

Report No.: FR0N2725-07AB



RADIO TEST REPORT

FCC ID : 2AMQU-QN-I-470

Equipment : Dual-Band Wi-Fi 6 indoor Access Point (802.11 ax

4X4)

Brand Name : Quantum Networks

Model Name : QN-I-470

Applicant : QUANTUM NETWORKS (SG) PTE.LTD.

8 UBI ROAD 2 #08-10 ZERVEX

SINGAPORE(408538), SINGAPORE, Singapore

Manufacturer : QUANTUM NETWORKS (SG) PTE.LTD.

8 UBI ROAD 2 #08-10 ZERVEX

SINGAPORE(408538), SINGAPORE, Singapore

Standard : 47 CFR FCC Part 15.407

The product was received on Dec. 01, 2020, and testing was started from Dec. 04, 2020 and completed on Sep. 13, 2021. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Cliff Chang

Sporton International Inc. Hsinchu Laboratory

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

Report Template No.: CB-A12_1 Ver1.4

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History of this test report

Report No.: FR0N2725-07AB

Report No.	Version	Description	Issued Date
FR0N2725-07AB	01	Initial issue of report	Nov. 09, 2021

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Summary of Test Result

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(a)	Emission Bandwidth	PASS	-
3.3	15.407(a)	Maximum Conducted Output Power	PASS	-
3.4 15.407(a) Peak Power Spectral Density		PASS	-	
3.5	15.407(b)	Unwanted Emissions	PASS	-
Note: From	n Sporton Proje	ect No.: 0N2725, 0N2725-06.		

Declaration of Conformity:

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

Comments and Explanations:

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

Reviewed by: Sam Chen Report Producer: Wendy Pan

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1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	a, n (HT20), ac (VHT20),	5180-5240	36-48 [4]
5725-5850	ax (HEW20)	5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40),	5190-5230	38-46 [2]
5725-5850	ax (HEW40)	5755-5795	151-159 [2]
5150-5250	as (V/HT90) av (HFW90)	5210	42 [1]
5725-5850	ac (VHT80), ax (HEW80)	5775	155 [1]

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

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Band	Mode	BWch (MHz)	Nant
5.725-5.85GHz	802.11ax HEW20	20	4
5.725-5.85GHz	802.11ax HEW20-BF	20	4
5.725-5.85GHz	802.11n HT40	40	4
5.725-5.85GHz	802.11n HT40-BF	40	4
5.725-5.85GHz	802.11ac VHT40	40	4
5.725-5.85GHz	802.11ac VHT40-BF	40	4
5.725-5.85GHz	802.11ax HEW40	40	4
5.725-5.85GHz	802.11ax HEW40-BF	40	4
5.725-5.85GHz	5.725-5.85GHz 802.11ac VHT80		4
5.725-5.85GHz	802.11ac VHT80-BF	80	4
5.725-5.85GHz	802.11ax HEW80	80	4
5.725-5.85GHz	802.11ax HEW80-BF	80	4

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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, 1024QAM modulation.

HEW20, HEW40, HEW80 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.

BWch is the nominal channel bandwidth.

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1.1.2 Antenna Information

Set.	Ant.	2.4G Port	5G Port	Bluetooth Port	Brand	P/N	Antenna Type	Connector	Gain (dBi)
	1	1	1	-			PIFA Antenna	I-PEX	
	2	2	2	-	MAG.	MSA-1313-25	PIFA Antenna	I-PEX	Note 1
'	3	3	3	-	LAYERS	GC4-A2-TN	PIFA Antenna	I-PEX	Note 1
	4	4	4	1			PIFA Antenna	I-PEX	

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Note 1:

Set.	Ant		Gain (dBi)	
Set.	Ant.	2.4GHz	5GHz	Bluetooth
	1	5.43	7.54	-
4	2	5.36	6.92	-
1	3	5.24	6.80	-
	4	5.19	6.76	5.19

Note 2: The above information was declared by manufacturer.

Note 3: The EUT has one set of antenna.

For 2.4GHz function:

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

The EUT supports all antennas with TX/RX diversity functions.

At once time there are only two antenna port can transmitting/receiving RF signal.

Port 1 and Port 2 generated the worst case than Port 3 and Port 4, so it is tested and recorded in the report.

For 5GHz function:

For IEEE 802.11a/n/ac/ax mode (4TX/4RX)

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

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

For Bluetooth function:

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

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1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.938	0.28	1.978m	1k
802.11ax HEW20	0.953	0.21	5.448m	300
802.11ax HEW20-BF	0.953	0.21	5.448m	300
802.11ax HEW40	0.945	0.25	5.446m	300
802.11ax HEW40-BF	0.945	0.25	5.446m	300
802.11ax HEW80	0.958	0.19	5.448m	300
802.11ax HEW80-BF	0.958	0.19	5.448m	300

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Note:	
DC is Duty Cycle.	
DCF is Duty Cycle Factor.	

1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter or PoE					
	\boxtimes	With beamforming		Without beamforming		
Beamforming Function		The product has beamforming function for n/VHT/ax in 2.4GHz and n/ac/ax in 5GHz				
Function		Outdoor P2M	\boxtimes	Indoor P2M		
runction		Fixed P2P		Client		
Test Software Version	QRCT Version:4.0.00134.0					

Note: The above information was declared by manufacturer.

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1.2 Applicable Standards

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

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- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01

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

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

1.3 Testing Location Information

Testing Location Information

Test Lab.: Sporton International Inc. Hsinchu Laboratory

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

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

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH03-CB	Nyle Chang	20.2~21.2 / 53~57	Dec. 21, 2020
Radiated below 1GHz	03CH03-CB	Ken Yeh	24.6-25.7 / 55-58	Sep. 13, 2021
Radiated above 1GHz (For other tests)	03CH02-CB	Lance Wu	23.5~24.5 / 54~57	Dec. 07, 2020~Dec. 22, 2020
Radiated above 1GHz (For co-location test)	03CH05-CB	Lance Wu	24~24.7 / 57~59	Dec. 04, 2020
AC Conduction	CO01-CB	Peter Wu	23~24 / 62~63	Dec. 07, 2020~Dec. 08, 2020

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	4.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.5 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.0 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.9 dB	Confidence levels of 95%
Conducted Emission	2.8 dB	Confidence levels of 95%
Output Power Measurement	1.4 dB	Confidence levels of 95%
Power Density Measurement	2.8 dB	Confidence levels of 95%
Bandwidth Measurement	0.4%	Confidence levels of 95%

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2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.11a_Nss1,(6Mbps)_4TX	-
5180MHz	17.5
5200MHz	17.5
5240MHz	17
5745MHz	24
5785MHz	24
5825MHz	24
802.11ax HEW20_Nss1,(MCS0)_4TX	-
5180MHz	18
5200MHz	18
5240MHz	17.5
5745MHz	24
5785MHz	24
5825MHz	24
802.11ax HEW40_Nss1,(MCS0)_4TX	-
5190MHz	20.5
5230MHz	20.5
5755MHz	23.5
5795MHz	23.5
802.11ax HEW80_Nss1,(MCS0)_4TX	-
5210MHz	20
5775MHz	23

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Mode	Power Setting
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-
5180MHz	18
5200MHz	18
5240MHz	18
5745MHz	18
5785MHz	18
5825MHz	18
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-
5190MHz	18
5230MHz	17.5
5755MHz	18
5795MHz	18
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-
5210MHz	18
5775MHz	18

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Note:

- Evaluated HEW20/HEW40/HEW80 mode only, due to similar modulation. The power setting of HT20/HT40/VHT20/VHT40/VHT80 mode are the same or lower than HEW20/HEW40/HEW80.
- The EUT supports beamforming and CDD modes, and the CDD mode is the worst case. Therefore, all test items are evaluated in the report. The beamforming mode only evaluates the output power.

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2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests			
Tests Item	Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz			
Operating Mode Normal Link			
1 Normal Link - EUT + Adapter + Uplink (PoE): 2.5Gbps + LAN: 2.5Gbps			
Normal Link - EUT + PoE + Uplink (PoE): 2.5Gbps + LAN: 2.5Gbps			
For operating mode 2 is the worst case and it was record in this test report.			

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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		

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.	
1. The EUT was performed at Y axis and Z axis position, and the wor was found at Z axis. So the measurement will follow this san configuration. 2. The EUT has two power supplies, one is PoE and the other is adapted to be the worst case and recorded in the report.		
	Normal Link	
1	EUT in Z axis + PoE + Uplink (PoE): 2.5Gbps + LAN: 2.5Gbps	
	СТХ	
Operating Mode > 1GHz The EUT was performed at Y axis and Z axis position for Unwanted Emalove 1GHz test, and the worst case was found at Y axis. So the measurable will follow this same test configuration.		
1	EUT in Y axis	

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The Worst Case Mode for Following Conformance Tests			
Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location			
Test Condition Radiated measurement			
	Normal Link		
Operating Mode	The EUT was performed at Y axis and Z axis position for Emissions in Restricted Frequency Bands below 1GHz test, and the worst case was found at Z axis. So the measurement will follow this same test configuration.		
1	EUT in Z axis - WLAN 2.4GHz + WLAN 5GHz + Bluetooth		
Refer to Appendix F for Radiated Emission Co-location.			

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The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode		
1 WLAN 2.4GHz + WLAN 5GHz + Bluetooth		
Refer to Sporton Test Report No.: FA0N2725-07 for Co-location RF Exposure Evaluation.		

Note1: The console port is professional usage by manufacturer declaration, and it was performed the test at the load.

Note2: The USB port was performed the test at the load by manufacturer requirement.

Note3: The PoE is for measurement only, would not be marketed.

PoE information as below:

Power	Brand	Model
PoE	GME	GME40B-480135FDA

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

Accessories				
Equipment Name	Brand Name	Model Name	Rating	
Adapter	APD	WB-24J12R	Input: 100-240V~50-60Hz 0.7A Max. Output: 12.0V, 2.0A, 24.0W	
Others				
Plug*1				
Console cable*1: Non-shielded, 1.5m				
Wall bracket*1				

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2.5 Support Equipment

For AC Conduction:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	2.5G LAN PC	DELL	T3400	N/A	
В	2.5G PoE LAN PC	DELL	T3400	N/A	
С	2.4G NB	DELL	E6430	N/A	
D	5G NB	DELL	E6430	N/A	
Е	Smart phone	Samsung	Galaxy J2	A3LSMJ200F	
F	Flash disk3.0	Transcend	JetFlash-700	N/A	
G	Flash disk3.0	Transcend	JetFlash-700	N/A	
Н	PoE	GME	GME40B-480135FDA	N/A	

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For Radiated (below 1GHz):

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	PoE	GME	GME40B-480135FDA	N/A
В	Notebook	DELL	E4300	N/A
С	Notebook	DELL	E4300	N/A
D	Notebook	DELL	E4300	N/A
Е	Flash disk3.0	Silicon Power	B06	N/A
F	Flash disk3.0	Silicon Power	B06	N/A
G	Phone	SAMSUNG	Galaxy J2	N/A
Н	Notebook	DELL	E4300	N/A

For Radiated (above 1GHz):

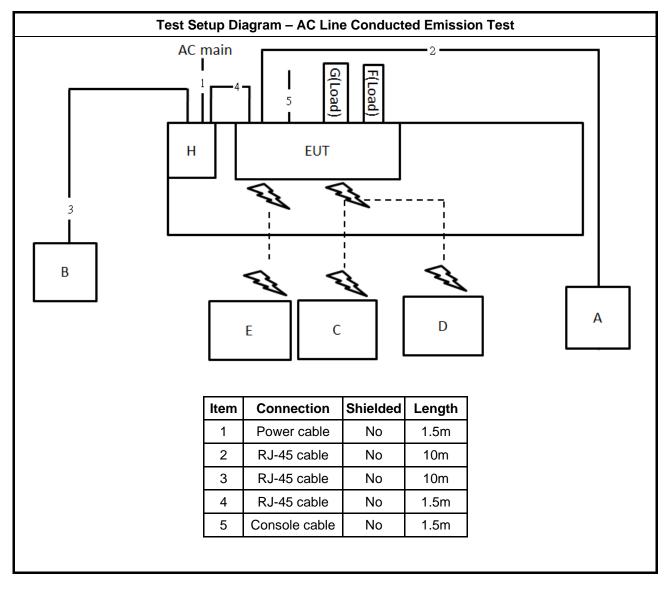
	Support Equipment			
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Notebook	DELL	E4300	N/A
С	PoE	GME	GME40B-480135FDA	N/A

For RF Conducted:

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

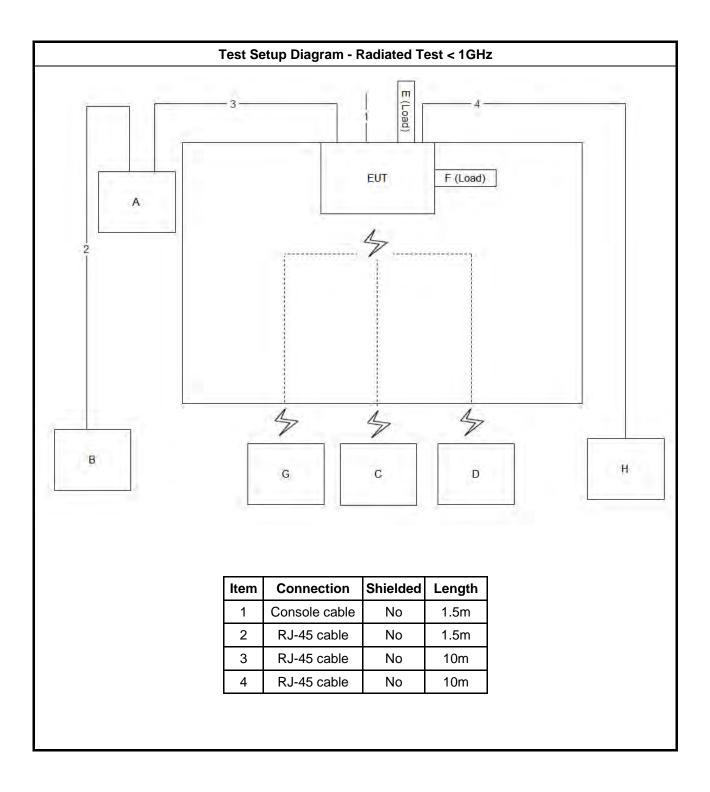


2.6 Test Setup Diagram



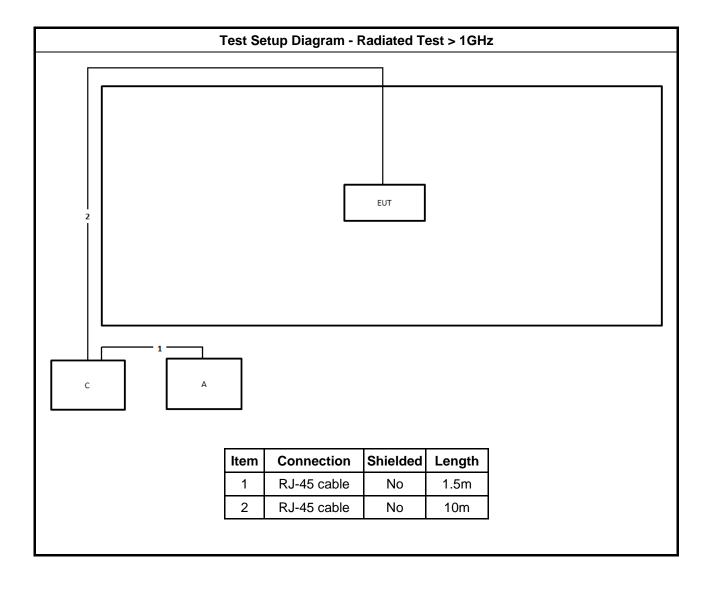
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3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

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

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3.1.2 Measuring Instruments

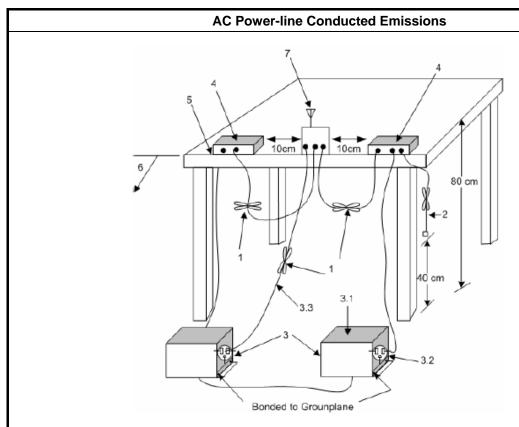
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

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3.1.4 Test Setup



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

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

3.1.5 Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

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3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

	Emission Bandwidth Limit		
UNI	JNII Devices		
\boxtimes	For the 5.15-5.25 GHz band, N/A		
	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.		
	For the $5.47-5.725$ GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.		
\boxtimes	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.		
	For the 5.85-5.895 GHz band, 6 dB emission bandwidth ≥ 500kHz.		
LE-	LAN Devices		
	For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.		
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz		
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz		
	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.		

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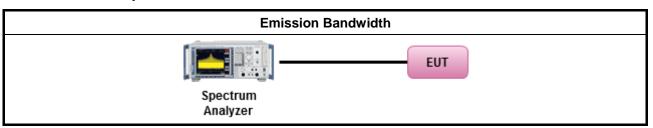
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

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

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

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3.3 Maximum Output Power

3.3.1 Limit

	Maximum Output Power Limit
UNI	II Devices
\boxtimes	For the 5.15-5.25 GHz band:
	 Outdoor AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6). e.i.r.p. at any elevation angle above 30 degrees ≤ 125mW [21dBm]
	Indoor AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$
	Point-to-point AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W If $G_{TX} > 23$ dBi, then $P_{Out} = 30 - (G_{TX} - 23)$.
	■ Mobile or Portable Client: the maximum conducted output power (P _{Out}) shall not exceed the lesser of 250 mW. If G _{TX} > 6 dBi, then P _{Out} = 24 - (G _{TX} - 6).
	For the 5.25-5.35 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$.
	For the 5.47-5.725 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If G_{TX} > 6 dBi, then P_{Out} = 24 – (G_{TX} – 6).
\boxtimes	For the 5.725-5.85 GHz band:
	 Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6).
	 Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W.
	Maximum EIRP Limit
	For the 5.85-5.895 GHz band:
	■ Indoor AP & subordinate device < 36 dBm
	■ Client device < 30 dBm
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.725-5.85 GHz band:
	 Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6).
	 Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W.

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 $\mathbf{P}_{\text{Out}} = \text{maximum conducted output power in dBm},$

 G_{TX} = the maximum transmitting antenna directional gain in dBi.

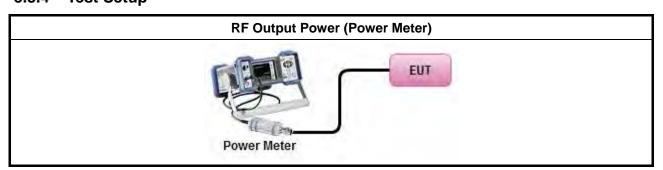
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

	Test Method		
•	Maximum Conducted Output Power		
	Average over on/off periods with duty factor		
	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).		
	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)		
	Wideband RF power meter and average over on/off periods with duty factor		
	Refer as FCC KDB 789033, clause E Method PM-G (using an RF average power meter).		
•	For conducted measurement.		
	If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.		
	If multiple transmit chains, EIRP calculation could be following as methods: P _{total} = P ₁ + P ₂ + + P _n (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP _{total} = P _{total} + DG		

3.3.4 Test Setup



3.3.5 Test Result of Maximum Output Power

Refer as Appendix C

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3.4 Power Spectral Density

3.4.1 Limit

	Peak Power Spectral Density Limit
UNI	I Devices
\boxtimes	For the 5.15-5.25 GHz band:
	 Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If G_{TX} > 6 dBi, then P_{Out} = 17 - (G_{TX} - 6).
	Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$.
	■ Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$.
	Mobile or Portable Client: the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G _{TX} > 6 dBi, then PPSD= 11 - (G _{TX} - 6)
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} >$ 6 dBi, then PPSD= 11 – ($G_{TX} -$ 6).
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} >$ 6 dBi, then PPSD= 11 – ($G_{TX} -$ 6).
\boxtimes	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) \leq 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$.
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
	EIRP Power Spectral Density Limit
	For the 5.85-5.895 GHz band:
	■ Indoor AP & subordinate device < 20dBm/MHz
	■ Client device < 14dBm/MHz
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz.
	 e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below: -13 dBW/MHz for 0° ≤ θ < 8°; -13 − 0.716 (θ-8) dBW/MHz for 8° ≤ θ < 40° -35.9 − 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ > 45°
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz.
	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) \leq 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$.
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
PPS	SD = peak power spectral density that he same method as used to determine the conducted output

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power shall be used to determine the power spectral density. And power spectral density in dBm/MHz G_{TX} = the maximum transmitting antenna directional gain in dBi.

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3.4.2 Measuring Instruments

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

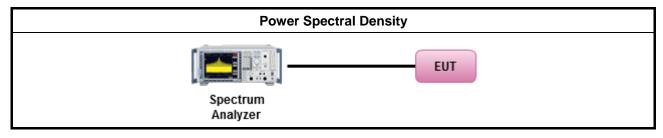
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3.4.3 Test Procedures

		Test Method	
•	outp func	k power spectral density procedures that the same method as used to determine the conducted out power shall be used to determine the peak power spectral density and use the peak search cition on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density I be measured using below options:	
	Refer as FCC KDB 789033, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth		
	[duty	y cycle ≥ 98% or external video / power trigger]	
	\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_{total} = PPSD_1 + PPSD_2 + + PPSD_n \\ (calculated in linear unit [mW] and transfer to log unit [dBm]) \\ EIRP_{total} = PPSD_{total} + DG $	

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3.4.4 Test Setup



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3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Unwanted Emissions

3.5.1 Transmitter Unwanted Emissions Limit

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

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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.

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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.	
□ 5.85 - 5.895 GHz	(i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of - 7 dBm/MHz at or above 5.925 GHz. (ii) For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz. (iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/ MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.725 GHz.	
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 linear distance for field-strength measurements, inverse of linear distance-squared for power-density

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3.5.2 Measuring Instruments

measurements).

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

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3.5.3 Test Procedures

Test Method

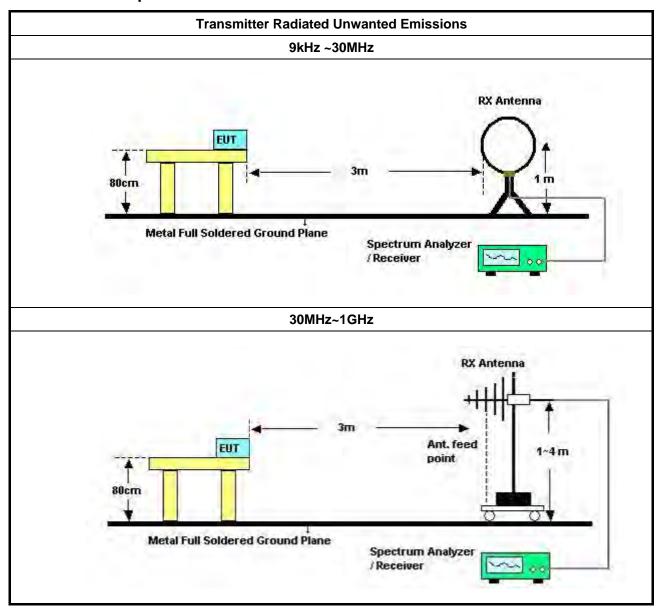
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- Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
- For the transmitter unwanted emissions shall be measured using following options below:
 - Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.
 - Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
 - Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
 - Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
 - Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
 - Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
 - Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
 - Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
- For radiated measurement.
 - Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
- The any unwanted emissions level shall not exceed the fundamental emission level.
- All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

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3.5.4 Test Setup



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Above 1GHz

BUT

3M & 1M

1.5M

Max 30cm

Spectrum Analyzer

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3.5.5 Measurement Results Calculation

The measured Level is calculated using:

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

3.5.6 Transmitter Unwanted Emissions (Below 30MHz)

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

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

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

3.5.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E

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4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics Calibration Date		Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz Feb. 26, 2020		Feb. 25, 2021	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50 -16-2	04083	150kHz ~ 100MHz Dec. 25, 2019		Dec. 24, 2020	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz Feb. 25, 2020		Feb. 24, 2021	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz Jan. 31, 2020		Jan. 30, 2021	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 20, 2020	May 19, 2021	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz		Apr. 13, 2022	Radiation (03CH03-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH03-CB	30 MHz ~ 1 GHz	30 MHz ~ 1 GHz Jan. 27, 2021		Radiation (03CH03-CB)
Bilog Antenna with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	2928 & AT-N0608	20MHz ~ 2GHz Feb. 22, 2021		Feb. 21, 2022	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8447D	2944A10259	9kHz ~ 1.3GHz Jan. 11, 2021		Jan. 10, 2022	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz Jun. 04, 2021		Jun. 03, 2022	Radiation (03CH03-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 21, 2021	Jun. 20, 2022	Radiation (03CH03-CB)
RF Cable-low	Woken	RG402	Low Cable-02+29	30MHz ~ 1GHz	Aug. 20, 2021	Aug. 19, 2022	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	- N.C.R.		Radiation (03CH03-CB)
3m Semi Anechoic Chamber VSWR	RIKEN	SAC-3M	03CH02-CB	1GHz ~18GHz 3m			Radiation (03CH02-CB
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz		Apr. 20, 2021	Radiation (03CH02-CB
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz Jul. 21, 2020		Jul. 20, 2021	Radiation (03CH02-CB
Pre-Amplifier	Agilent	83017A	MY39501305	1GHz ~ 26.5GHz Jul. 13, 2020 Ju		Jul. 12, 2021	Radiation (03CH02-CB
Pre-Amplifier	MITEQ	TTA1840-35- HG	1864479	18GHz ~ 40GHz	Jul. 08, 2020	Jul. 07, 2021	Radiation (03CH02-CB

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Calibration Calibration Instrument Model No. Serial No. Characteristics Remark Brand **Date Due Date** Spectrum Radiation R&S FSU 100015 9kHz~26GHz Oct. 15, 2020 Oct. 14, 2021 analyzer (03CH02-CB Radiation Woken RG402 High Cable-18 1GHz ~ 18GHz Oct. 05, 2020 Oct. 04, 2021 (03CH02-CB Cable-high High Radiation 1GHz ~ 18GHz Oct. 05, 2020 Oct. 04, 2021 Woken RG402 Cable-high Cable-18+19 (03CH02-CB RF High Radiation Woken RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Cable-high Cable-40G#1 (03CH02-CB Radiation High Woken RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 (03CH02-CB Cable-40G#2 Cable-high Radiation **SPORTON Test Software SENSE** V5.10 N.C.R. N.C.R. (03CH02-CB 3m Semi Anechoic 1GHz ~18GHz Radiation **TDK** SAC-3M 03CH05-CB Nov. 08, 2020 Nov. 07, 2021 Chamber 3m (03CH05-CB) **VSWR BBHA 9120** Radiation Horn Antenna SCHWARZBECK BBHA9120D 1GHz~18GHz Sep. 05, 2020 Sep. 04, 2021 (03CH05-CB) D-1291 Radiation Horn Antenna Schwarzbeck **BBHA 9170** BBHA9170252 15GHz ~ 40GHz Jul. 21, 2020 Jul. 20, 2021 (03CH05-CB) EMC12630S Radiation Pre-Amplifier **EMCI** 980287 1GHz - 26.5GHz Jul. 03, 2020 Jul. 02, 2021 (03CH05-CB) TTA1840-35-Radiation Pre-Amplifier **MITEQ** 1864479 18GHz ~ 40GHz Jul. 08, 2020 Jul. 07, 2021 HG (03CH05-CB) Spectrum Radiation FSP40 100304 9kHz ~ 40GHz R&S Nov. 10, 2020 Nov. 09, 2021 (03CH05-CB) Analyzer Radiation 1GHz~18GHz RG402 High Cable-28 Oct. 05, 2020 Oct. 04, 2021 Woken (03CH05-CB) Cable-high Radiation High Woken RG402 1GHz~18GHz Oct. 05, 2020 Oct. 04, 2021 Cable-high Cable-04+28 (03CH05-CB) RF High Radiation Woken RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Cable-40G#1 (03CH05-CB) Cable-high High Radiation 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Woken RG402 Cable-40G#2 (03CH05-CB) Cable-high Radiation Test Software **SPORTON** SENSE V5.10 N.C.R. N.C.R. (03CH05-CB) Signal Conducted R&S FSV40 101903 9kHz ~ 40GHz May 14, 2020 May 13, 2021 Analyzer (TH03-CB) Conducted Power Sensor MA2411B 1726195 300MHz~40GHz Aug. 16, 2021 Anritsu Aug. 17, 2020 (TH03-CB) Conducted Power Meter Anritsu ML2495A 1035008 300MHz~40GHz Aug. 17, 2020 Aug. 16, 2021 (TH03-CB) RF Conducted Woken RG402 High Cable-11 1 GHz -18 GHz Oct. 05, 2020 Oct. 04, 2021 (TH03-CB) Cable-high Conducted Woken RG402 1 GHz -18 GHz Oct. 05, 2020 Oct. 04, 2021 High Cable-12 Cable-high (TH03-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics Calibration Date		Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-13	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)

