





FCC RADIO TEST REPORT

FCC ID

: Q87-03433

Equipment

: LINKSYS MR9000 TRI-BAND WIFI 5 ROUTER,

LINKSYS MR9000X TRI-BAND WIFI 5 ROUTER, LINKSYS MR8900 TRI-BAND WIFI 5 ROUTER, LINKSYS MR8950 TRI-BAND WIFI 5 ROUTER

Brand Name

: LINKSYS

Model Name

: MR9000, MR9000X, MR8900, MR8950

Applicant

: Linksys LLC

121 Theory Drive, Irvine CA 92617, United States

Standard

: 47 CFR FCC Part 15.407

The product was received on Apr. 02, 2019, and testing was started from Apr. 02, 2019 and completed on Jun. 03, 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 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

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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

Page Number : 1 of 33

Issued Date : Jul. 19, 2019

Report Version : 01

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History of this test report

Report No.: FR941701AB

Report No.	Version	Description	Issued Date
FR941701AB	01	Initial issue of report	Jul. 19, 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	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(a)	Emission Bandwidth	PASS	-
3.3	15.407(a)	Maximum Conducted Output Power	PASS	-
3.4	15.407(a)	Peak Power Spectral Density PASS -		-
3.5	15.407(b)	Unwanted Emissions	PASS	-

Declaration of Conformity:

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

Comments and Explanations:

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

Reviewed by: Sam Chen

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

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Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	2TX
5.15-5.25GHz	802.11a-BF	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
5.15-5.25GHz	802.11ac VHT80-BF	80	2TX
5.725-5.85GHz	802.11a	20	4TX
5.725-5.85GHz	802.11a-BF	20	4TX
5.725-5.85GHz	802.11n HT20	20	4TX
5.725-5.85GHz	802.11ac VHT20-BF	20	4TX
5.725-5.85GHz	802.11n HT40	40	4TX
5.725-5.85GHz	802.11n HT40-BF	40	4TX
5.725-5.85GHz	802.11ac VHT40	40	4TX
5.725-5.85GHz	802.11ac VHT40-BF	40	4TX
5.725-5.85GHz	802.11ac VHT80	80	4TX
5.725-5.85GHz	802.11ac VHT80-BF	80	4TX

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Note:

- 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 and VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

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- 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.	Port	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	1	FIT	ANEP5M3-CCG01-EH	Dipole Antenna	I-PEX	
2	2	FIT	ANEP5M3-CCG00-EH	Dipole Antenna	I-PEX	
3	3	FIT	ANEP5M1-CCG00-EH	Dipole Antenna	I-PEX	Note 1
4	4	FIT	ANEP5M1-CCG01-EH	Dipole Antenna	I-PEX	
5	1	FIT	ANTS1M1-CCG00-EH	PIFA Antenna	N/A	

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Note 1:

Ant.	Port	Gain (dBi)					
Aire.	1 010	WLAN 2.4G	WLAN 5G Band 1	WLAN 5G Band 4	ВТ		
1	1	2.84	2.60	2.44	-		
2	2	2.36	2.87	2.28	-		
3	3	-	-	2.93	-		
4	4	-	-	3.01	-		
5	1	-	-	-	2.90		

Note 2: The above information was declared by manufacturer.

Note 3: The EUT has five antennas.

<For 2.4GHz Band>

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For 5GHz Band 1>

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For 5GHz Band 4>

For IEEE 802.11a/n/ac 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>

For BT function (1TX/1RX)

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

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1.1.3 Mode Test Duty Cycle

For Band 1 / 2T1S and Band 4 / 4T1S

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a-BF	0.89	0.506	1.717m	1k
802.11ac VHT20-BF	0.881	0.55	1.717m	1k
802.11ac VHT40-BF	0.818	0.872	1.758m	1k
802.11ac VHT80-BF	0.875	0.58	1.954m	1k

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For Band 4 / 4T2S

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11ac VHT20-BF	0.807	0.931	1.987m	1k
802.11ac VHT40-BF	0.893	0.491	1.958m	1k
802.11ac VHT80-BF	0.864	0.635	1.995m	1k

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

1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter			
Beamforming Function		With beamforming for 802.11g/n/VHT in 2.4GHz and 11a/n/ac in 5GHz		Without beamforming
Function		Outdoor P2M	\boxtimes	Indoor P2M
Tunction		Fixed P2P		Client
Test Software Version		QRCT Version3.0.187.0		

Note: The above information was declared by manufacturer.

1.1.5 Table for EUT supports function

Function	Supports type
AP Router	Master

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1.1.6 Table for Multiple Listing

The four equipment names and four model names in the following table are all refer to the identical product.

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Equipment Name	Model Name	Description
LINKSYS MR9000 TRI-BAND WIFI 5 ROUTER	MR9000	
LINKSYS MR9000X TRI-BAND WIFI 5 ROUTER	MR9000X	Marketing purpose to sell in
LINKSYS MR8900 TRI-BAND WIFI 5 ROUTER	MR8900	different retailers.
LINKSYS MR8950 TRI-BAND WIFI 5 ROUTER	MR8950	

From the above models, model: MR9000 was selected as representative model for the test and its data was recorded in this 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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-CB	Brian Sun	22~24°C / 50~60%	Apr. 18, 2019~May 15, 2019
Radiated	03CH01-CB for below 1GHz 03CH03-CB for above 1GHz	Brian Sun	22~24°C / 50~60%	Apr. 02, 2019~Jun 03, 2019
AC Conduction	CO01-CB	Wei Li	23~23.6°C / 55~58%	Apr. 11, 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
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	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 ⁻⁸	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 / 2T1S and Band 4 / 4T1S

Mode	PowerSetting
802.11a-BF_Nss1,(6Mbps)_2TX	-
5180MHz	22
5200MHz	25
5240MHz	25
802.11a-BF_Nss1,(6Mbps)_4TX	-
5745MHz	21.5
5785MHz	21
5825MHz	21
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-
5180MHz	21
5200MHz	25
5240MHz	25
802.11ac VHT20-BF_Nss1,(MCS0)_4TX	-
5745MHz	21.5
5785MHz	21.5
5825MHz	21.5
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-
5190MHz	19
5230MHz	24
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	-
5755MHz	21.5
5795MHz	21.5
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-
5210MHz	17.5
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	-
5775MHz	21

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For Band 4 / 4T2S

Mode	PowerSetting
802.11ac VHT20-BF_Nss2,(MCS0)_4TX	-
5745MHz	24.5
5785MHz	24
5825MHz	24
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	-
5755MHz	24
5795MHz	24
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	-
5775MHz	22.5

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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.
- There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for 11g/11n/VHT in 2.4GHz and 11a/11n/11ac in 5GHz, after evaluating, beamforming mode has been evaluated to be the worst case, so it was selected to test and record in this test report.

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2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral		
Operating Mode	Normal Link	
1	EUT + Adapter 2 with US plug	
2 EUT + Adapter 1		
3 EUT + Adapter 3		
Mode 2 generated the worst test result, so it was recorded in this report.		

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

The Worst Case Mode for Following Conformance Tests		
Tests Item	Unwanted Emissions	
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.	
	CTX	
Operating Mode < 1GHz	The EUT was performed at Y axis and Z axis position for Unwanted Emissions above 1GHz test, and the worst case was found at Z axis. So the measurement will follow this same test configuration.	
1	EUT_2.4GHz in Z axis + Adapter 1	
2	EUT_2.4GHz in Z axis + Adapter 2 with US plug	
3	EUT_2.4GHz in Z axis + Adapter 3	
Mode 2 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4~6 will follow this same test mode.		
4	EUT_5GHz in Z axis + Adapter 2 with US plug	
5	EUT_Bluetooth 2.0 in Z axis + Adapter 2 with US plug	
6	EUT_ Bluetooth 4.0 in Z axis + Adapter 2 with US plug	
Mode 2 generated the worst test result, so it was recorded in this report.		

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	СТХ
Operating Mode > 1GHz	The EUT (Band 1) was performed at Y axis and Z axis position for Unwanted Emissions test, and the worst case was found at Y axis. So the measurement will follow this same test configuration. The EUT (Band 4) was performed at Y axis and Z axis position for Unwanted Emissions test, and the worst case was found at Z axis. So the measurement will follow this same test configuration.
	garane
1	EUT in Y axis (Band 1) + two of Antennas in 90° / EUT in Z axis (Band 4)

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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		
Operating Mode Normal Link		
1 WLAN 2.4GHz + WLAN 5GHz B1		
Refer to Appendix F for Radiated Emission Co-location.		

The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode		
1	WLAN 2.4GHz + WLAN 5GHz B1 + WLAN 5GHz B4 + Bluetooth	
Refer to Sporton Test Report No.: FA941701 for Co-location RF Exposure Evaluation.		

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2.3 EUT Operation during Test

For CTX Mode:

non-beamforming mode:

The EUT was programmed to be in continuously transmitting/receiving mode.

beamforming mode:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

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

The program was executed as follows:

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

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For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

		Accessories	
Equipment Name	Brand Name	Model Name	Rating
Adapter 1 (Fixed plug)	KTEC	KSA-24W-120200HU	INPUT: 100-240V, 50/60Hz 0.6A OUTPUT: 12V, 2.0A
Adapter 2 (Interchangeable plug)	KTEC	KSA-24W-120200D5	INPUT: 100-240V, 50/60Hz 0.6A OUTPUT: 12V, 2.0A
Adapter 3 (Fixed plug)	APD	WB-24J12FU-ABBC	INPUT: 100-240V, 50-60Hz 0.7A Max. OUTPUT: 12V, 2A
Other			
US plug*1 (only for adapter 2 use)			

Note:The power adapter does not affect the test result of RF tests, so only adapter 3 was tested and recorded in this report.

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2.5 Support Equipment

For AC Conduction:

	Support Equipment			
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Flash disk3.0	Transcend	JetFlash-700	N/A
В	LAN NB	DELL	E6430	N/A
С	WAN NB	DELL	E6430	N/A
D	2.4G NB	DELL	E6430	N/A
Е	5G-1 & BT NB	Apple	A1278	N/A
F	5G-2 NB	DELL	E6430	N/A

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For Radiated (below 1GHz) and Radiated (above 1GHz / for Non-beamforming mode):

		Support Equ	ipment	
No.	Equipment	Brand Name	Model Name	FCC ID
Α	NB	DELL	E4300	N/A

For Radiated (above 1GHz / for beamforming mode):

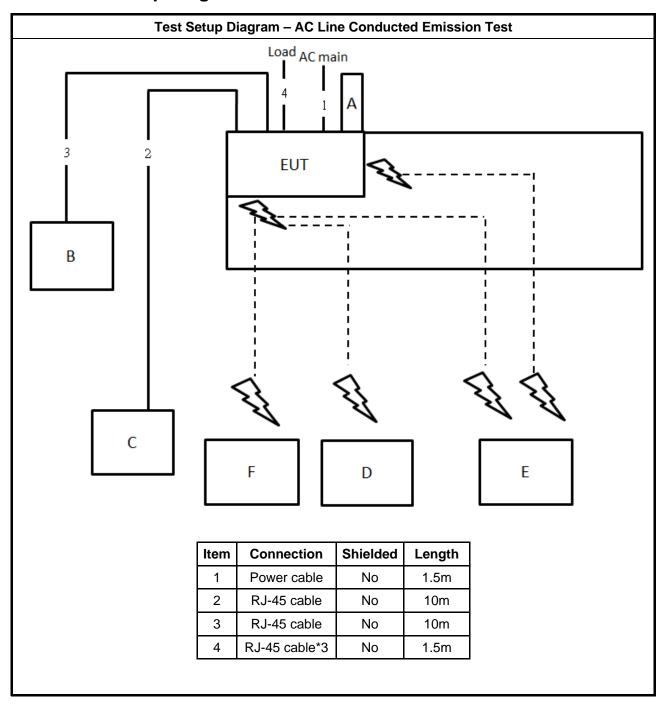
	•	Support Equ	ipment	
No.	Equipment	Brand Name	Model Name	FCC ID
Α	NB	DELL	E4300	N/A
В	NB	DELL	E4300	N/A
С	RX Device	LINKSYS	MR9000	Q87-03433

For RF Conducted:

		Support Equ	ipment	
No.	Equipment	Brand Name	Model Name	FCC ID
Α	NB	DELL	E4300	NA

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2.6 Test Setup Diagram



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Test Setup Diagram - Radiated Test < 1GHz and Radiated Test > 1GHz for non-beamforming mode

AC MAIN

EUT

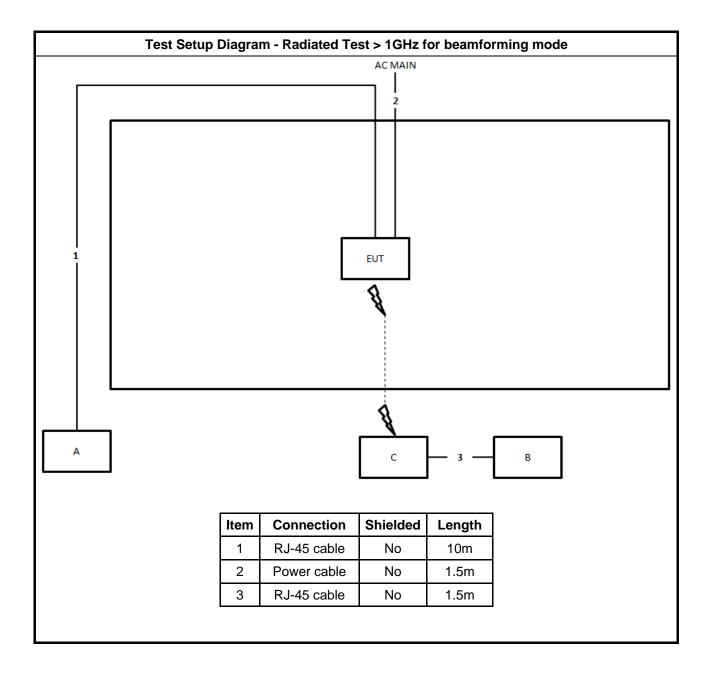
A

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Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	Power cable	No	1.5m
-			

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

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3.1.2 Measuring Instruments

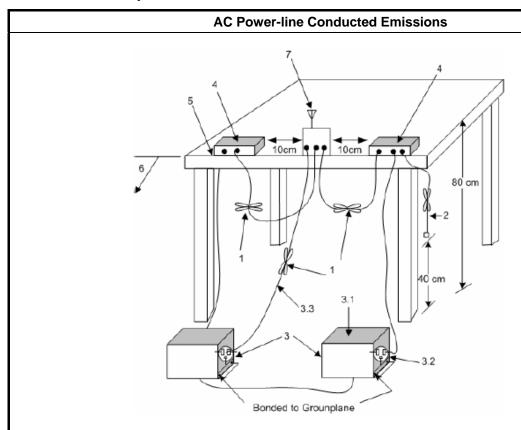
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

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3.1.4 Test Setup



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

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

3.1.5 Test Result of AC Power-line Conducted Emissions

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3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

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

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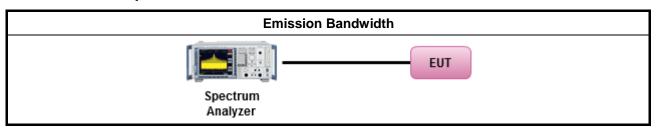
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

		Test Method
-	For	the emission bandwidth shall be measured using one of the options below:
	\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 Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

	Maximum Conducted Output Power Limit
UNI	I Devices
\boxtimes	For the 5.15-5.25 GHz band:
	Outdoor AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6). e.i.r.p. at any elevation angle above 30 degrees \leq 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).
	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$.
	Point-to-point systems (P2P): the maximum conducted output power (P _{Out}) shall not exceed the lesser of 1 W.
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the maximum conducted output power (P _{Out}) shall not exceed the lesser of 1 W. If G _{TX} > 6 dBi, then P _{Out} = 30 − (G _{TX} − 6).
	 Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W.
	e = maximum conducted output power in dBm, = the maximum transmitting antenna directional gain in dBi.

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3.3.2 Measuring Instruments

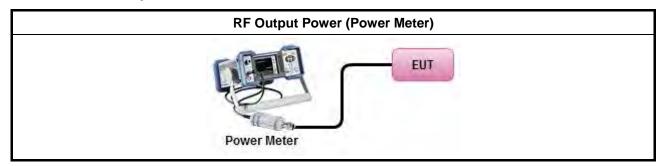
Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

	Test Method
•	Maximum Conducted Output Power
	Average over on/off periods with duty factor
	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).
	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
	Wideband RF power meter and average over on/off periods with duty factor
	Refer as FCC KDB 789033, clause E Method PM-G (using an RF average power meter).
•	For conducted measurement.
	■ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	 If multiple transmit chains, EIRP calculation could be following as methods: P_{total} = P₁ + P₂ + + P_n (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP_{total} = P_{total} + DG

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3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

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

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3.4.2 Measuring Instruments

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

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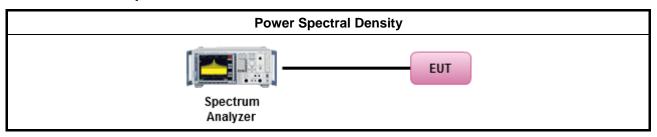
3.4.3 Test Procedures

		Test Method
	outp func	k power spectral density procedures that the same method as used to determine the conducted 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_{total} = PPSD_1 + PPSD_2 + \ldots + PPSD_n \\ (calculated in linear unit [mW] and transfer to log unit [dBm]) \\ EIRP_{total} = PPSD_{total} + DG $

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3.4.4 Test Setup



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3.4.5 Test Result of Peak Power Spectral Density

Refer as Appendix D

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3.5 Unwanted Emissions

3.5.1 Transmitter Unwanted Emissions Limit

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

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

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

Un-restricted band emissions above 1GHz Limit					
Operating Band	Limit				
⊠ 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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3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

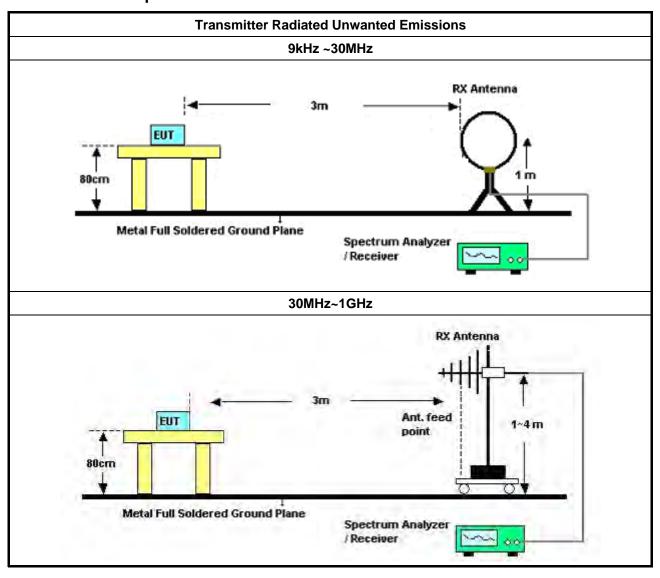
Test Method

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

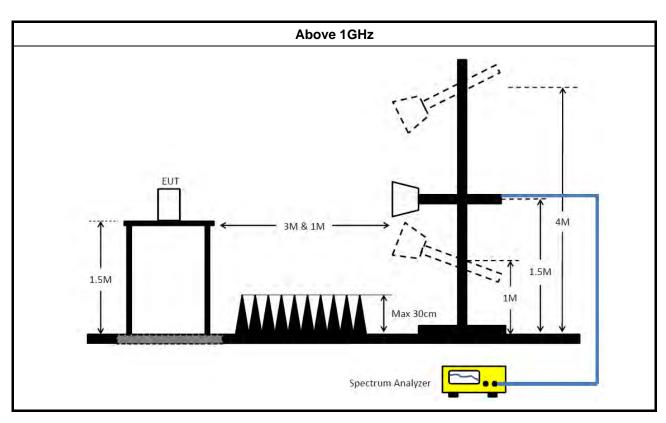
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3.5.4 Test Setup



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3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.5.6 Transmitter Unwanted Emissions (Below 30MHz)

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

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

3.5.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E

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4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 28, 2019	Jan. 29, 2020	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16 -2	04083	150kHz ~ 100MHz	Dec. 24, 2018	Dec. 23, 2019	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Jan. 11, 2019	Jan. 10, 2020	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	150kHz ~ 30MHz	May 22, 2018	May 21, 2019	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 27, 2018	Aug. 26, 2019	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH01-CB)
Horn Antenna	ETS·Lindgren	3115	6821	750MHz~18GHz	Jan. 24, 2019	Jan. 23, 2020	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 2019	Radiation (03CH03-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2018	May 01, 2019	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 01, 2019	Apr. 30, 2020	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Dec. 20, 2018	Dec. 19, 2019	Radiation (03CH03-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Jan. 31, 2019	Jan. 30, 2020	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Dec. 26, 2018	Dec. 25, 2019	Radiation (03CH03-CB)
EMI Test Receiver	R&S	ESCS	100359	9kHz ~ 2.75GHz	Jul. 03, 2018	Jul. 02, 2019	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-20+27	1GHz ~ 18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-27	1GHz ~ 18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH03-CB)

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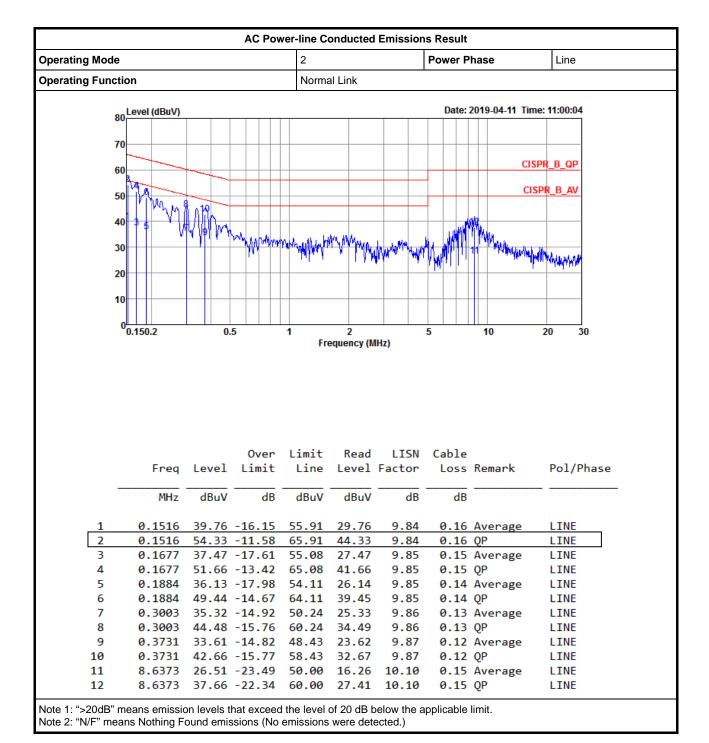
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Feb. 25, 2019	Feb. 24, 2020	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	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-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. 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. 05, 2018	Nov. 04, 2019	Conducted (TH01-CB)

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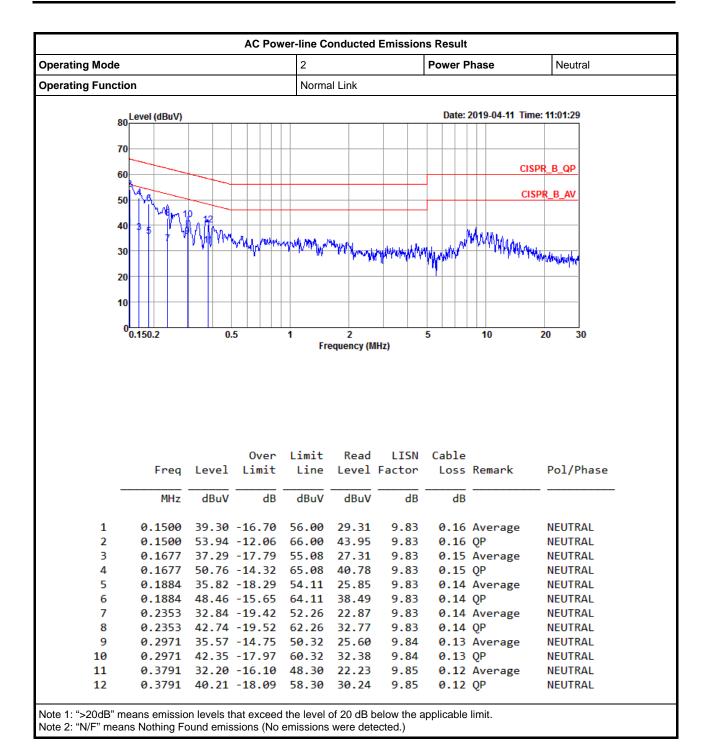
Note: Calibration Interval of instruments listed above is one year.

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

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Appendix B.1 **EBW**

For Band 1 / 2T1S and Band 4 / 4T1S **Summary**

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.15-5.25GHz	-	-	-	-	-
802.11a-BF_Nss1,(6Mbps)_2TX	38.925M	16.942M	16M9D1D	19.025M	16.417M
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	41.95M	18.041M	18M0D1D	19.85M	17.616M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	74.3M	36.332M	36M3D1D	39.55M	35.882M
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	83.7M	75.662M	75M7D1D	83.2M	75.662M
5.725-5.85GHz	-	-	-	-	-
802.11a-BF_Nss1,(6Mbps)_4TX	16.325M	16.442M	16M4D1D	15.925M	16.392M
VHT20.BF_Nss1,(MCS0)_4TX	17.575M	17.641M	17M6D1D	16.5M	17.591M
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	35.7M	36.032M	36M0D1D	30.9M	35.932M
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	75.6M	75.862M	75M9D1D	73.1M	75.762M

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;

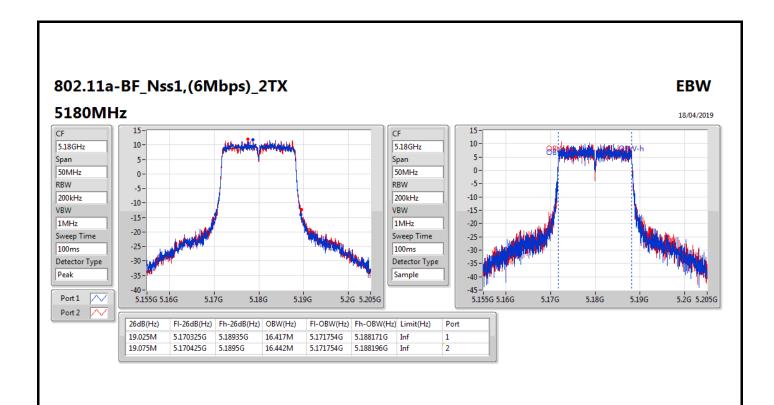


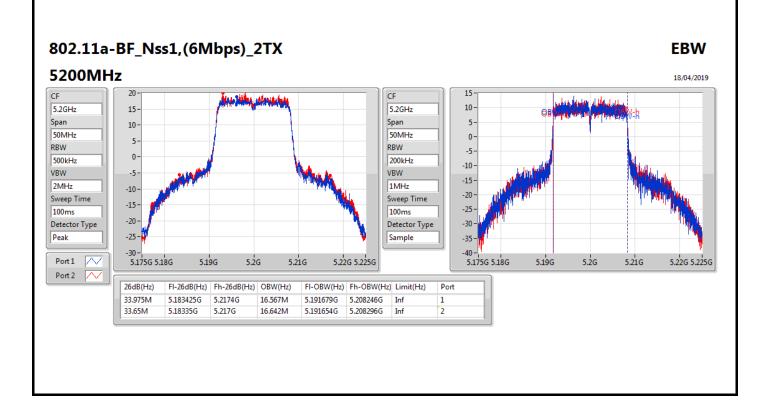
Appendix B.1 **EBW**

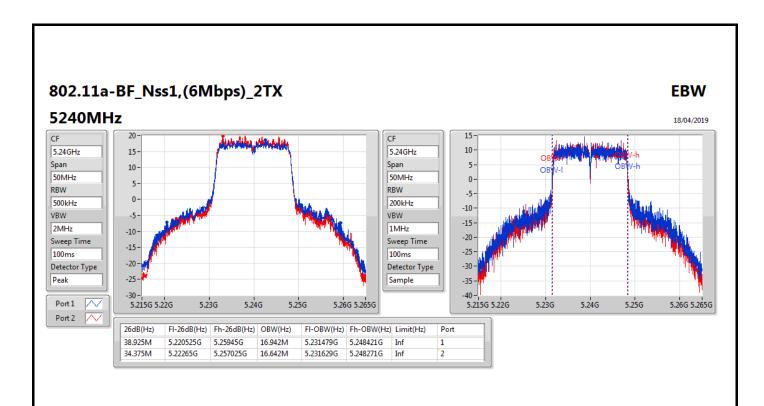
Result

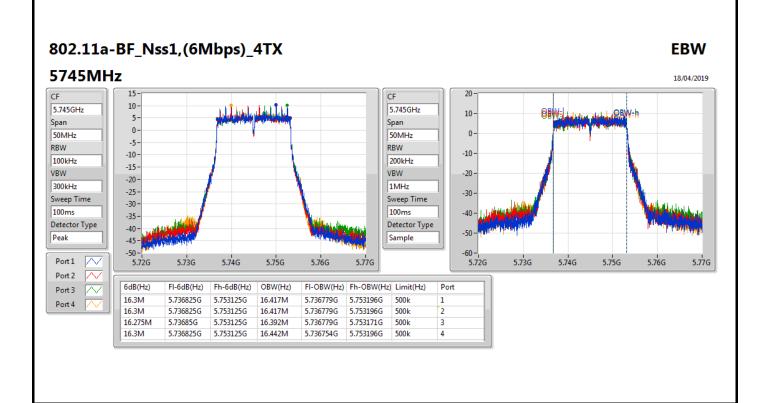
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a-BF_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	19.025M	16.417M	19.075M	16.442M				
5200MHz	Pass	Inf	33.975M	16.567M	33.65M	16.642M				
5240MHz	Pass	Inf	38.925M	16.942M	34.375M	16.642M				
802.11a-BF_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
5745MHz	Pass	500k	16.3M	16.417M	16.3M	16.417M	16.275M	16.392M	16.3M	16.442M
5785MHz	Pass	500k	16.3M	16.417M	16.3M	16.392M	15.925M	16.417M	16.3M	16.392M
5825MHz	Pass	500k	16.3M	16.442M	16.3M	16.392M	16.325M	16.392M	16.3M	16.392M
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	19.85M	17.616M	19.925M	17.666M				
5200MHz	Pass	Inf	34.1M	17.766M	34.85M	17.841M				
5240MHz	Pass	Inf	41.95M	18.041M	37M	17.791M				
VHT20.BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5745MHz	Pass	500k	17.15M	17.591M	17.15M	17.616M	16.5M	17.616M	17.575M	17.616M
5785MHz	Pass	500k	17.525M	17.591M	17.525M	17.591M	17.125M	17.616M	17.15M	17.616M
5825MHz	Pass	500k	17.525M	17.641M	16.55M	17.591M	17.1M	17.616M	16.525M	17.616M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	39.55M	35.982M	39.6M	35.882M				
5230MHz	Pass	Inf	74.3M	36.332M	65.05M	36.132M				
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5755MHz	Pass	500k	31.25M	35.982M	34.35M	35.982M	32.5M	36.032M	34.35M	35.982M
5795MHz	Pass	500k	30.9M	35.982M	35.05M	35.932M	34.45M	36.032M	35.7M	35.982M
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	83.7M	75.662M	83.2M	75.662M				
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5775MHz	Pass	500k	74.4M	75.762M	75.6M	75.862M	74.4M	75.762M	73.1M	75.762M

