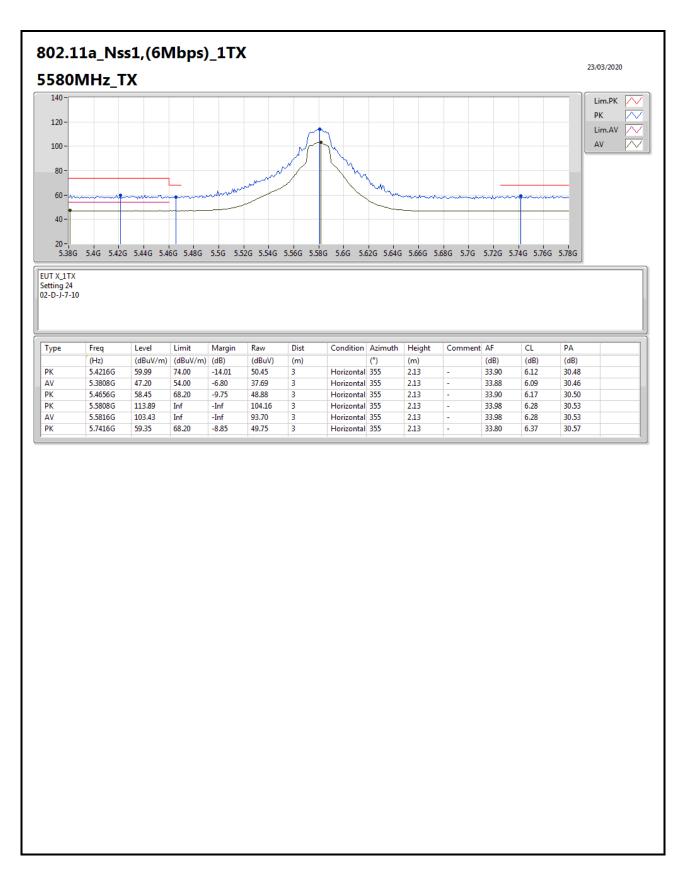




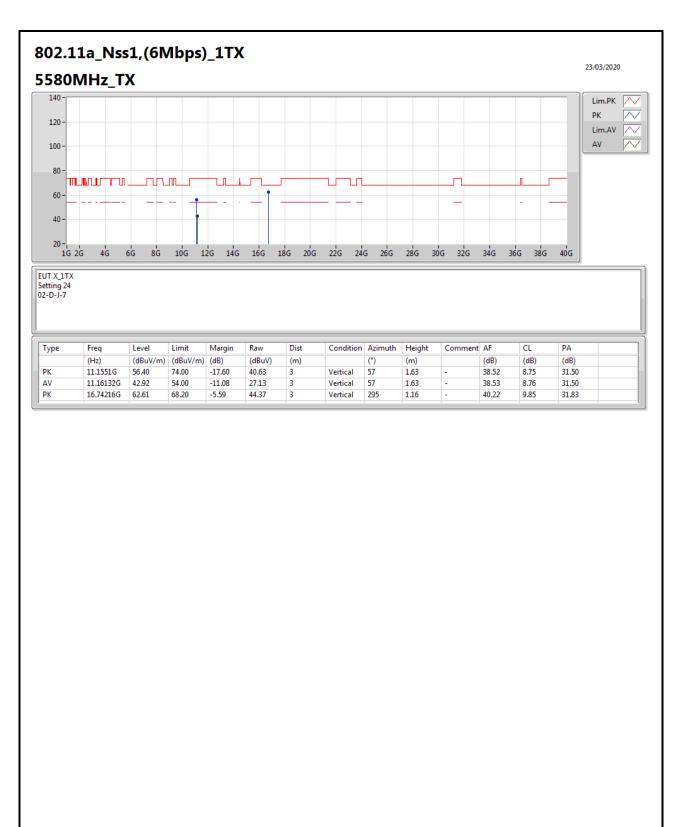




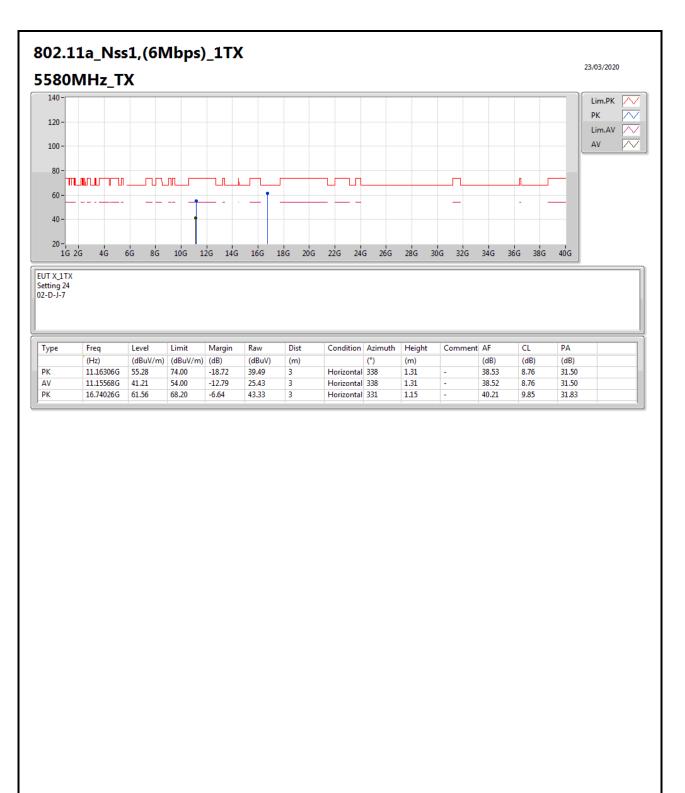




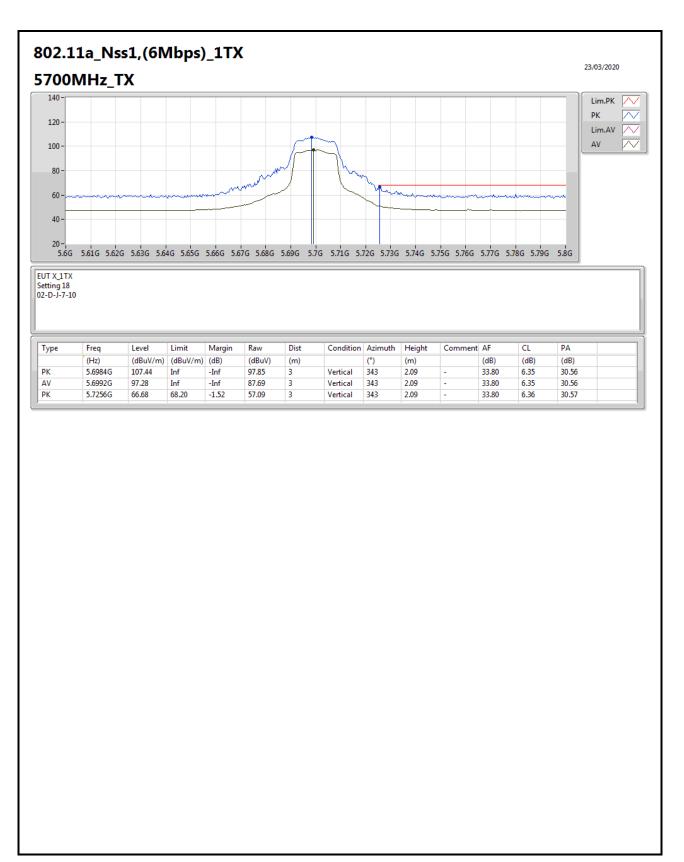




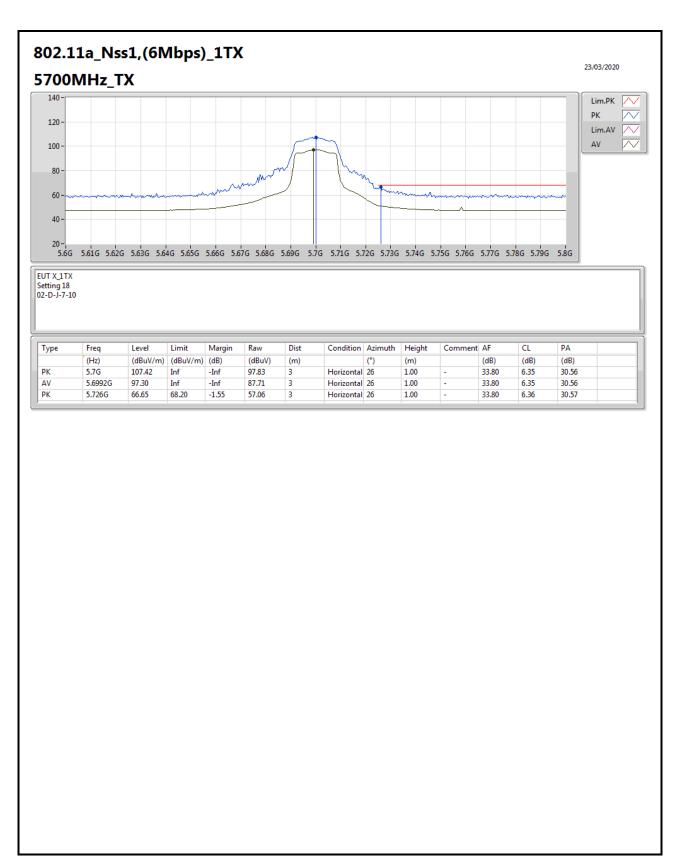




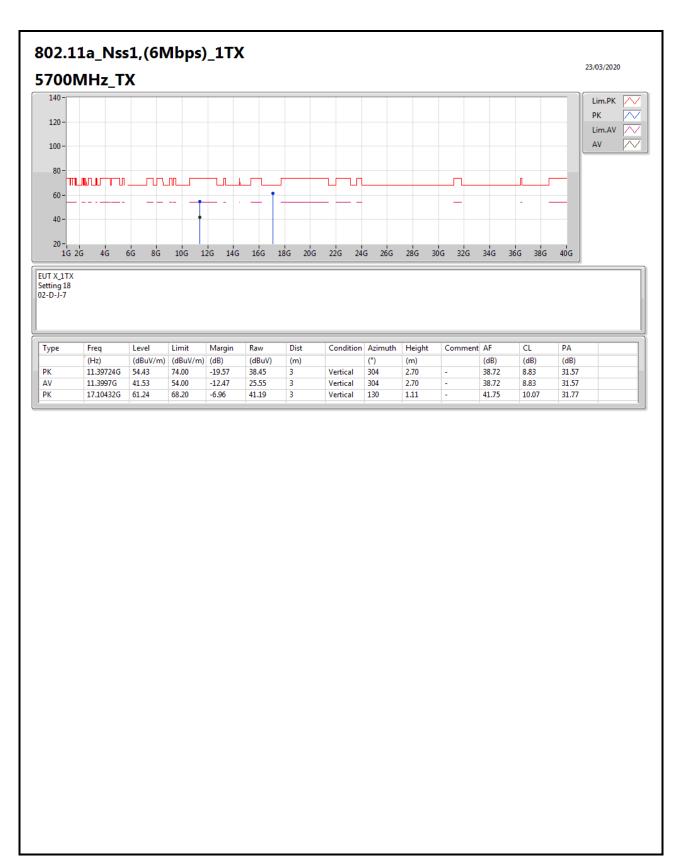




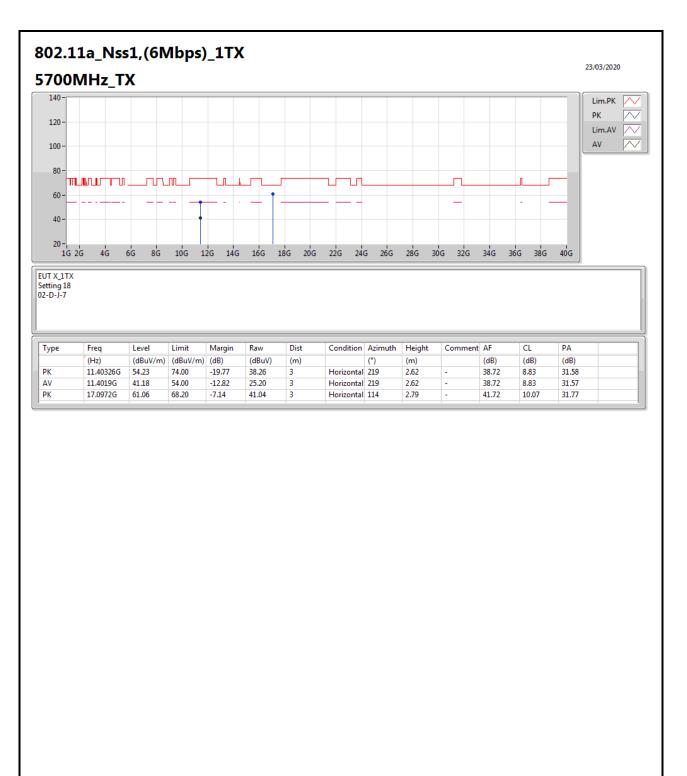




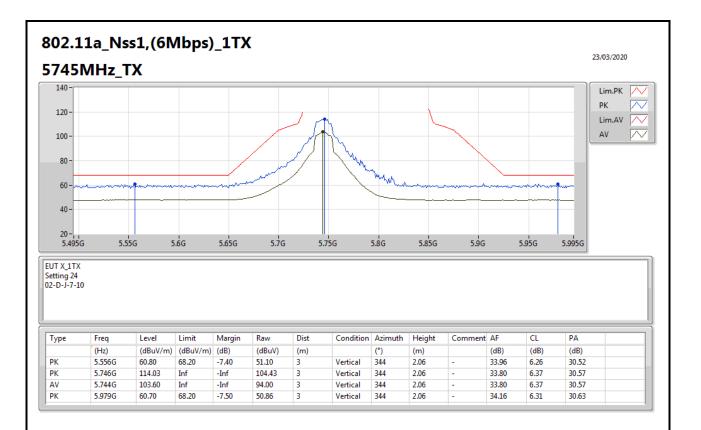




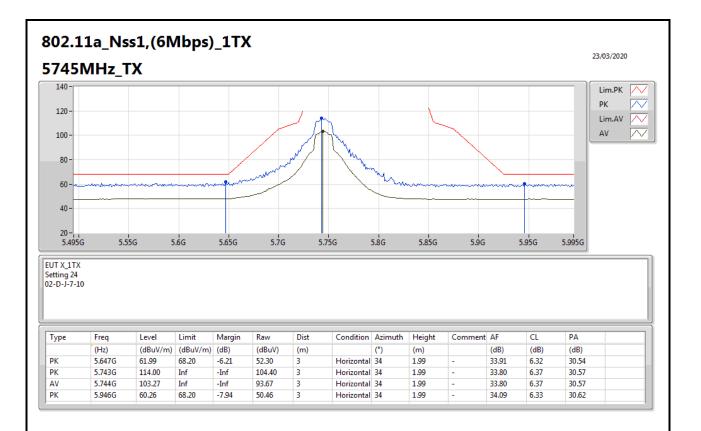




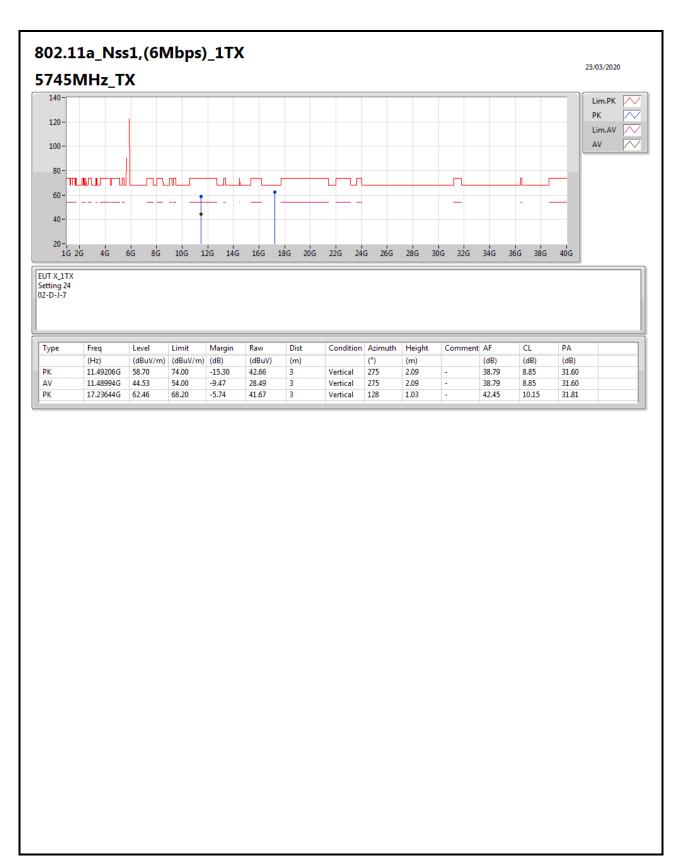




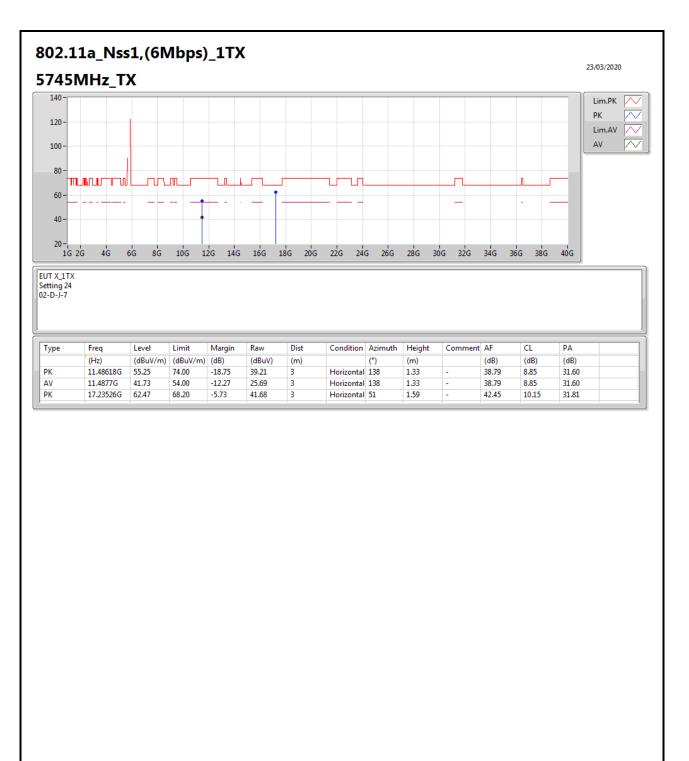














Inf

59.91

68.20

5.938G

-Inf

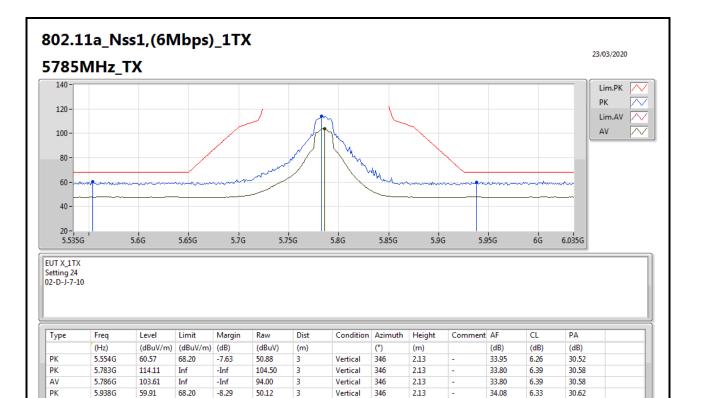
-8.29

94.00

50.12

3

3



Vertical

Vertical

346

2.13

2.13

-

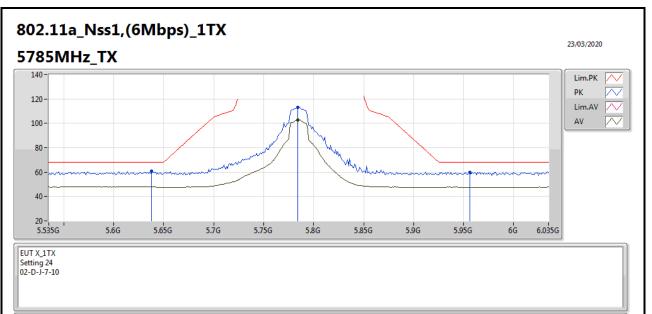
6.39

6.33

30.62

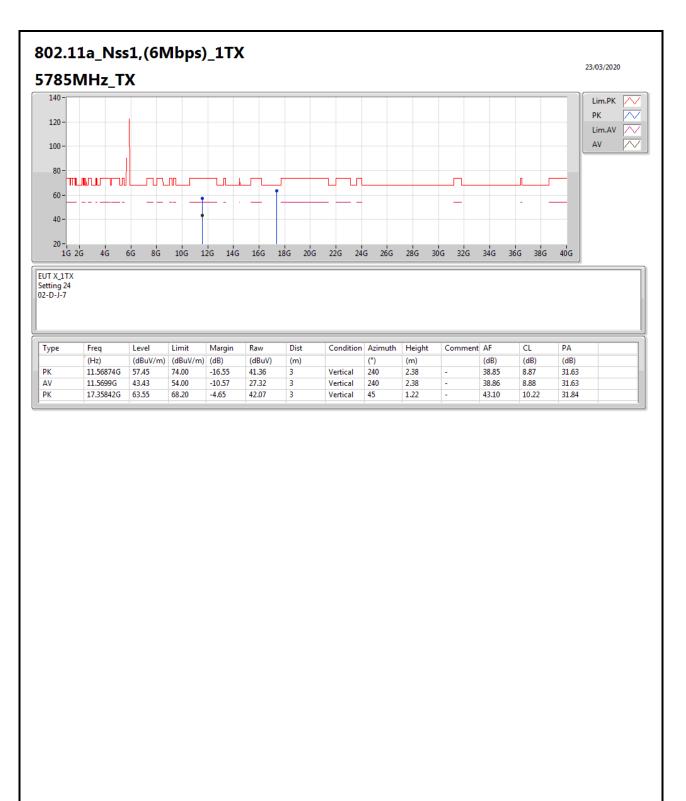
34.08



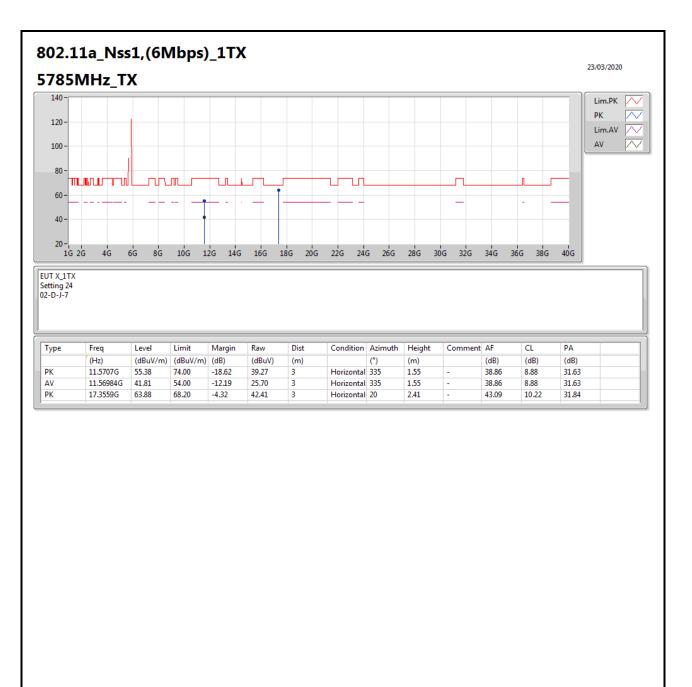


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	5.638G	60.61	68.20	-7.59	50.91	3	Horizontal	31	1.01	-	33.92	6.32	30.54
PK	5.784G	113.16	Inf	-Inf	103.55	3	Horizontal	31	1.01	-	33.80	6.39	30.58
AV	5.784G	102.81	Inf	-Inf	93.20	3	Horizontal	31	1.01	-	33.80	6.39	30.58
PK	5.956G	59.94	68.20	-8.26	50.13	3	Horizontal	31	1.01	-	34.11	6.32	30.62

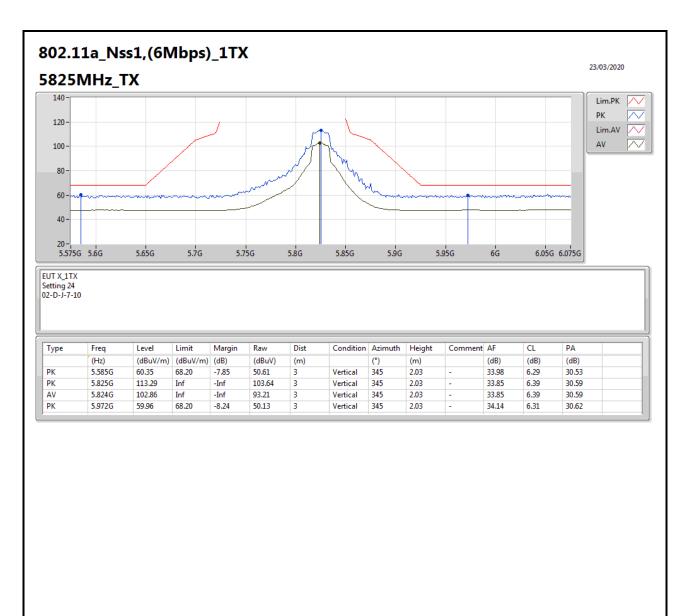




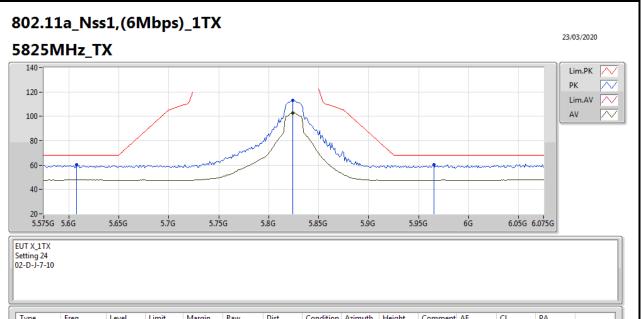






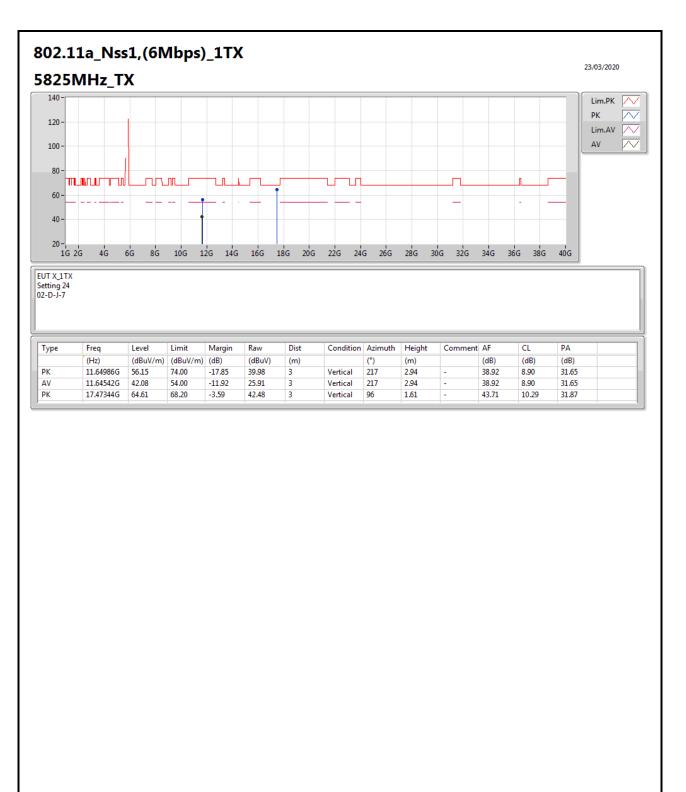




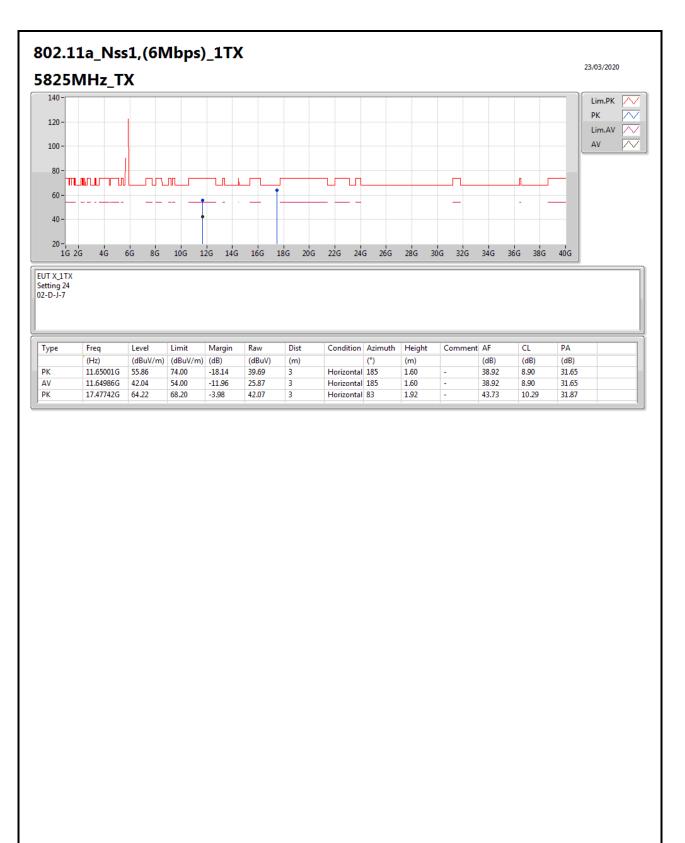


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
РК	5.608G	60.47	68.20	-7.73	50.72	3	Horizontal	33	1.00	-	33.98	6.30	30.53
PK	5.824G	113.32	Inf	-Inf	103.67	3	Horizontal	33	1.00	-	33.85	6.39	30.59
AV	5.824G	102.91	Inf	-Inf	93.26	3	Horizontal	33	1.00	-	33.85	6.39	30.59
PK	5.965G	60.11	68.20	-8.09	50.28	3	Horizontal	33	1.00	-	34.13	6.32	30.62

