

Report No.: FR030222AB



FCC RADIO TEST REPORT

FCC ID

: TE7RE230

Equipment

: AC750 Wi-Fi Range Extender

Brand Name

: tp-link

Model Name

: RE230

Applicant

: TP-Link Technologies Co., Ltd.

Building 24 (floors 1,3,4,5) and 28 (floors1-4), Central Science and Technology Park, Nanshan, Shenzhen, 518057, China

Manufacturer: TP-Link Technologies Co., Ltd.

Building 24 (floors 1,3,4,5) and 28 (floors1-4), Central Science and Technology Park, Nanshan, Shenzhen, 518057, China

Standard

: 47 CFR FCC Part 15.407

The product was received on Mar. 03, 2020, and testing was started from Mar. 13, 2020 and completed on Apr. 13, 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.

Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB-A12 1 Ver1.0

Page Number

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Issued Date

: Apr. 28, 2020

Report Version : 01

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History of this test report

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Report No.	Version	Description	Issued Date
FR030222AB	01	Initial issue of report	Apr. 28, 2020

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Summary of Test Result

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(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:

- 1. The test configuration, test mode and test software were written in this test report are declared by the manufacturer.
- 2. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Vicky Huang

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1 General Description

1.1 Information

1.1.1 RF General Information

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

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Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	2TX
5.15-5.25GHz	802.11n HT20	20	2TX
5.15-5.25GHz	802.11ac VHT20	20	2TX
5.15-5.25GHz	802.11n HT40	40	2TX
5.15-5.25GHz	802.11ac VHT40	40	2TX
5.15-5.25GHz	802.11ac VHT80	80	2TX
5.725-5.85GHz	802.11a	20	2TX
5.725-5.85GHz	802.11n HT20	20	2TX
5.725-5.85GHz	802.11ac VHT20	20	2TX
5.725-5.85GHz	802.11n HT40	40	2TX
5.725-5.85GHz	802.11ac VHT40	40	2TX
5.725-5.85GHz	802.11ac VHT80	80	2TX

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.
- Nss-Min is the minimum number of spatial streams.
- Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

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1.1.2 Antenna Information

	Port						Gain	(dBi)
Ant.	WLAN 2.4GHz	WLAN 5GHz	Brand	Model Name	Antenna Type	Connector	WLAN 2.4GHz	WLAN 5GHz
1	2	1	tp-link	-	PIFA	N/A	2	2
2	1	2	tp-link	-	PIFA	N/A	2	2

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Note: The above information was declared by manufacturer.

For 2.4GHz function:

For IEEE 802.11b/g/n mode (2TX/2RX):

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

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac mode (2TX/2RX):

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

Port 1 and Port 2 could transmit/receive simultaneously.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.99	0.04	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT20	0.99	0.04	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT40	0.981	0.08	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT80	0.963	0.16	336.875u	3k

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

1.1.4 EUT Operational Condition

EUT Power Type	Internal power supply			
Beamforming Function	☐ With beamforming ☐ Without beamforming			
Function		Outdoor P2M	\boxtimes	Indoor P2M
Function		Fixed P2P Client		
Test Software Version	1.0.0 Build 20200114 Rel. 39556			

Note: The above information was declared by manufacturer.

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1.1.5 Table for EUT support function

Function
AP (Master) Mode
Extender (Client with radar detection) Mode

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Note:

The EUT supports AP and Extender mode, Extender mode only for AC power-line conducted emissions and Unwanted Emissions below 1GHz were tested and recorded in this test report by manufacturer request.

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1.2 Applicable Standards

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

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- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01
- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	Conducted TH03-CB Justin Lin 20.9~23°C / 46~48%		20.9~23°C / 46~48%	Mar. 16, 2020~ Mar. 17, 2020
Radiated (Below 1GHz test)	03CH05-CB	Eason Chen	24~25.3°C / 53~55%	Apr. 10, 2020
Radiated (Above 1GHz test)	03CH01-CB	Justin Lin	21.3~22°C / 46~47%	Mar. 13, 2020~ Mar. 16, 2020
AC Conduction	CO02-CB	Peter Wu	22~23°C / 61~62%	Apr. 13, 2020

Test site Designation No. TW0006 with FCC

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%

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Test site registered number IC 4086D with Industry Canada.

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.11a_Nss1,(6Mbps)_2TX	-
5180MHz	25
5200MHz	63
5240MHz	24
5745MHz	63
5785MHz	63
5825MHz	63
802.11ac VHT20_Nss1,(MCS0)_2TX	-
5180MHz	25
5200MHz	63
5240MHz	24
5745MHz	63
5785MHz	63
5825MHz	63
802.11ac VHT40_Nss1,(MCS0)_2TX	-
5190MHz	16
5230MHz	23
5755MHz	28
5795MHz	63
802.11ac VHT80_Nss1,(MCS0)_2TX	-
5210MHz	13
5775MHz	27

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2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests			
Tests Item	Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral			
Operating Mode	Operating Mode Normal Link		
1 Normal Link - Extender Mode			

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

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

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

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The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode		
1 WLAN 2.4GHz+WLAN 5GHz		
Refer to Sporton Test Report No.: FA030222 for Co-location RF Exposure Evaluation.		

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2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

N/A

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2.5 Support Equipment

For AC Conduction:

		Support Equipmen	nt	
No.	Equipment	Brand Name	Model Name	FCC ID
Α	LAN NB	DELL	E6430	N/A
В	2.4G NB	DELL	E6430	N/A
С	5G NB	DELL	E6430	N/A
D	AC750 Wi-Fi Range Extender (Device)	tp-link	RE230	TE7RE230

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For Radiated (below 1GHz):

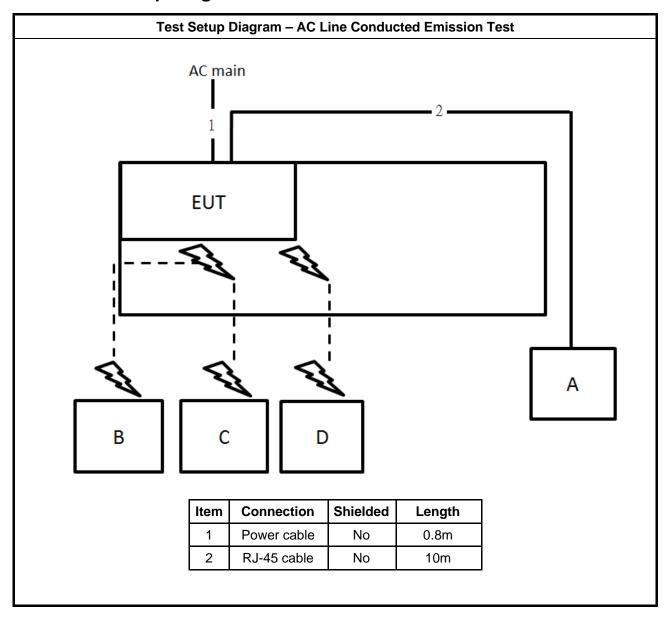
	,	Support Equipmen	nt	
No.	Equipment	Brand Name	Model Name	FCC ID
Α	LAN NB	DELL	E4300	N/A
В	2.4G NB	DELL	E4300	N/A
С	5G NB	DELL	E4300	N/A
D	AC750 Wi-Fi Range Extender (Device)	tp-link	RE230	TE7RE230

For Radiated (above 1GHz) and RF Conducted:

10111	adiatod (abovo 10112) dila 111 0	orradotoa.		
Support Equipment				
No.	No. Equipment Brand Name Model Name FCC ID			
Α	NB	DELL	E4300	N/A

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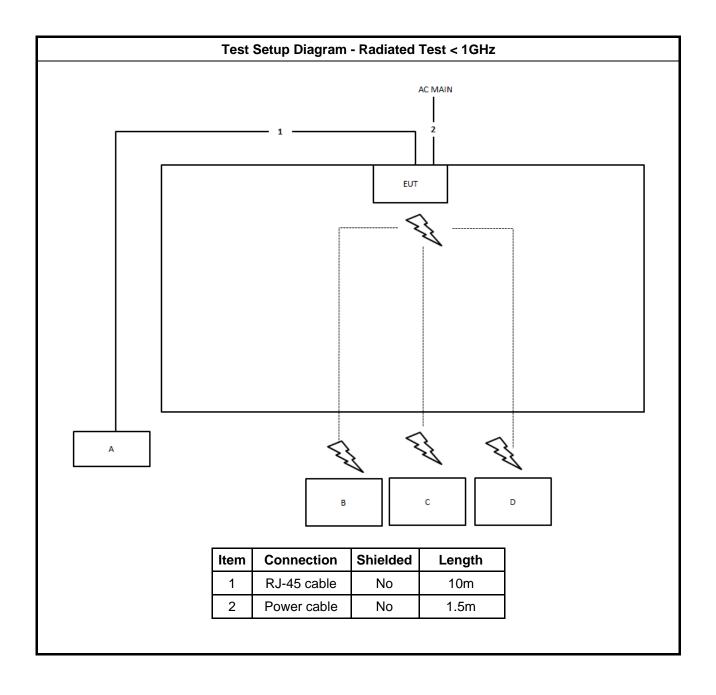
2.6 Test Setup Diagram



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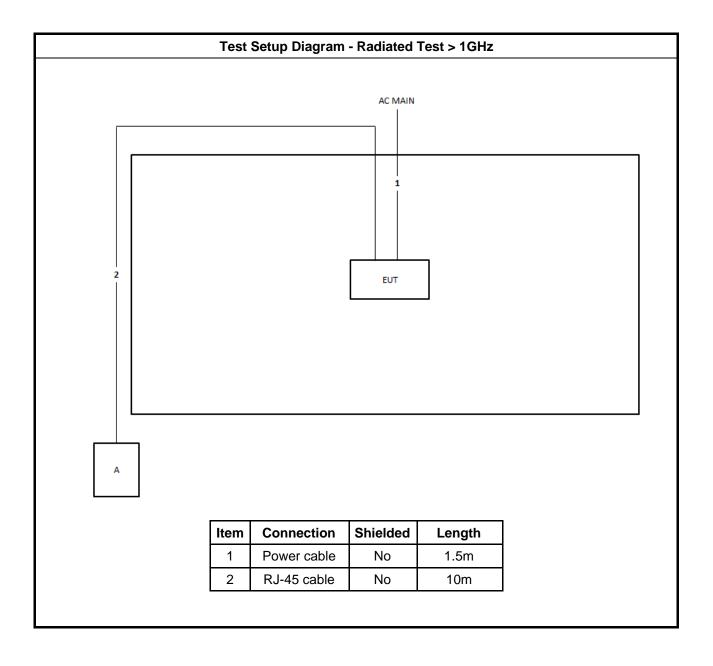
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3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

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3.1.2 Measuring Instruments

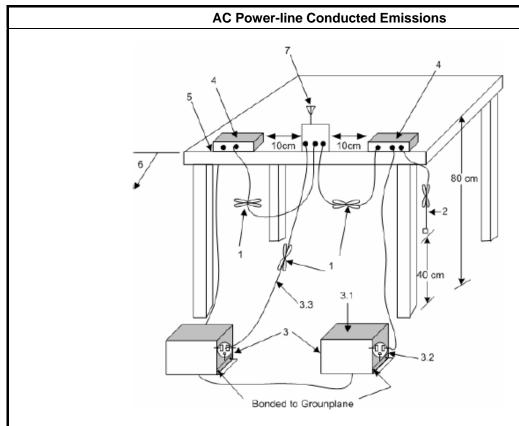
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

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3.1.4 Test Setup



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

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- 2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- 3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
- 3.1—All other equipment powered from additional LISN(s).
- 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
- 3.3—LISN at least 80 cm from nearest part of EUT chassis.
- 4—Non-EUT components of EUT system being tested.
- 5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

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3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

	Emission Bandwidth Limit						
UN	JNII Devices						
\boxtimes	For the 5.15-5.25 GHz band, N/A						
	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.						
	For the $5.47-5.725$ GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.						
\boxtimes	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 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 ≥ 500kHz.						

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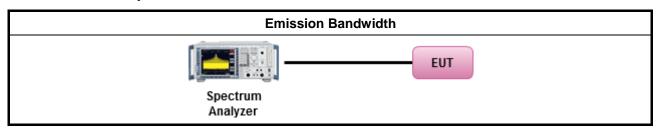
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

	Test Method							
•	For the emission bandwidth shall be measured using one of the options below:							
	Refer as FCC KDB 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

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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).
	For the 5.25-5.35 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$.
	For the 5.47-5.725 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 6 dBi, then P_{Out} = 24 – (G_{TX} – 6).
\boxtimes	For the 5.725-5.85 GHz band:
	 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.

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3.3.2 Measuring Instruments

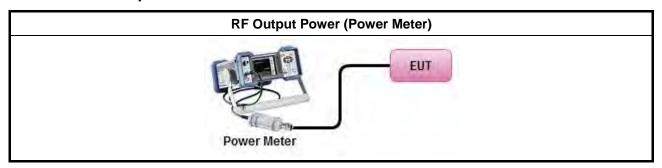
Refer a test equipment and calibration data table in this test report.

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 							

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3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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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) \leq 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 – ($G_{TX} - 6$).
\boxtimes	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) \leq 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$.
	 Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 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) ≤ 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 ver shall be used to determine the power spectral density. And power spectral density in dBm/MHz = the maximum transmitting antenna directional gain in dBi.

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3.4.2 Measuring Instruments

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

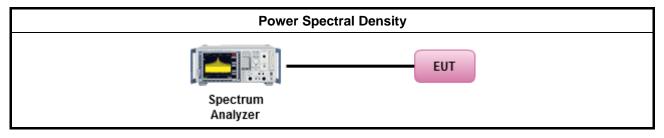
3.4.3 Test Procedures

		Test Method								
•	outp func	k power spectral density procedures that the same method as used to determine the conducted out 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 I 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	y cycle ≥ 98% or external video / power trigger]								
		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								
	\boxtimes	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 $								

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3.4.4 Test Setup



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3.4.5 Test Result of Peak Power Spectral Density

Refer as Appendix D

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3.5 Unwanted Emissions

3.5.1 Transmitter Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit							
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)				
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300				
0.490~1.705	24000/F(kHz)	33.8 - 23	30				
1.705~30.0	30	29	30				
30~88	100	40	3				
88~216	150	43.5	3				
216~960	200	46	3				
Above 960	500	54	3				

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

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

Un-restricted band emissions above 1GHz Limit							
Operating Band	Limit						
	e.i.r.p27 dBm [68.2 dBuV/m@3m]						
☐ 5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]						
☐ 5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]						
⊠ 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.						

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of

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

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3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

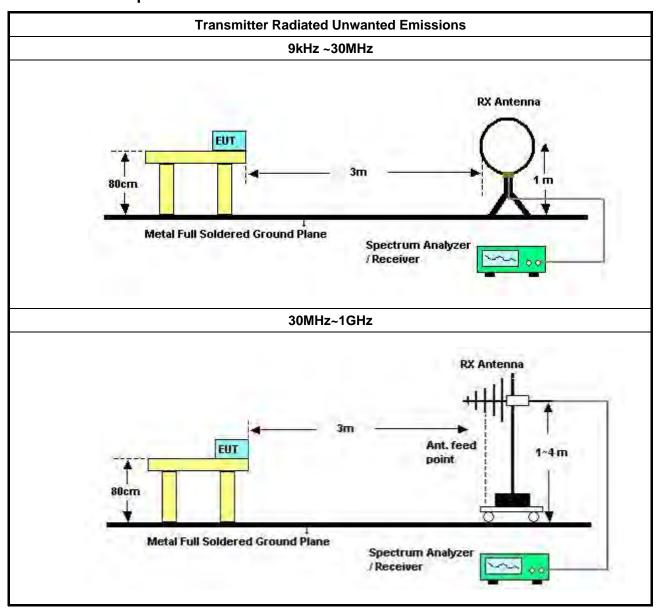
Test Method

- 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. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less 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 linear 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 FCC KDB 789033, clause G)5) measurement procedure peak limit.
 - Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
- For radiated measurement.
 - Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
- The any unwanted emissions level shall not exceed the fundamental emission level.
- All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

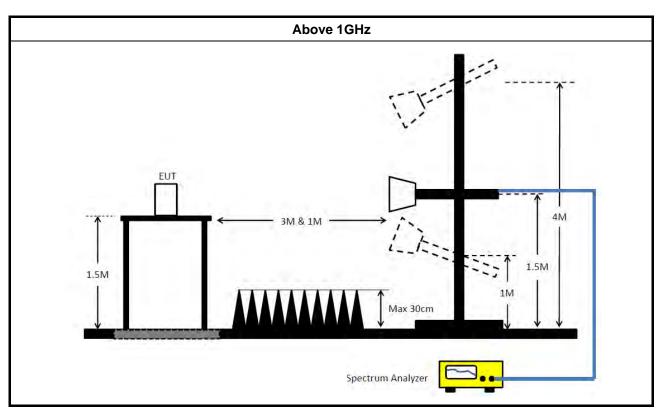
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3.5.4 Test Setup



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3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna Factor + Cable 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

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4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 21, 2019	Nov. 20, 2020	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Oct. 30, 2019	Oct. 29, 2020	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Mar. 10, 2020	Mar. 09, 2021	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Oct. 21, 2019	Oct. 20, 2020	Conduction (CO02-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 27, 2020	Mar. 26, 2021	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	May 01, 2019	Apr. 30, 2020	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Aug. 15, 2019	Aug. 14, 2020	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	LOW Cable-04+23	30MHz~1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH05-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 16, 2020	Mar. 15, 2021	Radiation (03CH05-CB)
Horn Antenna	ETS-LINDGRE N	3115	00075790	750MHz ~ 18GHz	Nov. 04, 2019	Nov. 03, 2020	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 27, 2019	Jun. 26, 2020	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 19, 2019	Jun. 18, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16	1 GHz ~ 18 GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16+17	1 GHz ~ 18 GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH01-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)

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Report Version : 01

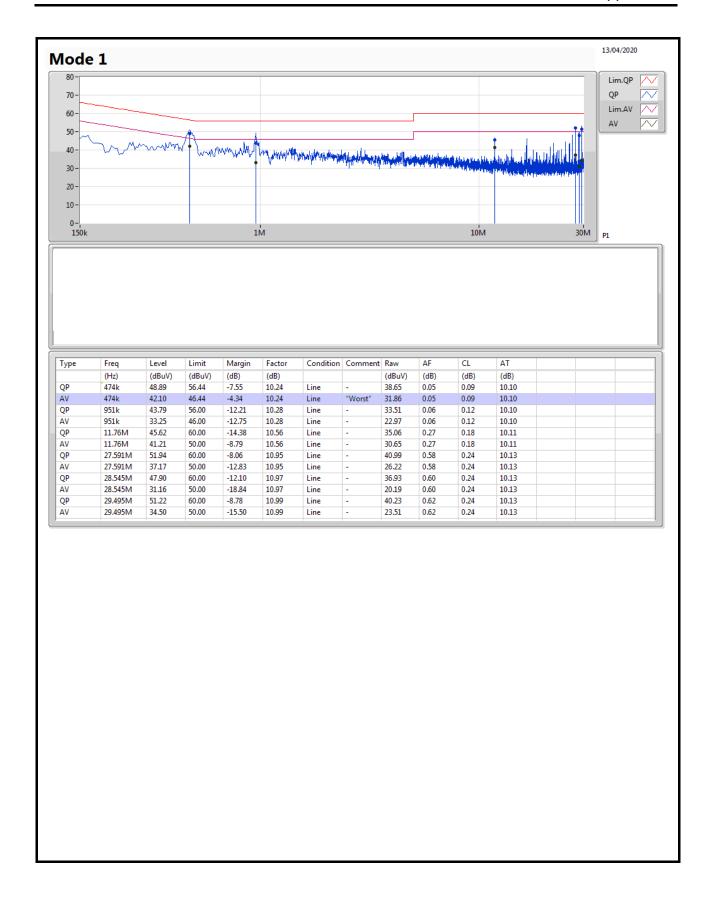
Instrument	Manufacturer	Model No.	Serial No.	Characteristics Calibration Date		Calibration Due Date	Remark
Power Meter	Anritsu	ML2495A	1035008	300MHz~ 40GHz	Aug. 13, 2019	Aug. 12, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz – 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)

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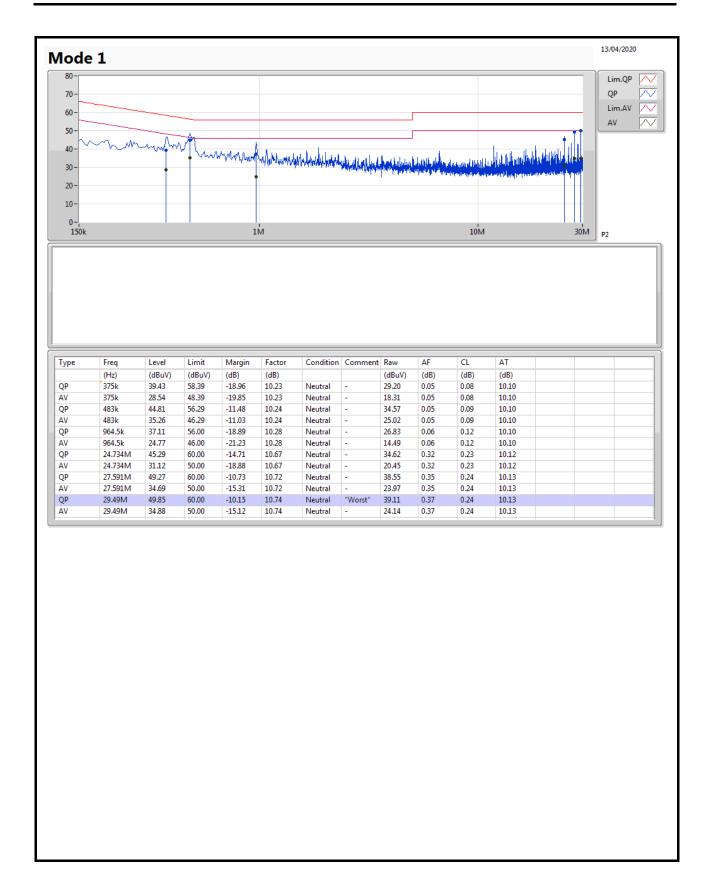
Note: Calibration Interval of instruments listed above is one year. NCR means Non-Calibration required.