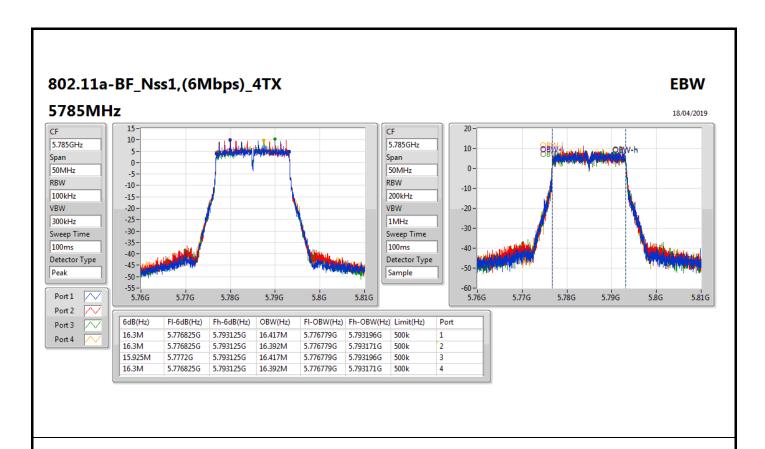
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

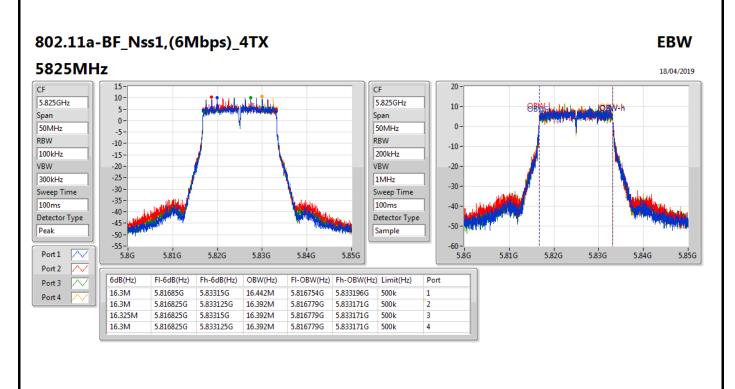


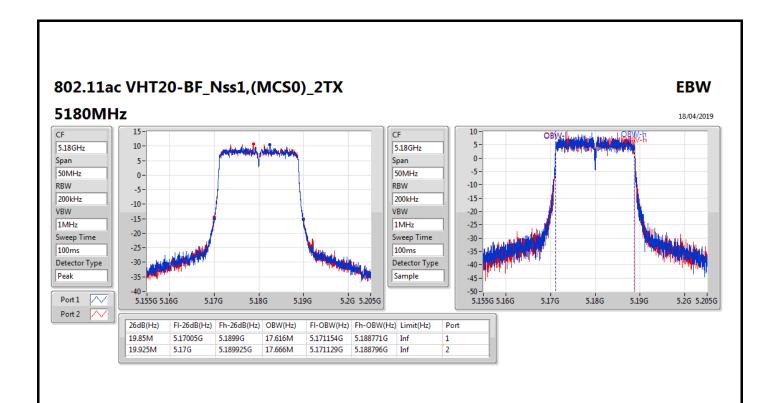


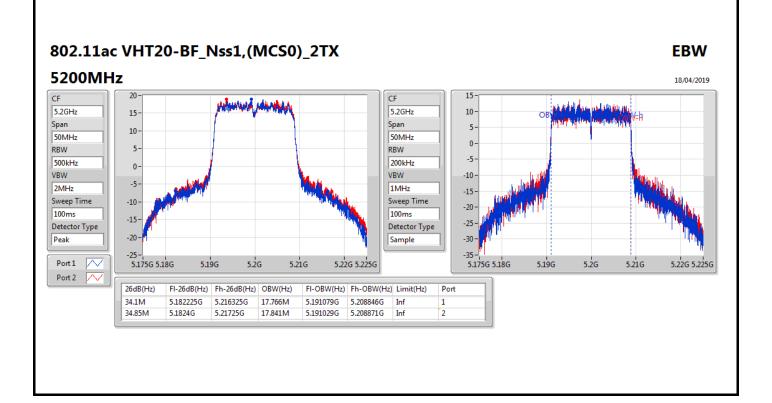


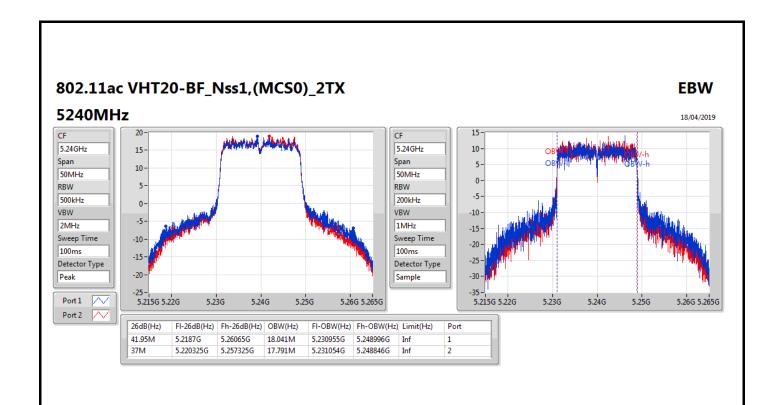


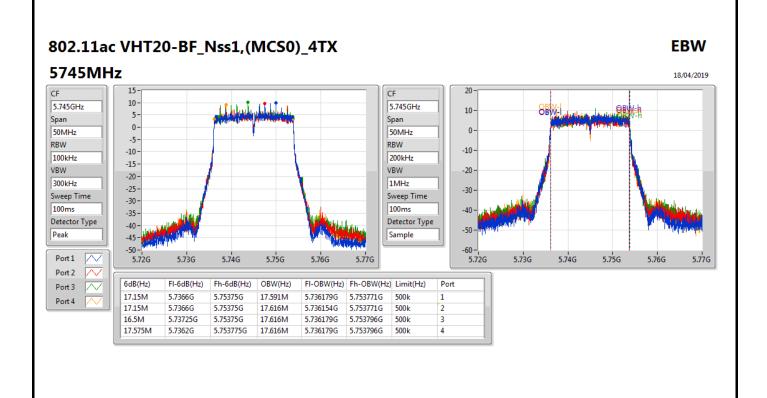


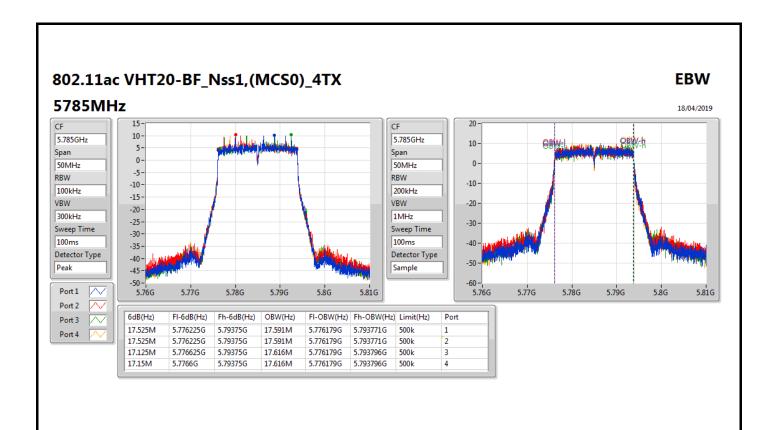


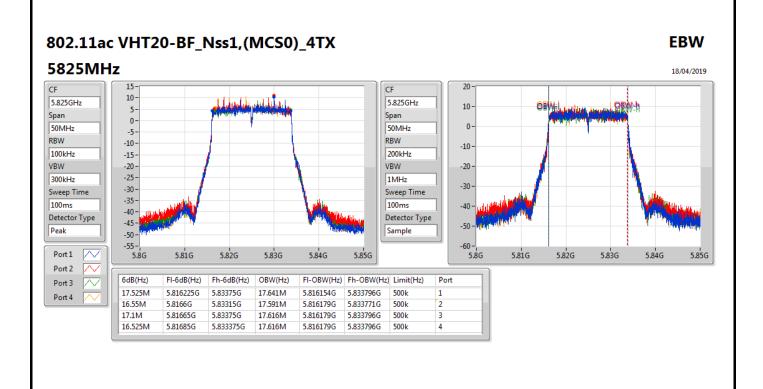


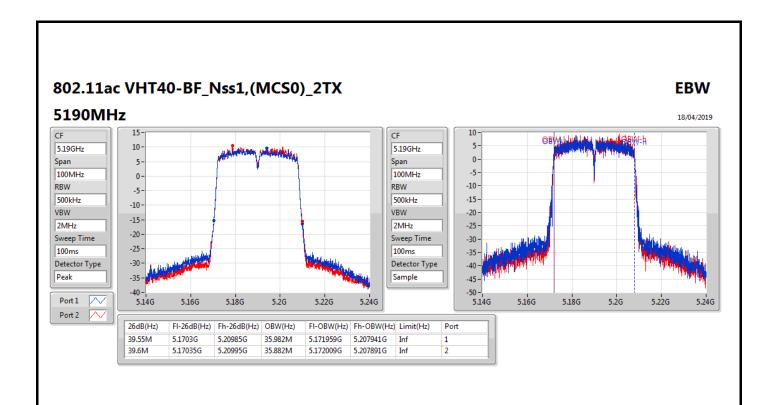


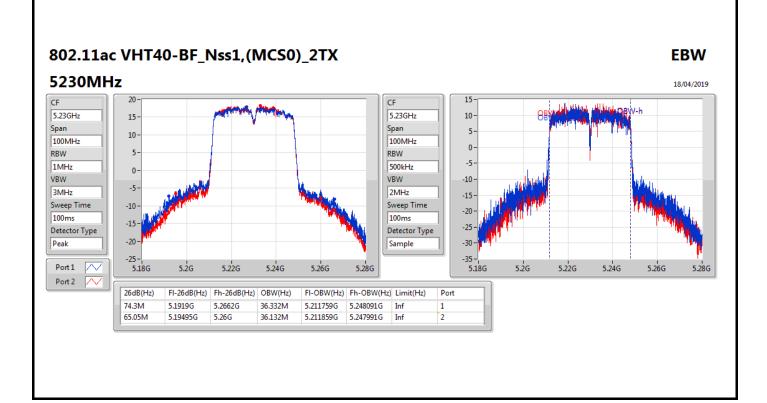


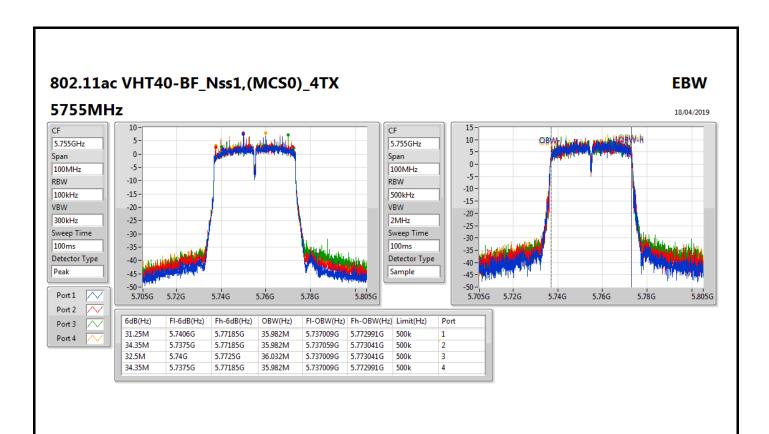


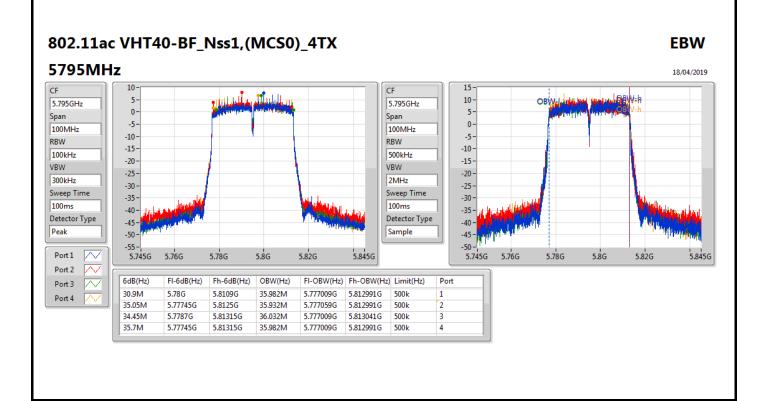


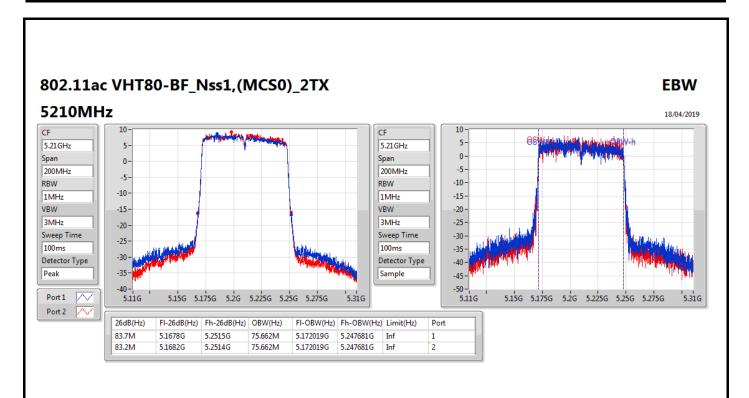


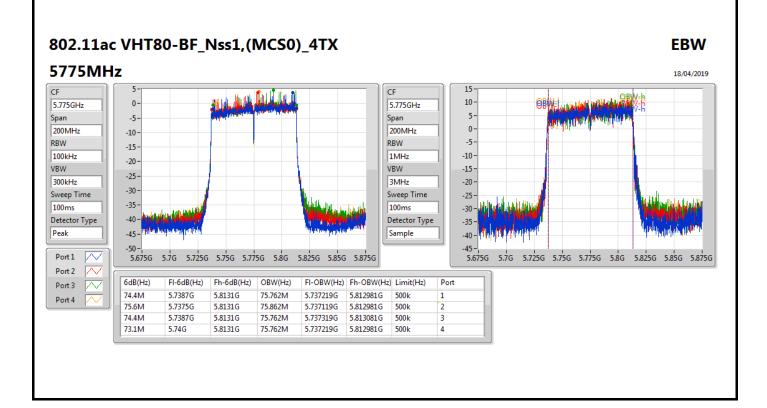














Appendix B.2 **EBW**

For Band 4 / 4T2S **Summary**

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
5.725-5.85GHz	-	-	-	-	-
802.11ac VHT20-BF_Nss2,(MCS0)_4TX	17.575M	17.691M	17M7D1D	16.825M	17.616M
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	35.65M	36.082M	36M1D1D	34.05M	35.982M
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	74.4M	75.862M	75M9D1D	73.2M	75.762M

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

Max-OBW = Maximum99% occupied bandwidth;

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

Min-OBW = Minimum 99% occupied bandwidth;

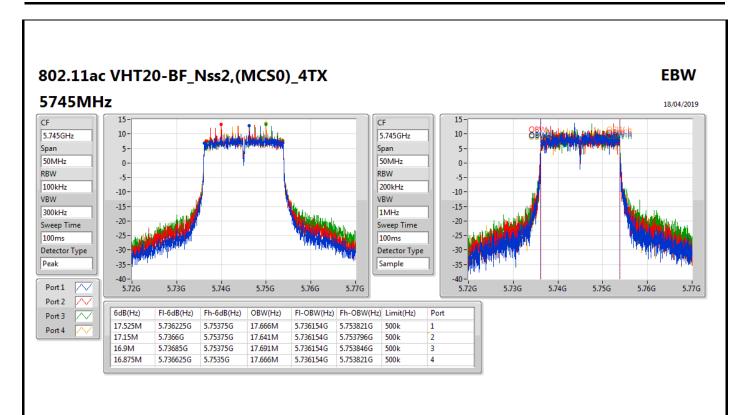


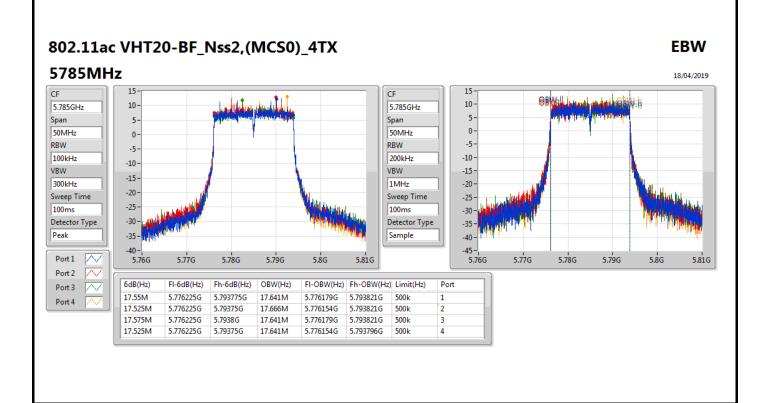
Result

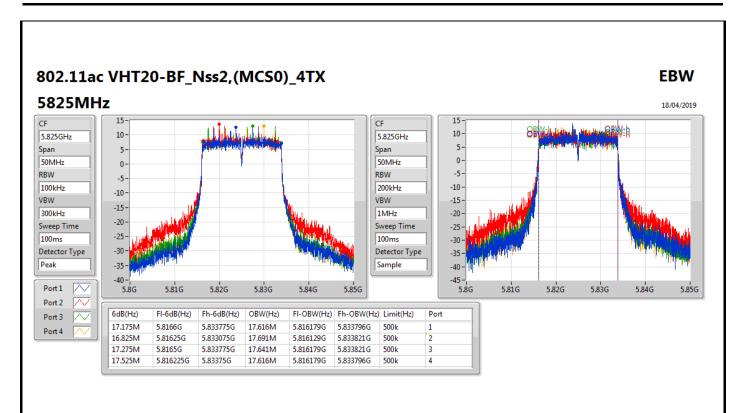
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
VHT20.BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5745MHz	Pass	500k	17.525M	17.666M	17.15M	17.641M	16.9M	17.691M	16.875M	17.666M
5785MHz	Pass	500k	17.55M	17.641M	17.525M	17.666M	17.575M	17.641M	17.525M	17.641M
5825MHz	Pass	500k	17.175M	17.616M	16.825M	17.691M	17.275M	17.641M	17.525M	17.616M
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5755MHz	Pass	500k	34.95M	36.032M	34.05M	36.032M	35.05M	36.082M	35.65M	36.032M
5795MHz	Pass	500k	34.95M	35.982M	34.65M	36.032M	35M	36.032M	35.05M	36.032M
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	=	-	-	-	-
5775MHz	Pass	500k	74.4M	75.762M	73.2M	75.862M	74.4M	75.862M	74.3M	75.862M

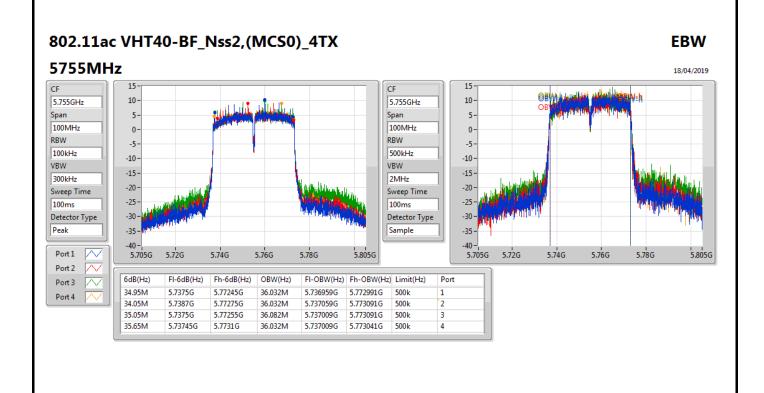
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

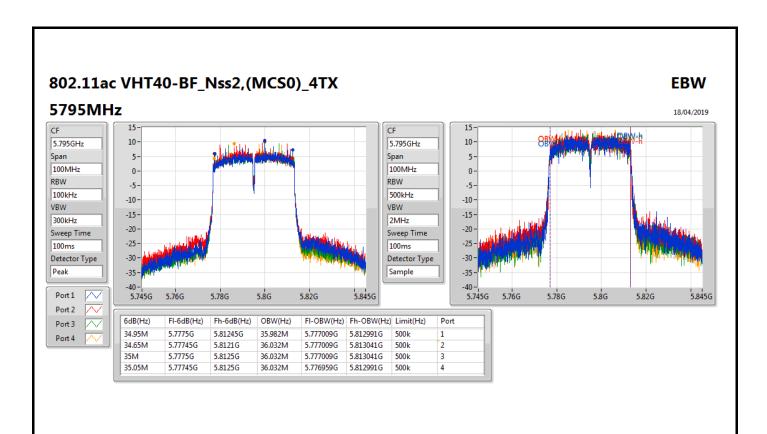
Appendix B.2

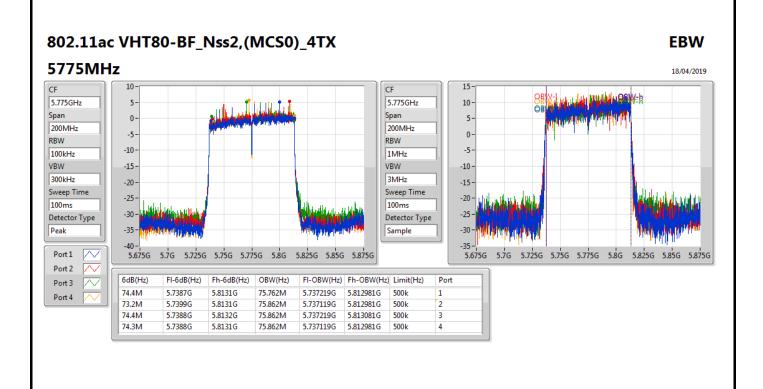














For Band 1 / 2T1S and Band 4 / 4T1S Summary

Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11a-BF_Nss1,(6Mbps)_2TX	27.45	0.55590
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	27.46	0.55719
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	26.98	0.49888
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	20.85	0.12162
5.725-5.85GHz	-	-
802.11a-BF_Nss1,(6Mbps)_4TX	27.14	0.51761
VHT20.BF_Nss1,(MCS0)_4TX	27.27	0.53333
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	27.21	0.52602
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	26.87	0.48641

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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-BF_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.75	21.97	21.96			24.98	30.00
5200MHz	Pass	5.75	24.29	24.37			27.34	30.00
5240MHz	Pass	5.75	24.31	24.57			27.45	30.00
802.11a-BF_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5745MHz	Pass	8.69	21.06	21.06	20.99	21.35	27.14	27.31
5785MHz	Pass	8.69	20.79	20.86	20.79	20.85	26.84	27.31
5825MHz	Pass	8.69	20.45	21.44	20.83	20.35	26.81	27.31
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.75	20.82	20.82			23.83	30.00
5200MHz	Pass	5.75	24.25	24.01			27.14	30.00
5240MHz	Pass	5.75	24.22	24.67			27.46	30.00
VHT20.BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5745MHz	Pass	8.69	20.73	20.81	20.85	20.98	26.86	27.31
5785MHz	Pass	8.69	21.06	21.32	21.24	21.36	27.27	27.31
5825MHz	Pass	8.69	20.97	21.39	21.19	21.27	27.23	27.31
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5190MHz	Pass	5.75	19.03	19.33			22.19	30.00
5230MHz	Pass	5.75	23.89	24.05			26.98	30.00
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5755MHz	Pass	8.69	20.78	20.96	20.89	21.18	26.98	27.31
5795MHz	Pass	8.69	20.88	21.27	21.08	21.52	27.21	27.31
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5210MHz	Pass	5.75	17.81	17.86			20.85	30.00
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5775MHz	Pass	8.69	20.72	20.98	20.81	20.90	26.87	27.31

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



For Band 4 / 4T2S Summary

Mode	Total Power (dBm)	Total Power (W)
5.725-5.85GHz	-	-
802.11ac VHT20-BF _Nss2,(MCS0)_4TX	29.96	0.99083
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	29.75	0.94406
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	28.39	0.69024

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Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11ac VHT20-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-
5745MHz	Pass	5.69	23.66	23.90	24.00	24.18	29.96	30.00
5785MHz	Pass	5.69	23.76	24.00	23.47	23.70	29.76	30.00
5825MHz	Pass	5.69	23.52	24.19	23.57	23.37	29.69	30.00
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-
5755MHz	Pass	5.69	23.67	23.60	23.58	23.56	29.62	30.00
5795MHz	Pass	5.69	23.77	23.98	23.50	23.67	29.75	30.00
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-
5775MHz	Pass	5.69	22.35	22.51	22.31	22.32	28.39	30.00

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

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For Band 1 / 2T1S and Band 4 / 4T1S Summary

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	-
802.11a-BF_Nss1,(6Mbps)_2TX	15.21
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	14.95
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	11.87
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	2.00
5.725-5.85GHz	-
802.11a-BF_Nss1,(6Mbps)_4TX	13.12
802.11ac VHT20-BF _Nss1,(MCS0)_4TX	13.22
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	10.58
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	6.72

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



Appendix D.1 **PSD**

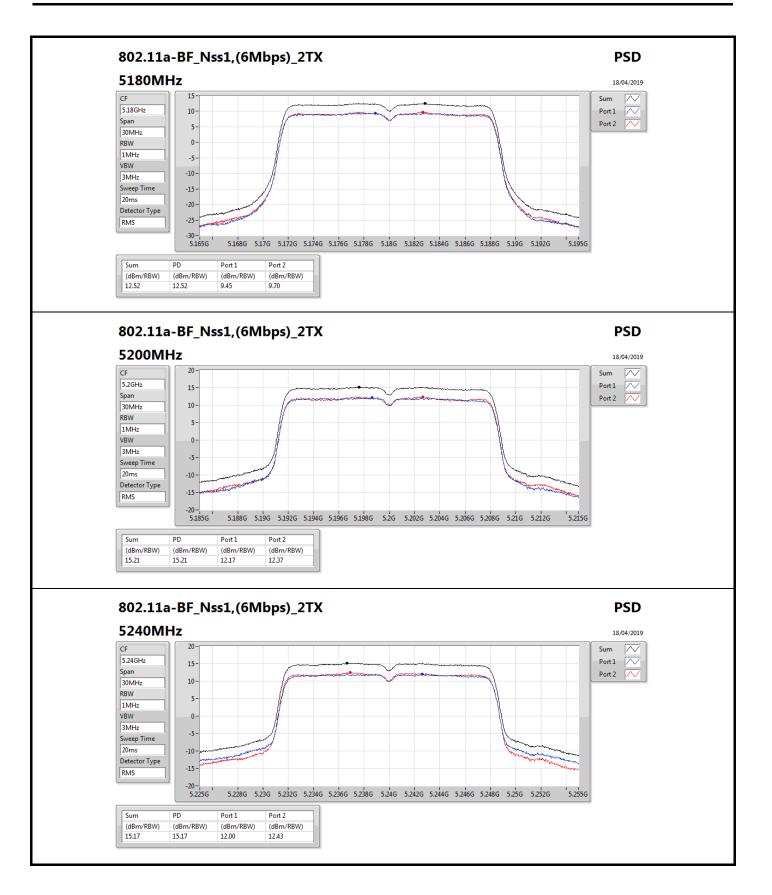
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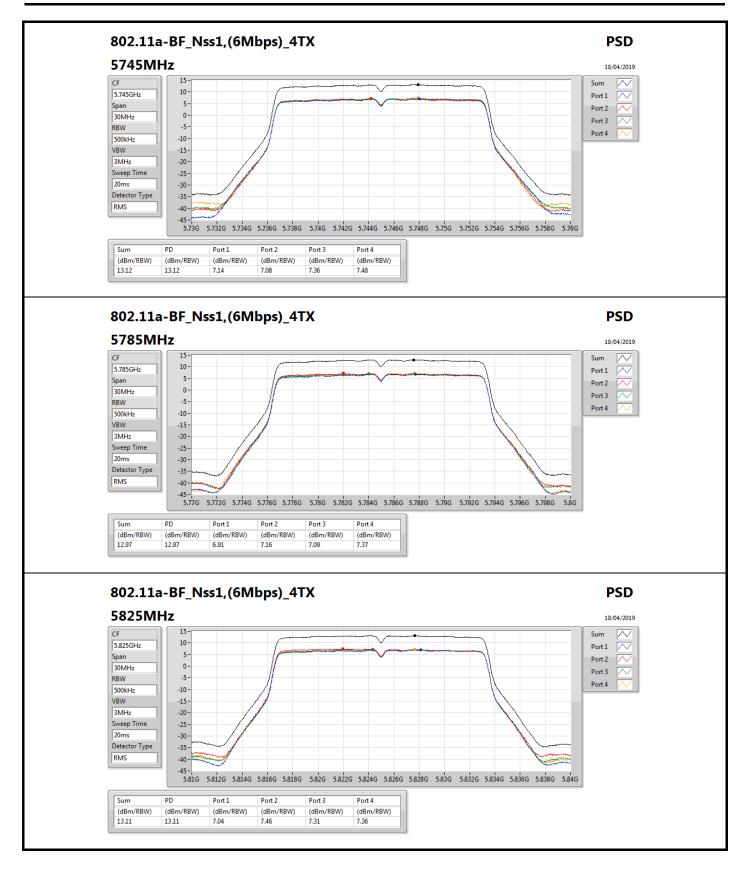
Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a-BF_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.75	9.45	9.70			12.52	17.00
5200MHz	Pass	5.75	12.17	12.37			15.21	17.00
5240MHz	Pass	5.75	12.00	12.43			15.17	17.00
802.11a-BF_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5745MHz	Pass	8.69	7.14	7.08	7.36	7.48	13.12	27.31
5785MHz	Pass	8.69	6.91	7.16	7.09	7.37	12.97	27.31
5825MHz	Pass	8.69	7.04	7.46	7.31	7.36	13.11	27.31
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.75	8.45	8.38			11.35	17.00
5200MHz	Pass	5.75	12.04	11.87			14.95	17.00
5240MHz	Pass	5.75	11.81	12.06			14.84	17.00
VHT20.BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5745MHz	Pass	8.69	6.52	6.52	6.74	7.04	12.59	27.31
5785MHz	Pass	8.69	7.16	7.43	7.35	7.64	13.22	27.31
5825MHz	Pass	8.69	6.89	7.44	7.34	7.32	13.12	27.31
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5190MHz	Pass	5.75	4.07	4.29			7.18	17.00
5230MHz	Pass	5.75	8.89	9.04			11.87	17.00
802.11ac VHT40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5755MHz	Pass	8.69	4.18	4.45	4.55	4.78	10.42	27.31
5795MHz	Pass	8.69	4.43	4.87	4.63	5.09	10.58	27.31
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5210MHz	Pass	5.75	-0.99	-1.01			2.00	17.00
802.11ac VHT80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5775MHz	Pass	8.69	0.69	0.97	0.99	1.19	6.72	27.31

