

Report No.: FR9D2627AA



# **FCC RADIO TEST REPORT**

FCC ID : W59MN10

Equipment : Epic Mesh Node

Brand Name : Luxul

Model Name : MN-10

Applicant : Luxul Wireless

12884 S Frontrunner Blvd Suite 201 Draper Utah

United States 84020

Standard : 47 CFR FCC Part 15.247

The product was received on Dec. 25, 2019, and testing was started from Dec. 25, 2019 and completed on Jan. 20, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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

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

Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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

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

Report Template No.: CB-A10\_10 Ver1.0

Page Number

: 1 of 32

Issued Date

: Mar. 04, 2020

Report Version : 01

# **Table of Contents**

HISTO	ory of this test report	3
Sumi	mary of Test Result	4
1	General Description	5
1.1	Information	5
1.2	Applicable 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	10
2.3	EUT Operation during Test	
2.4	Accessories	
2.5	Support Equipment	
2.6	Test Setup Diagram	14
3	Transmitter Test Result	18
3.1	AC Power-line Conducted Emissions	
3.2	DTS Bandwidth	
3.3	Maximum Conducted Output Power	
3.4	Power Spectral Density	
3.5	Emissions in Non-restricted Frequency Bands	
3.6	Emissions in Restricted Frequency Bands	
4	Test Equipment and Calibration Data	31
	endix A. Test Results of AC Power-line Conducted Emissions	
Appe	endix B. Test Results of DTS Bandwidth	
Appe	endix C. Test Results of Maximum Conducted Output Power	
Appe	endix D. Test Results of Power Spectral Density	
Appe	endix E. Test Results of Emissions in Non-restricted Frequency Bands	
Appe	endix F. Test Results of Emissions in Restricted Frequency Bands	
Appe	endix G. Test Results of Radiated Emission Co-location	
Appe	endix H. Test Photos	
Phot	ographs of EUT v01	

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

Report Template No.: CB-A10\_10 Ver1.0

Page Number : 2 of 32

Issued Date : Mar. 04, 2020

Report No.: FR9D2627AA

Report Version : 01

# History of this test report

Report No.: FR9D2627AA

Report No.	Version	Description	Issued Date
FR9D2627AA	01	Initial issue of report	Mar. 04, 2020

TEL: 886-3-656-9065 Page Number : 3 of 32
FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# **Summary of Test Result**

Report No.: FR9D2627AA

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

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

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

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

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

Reviewed by: Sam Chen

**Report Producer: Sandy Chuang** 

TEL: 886-3-656-9065 Page Number : 4 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 1 General Description

#### 1.1 Information

#### 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), VHT20	2412-2462	1-11 [11]
2400-2483.5	n (HT40), VHT40	2422-2452	3-9 [7]

Report No.: FR9D2627AA

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	2TX
2.4-2.4835GHz	802.11g	20	2TX
2.4-2.4835GHz	802.11n HT20	20	2TX
2.4-2.4835GHz	802.11n HT20-BF	20	2TX
2.4-2.4835GHz	VHT20	20	2TX
2.4-2.4835GHz	VHT20-BF	20	2TX
2.4-2.4835GHz	802.11n HT40	40	2TX
2.4-2.4835GHz	802.11n HT40-BF	40	2TX
2.4-2.4835GHz	VHT40	40	2TX
2.4-2.4835GHz	VHT40-BF	40	2TX

#### Note:

- 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 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.

TEL: 886-3-656-9065 Page Number : 5 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

#### 1.1.2 Antenna Information

		Po	ort						
Ant.	WLAN 2.4GHz	WLAN 5GHz (Band 1)	WLAN 5GHz (Band 4)	Bluetooth	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	2	-	-	HONGBO	WRG-AC87	PIFA	I-PEX	
2	2	1	-	-	HONGBO	WRG-AC87	PIFA	I-PEX	
3	-	-	1	-	HONGBO	WRG-AC87	PIFA	I-PEX	
4	-	-	2	-	HONGBO	WRG-AC87	PIFA	I-PEX	Note 1
5	-	-	3	-	HONGBO	WRG-AC87	PIFA	I-PEX	
6	-	-	4	-	HONGBO	WRG-AC87	PIFA	I-PEX	
7	-	-	-	1	ALPHA	WRG-AC87	PCB	N/A	

Report No.: FR9D2627AA

#### Note 1

		Gain	(dBi)		Directional Gain (dBi)				
Ant.	WLAN 2.4GHz	WLAN 5GHz (Band 1)	WLAN 5GHz (Band 4)	Bluetooth	WLAN 2.4GHz	WLAN 5GHz (Band 1)	WLAN 5GHz (Band 4)		
1	2.61	3.34	ı	-	4.07	5.40	-		
2	2.61	3.34	ı	-	4.37	5.40	-		
3	-	-	5.45	-	-	-			
4	-	-	5.45	-	-	-	0.54		
5	-	-	5.45	-	-	-	8.51		
6	-	-	5.45	-	-	-			
7	-	-	-	2.80	-	-	-		

Note 2: The above information was declared by manufacturer.

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

#### For 5GHz function:

#### Band 1

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

#### Band 4

#### For IEEE 802.11a/n/ac (4TX/4RX):

Port 1, Port 2, Pot 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Pot 3 and Port 4 could transmit/receive simultaneously.

#### For Bluetooth function:

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

TEL: 886-3-656-9065 Page Number : 6 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.995	0.02	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11g	0.963	0.16	2.068m	1k
VHT20	0.983	0.07	n/a (DC>=0.98)	n/a (DC>=0.98)
VHT20-BF	0.898	0.47	1.818m	1k
VHT40	0.967	0.15	2.44m	1k
VHT40-BF	0.923	0.35	1.753m	1k

Report No.: FR9D2627AA

	- 1 -	
N	Oto:	۰
N	OLG.	

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

# 1.1.4 EUT Operational Condition

EUT Power Type	Fro	From Power Adapter				
December and Inc.	$\boxtimes$	With beamforming		Without beamforming		
Beamforming Function	The product has beamforming function for n/VHT in 2.4GHz and n/ac in 5GHz.					
Function	$\boxtimes$	Point-to-multipoint		Point-to-point		
Test Software Version		<non-beamforming mode=""> QRCT <beamforming mode=""> Telnet</beamforming></non-beamforming>				

Note: The above information was declared by manufacturer.

#### 1.1.5 Table for EUT Operation Mode

Operation Mode	WLAN 2.4GHz	WLAN 5GHz Band 1	WLAN 5GHz Band 4	Bluetooth
AP Router	V	V	V (AP Router and Mesh function)	٧
Repeater	V	V	V (Repeater and Mesh function)	٧

Note: The applicant designated the AP Router mode to perform all test and its test result was written in the report.

TEL: 886-3-656-9065 Page Number : 7 of 32
FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 1.2 Applicable Standards

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

Report No.: FR9D2627AA

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 558074 D01 v05r02
- FCC KDB 662911 D01 v02r01
- FCC KDB 414788 D01 v01r01

# 1.3 Testing Location Information

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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH03-CB	Lucas Huang	21.7-24.3°C / 54-64%	Jan. 13, 2020~ Jan. 20, 2020
Radiated (Below 1GHz)	03CH06CB	KJ Chang	23-24.3°C / 56-60%	Jan. 18, 2020
Radiated (Above 1GHz)	03CH06CB	KJ Chang	14.8-15.4°C / 54-56%	Dec. 25, 2019~ Jan. 17, 2020
AC Conduction	CO01-CB	Max Lin	21~22°C / 58~59%	Jan. 20, 2020

Test site Designation No. TW0006 with FCC.

# 1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	2.4 dB	Confidence levels of 95%
Output Power Measurement	1.5 dB	Confidence levels of 95%
Power Density Measurement	2.4 dB	Confidence levels of 95%
Bandwidth Measurement	2%	Confidence levels of 95%

TEL: 886-3-656-9065 Page Number : 8 of 32
FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

Test site registered number IC 4086D with Industry Canada.

# 2 Test Configuration of EUT

# 2.1 Test Channel Mode

Mode	Power Setting
802.11b_Nss1,(1Mbps)_2TX	-
2412MHz	23.5
2437MHz	24.5
2462MHz	25
802.11g_Nss1,(6Mbps)_2TX	-
2412MHz	20
2417MHz	25
2437MHz	25
2457MHz	25
2462MHz	21
VHT20_Nss1,(MCS0)_2TX	-
2412MHz	19
2417MHz	22
2437MHz	25
2457MHz	25
2462MHz	20.5
VHT40_Nss1,(MCS0)_2TX	-
2422MHz	18.5
2437MHz	19.5
2452MHz	19
VHT20-BF_Nss1,(MCS0)_2TX	-
2412MHz	22
2417MHz	25
2437MHz	25
2462MHz	24
VHT40-BF_Nss1,(MCS0)_2TX	-
2422MHz	19
2427MHz	21
2437MHz	24
2452MHz	23

Report No.: FR9D2627AA

#### Note:

- VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.
- There are two modes of EUT, one is beamforming mode, and the other is Non-beamforming mode for n/VHT in 2.4GHz and n/ac in 5GHz. Beamforming mode and Non-beamforming mode has been test and record in this test report.

TEL: 886-3-656-9065 Page Number : 9 of 32
FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 2.2 The Worst Case Measurement Configuration

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

Report No.: FR9D2627AA

The Worst Case Mode for Following Conformance Tests			
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands		
Test Condition Conducted measurement at transmit chains			

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition  Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in regardless of spatial multiplexing MIMO configuration), the radiated test so be performed with highest antenna gain of each antenna type.			
Operating Mode < 1GHz	Normal Link		
1	EUT_ AP Router		
Operating Mode > 1GHz	СТХ		

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

The Worst Case Mode for Following Conformance Tests				
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation				
Operating Mode	Operating Mode			
1 WLAN 2.4GHz + WLAN 5GHz Band 1 + WLAN 5GHz Band 4 + Bluetooth				
Refer to Sporton Test Report No.: FA9D2627 for Co-location RF Exposure Evaluation.				

Note: The EUT can only be used in Z-axis position.

TEL: 886-3-656-9065 Page Number : 10 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 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 DOS.
- 3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by RX Device and transmit duty cycle no less than 98%.

Report No.: FR9D2627AA

For Normal Link:

During the test, the EUT operation to normal function.

#### 2.4 Accessories

Accessories				
Equipment Brand Model Rating				
Adapter	APD	WA-30P12FU	Input: 100-240V~, 50-60Hz, 0.9A Max. Output: 12V, 2.5A	
Other				
RJ-45 cable*1: Non-Shielded, 1.0m				

TEL: 886-3-656-9065 Page Number : 11 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 2.5 Support Equipment

#### For AC Conduction:

	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
Α	WAN NB	DELL	E6430	N/A		
В	LAN NB	DELL	E6430	N/A		
С	2.4G NB	DELL	E6430	N/A		
D	5G NB	DELL	E6430	N/A		
Е	AP-1	Luxul	MN-10	N/A		
F	AP-2	Luxul	MN-10	N/A		
G	Smart phone	Samsung	Galaxy J2	N/A		
Н	AP-1 NB	DELL	E6430	N/A		
I	AP-2 NB	DELL	E6430	N/A		

Report No.: FR9D2627AA

#### For Radiated (below 1GHz):

	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
Α	NB	DELL	E4300	N/A		
В	NB	DELL	E4300	N/A		
С	AP-1	Luxul	MN-10	N/A		
D	PHONE	HTC	One X9	N/A		
Е	NB	DELL	E4300	N/A		
F	NB	DELL	E4300	N/A		
G	AP-2	Luxul	MN-10	N/A		
Н	NB	DELL	E4300	N/A		
I	NB	DELL	E4300	N/A		

TEL: 886-3-656-9065 Page Number : 12 of 32 FAX: 886-3-656-9085 Ssued Date : Mar. 04, 2020

For Radiated (above 1GHz): <For Non-Beamforming Mode>

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

Report No.: FR9D2627AA

<For Beamforming Mode>

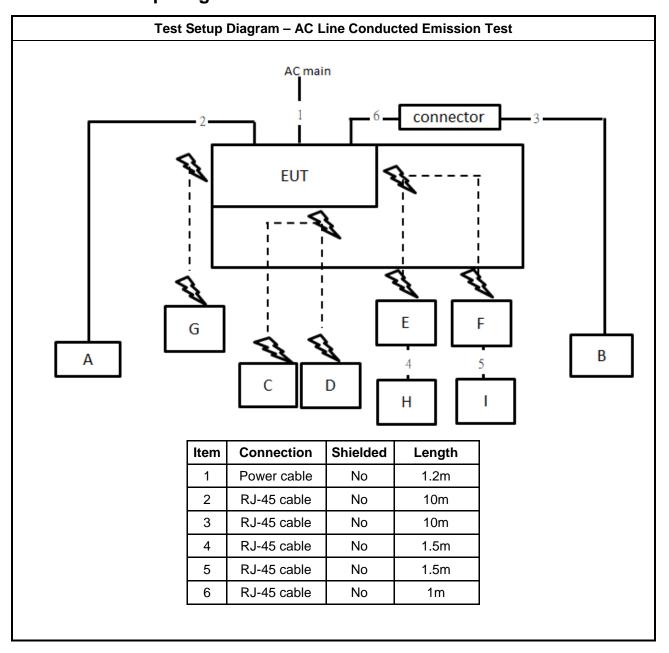
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	NB	DELL	E4300	N/A
В	NB	DELL	E4300	N/A
С	RX Device	Luxul	MN-10	N/A

#### For RF Conducted:

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

TEL: 886-3-656-9065 Page Number : 13 of 32
FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

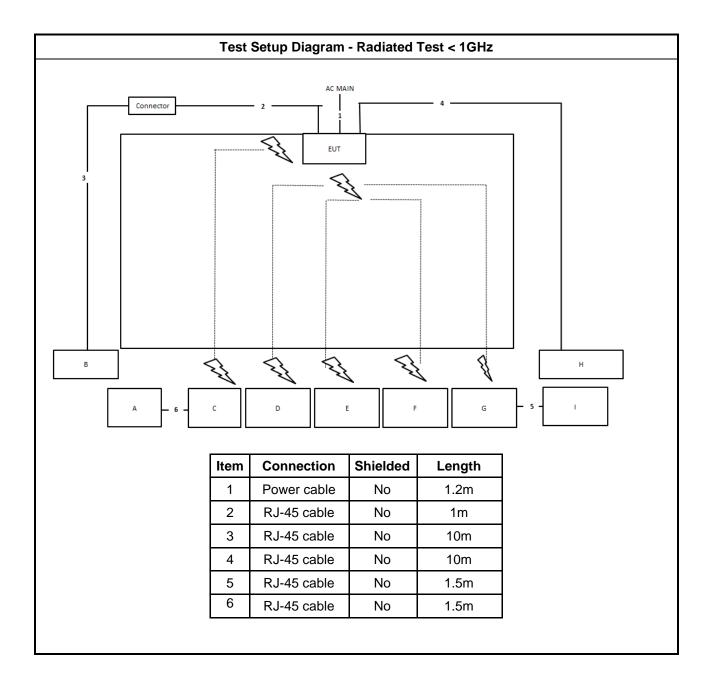
# 2.6 Test Setup Diagram



Report No.: FR9D2627AA

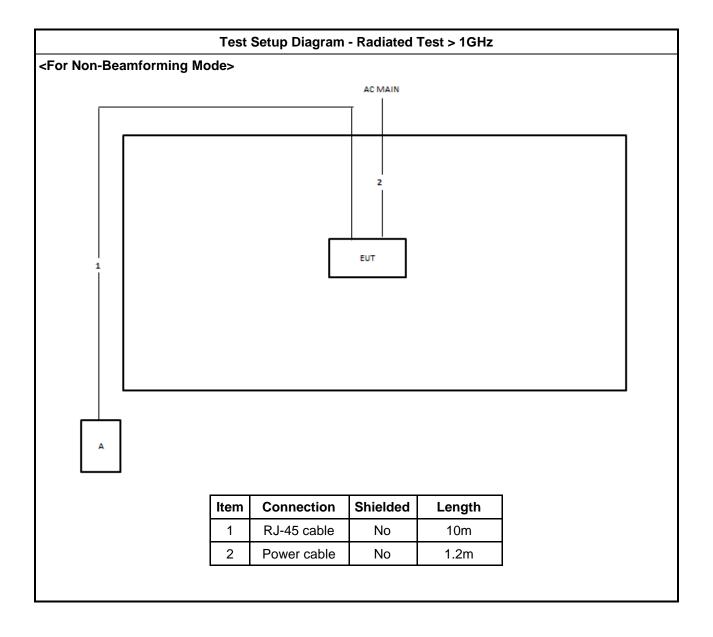
TEL: 886-3-656-9065 Page Number : 14 of 32 FAX: 886-3-656-9085 Saued Date : Mar. 04, 2020

Report No.: FR9D2627AA



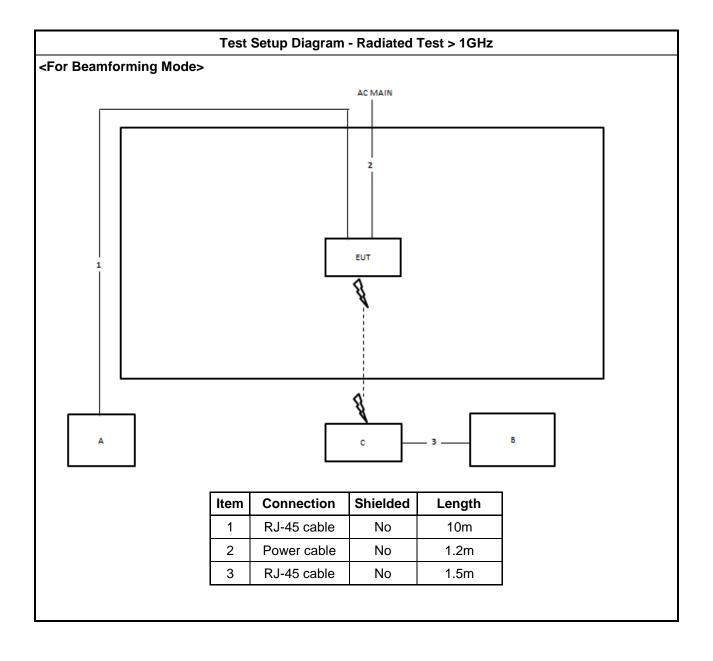
TEL: 886-3-656-9065 Page Number : 15 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

Report No. : FR9D2627AA



TEL: 886-3-656-9065 Page Number : 16 of 32 FAX: 886-3-656-9085 Saued Date : Mar. 04, 2020

Report No.: FR9D2627AA



TEL: 886-3-656-9065 Page Number : 17 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 3 Transmitter Test Result

# 3.1 AC Power-line Conducted Emissions

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

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

Report No.: FR9D2627AA

## 3.1.2 Measuring Instruments

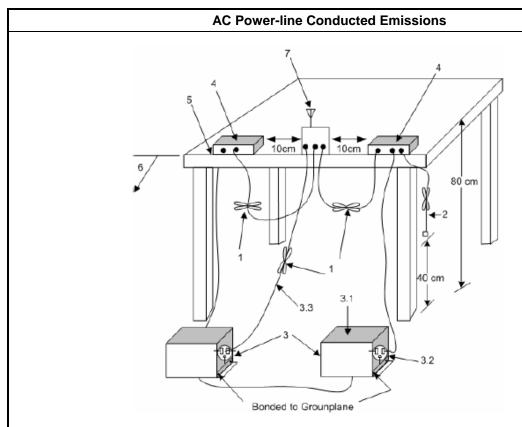
Refer a test equipment and calibration data table in this test report.

#### 3.1.3 Test Procedures

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

TEL: 886-3-656-9065 Page Number : 18 of 32
FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

## 3.1.4 Test Setup



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

Report No.: FR9D2627AA

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

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

Refer as Appendix A

TEL: 886-3-656-9065 Page Number : 19 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 3.2 DTS Bandwidth

#### 3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit		
Systems using digital modulation techniques:		
■ 6 dB bandwidth ≥ 500 kHz.		

Report No.: FR9D2627AA

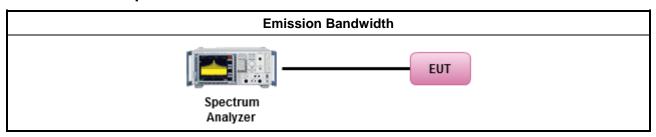
#### 3.2.2 Measuring Instruments

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 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.			
		Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.			
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.			

# 3.2.4 Test Setup



#### 3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

TEL: 886-3-656-9065 Page Number : 20 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 3.3 Maximum Conducted Output Power

#### 3.3.1 Maximum Conducted Output Power Limit

#### **Maximum Conducted Output Power Limit**

- If G<sub>TX</sub> ≤ 6 dBi, then P<sub>Out</sub> ≤ 30 dBm (1 W)
- Point-to-multipoint systems (P2M): If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)$  dBm
- Point-to-point systems (P2P): If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
- Smart antenna system (SAS):
  - Single beam: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
  - Overlap beam: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
  - Aggregate power on all beams: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3 + 8$ dB dBm

Report No.: FR9D2627AA

 $\mathbf{P}_{\text{Out}}$  = maximum peak conducted output power or maximum conducted output power in dBm,  $\mathbf{G}_{\text{TX}}$  = the maximum transmitting antenna directional gain in dBi.

#### 3.3.2 Measuring Instruments

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

TEL: 886-3-656-9065 Page Number : 21 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

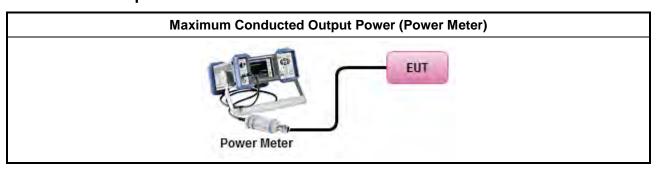
#### 3.3.3 Test Procedures

		Test Method
•	Max	imum Peak Conducted Output Power
		Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).
		Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
•	Max	imum Conducted Output Power
	[duty	/ cycle ≥ 98% or external video / power trigger]
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
	duty	cycle < 98% and average over on/off periods with duty factor
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)
	Mea	surement using a power meter (PM)
		Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
	$\boxtimes$	Refer as FCC KDB 558074, clause $8.3.2.3 \& C63.10$ clause $11.9.2.3.2$ Method AVGPM-G (using an gate 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: $P_{total} = P_1 + P_2 + + P_n \\ \text{(calculated in linear unit [mW] and transfer to log unit [dBm])} \\ \text{EIRP}_{total} = P_{total} + DG$

Report No.: FR9D2627AA

TEL: 886-3-656-9065 Page Number : 22 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 3.3.4 Test Setup



Report No.: FR9D2627AA

# 3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

TEL: 886-3-656-9065 Page Number : 23 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 3.4 Power Spectral Density

# 3.4.1 Power Spectral Density Limit

# Power Spectral Density Limit ■ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

Report No.: FR9D2627AA

## 3.4.2 Measuring Instruments

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

#### 3.4.3 Test Procedures

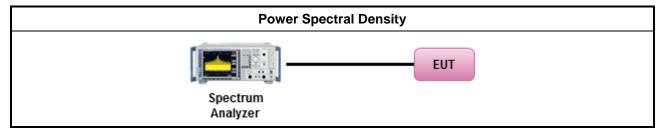
		Test Method
•	outp the c cond of th	k power spectral density procedures that the same method as used to determine the conducted ut power. If maximum peak conducted output power was measured to demonstrate compliance to output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum ducted output power was measured to demonstrate compliance to the output power limit, then one he average PSD procedures shall be used, as applicable based on the following criteria (the peak procedure is also an acceptable option).
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.2 Method PKPSD.
	[duty	/ cycle ≥ 98% or external video / power trigger]
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.3 Method AVGPSD-1.
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.5 Method AVGPSD-2.
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.7 Method AVGPSD-3.
	duty	cycle < 98% and average over on/off periods with duty factor
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.4 Method AVGPSD-1A. (alternative).
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.6 Method AVGPSD-2A. (alternative)
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.8 Method AVGPSD-3A. (alternative)
•	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,

TEL: 886-3-656-9065 Page Number : 24 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

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.

Report No.: FR9D2627AA

#### 3.4.4 Test Setup



#### 3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

TEL: 886-3-656-9065 Page Number : 25 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

## 3.5 Emissions in Non-restricted Frequency Bands

#### 3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit		
RF output power procedure	Limit (dBc)	
Peak output power procedure	20	
Average output power procedure	30	

Report No.: FR9D2627AA

- Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.
- Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

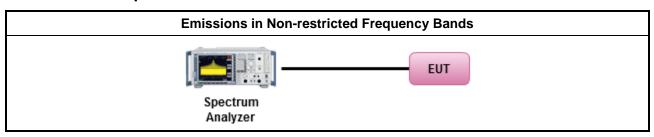
#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

Test Method	
<ul> <li>Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.</li> </ul>	

#### 3.5.4 Test Setup



#### 3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

TEL: 886-3-656-9065 Page Number : 26 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 3.6 Emissions in Restricted Frequency Bands

#### 3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions 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	

Report No.: FR9D2627AA

- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

#### 3.6.2 Measuring Instruments

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

TEL: 886-3-656-9065 Page Number : 27 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

#### 3.6.3 Test Procedures

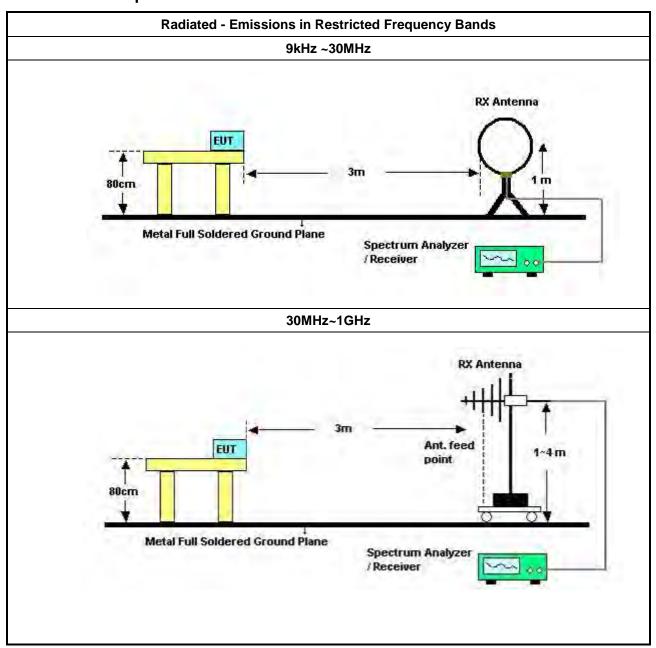
		Test Method	
•	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].		
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.		
•	For	the transmitter unwanted emissions shall be measured using following options below:	
	<ul> <li>Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.</li> </ul>		
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle ≥98%).	
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).	
		☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).	
		☐ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.	
		Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.	
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.	
•	For	the transmitter band-edge emissions shall be measured using following options below:	
	•	Refer as FCC KDB 558074 clause 8.7 & C63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.	
	•	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.	
	•	Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).	
	•	For conducted unwanted emissions into restricted bands (absolute emission limits).  Devices with multiple transmit chains using options given below:  (1) Measure and sum the spectra across the outputs or  (2) Measure and add 10 log(N) dB	
	•	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.	

Report No.: FR9D2627AA

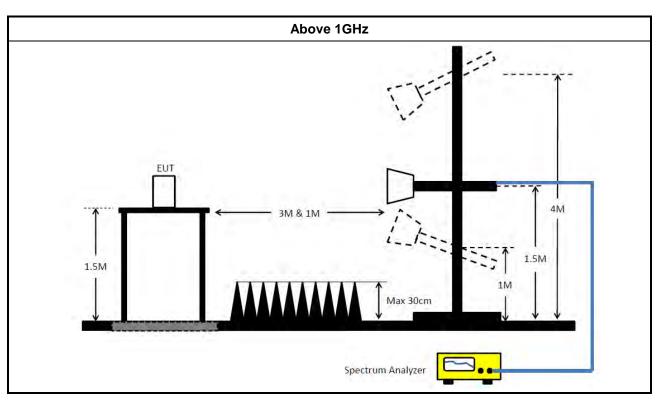
TEL: 886-3-656-9065 Page Number : 28 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

Report No.: FR9D2627AA

# 3.6.4 Test Setup



TEL: 886-3-656-9065 Page Number : 29 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020



Report No.: FR9D2627AA

#### 3.6.5 Measurement Results Calculation

The measured Level is calculated using:

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

#### 3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

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

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

#### 3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

TEL: 886-3-656-9065 Page Number : 30 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020

# 4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics Calibration Date		Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 28, 2019	Jan. 29, 2020	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50- 16-2	04083	150kHz ~ 100MHz	Dec. 25, 2019	Dec. 24, 2020	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Oct. 30, 2019	Oct. 29, 2020	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Aug. 03, 2019	Aug. 02, 2020	Radiation (03CH06-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	9120D-1292	1GHz~18GHz	Jul. 17, 2019	Jul. 16, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 12, 2019	Jun. 11, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	May 07, 2019	May 06, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	May 08, 2019	May 07, 2020	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 21, 2019	Oct. 20, 2020	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH06-CB)
RF Cable-low	HUBER+SUH NER	RG402	Low Cable-05+24	30MHz~1GHz Oct. 07, 2019		Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUH NER	RG402	High Cable-05	1GHz~18GHz Oct. 07, 2019		Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUH NER	RG402	High Cable-05+24	1GHz~18GHz Oct. 07, 2019		Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)

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

Report Template No.: CB-A10\_10 Ver1.0

Page Number : 31 of 32 Issued Date : Mar. 04, 2020

Report No.: FR9D2627AA

Report Version : 01

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz Nov. 01, 2019		Oct. 31, 2020	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1726195	300MHz~40GHz Aug. 13, 2019 A		Aug. 12, 2020	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz Aug. 13, 2019		Aug. 12, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz – 26.5 GHz Oct. 07, 2019		Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-13	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz – 26.5 GHz Oct. 07, 2019		Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)

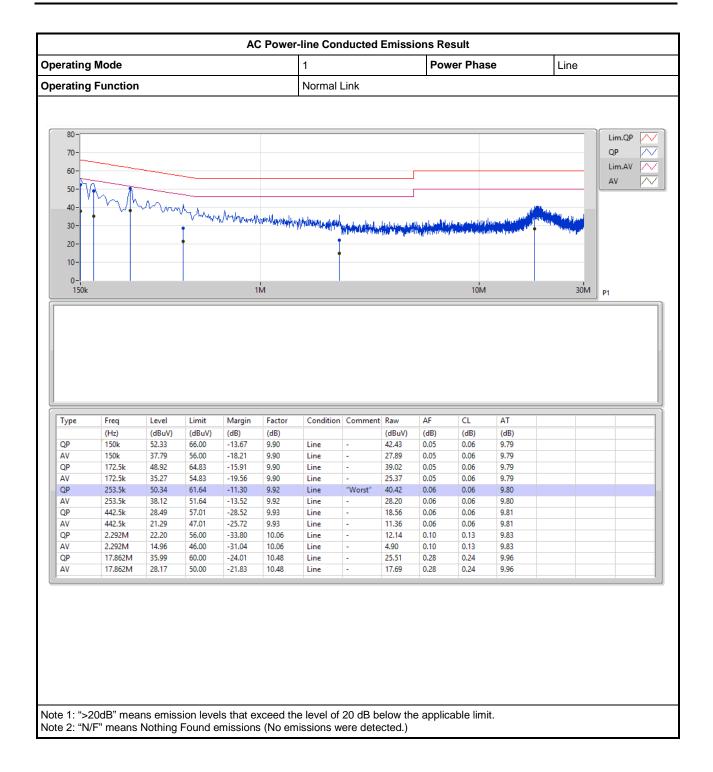
Report No.: FR9D2627AA

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

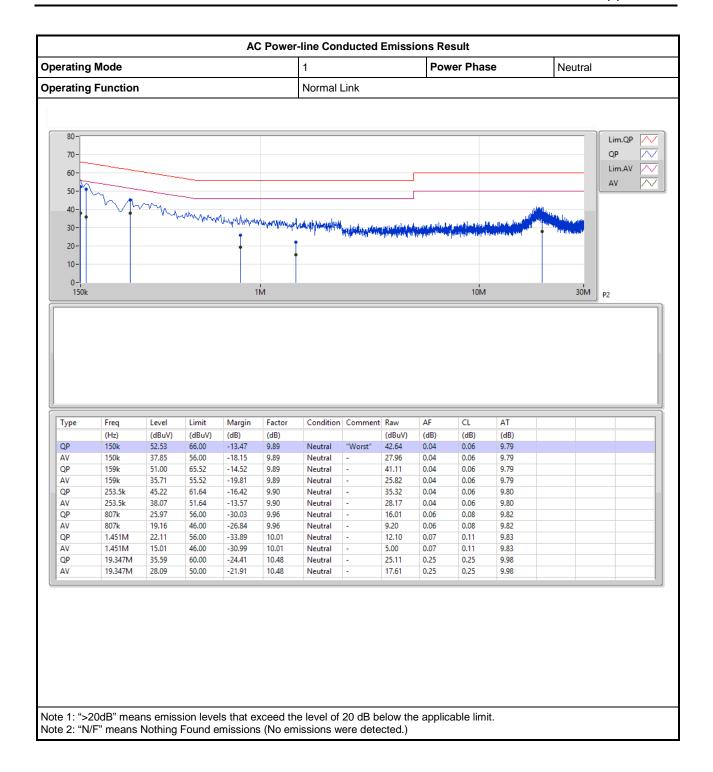
NCR means Non-Calibration required.

