

Report No.: FR901614AB



# **FCC RADIO TEST REPORT**

FCC ID : 2AHKM-CGNV5

Equipment : 24X8 P6 DBCC WiFi eMTA

Brand Name : hitron
Model Name : CGNV5

Applicant : Hitron Technologies Inc.

No. 1-8, Li-Hsin 1st Rd, Hsinchu Science Park,

Hsinchu 30078, Taiwan

Manufacturer : Hitron Technologies Inc.

No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,

Hsinchu 30078, Taiwan

Standard : 47 CFR FCC Part 15.407

The product was received on Oct. 18, 2019, and testing was started from Oct. 28, 2019 and completed on Nov. 01, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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

Report Template No.: CB-A12\_1 Ver1.0

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: Nov. 13, 2019

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Photographs of EUT v01

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## History of this test report

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Report No.	Version	Description	Issued Date
FR9O1614AB	01	Initial issue of report	Nov. 13, 2019

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## **Summary of Test Result**

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(a)	Emission Bandwidth	PASS	-
3.3	15.407(a)	Maximum Conducted Output Power	PASS	-
3.4	15.407(a)	Peak Power Spectral Density	PASS	-
3.5	15.407(b)	Unwanted Emissions	PASS	-

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

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

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

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: Cindy Peng

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## 1 General Description

#### 1.1 Information

#### 1.1.1 RF General Information

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

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Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	3TX
5.15-5.25GHz	802.11n HT20	20	3TX
5.15-5.25GHz	802.11ac VHT20	20	3TX
5.15-5.25GHz	802.11n HT40	40	3TX
5.15-5.25GHz	802.11ac VHT40	40	3TX
5.15-5.25GHz	802.11ac VHT80	80	3TX
5.725-5.85GHz	802.11a	20	3TX
5.725-5.85GHz	802.11n HT20	20	3TX
5.725-5.85GHz	802.11ac VHT20	20	3TX
5.725-5.85GHz	802.11n HT40	40	3TX
5.725-5.85GHz	802.11ac VHT40	40	3TX
5.725-5.85GHz	802.11ac VHT80	80	3TX

#### Note:

- 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 and VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
- BWch is the nominal channel bandwidth.
- Nss-Min is the minimum number of spatial streams.
- Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

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#### 1.1.2 Antenna Information

A m4	Po	ort	Brand	Madal Nama	Tumo	Connector	Gain (dBi)		
Ant.	2.4GHz	5GHz	Brand	Model Name Type		brand Model Name Type Connect	Connector	2.4GHz	5GHz
1	1	2	LYNWAVE	ALX19P-221AA1-00	Dipole	I-PEX	2.5	3.4	
2	2	3	LYNWAVE	ALX19P-221AA2-00	Dipole	I-PEX	2.5	3.4	
3	3	-	LYNWAVE	ALX19P-221AA3-00	Dipole	I-PEX	2.5	-	
4	-	1	LYNWAVE	ALX19P-221AA0-00	Dipole	I-PEX	-	3.4	

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Note 1: The above information was declared by manufacturer.

Note 2: The EUT has four antennas.

<For 2.4GHz Band>

For IEEE 802.11b mode (1TX/1RX)

Only Port 1 can be used as transmitting/receiving.

For IEEE 802.11g/n mode (3TX/3RX)

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

<For 5GHz Band>

For IEEE 802.11a/n/ac mode (3TX/3RX)

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

#### 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT20	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT40	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT80	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)

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

#### 1.1.4 EUT Operational Condition

<b>EUT Power Type</b>	From power adapter			
Beamforming Function	☐ With beamforming ☐ Without beamforming		Without beamforming	
Function		Outdoor P2M	$\boxtimes$	Indoor P2M
runction		Fixed P2P		Client
<b>Test Software Version</b>	Lantiq DUT · Telnet			

Note: The above information was declared by manufacturer.

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## 1.2 Applicable Standards

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

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- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01
- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

## 1.3 Testing Location Information

	Testing Location						
	HWA YA	ADD	:	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)			
		TEL	:	886-3-327-3456 FAX : 886-3-327-0973			
$\boxtimes$	JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.			
		TEL	:	886-3-656-9065 FAX : 886-3-656-9085			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH02-CB	Ekko Hsieh	24.2~24.6°C / 58~62%	Oct. 31, 2019~Nov. 01, 2019
Radiated below 1GHz	03CH05-CB	Bruce Yang	23.6~25.1°C / 60~64%	Oct. 28, 2019
Radiated above 1GHz	03CH06-CB	Stim Sung	23.7~25.9°C / 59~61%	Oct. 30, 2019~Oct. 31, 2019
AC Conduction	CO01-CB	Ryo Fan	24~26°C / 67~60%	Nov. 01, 2019

Test site Designation No. TW0006 with FCC

## 1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	2.4 dB	Confidence levels of 95%
Output Power Measurement	1.5 dB	Confidence levels of 95%
Power Density Measurement	2.4 dB	Confidence levels of 95%
Bandwidth Measurement	2%	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_Nss1,(6Mbps)_3TX	-
5180MHz	20.5
5200MHz	31.5
5240MHz	31.5
5745MHz	31.5
5785MHz	31.5
5825MHz	31.5
802.11ac VHT20_Nss1,(MCS0)_3TX	-
5180MHz	20
5200MHz	31.5
5240MHz	31.5
5745MHz	31.5
5785MHz	31.5
5825MHz	31.5
802.11ac VHT40_Nss1,(MCS0)_3TX	-
5190MHz	18
5230MHz	31.5
5755MHz	31.5
5795MHz	31.5
802.11ac VHT80_Nss1,(MCS0)_3TX	-
5210MHz	17.5
5775MHz	31.5

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### Note:

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

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## 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests			
Tests Item	Tests Item AC power-line conducted emissions		
Condition	Condition AC power-line conducted measurement for line and neutral		
Operating Mode Normal Link			
1	1 EUT + Adapter 1		
2 EUT + Adapter 2			
For operating mode 2 is the worst case and it was record in this test report.			

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

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

The Worst Case Mode for Following Conformance Tests			
Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location			
Test Condition Radiated measurement			
Operating Mode	Operating Mode Normal Link		
1 WLAN 2.4GHz + WLAN 5GHz			
Refer to Appendix F for Radiated Emission Co-location.			

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The Worst Case Mode for Following Conformance Tests				
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation				
Operating Mode	Operating Mode			
1	1 WLAN 2.4GHz + WLAN 5GHz			
Refer to Sporton Test Report No.: FA9O1614 for Co-location RF Exposure Evaluation.				

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Note: The EUT can only be used at Y axis position.

## 2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

#### 2.4 Accessories

	Accessories					
No.	Equipment Name	Brand Name	Model Name	Rating		
1	Adapter 1	APD	WA-30P12FU	Input: 100-240V~50-60Hz, 0.9A Max. Output: 12V, 2.5A		
2	Adapter 2 MOSO MSS-V2500WR120-030E0-US Input: 100-240V~50/60Hz, 1.0A max Output: 12.0V, 2.5A					
No.	No. Other					
3	3 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	LAN NB	DELL	E6430	N/A	
В	Phone	SAMPO	HT-B 907WL	N/A	
С	Terminal System	CASA-Systems	C2200	N/A	
D	Terminal System NB	HP	EliteBook 840	N/A	
Е	Phone	SAMPO	HT-B 907WL	N/A	
F	Flash disk3.0	Apacer	AH223	N/A	
G	2.4G NB	DELL	E6430	N/A	
Н	5G NB	DELL	E6430	N/A	

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For Radiated (below 1GHz):

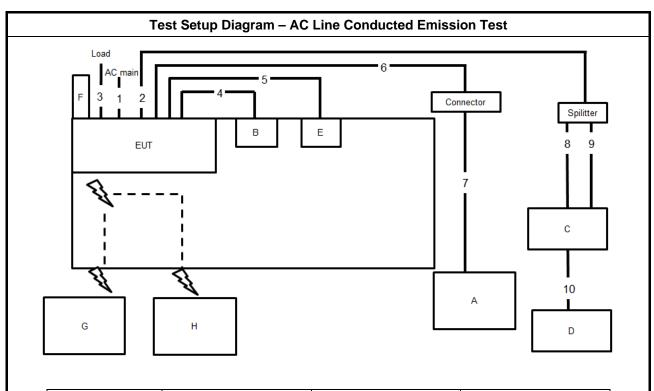
	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
Α	Notebook	DELL	E4300	N/A		
В	Notebook	DELL	E4300	N/A		
С	Notebook	DELL	E4300	N/A		
D	Notebook	Lenovo	TP00093A	N/A		
Е	Terminal System	CASA-Systems	C2200	N/A		
F	Phone	SAMPO	HT-B 907WL	N/A		
G	Phone	SAMPO	HT-B 907WL	N/A		
Н	USB dongle	Apacer	AH223	N/A		
I	Notebook	Lenovo	TP00075A	N/A		
J	Earphone	e-Power	S90W	N/A		
K	Mouse	Logitech	M-U0026	N/A		

For Radiated (above 1GHz) and RF Conducted:

10111	To Hadiatod (abovo Totile) and Hi Conadotod.				
	Support Equipment				
No.	No. Equipment Brand Name Model Name FCC ID				
Α	Notebook	DELL	E4300	N/A	

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## 2.6 Test Setup Diagram

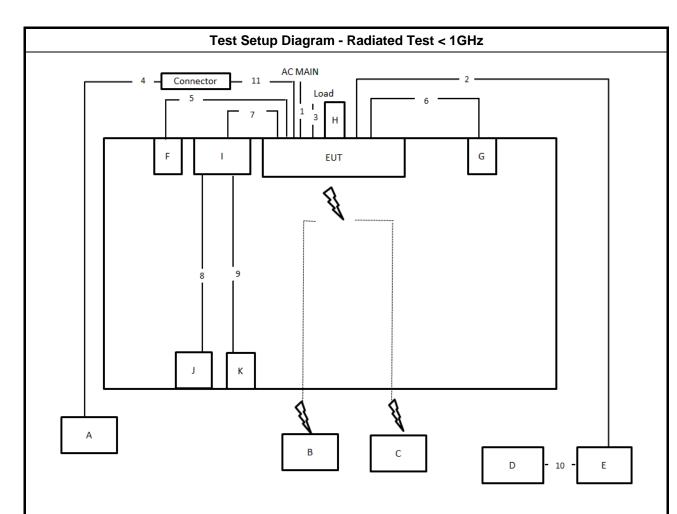


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Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	Coaxial cable	Yes	10m
3	RJ-45 cable*3	No	1.5m
4	RJ-11 cable	No	1.5m
5	RJ-11 cable	No	1.5m
6	RJ-45 cable	No	1.5m
7	RJ-45 cable	No	10m
8	Coaxial cable	Yes	1m
9	Coaxial cable	Yes	1m
10	RJ-45 cable	No	1.5m

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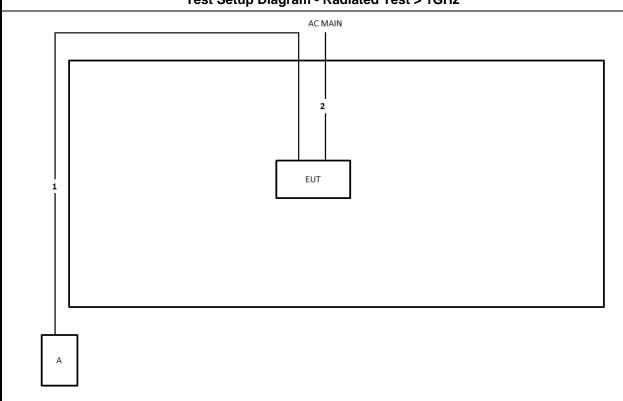
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Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	Coaxial cable	Yes	10m
3	RJ-45 cable*3	No	1.5m
4	RJ-45 cable	No	10m
5	RJ-11 cable	No	1.5m
6	RJ-11 cable	No	1.5m
7	Console cable	No	1.5m
8	USB cable	Yes	1.5m
9	Audio cable	No	1.5m
10	RJ-45 cable	No	1.5m
11	RJ-45 cable	No	1.5m

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Test Setup Diagram - Radiated Test > 1GHz



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

### 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

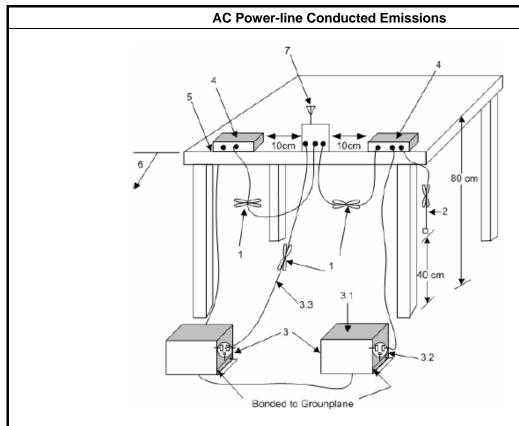
Refer a test equipment and calibration data table in this test report.

#### 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  $\Omega$  loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
- 3.1—All other equipment powered from additional LISN(s).
- 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
- 3.3—LISN at least 80 cm from nearest part of EUT chassis.
- 4—Non-EUT components of EUT system being tested.
- 5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

#### 3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

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## 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

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

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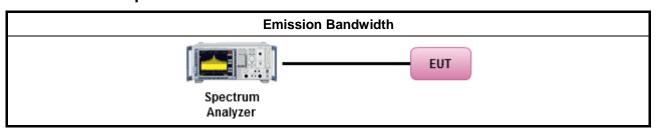
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

	Test Method				
•	For the emission bandwidth shall be measured using one of the options below:				
	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 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:					
	■ 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>					
	e = maximum conducted output power in dBm, = the maximum transmitting antenna directional gain in dBi.					

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## 3.3.2 Measuring Instruments

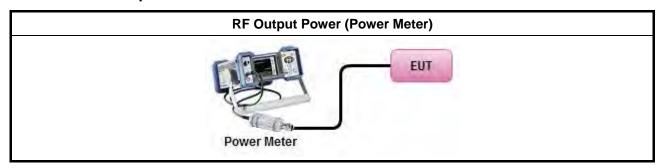
Refer a test equipment and calibration data table in this test report.

#### 3.3.3 Test Procedures

	Test Method				
•	Maximum Conducted Output Power				
	Average over on/off periods with duty factor				
	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).				
	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)				
	Wideband RF power meter and average over on/off periods with duty factor				
	Refer as FCC KDB 789033, clause E Method PM-G (using an RF average power meter).				
•	For conducted measurement.				
	■ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.				
	If multiple transmit chains, EIRP calculation could be following as methods: P <sub>total</sub> = P <sub>1</sub> + P <sub>2</sub> + + P <sub>n</sub> (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP <sub>total</sub> = P <sub>total</sub> + 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:				
	<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) ≤ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$ .				
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.				
LE-	LAN Devices				
	For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.				
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz.				
	<ul> <li>e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:</li> <li>-13 dBW/MHz for 0° ≤ θ &lt; 8°; -13 − 0.716 (θ-8) dBW/MHz for 8° ≤ θ &lt; 40°</li> <li>-35.9 − 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ &gt; 45°</li> </ul>				
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz.				
	For the 5.725-5.85 GHz band:				
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 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	<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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#### 3.4.3 Test Procedures

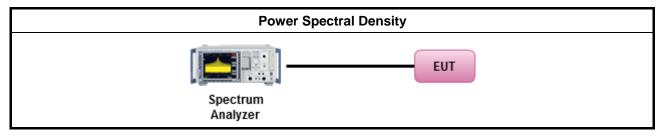
		Test Method
•	outp	k power spectral density procedures that the same method as used to determine the conducted ut power shall be used to determine the peak power spectral density and use the peak search tion on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density I be measured using below options:
		Refer as FCC KDB 789033, F)5) power spectral density can be measured using resolution bandwidths $<$ 1 MHz provided that the results are integrated over 1 MHz bandwidth
	[duty	/ cycle ≥ 98% or external video / power trigger]
	$\boxtimes$	Refer as FCC KDB 789033, clause E Method SA-1 (spectral trace averaging).
		Refer as FCC KDB 789033, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty	cycle < 98% and average over on/off periods with duty factor
		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

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#### 3.5 Unwanted Emissions

#### 3.5.1 Transmitter Unwanted Emissions Limit

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

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

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

Un-restricted band emissions above 1GHz Limit				
Operating Band	Limit			
⊠ 5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]			
☐ 5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]			
☐ 5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]			
⊠ 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.			

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of

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linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

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#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

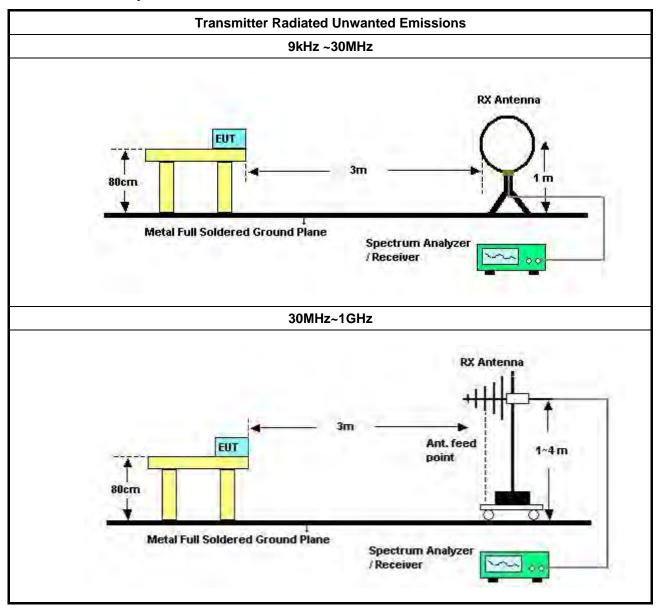
#### **Test Method**

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

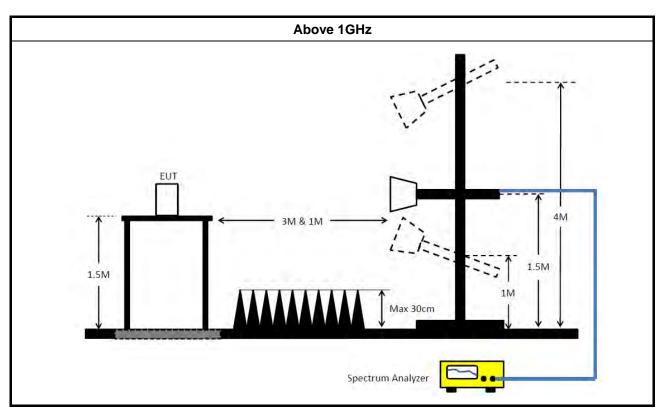
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### 3.5.4 Test Setup



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#### 3.5.5 Measurement Results Calculation

The measured Level is calculated using:

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

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

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 10 harmonic or 40 GHz, whichever is appropriate.

#### 3.5.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E

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## **Test Equipment and Calibration Data**

	I				O-liber-ti	Oalthart's	
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 28, 2019	Jan. 29, 2020	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50- 16-2	04083	150kHz ~ 100MHz	Dec. 24, 2018	Dec. 23, 2019	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Jan. 11, 2019	Jan. 10, 2020	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESE & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 28, 2019	Mar. 27, 2020	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	May 02, 2019	May 01, 2020	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Aug, 15, 2019	Aug, 14, 2020	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	LOW Cable-04+23	30MHz~1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	9120D-1292	1GHz~18GHz	Jul. 17, 2019	Jul. 16, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 12, 2019	Jun. 11, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	May 08, 2019	May 07, 2020	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 21, 2019	Oct. 20, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUH NER	RG402	High Cable-05	1GHz~18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUH NER	RG402	High Cable-05+24	1GHz~18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSV40	101027	9kHz~40GHz	Jul. 02, 2019	Jul. 01, 2020	Conducted (TH02-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GHz	Sep. 11, 2019	Sep. 10, 2020	Conducted (TH02-CB)

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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark	
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GHz	Sep. 11, 2019	Sep. 10, 2020	Conducted (TH02-CB)	
RF Cable-high	Woken	RG402	High Cable-01	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH02-CB)	
RF Cable-high	Woken	RG402	High Cable-02	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH02-CB)	
RF Cable-high	Woken	RG402	High Cable-3	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH02-CB)	
RF Cable-high	Woken	RG402	High Cable-04	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH02-CB)	
RF Cable-high	Woken	RG402	High Cable-05	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH02-CB)	

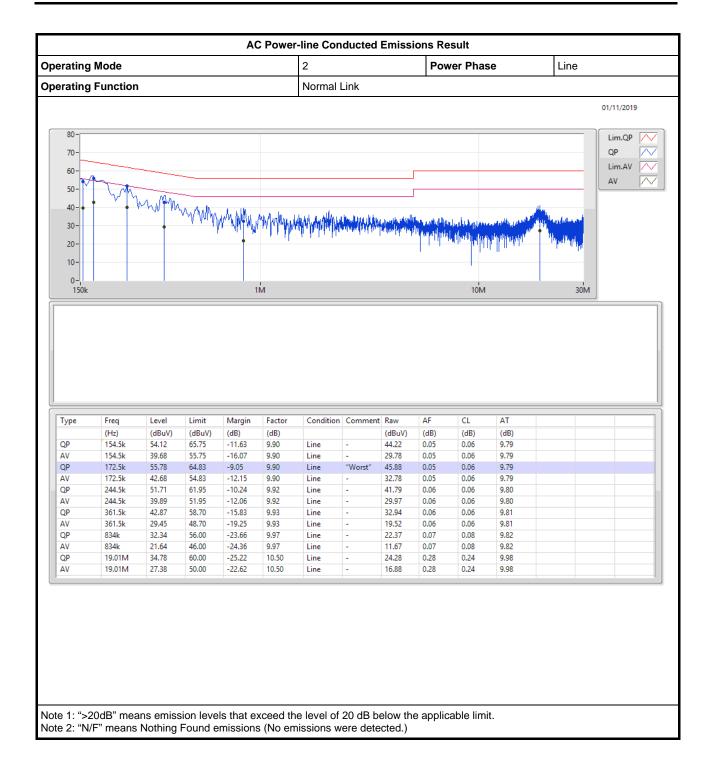
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Note: Calibration Interval of instruments listed above is one year.

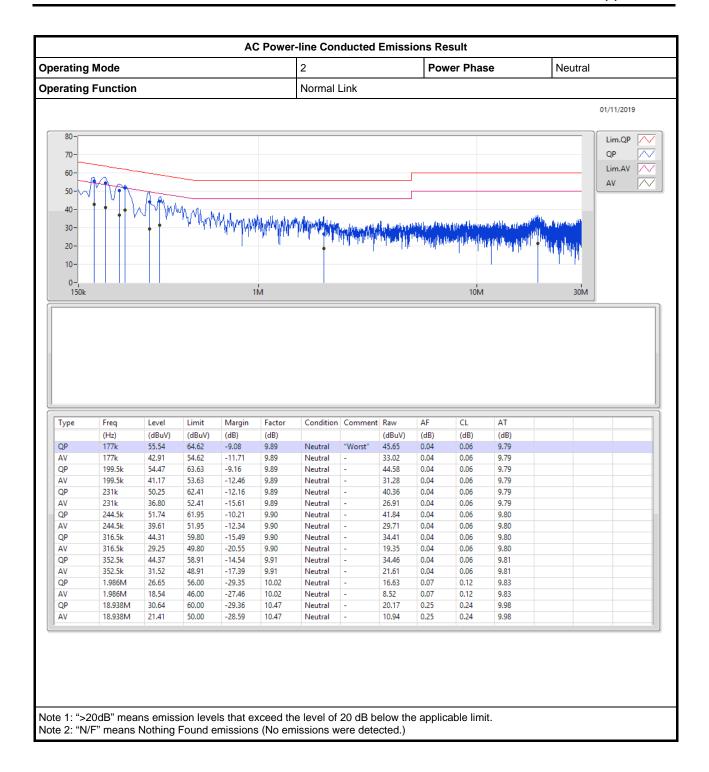
N.C.R. means Non-Calibration required.