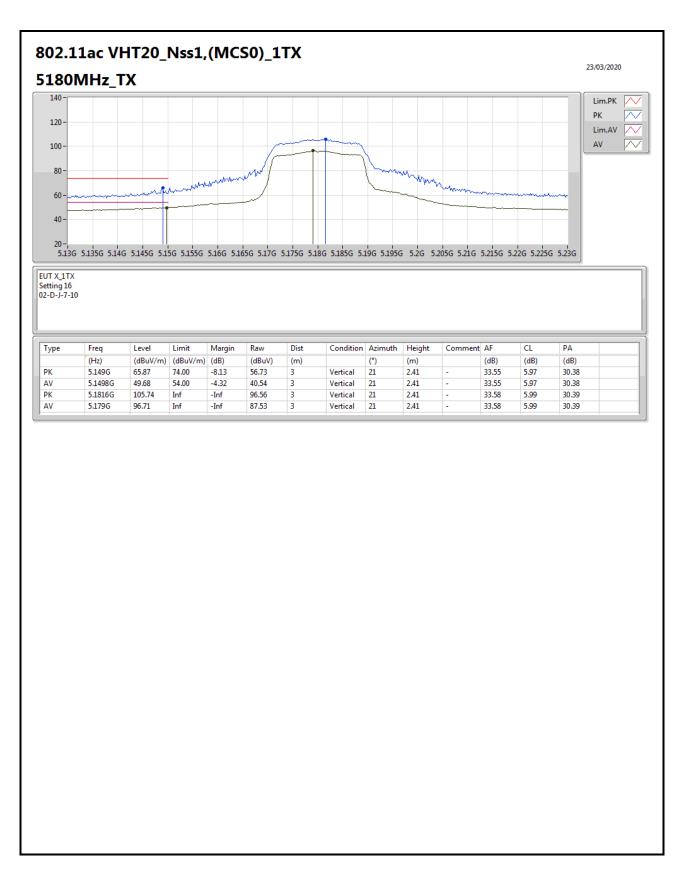




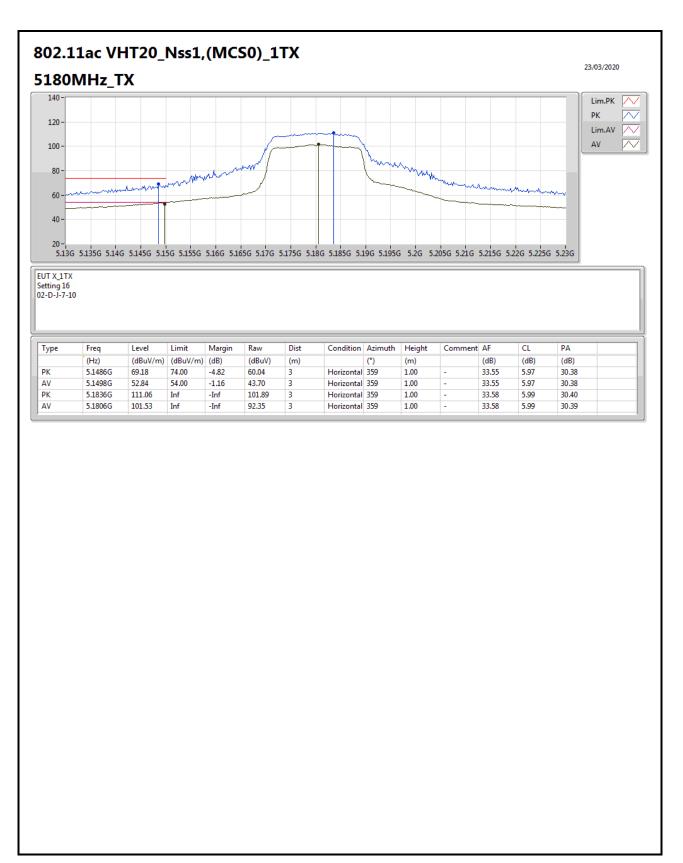




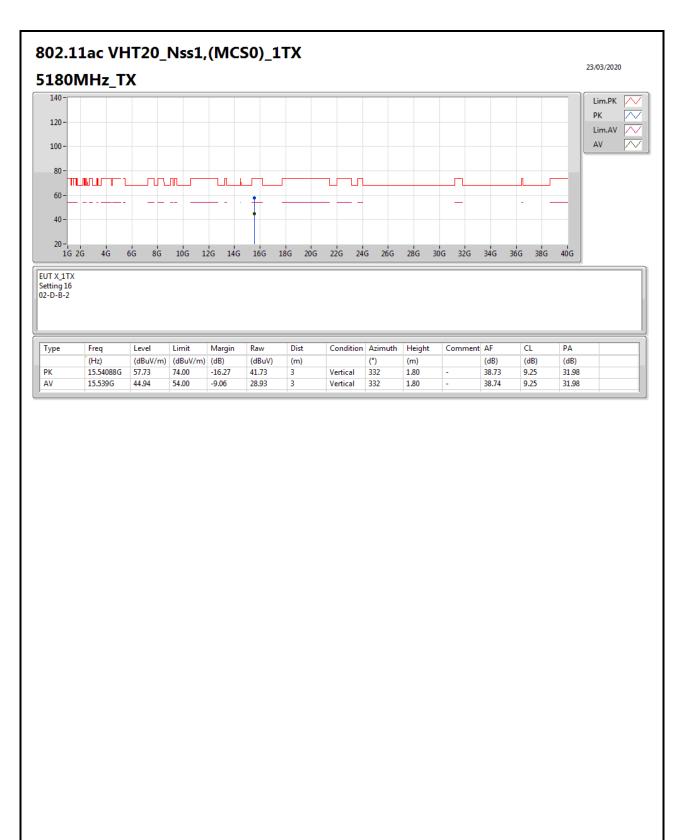




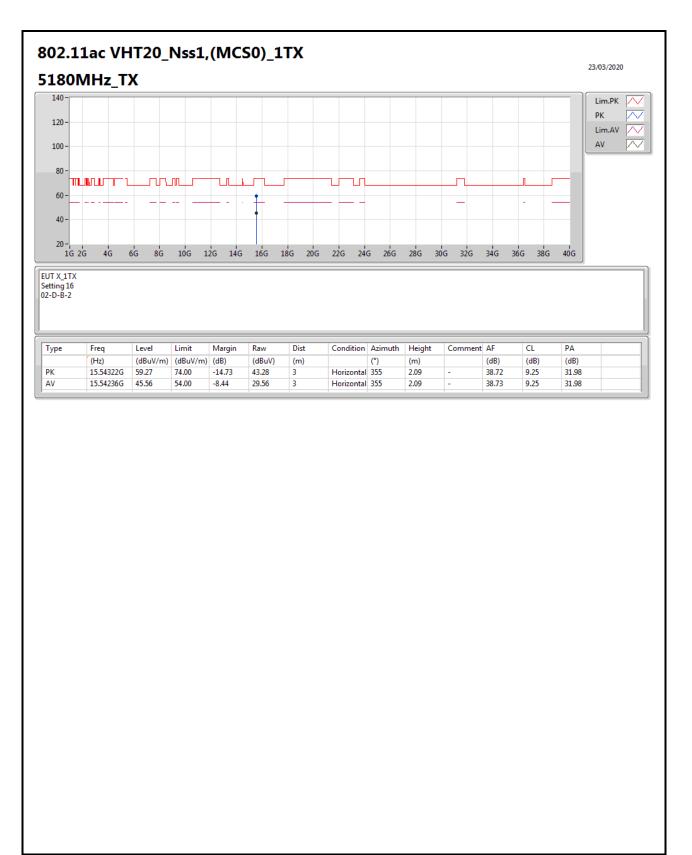




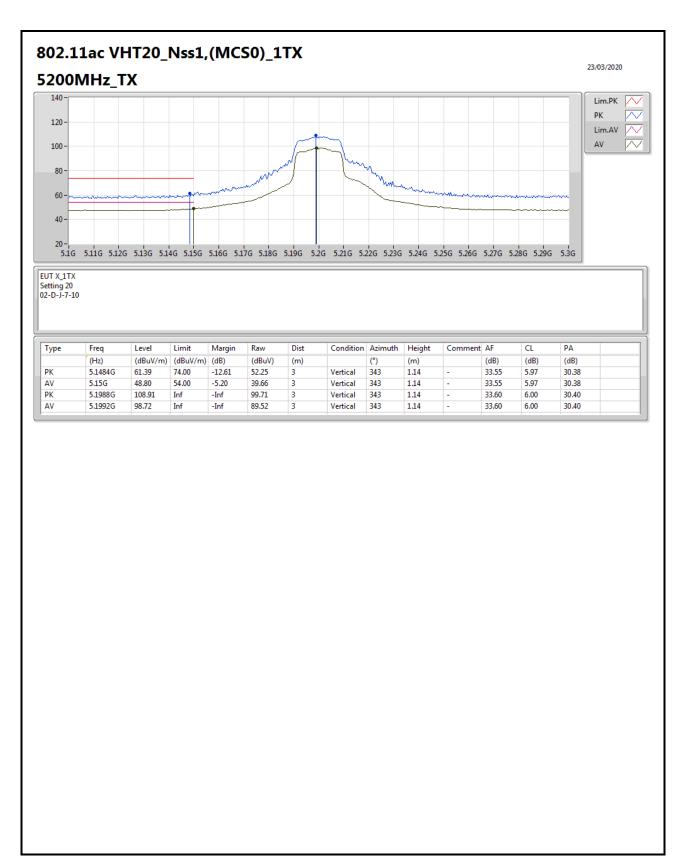




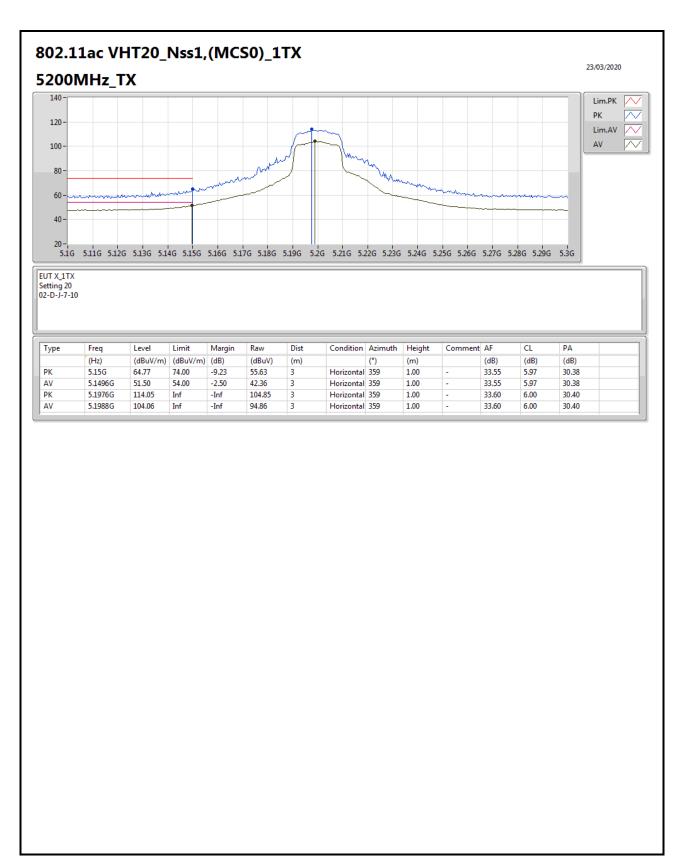




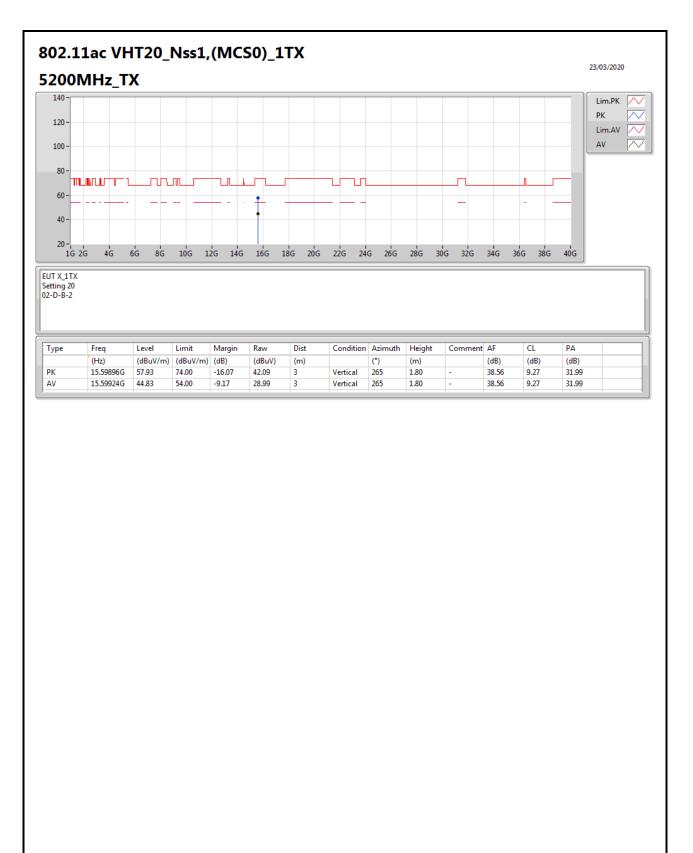




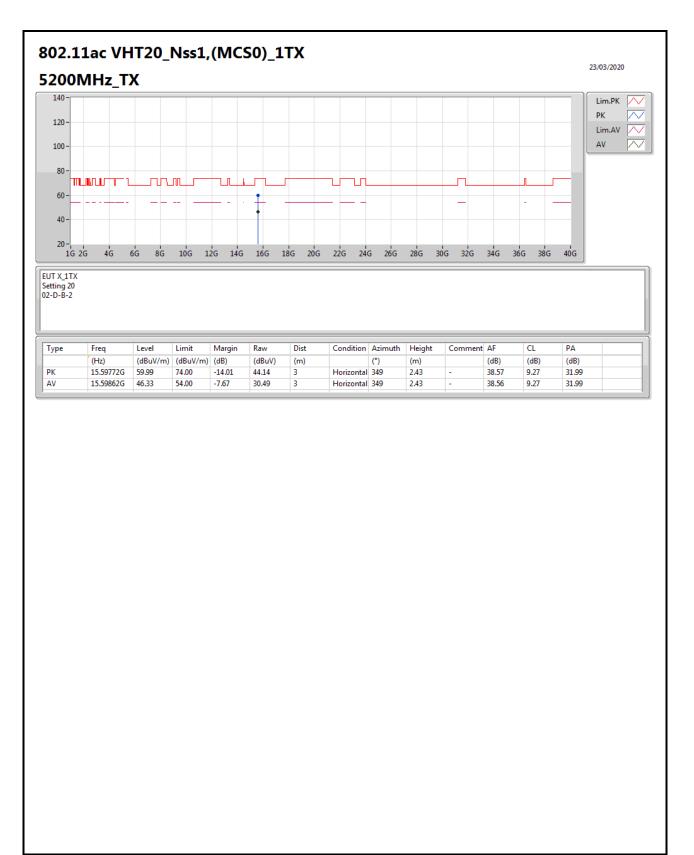




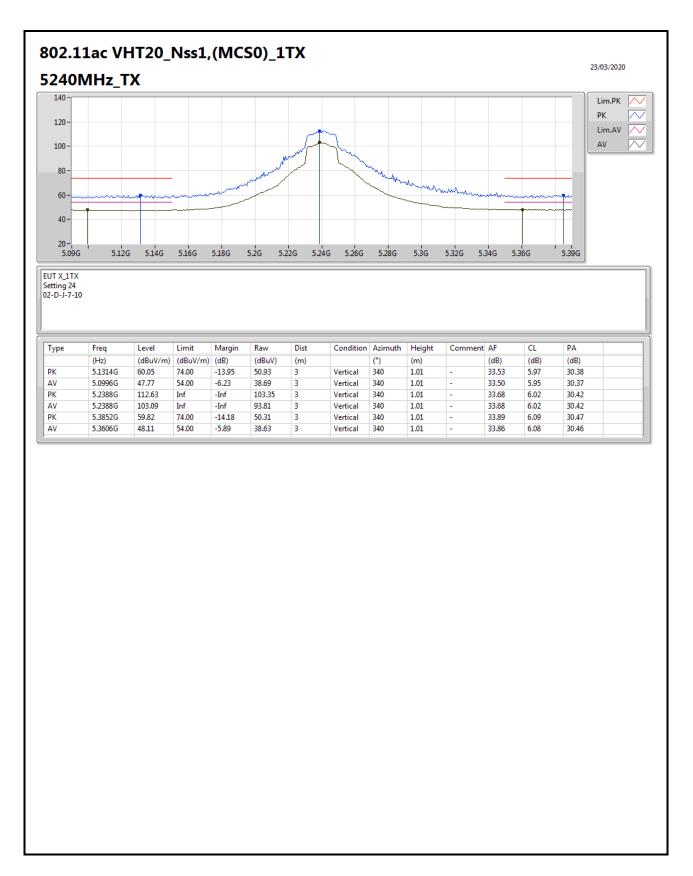




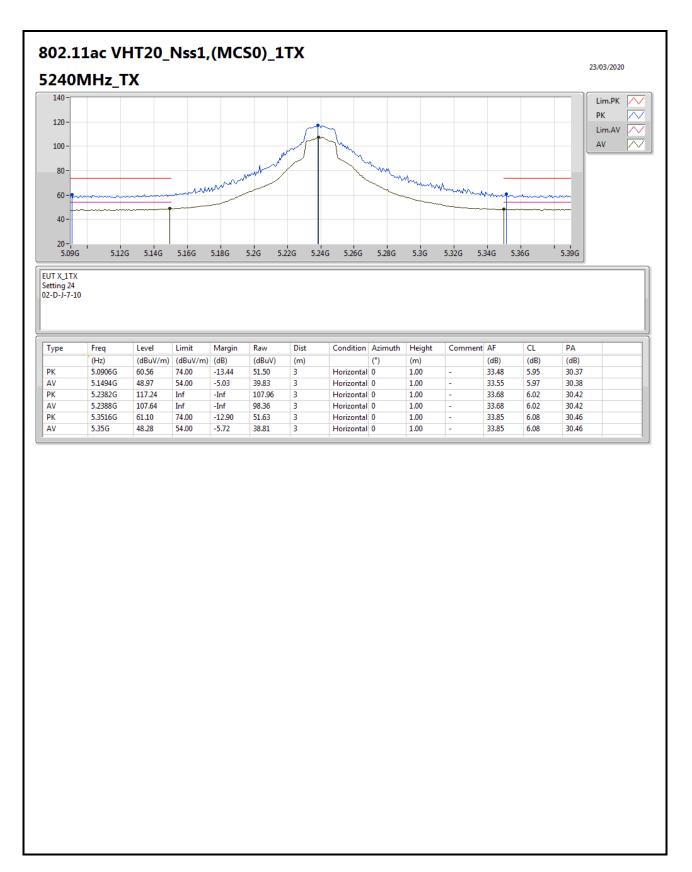




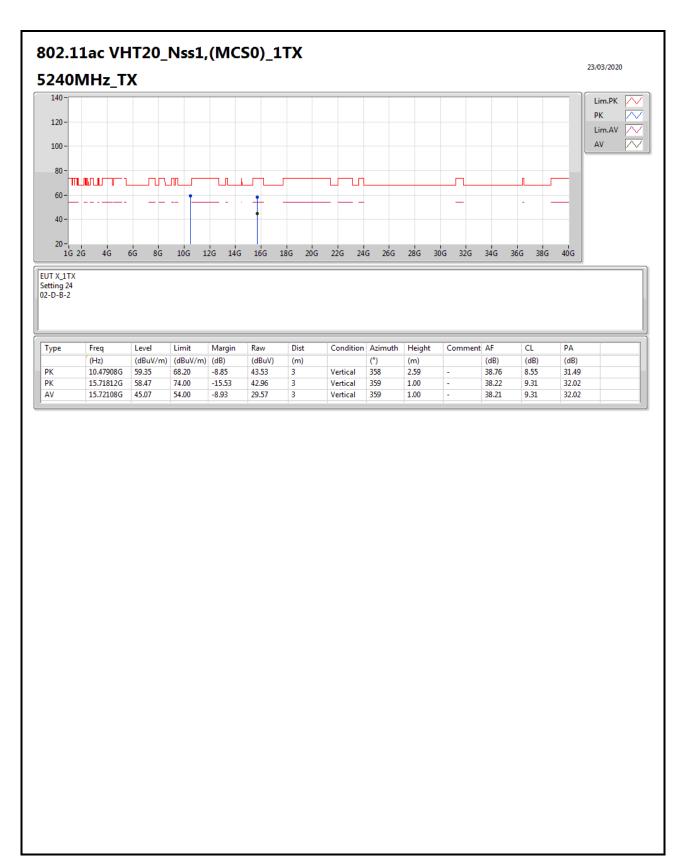




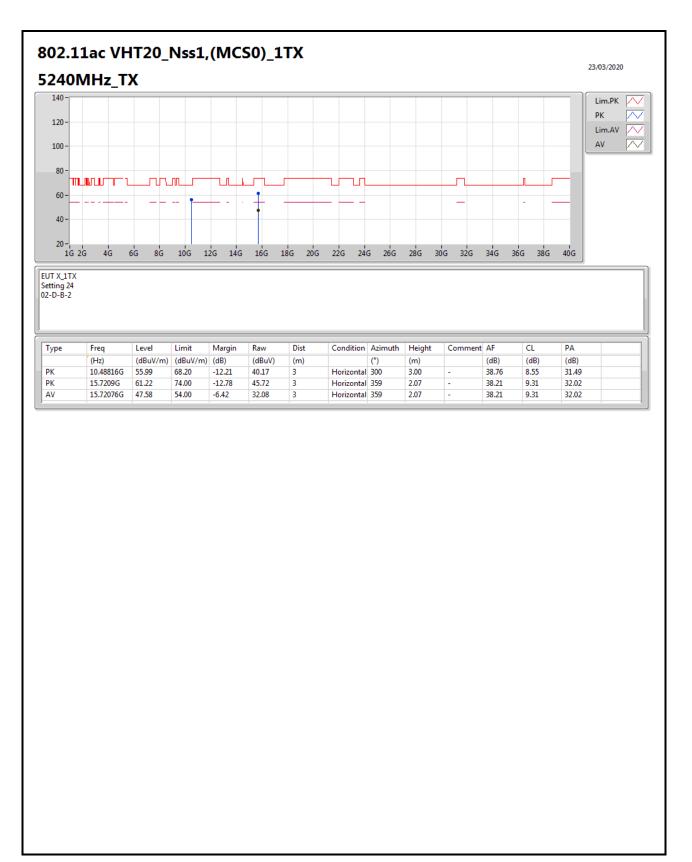




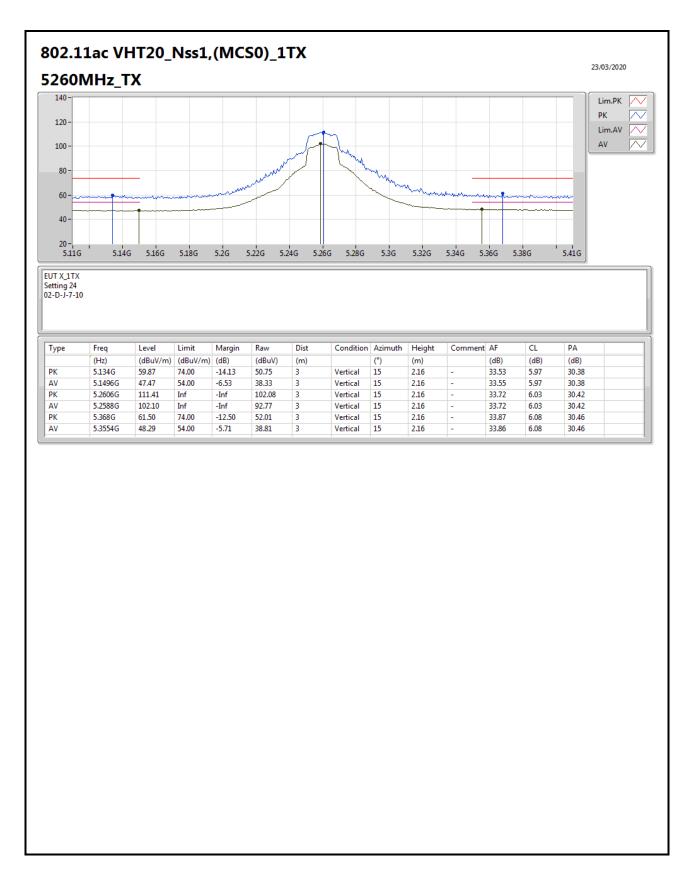




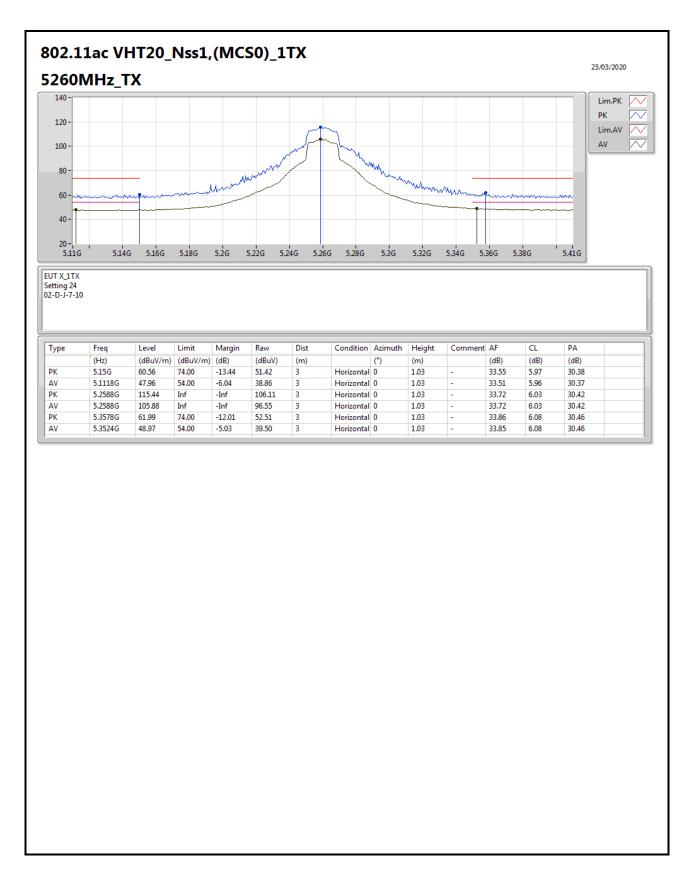




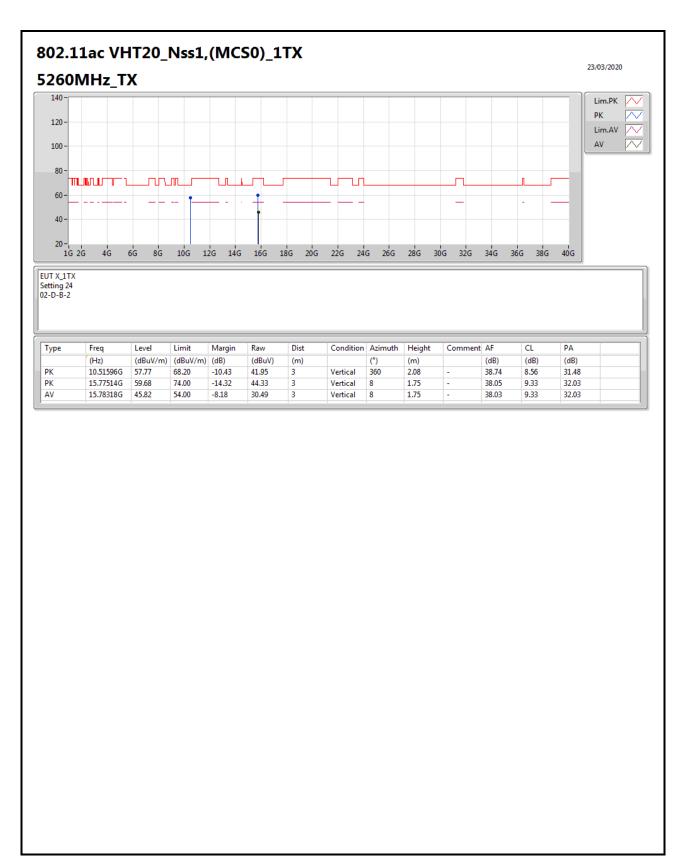




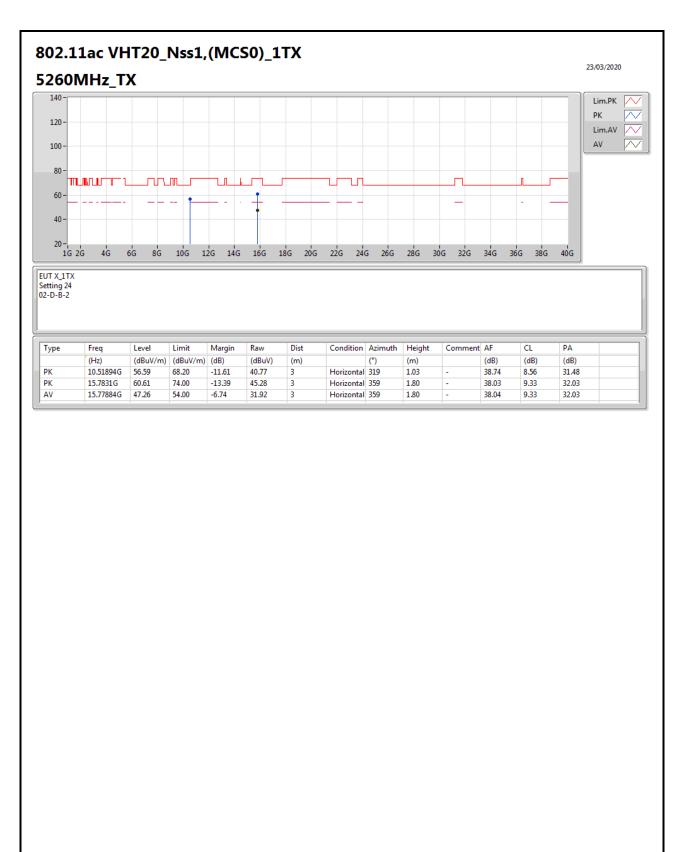




