FCC RADIO TEST REPORT

Report No. : FR031609AA



FCC RADIO TEST REPORT

FCC ID	:	2AWNEKDE20102
Equipment	:	Home Entertainment Hub
Brand Name	:	E1 by Ericsson
Model Name	4	KDE20102
Applicant	:	Ericsson AB 21-23 Torshamnsgatan Stockholm, 16480 Sweden
Manufacturer	:	CyberTAN Technology Inc. No. 99, Park Avenue III Science-based Industrial Park Hsinchu Taiwan 308
Standard	:	47 CFR FCC Part 15.247

The product was received on Mar. 27, 2020, and testing was started from Apr. 07, 2020 and completed on May 22, 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 test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR031609AA	01	Initial issue of report	Aug. 05, 2020
FR031609AA	02	Changing the support type of bridge function to "Slave without radar detection" from "Master".	Aug. 07, 2020



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	-

Summary of Test Result

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: Cindy Peng



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]

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	802.11g-BF	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.



1.1.2 Antenna Information

For WLAN 2.4GHz / WLAN 5GHz / Bluetooth / Zigbee function:

	Po	ort					Gain	(dBi)
Ant.	WLAN	WLAN	Brand	Model Name	Туре	Connector	WLAN	WLAN 5GHz
	2.4GHz	5GHz B1					2.4GHz	B1
1	1	1	Airgain	N2420DSRD	PCB	I-PEX	2.2	3.1
2	2	2	Airgain	N2420DSRF	PCB	I-PEX	2.7	3.3
	Port		Port				Gain (dBi)	
Ant.	WLAN	Ziaboo	Brand	Model Name	Туре	Connector	WLAN 5GHz	Ziaboo
	5GHz B4	Zigbee					B4	Zigbee
3	1	1	Airgain	N2420DSRC	PCB	I-PEX	3.1	2.8
	Port						Gain	(dBi)
Ant.	WLAN	Divisio stb	Brand	Model Name	Туре	Connector	WLAN 5GHz	Divisionsth
	5GHz B4	Bluetooth					B4	Bluetooth
4	2	1	Airgain	N2420DSRE	PCB	I-PEX	3.1	2.7

Note1: B1 means band 1, B4 means band 4.

Note2: The above information was declared by manufacturer.

- Note3: For WLAN 2.4GHz function (2TX/2RX):
 - The WLAN 2.4GHz supports the b, g, n, VHT.
- Port 1 and Port 2 could transmit/receive simultaneously.
- Note4: For WLAN 5GHz Band 1 function (2TX/2RX): The WLAN 5GHz Band 1 supports the a, n, ac. Port 1 and Port 2 could transmit/receive simultaneously.
- Note5: For WLAN 5GHz Band 4 function (2TX/2RX): The WLAN 5GHz Band 4 supports the a, n, ac. Port 1 and Port 2 could transmit/receive simultaneously.
- Note6: For Zigbee function (1TX/1RX):

Only Port 1 can be used as transmitting/receiving.

Note7: For Bluetooth function (1TX/1RX): Only Port 1 can be used as transmitting/receiving.

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-BF	0.928	0.32	2.148m	1k
VHT20-BF	0.974	0.11	1.759m	1k
VHT40-BF	0.971	0.13	1.694m	1k

Note:

• DC is Duty Cycle.

• DCF is Duty Cycle Factor.



1.1.4 EUT Operational Condition

EUT Power Type	From	From power adapter					
Beamforming Function	\boxtimes	With beamforming		Without beamforming			
	The product has beamforming function for g/n/VHT in 2.4GHz and a/n/ac in 5GHz.						
Function	\boxtimes	Point-to-point					
Test Software Version	QRCT						

Note: The above information was declared by manufacturer.

1.1.5 Table of WWAN Module

The EUT contains a LTE module, the detail information as following.

Brand Name	Model Name	FCC ID	Function
Telit	LN960A16	RI7LN960A16	LTE: Band 2/4/5/7/12/13/14/17/25/26/30/38/41/66

1.1.6 Table for EUT Supports Functions

Function	Support Type
AP	Master
Mesh	Master
Bridge	Slave without radar detection

Note: The "AP mode" has been selected to test and recorded in the test report by manufacturer.



1.2 Applicable Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- 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	Owen Hsu	23.5~25.5°C / 53~55%	Apr. 10, 2020~May 08, 2020
Radiated Below 1GHz (Mode 1~Mode 3)	03CH06-CB	JN Du	22.7~23.5°C / 53~57%	Apr. 13, 2020~May 22, 2020
Radiated Below 1GHz (Mode 4~Mode 6)	03CH06-CB Easo	Eason Chen	22.7~23.5°C / 53~57%	Apr. 09, 2020~May 14, 2020
Radiated Above 1GHz	03CH02-CB, 03CH04-CB	JN Du	22.7~23.5°C / 53~57%	Apr. 13, 2020~May 22, 2020
AC Conduction	CO01-CB	Ryo Fan	21~22°C / 60~63%	Apr. 07, 2020

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)	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%



2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.11b_Nss1,(1Mbps)_2TX	-
2412MHz	25.5
2437MHz	25.5
2462MHz	25.5
802.11g-BF_Nss1,(6Mbps)_2TX	-
2412MHz	22
2417MHz	24.5
2437MHz	25.5
2457MHz	24.5
2462MHz	21
VHT20-BF_Nss1,(MCS0)_2TX	-
2412MHz	21.5
2417MHz	24.5
2437MHz	25.5
2457MHz	24.5
2462MHz	20.5
VHT40-BF_Nss1,(MCS0)_2TX	-
2422MHz	20.5
2437MHz	21
2452MHz	21

Note:

There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for g/n/VHT in 2.4GHz and a/n/ac in 5GHz, after evaluating, beamforming mode has been evaluated to be the worst case, so it was selected to test and record in this test report.



2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests			
Tests Item	Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral			
Operating Mode	Operating Mode Normal Link		
1	AP mode with LTE Link: Band 2 – EUT + Adapter 1 + Power cable		
2	2 AP mode with LTE Link: Band 4 – EUT + Adapter 2 + Power cable		
For operating mode 2 is the worst case and it was record in this test report.			

	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 ConditionRadiated measurementIf EUT consist of multiple antenna assembly (multiple antenna are used in regardless of spatial multiplexing MIMO configuration), the radiated test sh be performed with highest antenna gain of each antenna type.				
Operating Mode < 1GHz	СТХ			
1	WLAN 2.4GHz + Adapter 1			
2	WLAN 5GHz Band 1 + Adapter 1			
3	WLAN 5GHz Band 4 + Adapter 1			
4	4 Bluetooth + Adapter 1			
5	5 Zigbee + Adapter 1			
Mode 4 has been evaluate this same test mode.	d to be the worst case among Mode 1~5, thus measurement for Mode 6 will follow			
6	Bluetooth + Adapter 2			
For operating mode 6 is th	e worst case and it was record in this test report.			
Operating Mode > 1GHz	Operating Mode > 1GHz CTX			



The Worst Case Mode for Following Conformance Tests				
Tests Item	Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location			
Test Condition	Test Condition Radiated measurement			
Operating Mode	Normal Link			
The Operating Mode of Ra	The Operating Mode of Radiated Emission Co-location as below:			
1. WLAN 2.4GHz + WLAN	1. WLAN 2.4GHz + WLAN 5GHz Band 1			
2. WLAN 5GHz Band 4 + F	2. WLAN 5GHz Band 4 + Bluetooth			
3. WLAN 5GHz Band 4 + 2	3. WLAN 5GHz Band 4 + Zigbee			
After evaluating, the full function generated the worst case, thus the measurement will follow this same test				
configuration.				
1 WLAN 2.4GHz + WLAN 5GHz Band 1 + WLAN 5GHz Band 4 + Bluetooth + Zigbee				
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			
1	WLAN 2.4GHz + WLAN 5GHz Band 1 + WLAN 5GHz Band 4 + Bluetooth + Zigbee + LTE		

Refer to Sporton Test Report No.: FA031609 for Co-location RF Exposure Evaluation.

Note: The EUT can only be used Z axis.

2.3 EUT Operation during Test

For CTX Mode:

For non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For 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 7 were executed.

The program was executed as follows:

- 1. During the test, the EUT operation to normal function.
- 2. Executed command fixed test channel under Putty, Telnet.
- 3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by WLAN AP and transmit duty cycle no less than 98%.

For Normal Link: During the test, the EUT operation to normal function.



2.4 Accessories

	Accessories					
No.	Equipment Name	Brand Name	Model Name	Rating	Remark	
1	Adapter 1	FSP	FSP100-A1AR3	INPUT: 100-240V~50-60Hz, 1.4A OUTPUT: 5V, 3A / 9V, 3A 12V, 3A / 15V, 3A 20V, 5.0A 100W MAX.	With the cable: Non-shielded, 1.6m	
2	Adapter 2	DELTA	ADH-100CR B	INPUT: 100-240V~1.8A, 50-60Hz OUTPUT: 5.0V, 3.0A, 15.0W or 9.0V, 3.0A 15.0V, 3.0A or 20.0V, 5.0A 100.0W.	With the cable: Non-shielded, 1.6m	
	Others					
3	3 HDMI cable*1: Shielded, 1.5m					
4	4 USB-C to USB-A cable*1: Shielded, 0.1m					
5	5 Power cable*1: Non-shielded, 1m					



2.5 Support Equipment

For AC Conduction:

	Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID		
А	ΤV	ASUS	VP28U	N/A		
В	Micro SD card	Transcend	TS16GUSDHC10	N/A		
С	SIM card	N/A	N/A	N/A		
D	LAN NB	DELL	E6430	N/A		
Е	WAN NB	DELL	E6430	N/A		
F	2.4G NB	DELL	E6430	N/A		
G	5G-1 NB	DELL	E6430	N/A		
Н	5G-2 NB	DELL	E6430	N/A		
I	Bluetooth speaker	Wei Xuan	S06B	N/A		
J	Zigbee device	N/A	N/A	N/A		
К	LTE base station	Anritsu	MT8820C	N/A		
L	Air mouse	HENGCHUANGYU	HCY-57B	2AOBUHCY-57B		

For Radiated (below 1GHz):

	Support Equipment					
No.	No. Equipment Brand Name Model Name FCC ID					
А	LCD Monitor	DELL	1704FPTt	N/A		
В	USB Hub	IOTNPCI	HB-16	N/A		
С	Keyboard	iCooky	SK068	N/A		
D	Mouse	Logitech	M-U0026	N/A		

For Radiated (above 1GHz):

For non-beamforming mode:

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

For beamforming mode:

	Support Equipment						
No.	Equipment	Brand Name	Model Name	FCC ID			
А	NB	DELL	E4300	N/A			
В	WLAN AP	LINKSYS	EA8300	N/A			
С	NB	DELL	E4300	N/A			

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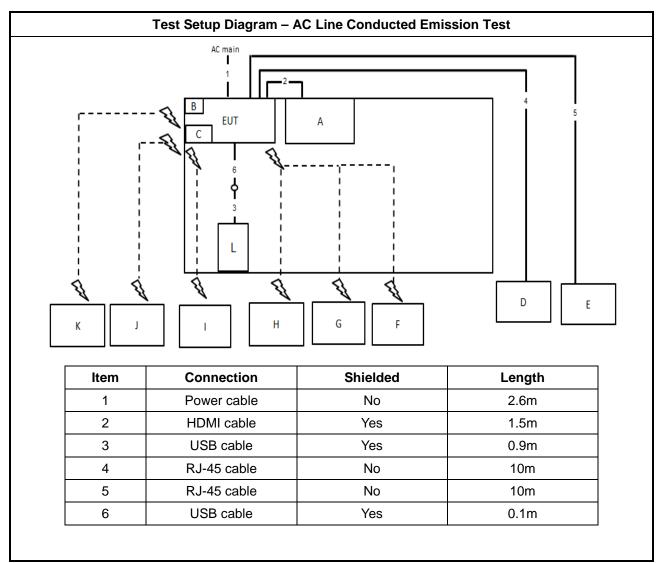


For RF Conducted:

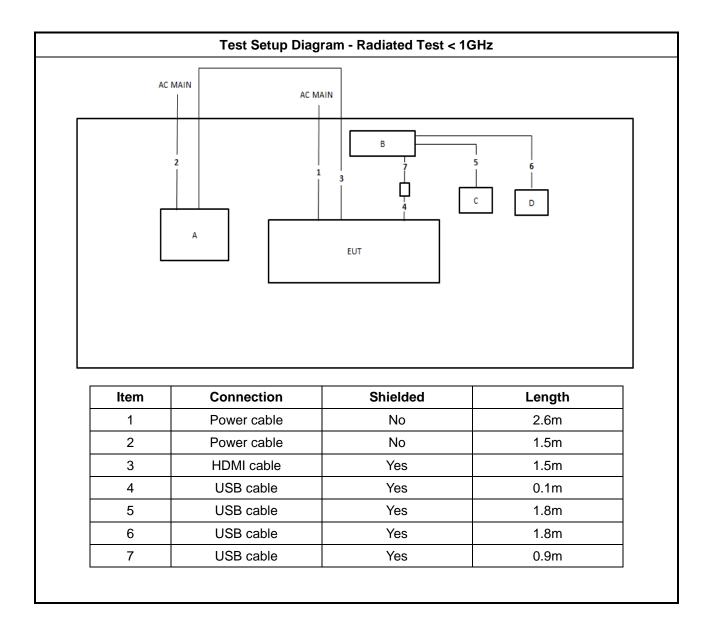
	Support Equipment						
No.	Equipment	Brand Name	Model Name	FCC ID			
А	NB	DELL	E4300	N/A			



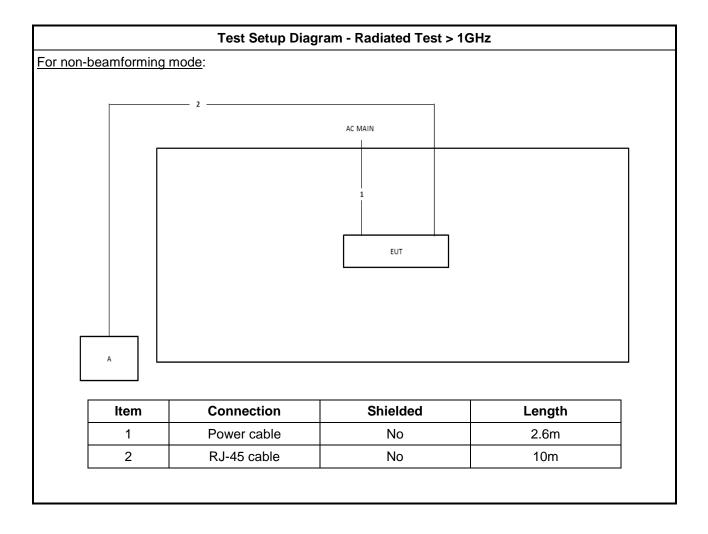
2.6 Test Setup Diagram



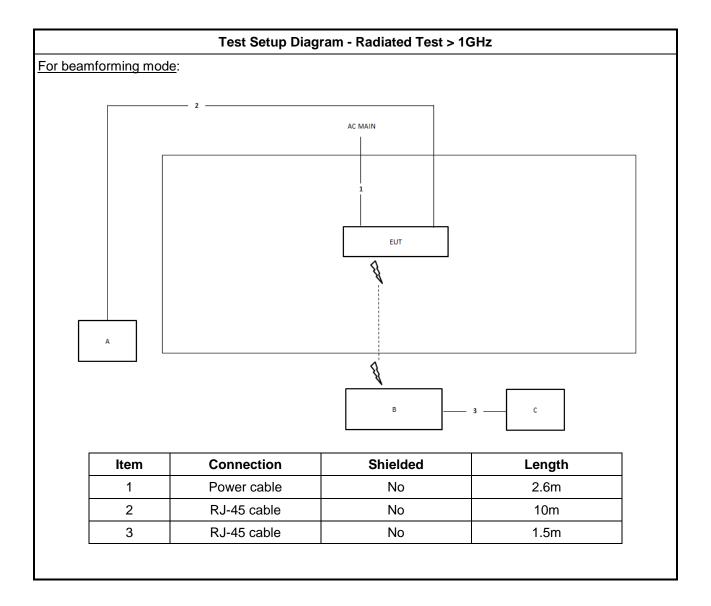














3 Transmitter Test Result

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.					

3.1.2 Measuring Instruments

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

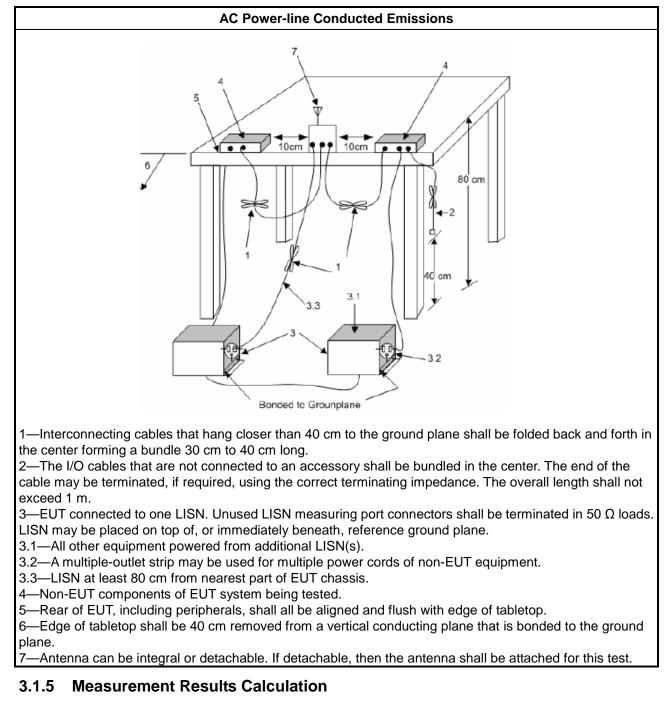
3.1.3 Test Procedures

Test Method

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



3.1.4 Test Setup



The measured Level is calculated using:

- a. Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- b. Margin = Limit + (Read Level + LISN Factor + Cable Loss)

3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A



3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

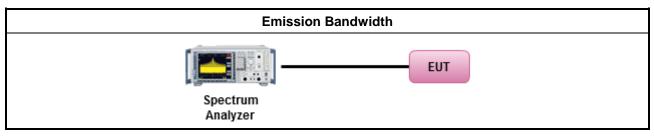
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

■ For	the emission handwidth shall be measured using one of the entires helow.				
	 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



3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit

• If $G_{TX} \ge 0$ dBI, then $P_{Out} \ge 30$ dBm (1 W)	•	If $G_{TX} \le 6$ dBi, then $P_{Out} \le 30$ 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

 P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{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.

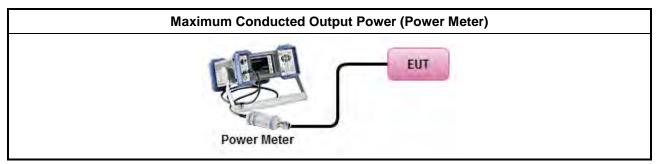
3.3.3 Test Procedures

	Test Method			
	Max	Maximum 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		
	[dut	y 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 AVGS (alternative) 				
		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 11.9.2.2.6 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)		
	Measurement 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} = P₁ + P₂ + + 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



3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit

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

3.4.2 Measuring Instruments

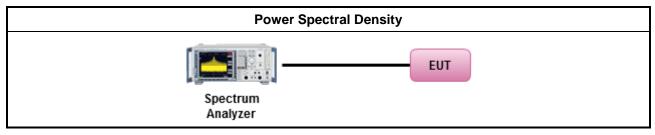
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

			Test Method				
	Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).						
	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.						
•	For	cond	ucted measurement.				
	•	lf Tł	ne 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.				



3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D



3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit			
Limit (dBc)			
20			
30			

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

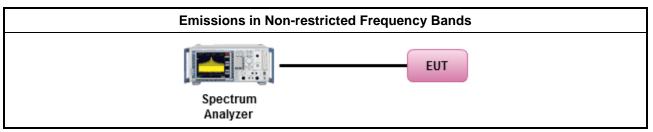
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method

Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E



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			

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.

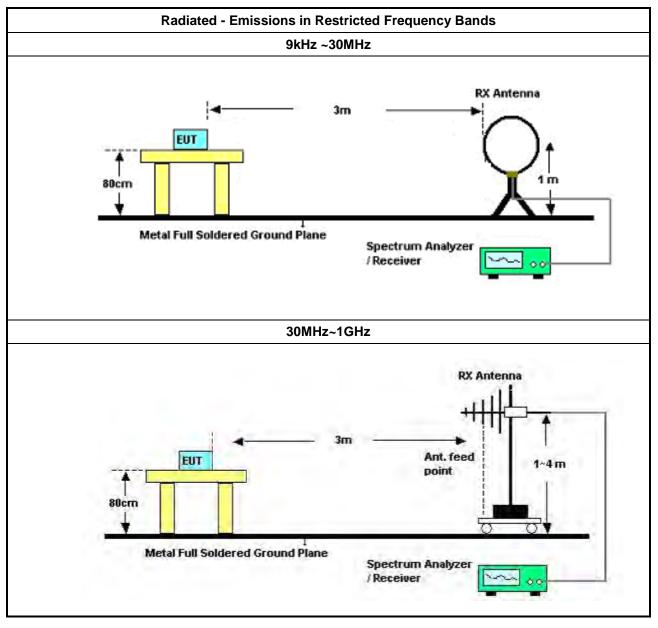


3.6.3 Test Procedures

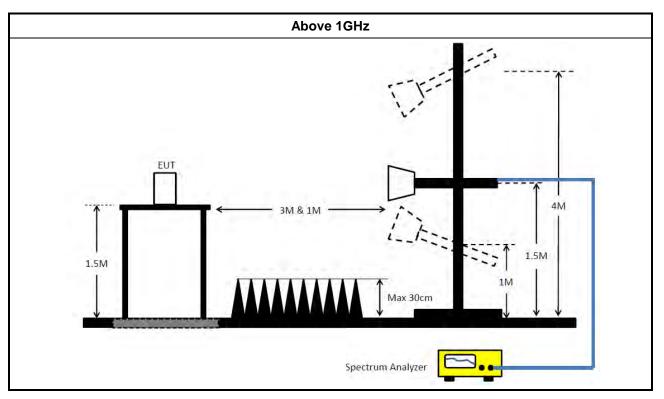
	Test Method									
•	The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].									
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.									
•	For the transmitter unwanted emissions shall be measured using following options below:									
	 Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands. 									
	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 \ge 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. 									



