Report No.: FR721427-06





# FCC RADIO TEST REPORT

FCC ID

: Z8H89FT0035

Equipment

: cnPilot E410 Indoor

**Brand Name** 

: Cambium Networks

**Model Name** 

: cnPilot E410 Indoor

Applicant

: Cambium Networks Inc.

3800 Golf Road, Suite 360 Rolling Meadows, IL

60008, USA

Manufacturer

: Cambium Networks, Ltd.

Ashburton, TQ13 7UP, UK

Standard

: 47 CFR FCC Part 15,407

The product was received on Jul. 12, 2017, and testing was started from Jul. 12, 2017 and completed on May 07, 2019. 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 variant 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 Ver1.0

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: Jul. 29, 2019

Report Version : 01

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Appendix B. Test Results of Maximum Conducted Output Power

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**Appendix E. Test Photos** 

Photographs of EUT v01

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# History of this test report

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Report No.	Version	Description	Issued Date
FR721427-06	01	Initial issue of report	Jul. 29, 2019

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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	15.407(a)	Emission Bandwidth	PASS	-
3.2	15.407(a)	Maximum Conducted Output Power	PASS	-
3.3	15.407(a)	Peak Power Spectral Density	PASS	-
3.4	15.407(b)	Unwanted Emissions	PASS	-

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

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

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

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

Reviewed by: Sam Chen

Report Producer: Viola Huang

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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)	<b>Channel Number</b>
5150-5250	a, n (HT20), ac (VHT20)	5180-5240	36-48 [4]
5250-5350		5260-5320	52-64 [4]
5470-5725		5500-5700	100-140 [11]
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		5510-5670	102-134 [5]
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	802.11n HT20-BF	20	2TX
5.15-5.25GHz	802.11ac VHT20	20	2TX
5.15-5.25GHz	802.11ac VHT20-BF	20	2TX
5.15-5.25GHz	802.11n HT40	40	2TX
5.15-5.25GHz	802.11n HT40-BF	40	2TX
5.15-5.25GHz	802.11ac VHT40	40	2TX
5.15-5.25GHz	802.11ac VHT40-BF	40	2TX
5.15-5.25GHz	802.11ac VHT80	80	2TX
5.25-5.35GHz	802.11a	20	2TX
5.25-5.35GHz	802.11n HT20	20	2TX
5.25-5.35GHz	802.11n HT20-BF	20	2TX
5.25-5.35GHz	802.11ac VHT20	20	2TX
5.25-5.35GHz	802.11ac VHT20-BF	20	2TX
5.25-5.35GHz	802.11n HT40	40	2TX
5.25-5.35GHz	802.11n HT40-BF	40	2TX
5.25-5.35GHz	802.11ac VHT40	40	2TX
5.25-5.35GHz	802.11ac VHT40-BF	40	2TX
5.47-5.725GHz	802.11a	20	2TX
5.47-5.725GHz	802.11n HT20	20	2TX
5.47-5.725GHz	802.11n HT20-BF	20	2TX
5.47-5.725GHz	802.11ac VHT20	20	2TX
5.47-5.725GHz	802.11ac VHT20-BF	20	2TX
5.47-5.725GHz	802.11n HT40	40	2TX
5.47-5.725GHz	802.11n HT40-BF	40	2TX
5.47-5.725GHz	802.11ac VHT40	40	2TX
5.725-5.85GHz	802.11a	20	2TX
5.725-5.85GHz	802.11n HT20	20	2TX
5.725-5.85GHz	802.11n HT20-BF	20	2TX
5.725-5.85GHz	802.11ac VHT20	20	2TX
5.725-5.85GHz	802.11ac VHT20-BF	20	2TX

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5.725-5.85GHz	802.11n HT40	40	2TX
5.725-5.85GHz	802.11n HT40-BF	40	2TX
5.725-5.85GHz	802.11ac VHT40	40	2TX
5.725-5.85GHz	802.11ac VHT40-BF	40	2TX
5.725-5.85GHz	802.11ac VHT80	80	2TX
5.725-5.85GHz	802.11ac VHT80-BF	80	2TX

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#### 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

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Accton	120G00000168A	PIFA Antenna	I-PEX	Note 1
2	Accton	120G00000168A	PIFA Antenna	I-PEX	Note 1

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Note 1:

Ant.			Gain (dBi)		
Ant.	2.4GHz	5GHz Band 1	5GHz Band 2	5GHz Band 3	5GHz Band 4
1	4.38	4.54	5.00	5.00	5.47
2	5.24	5.32	5.00	5.00	4.72

Note 2: The above information was declared by manufacturer.

Note 3: The EUT has two antennas.

Ant.1 = port 1, Ant.2 = port 2

For 2.4GHz WLAN function

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

Ant. 1(Port 1) and Ant. 2(Port 2) could transmit/receive simultaneously.

For 5GHz WLAN function

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

Ant. 1(Port 1) and Ant. 2(Port 2) could transmit/receive simultaneously.

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## 1.1.3 Mode Test Duty Cycle

## For 5G B1, B4

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11ac VHT20-BF	0.893	0.491	1.823m	1k
802.11ac VHT40-BF	0.927	0.329	1.758m	1k
802.11ac VHT80-BF	0.915	0.386	2.012m	1k

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#### For 5G B2~B3

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.965	0.15	2.068m	1k
802.11ac VHT20	0.985	0.07	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT20-BF	0.957	0.19	1.759m	1k
802.11ac VHT40	0.971	0.13	2.44m	1k
802.11ac VHT40-BF	0.96	0.18	1.694m	1k

ıv	uic.

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

## 1.1.4 EUT Operational Condition

EUT Power Type	From PoE				
Beamforming Function	$\boxtimes$	With beamforming For 802.11n/ac in 5GHz	Without beamforming		
Weather Band	$\boxtimes$	With 5600~5650MHz		Without 5600~5650MHz	
Function		Outdoor P2M	$\boxtimes$	Indoor P2M	
T unction		Fixed P2P		Client	
TPC Function			Without TPC		
Test Software Version QRCT V3.0.187.0					

Note: The above information was declared by manufacturer.

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## 1.1.5 Table for Class III Change

This product is an extension of original one reported under Sporton project number: FR721427-01AB Below is the table for the change of the product with respect to the original one.

Modifications	Description	
1. Adding 5 GHz Band 2 and Band 3 (5250~5350MHz,	1. Emission Bandwidth	
5470~5725 MHz) for this device only supports 20MHz and	2. Maximum Conducted Output Power	
40MHz functions.	3. Peak Power Spectral Density	
2. Adding beamforming function for 5GHz Band 1~ Band 4.	4. Unwanted Emissions above 1GHz	
3. Updating Manufacturer to "Cambium Networks, Ltd." and "Ashburton, TQ13 7UP, UK" from "Cambium Networks Inc." and "3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA"	There's no influence in this test report.	

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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

## 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		

<b>Test Condition</b>	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-CB	Owen Hsu	Band 1, Band 4:25°C / 55% Band 2~Band 3:21~26°C / 52~61%	Band 1, Band 4: Jul. 13, 2017 Band 2~Band 3: Apr. 18, 2019 ~ May 07, 2019
Radiated	03CH01-CB	Caster Chang	22~24°C / 50~60%	Band 1, Band 4: Jul. 12 , 2017 Band 2~Band 3: Apr. 17, 2019 ~ Apr. 18, 2019

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
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Power Density Measurement	1.27 dB	Confidence levels of 95%
Bandwidth Measurement	9.74 x10 <sup>-8</sup>	Confidence levels of 95%

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Test site registered number IC 4086B with Industry Canada.

# 2 Test Configuration of EUT

# 2.1 Test Channel Mode

### For Band 1, Band 4

Mode	Power Setting
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-
5180MHz	24
5200MHz	30
5240MHz	30
5745MHz	30
5785MHz	30
5825MHz	30
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-
5190MHz	23
5230MHz	30
5755MHz	30
5795MHz	30
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-
5210MHz	22
5775MHz	24

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#### For Band 2~Band 3

Mode	PowerSetting
802.11a_Nss1,(6Mbps)_2TX	-
5260MHz	18.5
5300MHz	18.5
5320MHz	18.5
5500MHz	18.5
5580MHz	18.5
5700MHz	18
802.11ac VHT20_Nss1,(MCS0)_2TX	-
5260MHz	18.5
5300MHz	18.5
5320MHz	18.5
5500MHz	18.5
5580MHz	18.5
5700MHz	18
802.11ac VHT40_Nss1,(MCS0)_2TX	-
5270MHz	20.5
5310MHz	19
5510MHz	19
5550MHz	20.5
5670MHz	20.5
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-
5260MHz	21
5300MHz	21
5320MHz	21
5500MHz	21
5580MHz	21
5700MHz	21
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-
5270MHz	21
5310MHz	21
5510MHz	21
5550MHz	21
5670MHz	21

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#### 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.

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# 2.2 The Worst Case Measurement Configuration

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

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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.		
CTX			
Operating Mode > 1GHz	The EUT was performed at Z axis and Y axis position. The worst case was found at Y axis, so it was selected to perform test and its test result was written in the report.		
1	EUT in Y axis		

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.: FA721427-06 for Co-location RF Exposure Evaluation.			

Noted: The PoE below is for measurement only, would not be marked

Support Unit	Brand	Model
PoE 1	Cambium	NET-P15-56IN
PoE 2	Cambium	NBT-P30-56IN

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# 2.3 EUT Operation during Test

#### non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

#### beamforming mode:

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

The program was executed as follows:

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

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### 2.4 Accessories

Accessories
Wall-mounted rack

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# 2.5 Support Equipment

For Radiated (above 1GHz): (For non-beamforming mode)

Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	PoE 1	Cambium	NET-P15-56IN	N/A	
В	Notebook	DELL	E4300	N/A	

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(For beamforming mode)

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	PoE 1	Cambium	NET-P15-56IN	N/A
В	Notebook	DELL	E4300	N/A
С	Notebook	DELL	E4300	N/A
D	Device	Accton	EAP7215A-1016-CAM (E410)	N/A

#### For RF Conducted:

(For non-beamforming mode)

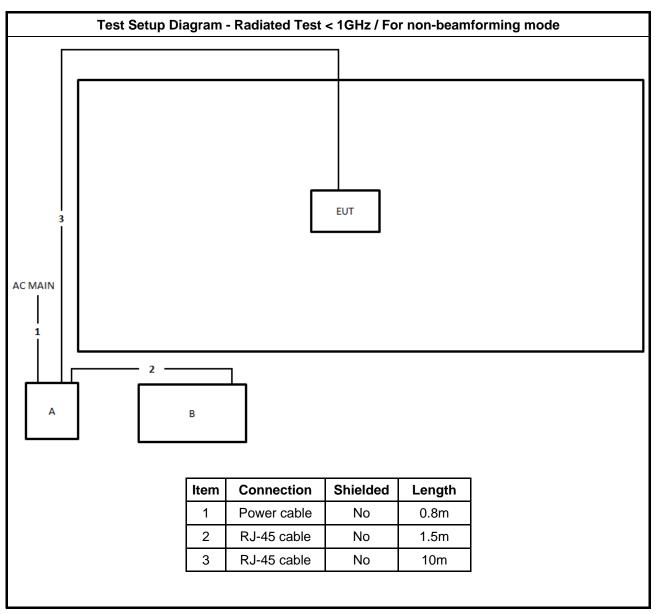
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Notebook	DELL	E4300	N/A
В	PoE 2	Cambium	NBT-P30-56IN	N/A

(For beamforming mode)

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Notebook	DELL	E4300	N/A
В	Notebook	DELL	E4300	N/A
С	Client	Cambium	e410	N/A
D	PoE 2	Cambium	NBT-P30-56IN	N/A

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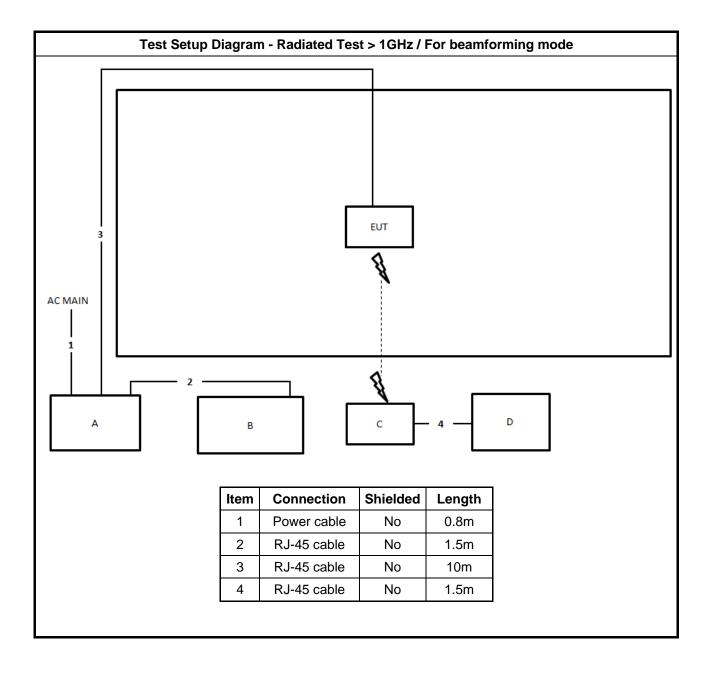
# 2.6 Test Setup Diagram



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## 3 Transmitter Test Result

## 3.1 Emission Bandwidth

### 3.1.1 Emission Bandwidth Limit

	Emission Bandwidth Limit			
UN	UNII Devices			
	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.			
$\boxtimes$	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 ≥ 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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## 3.1.2 Measuring Instruments

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

### 3.1.3 Test Procedures

	Test Method		
•	For the emission bandwidth shall be measured using one of the options below:		
	$\boxtimes$	Refer as FCC KDB 789033, clause C for EBW and clause D for OBW measurement.	
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.	
		Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.	

## 3.1.4 Test Setup

Emission Bandwidth		
	EUT	
Spectrum Analyzer		

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### 3.1.5 Test Result of Emission Bandwidth

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Refer as Appendix A

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# 3.2 Maximum Conducted Output Power

# 3.2.1 Maximum Conducted Output Power Limit

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

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### 3.2.2 Measuring Instruments

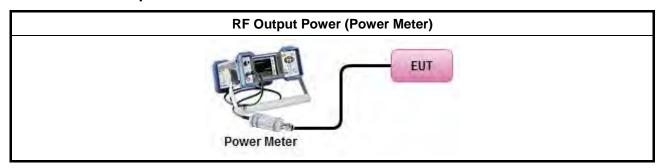
Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

	Test Method			
•	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.			
	<ul> <li>If multiple transmit chains, EIRP calculation could be following as methods:</li> <li>P<sub>total</sub> = P<sub>1</sub> + P<sub>2</sub> + + P<sub>n</sub></li> <li>(calculated in linear unit [mW] and transfer to log unit [dBm])</li> <li>EIRP<sub>total</sub> = P<sub>total</sub> + DG</li> </ul>			

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### 3.2.4 Test Setup



## 3.2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix B

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# 3.3 Peak Power Spectral Density

## 3.3.1 Peak Power Spectral Density Limit

	Peak Power Spectral Density Limit		
UNI	I Devices		
$\boxtimes$	For the 5.15-5.25 GHz band:		
	<ul> <li>Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 17 - (G<sub>TX</sub> - 6).</li> </ul>		
	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) ≤ 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.		
	<ul> <li>e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:</li> <li>-13 dBW/MHz for 0° ≤ θ &lt; 8°; -13 − 0.716 (θ-8) dBW/MHz for 8° ≤ θ &lt; 40°</li> <li>-35.9 − 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ &gt; 45°</li> </ul>		
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz.		
	For the 5.725-5.85 GHz band:		
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 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	<b>SD</b> = 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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### 3.3.2 Measuring Instruments

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

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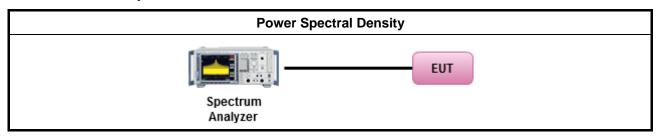
### 3.3.3 Test Procedures

		Test Method		
	outp func	k 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 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	/ cycle ≥ 98% or external video / power trigger]		
	$\boxtimes$	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 <sub>total</sub> = PPSD <sub>1</sub> + PPSD <sub>2</sub> + + PPSD <sub>n</sub> (calculated in linear unit [mW] and transfer to log unit [dBm])  EIRP <sub>total</sub> = PPSD <sub>total</sub> + DG		

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## 3.3.4 Test Setup



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## 3.3.5 Test Result of Peak Power Spectral Density

Refer as Appendix C

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### 3.4 Unwanted Emissions

#### 3.4.1 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	
⊠ 5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]	
⊠ 5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]	
⊠ 5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]	
⊠ 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results 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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### 3.4.2 Measuring Instruments

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

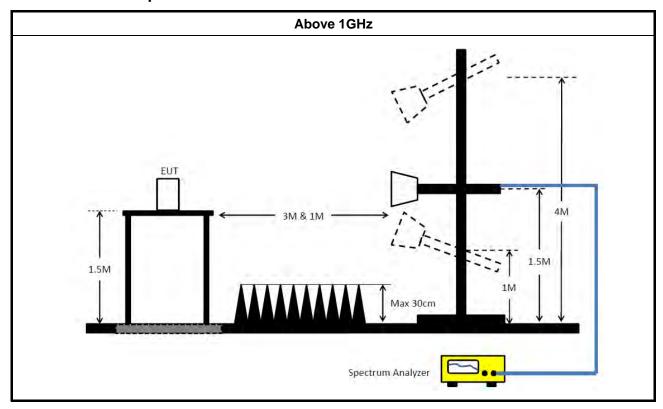
#### 3.4.3 Test Procedures

#### **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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### 3.4.4 Test Setup



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### 3.4.5 Transmitter Unwanted Emissions (Below 30MHz)

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.

### 3.4.6 Test Result of Transmitter Unwanted Emissions

Refer as Appendix D

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# 4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 10, 2016	Nov. 09, 2017	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 13, 2018	Nov. 12, 2019	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 2019	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 16, 2017	Jan. 15, 2018	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 08, 2019	Jan. 07, 2020	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Jul. 09, 2018	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 22, 2016	Nov. 21, 2017	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Jan. 31, 2019	Jan. 30, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-10-7	N/A	N/A	N/A	Radiation (03CH01-CB)
Spectrum anavlyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 26, 2016	Dec. 27, 2017	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Feb. 25, 2019	Feb. 24, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-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-06	1 GHz – 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-28	1 GHz –26.5 GHz	Nov. 19, 2018	Nov. 18, 2019	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 22, 2016	Oct. 23, 2017	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 05, 2018	Nov. 04, 2019	Conducted (TH01-CB)

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

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Appendix A.1 EBW Result

For Band 1 and Band 4 **Summary** 

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-
5.15-5.25GHz	30.525M	17.691M	17M7D1D	21.1M	17.616M
5.725-5.85GHz	17.6M	17.691M	17M7D1D	16.3M	17.566M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-
5.15-5.25GHz	72.2M	36.232M	36M2D1D	39.75M	35.982M
5.725-5.85GHz	35.35M	36.182M	36M2D1D	33.85M	36.082M
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-
5.15-5.25GHz	83.6M	75.662M	75M7D1D	83.2M	75.662M
5.725-5.85GHz	76.4M	75.862M	75M9D1D	76.4M	75.662M

Max-N dB = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;
Max-OBW = Maximum 99% 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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EBW Result Appendix A.1

#### Result

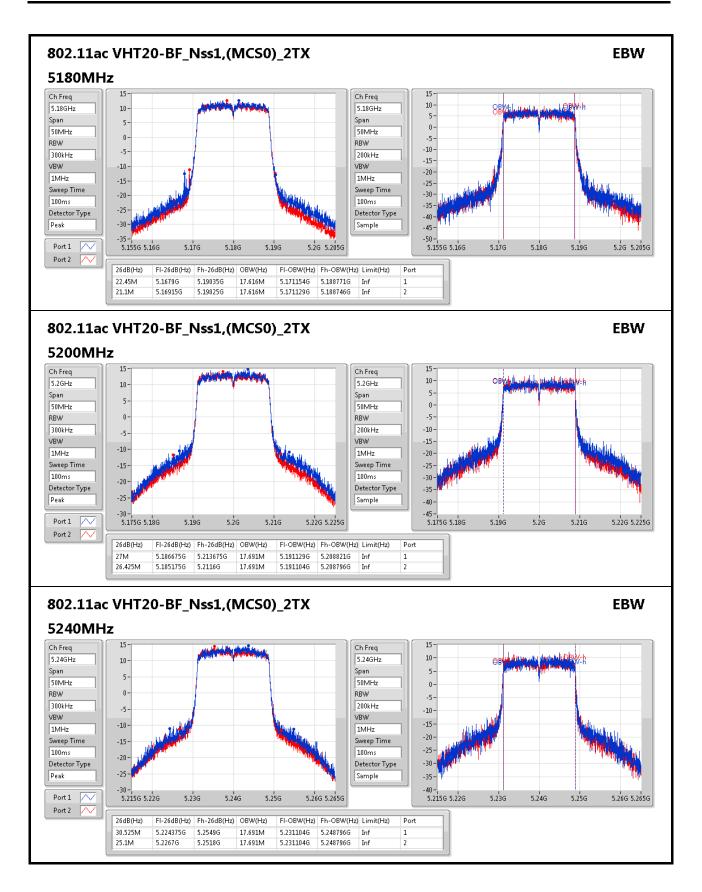
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	22.45M	17.616M	21.1M	17.616M
5200MHz	Pass	Inf	27M	17.691M	26.425M	17.691M
5240MHz	Pass	Inf	30.525M	17.691M	25.1M	17.691M
5745MHz	Pass	500k	17.275M	17.666M	17.55M	17.666M
5785MHz	Pass	500k	17.15M	17.691M	17.55M	17.641M
5825MHz	Pass	500k	17.6M	17.616M	16.3M	17.566M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	Inf	39.9M	35.982M	39.75M	35.982M
5230MHz	Pass	Inf	58.55M	36.082M	72.2M	36.232M
5755MHz	Pass	500k	35.35M	36.082M	35.05M	36.182M
5795MHz	Pass	500k	35.35M	36.082M	33.85M	36.082M
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	Inf	83.2M	75.662M	83.6M	75.662M
5775MHz	Pass	500k	76.4M	75.862M	76.4M	75.662M

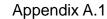
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

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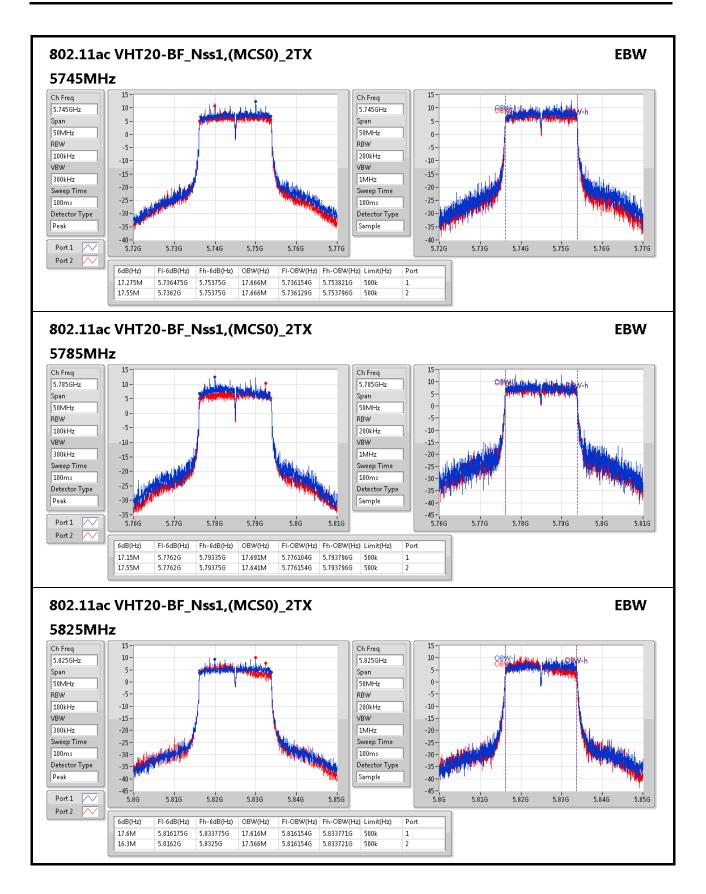






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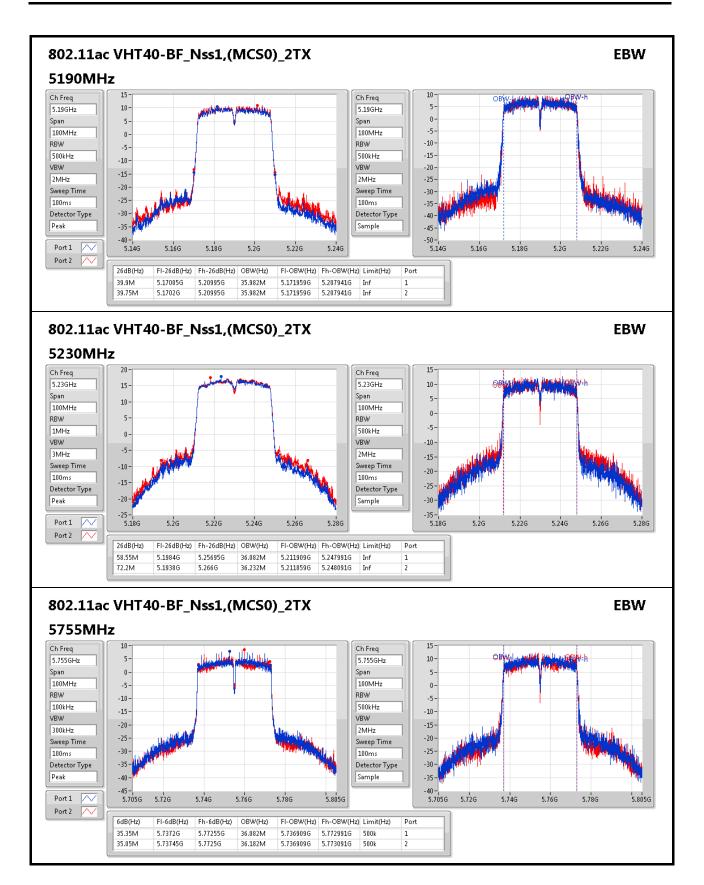




Appendix A.1

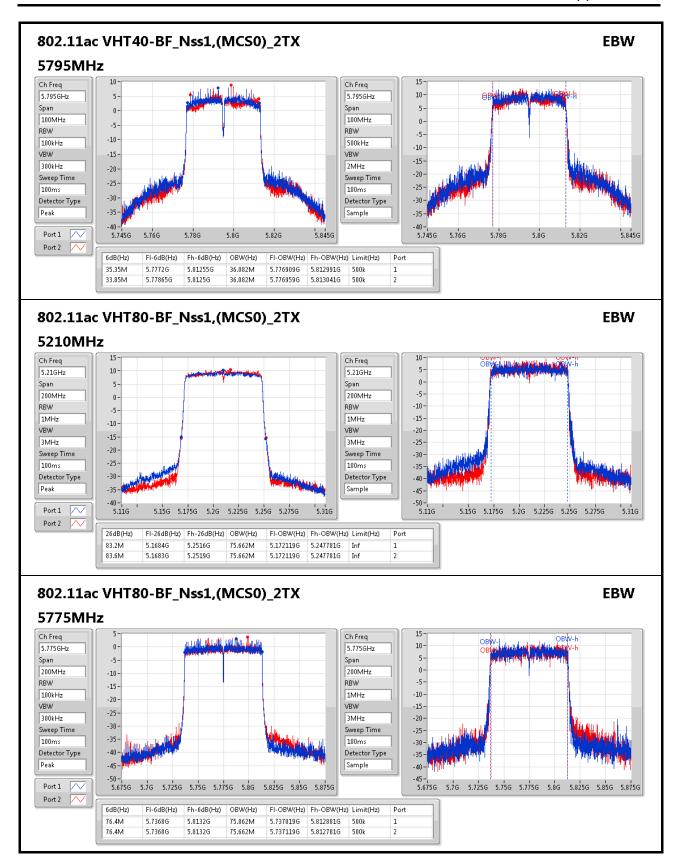
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EBW Result Appendix A.1



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EBW Result Appendix A.2

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# For Band 2~Band 3 Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.25-5.35GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	19.17M	16.402M	16M4D1D	18.9M	16.372M
802.11ac VHT20_Nss1,(MCS0)_2TX	19.98M	17.631M	17M6D1D	19.95M	17.571M
802.11ac VHT40_Nss1,(MCS0)_2TX	39.78M	35.982M	36M0D1D	39.54M	35.862M
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	20.55M	17.721M	17M7D1D	19.68M	17.541M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	38.82M	36.042M	36M0D1D	38.52M	35.682M
5.47-5.725GHz	-	=	-	-	-
802.11a_Nss1,(6Mbps)_2TX	19.14M	16.432M	16M4D1D	18.63M	16.372M
802.11ac VHT20_Nss1,(MCS0)_2TX	20.34M	17.631M	17M6D1D	19.74M	17.541M
802.11ac VHT40_Nss1,(MCS0)_2TX	39.9M	36.042M	36M0D1D	39.6M	35.922M
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	20.28M	17.631M	17M6D1D	19.74M	17.481M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	39.54M	36.222M	36M2D1D	38.76M	35.262M

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;

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory.



EBW Result Appendix A.2

# Result

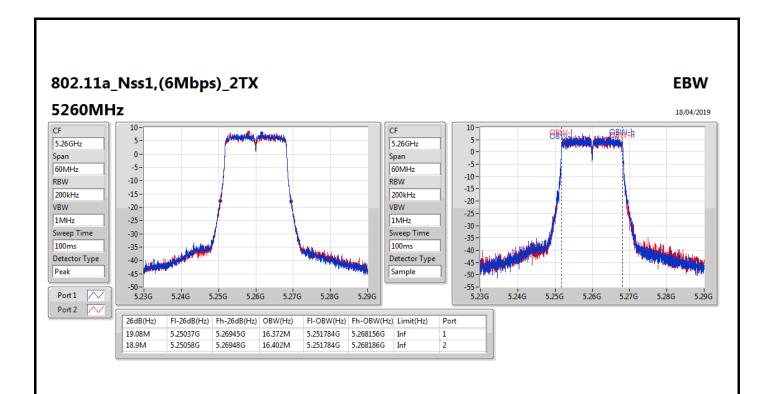
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5260MHz	Pass	Inf	19.08M	16.372M	18.9M	16.402M
5300MHz	Pass	Inf	19.05M	16.402M	18.93M	16.402M
5320MHz	Pass	Inf	19.17M	16.372M	18.96M	16.402M
5500MHz	Pass	Inf	19.11M	16.432M	18.87M	16.402M
5580MHz	Pass	Inf	19.05M	16.432M	18.93M	16.402M
5700MHz	Pass	Inf	19.14M	16.372M	18.63M	16.372M
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	=	•	٠
5260MHz	Pass	Inf	19.95M	17.601M	19.95M	17.631M
5300MHz	Pass	Inf	19.95M	17.601M	19.95M	17.631M
5320MHz	Pass	Inf	19.98M	17.571M	19.95M	17.601M
5500MHz	Pass	Inf	20.34M	17.631M	19.89M	17.601M
5580MHz	Pass	Inf	20.19M	17.631M	19.95M	17.571M
5700MHz	Pass	Inf	19.98M	17.601M	19.74M	17.541M
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	=	-	-
5270MHz	Pass	Inf	39.54M	35.922M	39.72M	35.982M
5310MHz	Pass	Inf	39.78M	35.982M	39.6M	35.862M
5510MHz	Pass	Inf	39.6M	35.982M	39.66M	35.982M
5550MHz	Pass	Inf	39.6M	35.922M	39.9M	35.982M
5670MHz	Pass	Inf	39.6M	35.922M	39.78M	36.042M
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	Inf	19.74M	17.571M	19.89M	17.631M
5300MHz	Pass	Inf	20.55M	17.691M	19.68M	17.541M
5320MHz	Pass	Inf	19.86M	17.571M	19.86M	17.721M
5500MHz	Pass	Inf	20.28M	17.571M	20.25M	17.631M
5580MHz	Pass	Inf	19.74M	17.631M	20.07M	17.601M
5700MHz	Pass	Inf	19.89M	17.631M	19.77M	17.481M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	Inf	38.52M	35.682M	38.7M	35.802M
5310MHz	Pass	Inf	38.82M	35.682M	38.7M	36.042M
5510MHz	Pass	Inf	38.76M	35.922M	39.12M	36.222M
5550MHz	Pass	Inf	39.18M	35.682M	39.54M	36.162M
5670MHz	Pass	Inf	39.06M	36.102M	38.94M	35.262M

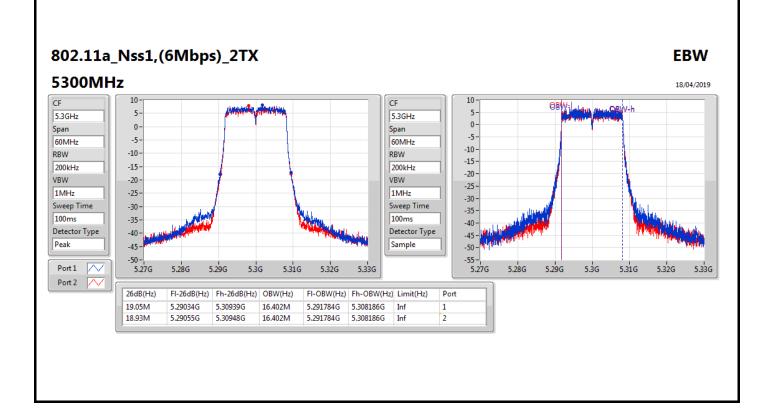
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

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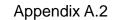


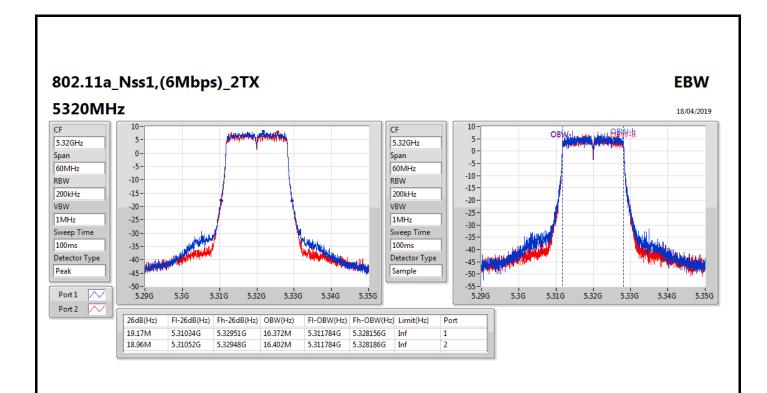


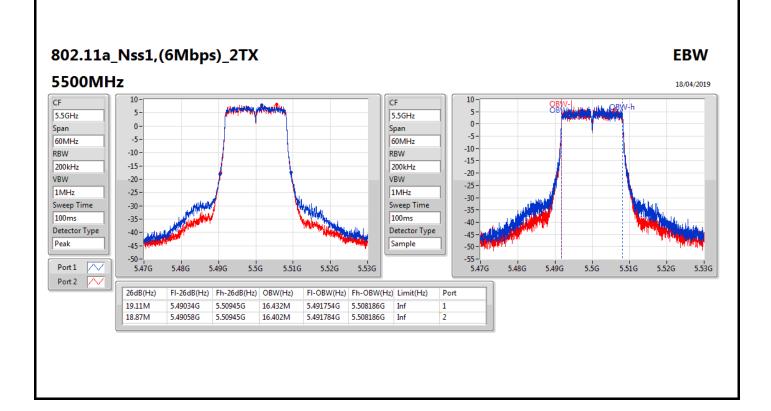


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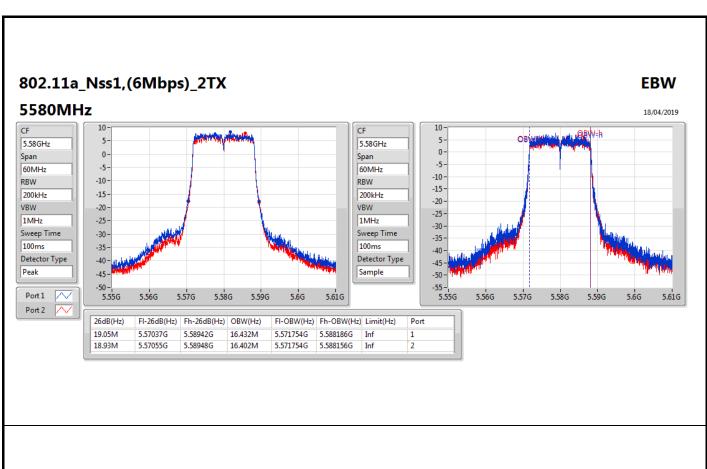
Page No.

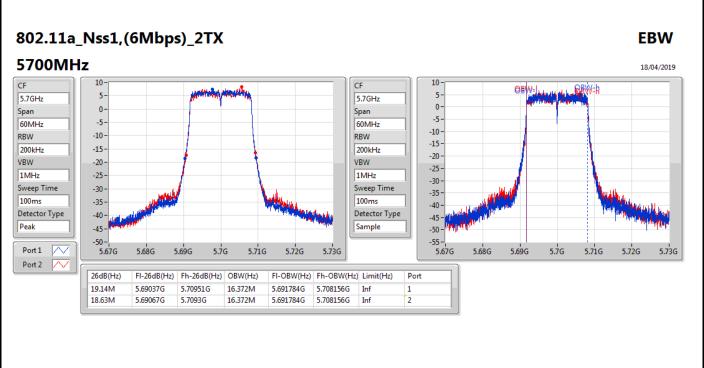
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EBW Result





Page No.

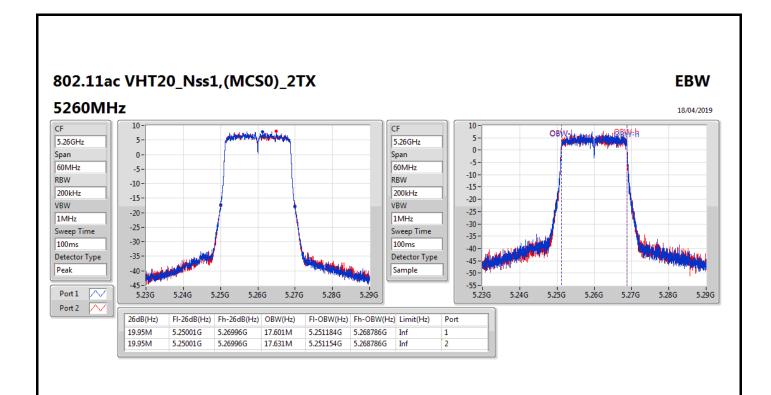
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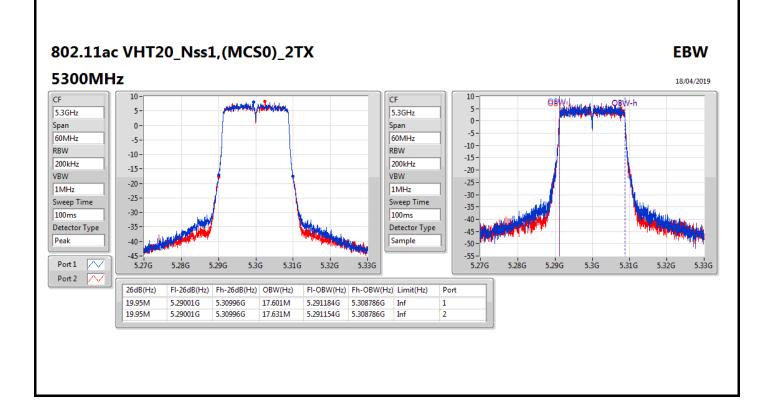
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Appendix A.2 EBW Result





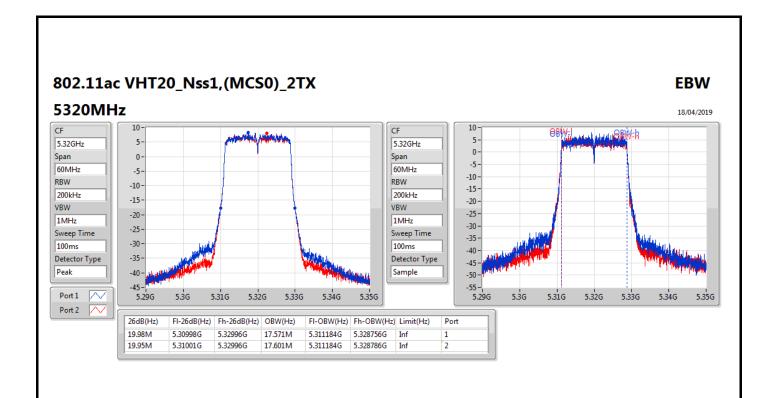
Page No.

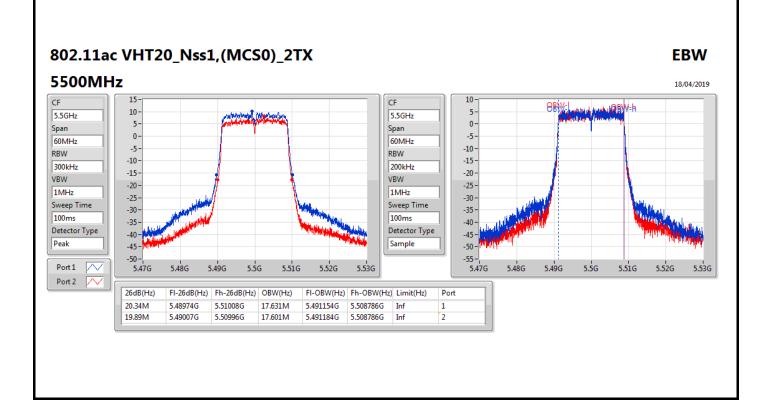
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EBW Result





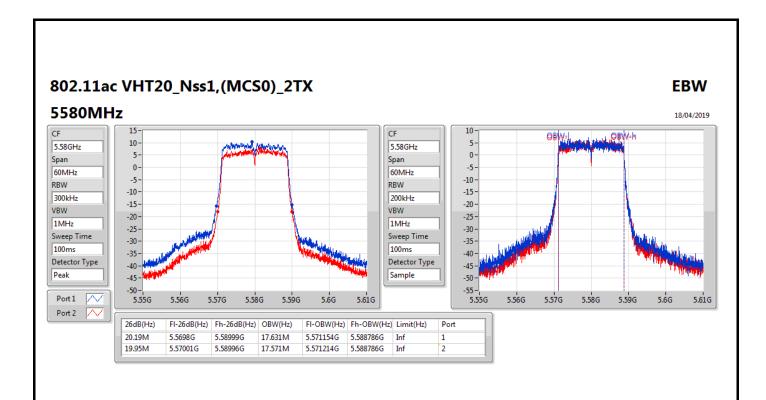
Page No.

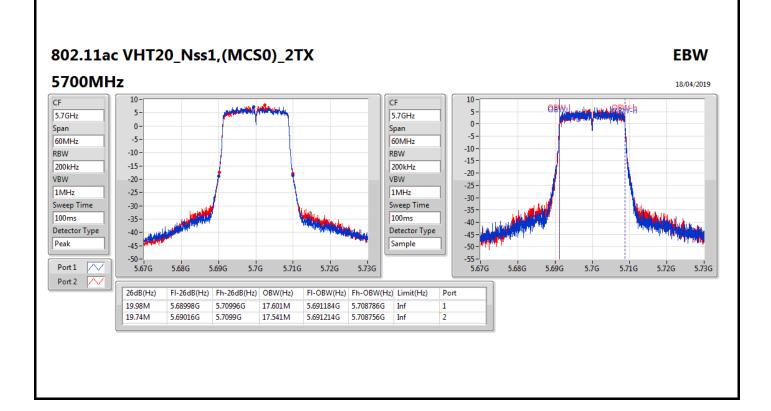
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Appendix A.2 EBW Result





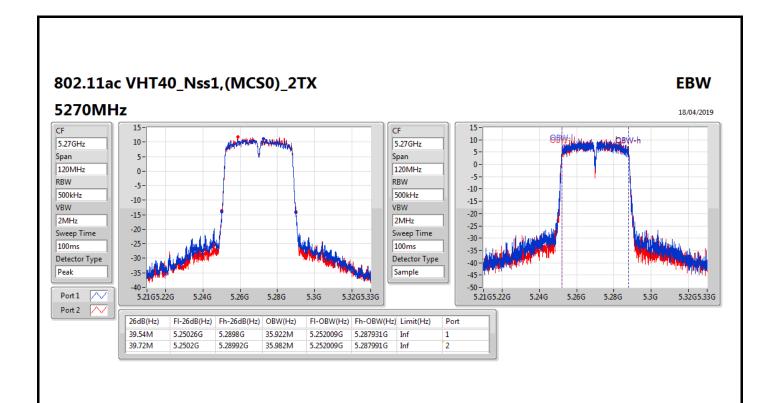
Page No.

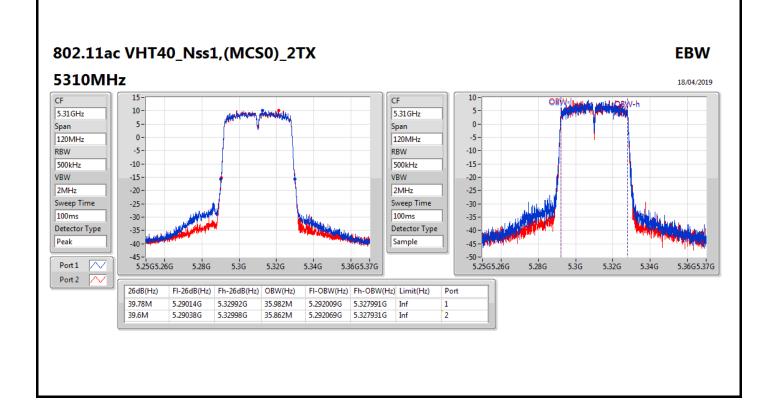
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EBW Result





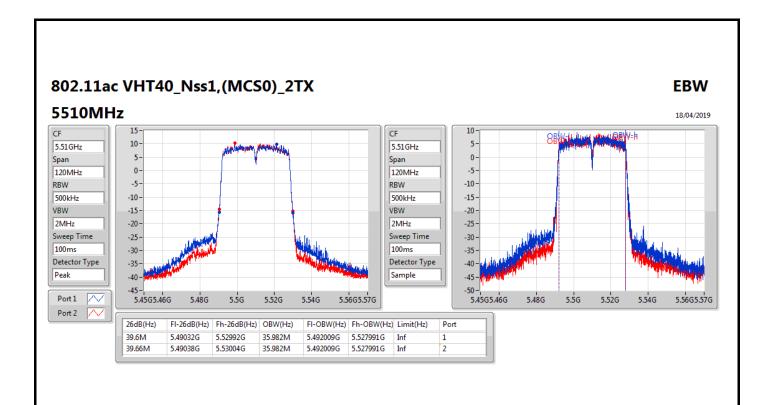
Page No.

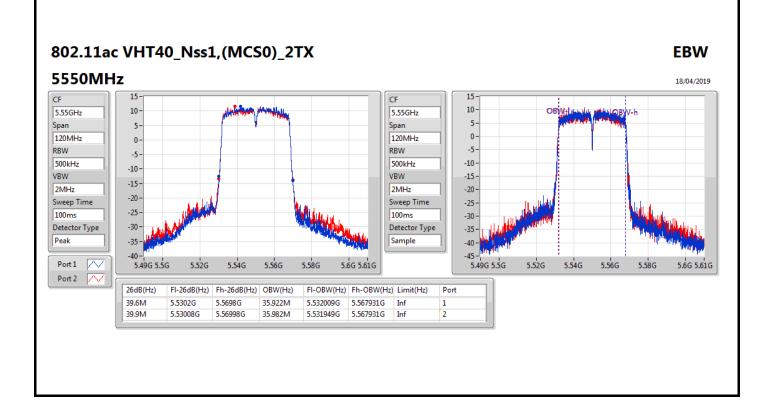
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EBW Result





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39.78M

5.65014G

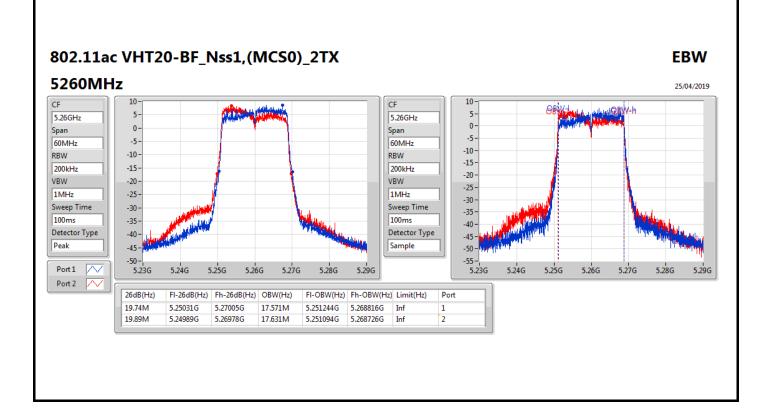
5.68992G

36.042M

5.651949G

5.687991G

#### 802.11ac VHT40\_Nss1,(MCS0)\_2TX **EBW** 5670MHz 18/04/2019 10-10-5.67GHz 5.67GHz Span Span 0-120MHz 120MHz 0--5 RBW RBW -5-500kHz 500kHz -10 -10-VBW VBW -15 -15-2MHz 2MHz -20 --20 -Sweep Time -25 -Sweep Time -25 -100ms 100ms -30 Detector Type -30 Detector Type -35 Peak -35 Sample -45 Port 1 5.61G5.62G 5.66G 5.68G 5.61G5.62G 5.68G 5.72G5.73G Port 2 26dB(Hz) FI-26dB(Hz) Fh-26dB(Hz) OBW(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) 5.68986G 5.652009G 5.687931G Inf



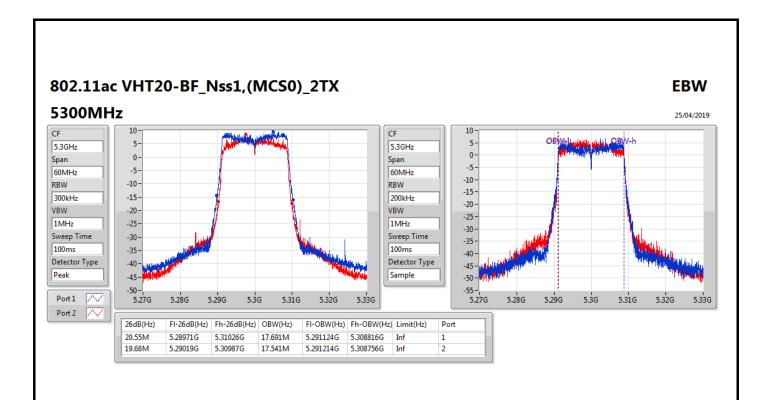
Page No.