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

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

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FAX: 886-3-656-9085 Issued Date : Nov. 09, 2021



Conducted Emissions at Powerline

Appendix A

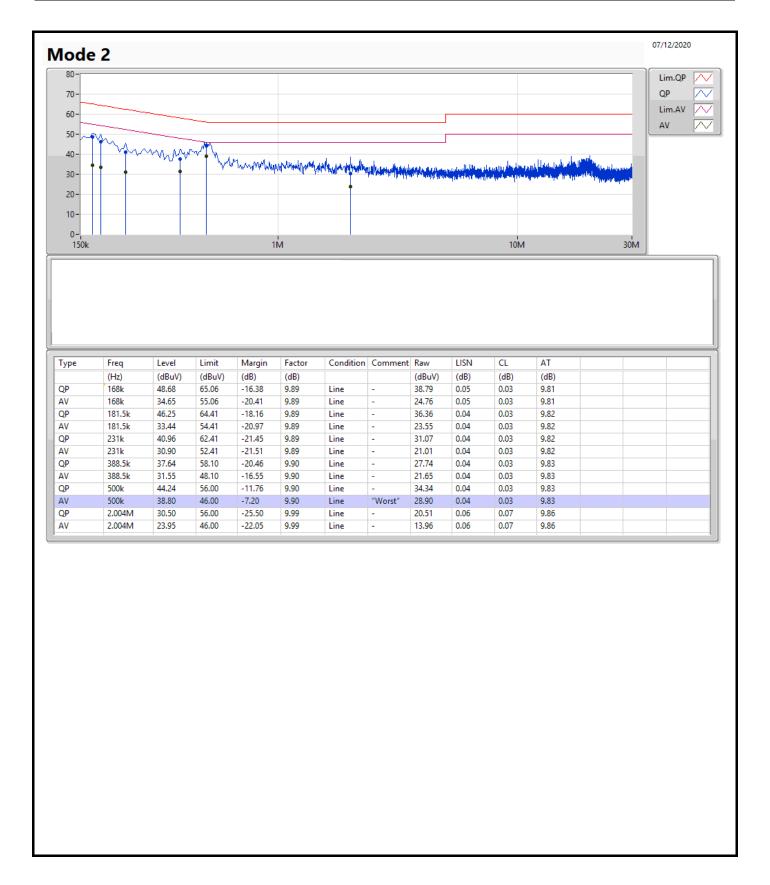
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 2	Pass	AV	500k	38.80	46.00	-7.20	Line

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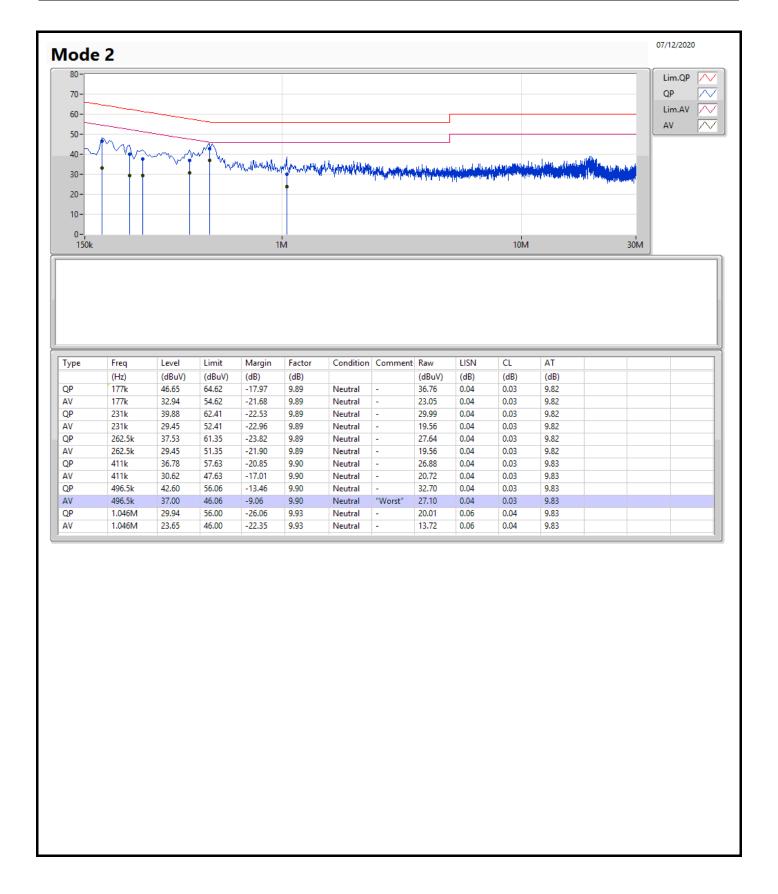




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Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.15-5.25GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	19.29M	16.432M	16M4D1D	18.42M	16.192M
802.11ax HEW20_Nss1,(MCS0)_4TX	21.33M	19.01M	19M0D1D	20.58M	18.801M
802.11ax HEW40_Nss1,(MCS0)_4TX	41.46M	37.901M	37M9D1D	40.38M	37.601M
802.11ax HEW80_Nss1,(MCS0)_4TX	82.32M	77.121M	77M1D1D	81.96M	77.001M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	16.32M	17.031M	17M0D1D	12.81M	16.102M
802.11ax HEW20_Nss1,(MCS0)_4TX	18.57M	19.1M	19M1D1D	13.95M	18.621M
802.11ax HEW40_Nss1,(MCS0)_4TX	37.98M	38.261M	38M3D1D	30.48M	37.541M
802.11ax HEW80_Nss1,(MCS0)_4TX	75.84M	77.841M	77M8D1D	67.68M	76.642M

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

Max-OBW = Maximum99% occupied bandwidth;

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

Min-OBW = Minimum 99% occupied bandwidth;

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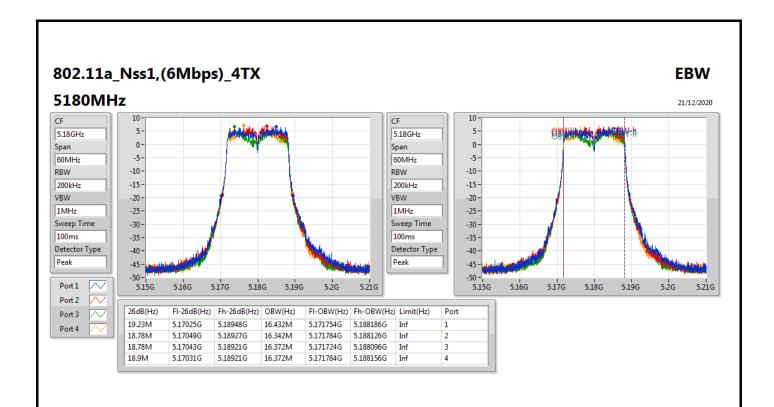
Result

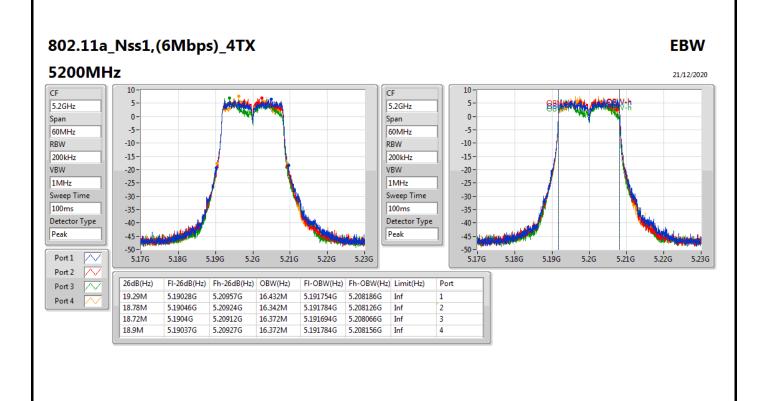
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	19.23M	16.432M	18.78M	16.342M	18.78M	16.372M	18.9M	16.372M
5200MHz	Pass	Inf	19.29M	16.432M	18.78M	16.342M	18.72M	16.372M	18.9M	16.372M
5240MHz	Pass	Inf	18.51M	16.222M	18.84M	16.312M	18.42M	16.192M	18.54M	16.282M
5745MHz	Pass	500k	16.02M	16.642M	12.81M	16.582M	15.42M	16.102M	16.32M	16.432M
5785MHz	Pass	500k	15.9M	16.702M	15.24M	16.552M	15.69M	16.522M	15M	16.402M
5825MHz	Pass	500k	15.36M	16.672M	16.26M	17.031M	15.27M	16.432M	15.3M	16.462M
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	21.18M	18.981M	21.06M	18.951M	20.67M	18.921M	21.06M	19.01M
5200MHz	Pass	Inf	21.15M	18.981M	20.91M	18.921M	20.58M	18.891M	21.33M	18.981M
5240MHz	Pass	Inf	20.67M	18.801M	20.97M	18.921M	20.79M	18.831M	20.88M	18.921M
5745MHz	Pass	500k	16.35M	18.621M	17.91M	19.1M	18.42M	19.07M	18.12M	19.01M
5785MHz	Pass	500k	15.84M	18.861M	15.15M	18.981M	13.95M	18.831M	16.26M	18.921M
5825MHz	Pass	500k	16.47M	18.951M	18.57M	19.07M	14.22M	18.741M	17.04M	18.951M
802.11ax HEW40_Nss1,(MCS0)_4TX	-	T.	-	-	·	T.	ī	-	-	=
5190MHz	Pass	Inf	40.8M	37.781M	40.98M	37.781M	40.74M	37.841M	40.44M	37.901M
5230MHz	Pass	Inf	41.46M	37.841M	41.04M	37.781M	40.38M	37.601M	40.74M	37.601M
5755MHz	Pass	500k	34.5M	37.721M	37.98M	38.081M	34.68M	37.541M	30.48M	37.961M
5795MHz	Pass	500k	35.76M	37.781M	32.76M	38.261M	33.66M	37.721M	35.1M	38.021M
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	82.2M	77.001M	81.96M	77.001M	81.96M	77.121M	82.32M	77.121M
5775MHz	Pass	500k	73.2M	77.241M	75.84M	77.841M	74.76M	76.642M	67.68M	77.481M

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;

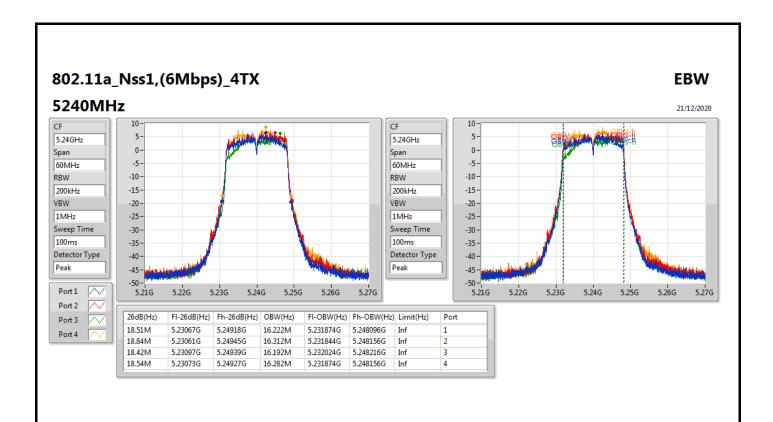
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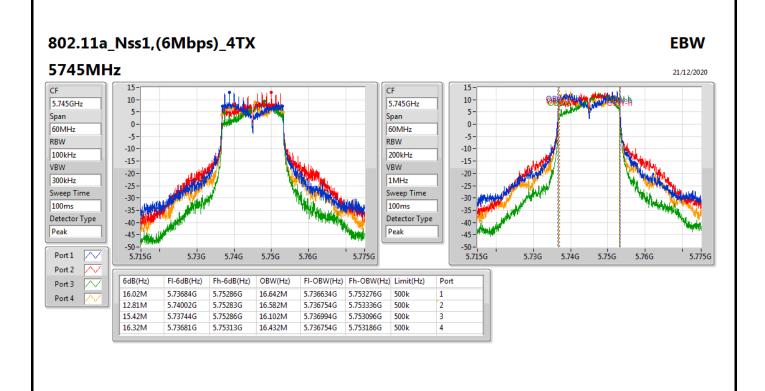
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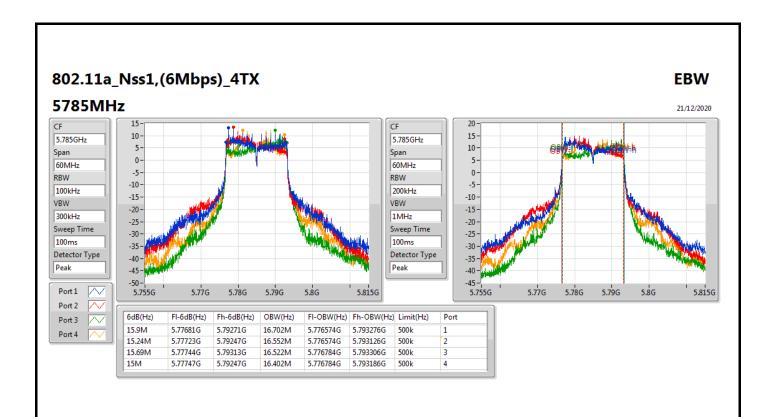


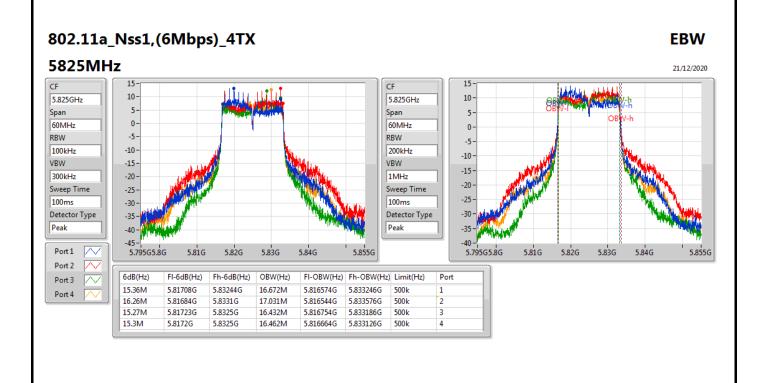
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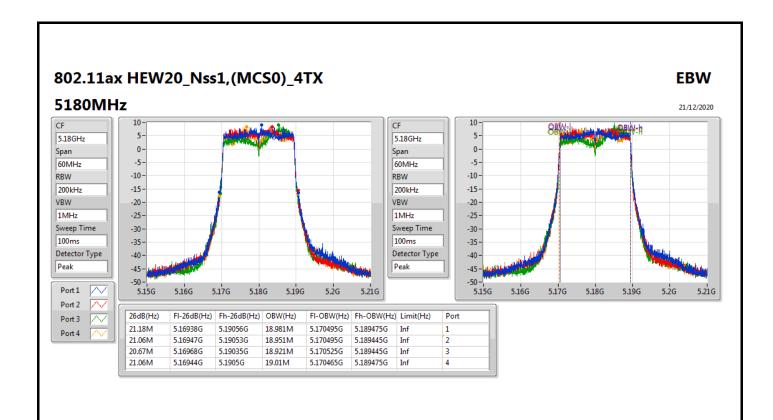


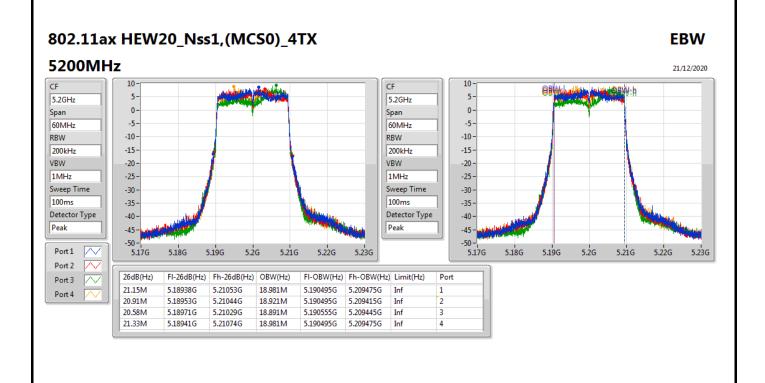
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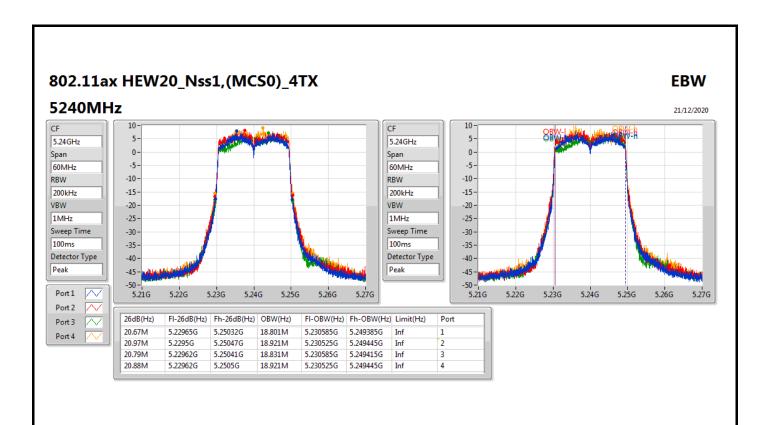


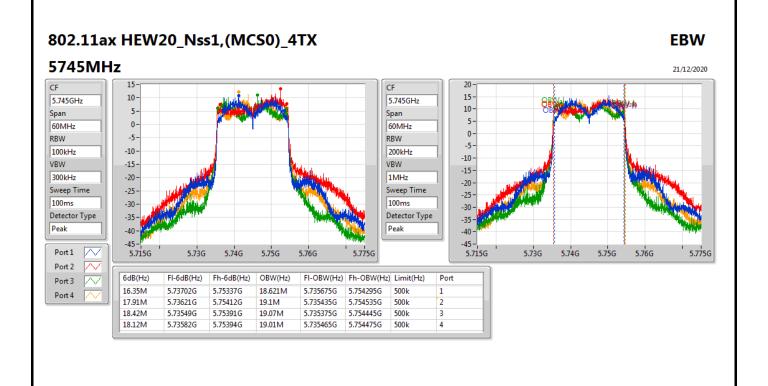
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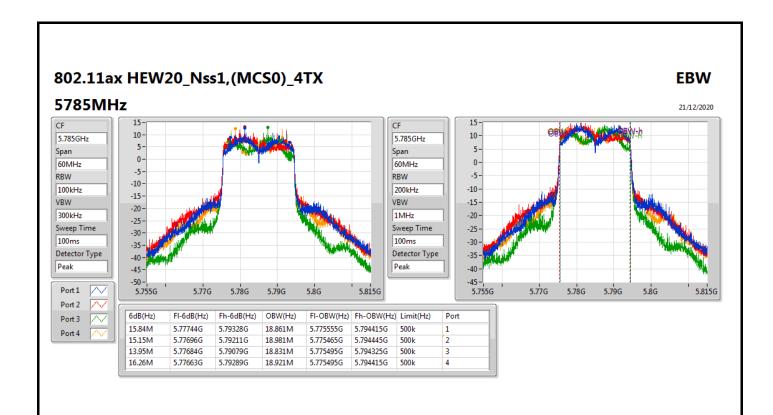


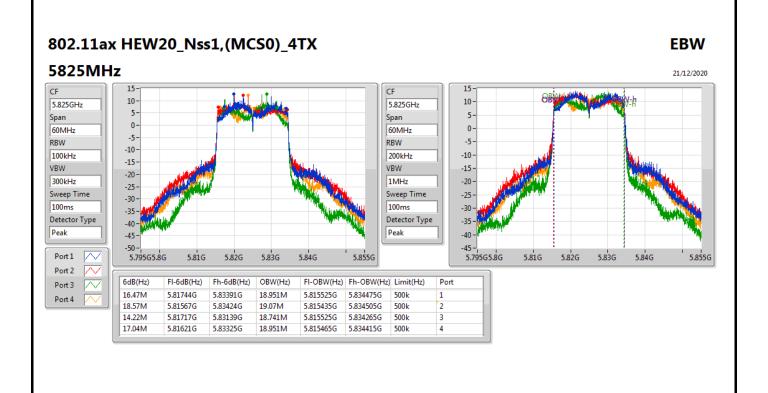
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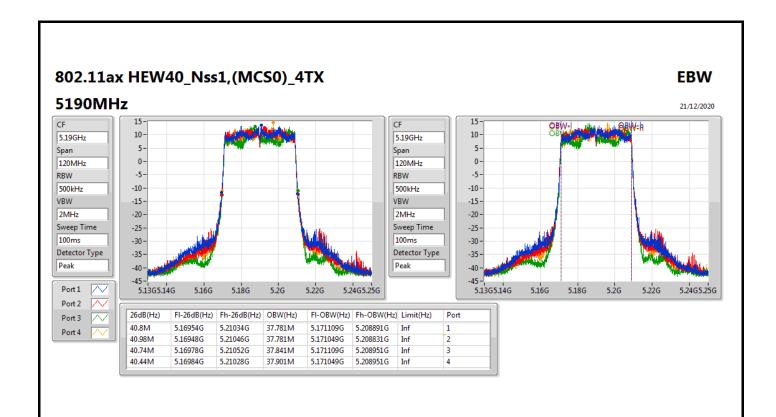


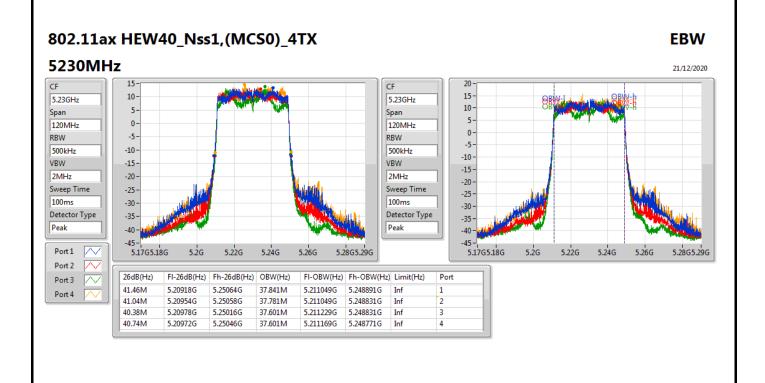
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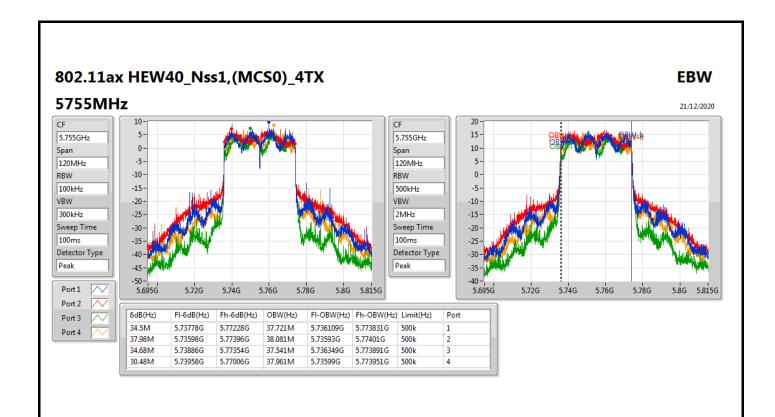


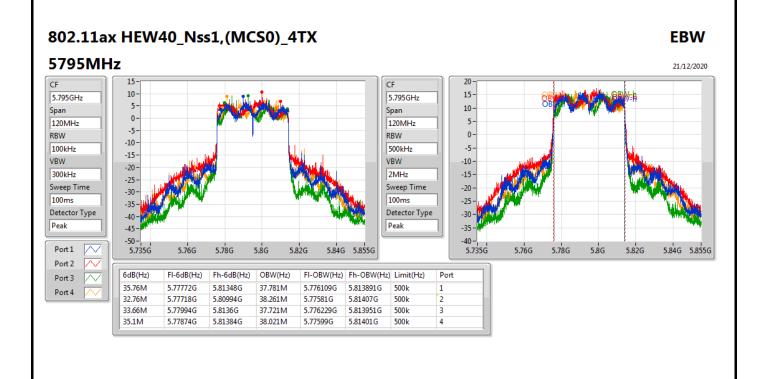
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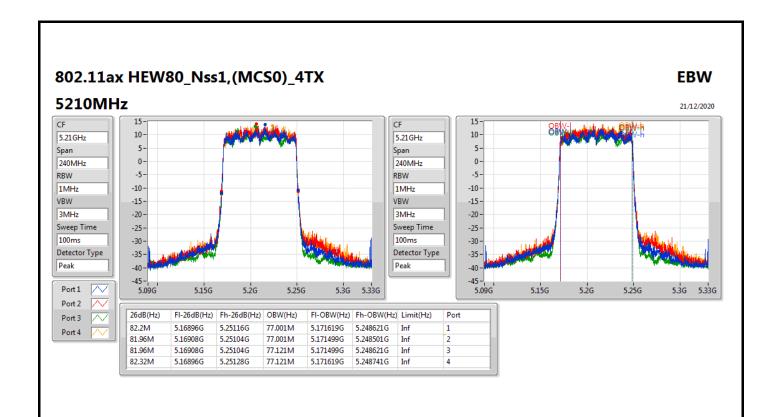


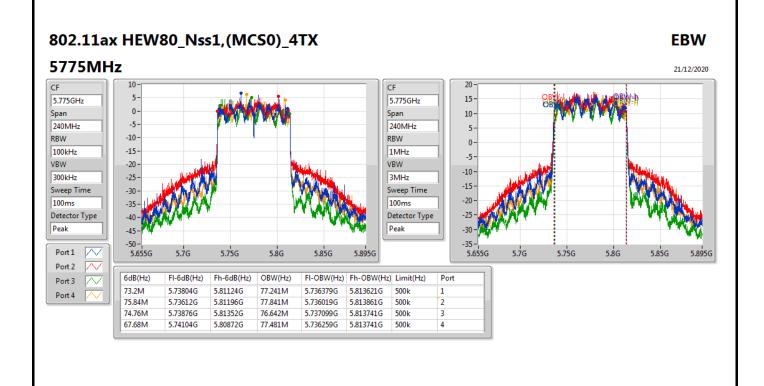
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Average Power Appendix C.1

For non-beamforming function: Summary

Mode	Total Power	Total Power		
	(dBm)	(W)		
5.15-5.25GHz	-	-		
802.11a_Nss1,(6Mbps)_4TX	22.21	0.16634		
802.11ax HEW20_Nss1,(MCS0)_4TX	22.75	0.18836		
802.11ax HEW40_Nss1,(MCS0)_4TX	25.84	0.38371		
802.11ax HEW80_Nss1,(MCS0)_4TX	24.93	0.31117		
5.725-5.85GHz	-	-		
802.11a_Nss1,(6Mbps)_4TX	28.07	0.64121		
802.11ax HEW20_Nss1,(MCS0)_4TX	28.10	0.64565		
802.11ax HEW40_Nss1,(MCS0)_4TX	28.33	0.68077		
802.11ax HEW80_Nss1,(MCS0)_4TX	27.96	0.62517		