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### AC Power-line Conducted Emissions Result



#### AC Power-line Conducted Emissions Result





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)_3TX	37.25M	19.54M	19M5D1D	22.475M	16.467M	
802.11ac VHT20_Nss1,(MCS0)_3TX	43.1M	19.265M	19M3D1D	23.3M	17.666M	
802.11ac VHT40_Nss1,(MCS0)_3TX	78.25M	36.832M	36M8D1D	43.7M	36.132M	
802.11ac VHT80_Nss1,(MCS0)_3TX	89.3M	75.162M	75M2D1D	85.6M	74.963M	
5.725-5.85GHz	-	-	-	-	-	
802.11a_Nss1,(6Mbps)_3TX	16.45M	16.567M	16M6D1D	16.375M	16.492M	
802.11ac VHT20_Nss1,(MCS0)_3TX	17.75M	17.791M	17M8D1D	17.575M	17.716M	
802.11ac VHT40_Nss1,(MCS0)_3TX	36.4M	36.332M	36M3D1D	36.35M	36.182M	
802.11ac VHT80_Nss1,(MCS0)_3TX	75.7M	75.562M	75M6D1D	75.4M	75.362M	

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

**Max-OBW** = Maximum99% occupied bandwidth;

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

**Min-OBW** = Minimum 99% occupied bandwidth;

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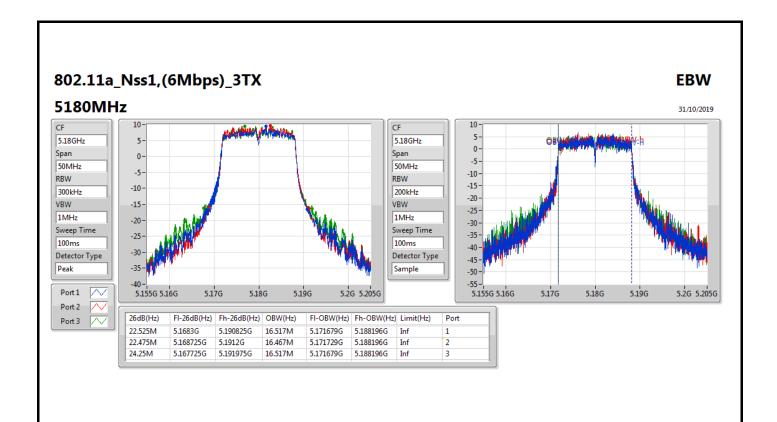
#### Result

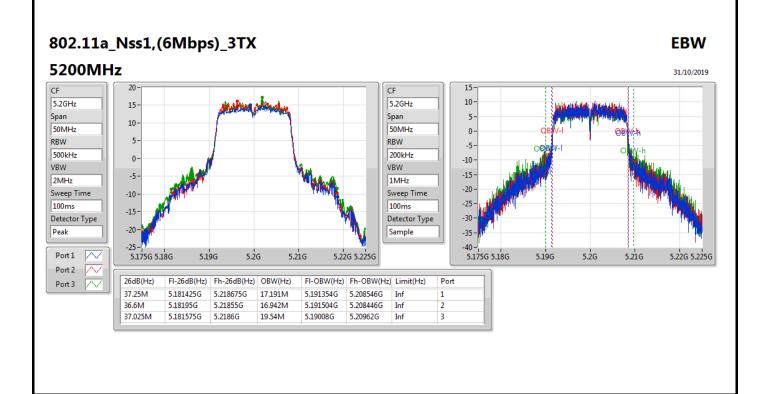
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_3TX	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	22.525M	16.517M	22.475M	16.467M	24.25M	16.517M
5200MHz	Pass	Inf	37.25M	17.191M	36.6M	16.942M	37.025M	19.54M
5240MHz	Pass	Inf	37.225M	16.917M	36.8M	17.091M	36.425M	18.091M
5745MHz	Pass	500k	16.45M	16.567M	16.4M	16.492M	16.375M	16.567M
5785MHz	Pass	500k	16.45M	16.542M	16.45M	16.567M	16.4M	16.567M
5825MHz	Pass	500k	16.4M	16.517M	16.425M	16.542M	16.375M	16.542M
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	23.725M	17.691M	23.4M	17.691M	23.3M	17.666M
5200MHz	Pass	Inf	42.575M	17.991M	36.95M	17.941M	43.1M	19.265M
5240MHz	Pass	Inf	42.2M	17.941M	40.5M	17.941M	42.4M	18.341M
5745MHz	Pass	500k	17.725M	17.741M	17.625M	17.716M	17.575M	17.766M
5785MHz	Pass	500k	17.675M	17.716M	17.625M	17.791M	17.625M	17.741M
5825MHz	Pass	500k	17.75M	17.766M	17.625M	17.716M	17.6M	17.716M
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	46.5M	36.132M	46M	36.132M	43.7M	36.282M
5230MHz	Pass	Inf	77M	36.532M	76.5M	36.482M	78.25M	36.832M
5755MHz	Pass	500k	36.4M	36.232M	36.35M	36.232M	36.35M	36.282M
5795MHz	Pass	500k	36.4M	36.182M	36.4M	36.232M	36.4M	36.332M
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	89.3M	75.162M	86.6M	74.963M	85.6M	75.062M
5775MHz	Pass	500k	75.6M	75.562M	75.7M	75.462M	75.4M	75.362M

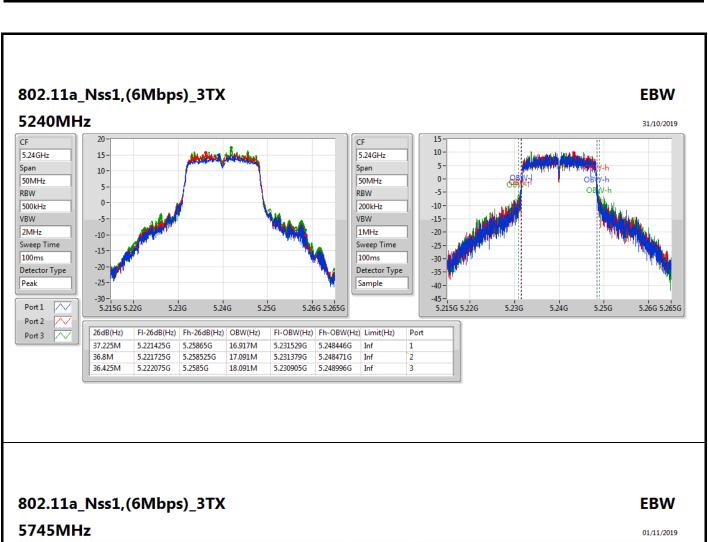
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

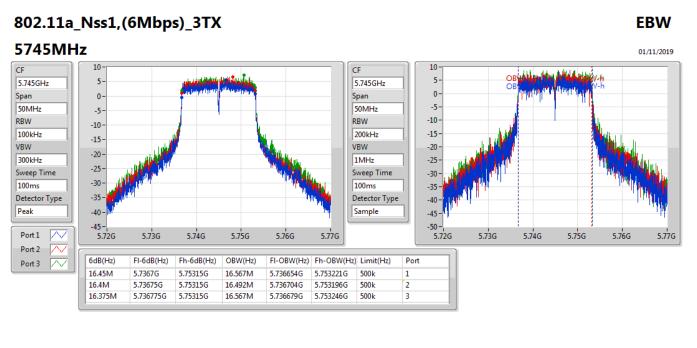
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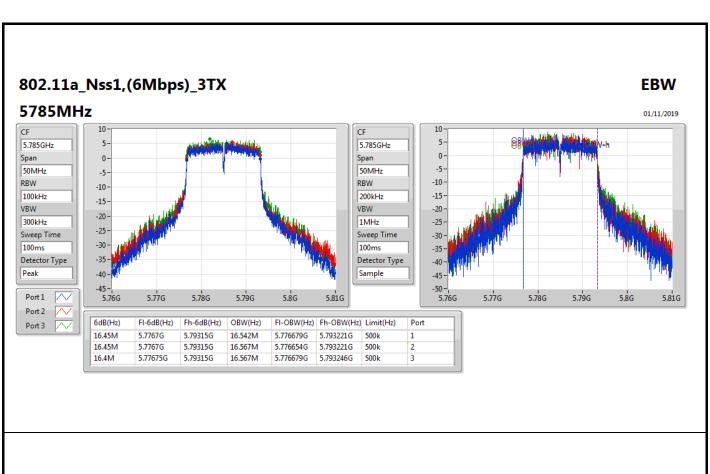
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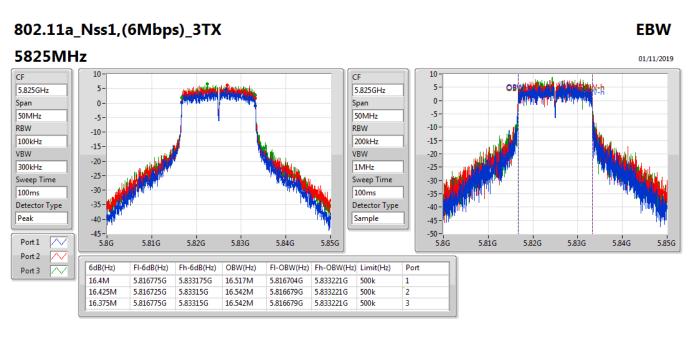


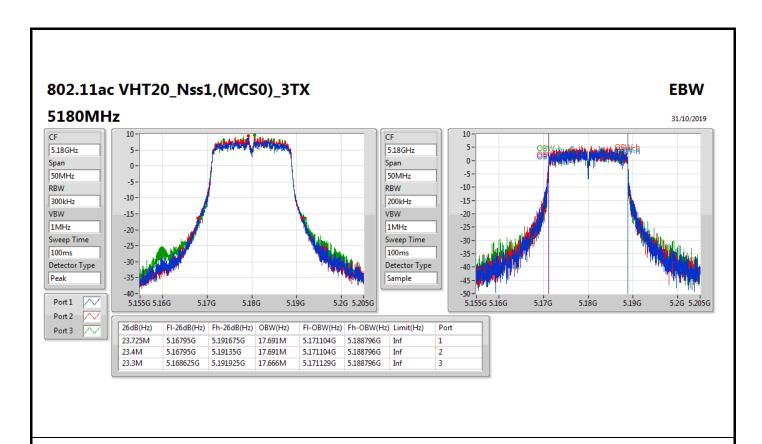


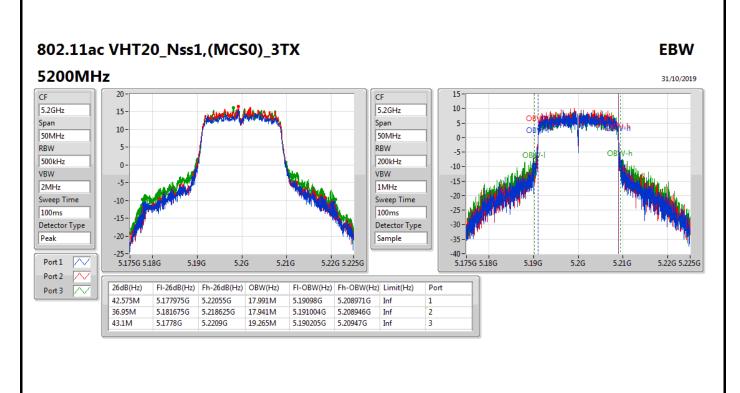


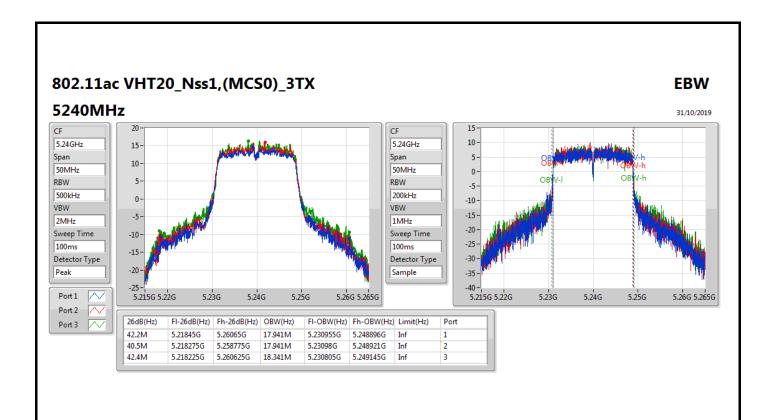


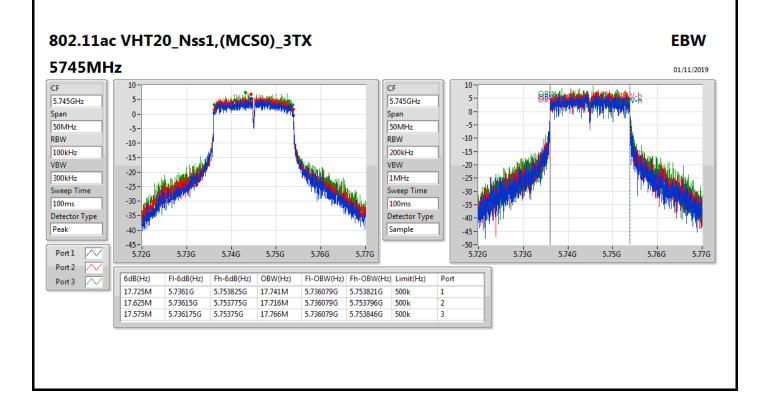


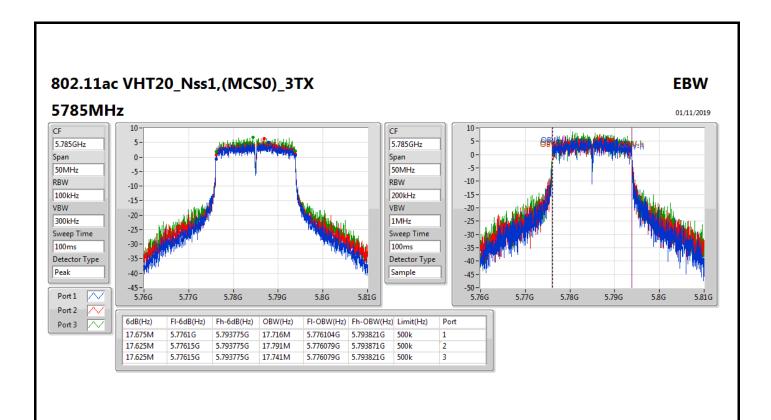


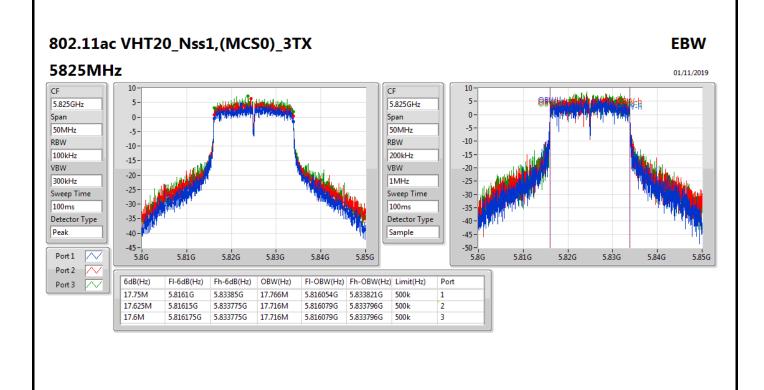


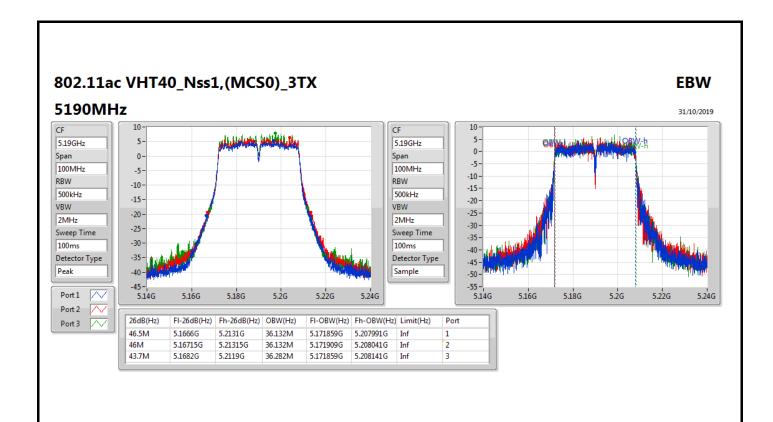


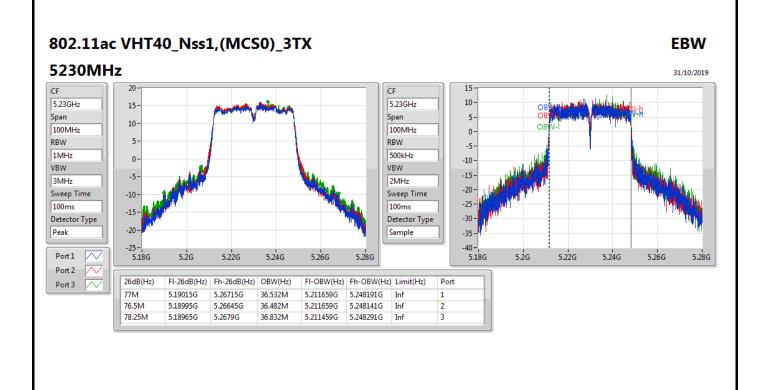


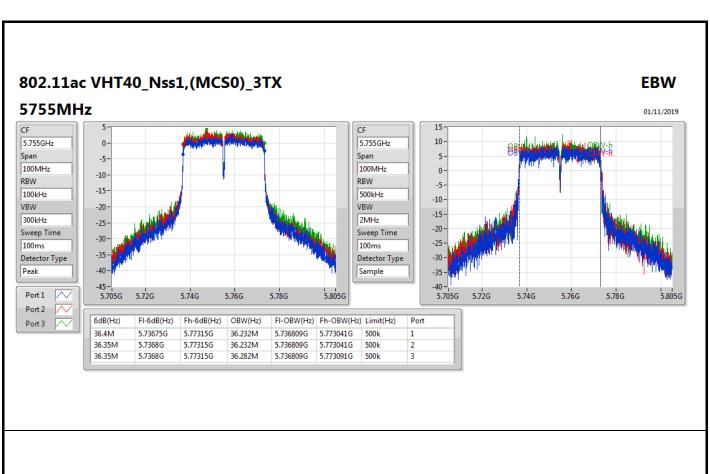


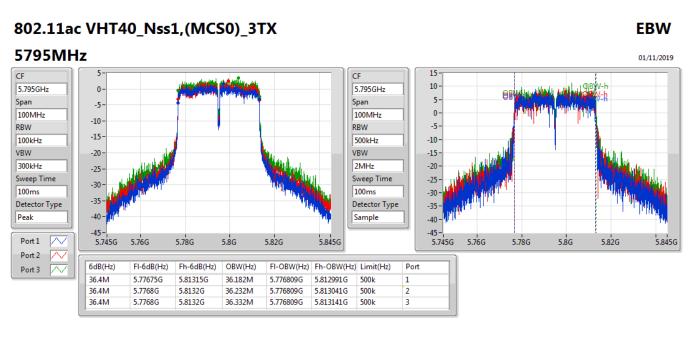


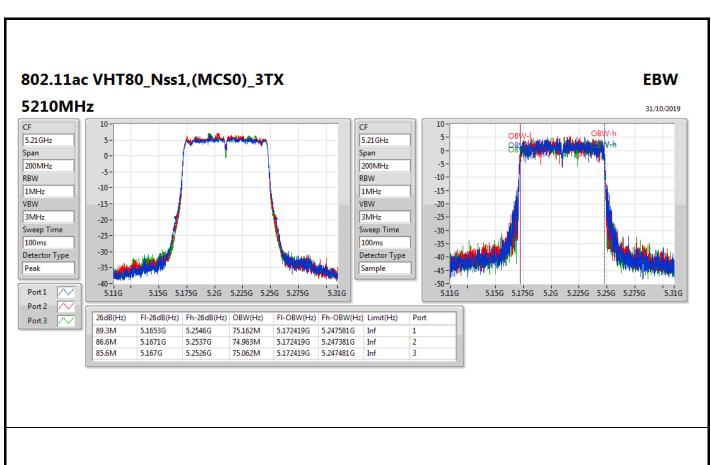


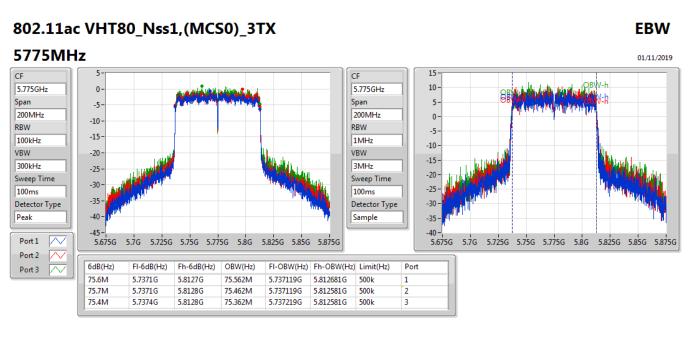














## Average Power Result

Appendix C

**Summary** 

Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11a_Nss1,(6Mbps)_3TX	26.32	0.42855
802.11ac VHT20_Nss1,(MCS0)_3TX	26.08	0.40551
802.11ac VHT40_Nss1,(MCS0)_3TX	25.95	0.39355
802.11ac VHT80_Nss1,(MCS0)_3TX	19.88	0.09727
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_3TX	25.01	0.31696
802.11ac VHT20_Nss1,(MCS0)_3TX	25.21	0.33189
802.11ac VHT40_Nss1,(MCS0)_3TX	25.14	0.32659
802.11ac VHT80_Nss1,(MCS0)_3TX	24.89	0.30832



## Result

Mode	Result	DG	Port 1	Port 2	Port 3	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11a_Nss1,(6Mbps)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	3.40	17.41	17.87	17.70	22.44	30.00
5200MHz	Pass	3.40	21.29	21.93	21.39	26.32	30.00
5240MHz	Pass	3.40	21.19	21.58	21.53	26.21	30.00
5745MHz	Pass	3.40	19.42	20.31	20.87	25.01	30.00
5785MHz	Pass	3.40	19.16	19.59	20.34	24.50	30.00
5825MHz	Pass	3.40	19.07	19.82	20.34	24.55	30.00
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	3.40	16.83	17.37	17.29	21.94	30.00
5200MHz	Pass	3.40	20.98	21.65	21.27	26.08	30.00
5240MHz	Pass	3.40	20.96	21.36	21.46	26.04	30.00
5745MHz	Pass	3.40	19.53	20.51	21.12	25.21	30.00
5785MHz	Pass	3.40	19.21	19.61	20.55	24.60	30.00
5825MHz	Pass	3.40	19.23	19.68	20.45	24.59	30.00
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5190MHz	Pass	3.40	15.06	15.67	15.58	20.22	30.00
5230MHz	Pass	3.40	20.94	21.38	21.20	25.95	30.00
5755MHz	Pass	3.40	19.61	20.35	21.03	25.14	30.00
5795MHz	Pass	3.40	19.06	19.78	20.48	24.58	30.00
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5210MHz	Pass	3.40	14.97	15.22	15.13	19.88	30.00
5775MHz	Pass	3.40	19.48	20.00	20.79	24.89	30.00

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



**Summary** 

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	·
802.11a_Nss1,(6Mbps)_3TX	13.80
802.11ac VHT20_Nss1,(MCS0)_3TX	13.25
802.11ac VHT40_Nss1,(MCS0)_3TX	9.99
802.11ac VHT80_Nss1,(MCS0)_3TX	0.82
5.725-5.85GHz	·
802.11a_Nss1,(6Mbps)_3TX	11.06
802.11ac VHT20_Nss1,(MCS0)_3TX	10.99
802.11ac VHT40_Nss1,(MCS0)_3TX	7.82
802.11ac VHT80_Nss1,(MCS0)_3TX	4.34

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

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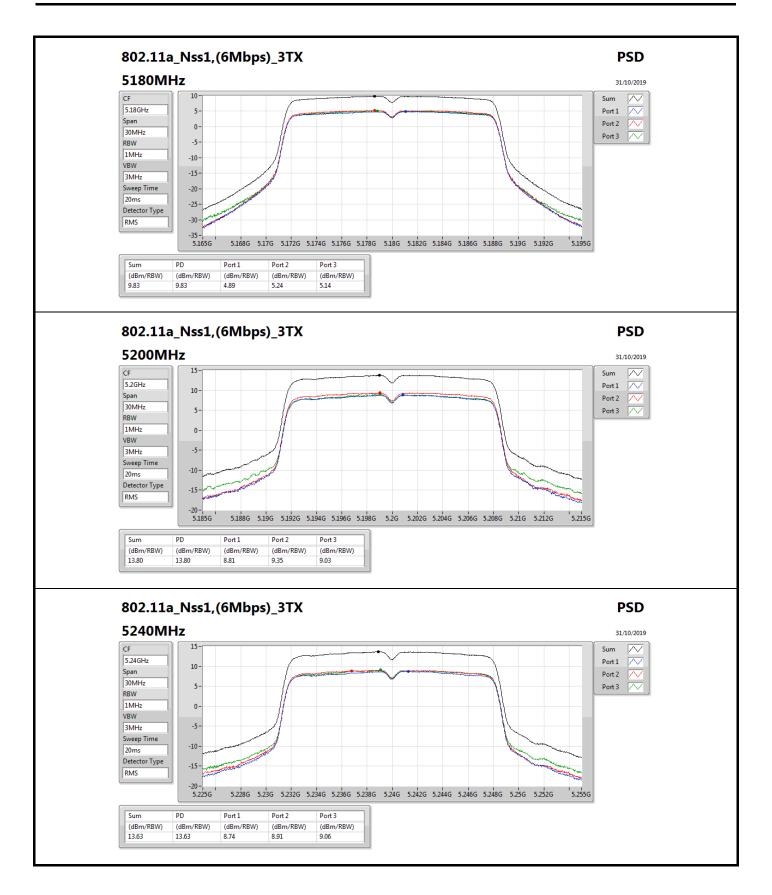
## Result

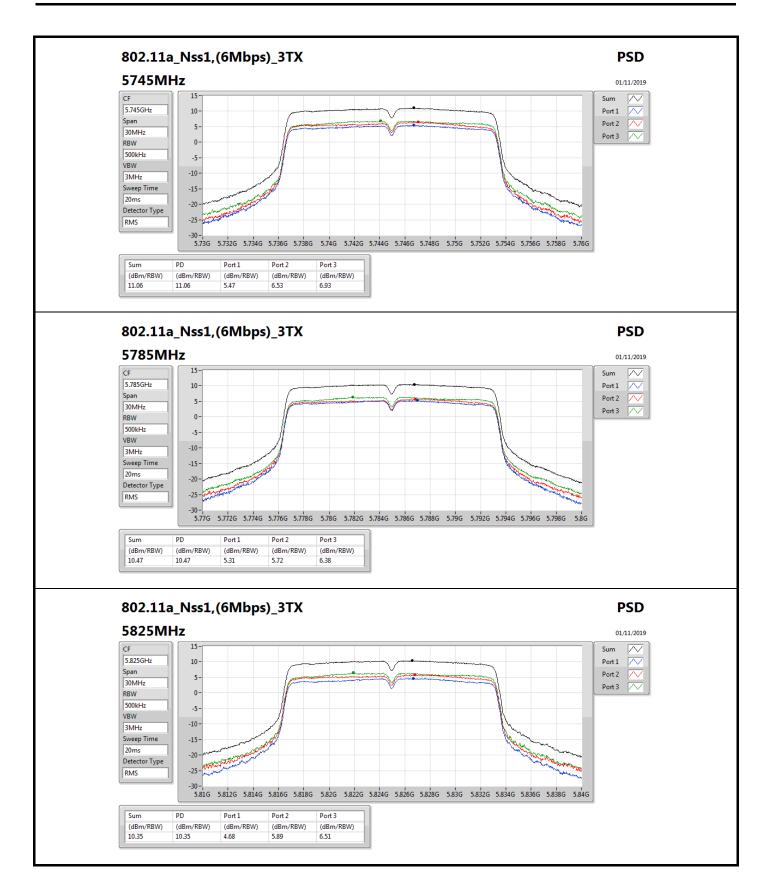
Mode	Result	DG	Port 1	Port 2	Port 3	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_Nss1,(6Mbps)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	8.17	4.89	5.24	5.14	9.83	14.83
5200MHz	Pass	8.17	8.81	9.35	9.03	13.80	14.83
5240MHz	Pass	8.17	8.74	8.91	9.06	13.63	14.83
5745MHz	Pass	8.17	5.47	6.53	6.93	11.06	27.83
5785MHz	Pass	8.17	5.31	5.72	6.38	10.47	27.83
5825MHz	Pass	8.17	4.68	5.89	6.51	10.35	27.83
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	8.17	4.30	4.73	4.75	9.29	14.83
5200MHz	Pass	8.17	8.20	8.87	8.62	13.25	14.83
5240MHz	Pass	8.17	8.20	8.46	8.80	13.18	14.83
5745MHz	Pass	8.17	5.31	6.46	6.87	10.99	27.83
5785MHz	Pass	8.17	4.99	5.51	6.36	10.36	27.83
5825MHz	Pass	8.17	4.36	5.49	6.26	10.13	27.83
802.11ac VHT40_Nss1,(MCS0)_3TX	•	•	-	-	٠	-	=
5190MHz	Pass	8.17	-0.78	-0.20	-0.24	4.27	14.83
5230MHz	Pass	8.17	5.06	5.50	5.40	9.99	14.83
5755MHz	Pass	8.17	2.27	3.17	3.82	7.82	27.83
5795MHz	Pass	8.17	1.92	2.81	3.34	7.34	27.83
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5210MHz	Pass	8.17	-3.99	-3.70	-3.91	0.82	14.83
5775MHz	Pass	8.17	-0.79	-0.46	0.36	4.34	27.83