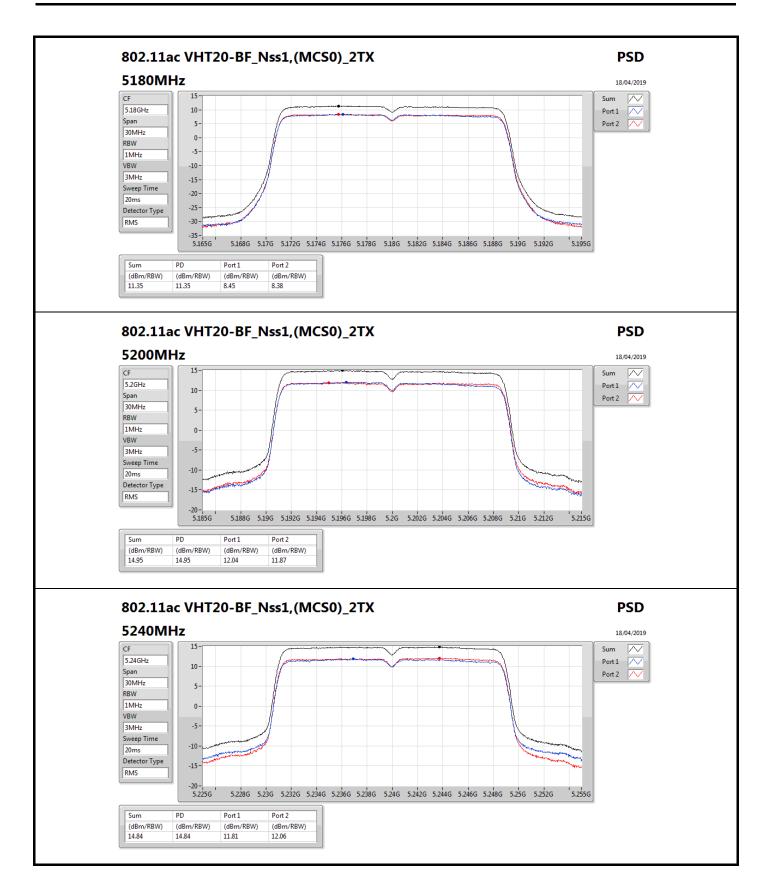
Page No.

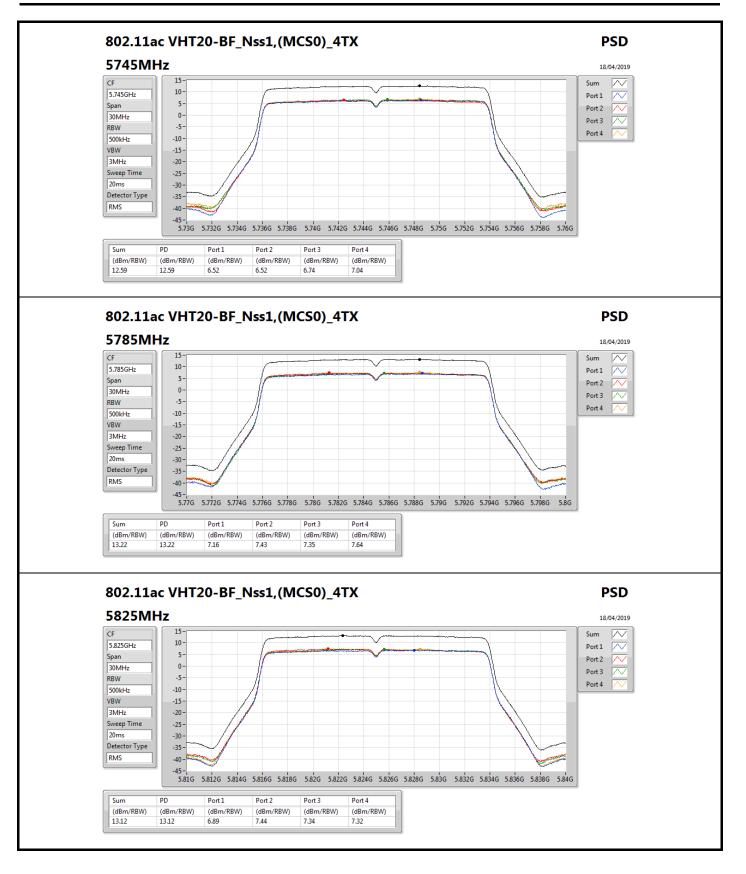
: 2 of 8

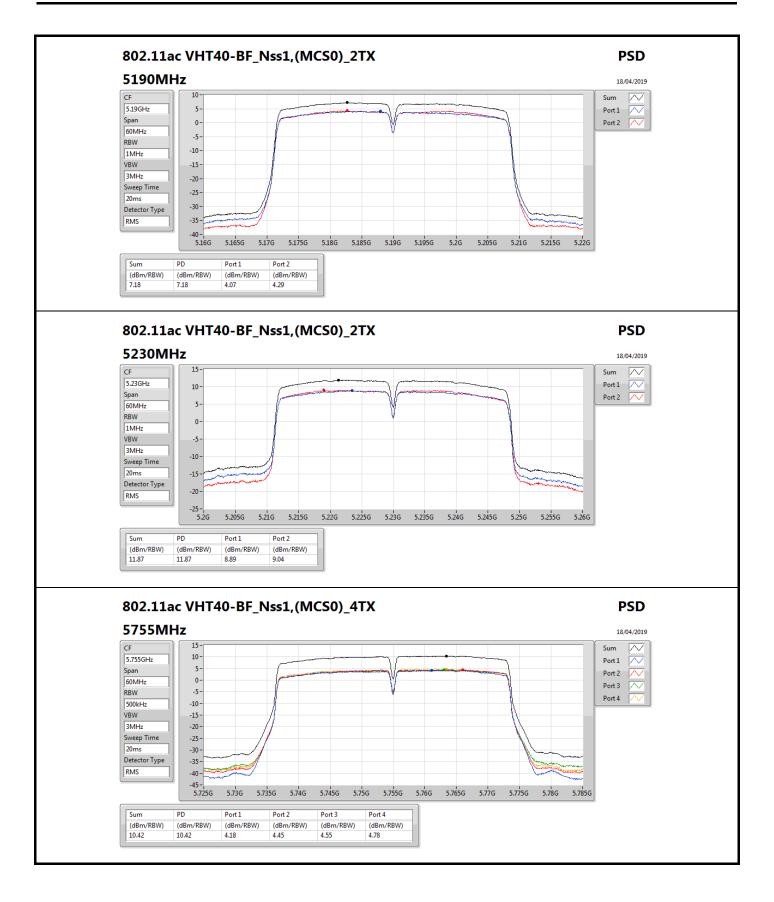
DG = Directional Gain; **RBW** = 500 kHz for 5.725-5.85GHz band / 1MHz for other band; **PD** = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

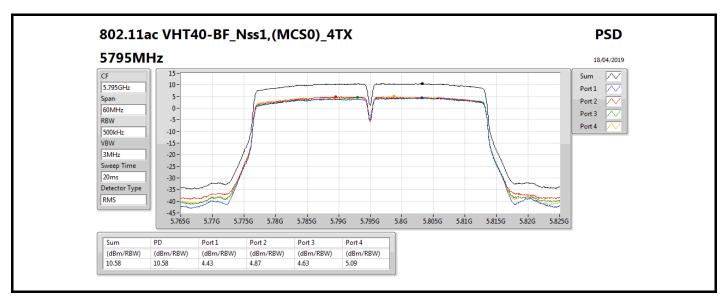


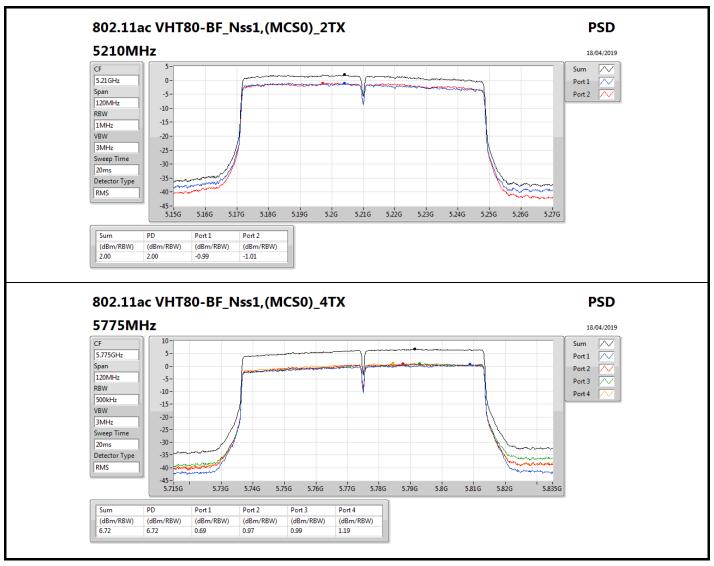














Appendix D.2 **PSD**

For Band 4 / 4T2S **Summary**

Mode	PD
	(dBm/RBW)
5.725-5.85GHz	-
802.11ac VHT20-BF _Nss2,(MCS0)_4TX	15.72
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	12.03
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	8.07

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

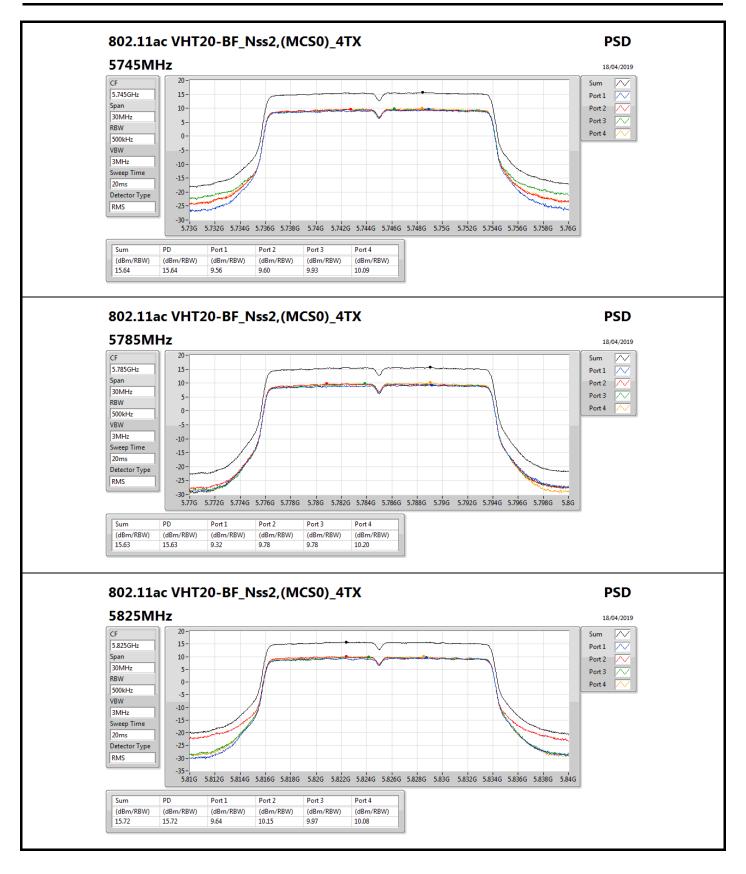
Result

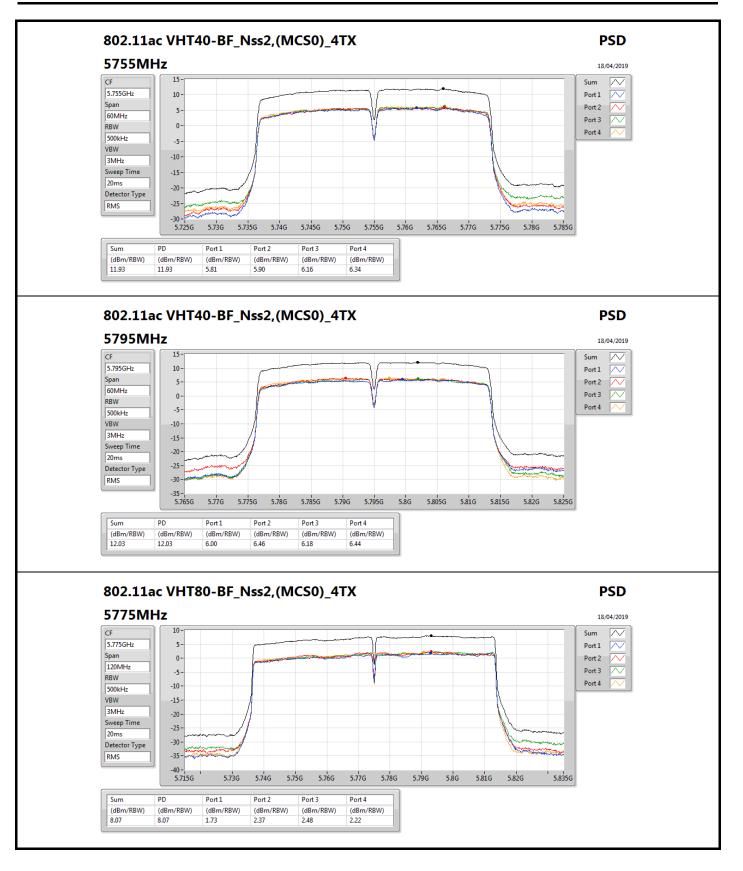
Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11ac VHT20-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-
5745MHz	Pass	5.69	9.56	9.60	9.93	10.09	15.64	30.00
5785MHz	Pass	5.69	9.32	9.78	9.78	10.20	15.63	30.00
5825MHz	Pass	5.69	9.64	10.15	9.97	10.08	15.72	30.00
802.11ac VHT40-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-
5755MHz	Pass	5.69	5.81	5.90	6.16	6.34	11.93	30.00
5795MHz	Pass	5.69	6.00	6.46	6.18	6.44	12.03	30.00
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-
5775MHz	Pass	5.69	1.73	2.37	2.48	2.22	8.07	30.00

Page No.

: 1 of 3

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;



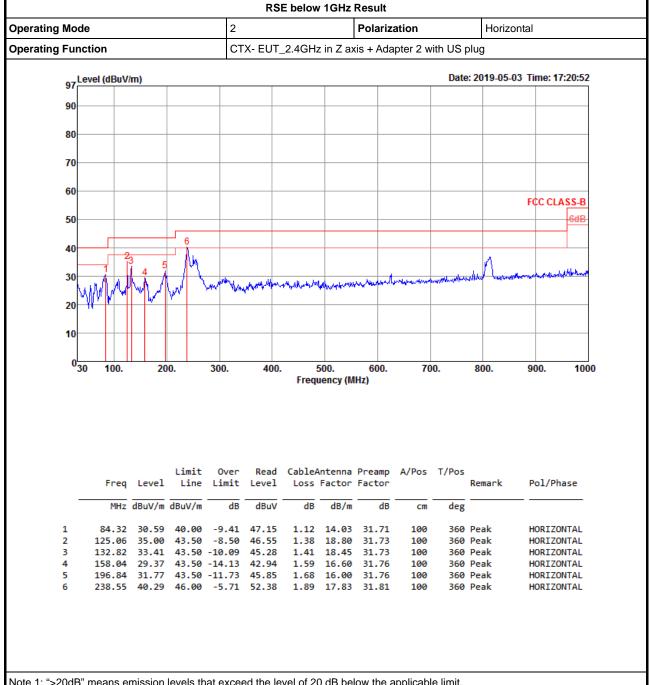




				110	_ 50.01	10112	Result			-		
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ng Function			СТ	X- EUT	_2.4GH	z in Z ax	is + Ada	pter 2 w	ith US p	olug		
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	20	0.	300.	400.				70	0.	800.	900.	10
	20	0.	300.	400.				70	0.	800.	900.	10
	20	00.	300.	400.				70	0.	800.	900.	10
	20	00.	300.	400.				70	0.	800.	900.	10
	20				Frequ	iency (M	Hz)			800.	900.	10
030 100.	20 q Level	Limit	300.	Read	Frequ Cable	uency (M	Hz)	70		800.	900.	
030 100.	η Level	Limit Line	Over Limit	Read Level	Cable/ Loss	ntenna Factor	Preamp Factor	A/Pos	T/Pos			
030 100.		Limit Line	0ver	Read	Frequ Cable	uency (M	Hz) Preamp					
030 100. Free MH: 1 30.9	Q Level dBuV/m 33.73	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Cable/Loss dB	untenna Factor dB/m	Preamp Factor dB	A/Pos	T/Pos deg 0	Remark ————————————————————————————————————	Pol/Pha — VERTICA	ise ——
030 100. Free MH: 1 30.9: 2 43.56	Level dBuV/m 33.73 33.67	Limit Line dBuV/m 40.00 40.00	Over Limit dB -6.27 -6.33	Read Level dBuV 38.89 46.10	Cable/Loss dB 0.76 0.84	untenna Factor dB/m 25.40 18.30	Preamp Factor dB 31.32 31.57	A/Pos 	T/Pos deg 0 358	Remark ————————————————————————————————————	Pol/Pha 	ıse ——
Free MH: 1 30.9: 2 43.5: 3 55.2:	Level dBuV/m 33.73 33.67 2 35.30	Limit Line dBuV/m 40.00 40.00 40.00	Over Limit dB -6.27 -6.33 -4.70	Read Level dBuV 38.89 46.10 52.69	Cable/ Loss dB 0.76 0.84 0.99	untenna Factor dB/m 25.40 18.30 13.24	Preamp Factor dB 31.32 31.57 31.62	A/Pos cm 300 100 122	T/Pos deg 0 358 60	Remark	Pol/Pha VERTICA VERTICA VERTICA	sse —— NL NL
Free MH: 1 30.9: 2 43.5: 3 55.2:	Level dBuV/m 33.73 33.67 2 35.30 36.88	Limit Line dBuV/m 40.00 40.00 40.00	Over Limit dB -6.27 -6.33 -4.70 -3.12	Read Level dBuV 38.89 46.10 52.69 54.95	Cable/Loss dB 0.76 0.84 0.99 1.00	untenna Factor dB/m 25.40 18.30	Preamp Factor dB 31.32 31.57 31.62 31.67	A/Pos 	T/Pos deg 0 358 60 0	Remark ————————————————————————————————————	Pol/Pha 	use L NL NL NL

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





Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)



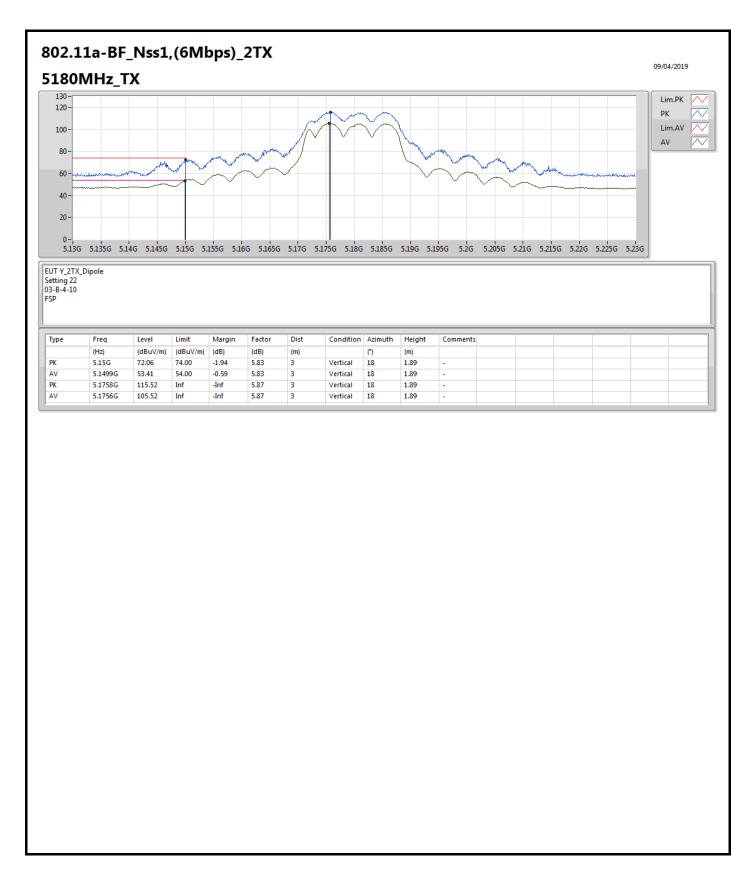
Appendix E.2

For Band 1 / 2T1S and Band 4 / 4T1S Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)
5.15-5.25GHz	-	-	-	-	-	-	-	-	-	-	-
802.11a-BF_Nss1,(6Mbps)_2TX	Pass	AV	5.1499G	53.41	54.00	-0.59	5.83	3	Vertical	18	1.89