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Appendix C.1 Average Power

Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	7.54	16.26	16.63	15.39	15.87	22.08	28.46
5200MHz	Pass	7.54	16.29	16.58	15.28	16.50	22.21	28.46
5240MHz	Pass	7.54	15.72	16.11	15.01	16.99	22.04	28.46
5745MHz	Pass	7.54	22.10	22.70	21.21	21.72	27.99	28.46
5785MHz	Pass	7.54	22.34	22.53	21.35	21.78	28.05	28.46
5825MHz	Pass	7.54	21.94	22.67	21.71	21.80	28.07	28.46
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	7.54	17.10	17.18	16.06	16.47	22.75	28.46
5200MHz	Pass	7.54	17.07	17.12	16.08	16.40	22.71	28.46
5240MHz	Pass	7.54	15.89	16.77	15.68	17.66	22.59	28.46
5745MHz	Pass	7.54	22.18	22.59	21.46	21.85	28.06	28.46
5785MHz	Pass	7.54	22.30	22.49	21.57	21.90	28.10	28.46
5825MHz	Pass	7.54	22.22	22.48	21.60	21.79	28.06	28.46
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	7.54	19.56	19.71	18.65	19.41	25.37	28.46
5230MHz	Pass	7.54	20.01	19.78	18.65	20.62	25.84	28.46
5755MHz	Pass	7.54	22.26	22.80	21.13	21.87	28.08	28.46
5795MHz	Pass	7.54	22.30	22.97	21.73	22.15	28.33	28.46
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	7.54	18.39	19.38	18.22	19.49	24.93	28.46
5775MHz	Pass	7.54	21.72	22.80	21.21	21.87	27.96	28.46

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

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Appendix C.2 Average Power

For beamforming function: **Summary**

Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	22.75	0.18836
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	22.89	0.19454
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	22.88	0.19409
5.725-5.85GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	22.94	0.19679
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	22.77	0.18923
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	22.73	0.18750

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Appendix C.2 Average Power

Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	13.03	17.1	17.18	16.06	16.47	22.75	22.97
5200MHz	Pass	13.03	17.07	17.12	16.08	16.4	22.71	22.97
5240MHz	Pass	13.03	15.89	16.77	15.68	17.66	22.59	22.97
5745MHz	Pass	13.03	16.65	17.30	15.45	16.58	22.57	22.97
5785MHz	Pass	13.03	17.39	17.67	15.89	16.51	22.94	22.97
5825MHz	Pass	13.03	16.82	17.41	16.52	16.52	22.85	22.97
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	13.03	17.51	17.27	15.83	16.69	22.89	22.97
5230MHz	Pass	13.03	16.11	17.10	15.72	17.68	22.74	22.97
5755MHz	Pass	13.03	16.71	17.51	15.58	16.39	22.62	22.97
5795MHz	Pass	13.03	16.81	17.52	16.01	16.54	22.77	22.97
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	13.03	16.41	17.43	15.96	17.44	22.88	22.97
5775MHz	Pass	13.03	16.64	17.56	15.86	16.61	22.73	22.97

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

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Appendix D **PSD**

Summary

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	
802.11a_Nss1,(6Mbps)_4TX	9.79
802.11ax HEW20_Nss1,(MCS0)_4TX	9.68
802.11ax HEW40_Nss1,(MCS0)_4TX	9.97
802.11ax HEW80_Nss1,(MCS0)_4TX	6.34
5.725-5.85GHz	
802.11a_Nss1,(6Mbps)_4TX	14.27
802.11ax HEW20_Nss1,(MCS0)_4TX	13.98
802.11ax HEW40_Nss1,(MCS0)_4TX	11.63
802.11ax HEW80_Nss1,(MCS0)_4TX	8.63

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

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Result

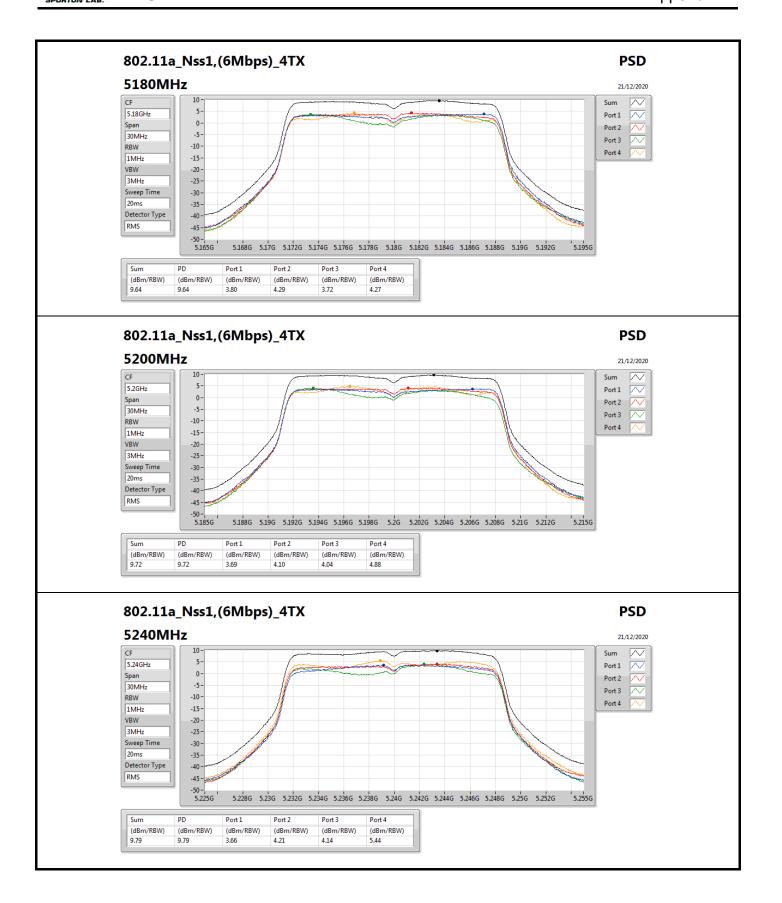
Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	13.03	3.80	4.29	3.72	4.27	9.64	9.97
5200MHz	Pass	13.03	3.69	4.10	4.04	4.88	9.72	9.97
5240MHz	Pass	13.03	3.66	4.21	4.14	5.44	9.79	9.97
5745MHz	Pass	13.03	9.06	9.14	9.36	8.69	14.27	22.97
5785MHz	Pass	13.03	9.46	9.98	9.15	9.16	14.23	22.97
5825MHz	Pass	13.03	9.11	8.84	8.91	8.34	13.92	22.97
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	13.03	4.36	4.31	5.09	4.38	9.49	9.97
5200MHz	Pass	13.03	4.32	4.40	4.93	5.05	9.65	9.97
5240MHz	Pass	13.03	3.31	3.79	3.42	5.24	9.68	9.97
5745MHz	Pass	13.03	8.52	9.23	8.07	8.49	13.98	22.97
5785MHz	Pass	13.03	8.74	9.23	8.65	8.03	13.58	22.97
5825MHz	Pass	13.03	8.75	8.50	8.49	7.81	13.35	22.97
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	13.03	4.33	3.97	5.09	4.43	9.81	9.97
5230MHz	Pass	13.03	4.50	4.27	4.73	5.42	9.97	9.97
5755MHz	Pass	13.03	5.99	6.43	5.02	5.91	11.60	22.97
5795MHz	Pass	13.03	5.89	6.57	5.36	6.21	11.63	22.97
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	13.03	0.31	0.66	0.79	1.63	6.34	9.97
5775MHz	Pass	13.03	2.92	3.42	2.55	2.95	8.63	22.97

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

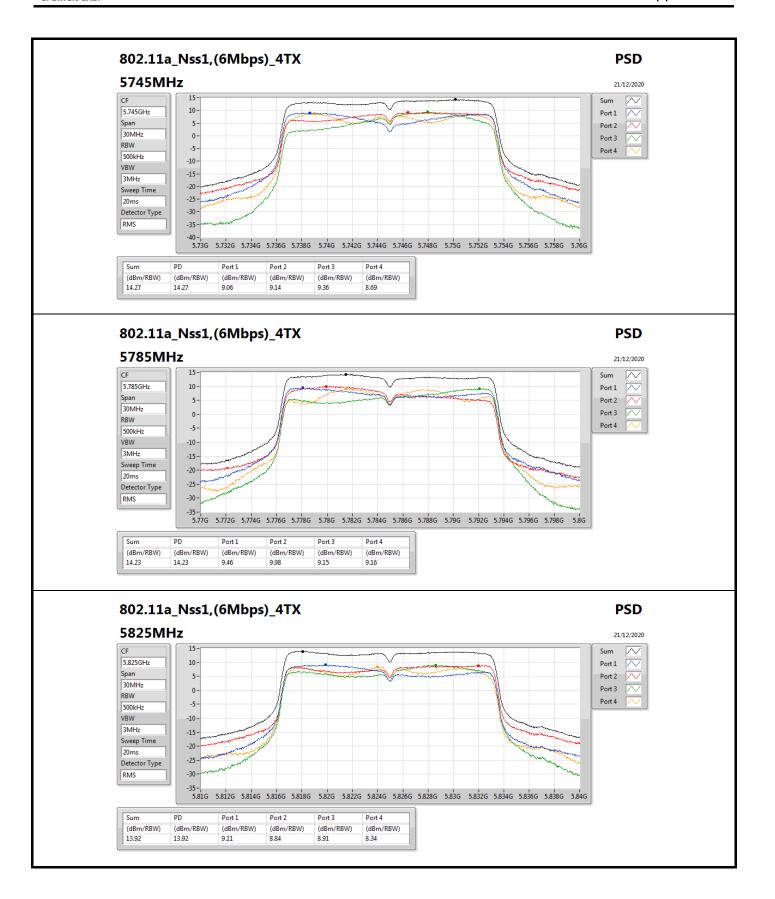
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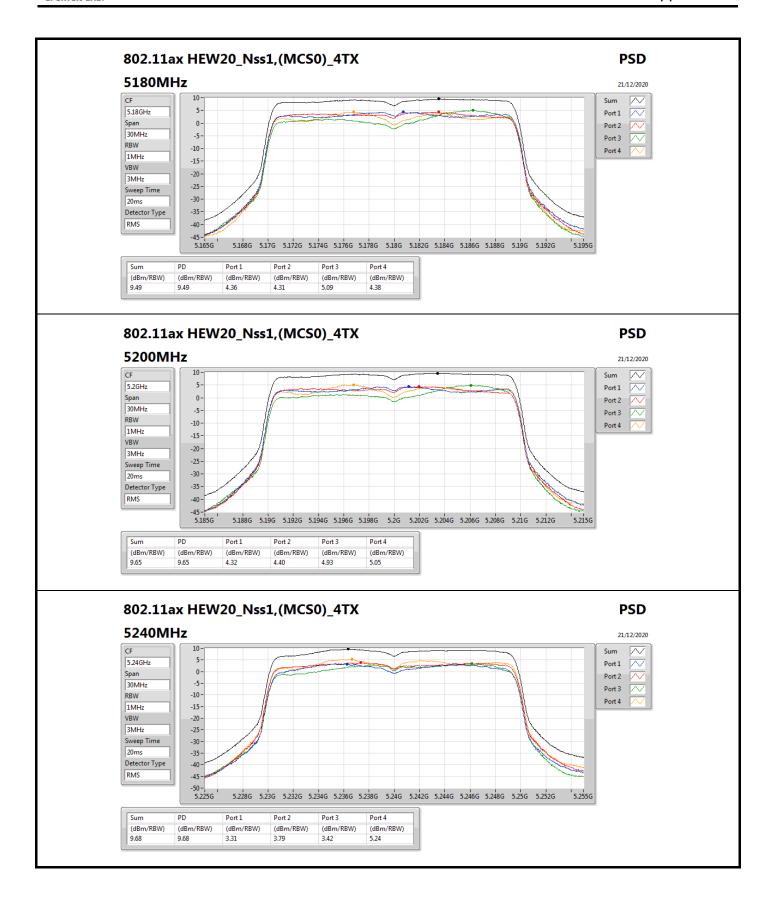
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;



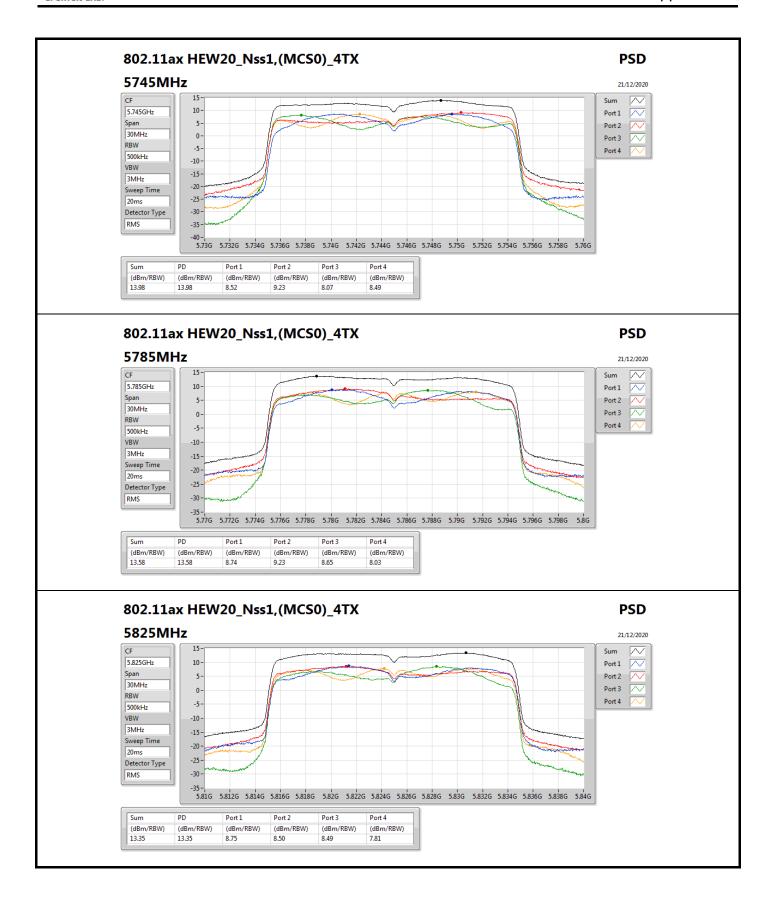
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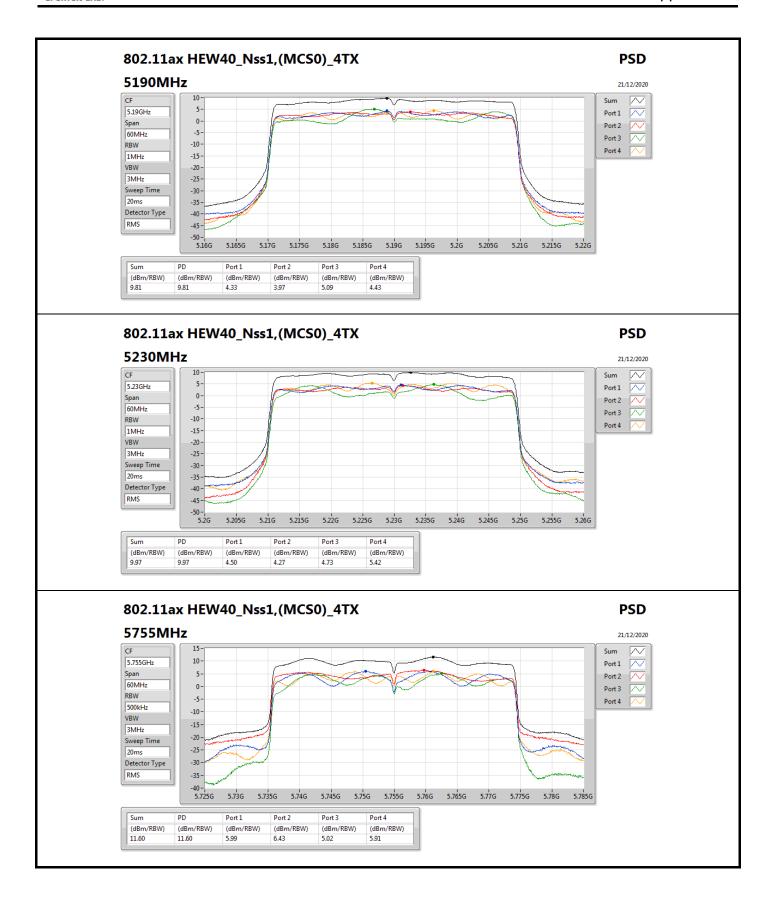
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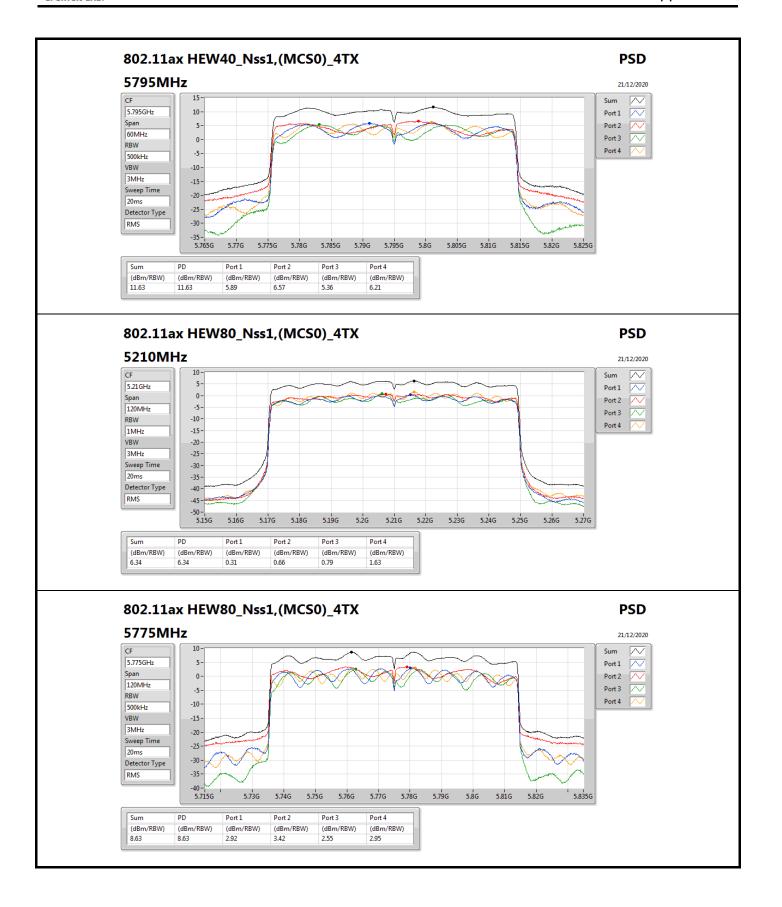
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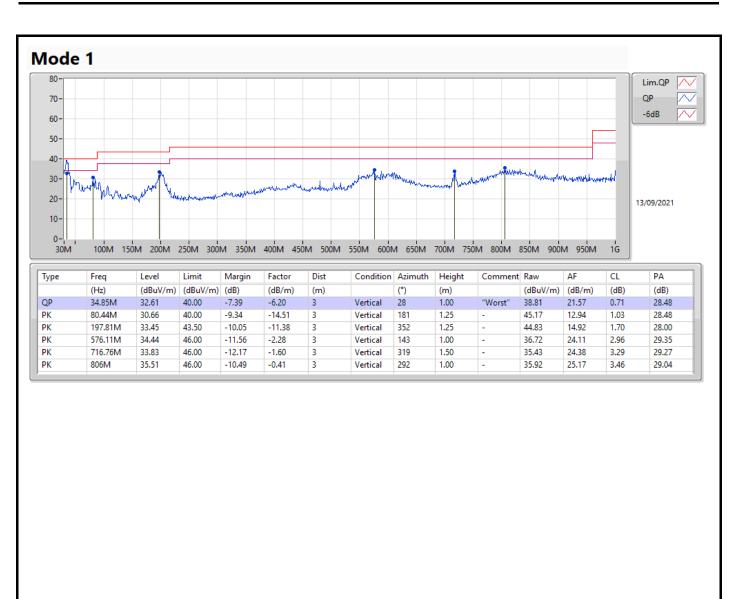
Radiated Emissions below 1GHz

Appendix E.1

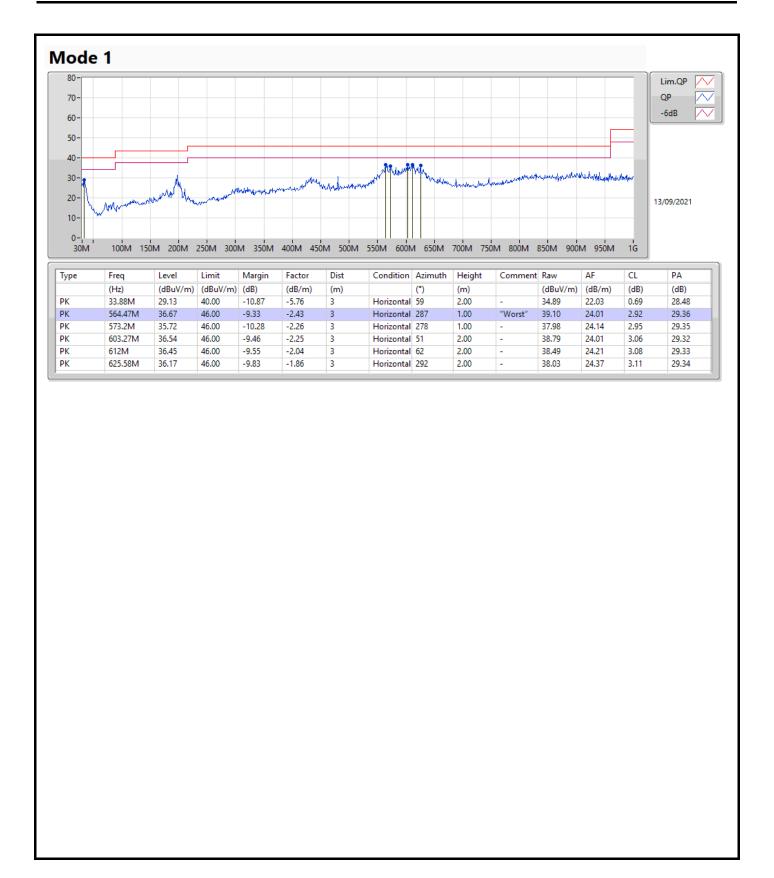
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	34.85M	32.61	40.00	-7.39	Vertical

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Radiated Emissions below 1GHz

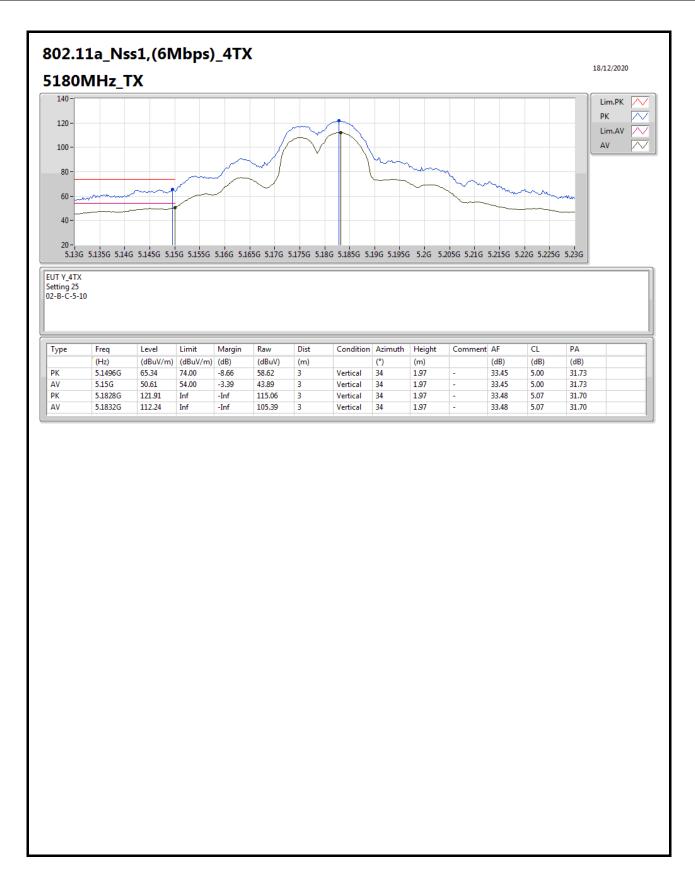
Appendix E.2

Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
5.15-5.25GHz	-	-	•	-	-	-	-	-	-	-	-
802.11ax HEW40_Nss1,(MCS0)_4TX	Pass	AV	5.15G	53.98	54.00	-0.02	3	Horizontal	57	1.80	-

