



RADIO TEST REPORT

FCC ID

: MSQ-RTAX8300

Equipment

: AX1800 + AV1300 Dual-band Powerline Mesh WiFi6

Router, ZenWiFi Hybrid Mesh Wi-Fi System

Brand Name

: ASUS

Model Name

: XP4, XP4R, XP4 Router

Applicant

: ASUSTEK COMPUTER INC.

1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan

Manufacturer

: ASUSTeK COMPUTER INC.

1F., No. 15, Lide Rd., Beitou, Taipei 112, Taiwan

Standard

: 47 CFR FCC Part 15.407

The product was received on Dec. 16, 2020, and testing was started from Dec. 17, 2020 and completed on Apr. 21, 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: Sam Chen

Sporton International Inc. Hsinchu Laboratory

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

TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB-A12_1 Ver1.3

Page Number

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Issued Date

: May 04, 2021

Report Version : 01

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Photographs of EUT v01

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Report No.: FR042147AB

Report Version : 01

History of this test report

Report No. : FR042147AB

Report No.	Version	Description	Issued Date
FR042147AB	01	Initial issue of report	May 04, 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	-
Reference	to Sporton Pro	pject No.: 042147-01		

Declaration of Conformity:

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

Comments and Explanations:

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

Reviewed by: Sam Chen
Report Producer: Viola Huang

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1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	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	ac (VHT80), ax (HEW80)	5210	42 [1]
5725-5850	ac (viiioo), ax (iic vvoo)	5775	155 [1]

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Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	11a	20	2
5.15-5.25GHz	HT20	20	2
5.15-5.25GHz	HT20-BF	20	2
5.15-5.25GHz	VHT20	20	2
5.15-5.25GHz	VHT20-BF	20	2
5.15-5.25GHz	HEW20	20	2
5.15-5.25GHz	HEW20-BF	20	2
5.15-5.25GHz	HT40	40	2
5.15-5.25GHz	HT40-BF	40	2
5.15-5.25GHz	VHT40	40	2
5.15-5.25GHz	VHT40-BF	40	2
5.15-5.25GHz	HEW40	40	2
5.15-5.25GHz	HEW40-BF	40	2
5.15-5.25GHz	VHT80	80	2
5.15-5.25GHz	VHT80-BF	80	2
5.15-5.25GHz	HEW80	80	2
5.15-5.25GHz	HEW80-BF	80	2
5.725-5.85GHz	HT20	20	2
5.725-5.85GHz	HT20-BF	20	2
5.725-5.85GHz	VHT20	20	2
5.725-5.85GHz	VHT20-BF	20	2
5.725-5.85GHz	HEW20	20	2

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Band	Mode	BWch (MHz)	Nant
5.725-5.85GHz	HEW20-BF	20	2
5.725-5.85GHz	HT40	40	2
5.725-5.85GHz	HT40-BF	40	2
5.725-5.85GHz	VHT40	40	2
5.725-5.85GHz	VHT40-BF	40	2
5.725-5.85GHz	HEW40	40	2
5.725-5.85GHz	HEW40-BF	40	2
5.725-5.85GHz	VHT80	80	2
5.725-5.85GHz	VHT80-BF	80	2
5.725-5.85GHz	HEW80	80	2
5.725-5.85GHz	HEW80-BF	80	2

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

Ant.	2.4GHz Port	5GHz Port	Bluetooth Port	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	2	-	-	Xinsheng	8000000031071341	PCB Antenna	I-PEX	
2	1	-	-	Xinsheng	8000000031081341	PCB Antenna	I-PEX	
3	-	2	-	Xinsheng	8000000031091341	PCB Antenna	I-PEX	Note 1
4	-	1	-	Xinsheng	8000000031101341	PCB Antenna	I-PEX	
5	-	-	1	Xinsheng	8000000031071341	PCB Antenna	I-PEX	

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Note1:

Ant.		Gain (dBi)	
AIII.	WLAN 2.4GHz	WLAN 5GHz	Bluetooth
1	3.25	-	-
2	3.27	-	-
3	-	3.48	-
4	-	3.41	-
5	-	-	3.25

Note 2: The above information was declared by manufacturer.

For 2.4GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

For Bluetooth function (1TX/1RX):

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

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1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.939	0.27	1.977m	1k
802.11ax HEW20-BF	0.906	0.43	1.761m	1k
802.11ax HEW40-BF	0.965	0.15	1.761m	1k
802.11ax HEW80-BF	0.896	0.48	1.685m	1k

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

1.1.4 EUT Operational Condition

EUT Power Type	Internal power supply			
	\boxtimes	With beamforming		Without beamforming
Beamforming Function	The product has beamforming function for 11n/VHT/ax in 2.4GHz and 11n/ac/ax in 5GHz.			
Function		Outdoor P2M	\boxtimes	Indoor P2M
i diletion		Fixed P2P		Client
Test Software Version	For non-beamforming mode: QSPR (Version : 5.0-00195) For beamforming mode: telnet (Version 6.1.7601)			

Note: The above information was declared by manufacturer.

1.1.5 Table for EUT Supports Functions

Function	Support Type
AP Router	Master
Mesh	Master

Note: After evaluating, there is only AP Router was selected to test and record in the report.

1.1.6 Table for Multiple Listing

Equipment Name	Model Name	Description
AX1800 + AV1300 Dual-band	VD4 VD4D	The variation of equipment name/model name is
Powerline Mesh WiFi6 Router,	XP4, XP4R, XP4 Router	for the strategy of marketing. The circuit of each
ZenWiFi Hybrid Mesh Wi-Fi System		equipment name/model name is identical.

Note 1: From the above models, model: XP4R was selected as representative model for the test and its data was recorded in this report.

Note 2: 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 412172 D01 v01r01
- 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	Jeff Wu	22.7~23.2 / 54~57	Jan. 13, 2021~Apr. 21, 2021
Radiated (For below 1GHz test)	03CH01-CB	KJ Chang	21.2~22.8 / 55~57	Dec. 26, 2020~Mar. 08, 2021
Radiated (For above 1GHz test)	03CH03-CB	KJ Chang	20.4~21.4 / 55~57	Dec. 26, 2020~Apr. 21, 2021
	03CH02-CB	1.0 Chang	20.5~21.8 / 55~58	Boo. 20, 2020 7 pl. 21, 2021
AC Conduction	CO02-CB	Wei Li	23~24 / 57~60	Dec. 17, 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)	3.8 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 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)_2TX	-
5180MHz	20
5200MHz	26
5240MHz	27
5745MHz	27
5785MHz	27
5825MHz	27
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-
5180MHz	26
5200MHz	29
5240MHz	29
5745MHz	29
5785MHz	29
5825MHz	29
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-
5190MHz	21
5230MHz	28
5755MHz	28
5795MHz	29
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	-
5210MHz	23
5775MHz	27

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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.
- There are two modes of EUT for 802.11n/VHT/ax in 2.4GHz and 802.11n/ac/ax in 5GHz. One is beamforming mode, and the other is non-beamforming mode, 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-AP Router + Power cord	

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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		

Th	The Worst Case Mode for Following Conformance Tests		
Tests Item	Unwanted Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	CTX		
1	EUT + Power cord_2.4GHz		
2	EUT + Power cord_5GHz		
3	EUT + Power cord_Bluetooth		
For operating mode 1 is the worst case and it was record in this test report.			
Operating Mode > 1GHz CTX			
1	EUT + Power cord_5GHz		

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.: FA042147 for Co-location RF Exposure Evaluation.			

Note: The EUT can only use Y axis position.

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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 mode.

beamforming mode:

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

The program was executed as follows:

- 1. During the test, the EUT operation to normal function.
- 2. Executed command fixed test channel under telnet.
- 3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by 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
Power cord*1, non-shielded, 1.5m
RJ-45 cable*1, non-shielded, 1.5m

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2.5 Support Equipment

For AC Conduction:

	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
Α	LAN1 NB	DELL	E6430	N/A		
В	2.4G NB	DELL	E6430	N/A		
С	5G NB	DELL	E6430	N/A		
D	WAN NB	DELL	E6430	N/A		
Е	Smart phone	Samsung	Galaxy J2	A3LSMJ200F		
F	HDD3.0	Transcend	TS1TSJ25A3K	N/A		
G	LAN2 NB	DELL	E6430	N/A		

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For Radiated (below 1GHz):

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

For Radiated (above 1GHz) and RF Conducted:

For non beamforming mode

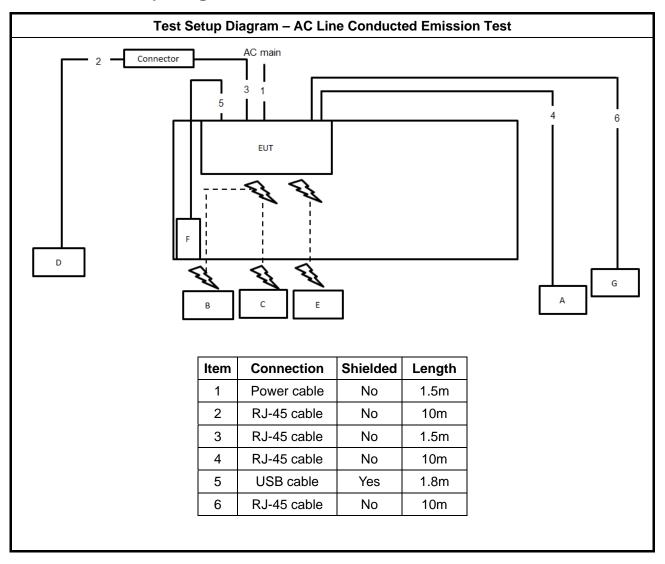
Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID				
Α	Notebook	DELL	E4300	N/A	

For beamforming mode

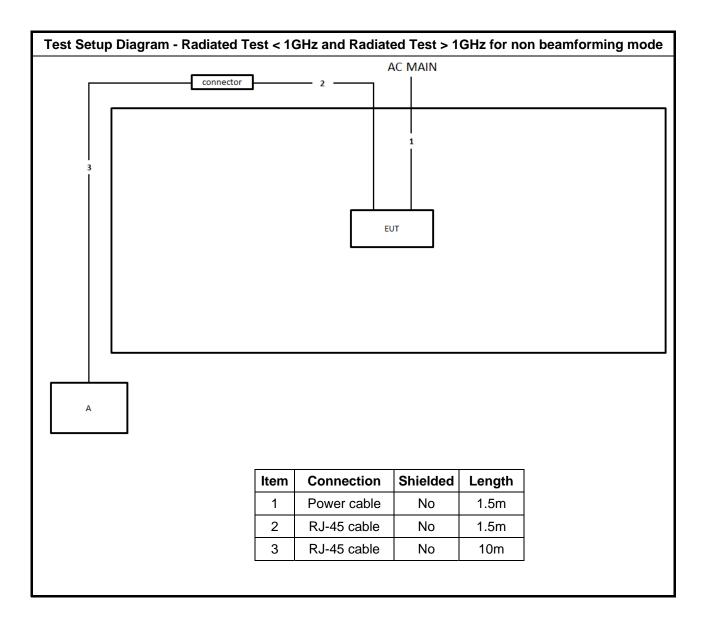
	Support Equipment							
No.	No. Equipment Brand Name Model Name FCC ID							
Α	Notebook	DELL	E4300	N/A				
В	RX Device	ASUS	XP4N	MSQ-RTAX8301				
C Notebook		DELL	E4300	N/A				

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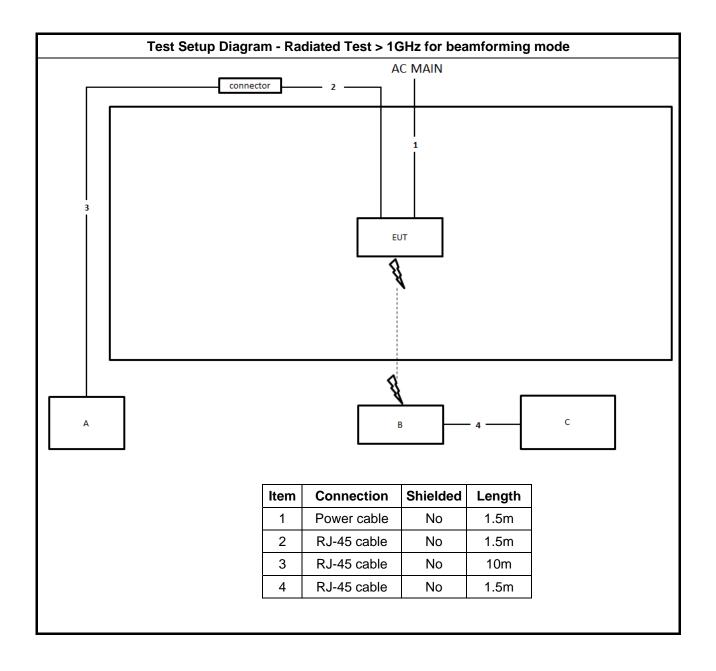
2.6 Test Setup Diagram



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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			
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

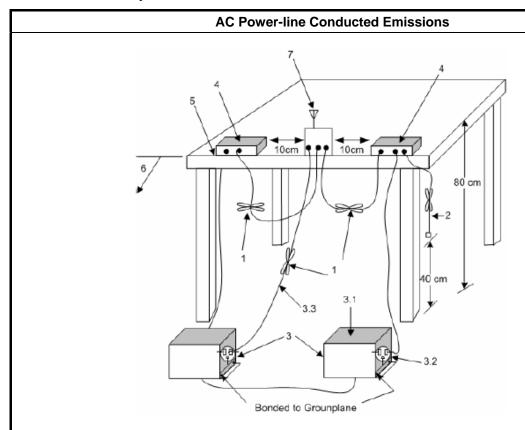
Refer a test equipment and calibration data table in this test report.

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					
UN	UNII 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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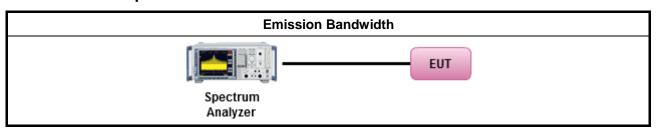
3.2.2 Measuring Instruments

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

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3.3.2 Measuring Instruments

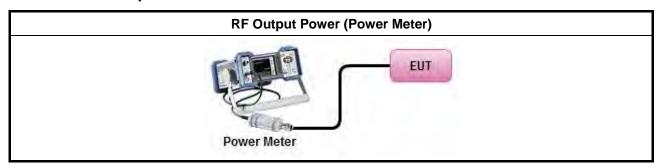
Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

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

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3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

	Peak Power Spectral Density Limit					
UNI	I Devices					
\boxtimes	For the 5.15-5.25 GHz band:					
	• Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$.					
	Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$.					
	Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$.					
	■ Mobile or Portable Client: the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – $(G_{TX} - 6)$					
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ($G_{TX} - 6$).					
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ($G_{TX} - 6$).					
	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) \leq 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$.					
	 Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz. 					
pow	SD = peak power spectral density that he same method as used to determine the conducted output 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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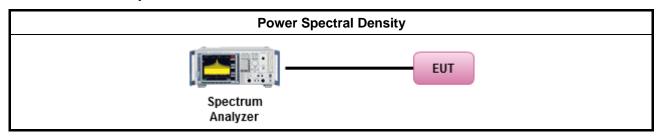
3.4.3 Test Procedures

		Test Method					
•	outp func	k power spectral density procedures that the same method as used to determine the conducted out power shall be used to determine the peak power spectral density and use the peak search tion on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density I be measured using below options:					
		Refer as FCC KDB 789033, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth					
	[duty	y cycle ≥ 98% or external video / power trigger]					
	\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 Peak 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 30			
1.705~30.0	30	29				
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

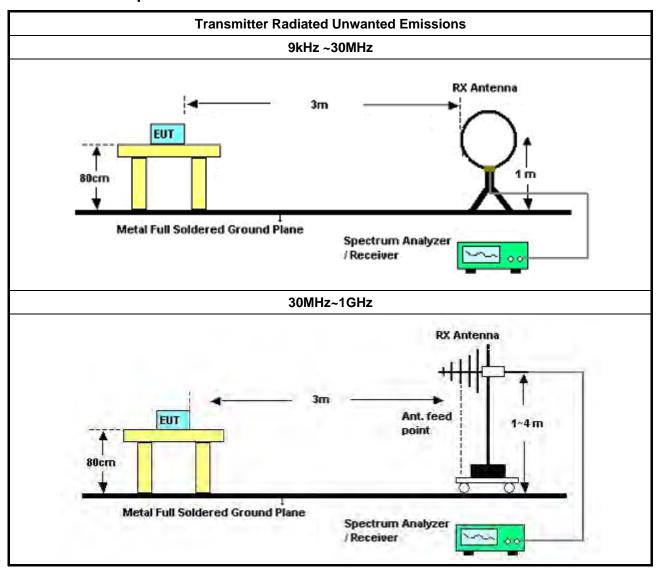
Test Method

- 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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Test Setup 3.5.4



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Above 1GHz

BUT

3M & 1M

1.5M

Max 30cm

Spectrum Analyzer

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: 01

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
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Dec. 04, 2020	Dec. 03, 2021	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 20, 2020	Nov. 19, 2021	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Mar. 10, 2020	Mar. 09, 2021	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Oct. 20, 2020	Oct. 19, 2021	Conduction (CO02-CB)
Pulse Limiter	Schwarzbeck	VTSD 9561F-N	00378	9kHz ~ 30MHz	Mar. 19, 2020	Mar. 18, 2021	Conduction (CO02-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Radiation (03CH01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH01-CB	30 MHz ~ 1 GHz	Jan. 28, 2020	Jan. 27, 2021	Radiation (03CH01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH01-CB	30 MHz ~ 1 GHz	Jan. 26, 2021	Jan. 25, 2022	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Feb. 28, 2020	Feb. 27, 2021	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Feb. 22, 2021	Feb. 21, 2022	Radiation (03CH01-CB)
Preamplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	Jul. 03, 2020	Jun. 02, 2021	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Apr. 16, 2020	Apr. 15, 2021	Radiation (03CH01-CB)
Signal Analyzer	R&S	FSV40	101903	9kHz ~ 40GHz	Mar. 22, 2021	Mar. 21, 2022	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	Radiation (03CH01-CB)
RF Cable-low	Woken	RG402	Low Cable-16+17	30 MHz ~ 1 GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH01-CB)
3m Semi Anechoic Chamber VSWR	RIKEN	SAC-3M	03CH02-CB	1GHz ~18GHz 3m	Mar. 28, 2020	Mar. 27, 2021	Radiation (03CH02-CB)

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RF Cable-high

Woken

Calibration Calibration Instrument **Brand** Model No. Serial No. Characteristics Remark **Date Due Date** 3m Semi Anechoic 1GHz ~18GHz Radiation RIKEN SAC-3M 03CH02-CB Mar. 27, 2021 Mar. 26, 2022 Chamber 3m (03CH02-CB) **VSWR** Radiation Horn Antenna **EMCO** 3115 9610-4976 1GHz ~ 18GHz Apr. 21, 2020 Apr. 20, 2021 (03CH02-CB) **SCHWARZBE** BBHA 9120 D Radiation Horn Antenna BBHA 9120 D 1GHz~18GHz Sep. 21, 2020 Sep. 20, 2021 (03CH02-CB) 1370 Radiation BBHA9170252 Horn Antenna Schwarzbeck **BBHA 9170** 15GHz ~ 40GHz Jul. 21, 2020 Jul. 20, 2021 (03CH02-CB) Radiation Pre-Amplifier 83017A MY39501305 1GHz ~ 26.5GHz Jul. 13, 2020 Jul. 12, 2021 Agilent (03CH02-CB) TTA1840-35-H Radiation Pre-Amplifier **MITEQ** 1864479 18GHz ~ 40GHz Jul. 08, 2020 Jul. 07, 2021 (03CH02-CB) Spectrum Radiation FSU R&S 100015 9kHz~26GHz Oct. 15, 2020 Oct. 14, 2021 analyzer (03CH02-CB) Radiation RF Cable-high Woken RG402 High Cable-18 1GHz ~ 18GHz Oct. 05, 2020 Oct. 04, 2021 (03CH02-CB) Radiation High RF Cable-high Woken RG402 1GHz ~ 18GHz Oct. 05, 2020 Oct. 04, 2021 Cable-18+19 (03CH02-CB) High Radiation RF Cable-high Woken RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Cable-40G#1 (03CH02-CB) High Radiation RF Cable-high Woken RG402 18GHz ~ 40 GHz Jul. 16, 2020 Jul. 15, 2021 Cable-40G#2 (03CH02-CB) Radiation Test Software **SPORTON SENSE** V5.10 N.C.R. N.C.R. (03CH02-CB) 3m Semi 1GHz ~18GHz Anechoic Radiation TDK SAC-3M 03CH03-CB May 28, 2020 May 27, 2021 Chamber 3m (03CH03-CB) **VSWR** Radiation Horn Antenna **COM-POWER** AH-118 071028 1GHz ~ 18GHz Jun. 09, 2020 Jun. 08, 2021 (03CH03-CB) Radiation 750MHz~18GHz Horn Antenna ETS · Lindgren 3115 6821 Jan. 26, 2021 Jan. 25, 2022 (03CH03-CB) Radiation **COM-POWER** 1GHz ~ 18GHz Horn Antenna AH-118 071028 Jun. 09, 2020 Jun. 08, 2021 (03CH03-CB) Radiation Schwarzbeck **BBHA 9170** BBHA9170252 15GHz ~ 40GHz Jul. 21, 2020 Jul. 20, 2021 Horn Antenna (03CH03-CB) Radiation Pre-Amplifier 8449B 3008A02097 1GHz ~ 26.5GHz Jul. 03, 2020 Jun. 02, 2021 Agilent (03CH03-CB) TTA1840-35-H Radiation Pre-Amplifier MITEQ 1864479 18GHz ~ 40GHz Jul. 08, 2020 Jul. 07, 2021 (03CH03-CB) G Spectrum Radiation FSP40 100019 9kHz ~ 40GHz R&S Jun. 09, 2020 Jun. 08, 2021 Analyzer (03CH03-CB) High Radiation

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1GHz ~ 18GHz

Oct. 05, 2020

Oct. 04, 2021

(03CH03-CB)

Report Template No.: CB-A12_1 Ver1.3 Report Version : 01

Cable-20+29

RG402

Instrument	Brand	Model No.	Serial No.	Characteristics Calibration Date		Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-29	1GHz ~ 18GHz Oct. 05, 2020		Oct. 04, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz Jul. 16, 2020		Jul. 15, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz Jul. 16, 2020		Jul. 15, 2021	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	- N.C.R.		N.C.R.	Radiation (03CH03-CB)
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz Dec. 31, 2020		Dec. 30, 2021	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1726195	300MHz~40GHz	Aug. 17, 2020	Aug. 16, 2021	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Aug. 17, 2020	Aug. 16, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
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)

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

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

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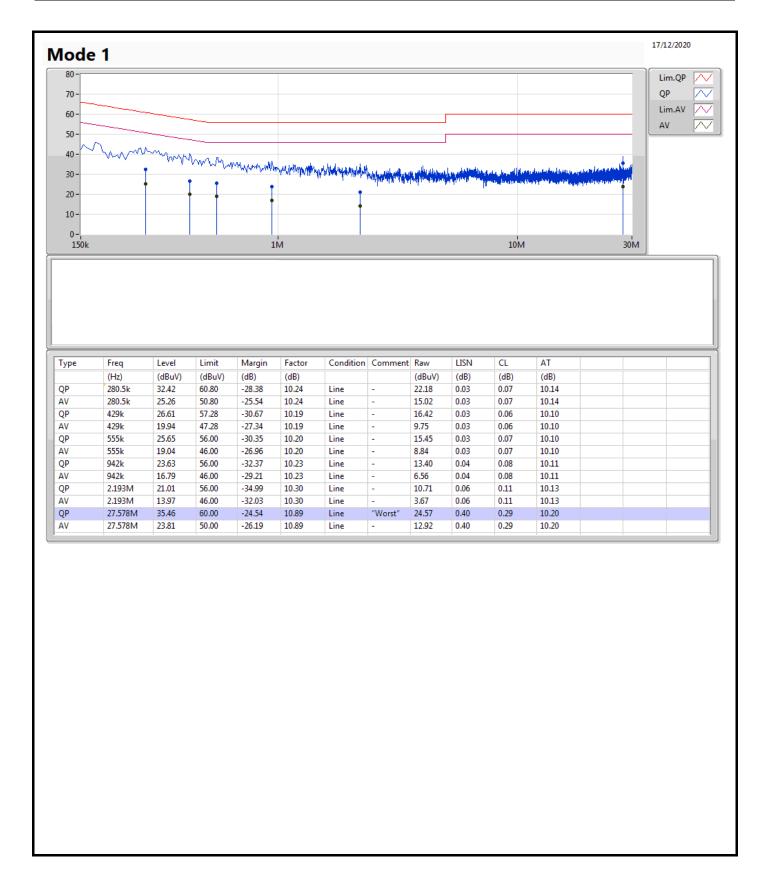
Conducted Emissions at Powerline

