

Report No.: FR761315AB

Project No: CB10608150

FCC Test Report

: Access Point Equipment

Brand Name : Aerohive Model No. : AP150W

FCC ID : WBV-AP150W

: 47 CFR FCC Part 15.407 Standard

Operating Band : 5150 MHz - 5250 MHz

5725 MHz - 5850 MHz

: Aerohive Networks Inc. Applicant

1011 McCarthy Blvd, Milpitas, CA 95035

Manufacturer : Aerohive Networks Inc.

1011 McCarthy Blvd, Milpitas, CA 95035

Outdoor; Indoor; Fixed P2P Function

Client

The product sample received on Jun. 13, 2017 and completely tested on Jul. 28, 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.

SPORTON INTERNATIONAL INC.





SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No.

: 1 of 33

Report Version

: Rev. 01

Issued Date

: Aug. 23, 2017



Table of Contents

Report No.: FR761315AB

1	GENERAL DESCRIPTION	5
1.1	Information	5
1.2	Testing Applied Standards	8
1.3	Testing Location Information	8
1.4	Measurement Uncertainty	8
2	TEST CONFIGURATION OF EUT	9
2.1	Test Channel Mode	9
2.2	The Worst Case Measurement Configuration	11
2.3	EUT Operation during Test	
2.4	Accessories	
2.5	Support Equipment	
2.6	Test Setup Diagram	15
3	TRANSMITTER TEST RESULT	19
3.1	AC Power-line Conducted Emissions	19
3.2	Emission Bandwidth	21
3.3	Maximum Conducted Output Power	22
3.4	Peak Power Spectral Density	
3.5	Unwanted Emissions	
3.6	Frequency Stability	31
4	TEST EQUIPMENT AND CALIBRATION DATA	32
APPE	ENDIX A. TEST RESULTS OF AC POWER-LINE CONDUCTED EMISSIONS	
APPE	ENDIX B. TEST RESULTS OF EMISSION BANDWIDTH	
APPE	ENDIX C. TEST RESULTS OF MAXIMUM CONDUCTED OUTPUT POWER	
APPE	ENDIX D. TEST RESULTS OF PEAK POWER SPECTRAL DENSITY	
APPE	ENDIX E. TEST RESULTS OF UNWANTED EMISSIONS	
APPE	ENDIX F. TEST RESULTS OF FREQUENCY STABILITY	
APPE	ENDIX G. TEST RESULTS OF RADIATED EMISSION CO-LOCATION	
APPE	ENDIX H. TEST PHOTOS	
PHO	TOGRAPHS OF EUT V01	

Page No.

Report Version

Issued Date

: 2 of 33

: Rev. 01

: Aug. 23, 2017



Summary of Test Result

	Conformance Test Specifications					
Report Clause	Ref. Std. 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			

SPORTON INTERNATIONAL INC.
TEL: 886-3-3273456

FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 3 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



Revision History

Report No.	Version	Description	Issued Date
FR761315AB	Rev. 01	Initial issue of report	Aug. 23, 2017

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No.
Report Version
Issued Date

: 4 of 33 : Rev. 01 : Aug. 23, 2017



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	3TX
5.15-5.25GHz	802.11n HT20	20	3TX
5.15-5.25GHz	802.11n HT20-BF	20	3TX
5.15-5.25GHz	802.11ac VHT20	20	3TX
5.15-5.25GHz	802.11ac VHT20-BF	20	3TX
5.15-5.25GHz	802.11n HT40	40	3TX
5.15-5.25GHz	802.11n HT40-BF	40	3TX
5.15-5.25GHz	802.11ac VHT40	40	3TX
5.15-5.25GHz	802.11ac VHT40-BF	40	3TX
5.15-5.25GHz	802.11ac VHT80	80	3TX
5.15-5.25GHz	802.11ac VHT80-BF	80	3TX
5.725-5.85GHz	802.11a	20	3TX
5.725-5.85GHz	802.11n HT20	20	3TX
5.725-5.85GHz	802.11n HT20-BF	20	3TX
5.725-5.85GHz	802.11ac VHT20	20	3TX
5.725-5.85GHz	802.11ac VHT20-BF	20	3TX
5.725-5.85GHz	802.11n HT40	40	3TX
5.725-5.85GHz	802.11n HT40-BF	40	3TX
5.725-5.85GHz	802.11ac VHT40	40	3TX
5.725-5.85GHz	802.11ac VHT40-BF	40	3TX
5.725-5.85GHz	802.11ac VHT80	80	3TX
5.725-5.85GHz	802.11ac VHT80-BF	80	3TX

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No.
Report Version
Issued Date

: 5 of 33 : Rev. 01 : Aug. 23, 2017



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.
- 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.

Report No.: FR761315AB

1.1.2 Antenna Information

Ant.	Brand	P/N An	Antenna Type	Connector	Gain (dBi)		
Ant.	Біапи	F/N	Antenna Type	Connector	2.4G	5G	
1	WNC	95XKAA15.GCY	PCB Antenna	I-PEX	2.33	5.88	
2	WNC	95XKAA15.GCZ	PCB Antenna	I-PEX	3.45	5.86	
3	WNC	95XKAA15.GC1	PCB Antenna	I-PEX	3.63	5.86	

Note: The EUT has three antennas.

<For 2.4GHz WLAN Function>

For IEEE 802.11b/g/n/ac mode (2TX, 2RX):

Ant. 2 connect to port 1 and Ant. 3 connect to port 2

Ant. 2 and Ant. 3 could transmit/receive simultaneously.

<For 5GHz WLAN Function>

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

Ant. 1 connect to port 1, Ant. 2 connect to port 2 and Ant. 3 connect to port 3

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

<For Bluetooth Function>

For bluetooth mode (1TX, 1RX):

Ant. 1 connect to port 1

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

 SPORTON INTERNATIONAL INC.
 Page No.
 : 6 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.876	0.575	2.065m	1k
802.11ac VHT20	0.927	0.329	1.929m	1k
802.11ac VHT20-BF	0.933	0.301	3.848m	300
802.11ac VHT40	0.868	0.615	946u	3k
802.11ac VHT40-BF	0.902	0.448	4.618m	300
802.11ac VHT80	0.812	0.904	454.667u	3k
802.11ac VHT80-BF	0.868	0.615	5.11m	300

1.1.4 EUT Operational Condition

FCC ID: WBV-AP150W

EUT Power Type	From Power Adapter or PoE		
Beamforming Function		☐ Without beamforming	

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456

Report Version
FAX: 886-3-3270973

Issued Date

Page No. : 7 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017

1.2 Testing Applied Standards

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

Report No.: FR761315AB

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v01r04
- FCC KDB 644545 D03 v01
- FCC KDB 662911 D01 v02r01

1.3 Testing Location Information

	Testing Location					
	HWA YA	ADD	:	lo. 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	Eddie Weng	23°C / 55%	Jun. 24, 2017
Radiated (For below 1GHz)	03CH01-CB	Welson Chen & Nyle Chang & Peter Wu	22°C / 54%	Jul. 19, 2017
Radiated (For above 1GHz)	03CH01-CB	Welson Chen & Nyle Chang & Peter Wu	22°C / 54%	Jun. 16, 2017 ~ Jul. 20, 2017
AC Conduction	CO01-CB	Howard Lin	22°C / 54%	Jul. 28, 2017

Test site Designation No. TW0006 with FCC

Test site registered number IC 4086D with Industry Canada.

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 ⁻⁸	Confidence levels of 95%
Frequency Stability	6.06 x10 ⁻⁸	Confidence levels of 95%

 SPORTON INTERNATIONAL INC.
 Page No.
 : 8 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.11a_(6Mbps)_3TX	-
5180MHz	66
5200MHz	79
5240MHz	70
5745MHz	86
5785MHz	86
5825MHz	86
802.11ac VHT20_Nss1,(MCS0)_3TX	-
5180MHz	63
5200MHz	78
5240MHz	70
5745MHz	86
5785MHz	86
5825MHz	86
802.11ac VHT40_Nss1,(MCS0)_3TX	-
5190MHz	48
5230MHz	69
5755MHz	78
5795MHz	78
802.11ac VHT80_Nss1,(MCS0)_3TX	-
5210MHz	51
5775MHz	67
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-
5180MHz	70
5200MHz	78
5240MHz	70
5745MHz	80
5785MHz	80
5825MHz	79
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-
5190MHz	50
5230MHz	69
5755MHz	76

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 9 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



Mode	Power Setting	
5795MHz	78	
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	
5210MHz	49	
5775MHz	64	

Report No.: FR761315AB

Note:

- VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.
- There are two modes of EUT for 802.11n/ac in 2.4GHz/5GHz. One is beamforming mode, and the other is non-beamforming mode. Both modes have been tested and recorded in this test report.

 SPORTON INTERNATIONAL INC.
 Page No.
 : 10 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017

2.2 The Worst Case Measurement Configuration

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

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

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

The Worst Case Mode for Following Conformance Tests			
Tests Item	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+Bluetooth			
Refer to Appendix G for Radiated Emission Co-location.			

SPORTON INTERNATIONAL INC. TEL: 886-3-3273456

FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 11 of 33

Report No.: FR761315AB

Report Version : Rev. 01 Issued Date : Aug. 23, 2017



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+Bluetooth			
Refer to Sporton Test Report No.: FA761315 for Co-location RF Exposure Evaluation.				

Report No.: FR761315AB

- Note 1: The EUT can only be used at Y axis position.
- Note 2: The defines from manufacturer, "console port" without any function, and it was performed test at the load.
- Note 3: PoE and Adapter information as below:

The EUT was powered by PoE or Adapter, and the PoE and Adapter was for measurement only, would not be marketed.

Support Unit	Brand	Model
Adapter	CUI INC	SWI36-48-N
PoE 1	Microsemi	PD-3501G/AC
PoE 2	Microsemi	PD-9001GR/AT/AC

 SPORTON INTERNATIONAL INC.
 Page No.
 : 12 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017

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 Conducted Mode:

The EUT was programmed to be in continuously transmitting 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 WLAN module and transmit duty cycle no less than 98%.

Report No.: FR761315AB

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

Wall-mounted rack*1

 SPORTON INTERNATIONAL INC.
 Page No.
 : 13 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



FCC Test Report Report No.: FR761315AB

2.5 Support Equipment

For Test Site No: CO01-CB

	Support Equipment				
No.	No. Equipment Brand Name Model Name FCC ID				
1	NB*5	DELL	E6430	DoC	
2	PoE Loader	Leader	PFS-4010	DoC	
3	Adapter	CUI INC	SWI36-48-N	DoC	

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

	Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID					
1	NB*4	DELL	E4300	DoC		
2	NB	Apple	Mac Book	DoC		
3	PoE Loader	WNC	M1	DoC		
4	Adapter	CUI INC	SWI36-48-N	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	NB	DELL	E4300	DoC		
2	PoE 1	Power Dsine	PD-3501G/AC	DoC		

For beamforming mode

	or bearing mode					
	Support Equipment					
No.	o. Equipment Brand Name Model Name FCC ID					
1	NB*2	DELL	E4300	DoC		
2	PoE 1	Power Dsine	PD-3501G/AC	DoC		
3	WLAN module	Broadcom	BCM943162ZP	QDS-BRCM1075		
4	Test fixture	N/A	N/A	N/A		

For Test Site No: TH01-CB

Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID				
1	NB	DELL	E4300	DoC	
2	PoE 2	Microsemi	PD-9001GR/AT/AC	DoC	

 SPORTON INTERNATIONAL INC.
 Page No.
 : 14 of 33

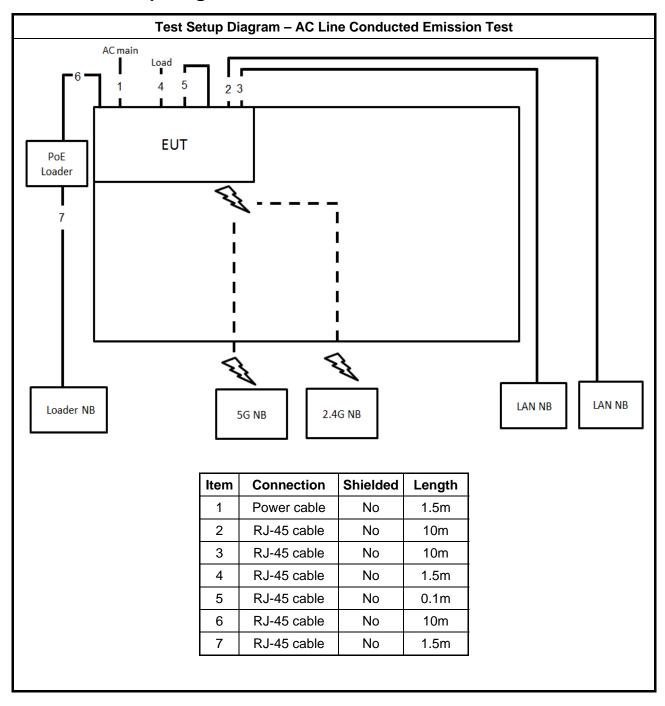
 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



Report No. : FR761315AB

2.6 Test Setup Diagram



TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 15 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017

Test Setup Diagram - Radiated Test < 1GHz AC MAIN LOAD EUT LAN NB LAN NB PoE loader LAN NB 2.4G NB 5G NB Item Connection Shielded Length Power cable 1 No 1.5m 2 RJ-45 cable No 10m 3 RJ-45 cable No 10m 4 RJ-45 cable No 10m 5 Power cable No 1.5m 6 RJ-45 cable No 0.1m 7 RJ-45 cable No 1.5m

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 16 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



Test Setup Diagram - Radiated Test > 1GHz / For non-beamforming mode EUT PoE LAN NB AC MAIN Connection Shielded Length ltem 1 RJ-45 cable No 10 2 RJ-45 cable 1.5 No 3 Power cable No 1.8

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 17 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017

Test Setup Diagram - Radiated Test > 1GHz / For beamforming mode EUT PoE LAN NB WLAN module NB AC MAIN Test fixture Item Connection Shielded Length RJ-45 cable No 10 1 RJ-45 cable 2 No 1.5 3 Power cable No 1.8 4 RJ-45 cable No 1.5

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 18 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



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			

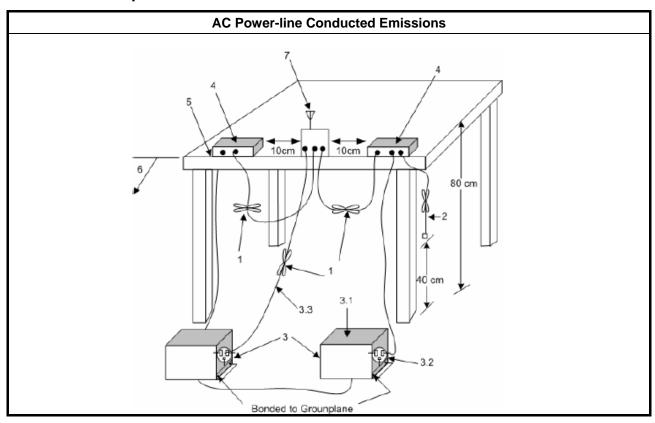
3.1.2 Measuring Instruments

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 e	missions.

3.1.4 Test Setup



SPORTON INTERNATIONAL INC. TEL: 886-3-3273456

FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 19 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



3.1.5 Test Result of AC Power-line Conducted Emissions

Report No.: FR761315AB

: 20 of 33

: Rev. 01

: Aug. 23, 2017

Refer as Appendix A

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456

Report Version

FAX: 886-3-3270973

Issued Date

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.					

Report No.: FR761315AB

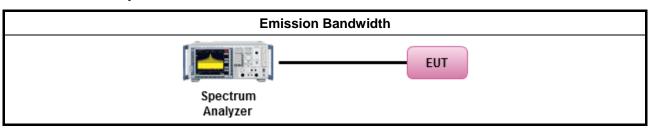
3.2.2 Measuring Instruments

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.				
	\boxtimes	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

 SPORTON INTERNATIONAL INC.
 Page No.
 : 21 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

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

Report No.: FR761315AB

 SPORTON INTERNATIONAL INC.
 Page No.
 : 22 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017

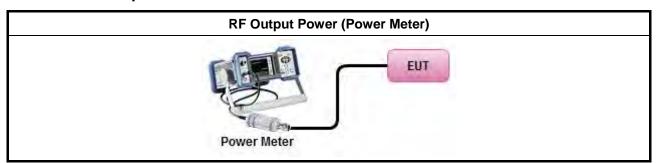
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

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

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

SPORTON INTERNATIONAL INC. TEL: 886-3-3273456

FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 23 of 33

Report No.: FR761315AB

Report Version : Rev. 01 Issued Date : Aug. 23, 2017

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

Report No.: FR761315AB

 SPORTON INTERNATIONAL INC.
 Page No.
 : 24 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



3.4.2 Measuring Instruments

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

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 rebandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth								
	[duty	/ cycle ≥ 98% or external video / power trigger]						
	\boxtimes	Refer as FCC KDB 789033, clause E Method SA-1 (spectral trace averaging).						
		Refer as FCC KDB 789033, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)						
	duty	cycle < 98% and average over on/off periods with duty factor						
	\boxtimes	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).						
		Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)						
•	For	conducted measurement.						
	•	If the EUT supports multiple transmit chains using options given below:						
		Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.						
		Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,						
		Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.						
	•	If multiple transmit chains, EIRP PPSD calculation could be following as methods: $ PPSD_{total} = PPSD_1 + PPSD_2 + + PPSD_n \\ (calculated in linear unit [mW] and transfer to log unit [dBm]) \\ EIRP_{total} = PPSD_{total} + DG $						

Report No.: FR761315AB

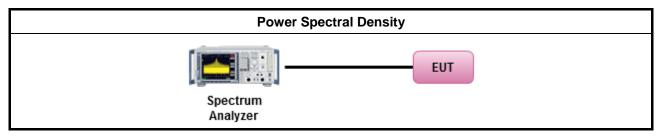
 SPORTON INTERNATIONAL INC.
 Page No.
 : 25 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



3.4.4 Test Setup



3.4.5 Test Result of Peak Power Spectral Density

Refer as Appendix D

SPORTON INTERNATIONAL INC. TEL: 886-3-3273456 FAX: 886-3-3270973

FCC ID: WBV-AP150W

Page No. : 26 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



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).

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 27 of 33
Report Version : Rev. 01

Issued Date : Aug. 23, 2017



3.5.2 Measuring Instruments

has no need to be reported.

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

Report No.: FR761315AB

 SPORTON INTERNATIONAL INC.
 Page No.
 : 28 of 33

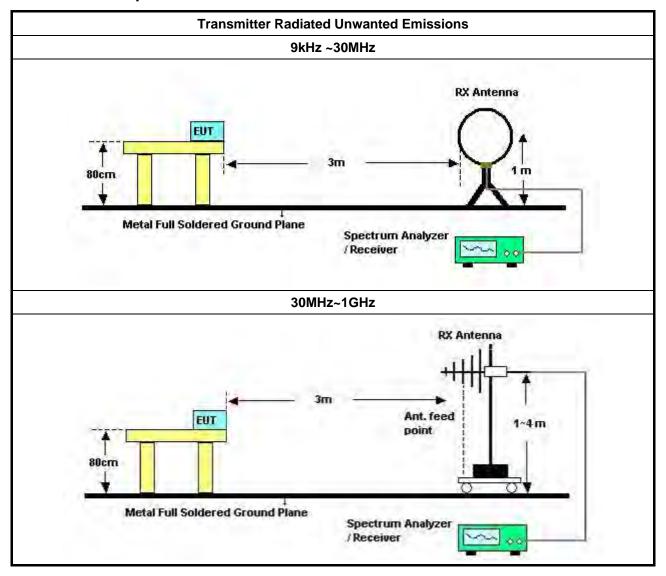
 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017

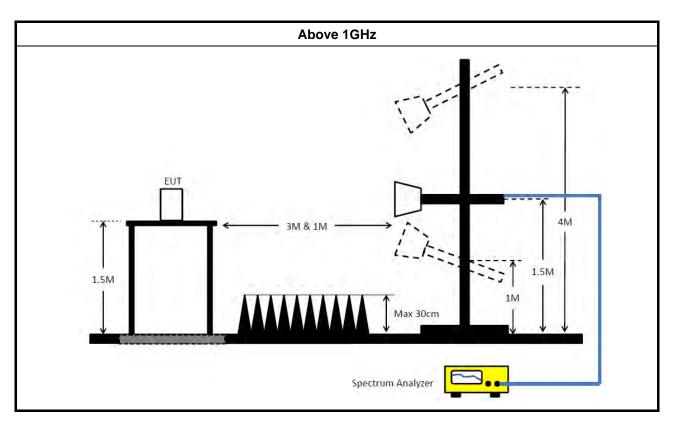


Report No. : FR761315AB

3.5.4 Test Setup



TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 29 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017



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

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 30 of 33
Report Version : Rev. 01

Issued Date : Aug. 23, 2017

3.6 Frequency Stability

3.6.1 Frequency Stability Limit

Frequency Stability Limit

Report No.: FR761315AB

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

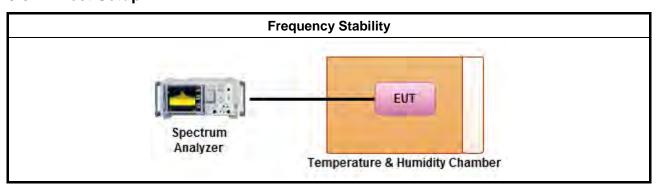
Refer a test equipment and calibration data table in this test report.

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 0°C~40°C.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Refer as Appendix F

 SPORTON INTERNATIONAL INC.
 Page No.
 : 31 of 33

 TEL: 886-3-3273456
 Report Version
 : Rev. 01

 FAX: 886-3-3270973
 Issued Date
 : Aug. 23, 2017



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	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jun. 28, 2016	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)

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 32 of 33
Report Version : Rev. 01

Issued Date

: Aug. 23, 2017



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.

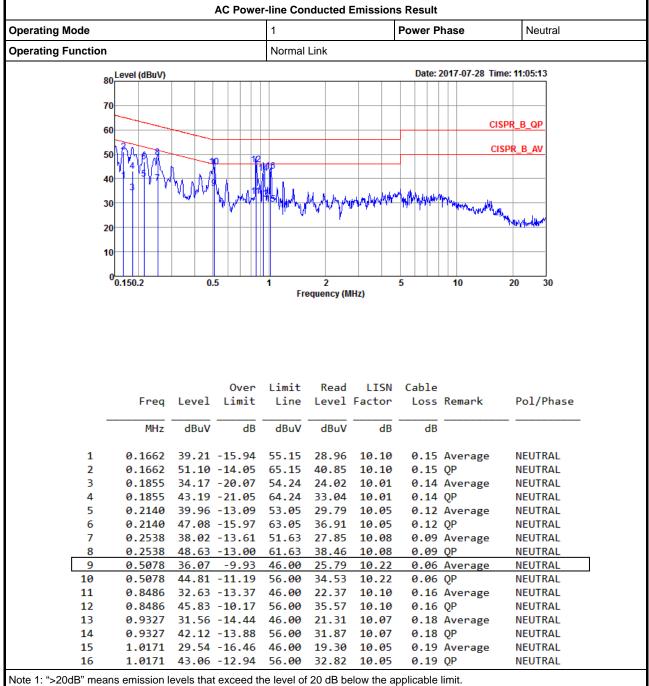
N.C.R. means Non-Calibration required.

SPORTON INTERNATIONAL INC.

TEL: 886-3-3273456 FAX: 886-3-3270973 FCC ID: WBV-AP150W Page No. : 33 of 33
Report Version : Rev. 01
Issued Date : Aug. 23, 2017

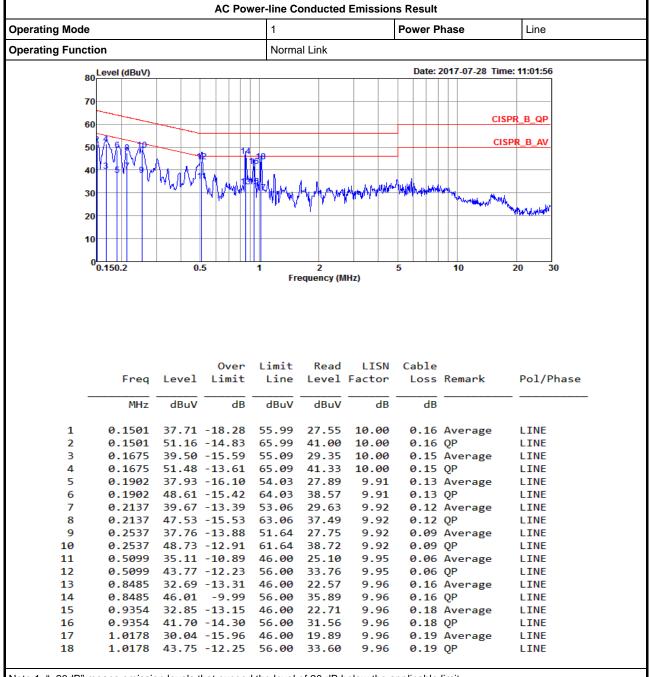
[&]quot;*" Calibration Interval of instruments listed above is two years.

AC Power-line Conducted Emissions Result



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

AC Power-line Conducted Emissions Result



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.)

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



Appendix B EBW Result

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
5.15-5.25GHz	47.65M	29.46M	29M5D1D	31.55M	16.667M
5.725-5.85GHz	16.375M	37.781M	37M8D1D	16.3M	34.733M
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-
5.15-5.25GHz	49.975M	30.96M	31M0D1D	32.4M	17.791M
5.725-5.85GHz	17.625M	39.505M	39M5D1D	17.275M	36.557M
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	-
5.15-5.25GHz	88.75M	38.881M	38M9D1D	39.75M	36.232M
5.725-5.85GHz	36.35M	55.172M	55M2D1D	36.1M	36.557M
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	-
5.15-5.25GHz	93.6M	75.162M	75M2D1D	80.7M	74.963M
5.725-5.85GHz	76.3M	76.462M	76M5D1D	75.3M	75.962M
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-	-	-	-	-
5.15-5.25GHz	50M	32.409M	32M4D1D	38.2M	18.041M
5.725-5.85GHz	17.6M	33.308M	33M3D1D	17.275M	19.815M
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-	-	-	-	-
5.15-5.25GHz	93.3M	38.131M	38M1D1D	43.25M	36.282M
5.725-5.85GHz	36.3M	76.312M	76M3D1D	35.85M	36.732M
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	-	-	-	-
5.15-5.25GHz	107M	75.162M	75M2D1D	80.8M	74.763M
5.725-5.85GHz	76.3M	76.262M	76M3D1D	75.8M	75.862M

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;

SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-327-0973 Page No. : 1 of 16



EBW Result Appendix B

Result

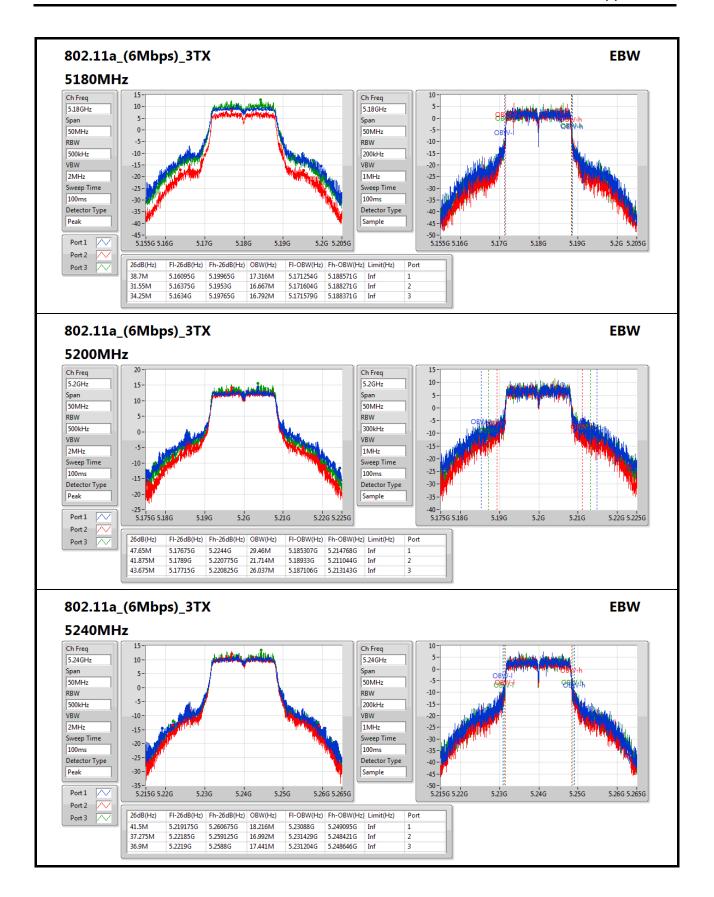
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW
		(Hz)	(Hz)	(Hz) (Hz) (Hz) (Hz)		(Hz)	(Hz)	
802.11a_(6Mbps)_3TX	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	38.7M	17.316M	31.55M	16.667M	34.25M	16.792M
5200MHz	Pass	Inf	47.65M	29.46M	41.875M	21.714M	43.675M	26.037M
5240MHz	Pass	Inf	41.5M	18.216M	37.275M	16.992M	36.9M	17.441M
5745MHz	Pass	500k	16.325M	35.382M	16.325M	37.106M	16.3M	35.282M
5785MHz	Pass	500k	16.35M	34.733M	16.325M	37.706M	16.375M	35.782M
5825MHz	Pass	500k	16.3M	35.907M	16.3M	37.781M	16.3M	36.557M
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	40.55M	18.041M	33.55M	17.791M	32.4M	17.891M
5200MHz	Pass	Inf	49.975M	30.96M	44.175M	21.689M	46.625M	25.237M
5240MHz	Pass	Inf	43.575M	19.54M	37.8M	18.091M	41.95M	18.541M
5745MHz	Pass	500k	17.6M	36.982M	17.625M	38.231M	17.575M	37.206M
5785MHz	Pass	500k	17.6M	36.557M	17.525M	39.505M	17.275M	37.656M
5825MHz	Pass	500k	17.525M	37.431M	17.6M	39.005M	17.525M	37.681M
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	63.75M	36.282M	39.75M	36.332M	41.35M	36.232M
5230MHz	Pass	Inf	88.75M	38.881M	81.3M	36.632M	88.05M	36.832M
5755MHz	Pass	500k	36.35M	37.281M	36.25M	47.226M	36.3M	54.873M
5795MHz	Pass	500k	36.35M	37.031M	36.1M	48.326M	36.35M	55.172M
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	91.1M	75.162M	93.6M	74.963M	80.7M	75.062M
5775MHz	Pass	500k	75.3M	75.962M	76.3M	76.462M	76.3M	76.162M
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	45.475M	20.015M	39.775M	18.041M	40.35M	18.366M
5200MHz	Pass	Inf	50M	32.409M	44.375M	22.014M	46.375M	25.112M
5240MHz	Pass	Inf	43.45M	19.465M	38.2M	18.091M	40.975M	18.316M
5745MHz	Pass	500k	17.55M	19.815M	17.525M	26.912M	17.575M	26.412M
5785MHz	Pass	500k	17.525M	19.79M	17.6M	28.311M	17.55M	27.636M
5825MHz	Pass	500k	17.275M	20.215M	17.525M	33.308M	17.525M	31.734M
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	67.7M	36.282M	43.25M	36.282M	44.65M	36.282M
5230MHz	Pass	Inf	93.3M	38.131M	81.95M	36.582M	85.35M	36.932M
5755MHz	Pass	500k	36.3M	36.732M	36.3M	41.829M	36M	47.826M
5795MHz	Pass	500k	35.85M	37.381M	36.3M	52.724M	36.3M	76.312M
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	107M	75.162M	81.3M	74.963M	80.8M	74.763M
5775MHz	Pass	500k	75.8M	75.862M	75.8M	76.262M	76.3M	76.062M

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

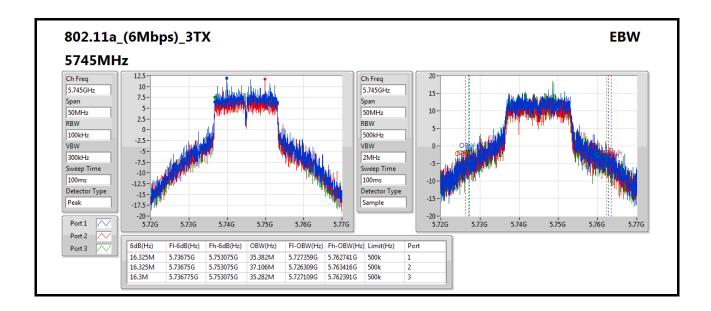
SPORTON INTERNATIONAL INC.