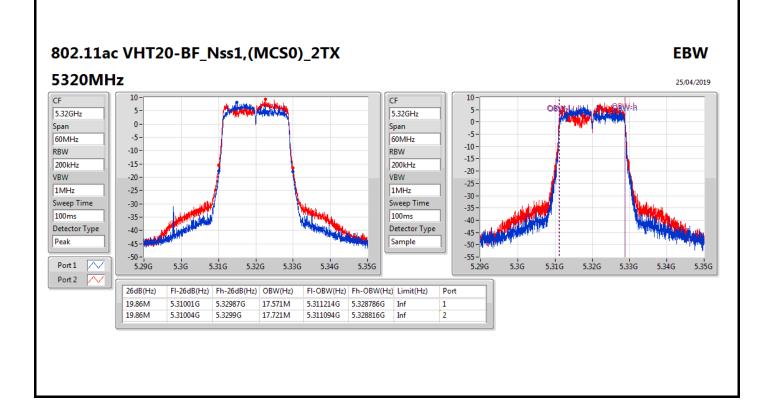
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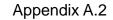
EBW Result

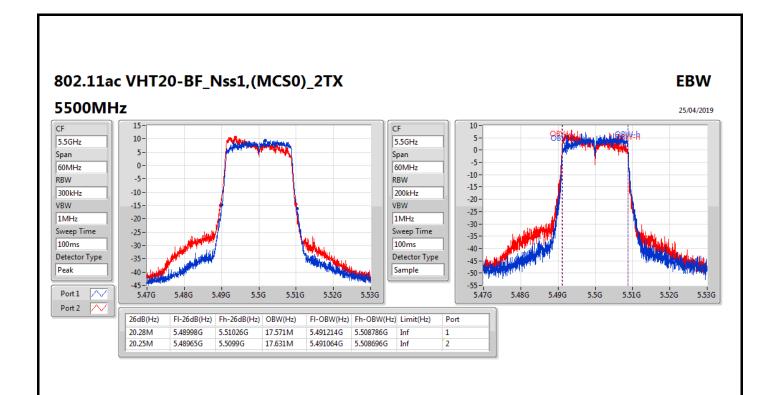


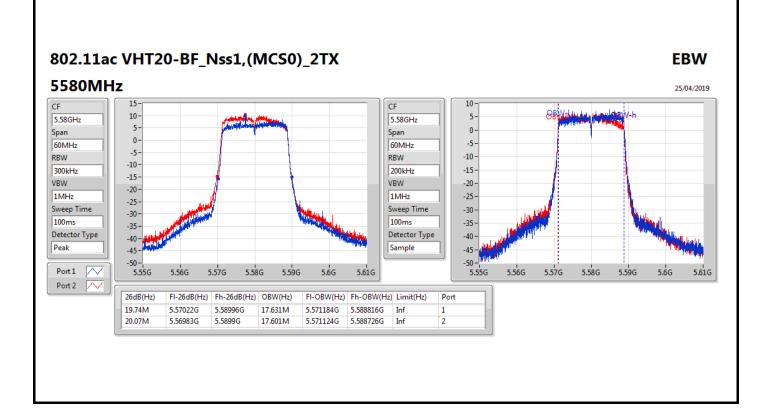


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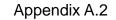


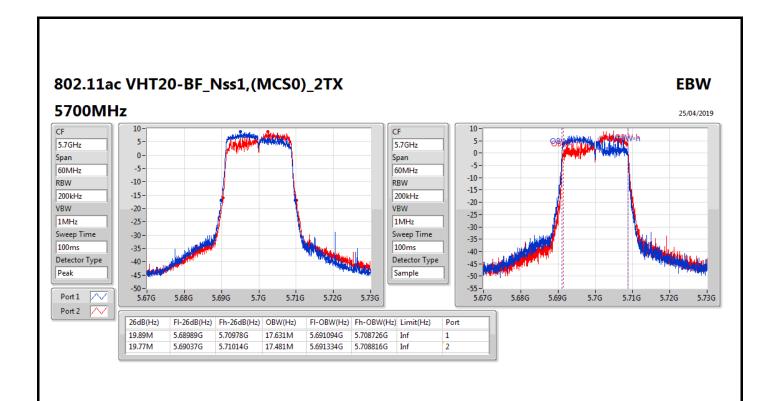


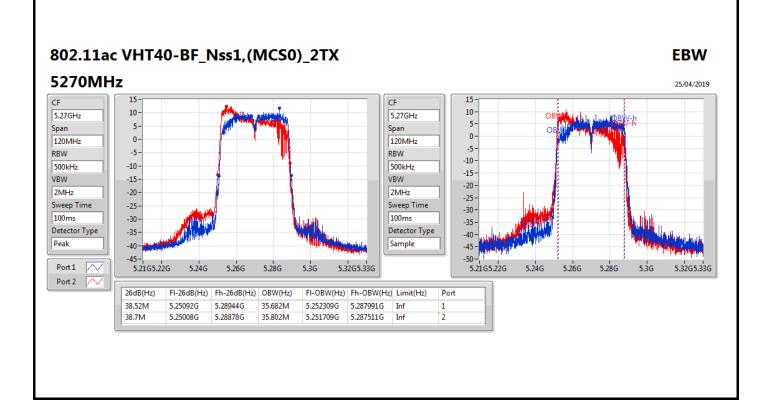


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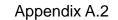






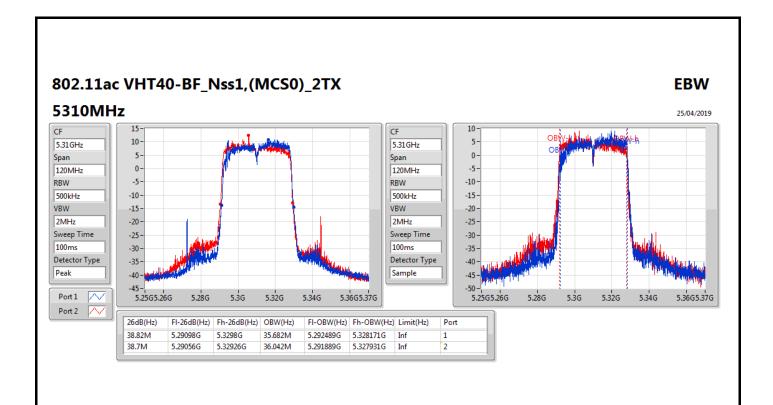
Page No.

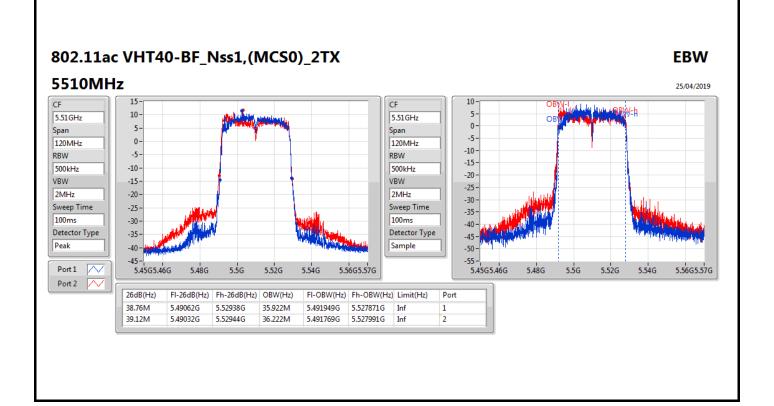
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EBW Result





Page No.

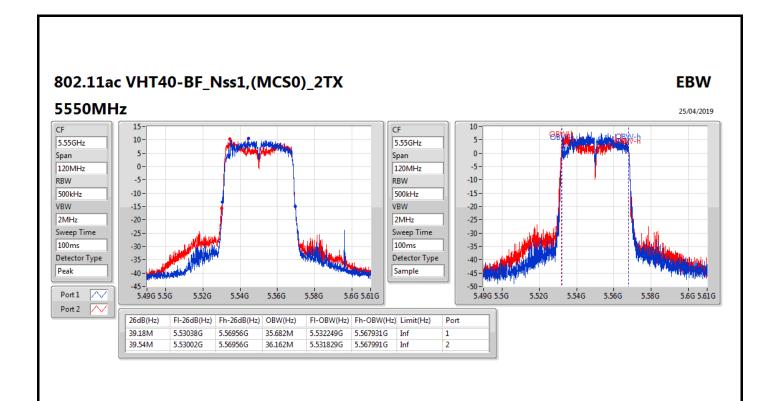
: 15 of 16

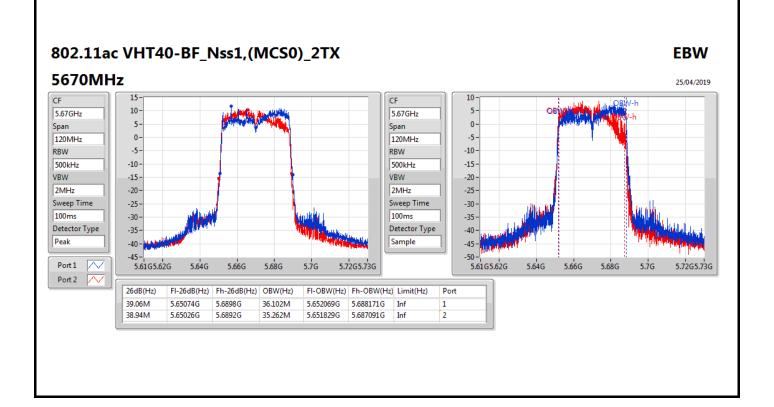
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EBW Result





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For Band 1 and Band 4 Summary

Mode	Total Power	Total Power	EIRP	EIRP
	(dBm)	(W)	(dBm)	(W)
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	26.35	0.43152	34.30	2.69153
5.725-5.85GHz	25.24	0.33420	33.35	2.16272
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	26.20	0.41687	34.14	2.59418
5.725-5.85GHz	25.63	0.36559	33.75	2.37137
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	22.25	0.16788	30.20	1.04713
5.725-5.85GHz	23.79	0.23933	31.91	1.55239

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### Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	7.95	21.64	21.48	24.57	28.05
5200MHz	Pass	7.95	23.47	23.21	26.35	28.05
5240MHz	Pass	7.95	23.31	23.32	26.33	28.05
5745MHz	Pass	8.11	22.18	22.27	25.24	27.89
5785MHz	Pass	8.11	21.95	22.25	25.11	27.89
5825MHz	Pass	8.11	22.03	21.85	24.95	27.89
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	7.95	20.32	20.52	23.43	28.05
5230MHz	Pass	7.95	23.16	23.21	26.20	28.05
5755MHz	Pass	8.11	22.63	22.50	25.58	27.89
5795MHz	Pass	8.11	22.75	22.49	25.63	27.89
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	7.95	19.15	19.33	22.25	28.05
5775MHz	Pass	8.11	20.87	20.69	23.79	27.89

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

Page No. : 2 of 2



Page No. : 1 of 2

For Band 2~Band 3 Summary

Mode	Total Power	Total Power
	(dBm)	(W)
5.25-5.35GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	21.89	0.15453
802.11ac VHT20_Nss1,(MCS0)_2TX	22.14	0.16368
802.11ac VHT40_Nss1,(MCS0)_2TX	23.90	0.24547
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	21.58	0.14388
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	21.34	0.13614
5.47-5.725GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	21.69	0.14757
802.11ac VHT20_Nss1,(MCS0)_2TX	21.78	0.15066
802.11ac VHT40_Nss1,(MCS0)_2TX	23.89	0.24491
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	21.43	0.13900
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	21.26	0.13366

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# Result

802.11a_Nss1,(6Mbps)_2TX 5260MHz	- Pass	(dBi) - 5.00	(dBm)	(dBm)	(dBm)	(dBm)
	Pass	- 5.00	-			
E340MUz		5.00		-	-	-
3200IVII IZ	Pass	5.00	18.43	18.72	21.59	23.76
5300MHz		5.00	18.88	18.77	21.84	23.77
5320MHz	Pass	5.00	18.98	18.78	21.89	23.78
5500MHz	Pass	5.00	18.56	18.78	21.68	23.76
5580MHz	Pass	5.00	18.83	18.52	21.69	23.77
5700MHz	Pass	5.00	18.36	18.47	21.43	23.70
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	1	•	•	=
5260MHz	Pass	5.00	18.90	18.94	21.93	23.98
5300MHz	Pass	5.00	19.15	18.95	22.06	23.98
5320MHz	Pass	5.00	19.30	18.95	22.14	23.98
5500MHz	Pass	5.00	18.82	18.67	21.76	23.98
5580MHz	Pass	5.00	18.84	18.70	21.78	23.98
5700MHz	Pass	5.00	18.31	18.62	21.48	23.95
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	1	•	•	=
5270MHz	Pass	5.00	20.90	20.87	23.90	23.98
5310MHz	Pass	5.00	19.59	19.43	22.52	23.98
5510MHz	Pass	5.00	19.42	19.40	22.42	23.98
5550MHz	Pass	5.00	21.06	20.70	23.89	23.98
5670MHz	Pass	5.00	20.88	20.53	23.72	23.98
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.01	18.71	18.42	21.58	21.94
5300MHz	Pass	8.01	18.54	18.51	21.54	21.93
5320MHz	Pass	8.01	18.48	18.56	21.53	21.97
5500MHz	Pass	8.01	18.52	18.30	21.42	21.97
5580MHz	Pass	8.01	18.65	18.18	21.43	21.94
5700MHz	Pass	8.01	18.59	18.16	21.39	21.95
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	8.01	18.51	18.08	21.31	21.97
5310MHz	Pass	8.01	18.37	18.29	21.34	21.97
5510MHz	Pass	8.01	18.24	18.15	21.21	21.97
5550MHz	Pass	8.01	18.46	18.03	21.26	21.97
5670MHz	Pass	8.01	18.32	18.02	21.18	21.97

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



PSD Result Appendix C.1

For Band 1 and Band 4 Summary

Mode	PD	EIRP PD
	(dBm/RBW)	(dBm/RBW)
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	13.22	21.17
5.725-5.85GHz	10.75	18.86
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	10.44	18.39
5.725-5.85GHz	8.61	16.72
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	3.03	10.98
5.725-5.85GHz	3.14	11.26

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

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Appendix C.1 **PSD Result** 

### Result

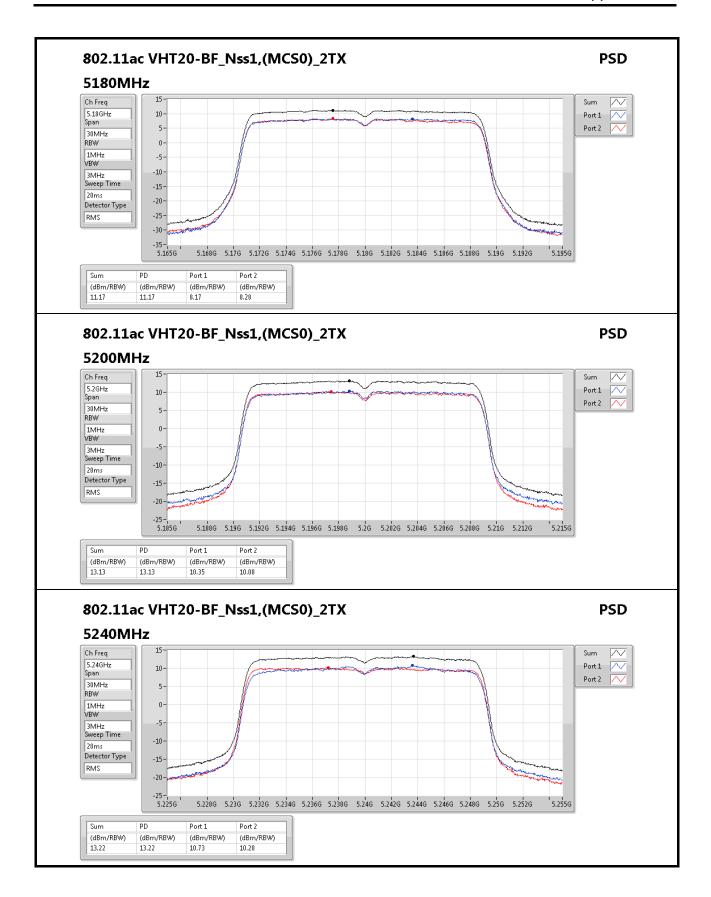
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	7.95	8.17	8.28	11.17	15.05
5200MHz	Pass	7.95	10.35	10.08	13.13	15.05
5240MHz	Pass	7.95	10.73	10.20	13.22	15.05
5745MHz	Pass	8.11	7.71	7.67	10.60	27.89
5785MHz	Pass	8.11	8.12	7.34	10.69	27.89
5825MHz	Pass	8.11	7.66	8.42	10.75	27.89
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	7.95	4.45	4.66	7.45	15.05
5230MHz	Pass	7.95	7.46	7.43	10.44	15.05
5755MHz	Pass	8.11	5.52	6.04	8.58	27.89
5795MHz	Pass	8.11	5.46	6.12	8.61	27.89
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	7.95	1.88	0.14	3.03	15.05
5775MHz	Pass	8.11	0.20	0.28	3.14	27.89

**DG** = Directional Gain; **RBW** = 500kHz 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;

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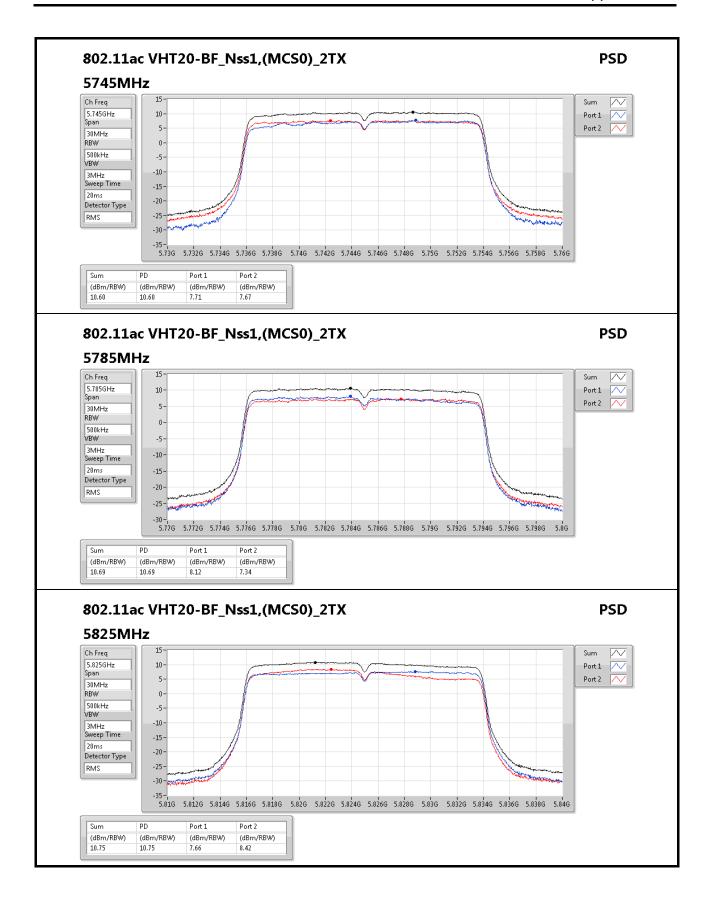
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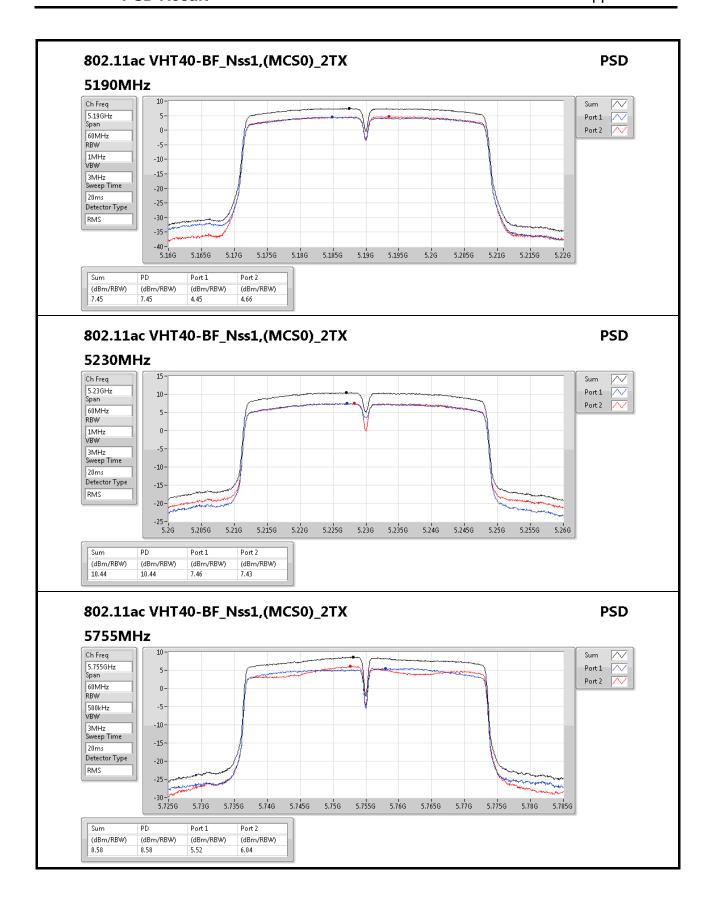
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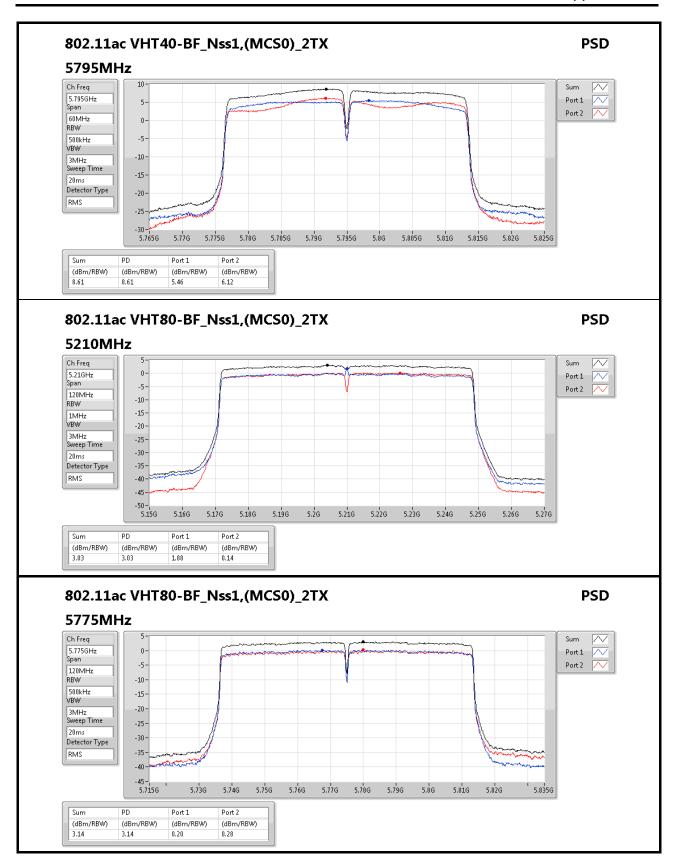
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Appendix C.1



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PSD Result Appendix C.2

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For Band 2~Band 3 Summary

Mode	PD
	(dBm/RBW)
5.25-5.35GHz	-
802.11a_Nss1,(6Mbps)_2TX	8.97
802.11ac VHT20_Nss1,(MCS0)_2TX	8.87
802.11ac VHT40_Nss1,(MCS0)_2TX	7.92
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	8.38
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	5.06
5.47-5.725GHz	-
802.11a_Nss1,(6Mbps)_2TX	8.98
802.11ac VHT20_Nss1,(MCS0)_2TX	8.77
802.11ac VHT40_Nss1,(MCS0)_2TX	8.15
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	8.47
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	4.86

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



Appendix C.2 **PSD Result** 

# Result

Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.01	5.78	5.99	8.80	8.99
5300MHz	Pass	8.01	5.88	5.88	8.85	8.99
5320MHz	Pass	8.01	6.05	5.97	8.97	8.99
5500MHz	Pass	8.01	5.88	5.99	8.90	8.99
5580MHz	Pass	8.01	6.17	6.06	8.98	8.99
5700MHz	Pass	8.01	5.33	6.12	8.67	8.99
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.01	5.82	5.86	8.83	8.99
5300MHz	Pass	8.01	5.98	5.74	8.76	8.99
5320MHz	Pass	8.01	6.16	5.82	8.87	8.99
5500MHz	Pass	8.01	5.48	5.91	8.70	8.99
5580MHz	Pass	8.01	5.82	5.93	8.77	8.99
5700MHz	Pass	8.01	5.10	6.07	8.59	8.99
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	8.01	5.00	4.95	7.92	8.99
5310MHz	Pass	8.01	3.71	3.47	6.46	8.99
5510MHz	Pass	8.01	3.53	3.75	6.59	8.99
5550MHz	Pass	8.01	5.22	5.14	8.11	8.99
5670MHz	Pass	8.01	5.11	5.24	8.15	8.99
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.01	5.91	6.51	8.32	8.99
5300MHz	Pass	8.01	5.13	6.48	8.38	8.99
5320MHz	Pass	8.01	5.68	6.33	8.26	8.99
5500MHz	Pass	8.01	5.49	7.00	8.31	8.99
5580MHz	Pass	8.01	5.44	5.74	8.47	8.99
5700MHz	Pass	8.01	4.71	6.71	8.22	8.99
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	8.01	2.18	3.80	4.97	8.99
5310MHz	Pass	8.01	2.93	1.69	5.06	8.99
5510MHz	Pass	8.01	2.81	2.30	4.86	8.99
5550MHz	Pass	8.01	2.74	2.08	4.34	8.99
5670MHz	Pass	8.01	2.57	2.45	4.32	8.99

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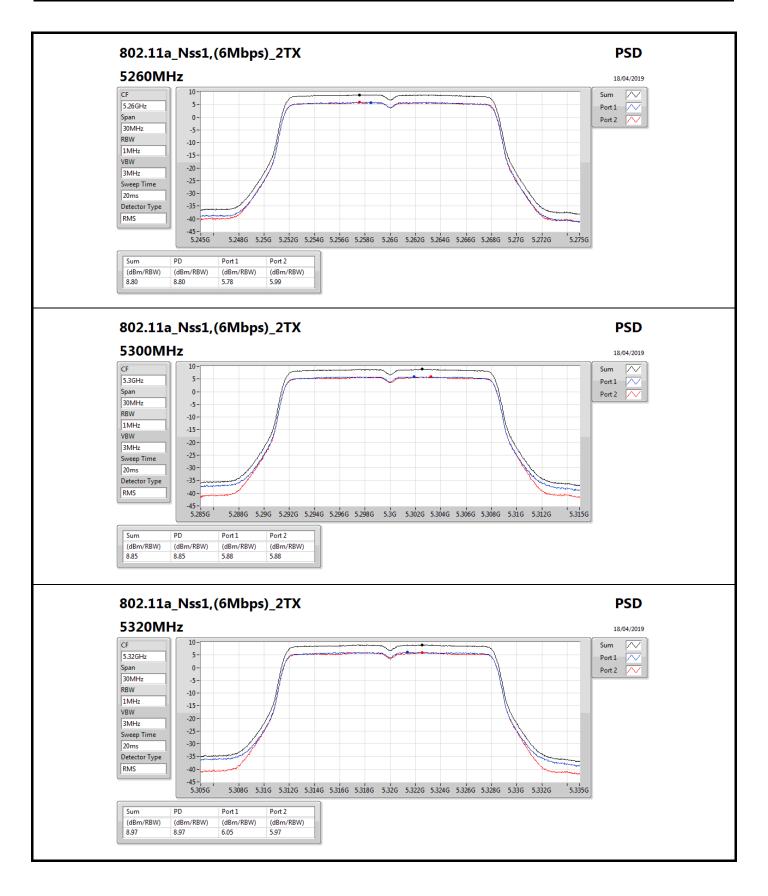
FAX: 886-3-656-9085

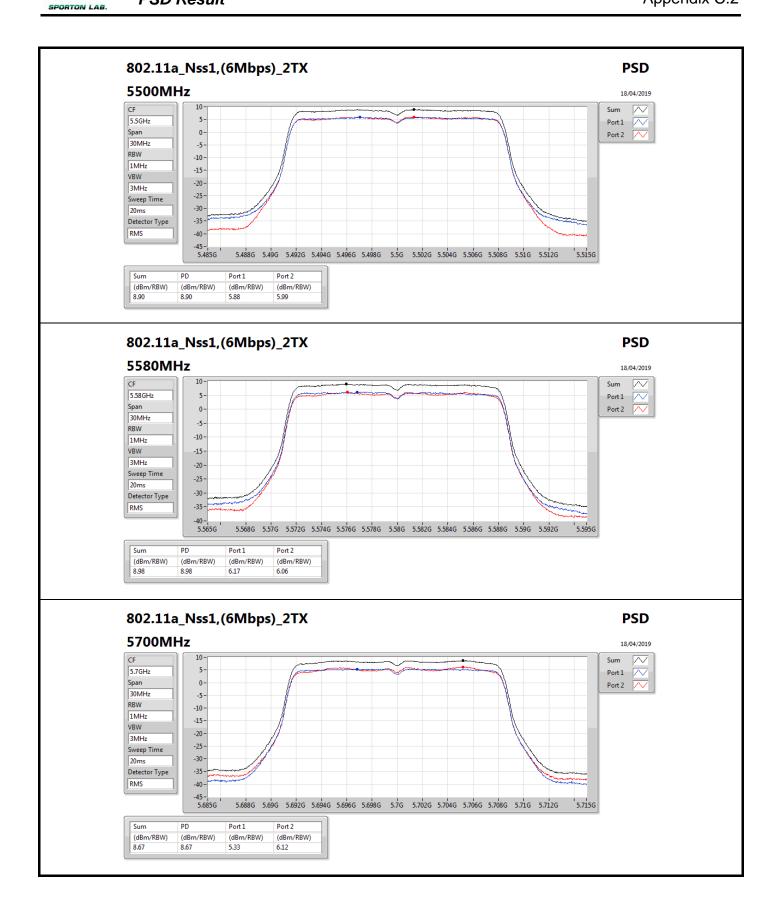
**DG** = Directional Gain; **RBW** = 500 kHz for 5.725-5.85GHz band / 1MHz for other band; **PD** = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

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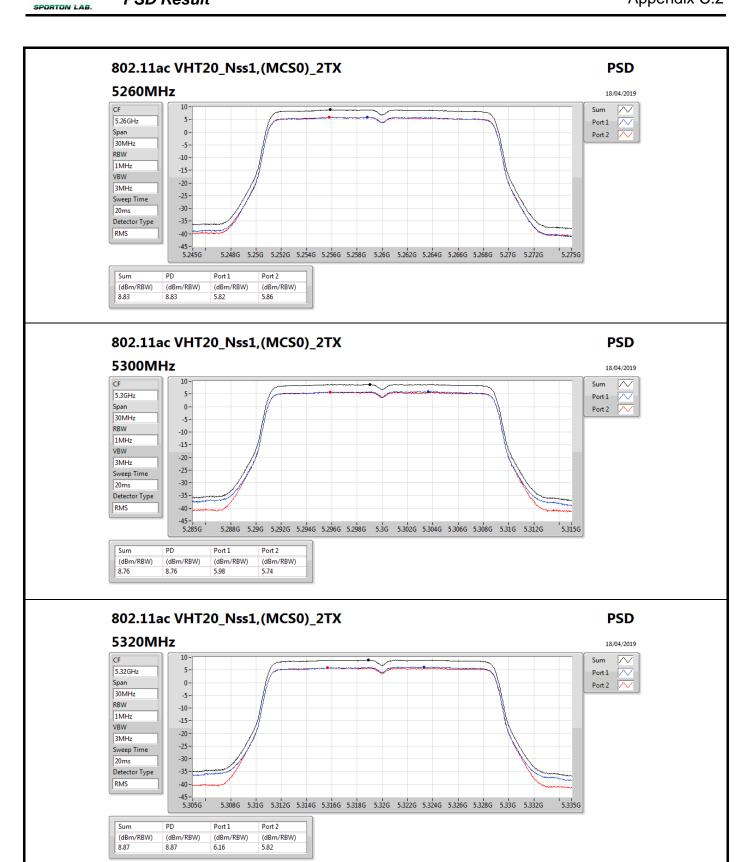






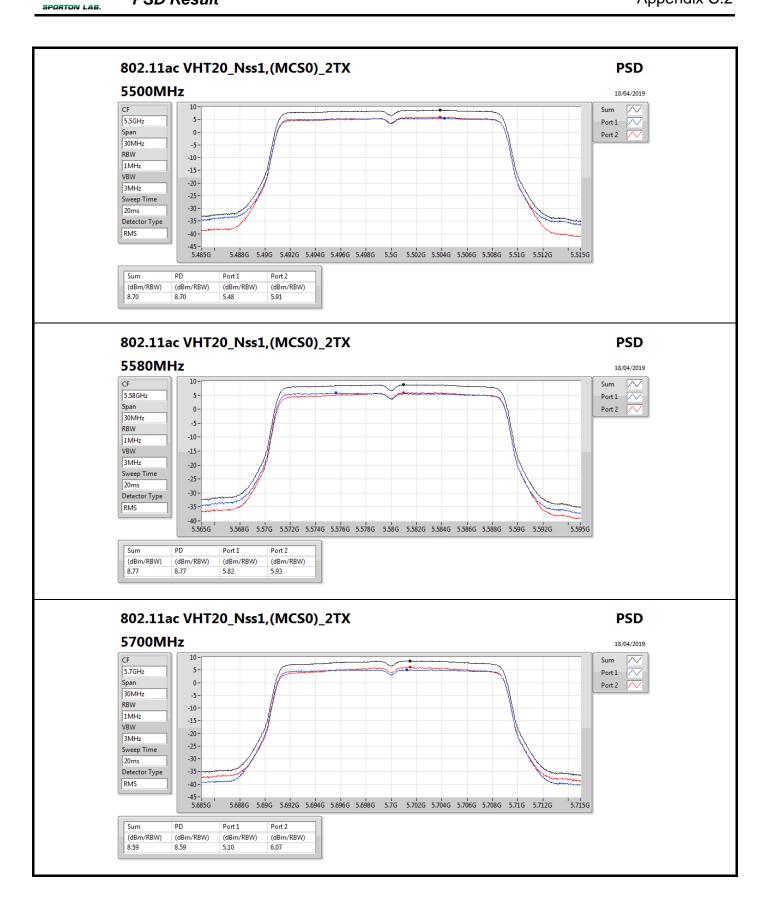
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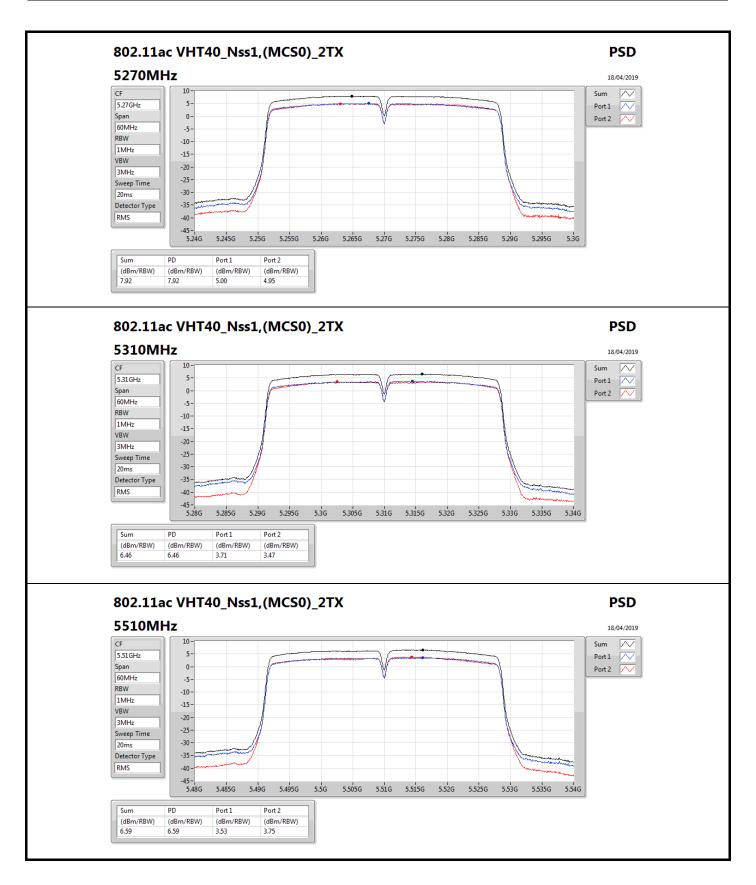
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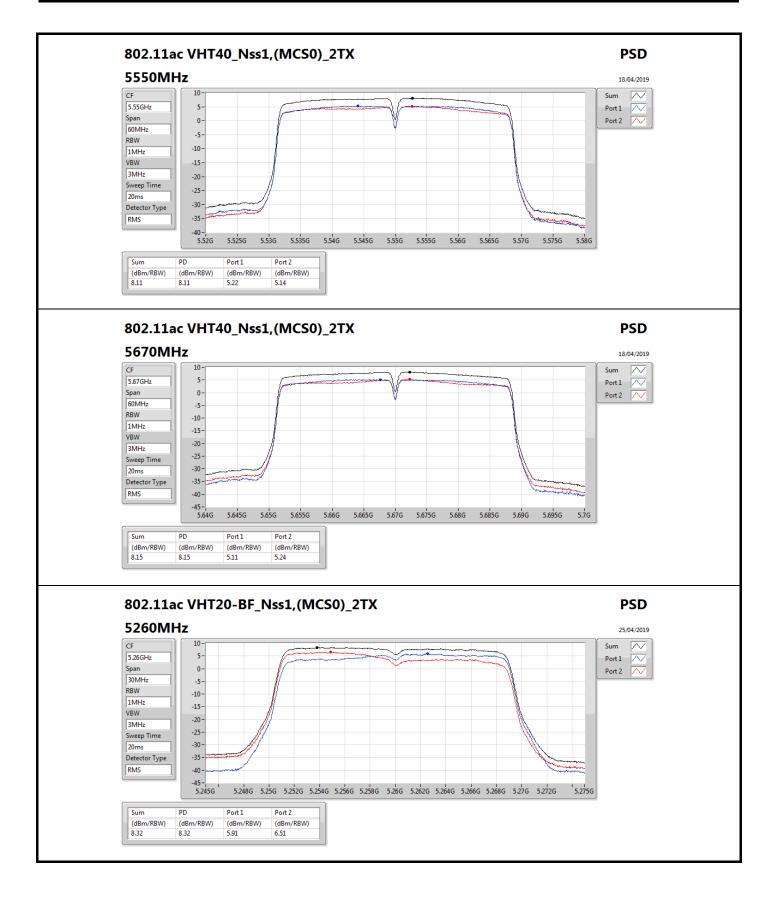
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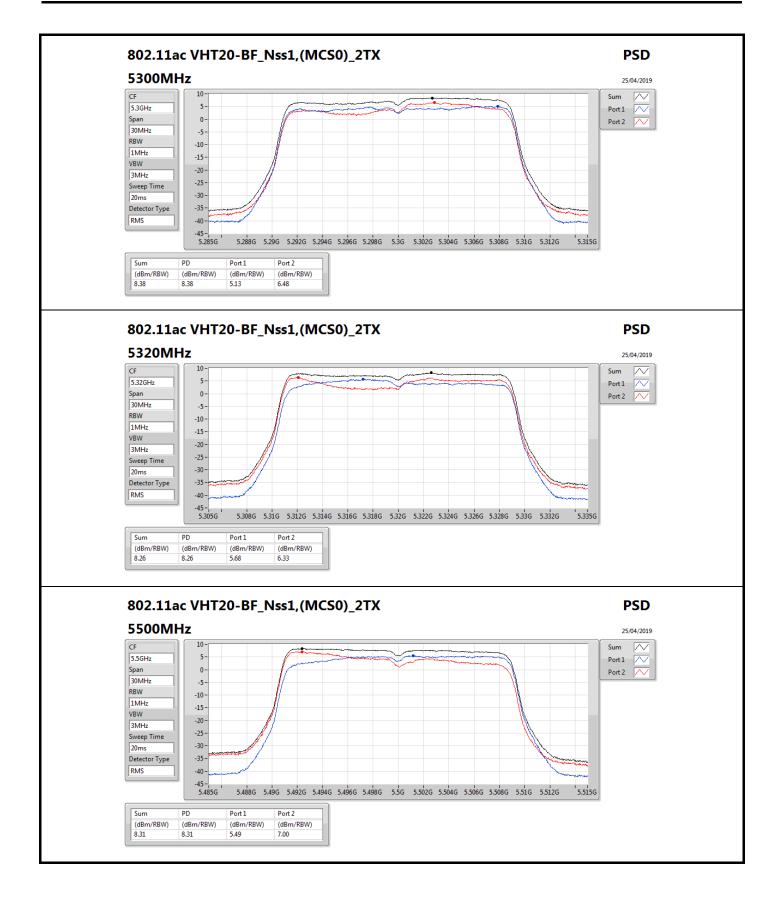
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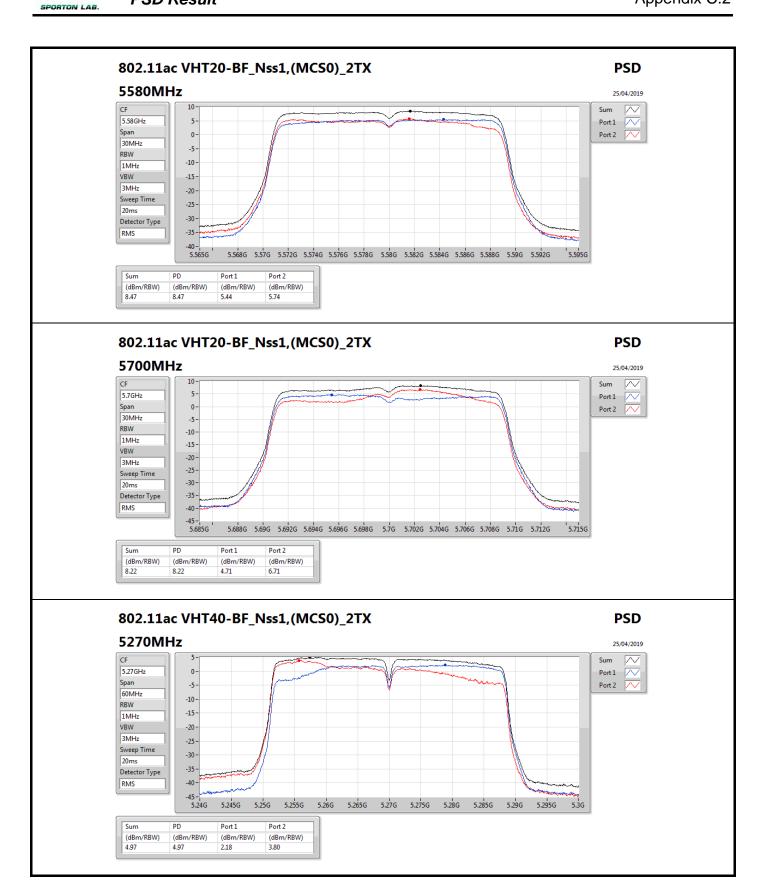
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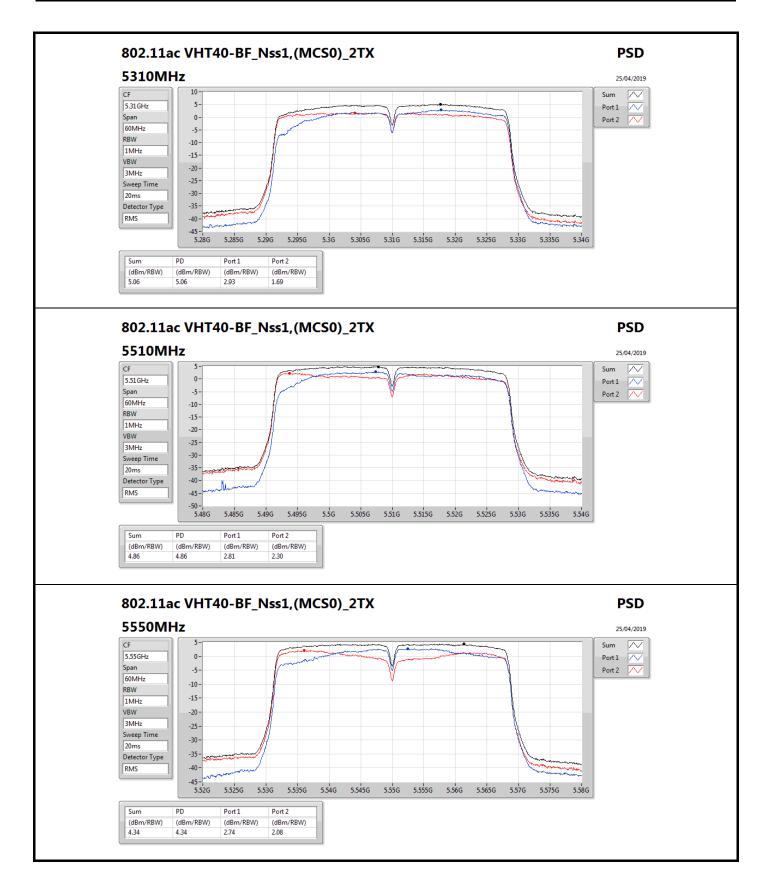
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Appendix C.2

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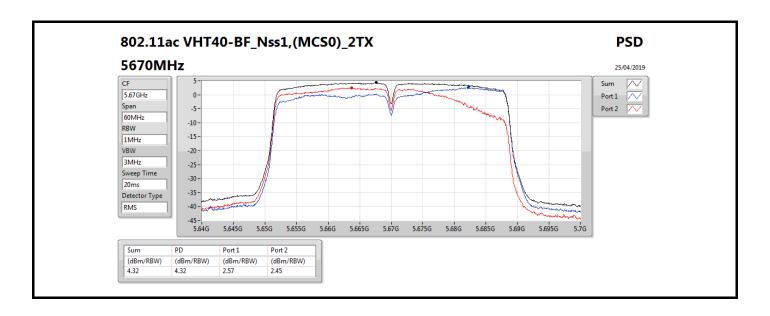


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**PSD Result** 





## RSE TX above 1GHz Result

Appendix D.1

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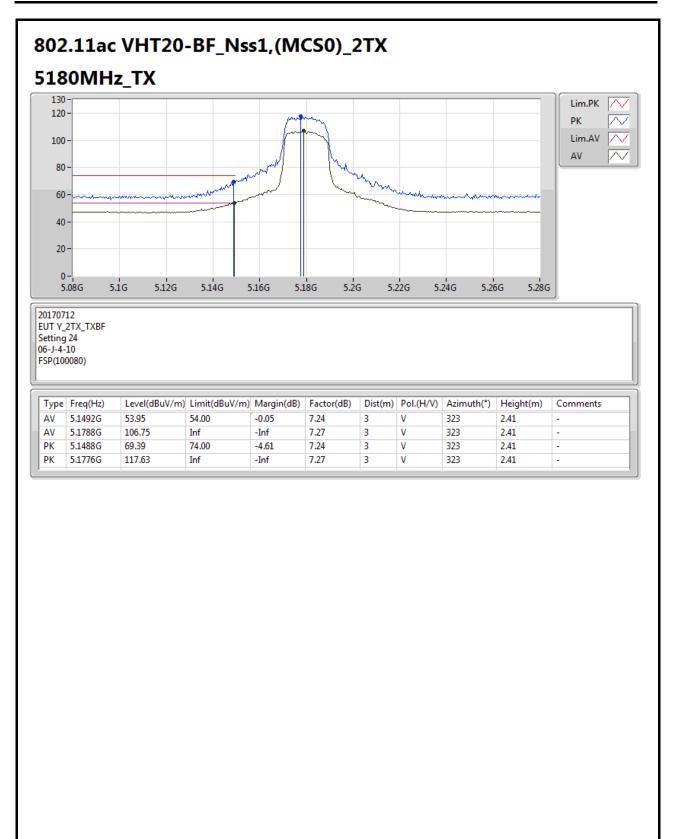
For Band 1 and Band 4 Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Dist	Pol.	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)	(H/V)	(°)	(m)	
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-		-	-	-	-	-	-	-	-	-	-
5.15-5.25GHz	Pass	AV	5.1492G	53.99	54.00	-0.01	7.24	3	Н	359	1.94	-