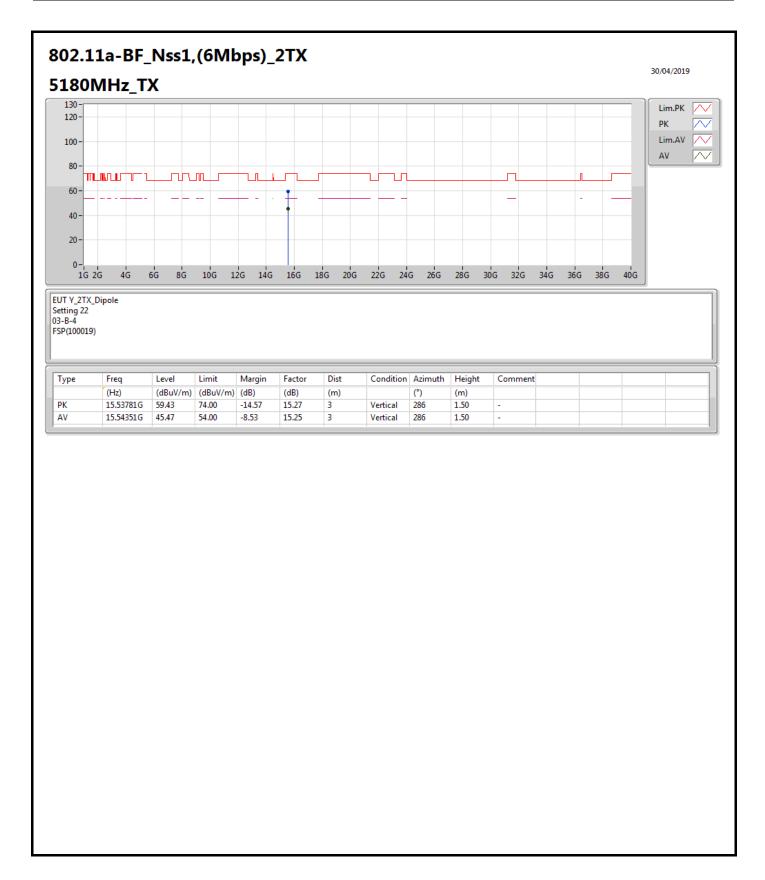
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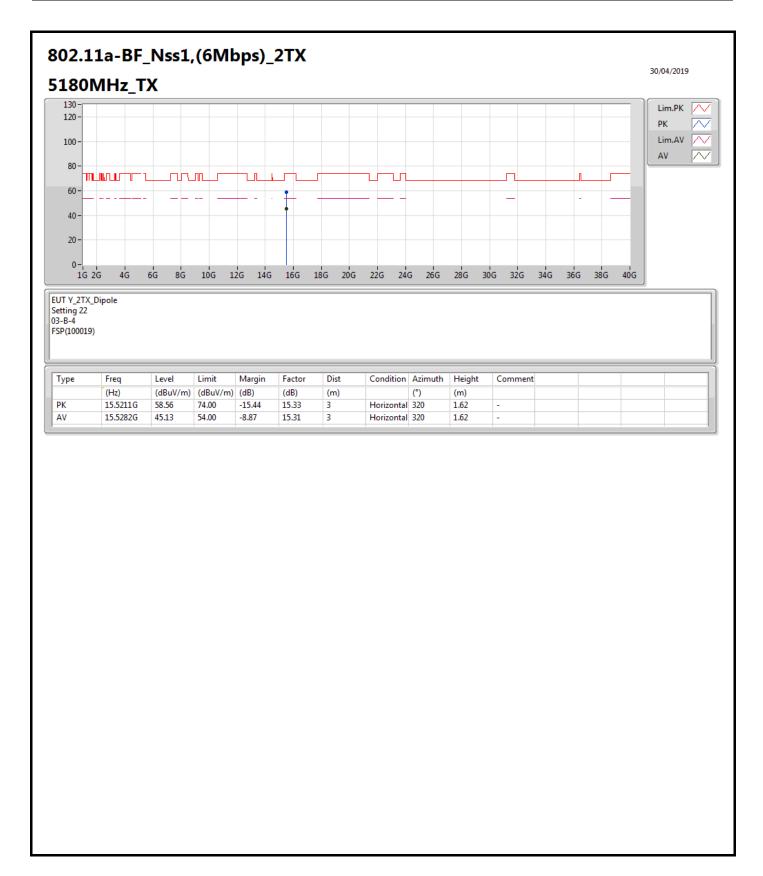
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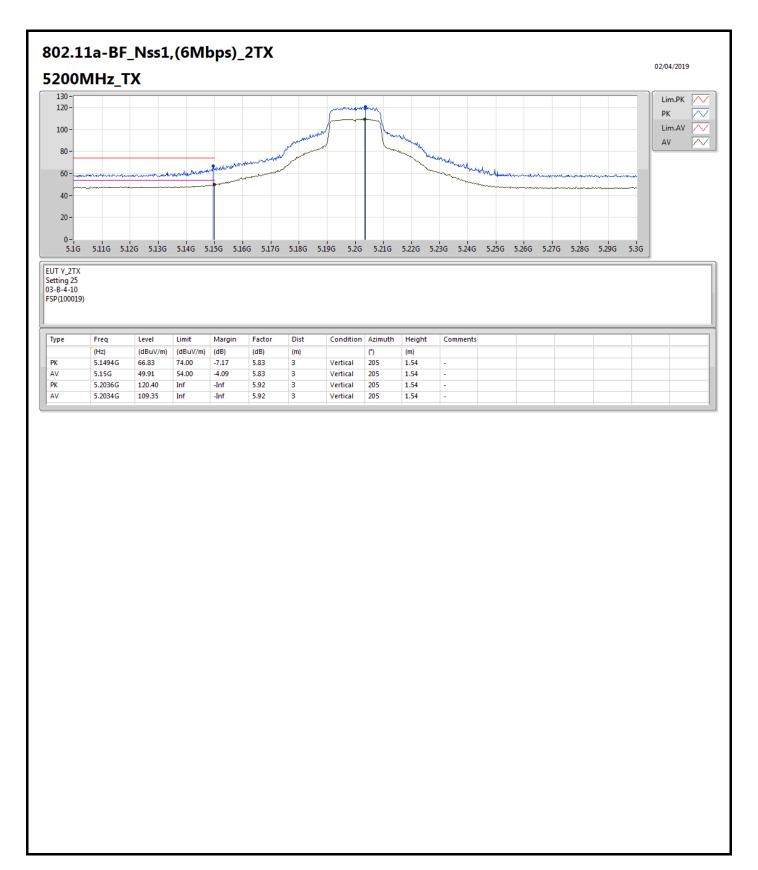
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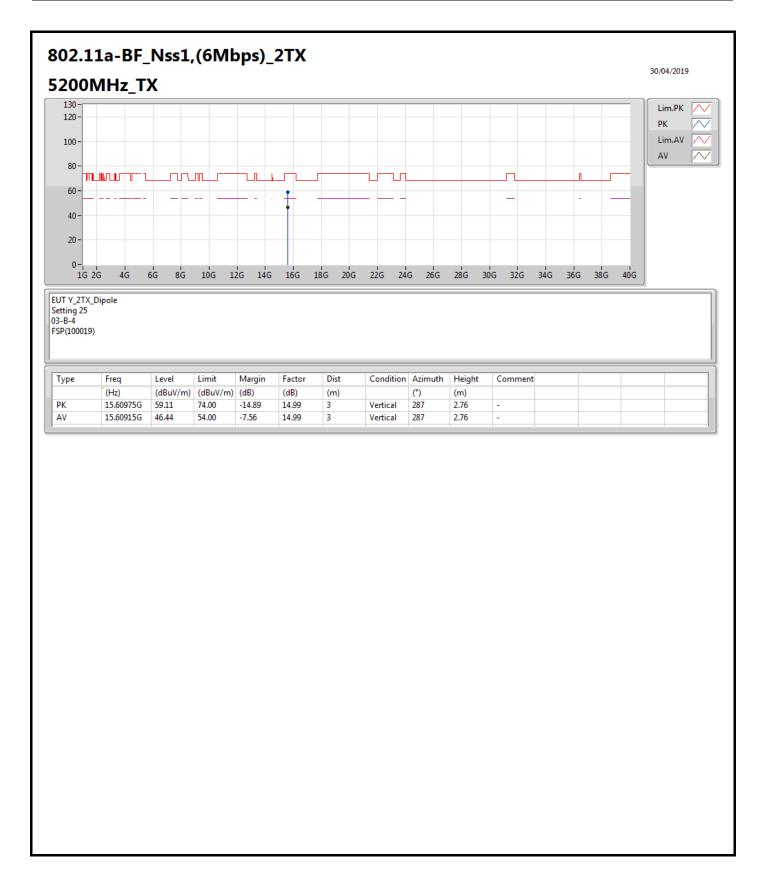
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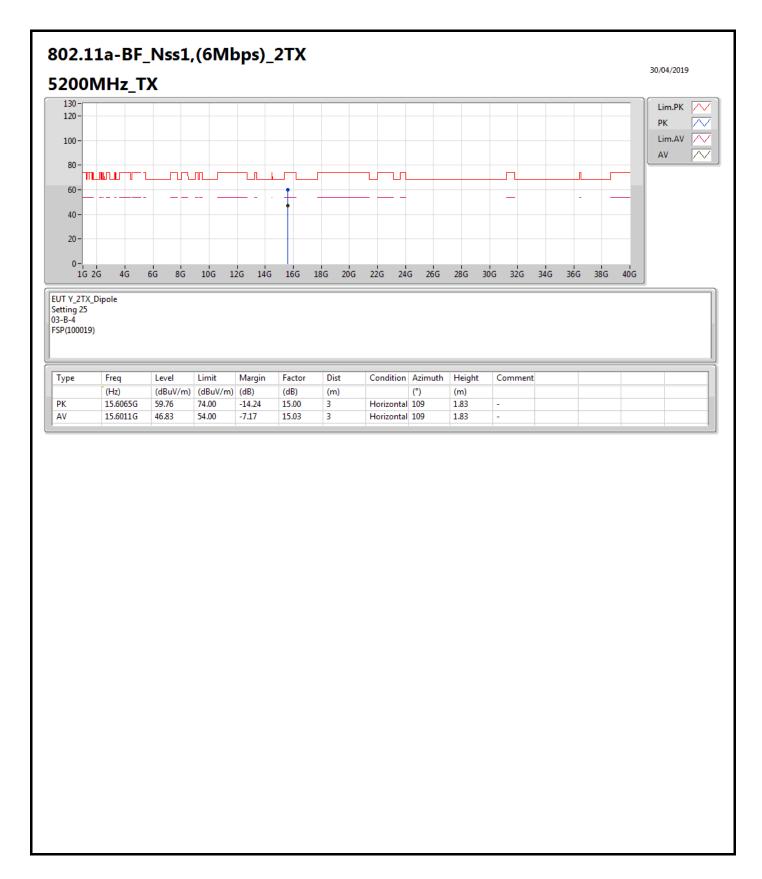
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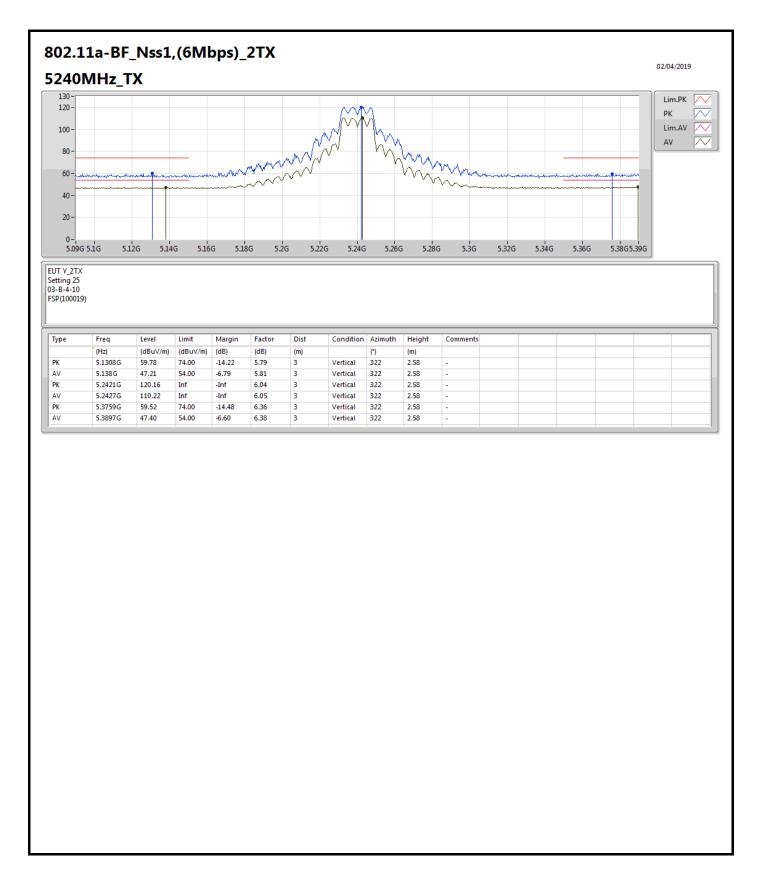
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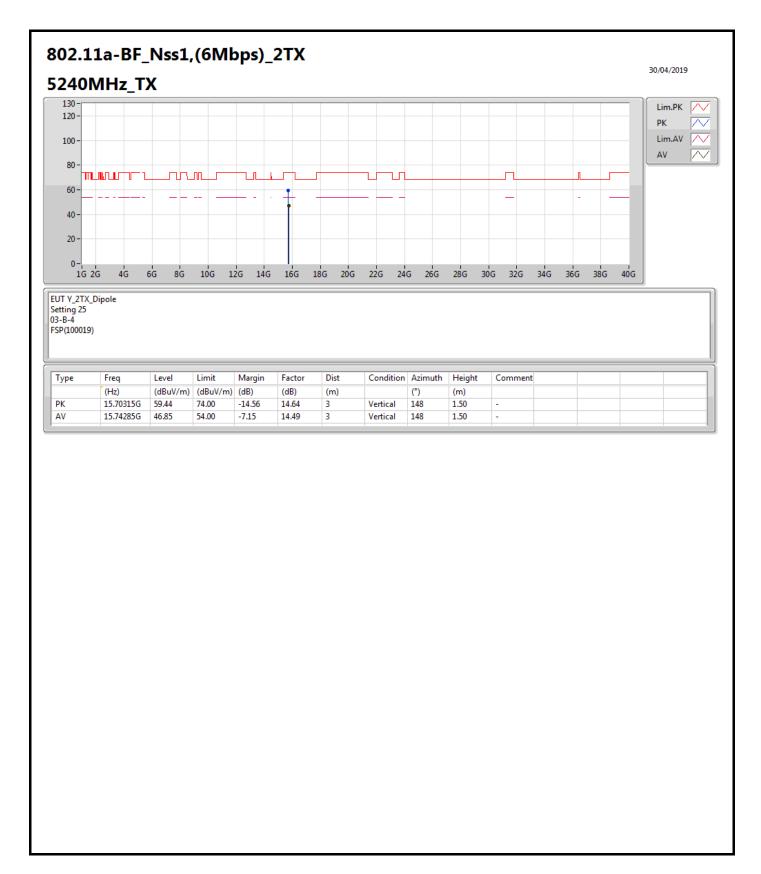
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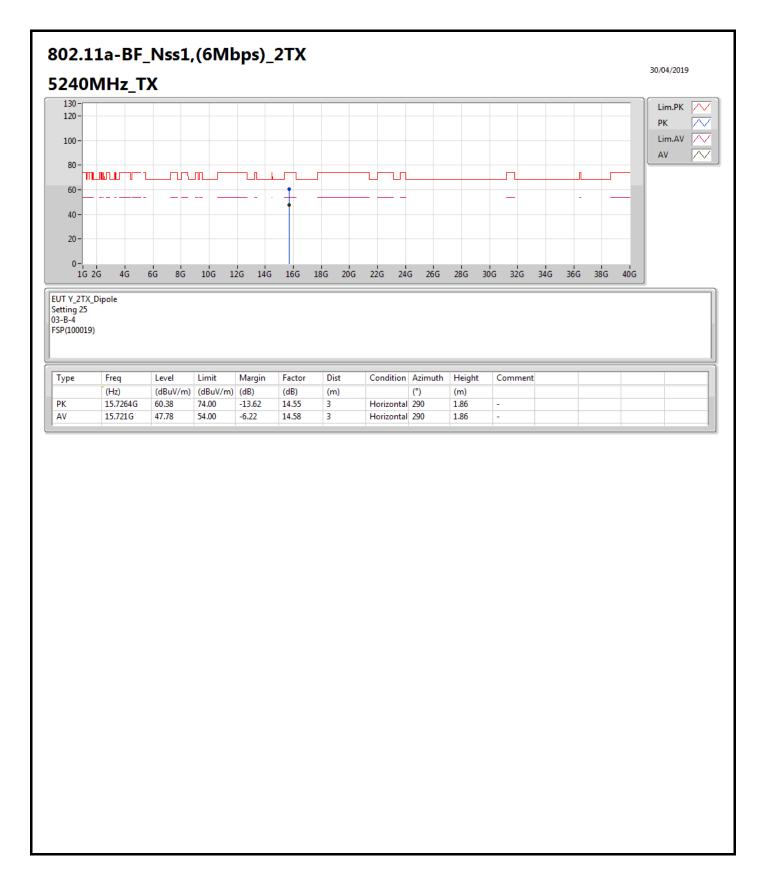
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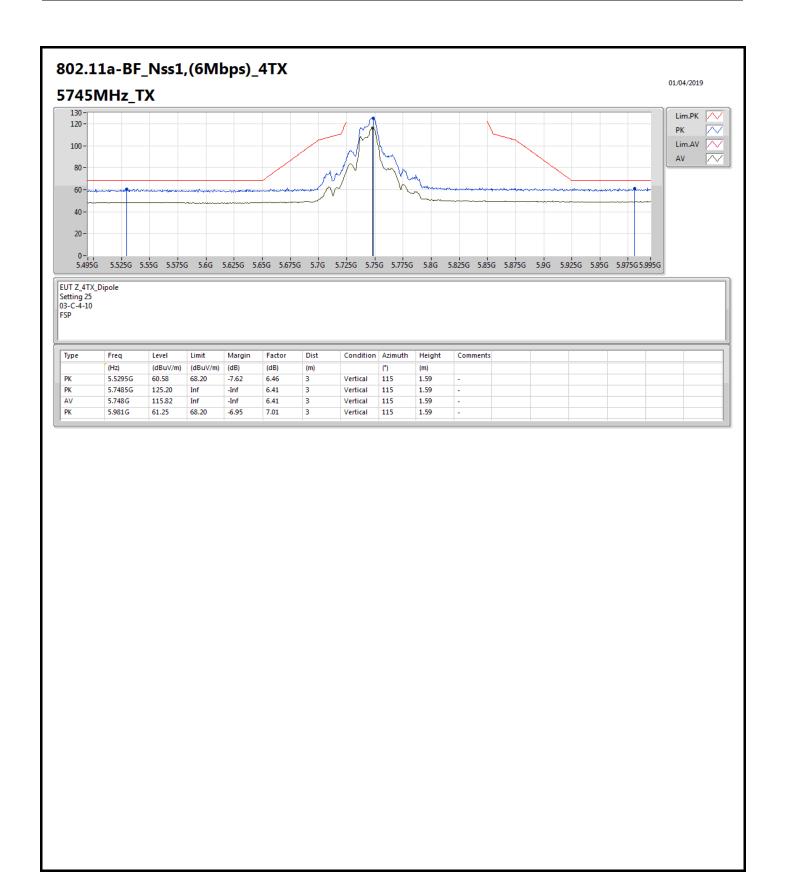
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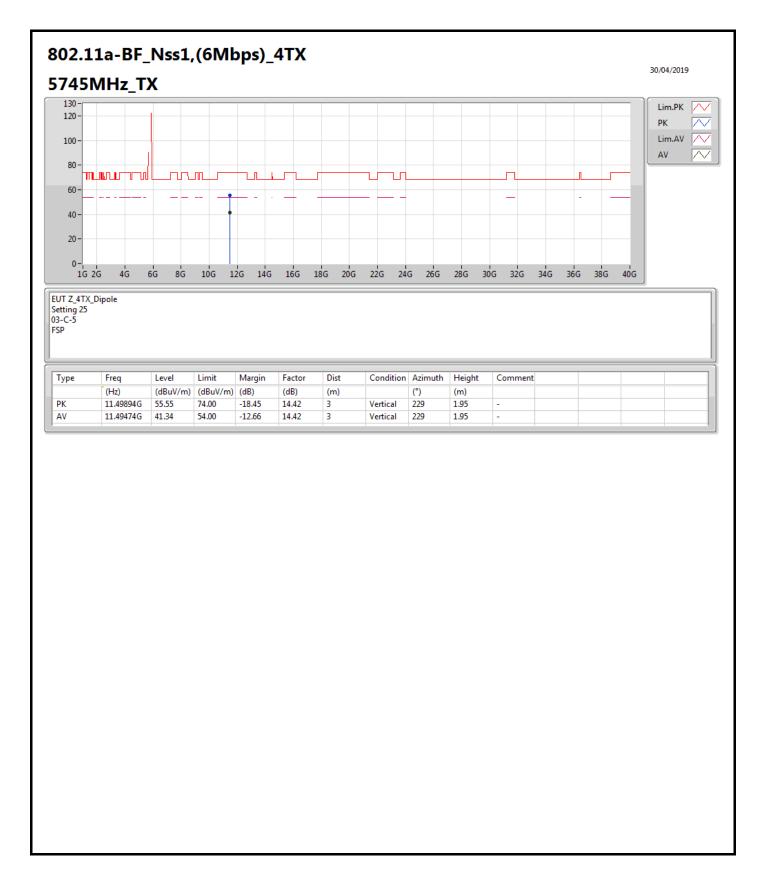


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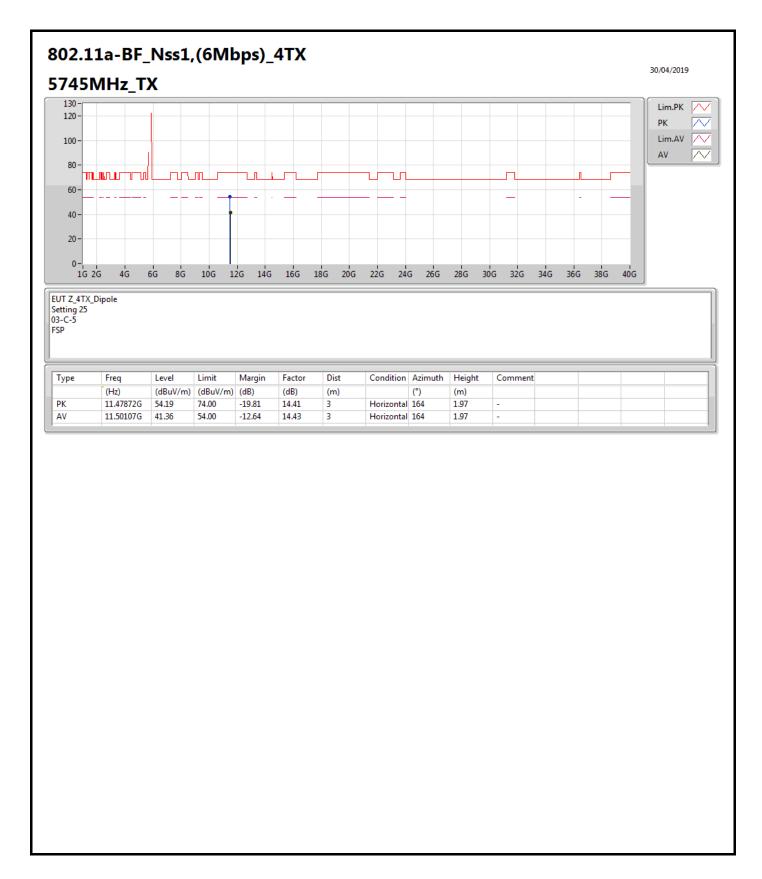






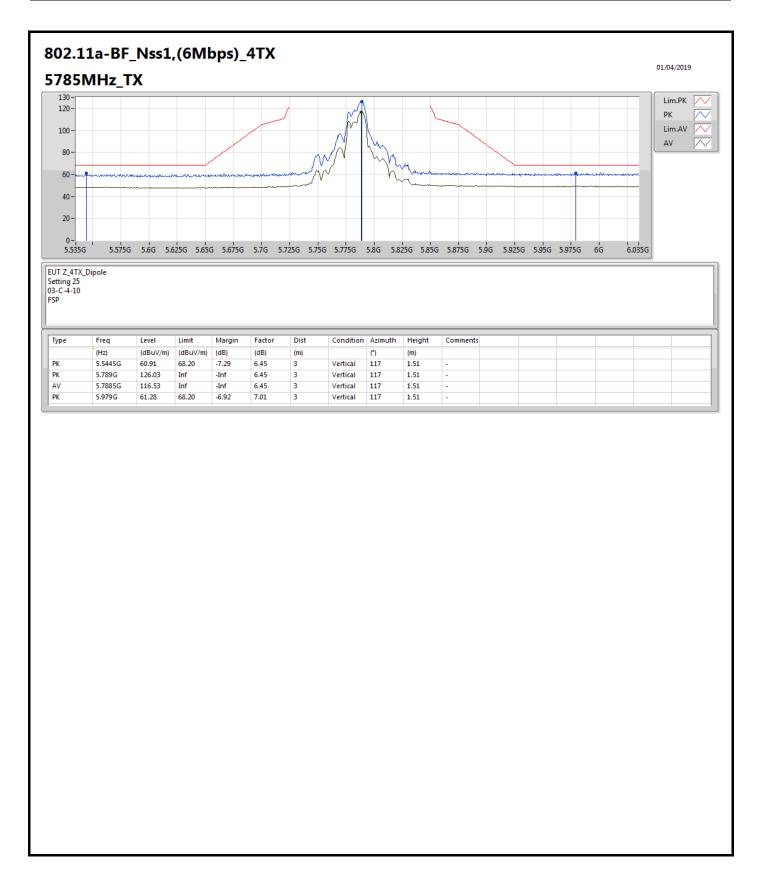
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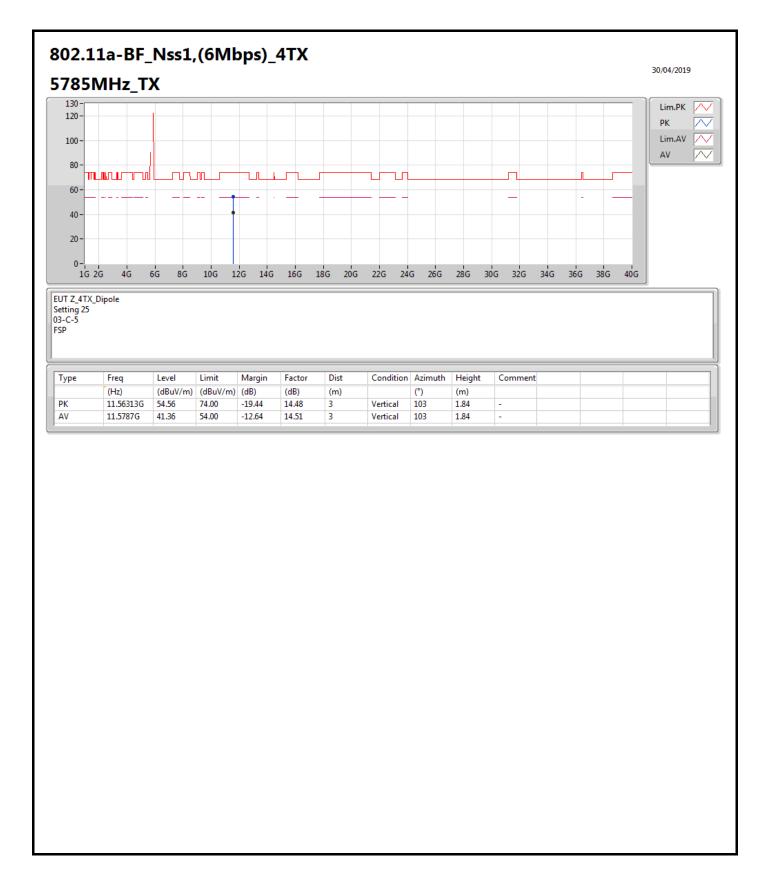
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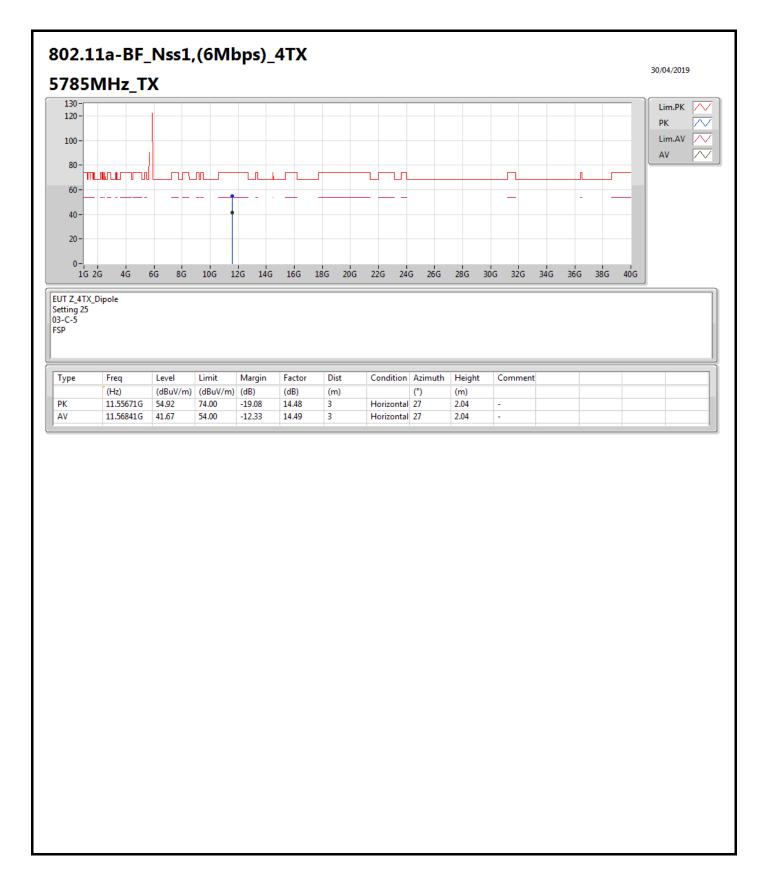
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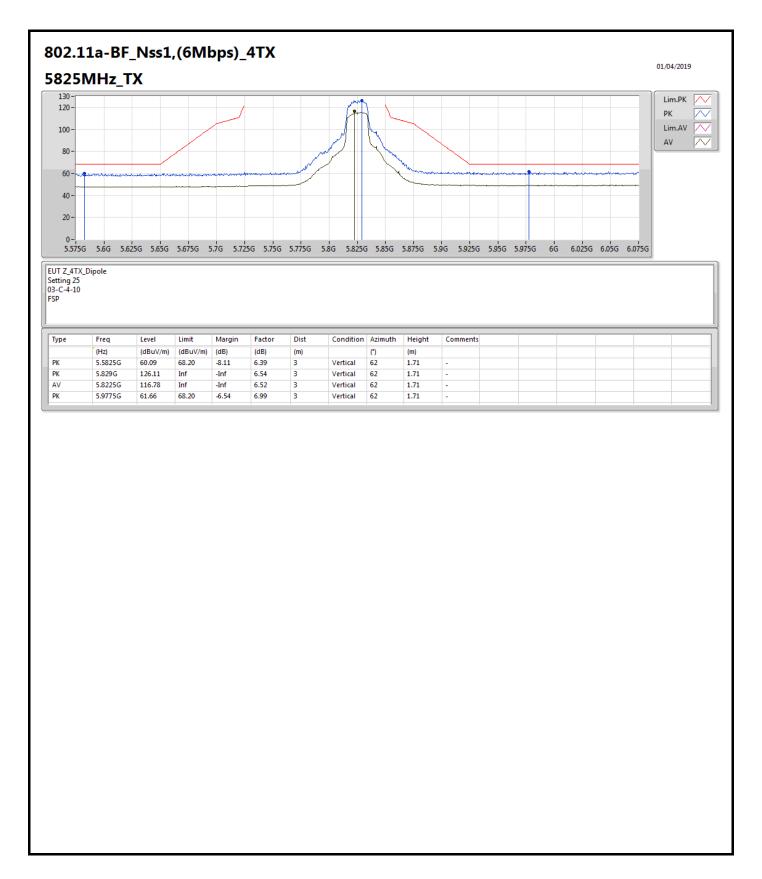
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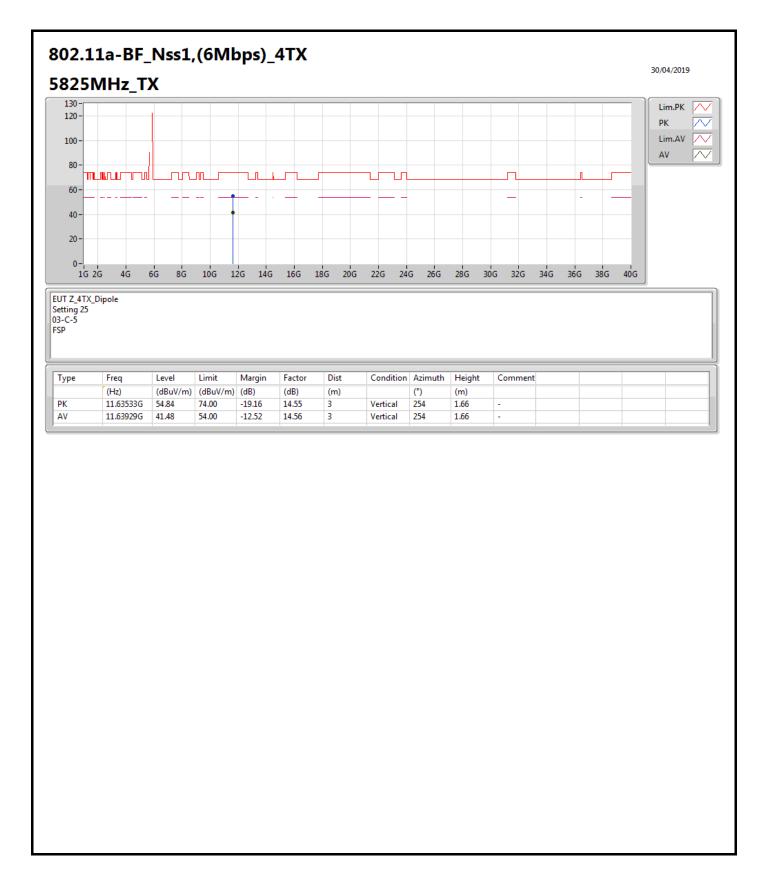


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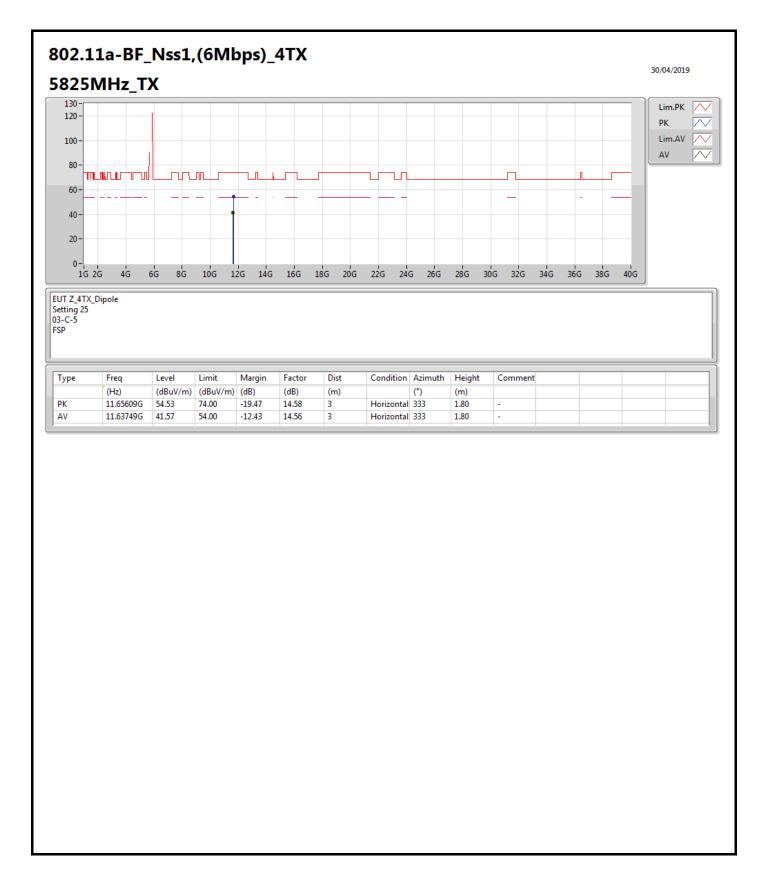