Page No. : 3 of 16



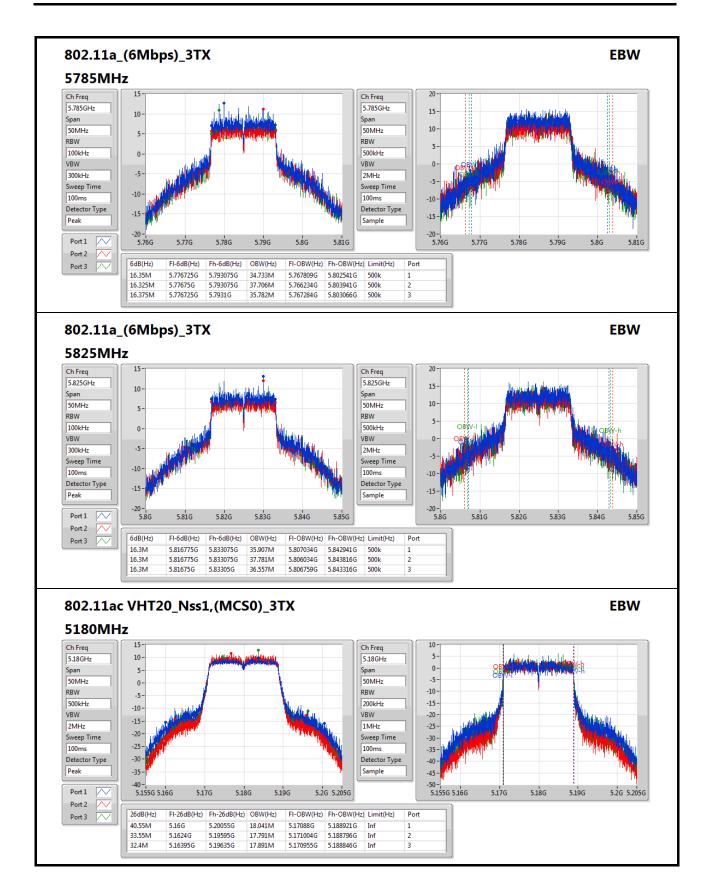


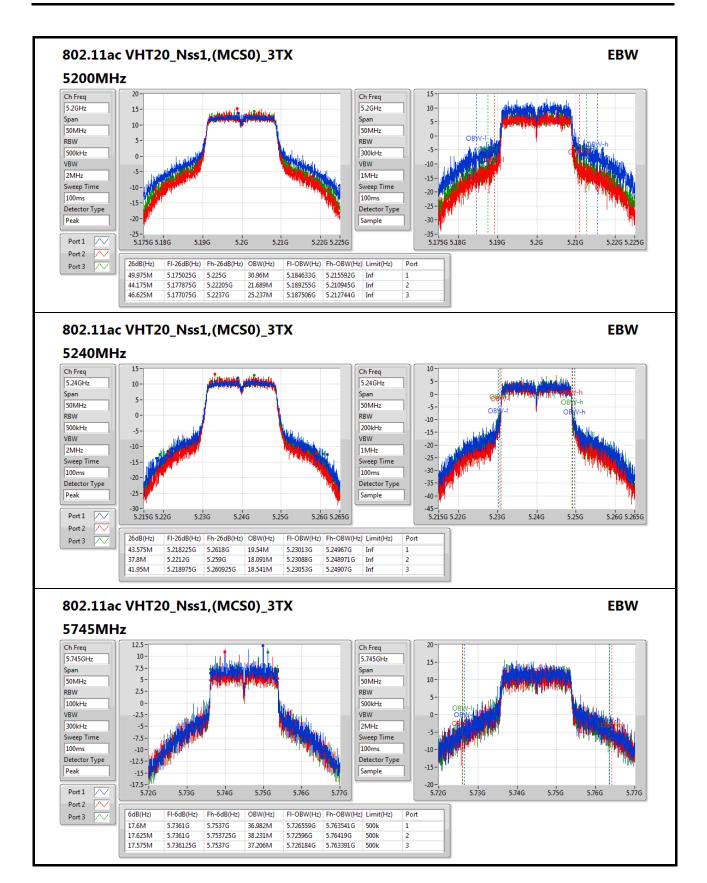
EBW Result



Page No. : 5 of 16

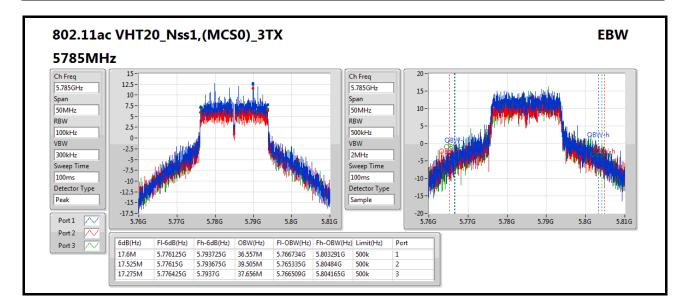






Appendix B

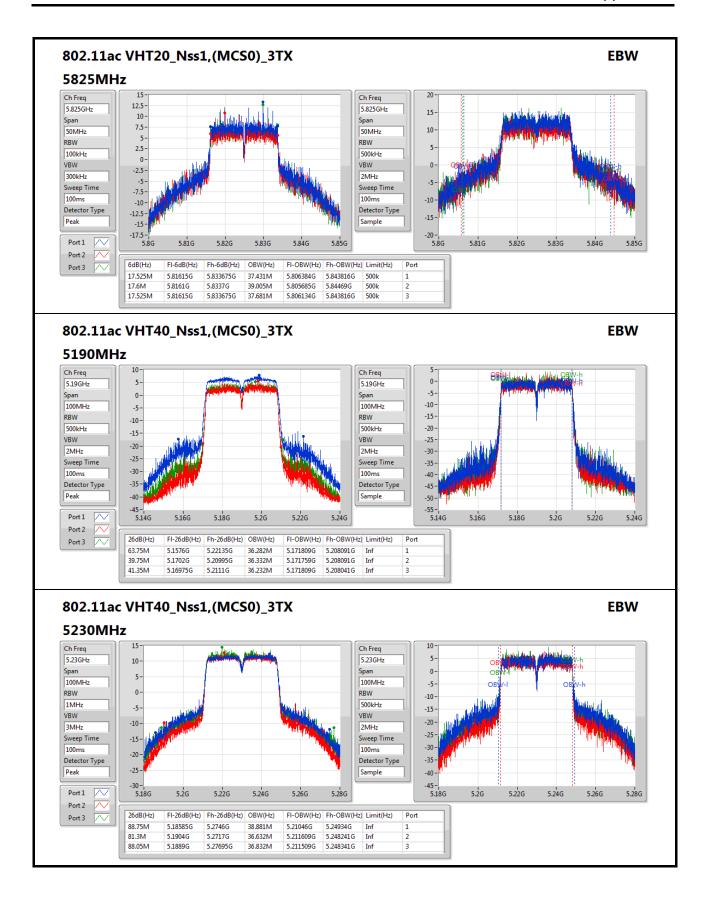
EBW Result Appendix B



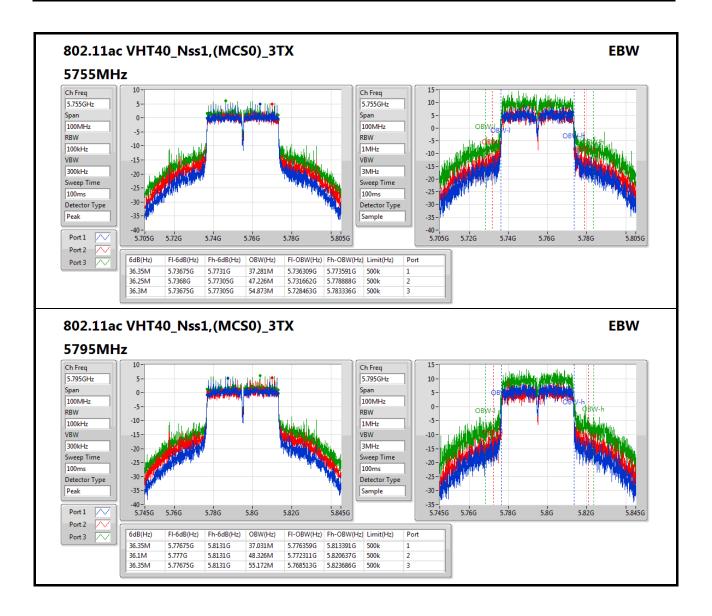
Appendix B

Page No. : 8 of 16

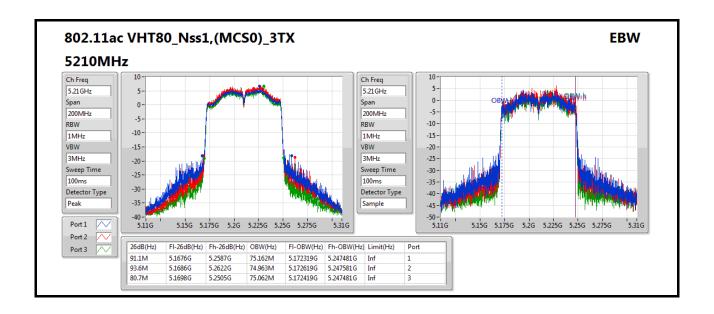






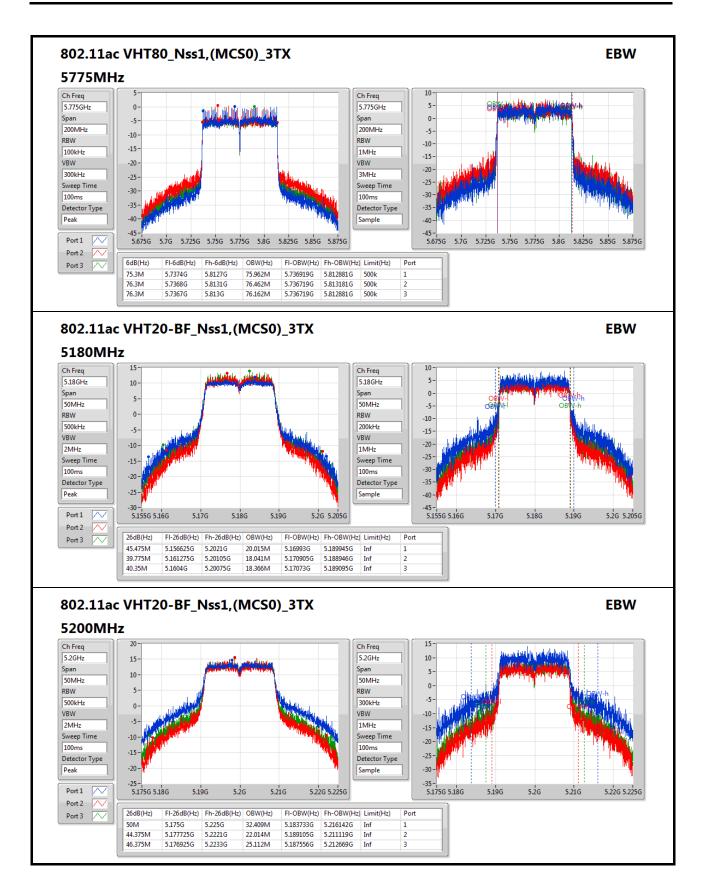


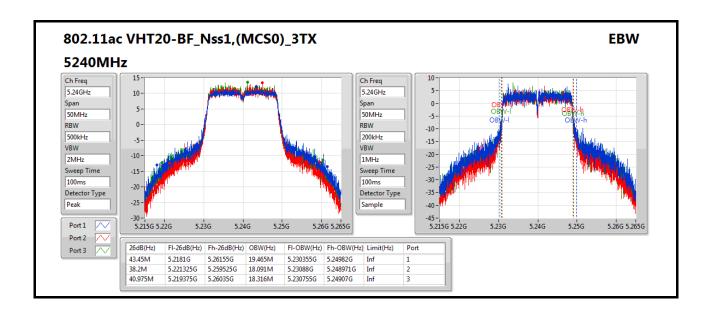
Page No. : 9 of 16



Appendix B

Page No. : 11 of 16

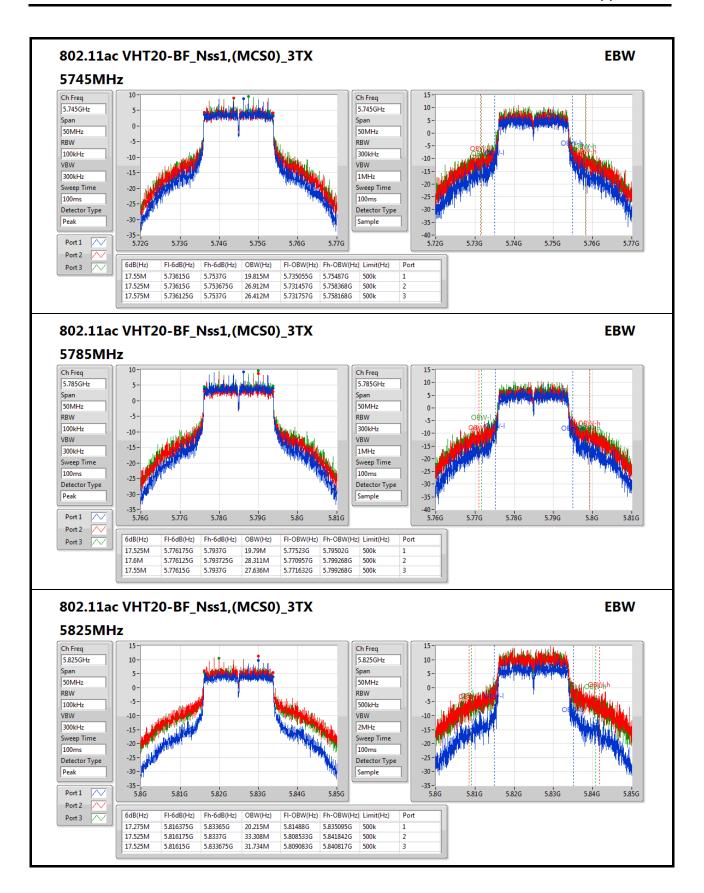




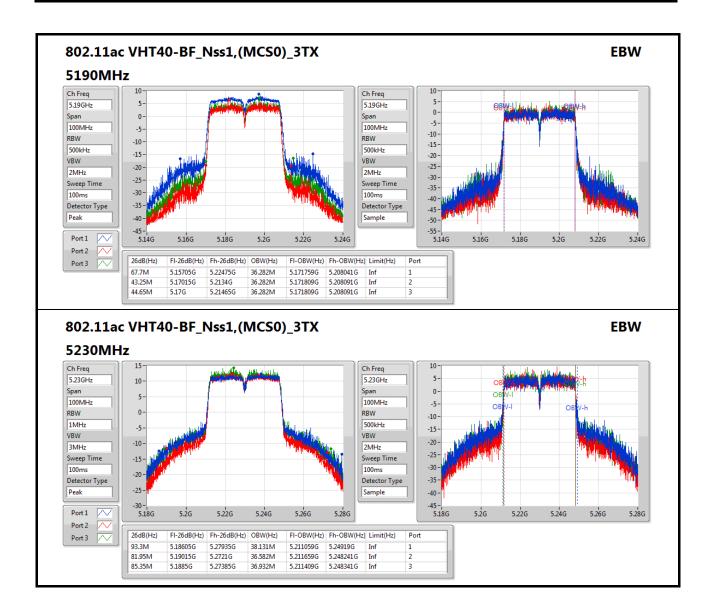
Page No. : 13 of 16



EBW Result









802.11ac VHT40-BF_Nss1,(MCS0)_3TX **EBW** 5755MHz Ch Freq Ch Freq 10-5.755GHz 5.755GHz 5-100MHz 100MHz 0--5-RBW RBW -5--10-100kHz 500kHz -10-VBW -15 VBW -15 300kHz -20 -2MHz -20 Sweep Time Sweep Time -25-100ms 100ms -30 -30 Detector Type Detector Typ -35 -Peak Sample -35 -40 -5.705G 40 -5.705G 5.76G 5.72G 5.74G 5.76G 5.78G 5.74G Port 2 6dB(Hz) FI-6dB(Hz) Fh-6dB(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) 36.3M 5.77305G 36.732M 5.736609G 5.773341G 36.3M 5 73675G 5 77305G 41 820M 5 73411G 5.77594G 5001 500k 36M 5.7368G 5.7728G 47.826M 5.731462G 5.779288G **EBW** 802.11ac VHT40-BF_Nss1,(MCS0)_3TX 5795MHz 5.795GHz 5.795GHz 15-10-0-100MHz 100MHz -5-RBW RBW 100kHz 1MHz VBW VBW 300kHz 3MHz Sweep Tim Sweep Time 100m 100ms Detector Type Detector Type -25 Peak -35-Sample 5.82G Port 1 5.745G 5.76G 5.78G 5.8G 5.82G 5.745G Port 2 6dB(Hz) FI-6dB(Hz) Fh-6dB(Hz) OBW(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) 5.813691G 35.85M 5.777G 5.81285G 37.381M 5.776309G 36.3M 5.77675G 5.81305G 52.724M 5.769413G 5.822136G 36.3M 5.77675G 5.81305G 76.312M 5.757069G 5.833381G **EBW** 802.11ac VHT80-BF_Nss1,(MCS0)_3TX 5210MHz Ch Freq 10-0-5.21 GHz 5.21 GHz -5-200MHz 200MHz -10 -RBW RBW -5--15-1MHz 1MHz -10--20 VBW VBW -15--25-3MHz 3MHz -20 --30 -Sweep Time Sweep Time -25--35 100ms 100ms -30 -40 Detector Detector Ty Peak -35 -Sample -45 -50 -5.11G 5.15G 5.175G 5.2G 5.25G 5.25G 5.275G 5.15G 5.175G 5.2G 5.25G 5.25G 5.275G 5.11G Port 2 26dB(Hz) FI-26dB(Hz) Fh-26dB(Hz) OBW(Hz) FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz) Port 3

81.3M

80.8M

5.1695G

5.1698G

5.2508G

5.2506G

74.963M

74.763M

5.172619G

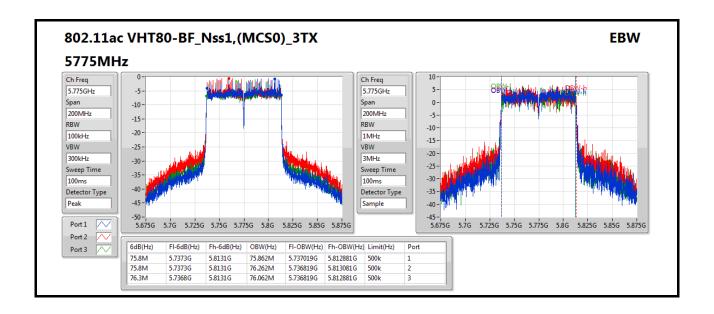
5.172519G

5.247581G

5.247281G

Inf

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





Power Result Appendix C

Summary

Mode	Total Power	Total Power	EIRP	EIRP	
	(dBm)	(W)	(dBm)	(W)	
802.11a_(6Mbps)_3TX	-	-	-	-	
5.15-5.25GHz	25.04	0.31915	30.92	1.23595	
5.725-5.85GHz	27.34	0.54200	33.22	2.09894	
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	
5.15-5.25GHz	24.72	0.29648	30.60	1.14815	
5.725-5.85GHz	27.35	0.54325	33.23	2.10378	
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	
5.15-5.25GHz	23.05	0.20184	28.93	0.78163	
5.725-5.85GHz	24.69	0.29444	30.57	1.14025	
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	
5.15-5.25GHz	18.46	0.07015	24.34	0.27164	
5.725-5.85GHz	21.77	0.15031	27.65	0.58210	
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-	-	-	-	
5.15-5.25GHz	25.14	0.32659	35.78	3.78443	
5.725-5.85GHz	25.05	0.31989	35.69	3.70681	
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-	-	-	-	
5.15-5.25GHz	23.07	0.20277	33.71	2.34963	
5.725-5.85GHz	24.65	0.29174	35.29	3.38065	
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	-	-	-	
5.15-5.25GHz	17.95	0.06237	28.59	0.72277	
5.725-5.85GHz	21.04	0.12706	31.67	1.46893	

SPORTON INTERNATIONAL INC.



Power Result Appendix C

Result

Mode	Result	DG	Port 1	Port 2	Port 3	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11a_(6Mbps)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	5.88	17.02	16.96	17.31	21.87	30.00
5200MHz	Pass	5.88	20.24	19.98	20.56	25.04	30.00
5240MHz	Pass	5.88	17.71	17.71	18.09	22.61	30.00
5745MHz	Pass	5.88	22.57	21.61	22.21	26.92	30.00
5785MHz	Pass	5.88	22.99	21.30	21.82	26.87	30.00
5825MHz	Pass	5.88	23.28	21.95	22.36	27.34	30.00
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	5.88	16.28	16.20	16.52	21.11	30.00
5200MHz	Pass	5.88	20.14	19.60	20.10	24.72	30.00
5240MHz	Pass	5.88	18.32	17.75	18.19	22.86	30.00
5745MHz	Pass	5.88	22.91	21.72	22.32	27.11	30.00
5785MHz	Pass	5.88	23.13	21.42	22.03	27.02	30.00
5825MHz	Pass	5.88	23.30	21.88	22.43	27.35	30.00
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5190MHz	Pass	5.88	13.02	12.77	13.57	17.90	30.00
5230MHz	Pass	5.88	18.28	17.88	18.63	23.05	30.00
5755MHz	Pass	5.88	19.33	19.16	20.44	24.45	30.00
5795MHz	Pass	5.88	19.75	19.23	20.66	24.69	30.00
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5210MHz	Pass	5.88	13.77	14.04	13.21	18.46	30.00
5775MHz	Pass	5.88	17.02	17.04	16.95	21.77	30.00
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	10.64	18.25	18.09	18.65	23.11	25.36
5200MHz	Pass	10.64	20.74	19.96	20.37	25.14	25.36
5240MHz	Pass	10.64	18.26	17.58	18.30	22.83	25.36
5745MHz	Pass	10.64	19.79	20.26	20.74	25.05	25.36
5785MHz	Pass	10.64	20.30	19.52	20.14	24.77	25.36
5825MHz	Pass	10.64	20.00	19.86	20.22	24.80	25.36
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5190MHz	Pass	10.64	13.74	13.32	14.34	18.59	25.36
5230MHz	Pass	10.64	18.26	17.91	18.69	23.07	25.36
5755MHz	Pass	10.64	18.82	18.54	19.76	23.84	25.36
5795MHz	Pass	10.64	19.78	19.30	20.48	24.65	25.36
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5210MHz	Pass	10.64	13.26	13.49	12.75	17.95	25.36
5775MHz	Pass	10.64	16.27	16.26	16.27	21.04	25.36

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)_3TX	-	-		
5.15-5.25GHz	12.29	22.93		
5.725-5.85GHz	12.81	23.45		
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-		
5.15-5.25GHz	11.68	22.32		
5.725-5.85GHz	12.41	23.05		
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-		
5.15-5.25GHz	7.28	17.92		
5.725-5.85GHz	7.56	18.20		
802.11ac VHT80_Nss1,(MCS0)_3TX	-	-		
5.15-5.25GHz	1.01	11.65		
5.725-5.85GHz	2.46	13.10		
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-	-		
5.15-5.25GHz	12.02	22.66		
5.725-5.85GHz	11.03	21.67		
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-	-		
5.15-5.25GHz	7.24	17.87		
5.725-5.85GHz	8.25	18.89		
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	-		
5.15-5.25GHz	0.30	10.94		
5.725-5.85GHz	1.03	11.67		

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

SPORTON INTERNATIONAL INC.



Appendix D **PSD Result**

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_(6Mbps)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	10.64	4.61	4.47	5.00	9.38	12.36
5200MHz	Pass	10.64	7.61	7.33	8.01	12.29	12.36
5240MHz	Pass	10.64	5.71	5.24	5.80	10.28	12.36
5745MHz	Pass	10.64	8.51	7.33	8.14	12.57	25.36
5785MHz	Pass	10.64	8.79	7.13	7.95	12.65	25.36
5825MHz	Pass	10.64	8.82	7.43	7.98	12.81	25.36
802.11ac VHT20_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	10.64	3.36	3.36	3.80	8.24	12.36
5200MHz	Pass	10.64	7.14	6.67	7.15	11.68	12.36
5240MHz	Pass	10.64	5.32	4.79	5.16	9.77	12.36
5745MHz	Pass	10.64	8.12	7.00	7.57	12.21	25.36
5785MHz	Pass	10.64	8.41	6.70	7.33	12.23	25.36
5825MHz	Pass	10.64	8.43	7.04	7.59	12.41	25.36
802.11ac VHT40_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5190MHz	Pass	10.64	-2.60	-2.78	-2.07	2.24	12.36
5230MHz	Pass	10.64	2.65	2.23	3.02	7.28	12.36
5755MHz	Pass	10.64	2.30	2.19	3.44	7.33	25.36
5795MHz	Pass	10.64	2.80	2.11	3.54	7.56	25.36
802.11ac VHT80_Nss1,(MCS0)_3TX	-	1	-	-	1	-	-
5210MHz	Pass	10.64	-3.70	-3.27	-4.08	1.01	12.36
5775MHz	Pass	10.64	-2.43	-2.82	-2.87	1.83	25.36
802.11ac VHT20-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5180MHz	Pass	10.64	5.13	5.27	5.63	10.06	12.36
5200MHz	Pass	10.64	7.68	6.93	7.27	12.02	12.36
5240MHz	Pass	10.64	5.55	4.83	5.33	9.90	12.36
5745MHz	Pass	10.64	5.30	5.50	6.10	10.28	25.36
5785MHz	Pass	10.64	5.68	5.04	5.86	10.26	25.36
5825MHz	Pass	10.64	5.78	6.47	6.84	11.03	25.36
802.11ac VHT40-BF_Nss1,(MCS0)_3TX	-	-	-	-	1	-	-
5190MHz	Pass	10.64	-1.91	-2.21	-1.45	2.87	12.36
5230MHz	Pass	10.64	2.62	2.15	2.88	7.24	12.36
5755MHz	Pass	10.64	1.71	1.69	2.78	6.63	25.36
5795MHz	Pass	10.64	2.79	2.39	5.04	8.25	25.36
802.11ac VHT80-BF_Nss1,(MCS0)_3TX	-	-	-	-	-	-	-
5210MHz	Pass	10.64	-4.51	-3.92	-4.78	0.30	12.36
5775MHz	Pass	10.64	-3.45	-3.65	-3.79	1.03	25.36

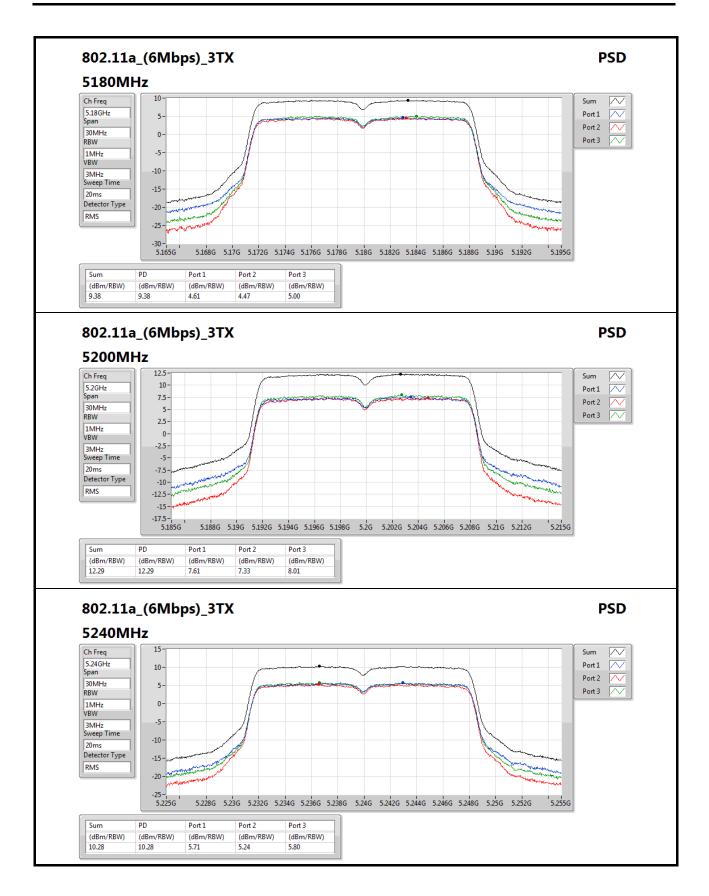
DG = Directional Gain; RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X power density;

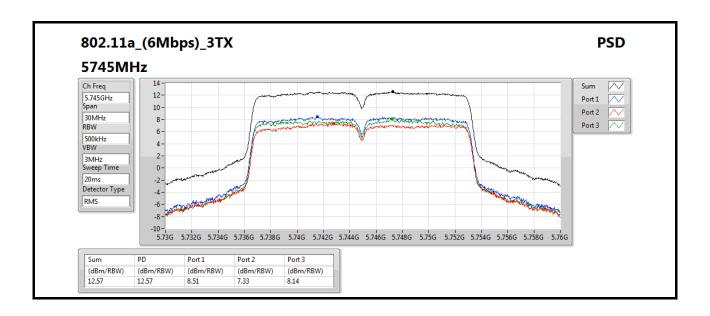
SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-327-0973 Page No. : 2 of 16

Page No. : 3 of 16

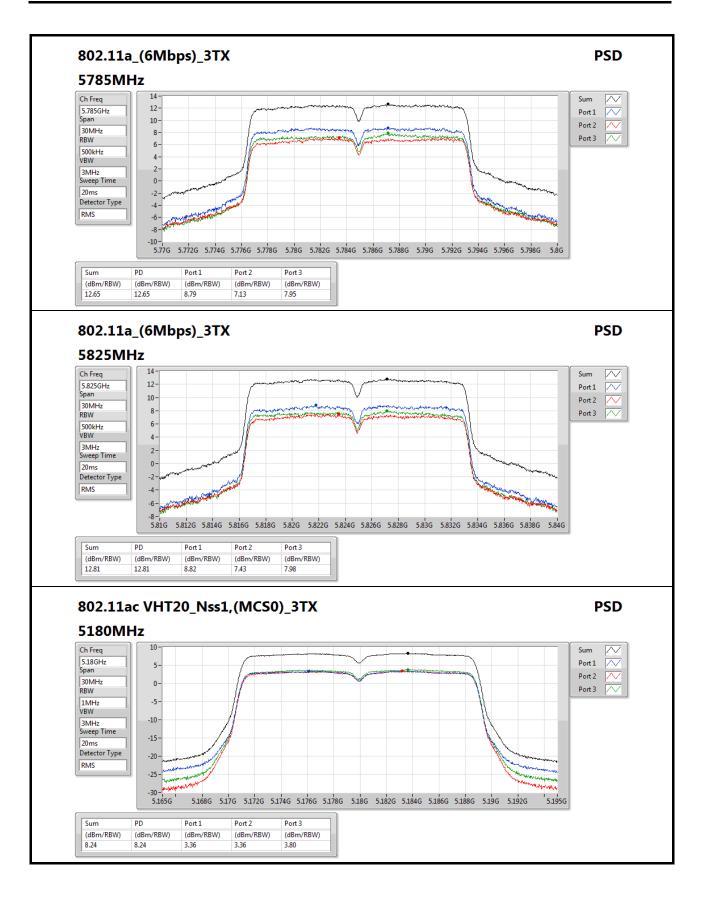






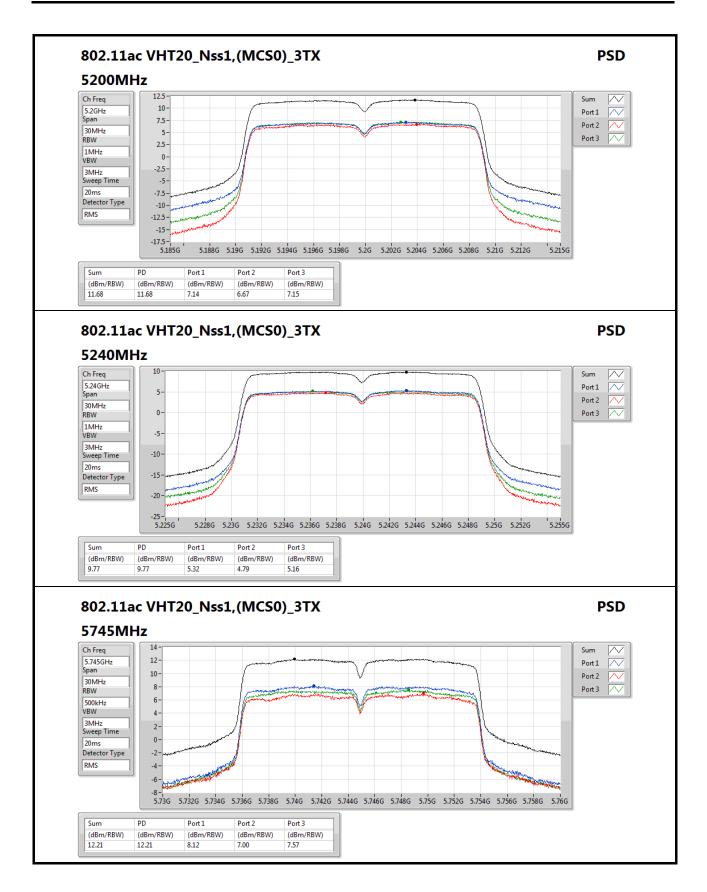
Page No. : 5 of 16



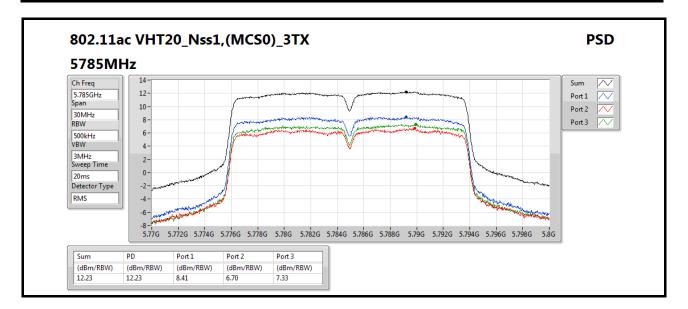


Page No. : 6 of 16





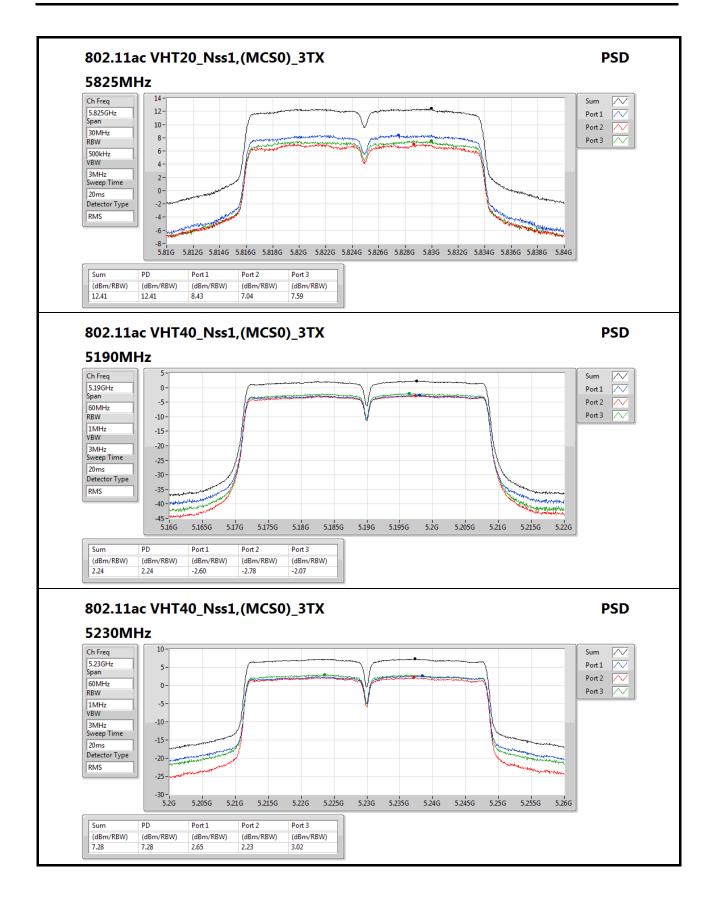
PSD Result Appendix D



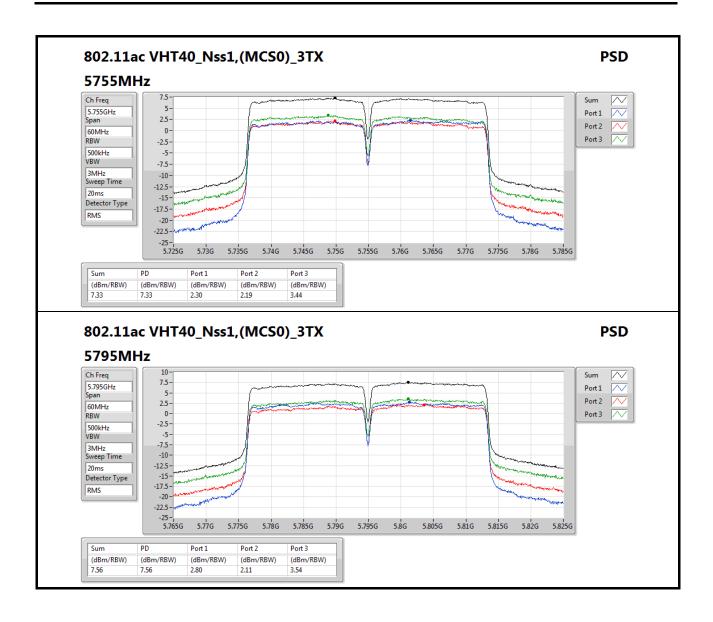
Appendix D

Page No. : 8 of 16



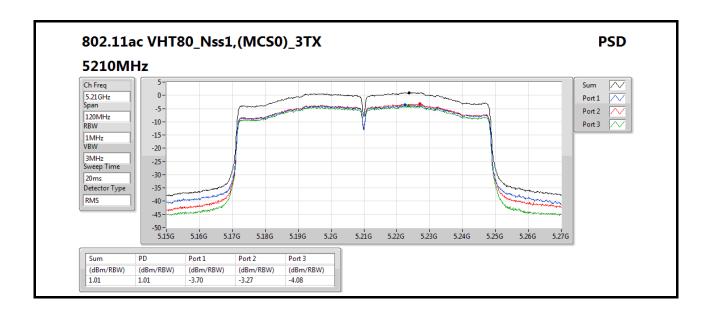






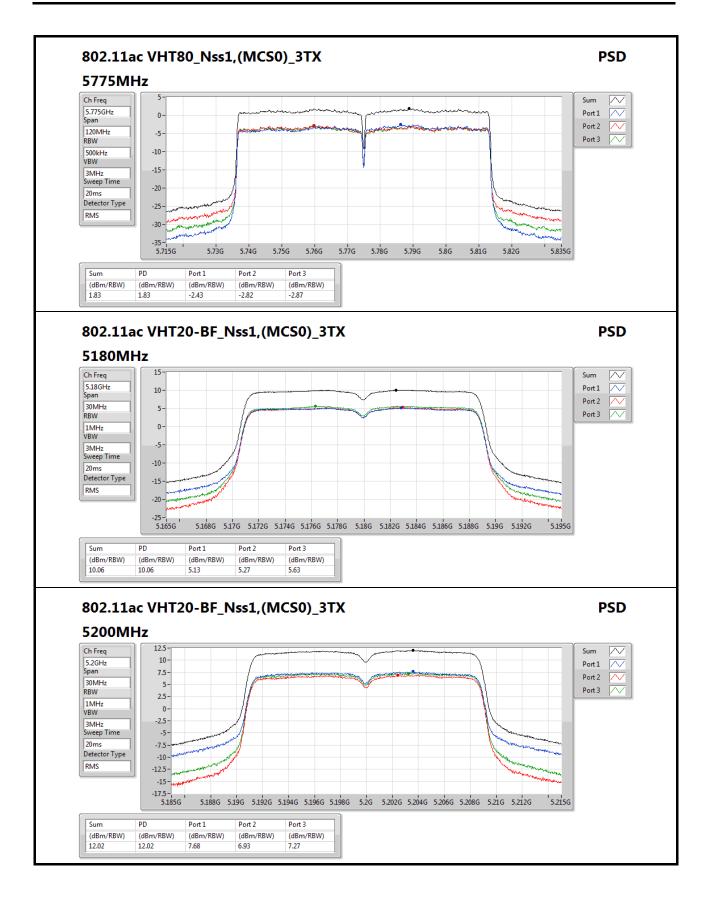
Appendix D

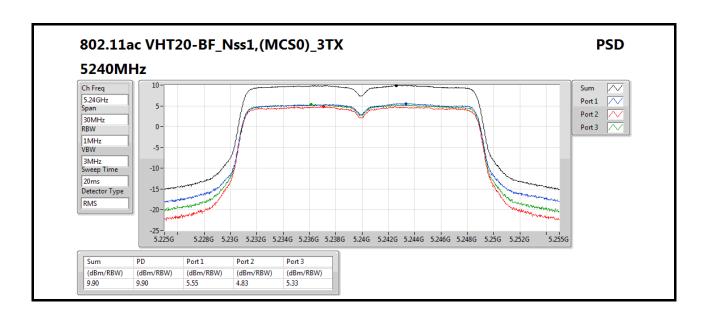




Appendix D

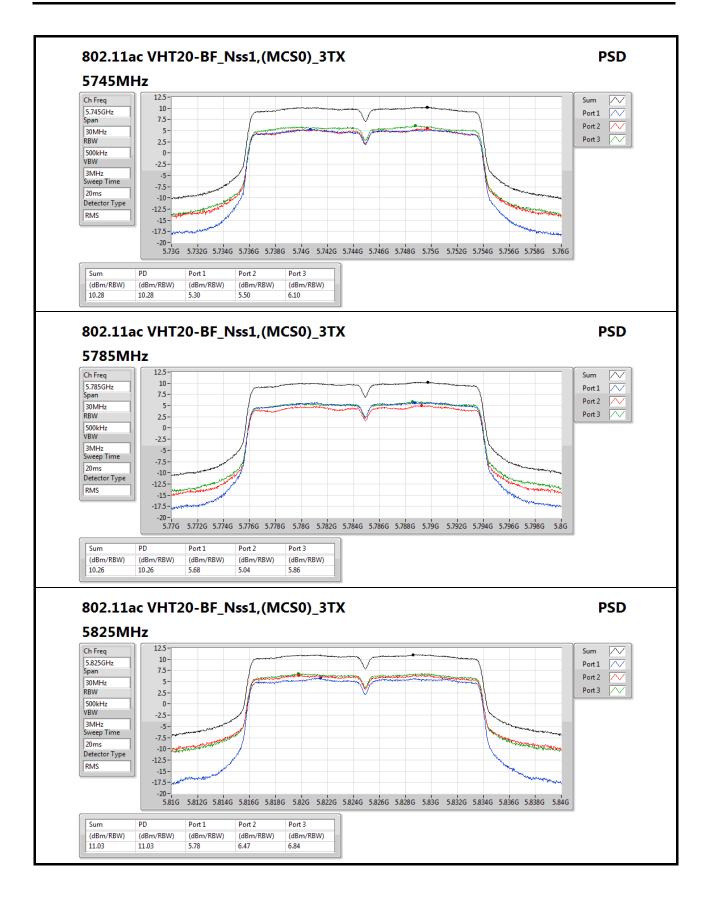






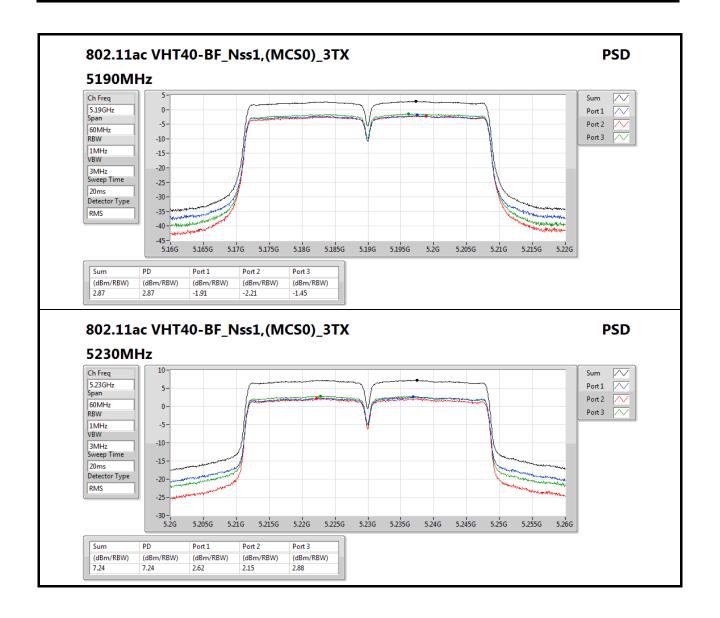
Appendix D



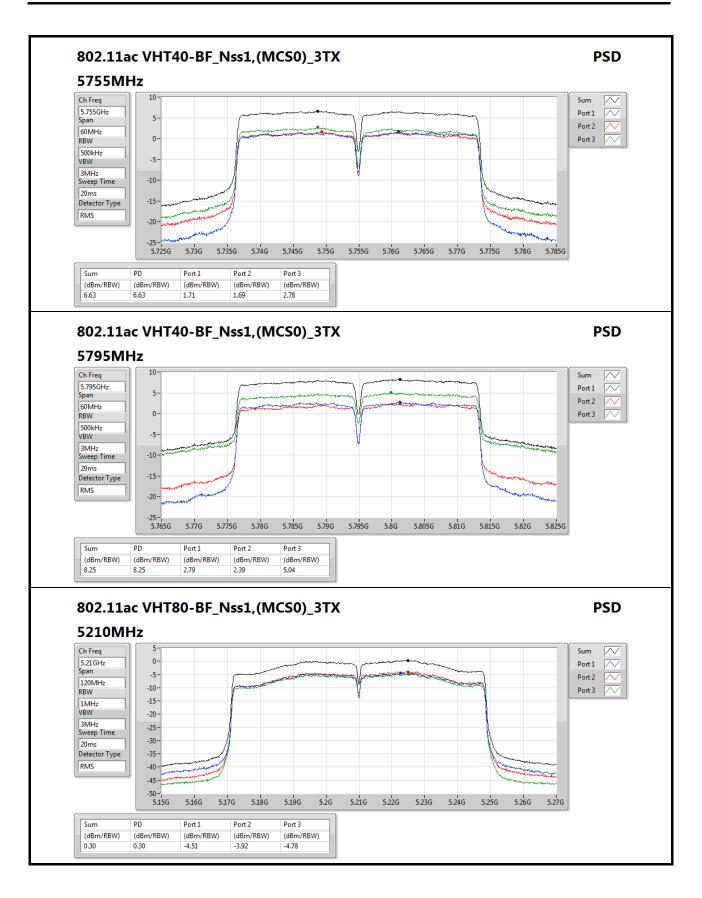


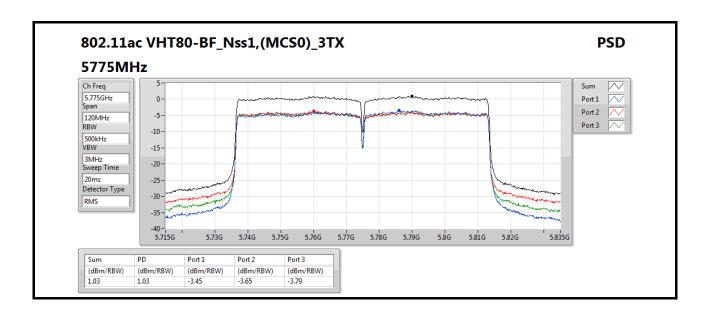
Page No. : 14 of 16



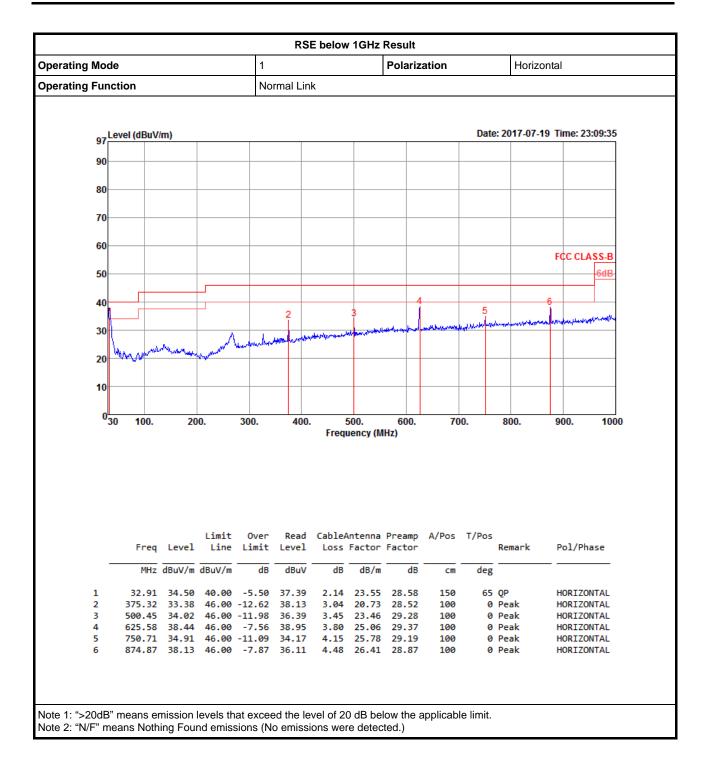






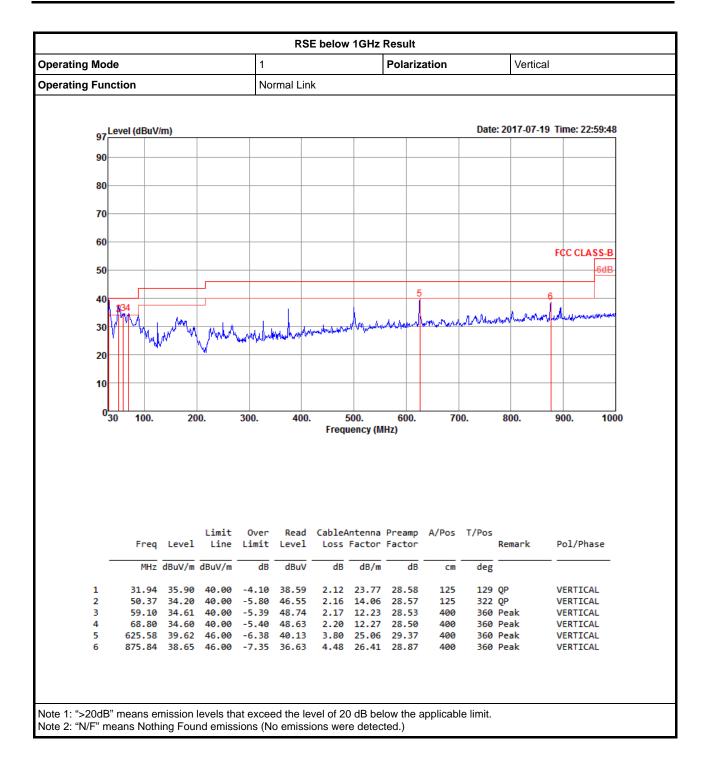






SPORTON INTERNATIONAL INC. Page No. : 1 of 2





SPORTON INTERNATIONAL INC. Page No. : 2 of 2



RSE TX above 1GHz Result

Appendix E.2

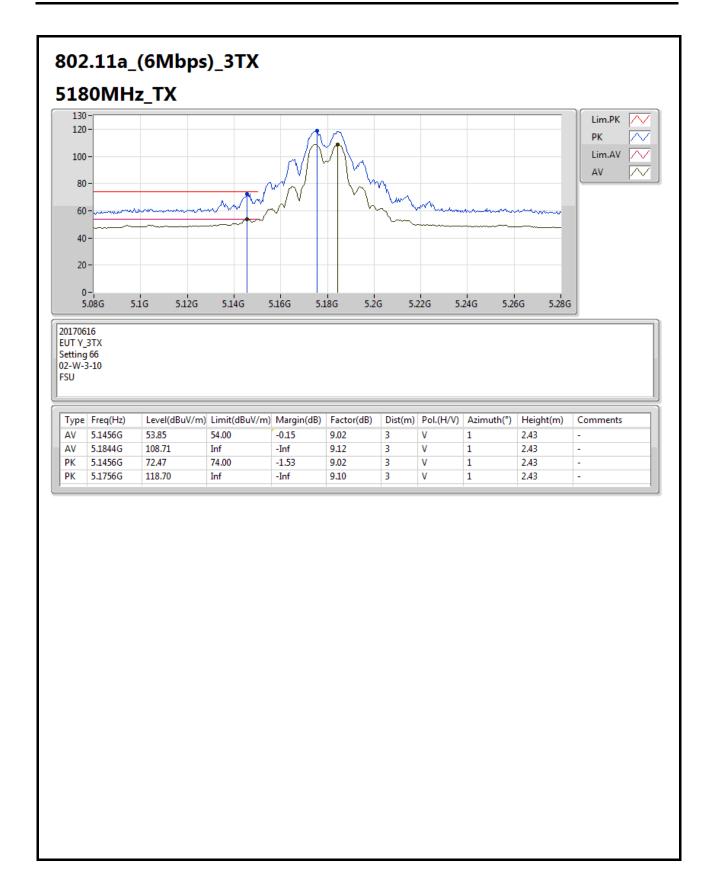
Summary

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)_3TX	-	-	-	-	- (ubuviii)	- -	-	-	-	-	-	-
5.725-5.85GHz	Pass	PK	5.9362G	68.19	68.20	-0.01	8.85	3	V	342	1.56	-