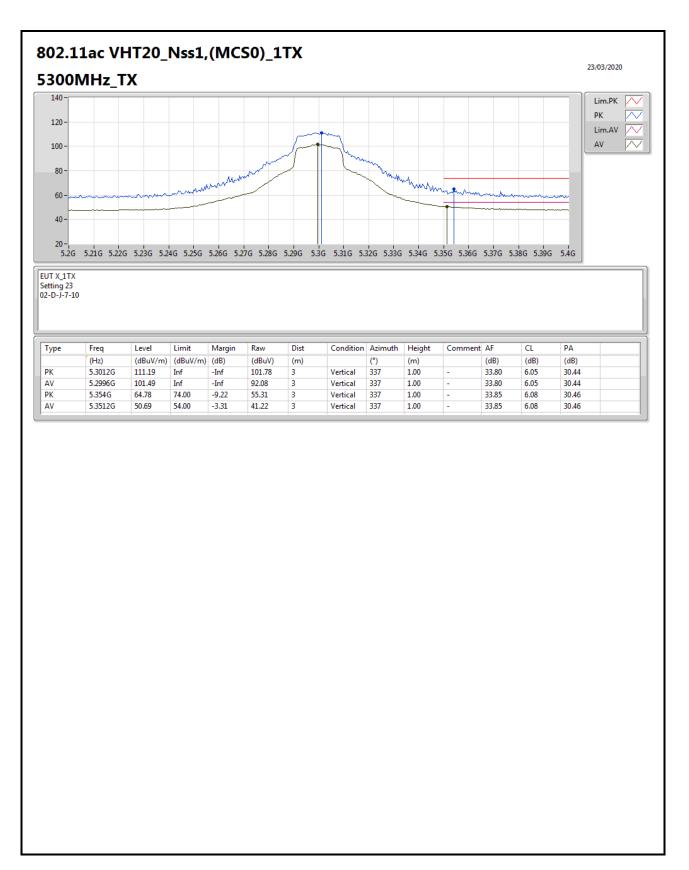




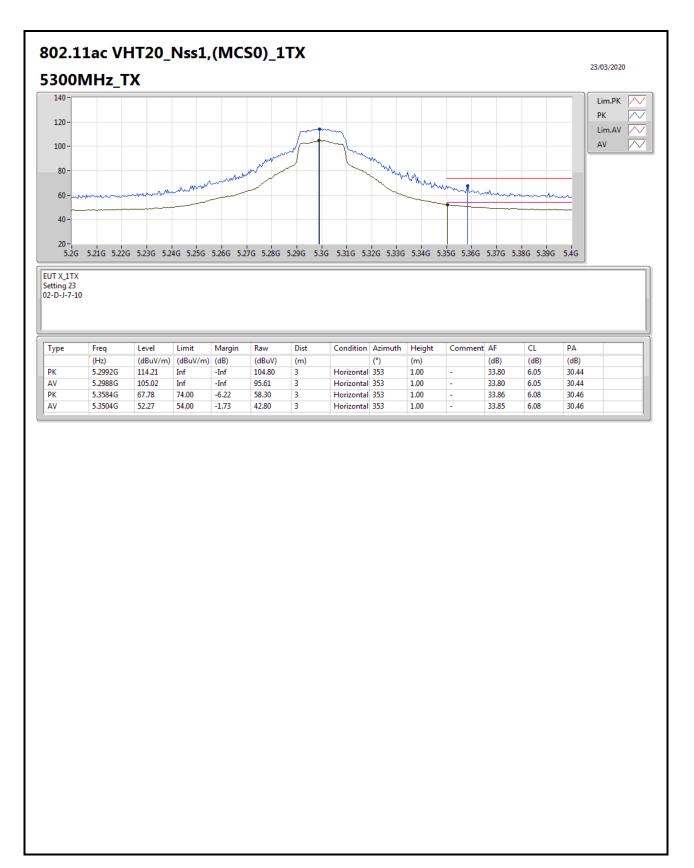




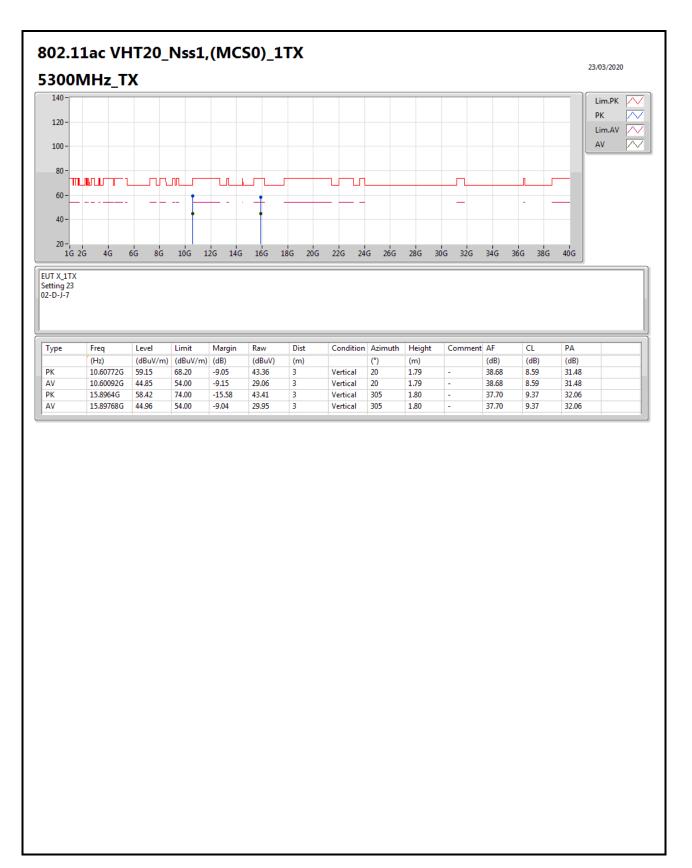




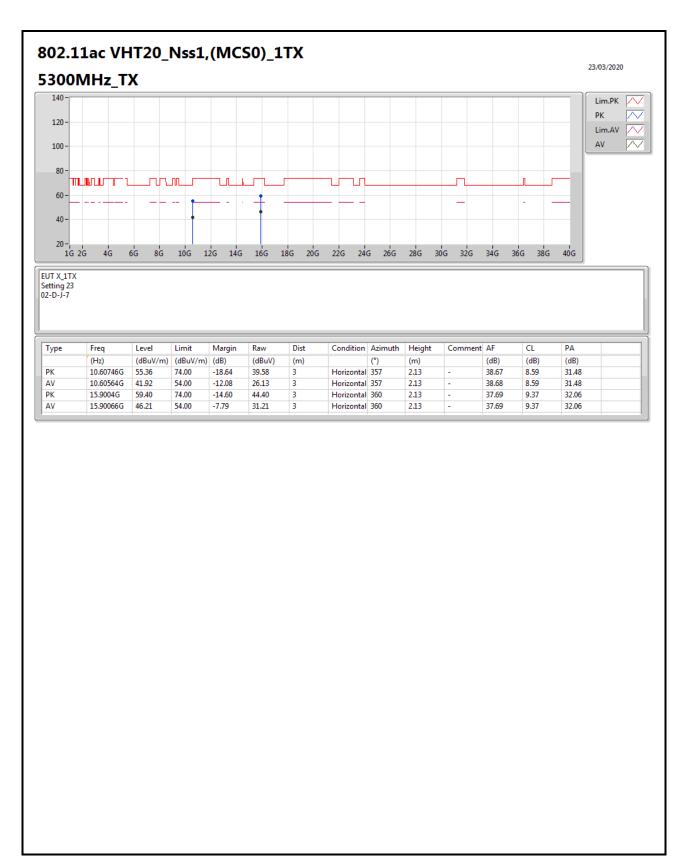




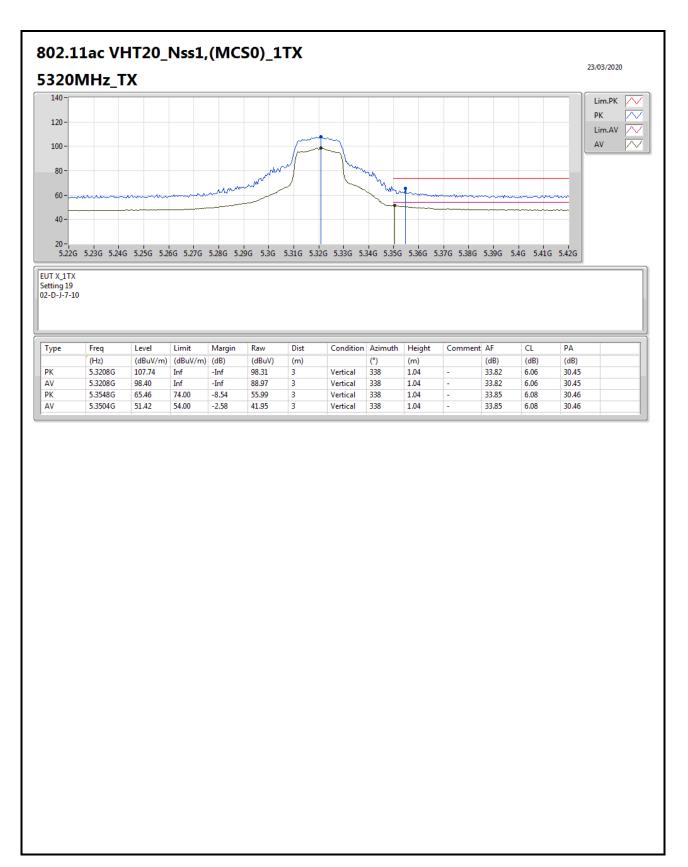




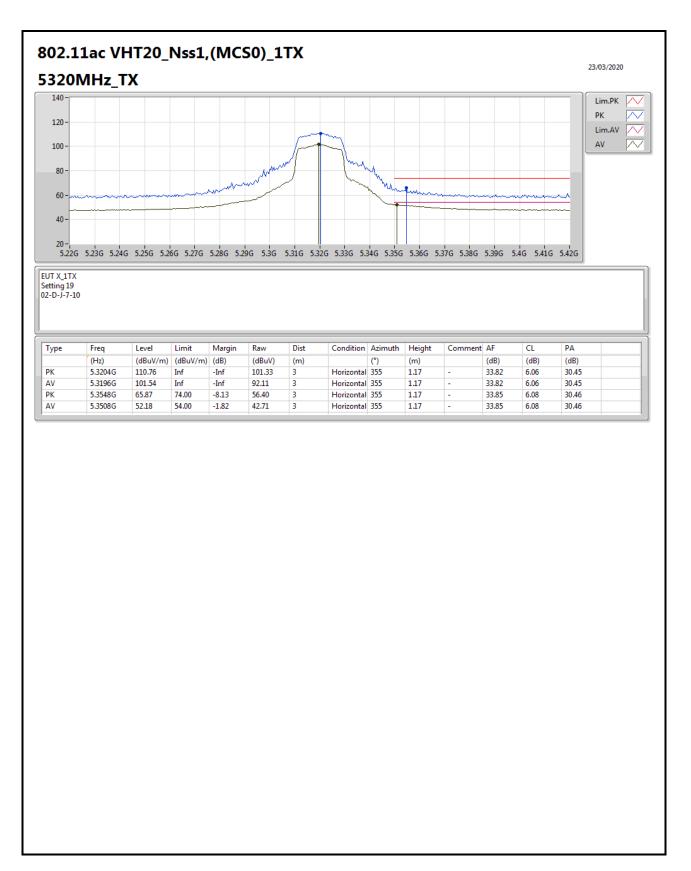




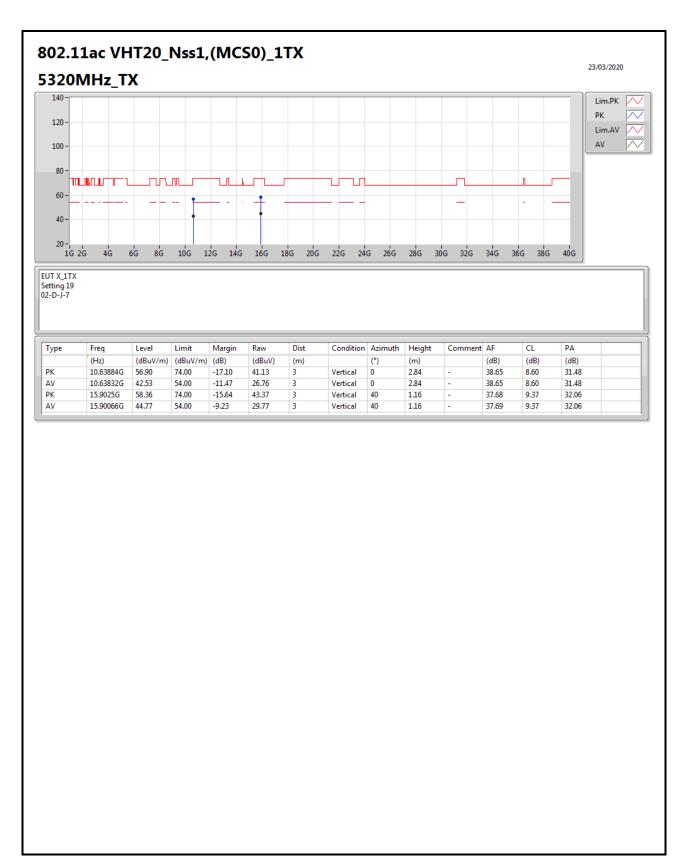




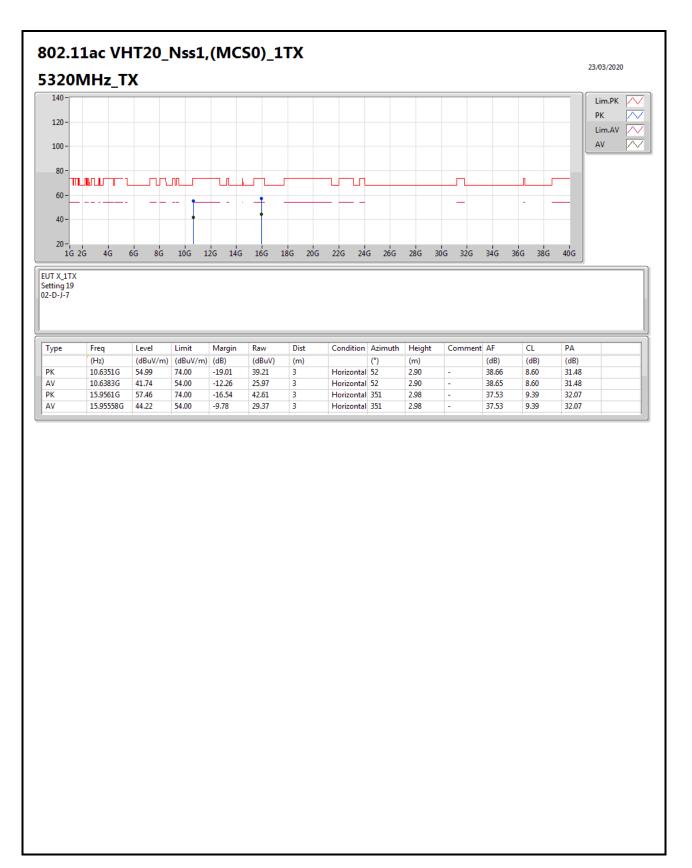




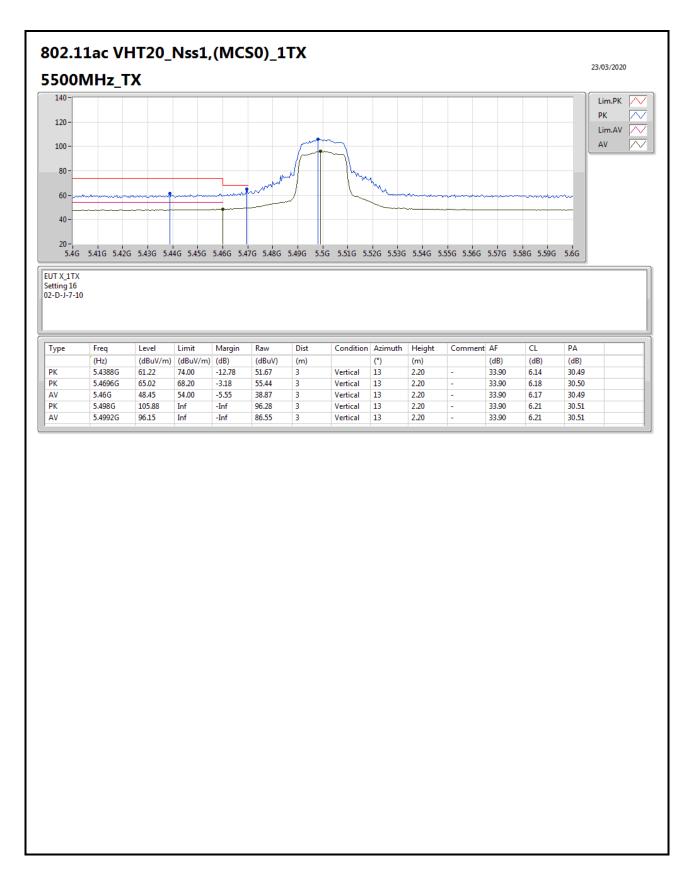




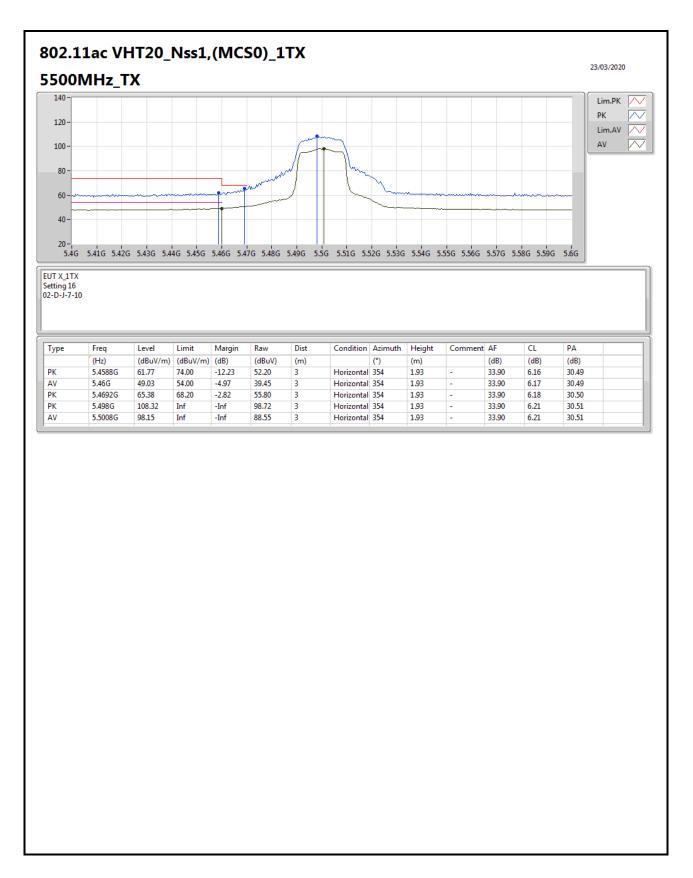




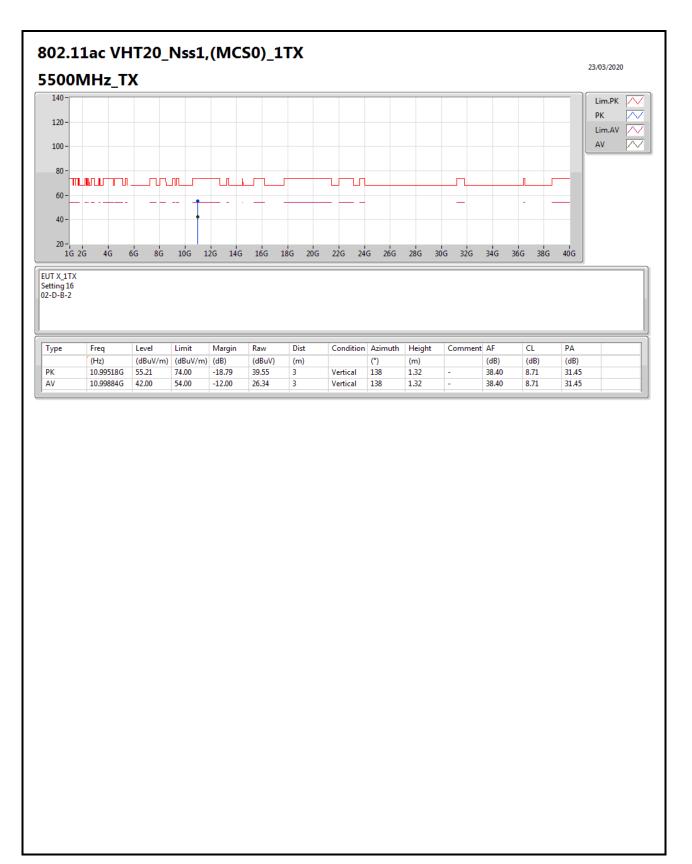




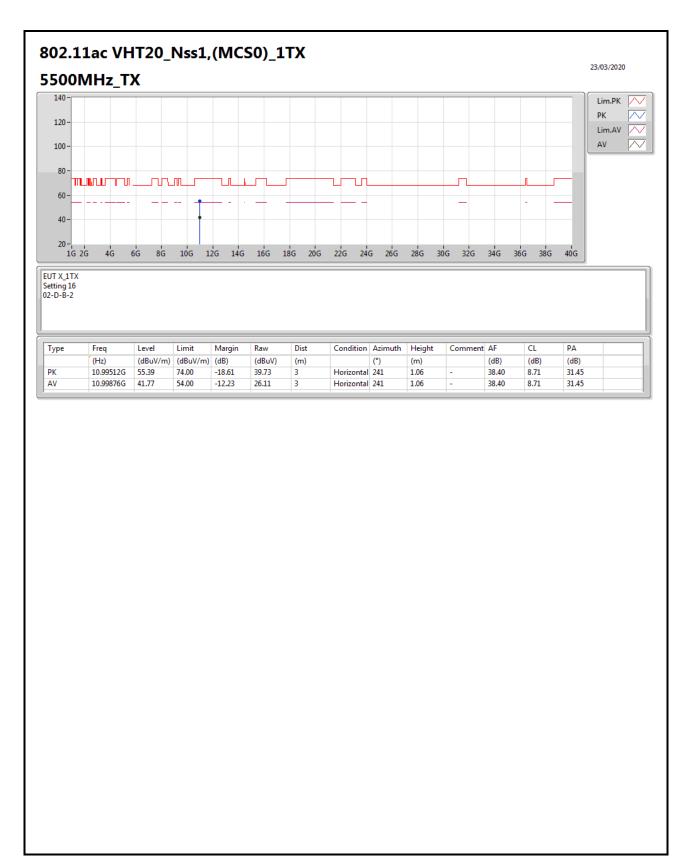




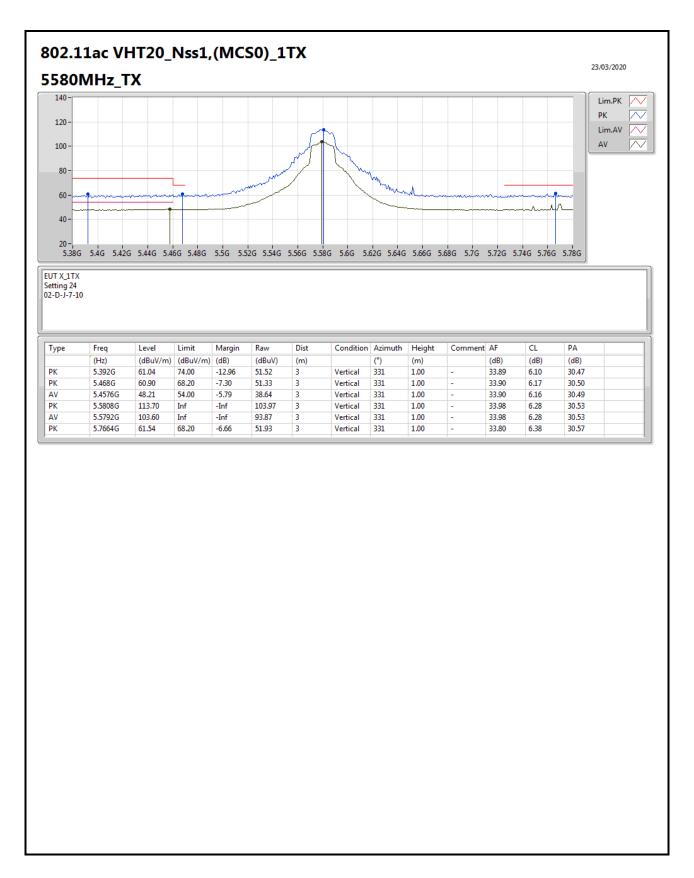




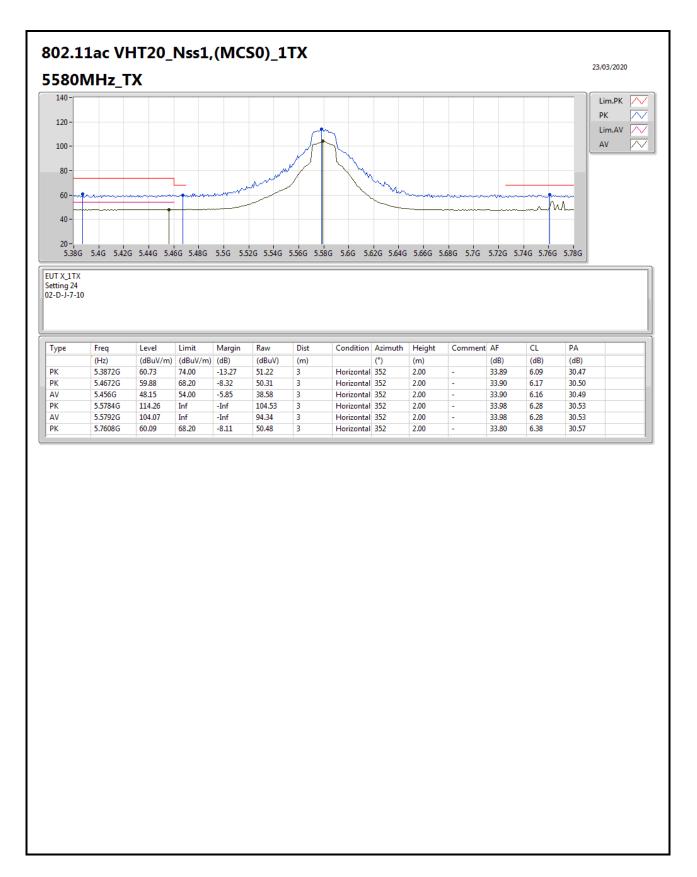




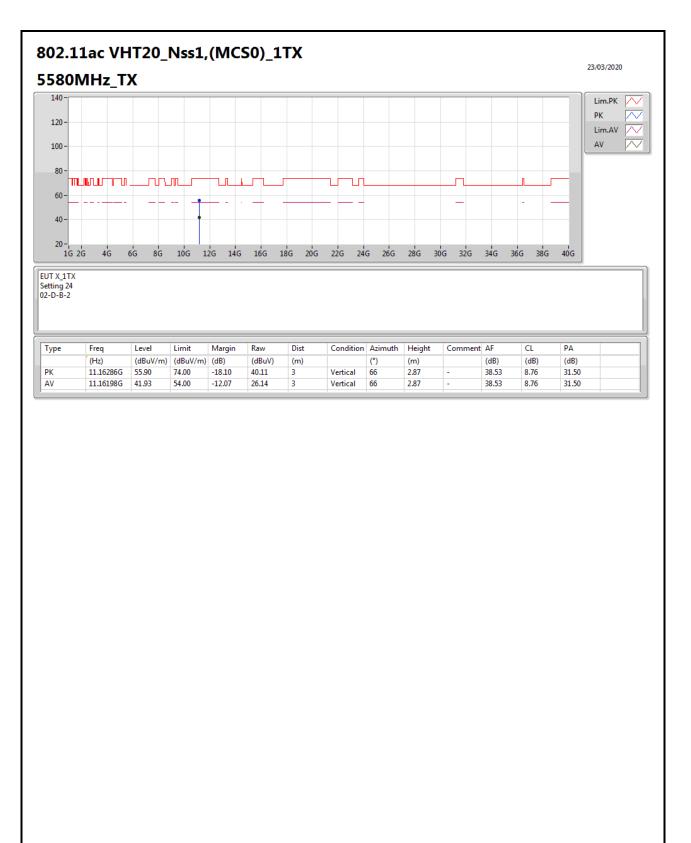




