




# FCC RADIO TEST REPORT

FCC ID : Z8H89FT0051  
Equipment : cnPilot e510 Outdoor  
Brand Name : Cambium Networks  
Model Name : REG-PL-E510  
Applicant : Cambium Networks Inc.  
3800 Golf Road, Suite 360 Rolling Meadows, IL  
60008, USA  
Manufacturer : Cambium Networks, Ltd.  
Ashburton, TQ13 7UP, UK  
Standard : 47 CFR FCC Part 15.407

The product was received on Nov. 01, 2018, and testing was started from Nov. 02, 2018 and completed on Nov. 09, 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 variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

  
Approved by: Cliff Chang

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



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**Photographs of EUT v02**



### History of this test report

Report No.	Version	Description	Issued Date
FR870416-04	01	Initial issue of report	Nov. 28, 2018
FR870416-04	02	1. Changing Equipment and Model Name to "REG-PL-E510" from "cnPilot Outdoor E510" 2. Changing photograph of EUT version to "v02" from "v01"	Dec. 06, 2018
FR870416-04	03	Changing Equipment Name to "cnPilot e510 Outdoor" from "REG-PL-E510"	Dec. 18, 2018
FR870416-04	04	1. Changing Manufacturer Name to "Cambium Networks, Ltd." from "Cambium Networks Inc." 2. Changing Manufacturer address to "Ashburton, TQ13 7UP, UK" from "3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA"	Feb. 28, 2019



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.407(a)	Emission Bandwidth	PASS	-
3.2	15.407(a)	Maximum Conducted Output Power	PASS	-
3.3	15.407(a)	Peak Power Spectral Density	PASS	-
3.4	15.407(b)	Unwanted Emissions	PASS	-

**Declaration of Conformity:**

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

**Comments and Explanations:**

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

Reviewed by: **Sam Chen**

Report Producer: **Wendy Pan**



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5250-5350	a, n (HT20), ac (VHT20)	5260-5320	52-64 [4]
5470-5725		5500-5700	100-140 [11]
5250-5350	n (HT40), ac (VHT40)	5270-5310	54-62 [2]
5470-5725		5510-5670	102-134 [5]
5250-5350	ac (VHT80)	5290	58 [1]
5470-5725		5530-5610	106-122 [2]

Band	Mode	BWch (MHz)	Nant
5.25-5.35GHz	802.11a	20	2TX
5.25-5.35GHz	802.11n HT20	20	2TX
5.25-5.35GHz	802.11ac VHT20	20	2TX
5.25-5.35GHz	802.11n HT40	40	2TX
5.25-5.35GHz	802.11ac VHT40	40	2TX
5.25-5.35GHz	802.11ac VHT80	80	2TX
5.47-5.725GHz	802.11a	20	2TX
5.47-5.725GHz	802.11n HT20	20	2TX
5.47-5.725GHz	802.11ac VHT20	20	2TX
5.47-5.725GHz	802.11n HT40	40	2TX
5.47-5.725GHz	802.11ac VHT40	40	2TX
5.47-5.725GHz	802.11ac VHT80	80	2TX

Note:

- ♦ 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ♦ VHT20, VHT40 and VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
- ♦ BWch is the nominal channel bandwidth.
- ♦ Nss-Min is the minimum number of spatial streams.
- ♦ Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.



1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	Accton	120G00000194A	PCB Antenna	I-PEX	8.4
2	2	Accton	120G00000195A	PCB Antenna	I-PEX	8.4
3	3	Accton	120G00000196A	PCB Antenna	I-PEX	8.9
4	4	Accton	120G00000197A	PCB Antenna	I-PEX	8.9

Note: The EUT has four antennas.

For 2.4GHz function:

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

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 3 and Port 4 could transmit/receive simultaneously.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.963	0.164	2.066m	1k
802.11ac VHT20	0.983	0.074	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ac VHT40	0.96	0.177	2.43m	1k
802.11ac VHT80	0.916	0.381	1.142m	1k

1.1.4 EUT Operational Condition

<b>EUT Power Type</b>	From PoE			
<b>Beamforming Function</b>	<input type="checkbox"/> With beamforming	<input checked="" type="checkbox"/>	Without beamforming	
<b>Weather Band</b>	<input checked="" type="checkbox"/> With 5600~5650MHz	<input type="checkbox"/>	Without 5600~5650MHz	
<b>Function</b>	<input checked="" type="checkbox"/> Outdoor P2M	<input type="checkbox"/>	Indoor P2M	
	<input type="checkbox"/> Fixed P2P	<input type="checkbox"/>	Client	
<b>TPC Function</b>	<input checked="" type="checkbox"/> With TPC	<input type="checkbox"/>	Without TPC	
<b>Test Software Version</b>	QRCT V3.0.187.0			

1.1.5 Table for Class III Change

This product is an extension of original one reported under Sporton project number: FR870416-03AB

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Adding Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.	<ol style="list-style-type: none"> <li>Emission Bandwidth</li> <li>Maximum Conducted Output Power</li> <li>Peak Power Spectral Density</li> <li>Unwanted Emissions &lt;Above 1GHz&gt;</li> </ol>



### 1.2 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013
- ♦ FCC KDB 789033 D02 v02r01
- ♦ FCC KDB 662911 D01 v02r01
- ♦ FCC KDB 412172 D01 v01r01

### 1.3 Testing Location Information

Testing Location		
<input type="checkbox"/>	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
<input checked="" type="checkbox"/>	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 / 60%	Nov. 02, 2018 ~ Nov. 09, 2018
Radiated	03CH01-CB	Eason Chen	25°C / 60%	Nov. 12, 2018

Test site Designation No. TW0006 with FCC  
Test site registered number IC 4086D with Industry Canada.

### 1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
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 <sup>-8</sup>	Confidence levels of 95%



## 2 Test Configuration of EUT

### 2.1 Test Channel Mode

Mode	PowerSetting
802.11a_Nss1,(6Mbps)_2TX	-
5260MHz	16
5300MHz	16
5320MHz	15.5
5500MHz	15
5580MHz	15
5700MHz	15.5
802.11ac VHT20_Nss1,(MCS0)_2TX	-
5260MHz	16
5300MHz	16
5320MHz	15.5
5500MHz	15.5
5580MHz	15.5
5700MHz	16
802.11ac VHT40_Nss1,(MCS0)_2TX	-
5270MHz	15
5310MHz	14.5
5510MHz	14.5
5550MHz	14.5
5670MHz	18
802.11ac VHT80_Nss1,(MCS0)_2TX	-
5290MHz	14
5530MHz	13.5
5610MHz	17.5

Note: VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.





### 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	Emission Bandwidth Maximum Conducted Output Power Peak Power Spectral Density Unwanted Emissions (Above 1GHz)
<b>Test Condition</b>	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	Unwanted Emissions
<b>Test Condition</b>	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.
<b>Operating Mode &gt; 1GHz</b>	CTX

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
<b>Operating Mode</b>	
1	WLAN 2.4GHz + WLAN 5GHz
Refer to Sporton Test Report No.: FA870416-04 for Co-location RF Exposure Evaluation.	

Note 1: The EUT can only be used in Y axis positon.

Note 2: PoE information as below:

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

Support Unit	Brand Name	Model Name
PoE	Cambium Networks	NET-P15-56IN

### 2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 2.4 Accessories

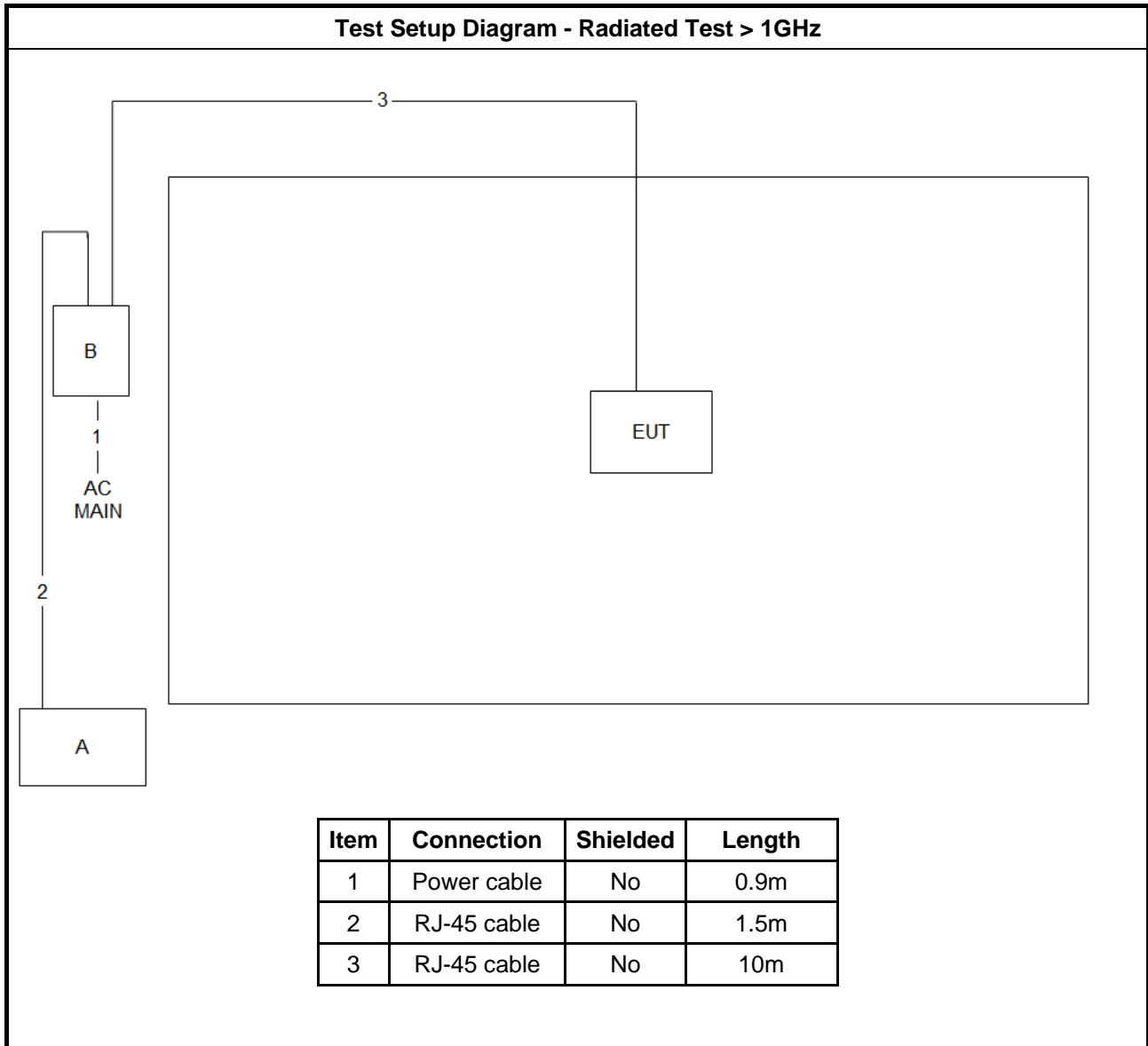
N/A

### 2.5 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	NB	DELL	E4300	N/A
B	PoE	Cambium Networks	NET-P15-56IN	PoE



## 2.6 Test Setup Diagram



### 3 Transmitter Test Result

#### 3.1 Emission Bandwidth

##### 3.1.1 Emission Bandwidth Limit

Emission Bandwidth Limit	
<b>UNII Devices</b>	
<input type="checkbox"/>	For the 5.15-5.25 GHz band, N/A
<input checked="" type="checkbox"/>	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
<input checked="" type="checkbox"/>	For the 5.47-5.725 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
<input type="checkbox"/>	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.
<b>LE-LAN Devices</b>	
<input type="checkbox"/>	For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
<input type="checkbox"/>	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
<input type="checkbox"/>	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
<input type="checkbox"/>	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.

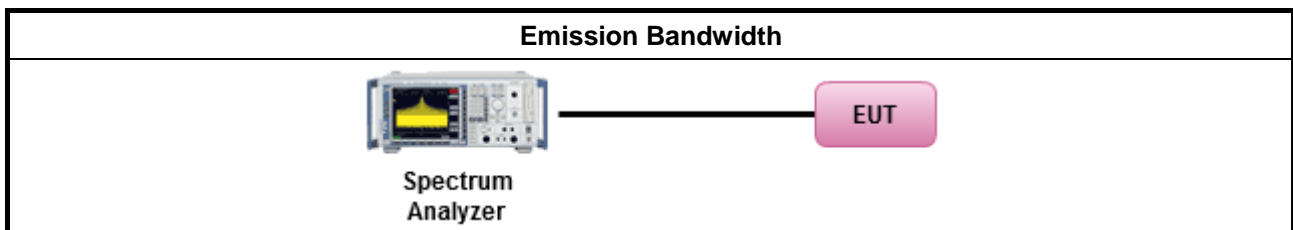
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

Test Method							
<ul style="list-style-type: none"> <li>▪ For the emission bandwidth shall be measured using one of the options below:               <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"><input checked="" type="checkbox"/></td> <td>Refer as FCC KDB 789033, clause C for EBW and clause D for OBW measurement.</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.</td> </tr> </table> </li> </ul>		<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause C for EBW and clause D for OBW measurement.	<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.	<input type="checkbox"/>	Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause C for EBW and clause D for OBW measurement.						
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.						
<input type="checkbox"/>	Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.						

##### 3.1.4 Test Setup





### **3.1.5 Test Result of Emission Bandwidth**

Refer as Appendix A



### 3.2 Maximum Conducted Output Power

#### 3.2.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
<b>UNII Devices</b>	
<input type="checkbox"/> For the 5.15-5.25 GHz band:	
	<ul style="list-style-type: none"> <li>▪ Outdoor AP: the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)</math>. e.i.r.p. at any elevation angle above 30 degrees <math>\leq 125mW</math> [21dBm]</li> <li>▪ Indoor AP: the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)</math></li> <li>▪ Point-to-point AP: the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W. If <math>G_{TX} &gt; 23</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 23)</math>.</li> <li>▪ Mobile or Portable Client: the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 250 mW. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 24 - (G_{TX} - 6)</math>.</li> </ul>
<input checked="" type="checkbox"/> For the 5.25-5.35 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .	
<input checked="" type="checkbox"/> For the 5.47-5.725 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .	
<input type="checkbox"/> For the 5.725-5.85 GHz band:	
	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)</math>.</li> <li>▪ Point-to-point systems (P2P): the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W.</li> </ul>
<b>LE-LAN Devices</b>	
<input type="checkbox"/> For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz.	
<input type="checkbox"/> For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz	
<input type="checkbox"/> For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz	
<input type="checkbox"/> For the 5.725-5.85 GHz band:	
	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)</math>.</li> <li>▪ Point-to-point systems (P2P): the maximum conducted output power (<math>P_{Out}</math>) shall not exceed the lesser of 1 W.</li> </ul>
$P_{Out}$ = maximum conducted output power in dBm, $G_{TX}$ = the maximum transmitting antenna directional gain in dBi.	

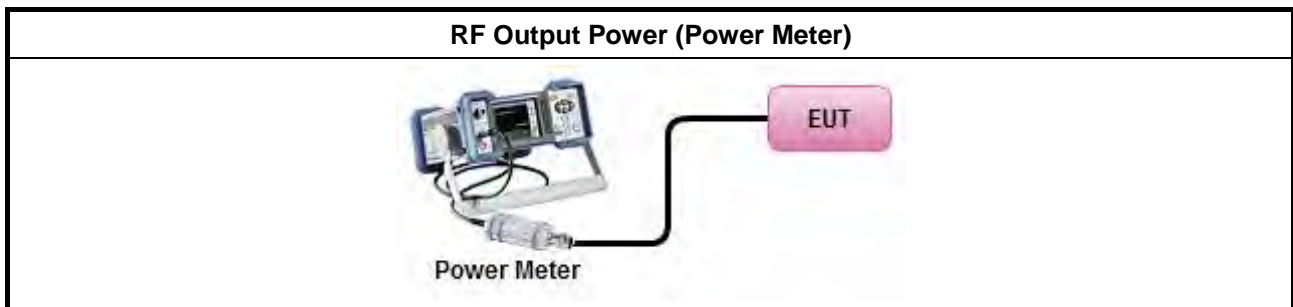
### 3.2.2 Measuring Instruments

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

### 3.2.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>▪ Maximum Conducted Output Power</li> </ul>	
Average over on/off periods with duty factor	
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
Wideband RF power meter and average over on/off periods with duty factor	
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause E Method PM-G (using an RF average power meter).
<ul style="list-style-type: none"> <li>▪ For conducted measurement.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ If multiple transmit chains, EIRP calculation could be following as methods:  <math>P_{total} = P_1 + P_2 + \dots + P_n</math>                      (calculated in linear unit [mW] and transfer to log unit [dBm])  <math>EIRP_{total} = P_{total} + DG</math> </li> </ul>	

### 3.2.4 Test Setup



### 3.2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix B



### 3.3 Peak Power Spectral Density

#### 3.3.1 Peak Power Spectral Density Limit

Peak Power Spectral Density Limit	
<b>UNII Devices</b>	
<input type="checkbox"/> For the 5.15-5.25 GHz band:	
<input type="checkbox"/>	<ul style="list-style-type: none"> <li>▪ Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 17 - (G_{TX} - 6)</math>.</li> <li>▪ Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 17 - (G_{TX} - 6)</math>.</li> <li>▪ Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If <math>G_{TX} &gt; 23</math> dBi, then <math>P_{Out} = 17 - (G_{TX} - 23)</math>.</li> <li>▪ Mobile or Portable Client: the peak power spectral density (PPSD) <math>\leq 11</math> dBm/MHz. If <math>G_{TX} &gt; 6</math> dBi, then <math>PPSD = 11 - (G_{TX} - 6)</math>.</li> </ul>
<input checked="" type="checkbox"/> For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq 11$ dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$ .	
<input checked="" type="checkbox"/> For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) $\leq 11$ dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$ .	
<input type="checkbox"/> For the 5.725-5.85 GHz band:	
<input type="checkbox"/>	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) <math>\leq 30</math> dBm/500kHz. If <math>G_{TX} &gt; 6</math> dBi, then <math>PPSD = 30 - (G_{TX} - 6)</math>.</li> <li>▪ Point-to-point systems (P2P): the peak power spectral density (PPSD) <math>\leq 30</math> dBm/500kHz.</li> </ul>
<b>LE-LAN Devices</b>	
<input type="checkbox"/> For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) $\leq 10$ dBm/MHz.	
<input type="checkbox"/> For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq 11$ dBm/MHz.	
<input type="checkbox"/>	<ul style="list-style-type: none"> <li>▪ e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where <math>\theta</math> is the angle above the local horizontal plane (of the Earth) as shown below:            -13 dBW/MHz for <math>0^\circ \leq \theta &lt; 8^\circ</math> ; -13 - 0.716 (<math>\theta-8</math>) dBW/MHz for <math>8^\circ \leq \theta &lt; 40^\circ</math>            -35.9 - 1.22 (<math>\theta-40</math>) dBW/MHz for <math>40^\circ \leq \theta \leq 45^\circ</math> ; -42 dBW/MHz for <math>\theta &gt; 45^\circ</math></li> </ul>
<input type="checkbox"/> For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) $\leq 11$ dBm/MHz.	
<input type="checkbox"/> For the 5.725-5.85 GHz band:	
<input type="checkbox"/>	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) <math>\leq 30</math> dBm/500kHz. If <math>G_{TX} &gt; 6</math> dBi, then <math>PPSD = 30 - (G_{TX} - 6)</math>.</li> <li>▪ Point-to-point systems (P2P): the peak power spectral density (PPSD) <math>\leq 30</math> dBm/500kHz.</li> </ul>
<p><b>PPSD</b> = peak power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz  <b><math>G_{TX}</math></b> = the maximum transmitting antenna directional gain in dBi.</p>	

#### 3.3.2 Measuring Instruments

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

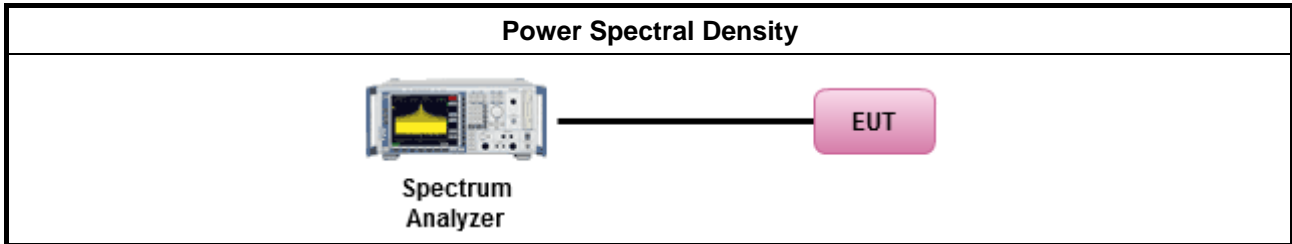


3.3.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>▪ Peak power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the peak power spectral density and use the peak search function on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density shall be measured using below options:</li> </ul>	
<input type="checkbox"/>	Refer as FCC KDB 789033, F5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth
[duty cycle ≥ 98% or external video / power trigger]	
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-1 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
duty cycle < 98% and average over on/off periods with duty factor	
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
<ul style="list-style-type: none"> <li>▪ For conducted measurement.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ If the EUT supports multiple transmit chains using options given below:</li> </ul>	
<input checked="" type="checkbox"/>	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
<input type="checkbox"/>	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
<input type="checkbox"/>	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.
<ul style="list-style-type: none"> <li>▪ If multiple transmit chains, EIRP PPSD calculation could be following as methods:  <math>PPSD_{total} = PPSD_1 + PPSD_2 + \dots + PPSD_n</math>            (calculated in linear unit [mW] and transfer to log unit [dBm])  <math>EIRP_{total} = PPSD_{total} + DG</math> </li> </ul>	



### 3.3.4 Test Setup



### 3.3.5 Test Result of Peak Power Spectral Density

Refer as Appendix C



### 3.4 Unwanted Emissions

#### 3.4.1 Transmitter Radiated Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

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.