Appendix A

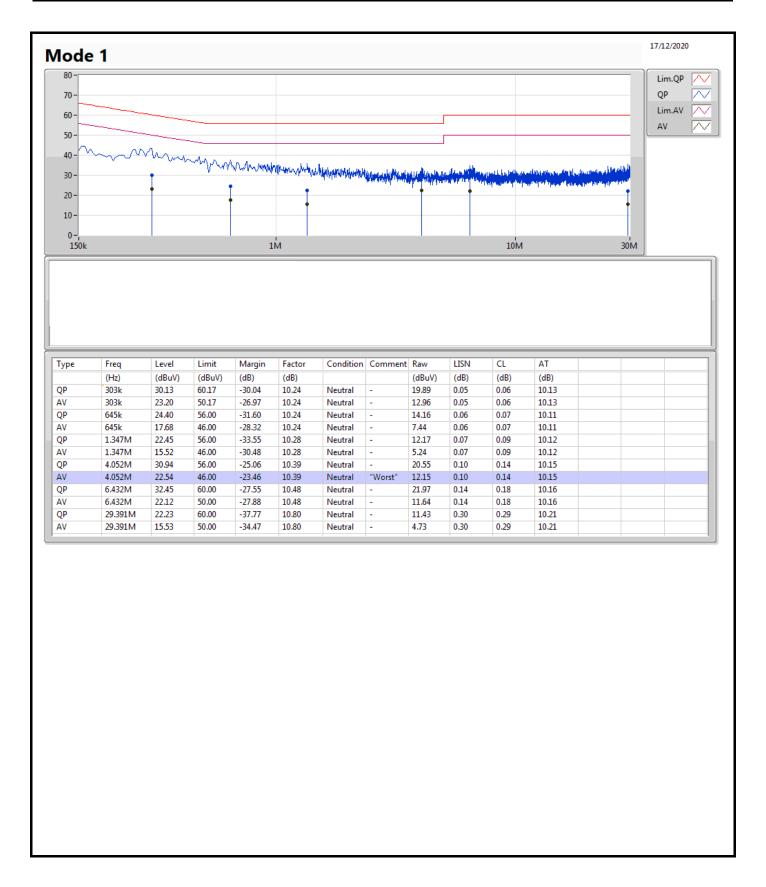
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	4.052M	22.54	46.00	-23.46	Neutral











Appendix B.1 **EBW**

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)_2TX	30.69M	17.511M	17M5D1D	20.25M	16.372M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	16.29M	16.672M	16M7D1D	15.54M	16.492M

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;

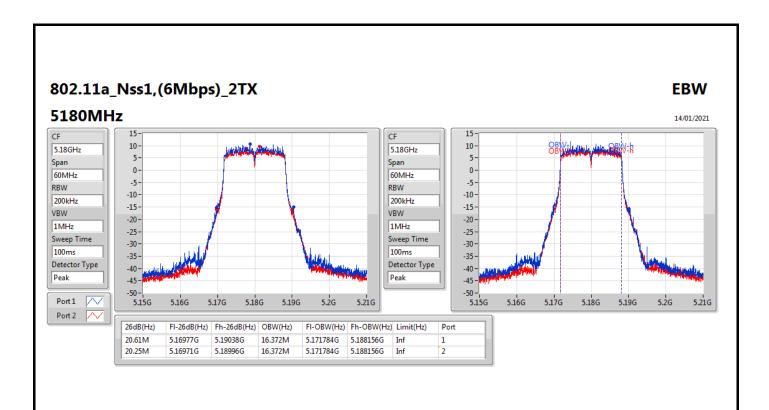


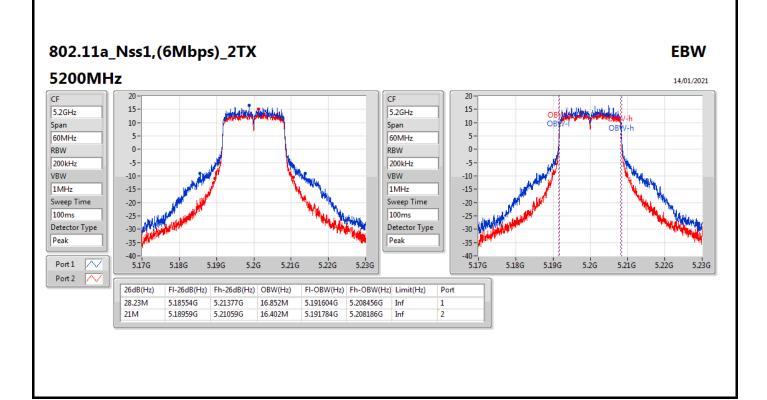
EBW Appendix B.1

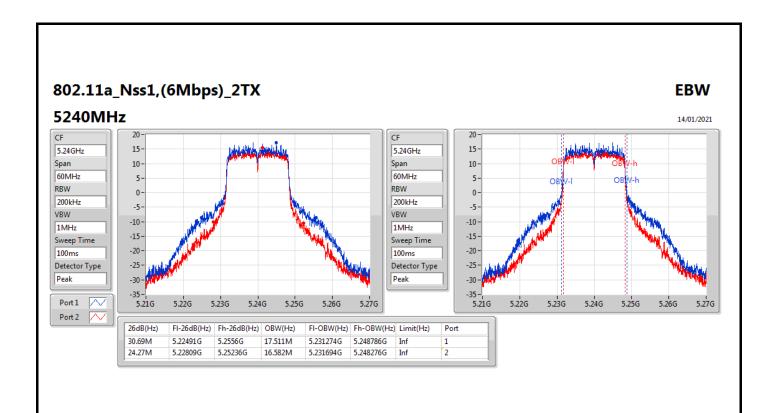
Result

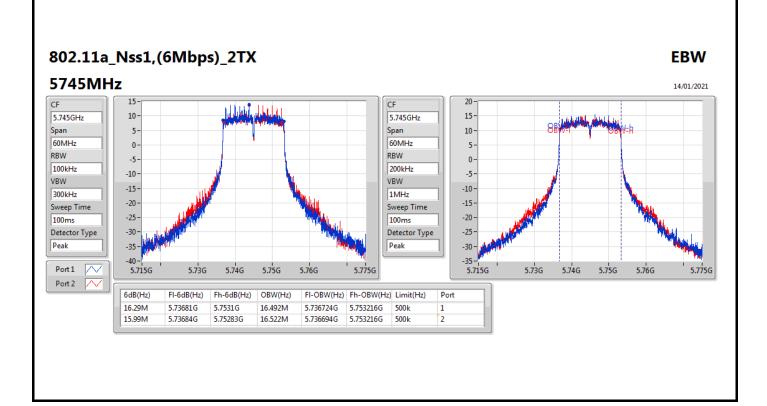
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	20.61M	16.372M	20.25M	16.372M
5200MHz	Pass	Inf	28.23M	16.852M	21M	16.402M
5240MHz	Pass	Inf	30.69M	17.511M	24.27M	16.582M
5745MHz	Pass	500k	16.29M	16.492M	15.99M	16.522M
5785MHz	Pass	500k	16.26M	16.612M	15.99M	16.642M
5825MHz	Pass	500k	16.02M	16.672M	15.54M	16.642M

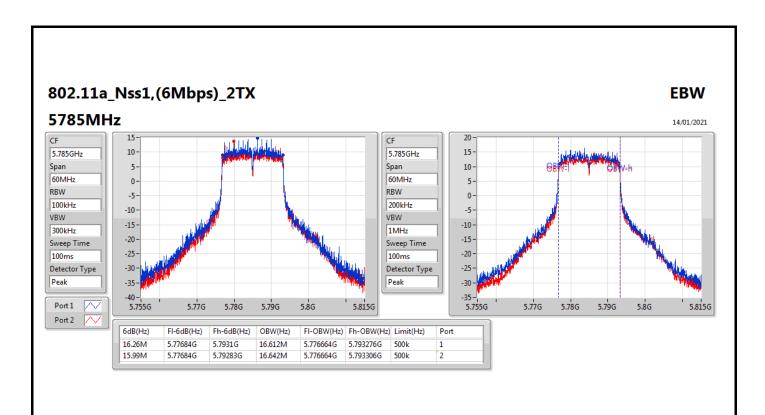
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

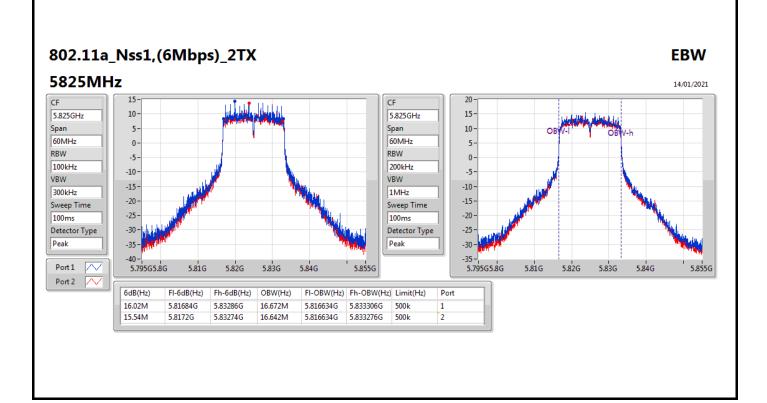














Appendix B.2 **EBW**

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.15-5.25GHz	-	-	-	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	23.25M	18.951M	19M0D1D	21.54M	18.891M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	40.92M	37.781M	37M8D1D	40.32M	37.601M
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	81.72M	76.882M	76M9D1D	81.12M	76.762M
5.725-5.85GHz	-	-	-	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	18.57M	19.1M	19M1D1D	17.43M	18.891M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	37.68M	37.781M	37M8D1D	35.04M	37.781M
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	72.6M	77.241M	77M2D1D	63.12M	76.882M

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;



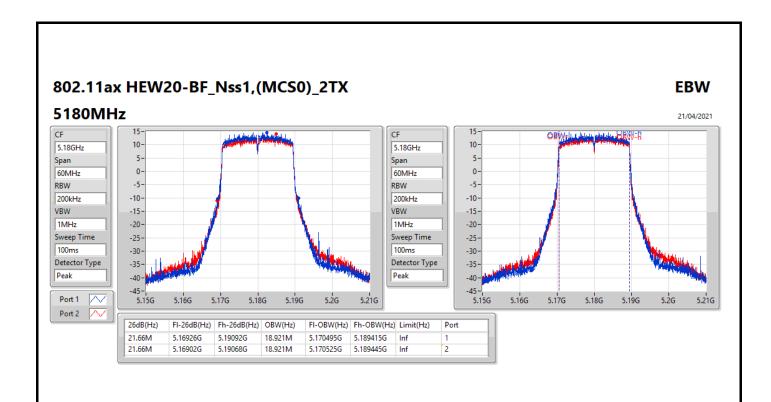
Result

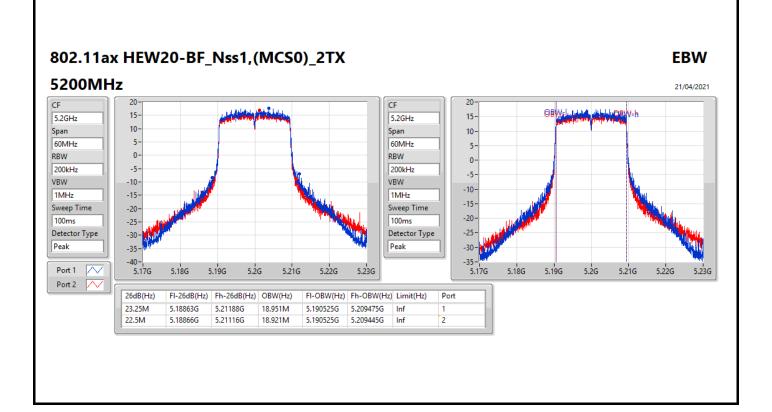
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	21.66M	18.921M	21.66M	18.921M
5200MHz	Pass	Inf	23.25M	18.951M	22.5M	18.921M
5240MHz	Pass	Inf	21.63M	18.891M	21.54M	18.891M
5745MHz	Pass	500k	17.85M	18.891M	17.7M	18.921M
5785MHz	Pass	500k	17.97M	18.891M	18.57M	18.891M
5825MHz	Pass	500k	18M	19.1M	17.43M	19.07M
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	Inf	40.56M	37.721M	40.32M	37.601M
5230MHz	Pass	Inf	40.5M	37.721M	40.92M	37.781M
5755MHz	Pass	500k	35.04M	37.781M	36.72M	37.781M
5795MHz	Pass	500k	37.68M	37.781M	37.02M	37.781M
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	Inf	81.72M	76.762M	81.12M	76.882M
5775MHz	Pass	500k	72.6M	77.241M	63.12M	76.882M

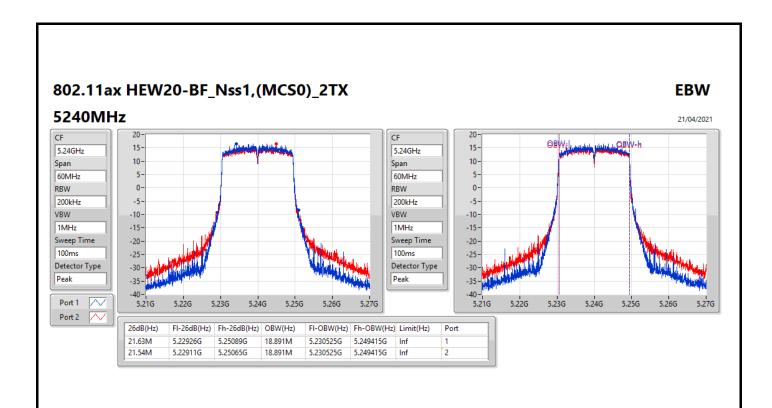
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

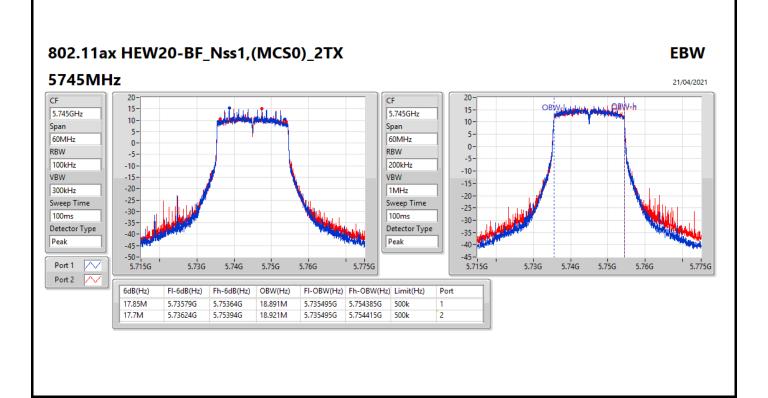
SPORTON LAB.

Appendix B.2

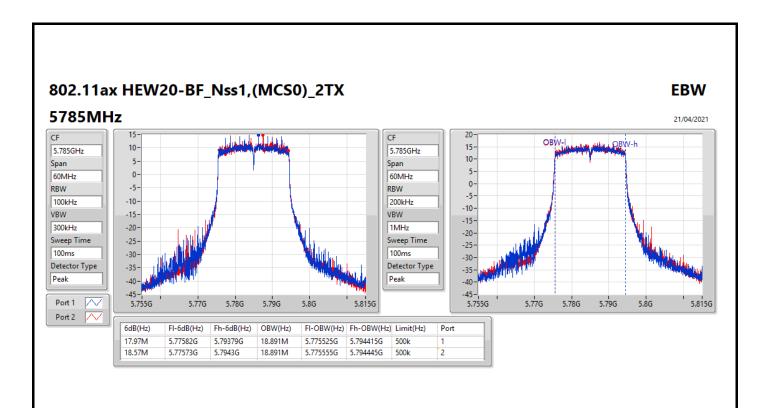


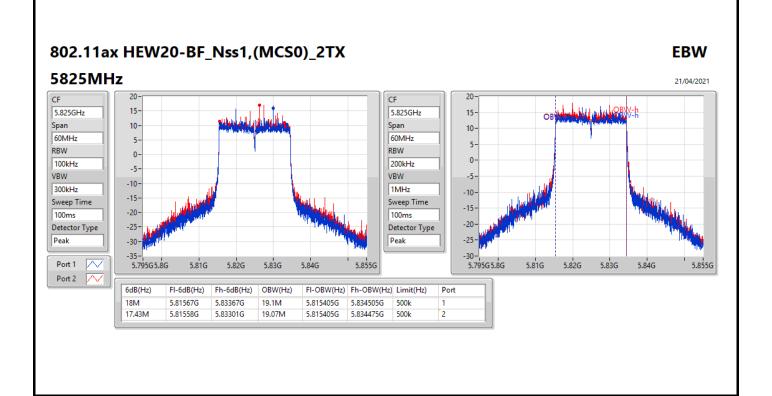


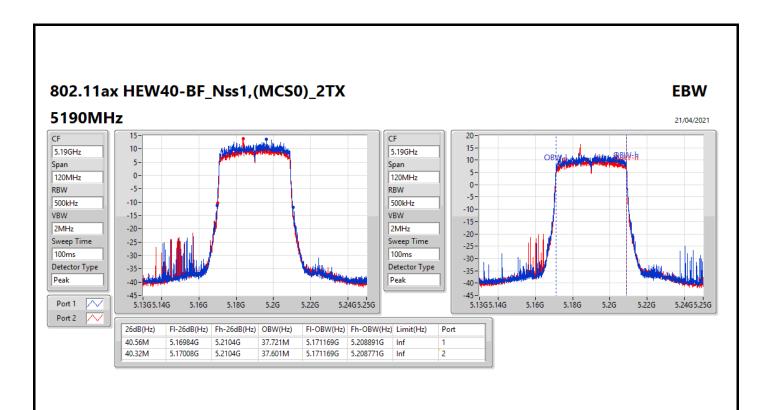


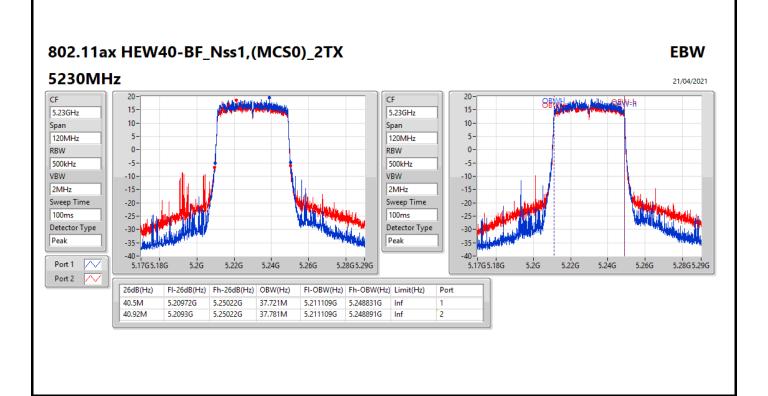


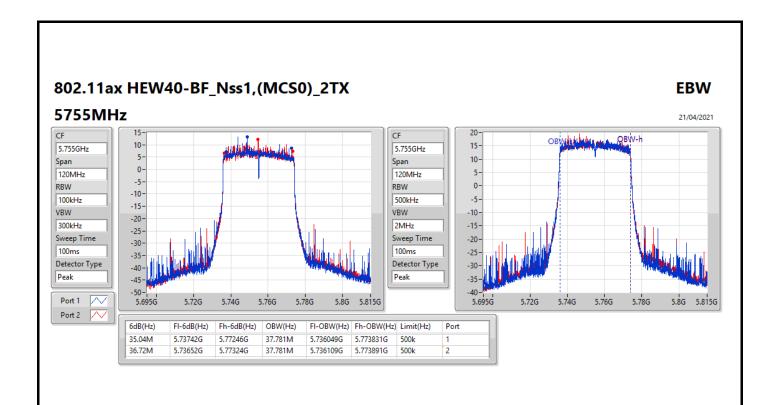
SPORTON LAB.

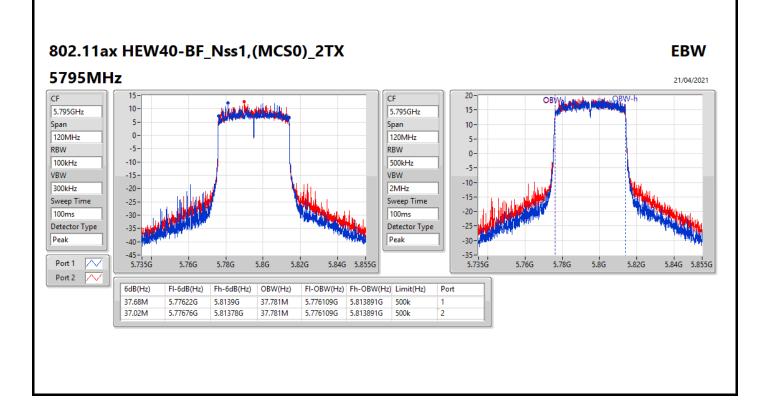




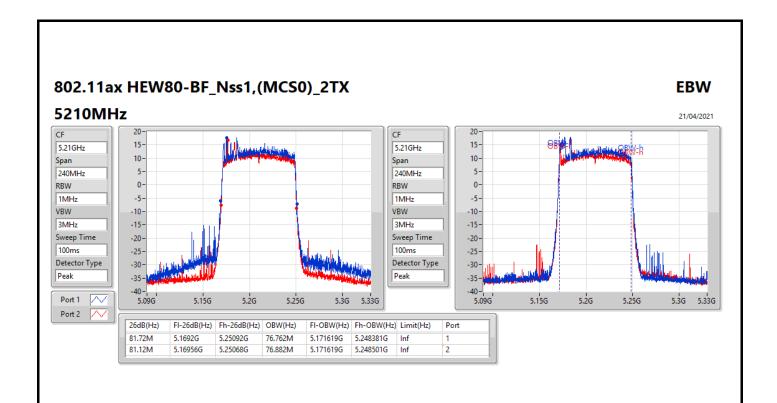


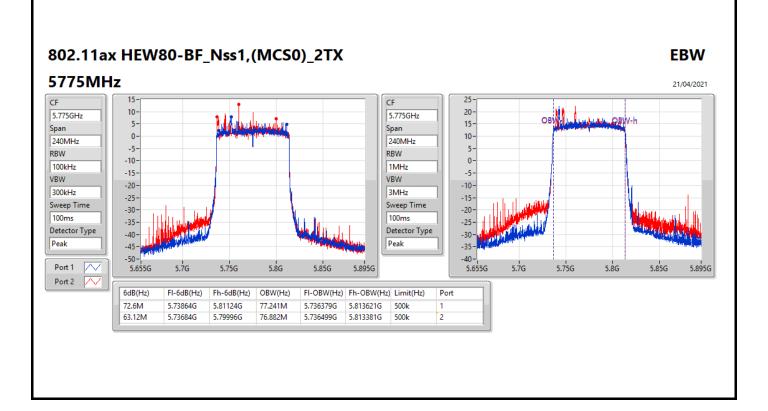






Appendix B.2







Summary

Carriniary		
Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	29.12	0.81658
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	28.55	0.71614

Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5180MHz	Pass	3.48	20.81	19.67	23.29	30.00
5200MHz	Pass	3.48	26.24	24.98	28.67	30.00
5240MHz	Pass	3.48	26.58	25.58	29.12	30.00
5745MHz	Pass	3.48	25.29	25.11	28.21	30.00
5785MHz	Pass	3.48	26.06	24.94	28.55	30.00
5825MHz	Pass	3.48	25.16	24.76	27.97	30.00

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



Summary

Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	28.61	0.72611
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	27.51	0.56364
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	22.86	0.19320
5.725-5.85GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	27.80	0.60256
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	28.25	0.66834
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	25.87	0.38637



Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	6.46	23.30	22.03	25.72	29.54
5200MHz	Pass	6.46	26.14	24.98	28.61	29.54
5240MHz	Pass	6.46	25.43	24.52	28.01	29.54
5745MHz	Pass	6.46	24.78	24.79	27.80	29.54
5785MHz	Pass	6.46	24.49	24.52	27.52	29.54
5825MHz	Pass	6.46	24.45	24.49	27.48	29.54
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	6.46	18.77	17.53	21.20	29.54
5230MHz	Pass	6.46	24.86	24.11	27.51	29.54
5755MHz	Pass	6.46	24.07	23.91	27.00	29.54
5795MHz	Pass	6.46	25.11	25.36	28.25	29.54
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	6.46	20.36	19.27	22.86	29.54
5775MHz	Pass	6.46	22.92	22.80	25.87	29.54

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



Summary

Gammary	
Mode	PD
	(dBm/RBW)
5.15-5.25GHz	-
802.11a_Nss1,(6Mbps)_2TX	15.85
5.725-5.85GHz	
802.11a_Nss1,(6Mbps)_2TX	13.45