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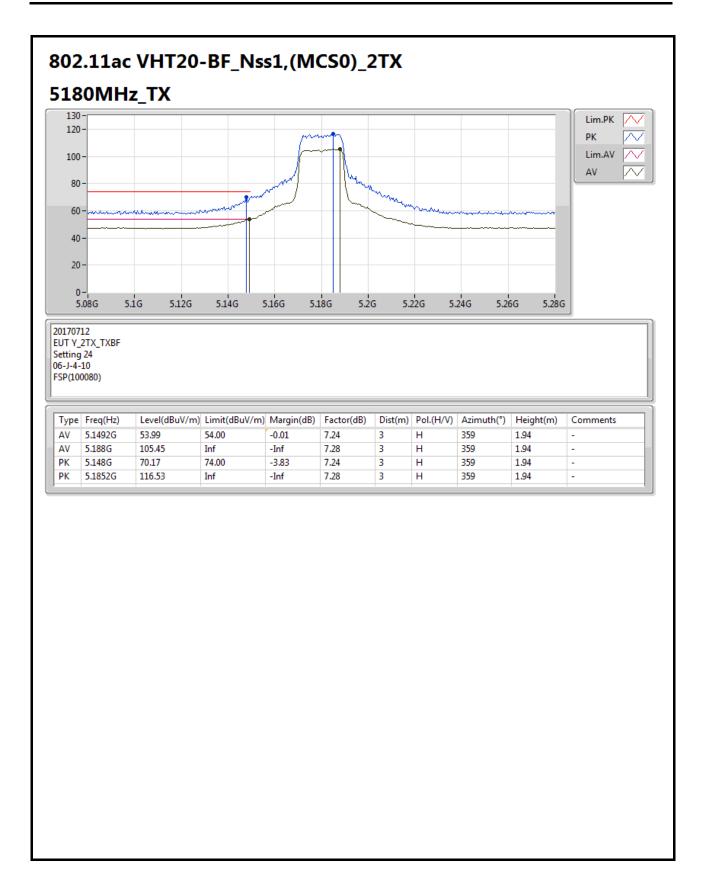
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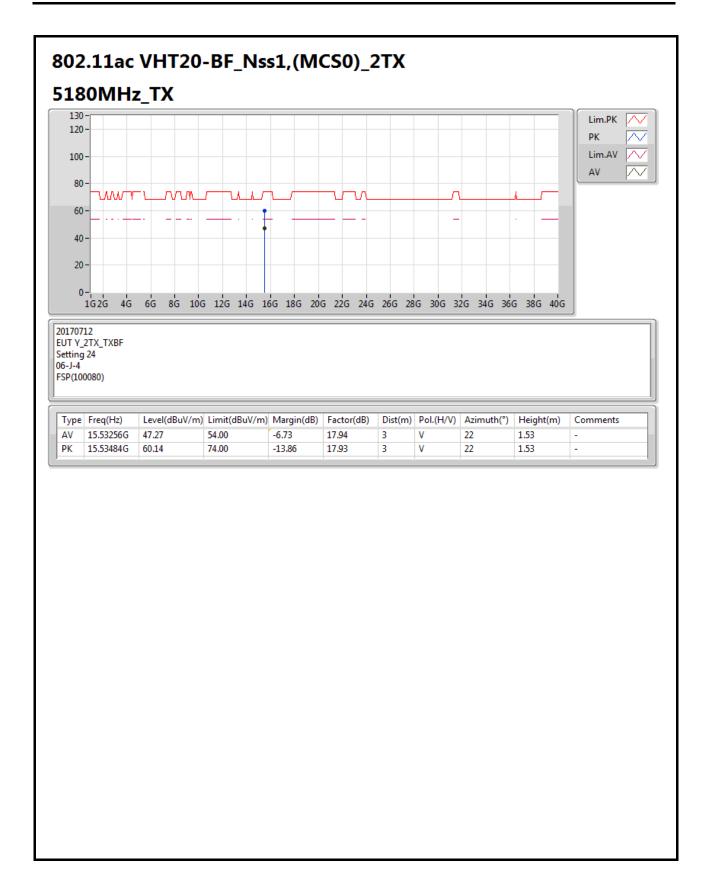
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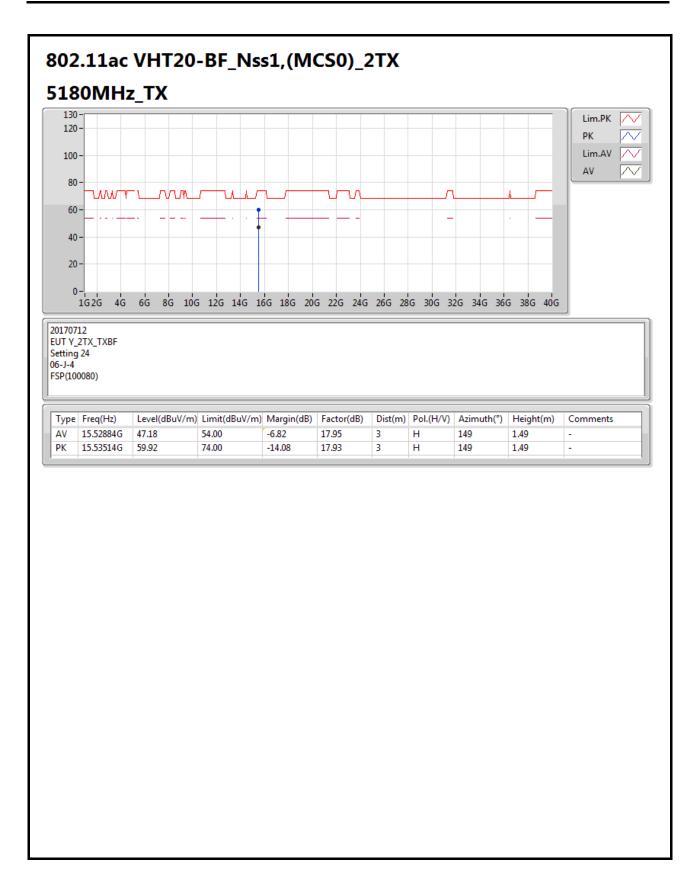
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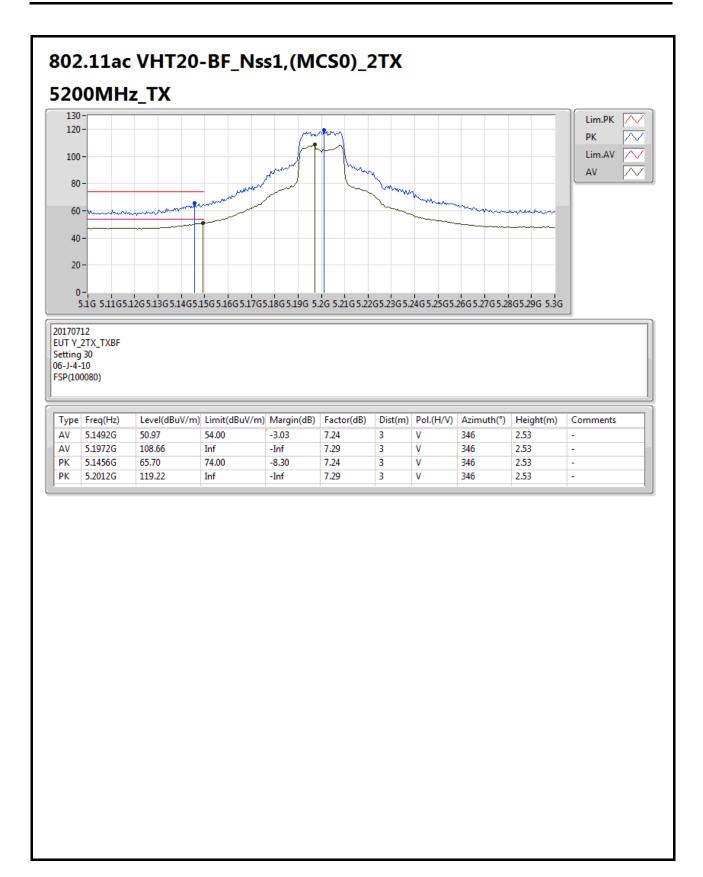
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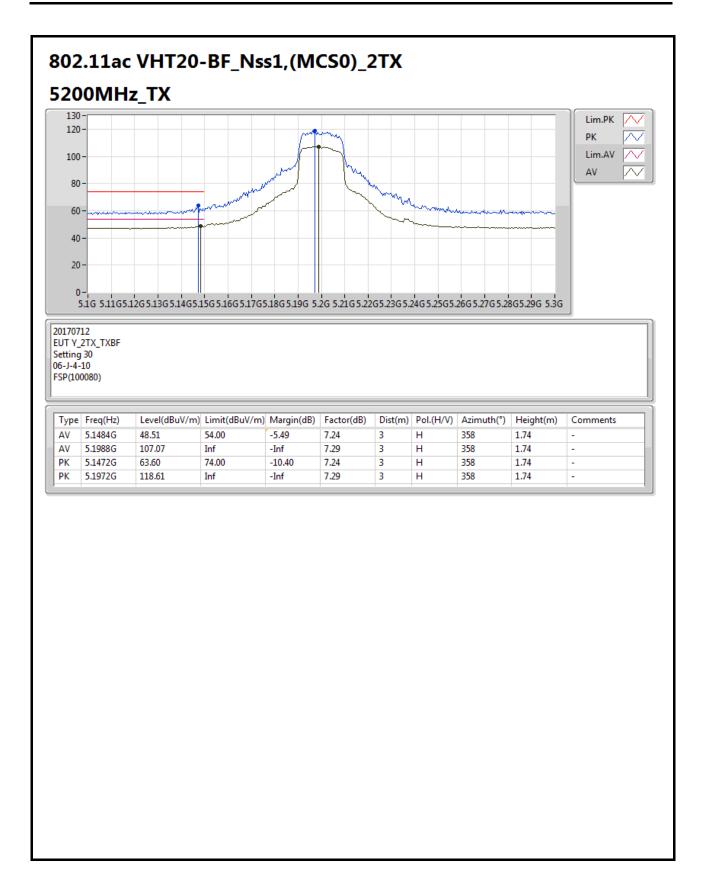
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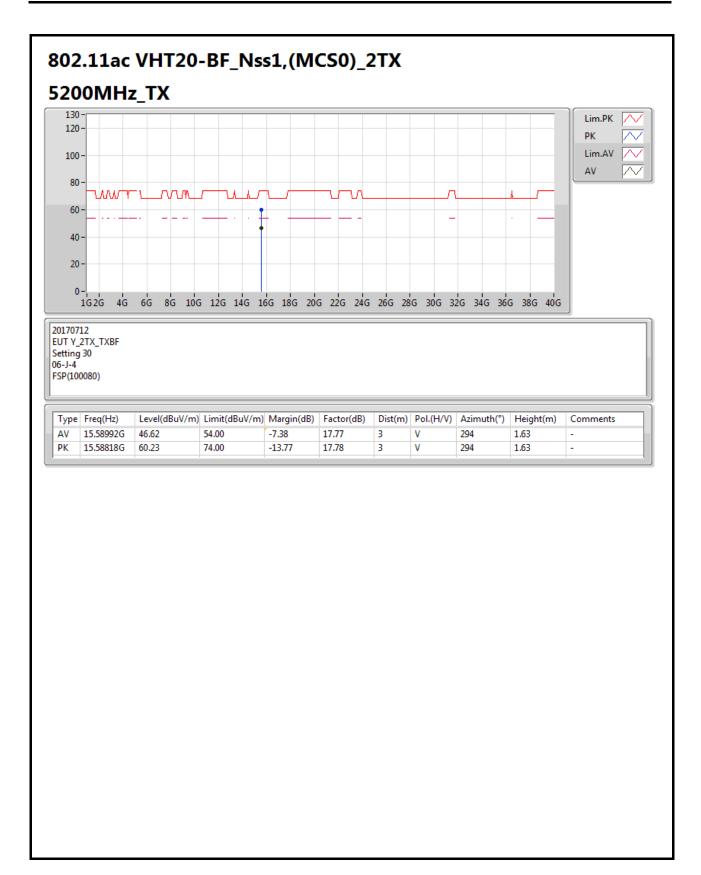
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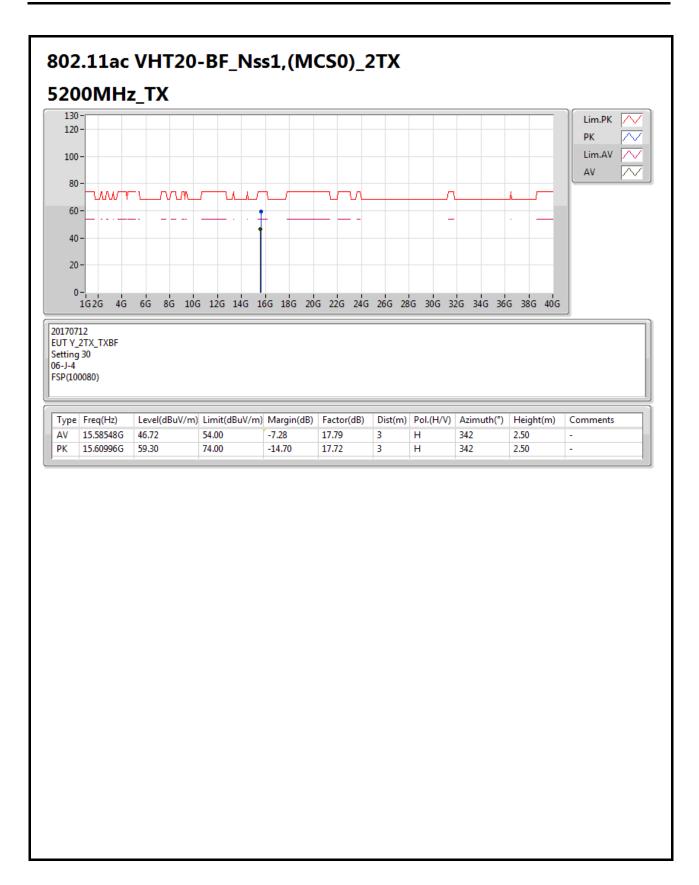
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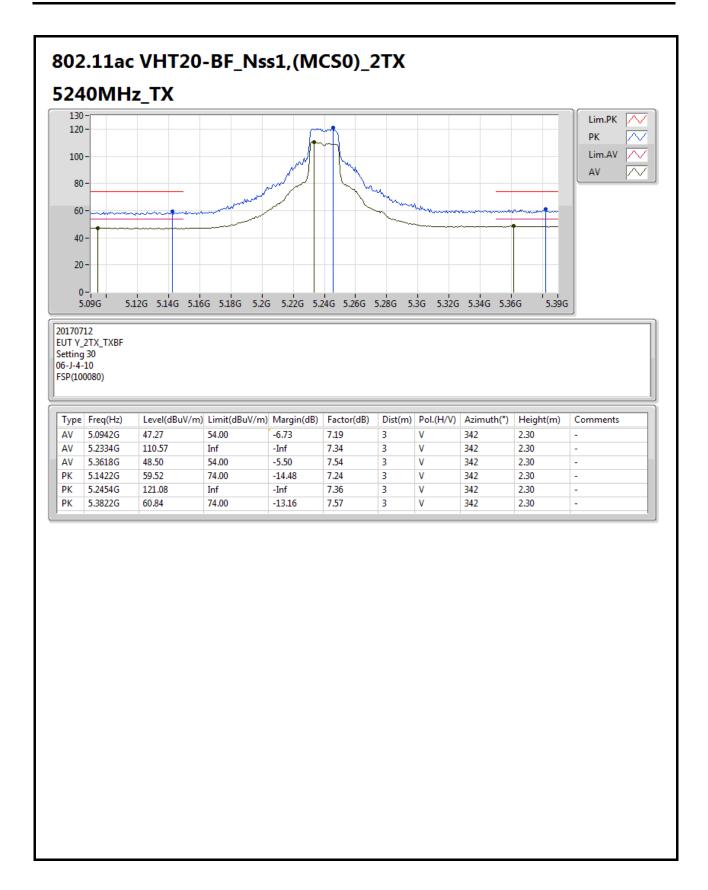
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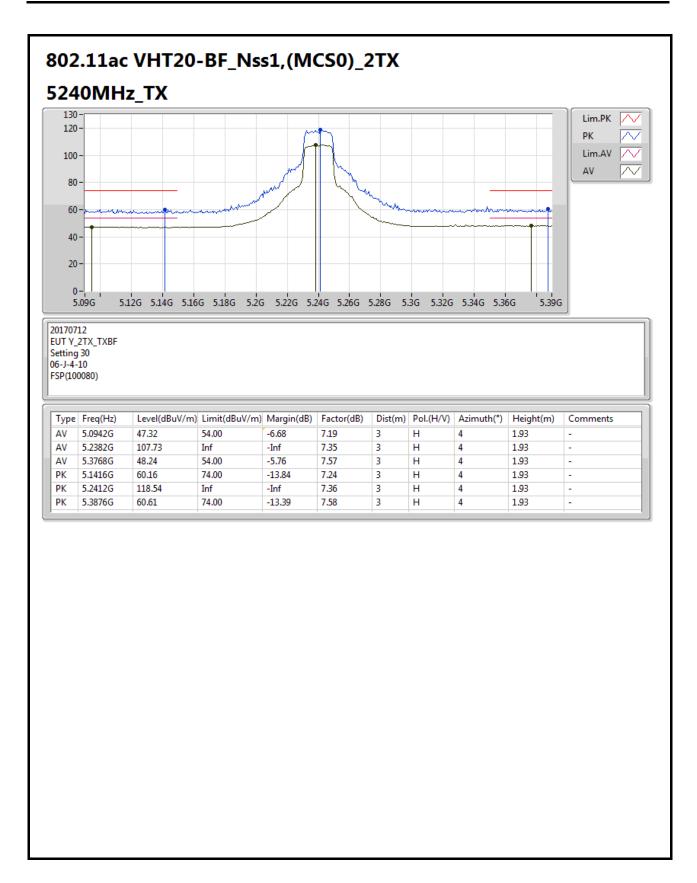
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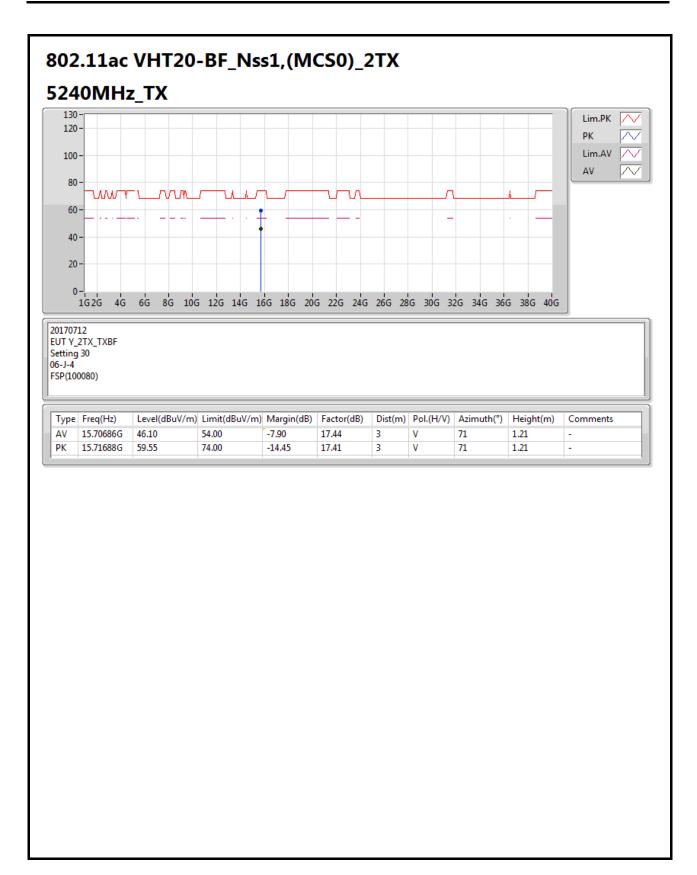
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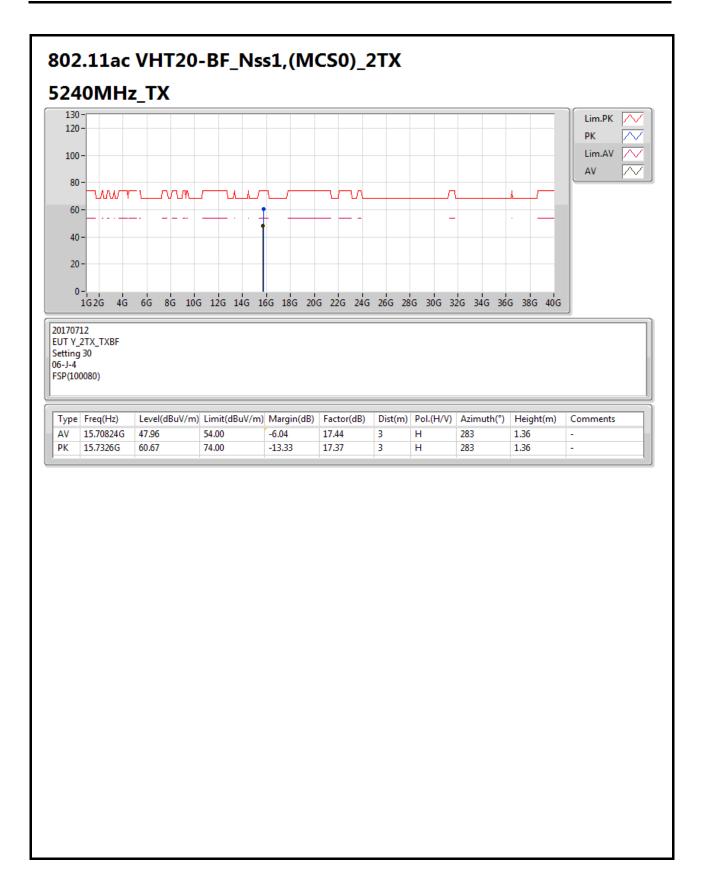
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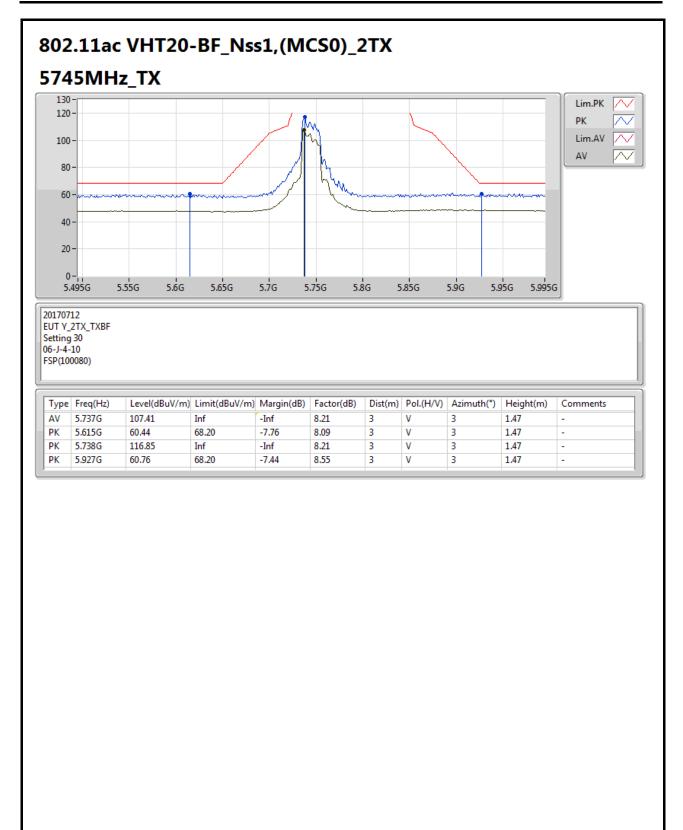
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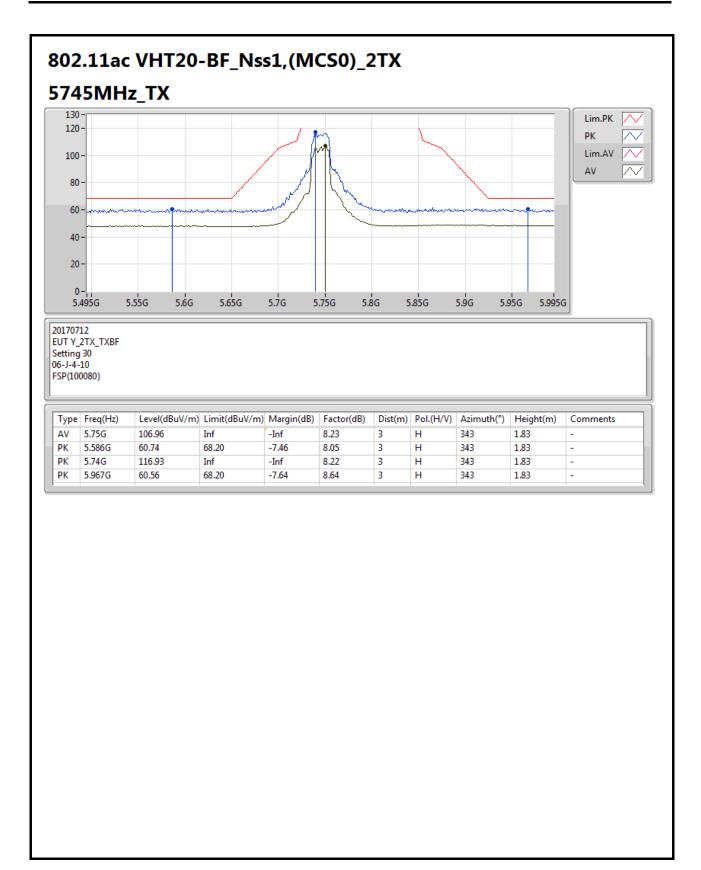
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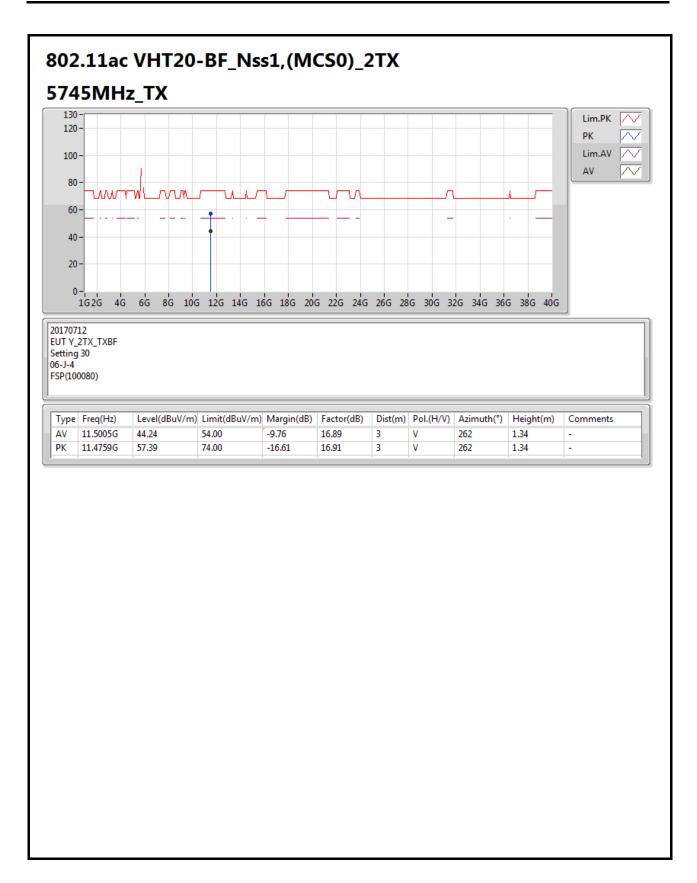
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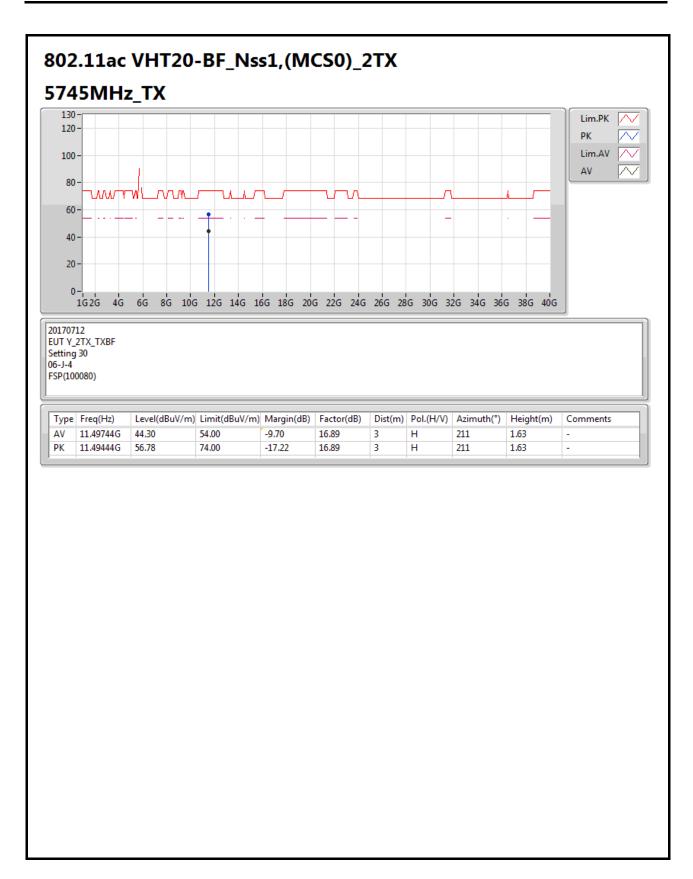
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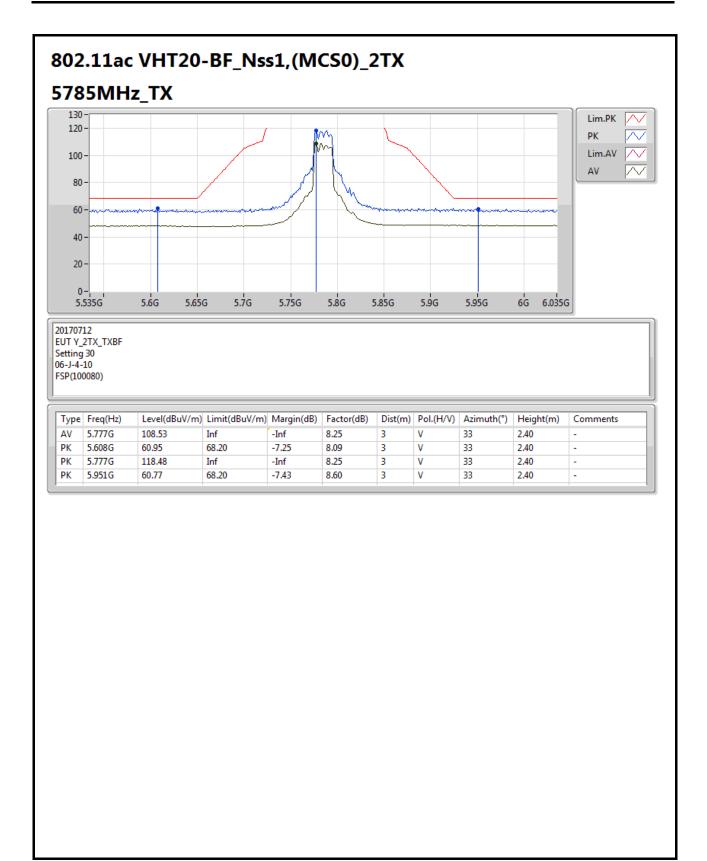
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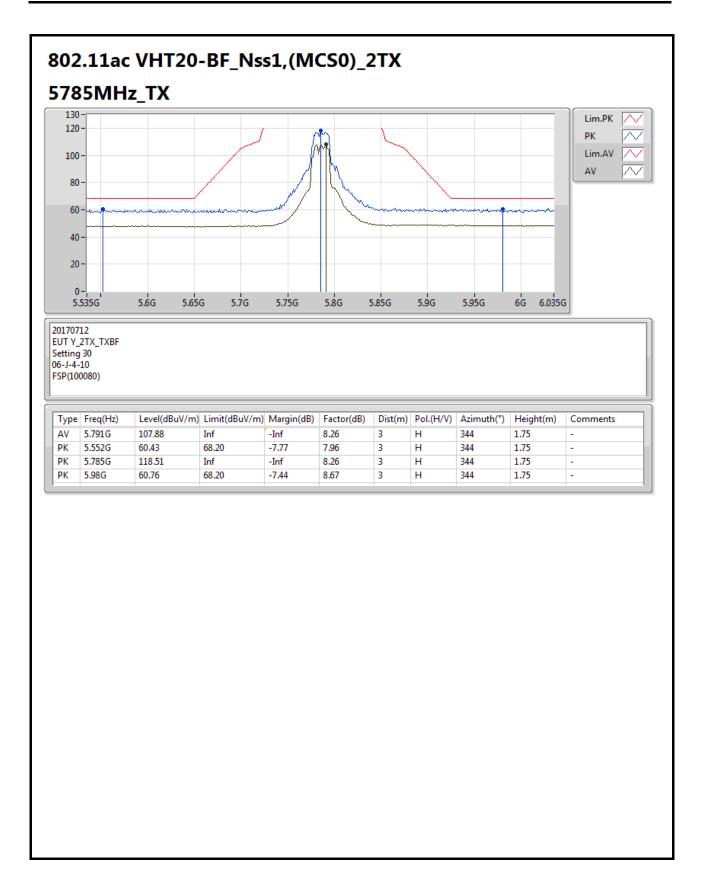
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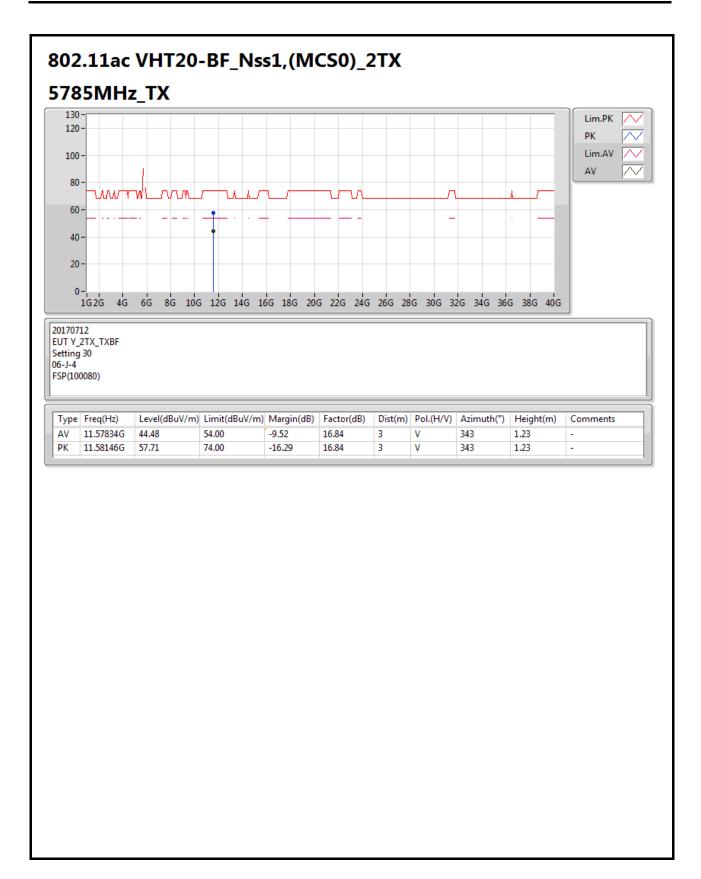
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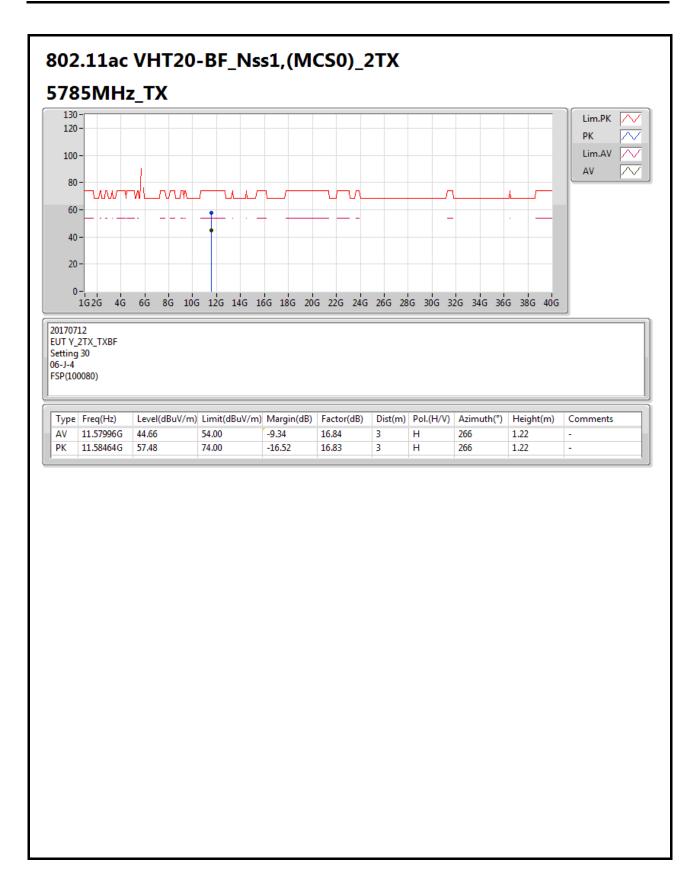
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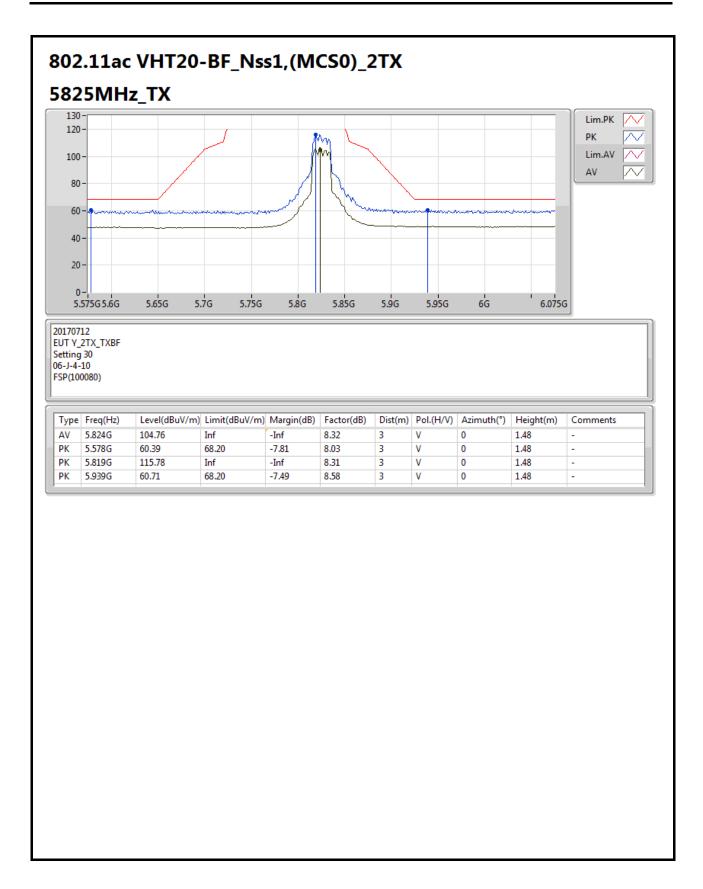
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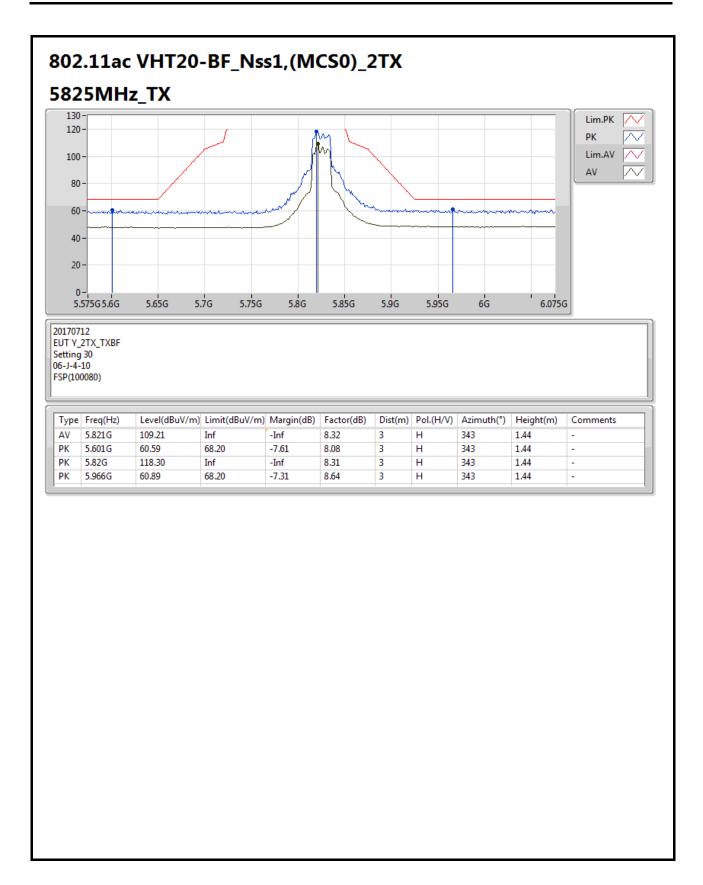
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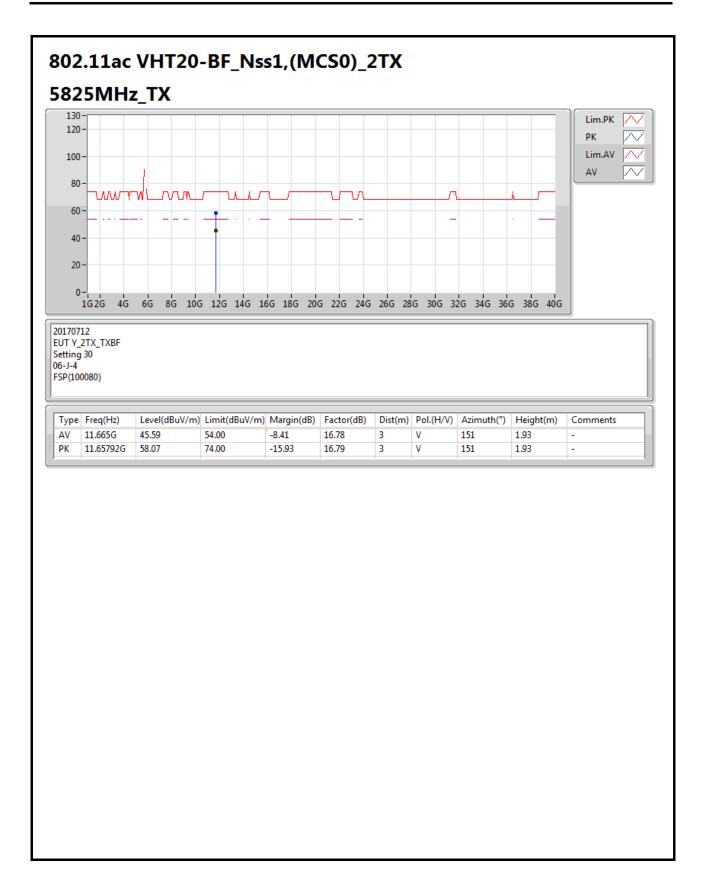
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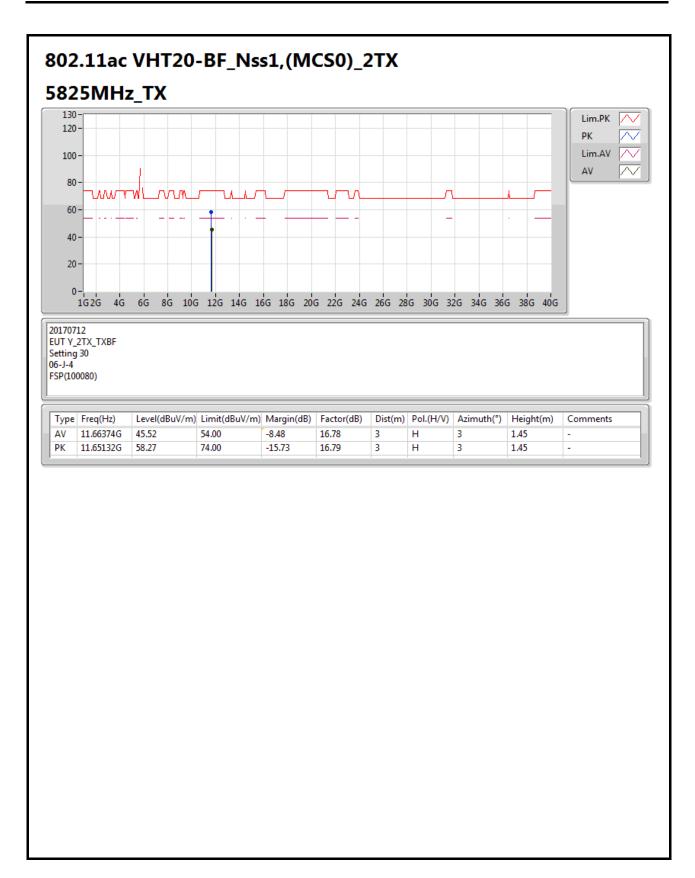
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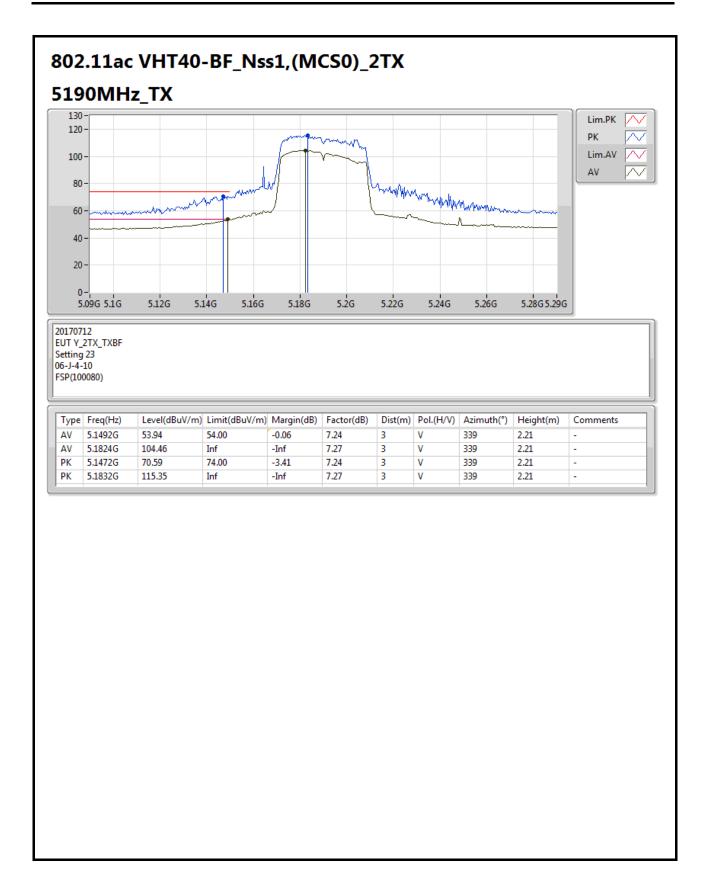
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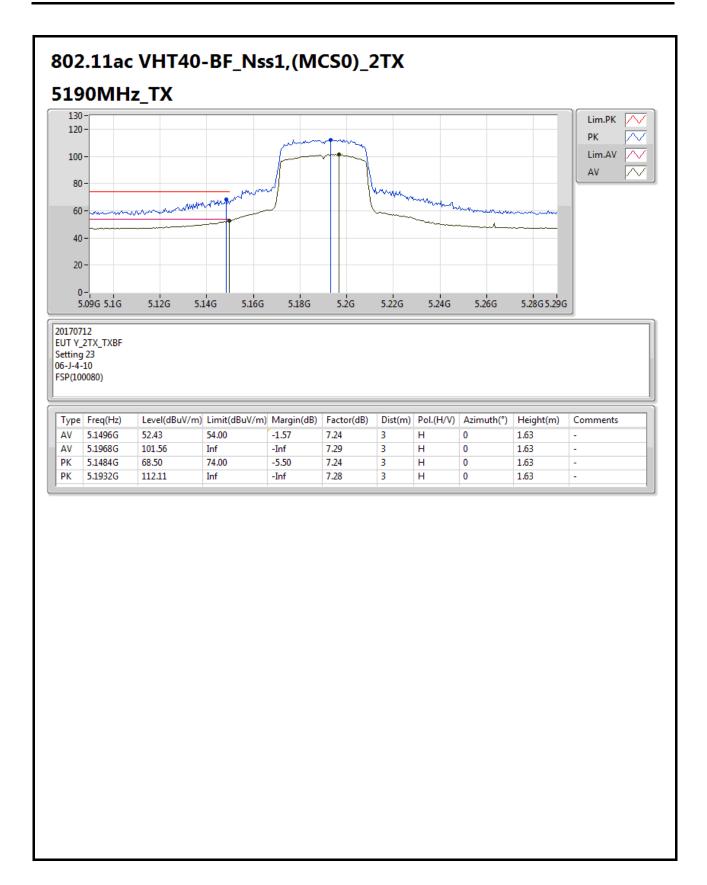
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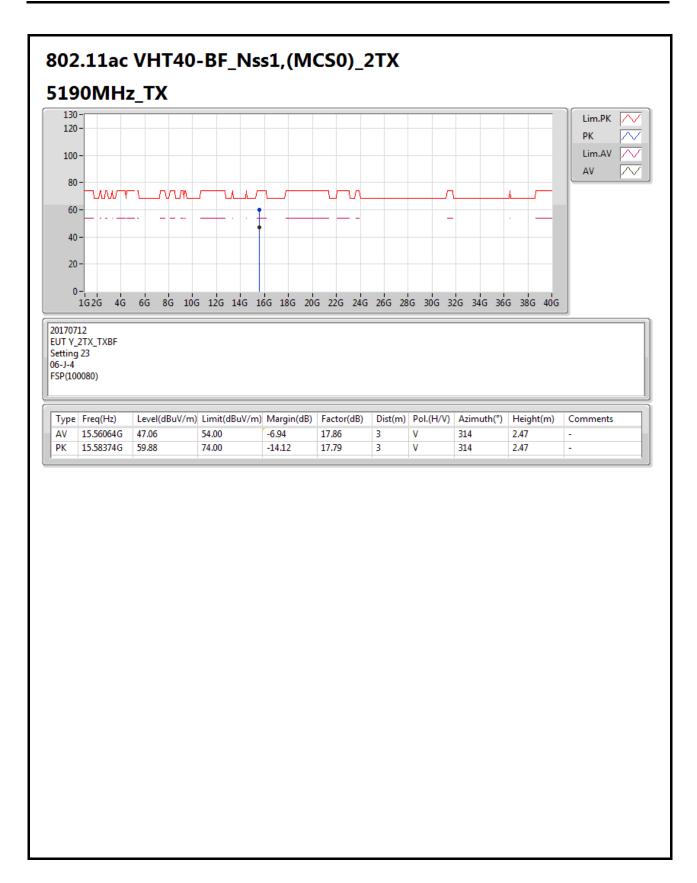
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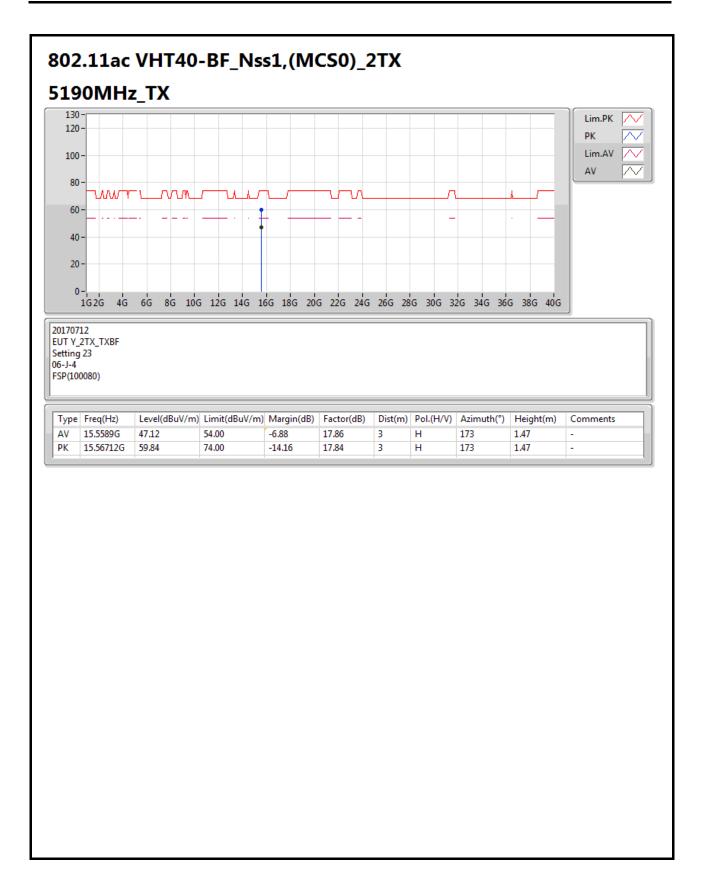
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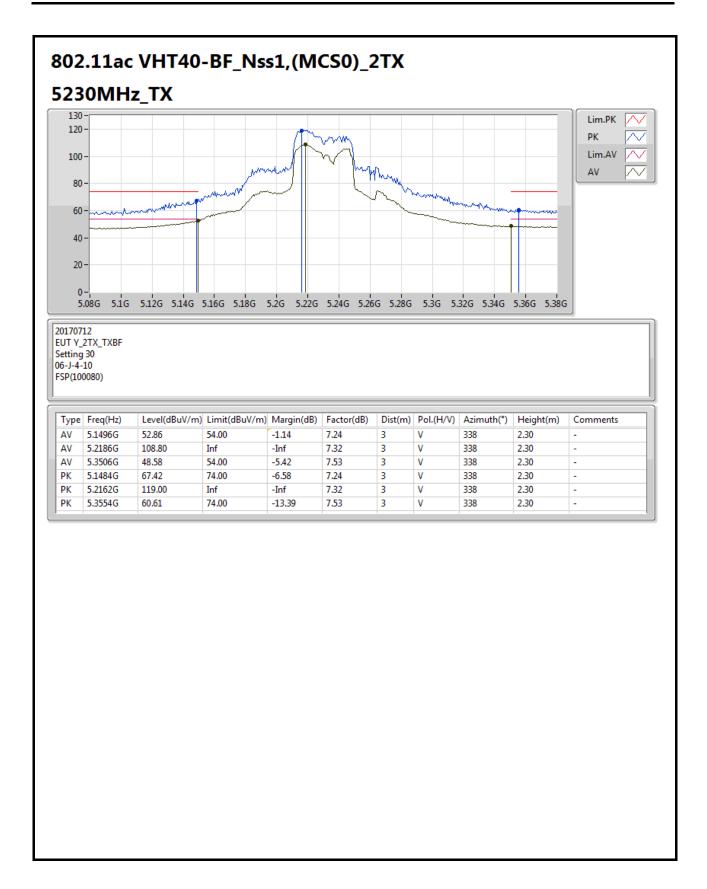
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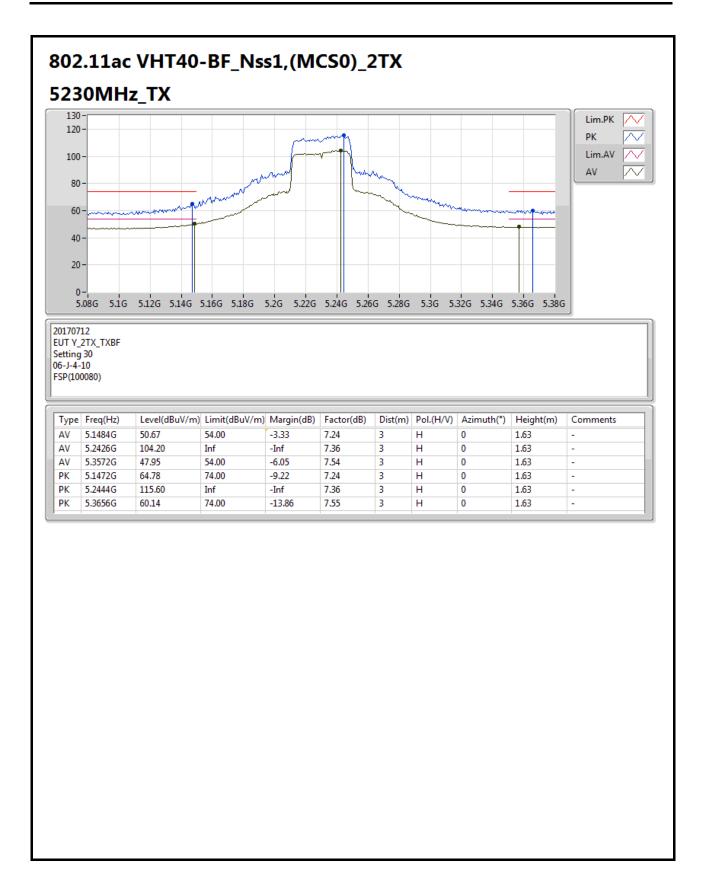
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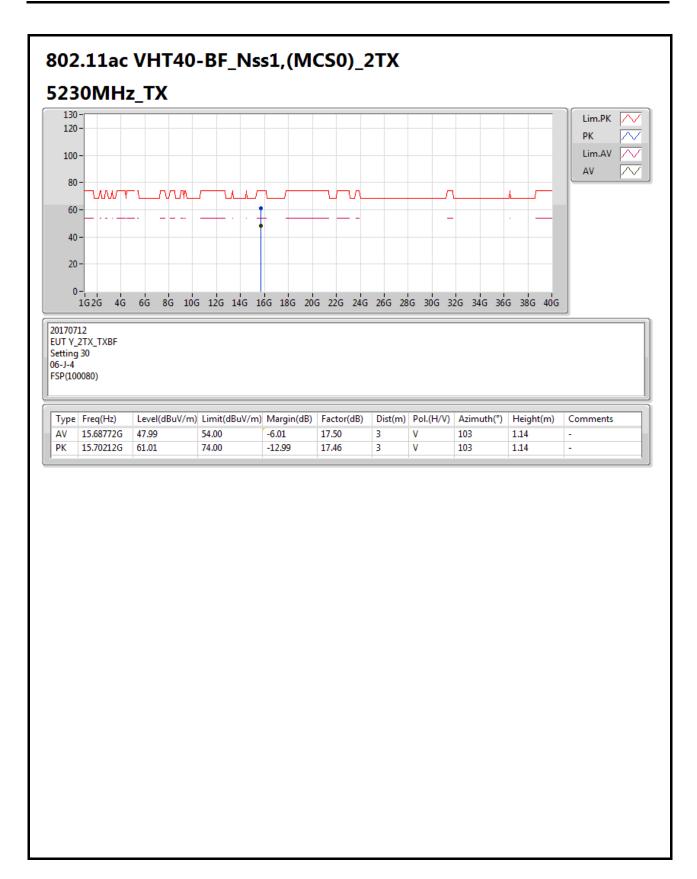
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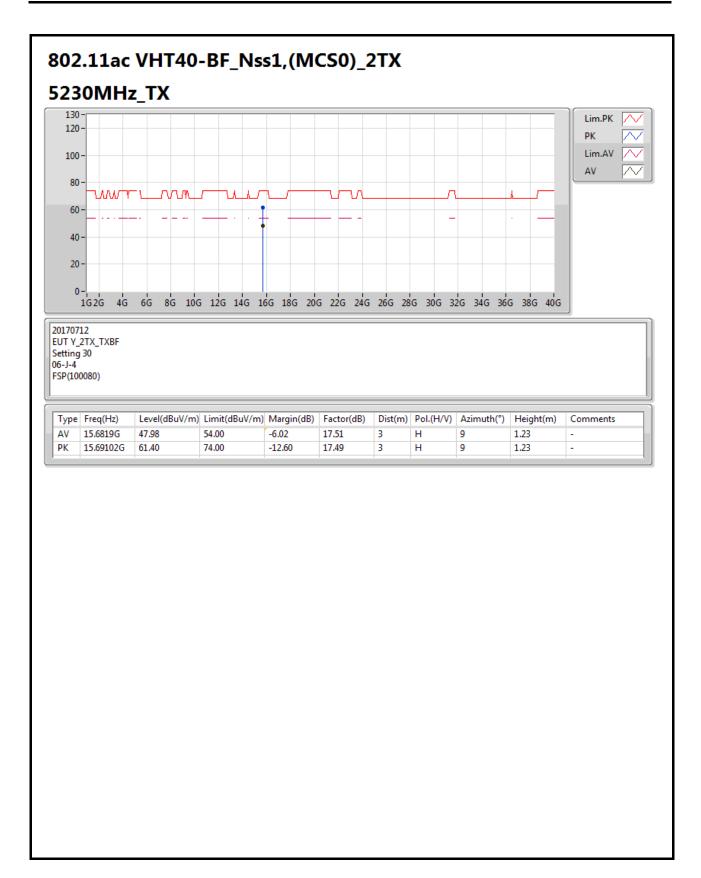
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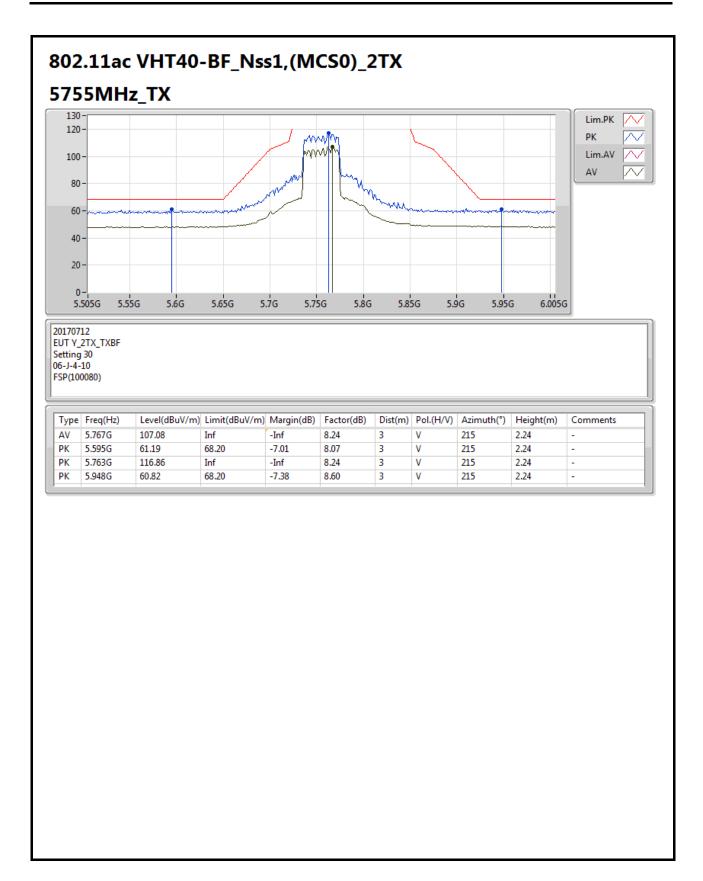
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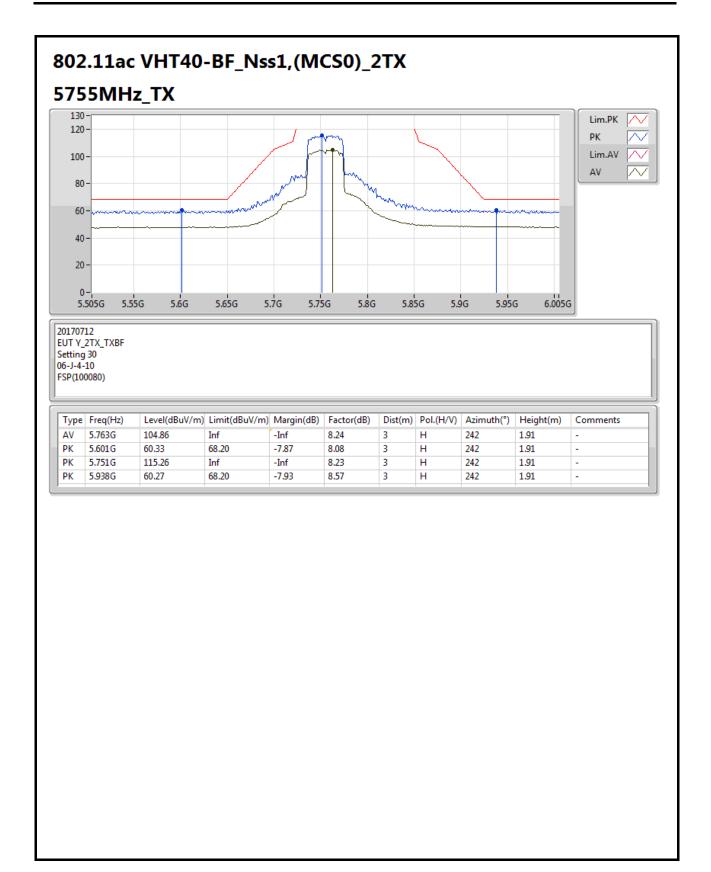
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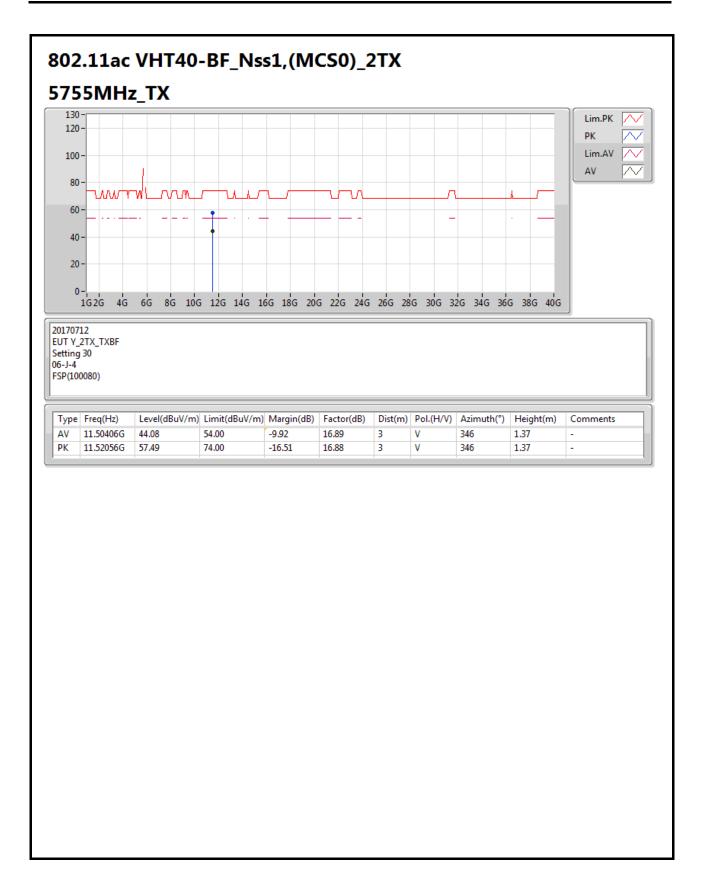
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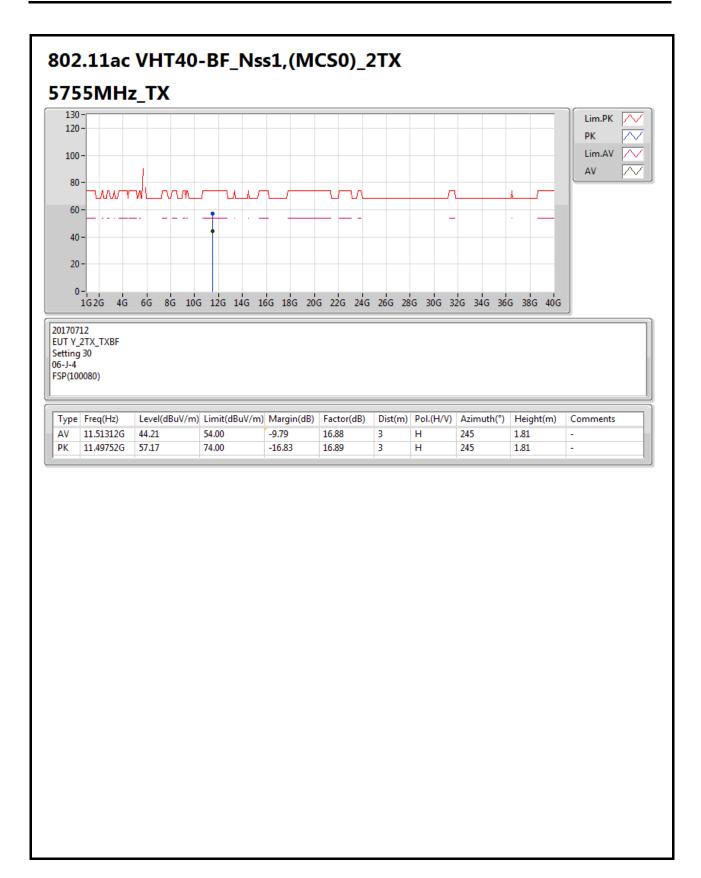
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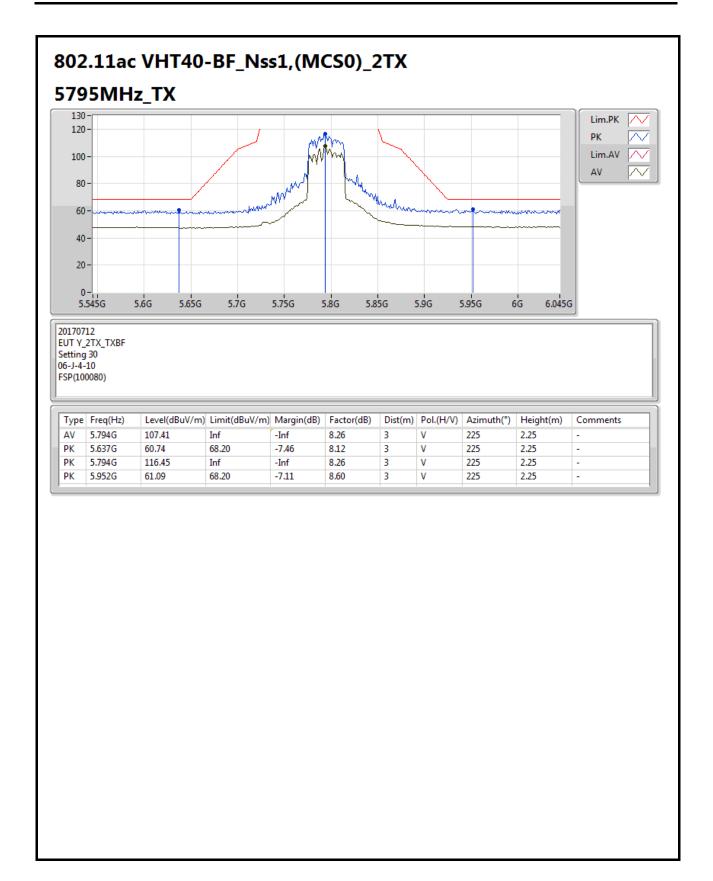
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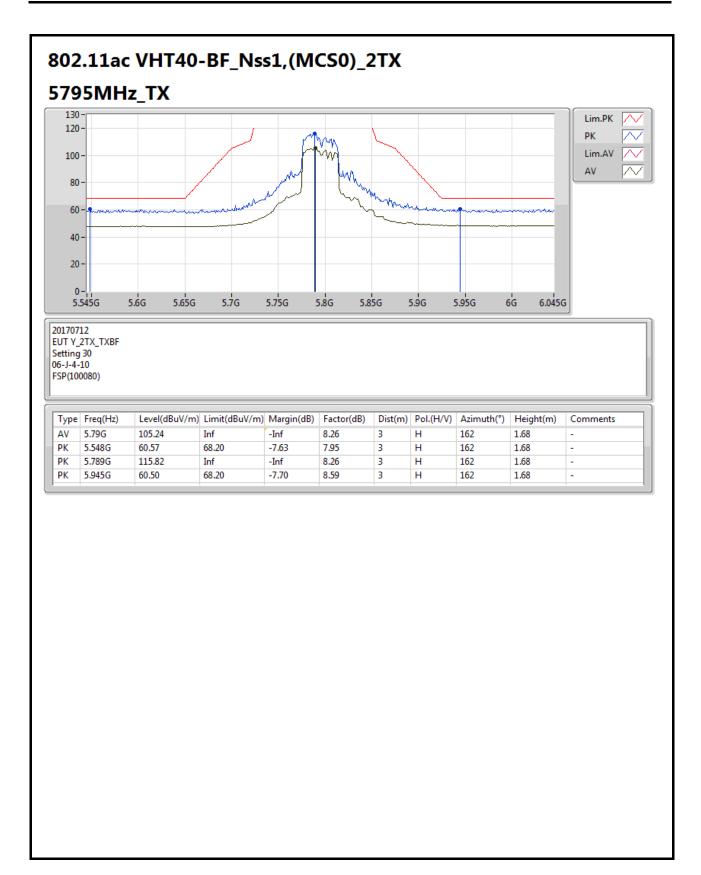
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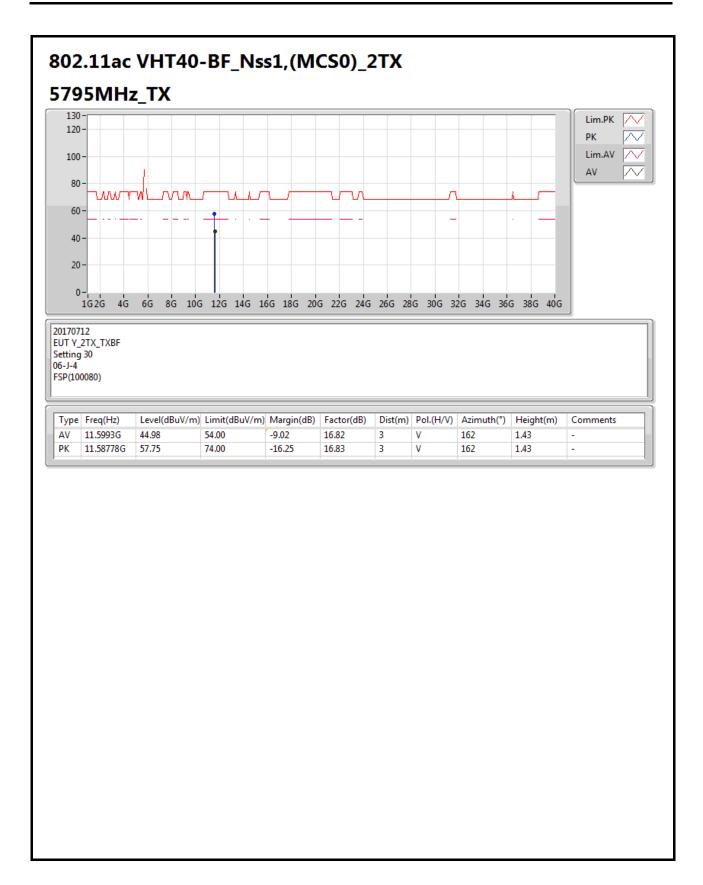
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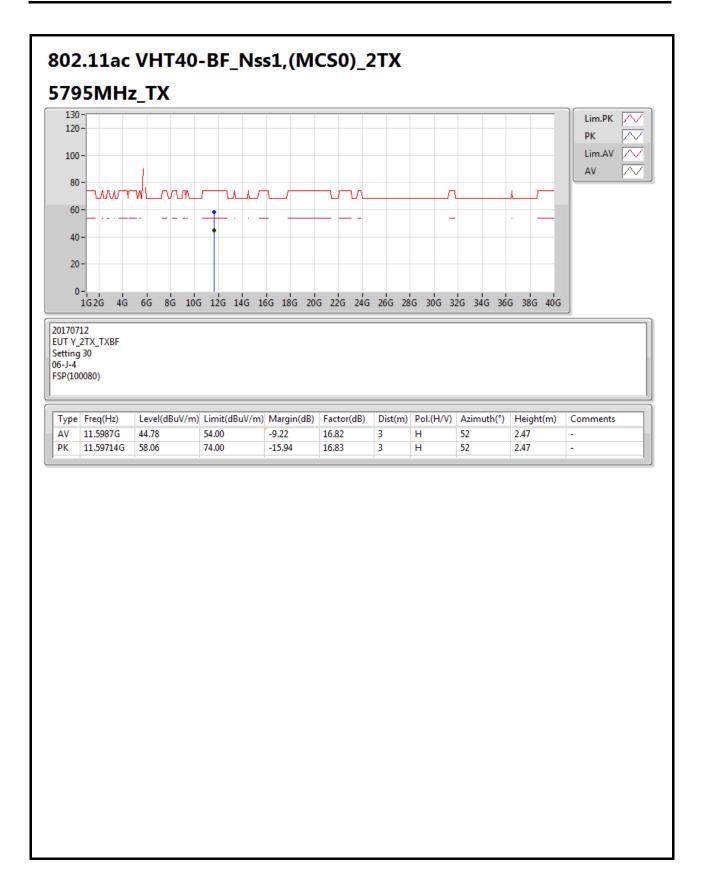
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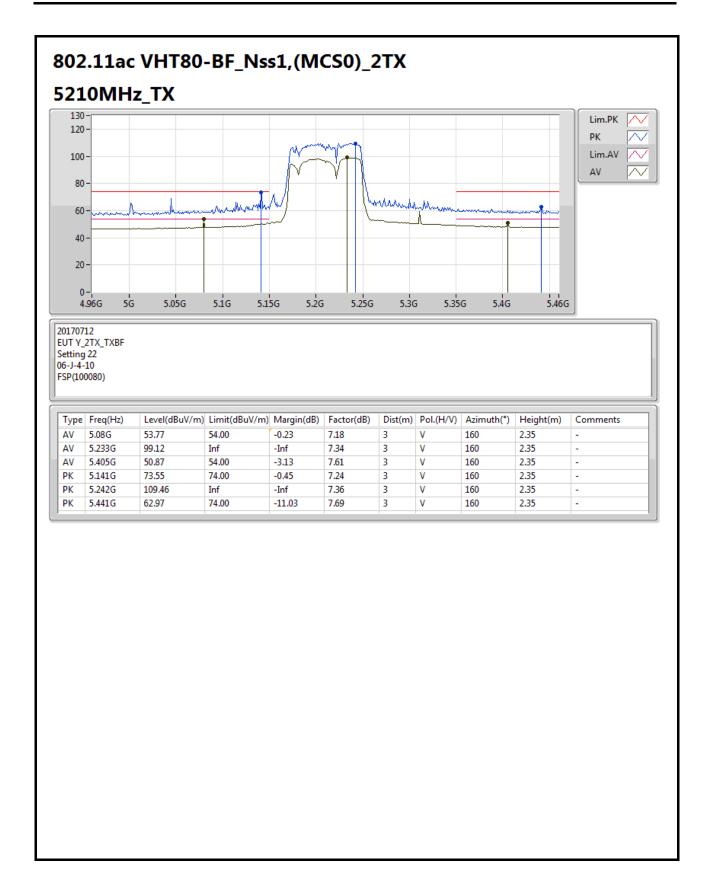
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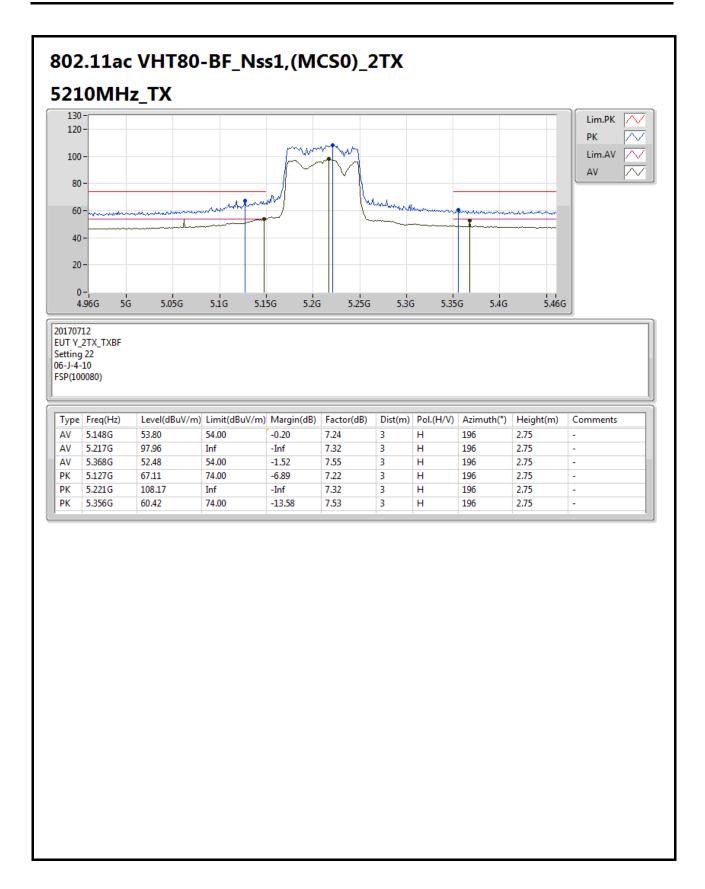
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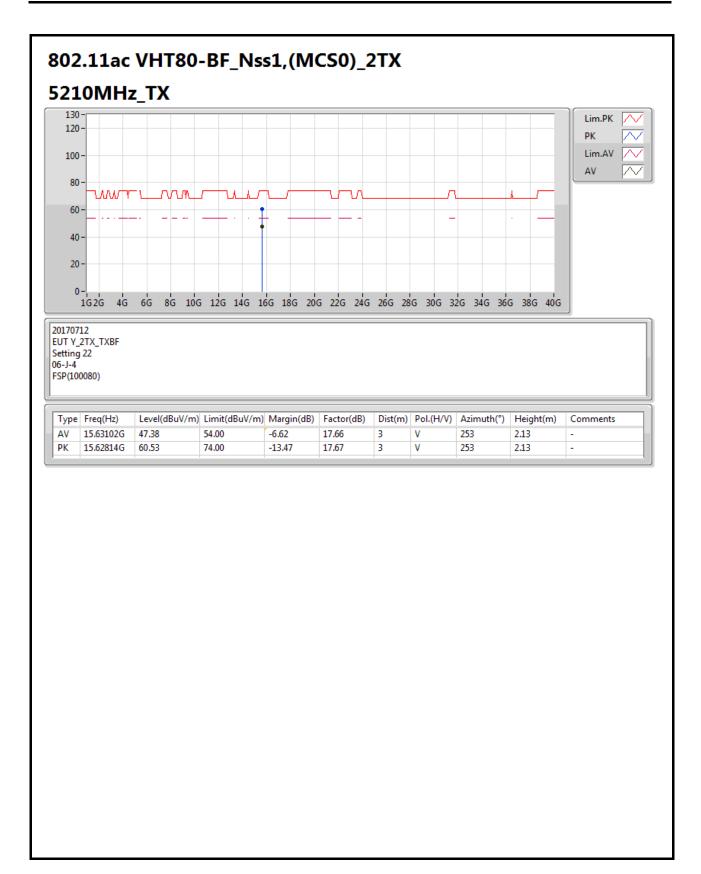
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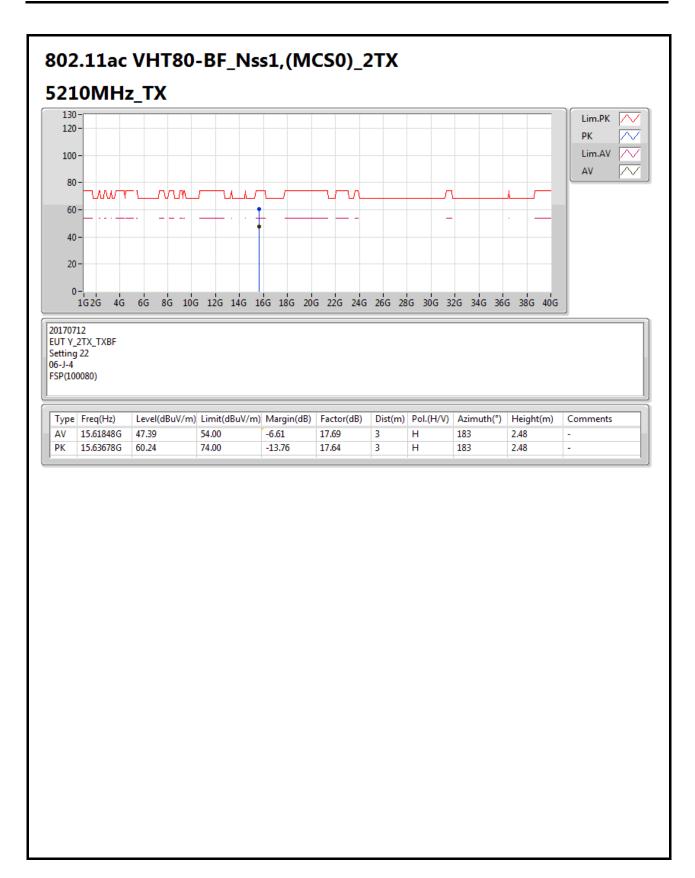
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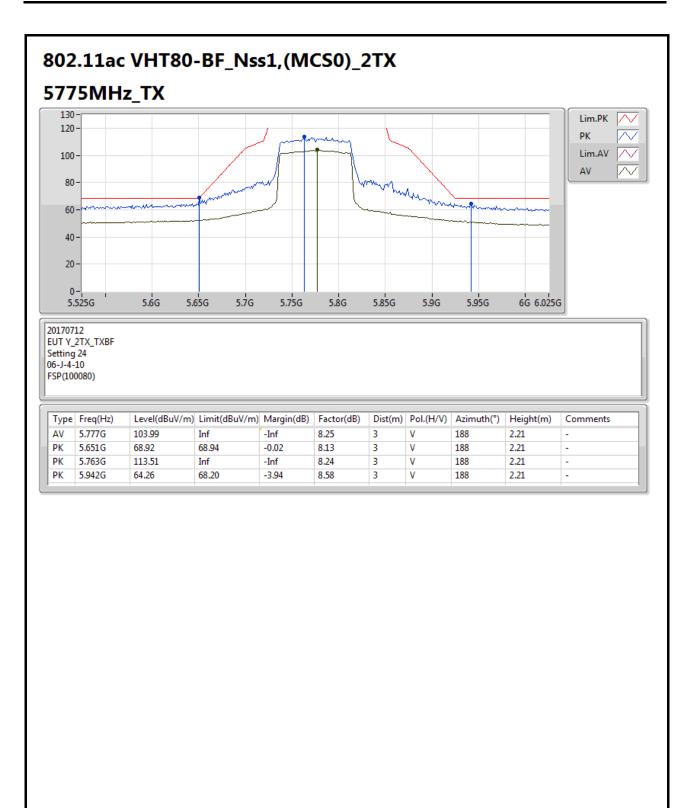
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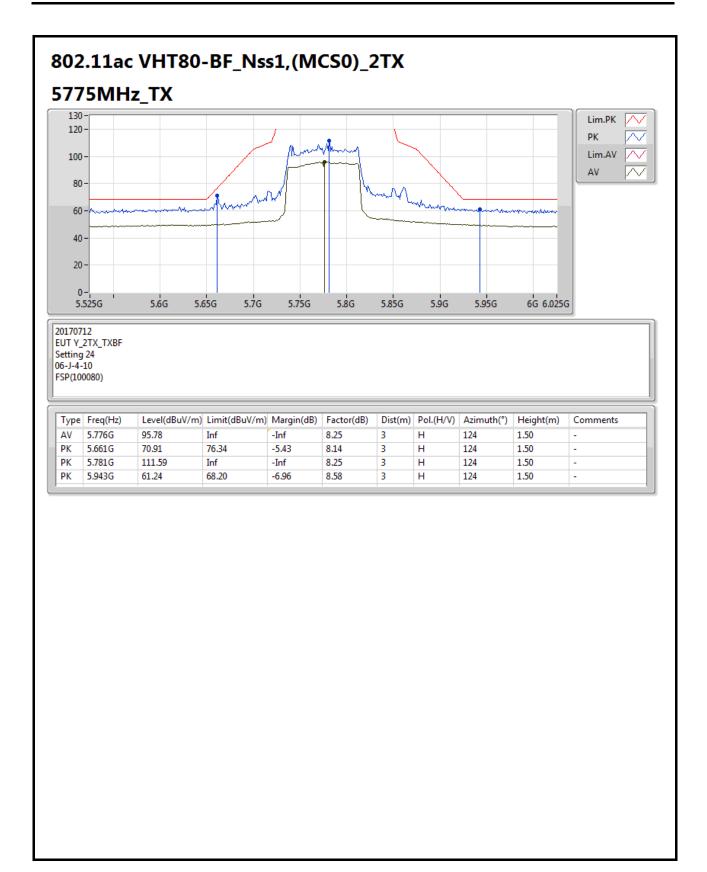
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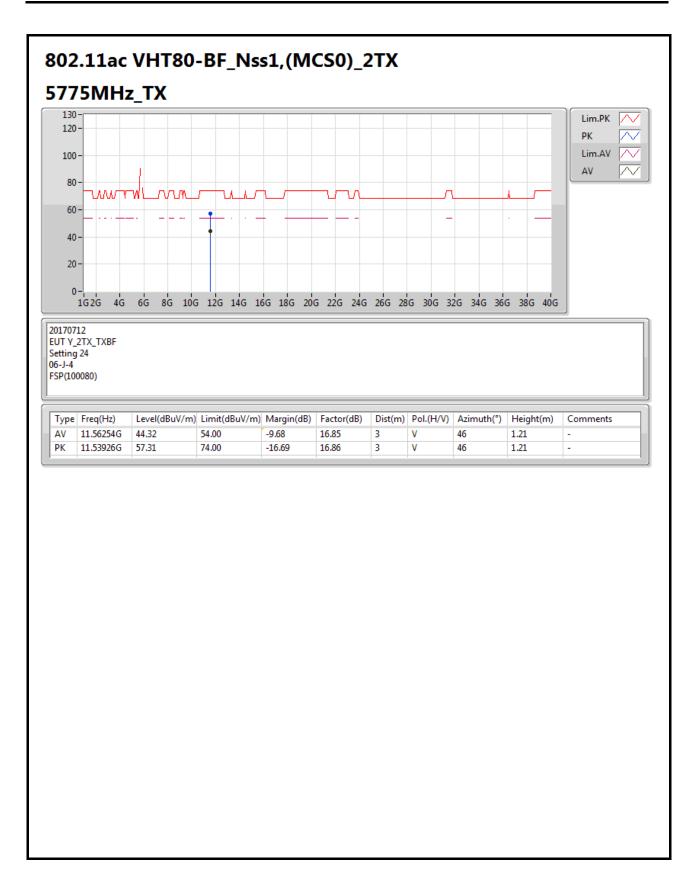
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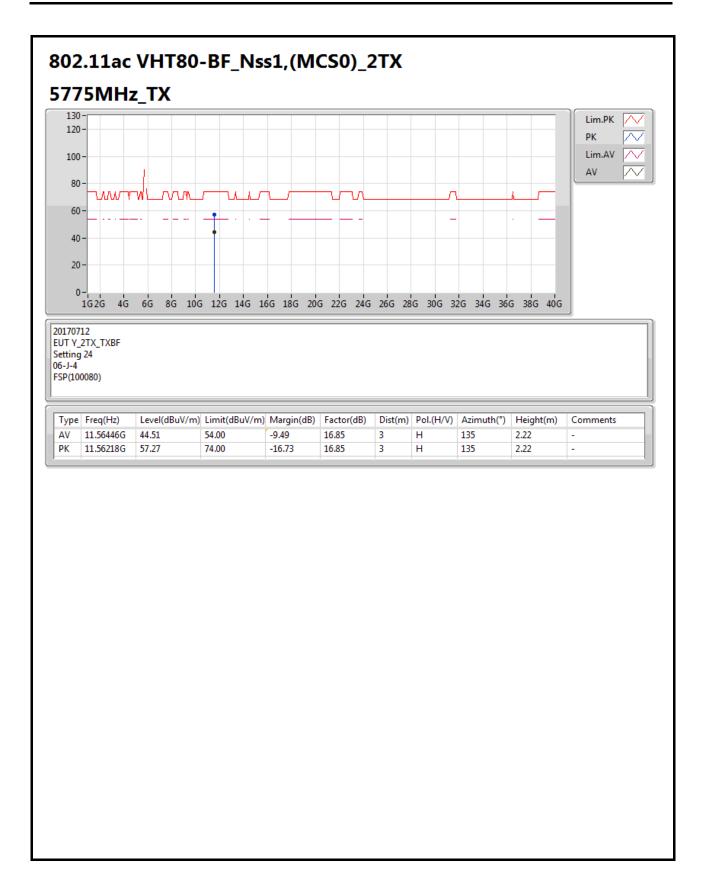
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## RSE TX above 1GHz Result