Un-restricted band emissions above 1GHz Limit	
Operating Band	Limit
<input type="checkbox"/> 5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
<input checked="" type="checkbox"/> 5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
<input checked="" type="checkbox"/> 5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
<input type="checkbox"/> 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedures

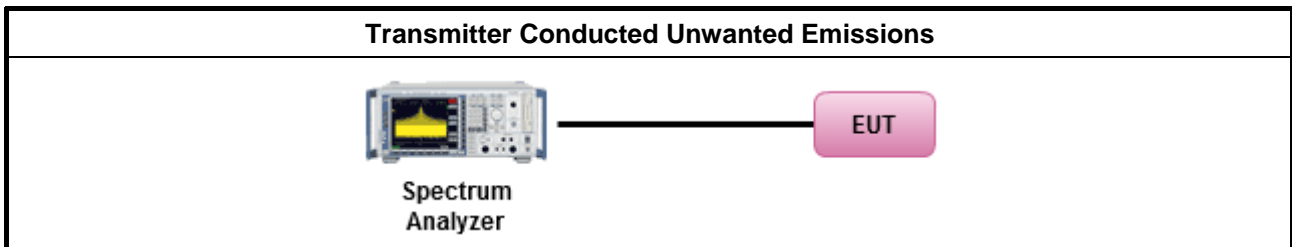
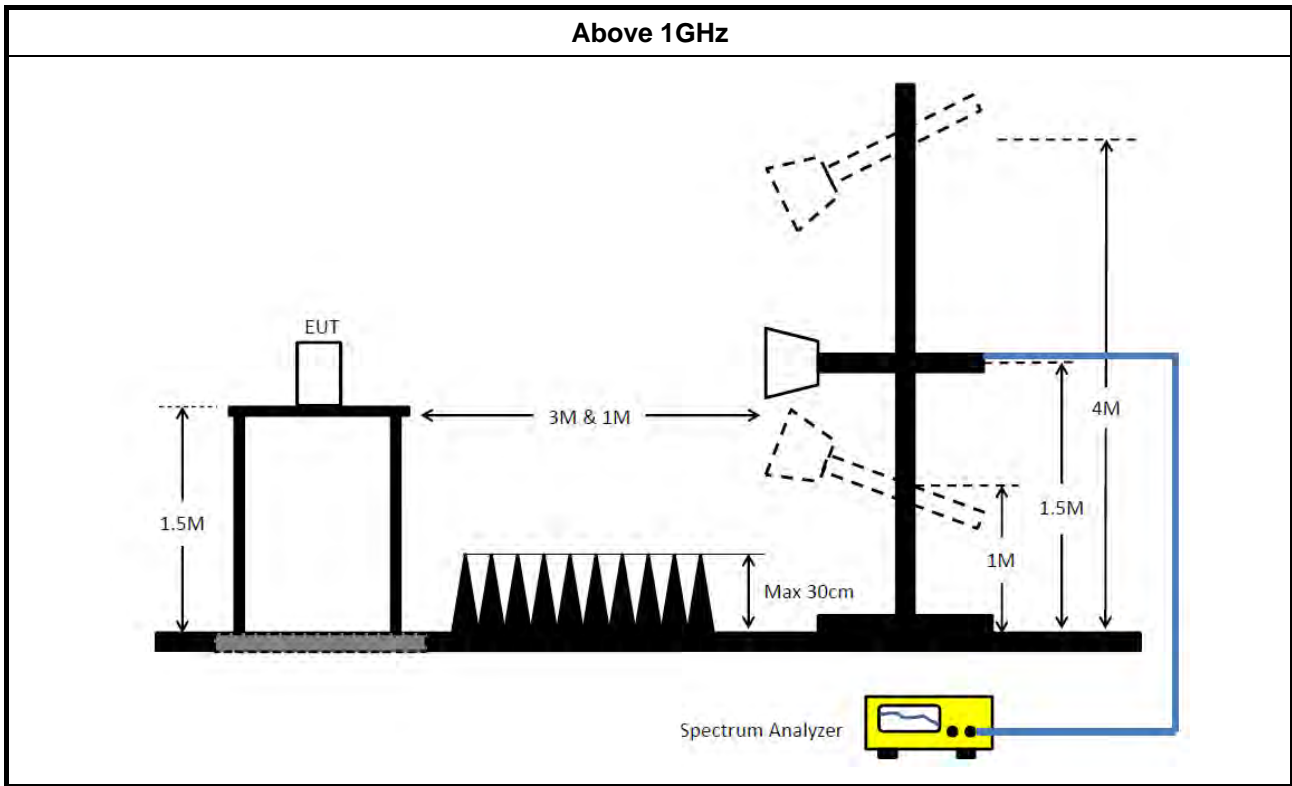
Test Method													
<ul style="list-style-type: none"> <li>▪ Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).</li> </ul>													
<ul style="list-style-type: none"> <li>▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].</li> </ul>													
<ul style="list-style-type: none"> <li>▪ For the transmitter unwanted emissions shall be measured using following options below:               <ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 789033, clause H)2) for unwanted emissions into non-restricted bands.</li> <li>▪ Refer as FCC KDB 789033, clause H)1) for unwanted emissions into restricted bands.                   <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"><input type="checkbox"/></td> <td>Refer as FCC KDB 789033, H)6) Method AD (Trace Averaging).</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Refer as FCC KDB 789033, H)6) Method VB (Reduced VBW).</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Refer as FCC KDB 789033, clause H)5) measurement procedure peak limit.</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.</td> </tr> </table> </li> </ul> </li> </ul>		<input type="checkbox"/>	Refer as FCC KDB 789033, H)6) Method AD (Trace Averaging).	<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, H)6) Method VB (Reduced VBW).	<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.	<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.	<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause H)5) measurement procedure peak limit.	<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
<input type="checkbox"/>	Refer as FCC KDB 789033, H)6) Method AD (Trace Averaging).												
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, H)6) Method VB (Reduced VBW).												
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.												
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.												
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause H)5) measurement procedure peak limit.												
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.												
<ul style="list-style-type: none"> <li>▪ For radiated measurement.</li> </ul>													



Test Method	
	<ul style="list-style-type: none"><li>Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.</li></ul>
	<ul style="list-style-type: none"><li>Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.</li></ul>
	<ul style="list-style-type: none"><li>Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.</li></ul>
	<ul style="list-style-type: none"><li>The any unwanted emissions level shall not exceed the fundamental emission level.</li></ul>
	<ul style="list-style-type: none"><li>All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.</li></ul>

Test Method	
	<ul style="list-style-type: none"><li>For conducted and cabinet radiation measurement, refer as FCC KDB 789033, clause H)3).</li></ul>
	<ul style="list-style-type: none"><li>For conducted unwanted emissions into non-restricted bands (relative emission limits). Devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs.</li></ul>
	<ul style="list-style-type: none"><li>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</li></ul>
	<ul style="list-style-type: none"><li>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.</li></ul>

### 3.4.4 Test Setup



### 3.4.5 Test Result of Transmitter Unwanted Emissions

Refer as Appendix D



## 4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 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-H G	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)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	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. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz ~ 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz ~ 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz ~ 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz ~ 26.5 GHz	Oct. 08, 2018	Oct. 07, 2019	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY54320014	50MHz~18GHz	Apr. 17, 2018	Apr. 16, 2019	Conducted (TH01-CB)

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



**Summary**

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
5.25-5.35GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	19.075M	16.392M	16M4D1D	18.8M	16.367M
802.11ac VHT20_Nss1,(MCS0)_2TX	20.225M	17.616M	17M6D1D	19.85M	17.566M
802.11ac VHT40_Nss1,(MCS0)_2TX	39.65M	36.032M	36M0D1D	39.5M	35.882M
802.11ac VHT80_Nss1,(MCS0)_2TX	83.7M	75.862M	75M9D1D	83.3M	75.862M
5.47-5.725GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	19.15M	16.442M	16M4D1D	18.8M	16.392M
802.11ac VHT20_Nss1,(MCS0)_2TX	20.35M	17.641M	17M6D1D	19.95M	17.591M
802.11ac VHT40_Nss1,(MCS0)_2TX	39.8M	36.032M	36M0D1D	39.35M	35.882M
802.11ac VHT80_Nss1,(MCS0)_2TX	83.5M	75.862M	75M9D1D	82.9M	75.762M

**Max-N dB** = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;

**Max-OBW** = Maximum 99% occupied bandwidth;

**Min-N dB** = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;

**Min-OBW** = Minimum 99% occupied bandwidth;

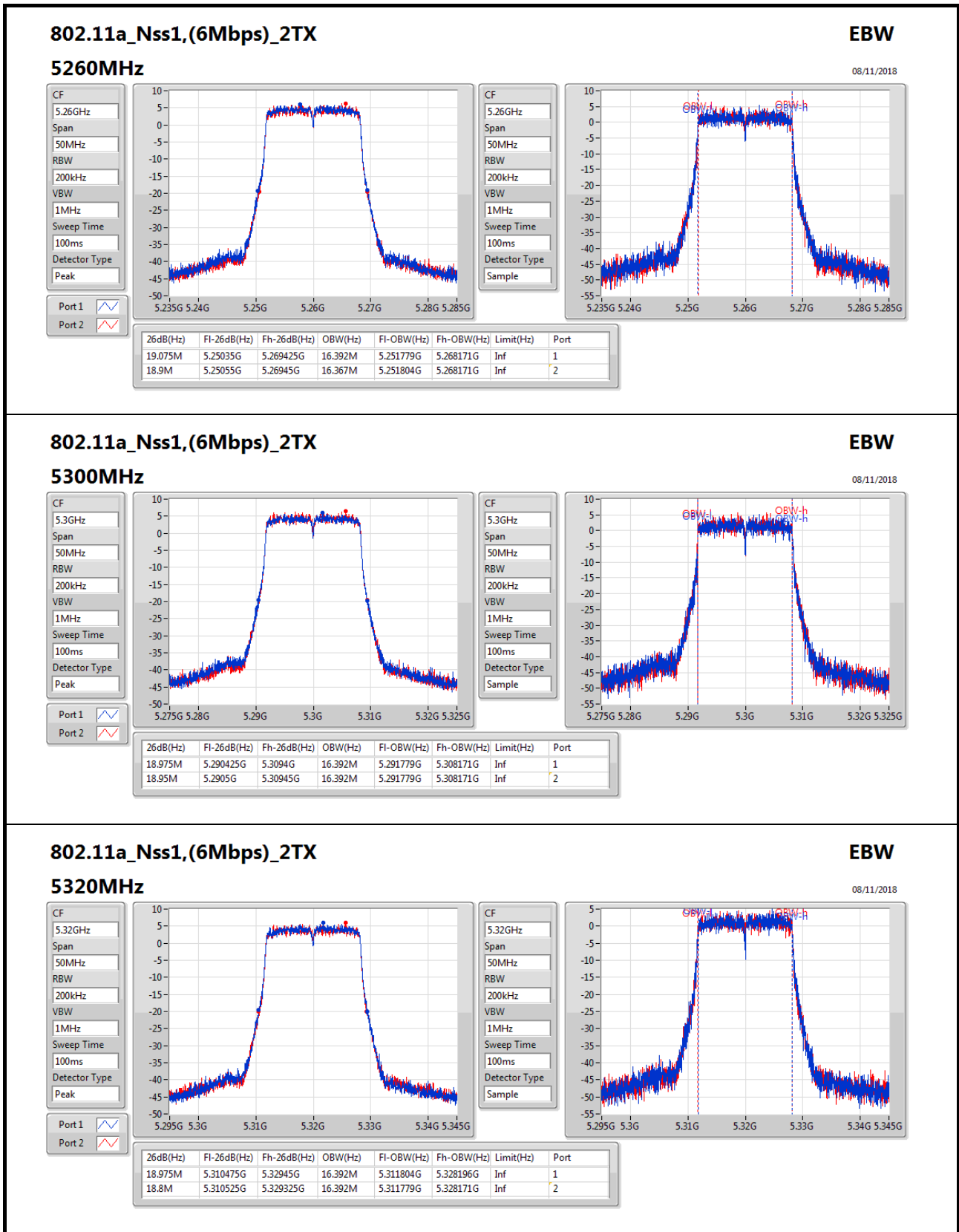


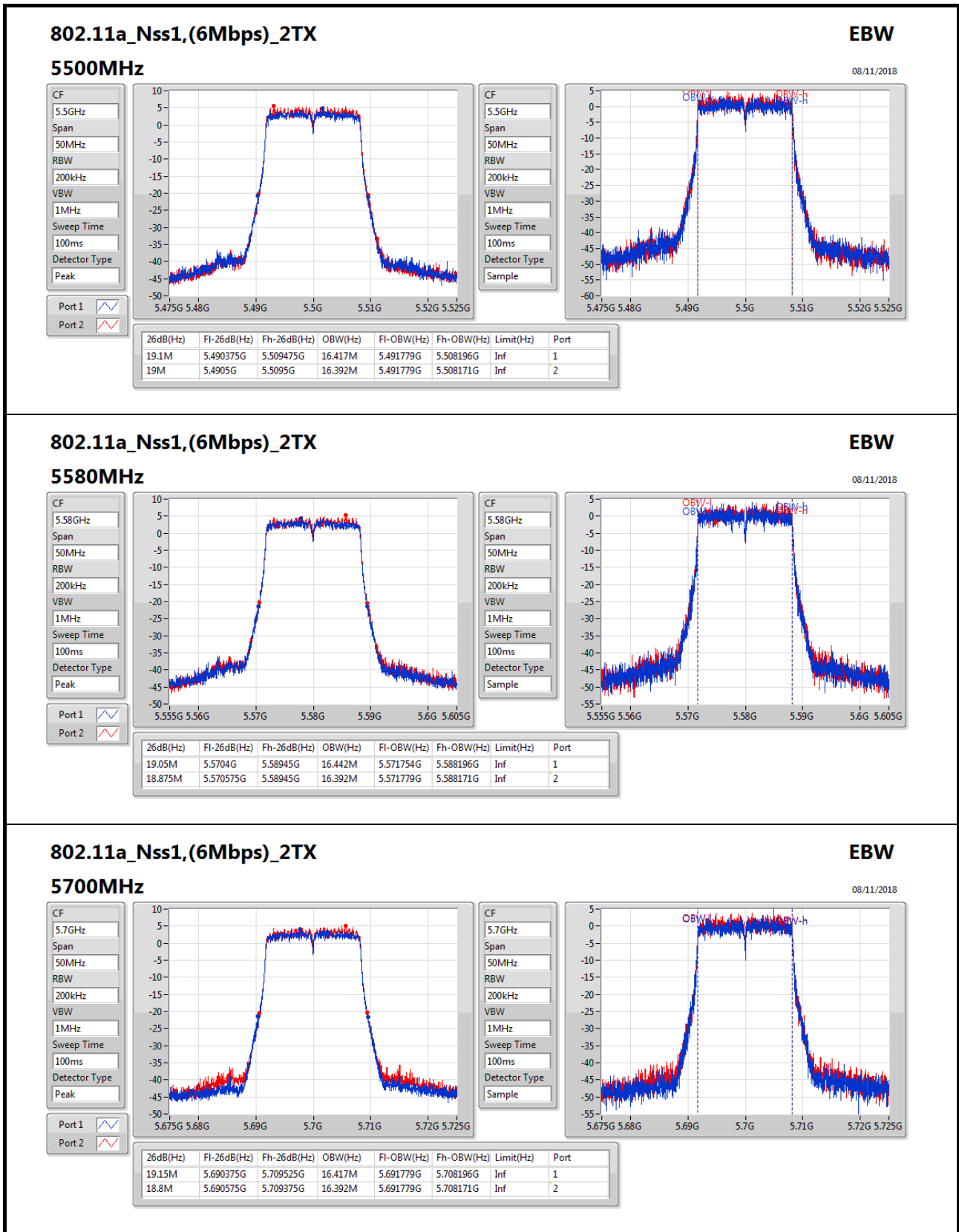
**Result**

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)	Port 2-N dB (Hz)	Port 2-OBW (Hz)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5260MHz	Pass	Inf	19.075M	16.392M	18.9M	16.367M
5300MHz	Pass	Inf	18.975M	16.392M	18.95M	16.392M
5320MHz	Pass	Inf	18.975M	16.392M	18.8M	16.392M
5500MHz	Pass	Inf	19.1M	16.417M	19M	16.392M
5580MHz	Pass	Inf	19.05M	16.442M	18.875M	16.392M
5700MHz	Pass	Inf	19.15M	16.417M	18.8M	16.392M
802.11ac_VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	Inf	19.975M	17.591M	20.225M	17.616M
5300MHz	Pass	Inf	20.15M	17.591M	19.875M	17.591M
5320MHz	Pass	Inf	19.95M	17.616M	19.85M	17.566M
5500MHz	Pass	Inf	20M	17.616M	19.95M	17.616M
5580MHz	Pass	Inf	20.3M	17.641M	20.2M	17.591M
5700MHz	Pass	Inf	20.35M	17.641M	19.95M	17.591M
802.11ac_VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	Inf	39.5M	35.982M	39.65M	35.882M
5310MHz	Pass	Inf	39.55M	35.932M	39.65M	36.032M
5510MHz	Pass	Inf	39.5M	35.982M	39.65M	35.932M
5550MHz	Pass	Inf	39.35M	35.882M	39.5M	35.982M
5670MHz	Pass	Inf	39.35M	35.882M	39.8M	36.032M
802.11ac_VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5290MHz	Pass	Inf	83.7M	75.862M	83.3M	75.862M
5530MHz	Pass	Inf	82.9M	75.762M	83.2M	75.762M
5610MHz	Pass	Inf	83.5M	75.862M	83.4M	75.762M

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






**802.11a\_Nss1,(6Mbps)\_2TX**
**EBW**

08/11/2018

**5700MHz**

CF: 5.7GHz  
Span: 50MHz  
RBW: 200kHz  
VBW: 1MHz  
Sweep Time: 100ms  
Detector Type: Peak

CF: 5.7GHz  
Span: 50MHz  
RBW: 200kHz  
VBW: 1MHz  
Sweep Time: 100ms  
Detector Type: Sample

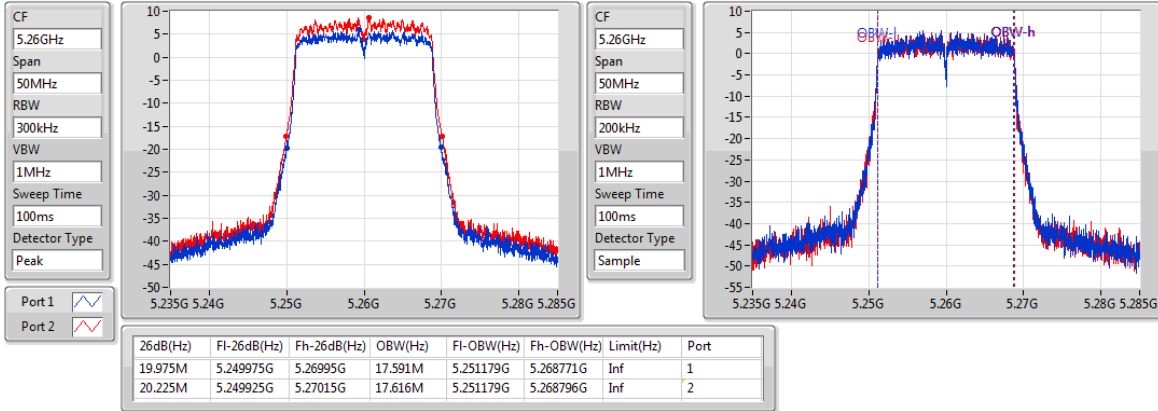
26dB(Hz)	Fl-26dB(Hz)	Fh-26dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
19.15M	5.690375G	5.709525G	16.417M	5.691779G	5.708196G	Inf	1
18.8M	5.690575G	5.709375G	16.392M	5.691779G	5.708171G	Inf	2

**802.11ac VHT20\_Nss1,(MCS0)\_2TX**

**EBW**

**5260MHz**

08/11/2018

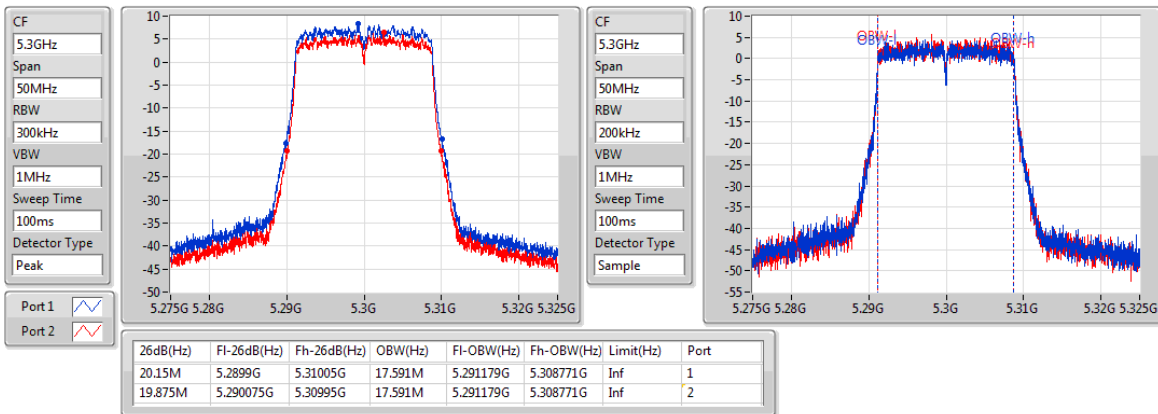


**802.11ac VHT20\_Nss1,(MCS0)\_2TX**

**EBW**

**5300MHz**

08/11/2018

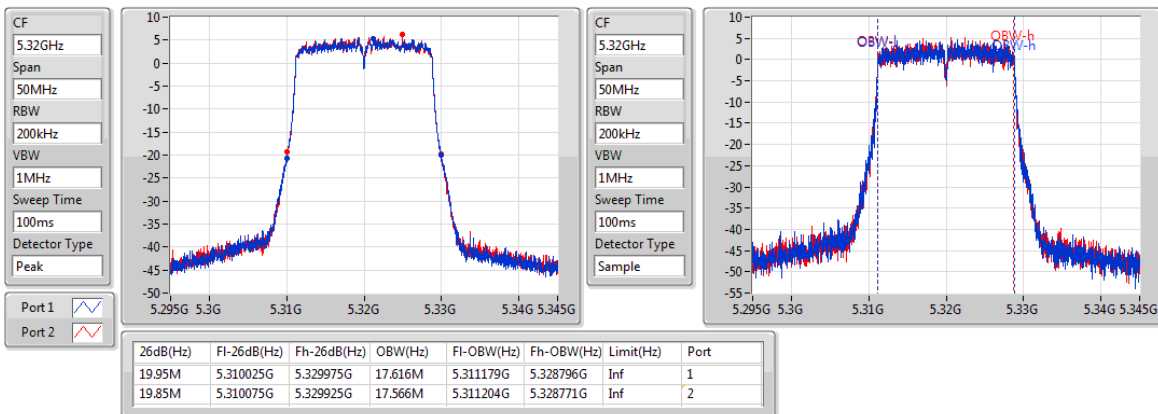


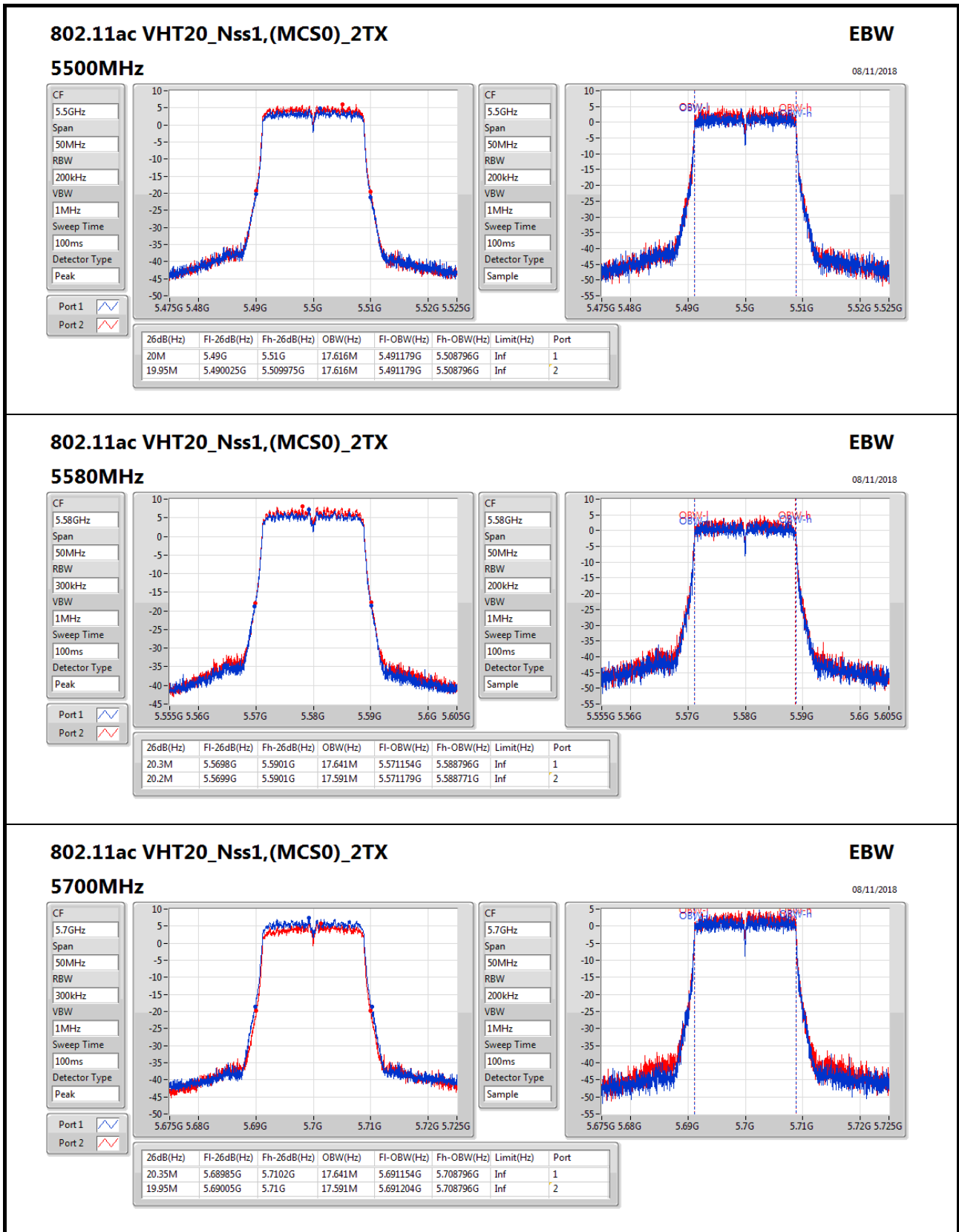
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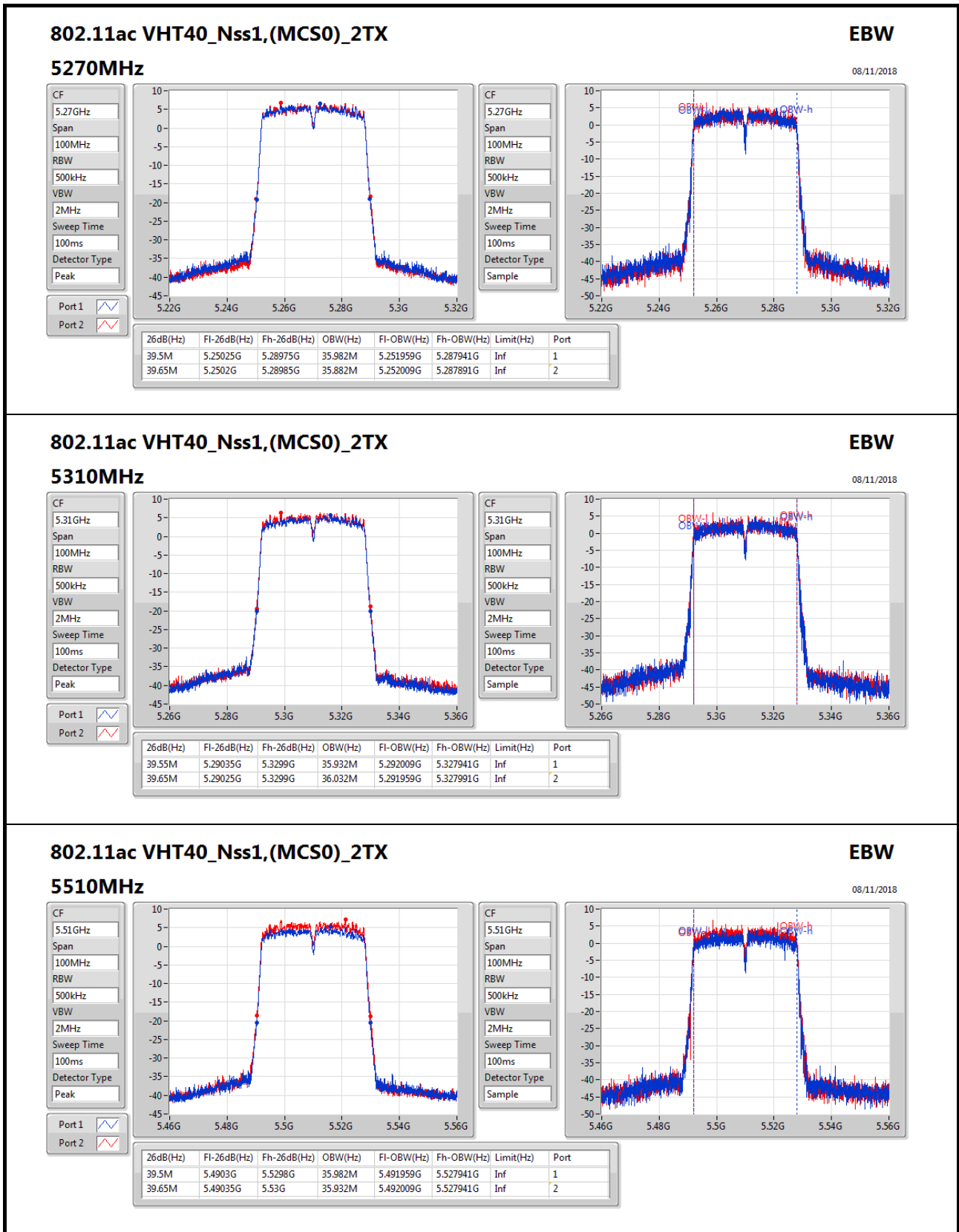
**EBW**