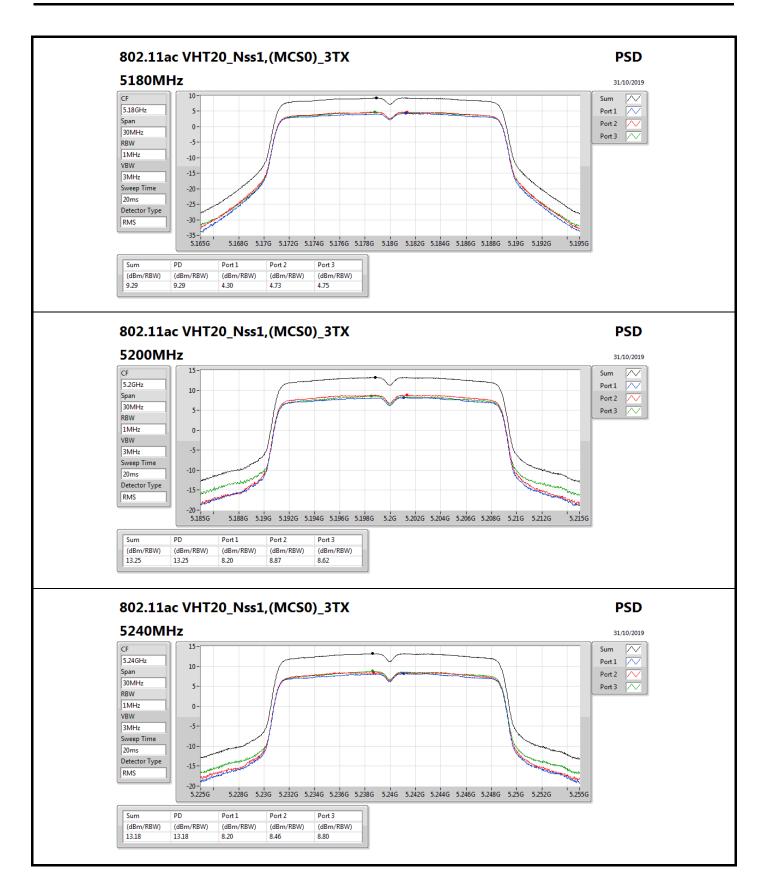
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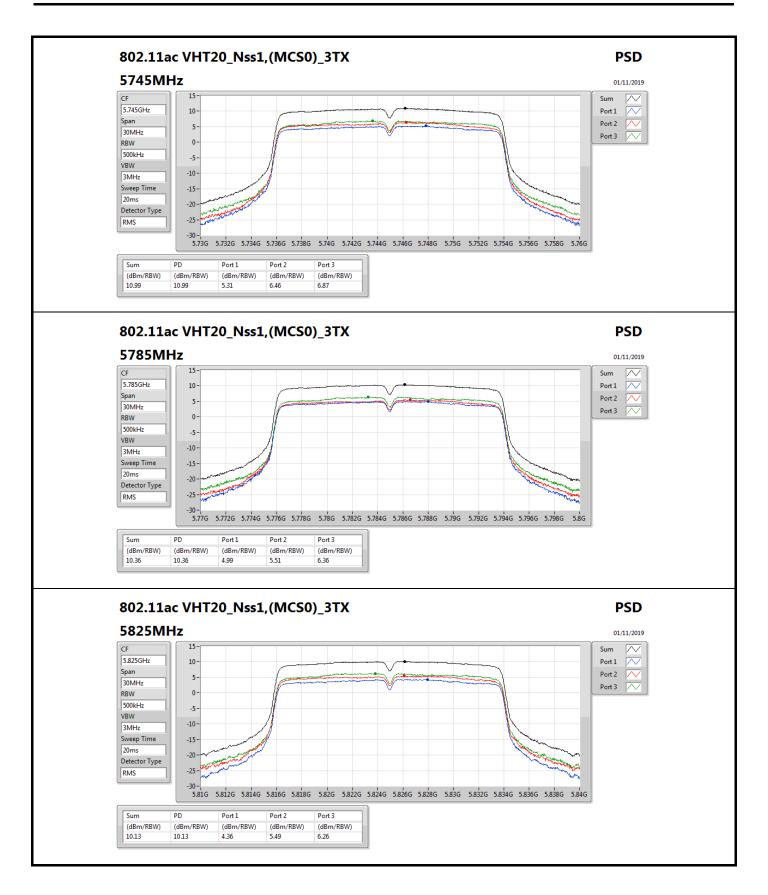
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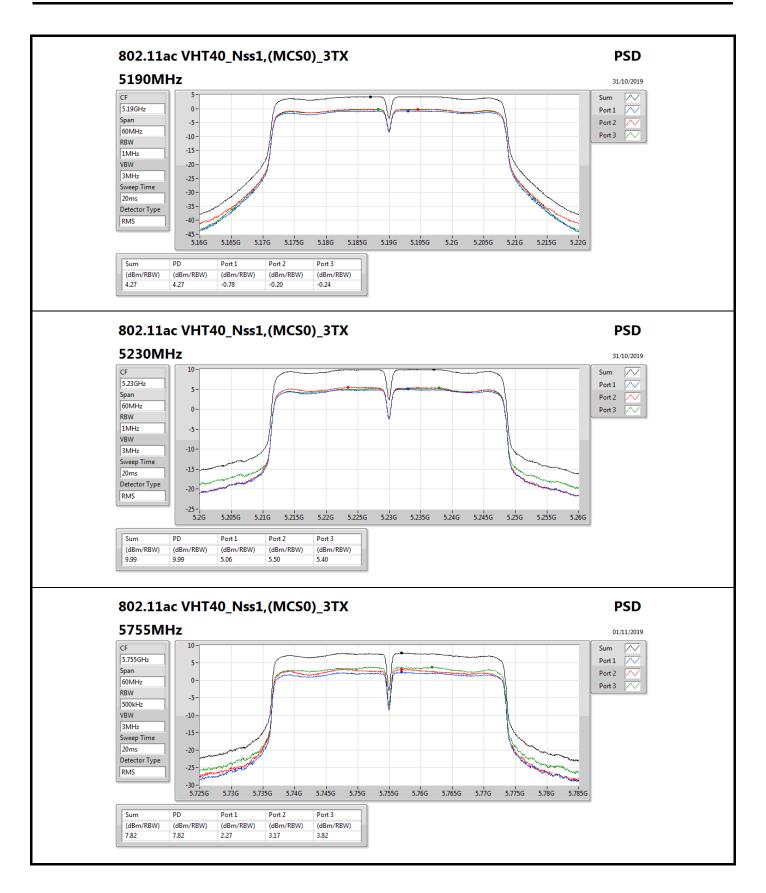
DG = Directional Gain; RBW = 500 kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X power density;

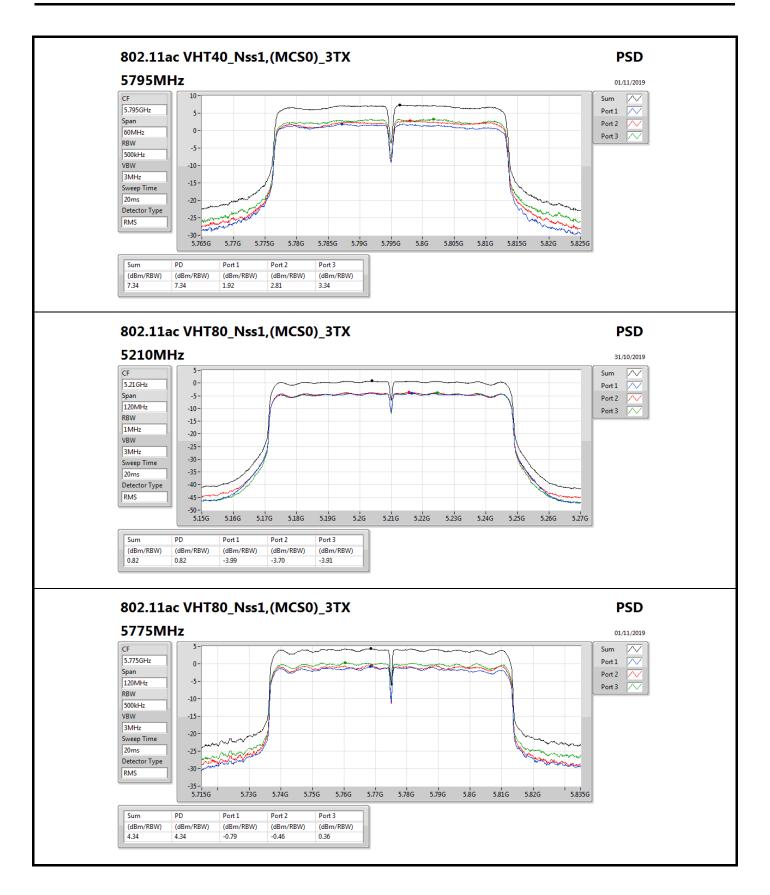


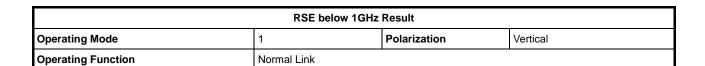


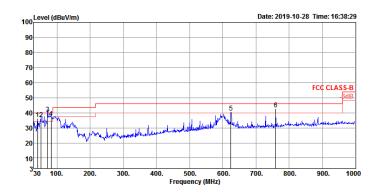






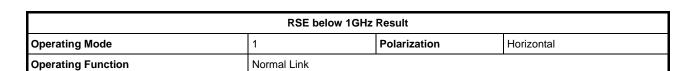


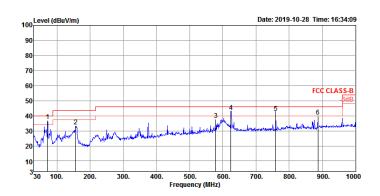




	Freq	Level	Limit					Factor		1/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	41.64	36.10	40.00	-3.90	50.28	0.63	17.41	32.22	100	336	Peak	VERTICAL
2	52.31	35.84	40.00	-4.16	54.20	0.74	13.08	32.18	100	359	QP	VERTICAL
3	71.71	39.38	40.00	-0.62	58.60	0.86	12.06	32.14	100	97	QP	VERTICAL
4	82.38	36.68	40.00	-3.32	54.80	0.92	13.07	32.11	125	252	QP	VERTICAL
5	624.61	40.28	46.00	-5.72	44.47	2.66	25.21	32.06	100	259	Peak	VERTICAL
6	759.44	42.48	46.00	-3.52	45.87	2.95	25.66	32.00	100	326	Peak	VERTICAL

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.)





	Freq	Level						Factor	A/FOS	17703	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	71.71	36.74	40.00	-3.26	55.96	0.86	12.06	32.14	300	278	Peak	HORIZONTAL
2	156.10	32.95	43.50	-10.55	47.67	1.28	16.13	32.13	200	164	Peak	HORIZONTAL
3	579.02	37.23	46.00	-8.77	42.56	2.55	24.13	32.01	150	179	Peak	HORIZONTAL
4	624.61	42.89	46.00	-3.11	47.08	2.66	25.21	32.06	150	144	Peak	HORIZONTAL
5	759.44	42.06	46.00	-3.94	45.45	2.95	25.66	32.00	125	49	Peak	HORIZONTAL
6	886.51	39.68	46.00	-6.32	41.52	3.09	26.40	31.33	100	176	Peak	HORIZONTAL

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.)



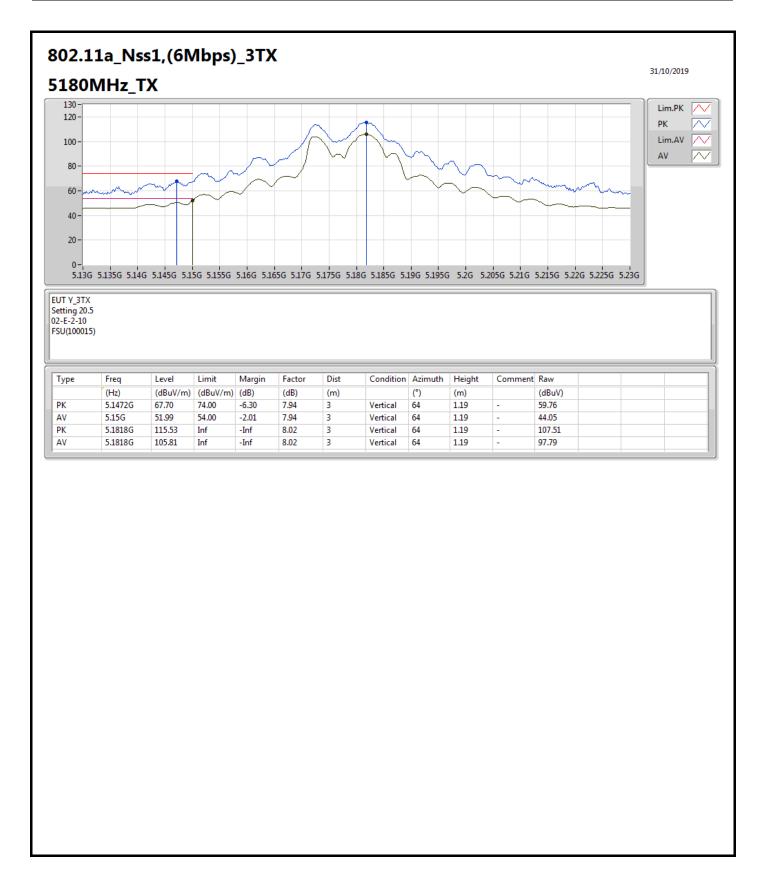
## RSE TX above 1GHz Result

Appendix E.2

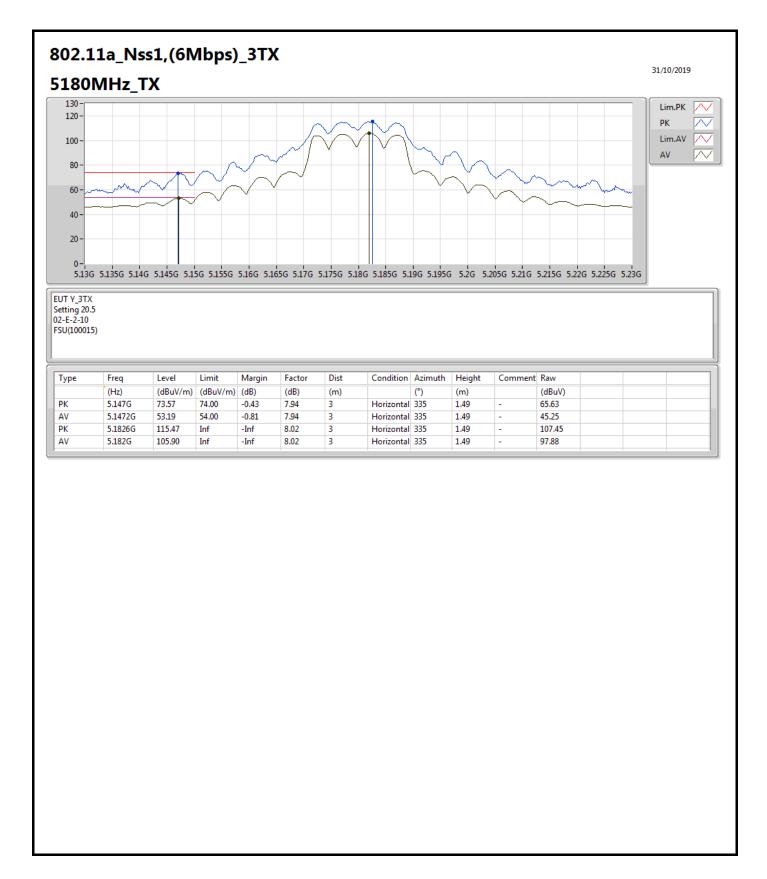
**Summary** 

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist	Condition	Azimuth	Height	Comments
			(HZ)	(aBuv/m)	(dBuV/III)	(dB)	(dB)	(m)		()	(m)	
5.15-5.25GHz	-	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT20_Nss1,(MCS0)_3TX	Pass	PK	5.1474G	73.63	74.00	-0.37	7.94	3	Horizontal	326	1.32	-