3.6.4 Test Setup







3.6.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor (if applicable) = 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



Test Equipment and Calibration Data 4

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Feb. 26, 2020	Feb. 25, 2021	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	8127647	9kHz ~ 30MHz	Feb. 25, 2020	Feb. 24, 2021	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwa rz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 31, 2020	Jan. 30, 2021	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 16, 2020	Mar. 15, 2021	Radiation (03CH06-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)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	May 07, 2019	May 06, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Apr. 28, 2020	Apr. 27, 2021	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)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	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)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	Apr. 24, 2019	Apr. 23, 2020	Radiation (03CH02-CB)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	Apr. 21, 2020	Apr. 20, 2021	Radiation (03CH02-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 27, 2019	Jun. 26, 2020	Radiation (03CH02-CB)
Pre-Amplifier	Agilent	83017A	MY39501305	1GHz ~ 26.5GHz	Aug. 21, 2019	Aug. 20, 2020	Radiation (03CH02-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH02-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Aug. 15, 2019	Aug. 14, 2020	Radiation (03CH02-CB)
High Cable	Woken	RG402	High Cable-18	1GHz ~ 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH02-CB)
High Cable	Woken	RG402	High Cable-18+19	1GHz ~ 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH02-CB)



Instrument	Instrument Manufacturer Model No.		Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH02-CB)
Horn Antenna	ETS · Lindgren	3115	00143147	750MHz~18GHz	Oct. 22, 2019	Oct. 21, 2020	Radiation (03CH04-CB)
Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 12, 2019	Jun. 11, 2020	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	83017A	MY53270063	0.5GHz ~ 26.5GHz	Mar. 11, 2020	Mar. 10, 2021	Radiation (03CH04-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Dec. 18, 2019	Dec. 17, 2020	Radiation (03CH04-CB
RF Cable-high	Woken	RG402	High Cable-21	1GHz - 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-21+22	1GHz - 18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH04-CB)
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	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)

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

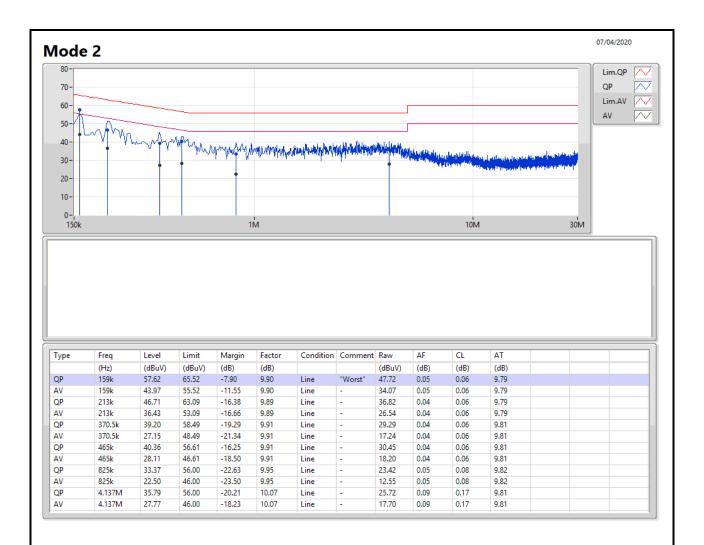
N.C.R. means Non-Calibration required.



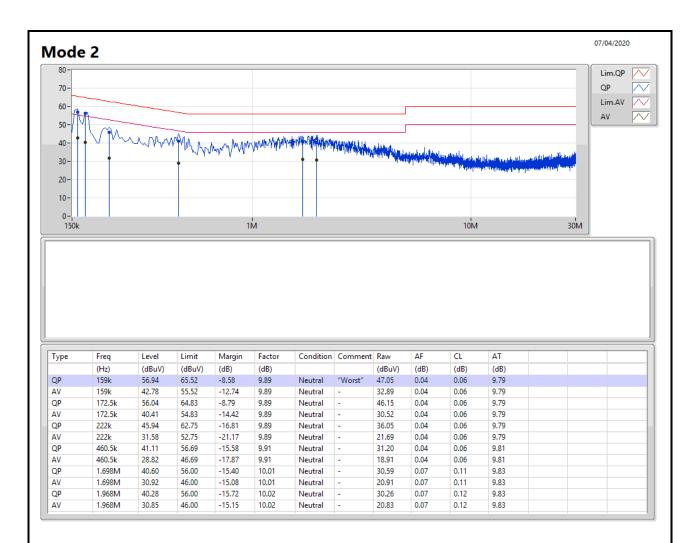
Summary

Cannary								
Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Condition
			(Hz)	(dBuV)	(dBuV)	(dB)	(dB)	
Mode 2	Pass	QP	159k	57.62	65.52	-7.90	9.90	Line











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	8.55M	14.193M	14M2G1D	7.075M	13.068M
802.11g-BF_Nss1,(6Mbps)_2TX	16.325M	17.166M	17M2D1D	15.625M	16.342M
VHT20-BF_Nss1,(MCS0)_2TX	17.55M	18.316M	18M3D1D	16.525M	17.516M
VHT40-BF_Nss1,(MCS0)_2TX	35.85M	36.082M	36M1D1D	32.45M	35.632M

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;



Result

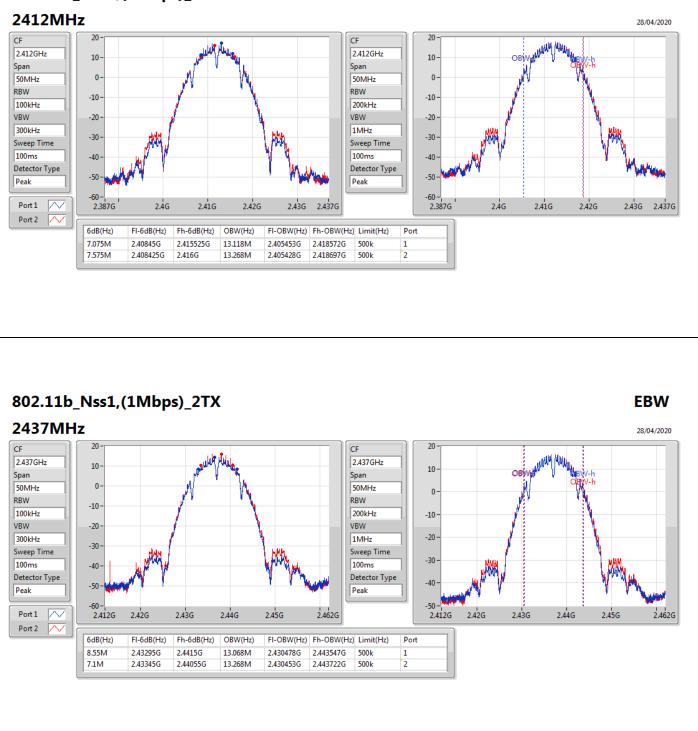
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	7.075M	13.118M	7.575M	13.268M
2437MHz	Pass	500k	8.55M	13.068M	7.1M	13.268M
2462MHz	Pass	500k	8.55M	13.943M	8.55M	14.193M
802.11g-BF_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	16.3M	16.342M	15.7M	16.367M
2437MHz	Pass	500k	16.325M	17.166M	16.3M	17.116M
2462MHz	Pass	500k	15.625M	16.417M	15.725M	16.392M
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	17.55M	17.541M	16.525M	17.516M
2437MHz	Pass	500k	17.55M	18.041M	17.55M	18.316M
2462MHz	Pass	500k	16.925M	17.566M	17.175M	17.566M
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	35.05M	35.732M	33.85M	35.682M
2437MHz	Pass	500k	35.35M	36.082M	35.85M	36.082M
2452MHz	Pass	500k	32.45M	35.682M	35M	35.632M

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





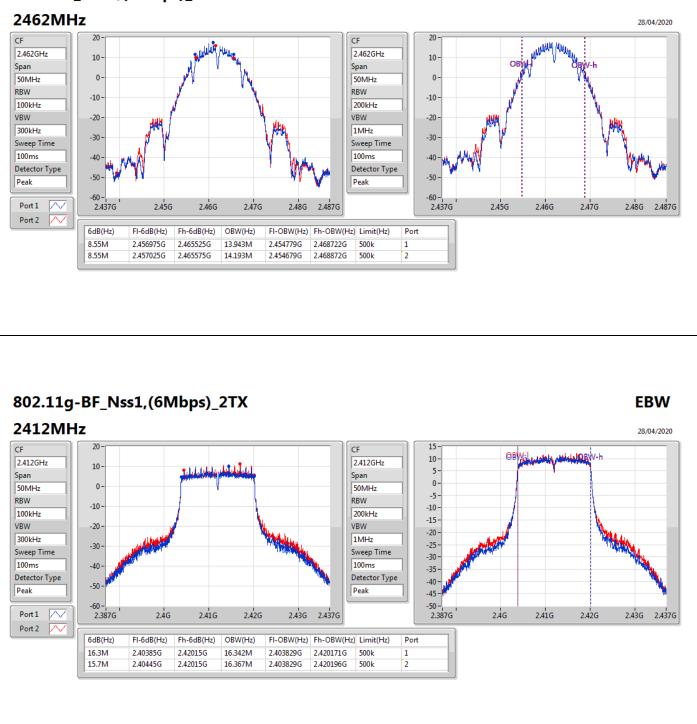
802.11b_Nss1,(1Mbps)_2TX







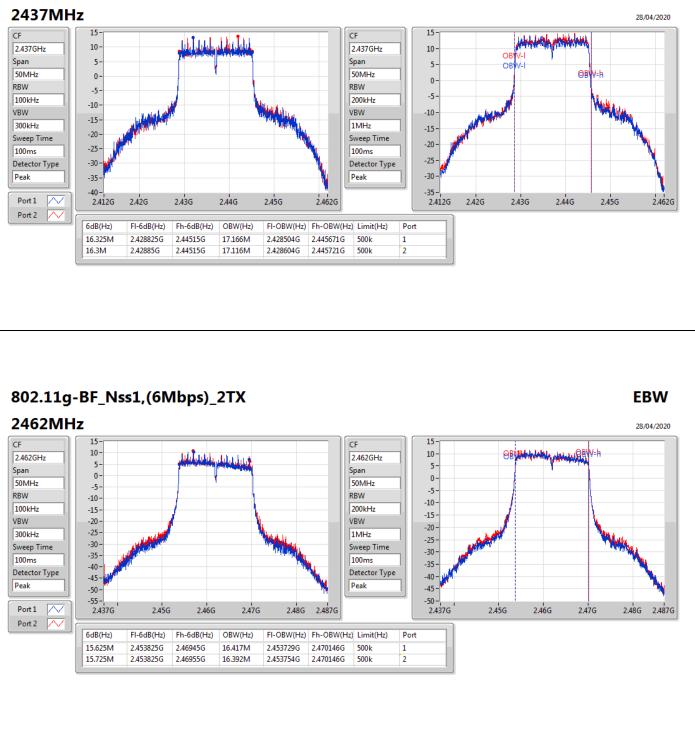
802.11b_Nss1,(1Mbps)_2TX







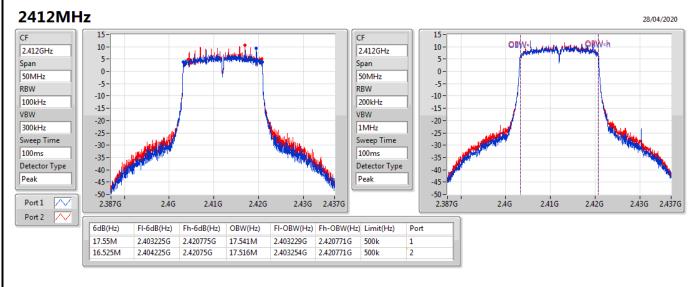
802.11g-BF_Nss1,(6Mbps)_2TX





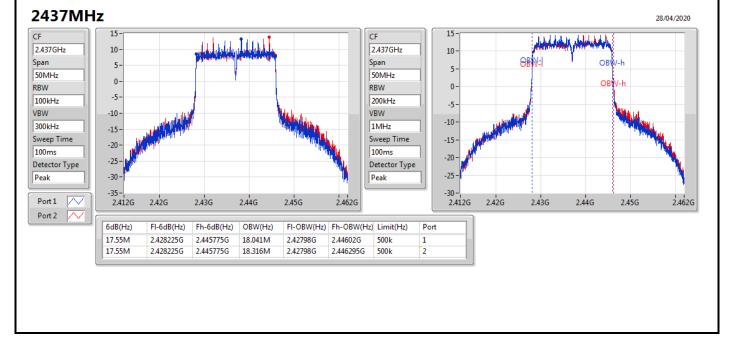


VHT20-BF_Nss1,(MCS0)_2TX



VHT20-BF_Nss1,(MCS0)_2TX

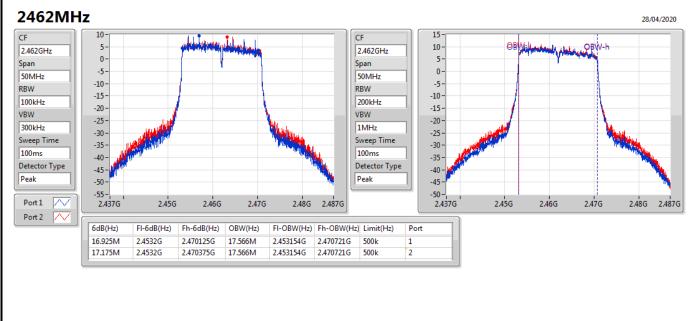
EBW





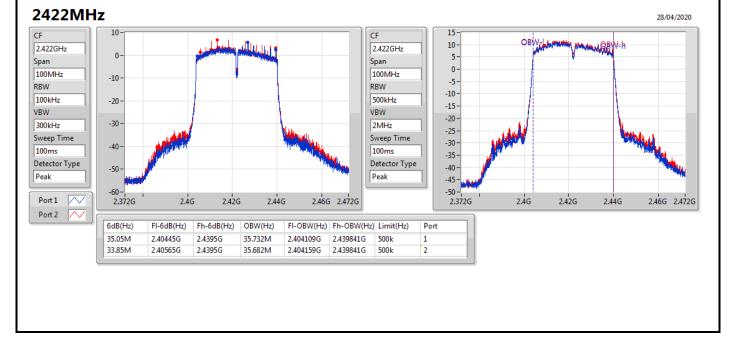


VHT20-BF_Nss1,(MCS0)_2TX



VHT40-BF_Nss1,(MCS0)_2TX

EBW

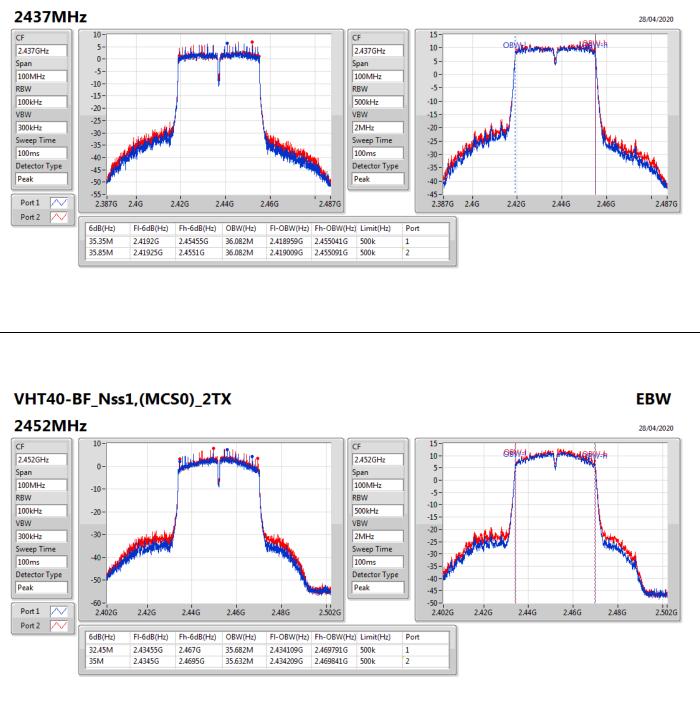






EBW Result

VHT40-BF_Nss1,(MCS0)_2TX





Summary

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	28.70	0.74131
802.11g-BF_Nss1,(6Mbps)_2TX	27.71	0.59020
VHT20-BF_Nss1,(MCS0)_2TX	27.87	0.61235
VHT40-BF_Nss1,(MCS0)_2TX	24.01	0.25177



Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	2.70	25.44	25.82	28.64	30.00
2437MHz	Pass	2.70	25.19	25.46	28.34	30.00
2462MHz	Pass	2.70	25.52	25.85	28.70	30.00
802.11g-BF_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	21.66	21.69	24.69	30.00
2417MHz	Pass	5.46	23.43	23.62	26.54	30.00
2437MHz	Pass	5.46	24.60	24.79	27.71	30.00
2457MHz	Pass	5.46	23.81	23.94	26.89	30.00
2462MHz	Pass	5.46	21.00	21.27	24.15	30.00
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	21.41	21.81	24.62	30.00
2417MHz	Pass	5.46	23.52	23.78	26.66	30.00
2437MHz	Pass	5.46	24.81	24.90	27.87	30.00
2457MHz	Pass	5.46	23.85	23.96	26.92	30.00
2462MHz	Pass	5.46	20.77	21.21	24.01	30.00
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	5.46	20.22	20.57	23.41	30.00
2437MHz	Pass	5.46	20.73	20.94	23.85	30.00
2452MHz	Pass	5.46	20.60	21.37	24.01	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	0.62
802.11g-BF_Nss1,(6Mbps)_2TX	-1.45
VHT20-BF_Nss1,(MCS0)_2TX	-1.04
VHT40-BF_Nss1,(MCS0)_2TX	-5.75

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

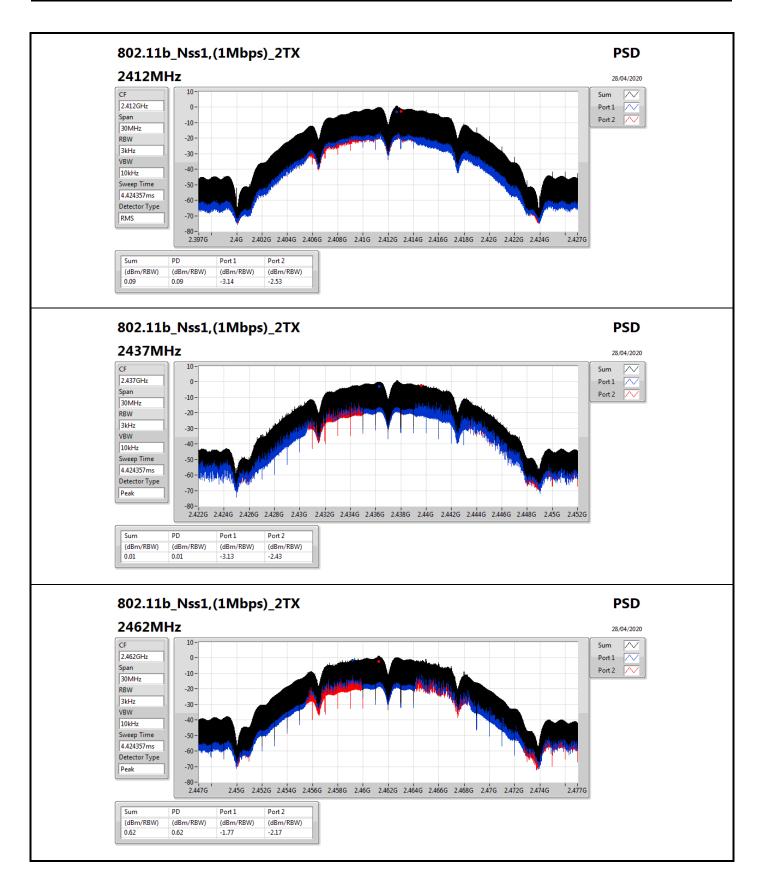


Result

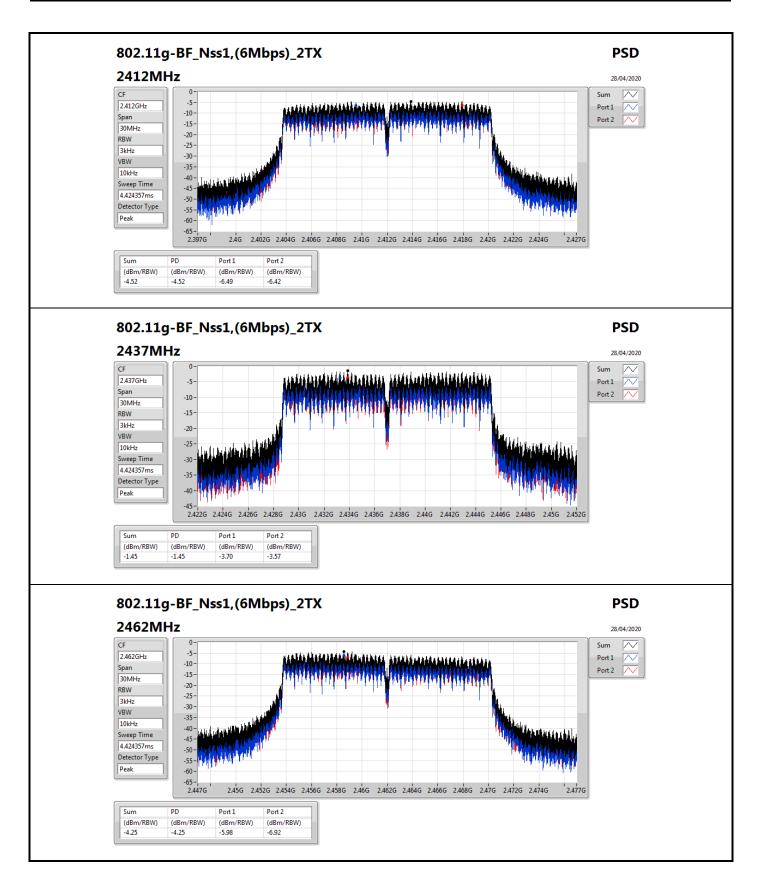
Mode	Result	DG	Port 1	Port 2	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	-3.14	-2.53	0.09	8.00
2437MHz	Pass	5.46	-3.13	-2.43	0.01	8.00
2462MHz	Pass	5.46	-1.77	-2.17	0.62	8.00
802.11g-BF_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	-6.49	-6.42	-4.52	8.00
2437MHz	Pass	5.46	-3.70	-3.57	-1.45	8.00
2462MHz	Pass	5.46	-5.98	-6.92	-4.25	8.00
VHT20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	-7.20	-6.81	-4.23	8.00
2437MHz	Pass	5.46	-3.61	-2.43	-1.04	8.00
2462MHz	Pass	5.46	-5.63	-6.27	-4.56	8.00
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	5.46	-9.53	-9.21	-6.78	8.00
2437MHz	Pass	5.46	-9.53	-8.44	-6.70	8.00
2452MHz	Pass	5.46	-8.87	-7.16	-5.75	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;