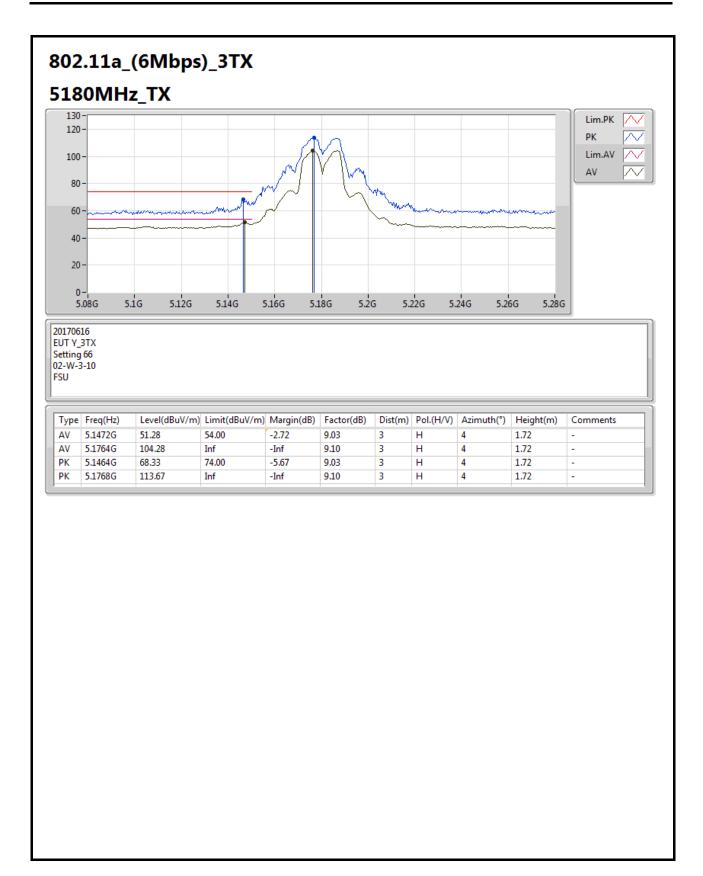
SPORTON INTERNATIONAL INC. Page No. : 1 of 121