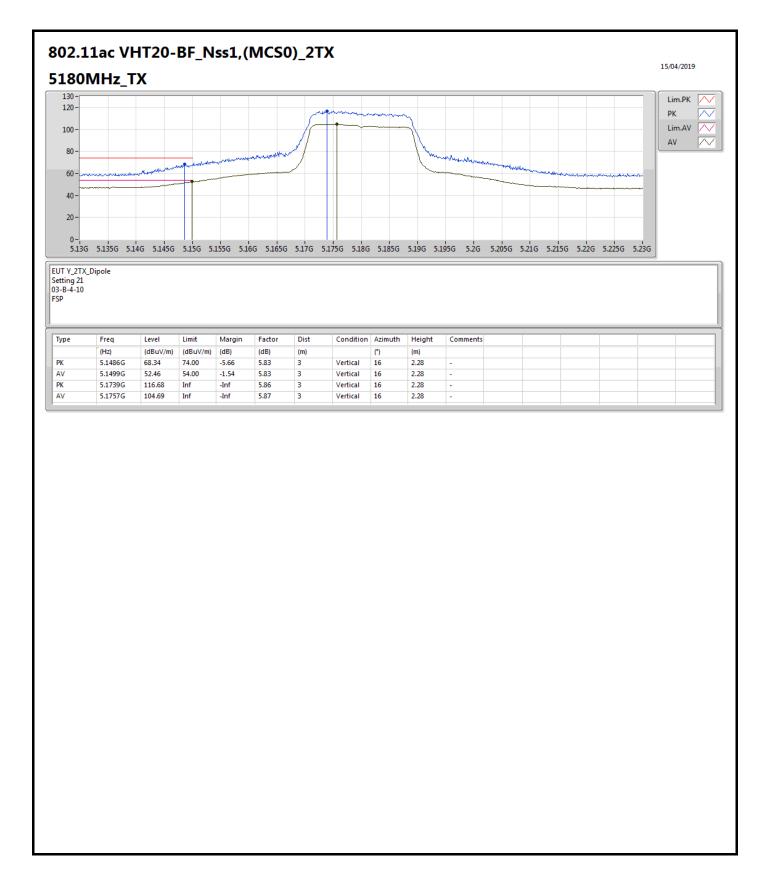
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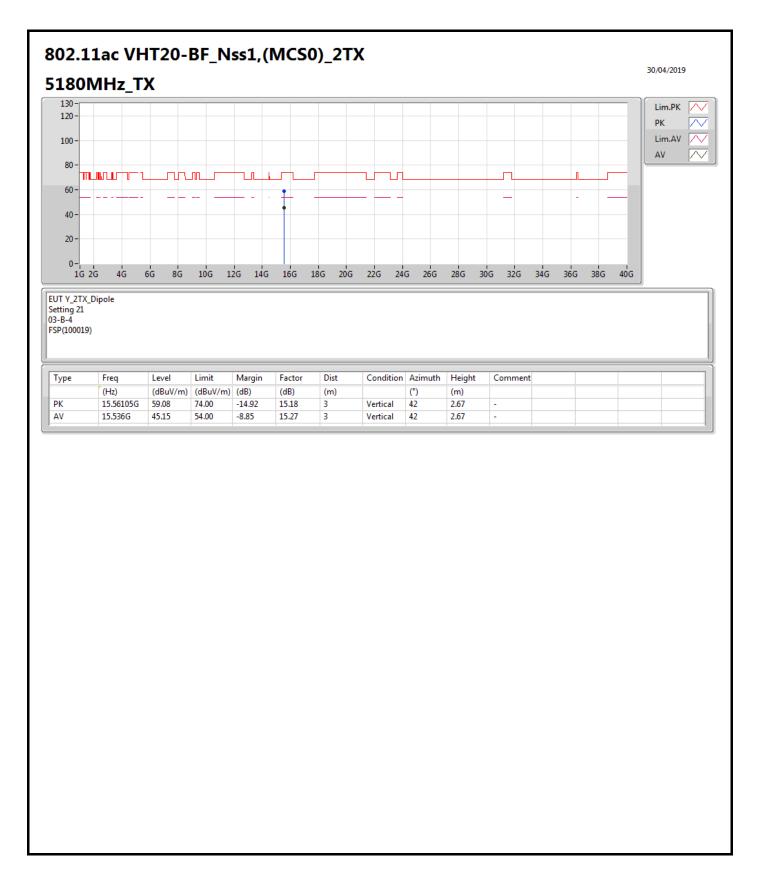
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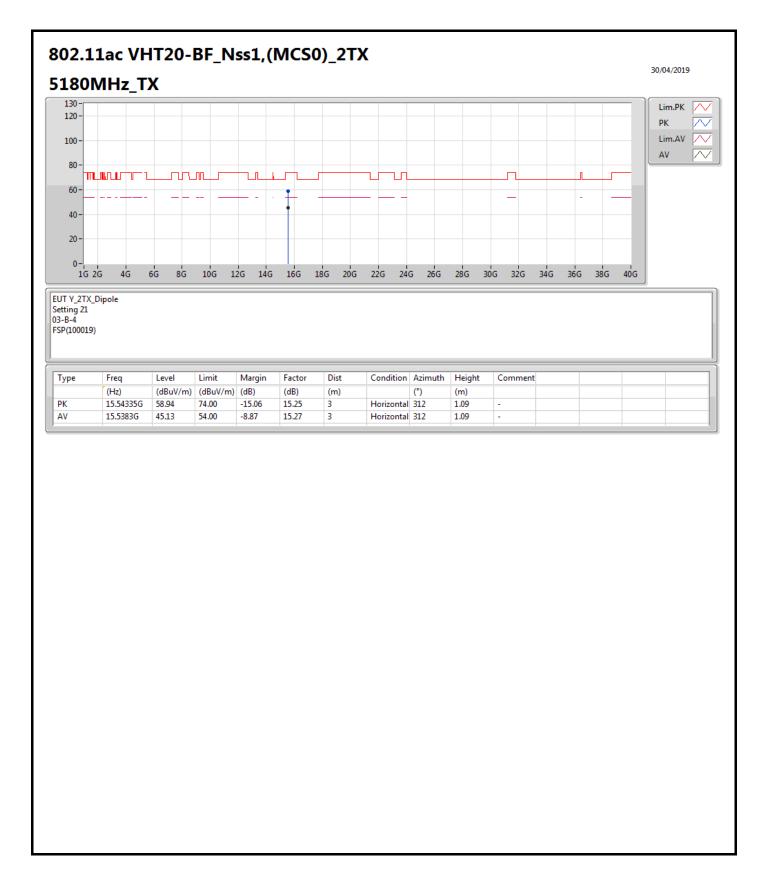
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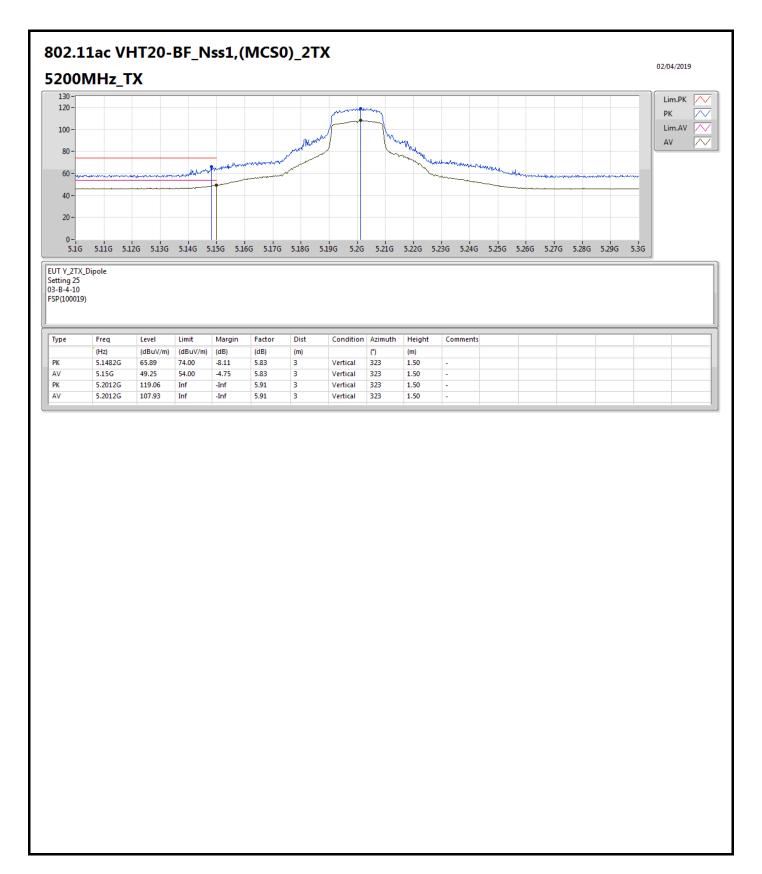
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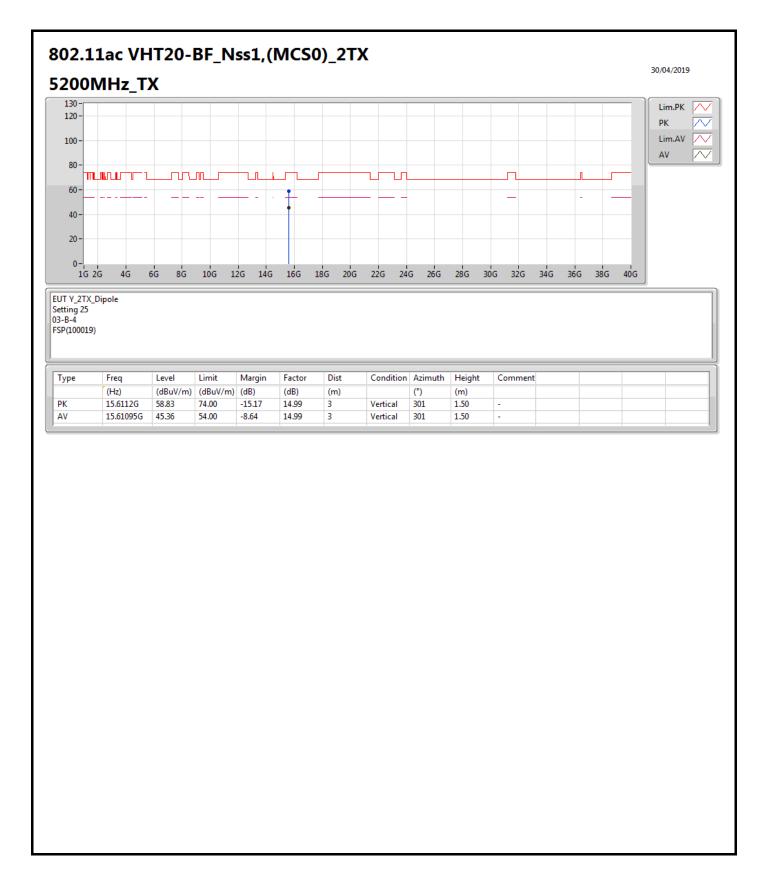
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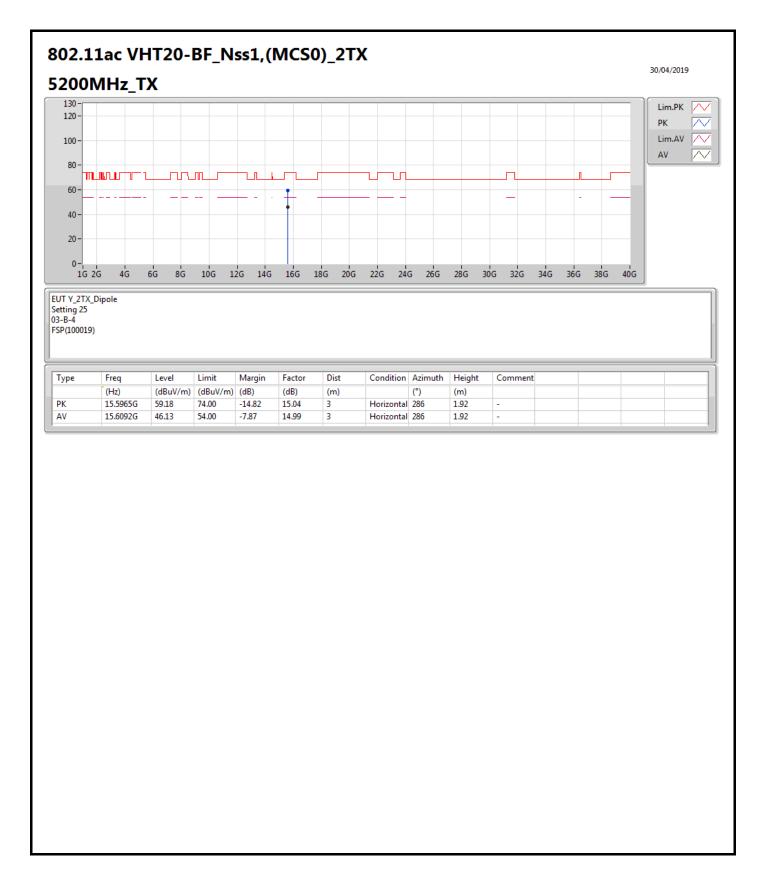
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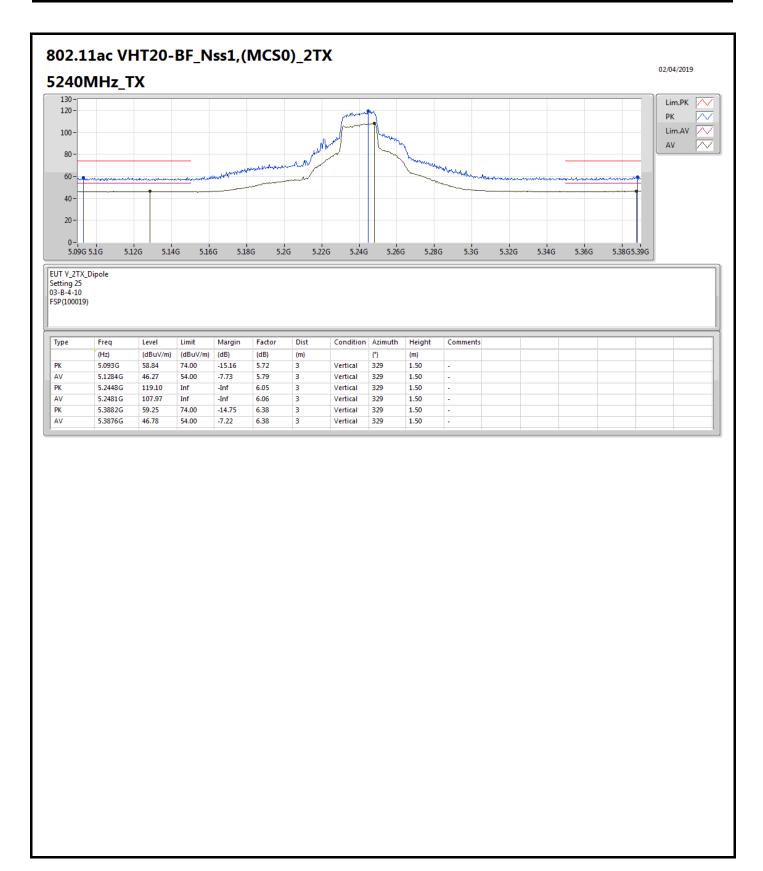
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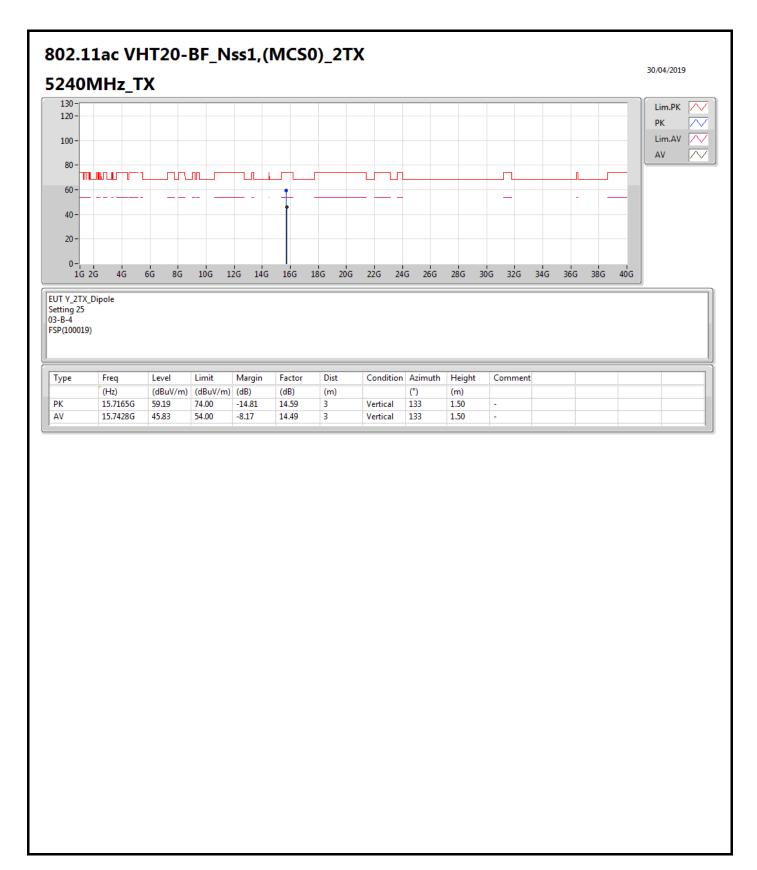
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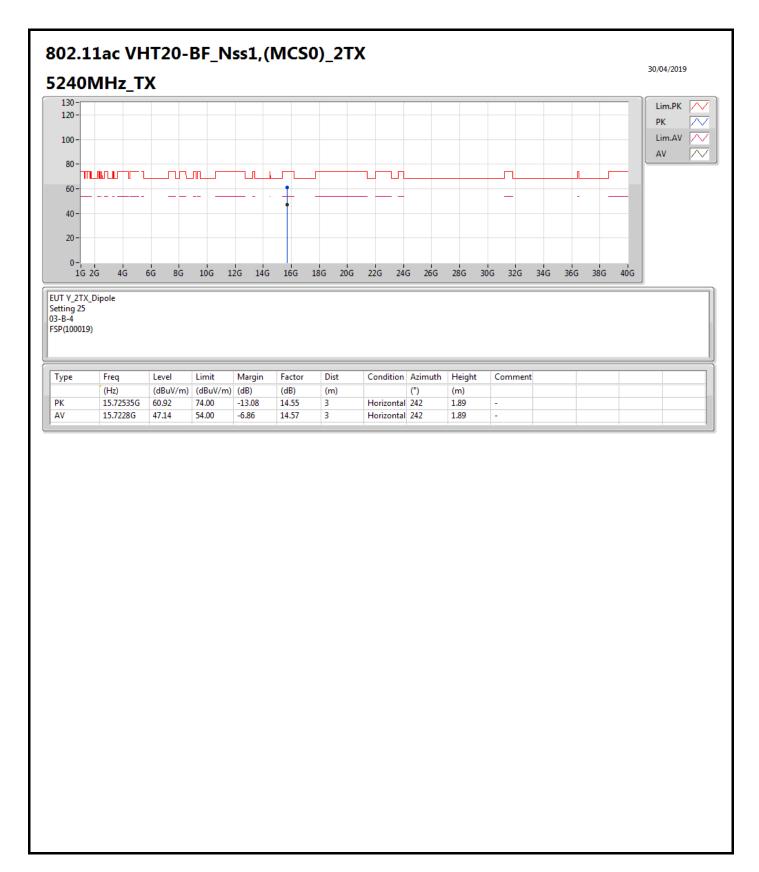
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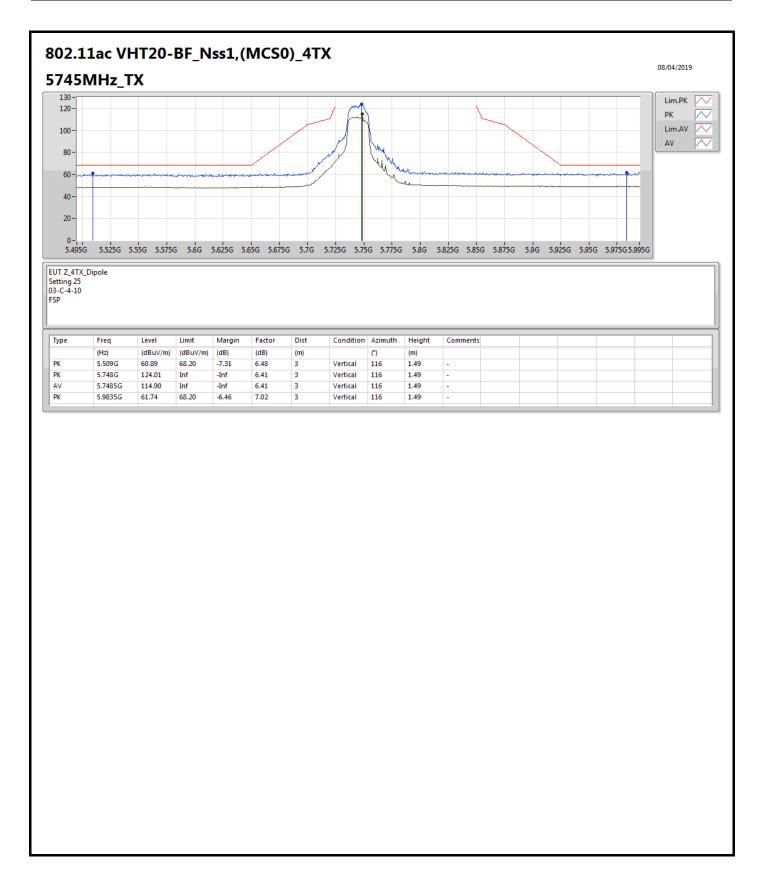
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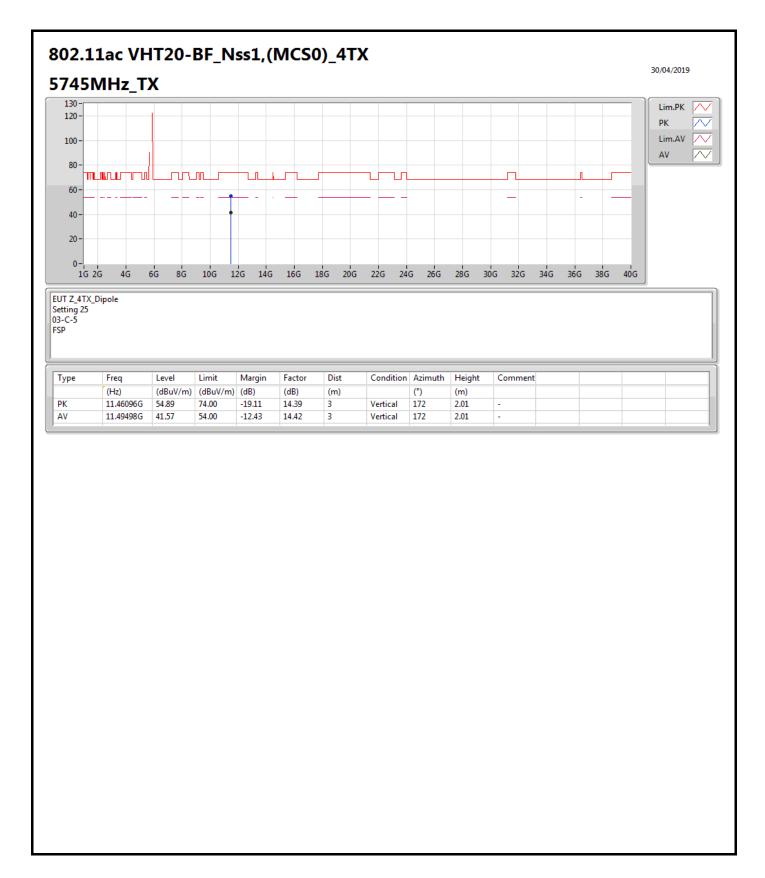
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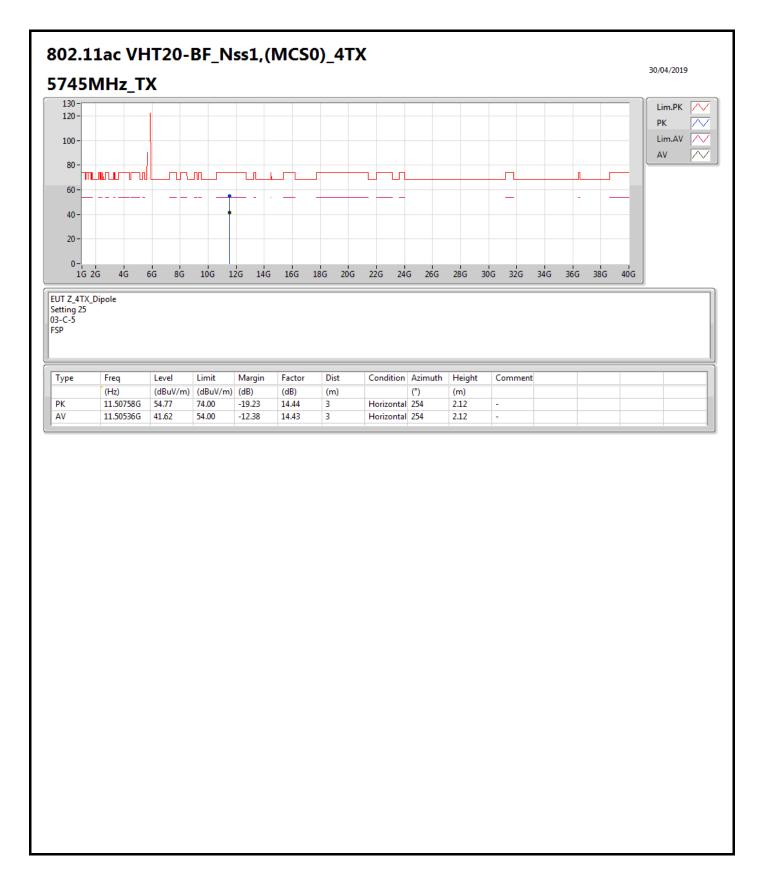
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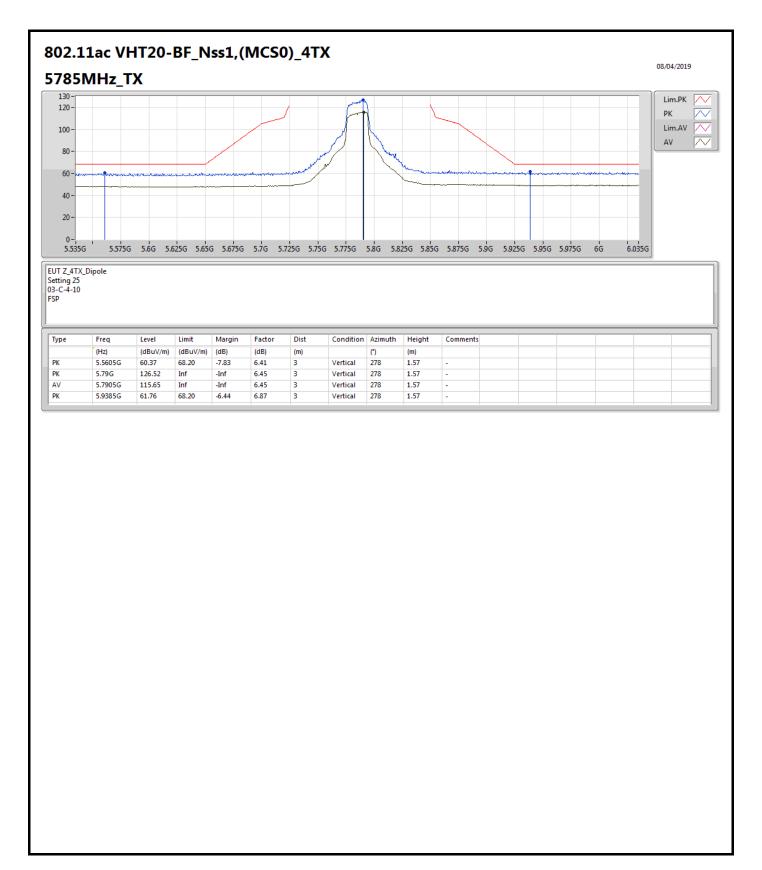
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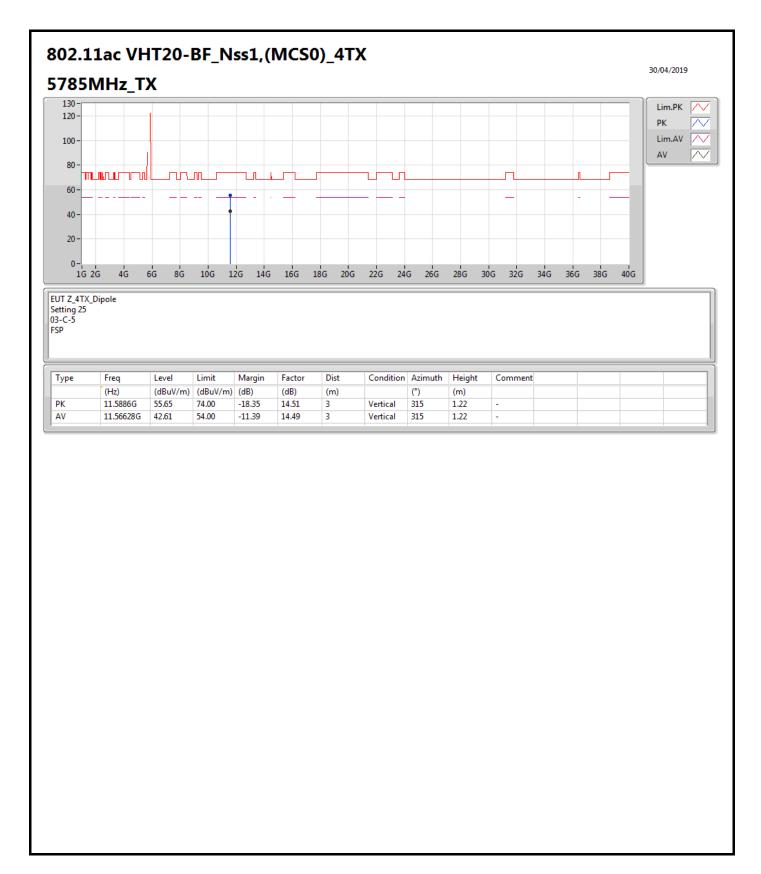
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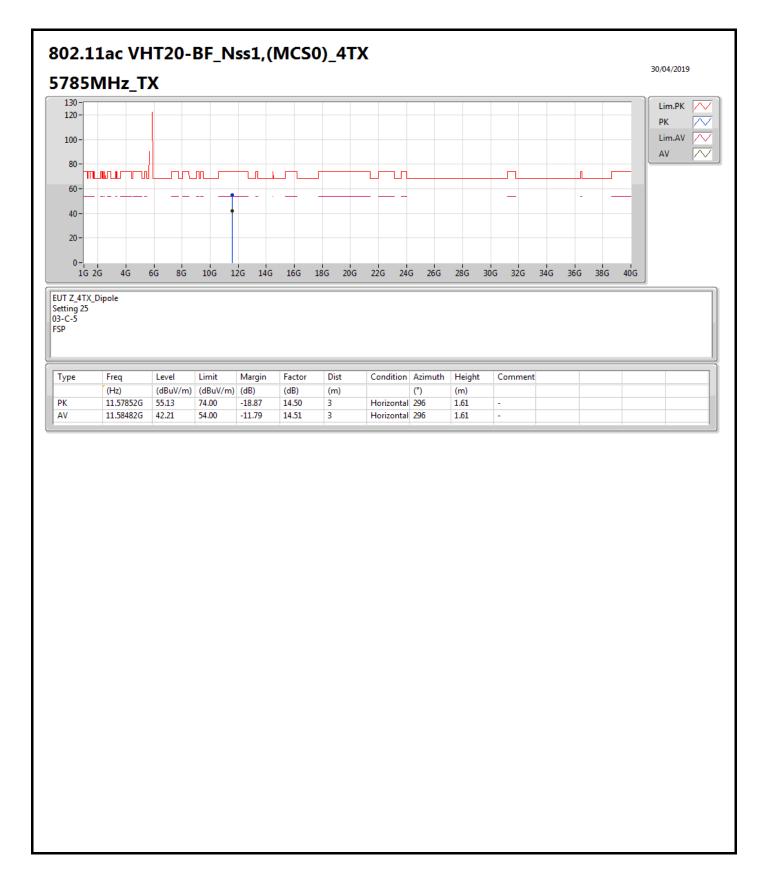
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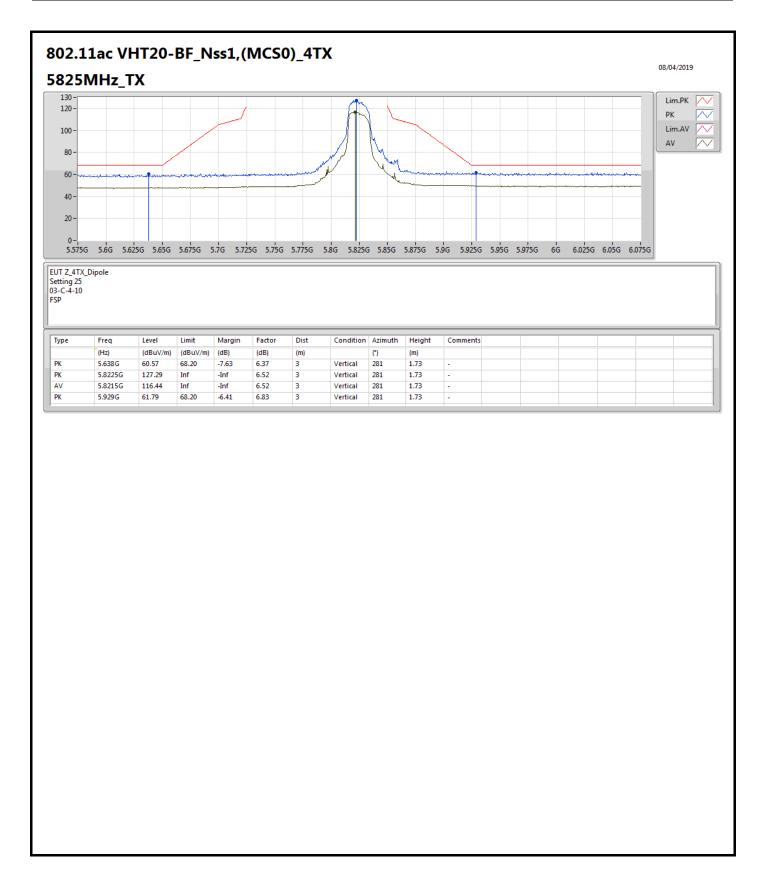
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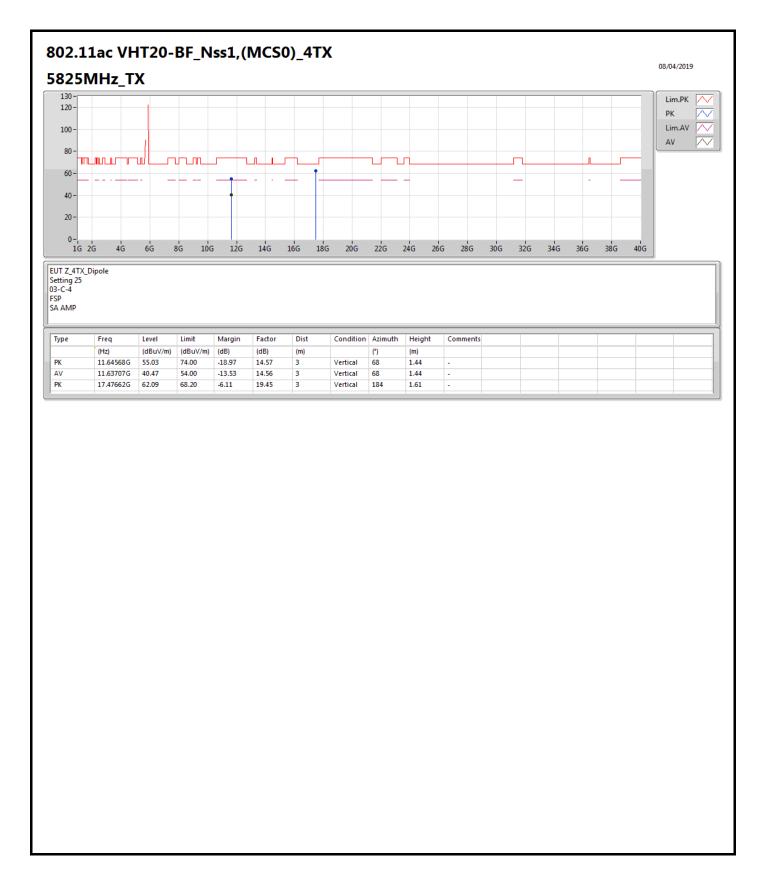
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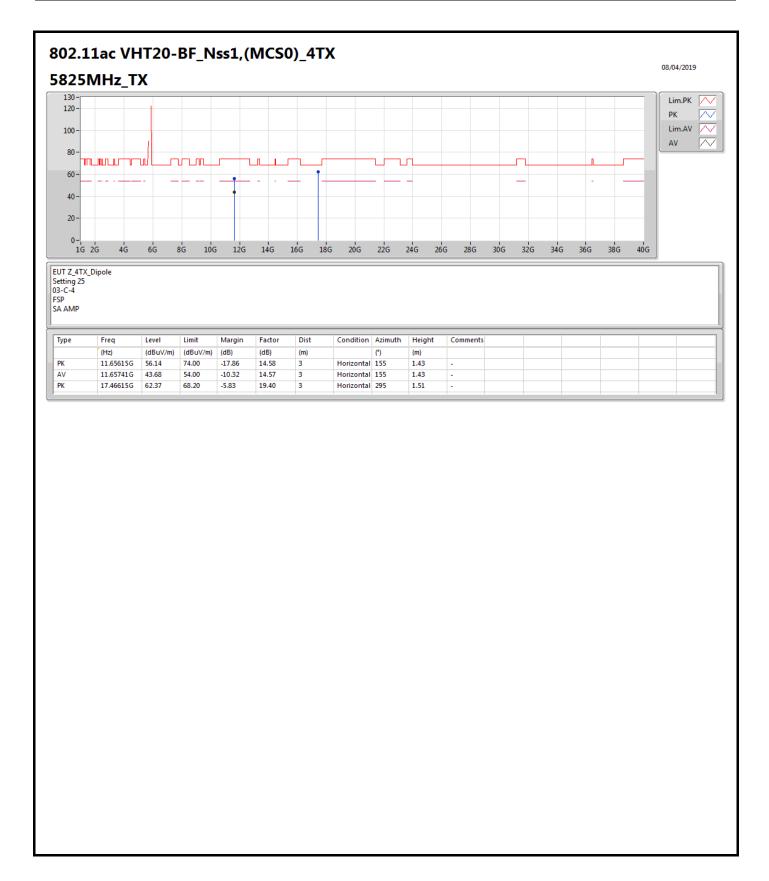
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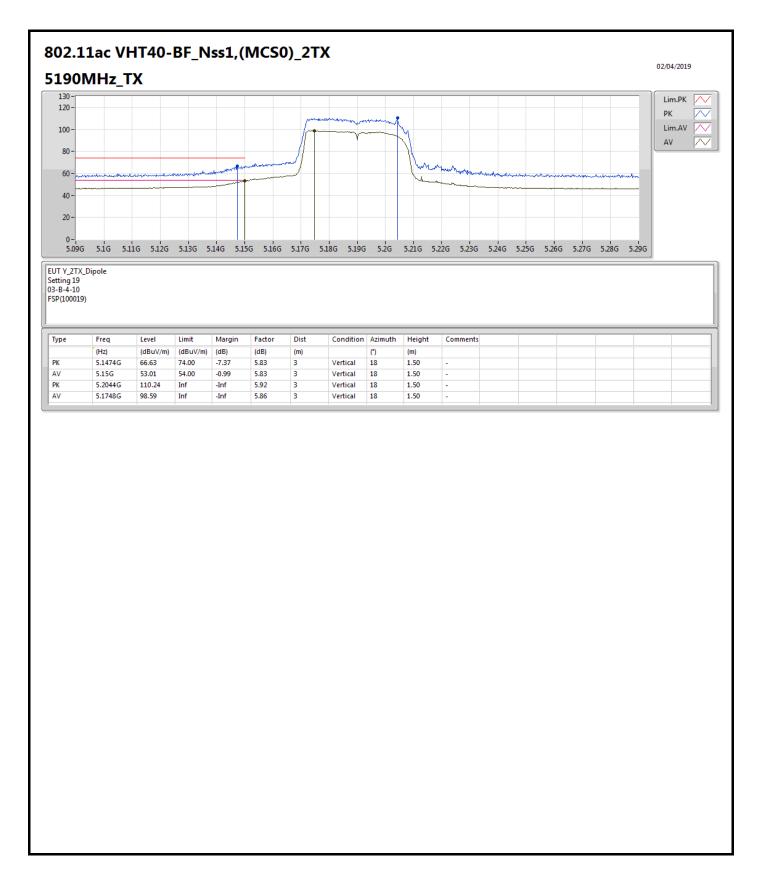
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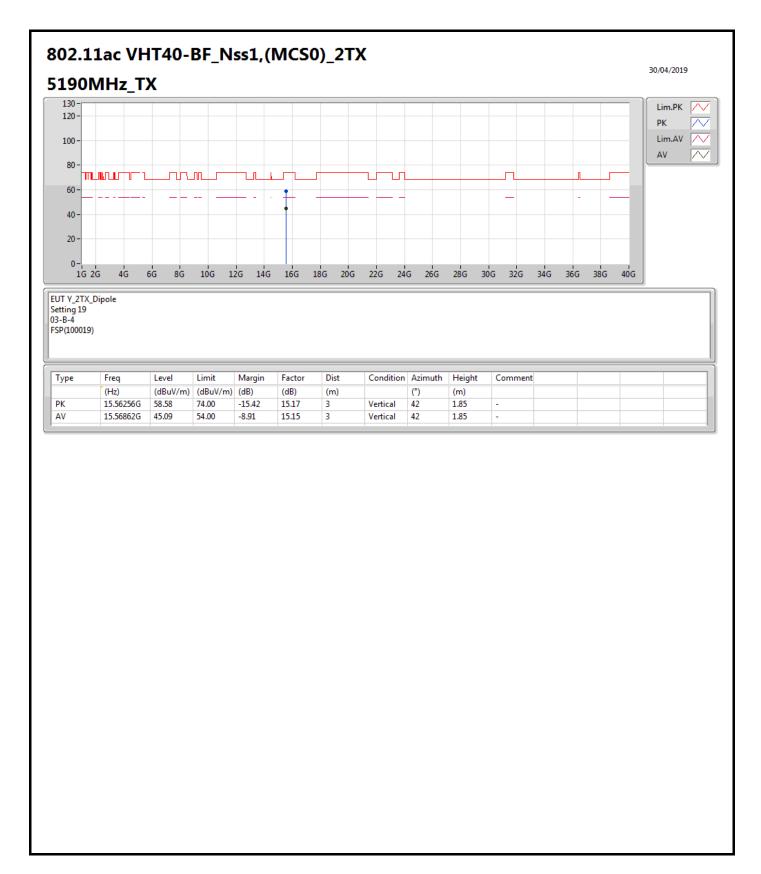