TEL: 886-3-656-9065 Page Number : 32 of 32 FAX: 886-3-656-9085 Issued Date : Mar. 04, 2020











EBW Appendix B

**Summary** 

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	8.075M	13.018M	13M0G1D	7.55M	12.819M
802.11g_Nss1,(6Mbps)_2TX	16.35M	16.792M	16M8D1D	16.325M	16.392M
VHT20_Nss1,(MCS0)_2TX	17.575M	17.916M	17M9D1D	17.15M	17.566M
VHT40_Nss1,(MCS0)_2TX	35.3M	35.932M	35M9D1D	32.75M	35.832M
VHT20-BF_Nss1,(MCS0)_2TX	17.6M	17.641M	17M6D1D	15.55M	17.366M
VHT40-BF_Nss1,(MCS0)_2TX	33.1M	35.982M	36M0D1D	26.3M	35.732M

**Max-N dB** = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth; **Min-N dB** = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;



EBW Appendix B

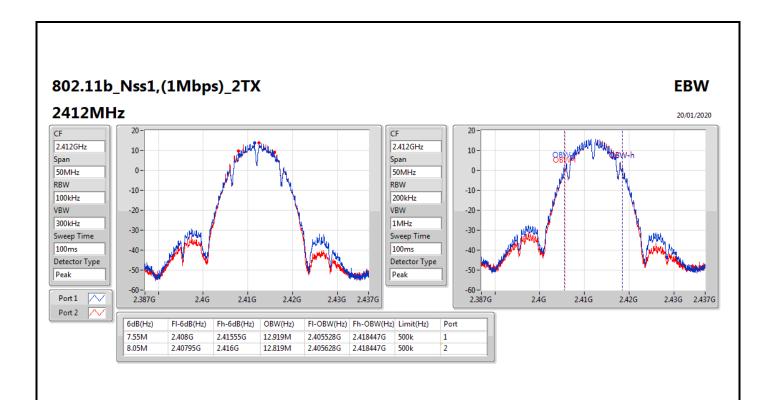
#### Result

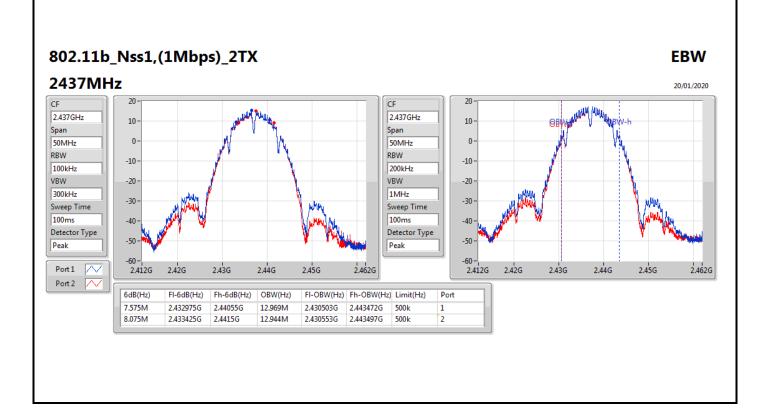
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	7.55M	12.919M	8.05M	12.819M
2437MHz	Pass	500k	7.575M	12.969M	8.075M	12.944M
2462MHz	Pass	500k	8.075M	13.018M	8M	12.944M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	16.35M	16.392M	16.325M	16.392M
2437MHz	Pass	500k	16.325M	16.792M	16.325M	16.517M
2462MHz	Pass	500k	16.35M	16.392M	16.325M	16.392M
VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	17.575M	17.591M	17.55M	17.566M
2437MHz	Pass	500k	17.55M	17.916M	17.15M	17.641M
2462MHz	Pass	500k	17.575M	17.566M	17.525M	17.566M
VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	32.75M	35.932M	35.3M	35.932M
2437MHz	Pass	500k	35M	35.882M	34.1M	35.882M
2452MHz	Pass	500k	35M	35.832M	35.1M	35.882M
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	17.6M	17.591M	16.3M	17.366M
2437MHz	Pass	500k	16.525M	17.566M	15.55M	17.591M
2462MHz	Pass	500k	17.525M	17.541M	17.6M	17.641M
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	28.55M	35.882M	33.1M	35.982M
2437MHz	Pass	500k	32.55M	35.782M	26.3M	35.732M
2452MHz	Pass	500k	31.25M	35.882M	29M	35.782M

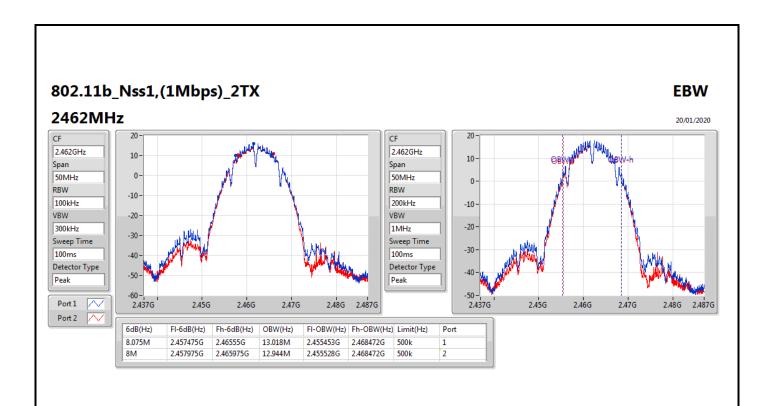
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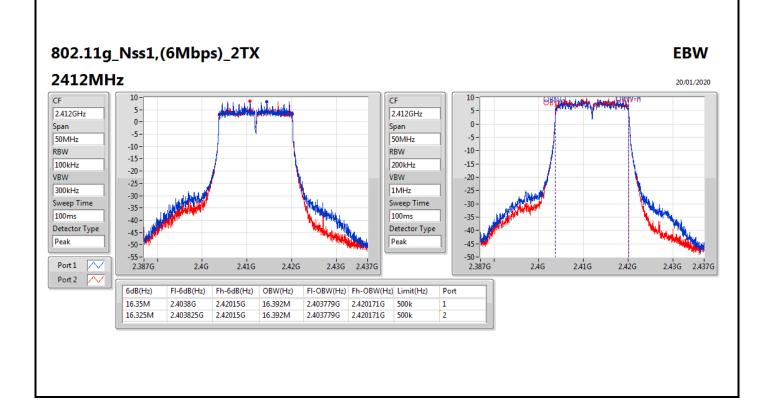
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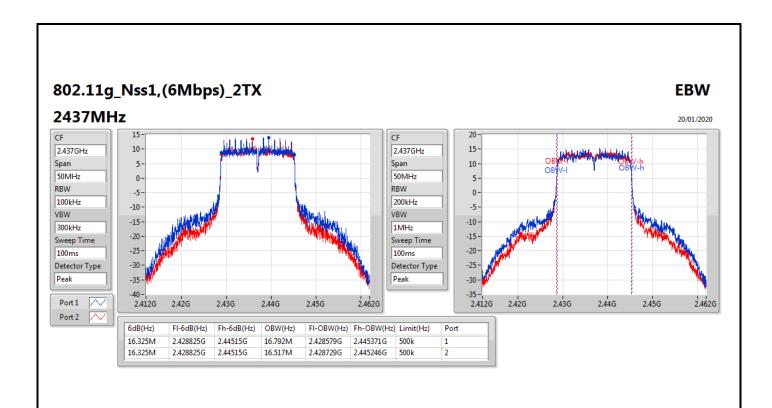
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth;

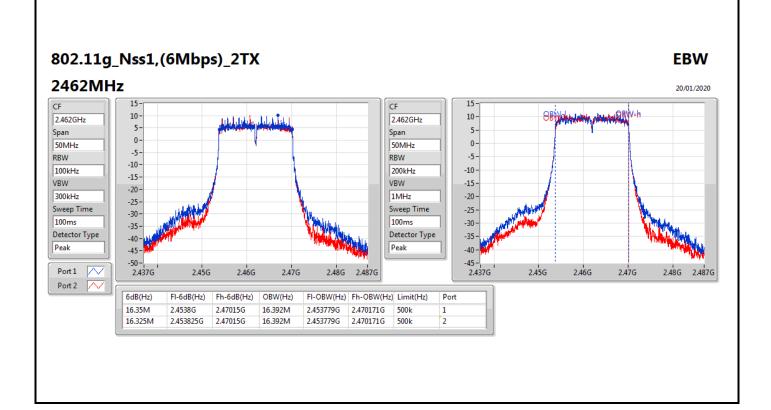


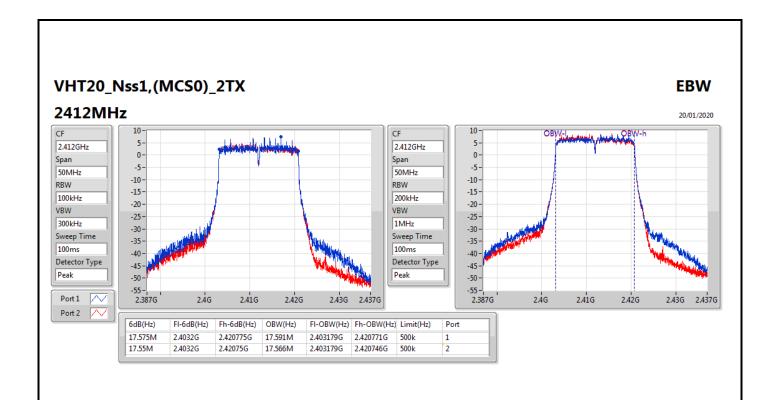


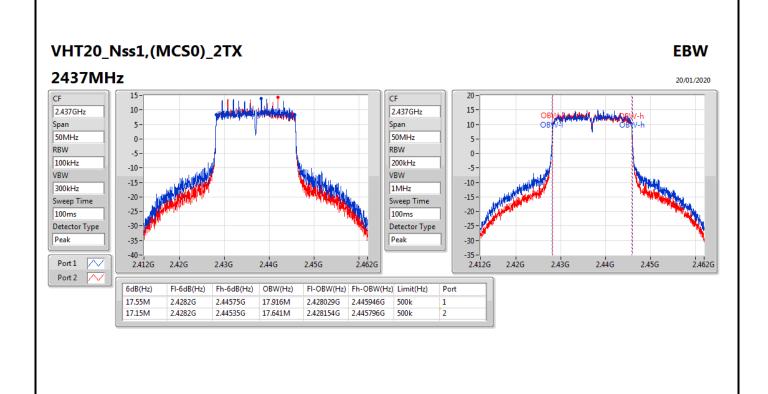


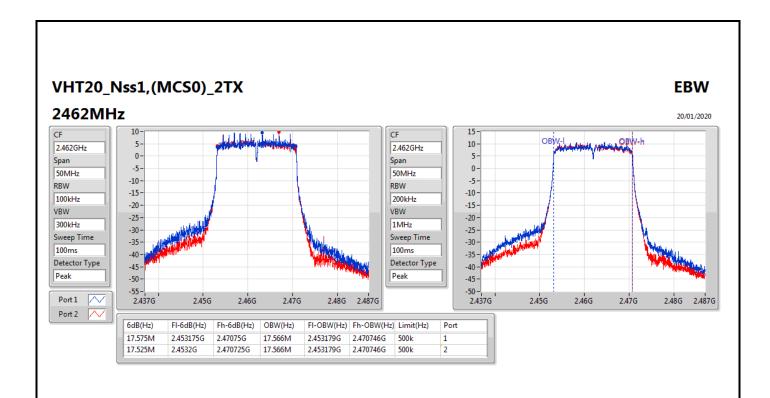


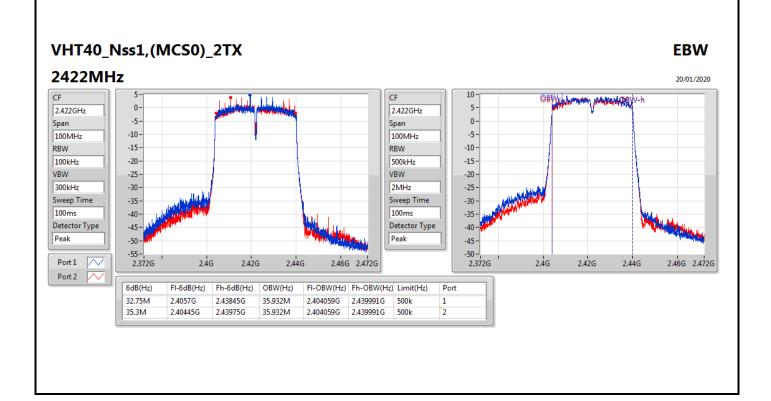


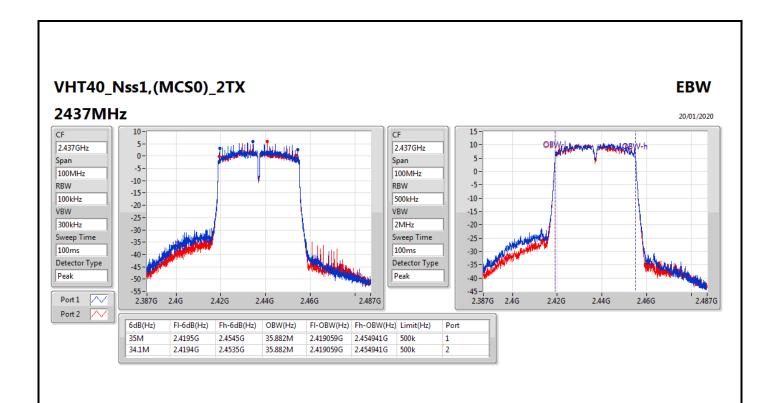


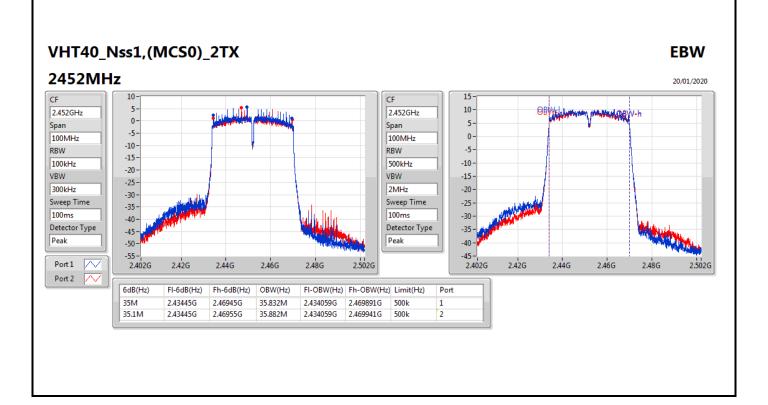


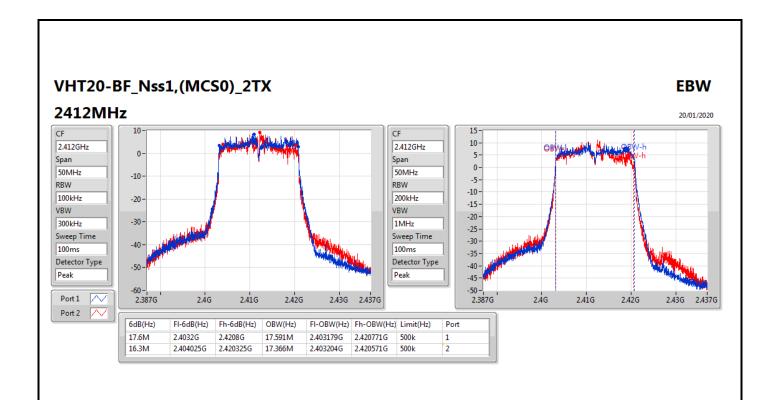


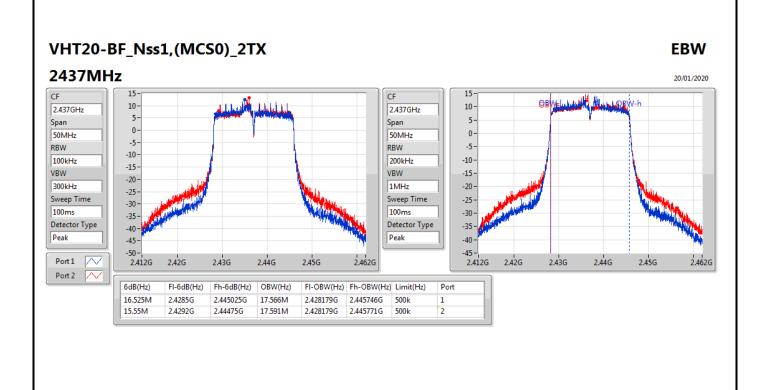


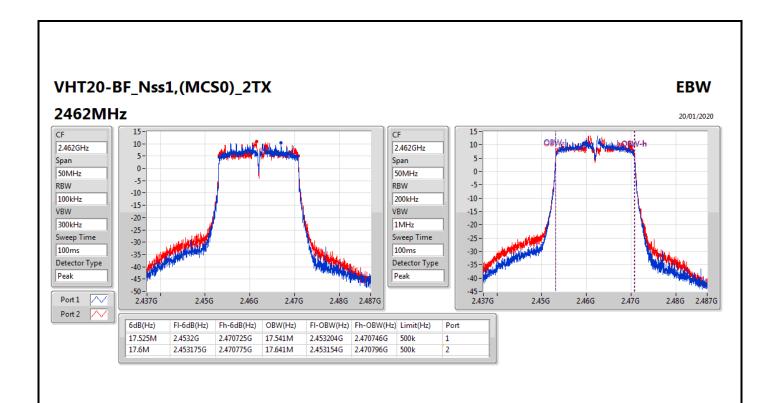


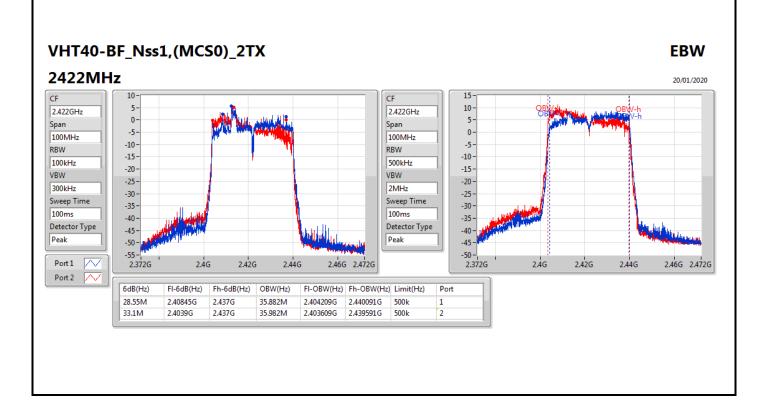


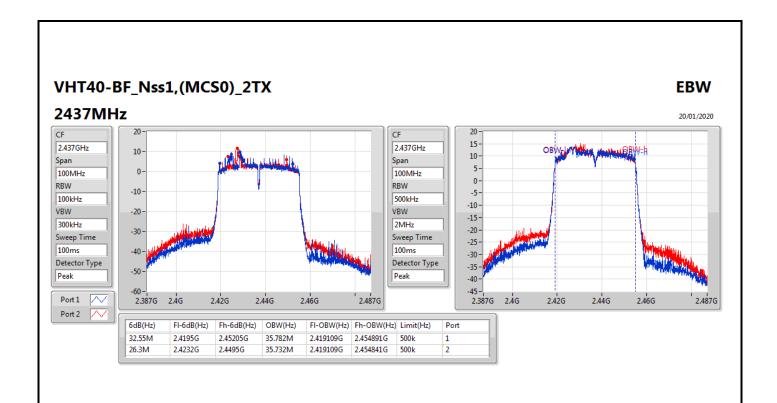


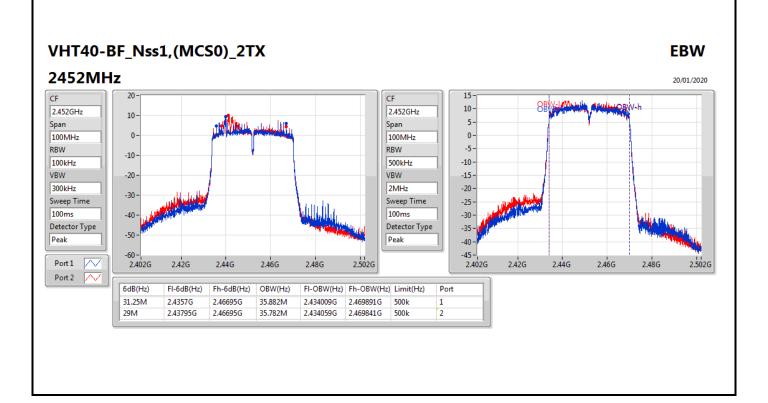














Average Power Appendix C

#### **Summary**

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	28.04	0.63680
802.11g_Nss1,(6Mbps)_2TX	27.77	0.59841
VHT20_Nss1,(MCS0)_2TX	27.75	0.59566
VHT40_Nss1,(MCS0)_2TX	22.30	0.16982
VHT20-BF_Nss1,(MCS0)_2TX	24.74	0.29785
VHT40-BF_Nss1,(MCS0)_2TX	23.27	0.21232



Average Power Appendix C

### Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit	
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-	
2412MHz	Pass	2.61	23.00	23.20	26.11	30.00	
2437MHz	Pass	2.61	24.66	24.38	27.53	30.00	
2462MHz	Pass	2.61	25.21	24.84	28.04	30.00	
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	
2412MHz	Pass	2.61	19.42	19.59	22.52	30.00	
2417MHz	Pass	2.61	24.22	24.28	27.26	30.00	
2437MHz	Pass	2.61	24.64	24.65	27.66	30.00	
2457MHz	Pass	2.61	24.77	24.74	27.77	30.00	
2462MHz	Pass	2.61	21.14	21.07	24.12	30.00	
VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
2412MHz	Pass	2.61	18.67	18.65	21.67	30.00	
2417MHz	Pass	2.61	21.71	21.61	24.67	30.00	
2437MHz	Pass	2.61	24.68	24.71	27.71	30.00	
2457MHz	Pass	2.61	24.58	24.90	27.75	30.00	
2462MHz	Pass	2.61	20.69	20.68	23.70	30.00	
VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
2422MHz	Pass	2.61	18.07	17.91	21.00	30.00	
2437MHz	Pass	2.61	19.38	19.19	22.30	30.00	
2452MHz	Pass	2.61	18.98	18.69	21.85	30.00	
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	
2412MHz	Pass	4.37	18.47	18.11	21.30	30.00	
2417MHz	Pass	4.37	21.06	21.02	24.05	30.00	
2437MHz	Pass	4.37	21.96	21.48	24.74	30.00	
2462MHz	Pass	4.37	21.04	21.13	24.10	30.00	
VHT40-BF_Nss1,(MCS0)_2TX	-	-	=	-	-	-	
2422MHz	Pass	4.37	14.80	14.68	17.75	30.00	
2427MHz	Pass	4.37	16.68	17.28	20.00	30.00	
2437MHz	Pass	4.37	20.10	20.41	23.27	30.00	
2452MHz	Pass	4.37	19.26	19.34	22.31	30.00	

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



**Summary** 

Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	·
802.11b_Nss1,(1Mbps)_2TX	0.65
802.11g_Nss1,(6Mbps)_2TX	-0.64
VHT20_Nss1,(MCS0)_2TX	0.09
VHT40_Nss1,(MCS0)_2TX	-7.43
VHT20-BF_Nss1,(MCS0)_2TX	0.54
VHT40-BF_Nss1,(MCS0)_2TX	0.38

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

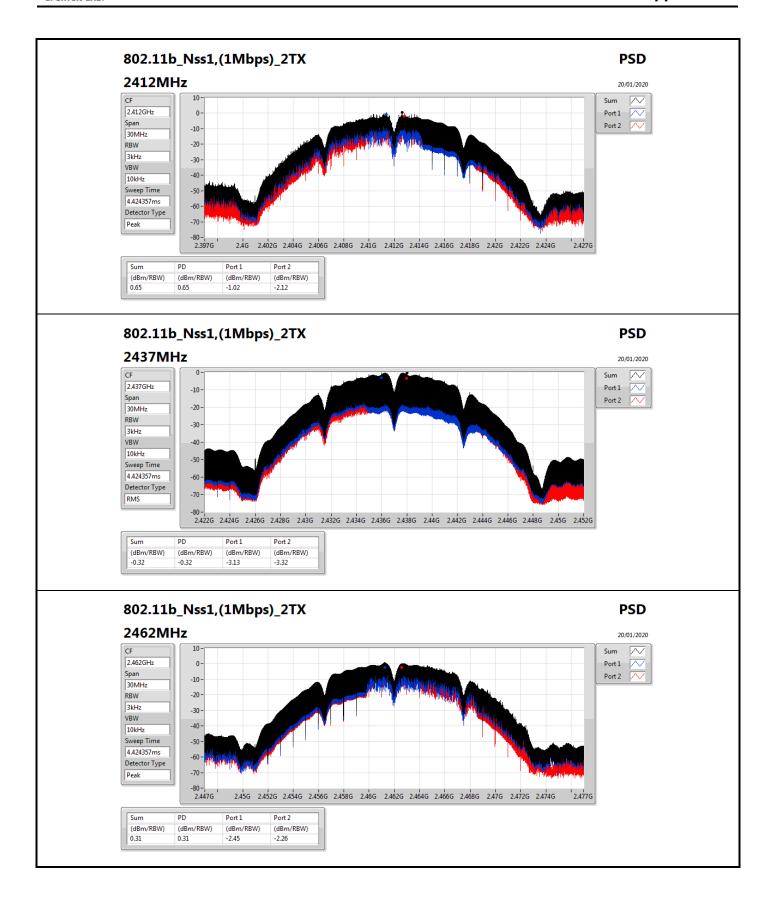


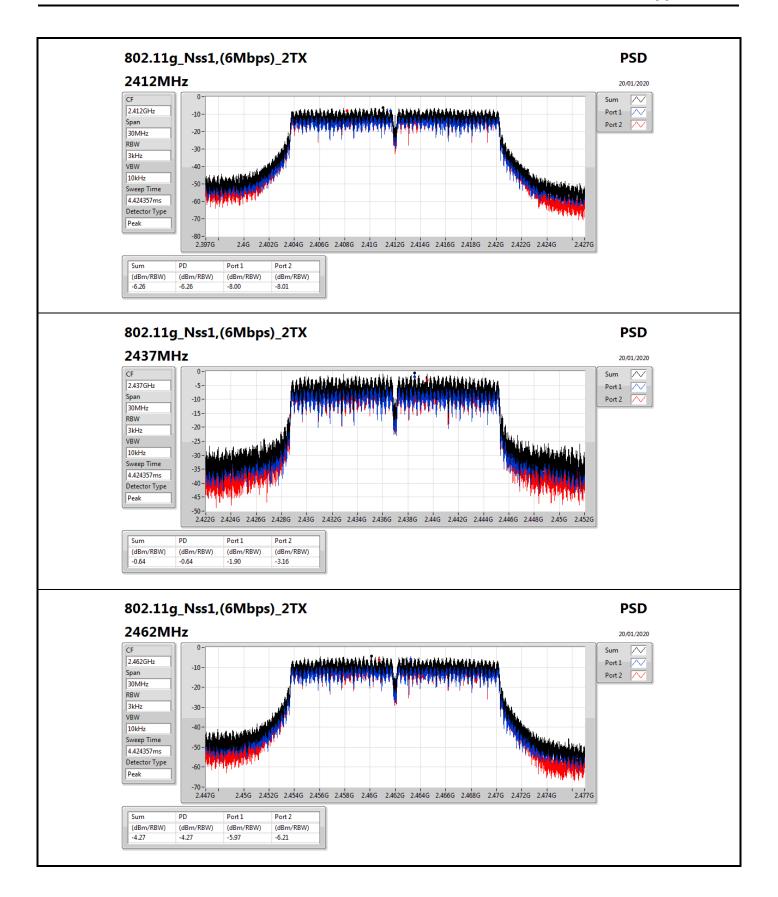
Appendix D **PSD** 

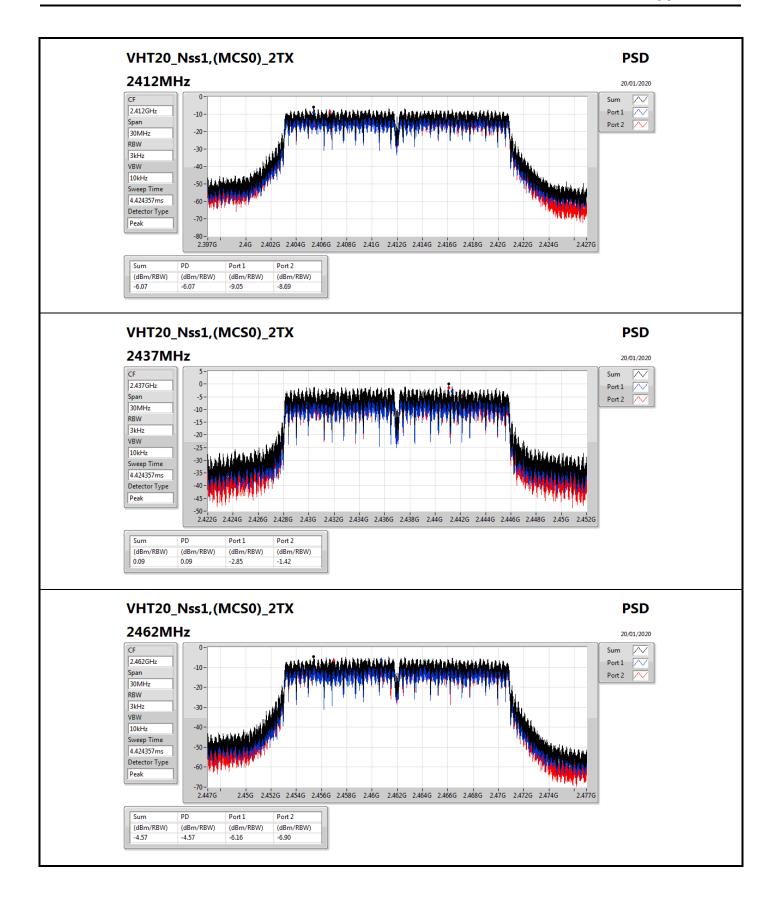
#### Result

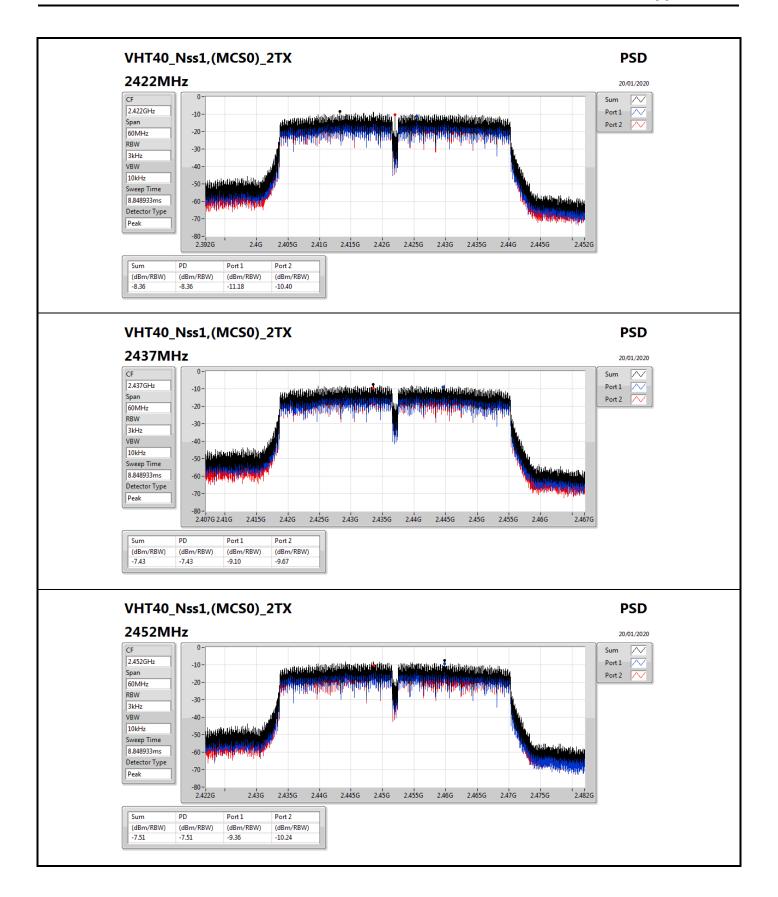
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.37	-1.02	-2.12	0.65	8.00
2437MHz	Pass	4.37	-3.13	-3.32	-0.32	8.00
2462MHz	Pass	4.37	-2.45	-2.26	0.31	8.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.37	-8.00	-8.01	-6.26	8.00
2437MHz	Pass	4.37	-1.90	-3.16	-0.64	8.00
2462MHz	Pass	4.37	-5.97	-6.21	-4.27	8.00
VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.37	-9.05	-8.69	-6.07	8.00
2437MHz	Pass	4.37	-2.85	-1.42	0.09	8.00
2462MHz	Pass	4.37	-6.16	-6.90	-4.57	8.00
VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.37	-11.18	-10.40	-8.36	8.00
2437MHz	Pass	4.37	-9.10	-9.67	-7.43	8.00
2452MHz	Pass	4.37	-9.36	-10.24	-7.51	8.00
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.37	-4.05	-3.40	-1.54	8.00
2437MHz	Pass	4.37	-3.49	-3.79	-2.05	8.00
2462MHz	Pass	4.37	-1.05	-1.78	0.54	8.00
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	4.37	-5.23	-6.22	-4.39	8.00
2437MHz	Pass	4.37	-1.92	-0.53	0.38	8.00
2452MHz	Pass	4.37	-2.03	-3.69	-0.14	8.00