Page No. : 2 of 121

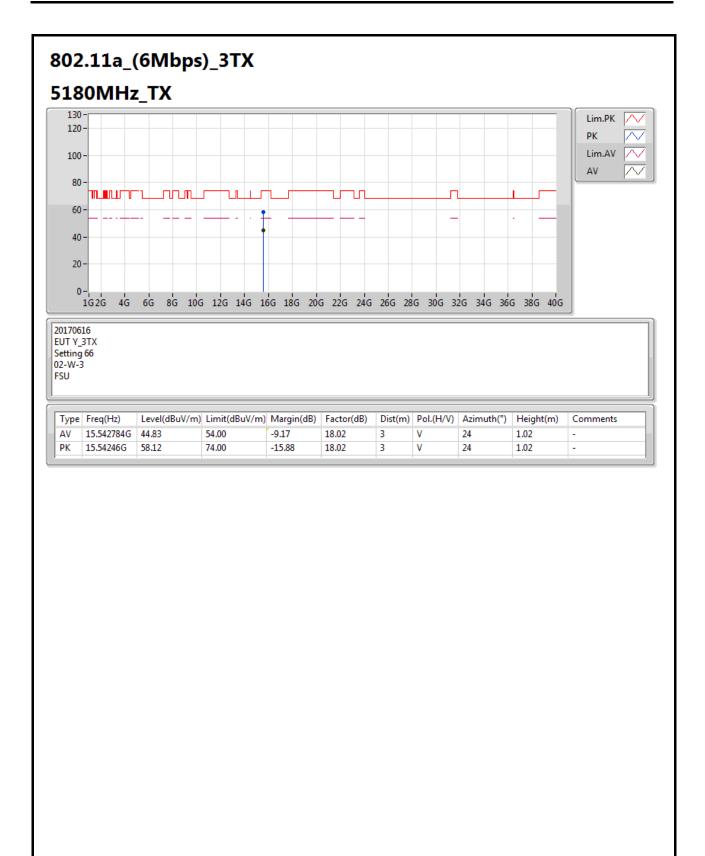




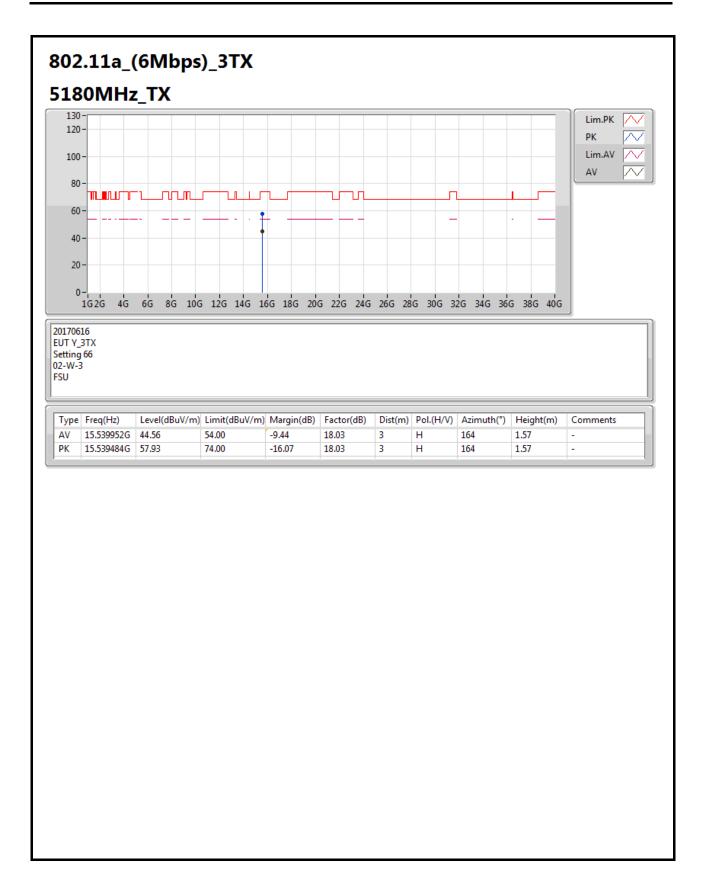






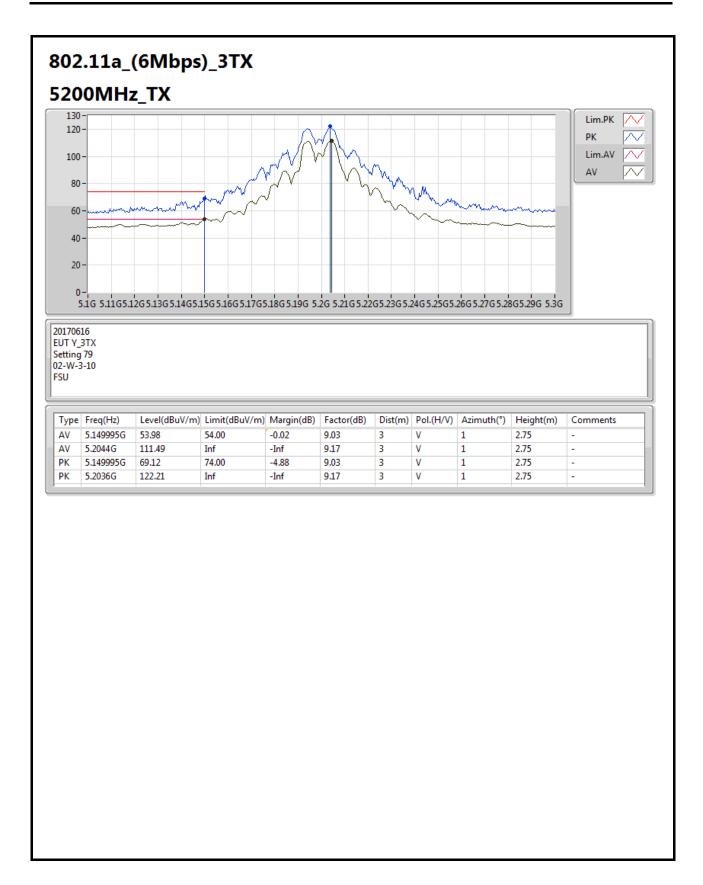






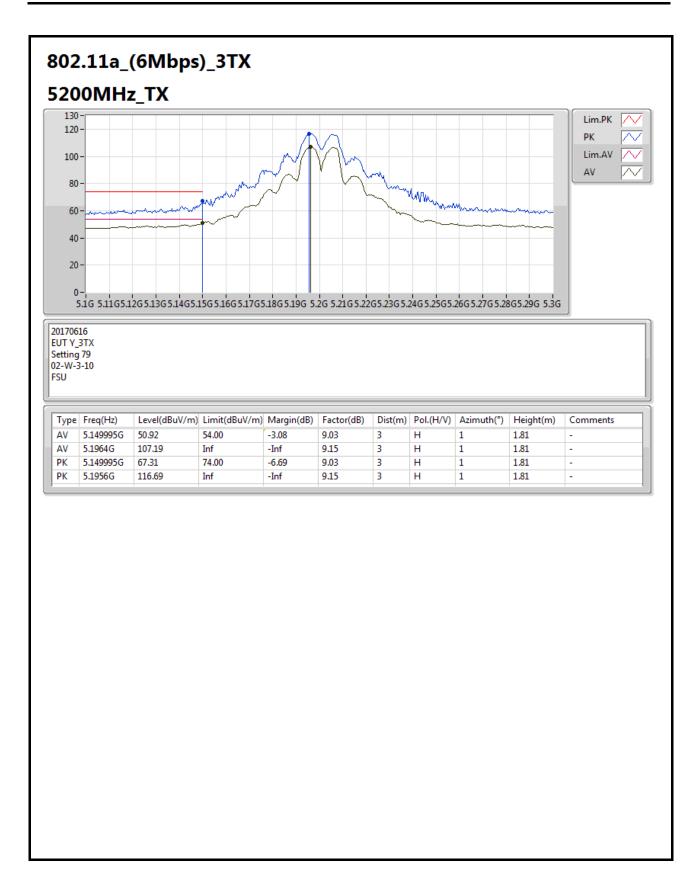
Page No. : 6 of 121





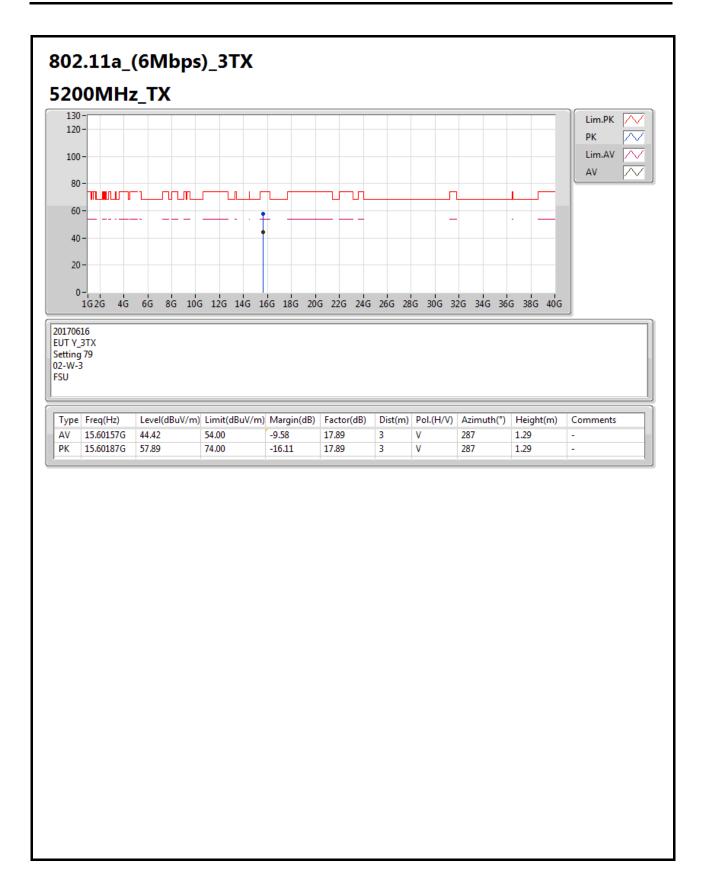
Page No. : 7 of 121



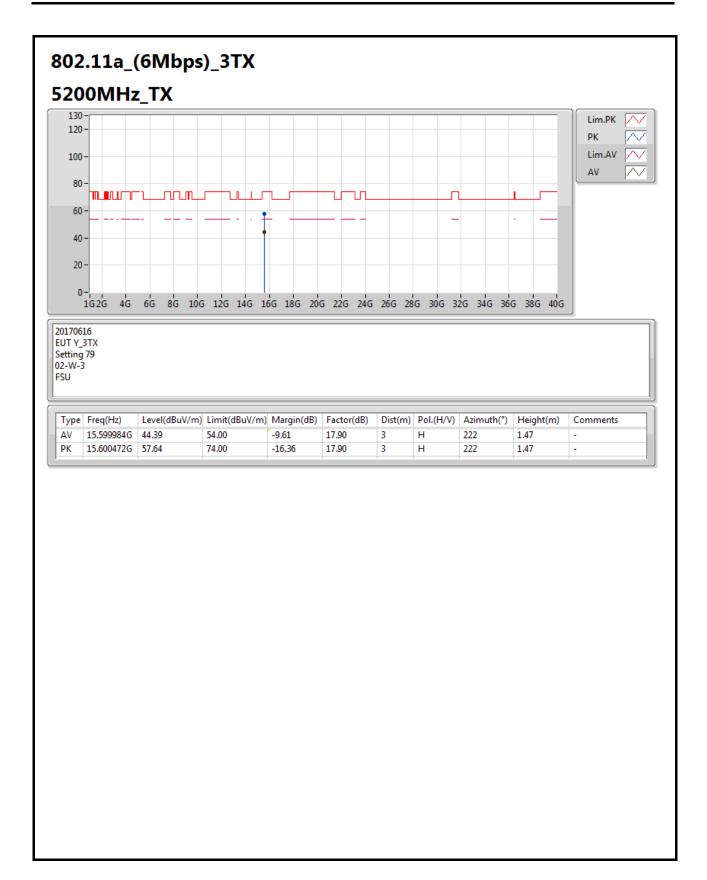


Page No. : 8 of 121



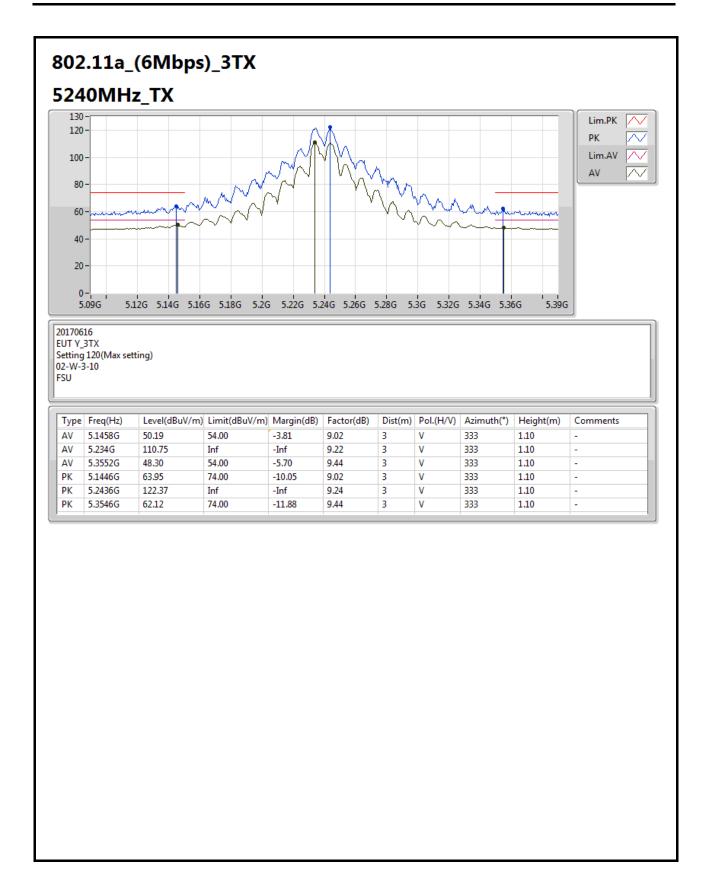




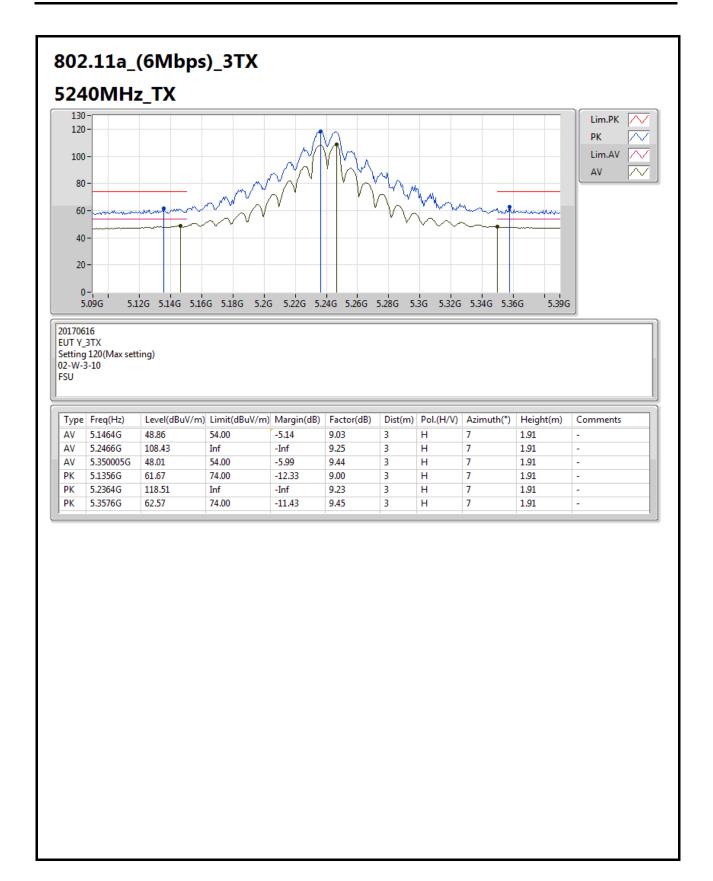


Page No. : 10 of 121

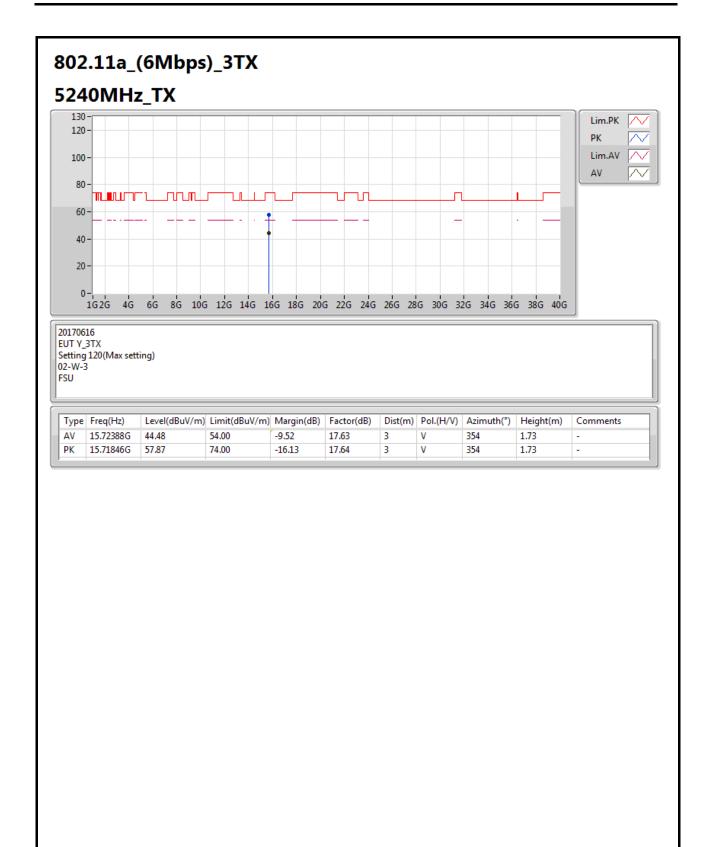




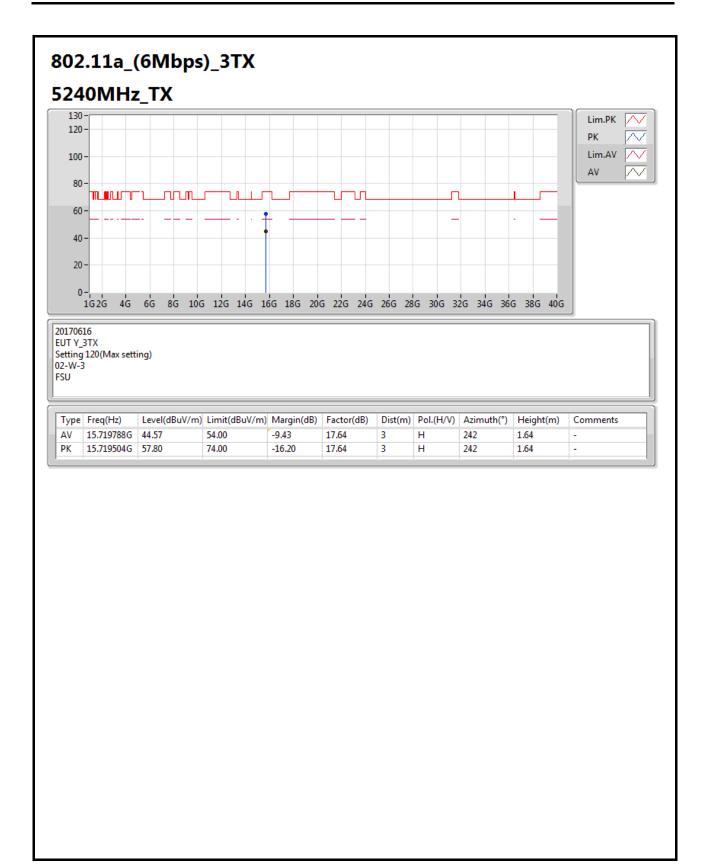






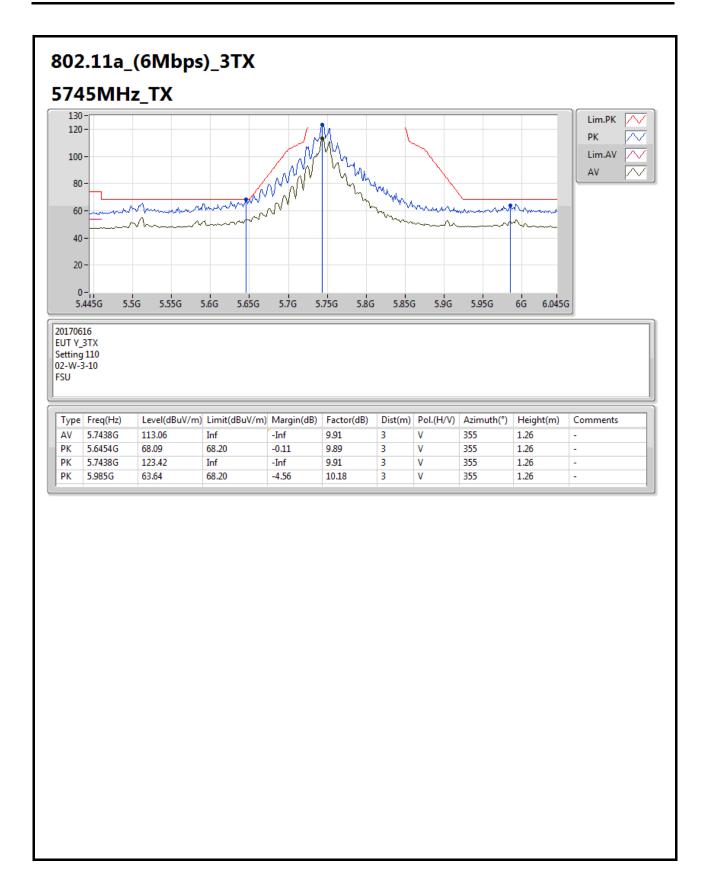






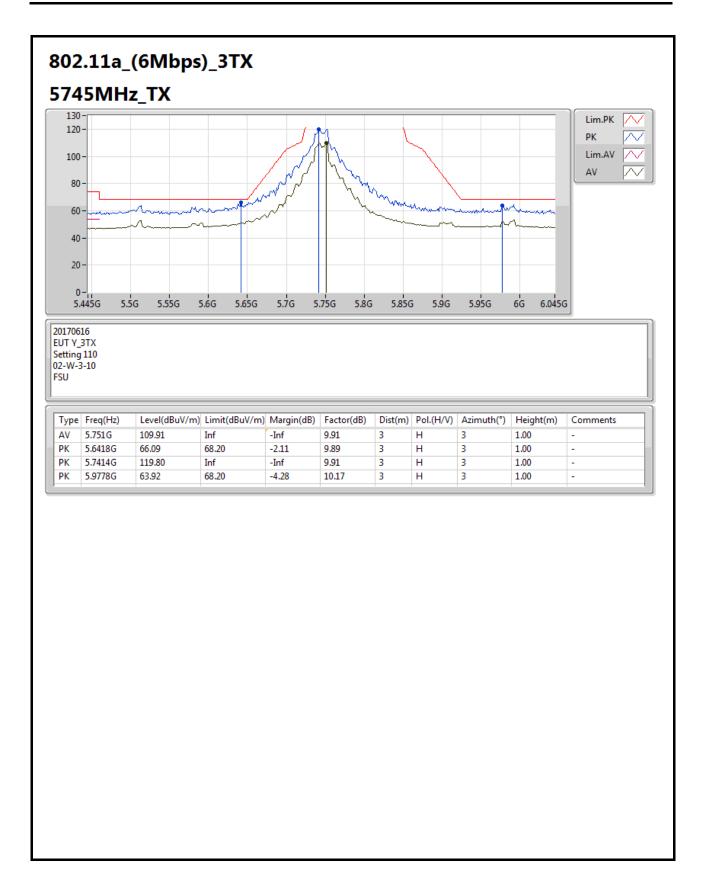
Page No. : 14 of 121



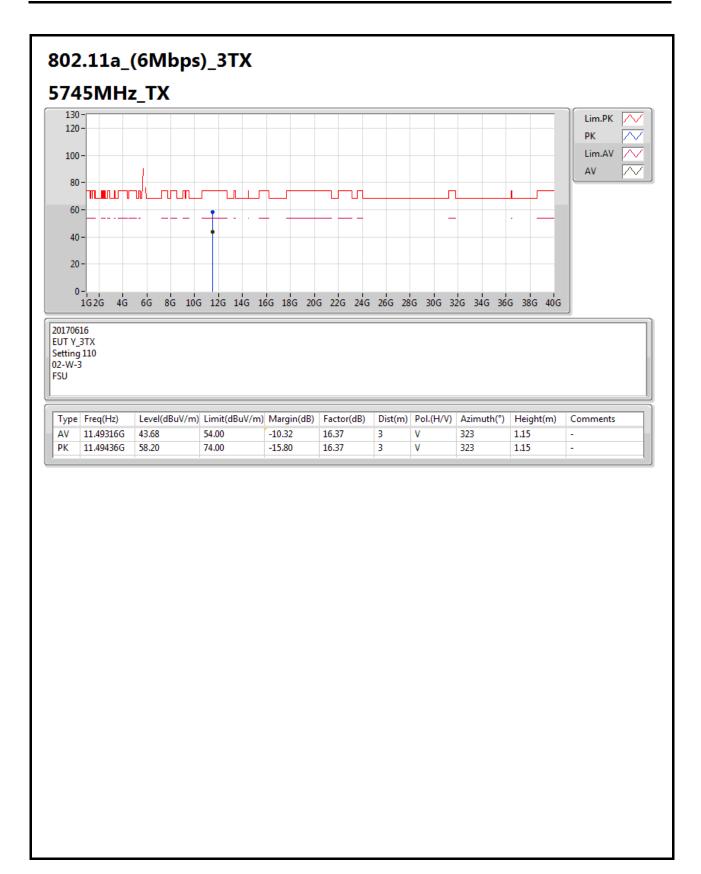


Page No. : 15 of 121

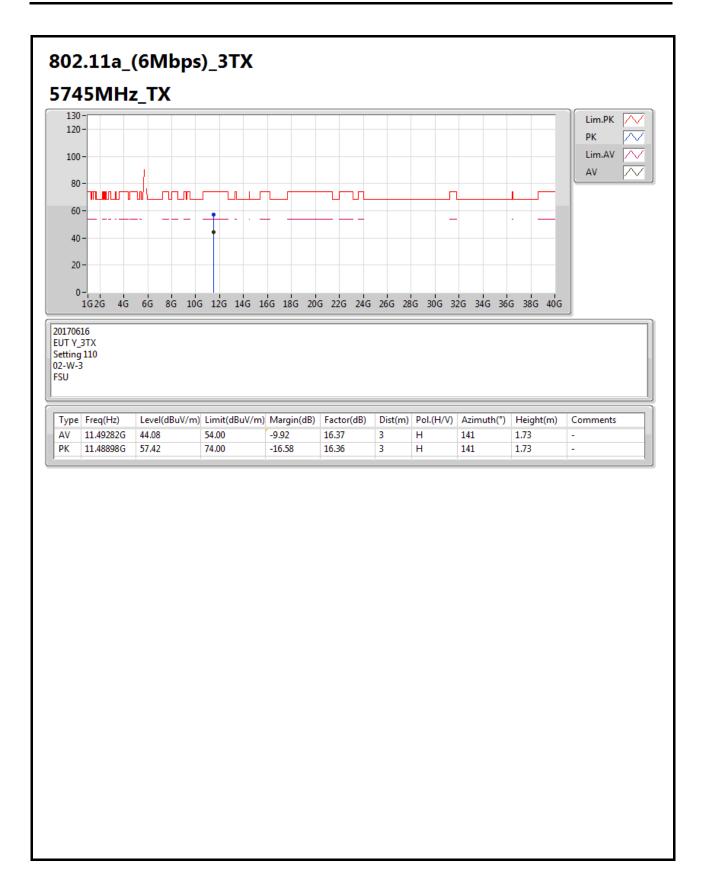




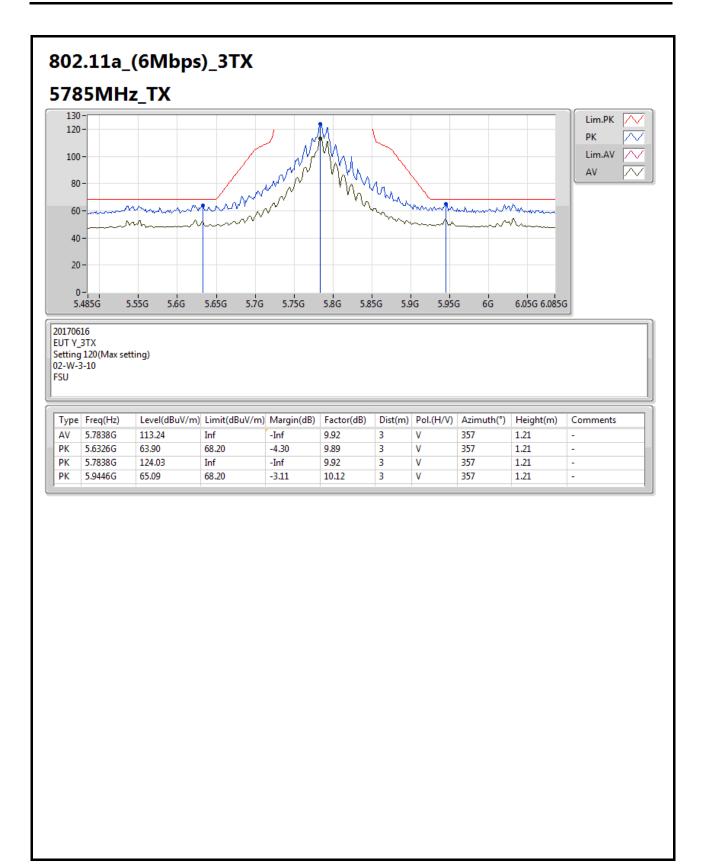




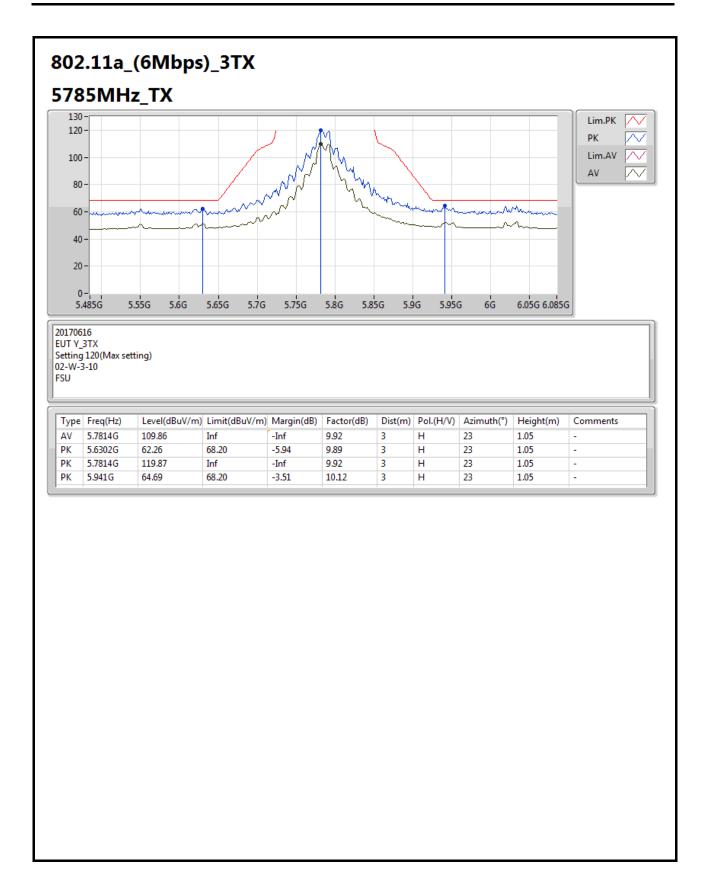




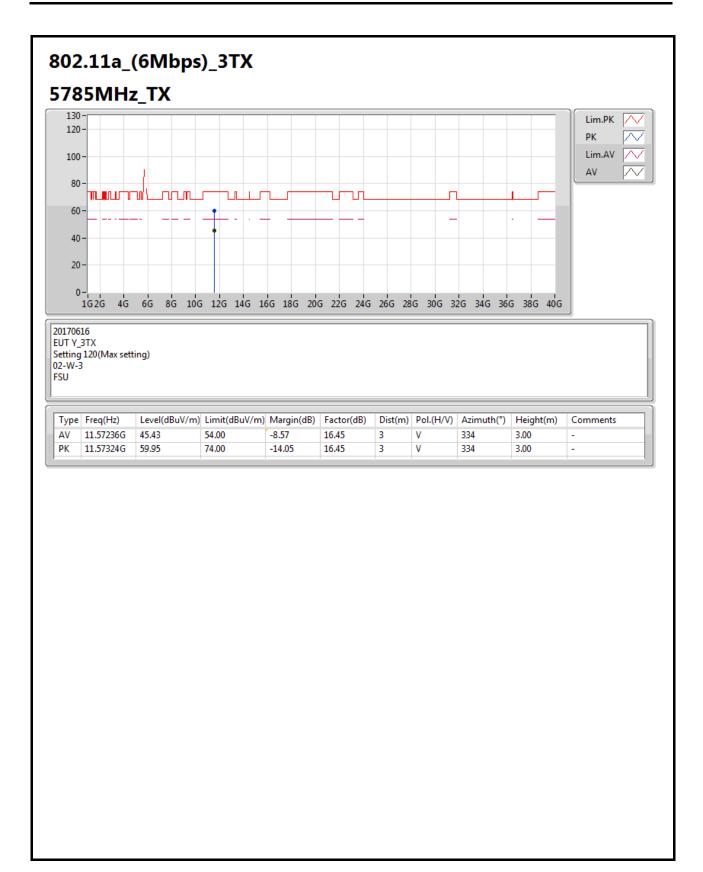




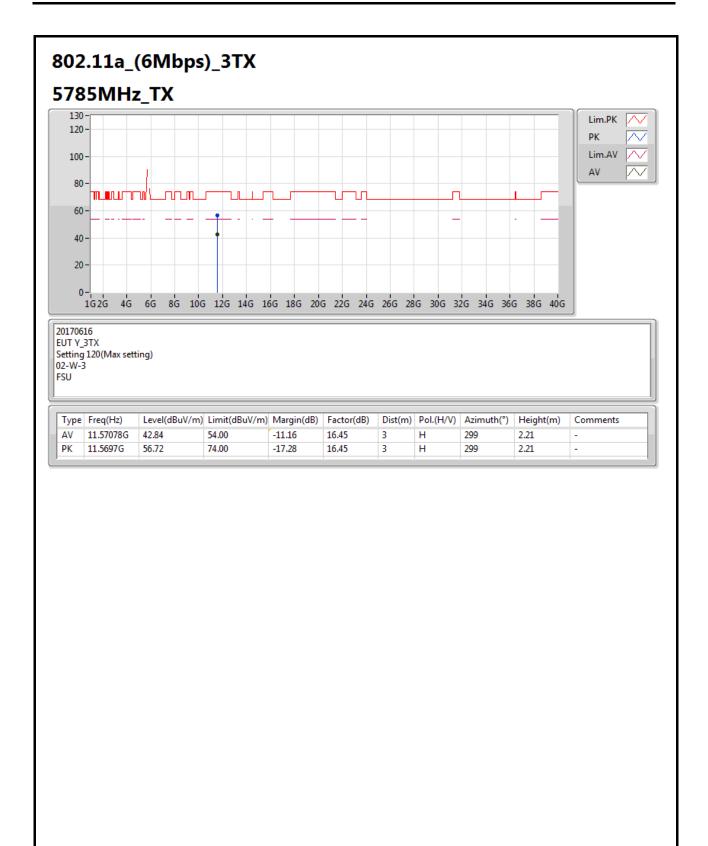




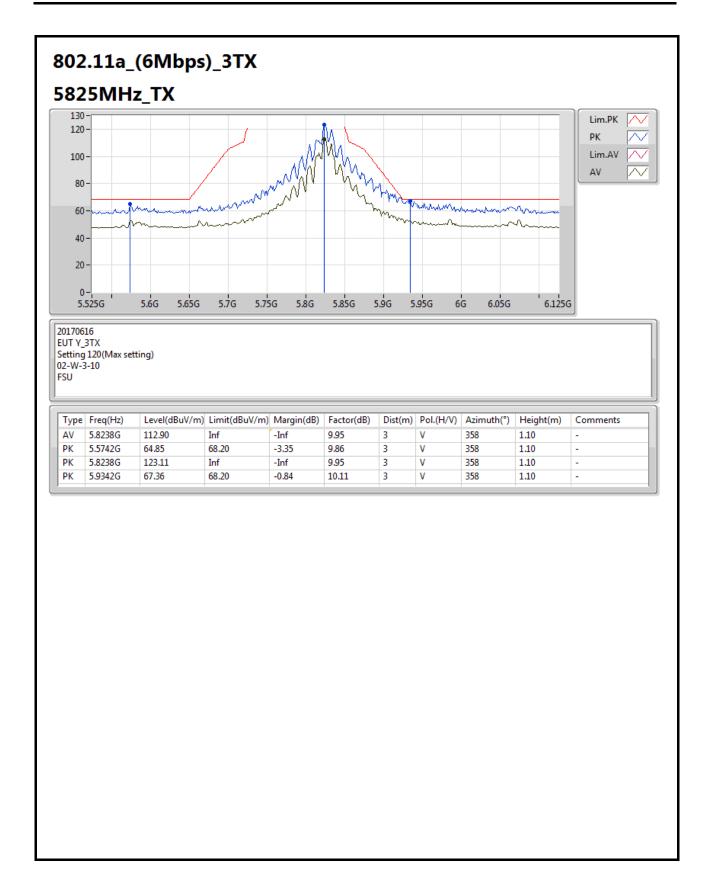




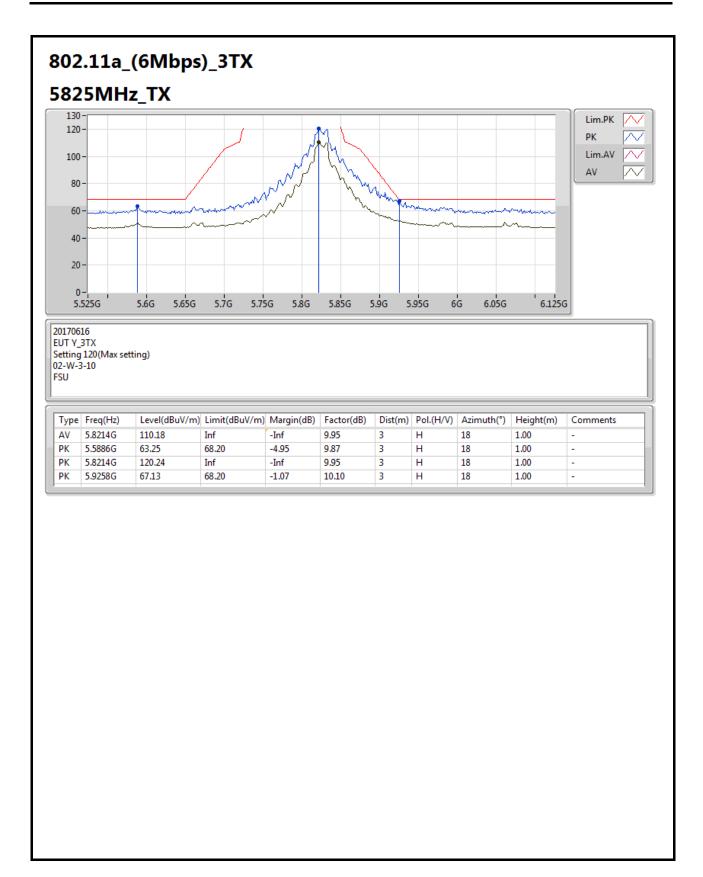




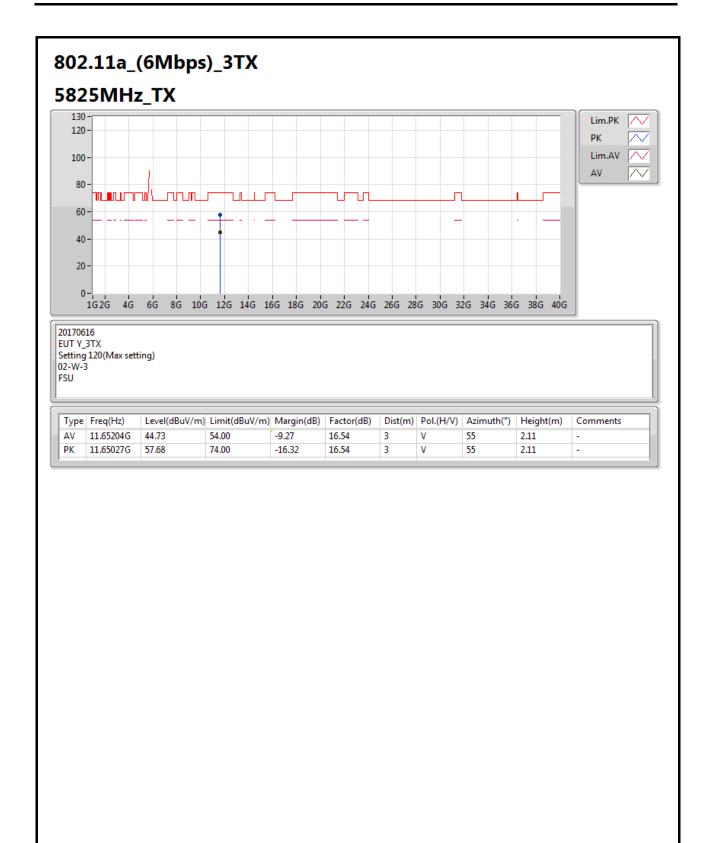




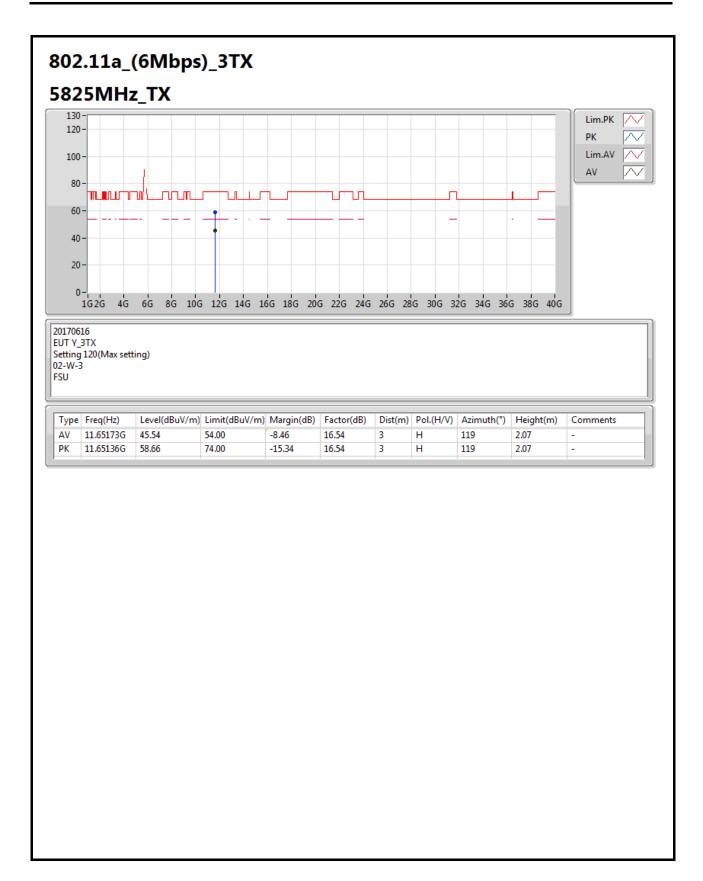






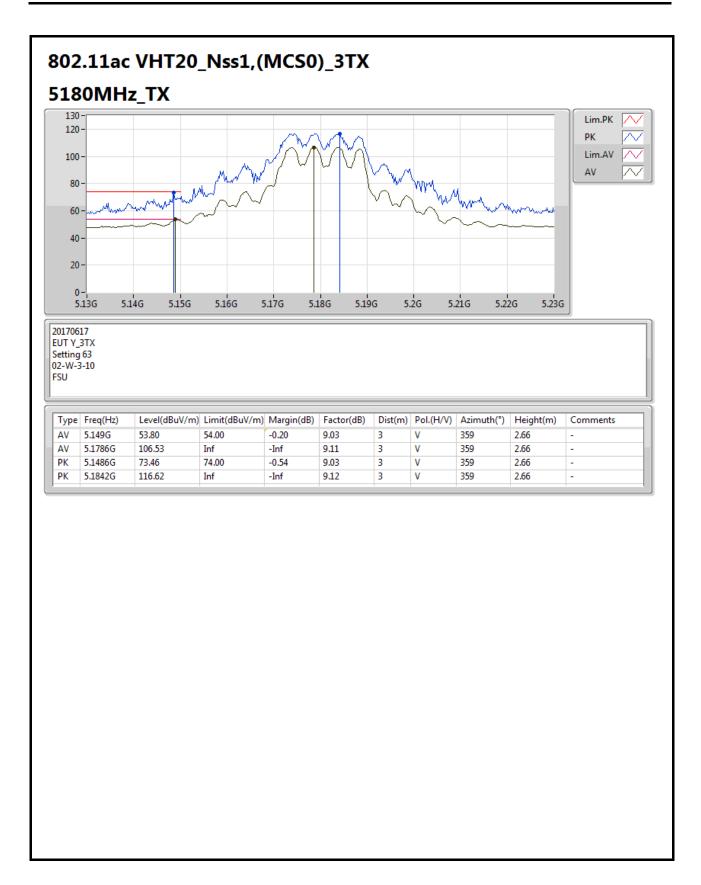






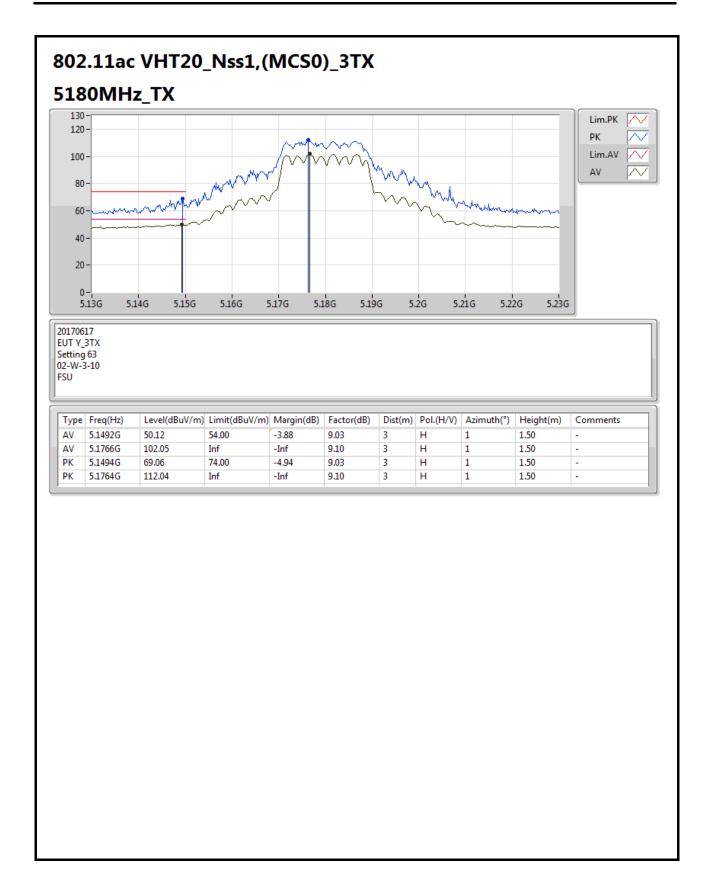
Page No. : 26 of 121



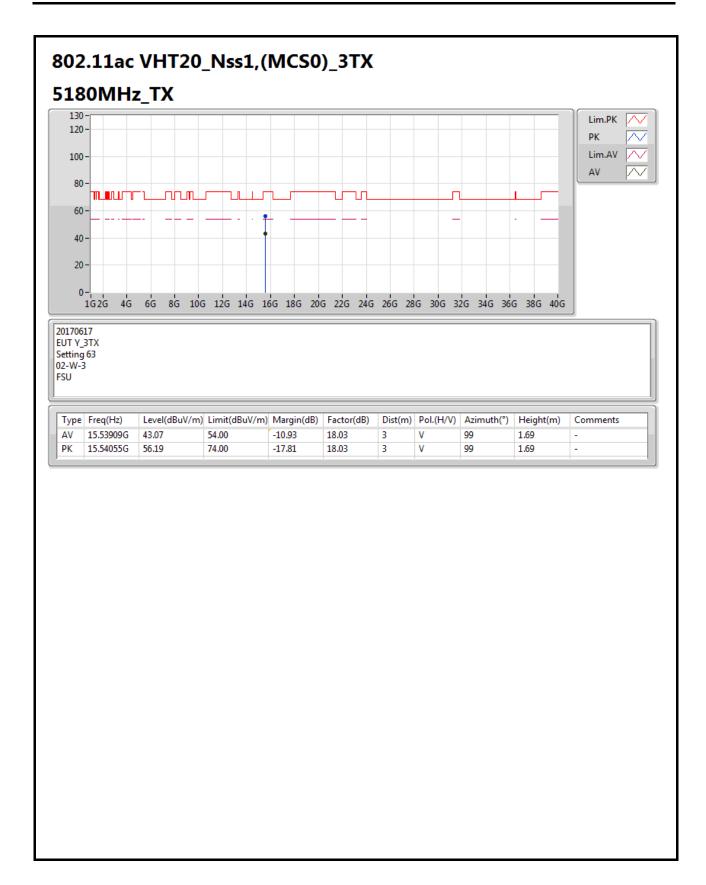


