

Report No.: FR652509-01AA



FCC RADIO TEST REPORT

FCC ID : 2AI5IMTBK

Equipment: MEATER Block

Brand Name : MEATER

Model Name : MT-BL01

Applicant : Apption Labs Limited

7-8 Westbridge Close, Leicester, LE3 5LW, United Kingdom

Manufacturer : Abocom Systems, Inc.

No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.

Standard : 47 CFR FCC Part 15.247

The product was received on Sep. 19, 2017, and testing was started from Jun. 27, 2018 and completed on Jul. 17, 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: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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

TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB Ver1.0

Page Number

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: Aug. 10, 2018

Report Version : 01

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History of this test report

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Report No.	Version	Description	Issued Date
FR652509-01AA	01	Initial issue of report	Aug. 10, 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	Note
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	-

Note:

For powered from battery mode, it was supplied power by battery for EUT; It's not necessary to apply to AC Power-line Conducted Emissions test.

Reviewed by: Sam Chen Report Producer: Cindy Peng

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1 General Description

1.1 Information

1.1.1 RF General Information

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

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Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	1TX
2.4-2.4835GHz	802.11g	20	1TX
2.4-2.4835GHz	802.11n HT20	20	1TX

Note:

- ◆ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- ◆ 11g and HT20 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.

1.1.2 Antenna Information

Ant.	Port	Brand	Brand Model Name		Connector	Gain (dBi)	Remark
1	1	MEATER	N/A	Printed Antenna	N/A	1	2.4GHz WLAN
2	1	MEATER	N/A	Printed Antenna	N/A	1	Bluetooth

Note: There are two antennas.

For 2.4GHz WALN function (1TX/1RX):

Only Ant. 1 (Port 1) could transmit/receive simultaneously.

For Bluetooth function (1TX/1RX):

Only Ant. 2 (Port 1) could transmit/receive simultaneously.

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1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.998	0.009	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11g	0.988	0.052	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11n HT20	0.997	0.013	n/a (DC>=0.98)	n/a (DC>=0.98)

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Not	
•	DC is Duty Cycle.
*	DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

EUT Power Type	Fro	From 5Vdc (via USB cable) or AA battery*4 (6Vdc)				
Beamforming Function	☐ With beamforming ☐ Without beamforming					
Function	✓ Point-to-multipoint ☐ Point-to-point			Point-to-point		
Test Software Version	Hyperterminal_6.1					

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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

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	Serway Li	25°C / 58%	Jul. 17, 2018
Radiated	03CH01-CB	Joy Lou, Lance Hsieh, Jeff Wu	22°C / 54%	Jun. 27, 2018~Jul. 17, 2018
AC Conduction	CO01-CB	Max Lin	24°C / 55%	Jul. 02, 2018

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

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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

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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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2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	PowerSetting
802.11b_Nss1,(1Mbps)_1TX	-
2412MHz	8
2417MHz	7
2437MHz	7
2462MHz	7
802.11g_Nss1,(6Mbps)_1TX	-
2412MHz	7
2437MHz	7
2462MHz	7
802.11n HT20_Nss1,(MCS0)_1TX	-
2412MHz	7
2437MHz	7
2462MHz	7

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2.2 The Worst Case Measurement Configuration

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

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

Th	The Worst Case Mode for Following Conformance Tests		
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used ir regardless of spatial multiplexing MIMO configuration), the radiated test s be performed with highest antenna gain of each antenna type.			
Operating Mode < 1GHz Normal Link			
There are two modes of EUT, one is Link Mode, the other is Charge Mode. The worst case was found at Mode. So the measurement will follow this same test configuration.			
1	Link Mode - EUT Y axis, powered from adapter		
2	Link Mode - EUT Y axis, powered from battery		
For operating mode 2 is the worst case and it was record in this test report.			
Operating Mode > 1GHz	стх		
1	CTX - EUT Y axis		

The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode		
1 WLAN 2.4GHz + Bluetooth		
Refer to Sporton Test Report No.: FA652509-01 for Co-location RF Exposure Evaluation.		

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Note 1: The EUT can only be used at Y axis position.

Note 2: The EUT was powered by adapter, and the adapter was for measurement only, would not be marketed.

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Equipment	Brand Name	Model Name	FCC ID
Adapter	Apple	A1357	N/A

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.	No. Equipment Brand Name Model Name FCC ID			
1	iPad	Apple	A1430	N/A
2	NB	DELL	E6430	N/A
3	AP Router	Planex	GW-AP54SGX	KA220030603014-1
4	MEATER Probe (Device)	Apption Labs	MT-PR00	2AI5IMTPR
5	Adapter	Apple	A1357	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	WLAN AP	NETGEAR	WNDR3300v2	PY309300116	
3	3 iPad Apple A1430 N/A		N/A		
4	MEATER Probe (Device)	Apption Labs	MT-PR00	2AI5IMTPR	

For Test Site No: 03CH01-CB (above 1GHz) and TH01-CB

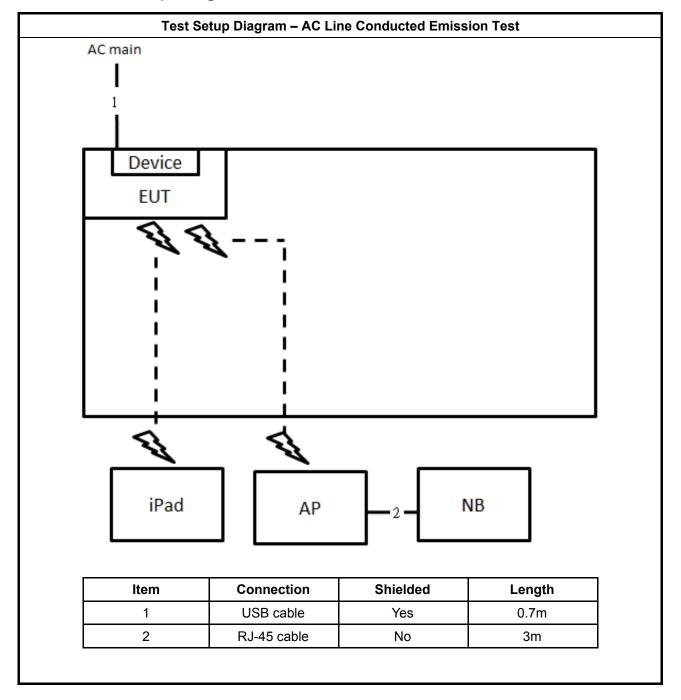
	Support Equipment			
No.	Equipment	Brand Name	Model Name	FCC ID
1	NB	DELL	E4300	N/A
2	Test fixture	iComm	S274_ADB	N/A
3	MEATER Probe (Device)	Apption Labs	MT-PR00	2AI5IMTPR

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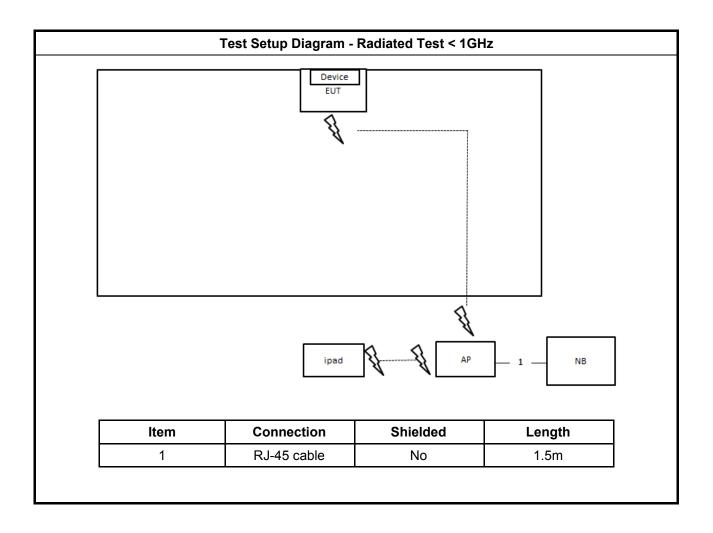
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2.6 Test Setup Diagram



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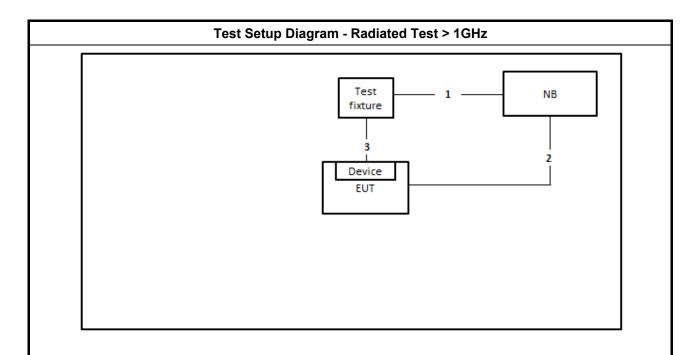
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Item	Connection	Shielded	Length
1	USB cable	No	2m
2	USB cable	No	1.5m
3	Console cable	No	0.1m

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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 the frequency.		

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3.1.2 Measuring Instruments

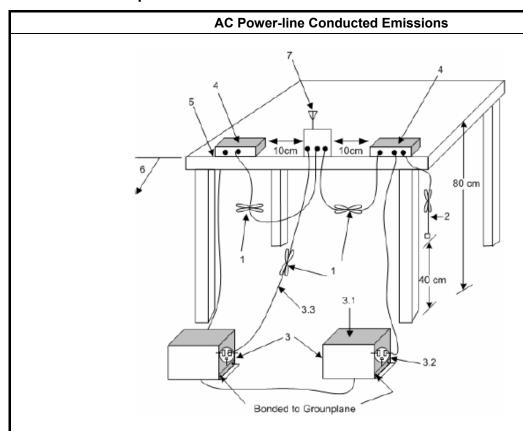
Refer a test equipment and calibration data table in this test report.

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

Emission Bandwidth						
Spectrum Analyzer						

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 $G_{TX} \le 6$ 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

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 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.

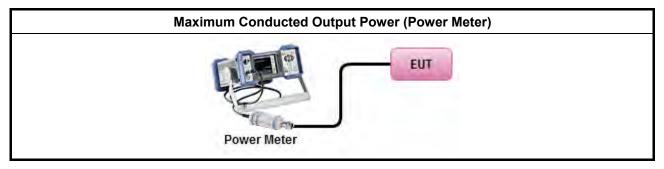
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3.3.3 Test Procedures

		Test Method
•	Maximum Peak Conducted O	utput Power
	Refer as FCC KDB 5580	74, clause 9.1.1 Option 1 (RBW ≥ EBW method).
	☐ Refer as FCC KDB 5580	74, 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 5580	74, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).
	☐ Refer as FCC KDB 5580	74, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)
	duty cycle < 98% and average	e over on/off periods with duty factor
	☐ Refer as FCC KDB 5580	74, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
	☐ Refer as FCC KDB 5580	74, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
	Measurement using a power	meter (PM)
	□ Refer as FCC KDB 5580	74, clause 9.2.3 Method AVGPM (using an RF average power meter).
	Refer as FCC KDB 558 meter).	074, clause 9.2.3.2 Method AVGPM-G (using an gate RF average power
•	For conducted measurement.	
	Refer as FCC KDB 6 approach, measured all	ple transmit chains using options given below: 62911, In-band power measurements. Using the measure-and-sum transmit ports individually. Sum the power (in linear power units e.g., mW) idual sample and save them.
	$P_{\text{total}} = P_1 + P_2 + \dots + P_n$	s, EIRP calculation could be following as methods: [mW] and transfer to log unit [dBm])

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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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3.4.2 Measuring Instruments

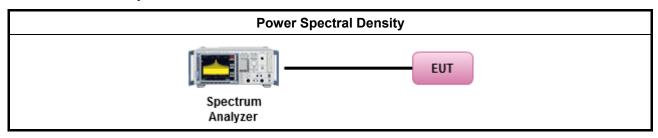
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

	Test Method	
•	Peak power spectral density procedures that the same method as used to determine the conduct output power. If maximum peak conducted output power was measured to demonstrate compliance 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 of the average PSD procedures shall be used, as applicable based on the following criteria (the per PSD procedure is also an acceptable option).	to um one
	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 (spectral 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 (spectral trace averaging).	
	Refer as FCC KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)	
•	For conducted measurement.	
	If The EUT supports multiple transmit chains using options given below:	
	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 6629 In-band power spectral density (PSD). Sample all transmit ports simultaneously using spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit possumming can be performed. (i.e., in the first spectral bin of output 1 is summed with that in 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 the amplitude (power) values for the different transmit chains and use this as the new dataset.	ort the the up
	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectral maximum value 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 the summed mathematically in linear power units across the outputs. These operations shall performed separately over frequency spans that have different out-of-band or spurice emission limits,	he en be
	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chain 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.	ins

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3.4.4 Test Setup



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3.4.5 Test Result of Power Spectral Density

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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.

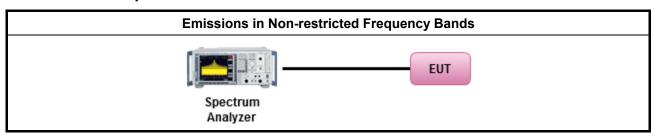
3.5.2 Measuring Instruments

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 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.

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3.6.3 Test Procedures

		$\overline{}$					
	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%	5)					
	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	e.					
	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 radia measurements, emissions within 2 MHz of the authorized band edge may be measured using marker-delta method described below. 						
	 Refer as FCC KDB 558074, clause 13.2 (ANSI C63.10, clause 6.9.3) for marker-delta method band-edge measurements. 	for					
	 Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using band power and summing the spectral levels (i.e., 1 MHz). 	the					
•	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, there resulting in apparent failures to satisfy the out-of-band limits even if the device is actu compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.	ally					

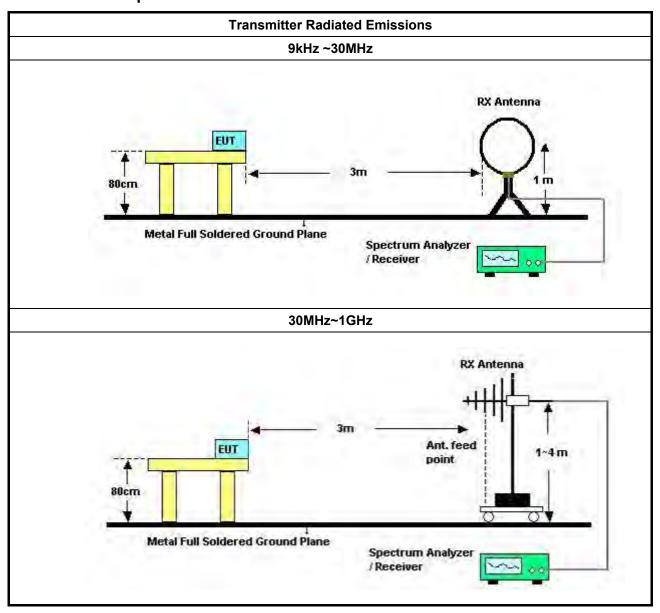
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3.6.4 Test Setup



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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	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 31, 2018	Jan. 30, 2019	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50 -16-2	04083	150kHz ~ 100MHz	Dec. 20, 2017	Dec. 19, 2018	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 29, 2017	Dec. 28, 2018	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	150kHz ~ 30MHz	May 22, 2018	May 21, 2019	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2018	Mar. 15, 2019	Radiation (03CH01-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)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA917025 2	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA917025 2	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 2019	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)
Pre-Amplifier	MITEQ	TTA1840-35- HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	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)

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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	h Woken	Waken High	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation
Tri Gabic-riigii	VVOKEII	Cable-16+17	IN/A	1 G112 7 10 G112	Oct. 11, 2017	Oct. 10, 2010	(03CH01-CB)
RF Cable-high	Woken	High	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation
Tri Cable-High	vvoken	Cable-40G#1	IN/A	16GH2 ~ 40 GH2	Oct. 11, 2017	Oct. 10, 2010	(03CH01-CB)
RF Cable-high	Woken	High	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation
Ki Cable-nigh	vvoken	Cable-40G#2	IN/A	16GH2 ~ 40 GH2	Oct. 11, 2017	Oct. 10, 2016	(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	\\/_\.	DC400	High Cable 00	4.011- 20.5.011-	O-t 44 2047	0-4 40 2040	Conducted
RF Cable-High	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 11, 2017	Oct. 10, 2018	(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)

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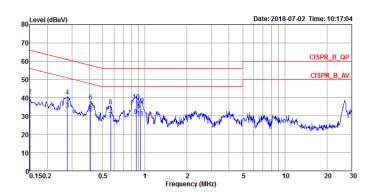
Note: Calibration Interval of instruments listed above is one year.

