

Report No.: FR770425AB

Project No: CB10607440

# **FCC Test Report**

Equipment

: Whole Home Smart Wi-Fi Range Extender

**Brand Name** 

: Amped Wireless

Model No.

: AEX1200L

FCC ID

: ZTT-AEX1200L

Standard

: 47 CFR FCC Part 15.407

Operating

: 5150 MHz - 5250 MHz

Band

5725 MHz - 5850 MHz

Applicant

: Amped Wireless

13089 Peyton Dr. #C307 Chino Hills, CA 91709 USA

Manufacturer

Amped Wireless

13089 Peyton Dr. #C307 Chino Hills, CA 91709 USA

Function

☐ Outdoor; ☐ Indoor; ☐ Fixed P2P

Client

The product sample received on Jul. 06, 2017 and completely tested on Jul. 14, 2017. We, SPORTON, 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., the test report shall not be reproduced except in full.

Cliff Chang

SPORTON INTERNATIONAL INC.







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# **Summary of Test Result**

Conformance Test Specifications						
Report Clause Description						
1.1.2	15.203	Antenna Requirement	Complied			
3.1	15.207	AC Power-line Conducted Emissions	Complied			
3.2	15.407(a)	Emission Bandwidth	Complied			
3.3	15.407(a)	Maximum Conducted Output Power	Complied			
3.4	15.407(a)	Peak Power Spectral Density	Complied			
3.5	15.407(b)	Unwanted Emissions	Complied			
3.6	15.407(g)	Frequency Stability	Complied			

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# **Revision History**

Report No.	Version	Description	Issued Date
FR770425AB	Rev. 01	Initial issue of report	Aug. 07, 2017
FR770425AB	Rev. 02	Changing the Brand Name to "Amped Wireless".	Aug. 11, 2017

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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]

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

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Note:

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

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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.

#### 1.1.2 Antenna Information

				Gain (dBi)						
Ant.	Port	Brand	P/N	N Antenna Type Connector		2.4GHz	5GHz	5GHz		
								2.4GHZ	(Band 1)	(Band 4)
1	1	Airgain	N2420DG-G200U	PIFA Antenna	I-PEX	2.71	3.05	4.20		
2	2	Airgain	N2425DR-G150U	PIFA Antenna	I-PEX	2.71	3.05	4.20		

Note: The EUT has two antennas.

#### <For 2.4GHz Band>

#### For IEEE 802.11b/g/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>

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

#### 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.811	0.91	1.4m	1k
802.11ac VHT20	0.674	1.713	687.5u	3k
802.11ac VHT20-BF	0.994	0.026	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT40	0.517	2.865	352.5u	3k
802.11ac VHT40-BF	0.984	0.07	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT80	0.343	4.647	190u	10k
802.11ac VHT80-BF	0.988	0.052	n/a (DC>=0.98)	n/a (DC>=0.98)

## 1.1.4 EUT Operational Condition

EUT Power Type	T Power Type From power adapter				
Beamforming Function	1 I X I	With beamforming for 802.11n/ac in 5GHz		Without beamforming	

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#### 1.2 **Testing Applied 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 v01r04
- FCC KDB 644545 D03 v01
- FCC KDB 662911 D01 v02r01

#### **Testing Location Information** 1.3

	Testing Location								
	HWA YA	ADD	:	: No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.					
		TEL	:	886-3-327-3456 FAX : 886-3-318-0055					
$\boxtimes$	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°C / 54%	Jul. 11, 2017~ Jul, 14, 2017
Radiated	03CH01-CB	Welson Chen	22°C / 54%	Jul. 07, 2017~ Jul, 12, 2017
AC Conduction	CO01-CB	Ryo Fan	23°C / 60%	Jul. 14, 2017

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)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Power Density Measurement	1.27 dB	Confidence levels of 95%
Bandwidth Measurement	9.74 x10 <sup>-8</sup>	Confidence levels of 95%
Frequency Stability	6.06 x10 <sup>-8</sup>	Confidence levels of 95%

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Test site registered number IC 4086D with Industry Canada.



2 Test Configuration of EUT

# 2.1 Test Channel Mode

Mode	Power Setting
802.11a_(6Mbps)_2TX	-
5180MHz	0E
5200MHz	13
5240MHz	15
5745MHz	17
5785MHz	17
5825MHz	16
802.11ac VHT20_Nss1,(MCS0)_2TX	-
5180MHz	10
5200MHz	15
5240MHz	15
5745MHz	14
5785MHz	18
5825MHz	1A
802.11ac VHT40_Nss1,(MCS0)_2TX	-
5190MHz	0B
5230MHz	12
5755MHz	18
5795MHz	1B
802.11ac VHT80_Nss1,(MCS0)_2TX	-
5210MHz	04
5775MHz	14
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-
5180MHz	13
5200MHz	26
5240MHz	26
5745MHz	28
5785MHz	31
5825MHz	31
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-
5190MHz	16
5230MHz	20
5755MHz	27
5795MHz	27
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-
5210MHz	14
5775MHz	26

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Note:

♦ VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.

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# 2.2 The Worst Case Measurement Configuration

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

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The Worst Case Mode for Following Conformance Tests			
Tests Item	Emission Bandwidth Maximum Conducted Output Power Peak Power Spectral Density Frequency Stability		
Test Condition	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	Normal Link			
1	Normal link - EUT in Y axis			
2	Normal link - EUT in Z axis			
For operating mode 2 is th	e worst case and it was record in this test report.			
Operating Mode > 1GHz	СТХ			
The EUT can be placed in	Y-axis and Z-axis. After evaluating, Z-axis was the worst case, so it's recorded in			

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		
The EUT can be placed in Y-axis and Z-axis. After evaluating, Z-axis was the worst case, so it's recothis report.			
1	WLAN 2.4GHz + WLAN 5GHz		

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Refer to Appendix G for Radiated Emission Co-location.

this report.



The Worst Case Mode for Following Conformance Tests				
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation				
Operating Mode	Operating Mode CTX			
1 WLAN 2.4GHz + WLAN 5GHz				
Refer to Sporton Test Report No.: FA770425 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 mode.

#### beamforming mode:

For Radiated Mode:

During the test, the following programs under WIN XP 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 98%.

For Normal Link:

During the test, the EUT operation to normal function.

#### 2.4 Accessories

	Accessories					
No. Equipment Brand Model Name Name				Rating		
1	Adapter	DVE	DSA-18PFM-12 FUS 120150	Input:100-240V~50/60Hz, 0.6A Ouput:+12V, 1.5A		

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# 2.5 Support Equipment

For Test Site No: CO01-CB

Support Equipment						
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook*4	DELL	E6430	DoC		

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For Test Site No: 03CH01-CB (Below 1GHz)

	Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook*2	DELL	E4300	DoC		
2	Notebook*2	Apple	Mac Book	DoC		

For Test Site No: 03CH01-CB (Above 1GHz)

<For Non-Beamforming Mode>

Support Equipment						
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook	DELL	E4300	DoC		

<For Beamforming Mode>

	Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook*2	DELL	E4300	DoC		
2	RX Device	Amped Wireless	AC1200 Repeater Router	DoC		

For Test Site No: TH01-CB <For Non-Beamforming Mode>

<u> </u>	To Non Beamforning Meach						
Support Equipment							
No.	No. Equipment Brand Name Model Name FCC ID						
1	Notebook	DELL	E4300	DoC			

<For Beamforming Mode>

	Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook*2	DELL	E4300	DoC		
2	RX Device	Amped Wireless	AC1200 Repeater Router	N/A		

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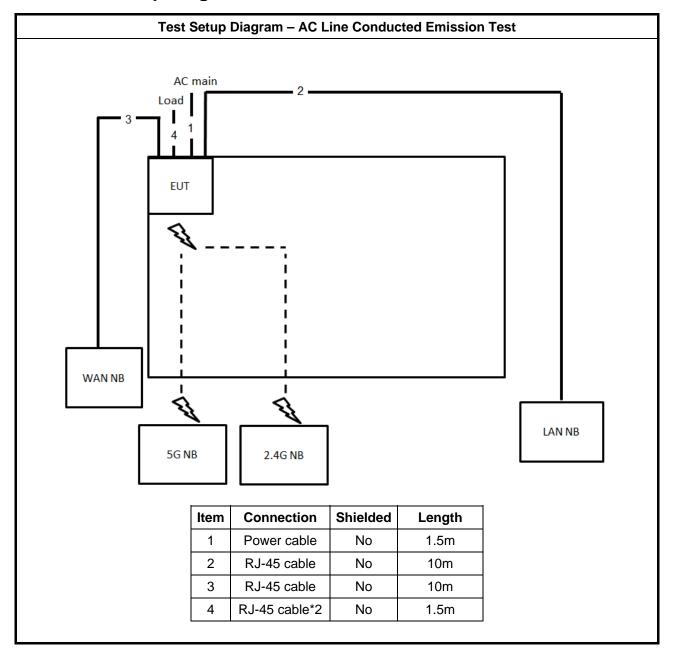
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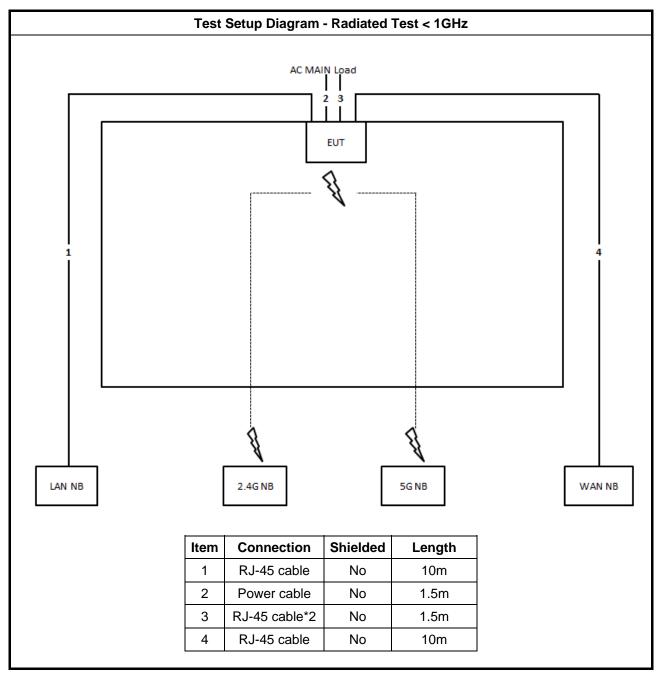


# 2.6 Test Setup Diagram

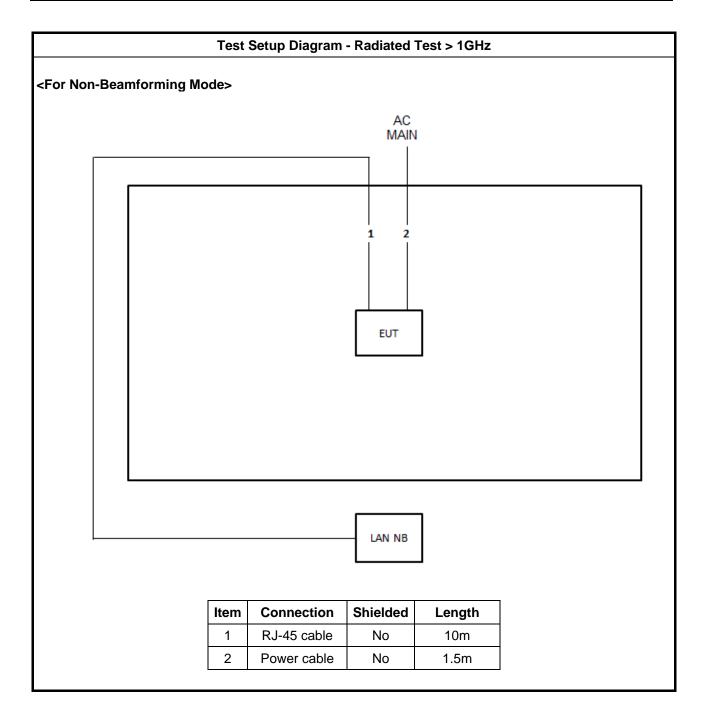


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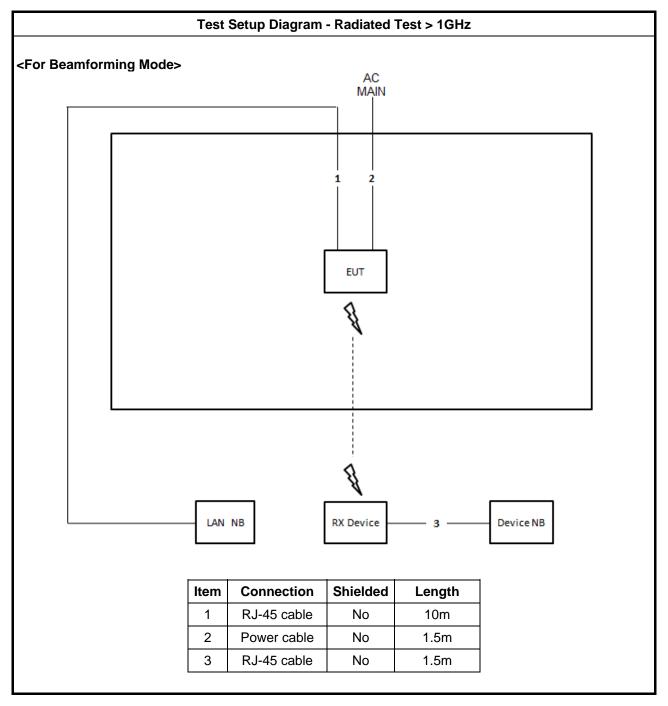
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3 Transmitter Test Result

## 3.1 AC Power-line Conducted Emissions

#### 3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit					
Frequency Emission (MHz) Quasi-Peak Average					
0.15-0.5	66 - 56 *	56 - 46 *			
0.5-5	56	46			
5-30	60	50			

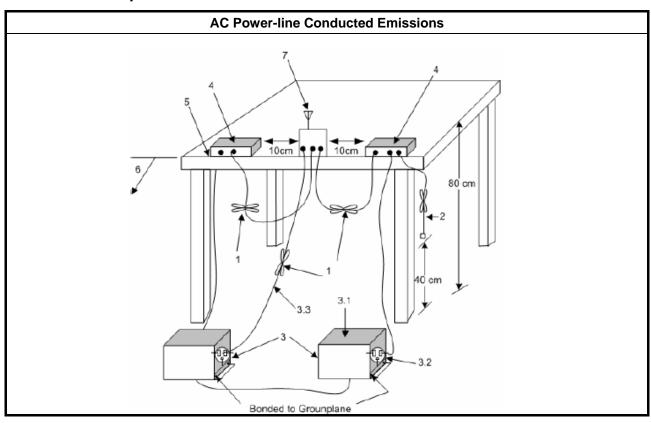
## 3.1.2 Measuring Instruments

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.	

## 3.1.4 Test Setup



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# 3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

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## 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

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

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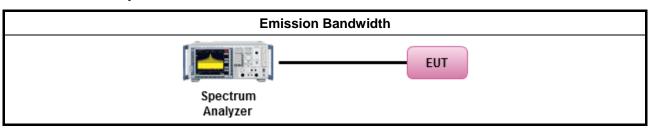
## 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

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

### 3.2.4 Test Setup



#### 3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

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# 3.3 Maximum Conducted Output Power

# 3.3.1 Maximum Conducted Output Power Limit

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

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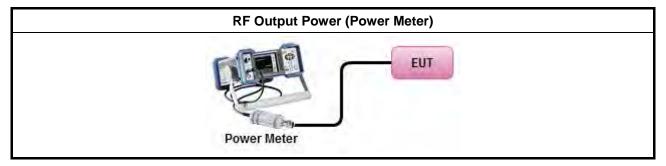
## 3.3.2 Measuring Instruments

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

# 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	II Devices
$\boxtimes$	For the 5.15-5.25 GHz band:
	<ul> <li>Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 17 - (G<sub>TX</sub> - 6).</li> </ul>
	Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .
	Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$ .
	• Mobile or Portable Client: the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi, then PPSD= 11 – (G <sub>TX</sub> – 6)
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If $G_{TX} >$ 6 dBi, then PPSD= 11 $-$ ( $G_{TX} -$ 6).
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ( $G_{TX} - 6$ ).
$\boxtimes$	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$ .
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the peak power spectral density (PPSD) $\leq$ 4 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) $\leq$ 10 dBm/MHz.
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) $\leq$ 17 dBm/MHz.
	<ul> <li>e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:</li> <li>-13 dBW/MHz for 0° ≤ θ &lt; 8°; -13 - 0.716 (θ-8) dBW/MHz for 8° ≤ θ &lt; 40°</li> <li>-35.9 - 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ &gt; 45°</li> </ul>
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) $\leq$ 17 dBm/MHz.
	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= 30 – ( $G_{TX} - 6$ ).
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
pow	<b>SD</b> = peak power spectral density that he same method as used to determine the conducted output ver shall be used to determine the power spectral density. And power spectral density in dBm/MHz = the maximum transmitting antenna directional gain in dBi.

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# 3.4.2 Measuring Instruments

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

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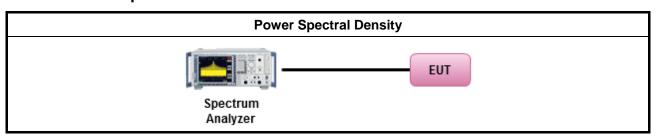
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## 3.4.3 Test Procedures

		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 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						
		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 $						

# 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 Radiated 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			

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.

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 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 H)2) for unwanted emissions into non-restricted bands. Refer as FCC KDB 789033, clause H)1) for unwanted emissions into restricted bands. Refer as FCC KDB 789033, H)6) Method AD (Trace Averaging). Refer as FCC KDB 789033, H)6) Method VB (Reduced VBW). Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions. Refer as FCC KDB 789033, clause H)5) measurement procedure peak limit. Refer as ANSI C63.10, clause 4.2.3.2.2 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

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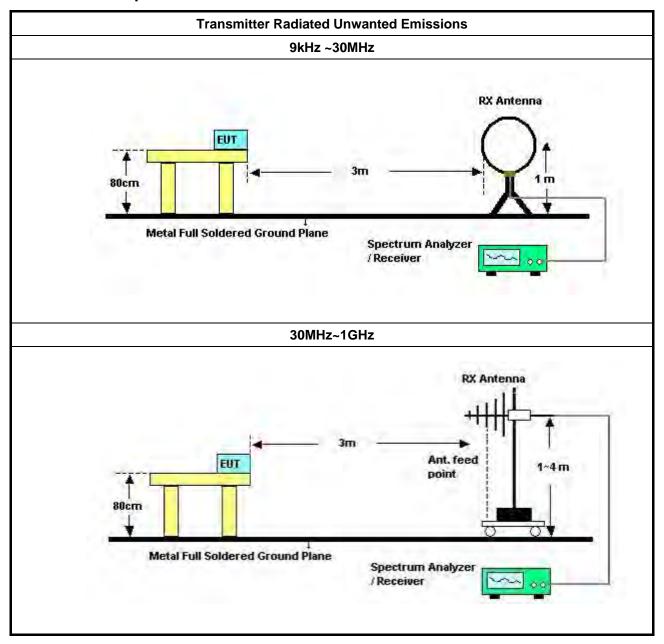
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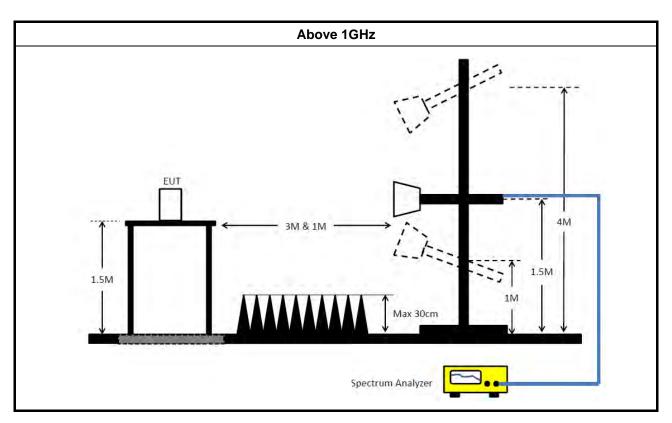
has no need to be reported.



3.5.4 Test Setup



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# 3.5.5 Transmitter Unwanted Emissions (Below 30MHz)

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

## 3.5.6 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E

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# 3.6 Frequency Stability

#### 3.6.1 Frequency Stability Limit

#### **Frequency Stability Limit**

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#### **UNII Devices**

 In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

#### **LE-LAN Devices**

N/A

#### IEEE Std. 802.11

■ The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band and ± 25 ppm maximum for the 2.4 GHz band.

#### 3.6.2 Measuring Instruments

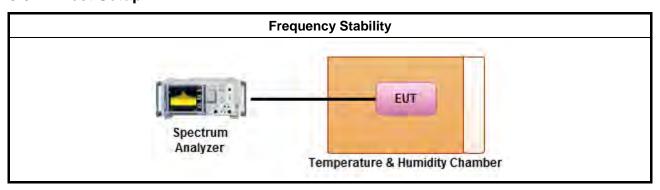
Refer a test equipment and calibration data table in this test report.

#### 3.6.3 Test Procedures

#### **Test Method**

- Refer as ANSI C63.10, clause 6.8 for frequency stability tests
  - Frequency stability with respect to ambient temperature
  - Frequency stability when varying supply voltage
  - Extreme temperature is -30°C~50°C.

#### 3.6.4 Test Setup



### 3.6.5 Test Result of Frequency Stability

Refer as Appendix F

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4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 23, 2017	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16- 2	04083	150kHz ~ 100MHz	Dec. 14, 2016	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 21, 2016	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 23, 2017	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2016	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 10, 2016	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 25, 2016	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2017	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 16, 2017	Radiation (03CH01-CB)
Pre-Amplifier	-	-	TF-130N-R1	26GHz ~ 40GHz	Jun. 20, 2017	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 22, 2016	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 06, 2017	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 24, 2016	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Radiation (03CH01-CB)

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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-10-7	N/A	N/A	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 26, 2016	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 02, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Oct. 24, 2016	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz –26.5 GHz	Oct. 24, 2016	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz –26.5 GHz	Oct. 24, 2016	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz –26.5 GHz	Oct. 24, 2016	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 24, 2016	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 22, 2016	Conducted (TH01-CB)

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

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

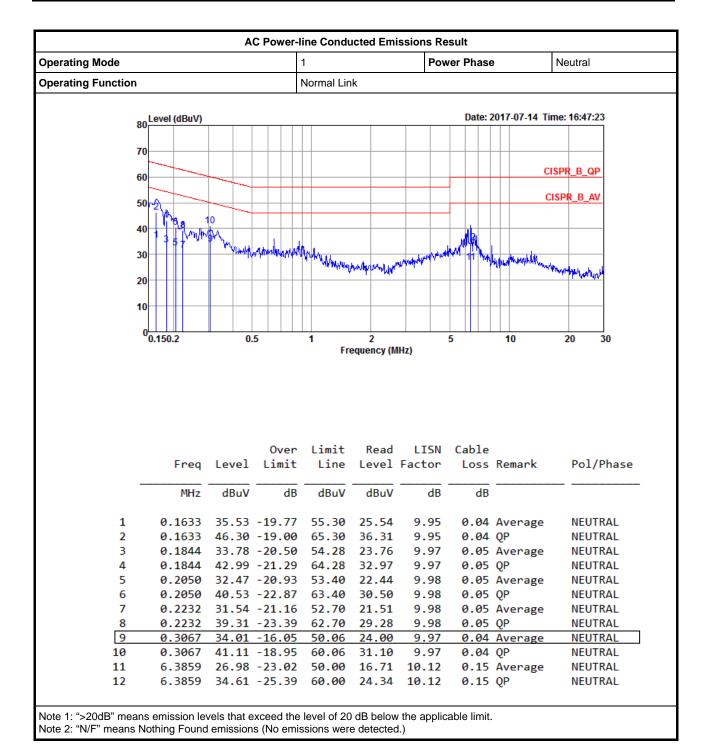
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<sup>&</sup>quot;\*" Calibration Interval of instruments listed above is two years.

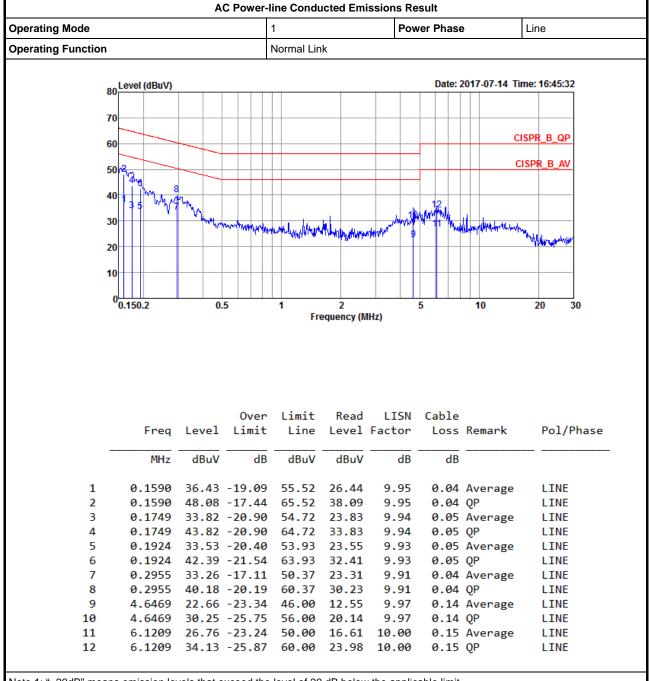
#### AC Power-line Conducted Emissions Result



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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.)

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Appendix B EBW Result

**Summary** 

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW	
	(Hz)	(Hz)		(Hz)	(Hz)	
802.11a_(6Mbps)_2TX	-	-	-	-	-	
5.15-5.25GHz	21.425M	16.392M	16M4D1D	19.25M	16.267M	
5.725-5.85GHz	15.3M	16.467M	16M5D1D	13.85M	16.367M	
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	
5.15-5.25GHz	21.8M	17.566M	17M6D1D	19.8M	17.516M	
5.725-5.85GHz	15.05M	17.666M	17M7D1D	12.55M	17.566M	
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	
5.15-5.25GHz	41.1M	36.032M	36M0D1D	39.95M	35.932M	
5.725-5.85GHz	35M	36.232M	36M2D1D	32.55M	35.982M	
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	
5.15-5.25GHz	80.5M	75.062M	75M1D1D	80.1M	74.963M	
5.725-5.85GHz	75.1M	75.262M	75M3D1D	72.6M	75.062M	
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	
5.15-5.25GHz	38.875M	18.241M	18M2D1D	20.35M	17.666M	
5.725-5.85GHz	16.9M	23.988M	24M0D1D	13.8M	17.866M	
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	
5.15-5.25GHz	78.2M	36.732M	36M7D1D	40.85M	36.082M	
5.725-5.85GHz	34M	56.122M	56M1D1D	31.3M	36.832M	
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	
5.15-5.25GHz	137.2M	75.962M	76M0D1D	80.9M	75.762M	
5.725-5.85GHz	76.3M	98.151M	98M2D1D	13.7M	76.062M	

Max-N dB = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;
Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;
Min-OBW = Minimum 99% occupied bandwidth;

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TEL: 886-3-327-3456 FAX: 886-3-327-0973 Page No. : 1 of 12



EBW Result Appendix B

#### 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_(6Mbps)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	19.7M	16.267M	19.625M	16.367M
5200MHz	Pass	Inf	19.875M	16.342M	19.25M	16.392M
5240MHz	Pass	Inf	21.425M	16.342M	19.5M	16.367M
5745MHz	Pass	500k	14.375M	16.367M	15.3M	16.467M
5785MHz	Pass	500k	13.85M	16.417M	15.05M	16.442M
5825MHz	Pass	500k	15M	16.442M	14.975M	16.367M
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	20.425M	17.541M	19.85M	17.566M
5200MHz	Pass	Inf	20.35M	17.566M	19.975M	17.541M
5240MHz	Pass	Inf	21.8M	17.516M	19.8M	17.566M
5745MHz	Pass	500k	12.55M	17.566M	15.05M	17.566M
5785MHz	Pass	500k	14.975M	17.566M	14.975M	17.616M
5825MHz	Pass	500k	14.975M	17.591M	15.05M	17.666M
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	Inf	40.8M	36.032M	39.95M	35.932M
5230MHz	Pass	Inf	41.1M	36.032M	40.1M	35.932M
5755MHz	Pass	500k	32.55M	36.032M	35M	35.982M
5795MHz	Pass	500k	35M	36.132M	33.85M	36.232M
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	Inf	80.5M	74.963M	80.1M	75.062M
5775MHz	Pass	500k	72.6M	75.262M	75.1M	75.062M
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	Inf	20.45M	17.666M	21.8M	17.691M
5200MHz	Pass	Inf	20.5M	17.716M	38.875M	18.141M
5240MHz	Pass	Inf	20.35M	17.691M	37.825M	18.241M
5745MHz	Pass	500k	16.9M	17.866M	15.05M	22.089M
5785MHz	Pass	500k	13.8M	17.991M	15.425M	23.988M
5825MHz	Pass	500k	15.075M	17.966M	15.7M	19.665M
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	Inf	40.85M	36.182M	71.9M	36.382M
5230MHz	Pass	Inf	41M	36.082M	78.2M	36.732M
5755MHz	Pass	500k	33.8M	42.629M	33.75M	56.122M
5795MHz	Pass	500k	34M	36.832M	31.3M	50.325M
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	Inf	80.9M	75.762M	137.2M	75.962M
5775MHz	Pass	500k	13.7M	76.062M	76.3M	98.151M
B (VI) B D (VOID	5 705 5 05011					1

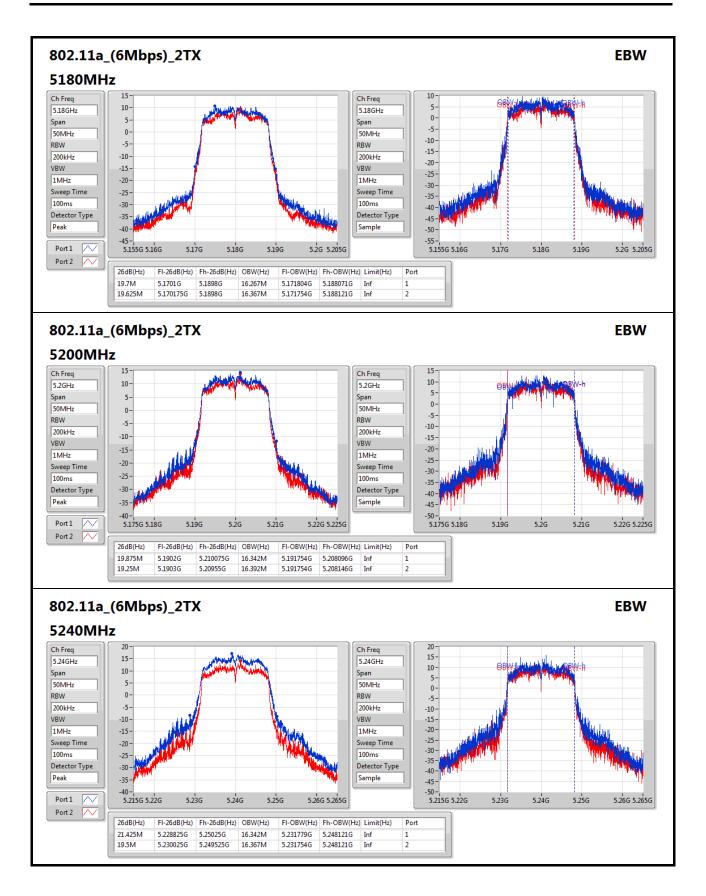
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

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Appendix B

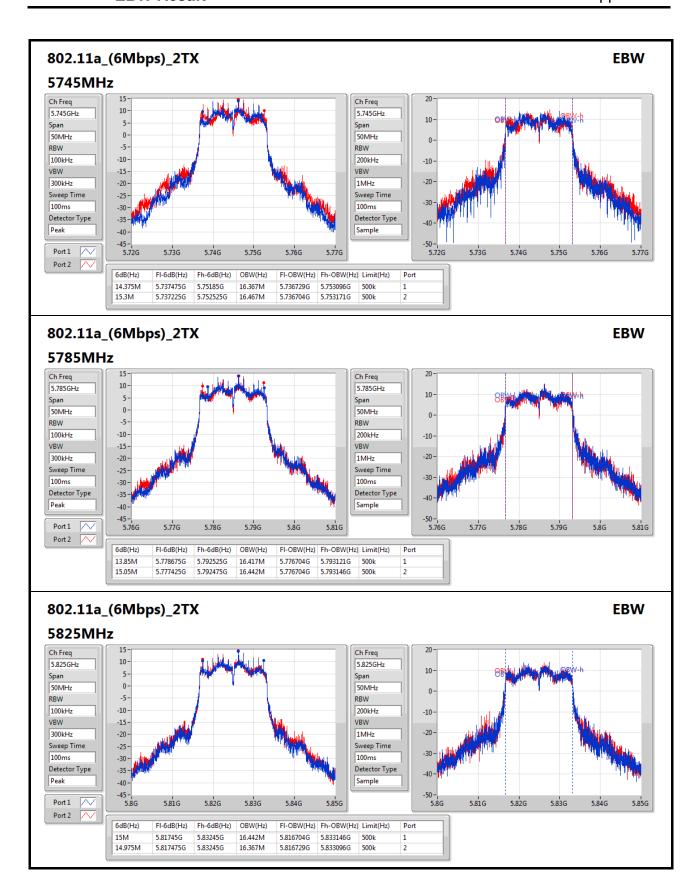
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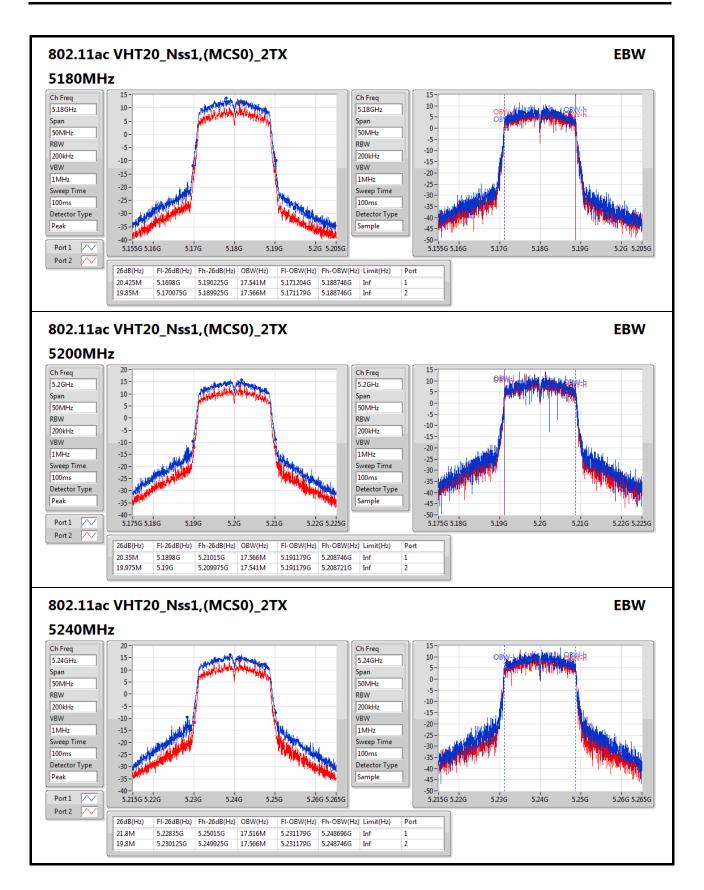
TEL: 886-3-327-3456 FAX: 886-3-327-0973

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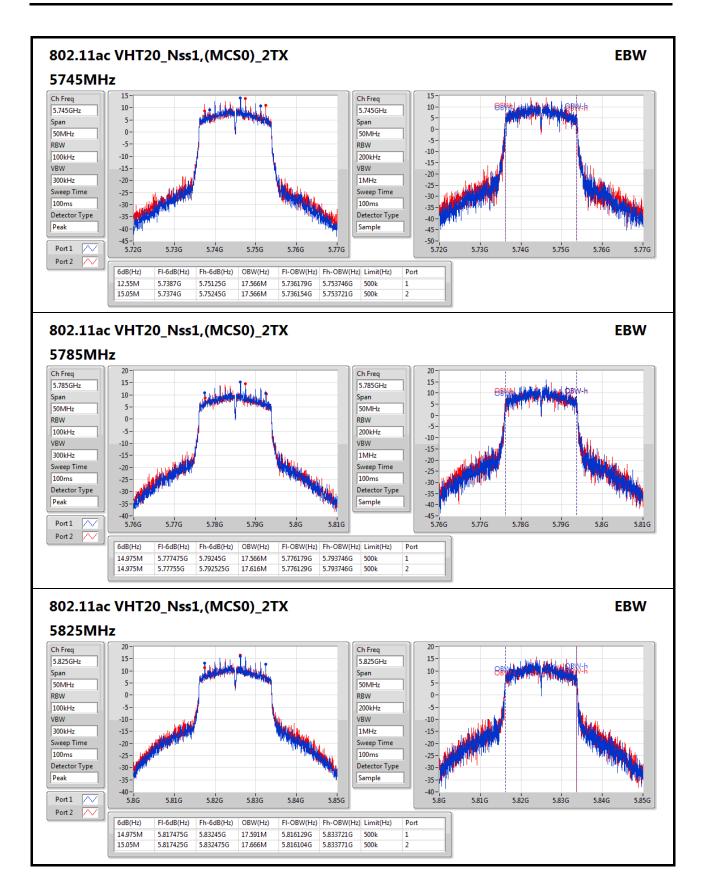


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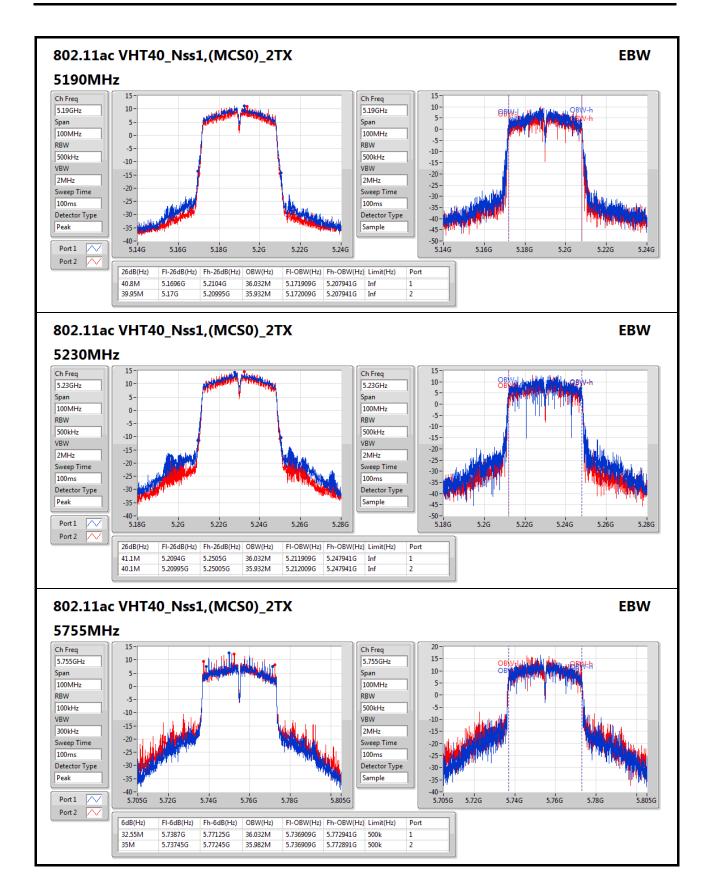




