



FCC RADIO TEST REPORT

FCC ID

: RAXWN8122B

Equipment

: Wi-Fi MODU

Brand Name

: Arcadyan

Model Name

: WN8122BTEAC-HF-CP

Applicant

: Arcadyan Technology Corporation

No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan

Manufacturer

: Arcadyan Technology Corporation

No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan

Standard

: 47 CFR FCC Part 15.247

The product was received on Apr. 20, 2018, and testing was started from Apr. 20, 2018 and completed on Jun. 04, 2018. 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 Shang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB Ver1.0

Page Number

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Issued Date

: Jun. 21, 2018

Report Version : 01

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Appendix H. Photographs of EUT

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Report Version : 01

History of this test report

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Report No.	Version	Description	Issued Date
FR842718AA	01	Initial issue of report	Jun. 21, 2018

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Summary of Test Result

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(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	-

Reviewed by: Sam Chen Report Producer: Viola Huang

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1 General Description

1.1 Information

1.1.1 RF General Information

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

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Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	2.4-2.4835GHz 802.11b		2TX
2.4-2.4835GHz	802.11g	20	2TX
2.4-2.4835GHz 802.11n HT20		20	2TX
2.4-2.4835GHz	2.4-2.4835GHz 802.11n HT40		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.
- 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.
- HT20 and HT40 support MCS8~15 only.

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1.1.2 Antenna Information

				Antenna	Antonno		Gain (dBi)			
Ant.	Port	Brand	P/N	Type	Connector	WLAN 2.4GHz	WLAN 5GHz	ВТ	Remark	
1	1	arcadyan	-	Printed Antenna	N/A	3.5	4.7	-	Internal	
2	2	arcadyan	-	Printed Antenna	N/A	0.8	3.8	-	antenna	
3	1	arcadyan	120800060900J	PIFA Antenna	I-PEX	0.1	3.16	-		
4	2	arcadyan	120800060400J	PIFA Antenna	I-PEX	-0.7	3.25	-	External antenna	
5	1	arcadyan	120800060300J	PIFA Antenna	I-PEX	-	-	2.04	antenna	

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Note: The EUT has five antennas.

For 2.4GHz function:

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

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

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

Port 1 and Port 2 could transmit/receive simultaneously.

For Bluetooth function:

For Bluetooth mode (1TX/1RX)

Port 1 can be used as transmitting/receiving antenna.

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1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11g	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11n HT20	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11n HT40	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)

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1.1.4 EUT Operational Condition

EUT Power Type	Fro	From host system			
Beamforming Function	☐ With beamforming ☐ Without beamforming		Without beamforming		
Function				Point-to-point	
Test Software Version	QA Tool_Dbg Version:0.0.1.85				

1.1.5 Table for Multiple Listing

Brand Name	Model Name	EUT No.	Description
Aroodyon	WN8122BTEAC-HF-CP	EUT 1	The EUT equips internal antenna for WLAN function.
Arcadyan		EUT 2	The EUT equips external antenna for WLAN function.

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1.2 Testing Applied Standards

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

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- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 558074 D01 v04
- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01

1.3 Testing Location Information

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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-CB	Brian Sun & Serway Li & Owen Hsu	22°C / 52%	May 09, 2018~May 10, 2018
Radiated (Below 1GHz)	03CH01-CB	Cola Fan & Eddie Weng & Mason Chen & Stim Sung	25°C / 56%	May 30, 2018
Radiated (Above 1GHz)	03CH01-CB	Cola Fan & Eddie Weng & Mason Chen & Stim Sung	25°C / 56%	Apr. 20, 2018~May 30, 2018
AC Conduction	CO02-CB	Tony Chang	23°C / 60%	Jun. 04, 2018

Test site Designation No. TW0006 with FCC.

1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Power Density Measurement	1.27 dB	Confidence levels of 95%
Bandwidth Measurement	9.74 x10 ⁻⁸	Confidence levels of 95%

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Test site registered number IC 4086D with Industry Canada.

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	PowerSetting
802.11b_Nss1,(1Mbps)_2TX	-
2412MHz	1F-C6
2437MHz	1F-C6
2462MHz	1F-C6
802.11g_Nss1,(6Mbps)_2TX	-
2412MHz	1F-C2
2437MHz	1F-C2
2462MHz	1F-C2
802.11n HT20_Nss2,(MCS8)_2TX	-
2412MHz	1F
2437MHz	1F
2462MHz	1F
802.11n HT40_Nss2,(MCS8)_2TX	-
2422MHz	1F-84
2437MHz	1F-84
2452MHz	1F-84

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Note: Because the low channel and high channel output power is lower than the middle channel, so Band edges emission and output power of other channels are not evaluated.

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2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item	AC power-line conducted emissions	
Condition	Condition AC power-line conducted measurement for line and neutral	
Operating Mode	Normal Link	
1	EUT 1: 2.4GHz + Bluetooth	
2	EUT 1: 5GHz + Bluetooth	
3	EUT 2: 2.4GHz + Bluetooth	
4	EUT 2: 5GHz + Bluetooth	
For operating mode 1 is the worst case and it was record in this test report.		

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Th	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	
Operating Mode	СТХ	
1	EUT 1	

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Th	e 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 EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
1	EUT 1 in Z axis: 2.4GHz + Bluetooth
2	EUT 1 in Z axis: 5GHz + Bluetooth
3	EUT 2 in Z axis: 2.4GHz + Bluetooth
4	EUT 2 in Z axis: 5GHz + Bluetooth
For operating mode 3 is the worst case and it was record in this test report.	
	CTX
Operating Mode > 1GHz	The EUT was performed at X axis, Y axis and Z axis position for Emissions in Restricted Frequency Bands, and the worst case was found at Y axis. So the measurement will follow this same test configuration.
1	EUT 1 in Y axis
2	EUT 2 in Y axis

The Worst Case Mode for Following Conformance Tests		
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation	
Operating Mode		
1	EUT 1: 2.4GHz + Bluetooth	
2	EUT 1: 5GHz + Bluetooth	
3	EUT 2: 2.4GHz + Bluetooth	
4	EUT 2: 5GHz + Bluetooth	
Refer to Sporton Test Report No.: FA842718 for Co-location RF Exposure Evaluation.		

Note: For conducted test, only the highest antenna gain (EUT 1) was tested and recorded in the test report.

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

N/A

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2.5 Support Equipment

For Test Site No: CO01-CB

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
1	NB	DELL	E6430	N/A	
2	NB	ASUS	PRO88Q	N/A	
3	AP Router	ASUS	RP-N53	MSQ-RPN53	
4	iPhone 4	Apple	A1332	BCG-E2380A	
5	Earphone	SHYARO CHI	MIC-04	N/A	
6	Mouse	Logitech	M-U0026	N/A	

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

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
1	NB	DELL	E4300	N/A	
2	NB	ASUS	PRO88Q	N/A	
3	WLAN AP	D-LINK	DIR860L	KA2IR860LA1	
4	iPhone 4	Apple	A1332	BCG-E2380A	
5	Earphone	SHYARO CHI	MIC-04	N/A	
6	Mouse	Logitech	M-U0026	N/A	

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

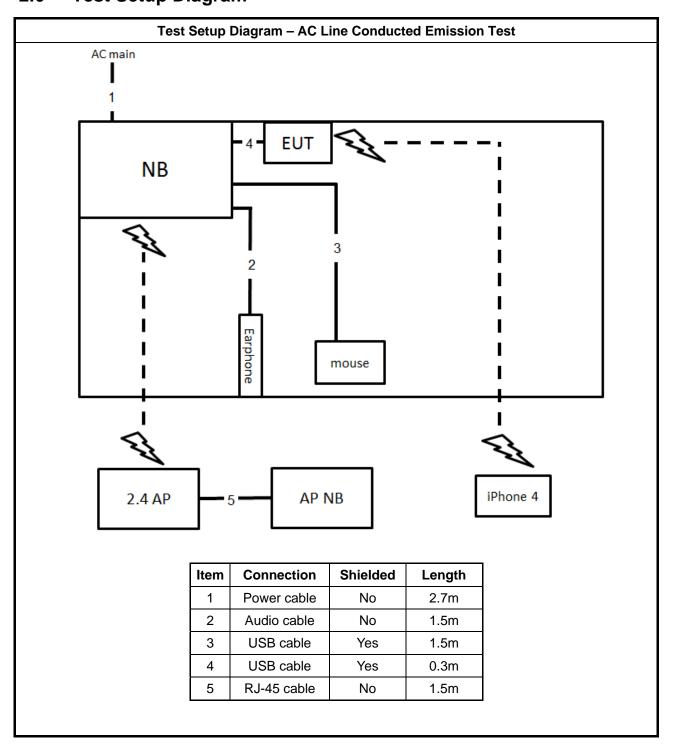
	COL CITO HOL COCHICL CD	(asere reria)		
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	NB	DELL	E4300	N/A

For Test Site No: TH01-CB

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

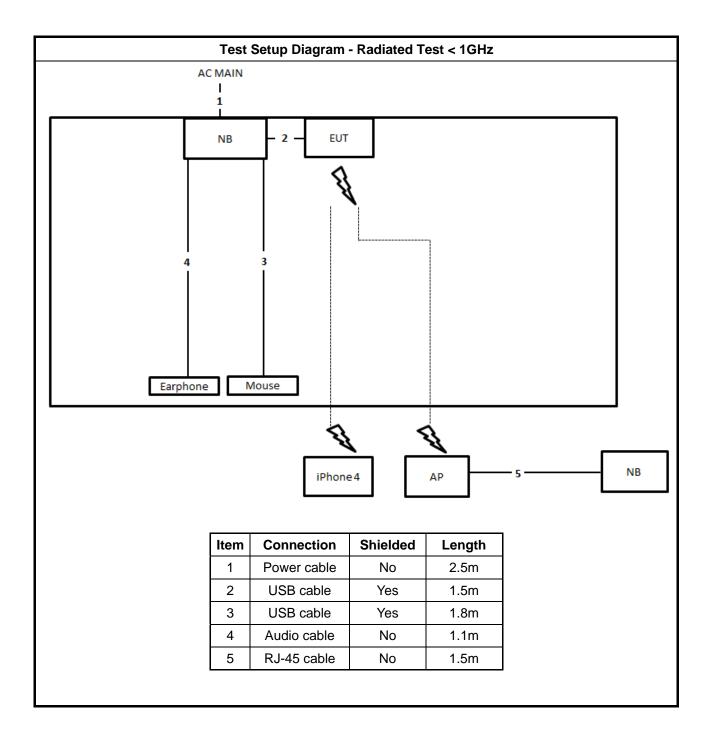
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2.6 Test Setup Diagram

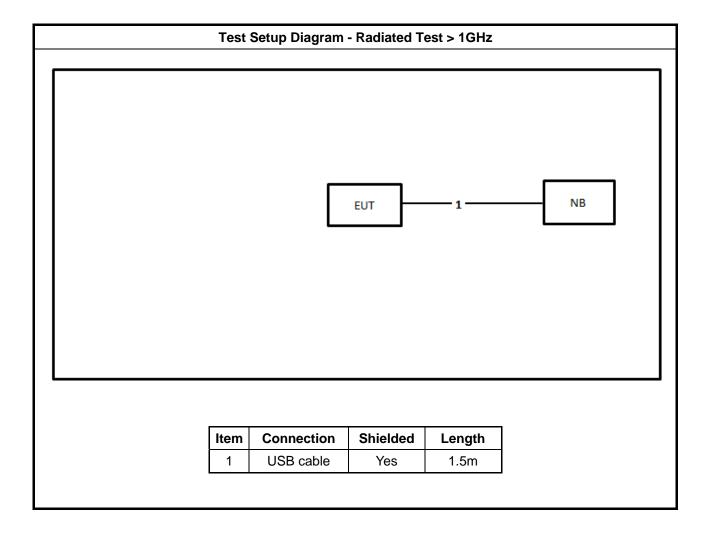


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3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

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

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3.1.2 Measuring Instruments

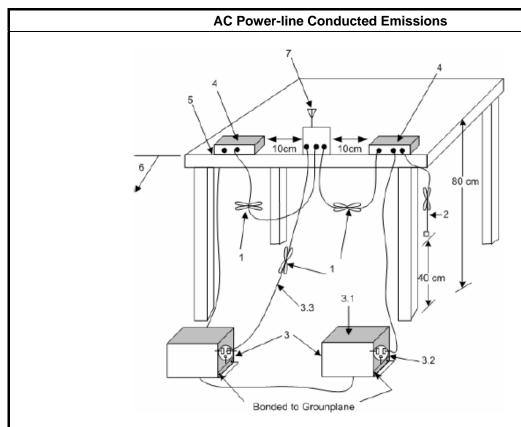
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

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3.1.4 Test Setup



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

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

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

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3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

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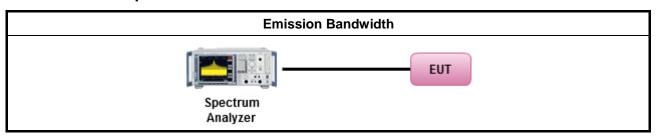
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

	Test Method						
•	For the emission bandwidth shall be measured using one of the options below:						
	Refer as FCC KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.						
	Refer as FCC KDB 558074, clause 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

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3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit

- If G_{TX} ≤ 6 dBi, then P_{Out} ≤ 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

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 \mathbf{P}_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, \mathbf{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.

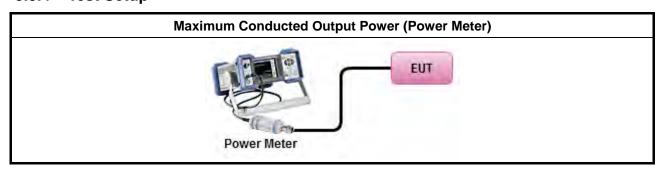
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3.3.3 Test Procedures

	Test Method	
•	Maximum Peak Conducted Output Power	
	Refer as FCC KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).	
	☐ Refer as FCC KDB 558074, clause 9.1.3 (peak power meter for VBW ≥ DTS BW)	
•	Maximum Conducted Output Power	
	[duty cycle ≥ 98% or external video / power trigger]	
	Refer as FCC KDB 558074, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging	g).
	Refer as FCC KDB 558074, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)	
	duty cycle < 98% and average over on/off periods with duty factor	
	Refer as FCC KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging	g).
	Refer as FCC KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)	
	Measurement using a power meter (PM)	
	Refer as FCC KDB 558074, clause 9.2.3 Method AVGPM (using an RF average power	er meter).
	Refer as FCC KDB 558074, clause 9.2.3.2 Method AVGPM-G (using an gate RF av meter).	erage power
•	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 meas approach, measured all transmit ports individually. Sum the power (in linear power un of all ports for each individual sample and save them.	
	■ If multiple transmit chains, EIRP calculation could be following as methods: P _{total} = P ₁ + P ₂ + + P _n (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP _{total} = P _{total} + DG	

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3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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3.4 **Power Spectral Density**

3.4.1 **Power Spectral Density Limit**

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

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Measuring Instruments

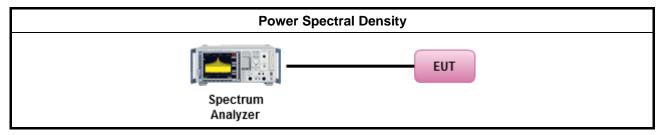
Refer a test equipment and calibration data table in this test report.

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 10.2 Method PKPSD (RBW=3-	100kHz; Detector=peak).							
	[duty cycle ≥ 98% or external video / power trigger]								
	Refer as FCC KDB 558074, clause 10.3 Method AVGPSD-1 (spect	ral trace averaging).							
	Refer as FCC KDB 558074, clause 10.4 Method AVGPSD-2 (slow	sweep speed)							
	duty cycle < 98% and average over on/off periods with duty factor								
	Refer as FCC KDB 558074, clause 10.5 Method AVGPSD-1 Alt (sp	ectral trace averaging).							
	Refer as FCC KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (sl	ow sweep speed)							
•	For conducted measurement.								
	If The EUT supports multiple transmit chains using options given be	elow:							
	Option 1: Measure and sum the spectra across the outputs In-band power spectral density (PSD). Sample all transmit spectrum analyzer for each transmit port. Where the trace be summing can be performed. (i.e., in the first spectral bin of out first spectral bin of output 2 and that from the first spectral bin NTX output to obtain the value for the first frequency bin of the amplitude (power) values for the different transmit chains trace.	ports simultaneously using a sin-by-bin of each transmit port put 1 is summed with that in the of output 3, and so on up to the ne summed spectrum.). Add up							
	Option 2: Measure and sum spectral maxima across the output are measured at each output of the device at the requiremaximum value (peak) of each spectrum is determined. The summed mathematically in linear power units across the output performed separately over frequency spans that have differentiations.	red resolution bandwidth. The ese maximum values are then buts. These operations shall be							
	Option 3: Measure and add 10 log(N) dB, where N is the num FCC KDB 662911, In-band power spectral density (PSD). Per and each transmit chains shall be compared with the limit hav Or each transmit chains shall be add 10 log(N) to compared w	formed at each transmit chains been reduced with 10 log(N).							

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3.4.4 Test Setup



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3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

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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 (dB)			
Peak output power procedure	20			
Average output power procedure	30			

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- 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.

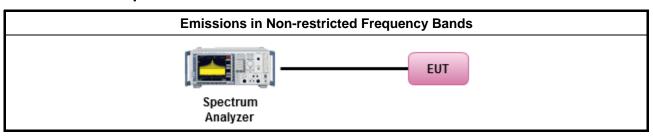
3.5.2 Measuring Instruments

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 11 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

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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				

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

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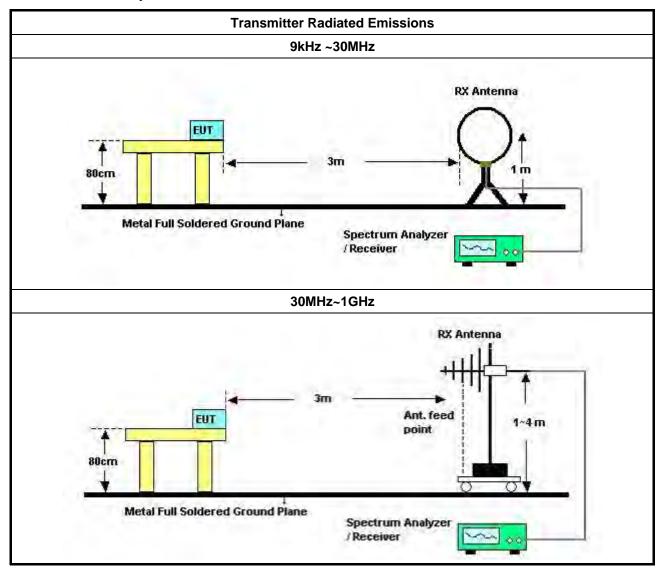
3.6.3 Test Procedures

	Test Method							
•	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].							
•	Refer as ANSI C63.10, clause 6.9.2.2 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 12 for unwanted emissions into restricted bands. 							
	Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)							
	Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).							
	Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).							
	☐ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.							
	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.							
	Refer as FCC KDB 558074, clause 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 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 13.2 (ANSI C63.10, clause 6.9.3) for marker-delta method fo band-edge measurements. 							
	 Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz). 							
•	For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 12.2.2.							
	 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.							

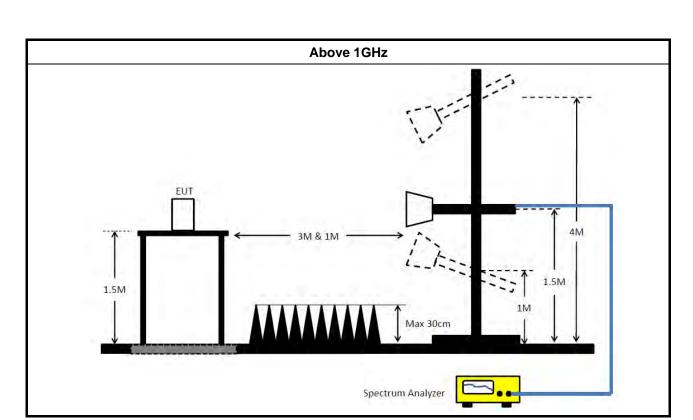
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3.6.4 Test Setup



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3.6.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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

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.