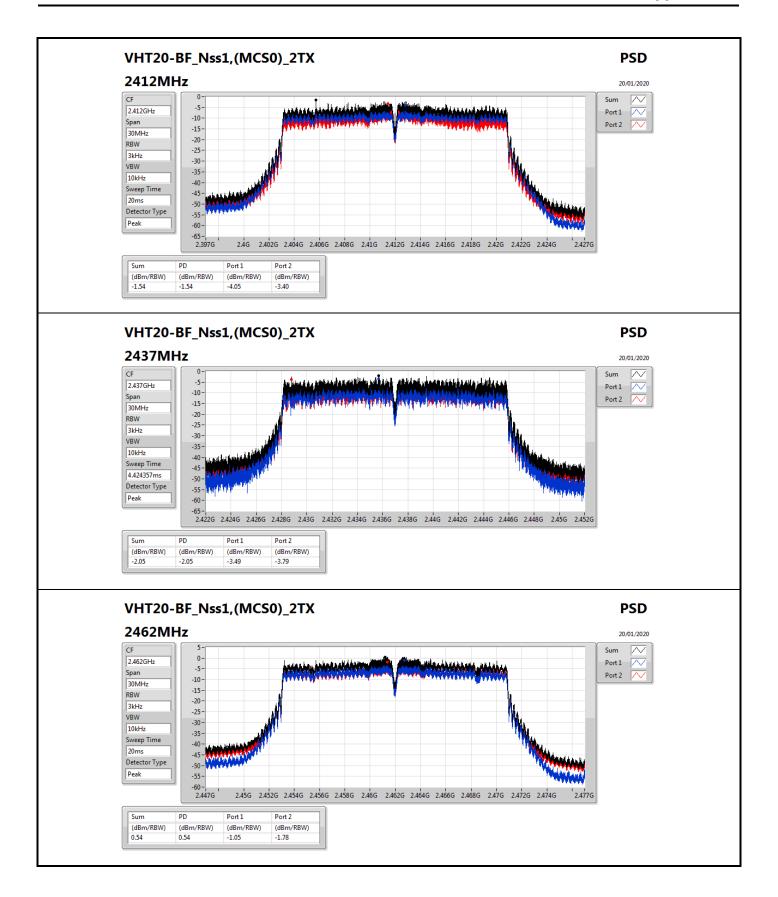
DG = Directional Gain; RBW = 500 kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X power density;

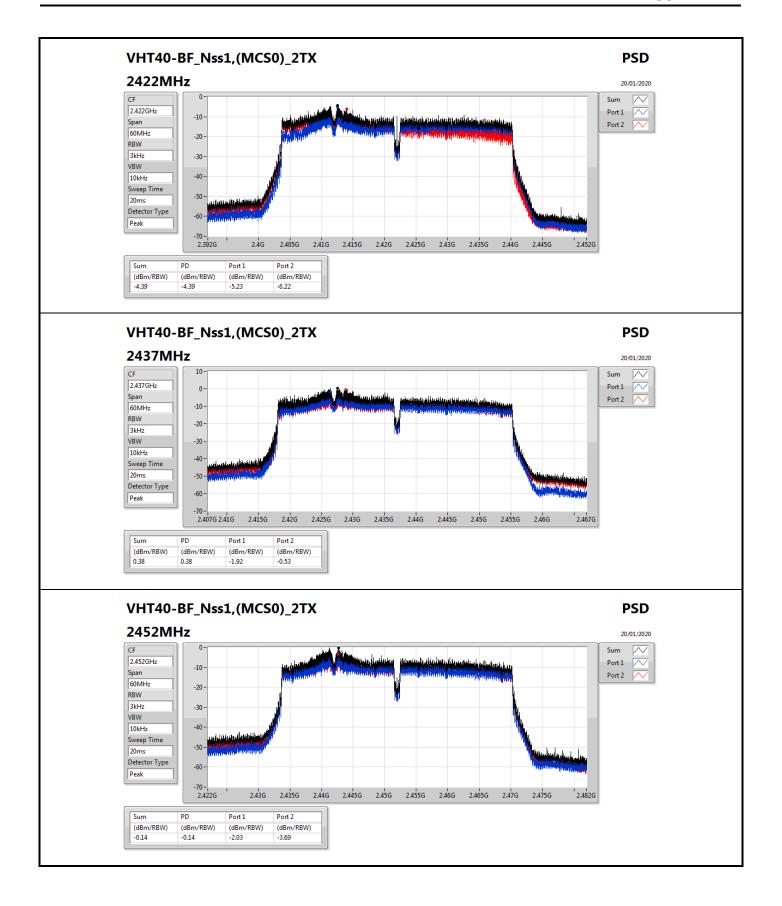














# CSE(Non-restricted Band)

Appendix E

**Summary** 

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2.4-2.4835GHz		-	-	-	-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	Pass	2.43649G	15.42	-14.58	2.13894G	-47.46	2.39752G	-29.37	2.4G	-40.11	2.51396G	-46.68	17.48161G	-37.12	1
802.11g_Nss1,(6Mbps)_2TX	Pass	2.442G	14.10	-15.90	835.89M	-47.52	2.397G	-28.25	2.4G	-31.82	2.51894G	-46.39	23.35922G	-37.07	1
VHT20_Nss1,(MCS0)_2TX	Pass	2.4395G	13.99	-16.01	913.94M	-47.91	2.39884G	-29.83	2.4G	-33.73	2.52016G	-47.03	17.64457G	-36.49	1
VHT40_Nss1,(MCS0)_2TX	Pass	2.43444G	6.19	-23.81	797.72M	-47.69	2.39448G	-31.70	2.4G	-33.22	2.49358G	-46.88	17.66887G	-37.47	1
VHT20-BF_Nss1,(MCS0)_2TX	Pass	2.43198G	11.52	-18.48	358.82M	-47.42	2.3989G	-29.48	2.4G	-33.05	2.48538G	-46.45	16.48984G	-37.25	2
VHT40-BF_Nss1,(MCS0)_2TX	Pass	2.42893G	11.90	-18.10	1.62813G	-47.98	2.39976G	-31.40	2.4G	-33.26	2.48694G	-41.17	16.3956G	-36.57	2



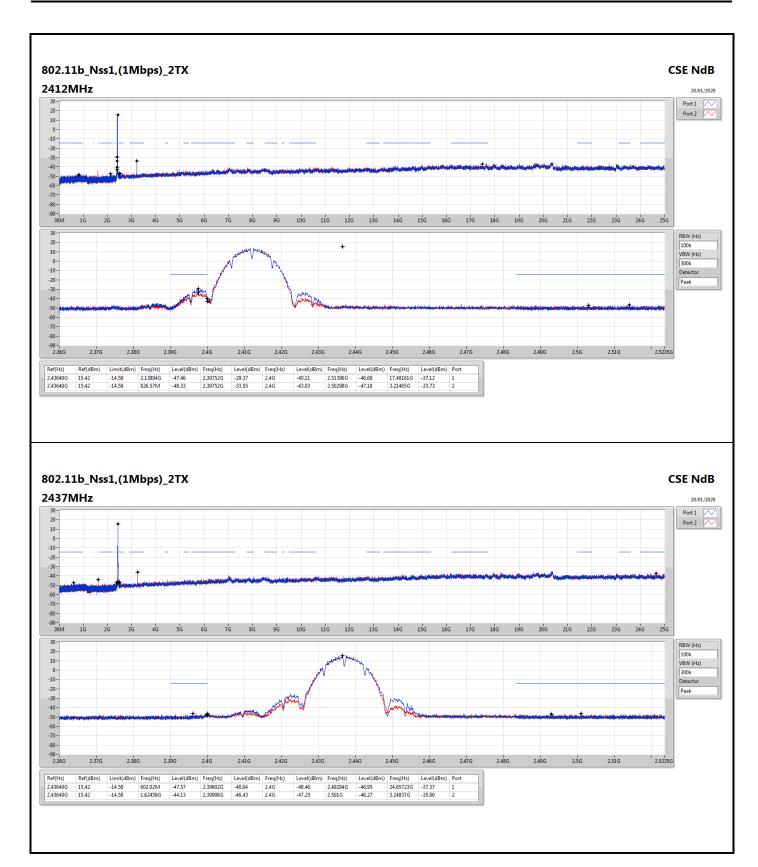
# CSE(Non-restricted Band)

# Appendix E

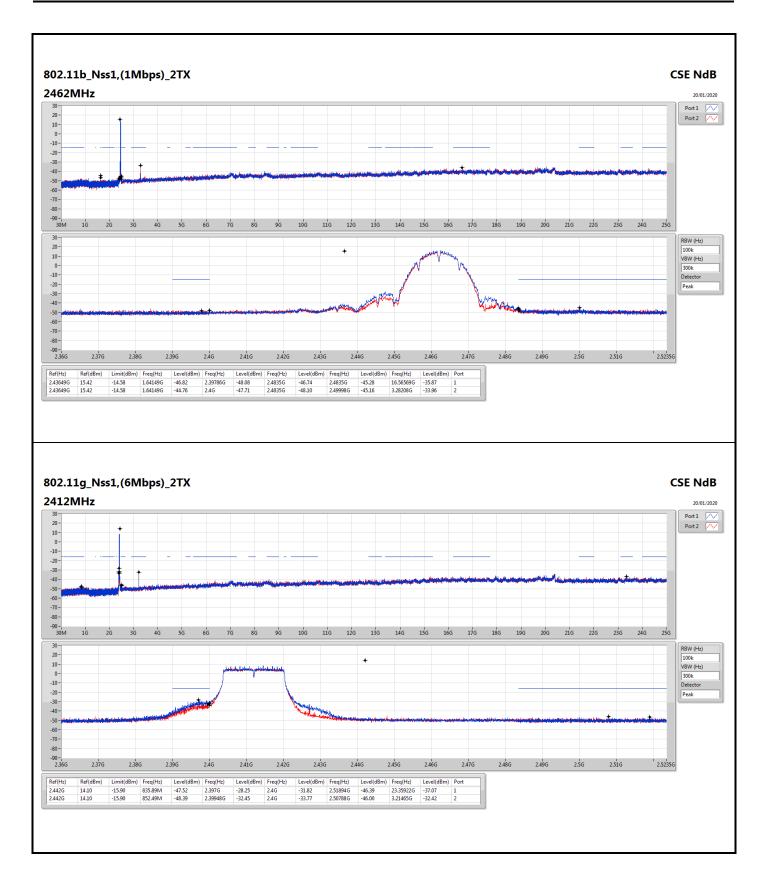
#### Result

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
802.11b_Nss1,(1Mbps)_2TX		-			-		-	-	-		-		-	-	-
2412MHz	Pass	2.43649G	15.42	-14.58	2.13894G	-47.46	2.39752G	-29.37	2.4G	-40.11	2.51396G	-46.68	17.48161G	-37.12	1
2412MHz	Pass	2.43649G	15.42	-14.58	826.57M	-48.33	2.39752G	-33.55	2.4G	-43.03	2.50298G	-47.18	3.21465G	-33.73	2
2437MHz	Pass	2.43649G	15.42	-14.58	602.02M	-47.57	2.39602G	-46.64	2.4G	-48.46	2.49294G	-46.95	24.65723G	-37.37	1
2437MHz	Pass	2.43649G	15.42	-14.58	1.62459G	-44.13	2.39998G	-46.43	2.4G	-47.25	2.501G	-46.27	3.24837G	-35.90	2
2462MHz	Pass	2.43649G	15.42	-14.58	1.64149G	-46.82	2.39786G	-48.08	2.4835G	-46.74	2.4835G	-45.28	16.56569G	-35.87	1
2462MHz	Pass	2.43649G	15.42	-14.58	1.64149G	-44.76	2.4G	-47.71	2.4835G	-48.10	2.49998G	-45.16	3.28208G	-33.96	2
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.442G	14.10	-15.90	835.89M	-47.52	2.397G	-28.25	2.4G	-31.82	2.51894G	-46.39	23.35922G	-37.07	1
2412MHz	Pass	2.442G	14.10	-15.90	852.49M	-48.39	2.39948G	-32.45	2.4G	-33.77	2.50788G	-46.00	3.21465G	-32.42	2
2437MHz	Pass	2.442G	14.10	-15.90	819.58M	-47.88	2.39828G	-40.40	2.4G	-42.00	2.4914G	-44.58	16.61065G	-36.74	1
2437MHz	Pass	2.442G	14.10	-15.90	2.13952G	-48.15	2.39878G	-44.17	2.4G	-45.38	2.52098G	-46.53	3.24837G	-35.20	2
2462MHz	Pass	2.442G	14.10	-15.90	2.17506G	-47.24	2.39796G	-47.37	2.4835G	-38.32	2.48384G	-39.84	17.62771G	-37.70	1
2462MHz	Pass	2.442G	14.10	-15.90	780.55M	-47.46	2.39984G	-47.56	2.4835G	-43.86	2.48508G	-42.23	3.28208G	-33.58	2
VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.4395G	13.99	-16.01	913.94M	-47.91	2.39884G	-29.83	2.4G	-33.73	2.52016G	-47.03	17.64457G	-36.49	1
2412MHz	Pass	2.4395G	13.99	-16.01	775.89M	-48.99	2.39984G	-31.49	2.4G	-35.25	2.49344G	-47.16	3.21465G	-32.16	2
2437MHz	Pass	2.4395G	13.99	-16.01	707.45M	-48.21	2.39942G	-38.92	2.4G	-41.74	2.48576G	-45.36	16.76517G	-37.38	1
2437MHz	Pass	2.4395G	13.99	-16.01	671.04M	-48.46	2.39952G	-42.10	2.4G	-43.03	2.52012G	-46.58	3.24837G	-35.52	2
2462MHz	Pass	2.4395G	13.99	-16.01	798.32M	-47.36	2.39186G	-47.31	2.4835G	-42.26	2.48424G	-41.11	16.25664G	-37.77	1
2462MHz	Pass	2.4395G	13.99	-16.01	684.44M	-47.56	2.4G	-47.01	2.4835G	-45.13	2.48446G	-42.86	3.28208G	-34.23	2
VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.43444G	6.19	-23.81	797.72M	-47.69	2.39448G	-31.70	2.4G	-33.22	2.49358G	-46.88	17.66887G	-37.47	1
2422MHz	Pass	2.43444G	6.19	-23.81	776.25M	-47.93	2.397G	-32.46	2.4G	-37.30	2.48982G	-45.20	3.22818G	-32.70	2
2437MHz	Pass	2.43444G	6.19	-23.81	697.25M	-48.40	2.39976G	-34.93	2.4G	-37.88	2.48378G	-45.51	24.03523G	-37.51	1
2437MHz	Pass	2.43444G	6.19	-23.81	2.1577G	-48.29	2.39888G	-38.72	2.4G	-41.02	2.48378G	-46.10	3.24781G	-33.83	2
2452MHz	Pass	2.43444G	6.19	-23.81	769.38M	-48.40	2.39956G	-45.90	2.4835G	-45.52	2.48442G	-40.35	23.35653G	-37.86	1
2452MHz	Pass	2.43444G	6.19	-23.81	212.06M	-48.26	2.4G	-46.42	2.4835G	-42.93	2.48442G	-37.10	3.26745G	-34.79	2
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43198G	11.52	-18.48	1.81595G	-48.30	2.39988G	-32.65	2.4G	-34.25	2.49458G	-46.50	3.21465G	-31.47	1
2412MHz	Pass	2.43198G	11.52	-18.48	358.82M	-47.42	2.3989G	-29.48	2.4G	-33.05	2.48538G	-46.45	16.48984G	-37.25	2
2437MHz	Pass	2.43198G	11.52	-18.48	877.25M	-47.85	2.3948G	-46.25	2.4G	-48.37	2.49466G	-46.08	3.24837G	-34.17	1
2437MHz	Pass	2.43198G	11.52	-18.48	828.9M	-47.85	2.39852G	-45.42	2.4G	-48.20	2.49804G	-46.69	17.22313G	-37.40	2
2462MHz	Pass	2.43198G	11.52	-18.48	819.58M	-48.19	2.39996G	-46.52	2.4835G	-42.38	2.4836G	-41.56	3.28208G	-32.92	1
2462MHz	Pass	2.43198G	11.52	-18.48	751.43M	-47.86	2.39928G	-47.72	2.4835G	-39.78	2.48354G	-38.81	16.49545G	-37.11	2
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.42893G	11.90	-18.10	766.52M	-47.65	2.39076G	-35.59	2.4G	-44.78	2.55734G	-46.54	3.22818G	-32.24	1
2422MHz	Pass	2.42893G	11.90	-18.10	544.11M	-48.15	2.39952G	-38.02	2.4G	-38.89	2.52066G	-47.18	17.61559G	-37.56	2
2437MHz	Pass	2.42893G	11.90	-18.10	713.57M	-48.21	2.39948G	-35.66	2.4G	-35.59	2.4895G	-43.86	3.24781G	-33.55	1
2437MHz	Pass	2.42893G	11.90	-18.10	1.62813G	-47.98	2.39976G	-31.40	2.4G	-33.26	2.48694G	-41.17	16.3956G	-36.57	2
2452MHz	Pass	2.42893G	11.90	-18.10	776.25M	-48.19	2.39576G	-41.57	2.4835G	-44.36	2.48446G	-33.33	3.26745G	-34.75	1
2452MHz	Pass	2.42893G	11.90	-18.10	907.64M	-46.44	2.39824G	-40.94	2.4835G	-44.09	2.48826G	-40.94	24.37178G	-37.40	2



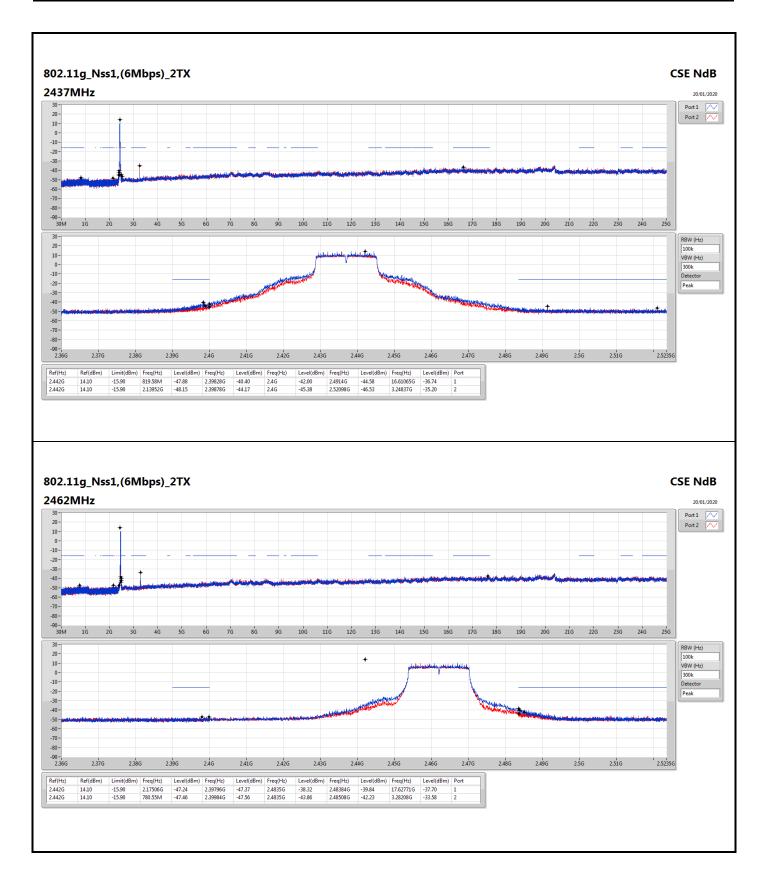






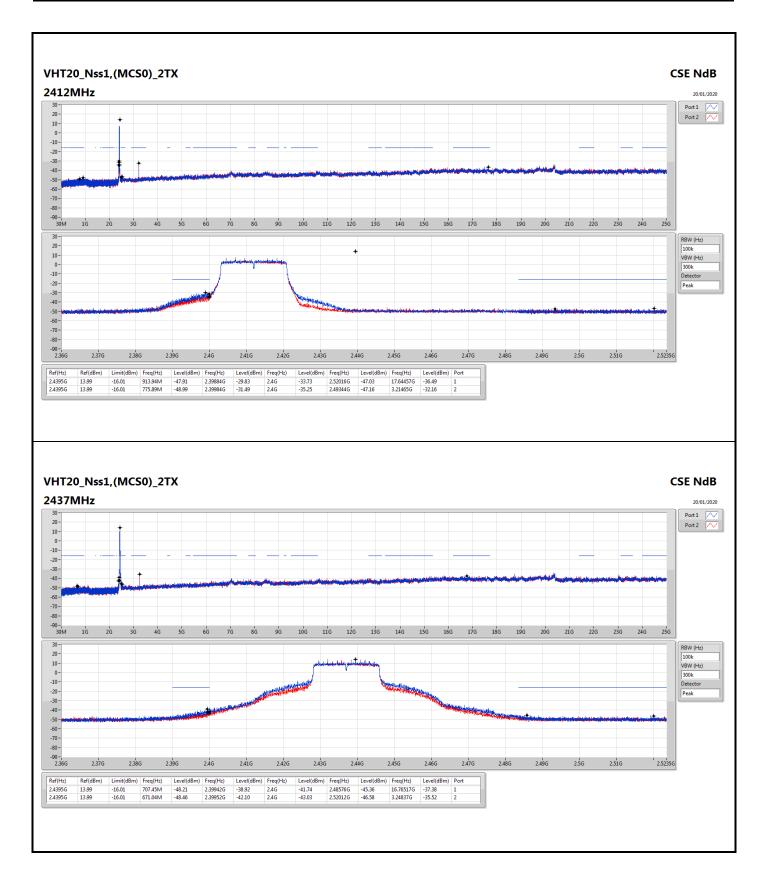
: 4 of 11



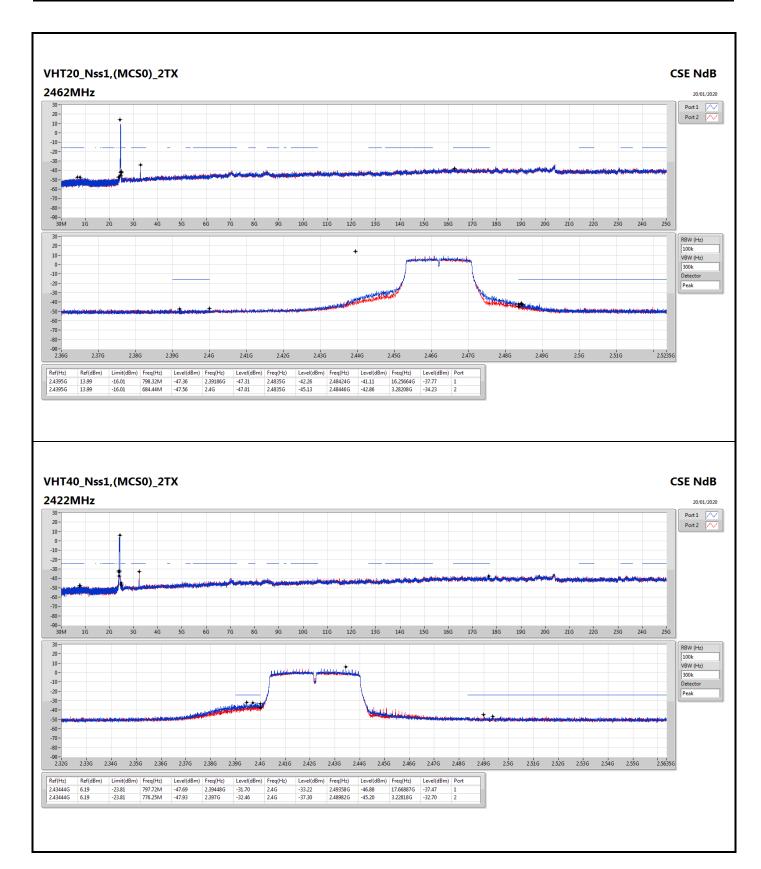


: 5 of 11

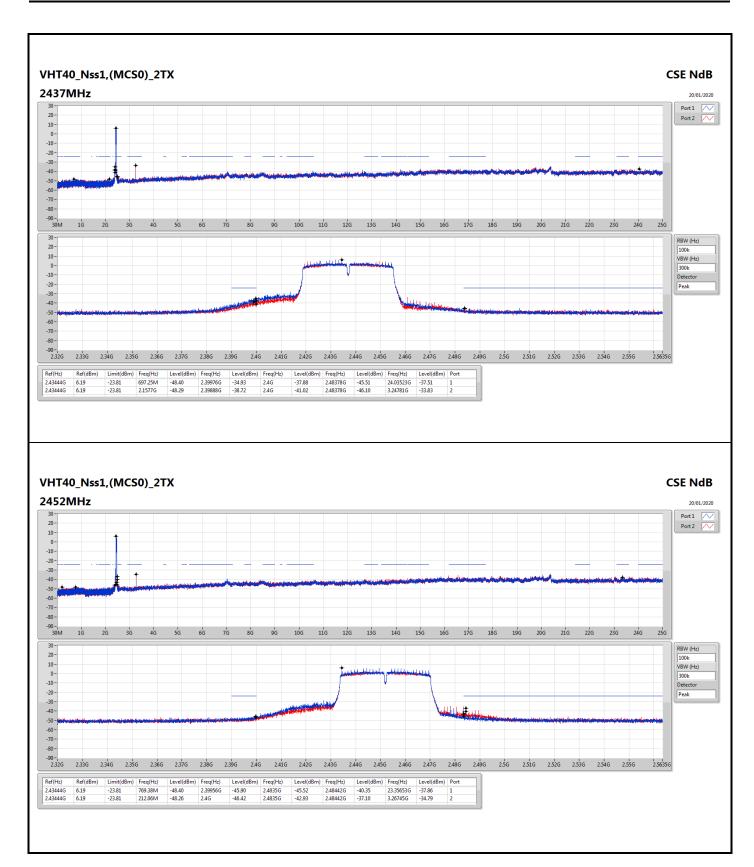




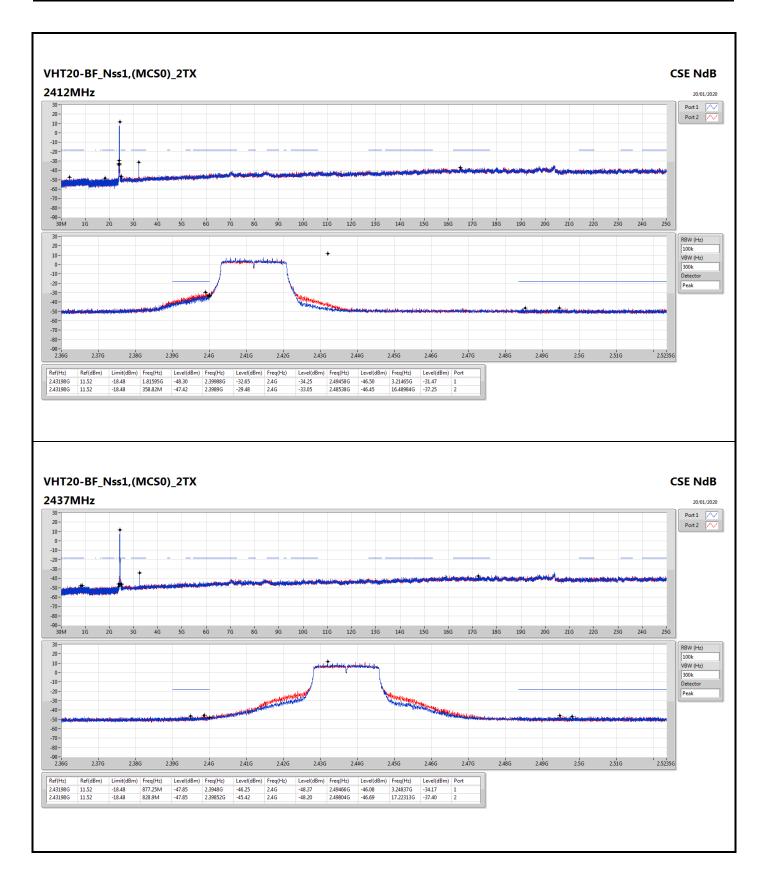




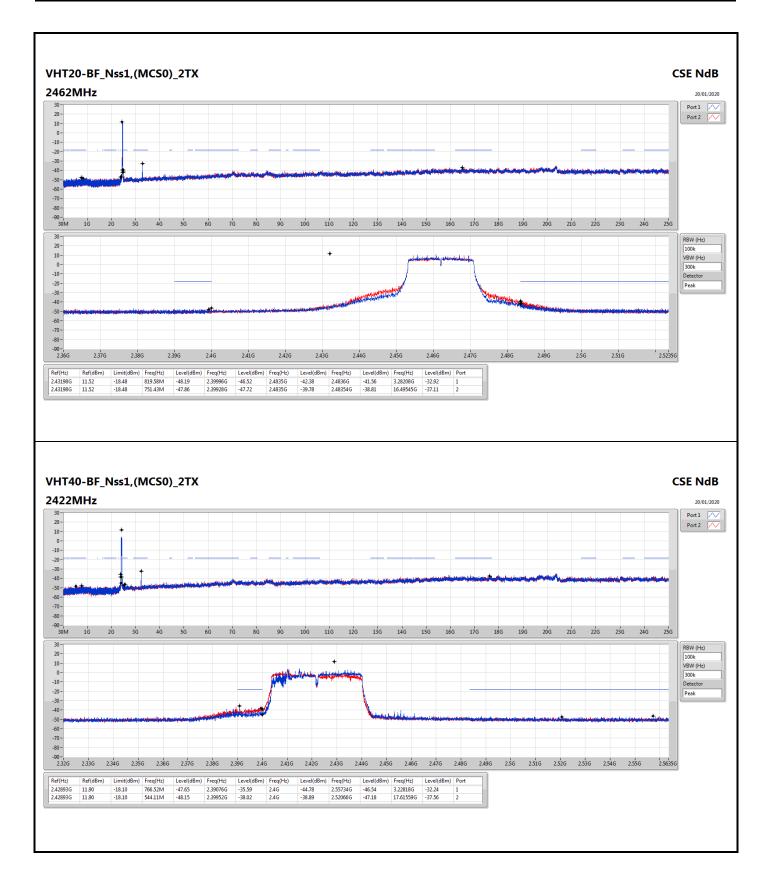




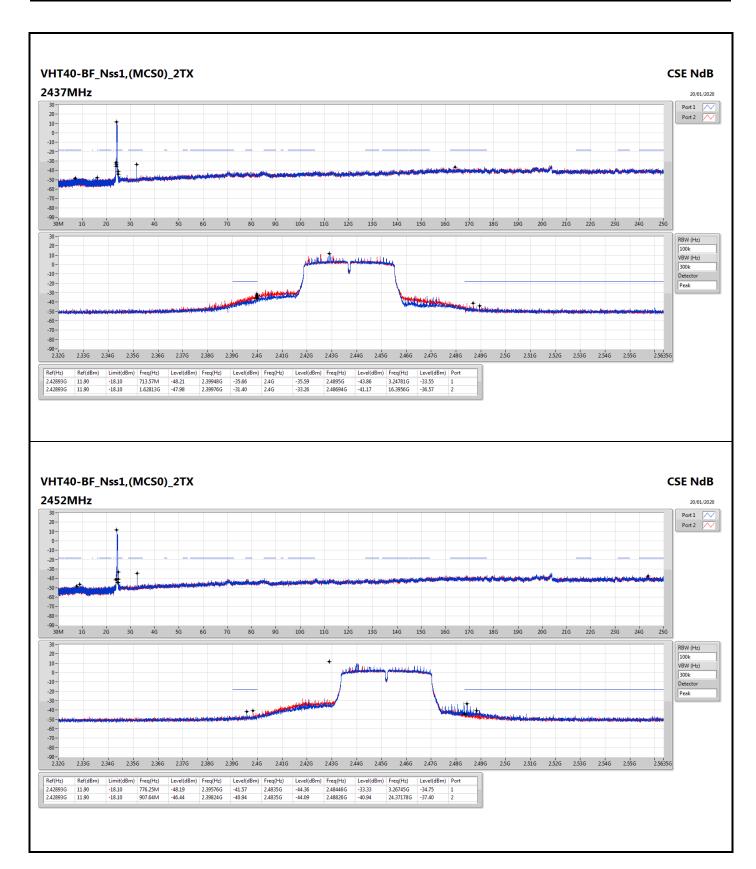




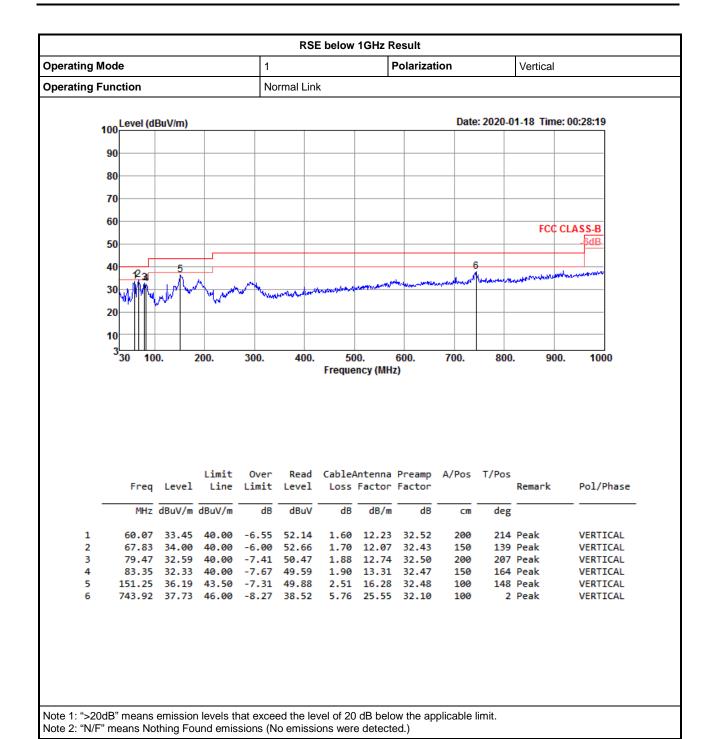




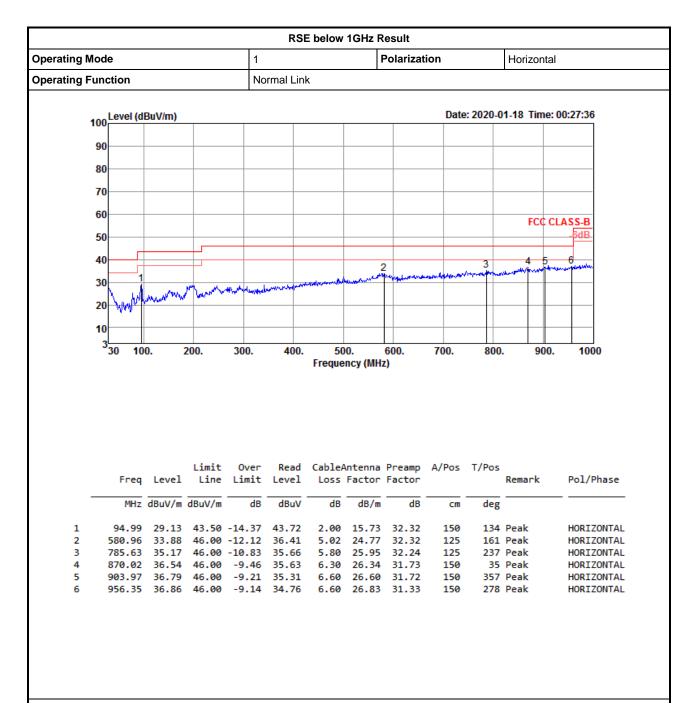












Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

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



### RSE TX above 1GHz

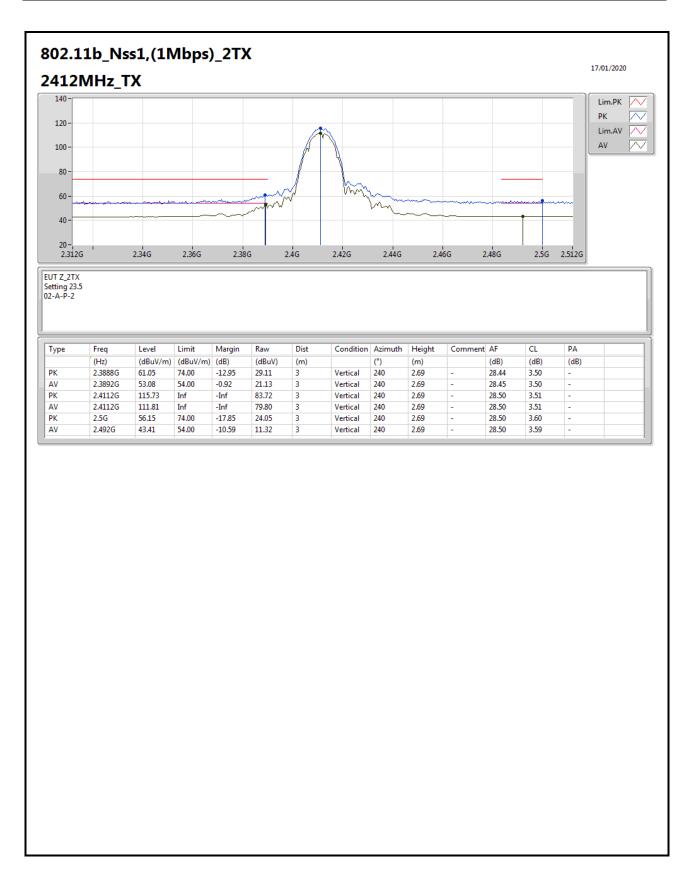
Appendix F.2

Page No. : 1 of 85

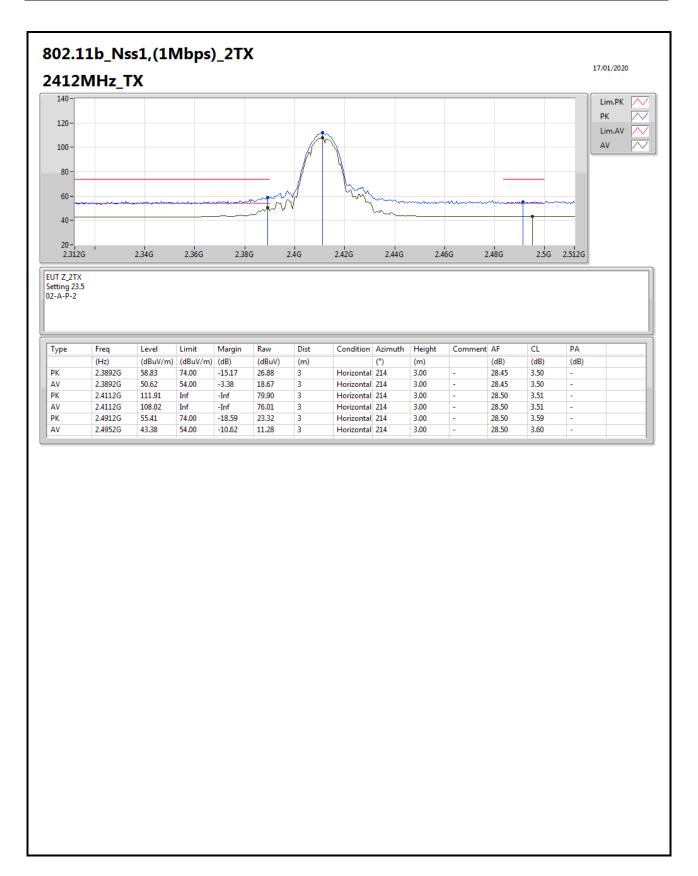
**Summary** 

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
VHT20_Nss1,(MCS0)_2TX	Pass	AV	2.3898G	53.98	54.00	-0.02	3	Vertical	35	2.23	-