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Appendix B **EBW**

Summary

Mode Max-N dB		Max-OBW	Max-OBW ITU-Code		Min-OBW	
	(Hz)	(Hz)		(Hz)	(Hz)	
5.15-5.25GHz	-	-	-	-	-	
802.11a_Nss1,(6Mbps)_2TX	43.89M	30.705M	30M7D1D	32.55M	17.991M	
802.11ac VHT20_Nss1,(MCS0)_2TX	48.27M	31.634M	31M6D1D	32.55M	18.261M	
802.11ac VHT40_Nss1,(MCS0)_2TX	74.4M	38.021M	38M0D1D	40.32M	36.162M	
802.11ac VHT80_Nss1,(MCS0)_2TX	81.48M	75.202M	75M2D1D	81.48M	75.082M	
5.725-5.85GHz	-	-	-	-	-	
802.11a_Nss1,(6Mbps)_2TX	16.32M	33.133M	33M1D1D	16.29M	30.165M	
802.11ac VHT20_Nss1,(MCS0)_2TX	17.55M	34.273M	34M3D1D	17.28M	31.904M	
802.11ac VHT40_Nss1,(MCS0)_2TX	35.4M	69.625M	69M6D1D	35.04M	55.832M	
802.11ac VHT80_Nss1,(MCS0)_2TX	73.8M	96.072M	96M1D1D	72.6M	88.876M	

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;

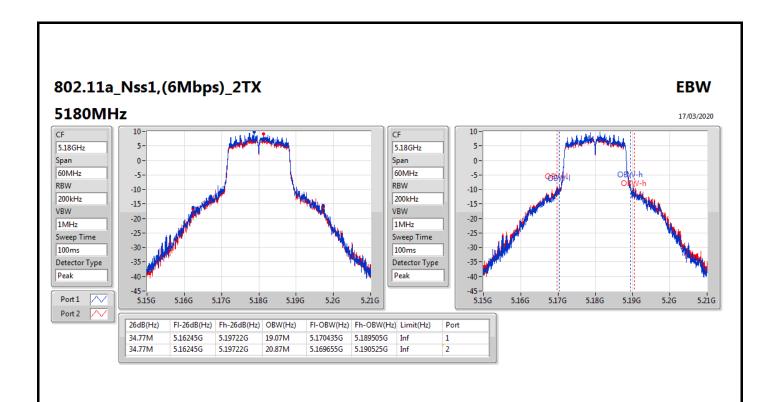
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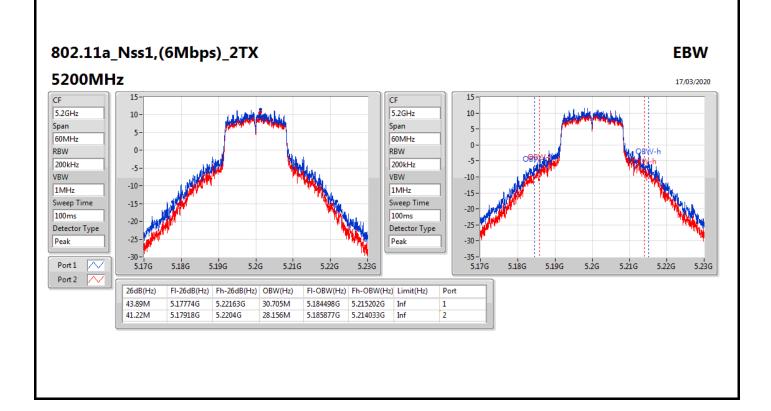


Result

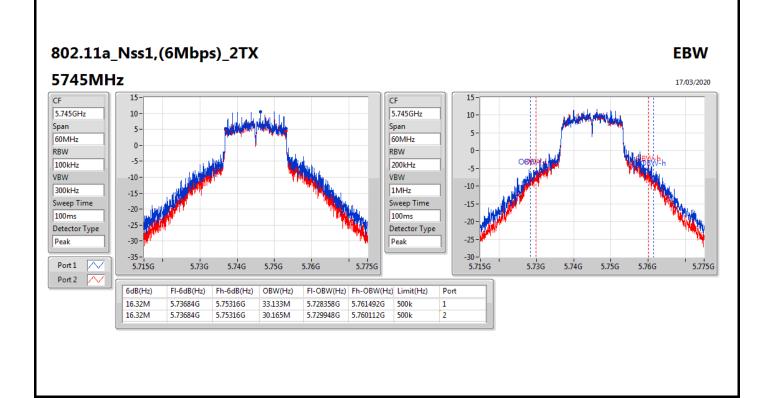
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	34.77M	19.07M	34.77M	20.87M
5200MHz	Pass	Inf	43.89M	30.705M	41.22M	28.156M
5240MHz	Pass	Inf	32.55M	17.991M	33.81M	19.22M
5745MHz	Pass	500k	16.32M	33.133M	16.32M	30.165M
5785MHz	Pass	500k	16.29M	32.864M	16.29M	30.915M
5825MHz	Pass	500k	16.29M	32.714M	16.32M	30.615M
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	33.24M	18.981M	33.9M	20.06M
5200MHz	Pass	Inf	48.27M	31.634M	44.01M	28.006M
5240MHz	Pass	Inf	32.55M	18.261M	32.73M	18.411M
5745MHz	Pass	500k	17.52M	34.123M	17.49M	32.264M
5785MHz	Pass	500k	17.28M	34.273M	17.55M	31.964M
5825MHz	Pass	500k	17.52M	34.213M	17.52M	31.904M
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	Inf	40.32M	36.162M	40.5M	36.222M
5230MHz	Pass	Inf	73.32M	37.421M	74.4M	38.021M
5755MHz	Pass	500k	35.1M	56.612M	35.04M	55.832M
5795MHz	Pass	500k	35.1M	69.625M	35.4M	65.967M
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	Inf	81.48M	75.202M	81.48M	75.082M
5775MHz	Pass	500k	72.6M	96.072M	73.8M	88.876M

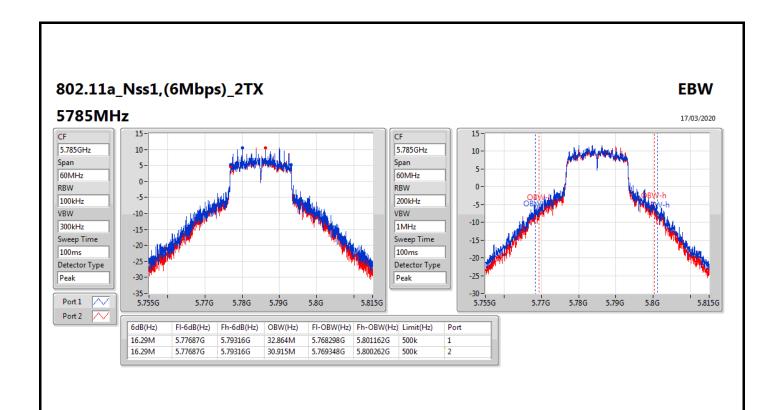
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

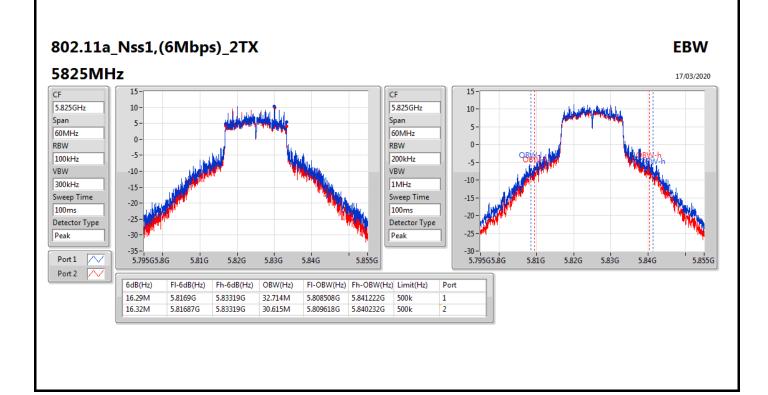


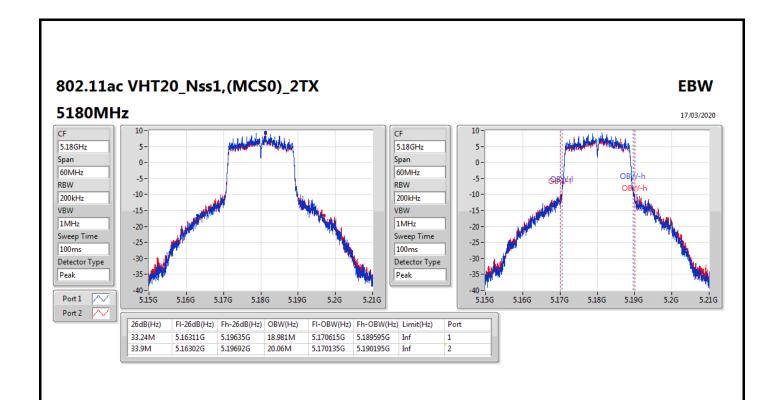


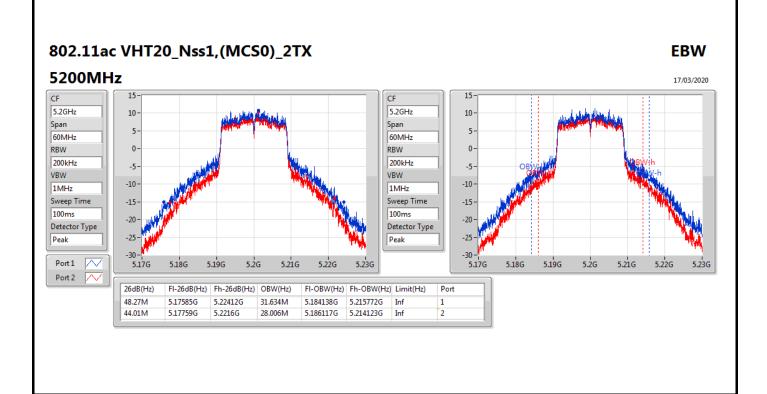


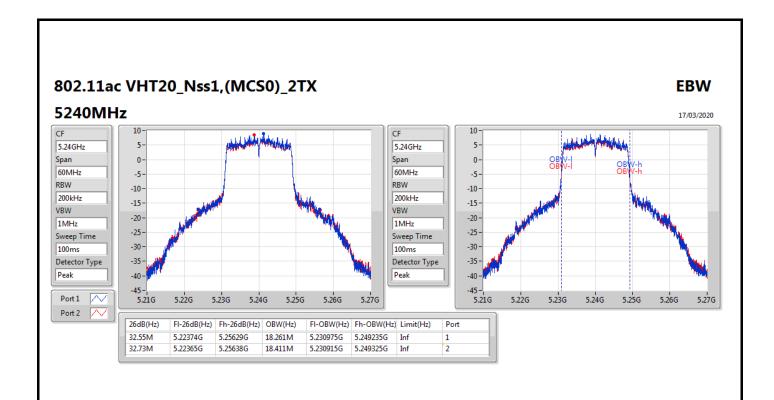


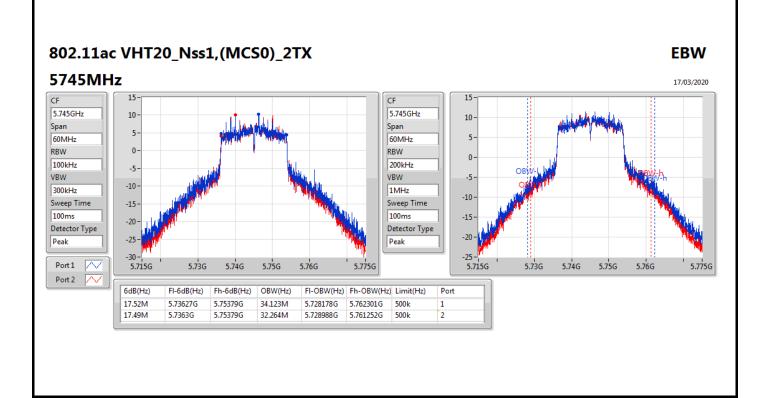


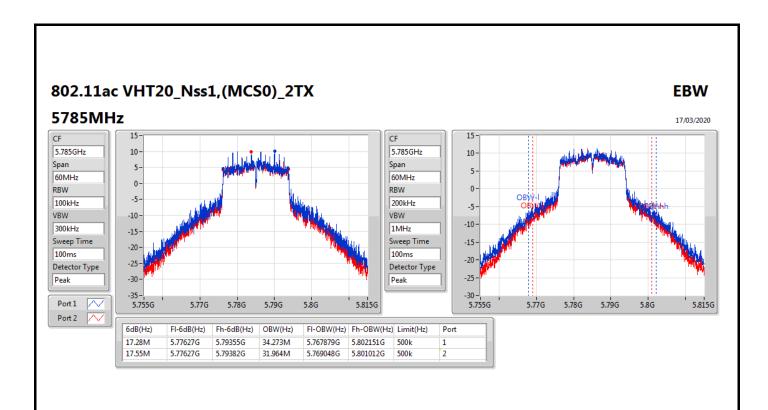


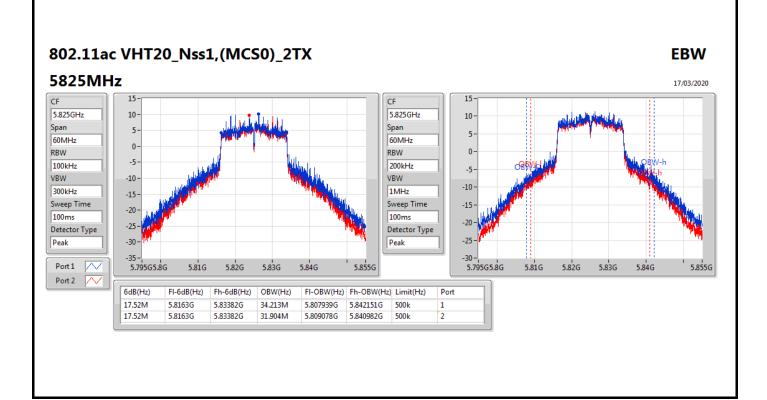


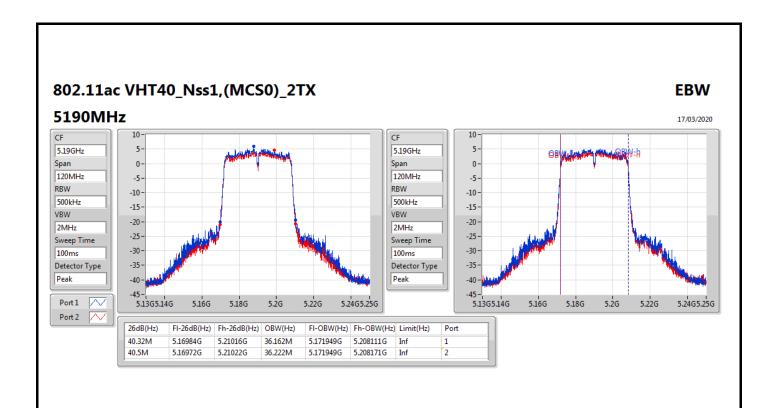


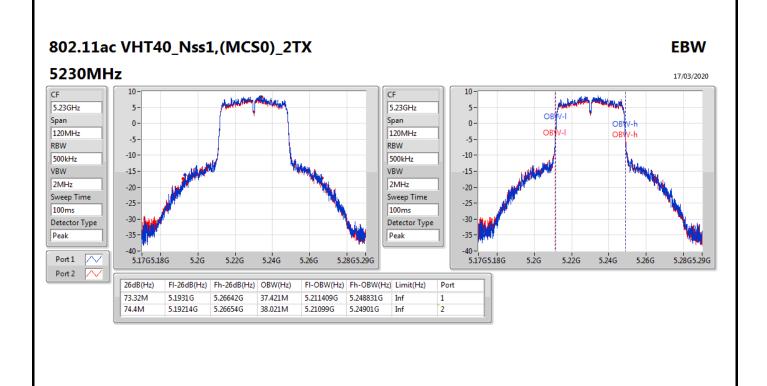


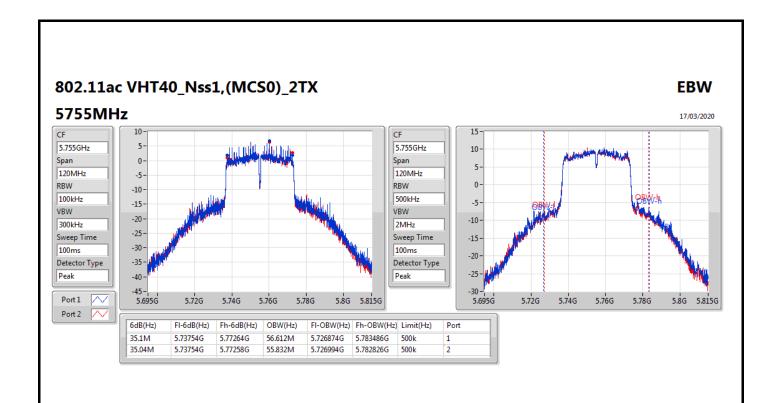


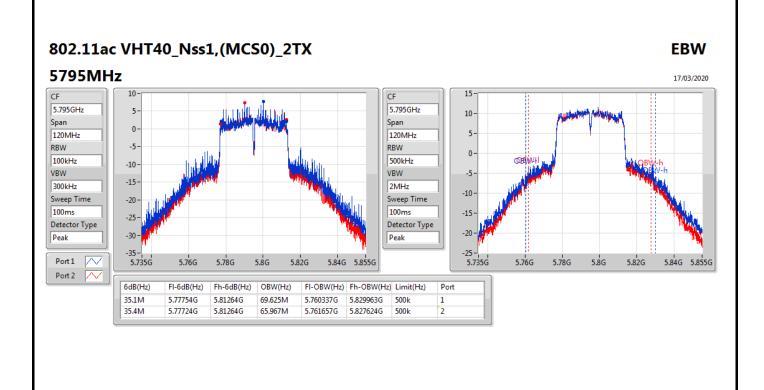


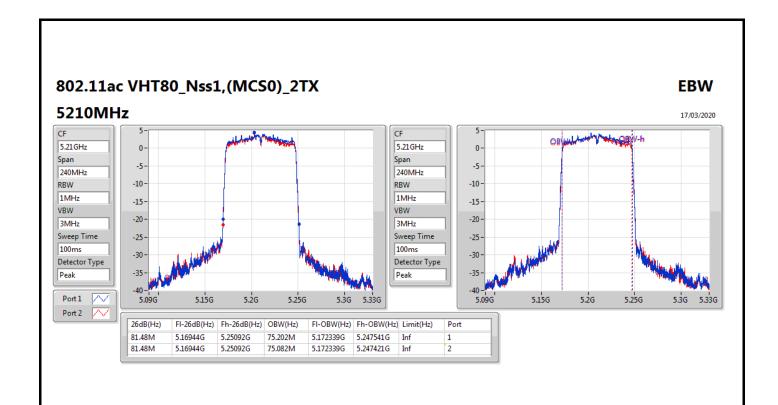


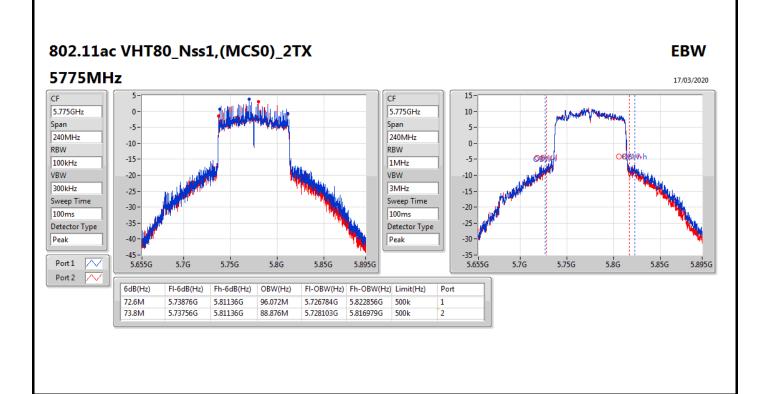














Average Power Appendix C

Summary

Mode	Total Power	Total Power	EIRP	EIRP
	(dBm)	(W)	(dBm)	(W)
5.15-5.25GHz	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	23.55	0.22646	25.55	0.35892
802.11ac VHT20_Nss1,(MCS0)_2TX	23.19	0.20845	25.19	0.33037
802.11ac VHT40_Nss1,(MCS0)_2TX	20.69	0.11722	22.69	0.18578
802.11ac VHT80_Nss1,(MCS0)_2TX	15.74	0.03750	17.74	0.05943
5.725-5.85GHz	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	23.92	0.24660	25.92	0.39084
802.11ac VHT20_Nss1,(MCS0)_2TX	23.59	0.22856	25.59	0.36224
802.11ac VHT40_Nss1,(MCS0)_2TX	24.27	0.26730	26.27	0.42364
802.11ac VHT80_Nss1,(MCS0)_2TX	21.59	0.14421	23.59	0.22856

Average Power Appendix C

Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit	EIRP	EIRP Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	2.00	19.06	18.73	21.91	30.00	23.91	36.00
5200MHz	Pass	2.00	20.93	20.11	23.55	30.00	25.55	36.00
5240MHz	Pass	2.00	18.48	18.11	21.31	30.00	23.31	36.00
5745MHz	Pass	2.00	20.83	20.88	23.87	30.00	25.87	36.00
5785MHz	Pass	2.00	20.99	20.82	23.92	30.00	25.92	36.00
5825MHz	Pass	2.00	20.92	20.54	23.74	30.00	25.74	36.00
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	2.00	18.49	18.18	21.35	30.00	23.35	36.00
5200MHz	Pass	2.00	20.66	19.63	23.19	30.00	25.19	36.00
5240MHz	Pass	2.00	17.97	17.66	20.83	30.00	22.83	36.00
5745MHz	Pass	2.00	20.56	20.59	23.59	30.00	25.59	36.00
5785MHz	Pass	2.00	20.72	20.42	23.58	30.00	25.58	36.00
5825MHz	Pass	2.00	20.76	20.29	23.54	30.00	25.54	36.00
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5190MHz	Pass	2.00	15.35	13.93	17.71	30.00	19.71	36.00
5230MHz	Pass	2.00	17.87	17.49	20.69	30.00	22.69	36.00
5755MHz	Pass	2.00	19.39	19.38	22.40	30.00	24.40	36.00
5795MHz	Pass	2.00	22.04	20.32	24.27	30.00	26.27	36.00
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5210MHz	Pass	2.00	12.84	12.61	15.74	30.00	17.74	36.00
5775MHz	Pass	2.00	18.56	18.59	21.59	30.00	23.59	36.00

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



Summary

Mode	PD	EIRP PD
	(dBm/RBW)	(dBm/RBW)
5.15-5.25GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	11.42	16.43
802.11ac VHT20_Nss1,(MCS0)_2TX	10.75	15.76
802.11ac VHT40_Nss1,(MCS0)_2TX	5.29	10.30
802.11ac VHT80_Nss1,(MCS0)_2TX	-2.55	2.46
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	10.52	15.53
802.11ac VHT20_Nss1,(MCS0)_2TX	9.70	14.71
802.11ac VHT40_Nss1,(MCS0)_2TX	6.19	11.20
802.11ac VHT80_Nss1,(MCS0)_2TX	2.10	7.11

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

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Appendix D **PSD**

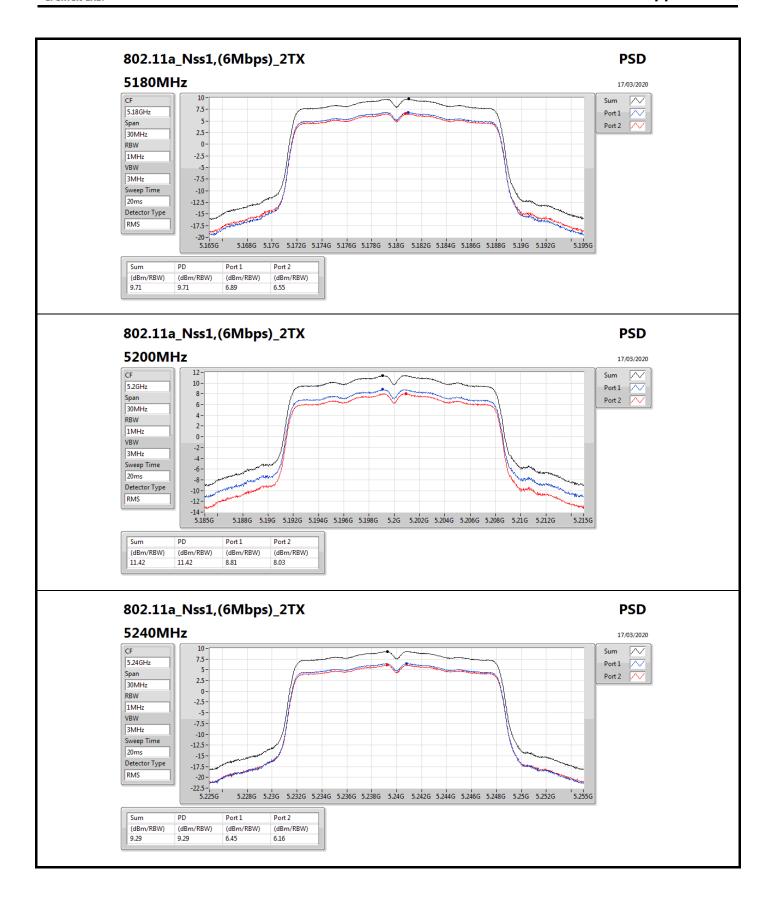
Result

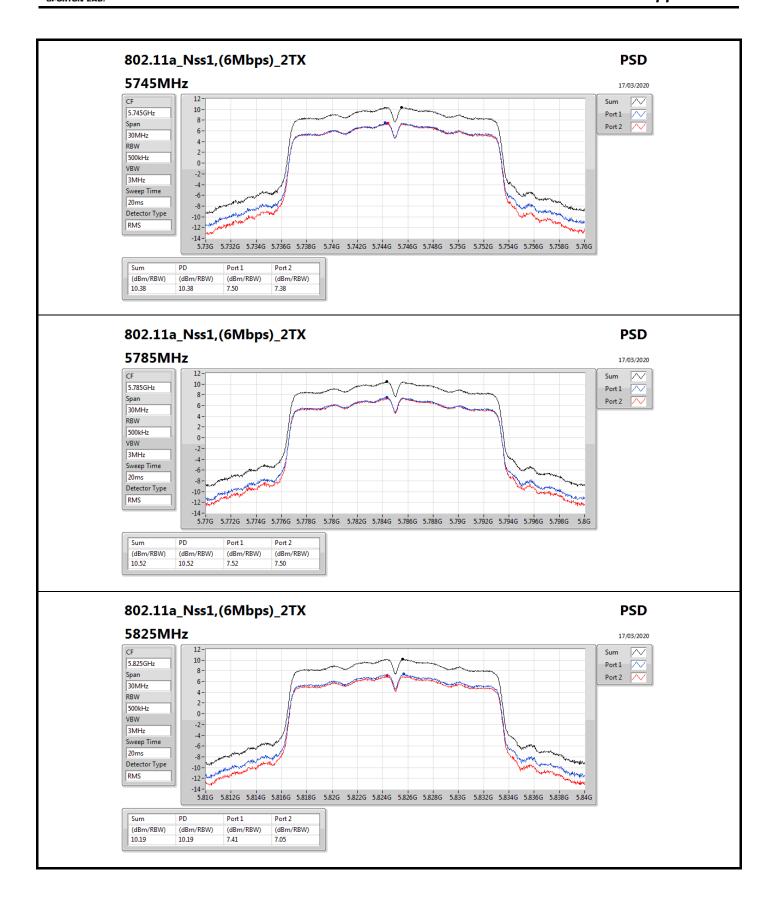
Mode	Result	DG	Port 1	Port 2	PD	PD Limit	EIRP PD	EIRP PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.01	6.89	6.55	9.71	17.00	14.72	23.00
5200MHz	Pass	5.01	8.81	8.03	11.42	17.00	16.43	23.00
5240MHz	Pass	5.01	6.45	6.16	9.29	17.00	14.30	23.00
5745MHz	Pass	5.01	7.50	7.38	10.38	30.00	15.39	36.00
5785MHz	Pass	5.01	7.52	7.50	10.52	30.00	15.53	36.00
5825MHz	Pass	5.01	7.41	7.05	10.19	30.00	15.20	36.00
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.01	6.06	5.74	8.89	17.00	13.90	23.00
5200MHz	Pass	5.01	8.21	7.22	10.75	17.00	15.76	23.00
5240MHz	Pass	5.01	5.70	5.38	8.52	17.00	13.53	23.00
5745MHz	Pass	5.01	6.70	6.75	9.68	30.00	14.69	36.00
5785MHz	Pass	5.01	6.82	6.56	9.70	30.00	14.71	36.00
5825MHz	Pass	5.01	6.90	6.47	9.70	30.00	14.71	36.00
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5190MHz	Pass	5.01	-1.20	-1.55	1.56	17.00	6.57	23.00
5230MHz	Pass	5.01	2.49	2.10	5.29	17.00	10.30	23.00
5755MHz	Pass	5.01	2.47	2.55	5.50	30.00	10.51	36.00
5795MHz	Pass	5.01	3.23	3.26	6.19	30.00	11.20	36.00
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5210MHz	Pass	5.01	-5.47	-5.61	-2.55	17.00	2.46	23.00
5775MHz	Pass	5.01	-0.87	-0.96	2.10	30.00	7.11	36.00