Appendix B

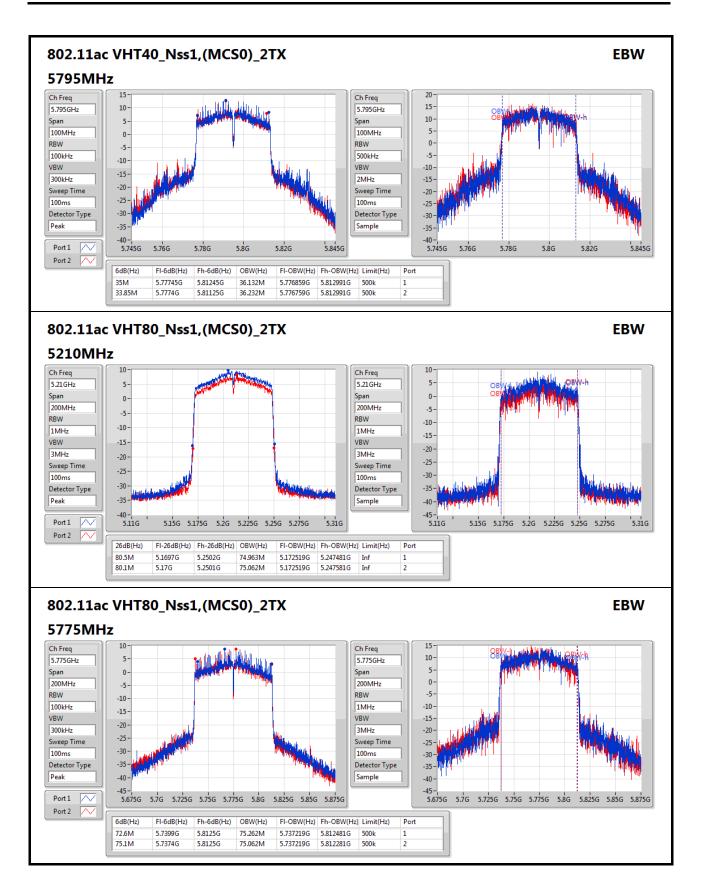
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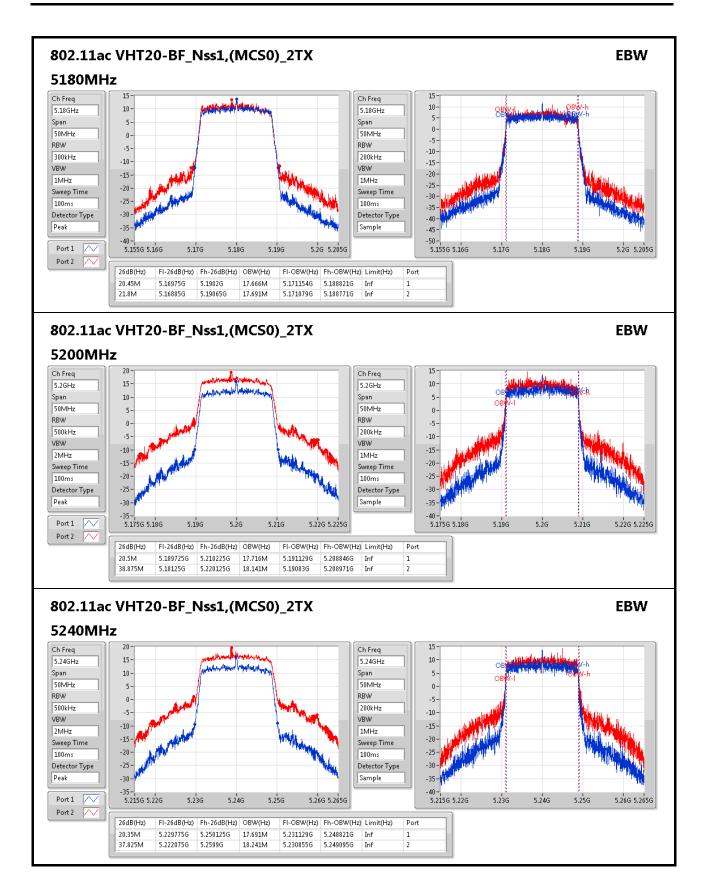


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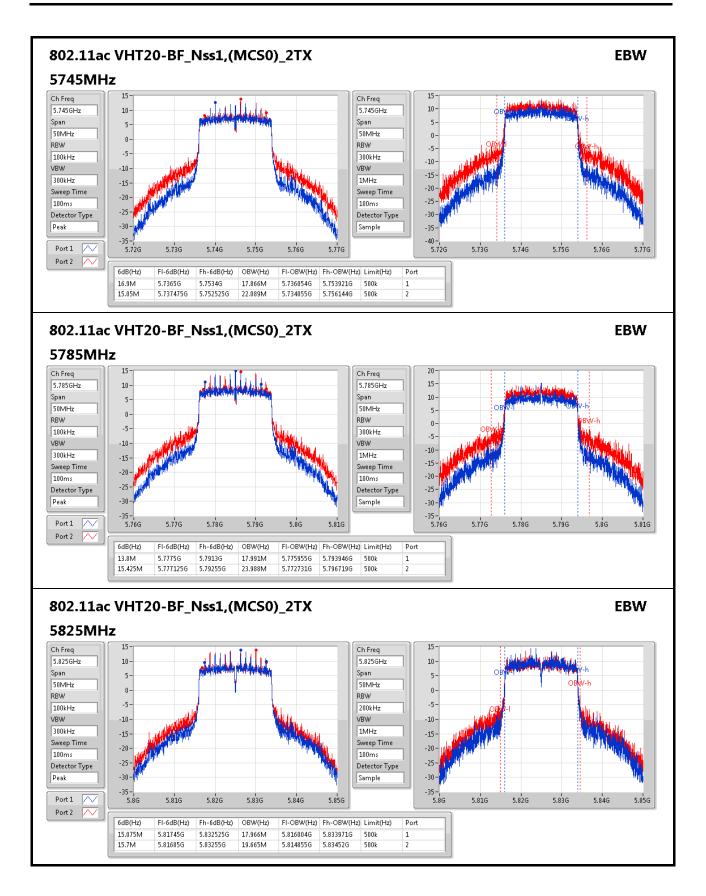


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Appendix B

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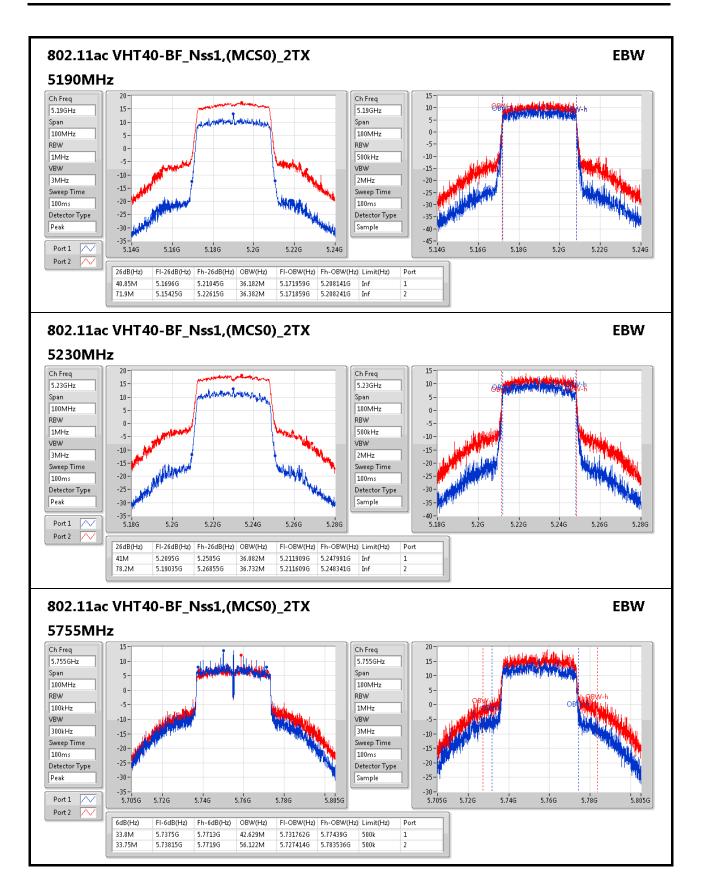




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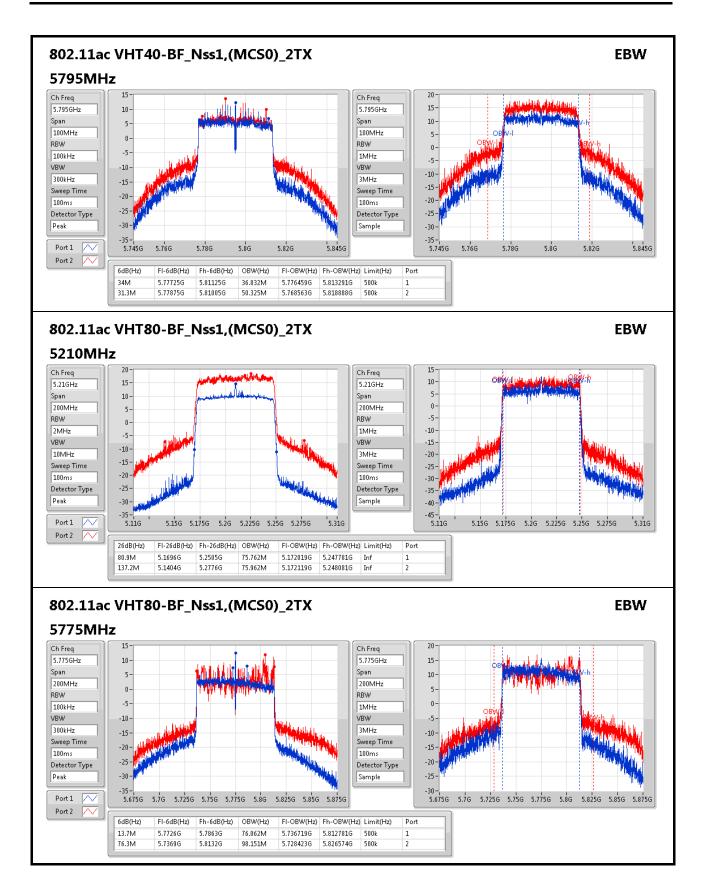


EBW Result



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SPORTON INTERNATIONAL INC.



Power Result Appendix C

**Summary** 

Mode	Total Power	Total Power	EIRP	EIRP
	(dBm)	(W)	(dBm)	(W)
802.11a_(6Mbps)_2TX	-	-	-	-
5.15-5.25GHz	27.00	0.50119	30.05	1.01158
5.725-5.85GHz	27.96	0.62517	32.16	1.64437
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	27.05	0.50699	30.10	1.02329
5.725-5.85GHz	28.96	0.78705	33.16	2.07014
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	25.87	0.38637	28.92	0.77983
5.725-5.85GHz	29.06	0.80538	33.26	2.11836
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	19.91	0.09795	22.96	0.19770
5.725-5.85GHz	27.03	0.50466	31.23	1.32739
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	26.84	0.48306	32.90	1.94984
5.725-5.85GHz	27.75	0.59566	34.96	3.13329
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	26.65	0.46238	32.71	1.86638
5.725-5.85GHz	28.77	0.75336	35.98	3.96278
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-
5.15-5.25GHz	24.61	0.28907	30.67	1.16681
5.725-5.85GHz	28.43	0.69663	35.64	3.66438

SPORTON INTERNATIONAL INC.



Power Result Appendix C

## Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Lim	
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	
802.11a_(6Mbps)_2TX	-	-	-	-	-	-	
5180MHz	Pass	3.05	21.08	19.64	23.43	30.00	
5200MHz	Pass	3.05	23.61	22.42	26.07	30.00	
5240MHz	Pass	3.05	24.62	23.26	27.00	30.00	
5745MHz	Pass	4.20	24.95	24.96	27.96	30.00	
5785MHz	Pass	4.20	24.01	23.83	26.93	30.00	
5825MHz	Pass	4.20	23.49	22.95	26.24	30.00	
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
5180MHz	Pass	3.05 3.05	20.96	20.83	23.91	30.00	
5200MHz	Pass		24.42	23.26	26.88	30.00	
5240MHz	Pass	3.05	24.68	23.28	27.05	30.00	
5745MHz	Pass	4.20	23.61	23.60	26.62	30.00	
5785MHz	Pass	4.20	24.67	24.60	27.64	30.00	
5825MHz	Pass	4.20	25.94	25.96	28.96	30.00	
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
5190MHz	Pass	3.05	20.09	18.74	22.48	30.00	
5230MHz	Pass	3.05	23.57	22.02	25.87	30.00	
5755MHz	Pass	4.20	25.52	25.71	28.63	30.00	
5795MHz	Pass	4.20	26.17	25.93	29.06	30.00	
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
5210MHz	Pass	3.05	17.75	15.85	19.91	30.00	
5775MHz	Pass	4.20	24.10	23.95	27.03	30.00	
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
5180MHz	Pass	6.06	17.83	20.06	22.09	29.94	
5200MHz	Pass	6.06	22.90	24.59	26.84	29.94	
5240MHz	Pass	6.06	22.79	24.16	26.54	29.94	
5745MHz	Pass	7.21	23.74	23.77	26.77	28.79	
5785MHz	Pass	7.21	24.80	24.68	27.75	28.79	
5825MHz	Pass	7.21	23.90	23.88	26.90	28.79	
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
5190MHz	Pass	6.06	21.65	23.86	25.91	29.94	
5230MHz	Pass	6.06	22.41	24.60	26.65	29.94	
5755MHz	Pass	7.21	26.01	25.50	28.77	28.79	
5795MHz	Pass	7.21	24.98	25.46	28.24	28.79	
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
5210MHz	Pass	6.06	20.30	22.60	24.61	29.94	
5775MHz	Pass	7.21	25.45	25.39	28.43	28.79	

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

SPORTON INTERNATIONAL INC.



PSD Result Appendix D

Summary

Mode	PD	EIRP PD
	(dBm/RBW)	(dBm/RBW)
802.11a_(6Mbps)_2TX	-	-
5.15-5.25GHz	15.95	22.01
5.725-5.85GHz	14.84	22.05
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	14.90	20.96
5.725-5.85GHz	14.99	22.20
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	10.85	16.91
5.725-5.85GHz	12.72	19.93
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	2.52	8.58
5.725-5.85GHz	8.85	16.06
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	15.28	21.34
5.725-5.85GHz	15.93	23.14
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	12.92	18.98
5.725-5.85GHz	13.65	20.86
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-
5.15-5.25GHz	11.04	17.10
5.725-5.85GHz	13.53	20.74

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

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Appendix D **PSD Result** 

## Result

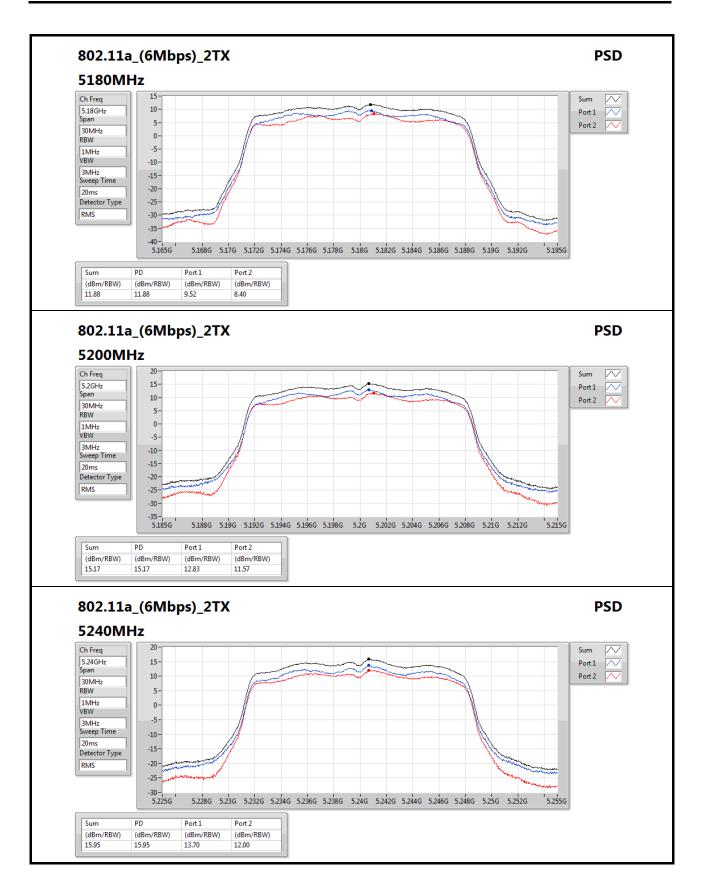
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
	1	(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_(6Mbps)_2TX	-	-	-	-	-	-
5180MHz	Pass	6.06	9.52	8.40	11.88	16.94
5200MHz	Pass	6.06	12.83	11.57	15.17	16.94
5240MHz	Pass	6.06	13.70	12.00	15.95	16.94
5745MHz	Pass	7.21	12.10	11.88	14.84	28.79
5785MHz	Pass	7.21	11.68	11.33	14.29	28.79
5825MHz	Pass	7.21	10.84	11.14	13.95	28.79
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	6.06	9.96	8.60	12.28	16.94
5200MHz	Pass	6.06	12.35	11.01	14.62	16.94
5240MHz	Pass	6.06	12.66	11.20	14.90	16.94
5745MHz	Pass	7.21	9.99	9.83	12.82	28.79
5785MHz	Pass	7.21	11.26	11.29	14.29	28.79
5825MHz	Pass	7.21	12.25	12.04	14.99	28.79
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	6.06	5.12	4.02	7.46	16.94
5230MHz	Pass	6.06	8.66	7.24	10.85	16.94
5755MHz	Pass	7.21	9.10	9.41	12.22	28.79
5795MHz	Pass	7.21	9.81	9.64	12.72	28.79
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	6.06	0.25	-1.20	2.52	16.94
5775MHz	Pass	7.21	6.25	6.26	8.85	28.79
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5180MHz	Pass	6.06	9.80	9.03	12.41	16.94
5200MHz	Pass	6.06	12.79	11.25	15.07	16.94
5240MHz	Pass	6.06	13.14	11.25	15.28	16.94
5745MHz	Pass	7.21	11.10	10.01	13.56	28.79
5785MHz	Pass	7.21	14.34	10.91	15.93	28.79
5825MHz	Pass	7.21	9.15	9.10	12.06	28.79
802.11ac VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5190MHz	Pass	6.06	9.76	10.12	12.92	16.94
5230MHz	Pass	6.06	10.01	9.15	12.60	16.94
5755MHz	Pass	7.21	12.58	7.66	13.65	28.79
5795MHz	Pass	7.21	11.44	7.61	12.94	28.79
802.11ac VHT80-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5210MHz	Pass	6.06	9.40	6.02	11.04	16.94
5775MHz	Pass	7.21	12.25	7.61	13.53	28.79

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

SPORTON INTERNATIONAL INC.

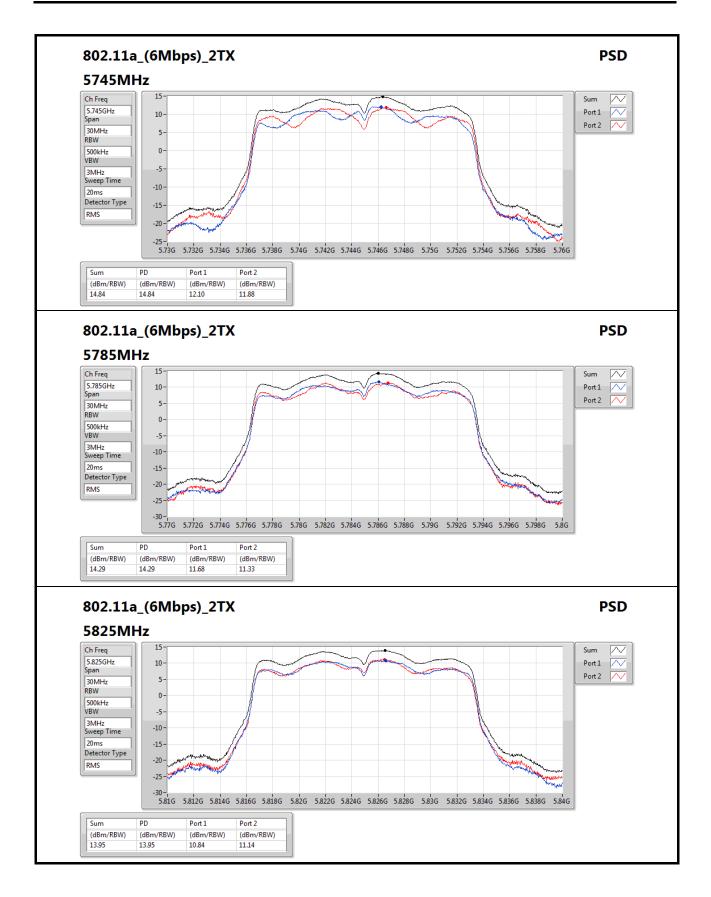
TEL: 886-3-327-3456 FAX: 886-3-327-0973 Page No. : 2 of 12





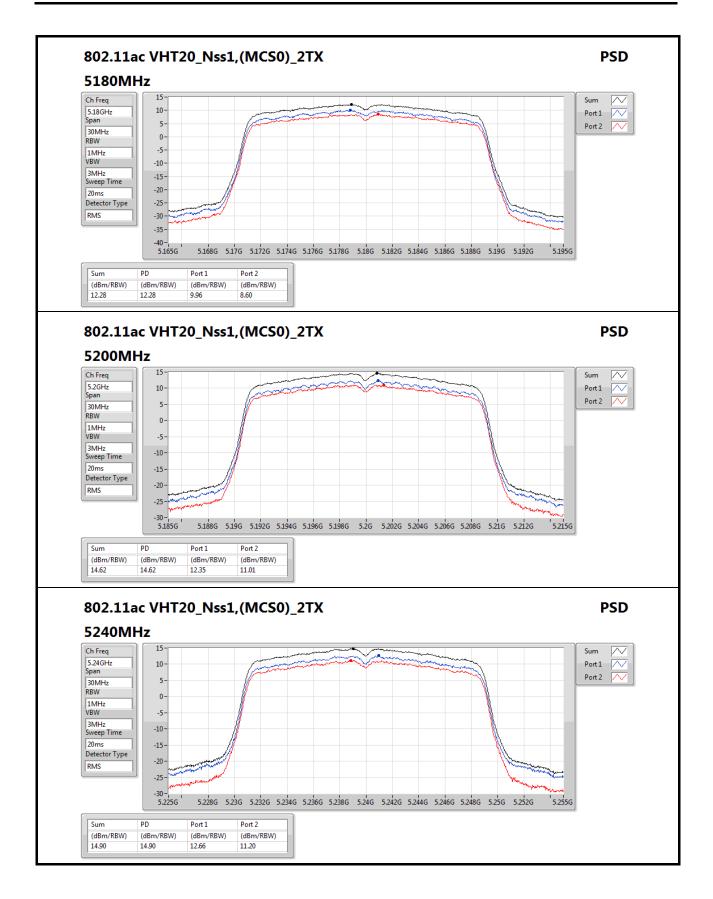
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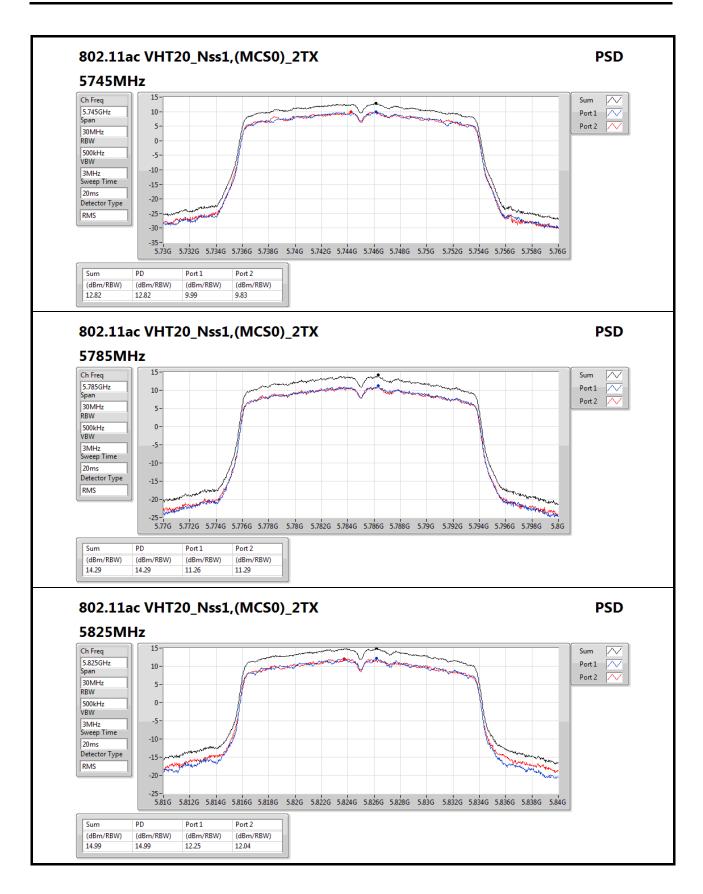


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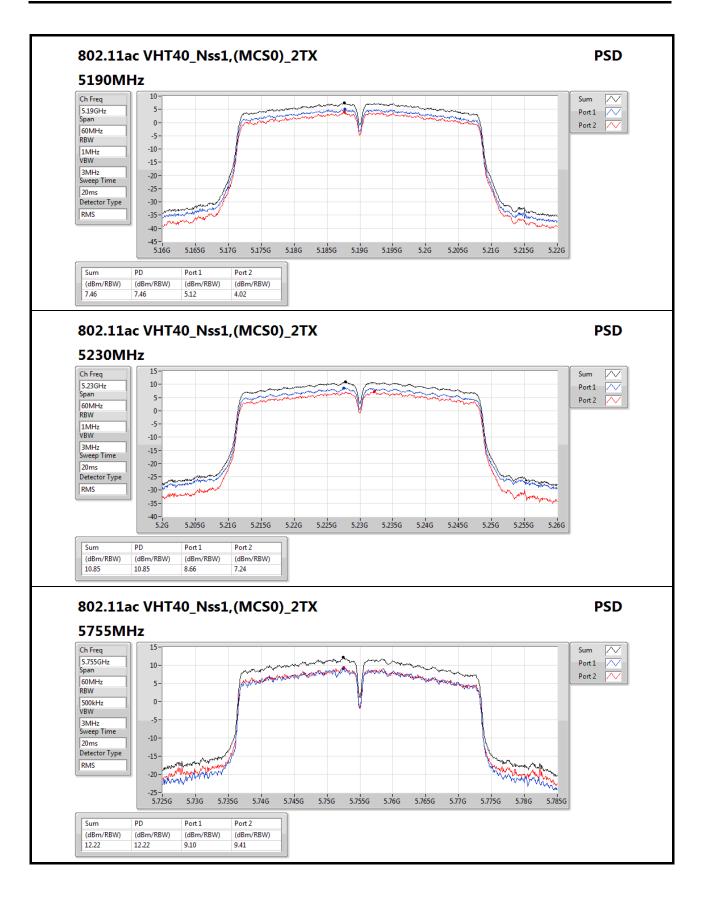




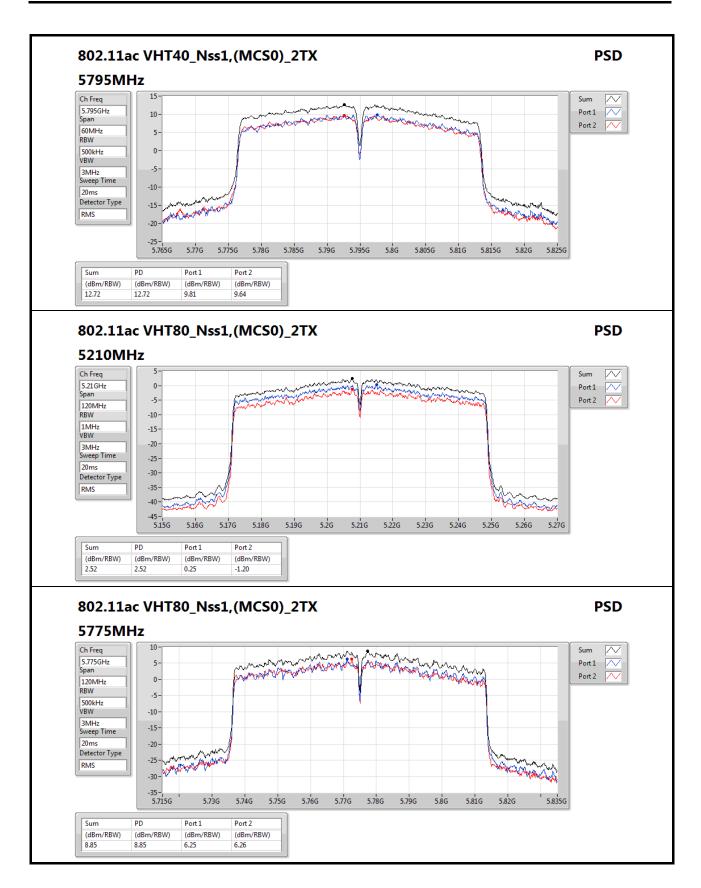


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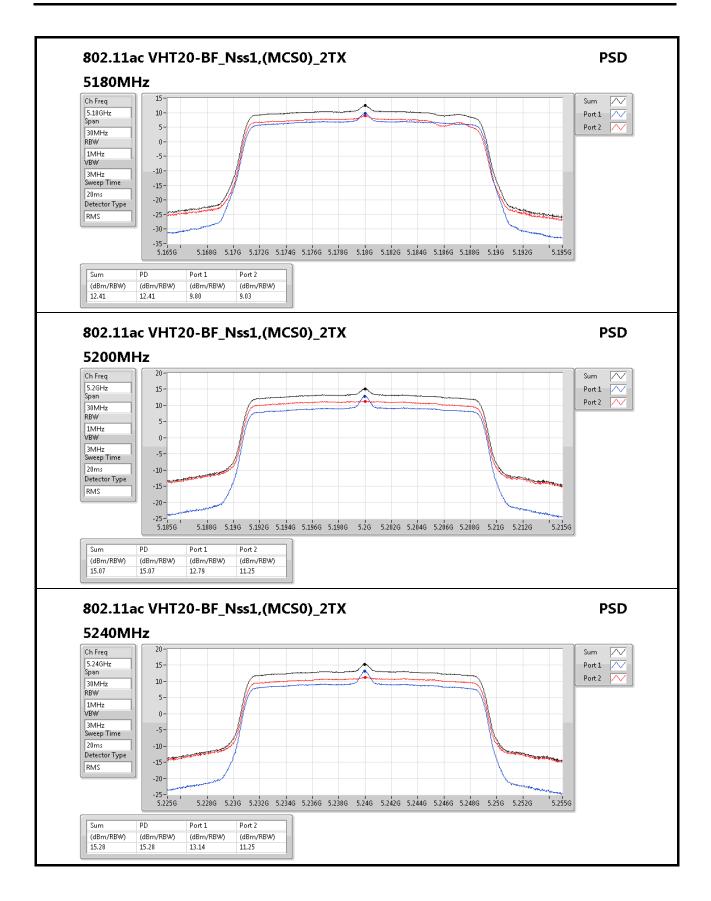






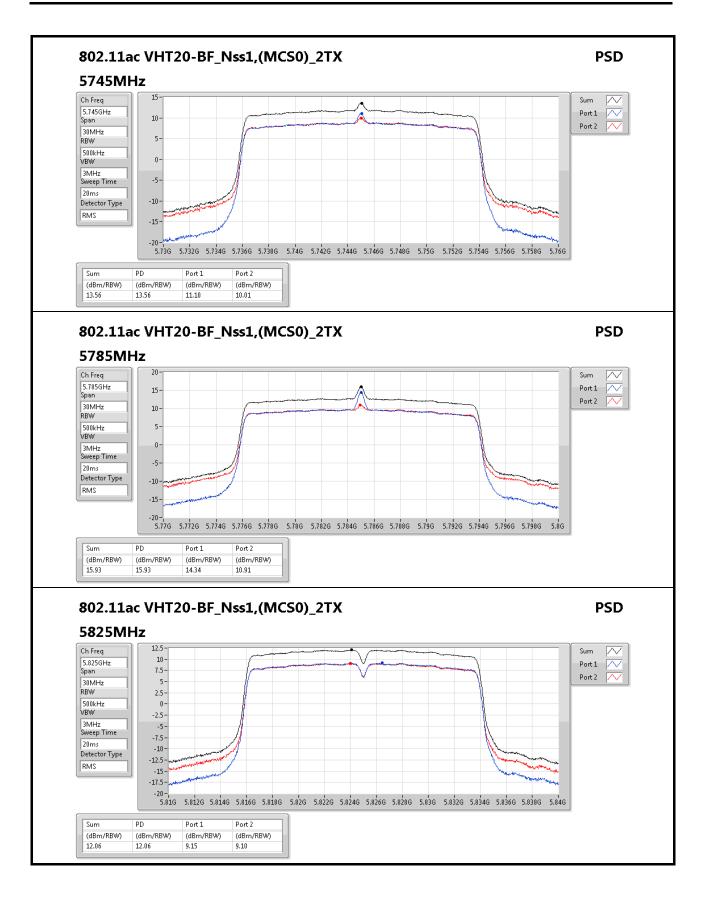
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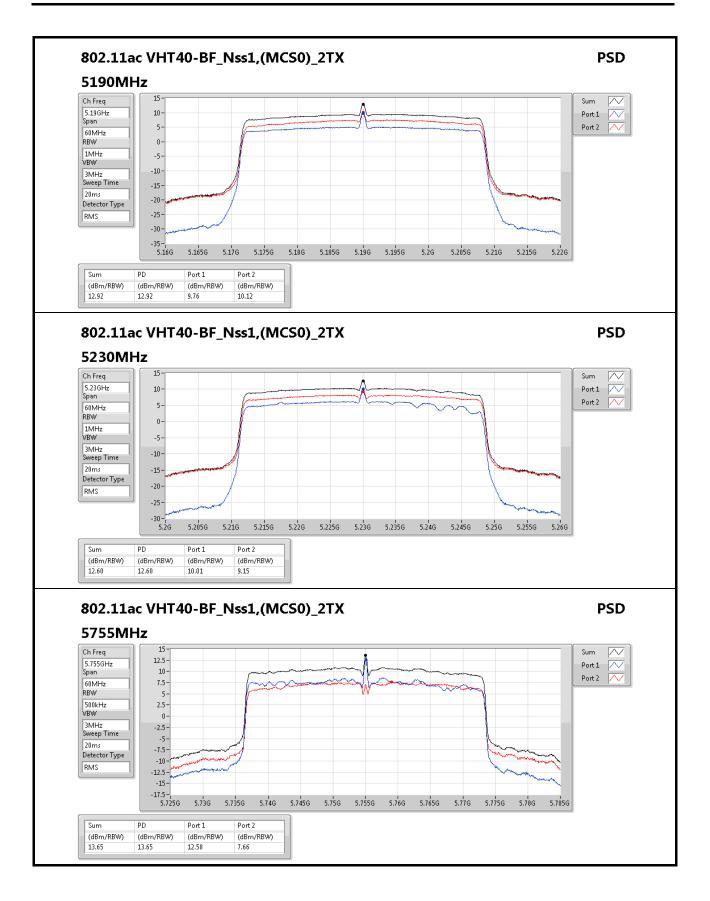


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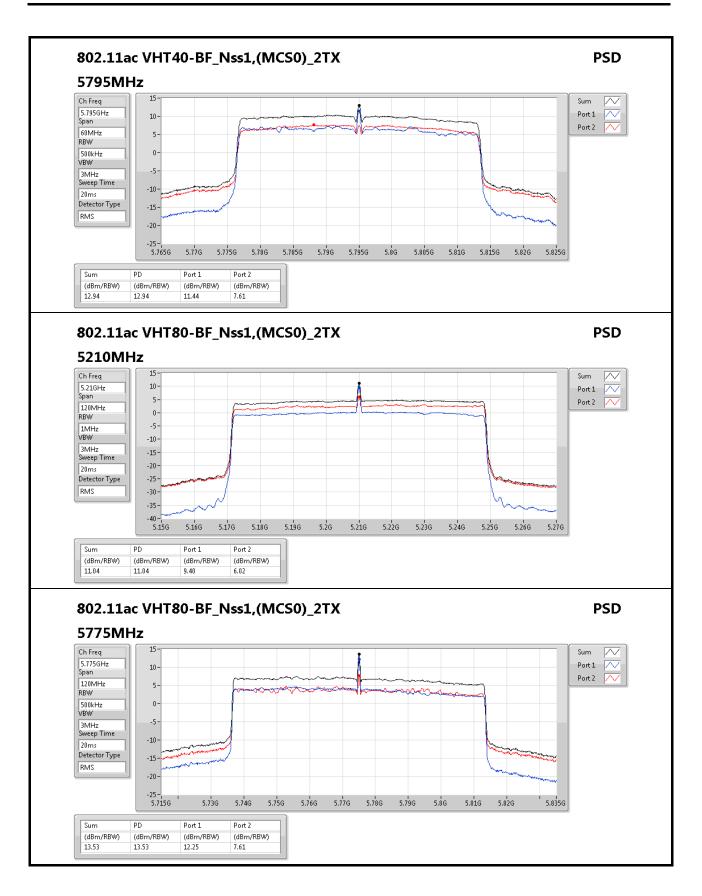




Appendix D

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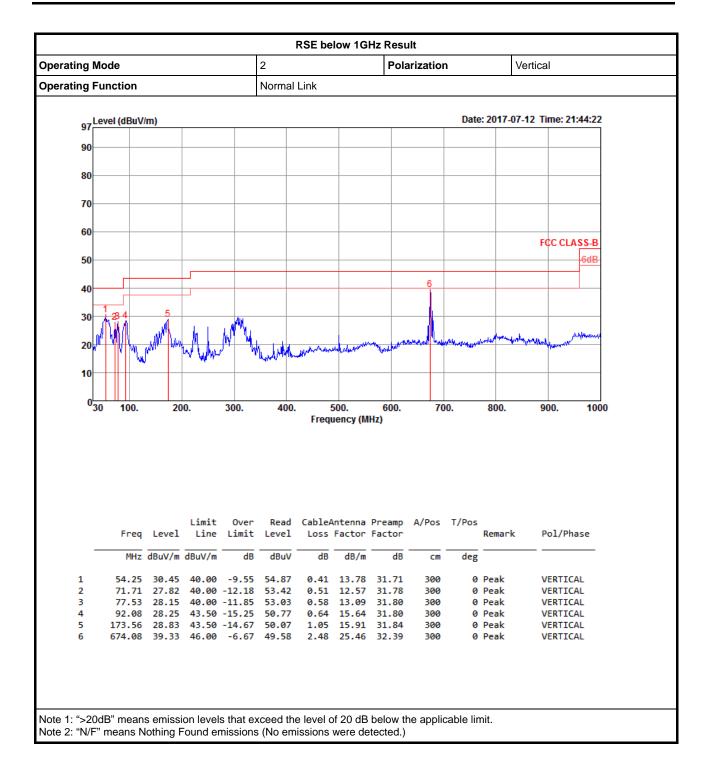




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1 2		dBuV/m	Line	Limit dB	dBuV	CableA Loss	Antenna Factor	Preamp Factor		deg	Remark ————		ol/Pha	
2 2	MHz 282.20 286.08	dBuV/m 31.82 33.64	Line  dBuV/m  46.00 46.00	Limit  dB  -14.18 -12.36	dBuV 49.19 51.30	CableA Loss dB 1.44 1.46	dB/m 19.34	Preamp Factor dB 31.95 31.94	cm 100 100	deg 0	Peak Peak	— -	ORIZON ORIZON	TAL TAL
2 2 3 3 2	MHz 282.20 286.08 297.72	31.82 33.64 30.22	Line dBuV/m 46.00 46.00 46.00	Limit dB -14.18 -12.36 -15.78	dBuV 49.19 51.30 48.04	CableA Loss dB 1.44 1.46 1.50	19.34 19.42	Preamp Factor dB 31.95 31.94 31.96	Cm 100 100 100	deg 0 0	Peak Peak Peak	— - Н Н	ORIZON ORIZON ORIZON	TAL TAL TAL
2 2 3 2 4 3	MHz 282.20 286.08	31.82 33.64 30.22	Line dBuV/m 46.00 46.00 46.00 46.00	Limit dB -14.18 -12.36 -15.78	dBuV 49.19 51.30 48.04 51.47	CableA Loss dB 1.44 1.46	dB/m 19.34	Preamp Factor dB 31.95 31.94	cm 100 100	deg 0 0	Peak Peak	— - Н Н Н	ORIZON ORIZON	TAL TAL TAL TAL

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.)