3.6.6 Test Result of Transmitter Radiated Unwanted Emissions

Refer as Appendix F

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4 Test Equipment and Calibration Data

Instrument	Instrument Manufacturer Model No. Serial No.		Characteristics	Calibration Date	Calibration Due Date	Remark	
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 24, 2017	Nov. 23, 2018	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 13, 2017	Nov. 12, 2018	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Jan. 17, 2018	Jan. 16, 2019	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz~30MHz	Nov. 10, 2017	Nov. 09, 2018	Conduction (CO02-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2017	Aug. 29, 2018	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2018	Mar. 15, 2019	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2018	May 01, 2019	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 09, 2018	Jan. 08, 2019	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Jul. 09, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	R&S	R&S ESCS 100354		9kHz ~ 2.75GHz	Dec. 08, 2017	Dec. 07, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)

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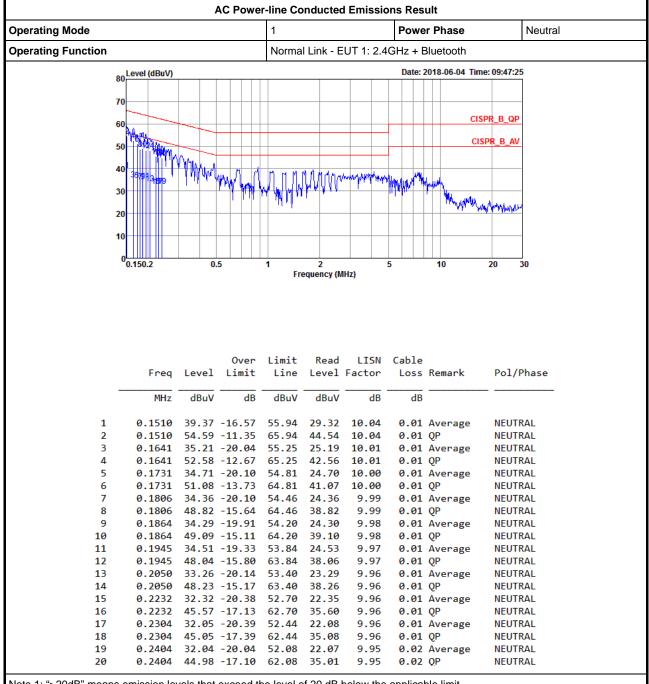
Instrument Manufactu		Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 21, 2017	Dec. 20, 2018	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz –26.5 GHz	Oct. 11, 2017	Oct. 10, 2018	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 11, 2017	Oct. 10, 2018	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 11, 2017	Oct. 10, 2018	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 11, 2017	Oct. 10, 2018	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 11, 2017	Oct. 10, 2018	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 20, 2017	Nov. 19, 2018	Conducted (TH01-CB)

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

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

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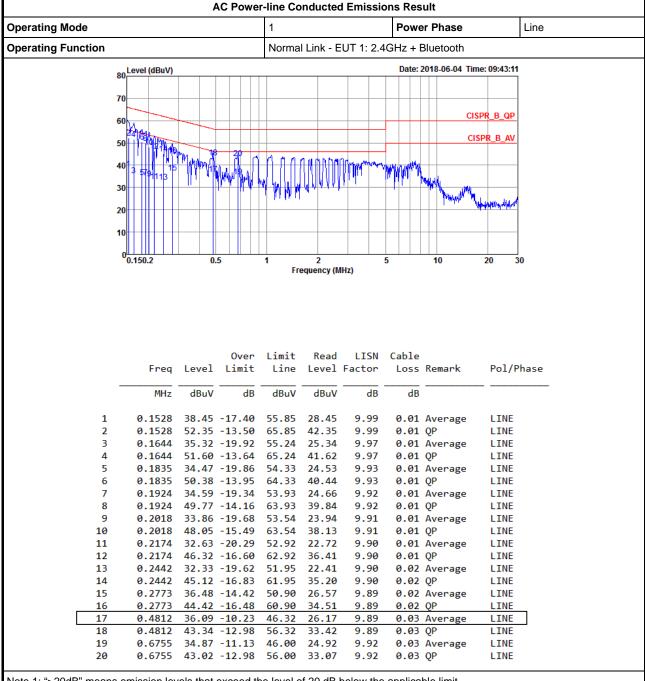




Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

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

AC Power-line Conducted Emissions Result



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

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



EBW Result Appendix B

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(MHz)	(MHz)		(MHz)	(MHz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	9.025M	13.868M	13M9G1D	8M	13.343M
802.11g_Nss1,(6Mbps)_2TX	16.325M	16.417M	16M4D1D	16.025M	16.367M
802.11n HT20_Nss2,(MCS8)_2TX	17.575M	17.566M	17M6D1D	16.9M	17.541M
802.11n HT40_Nss2,(MCS8)_2TX	36.35M	36.082M	36M1D1D	35.65M	35.932M

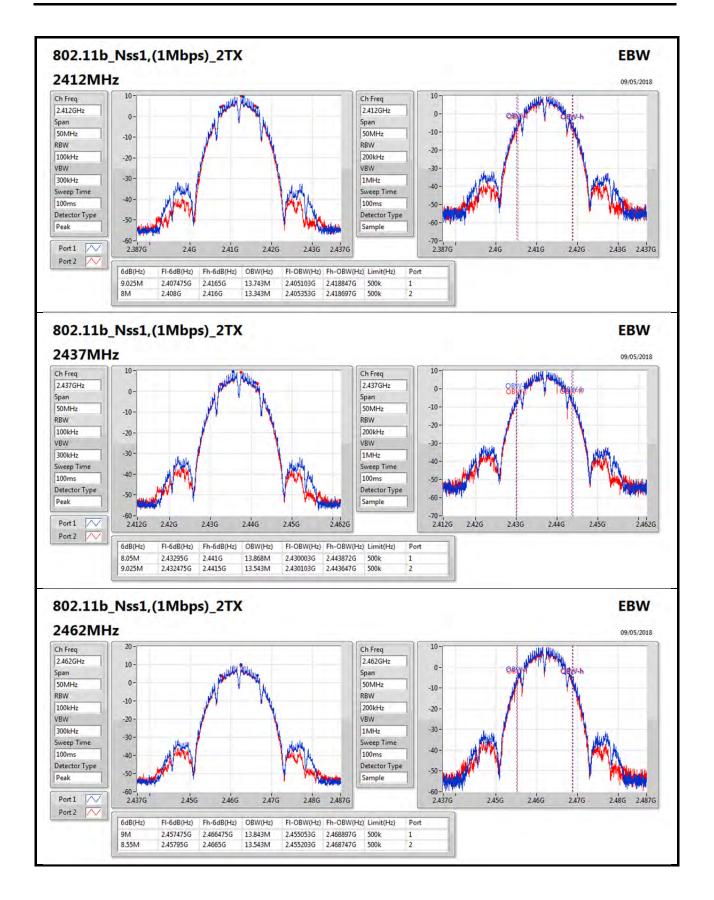
Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth; **Min-N dB** = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

Result

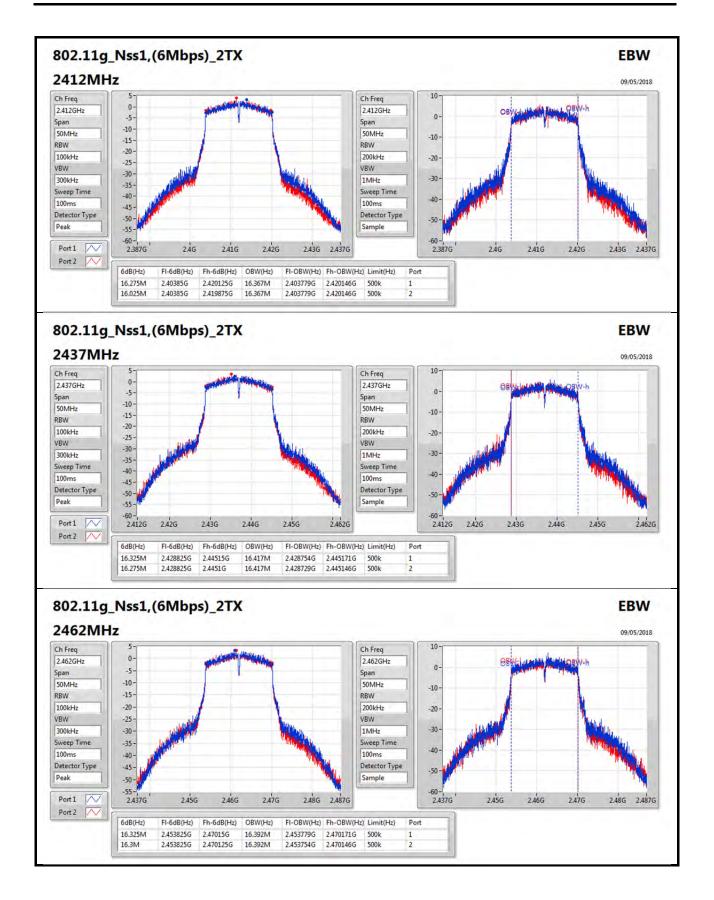
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW
		(MHz)	(MHz)	(MHz)	(MHz)	(MHz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	9.025M	13.743M	8M	13.343M
2437MHz	Pass	500k	8.05M	13.868M	9.025M	13.543M
2462MHz	Pass	500k	9M	13.843M	8.55M	13.543M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	16.275M	16.367M	16.025M	16.367M
2437MHz	Pass	500k	16.325M	16.417M	16.275M	16.417M
2462MHz	Pass	500k	16.325M	16.392M	16.3M	16.392M
802.11n HT20_Nss2,(MCS8)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	17.55M	17.541M	16.9M	17.541M
2437MHz	Pass	500k	17.5M	17.541M	17.55M	17.541M
2462MHz	Pass	500k	17.575M	17.566M	17.525M	17.566M
802.11n HT40_Nss2,(MCS8)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	36.25M	35.982M	35.65M	35.932M
2437MHz	Pass	500k	36.35M	35.982M	36.25M	36.032M
2452MHz	Pass	500k	36.35M	36.082M	36.35M	36.082M

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

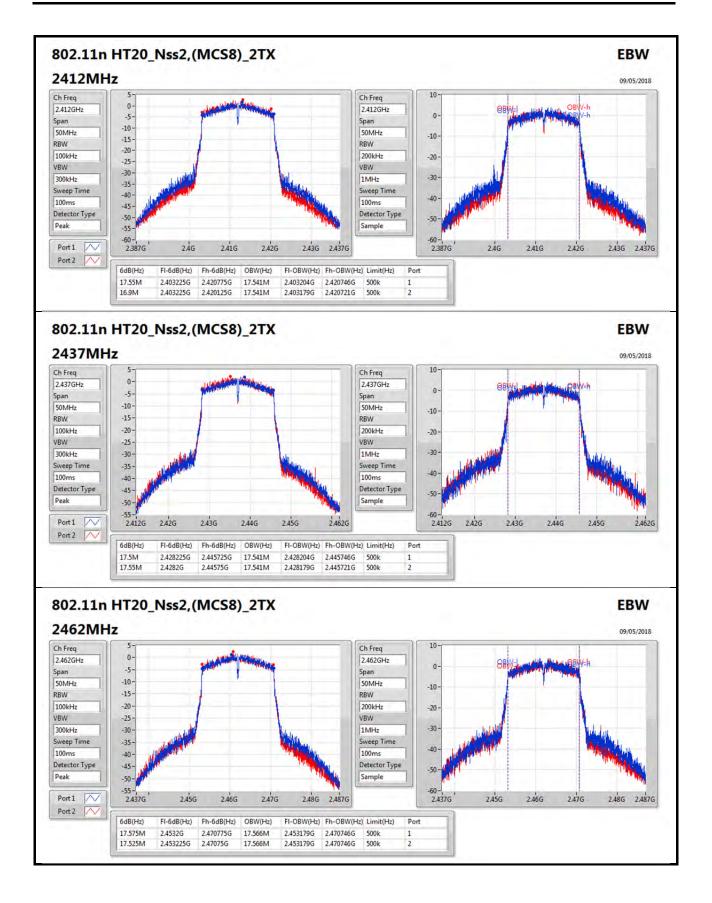




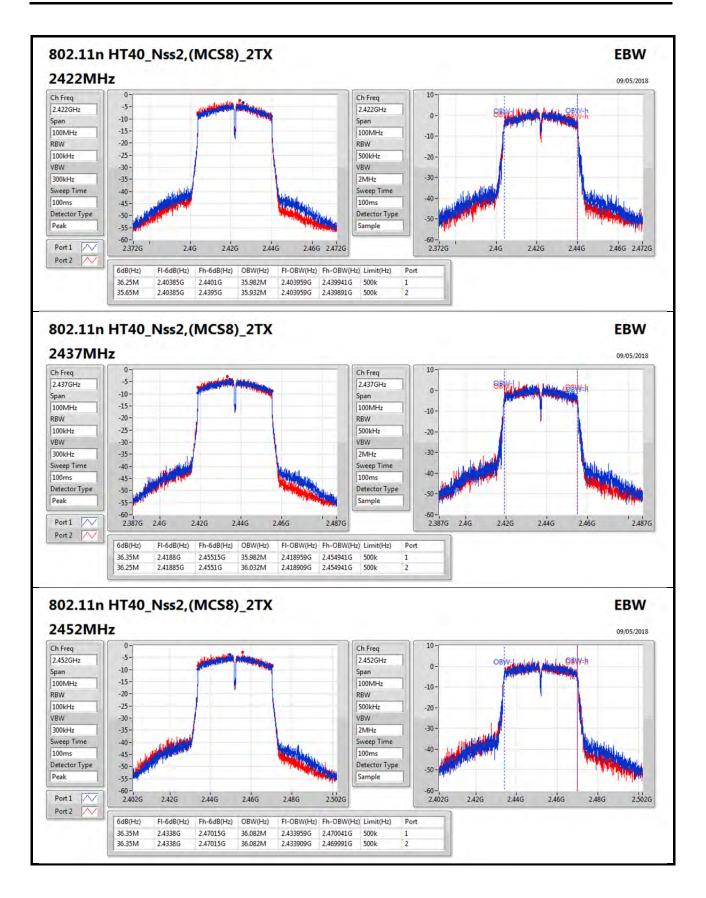












AV Power Result Appendix C

Summary

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	21.61	0.14488
802.11g_Nss1,(6Mbps)_2TX	19.52	0.08954
802.11n HT20_Nss2,(MCS8)_2TX	18.47	0.07031
802.11n HT40_Nss2,(MCS8)_2TX	16.42	0.04385

Result

Mode	Result	DG	Port 1	Port 2	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	3.50	18.6	18.57	21.60	30.00
2437MHz	Pass	3.50	18.67	18.53	21.61	30.00
2462MHz	Pass	3.50	18.72	18.39	21.57	30.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	3.50	16.41	16.45	19.44	30.00
2437MHz	Pass	3.50	16.57	16.44	19.52	30.00
2462MHz	Pass	3.50	16.56	16.28	19.43	30.00
802.11n HT20_Nss2,(MCS8)_2TX	-	-	-	-	-	-
2412MHz	Pass	3.50	15.42	15.45	18.45	30.00
2437MHz	Pass	3.50	15.41	15.51	18.47	30.00
2462MHz	Pass	3.50	15.53	15.29	18.42	30.00
802.11n HT40_Nss2,(MCS8)_2TX	-	-	-	-	-	-
2422MHz	Pass	3.50	13.35	13.41	16.39	30.00
2437MHz	Pass	3.50	13.48	13.33	16.42	30.00
2452MHz	Pass	3.50	13.39	13.27	16.34	30.00

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



PSD Result Appendix D

Summary

Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	-2.91
802.11g_Nss1,(6Mbps)_2TX	-6.99
802.11n HT20_Nss2,(MCS8)_2TX	-7.98
802.11n HT40_Nss2,(MCS8)_2TX	-13.38

RBW=3kHz.

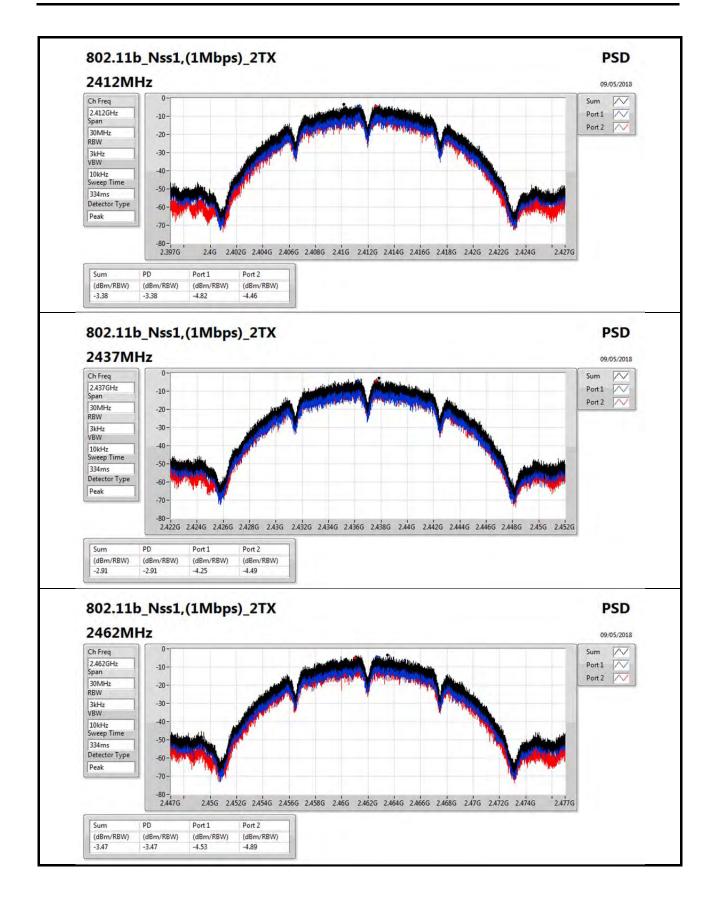
Result

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	5.26	-4.82	-4.46	-3.38	8.00
2437MHz	Pass	5.26	-4.25	-4.49	-2.91	8.00
2462MHz	Pass	5.26	-4.53	-4.89	-3.47	8.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.26	-9.17	-8.94	-7.07	8.00
2437MHz	Pass	5.26	-8.15	-9.07	-6.99	8.00
2462MHz	Pass	5.26	-8.62	-9.07	-7.21	8.00
802.11n HT20_Nss2,(MCS8)_2TX	-	-	-	-	-	-
2412MHz	Pass	2.36	-10.63	-9.79	-8.02	8.00
2437MHz	Pass	2.36	-10.08	-9.86	-7.98	8.00
2462MHz	Pass	2.36	-10.16	-10.69	-8.32	8.00
802.11n HT40_Nss2,(MCS8)_2TX	-	-	-	-	-	-
2422MHz	Pass	2.36	-15.27	-15.52	-14.11	8.00
2437MHz	Pass	2.36	-14.3	-14.44	-13.38	8.00
2452MHz	Pass	2.36	-16.32	-15.45	-14.27	8.00

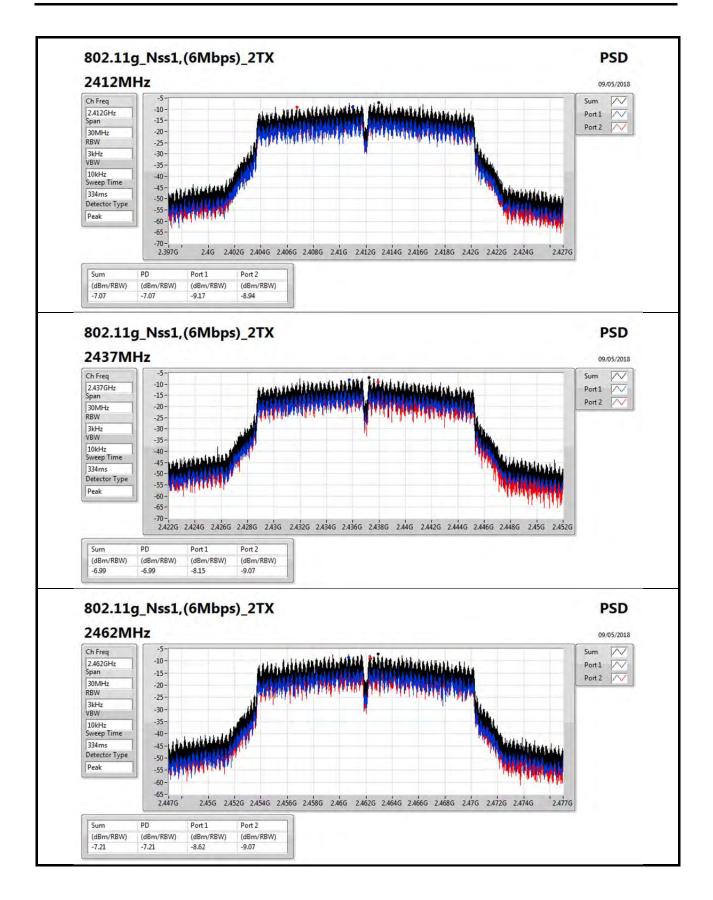
DG = Directional Gain; RBW=3kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port Xpower density;

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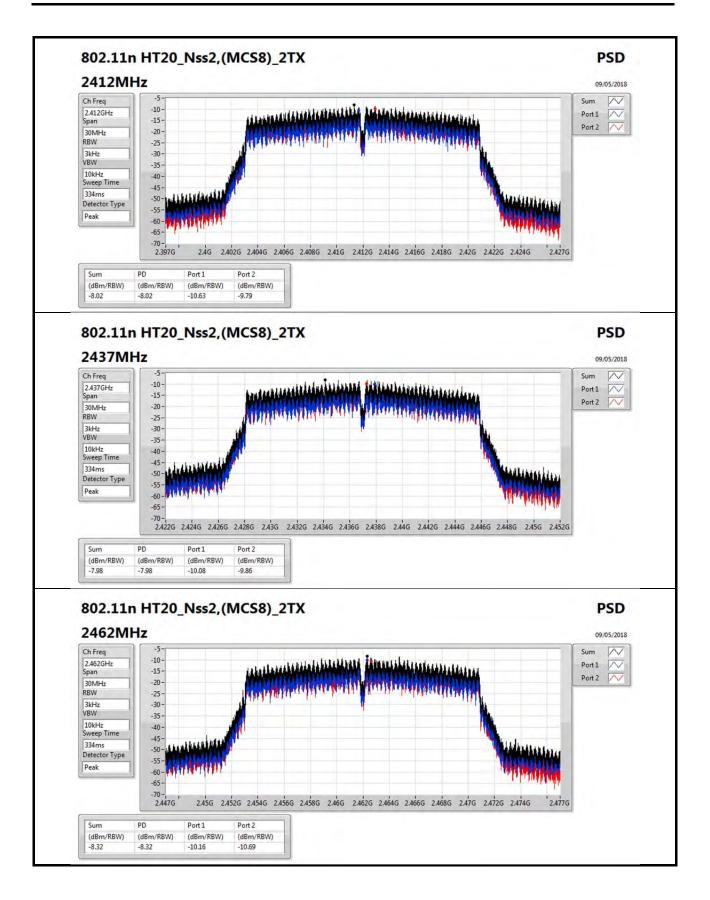






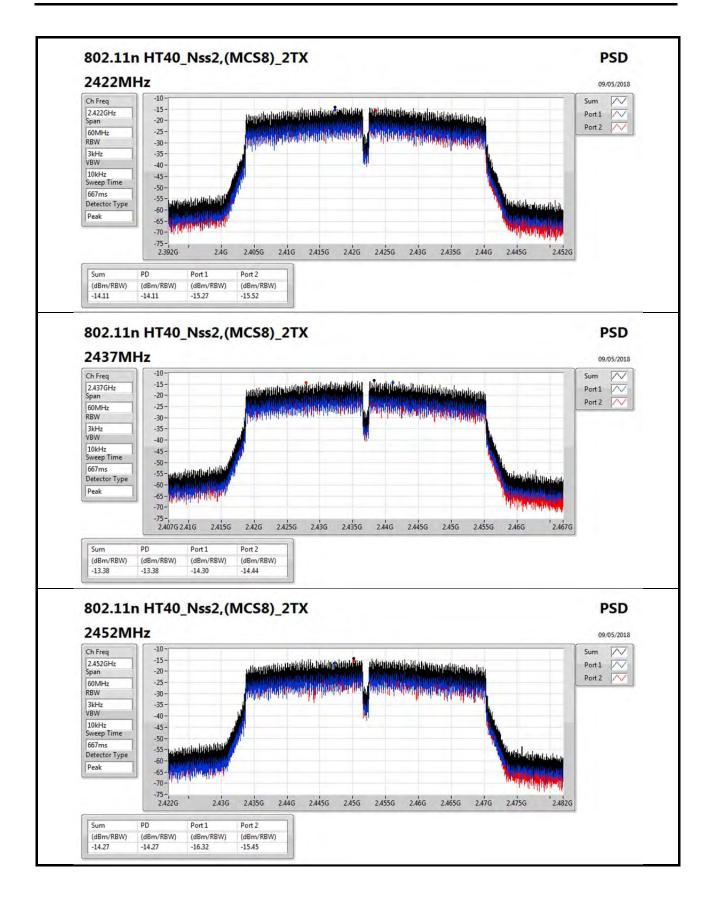






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CSE Non-restricted Band Result