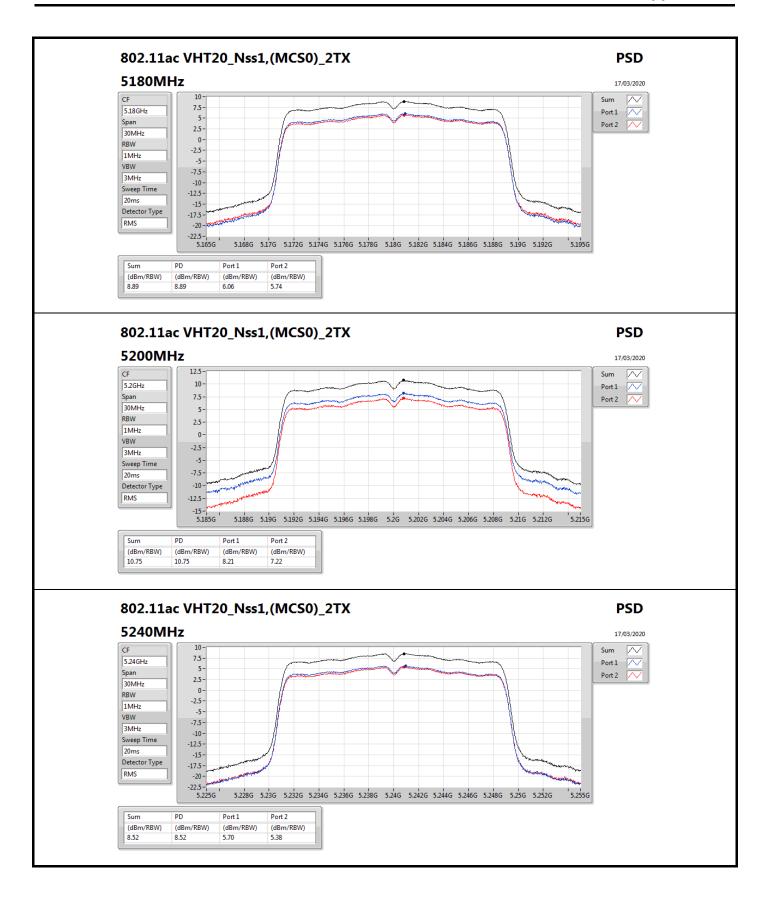
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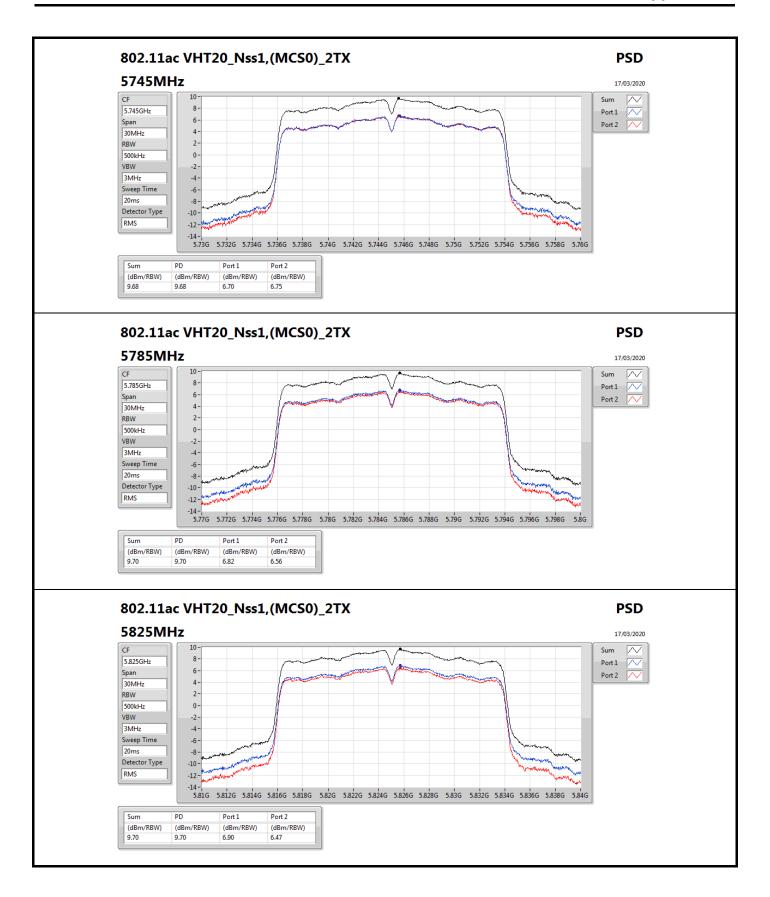
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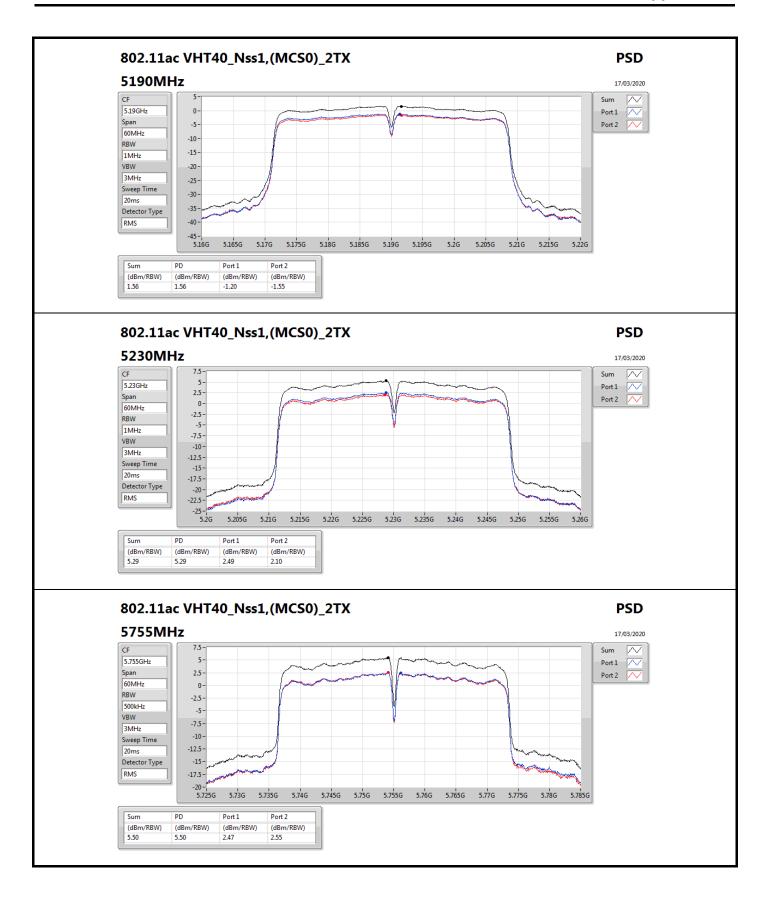
DG = Directional Gain; RBW = 500 kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X power density;

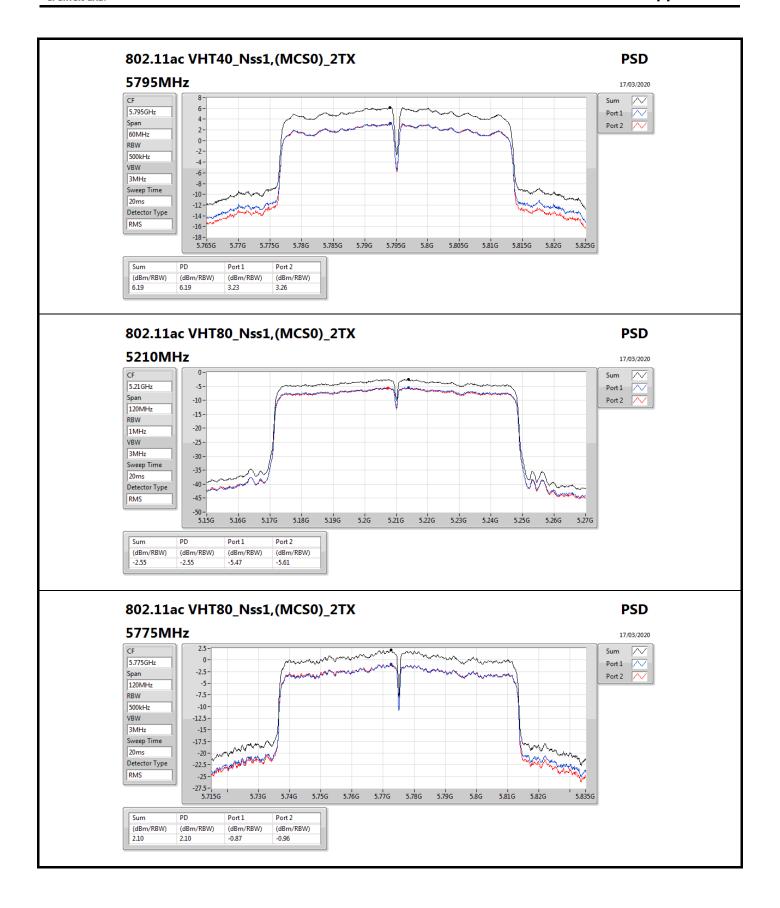




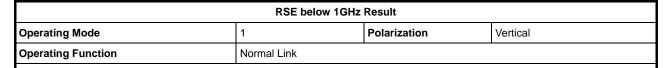


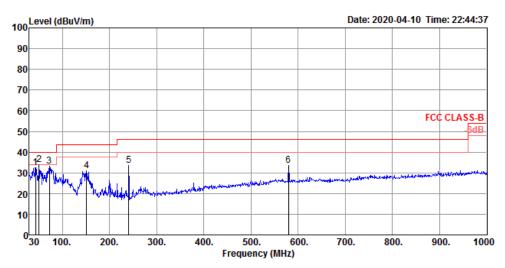








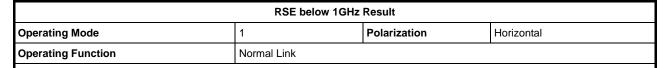


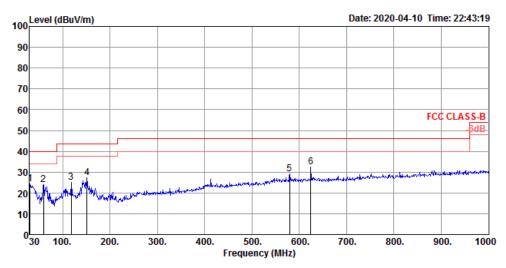


	Freq	Level		Over Limit				Preamp Factor		T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Cm	deg		
1	43.58	32.57	40.00	-7.43	45.66	1.26	17.22	31.57	100	232	Peak	VERTICAL
2	50.37	33.95	40.00	-6.05	50.16	1.19	14.34	31.74	100	302	Peak	VERTICAL
3	72.68	33.18	40.00	-6.82	51.23	1.30	12.53	31.88	200	2	Peak	VERTICAL
4	151.25	30.94	43.50	-12.56	44.67	1.80	16.41	31.94	100	144	Peak	VERTICAL
5	240.49	33.44	46.00	-12.56	46.51	2.17	16.77	32.01	300	145	Peak	VERTICAL
6	579.99	33.61	46.00	-12.39	38.51	3.42	24.00	32.32	100	221	Peak	VERTICAL

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







	Freq	Level		Over Limit						T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.97	24.31	40.00	-15.69	31.05	1.22	23.60	31.56	300	27	Peak	HORIZONTAL
2	59.10	23.91	40.00	-16.09	41.74	1.18	12.83	31.84	100	34	Peak	HORIZONTAL
3	118.27	25.20	43.50	-18.30	37.07	1.68	18.22	31.77	100	347	Peak	HORIZONTAL
4	151.25	27.30	43.50	-16.20	41.03	1.80	16.41	31.94	200	49	Peak	HORIZONTAL
5	579.99	29.17	46.00	-16.83	34.07	3.42	24.00	32.32	300	0	Peak	HORIZONTAL
6	624.61	32.46	46.00	-13.54	36.94	3.55	24.40	32.43	200	359	Peak	HORIZONTAL

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



RSE TX above 1GHz

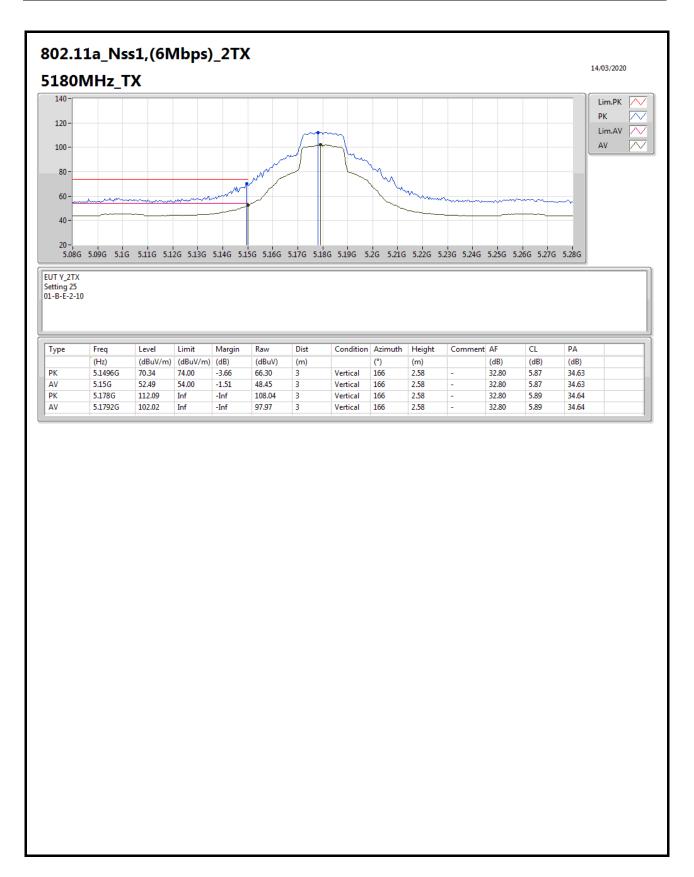
Appendix E.2

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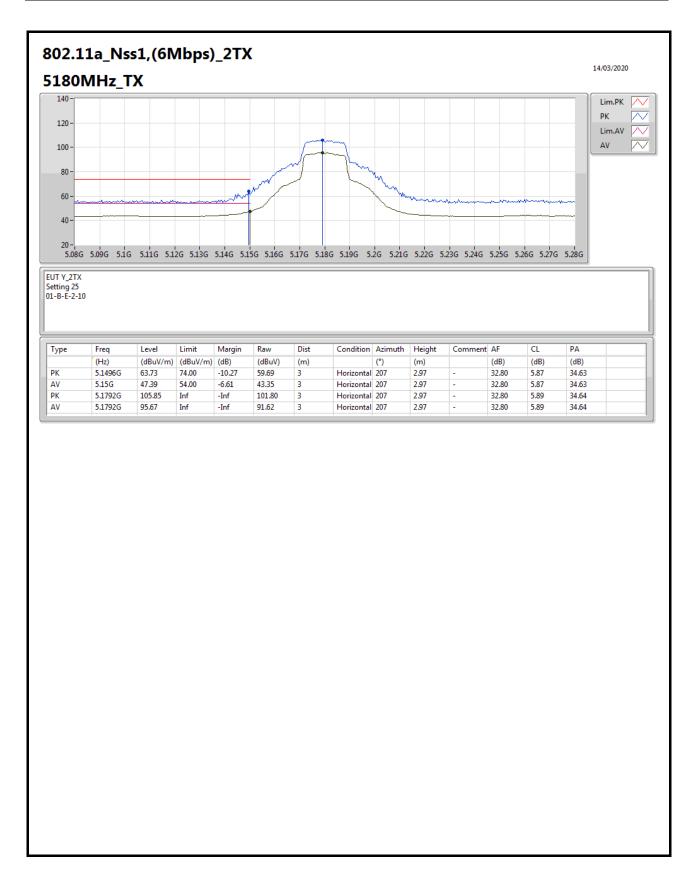
Summary

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 VHT80_Nss1,(MCS0)_2TX	Pass	AV	5.15G	53.95	54.00	-0.05	3	Vertical	340	1.00	-