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## RSE TX above 1GHz Result

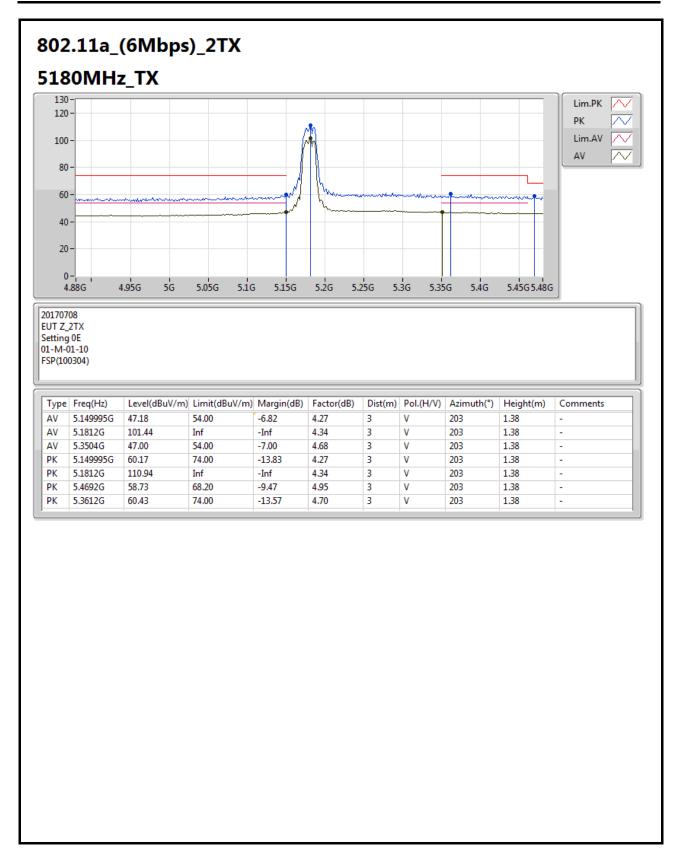
Appendix E.2

**Summary** 

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth	Height (m)	Comments
802.11ac VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-
5.15-5.25GHz	Pass	AV	5.149995G	53.99	54.00	-0.01	5.31	3	Н	92	1.07	-

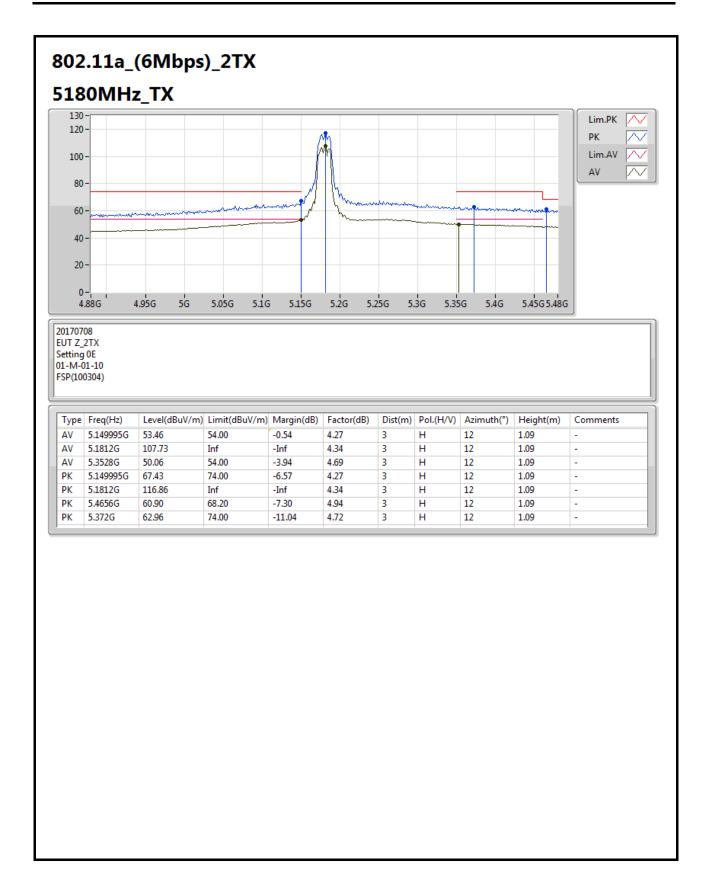
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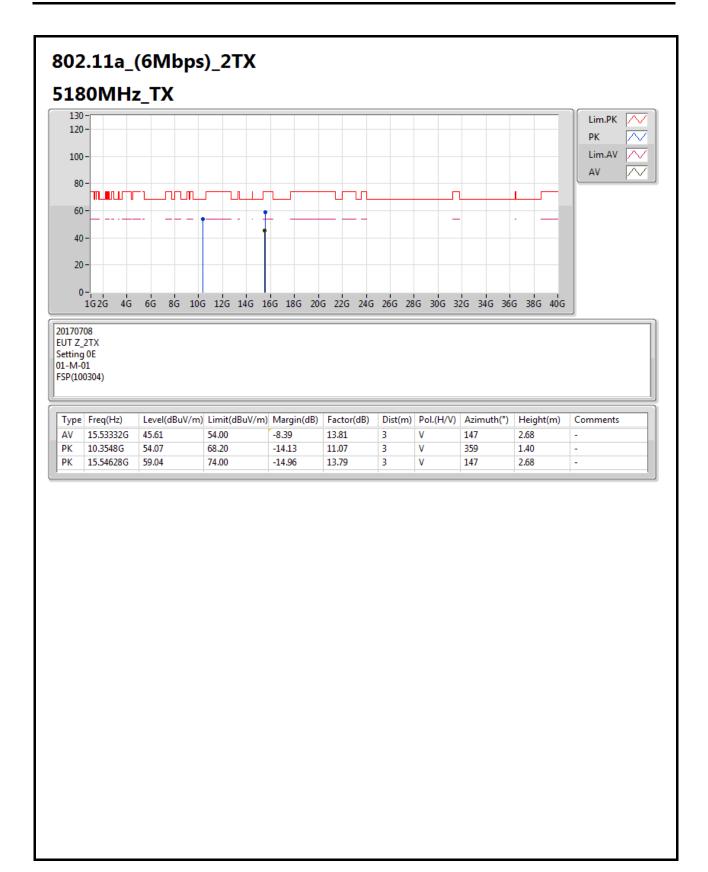


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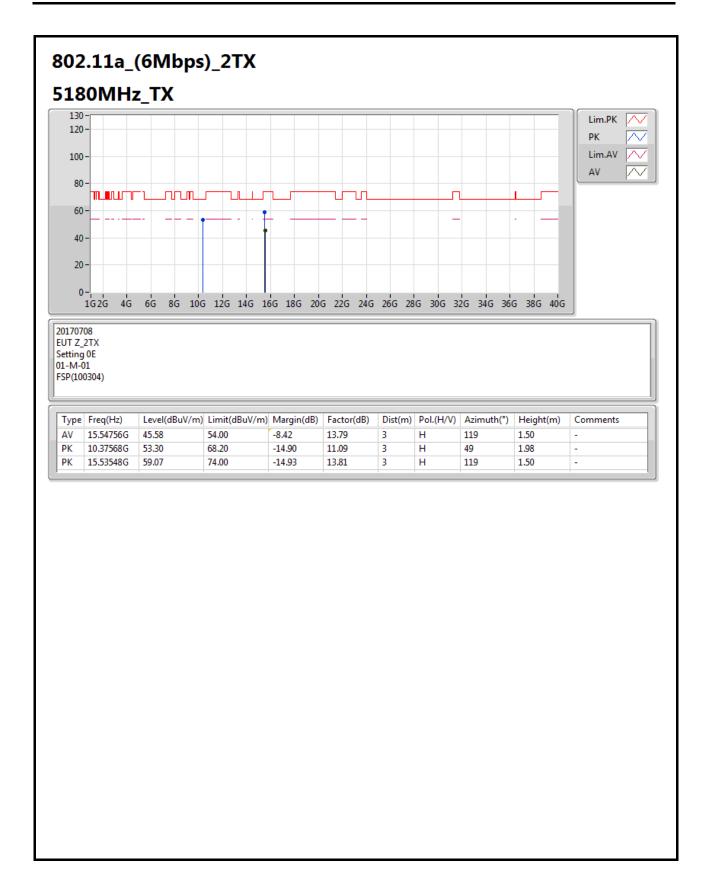






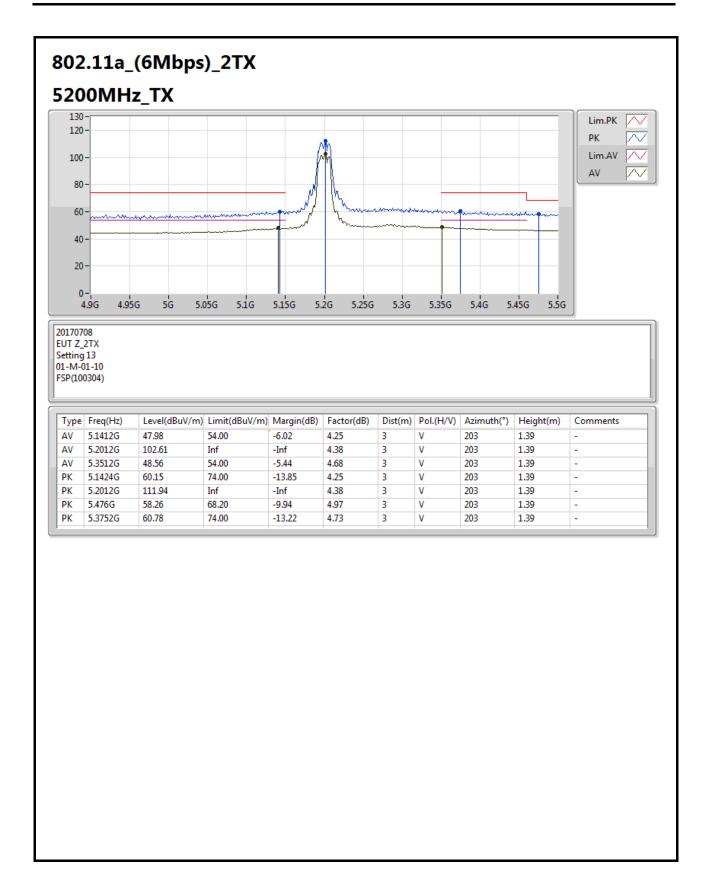






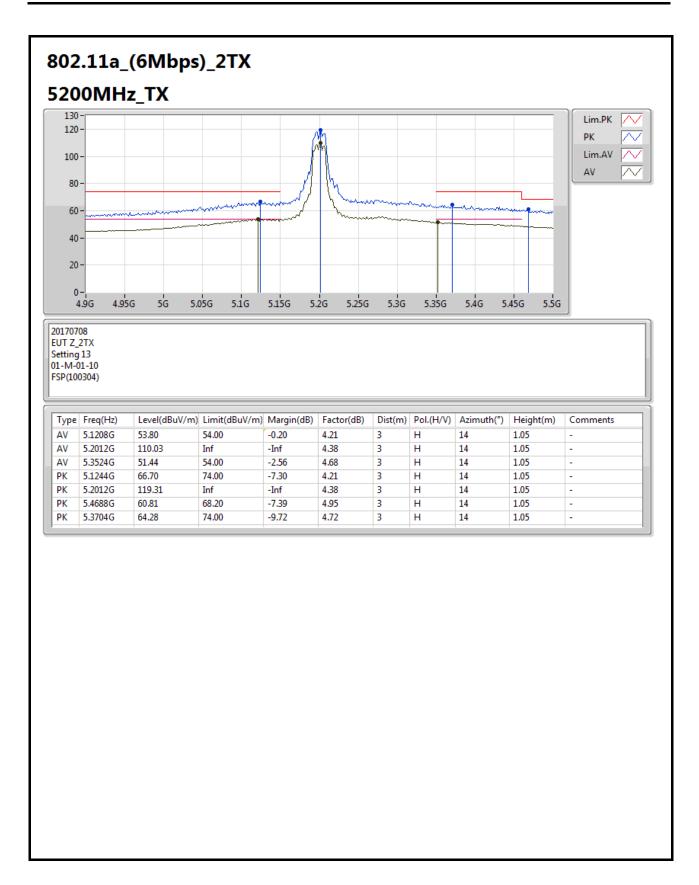
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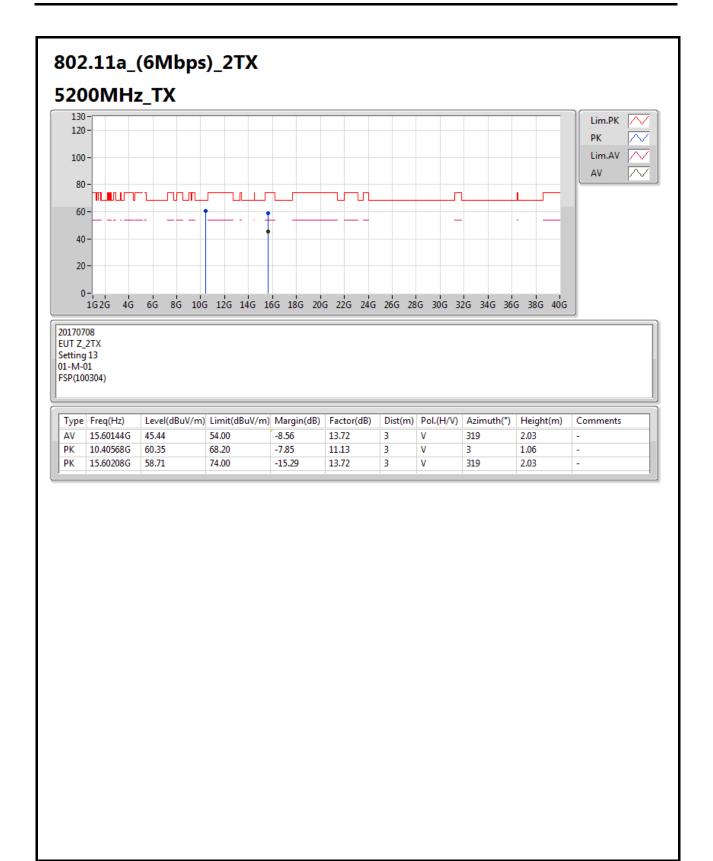


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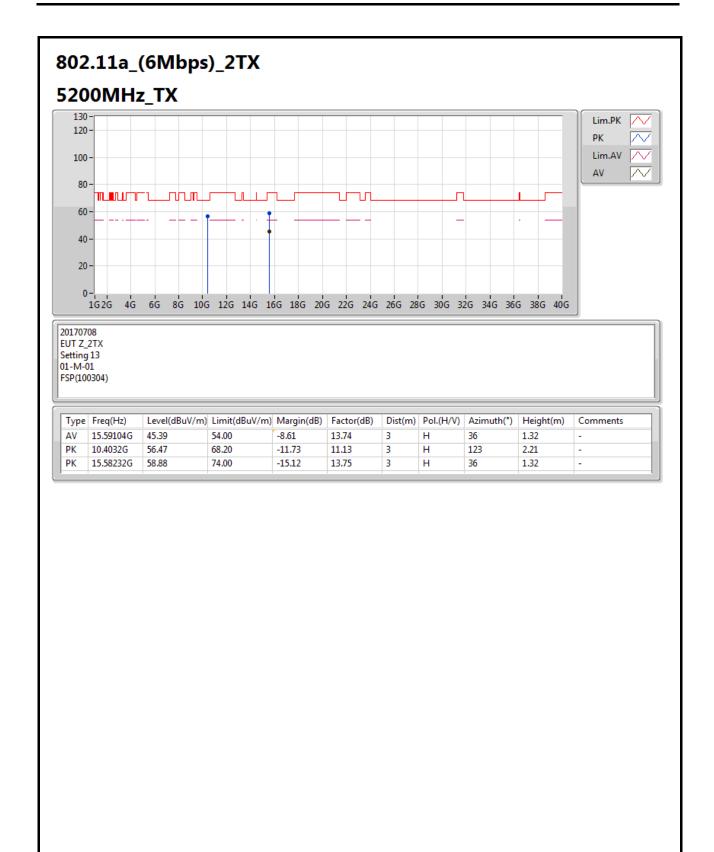






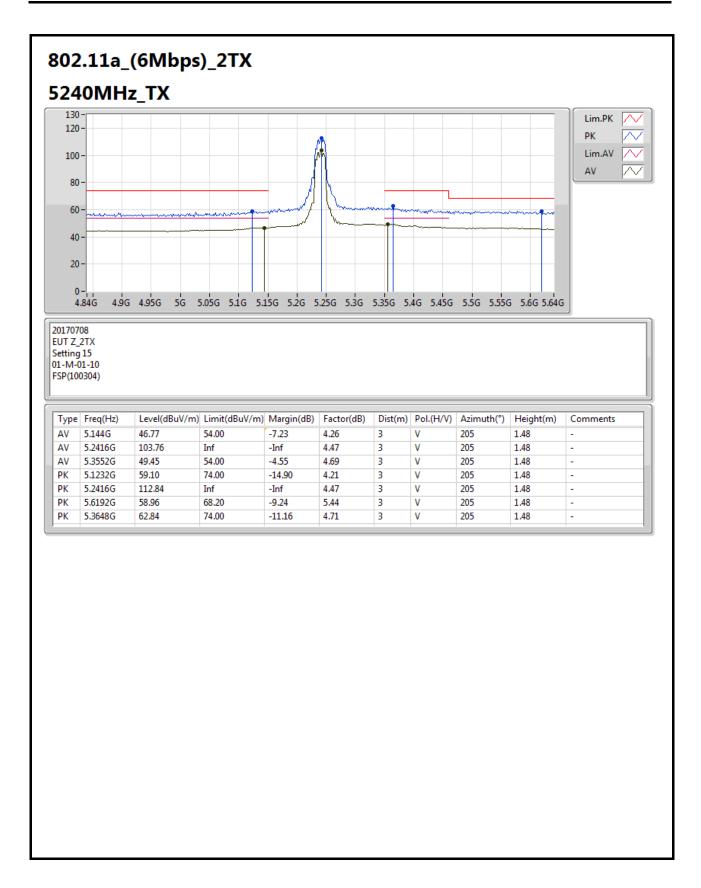






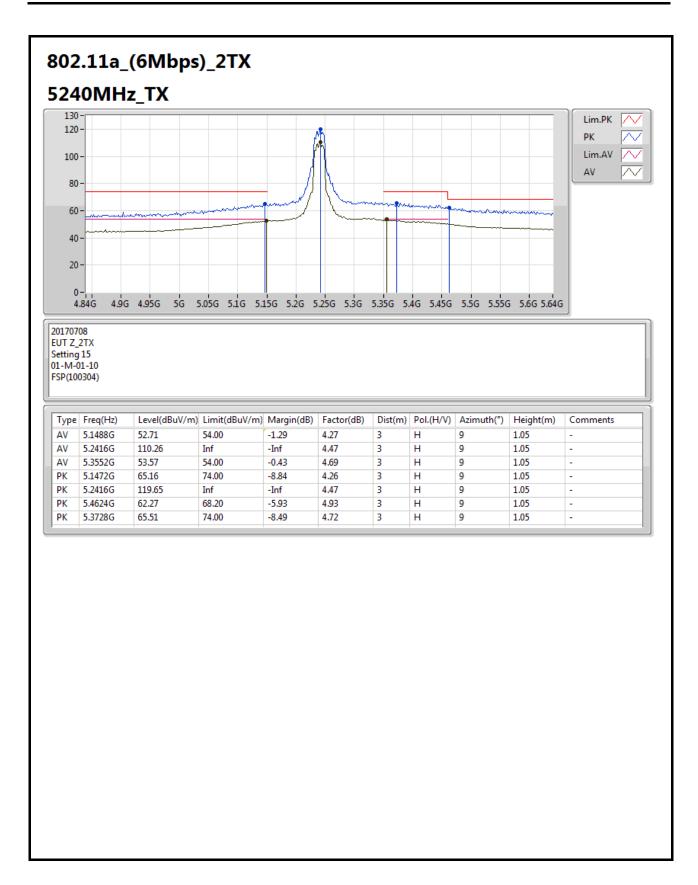
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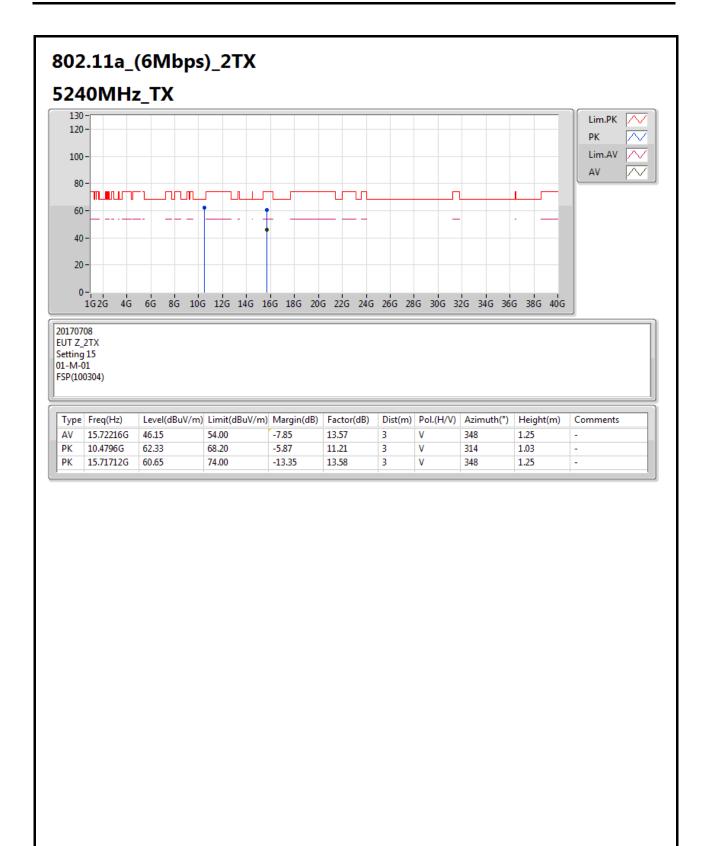


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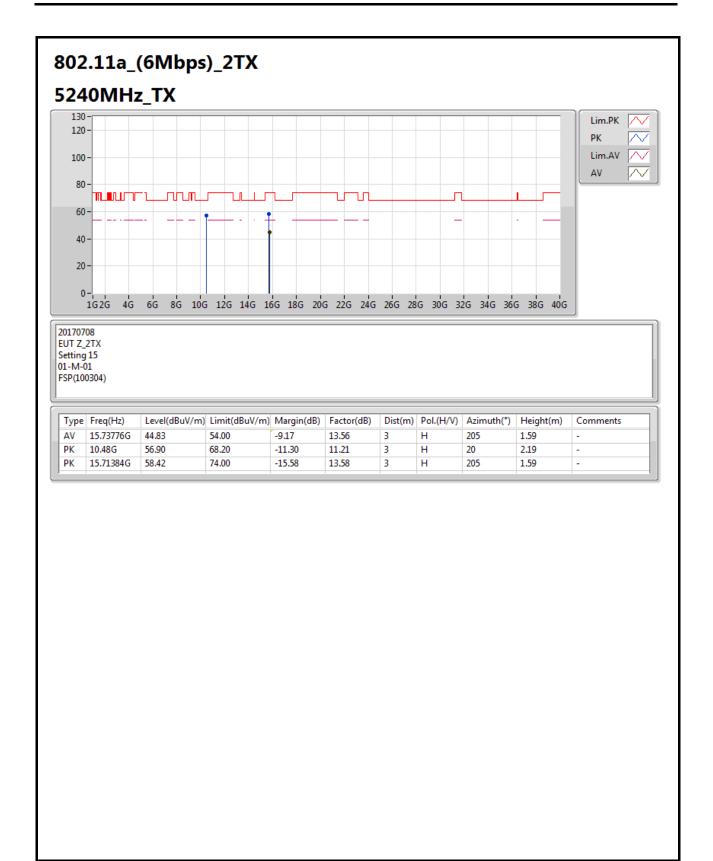




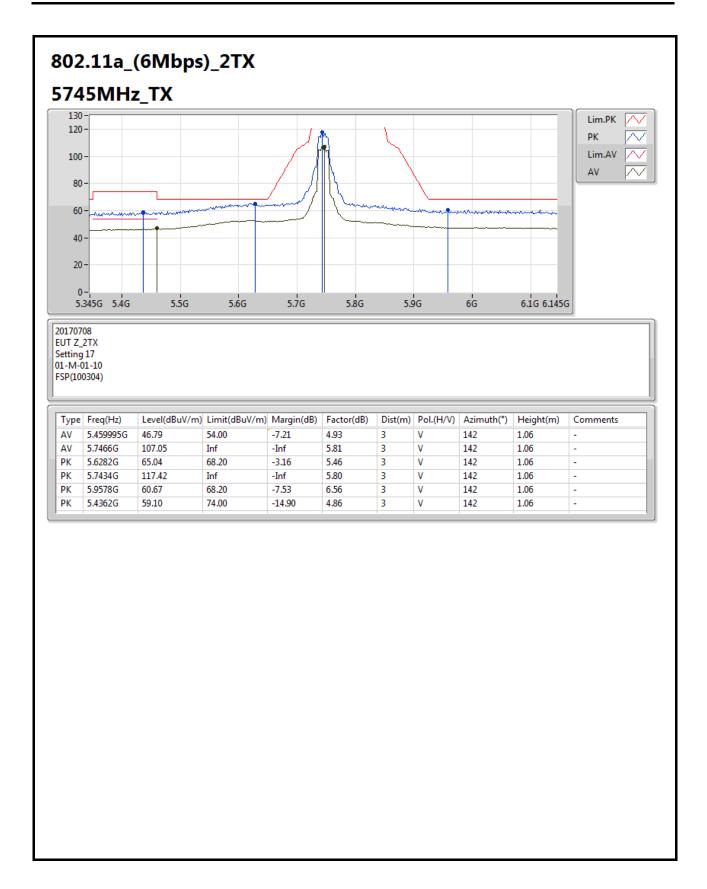






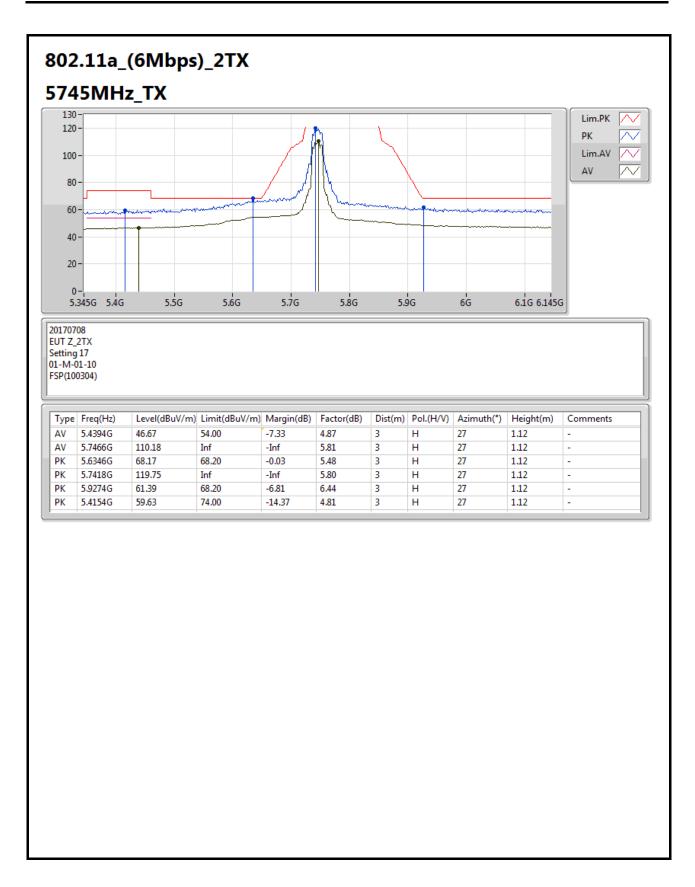




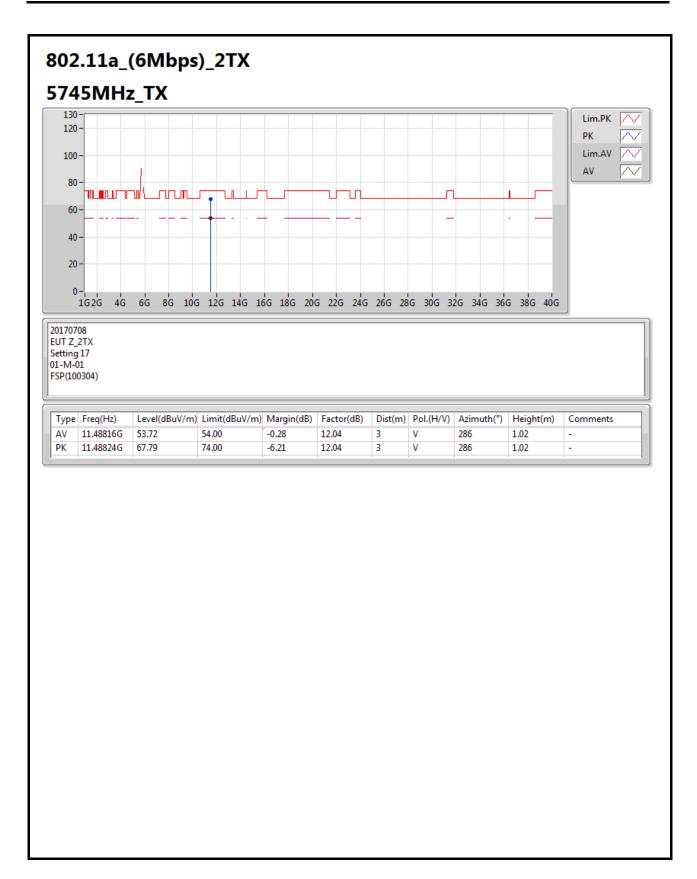


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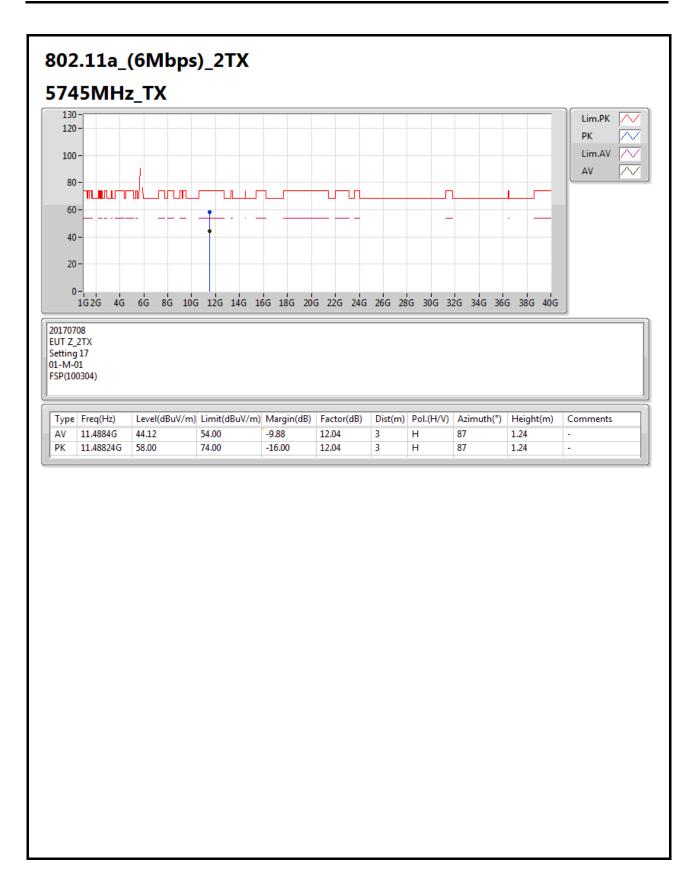




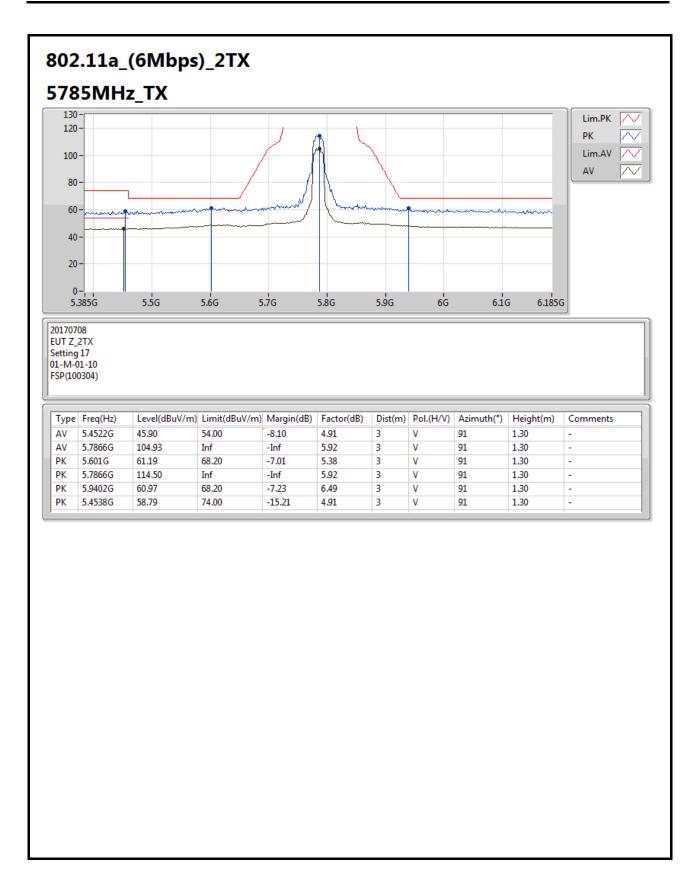




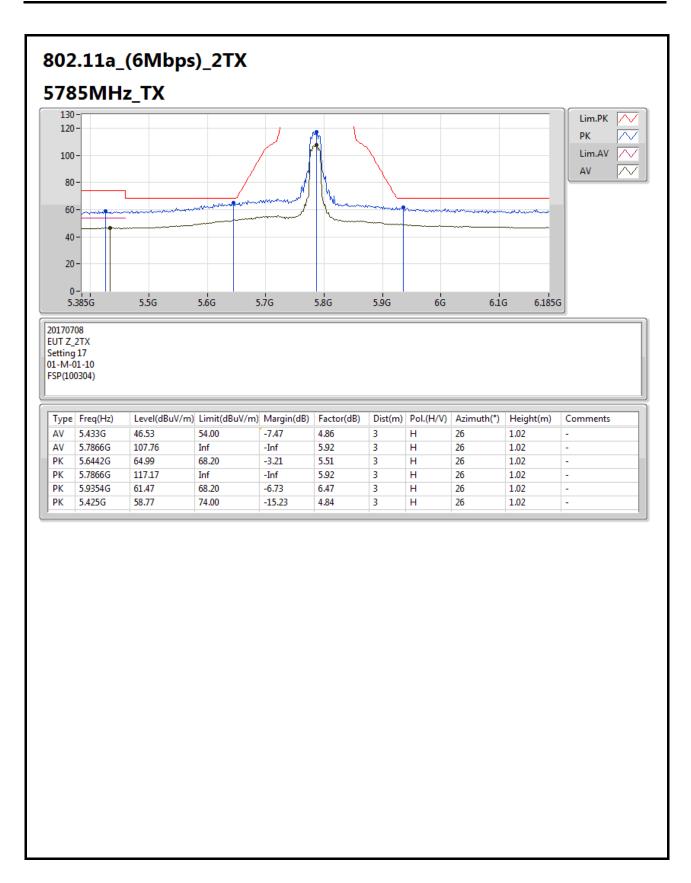






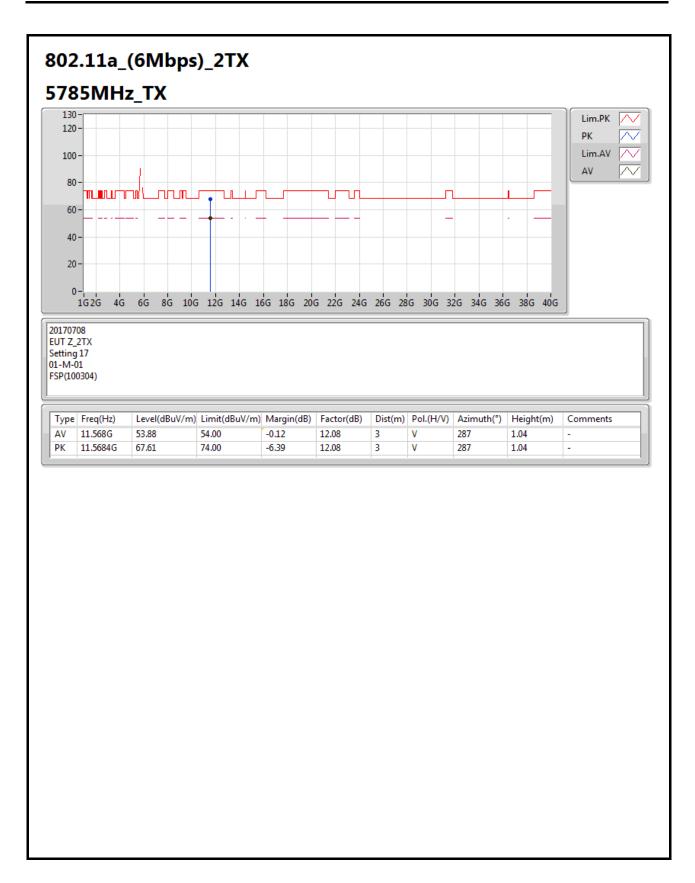




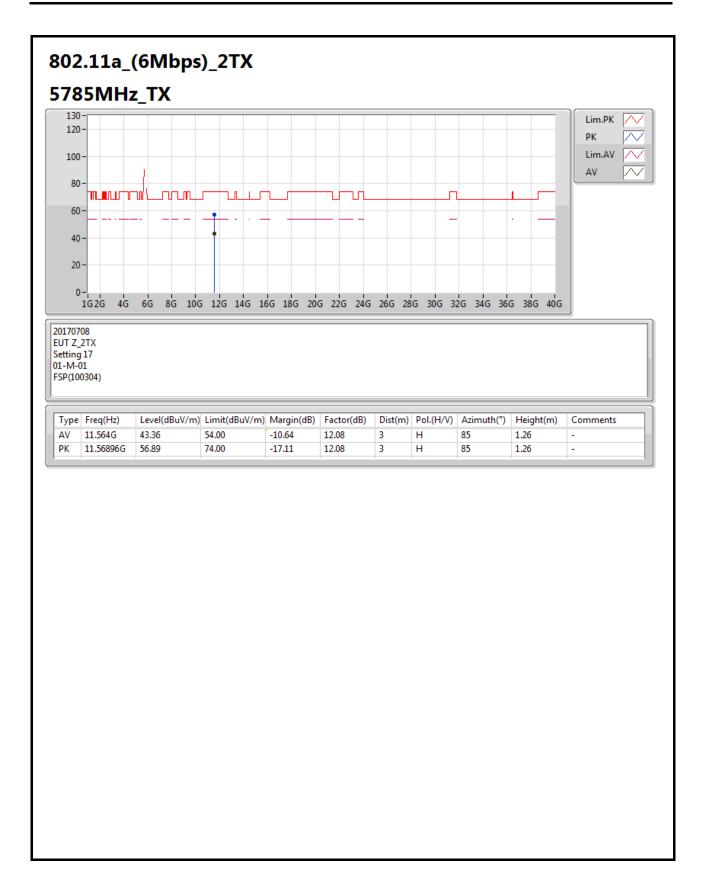


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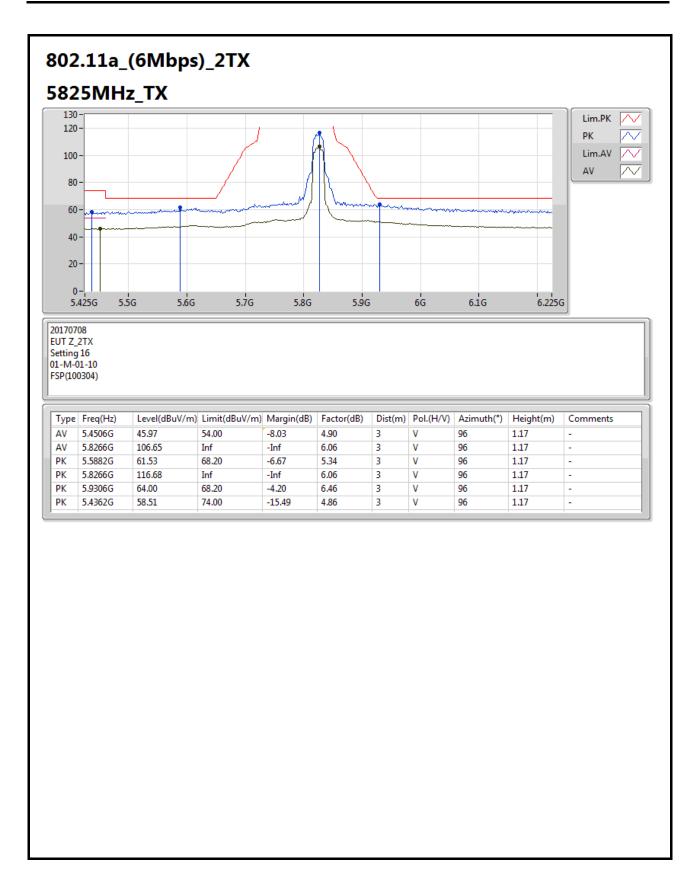