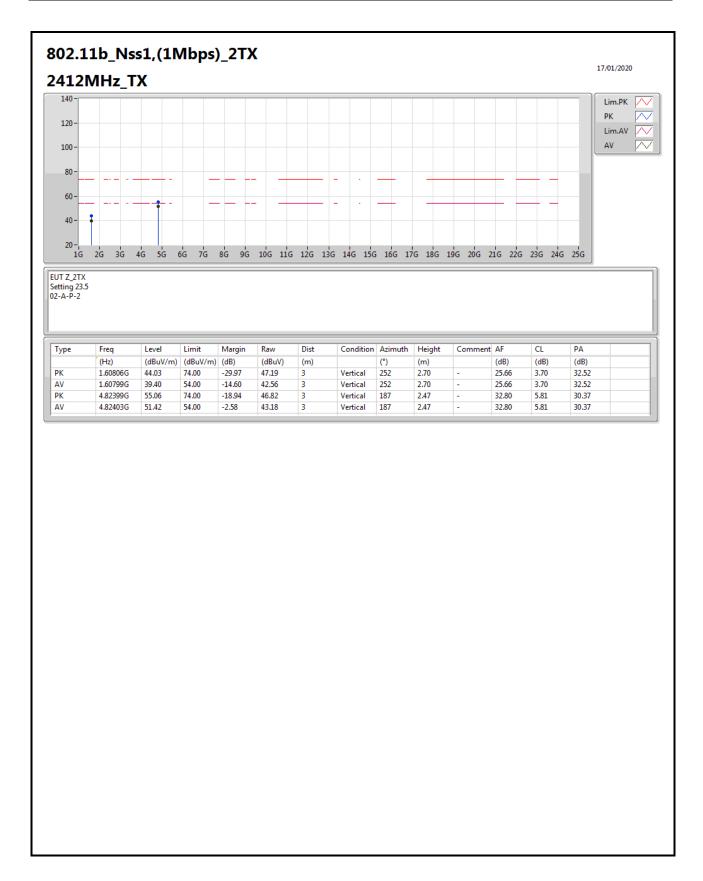






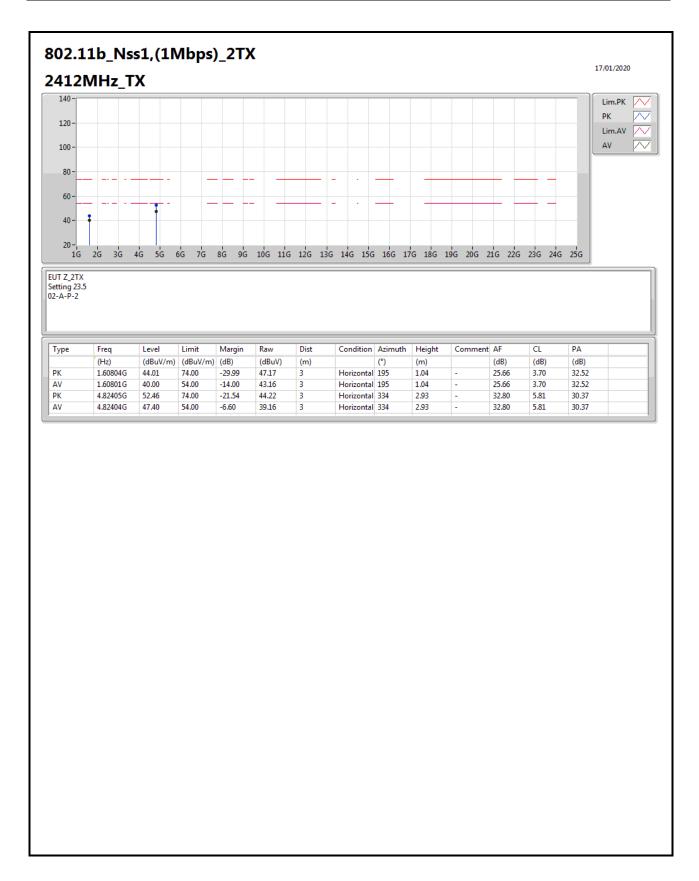




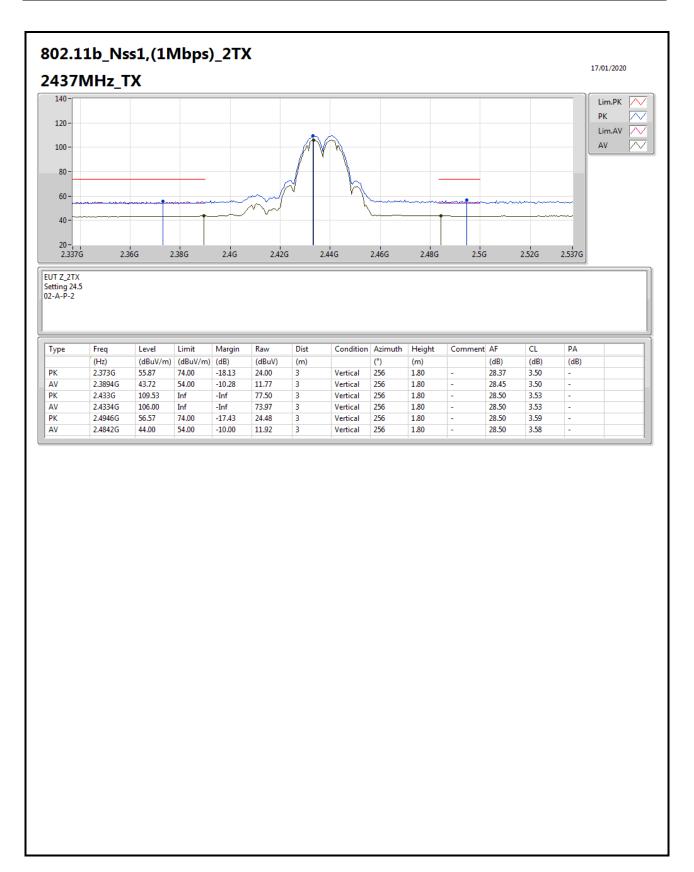


Page No. : 5 of 85

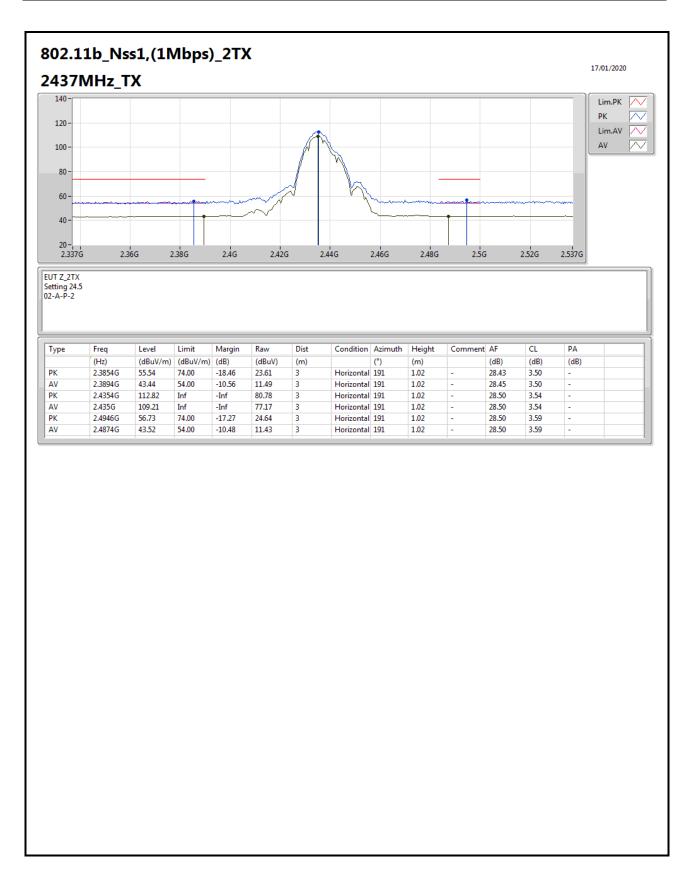




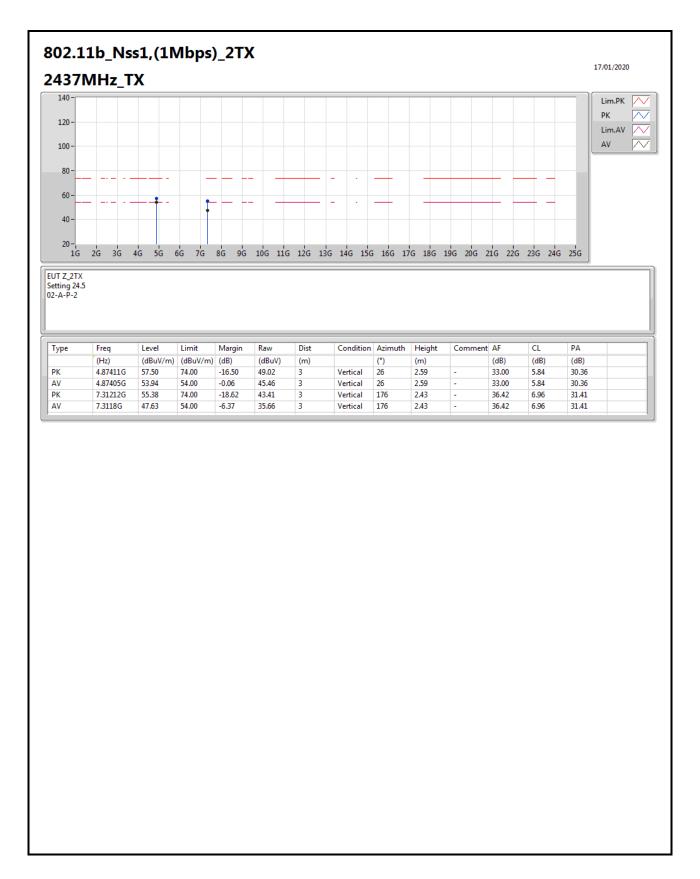




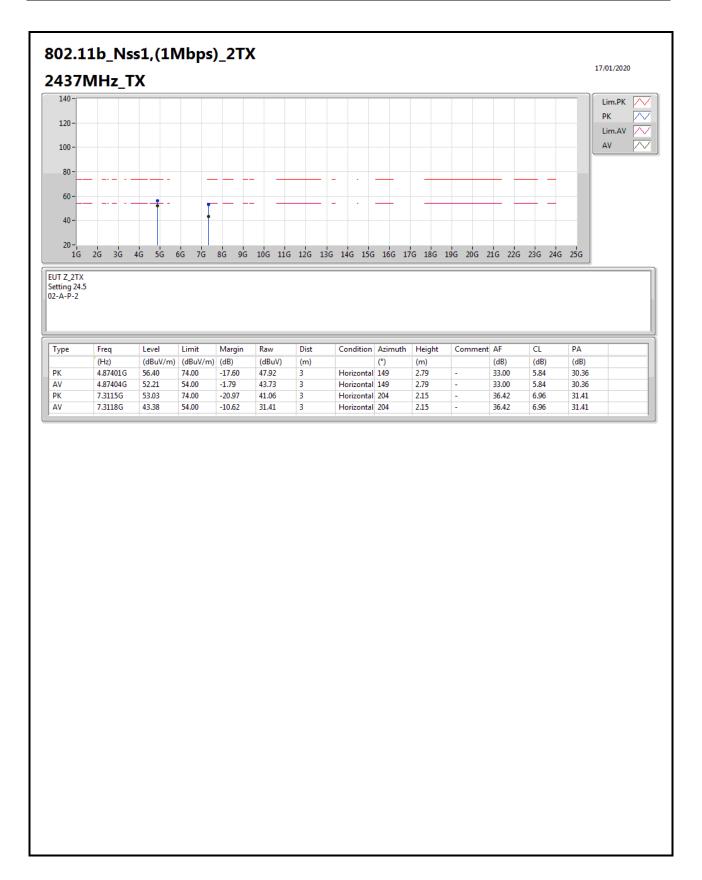




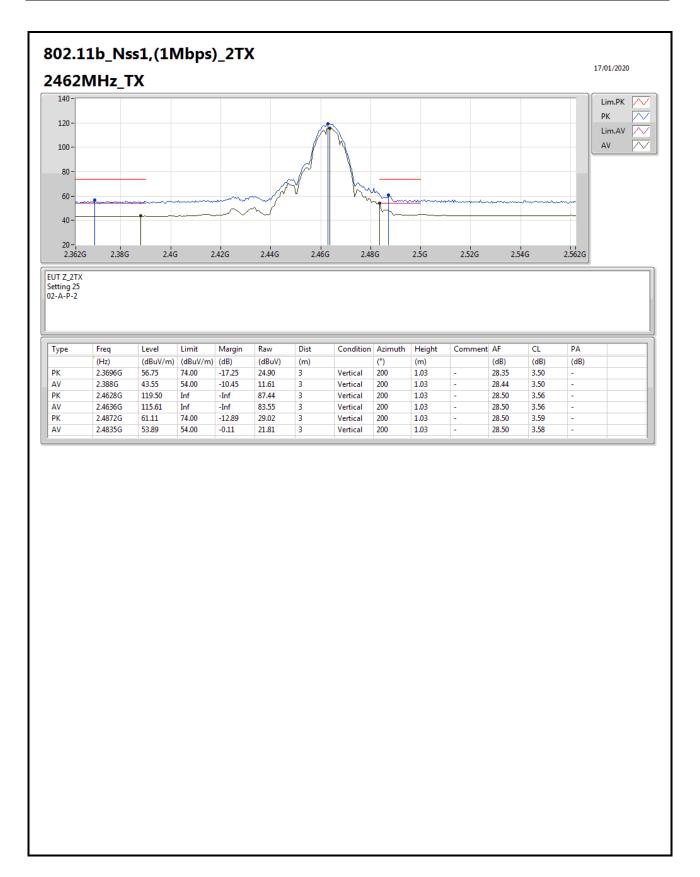




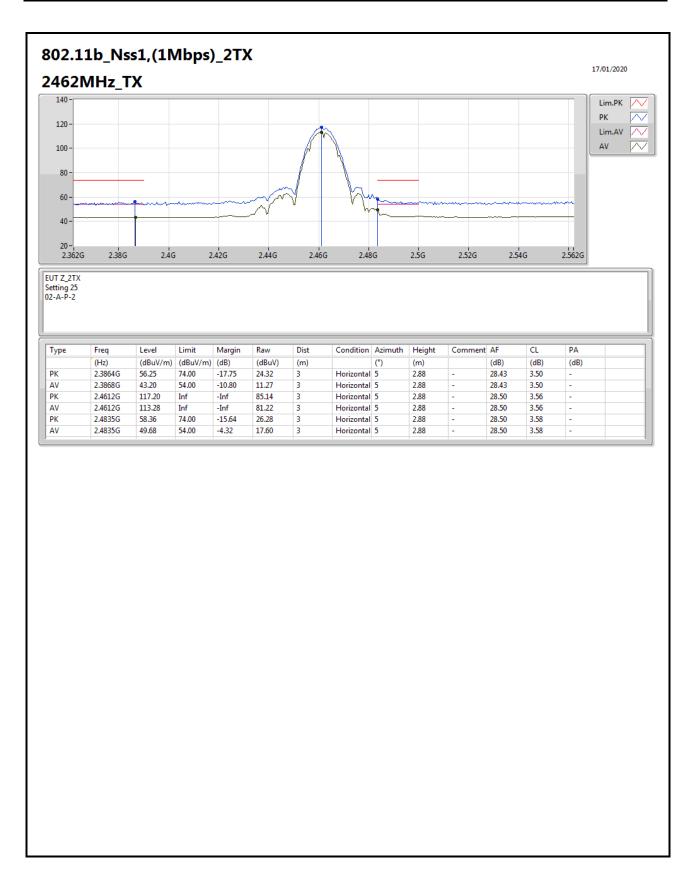




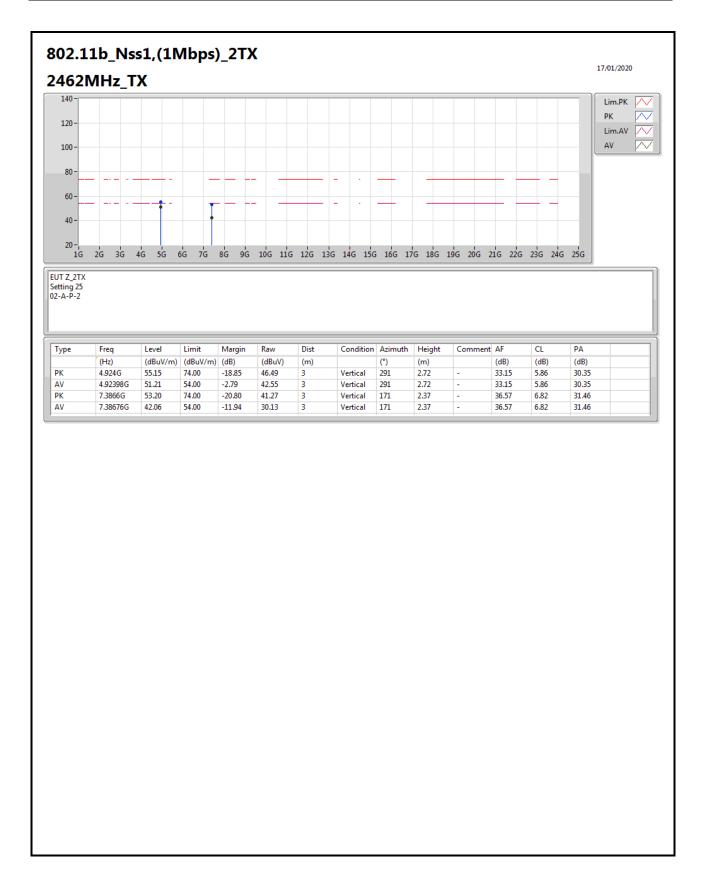




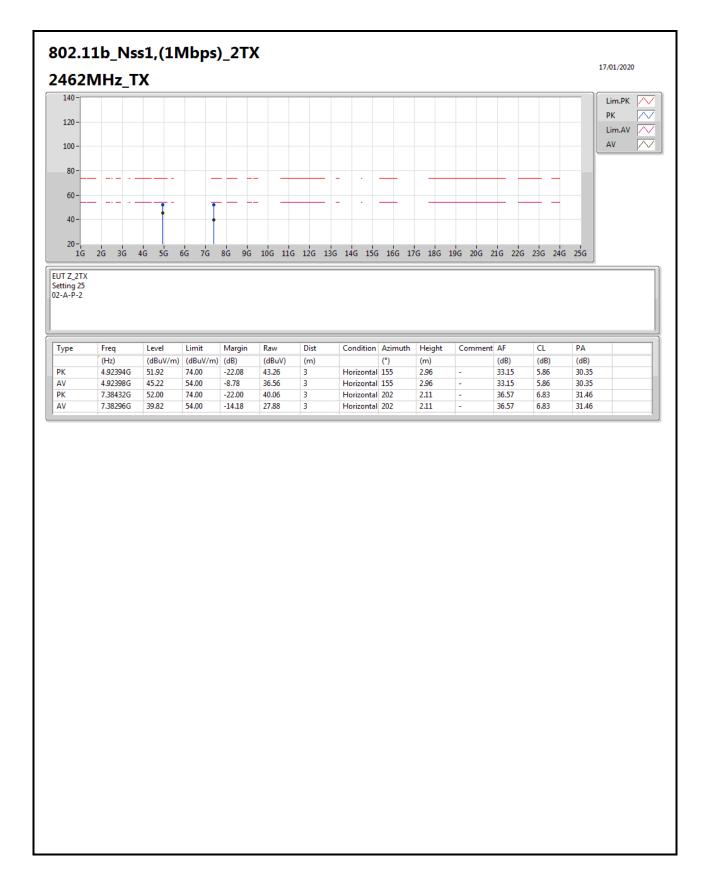


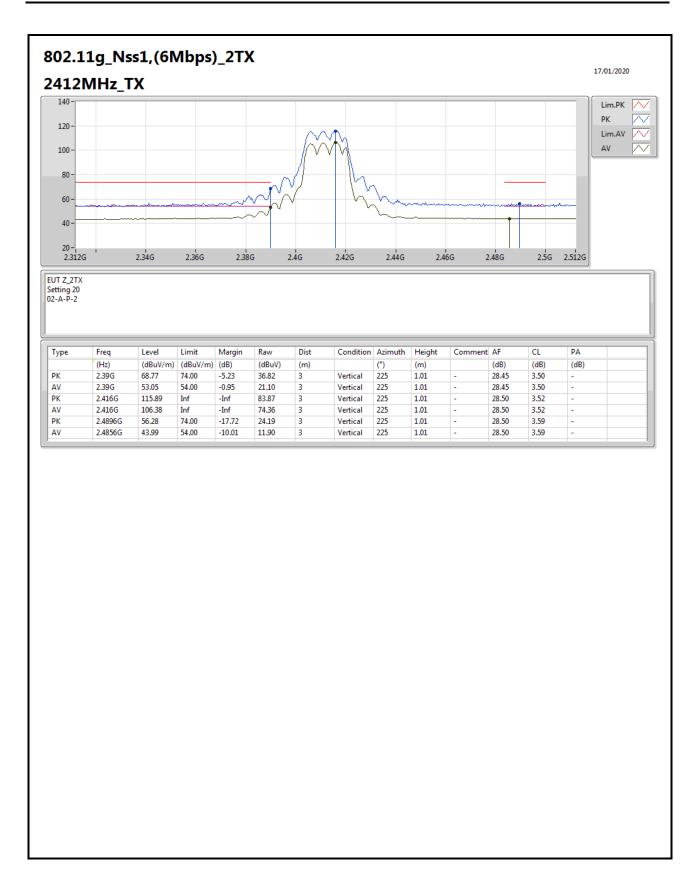




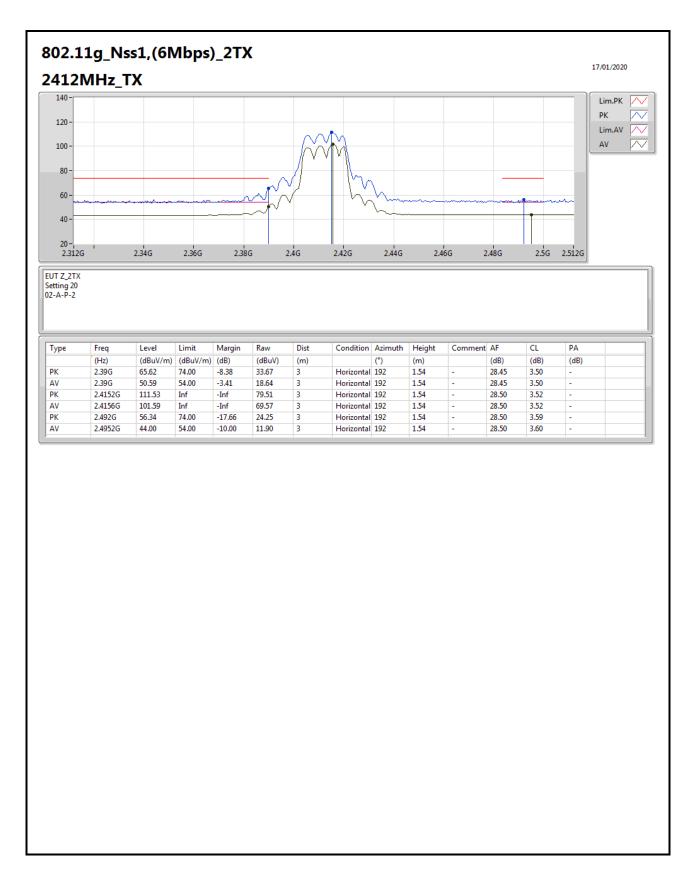




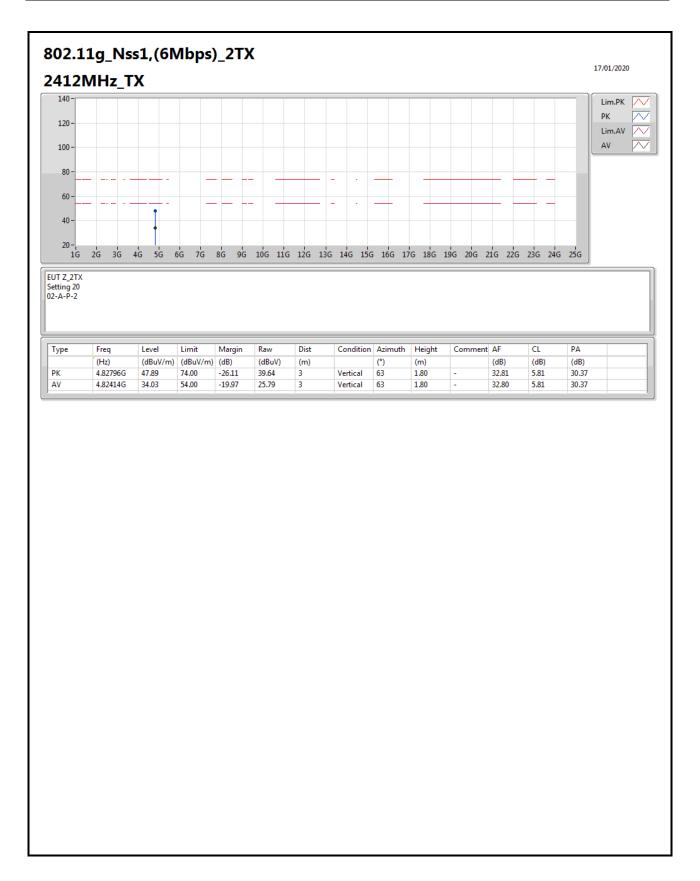






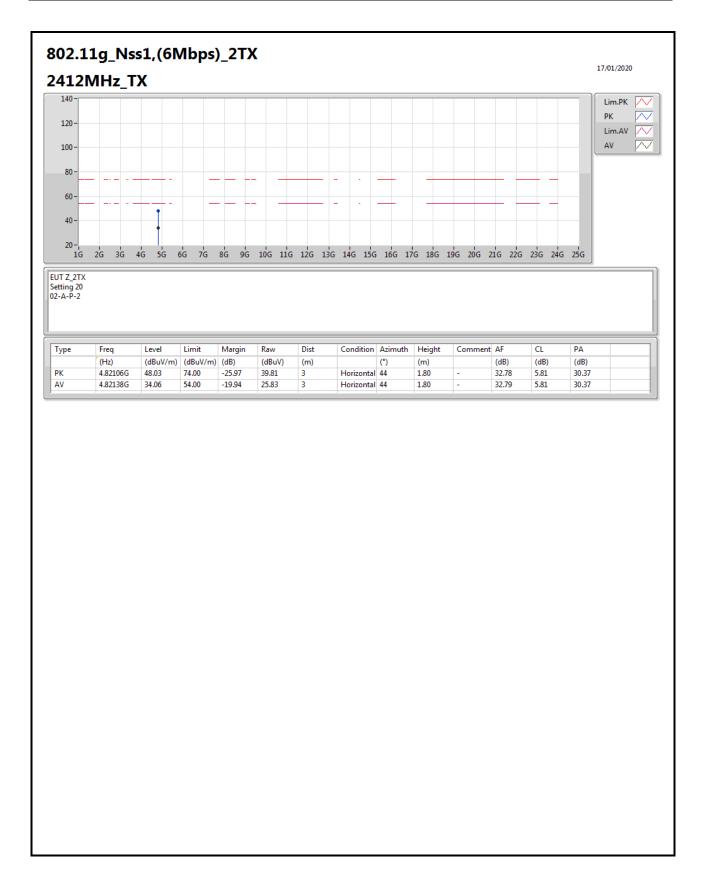




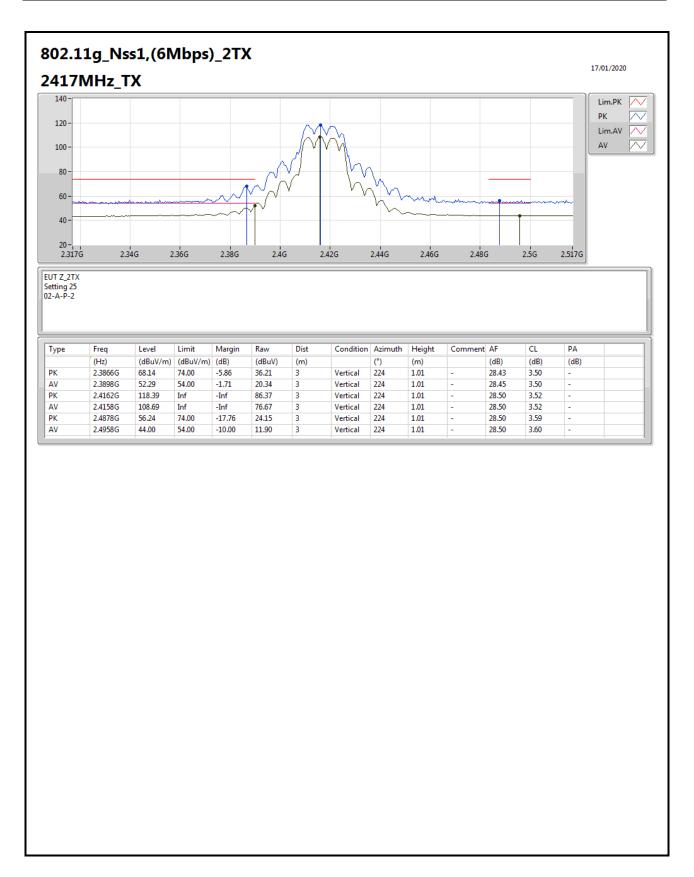


Page No. : 17 of 85

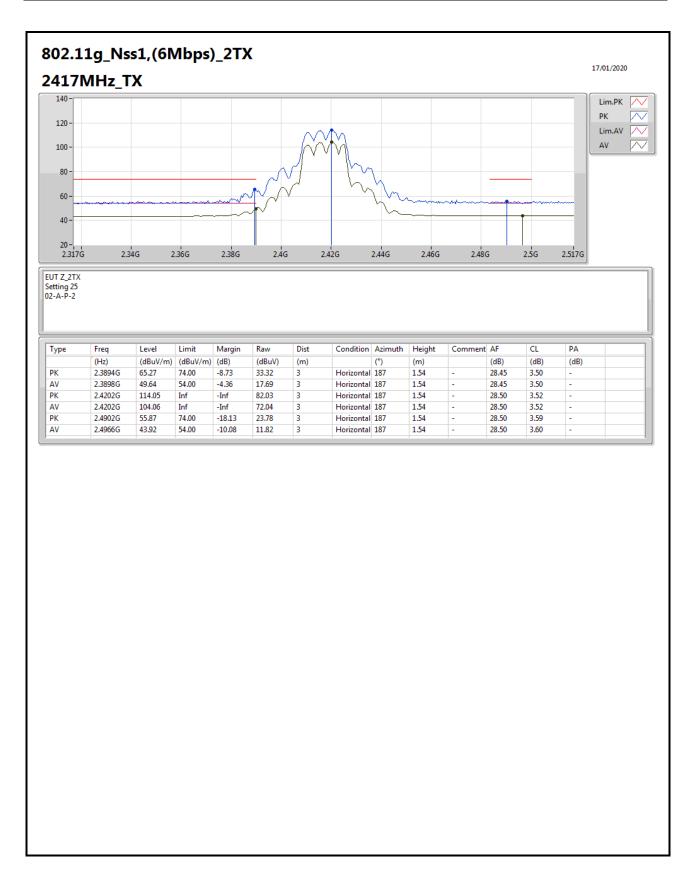




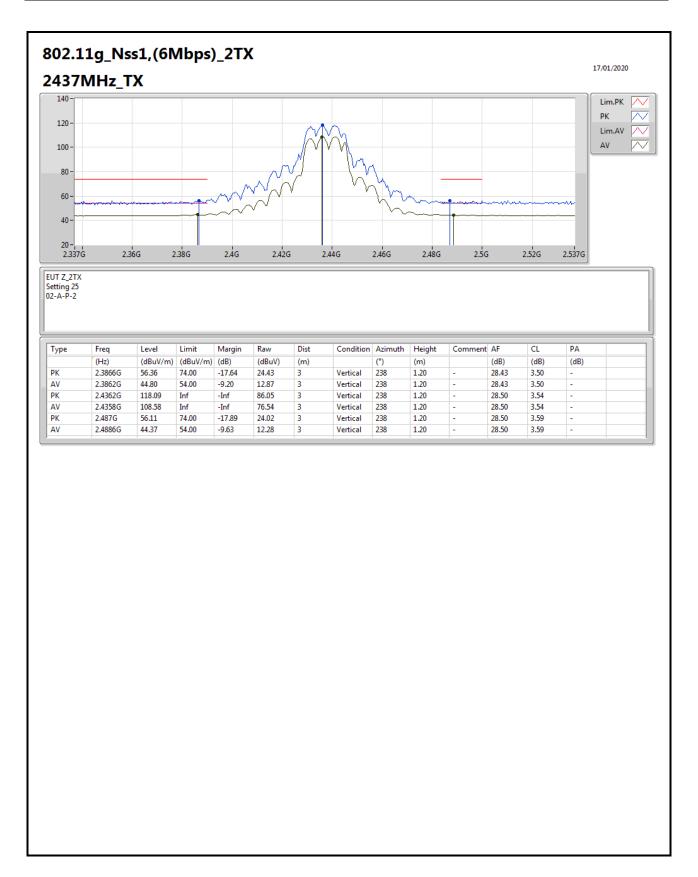




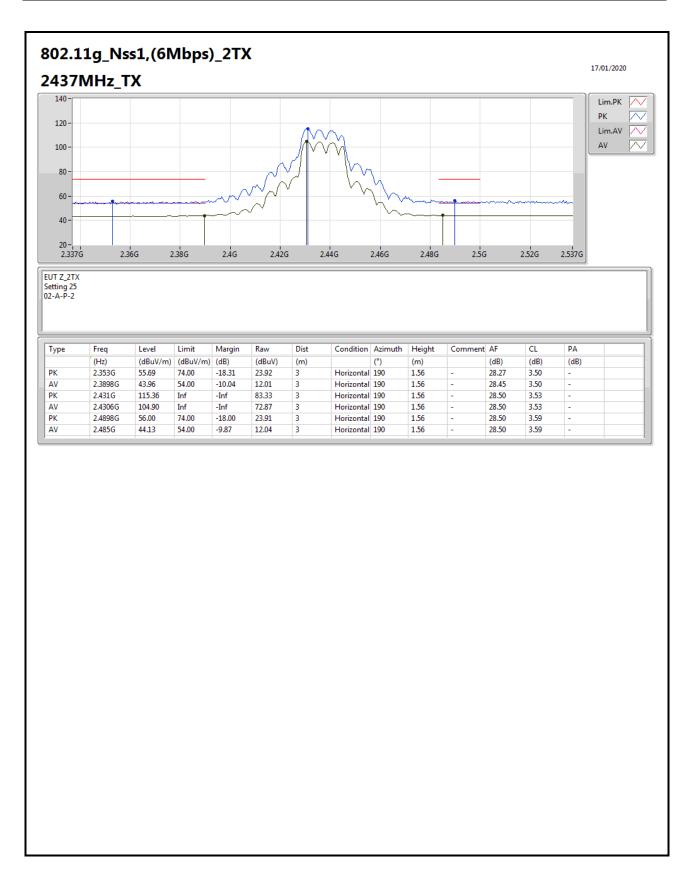




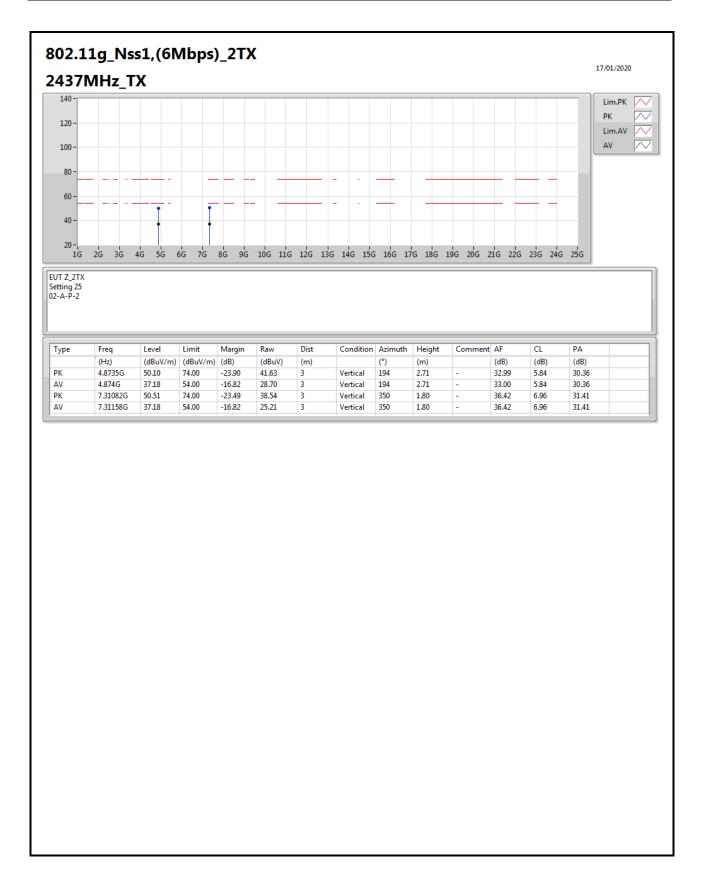




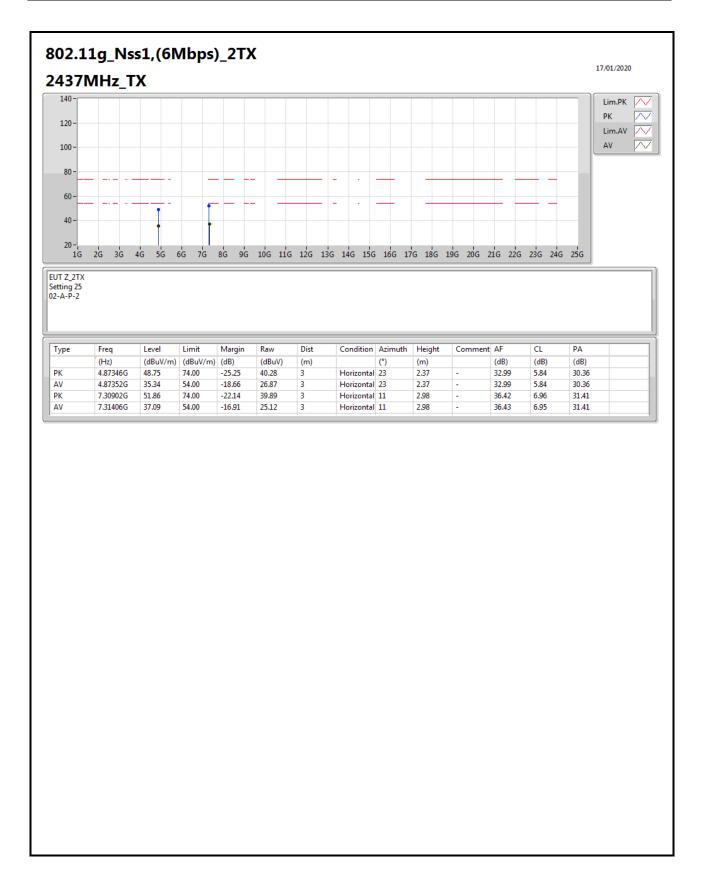


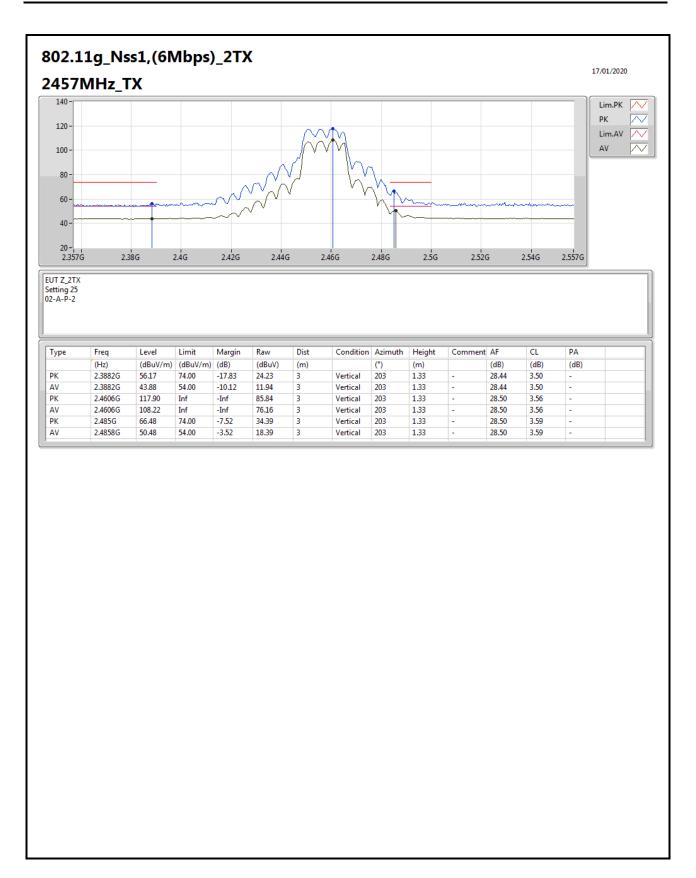