Appendix D.2

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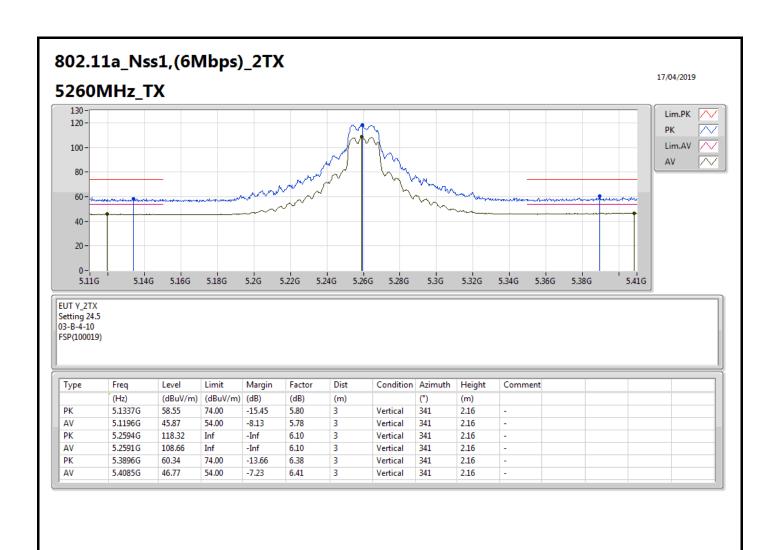
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For Band 2~Band 3 Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth	Height (m)
5.47-5.725GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT40_Nss1,(MCS0)_2TX	Pass	PK	5.4686G	68.18	68.20	-0.02	6.46	3	Horizontal	76	2.50