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

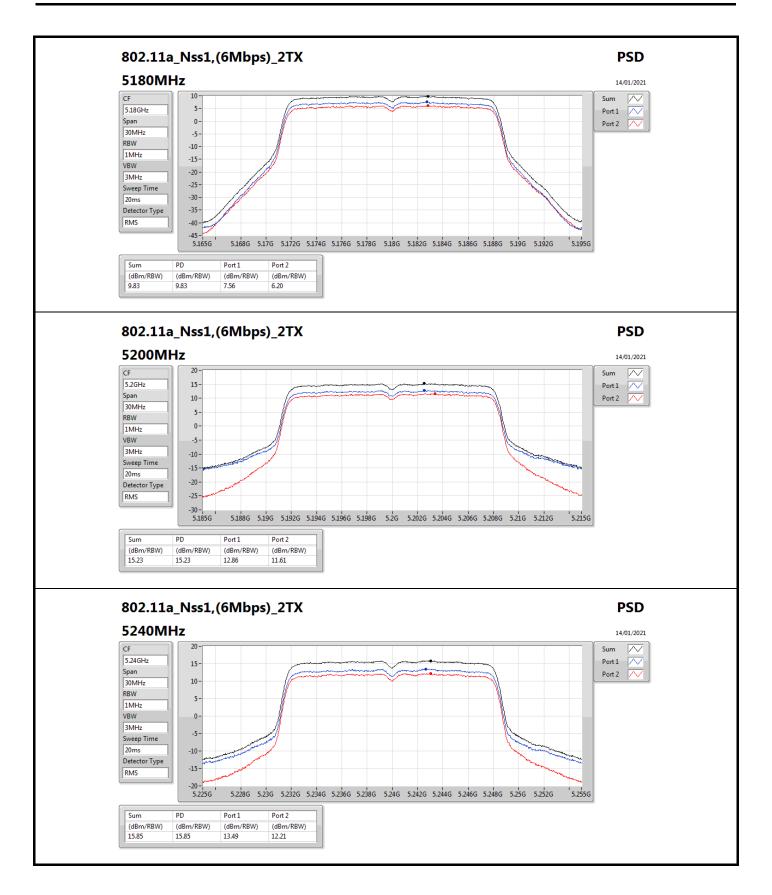


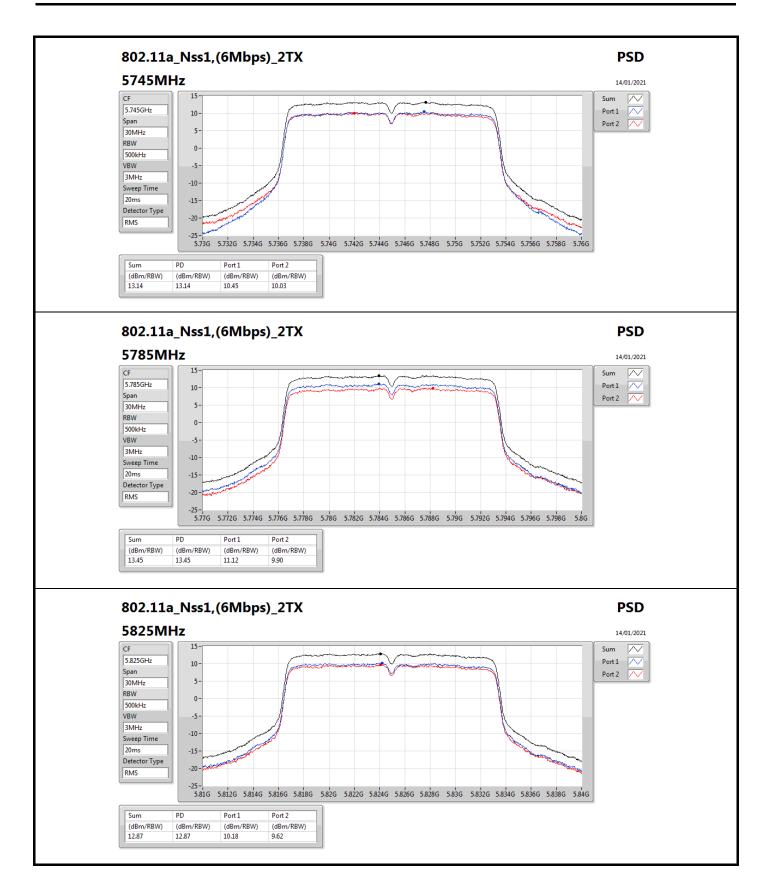
Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	Port 2 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	=
5180MHz	Pass	6.46	7.56	6.20	9.83	16.54
5200MHz	Pass	6.46	12.86	11.61	15.23	16.54
5240MHz	Pass	6.46	13.49	12.21	15.85	16.54
5745MHz	Pass	6.46	10.45	10.03	13.14	29.54
5785MHz	Pass	6.46	11.12	9.90	13.45	29.54
5825MHz	Pass	6.46	10.18	9.62	12.87	29.54

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;







Summary

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	15.78
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	11.82
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	6.83
5.725-5.85GHz	·
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	13.43
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	10.99
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	7.98

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

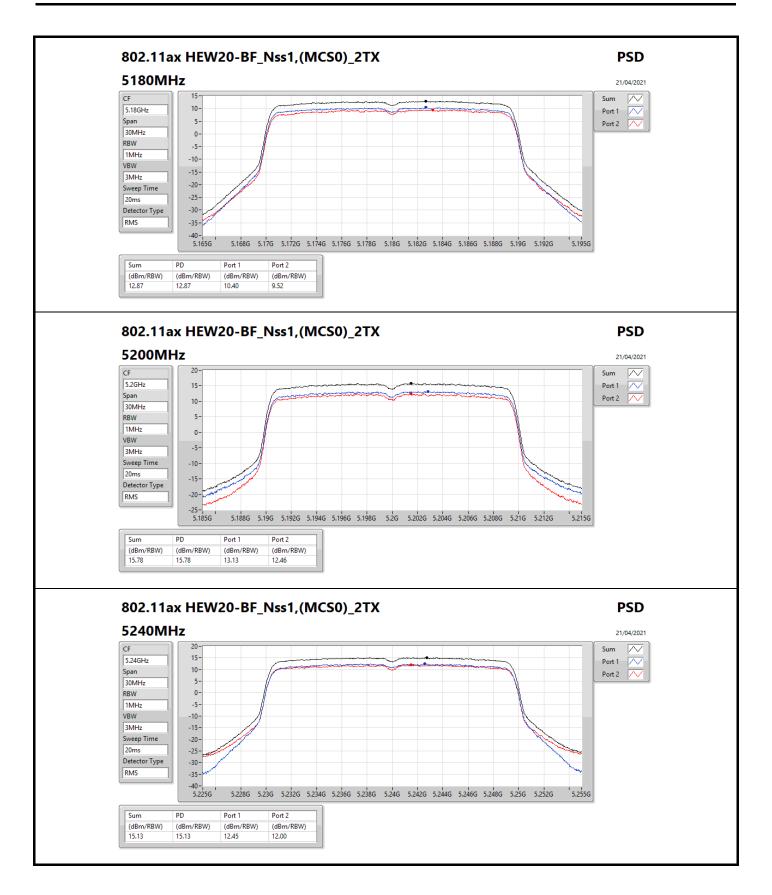


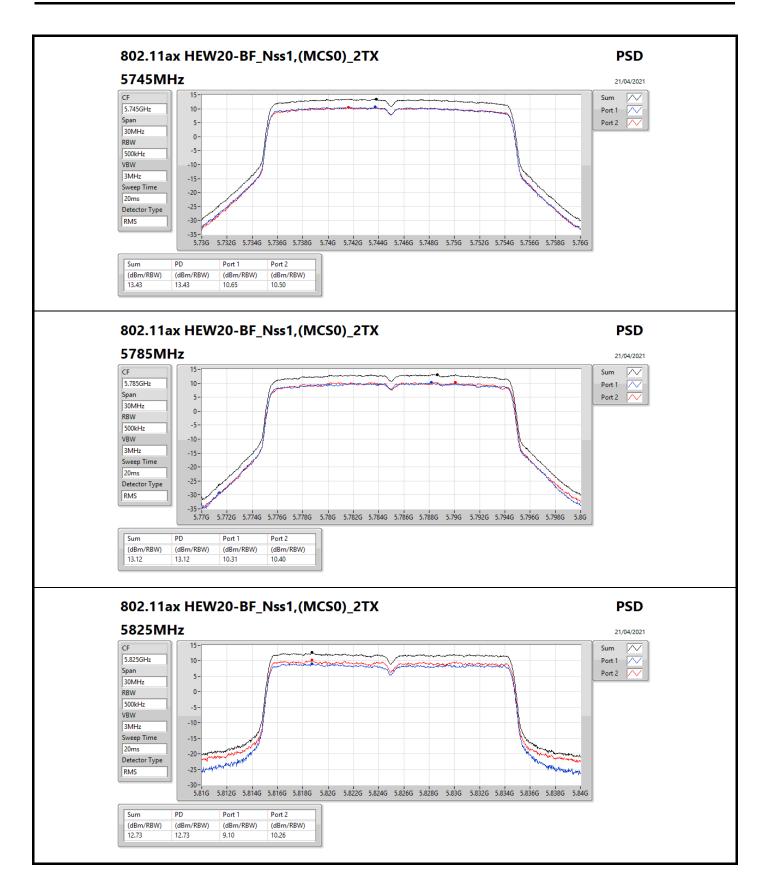
Appendix D.2 **PSD**

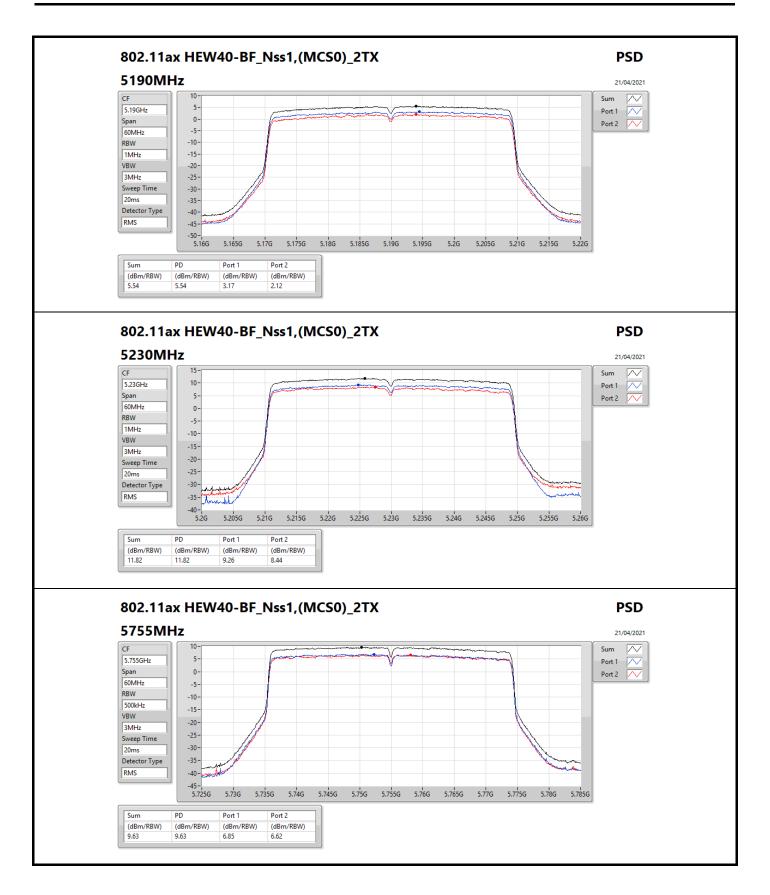
Result

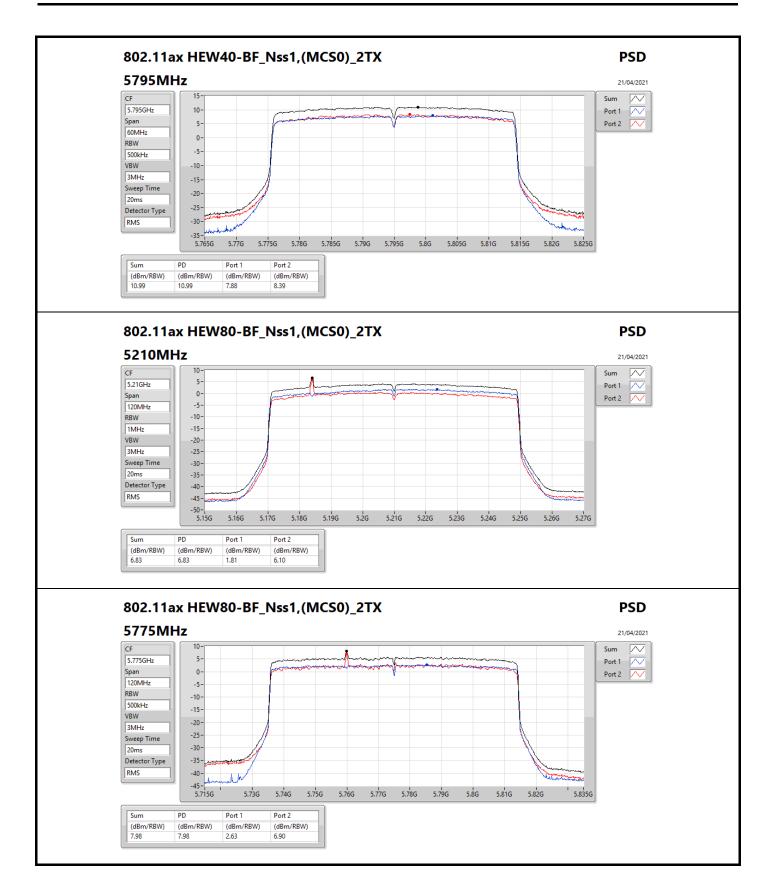
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	6.46	10.40	9.52	12.87	16.54
5200MHz	Pass	6.46	13.13	12.46	15.78	16.54
5240MHz	Pass	6.46	12.45	12.00	15.13	16.54
5745MHz	Pass	6.46	10.65	10.50	13.43	29.54
5785MHz	Pass	6.46	10.31	10.40	13.12	29.54
5825MHz	Pass	6.46	9.10	10.26	12.73	29.54
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	6.46	3.17	2.12	5.54	16.54
5230MHz	Pass	6.46	9.26	8.44	11.82	16.54
5755MHz	Pass	6.46	6.85	6.62	9.63	29.54
5795MHz	Pass	6.46	7.88	8.39	10.99	29.54
802.11ax HEW80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	6.46	1.81	6.10	6.83	16.54
5775MHz	Pass	6.46	2.63	6.90	7.98	29.54

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;











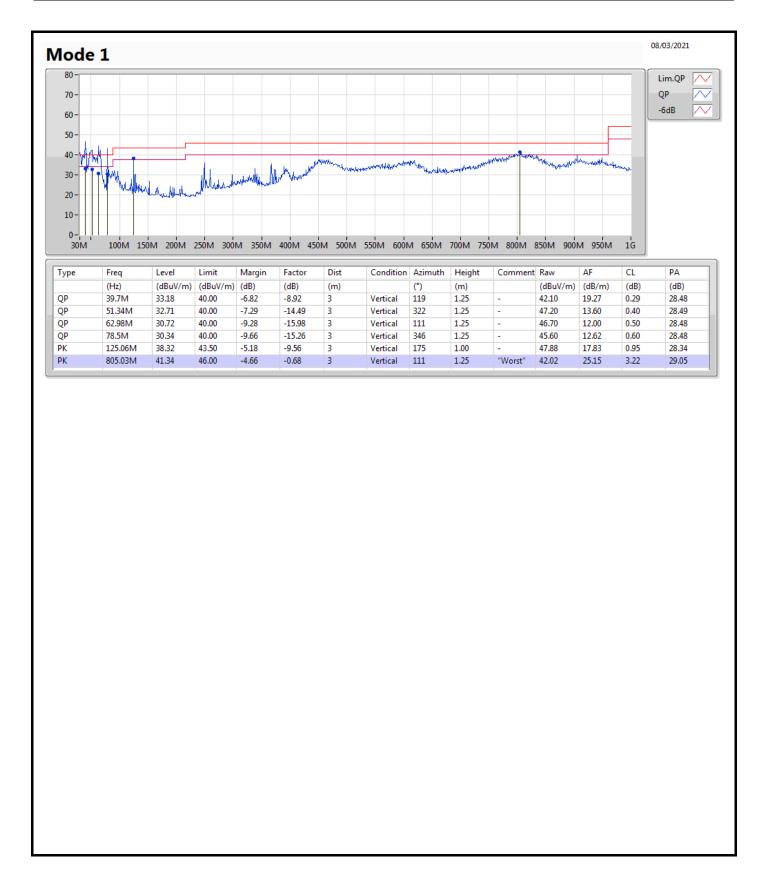
Radiated Emissions below 1GHz

Appendix E.1

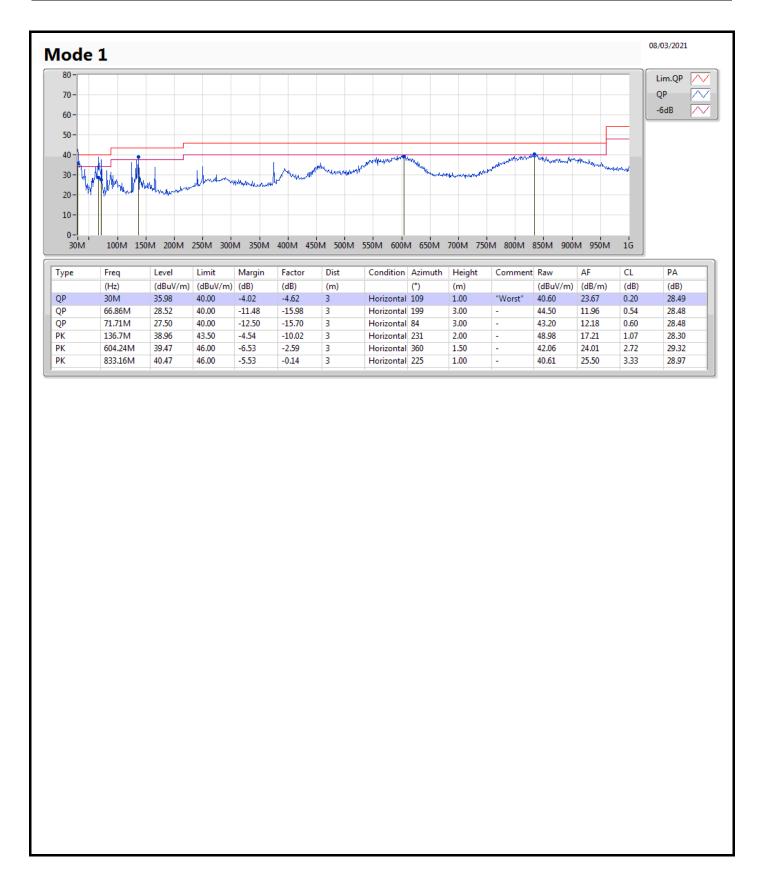
Summary

Mode	Result	Туре	Freq	Level	Limit	Limit Margin	
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	
Mode 1	Pass	QP	30M	35.98	40.00	-4.02	Horizontal











RSE TX above 1GHz

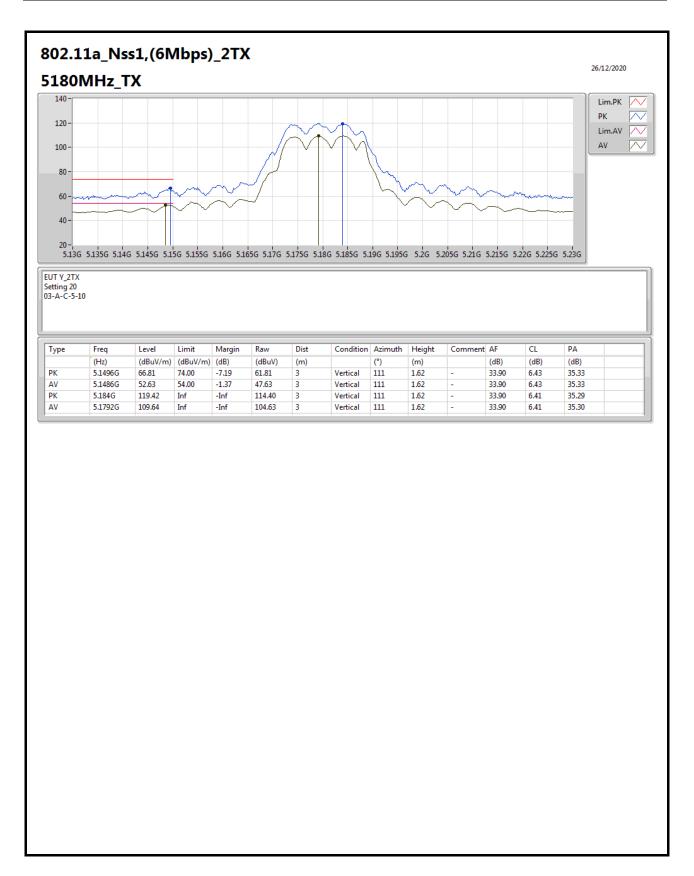
Appendix E.2

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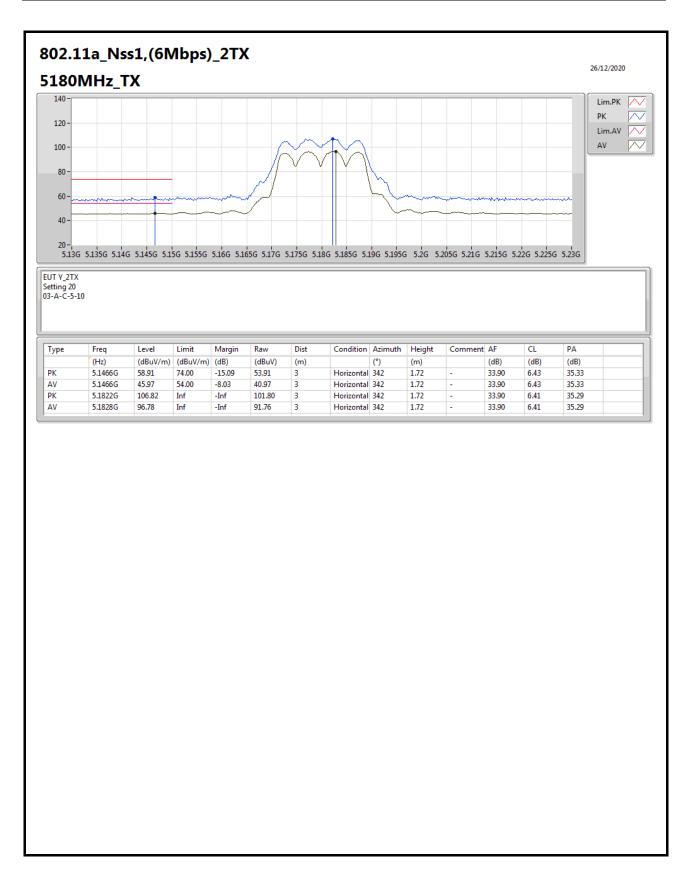
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
5.15-5.25GHz	-	-	-	-	-	-	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	Pass	AV	5.15G	52.85	54.00	-1.15	3	Vertical	260	1.94	-