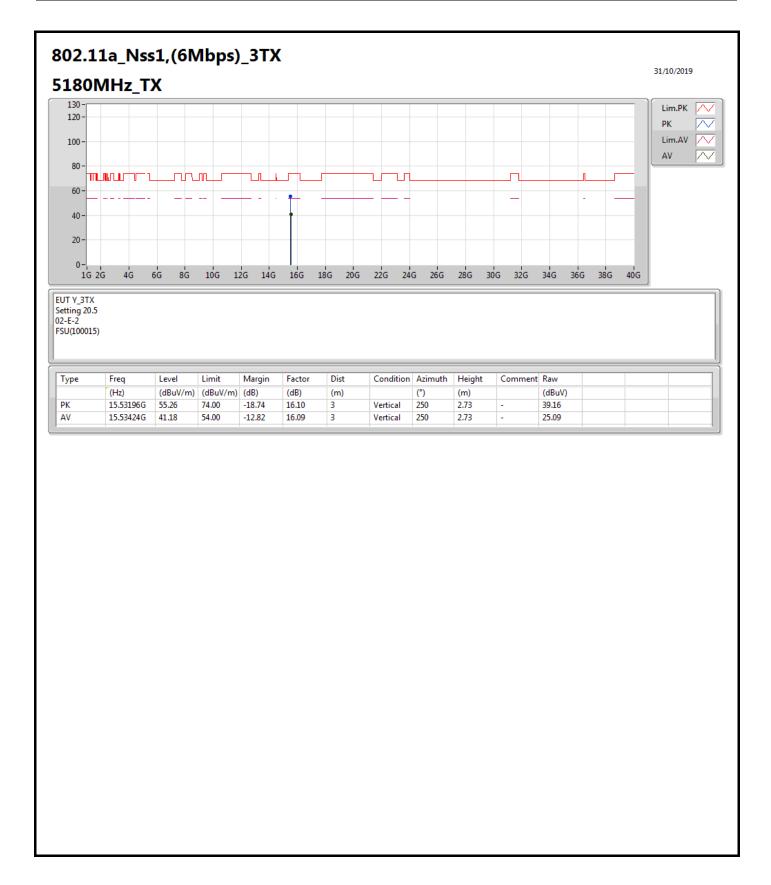




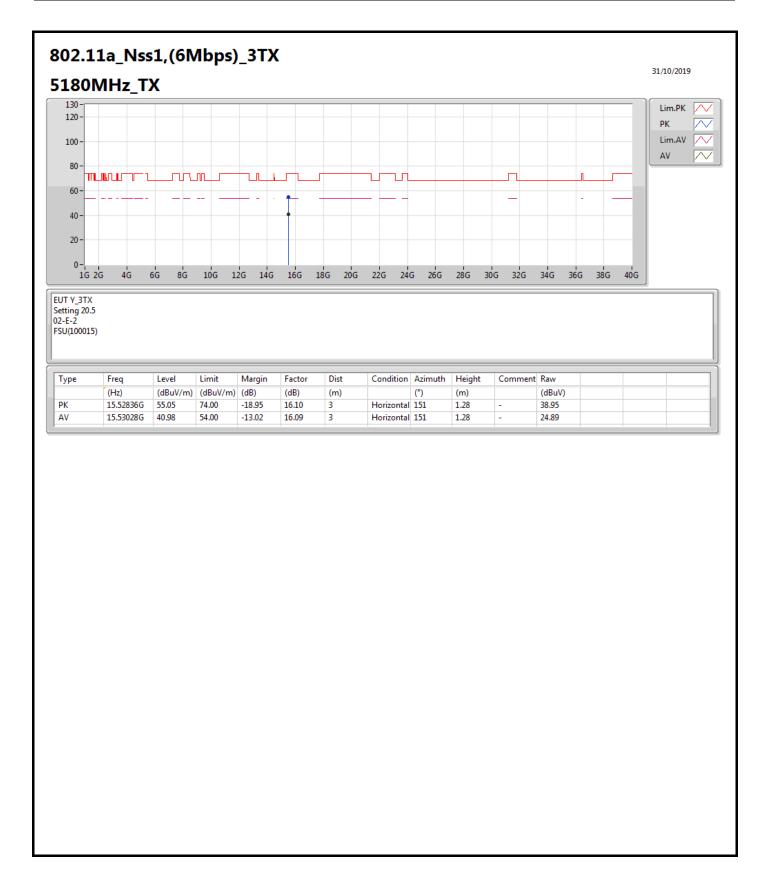




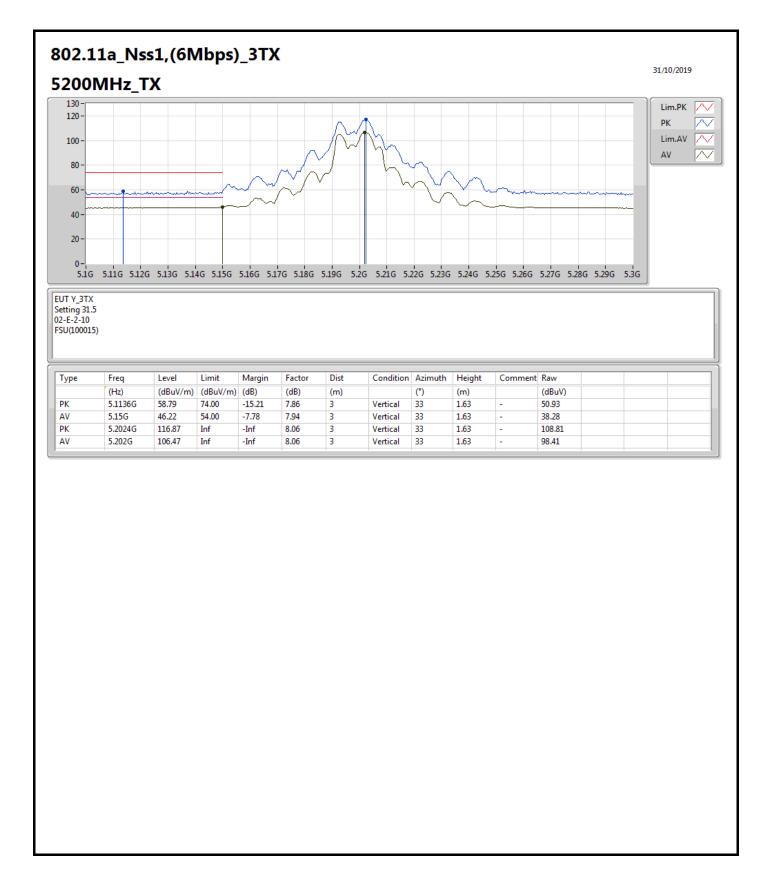




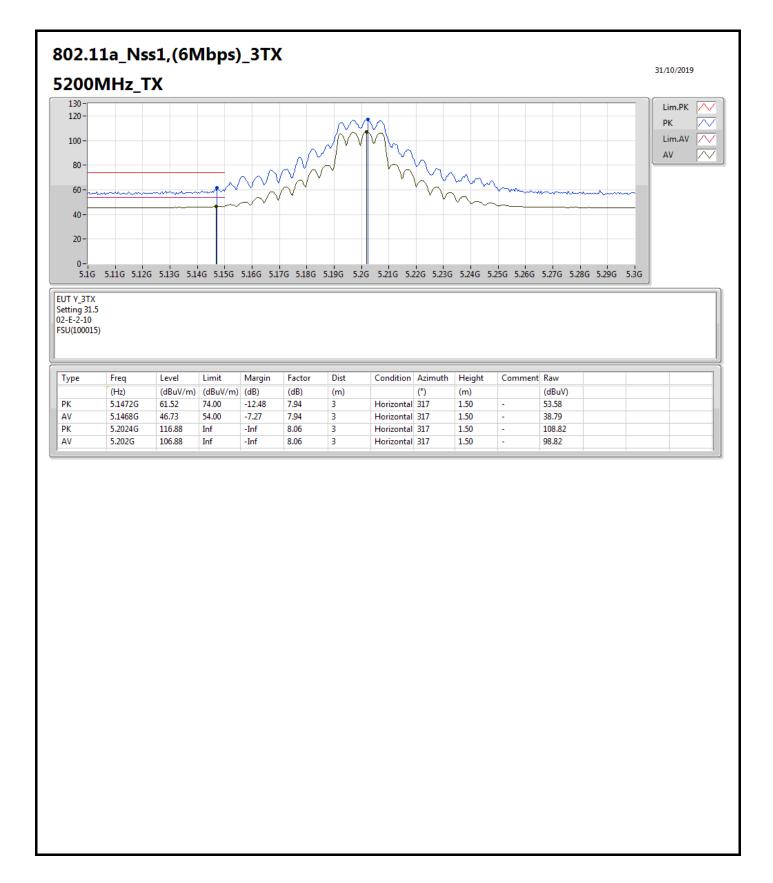




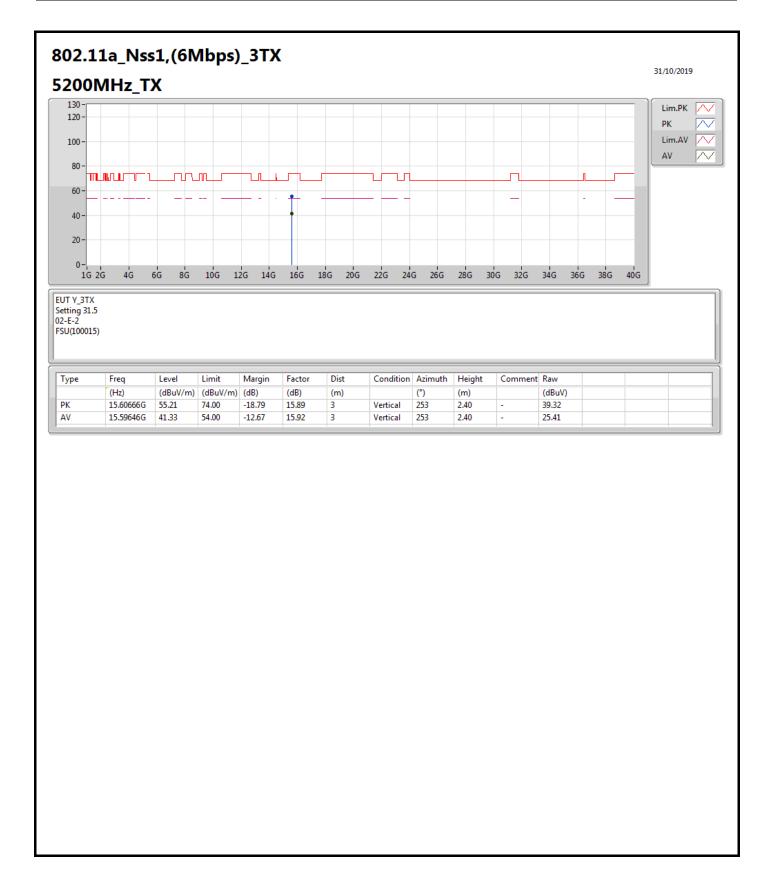




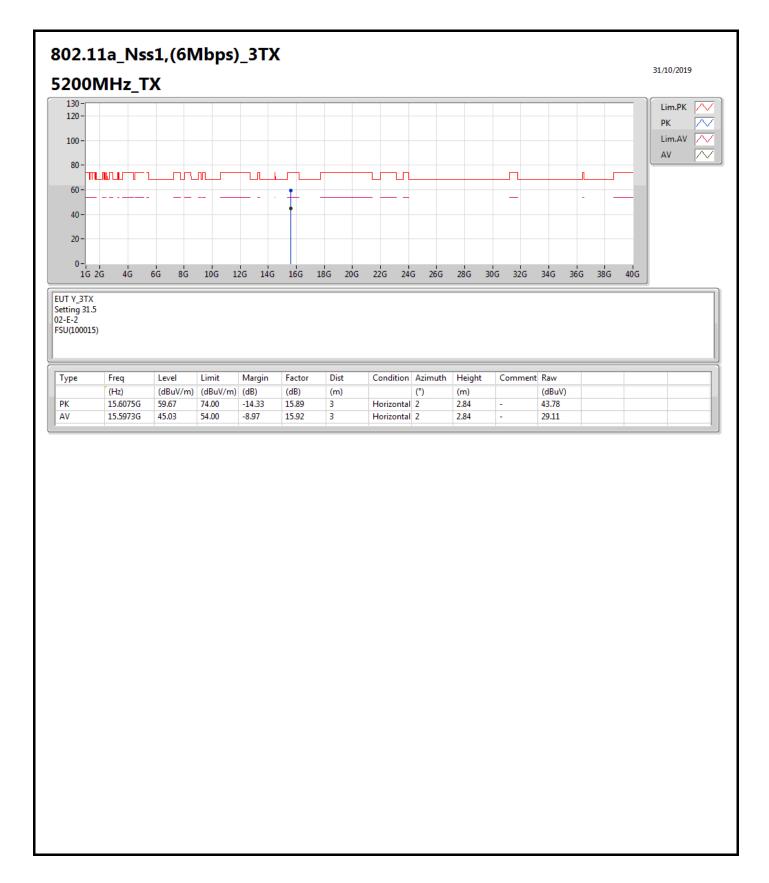




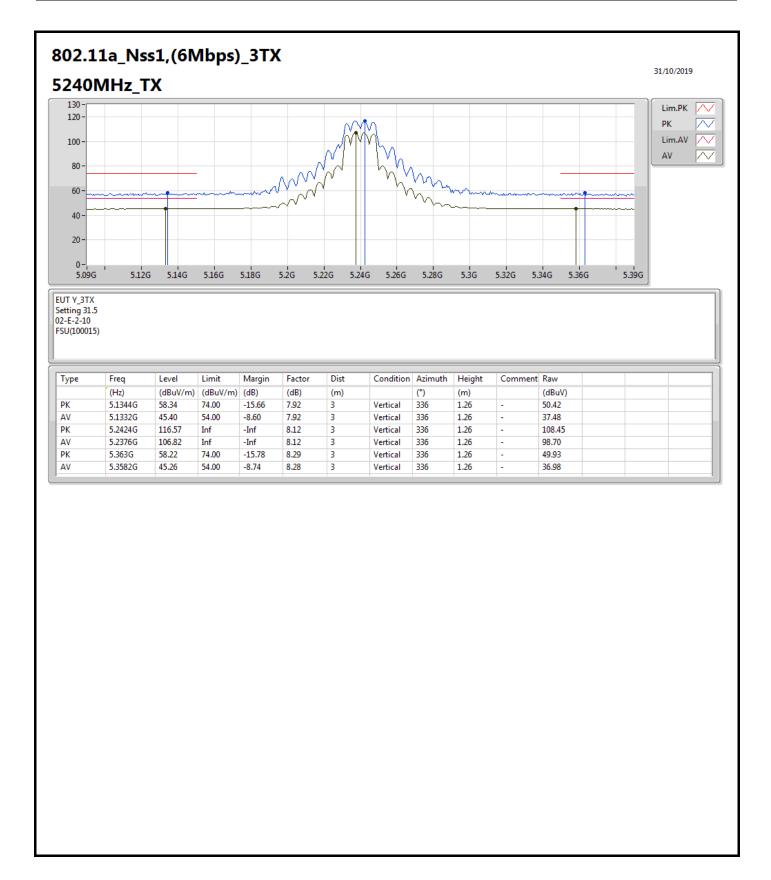




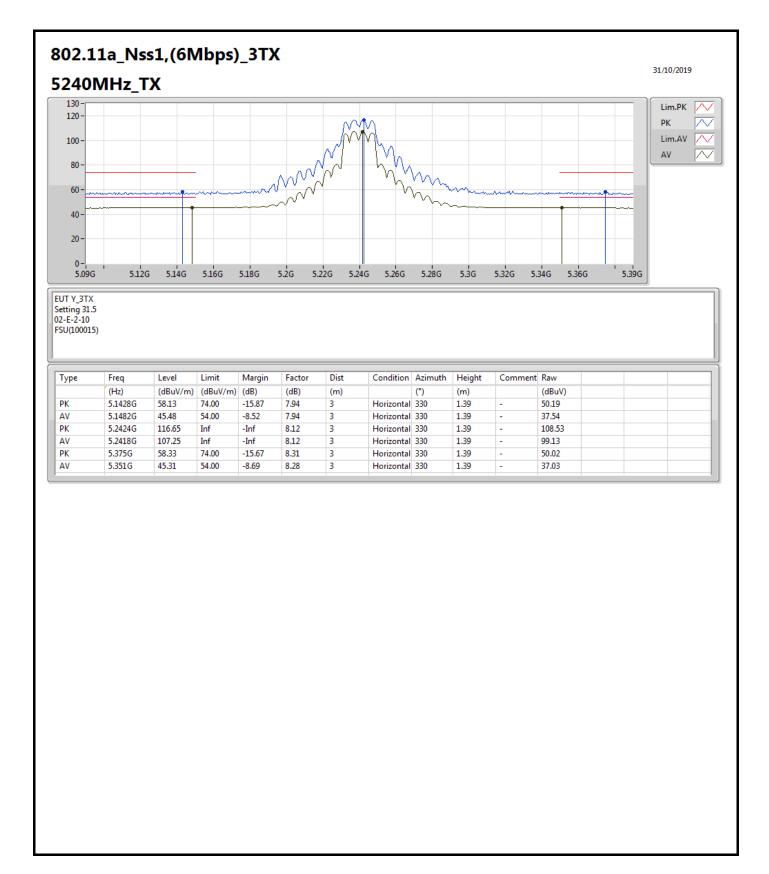




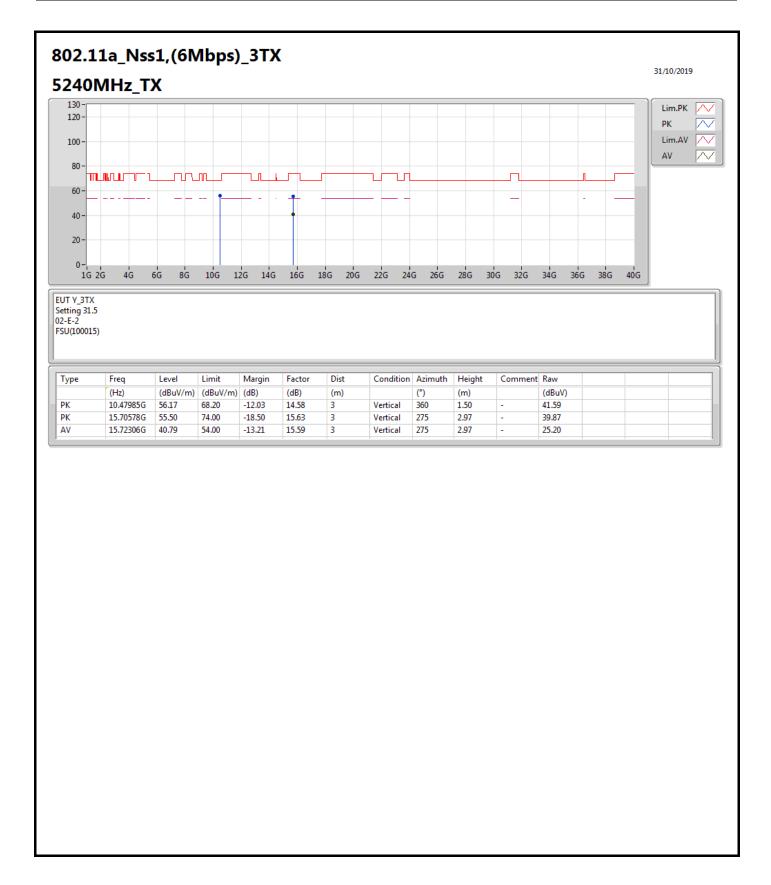




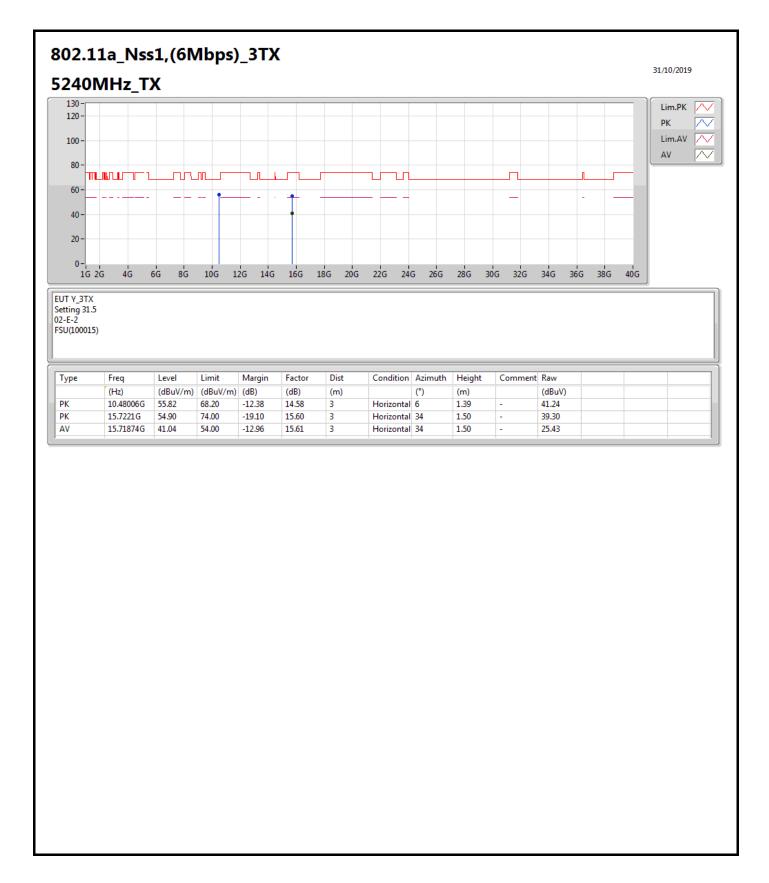




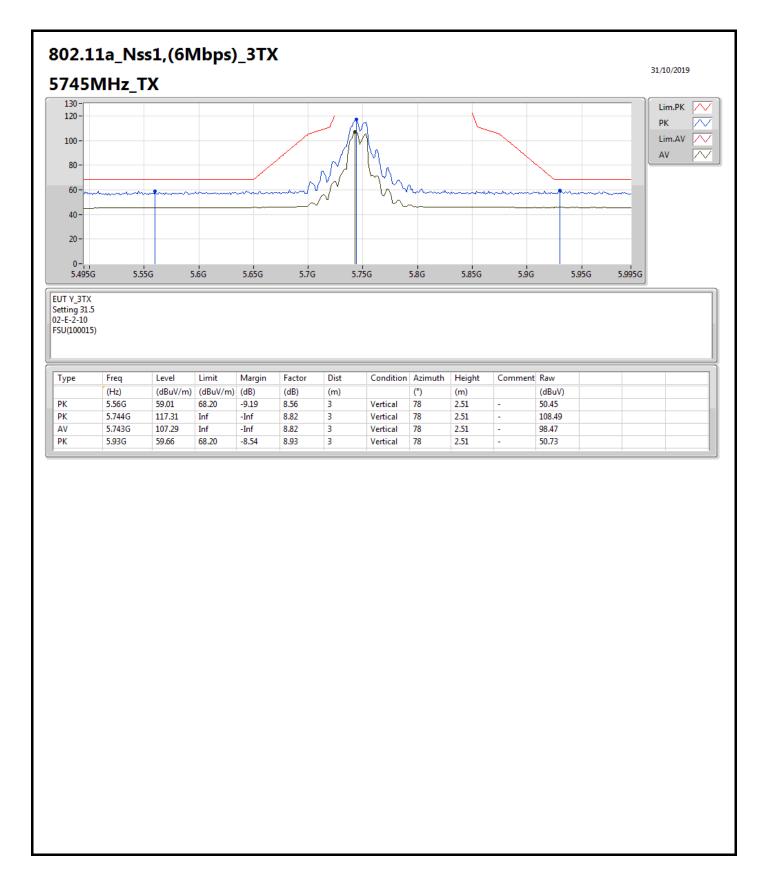




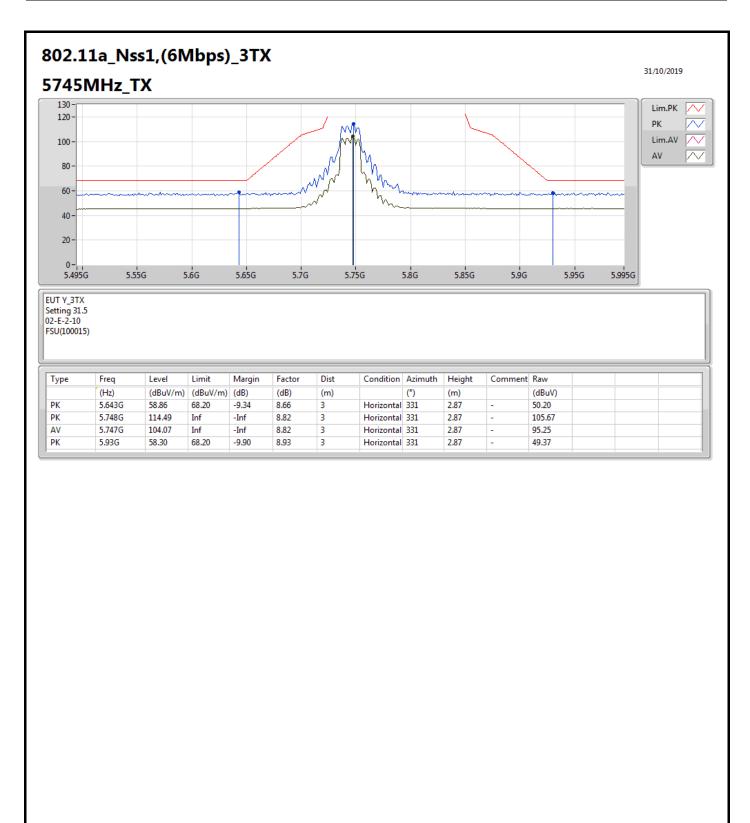




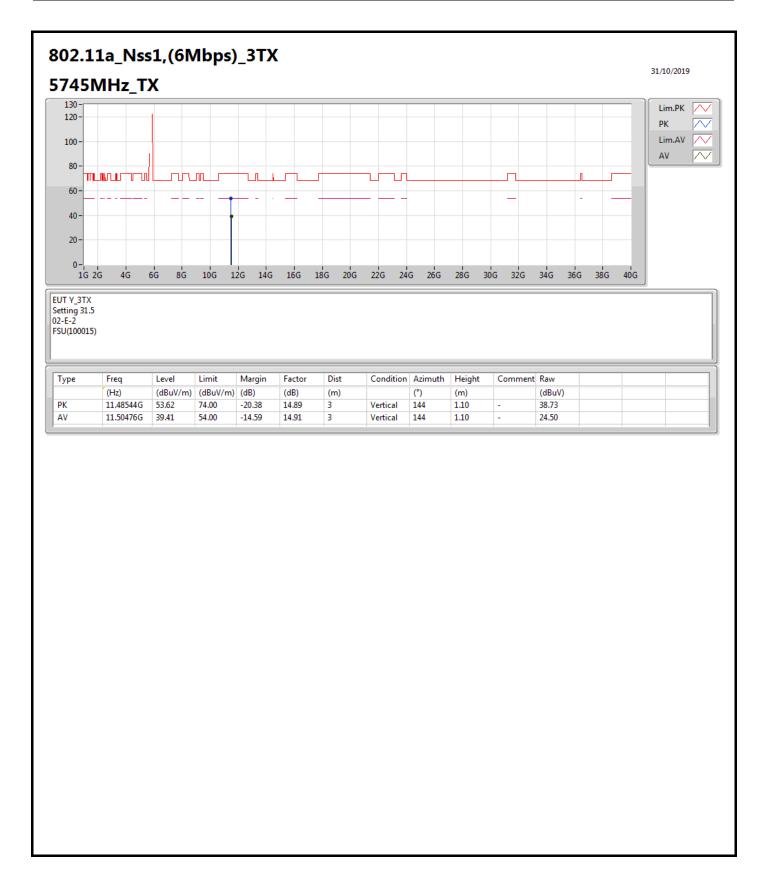




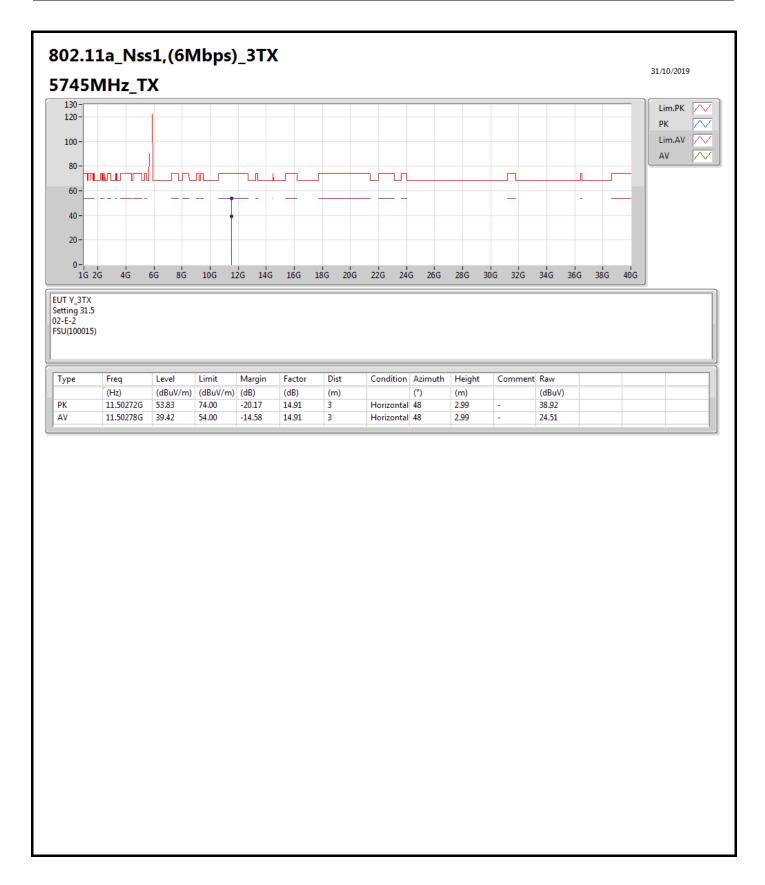




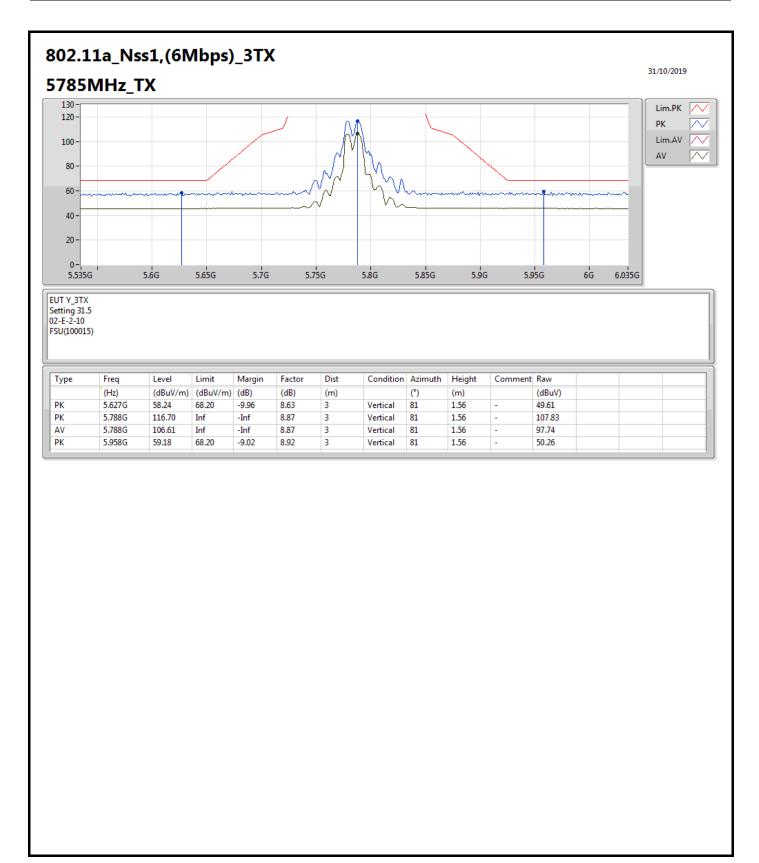




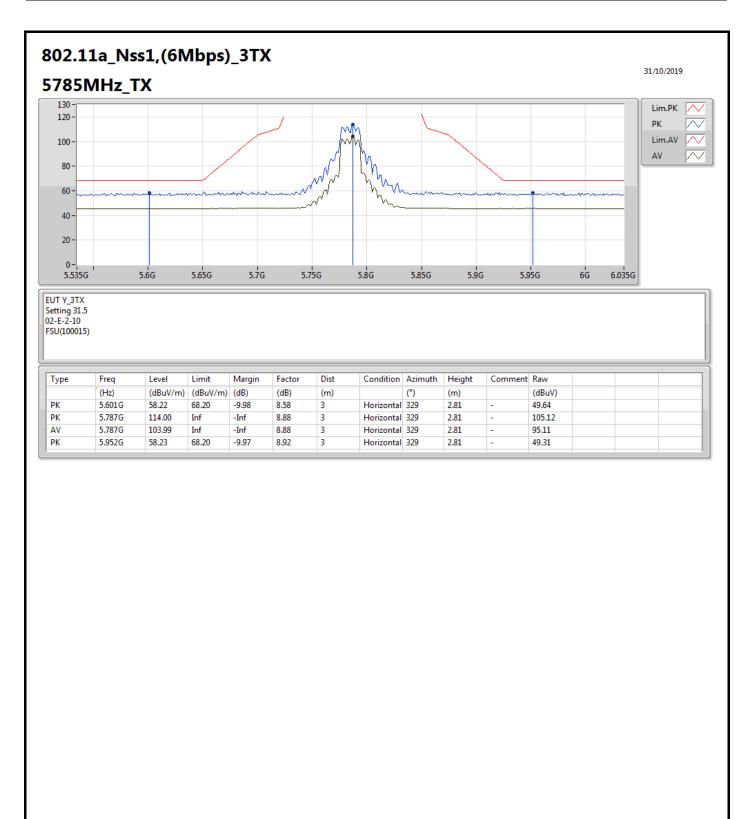