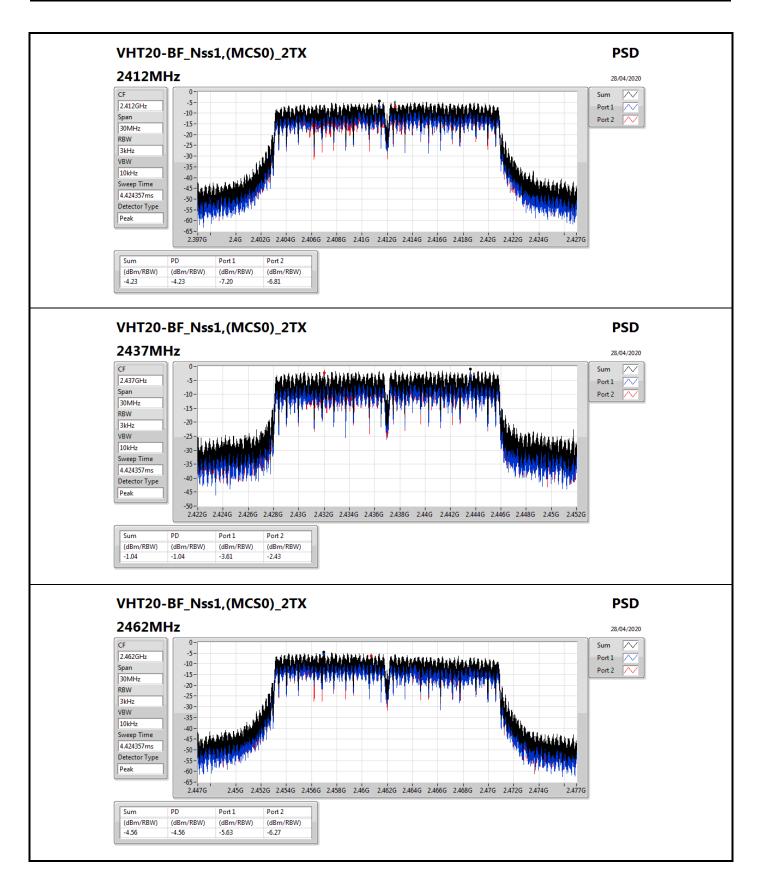




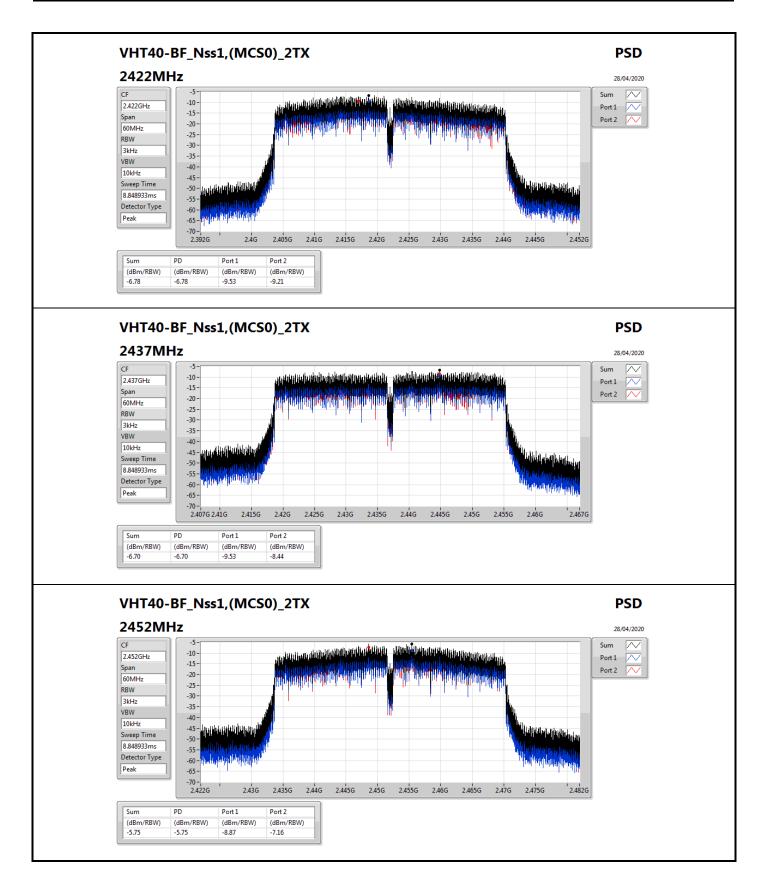














CSE(Non-restricted Band) Result

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	2.46254G	16.29	-13.71	2.13574G	-52.06	2.3985G	-27.71	2.4G	-44.36	2.48414G	-50.43	23.59803G	-43.11	2
802.11g-BF_Nss1,(6Mbps)_2TX	Pass	2.44196G	14.18	-15.82	290.67M	-52.81	2.39914G	-25.05	2.4G	-27.12	2.48432G	-50.95	17.63614G	-43.21	2
VHT20-BF_Nss1,(MCS0)_2TX	Pass	2.44446G	13.71	-16.29	2.00031G	-51.53	2.39888G	-24.84	2.4G	-29.80	2.48586G	-50.59	24.66566G	-43.60	2
VHT40-BF_Nss1,(MCS0)_2TX	Pass	2.44947G	6.67	-23.33	787.99M	-52.96	2.39816G	-32.65	2.4G	-37.74	2.48398G	-50.34	23.33129G	-42.94	2



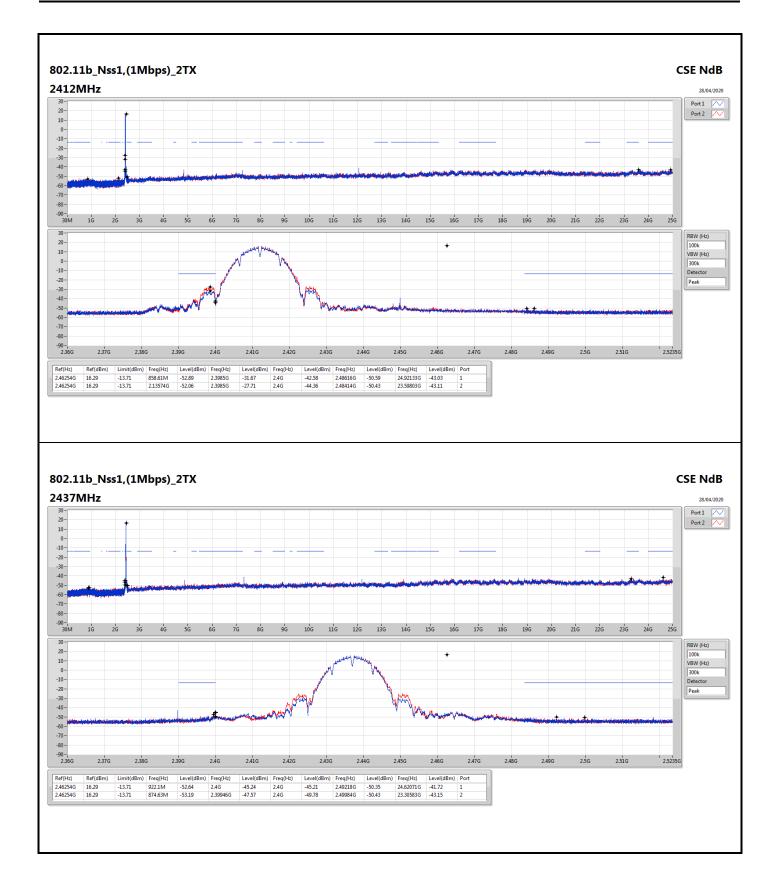
CSE(Non-restricted Band) Result

Appendix E

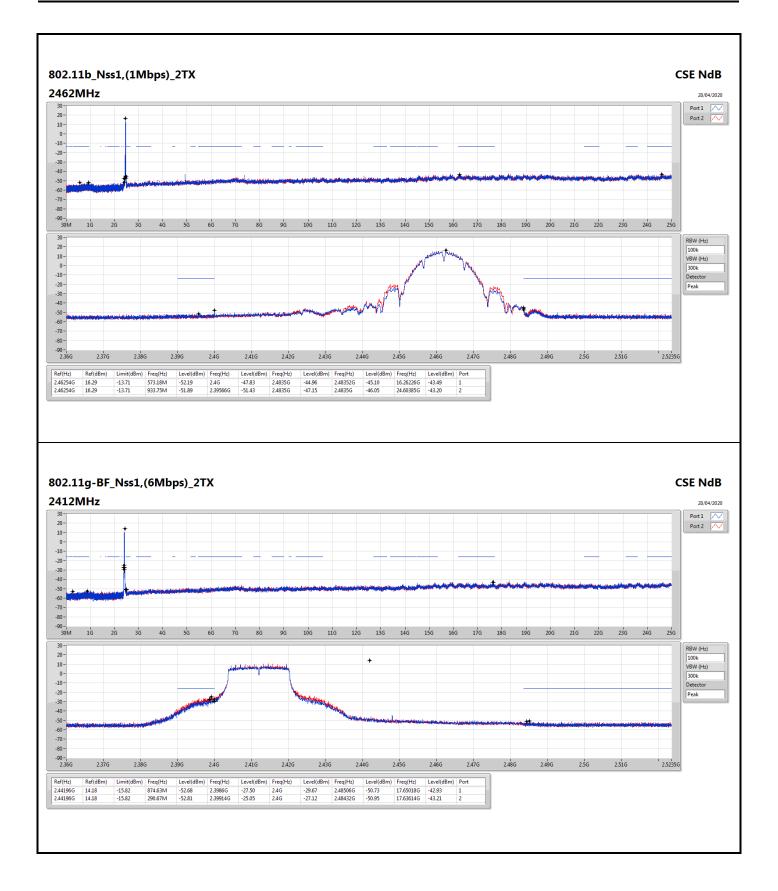
Result

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	2.46254G	16.29	-13.71	858.61M	-52.89	2.3985G	-31.67	2.4G	-42.58	2.48616G	-50.59	24.92133G	-43.03	1
2412MHz	Pass	2.46254G	16.29	-13.71	2.13574G	-52.06	2.3985G	-27.71	2.4G	-44.36	2.48414G	-50.43	23.59803G	-43.11	2
2437MHz	Pass	2.46254G	16.29	-13.71	922.1M	-52.64	2.4G	-45.24	2.4G	-45.21	2.49218G	-50.35	24.62071G	-41.72	1
2437MHz	Pass	2.46254G	16.29	-13.71	874.63M	-53.19	2.39946G	-47.57	2.4G	-49.78	2.49984G	-50.43	23.30583G	-43.15	2
2462MHz	Pass	2.46254G	16.29	-13.71	573.18M	-52.19	2.4G	-47.83	2.4835G	-44.96	2.48352G	-45.10	16.26226G	-43.49	1
2462MHz	Pass	2.46254G	16.29	-13.71	933.75M	-51.89	2.39566G	-51.43	2.4835G	-47.15	2.4835G	-46.05	24.60385G	-43.20	2
802.11g-BF_Nss1,(6Mbps)_2TX	-	-		-	-	-	-	-			-		-	-	-
2412MHz	Pass	2.44196G	14.18	-15.82	874.63M	-52.68	2.3986G	-27.50	2.4G	-29.67	2.48506G	-50.73	17.65018G	-42.93	1
2412MHz	Pass	2.44196G	14.18	-15.82	290.67M	-52.81	2.39914G	-25.05	2.4G	-27.12	2.48432G	-50.95	17.63614G	-43.21	2
2437MHz	Pass	2.44196G	14.18	-15.82	788.71M	-53.08	2.39916G	-43.95	2.4G	-46.65	2.4838G	-49.60	16.25664G	-43.19	1
2437MHz	Pass	2.44196G	14.18	-15.82	2.30029G	-51.53	2.39948G	-41.33	2.4G	-43.94	2.48402G	-49.92	24.01946G	-42.98	2
2462MHz	Pass	2.44196G	14.18	-15.82	913.94M	-52.68	2.4G	-45.99	2.4835G	-39.45	2.4836G	-41.88	24.97752G	-42.68	1
2462MHz	Pass	2.44196G	14.18	-15.82	879.58M	-53.32	2.39998G	-49.66	2.4835G	-40.96	2.4837G	-40.97	16.90284G	-43.33	2
VHT20-BF_Nss1,(MCS0)_2TX	-	-		-	-	-	-	-			-		-	-	-
2412MHz	Pass	2.44446G	13.71	-16.29	1.71284G	-52.60	2.39892G	-28.36	2.4G	-29.50	2.49804G	-51.20	23.5615G	-43.35	1
2412MHz	Pass	2.44446G	13.71	-16.29	2.00031G	-51.53	2.39888G	-24.84	2.4G	-29.80	2.48586G	-50.59	24.66566G	-43.60	2
2437MHz	Pass	2.44446G	13.71	-16.29	774.44M	-52.50	2.39984G	-39.93	2.4G	-42.03	2.48544G	-48.73	16.61346G	-43.04	1
2437MHz	Pass	2.44446G	13.71	-16.29	2.08535G	-52.18	2.39922G	-42.39	2.4G	-42.72	2.4842G	-49.41	24.58699G	-43.05	2
2462MHz	Pass	2.44446G	13.71	-16.29	875.79M	-51.95	2.4G	-47.99	2.4835G	-41.09	2.48382G	-40.26	16.9197G	-42.54	1
2462MHz	Pass	2.44446G	13.71	-16.29	920.35M	-52.15	2.39914G	-51.19	2.4835G	-40.13	2.48352G	-39.07	23.31988G	-42.87	2
VHT40-BF_Nss1,(MCS0)_2TX	-	-	-		-		-	-		-	-	-	-		-
2422MHz	Pass	2.44947G	6.67	-23.33	934.26M	-52.31	2.39792G	-32.88	2.4G	-37.77	2.48434G	-51.02	16.59473G	-42.95	1
2422MHz	Pass	2.44947G	6.67	-23.33	787.99M	-52.96	2.39816G	-32.65	2.4G	-37.74	2.48398G	-50.34	23.33129G	-42.94	2
2437MHz	Pass	2.44947G	6.67	-23.33	1.84654G	-52.68	2.39948G	-33.27	2.4G	-35.76	2.48358G	-45.00	23.58931G	-42.59	1
2437MHz	Pass	2.44947G	6.67	-23.33	765.38M	-52.74	2.397G	-32.99	2.4G	-34.92	2.4845G	-45.09	17.6857G	-42.82	2
2452MHz	Pass	2.44947G	6.67	-23.33	916.8M	-52.50	2.4G	-44.94	2.4835G	-38.71	2.4839G	-36.71	16.26659G	-42.74	1
2452MHz	Pass	2.44947G	6.67	-23.33	864.42M	-52.67	2.39448G	-48.20	2.4835G	-36.87	2.48446G	-34.83	24.27923G	-43.26	2

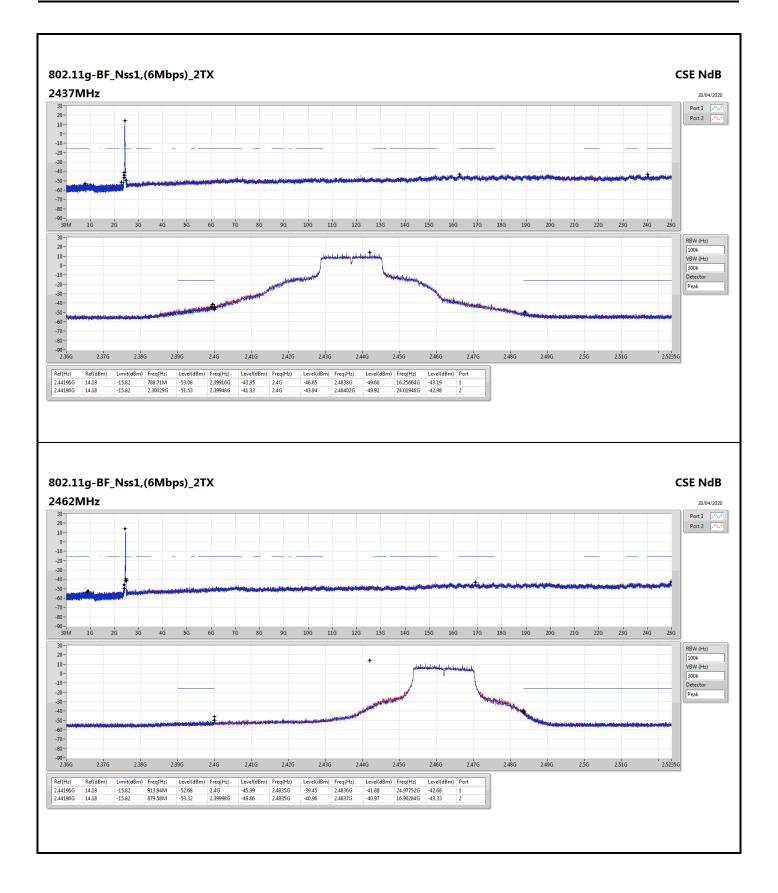




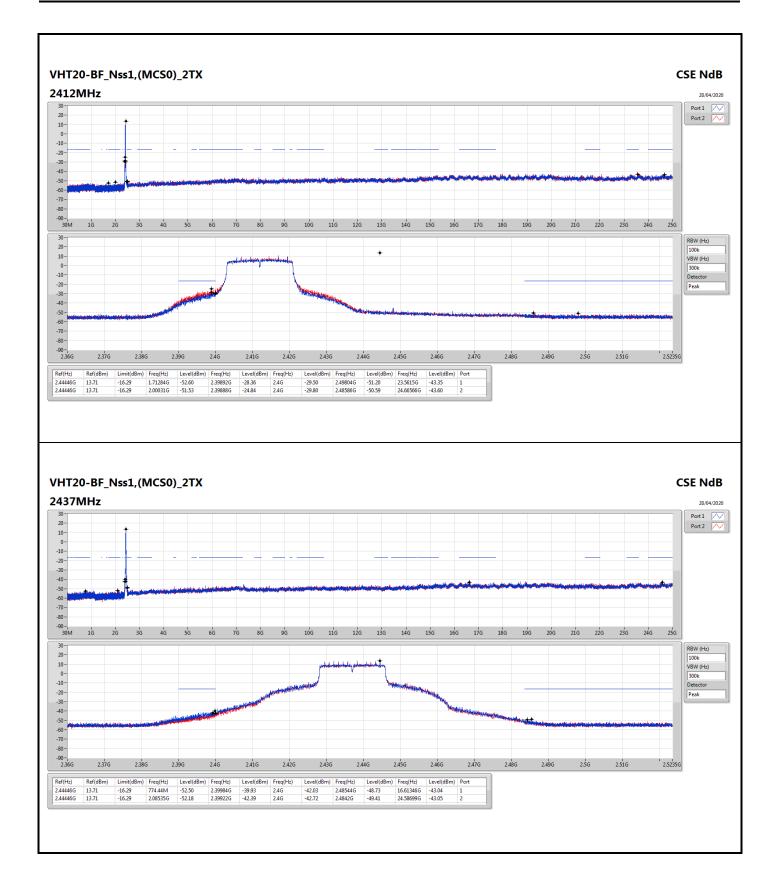




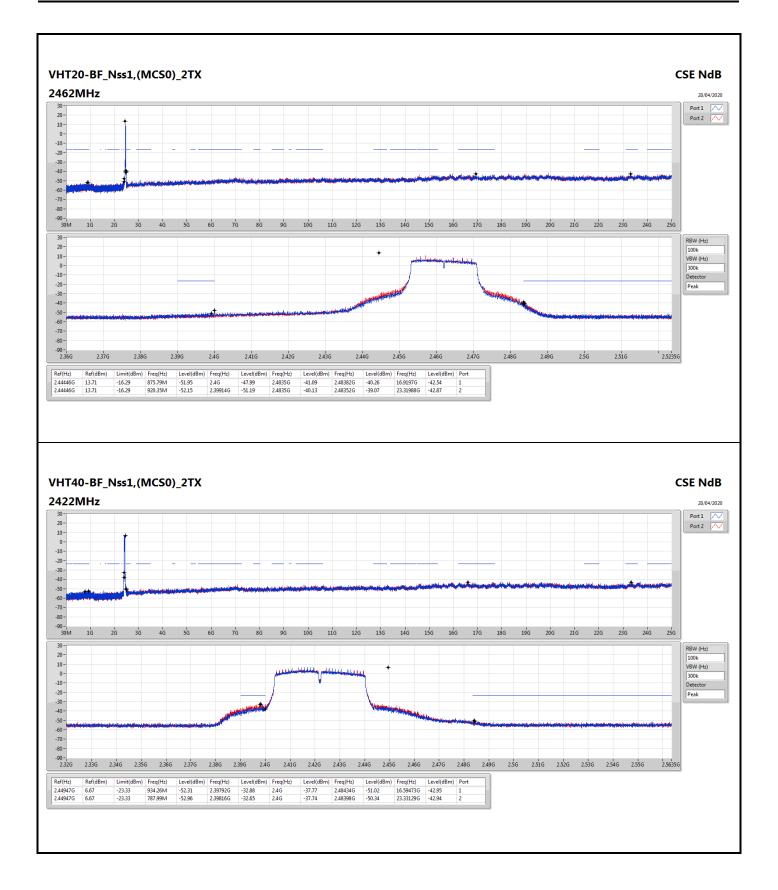




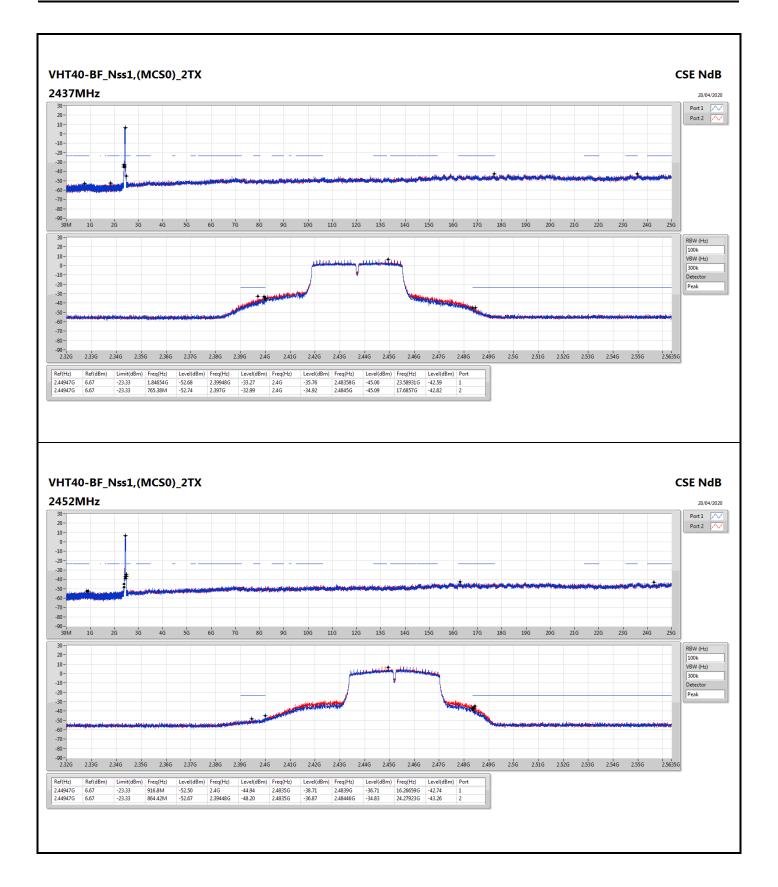














Radiated Emissions below 1GHz

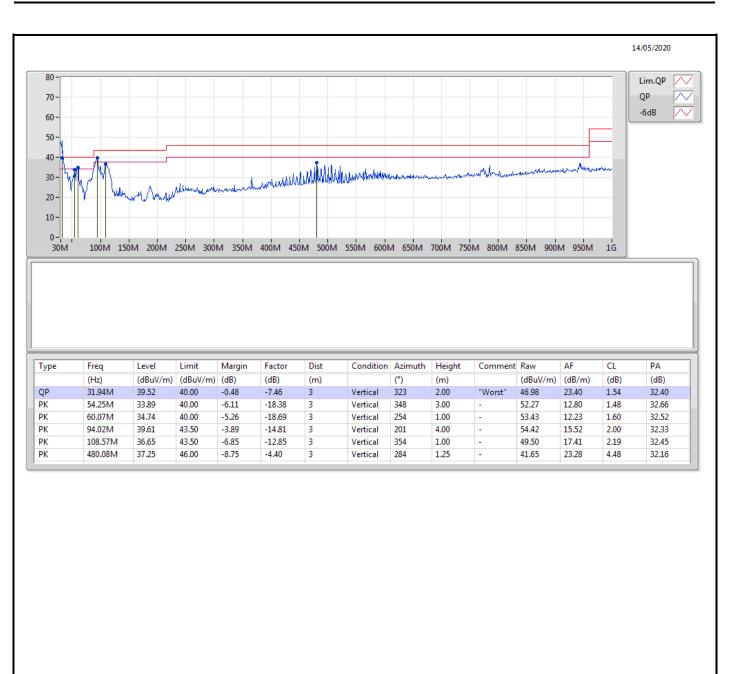
Appendix F.1

Summary							-
Mode	Result	Туре	Freq	Level	Limit	Margin	Condition
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	
Mode 6	Pass	QP	30M	39.75	40.00	-0.25	Horizontal