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

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AC Power-line Conducted Emissions Result

AC Power-line Conducted Emissions Result					
Operating Mode 1 Power Phase Line					
Operating Function Normal Link					



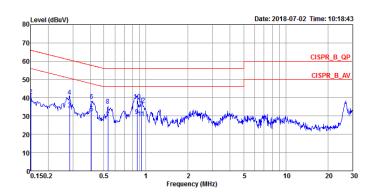
	Freq	Level	over Limit	Limit Line	кеаа Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	34.17	-21.83	56.00	24.10	9.91	0.16	Average	LINE
2	0.1500	41.11	-24.89	66.00	31.04	9.91	0.16	QP	LINE
3	0.2788	33.80	-17.05	50.85	23.76	9.91	0.13	Average	LINE
4	0.2788	40.79	-20.06	60.85	30.75	9.91	0.13	QP	LINE
5	0.4083	31.56	-16.12	47.68	21.53	9.91	0.12	Average	LINE
6	0.4083	38.19	-19.49	57.68	28.16	9.91	0.12	QP	LINE
7	0.5701	28.33	-17.67	46.00	18.26	9.92	0.15	Average	LINE
8	0.5701	35.40	-20.60	56.00	25.33	9.92	0.15	QP	LINE
9	0.8618	30.19	-15.81	46.00	20.07	9.93	0.19	Average	LINE
10	0.8618	38.48	-17.52	56.00	28.36	9.93	0.19	QP	LINE
11	0.9282	29.14	-16.86	46.00	19.02	9.93	0.19	Average	LINE
12	0.9282	36.08	-19.92	56.00	25.96	9.93	0.19	QP	LINE

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

AC Power-line Conducted Emissions Result							
Operating Mode	1	Power Phase	Neutral				
Operating Function Normal Link							



			0ver	Limit	Read	LISN	Cable		
	Freq	Level	Limit	Line	Level	Factor	Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	34.37	-21.63	56.00	24.29	9.92	0.16	Average	NEUTRAL
2	0.1500	41.07	-24.93	66.00	30.99	9.92	0.16	QP	NEUTRAL
3	0.2848	33.55	-17.13	50.68	23.50	9.92	0.13	Average	NEUTRAL
4	0.2848	40.68	-20.00	60.68	30.63	9.92	0.13	QP	NEUTRAL
5	0.4083	31.55	-16.13	47.68	21.51	9.92	0.12	Average	NEUTRAL
6	0.4083	38.30	-19.38	57.68	28.26	9.92	0.12	QP	NEUTRAL
7	0.5350	28.74	-17.26	46.00	18.67	9.92	0.15	Average	NEUTRAL
8	0.5350	35.69	-20.31	56.00	25.62	9.92	0.15	QP	NEUTRAL
9	0.8618	30.20	-15.80	46.00	20.08	9.93	0.19	Average	NEUTRAL
10	0.8618	38.31	-17.69	56.00	28.19	9.93	0.19	QP	NEUTRAL
11	0.9282	29.01	-16.99	46.00	18.89	9.93	0.19	Average	NEUTRAL
12	0.9282	36.19	-19.81	56.00	26.07	9.93	0.19	QP	NEUTRAL

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
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_1TX	10.05M	15.067M	15M1G1D	10.05M	14.993M
802.11g_Nss1,(6Mbps)_1TX	16.35M	16.667M	16M7D1D	16.35M	16.592M
802.11n HT20_Nss1,(MCS0)_1TX	17.6M	17.866M	17M9D1D	17.55M	17.741M

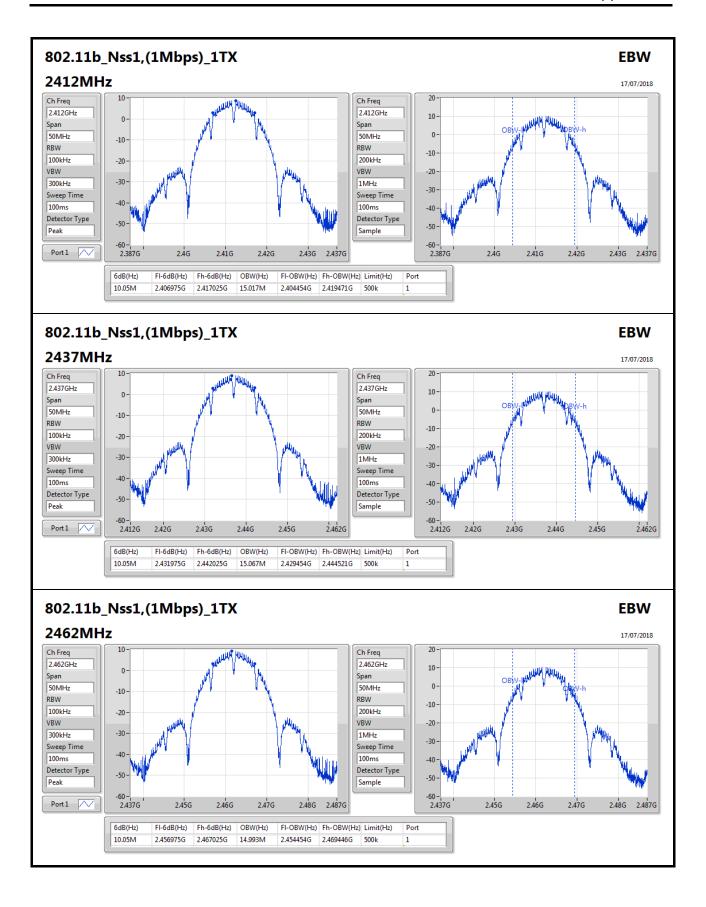
Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth; Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth;

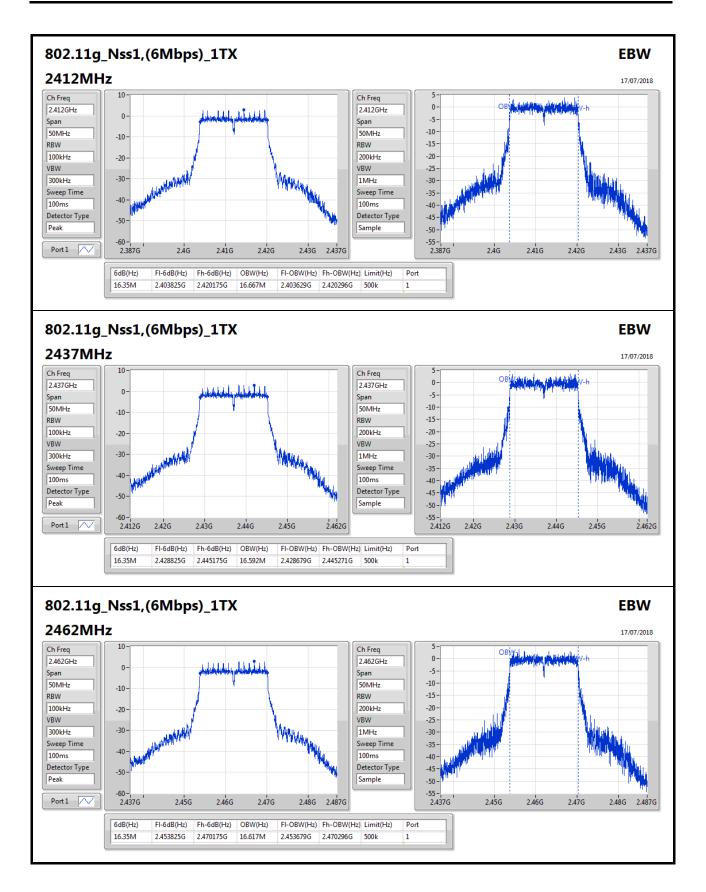
Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	10.05M	15.017M
2437MHz	Pass	500k	10.05M	15.067M
2462MHz	Pass	500k	10.05M	14.993M
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	16.35M	16.667M
2437MHz	Pass	500k	16.35M	16.592M
2462MHz	Pass	500k	16.35M	16.617M
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-
2412MHz	Pass	500k	17.6M	17.791M
2437MHz	Pass	500k	17.55M	17.741M
2462MHz	Pass	500k	17.6M	17.866M

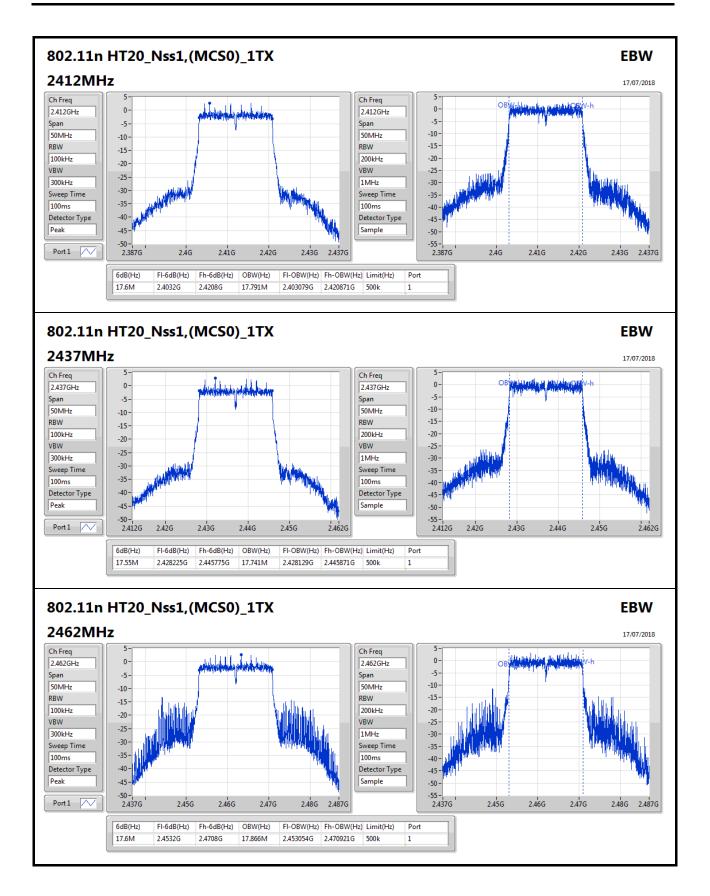
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth;

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Appendix C **AV Power Result**

Summary

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_1TX	18.67	0.07362
802.11g_Nss1,(6Mbps)_1TX	14.21	0.02636
802.11n HT20_Nss1,(MCS0)_1TX	14.23	0.02649

Result

Mode	Result	DG	Port 1	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	1.00	18.38	18.38	30.00
2417MHz	Pass	1.00	18.65	18.65	30.00
2437MHz	Pass	1.00	18.67	18.67	30.00
2462MHz	Pass	1.00	18.55	18.55	30.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	1.00	14.21	14.21	30.00
2437MHz	Pass	1.00	14.12	14.12	30.00
2462MHz	Pass	1.00	14.02	14.02	30.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-
2412MHz	Pass	1.00	14.23	14.23	30.00
2437MHz	Pass	1.00	14.14	14.14	30.00
2462MHz	Pass	1.00	14.03	14.03	30.00

DG = Directional Gain; Port X = Port X output power
Note : Conducted average output power is for reference only

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Appendix D **PSD Result**

Summary

Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_1TX	-7.06
802.11g_Nss1,(6Mbps)_1TX	-12.47
802.11n HT20_Nss1,(MCS0)_1TX	-12.01

RBW=3kHz.

Result

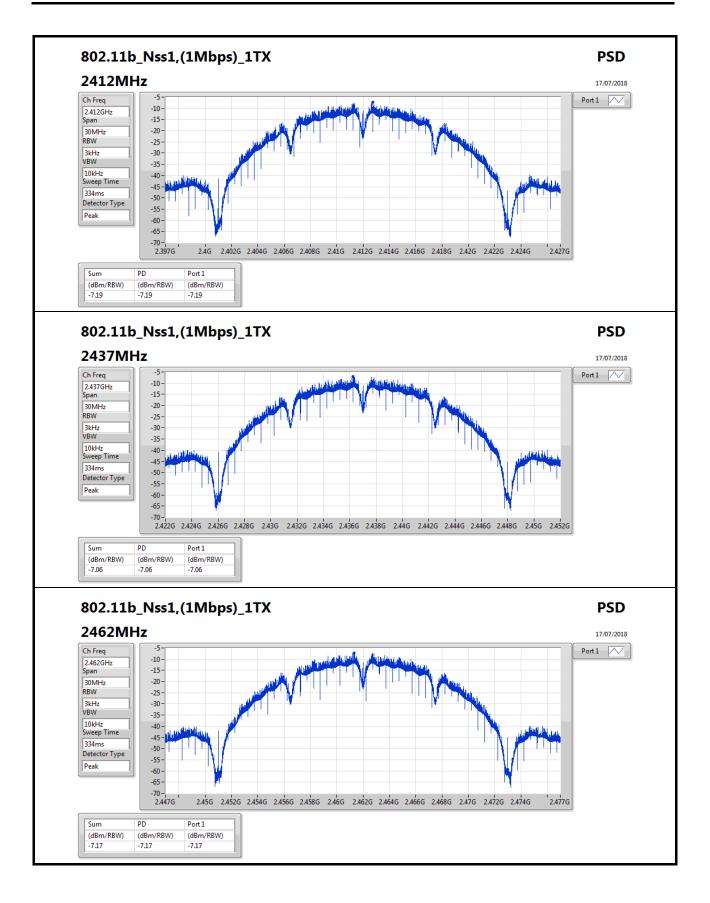
Mode	Result	DG	Port 1	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	1.00	-7.19	-7.19	8.00
2437MHz	Pass	1.00	-7.06	-7.06	8.00
2462MHz	Pass	1.00	-7.17	-7.17	8.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	1.00	-12.47	-12.47	8.00
2437MHz	Pass	1.00	-12.66	-12.66	8.00
2462MHz	Pass	1.00	-12.63	-12.63	8.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-
2412MHz	Pass	1.00	-12.01	-12.01	8.00
2437MHz	Pass	1.00	-12.16	-12.16	8.00
2462MHz	Pass	1.00	-12.19	-12.19	8.00