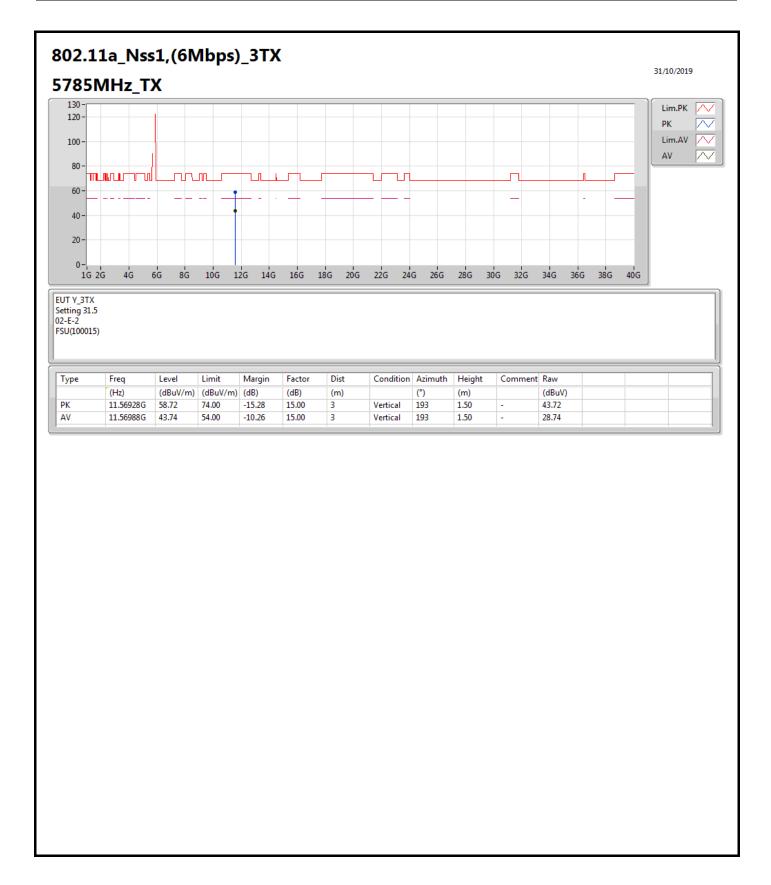




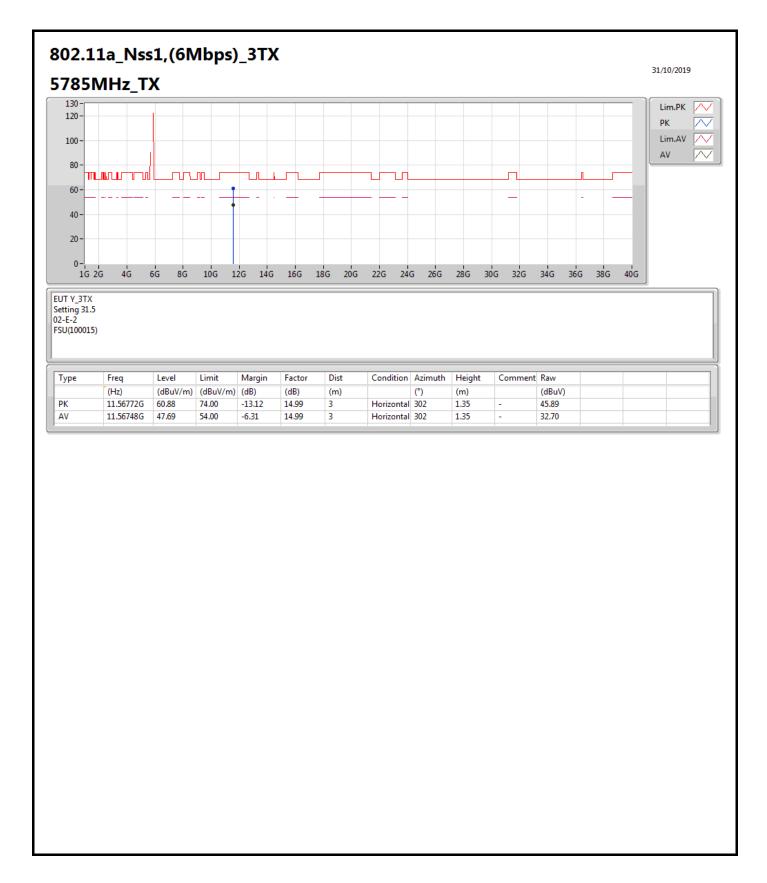




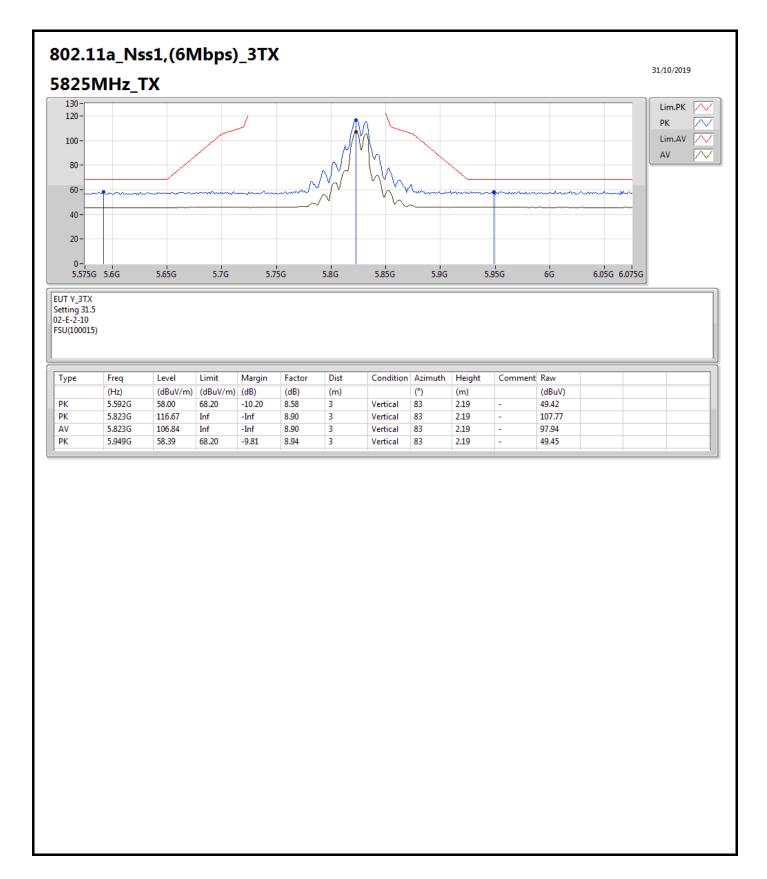




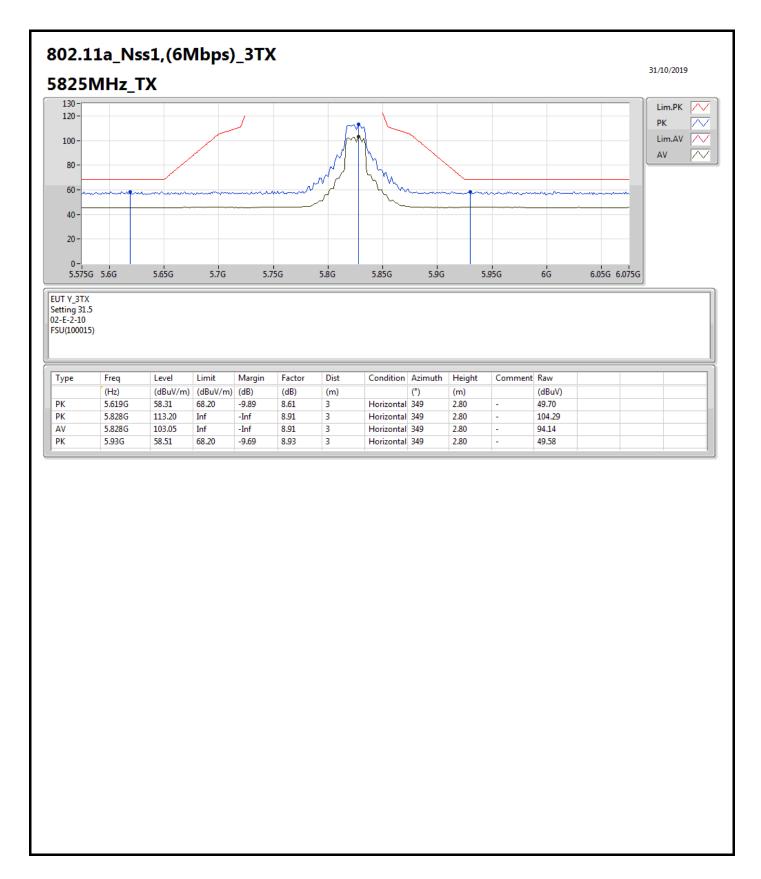




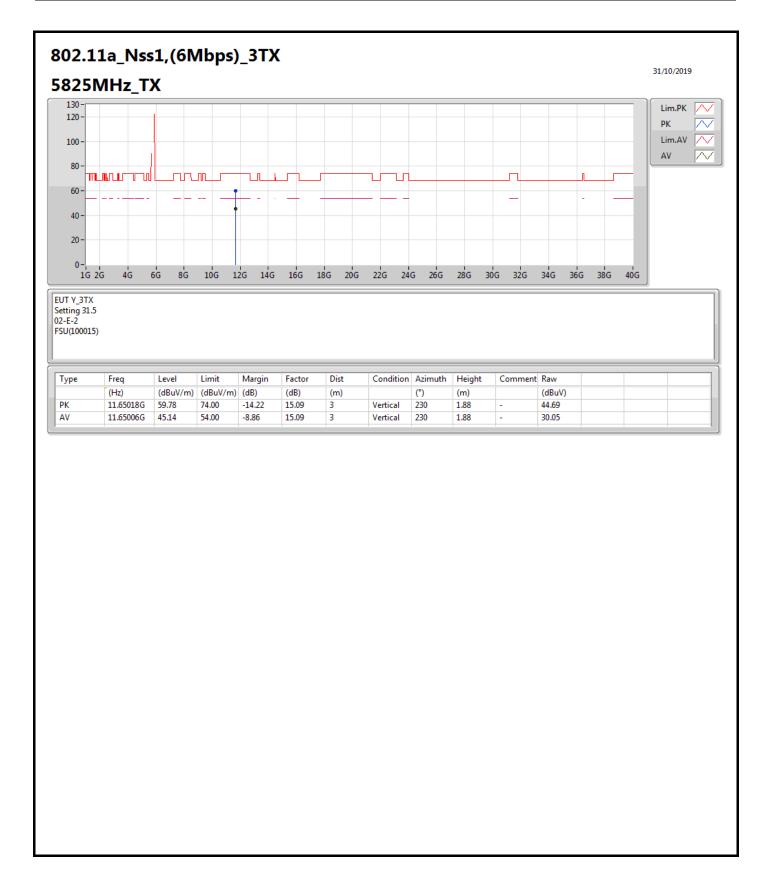




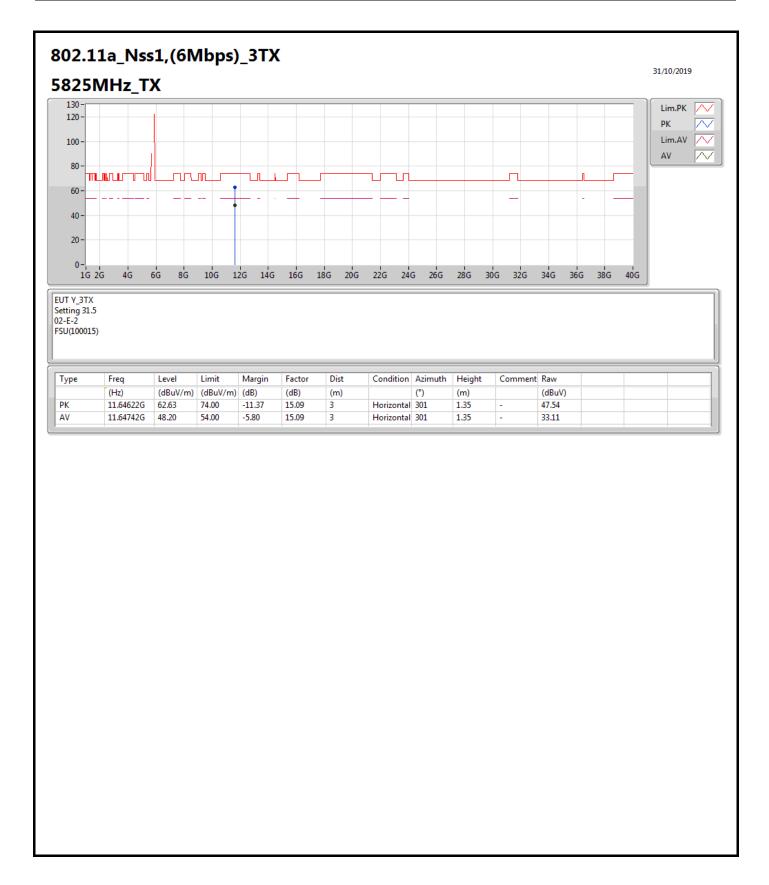




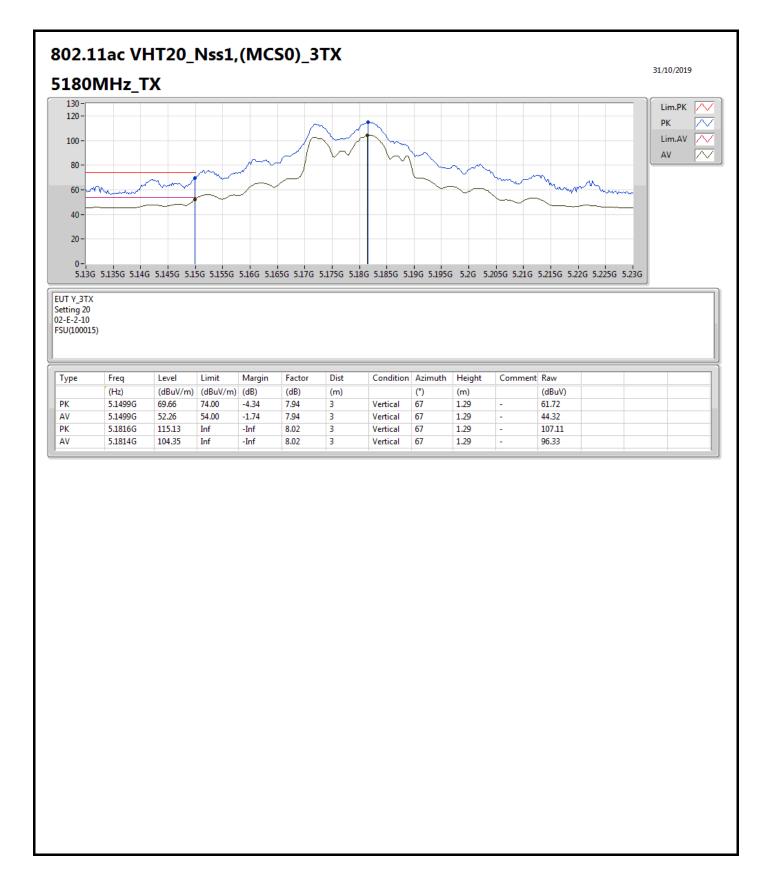




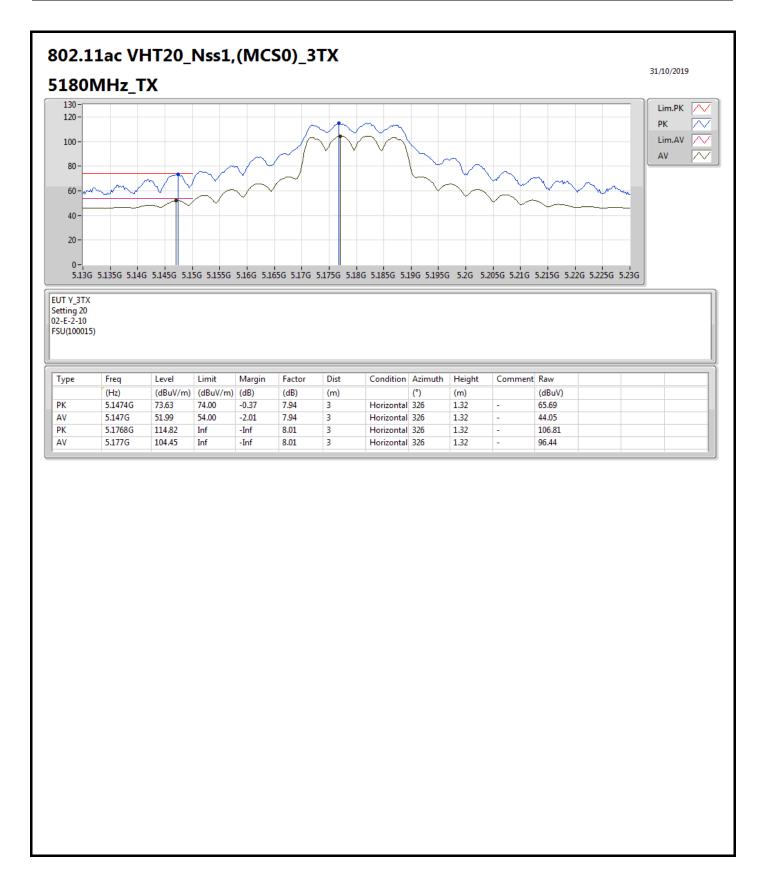




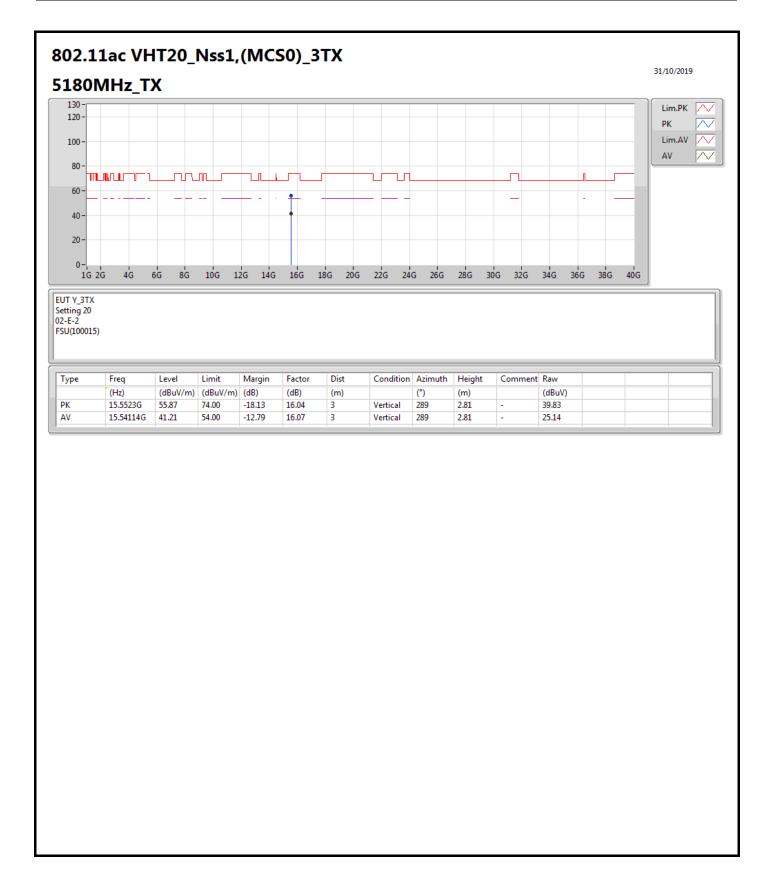




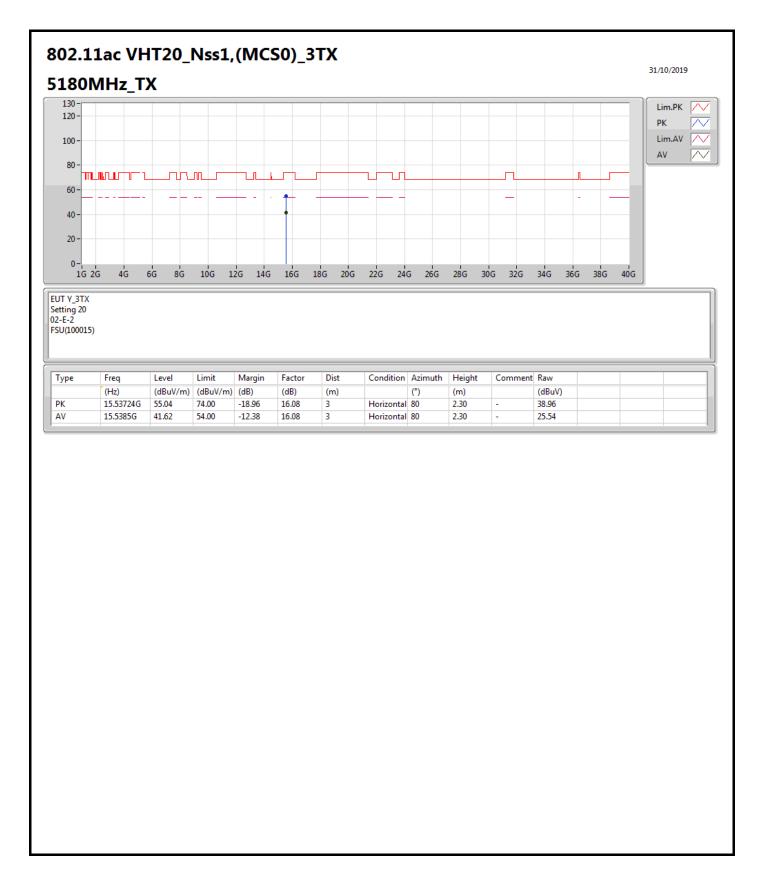




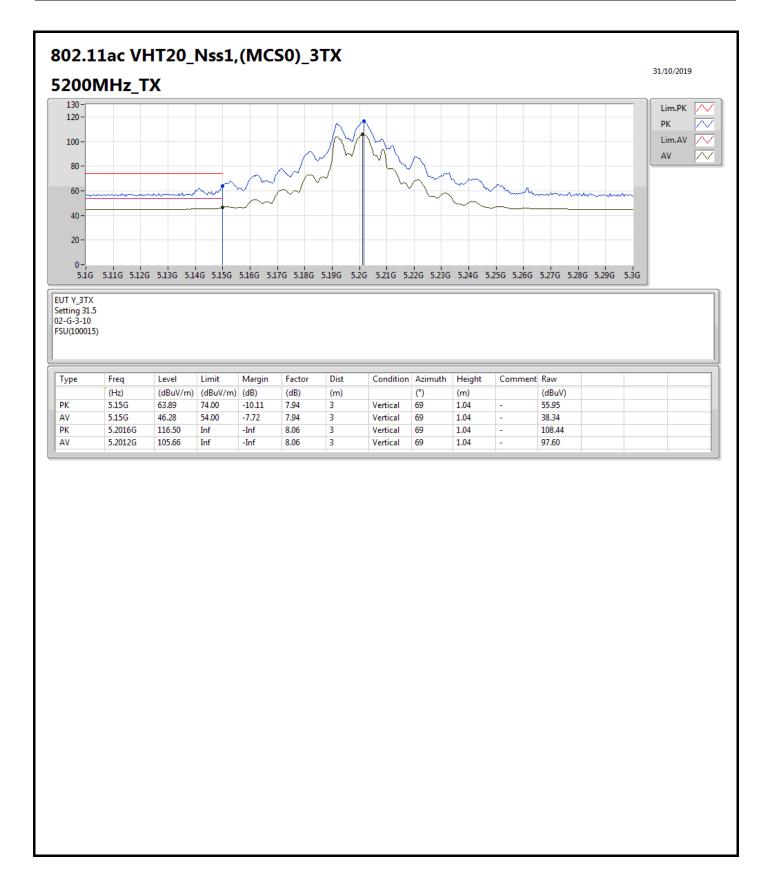




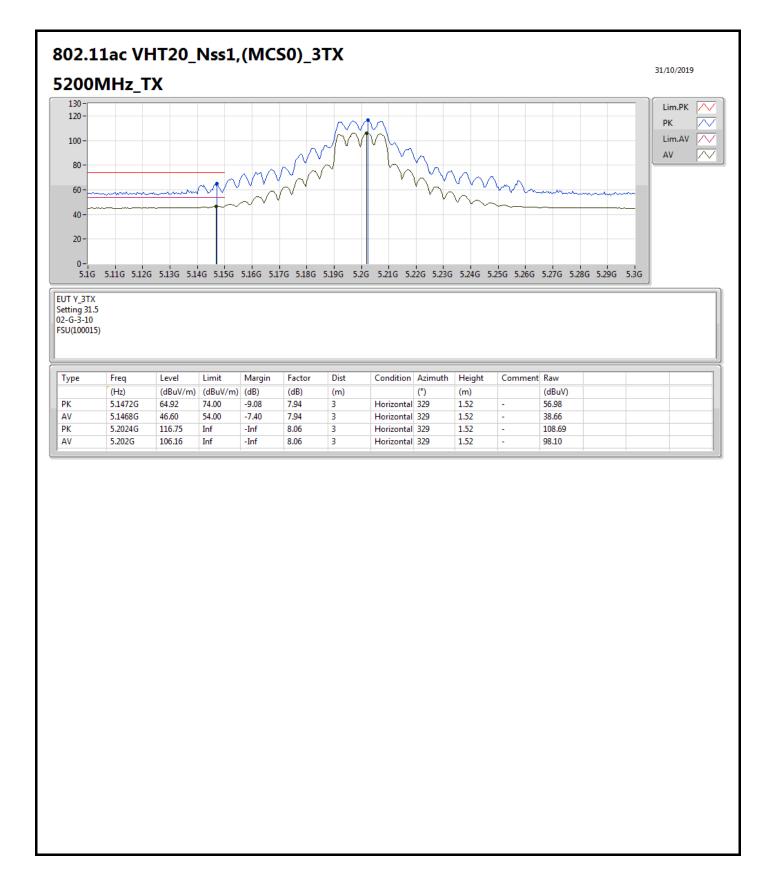




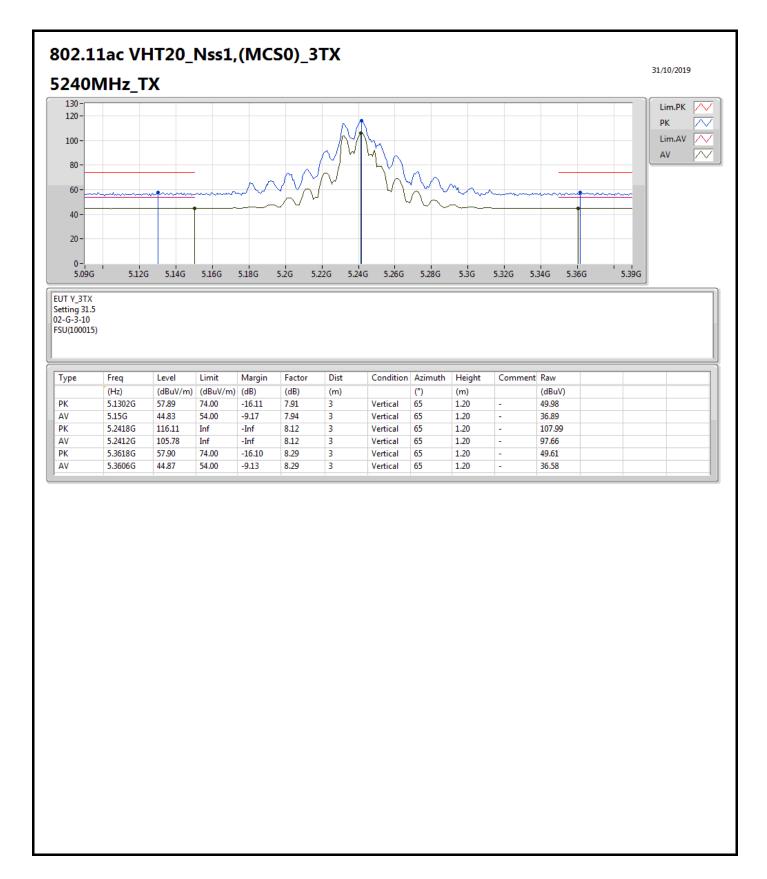




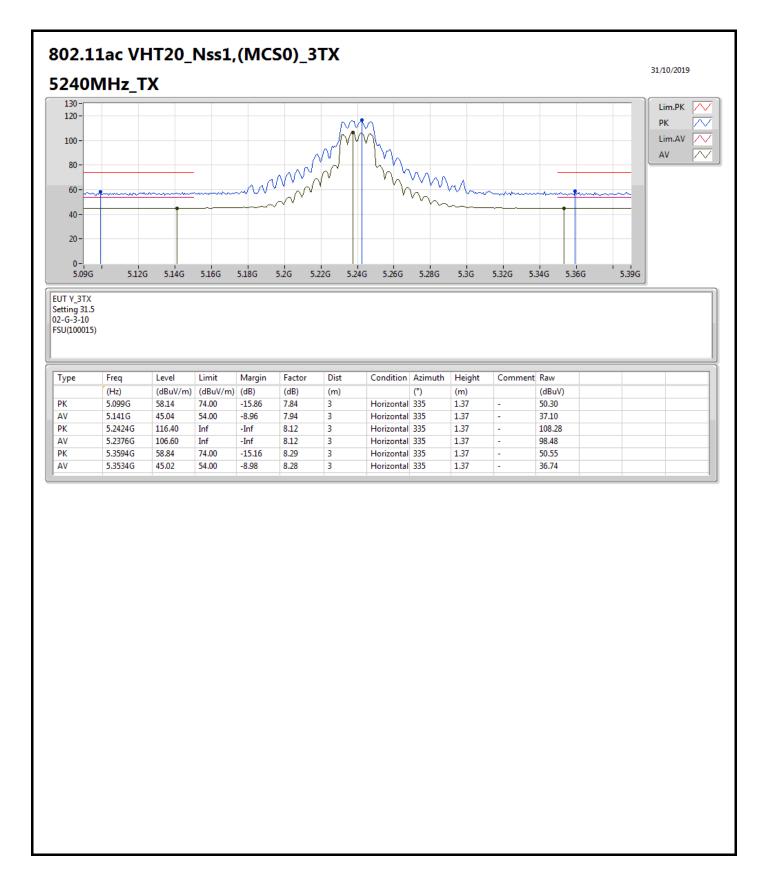




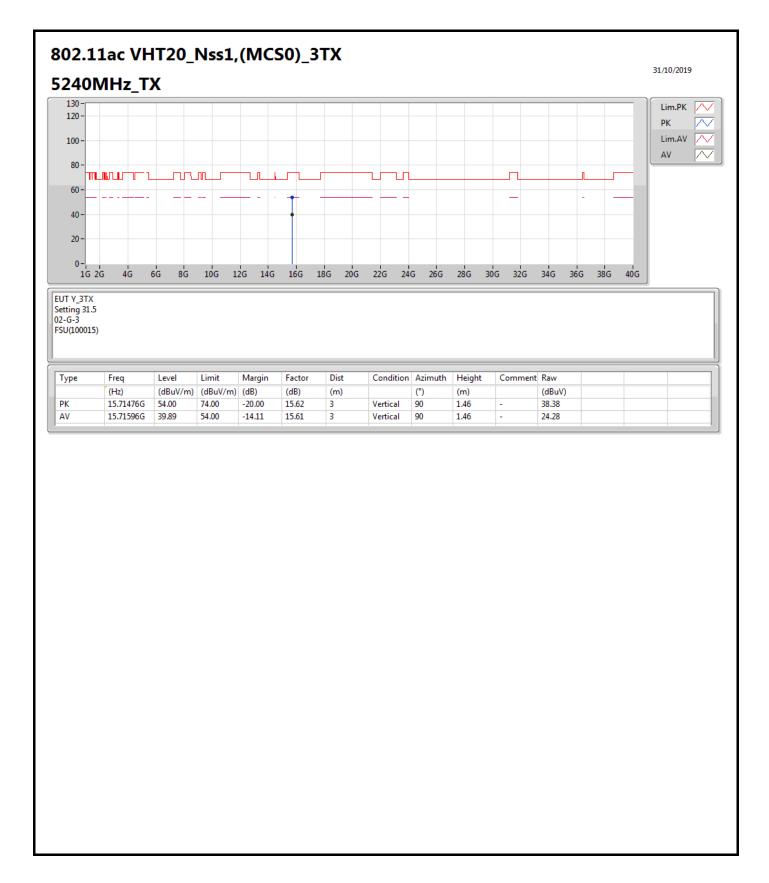




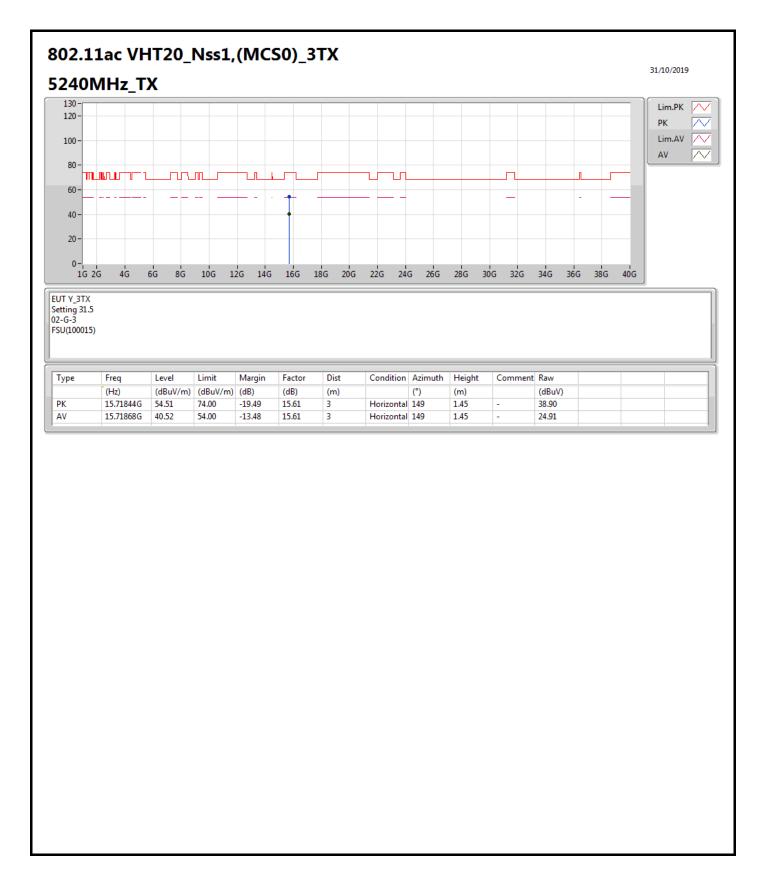




