

Report No.: FR190215AB

# RADIO TEST REPORT

FCC ID : RAXKVD21

Equipment : 5G Gateway

Brand Name : T-Mobile

Model Name : KVD21

Applicant : Arcadyan Technology Corporation

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

Manufacturer : Arcadyan Technology Corporation

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

Standard : 47 CFR FCC Part 15.407

The product was received on Sep. 02, 2021, and testing was started from Oct. 05, 2021 and completed on Oct. 20, 2021. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Cliff Chang

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

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

Report Template No.: CB-A12\_1 Ver1.4

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: Oct. 29, 2021

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# History of this test report

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Report No.	Version	Description	Issued Date
FR190215AB	01	Initial issue of report	Oct. 29, 2021

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## **Summary of Test Result**

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(a)	Emission Bandwidth	PASS	-
3.3	15.407(a)	Maximum Output Power	PASS	-
3.4	15.407(a)	Power Spectral Density	PASS	-
3.5	15.407(b)	Unwanted Emissions	PASS	-

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

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

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

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: Jessie Wei

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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
5150-5250	a, n (HT20), ac (VHT20),	5180-5240	36-48 [4]
5725-5850	ax (HEW20)	5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40),	5190-5230	38-46 [2]
5725-5850	ax (HEW40)	5755-5795	151-159 [2]
5150-5250	ac (VHT80), ax (HEW80)	5210	42 [1]
5725-5850		5775	155 [1]

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Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	4TX
5.15-5.25GHz	802.11n HT20	20	4TX
5.15-5.25GHz	802.11n HT20-BF	20	4TX
5.15-5.25GHz	802.11ac VHT20	20	4TX
5.15-5.25GHz	802.11ac VHT20-BF	20	4TX
5.15-5.25GHz	802.11ax HEW20	20	4TX
5.15-5.25GHz	802.11ax HEW20-BF	20	4TX
5.15-5.25GHz	802.11n HT40	40	4TX
5.15-5.25GHz	802.11n HT40-BF	40	4TX
5.15-5.25GHz	802.11ac VHT40	40	4TX
5.15-5.25GHz	802.11ac VHT40-BF	40	4TX
5.15-5.25GHz	802.11ax HEW40	40	4TX
5.15-5.25GHz	802.11ax HEW40-BF	40	4TX
5.15-5.25GHz	802.11ac VHT80	80	4TX
5.15-5.25GHz	802.11ac VHT80-BF	80	4TX
5.15-5.25GHz	802.11ax HEW80	80	4TX
5.15-5.25GHz	802.11ax HEW80-BF	80	4TX
5.725-5.85GHz	802.11a	20	4TX
5.725-5.85GHz	802.11n HT20	20	4TX
5.725-5.85GHz	802.11n HT20-BF	20	4TX
5.725-5.85GHz	802.11ac VHT20	20	4TX
5.725-5.85GHz	802.11ac VHT20-BF	20	4TX
5.725-5.85GHz	802.11ax HEW20	20	4TX
5.725-5.85GHz	802.11ax HEW20-BF	20	4TX
5.725-5.85GHz	802.11n HT40	40	4TX

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Band	Mode	BWch (MHz)	Nant
5.725-5.85GHz	802.11n HT40-BF	40	4TX
5.725-5.85GHz	802.11ac VHT40	40	4TX
5.725-5.85GHz	802.11ac VHT40-BF	40	4TX
5.725-5.85GHz	802.11ax HEW40	40	4TX
5.725-5.85GHz	802.11ax HEW40-BF	40	4TX
5.725-5.85GHz	802.11ac VHT80	80	4TX
5.725-5.85GHz	802.11ac VHT80-BF	80	4TX
5.725-5.85GHz	802.11ax HEW80	80	4TX
5.725-5.85GHz	802.11ax HEW80-BF	80	4TX

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#### Note:

- 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation. VHT20, VHT40, VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, modulation.
- HEW20, HEW40, HEW80 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- BWch is the nominal channel bandwidth.