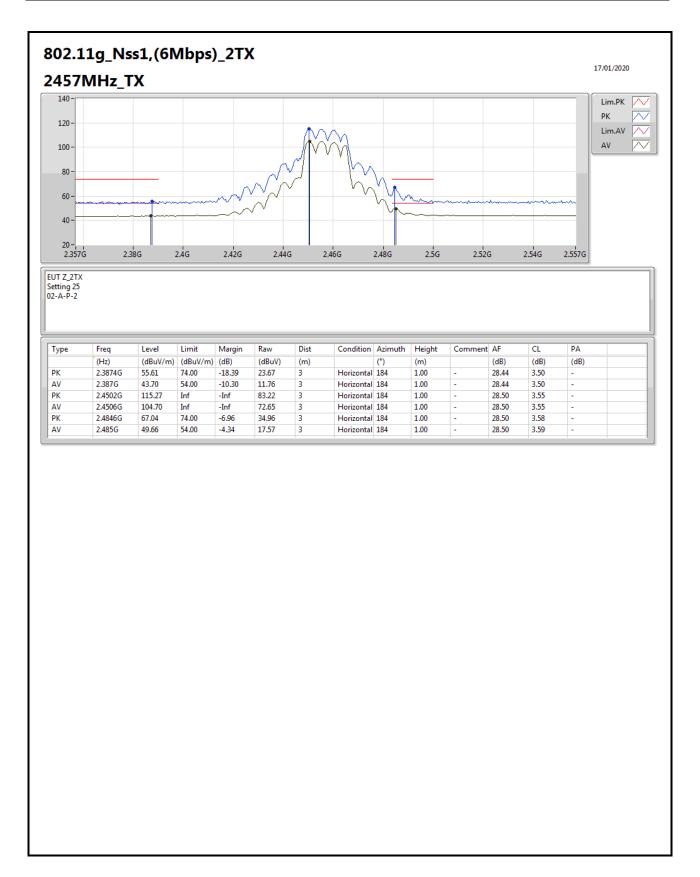




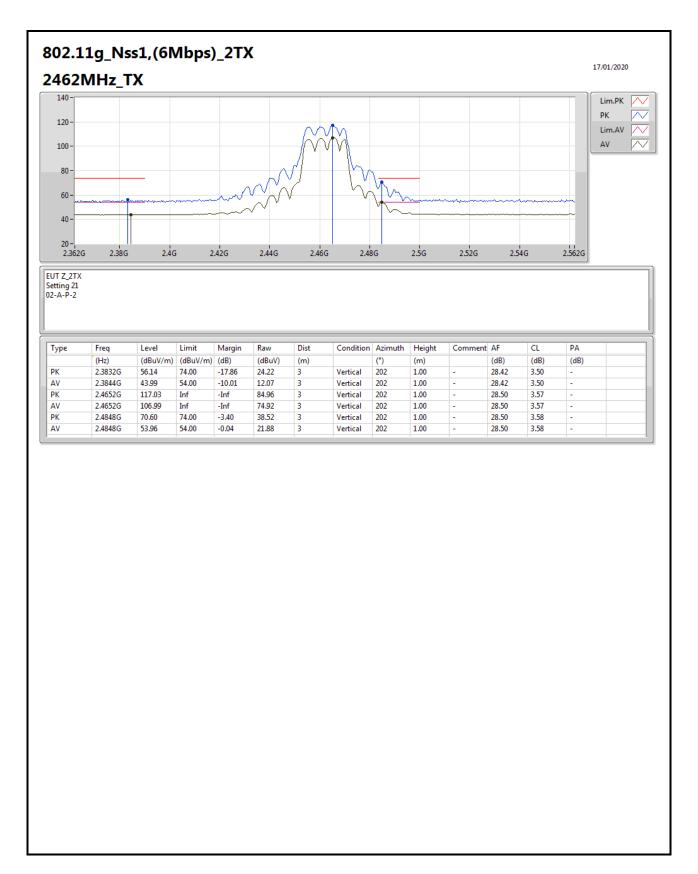




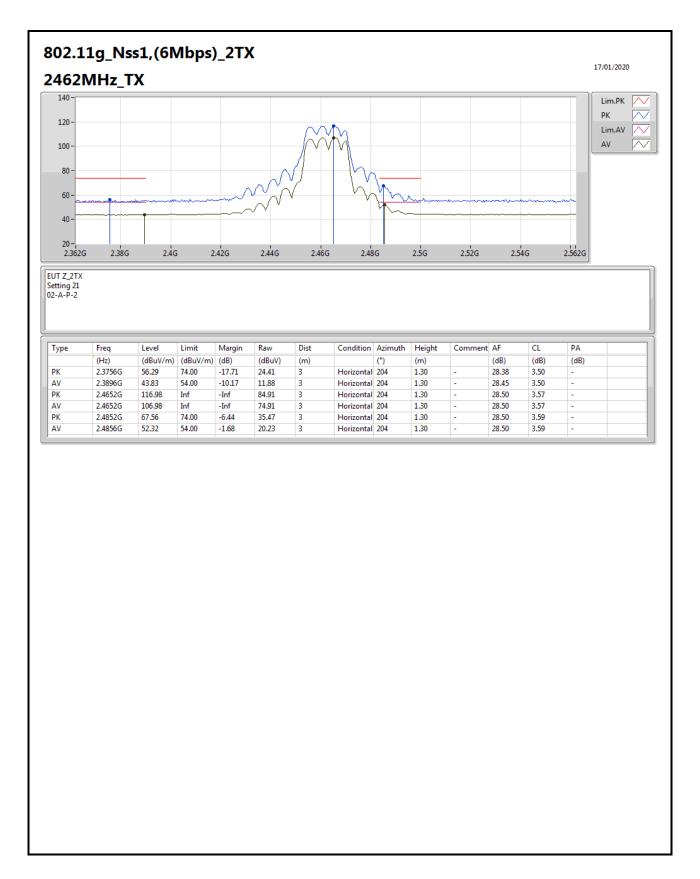




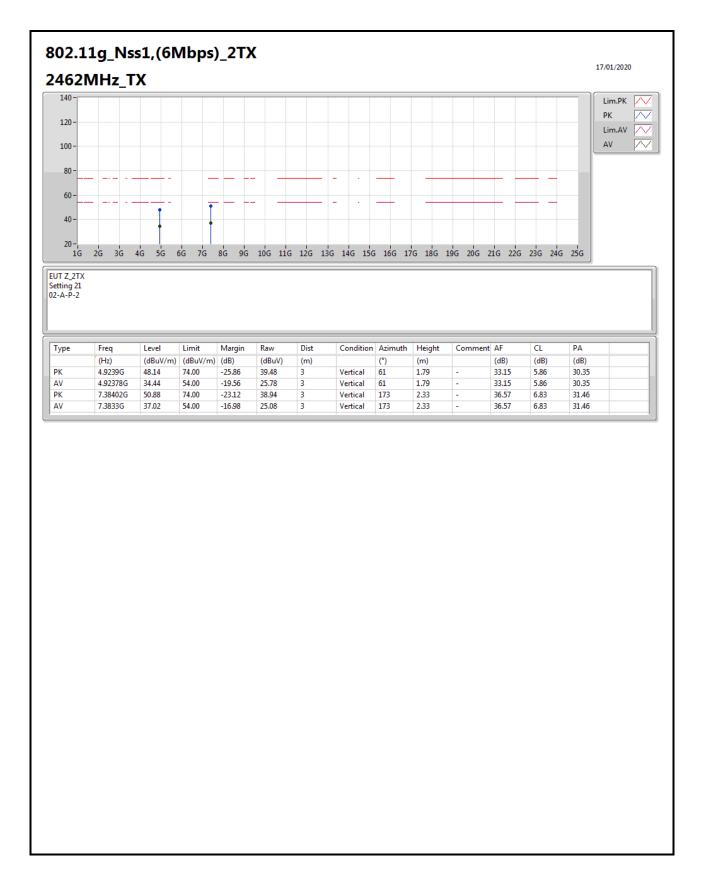




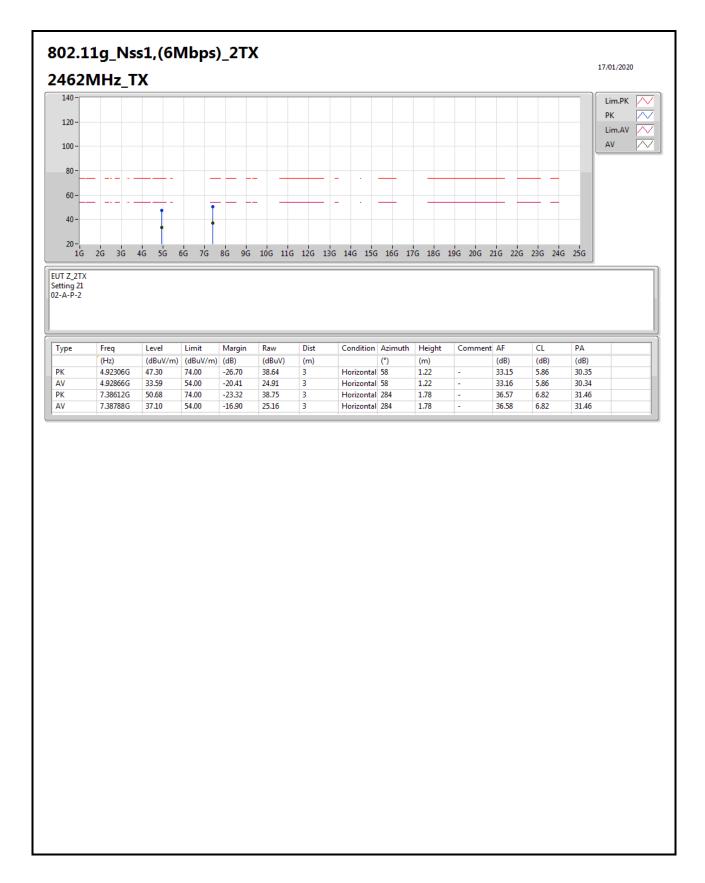


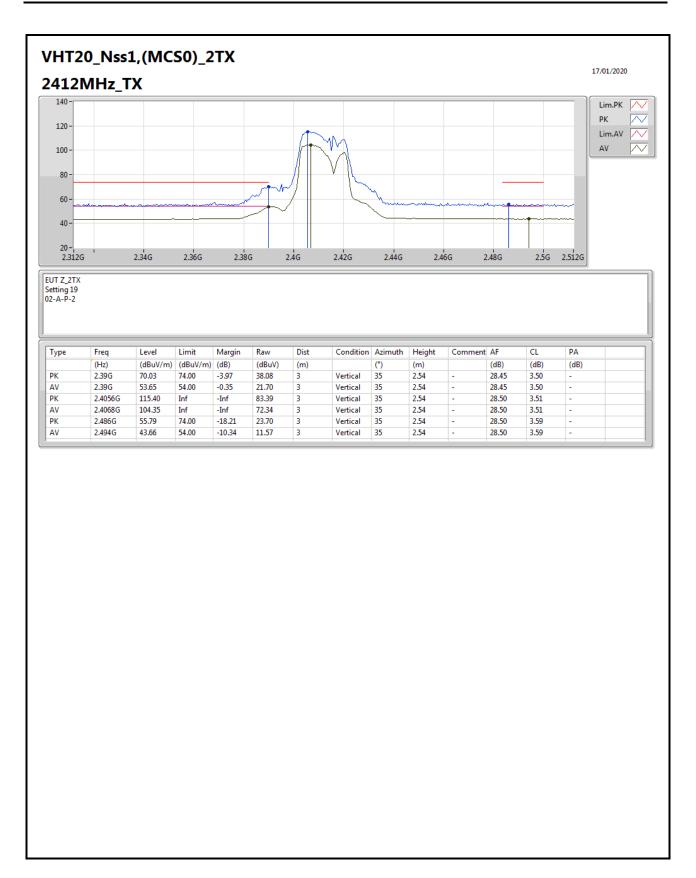


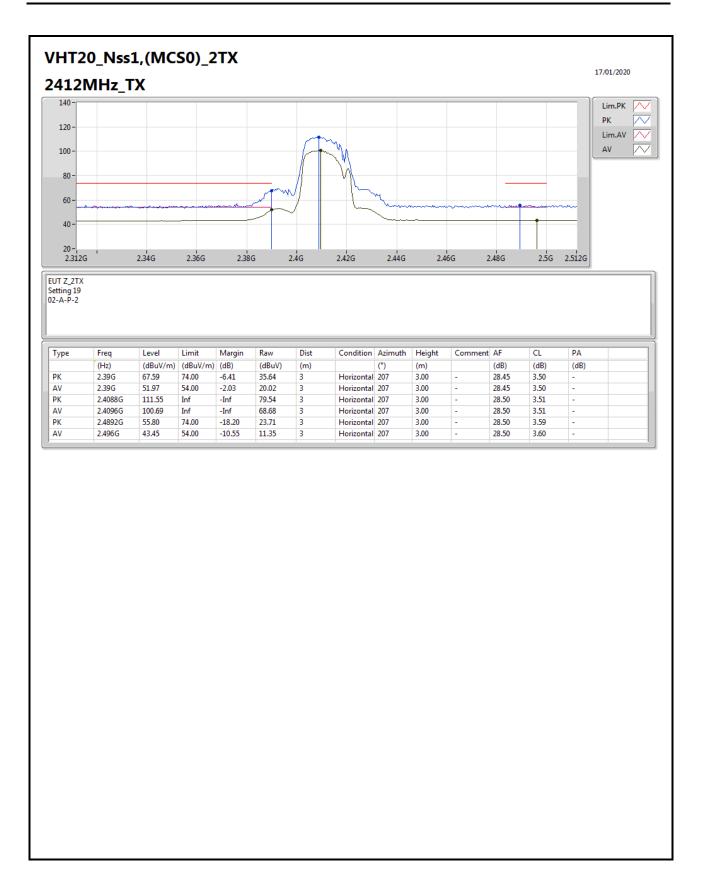




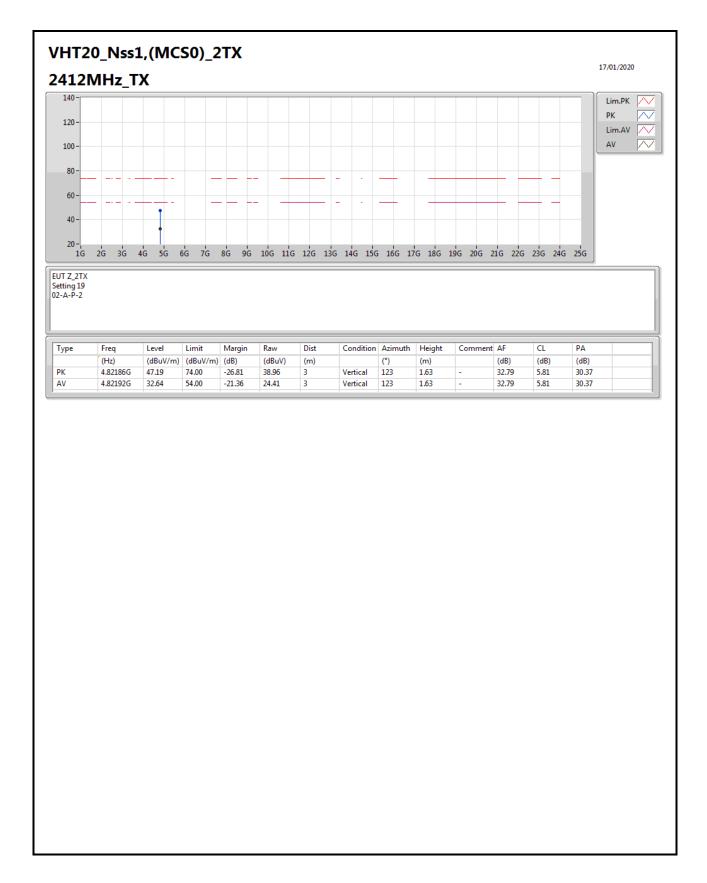




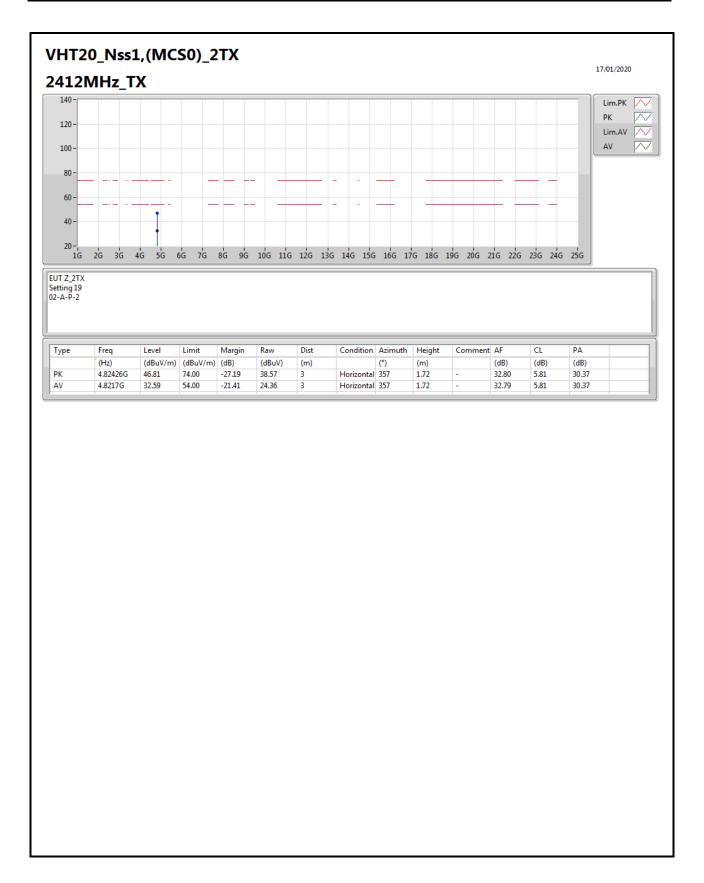




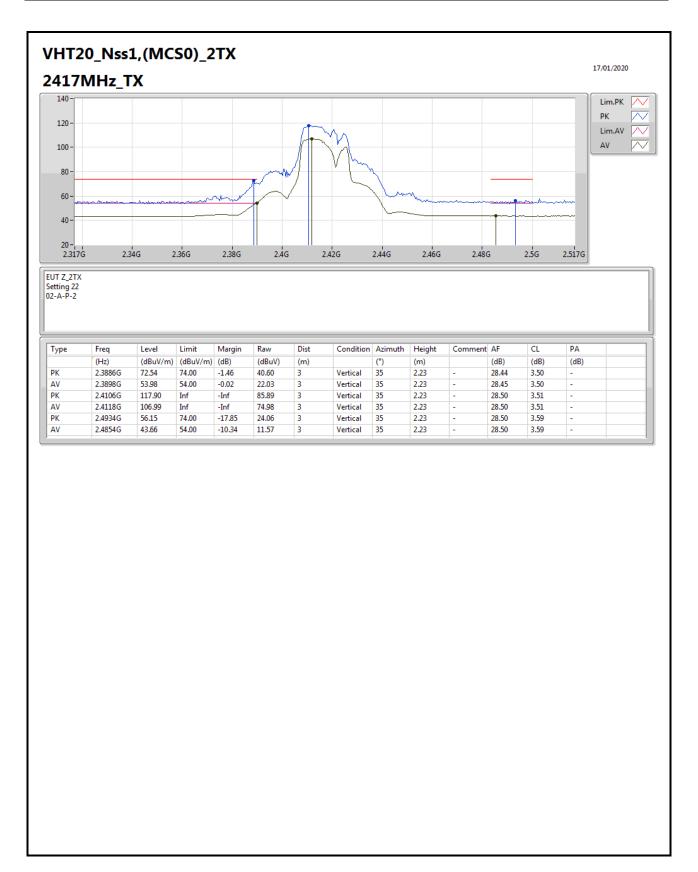




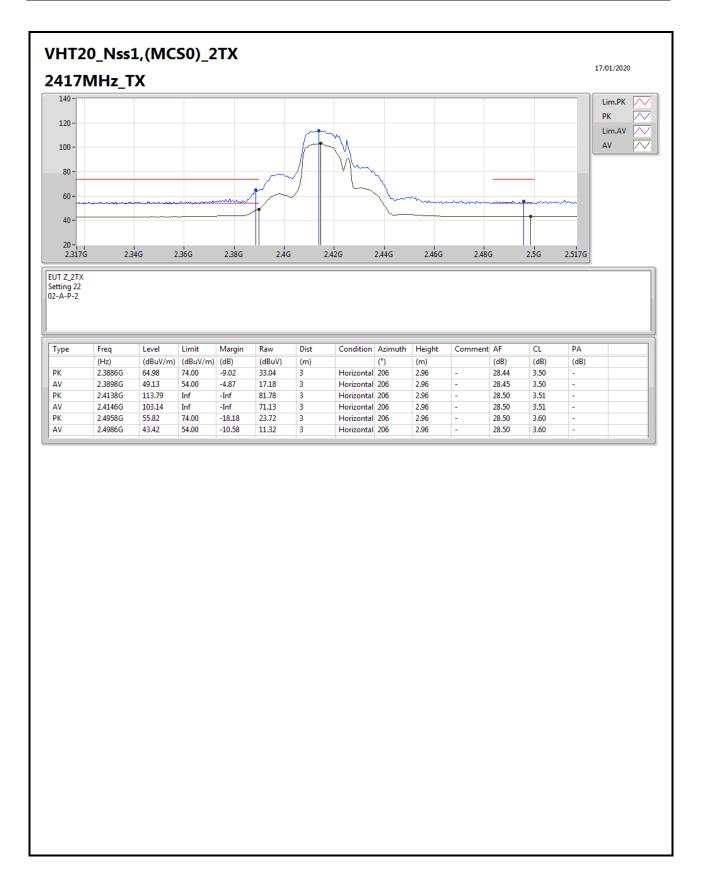




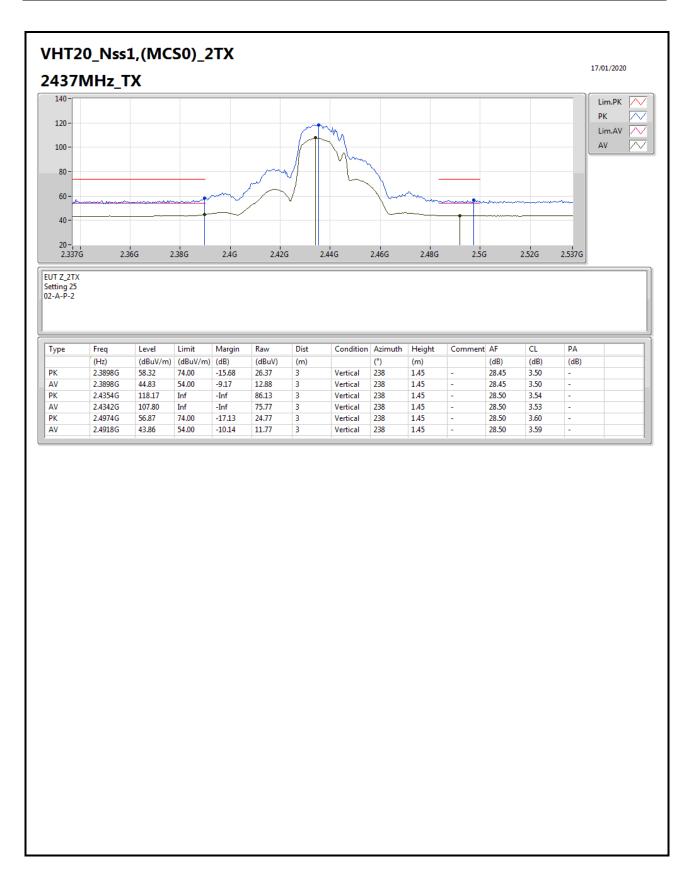




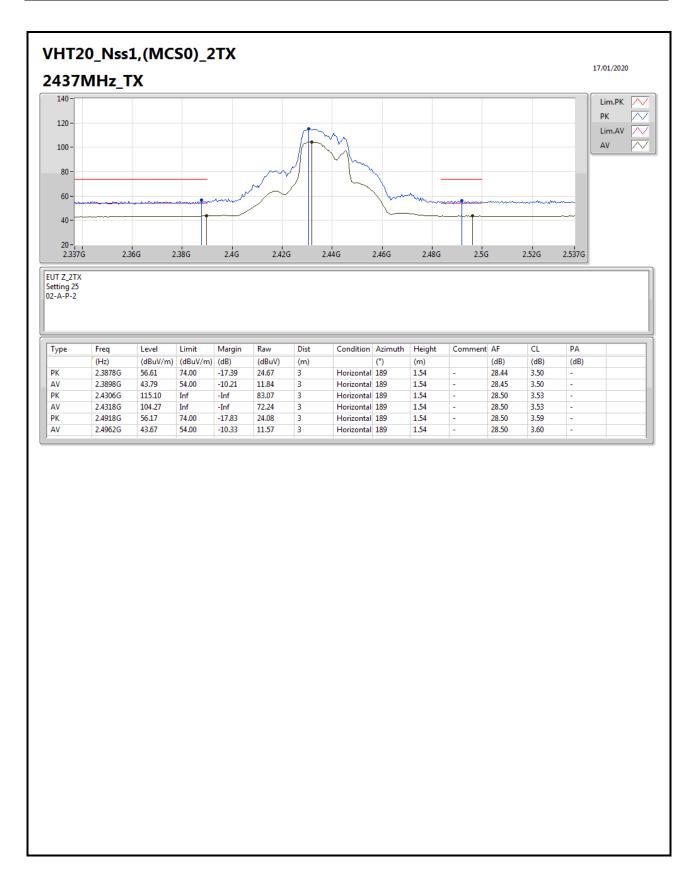




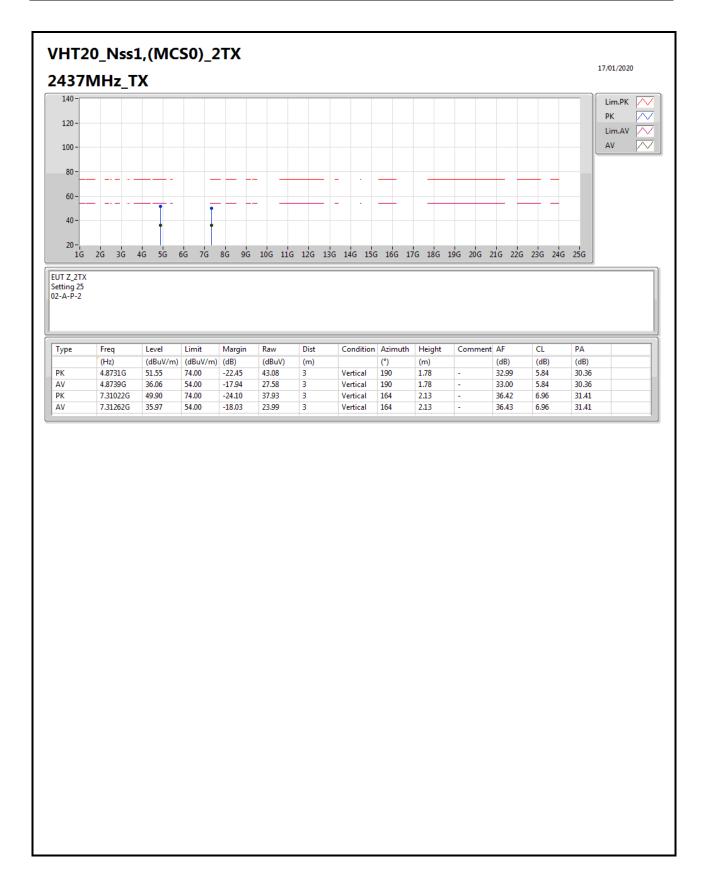




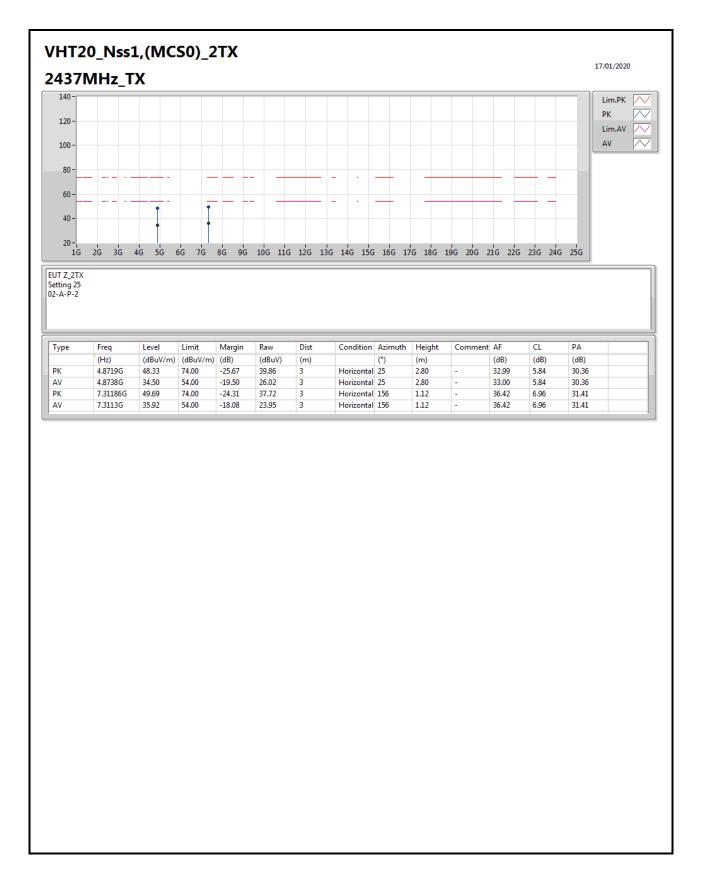




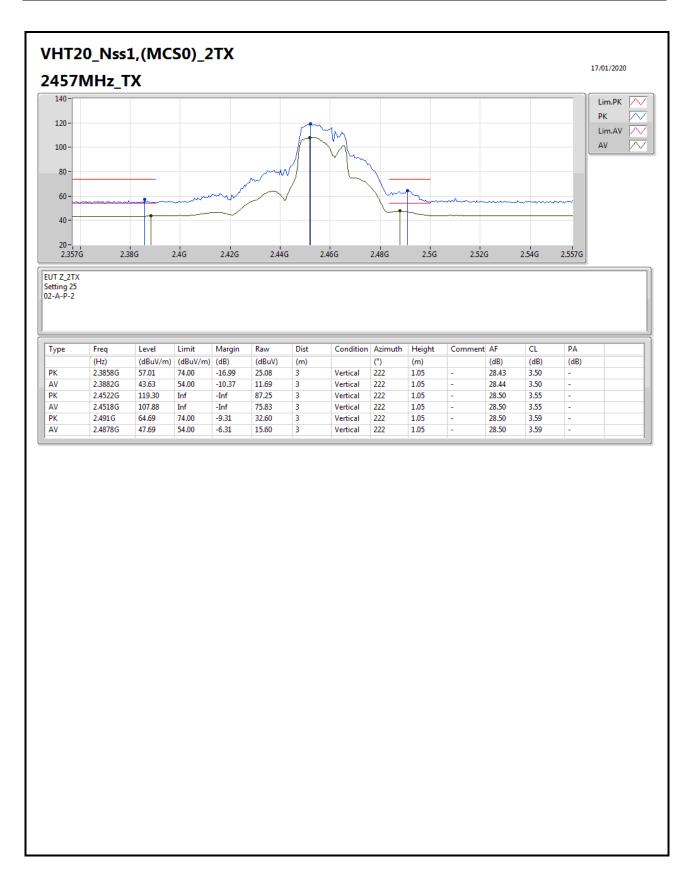




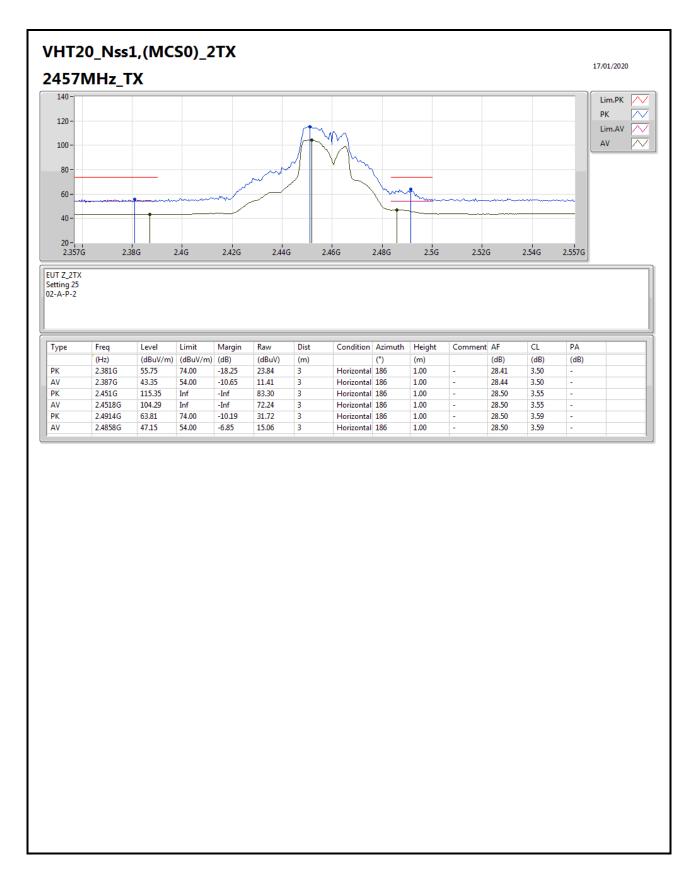




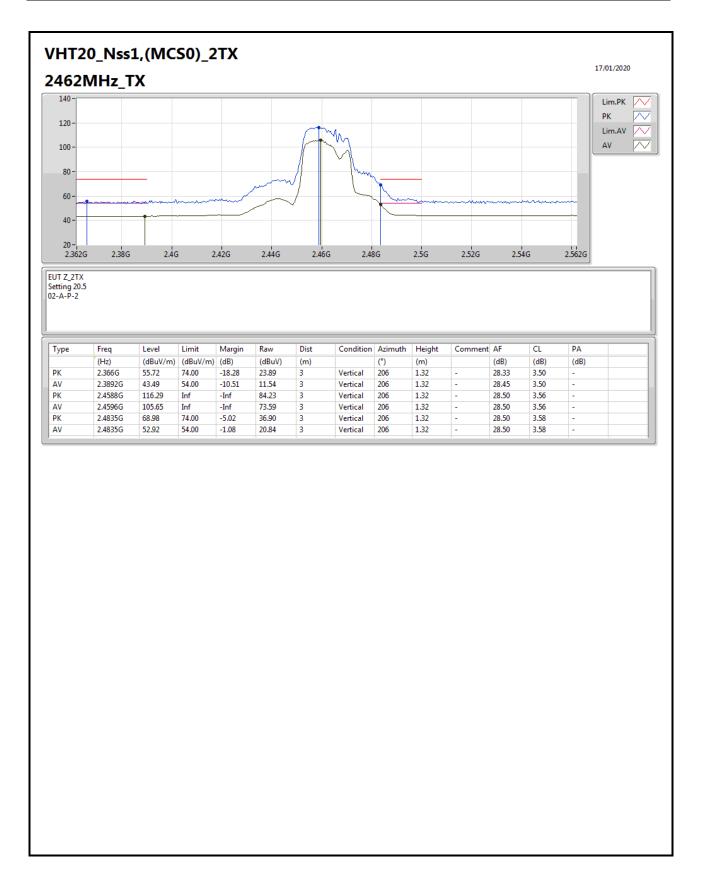




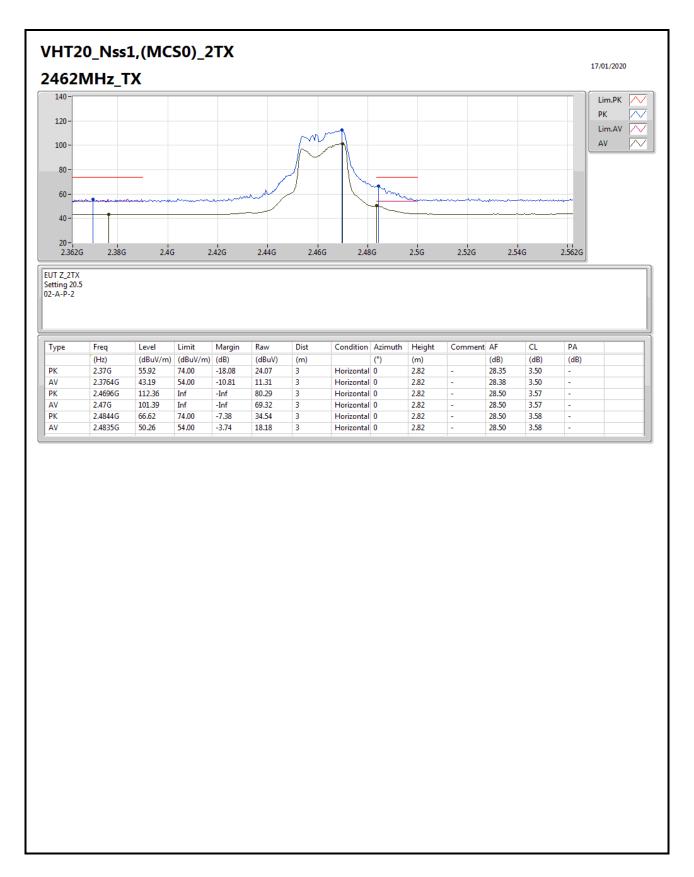




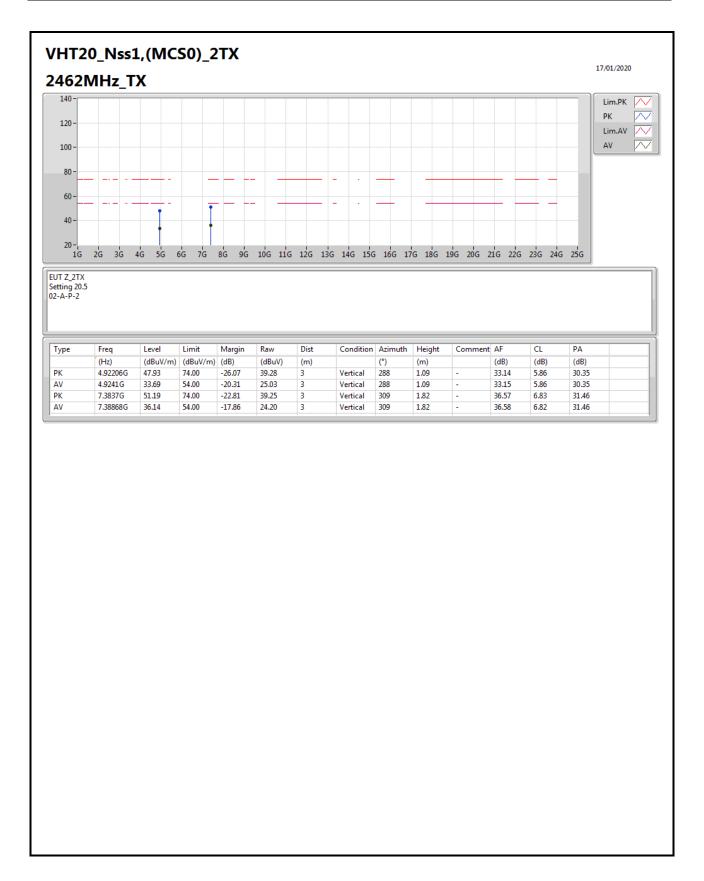




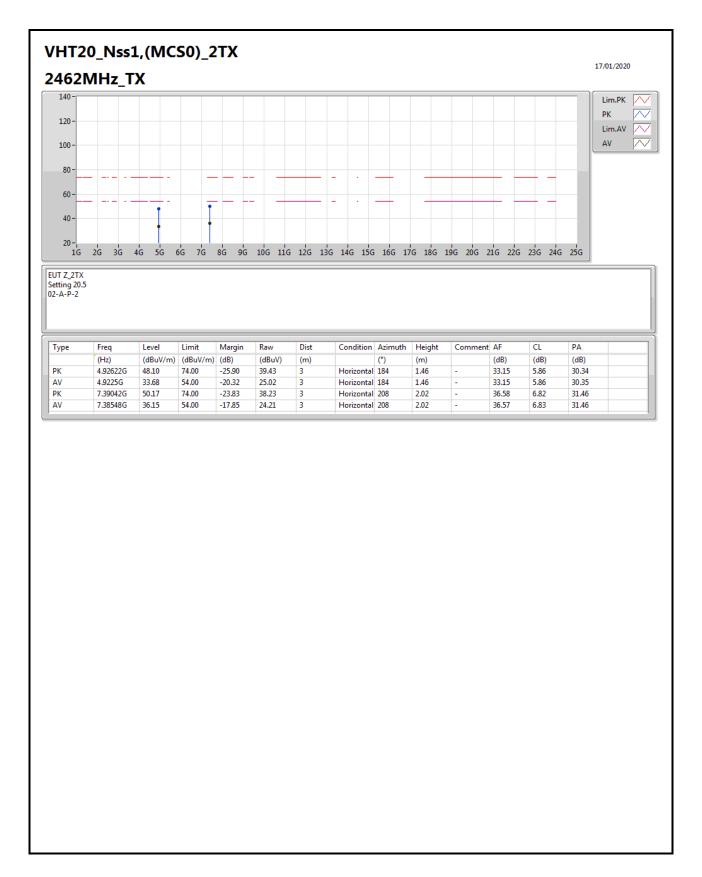




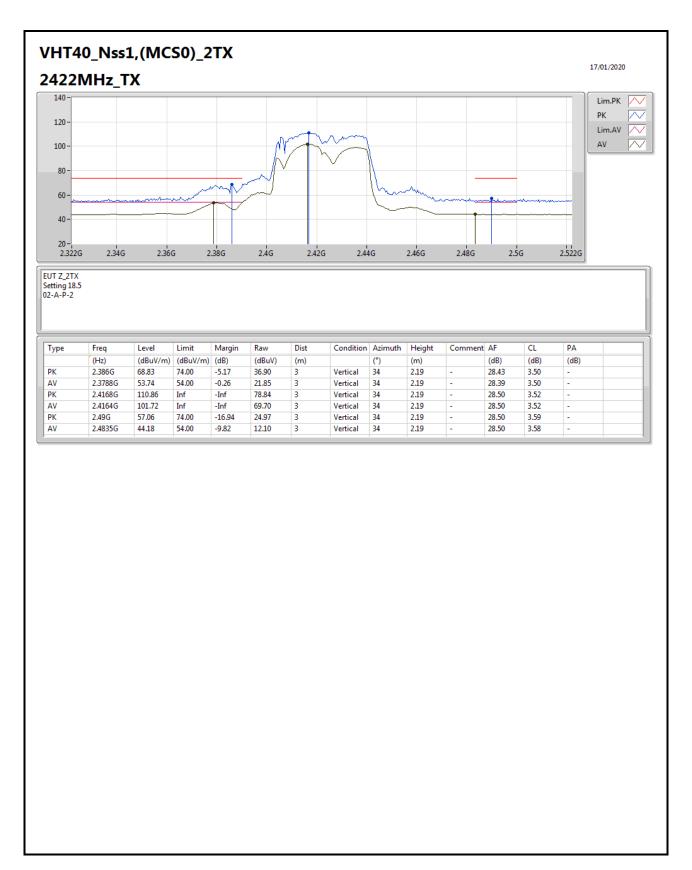