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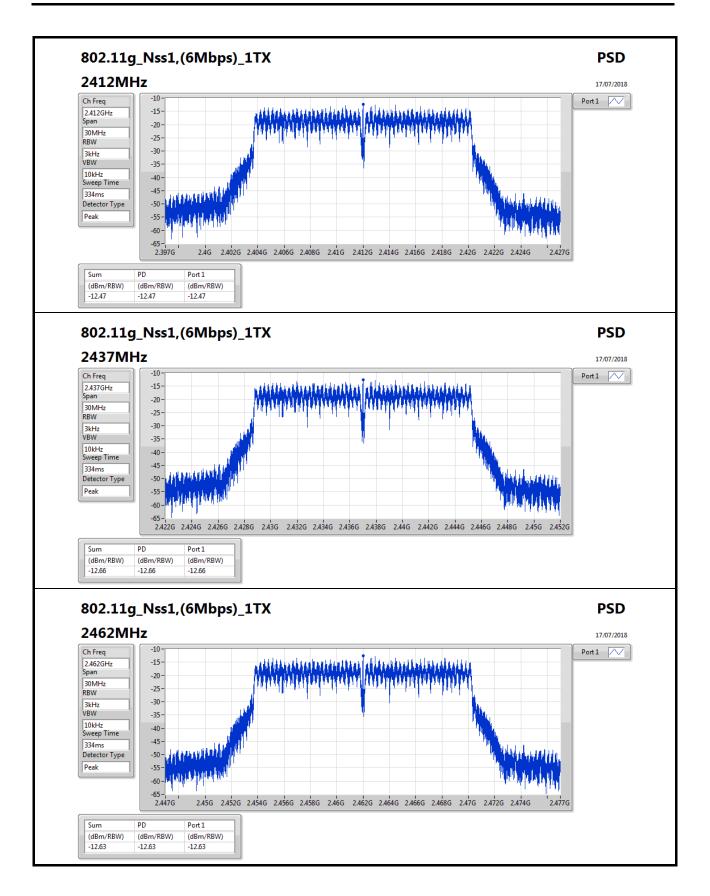
DG = Directional Gain; RBW=3kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port Xpower density;



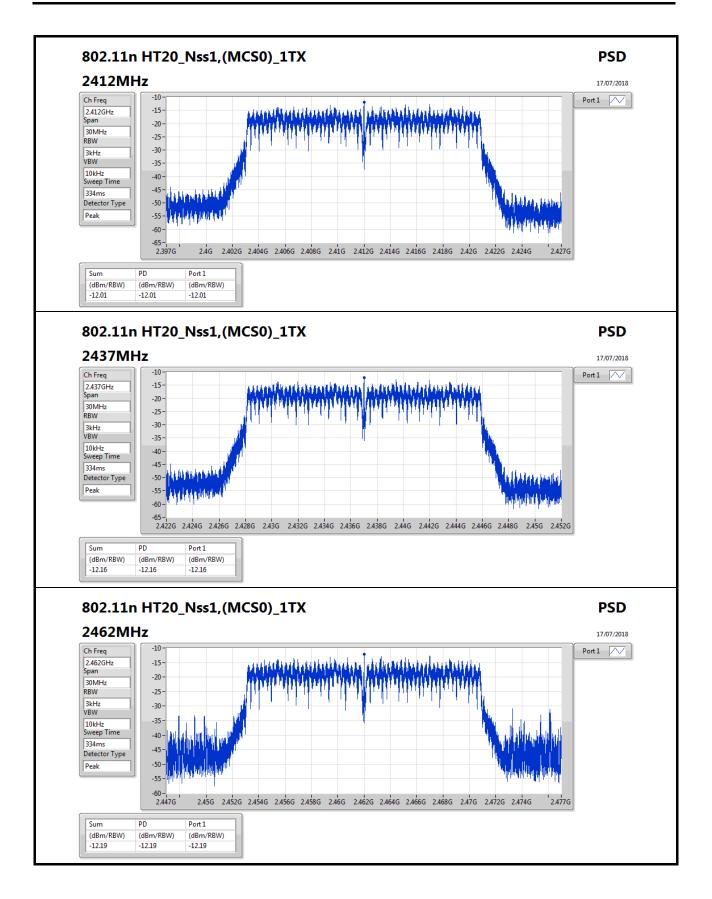
PSD Result













CSE Non-restricted Band Result

Appendix E

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Summary

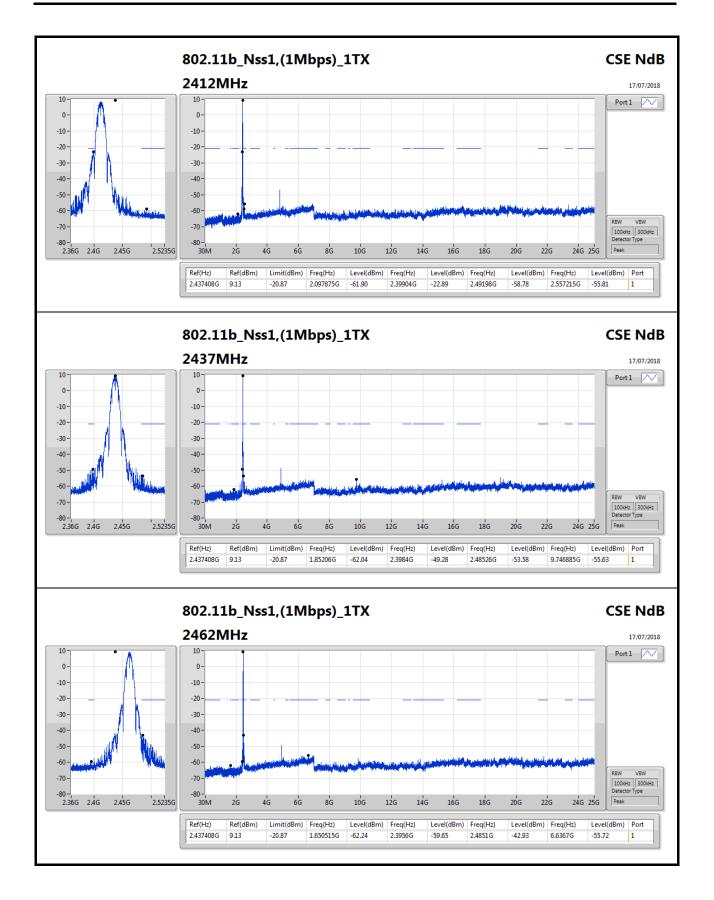
Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2.4-2.4835GHz	-		-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_1TX	Pass	2.437408G	9.13	-20.87	2.097875G	-61.90	2.39904G	-22.89	2.49198G	-58.78	2.557215G	-55.81	1
802.11g_Nss1,(6Mbps)_1TX	Pass	2.441917G	2.87	-27.13	1.95924G	-61.82	2.39968G	-28.18	2.49142G	-60.17	2.560024G	-54.98	1
802.11n HT20_Nss1,(MCS0)_1TX	Pass	2.444589G	2.79	-27.21	1.79148G	-61.72	2.39872G	-29.41	2.49934G	-59.33	2.557215G	-55.89	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)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.437408G	9.13	-20.87	2.097875G	-61.90	2.39904G	-22.89	2.49198G	-58.78	2.557215G	-55.81	1
2437MHz	Pass	2.437408G	9.13	-20.87	1.85206G	-62.04	2.3984G	-49.28	2.48526G	-53.58	9.746885G	-55.63	1
2462MHz	Pass	2.437408G	9.13	-20.87	1.650515G	-62.24	2.3956G	-59.65	2.4851G	-42.93	6.6367G	-55.72	1
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-	-		-	-	-	-
2412MHz	Pass	2.441917G	2.87	-27.13	1.95924G	-61.82	2.39968G	-28.18	2.49142G	-60.17	2.560024G	-54.98	1
2437MHz	Pass	2.441917G	2.87	-27.13	1.64003G	-62.51	2.39704G	-54.33	2.48438G	-57.57	2.557215G	-55.91	1
2462MHz	Pass	2.441917G	2.87	-27.13	1.797305G	-62.09	2.39176G	-59.60	2.48382G	-42.43	2.557215G	-55.46	1
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.444589G	2.79	-27.21	1.79148G	-61.72	2.39872G	-29.41	2.49934G	-59.33	2.557215G	-55.89	1
2437MHz	Pass	2.444589G	2.79	-27.21	851.325M	-62.37	2.39896G	-52.24	2.48478G	-58.45	2.557215G	-55.67	1
2462MHz	Pass	2.444589G	2.79	-27.21	2.1503G	-59.54	2.39936G	-59.91	2.48502G	-31.83	6.167503G	-55.52	1

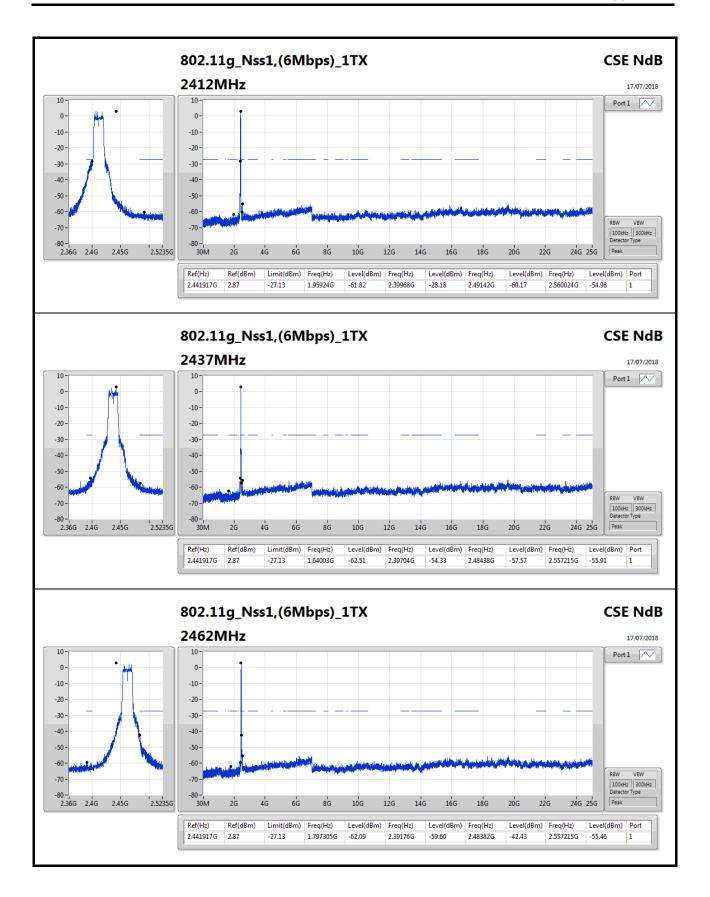
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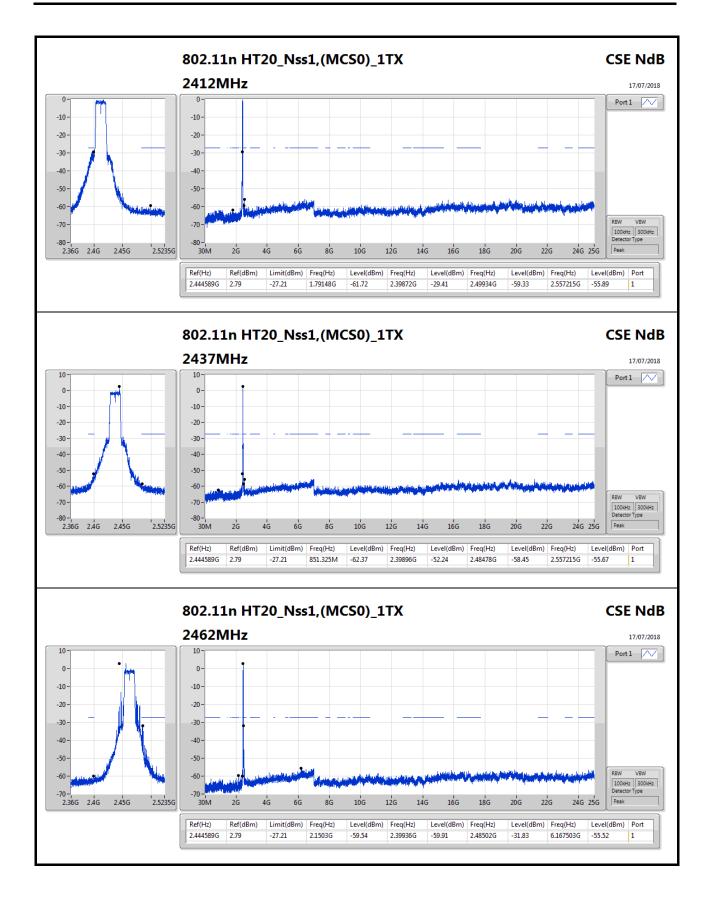
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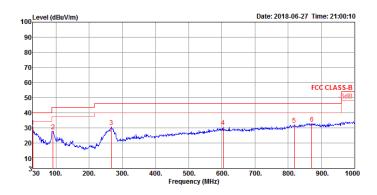
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RSE below 1GHz Result										
Operating Mode	2	Polarization Horizontal								
Operating Function	Normal Link									

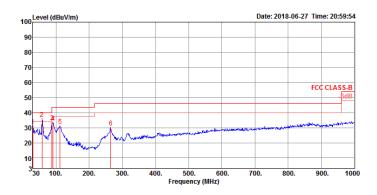


	Freq	Level	Line	Limit					A/POS	1/205	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	30.70	40.00	-9.30	38.35	0.67	24.29	32.61	125	98	Peak	HORIZONTAL
2	91.11	27.78	43.50	-15.72	44.05	1.32	14.97	32.56	200	211	Peak	HORIZONTAL
3	267.65	30.67	46.00	-15.33	41.00	2.76	19.36	32.45	300	348	Peak	HORIZONTAL
4	604.24	30.45	46.00	-15.55	33.76	4.70	24.52	32.53	300	301	Peak	HORIZONTAL
5	818.61	31.85	46.00	-14.15	32.50	5.72	25.87	32.24	150	24	Peak	HORIZONTAL
6	870.99	32.84	46.00	-13.16	32.39	6.00	26.42	31.97	125	293	Peak	HORIZONTAL

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit. Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

RSE below 1GHz Result

RSE below 1GHz Result										
Operating Mode	2	Polarization Vertical								
Operating Function	Normal Link									



	Freq	Level						Preamp Factor		T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	31.42	40.00	-8.58	39.07	0.67	24.29	32.61	100	200	Peak	VERTICAL
2	58.13	35.82	40.00	-4.18	54.82	1.12	12.46	32.58	100	220	Peak	VERTICAL
3	88.20	33.76	43.50	-9.74	50.66	1.27	14.39	32.56	100	234	Peak	VERTICAL
4	91.11	33.47	43.50	-10.03	49.74	1.32	14.97	32.56	100	78	Peak	VERTICAL
5	112.45	31.14	43.50	-12.36	44.31	1.62	17.75	32.54	100	38	Peak	VERTICAL
6	264.74	30.11	46.00	-15.89	40.31	2.74	19.51	32.45	200	50	Peak	VERTICAL