Appendix E

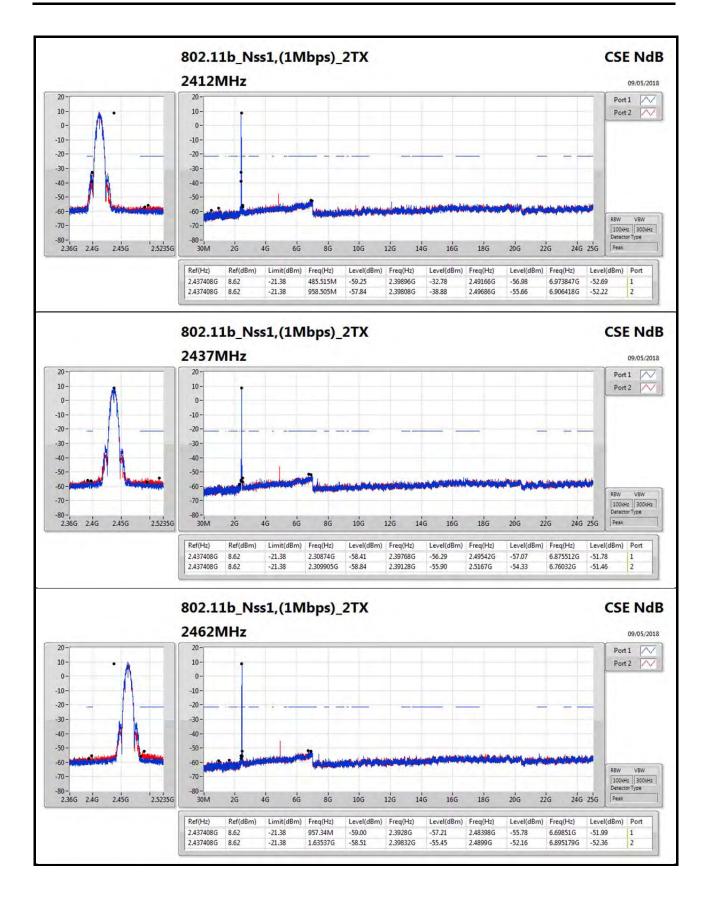
Summary

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	Pass	2.437408G	8.62	-21.38	485.515M	-59.25	2.39896G	-32.78	2.49166G	-56.98	6.973847G	-52.69	1
802.11g_Nss1,(6Mbps)_2TX	Pass	2.436406G	2.64	-27.36	2.30408G	-59.11	2.39832G	-27.97	2.51382G	-55.7	6.757511G	-52.31	2
802.11n HT20_Nss2,(MCS8)_2TX	Pass	2.43507G	1.27	-28.73	1.909145G	-57.62	2.3992G	-31.66	2.50878G	-55.94	6.95699G	-52.32	1
802.11n HT40_Nss2,(MCS8)_2TX	Pass	2.435738G	-3.72	-33.72	919.665M	-57.97	2.39744G	-39.86	2.49006G	-56.4	6.888135G	-52.39	1

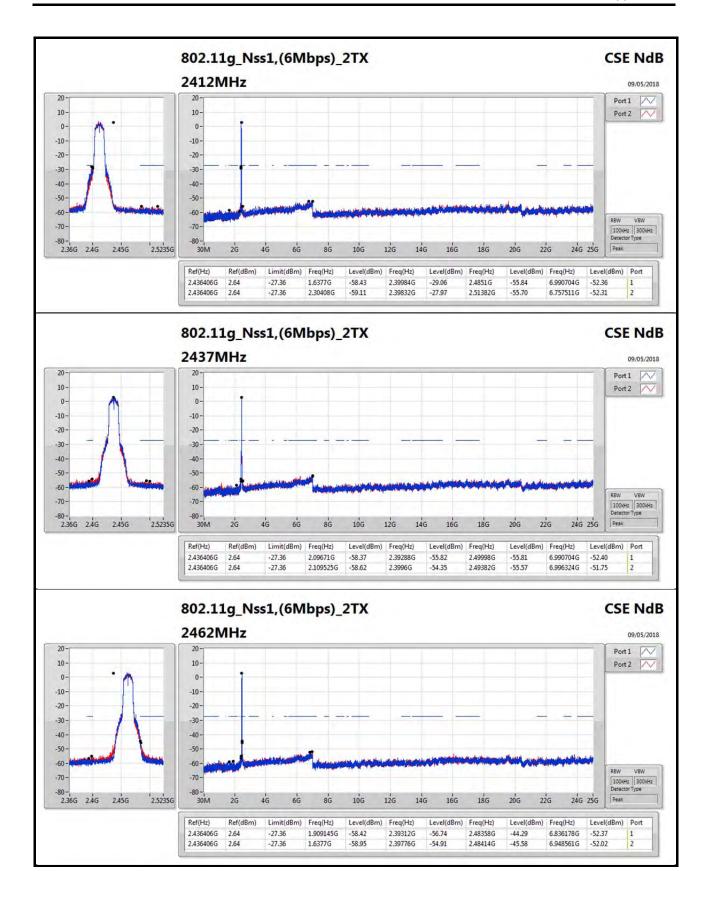
Result

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.437408G	8.62	-21.38	485.515M	-59.25	2.39896G	-32.78	2.49166G	-56.98	6.973847G	-52.69	1
2412MHz	Pass	2.437408G	8.62	-21.38	958.505M	-57.84	2.39808G	-38.88	2.49686G	-55.66	6.906418G	-52.22	2
2437MHz	Pass	2.437408G	8.62	-21.38	2.30874G	-58.41	2.39768G	-56.29	2.49542G	-57.07	6.875512G	-51.78	1
2437MHz	Pass	2.437408G	8.62	-21.38	2.309905G	-58.84	2.39128G	-55.9	2.5167G	-54.33	6.76032G	-51.46	2
2462MHz	Pass	2.437408G	8.62	-21.38	957.34M	-59	2.3928G	-57.21	2.48398G	-55.78	6.69851G	-51.99	1
2462MHz	Pass	2.437408G	8.62	-21.38	1.63537G	-58.51	2.39832G	-55.45	2.4899G	-52.16	6.895179G	-52.36	2
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.436406G	2.64	-27.36	1.6377G	-58.43	2.39984G	-29.06	2.4851G	-55.84	6.990704G	-52.36	1
2412MHz	Pass	2.436406G	2.64	-27.36	2.30408G	-59.11	2.39832G	-27.97	2.51382G	-55.7	6.757511G	-52.31	2
2437MHz	Pass	2.436406G	2.64	-27.36	2.09671G	-58.37	2.39288G	-55.82	2.49998G	-55.81	6.990704G	-52.4	1
2437MHz	Pass	2.436406G	2.64	-27.36	2.109525G	-58.62	2.3996G	-54.35	2.49382G	-55.57	6.996324G	-51.75	2
2462MHz	Pass	2.436406G	2.64	-27.36	1.909145G	-58.42	2.39312G	-56.74	2.48358G	-44.29	6.836178G	-52.37	1
2462MHz	Pass	2.436406G	2.64	-27.36	1.6377G	-58.95	2.39776G	-54.91	2.48414G	-45.58	6.948561G	-52.02	2
802.11n HT20_Nss2,(MCS8)_2TX	-	-	-	-	-	-	-	-	-	-		-	
2412MHz	Pass	2.43507G	1.27	-28.73	1.909145G	-57.62	2.3992G	-31.66	2.50878G	-55.94	6.95699G	-52.32	1
2412MHz	Pass	2.43507G	1.27	-28.73	2.309905G	-58.04	2.3992G	-32.04	2.48958G	-56.05	6.973847G	-52.17	2
2437MHz	Pass	2.43507G	1.27	-28.73	1.77051G	-57.74	2.39648G	-55.81	2.50646G	-55.07	6.791225G	-52.6	1
2437MHz	Pass	2.43507G	1.27	-28.73	2.307575G	-58.2	2.3936G	-53.3	2.49246G	-55.35	6.959799G	-51.63	2
2462MHz	Pass	2.43507G	1.27	-28.73	1.648185G	-58.64	2.39736G	-56.87	2.48382G	-44.19	6.788416G	-52.11	1
2462MHz	Pass	2.43507G	1.27	-28.73	2.16428G	-59.24	2.3992G	-55.82	2.48446G	-47.6	6.985085G	-52.4	2
802.11n HT40_Nss2,(MCS8)_2TX	-	-	-	-	-	-	-	-	-	-	-	-	
2422MHz	Pass	2.435738G	-3.72	-33.72	919.665M	-57.97	2.39744G	-39.86	2.49006G	-56.4	6.888135G	-52.39	
2422MHz	Pass	2.435738G	-3.72	-33.72	2.17573G	-58	2.39728G	-39.99	2.50622G	-56.95	6.907767G	-52.27	:
2437MHz	Pass	2.435738G	-3.72	-33.72	875.01M	-58.17	2.39968G	-45.26	2.48382G	-54.19	6.994709G	-51.71	
2437MHz	Pass	2.435738G	-3.72	-33.72	2.30626G	-58.93	2.39984G	-45.28	2.49694G	-56.12	6.885331G	-52.39	
2452MHz	Pass	2.435738G	-3.72	-33.72	2.07497G	-58.05	2.392G	-56.06	2.48446G	-44.3	6.851676G	-52.66	
2452MHz	Pass	2.435738G	-3.72	-33.72	926.535M	-58.32	2.39856G	-54.85	2.48654G	-44.93	6.95264G	-51.41	

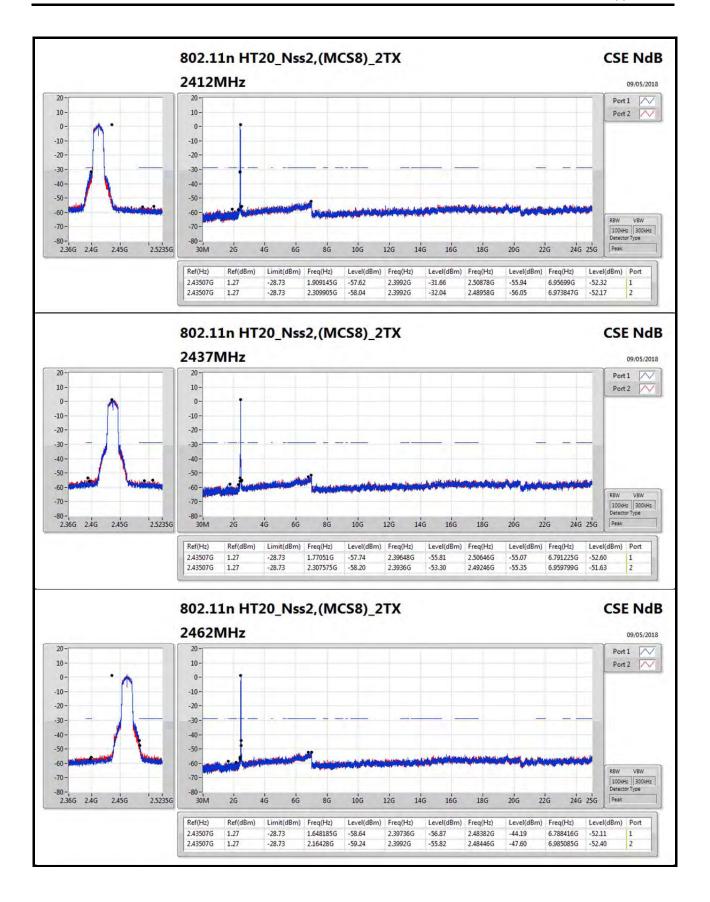




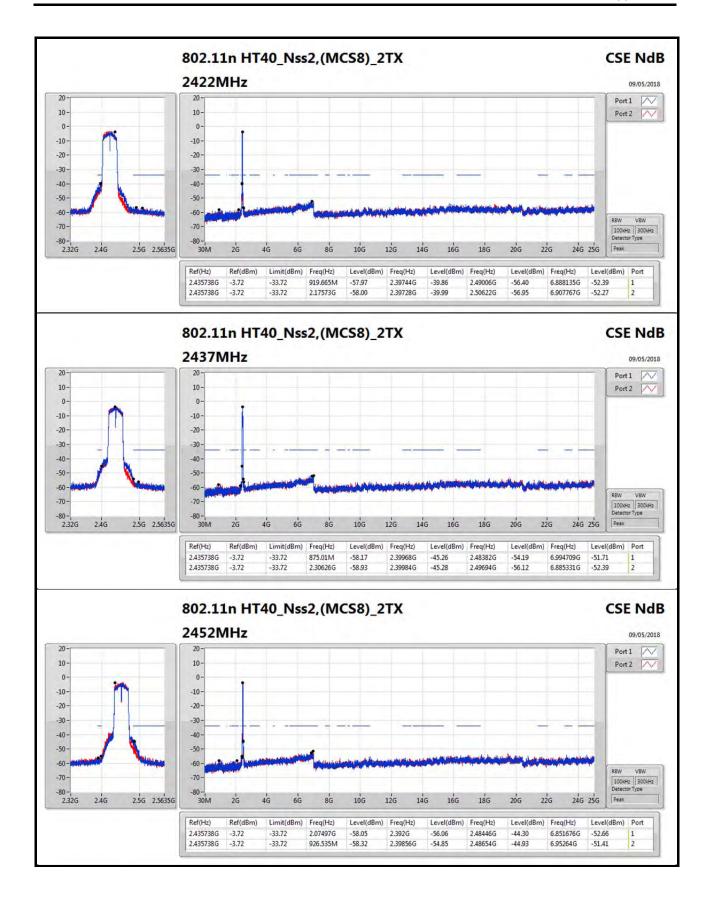




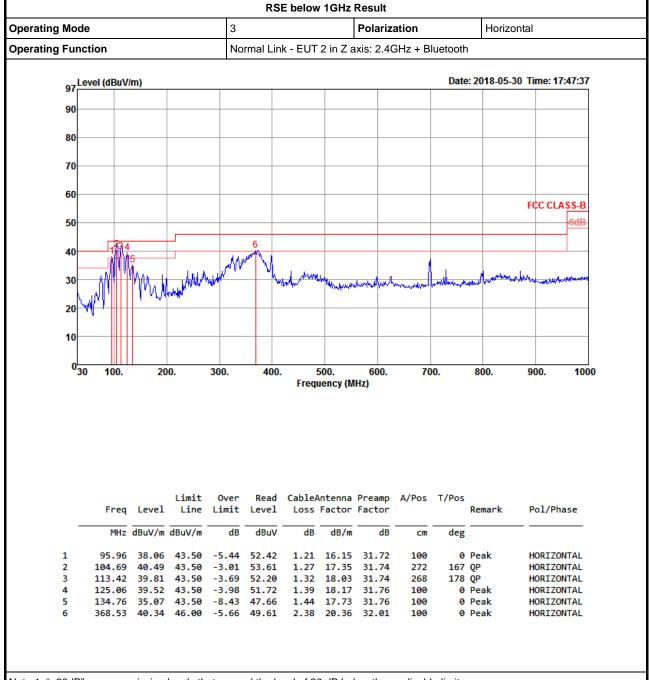








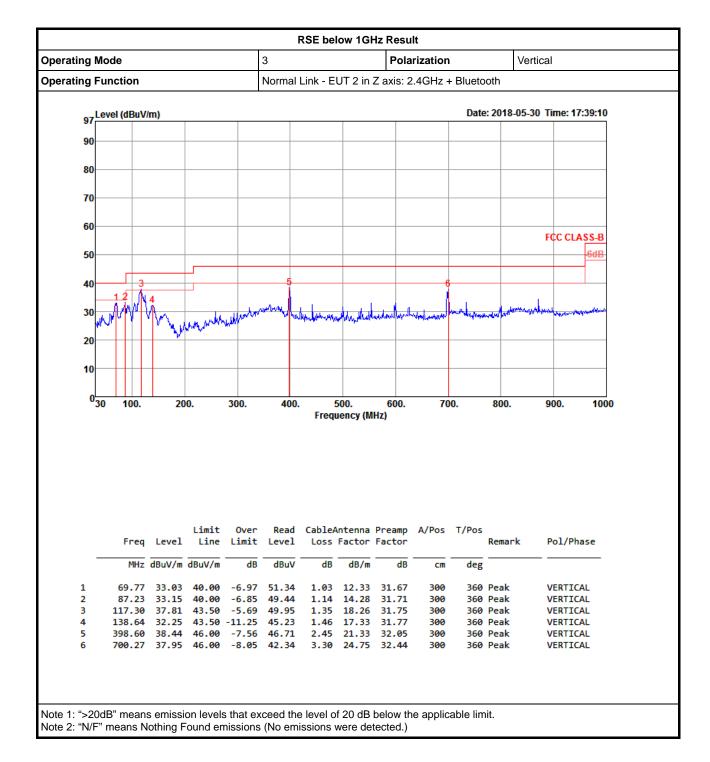




Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

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







RSE TX above 1GHz Result

Appendix F.2

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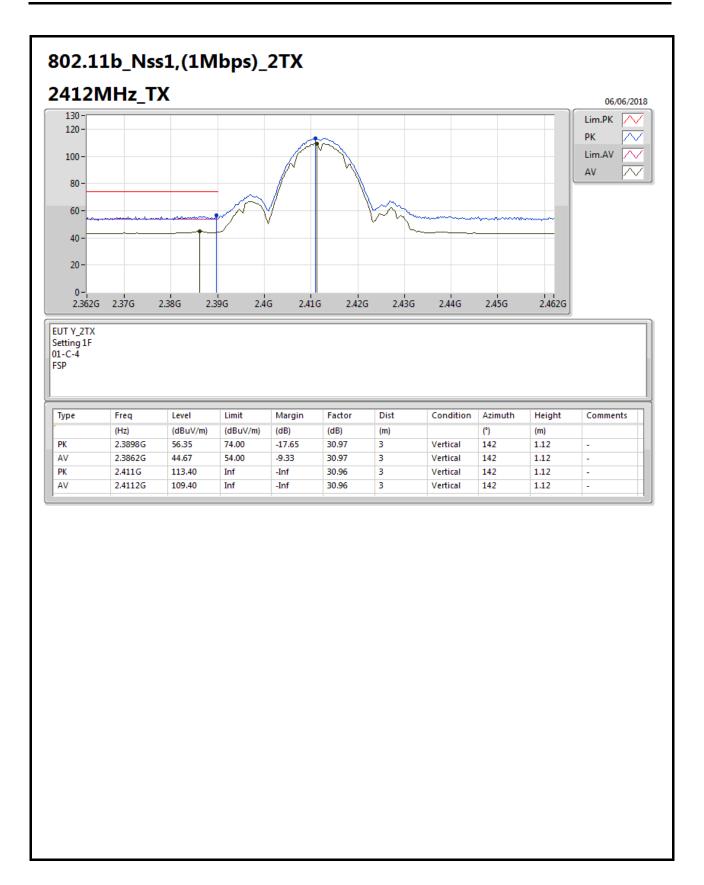
Test Mode: Mode 1

Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-		-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	Pass	AV	4.92388G	52.13	54.00	-1.87	4.40	3	Vertical	306	2.62	-