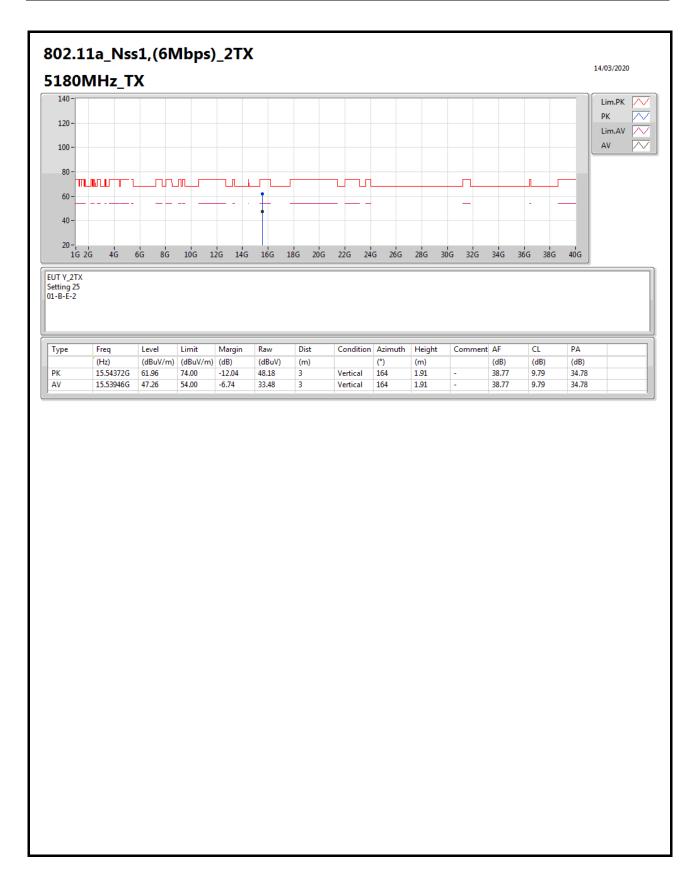




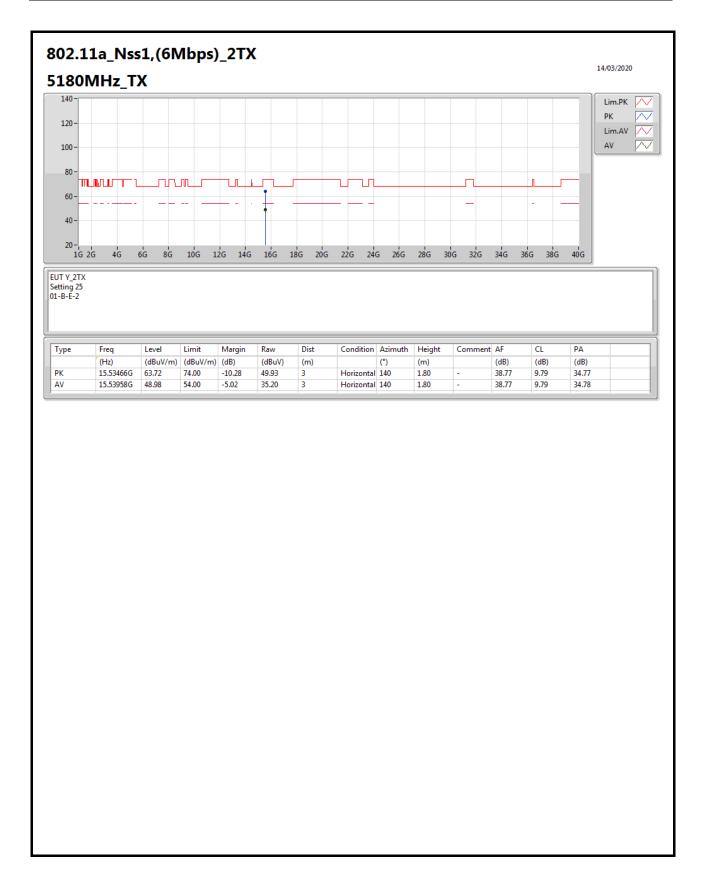




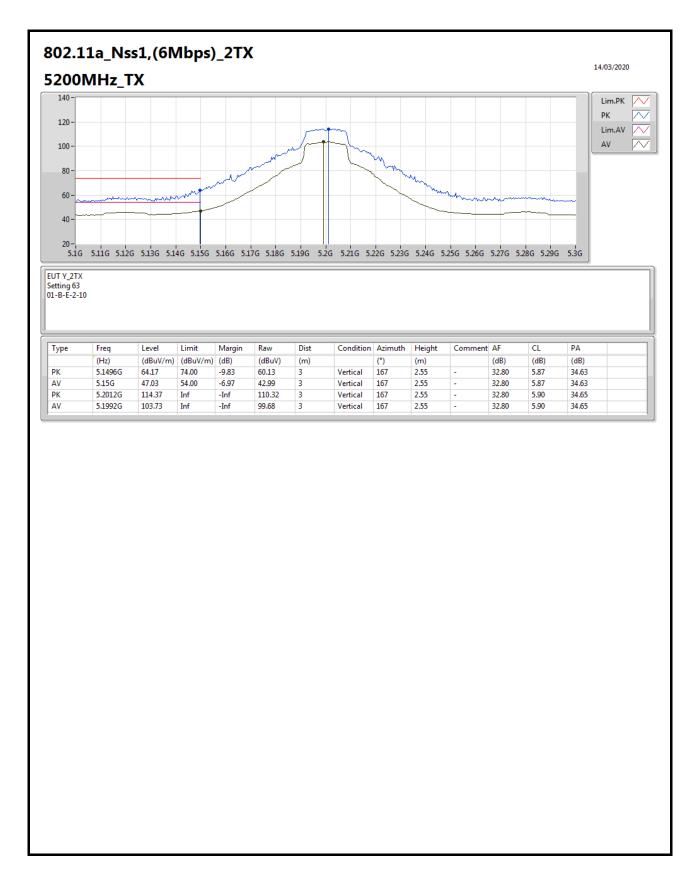




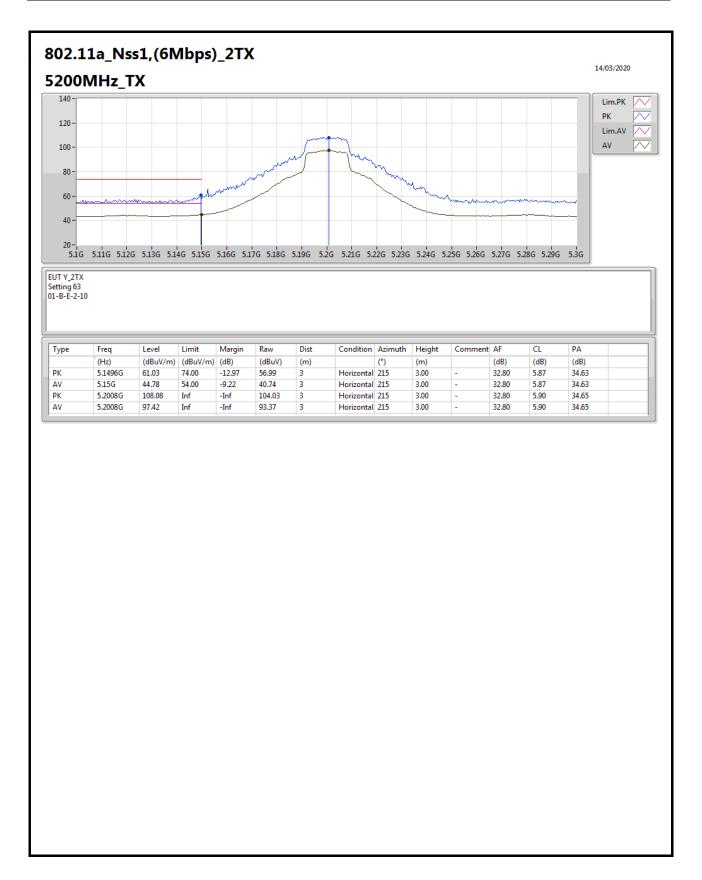




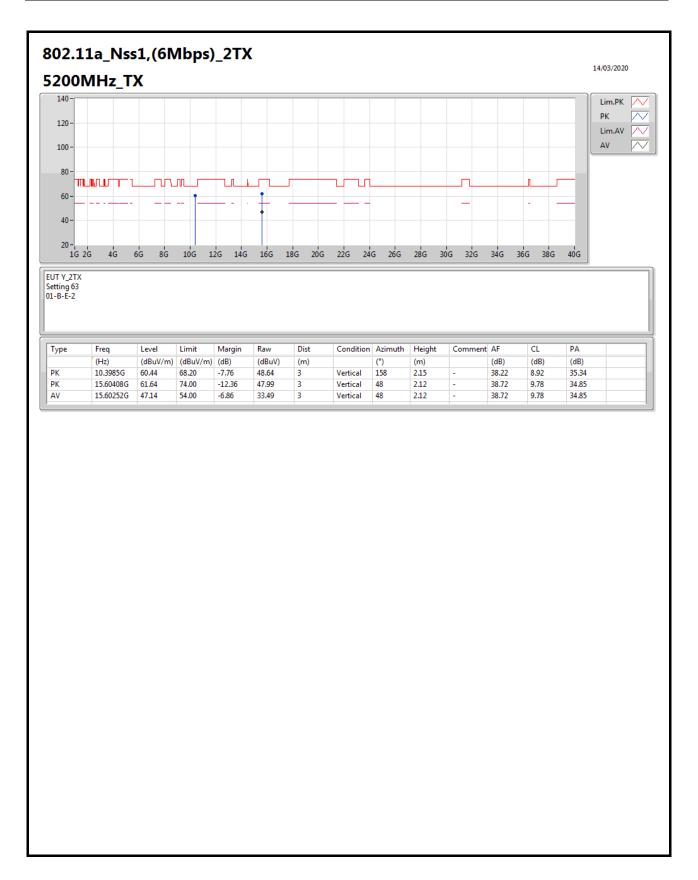




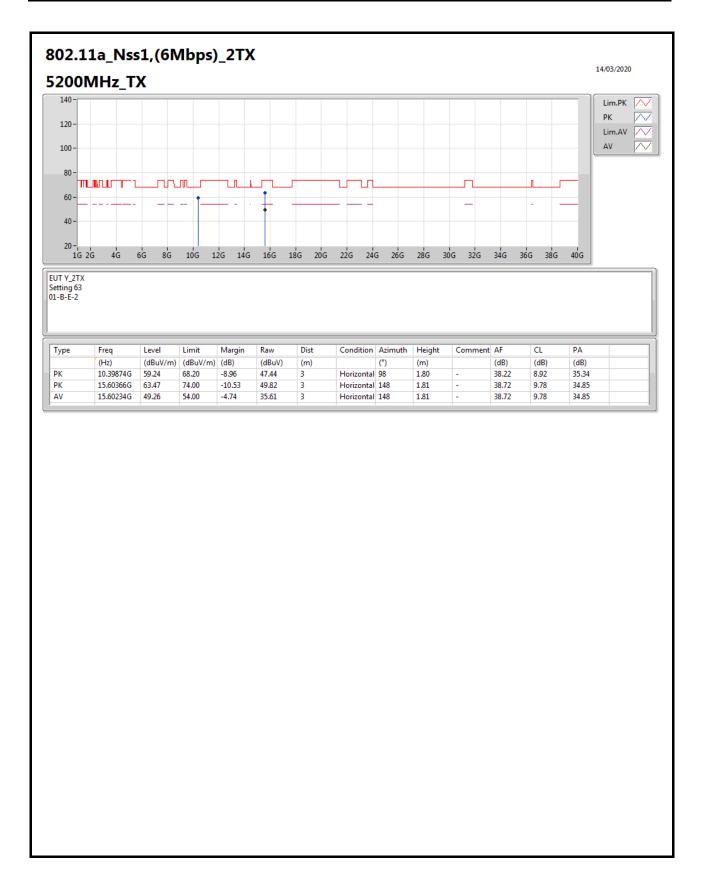




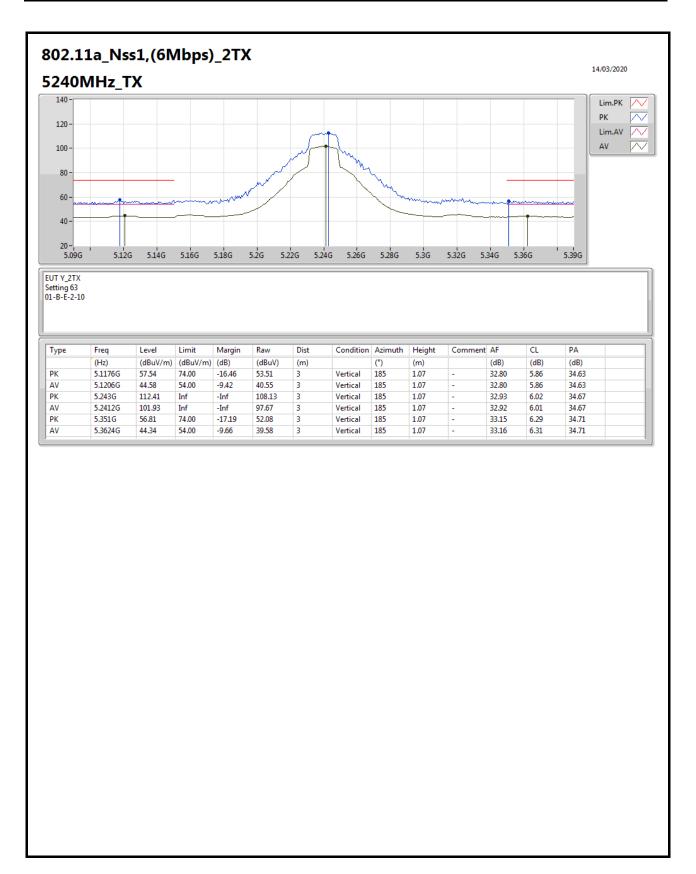




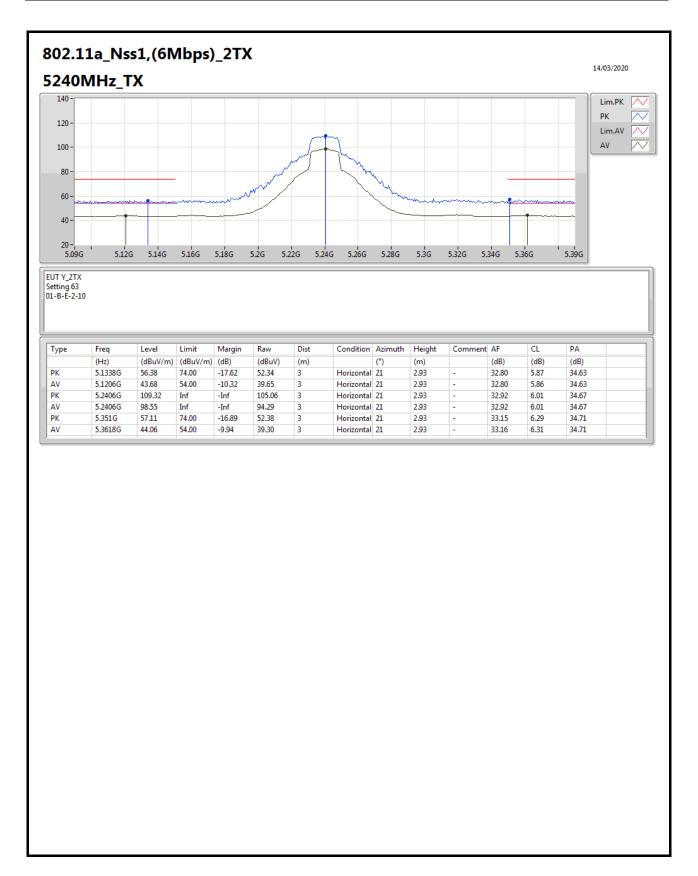




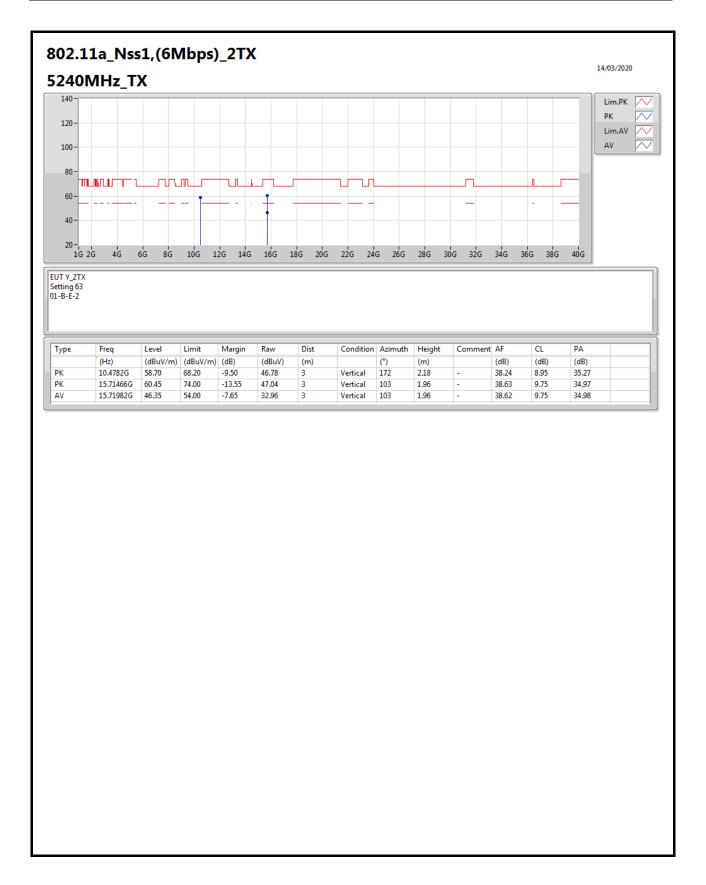




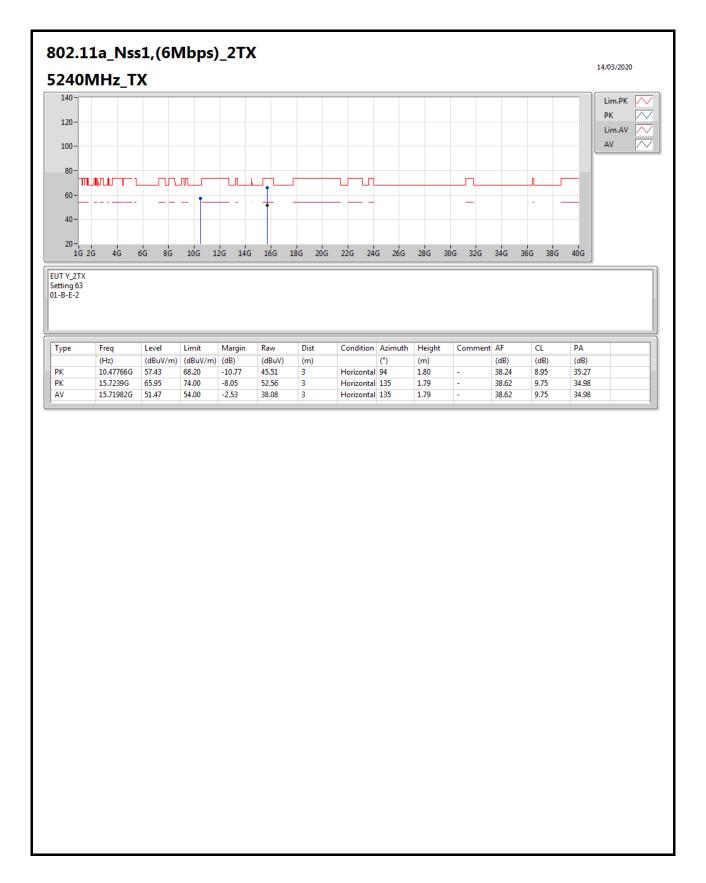




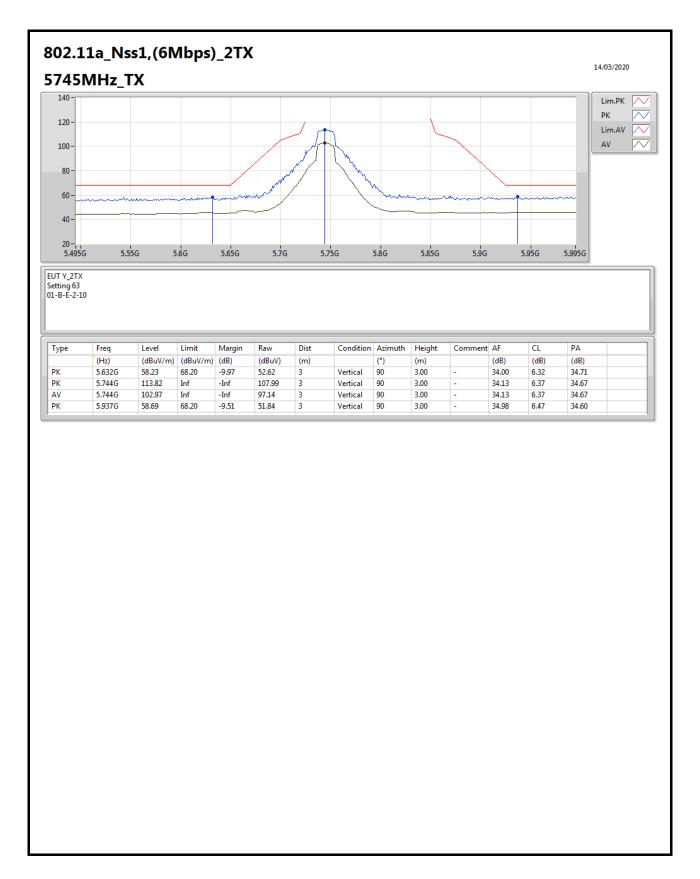






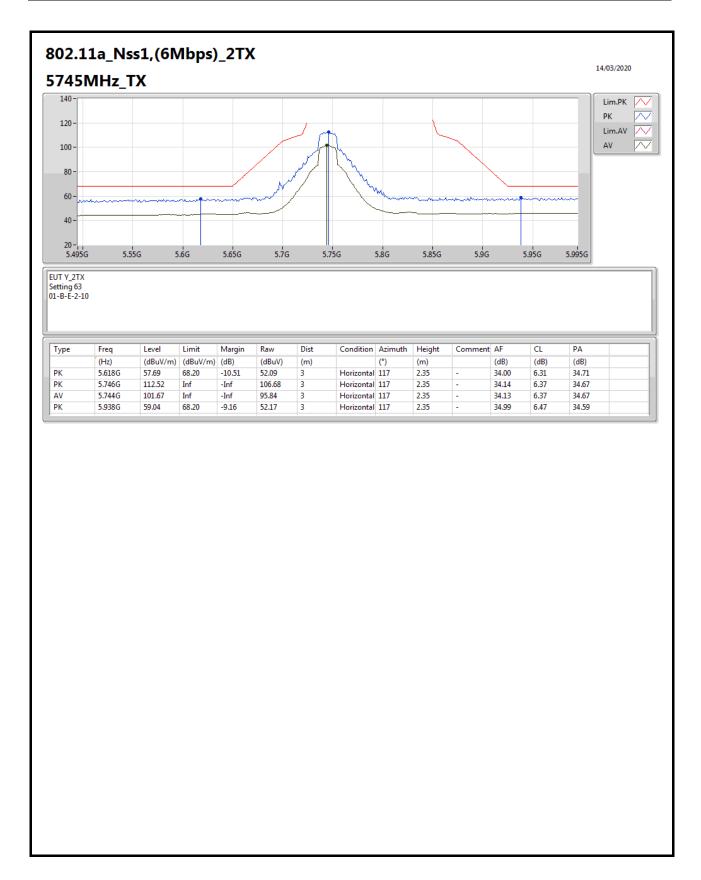




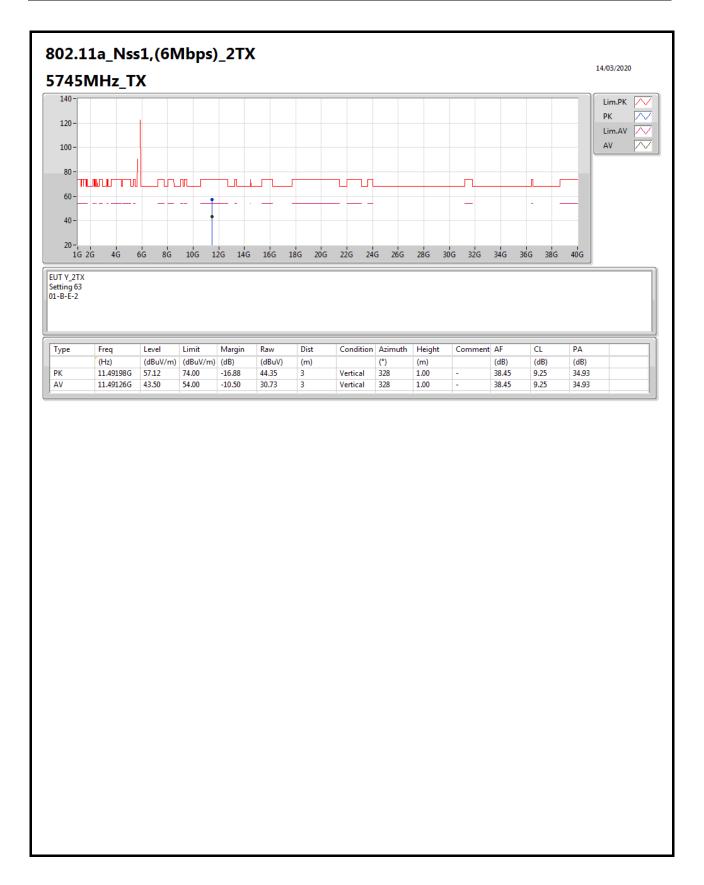


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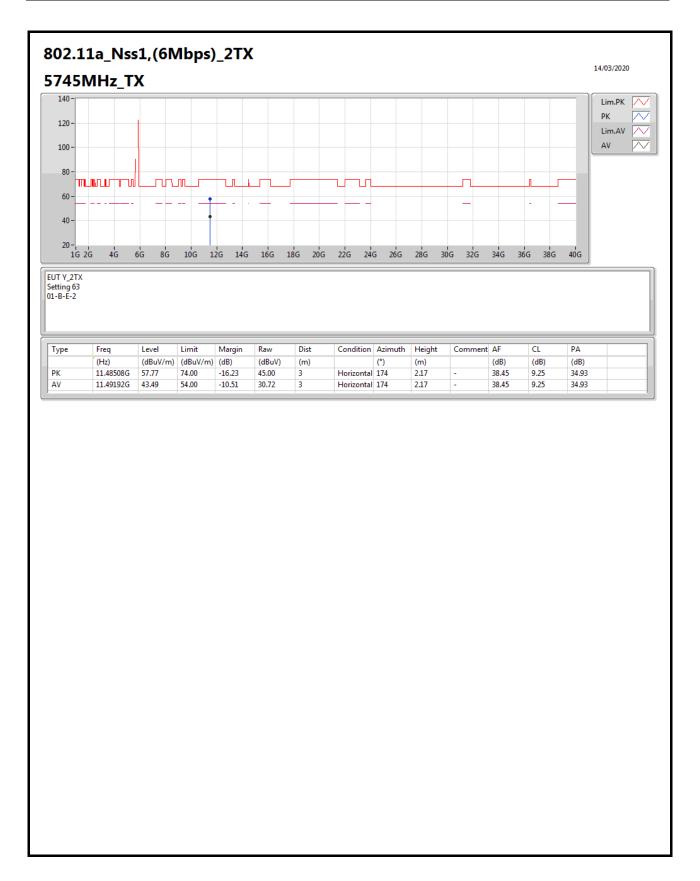




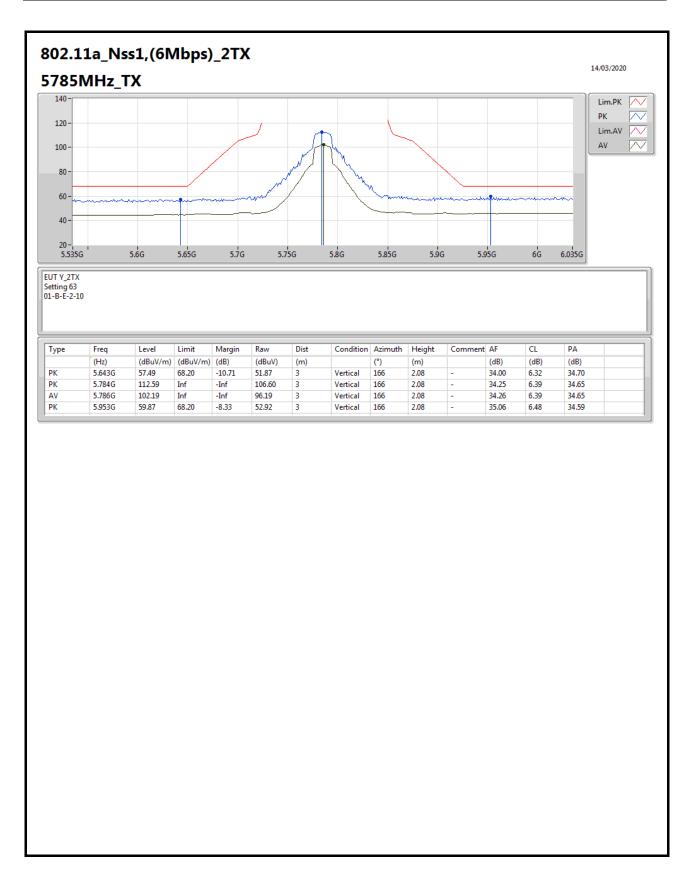


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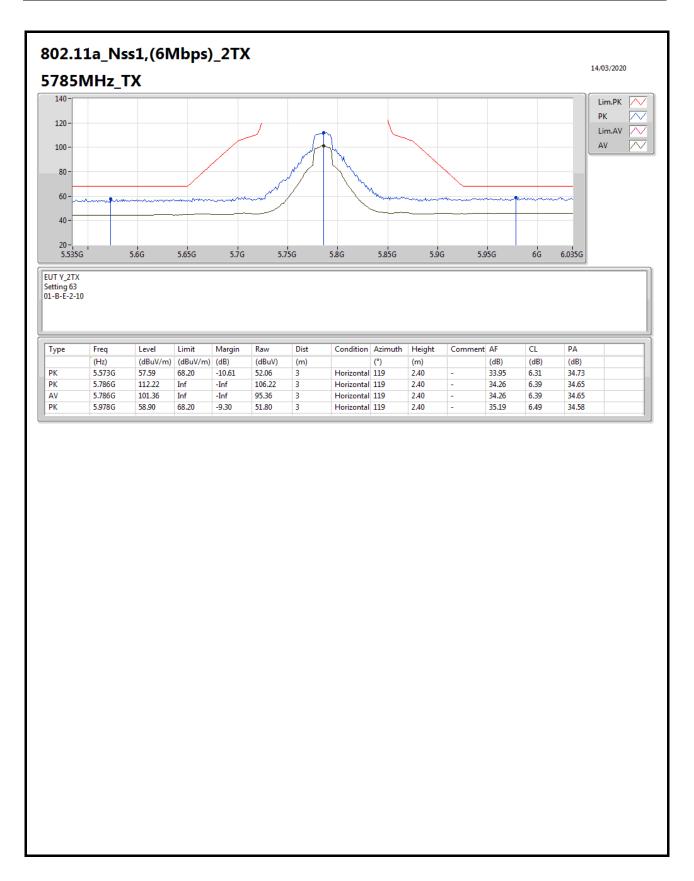






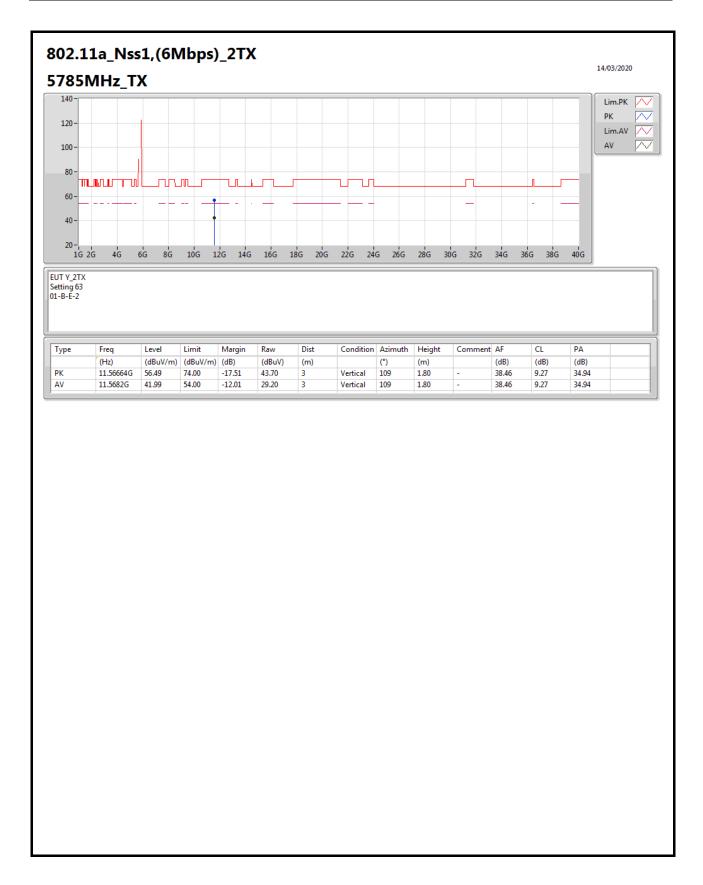




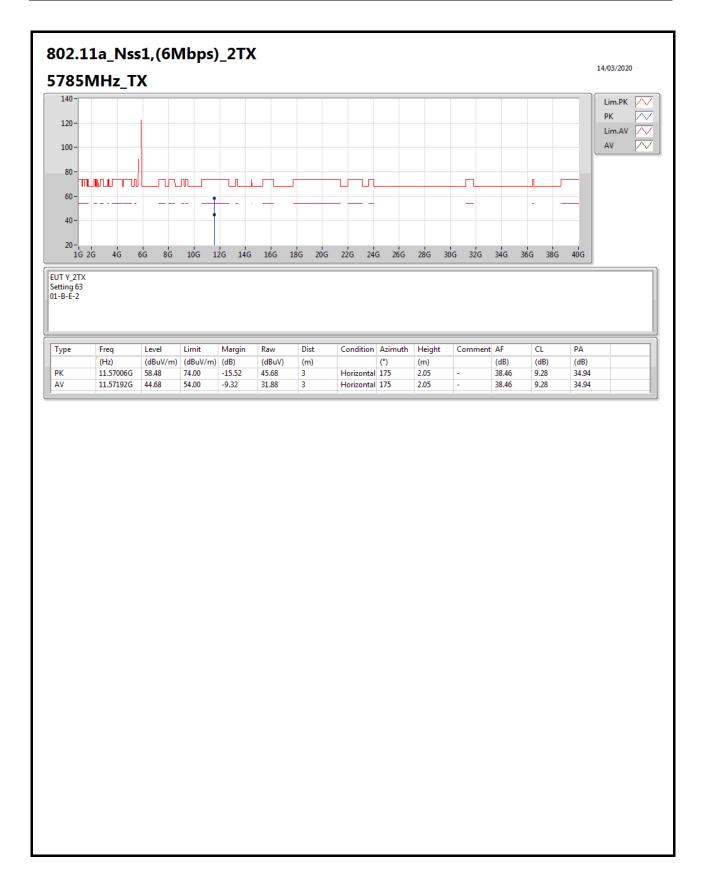


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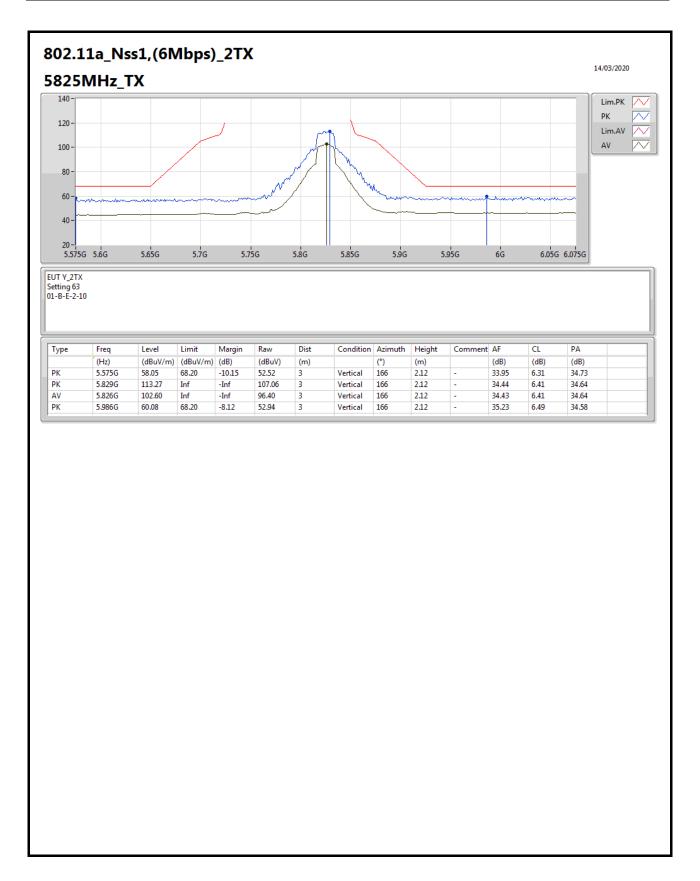