**5320MHz**

08/11/2018






**802.11ac VHT40\_Nss1,(MCS0)\_2TX**
**EBW**

**5510MHz**

08/11/2018

CF: 5.51GHz  
Span: 100MHz  
RBW: 500kHz  
VBW: 2MHz  
Sweep Time: 100ms  
Detector Type: Peak

Port 1:

Port 2:

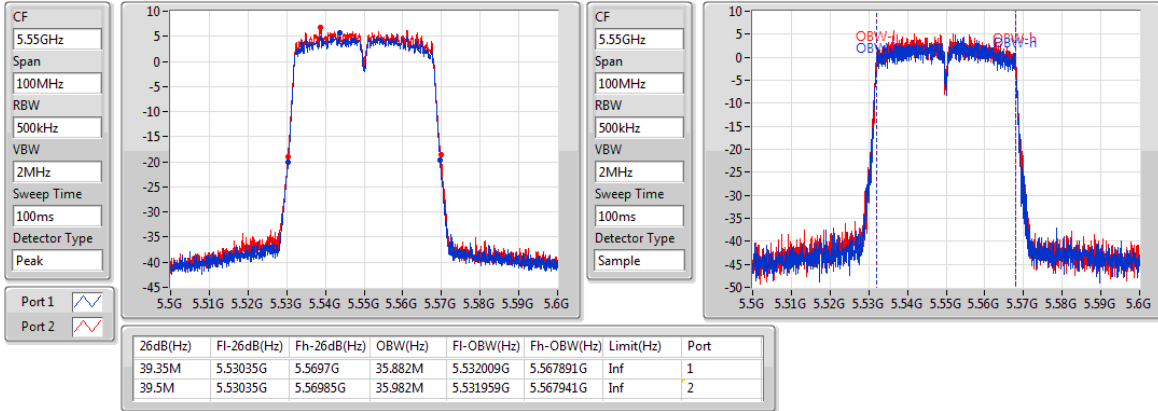
CF: 5.51GHz  
Span: 100MHz  
RBW: 500kHz  
VBW: 2MHz  
Sweep Time: 100ms  
Detector Type: Sample

**802.11ac VHT40\_Nss1,(MCS0)\_2TX**

**EBW**

**5550MHz**

08/11/2018

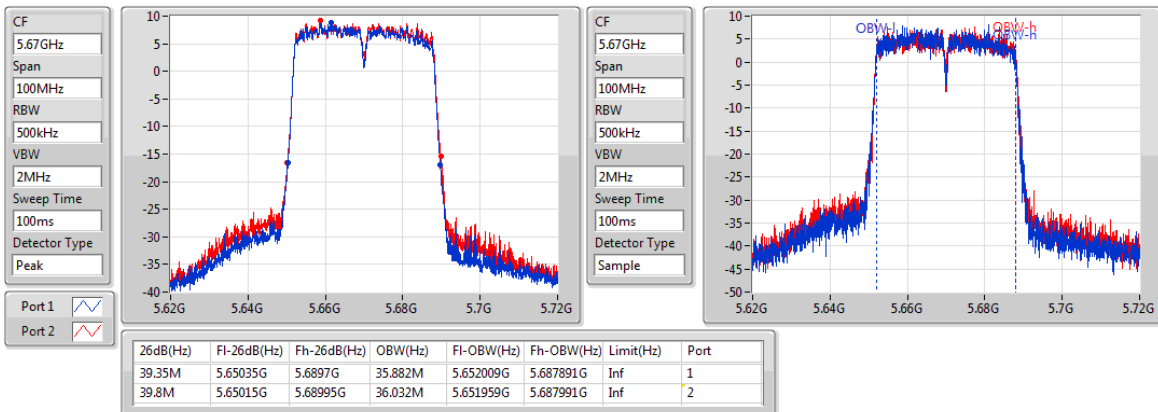


**802.11ac VHT40\_Nss1,(MCS0)\_2TX**

**EBW**

**5670MHz**

08/11/2018

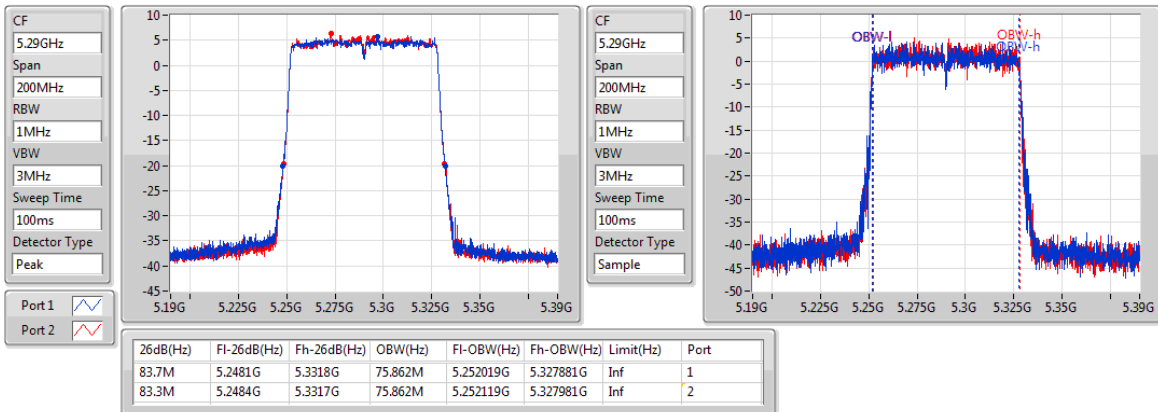


**802.11ac VHT80\_Nss1,(MCS0)\_2TX**

**EBW**

**5290MHz**

08/11/2018



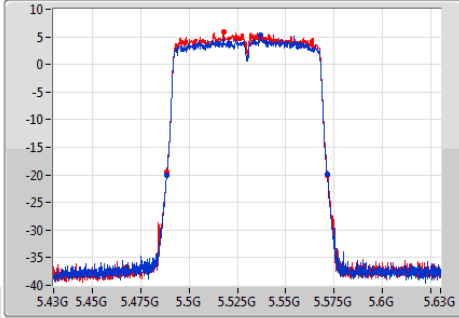
**802.11ac VHT80\_Nss1,(MCS0)\_2TX**

**EBW**

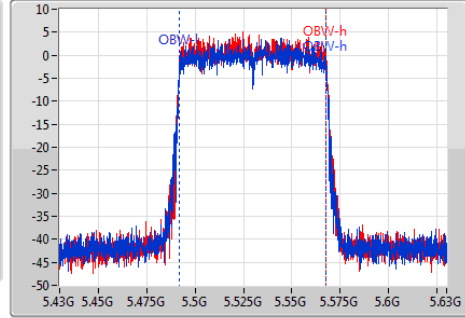
**5530MHz**

08/11/2018

CF  
5.53GHz  
Span  
200MHz  
RBW  
1MHz  
VBW  
3MHz  
Sweep Time  
100ms  
Detector Type  
Peak  
Port 1  
Port 2



CF  
5.53GHz  
Span  
200MHz  
RBW  
1MHz  
VBW  
3MHz  
Sweep Time  
100ms  
Detector Type  
Sample



26dB(Hz)	Fl-26dB(Hz)	Fh-26dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
82.9M	5.4884G	5.5713G	75.762M	5.492019G	5.567781G	Inf	1
83.2M	5.4885G	5.5717G	75.762M	5.492019G	5.567781G	Inf	2

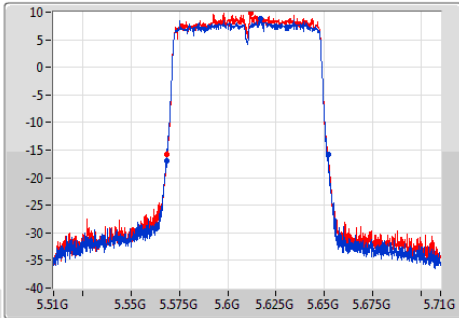
**802.11ac VHT80\_Nss1,(MCS0)\_2TX**

**EBW**

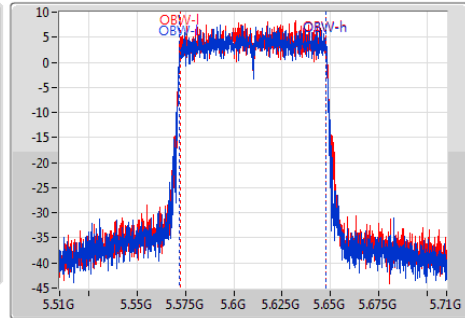
**5610MHz**

08/11/2018

CF  
5.61GHz  
Span  
200MHz  
RBW  
1MHz  
VBW  
3MHz  
Sweep Time  
100ms  
Detector Type  
Peak  
Port 1  
Port 2



CF  
5.61GHz  
Span  
200MHz  
RBW  
1MHz  
VBW  
3MHz  
Sweep Time  
100ms  
Detector Type  
Sample



26dB(Hz)	Fl-26dB(Hz)	Fh-26dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
83.5M	5.5683G	5.6518G	75.862M	5.572019G	5.647881G	Inf	1
83.4M	5.5684G	5.6518G	75.762M	5.572119G	5.647881G	Inf	2



**Summary**

Mode	Total Power (dBm)	Total Power (W)
5.25-5.35GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	19.92	0.09817
802.11ac VHT20_Nss1,(MCS0)_2TX	19.96	0.09908
802.11ac VHT40_Nss1,(MCS0)_2TX	19.01	0.07962
802.11ac VHT80_Nss1,(MCS0)_2TX	17.82	0.06053
5.47-5.725GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	18.76	0.07516
802.11ac VHT20_Nss1,(MCS0)_2TX	19.28	0.08472
802.11ac VHT40_Nss1,(MCS0)_2TX	20.95	0.12445
802.11ac VHT80_Nss1,(MCS0)_2TX	20.89	0.12274





**Result**

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.90	16.79	16.83	19.82	20.86
5300MHz	Pass	8.90	16.75	17.07	19.92	20.88
5320MHz	Pass	8.90	16.37	16.42	19.41	20.84
5500MHz	Pass	8.90	15.51	15.97	18.76	20.89
5580MHz	Pass	8.90	15.22	15.65	18.45	20.86
5700MHz	Pass	8.90	15.19	15.53	18.37	20.84
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.90	16.86	16.98	19.93	21.08
5300MHz	Pass	8.90	16.78	17.12	19.96	21.08
5320MHz	Pass	8.90	16.51	16.58	19.56	21.08
5500MHz	Pass	8.90	15.94	16.41	19.19	21.08
5580MHz	Pass	8.90	15.75	16.29	19.04	21.08
5700MHz	Pass	8.90	15.84	16.66	19.28	21.08
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	8.90	15.97	16.02	19.01	21.08
5310MHz	Pass	8.90	15.28	15.66	18.48	21.08
5510MHz	Pass	8.90	15.44	16.15	18.82	21.08
5550MHz	Pass	8.90	15.14	15.78	18.48	21.08
5670MHz	Pass	8.90	17.61	18.24	20.95	21.08
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5290MHz	Pass	8.90	14.81	14.80	17.82	21.08
5530MHz	Pass	8.90	13.58	14.27	16.95	21.08
5610MHz	Pass	8.90	17.62	18.13	20.89	21.08

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



Summary

Mode	PD (dBm/RBW)
5.25-5.35GHz	-
802.11a_Nss1,(6Mbps)_2TX	7.01
802.11ac VHT20_Nss1,(MCS0)_2TX	6.99
802.11ac VHT40_Nss1,(MCS0)_2TX	3.34
802.11ac VHT80_Nss1,(MCS0)_2TX	-1.53
5.47-5.725GHz	-
802.11a_Nss1,(6Mbps)_2TX	6.09
802.11ac VHT20_Nss1,(MCS0)_2TX	6.45
802.11ac VHT40_Nss1,(MCS0)_2TX	5.43
802.11ac VHT80_Nss1,(MCS0)_2TX	1.92

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

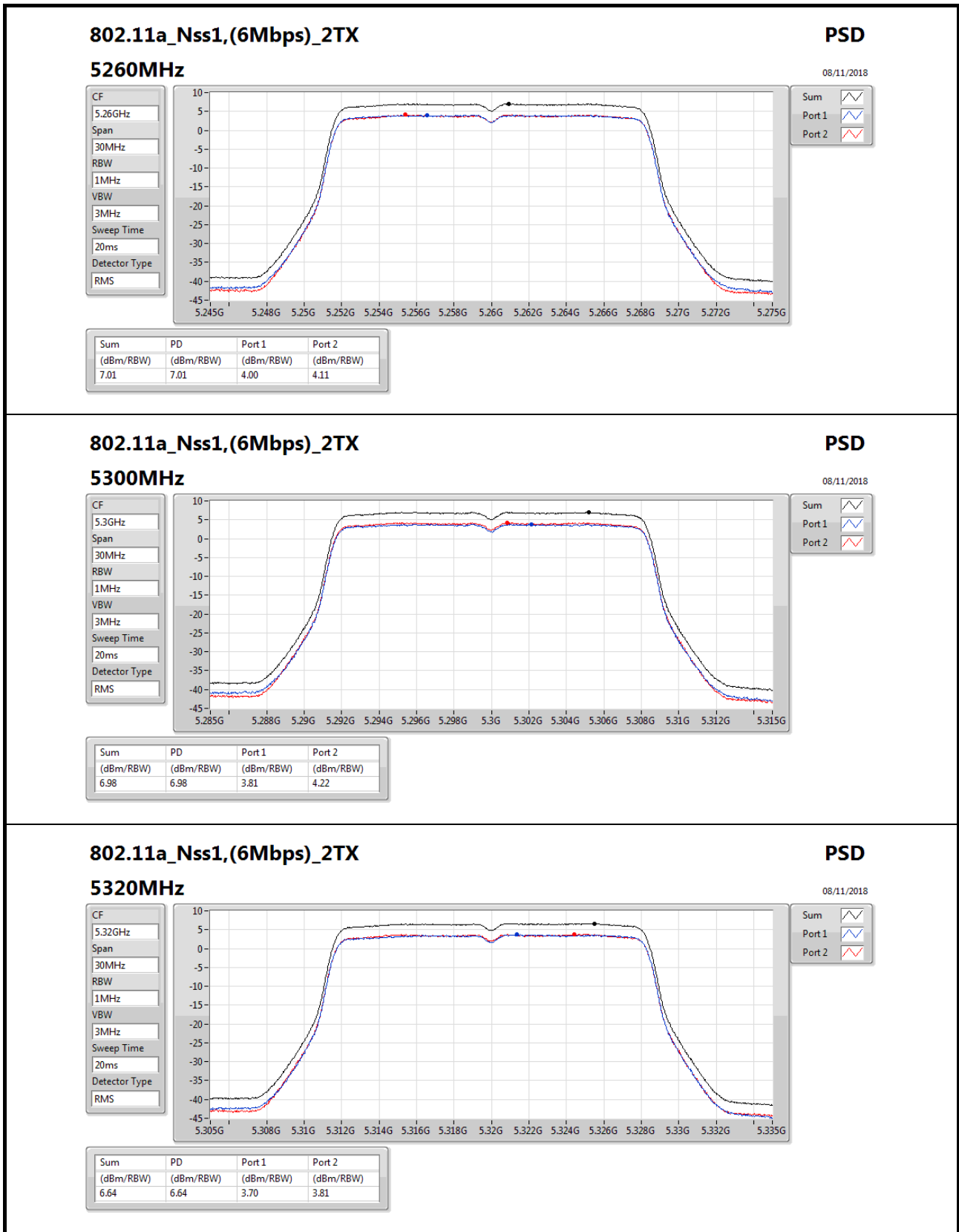


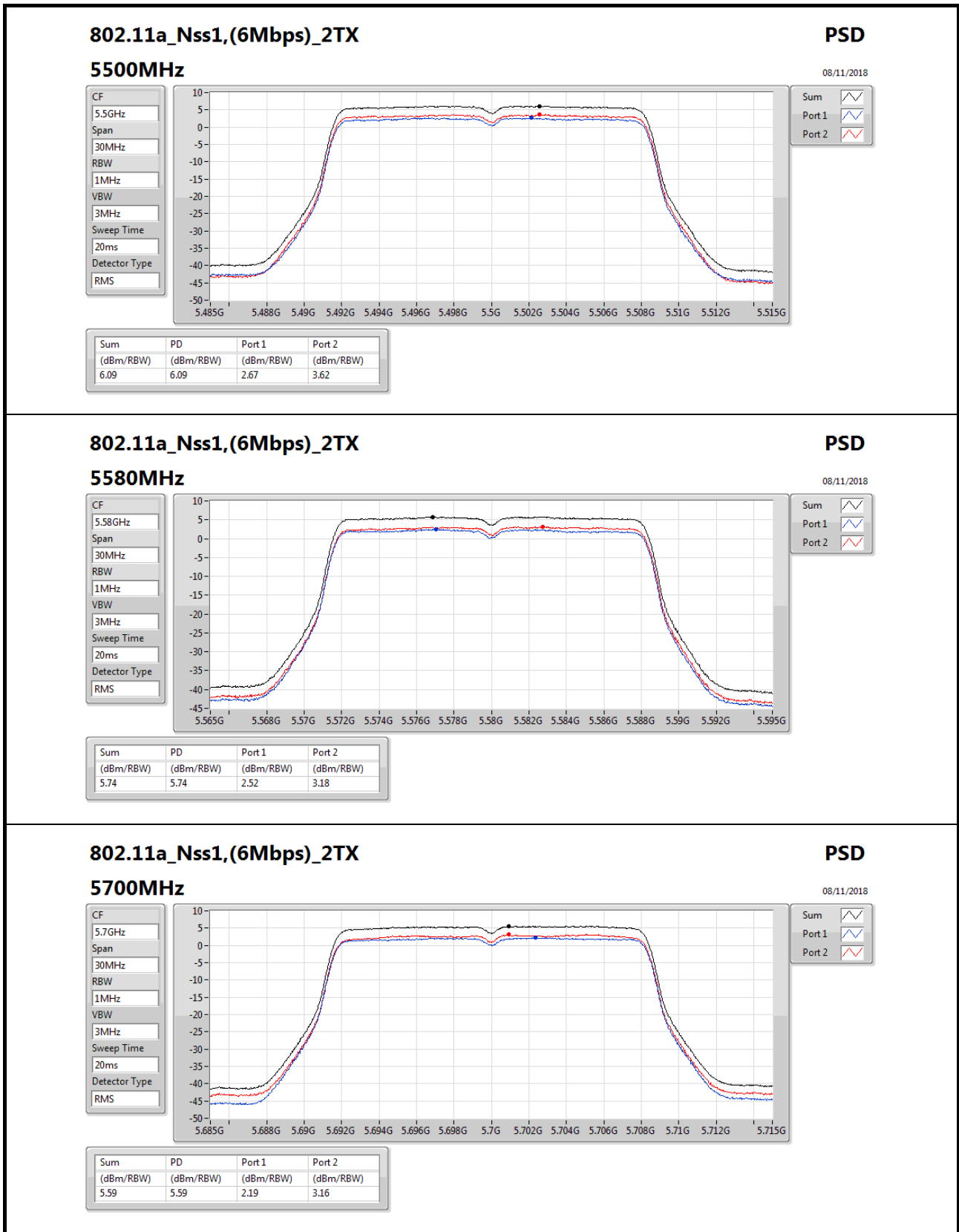
Result

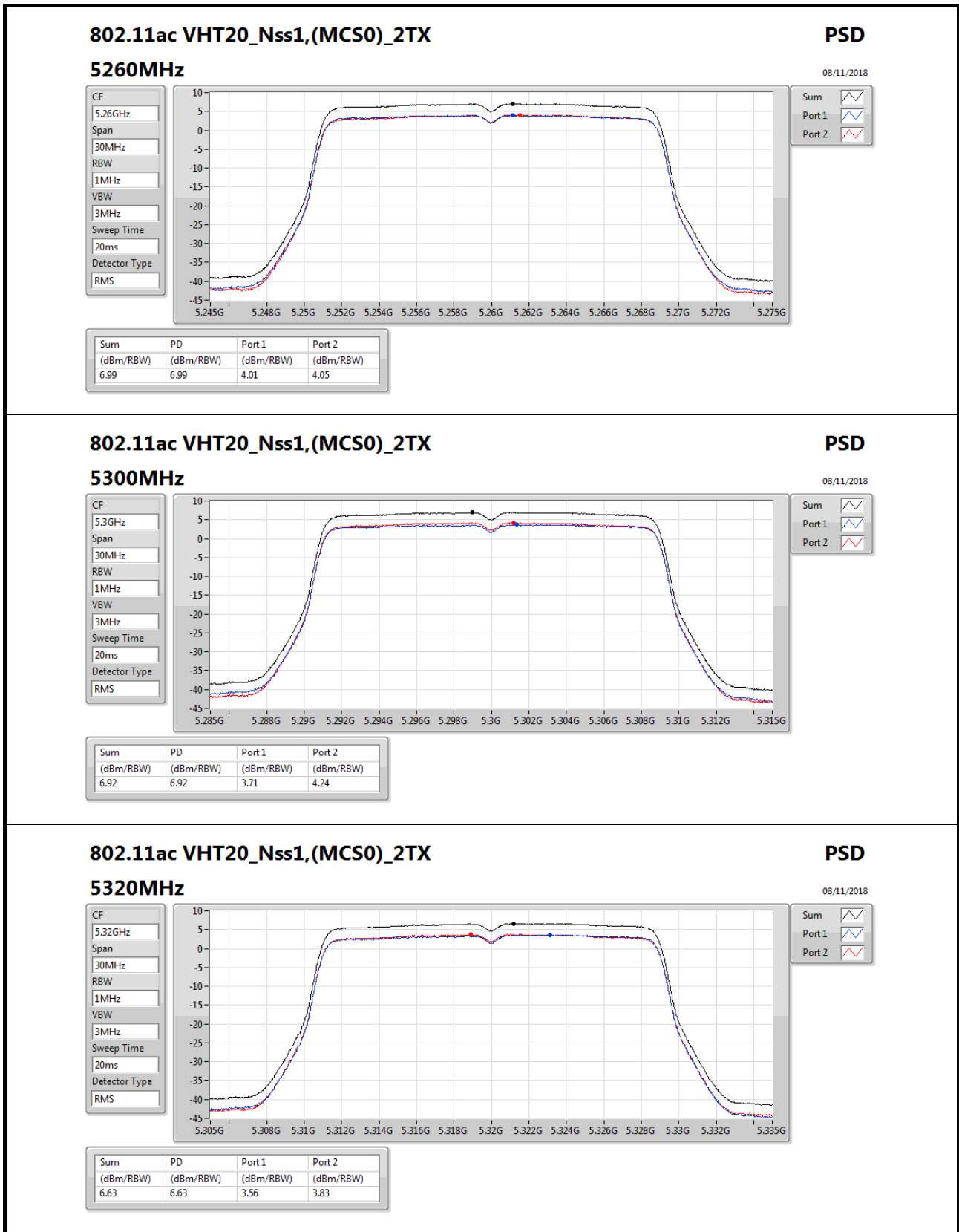
Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	Port 2 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.90	4.00	4.11	7.01	8.10
5300MHz	Pass	8.90	3.81	4.22	6.98	8.10
5320MHz	Pass	8.90	3.70	3.81	6.64	8.10
5500MHz	Pass	8.90	2.67	3.62	6.09	8.10
5580MHz	Pass	8.90	2.52	3.18	5.74	8.10
5700MHz	Pass	8.90	2.19	3.16	5.59	8.10
802.11ac VHT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5260MHz	Pass	8.90	4.01	4.05	6.99	8.10
5300MHz	Pass	8.90	3.71	4.24	6.92	8.10
5320MHz	Pass	8.90	3.56	3.83	6.63	8.10
5500MHz	Pass	8.90	2.86	3.98	6.39	8.10
5580MHz	Pass	8.90	2.48	3.53	6.04	8.10
5700MHz	Pass	8.90	2.86	4.06	6.45	8.10
802.11ac VHT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5270MHz	Pass	8.90	0.38	0.40	3.34	8.10
5310MHz	Pass	8.90	-0.26	-0.03	2.87	8.10
5510MHz	Pass	8.90	-0.87	0.42	2.77	8.10
5550MHz	Pass	8.90	-1.00	-0.23	2.29	8.10
5670MHz	Pass	8.90	2.61	2.43	5.43	8.10
802.11ac VHT80_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5290MHz	Pass	8.90	-4.52	-4.25	-1.53	8.10
5530MHz	Pass	8.90	-4.86	-4.49	-1.77	8.10
5610MHz	Pass	8.90	-1.27	-0.72	1.92	8.10