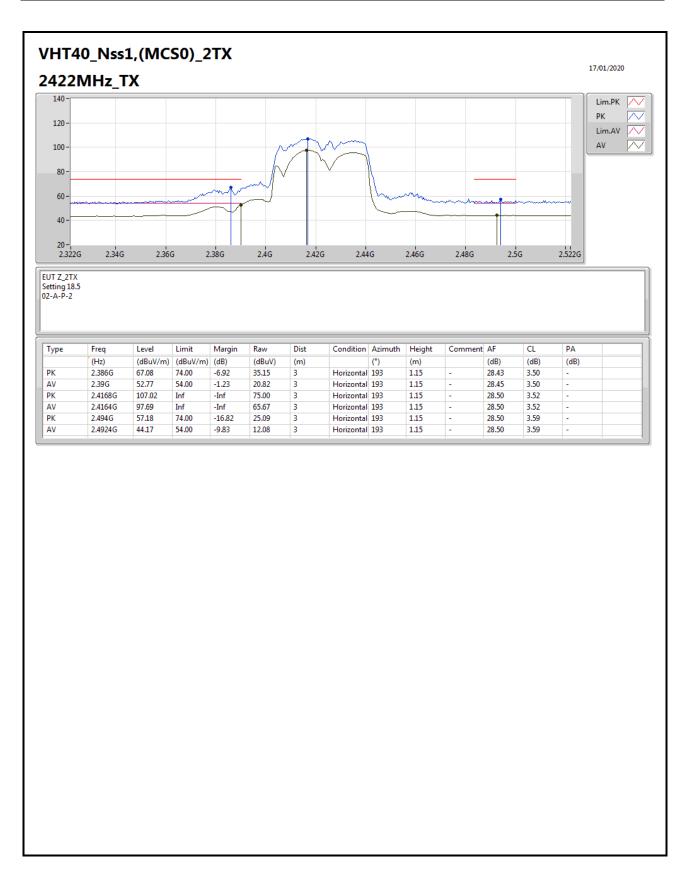




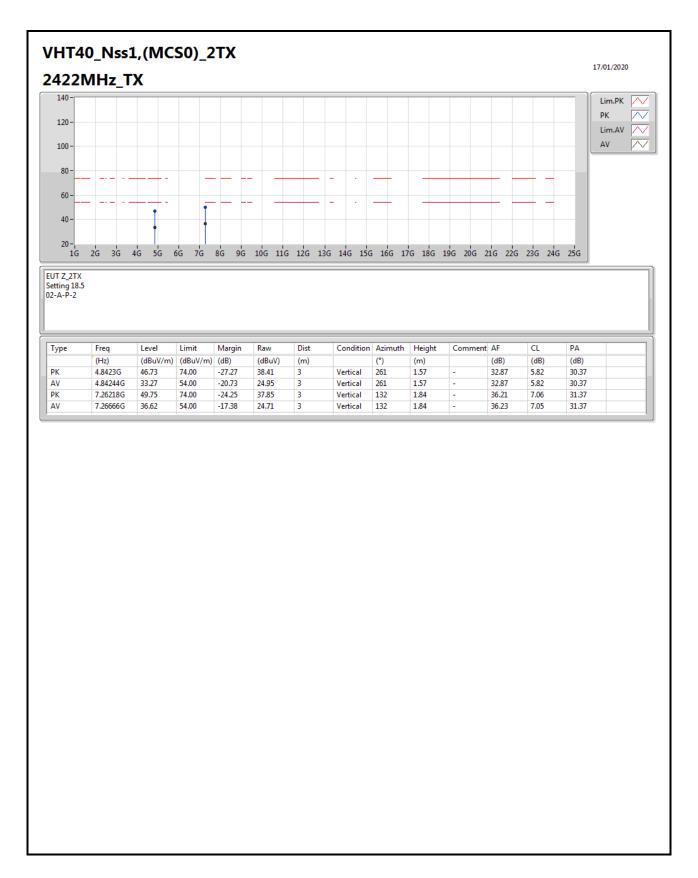




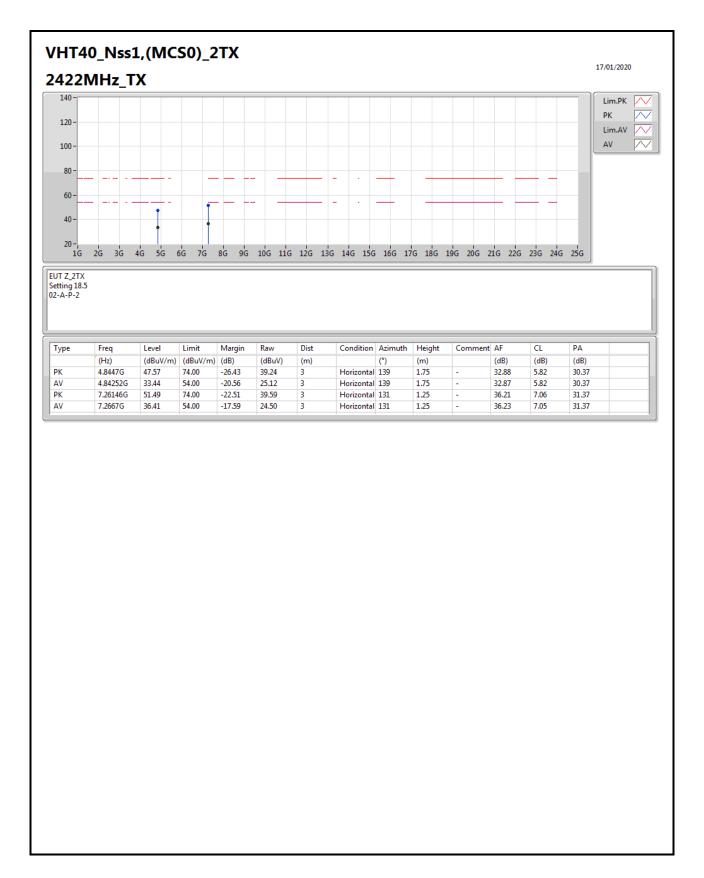




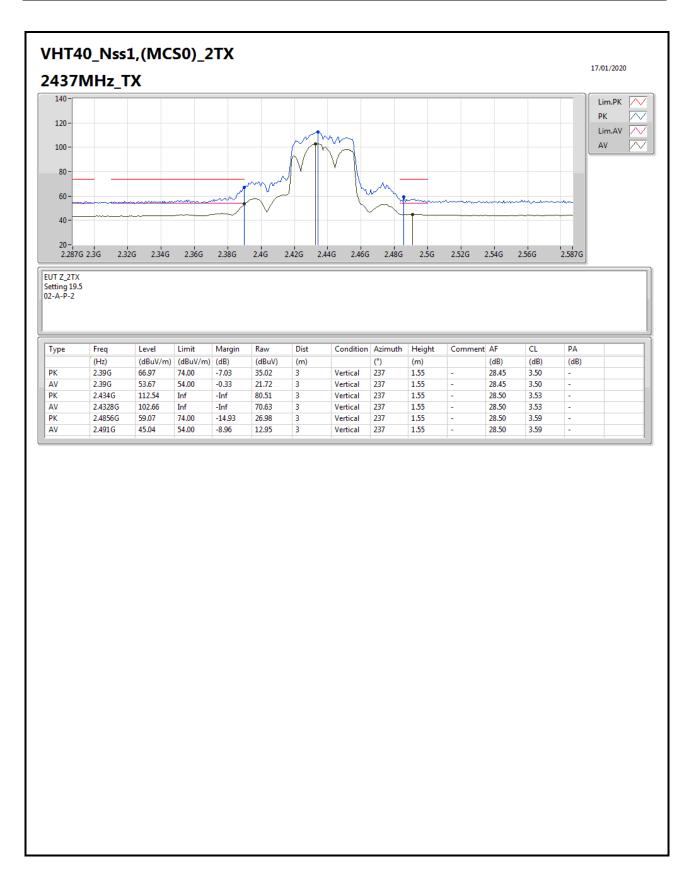




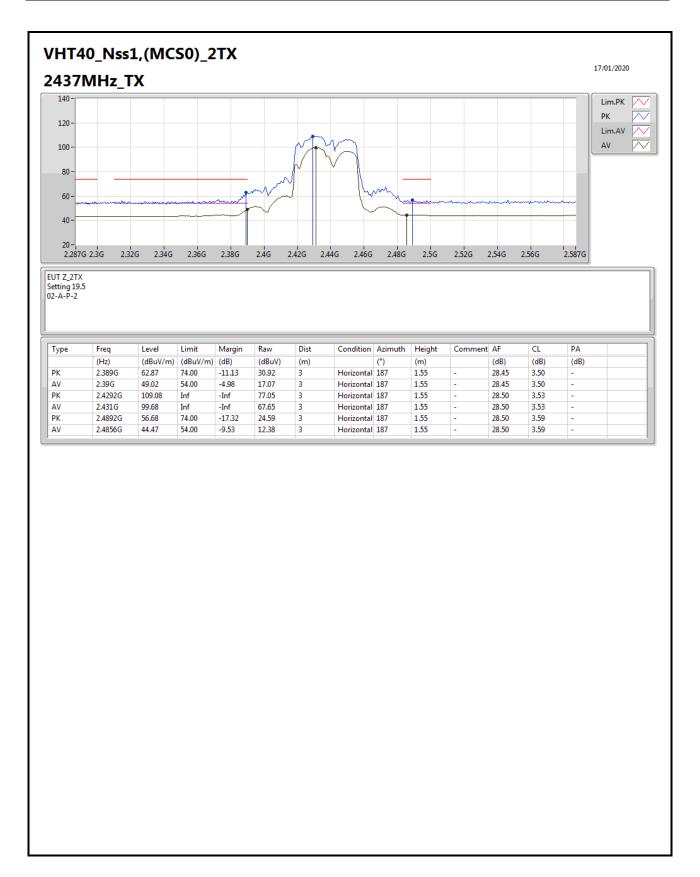




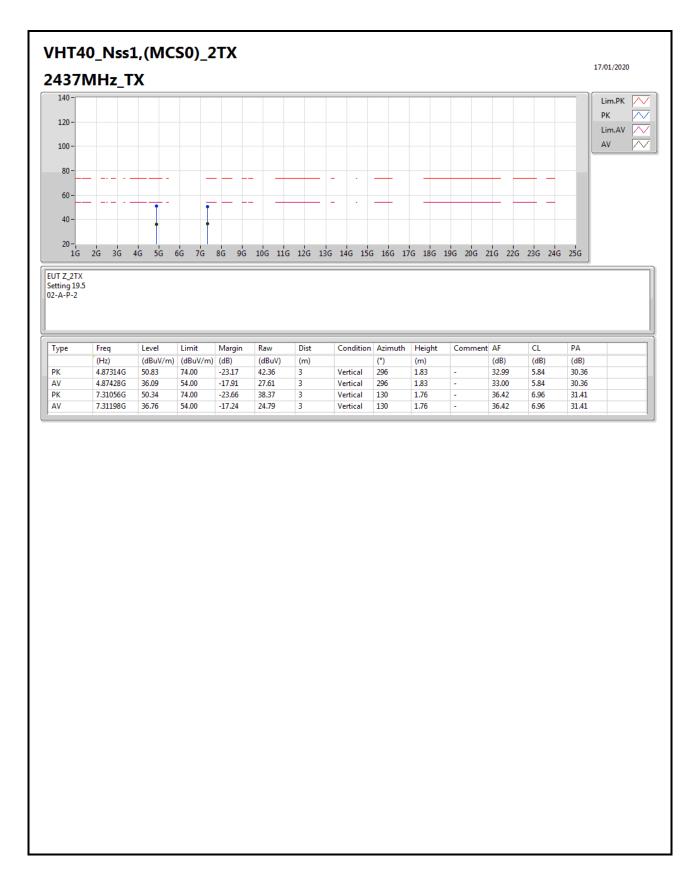




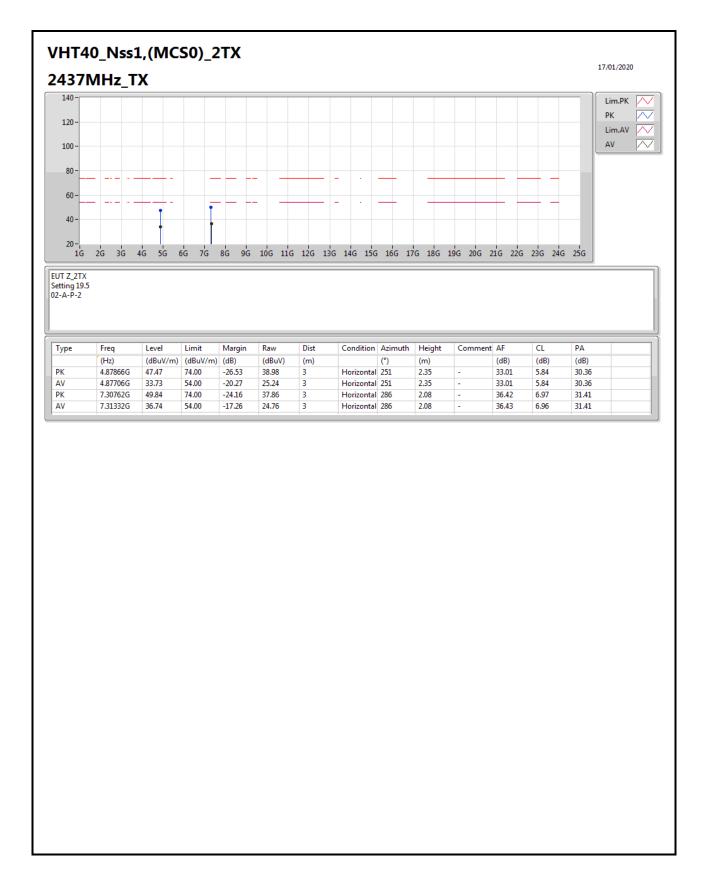




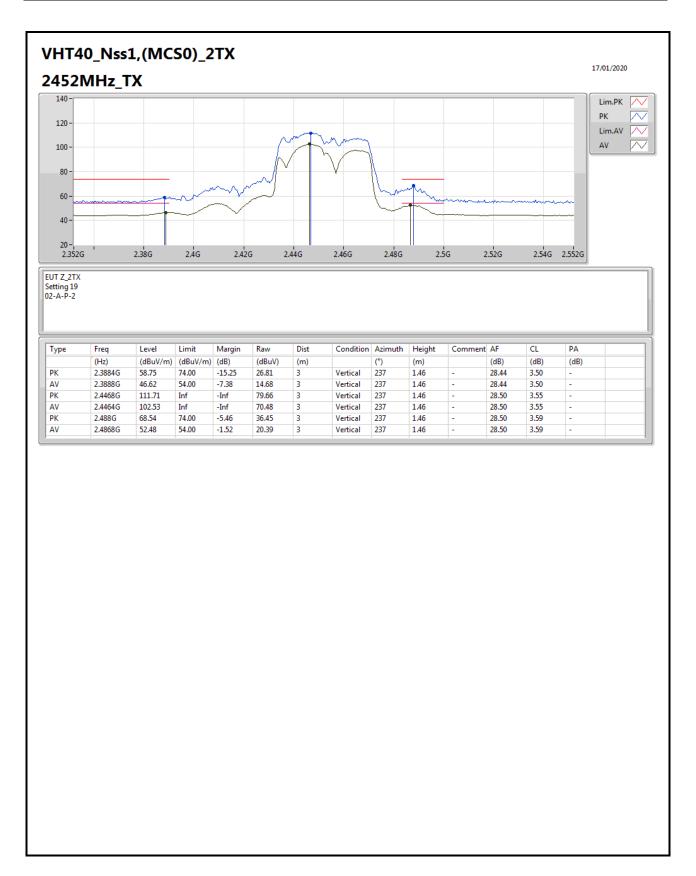




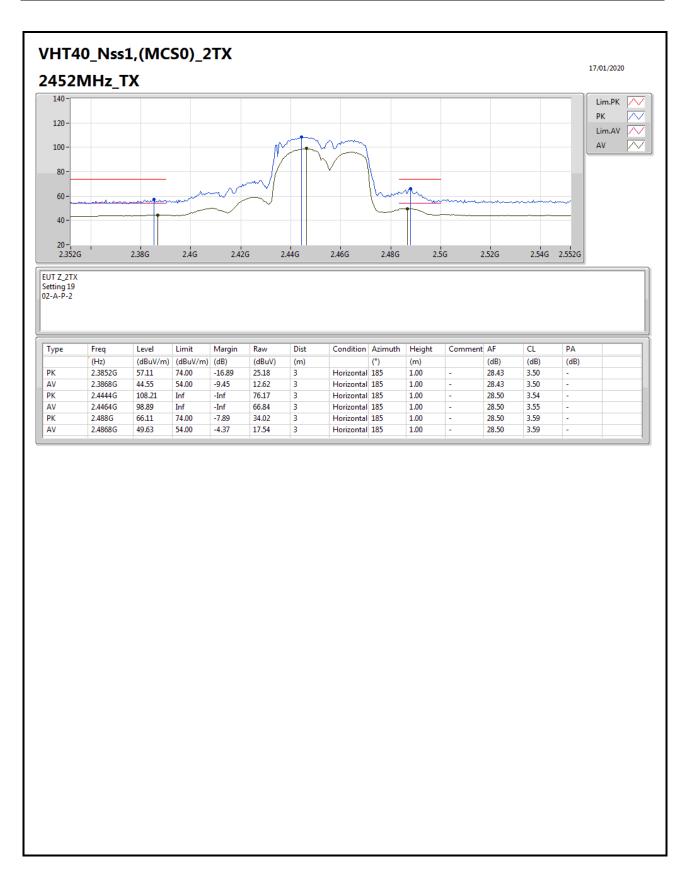






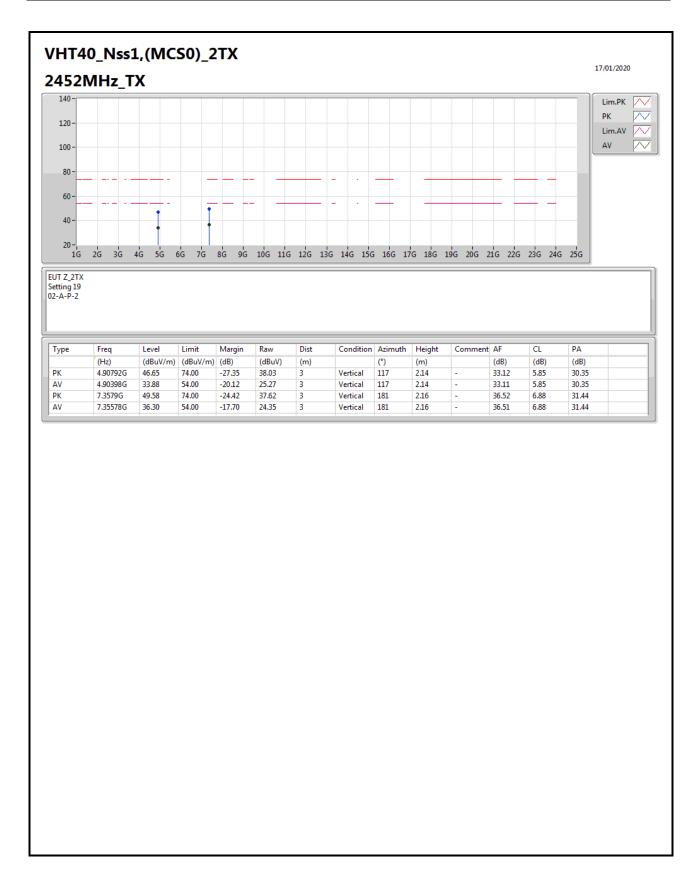






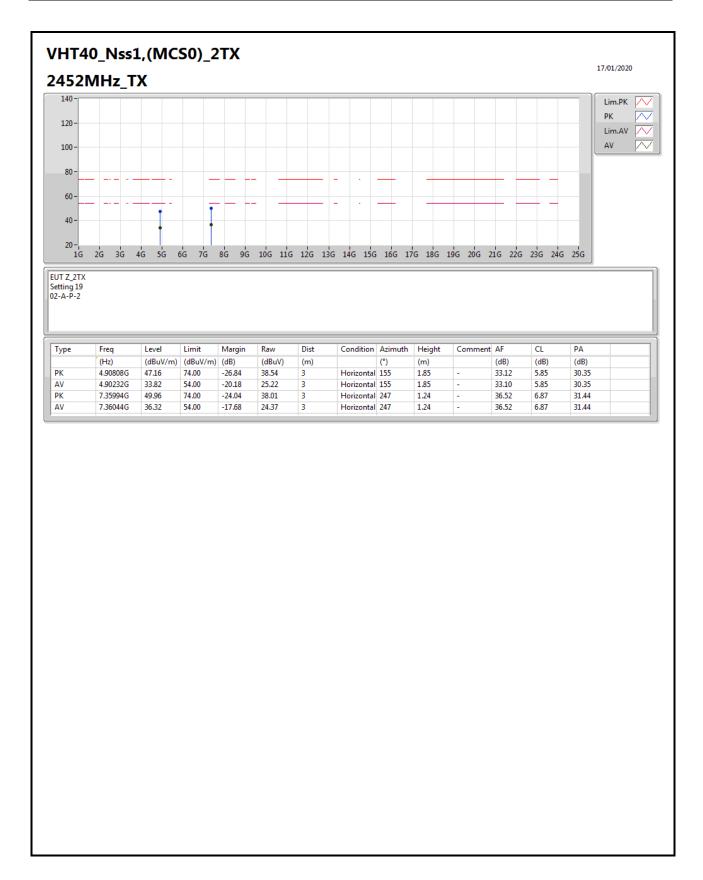
Page No. : 56 of 85



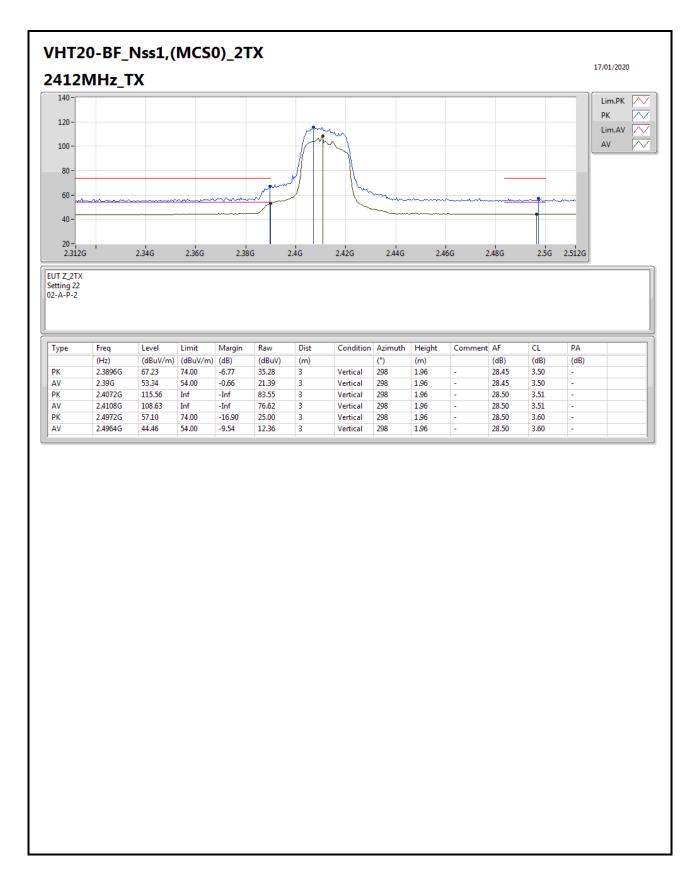


Page No. : 57 of 85

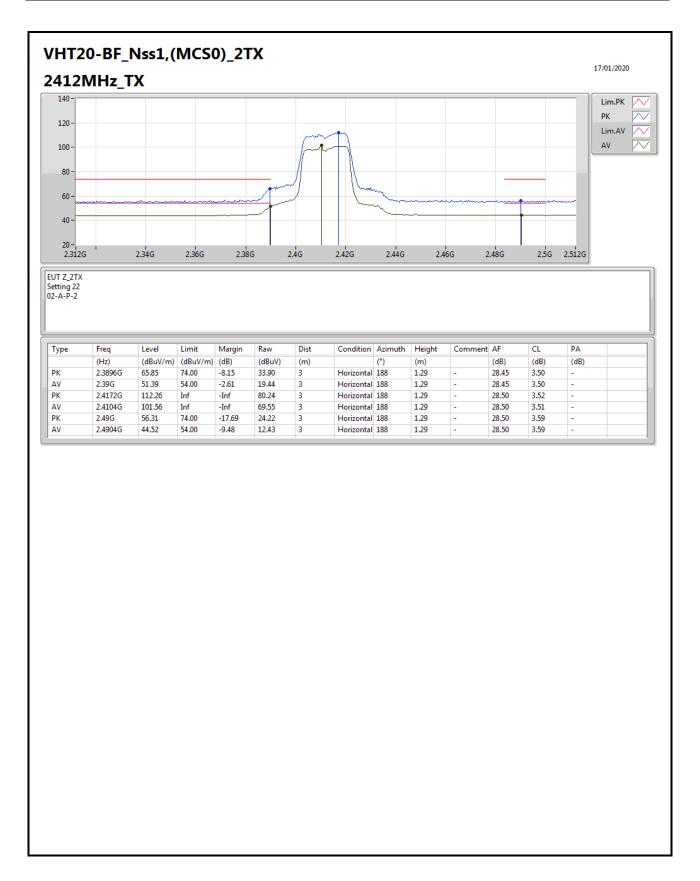




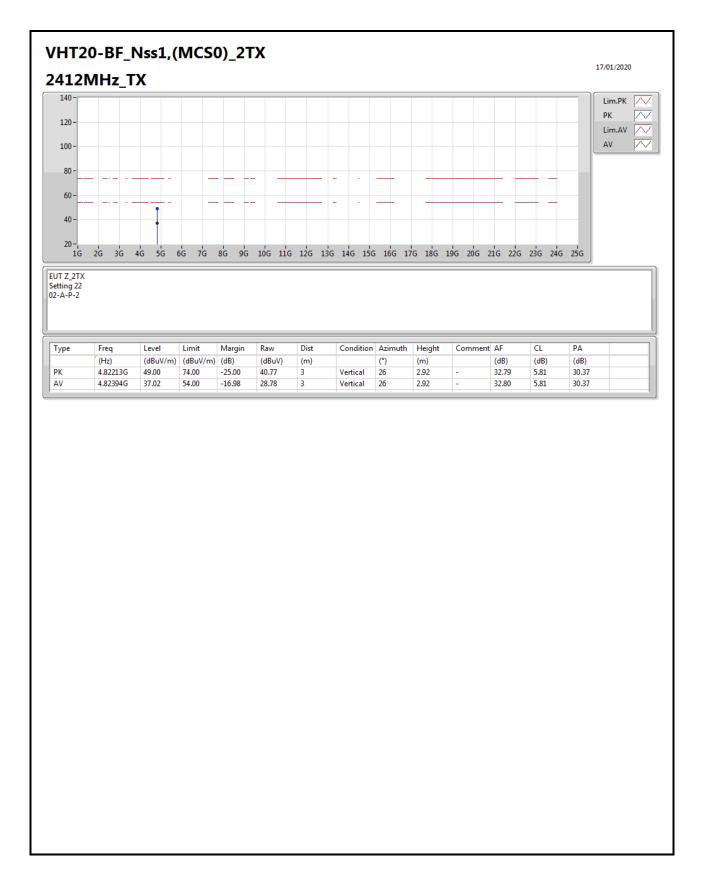




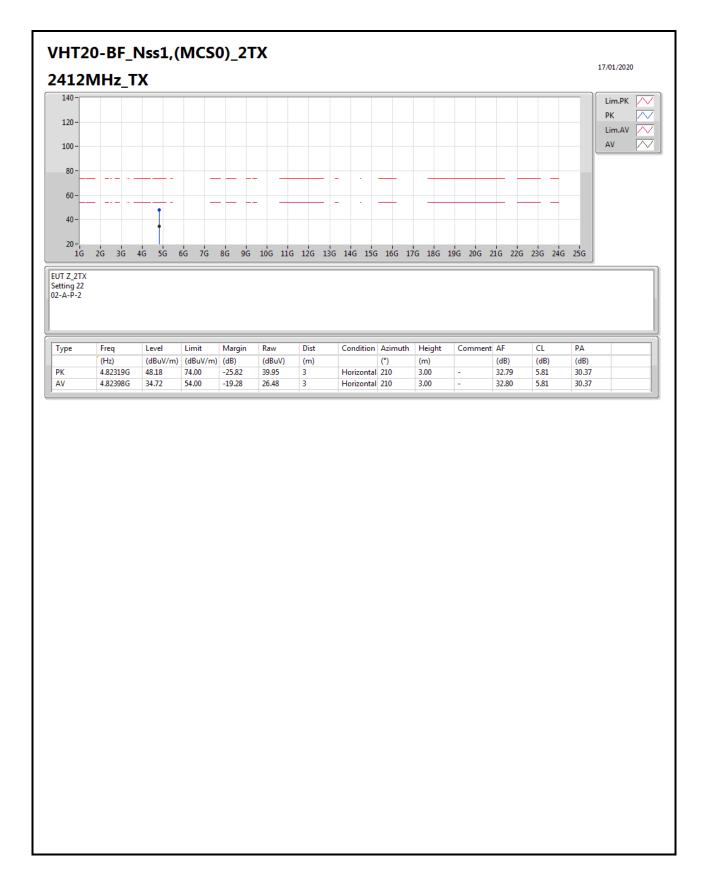




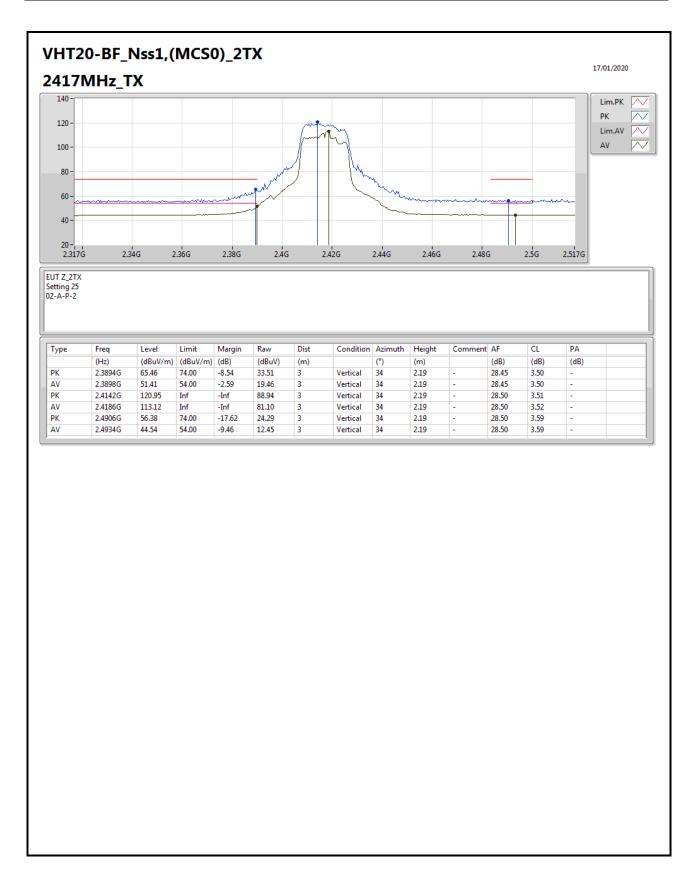




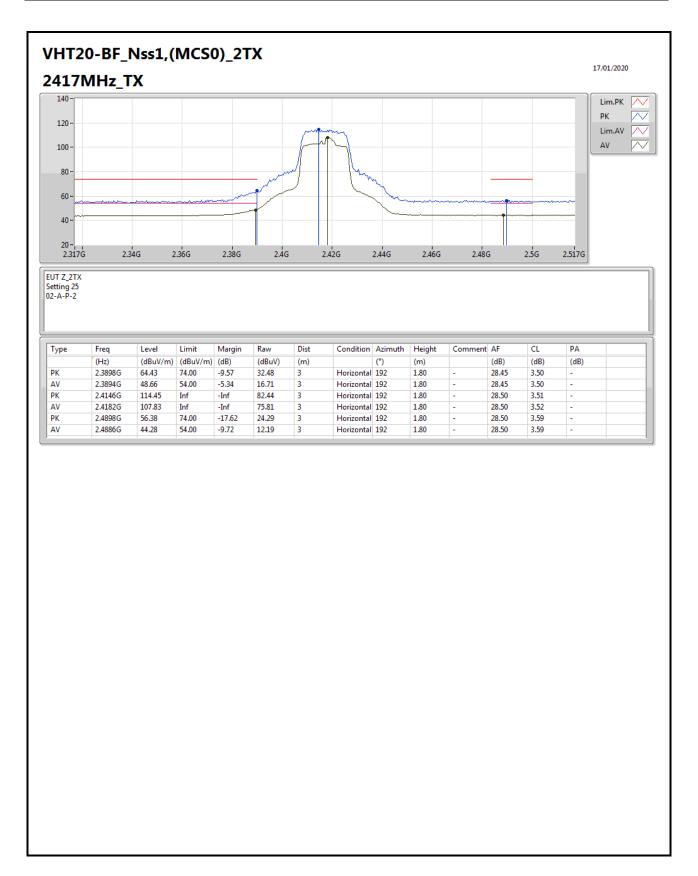




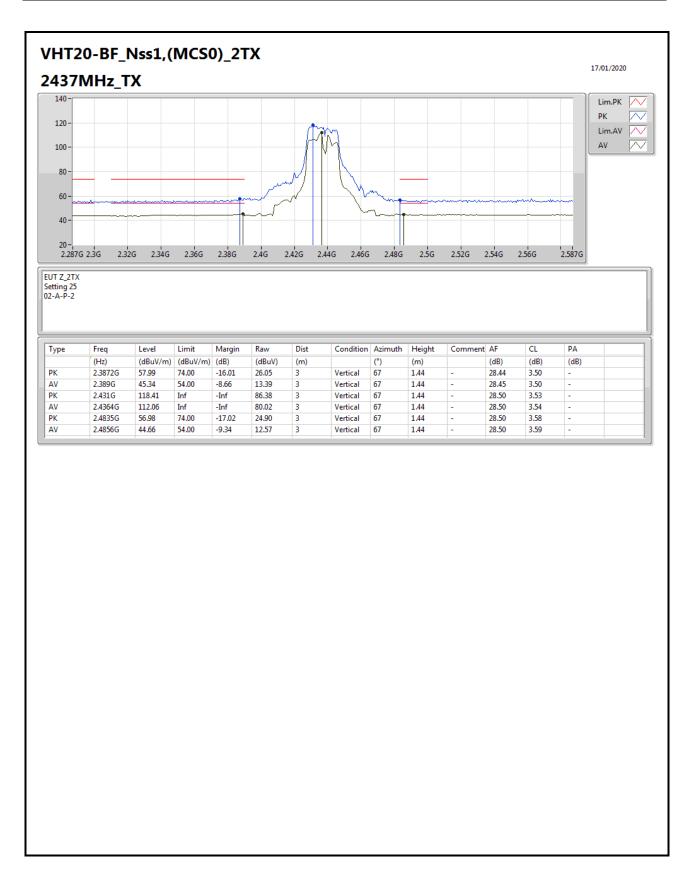




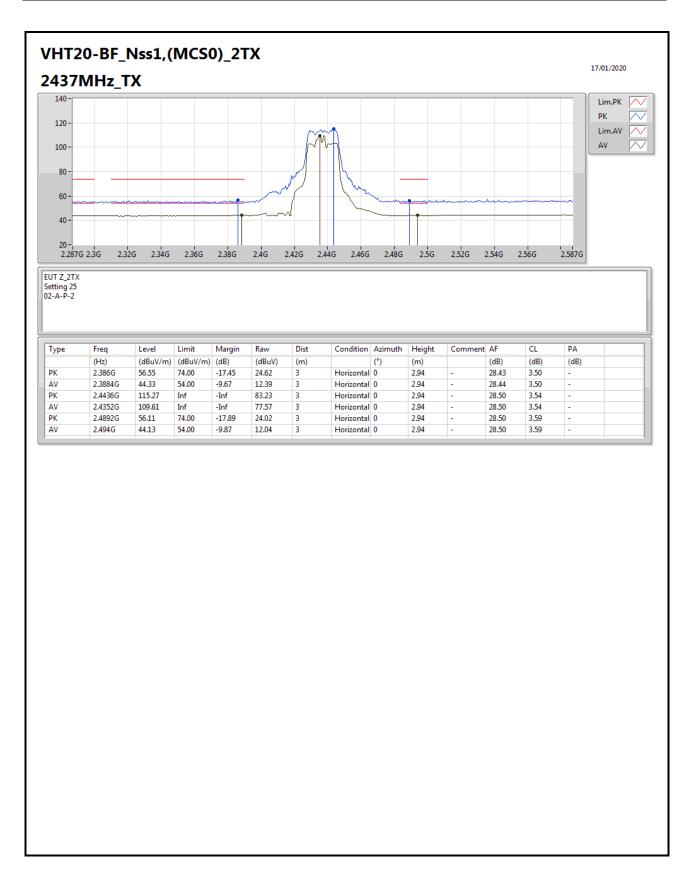




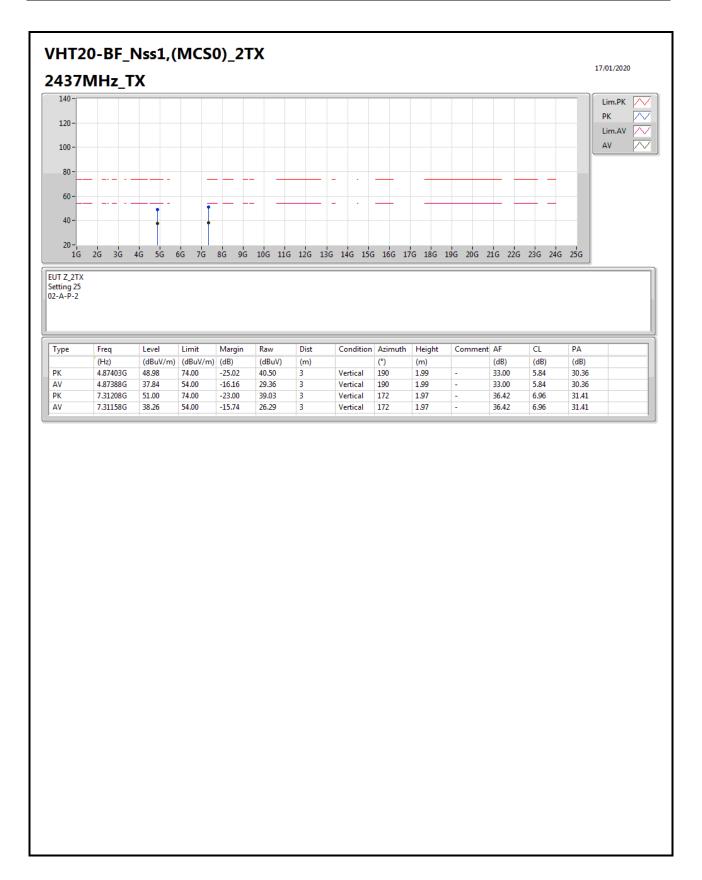




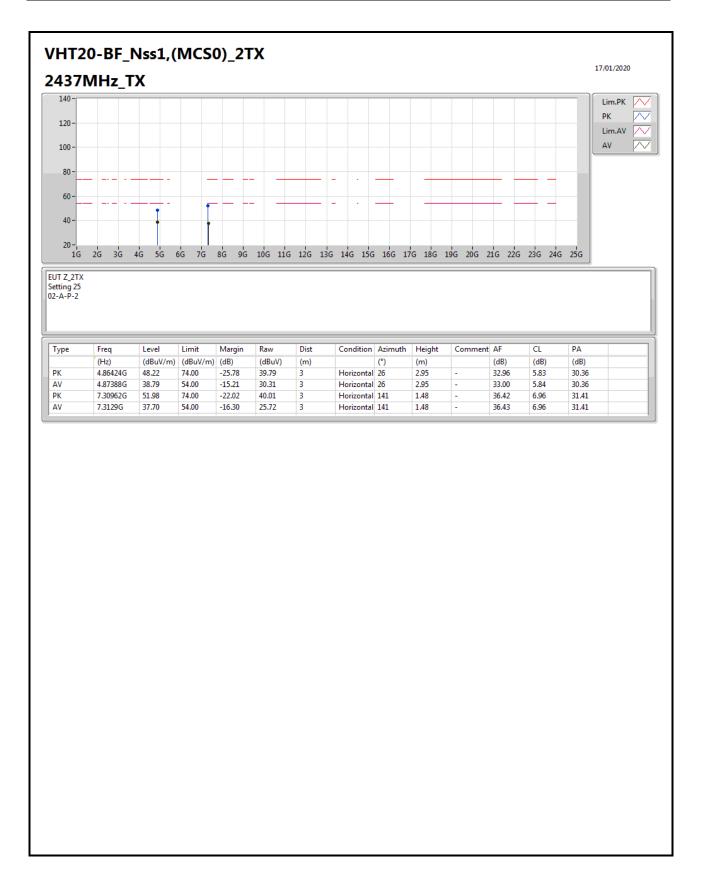




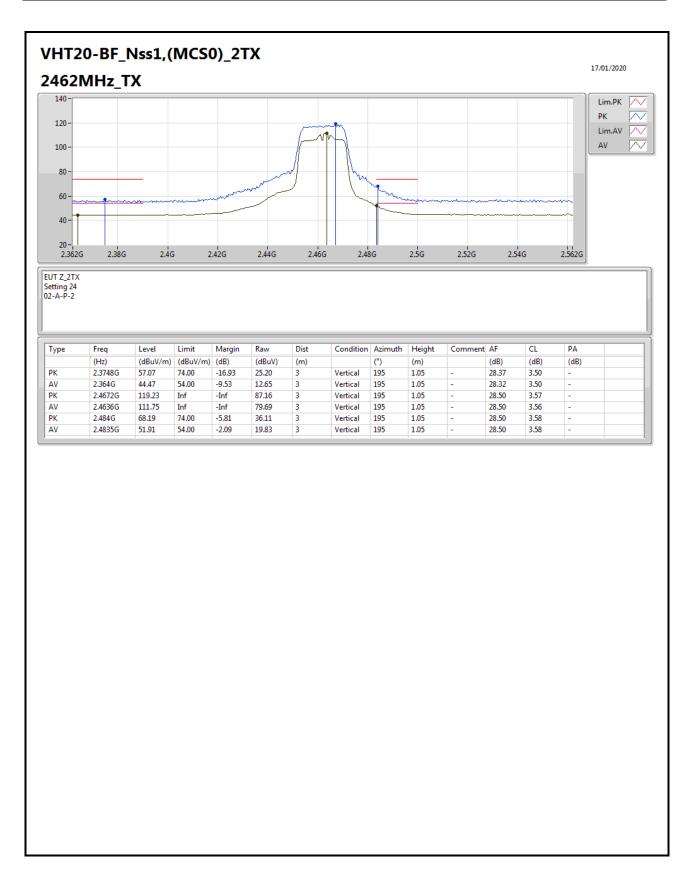