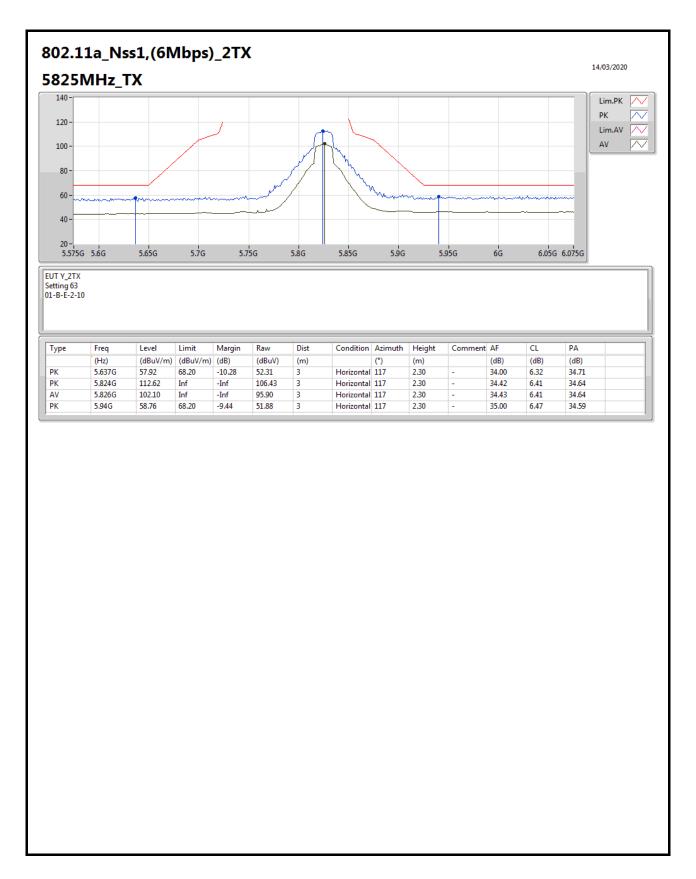




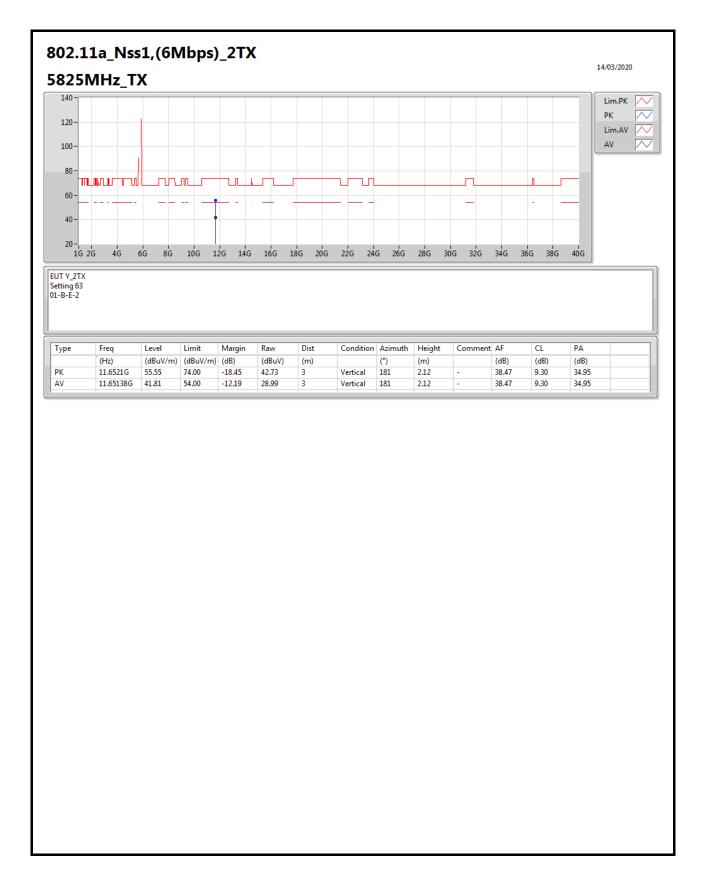




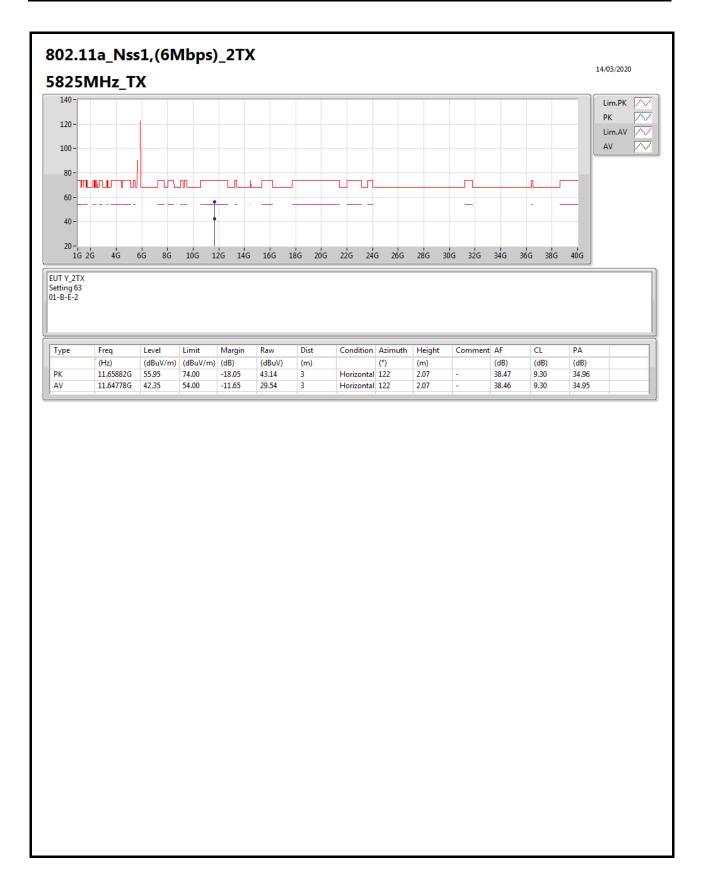




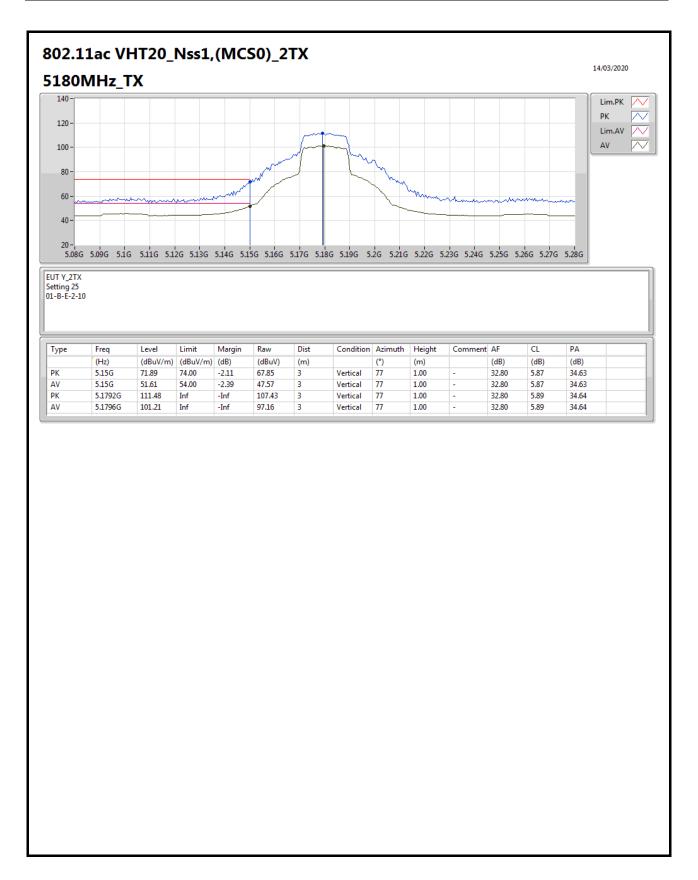




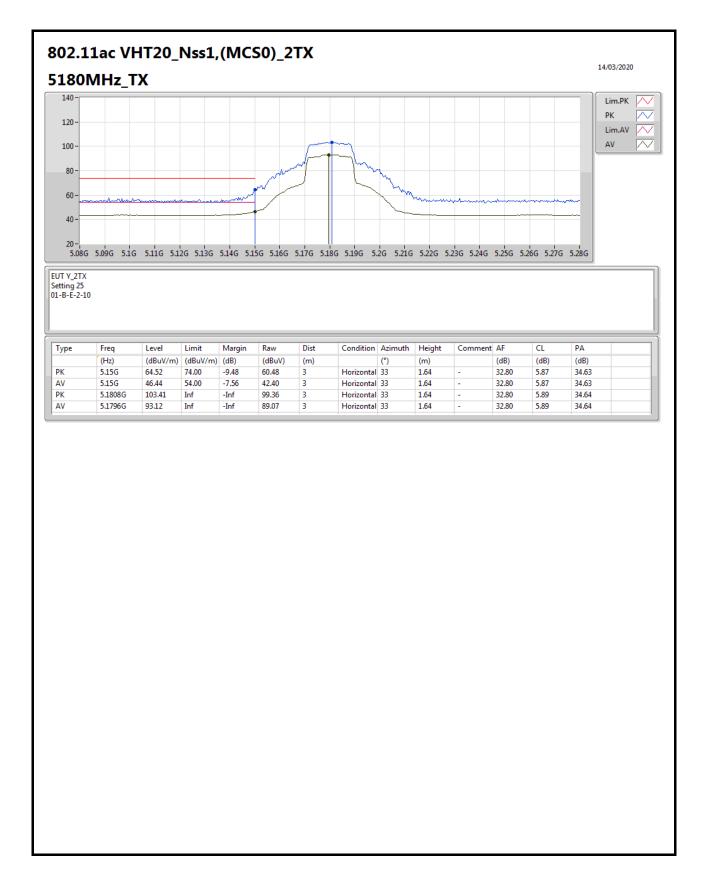




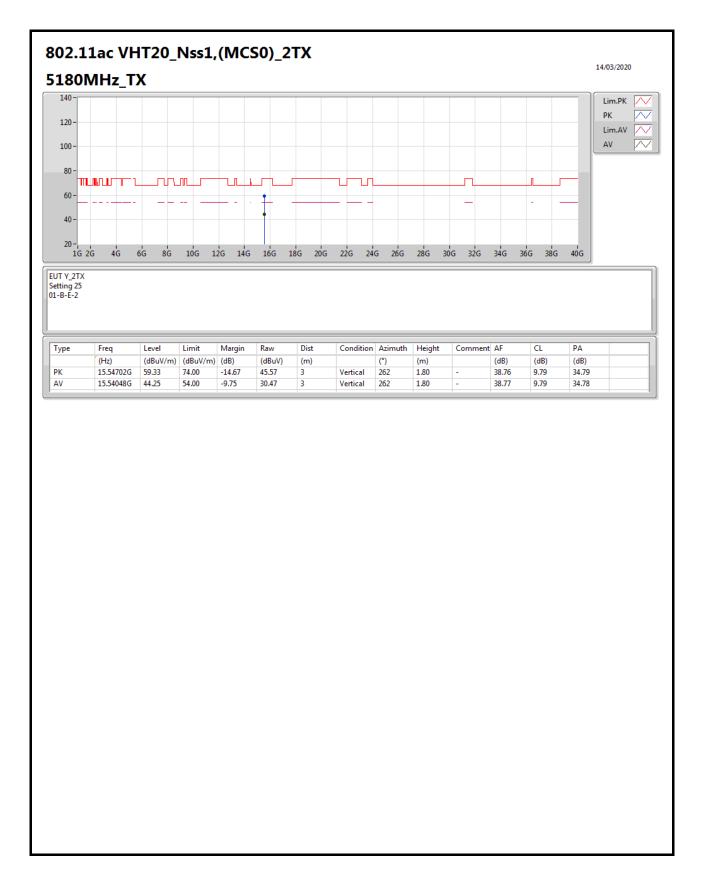




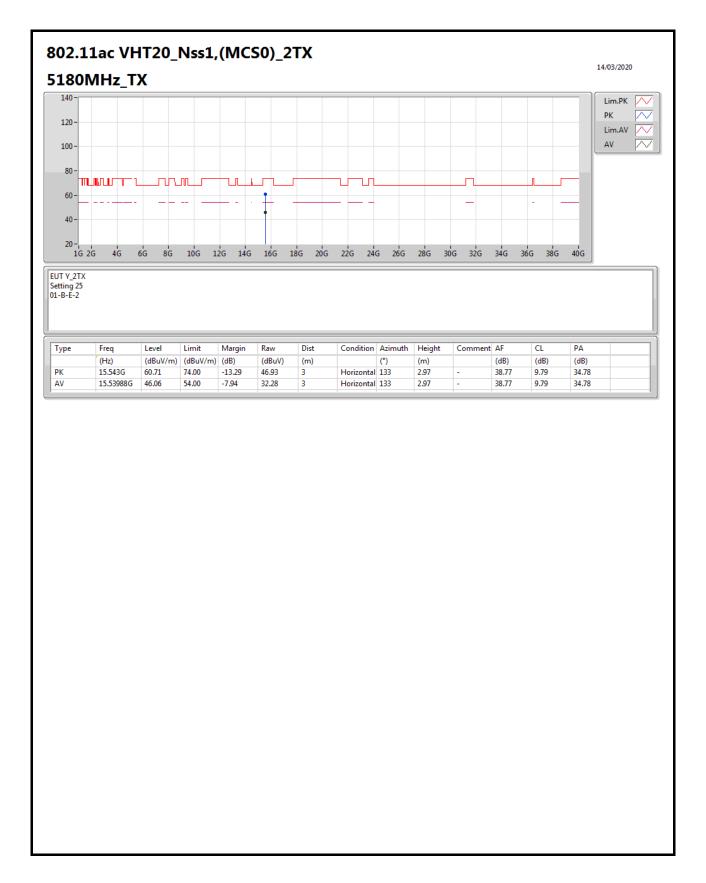




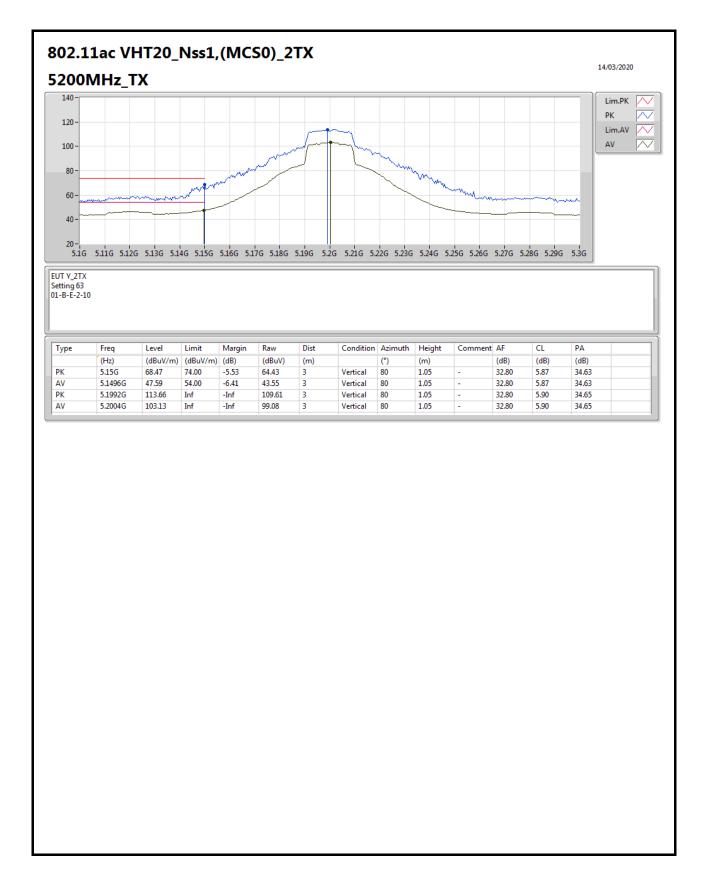




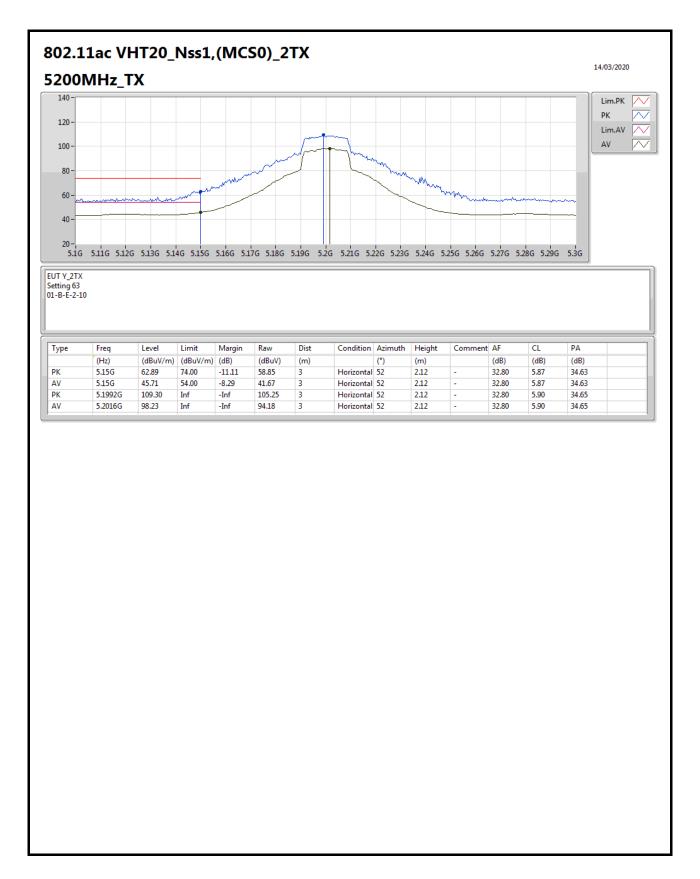




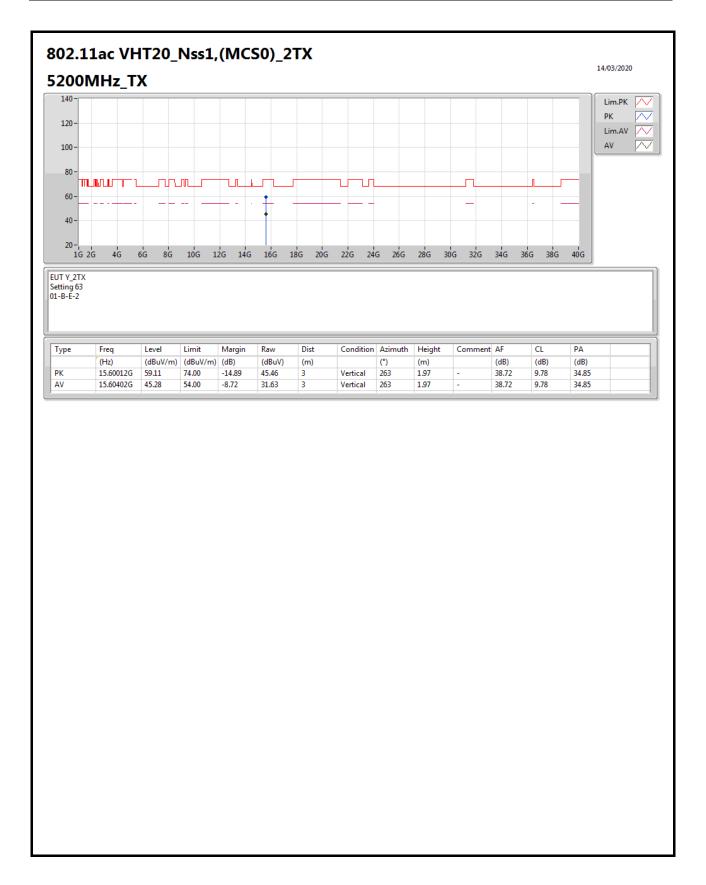




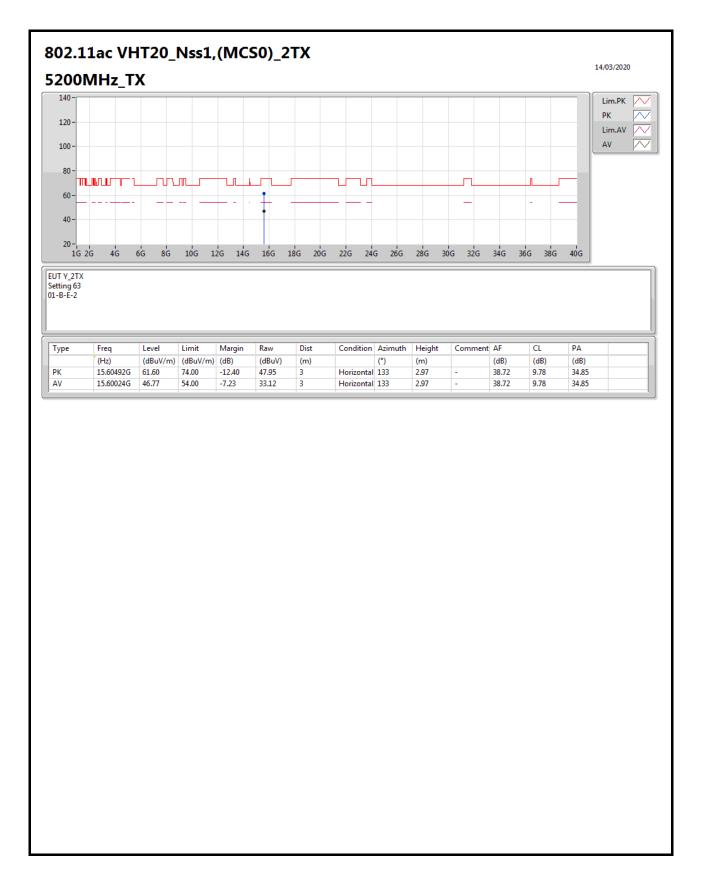




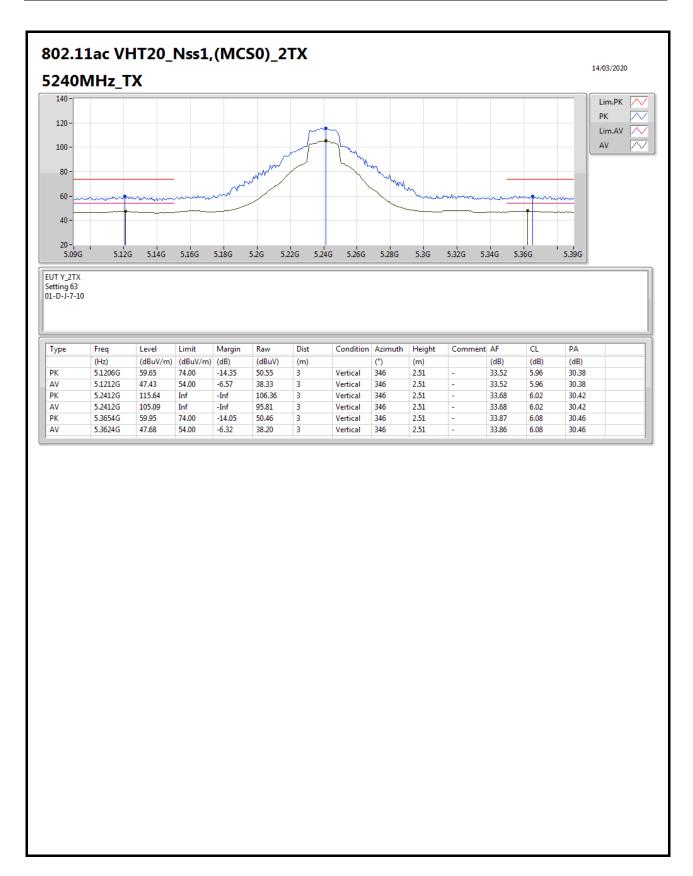




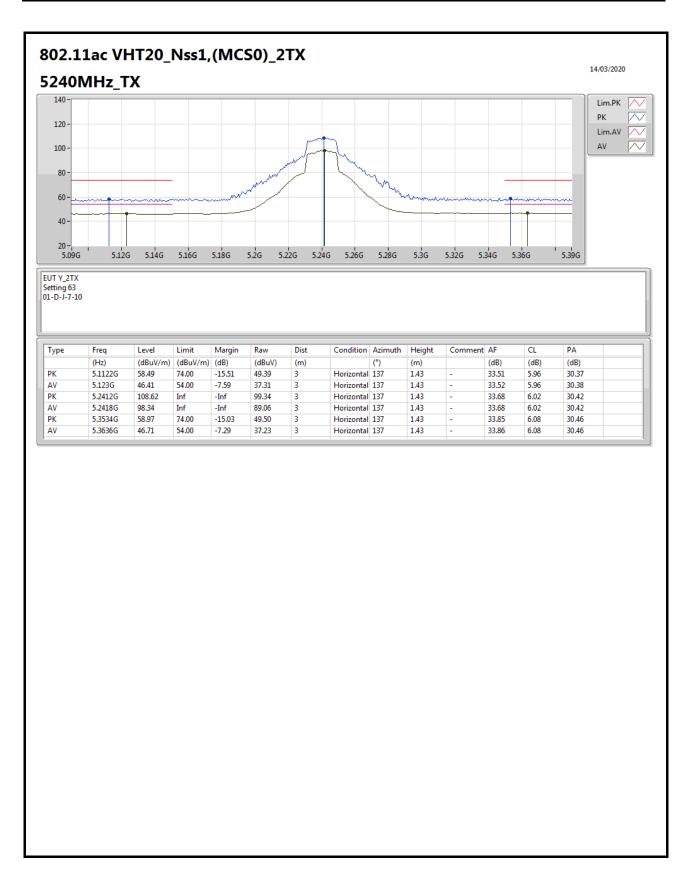




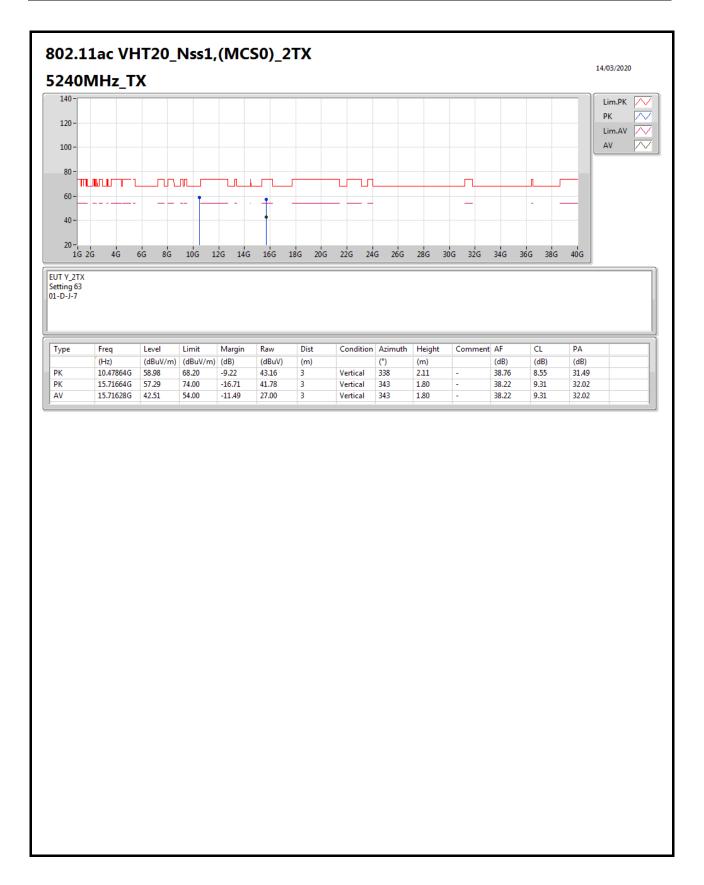




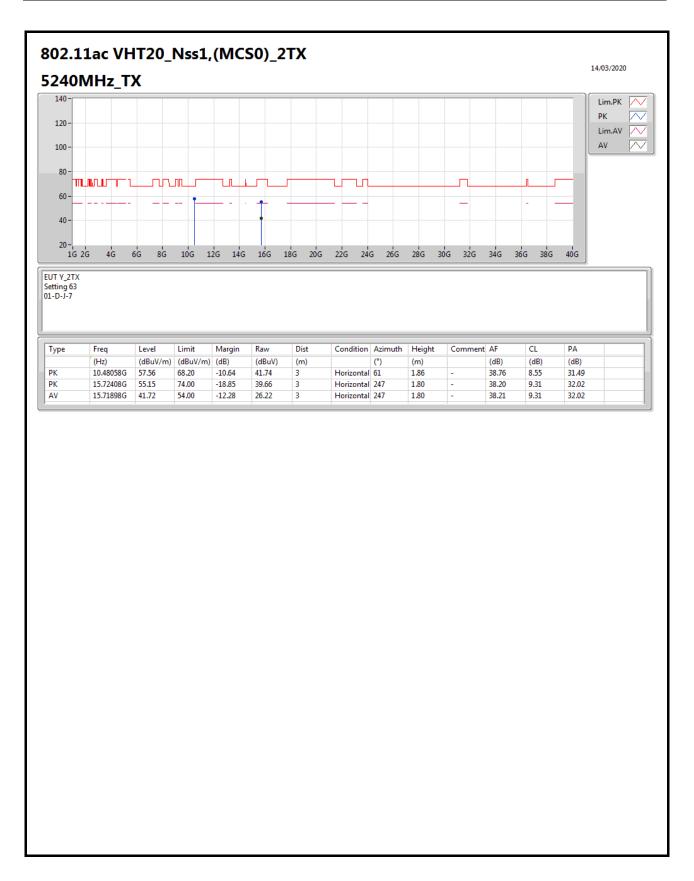