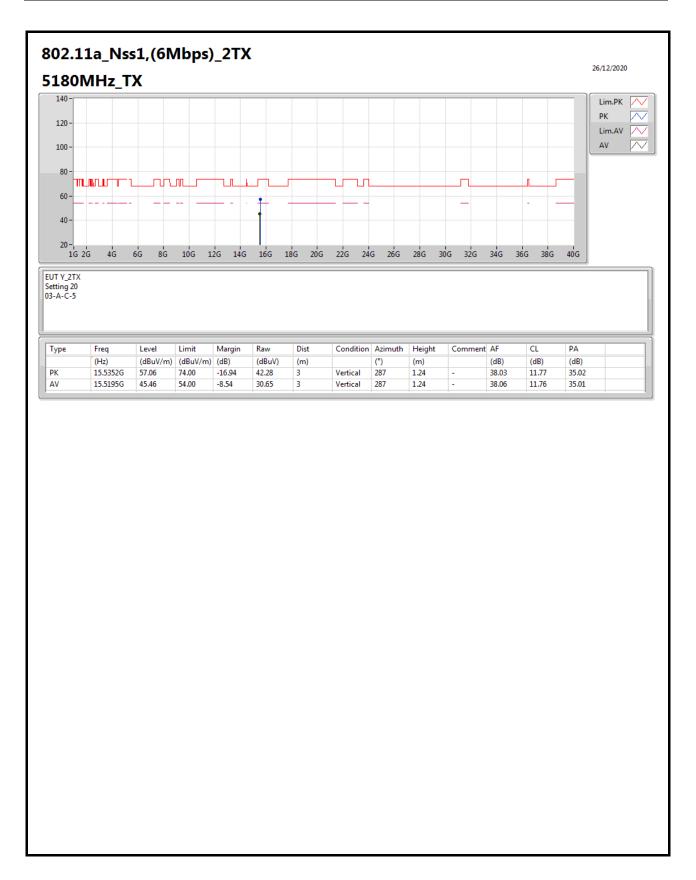




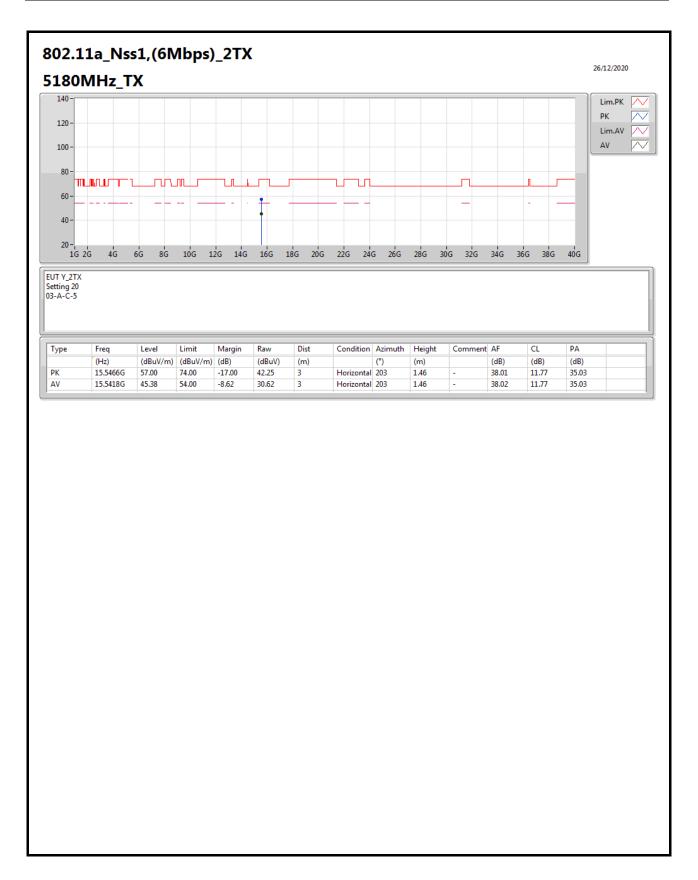




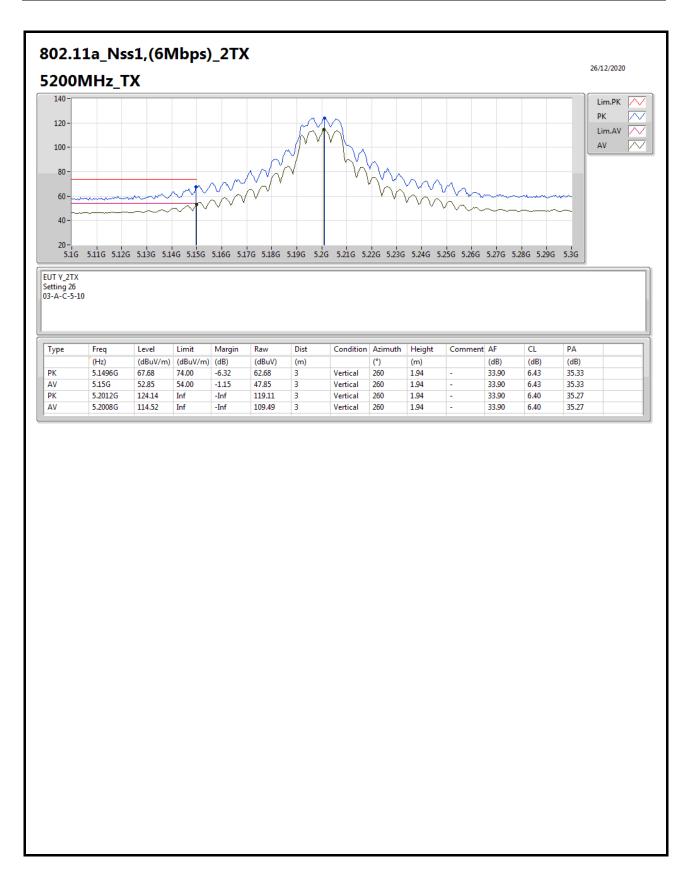




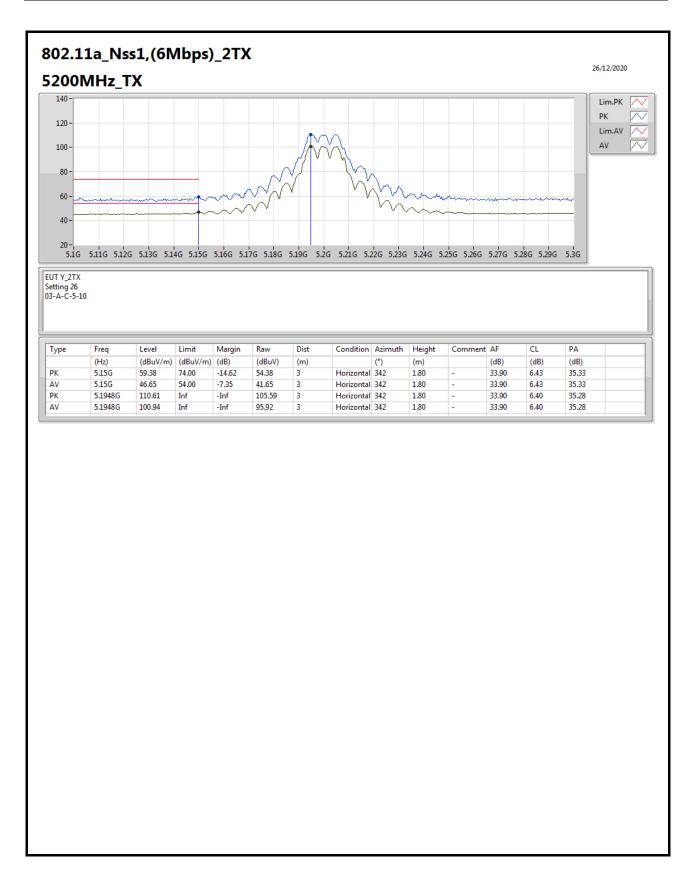




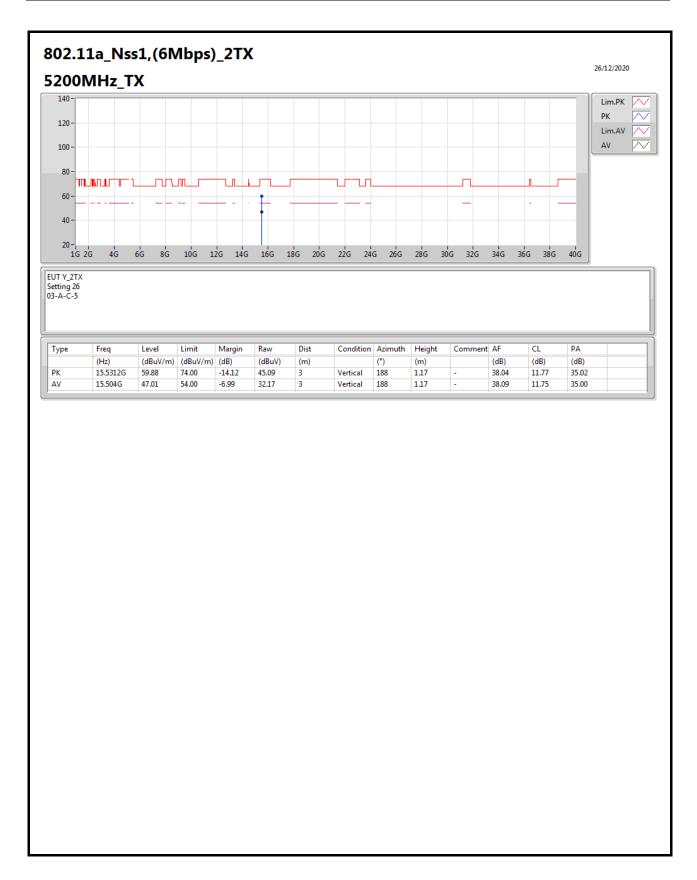




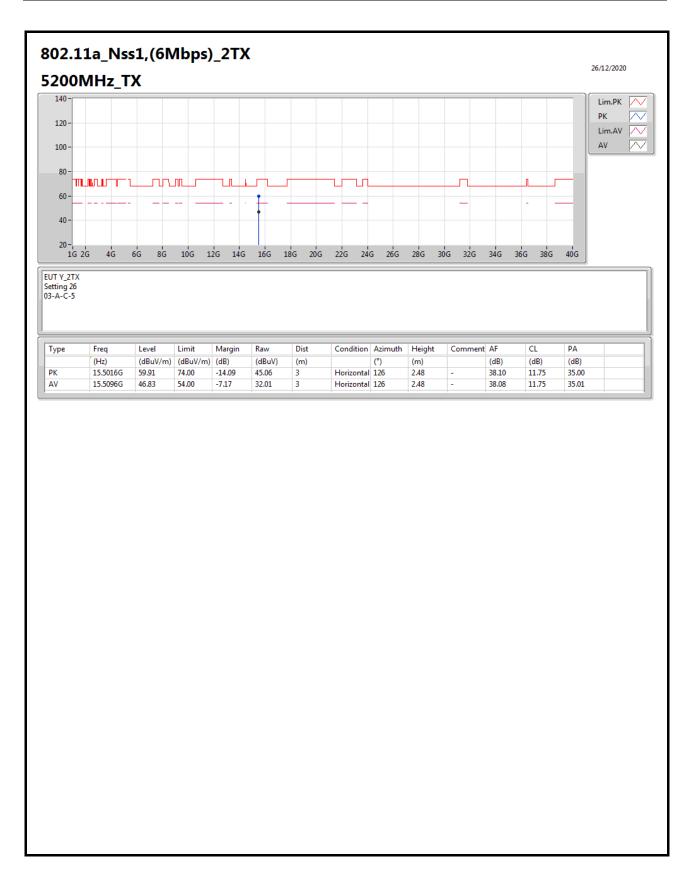




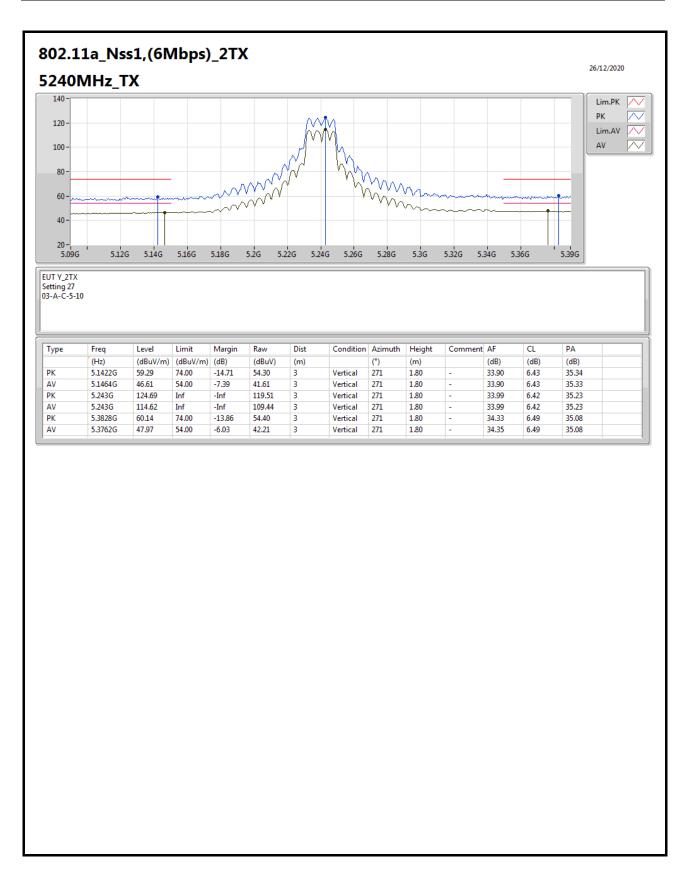




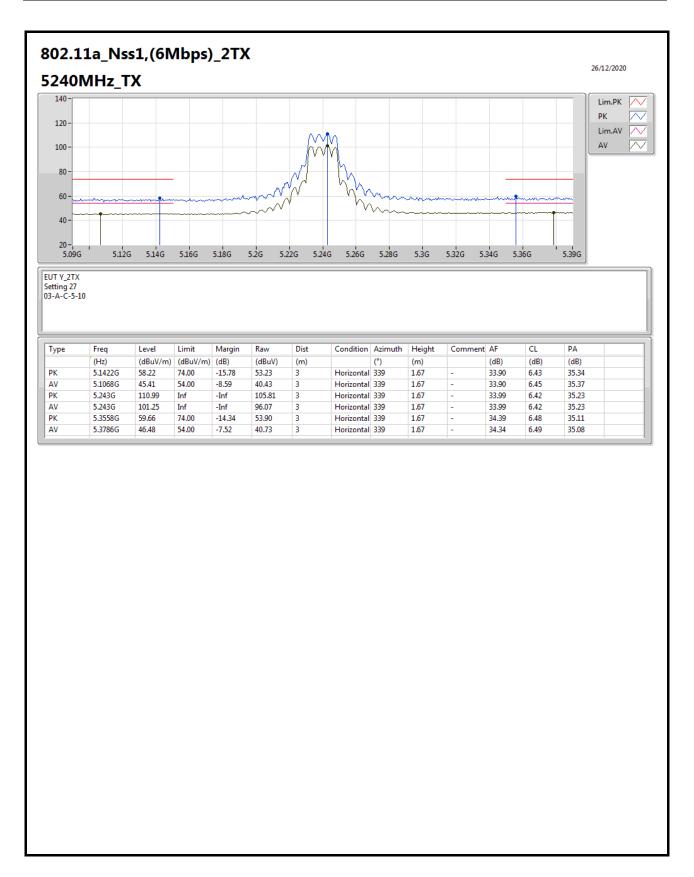




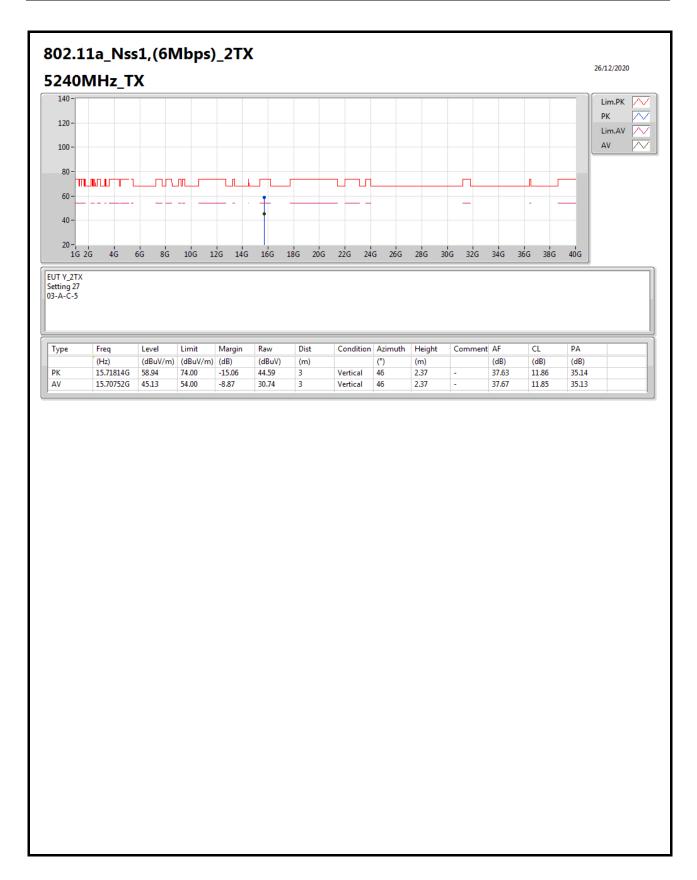




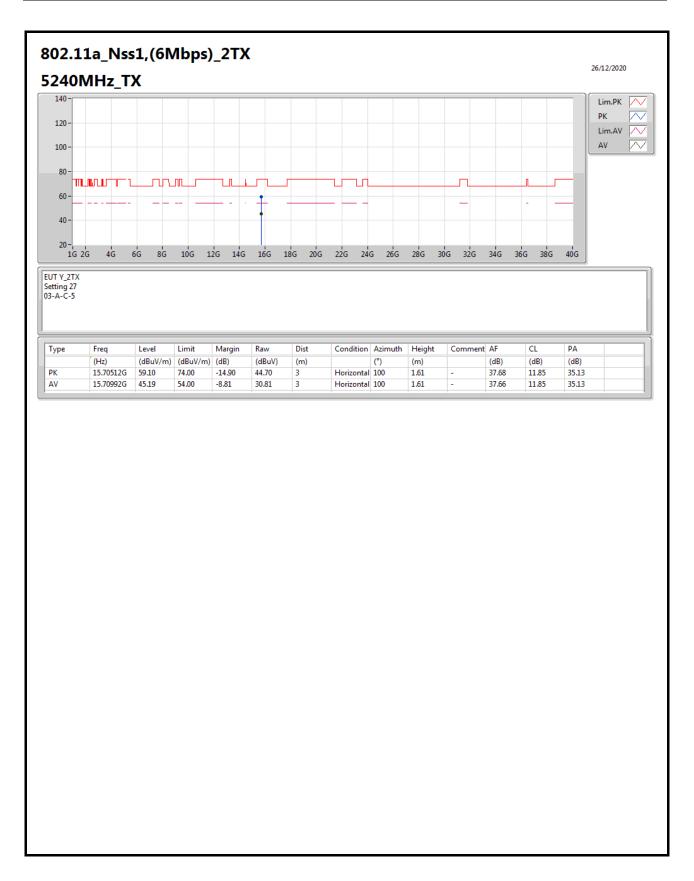




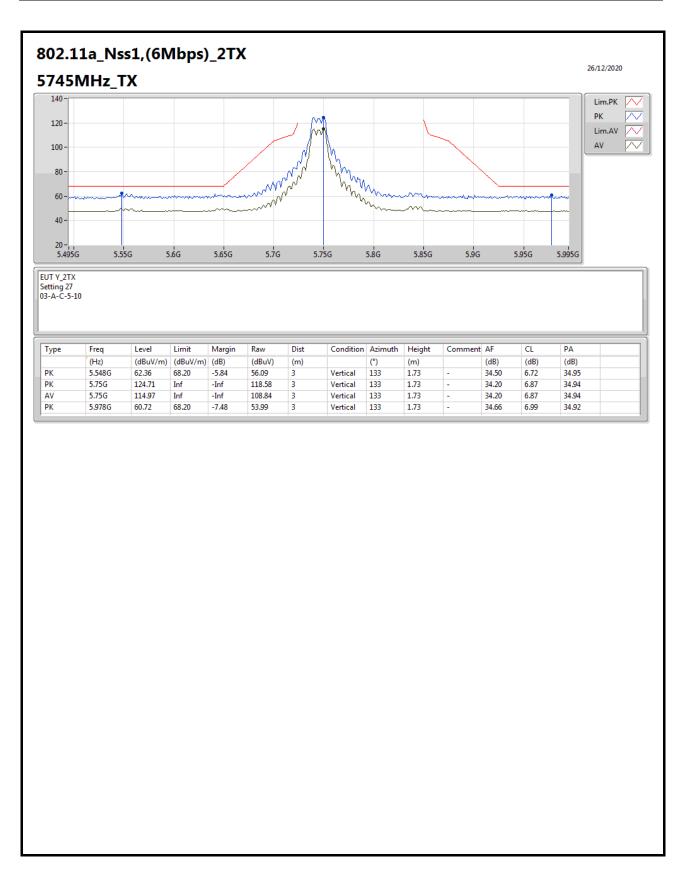




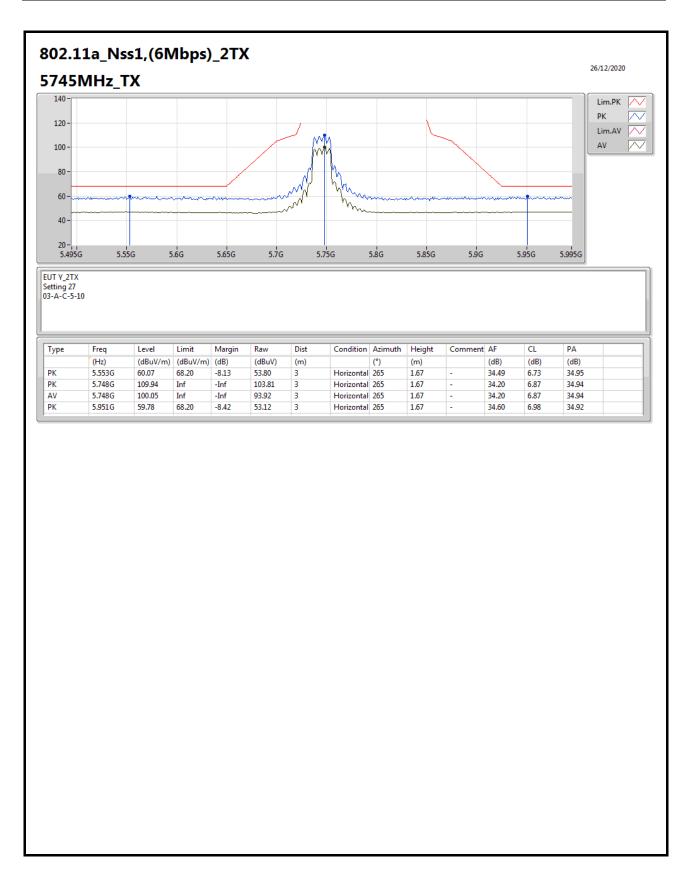




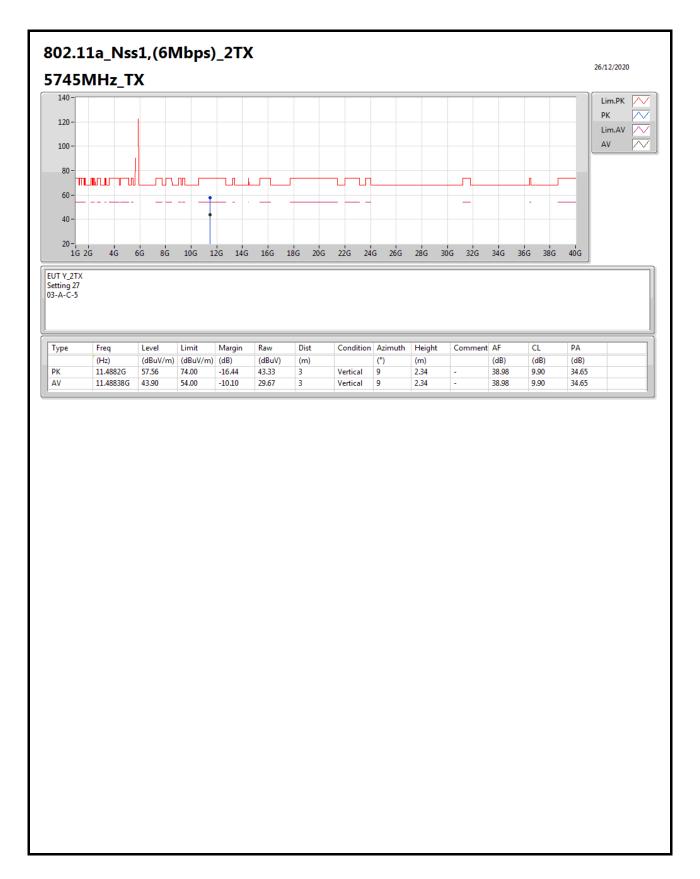




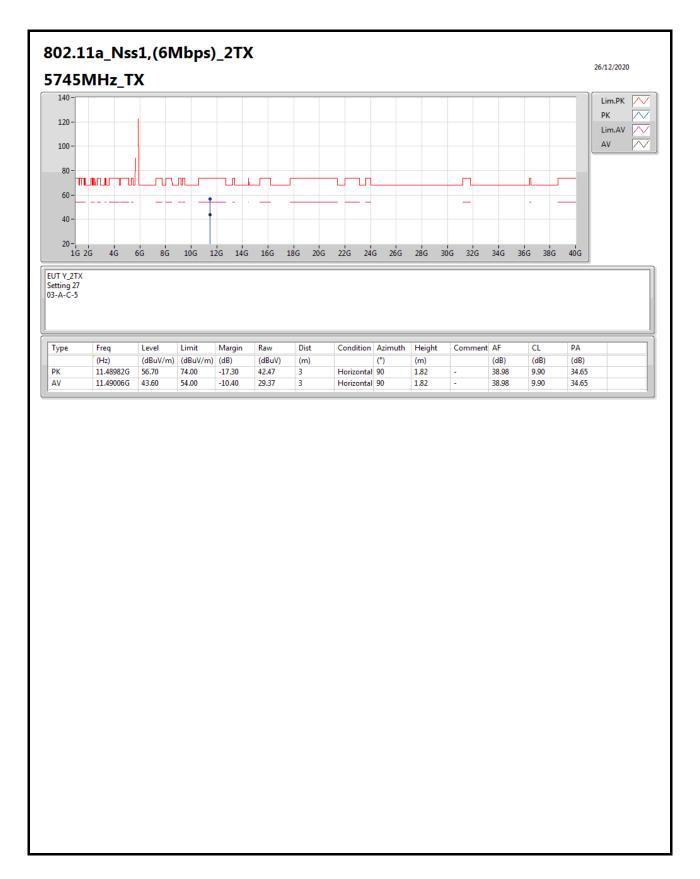




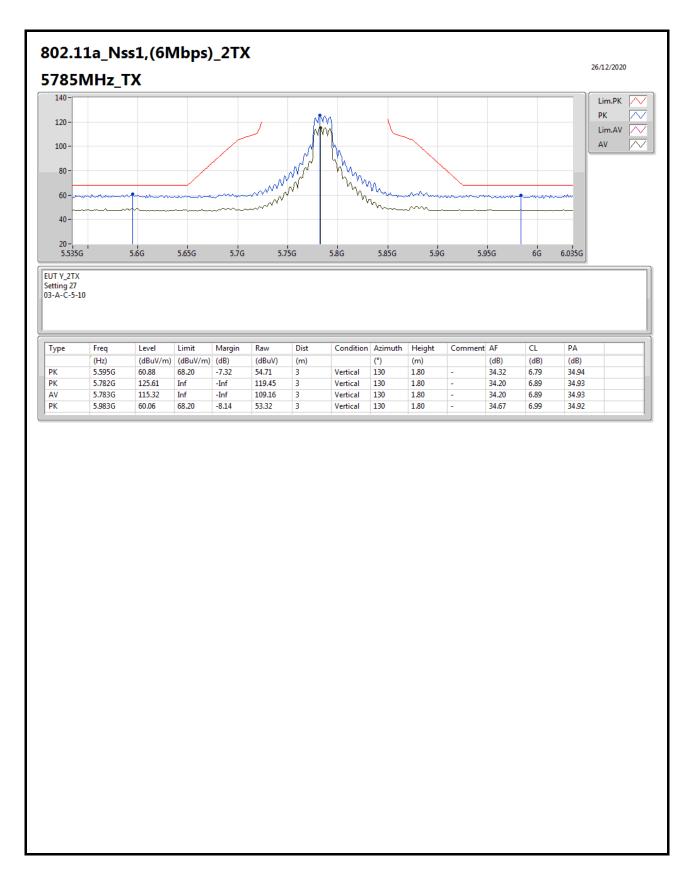