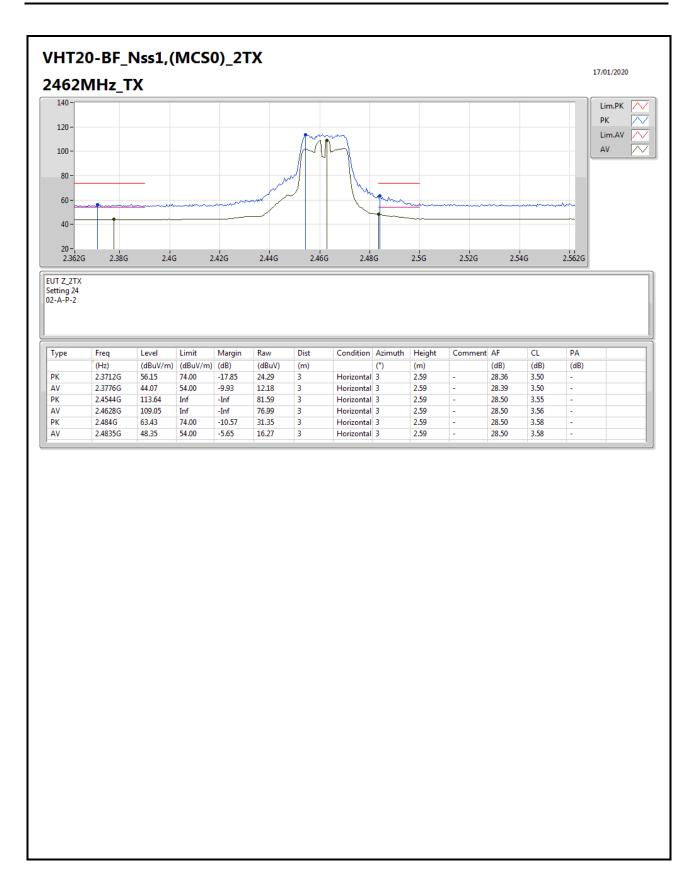




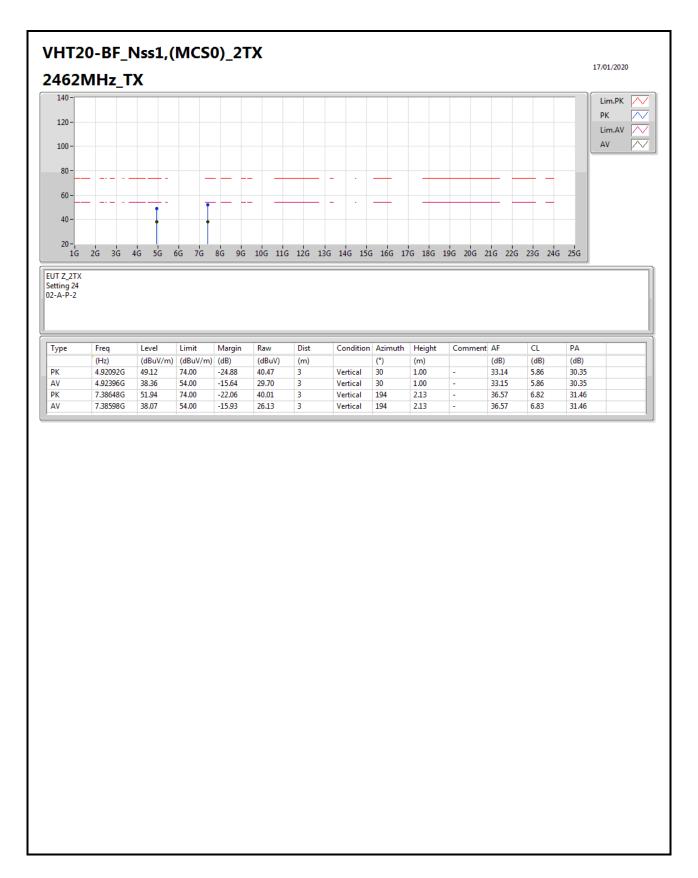




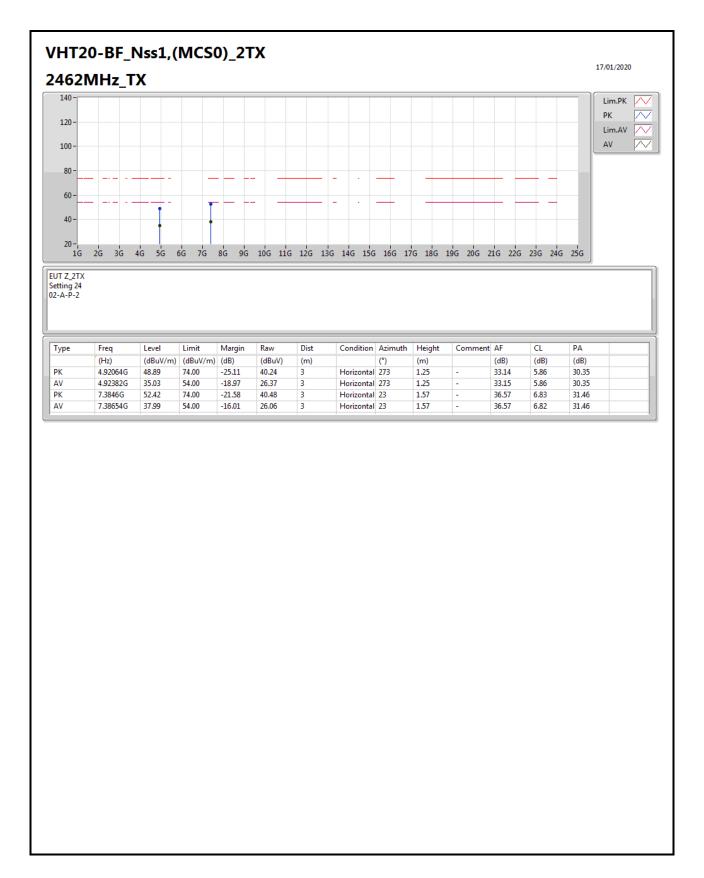


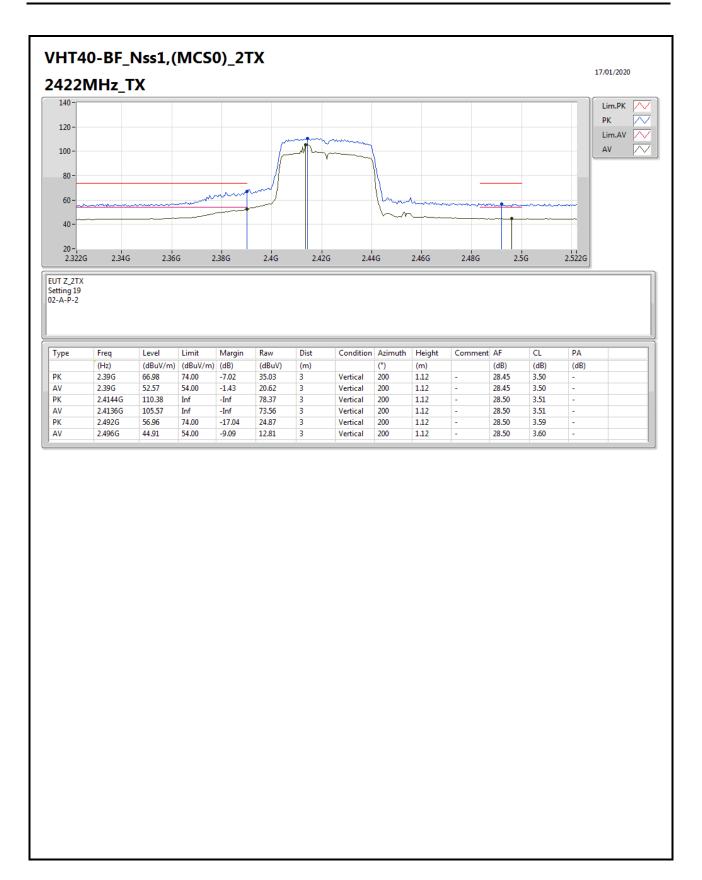




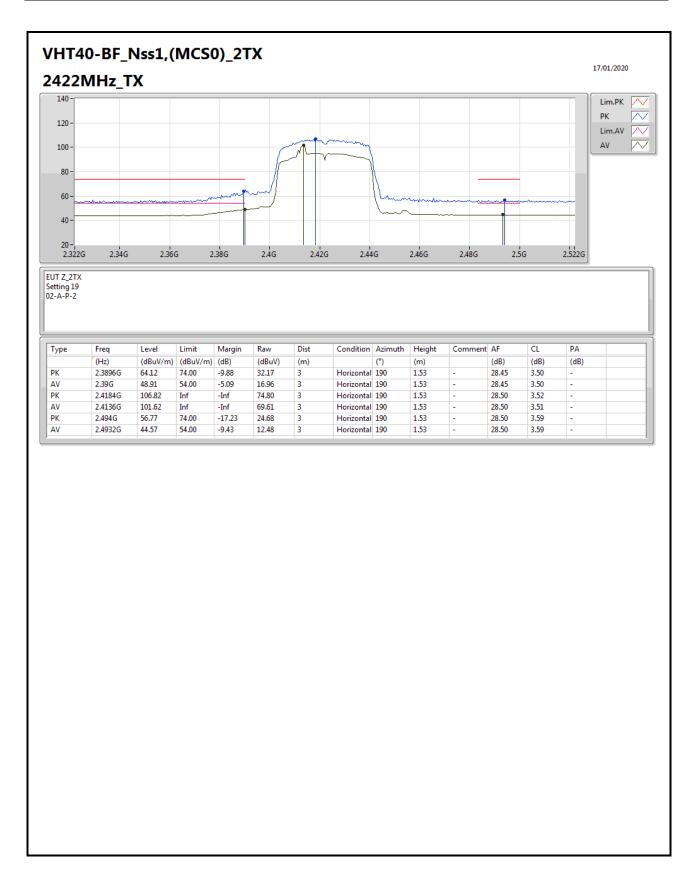




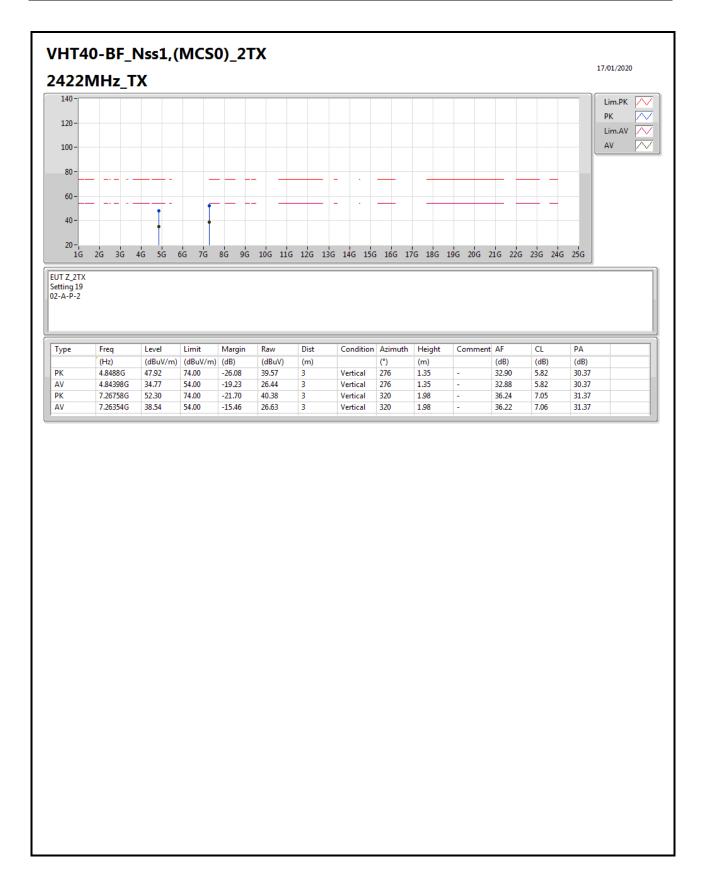




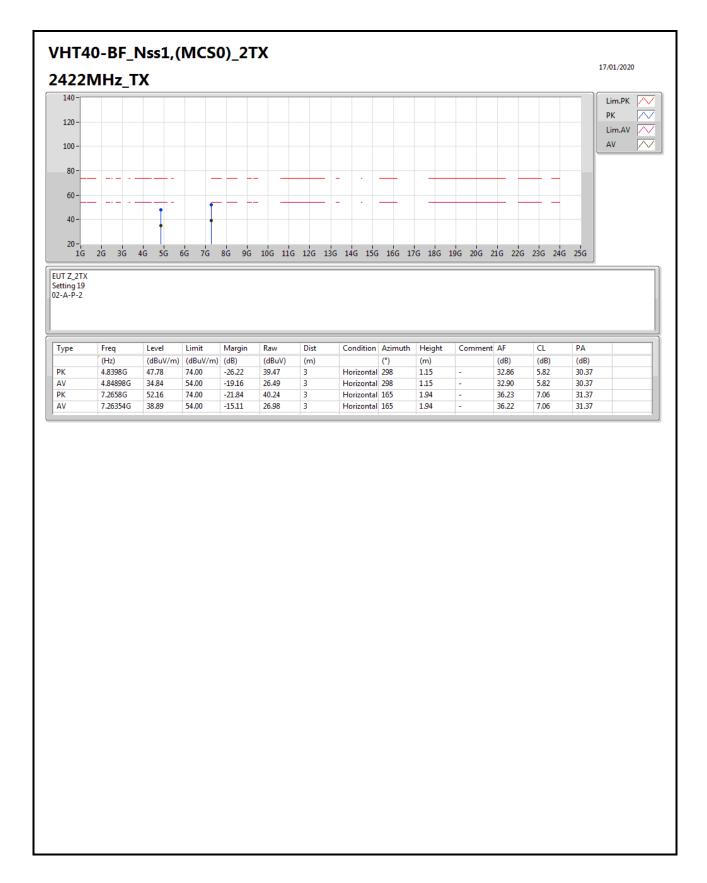




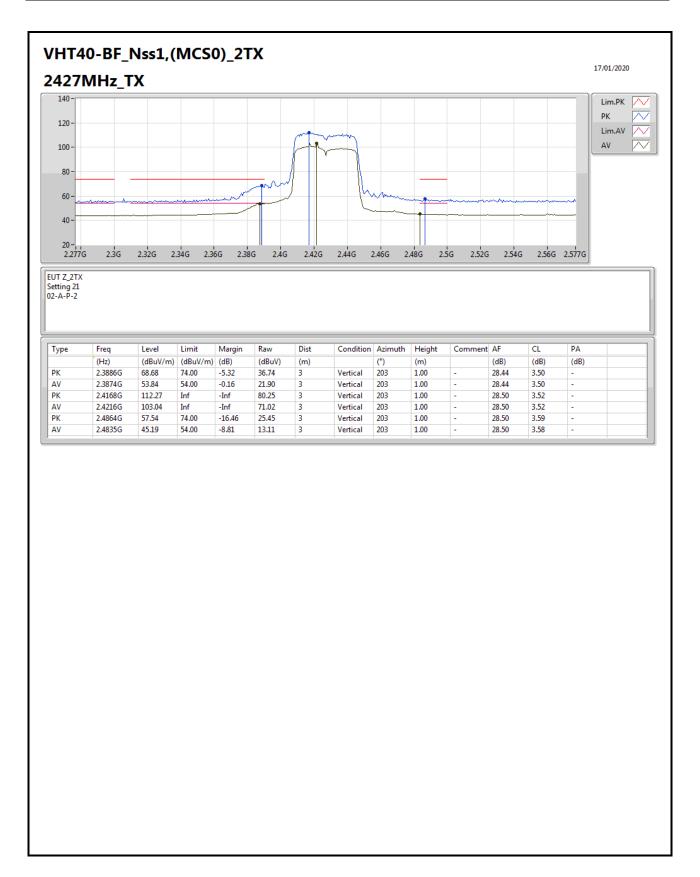




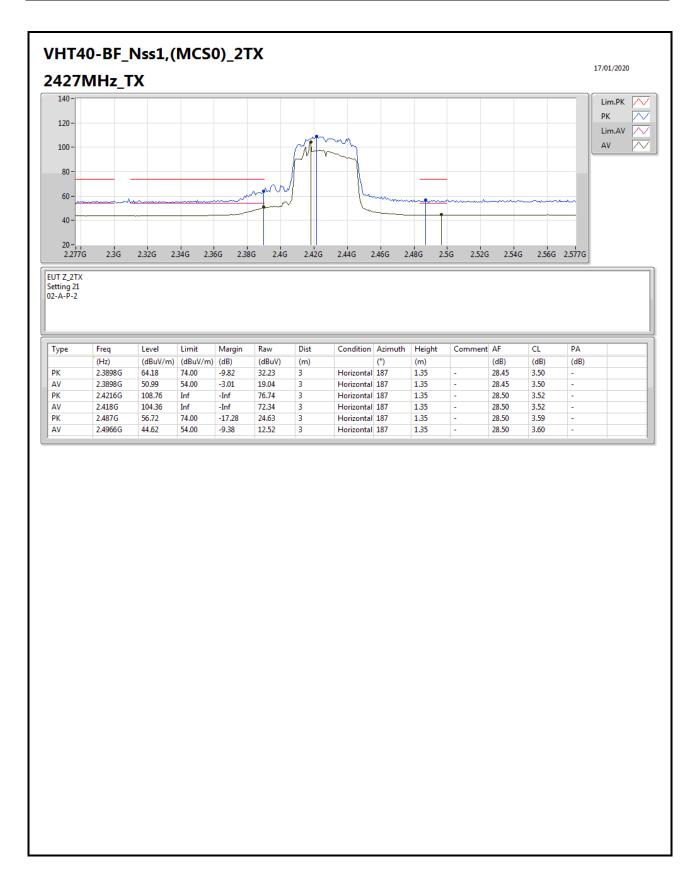




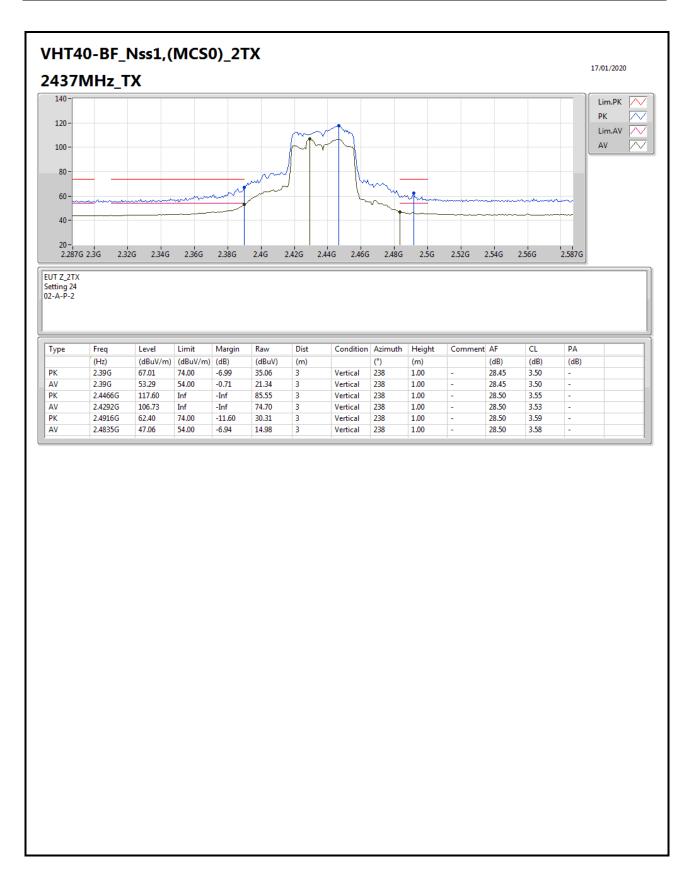




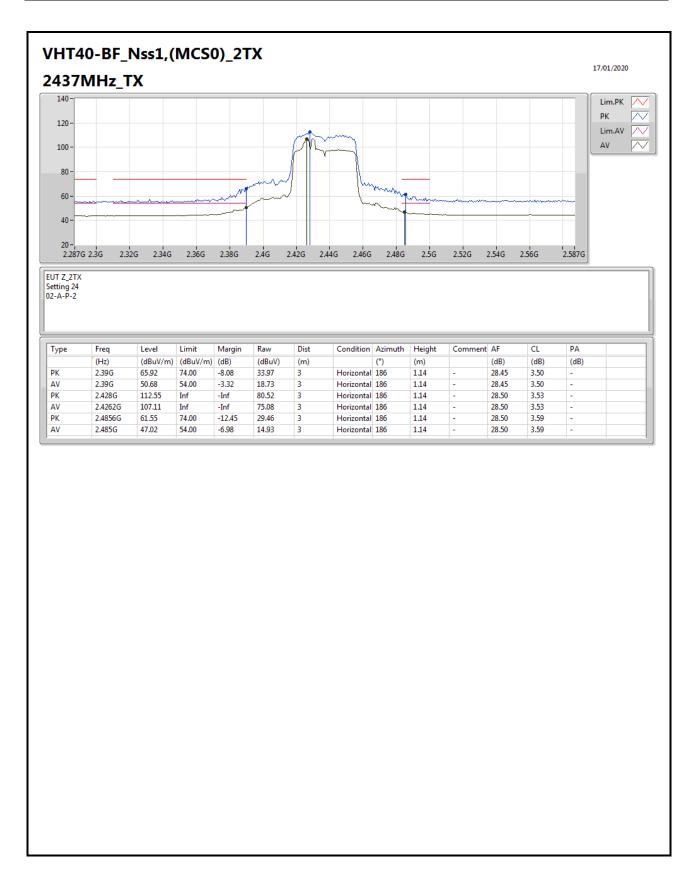




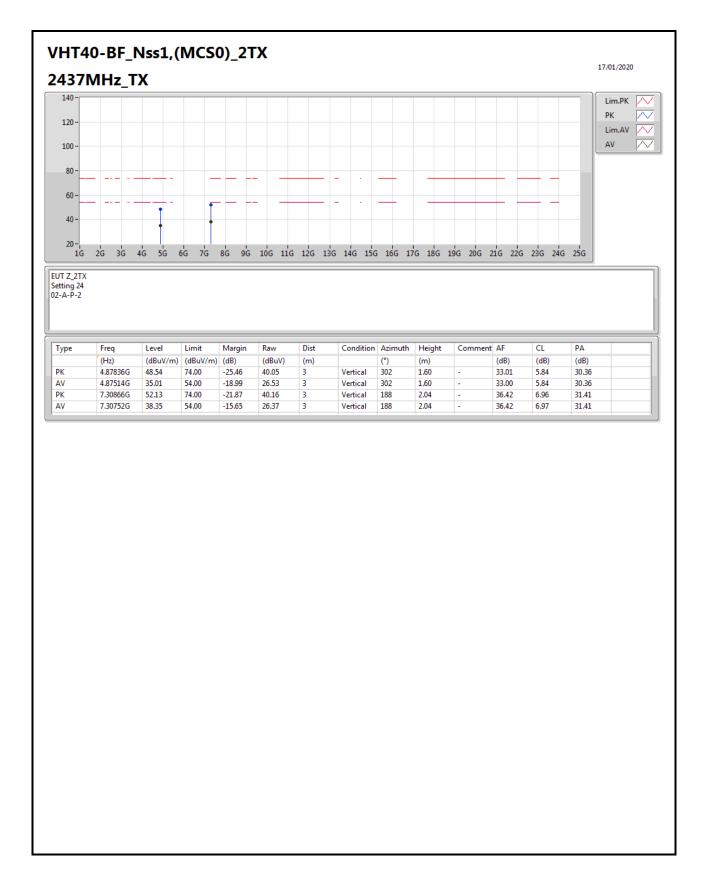




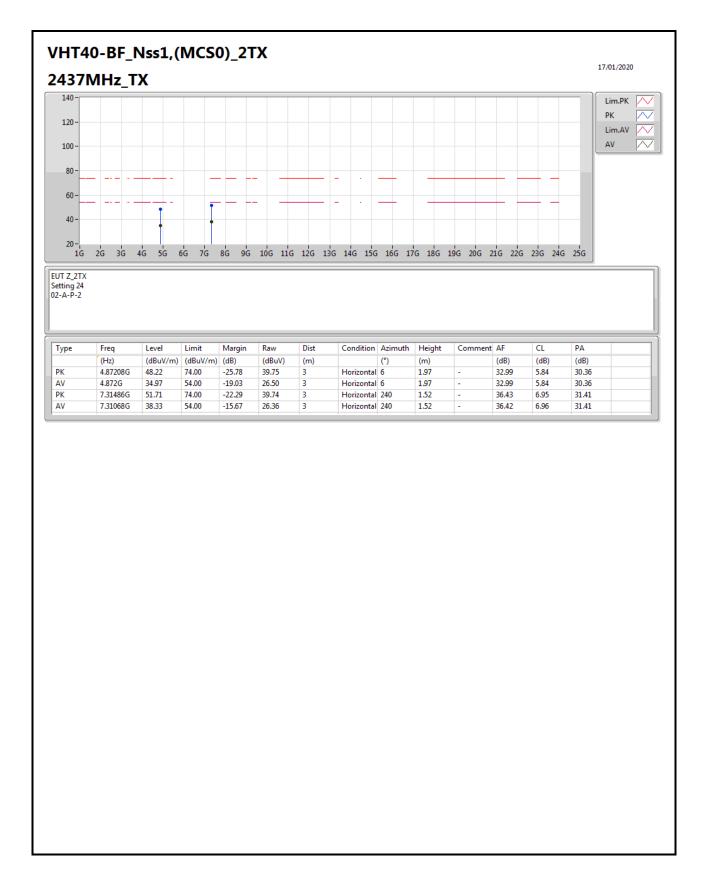




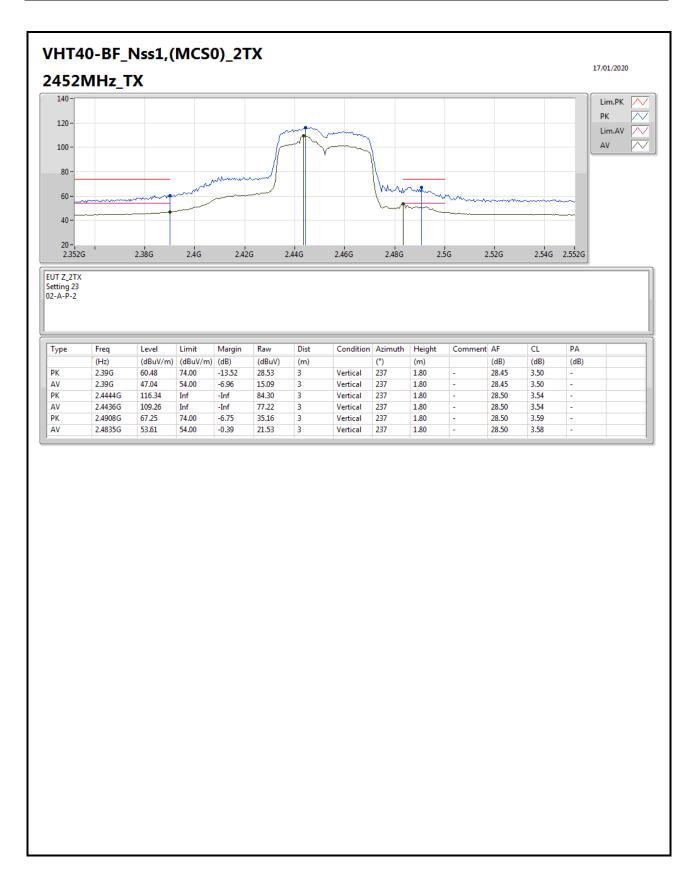




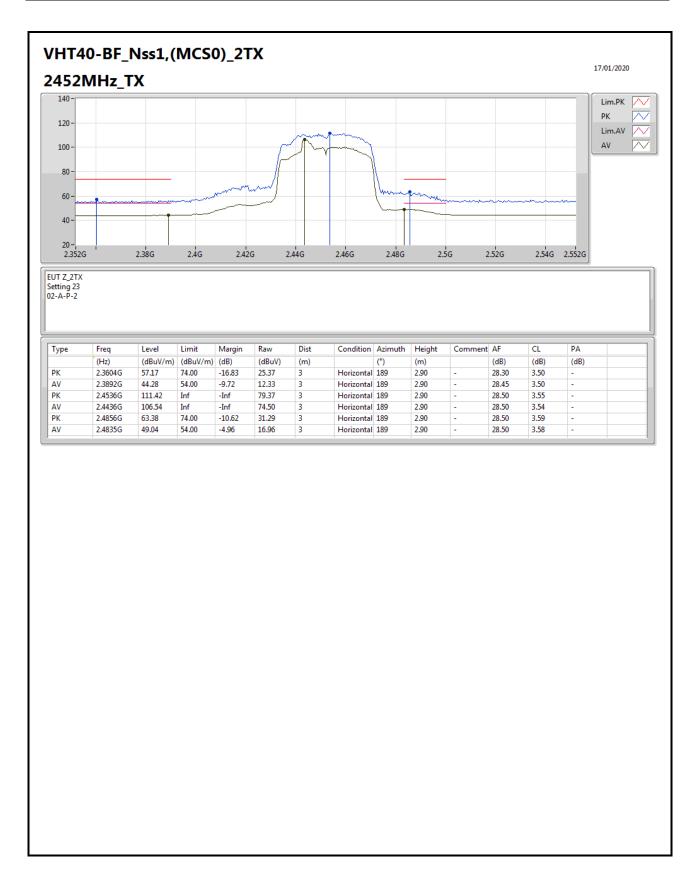




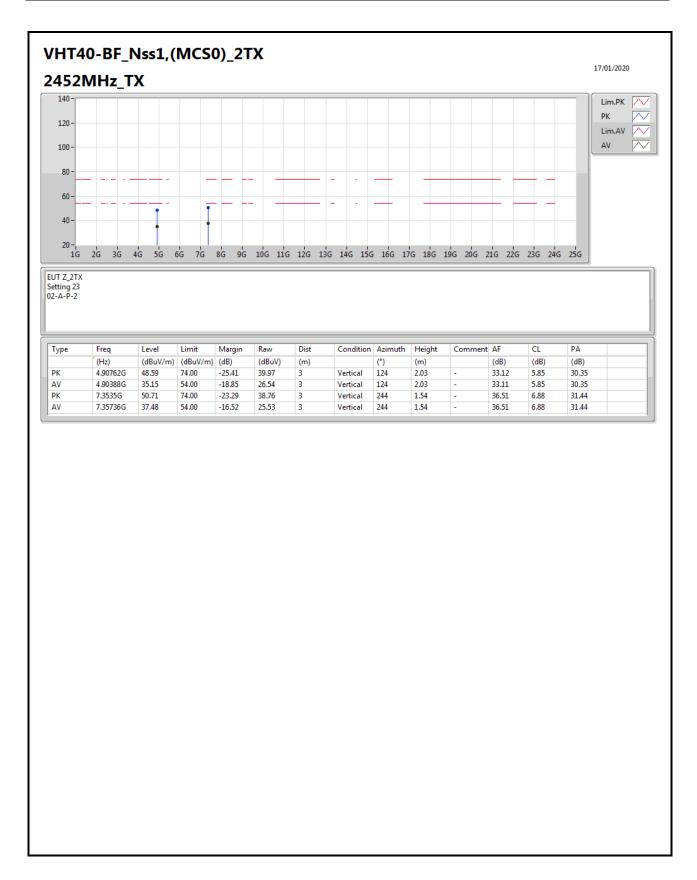






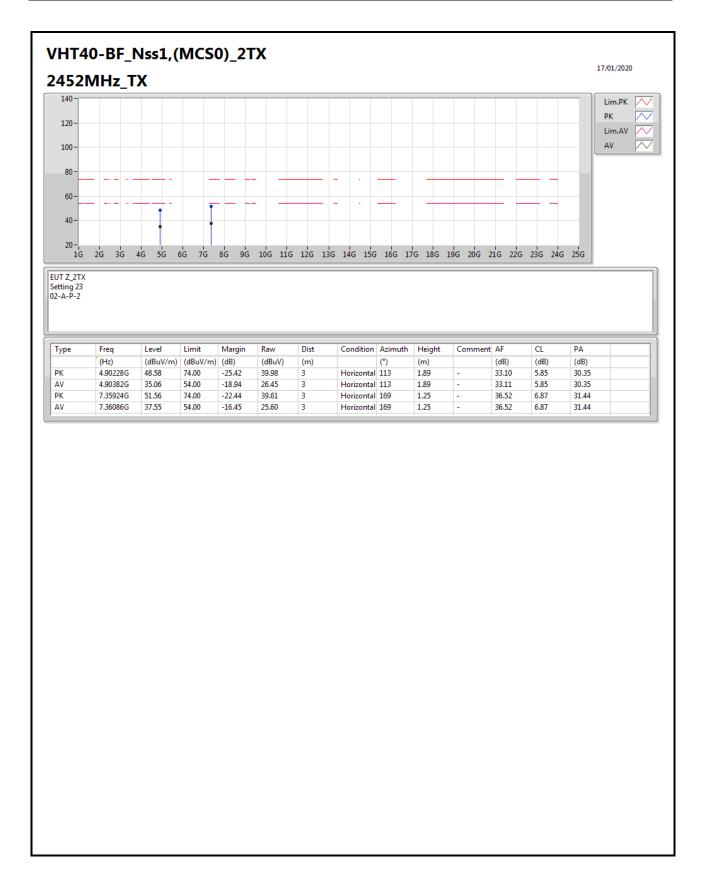




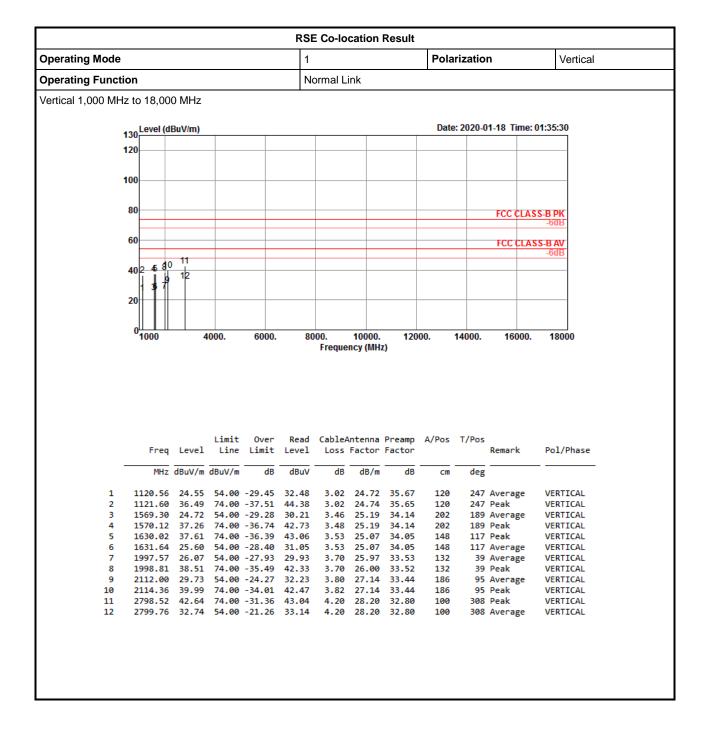


Page No. : 85 of 85

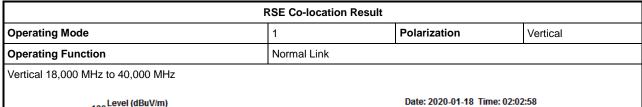


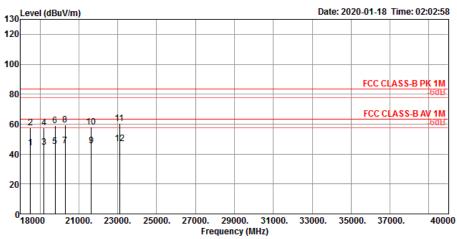