Page No. : 27 of 121

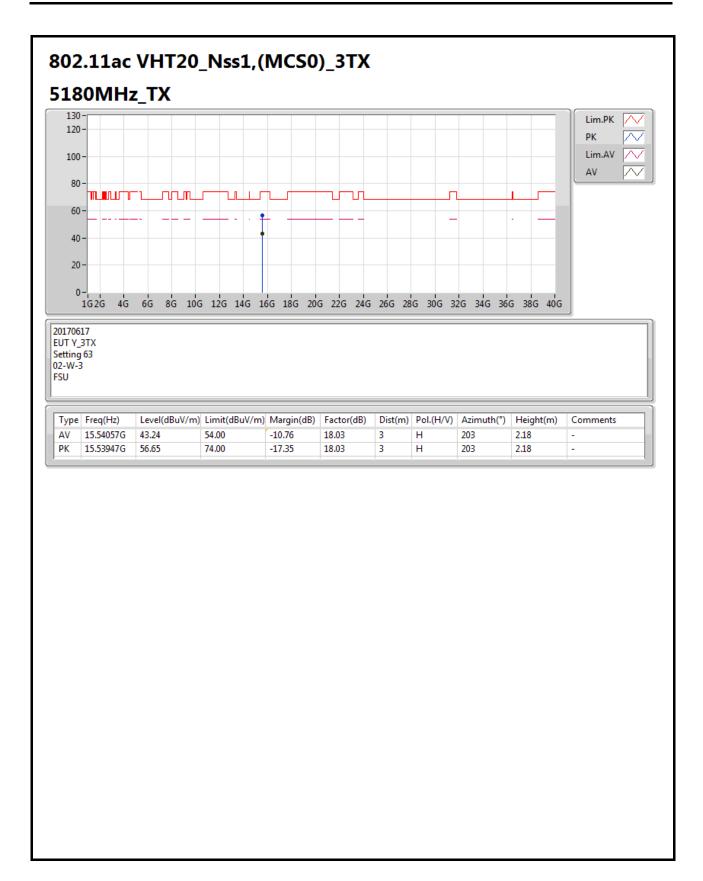




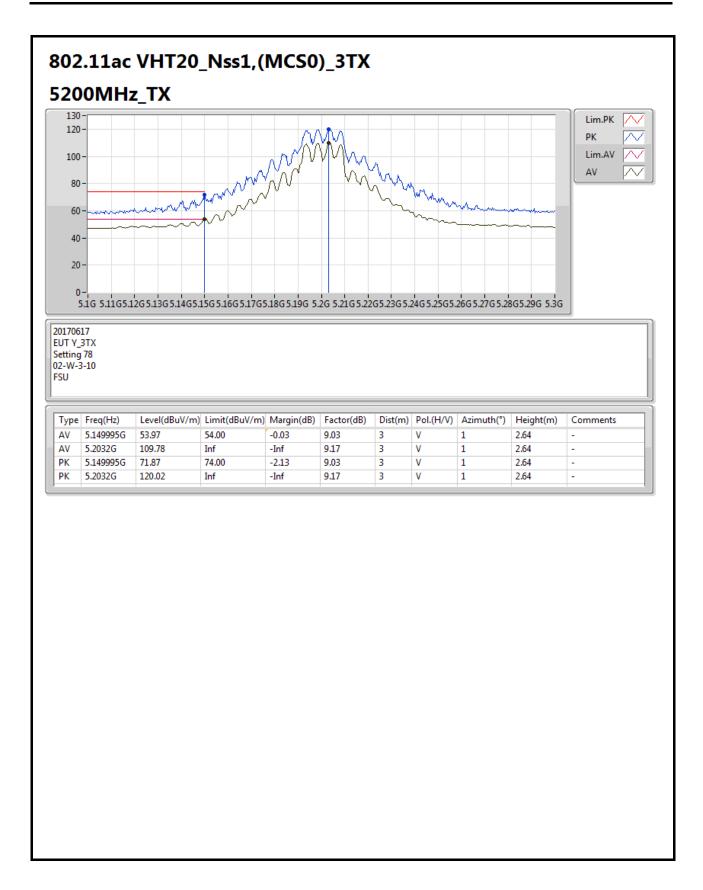






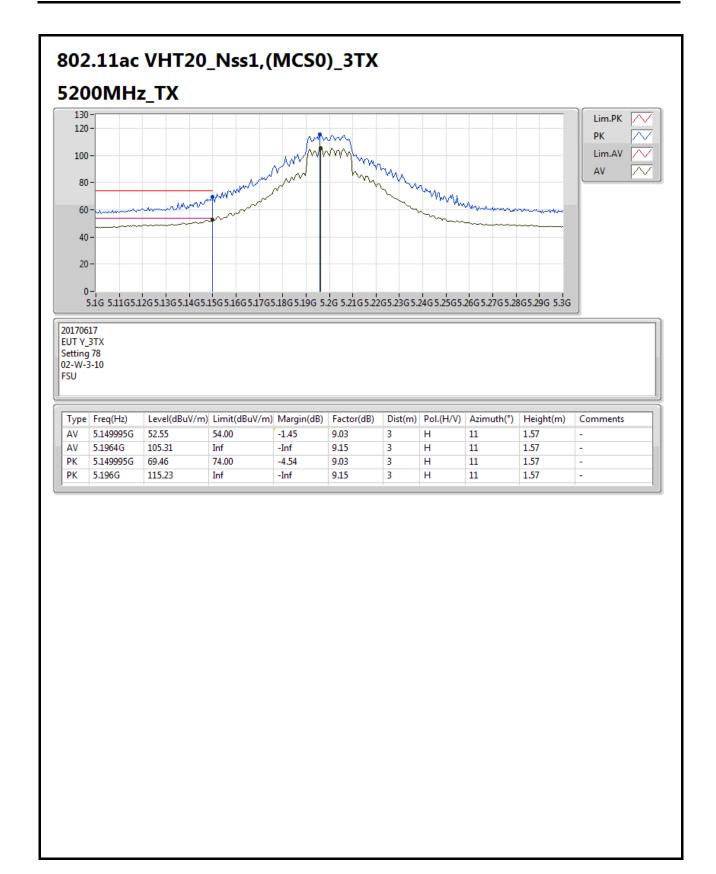






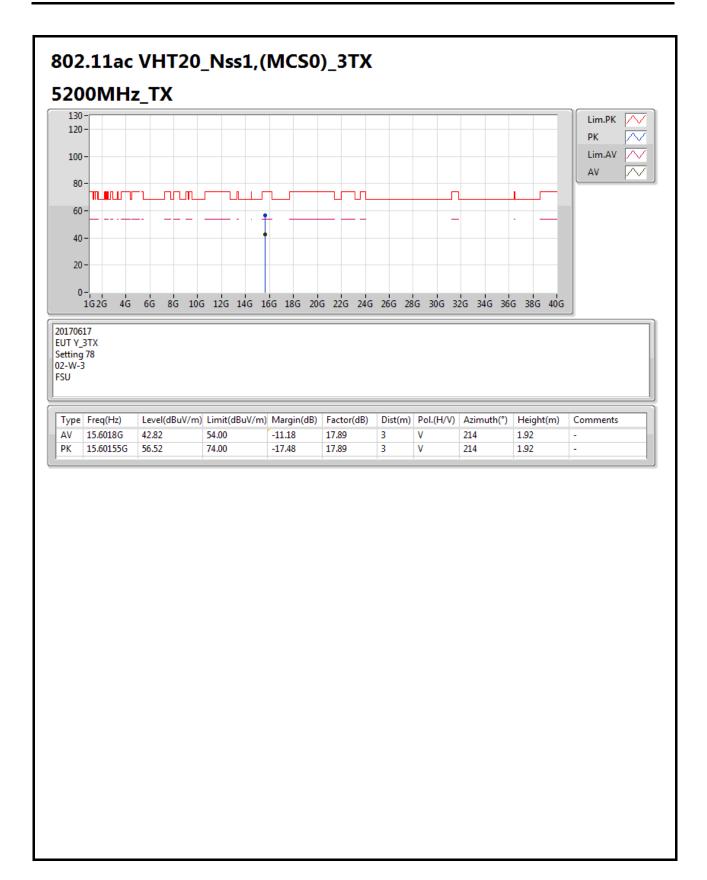
Page No. : 31 of 121



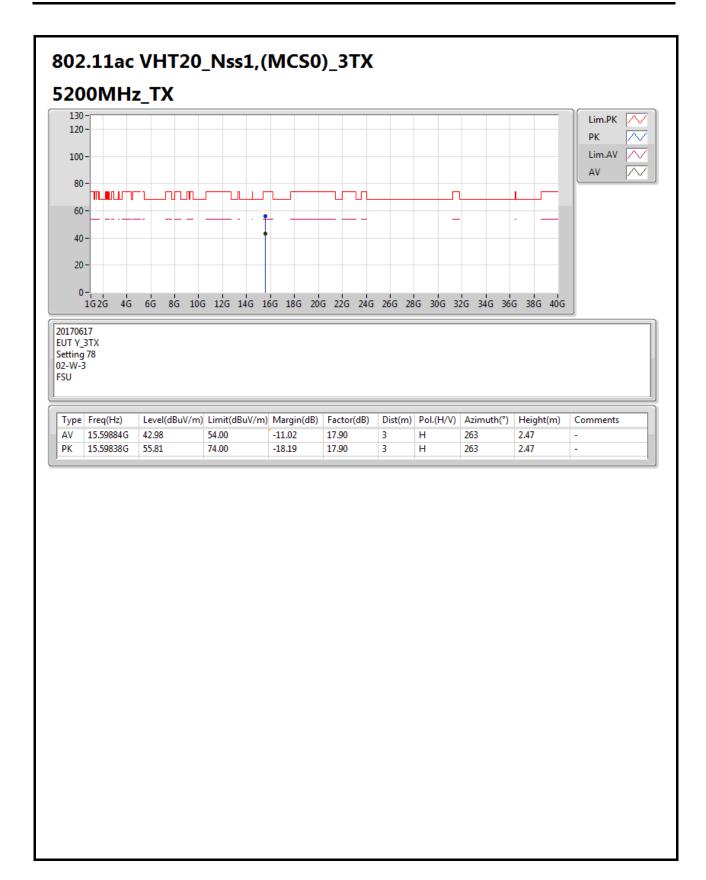


Page No. : 32 of 121



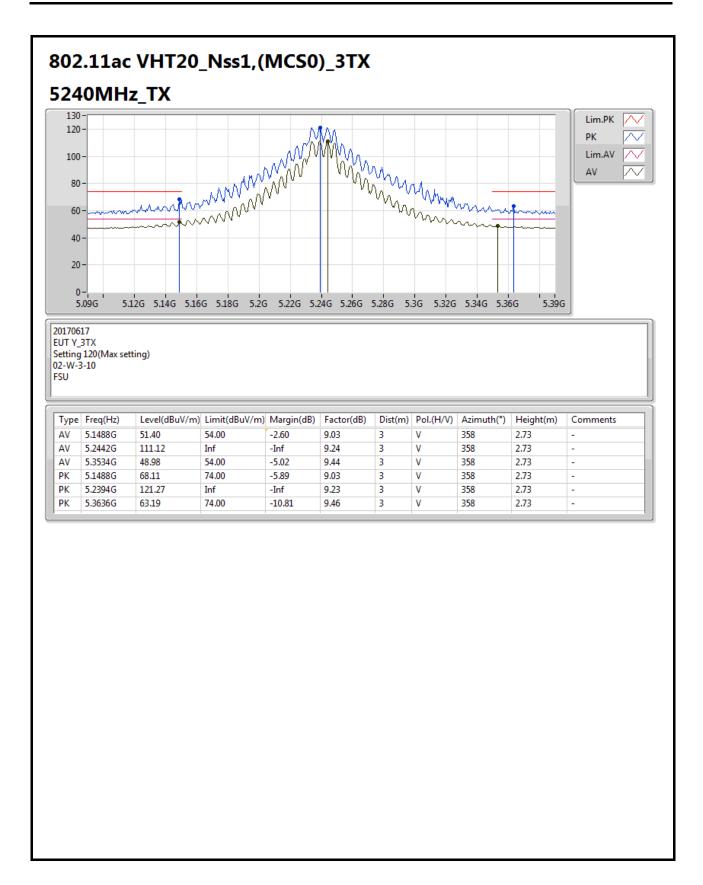




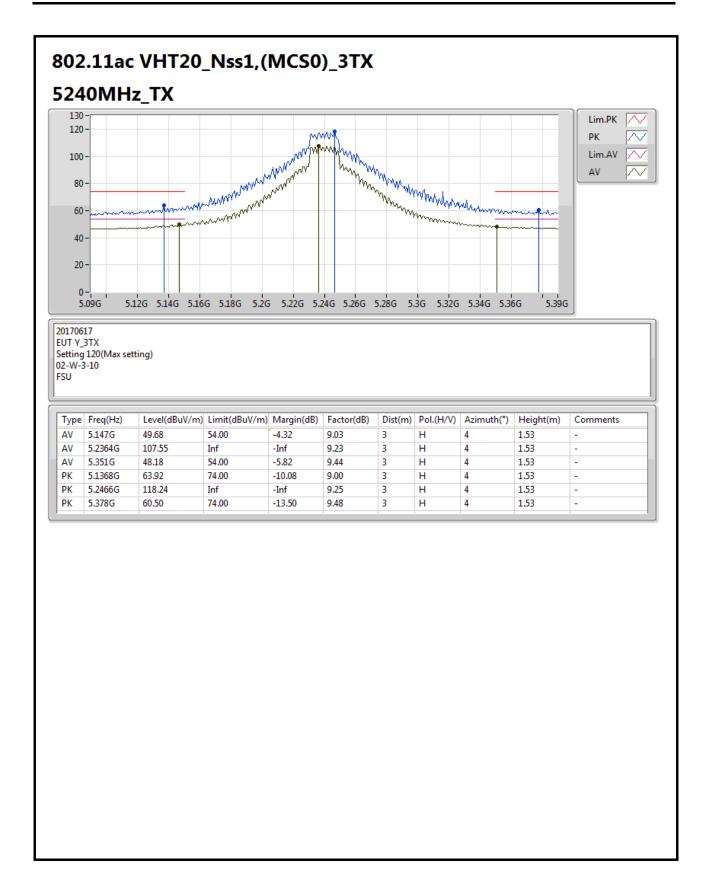


Page No. : 34 of 121

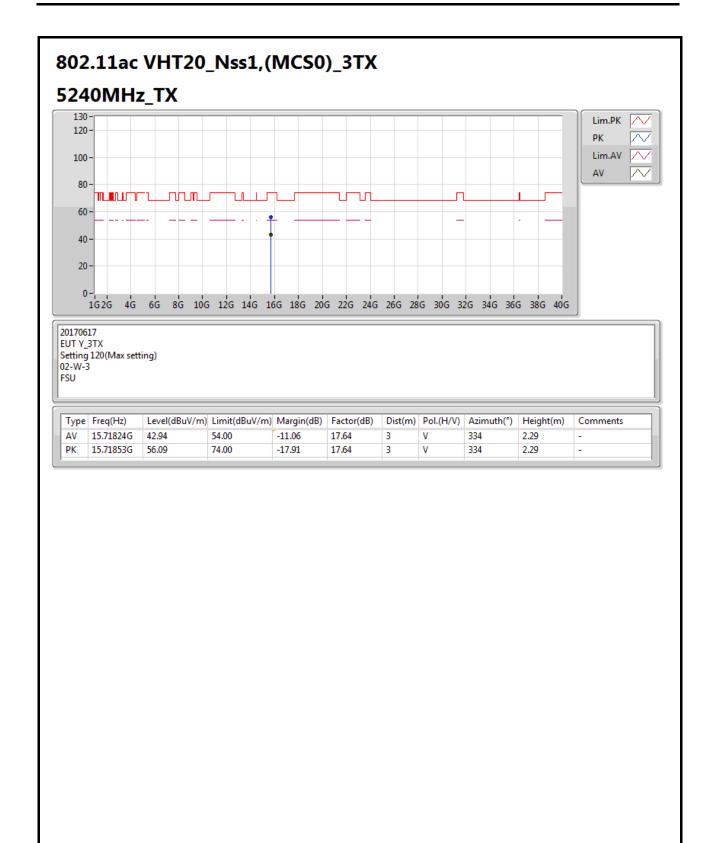




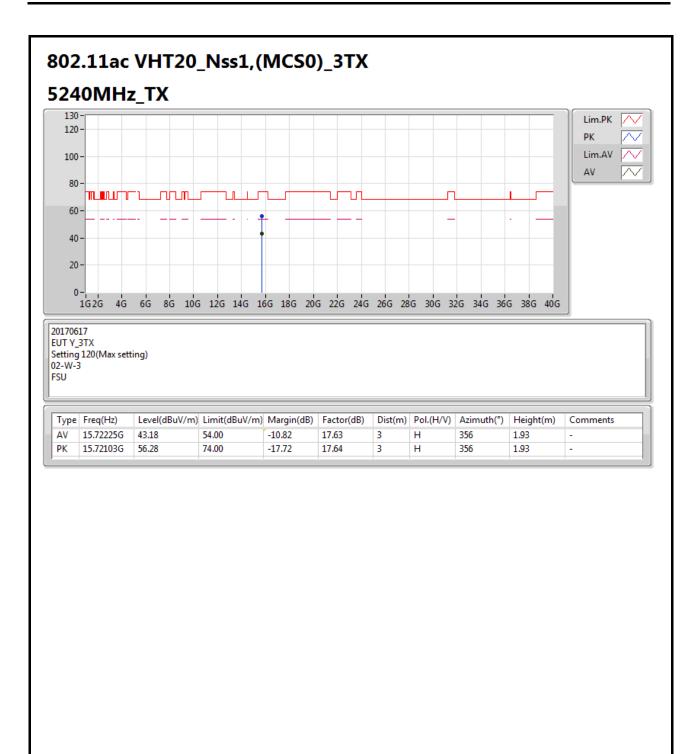






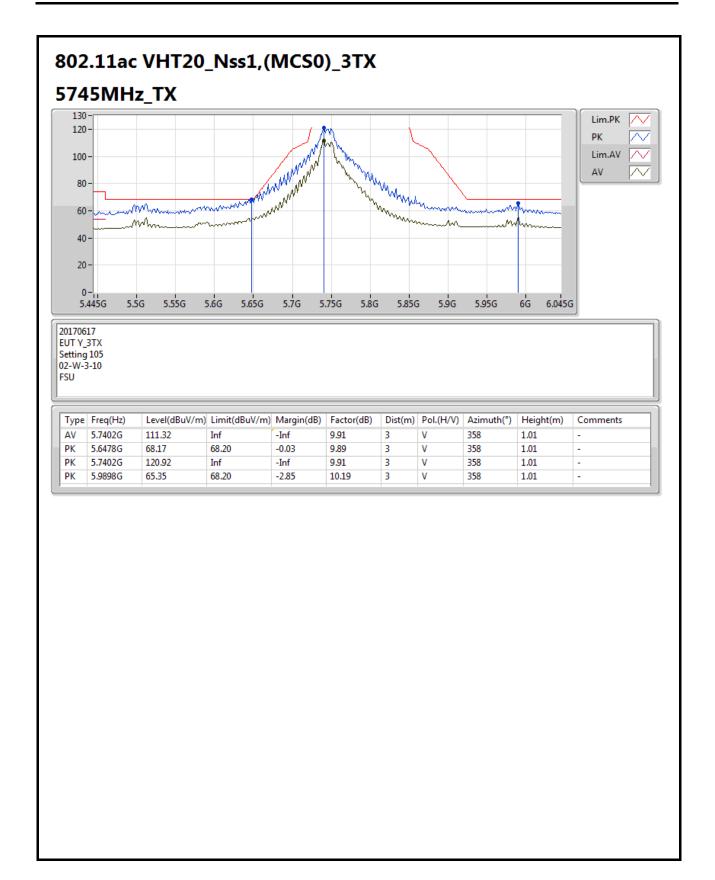






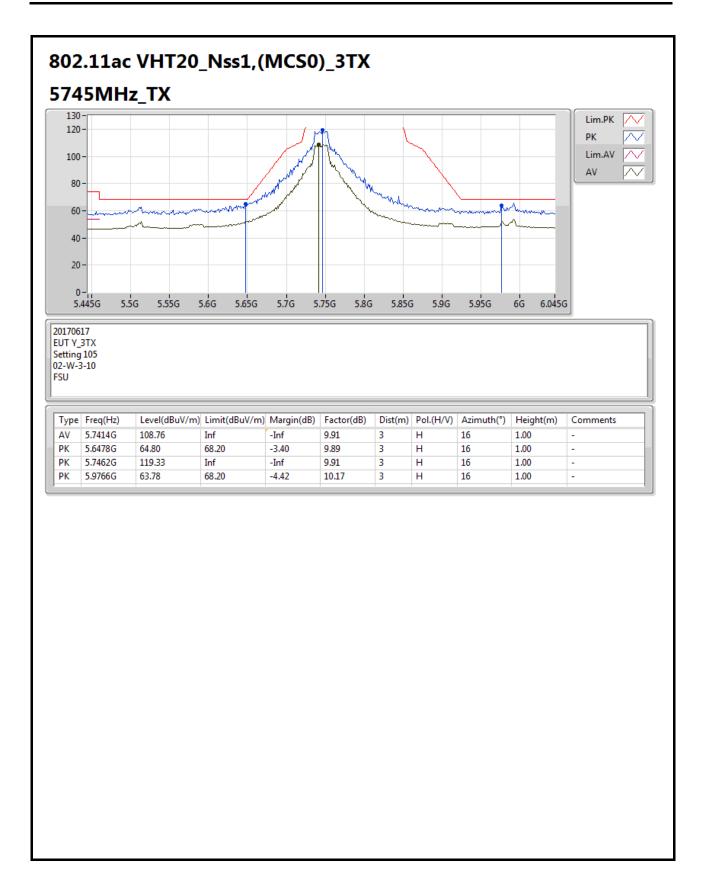
Page No. : 38 of 121



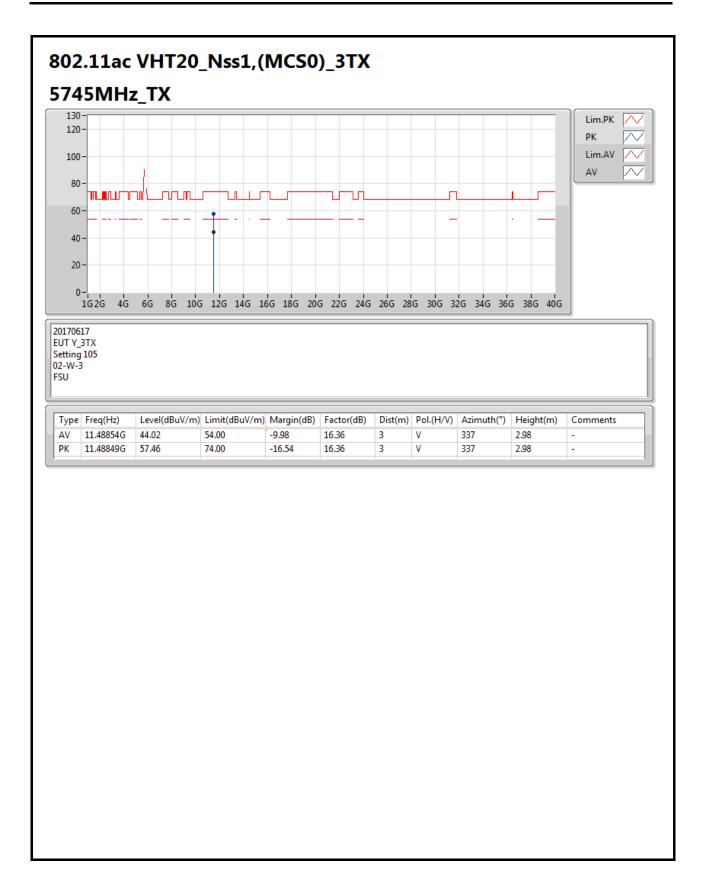


Page No. : 39 of 121

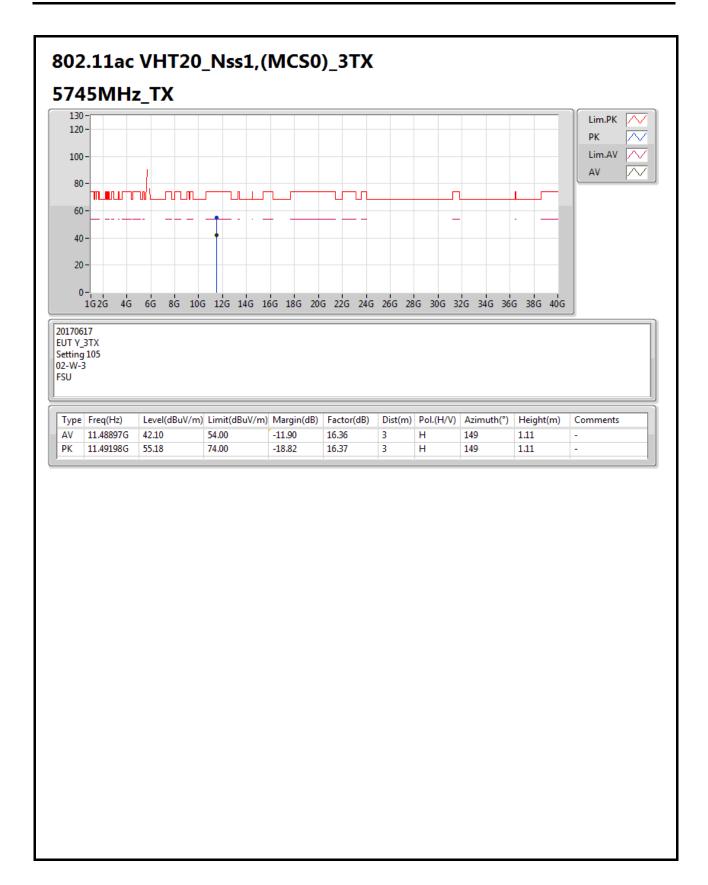




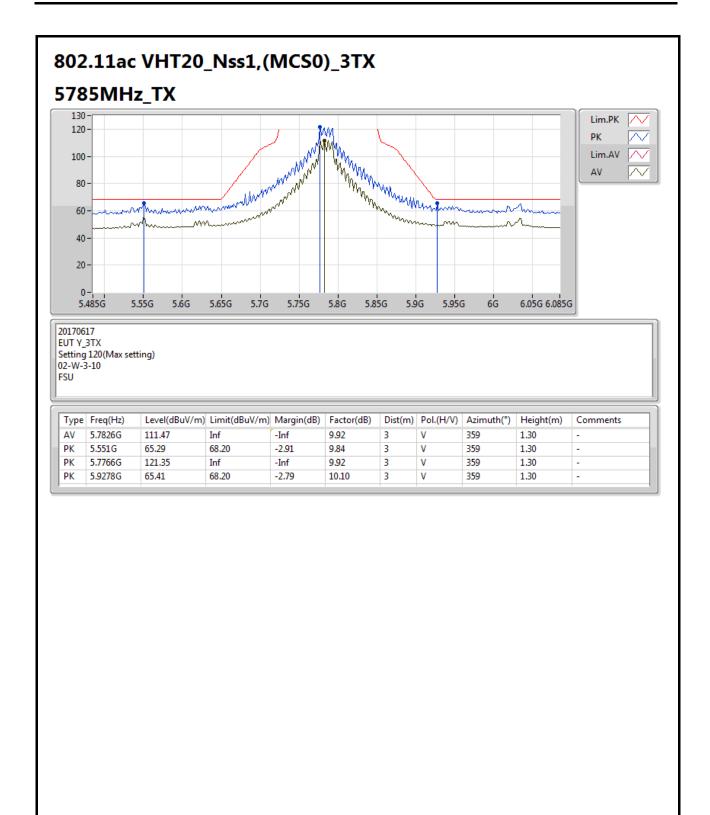




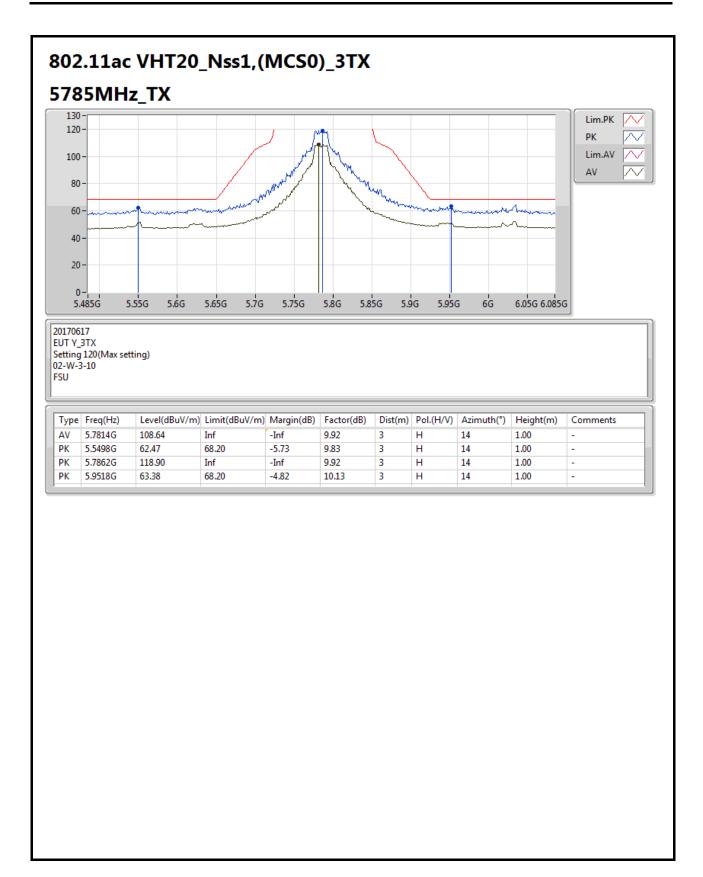




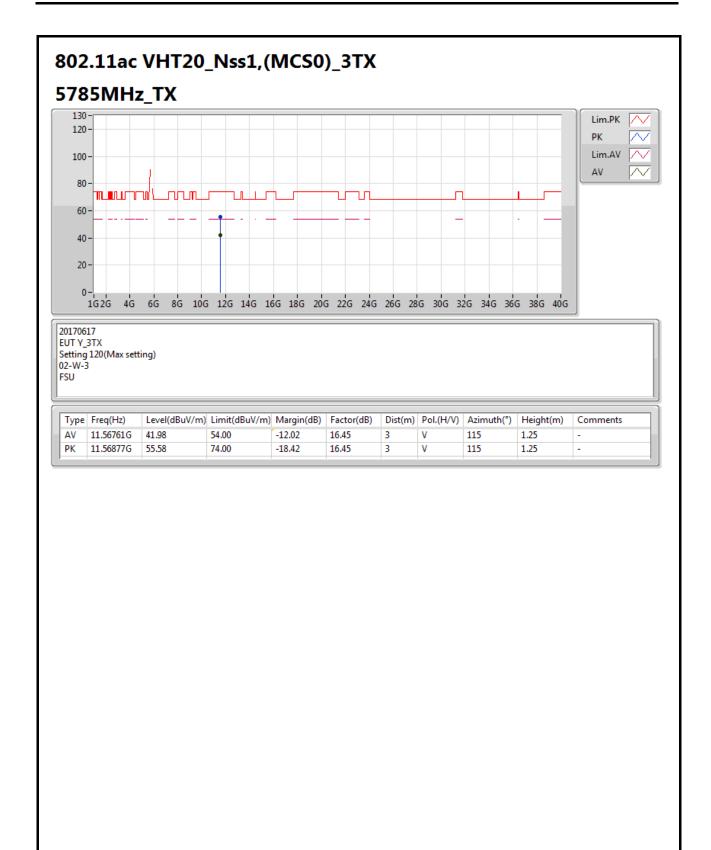




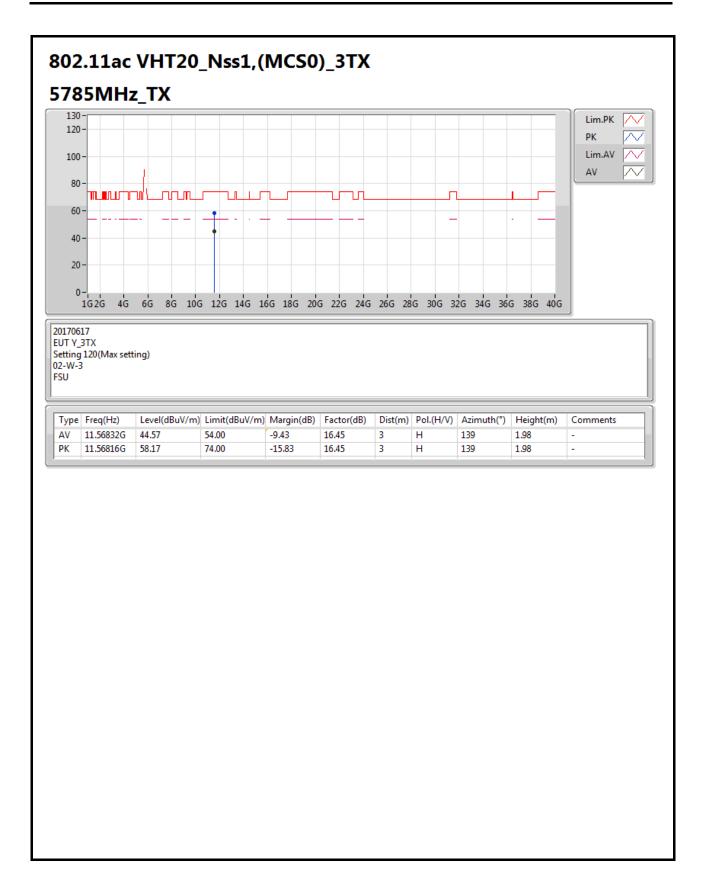




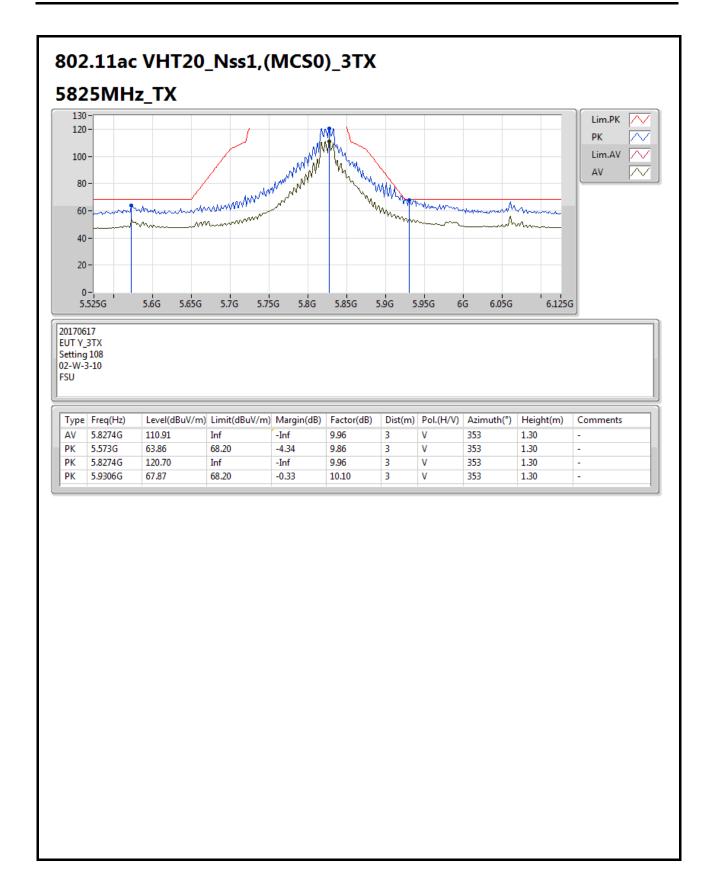




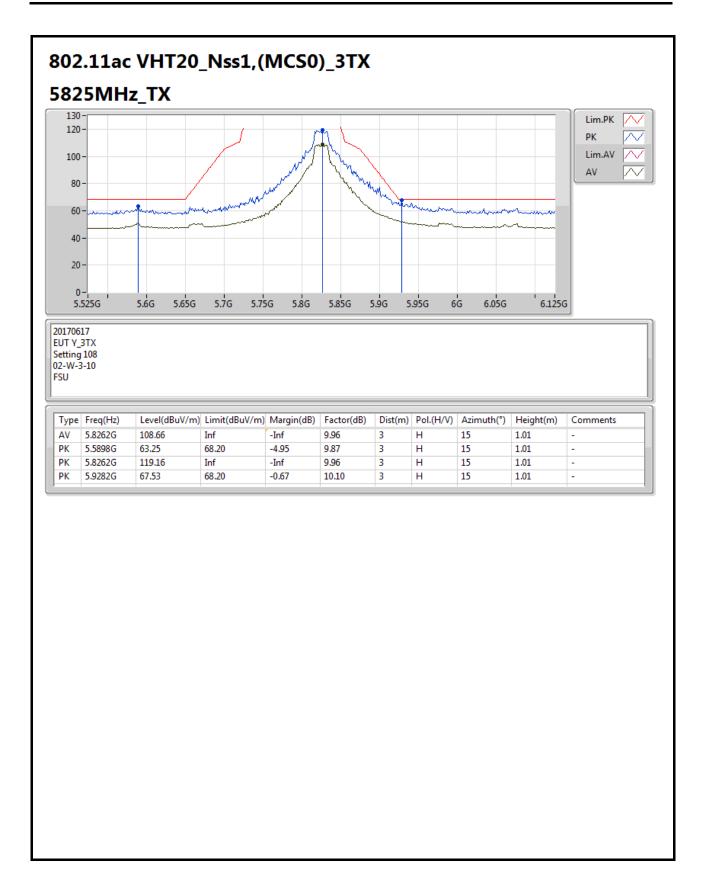




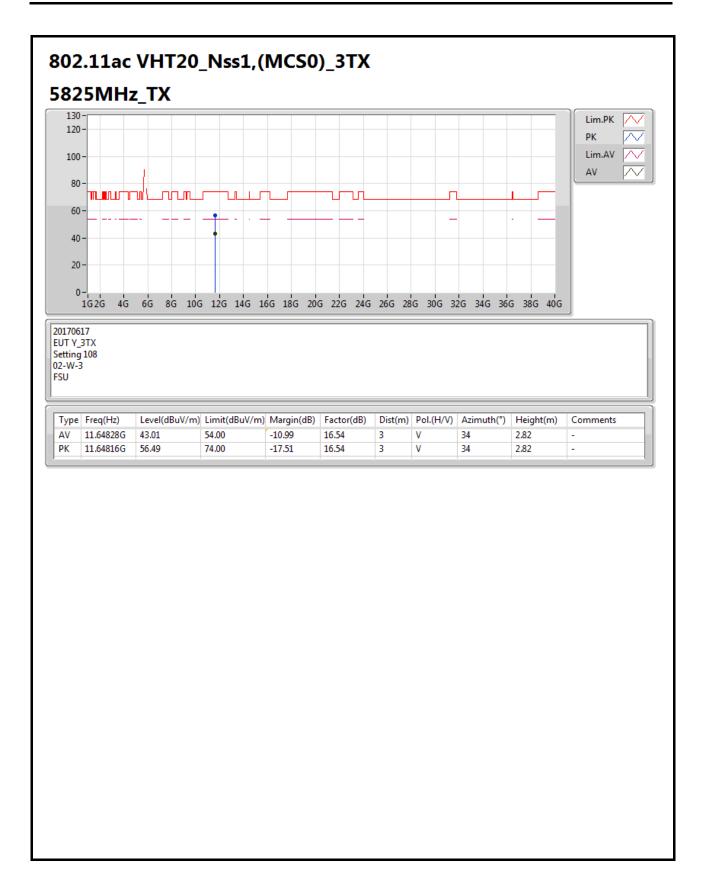




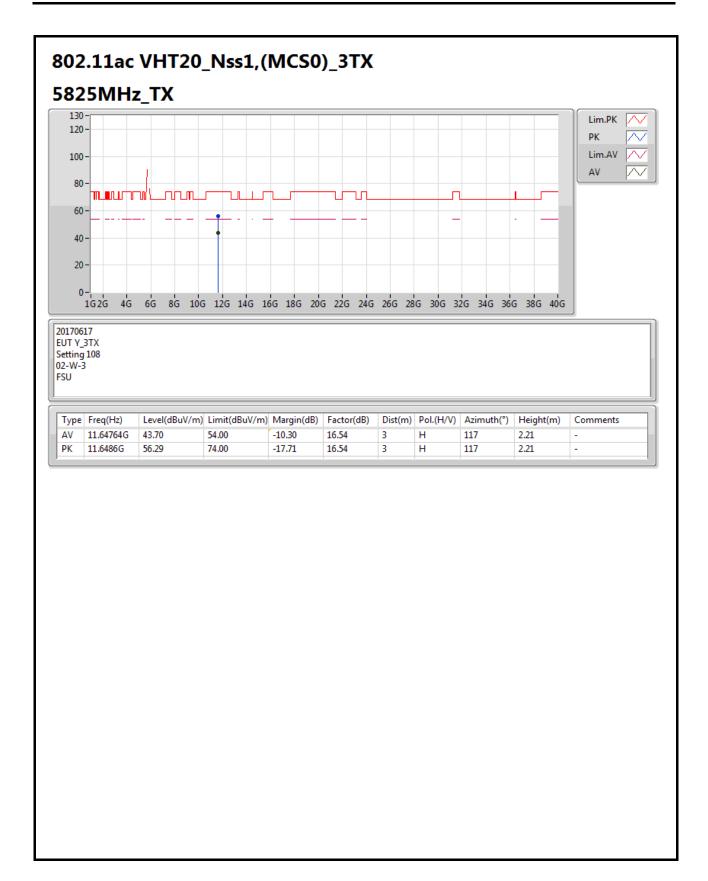




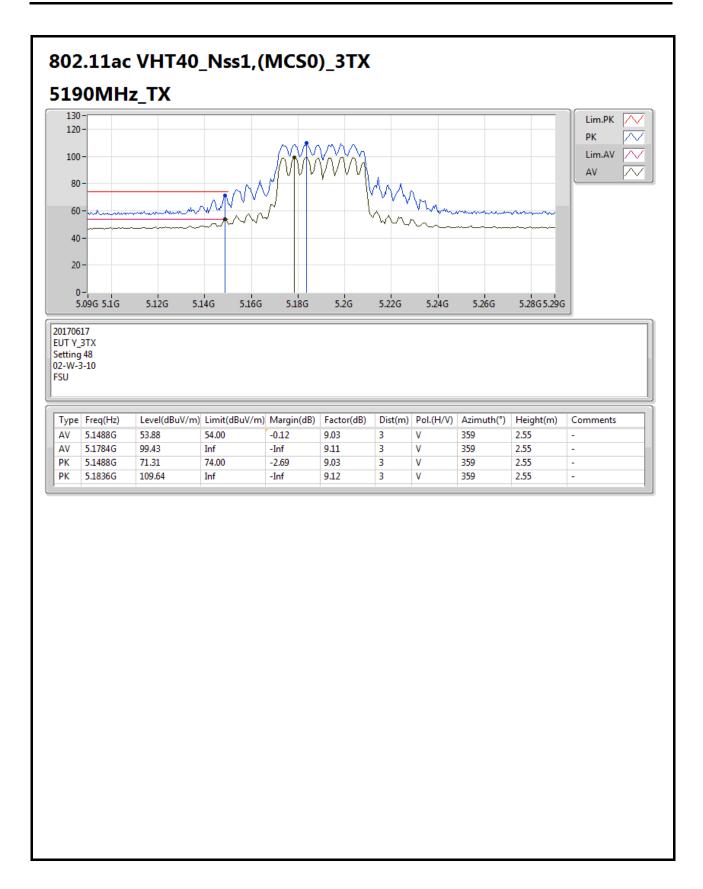






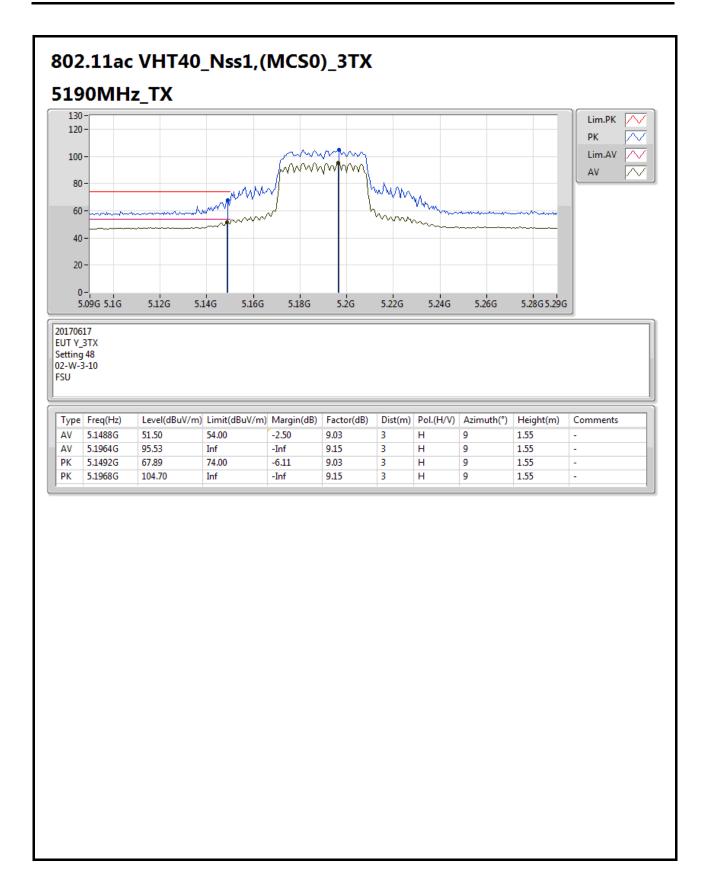




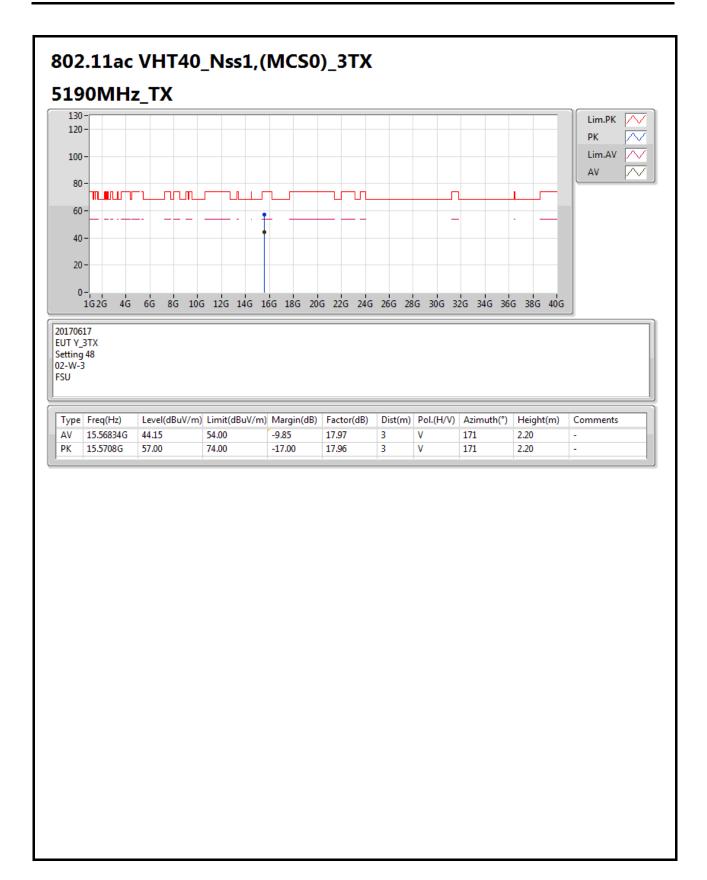


Page No. : 51 of 121



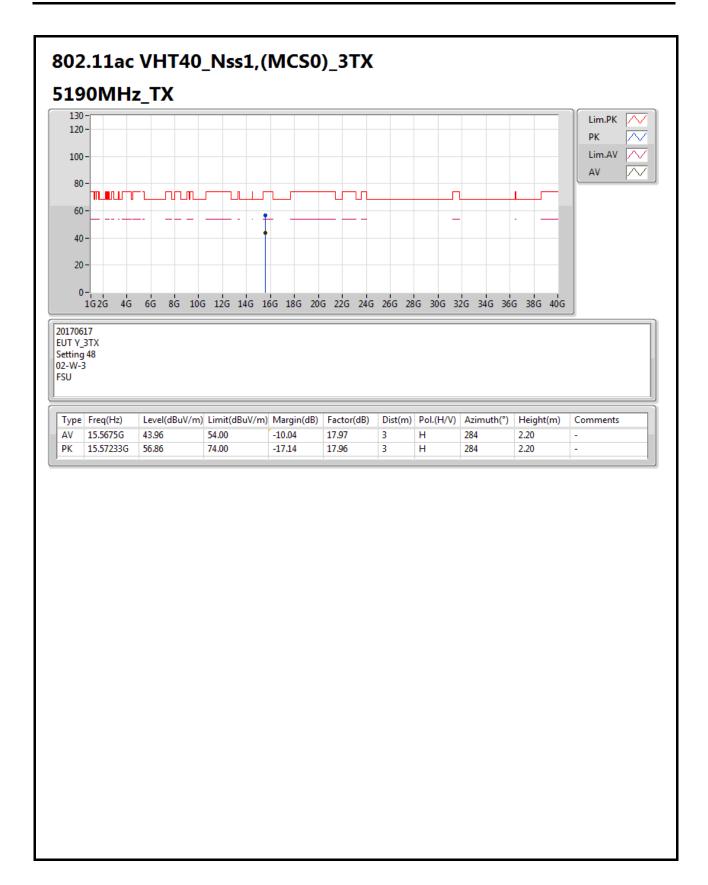




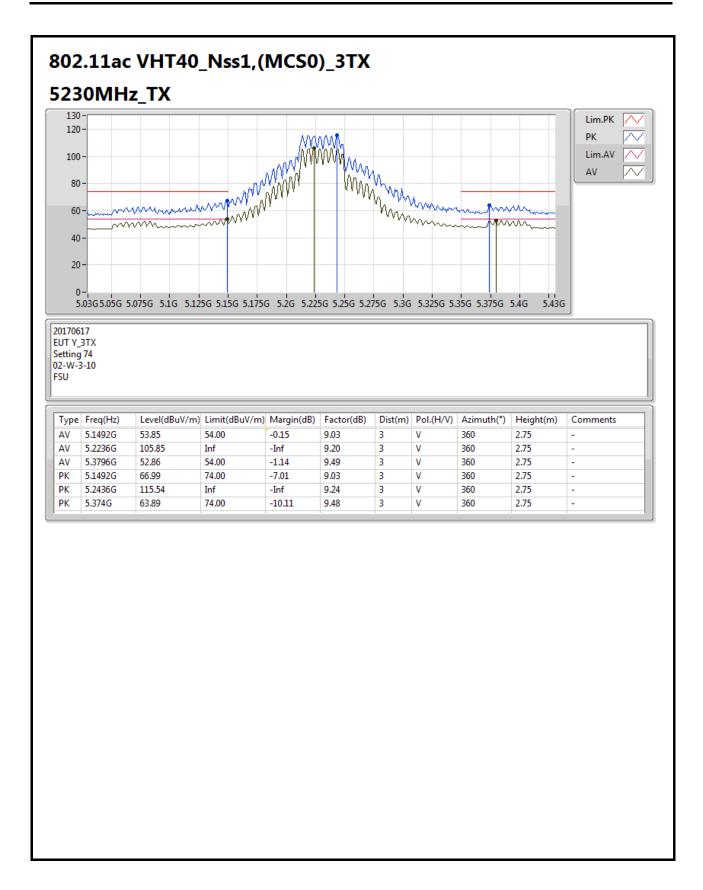