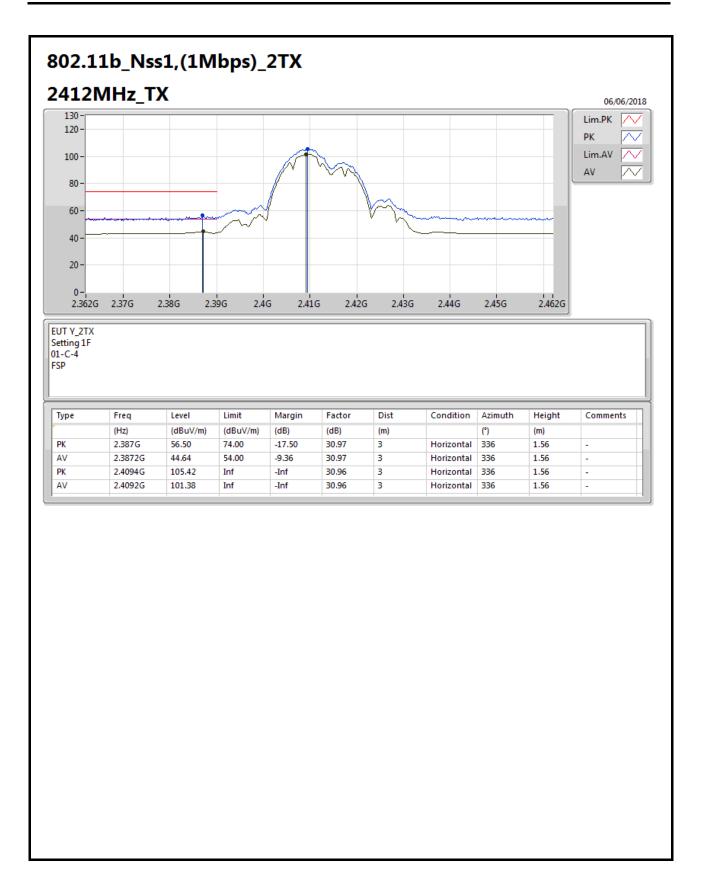
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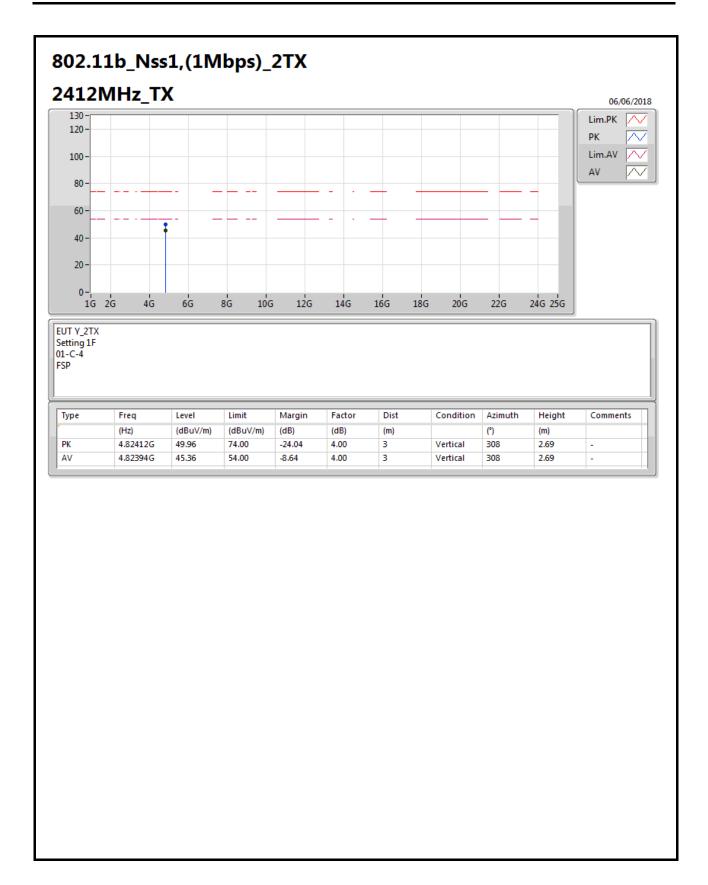
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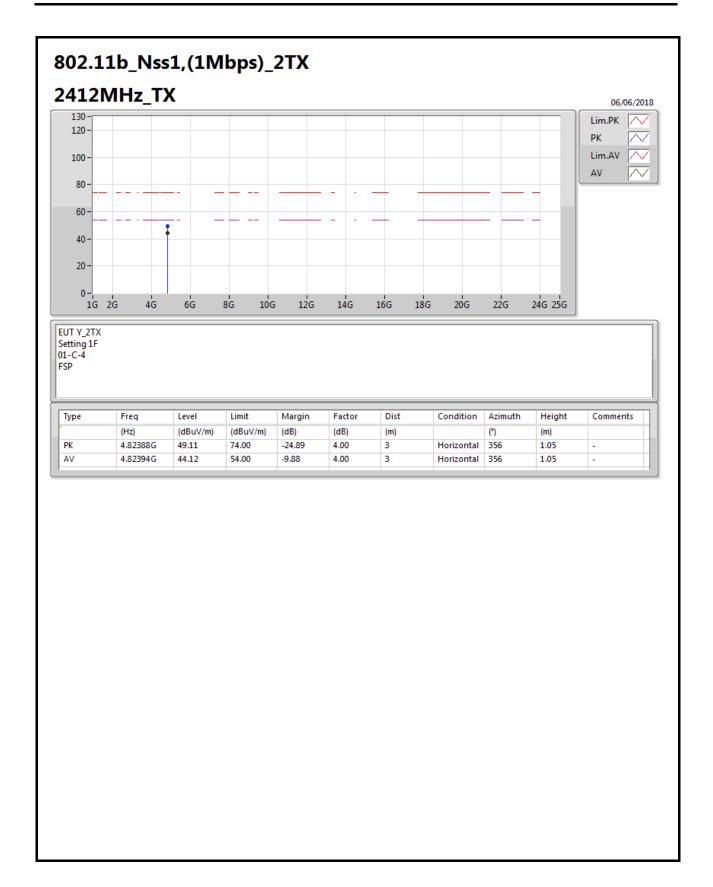
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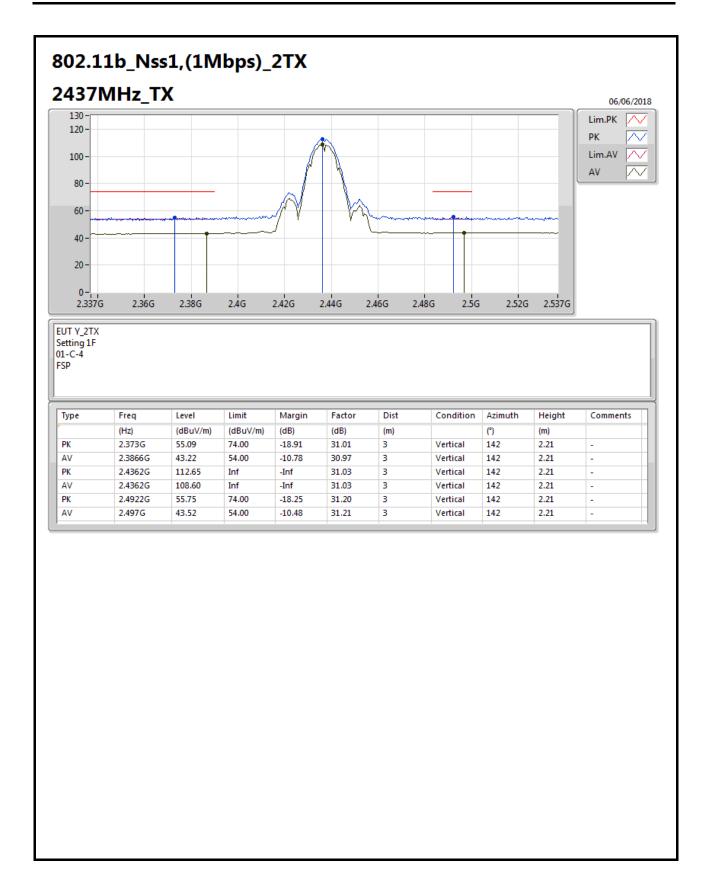
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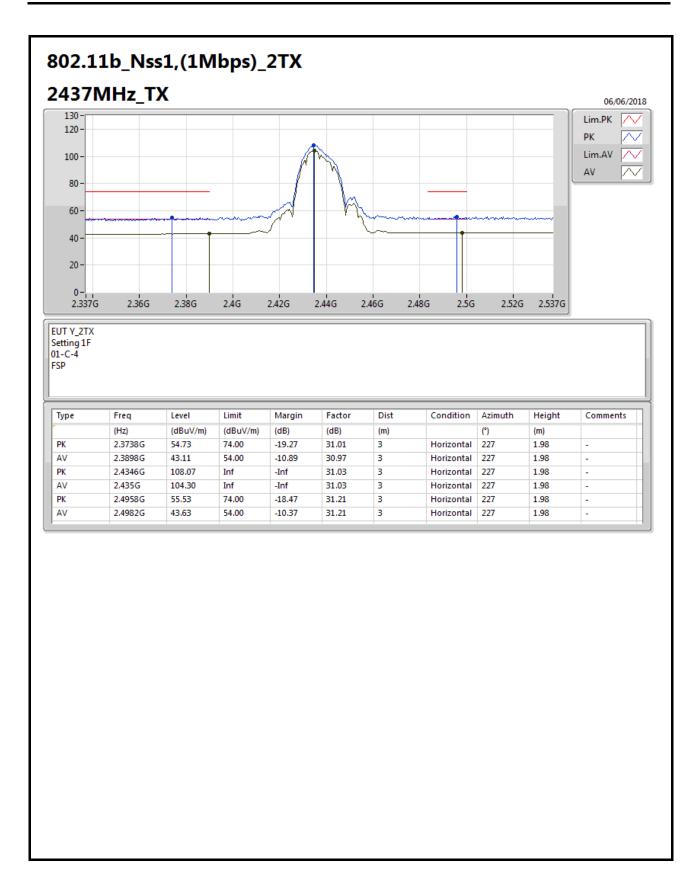
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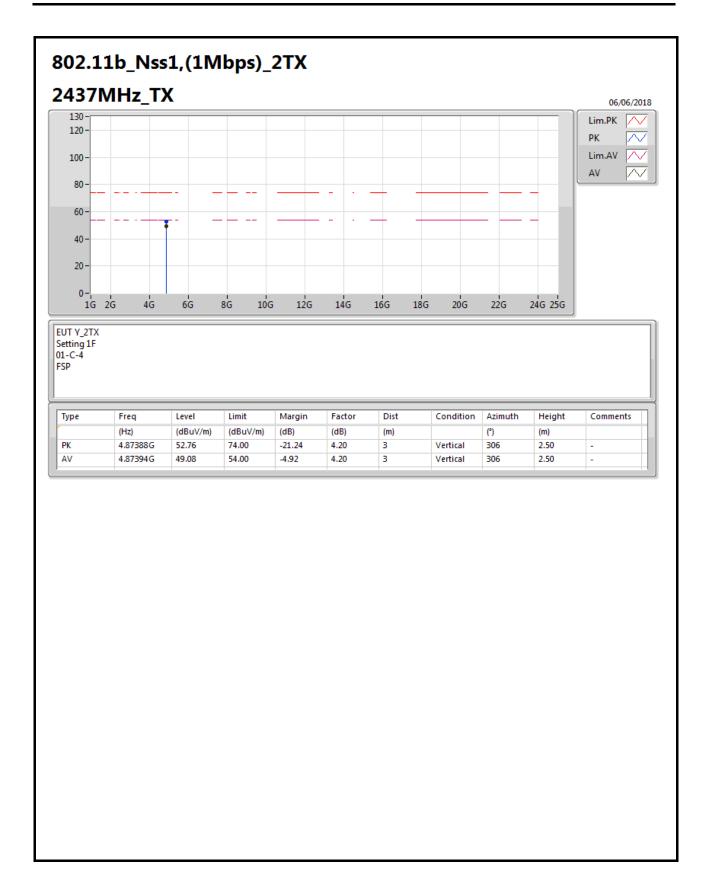
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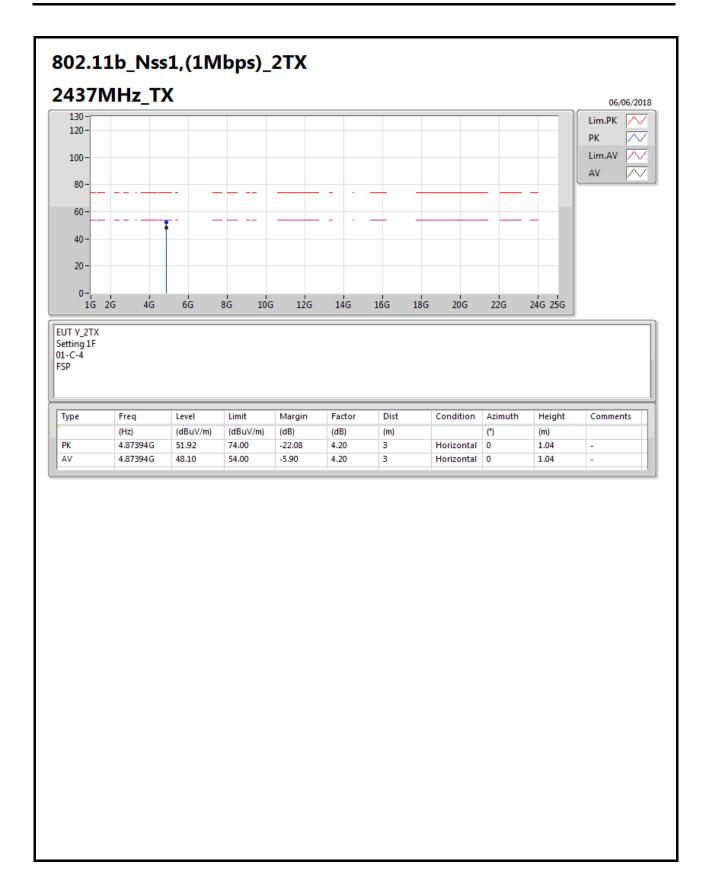
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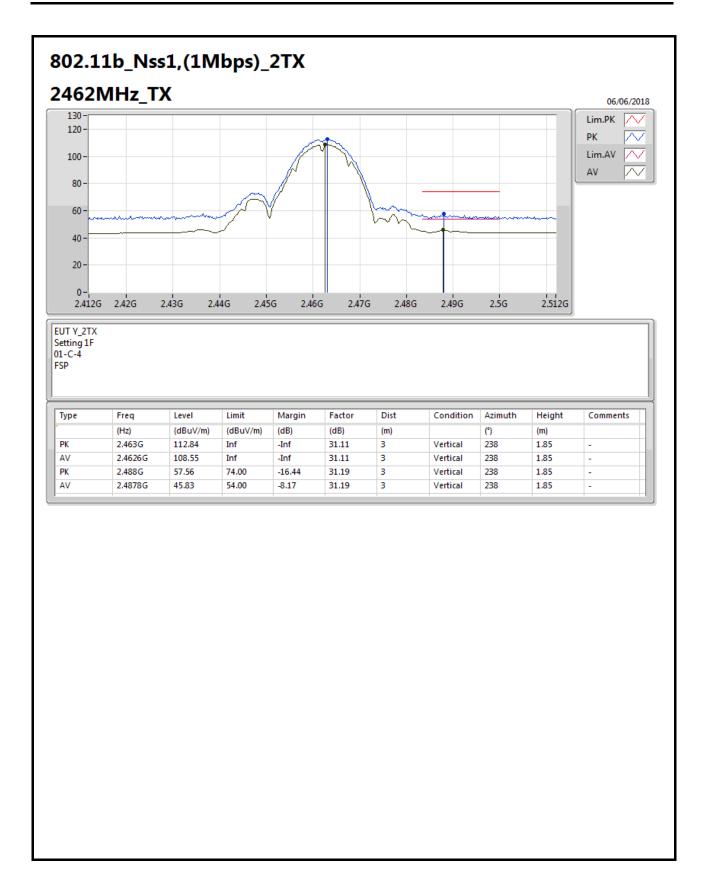


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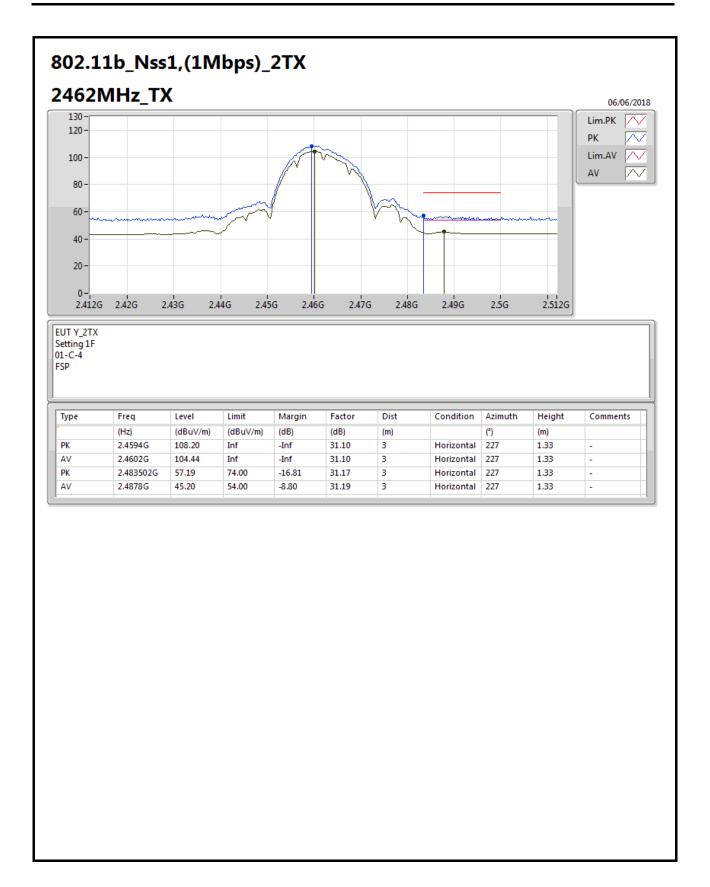




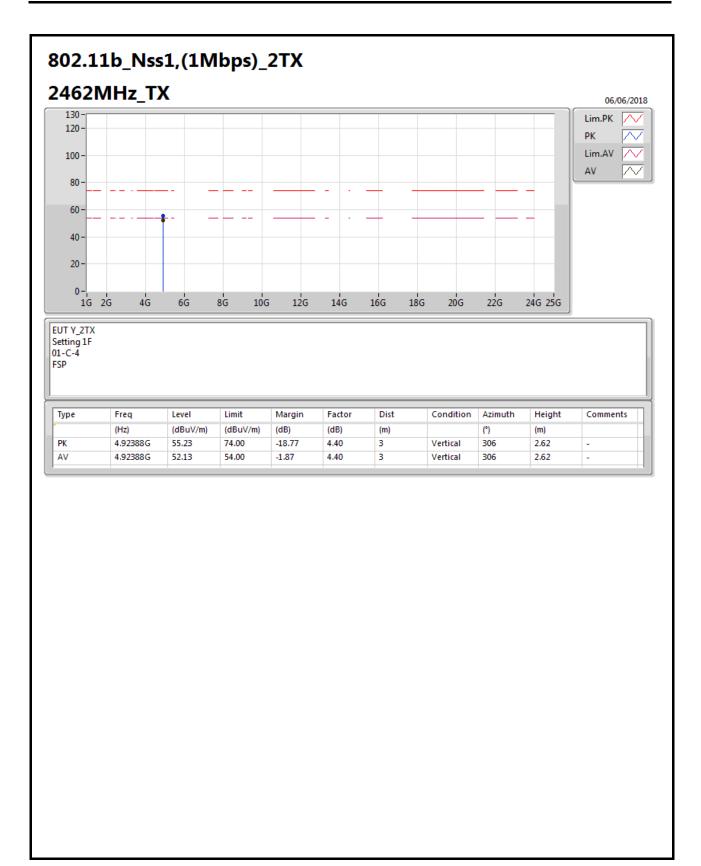


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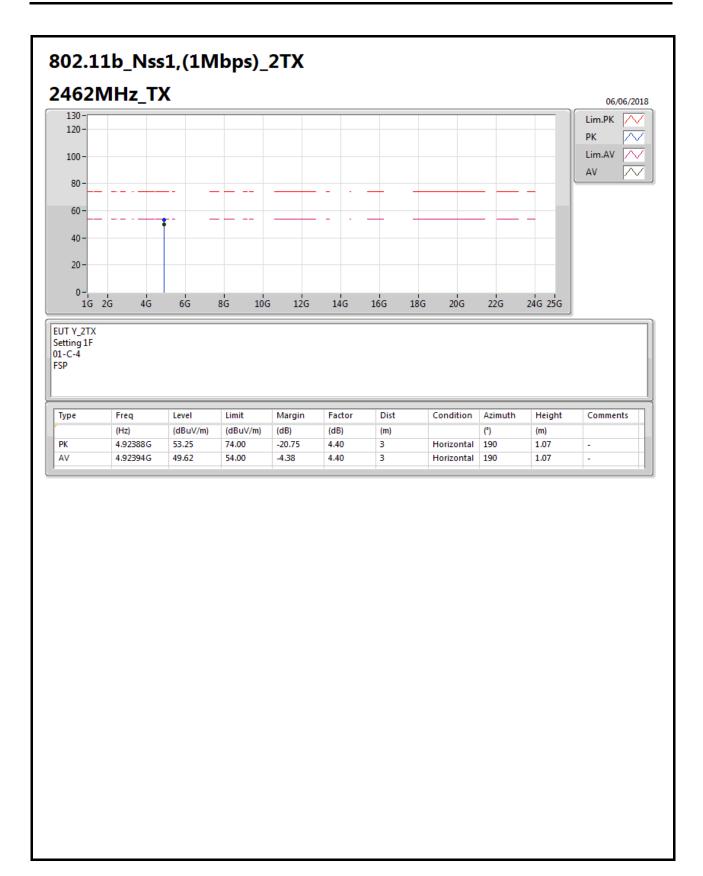






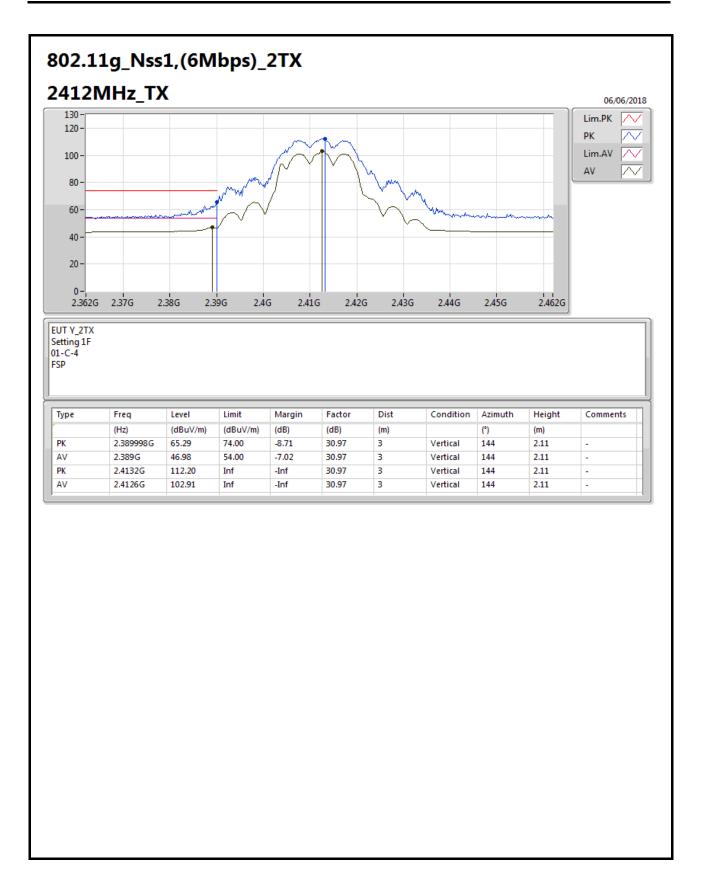




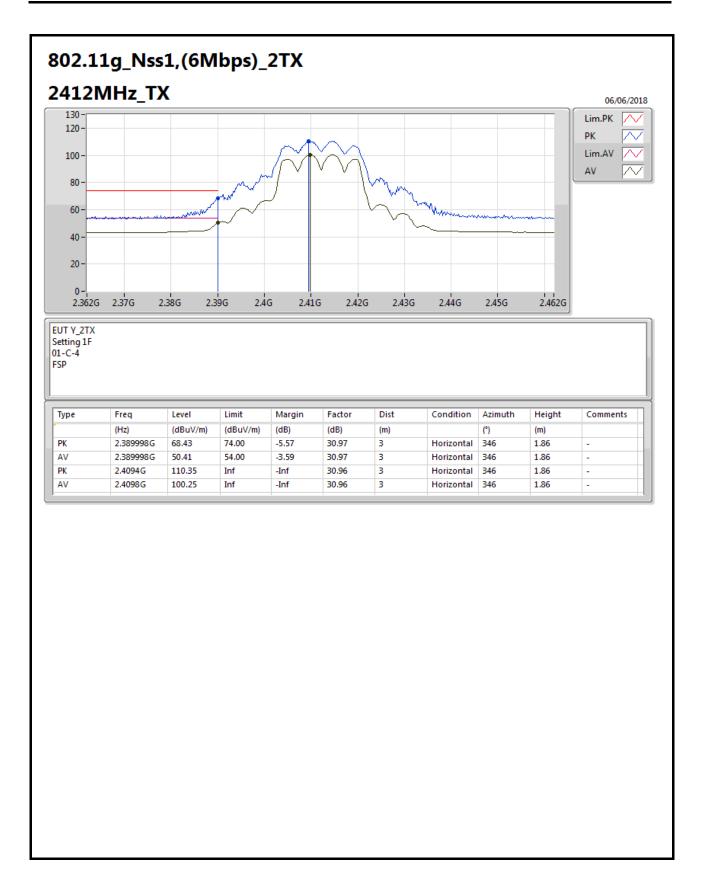


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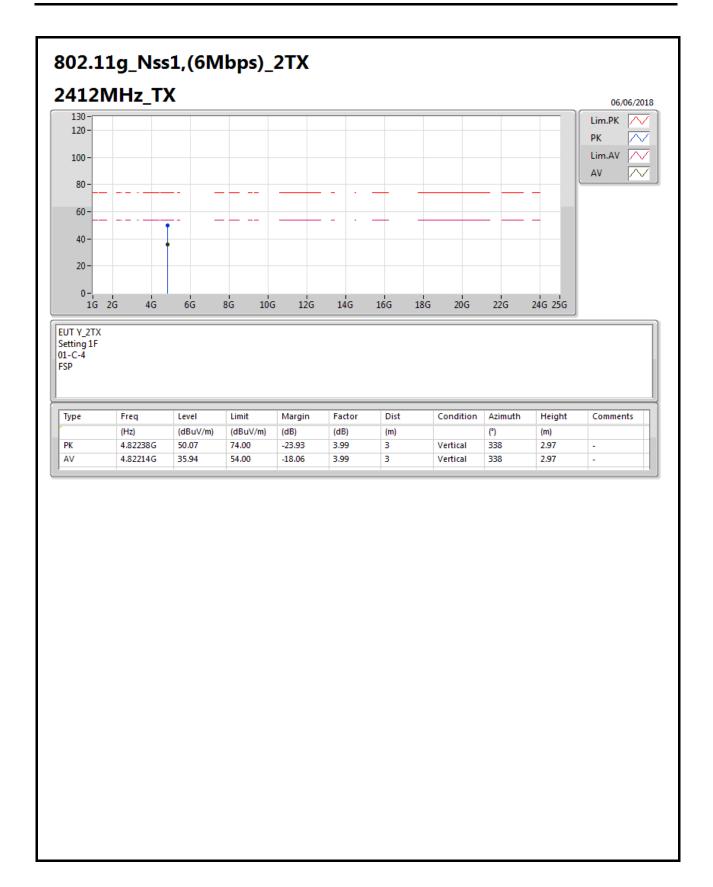