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit. Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)



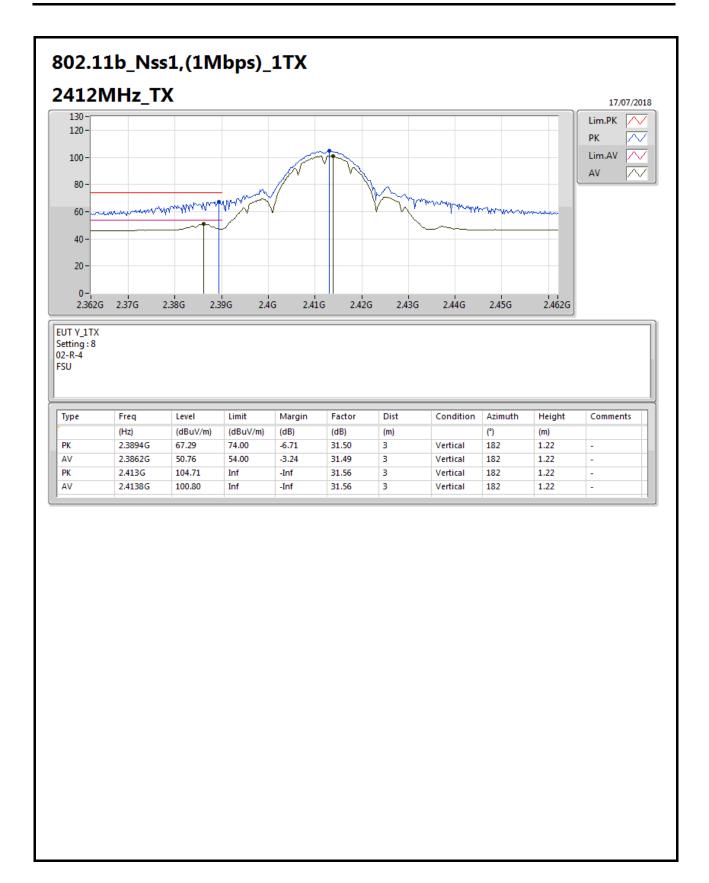
RSE TX above 1GHz Result

Appendix F.2

Summary

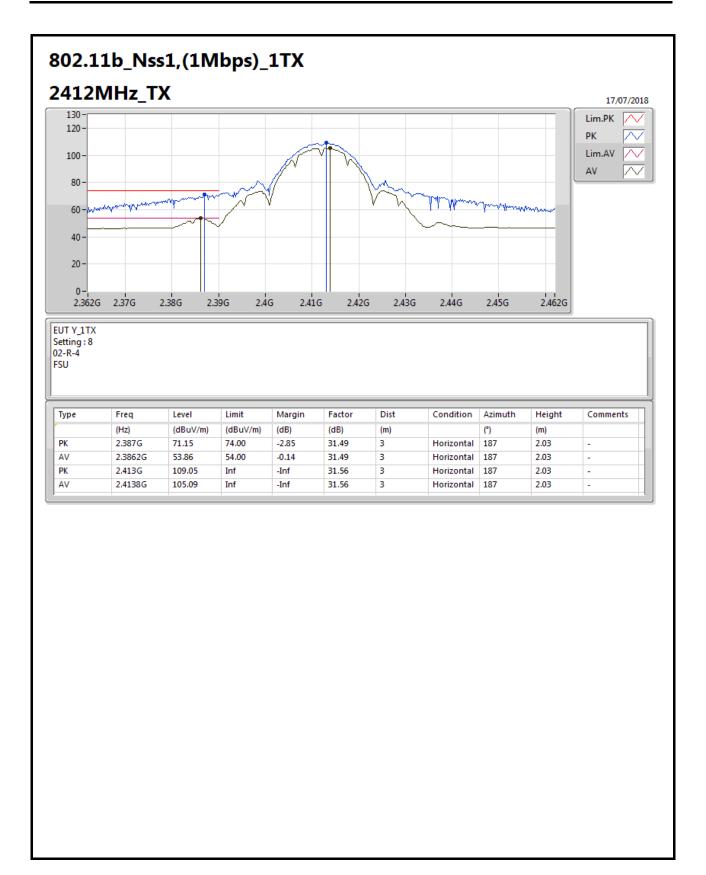
Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1,(1Mbps)_1TX	Pass	AV	2.3862G	53.86	54.00	-0.14	31.49	3	Horizontal	187	2.03	-



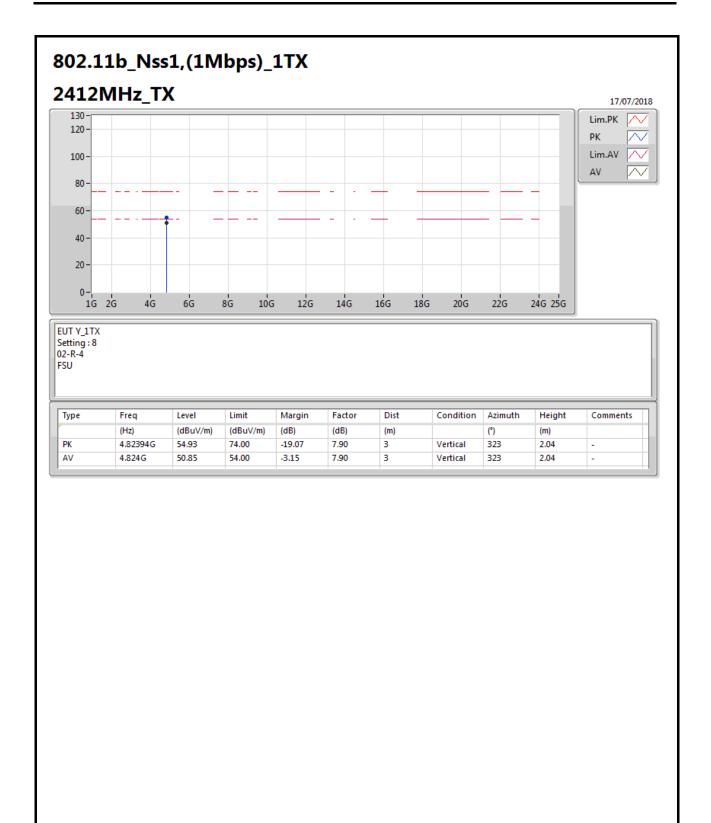


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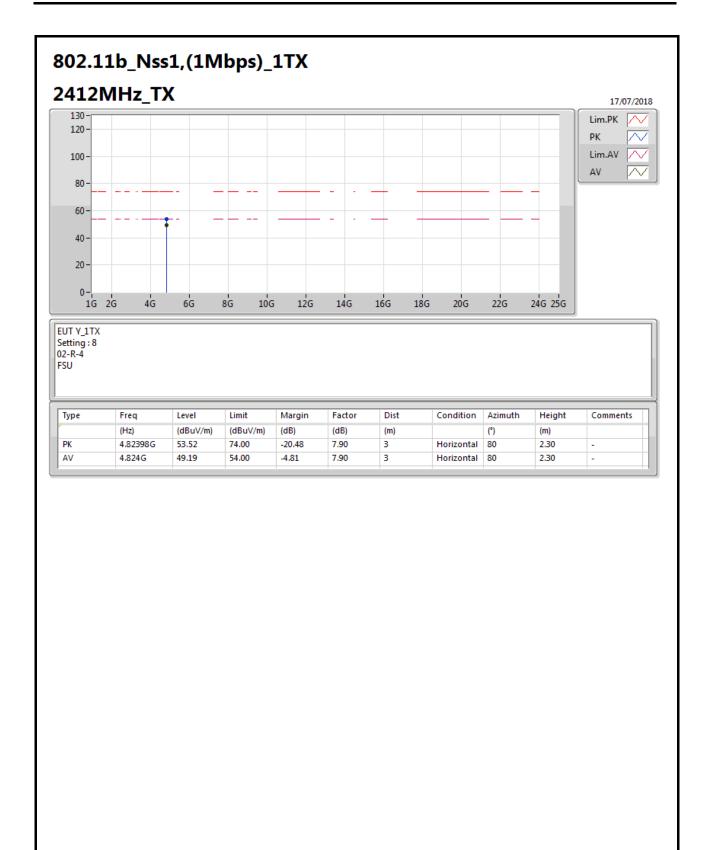






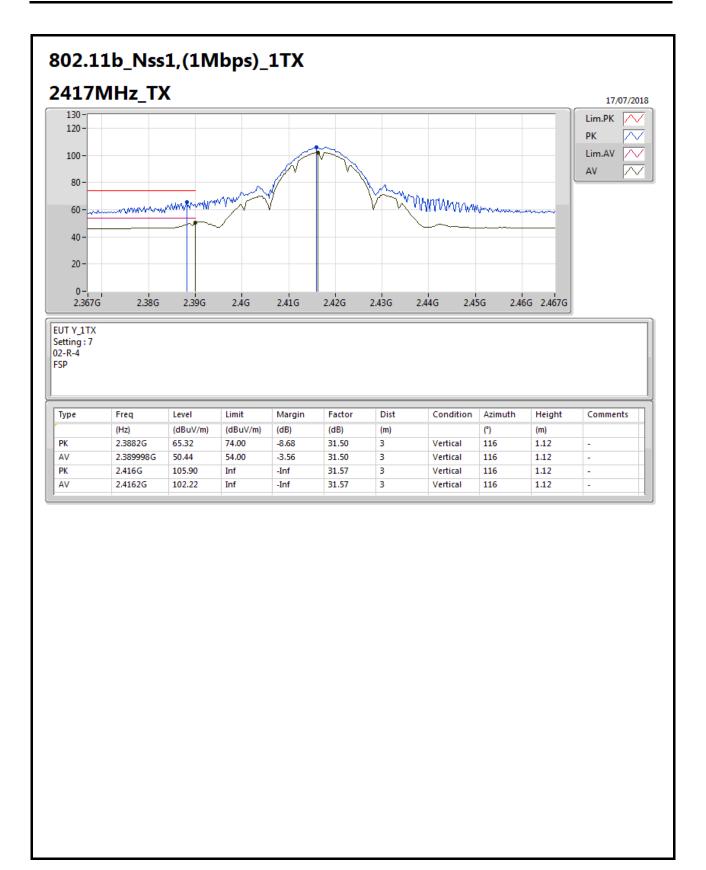




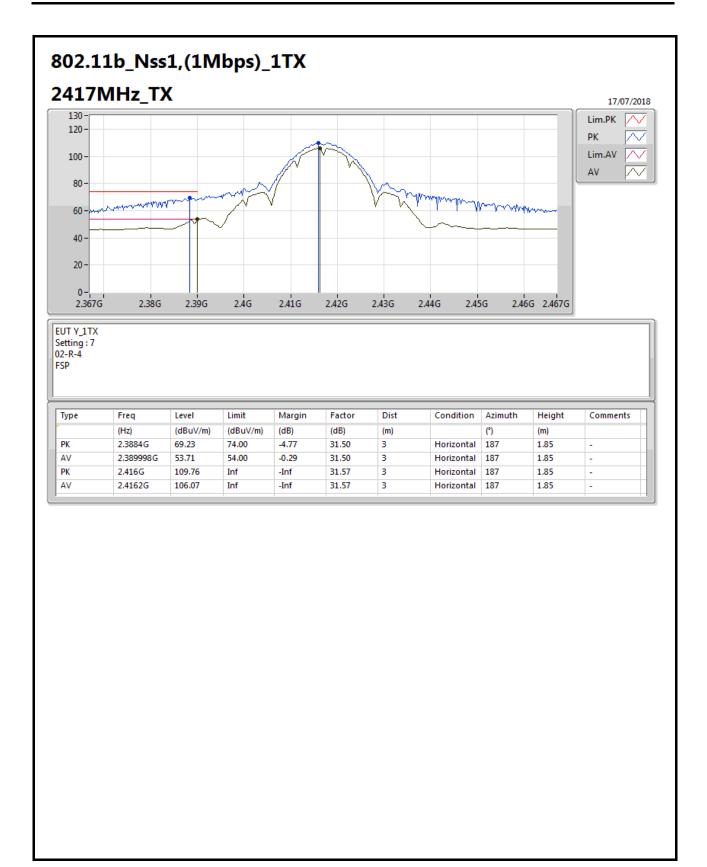


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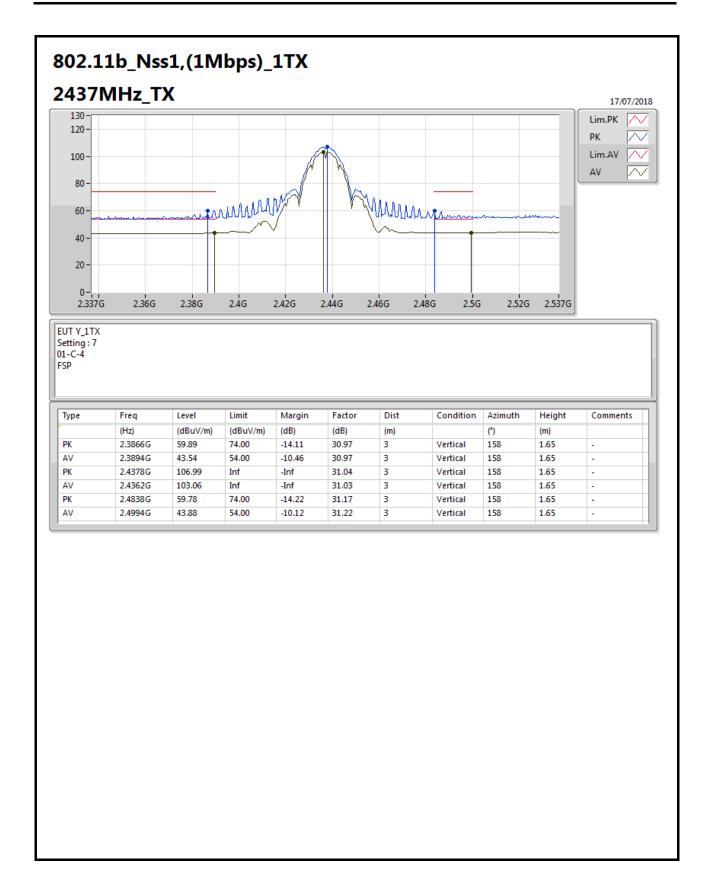