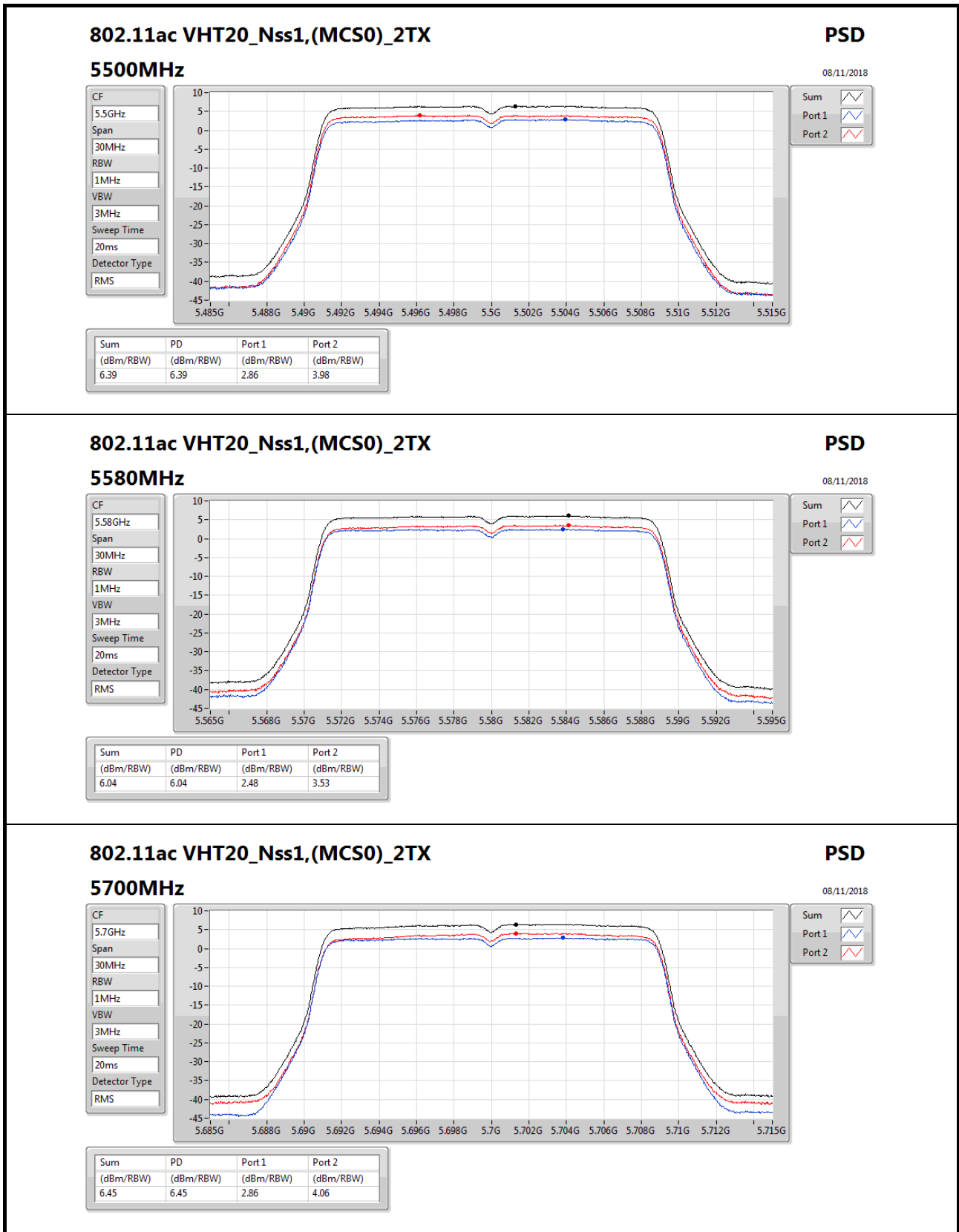
DG = Directional Gain; RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;

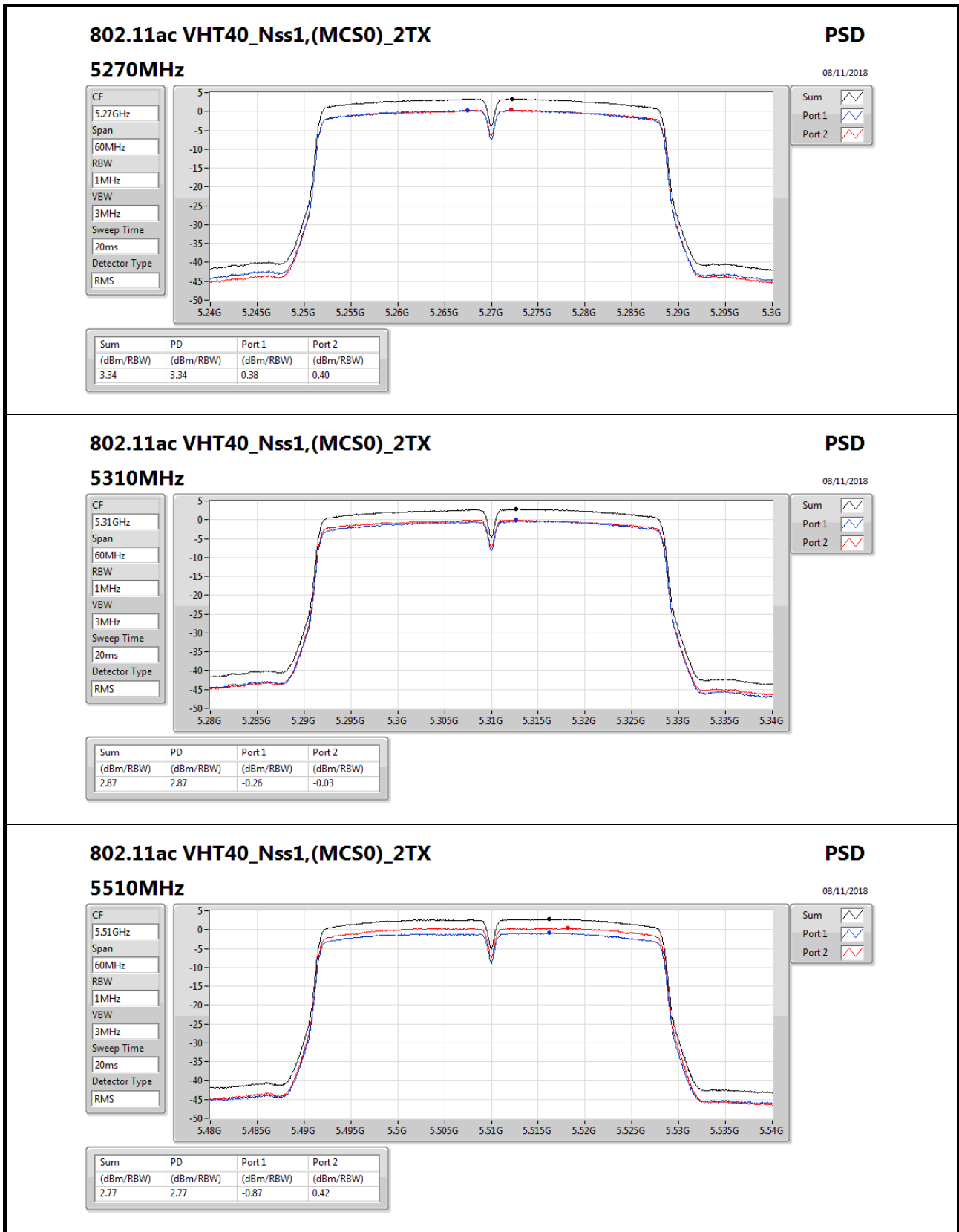
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port Xpower density;











### 802.11ac VHT40\_Nss1,(MCS0)\_2TX

#### 5510MHz

**PSD**

08/11/2018

CF

5.51GHz

Span

60MHz

RBW

1MHz

VBW

3MHz

Sweep Time

20ms

Detector Type

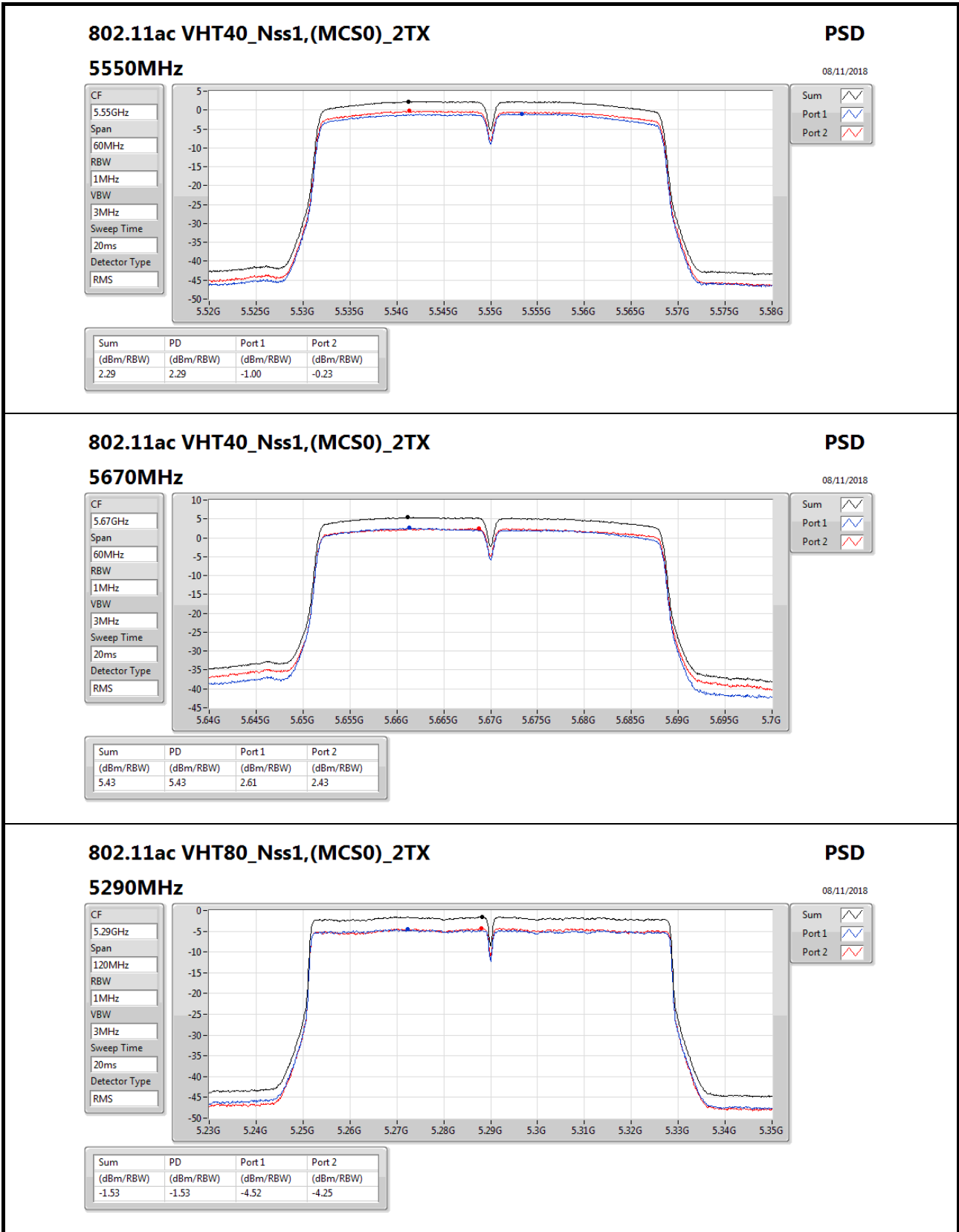
RMS

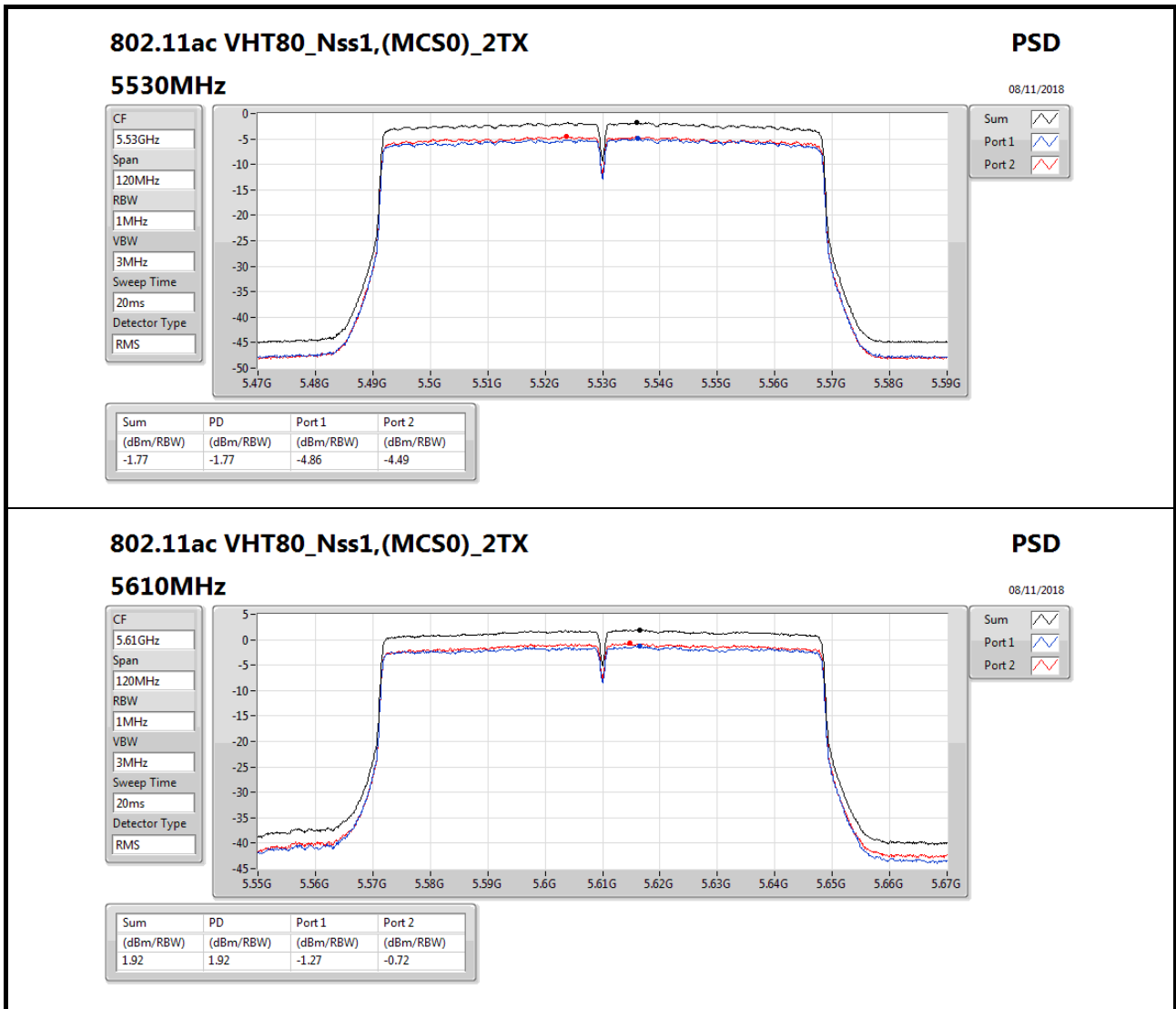
Sum

Port 1

Port 2





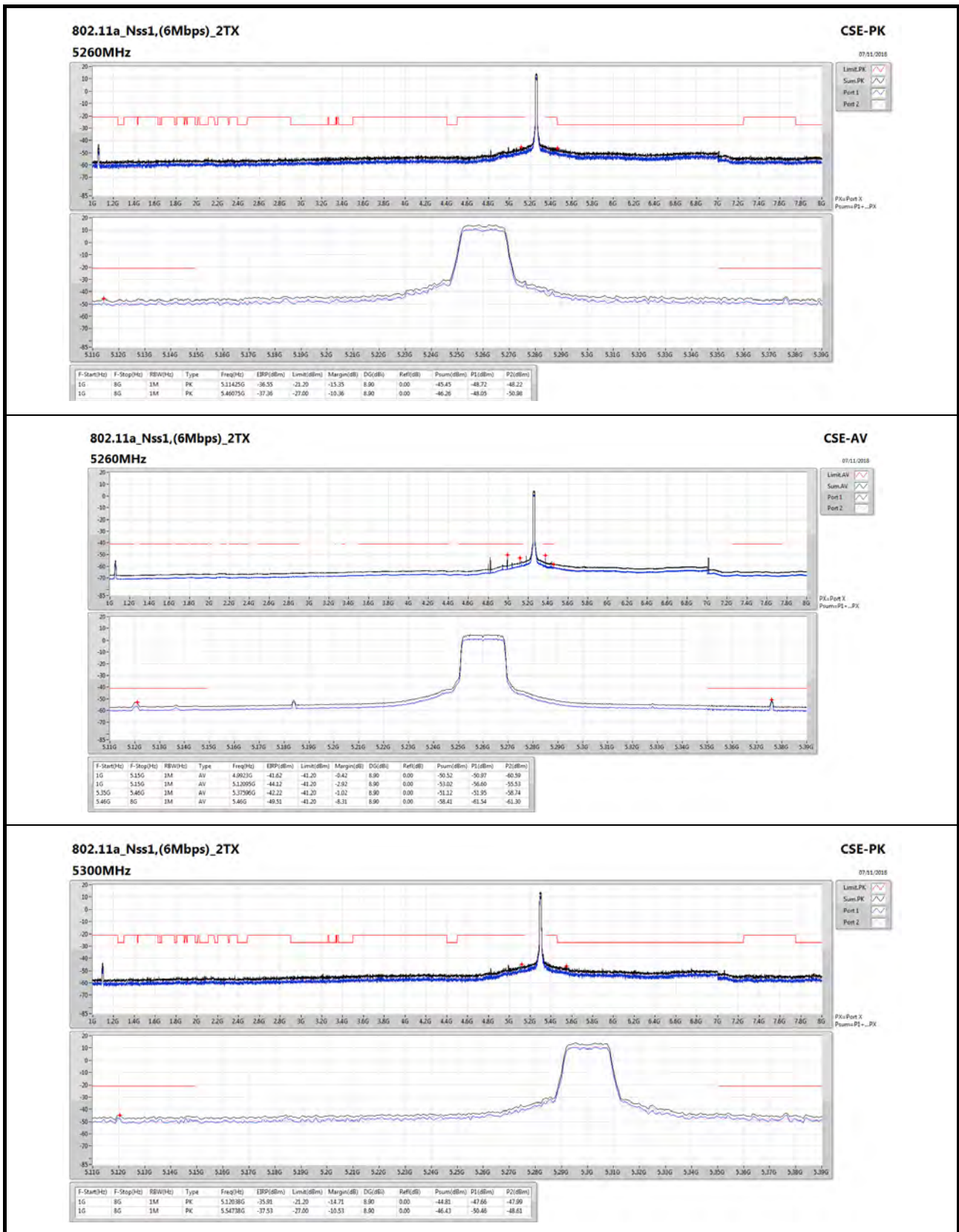


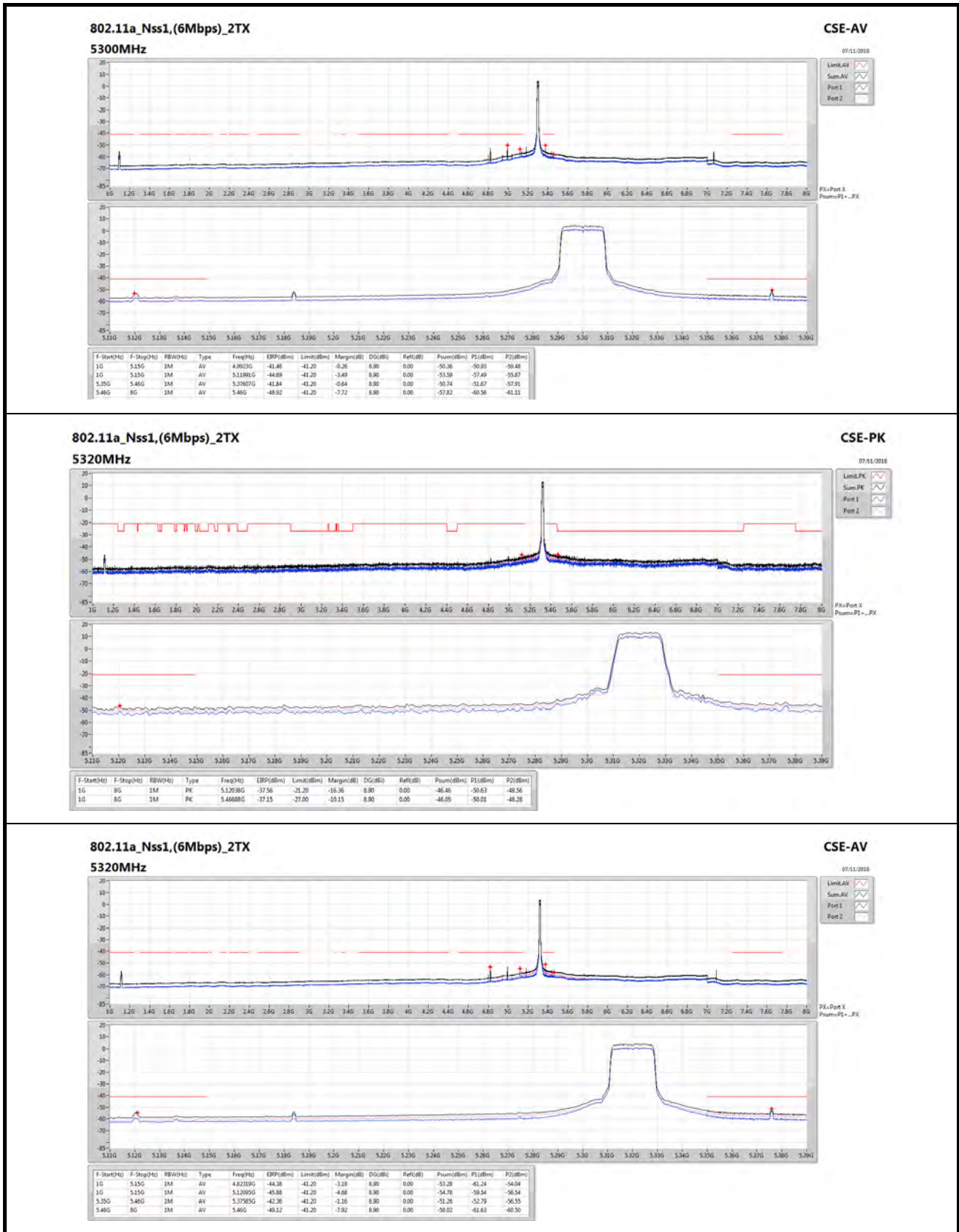


Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	RBW (Hz)	Type	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	DG (dBi)	Refl (dB)	Psum (dBm)	P1 (dBm)	P2 (dBm)
5.47-5.725GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT80_Nss1,(MCS0)_2TX	Pass	1G	8G	1M	PK	5.73025G	-27.07	-27.00	-0.07	8.90	0.00	-35.97	-40.19	-38.04