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#### 1.1.2 Antenna Information

	Port					Antenna		
Ant.	WLAN 2.4GHz		Bluetooth	Brand	Brand Model Name		Connector	Gain (dBi)
1	1	1	-	Maglayers	PCA-2510-25GC6-A1	Dipole	I-PEX	
2	2	2	-	Maglayers	PCA-2510-25GC6-A2	Dipole	I-PEX	
3	3	3	-	Maglayers	PCA-2510-25GC6-A3	Dipole	I-PEX	Note1
4	4	4	-	Maglayers	PCA-2510-25GC6-A4	Dipole	I-PEX	
5	-	-	1	Maglayers	PCA-2510-2G4C6-A1	Dipole	I-PEX	

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#### Note 1:

	Port			Antenna Gain (dBi)					
Ant.	WLAN 2.4GHz	WLAN 5GHz	Bluetooth	WLAN 2.4GHz	WLAN 5GHz UNII 1	WLAN 5GHz UNII 2A	WLAN 5GHz UNII 2C	WLAN 5GHz UNII 3	Bluetooth
1	1	1	-	0.92	2.86	2.91	2.39	1.9	-
2	2	2	-	3.78	3.48	4.07	4.84	5.09	-
3	3	3	-	4.13	3.52	3.1	2.85	2.93	-
4	4	4	-	3.61	1.42	2.74	3.1	2.58	-
5	-	-	1	-	-	-	-	-	4.39

Note 2: The above information was declared by manufacturer.

#### For WLAN 2.4GHz:

#### For IEEE 802.11b/g/n/VHT/ax mode (4TX/4RX):

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

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

#### For WLAN 5GHz:

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

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

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

#### For Bluetooth (1TX/1RX):

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

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## 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.812	0.9	1.058m	1k
802.11ax HEW20	0.826	0.83	947.5u	3k
802.11ax HEW20-BF	0.826	0.83	947.5u	3k
802.11ax HEW40	0.824	0.84	938.75u	3k
802.11ax HEW40-BF	0.819	0.87	938.125u	3k
802.11ax HEW80	0.82	0.86	940u	3k
802.11ax HEW80-BF	0.833	0.79	938.125u	3k

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

## 1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter					
	$\boxtimes$	With beamforming		Without beamforming		
Beamforming Function	The product has beamforming function for n/VHT/ax in 2.4GHz and n/ac/ax in 5GHz.					
Function		Outdoor P2M	$\boxtimes$	Indoor P2M		
Tanction		Fixed P2P		Client		
Test Software Version	QATool.Dbg_0.0.2.29					

Note: The above information was declared by manufacturer.

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## 1.2 Applicable 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 789033 D02 v02r01

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

- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

### 1.3 Testing Location Information

**Testing Location Information** 

Test Lab.: Sporton International Inc. Hsinchu Laboratory

Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted TH02-CB		Jay Lo	23.1~24.6 / 55~57	Oct. 09, 2021~ Oct. 20, 2021
Radiated below 1GHz	03CH05-CB	Kevin Huang	24.5~25.6 / 56~59	Oct. 05, 2021~ Oct. 20, 2021
Radiated above 1GHz	03CH02-CB	Kevin Huang	24.2~26.1 / 55~58	Oct. 05, 2021~ Oct. 20, 2021
radiated above 16112	03CH06-CB	Kevin Huang	24.4~25.5 / 55~58	Oct. 05, 2021~ Oct. 20, 2021
Radiated Co-Location	03CH05-CB	Kevin Huang	24.5~25.6 / 56~59	Oct. 05, 2021~ Oct. 20, 2021
AC Conduction	CO01-CB	Peter Wu	21~23 / 55~57	Oct. 20, 2021

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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 level (based on a coverage factor (k=2)

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Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	4.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.5 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%
Conducted Emission	2.5 dB	Confidence levels of 95%
Output Power Measurement	1.3 dB	Confidence levels of 95%
Power Density Measurement	2.5 dB	Confidence levels of 95%
Bandwidth Measurement	0.9%	Confidence levels of 95%

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# 2 Test Configuration of EUT