Page No. : 53 of 121



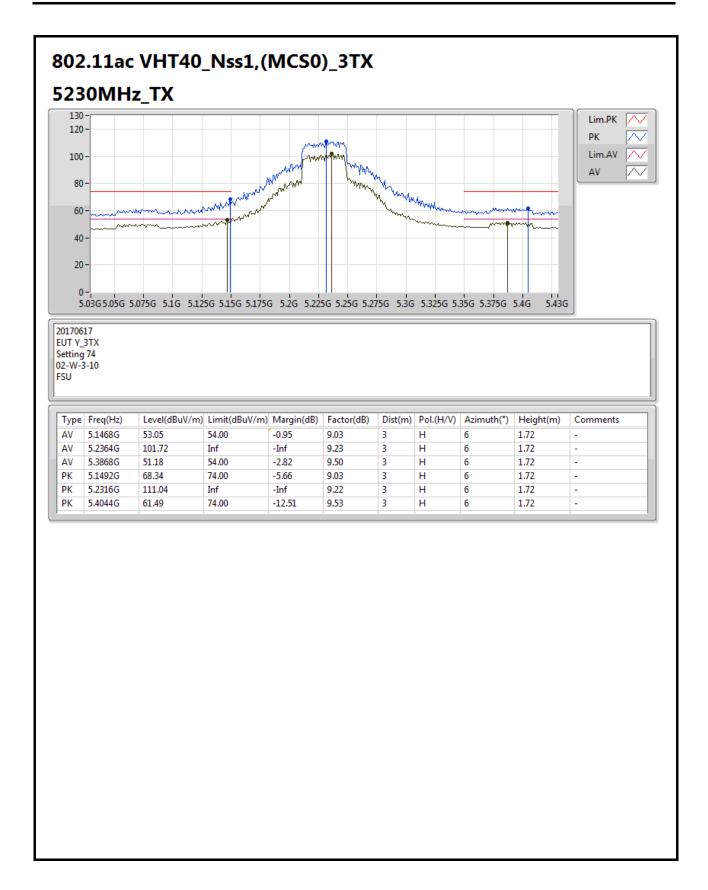




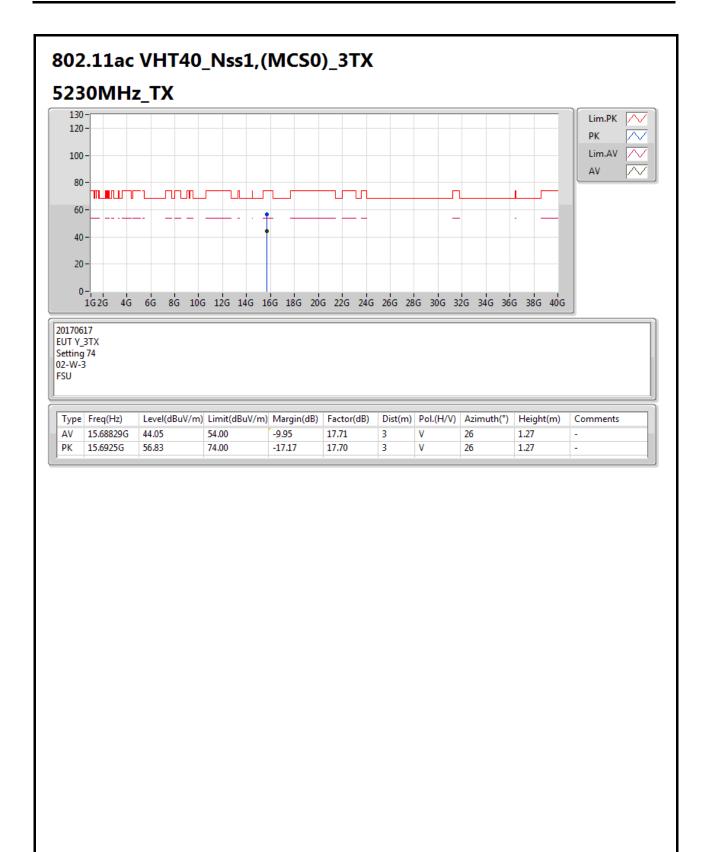


Page No. : 55 of 121

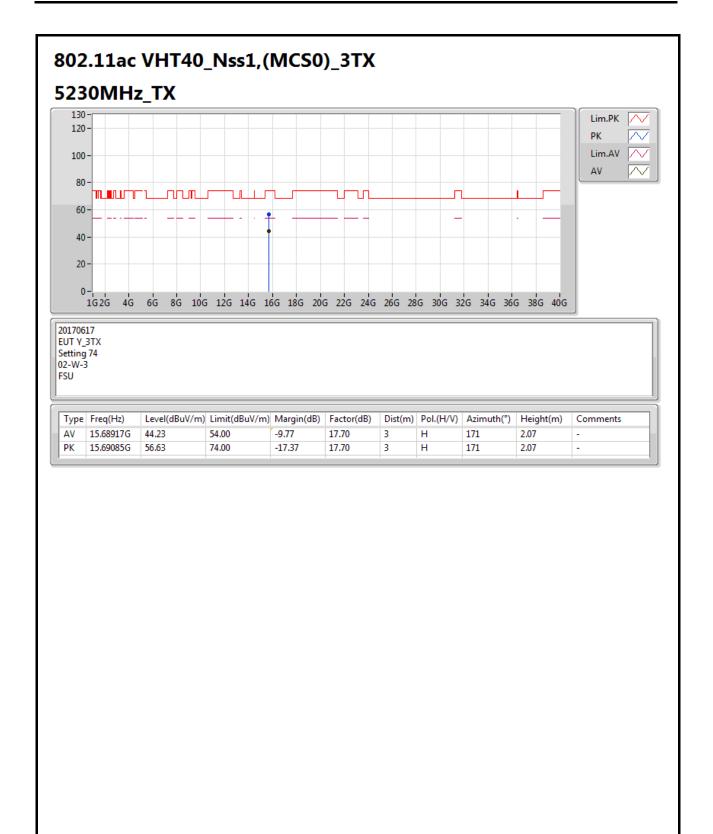




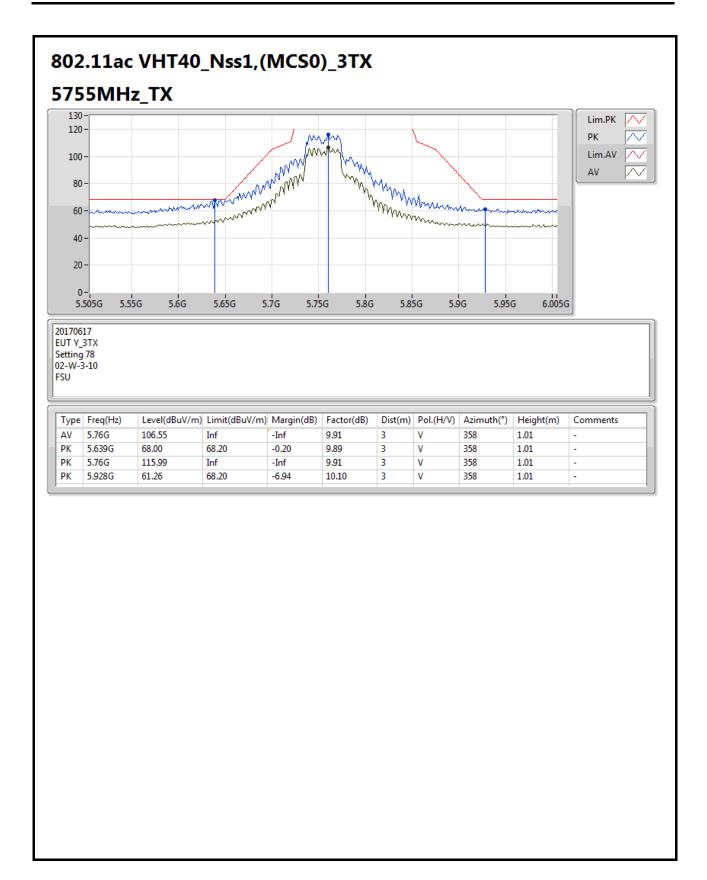




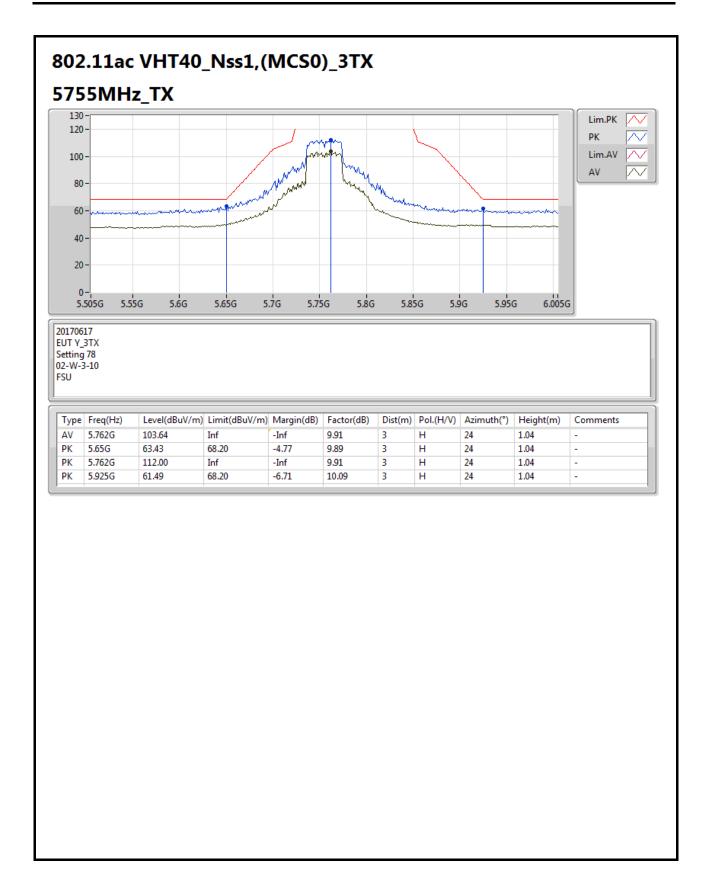






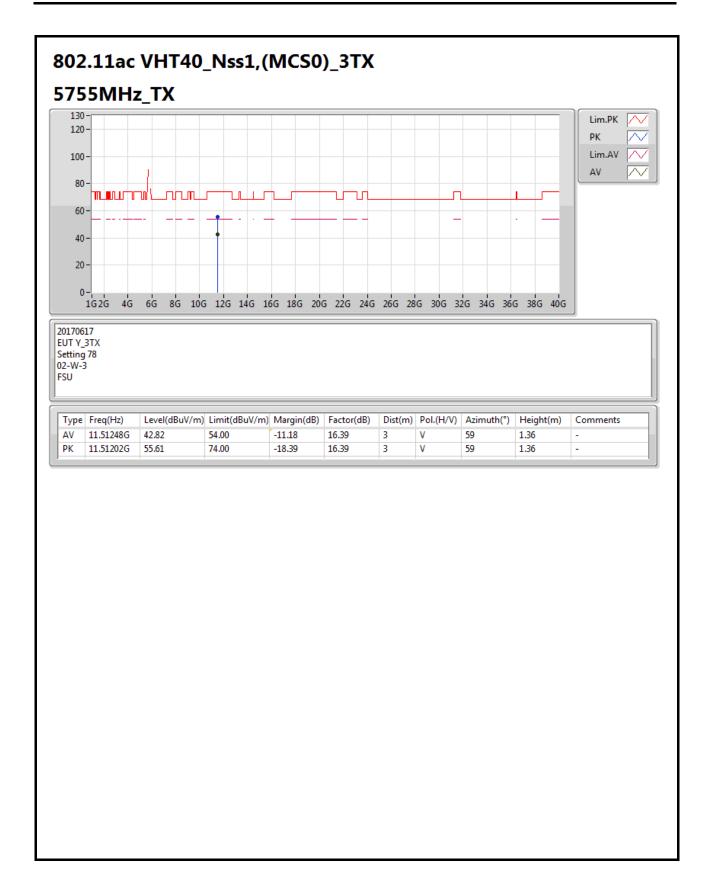




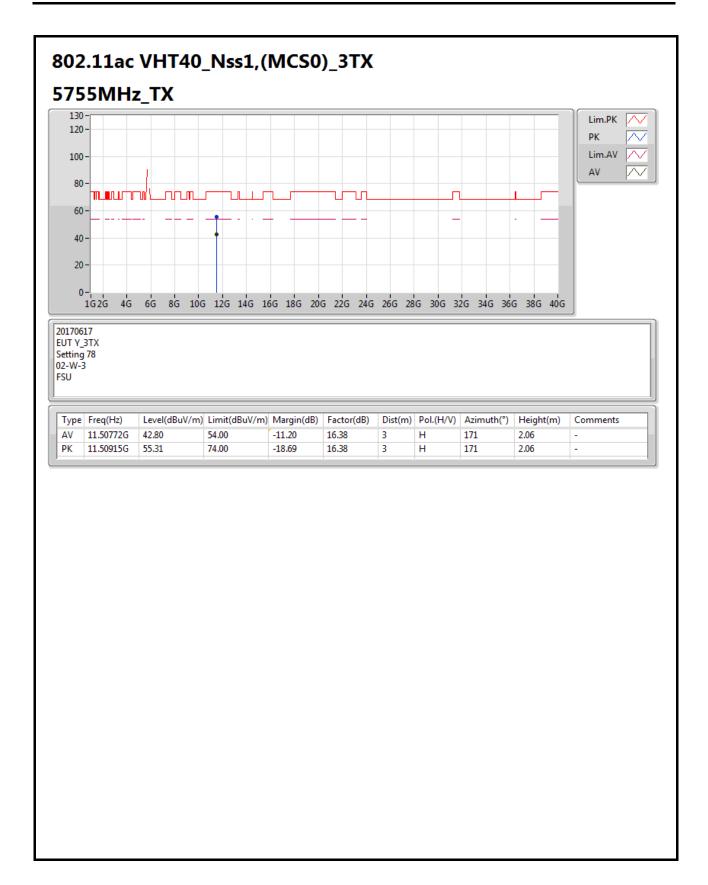


Page No. : 60 of 121

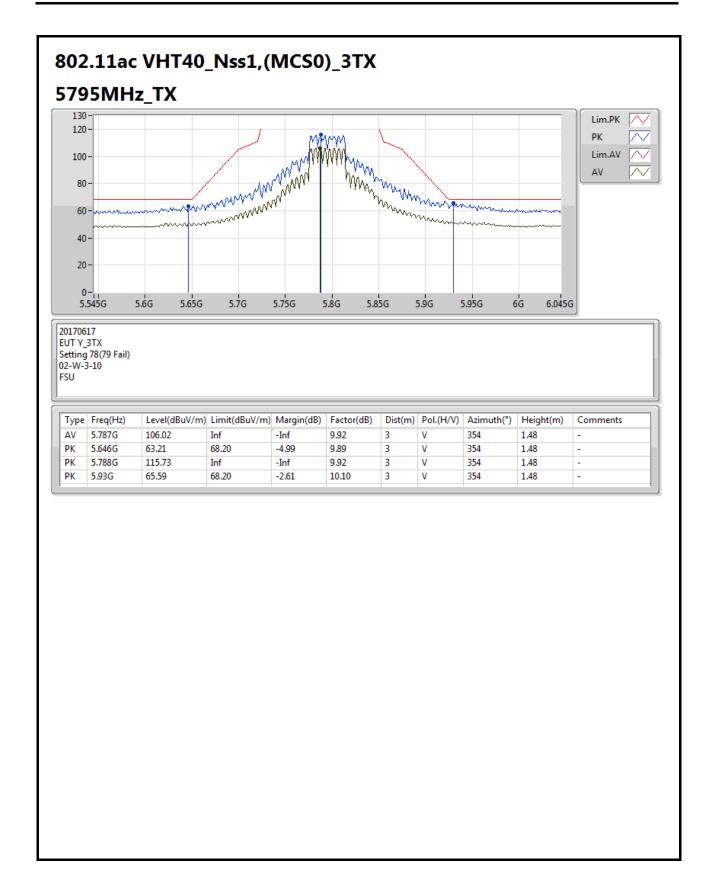




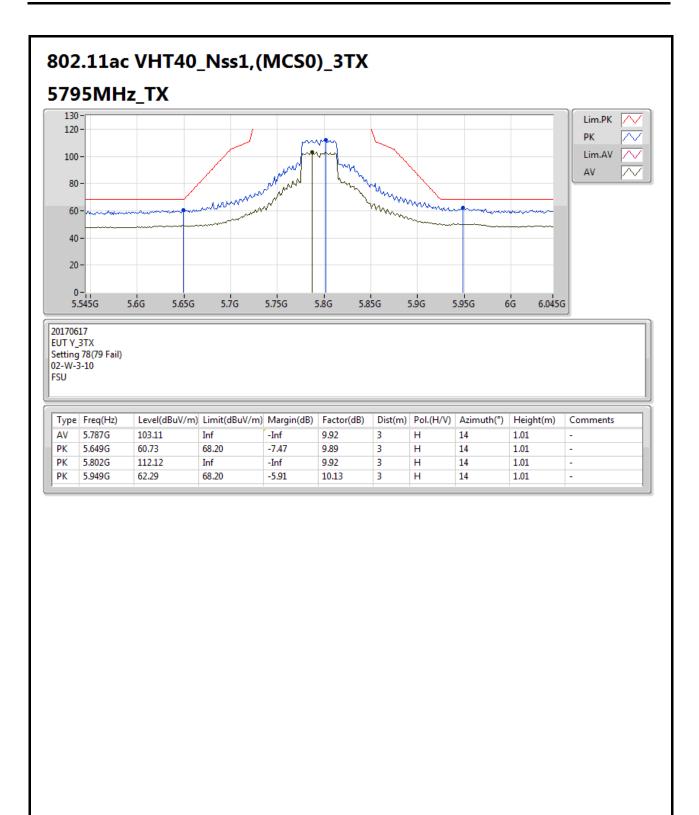




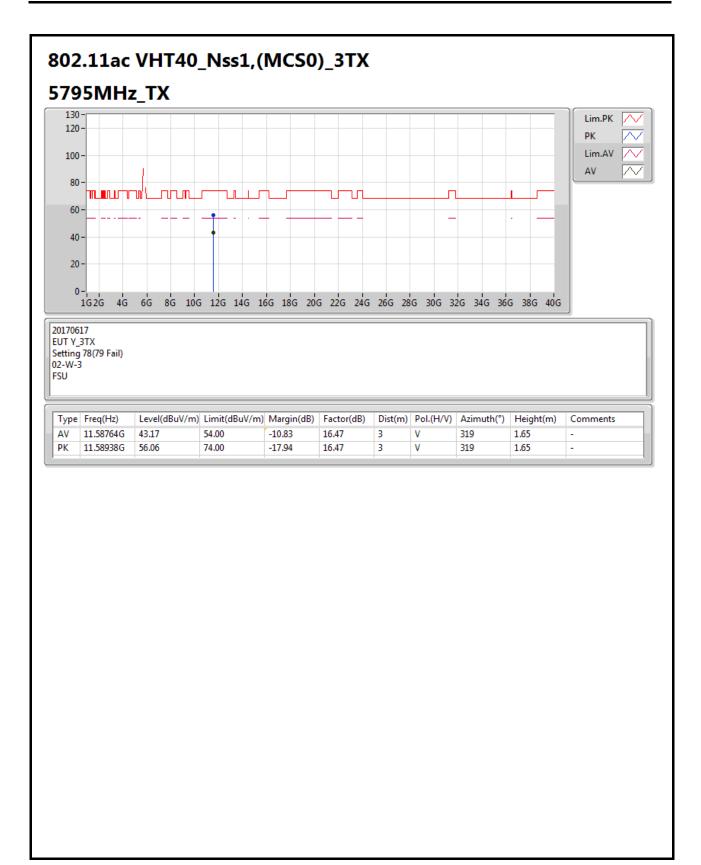




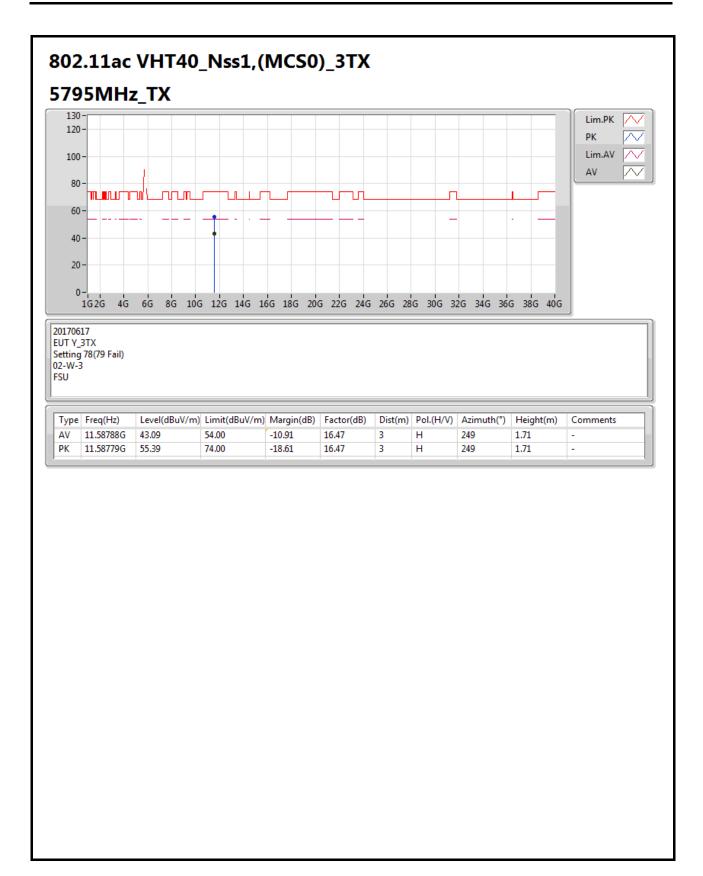




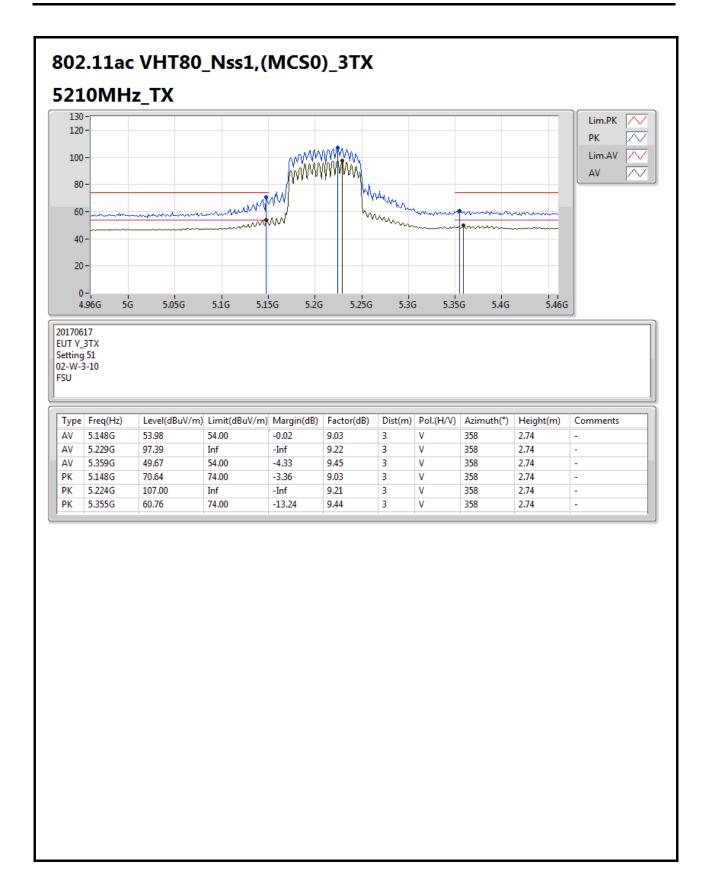




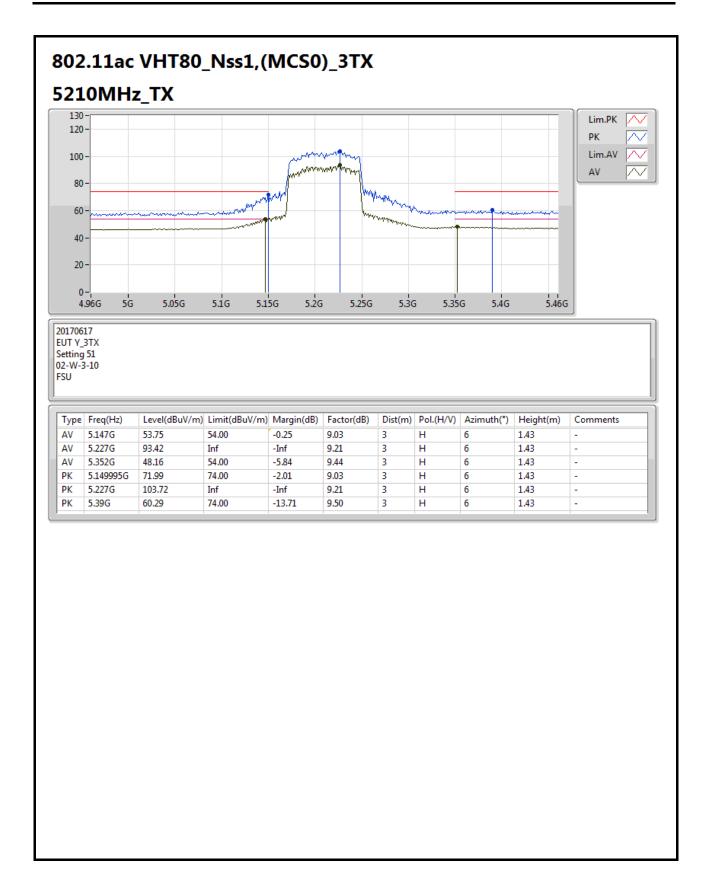




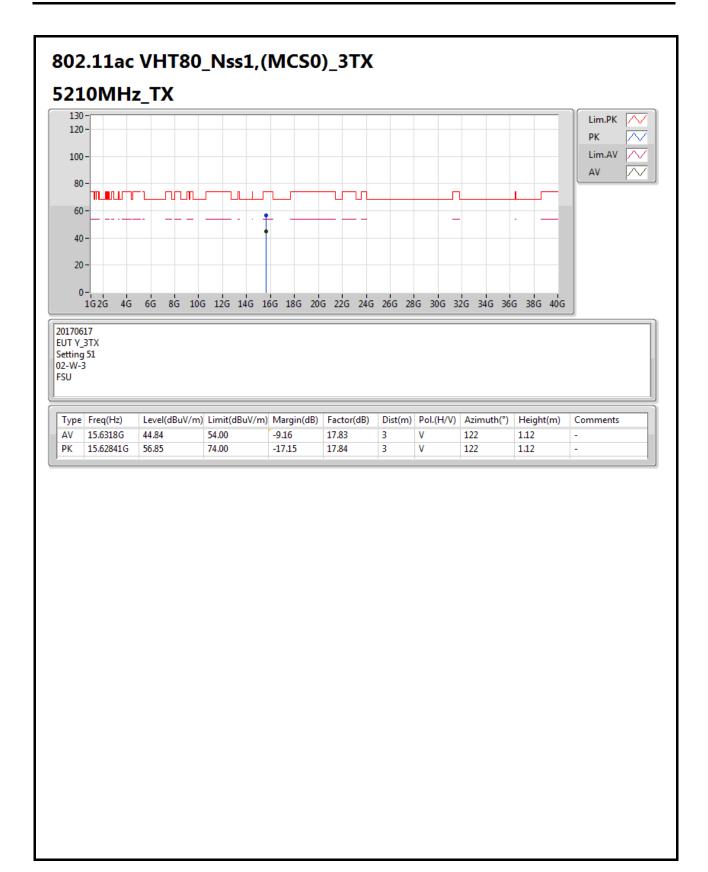




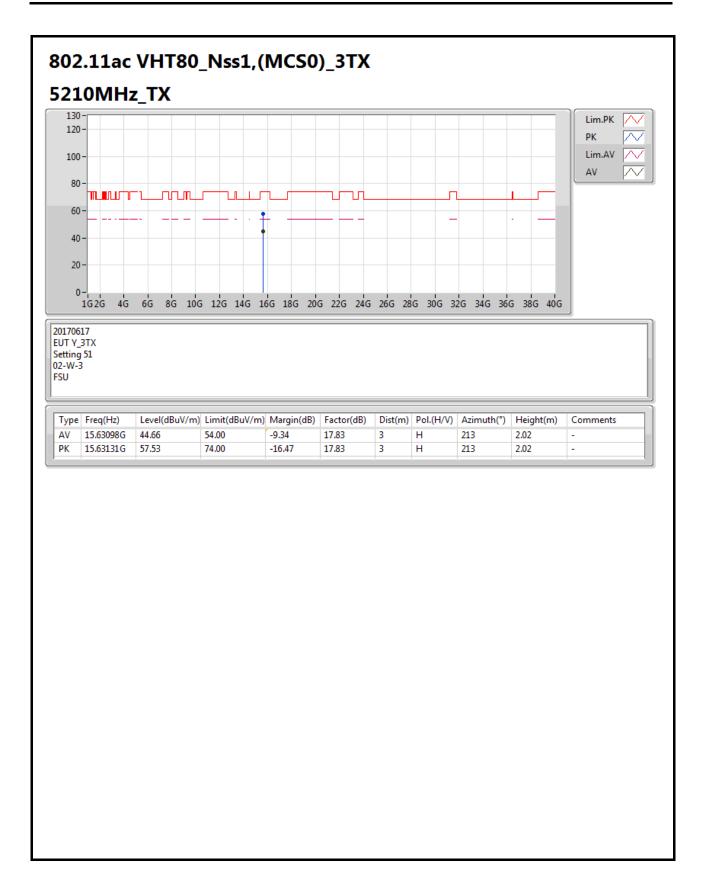






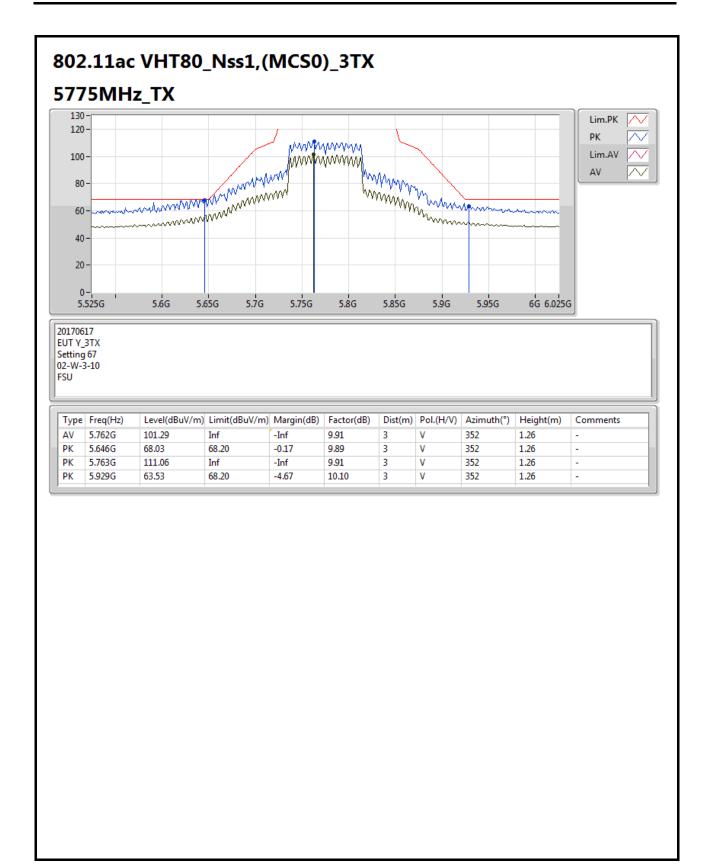






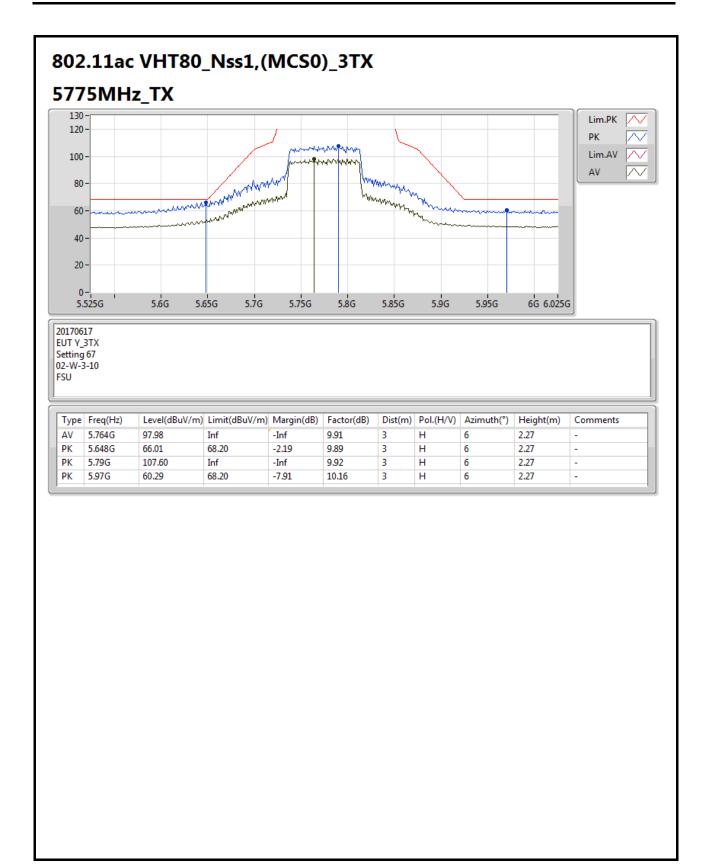
Page No. : 70 of 121





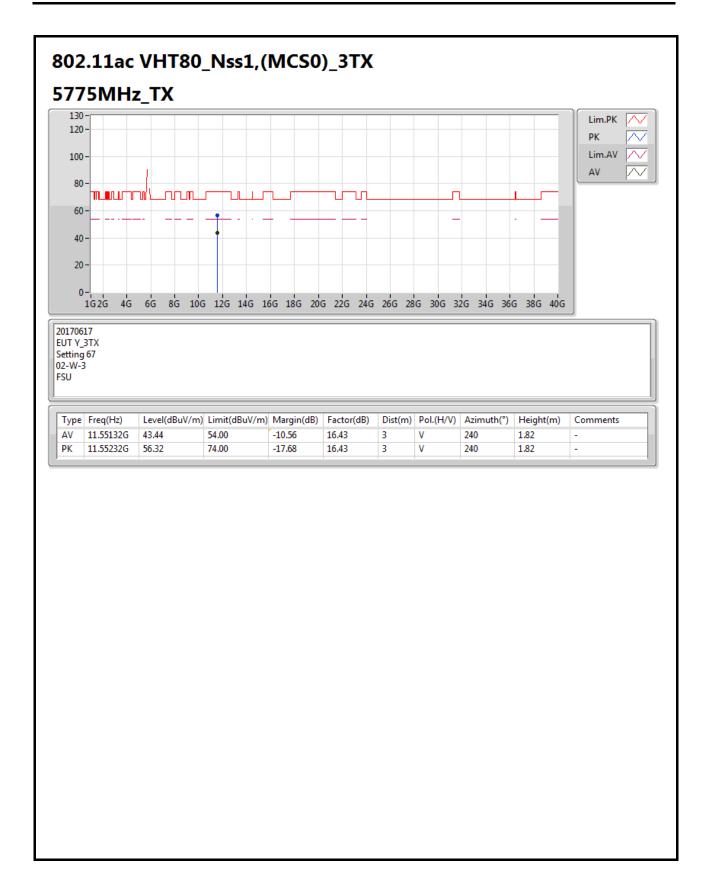
Page No. : 71 of 121



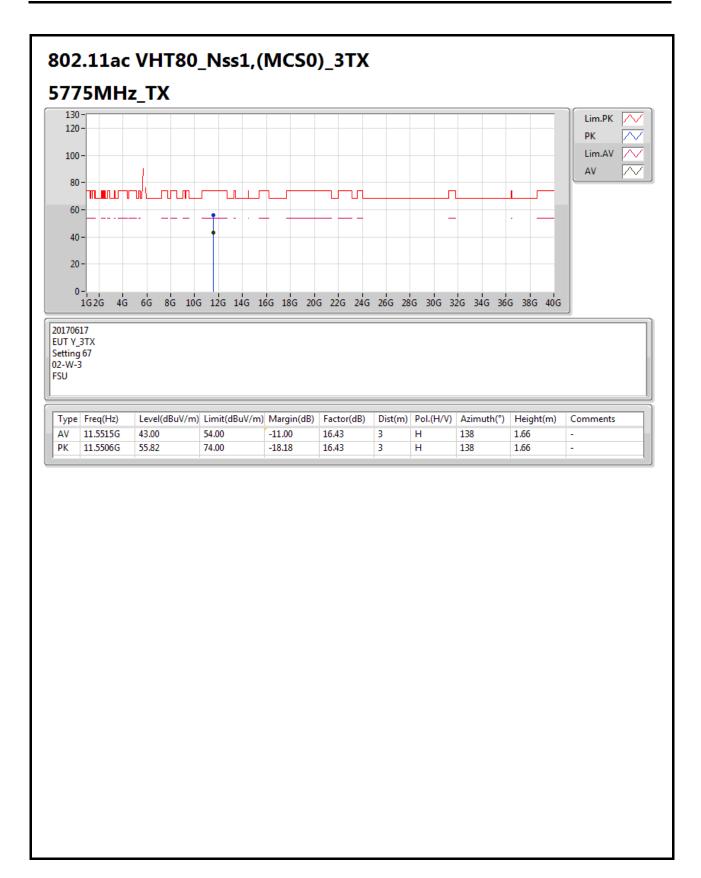


Page No. : 72 of 121

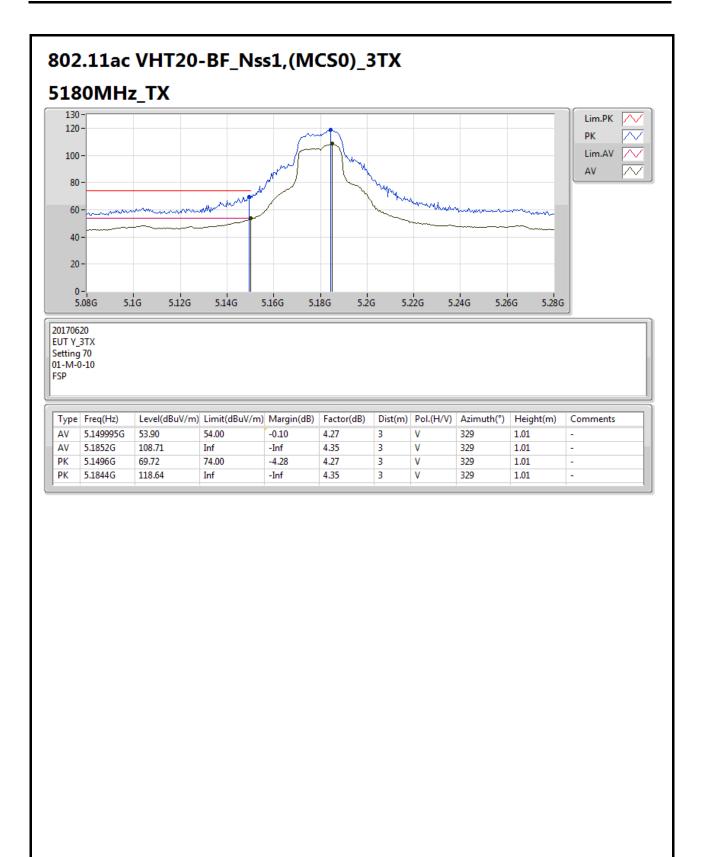




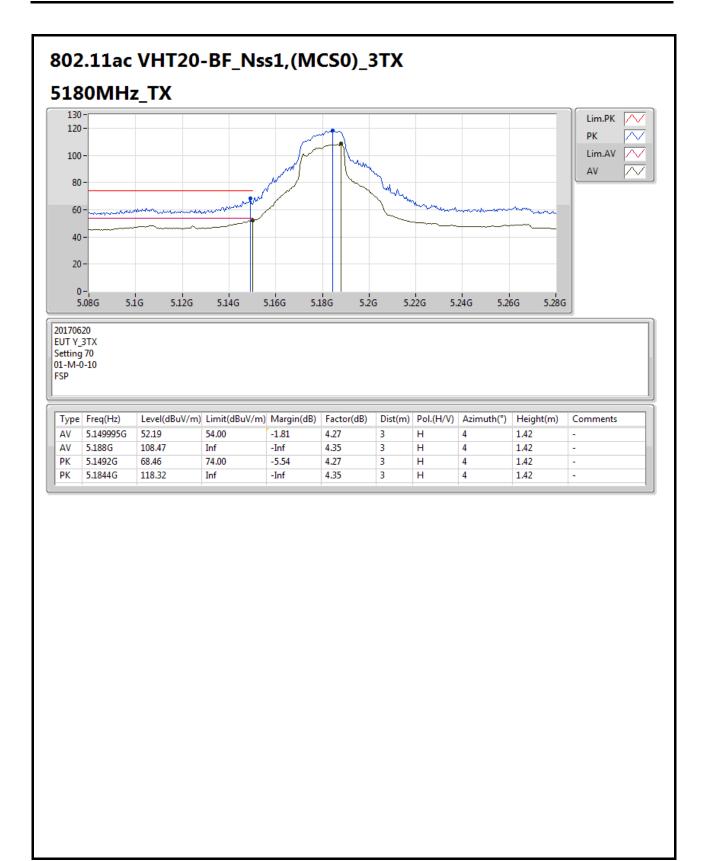




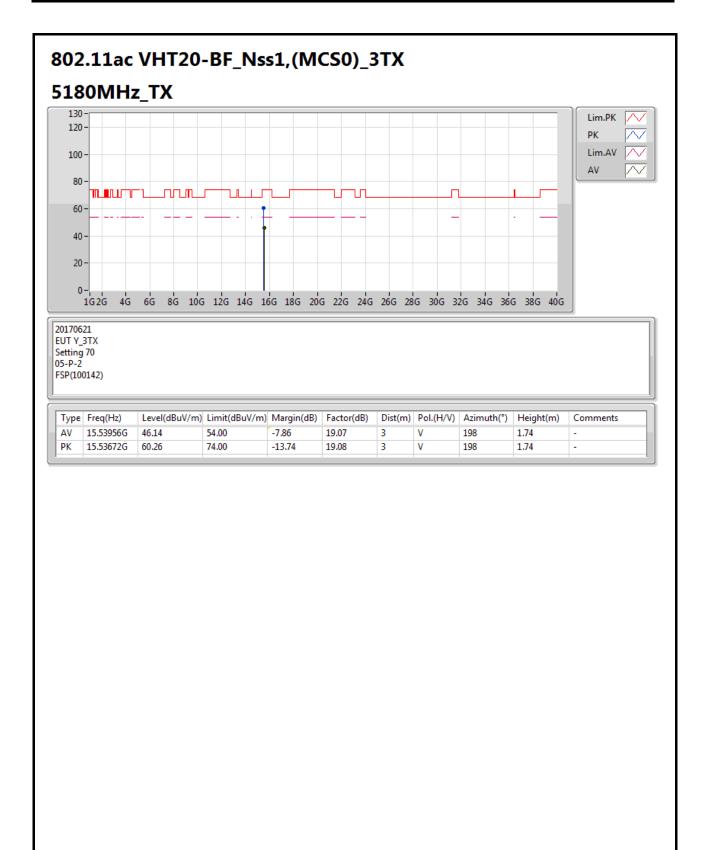




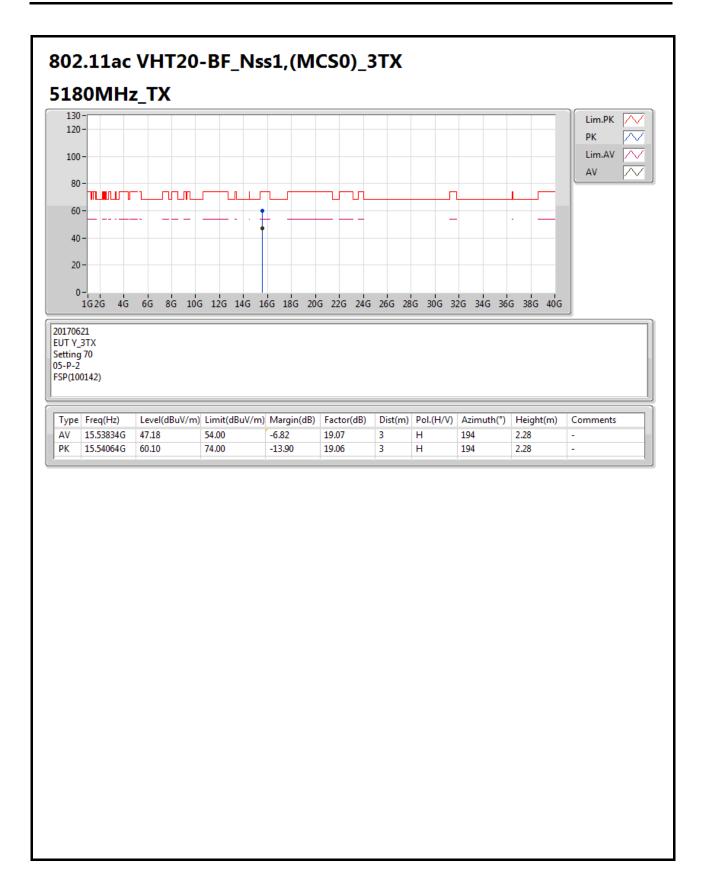






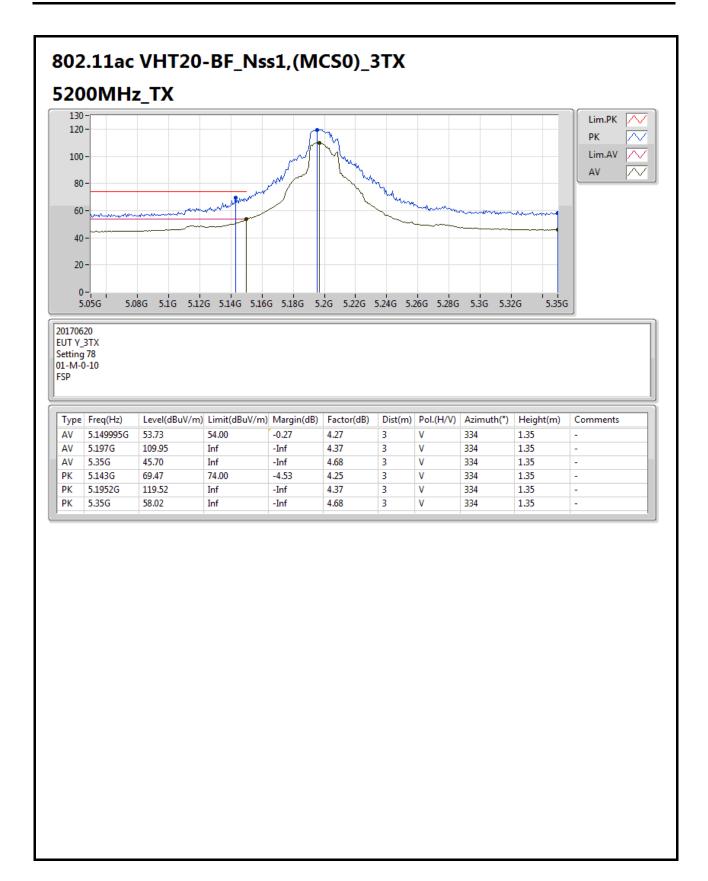




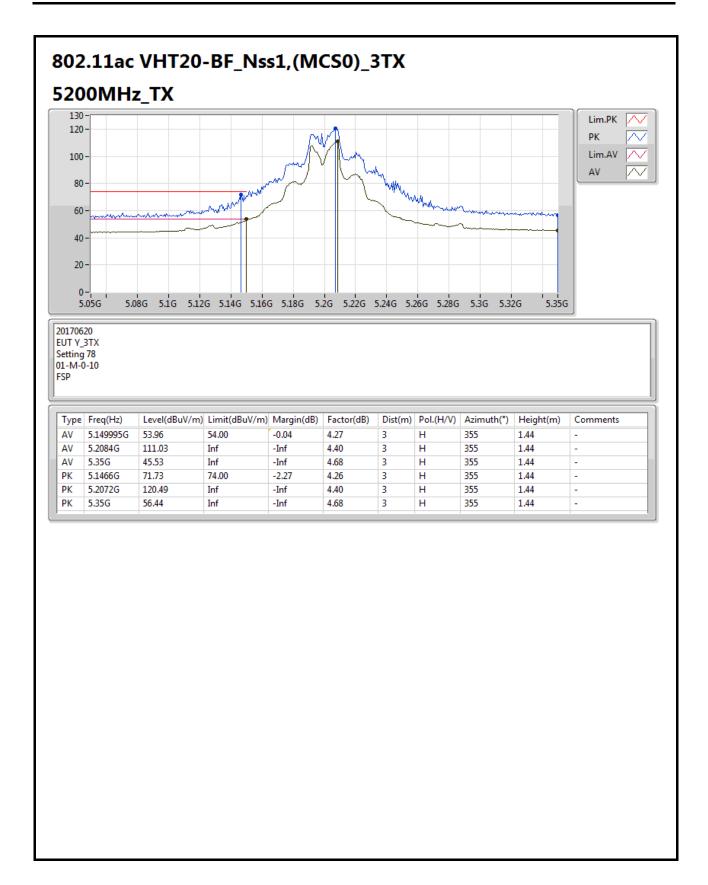


SPORTON INTERNATIONAL INC.