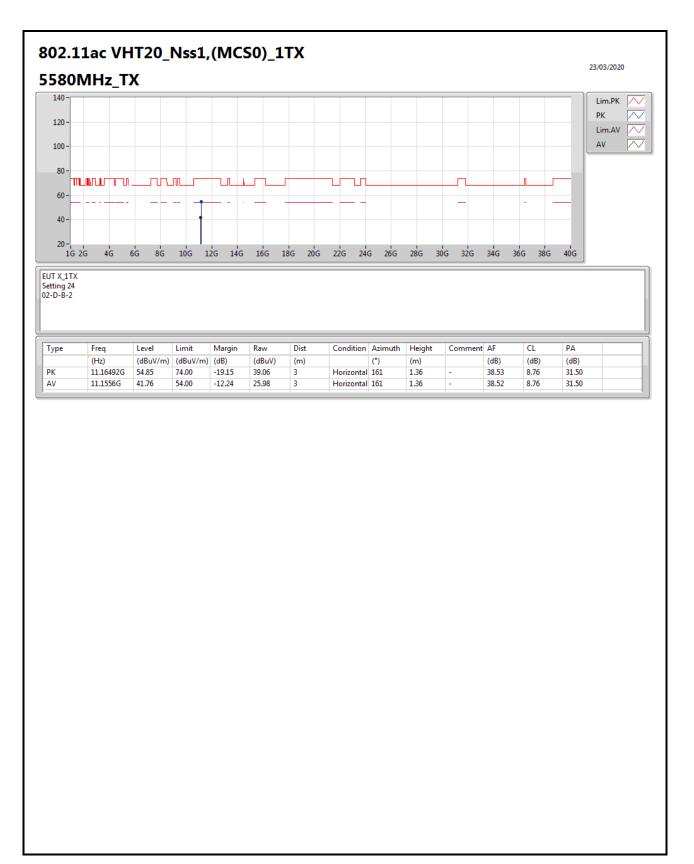




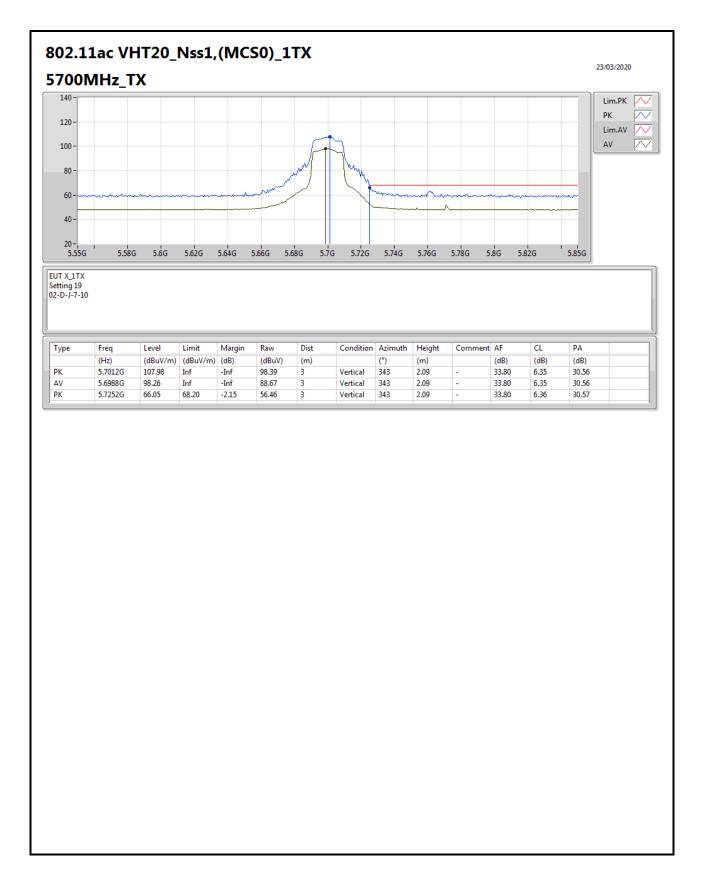




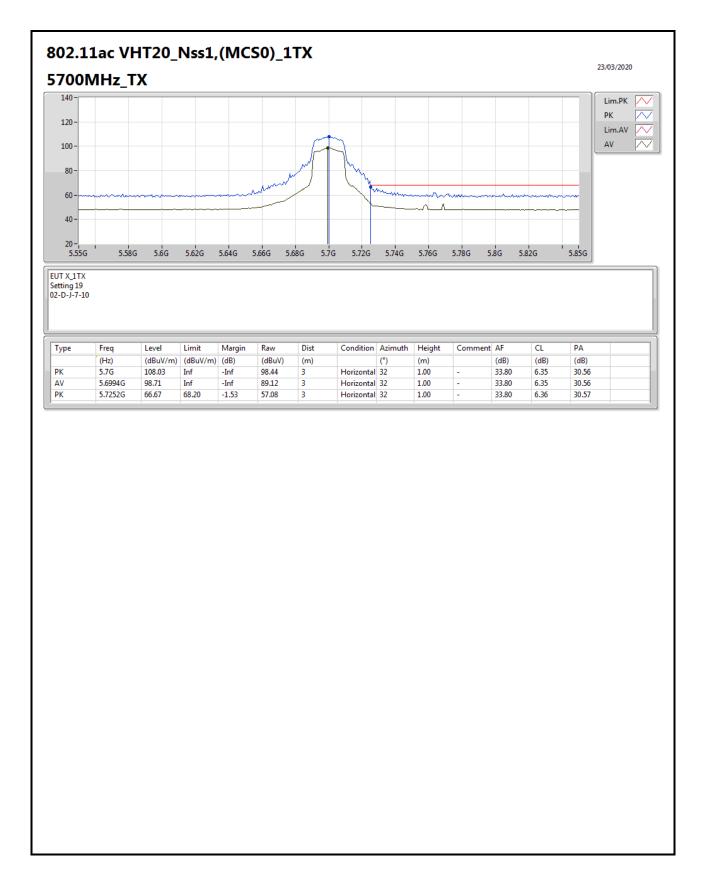




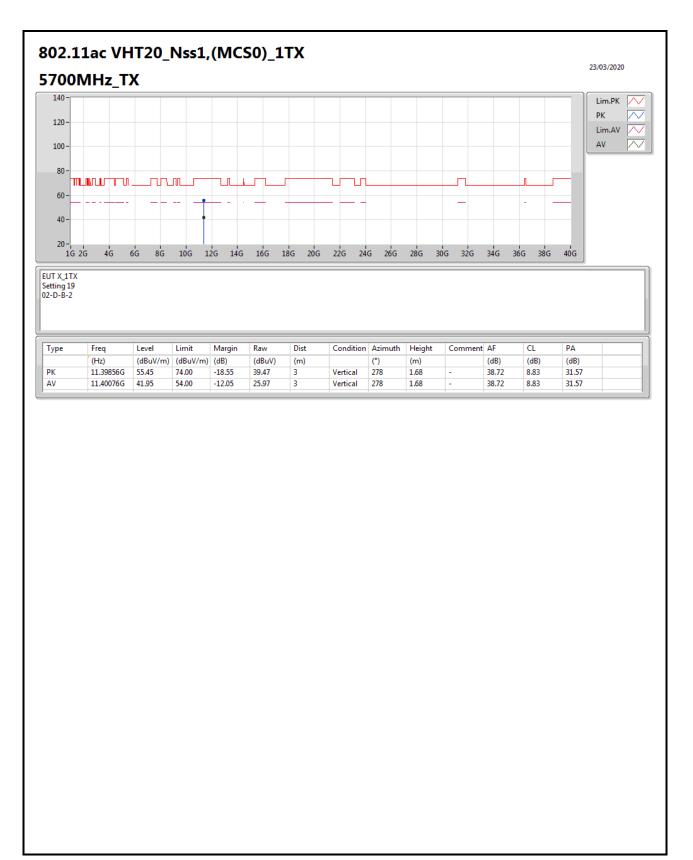




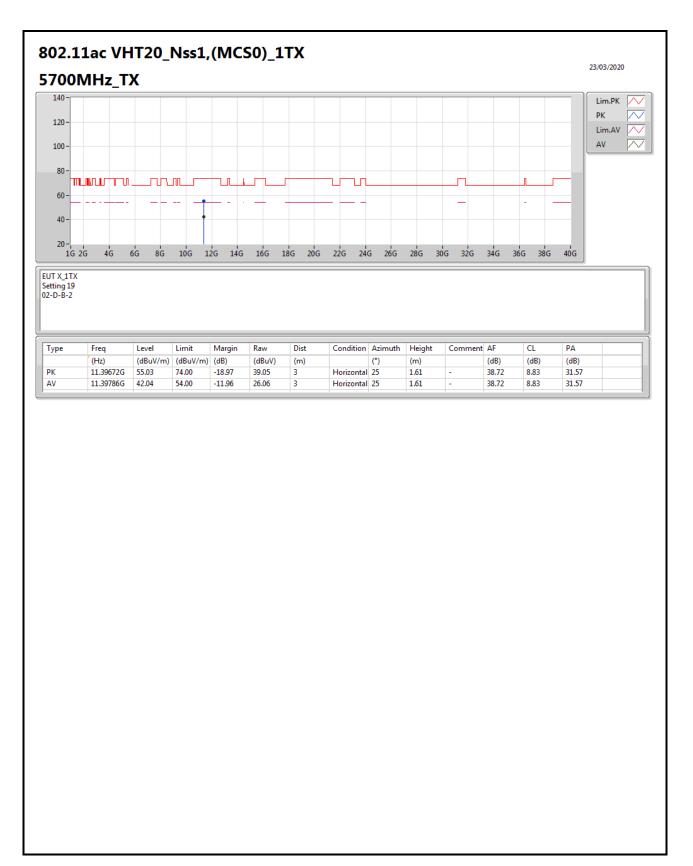




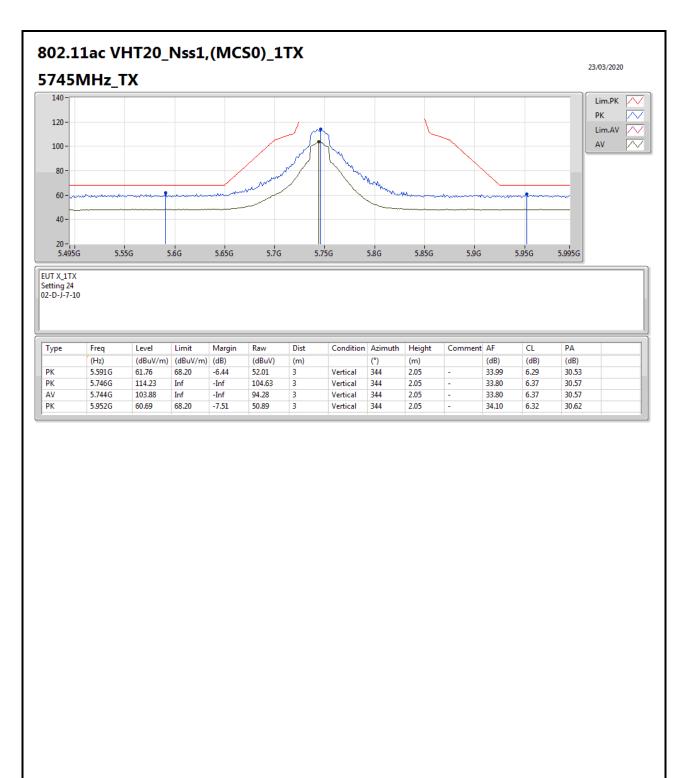




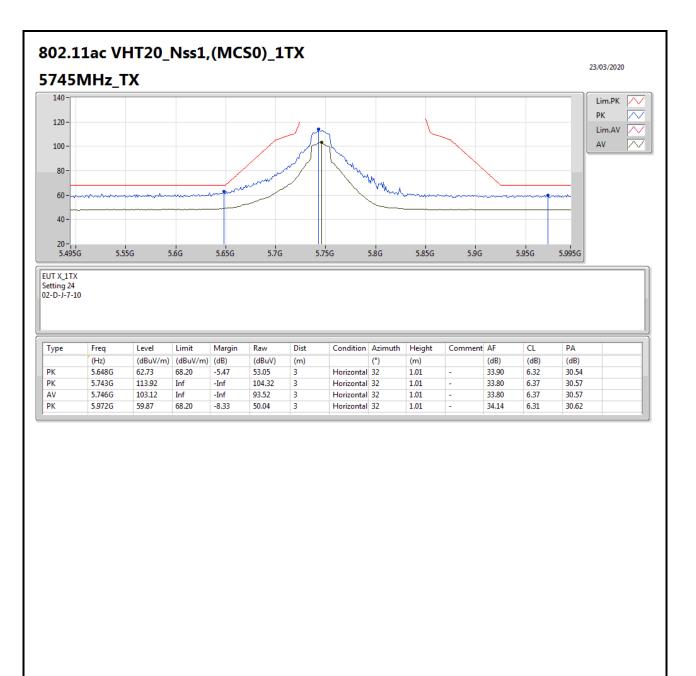




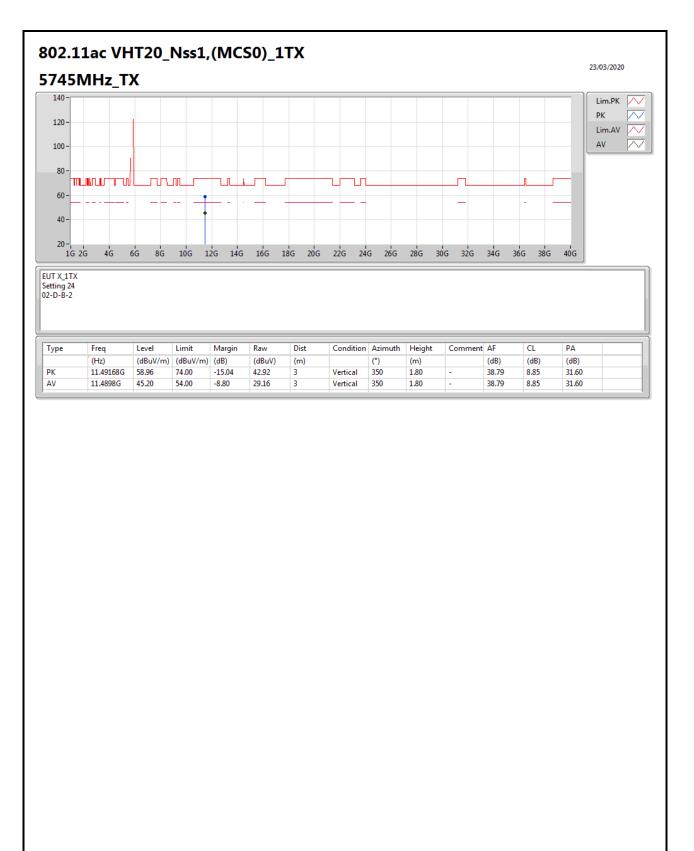




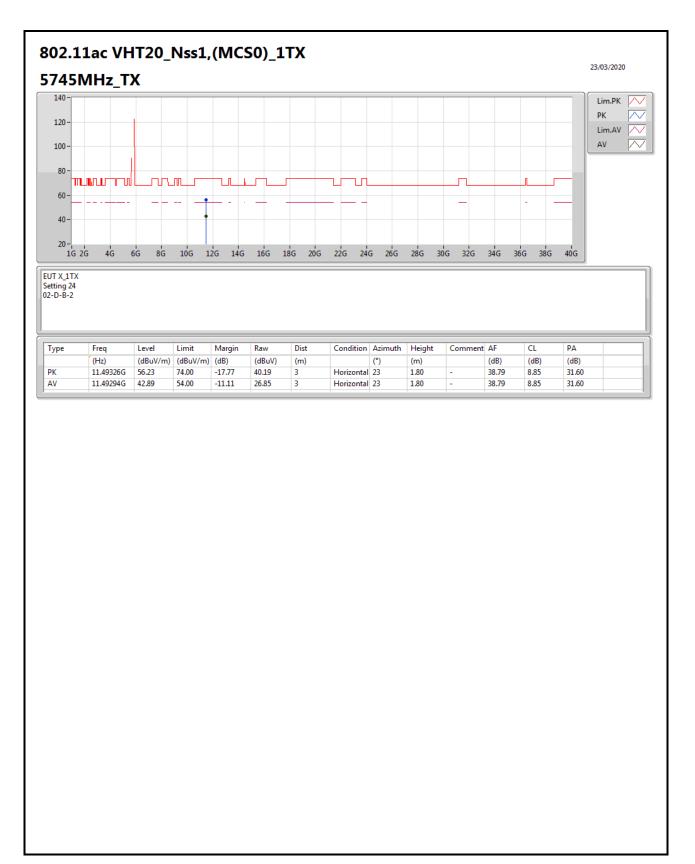




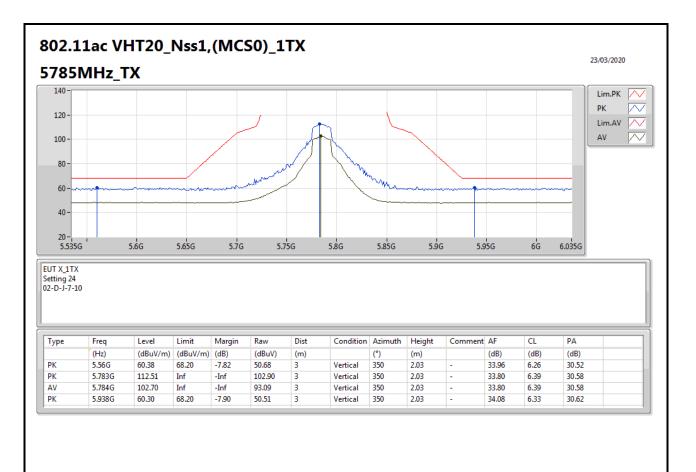




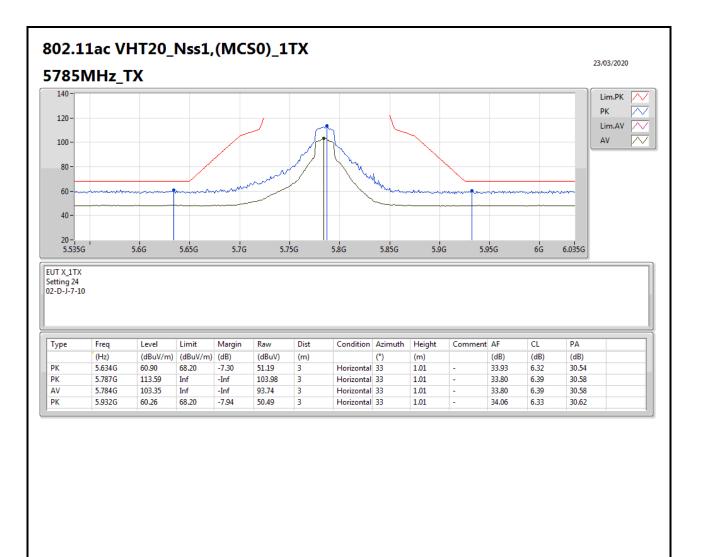




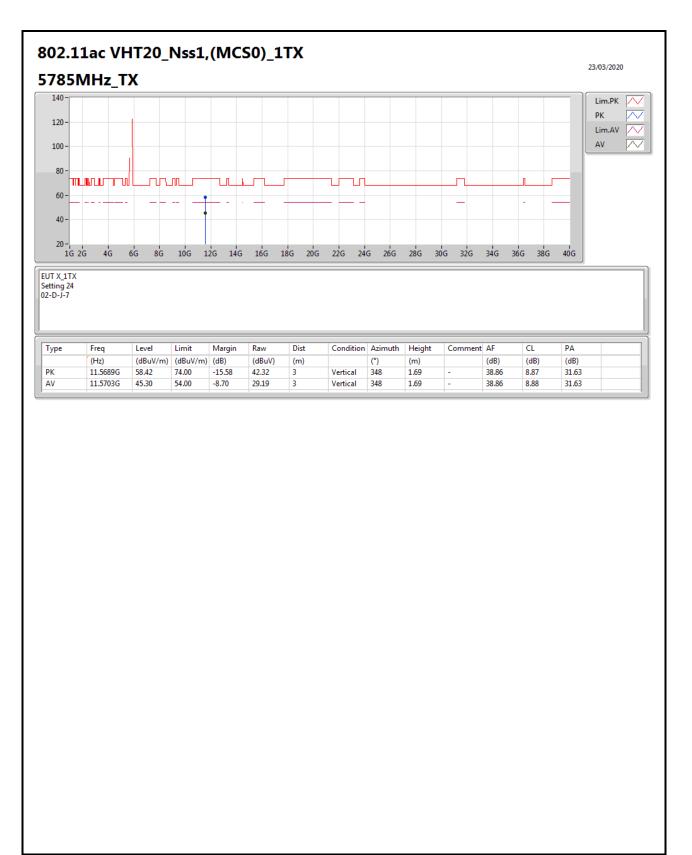




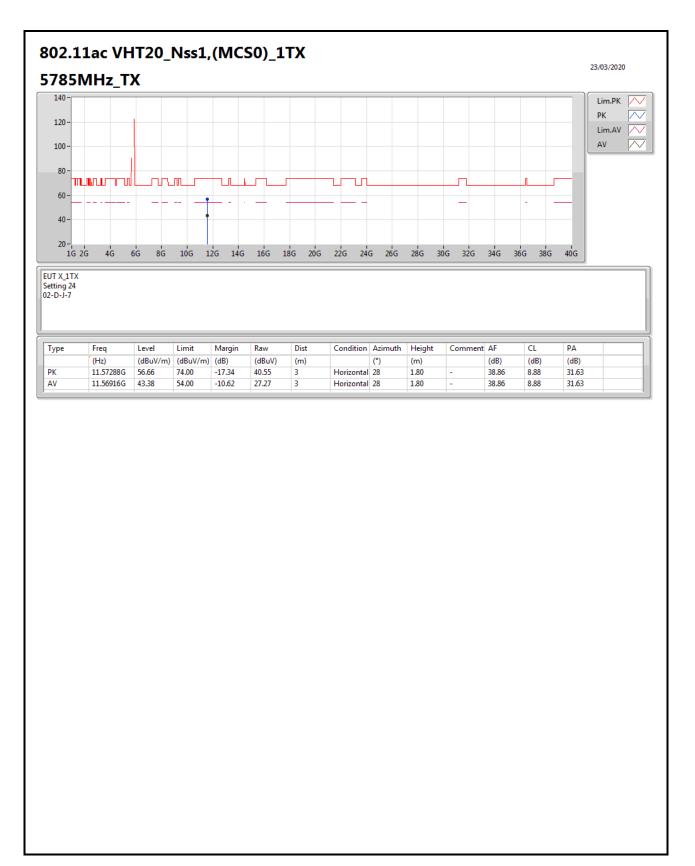




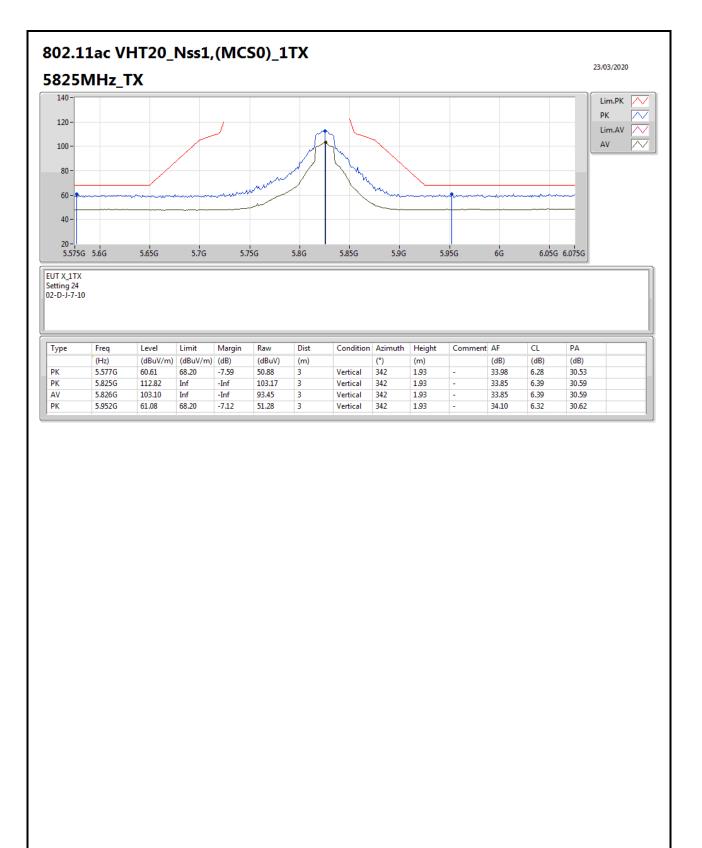




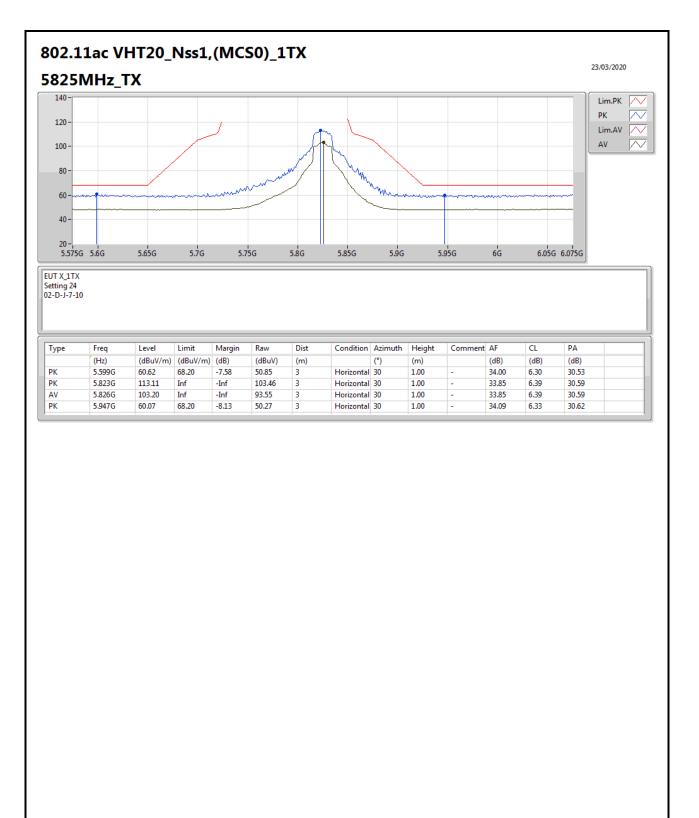




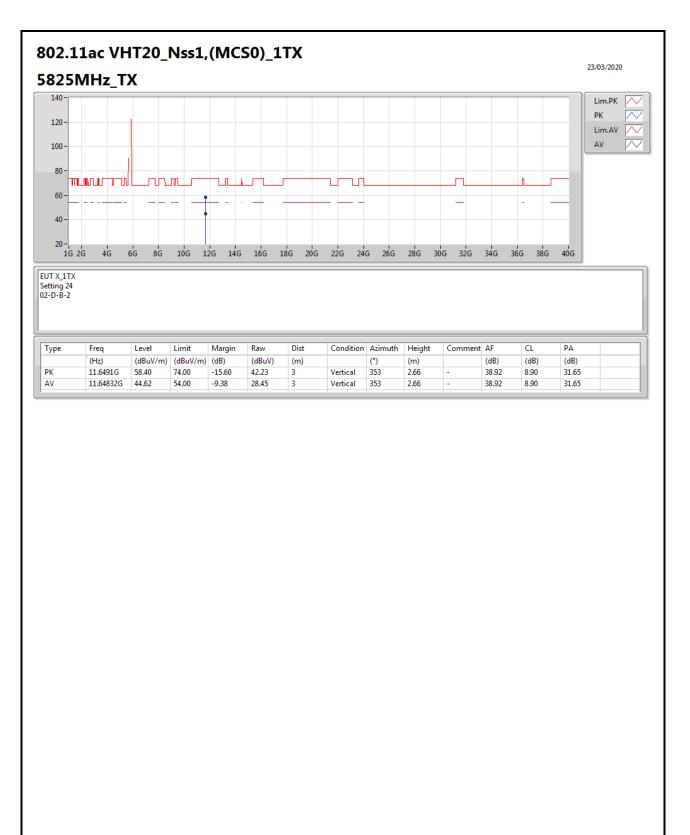