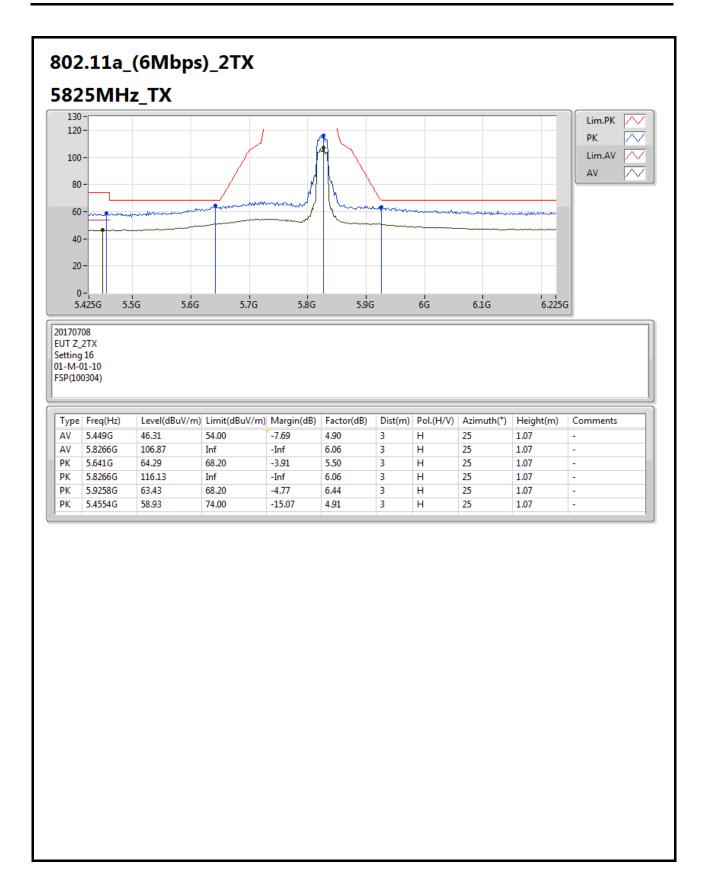




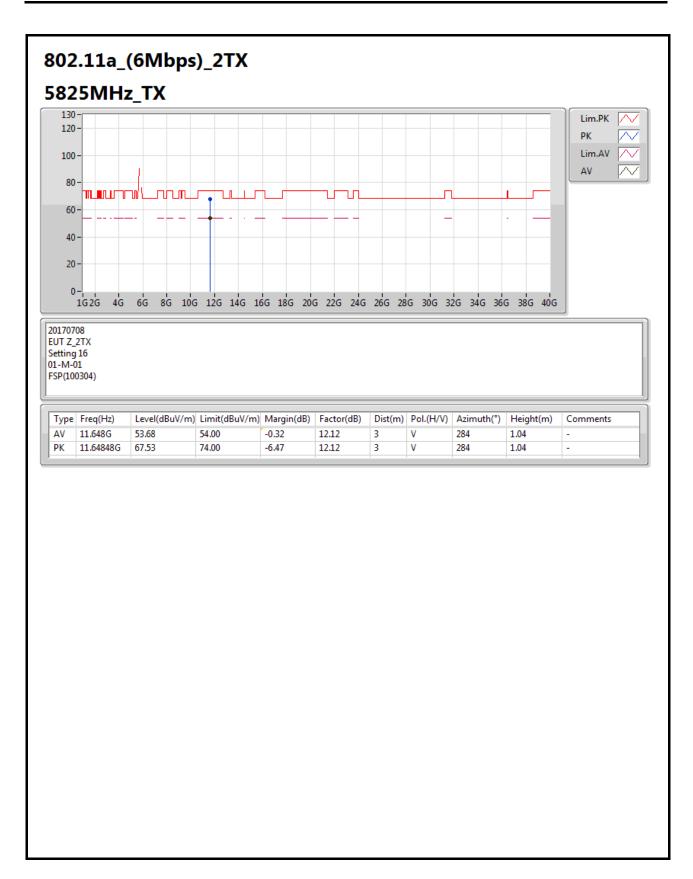




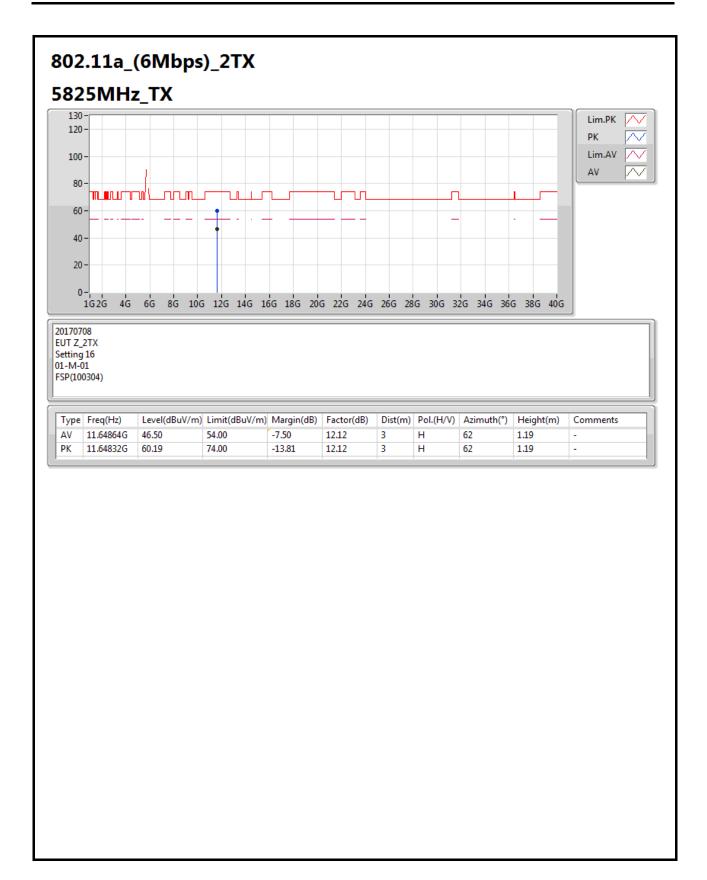






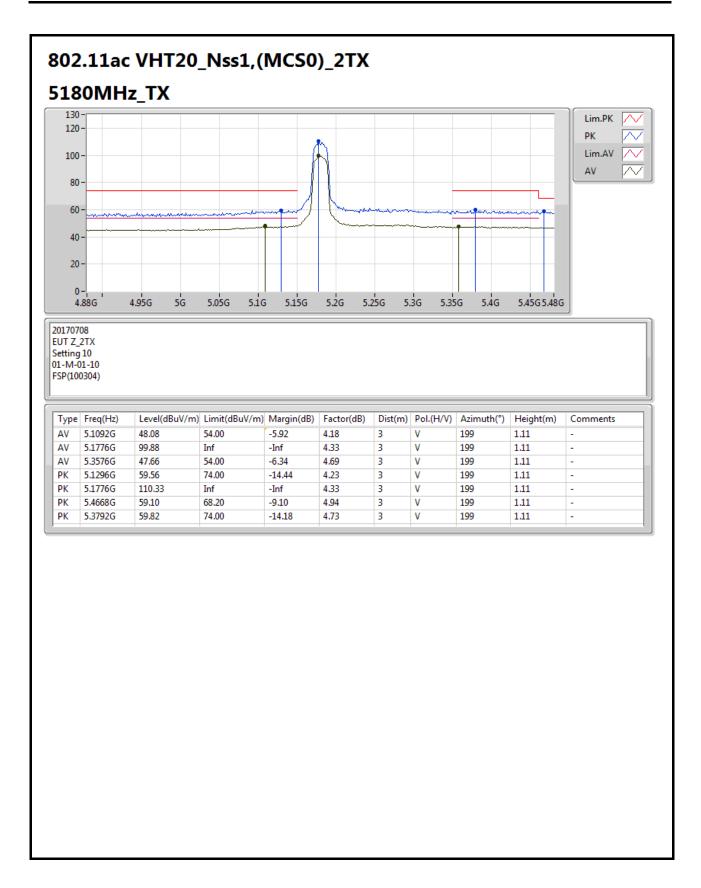




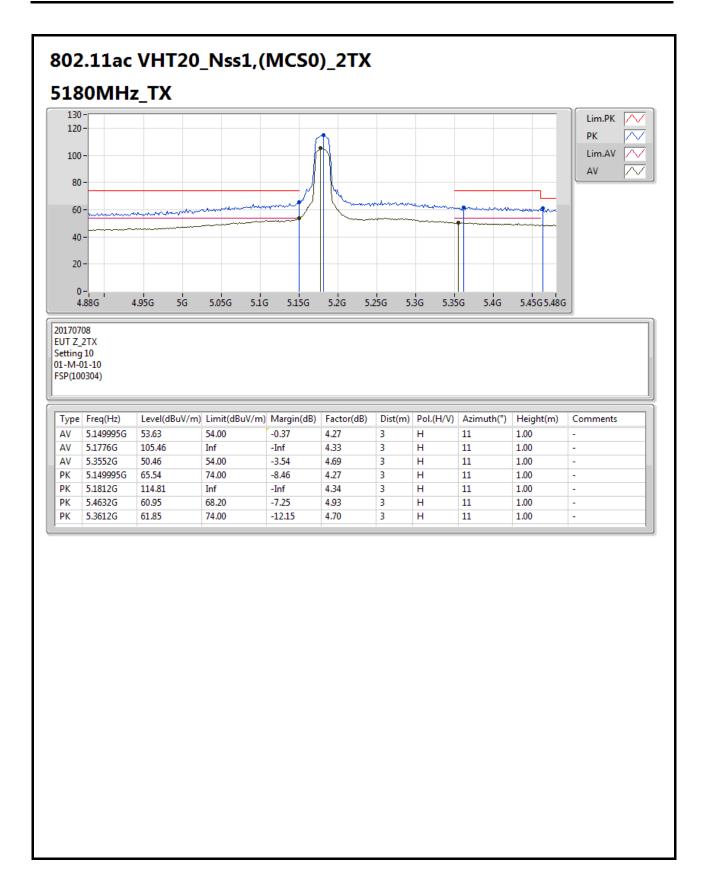


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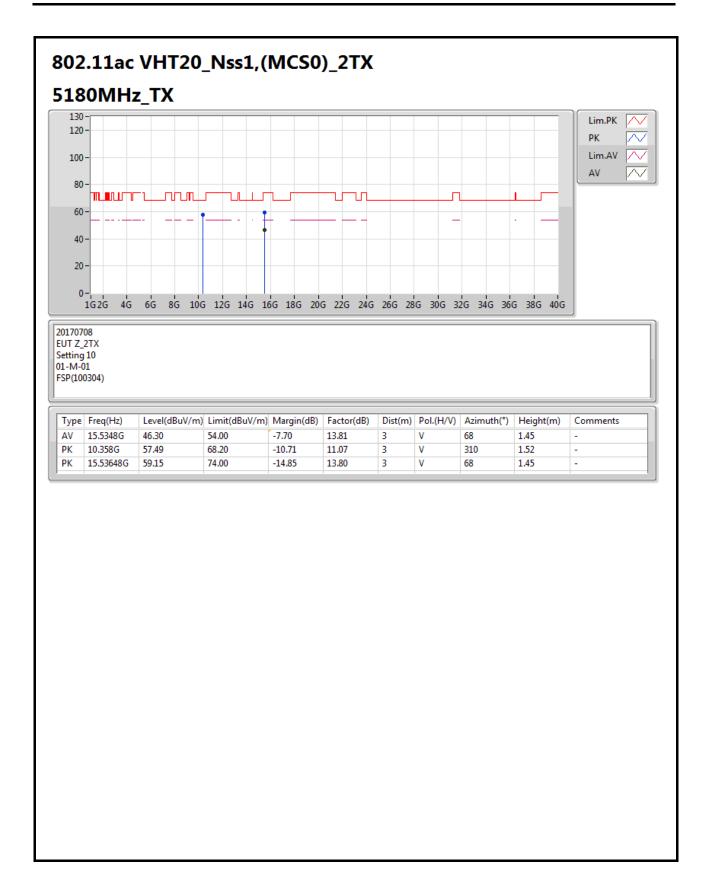




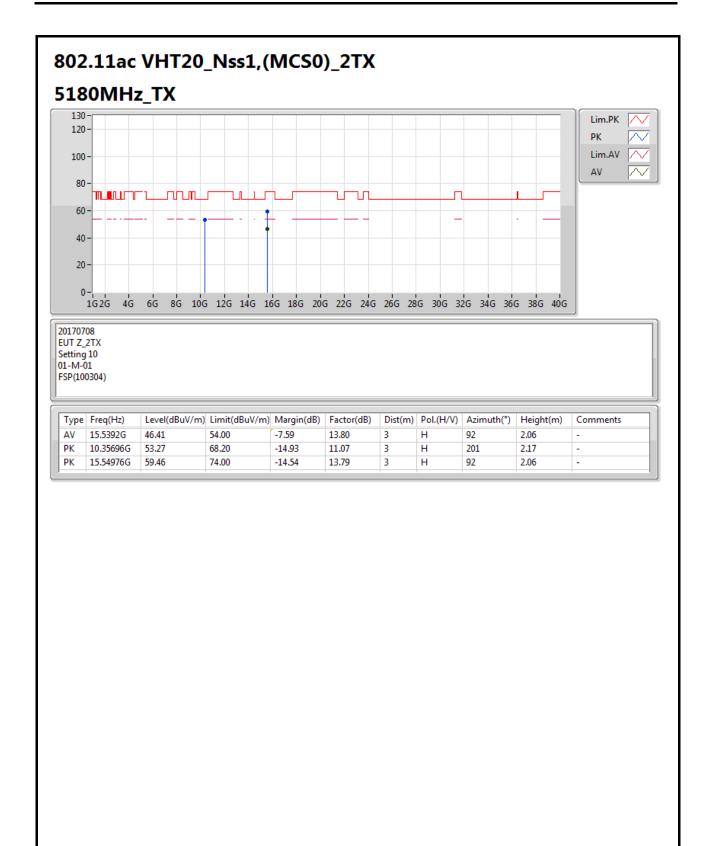




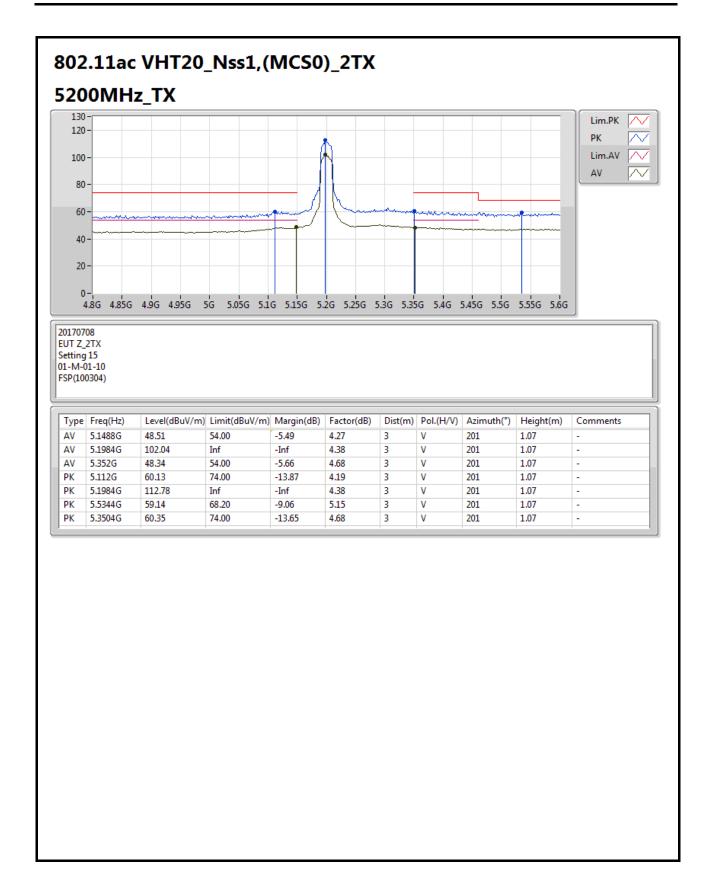




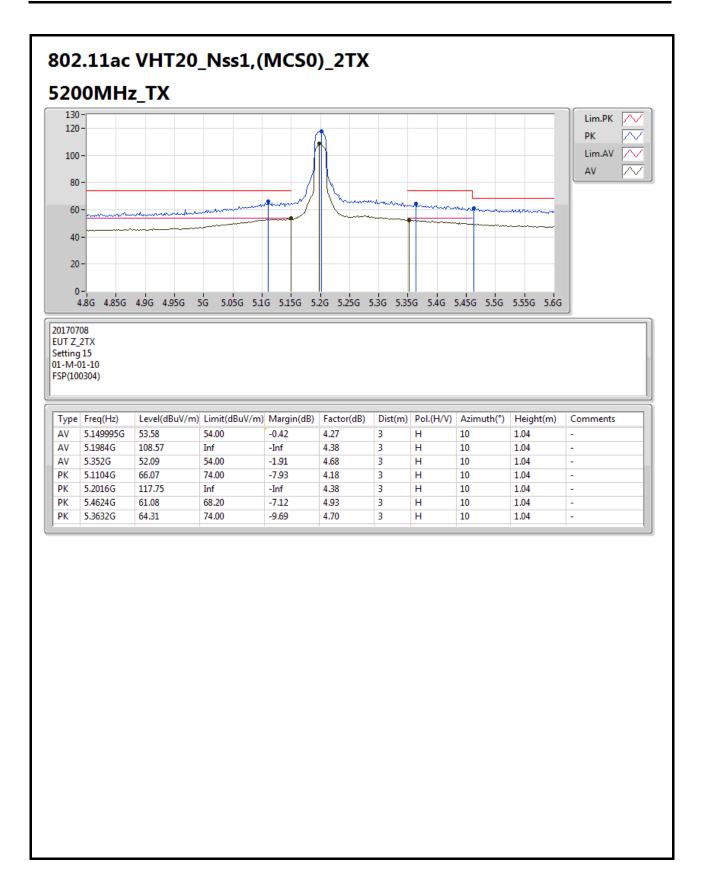






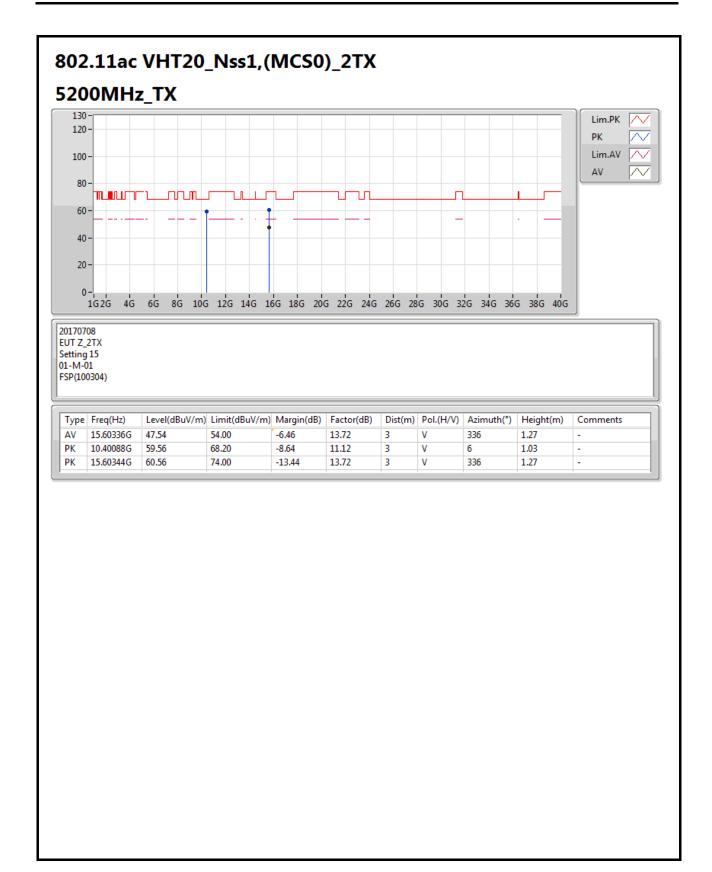




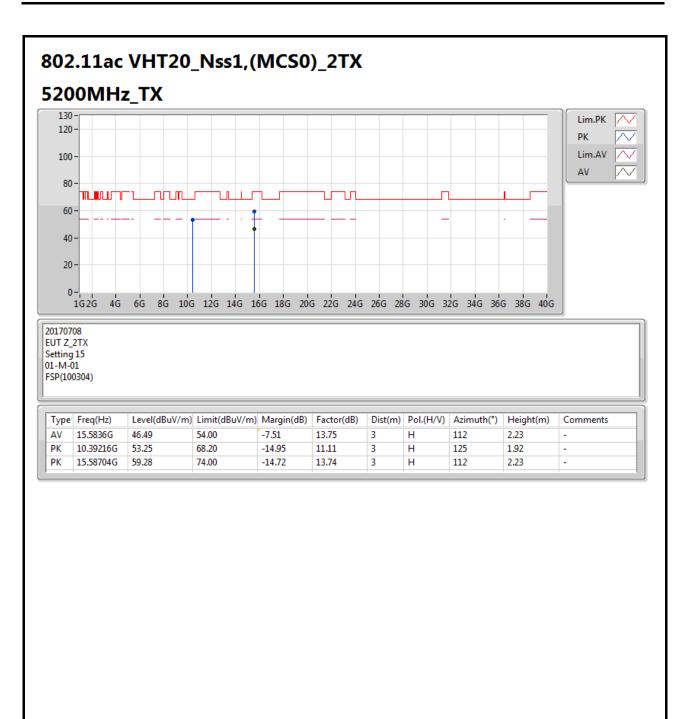


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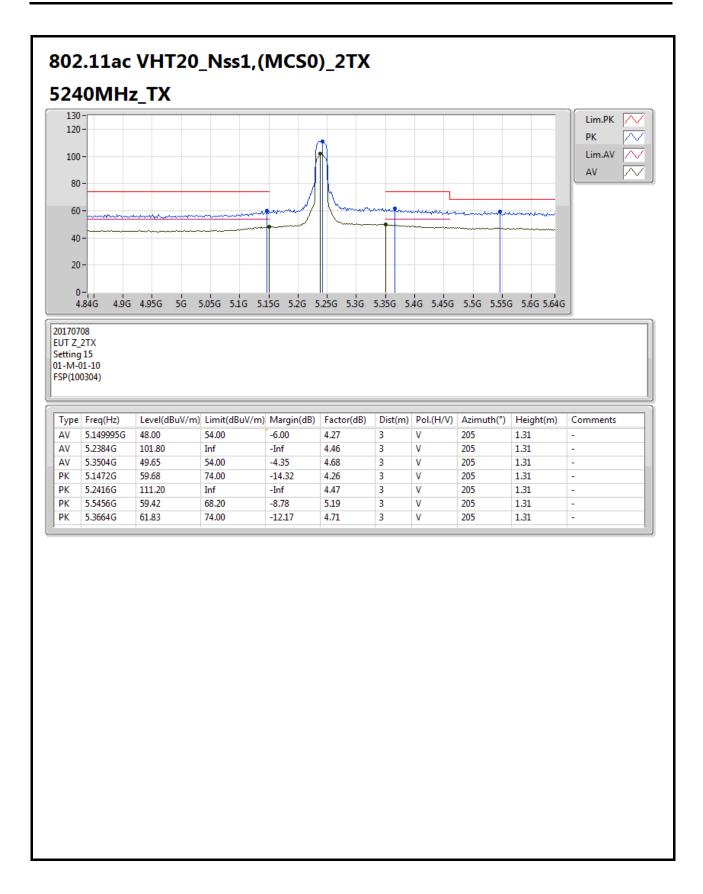




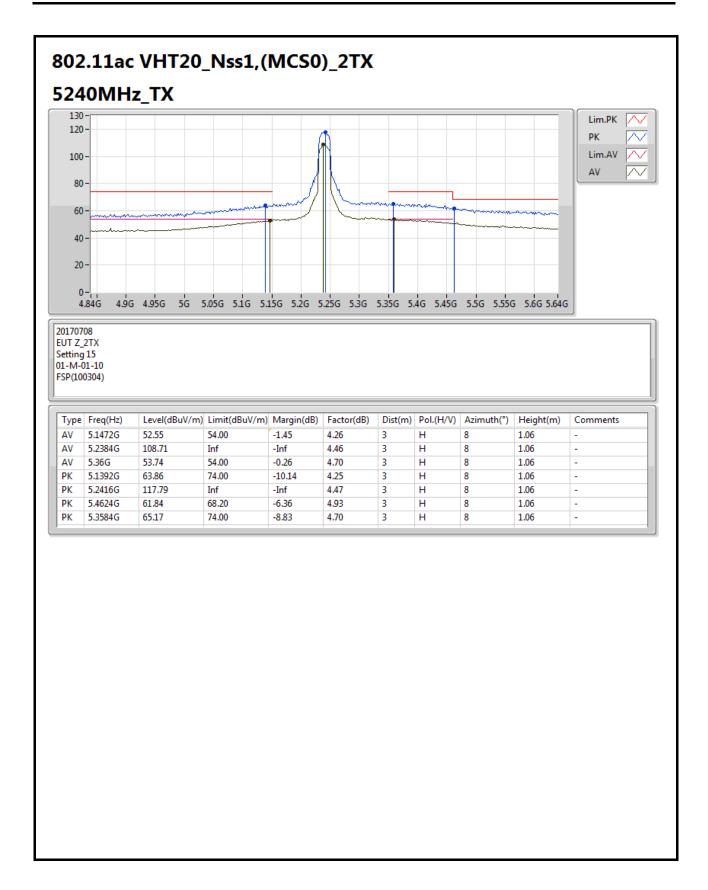




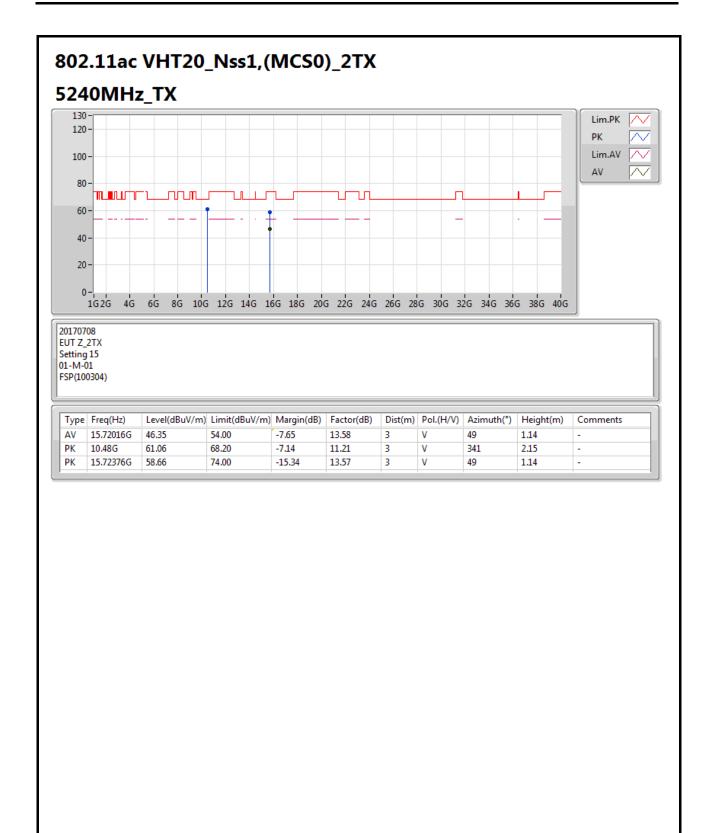






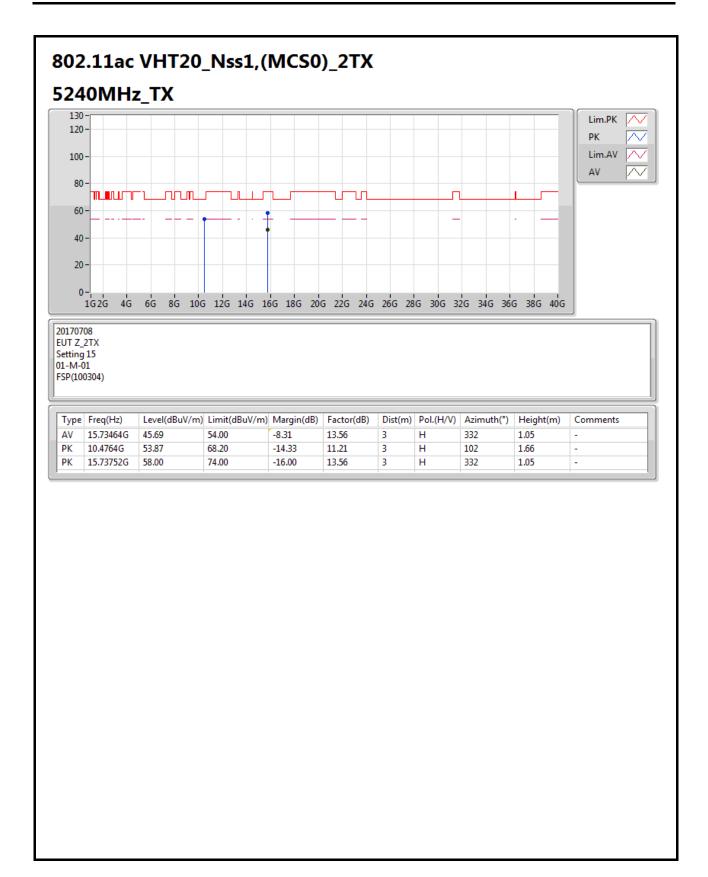




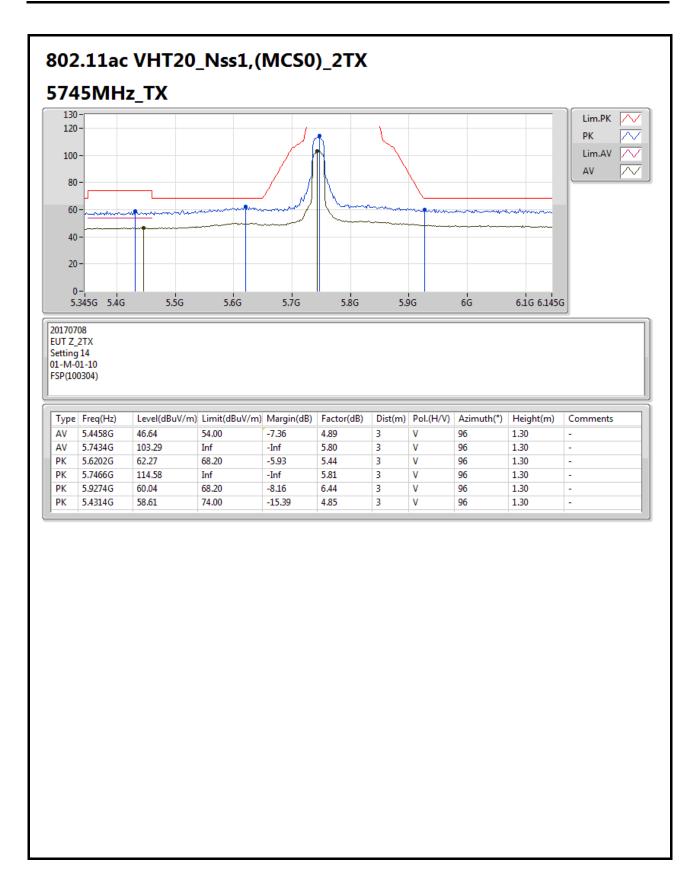


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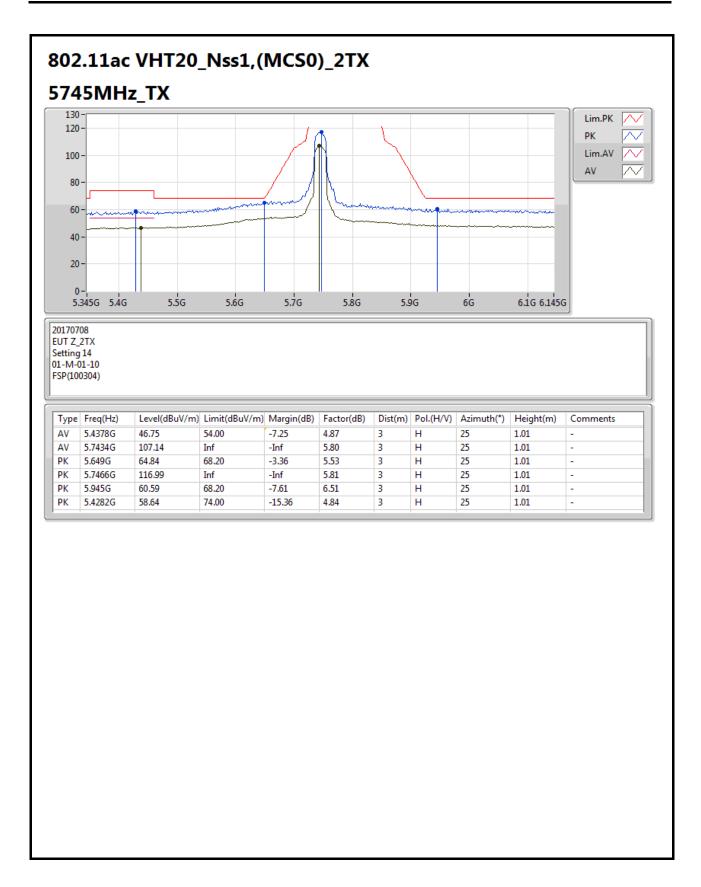




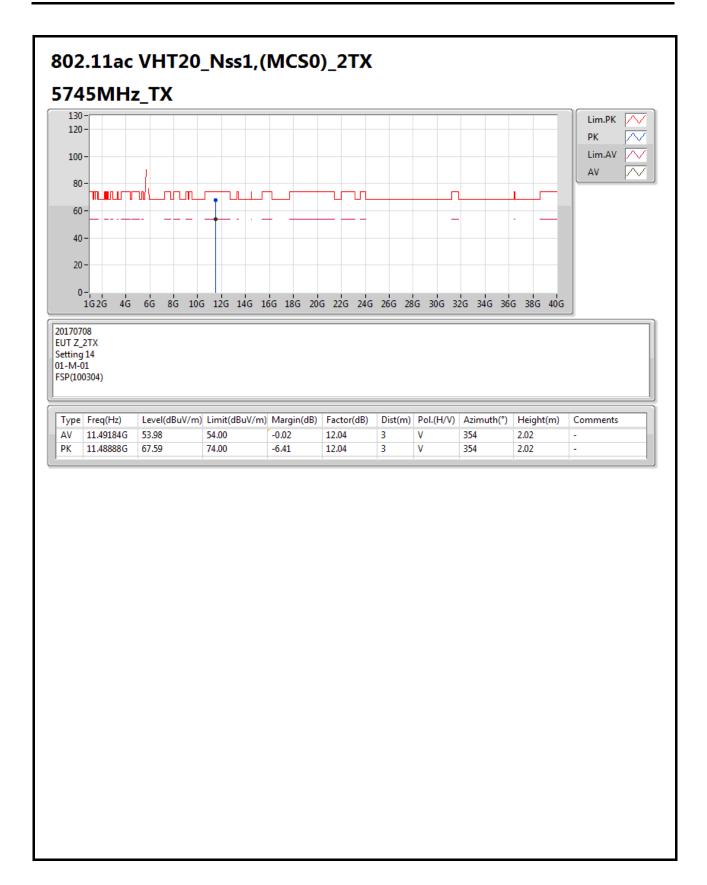


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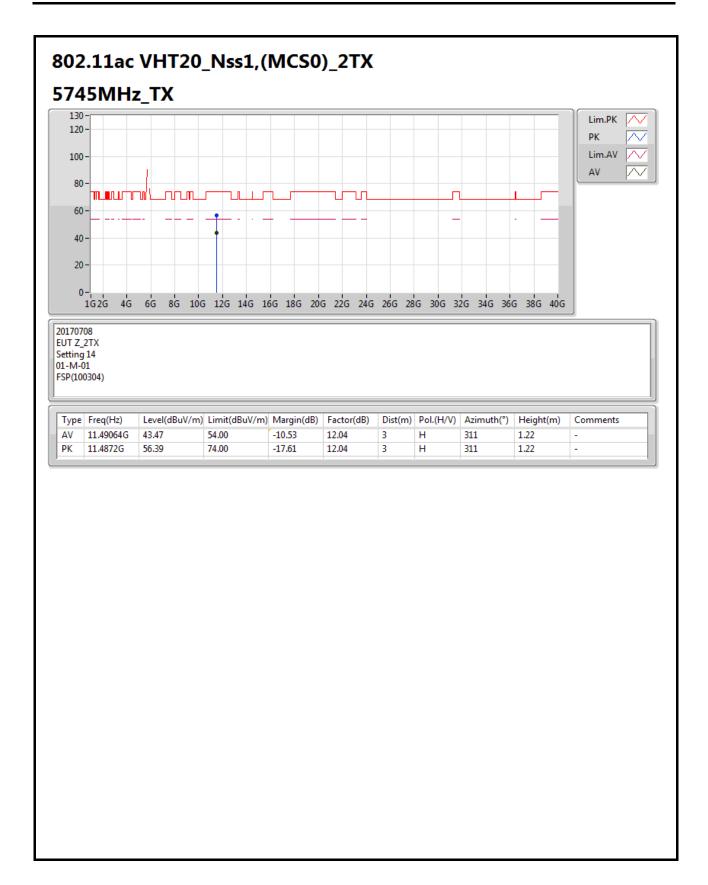






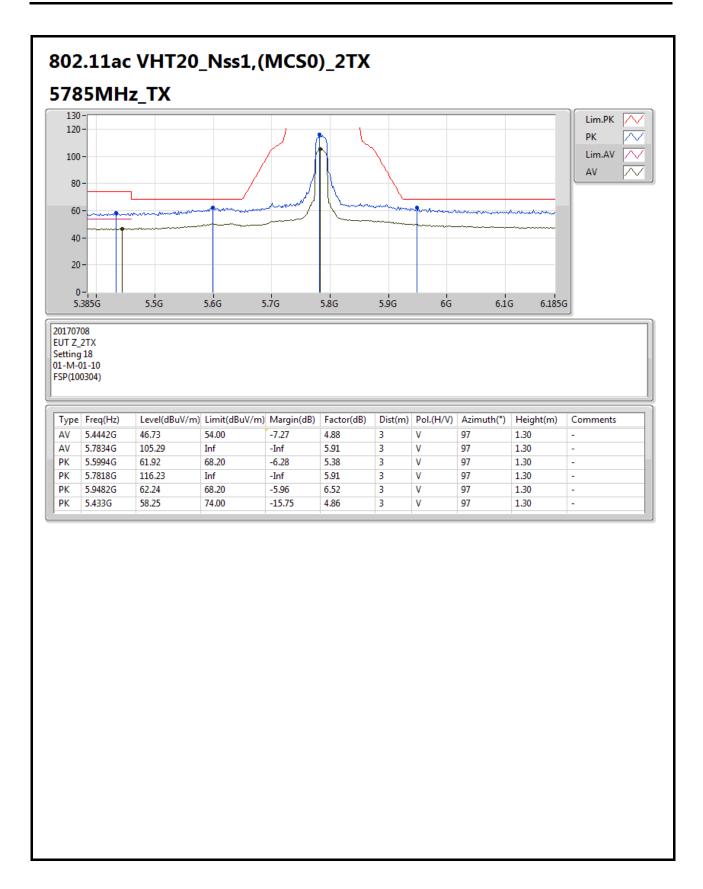




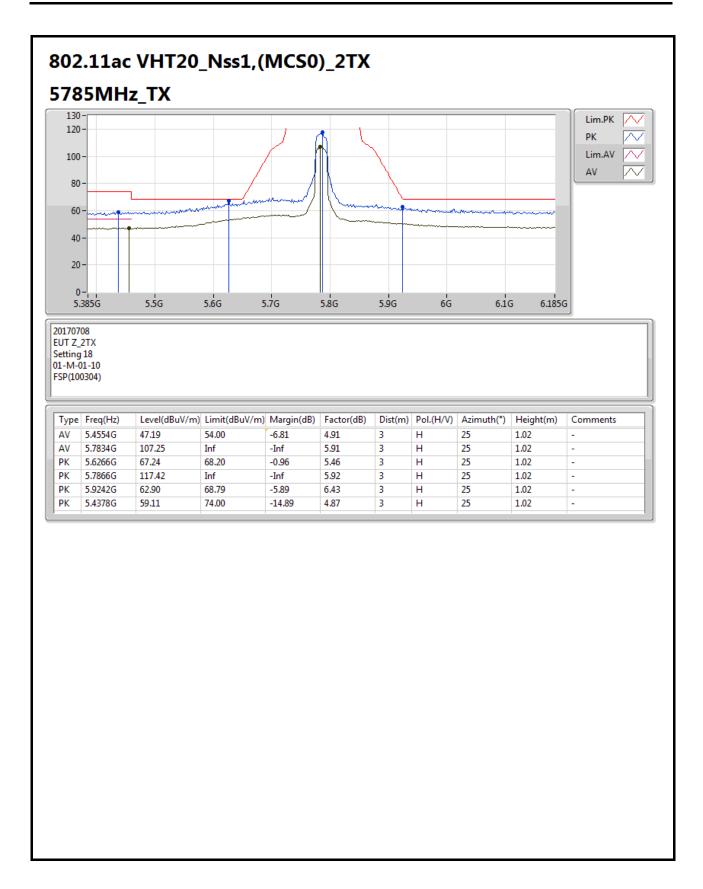


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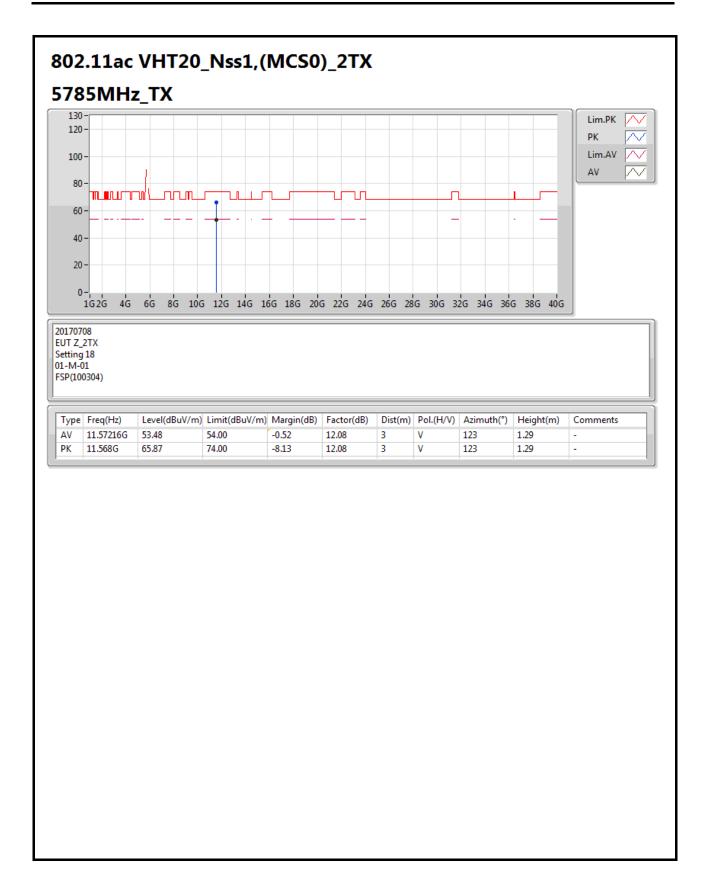