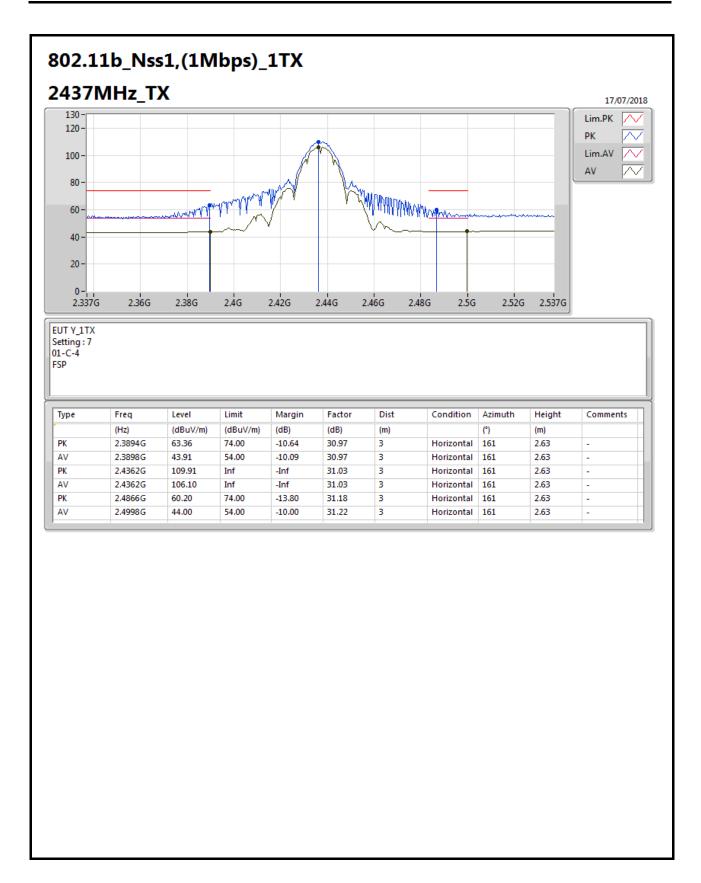


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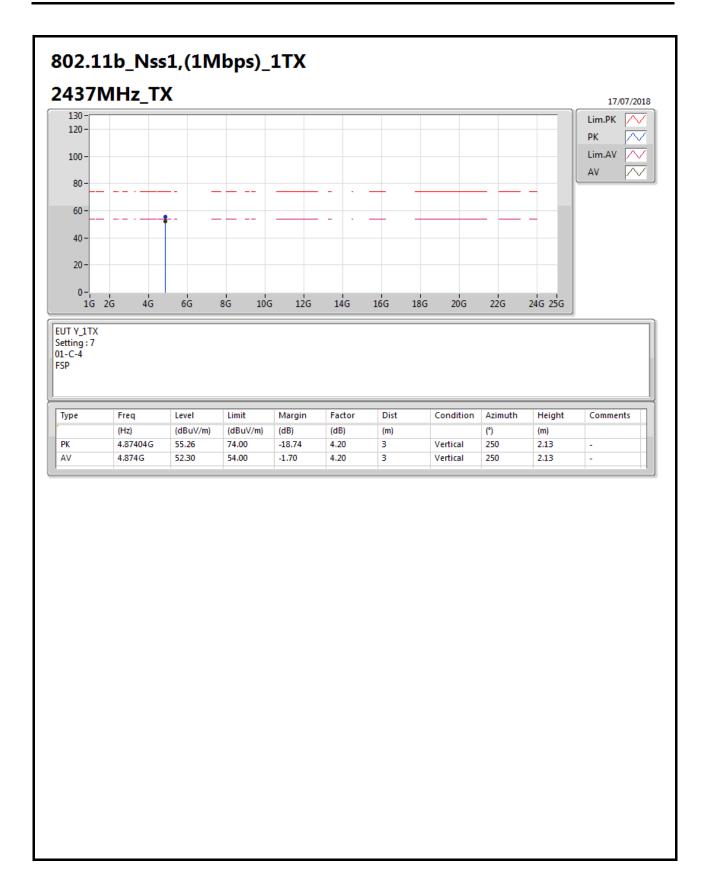




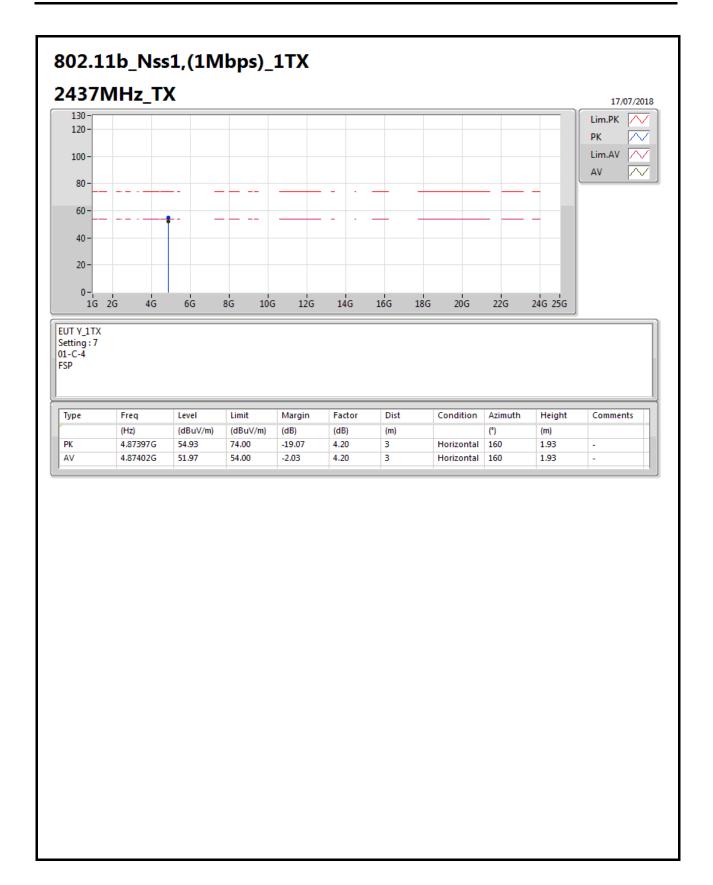


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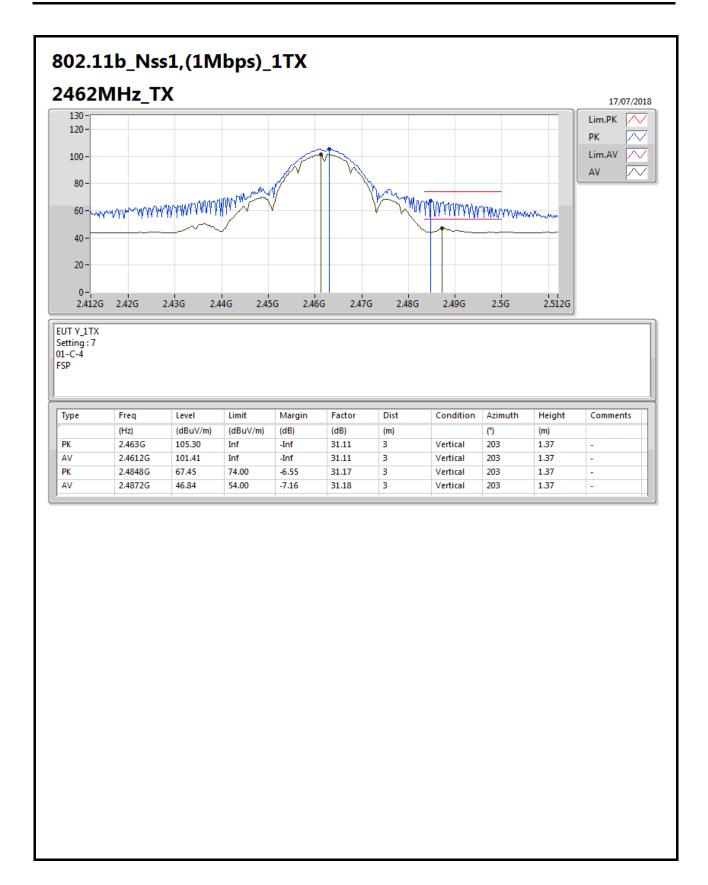






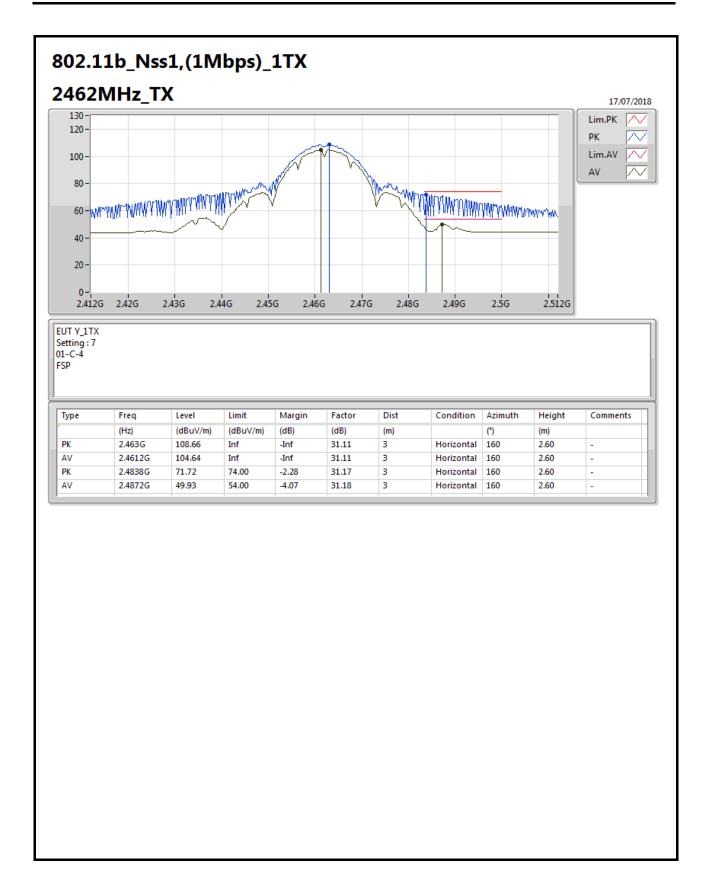




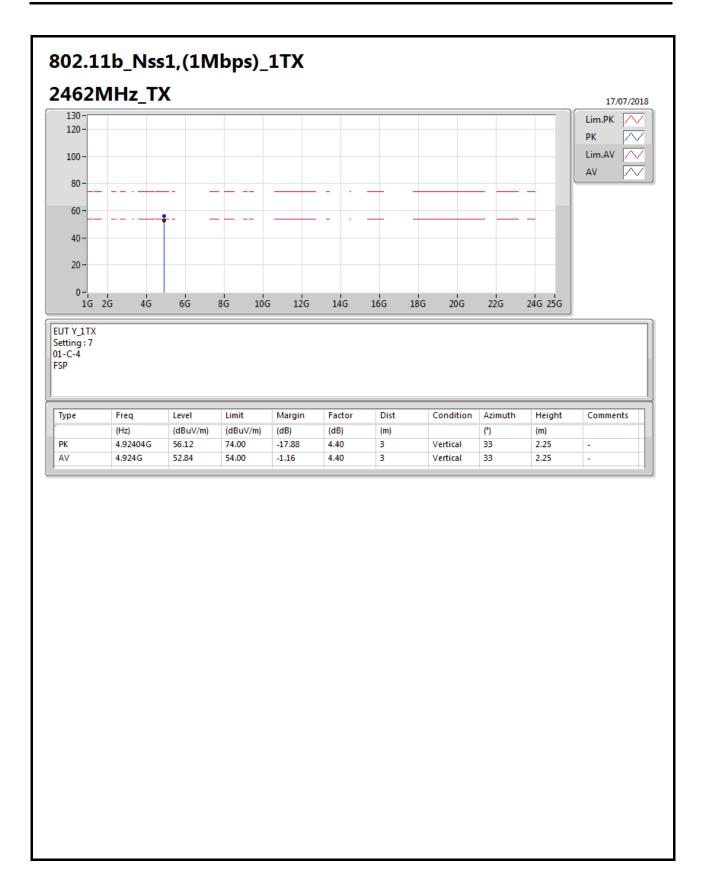


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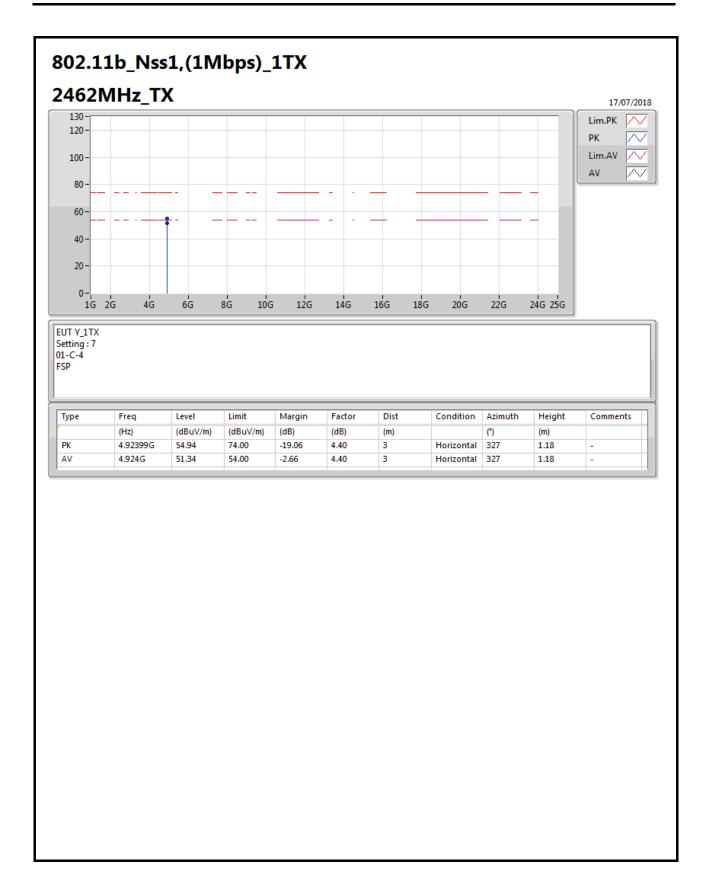