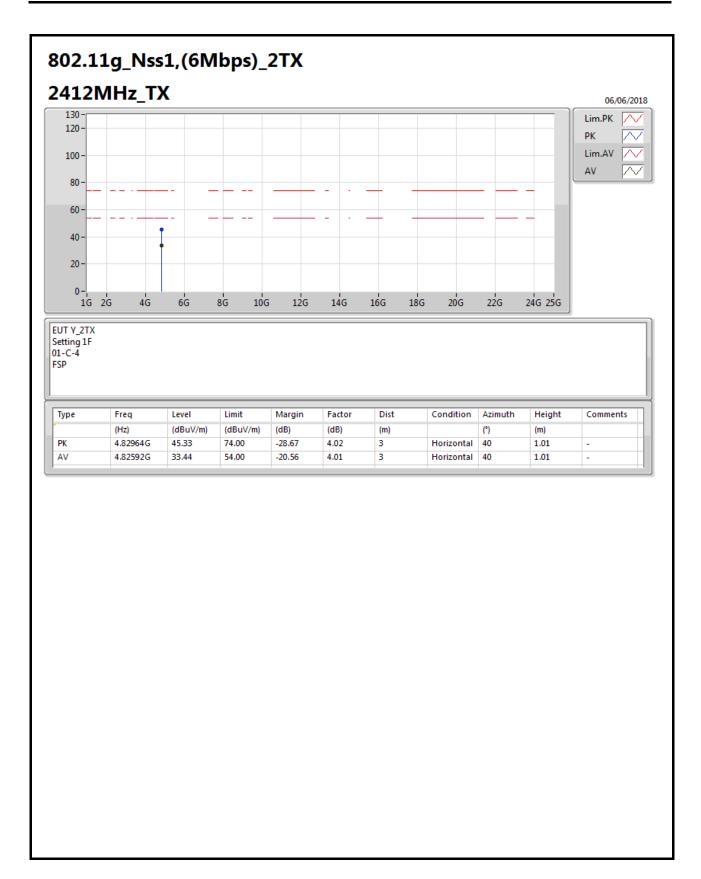


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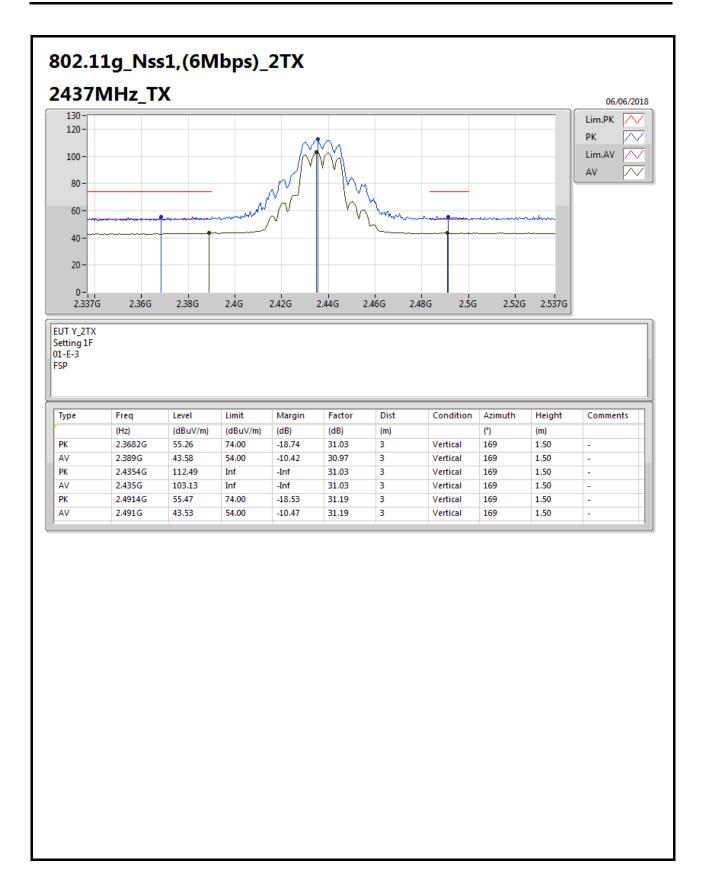




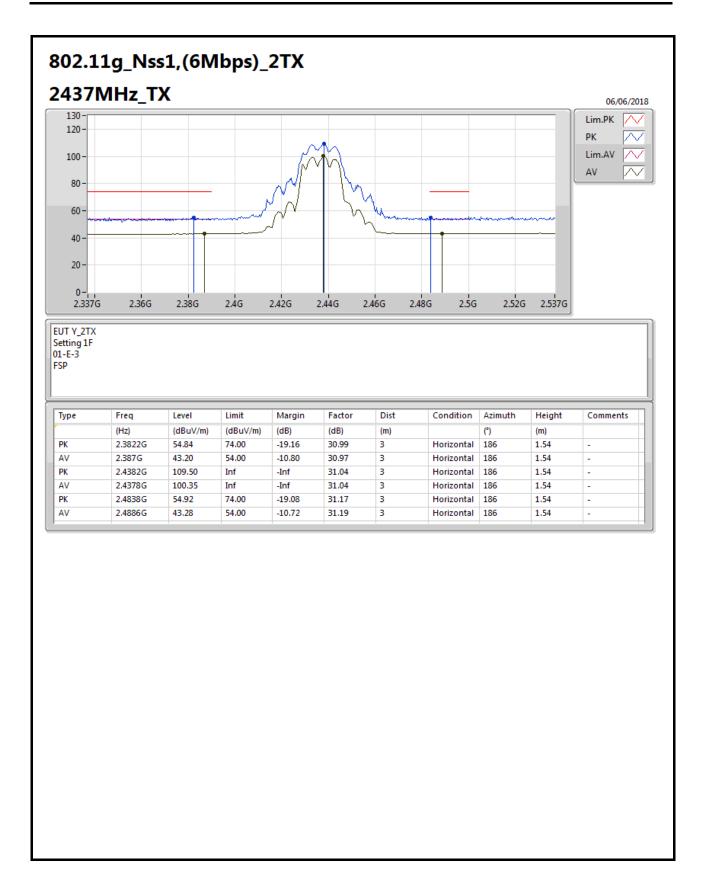




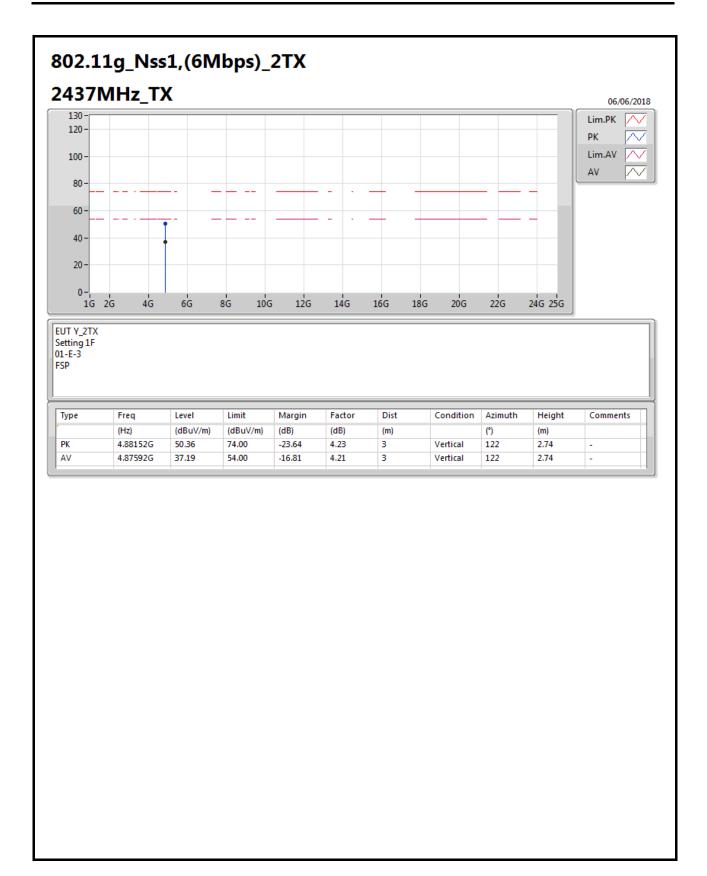




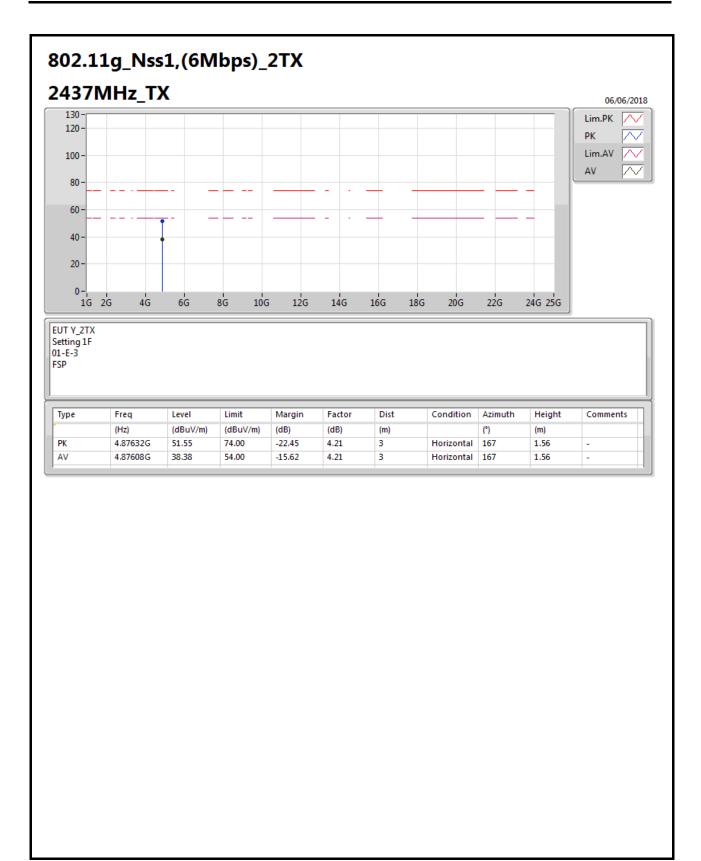






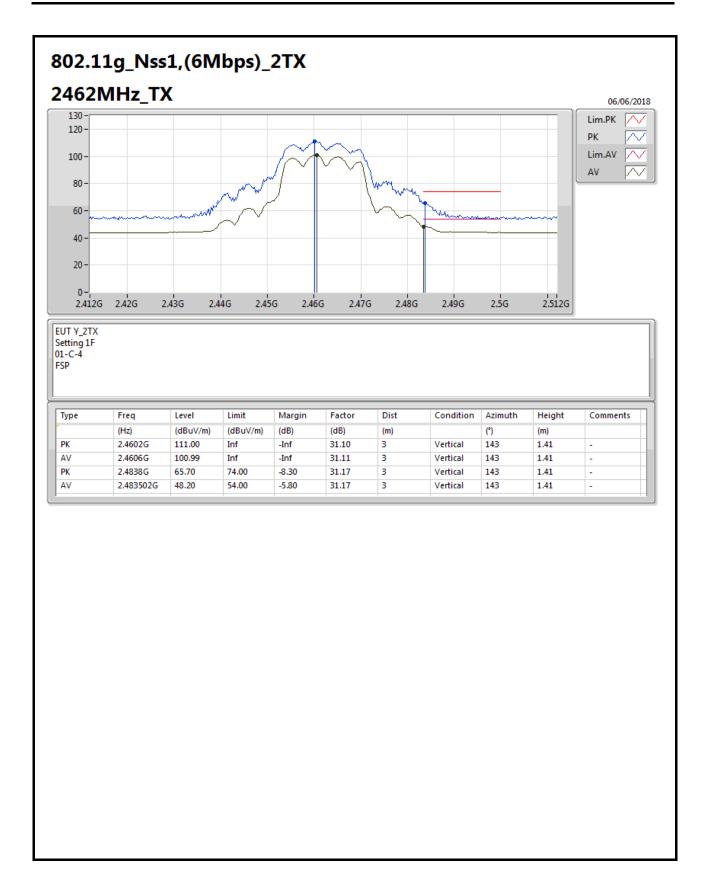




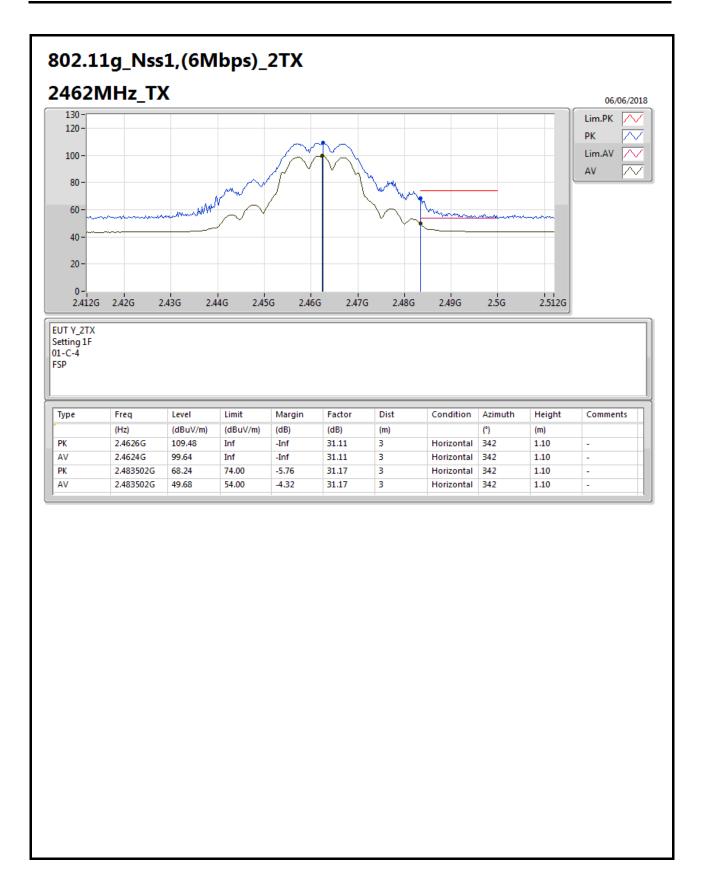


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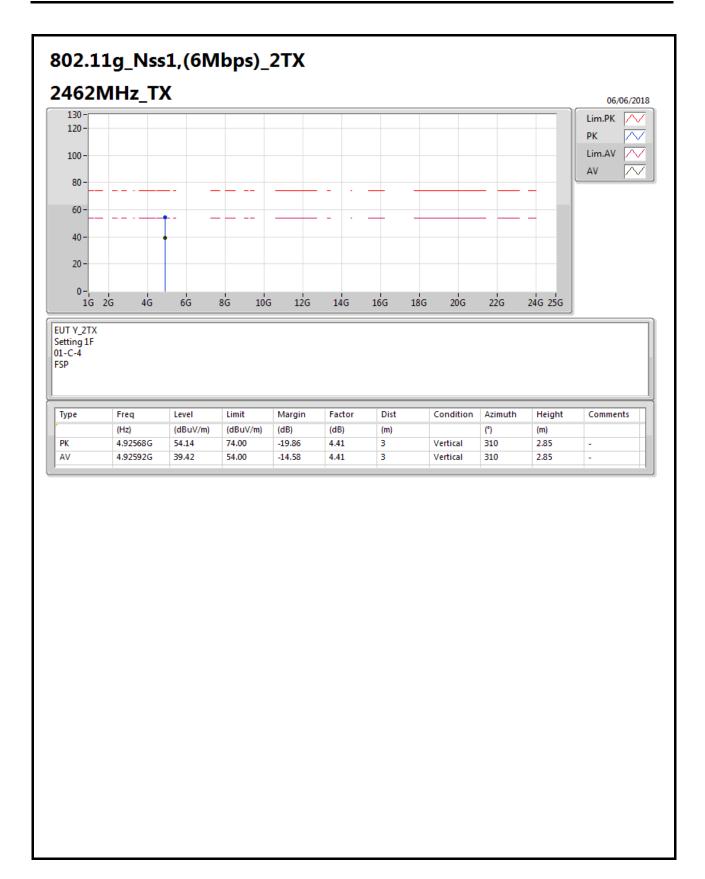