Radiated Emissions below 1GHz

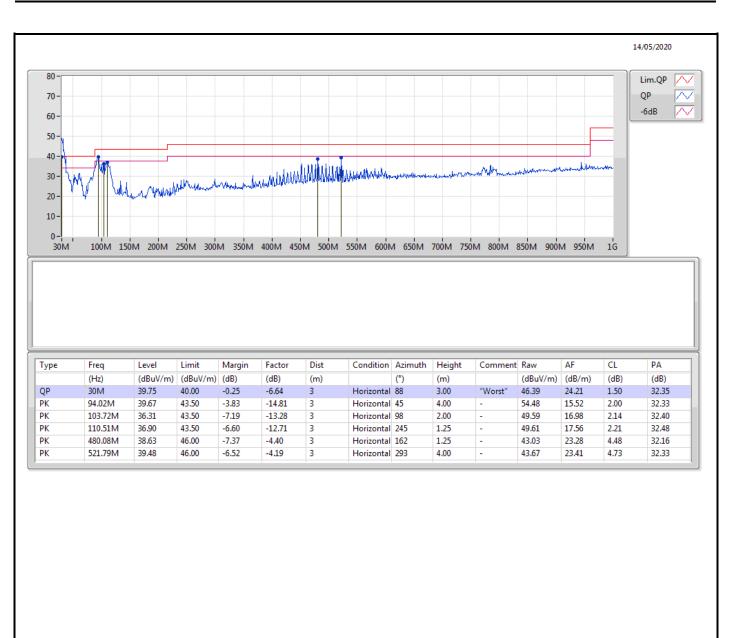
Appendix F.1





Radiated Emissions below 1GHz

Appendix F.1



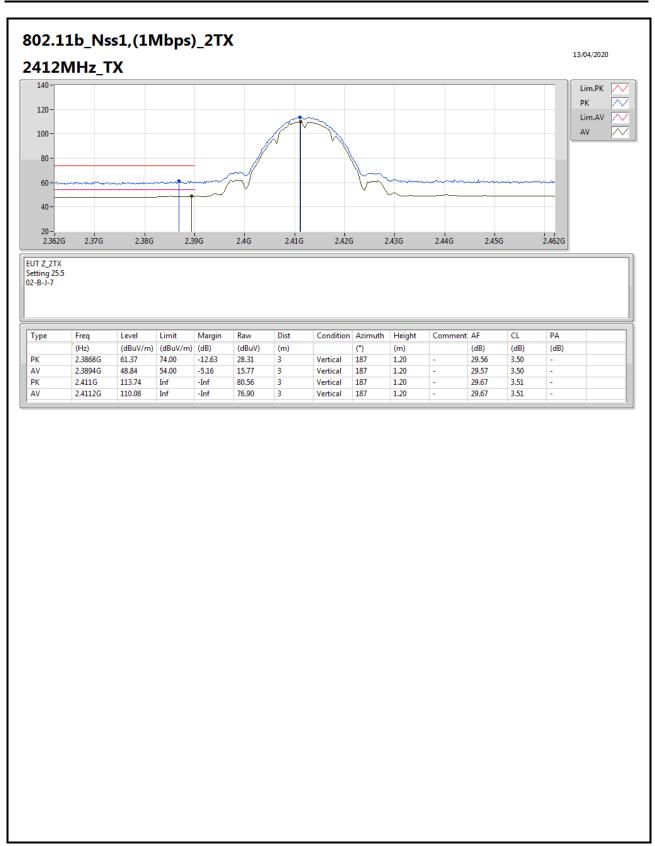


Appendix F.2

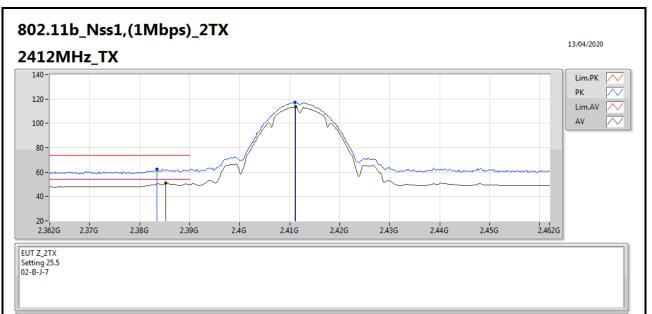
Summary

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-BF_Nss1,(MCS0)_2TX	Pass	AV	2.3898G	53.93	54.00	-0.07	3	Horizontal	133	1.90	-



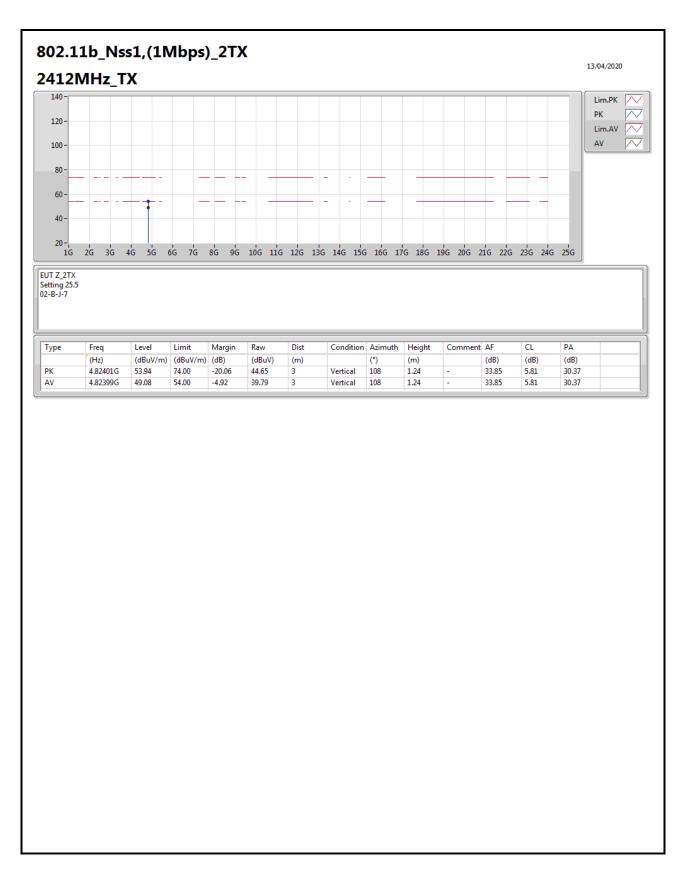




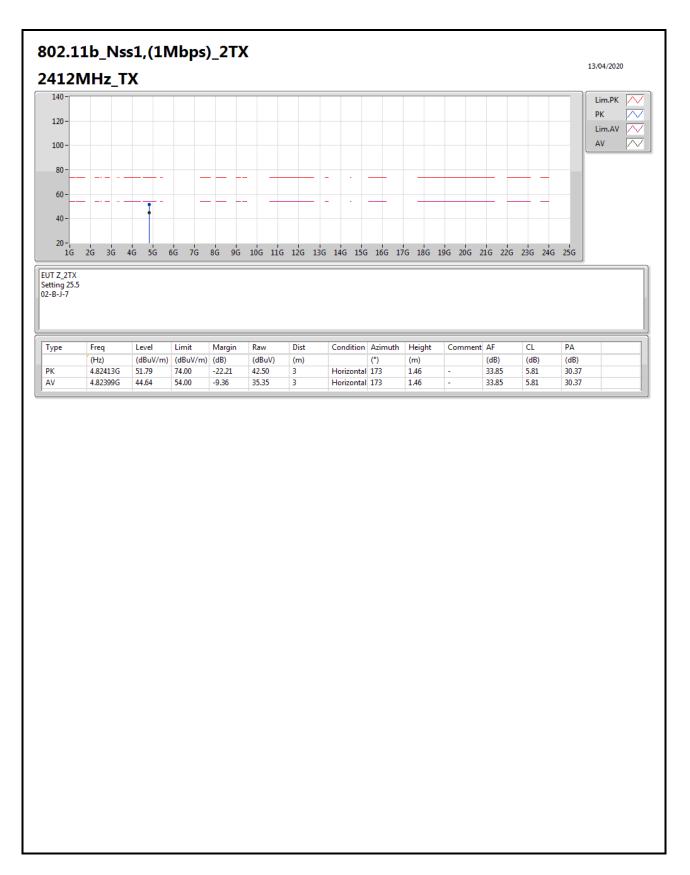


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
РК	2.3834G	62.43	74.00	-11.57	29.38	3	Horizontal	135	2.34	-	29.55	3.50	-	
AV	2.3852G	51.02	54.00	-2.98	17.96	3	Horizontal	135	2.34	-	29.56	3.50	-	
PK	2.411G	117.24	Inf	-Inf	84.06	3	Horizontal	135	2.34	-	29.67	3.51	-	
AV	2.4112G	113.53	Inf	-Inf	80.35	3	Horizontal	135	2.34	-	29.67	3.51	-	

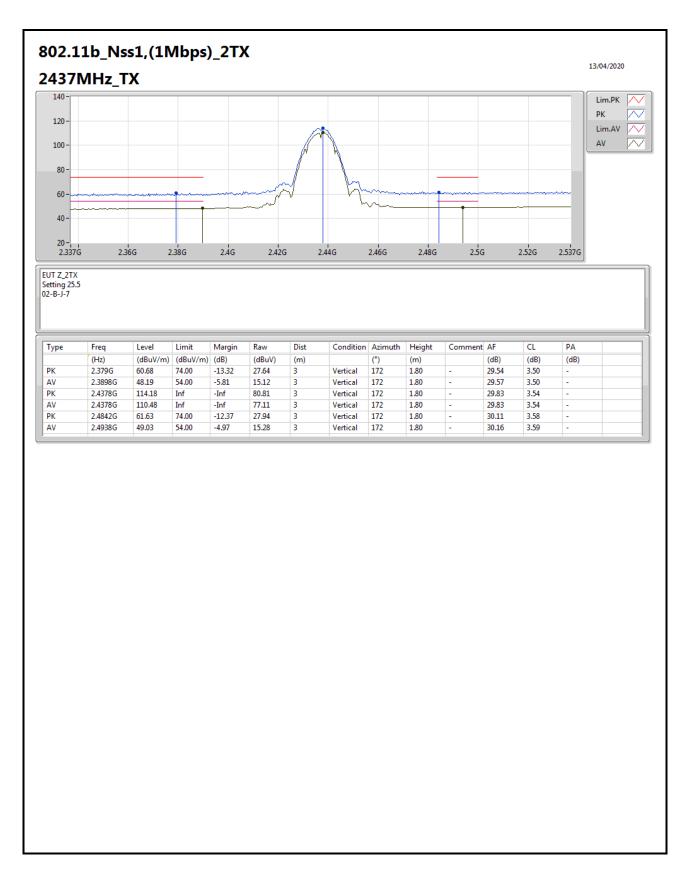




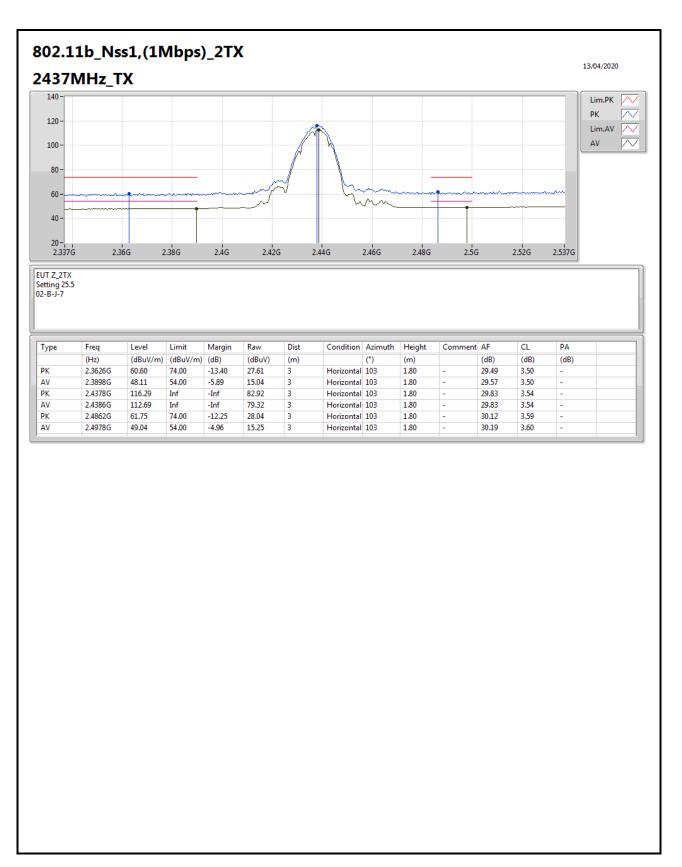




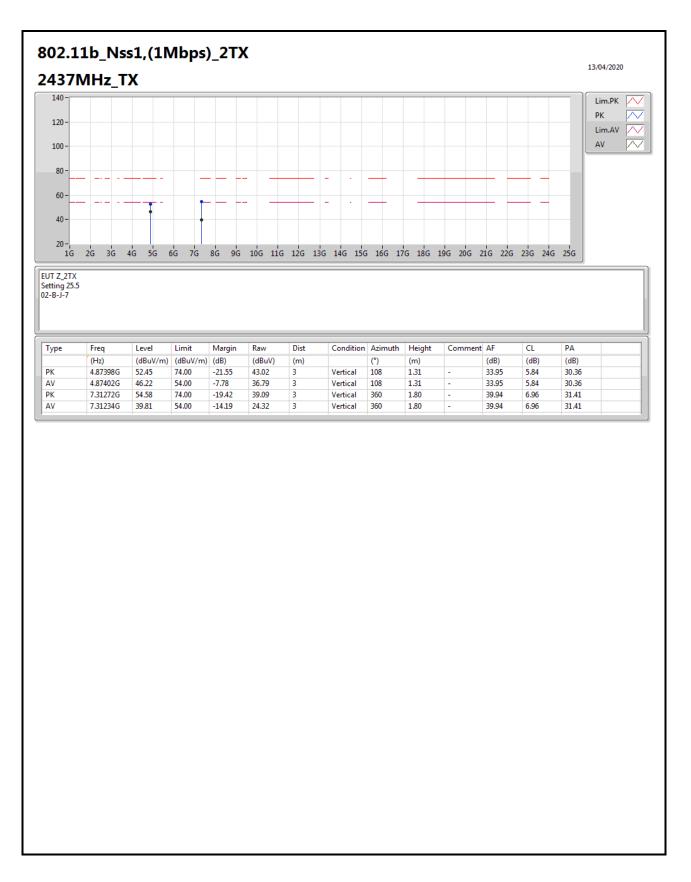




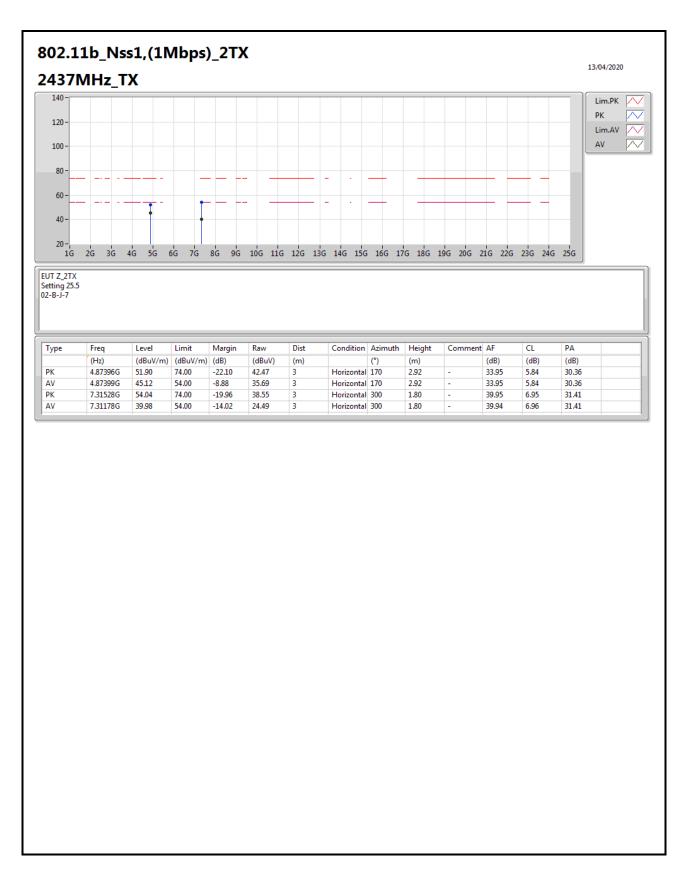




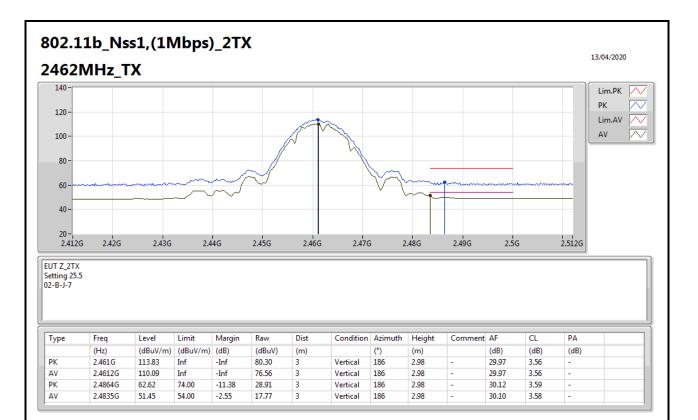




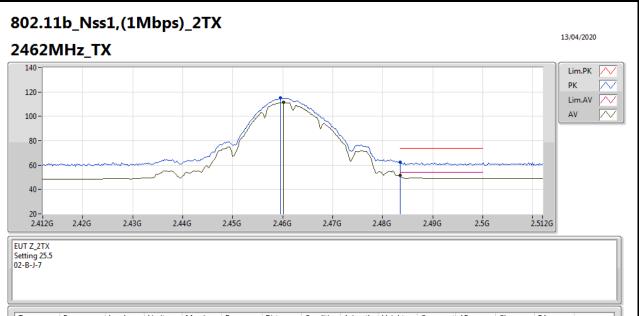






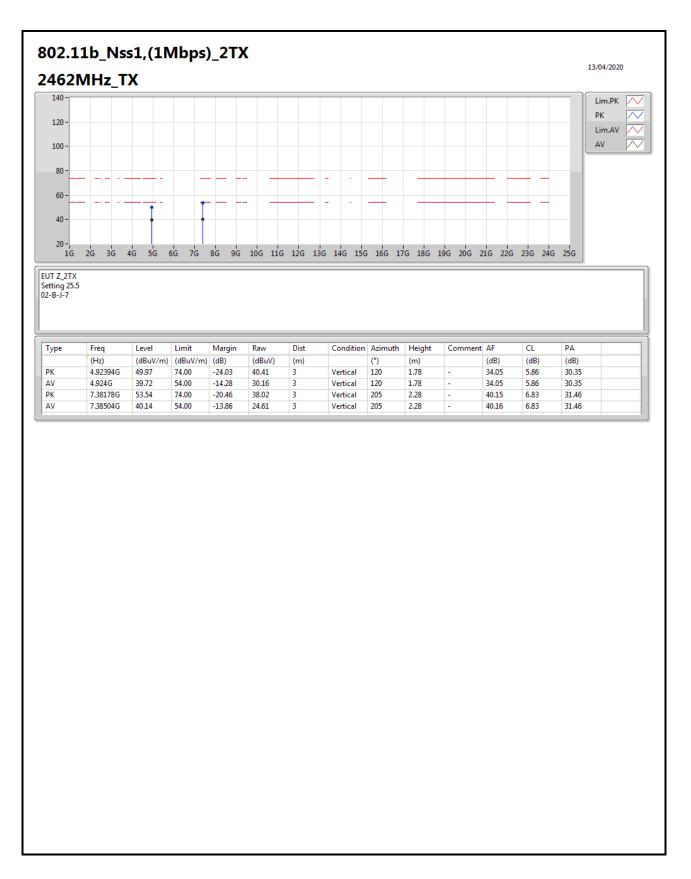




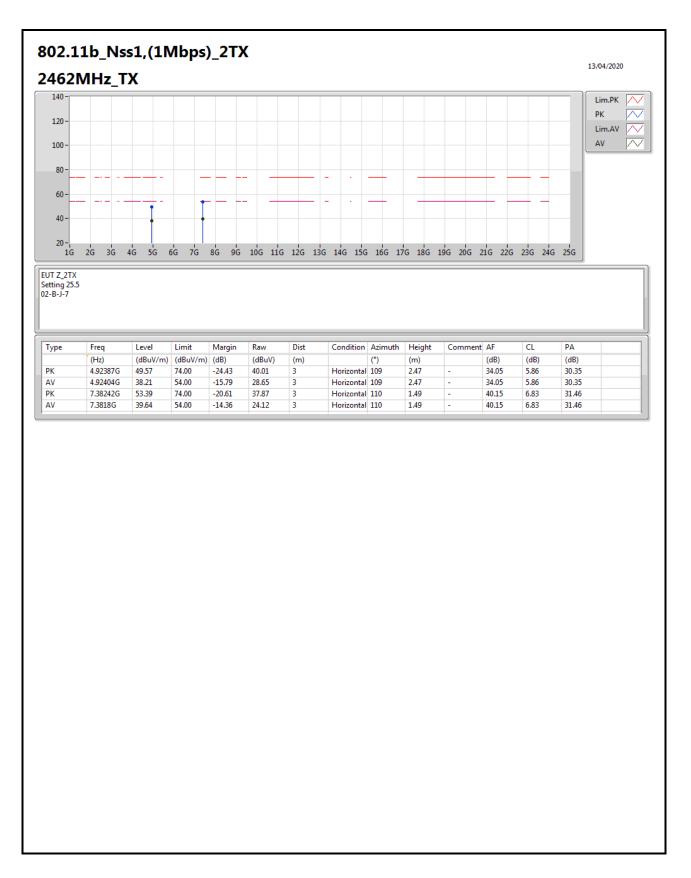


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.4596G	114.97	Inf	-Inf	81.45	3	Horizontal	118	1.80	-	29.96	3.56	-	
AV	2.4602G	111.53	Inf	-Inf	78.01	3	Horizontal	118	1.80	-	29.96	3.56	-	
PK	2.4835G	62.38	74.00	-11.62	28.70	3	Horizontal	118	1.80	-	30.10	3.58	-	
AV	2.4835G	51.54	54.00	-2.46	17.86	3	Horizontal	118	1.80	-	30.10	3.58	-	