## 2.1 Test Channel Mode

<For Non-beamforming mode>

Mode	Power Setting
802.11a_Nss1,(6Mbps)_4TX	-
5180MHz	17
5200MHz	17
5240MHz	16.5
5745MHz	17
5785MHz	18
5825MHz	16.5
802.11ax HEW20_Nss1,(MCS0)_4TX	-
5180MHz	17.5
5200MHz	17.5
5240MHz	17
5745MHz	18.5
5785MHz	18
5825MHz	18
802.11ax HEW40_Nss1,(MCS0)_4TX	-
5190MHz	14
5230MHz	17.5
5755MHz	19.5
5795MHz	18.5
802.11ax HEW80_Nss1,(MCS0)_4TX	-
5210MHz	12
5775MHz	16

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<For Beamforming mode>

Mode	Power Setting
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-
5180MHz	17.5
5200MHz	17.5
5240MHz	17
5745MHz	16.5
5785MHz	16
5825MHz	15.5
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-
5190MHz	14
5230MHz	17.5
5755MHz	17
5795MHz	17
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-
5210MHz	12
5775MHz	16

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Note1: Evaluated HEW20/HEW40/HEW80 mode only, due to similar modulation. The power setting of HT20/HT40/VHT20/VHT40/VHT80 mode are the same or lower than HEW20/HEW40/HEW80.

Note2: The EUT supports beamforming and CDD modes, and the CDD mode is the worst case. Therefore, all test items are evaluated in the report. The beamforming mode only evaluates the output power.

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## 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item	Tests Item AC power-line conducted emissions	
Condition AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz		
Operating Mode	CTX	
1	EUT + Adapter – WLAN 2.4GHz	
2	EUT + Adapter – WLAN 5GHz	
3	3 EUT + Adapter – Bluetooth	
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	Emission Bandwidth Maximum Output Power Power Spectral Density
Test Condition Conducted measurement at transmit chains	

Th	The Worst Case Mode for Following Conformance Tests		
Tests Item	Unwanted Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
	CTX		
Operating Mode < 1GHz	The EUT was performed at X axis, Y axis and Z axis position for Radiated emission above 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.		
1	EUT in Y axis + Adapter – WLAN 2.4GHz		
2	EUT in Y axis + Adapter – WLAN 5GHz		
3	EUT in Y axis + Adapter – Bluetooth		
For operating mode 2 is the worst case and it was record in this test report.			
	CTX		
Operating Mode > 1GHz	The EUT was performed at X axis, Y axis and Z axis position, and the worst case was found at Y axis. So the measurement will follow this same test configuration.		
1	EUT in Y axis		

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The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location		
Test Condition Radiated measurement		
	Normal Link	
Operating Mode  The EUT was performed at X axis, Y axis and Z axis position emission above 1GHz test, and the worst case was found at Y measurement will follow this same test configuration.		
1 EUT in Y axis - WLAN 2.4GHz + WLAN 5GHz		
Refer to Appendix F for Radiated Emission Co-location.		

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The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode		
1	1 WLAN 2.4GHz + WLAN 5GHz + Bluetooth + WWAN	
Refer to Sporton Test Report No.: FA190215 for Co-location RF Exposure Evaluation.		

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## 2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 2.4 Accessories

Accessories				
<b>Equipment Name</b>	Brand Name	Rating		
Adapter	LUCENT TRANS	1A78	INPUT: 100-240V~1.2A, 50/60Hz OUTPUT: 5.0V, 3.0A, 15.0W 9.0V, 3.0A, 27.0W 15.0V, 3.0A, 45.0W	