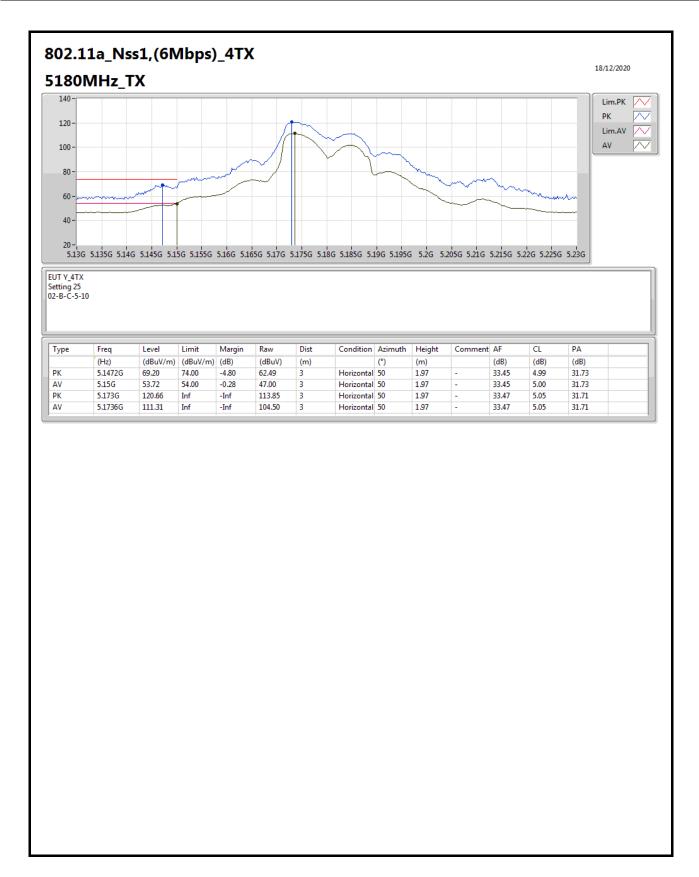
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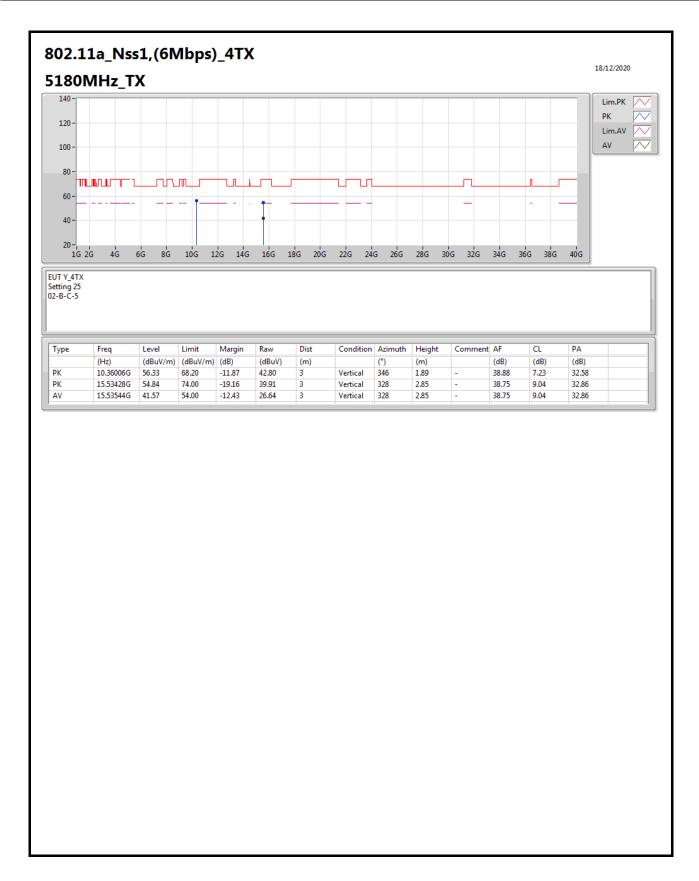
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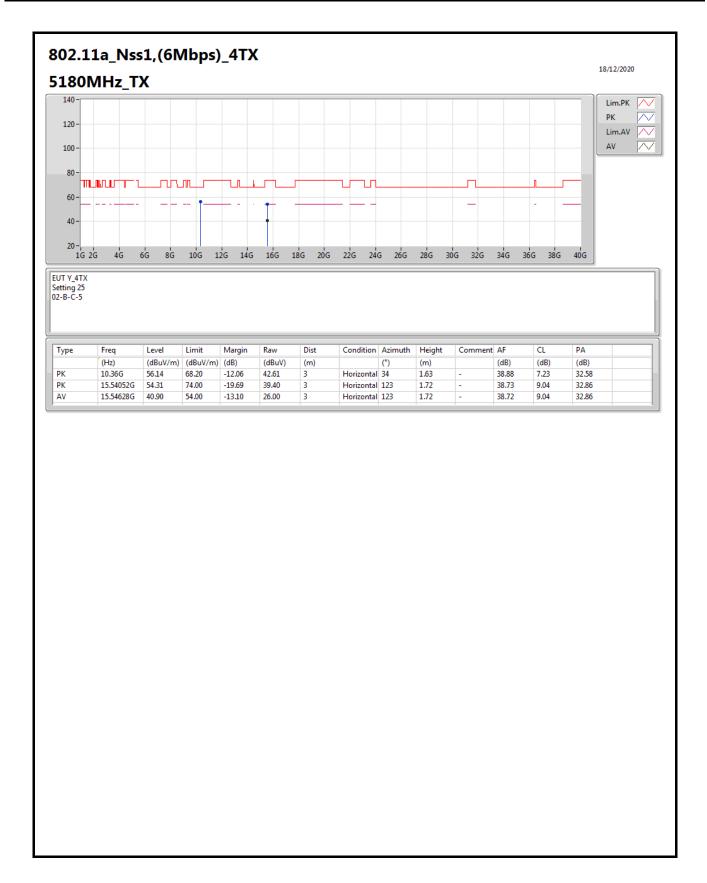
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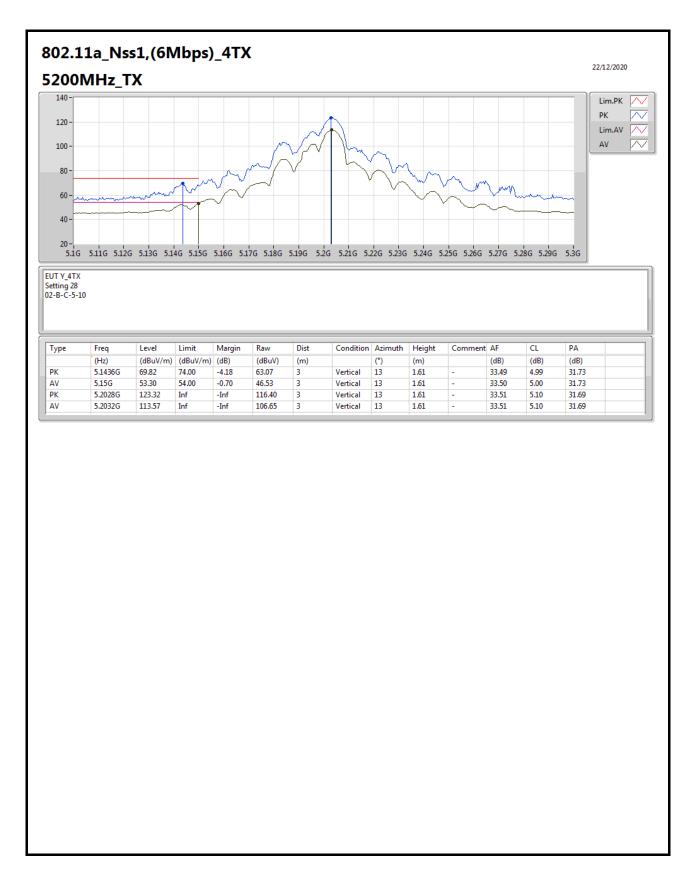
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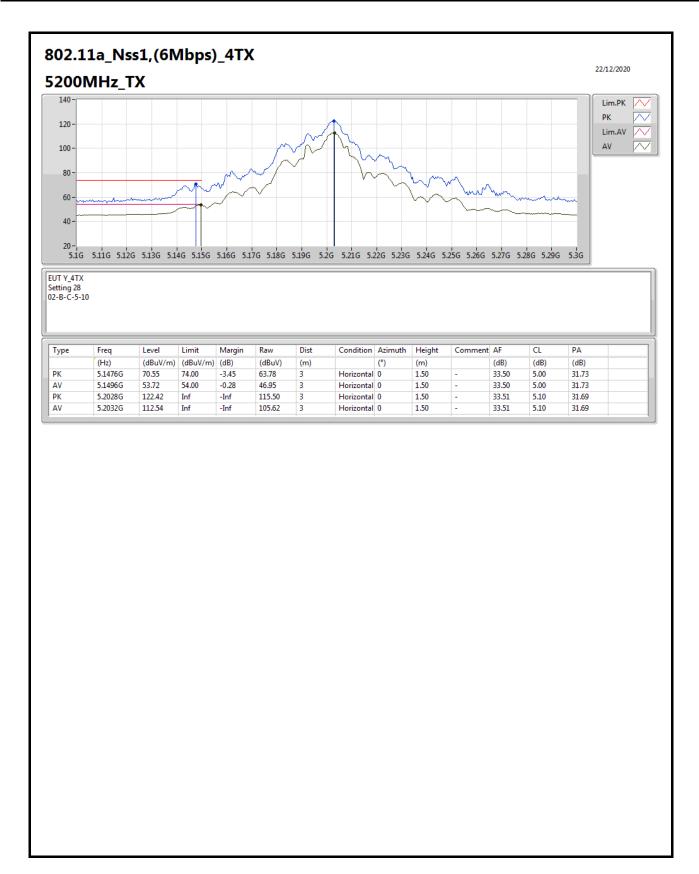
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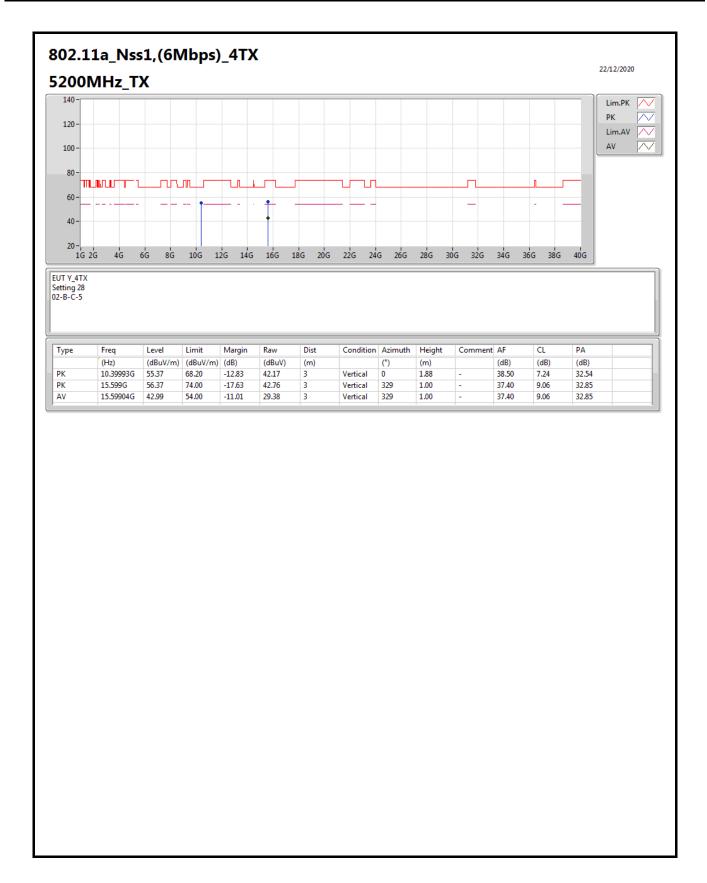
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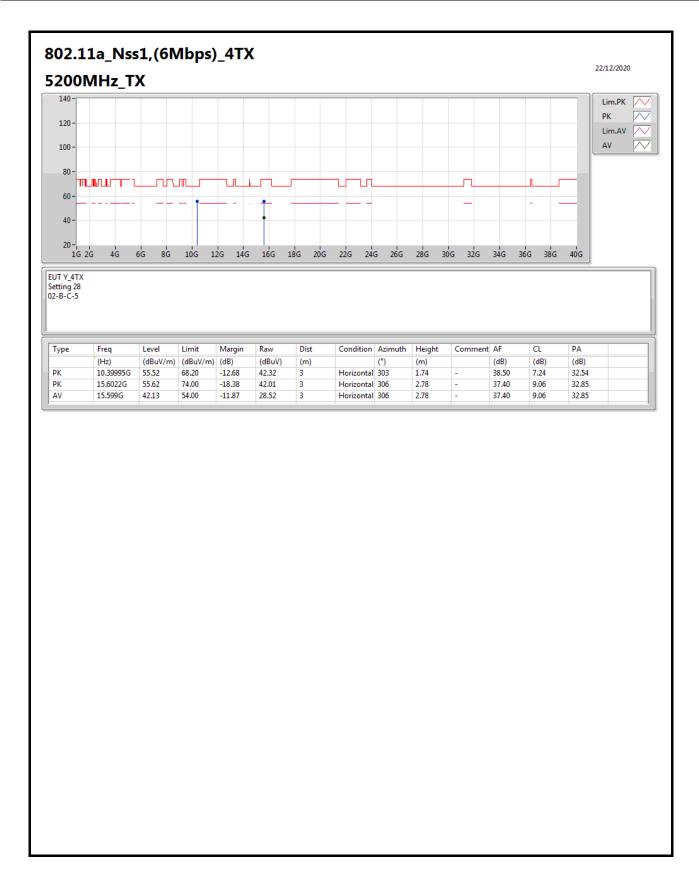
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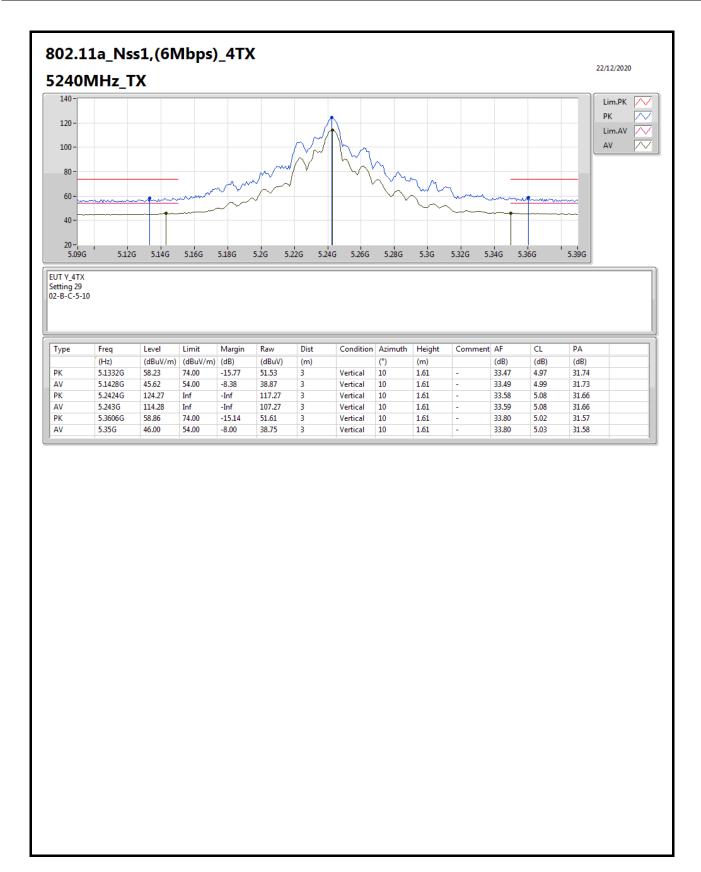
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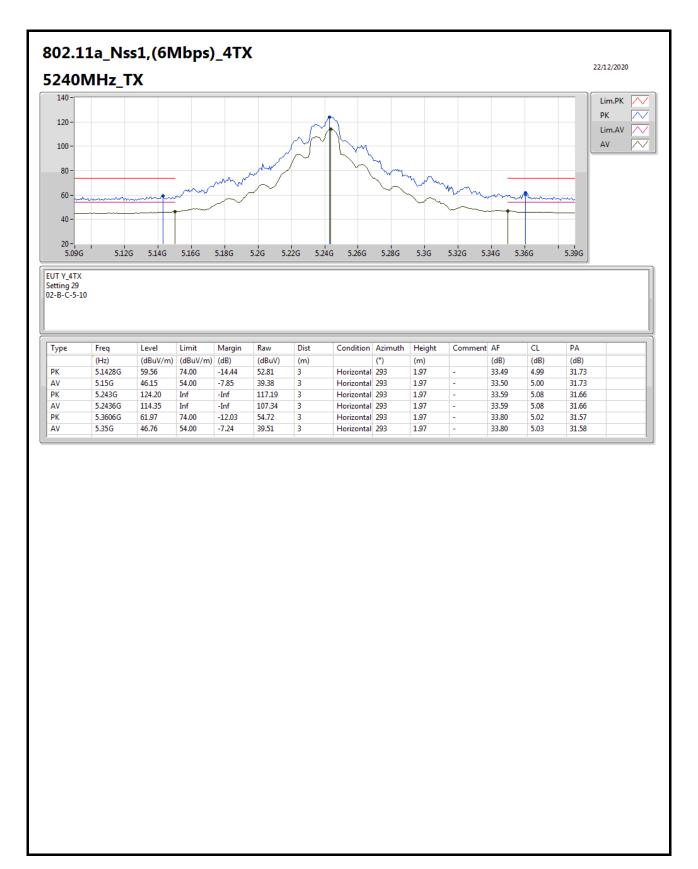
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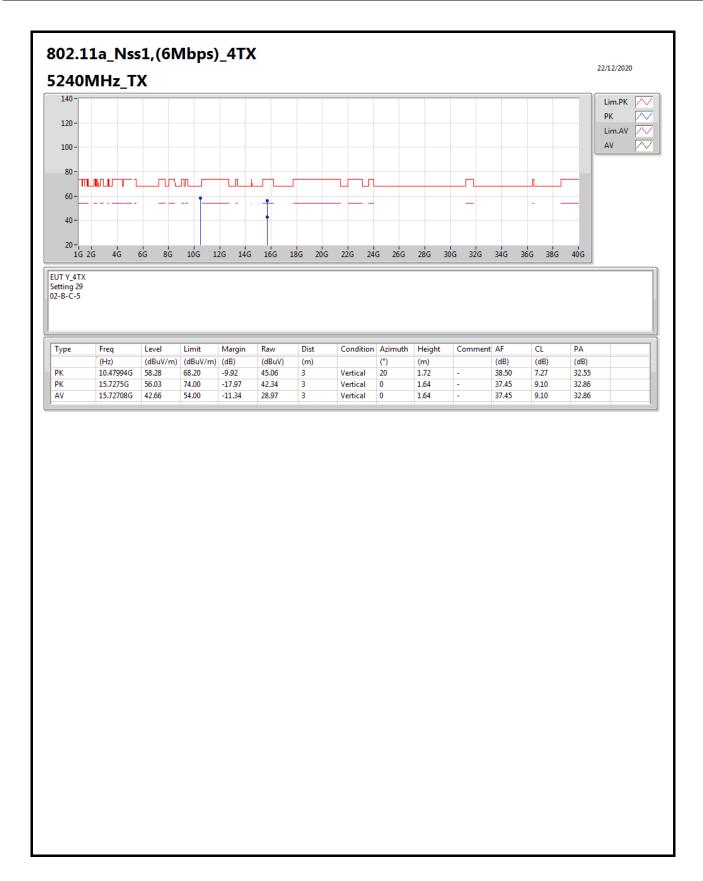
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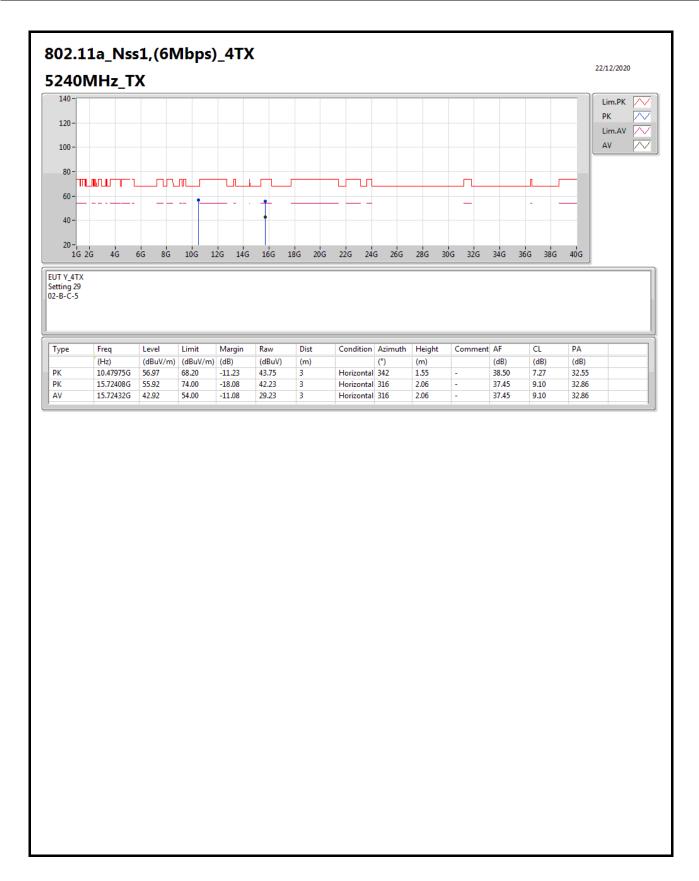
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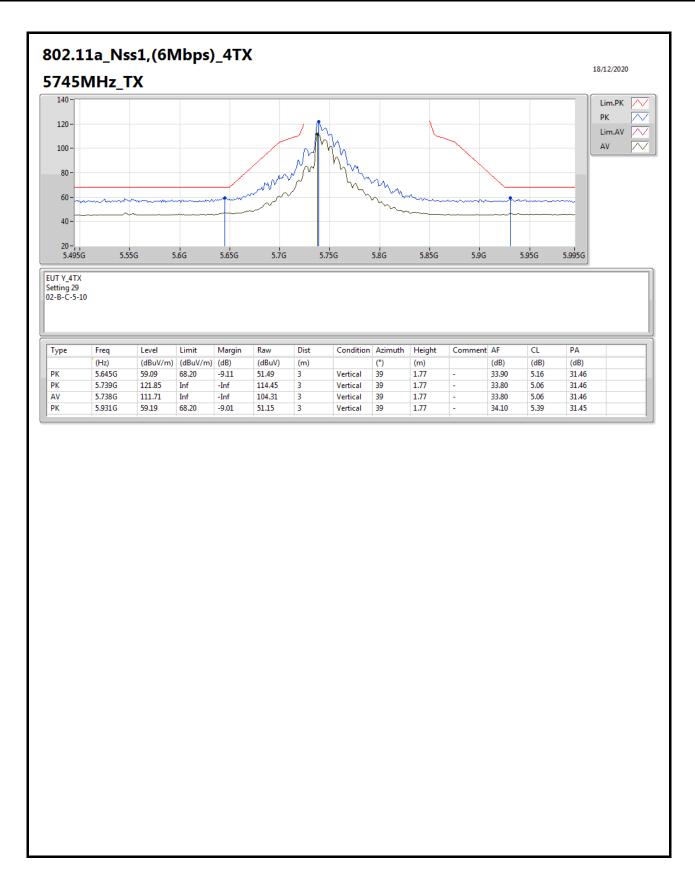
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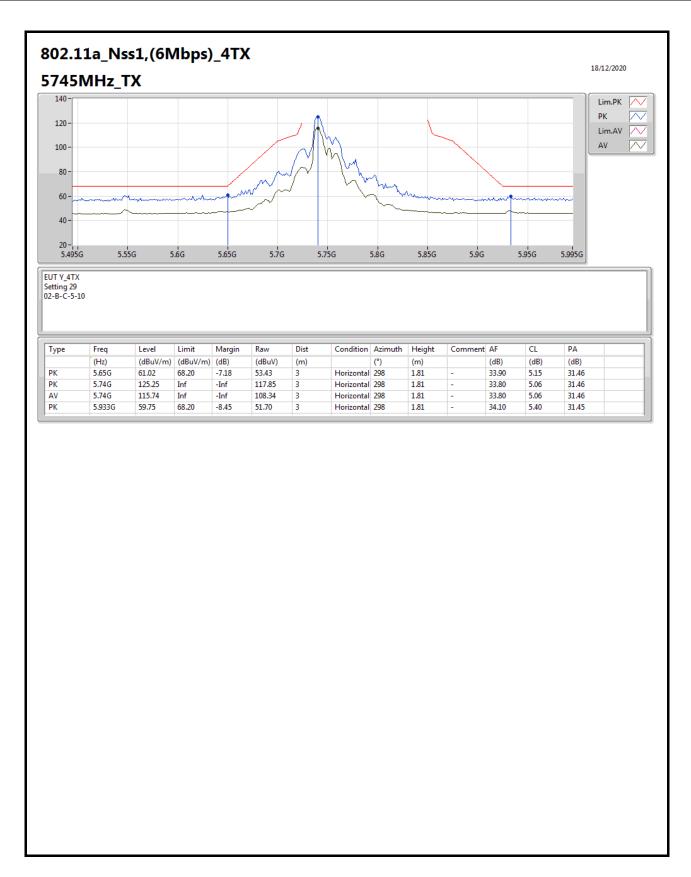
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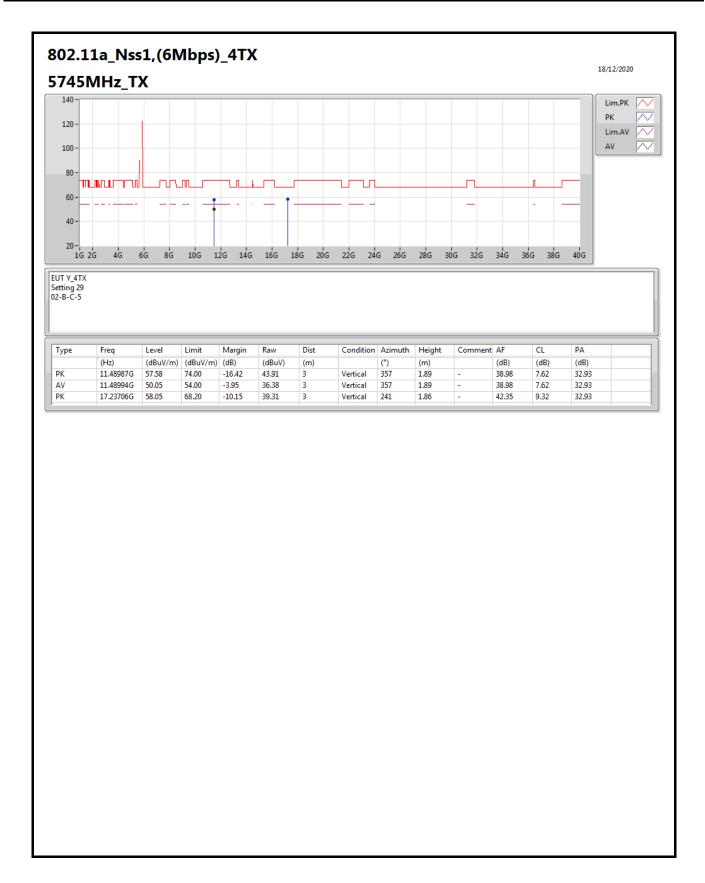
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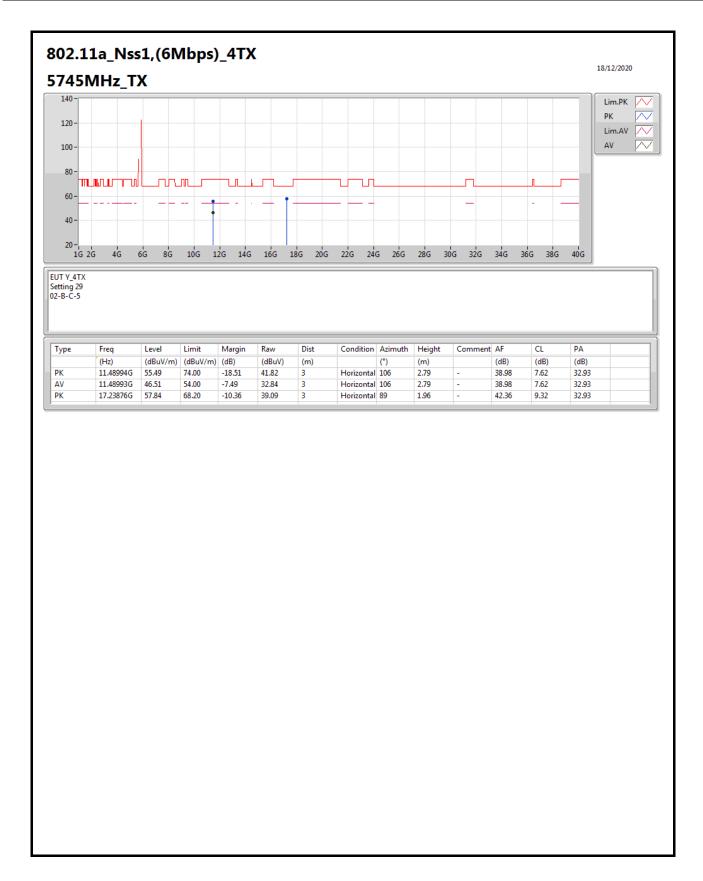
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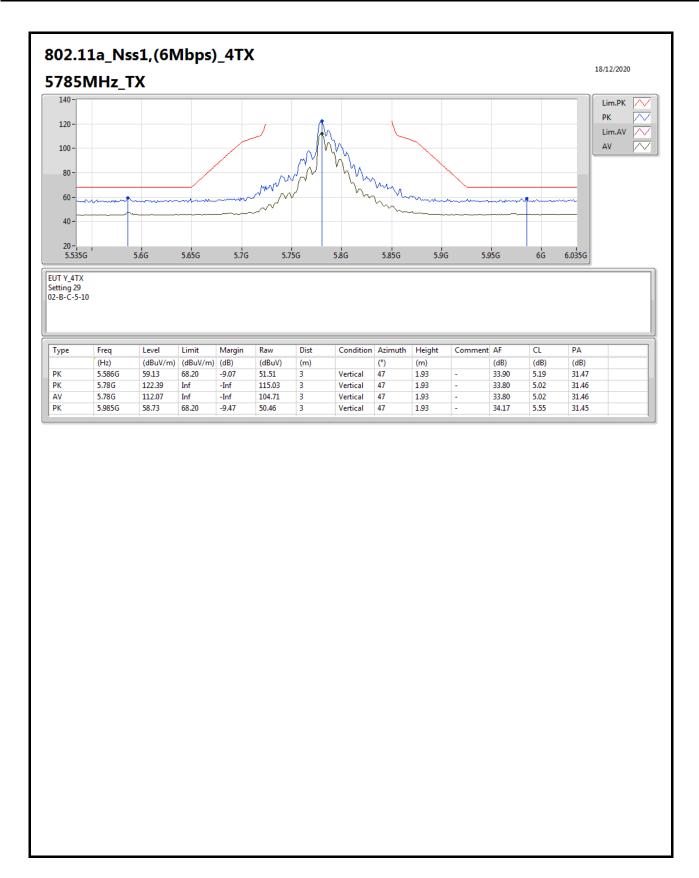
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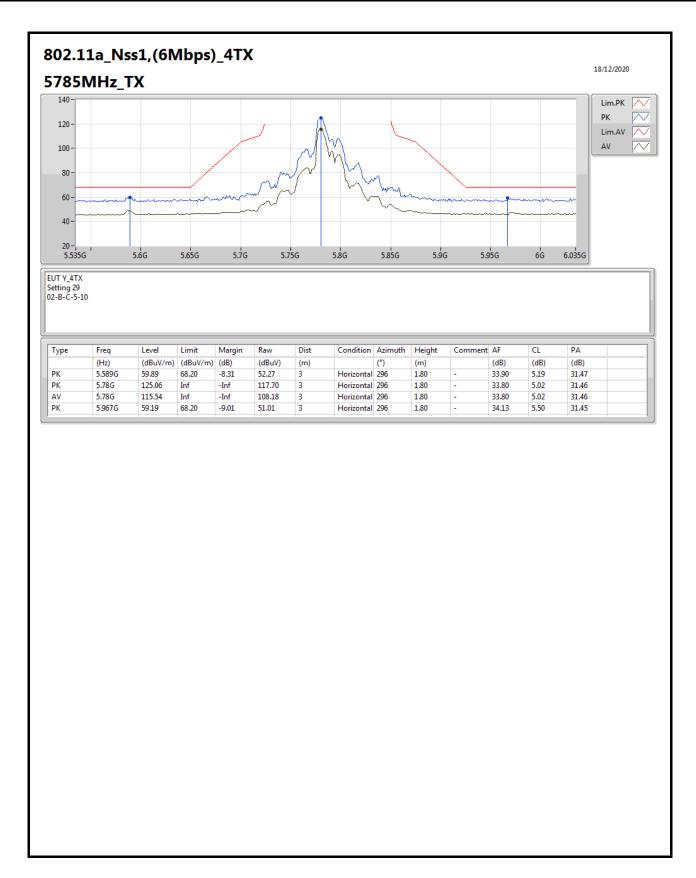