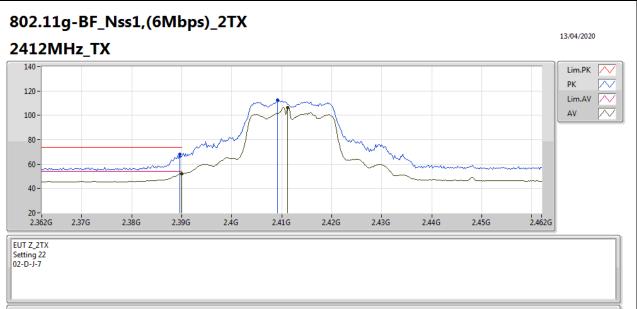












Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
РК	2.3896G	67.96	74.00	-6.04	34.89	3	Vertical	29	2.99	-	29.57	3.50	-	
AV	2.39G	52.12	54.00	-1.88	19.05	3	Vertical	29	2.99	-	29.57	3.50	-	
PK	2.4092G	112.61	Inf	-Inf	79.44	3	Vertical	29	2.99	-	29.66	3.51	-	
AV	2.4112G	106.57	Inf	-Inf	73.39	3	Vertical	29	2.99	-	29.67	3.51	-	



Inf

110.05

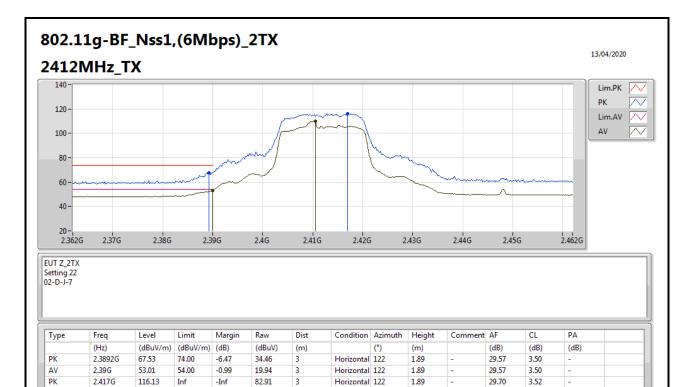
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3

76.88

AV

2.4106G



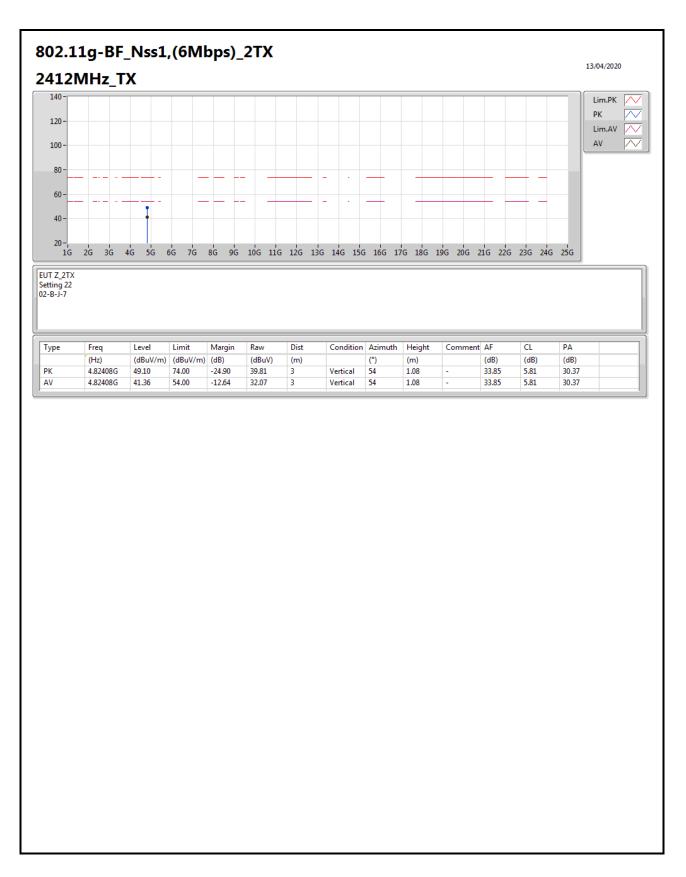
Horizontal 122

1.89

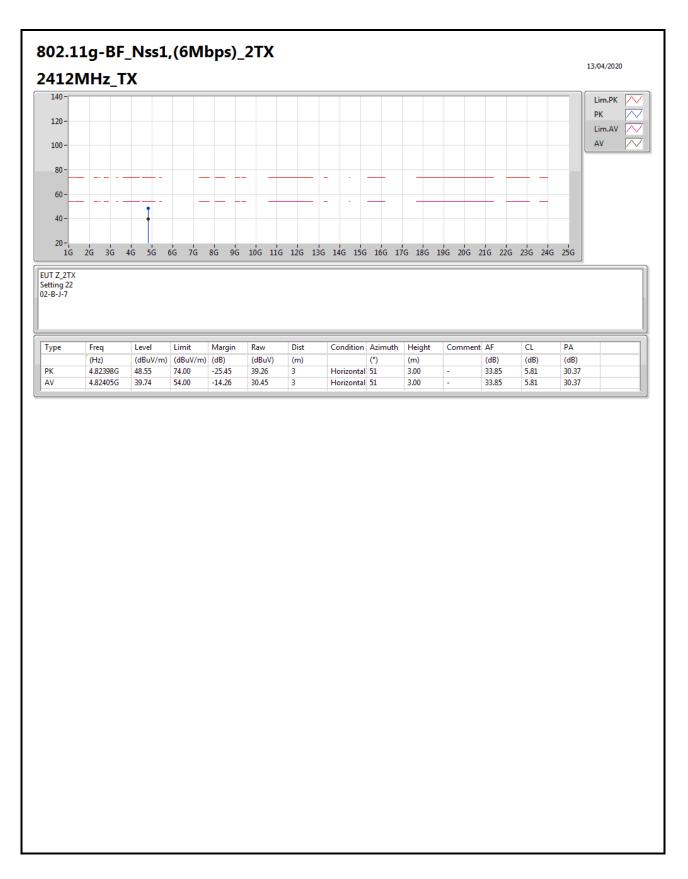
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3.51

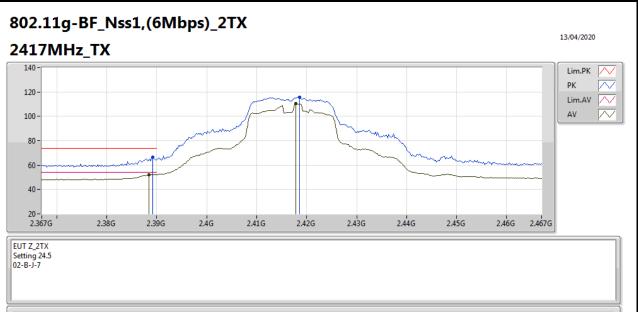






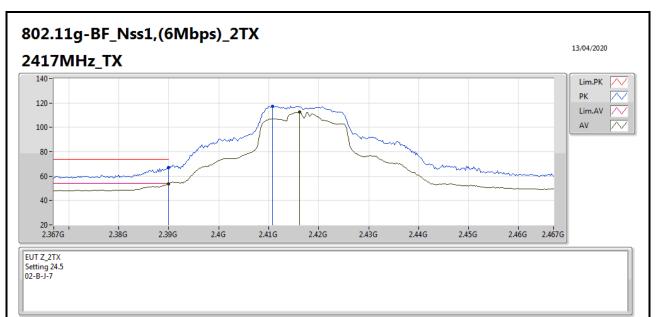






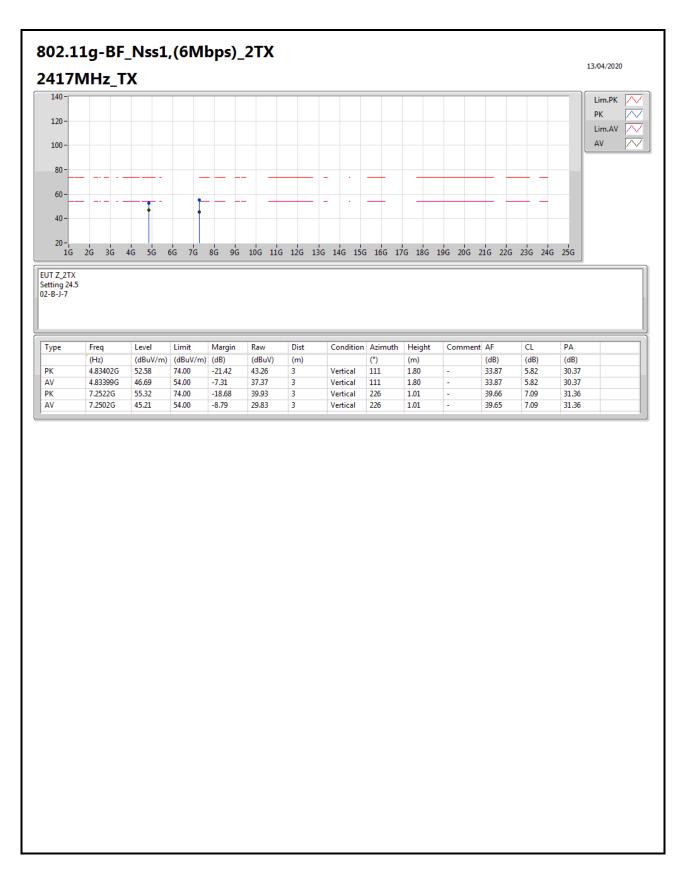
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	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.3892G	66.35	74.00	-7.65	33.28	3	Vertical	194	1.45	-	29.57	3.50	-	
AV	2.3884G	52.26	54.00	-1.74	19.19	3	Vertical	194	1.45	-	29.57	3.50	-	
PK	2.4186G	115.86	Inf	-Inf	82.63	3	Vertical	194	1.45	-	29.71	3.52	-	
AV	2.4178G	110.38	Inf	-Inf	77.15	3	Vertical	194	1.45	-	29.71	3.52	-	



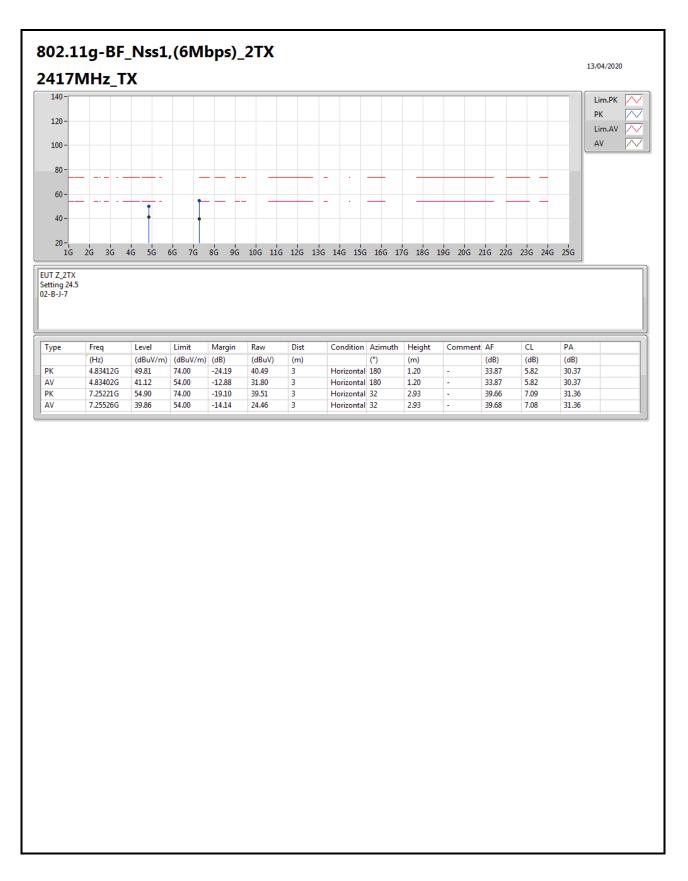


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.39G	66.88	74.00	-7.12	33.81	3	Horizontal	144	1.09	-	29.57	3.50	-	
AV	2.39G	53.81	54.00	-0.19	20.74	3	Horizontal	144	1.09	-	29.57	3.50	-	
PK	2.4108G	117.41	Inf	-Inf	84.24	3	Horizontal	144	1.09	-	29.66	3.51	-	
AV	2.4162G	112.60	Inf	-Inf	79.38	3	Horizontal	144	1.09	-	29.70	3.52	-	

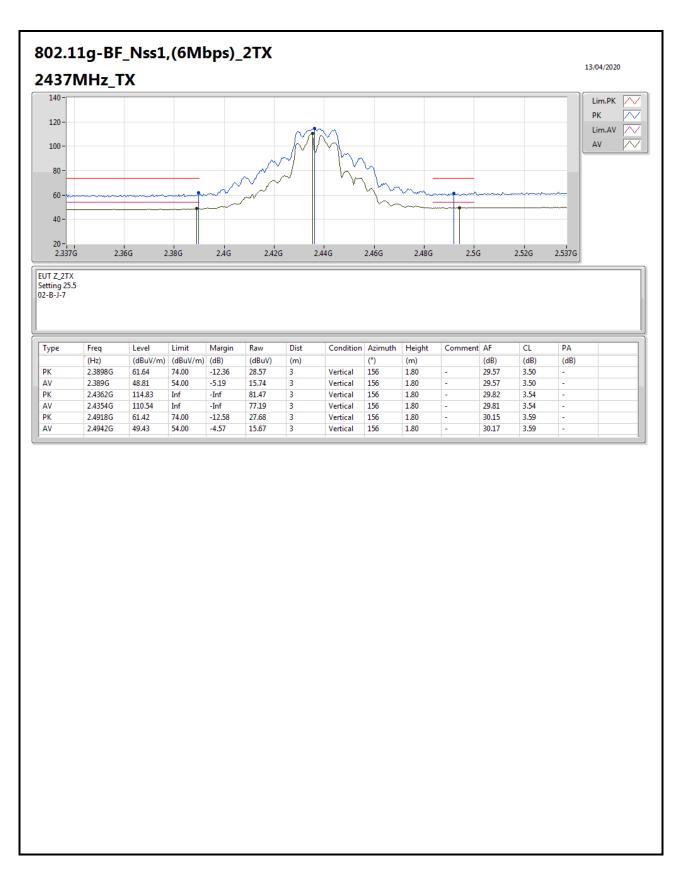




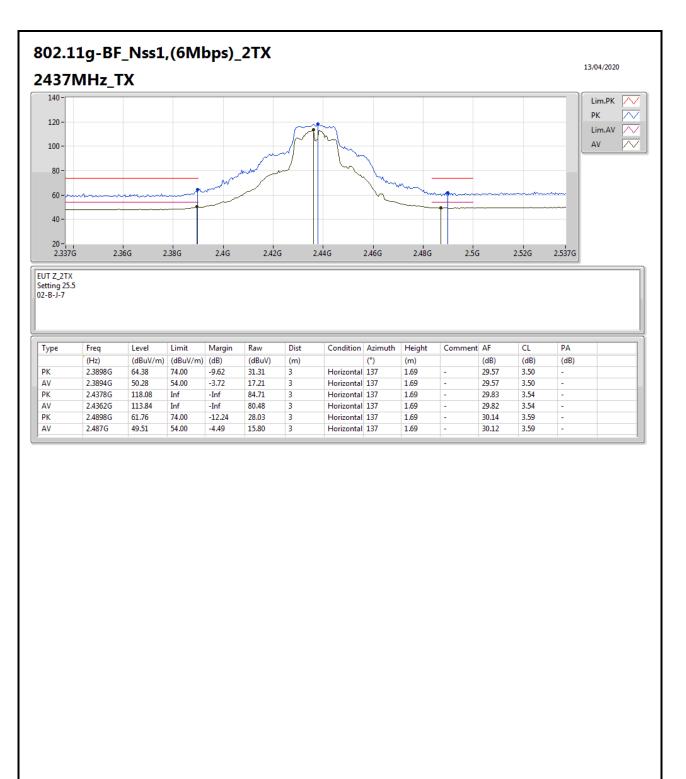




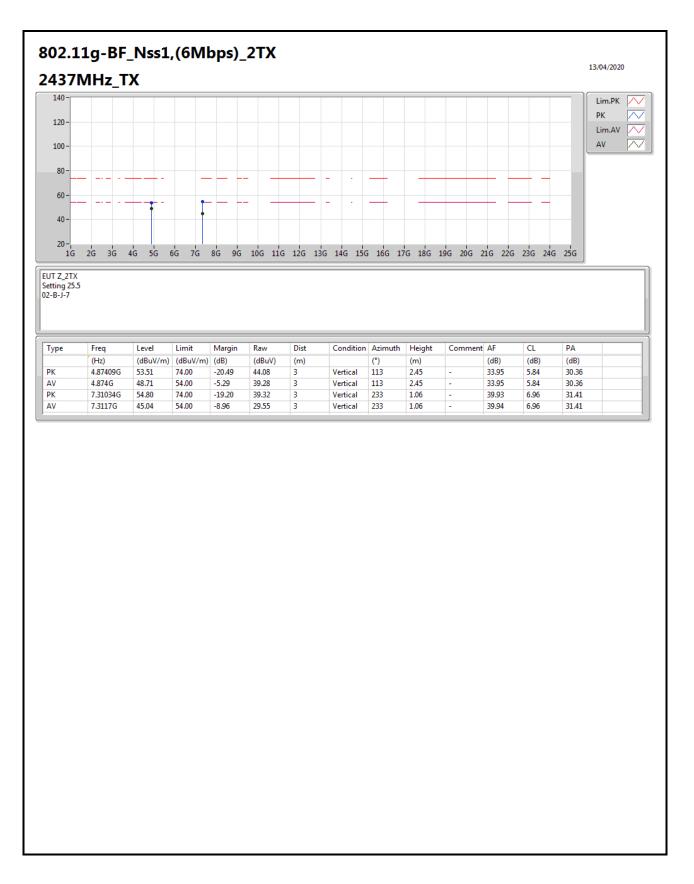




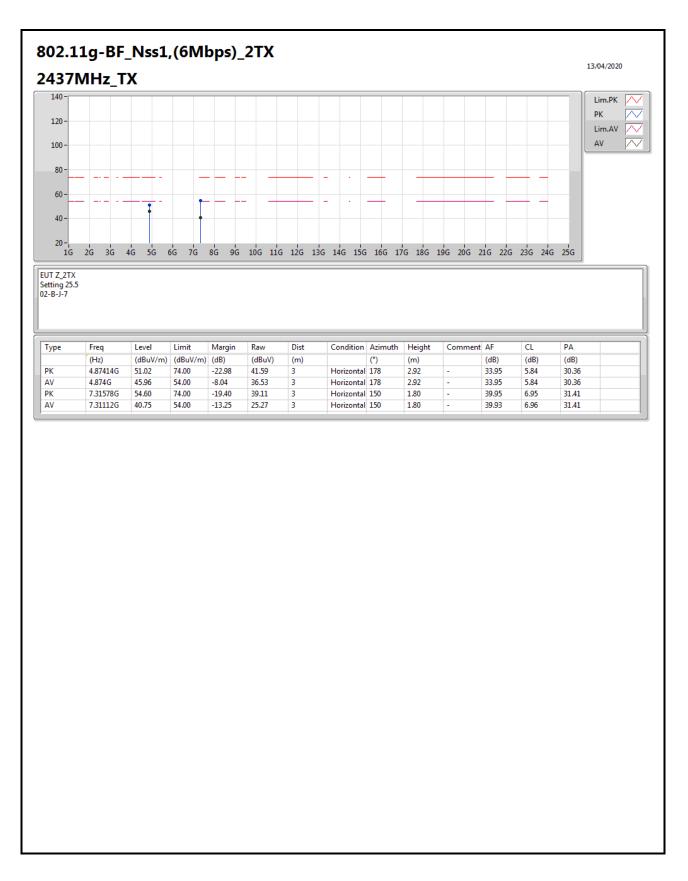














2.4856G

2.4835G

AV

74.00

54.00

-9.11

-3.09

31.19

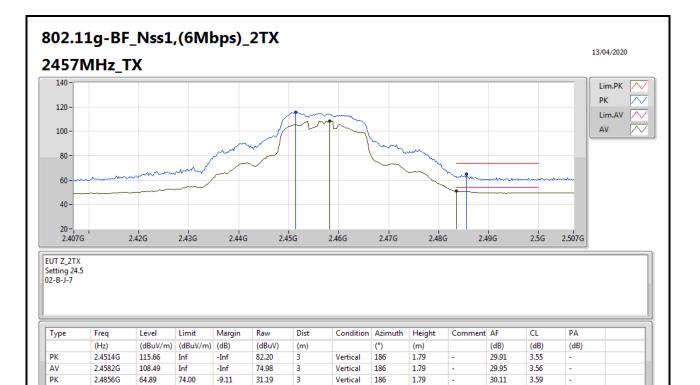
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3

3

64.89

50.91



Vertical

Vertical

186

186

1.79

1.79

-

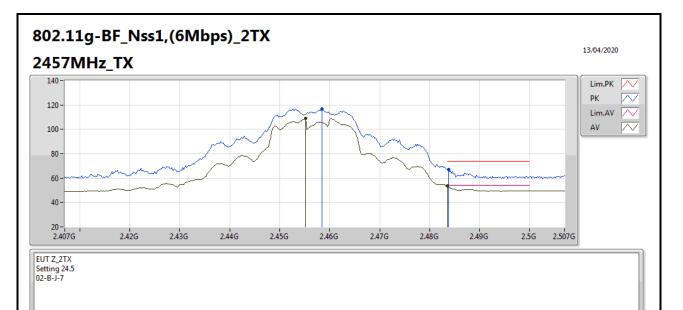
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30.10