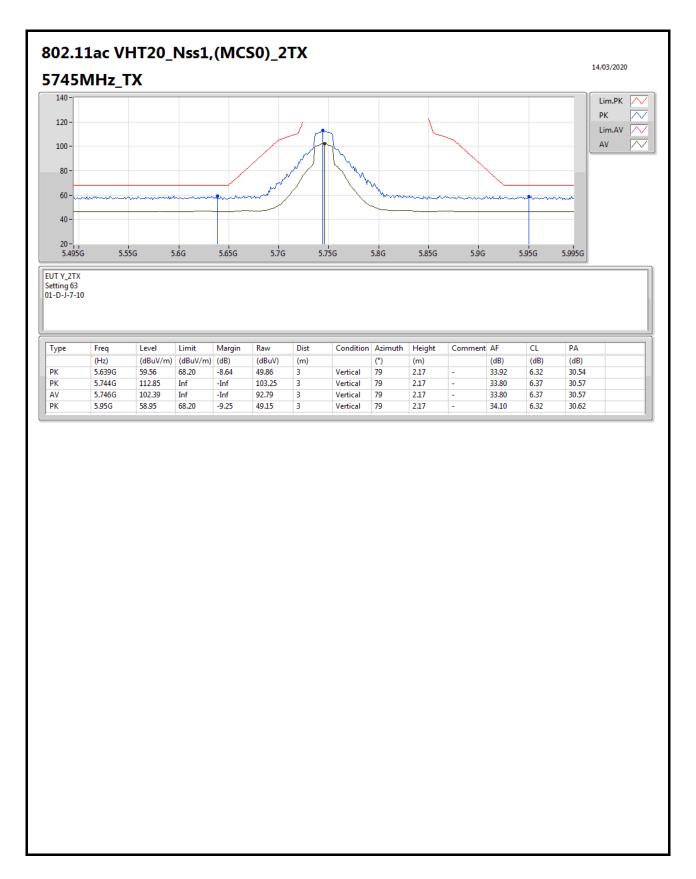




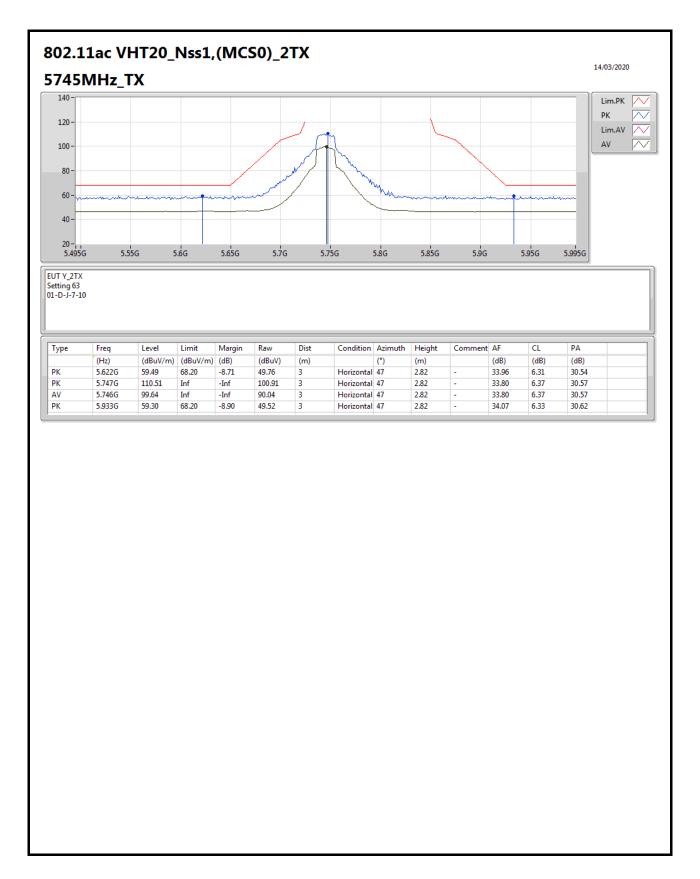




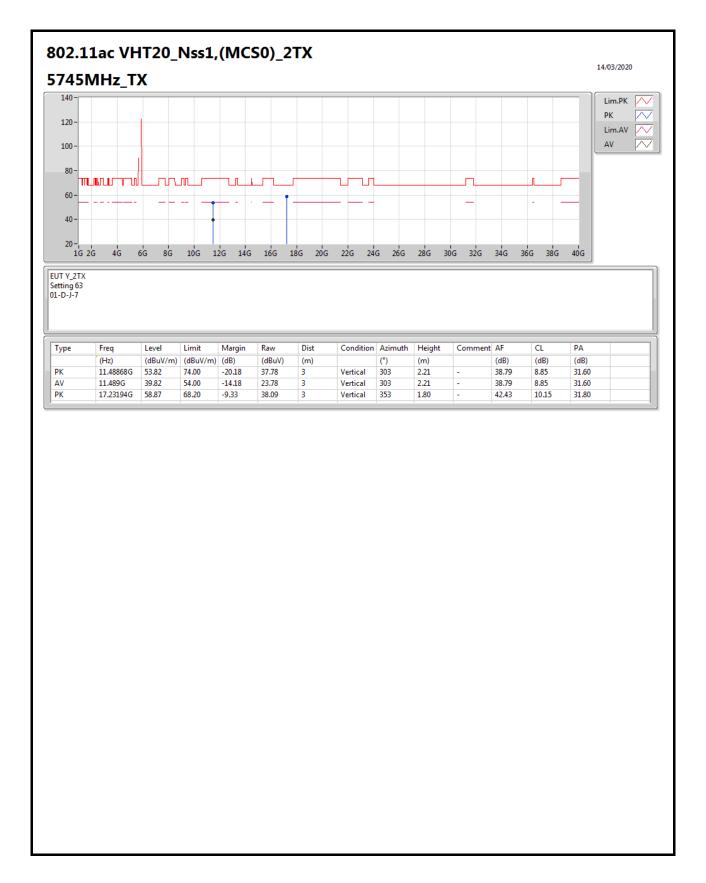




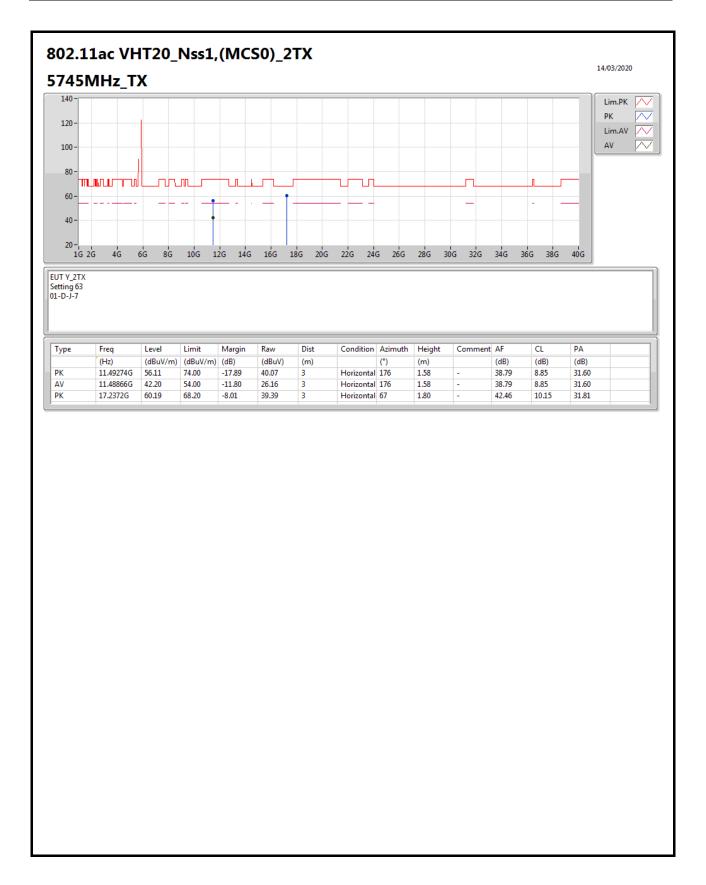




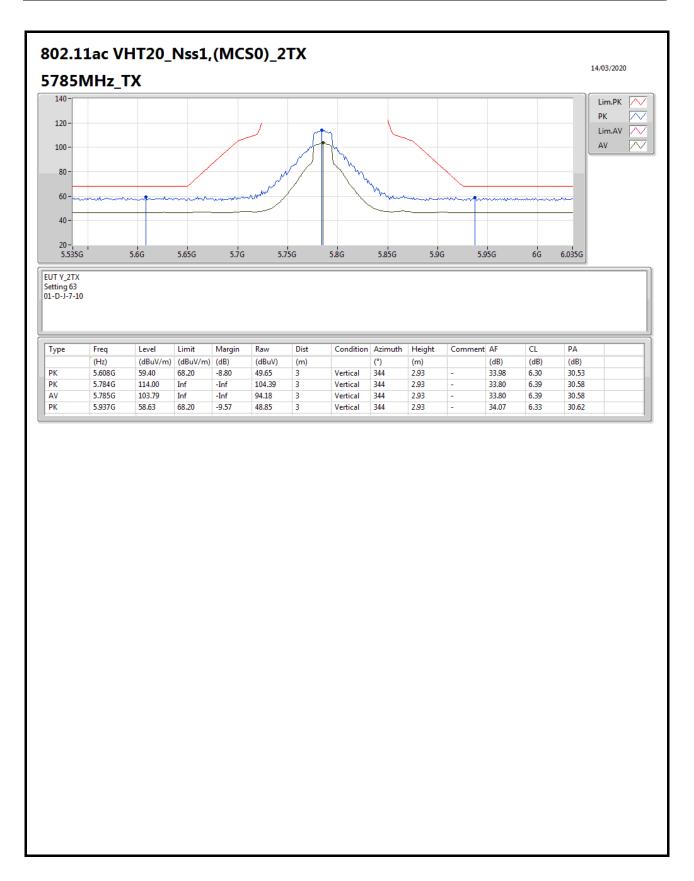




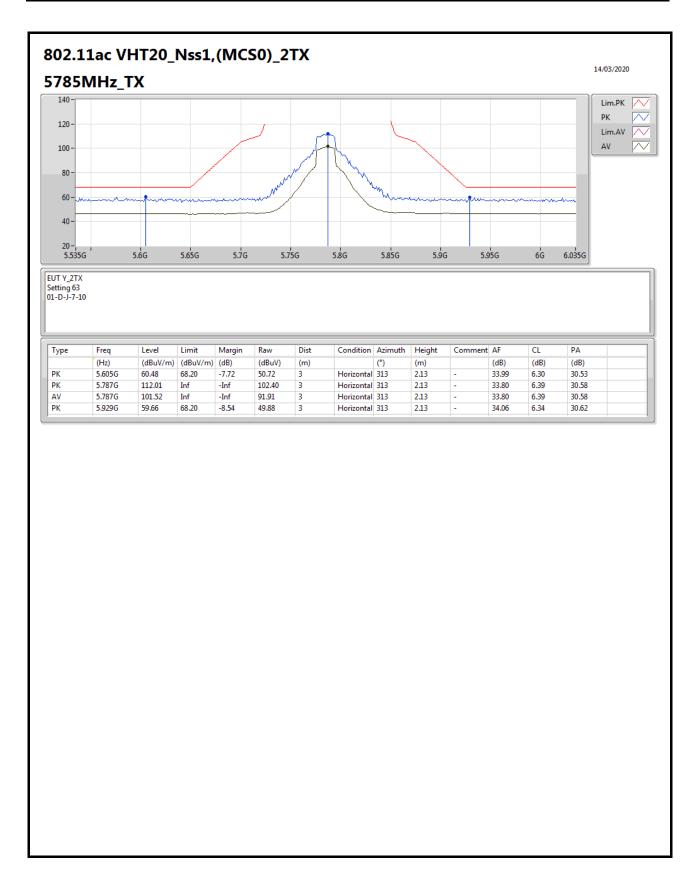




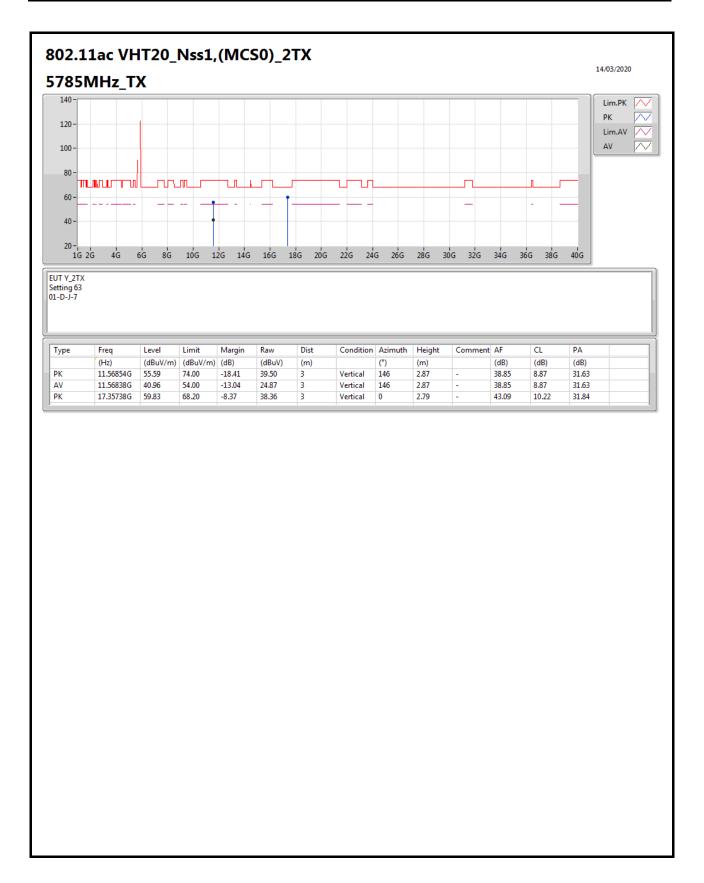




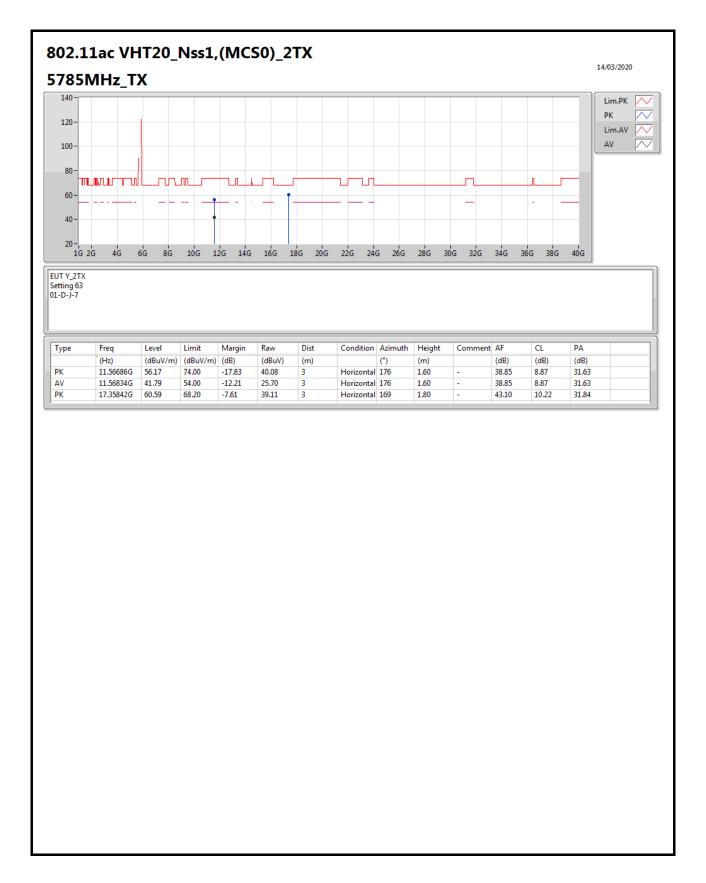




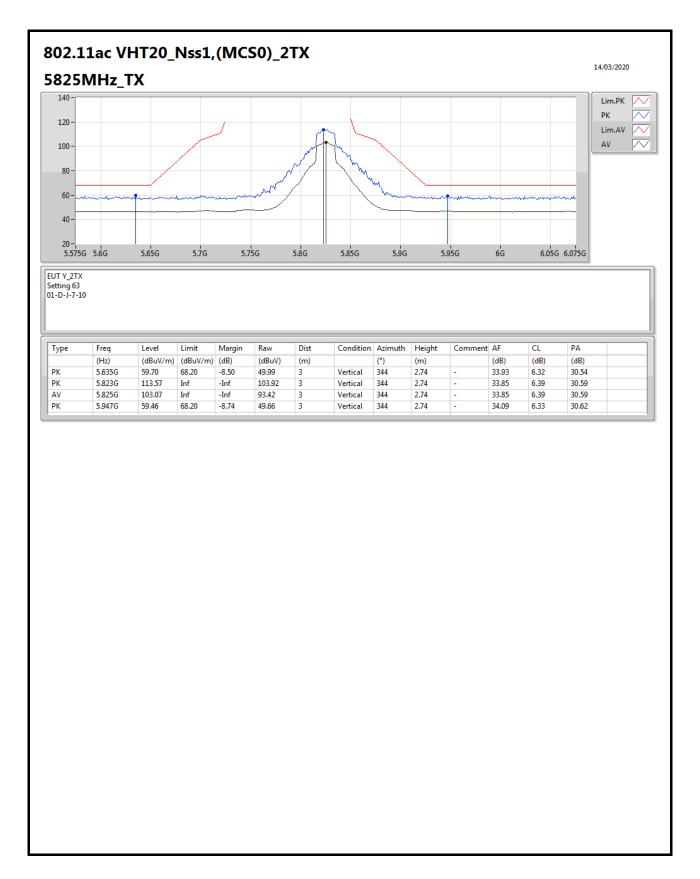




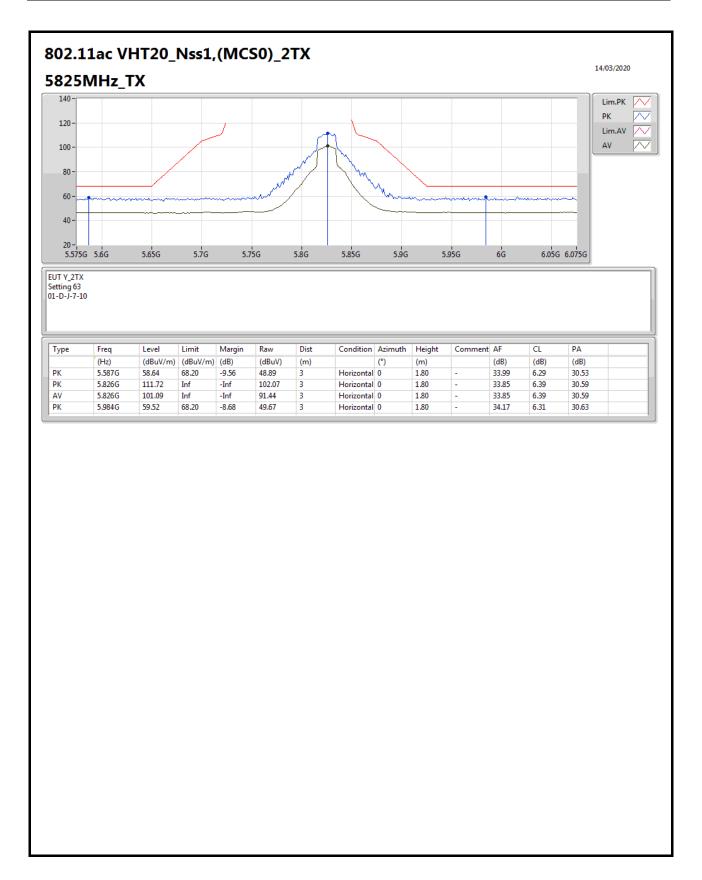




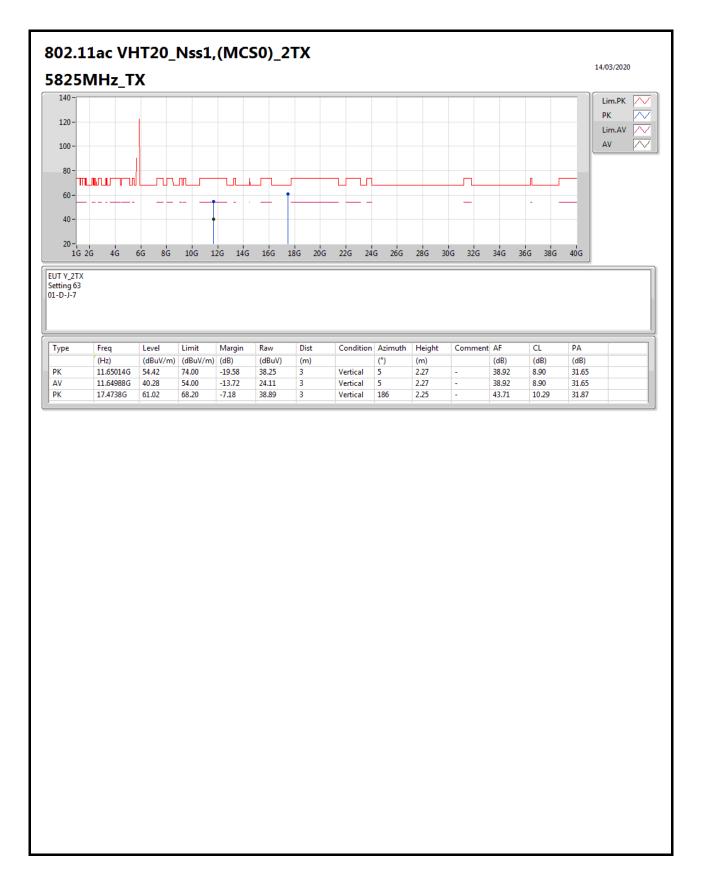




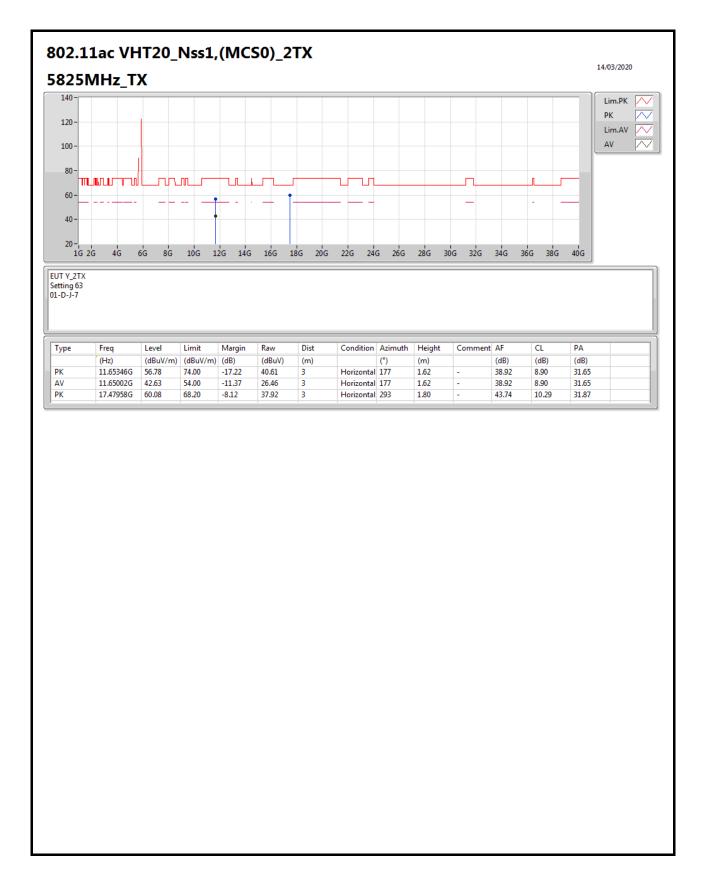




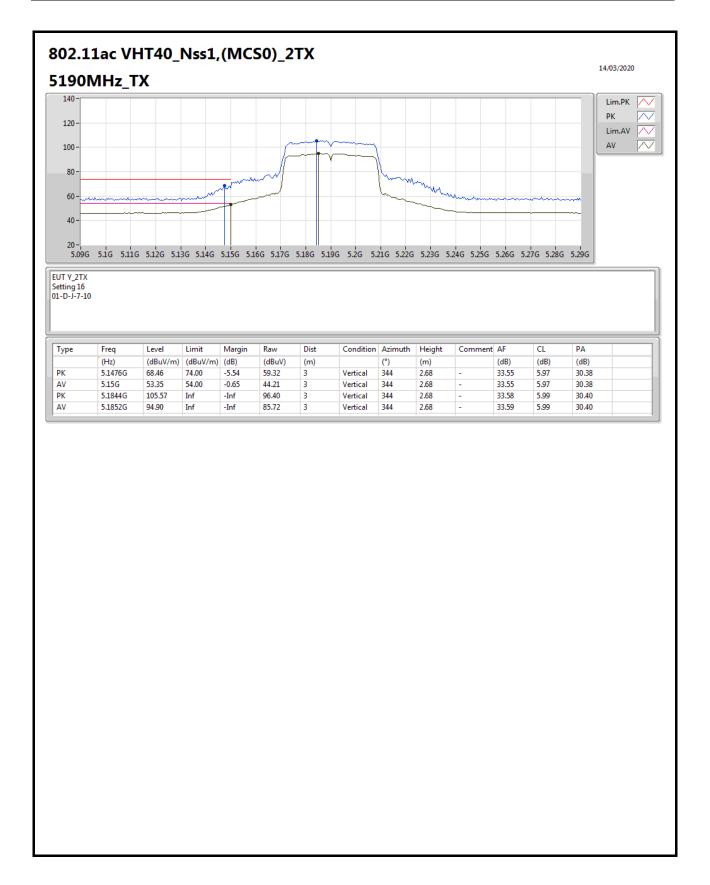






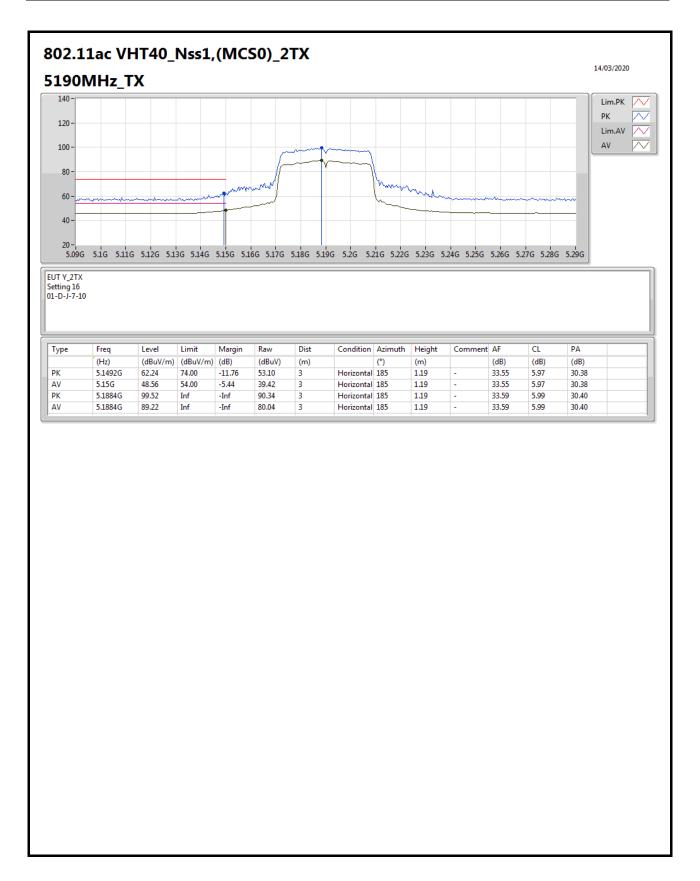