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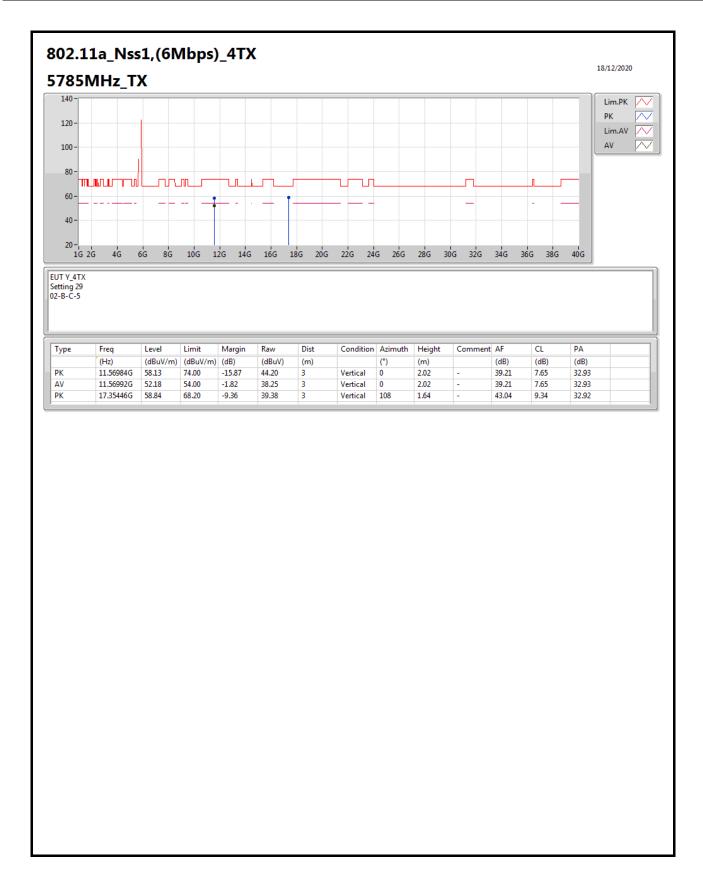
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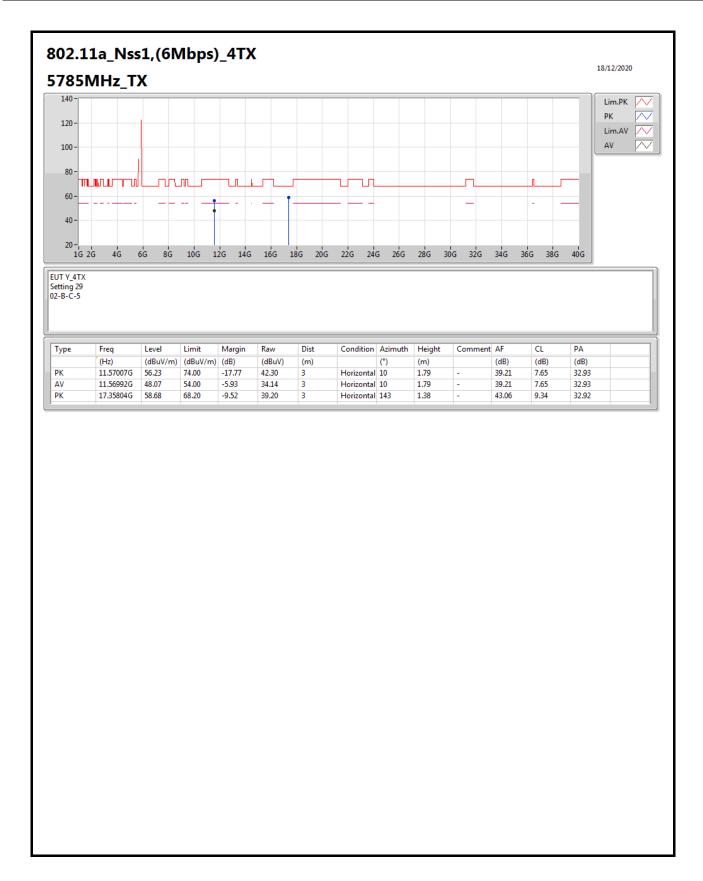
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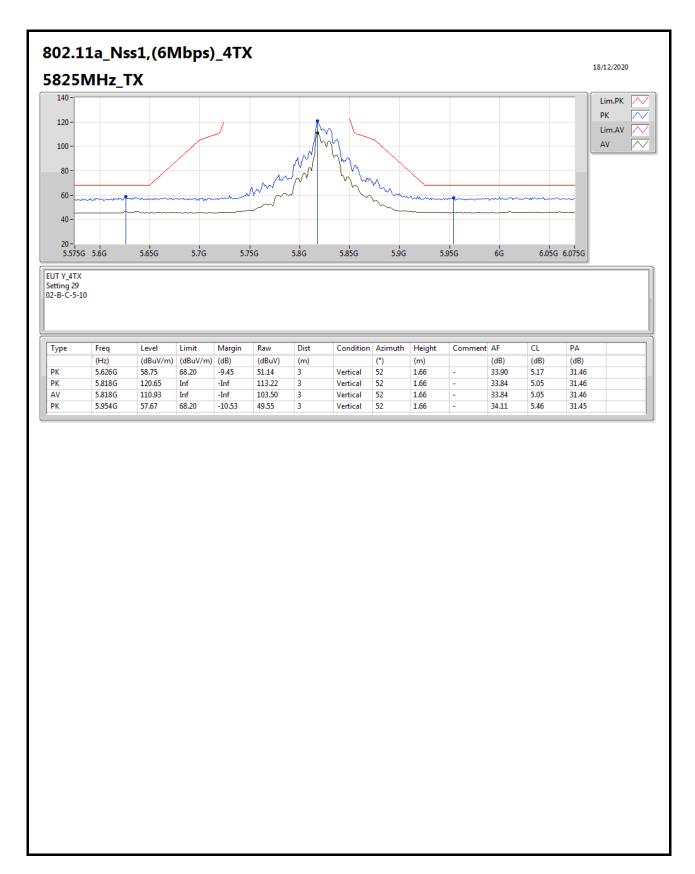
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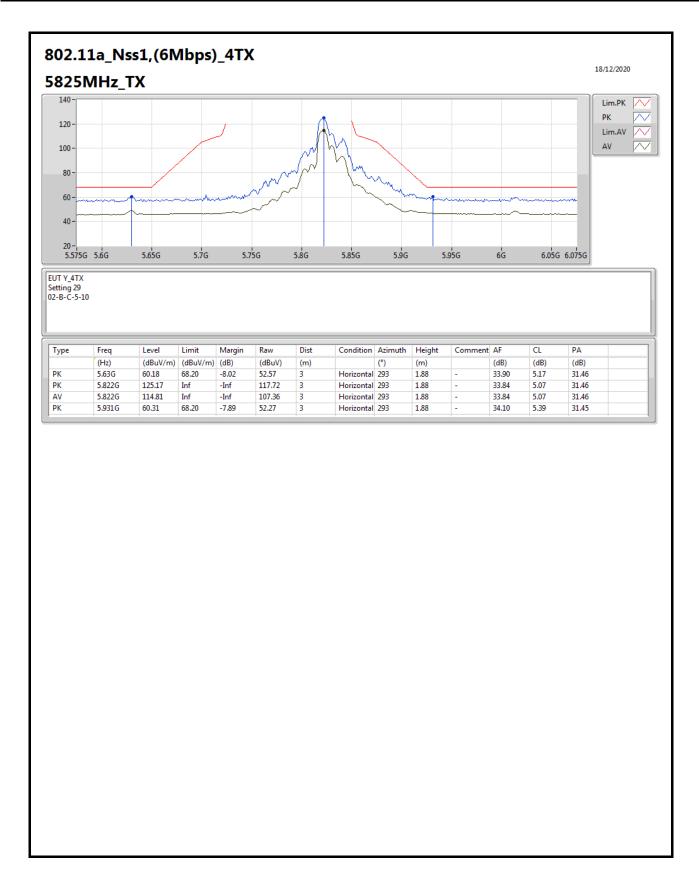
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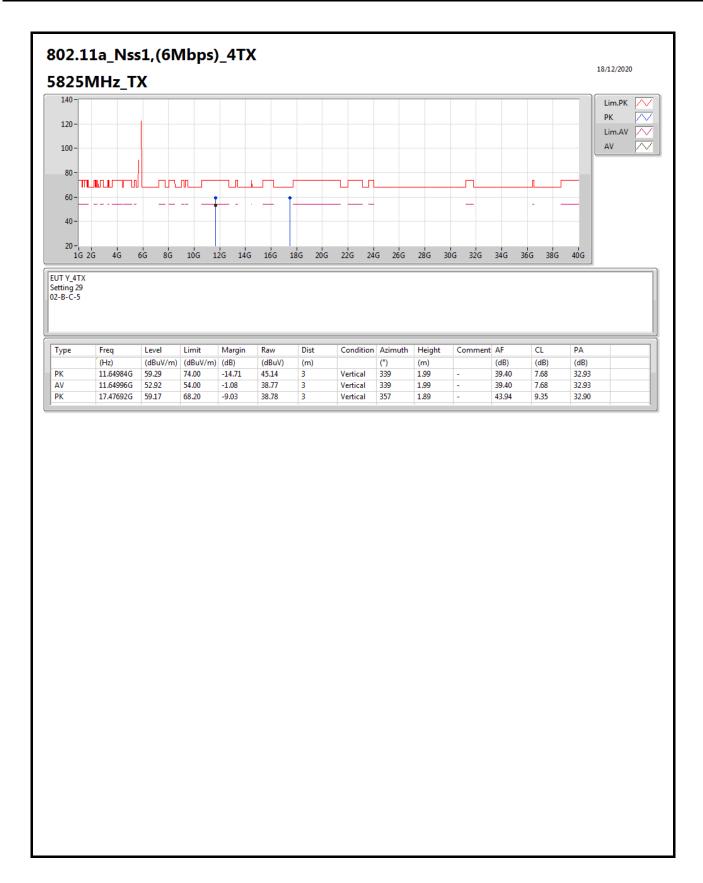
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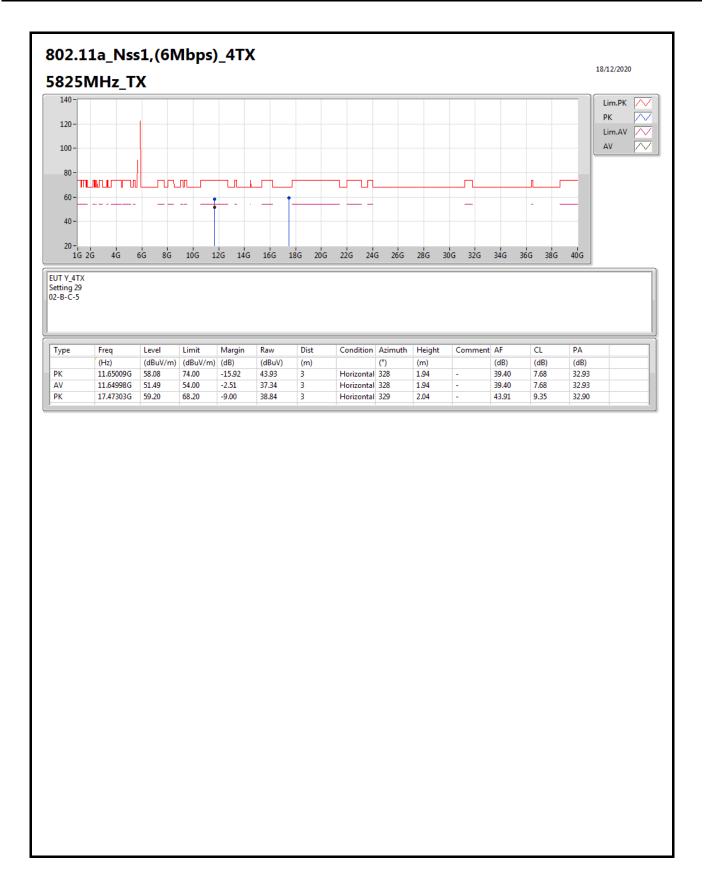
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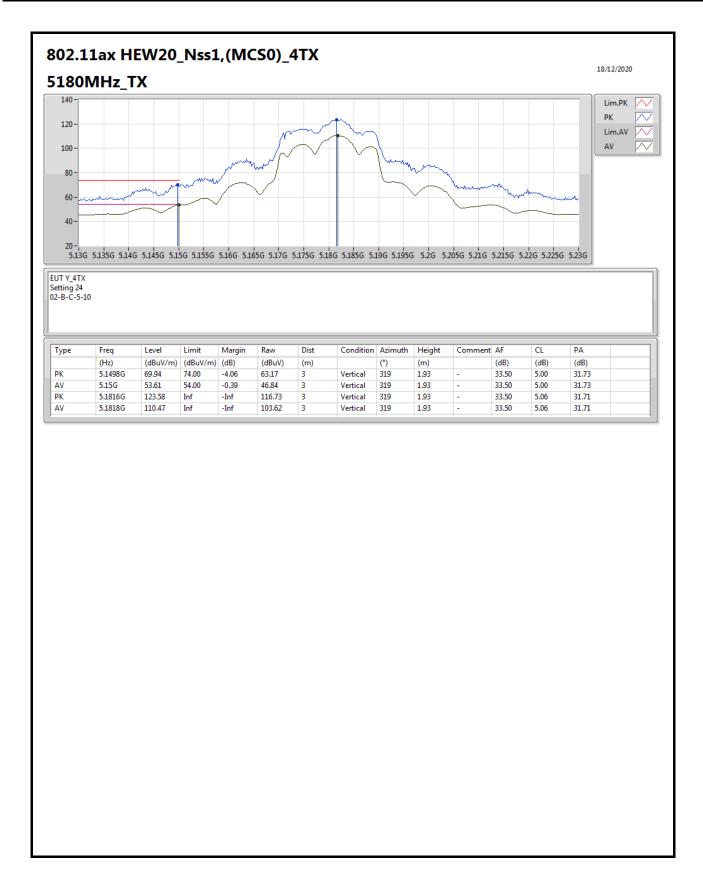
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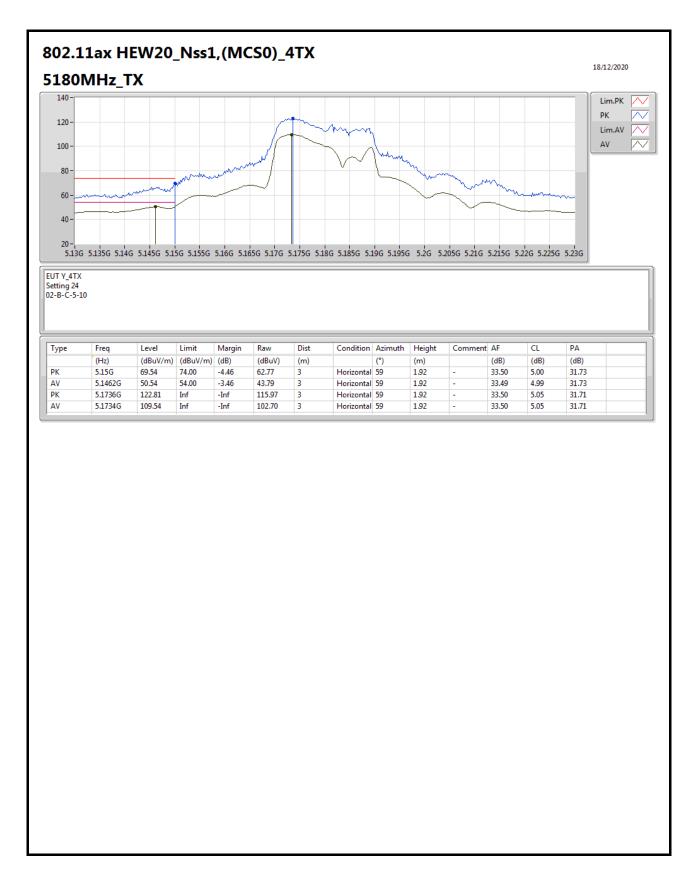
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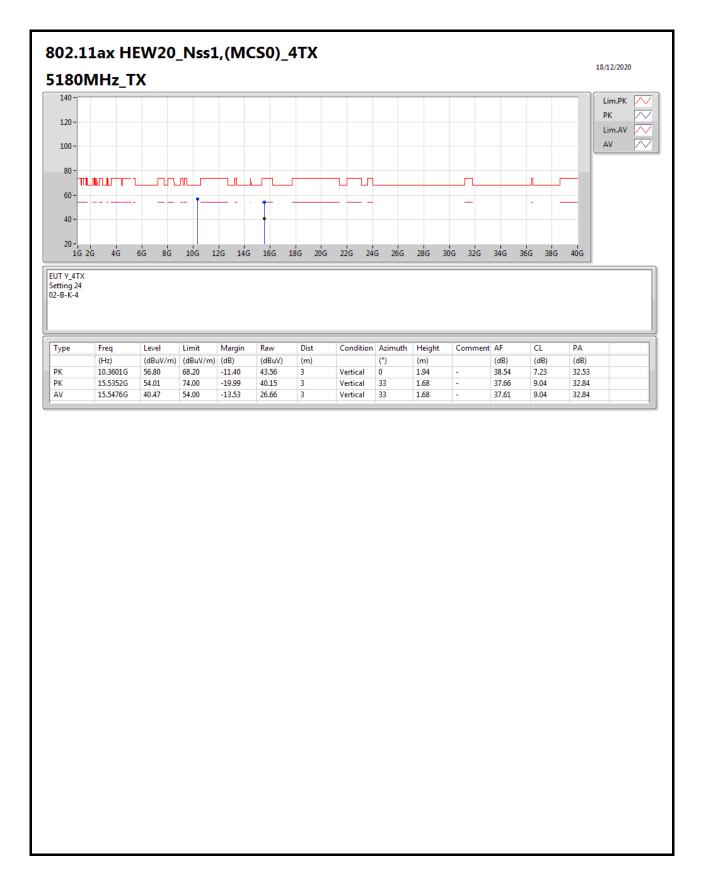
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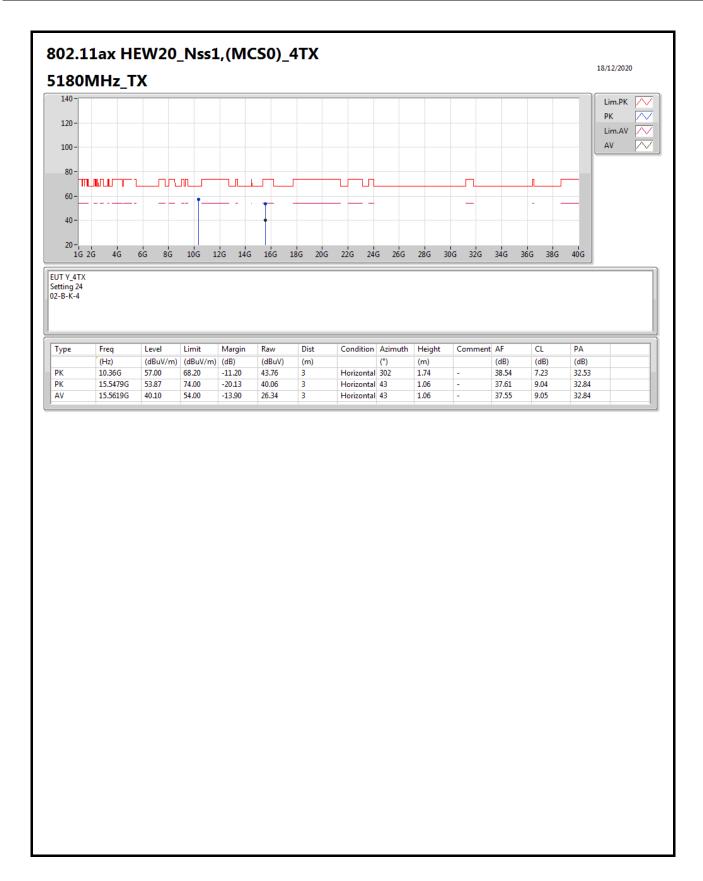
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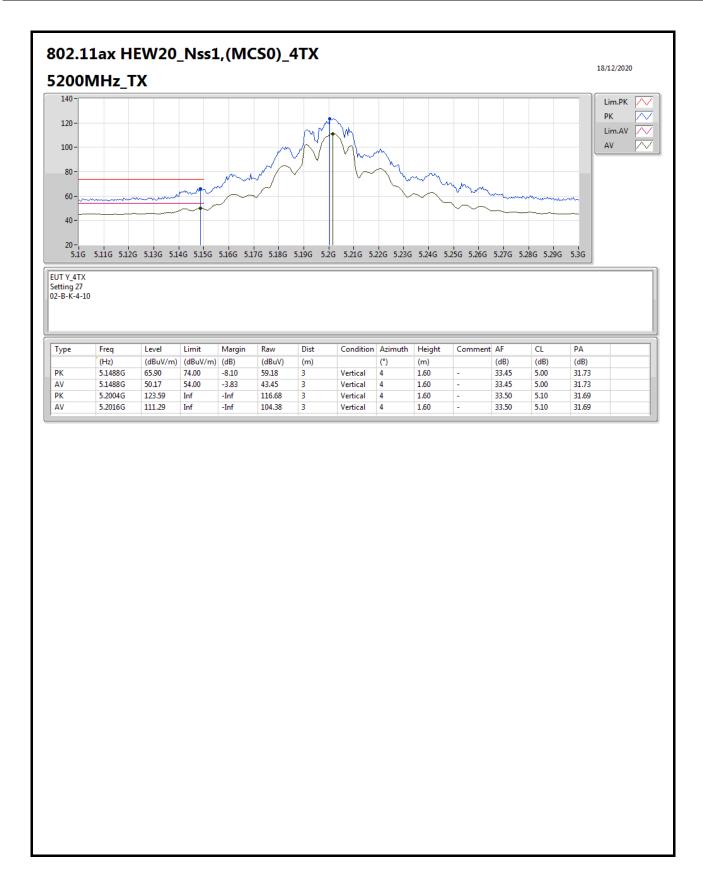
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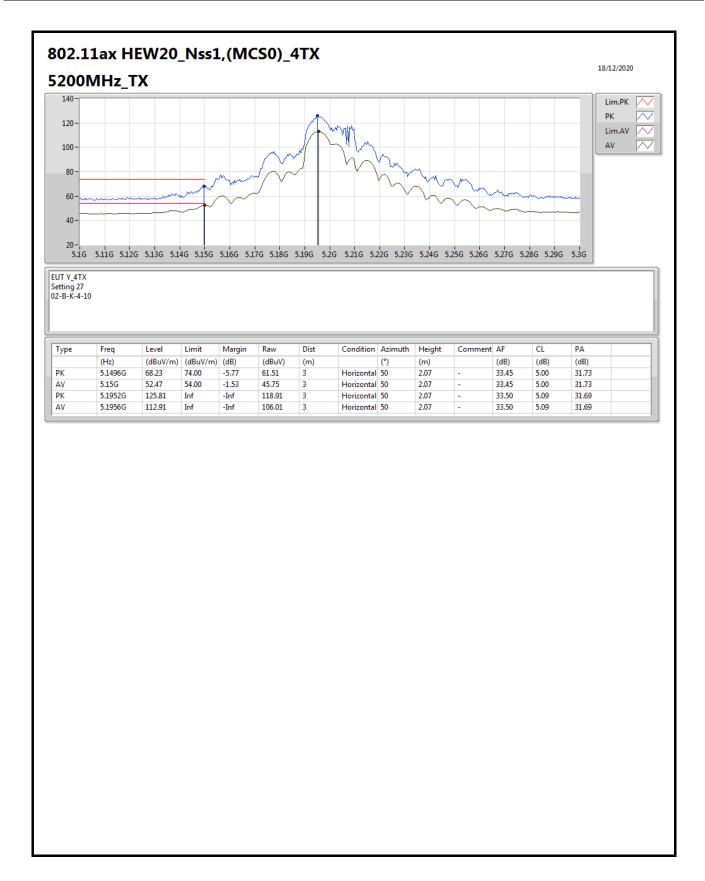
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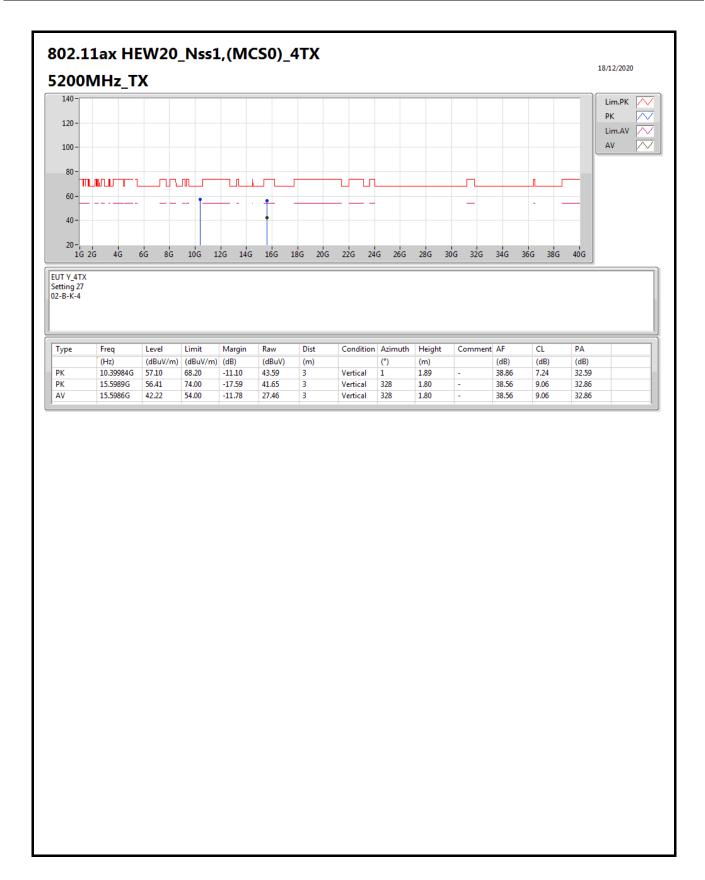
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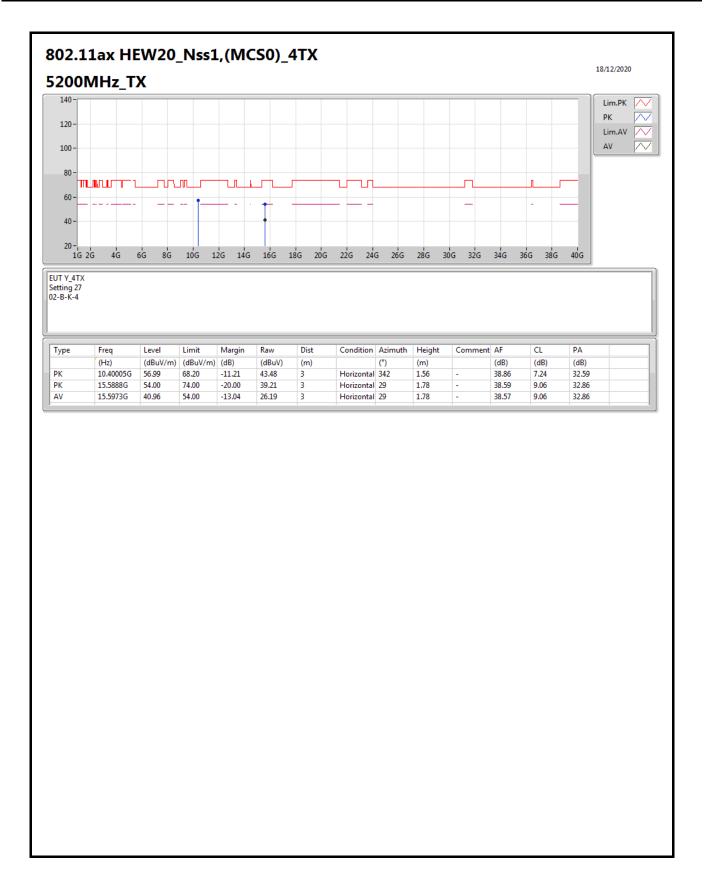
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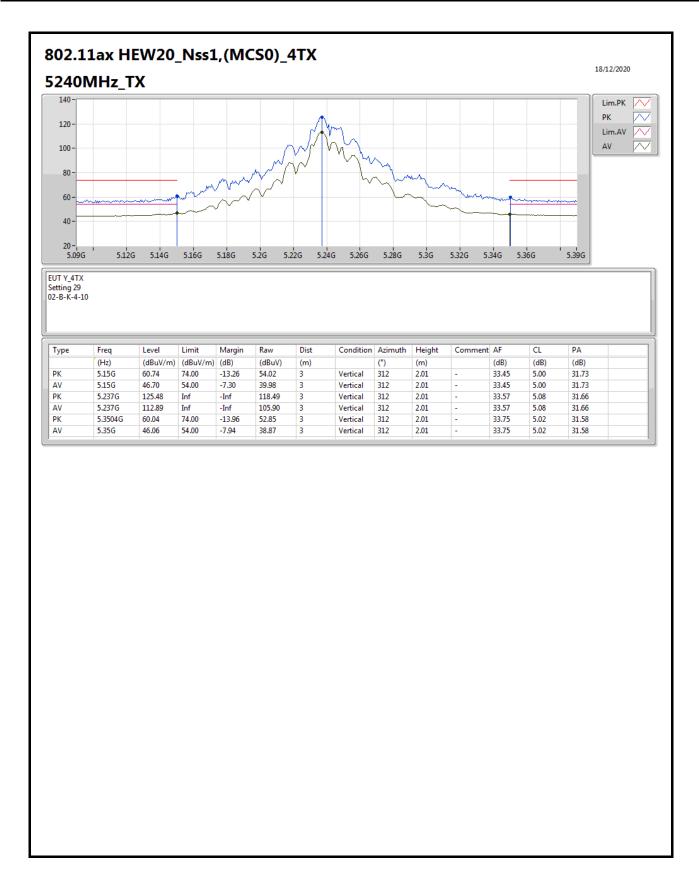
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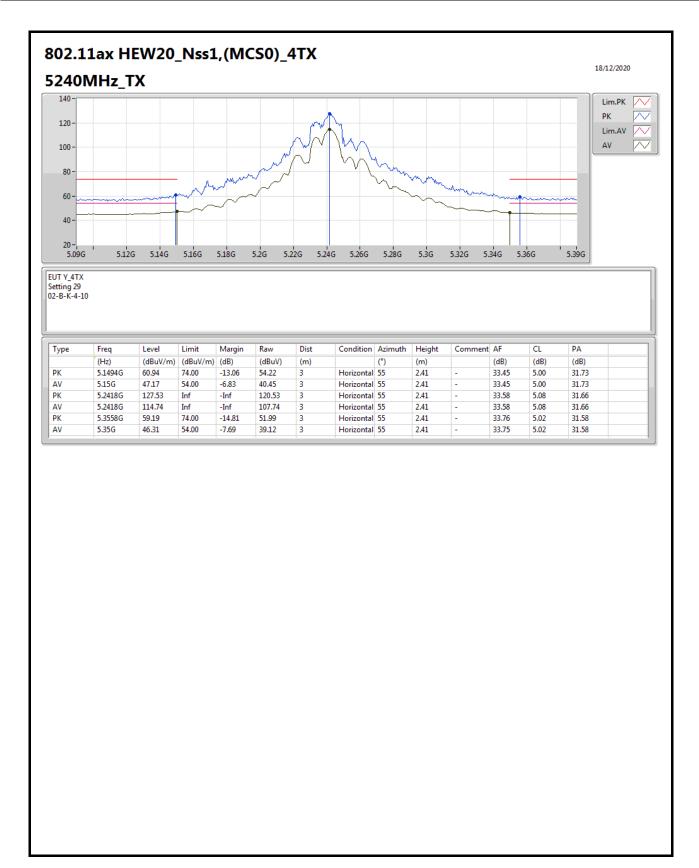
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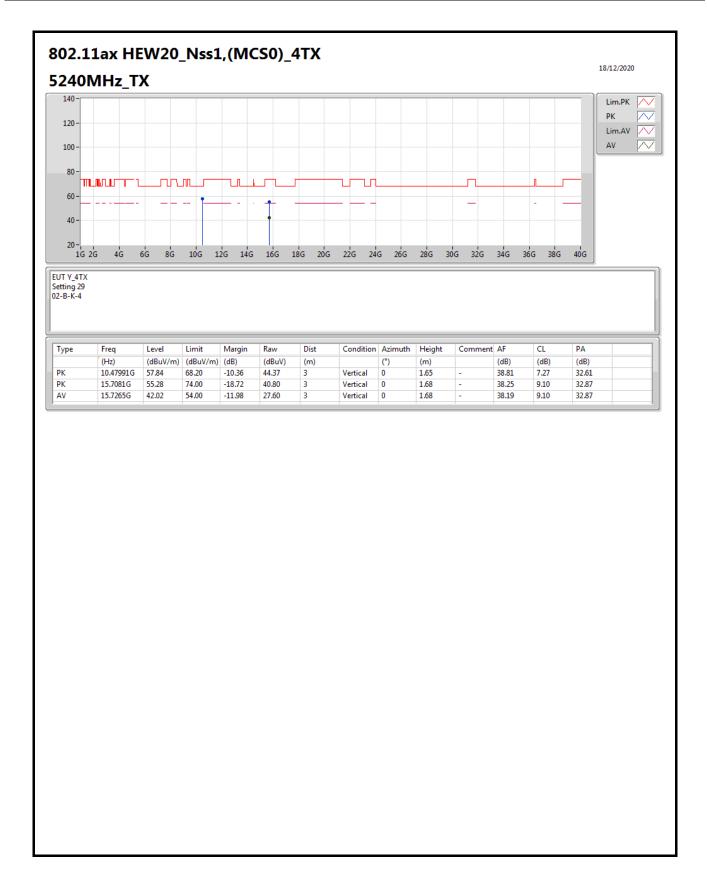