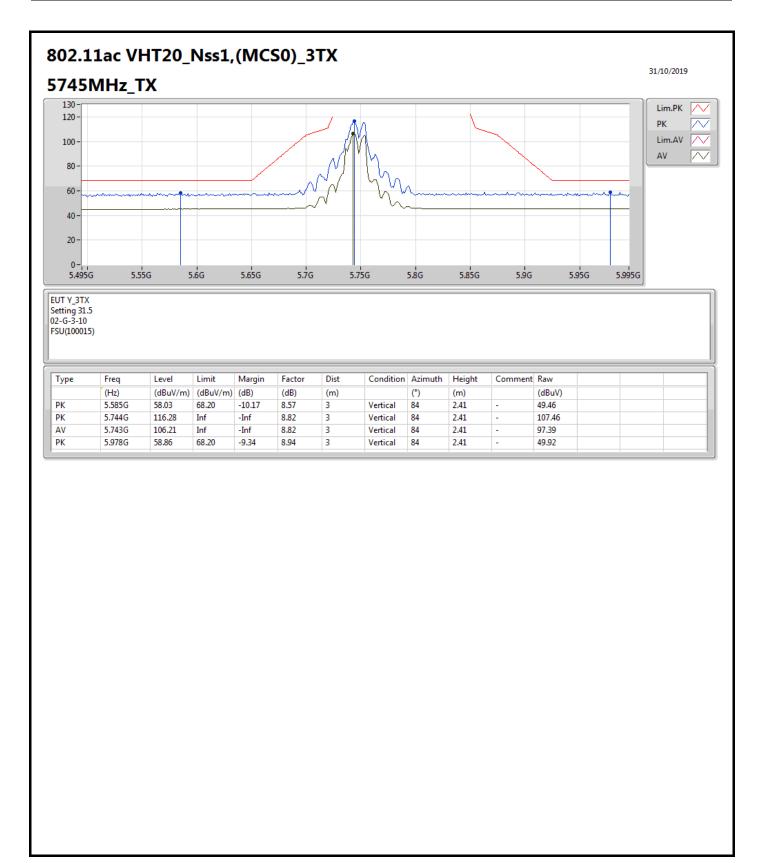




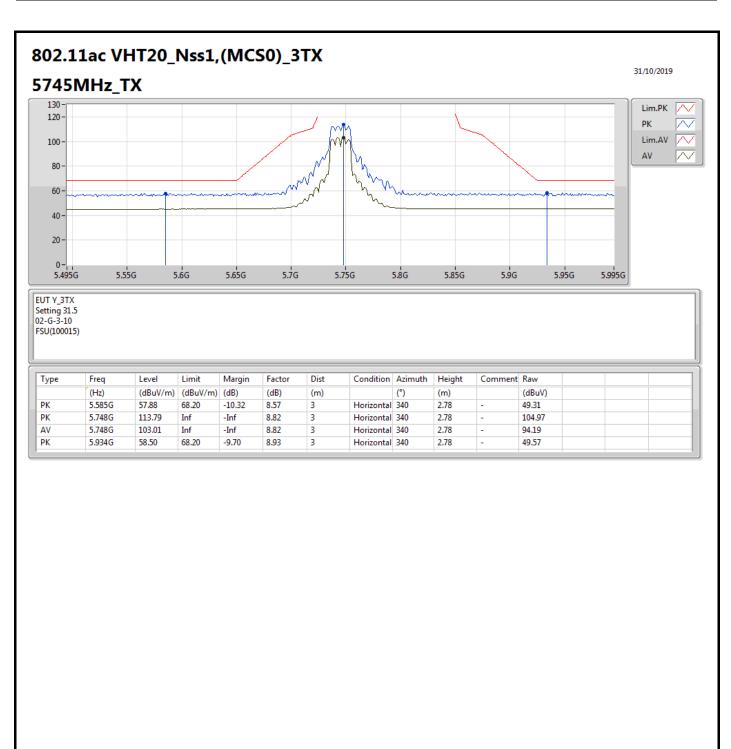




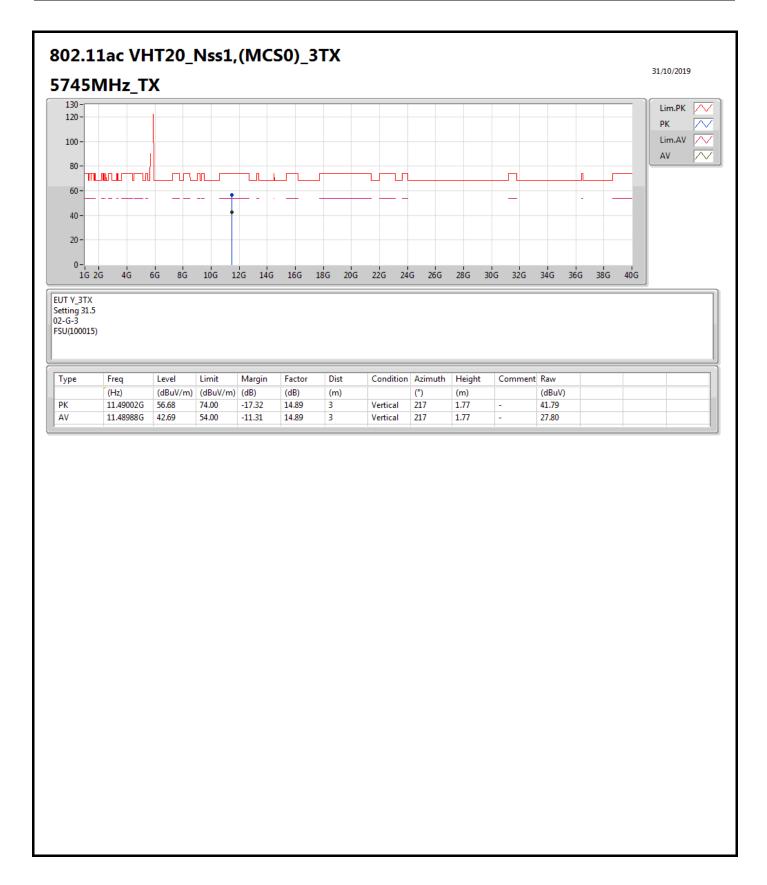




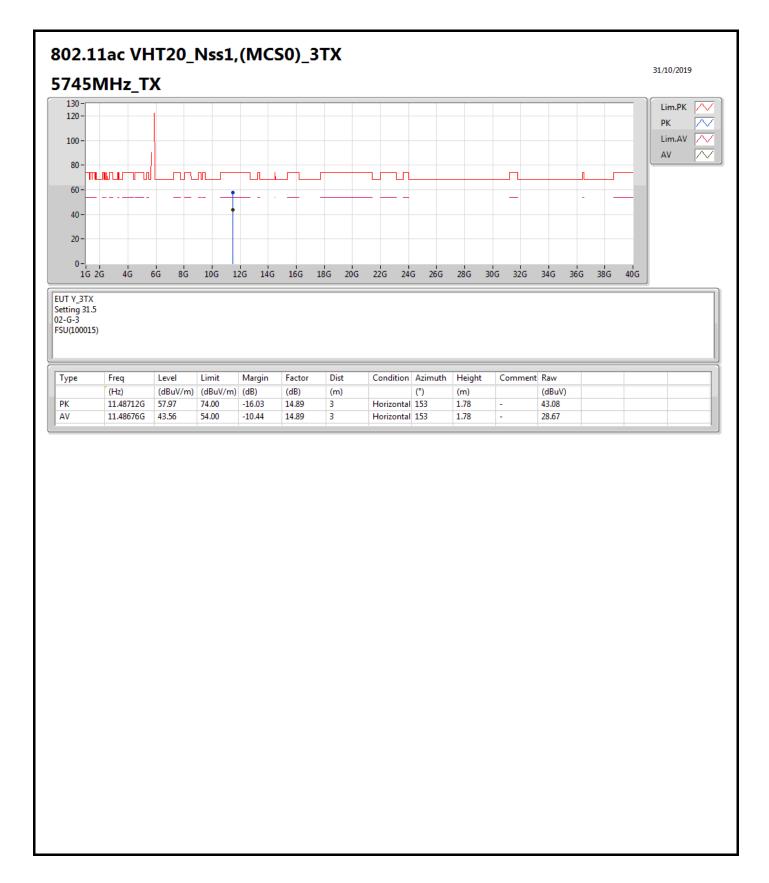




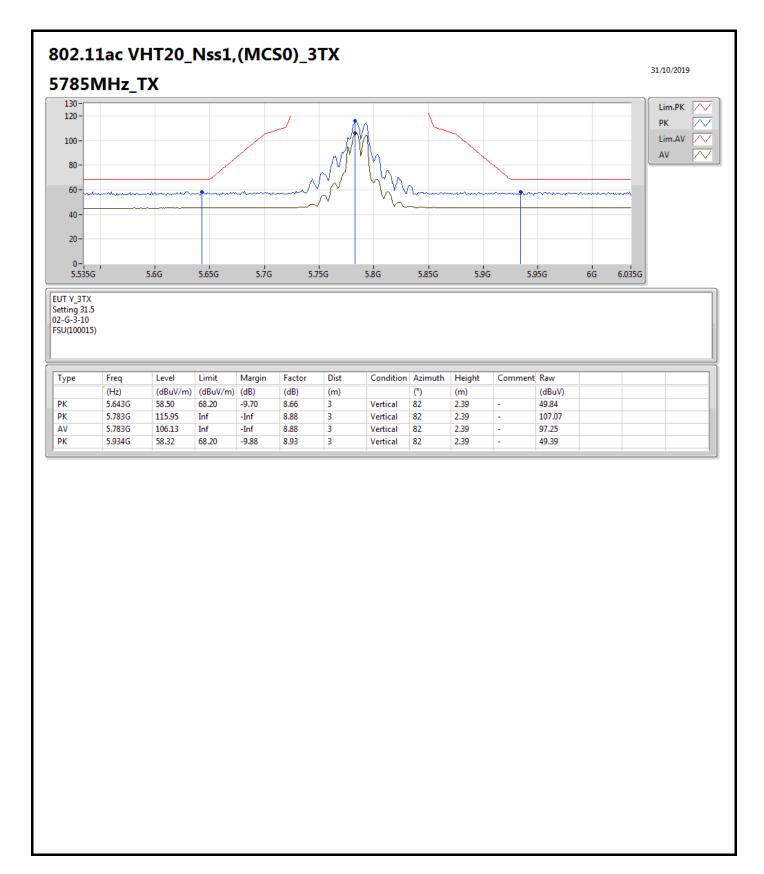




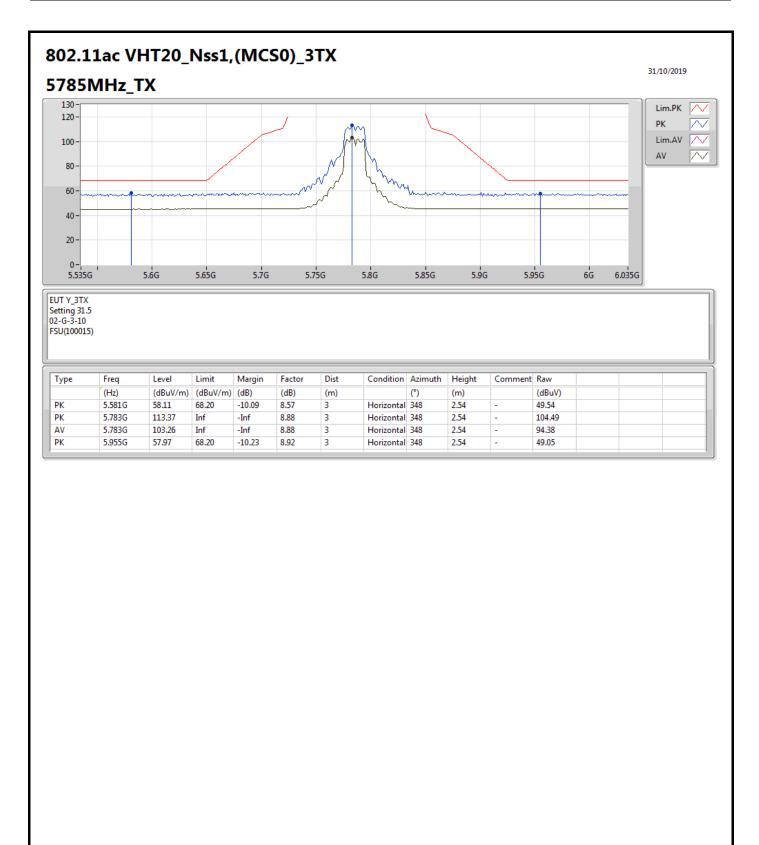




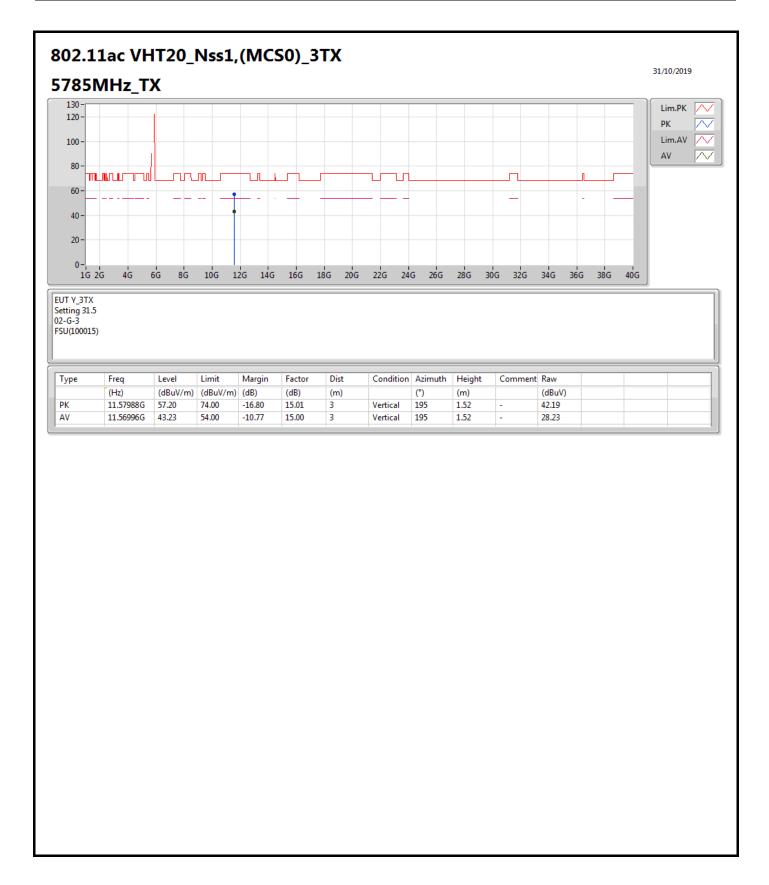




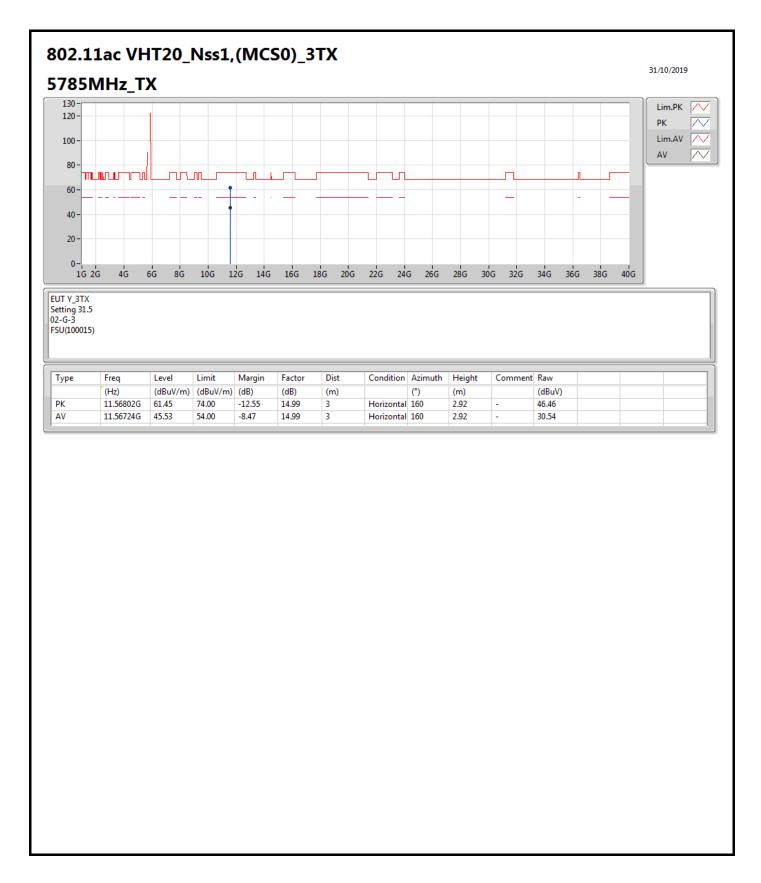




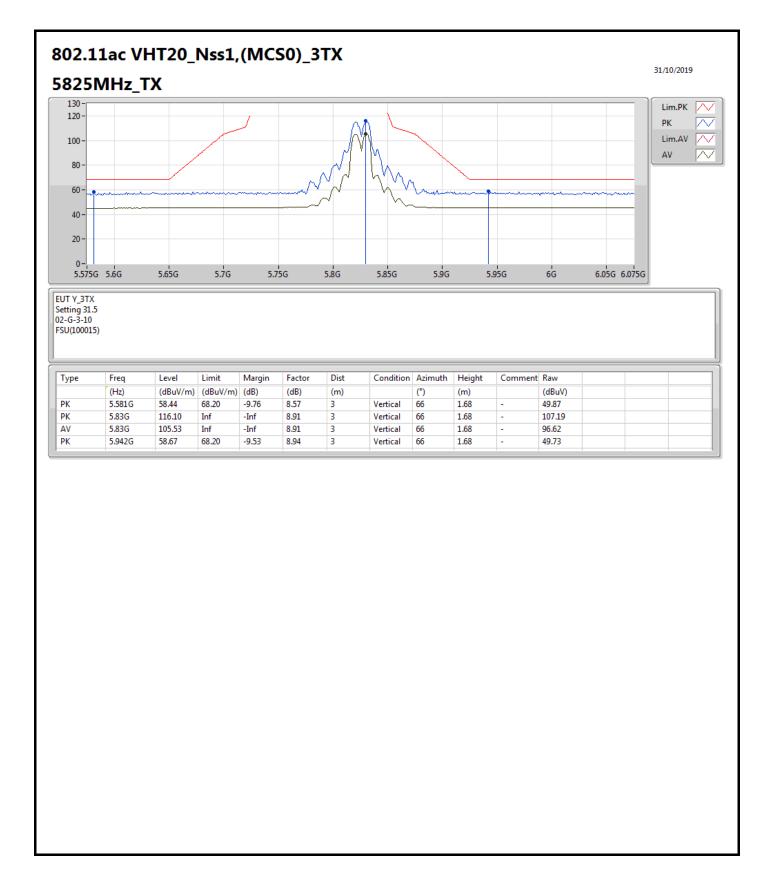








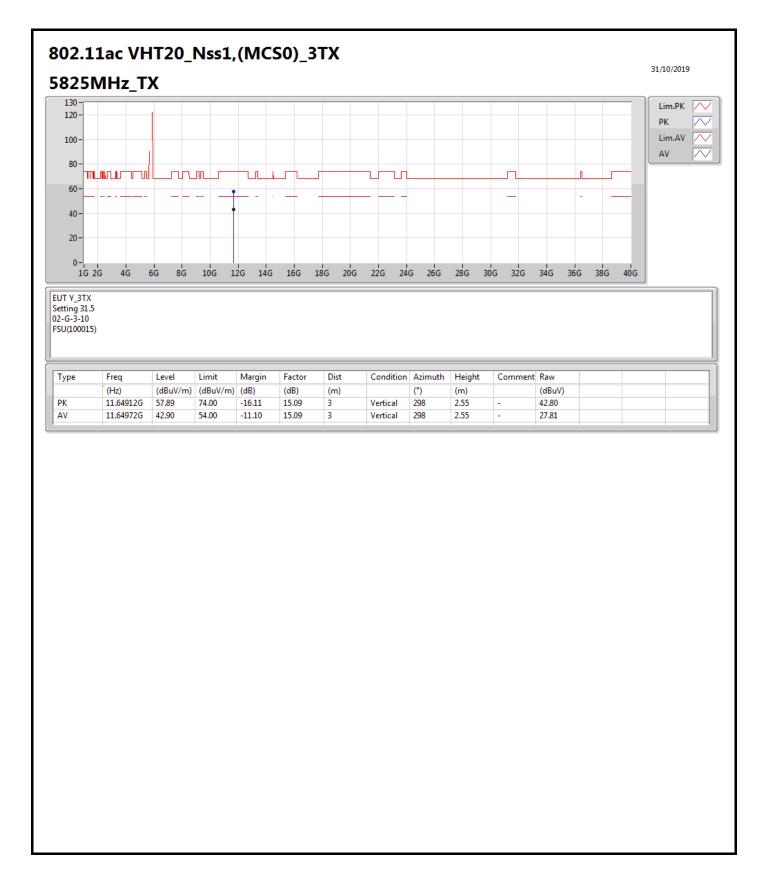




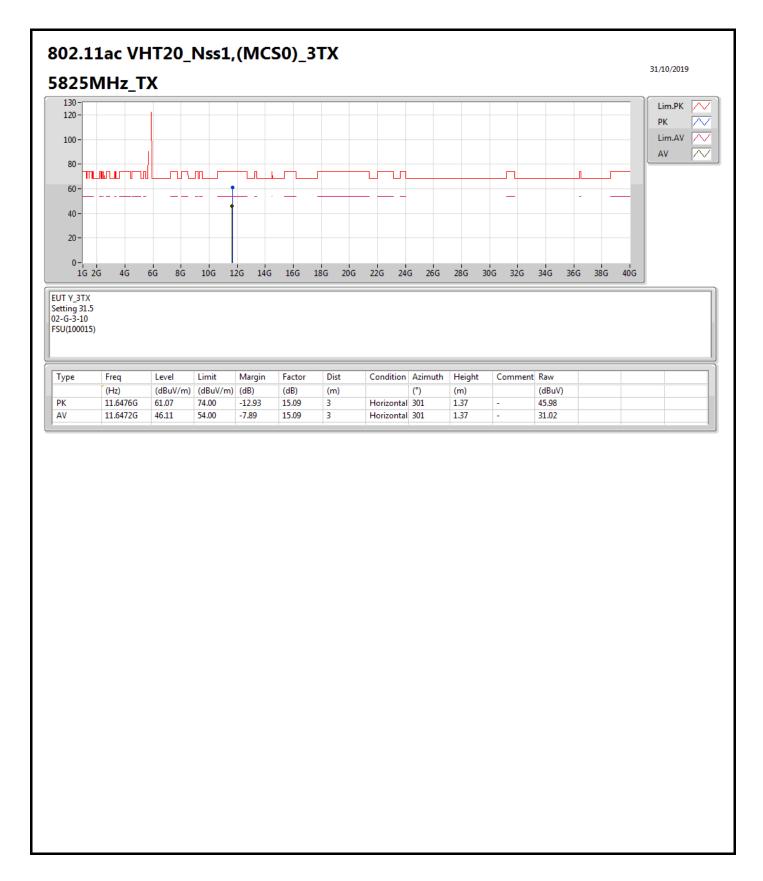




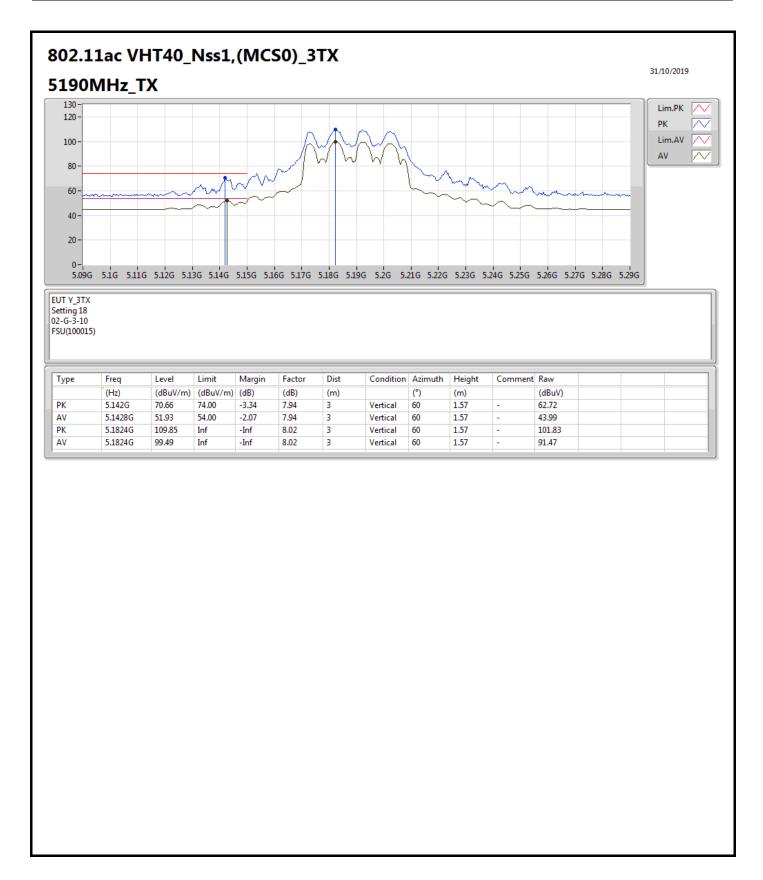




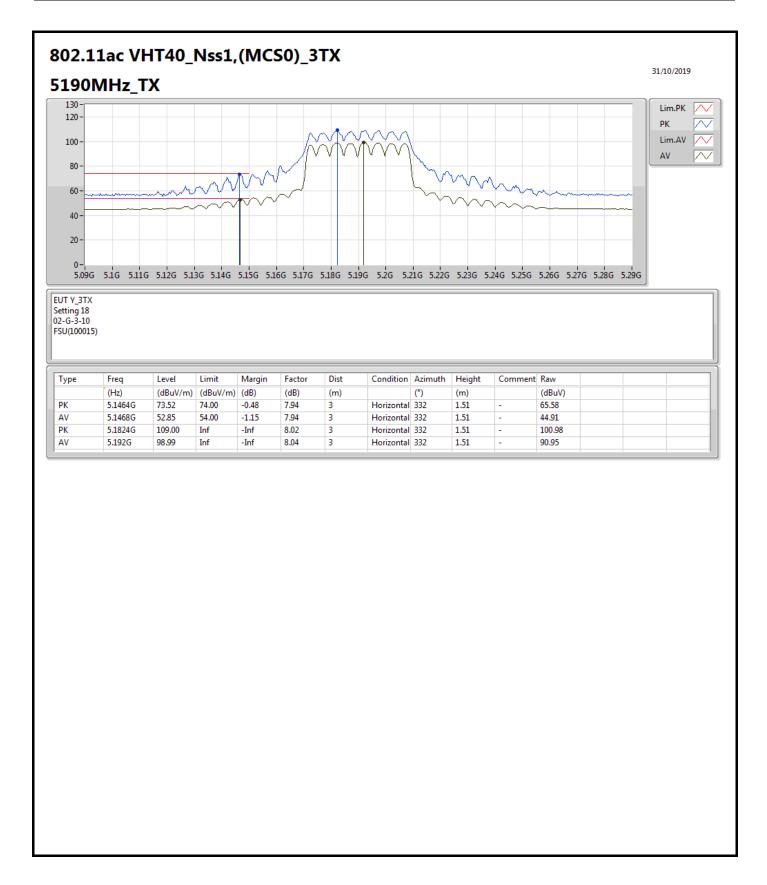




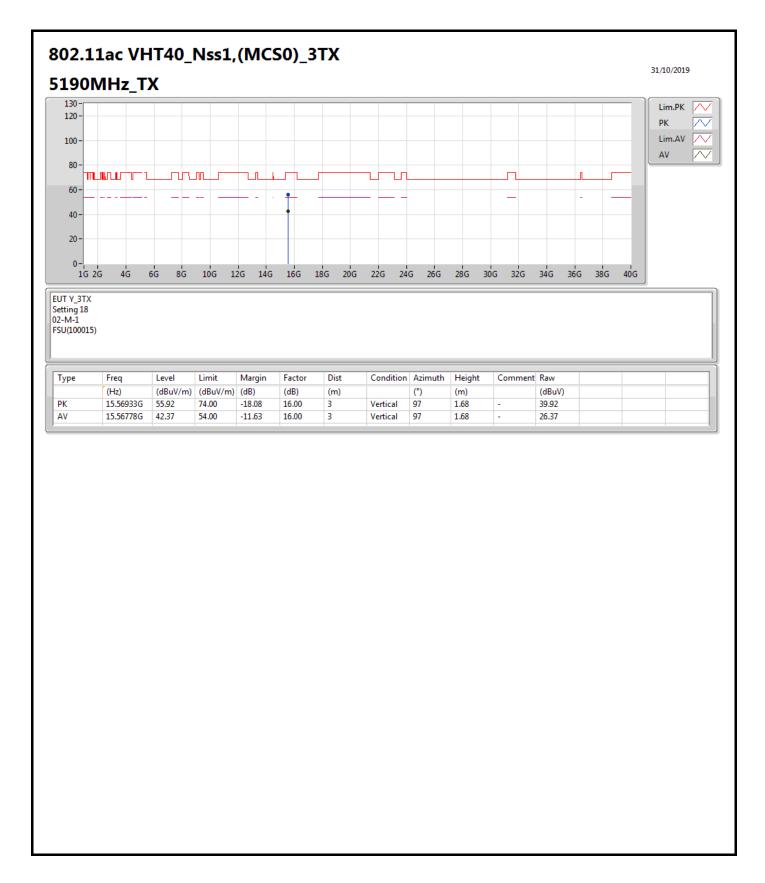




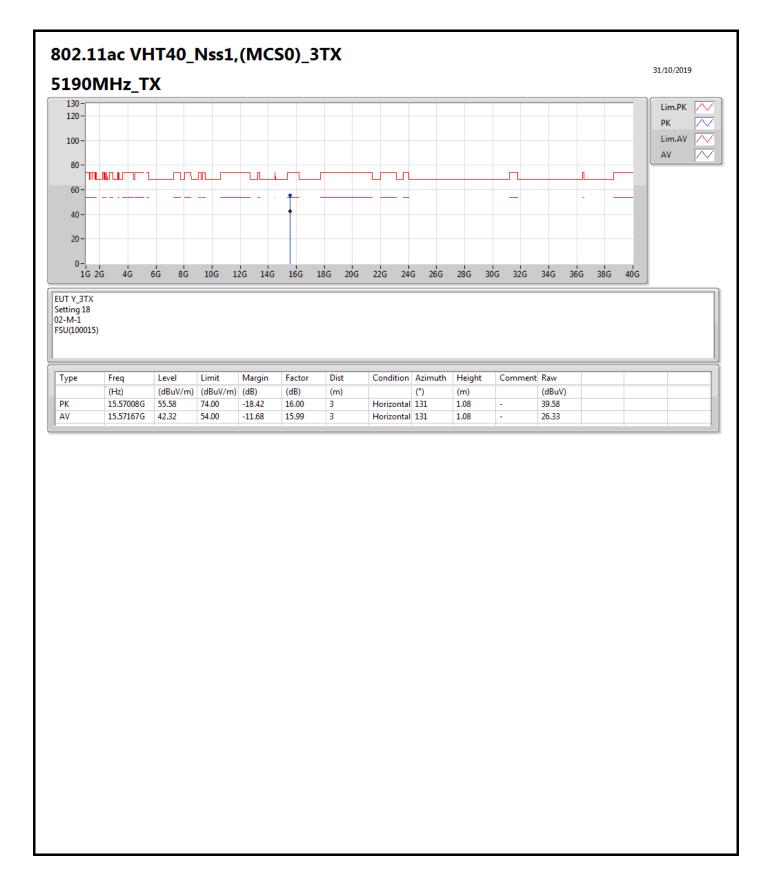




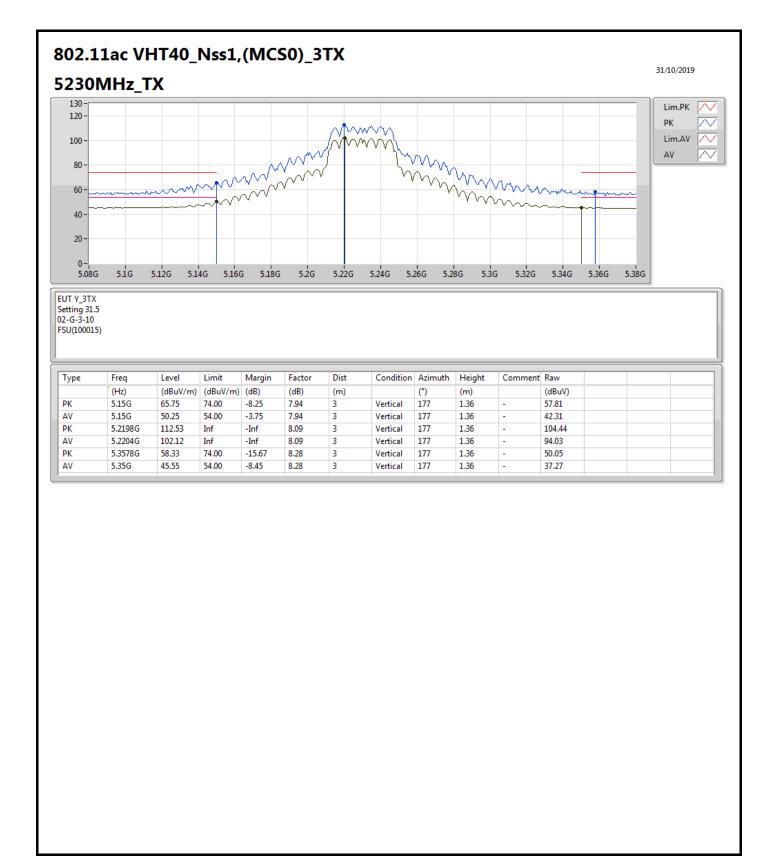