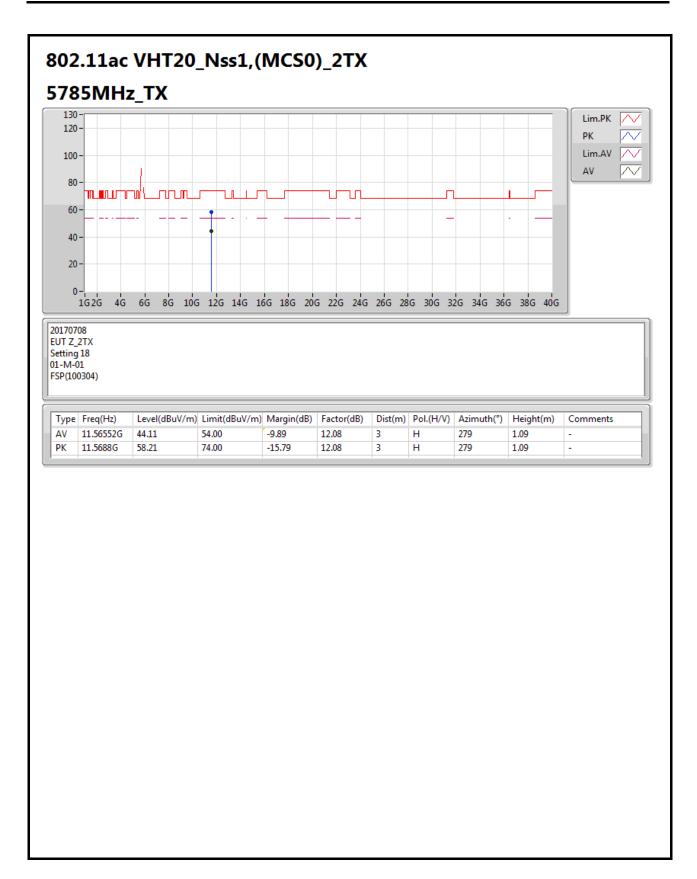




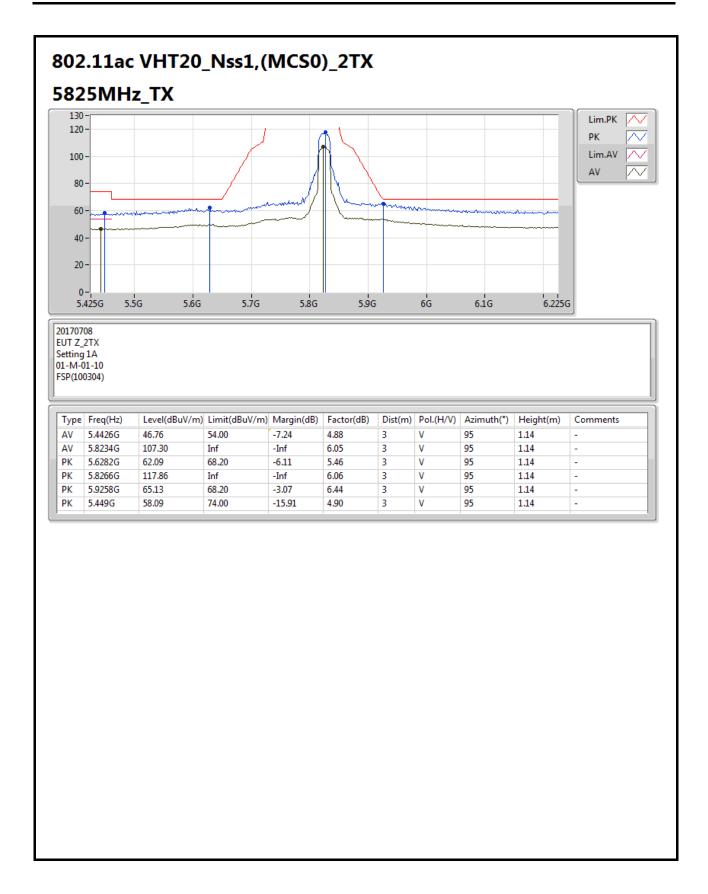




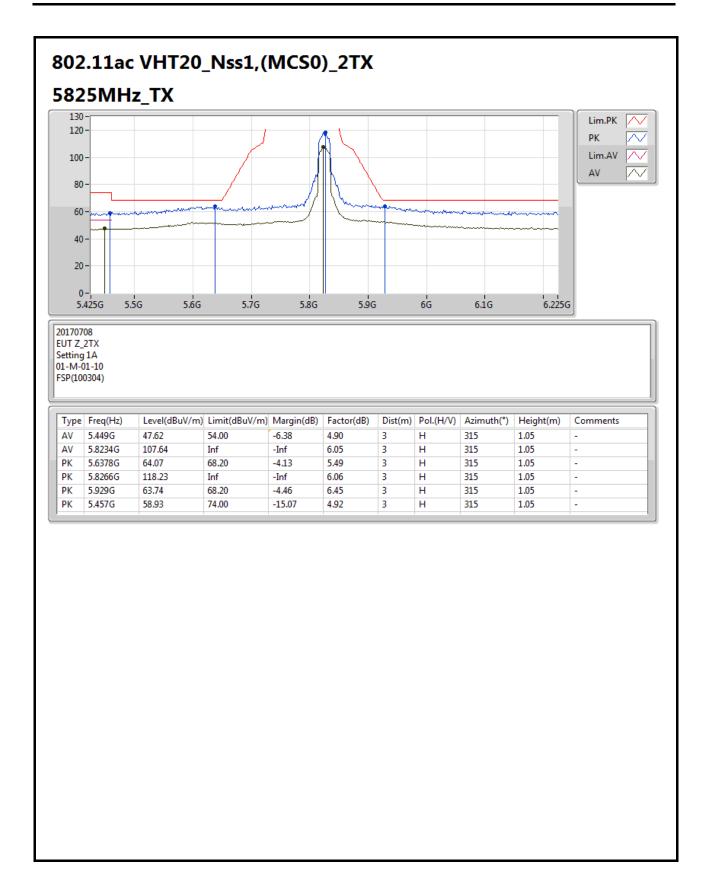




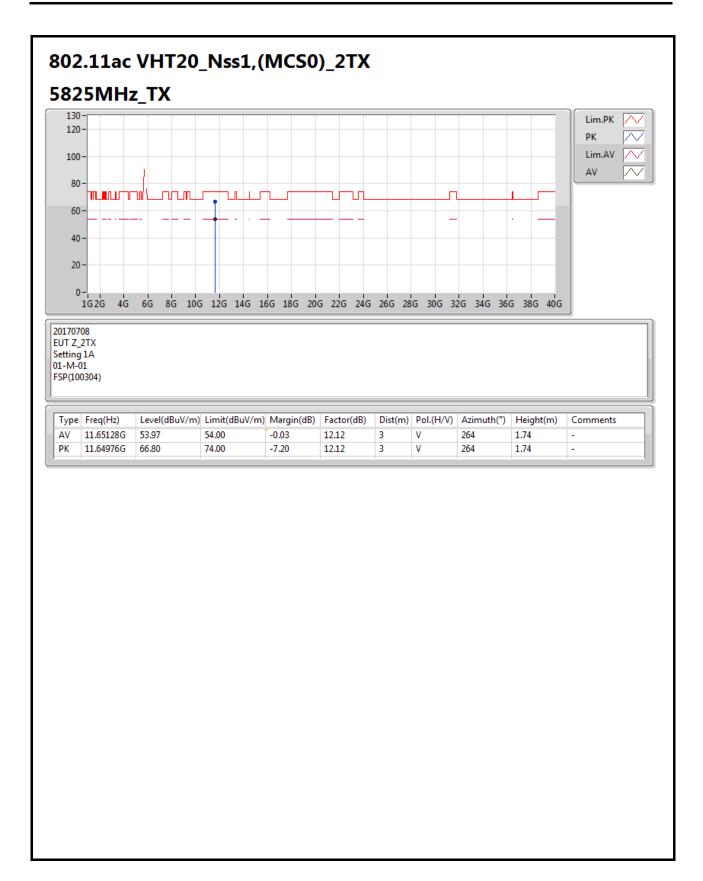




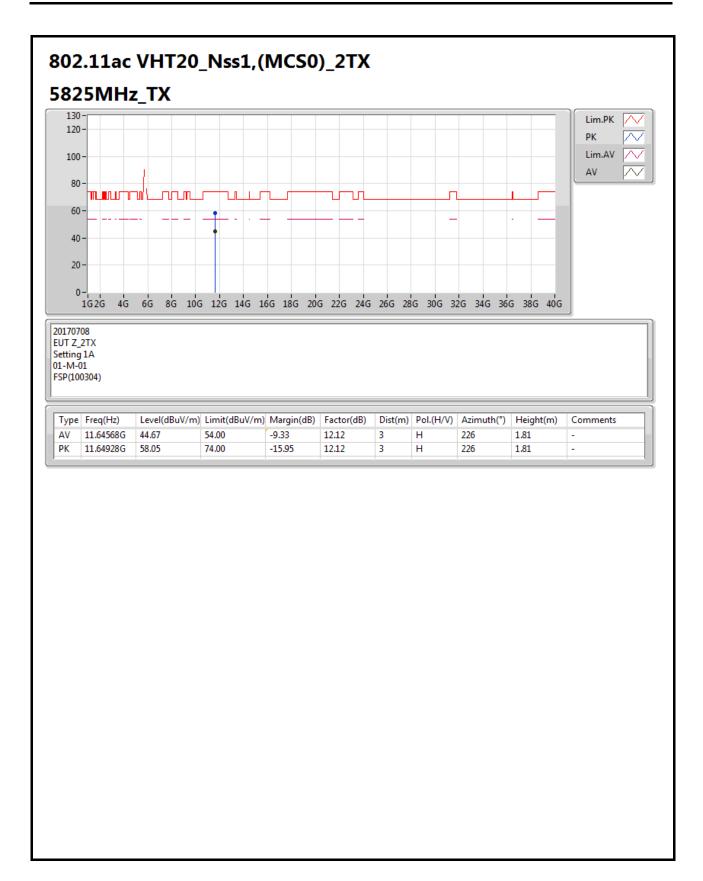






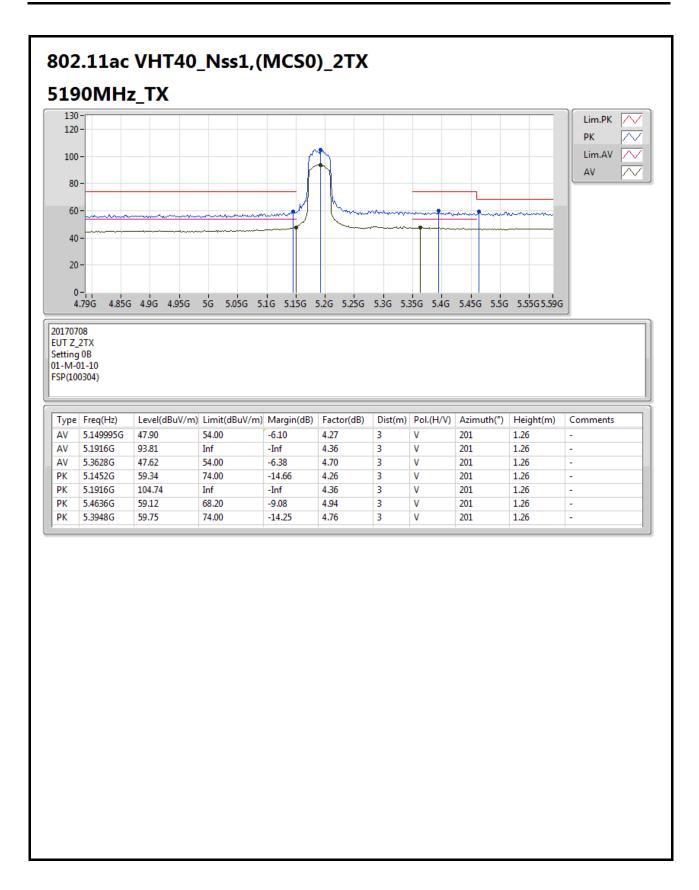




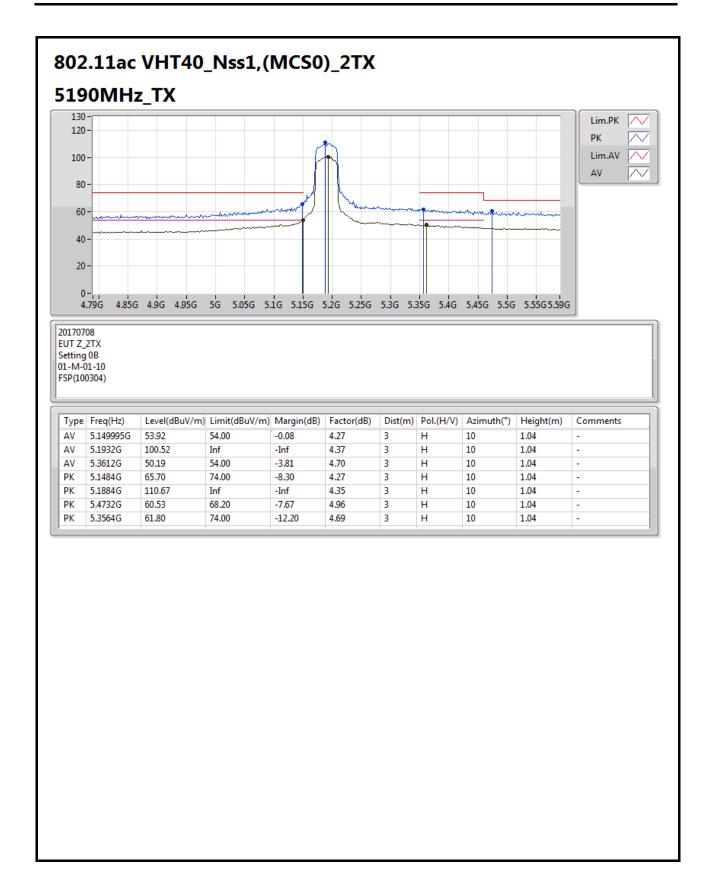


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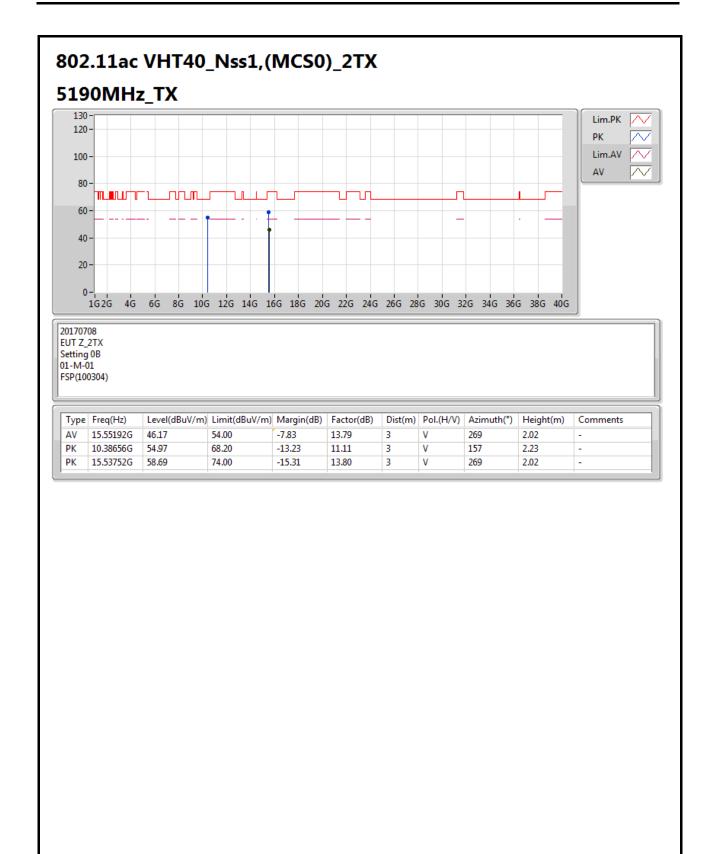




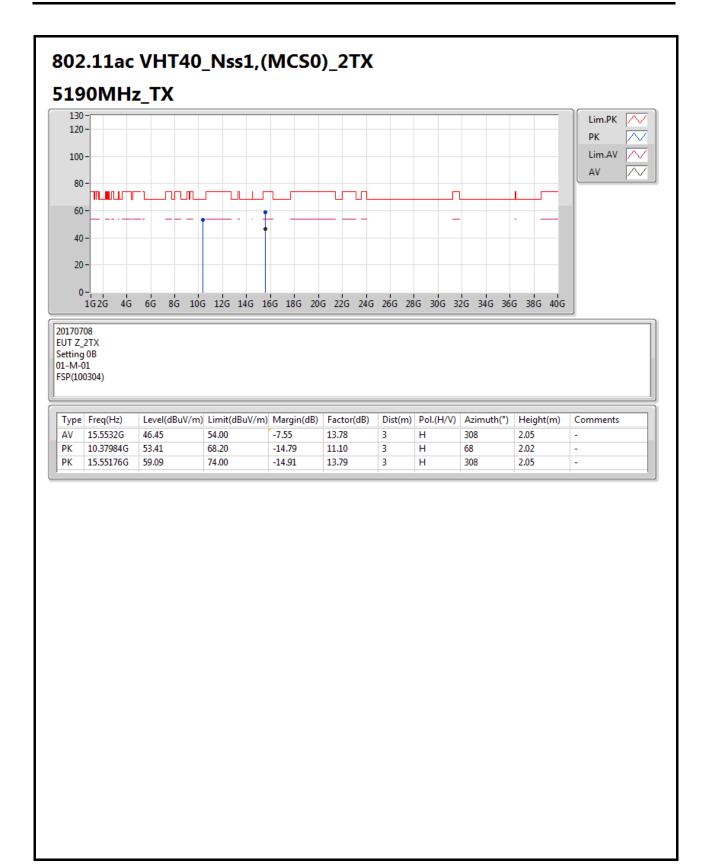




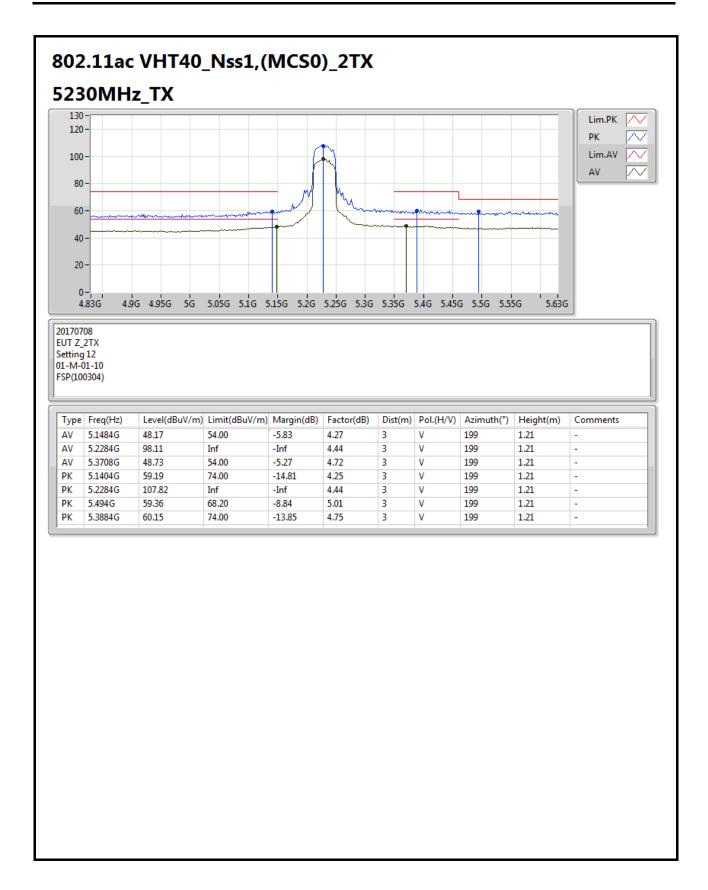






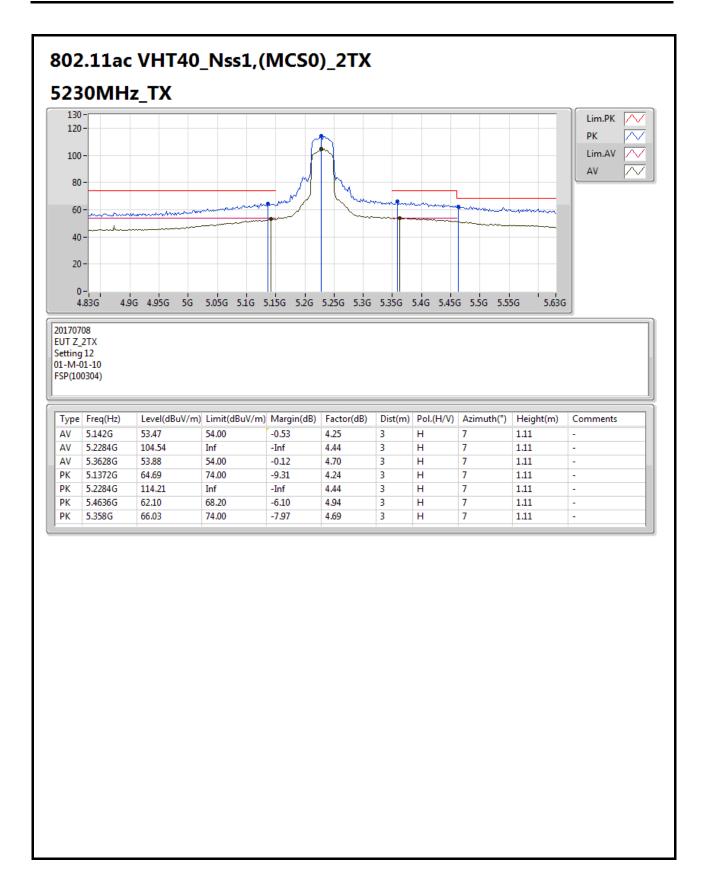




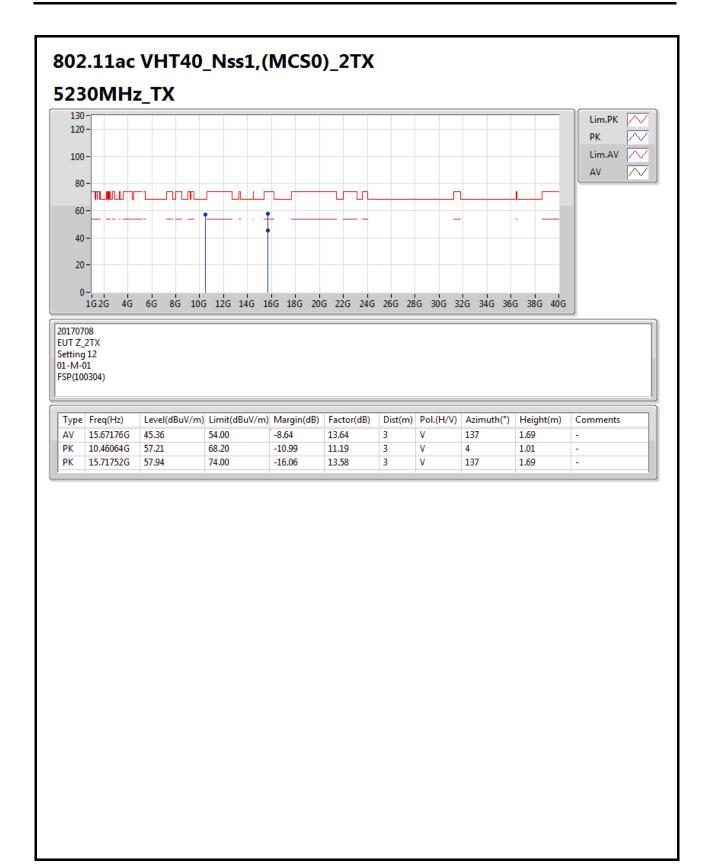


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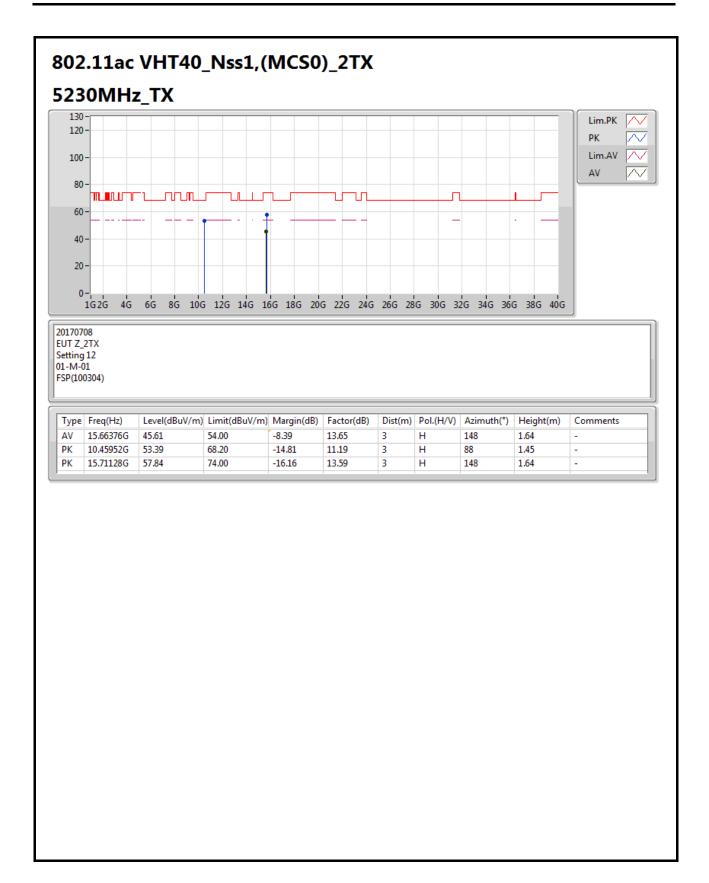






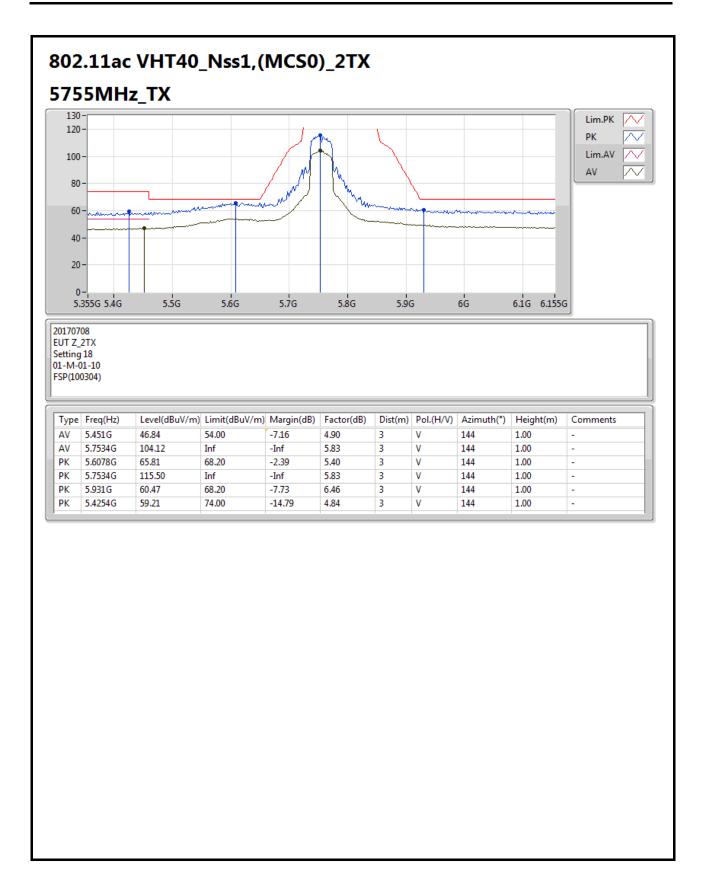




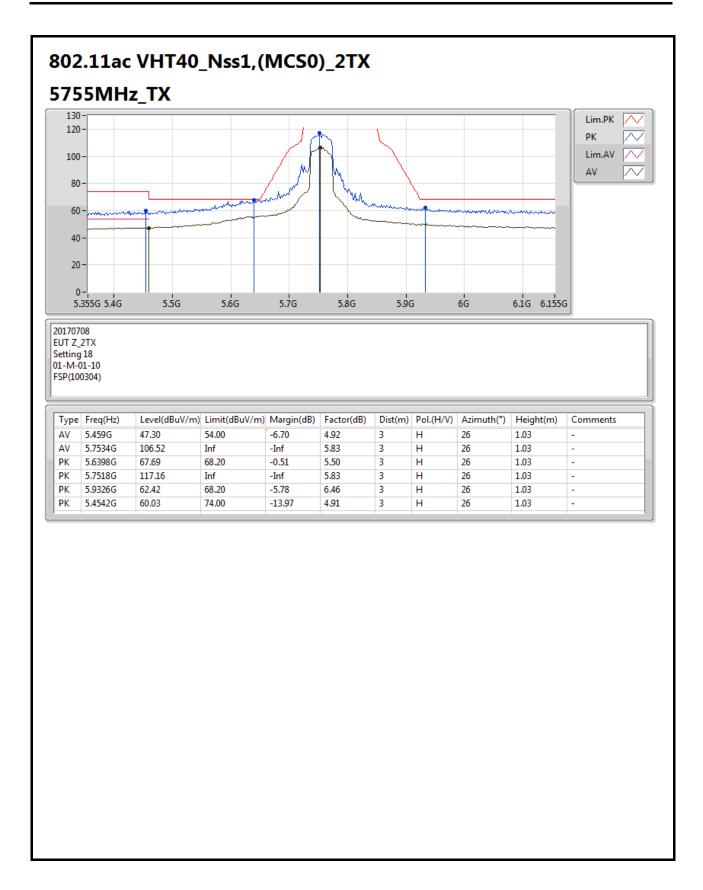


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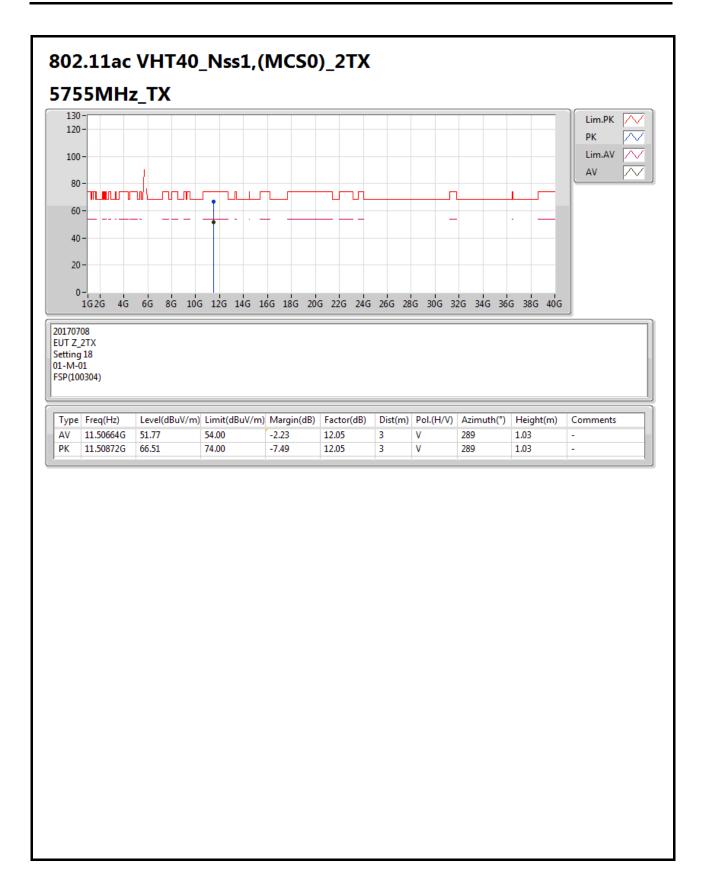




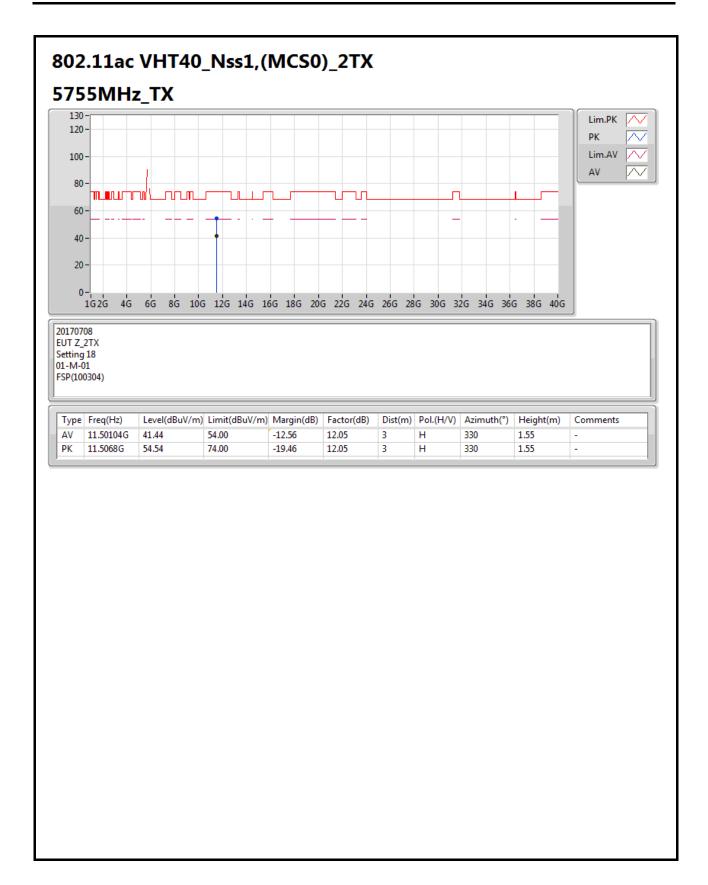








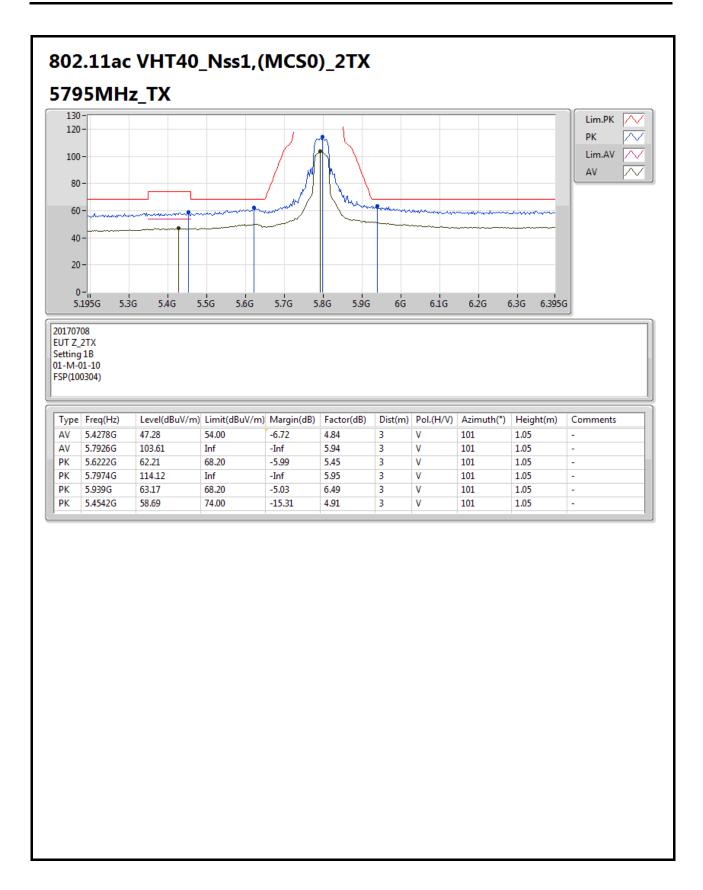




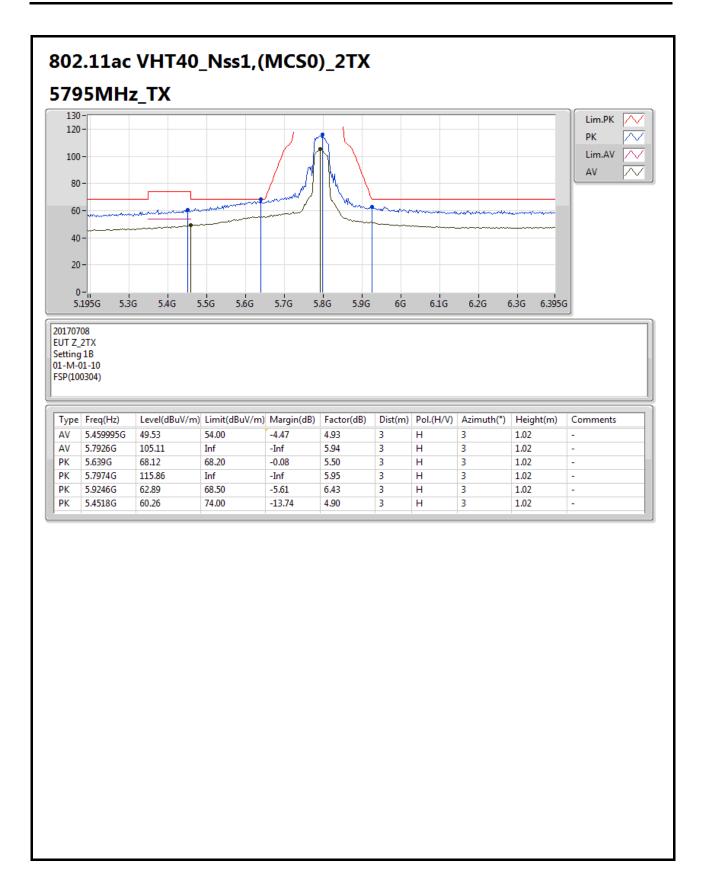
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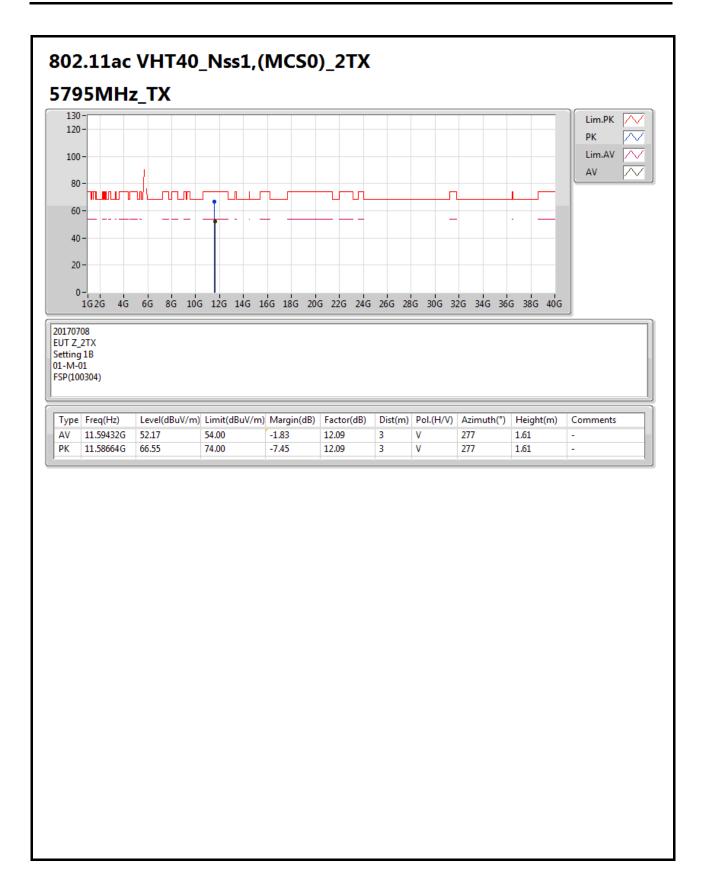