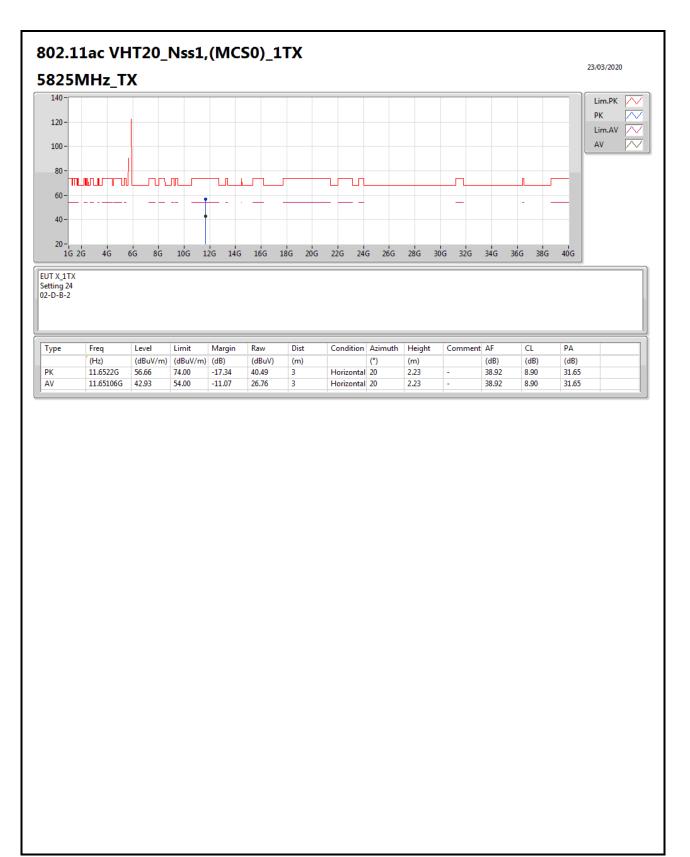




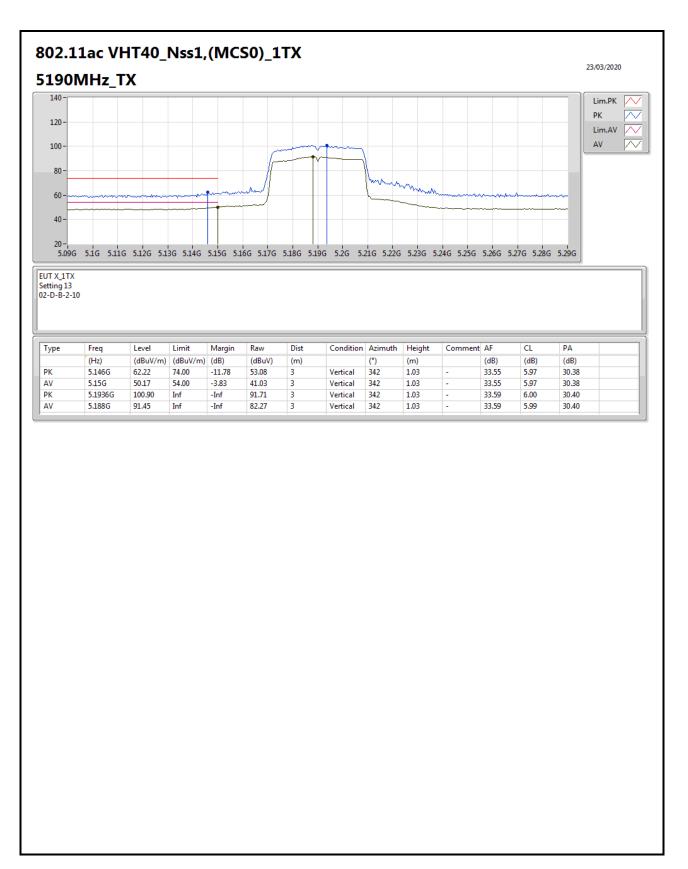




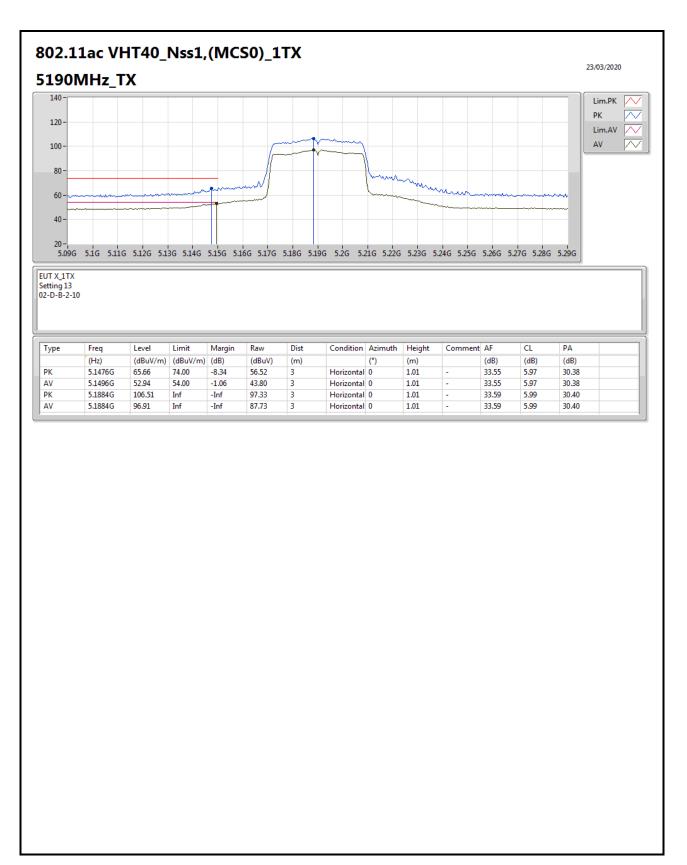




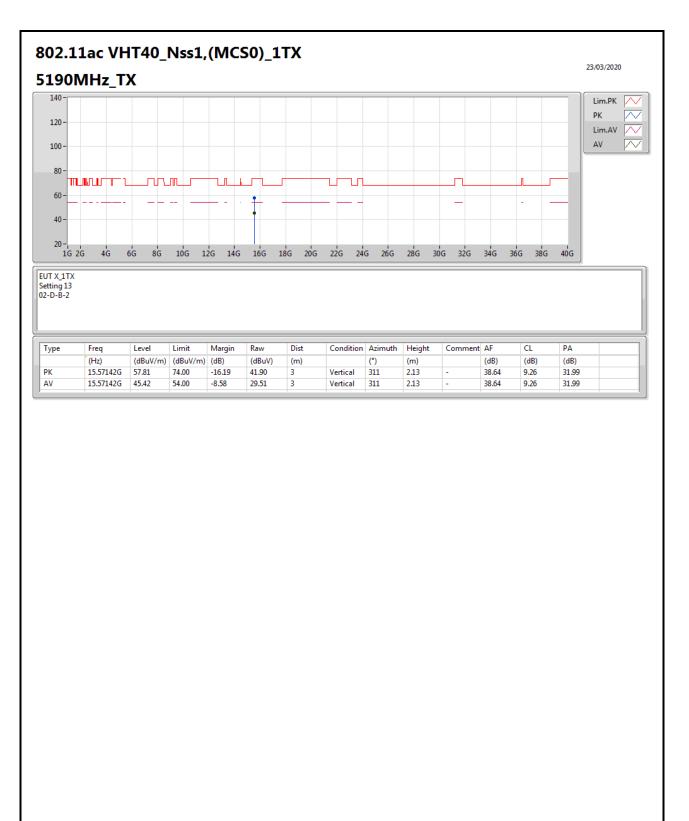




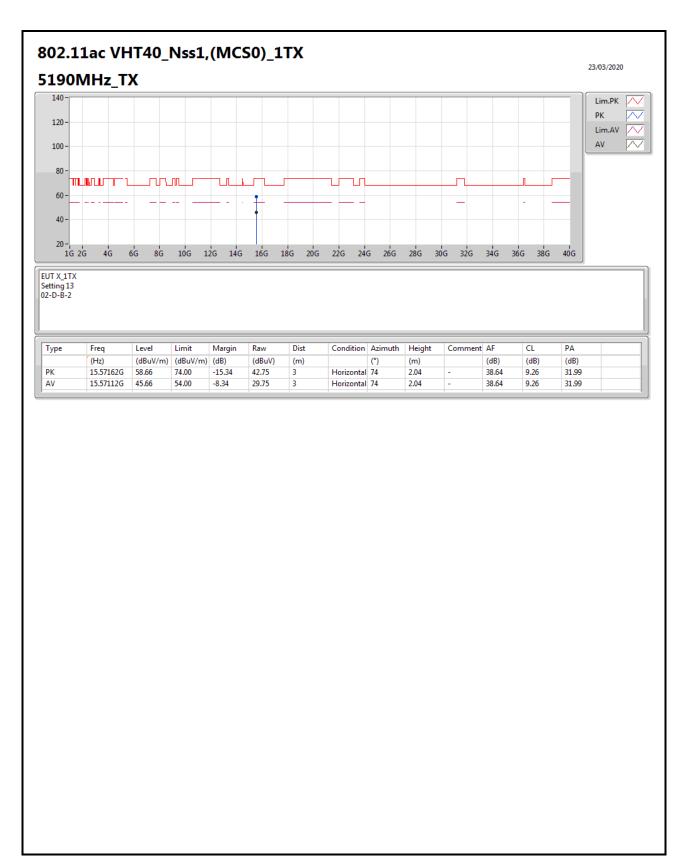




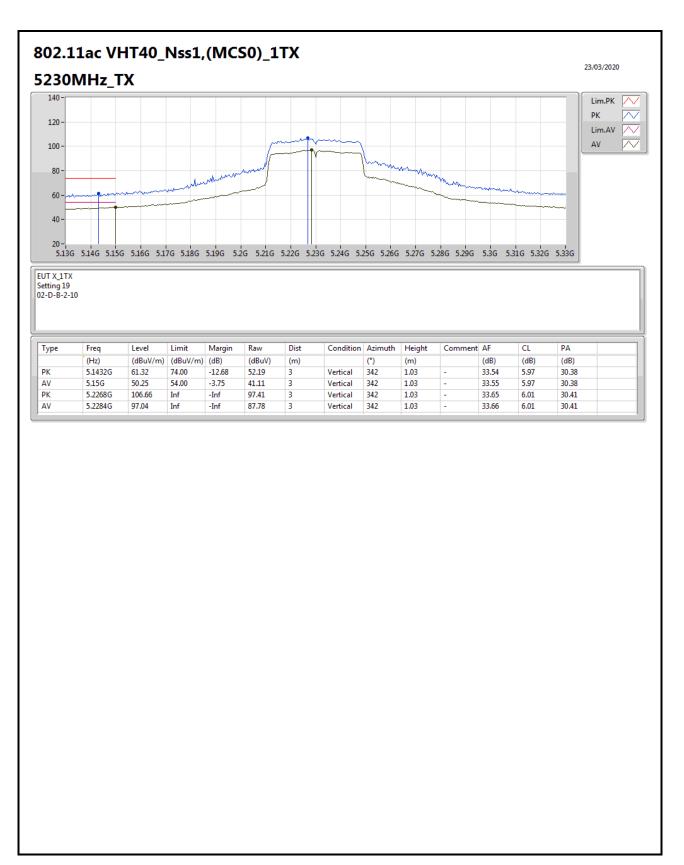




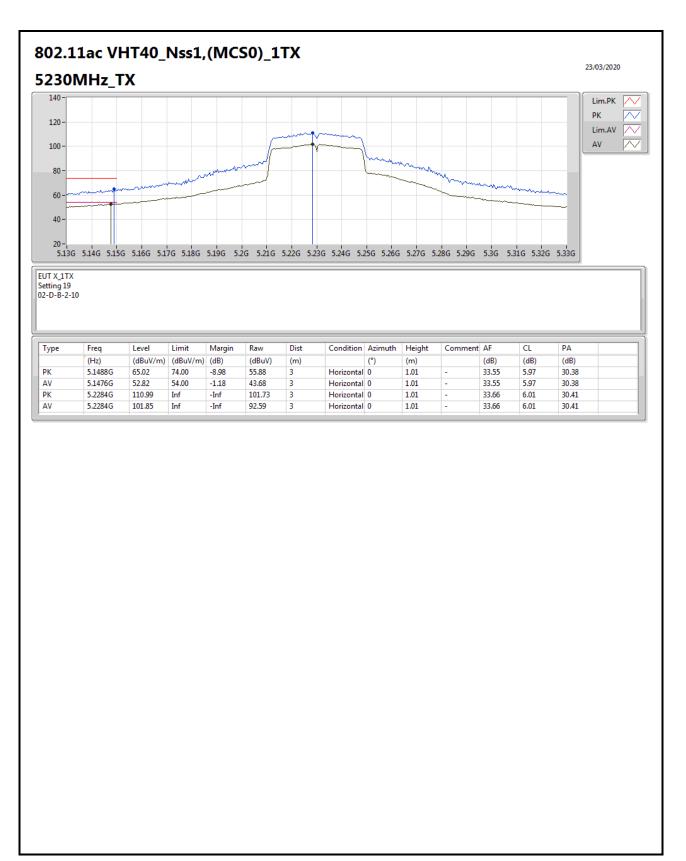




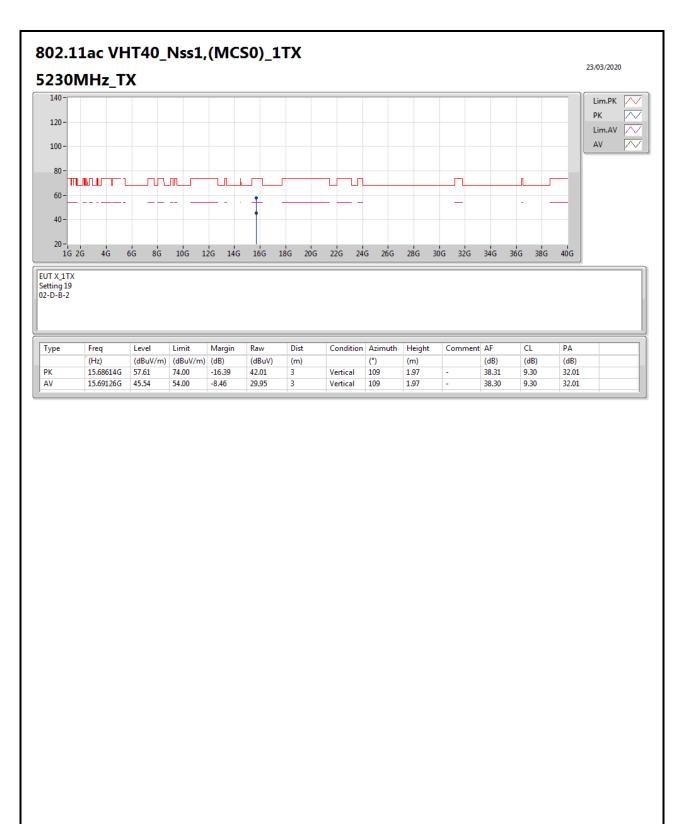




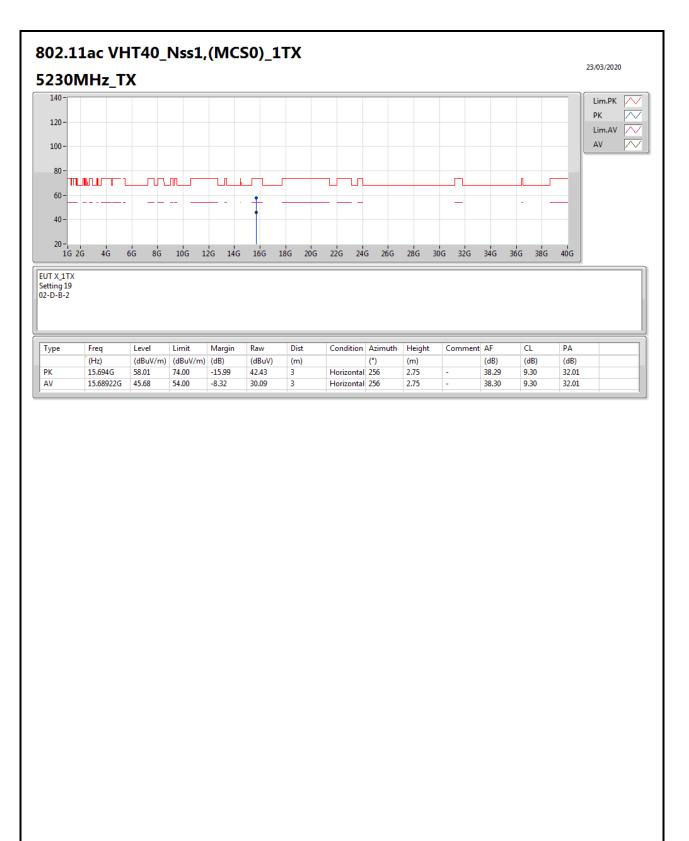




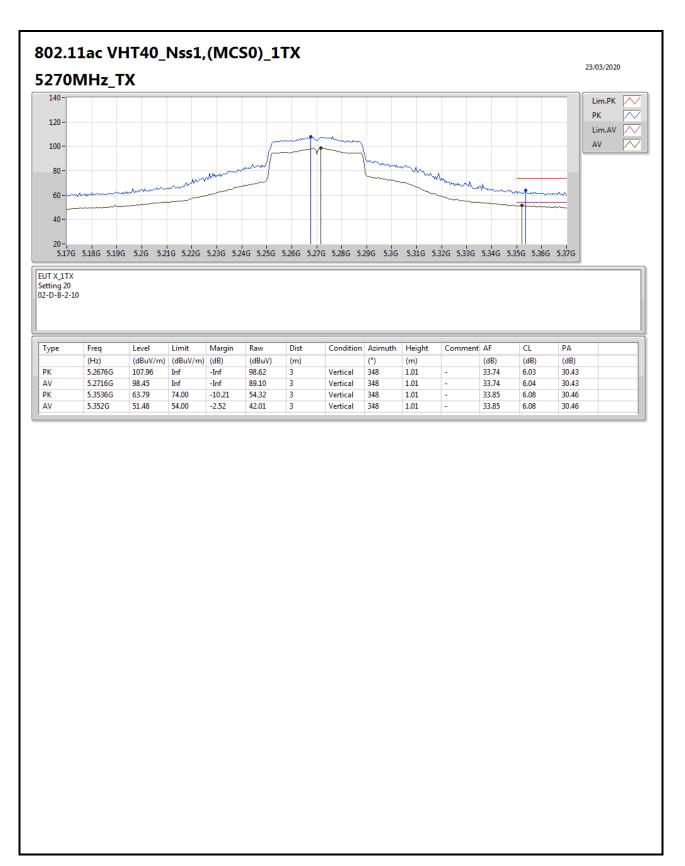




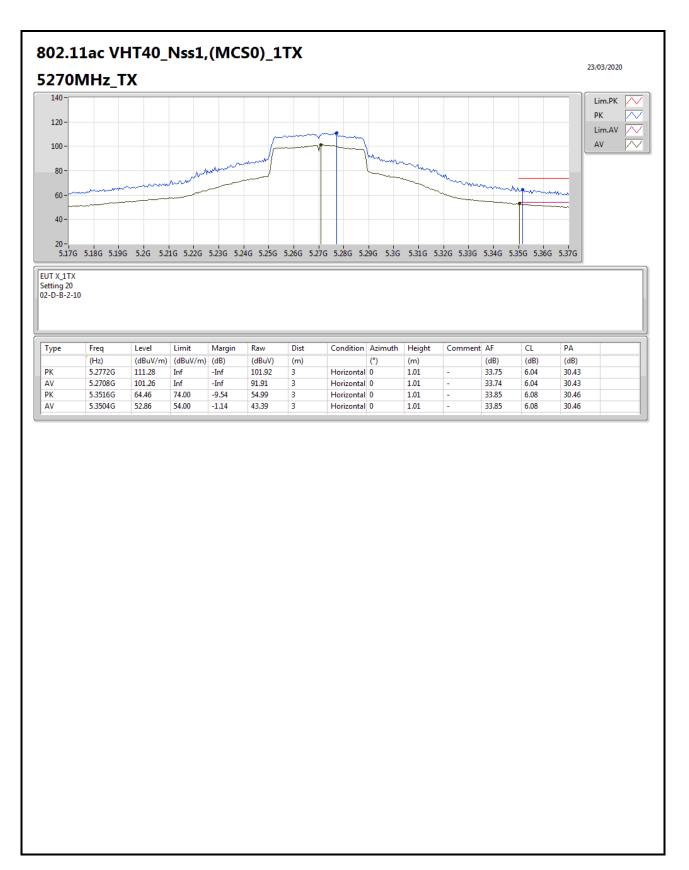




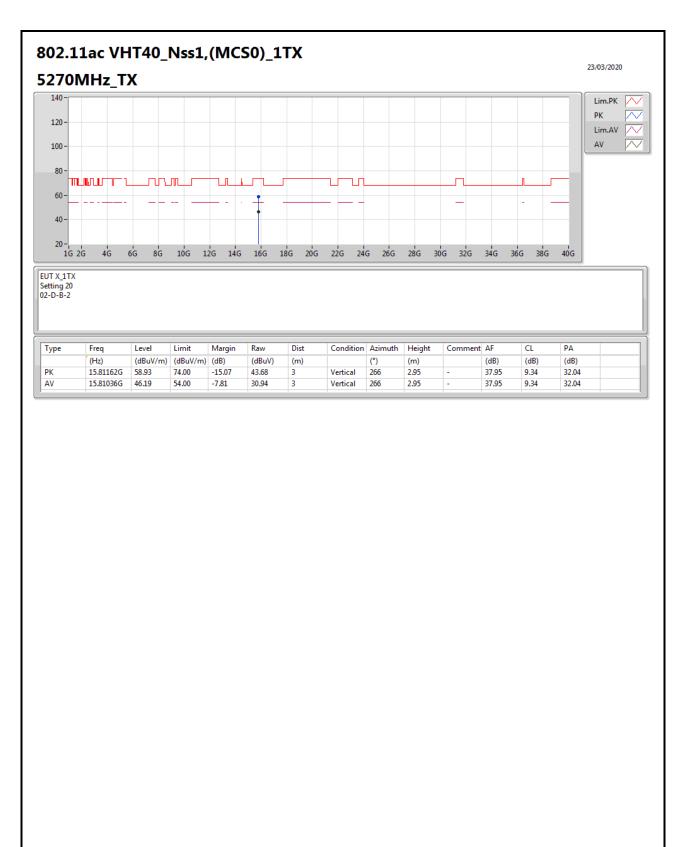




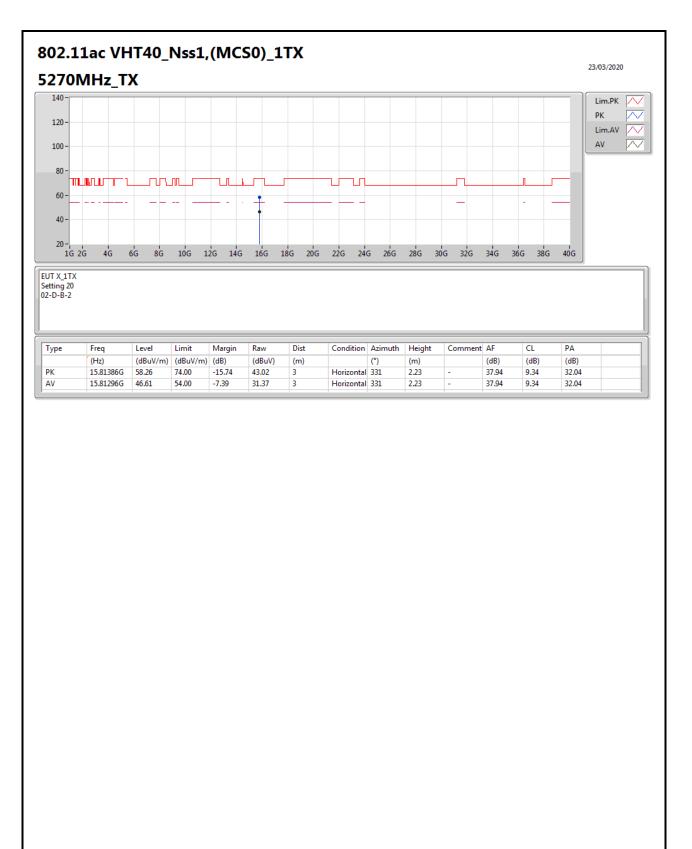




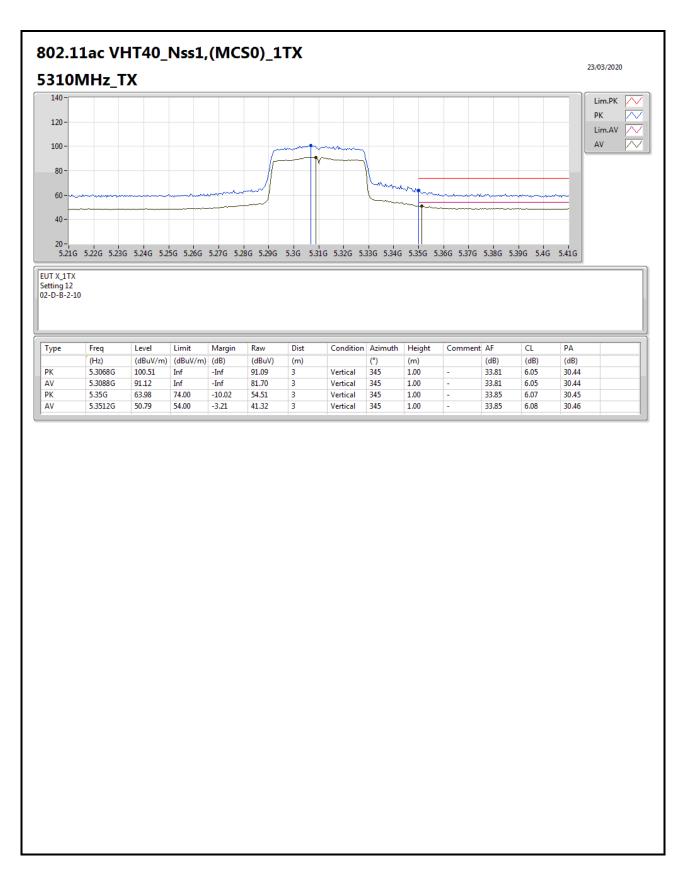




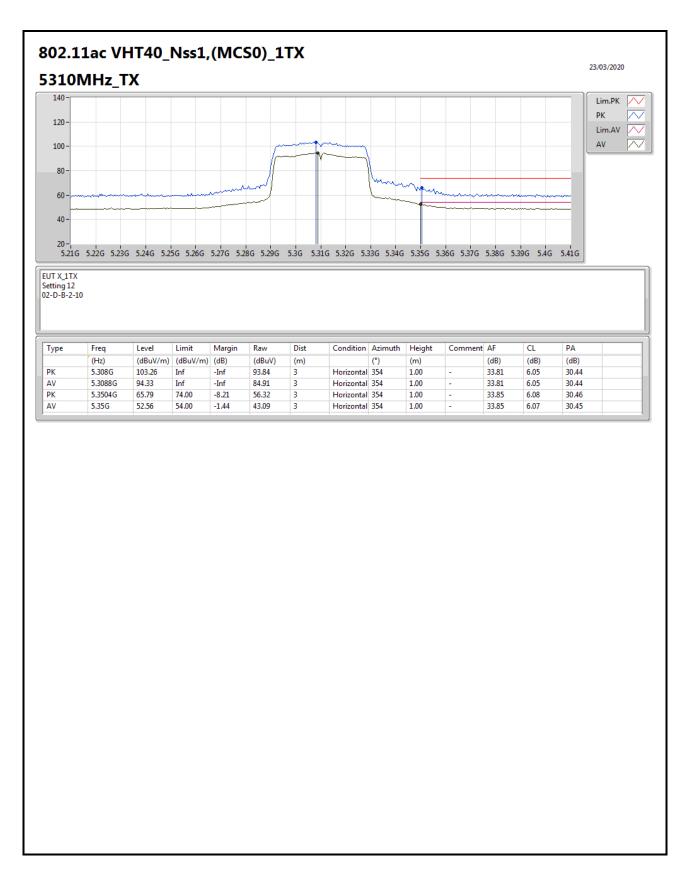




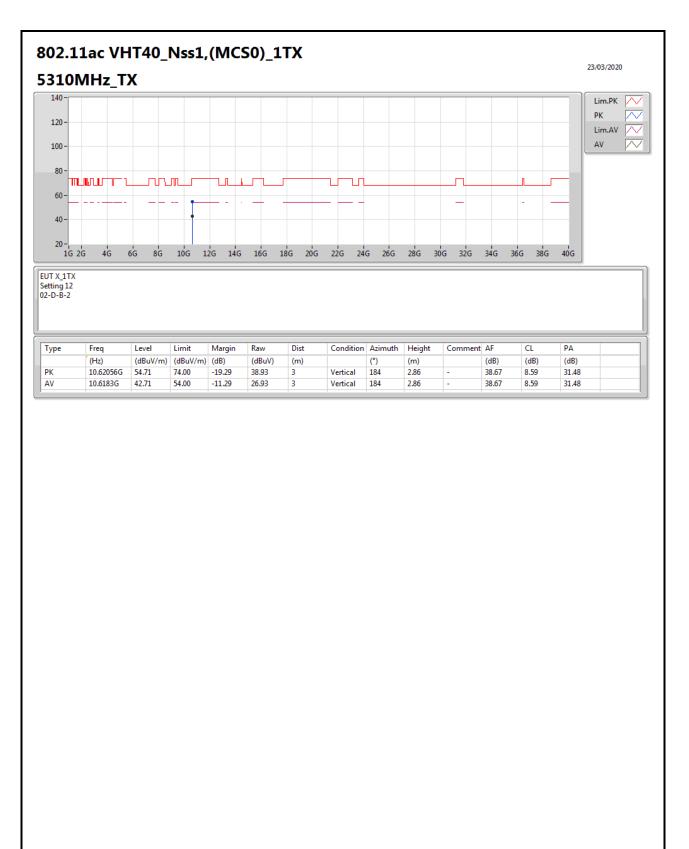