DG = Directional Gain;  
 PX=Port X; Psum=P1+.P2+..PX





**802.11a\_Nss1,(6Mbps)\_2TX**

**5320MHz**

**CSE-AV**

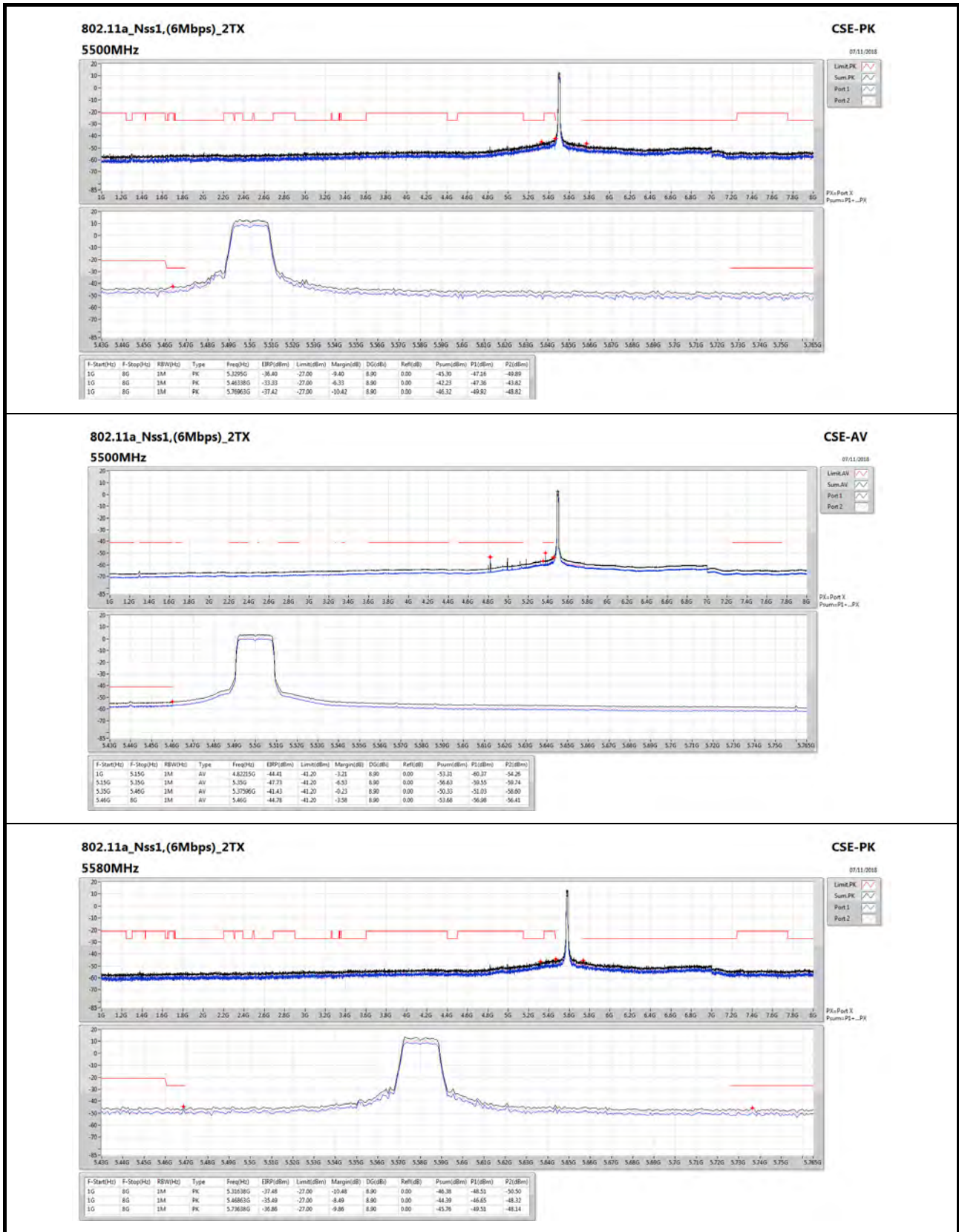
07/11/2018

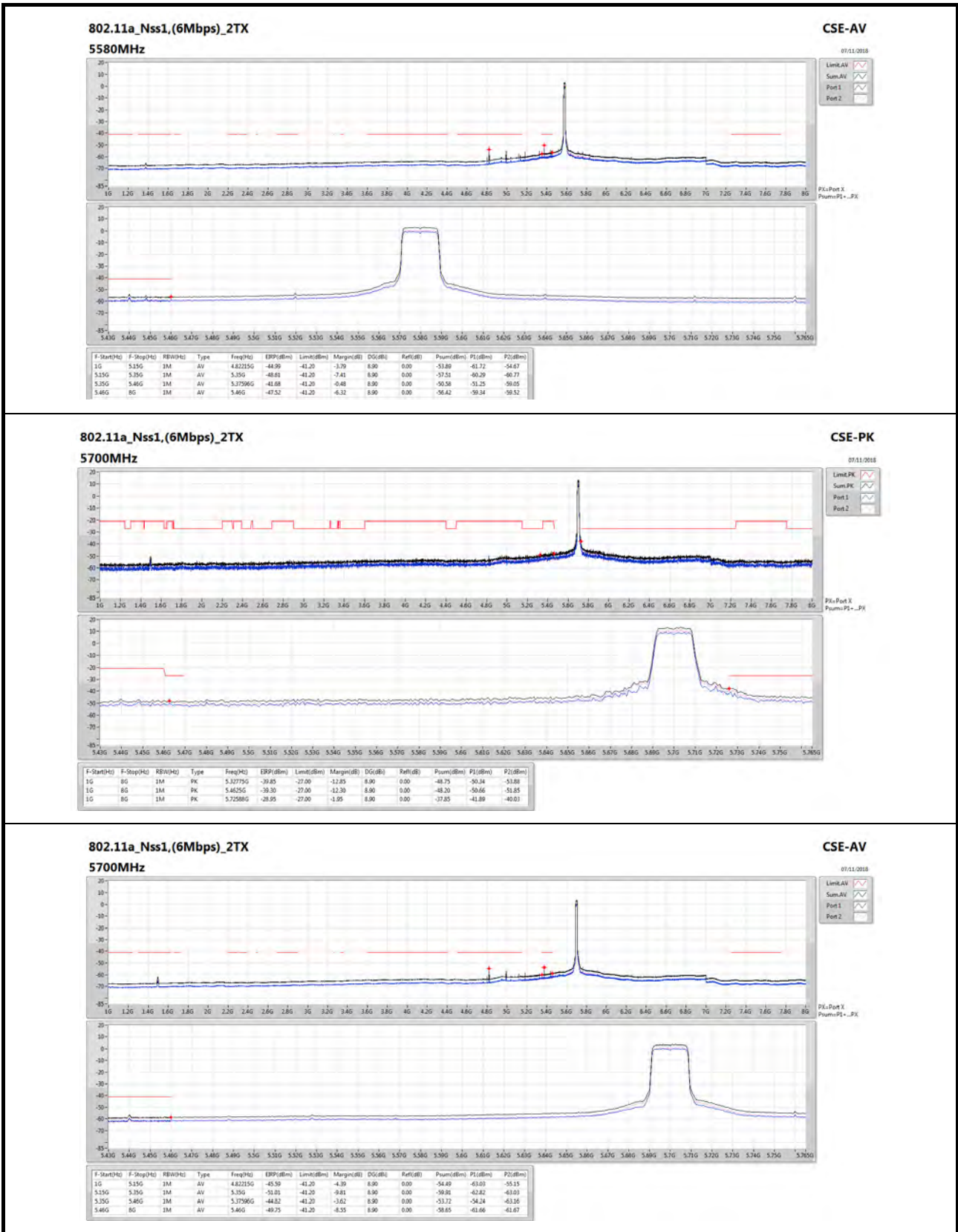
Limit:AV

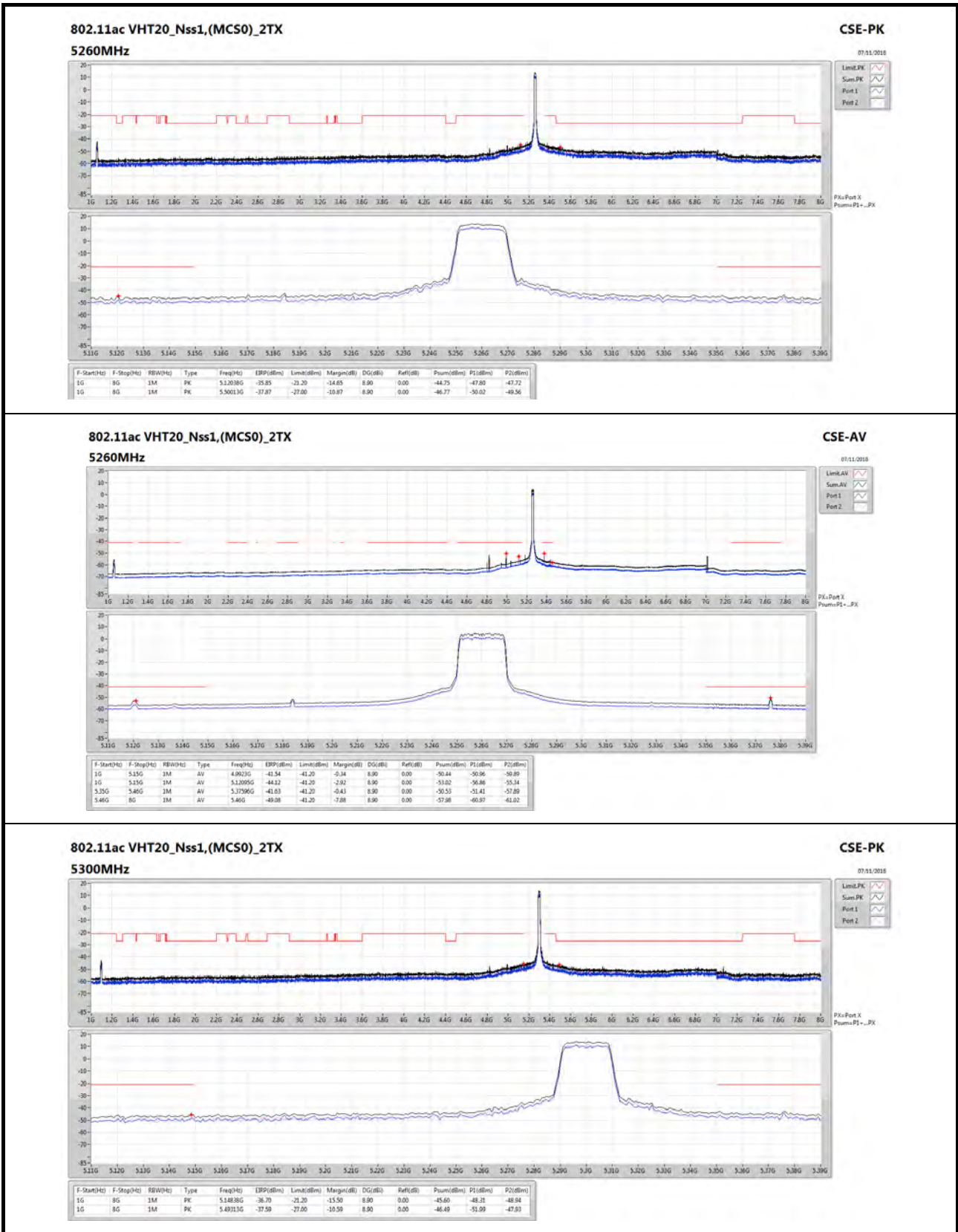
Sum:AV

Port 1

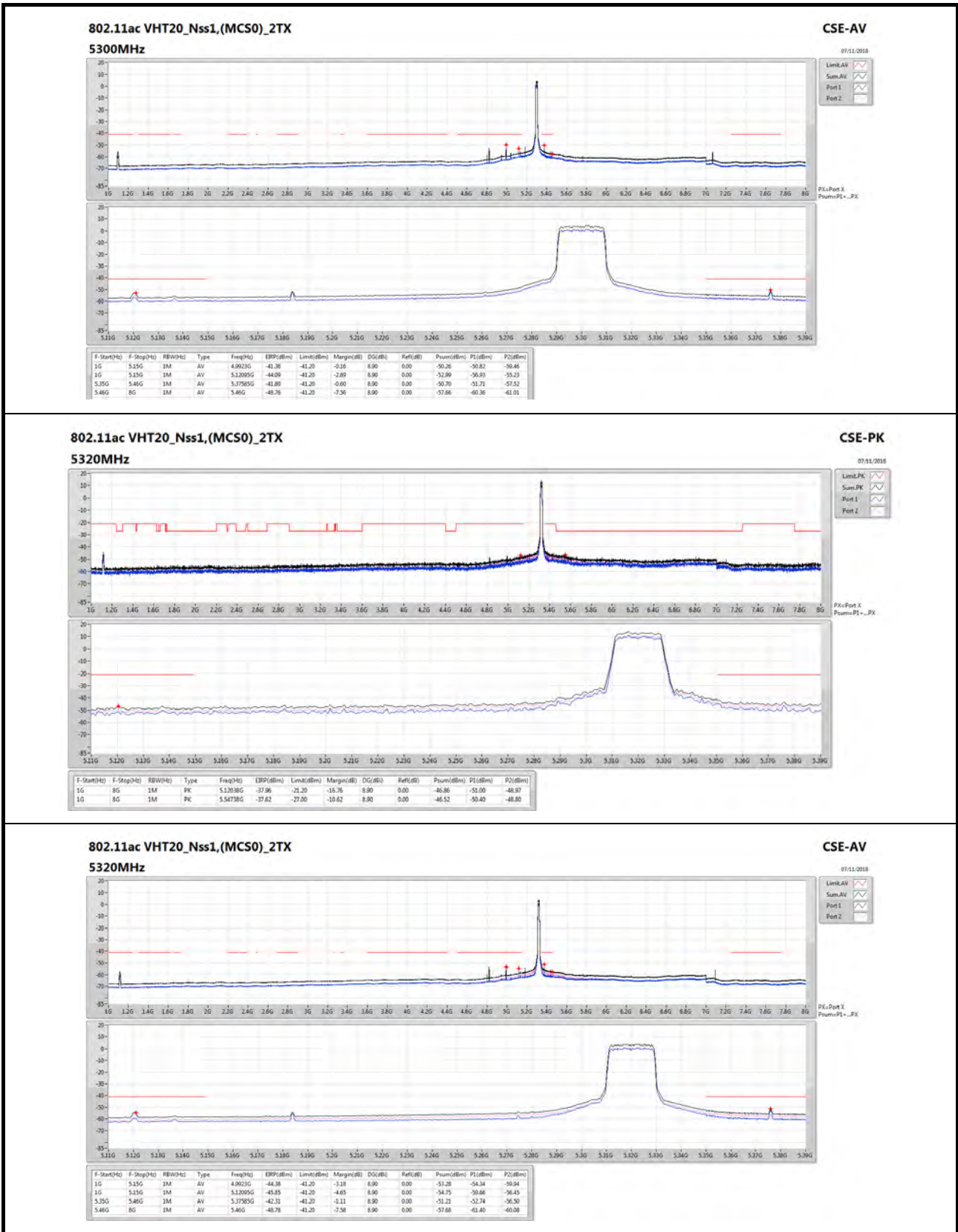
Port 2

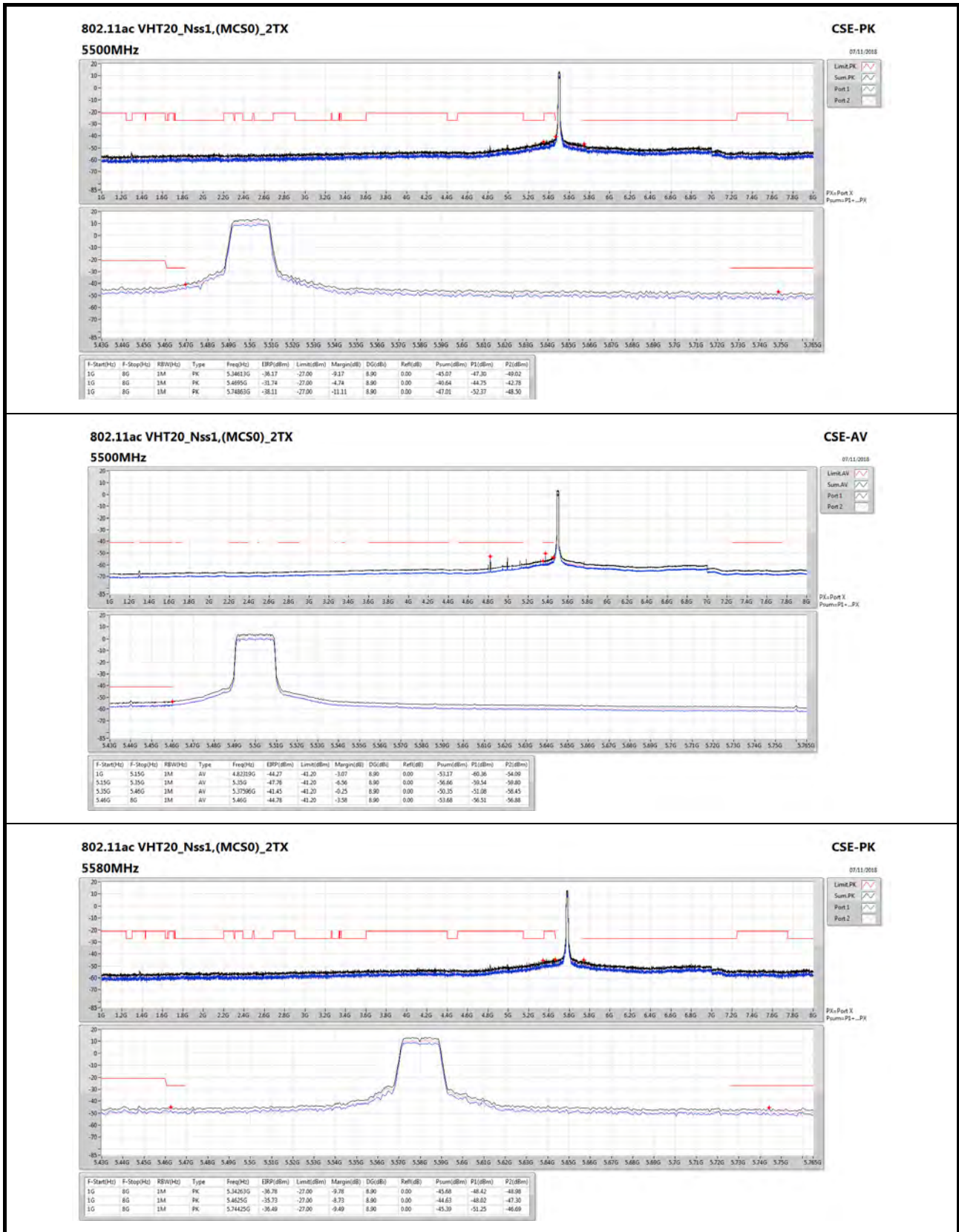


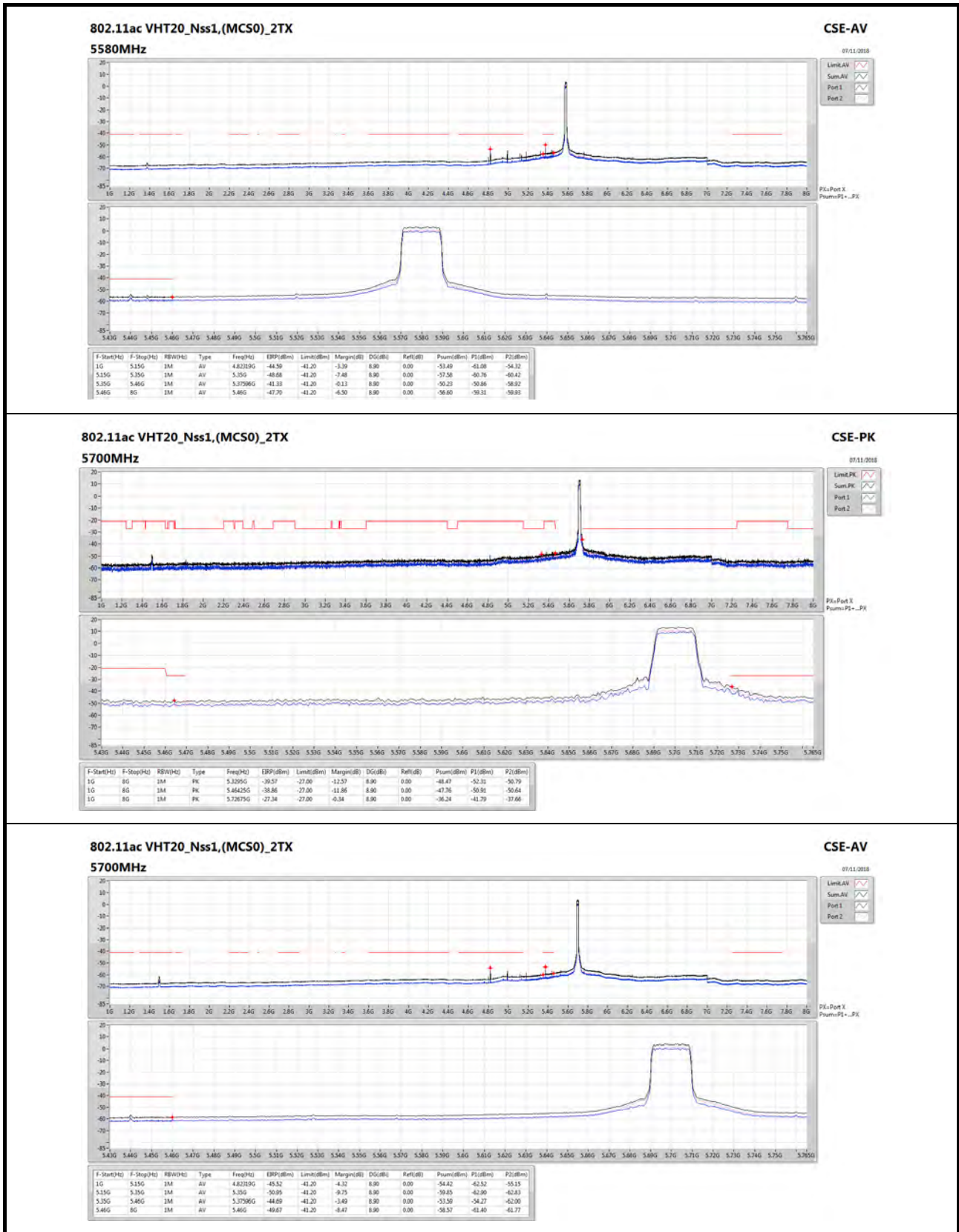


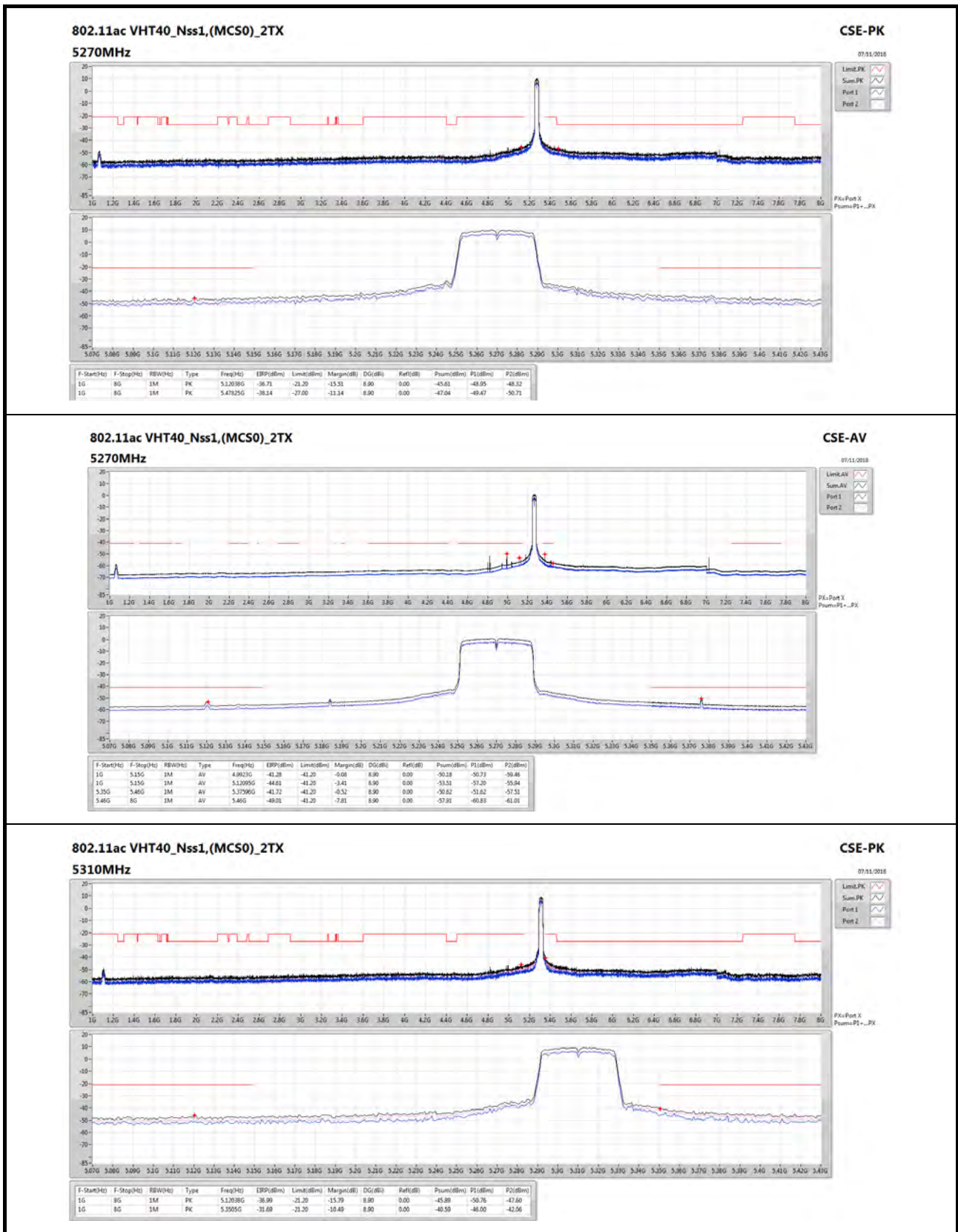


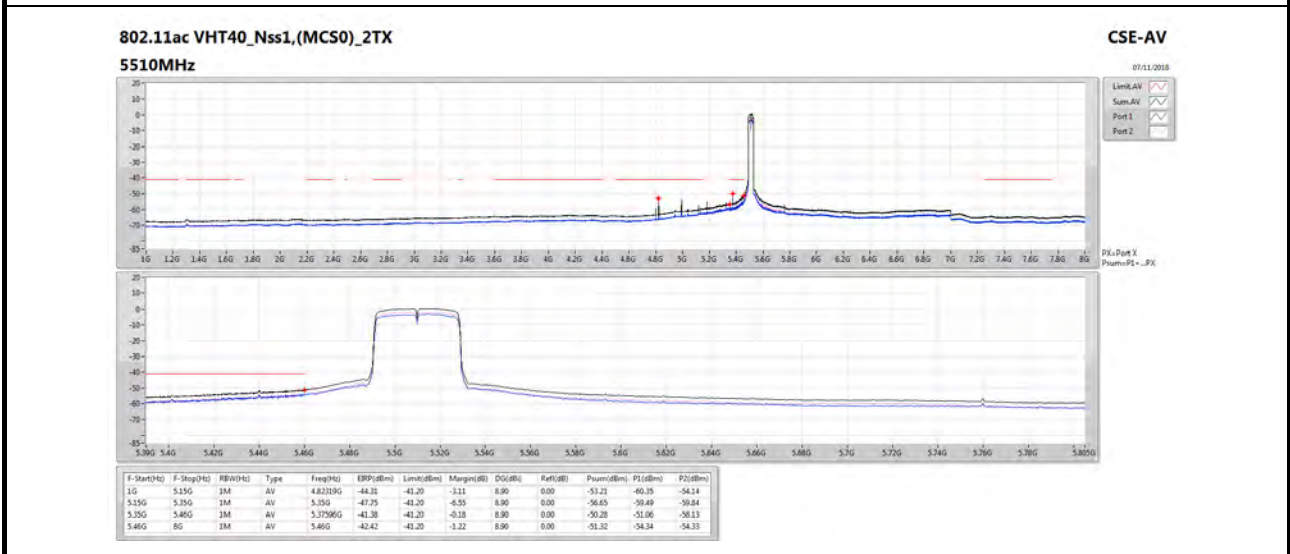
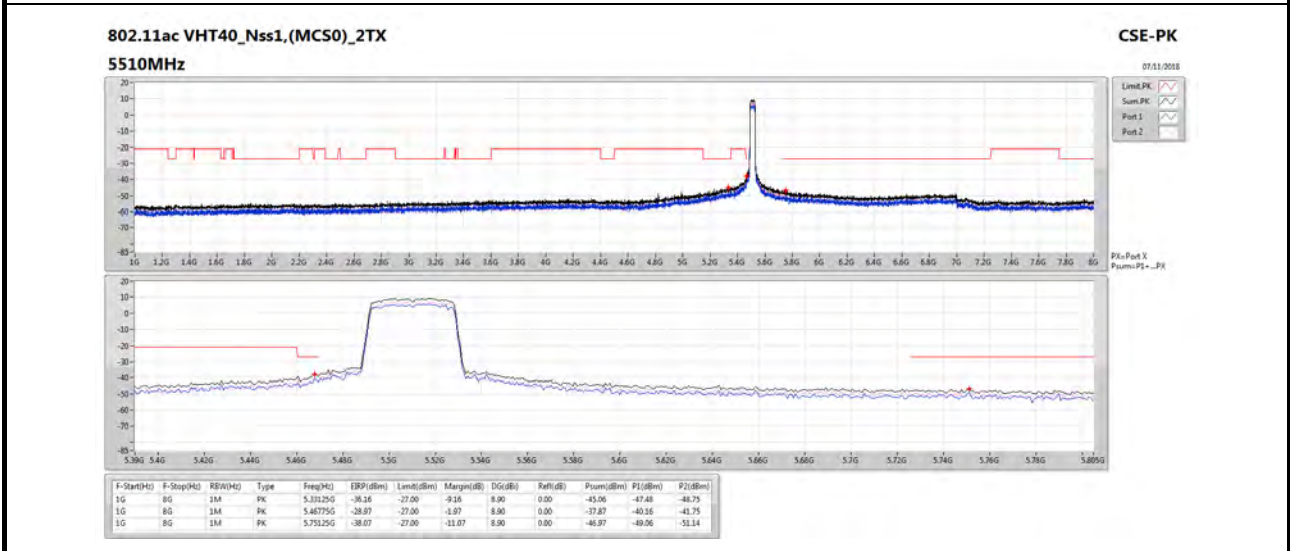
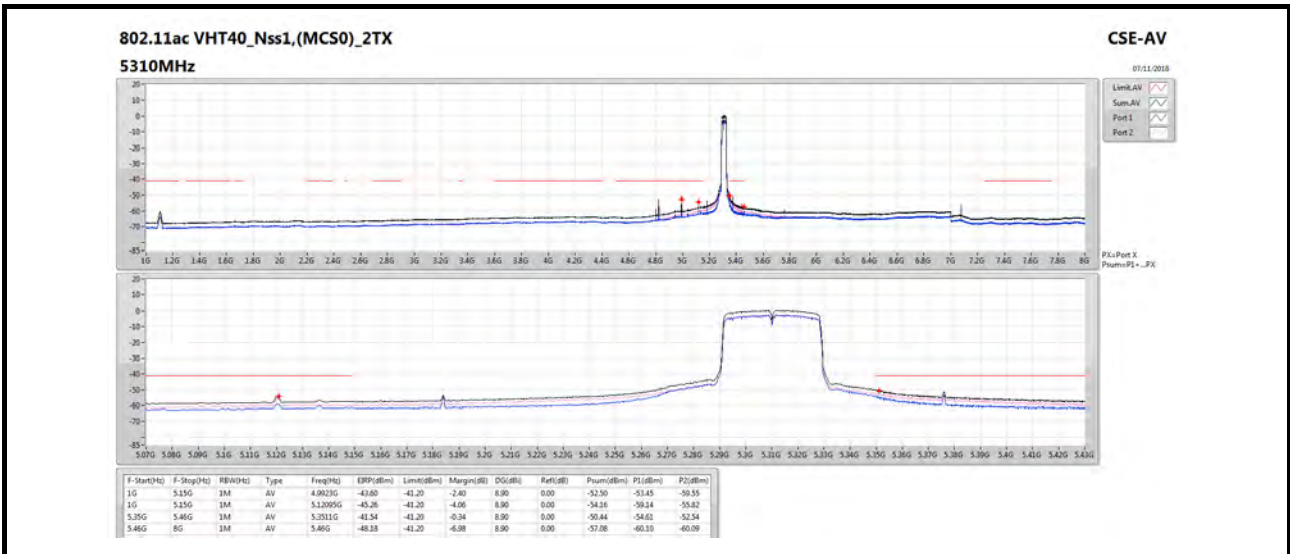