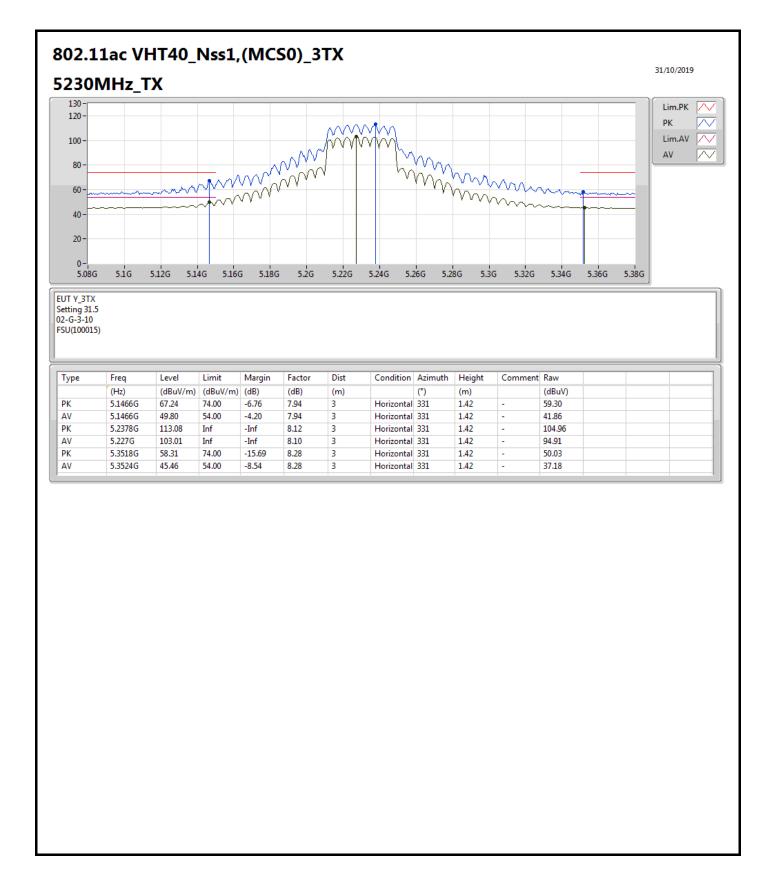




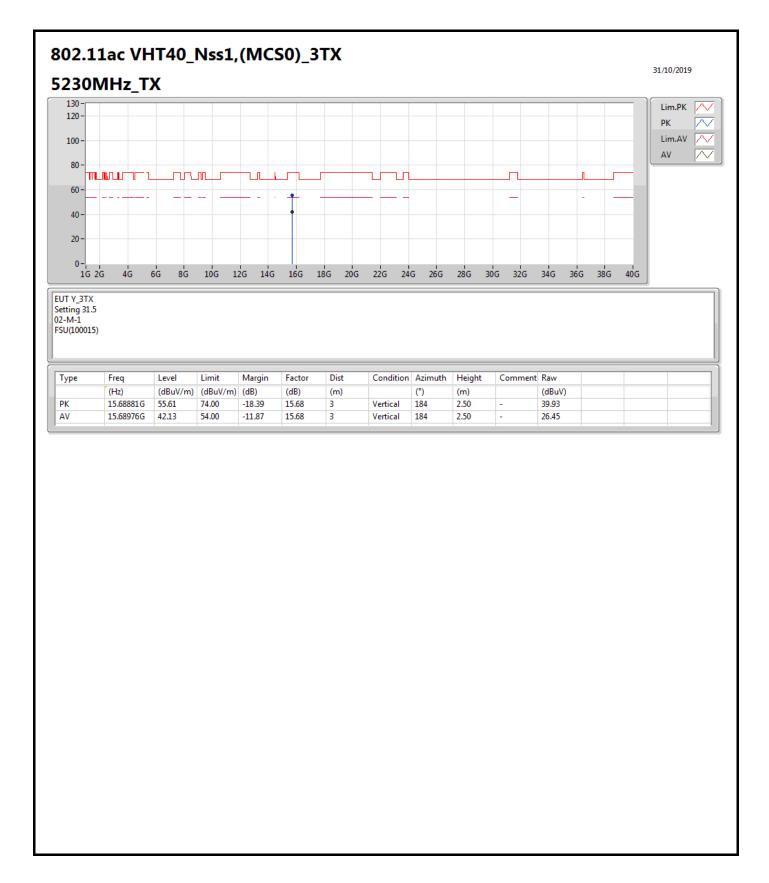




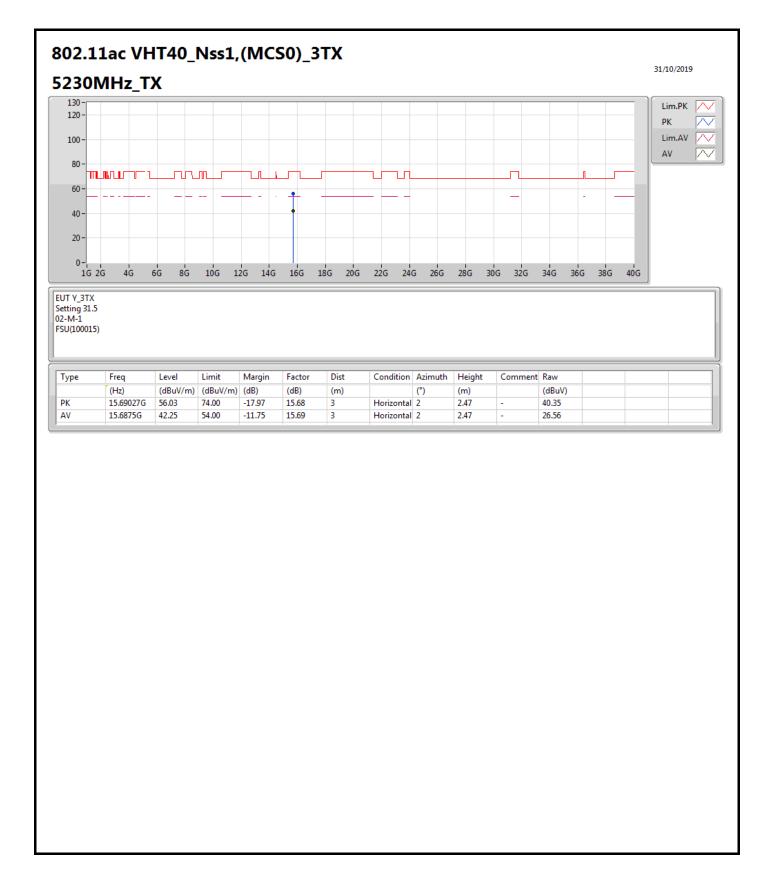




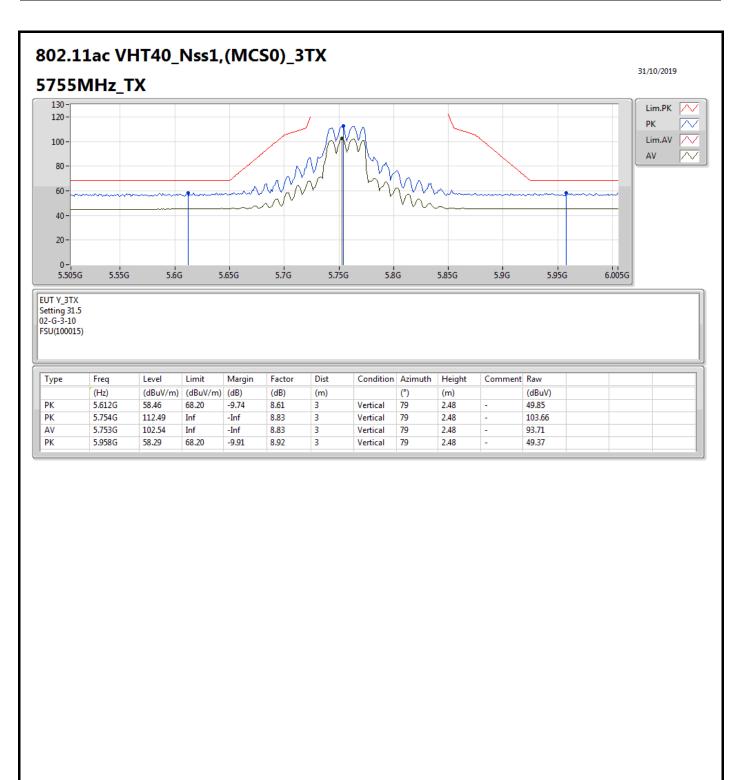




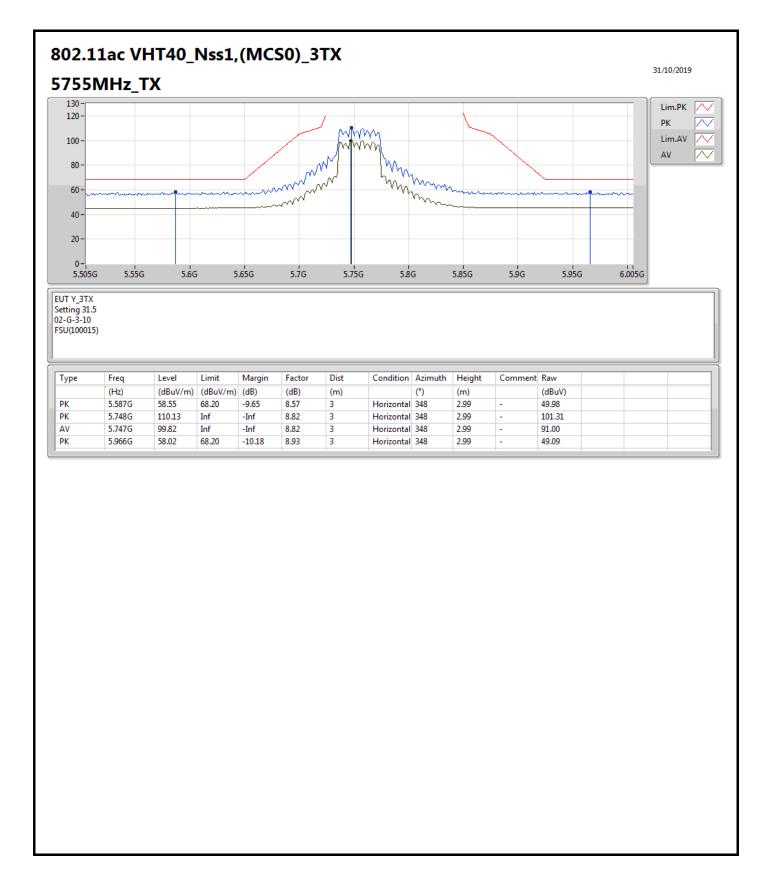




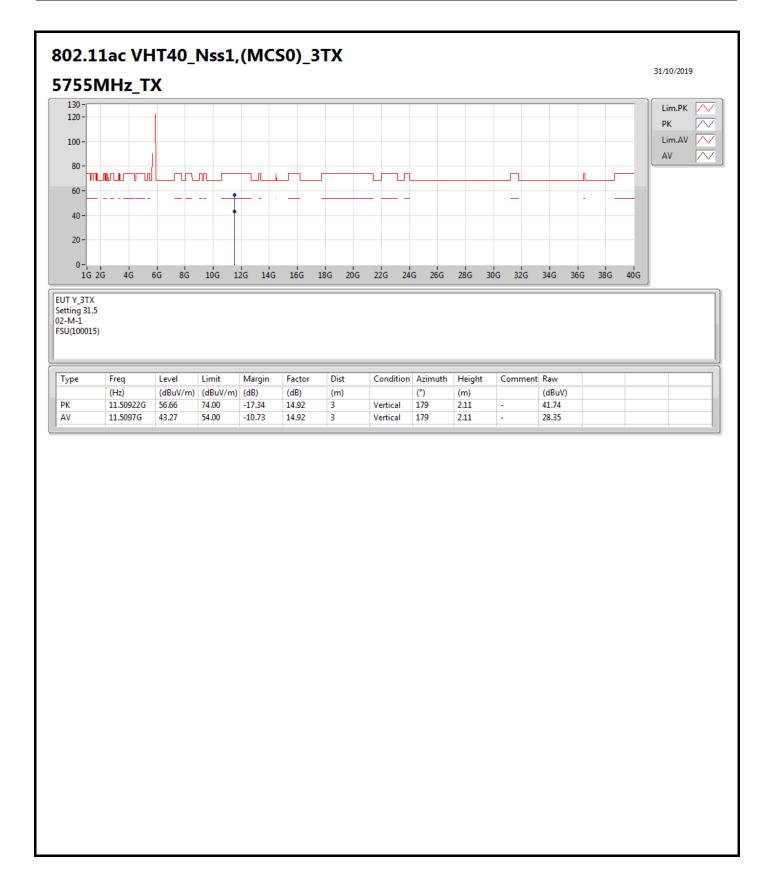




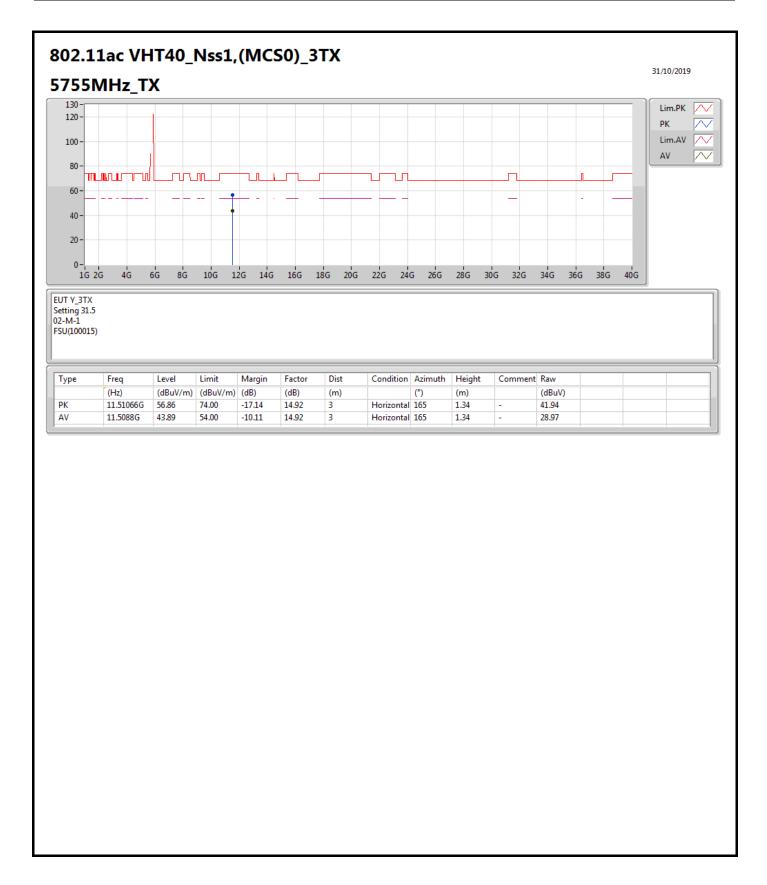




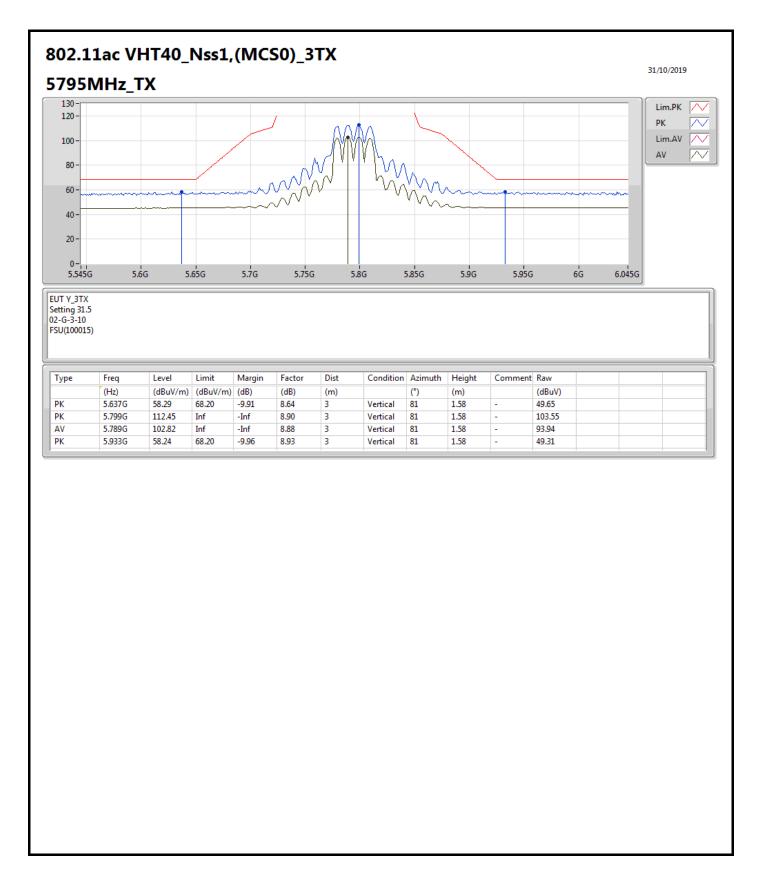




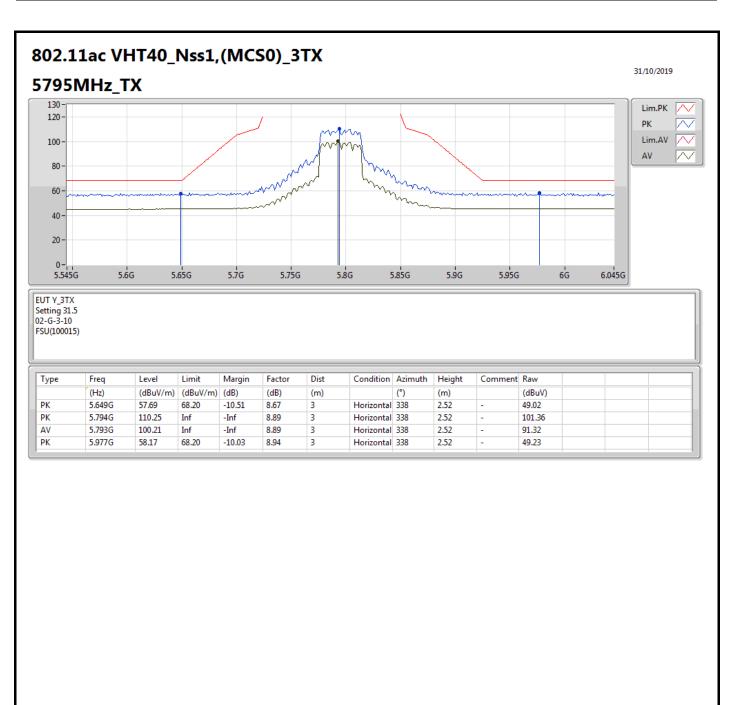




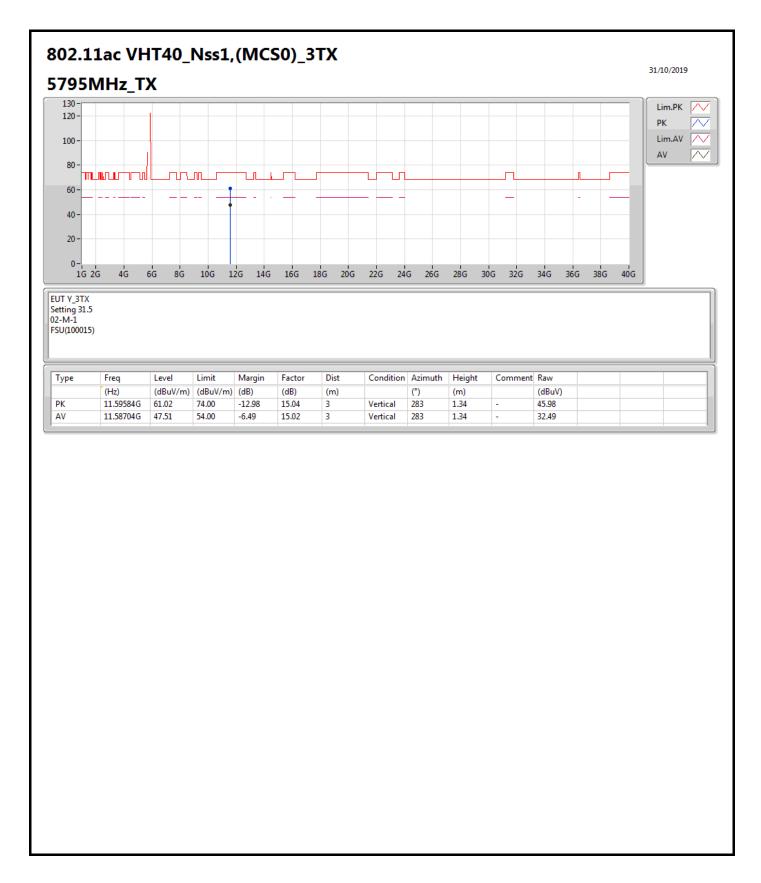




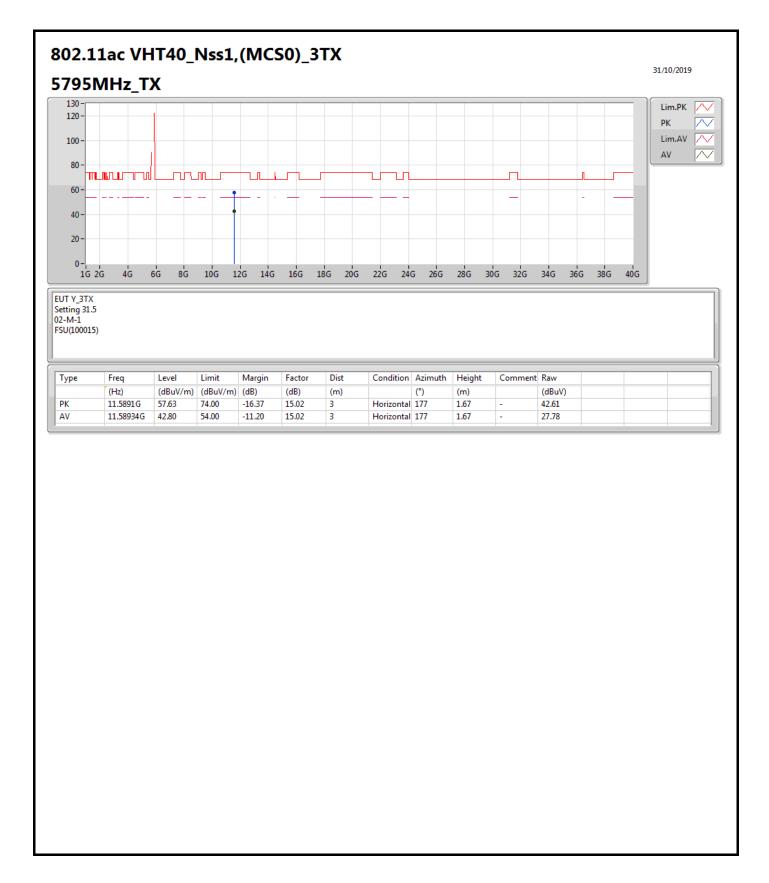




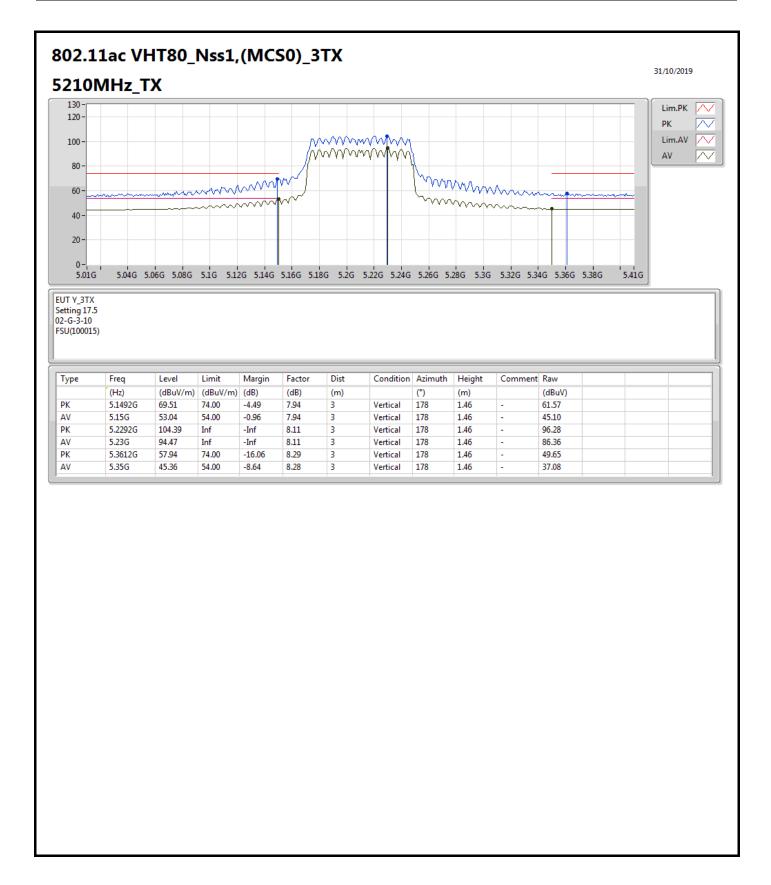




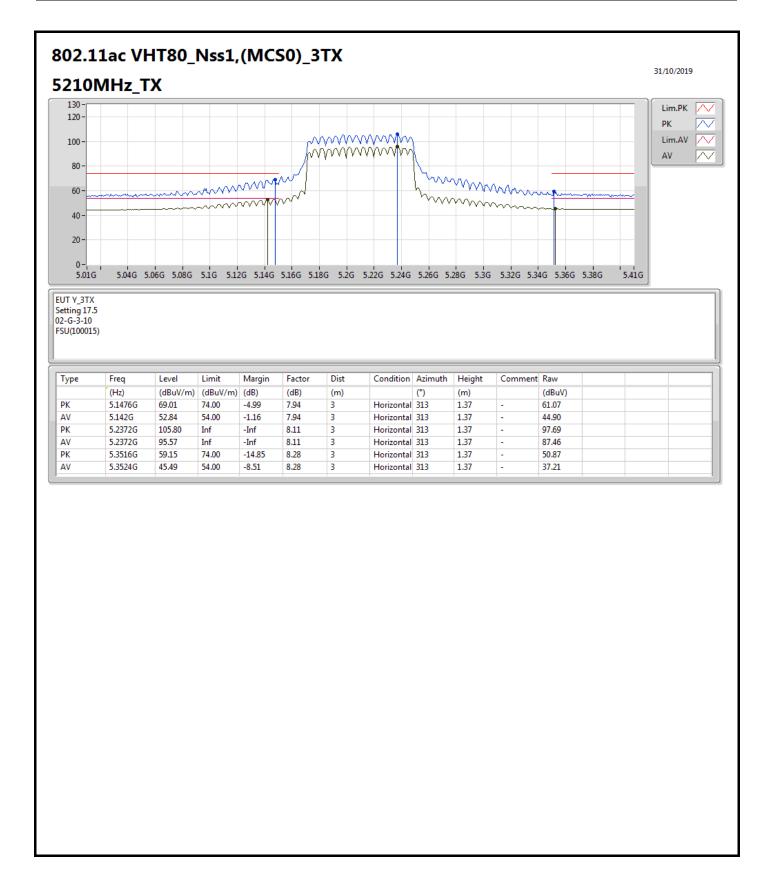




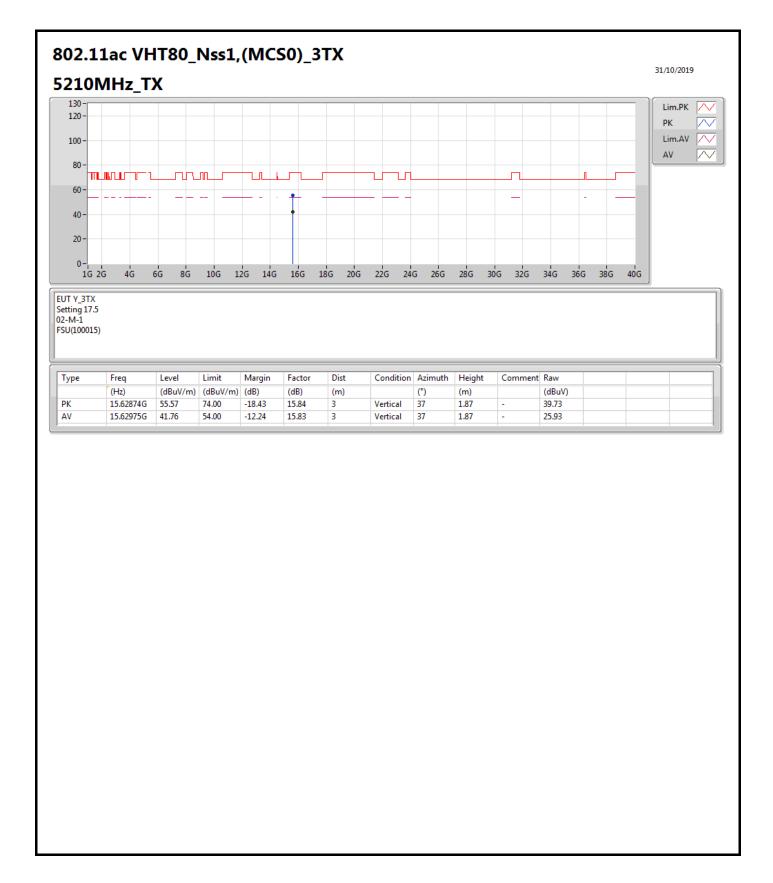




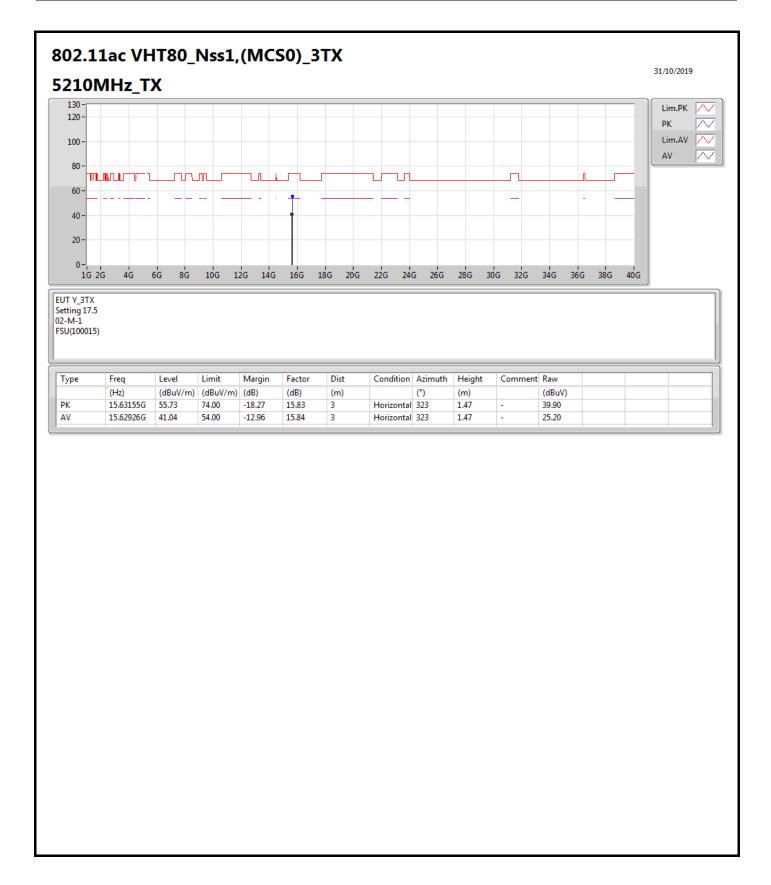




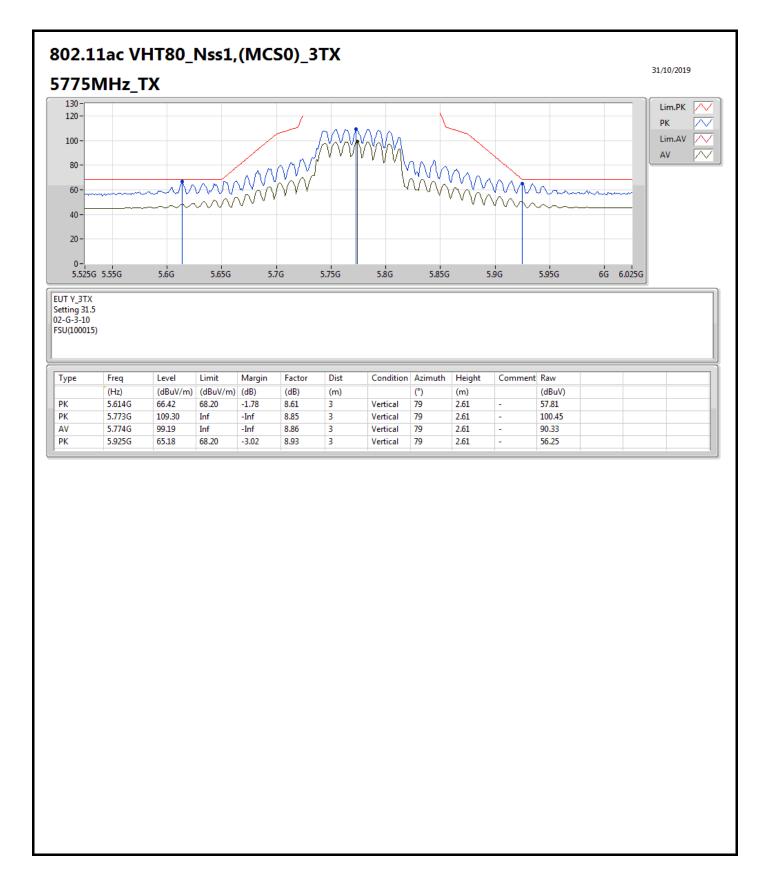