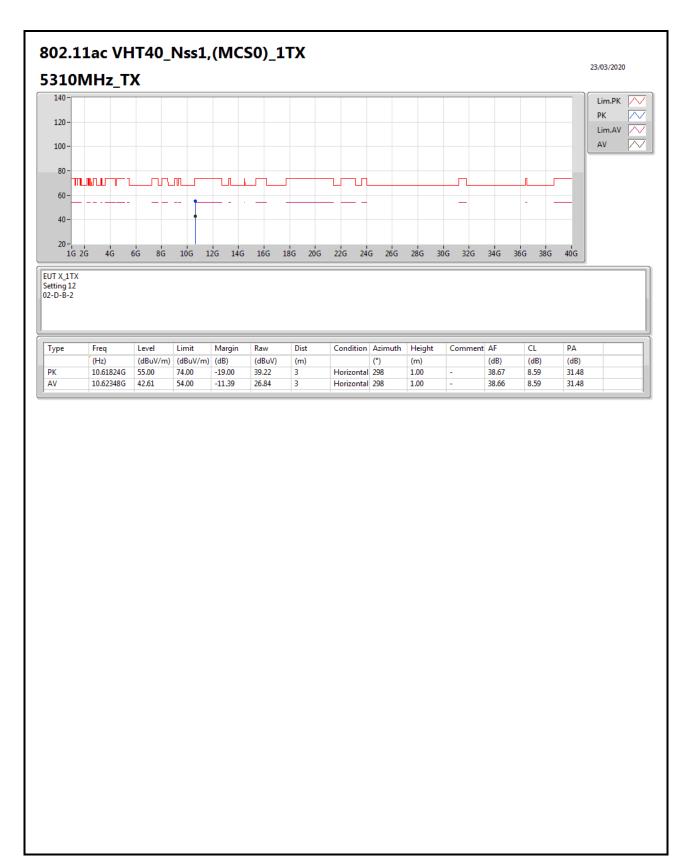




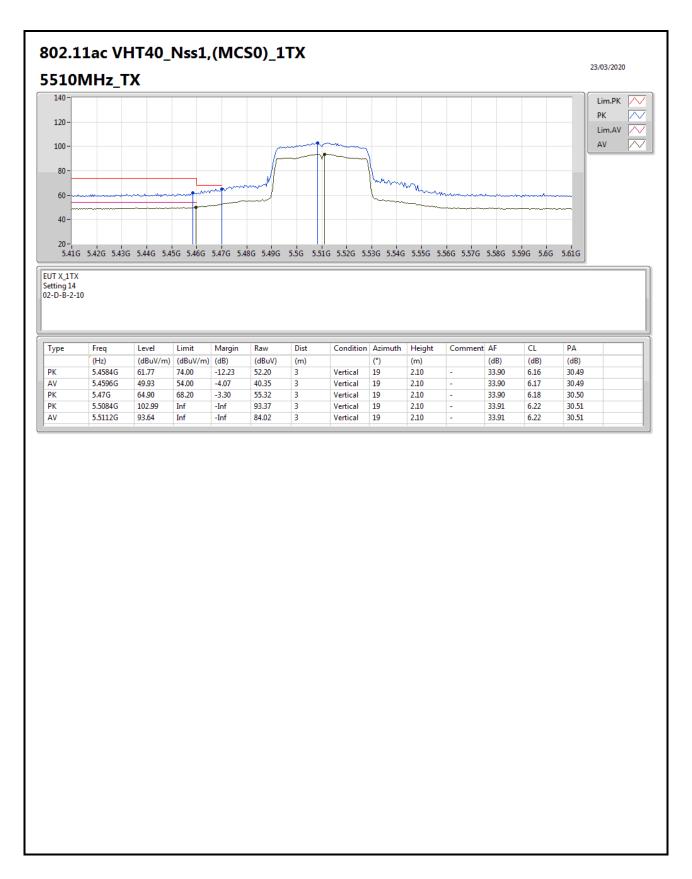




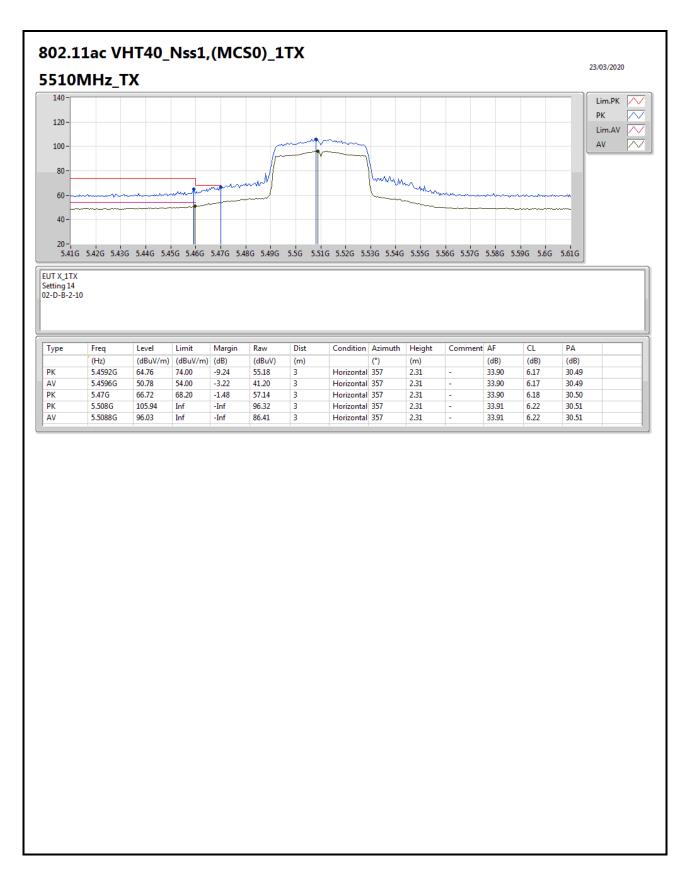




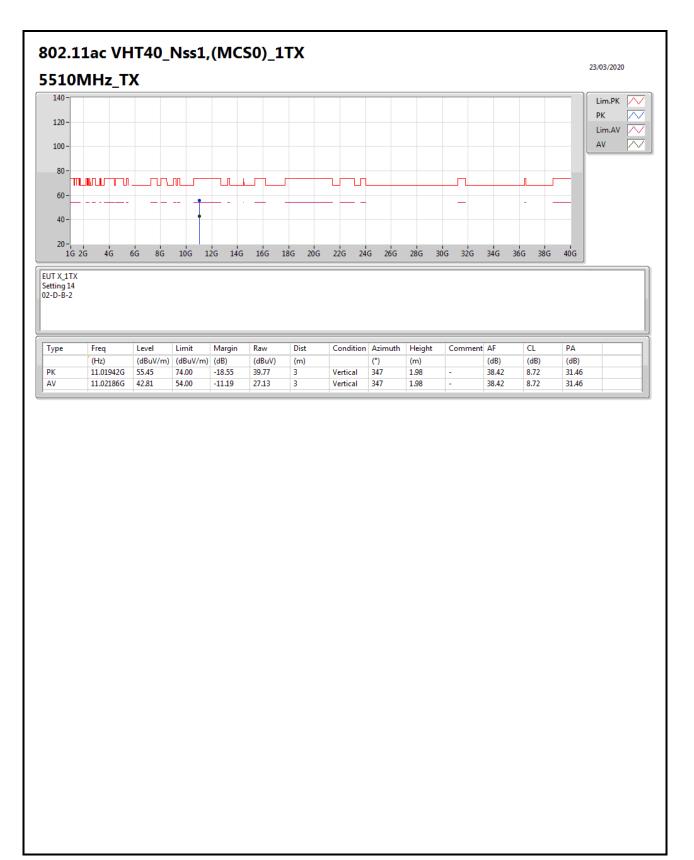




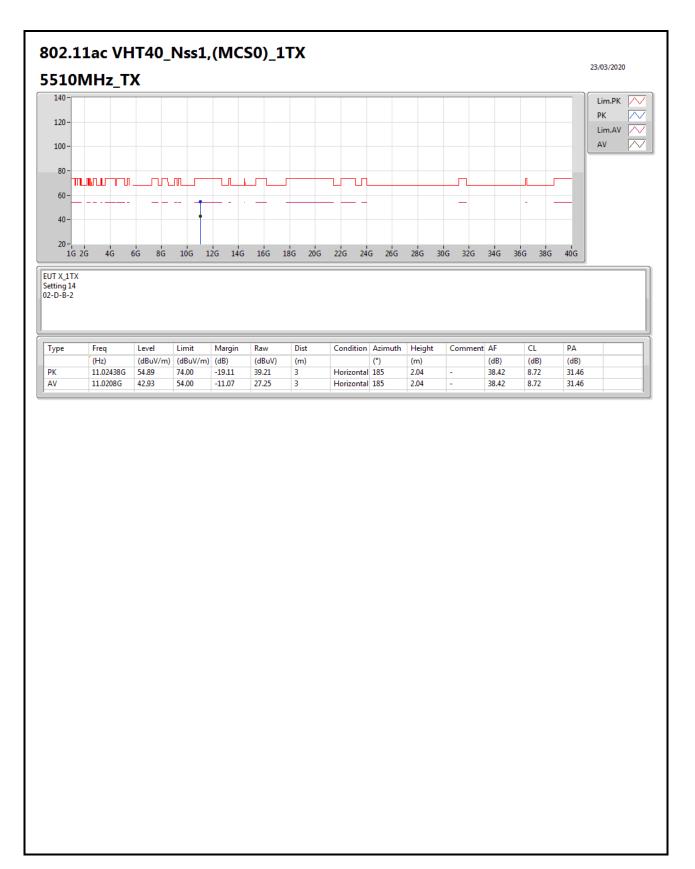




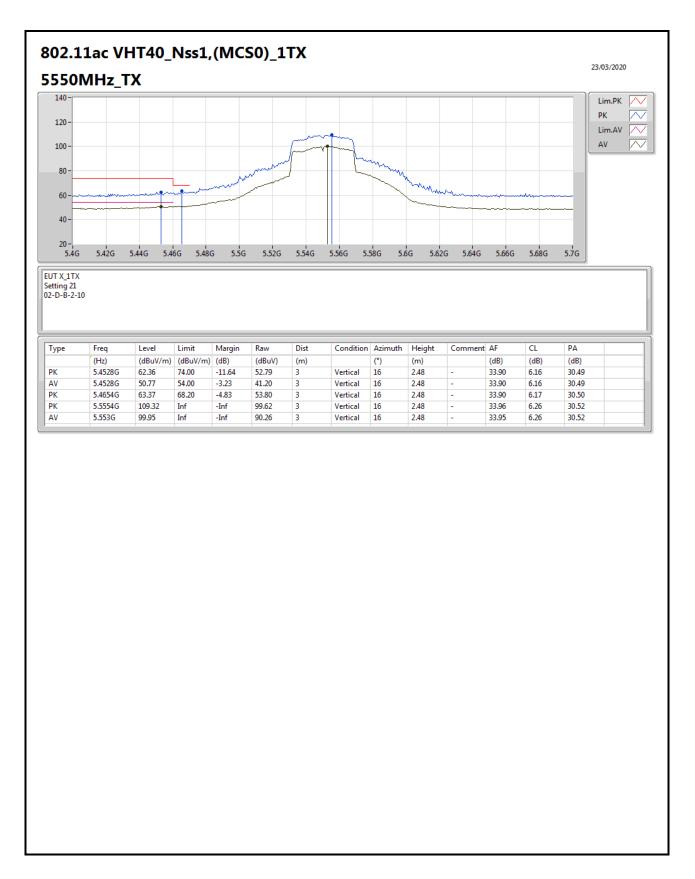




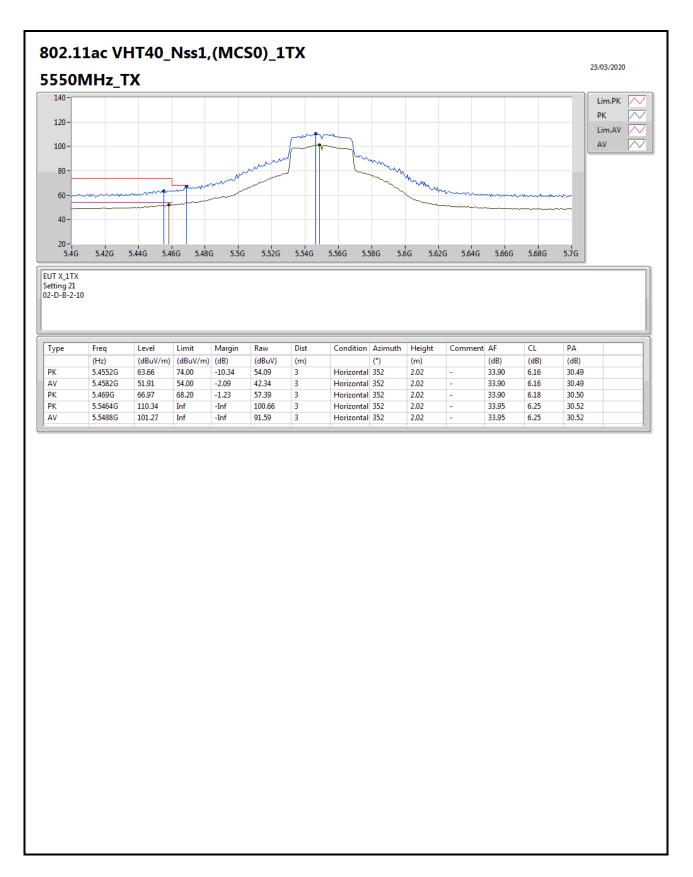




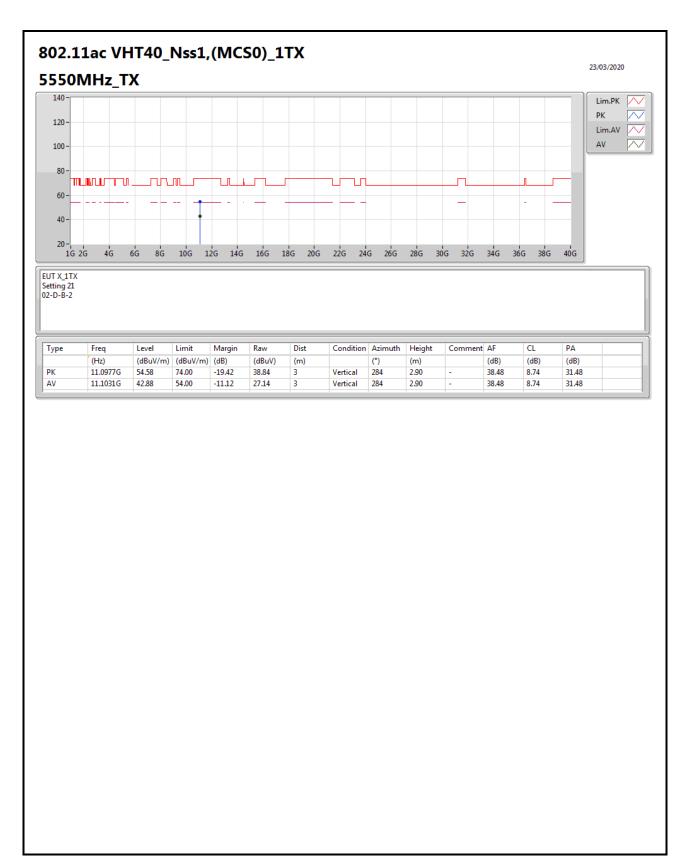




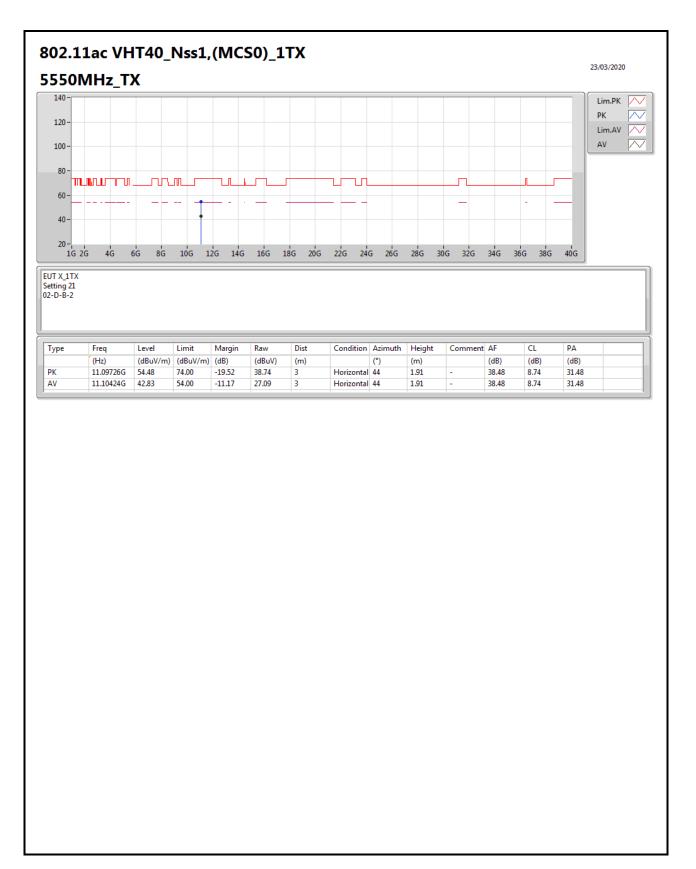






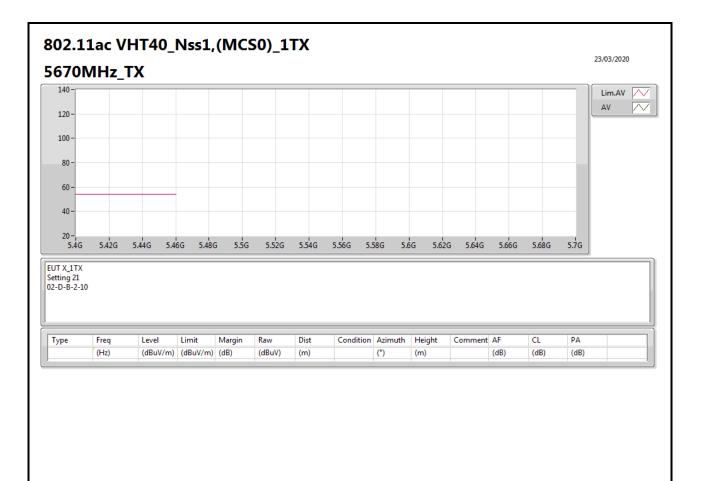




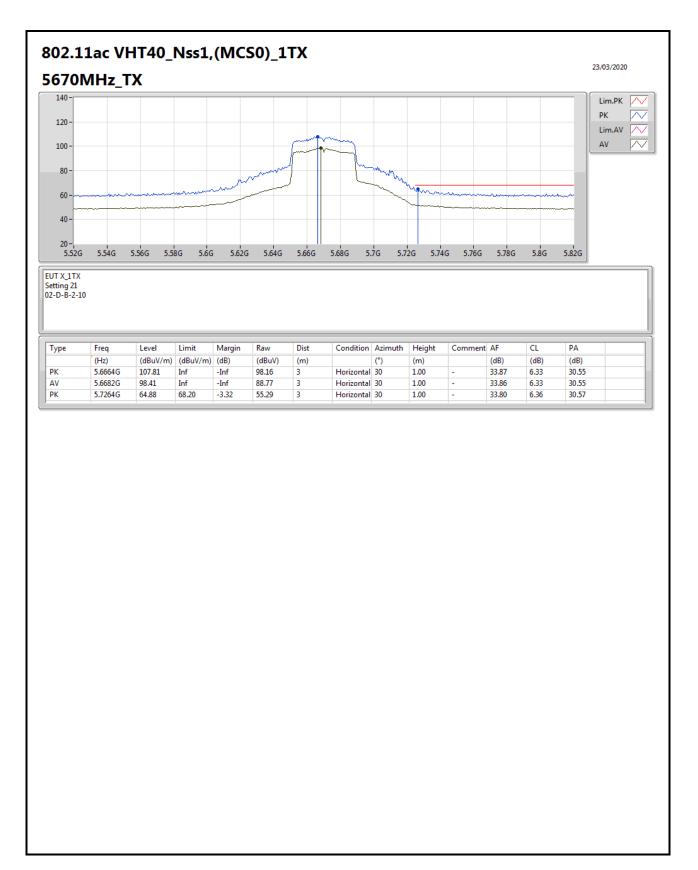




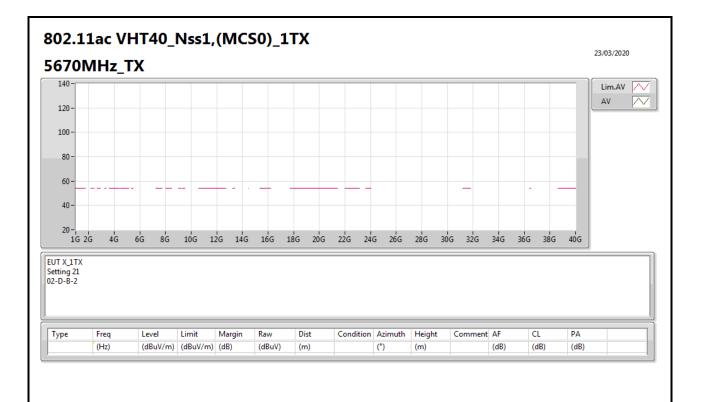
Appendix E.2



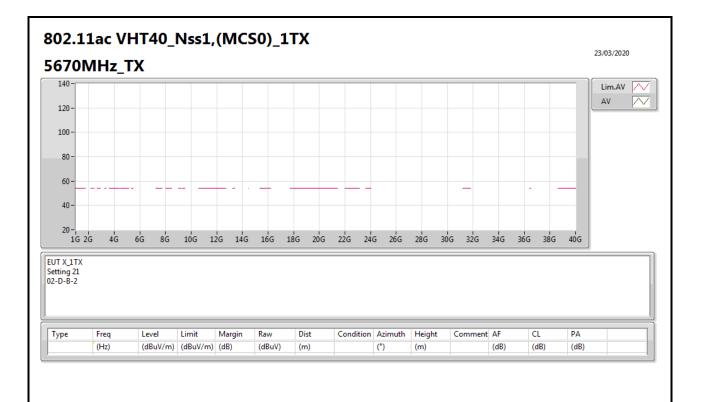




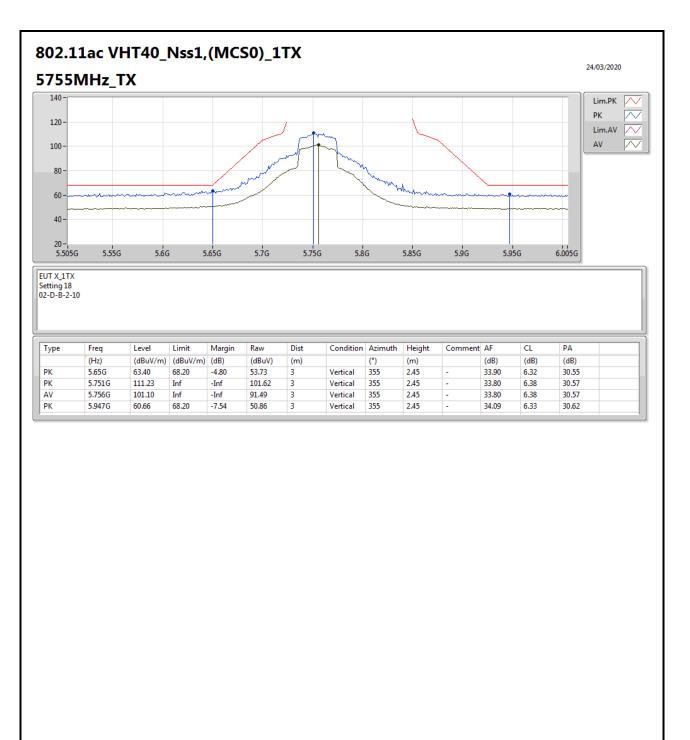




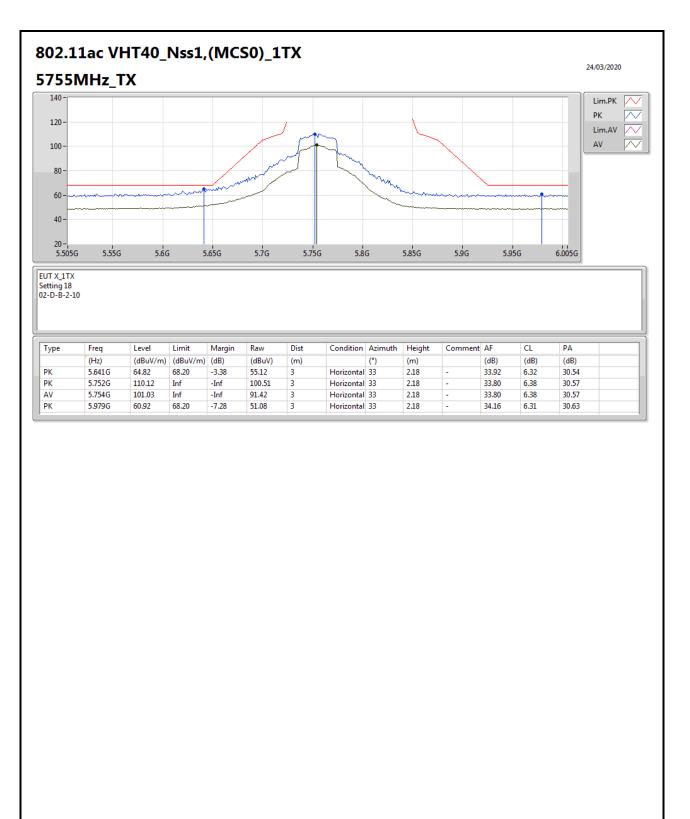