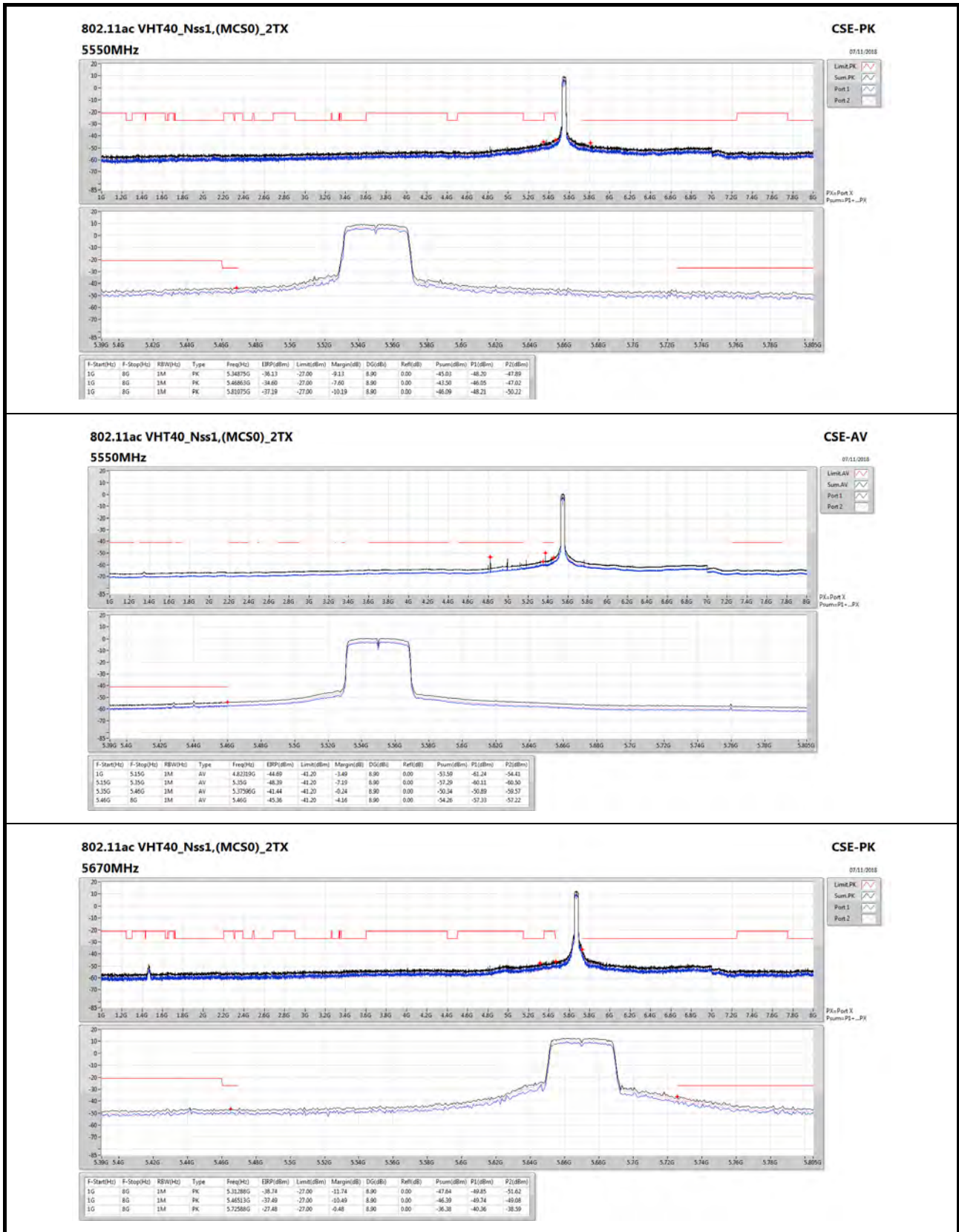


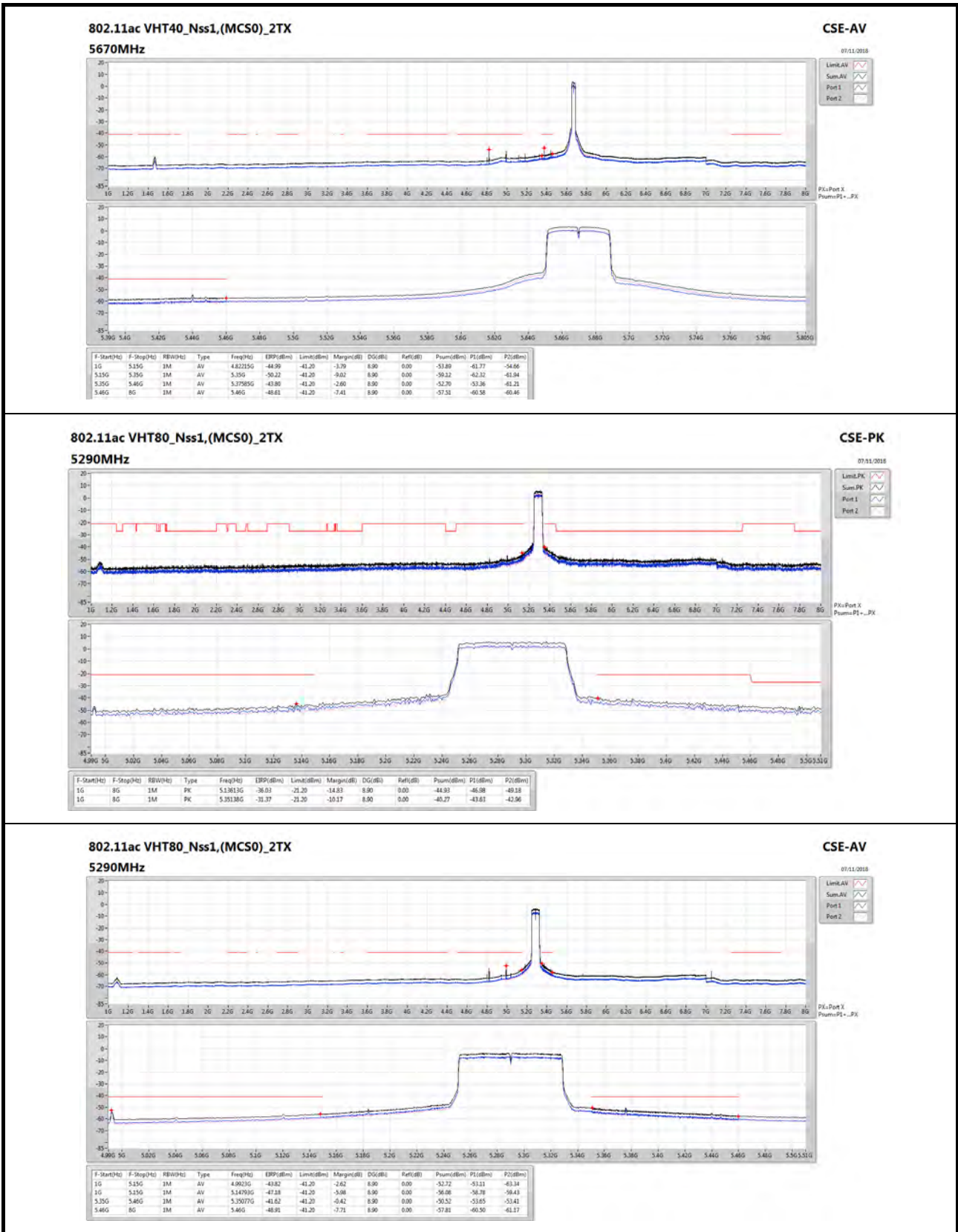

**802.11ac VHT20\_Nss1,(MCS0)\_2TX**
**CSE-PK**

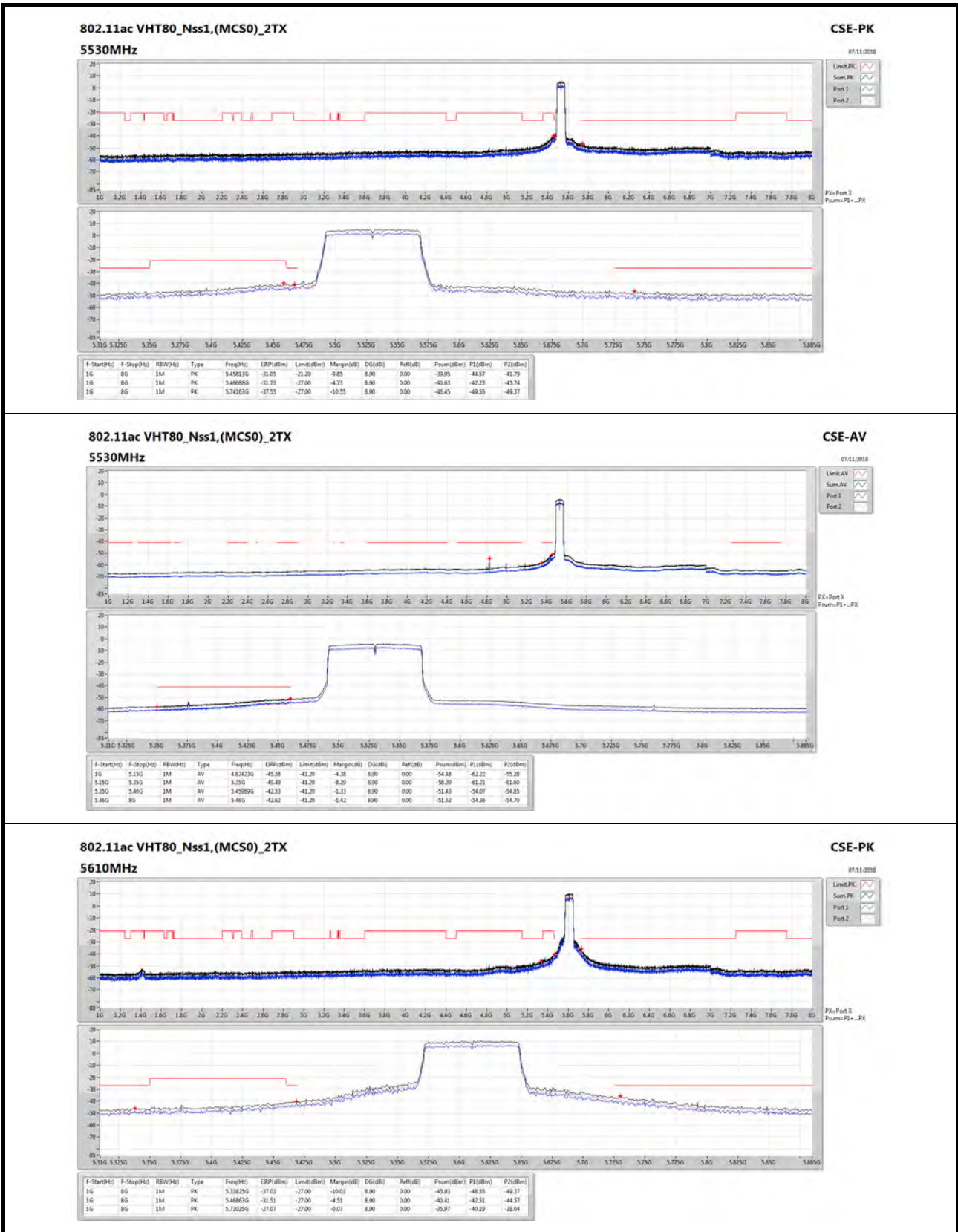




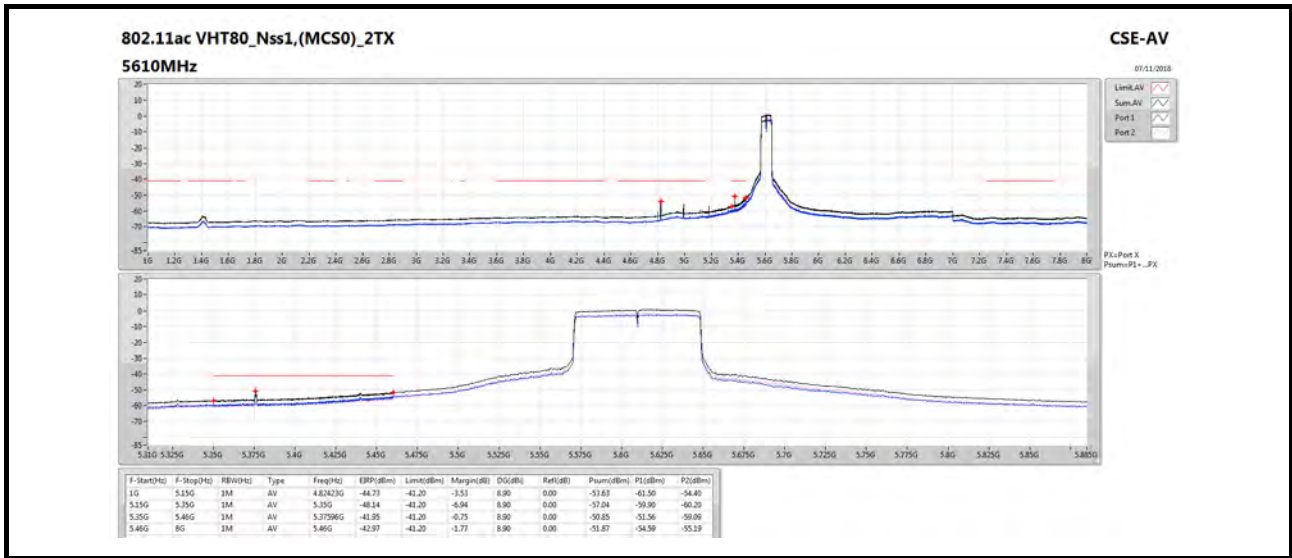










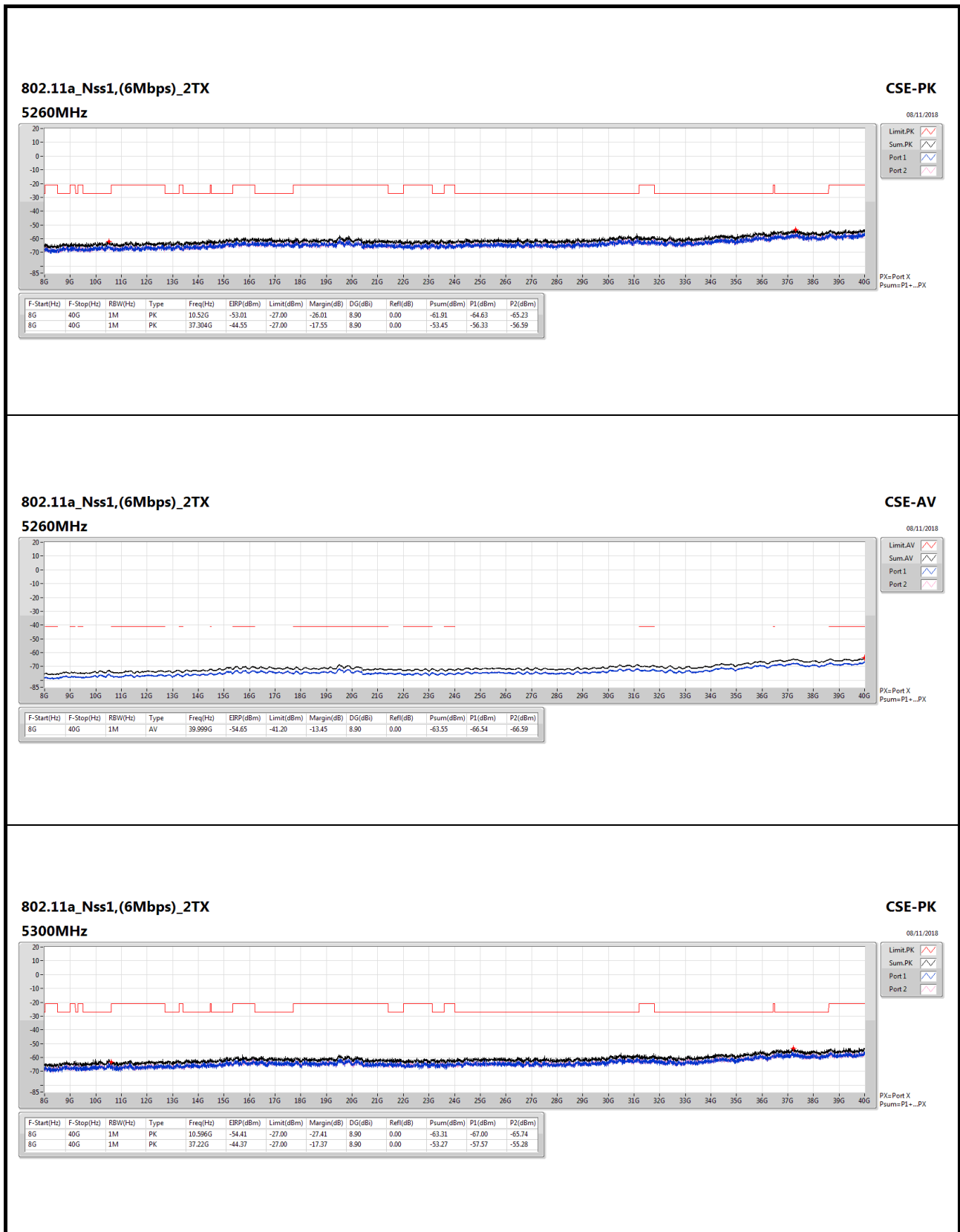




Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	RBW (Hz)	Type	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	DG (dBi)	Refl (dB)	Psum (dBm)	P1 (dBm)	P2 (dBm)
5.47-5.725GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT80_Nss1,(MCS0)_2TX	Pass	8G	40G	1M	AV	39.999G	-54.45	-41.20	-13.25	8.90	0.00	-63.35	-66.31	-66.42