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## 2.5 Support Equipment

#### For AC Conduction:

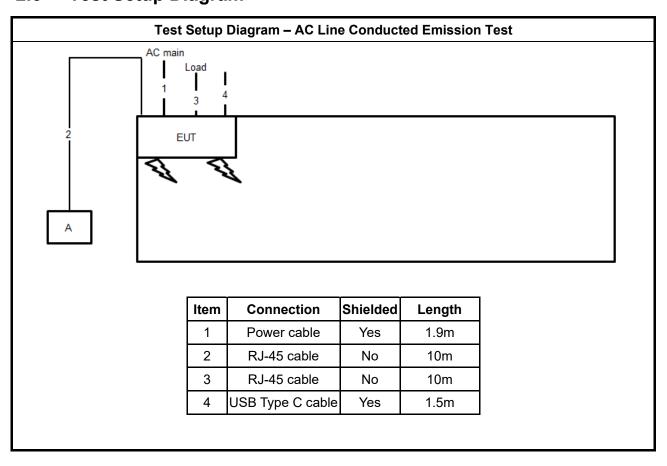
	Support Equipment			
No.	No. Equipment Brand Name Model Name FCC ID			
Α	LAN NB	DELL	E6430	N/A

#### For Radiated and RF Conducted:

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

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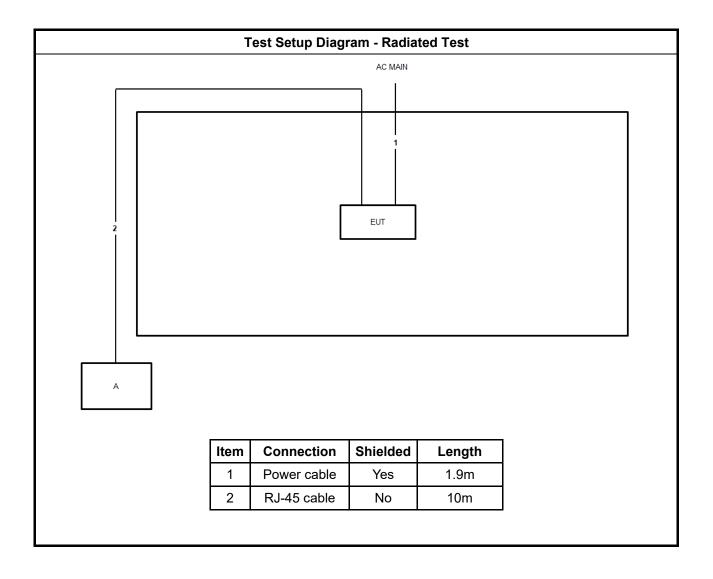
## 2.6 Test Setup Diagram



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## 3 Transmitter Test Result

## 3.1 AC Power-line Conducted Emissions

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

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

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### 3.1.2 Measuring Instruments

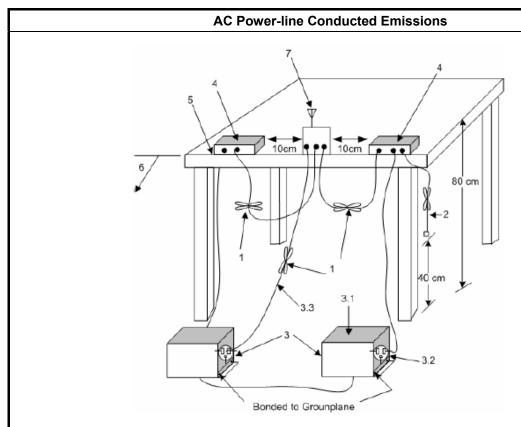
Refer a test equipment and calibration data table in this test report.

#### 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  $\Omega$  loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
- 3.1—All other equipment powered from additional LISN(s).
- 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
- 3.3—LISN at least 80 cm from nearest part of EUT chassis.
- 4—Non-EUT components of EUT system being tested.
- 5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

#### 3.1.5 Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

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

Refer as Appendix A

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## 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

	Emission Bandwidth Limit
UN	I Devices
$\boxtimes$	For the 5.15-5.25 GHz band, N/A
	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.
	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.
$\boxtimes$	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.
	For the 5.85-5.895 GHz band, 6 dB emission bandwidth ≥ 500kHz.
LE-	LAN Devices
	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.
	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
	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
	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.

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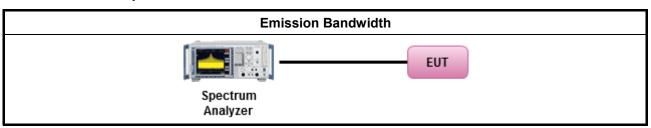
### 3.2.2 Measuring Instruments

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 789033, clause C for EBW and clause D for OBW measurement.										
Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.										
		Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.								