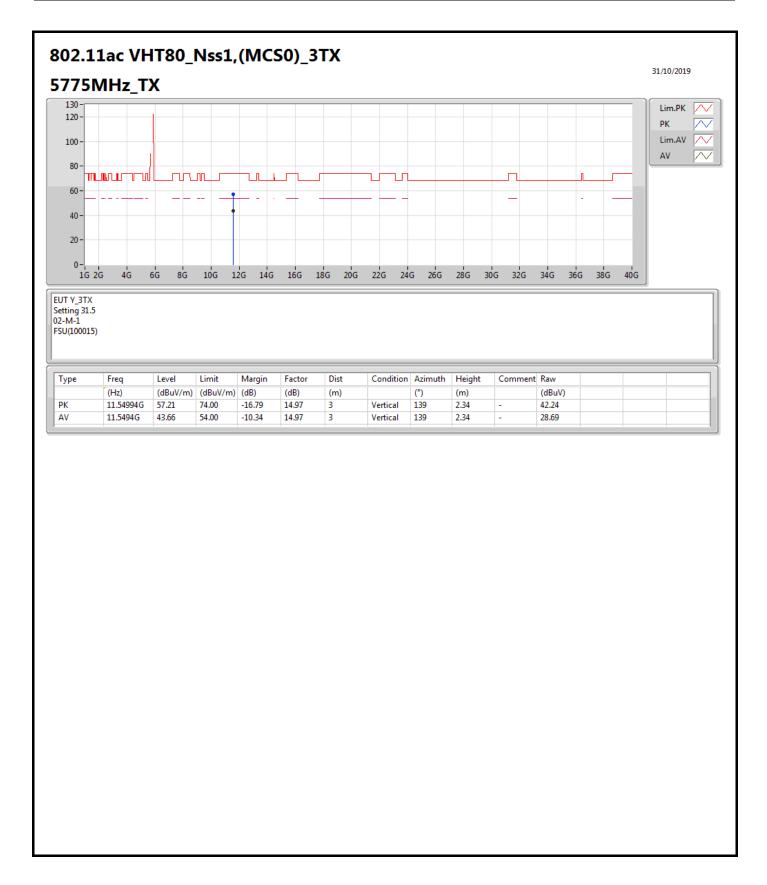




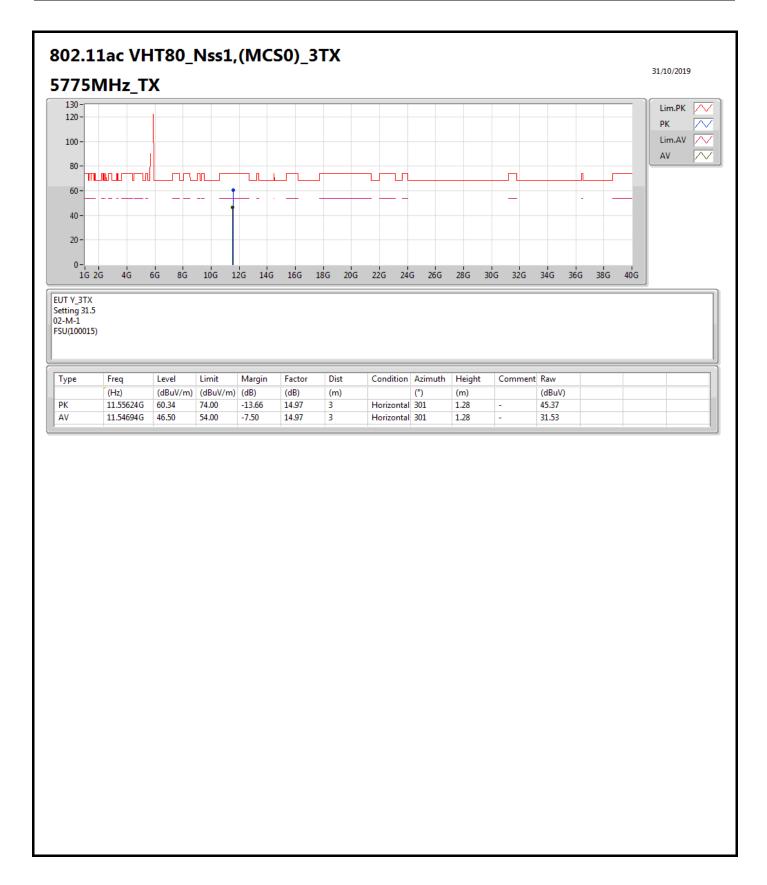






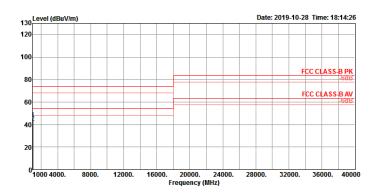








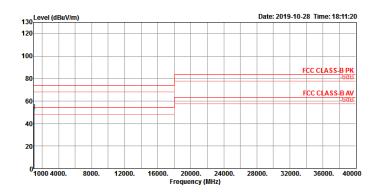
RSE Co-location Result						
Operating Mode	1	Polarization	Horizontal			
Operating Function	Normal Link					



	Freq	Limit Level Line	Over Limit						T/Pos	Remark	Pol/Phase	
			dBuV/m				dB/m			deg		
		-								·		
1	1012.43								100	54	Peak	HORIZONTAL
2	1012.58	41.65	54.00	-12.35	53.09	1.84	24.49	37.77	100	54	Average	HORIZONTAL



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



Limit Over Read CableAntenna Preamp A/Pos T/Pos
Freq Level Line Limit Level Loss Factor Factor Remark Pol/Phase MHz dBuV/m dB dBuV dB dB/m dB cm deg