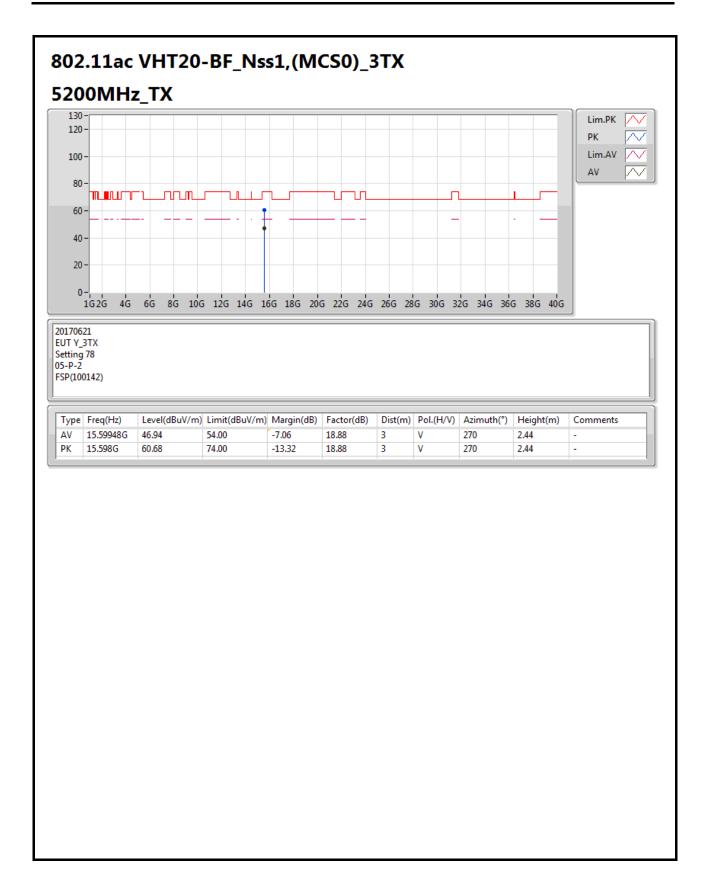




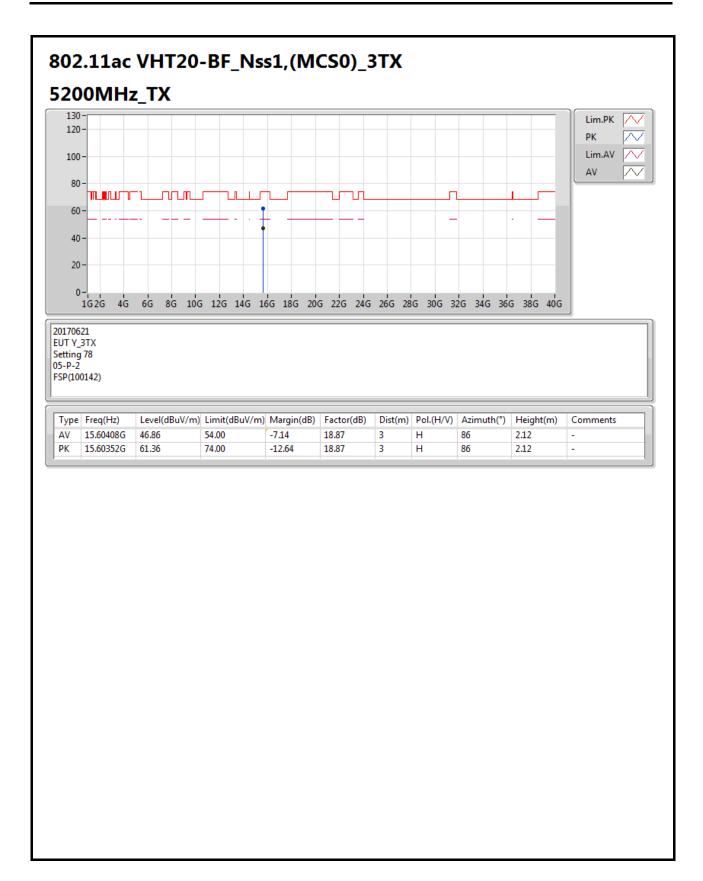




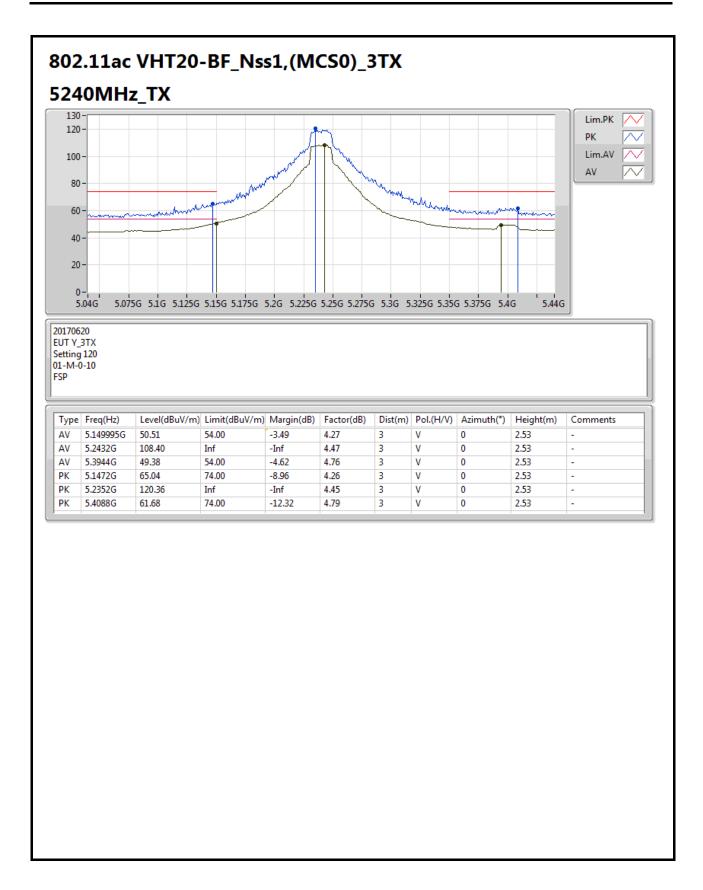






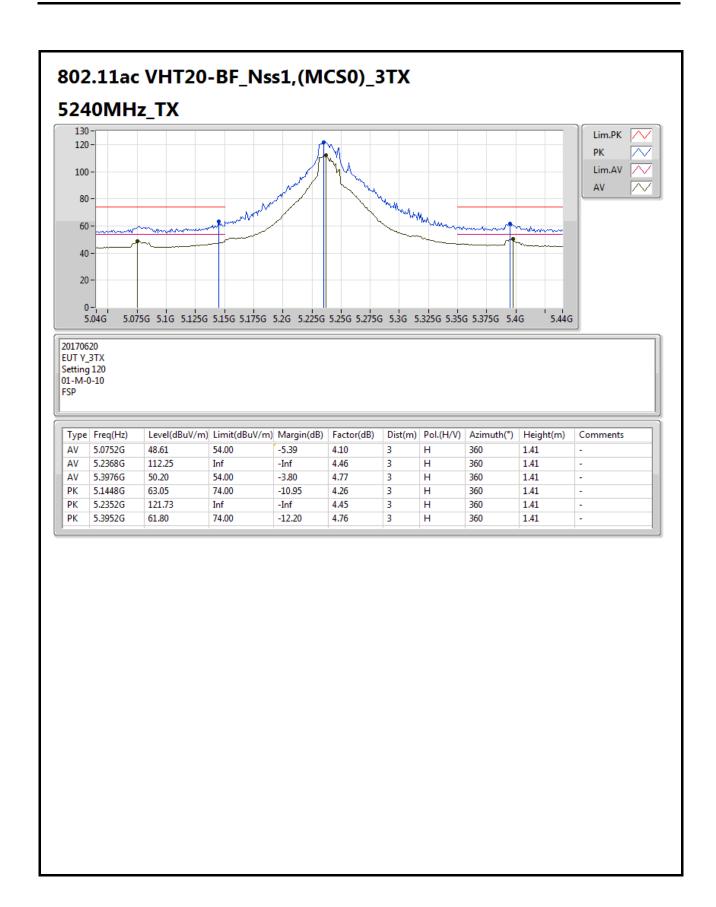




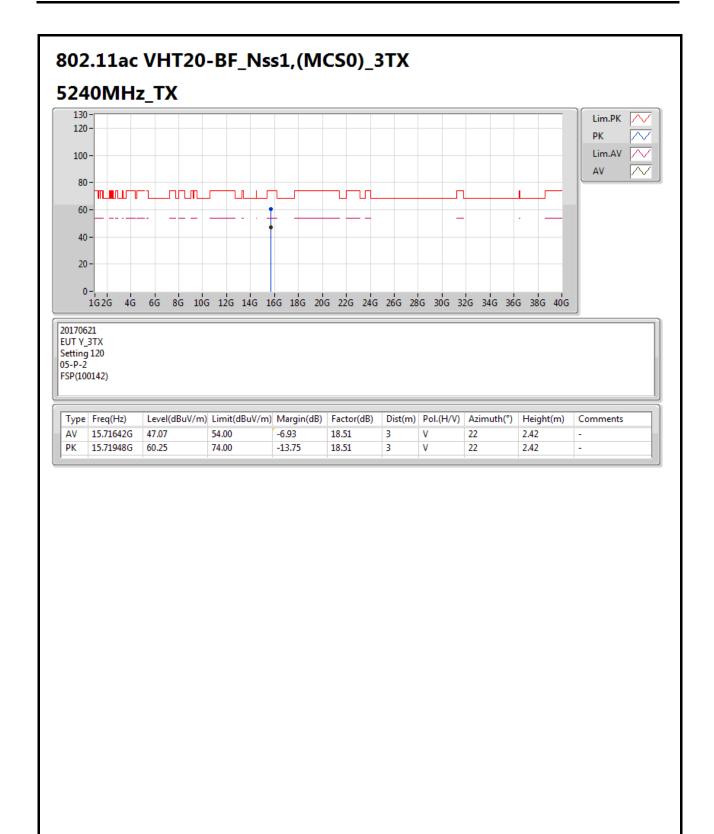


Page No. : 83 of 121

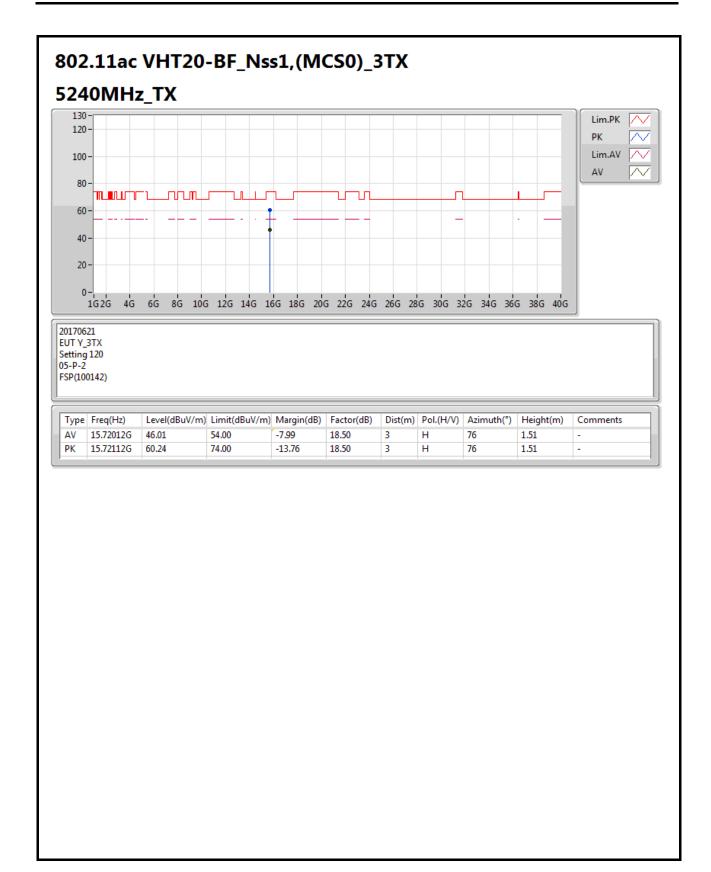






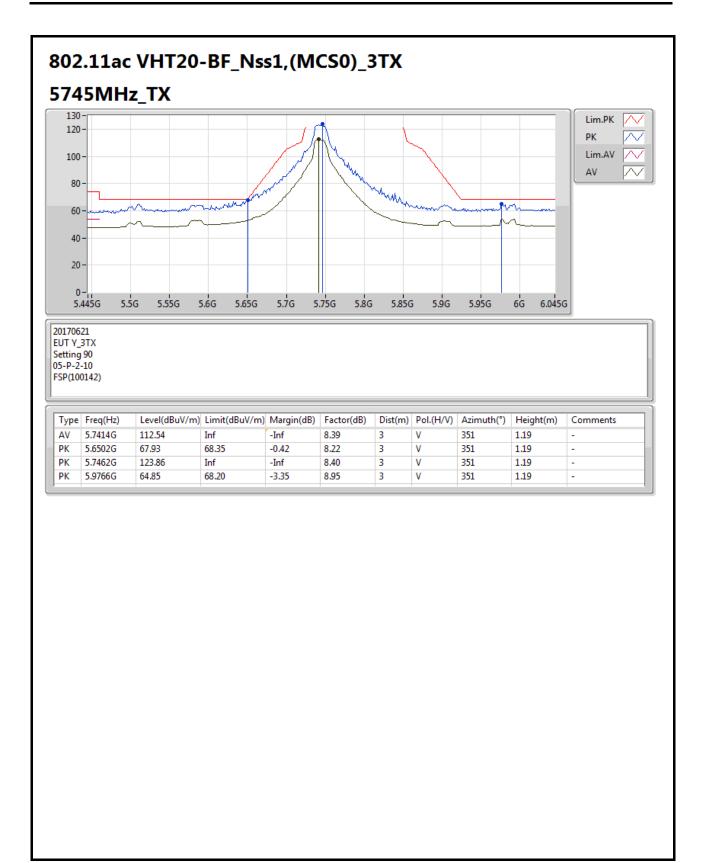




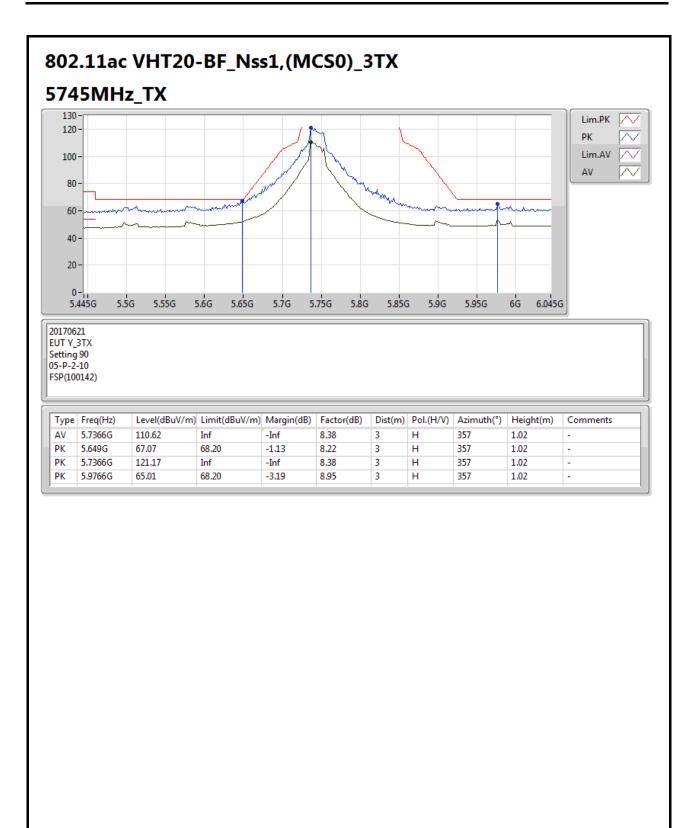


Page No. : 86 of 121



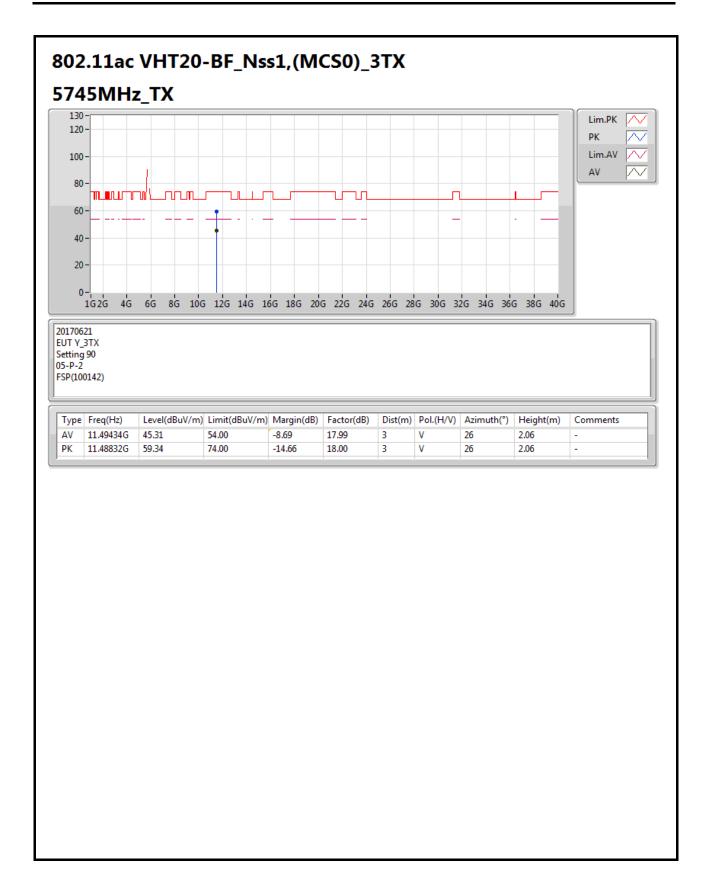




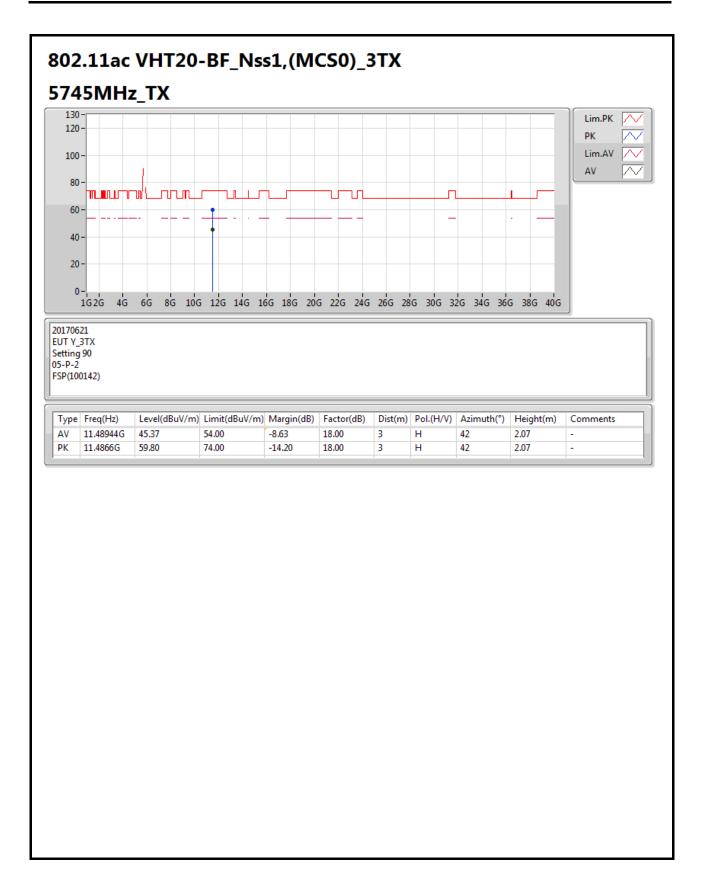


Page No. : 88 of 121



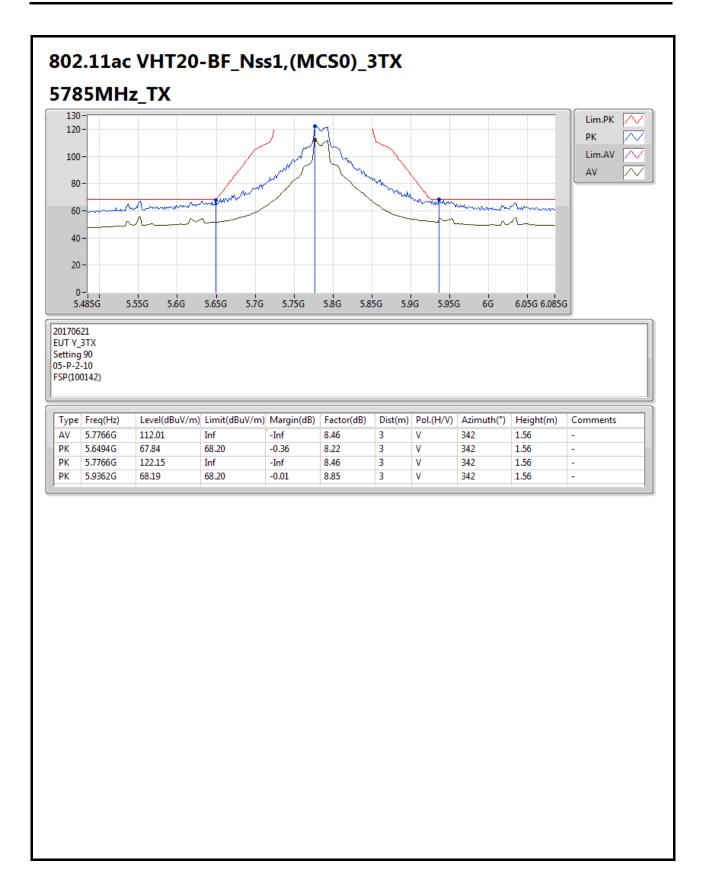






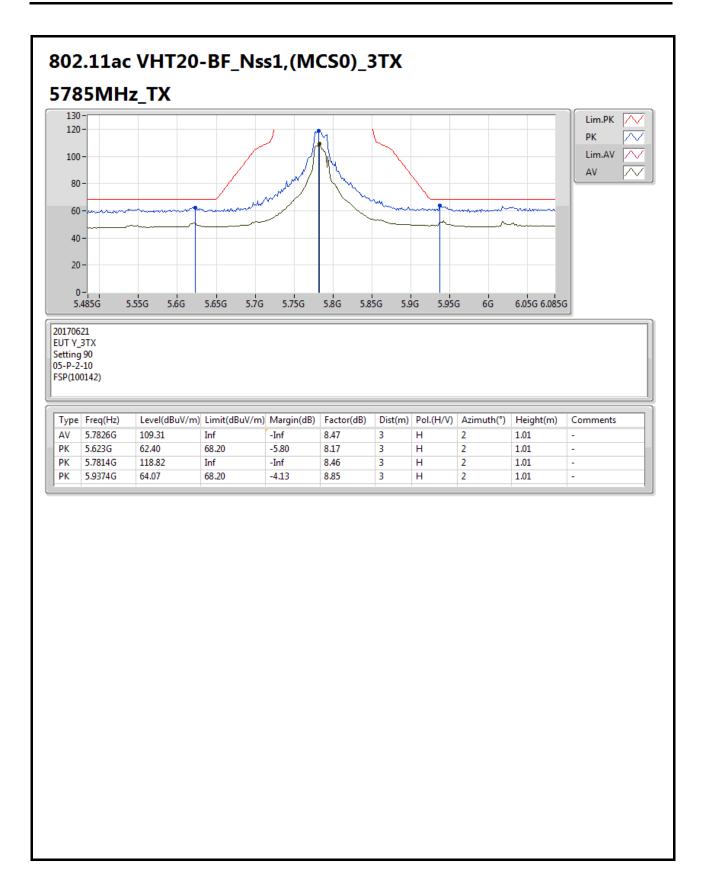
Page No. : 90 of 121



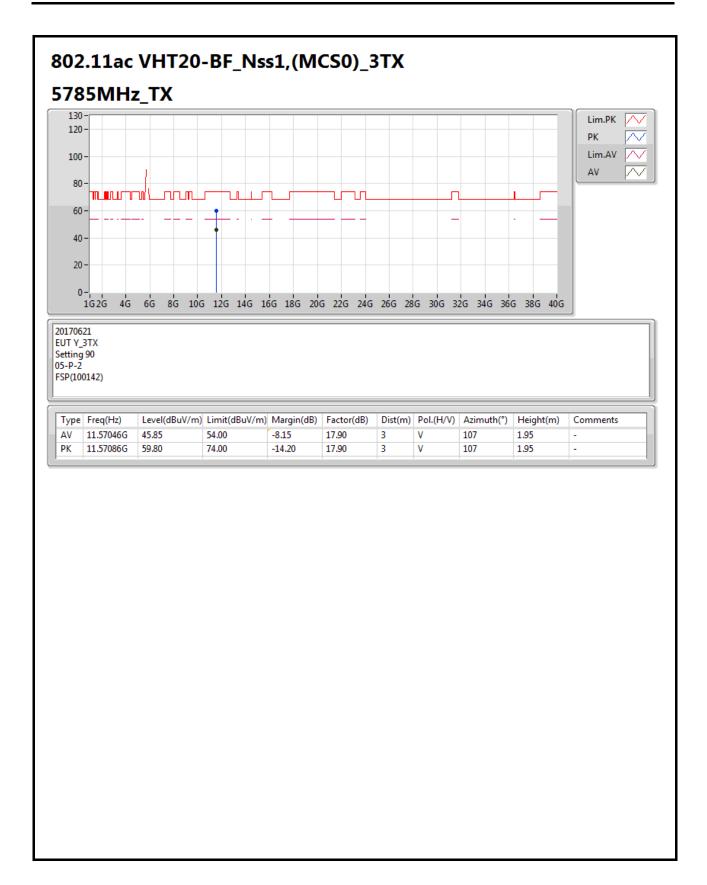


Page No. : 91 of 121

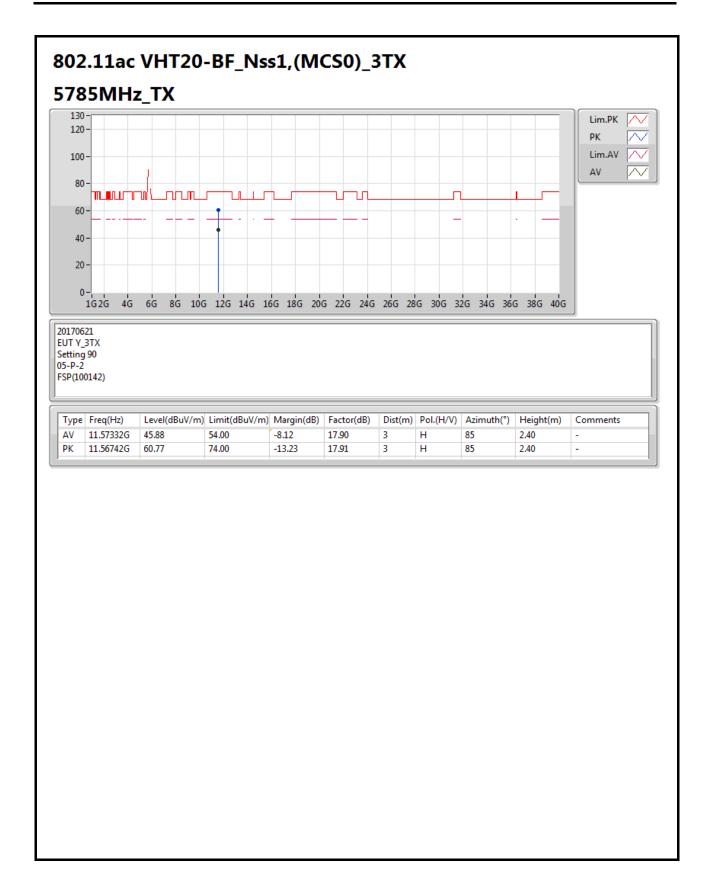




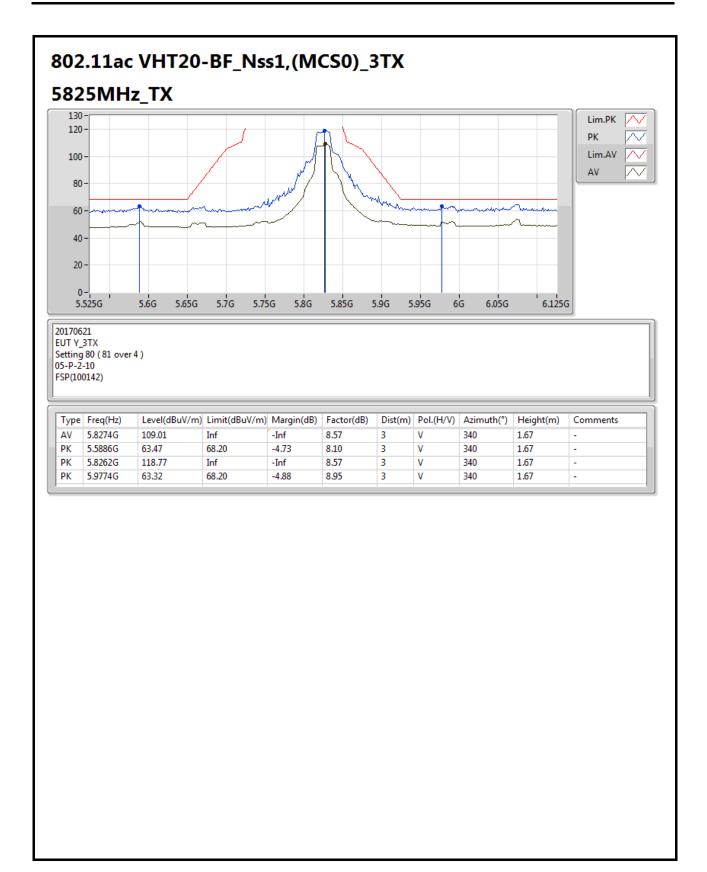




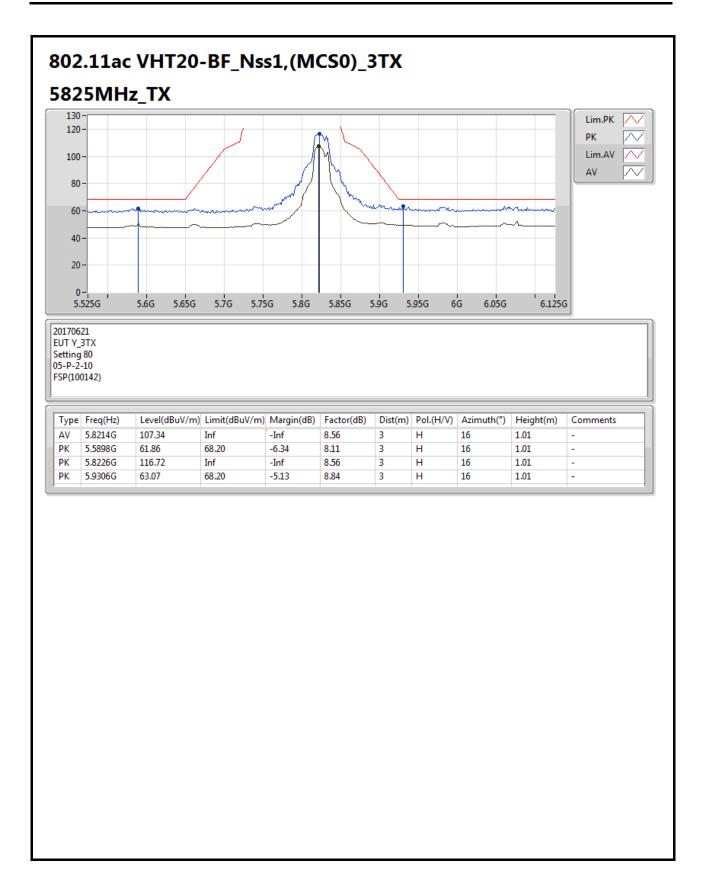






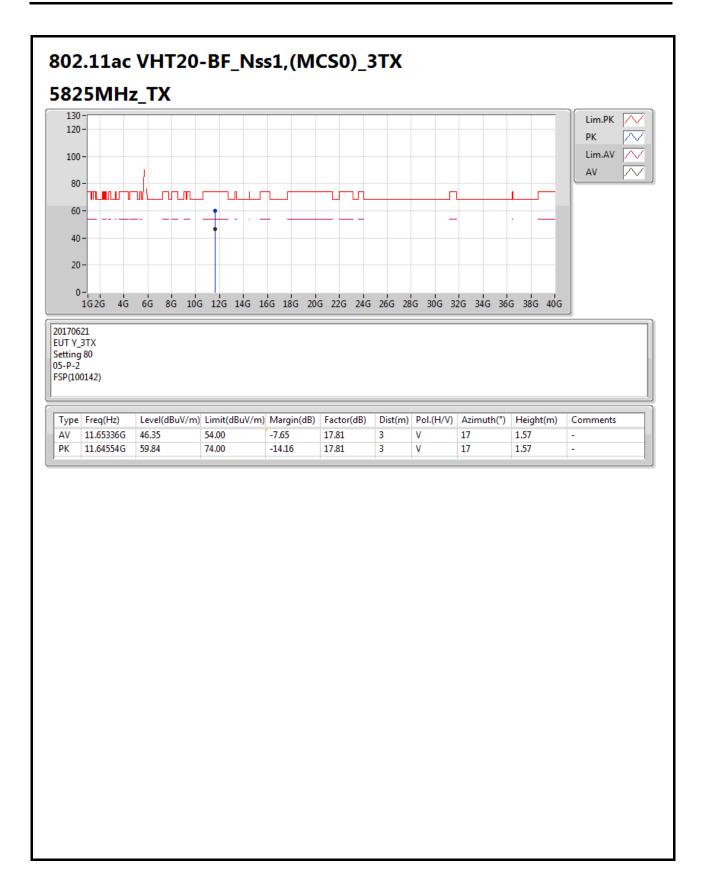




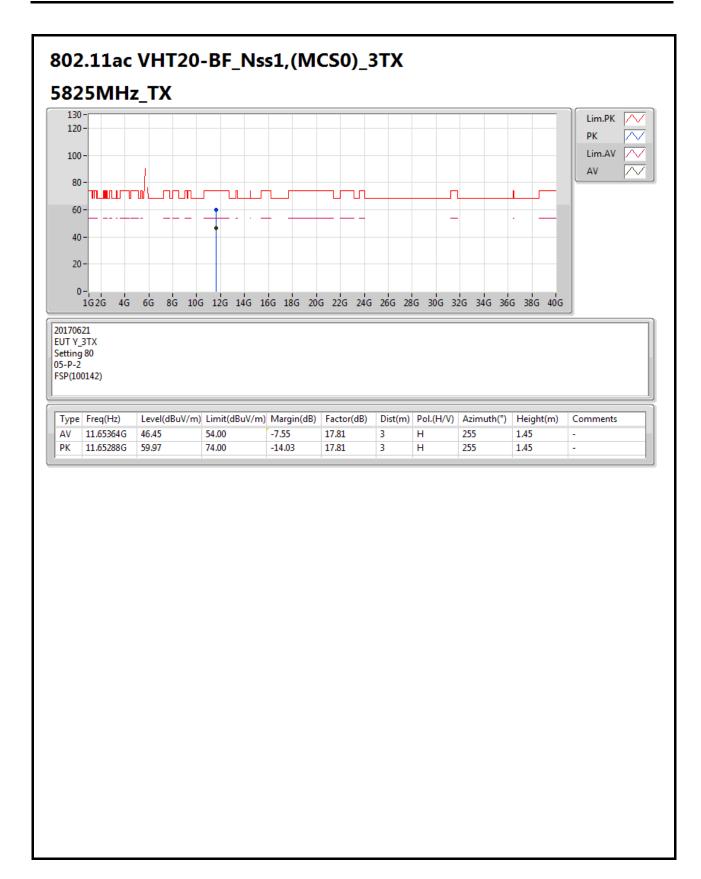


Page No. : 96 of 121



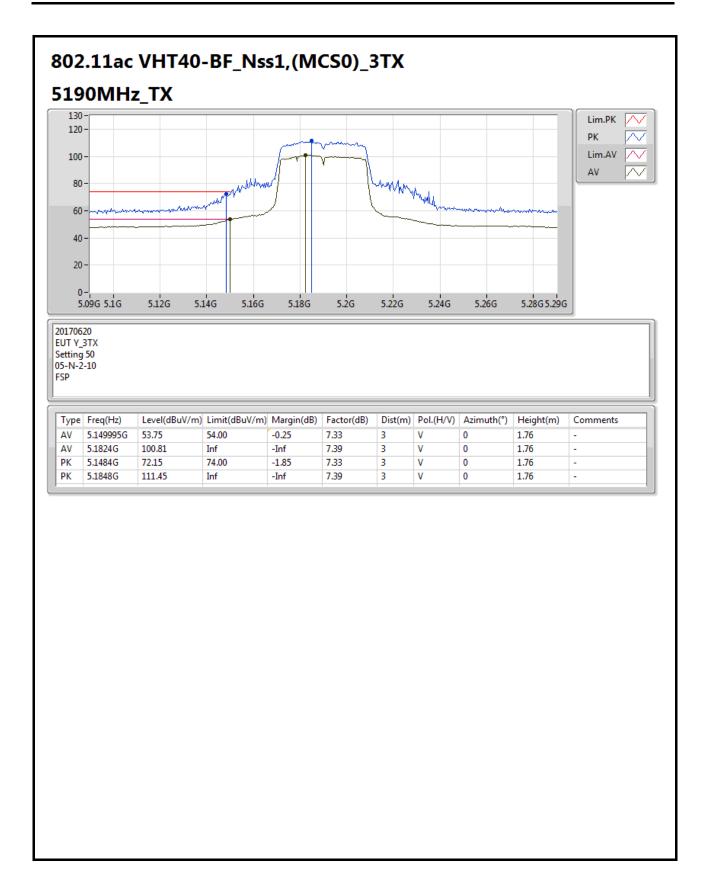






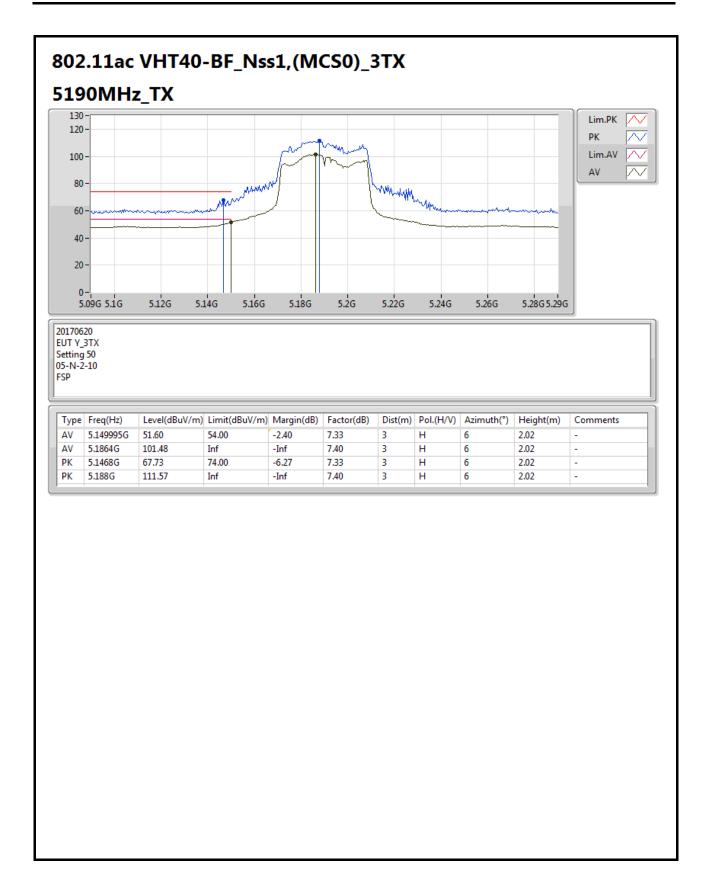
Page No. : 98 of 121



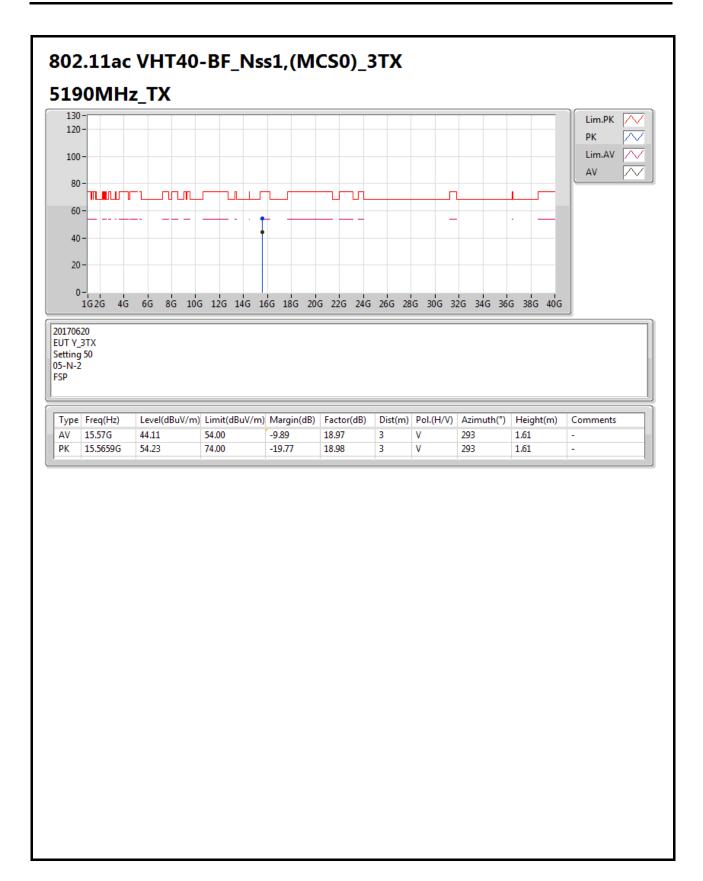


Page No. : 99 of 121



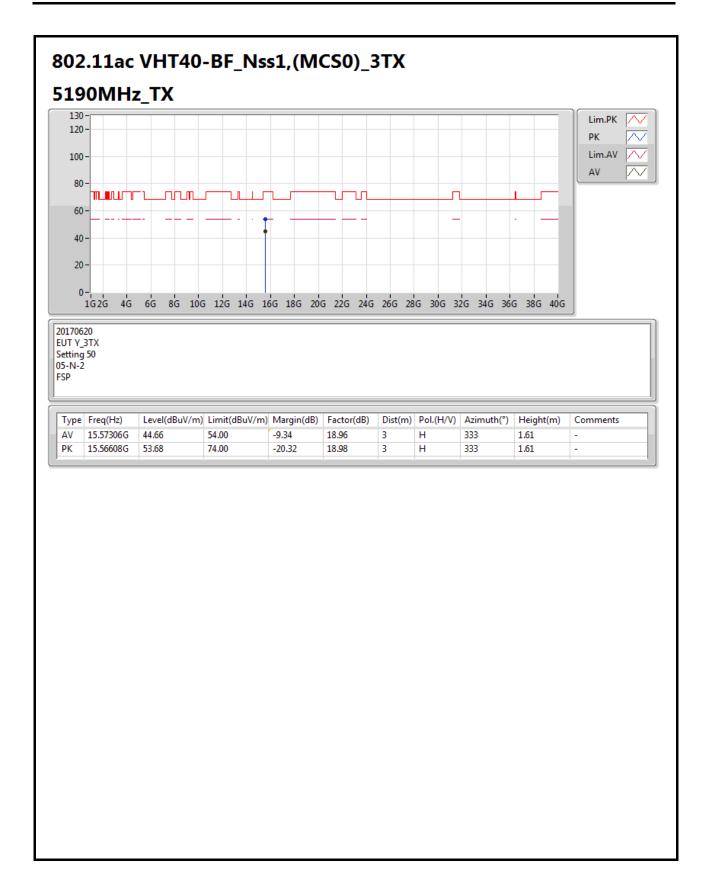






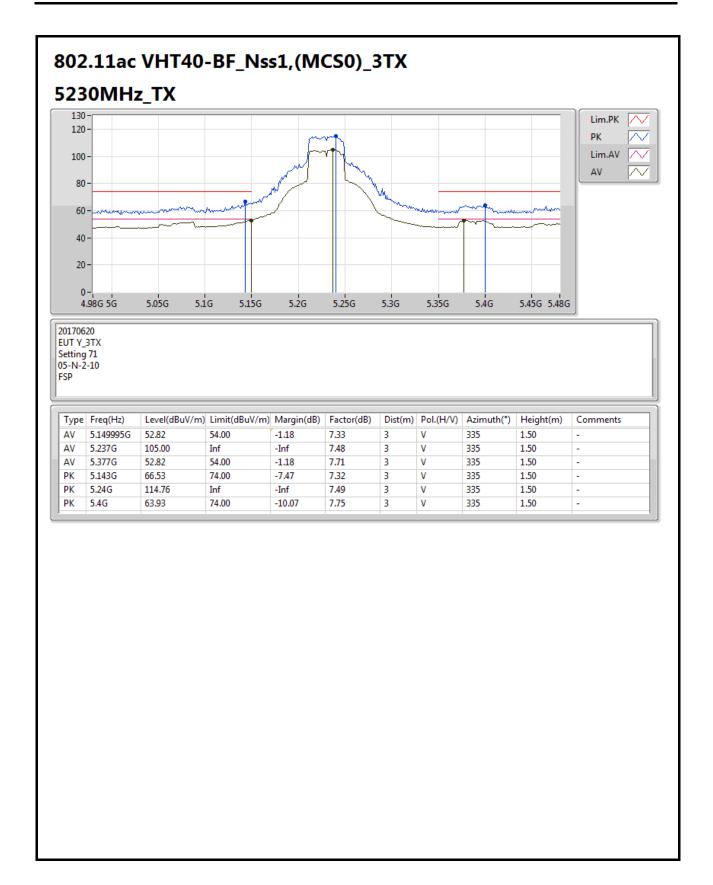
Page No. : 101 of 121





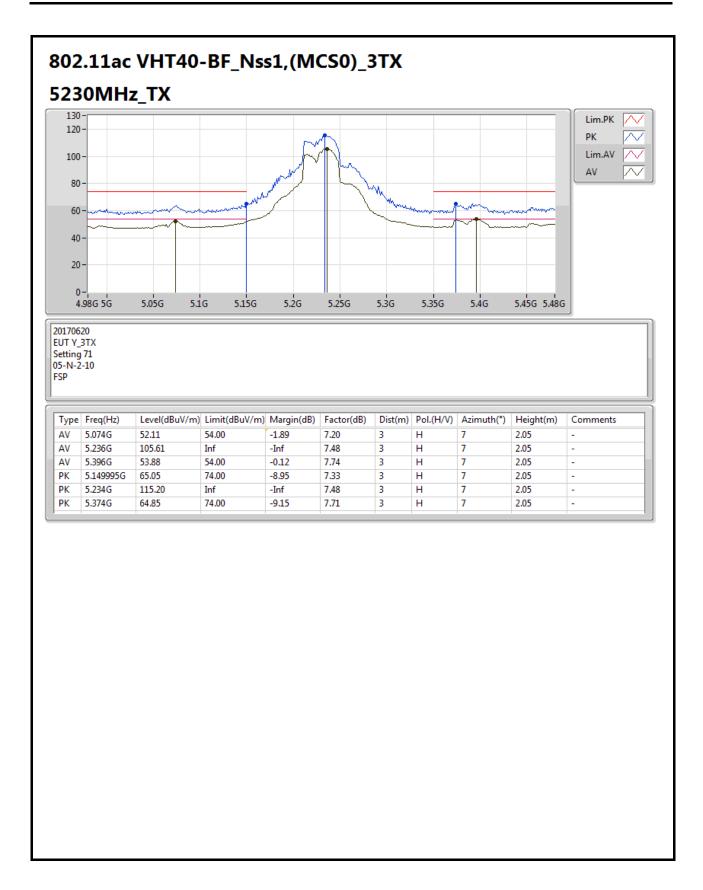
Page No. : 102 of 121



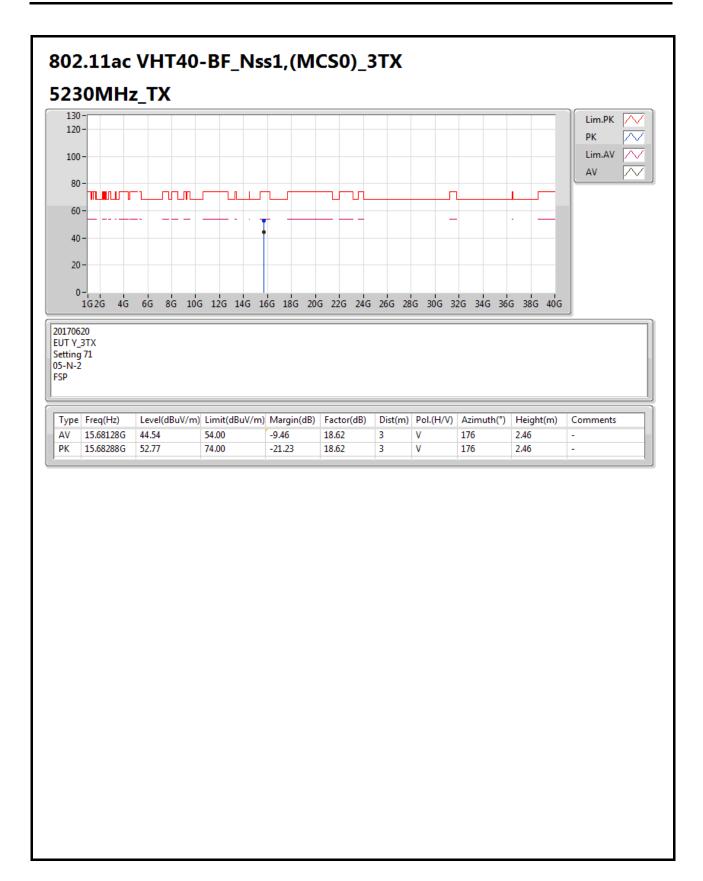


Page No. : 103 of 121

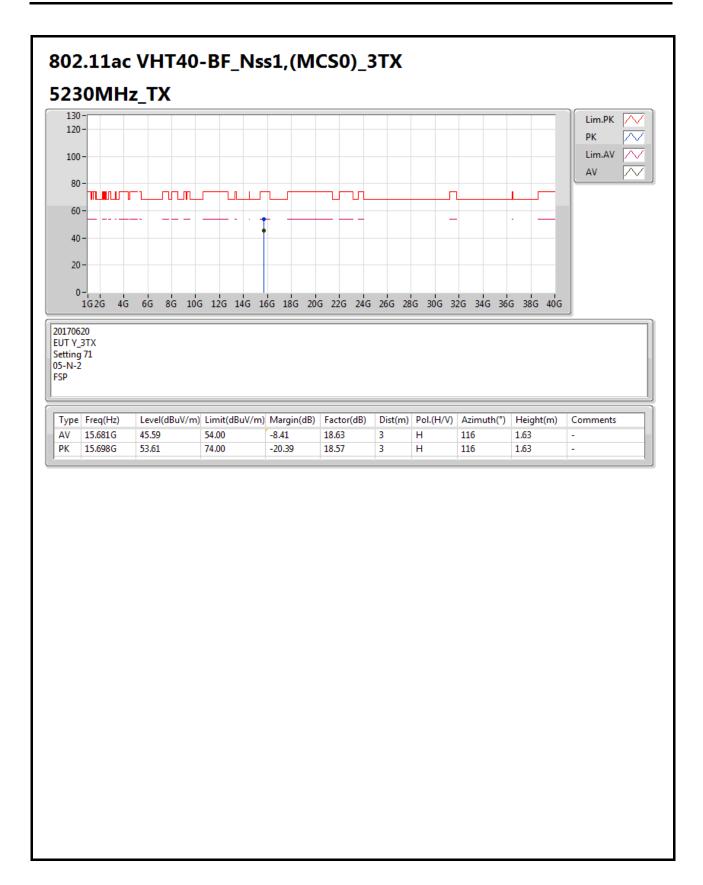






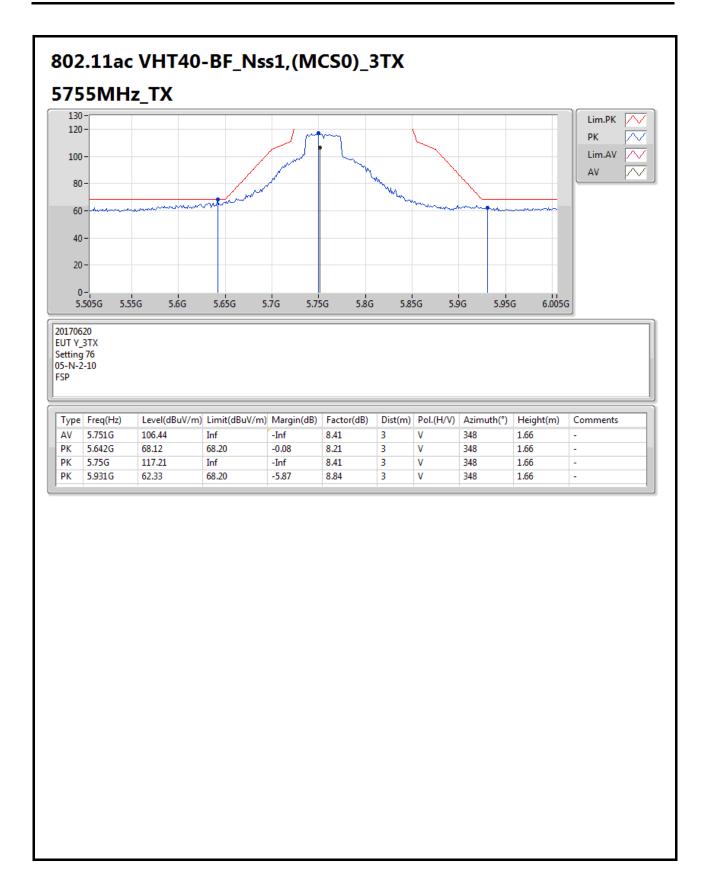






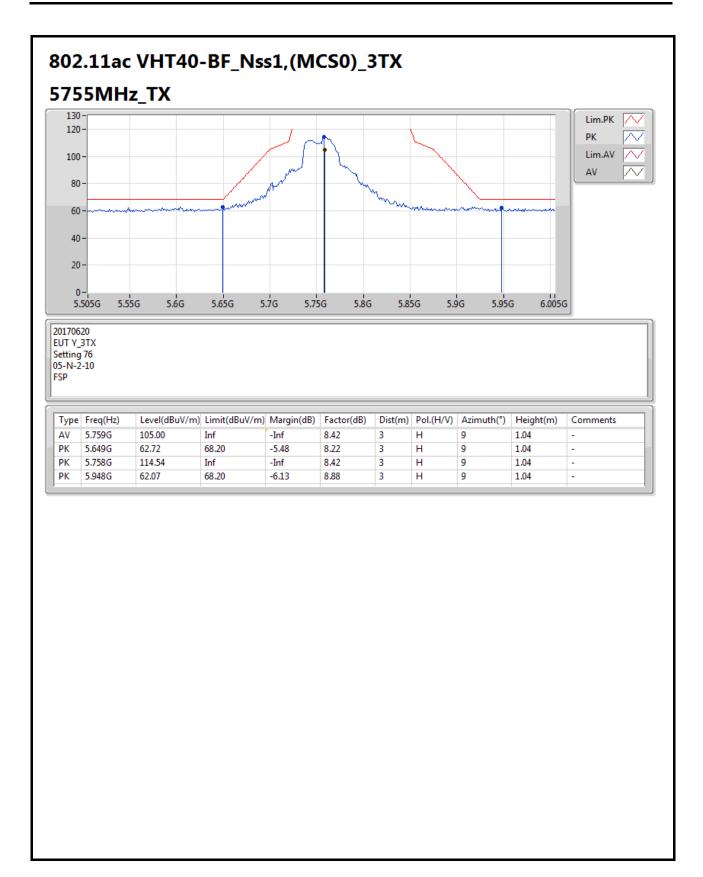
Page No. : 106 of 121





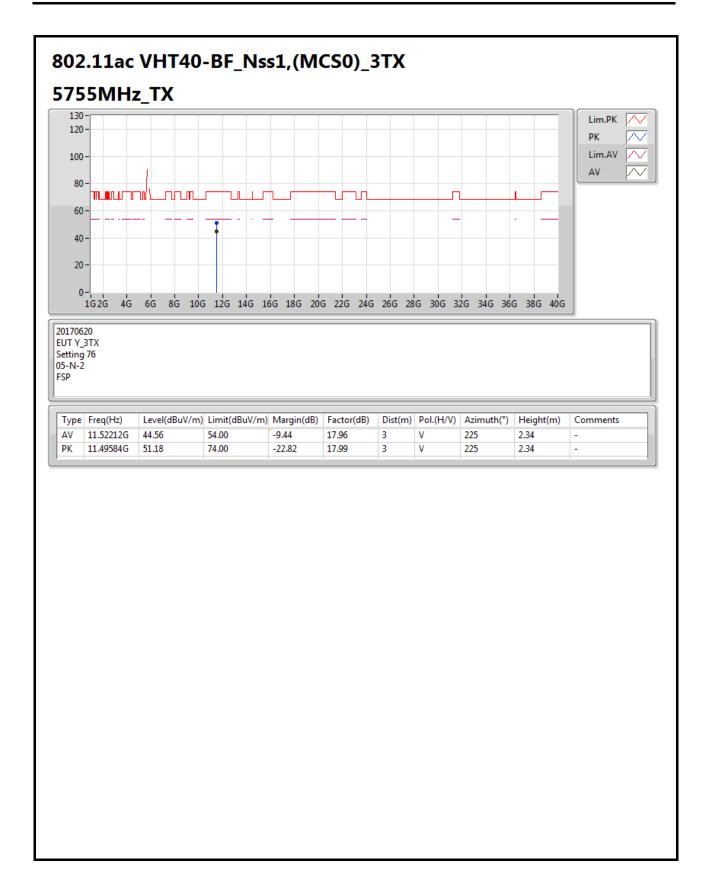
Page No. : 107 of 121





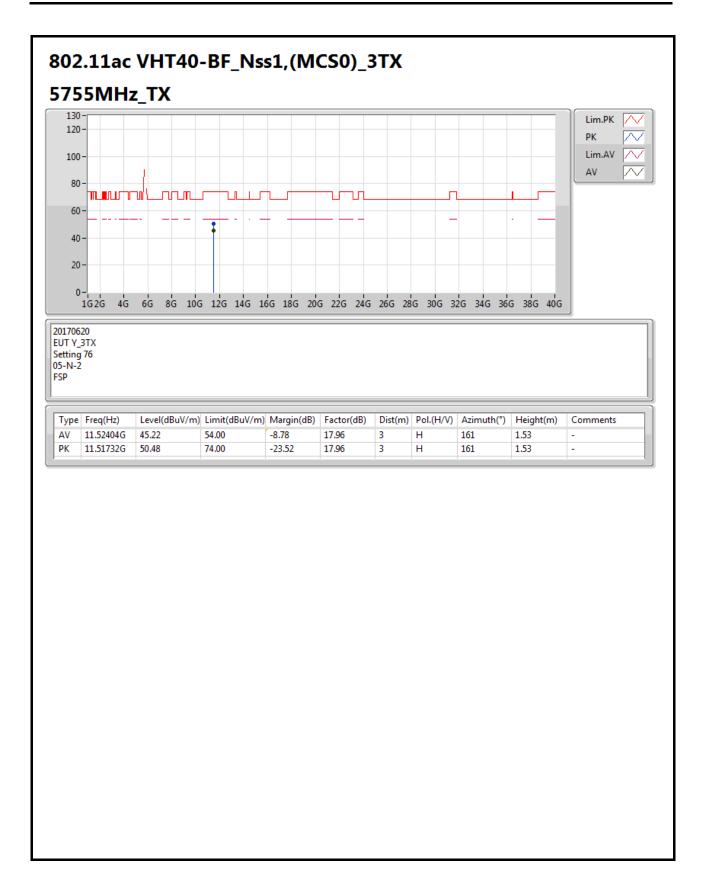
Page No. : 108 of 121



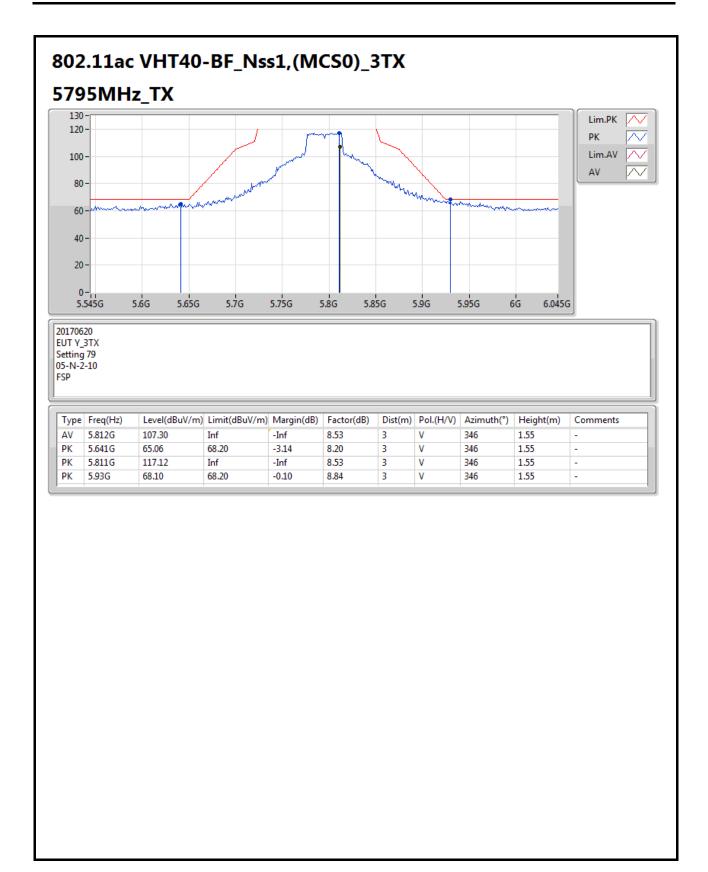


Page No. : 109 of 121



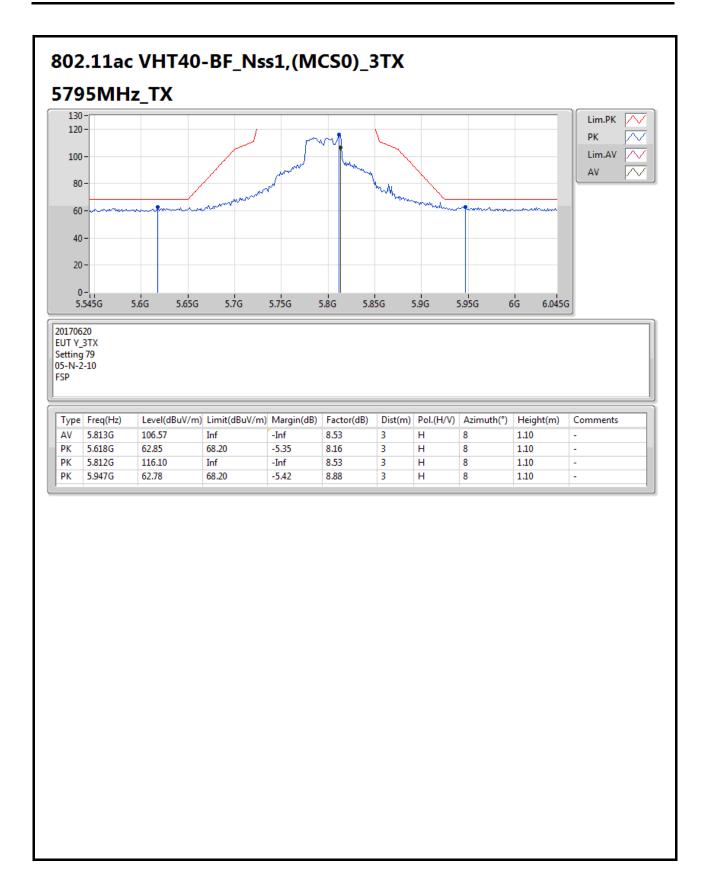






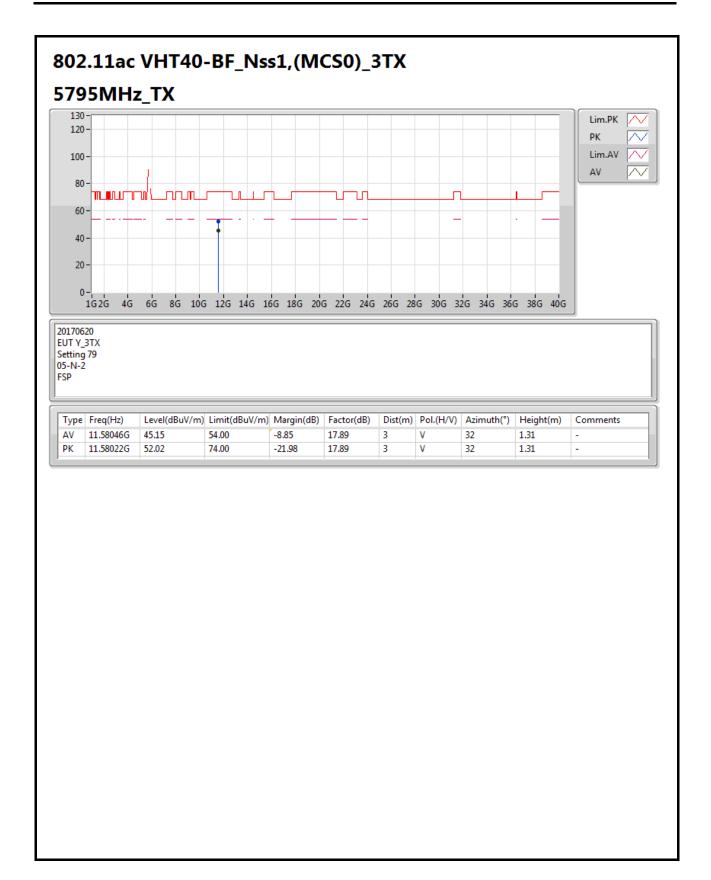
Page No. : 111 of 121



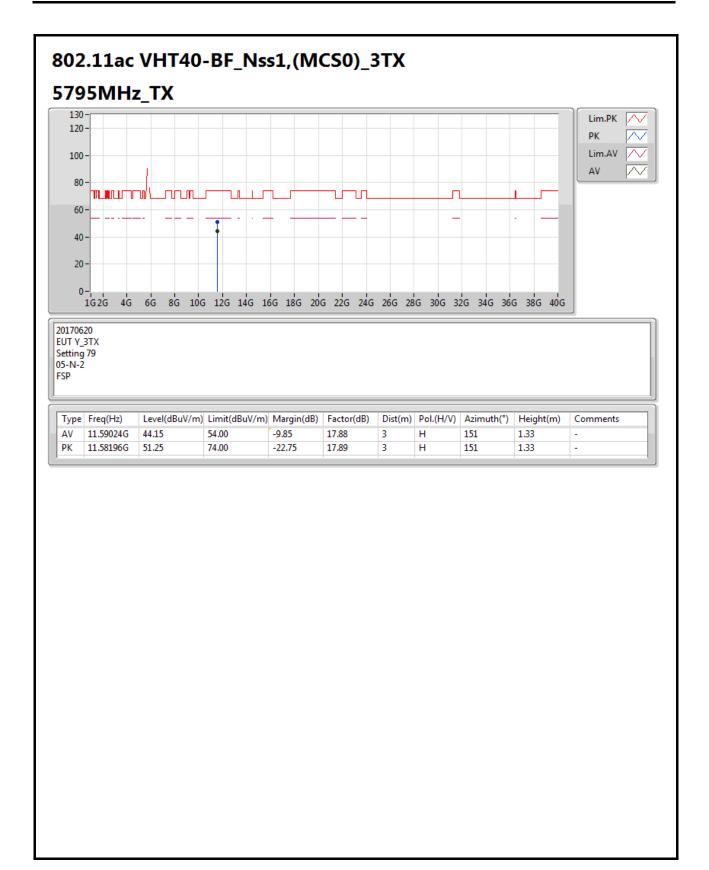


Page No. : 112 of 121



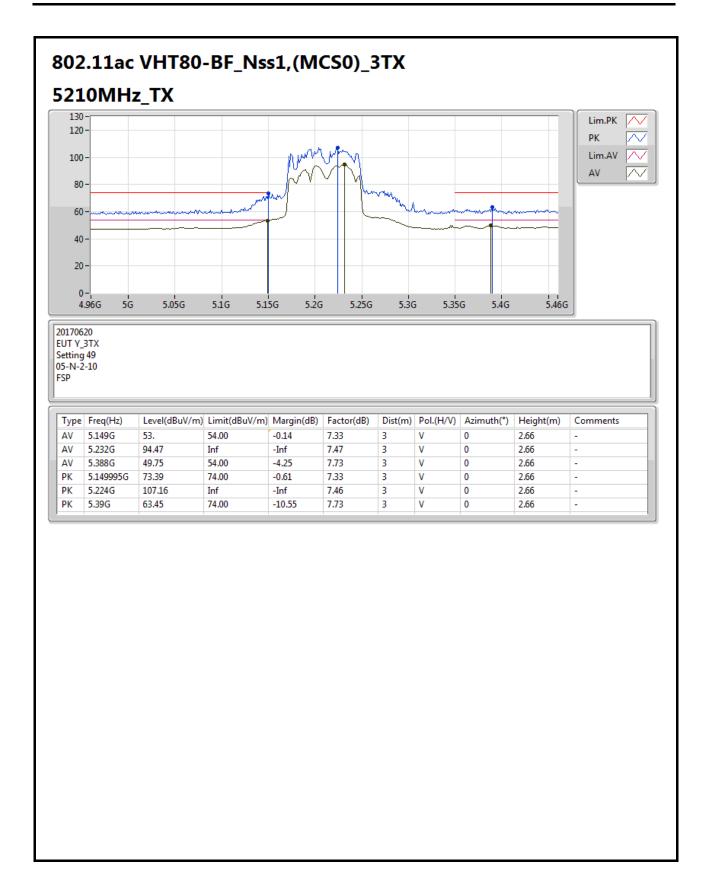






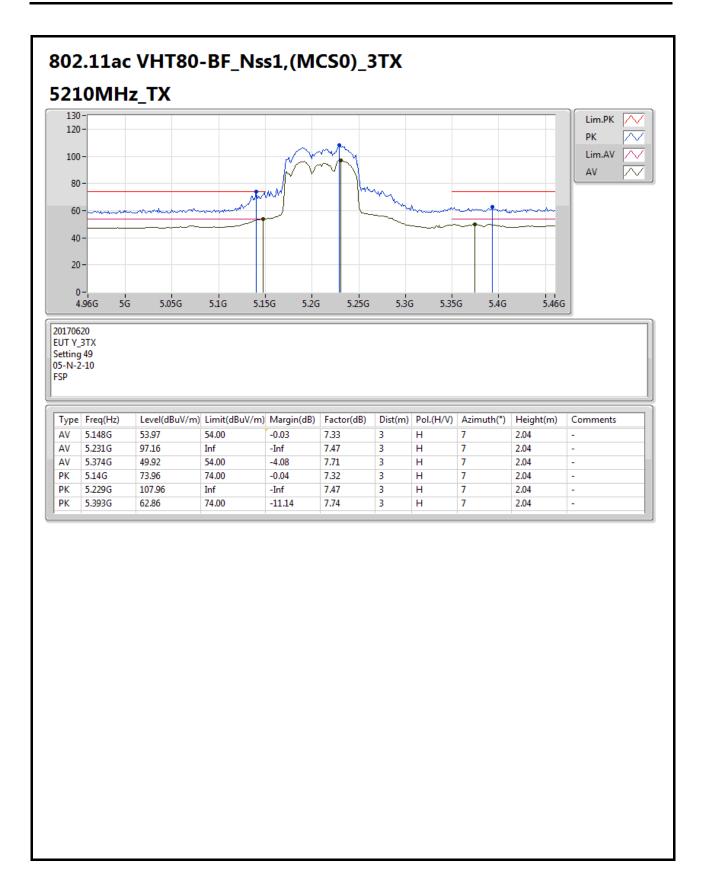
Page No. : 114 of 121



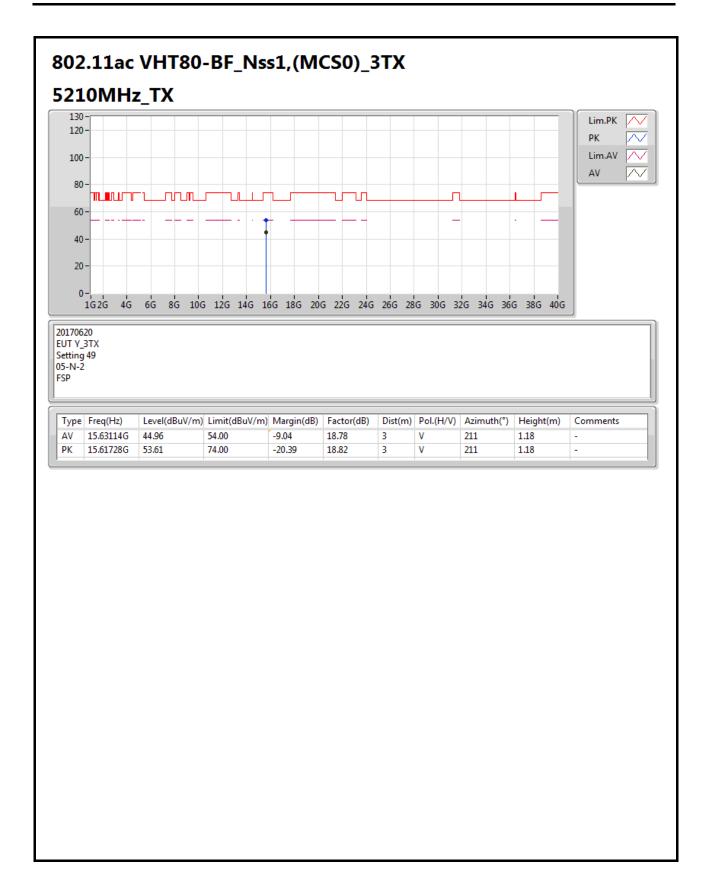


Page No. : 115 of 121



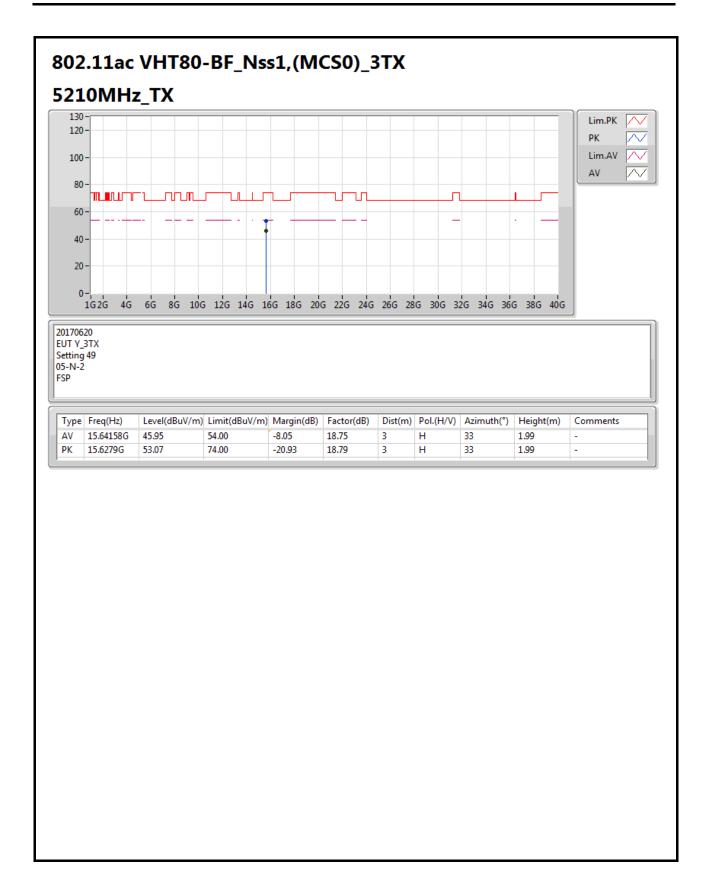






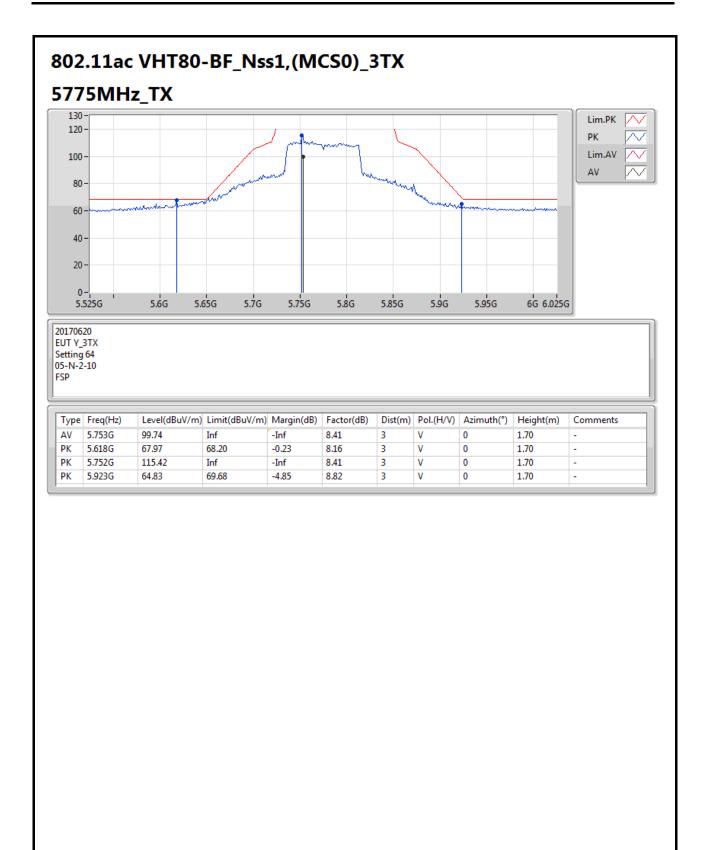
Page No. : 117 of 121





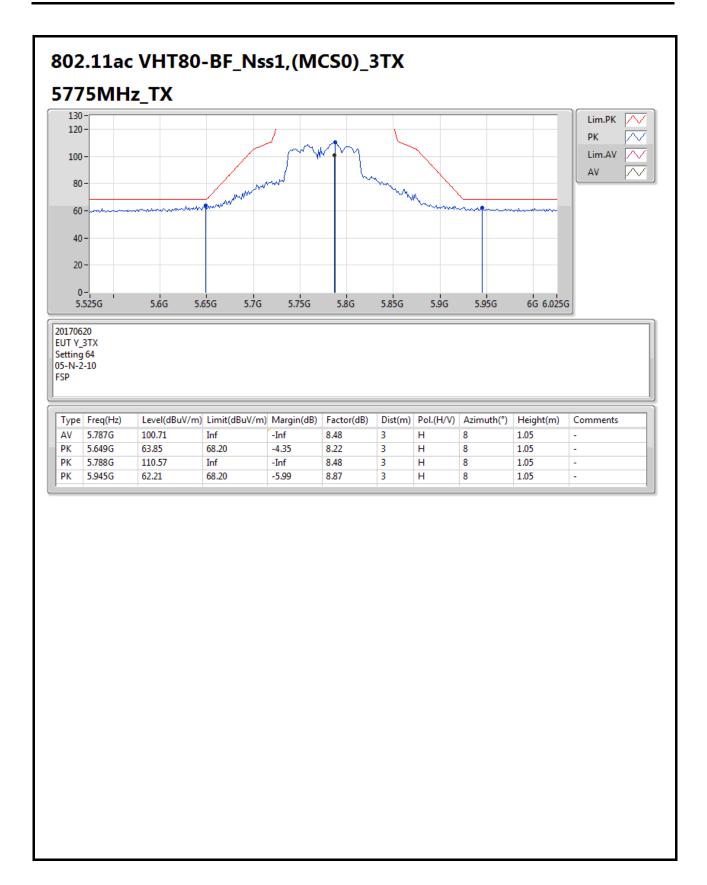
Page No. : 118 of 121



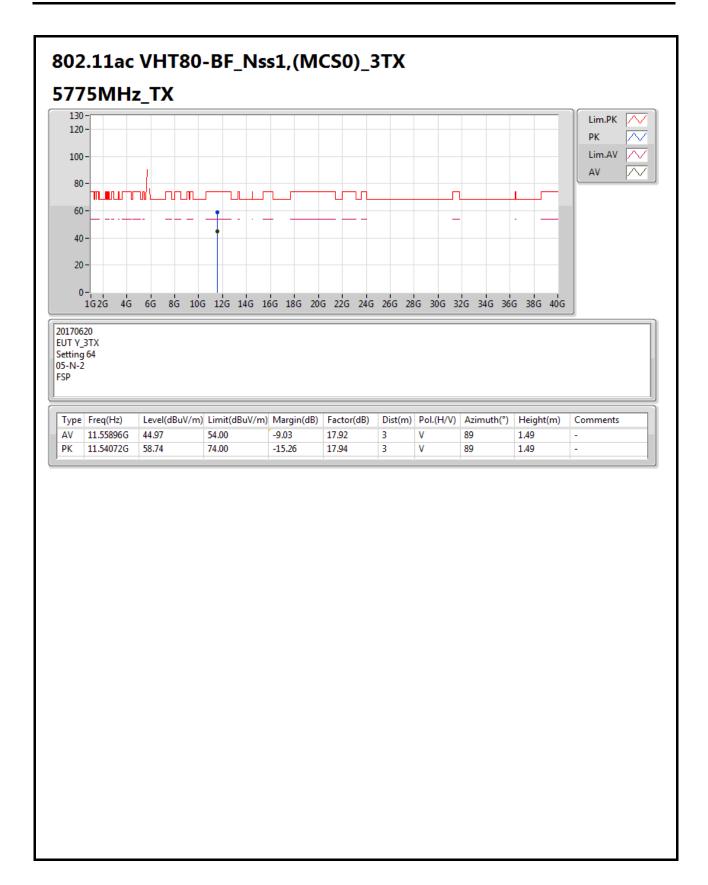


Page No. : 119 of 121



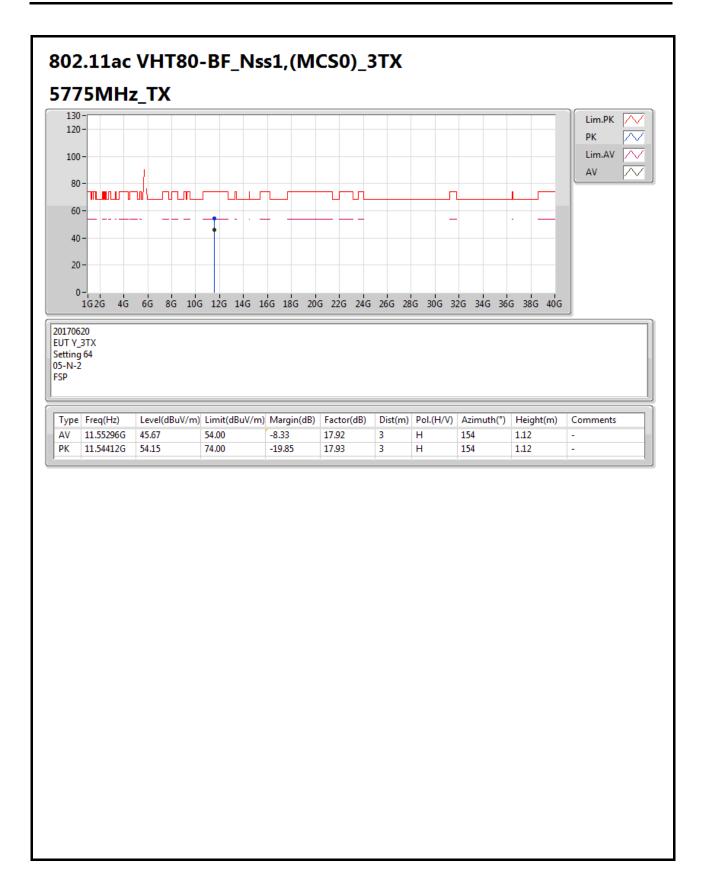






Page No. : 121 of 121







FS Result Appendix F

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

Voltage	Measurement Frequency (MHz)					
(V)		5200 MHz				
	0 Minute	2 Minute	5 Minute	10 Minute		
126.50	5199.9636	5199.9631	5199.9626	5199.9624		
110.00	5199.9635	5199.9630	5199.9629	5199.9620		
93.50	5199.9632	5199.9626	5199.9622	5199.9617		
Max. Deviation (MHz)	0.0368	0.0374	0.0378	0.0383		
Max. Deviation (ppm)	7.08	7.19	7.27	7.37		
Result		P	ass			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)		5200	MHz	
(℃)	0 Minute	2 Minute	5 Minute	10 Minute
0	5199.9598	5199.9597	5199.9589	5199.9584
10	5199.9618	5199.9611	5199.9605	5199.9601
20	5199.9635	5199.9632	5199.9622	5199.9614
30	5199.9958	5199.9950	5199.9948	5199.9947
40	5199.9959	5199.9953	5199.9948	5199.9944
Max. Deviation (MHz)	0.0421	0.0431	0.0434	0.0435
Max. Deviation (ppm)	8.10	8.29	8.35	8.37
Result		Pa	ass	

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)				
0.0	5785 MHz				
(V)	0 Minute	2 Minute	5 Minute	10 Minute	
126.50	5784.9638	5784.9630	5784.9626	5784.9624	
110.00	5784.9635	5784.9631	5784.9622	5784.9612	
93.50	5784.9632	5784.9626	5784.9623	5784.9615	
Max. Deviation (MHz)	0.0368	0.0374	0.0378	0.0388	
Max. Deviation (ppm)	6.36	6.46	6.53	6.71	
Result	Pass				

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)		5785	MHz	
	0 Minute	2 Minute	5 Minute	10 Minute
0	5784.9621	5784.9617	5784.9613	5784.9606
10	5784.9629	5784.9628	5784.9623	5784.9618
20	5784.9635	5784.9630	5784.9624	5784.9619
30	5784.9958	5784.9951	5784.9942	5784.9937
40	5784.9960	5784.9958	5784.9953	5784.9945
Max. Deviation (MHz)	0.0420	0.0426	0.0430	0.0436
Max. Deviation (ppm)	7.26	7.36	7.43	7.54
Result	Pass			

SPORTON INTERNATIONAL INC. : 1 of 3 Page No.



FS Result Appendix F

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

Voltage	Measurement Frequency (MHz)					