3.59

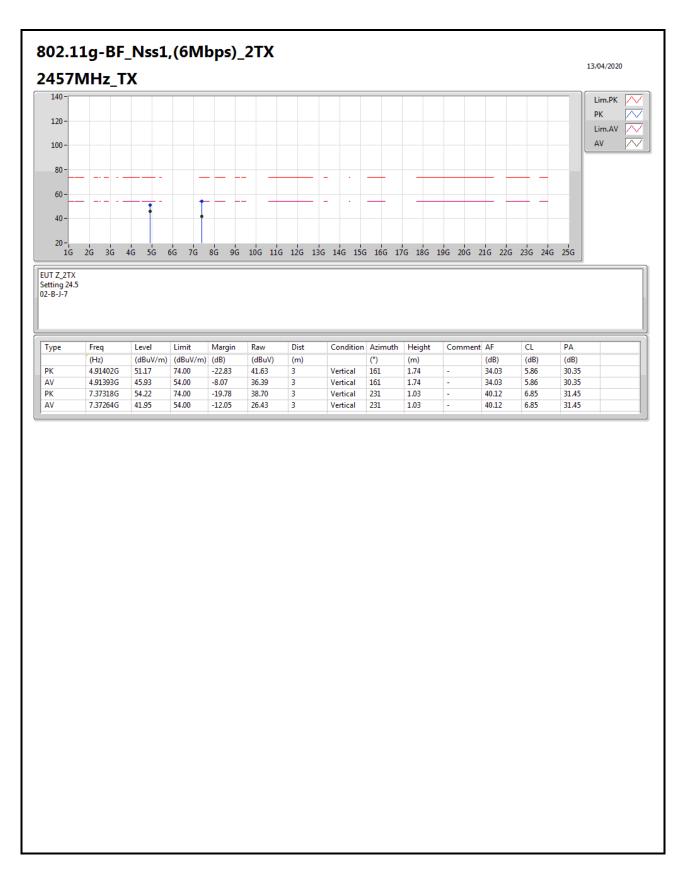
3.58



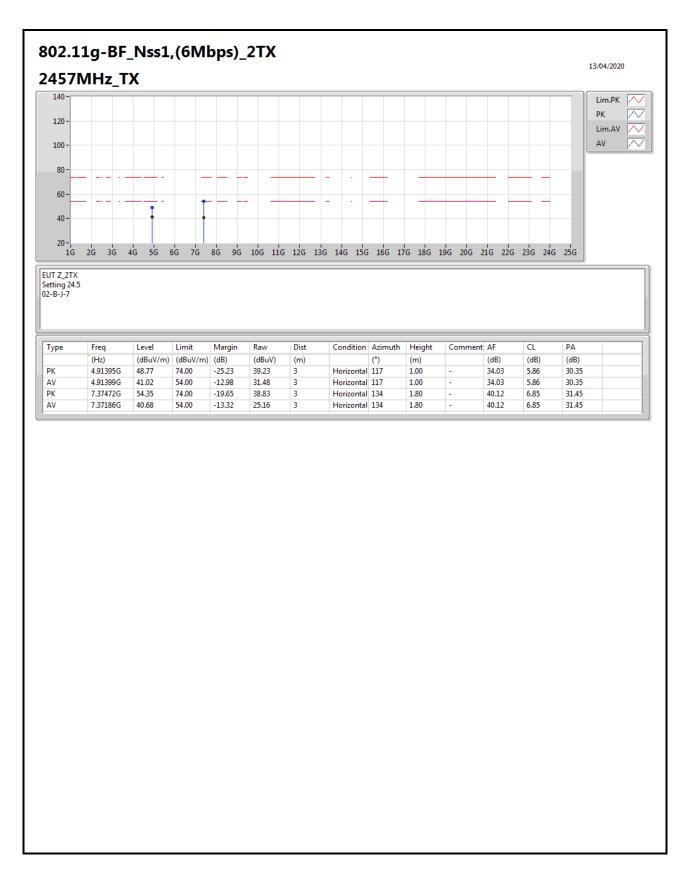


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.4584G	116.87	Inf	-Inf	83.36	3	Horizontal	104	2.47	-	29.95	3.56	-	
AV	2.4552G	109.15	Inf	-Inf	75.66	3	Horizontal	104	2.47	-	29.93	3.56	-	
PK	2.4838G	67.14	74.00	-6.86	33.46	3	Horizontal	104	2.47	-	30.10	3.58	-	
AV	2.4835G	53.43	54.00	-0.57	19.75	3	Horizontal	104	2.47	-	30.10	3.58	-	

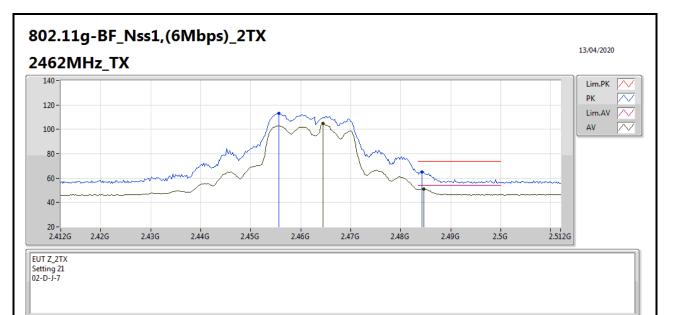












Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
РК	2.4556G	113.22	Inf	-Inf	79.73	3	Vertical	184	2.42	-	29.93	3.56	-	
AV	2.4644G	104.60	Inf	-Inf	71.05	3	Vertical	184	2.42	-	29.99	3.56	-	
PK	2.4842G	64.92	74.00	-9.08	31.23	3	Vertical	184	2.42	-	30.11	3.58	-	
AV	2.4846G	50.84	54.00	-3.16	17.15	3	Vertical	184	2.42	-	30.11	3.58	-	



2.4835G

2.4835G

AV

74.00

54.00

68.92

53.52

-5.08

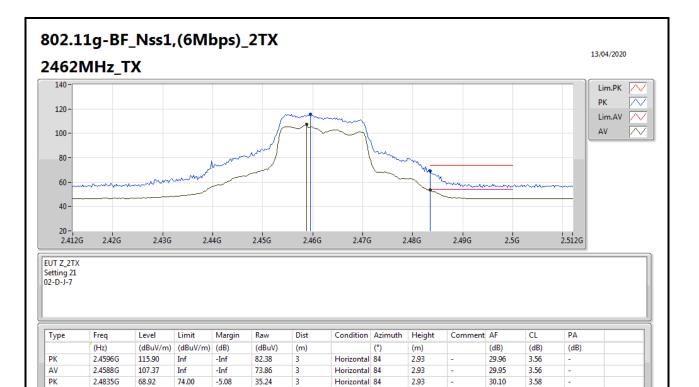
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35.24

19.84

3

3



Horizontal 84

Horizontal 84

2.93

2.93

-

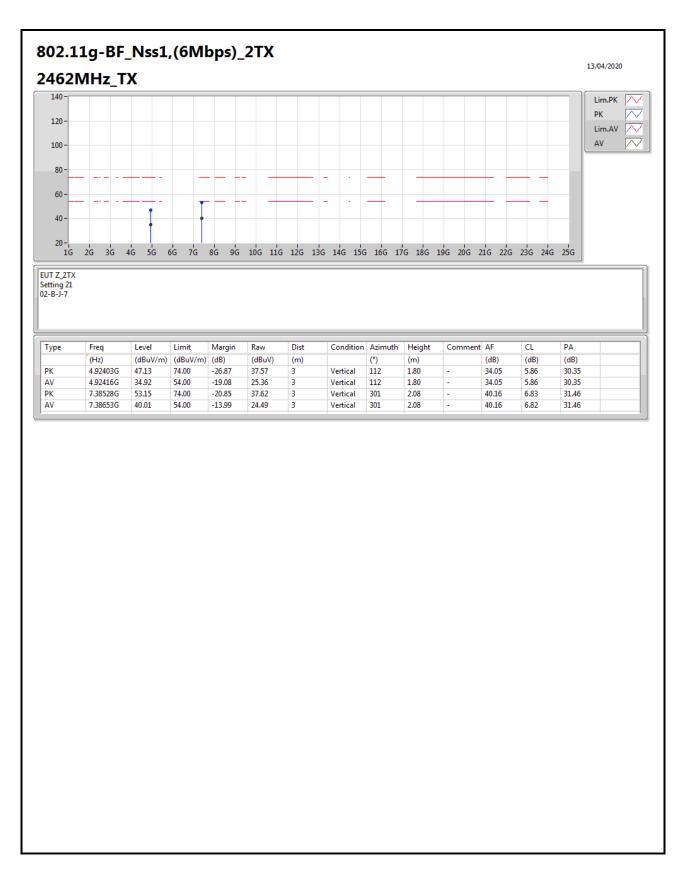
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30.10

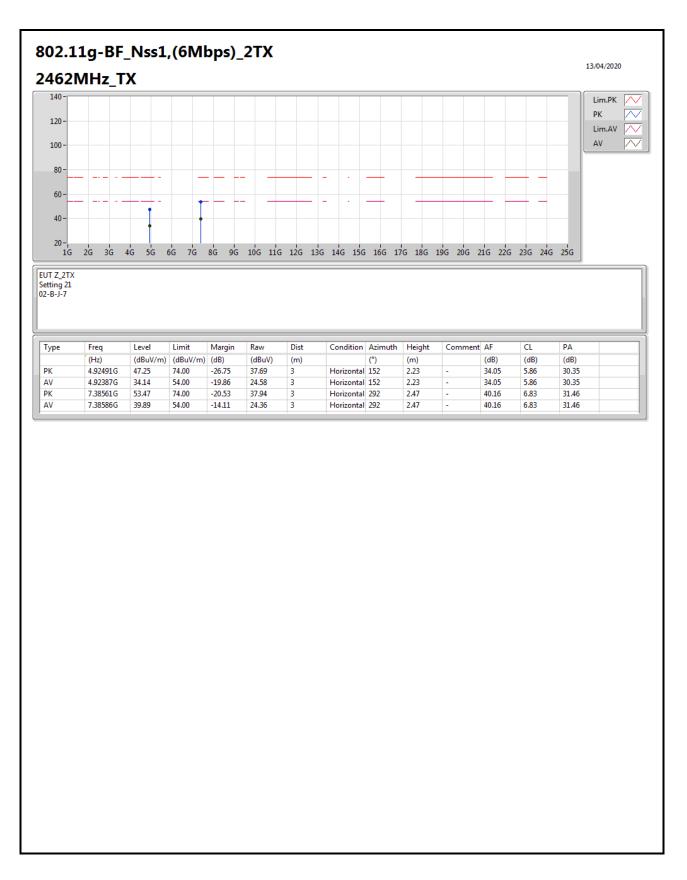
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3.58

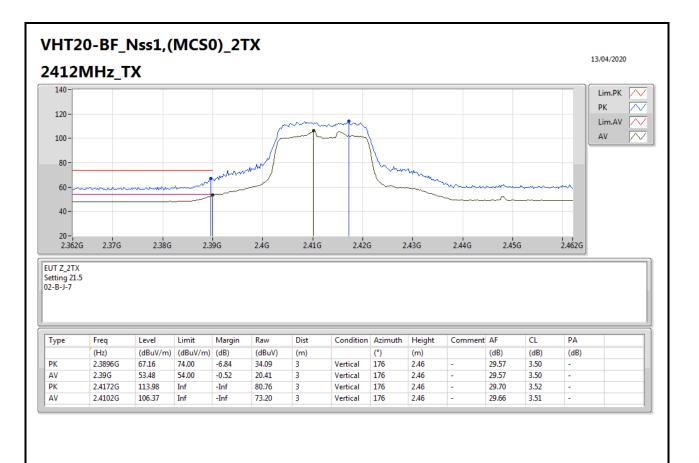




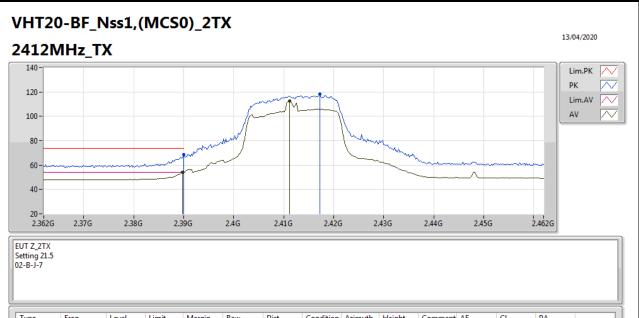






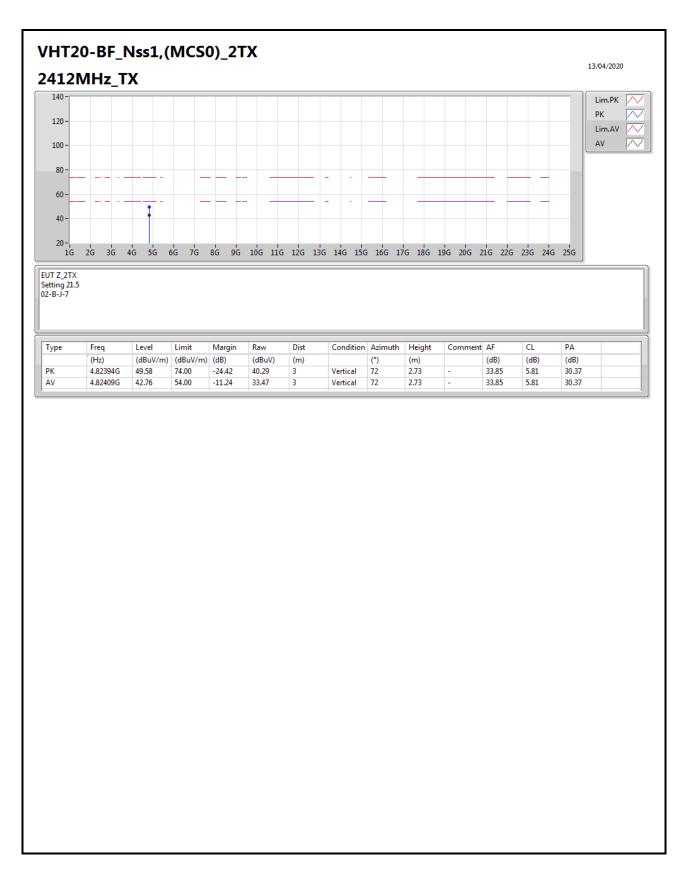




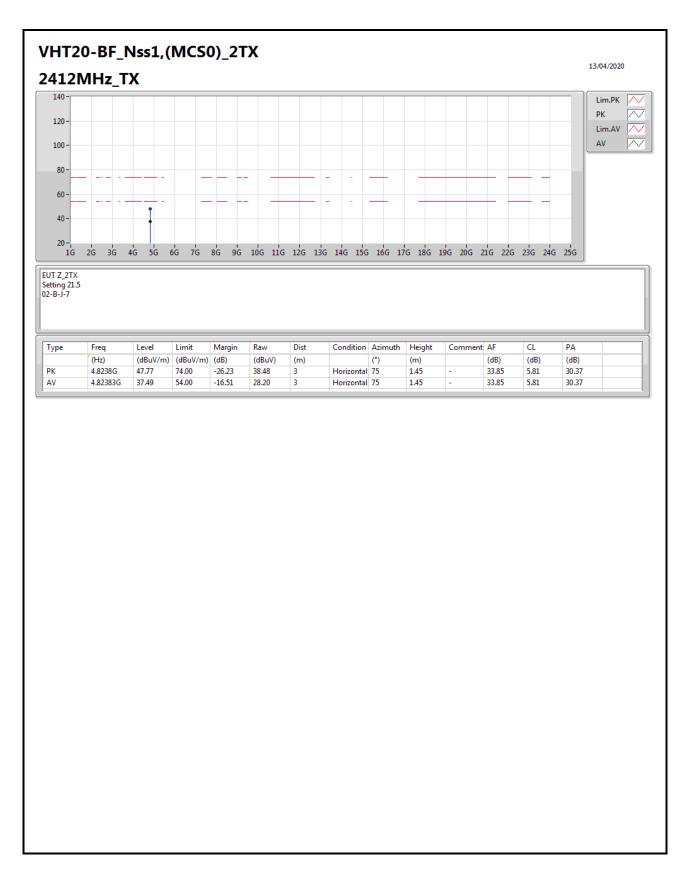


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.39G	68.45	74.00	-5.55	35.38	3	Horizontal	133	1.90	-	29.57	3.50	-	
AV	2.3898G	53.93	54.00	-0.07	20.86	3	Horizontal	133	1.90	-	29.57	3.50	-	
PK	2.4172G	118.11	Inf	-Inf	84.89	3	Horizontal	133	1.90	-	29.70	3.52	-	
AV	2.4112G	112.84	Inf	-Inf	79.66	3	Horizontal	133	1.90	-	29.67	3.51	-	

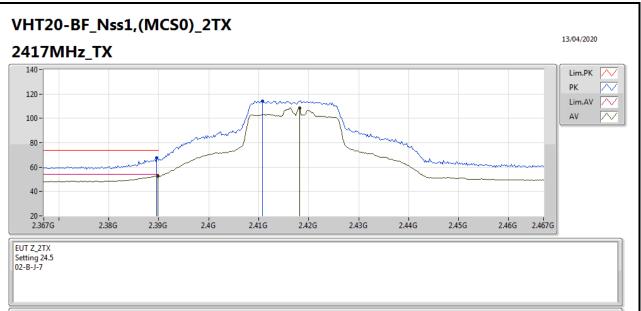






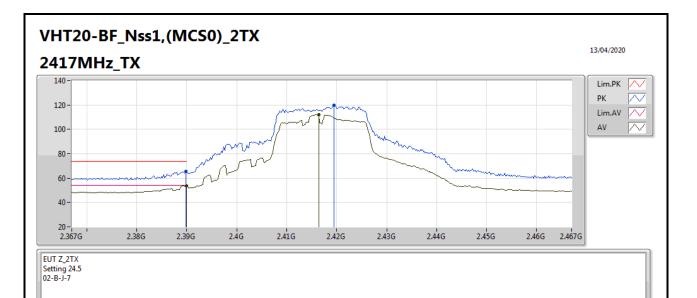






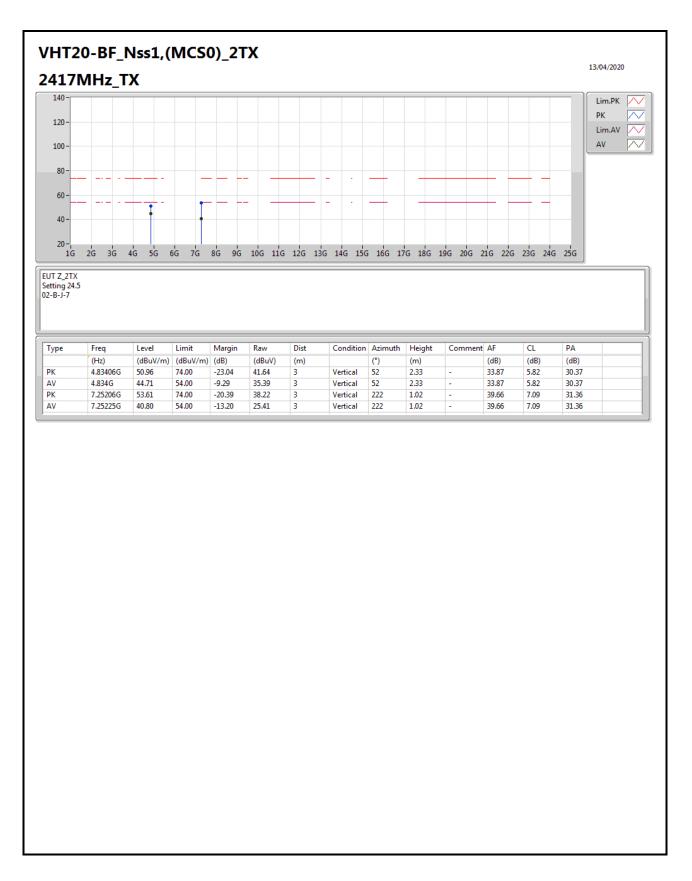
Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.3896G	67.65	74.00	-6.35	34.58	3	Vertical	190	1.80	-	29.57	3.50	-	
AV	2.3898G	52.68	54.00	-1.32	19.61	3	Vertical	190	1.80	-	29.57	3.50	-	
PK	2.4108G	114.32	Inf	-Inf	81.15	3	Vertical	190	1.80	-	29.66	3.51	-	
AV	2.4182G	108.51	Inf	-Inf	75.28	3	Vertical	190	1.80	-	29.71	3.52	-	



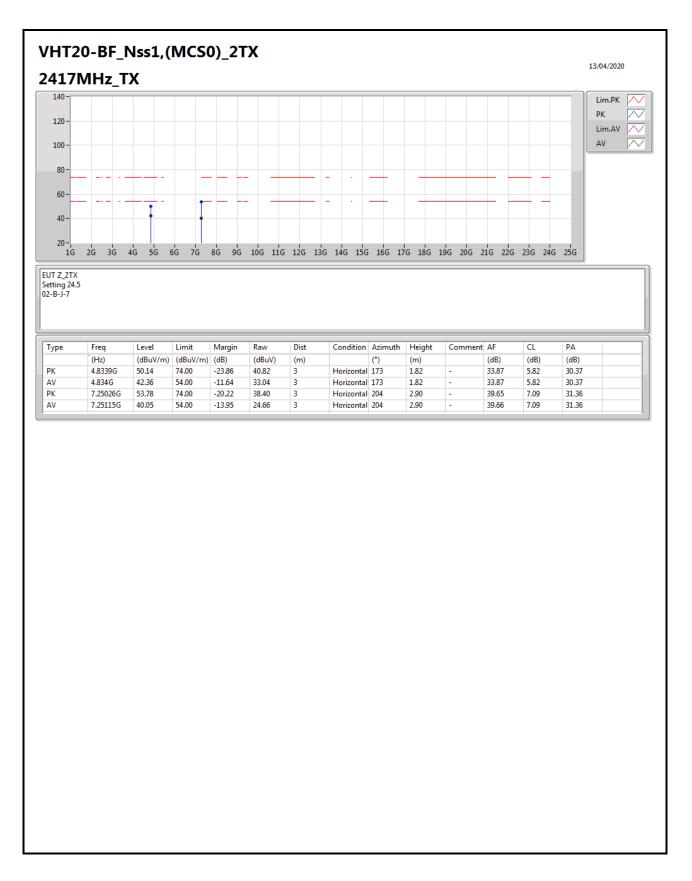


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.3898G	65.50	74.00	-8.50	32.43	3	Horizontal	135	1.88	-	29.57	3.50	-	
AV	2.39G	53.54	54.00	-0.46	20.47	3	Horizontal	135	1.88	-	29.57	3.50	-	
PK	2.4194G	119.64	Inf	-Inf	86.40	3	Horizontal	135	1.88	-	29.72	3.52	-	
AV	2.4164G	112.17	Inf	-Inf	78.95	3	Horizontal	135	1.88	-	29.70	3.52	-	