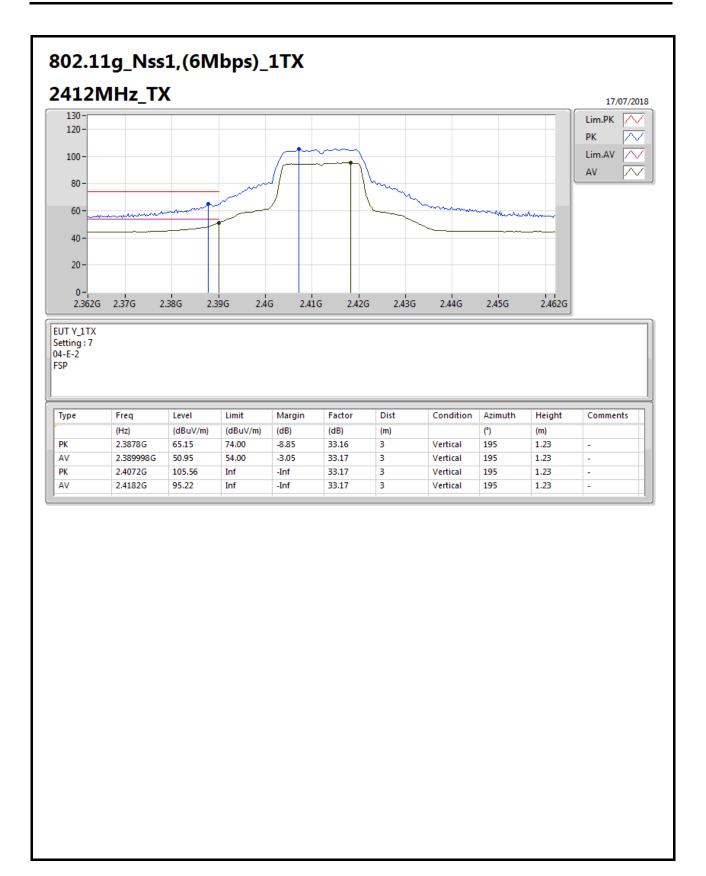




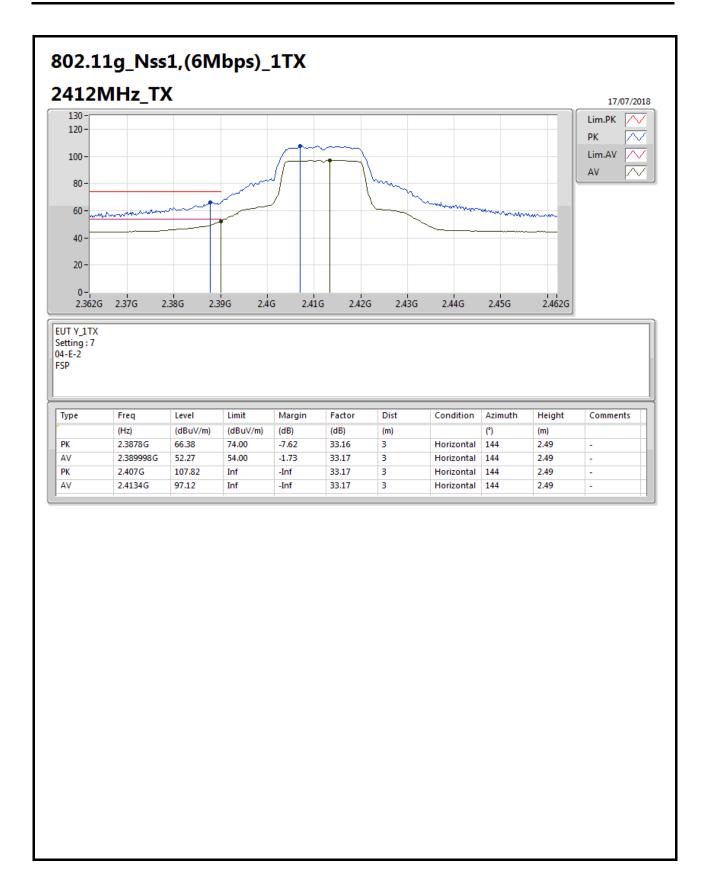


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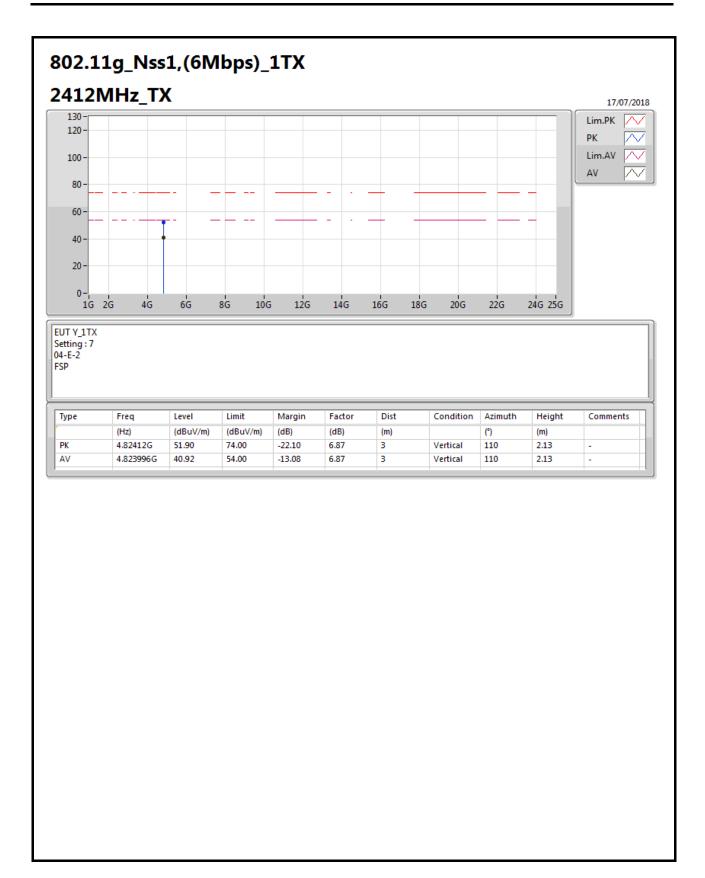






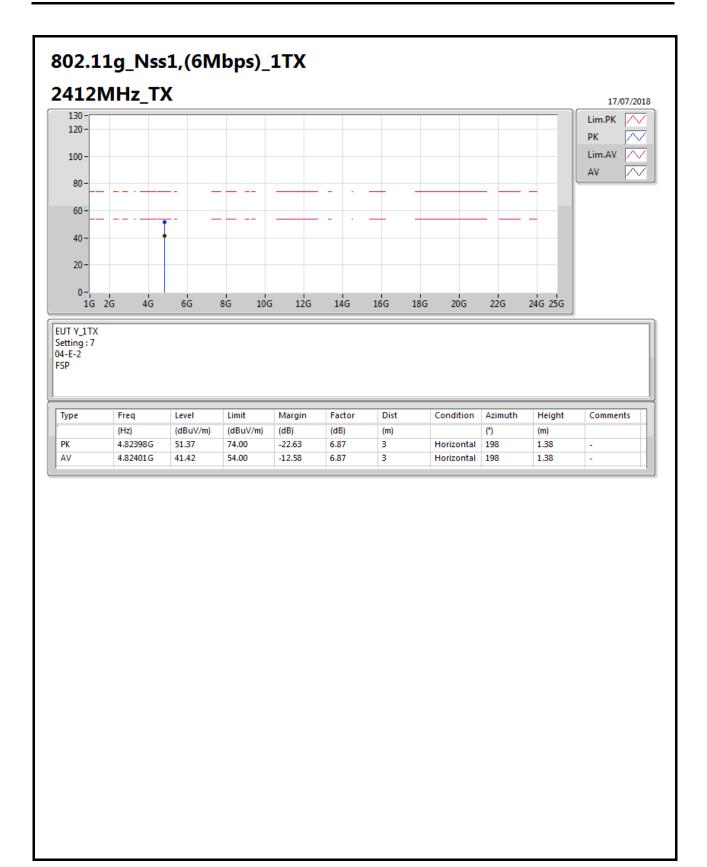
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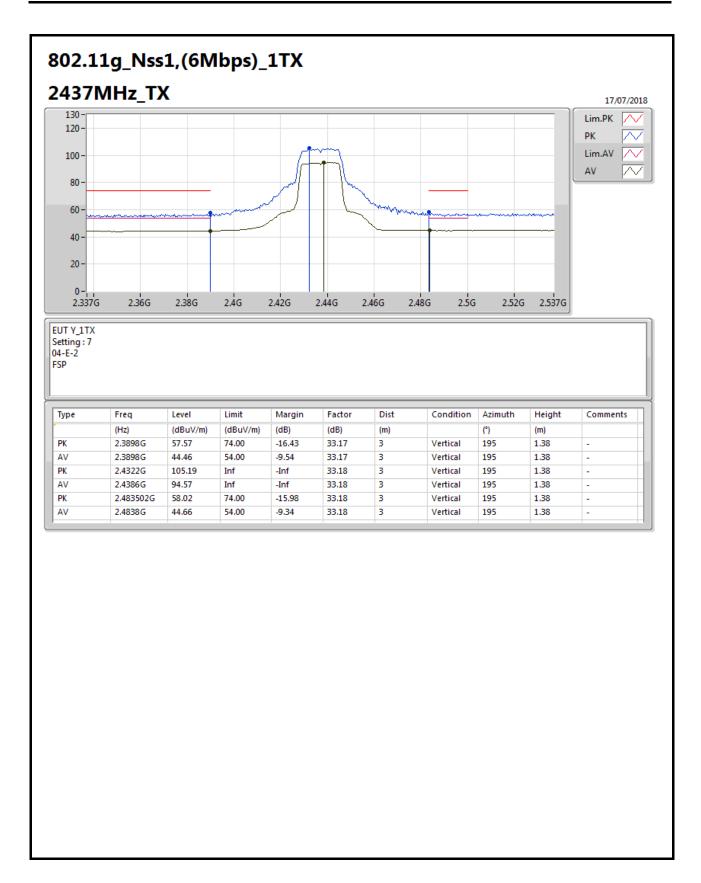
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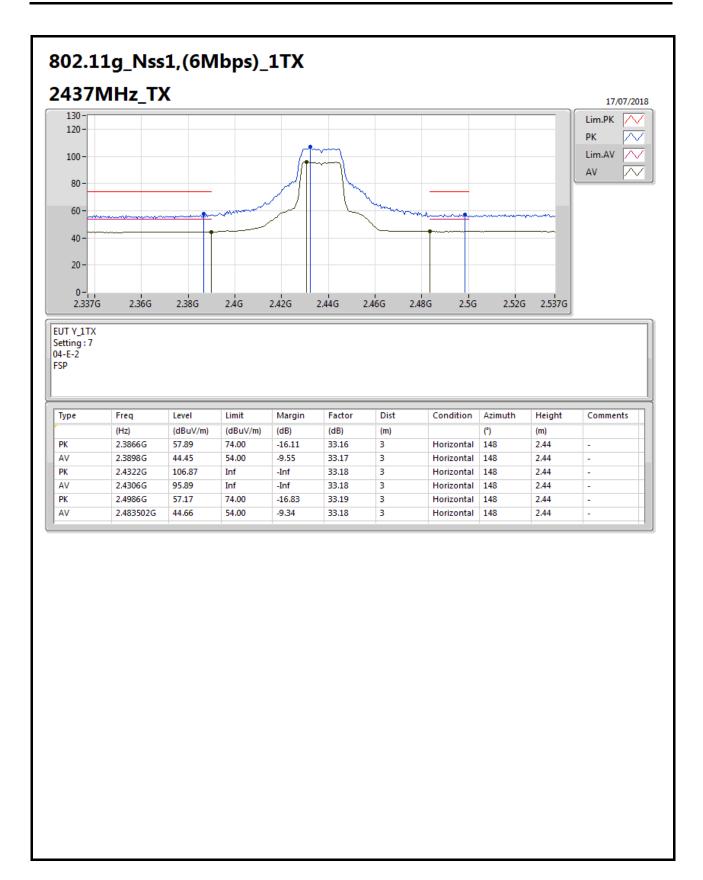


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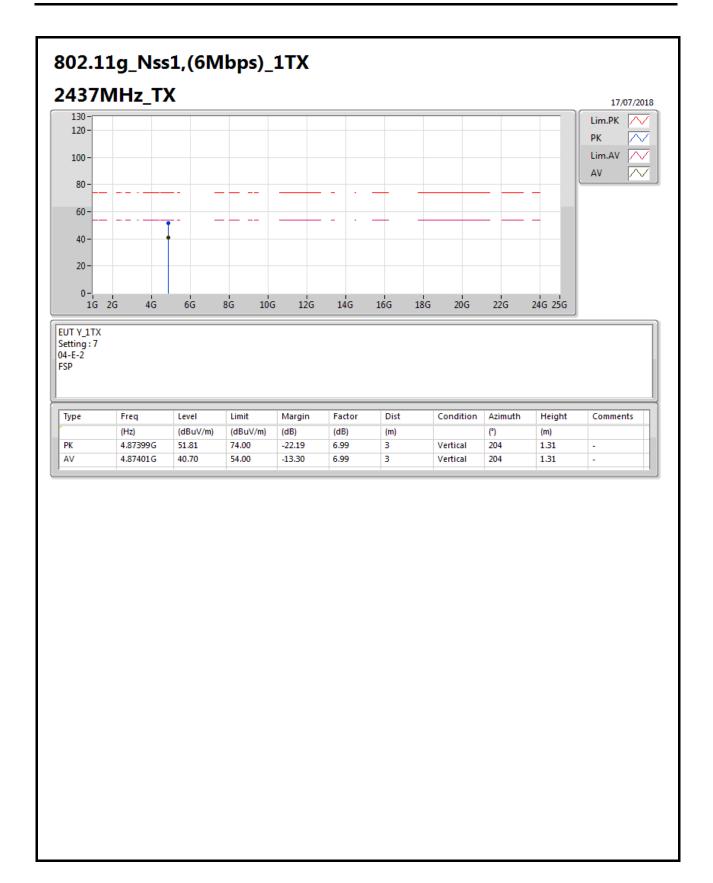




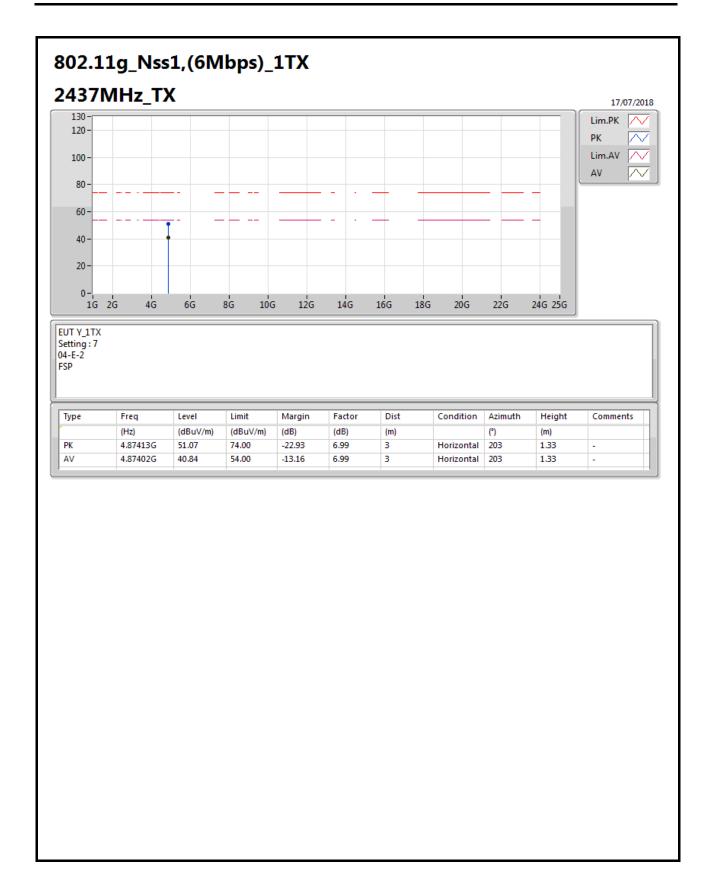


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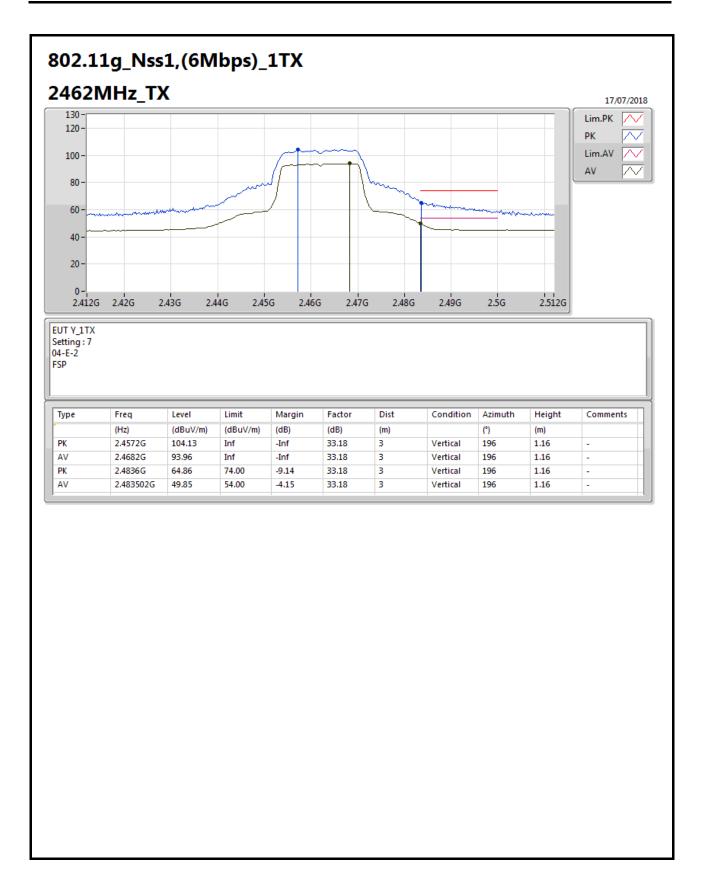