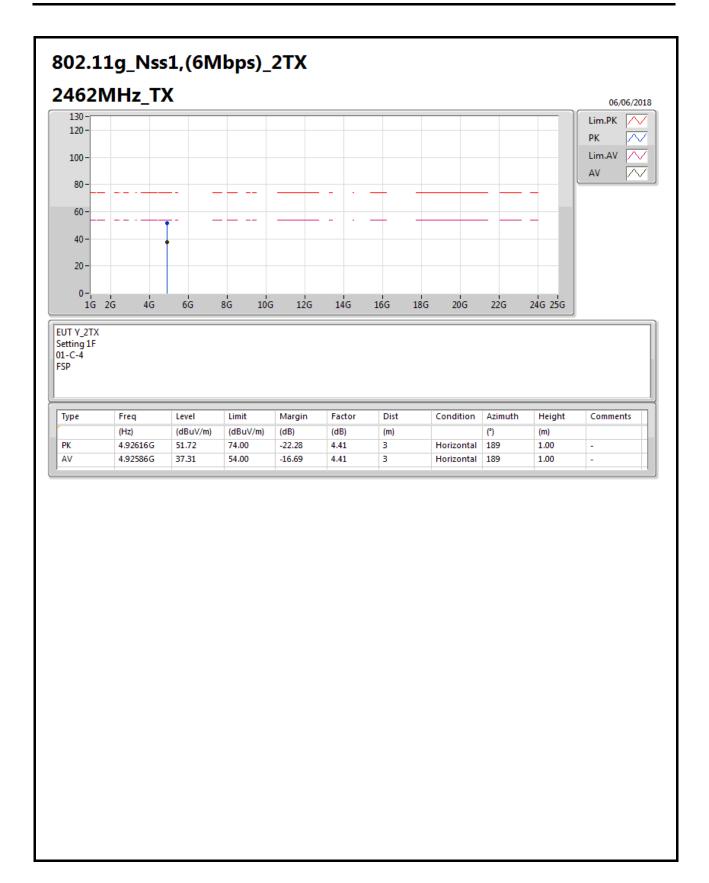




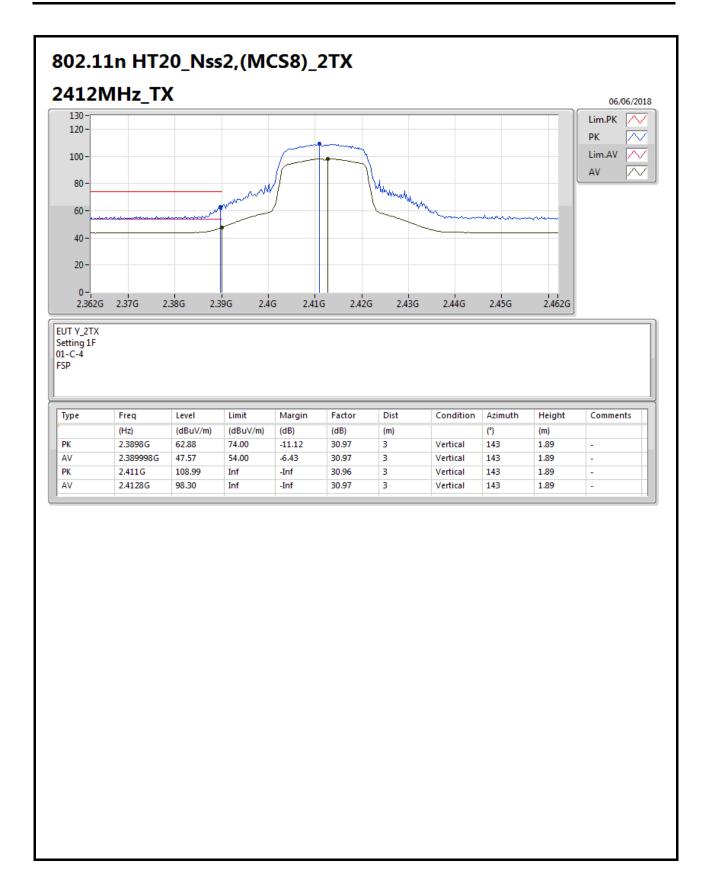




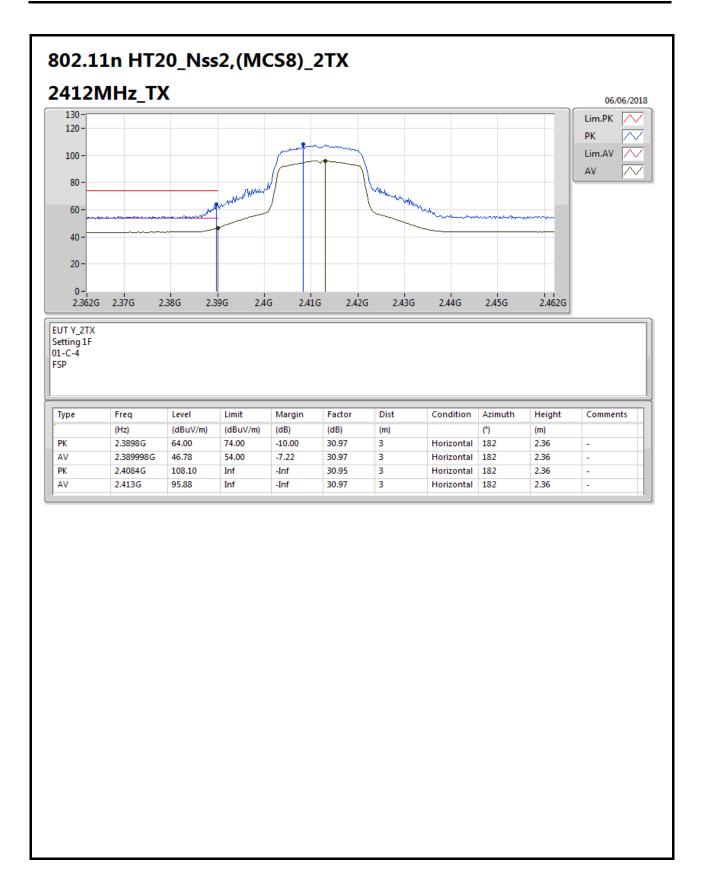




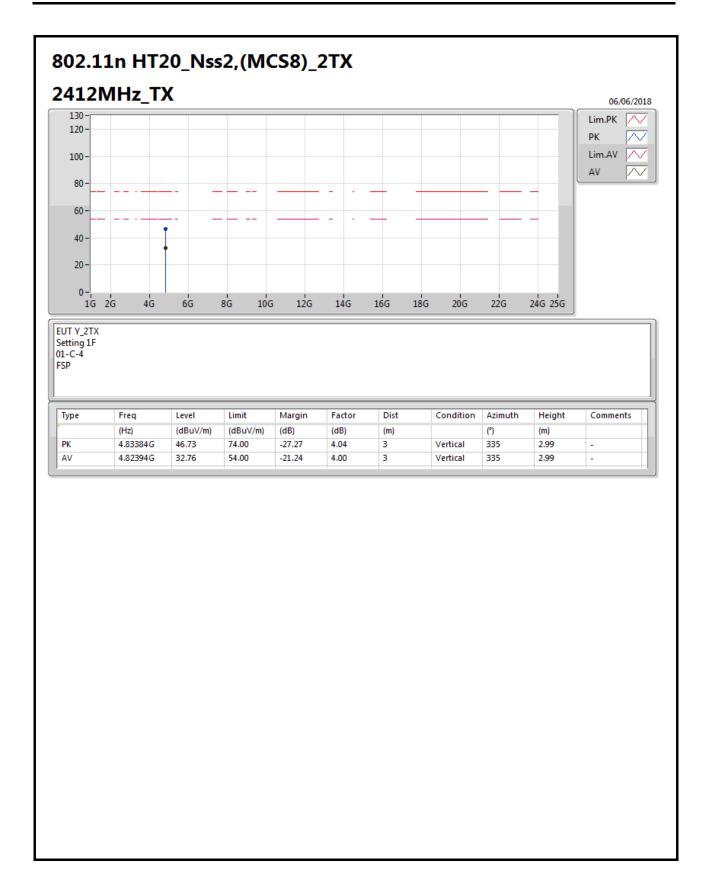




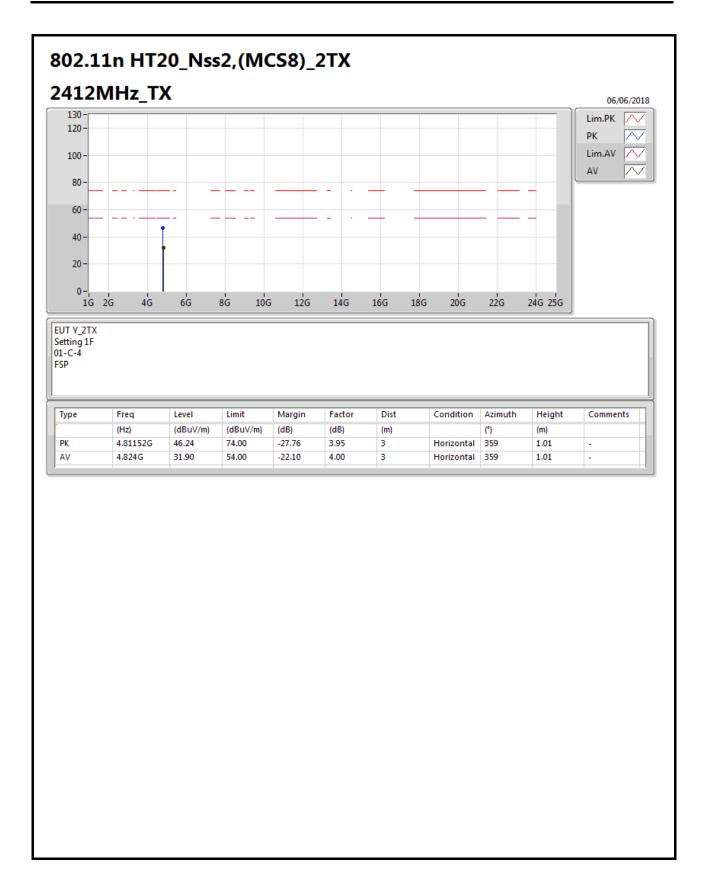




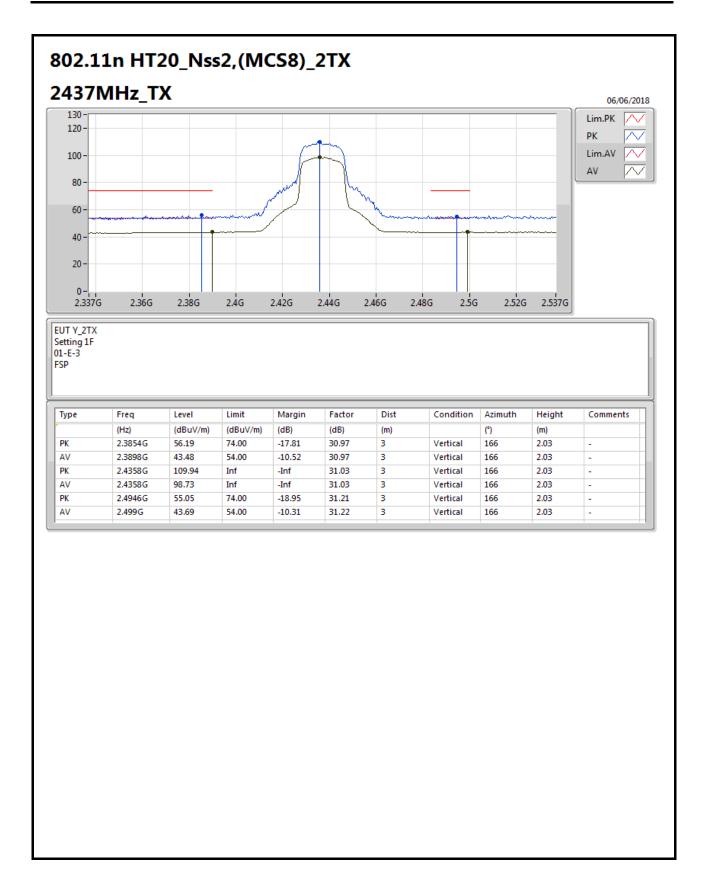




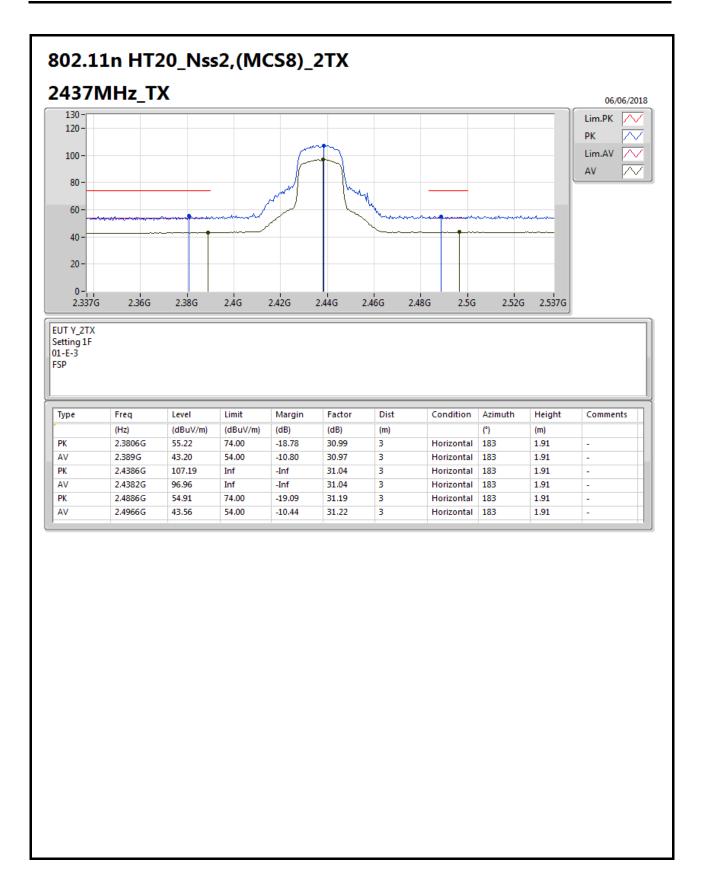




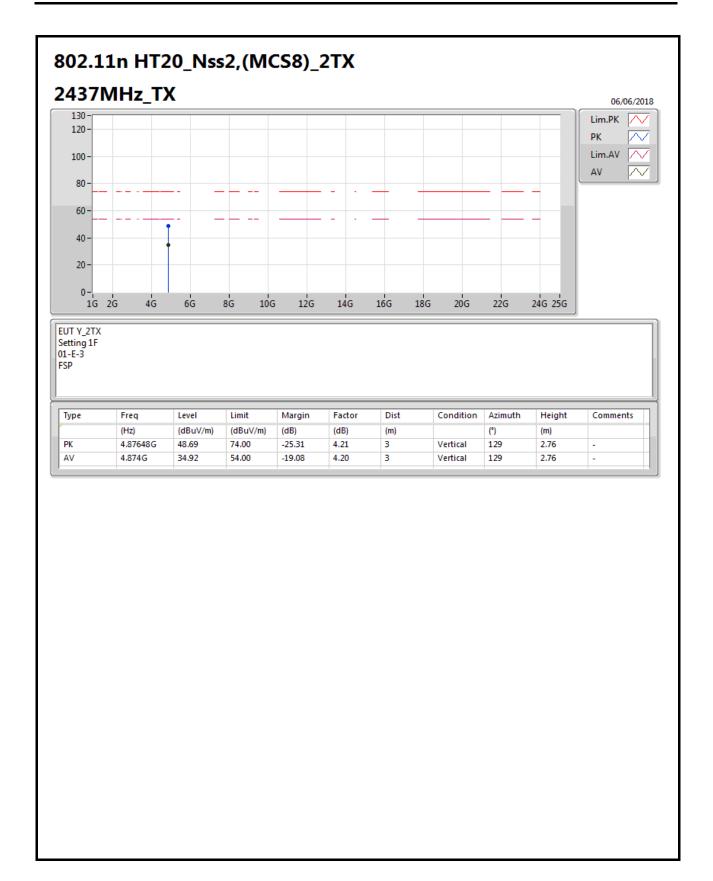




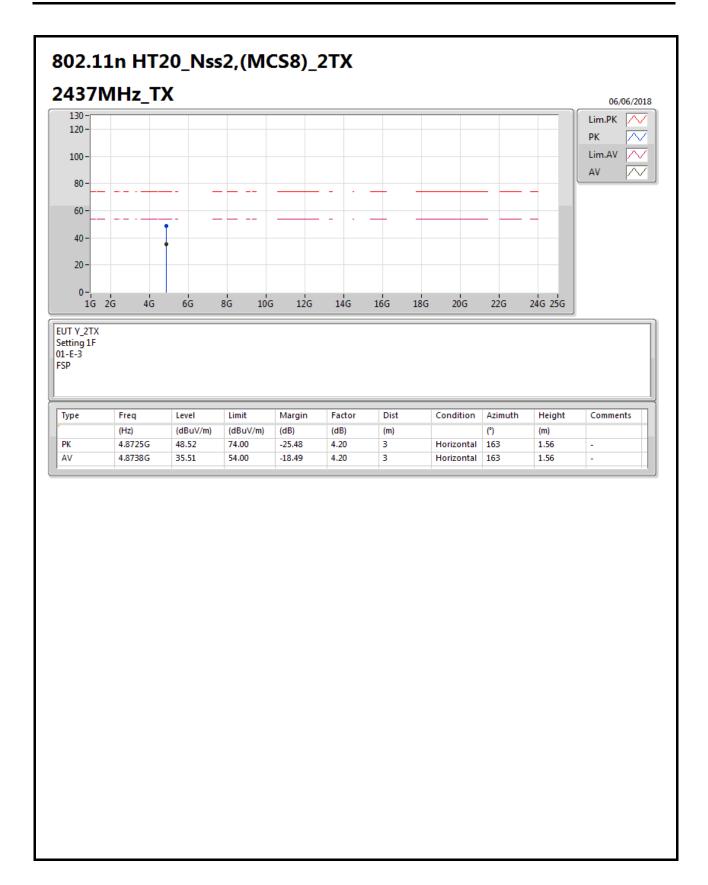




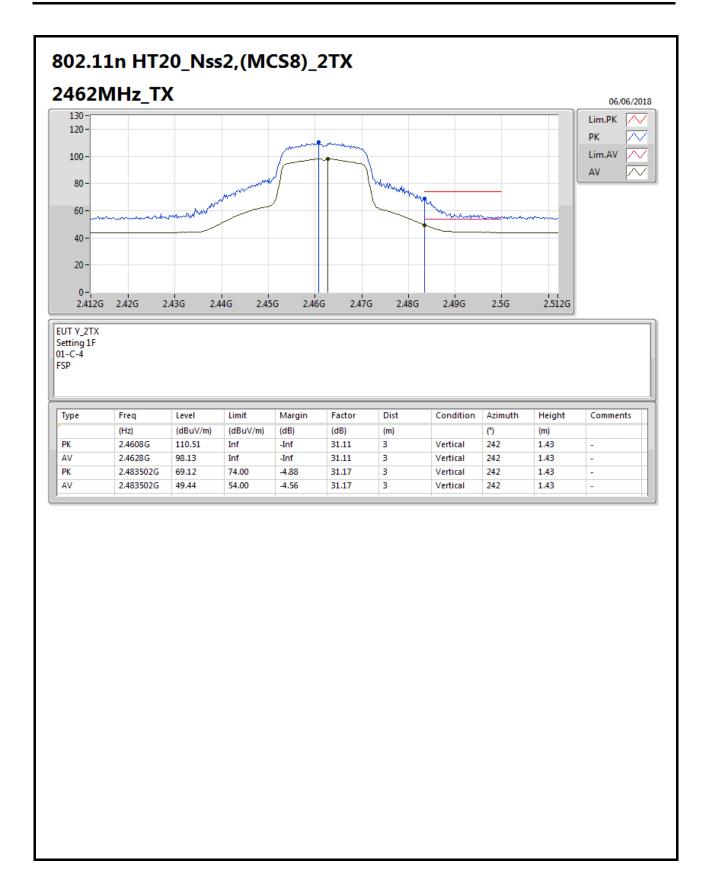




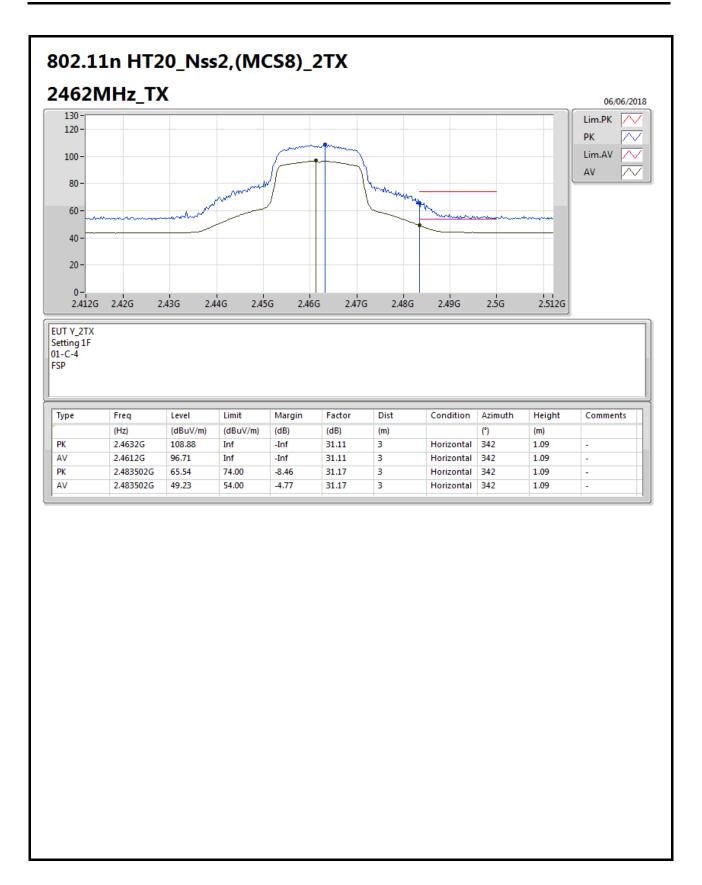




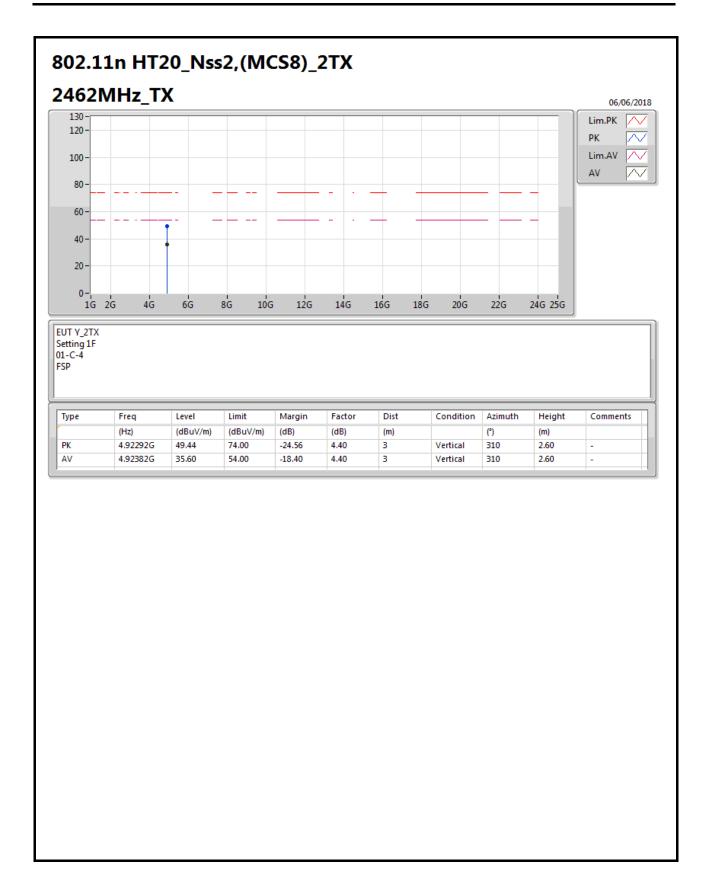




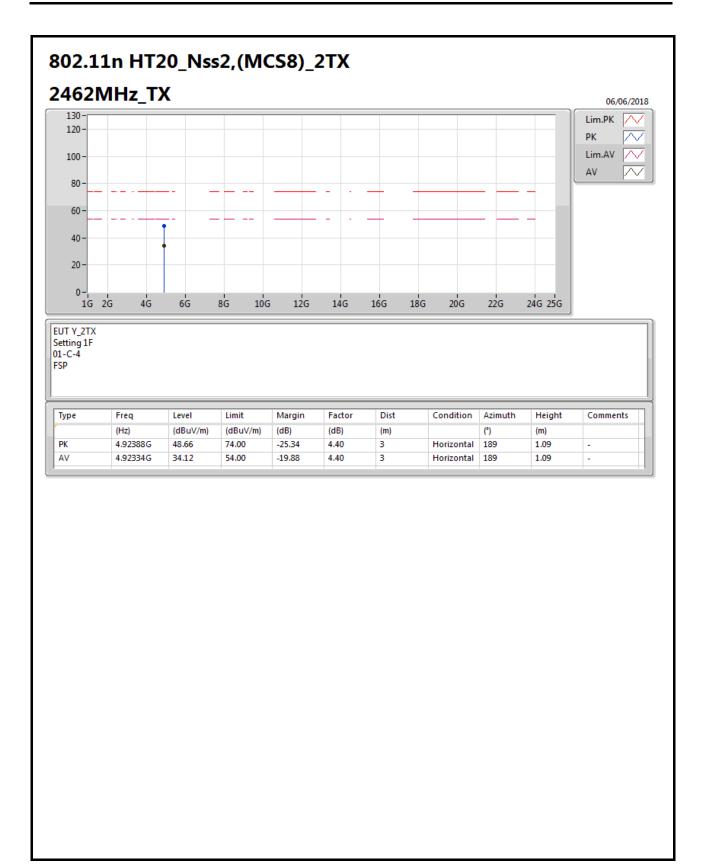




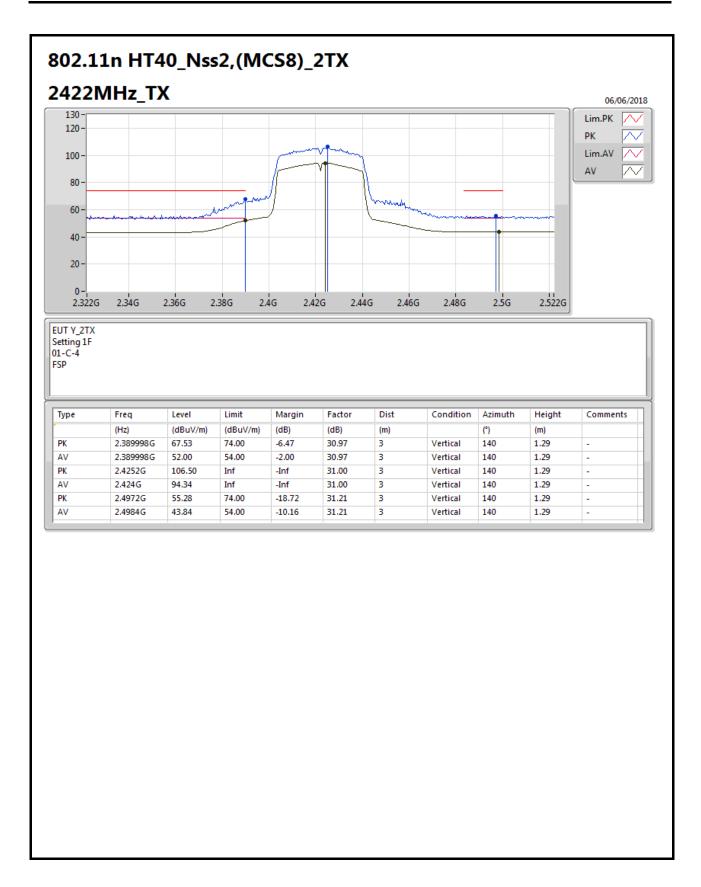








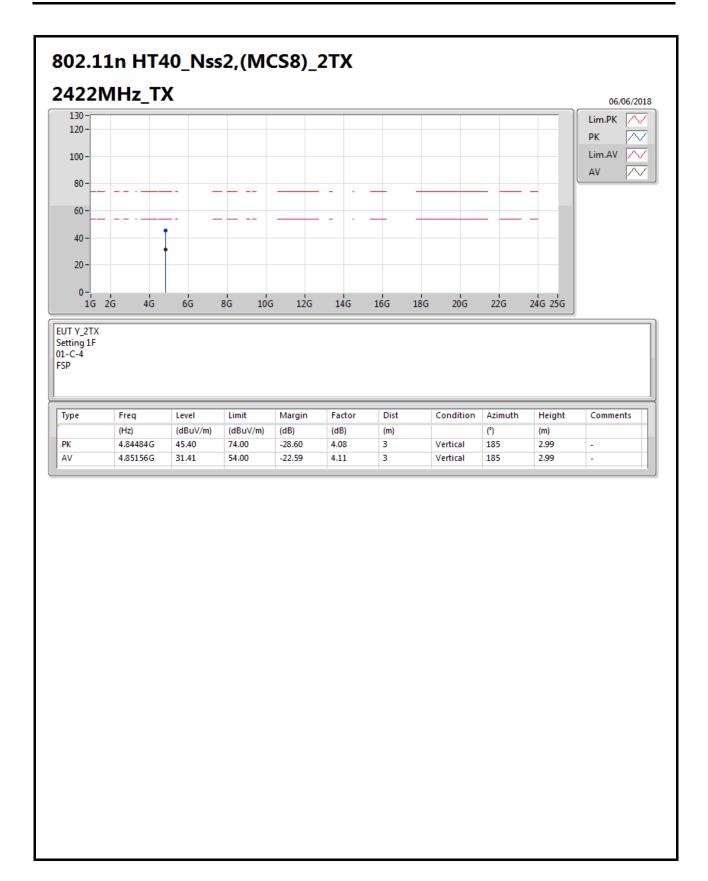