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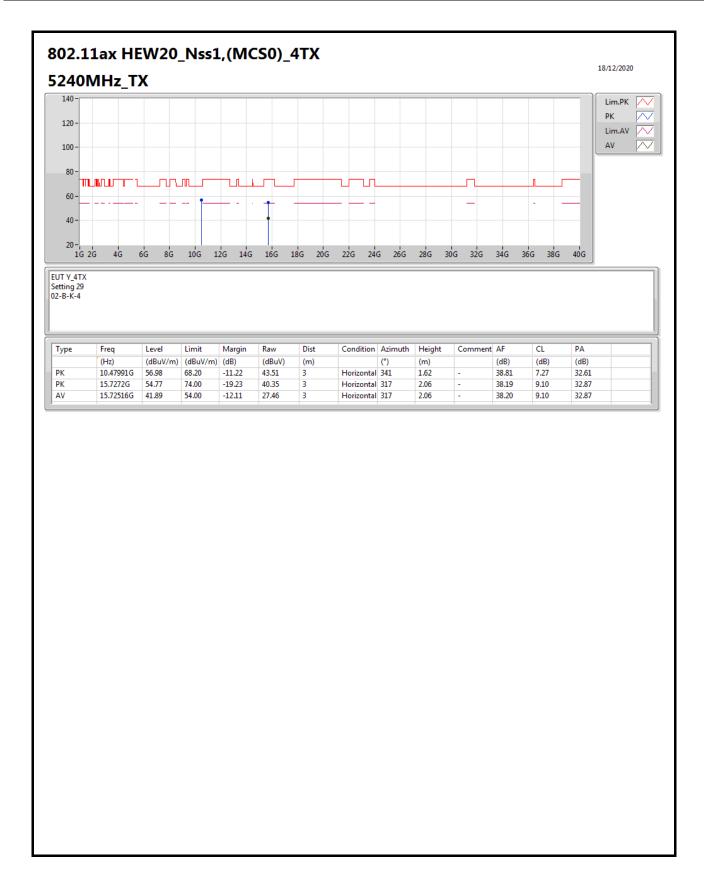
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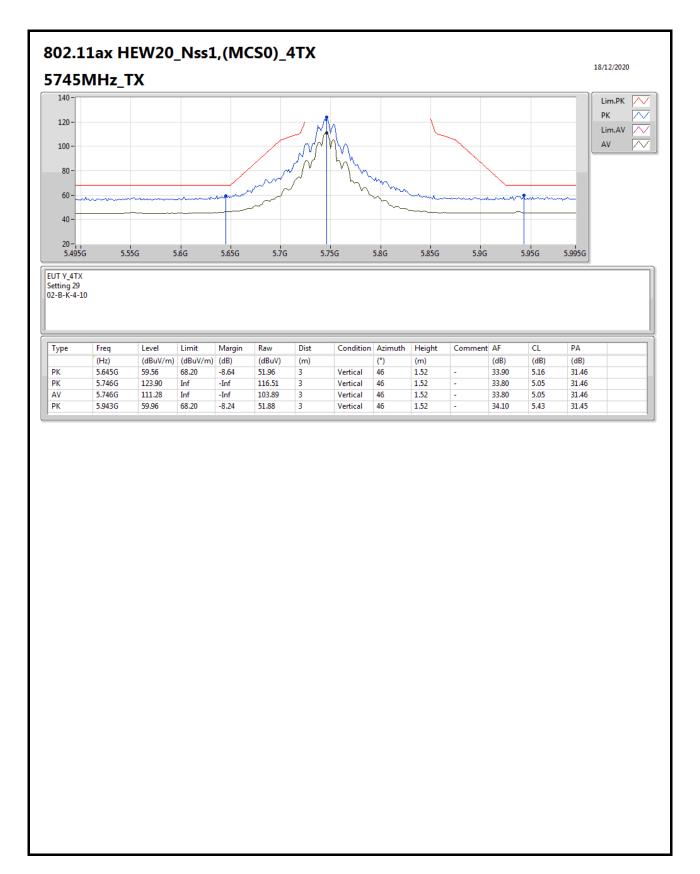
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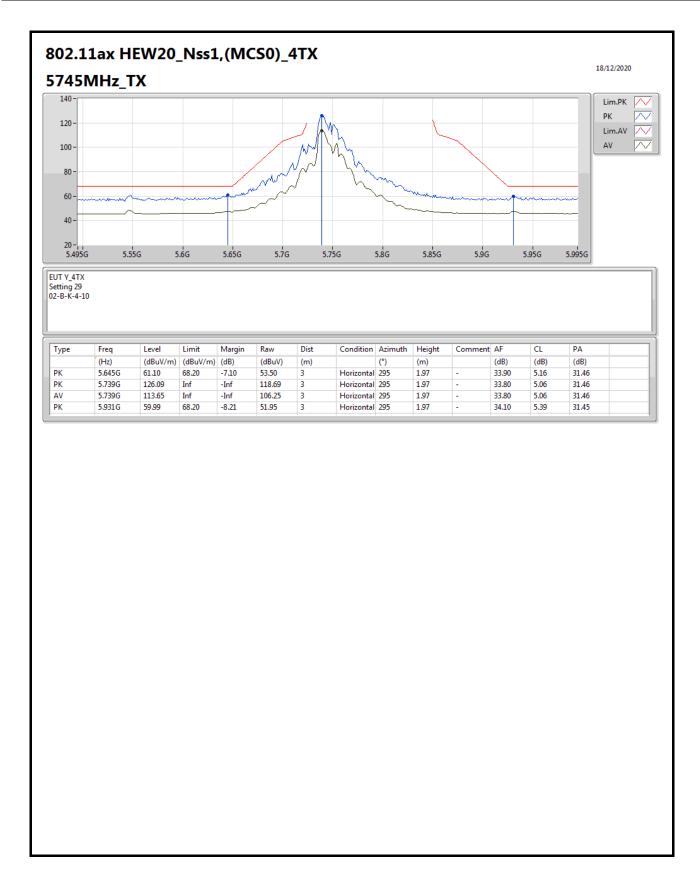
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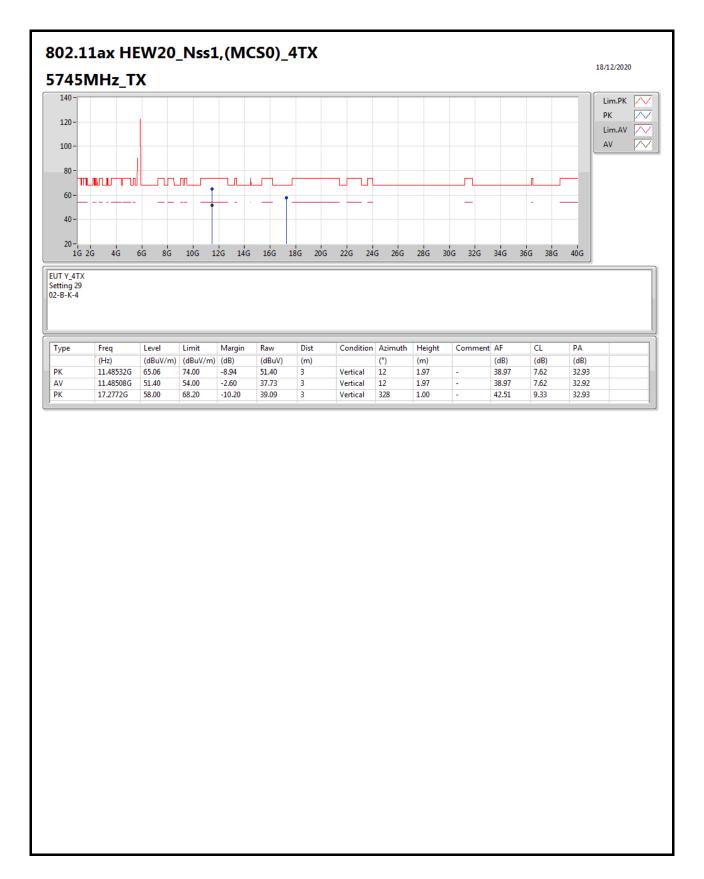
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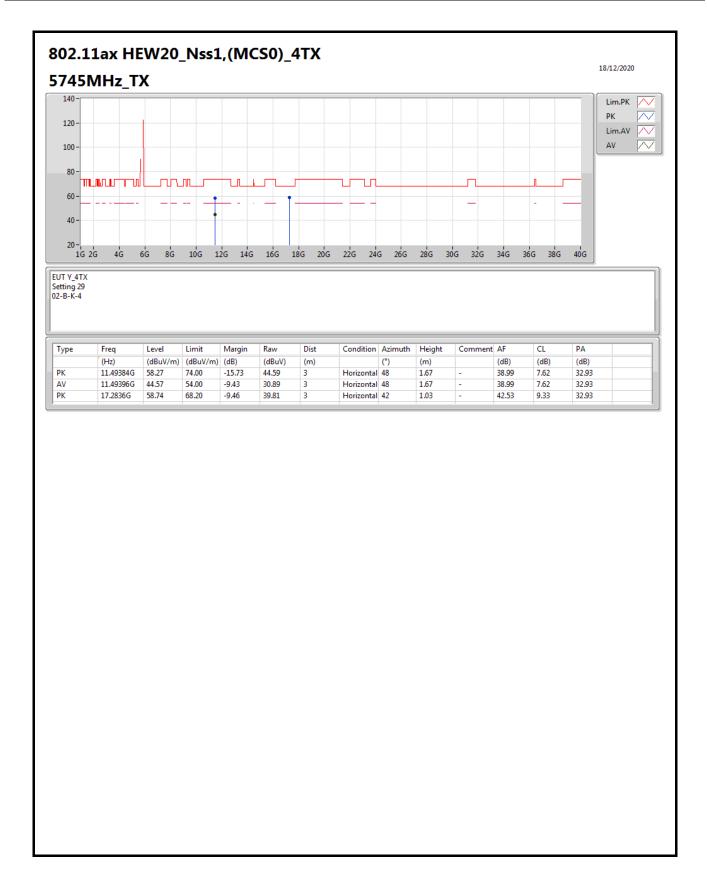
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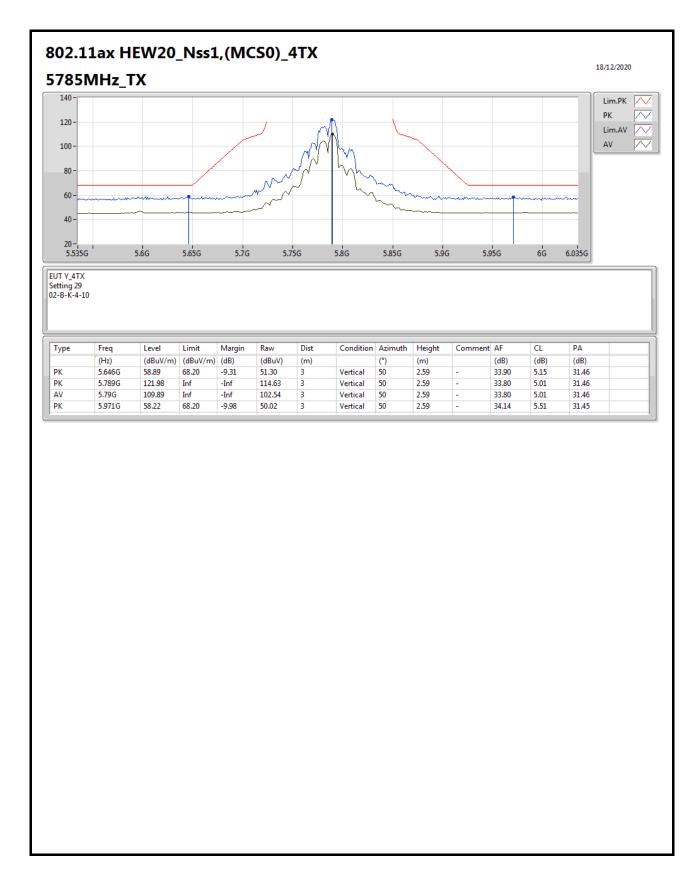
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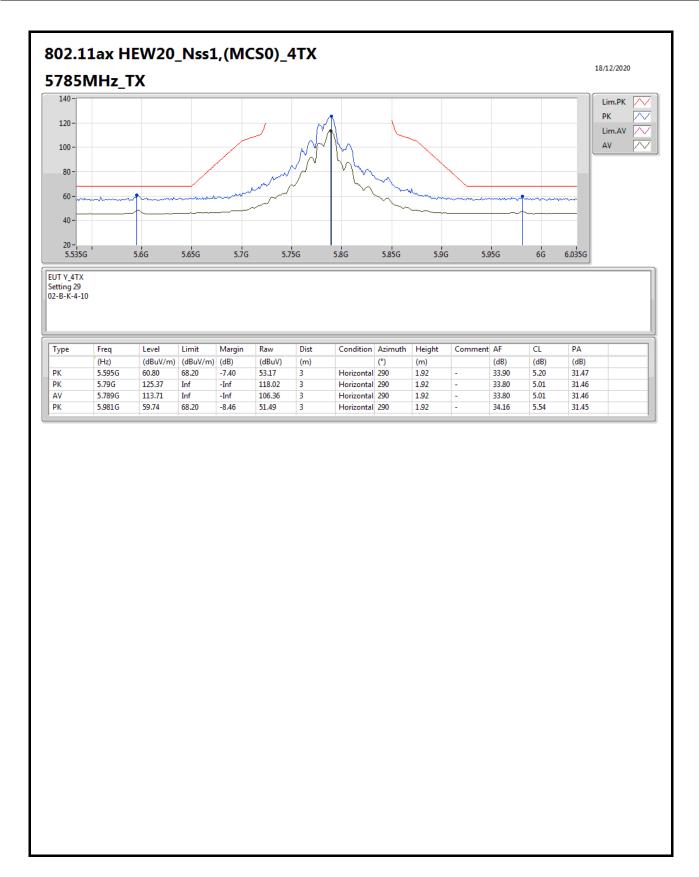
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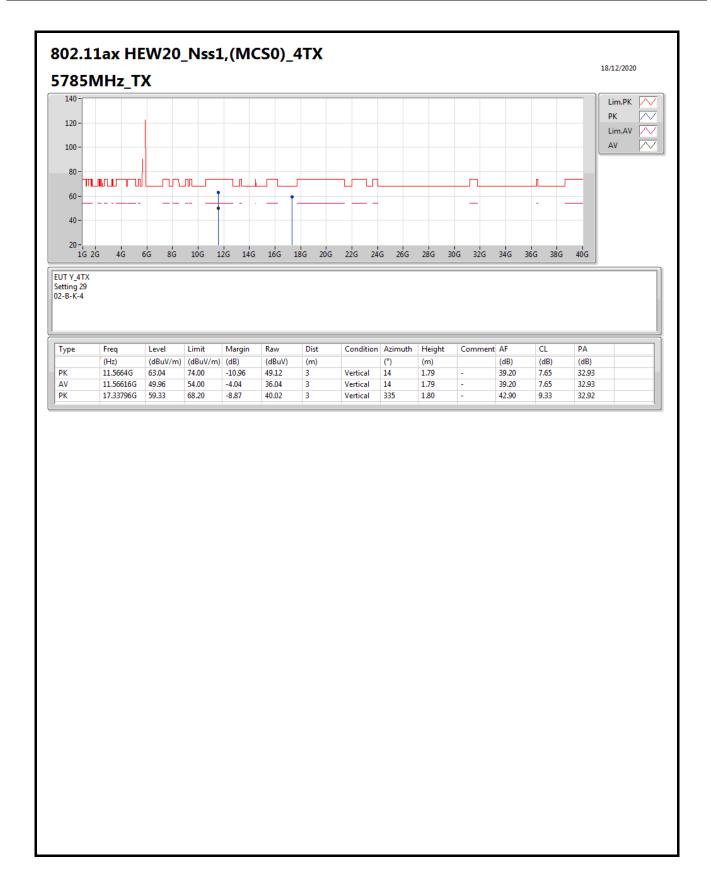
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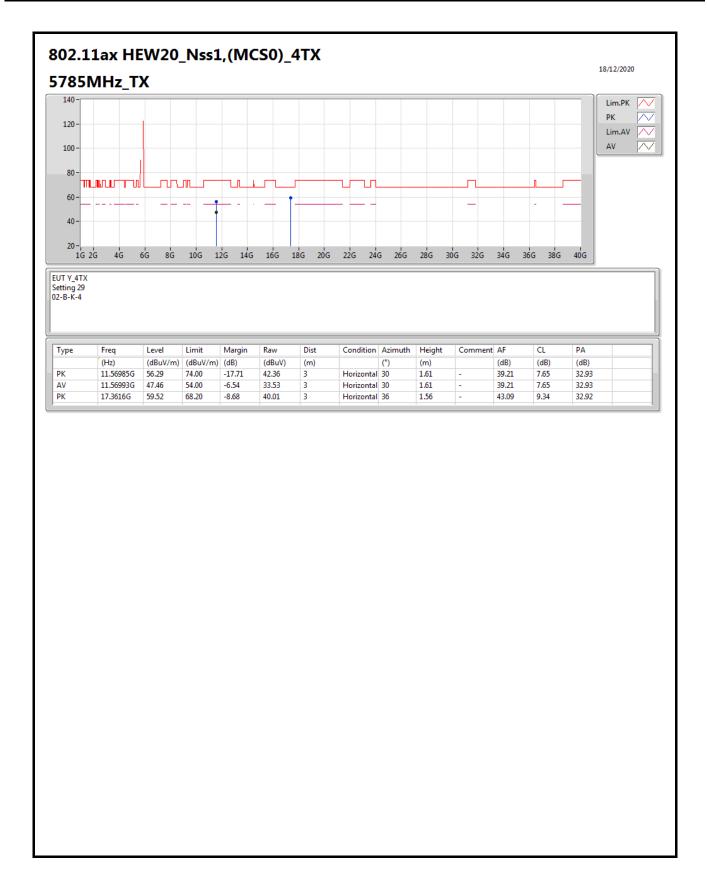
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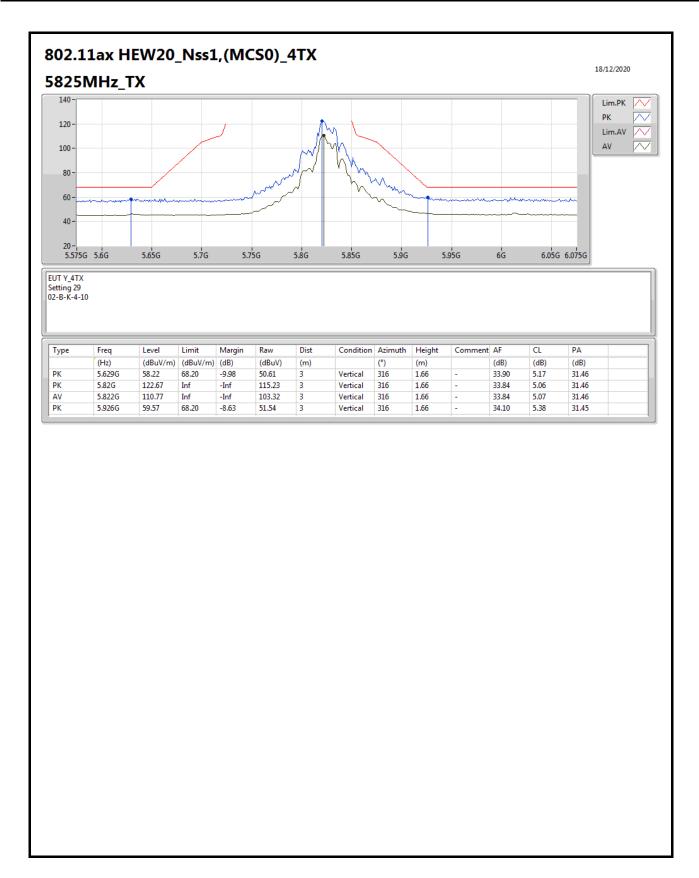
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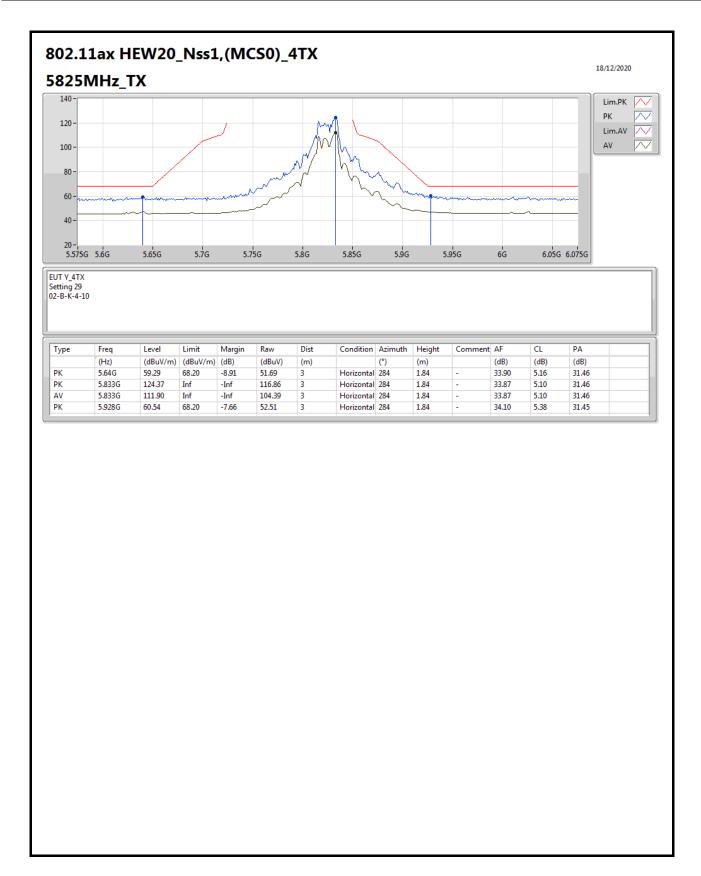
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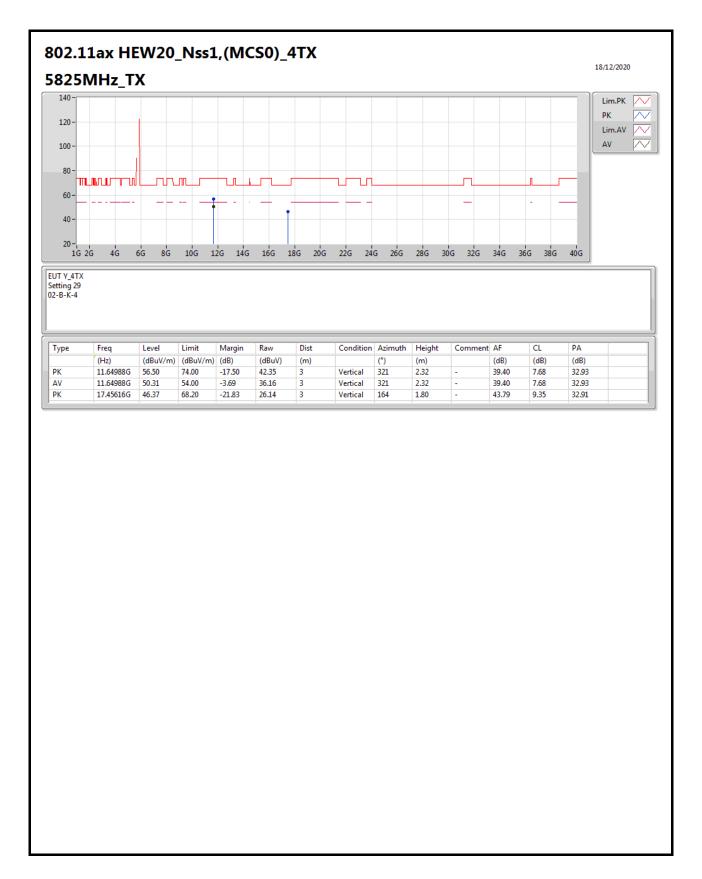
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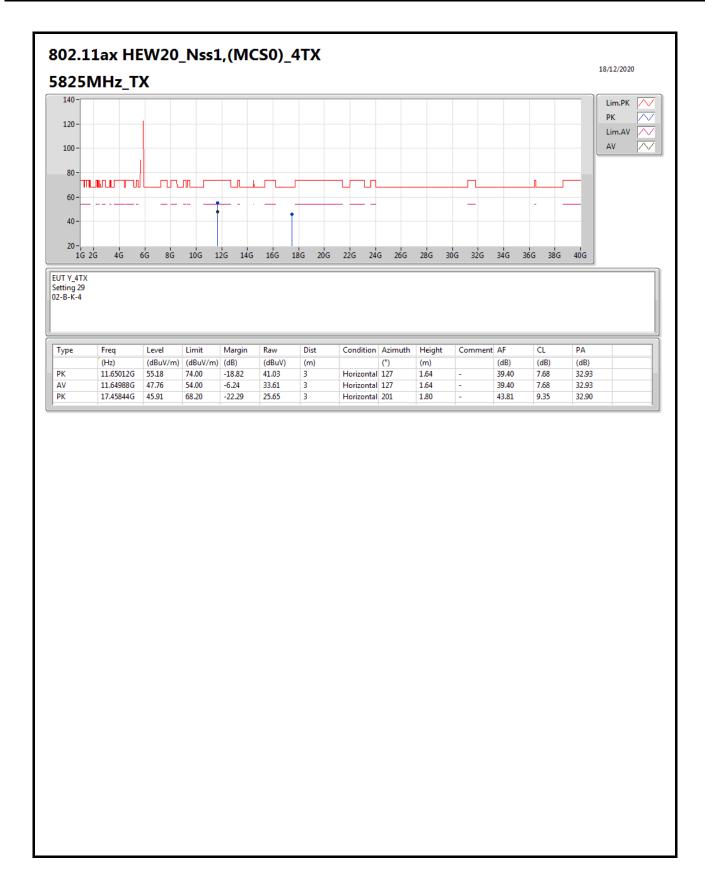
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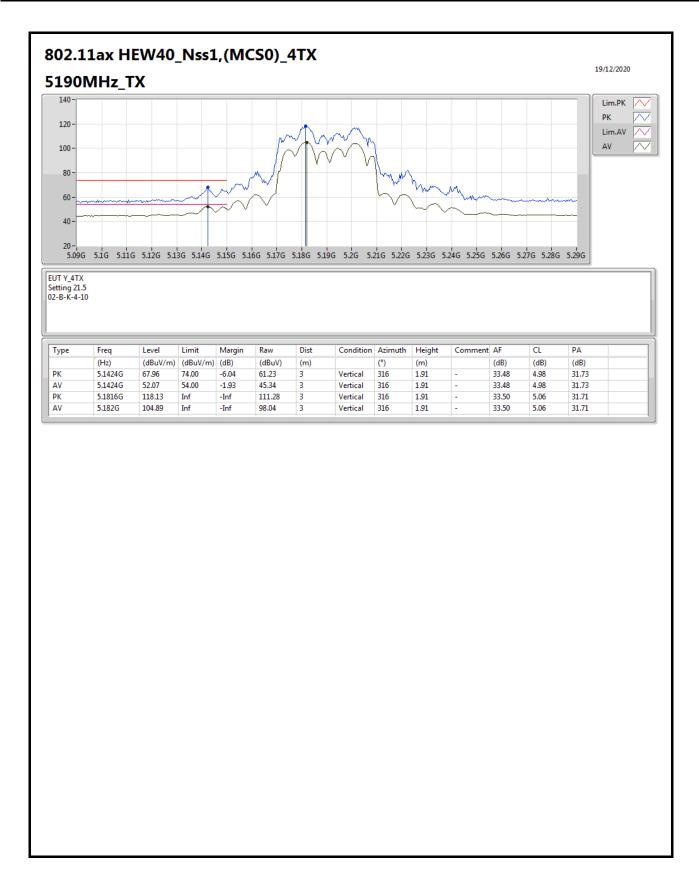
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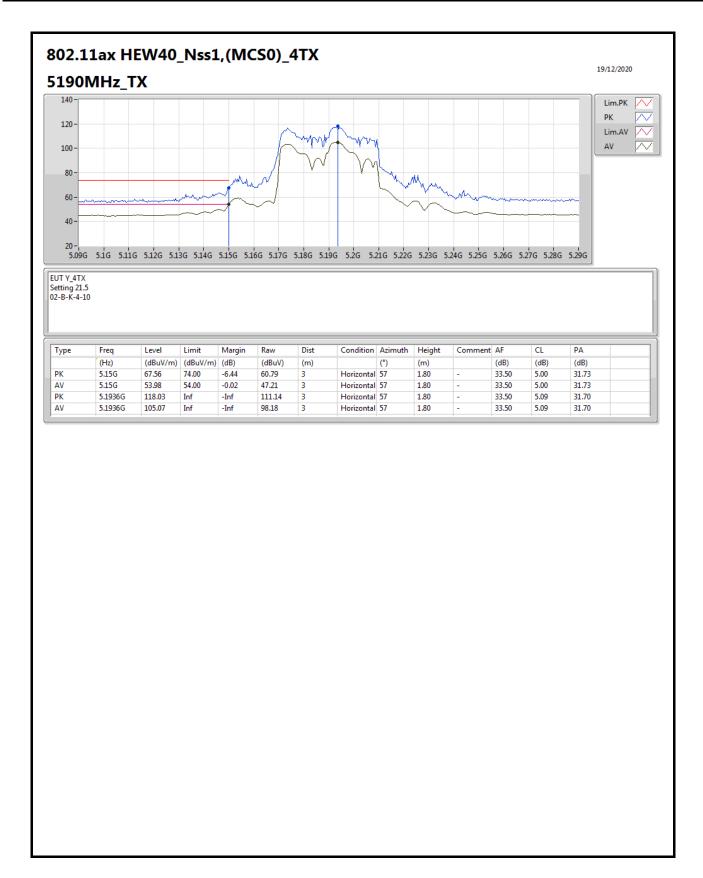
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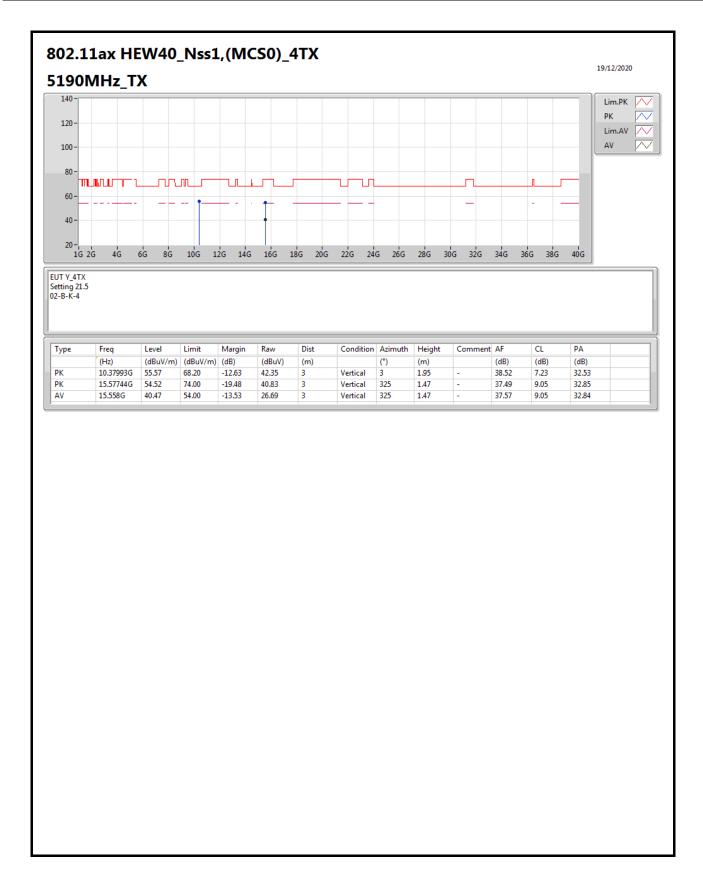
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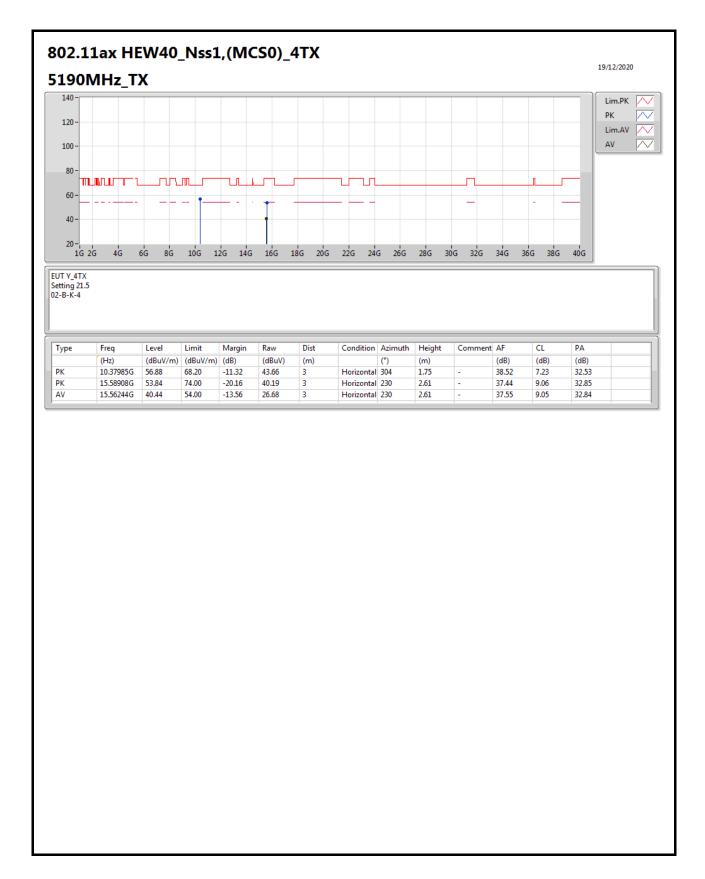