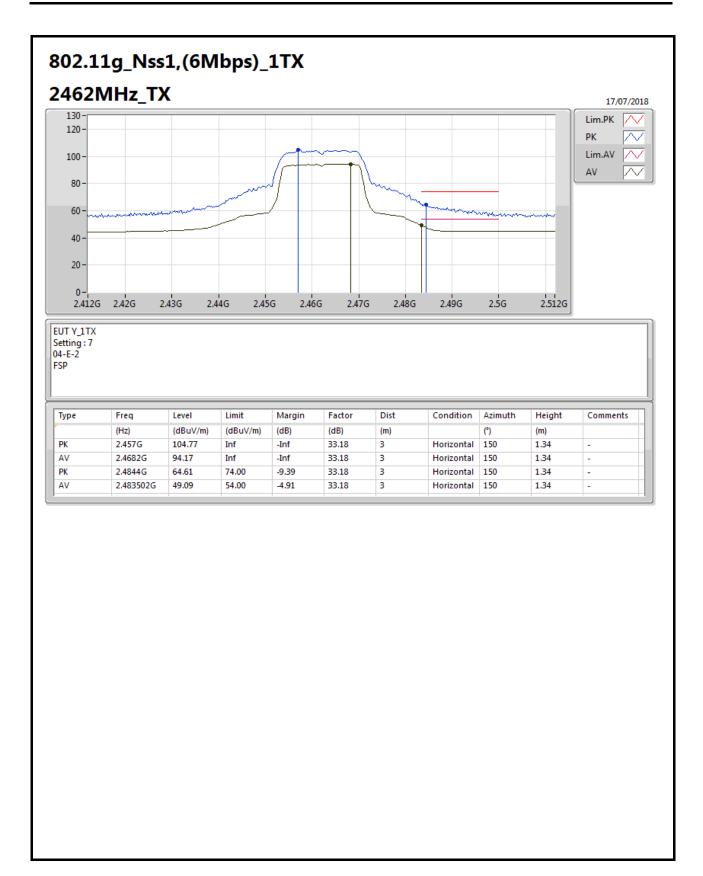




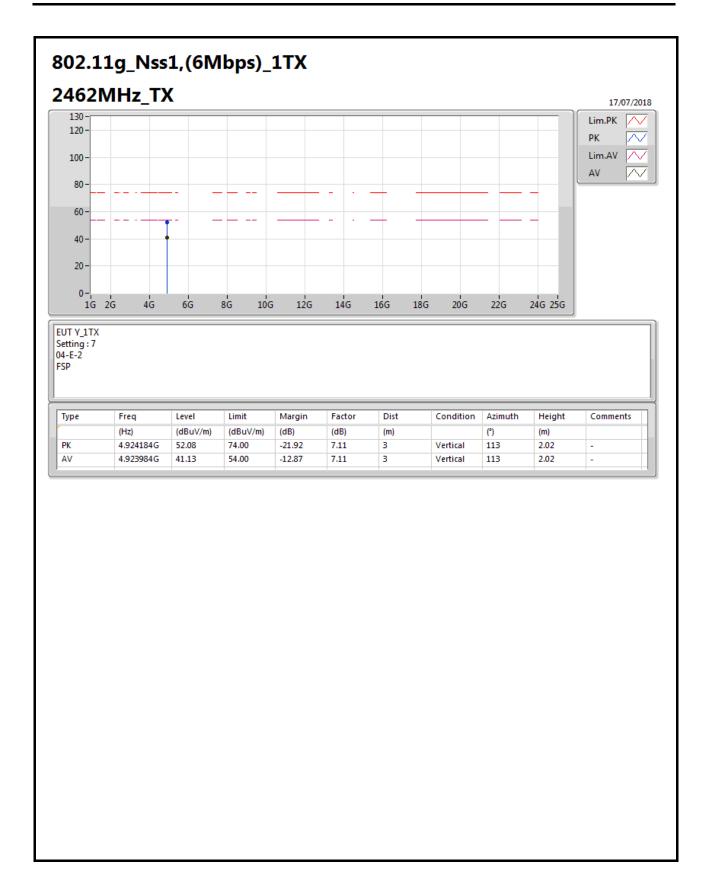


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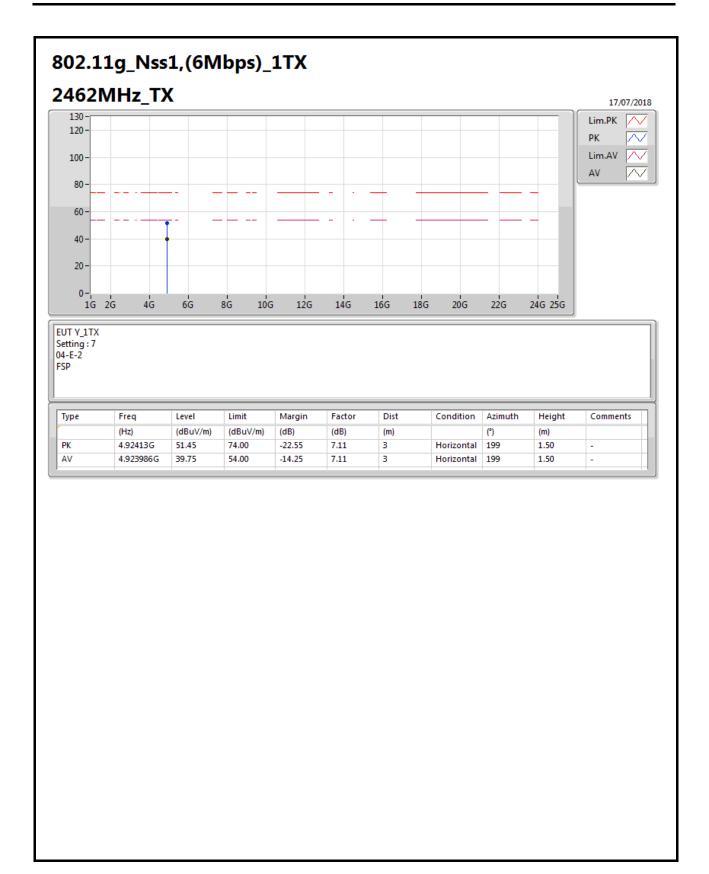






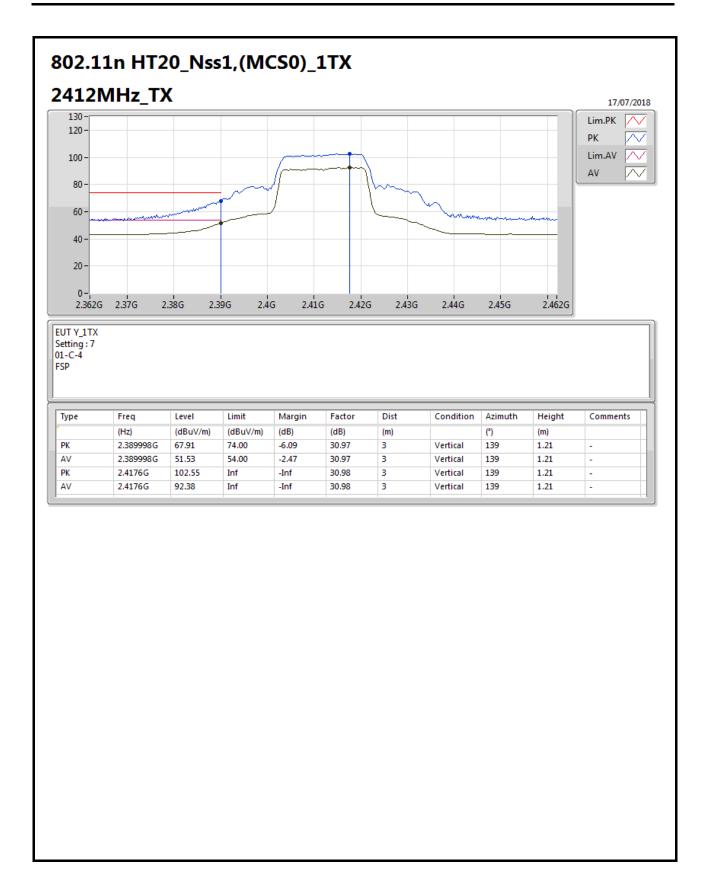
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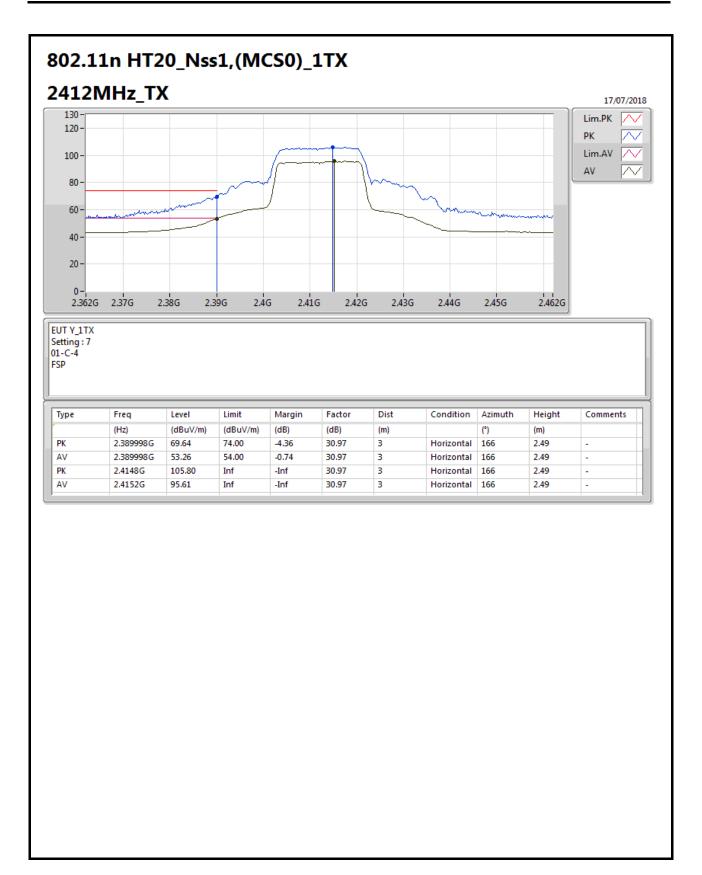
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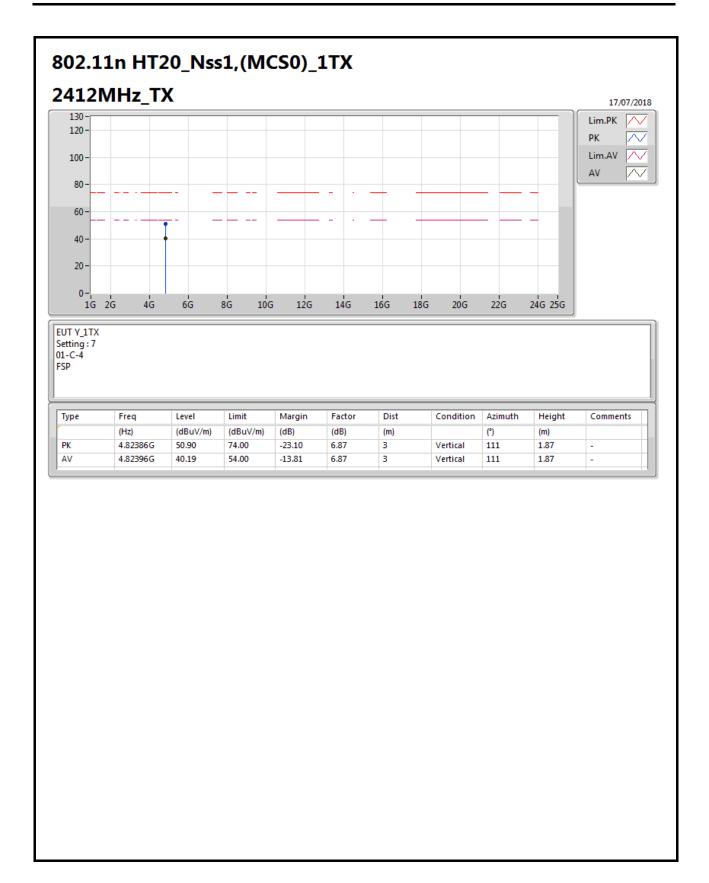
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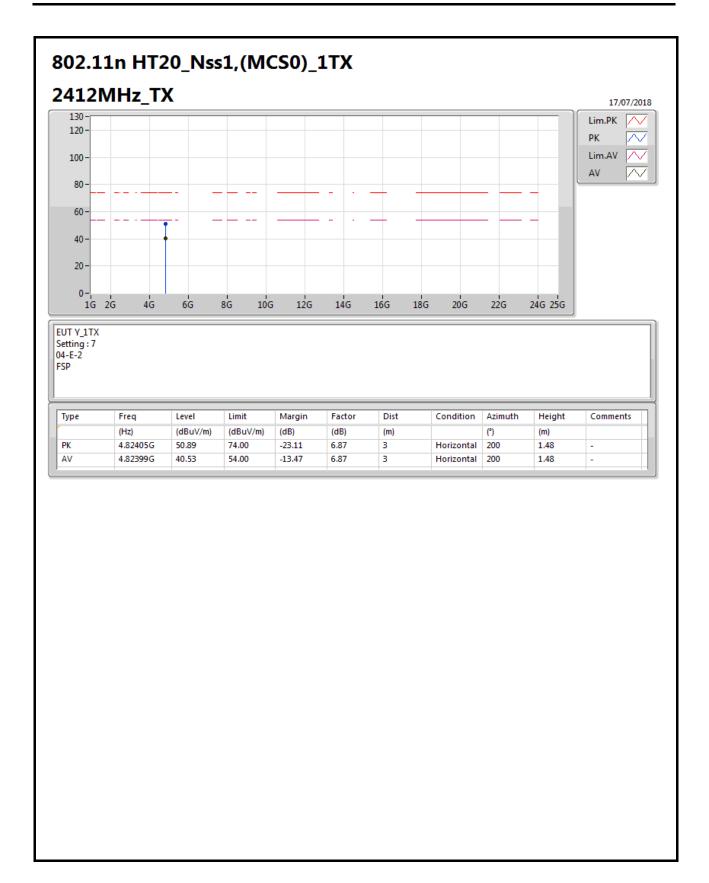