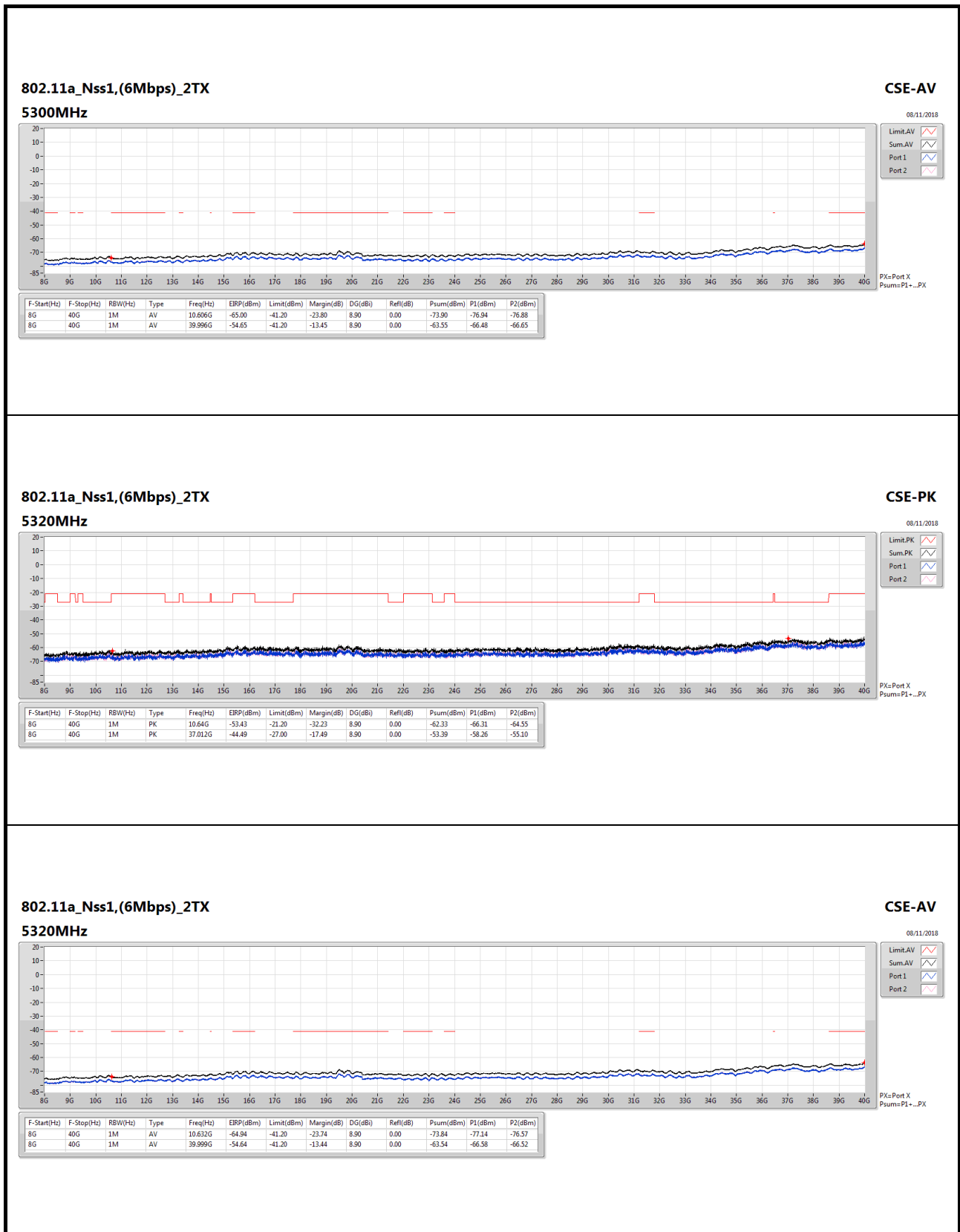
DG = Directional Gain;  
 PX=Port X; Psum=P1+.P2+..PX