### 3.2.4 Test Setup



#### 3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

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## 3.3 Maximum Output Power

## 3.3.1 Limit

	Maximum Output Power Limit
UN	II Devices
$\boxtimes$	For the 5.15-5.25 GHz band:
	<ul> <li>Outdoor AP: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6). e.i.r.p. at any elevation angle above 30 degrees ≤ 125mW [21dBm]</li> </ul>
	Indoor AP: the maximum conducted output power (P <sub>Out</sub> ) shall not exceed the lesser of 1 W. If G <sub>TX</sub> > 6 dBi, then P <sub>Out</sub> = 30 − (G <sub>TX</sub> − 6)
	Point-to-point AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W If $G_{TX} > 23$ dBi, then $P_{Out} = 30 - (G_{TX} - 23)$ .
	<ul> <li>Mobile or Portable Client: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 250 mW. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 24 – (G<sub>TX</sub> – 6).</li> </ul>
	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 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).
	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 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).
$\boxtimes$	For the 5.725-5.85 GHz band:
	<ul> <li>Point-to-multipoint systems (P2M): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 – (G<sub>TX</sub> – 6).</li> </ul>
	<ul> <li>Point-to-point systems (P2P): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W.</li> </ul>
	Maximum EIRP Limit
	For the 5.85-5.895 GHz band:
	■ Indoor AP & subordinate device < 36 dBm
	■ Client device < 30 dBm
LE-	LAN Devices
	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.
	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
	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
	For the 5.725-5.85 GHz band:
	<ul> <li>Point-to-multipoint systems (P2M): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 – (G<sub>TX</sub> – 6).</li> </ul>
	■ Point-to-point systems (P2P): the maximum conducted output power (P <sub>Out</sub> ) shall not exceed the

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lesser of 1 W.

Pout = maximum conducted output power in dBm,

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### 3.3.2 Measuring Instruments

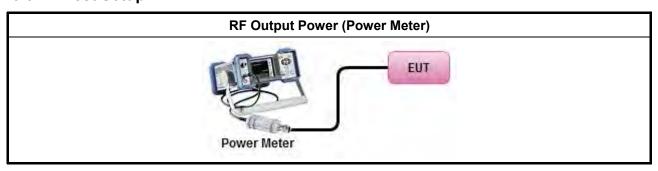
Refer a test equipment and calibration data table in this test report.

 $G_{TX}$  = the maximum transmitting antenna directional gain in dBi.

#### 3.3.3 Test Procedures

	Test Method							
•	Maximum Conducted Output Power							
	Average over on/off periods with duty factor							
	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).							
	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							
'	Refer as FCC KDB 789033, clause E Method PM-G (using an RF average power meter).							
•	For conducted measurement.							
	If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.							
	If multiple transmit chains, EIRP calculation could be following as methods: P <sub>total</sub> = P <sub>1</sub> + P <sub>2</sub> + + P <sub>n</sub> (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP <sub>total</sub> = P <sub>total</sub> + DG							

## 3.3.4 Test Setup



## 3.3.5 Test Result of Maximum Output Power

Refer as Appendix C

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## 3.4 Power Spectral Density

## 3.4.1 Limit

	Peak Power Spectral Density Limit
UNI	Devices
$\boxtimes$	For the 5.15-5.25 GHz band:
	• Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .
	Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .
	Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$ .
	■ Mobile or Portable Client: the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ( $G_{TX} - 6$ )
	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).
	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).
$\boxtimes$	For the 5.725-5.85 GHz band:
	■ Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$ .
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
	EIRP Power Spectral Density Limit
	For the 5.85-5.895 GHz band:
	■ Indoor AP & subordinate device < 20dBm/MHz
	■ Client device < 14dBm/MHz
LE-I	_AN Devices
	For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz.
	<ul> <li>e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:</li> <li>-13 dBW/MHz for 0° ≤ θ &lt; 8°; -13 − 0.716 (θ-8) dBW/MHz for 8° ≤ θ &lt; 40°</li> <li>-35.9 − 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ &gt; 45°</li> </ul>
	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.
	For the 5.725-5.85 GHz band:
	■ Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$ .
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
PPS	$\mathbf{D}$ = neak nower spectral density that he same method as used to determine the conducted output

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power shall be used to determine the power spectral density. And power spectral density in dBm/MHz  $G_{TX}$  = the maximum transmitting antenna directional gain in dBi.