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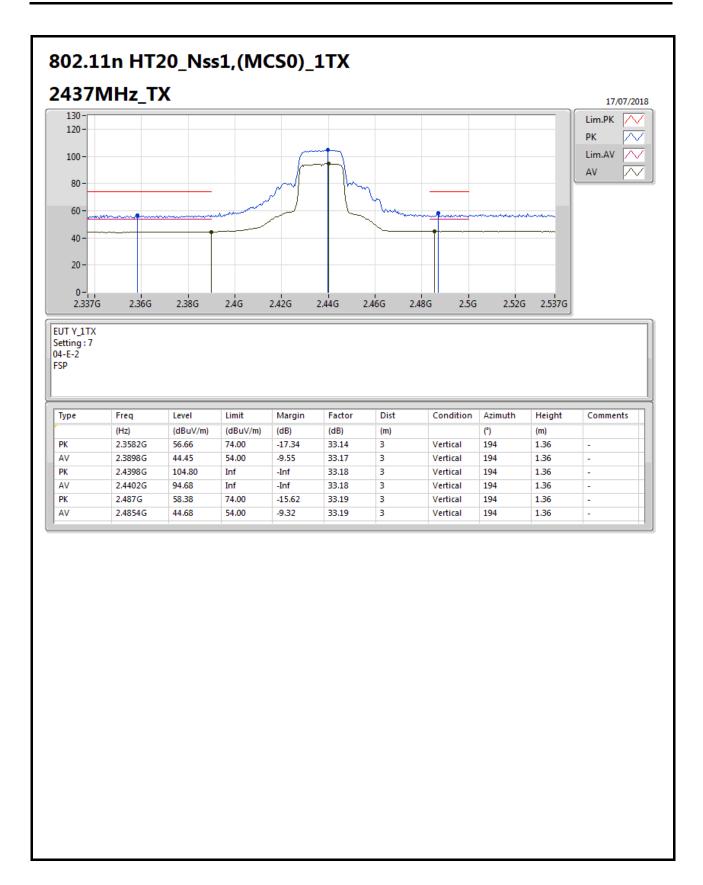




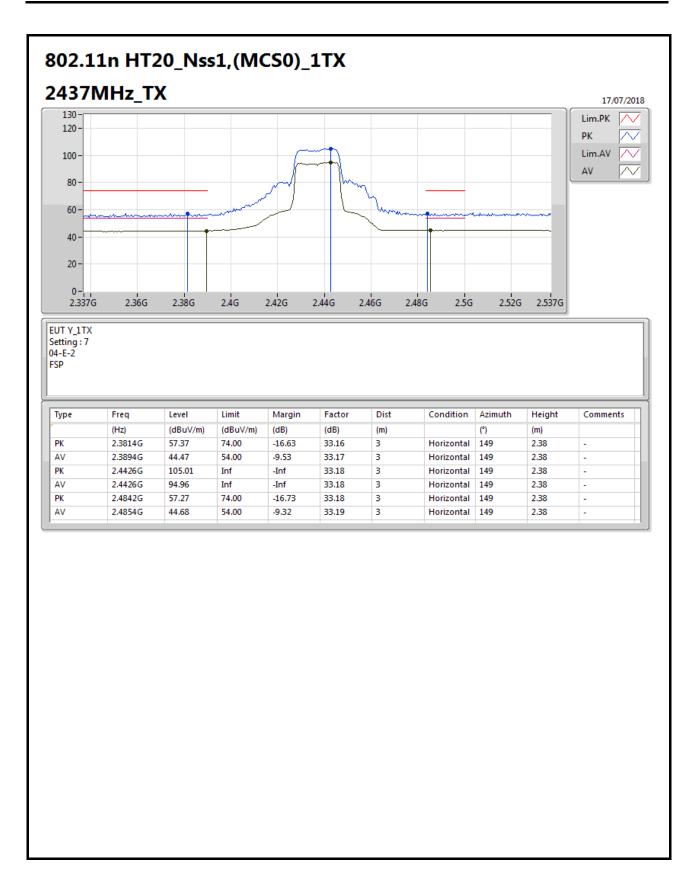




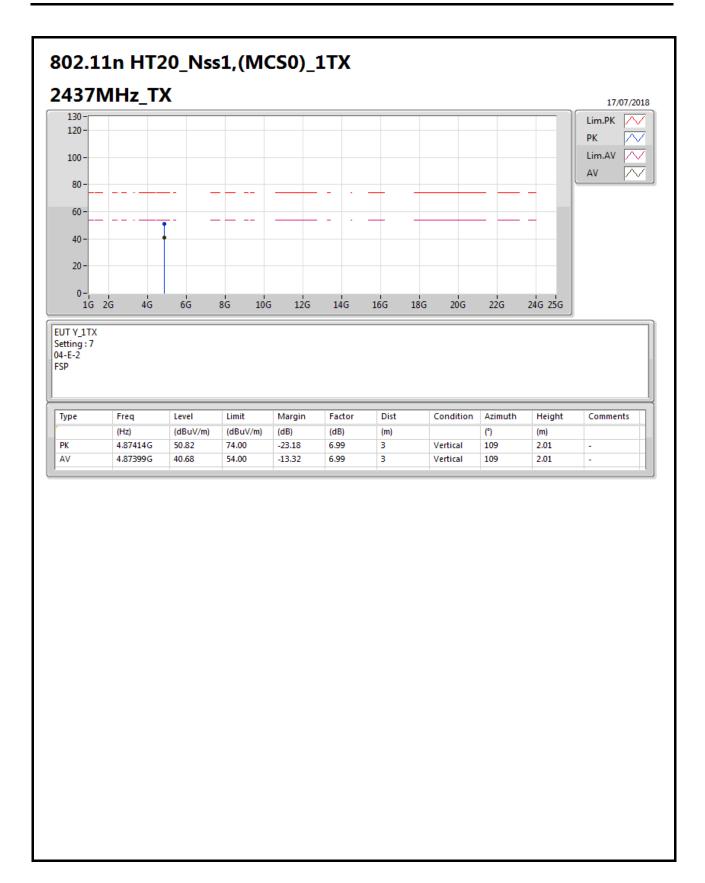






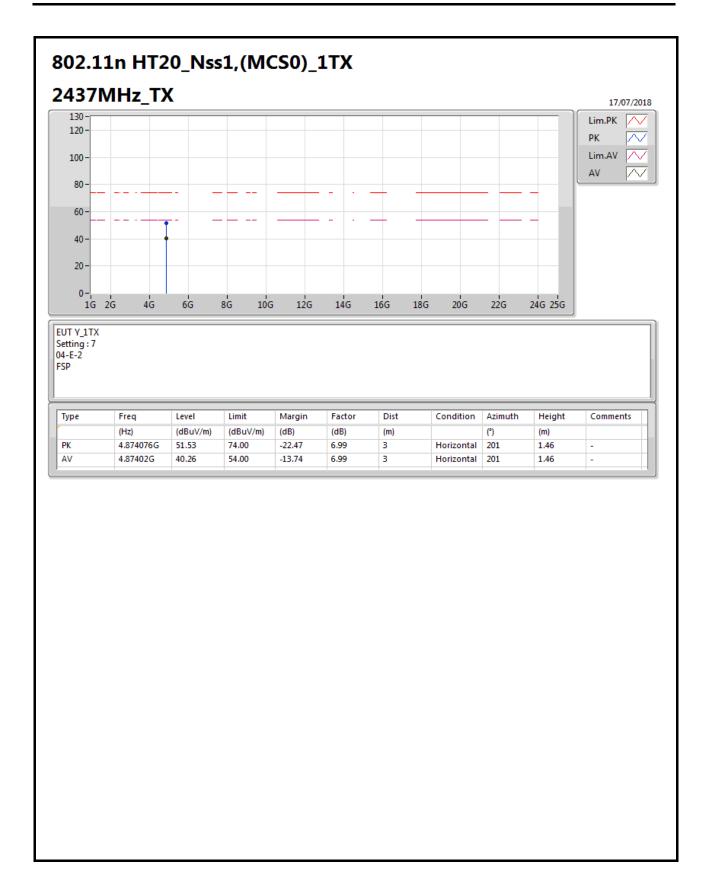




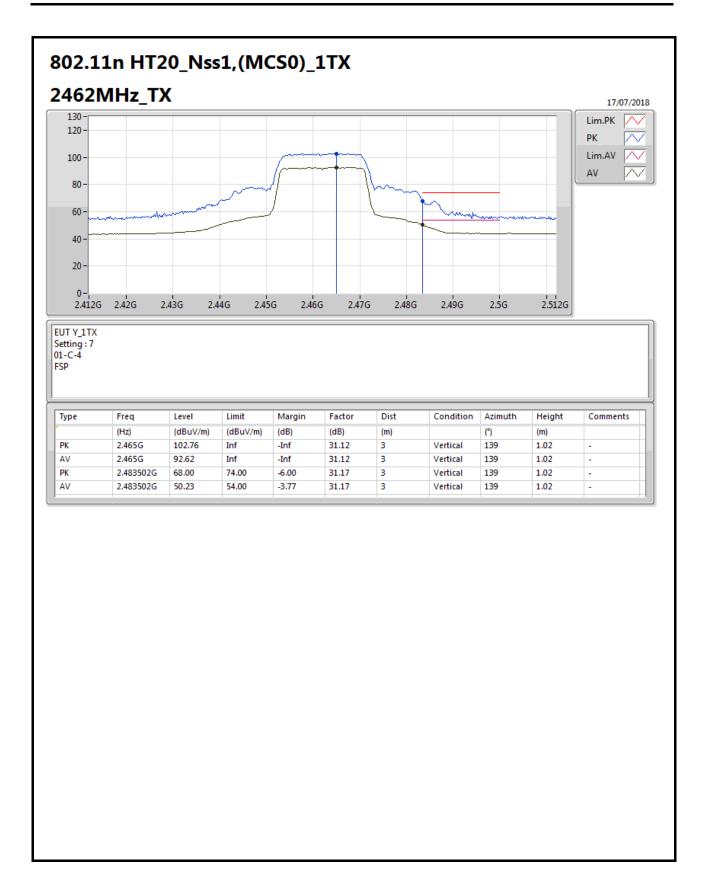


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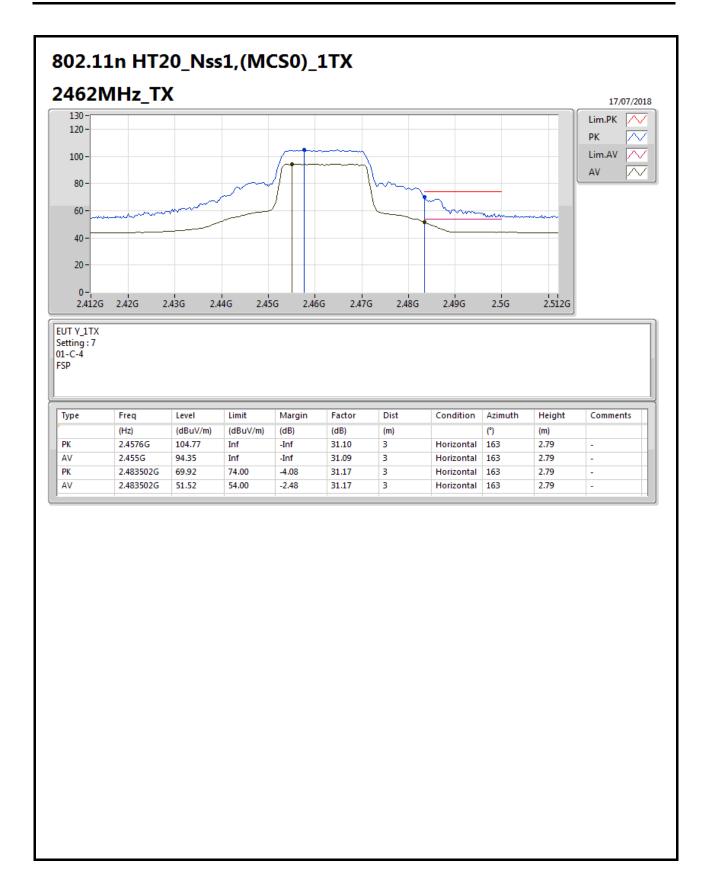




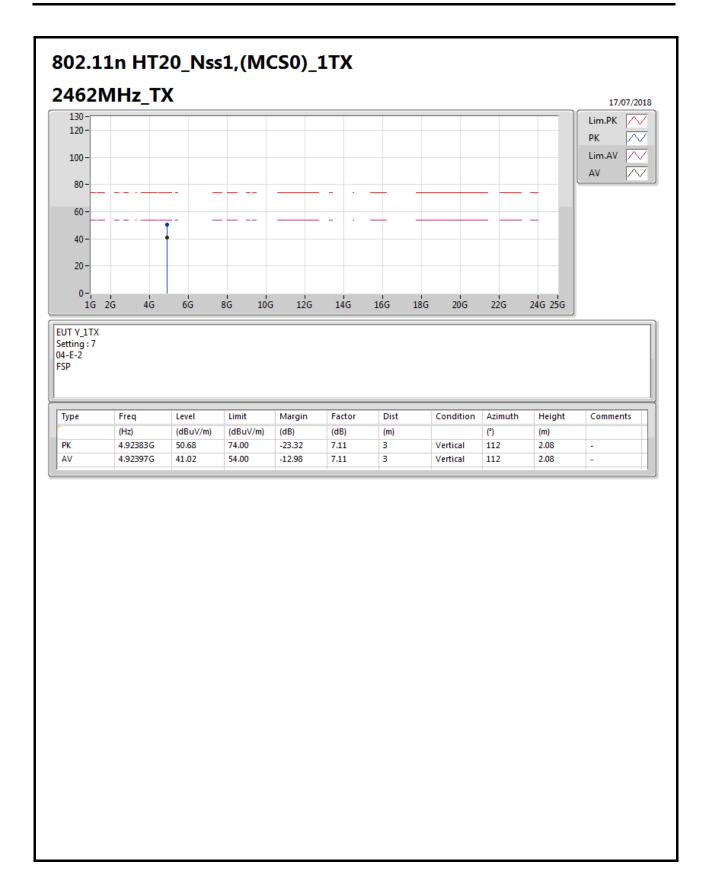












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