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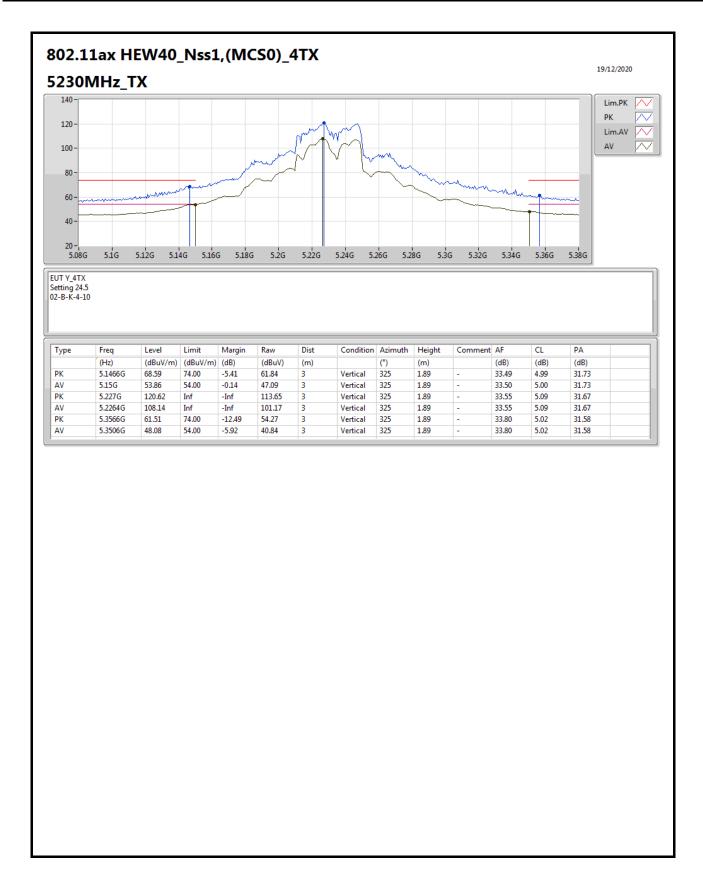
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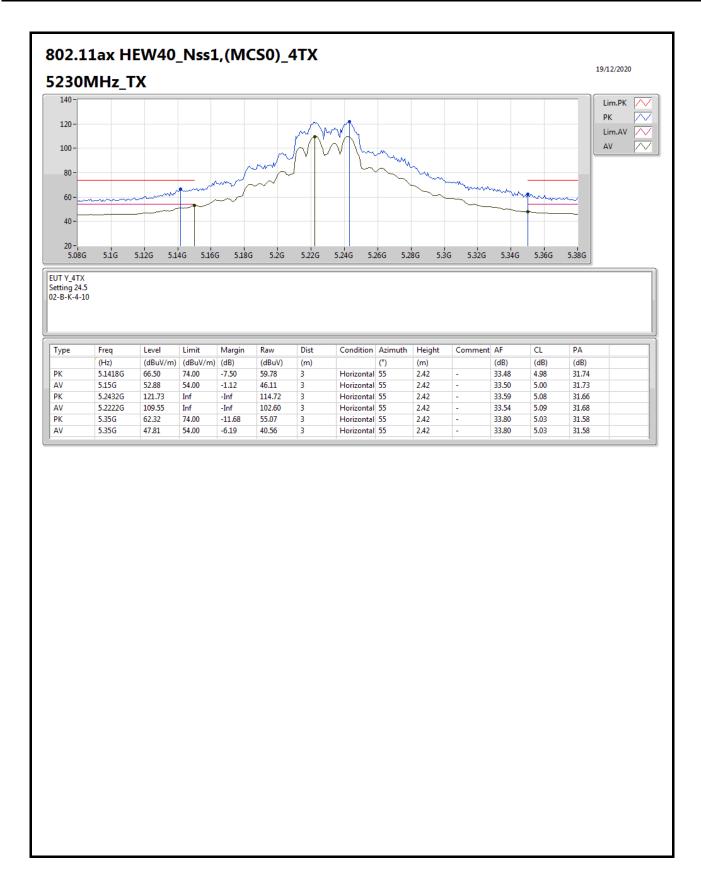
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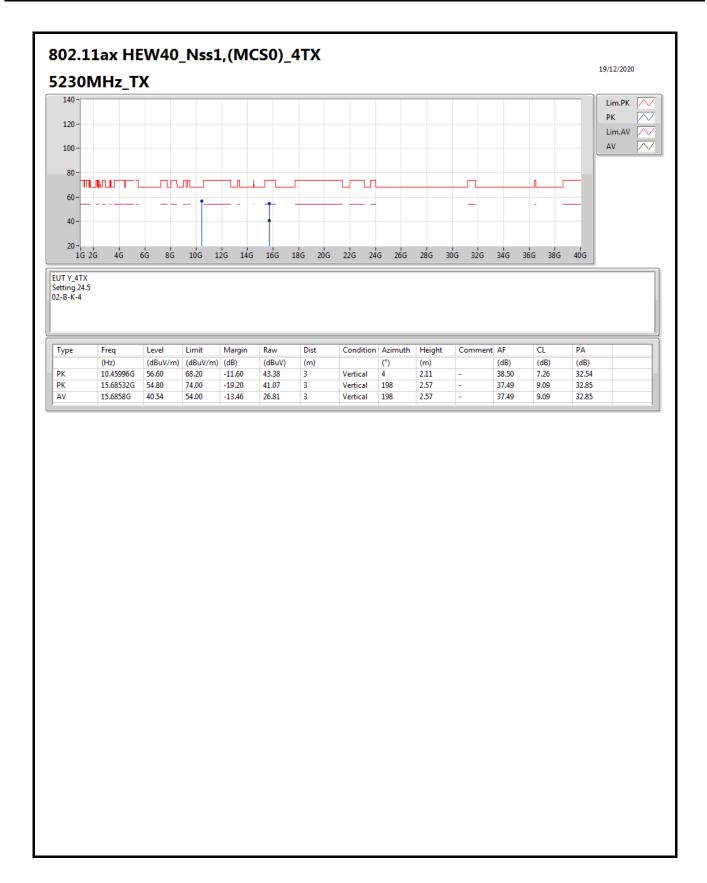
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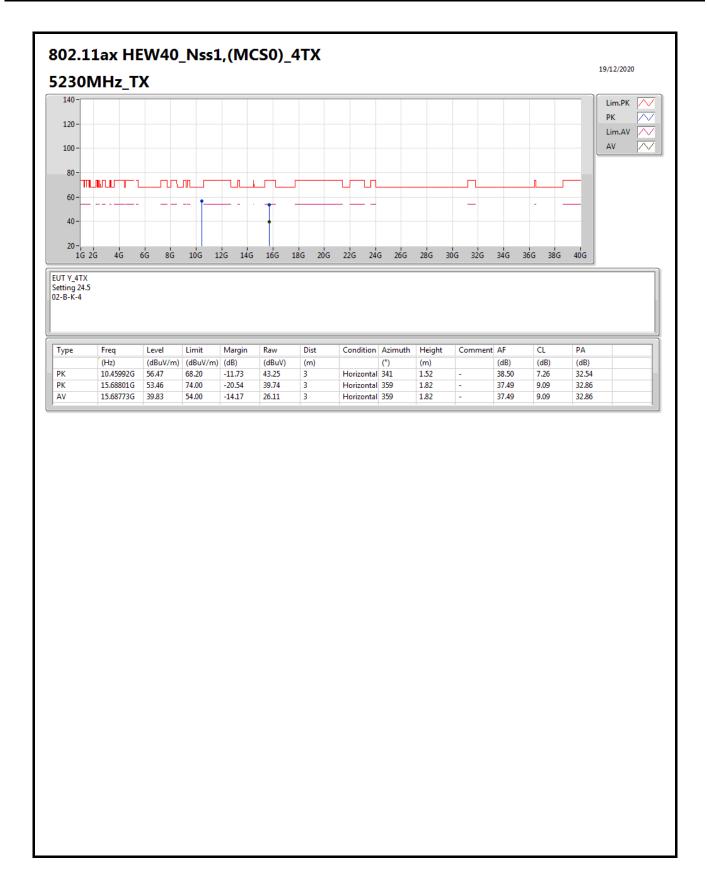
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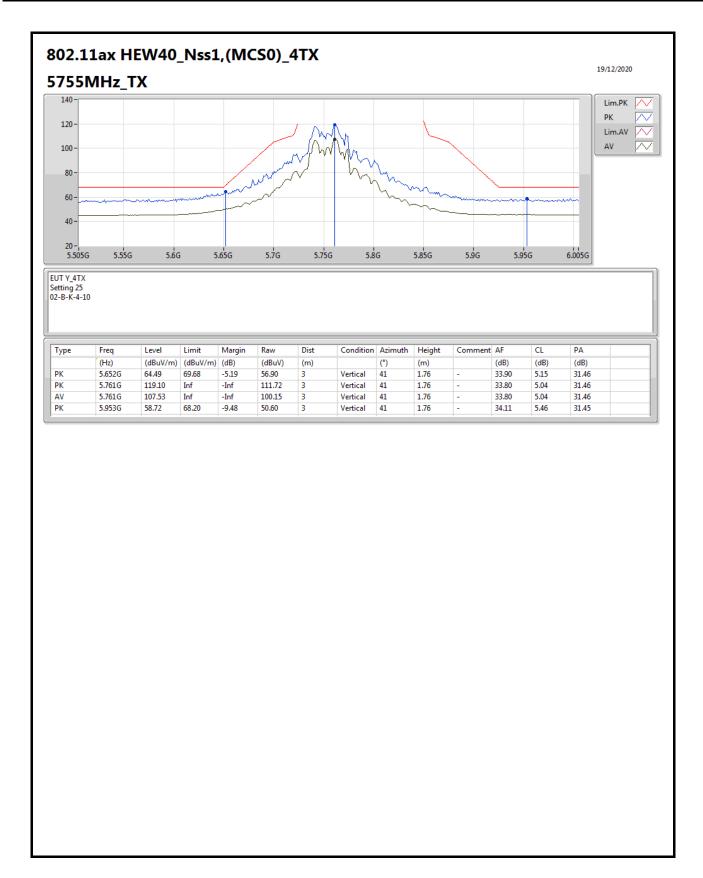
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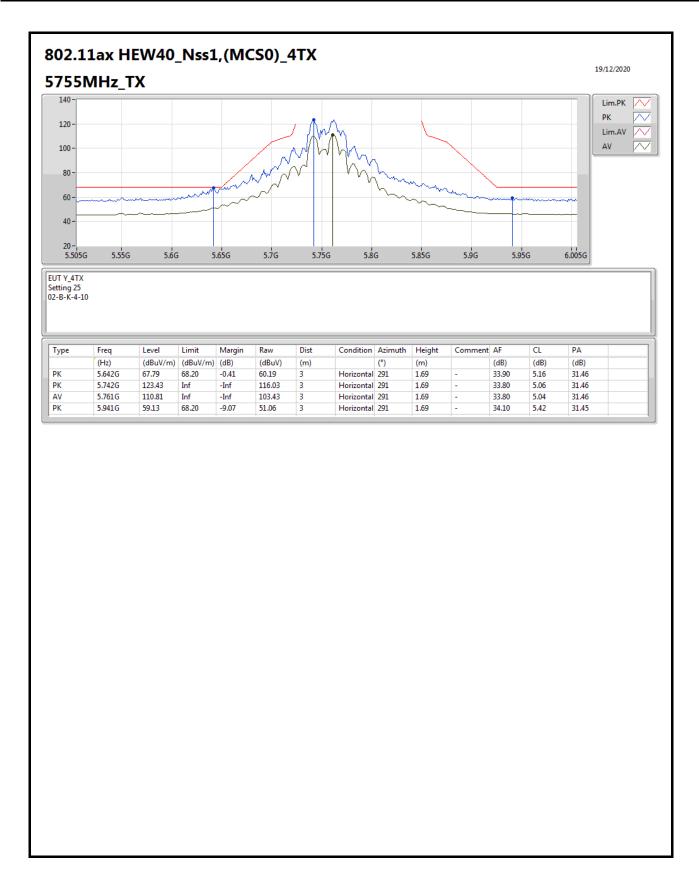
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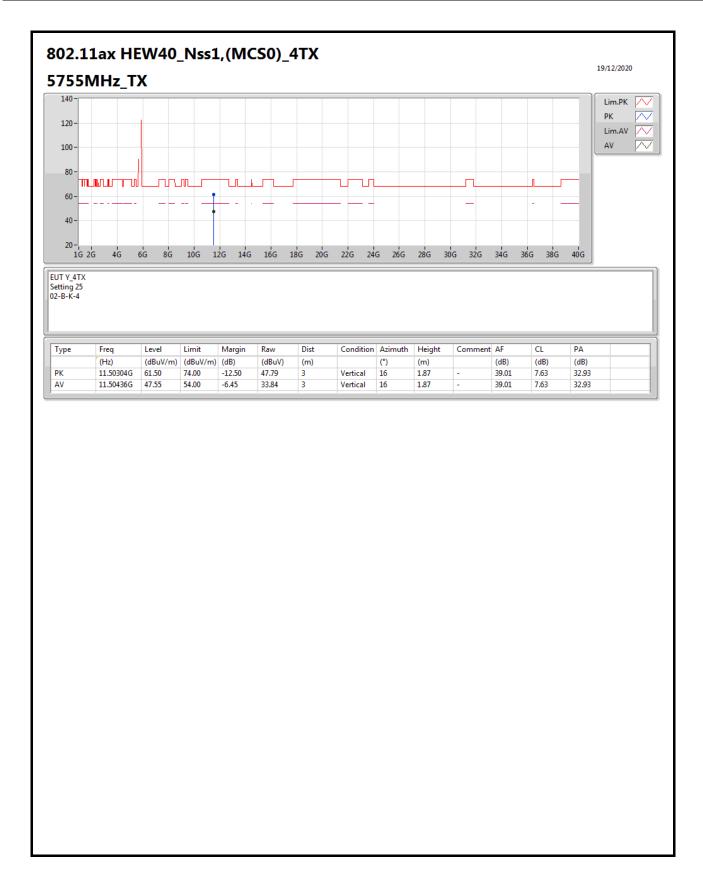
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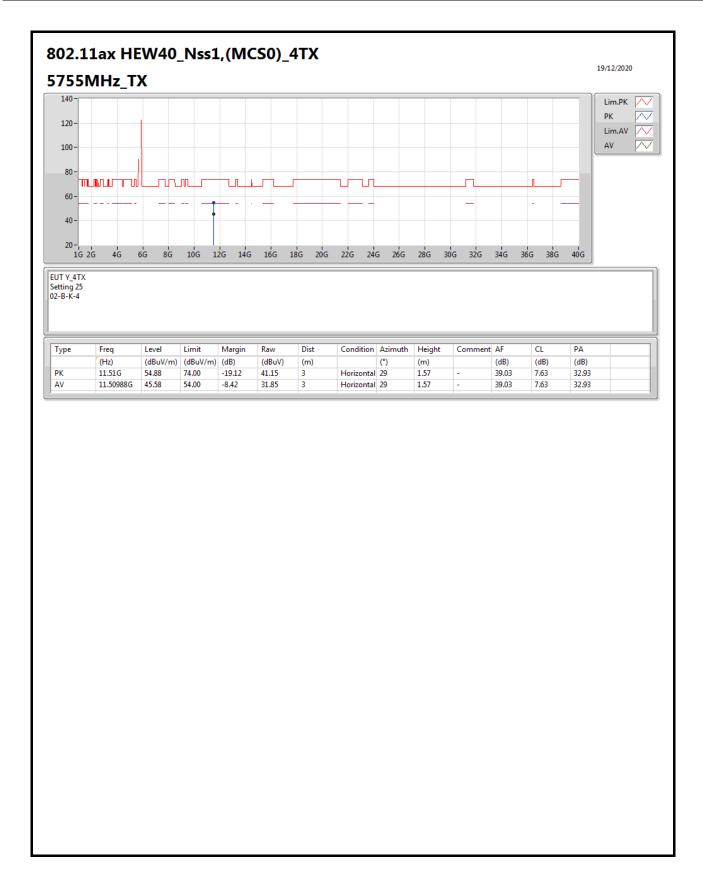
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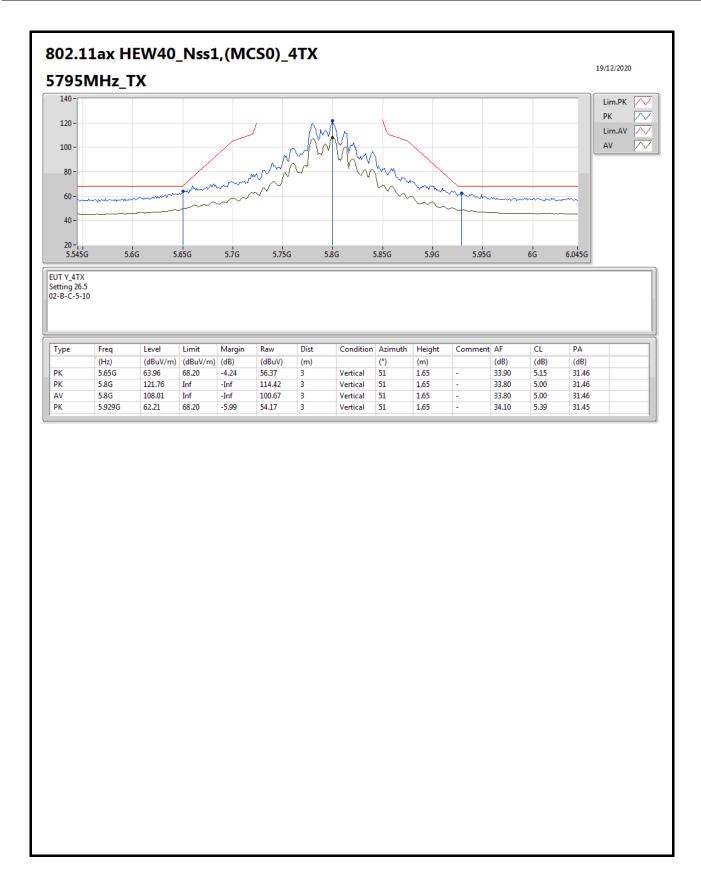
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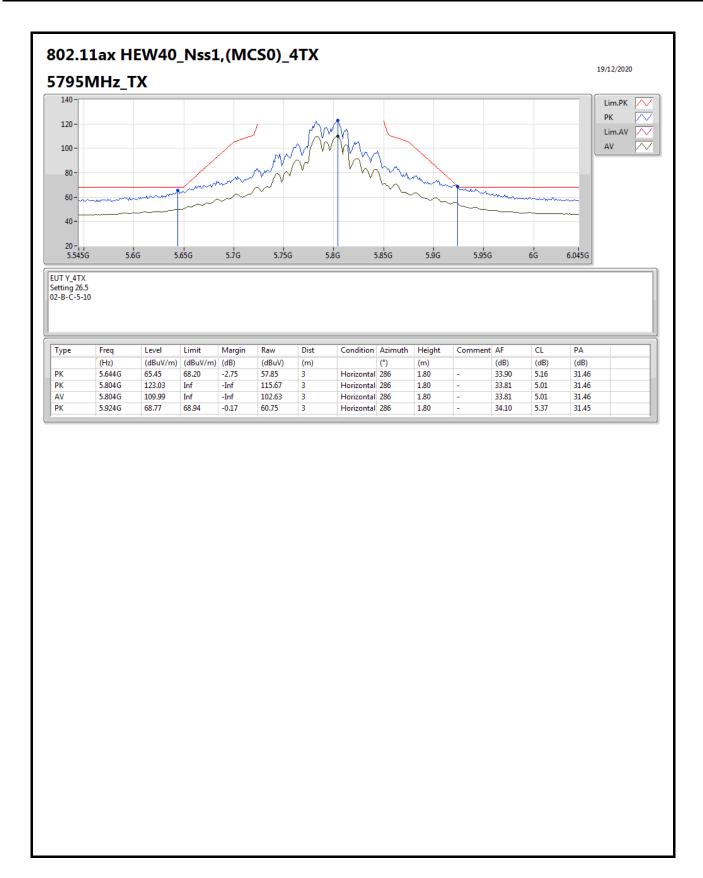
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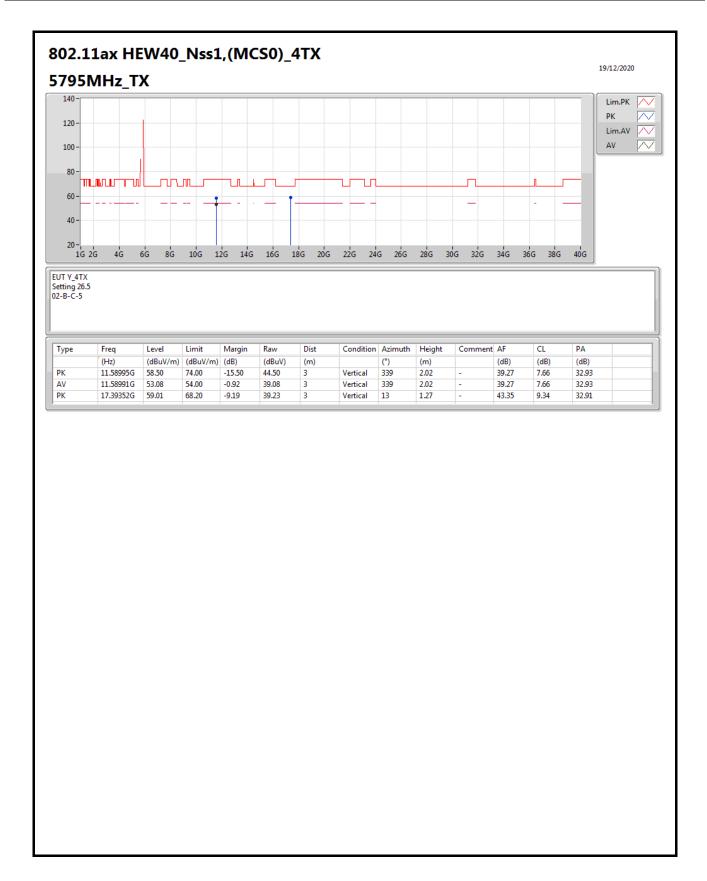
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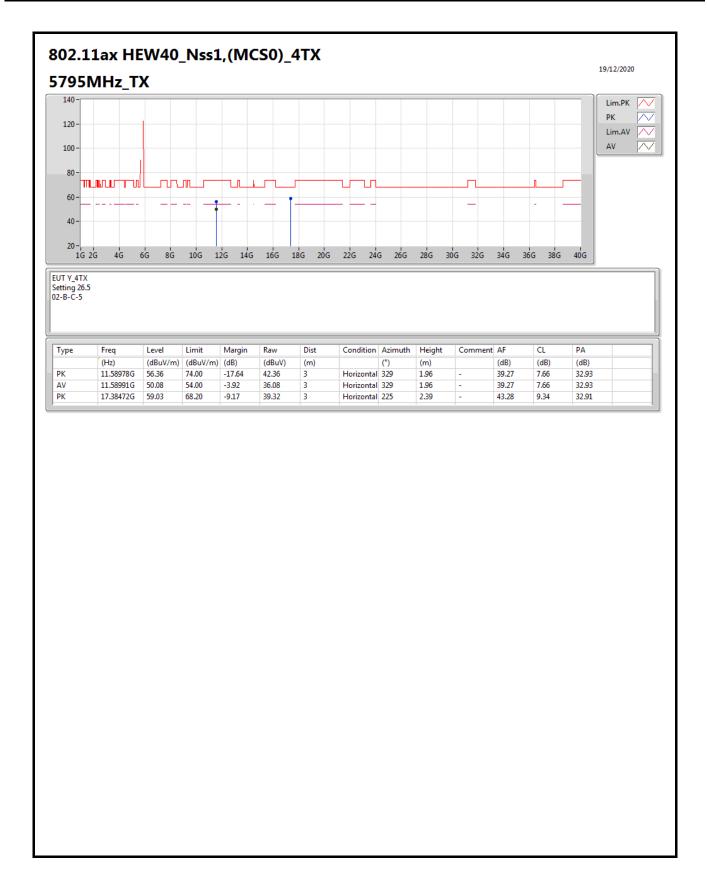
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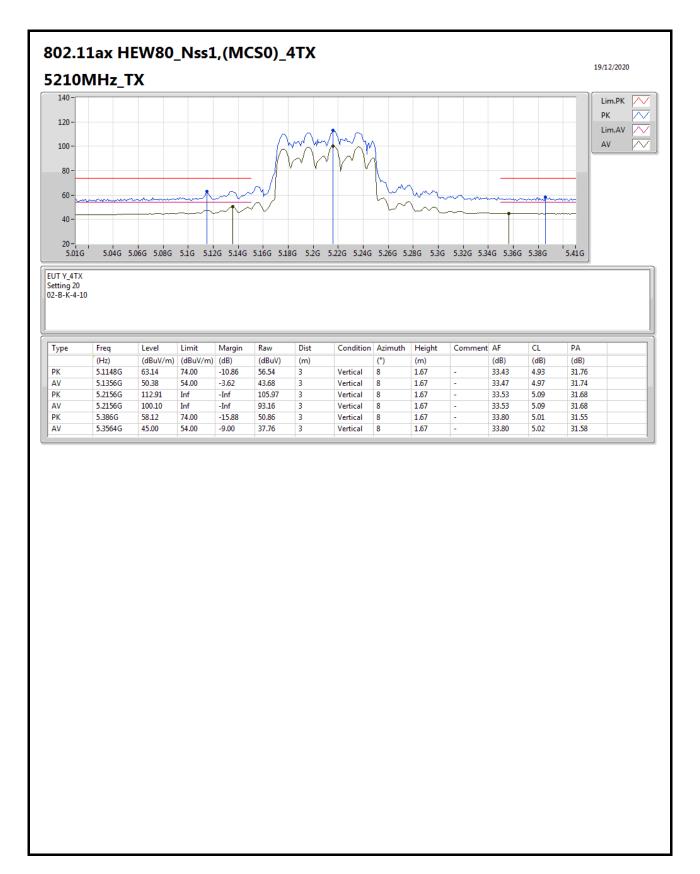
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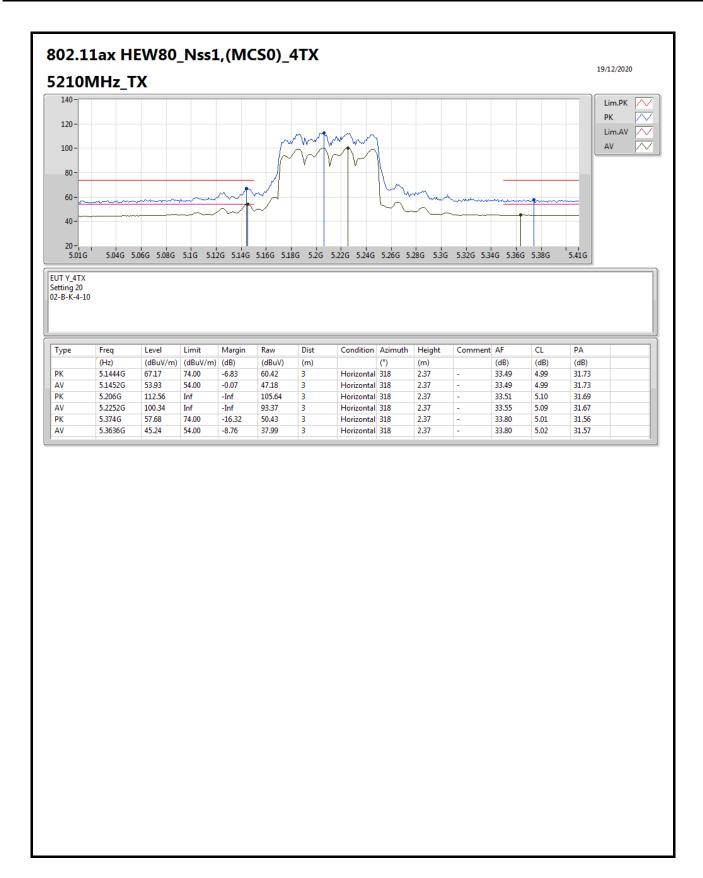
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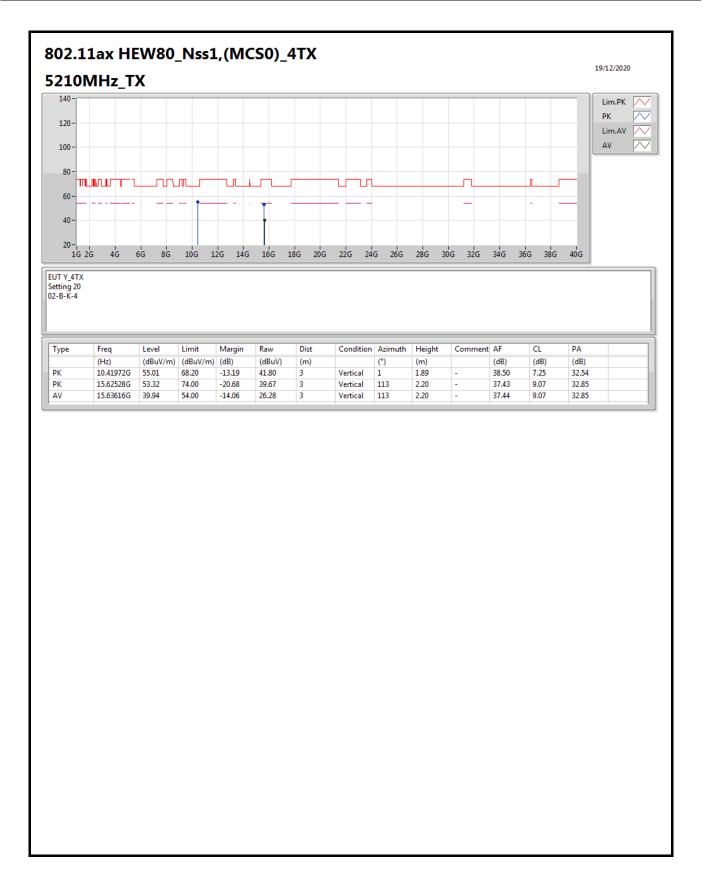
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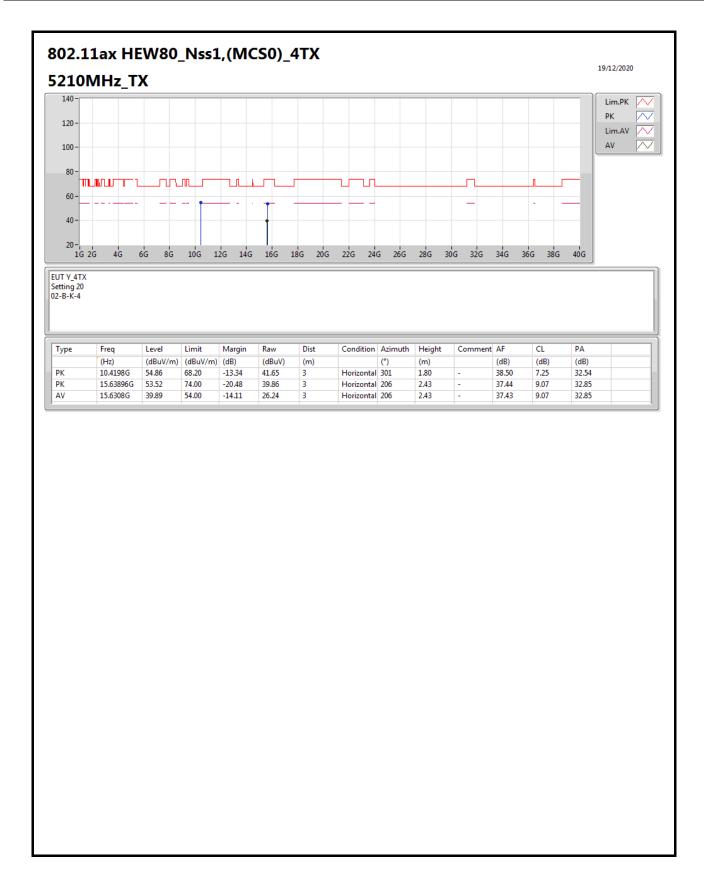
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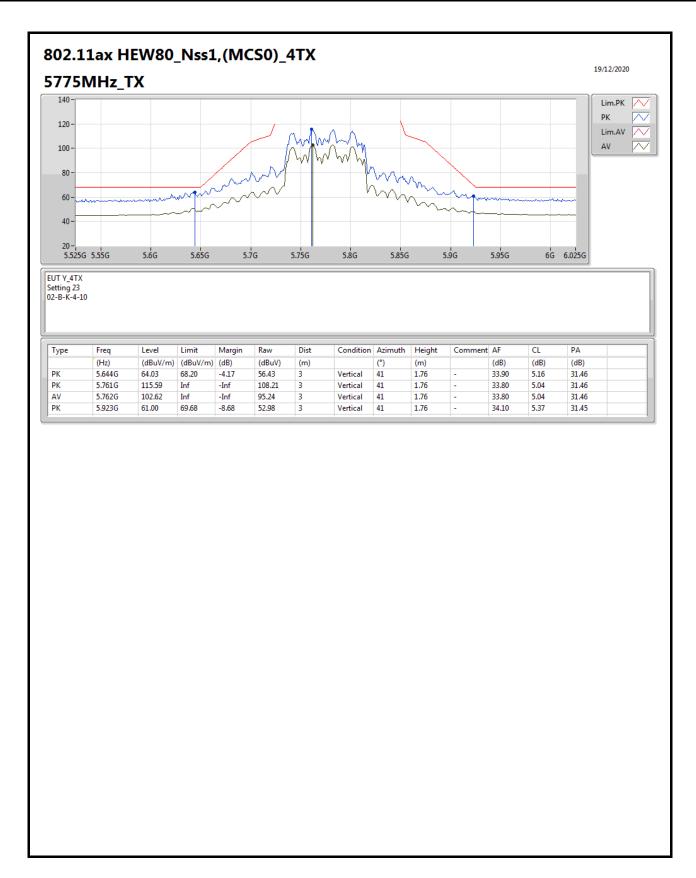
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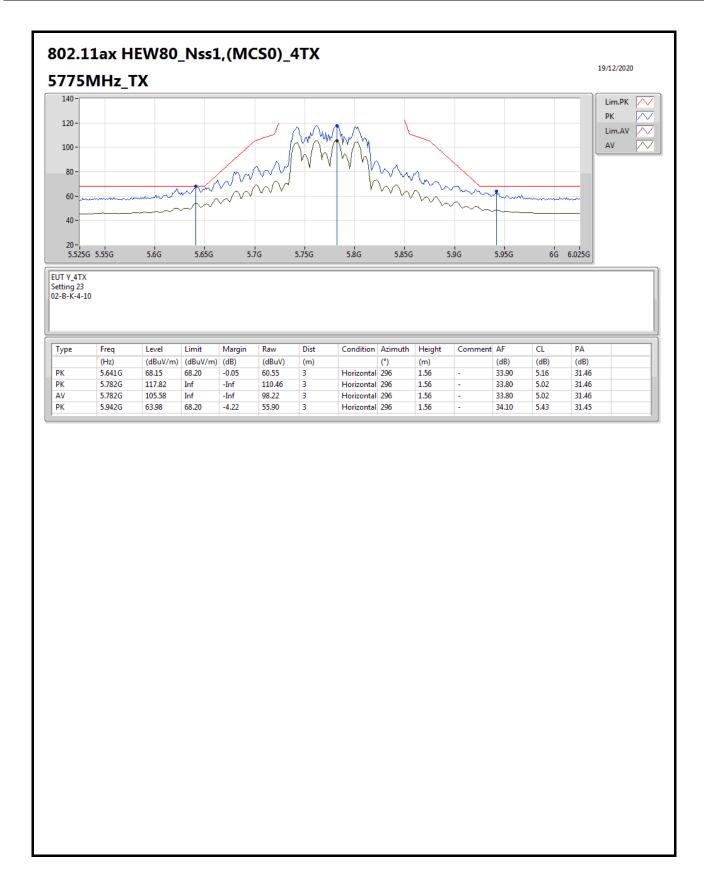
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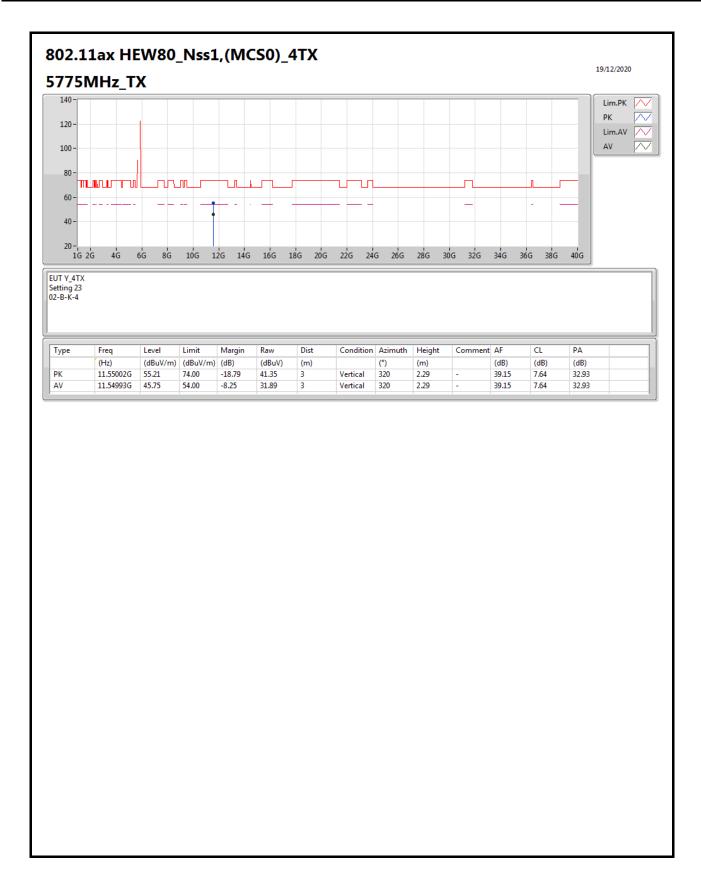
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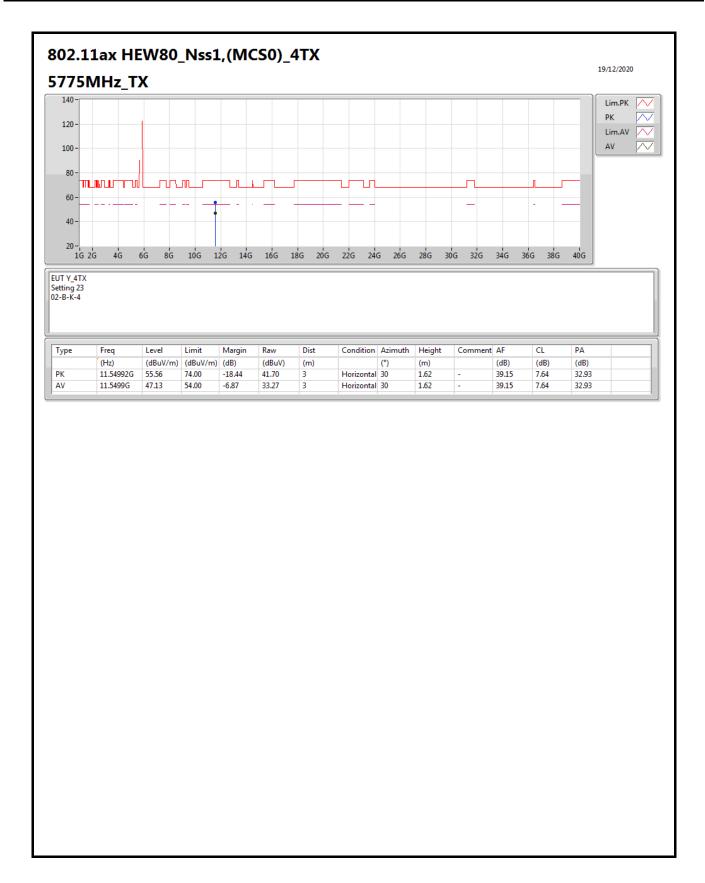
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Radiated Emission Co-location