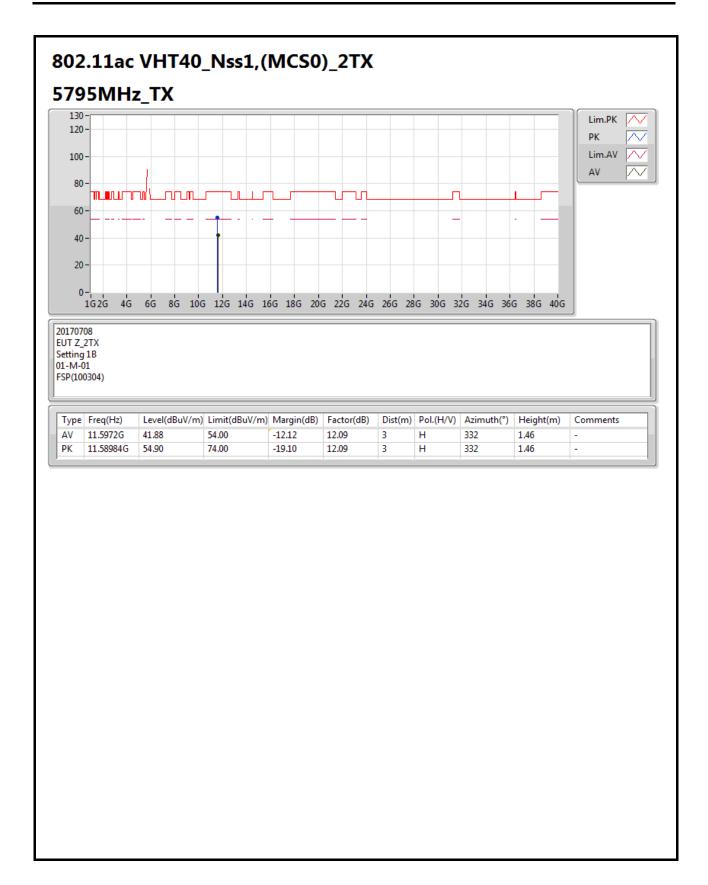




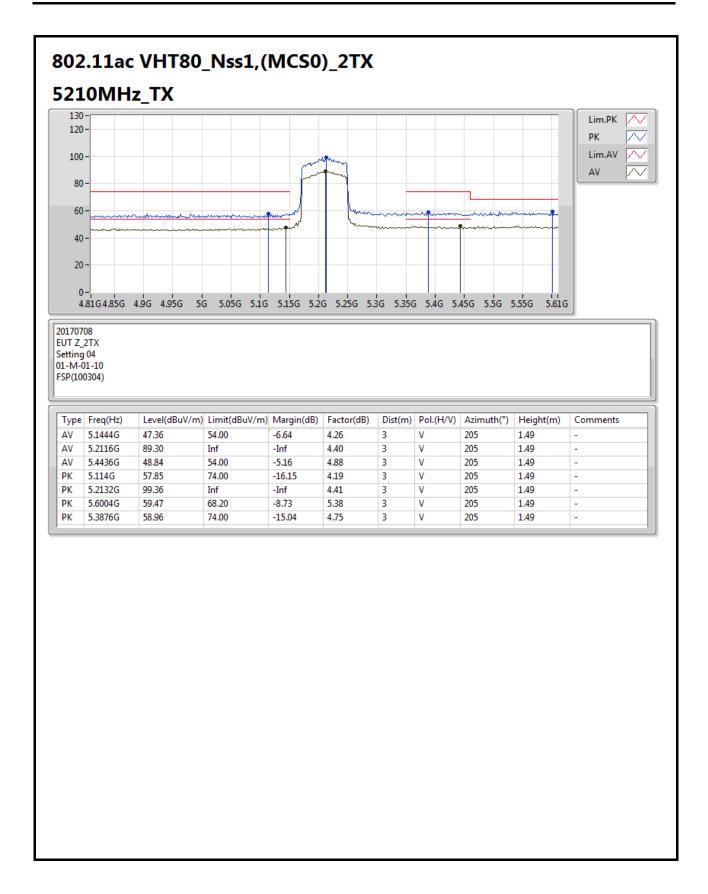






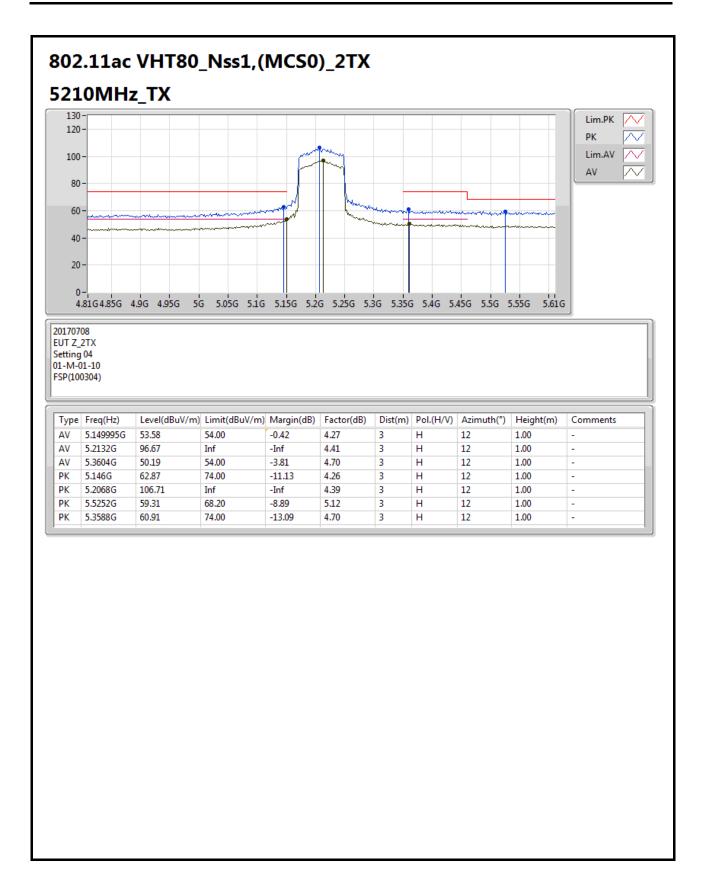




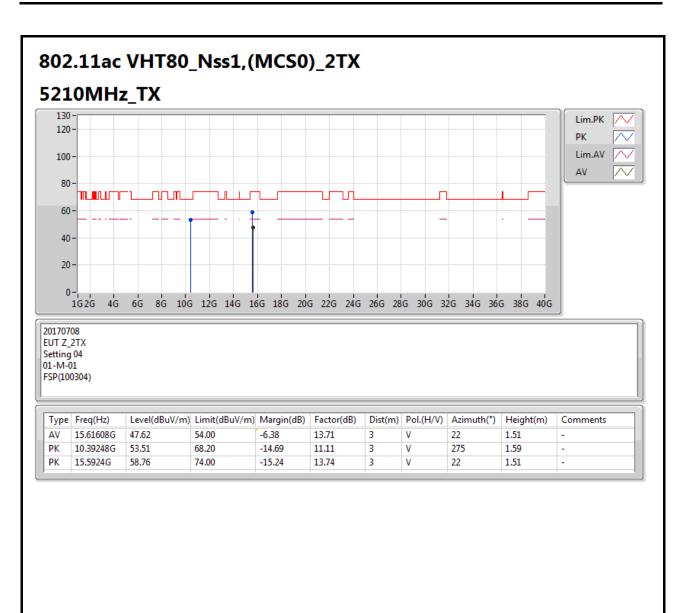


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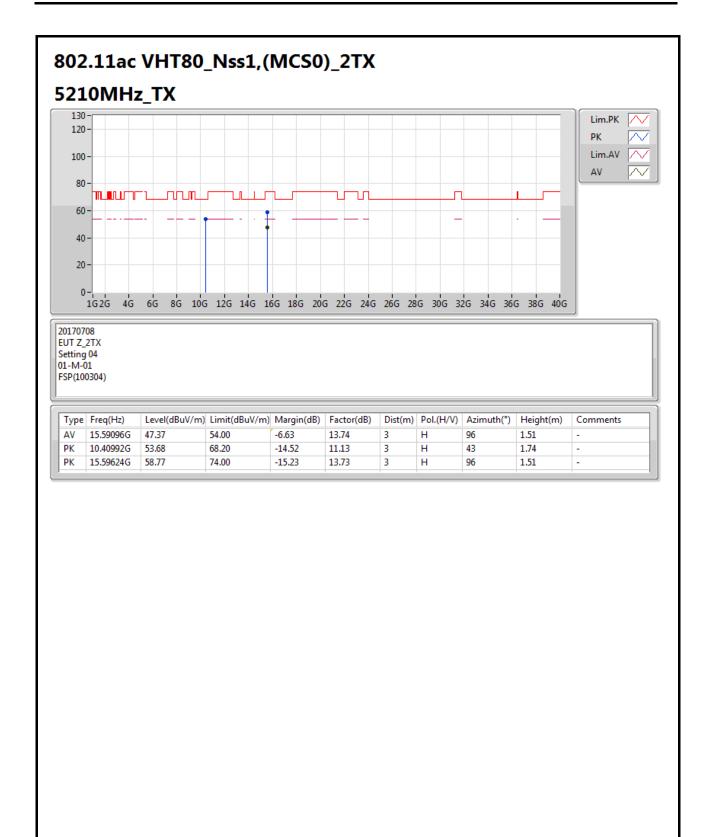






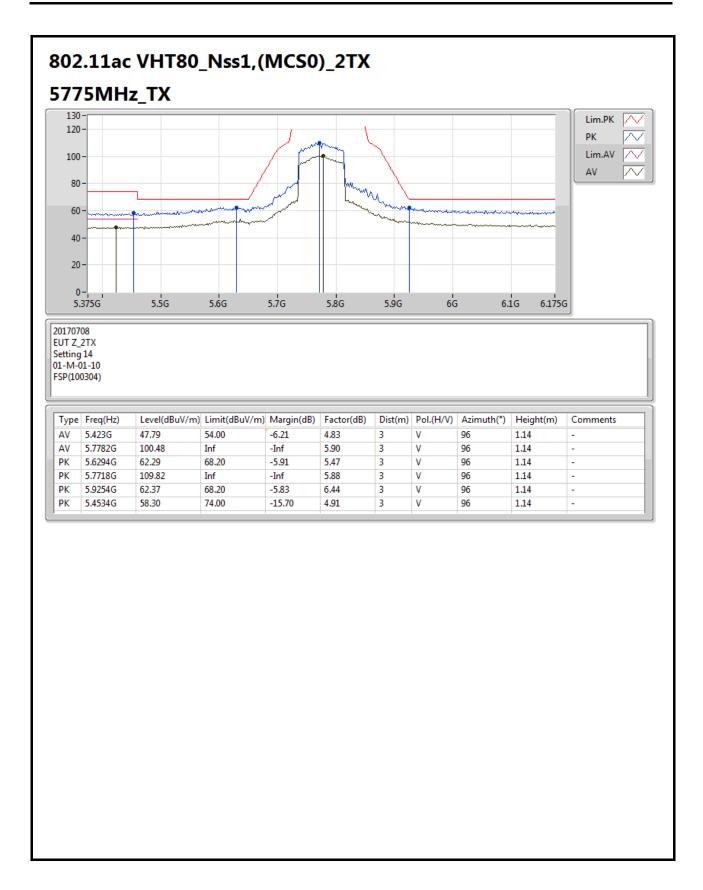




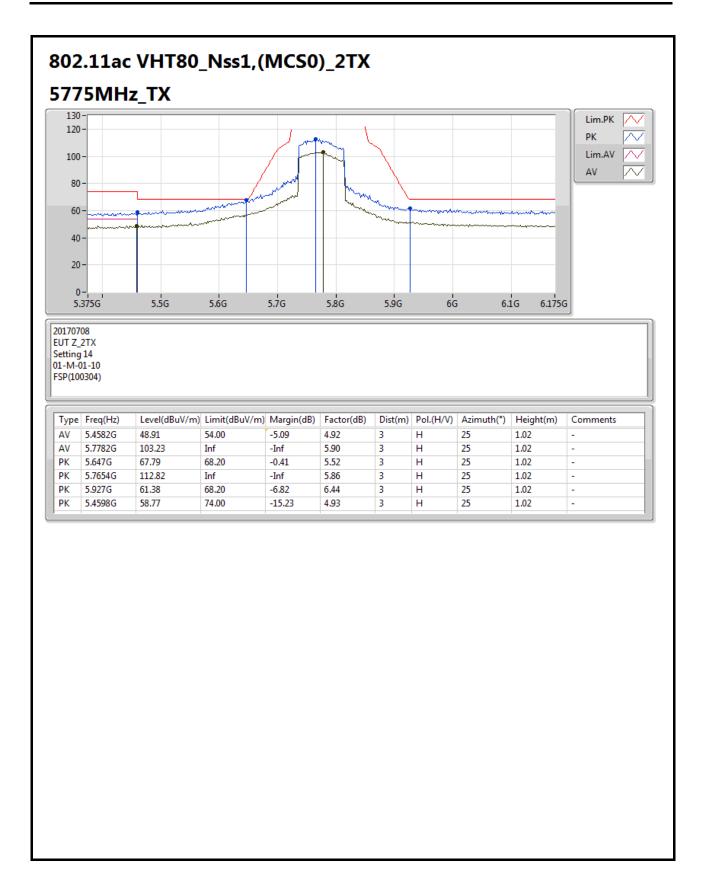


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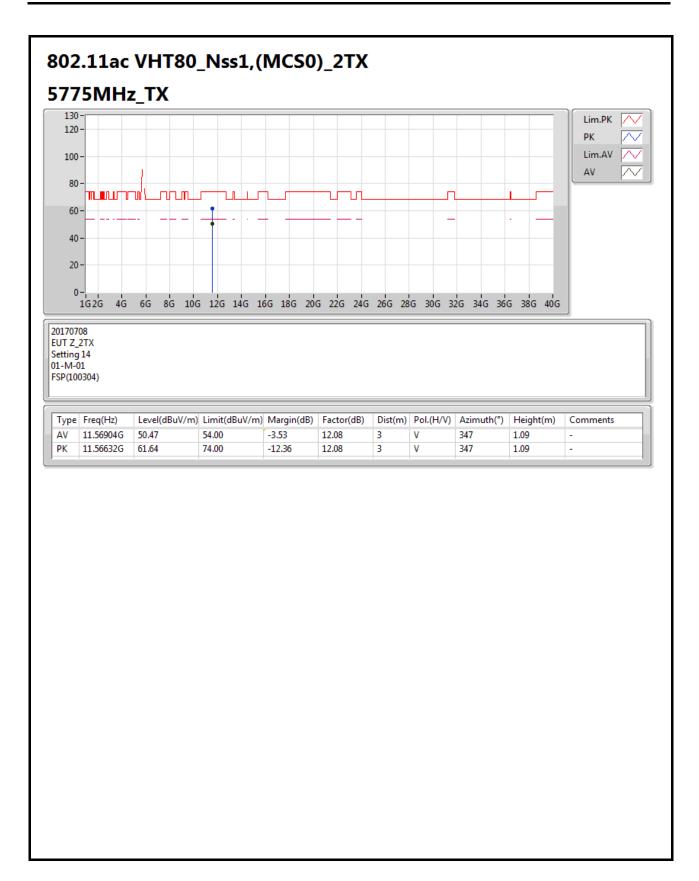






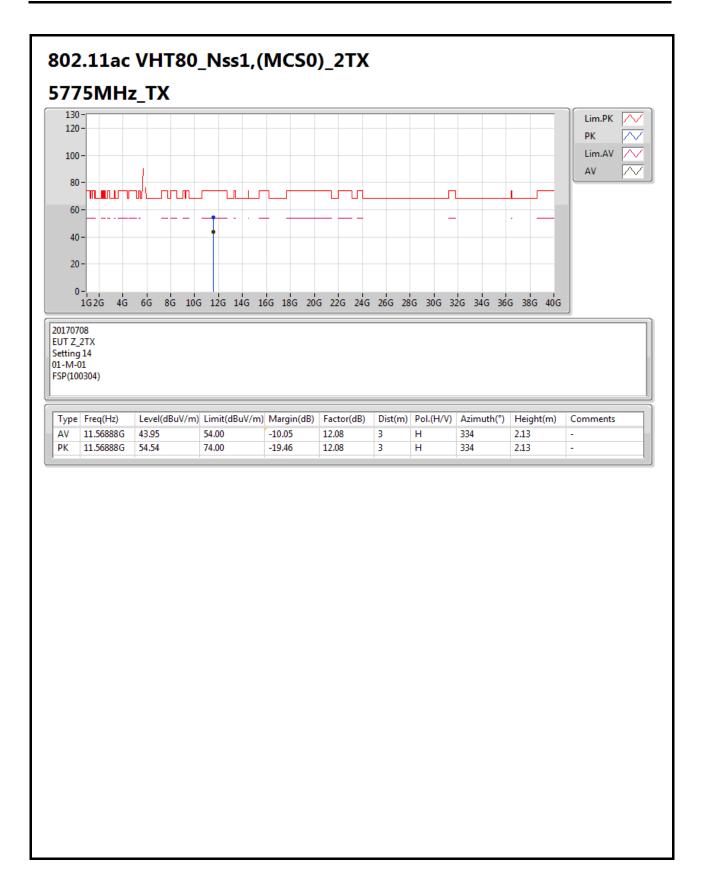






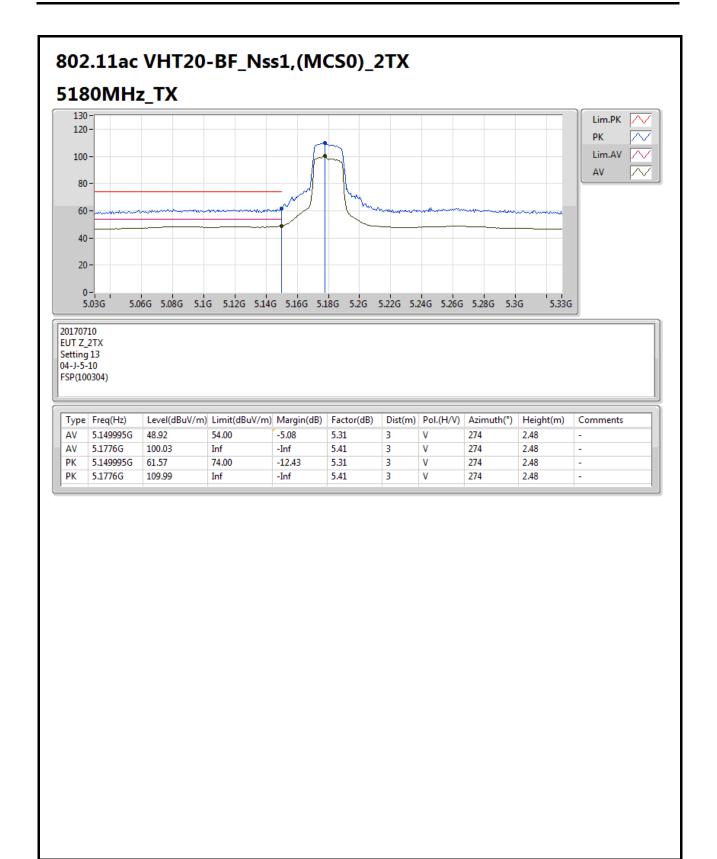
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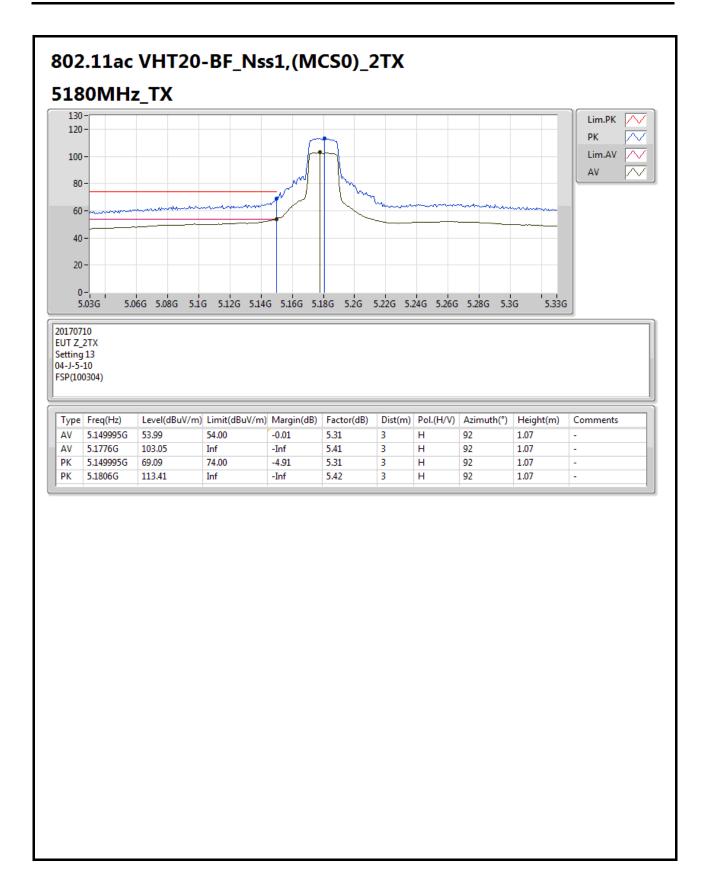
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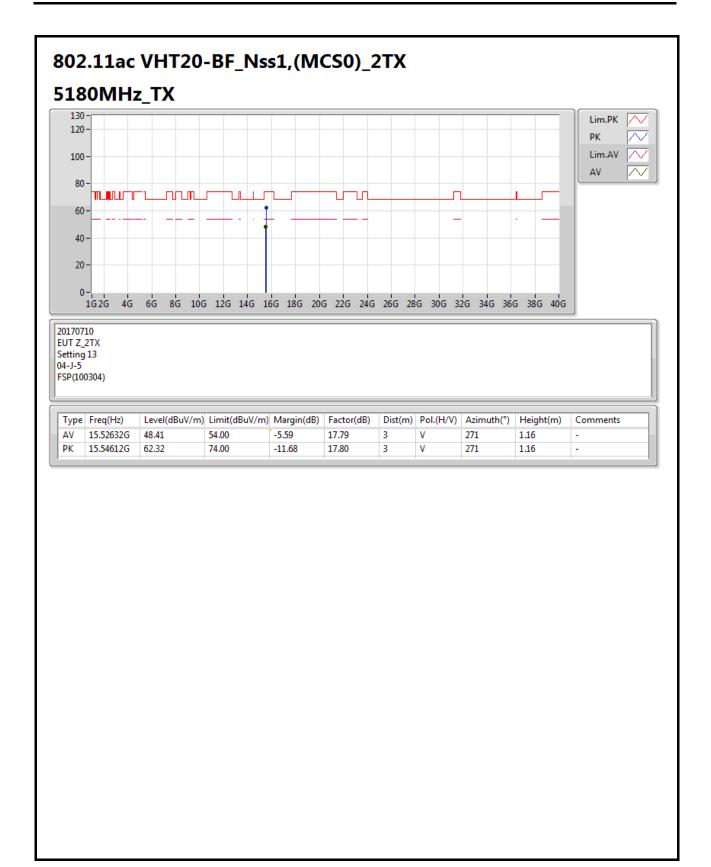


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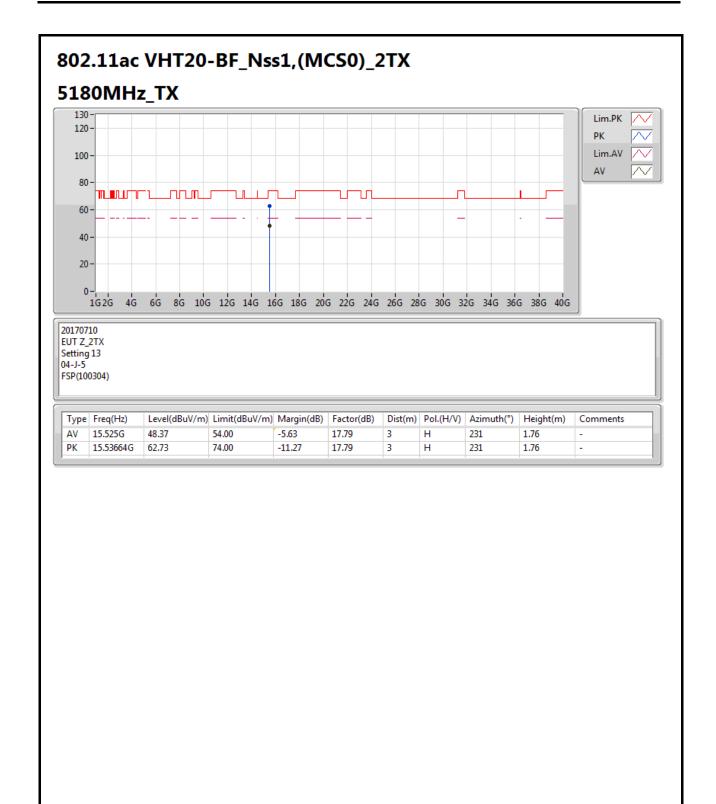






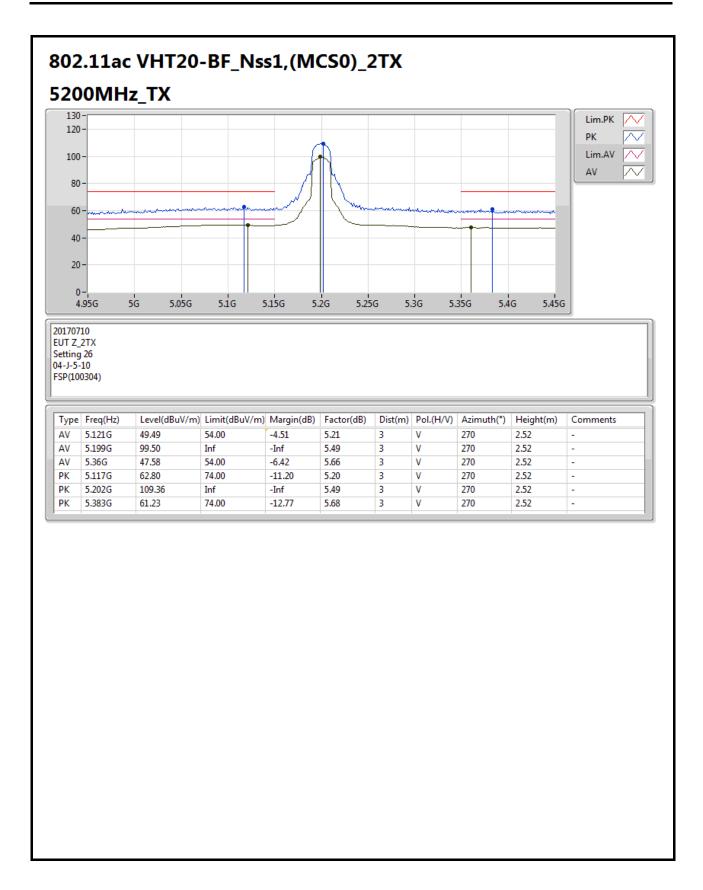




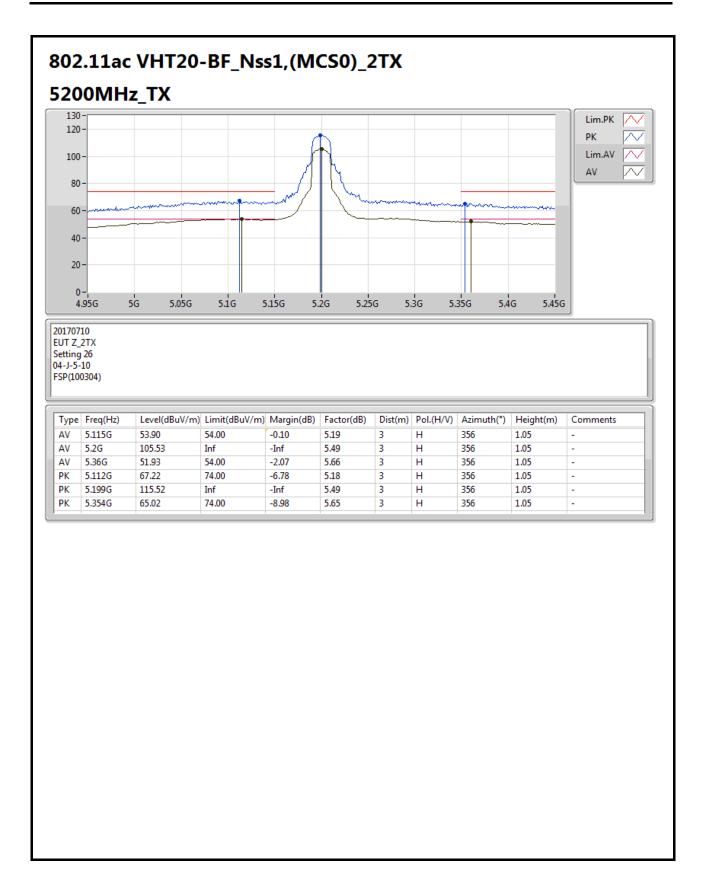


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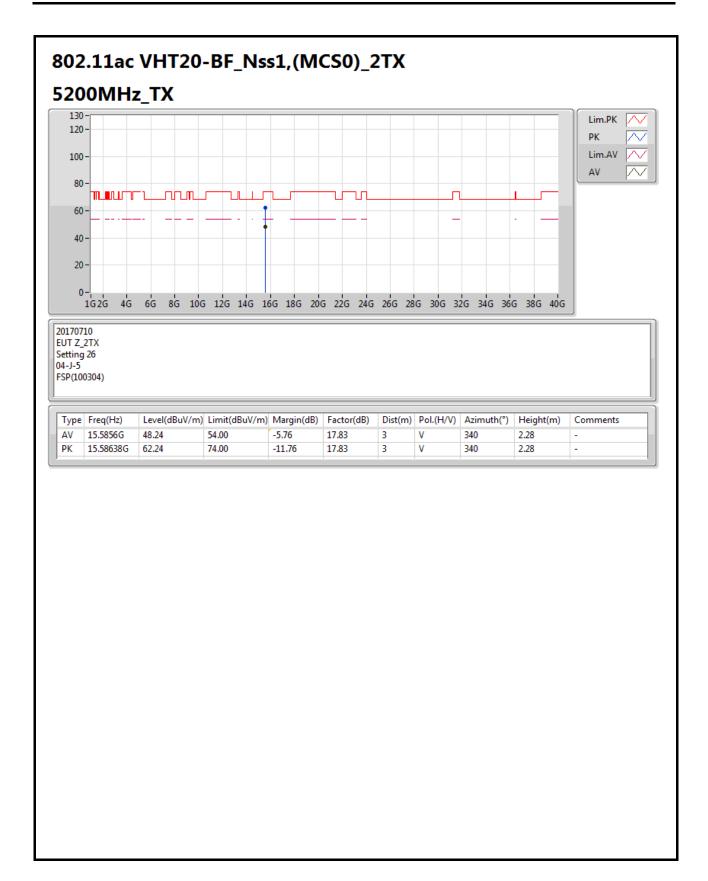






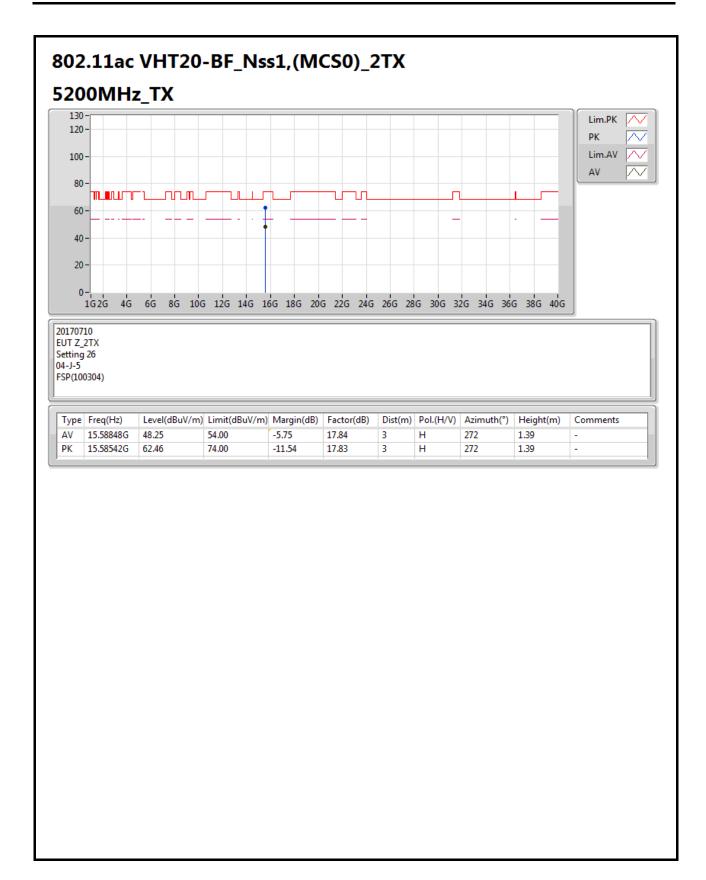
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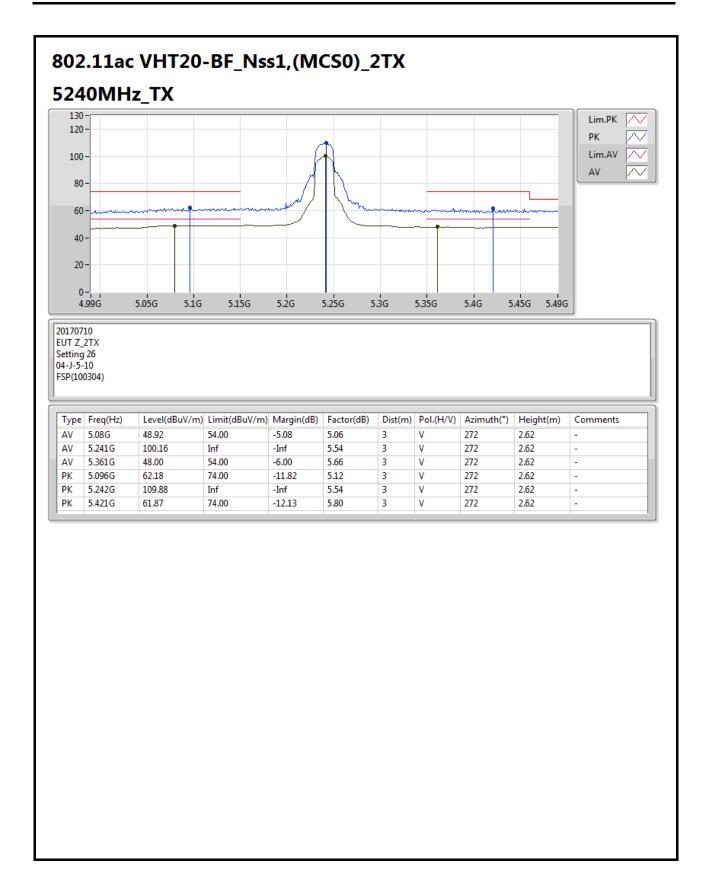


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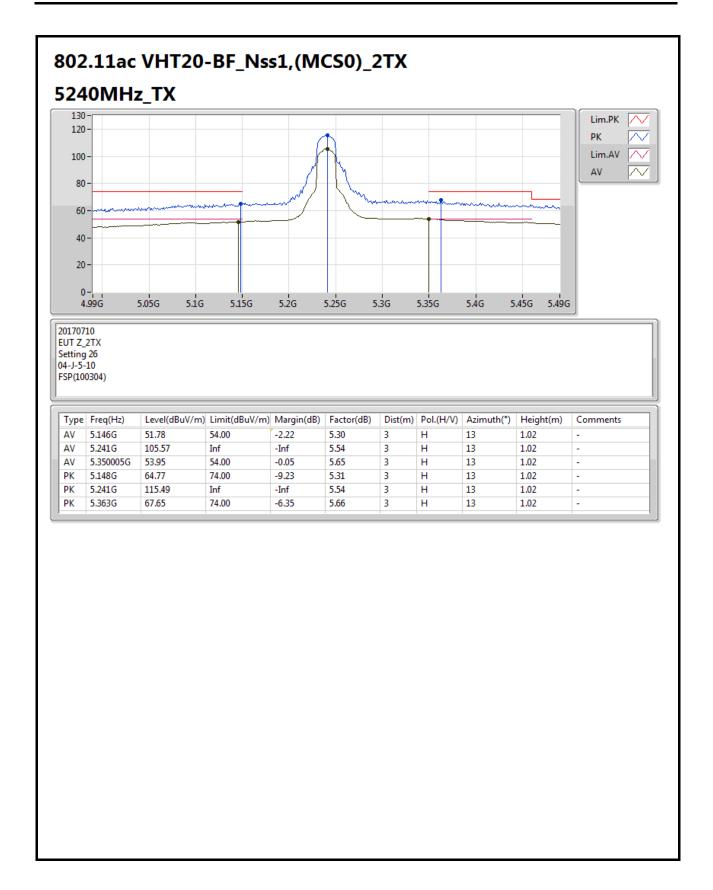