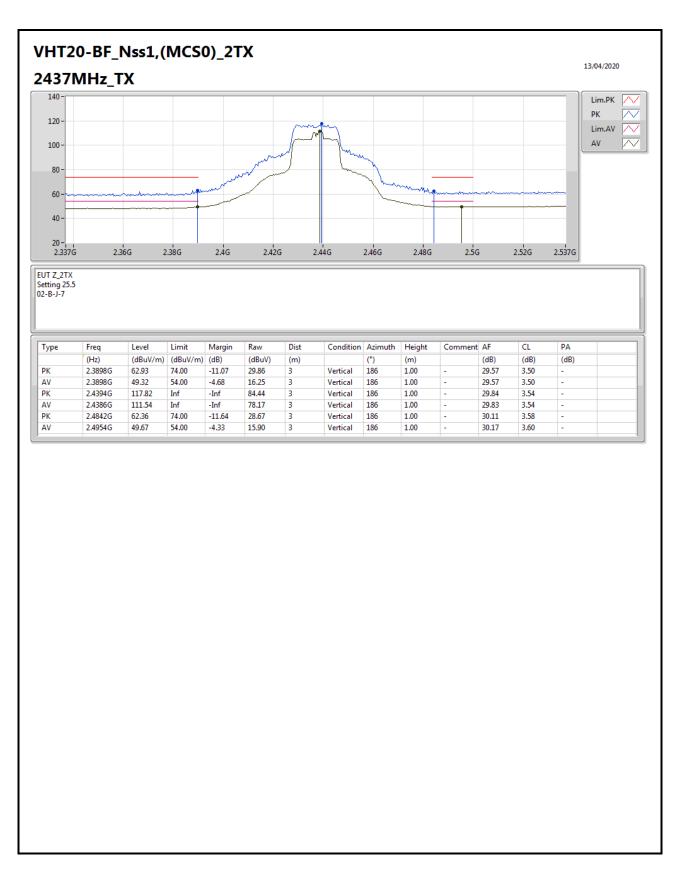




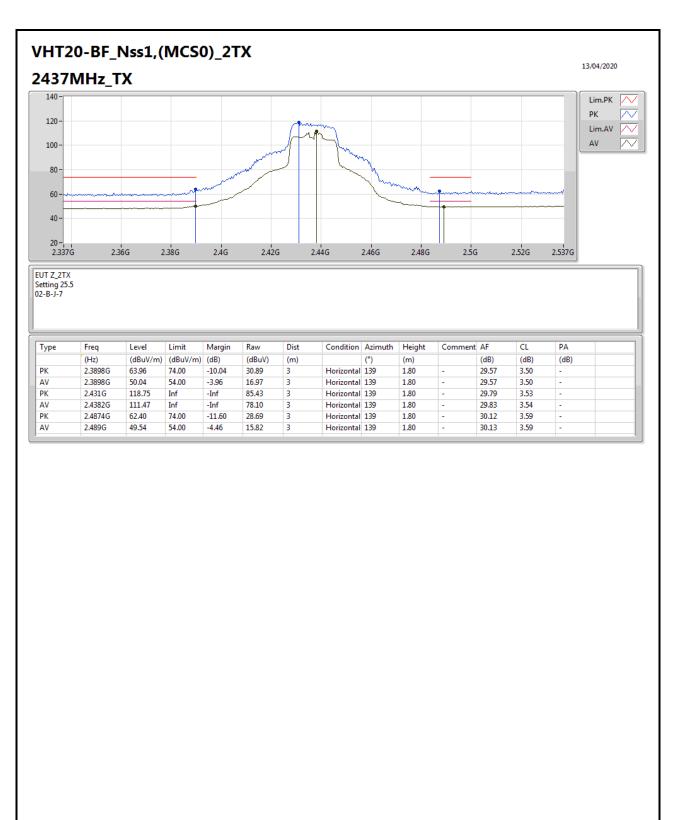




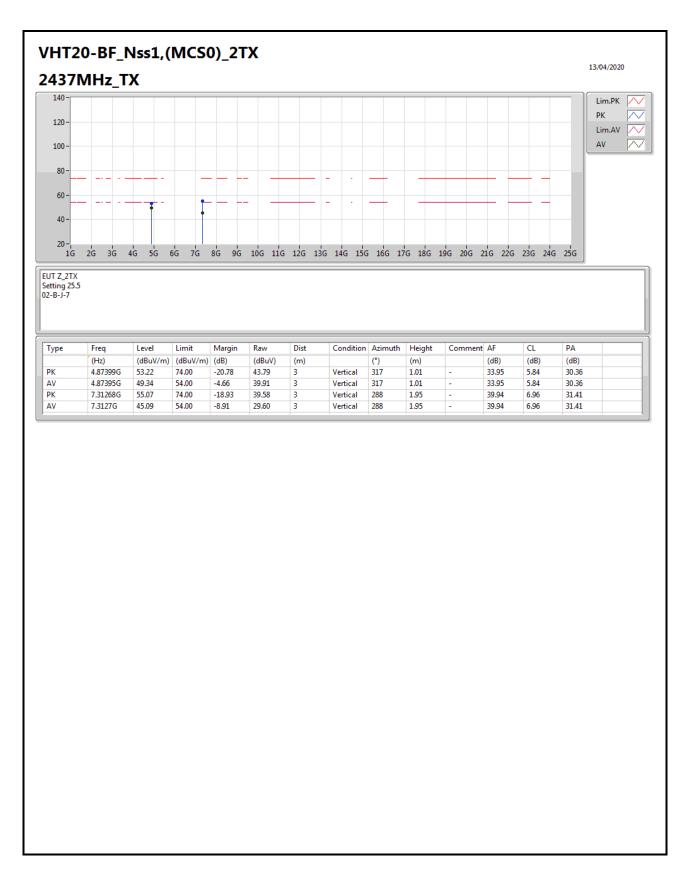




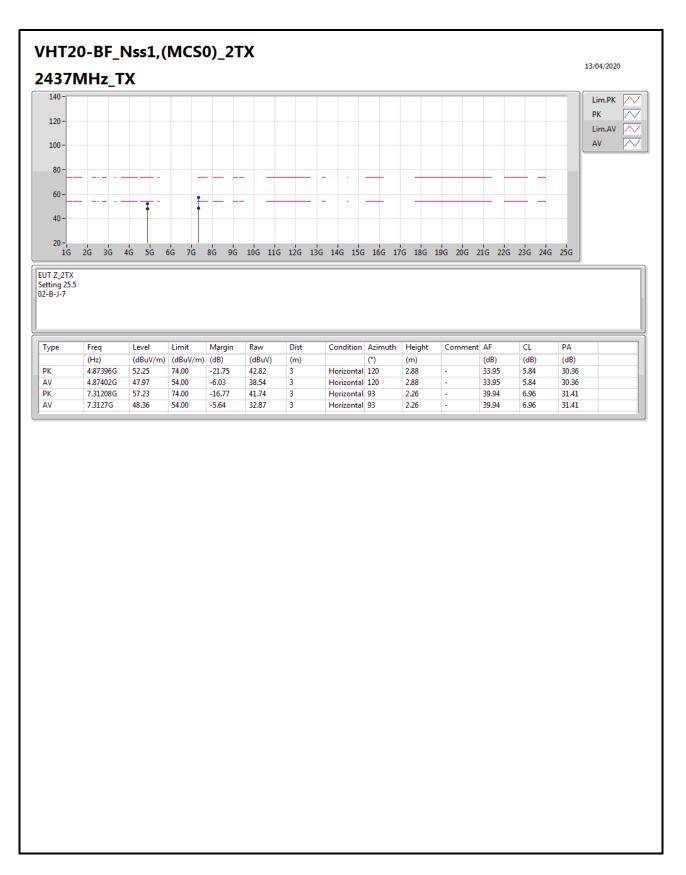




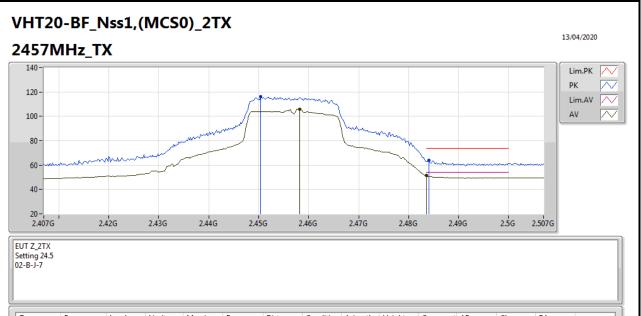






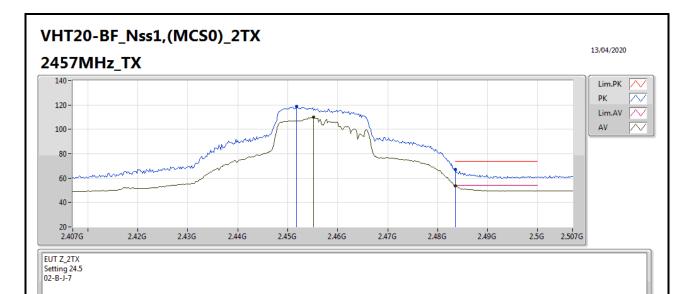






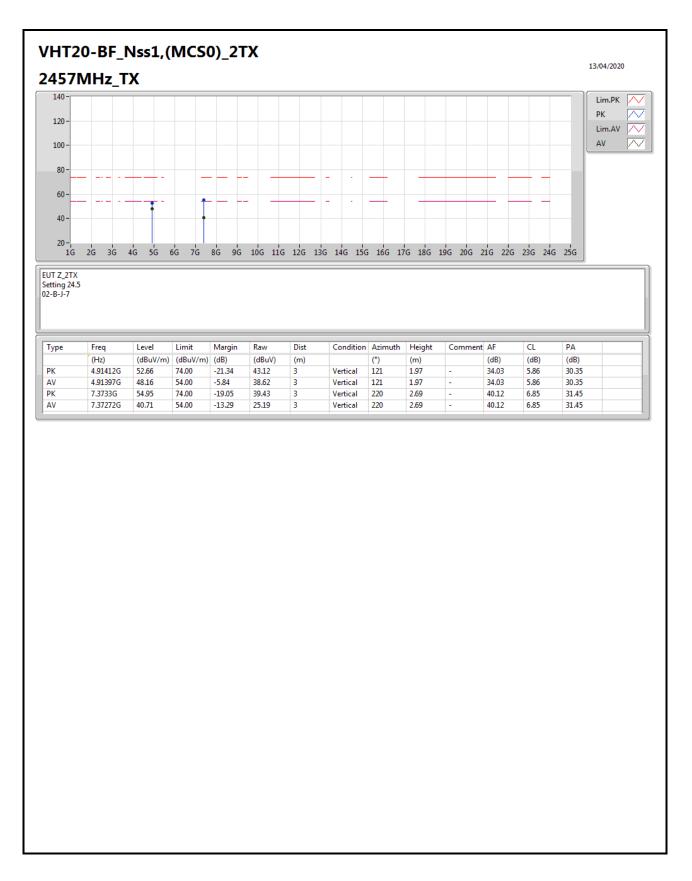
Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.4504G	116.01	Inf	-Inf	82.56	3	Vertical	172	2.38	-	29.90	3.55	-	
AV	2.4582G	106.04	Inf	-Inf	72.53	3	Vertical	172	2.38	-	29.95	3.56	-	
PK	2.484G	63.77	74.00	-10.23	30.09	3	Vertical	172	2.38	-	30.10	3.58	-	
AV	2.4835G	51.33	54.00	-2.67	17.65	3	Vertical	172	2.38	-	30.10	3.58	-	



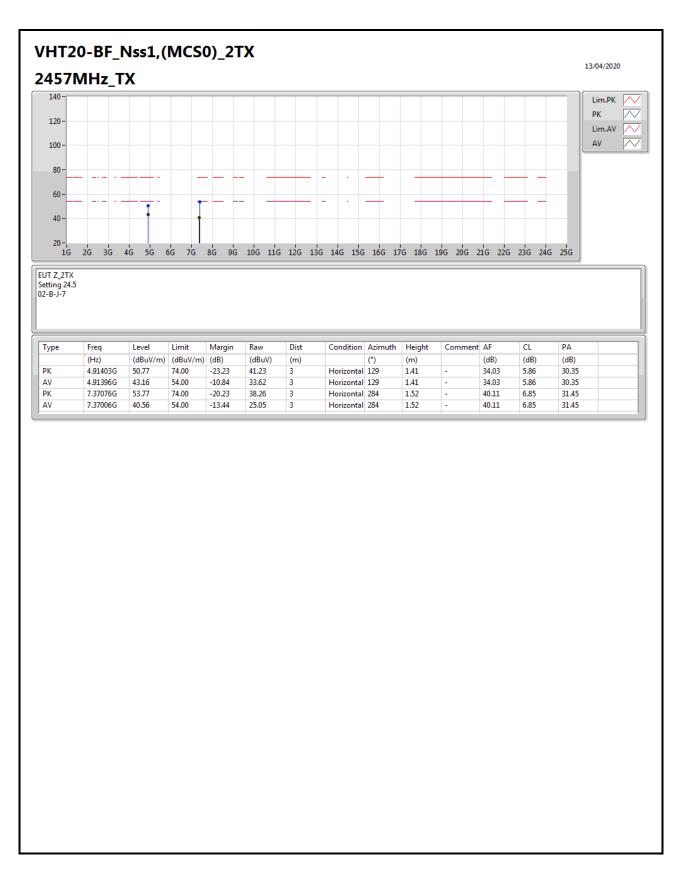


Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA	
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)	
PK	2.4518G	118.65	Inf	-Inf	85.19	3	Horizontal	104	2.47	-	29.91	3.55	-	
AV	2.4552G	110.01	Inf	-Inf	76.52	3	Horizontal	104	2.47	-	29.93	3.56	-	
PK	2.4835G	67.06	74.00	-6.94	33.38	3	Horizontal	104	2.47	-	30.10	3.58	-	
AV	2.4835G	53.78	54.00	-0.22	20.10	3	Horizontal	104	2.47	-	30.10	3.58	-	