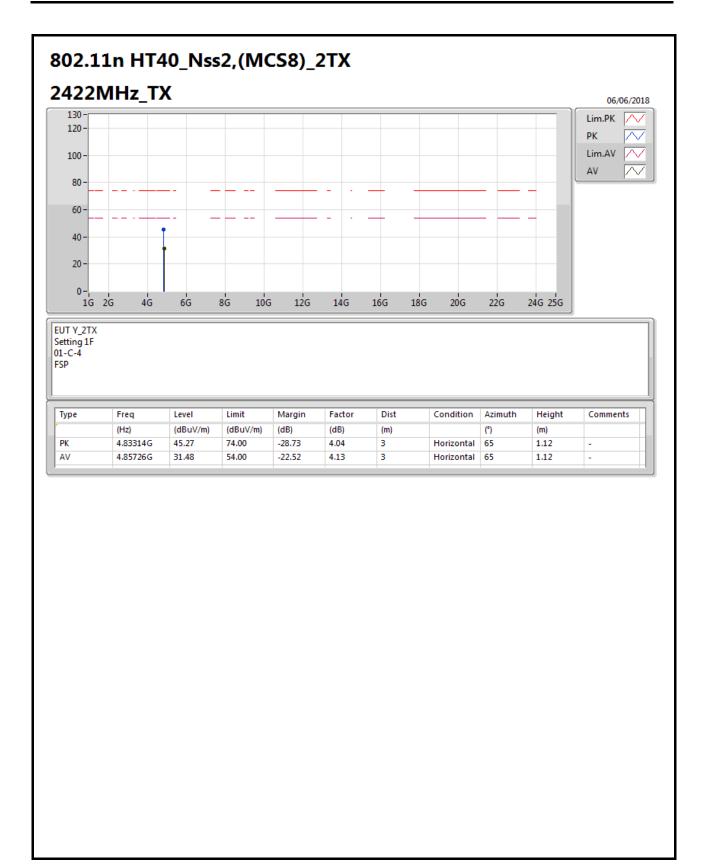




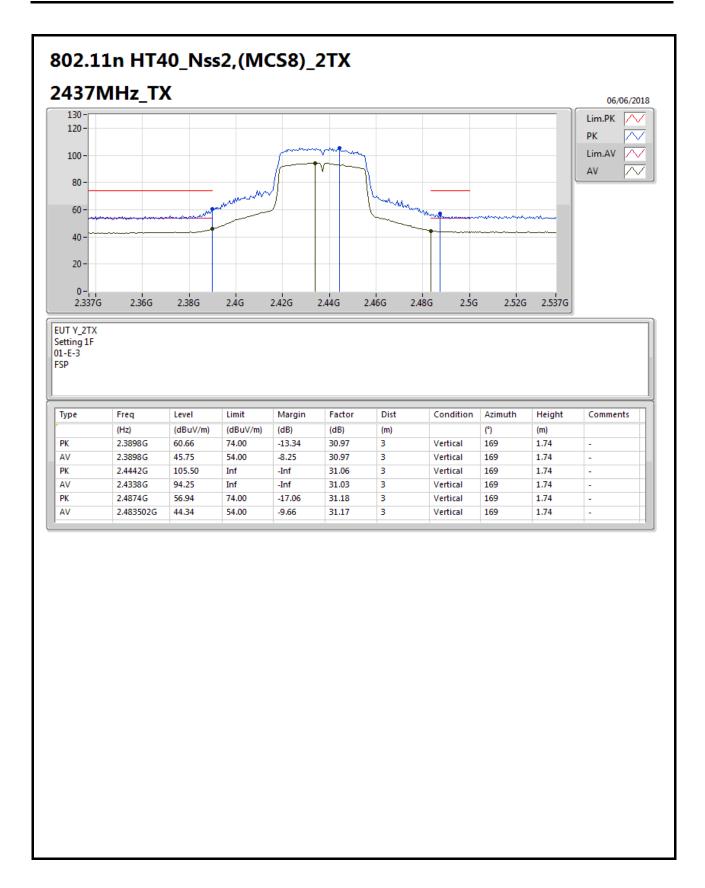




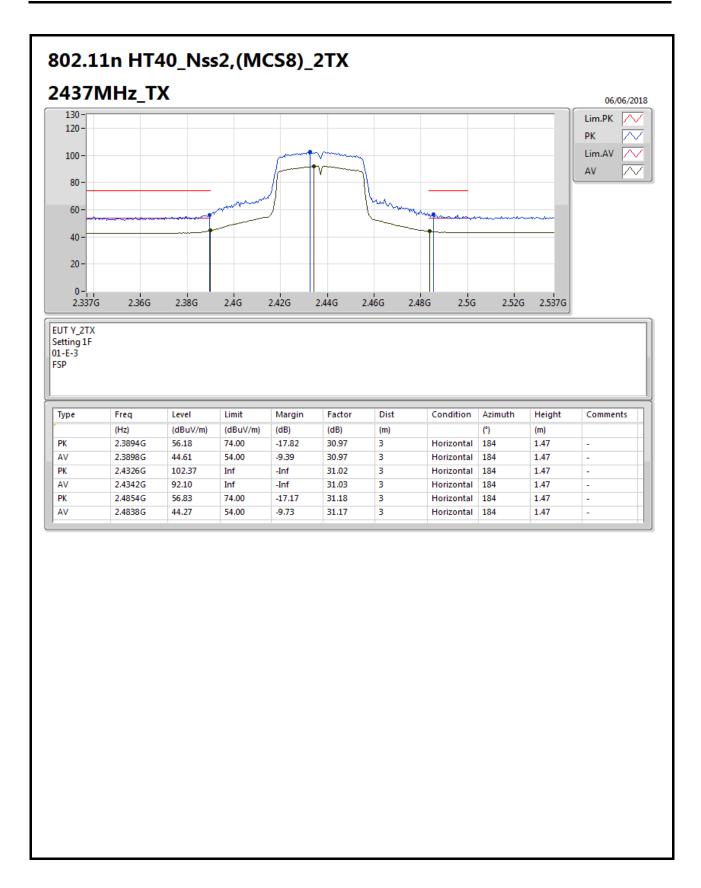




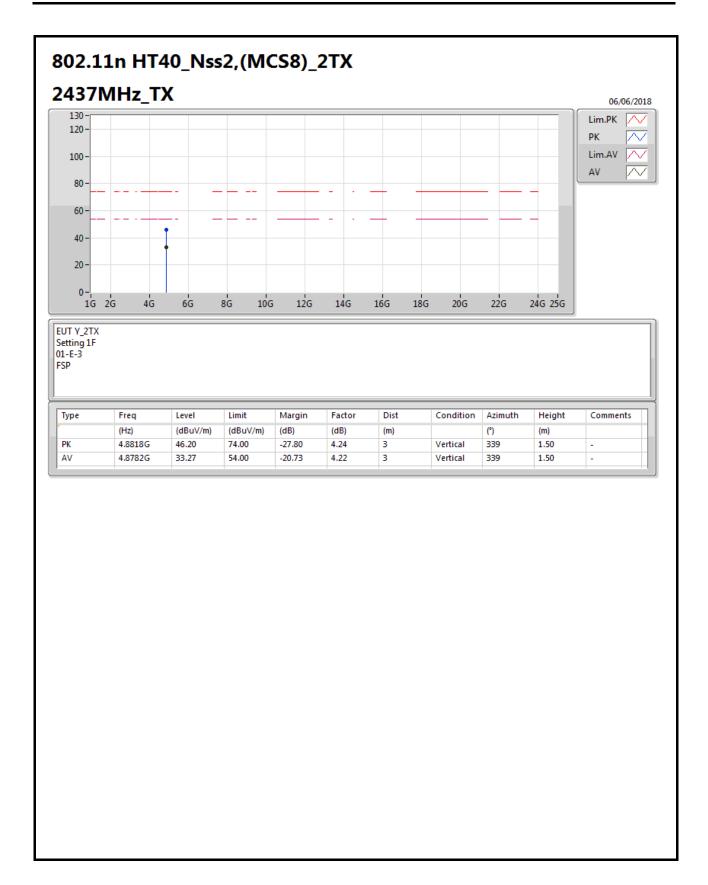




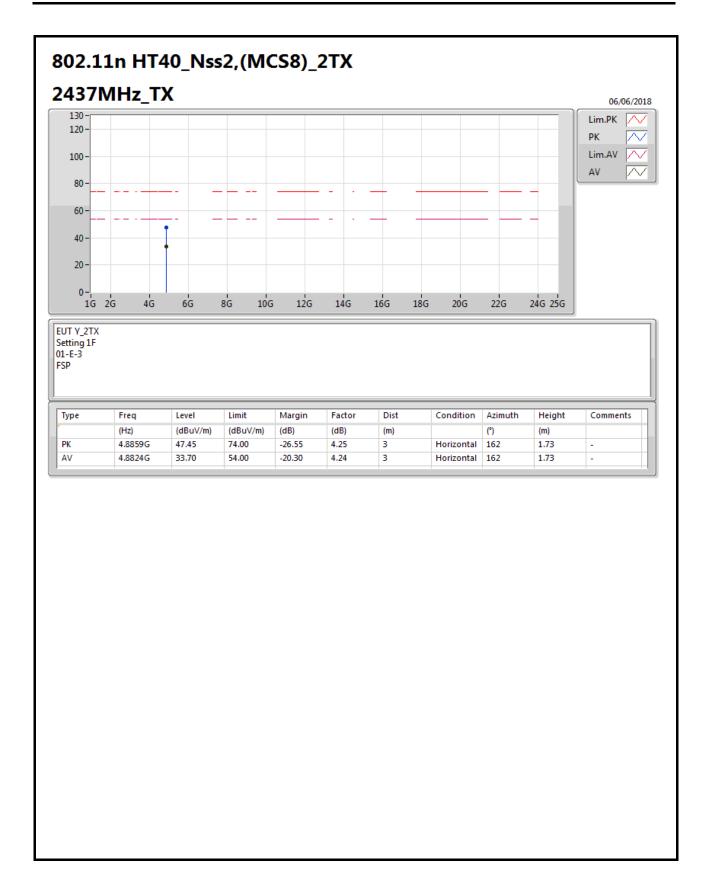




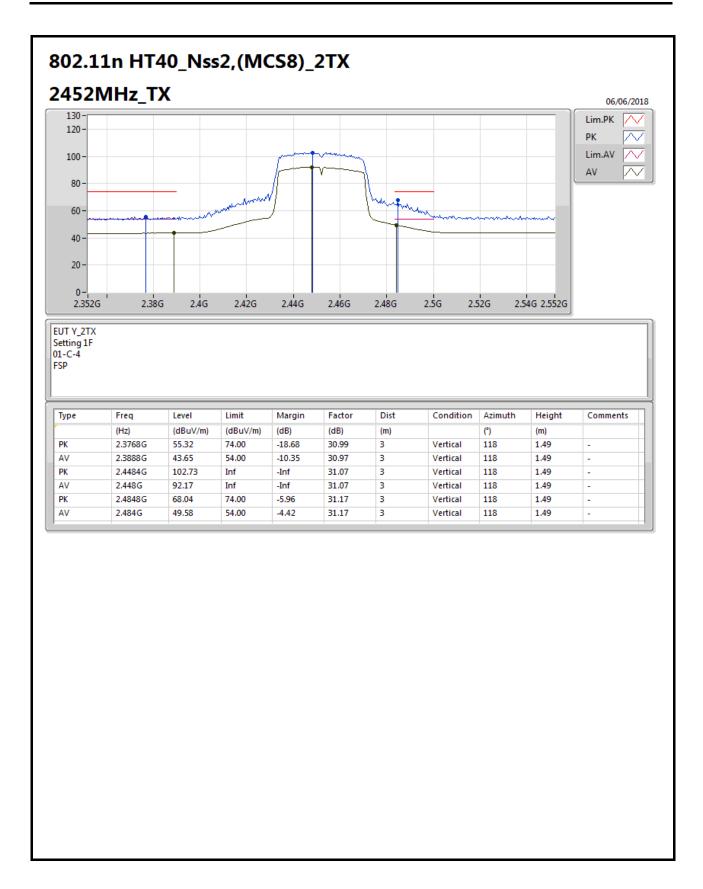




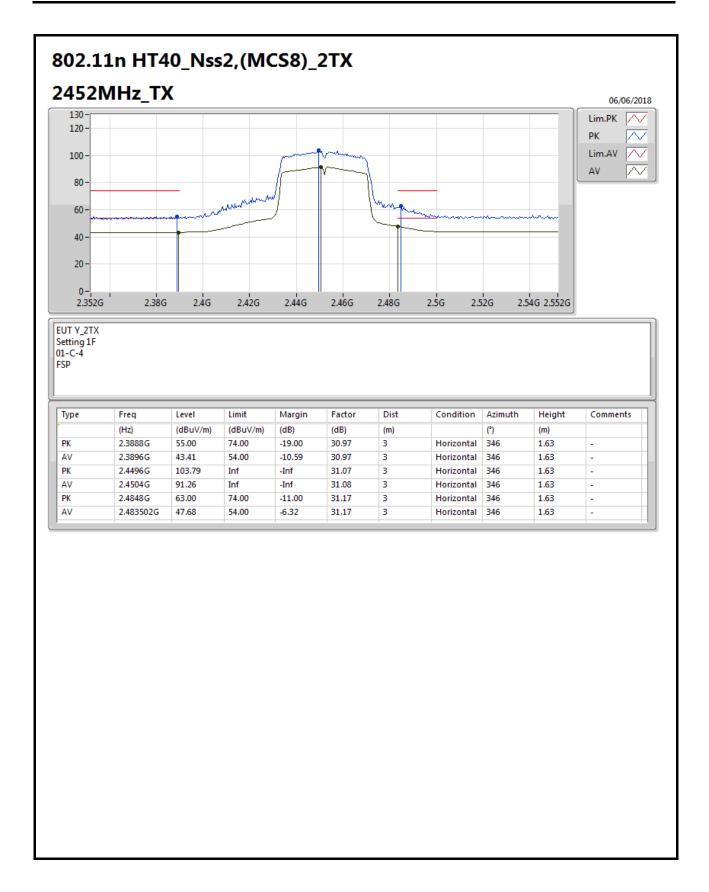




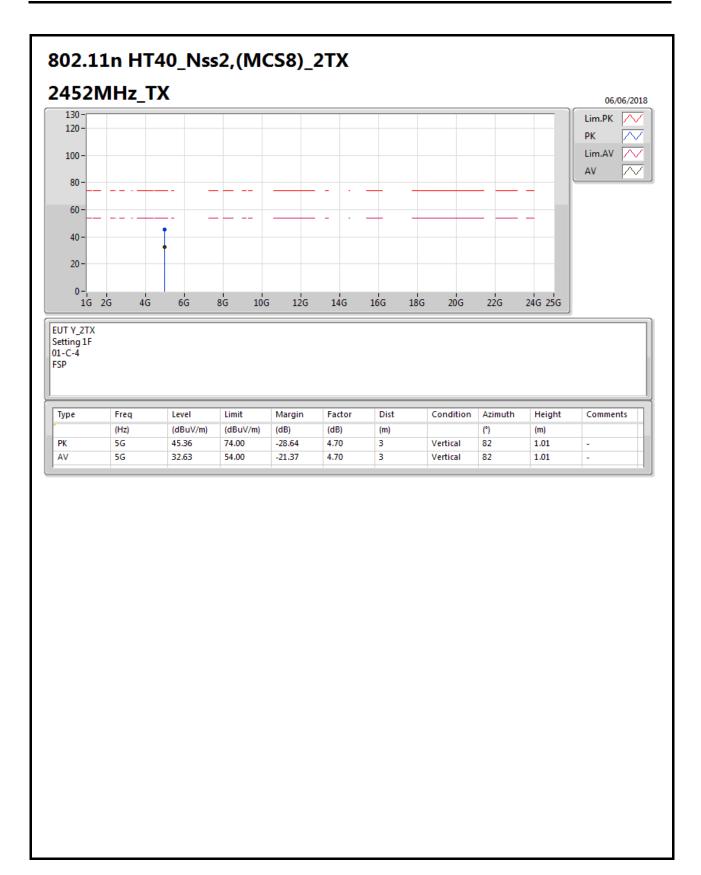




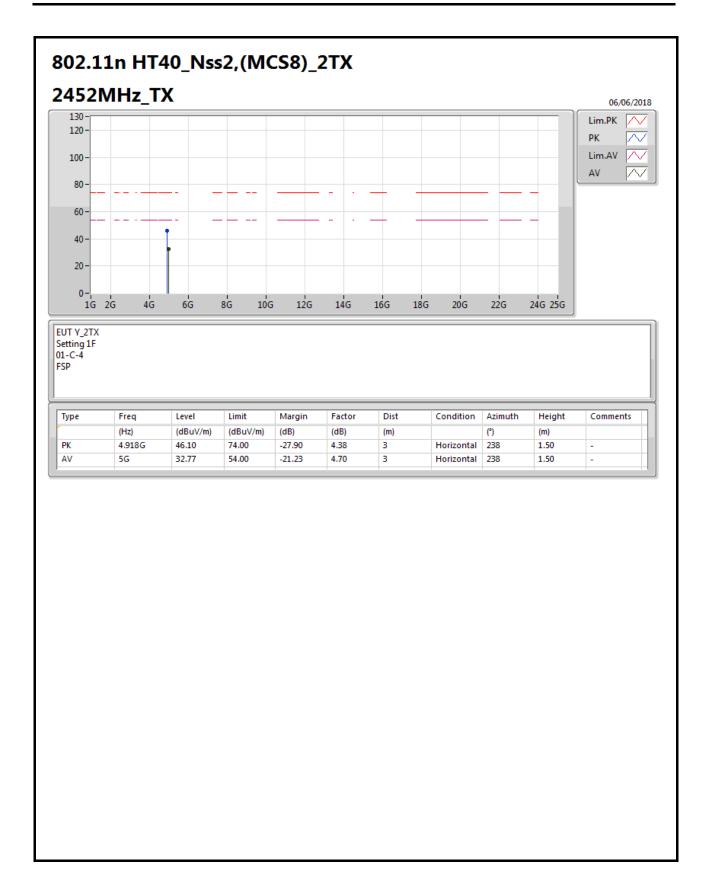














RSE TX above 1GHz Result

Appendix F.2

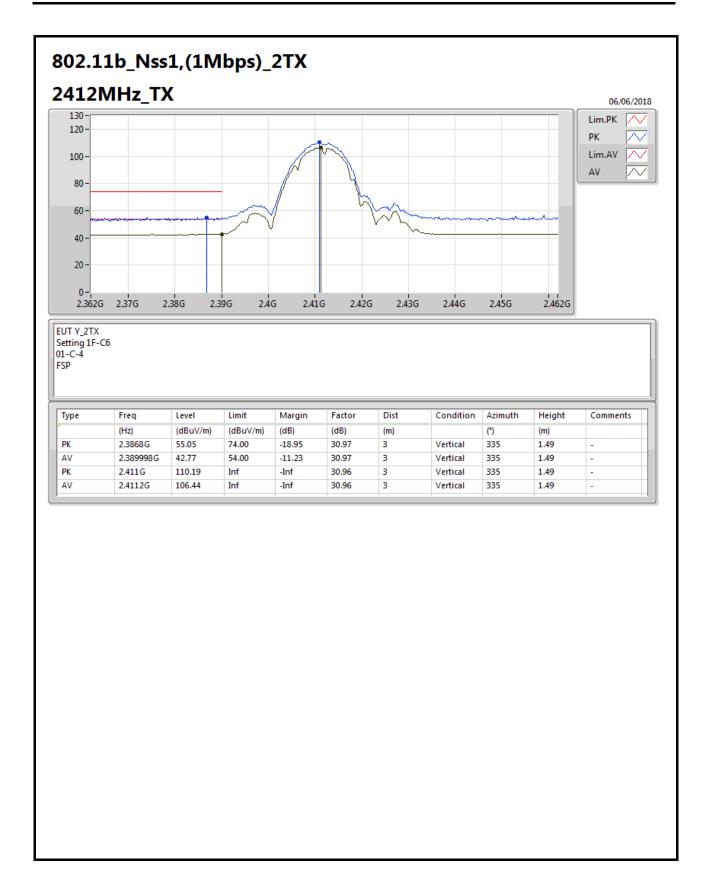
Test Mode: Mode 2

Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-		-
802.11b_Nss1,(1Mbps)_2TX	Pass	AV	4.87398G	50.42	54.00	-3.58	4.20	3	Horizontal	145	1.26	-