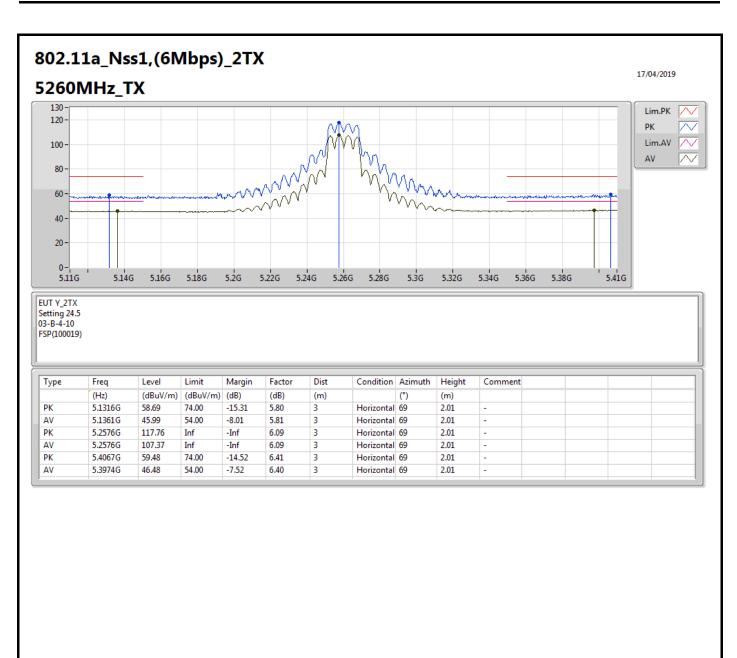
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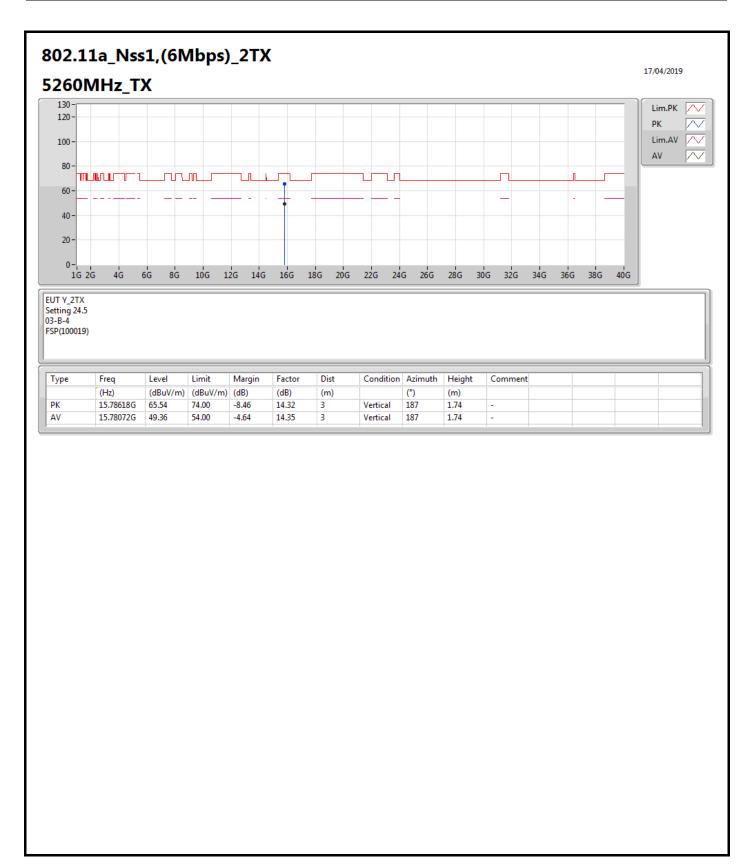
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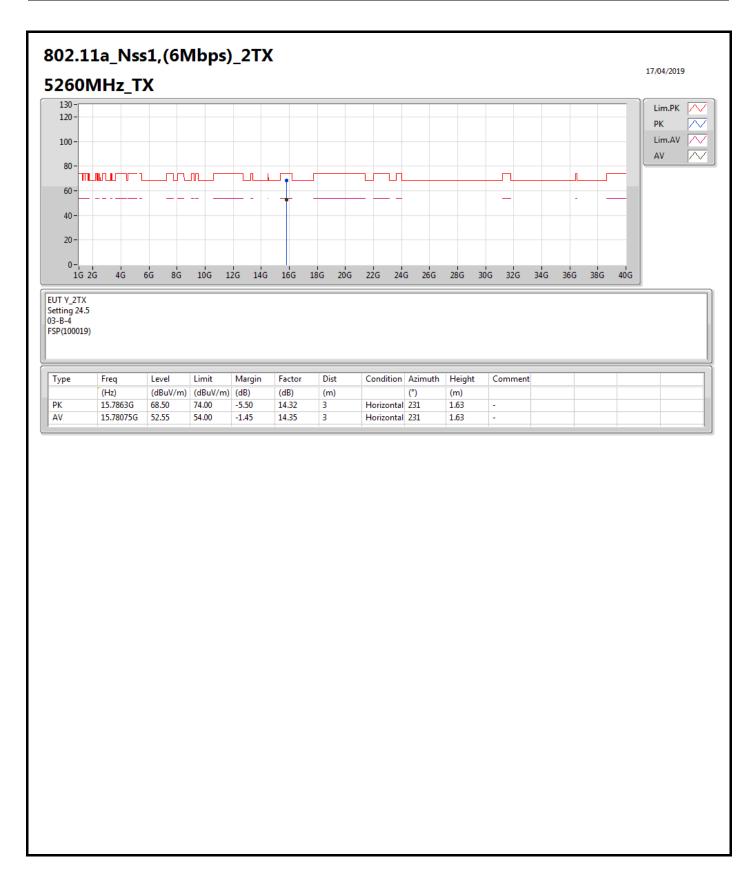
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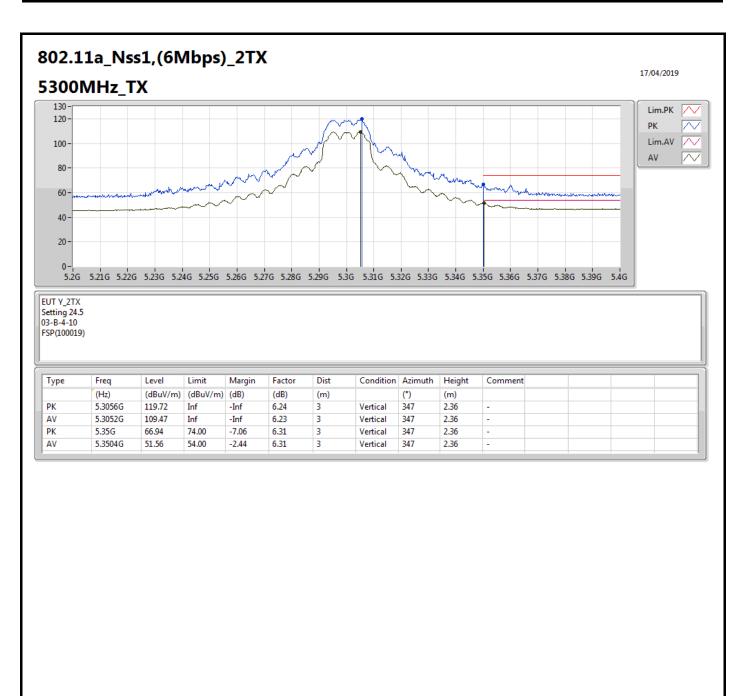
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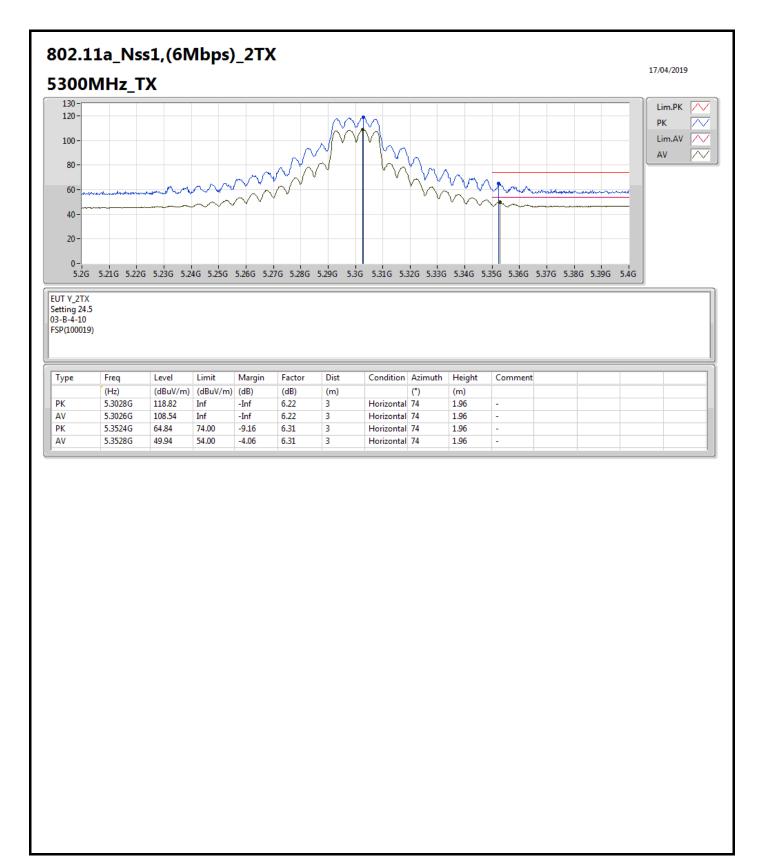
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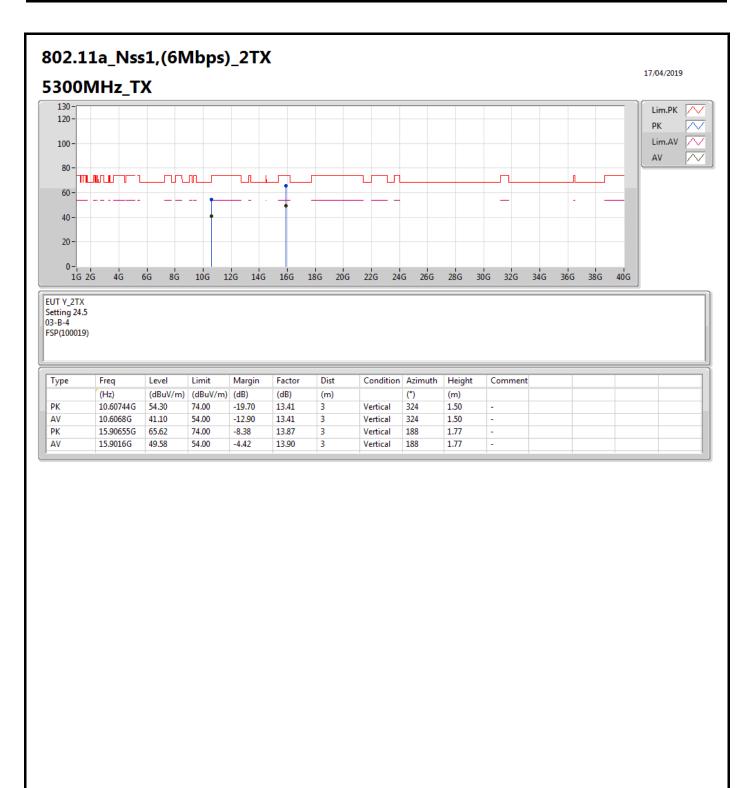
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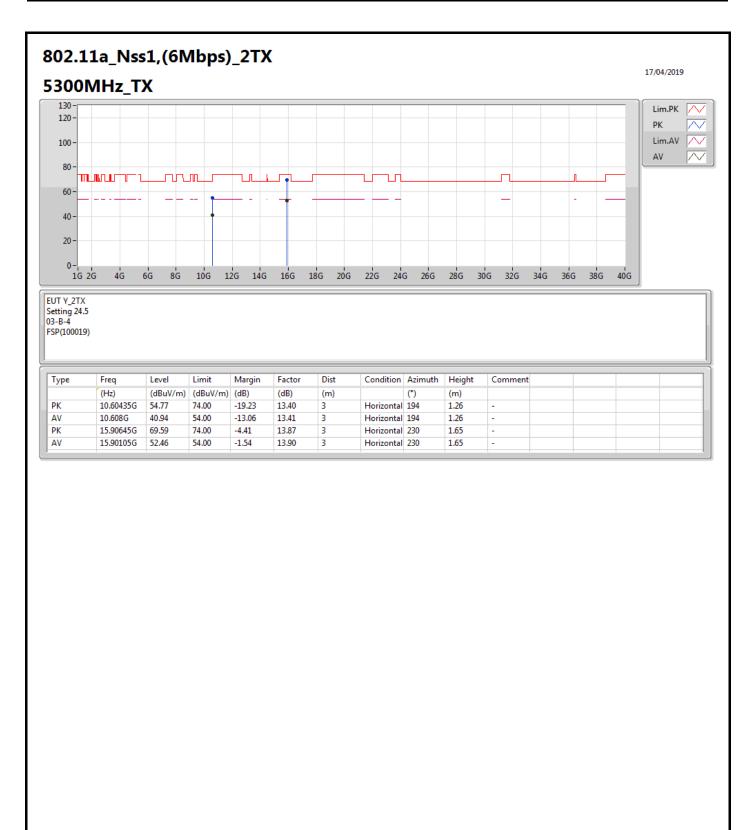
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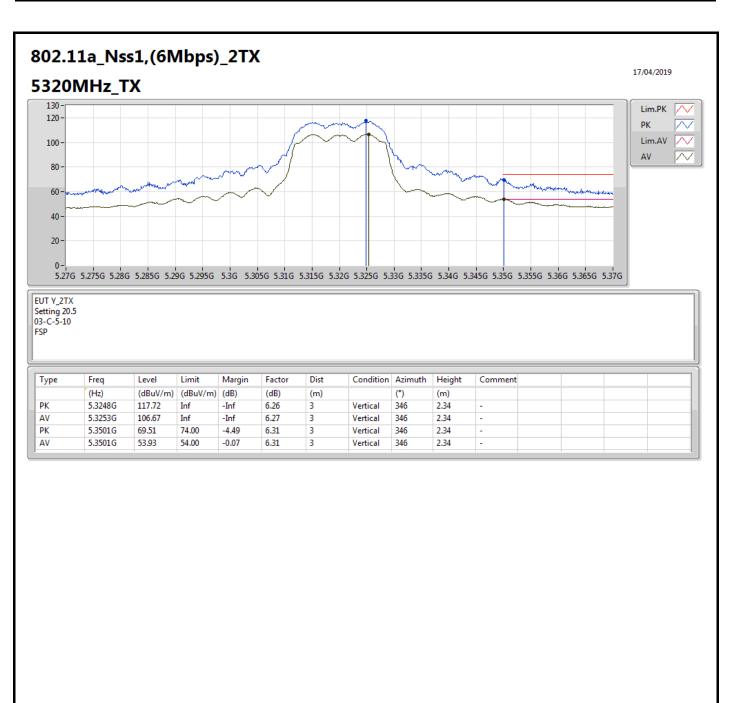
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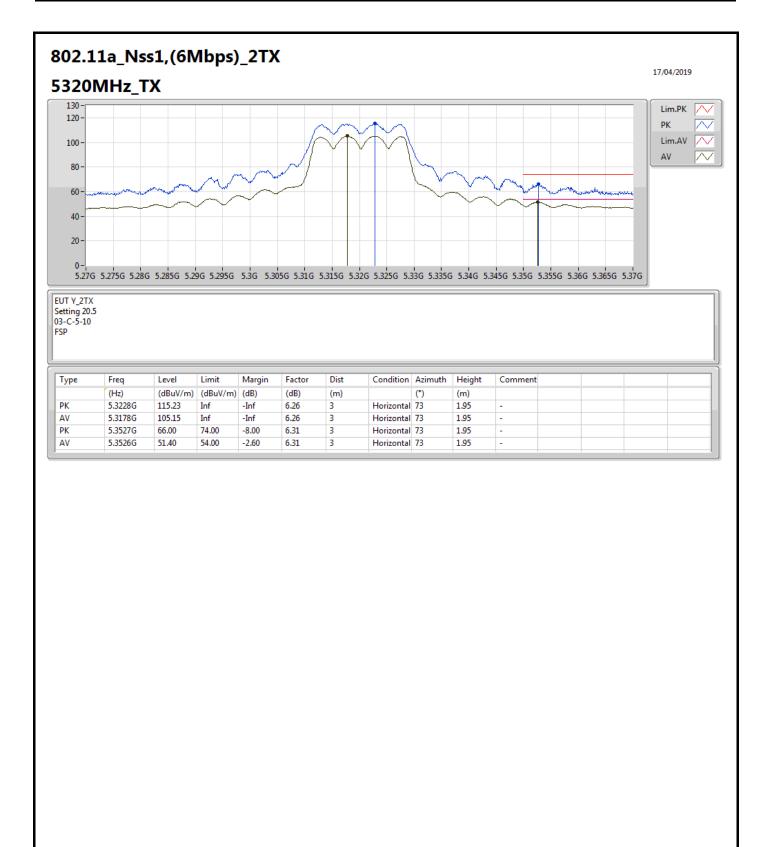
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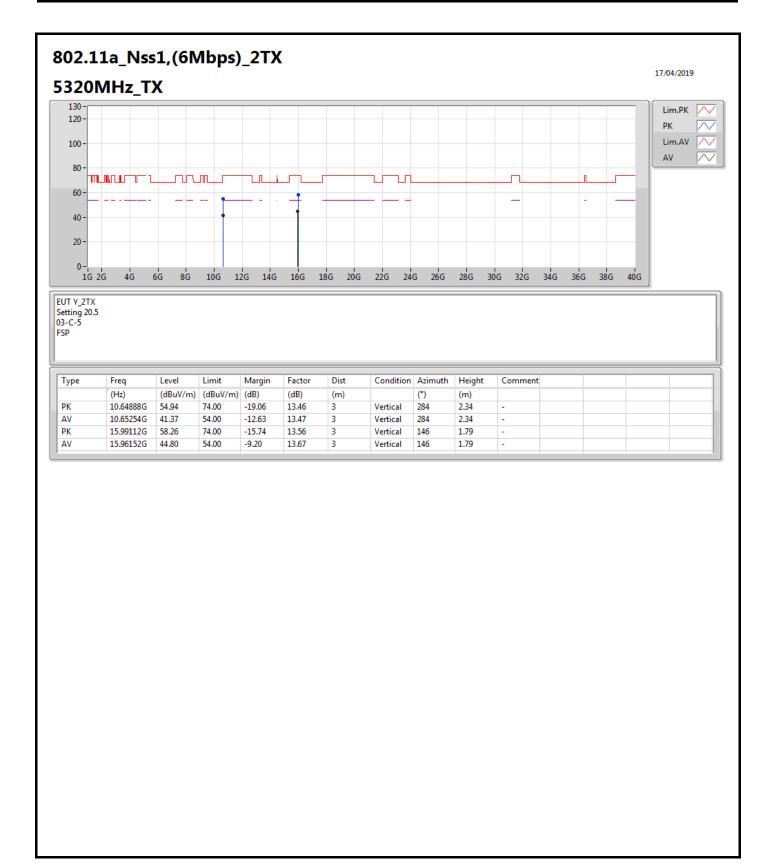
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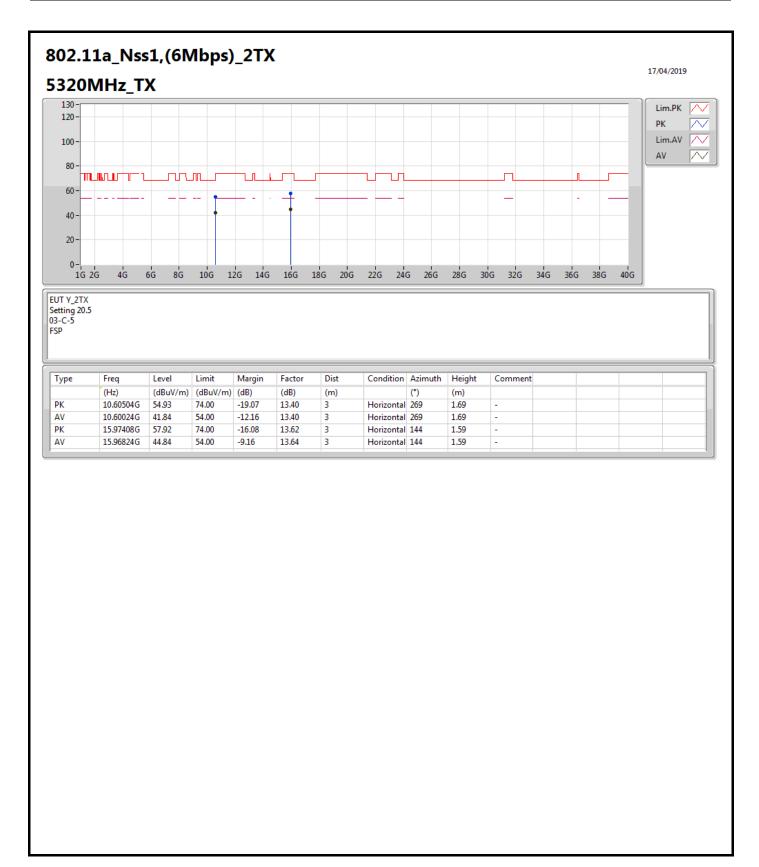
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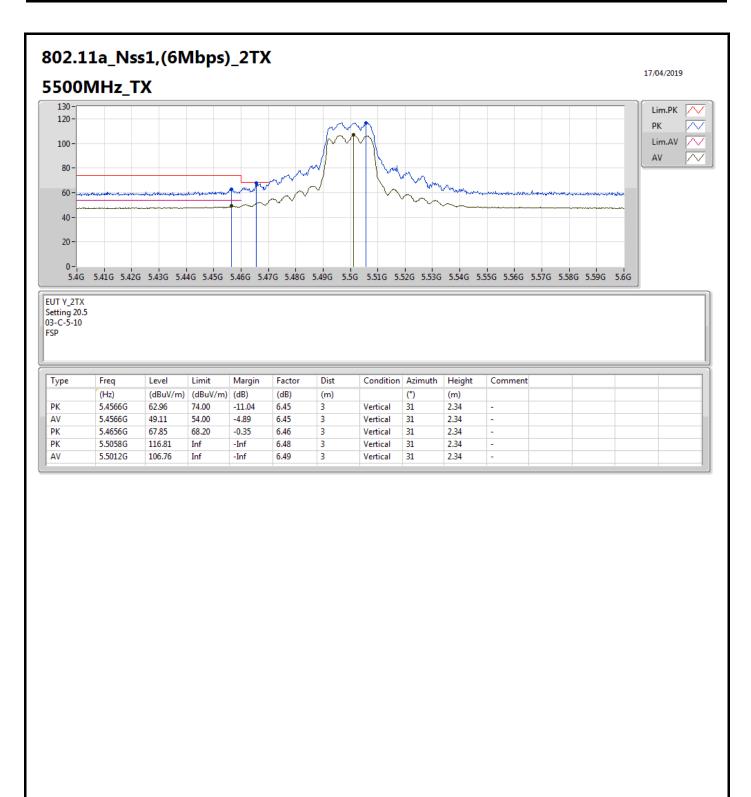
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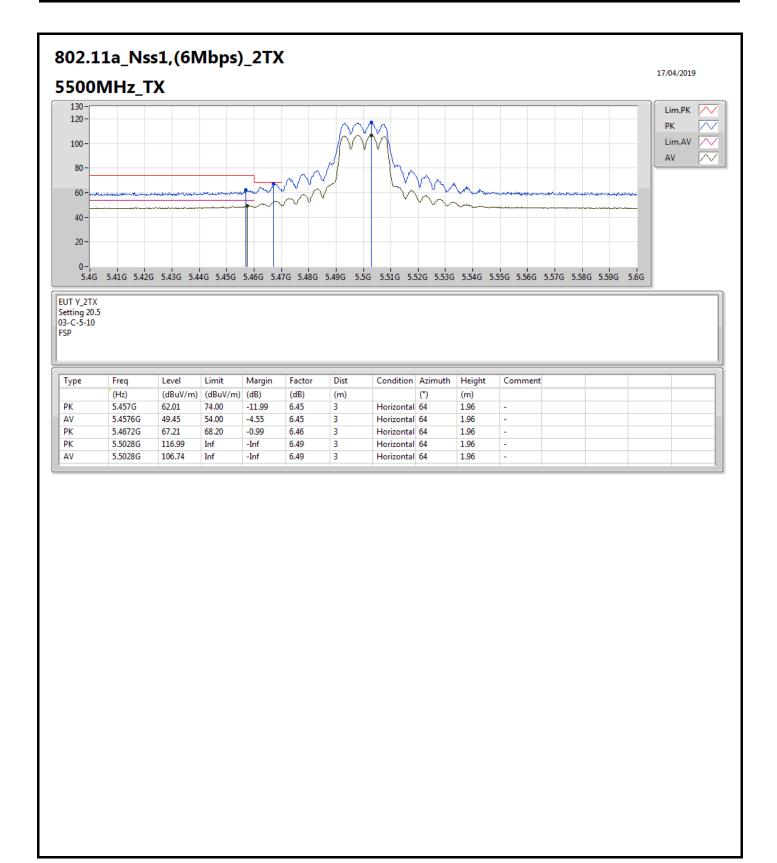
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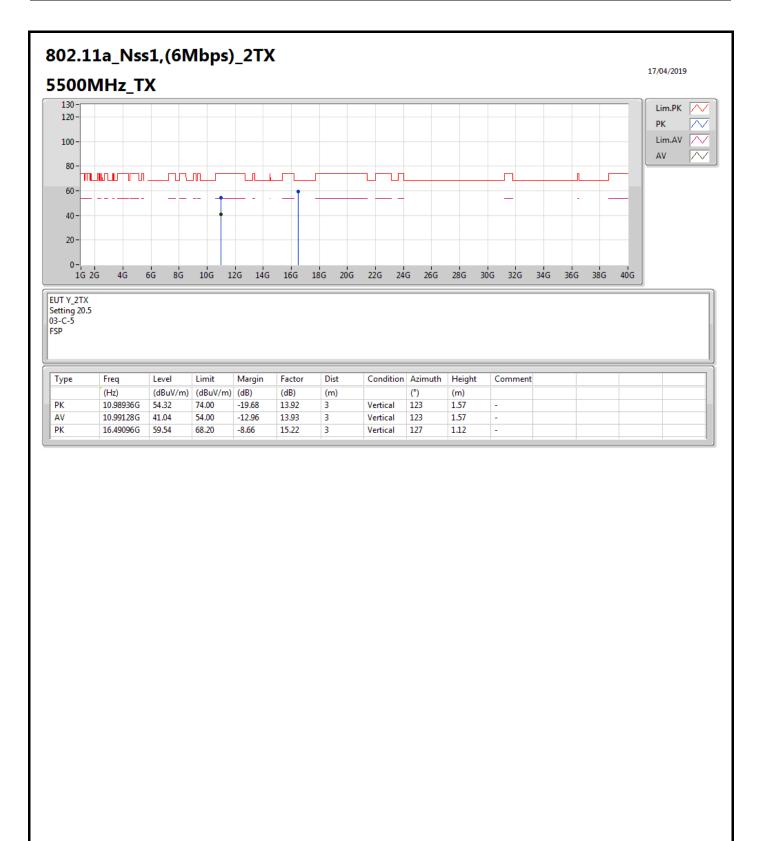
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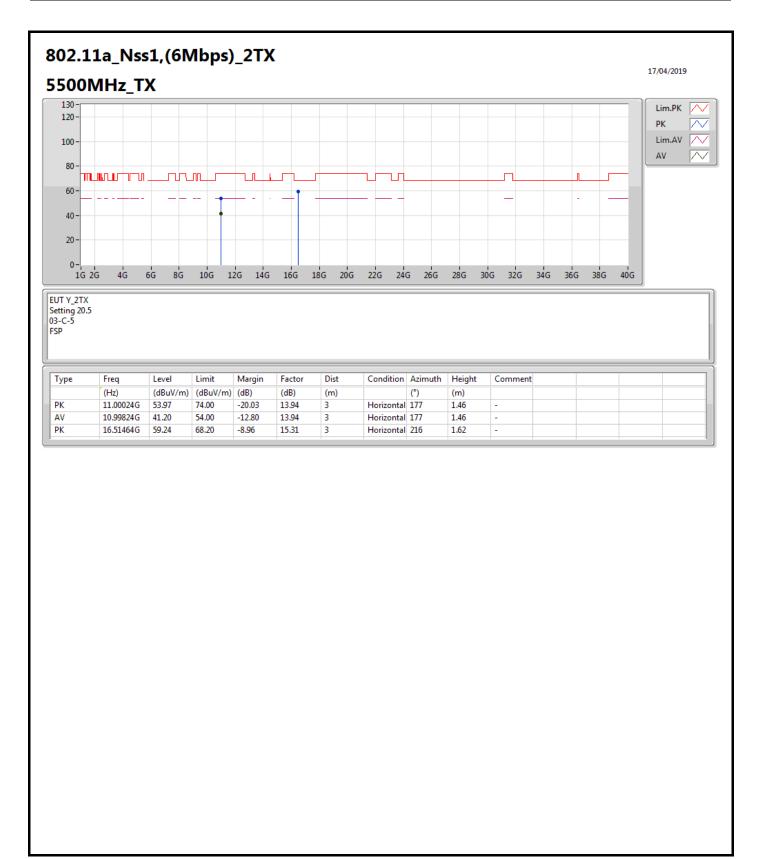
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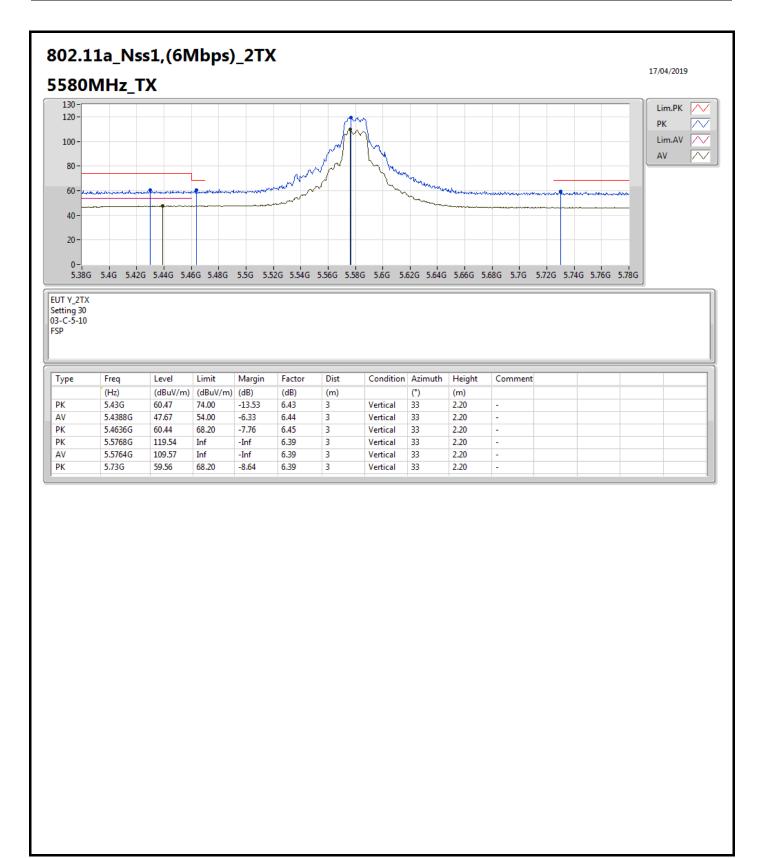
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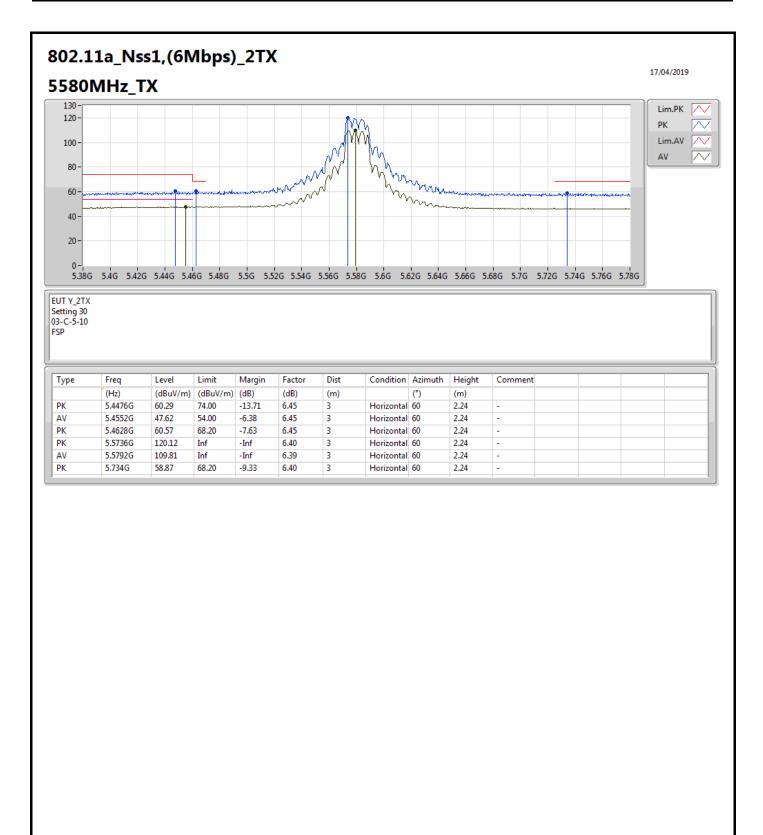
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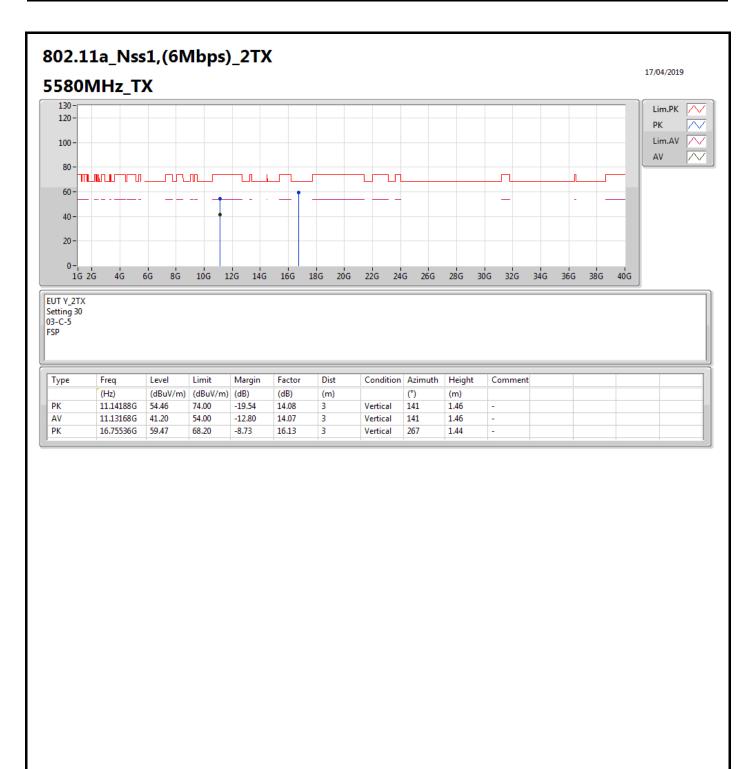
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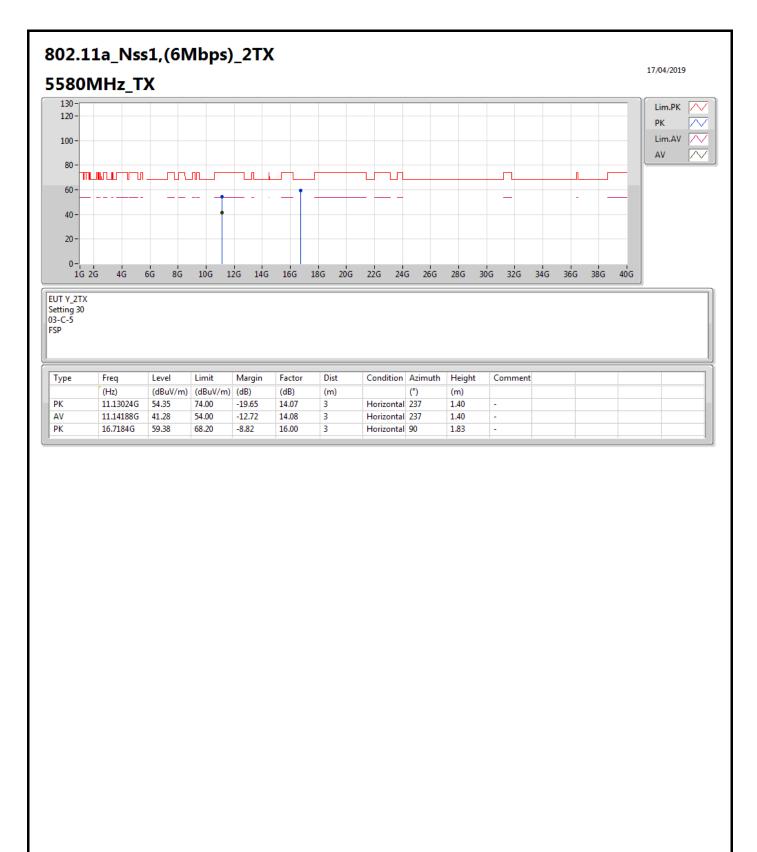
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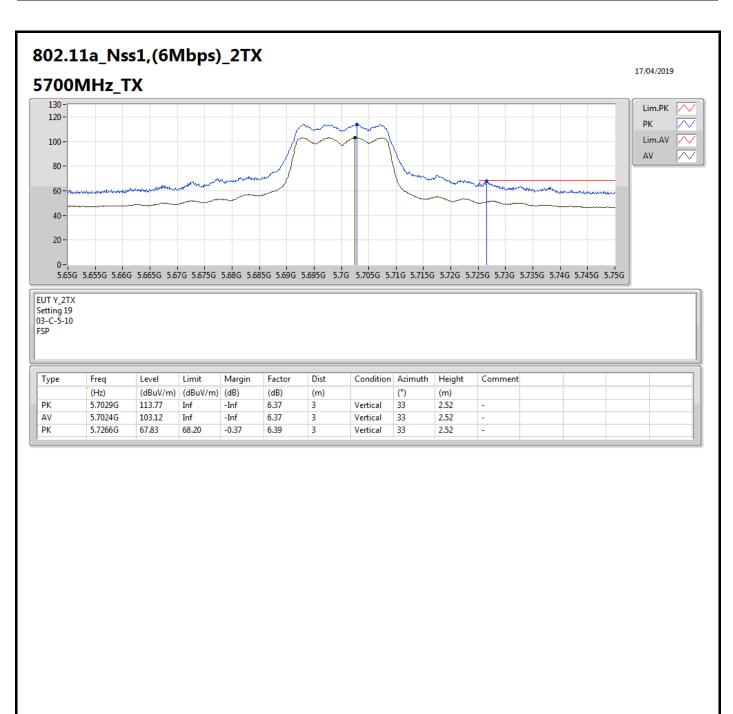




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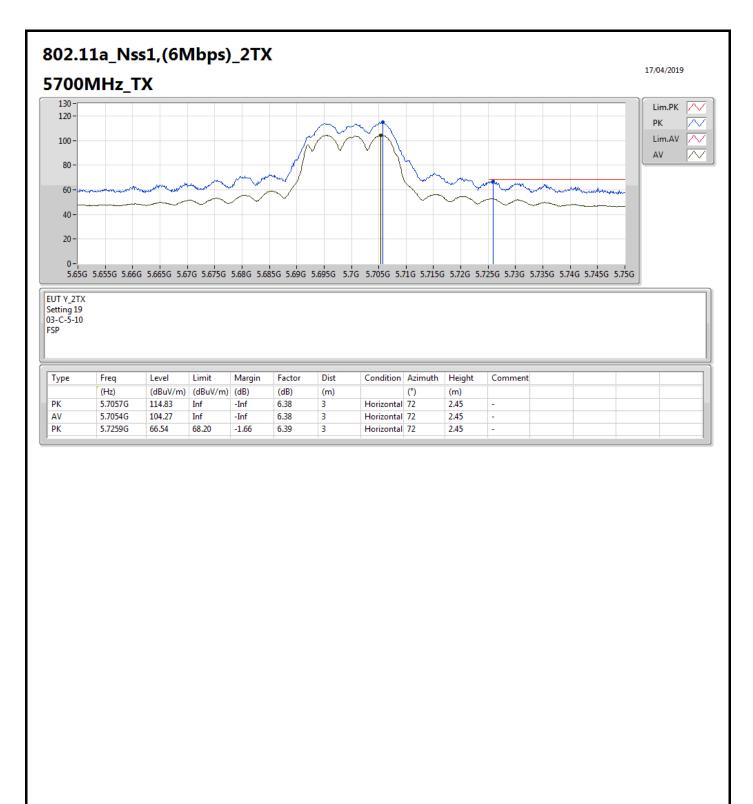




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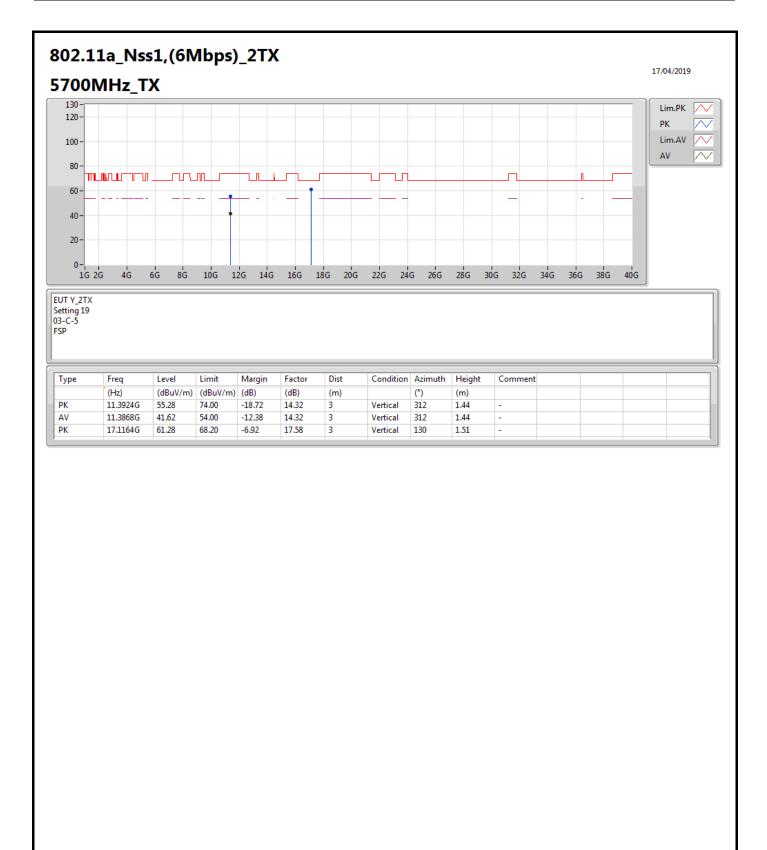
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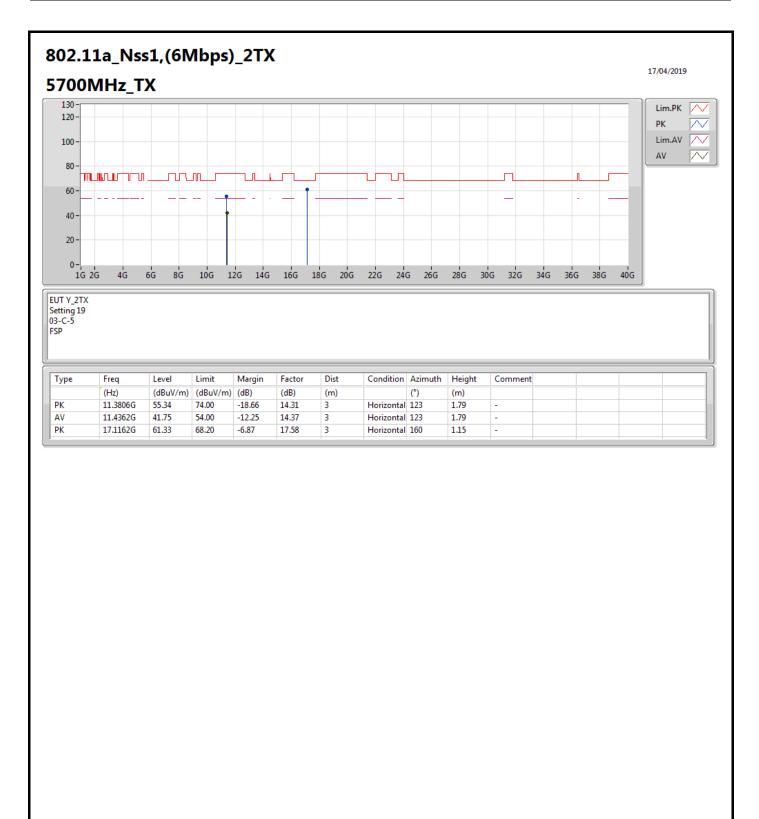
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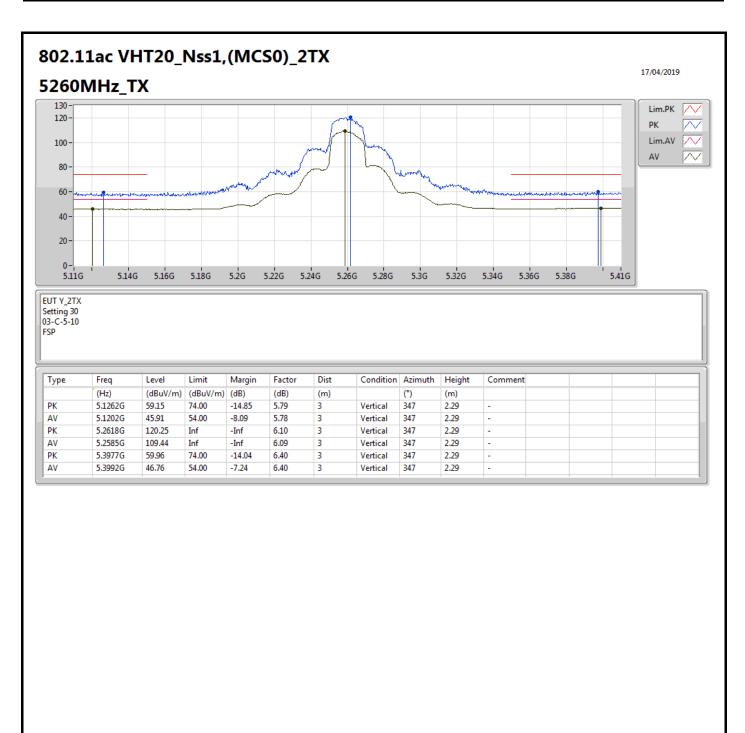
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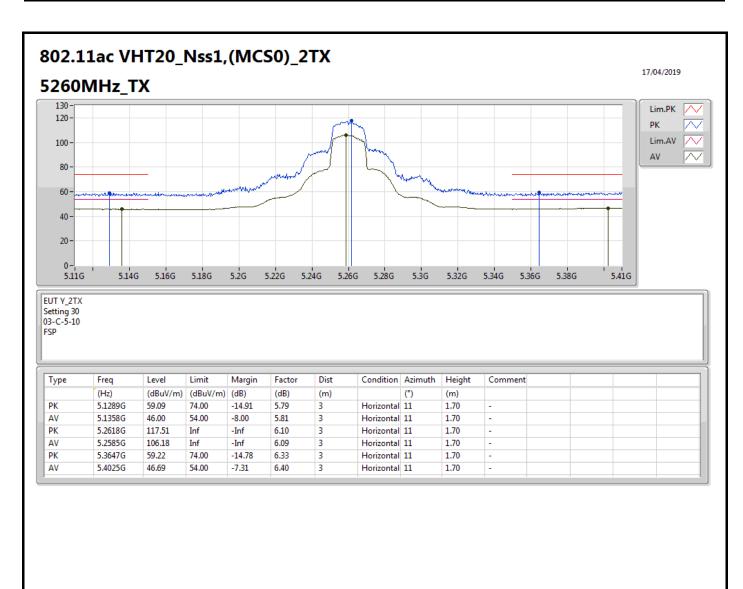


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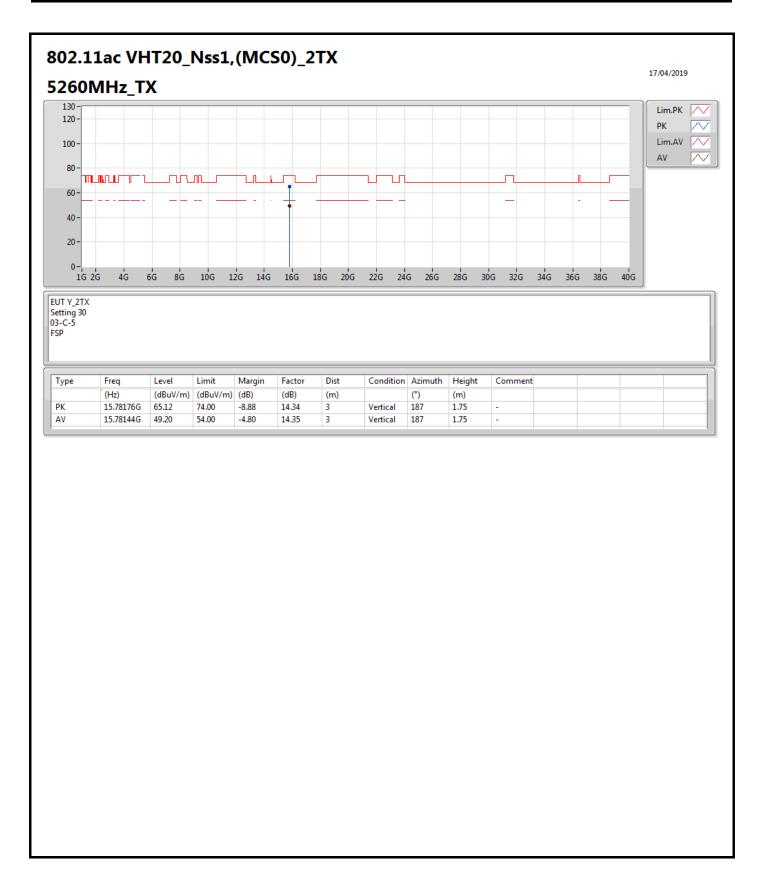






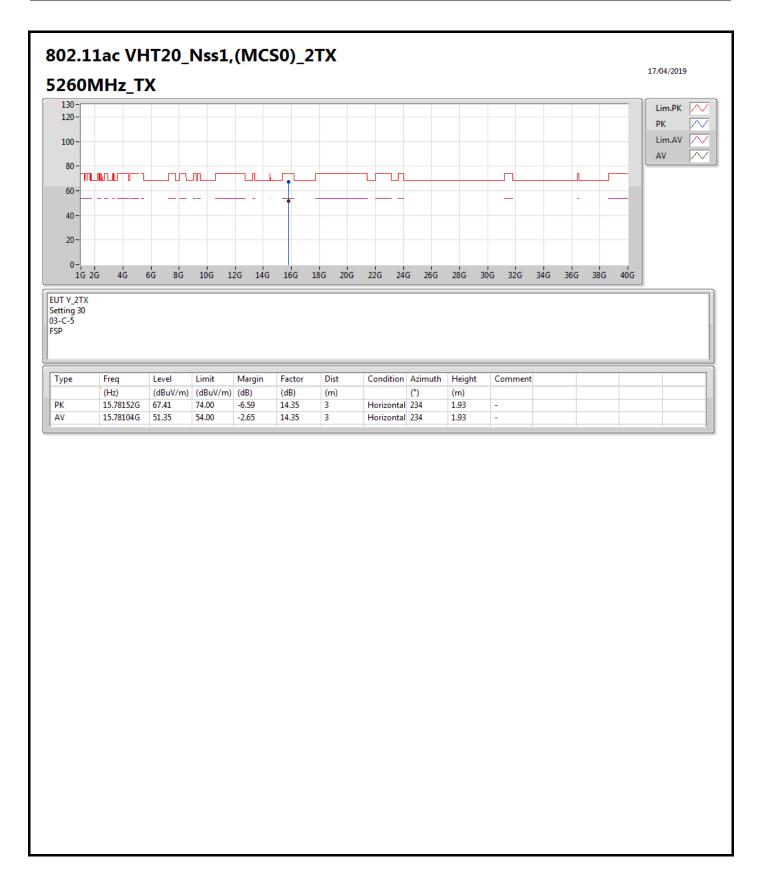
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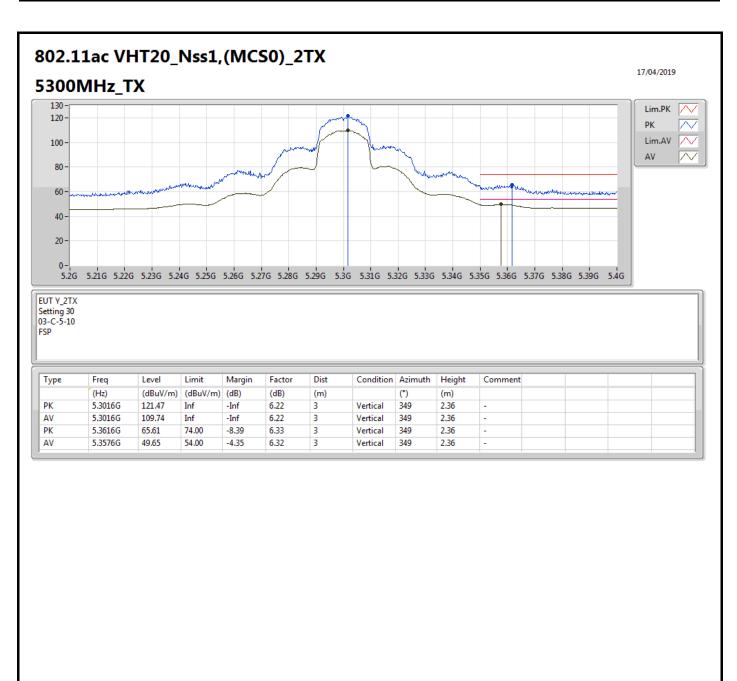




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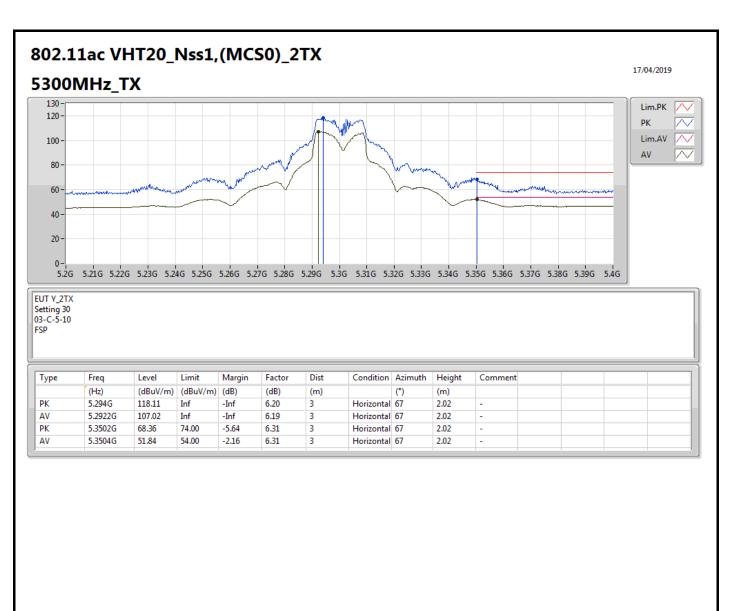