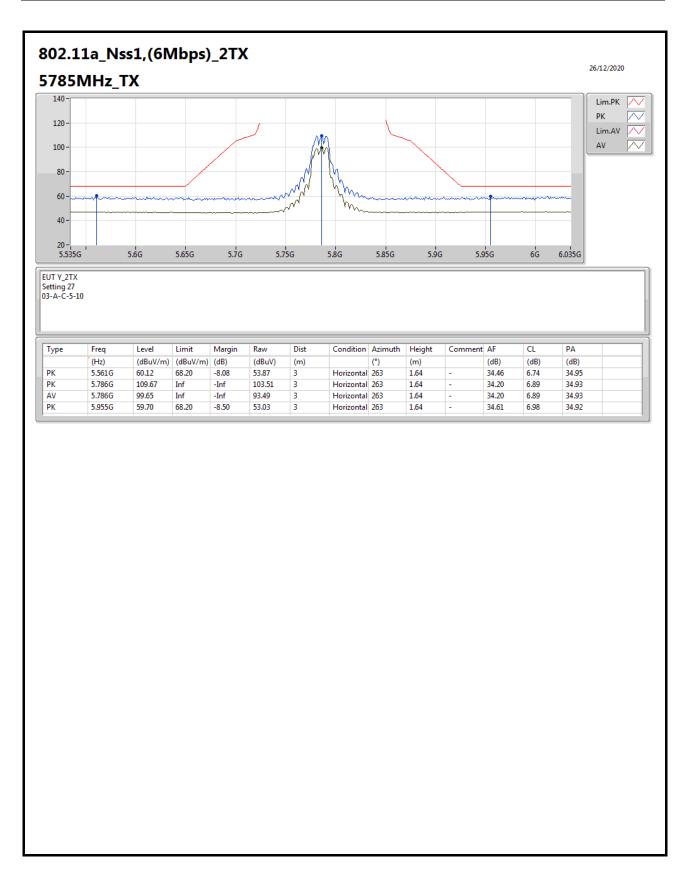




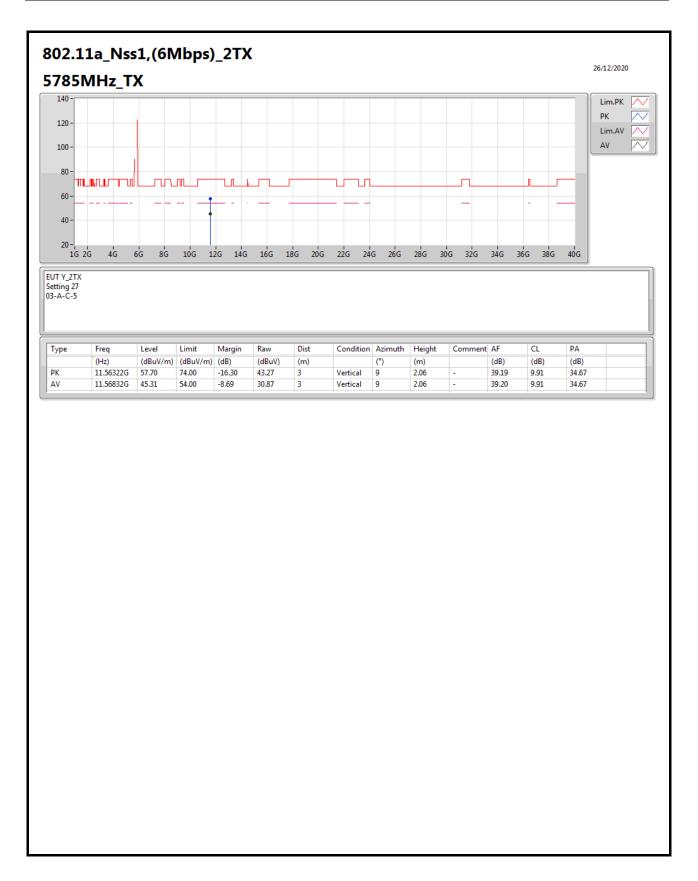




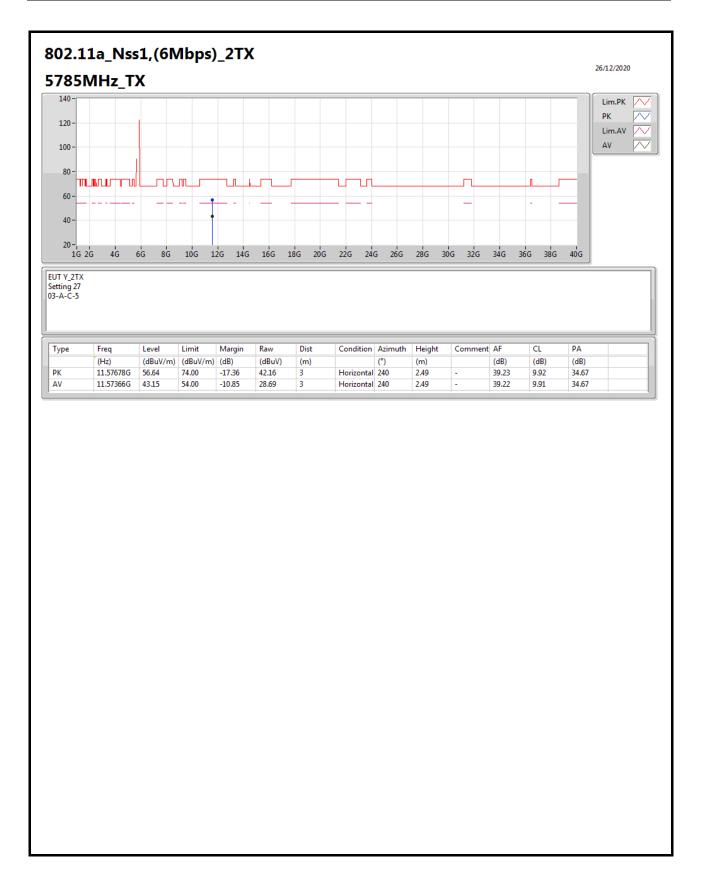




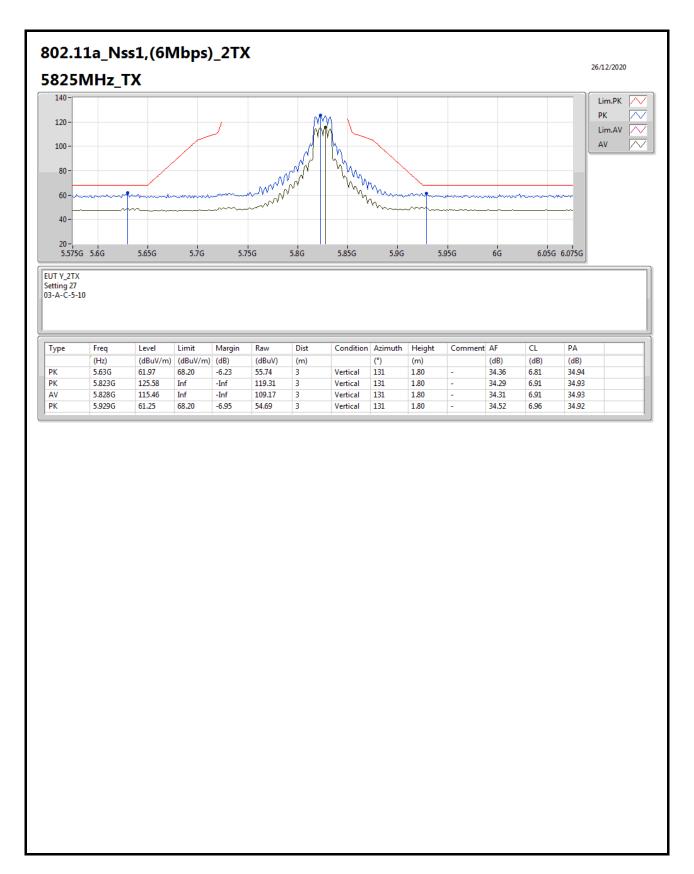




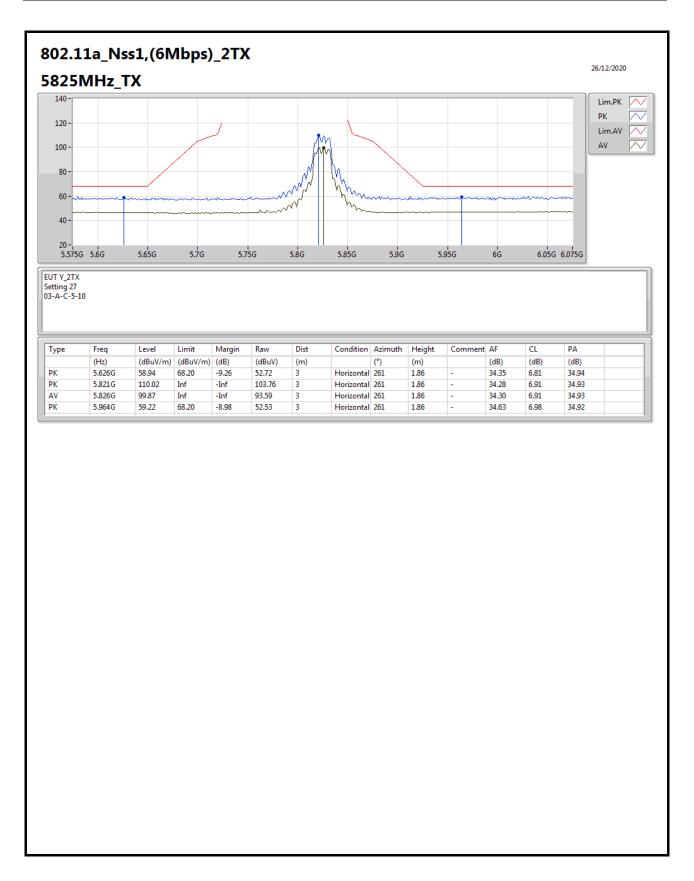




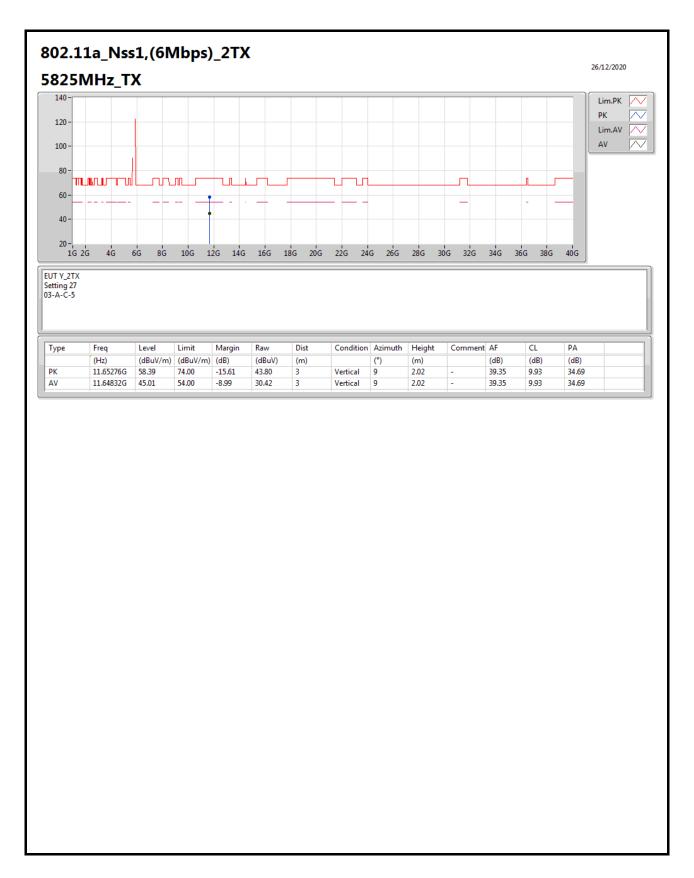




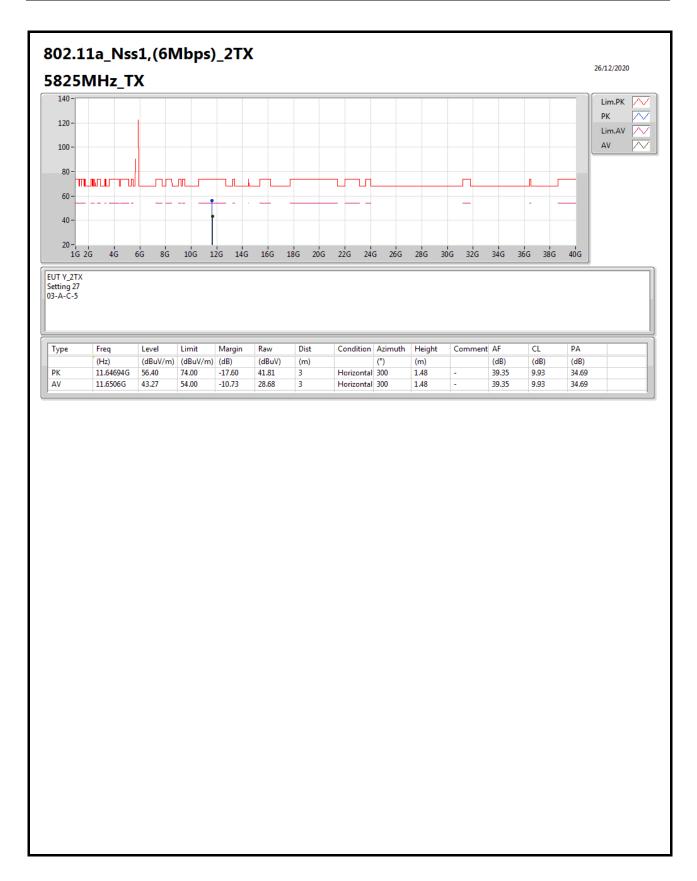














RSE TX above 1GHz

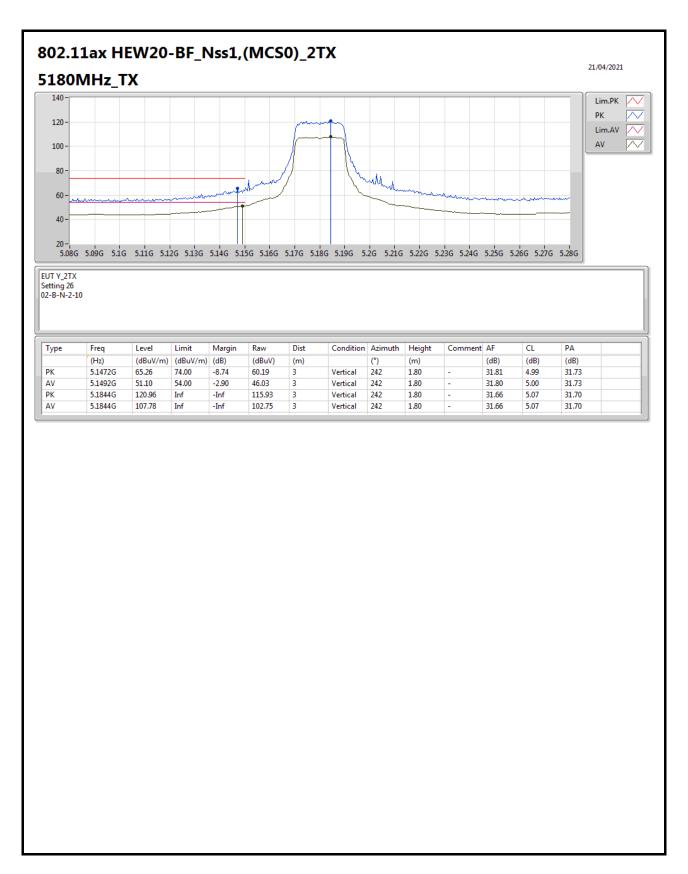
Appendix E.3

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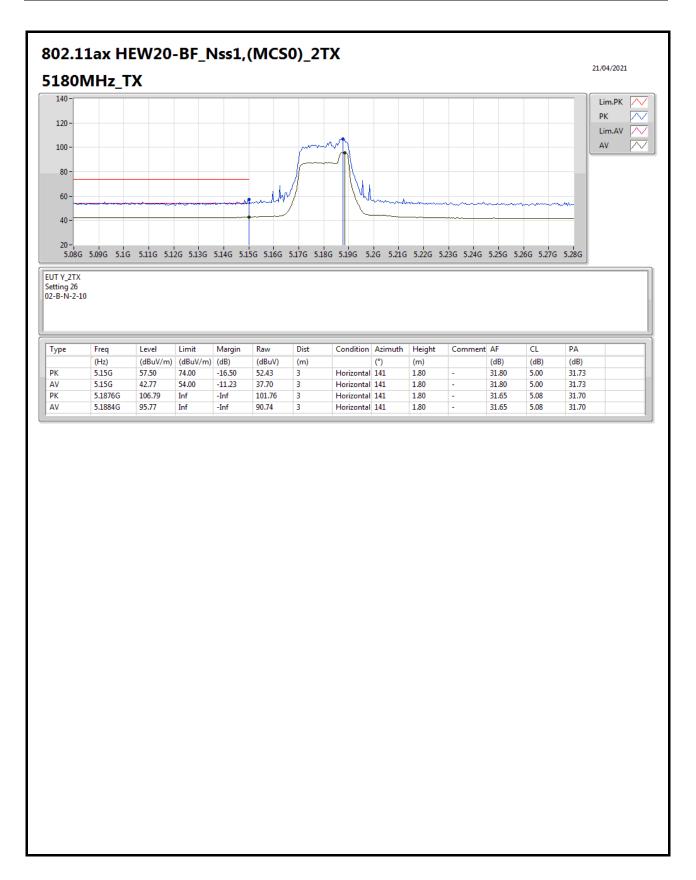
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
5.15-5.25GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ax HEW40-BF_Nss1,(MCS0)_2TX	Pass	AV	5.15G	52.31	54.00	-1.69	3	Vertical	117	1.26	-