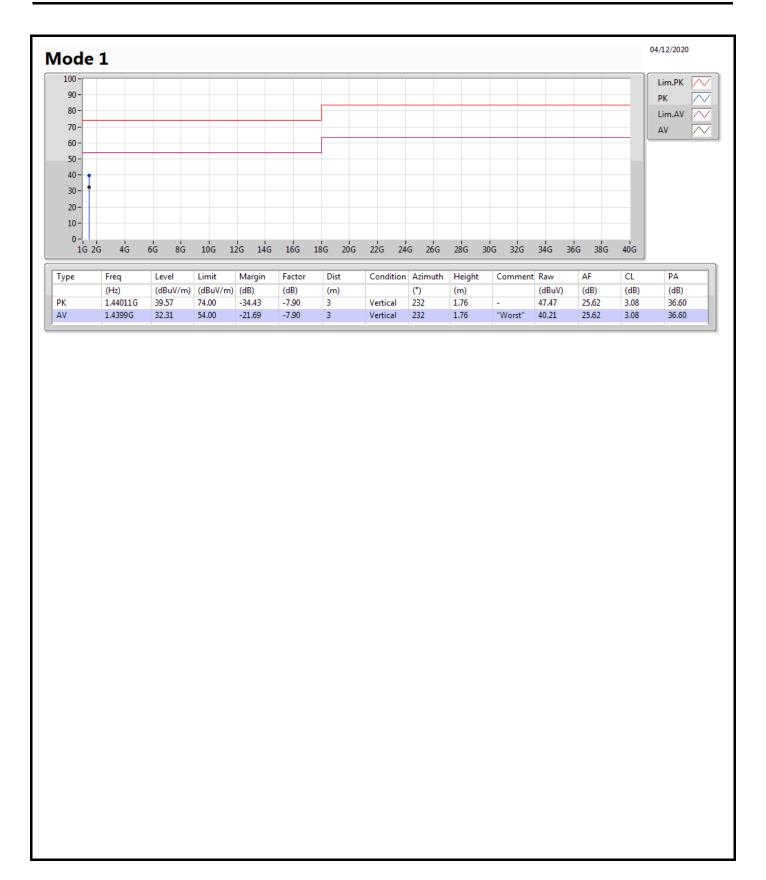
Appendix F

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	1.4399G	32.31	54.00	-21.69	Vertical

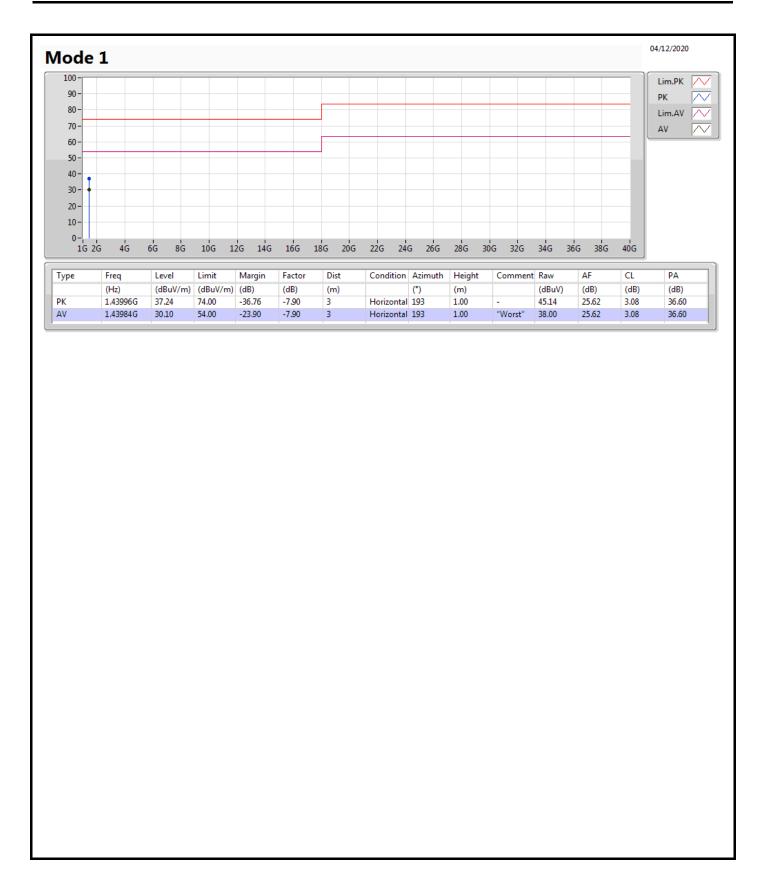
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