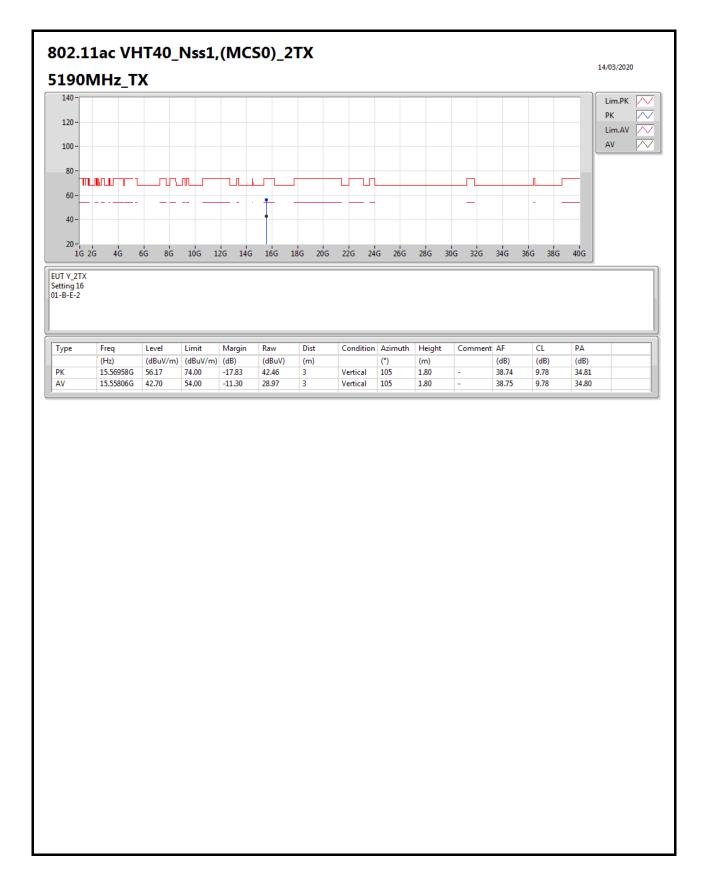
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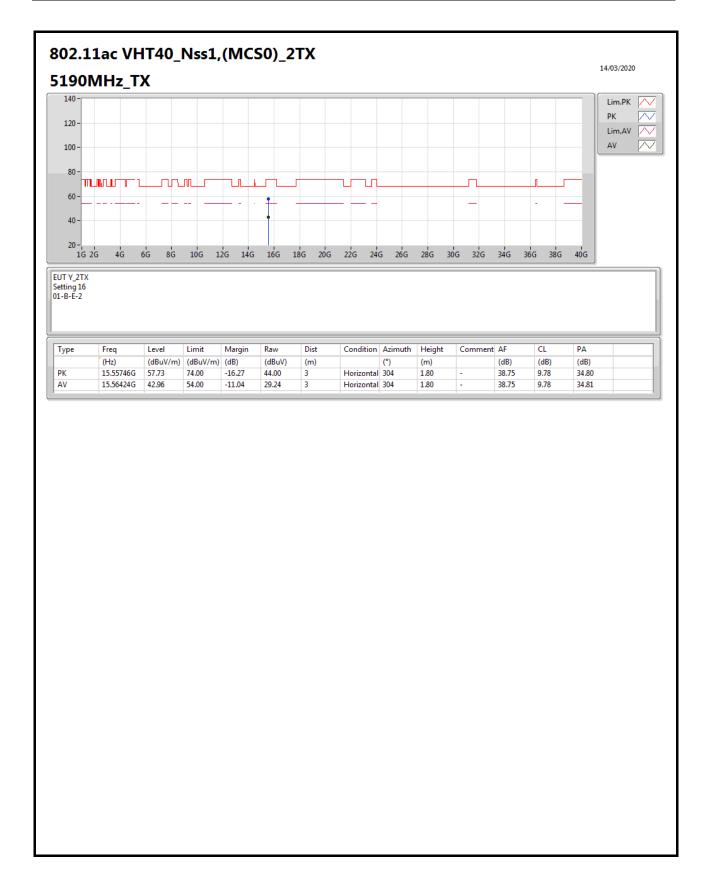


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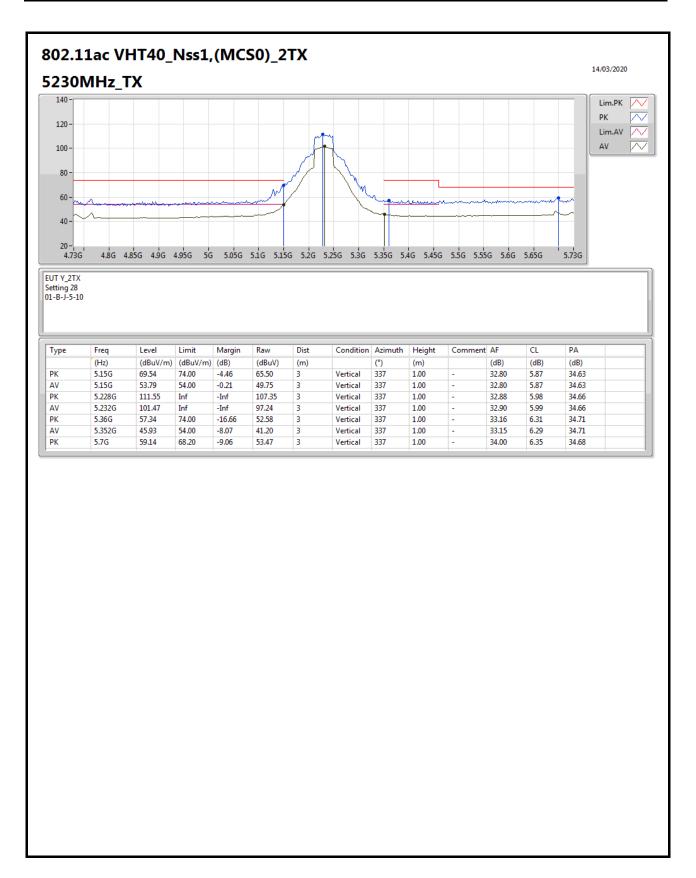




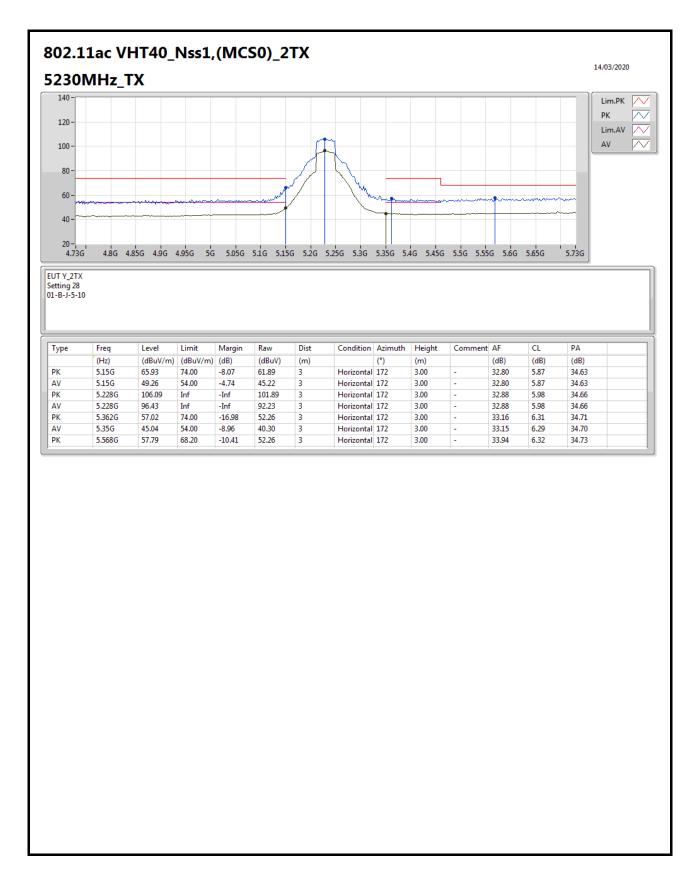




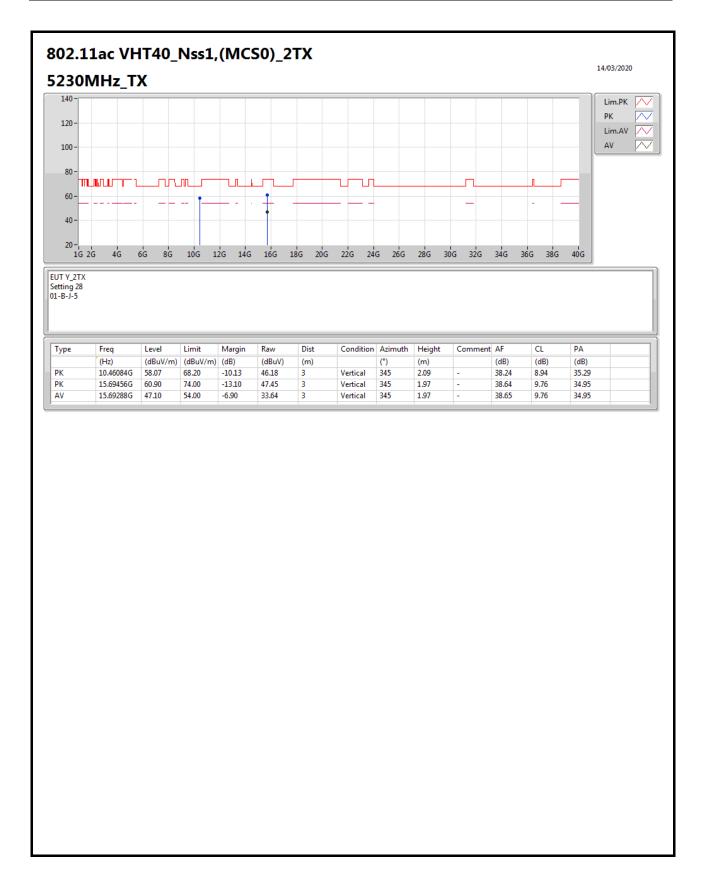






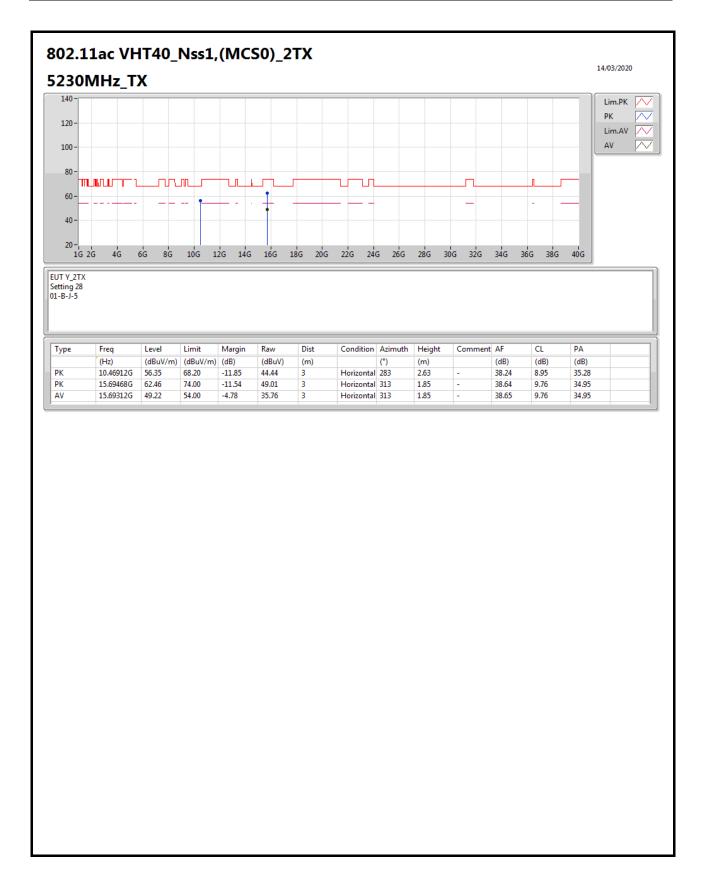




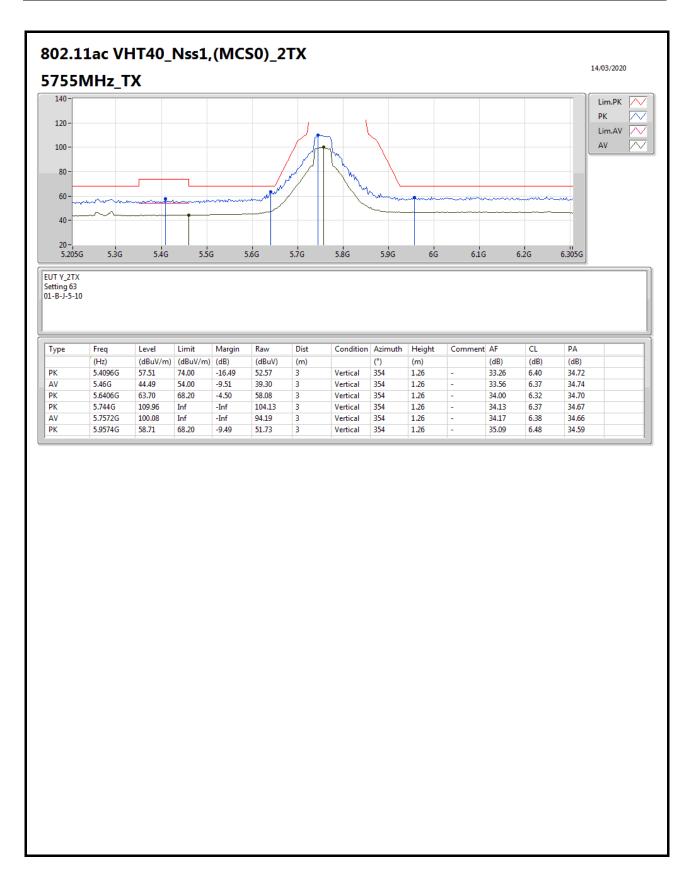


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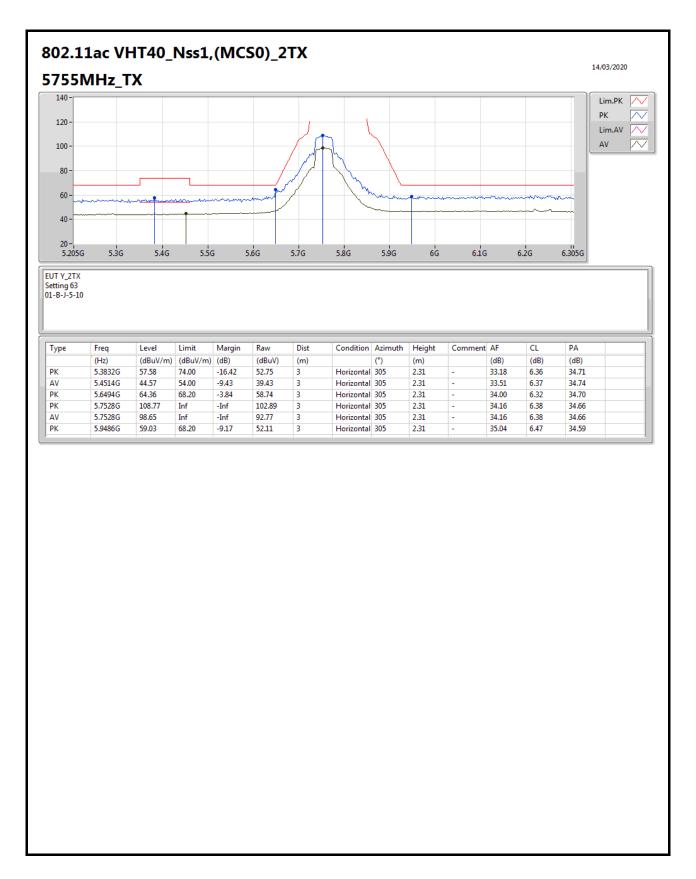




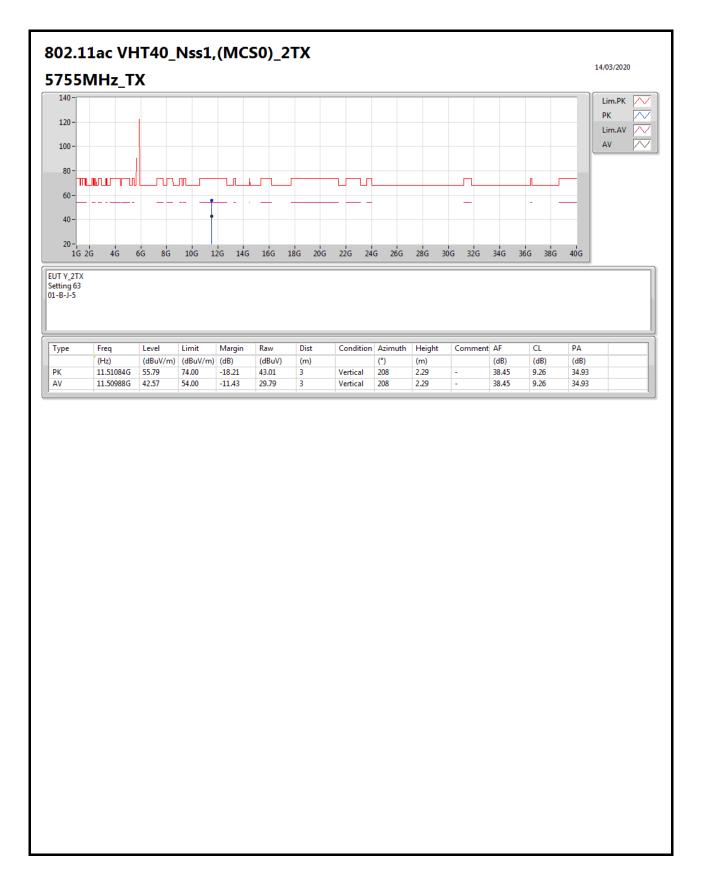


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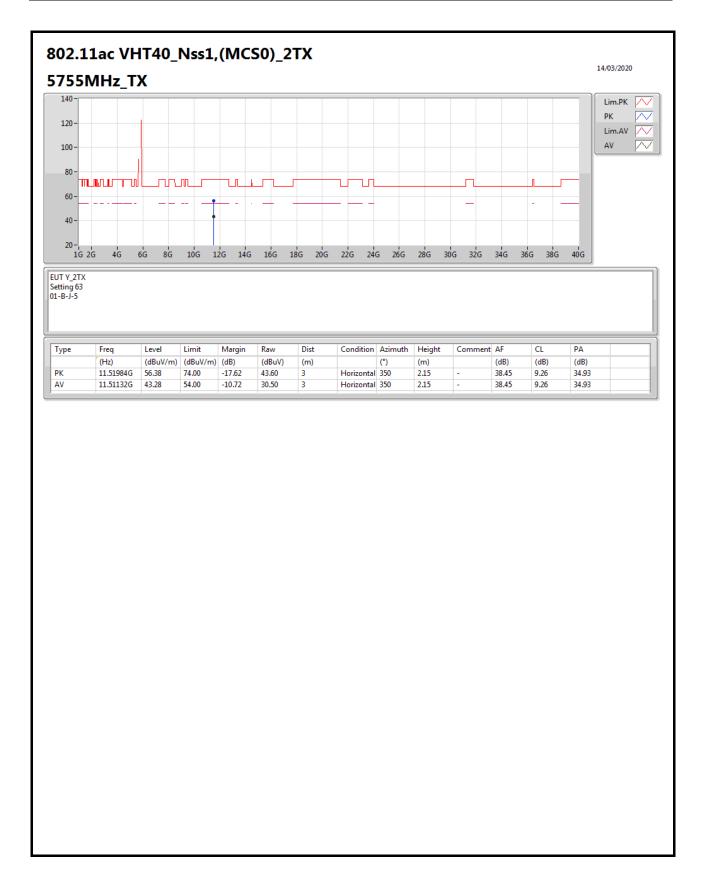