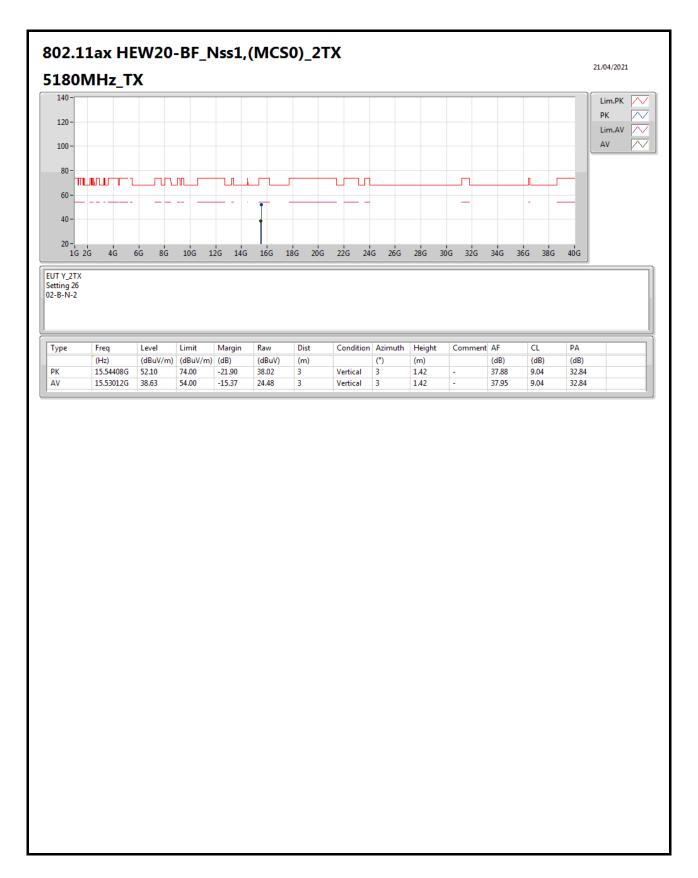




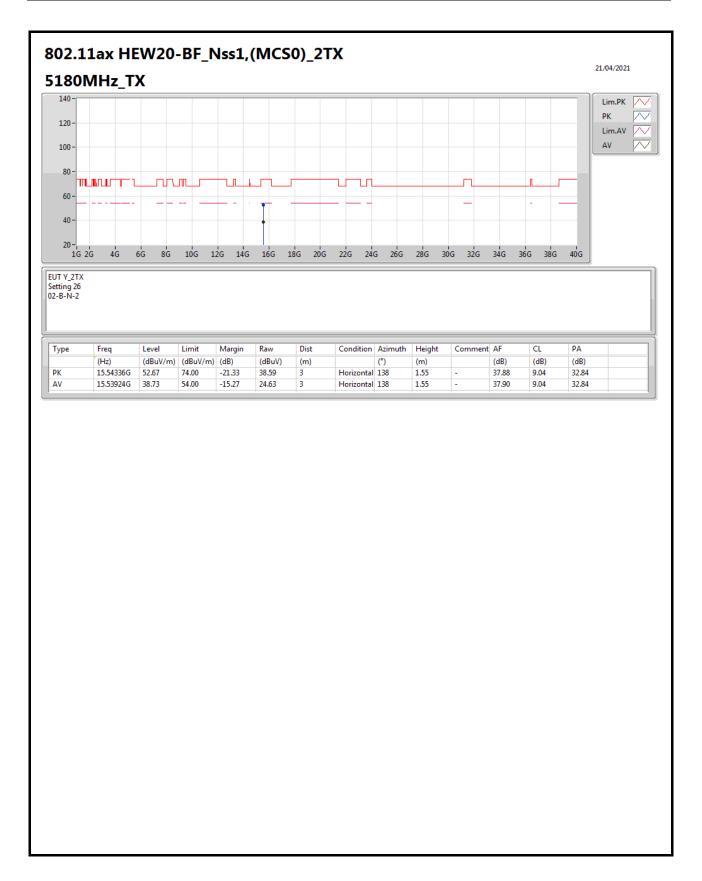




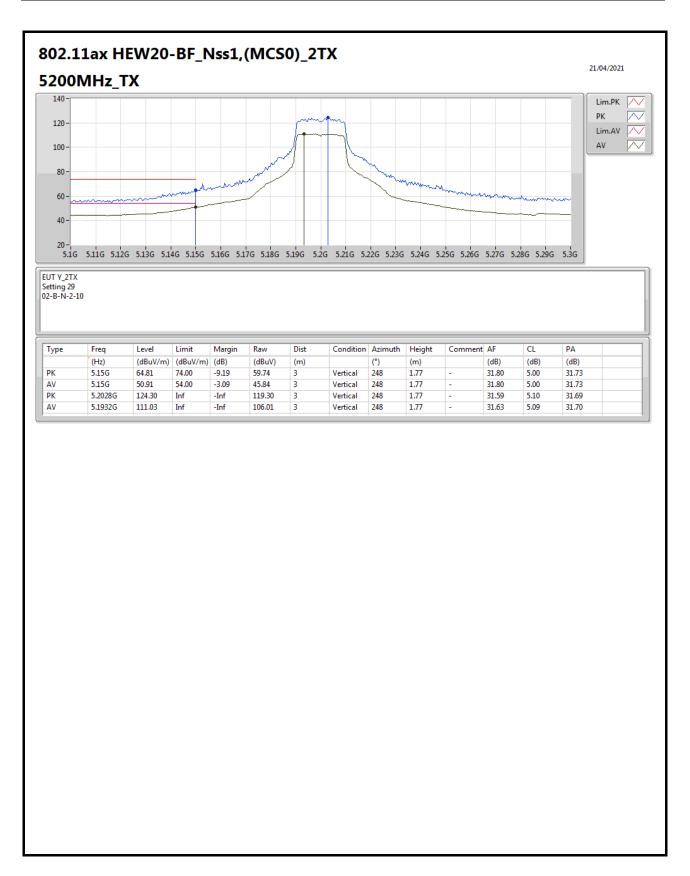




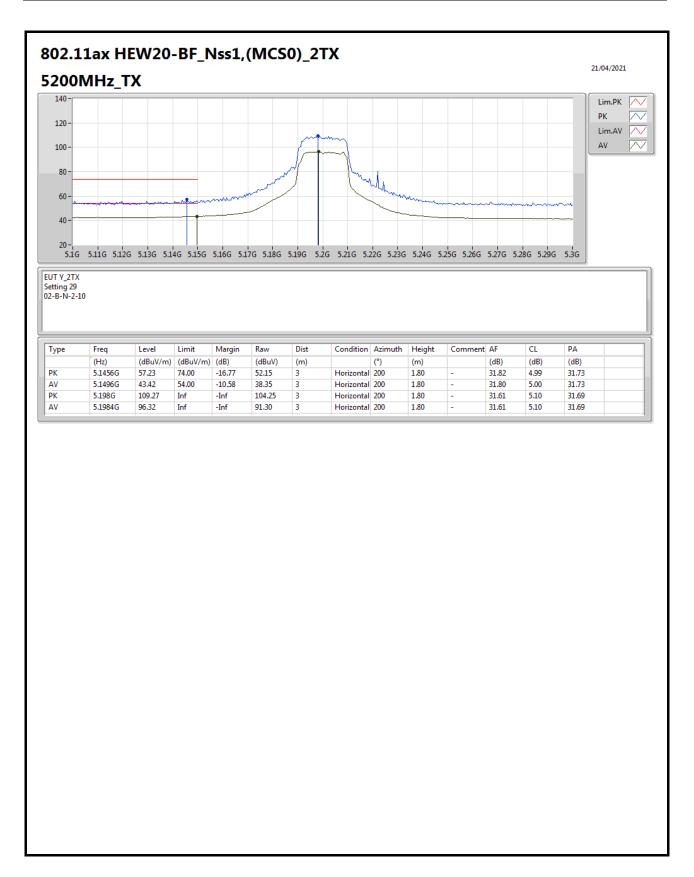




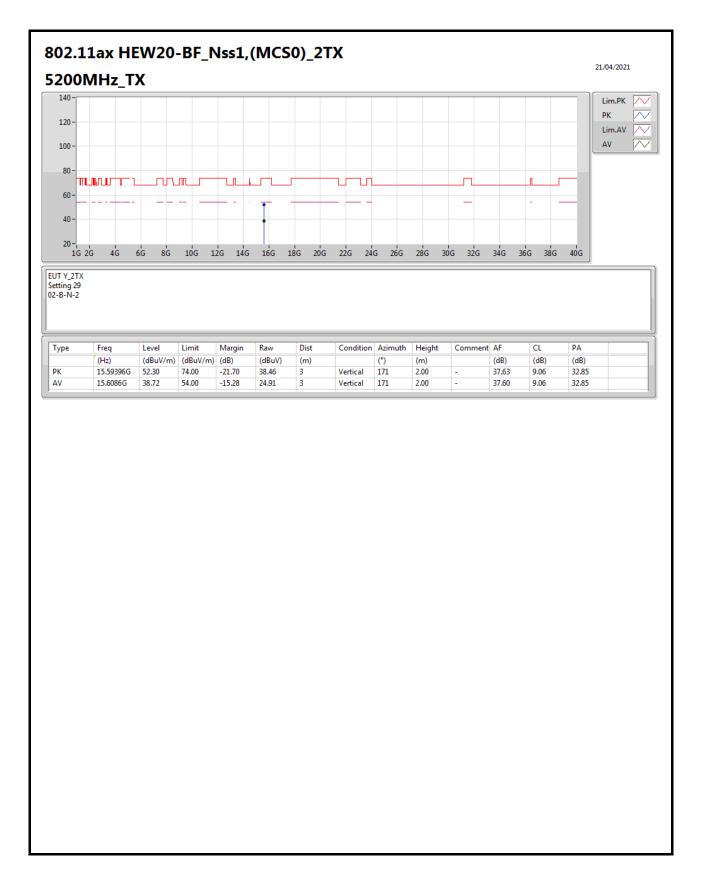




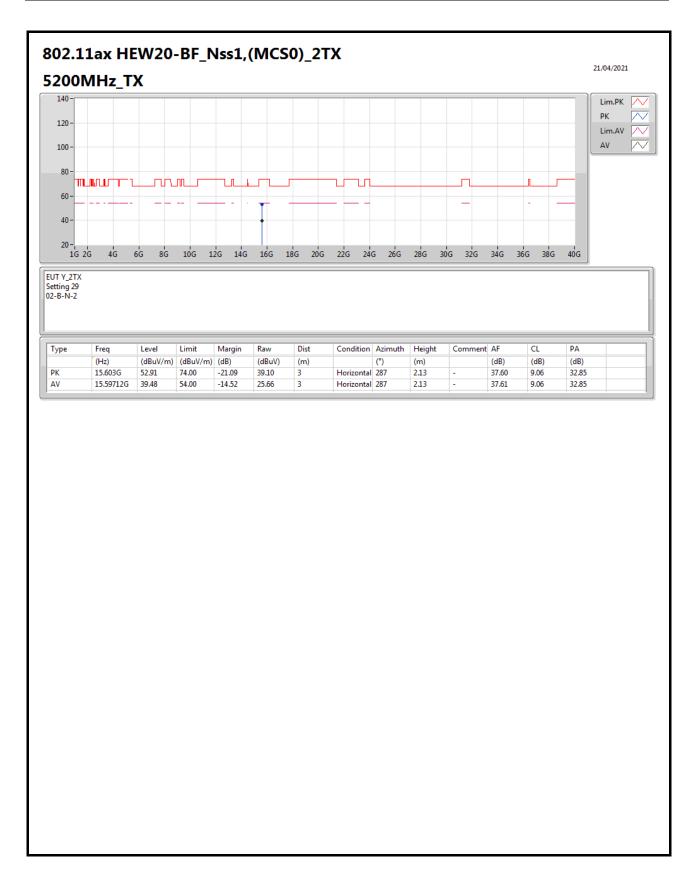




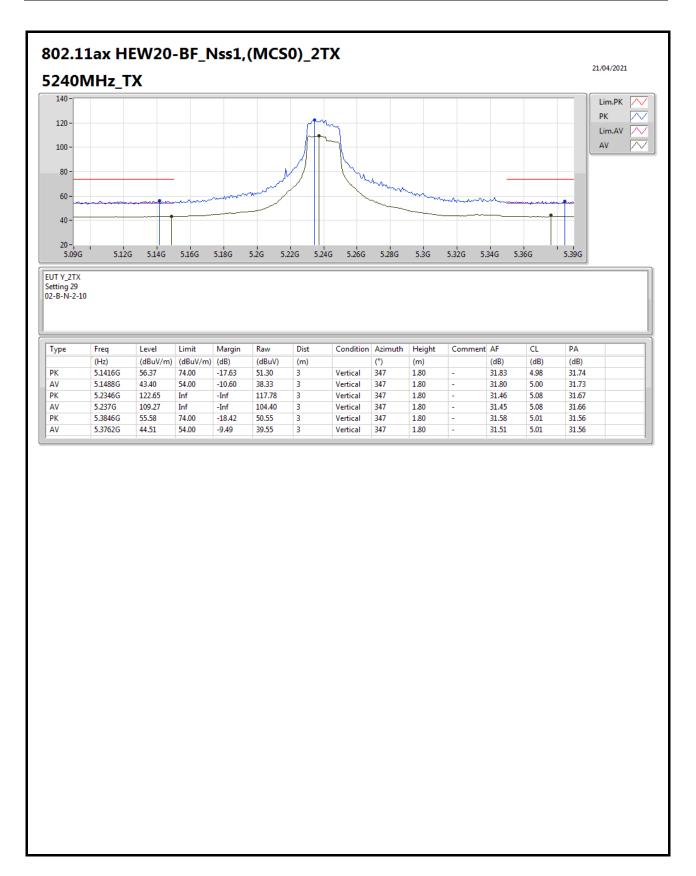




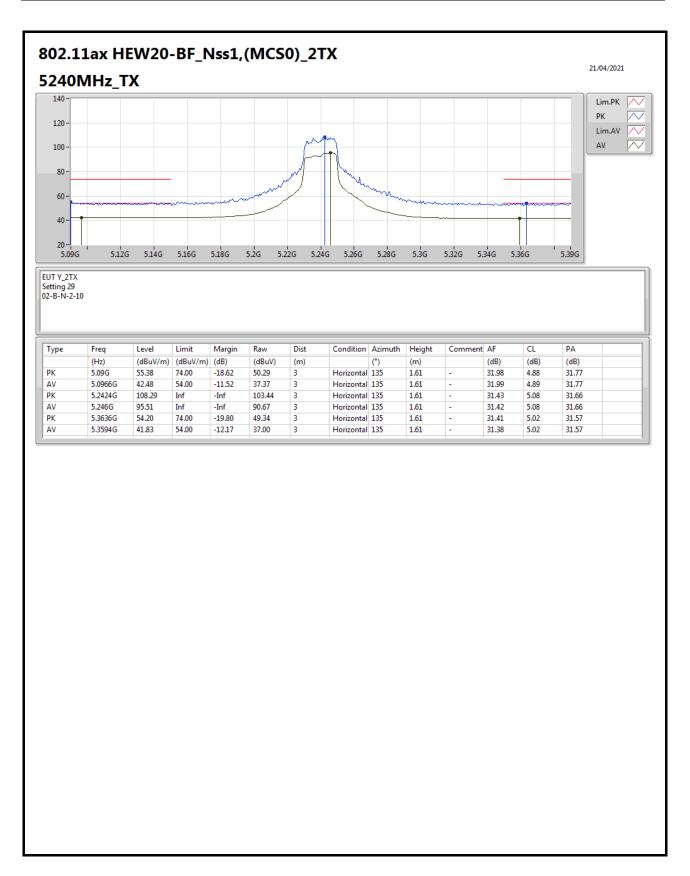




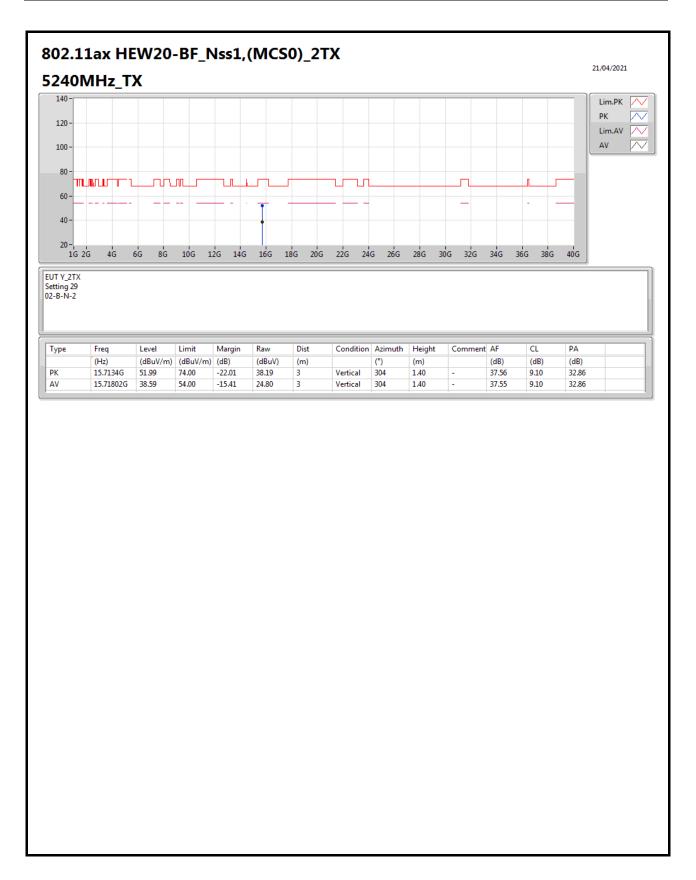




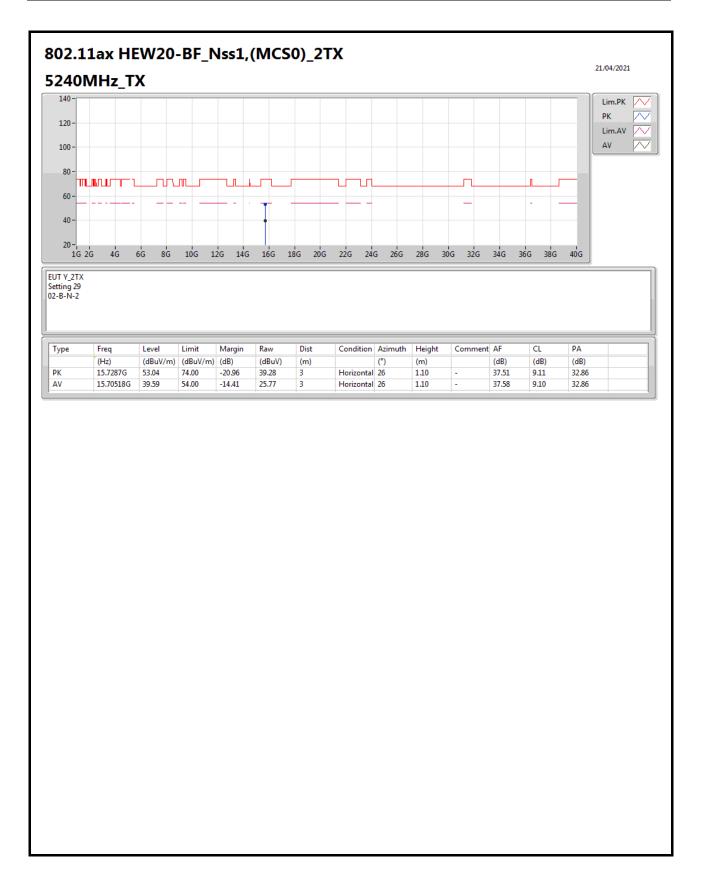




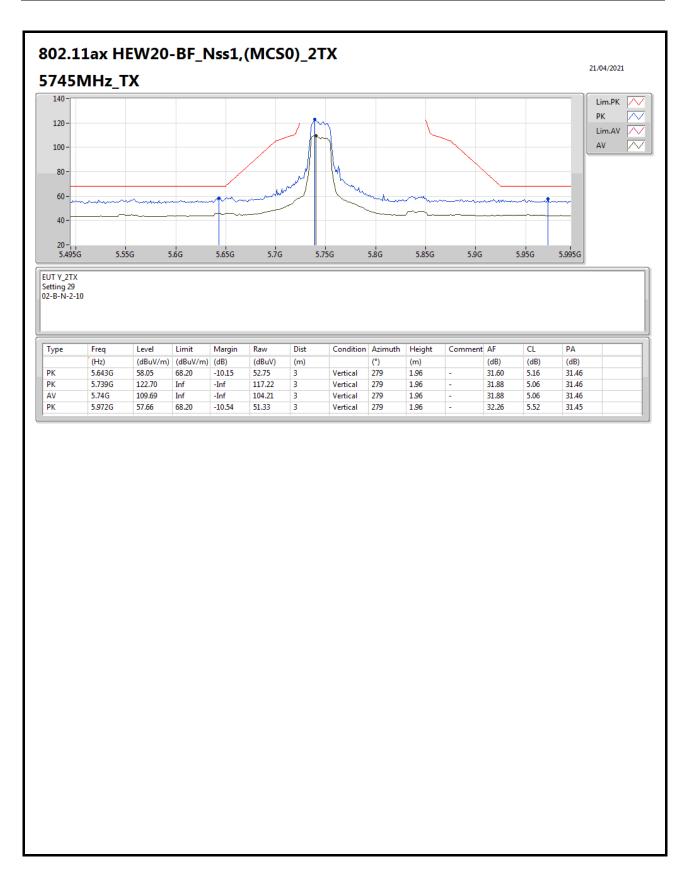




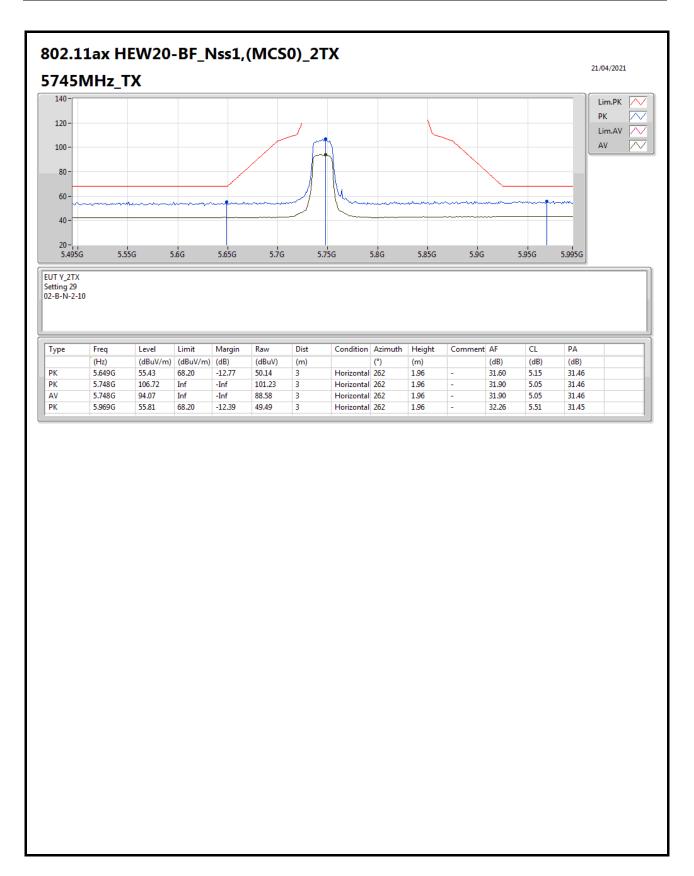




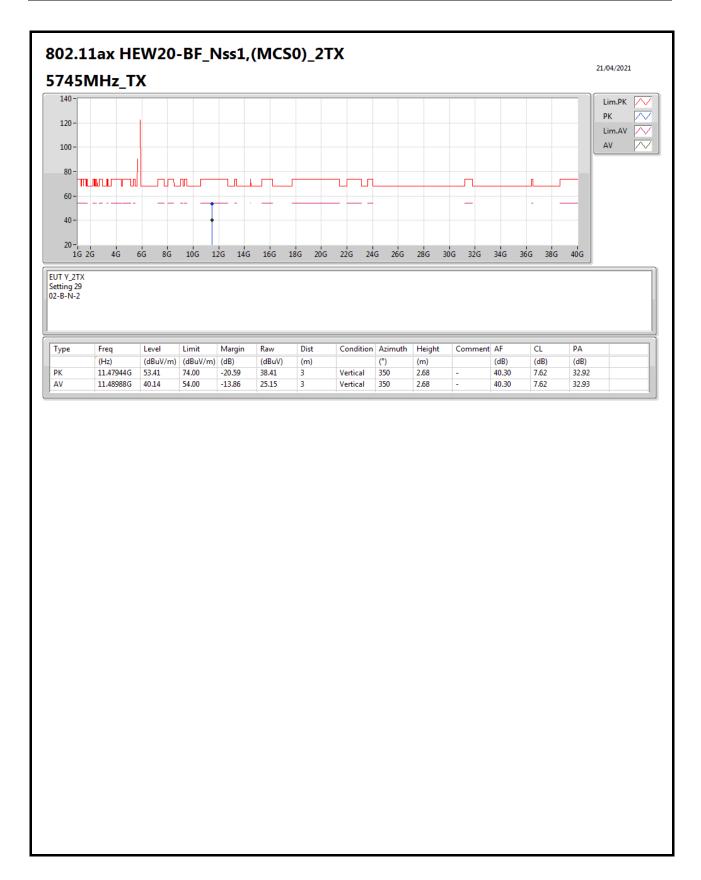




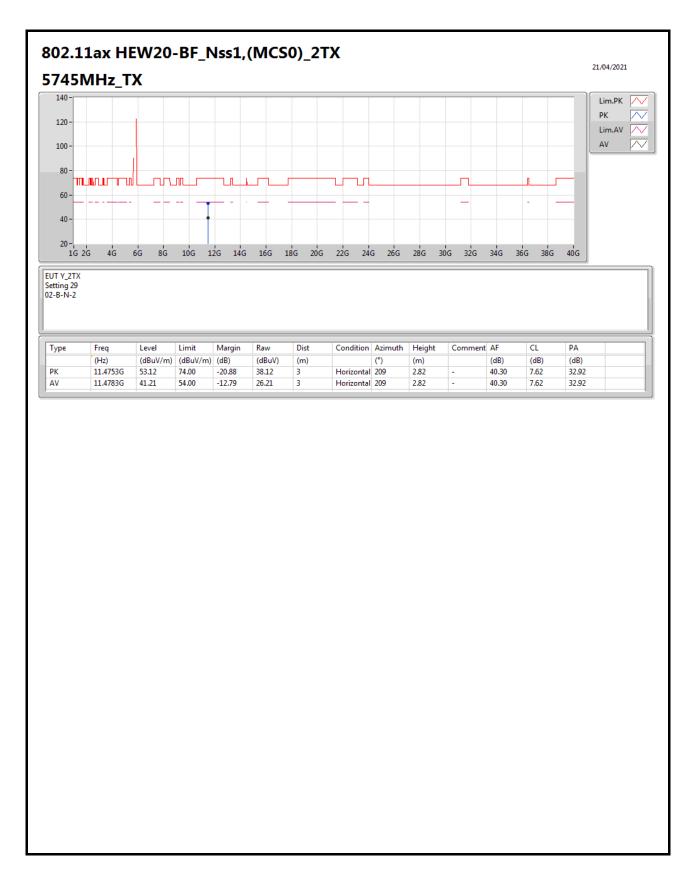




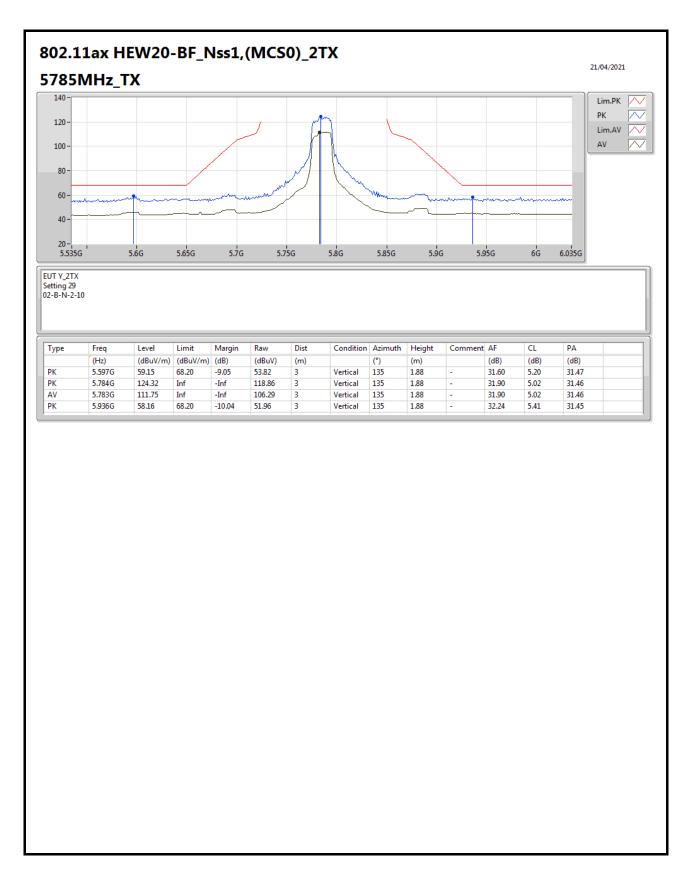