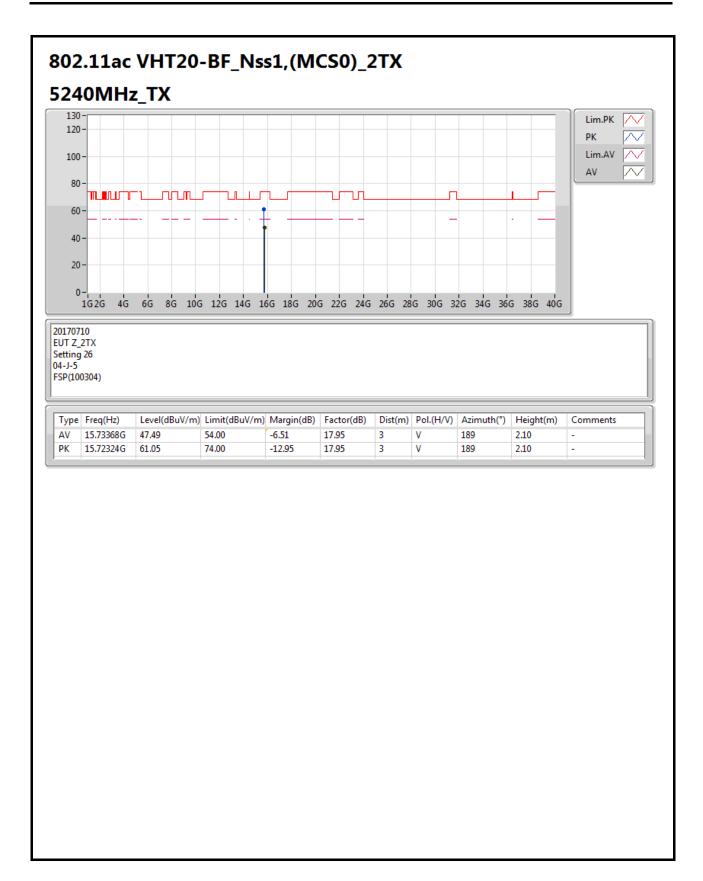




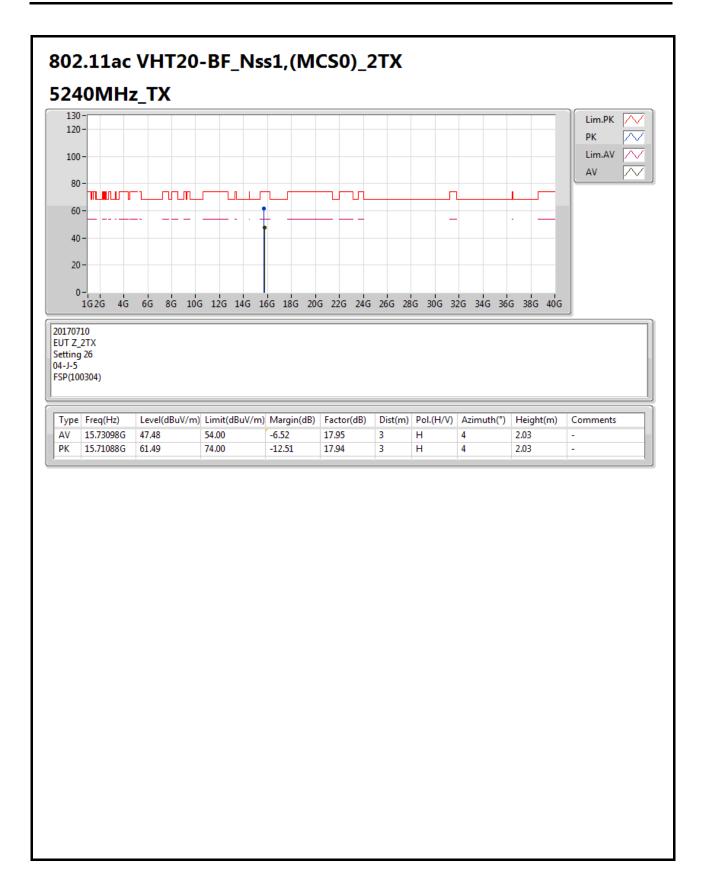




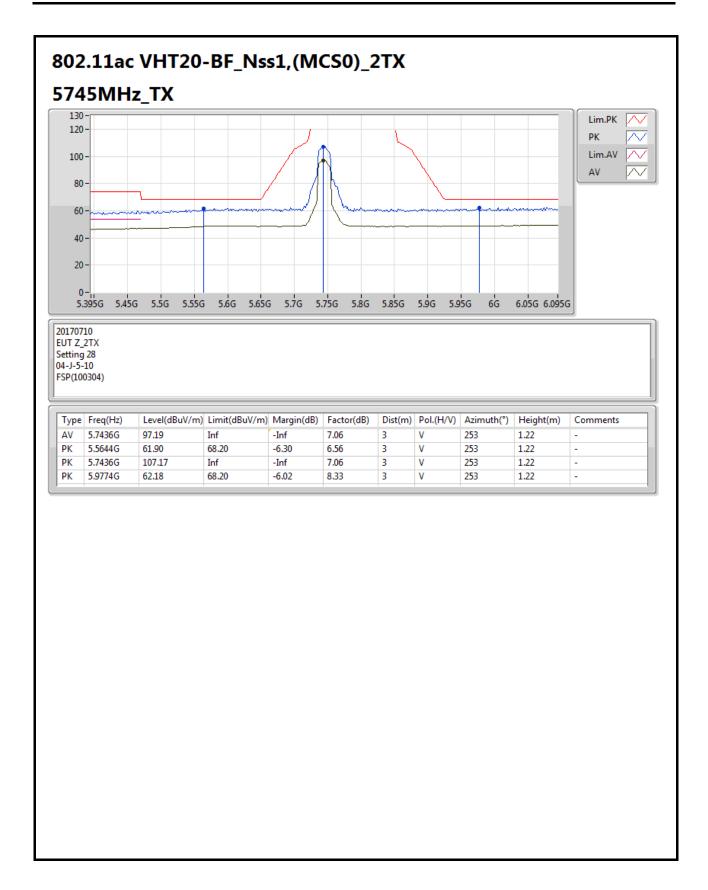






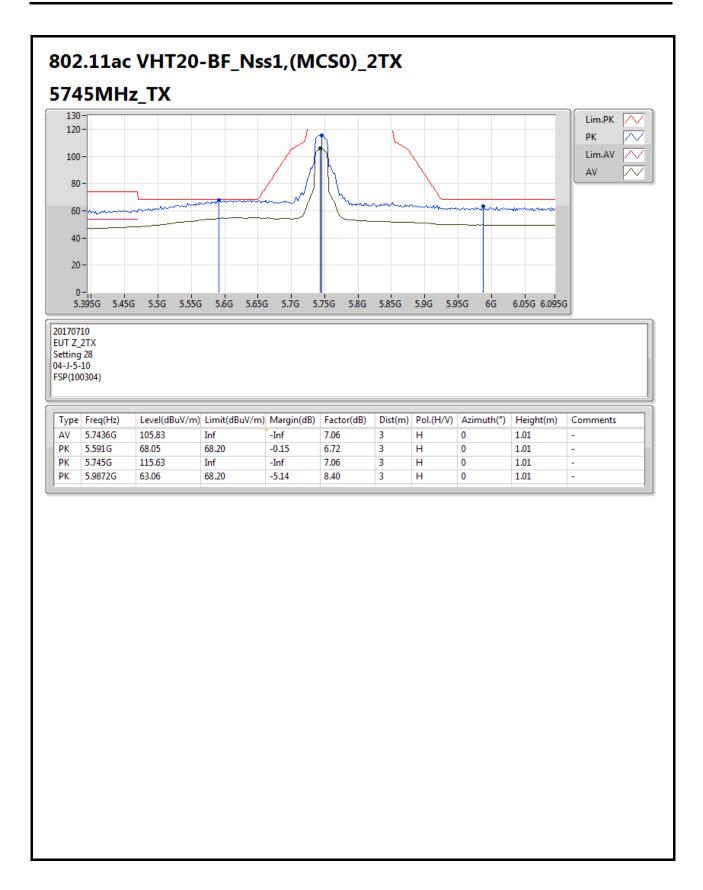




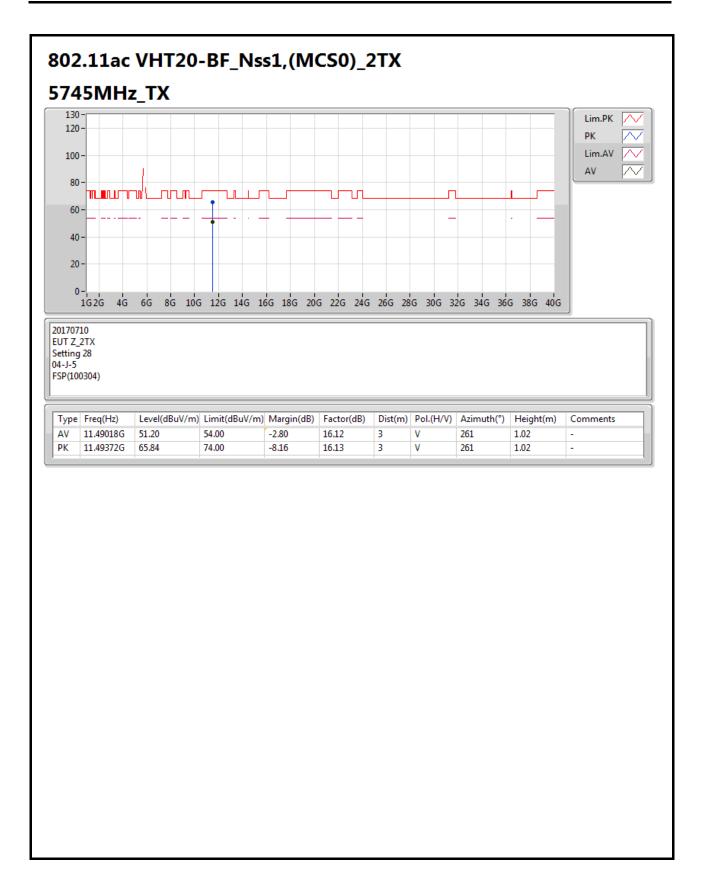


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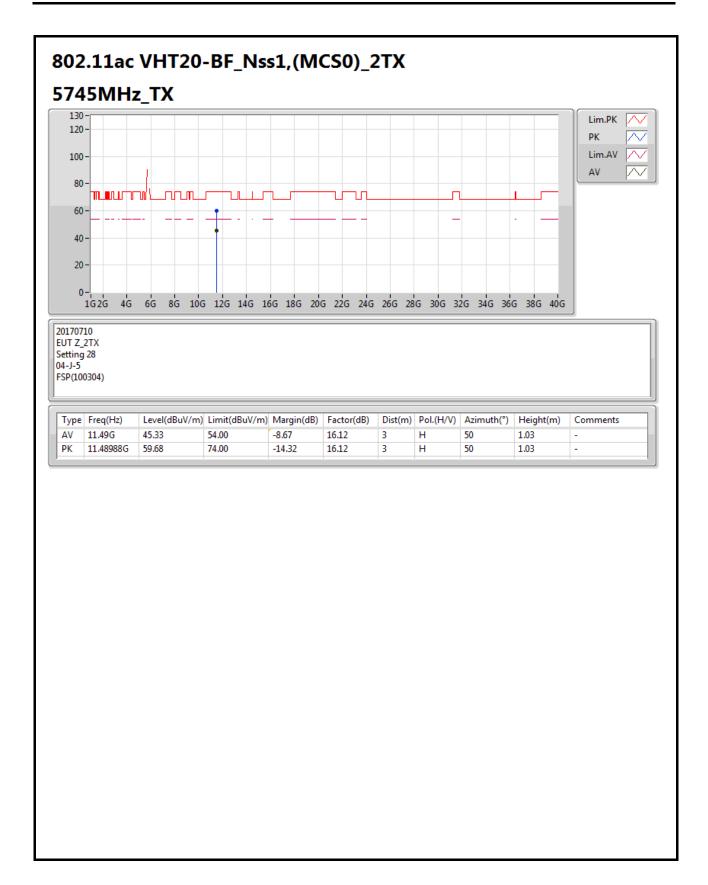








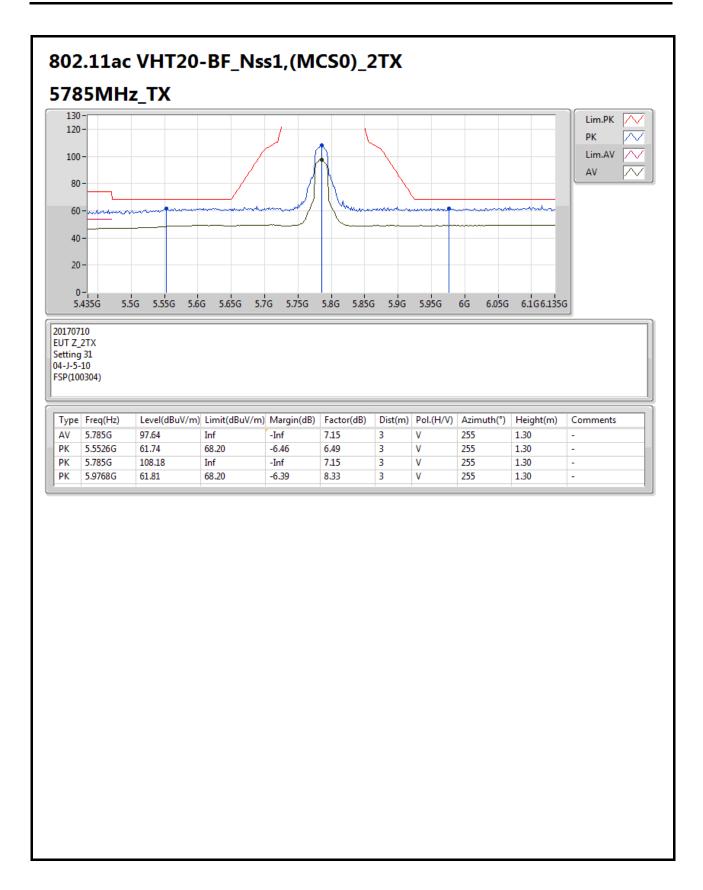




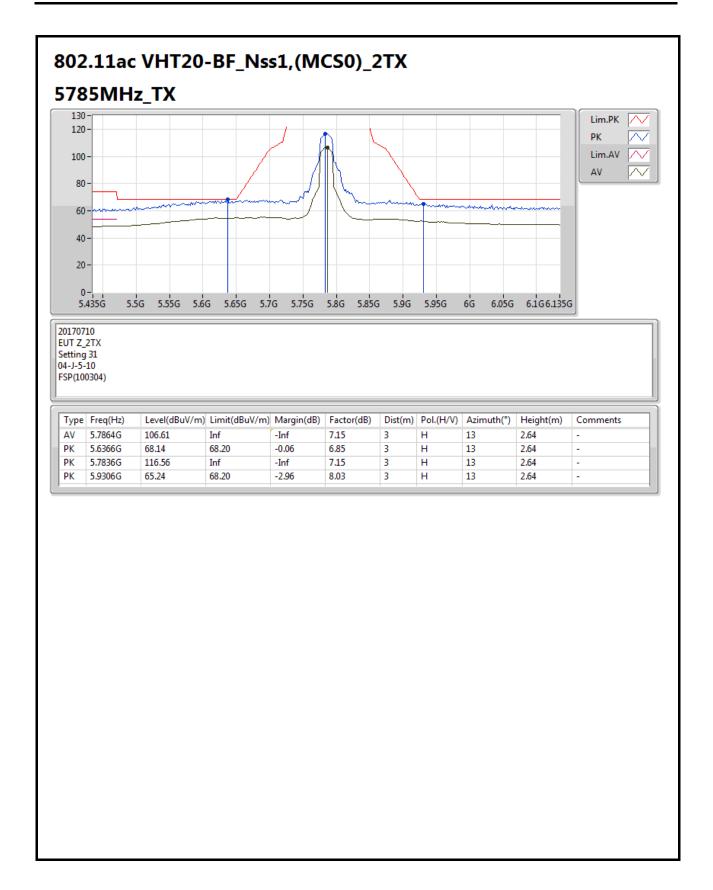
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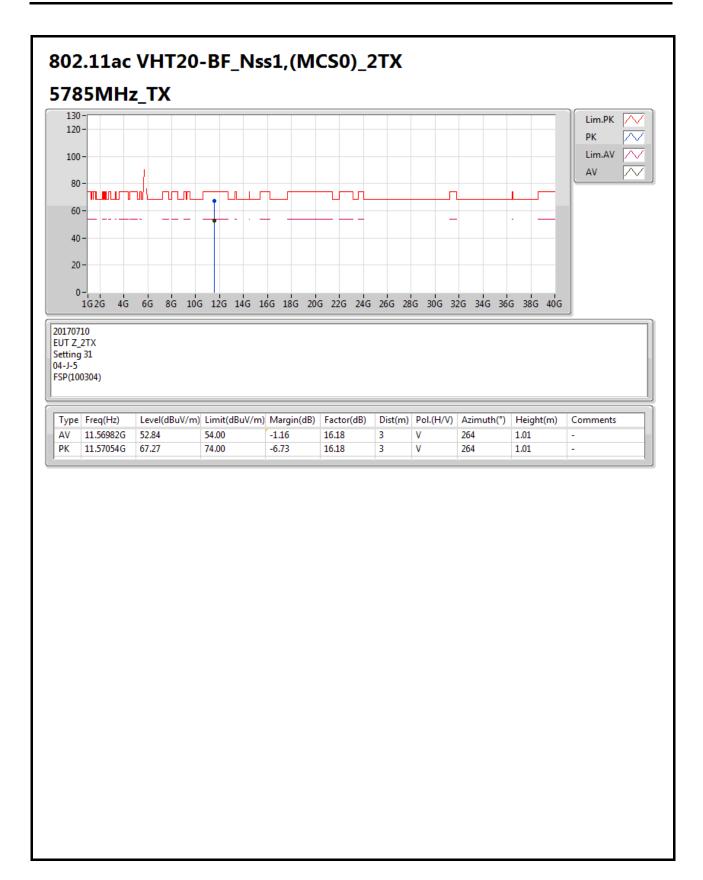




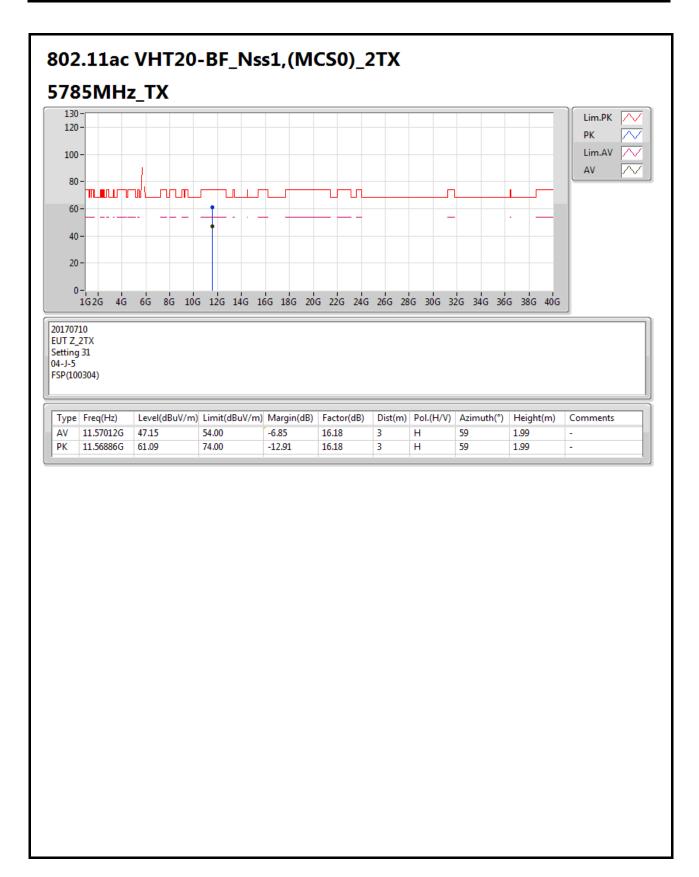






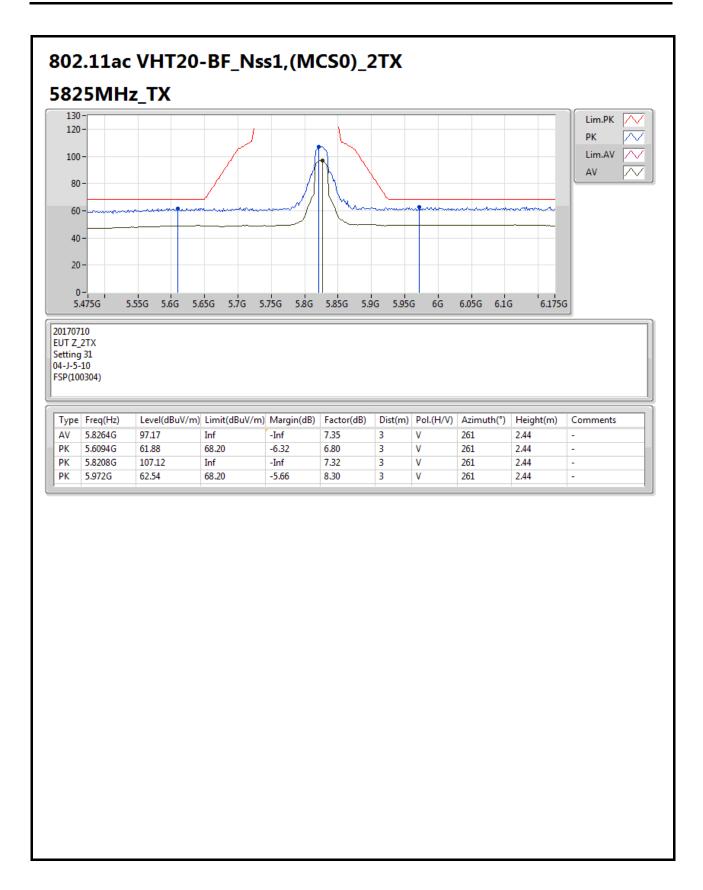




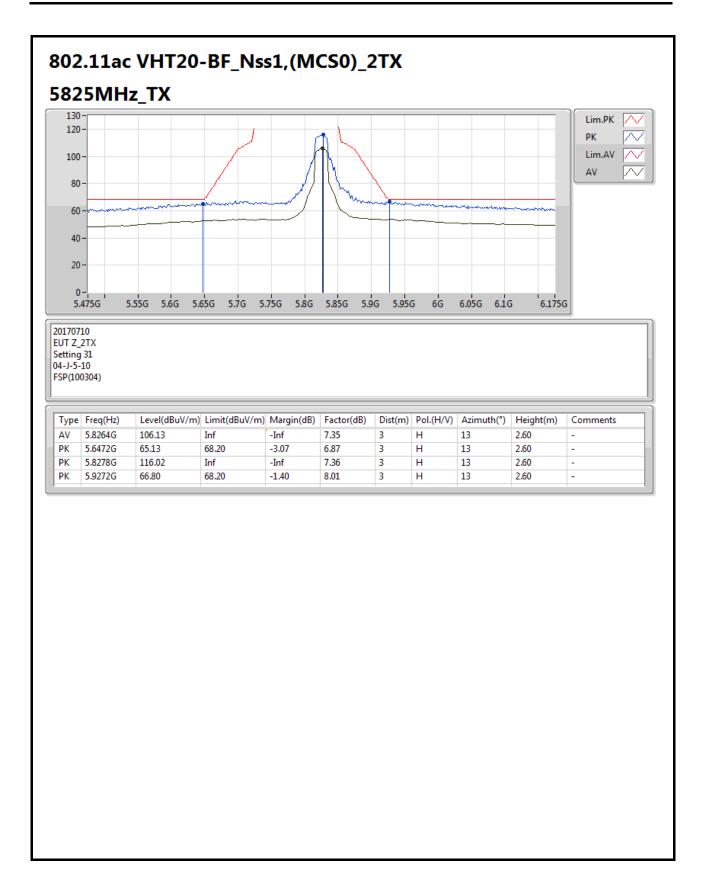


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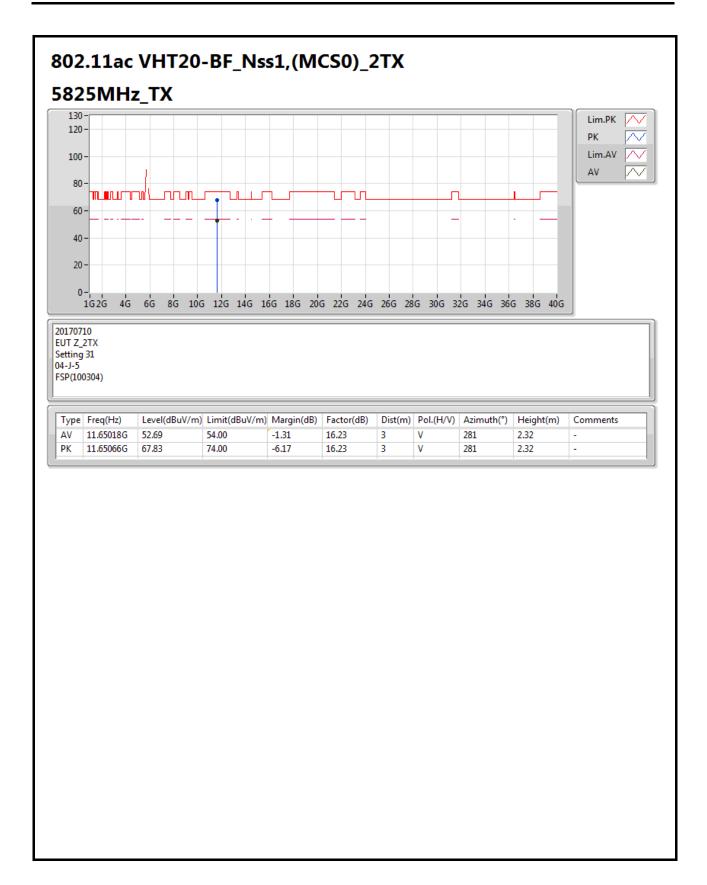






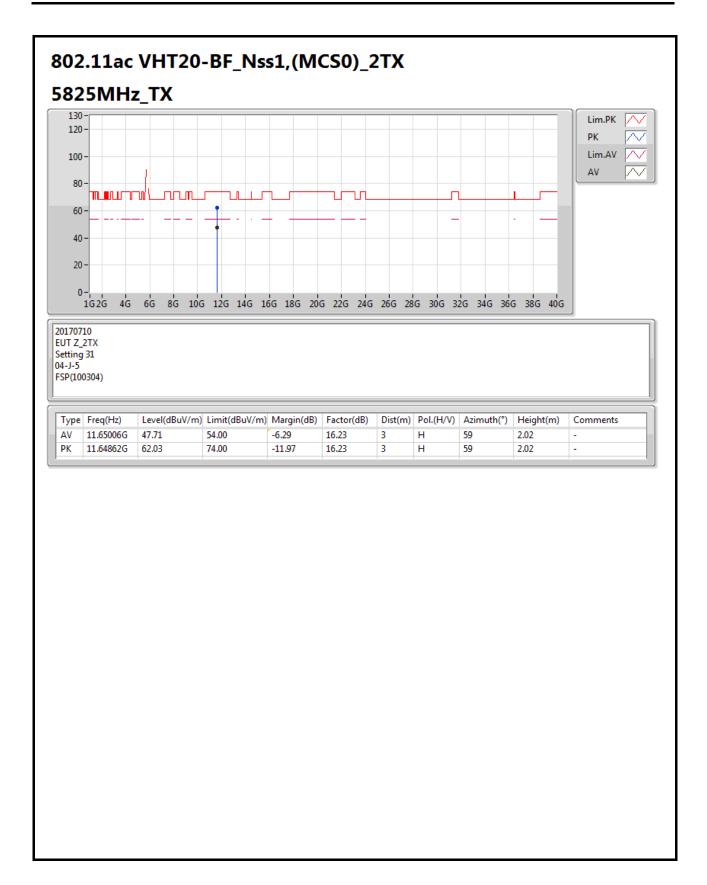




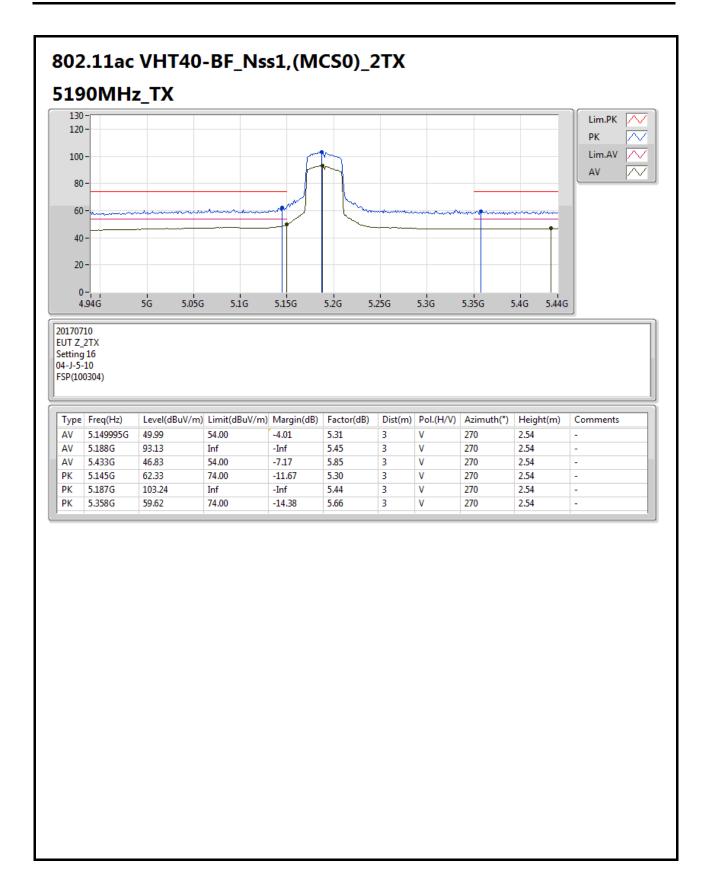


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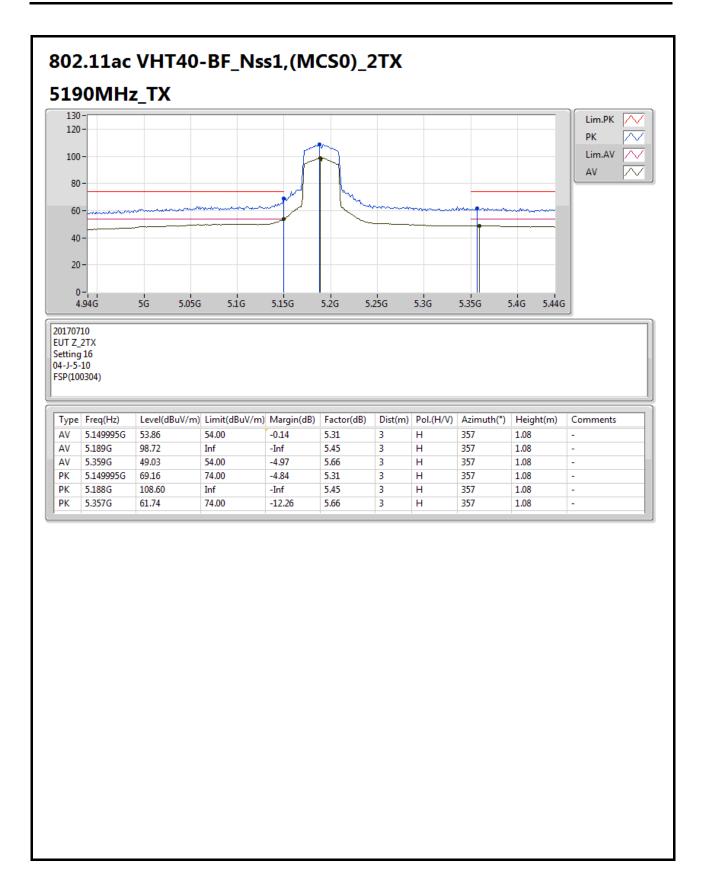




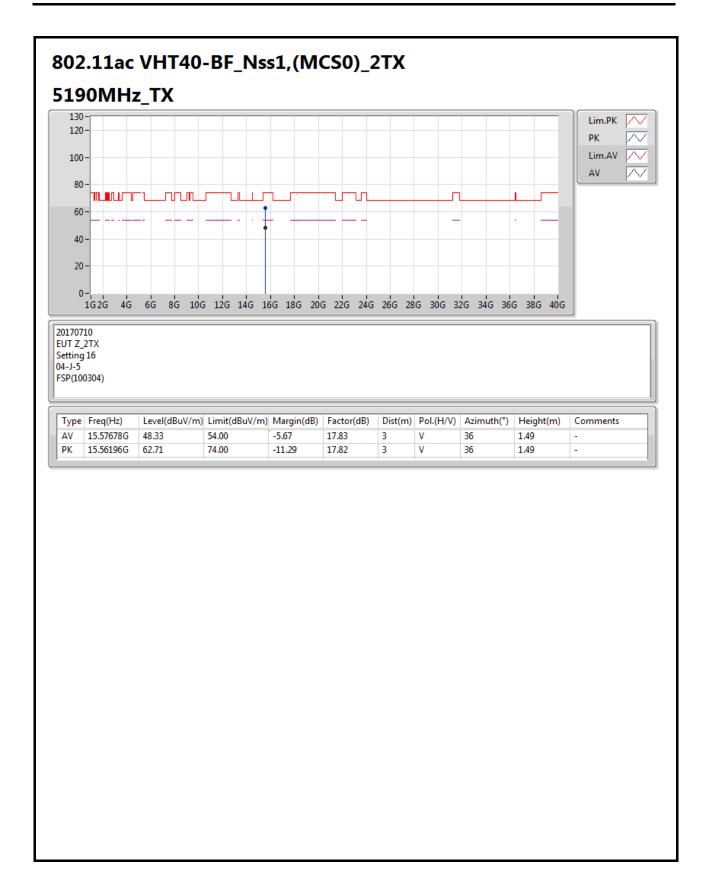






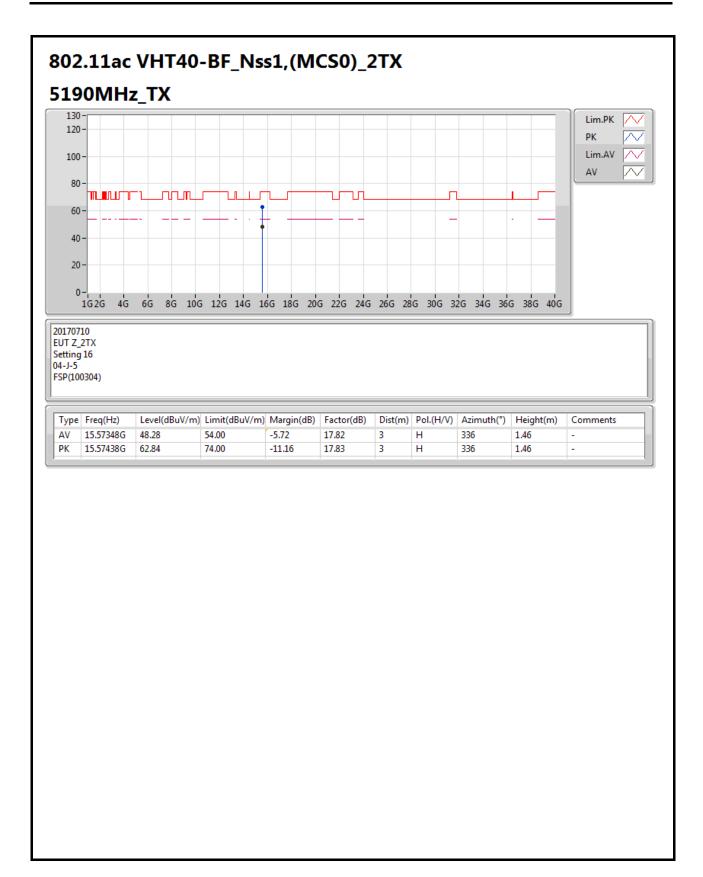




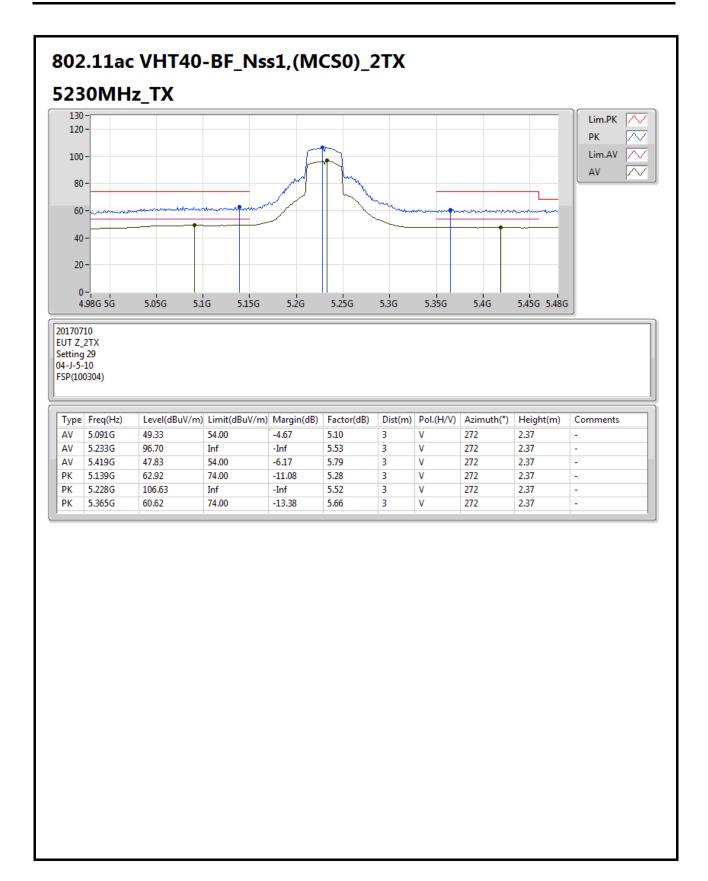


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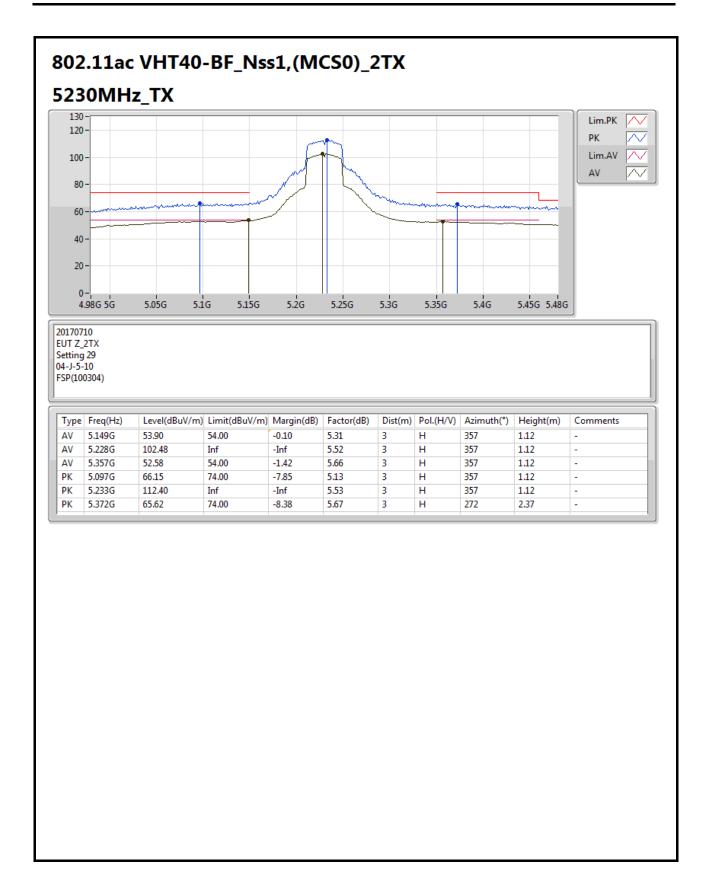






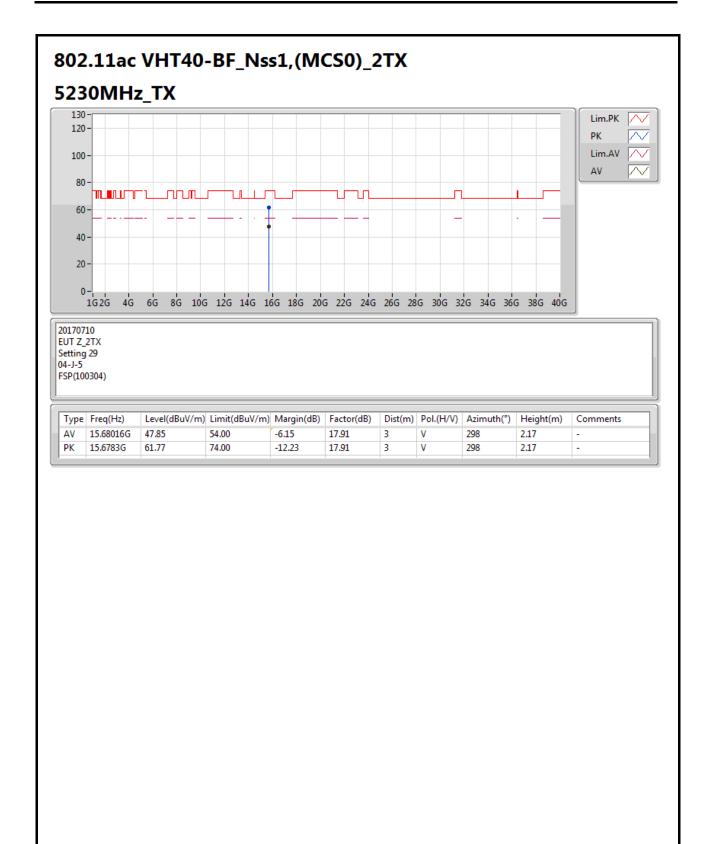
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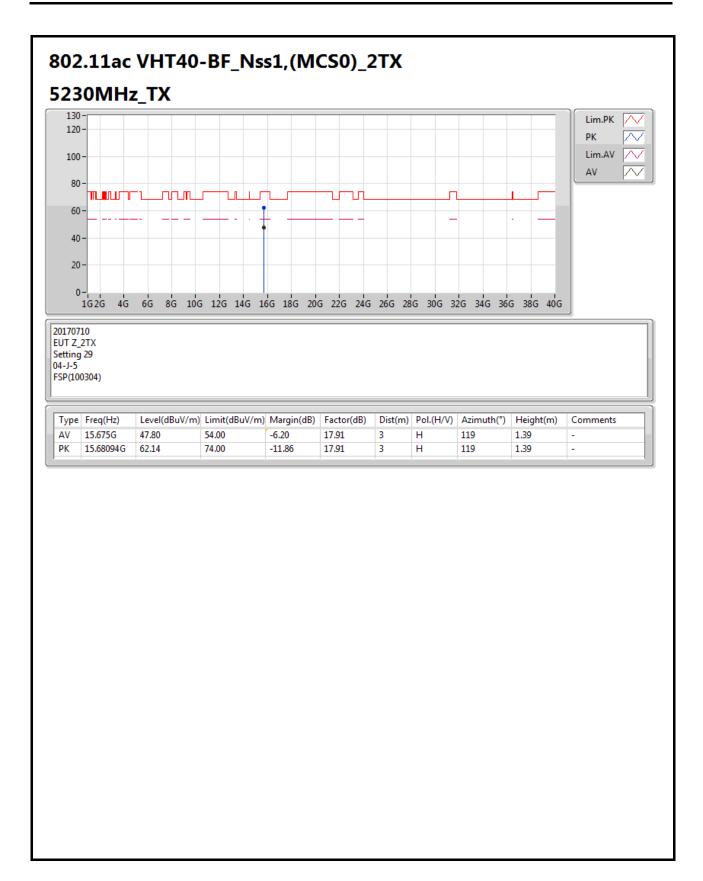


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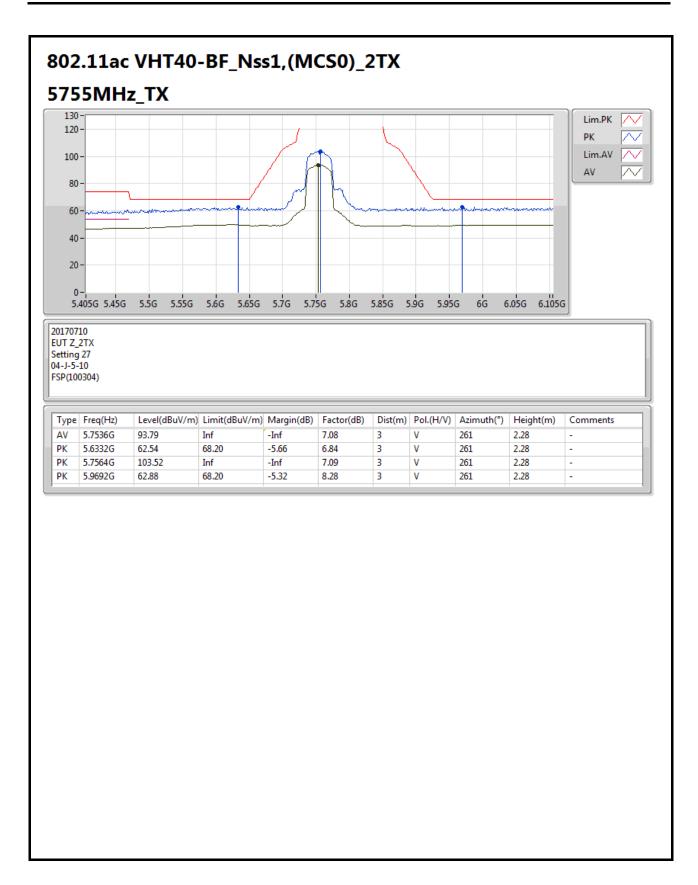