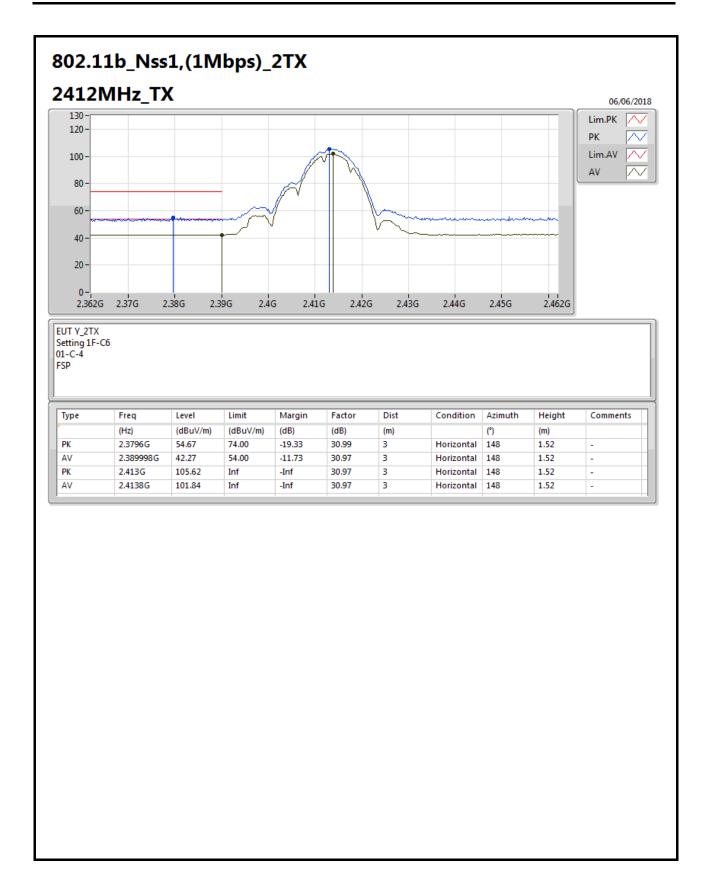
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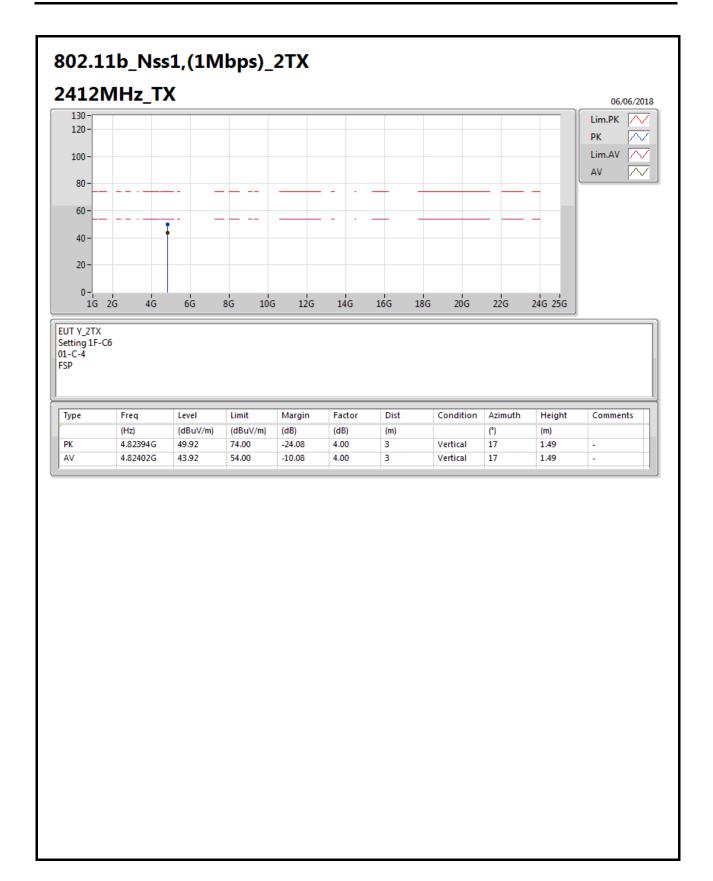
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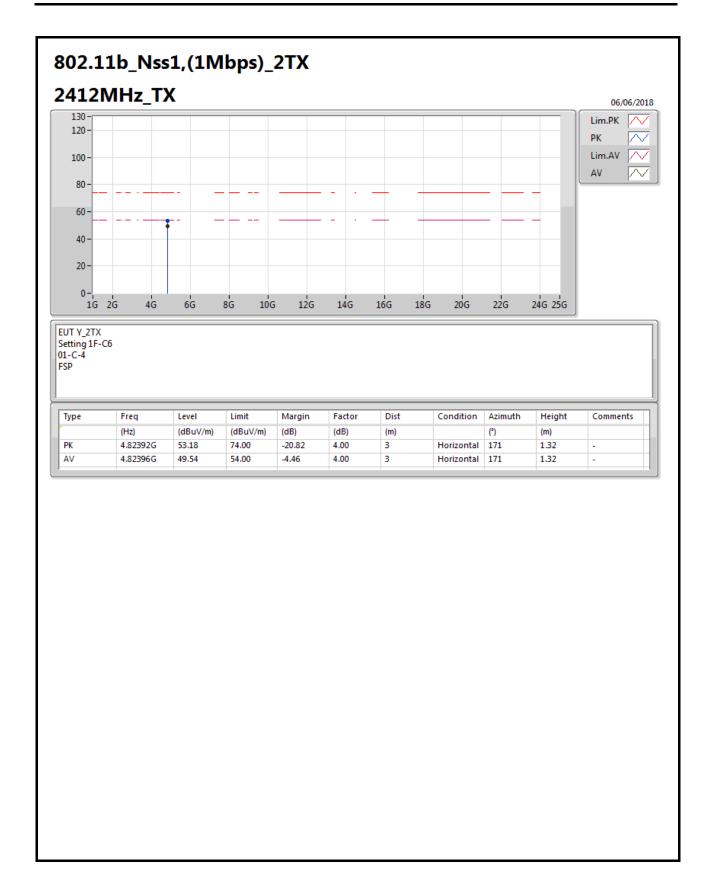
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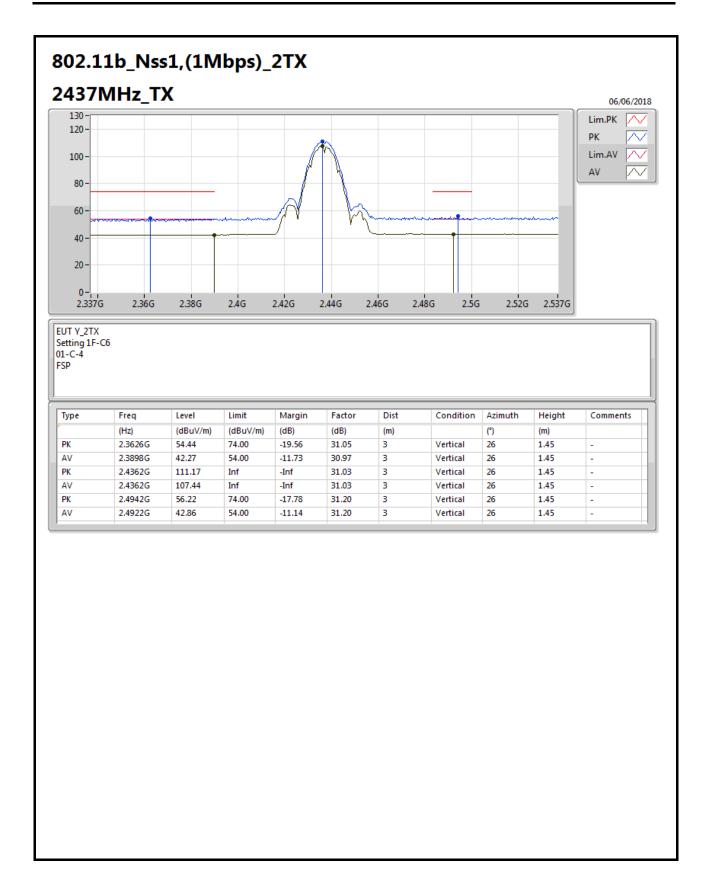
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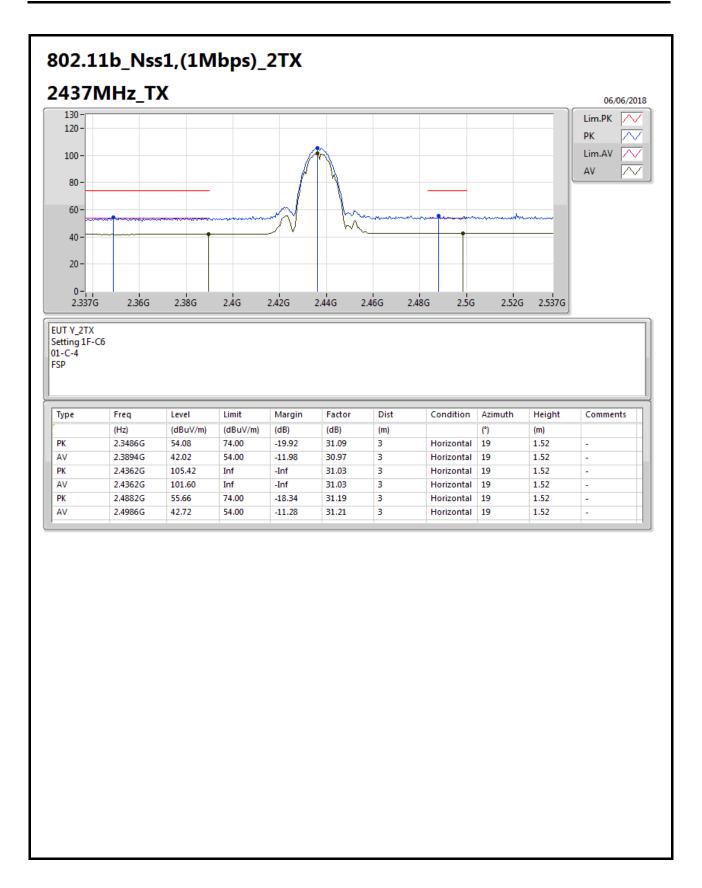
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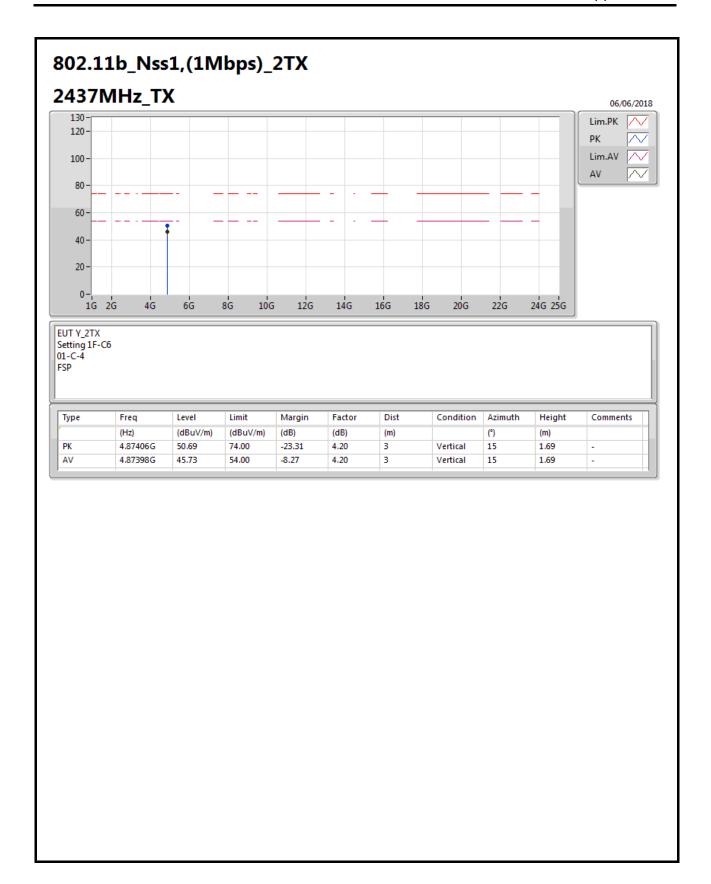
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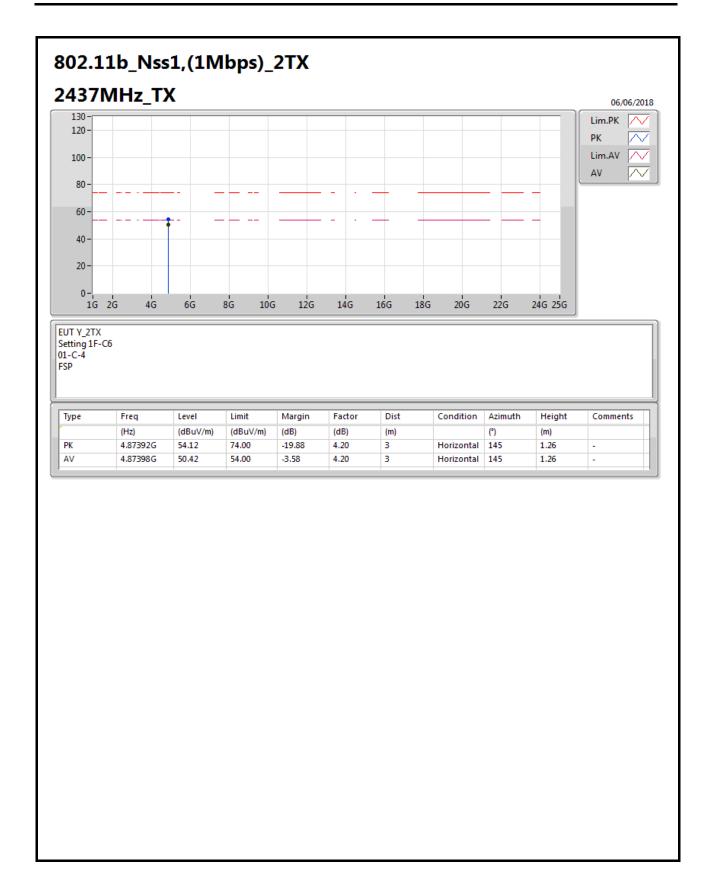
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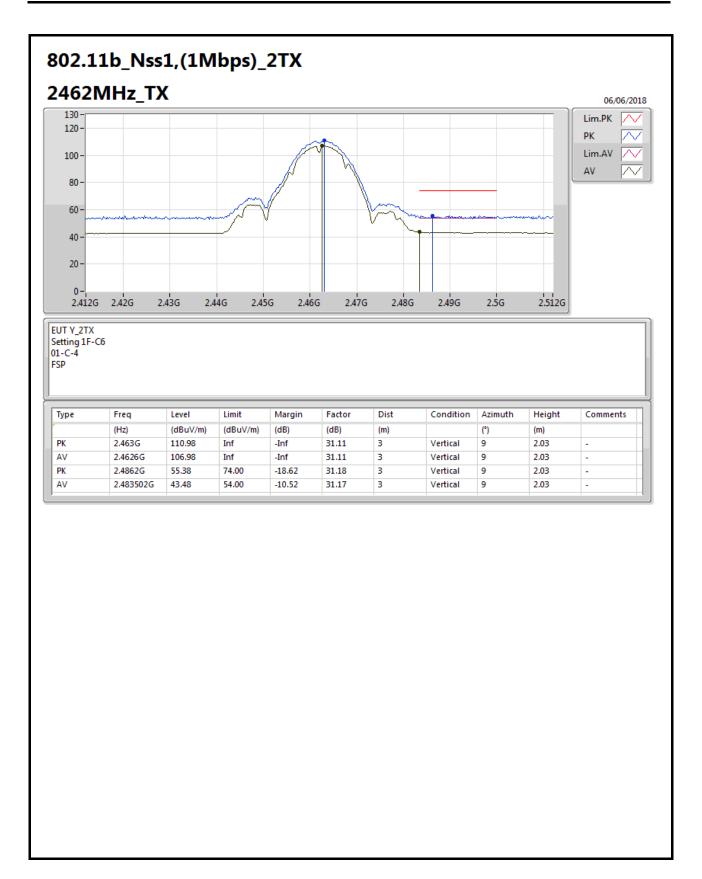


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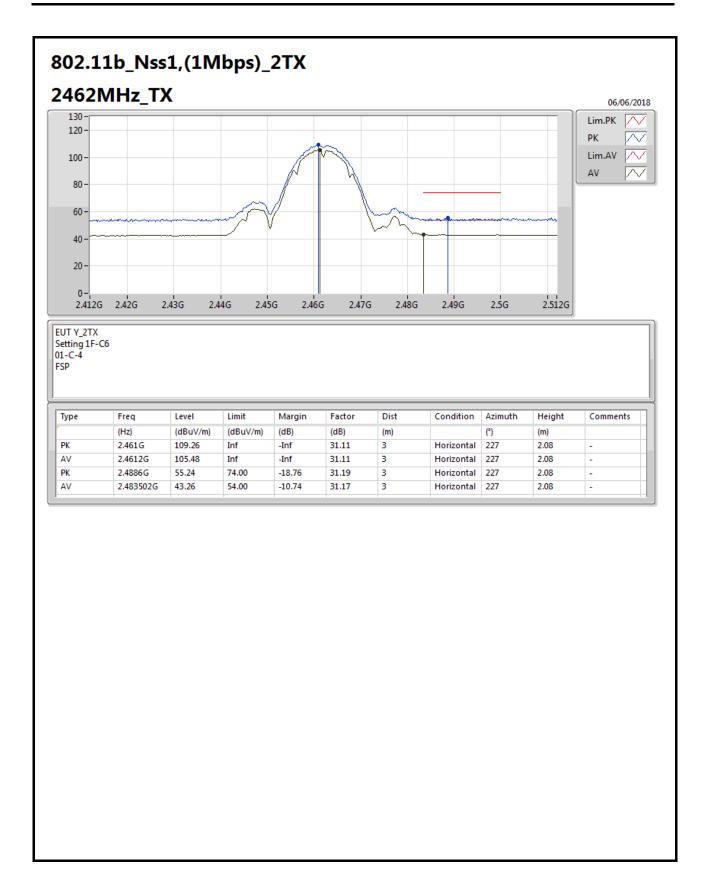




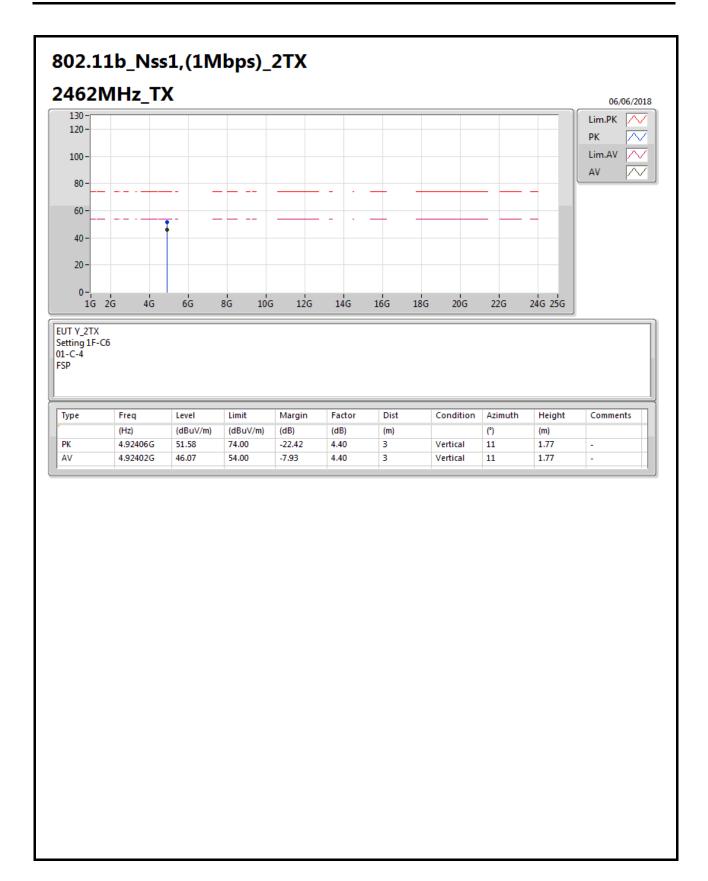


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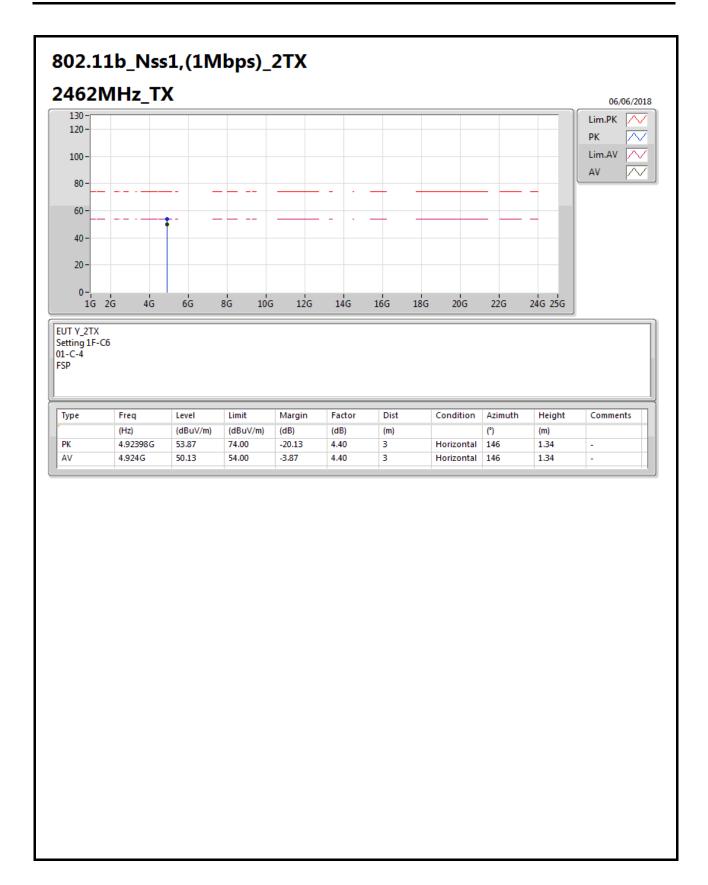






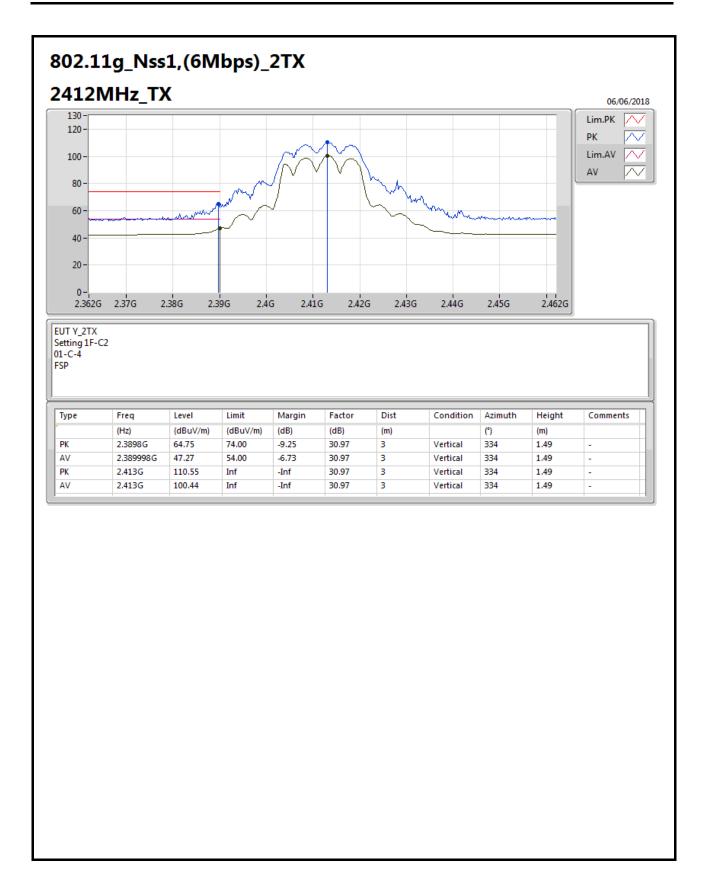






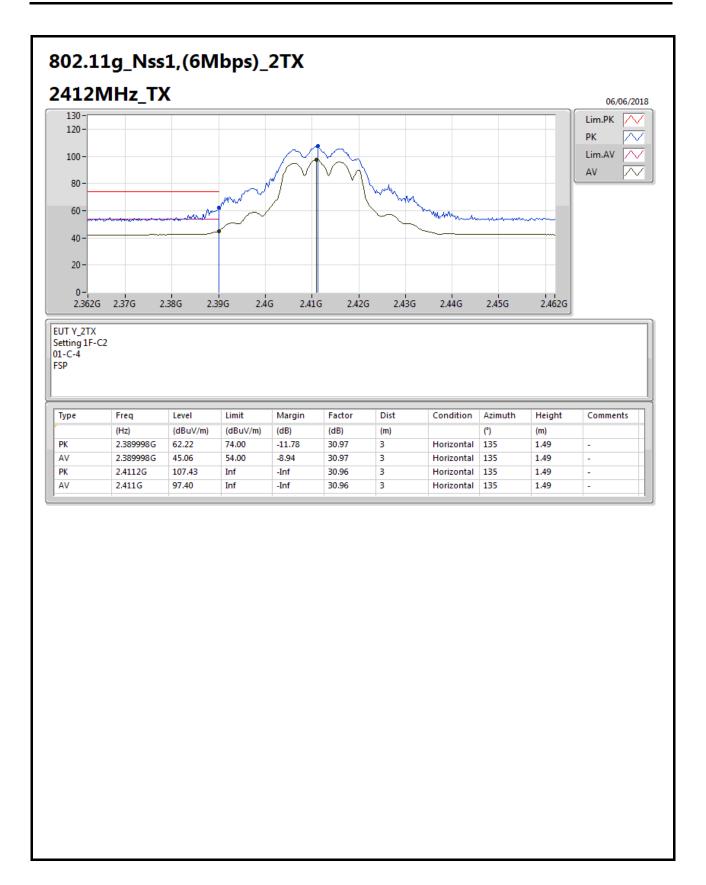
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