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#### 3.4.2 Measuring Instruments

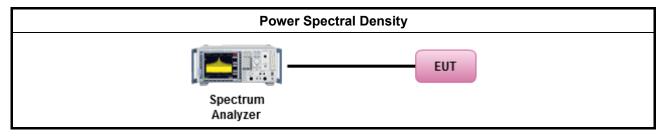
Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

		Test Method								
•	Peak power spectral density procedures that the same method as used to determine the 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:									
		Refer as FCC KDB 789033, F)5) 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]								
	Refer as FCC KDB 789033, clause E Method SA-1 (spectral trace averaging).									
		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								
	$\boxtimes$	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).								
		Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with 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 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.								
		Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,								
		Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.								
	•	If multiple transmit chains, EIRP PPSD calculation could be following as methods: $PPSD_{total} = PPSD_1 + PPSD_2 + + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$								

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## 3.4.4 Test Setup



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## 3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

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#### 3.5 Unwanted Emissions

#### 3.5.1 Transmitter 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					

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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.

Un-restricted band emissions above 1GHz Limit								
Operating Band	Limit							
⊠ 5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]							
☐ 5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]							
☐ 5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]							
∑ 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.							
5.85 - 5.895 GHz	(i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of - 7 dBm/MHz at or above 5.925 GHz.  (ii) For a client device all emissions at or above 5.895 GHz shall not exceed an							

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e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz.

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(iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/ MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.

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).

#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

### **Test Method**

- 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).
- The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
- For the transmitter unwanted emissions shall be measured using following options below:
  - Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.
  - Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
    - Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
    - Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
    - Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
    - Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
    - Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
    - Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
- For radiated measurement.
  - Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
  - Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
  - Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
- The any unwanted emissions level shall not exceed the fundamental emission level.

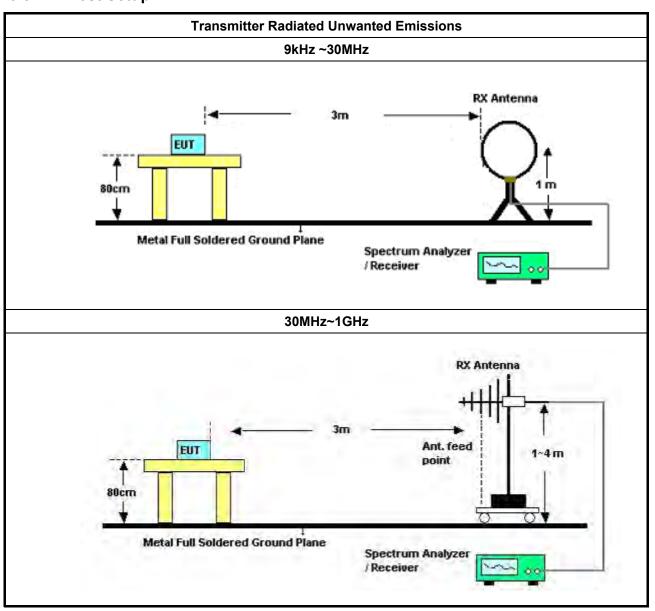
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#### **Test Method**

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

### 3.5.4 Test Setup



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Above 1GHz

Spectrum Analyzer

Above 1GHz

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#### 3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