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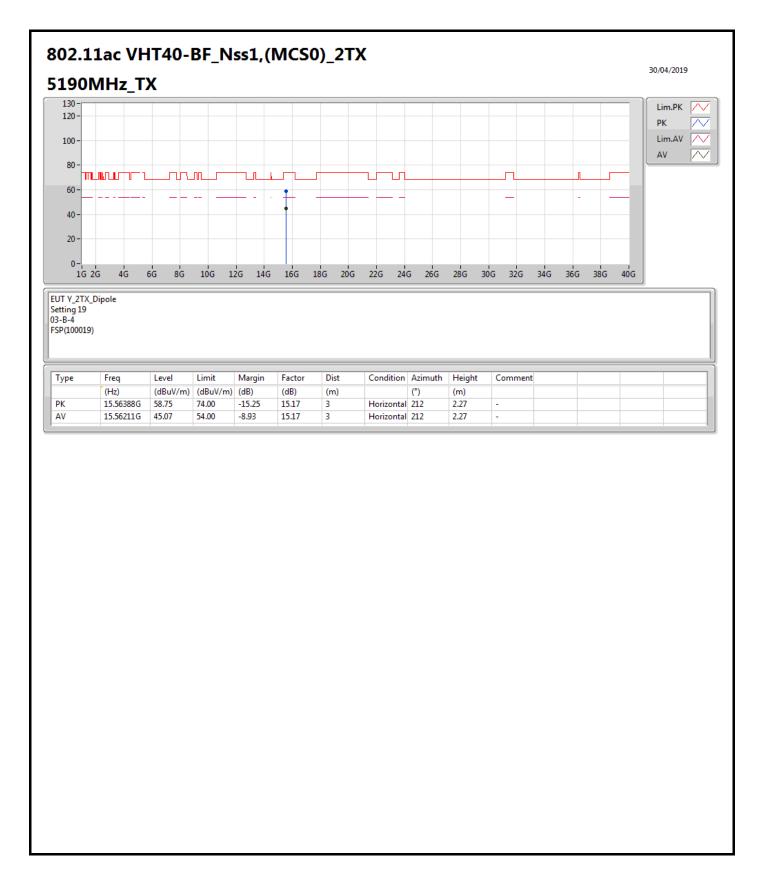






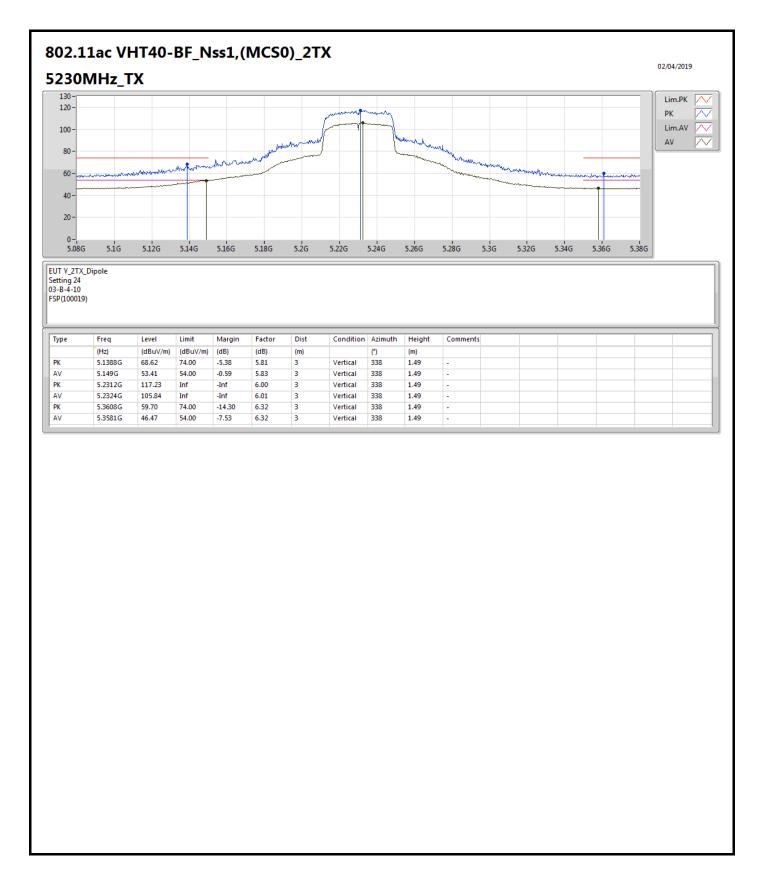
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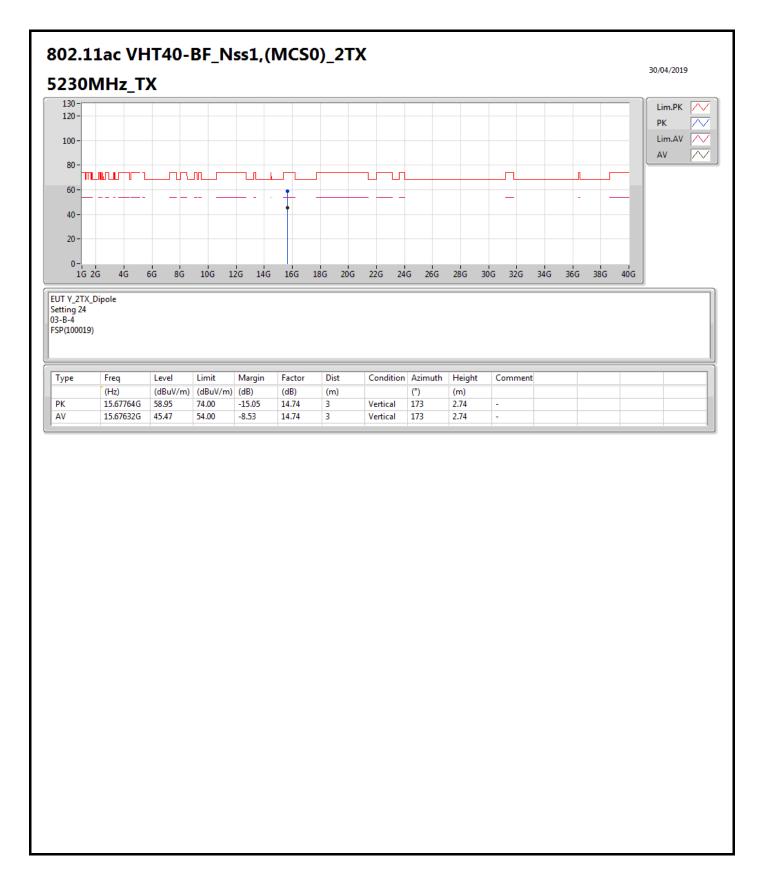
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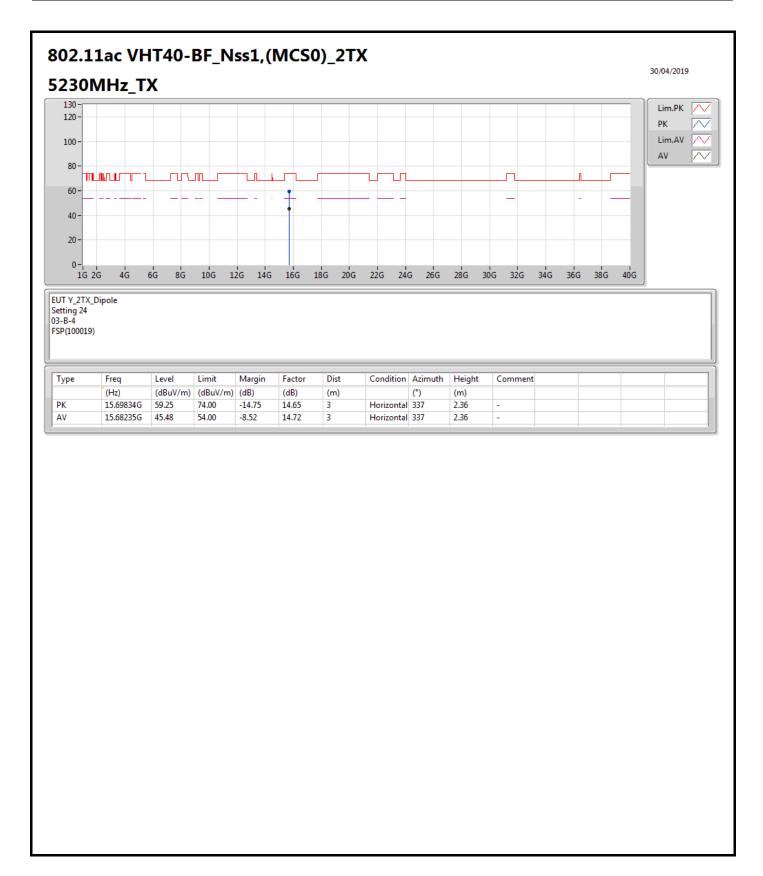
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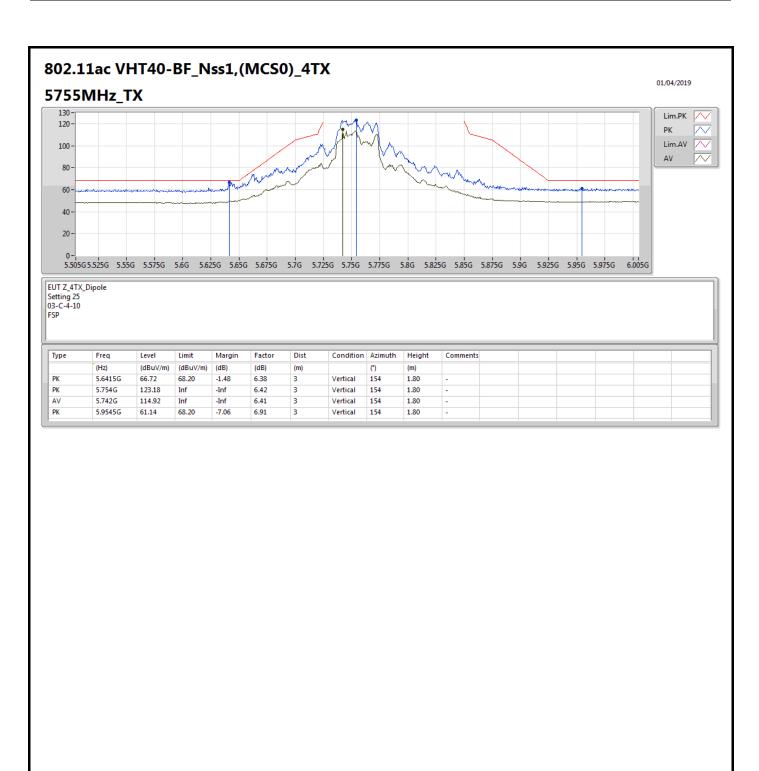
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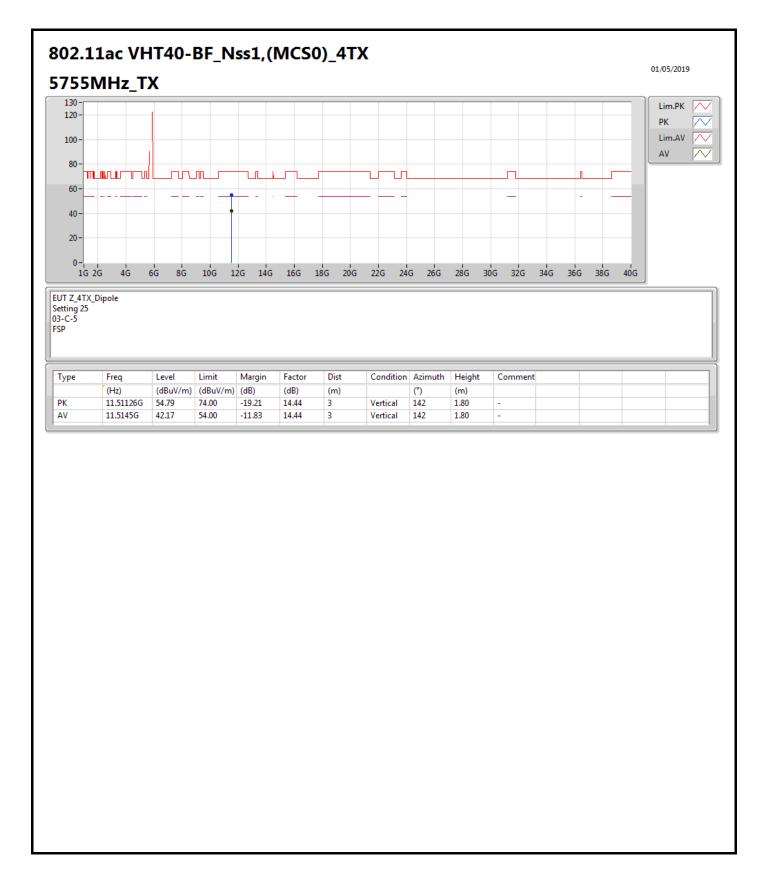


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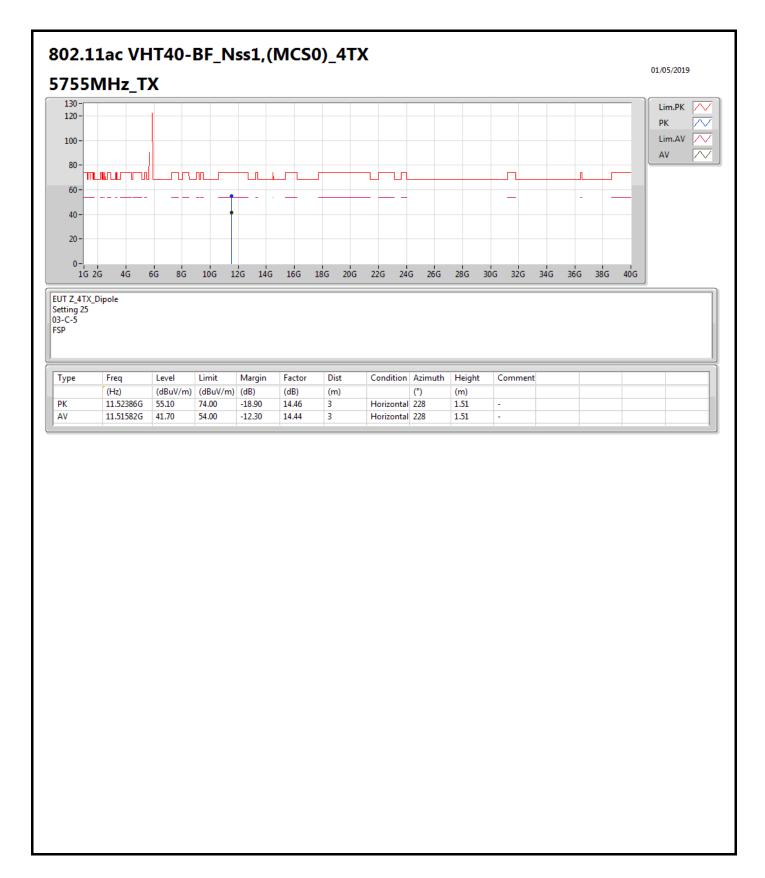