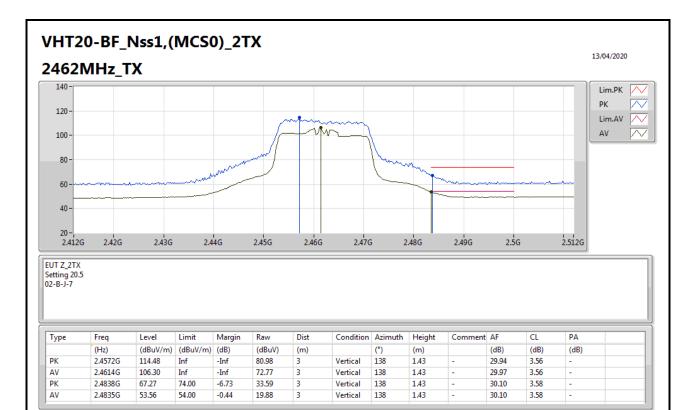




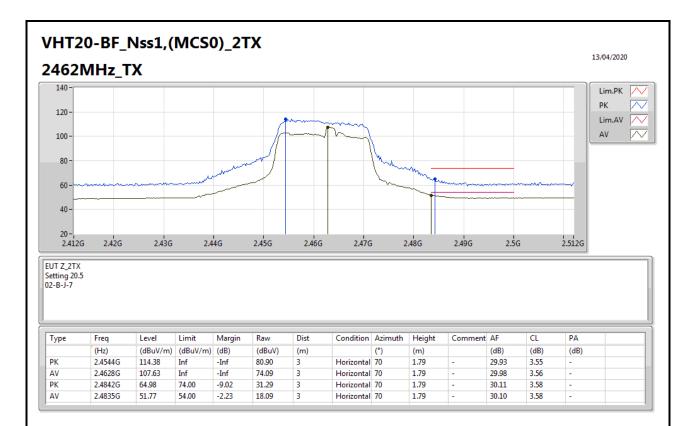




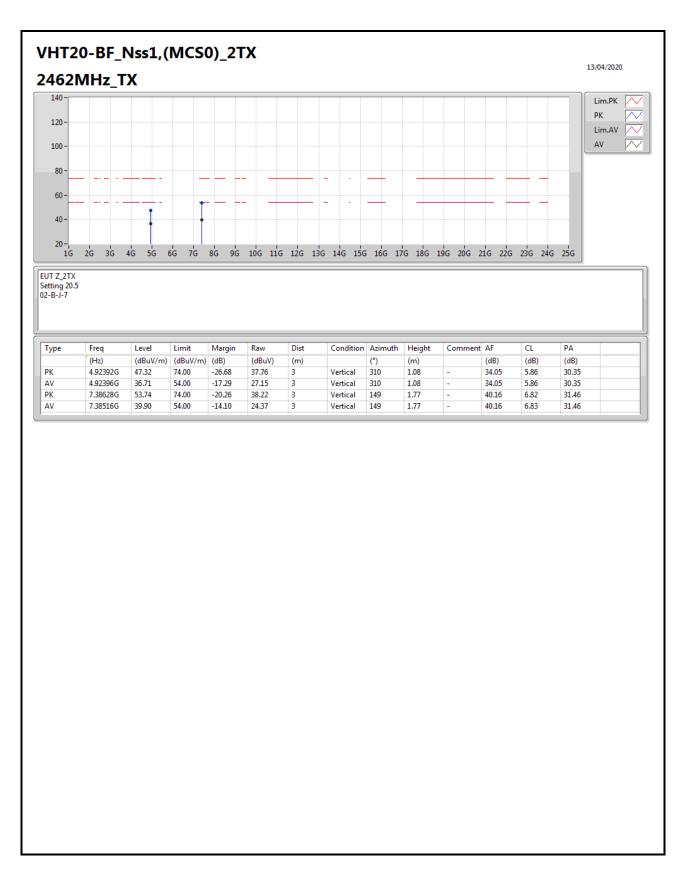




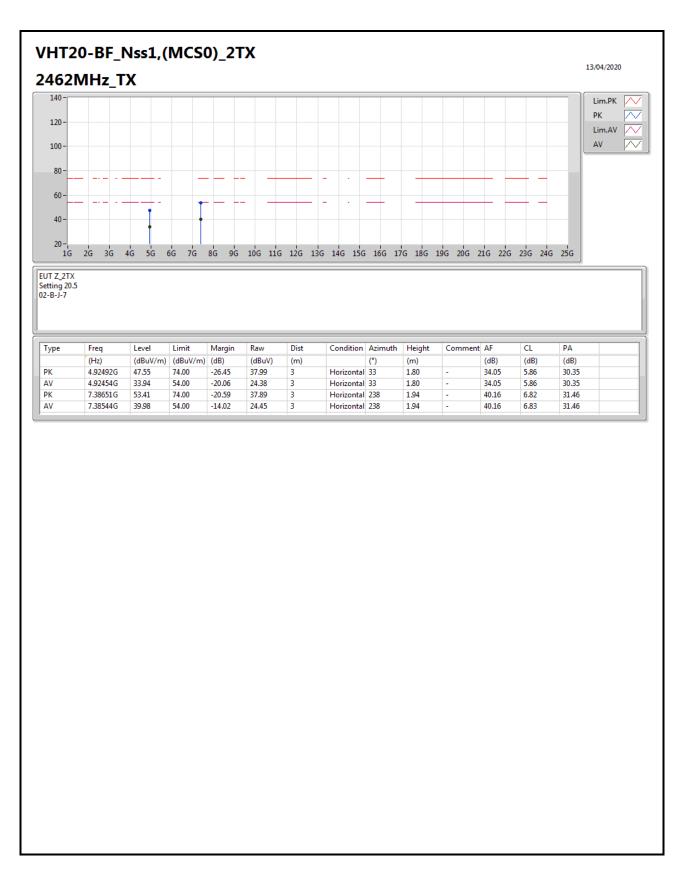




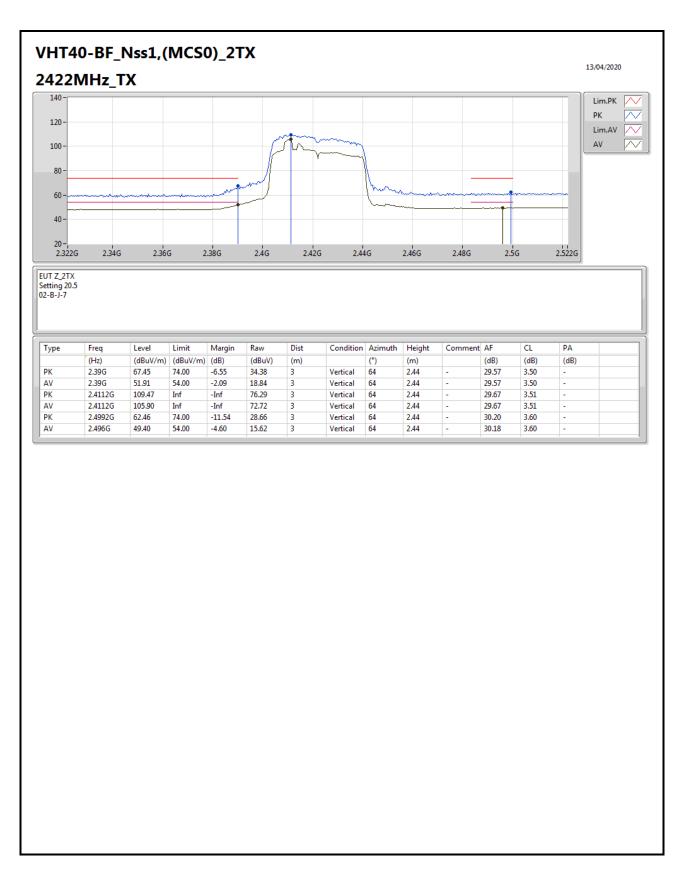




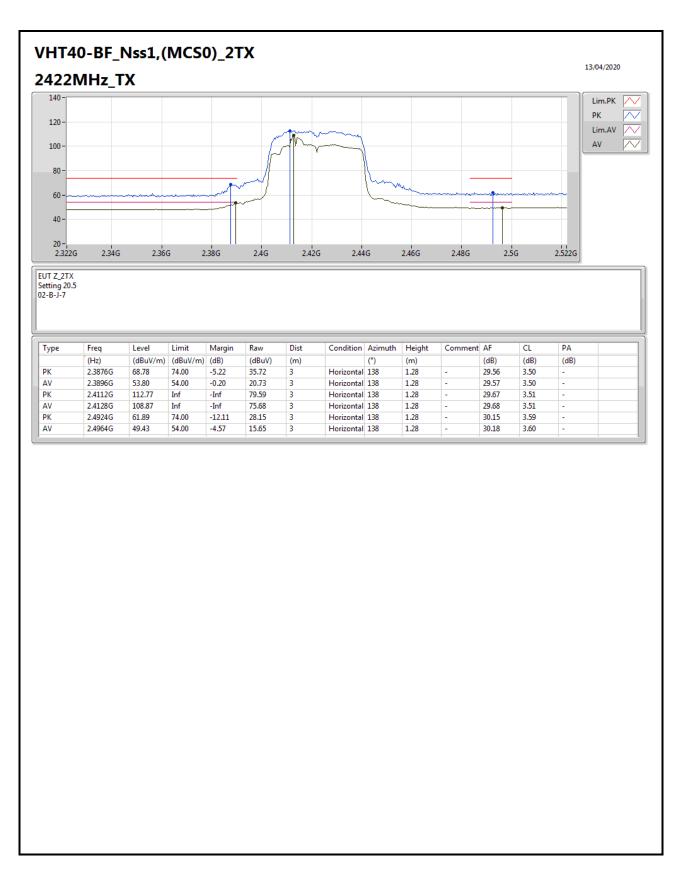




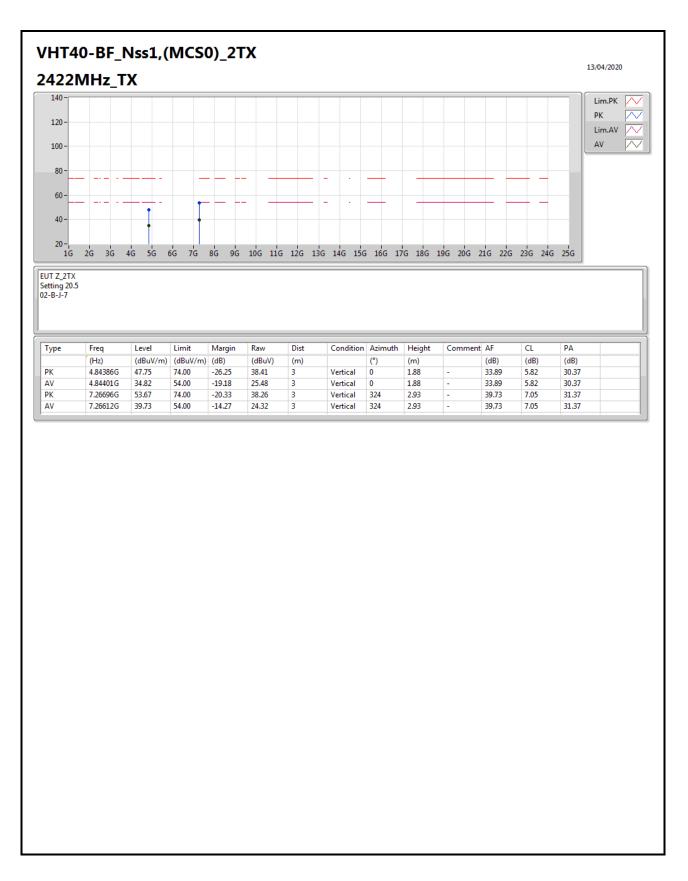




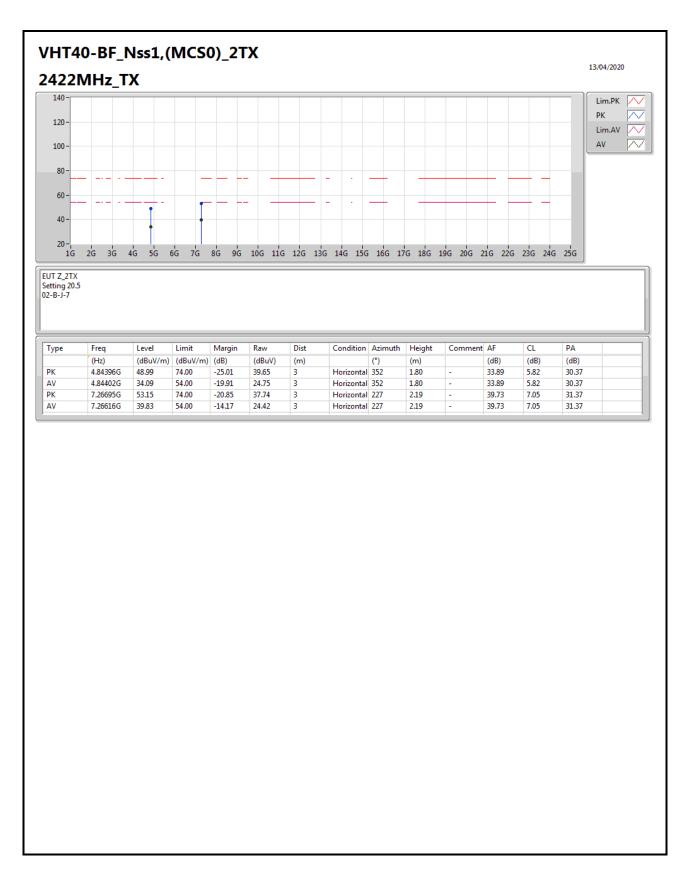




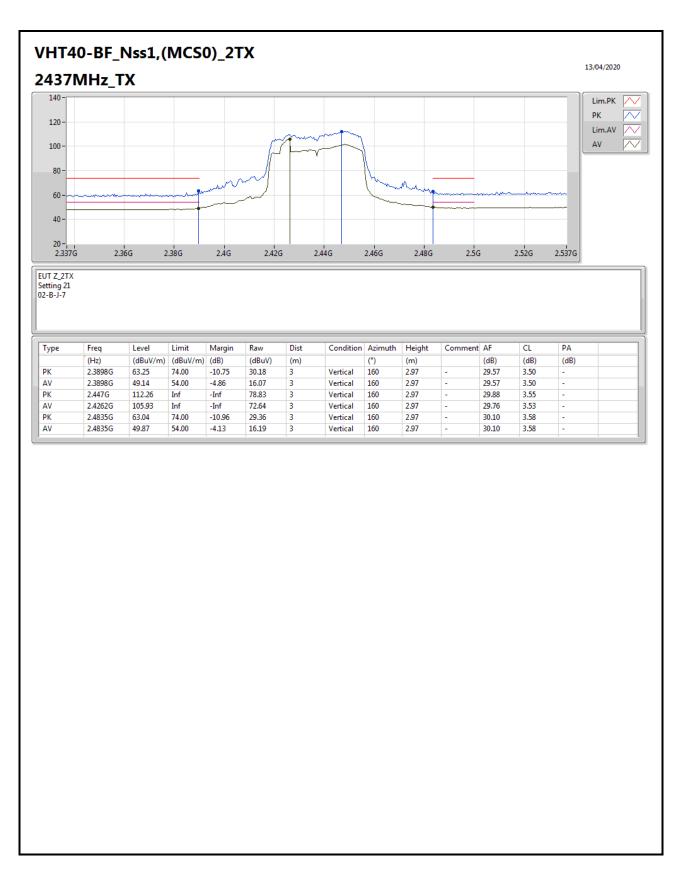




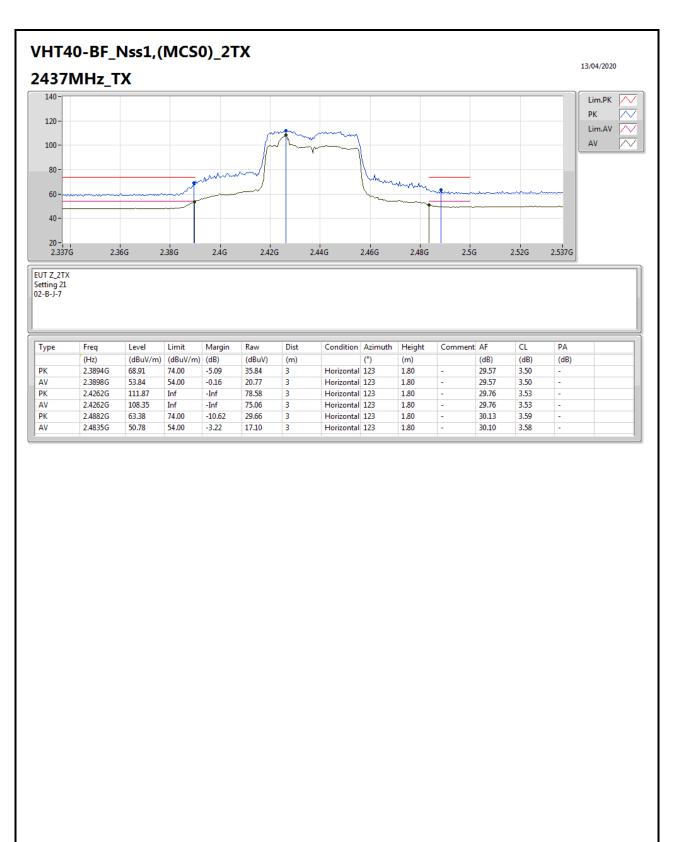




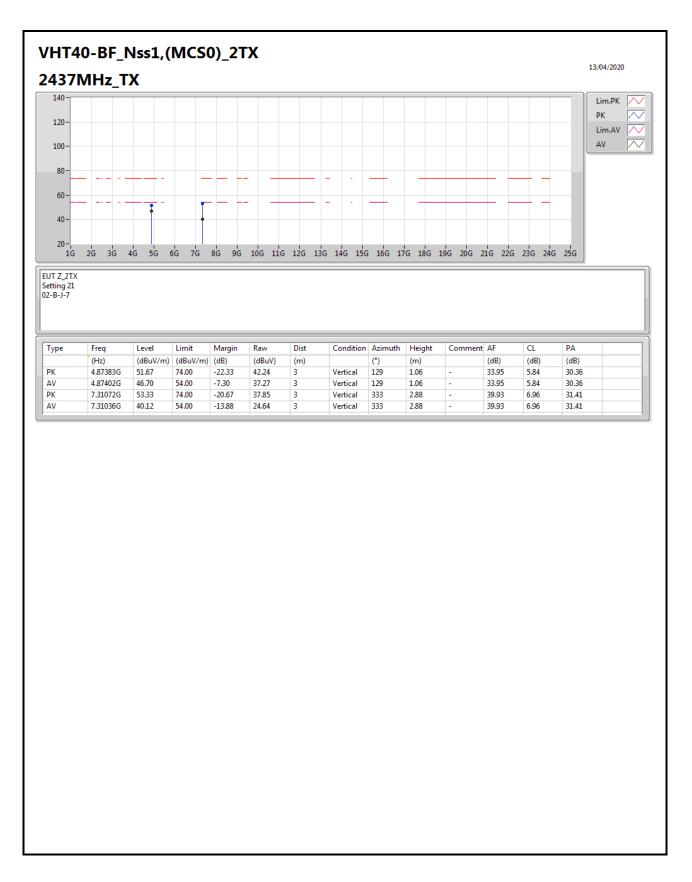




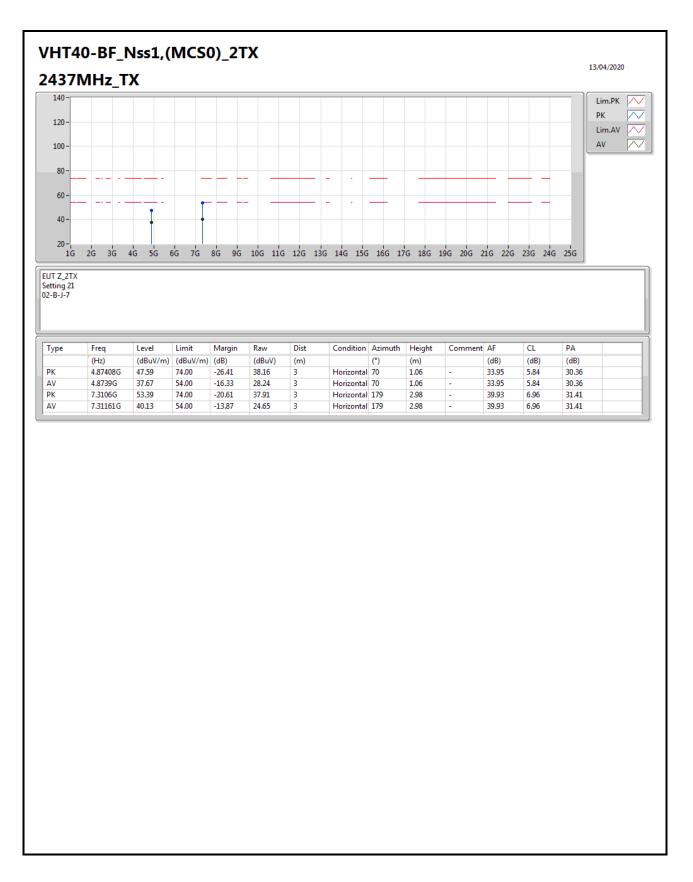




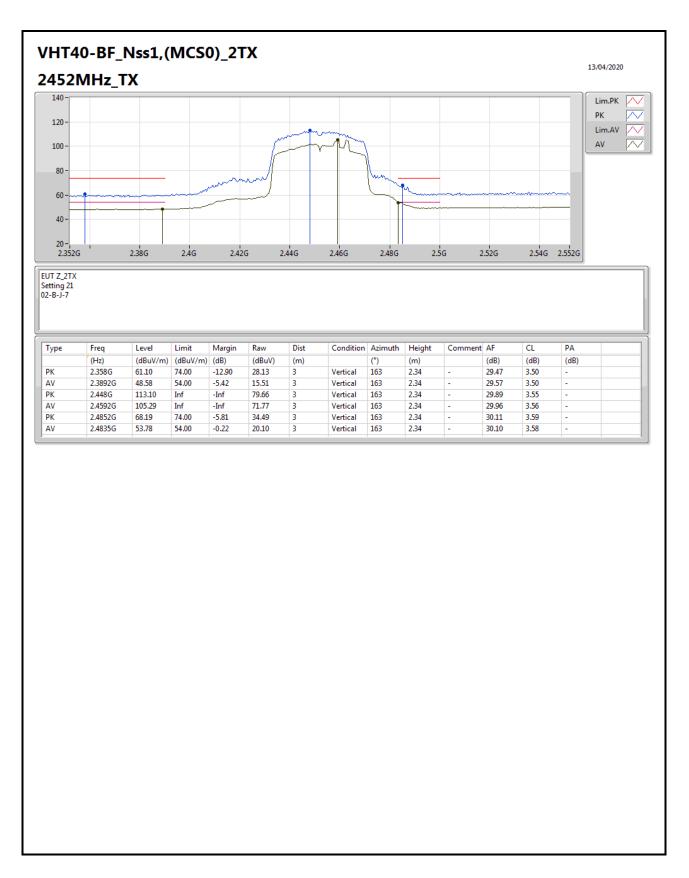




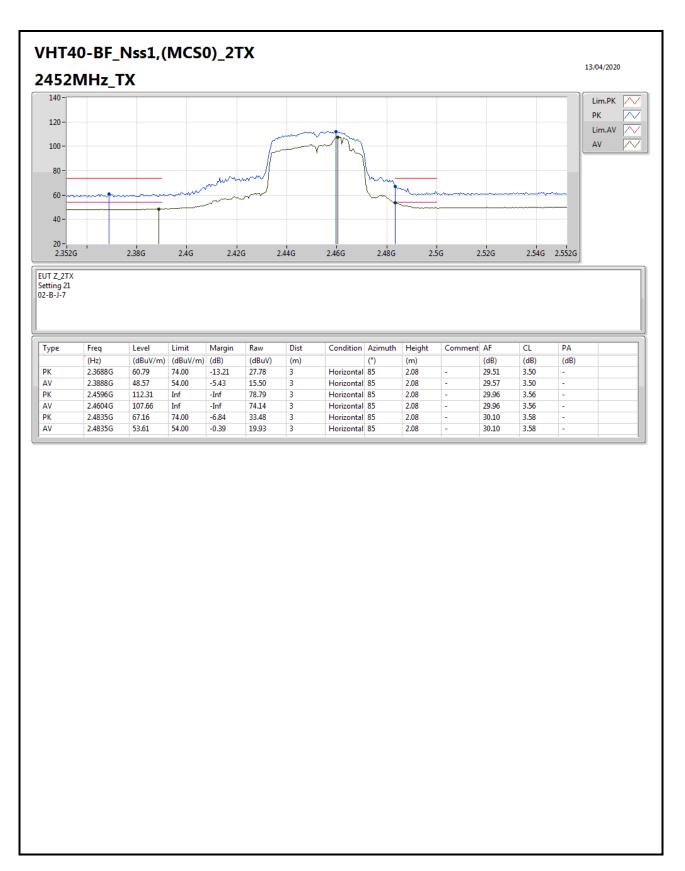




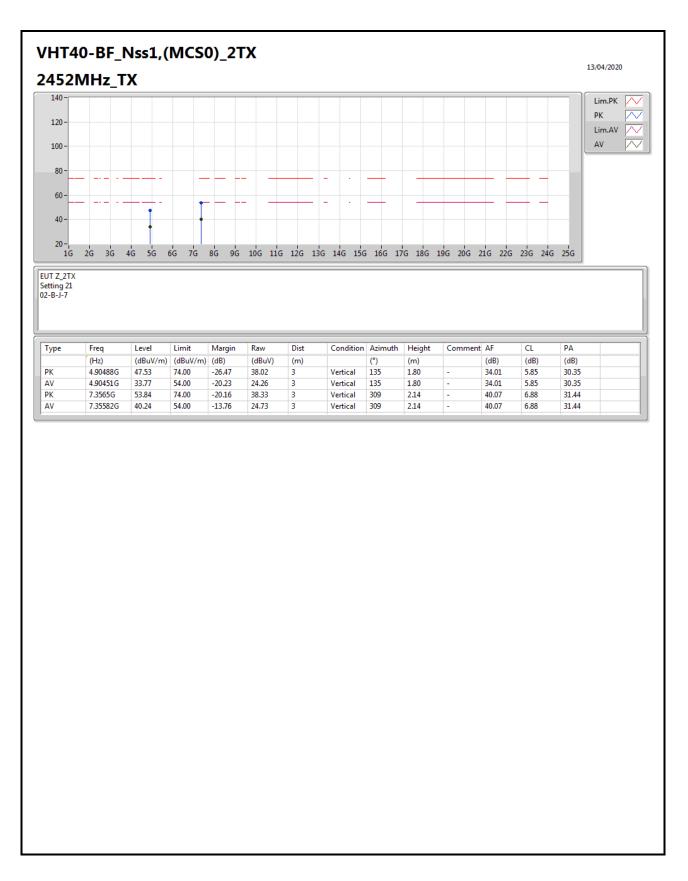




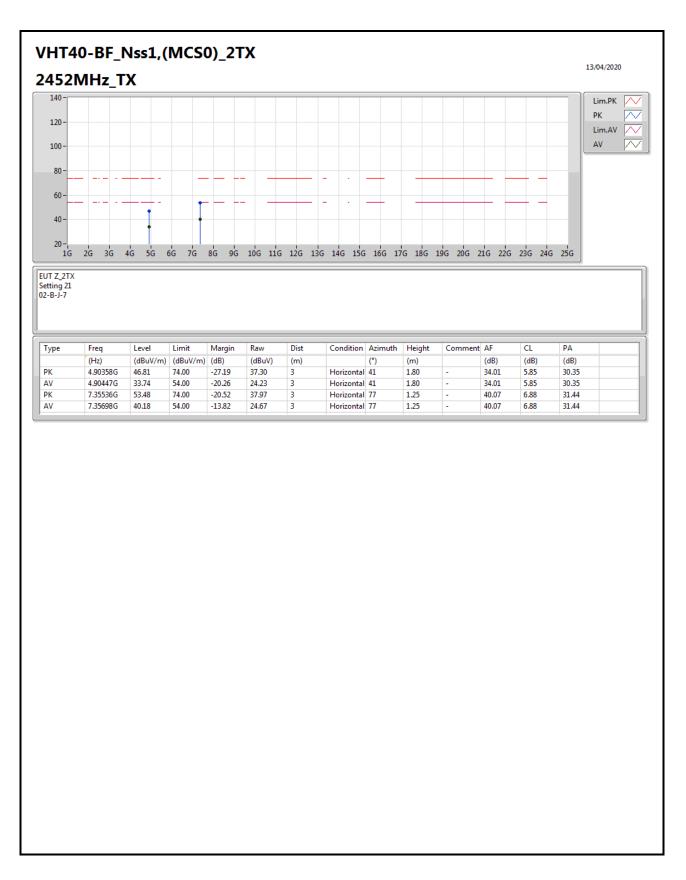














RSE Co-location Result

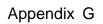
Appendix G

Summary												
	Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition				
	Mode 1	Pass	AV	1.33521G	50.00	54.00	-4.00	Vertical				



RSE Co-location Result

14/05/2020 100 Lim.PK 90 -РК \sim 80-Lim.AV 70 - \square AV 60 -50 -40-30 -20 -10-0-12G 14G 16G 18G 20G 22G 24G 26G 28G 34G 36G 1G 2G 4G 6Ġ 8Ġ 10G 30G 32G 38G 40G Туре Freq Level Limit Margin Factor Dist Condition Azimuth Height Comment Raw AF CL PA (dBuV/m) (dBuV/m) (dB) (dB) (Hz) (dBuV) (dB) (dB) (dB) (m) (°) (m) 1.03881G 37.42 PK 50.86 74.00 -23.14 -11.49 3 Vertical 213 1.50 62.35 23.68 2.25 AV 1.0384G 46.00 54.00 -8.00 -11.50 3 Vertical 213 1.50 _ 57.50 23.68 2.25 37.43 1.33518G -18.28 PK 55.72 74.00 -8.31 3 Vertical 185 1.42 64.03 25.28 2.55 36.14 1.33521G 54.00 185 1.42 "Worst" 58.31 25.28 36.14 AV 50.00 -4.00 -8.31 3 Vertical 2.55 РК 1.48352G 50.65 74.00 -23.35 -7.32 3 Vertical 152 1.00 57.97 25.60 2.68 35.60 -AV 1.48357G 43.54 54.00 -10.46 -7.32 3 Vertical 152 1.00 50.86 25.60 2.68 35.60 1.91991G 74.00 -27.23 51.74 27.00 3.08 35.05 PK 46.77 -4.97 3 Vertical 127 1.57 _ AV 1.92017G 39.23 54.00 -14.77 -4.97 3 Vertical 127 1.57 _ 44.20 27.00 3.08 35.05 РК 3.56057G 74.00 -22.25 0.72 3 213 1.00 51.03 30.62 4.22 34.12 51.75 Vertical -AV 3.56037G 47.23 54.00 -6.77 0.72 3 Vertical 213 1.00 -46.51 30.62 4.22 34.12





RSE Co-location Result

14/05/2020 100 Lim.PK 90 -РК \sim 80- \sim Lim.AV 70 - \square AV 60 -50 -40-30 -20 -10-0-12G 14G 16G 18G 20G 22G 24G 26G 28G 34G 36G 1G 2G 4G 6Ġ 8Ġ 10G 30G 32G 38G 40G Туре Freq Level Limit Margin Factor Dist Condition Azimuth Height Comment Raw AF CL PA (dBuV/m) (dBuV/m) (dB) (dB) (Hz) (dB) (dB) (dB) (m) (dBuV) (°) (m) 1.03849G 37.43 PK 52.63 74.00 -21.37 -11.50 3 Horizontal 52 1.28 64.13 23.68 2.25 AV 1.03849G 47.40 54.00 -6.60 -11.50 3 Horizontal 52 1.28 58.90 23.68 2.25 37.43 1.33518G PK 54.17 74.00 -19.83 -8.31 3 Horizontal 59 1.24 62.48 25.28 2.55 36.14 1.33521G 49.63 54.00 Horizontal 59 1.24 "Worst" 57.94 25.28 36.14 AV -4.37 -8.31 3 2.55 PK 1.4836G 49.96 74.00 -24.04 -7.32 3 Horizontal 240 1.00 57.28 25.60 2.68 35.60 -AV 1.48349G 42.27 54.00 -11.73 -7.32 3 Horizontal 240 1.00 49.59 25.60 2.68 35.60 1.92005G 74.00 Horizontal 141 50.91 27.00 3.08 35.05 PK 45.94 -28.06 -4.97 3 1.00 _ AV 1.92015G 40.23 54.00 -13.77 -4.97 3 Horizontal 141 1.00 _ 45.20 27.00 3.08 35.05 РК 3.56036G 50.83 74.00 -23.17 0.72 3 Horizontal 151 1.00 50.11 30.62 4.22 34.12 -AV 3.56035G 44.54 54.00 -9.46 0.72 3 Horizontal 151 1.00 -43.82 30.62 4.22 34.12

Appendix G