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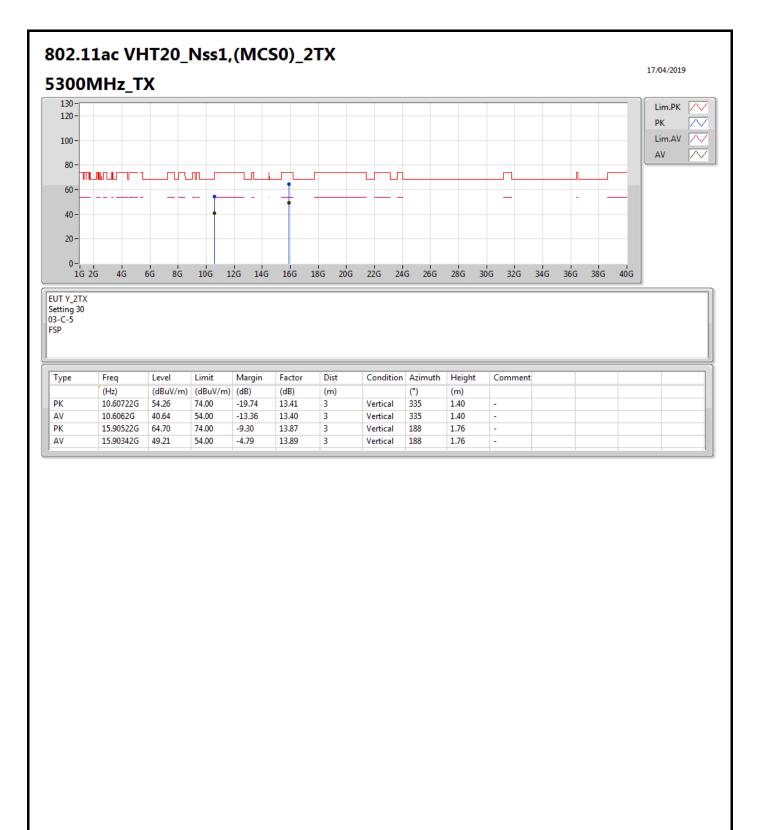
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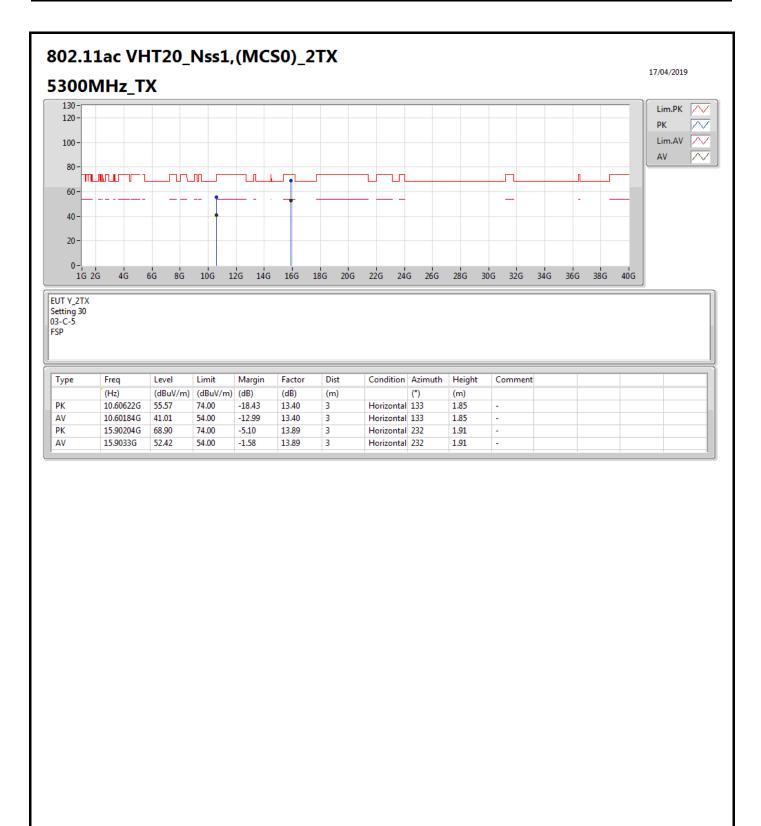
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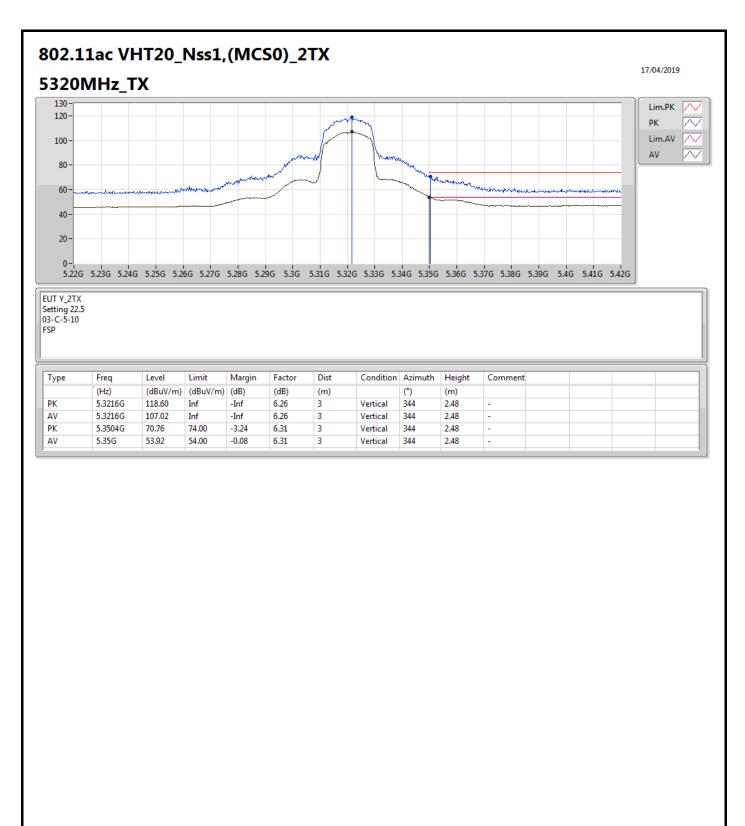




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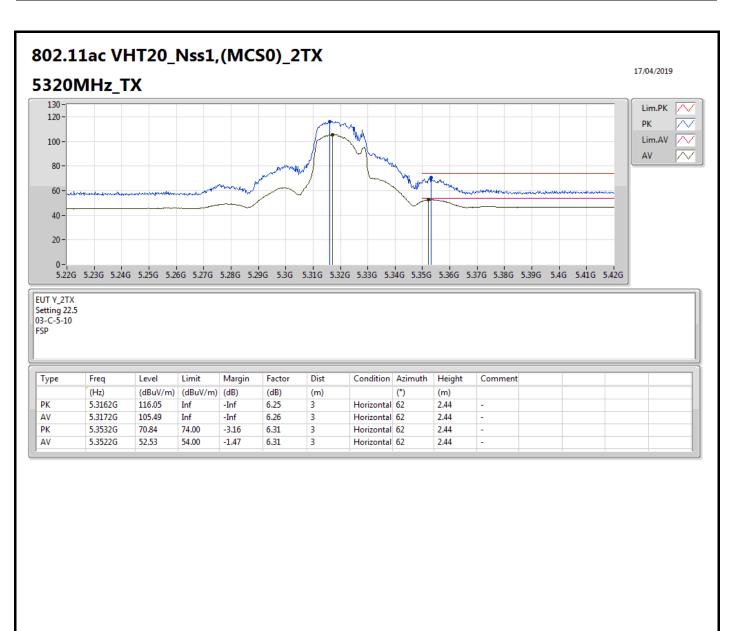




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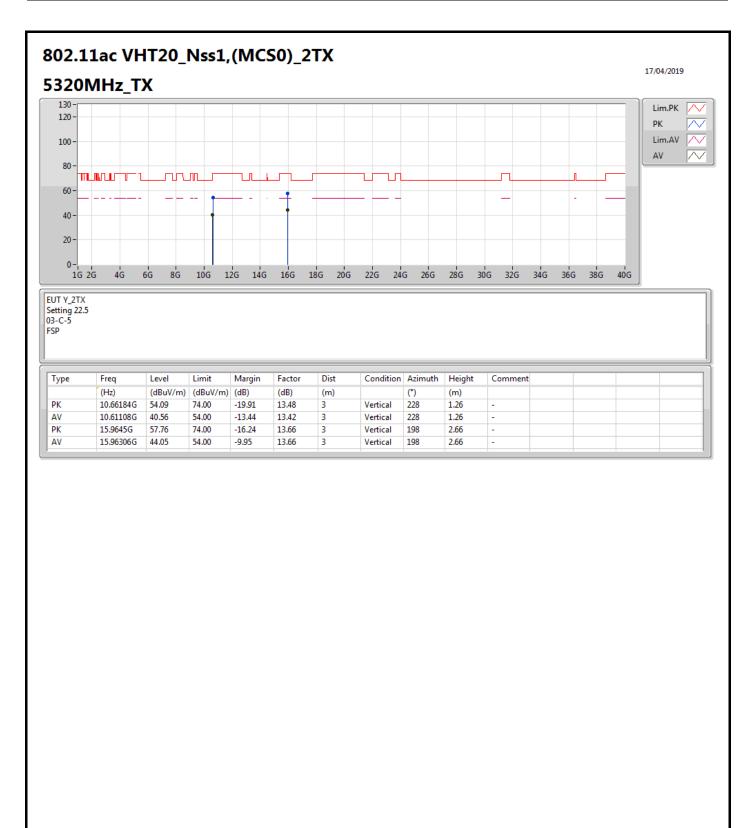
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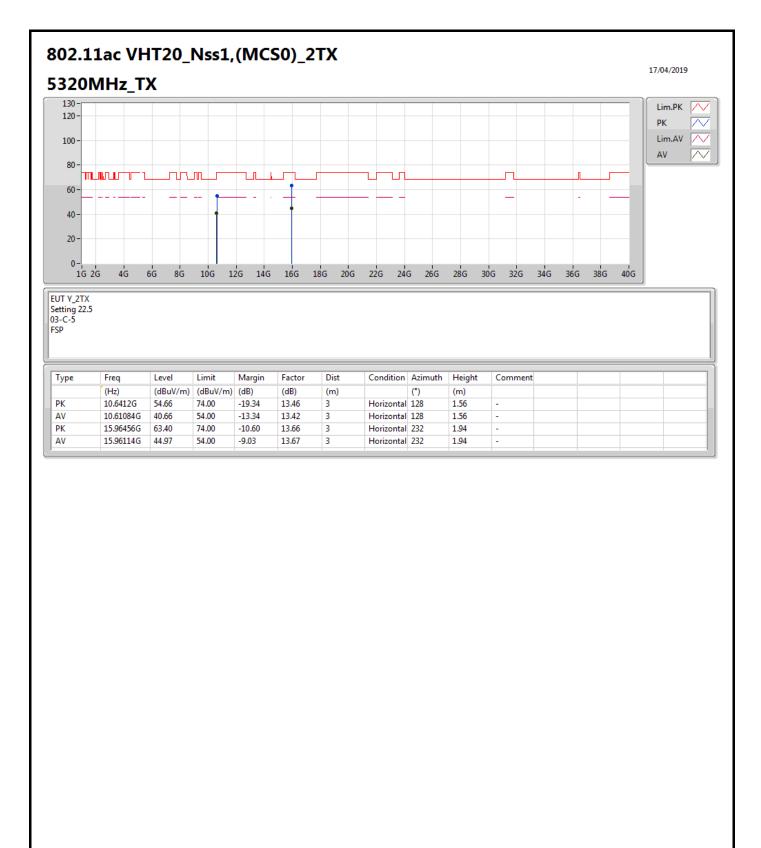
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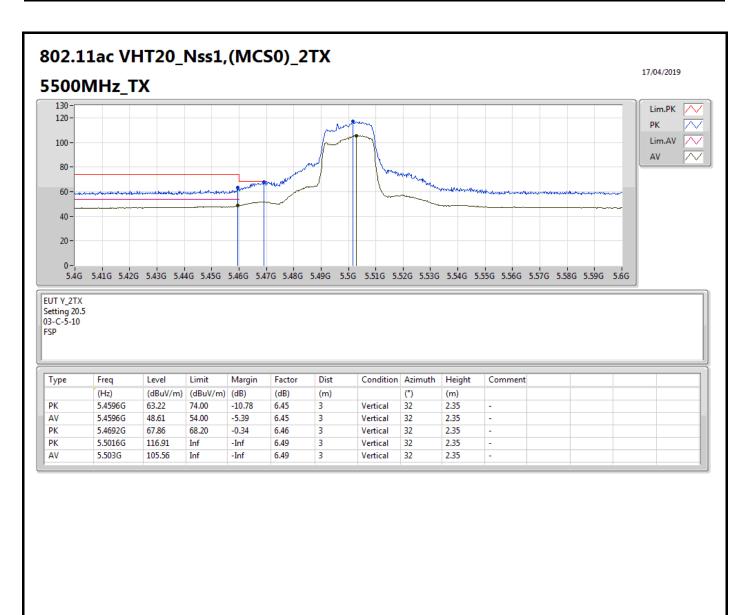


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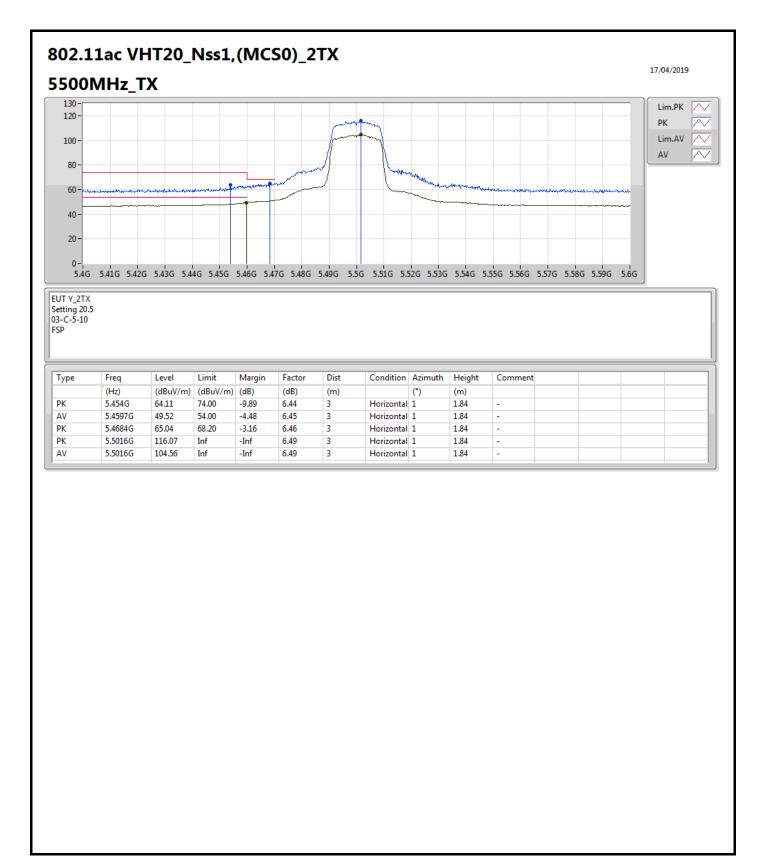




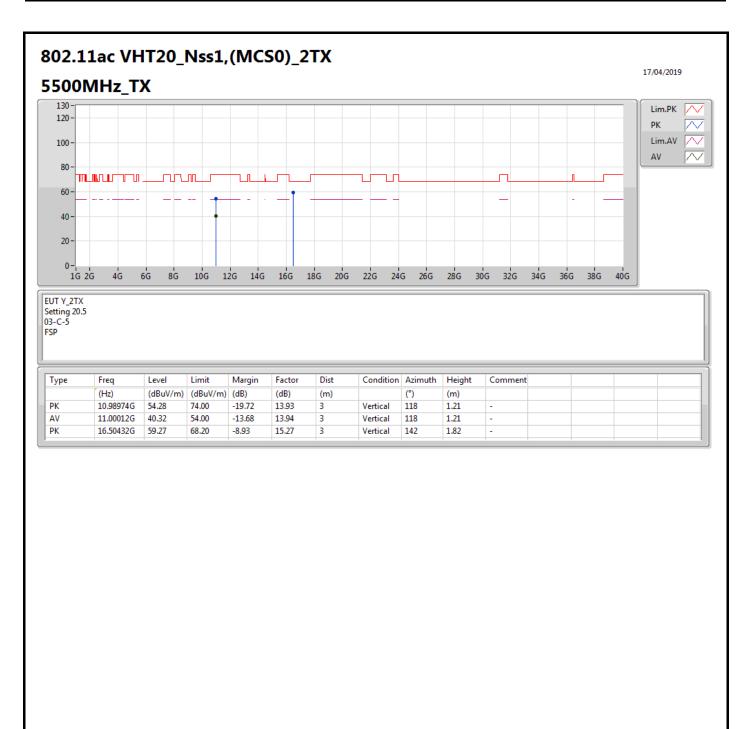


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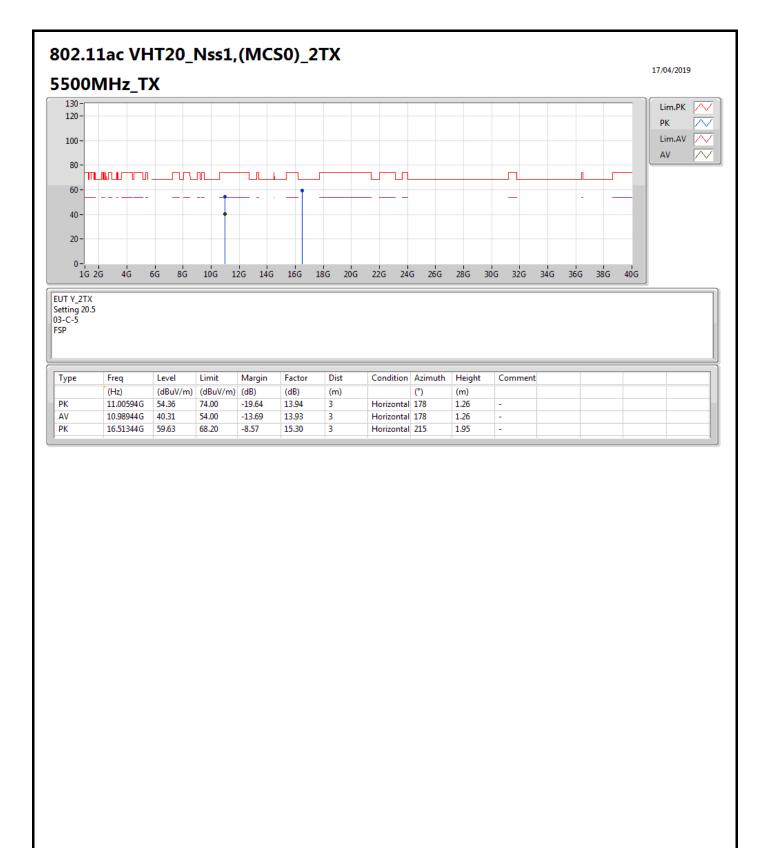






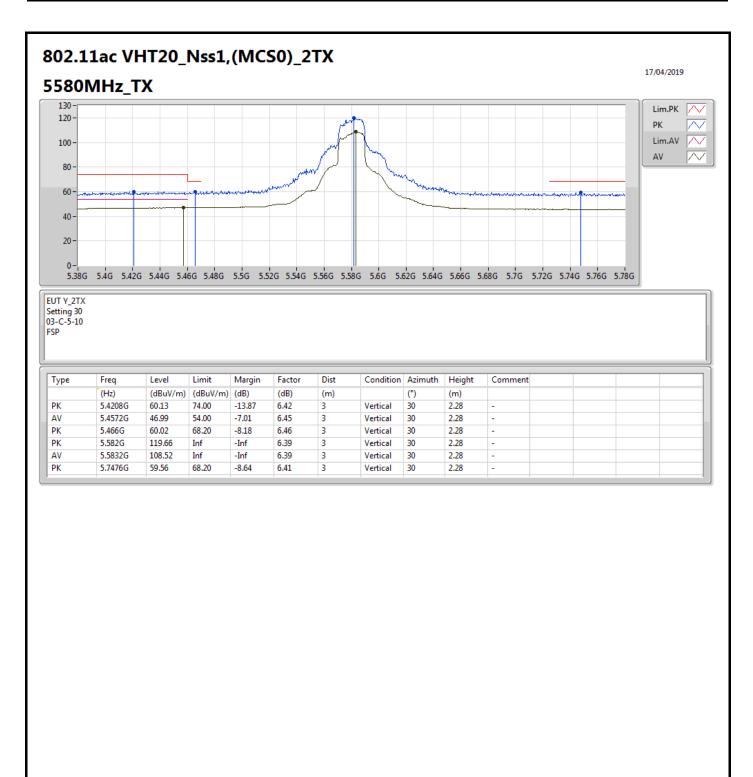
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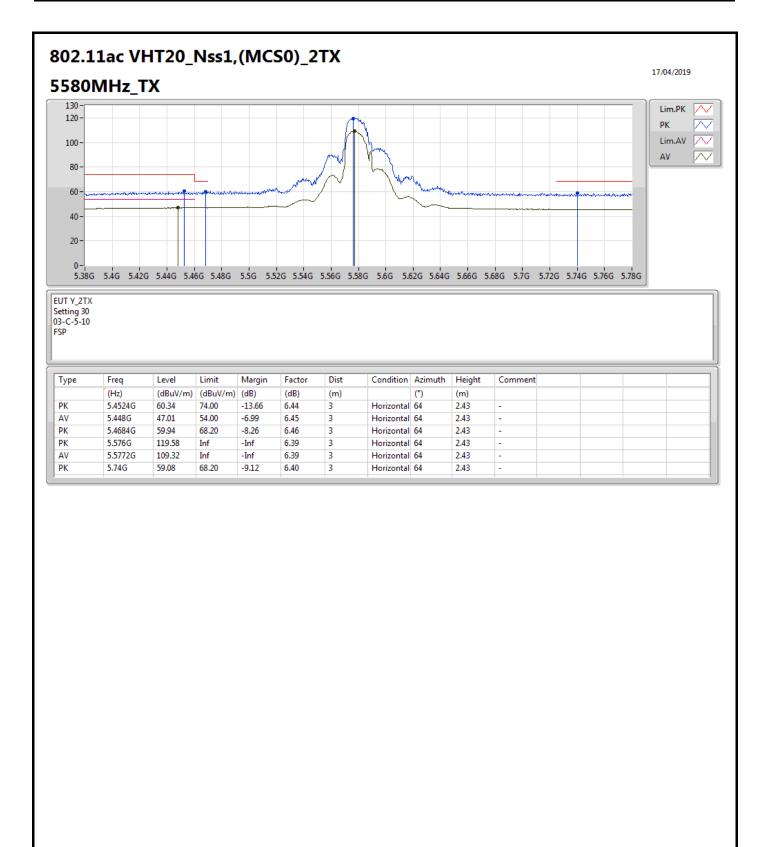
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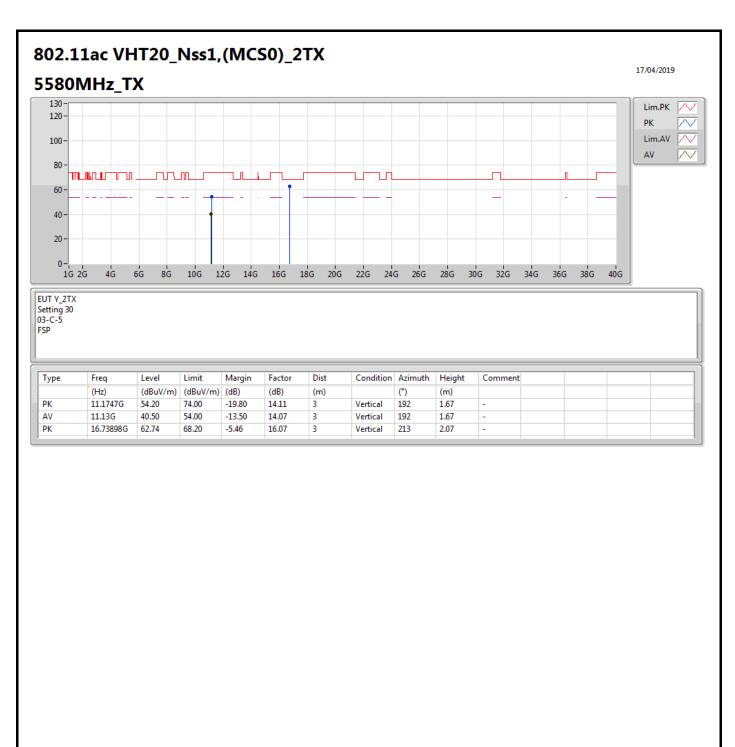
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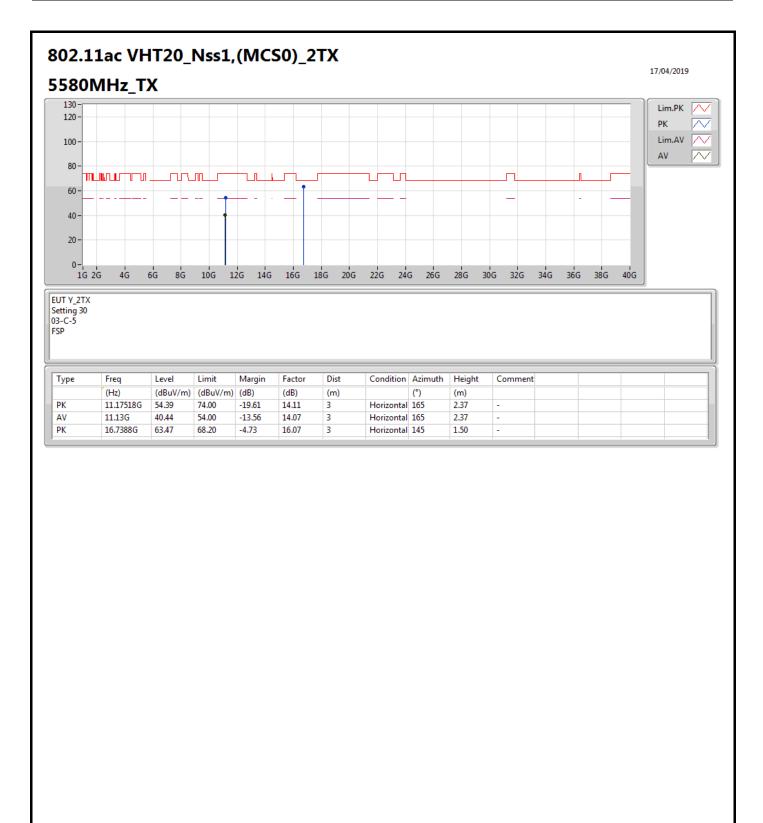
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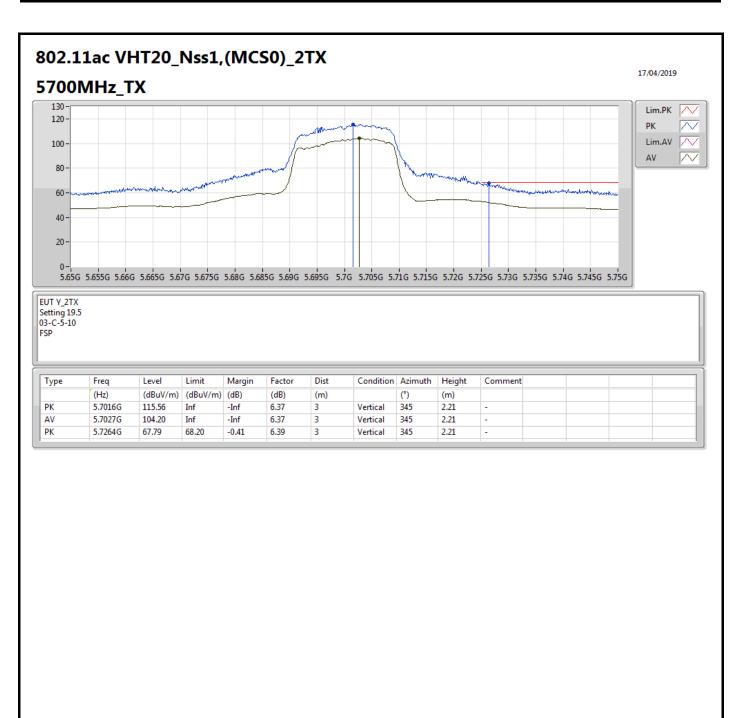
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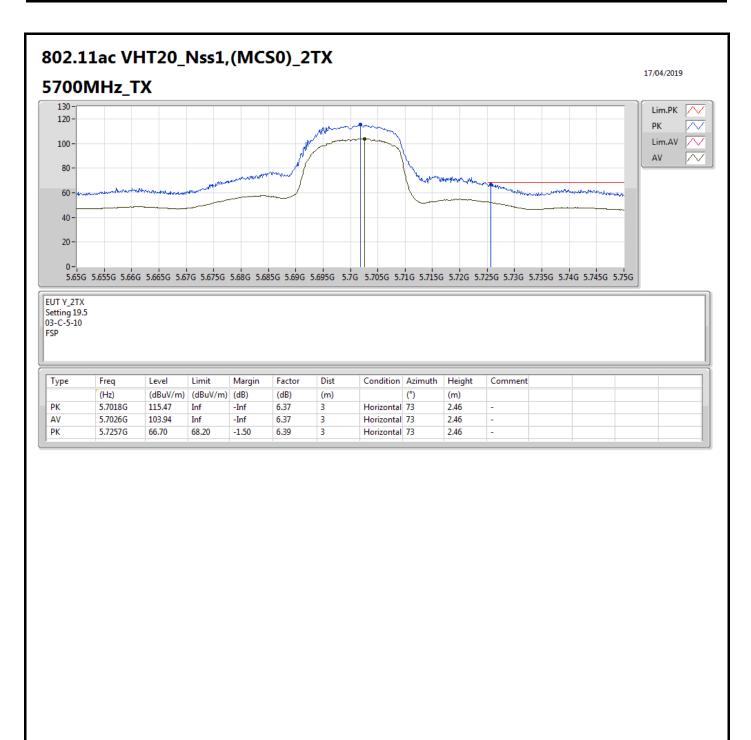




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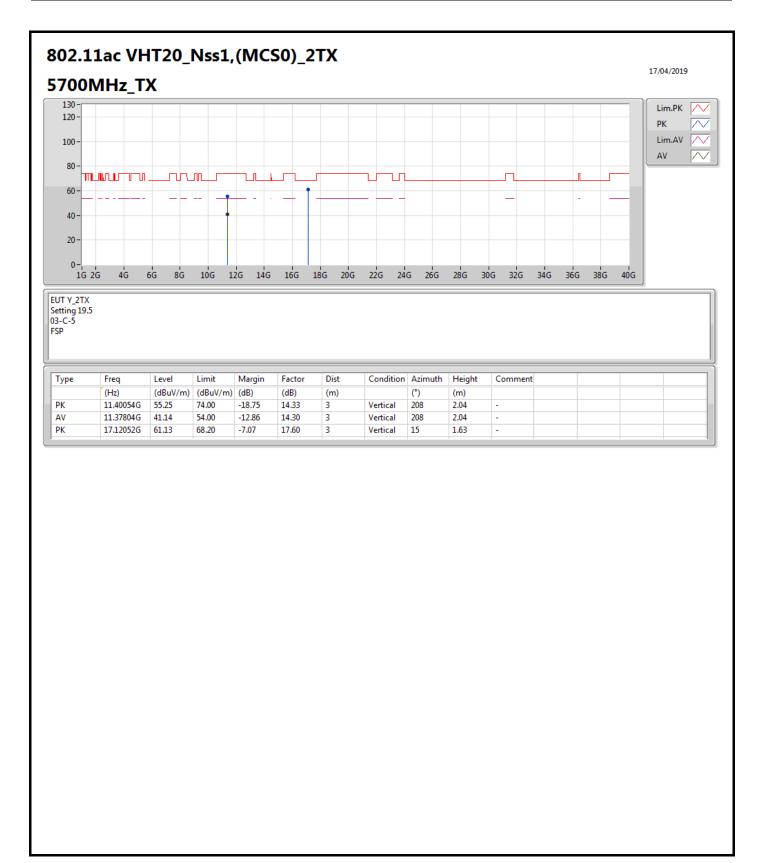
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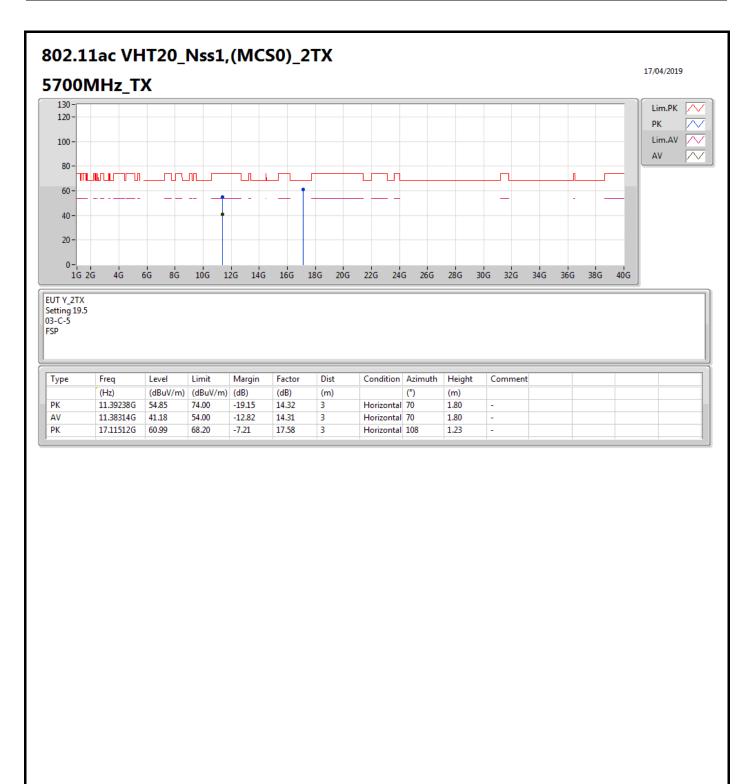
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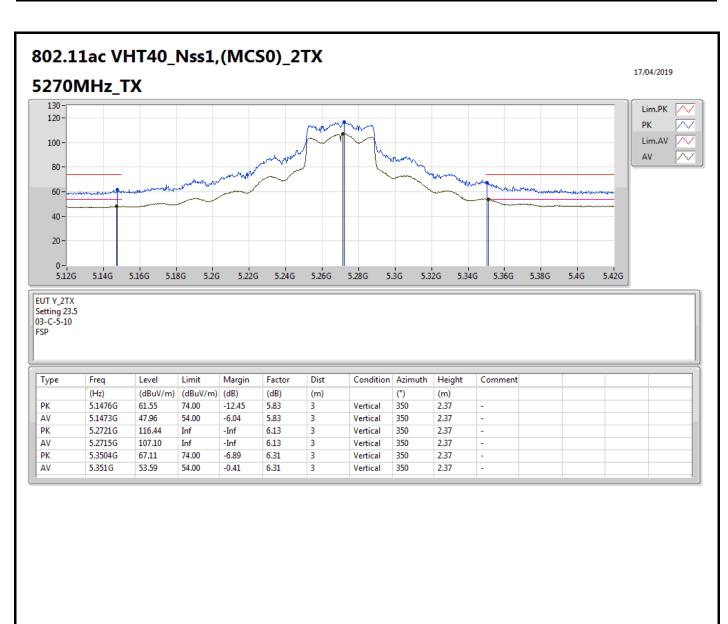
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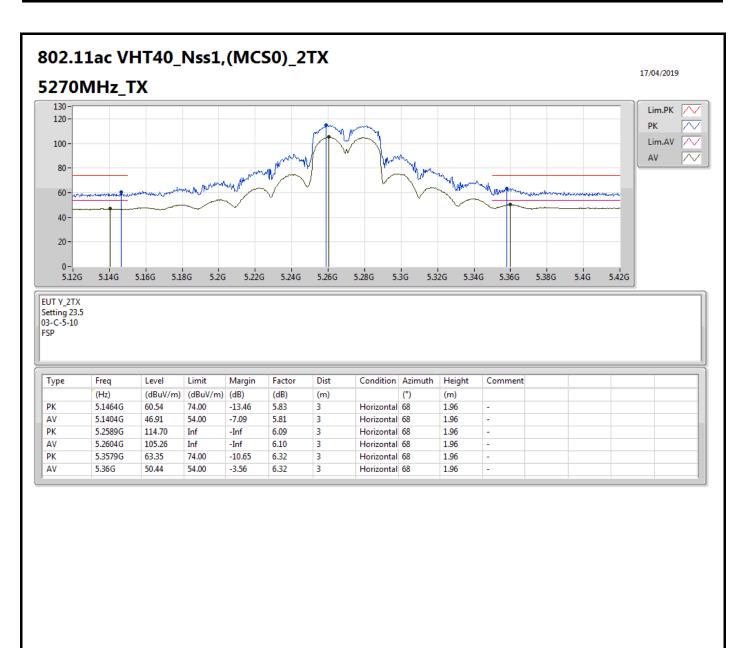
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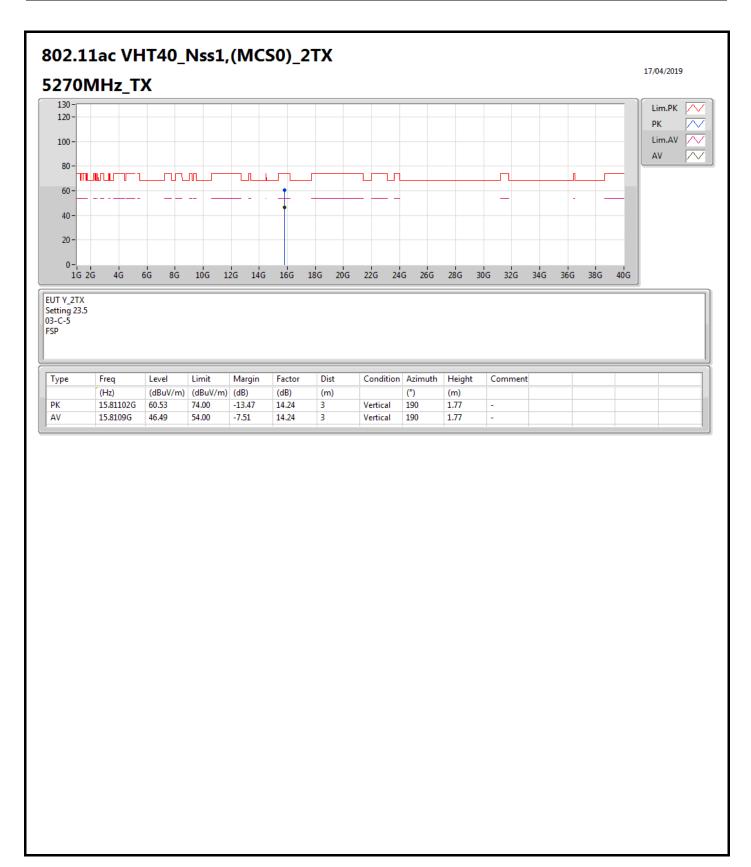
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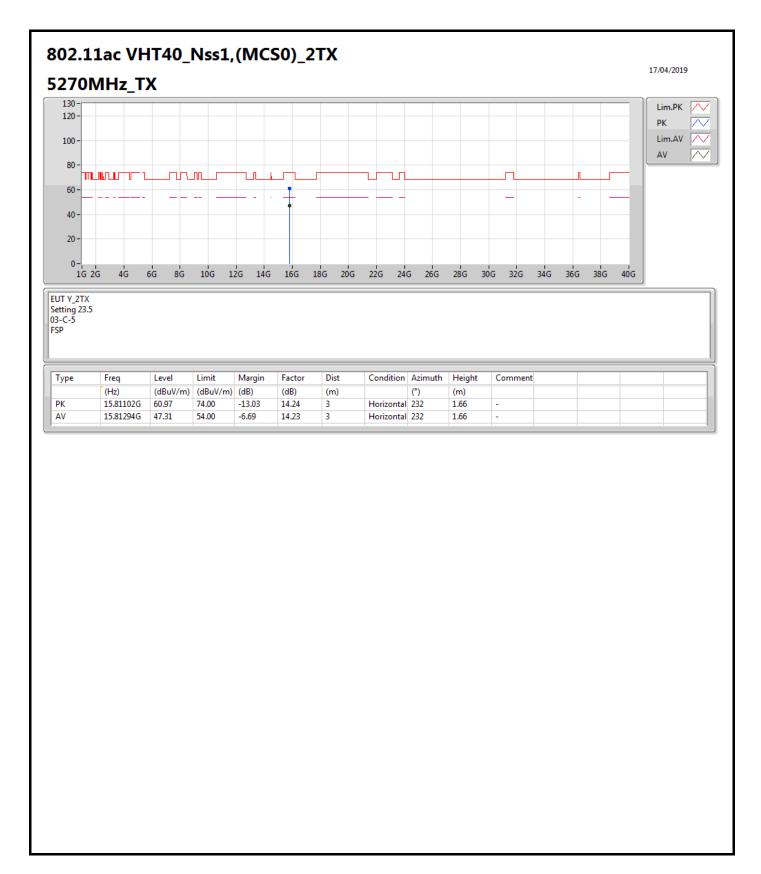
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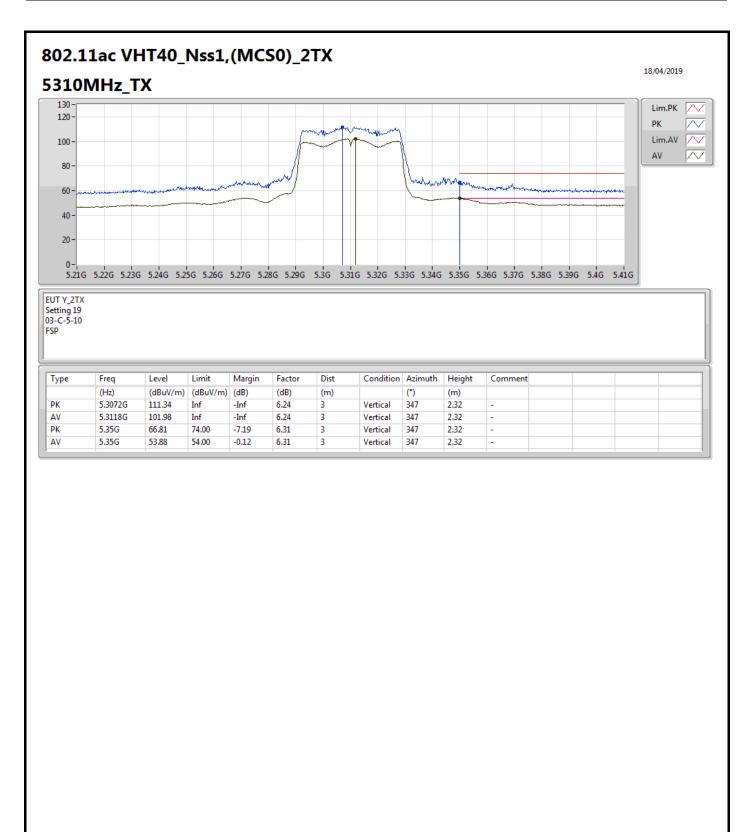
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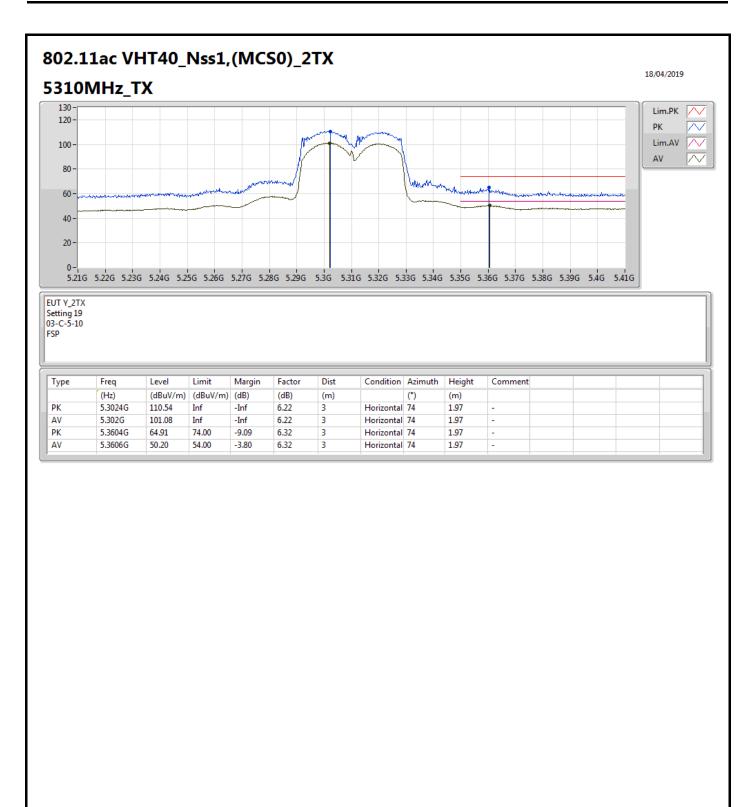
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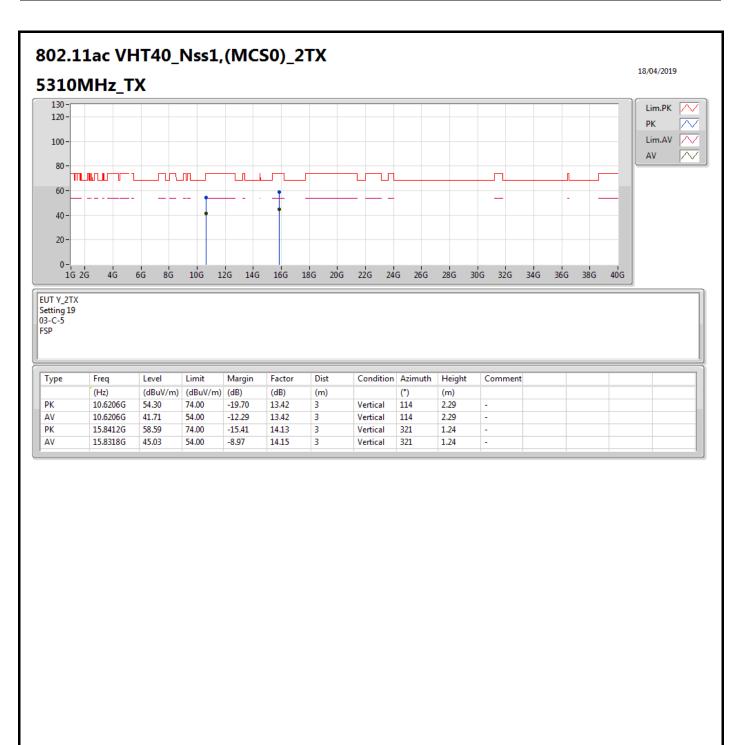
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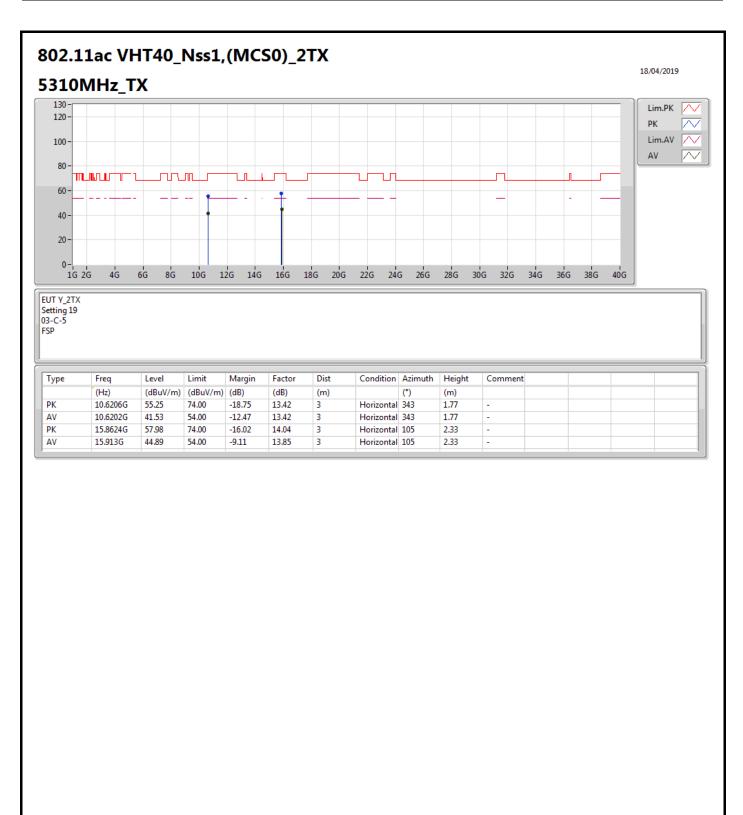
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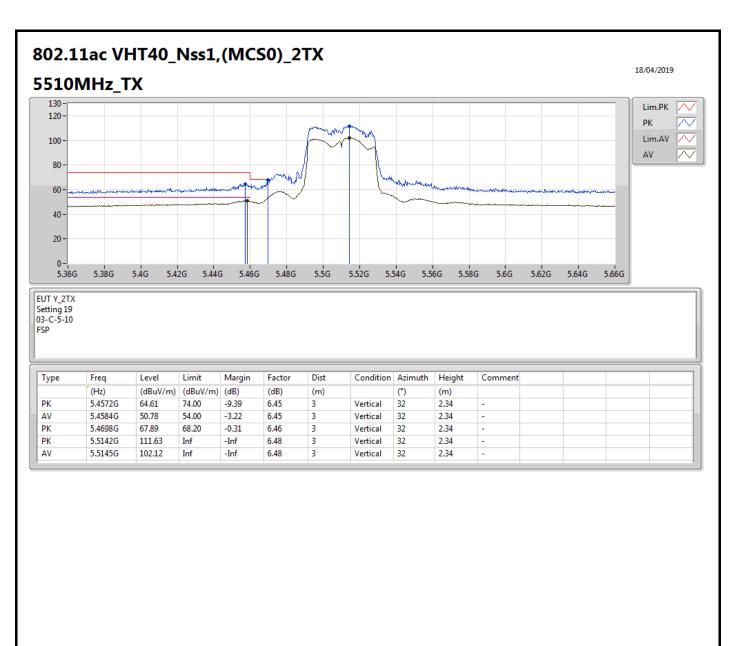
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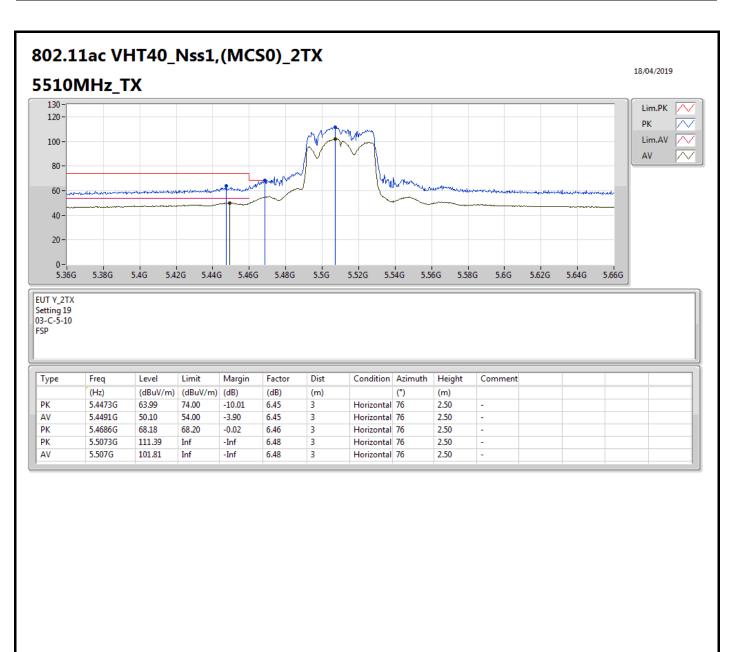
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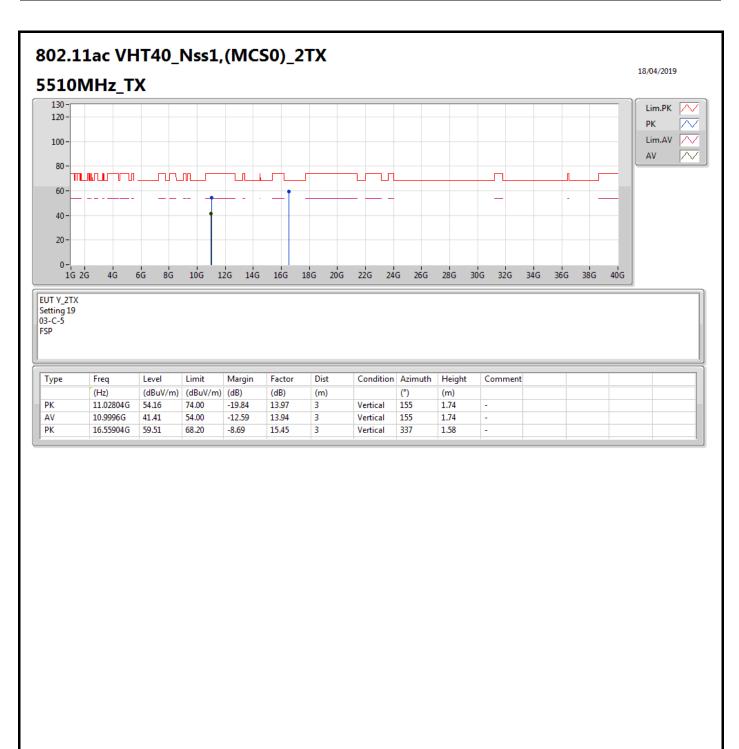
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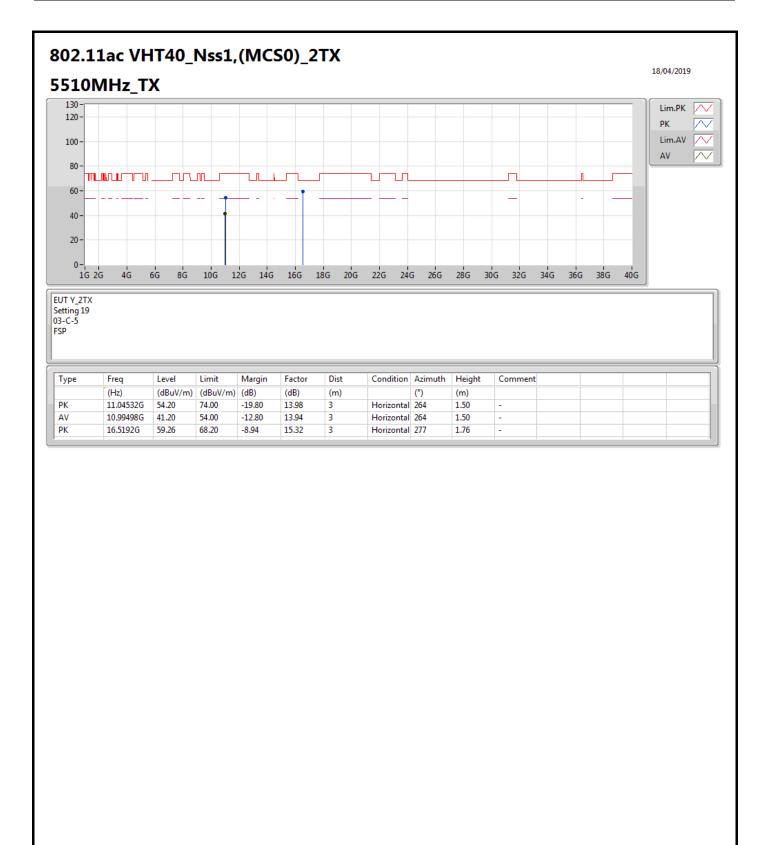
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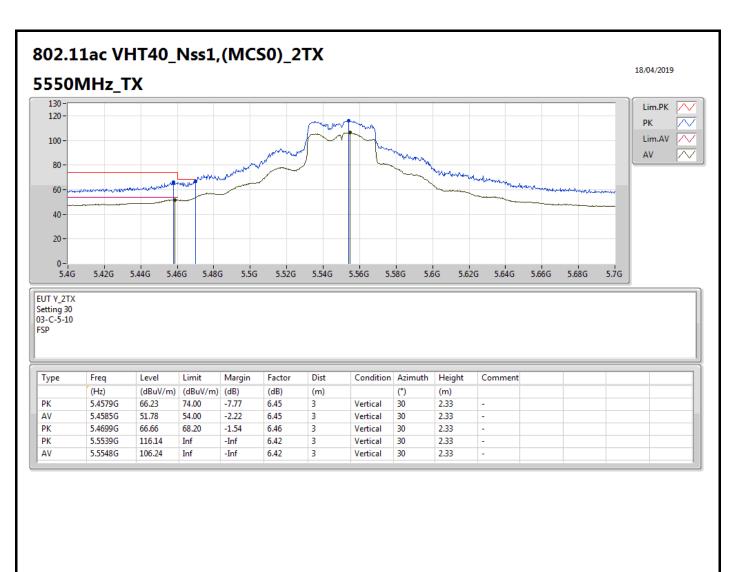