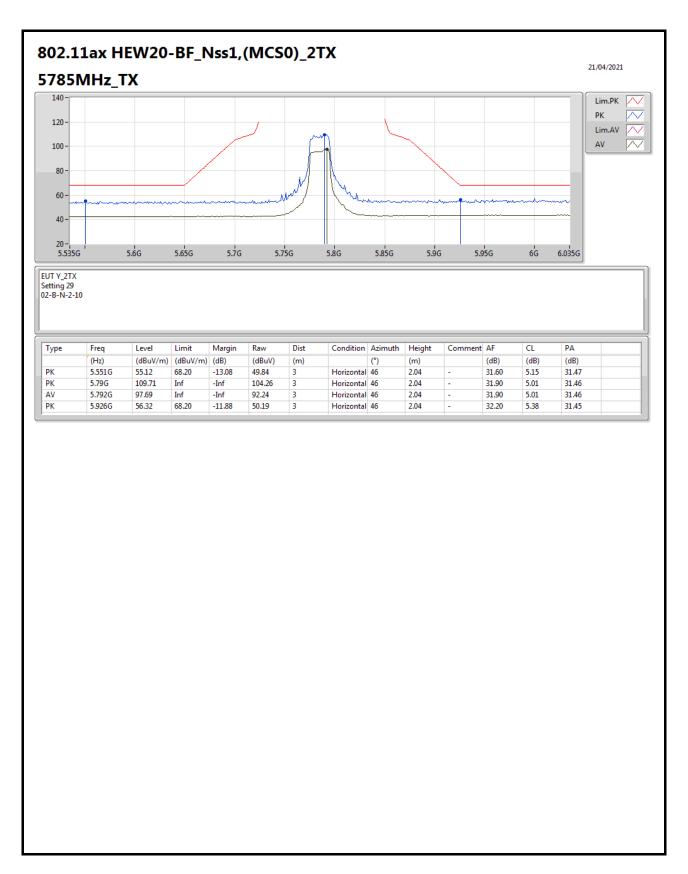




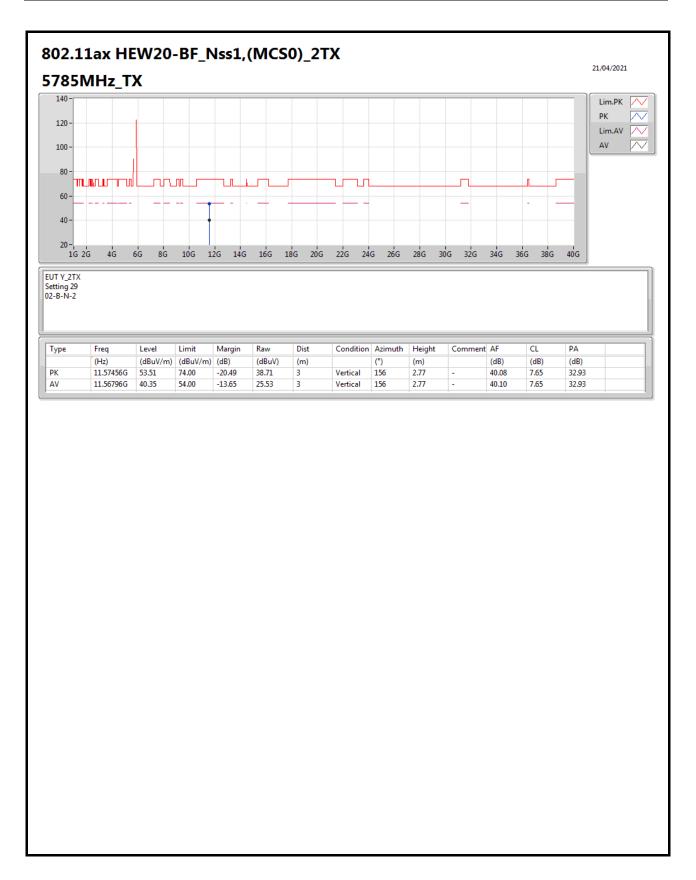




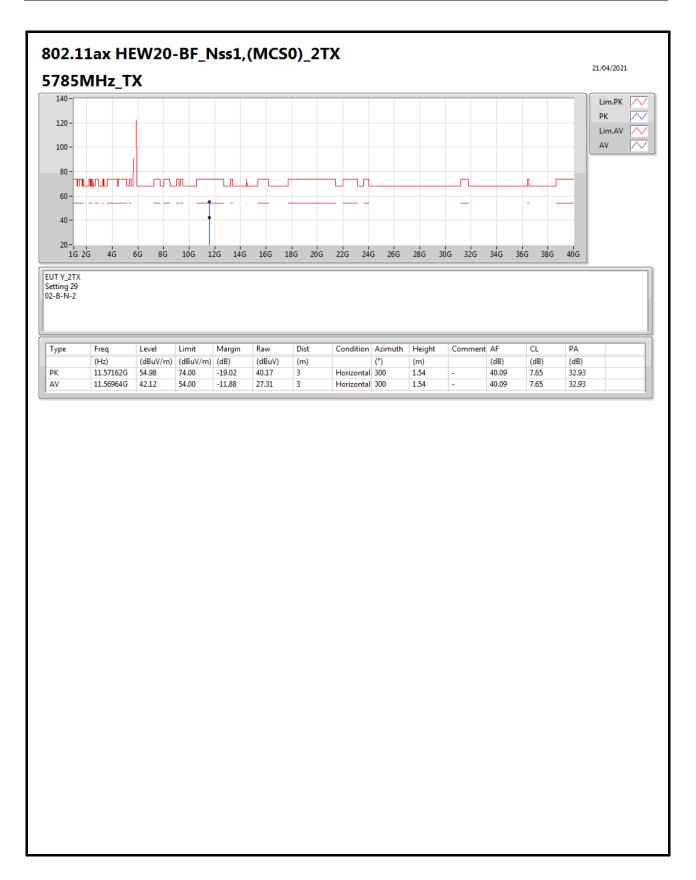




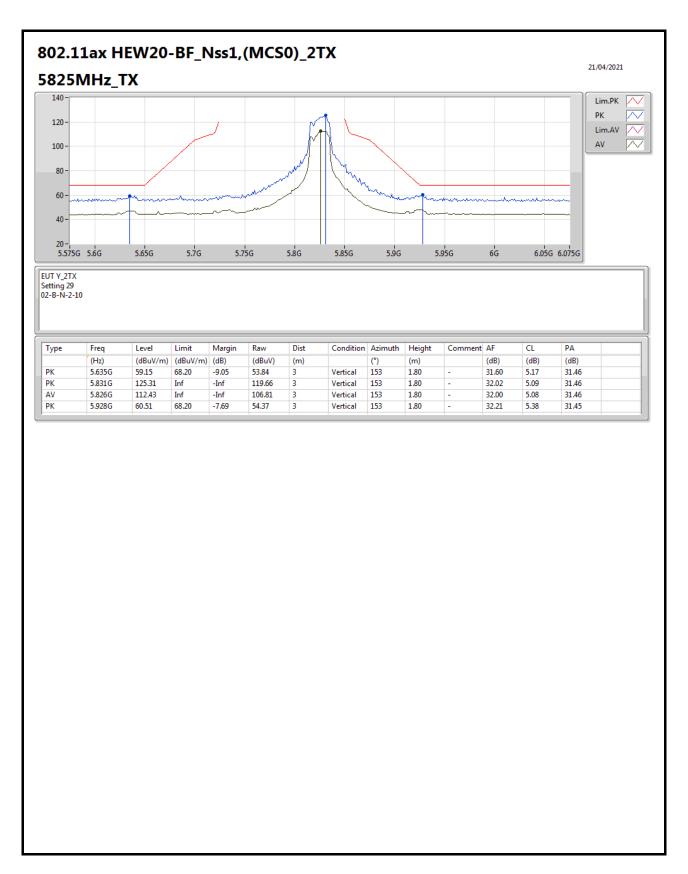




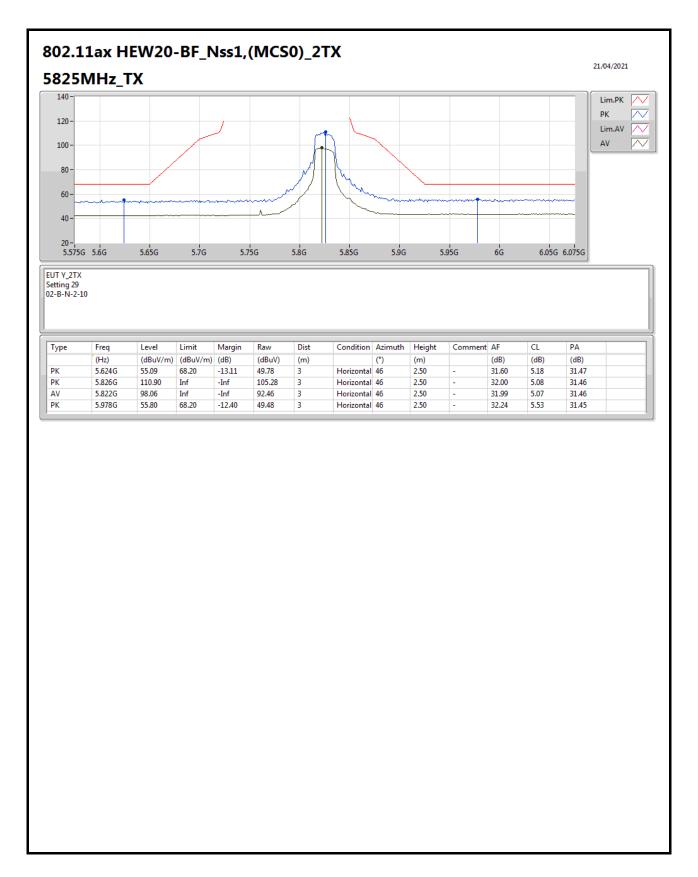




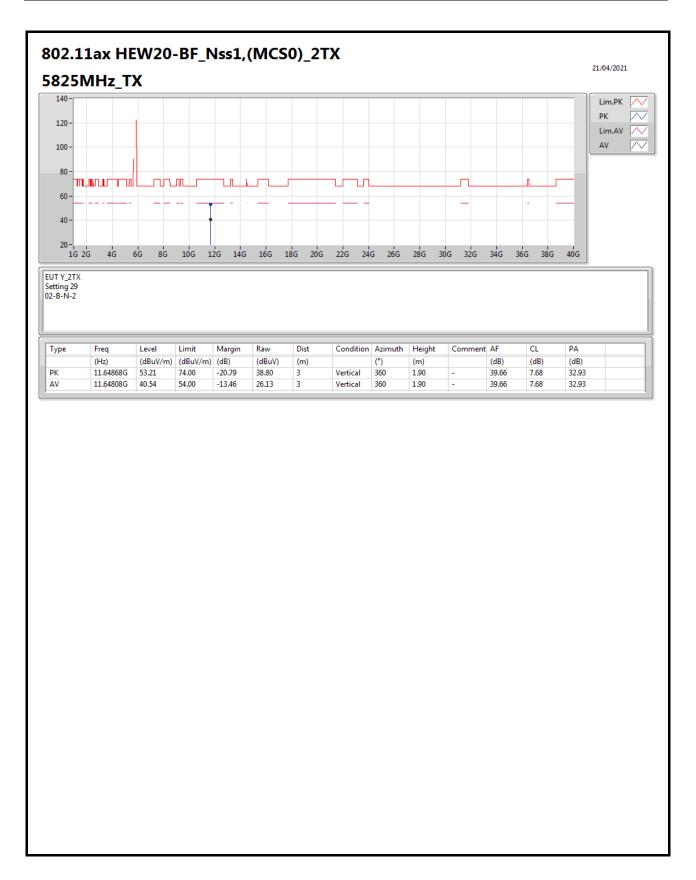




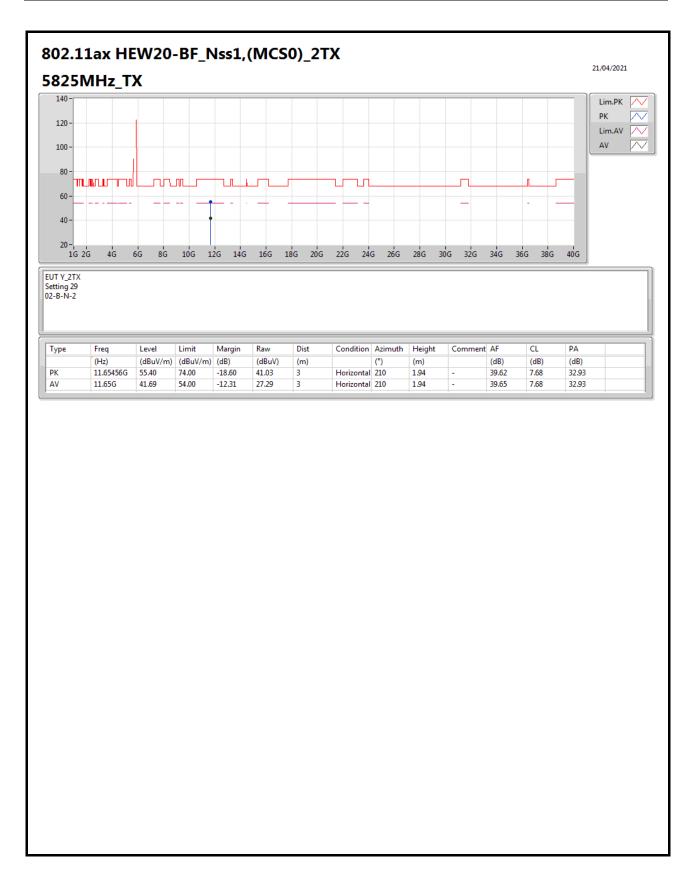




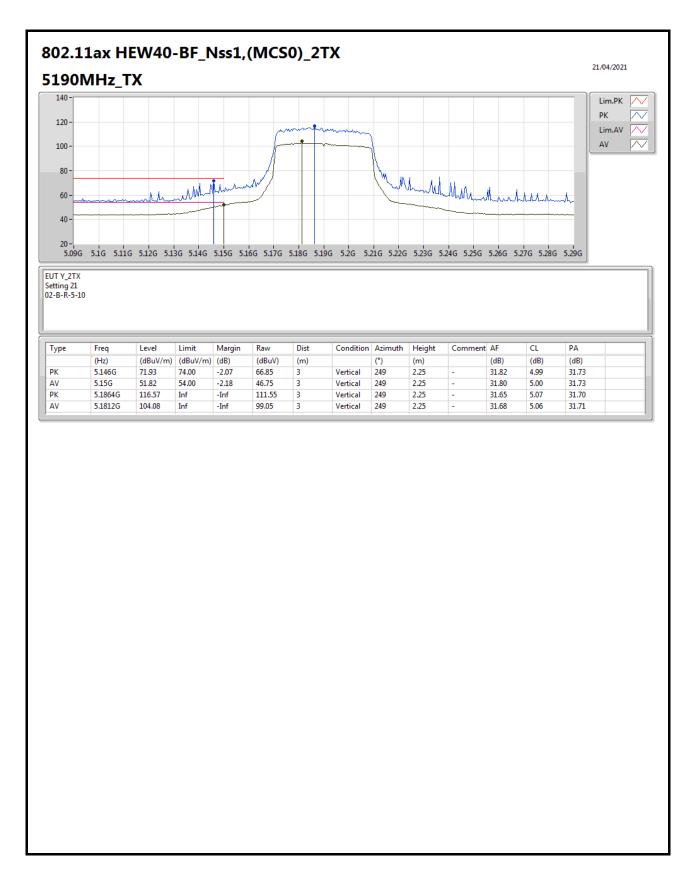




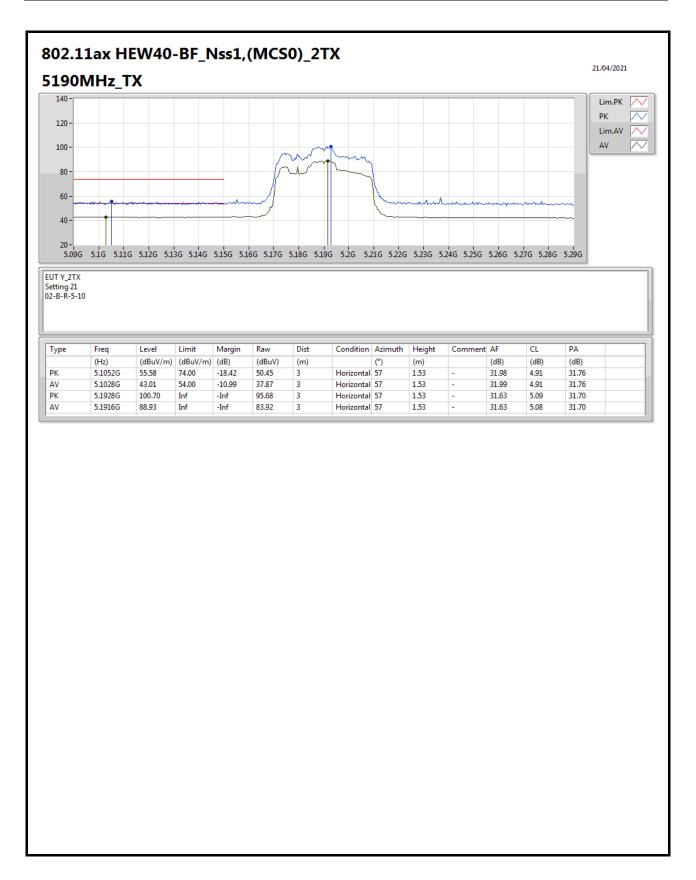




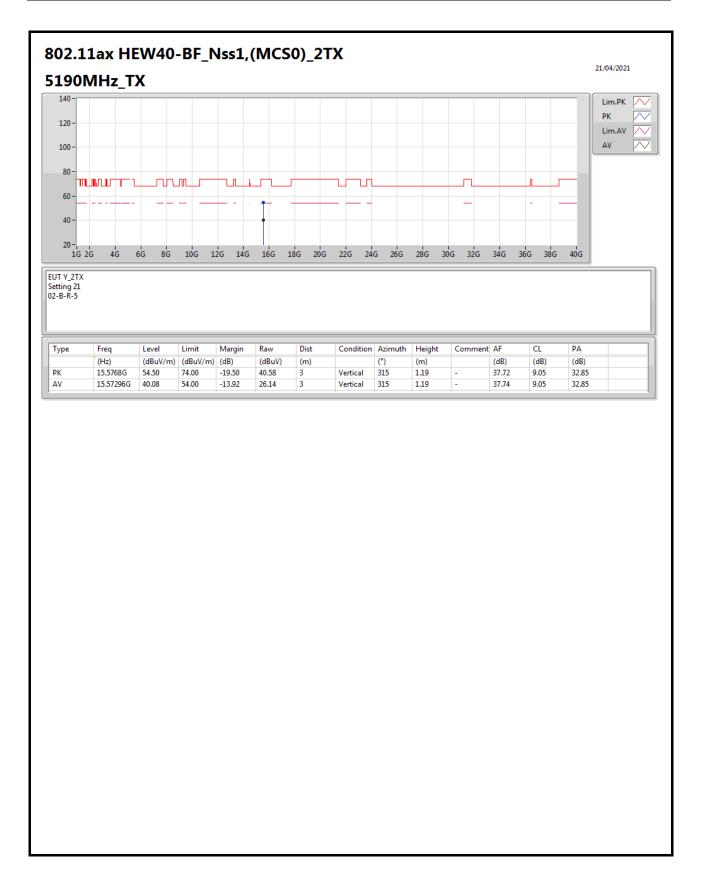




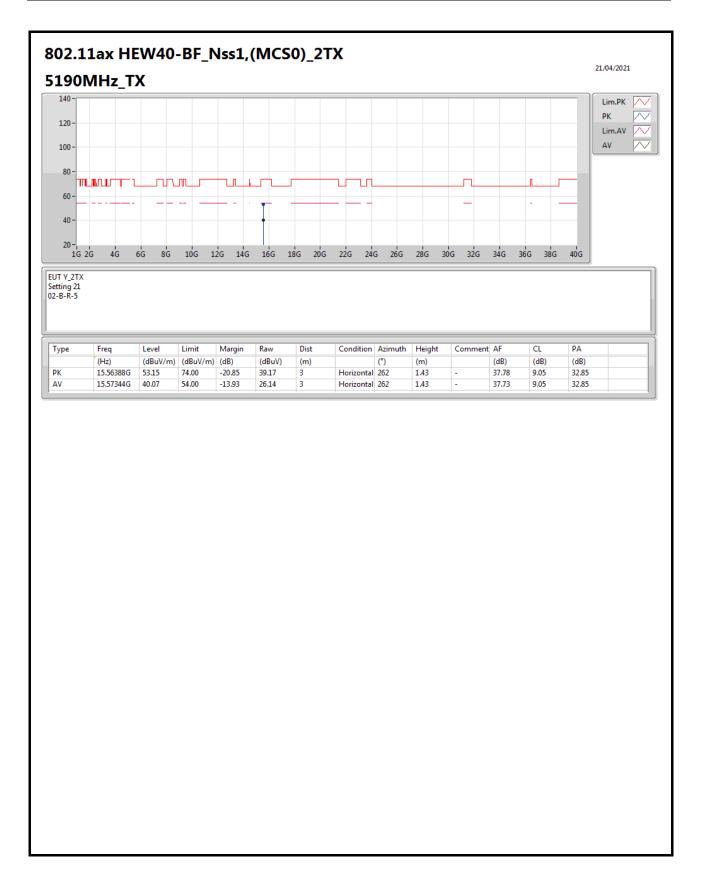




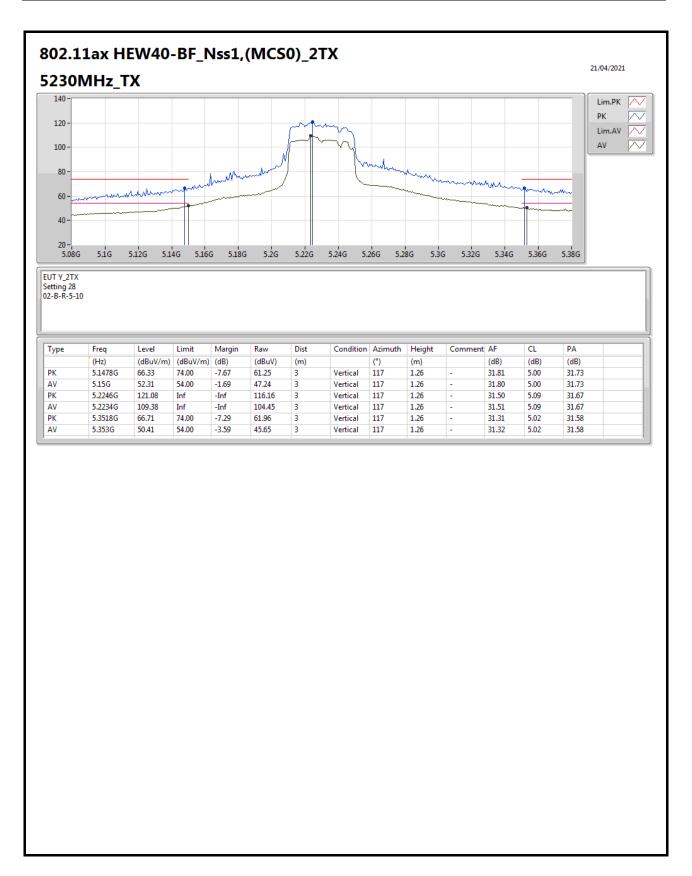




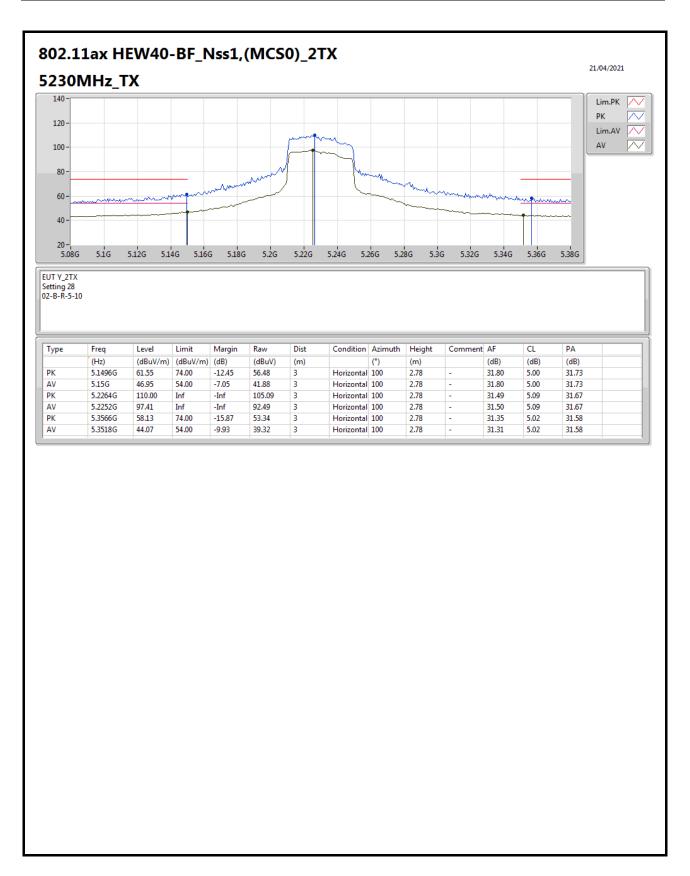




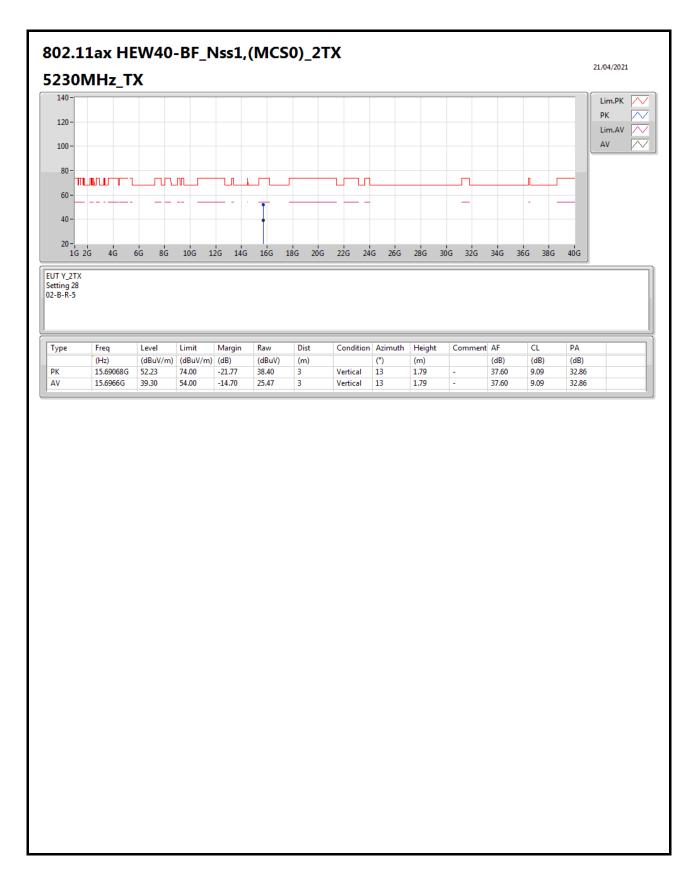




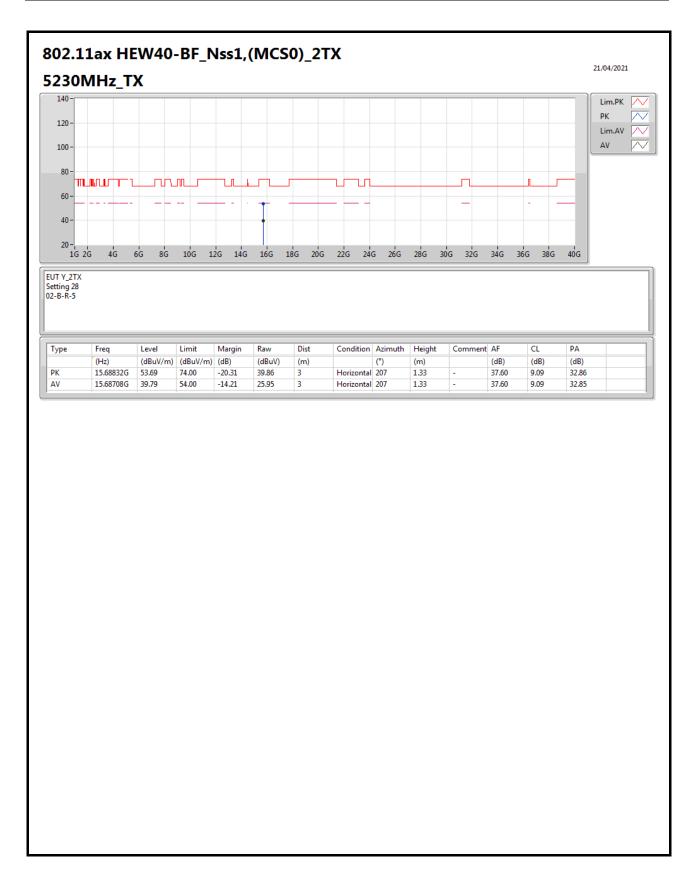




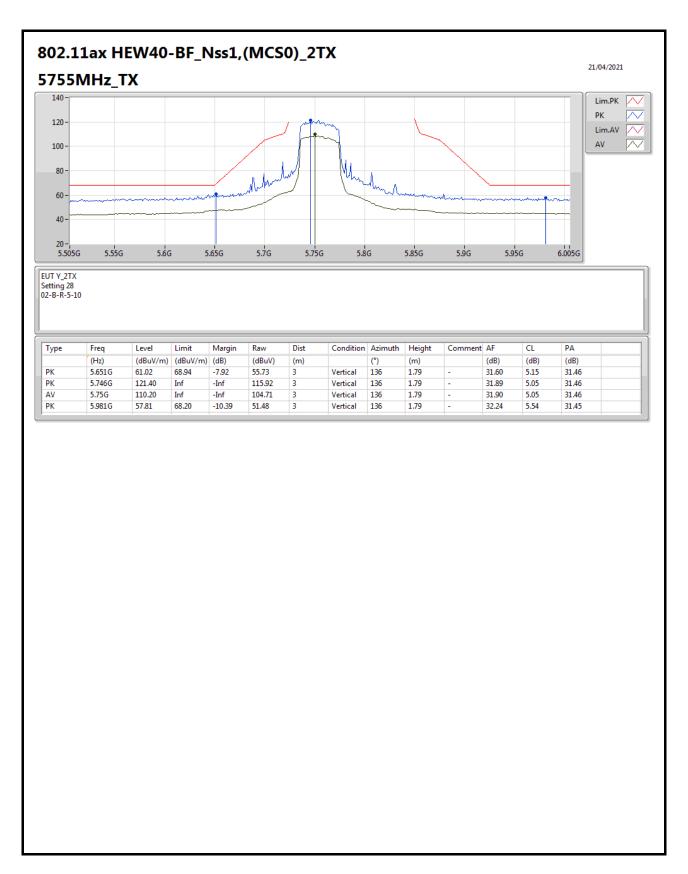