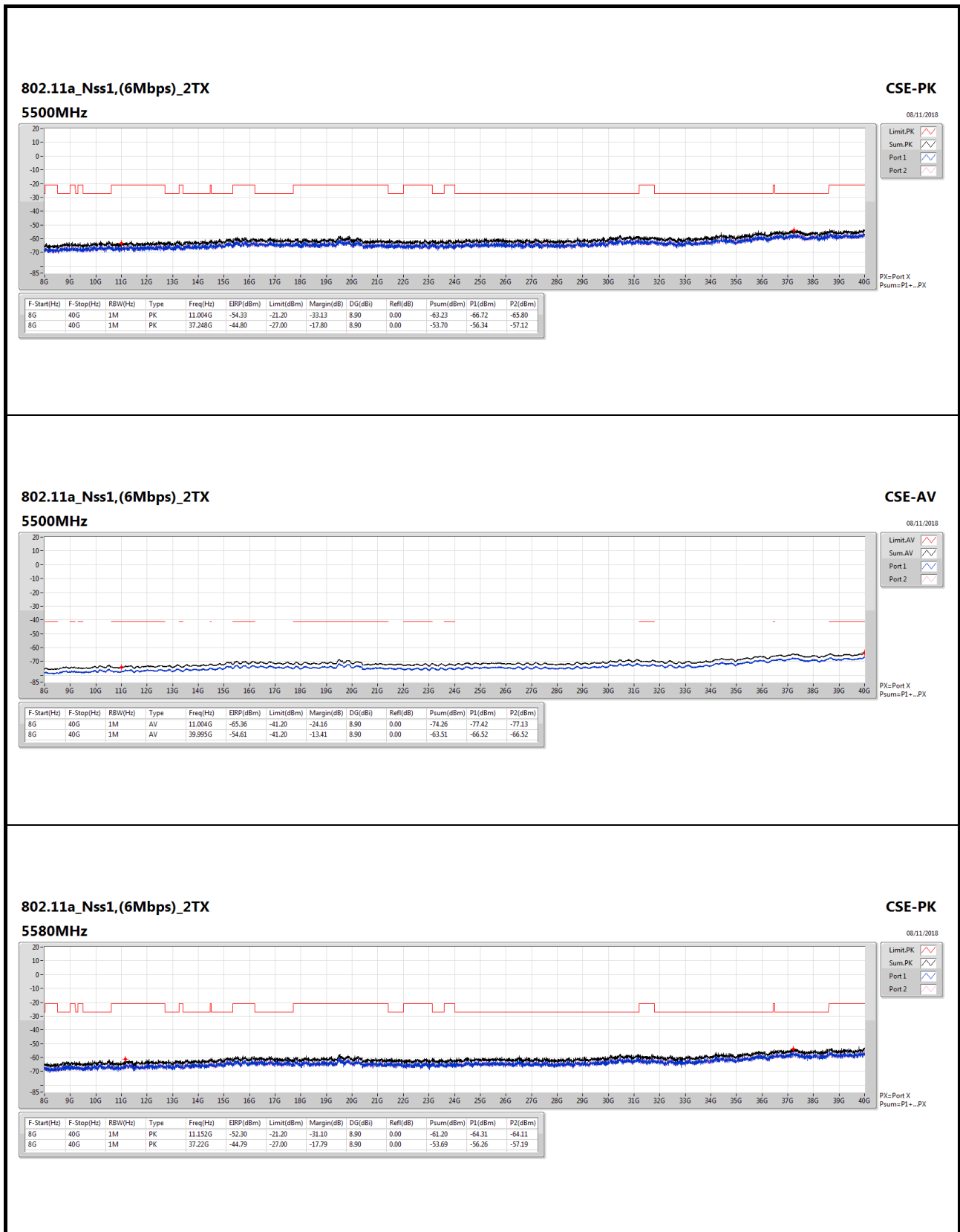


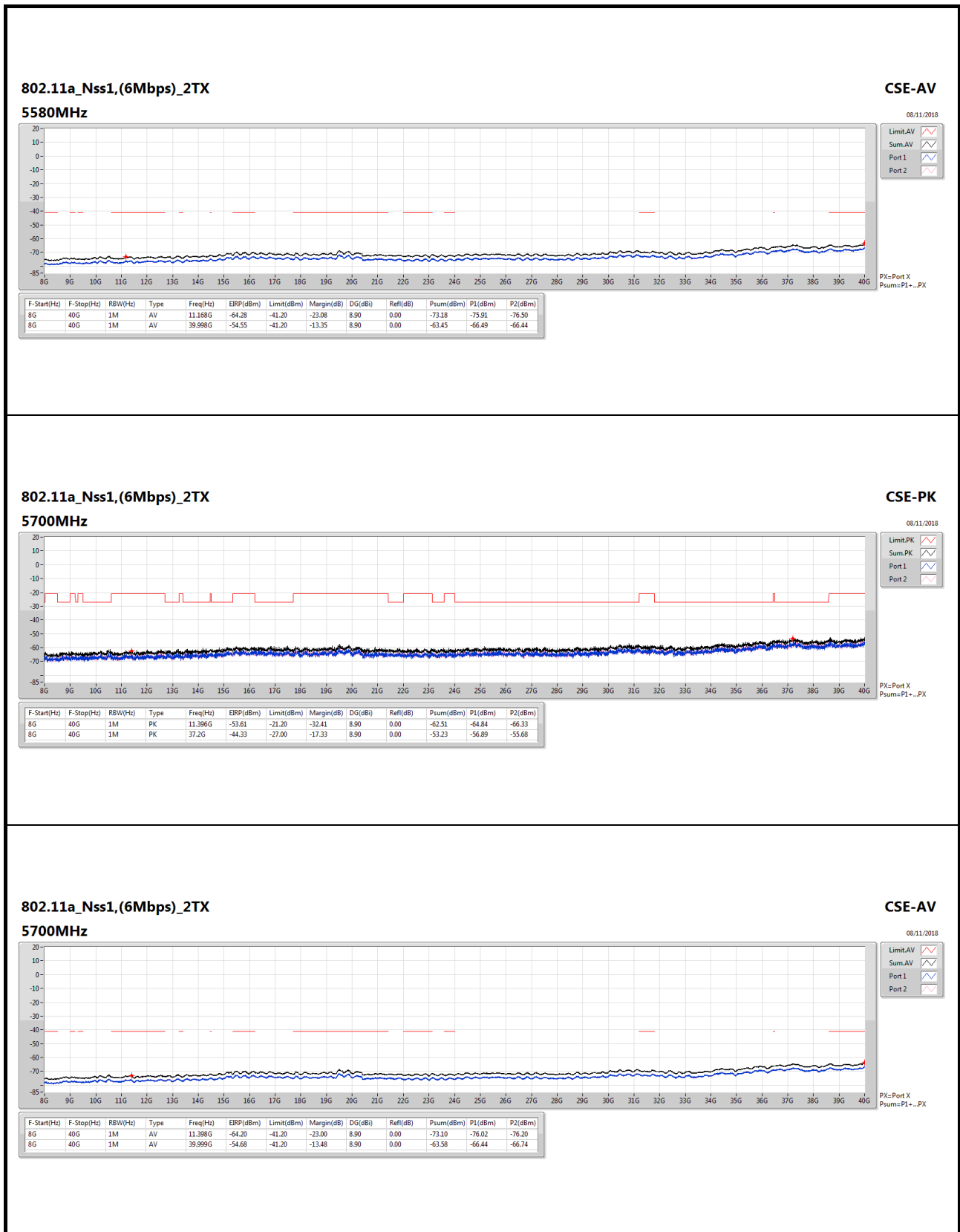
### 802.11a\_Nss1,(6Mbps)\_2TX

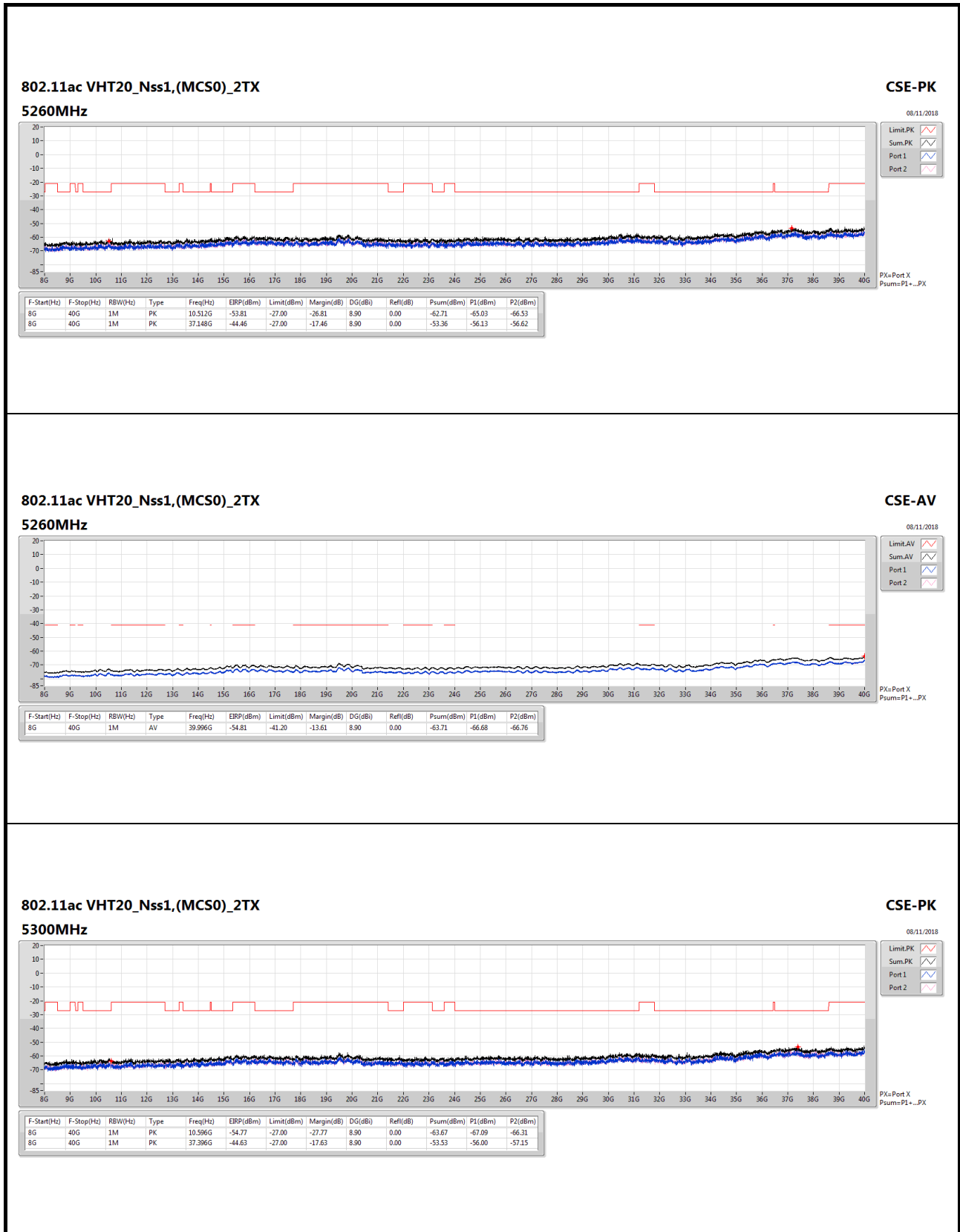
#### 5300MHz

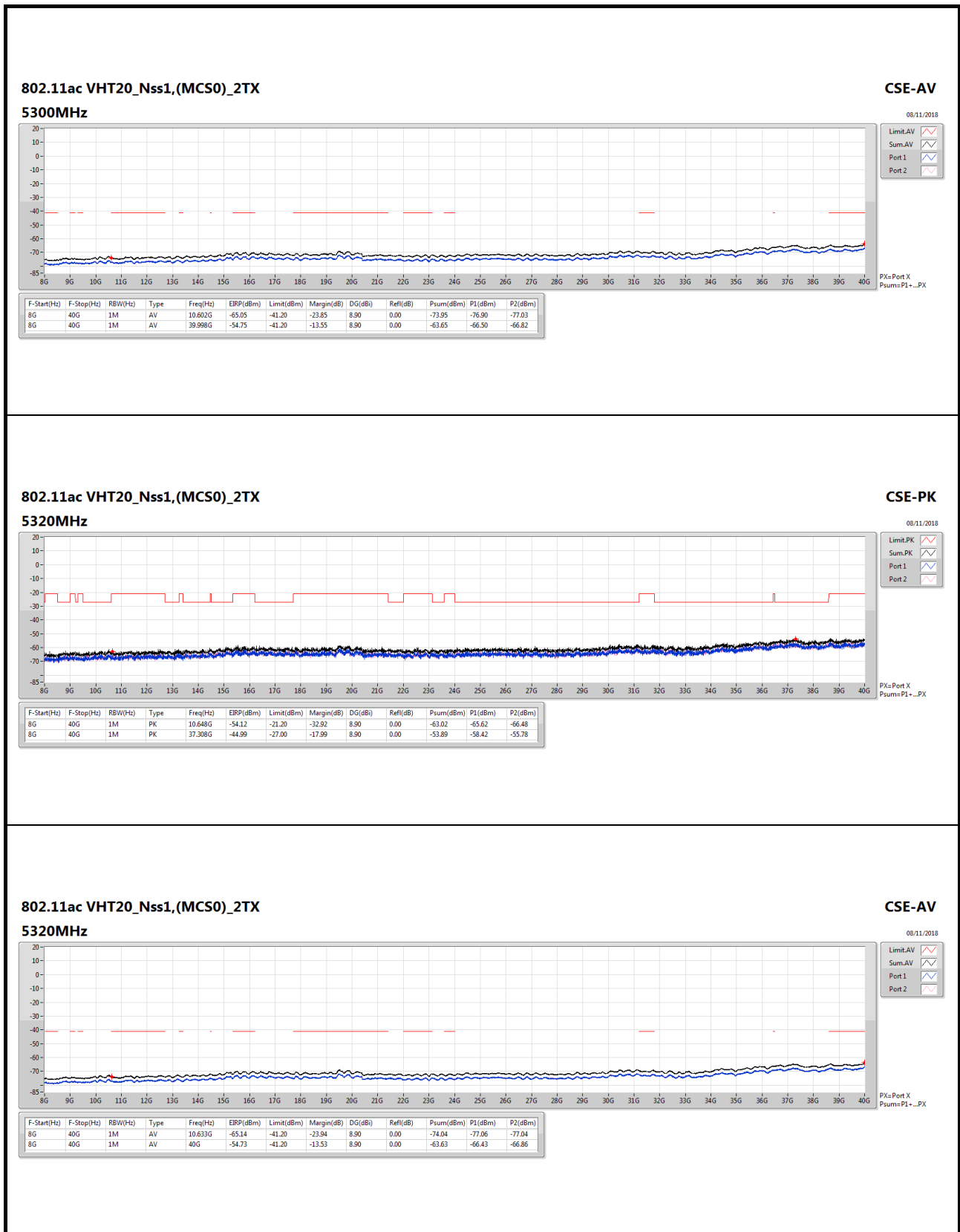
**CSE-PK**  
08/11/2018



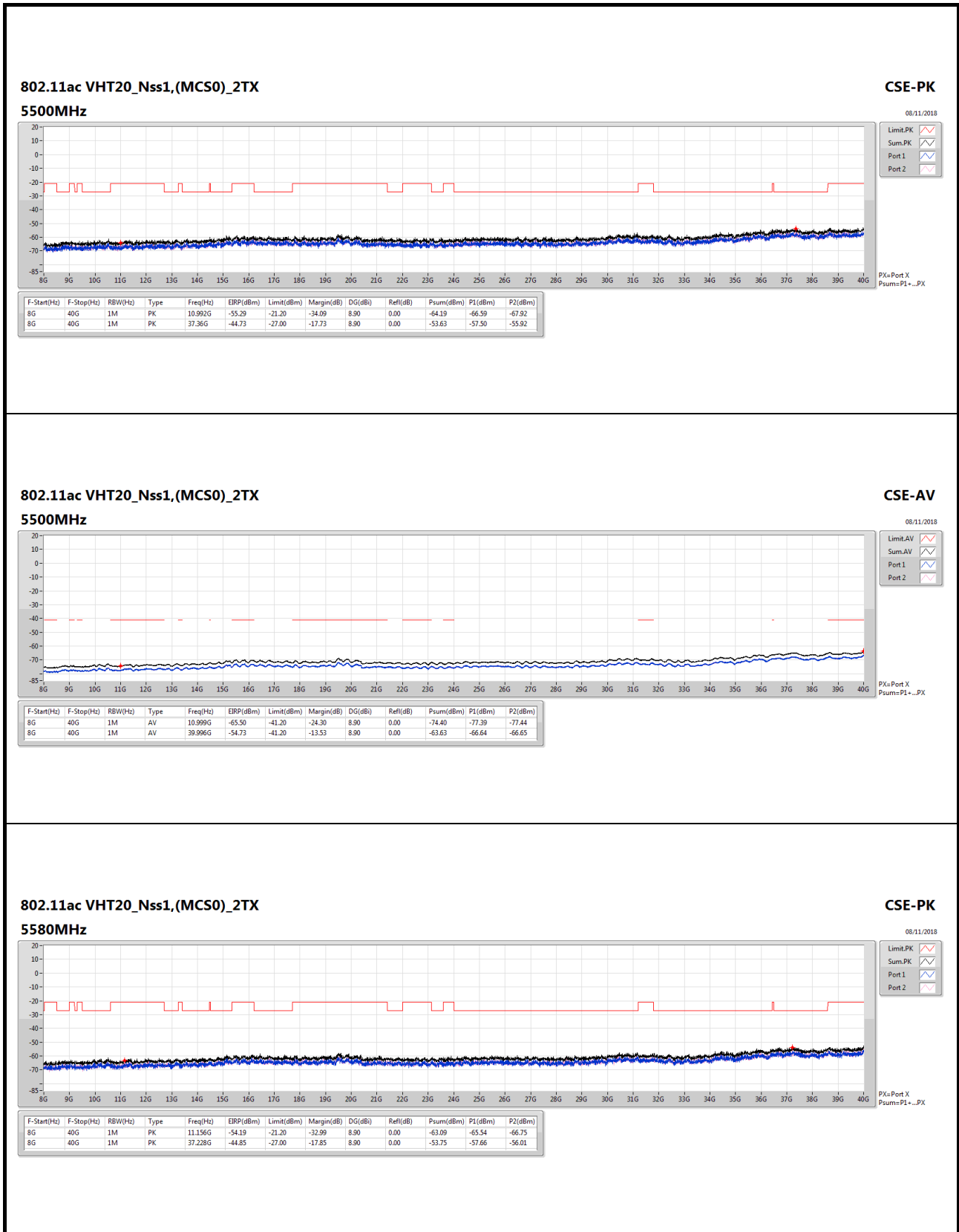


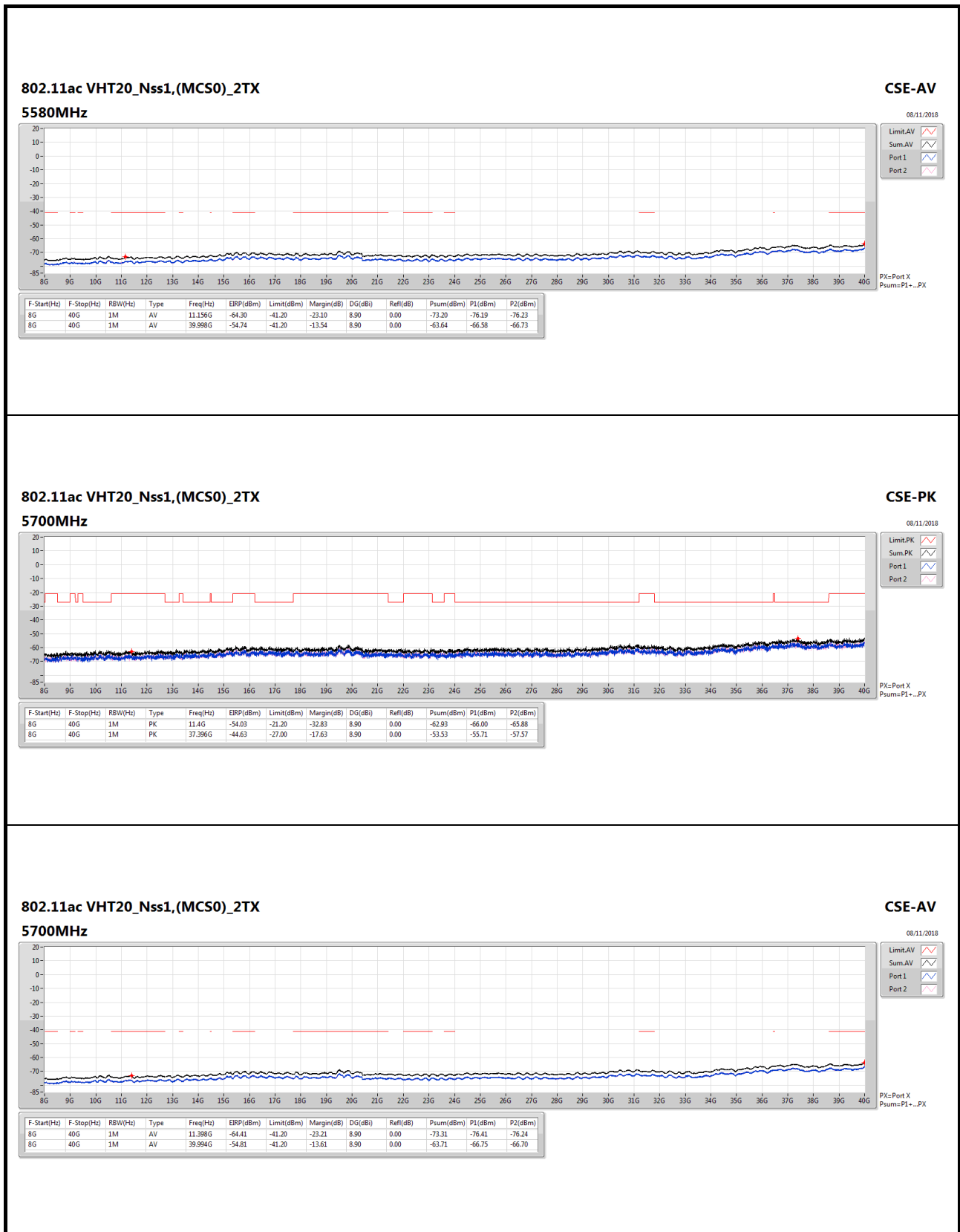


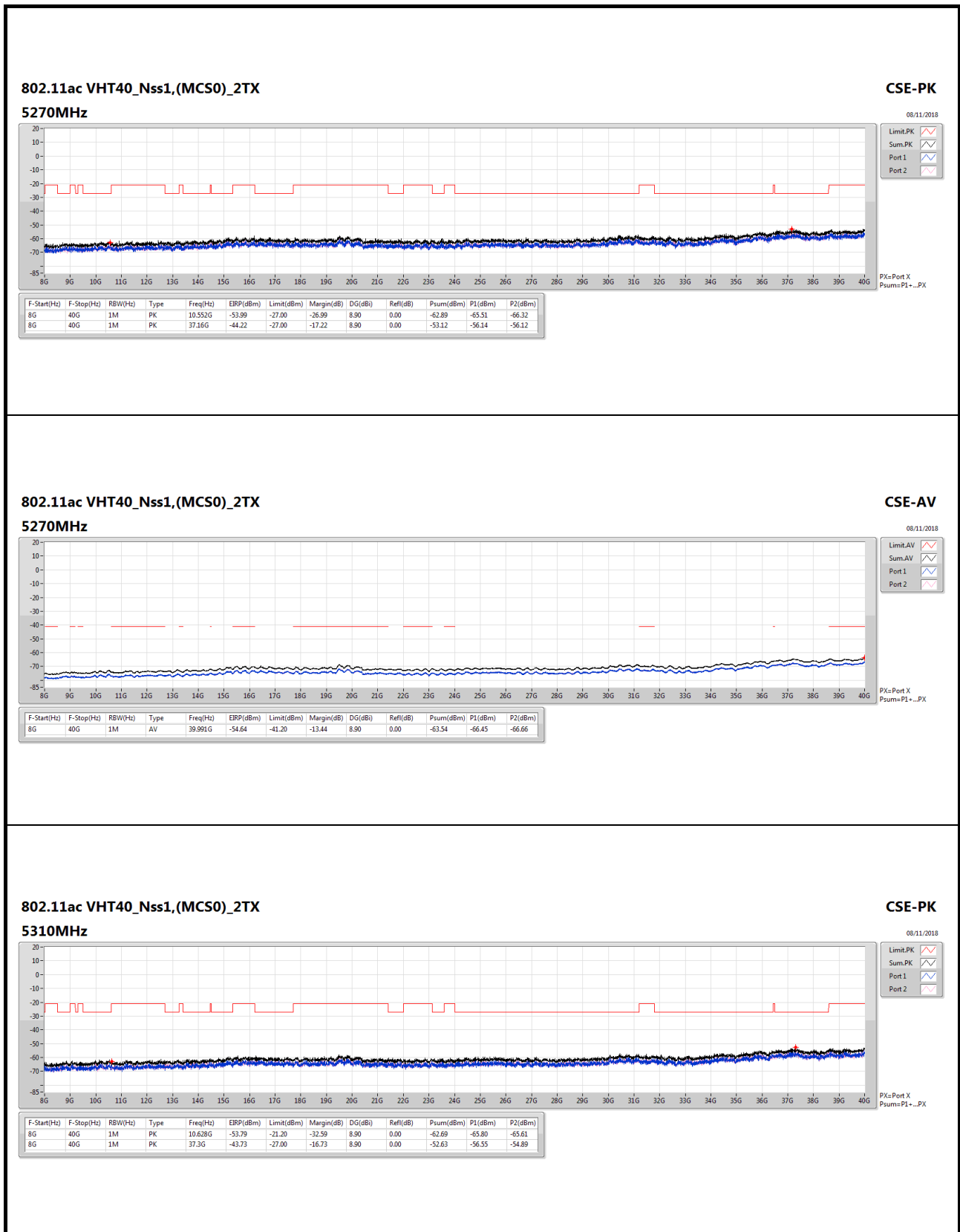












**802.11ac VHT40\_Nss1,(MCS0)\_2TX**

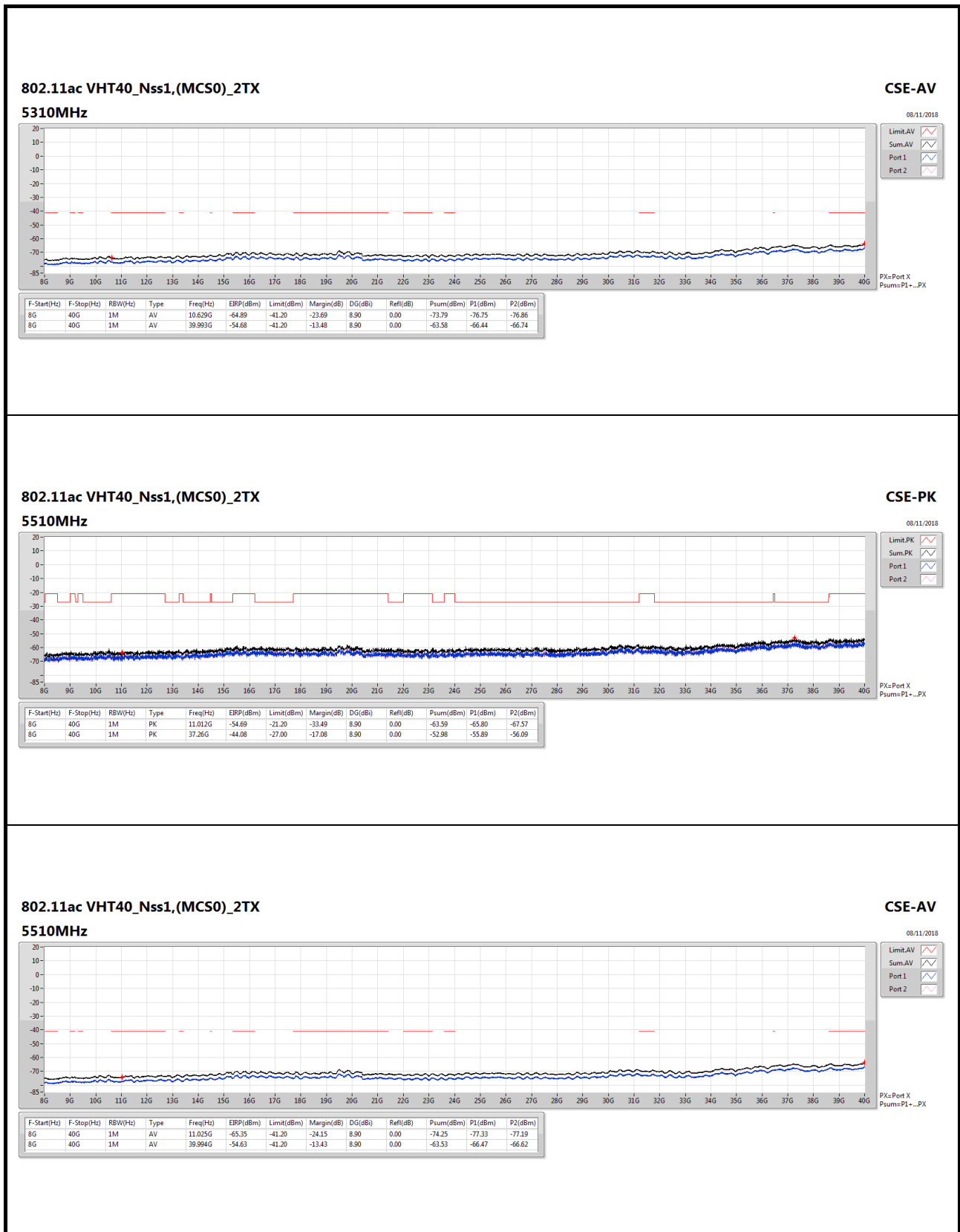
**5310MHz**

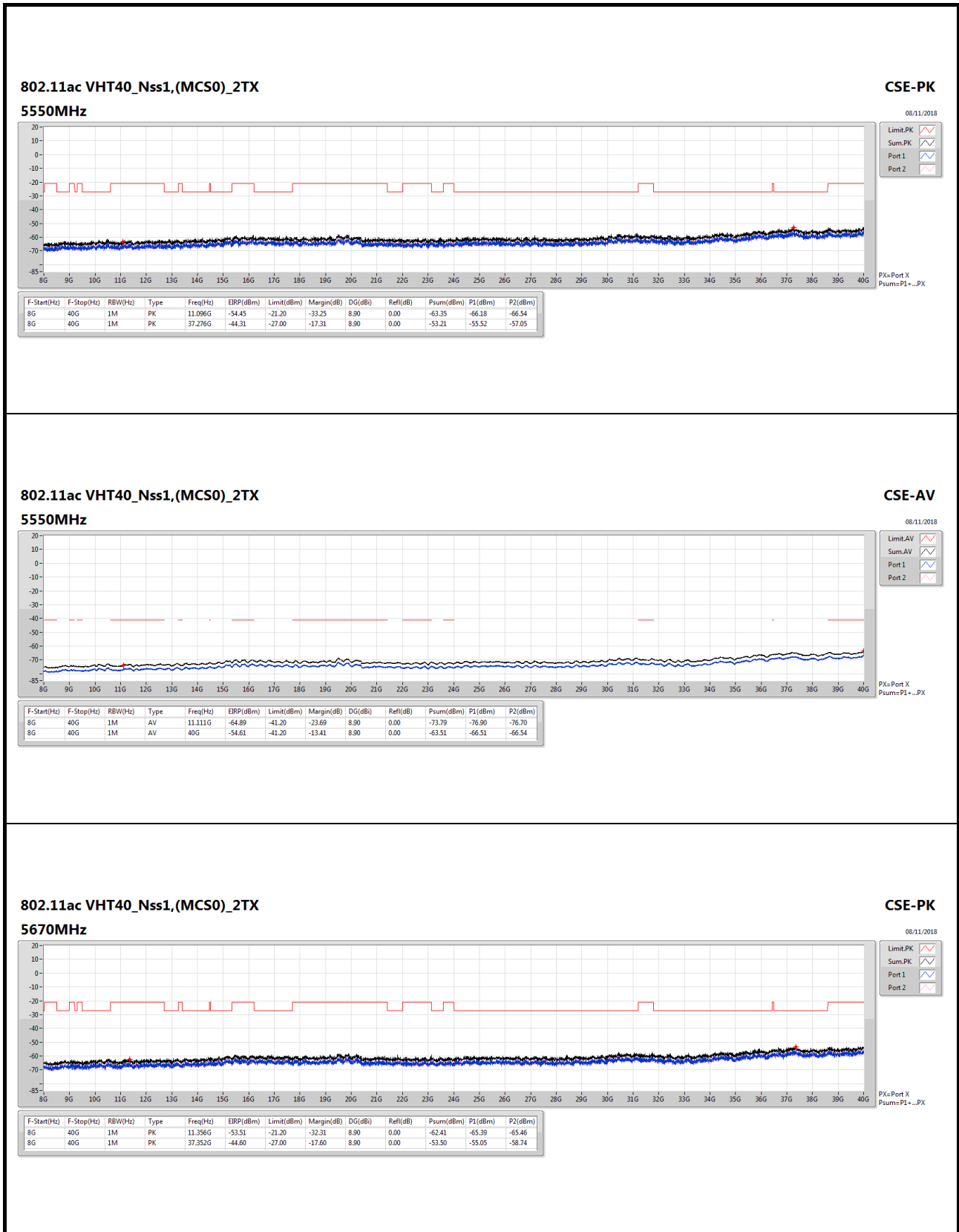
**CSE-PK**

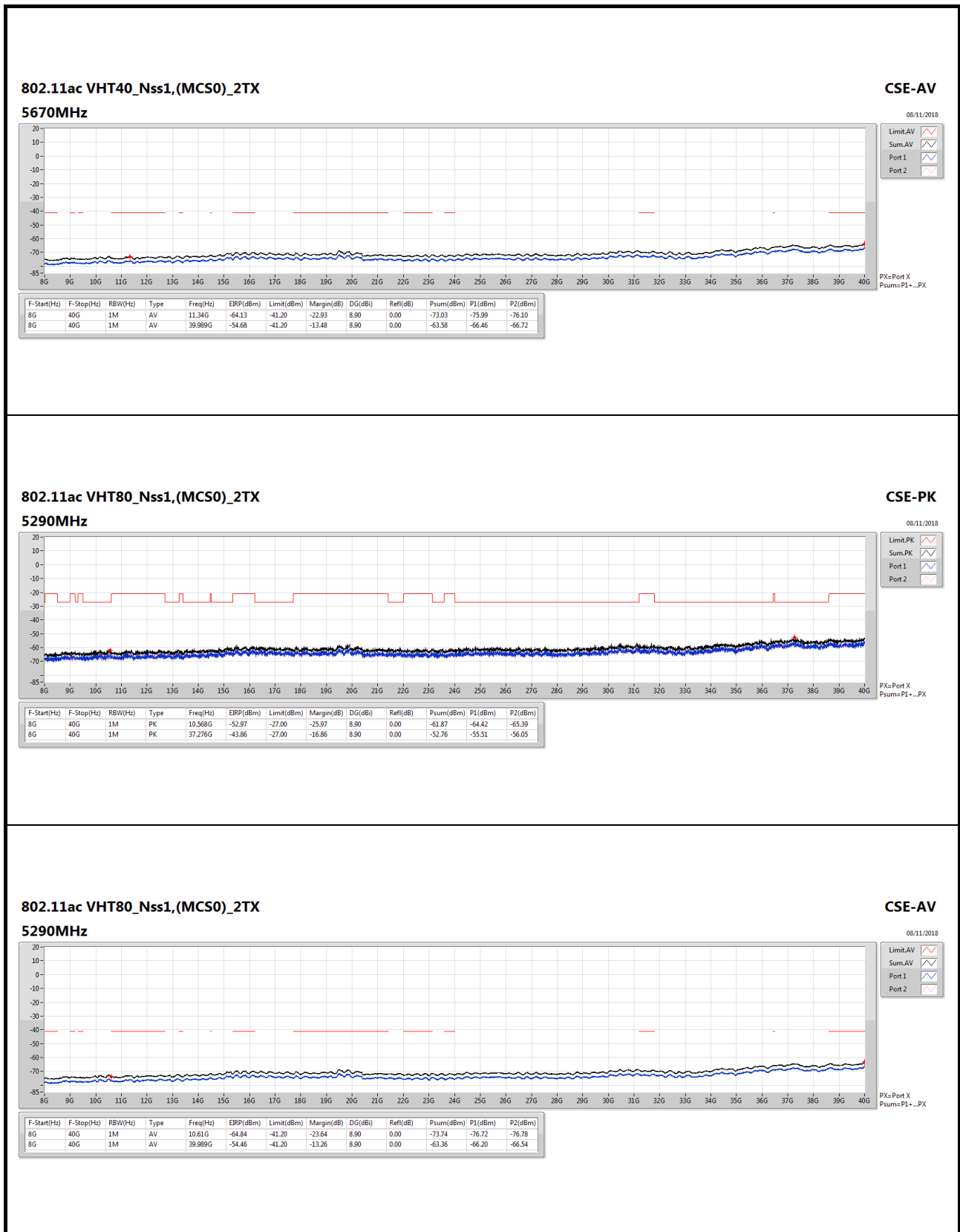
08/11/2018

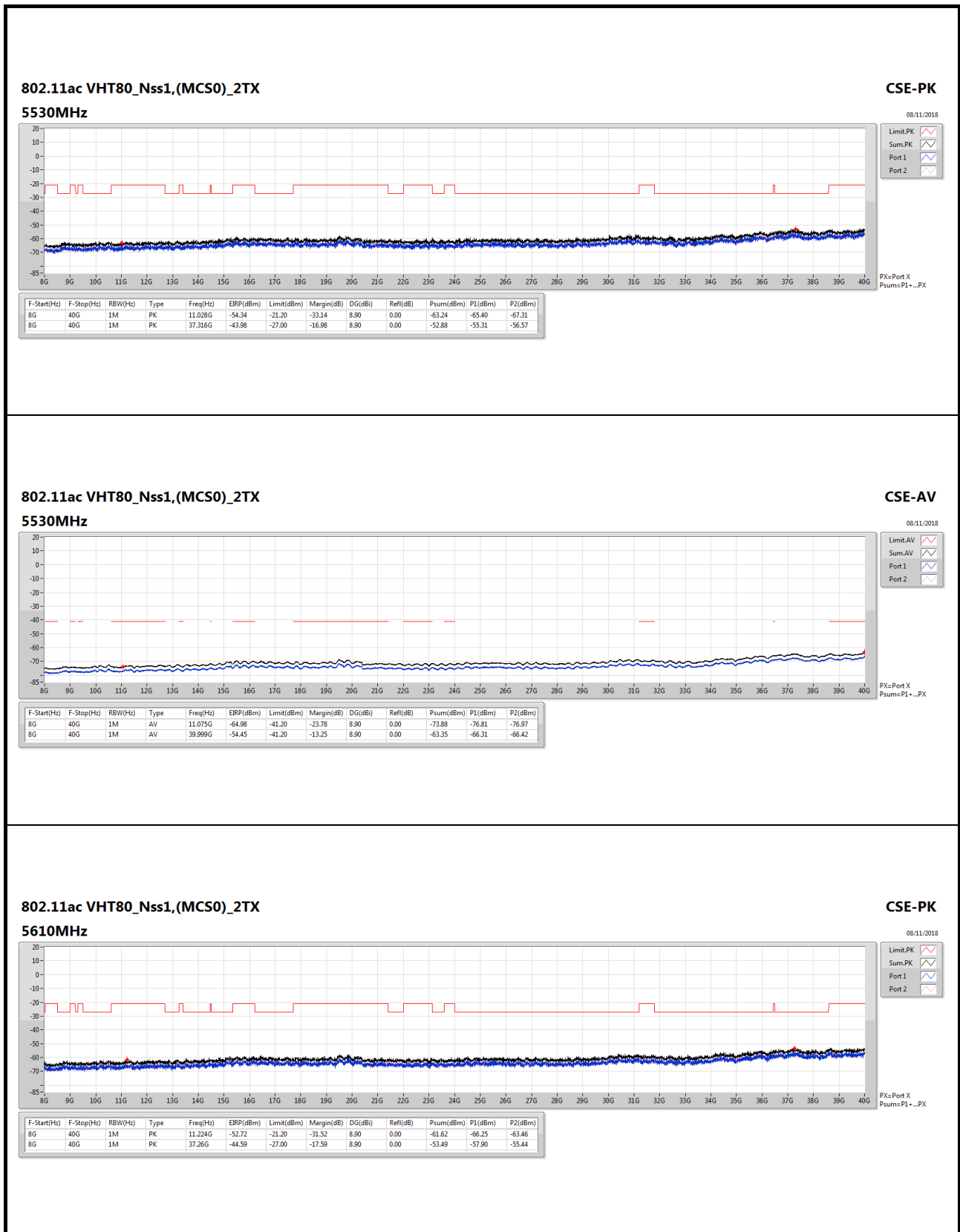
F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	EIRP(dBm)	Limit(dBm)	Margin(dB)	DG(dB)	Ref(dB)	Psum(dBm)	P1(dBm)	P2(dBm)
8G	40G	1M	PK	10.628G	-53.79	-21.20	-32.59	8.90	0.00	-62.69	-65.80	-65.61
8G	40G	1M	PK	37.3G	-43.73	-27.00	-16.73	8.90	0.00	-52.63	-56.55	-54.89

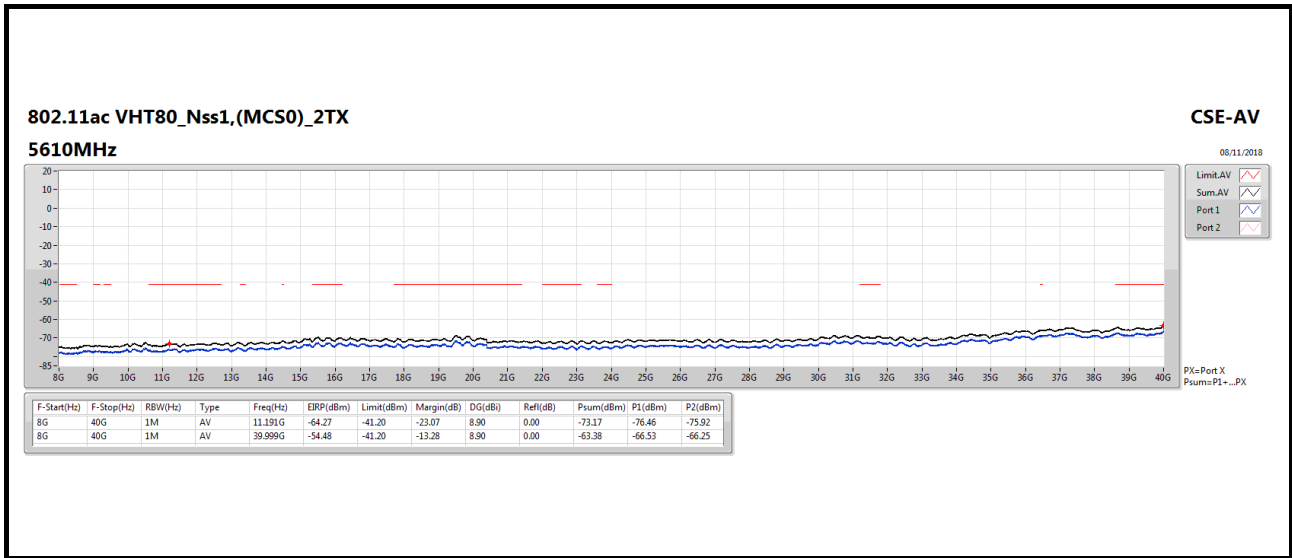
PX=Port X  
Psum=P1+\_PX















Summary

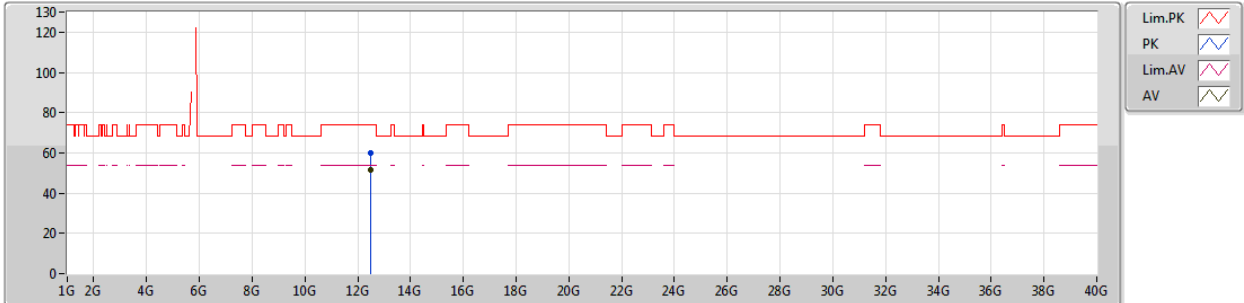
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
5.725-5.85GHz	-	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT40_Nss1,(MCS0)_2TX	Pass	AV	12.49996G	52.26	54.00	-1.74	15.57	3	Horizontal	83	1.20	-



802.11ac VHT40\_Nss1,(MCS0)\_2TX

12/11/2018

5795MHz\_TX



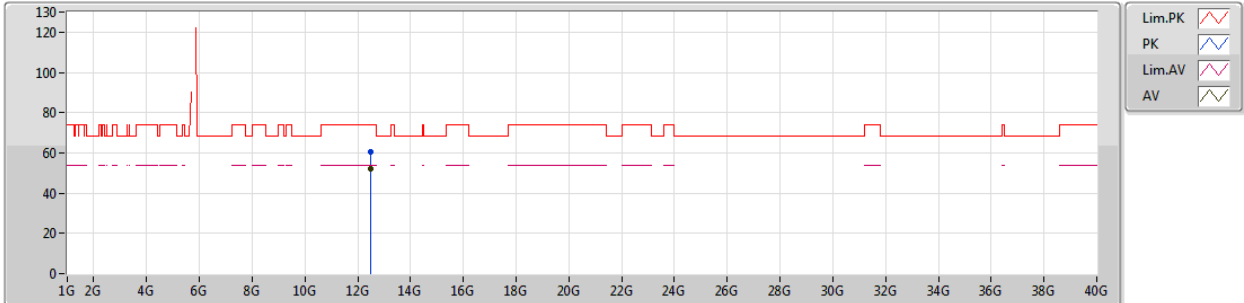
EUT\_Y\_2TX  
 Setting 23.5  
 04-E-2  
 FSP(100142)

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
PK	12.50019G	60.16	74.00	-13.84	15.58	3	Vertical	185	1.63	-
AV	12.49994G	51.58	54.00	-2.42	15.57	3	Vertical	185	1.63	-

802.11ac VHT40\_Nss1,(MCS0)\_2TX

12/11/2018

5795MHz\_TX



EUT Y\_2TX  
Setting 23.5  
04-E-2  
FSP(100142)

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
PK	12.49992G	60.30	74.00	-13.70	15.57	3	Horizontal	83	1.20	-
AV	12.49996G	52.26	54.00	-1.74	15.57	3	Horizontal	83	1.20	-