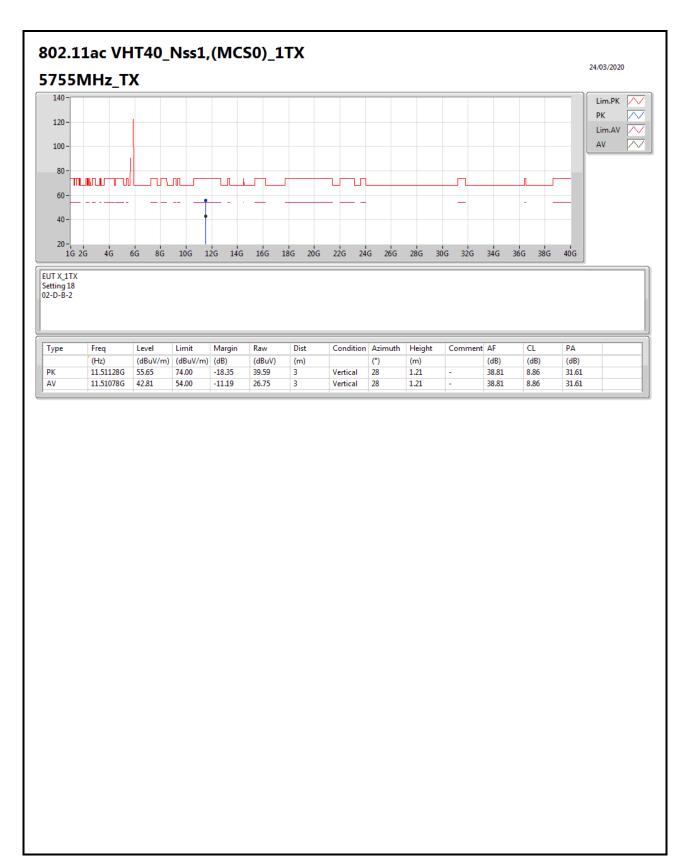




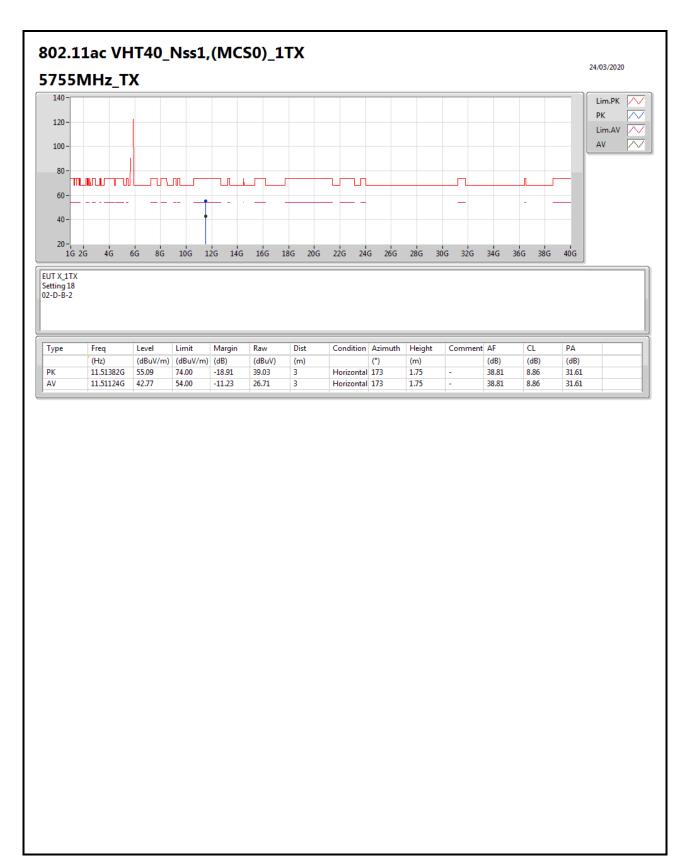




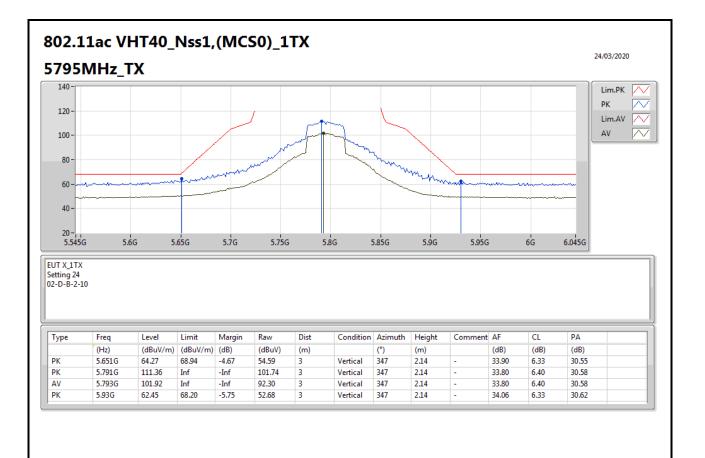




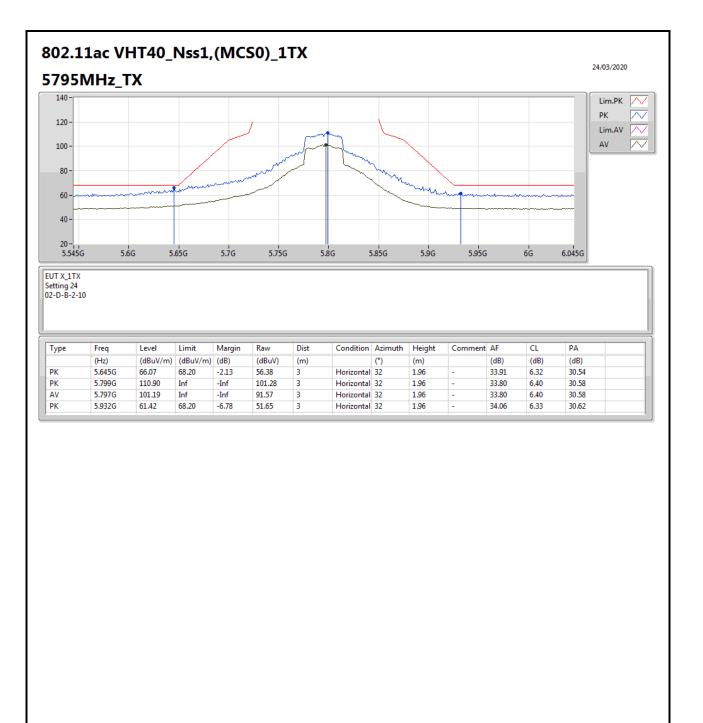




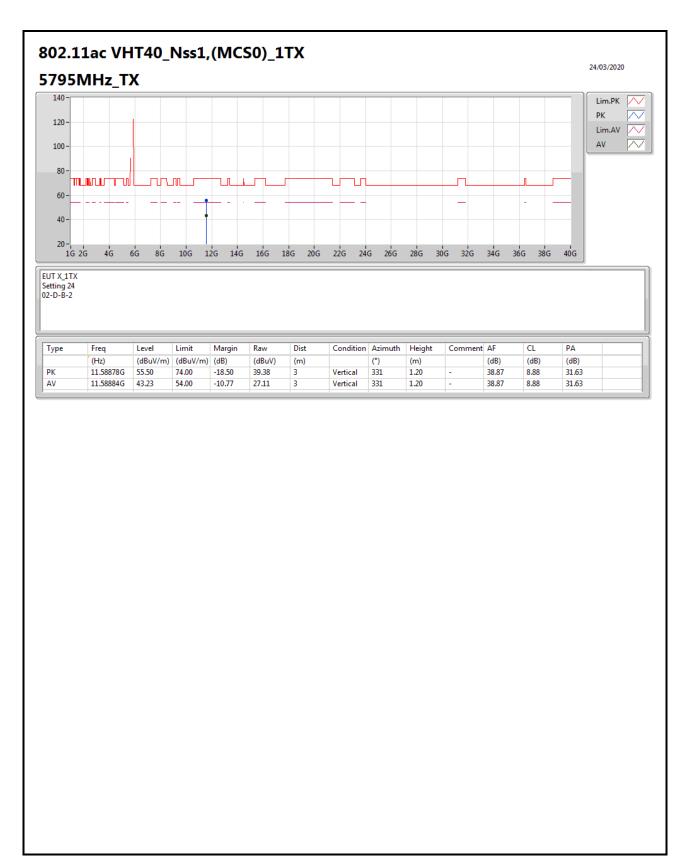




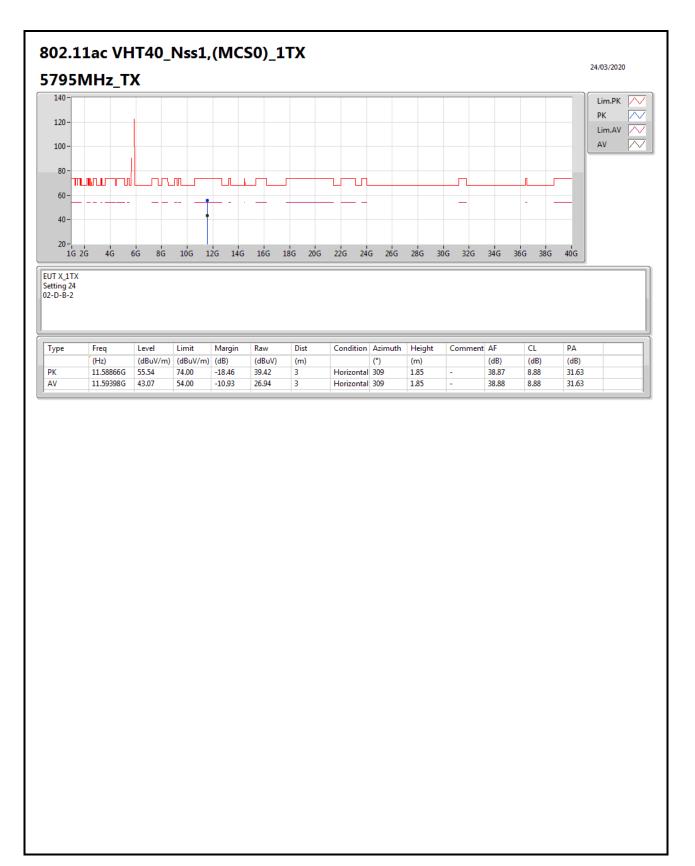




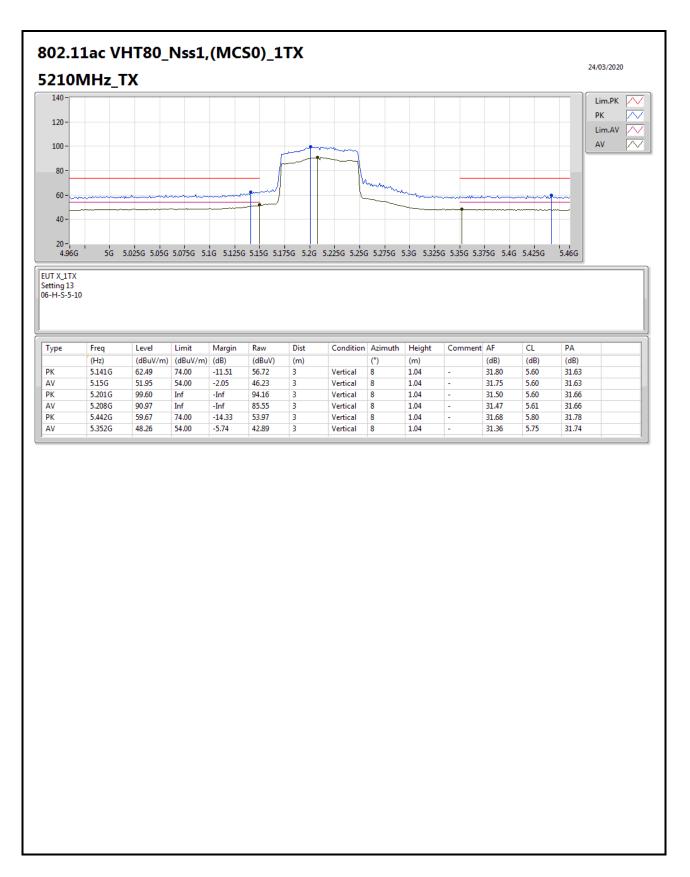




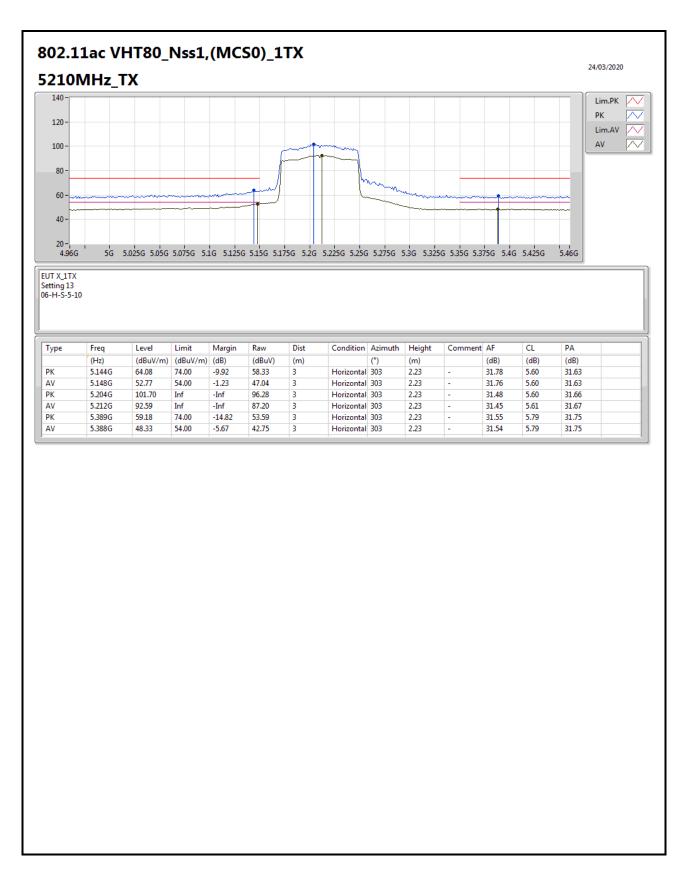




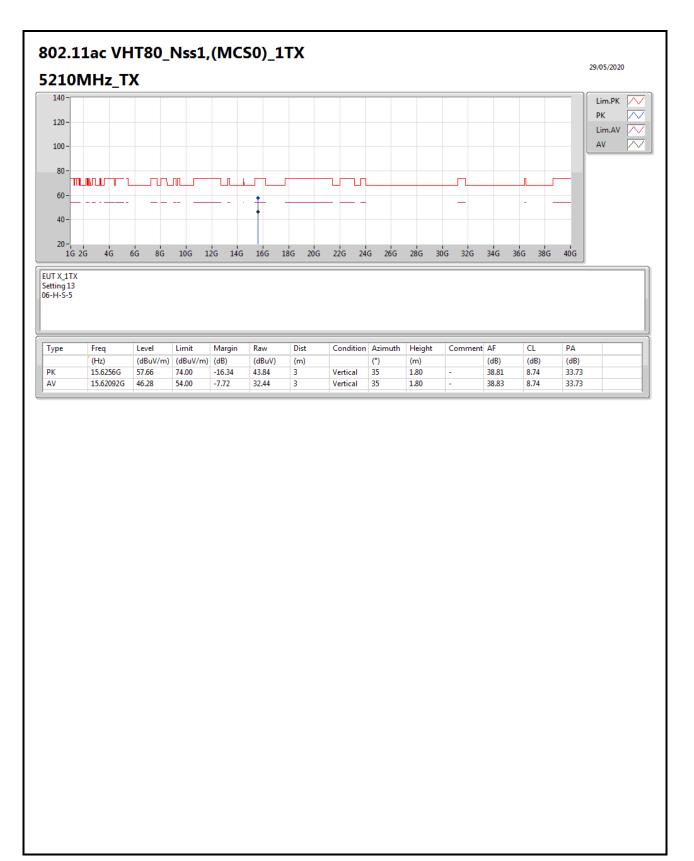




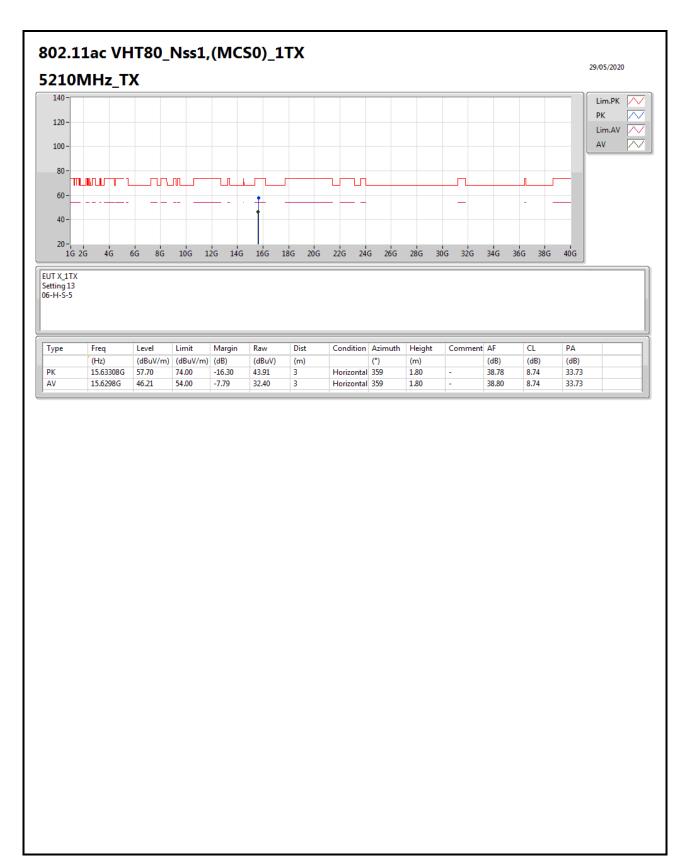




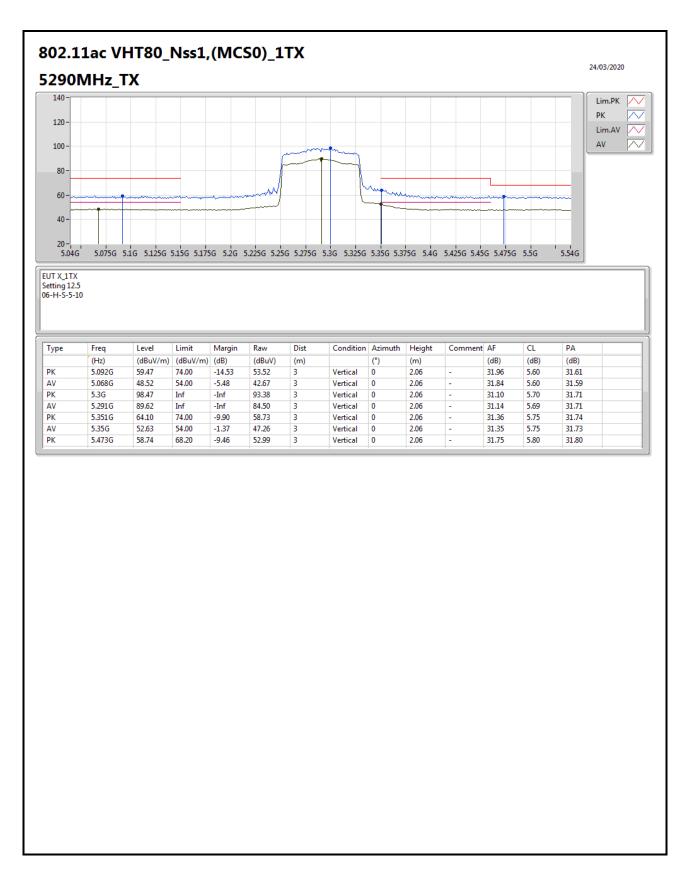




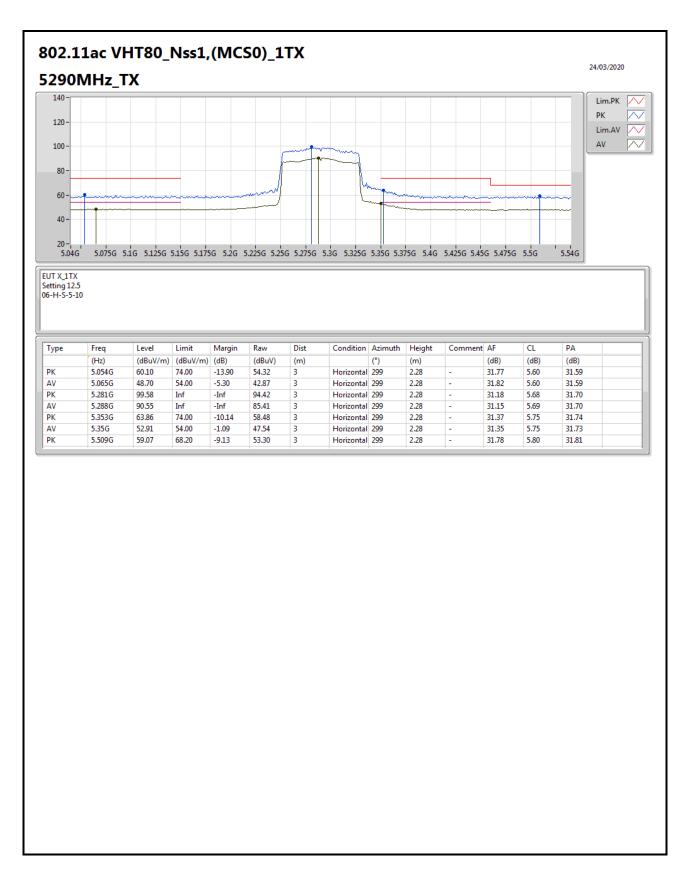




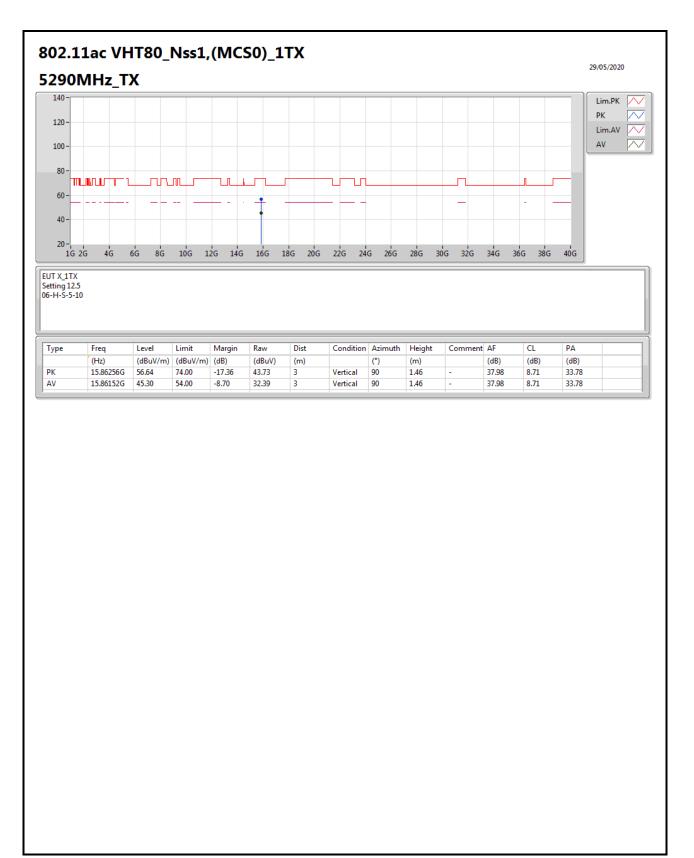




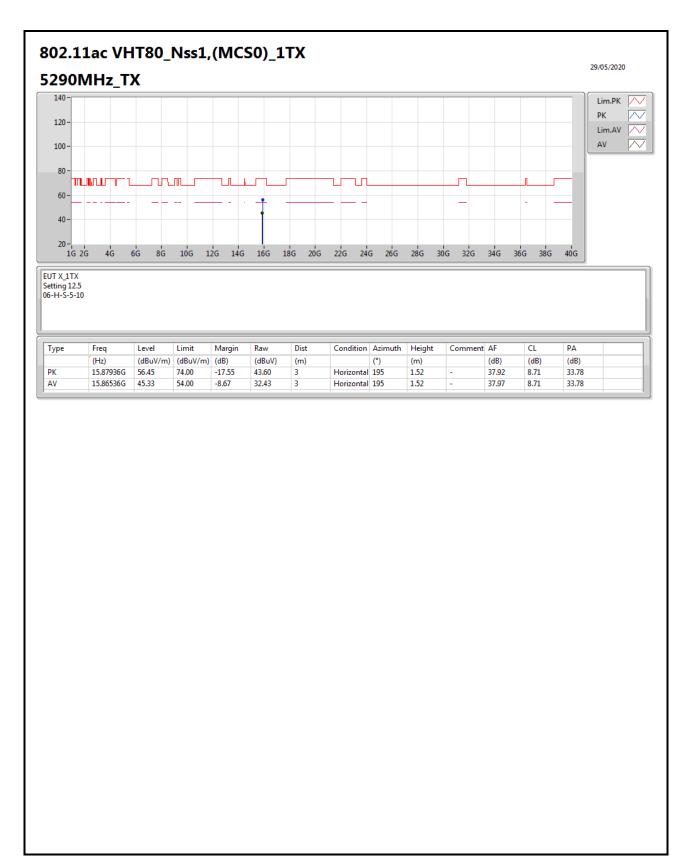




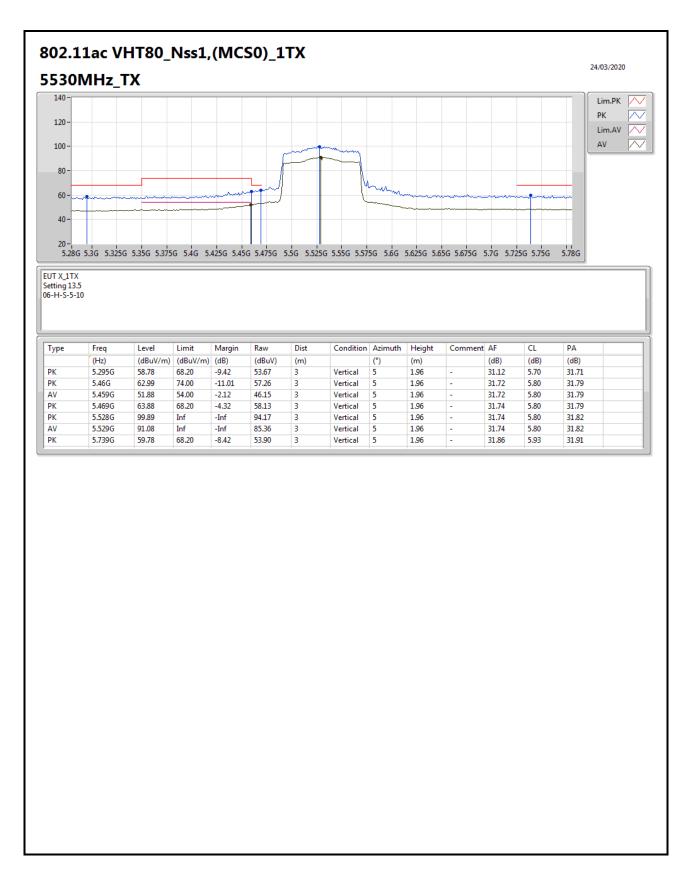




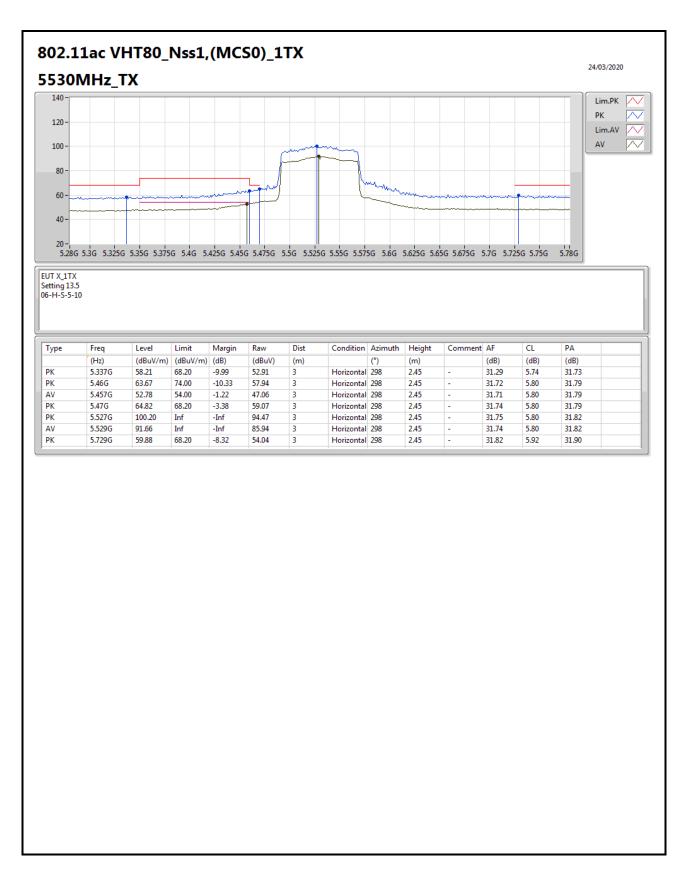