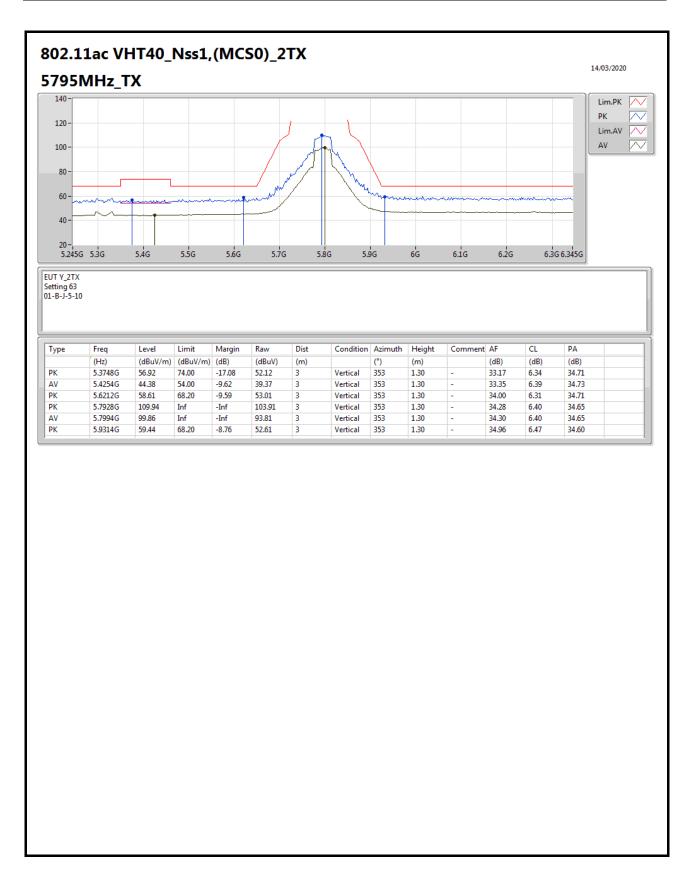




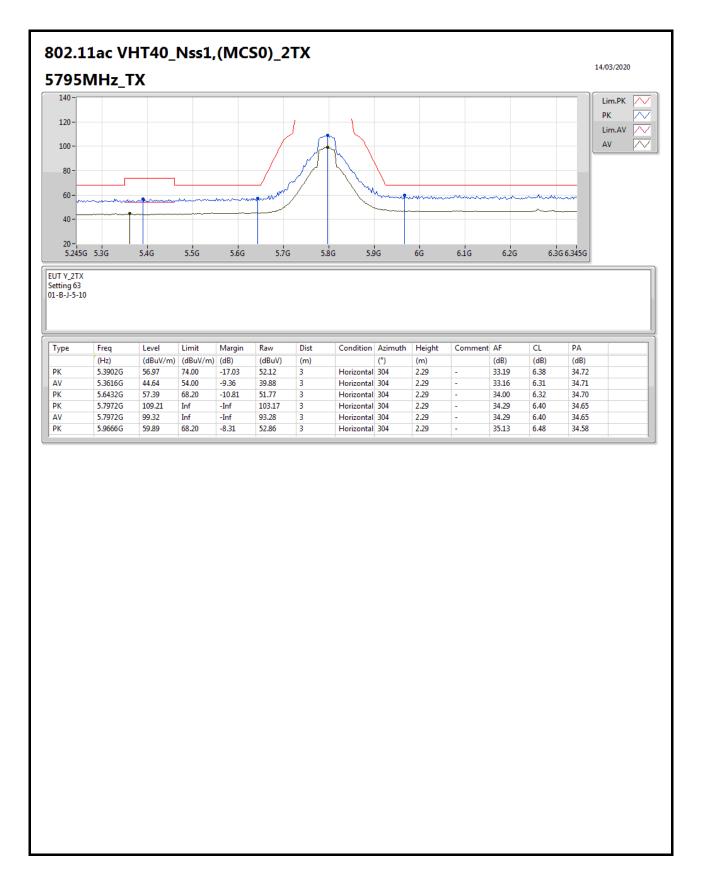






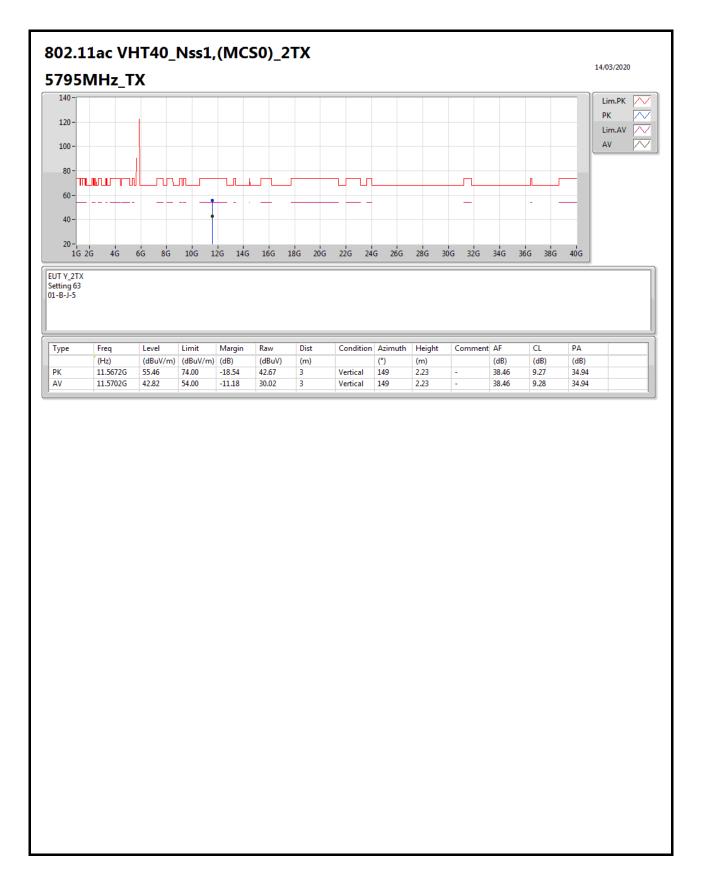




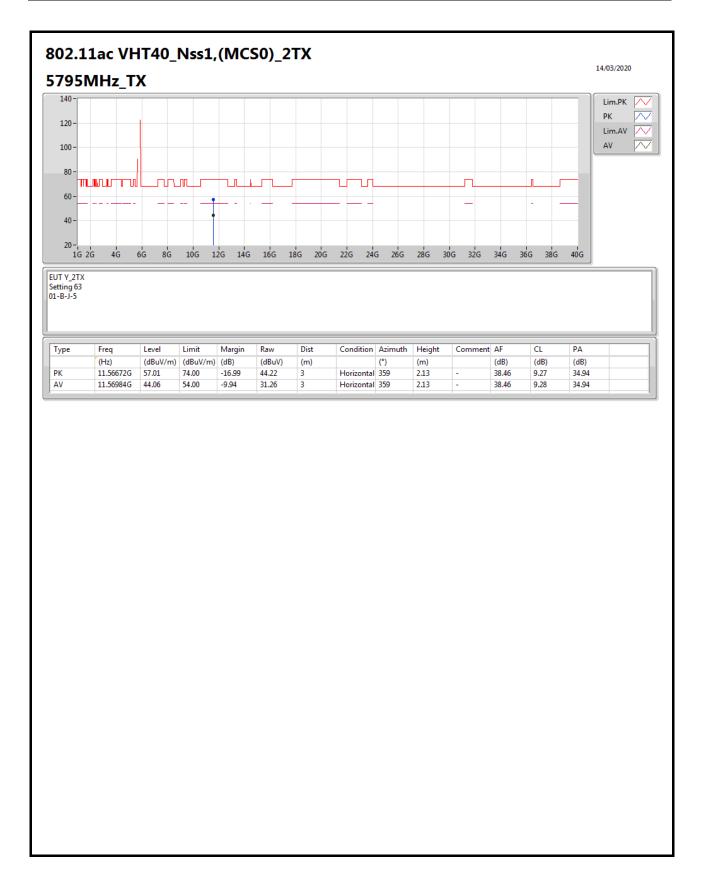


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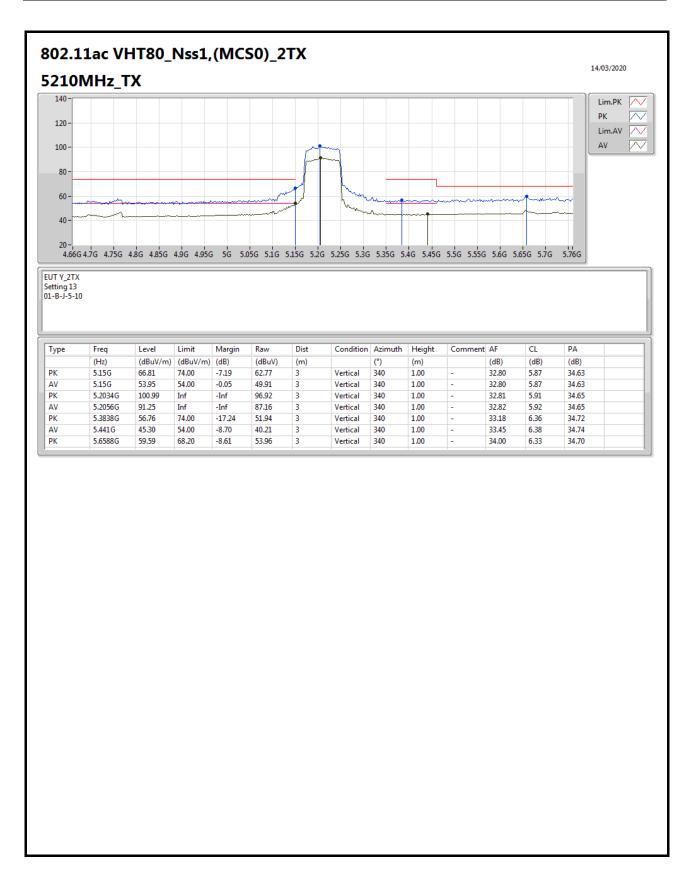






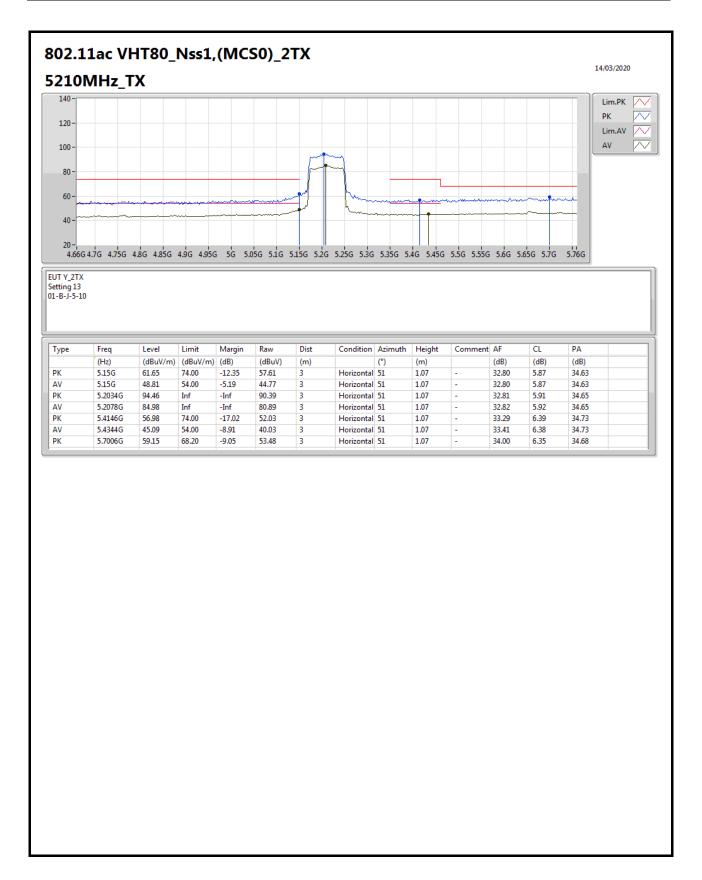




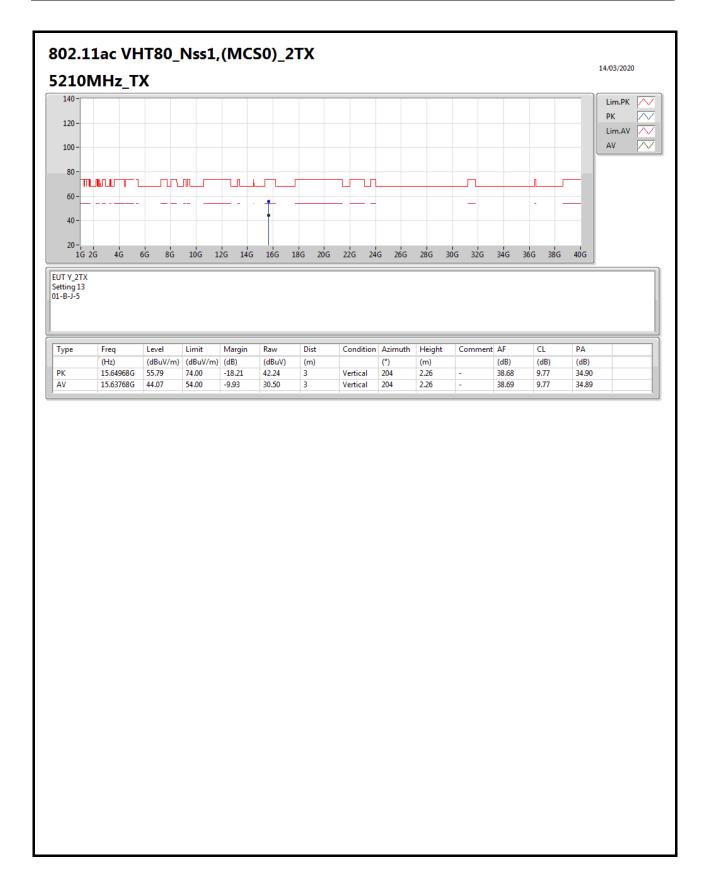


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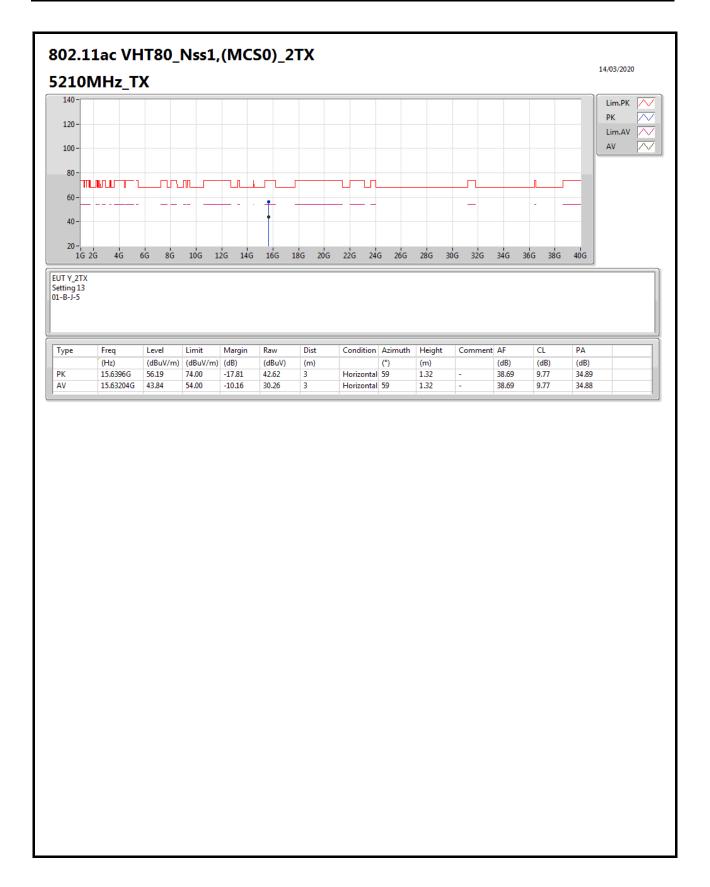




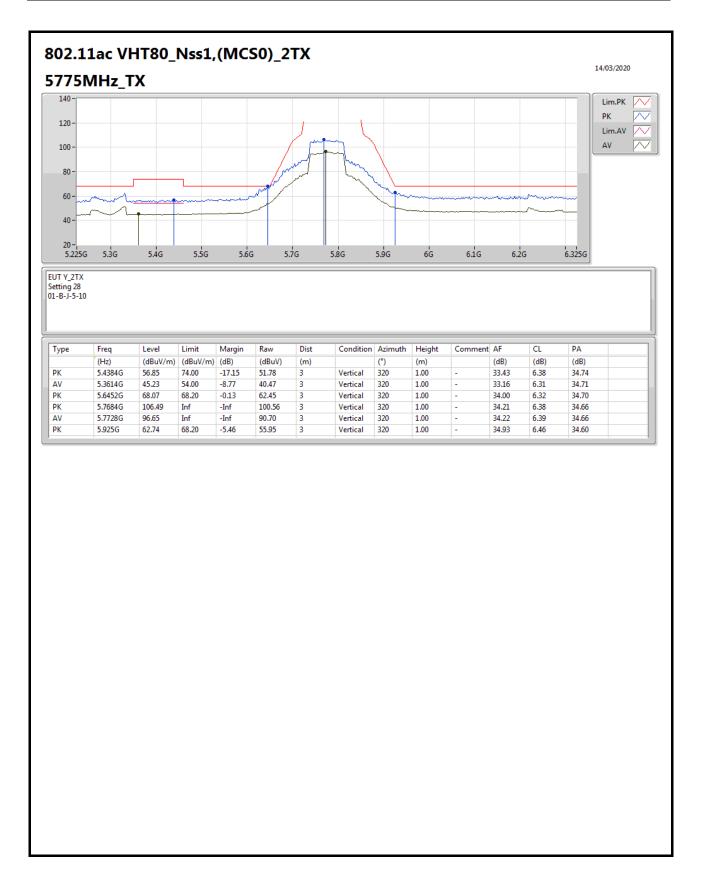




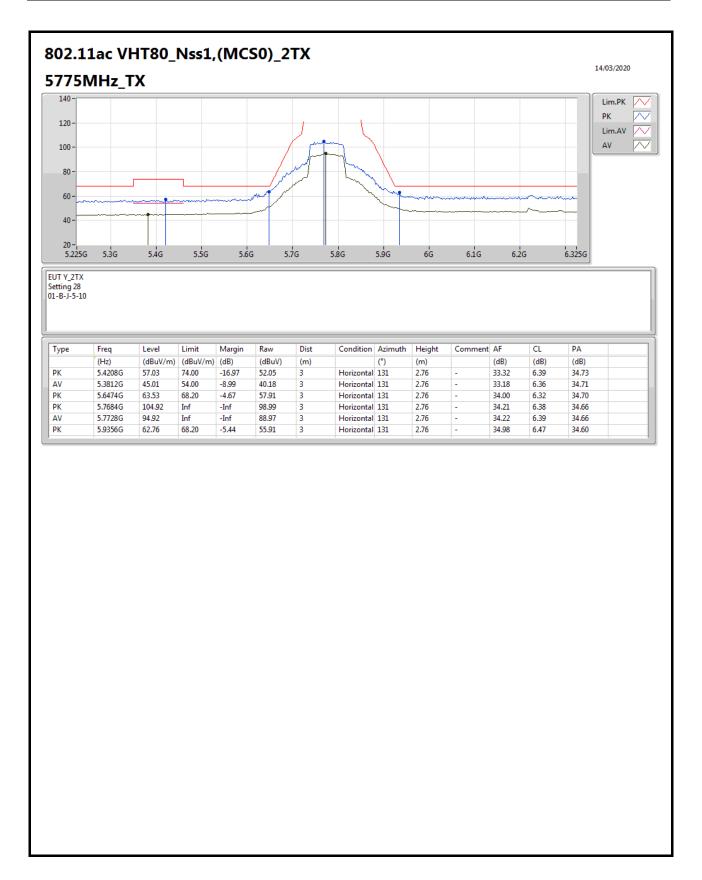




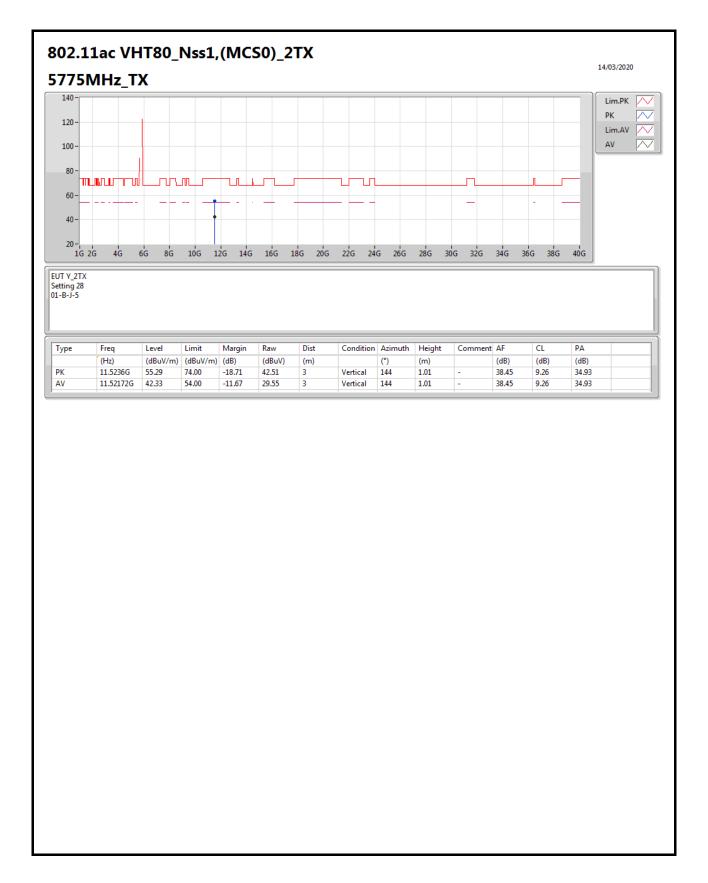




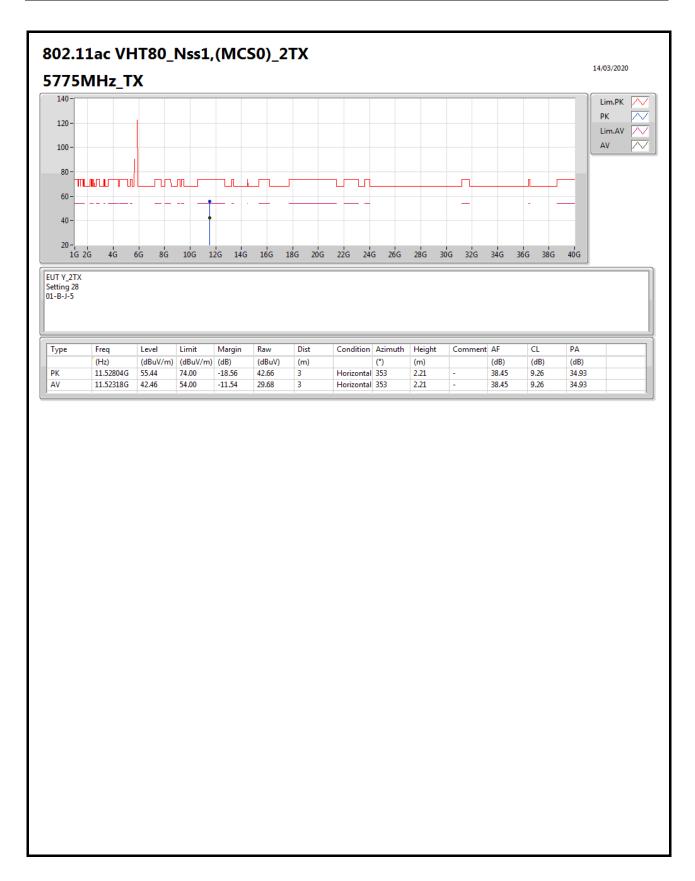




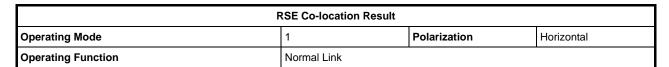


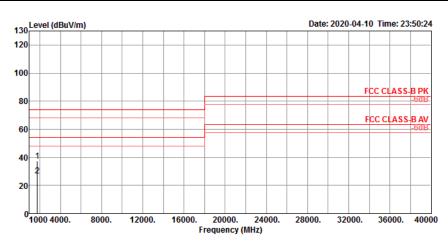






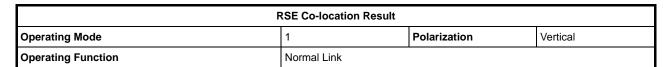


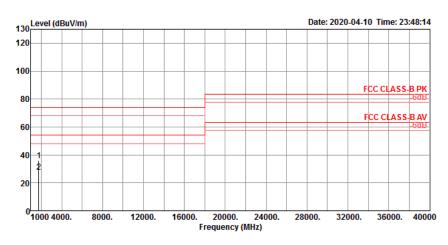




	Freq	Level						Preamp Factor		T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1747.51	37.60	74.00	-36.40	45.91	3.61	25.04	36.96	100	155	Peak	HORIZONTAL
2	1752.32	26.98	54.00	-27.02	35.26	3.62	25.06	36.96	100	155	Average	HORIZONTAL







	Freq	Level						Preamp Factor		T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1751.59	35.84	74.00	-38.16	44.12	3.62	25.06	36.96	100	299	Peak	VERTICAL
2	1752.88	27.61	54.00	-26.39	35.89	3.62	25.06	36.96	100	299	Average	VERTICAL