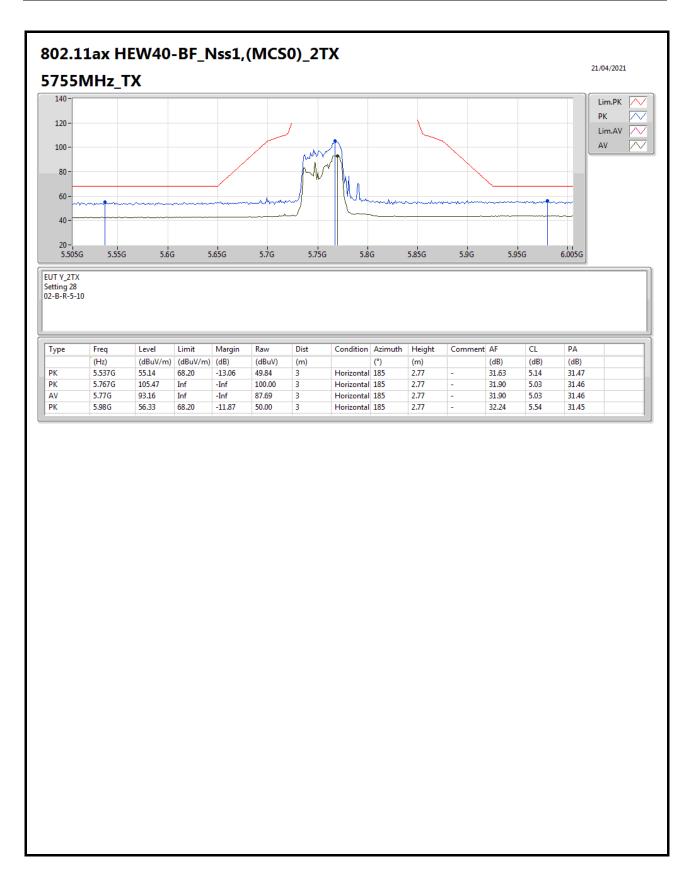




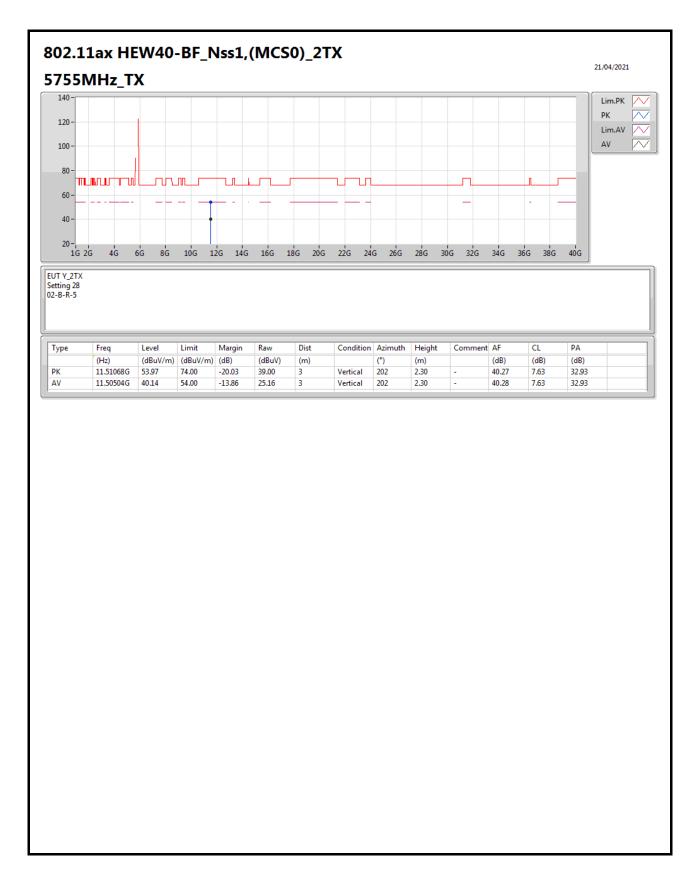




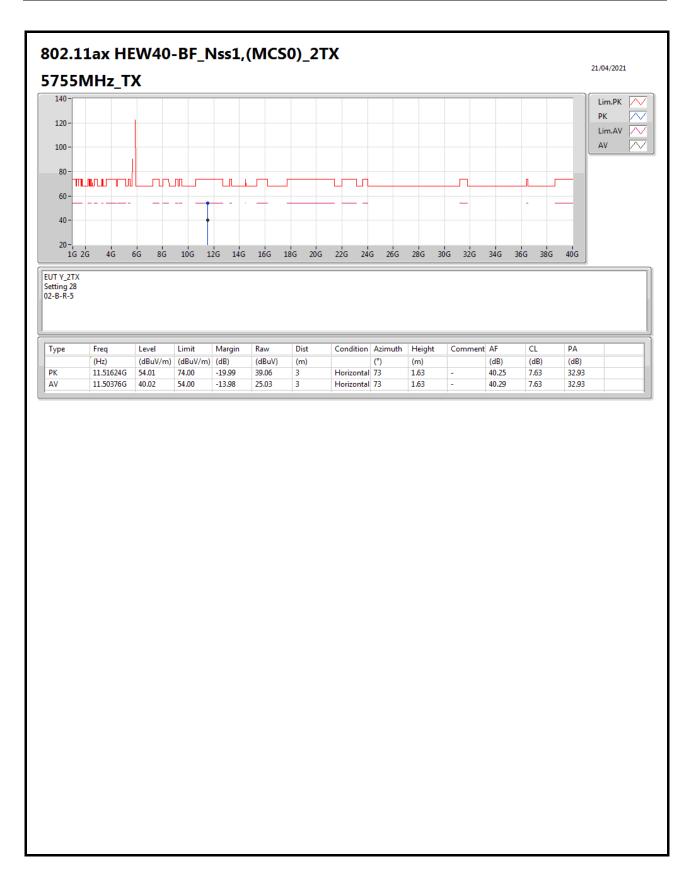




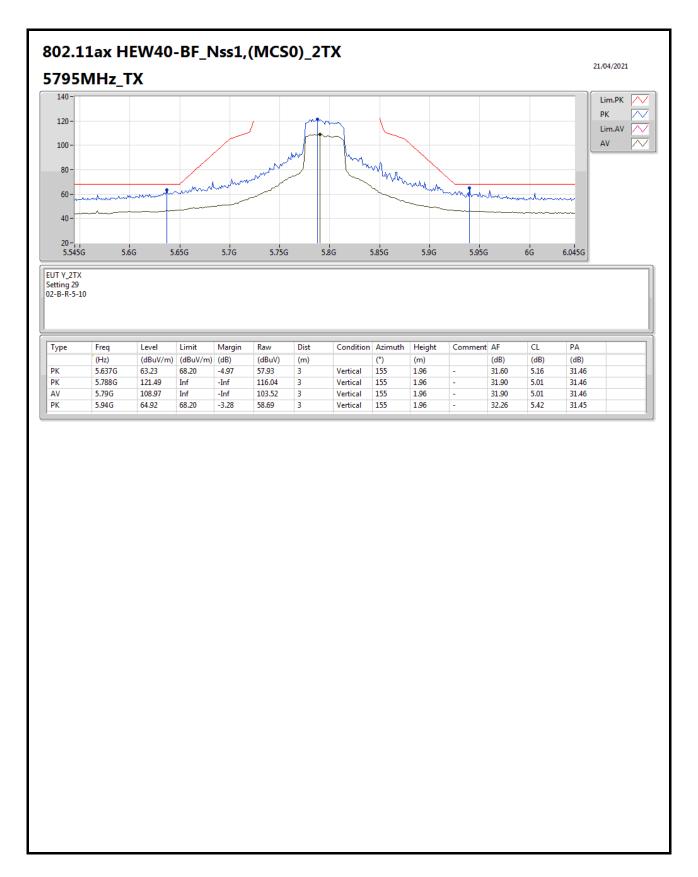




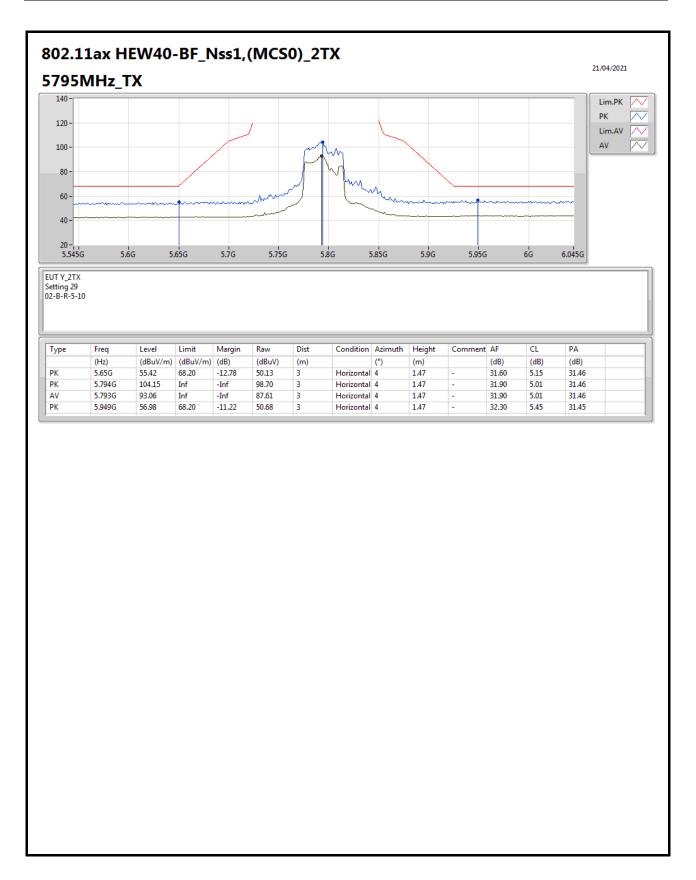




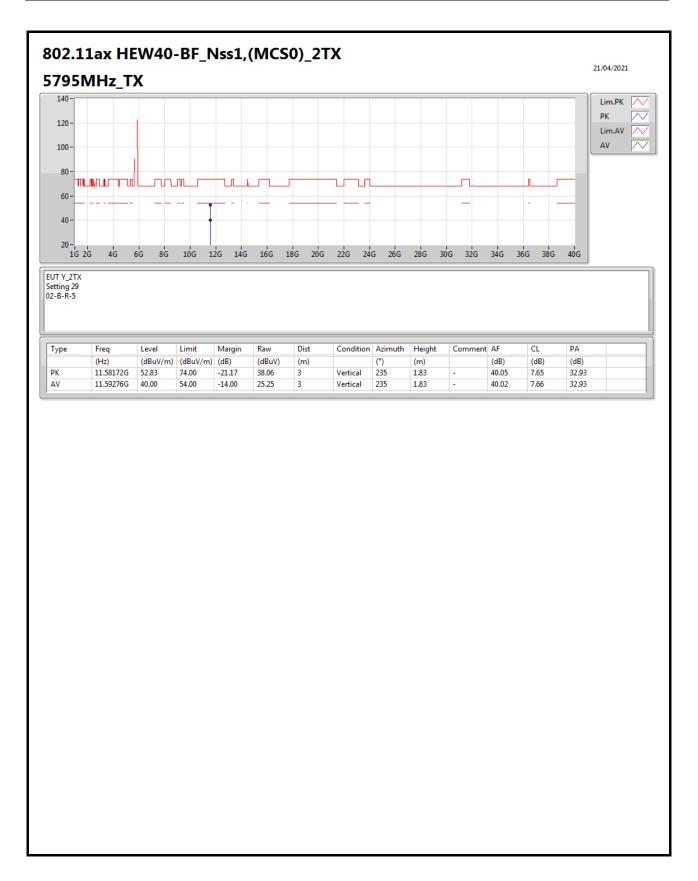




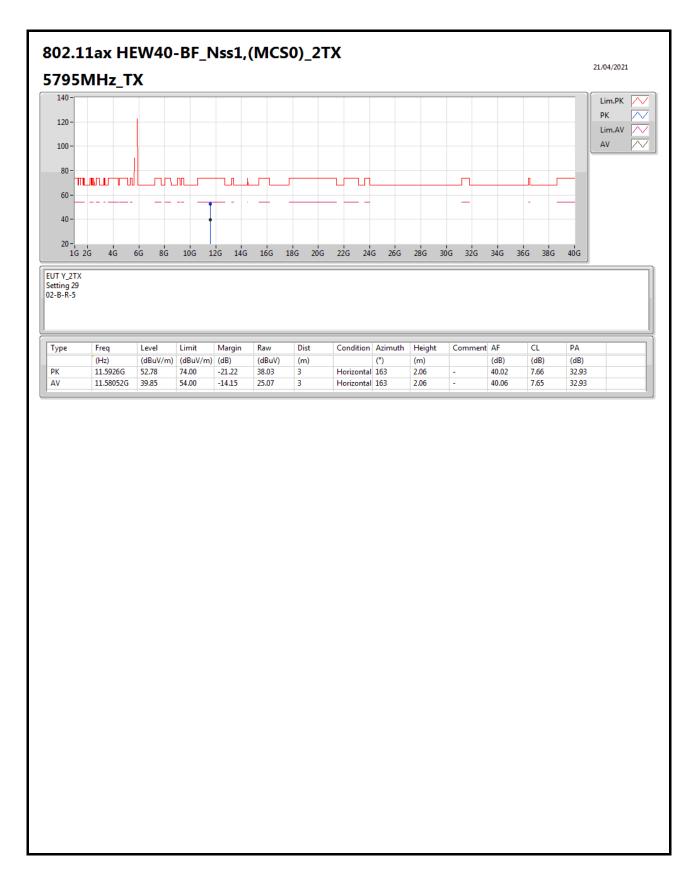




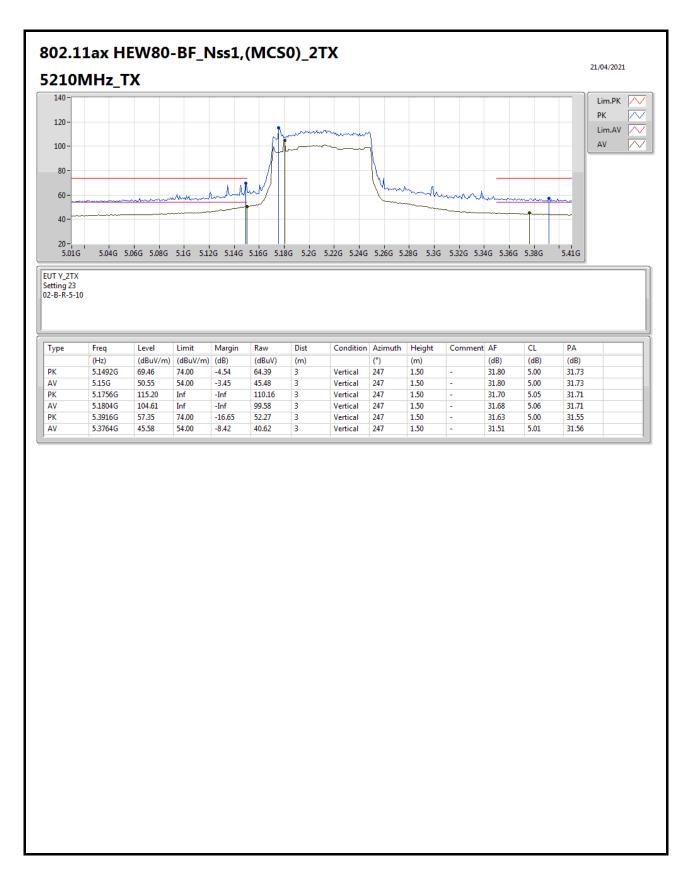




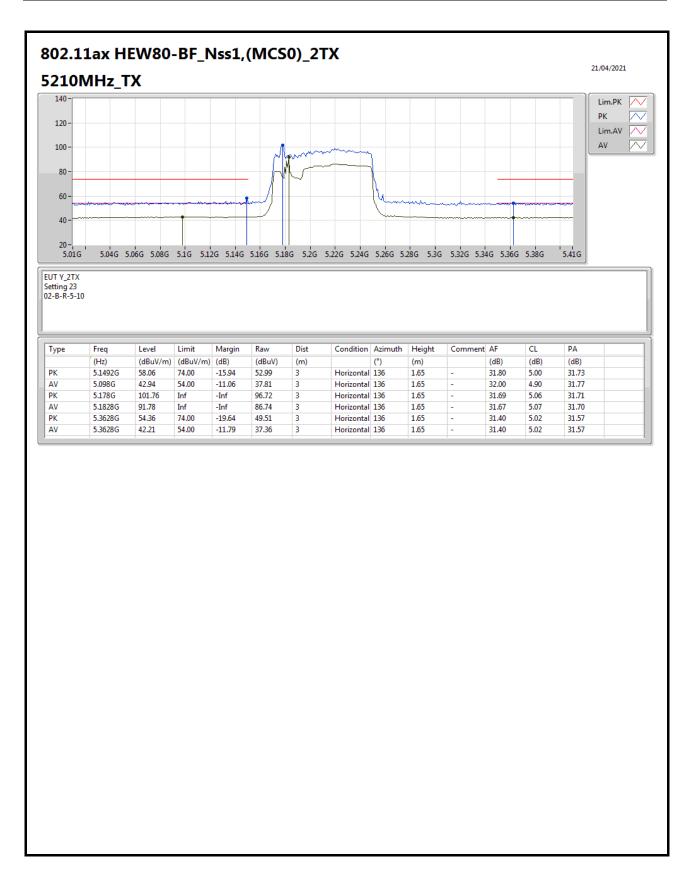




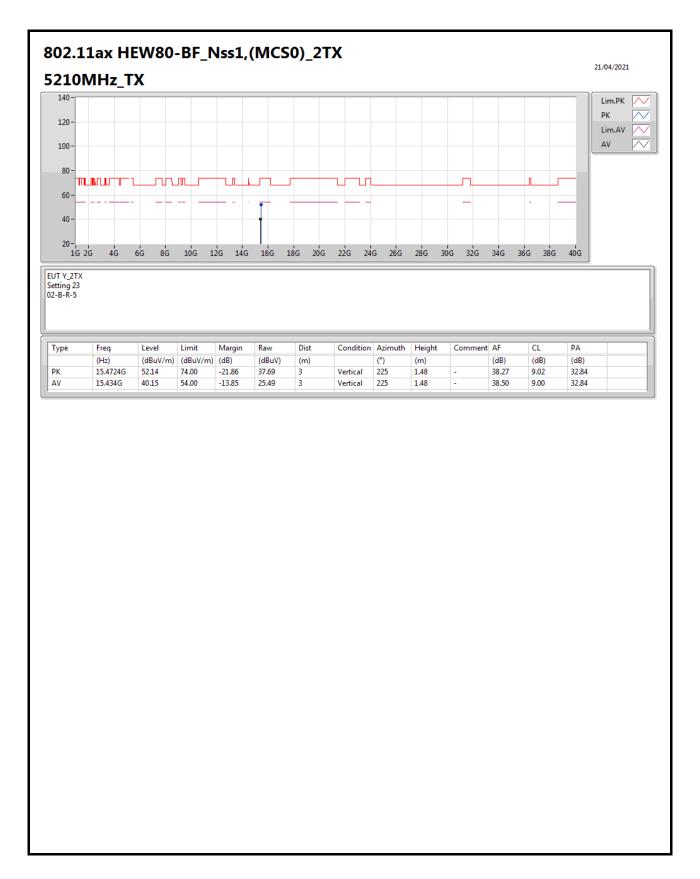




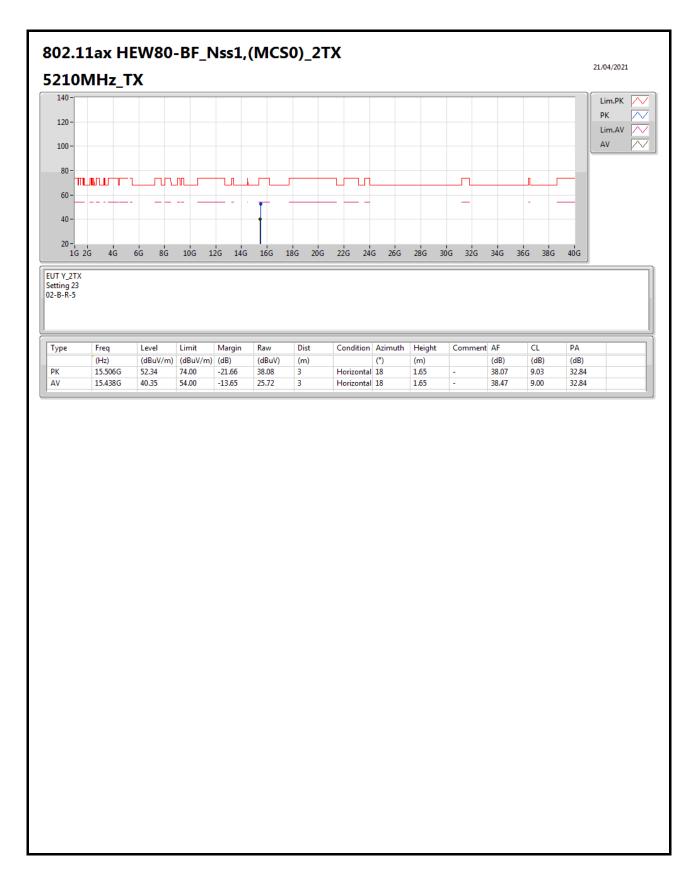




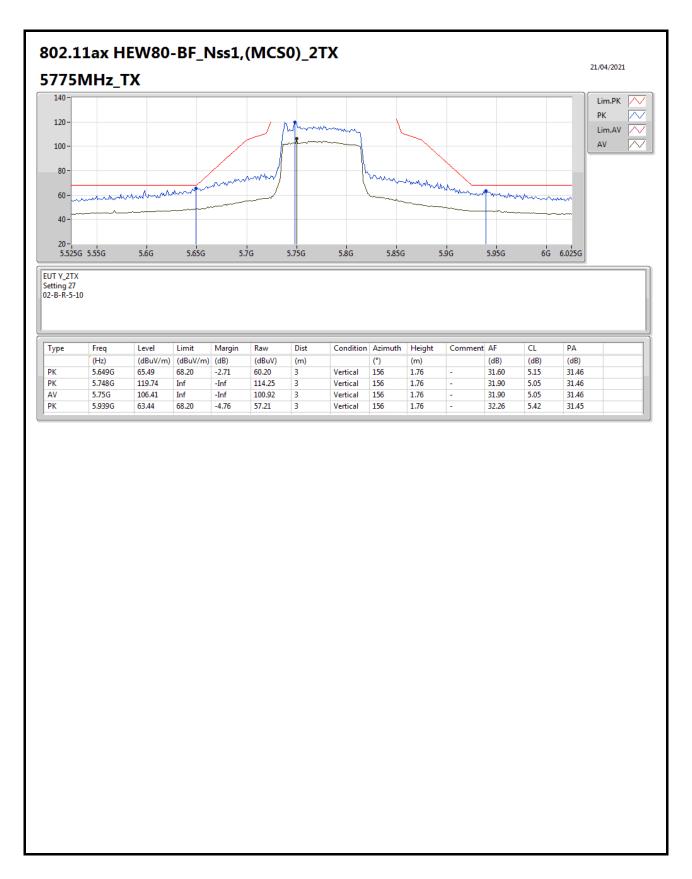




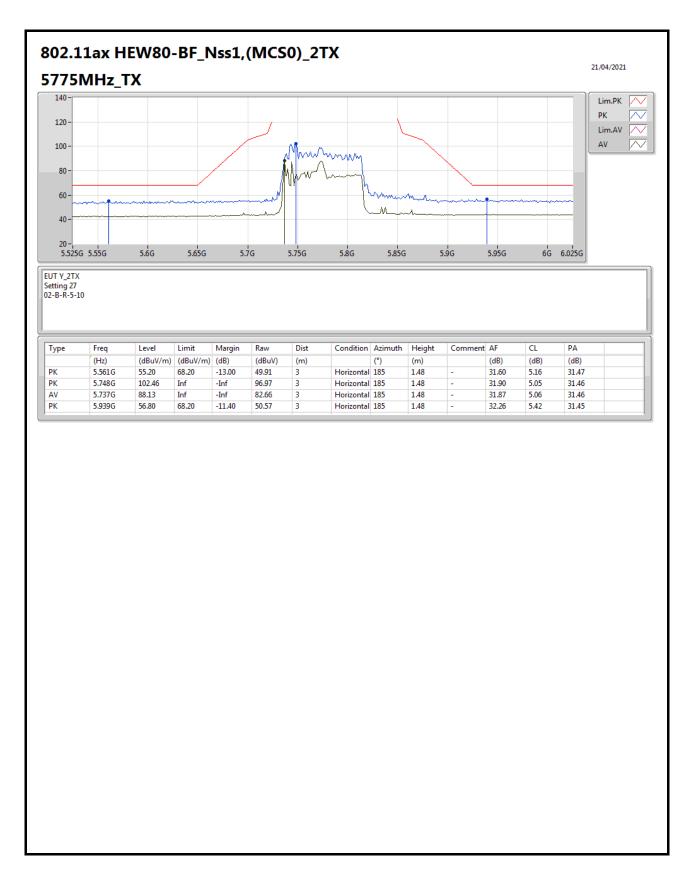






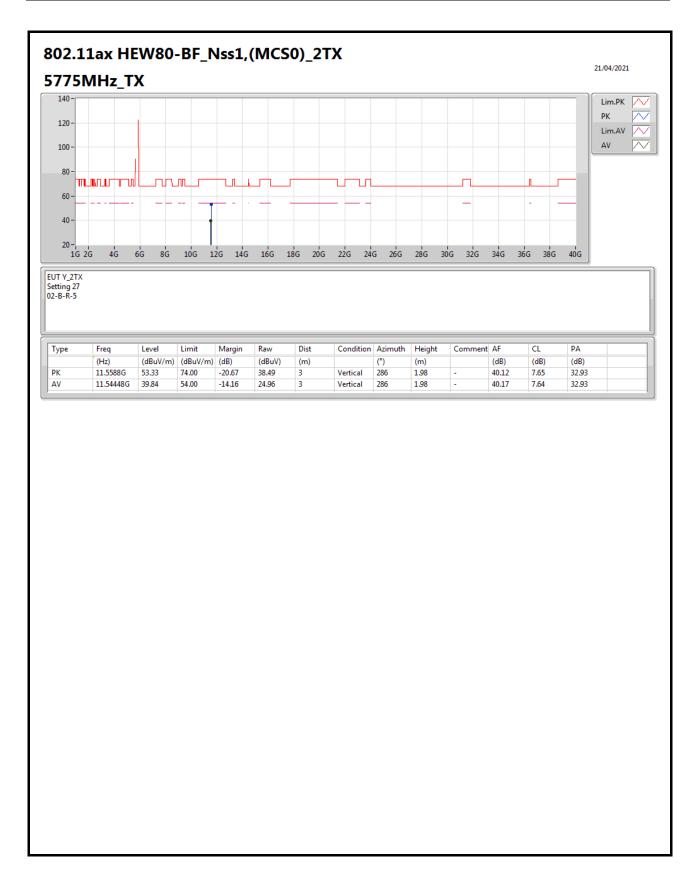






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