0.0		5190 MHz				
(V)	0 Minute	5 Minute	10 Minute			
126.50	5189.9639	5189.9630	5189.9620	5189.9616		
110.00	5189.9635	5189.9629	5189.9624	5189.9621		
93.50	5189.9632	5189.9625	5189.9621	5189.9619		
Max. Deviation (MHz)	0.0368	0.0375	0.0380	0.0384		
Max. Deviation (ppm)	7.09	7.23	7.32	7.40		
Result		Pa	ass			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)		5190	MHz	
(℃)	0 Minute	2 Minute	5 Minute	10 Minute
0	5189.9609	5189.9608	5189.9607	5189.9603
10	5189.9619	5189.9616	5189.9609	5189.9602
20	5189.9635	5189.9628	5189.9623	5189.9617
30	5189.9958	5189.9955	5189.9952	5189.9948
40	5189.9976	5189.9968	5189.9963	5189.9958
Max. Deviation (MHz)	0.0431	0.0435	0.0438	0.0445
Max. Deviation (ppm)	8.30	8.38	8.44	8.57
Result		Pass		

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)					
0.0		5755 MHz				
(V)	0 Minute	2 Minute	5 Minute	10 Minute		
126.50	5754.9638	5754.9634	5754.9624	5754.9619		
110.00	5754.9635	5754.9627	5754.9624	5754.9617		
93.50	5754.9628	5754.9625	5754.9615	5754.9612		
Max. Deviation (MHz)	0.0372	0.0375	0.0385	0.0388		
Max. Deviation (ppm)	6.46	6.52	6.69	6.74		
Result		P	ass			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)		5755	MHz	
(℃)	0 Minute	2 Minute	5 Minute	10 Minute
0	5754.9615	5754.9610	5754.9604	5754.9596
10	5754.9621	5754.9616	5754.9607	5754.9602
20	5754.9635	5754.9633	5754.9631	5754.9623
30	5754.9958	5754.9956	5754.9951	5754.9942
40	5754.9966	5754.9965	5754.9956	5754.9951
Max. Deviation (MHz)	0.0432	0.0439	0.0448	0.0454
Max. Deviation (ppm)	7.51	7.63	7.78	7.89
Result	Pass			

SPORTON INTERNATIONAL INC. Page No. : 2 of 3



FS Result Appendix F

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

Voltage	Measurement Frequency (MHz)					
4.4		5210 MHz				
(V)	0 Minute	2 Minute	5 Minute	10 Minute		
126.50	5209.9643	5209.9638	5209.9629	5209.9625		
110.00	5209.9635	5209.9628	5209.9621	5209.9618		
93.50	5209.9631	5209.9629	5209.9622	5209.9618		
Max. Deviation (MHz)	0.0369	0.0372	0.0379	0.0382		
Max. Deviation (ppm)	7.08	7.14	7.27	7.33		
Result		Pa	ass			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)				
(°C)		5210 MHz			
(℃)	0 Minute	2 Minute	5 Minute	10 Minute	
0	5209.9599	5209.9594	5209.9584	5209.9575	
10	5209.9616	5209.9610	5209.9609	5209.9606	
20	5209.9635	5209.9631	5209.9621	5209.9620	
30	5209.9958	5209.9953	5209.9945	5209.9944	
40	5209.9978	5209.9975	5209.9965	5209.9961	
Max. Deviation (MHz)	0.0423	0.0429	0.0435	0.0438	
Max. Deviation (ppm)	8.12	8.23	8.35	8.41	
Result		Pass			

Voltage vs. Frequency Stability

voltage ver i requerity etabliky						
Voltage	Measurement Frequency (MHz)					
0.0		5775 MHz				
(V)	0 Minute	10 Minute				
126.50	5774.9637	5774.9633	5774.9629	5774.9620		
110.00	5774.9635	5774.9634	5774.9628	5774.9626		
93.50	5774.9632	5774.9629	5774.9621	5774.9617		
Max. Deviation (MHz)	0.0368	0.0371	0.0379	0.0383		
Max. Deviation (ppm)	6.37	6.42	6.56	6.63		
Result		Р	ass			

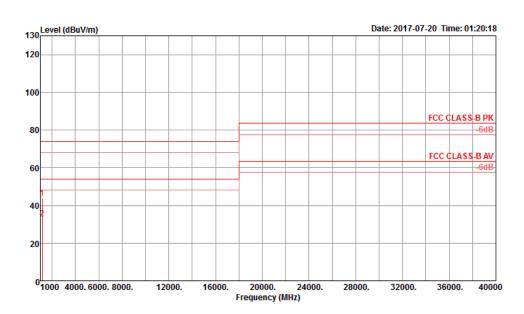
Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)				
(°C)		5775 MHz			
(°C)	0 Minute	2 Minute	5 Minute	10 Minute	
0	5774.9604	5774.9603	5774.9598	5774.9596	
10	5774.9615	5774.9605	5774.9600	5774.9593	
20	5774.9635	5774.9627	5774.9622	5774.9616	
30	5774.9958	5774.9951	5774.9944	5774.9938	
40	5774.9976	5774.9974	5774.9970	5774.9965	
Max. Deviation (MHz)	0.0416	0.0422	0.0430	0.0440	
Max. Deviation (ppm)	7.20	7.31	7.45	7.62	
Result	Pass				

SPORTON INTERNATIONAL INC. Page No. : 3 of 3

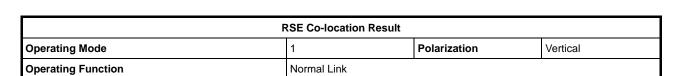


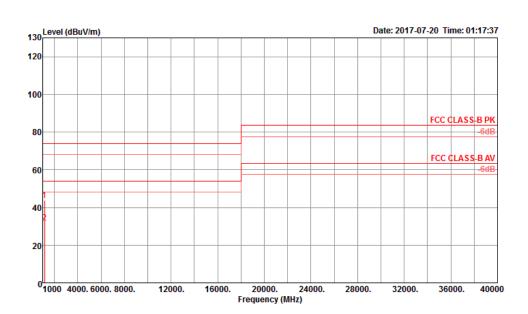
RSE Co-location Result								
Operating Mode	1	Polarization	Horizontal					
Operating Function	Normal Link							



		Freq	Level						Preamp Factor		T/Pos	Remark	Pol/Phase
	-	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	L	1168.46	43.67	74.00	-30.33	50.63	2.99	24.34	34.29	100	360	Peak	HORIZONTAL
	2	1169.00	33.10	54.00	-20.90	40.06	2.99	24.34	34.29	100	360	Average	HORIZONTAL

SPORTON INTERNATIONAL INC. Page No. : 1 of 2





	Freq	Level		Over Limit						T/Pos		Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg			
1	1168.06	43.72	74.00	-30.28	50.68	2.99	24.34	34.29	100	360	Peak	VERTICAL	
2	1168.46	32.04	54.00	-21.96	39.00	2.99	24.34	34.29	100	360	Average	VERTTCAL	

SPORTON INTERNATIONAL INC. Page No. : 2 of 2