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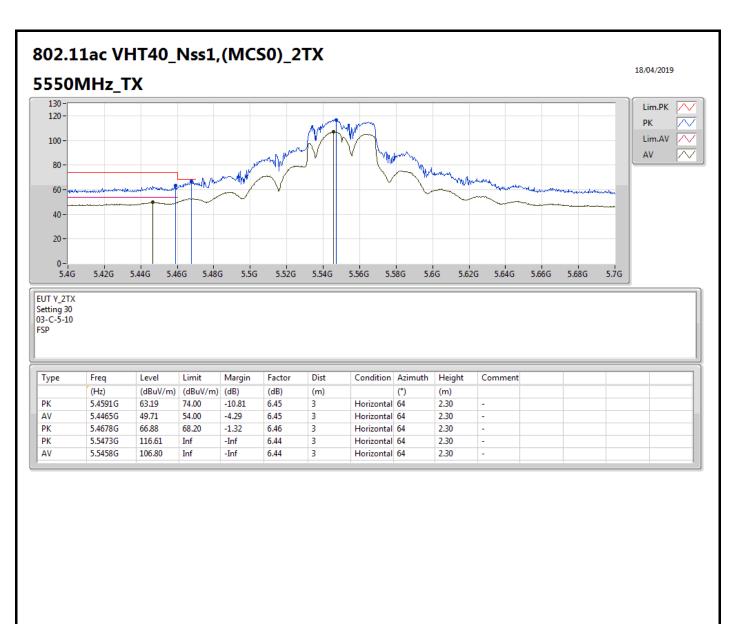






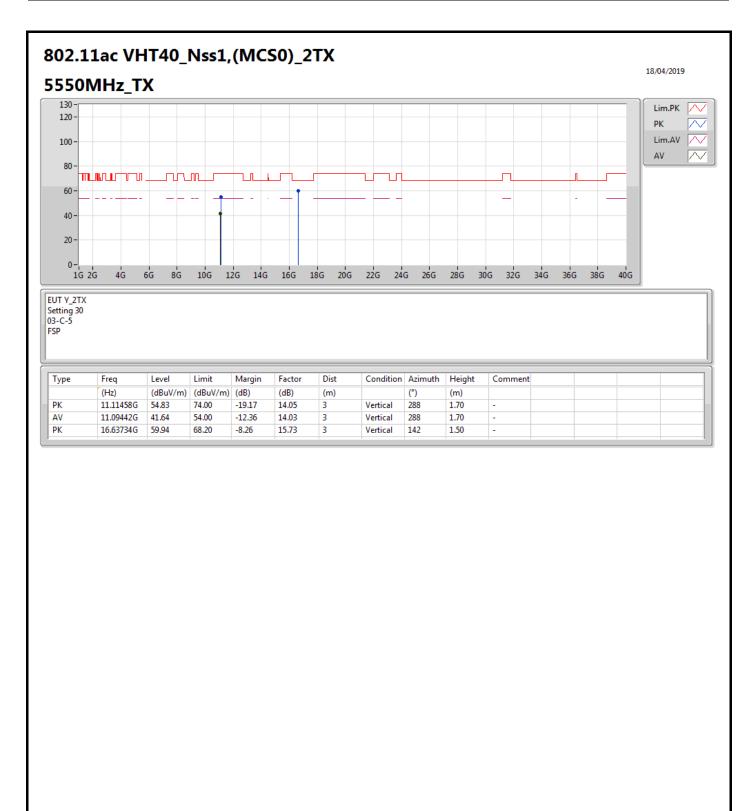
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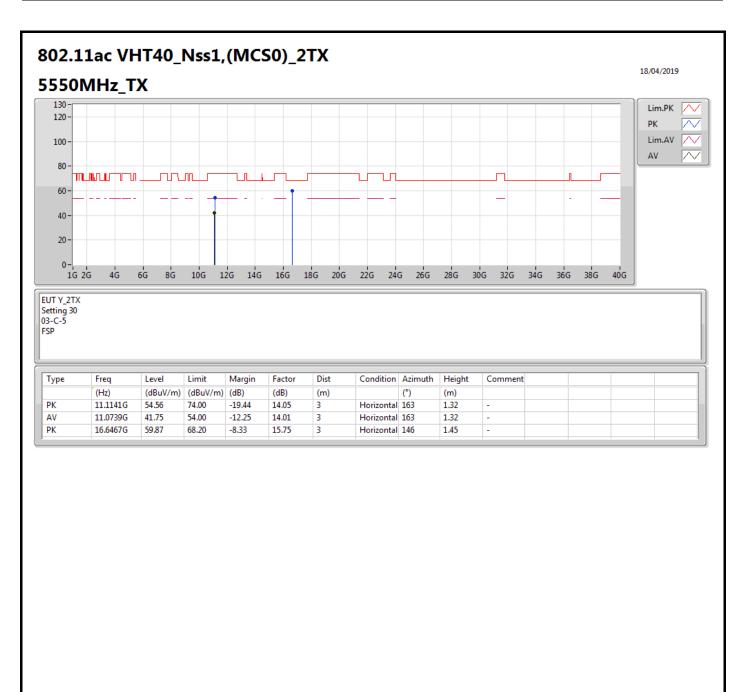
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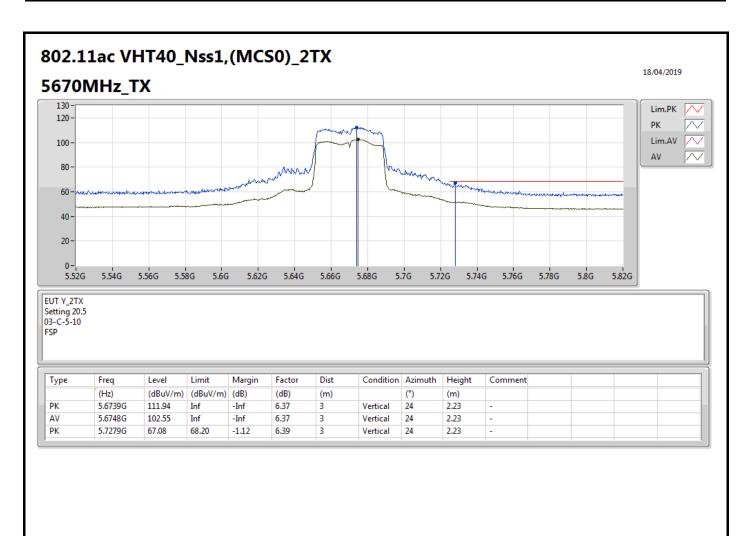
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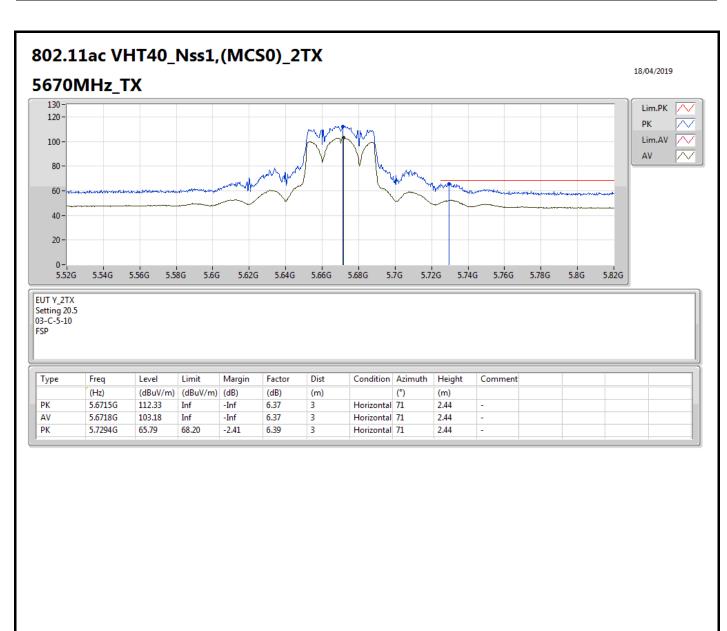
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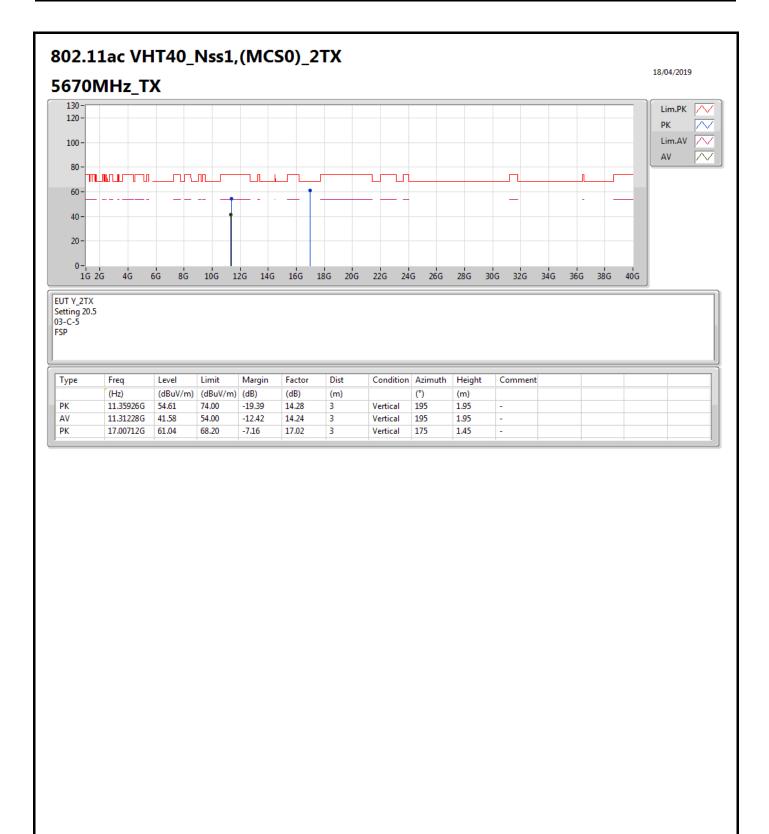
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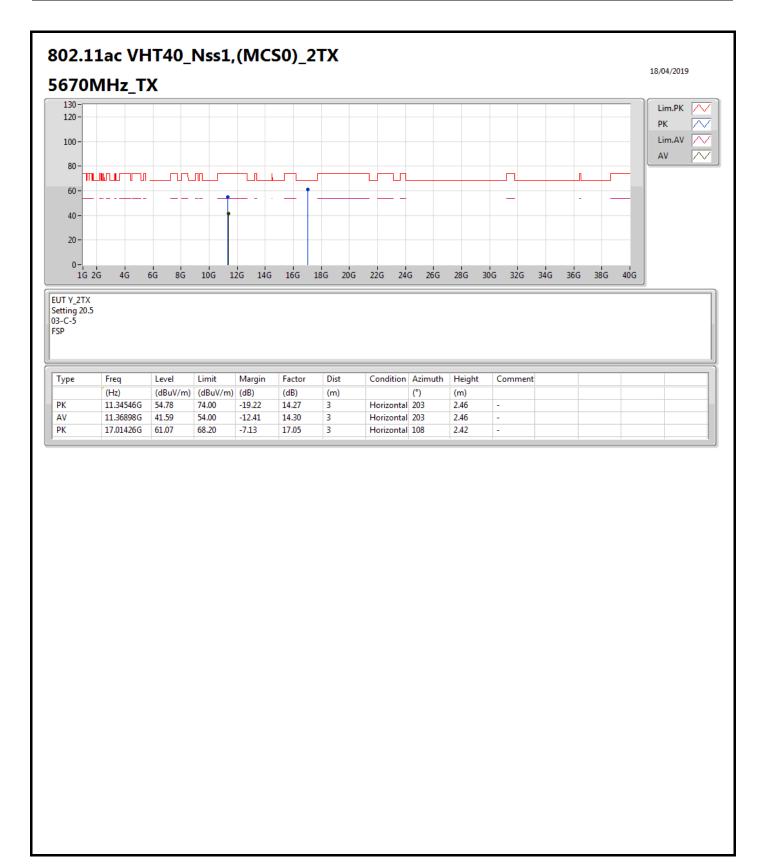
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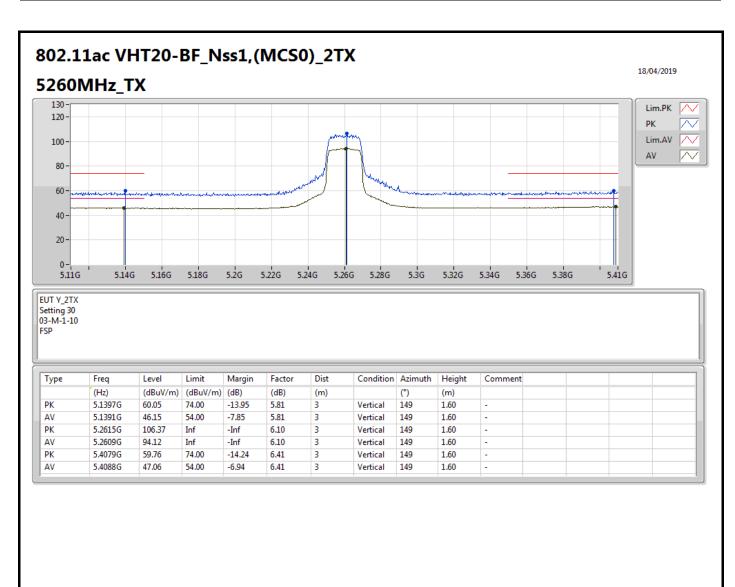


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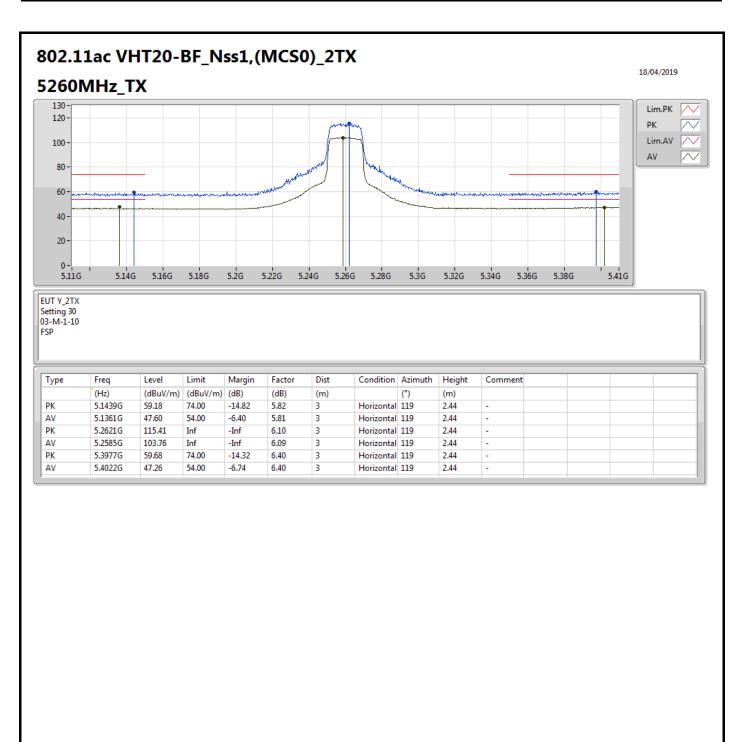




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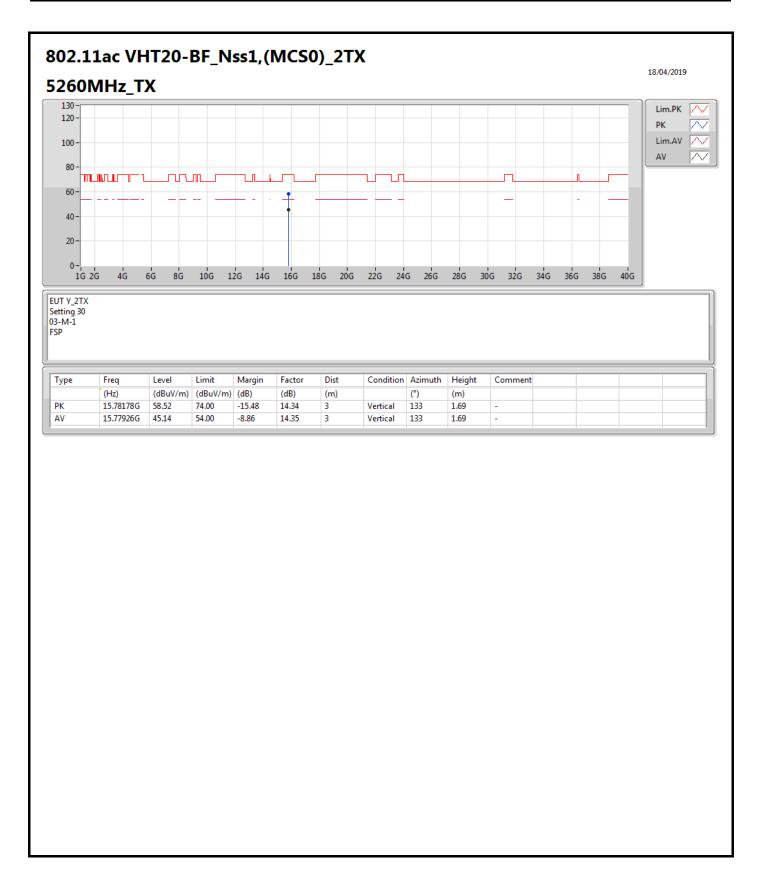
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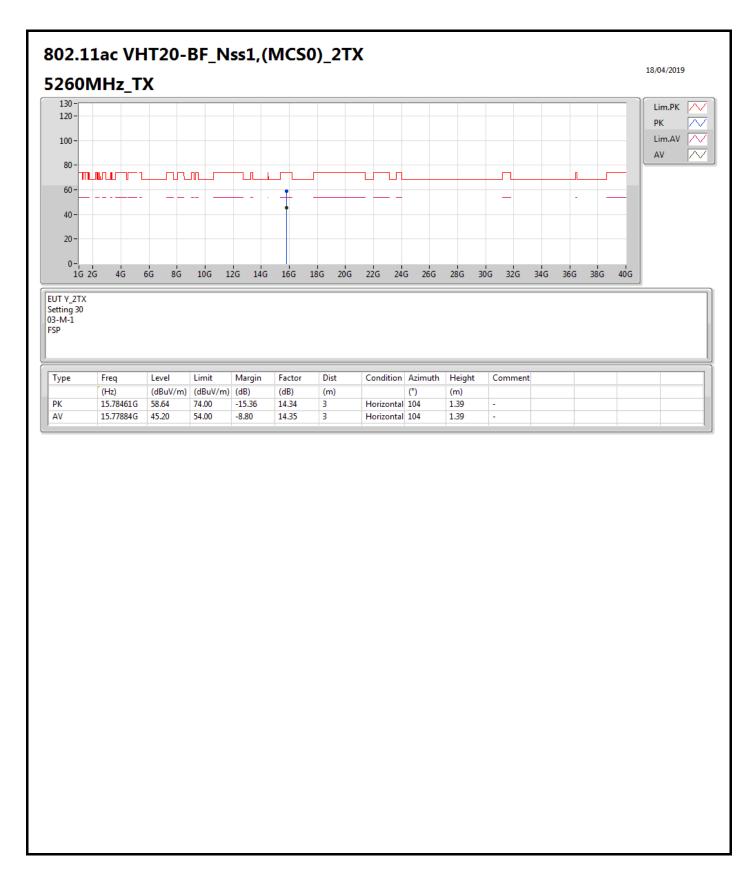
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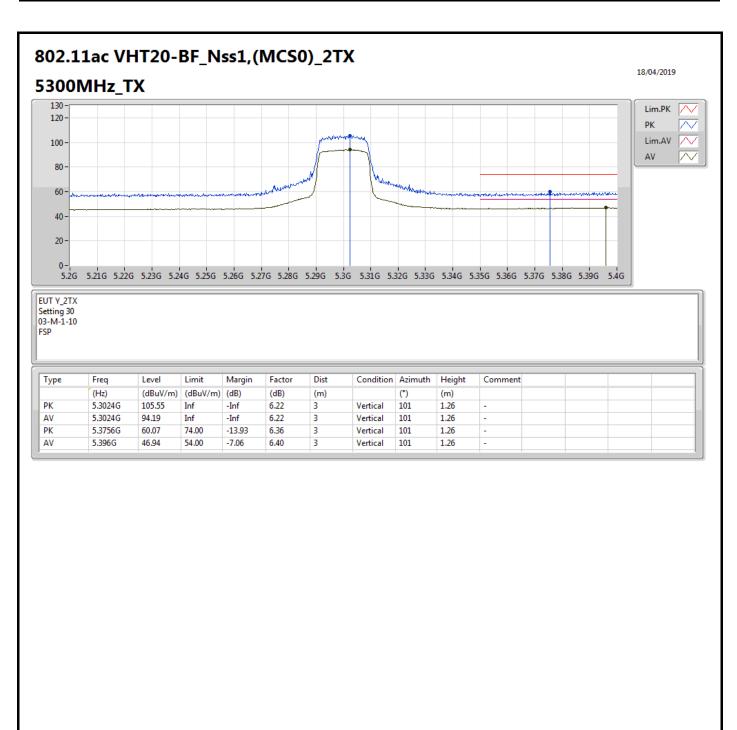




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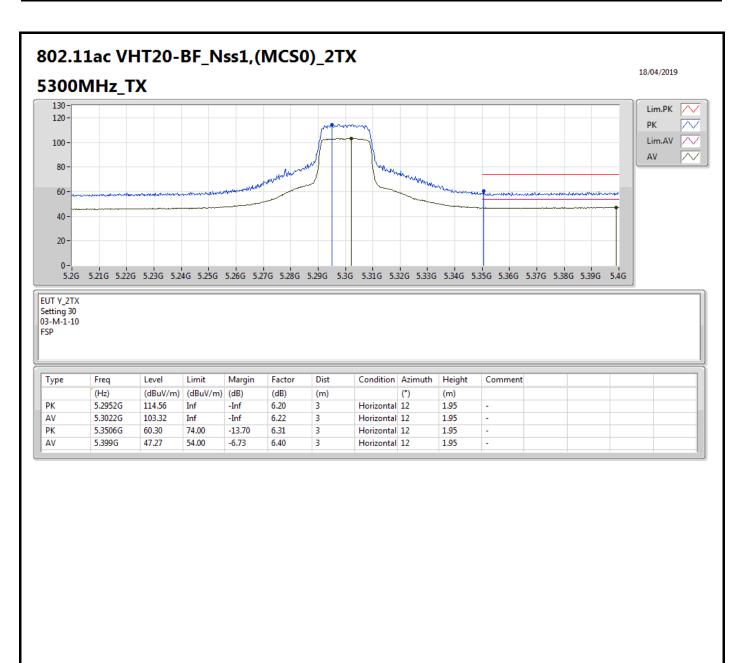




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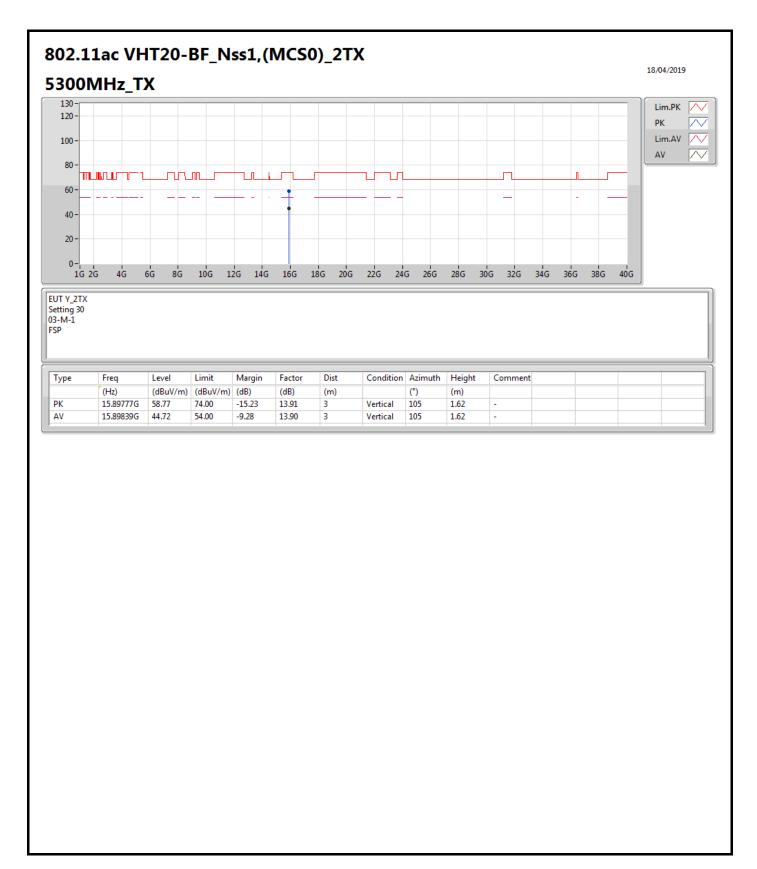
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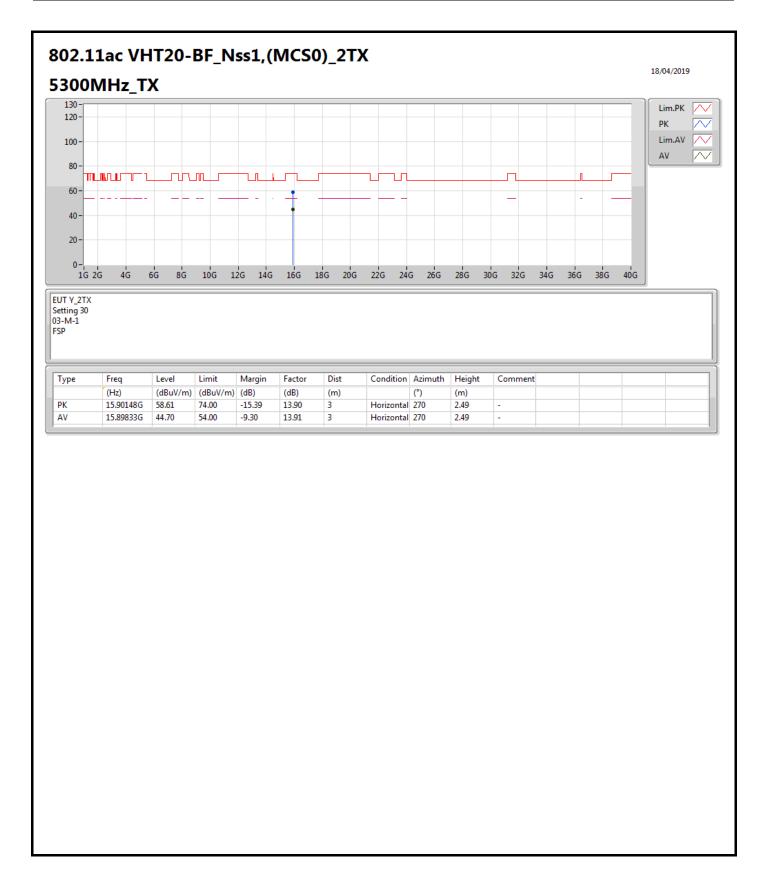
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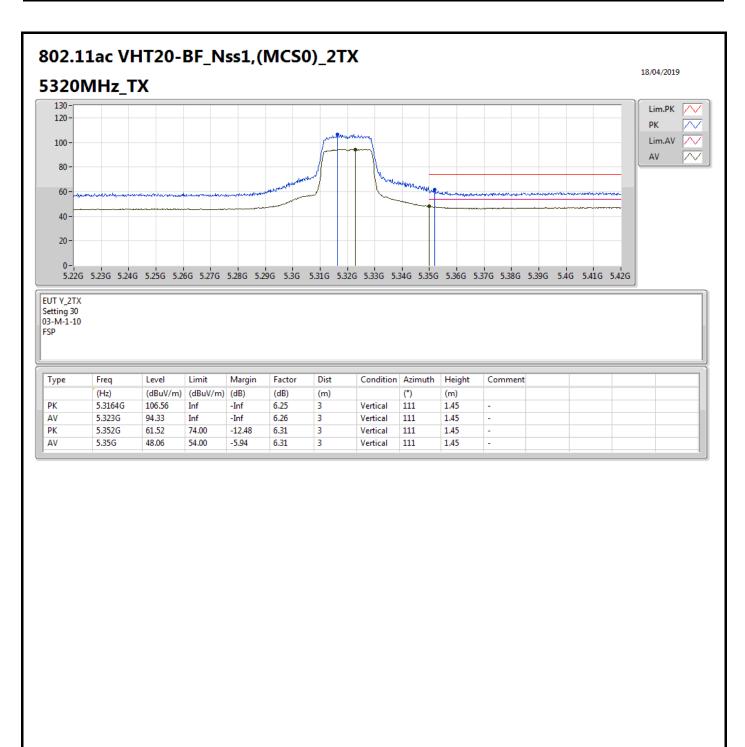




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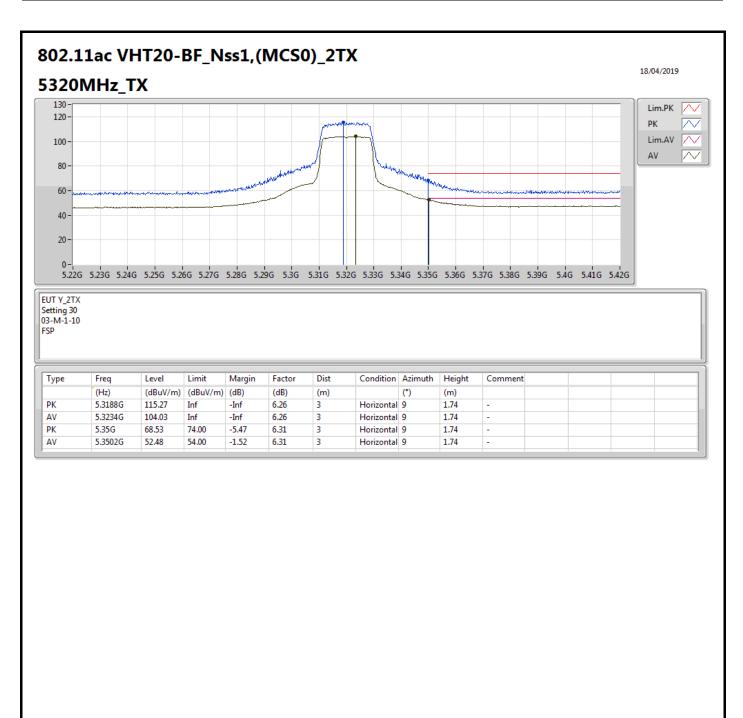
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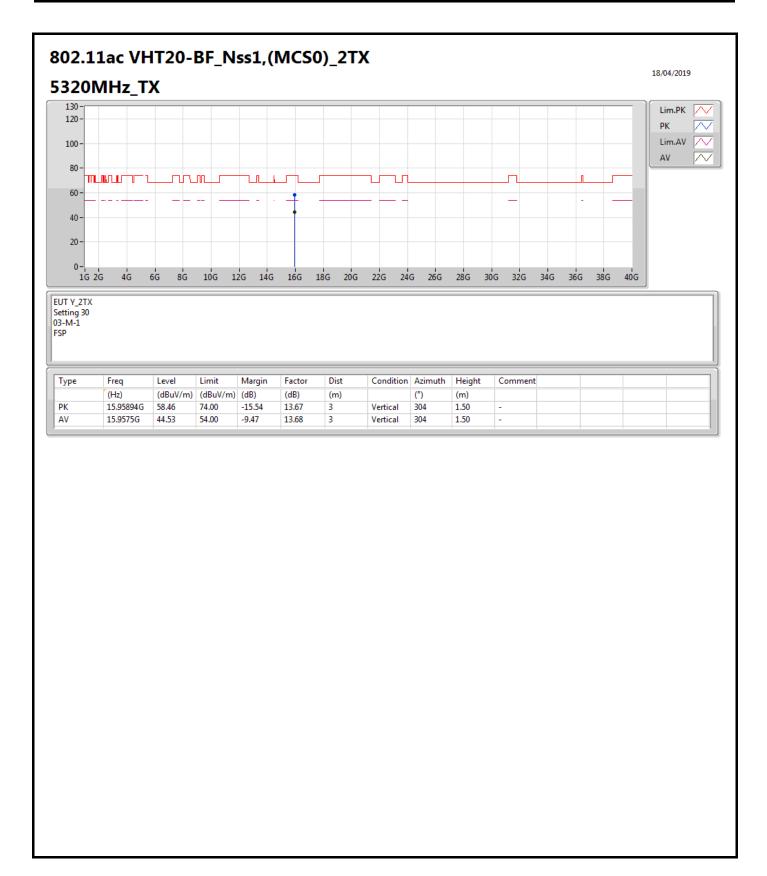
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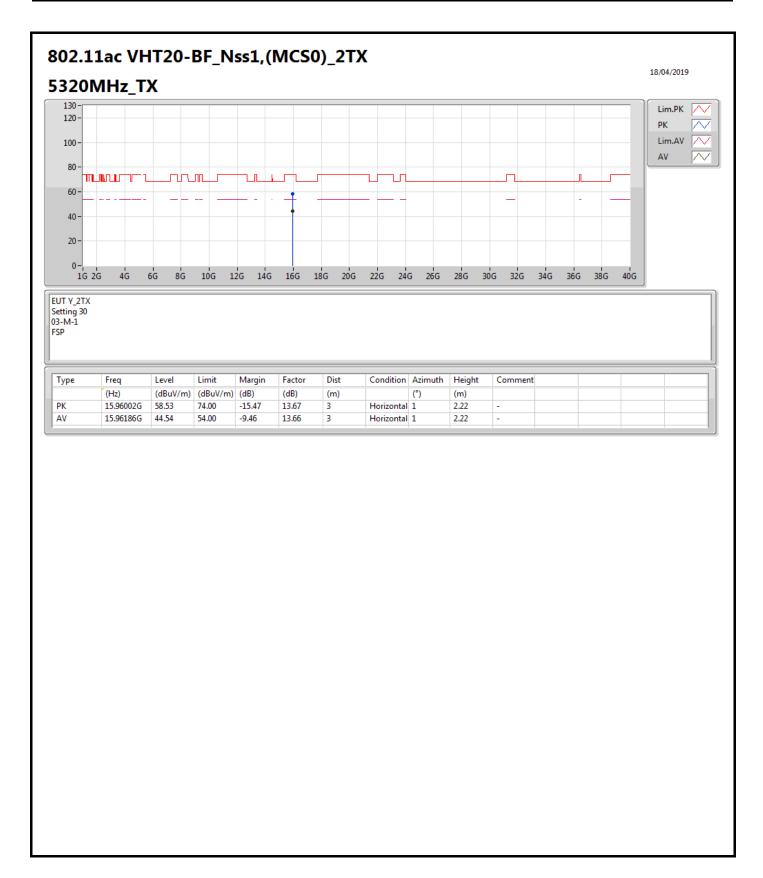
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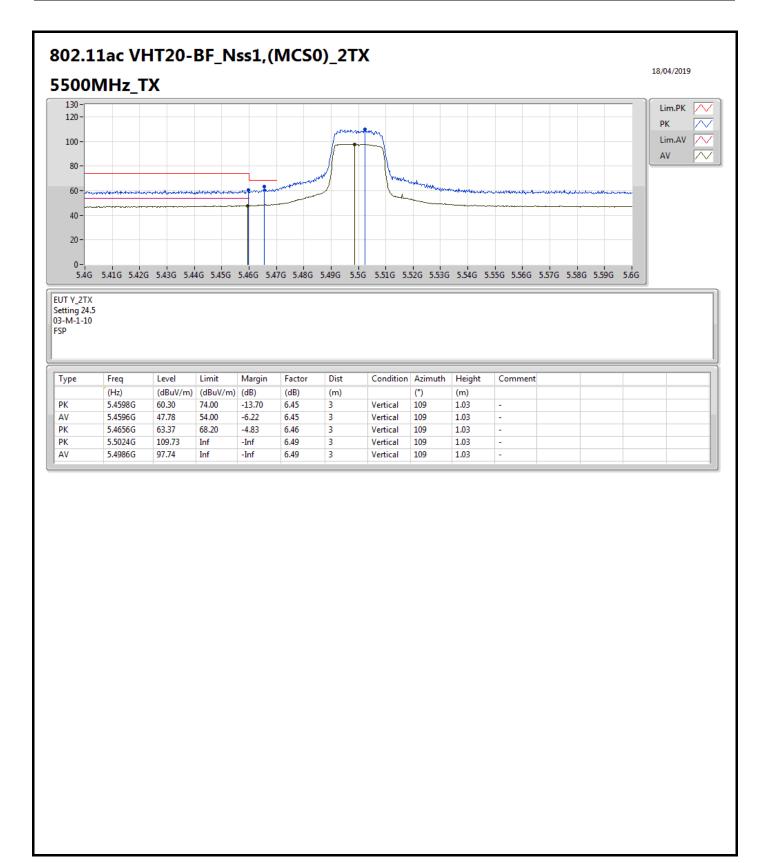