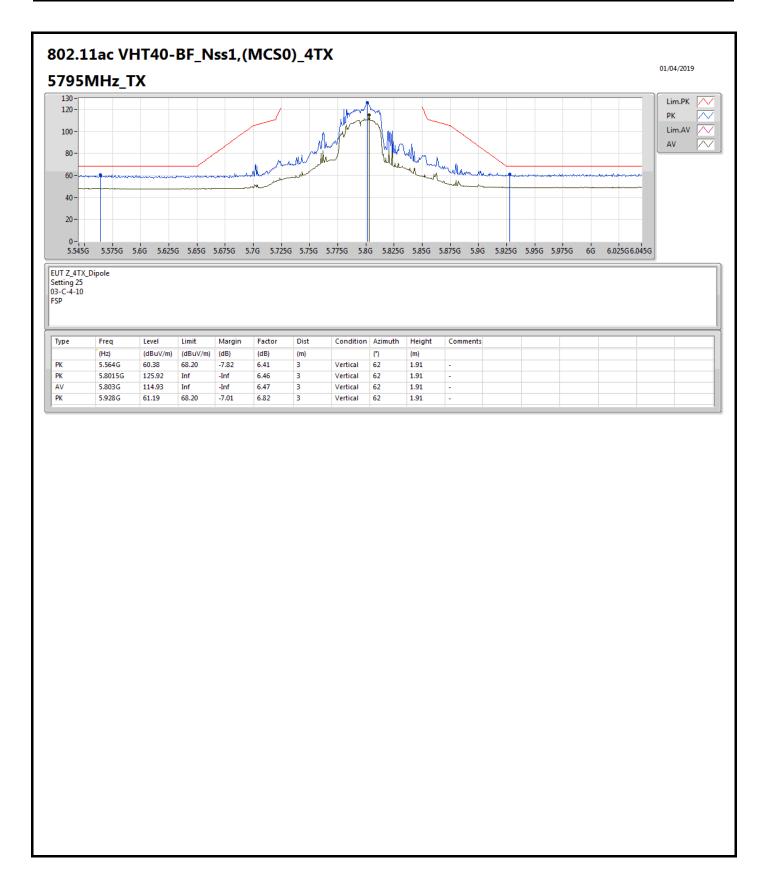
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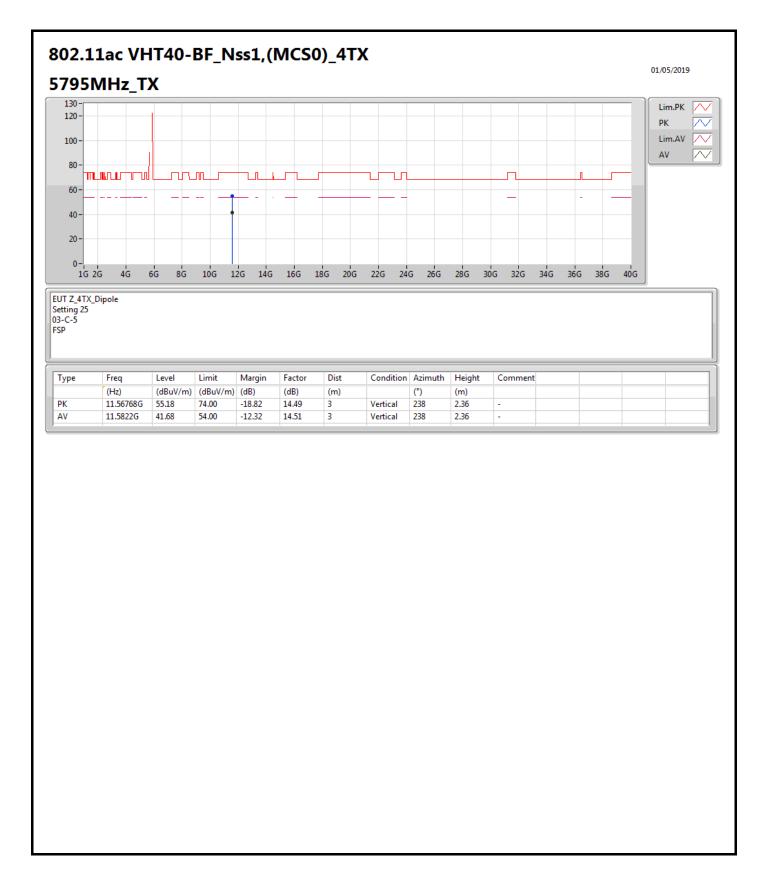


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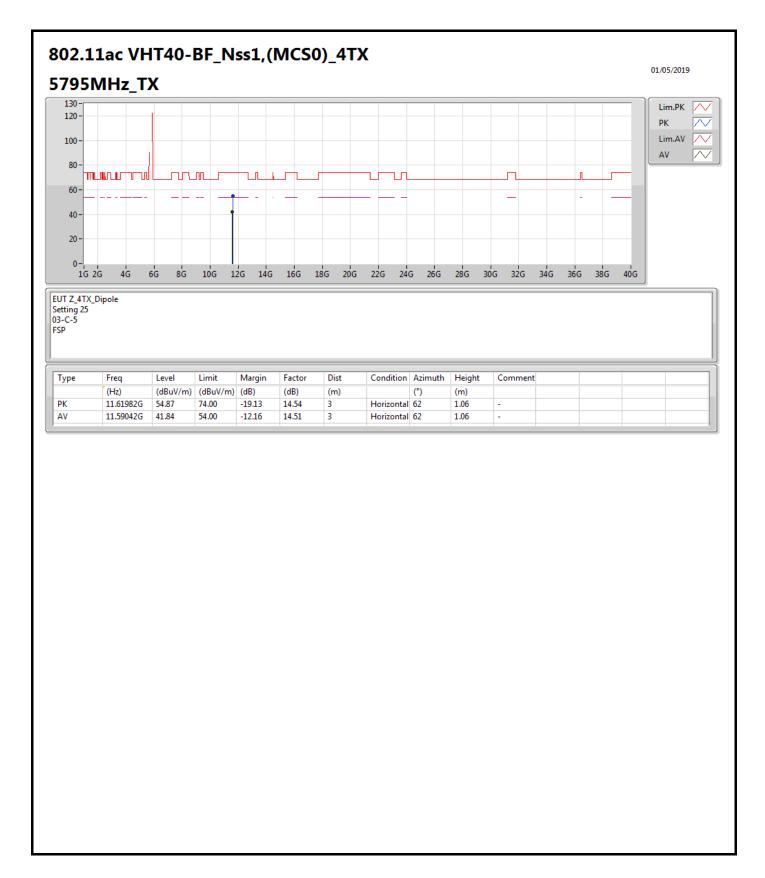






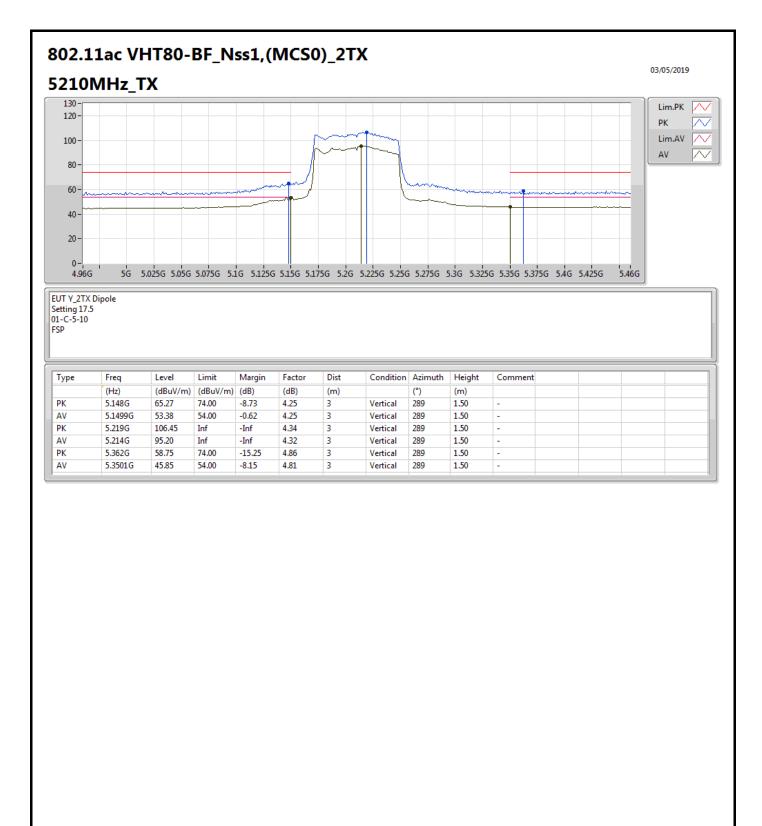
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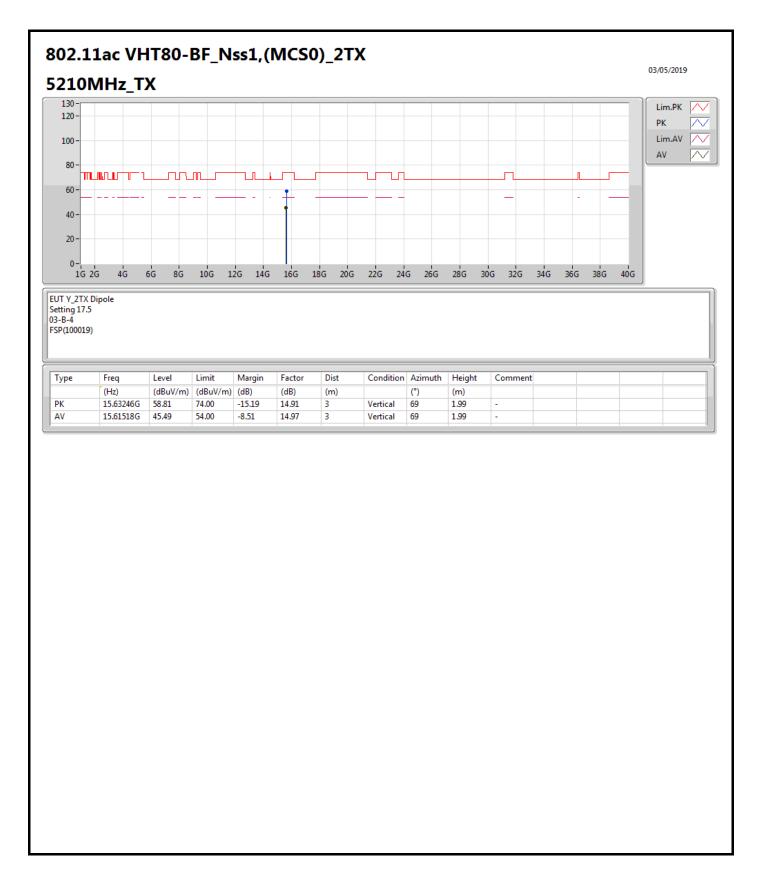
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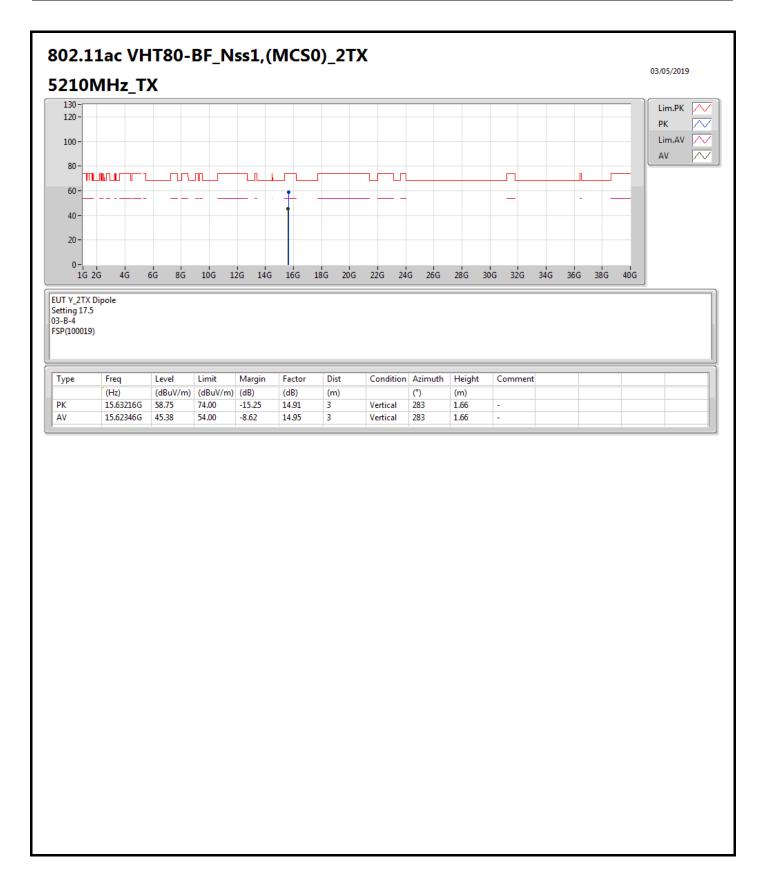
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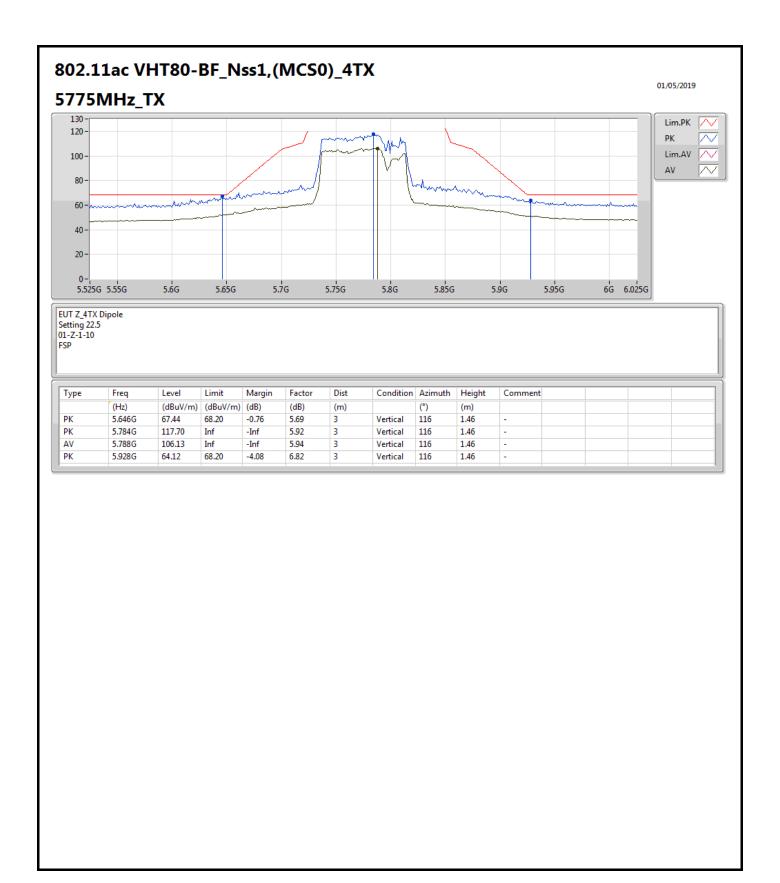
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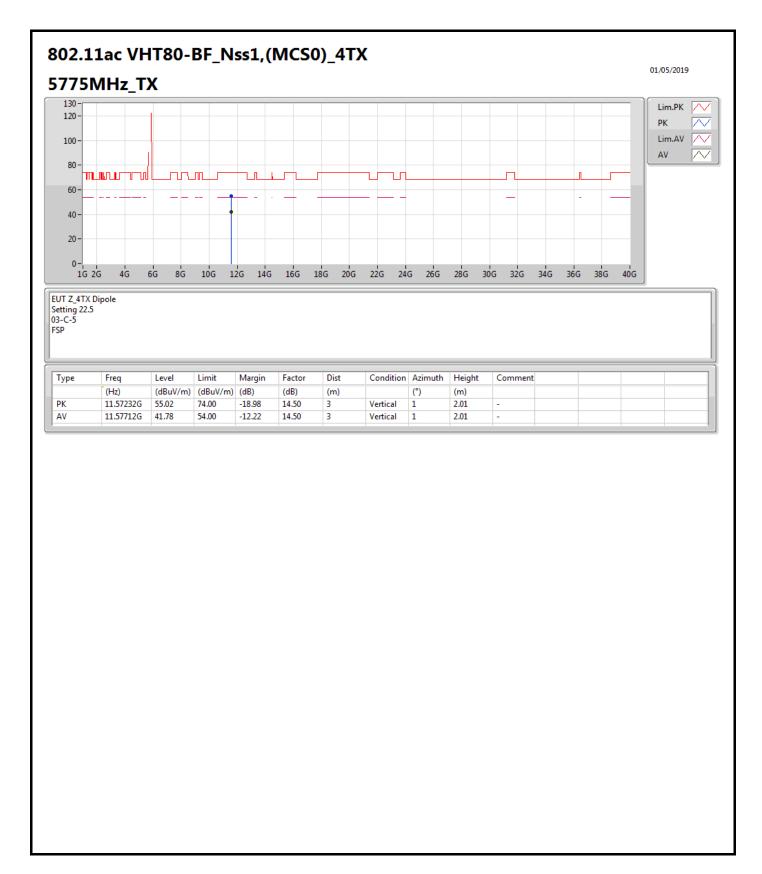


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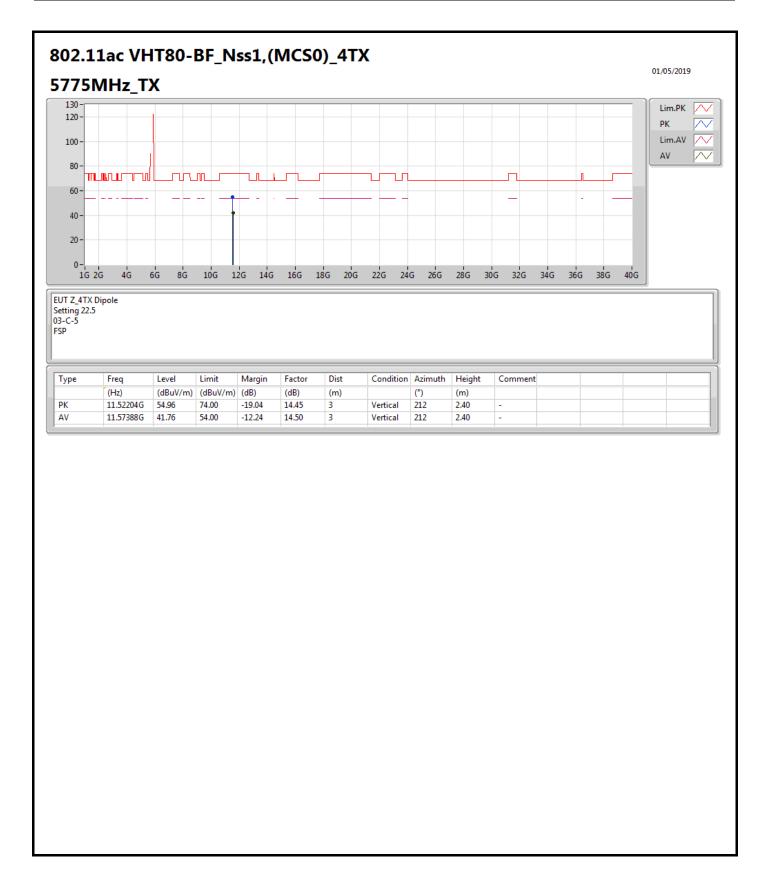






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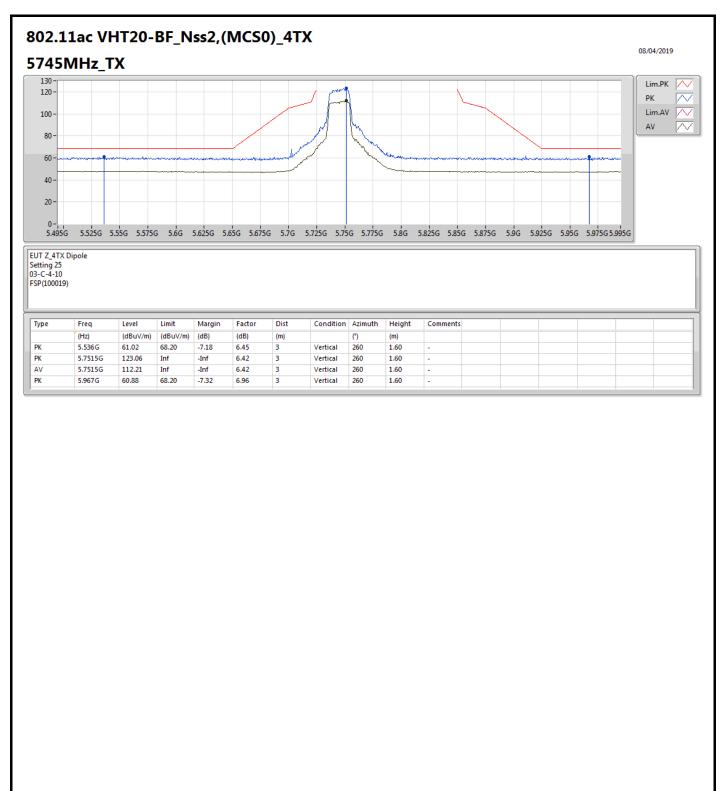
Appendix E.3

For Band 4 / 4T2S Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)
5.725-5.85GHz	-	-	-	-	-	-			-	-	-
802.11ac VHT80-BF_Nss2,(MCS0)_4TX	Pass	PK	5.649G	66.67	68.20	-1.53	5.69	3	Vertical	60	1.48