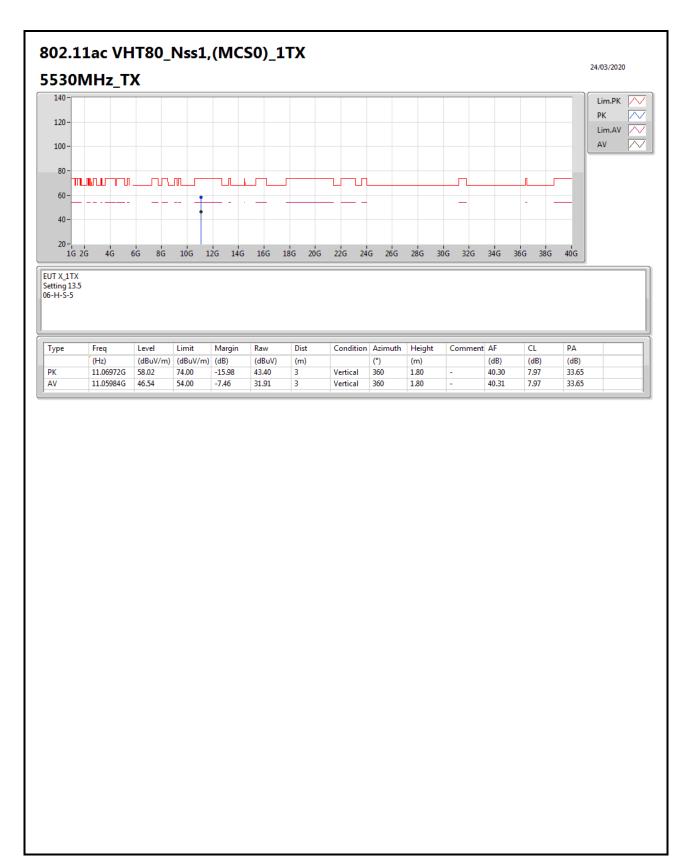




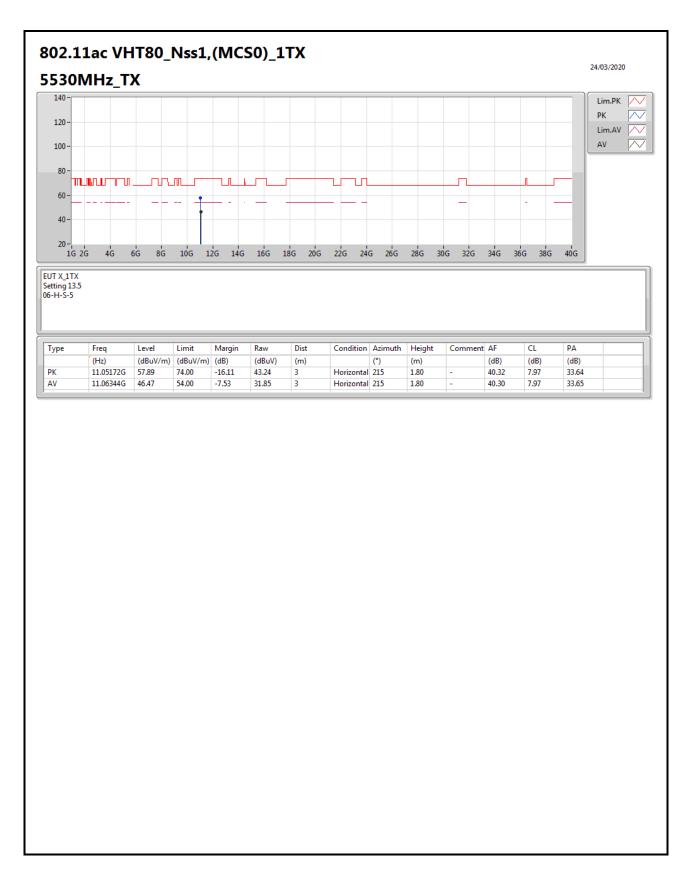




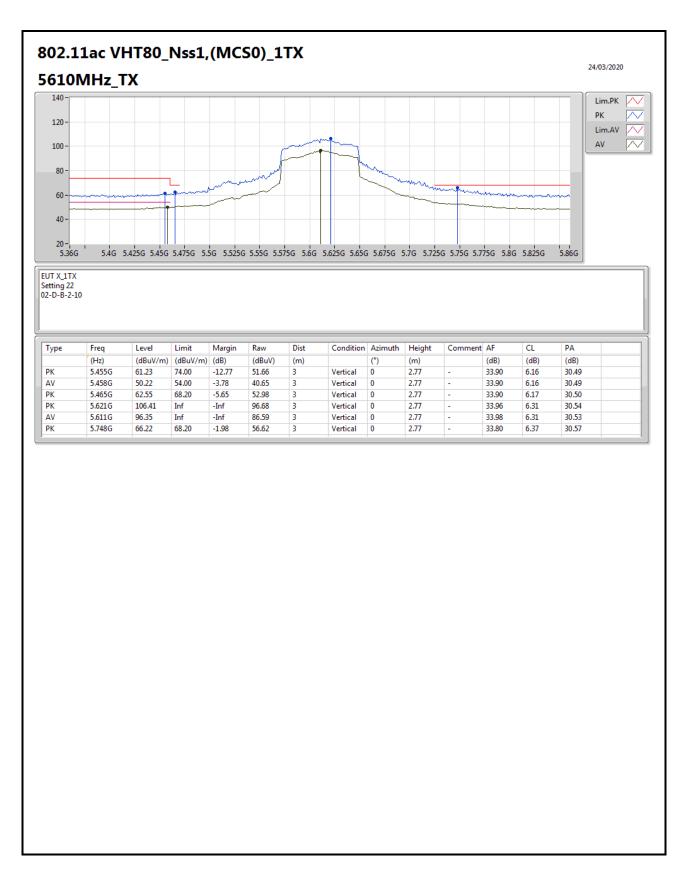




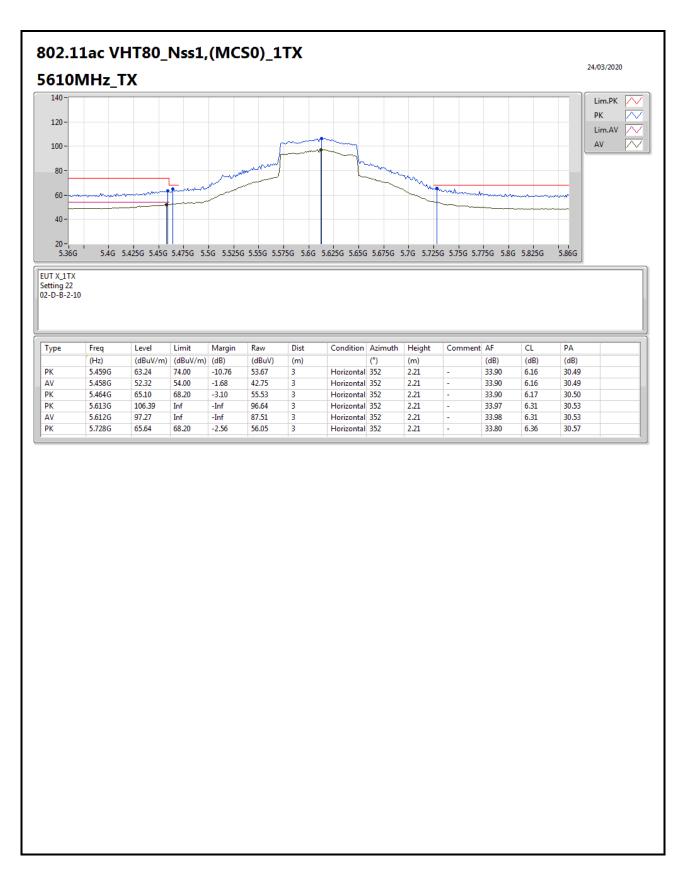




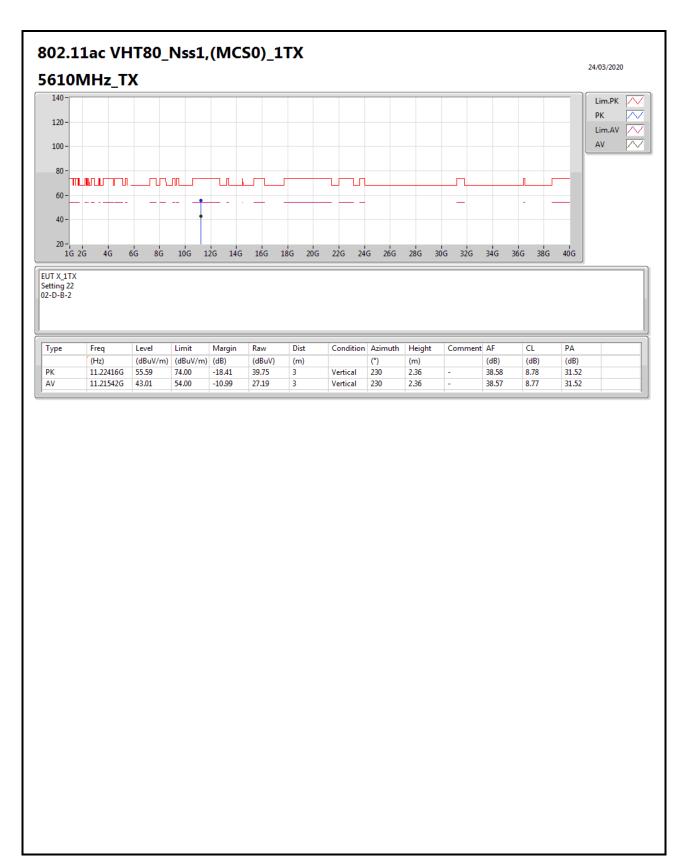




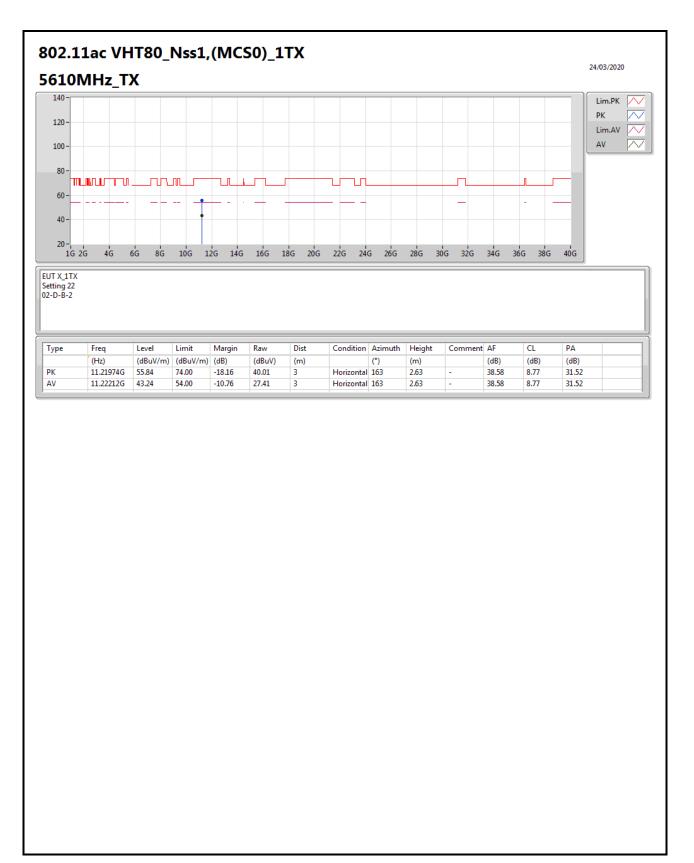




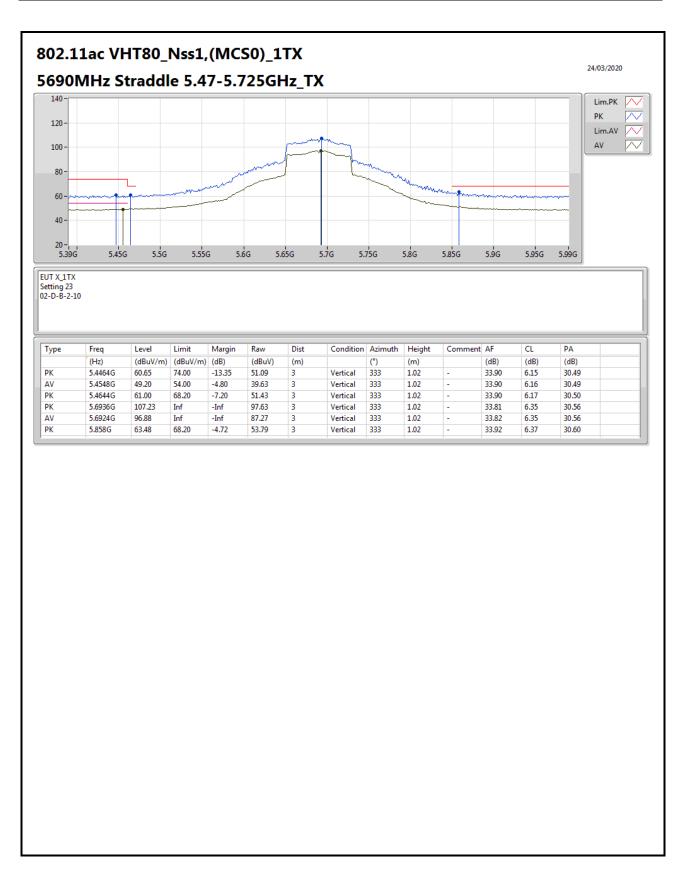






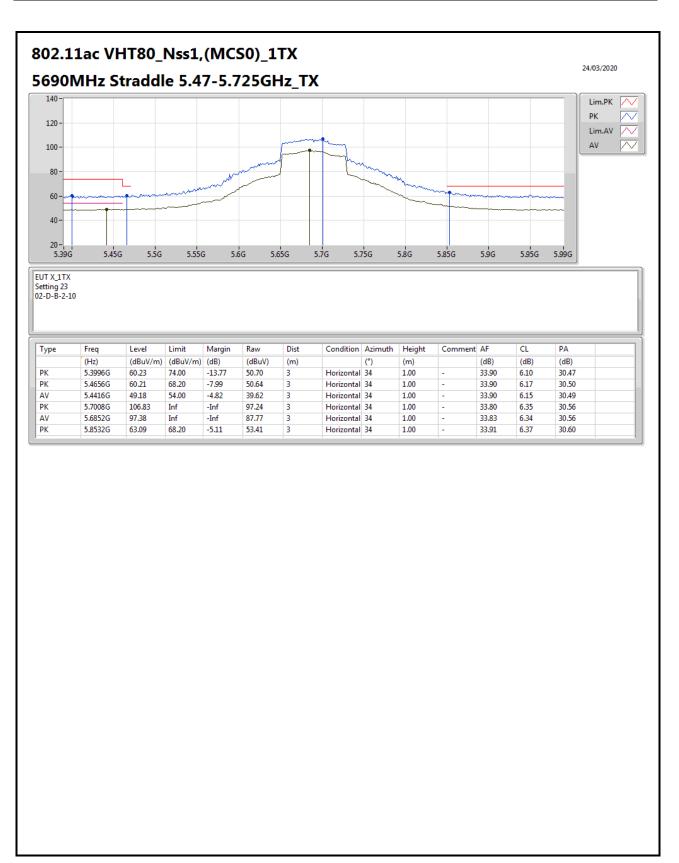




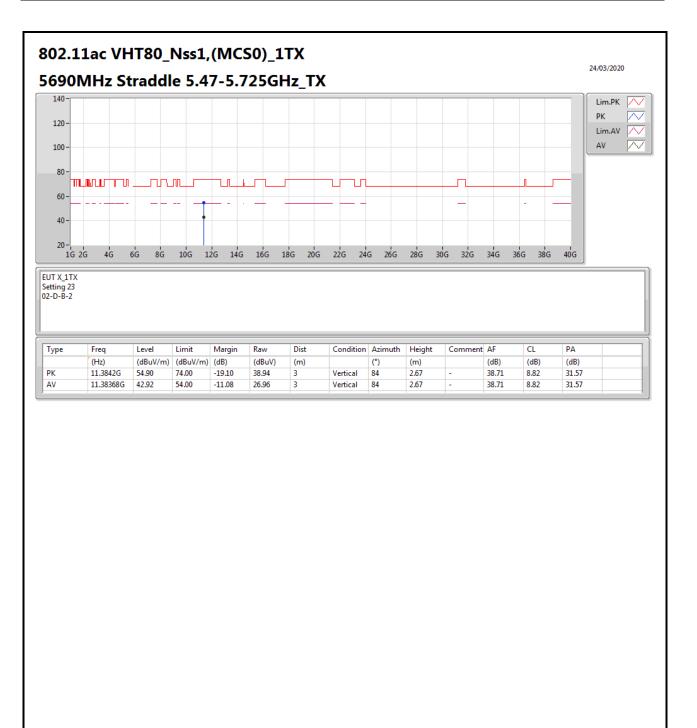




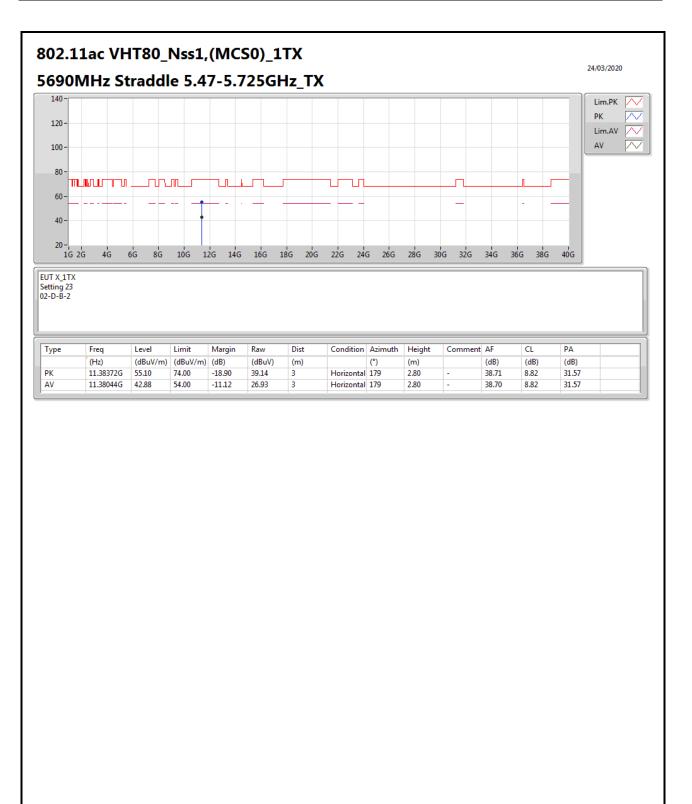




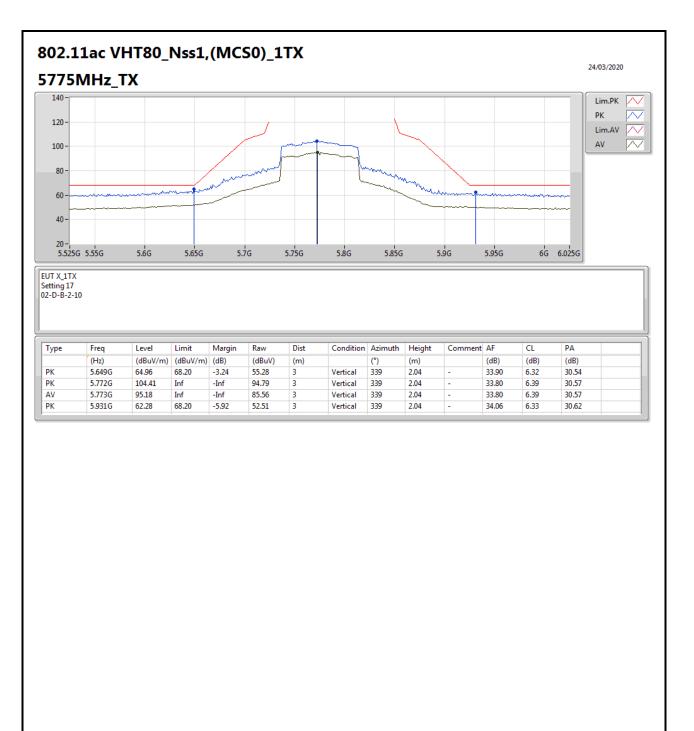




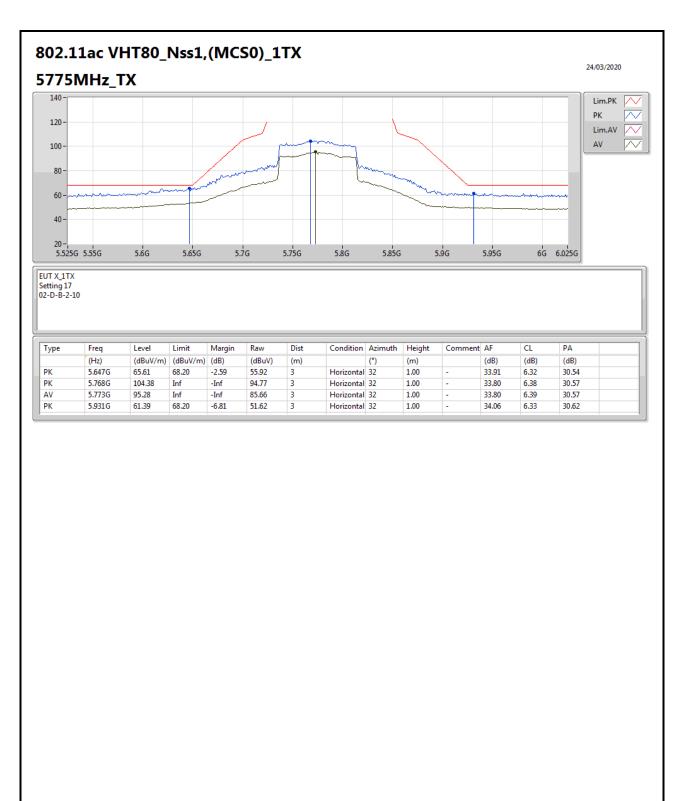




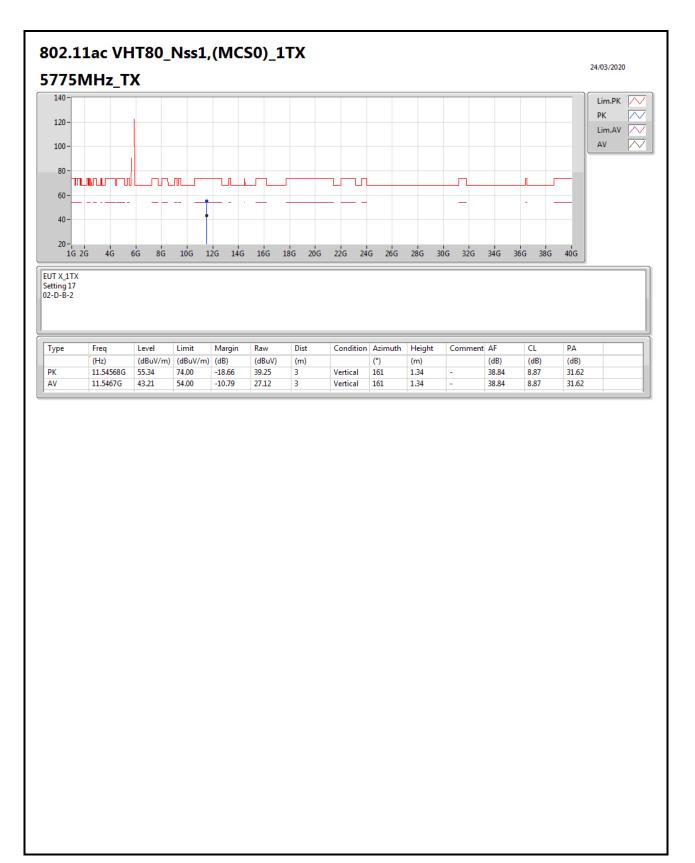




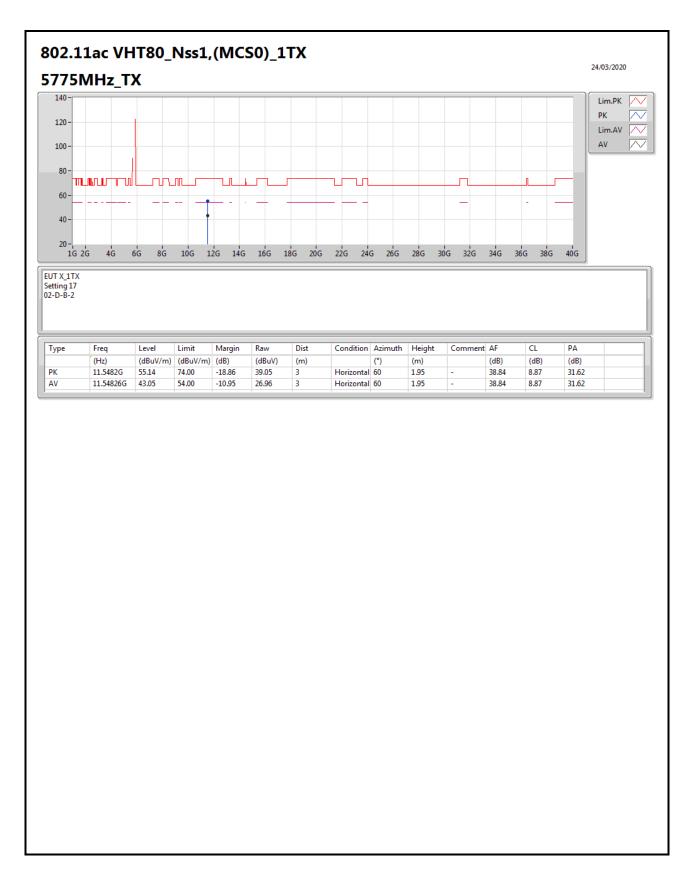














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