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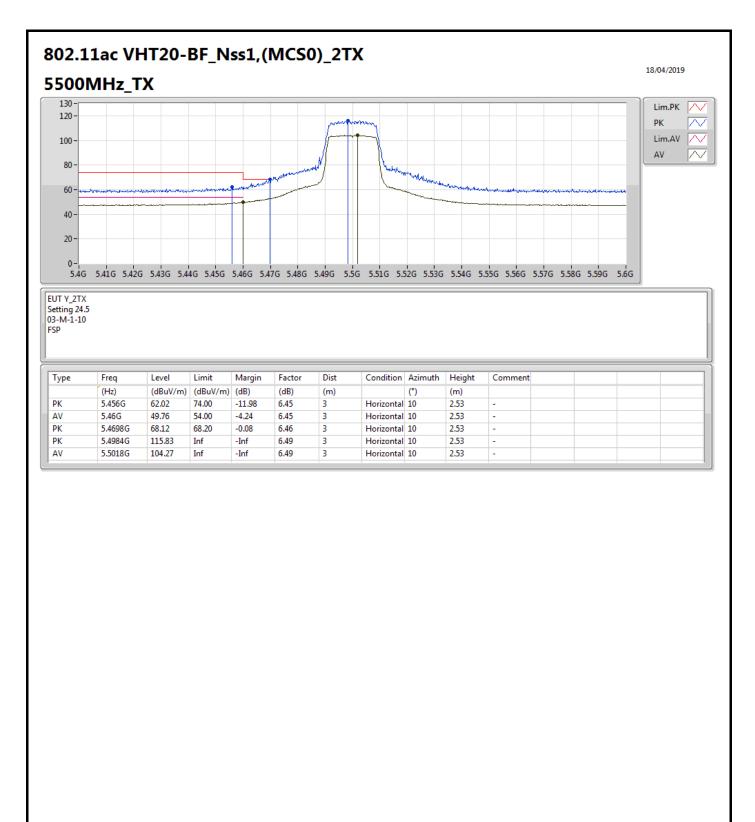
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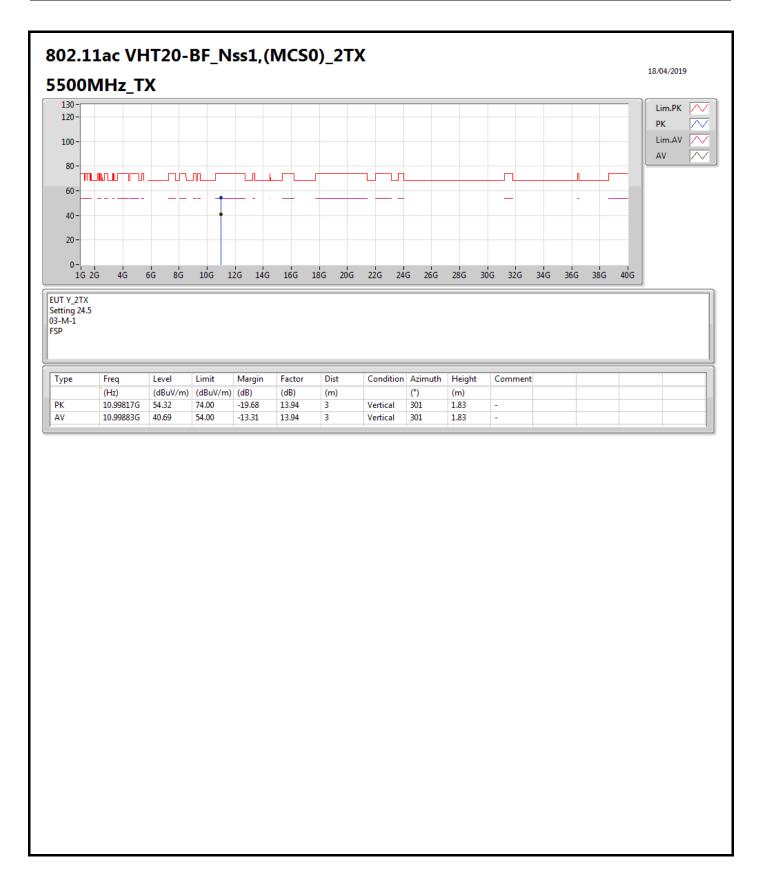
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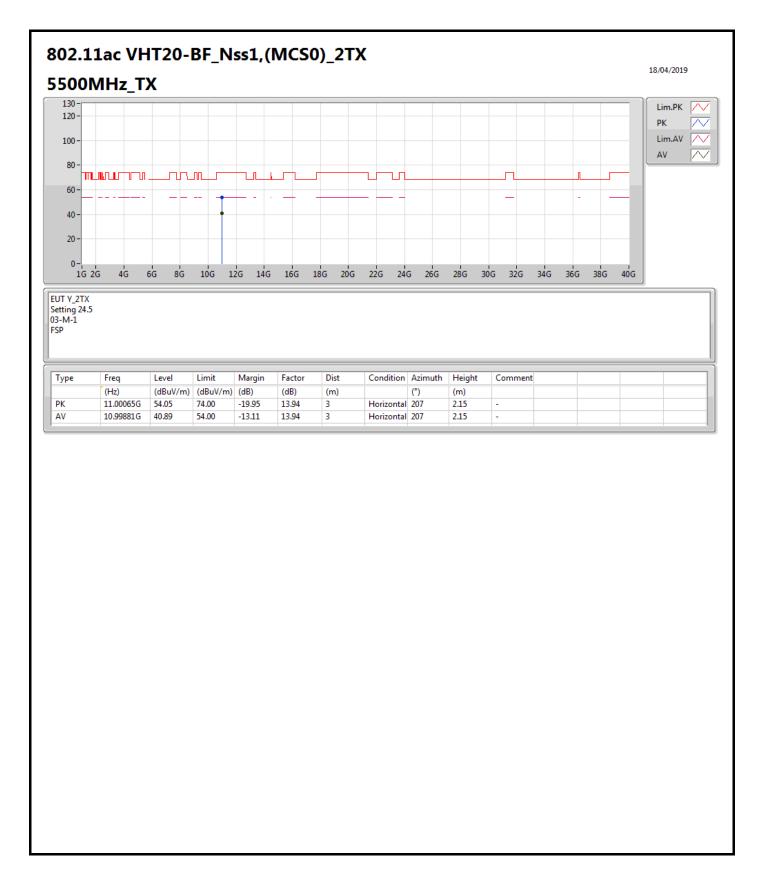
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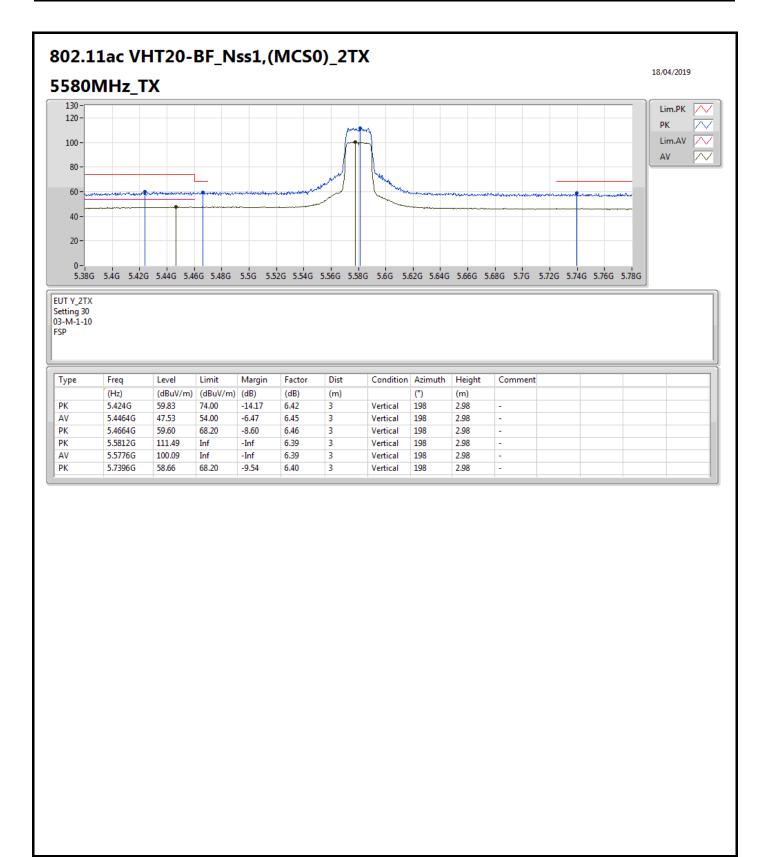
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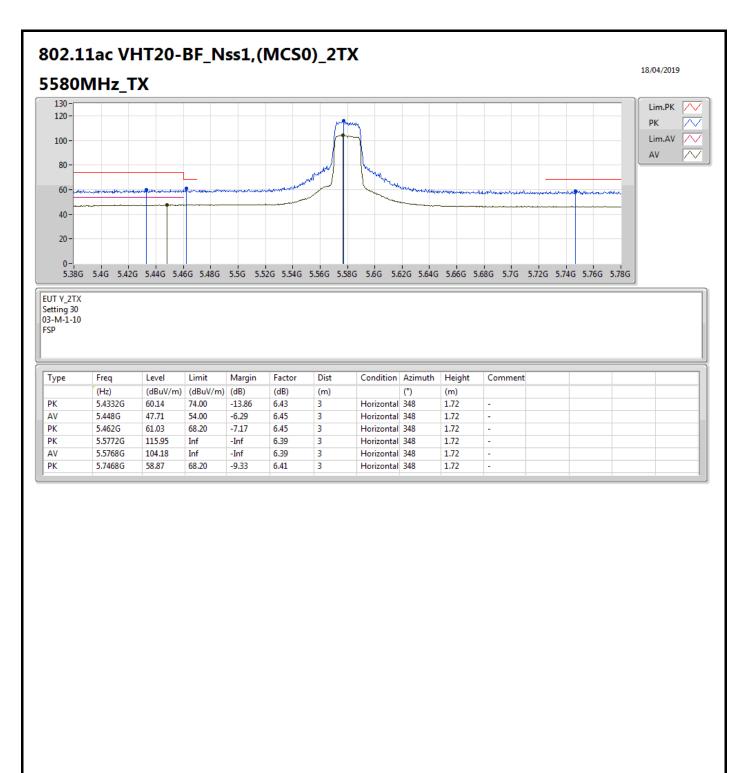
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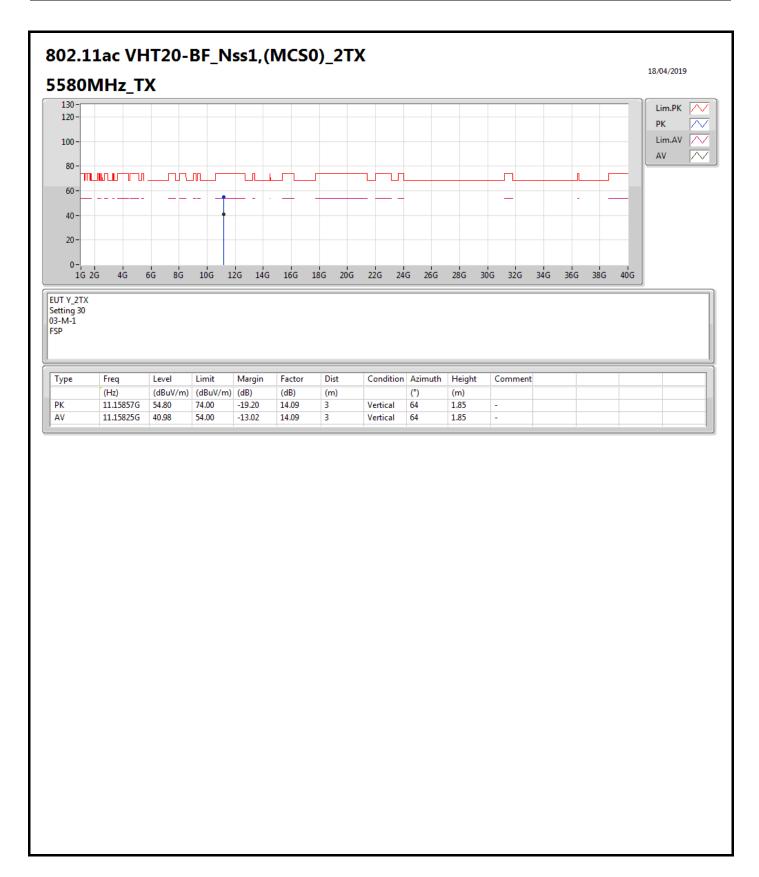
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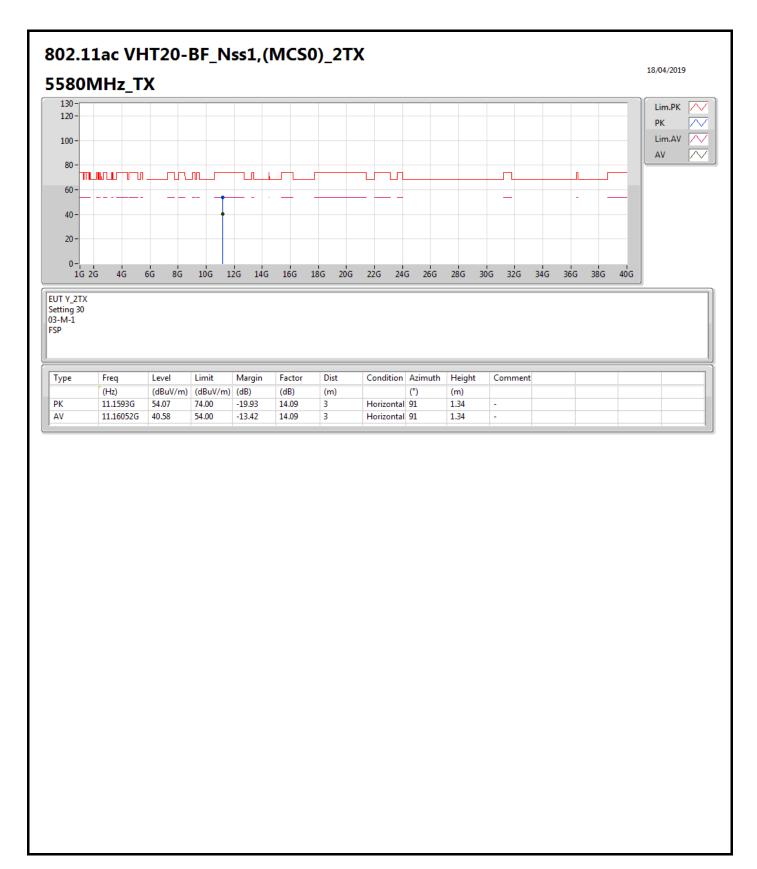
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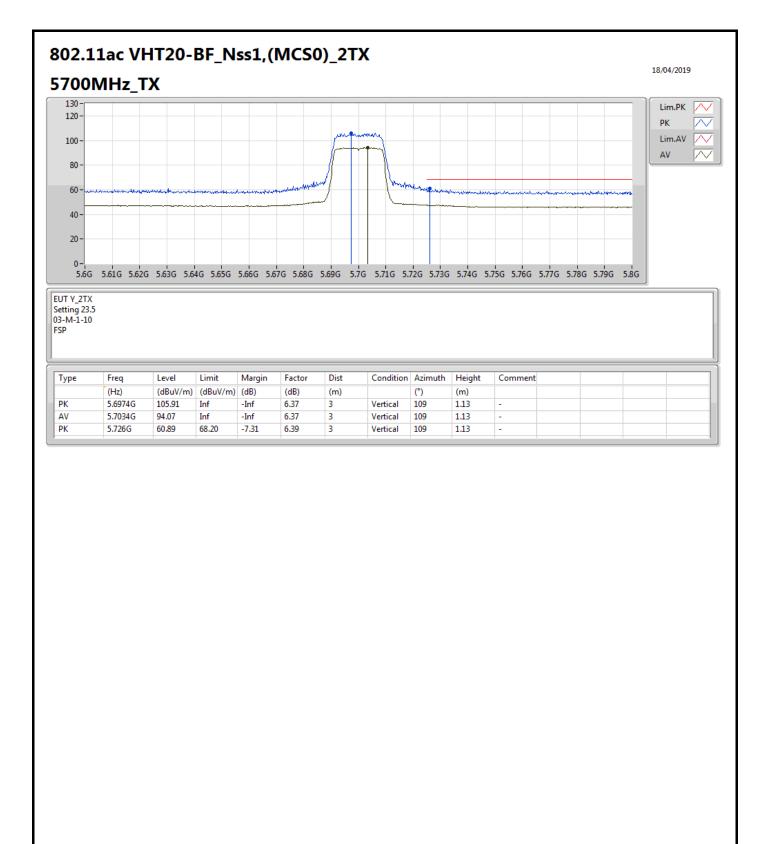
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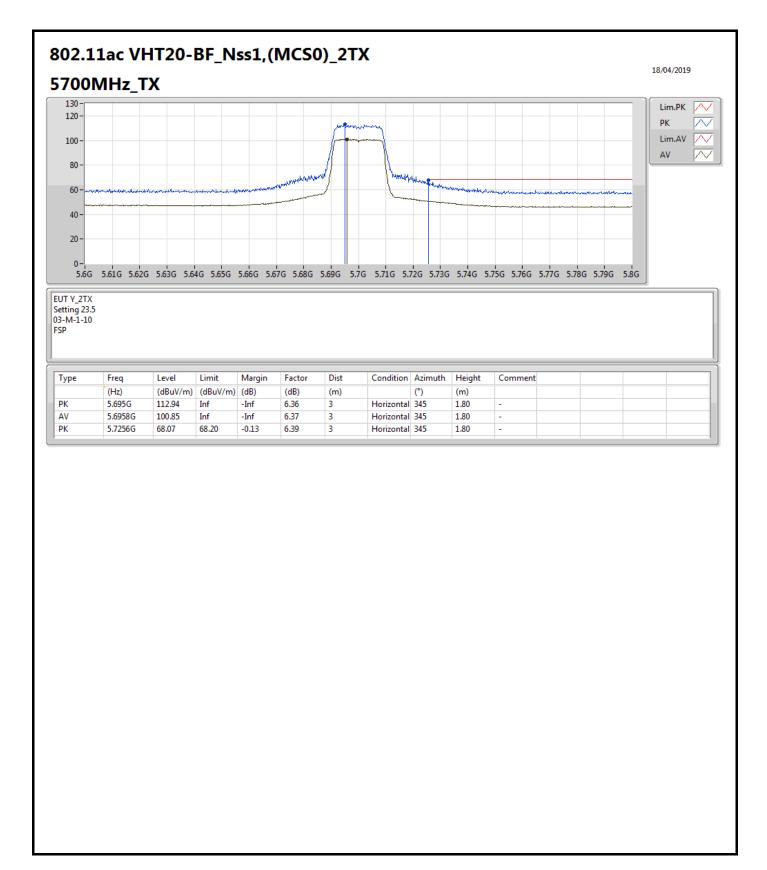
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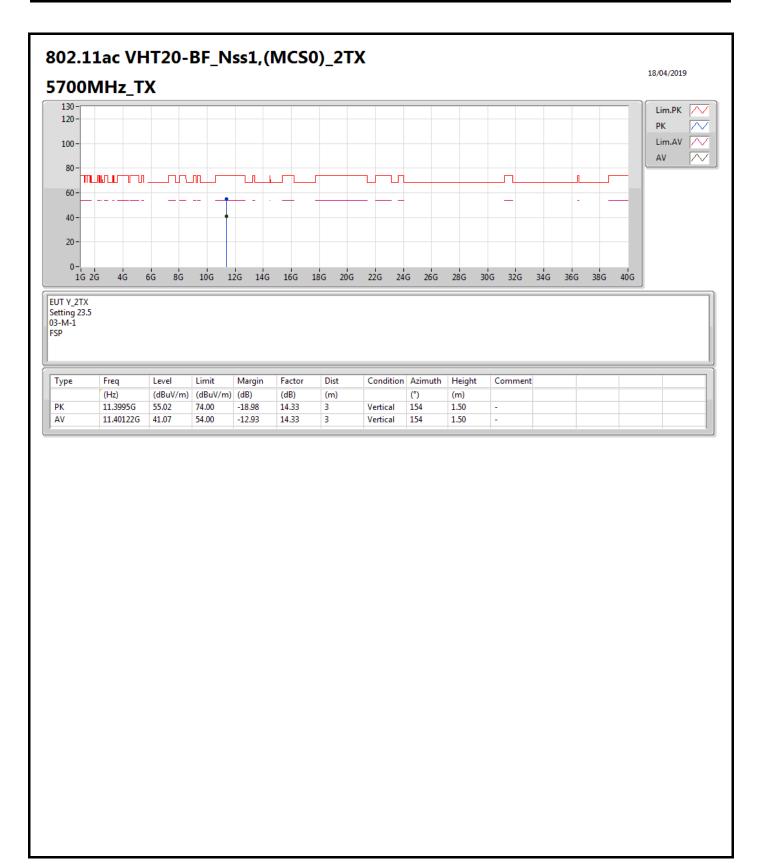
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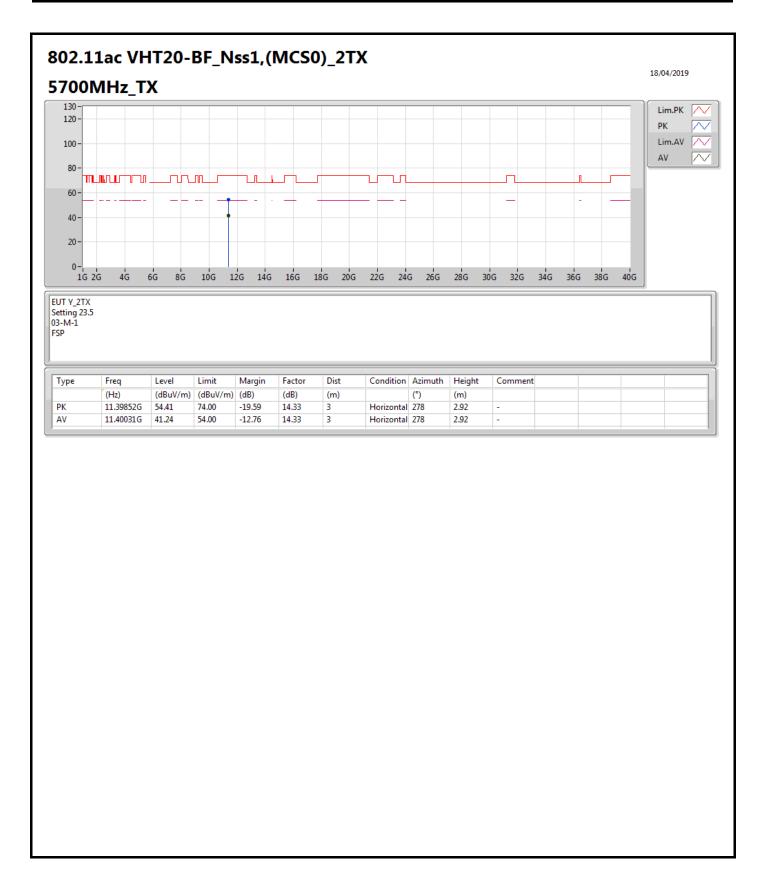
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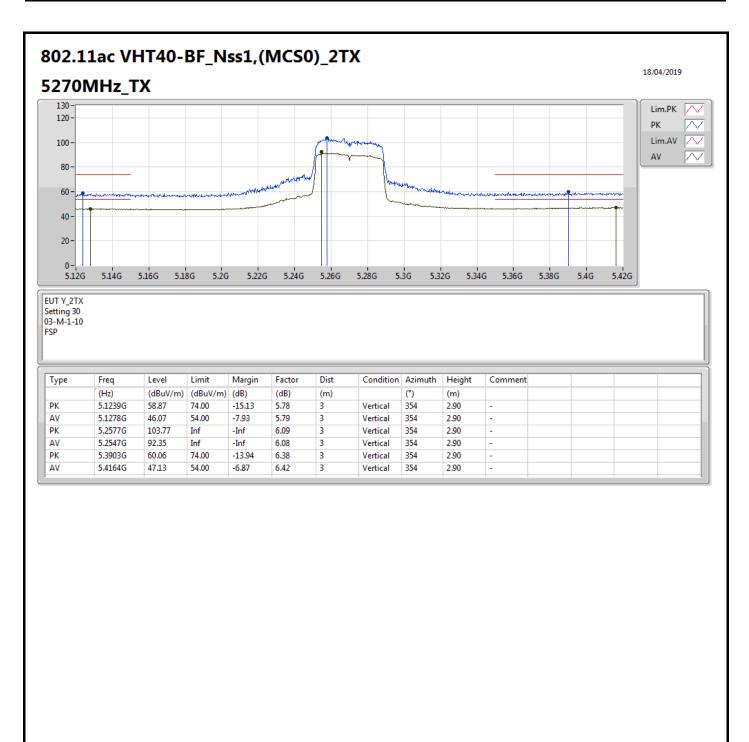
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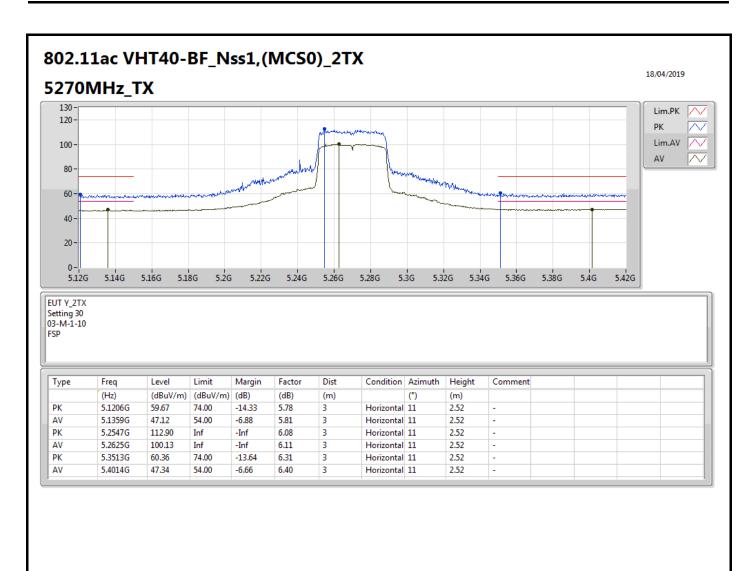
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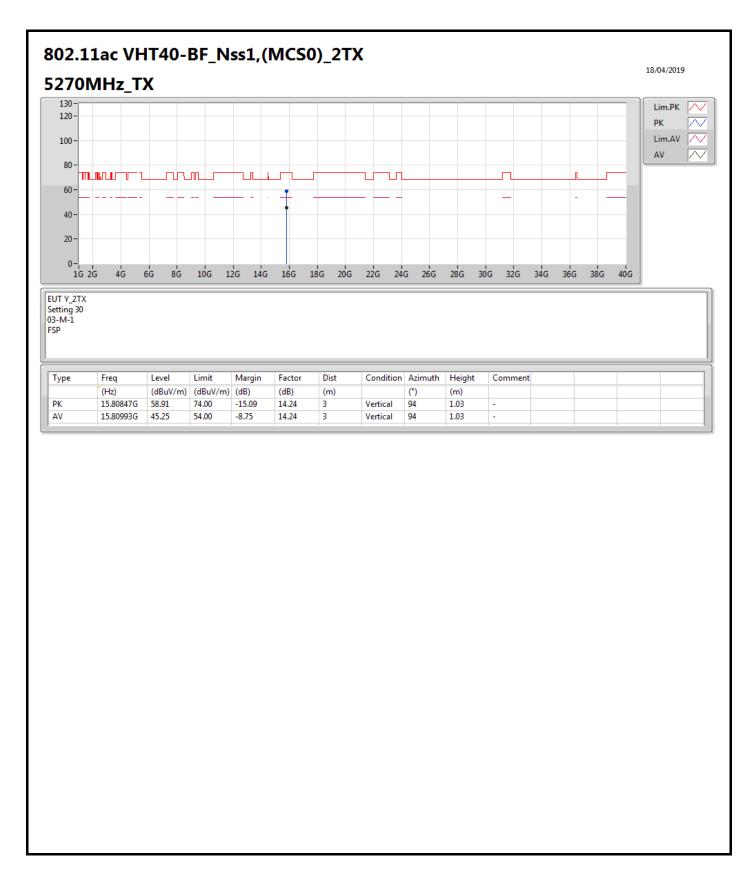
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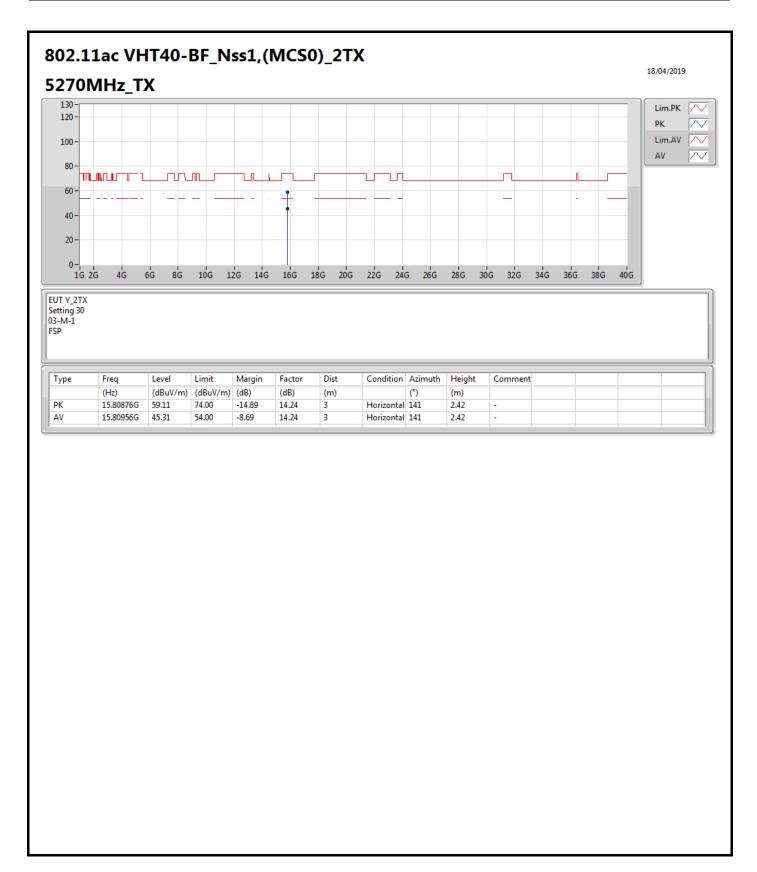
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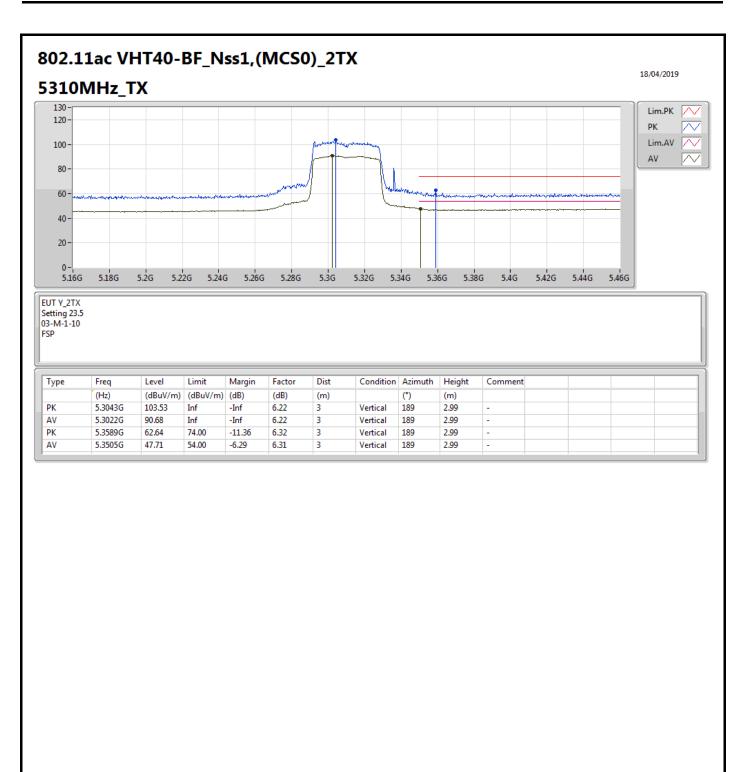
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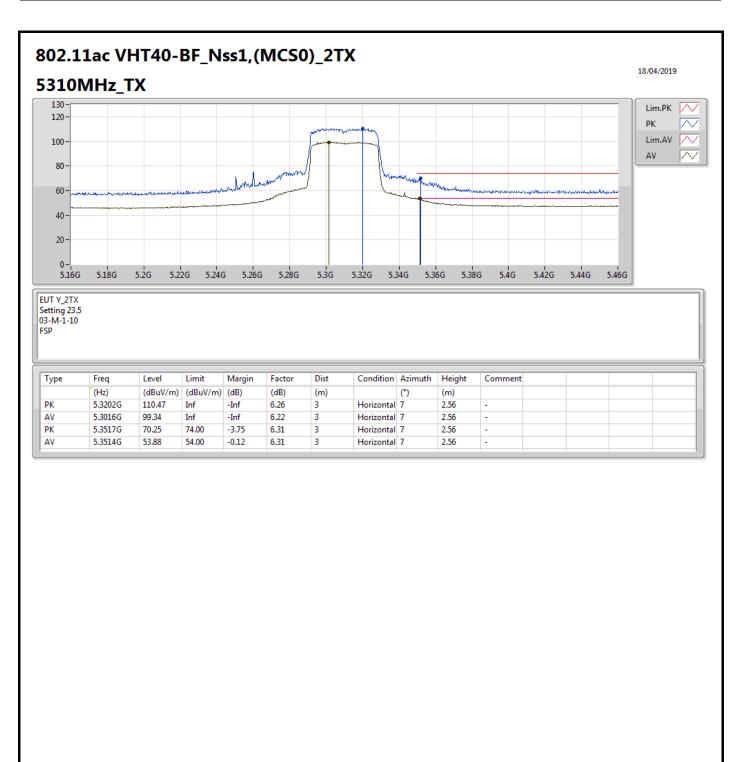
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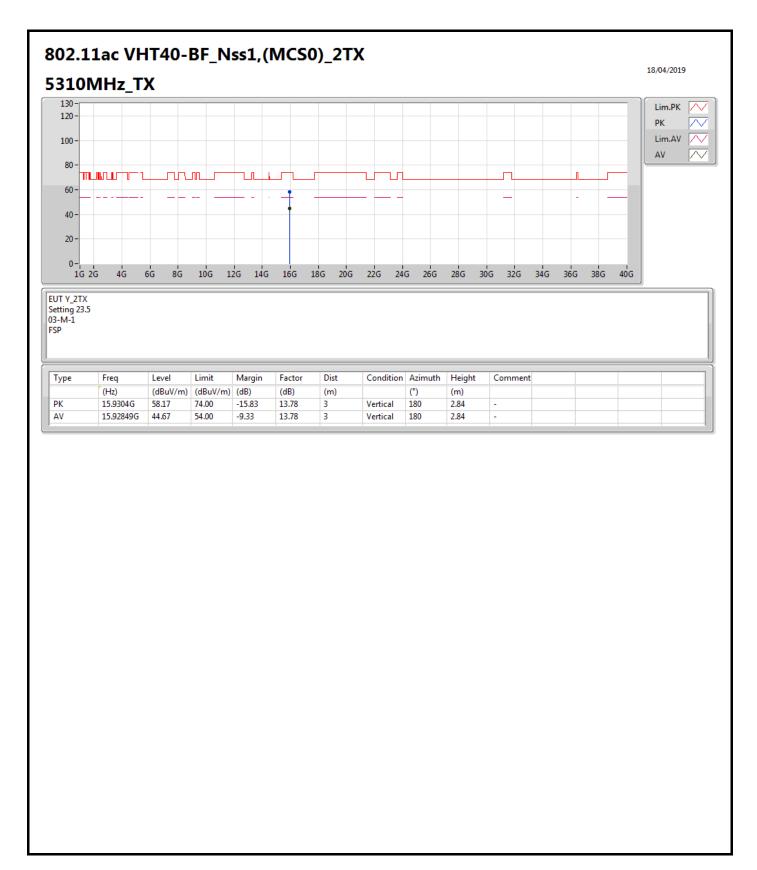
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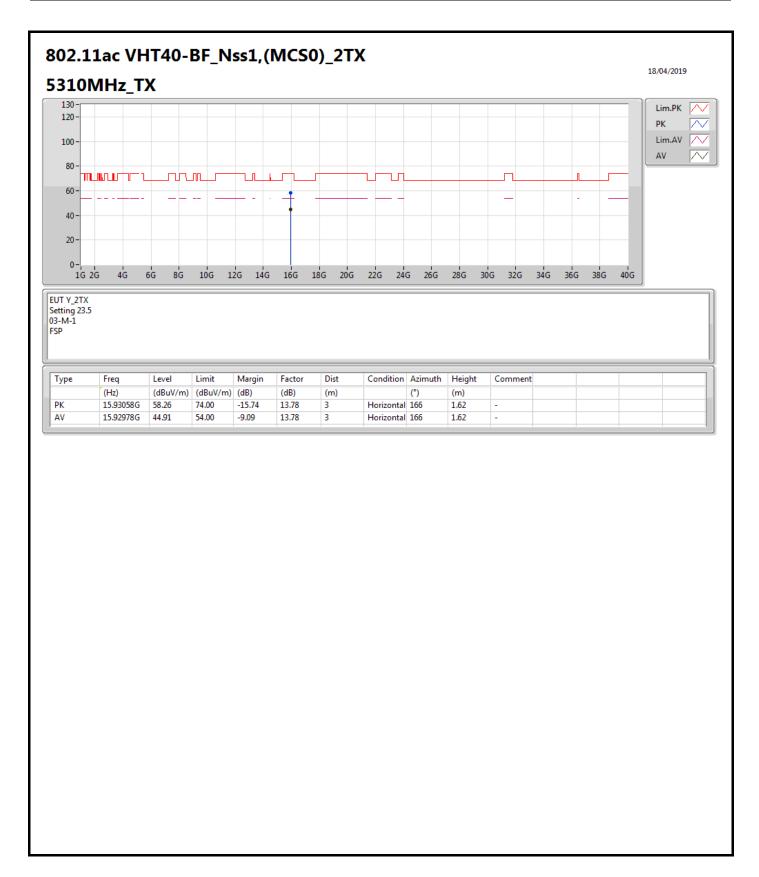
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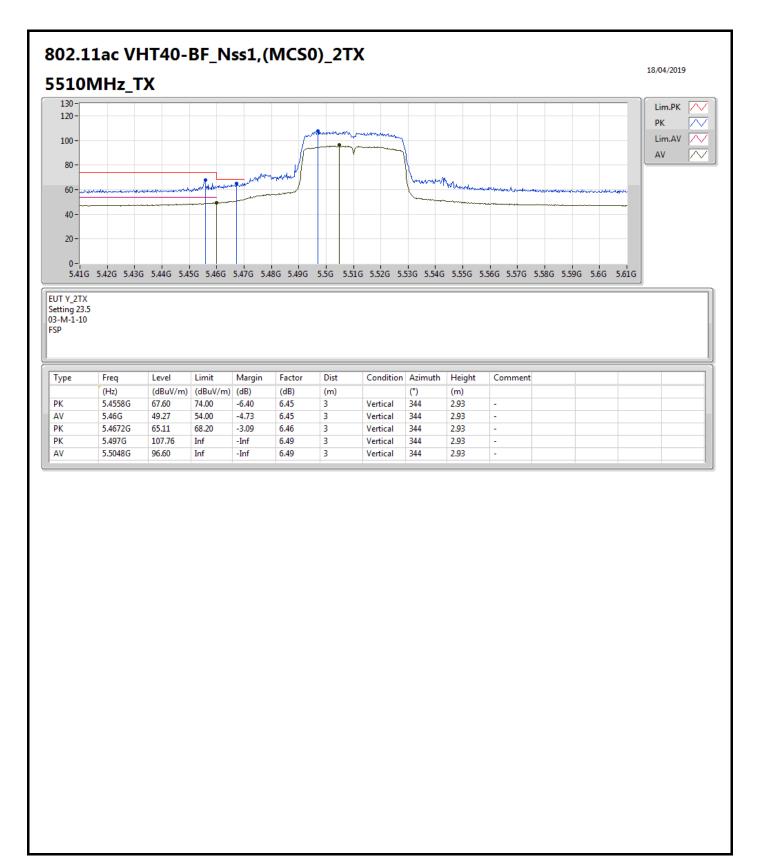




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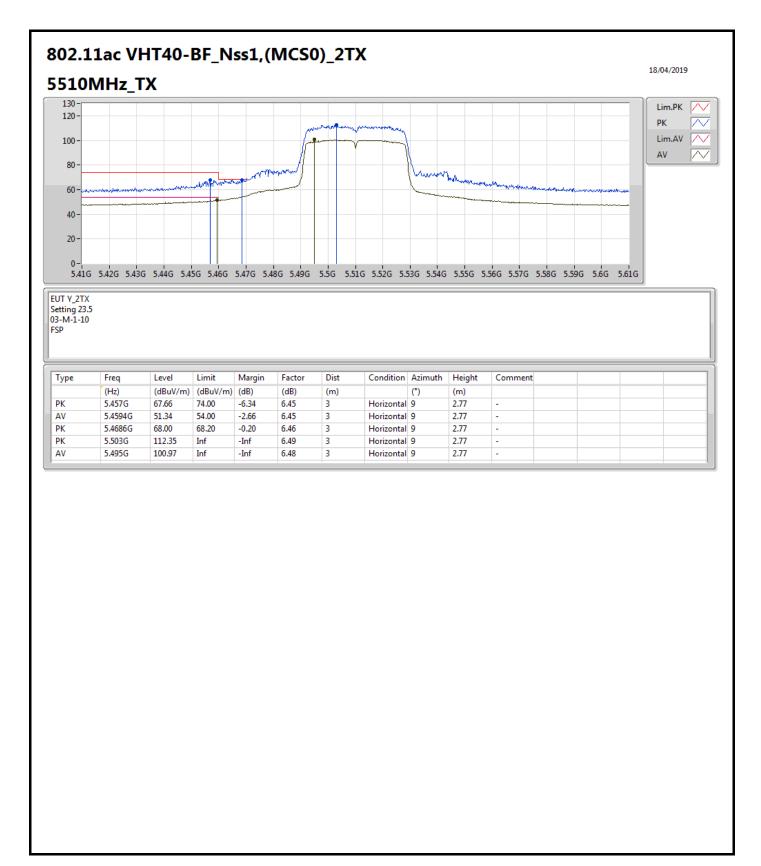
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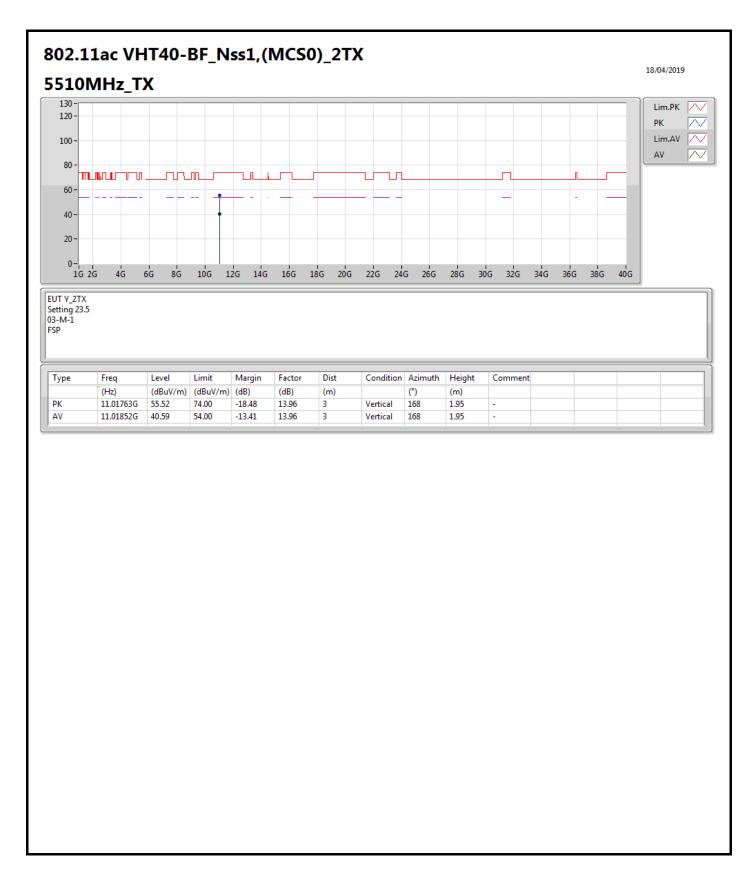
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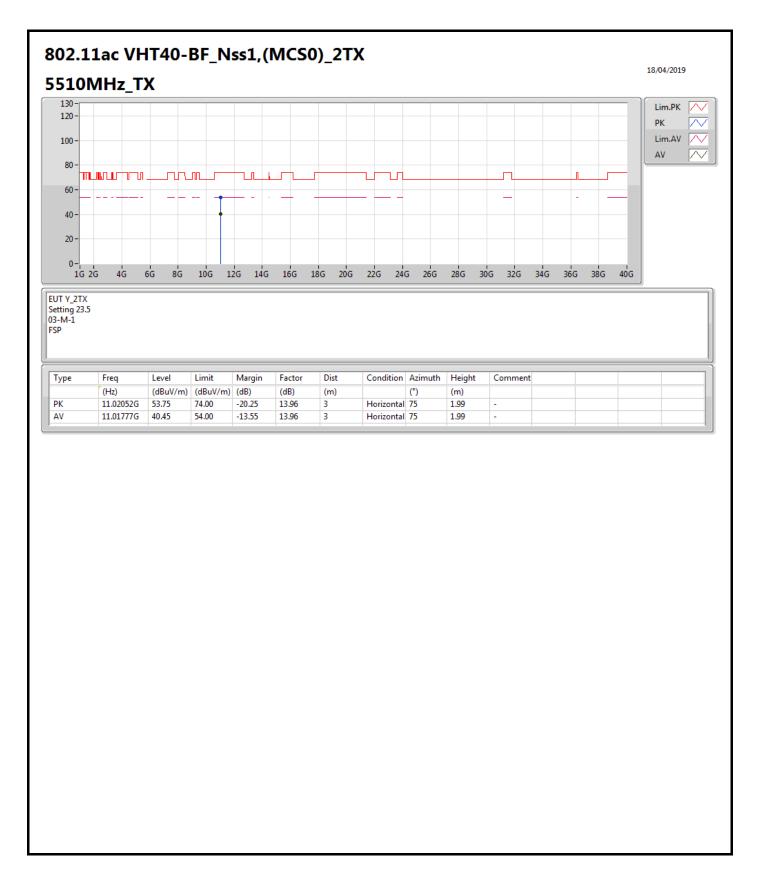
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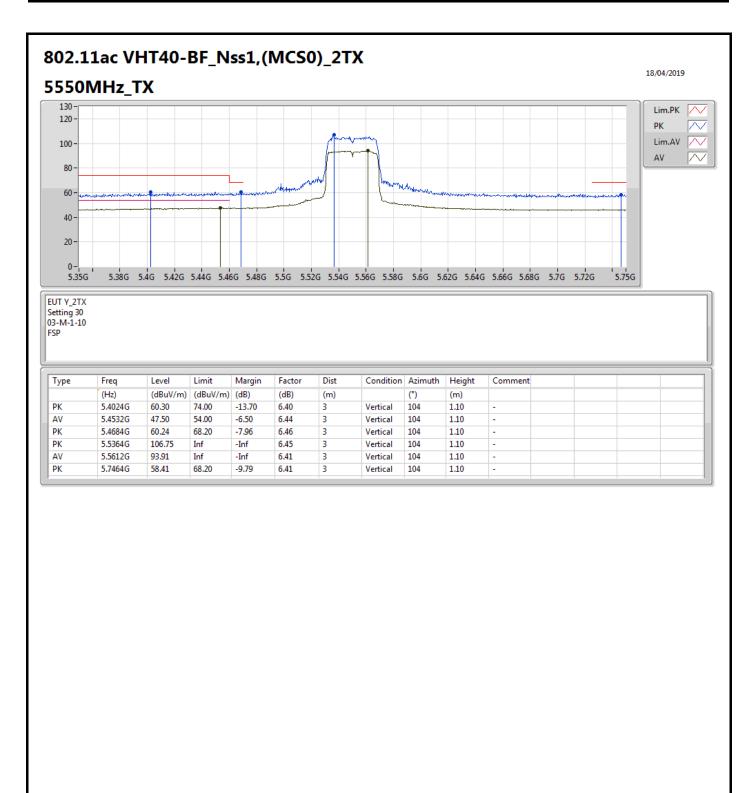
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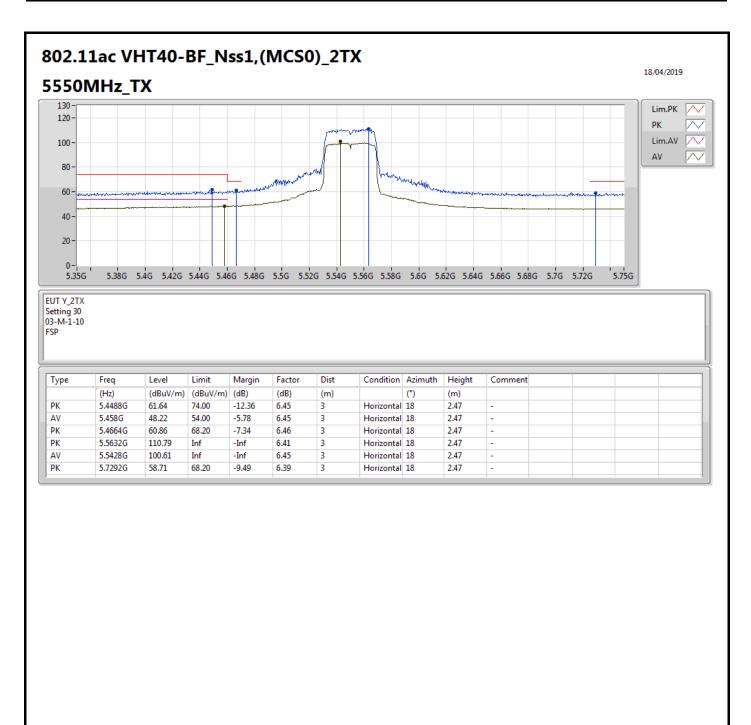
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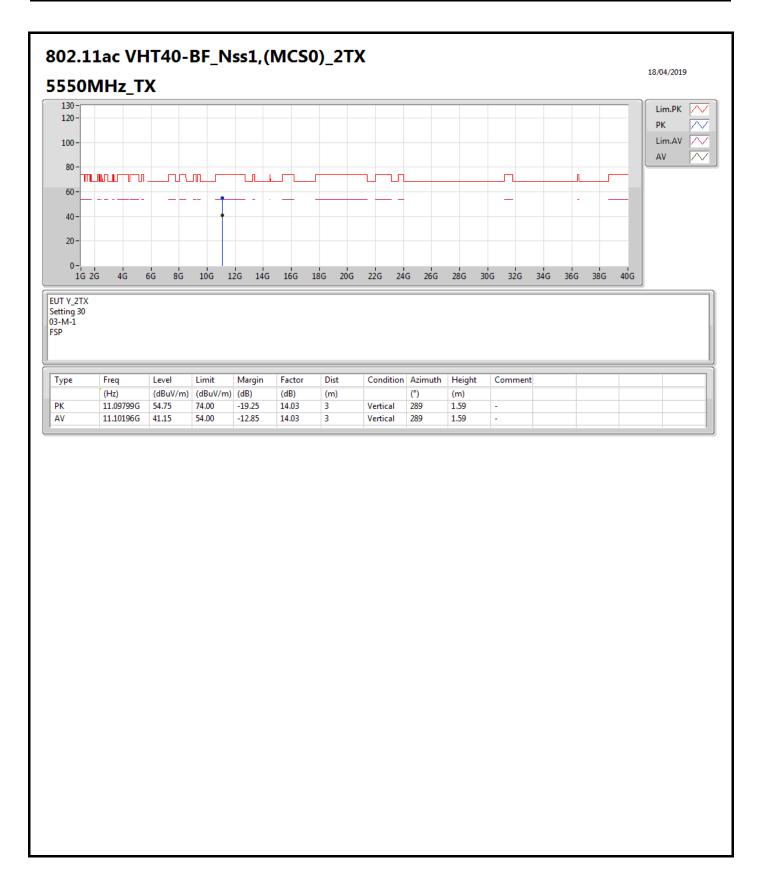
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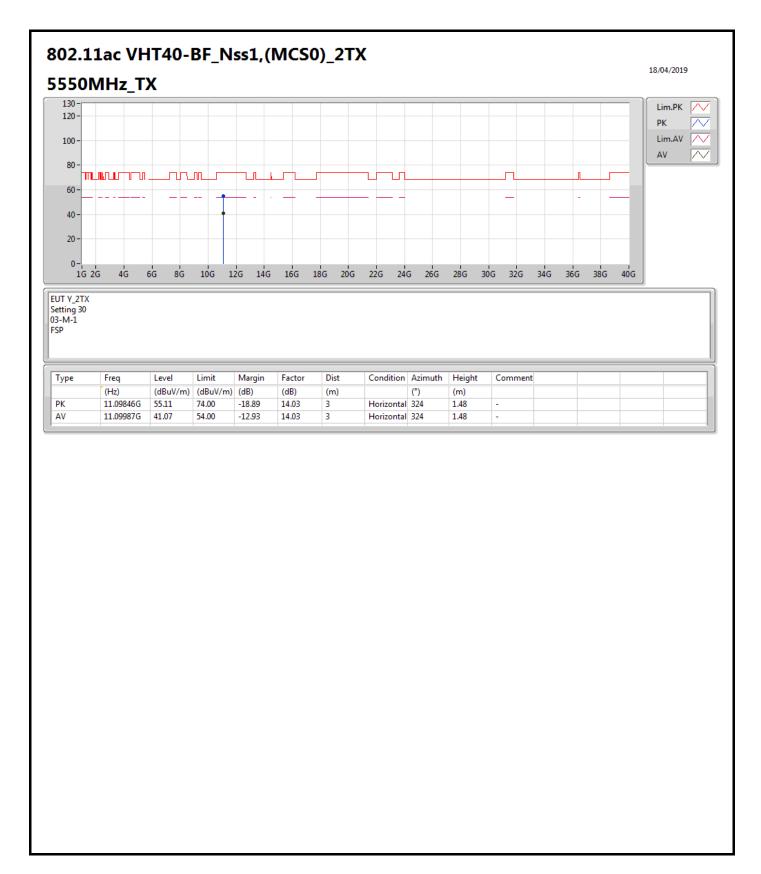
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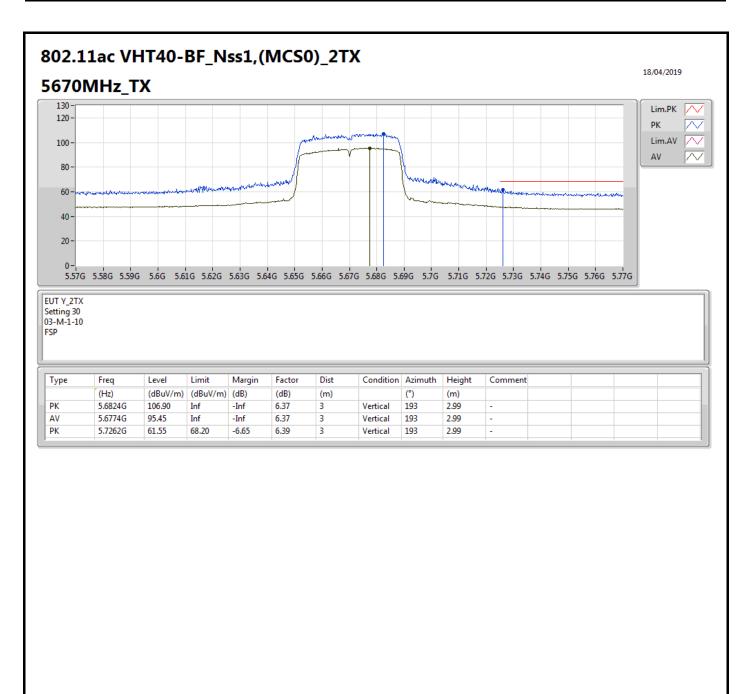
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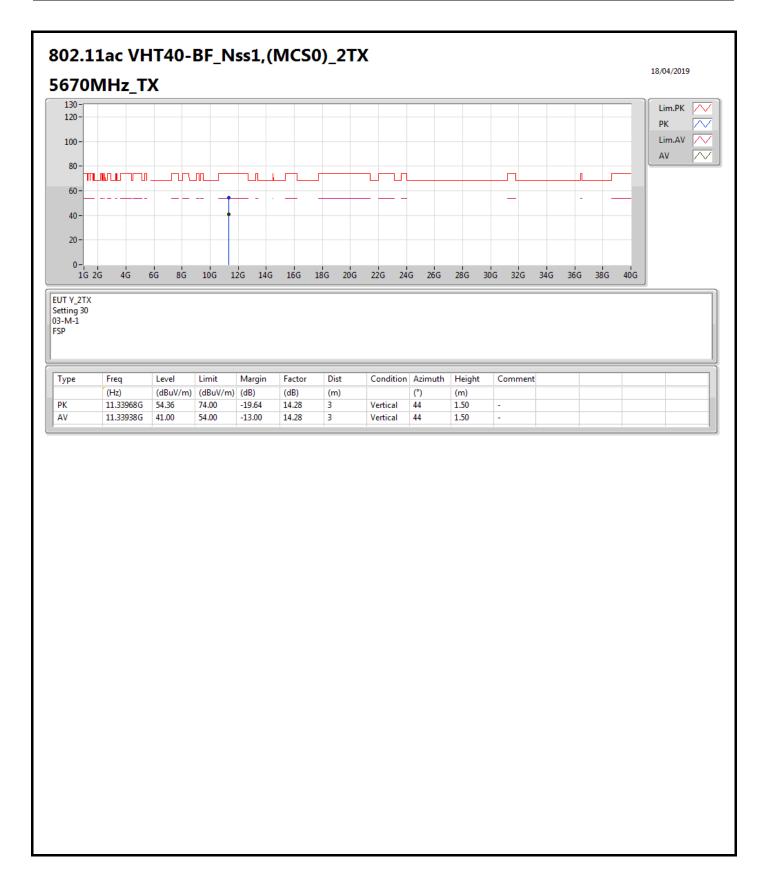
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