#### 3.5.6 Transmitter Unwanted Emissions (Below 30MHz)

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

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

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

#### 3.5.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E

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# 4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Mar. 03, 2021	Mar. 02, 2022	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50- 16-2	04083	150kHz ~ 100MHz	Jan. 06, 2021	Jan. 05, 2022	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Mar. 07, 2021	Mar. 06, 2022	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwa rz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 30, 2021	Jan. 29, 2022	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 19, 2021	May 18, 2022	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 09, 2021	Aug. 08, 2022	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH05-CB	1GHz ~18GHz 3m	Nov. 08, 2020	Nov. 07, 2021	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 26, 2021	Mar. 25, 2022	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	BBHA 9120 D 1370	1GHz~18GHz	Sep. 14, 2021	Sep. 13, 2022	Radiation (03CH05-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 05, 2021	Aug. 04, 2022	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 27, 2021	Apr. 26, 2022	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC12630SE	980287	1GHz – 26.5GHz	Jul. 02, 2021	Jul. 01, 2022	Radiation (03CH05-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 13, 2021	Jul. 12, 2022	Radiation (03CH05-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 14, 2021	Apr. 13, 2022	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Nov. 10, 2020	Nov. 09, 2021	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 21, 2021	Jun. 20, 2022	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 15, 2021	Jul. 14, 2022	Radiation (03CH05-CB)

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	T	1	T	T	1	T	
Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 15, 2021	Jul. 14, 2022	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	RIKEN	SAC-3M	03CH02-CB	1GHz ~18GHz 3m	Mar. 27, 2021	Mar. 26, 2022	Radiation (03CH02-CB)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	May 04, 2021	May 03, 2022	Radiation (03CH02-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 05, 2021	Aug. 04, 2022	Radiation (03CH02-CB)
Pre-Amplifier	Agilent	83017A	MY39501305	1GHz ~ 26.5GHz	Jul. 12, 2021	Jul. 11, 2022	Radiation (03CH02-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 13, 2021	Jul. 12, 2022	Radiation (03CH02-CB)
Spectrum analyzer	R&S	FSU	100015	9kHz~26GHz	Oct. 15, 2020	Oct. 14, 2021	Radiation (03CH02-CB)
Signal Analyzer	R&S	FSV40	101903	9kHz ~ 40GHz	Mar. 22, 2021	Mar. 21, 2022	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18	1GHz ~ 18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18+19	1GHz ~ 18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 15, 2021	Jul. 14, 2022	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 15, 2021	Jul. 14, 2022	Radiation (03CH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH02-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH06-CB	1GHz ~18GHz 3m	Oct. 02, 2020	Oct. 01, 2021	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Aug. 04, 2021	Aug. 03, 2022	Radiation (03CH06-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 05, 2021	Aug. 04, 2022	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	May 06, 2021	May 05, 2022	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 13, 2021	Jul. 12, 2022	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Dec. 15, 2020	Dec. 14, 2021	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05	1GHz~18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05+24	1GHz~18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH06-CB)

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TEL: 886-3-656-9065 Page Number : 31 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 29, 2021

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 15, 2021	Jul. 14, 2022	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 15, 2021	Jul. 14, 2022	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSV40	101027	9kHz~40GHz	Aug. 02, 2021	Aug. 01, 2022	Conducted (TH02-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GH z	Sep. 17, 2020	Sep. 16, 2021	Conducted (TH02-CB)
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GH z	Sep. 17, 2020	Sep. 16, 2021	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-01	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-02	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-03	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-04	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-05	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH02-CB)

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

NCR means Non-Calibration required.

TEL: 886-3-656-9065 Page Number : 32 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 29, 2021