	Freq	Level	Limit Line	Over Limit	Read Level			Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Cm	deg		
1	18497.83	44.29	63.54	-19.25	42.66	13.83	38.00	50.20	100	202	Average	VERTICAL
2	18498.99	57.72	83.54	-25.82	56.09	13.83	38.00	50.20	100	202	Peak	VERTICAL
3	19198.89	44.73	63.54	-18.81	43.04	14.15	37.60	50.06	100	308	Average	VERTICAL
4	19202.05	57.53	83.54	-26.01	55.84	14.15	37.60	50.06	100	308	Peak	VERTICAL
5	19778.42	45.33	63.54	-18.21	43.18	14.40	37.64	49.89	103	179	Average	VERTICAL
6	19779.74	58.85	83.54	-24.69	56.70	14.40	37.64	49.89	103	179	Peak	VERTICAL
7	20289.35	45.40	63.54	-18.14	42.56	14.62	38.02	49.80	105	113	Average	VERTICAL
8	20291.22	59.32	83.54	-24.22	56.48	14.62	38.02	49.80	105	113	Peak	VERTICAL
9	21628.52	45.39	63.54	-18.15	42.20	15.16	37.65	49.62	100	39	Average	VERTICAL
10	21628.86	58.00	83.54	-25.54	54.81	15.16	37.65	49.62	100	39	Peak	VERTICAL
11	23101.43	60.67	83.54	-22.87	55.25	15.69	38.69	48.96	100	97	Peak	VERTICAL
12	23101.46	46.96	63.54	-16.58	41.54	15.69	38.69	48.96	100	97	Average	VERTICAL