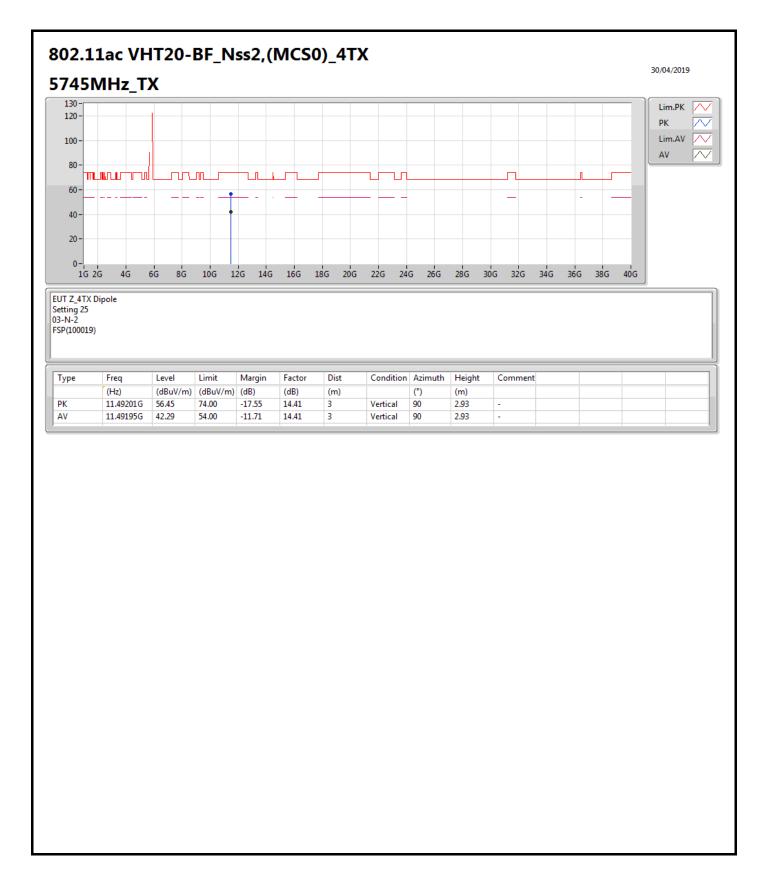
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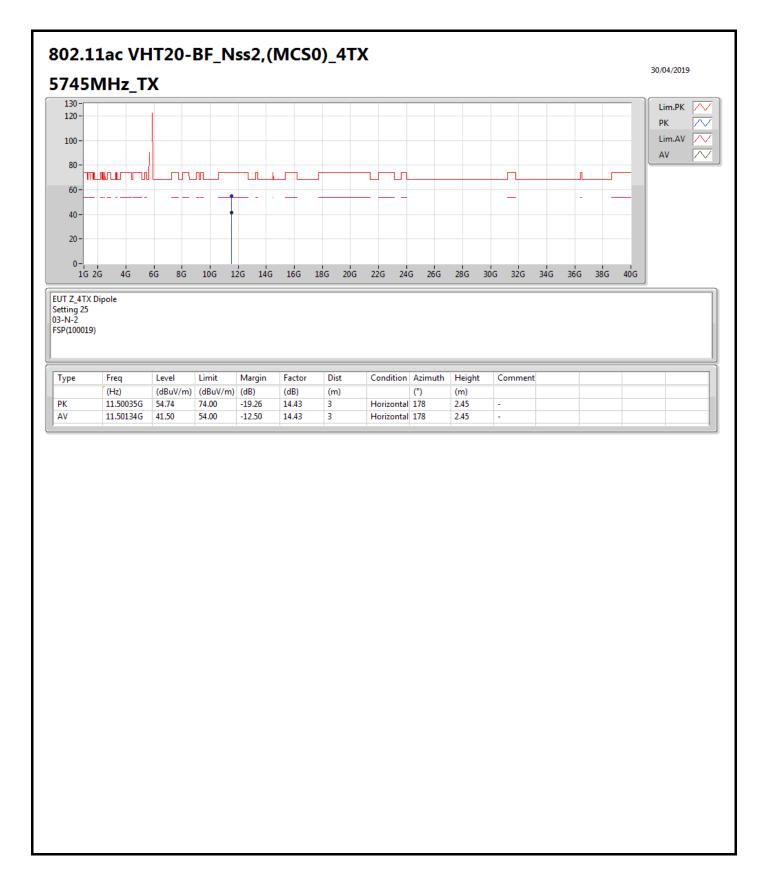
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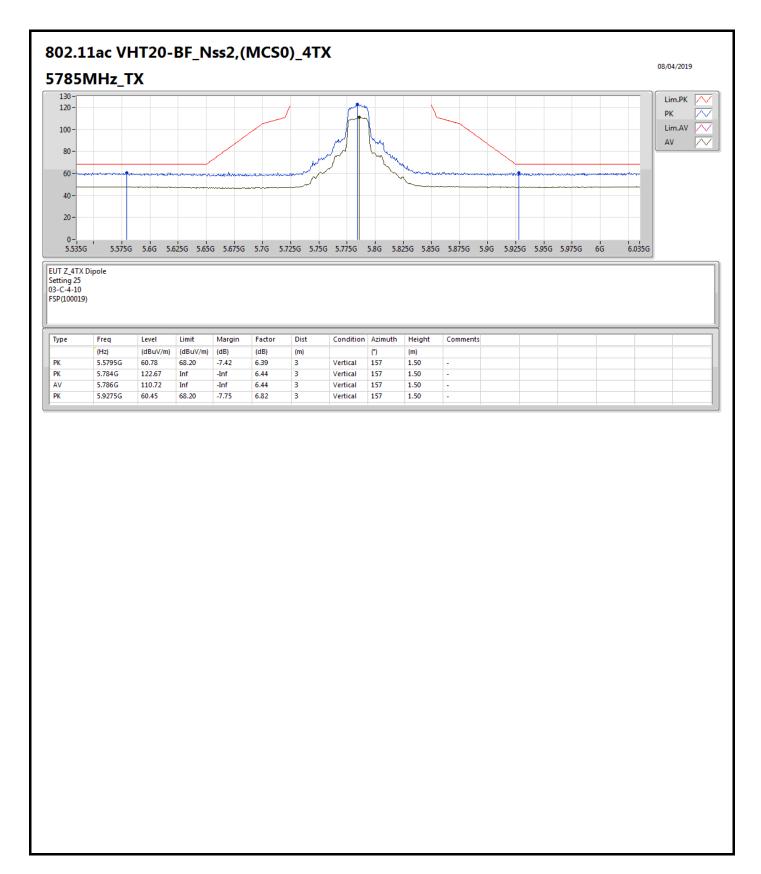
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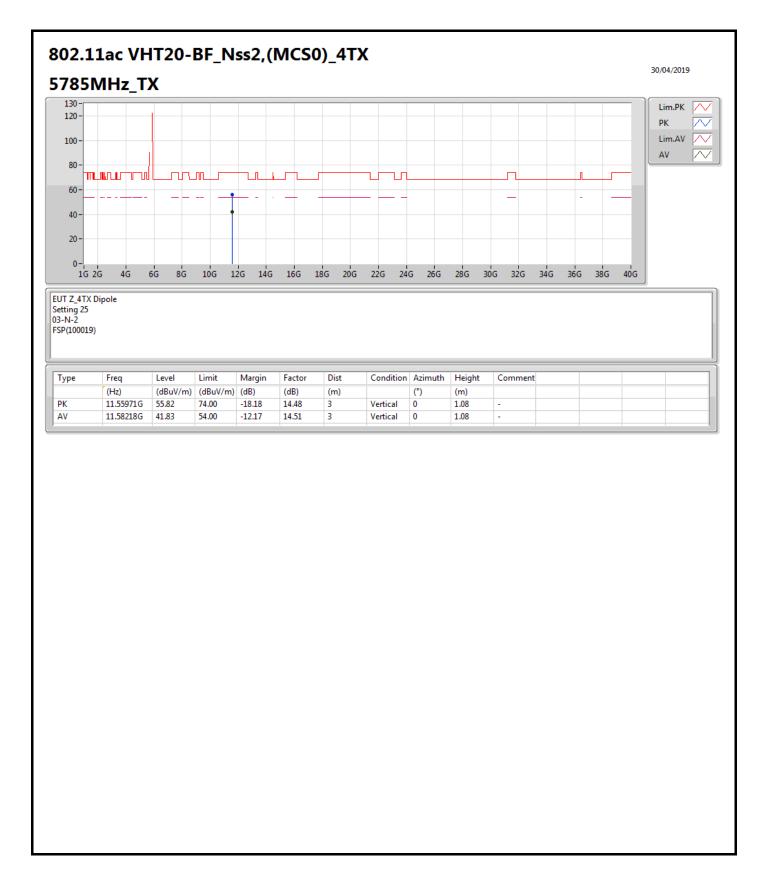
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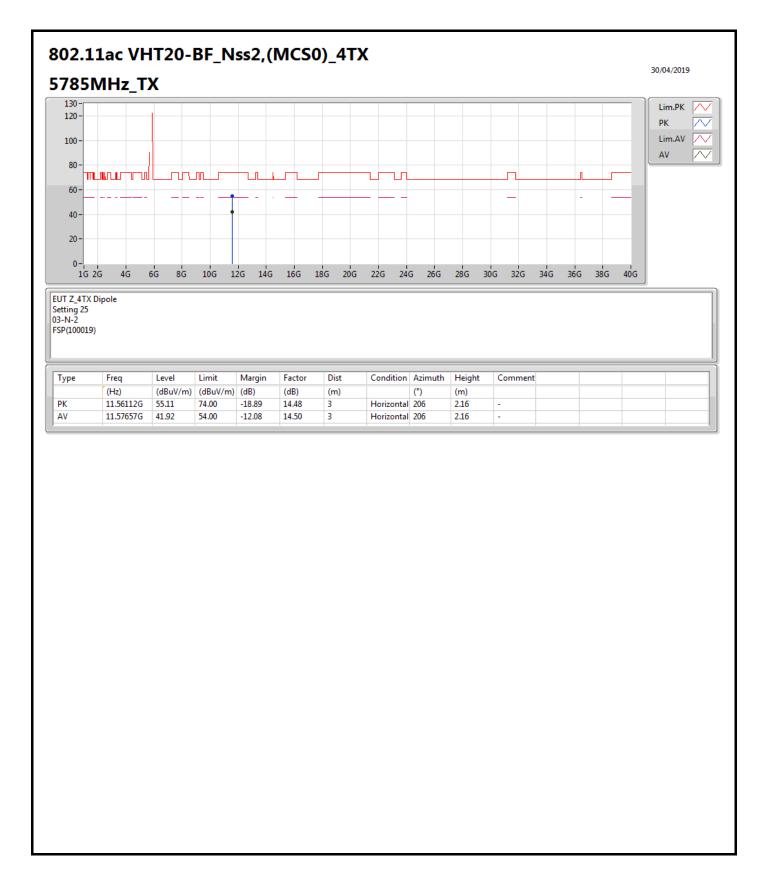
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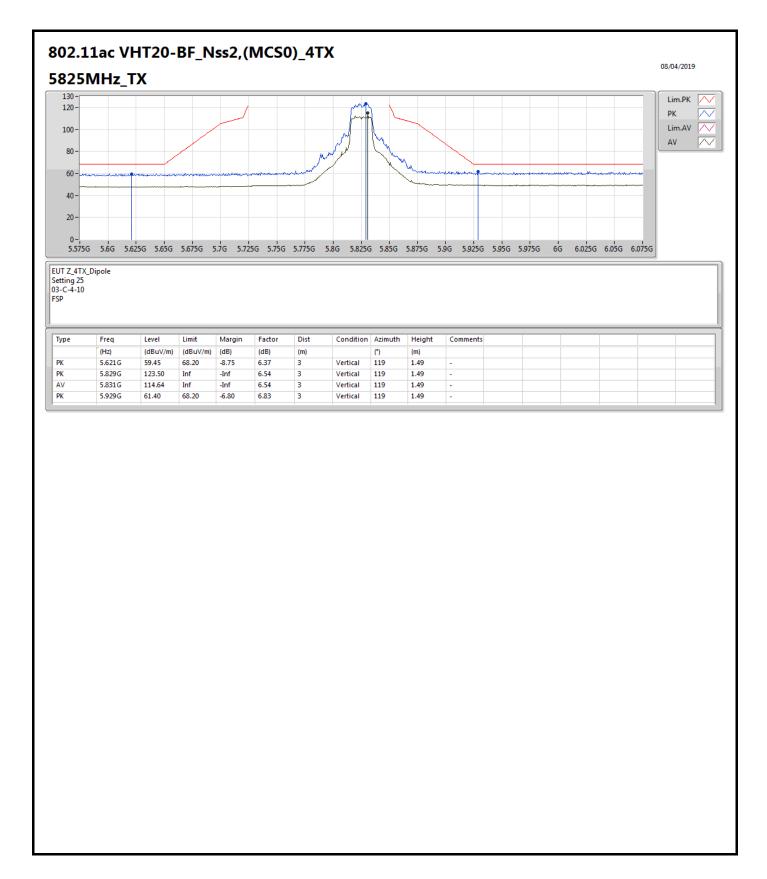
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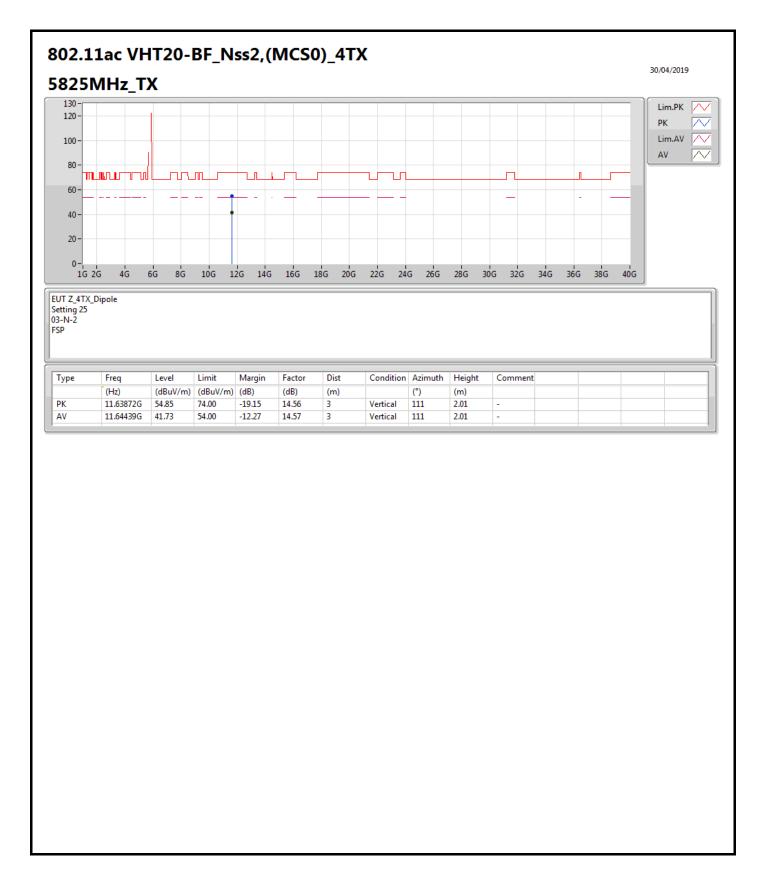
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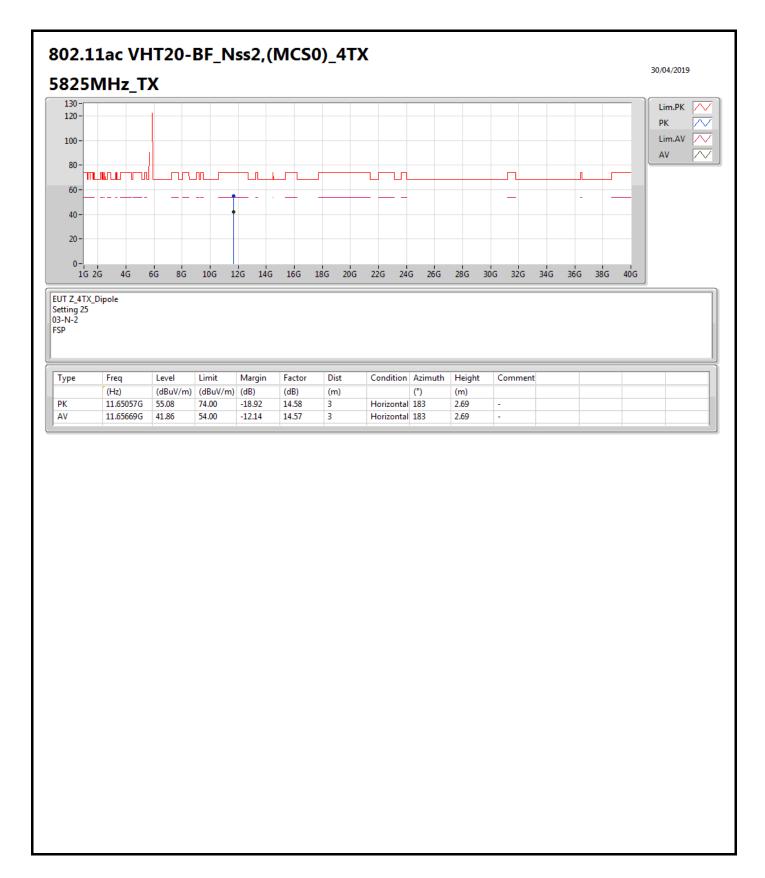
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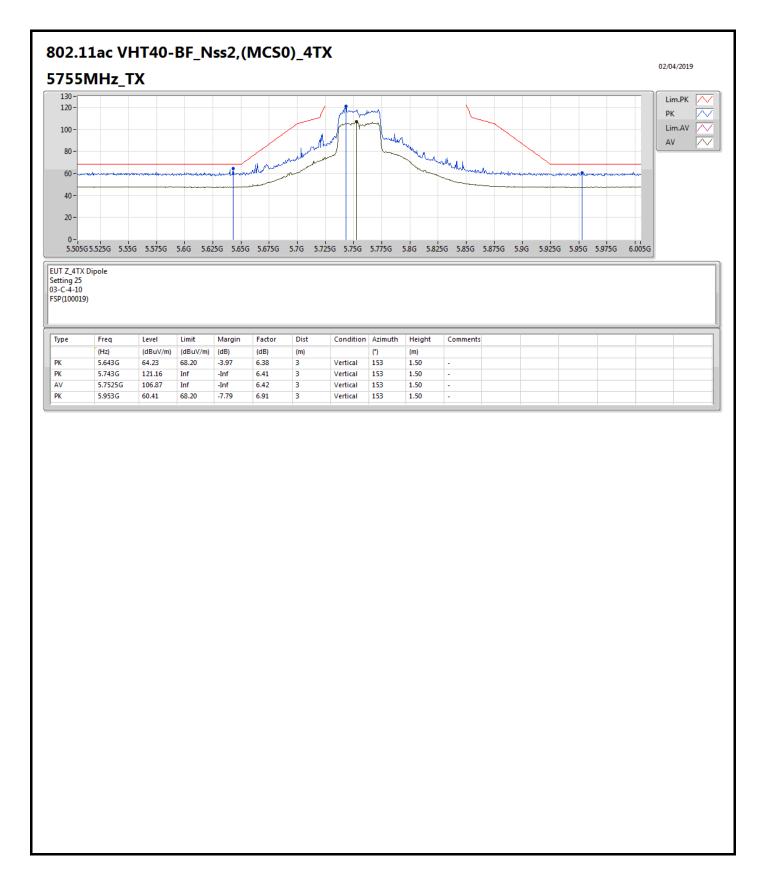
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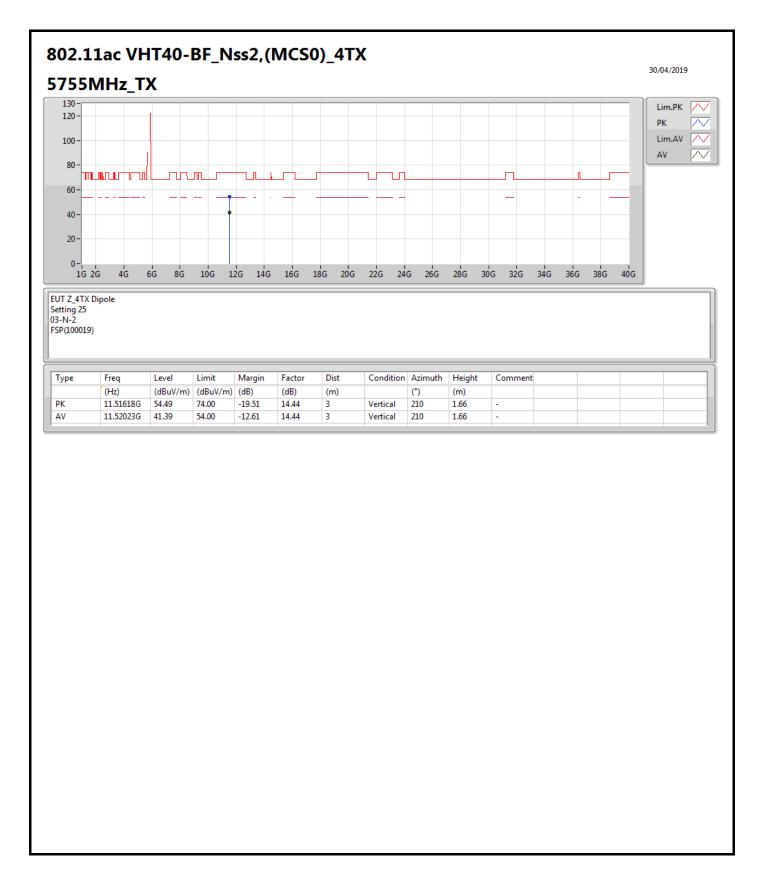
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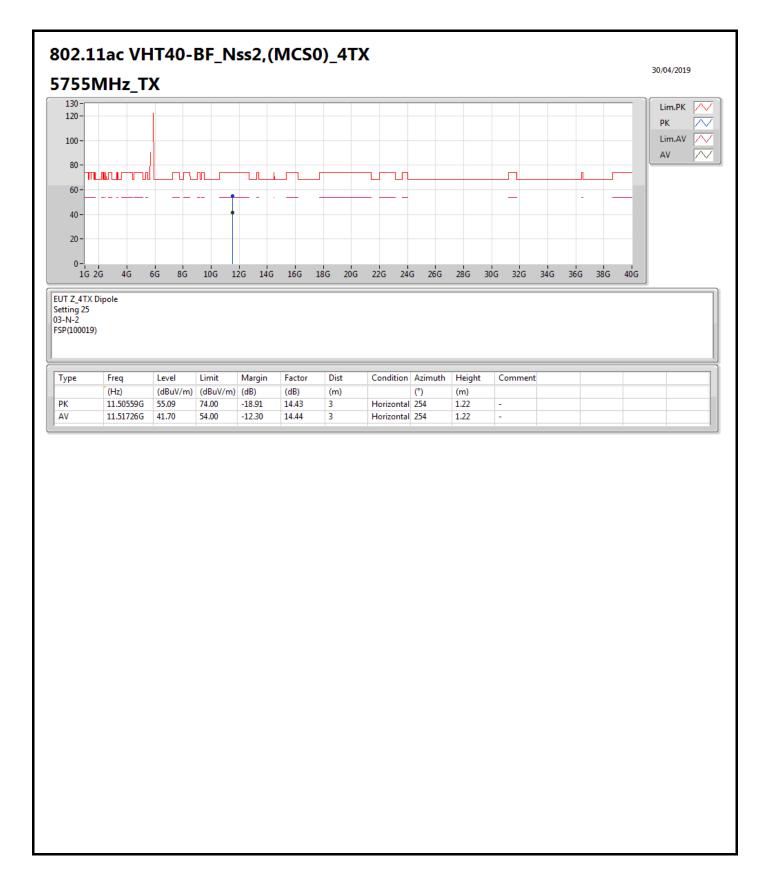
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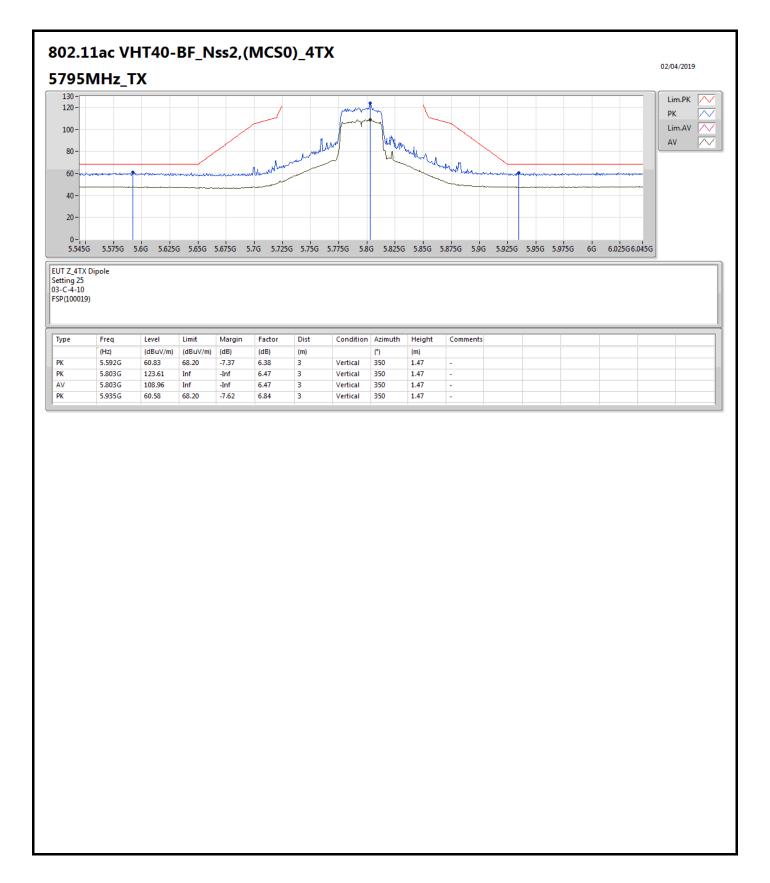
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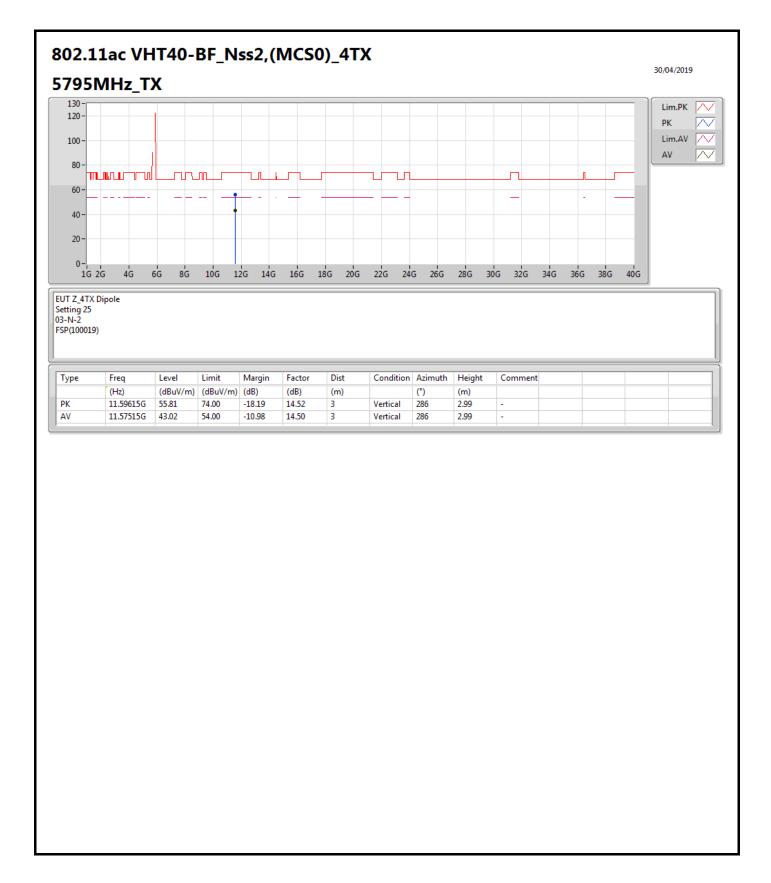
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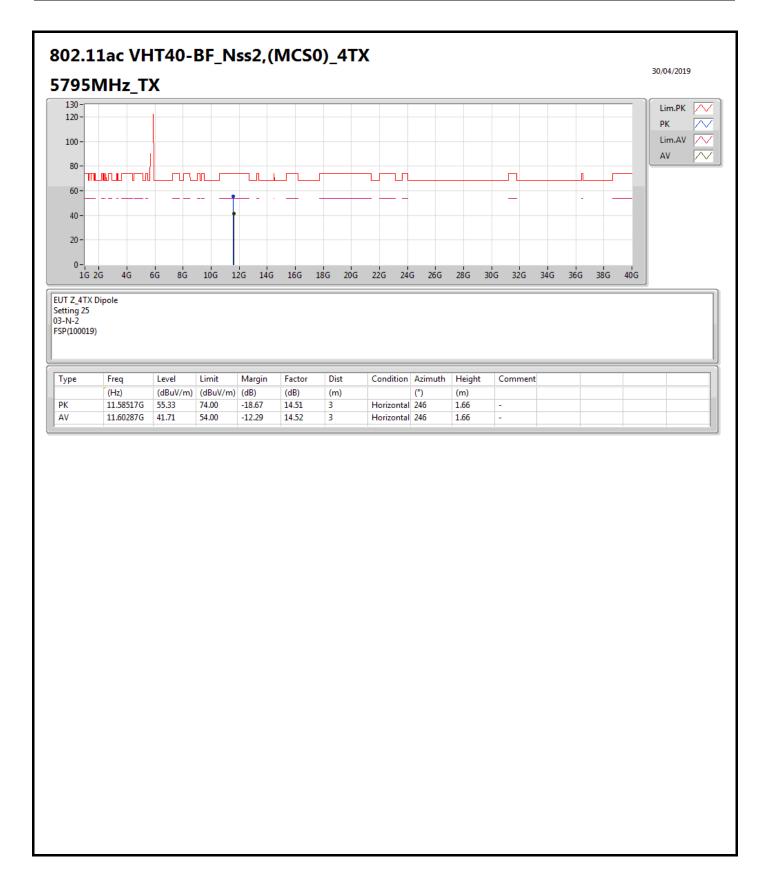
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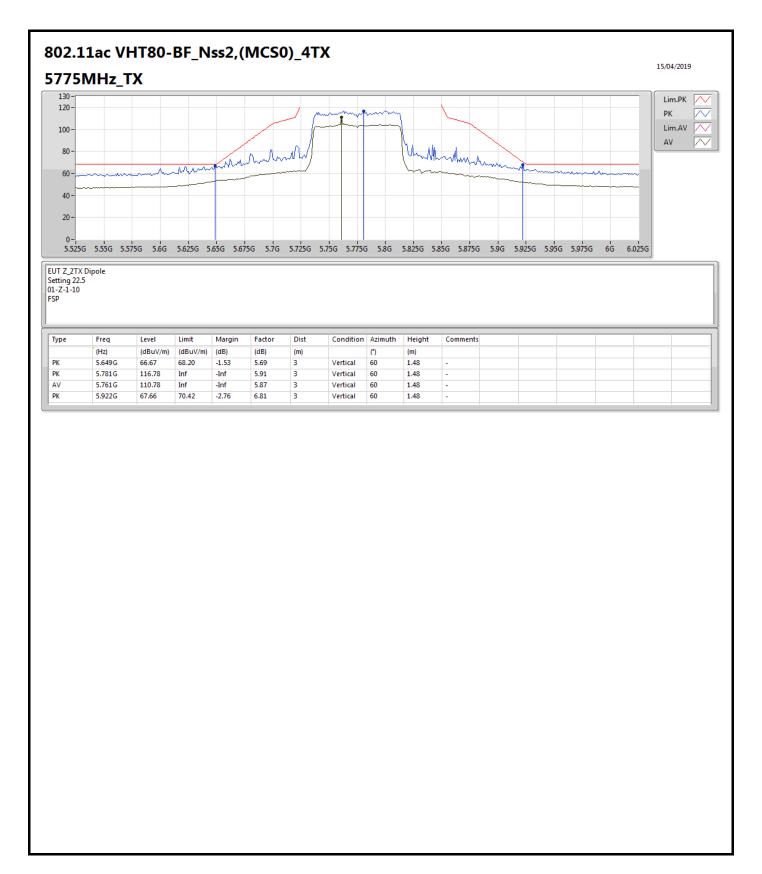
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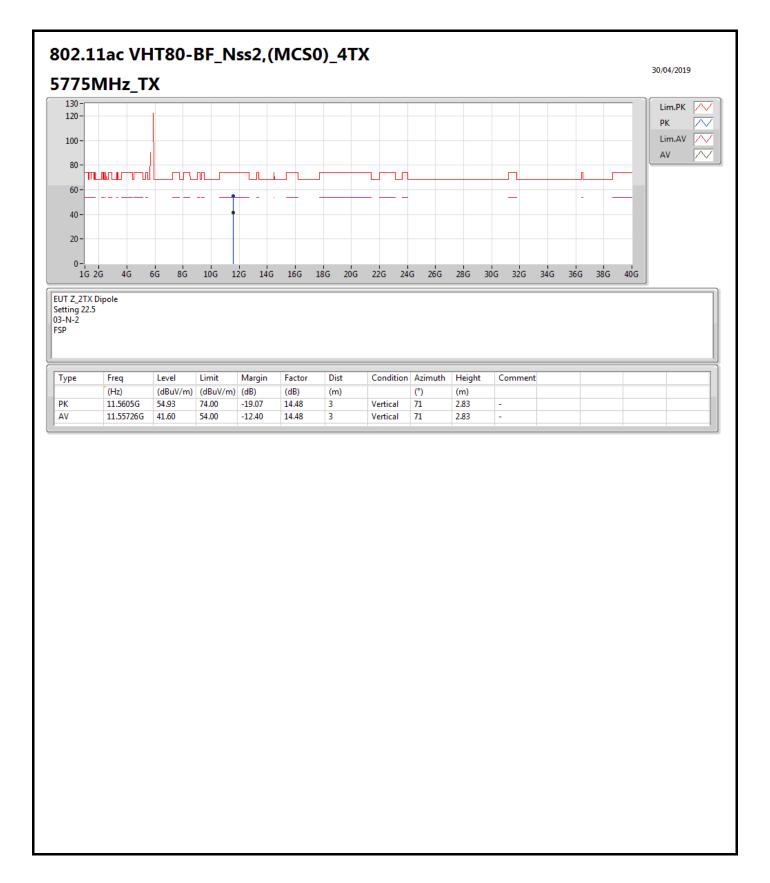
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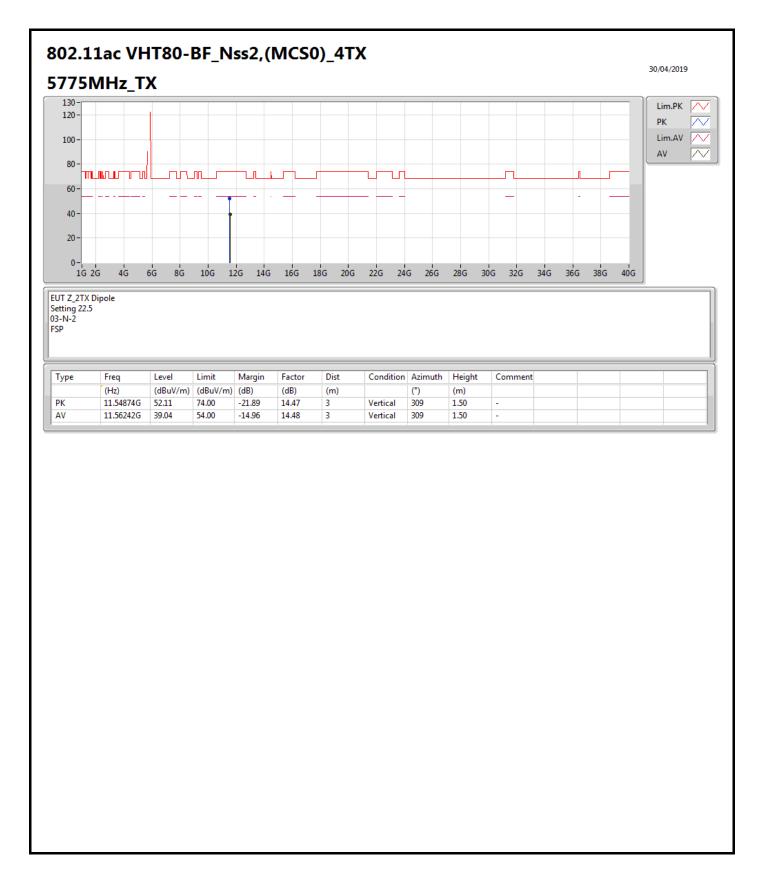
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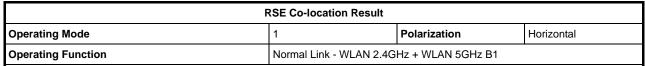
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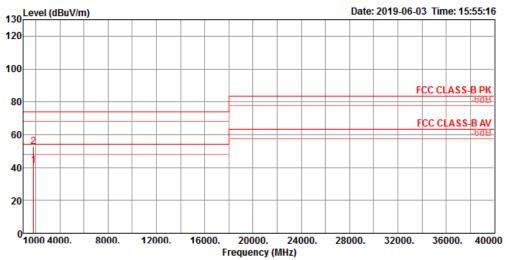




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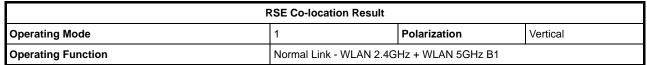


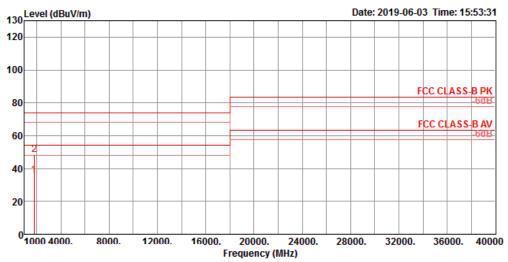




	Freq	Level		Limit							Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1811.90	41.28	54.00	-12.72	49.25	3.42	25.50	36.89	100	48	Average	HORIZONTAL
2	1817.70	52.72	74.00	-21.28	60.68	3.43	25.50	36.89	100	48	Peak	HORIZONTAL







	Freq	Level						Factor		1/Pos		Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1800.30	36.10	54.00	-17.90	44.08	3.41	25.50	36.89	153	257	Average	VERTICAL
2	1823.40	48.22	74.00	-25.78	56.18	3.43	25.50	36.89	153	257	Peak	VERTICAL