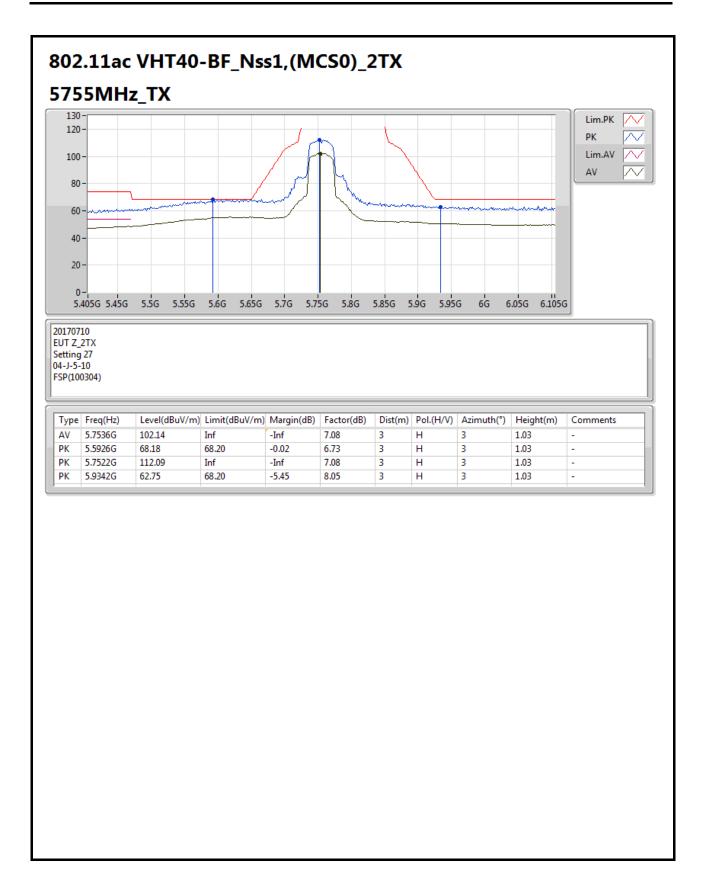
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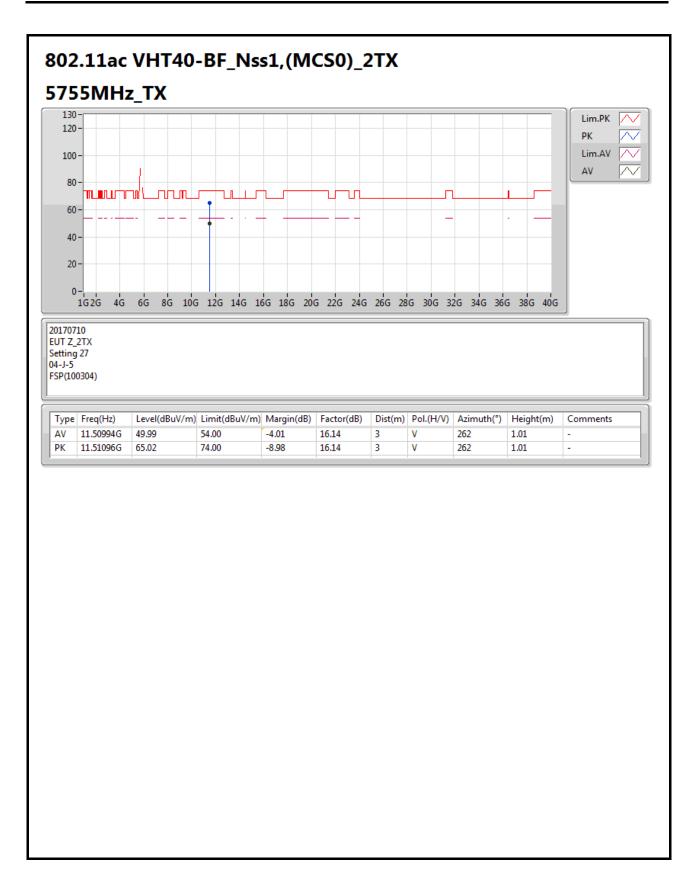
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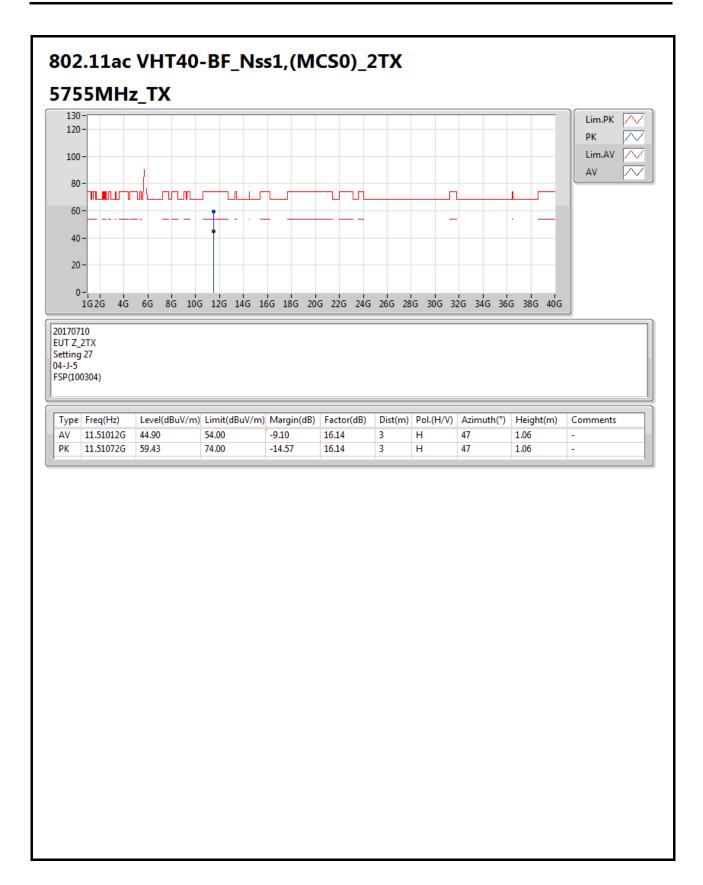


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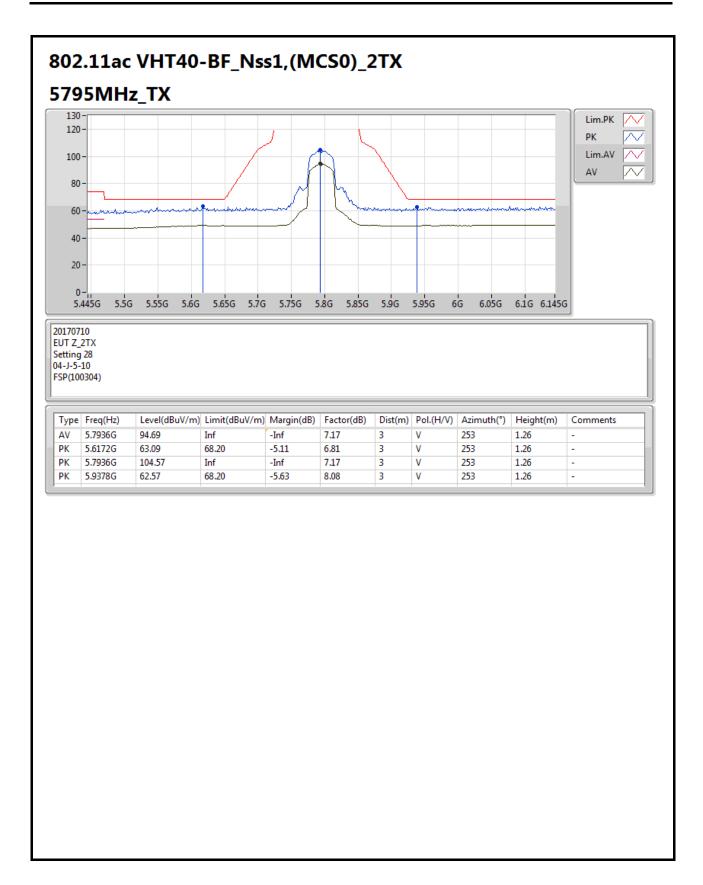




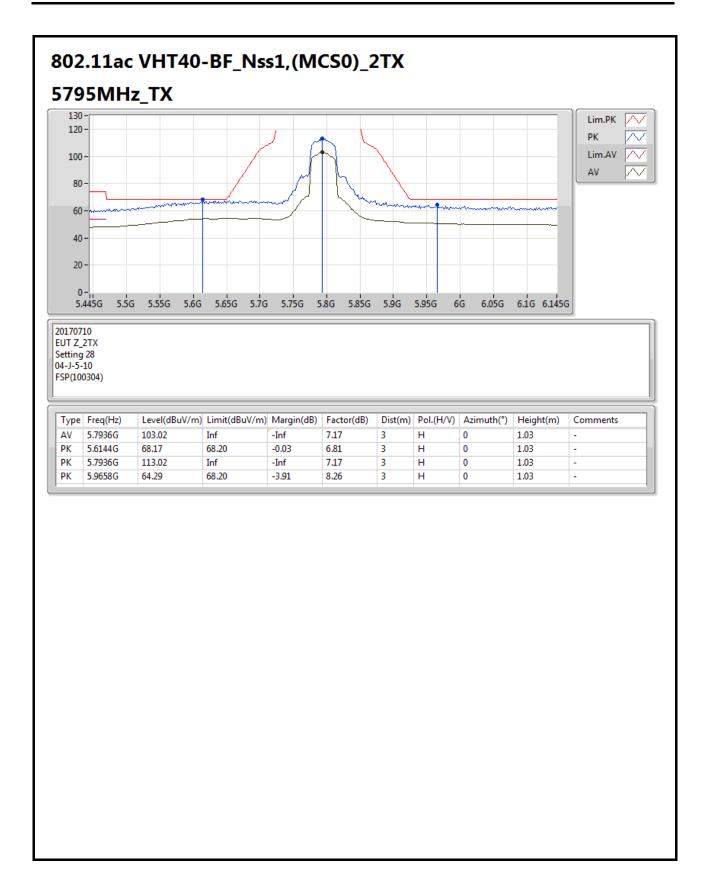






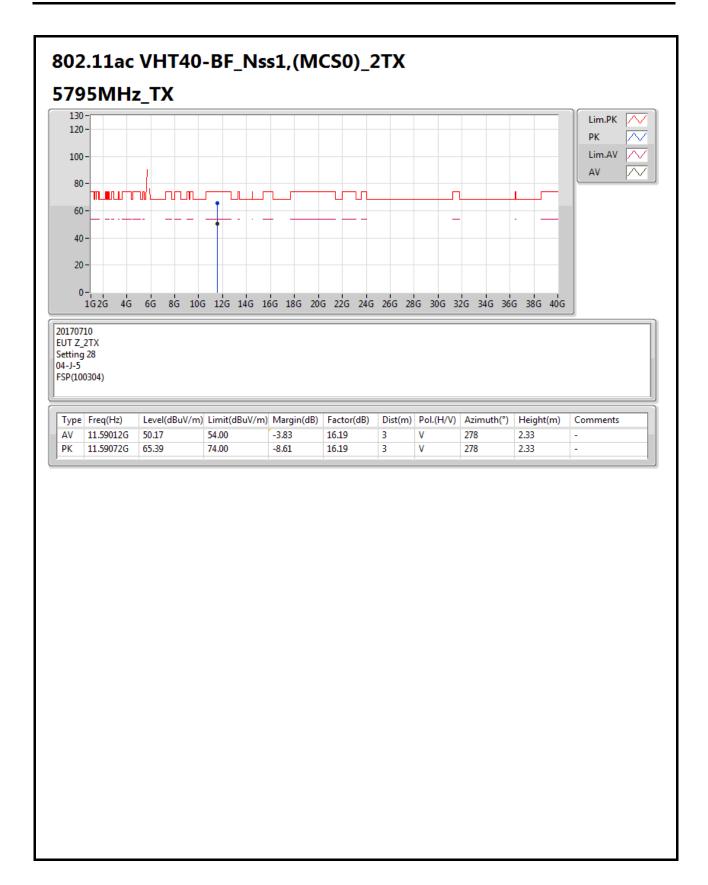






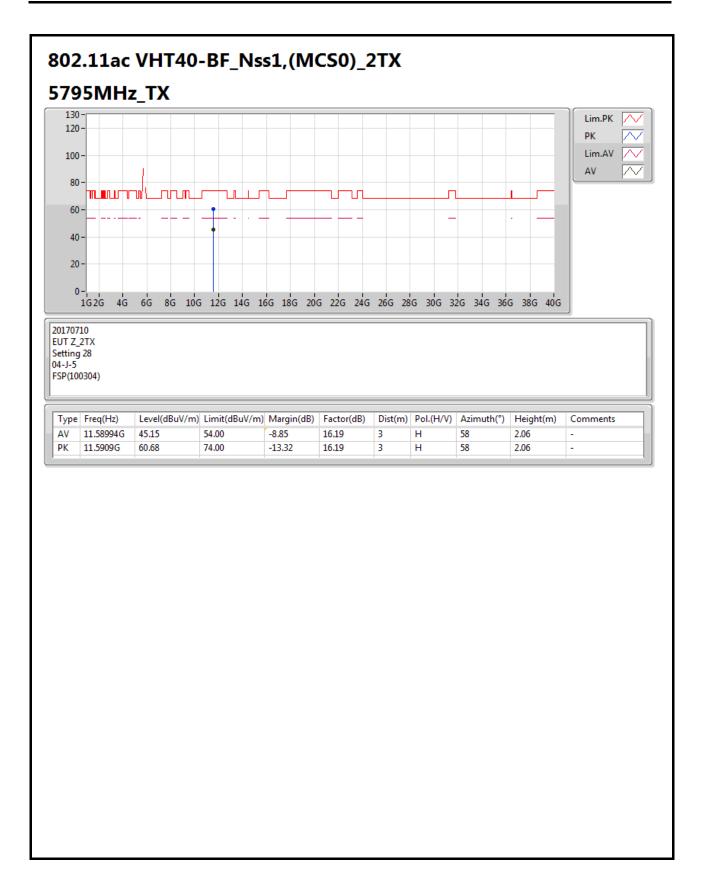
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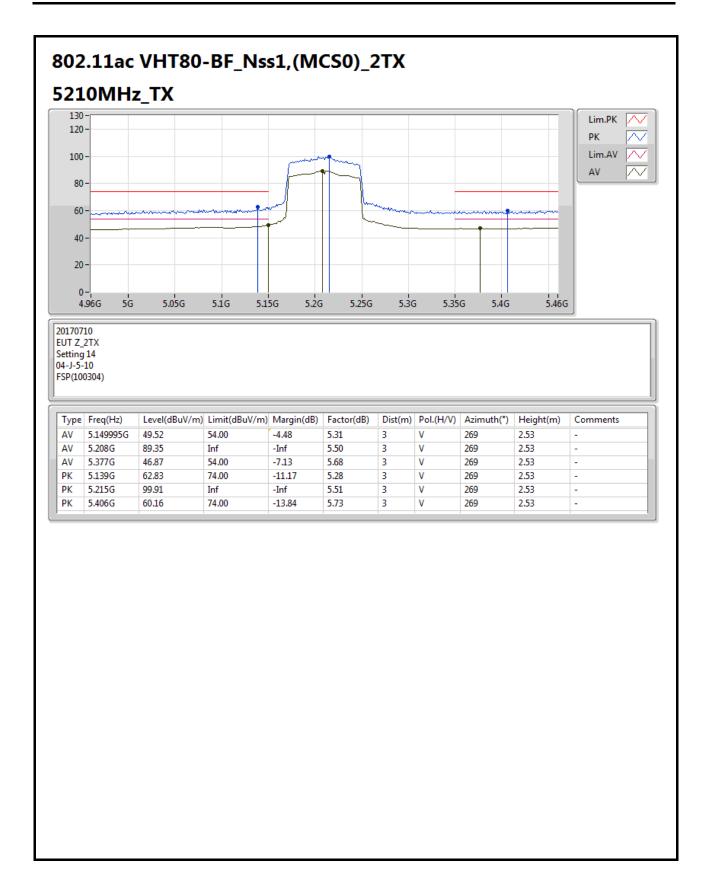
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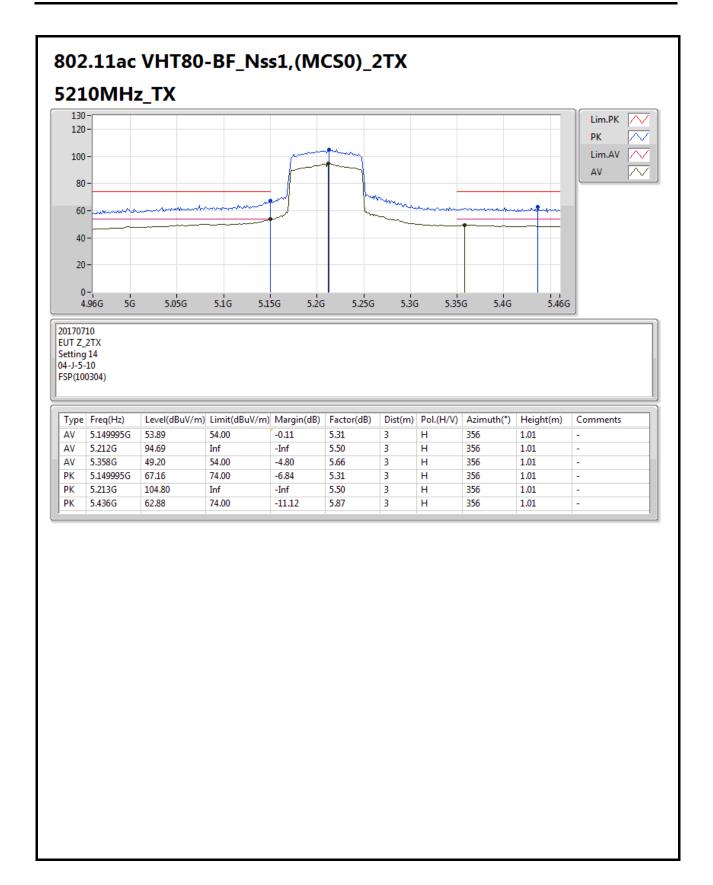
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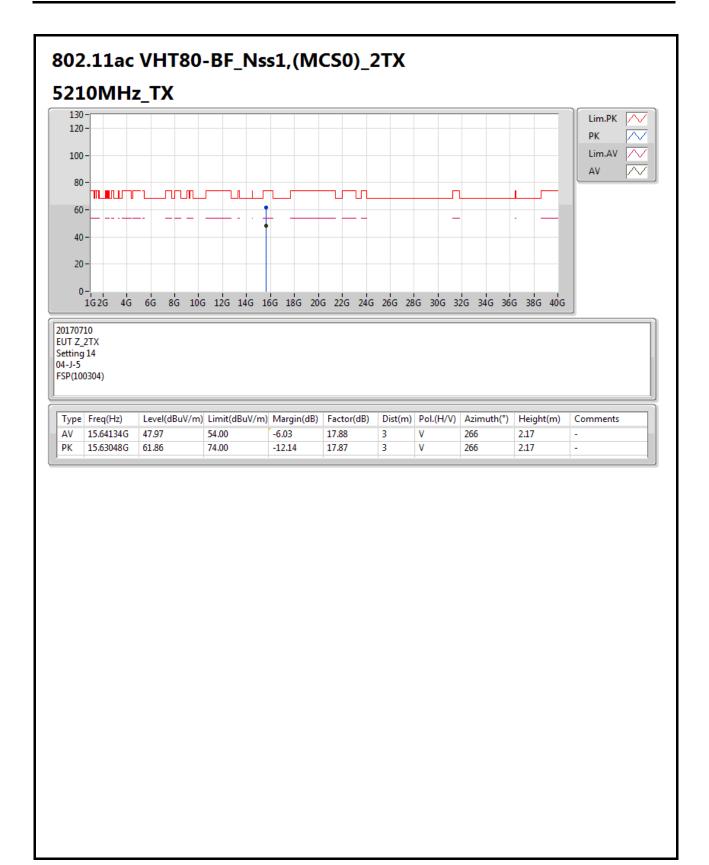
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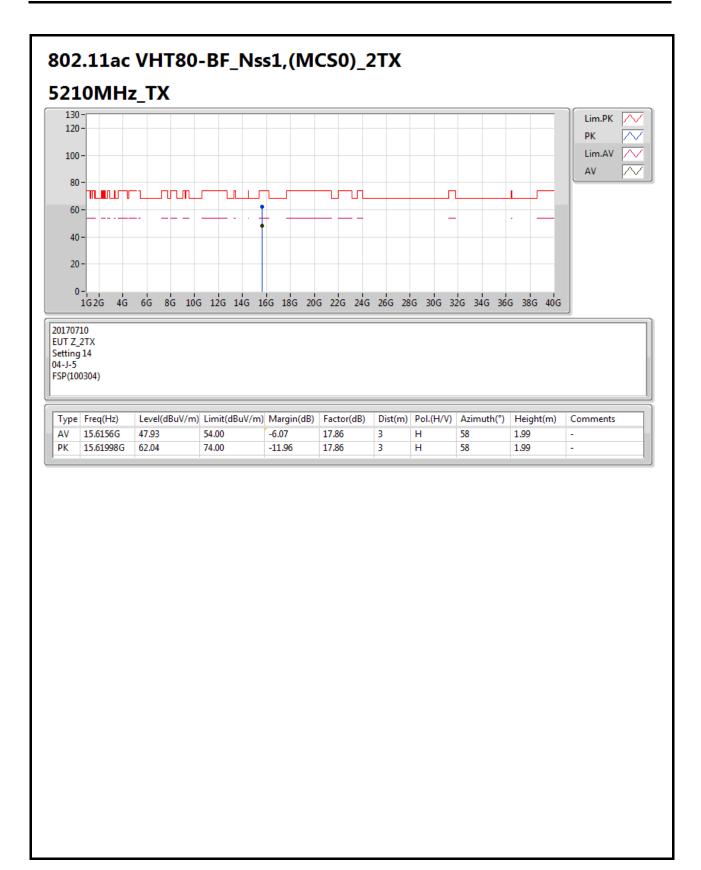
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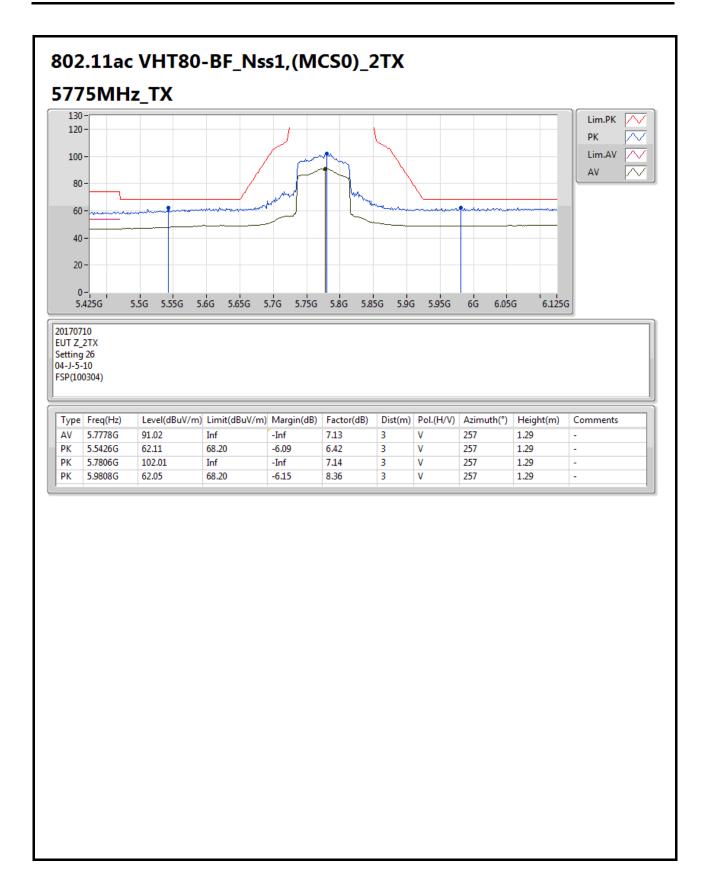


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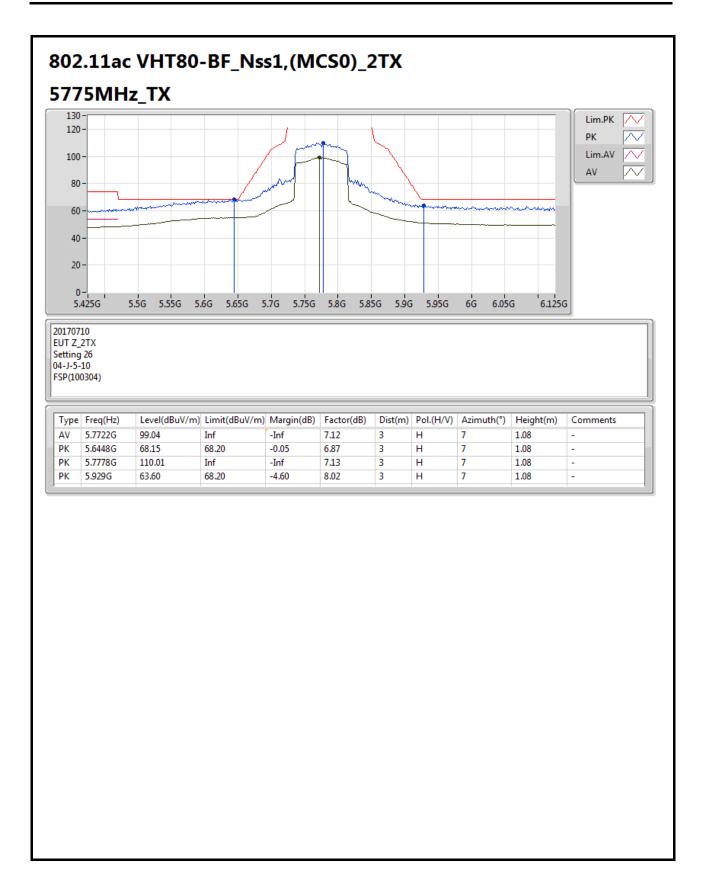






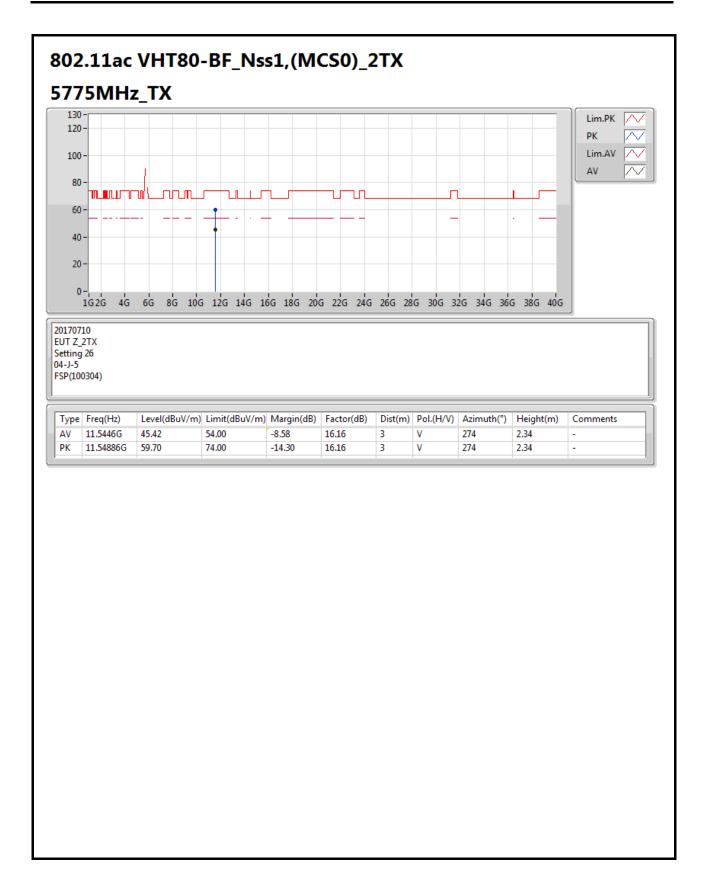
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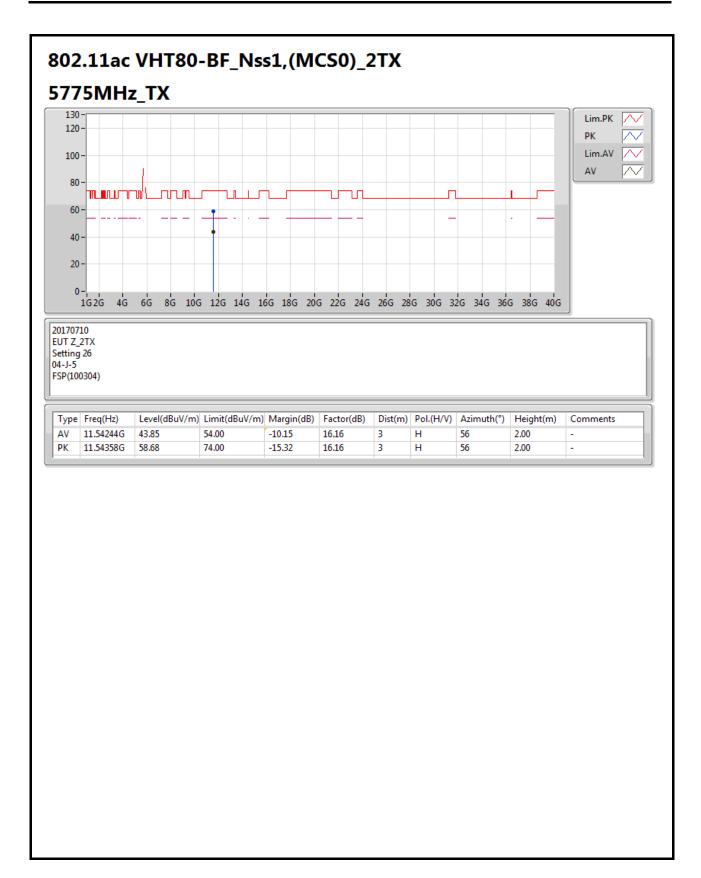
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FS Result Appendix F

Mode: 20 MHz / Port 2 Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)				
(V)	5200 MHz				
(V)	0 Minute	2 Minute	5 Minute	10 Minute	
126.50	5199.9860	5199.9852	5199.9843	5199.9840	
110.00	5199.9854	5199.9852	5199.9844	5199.9838	
93.50	5199.9845	5199.9842	5199.9837	5199.9833	
Max. Deviation (MHz)	0.0155	0.0158	0.0163	0.0167	
Max. Deviation (ppm)	2.98	3.04	3.13	3.21	
Result	Pass				

Temperature vs. Frequency Stability

Temperature		Measurement F	Frequency (MHz)		
(°C)		5200 MHz			
(°C)	0 Minute	2 Minute	5 Minute	10 Minute	
-30	5200.0000	5200.0000	5200.0000	5200.0000	
-20	5200.0000	5200.0000	5200.0000	5200.0000	
-10	5200.0000	5200.0000	5200.0000	5200.0000	
0	5199.9837	5199.9828	5199.9821	5199.9815	
10	5199.9838	5199.9834	5199.9826	5199.9823	
20	5199.9854	5199.9847	5199.9839	5199.9833	
30	5199.9879	5199.9878	5199.9877	5199.9874	
40	5199.9896	5199.9889	5199.9888	5199.9879	
50	5199.9901	5199.9897	5199.9888	5199.9884	
Max. Deviation (MHz)	0.0163	0.0172	0.0179	0.0185	
Max. Deviation (ppm)	3.13	3.31	3.44	3.56	
Result		P	ass		

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz) 5785 MHz			
0.0				
(V)	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5784.9859	5784.9849	5784.9847	5784.9845
110.00	5784.9854	5784.9847	5784.9846	5784.9837
93.50	5784.9846	5784.9840	5784.9832	5784.9822
Max. Deviation (MHz)	0.0154	0.0160	0.0168	0.0178
Max. Deviation (ppm)	2.66	2.77	2.90	3.08
Result		Pass		

Temperature vs. Frequency Stability

Temperature		Measurement F	requency (MHz)	
(℃)	5785 MHz			
(C)	0 Minute	2 Minute	5 Minute	10 Minute
-30	5785.0000	5785.0000	5785.0000	5785.0000
-20	5785.0000	5785.0000	5785.0000	5785.0000
-10	5785.0000	5785.0000	5785.0000	5785.0000
0	5784.9824	5784.9815	5784.9807	5784.9803
10	5784.9840	5784.9834	5784.9827	5784.9823
20	5784.9854	5784.9849	5784.9843	5784.9842
30	5784.9879	5784.9878	5784.9874	5784.9866
40	5784.9884	5784.9876	5784.9874	5784.9873
50	5784.9889	5784.9888	5784.9881	5784.9878
Max. Deviation (MHz)	0.0176	0.0185	0.0193	0.0197
Max. Deviation (ppm)	3.04	3.20	3.34	3.41
Result	Pass			

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FS Result Appendix F

Mode: 40 MHz / Port 2 Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)				
00	5190 MHz				
(V)	0 Minute	2 Minute	5 Minute	10 Minute	
126.50	5189.9862	5189.9856	5189.9855	5189.9848	
110.00	5189.9854	5189.9850	5189.9847	5189.9844	
93.50	5189.9847	5189.9841	5189.9839	5189.9833	
Max. Deviation (MHz)	0.0153	0.0159	0.0161	0.0167	
Max. Deviation (ppm)	2.95	3.06	3.10	3.22	
Result		Pass			

Temperature vs. Frequency Stability

Temperature		Measurement F	requency (MHz)	
(°C)		5190	MHz	
(℃)	0 Minute	2 Minute	5 Minute	10 Minute
-30	5190.0000	5190.0000	5190.0000	5190.0000
-20	5190.0000	5190.0000	5190.0000	5190.0000
-10	5190.0000	5190.0000	5190.0000	5190.0000
0	5189.9832	5189.9828	5189.9827	5189.9825
10	5189.9841	5189.9832	5189.9826	5189.9820
20	5189.9854	5189.9852	5189.9851	5189.9842
30	5189.9879	5189.9872	5189.9869	5189.9861
40	5189.9894	5189.9893	5189.9886	5189.9885
50	5189.9856	5189.9850	5189.9843	5189.9836
Max. Deviation (MHz)	0.0168	0.0172	0.0174	0.0180
Max. Deviation (ppm)	3.24	3.31	3.35	3.47
Result		Pa	ass	•

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5754.9862	5754.9857	5754.9848	5754.9838
110.00	5754.9854	5754.9850	5754.9842	5754.9840
93.50	5754.9853	5754.9844	5754.9834	5754.9828
Max. Deviation (MHz)	0.0147	0.0156	0.0166	0.0172
Max. Deviation (ppm)	2.55	2.71	2.88	2.99
Result	Pass			

Temperature vs. Frequency Stability

Temperature		Measurement F	Frequency (MHz)		
(℃)		5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute	
-30	5755.0000	5755.0000	5755.0000	5755.0000	
-20	5755.0000	5755.0000	5755.0000	5755.0000	
-10	5755.0000	5755.0000	5755.0000	5755.0000	
0	5754.9844	5754.9842	5754.9833	5754.9826	
10	5754.9850	5754.9842	5754.9838	5754.9828	
20	5754.9854	5754.9853	5754.9845	5754.9838	
30	5754.9879	5754.9872	5754.9869	5754.9866	
40	5754.9889	5754.9888	5754.9881	5754.9873	
50	5754.9869	5754.9866	5754.9857	5754.9851	
Max. Deviation (MHz)	0.0156	0.0158	0.0167	0.0174	
Max. Deviation (ppm)	2.71	2.75	2.90	3.02	
Result		Pa	ass		

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FS Result Appendix F

Mode: 80 MHz / Port 2 Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)				
0.0	5210 MHz				
(V)	0 Minute	2 Minute	5 Minute	10 Minute	
126.50	5209.9864	5209.9854	5209.9851	5209.9850	
110.00	5209.9854	5209.9847	5209.9844	5209.9838	
93.50	5209.9846	5209.9836	5209.9833	5209.9824	
Max. Deviation (MHz)	0.0154	0.0164	0.0167	0.0176	
Max. Deviation (ppm)	2.96	3.15	3.21	3.38	
Result		Pa	ass	•	

Temperature vs. Frequency Stability

Temperature		Measurement F	requency (MHz)	
(°C)	5210 MHz			
(℃)	0 Minute	2 Minute	5 Minute	10 Minute
-30	5210.0000	5210.0000	5210.0000	5210.0000
-20	5210.0000	5210.0000	5210.0000	5210.0000
-10	5210.0000	5210.0000	5210.0000	5210.0000
0	5209.9830	5209.9821	5209.9814	5209.9808
10	5209.9846	5209.9839	5209.9836	5209.9827
20	5209.9854	5209.9851	5209.9846	5209.9839
30	5209.9879	5209.9873	5209.9869	5209.9860
40	5209.9887	5209.9880	5209.9873	5209.9867
50	5209.9863	5209.9860	5209.9854	5209.9846
Max. Deviation (MHz)	0.0170	0.0179	0.0186	0.0192
Max. Deviation (ppm)	3.26	3.44	3.57	3.69
Result		Pa	ass	

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5774.9863	5774.9859	5774.9851	5774.9843
110.00	5774.9854	5774.9847	5774.9844	5774.9843
93.50	5774.9848	5774.9846	5774.9836	5774.9830
Max. Deviation (MHz)	0.0152	0.0154	0.0164	0.0170
Max. Deviation (ppm)	2.63	2.67	2.84	2.94
Result		Pass		

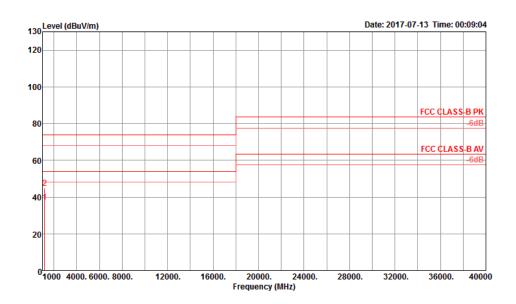
Temperature vs. Frequency Stability

Temperature		Measurement F	requency (MHz)	
(°C)	5775 MHz			
(℃)	0 Minute	2 Minute	5 Minute	10 Minute
-30	5775.0000	5775.0000	5775.0000	5775.0000
-20	5775.0000	5775.0000	5775.0000	5775.0000
-10	5775.0000	5775.0000	5775.0000	5775.0000
0	5774.9834	5774.9833	5774.9825	5774.9816
10	5774.9853	5774.9848	5774.9839	5774.9830
20	5774.9854	5774.9851	5774.9846	5774.9836
30	5774.9879	5774.9874	5774.9864	5774.9863
40	5774.9899	5774.9893	5774.9885	5774.9881
50	5774.9861	5774.9855	5774.9851	5774.9848
Max. Deviation (MHz)	0.0166	0.0167	0.0175	0.0184
Max. Deviation (ppm)	2.87	2.89	3.03	3.19
Result	Pass			

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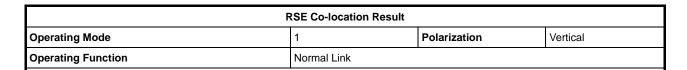
RSE Co-location Result								
Operating Mode	1	Polarization	Horizontal					
Operating Function	Normal Link							

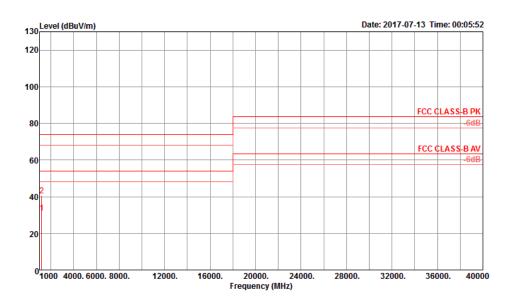


	Freq	Level				CableAntenna Preamp Loss Factor Factor		A/Pos	T/Pos Remark		Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1199.49	37.31	54.00	-16.69	45.59	2.60	24.51	35.39	102	165	Average	HORIZONTAL
2	1199.92	45.05	74.00	-28.95	53.33	2.60	24.51	35.39	102	165	Peak	HORIZONTAL

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	Freq	Level		Over Limit						T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1199.68	31.06	54.00	-22.94	39.34	2.60	24.51	35.39	121	128	Average	VERTICAL
2	1199.78	40.47	74.00	-33.53	48.75	2.60	24.51	35.39	121	128	Peak	VERTICAL

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