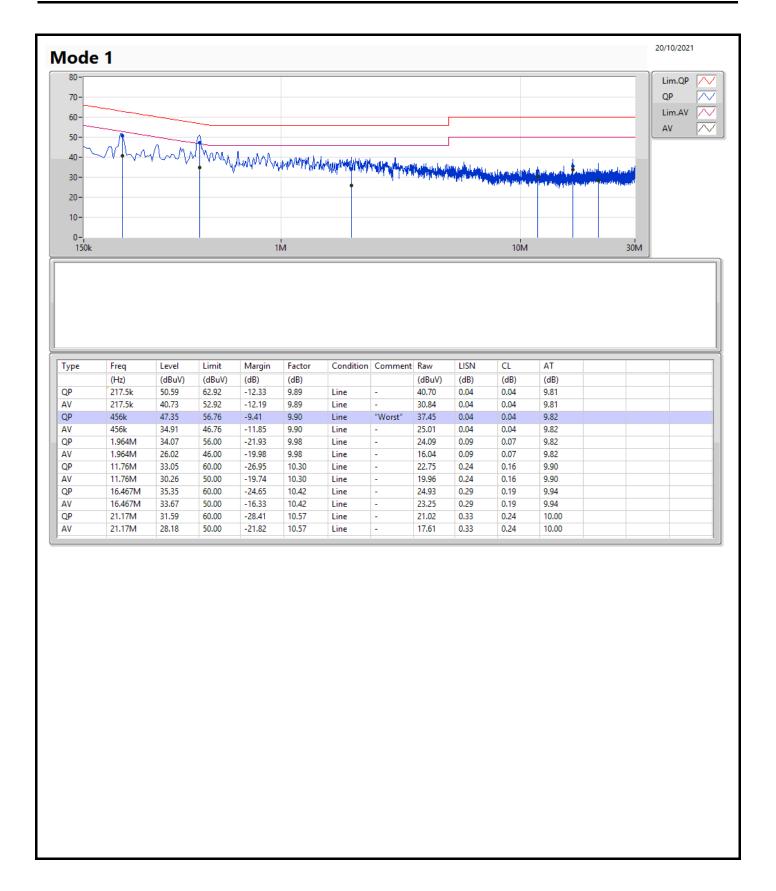
## **Conducted Emissions at Powerline**

Appendix A

Summary

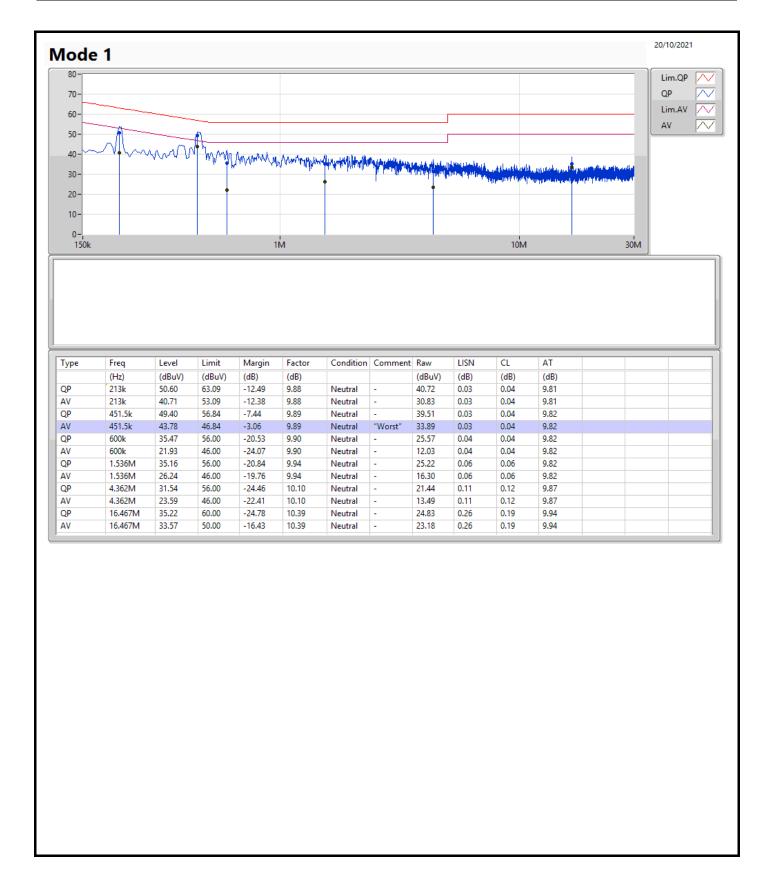
Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	451.5k	43.78	46.84	-3.06	Neutral

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Appendix B **EBW** 

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.15-5.25GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	23.13M	16.702M	16M7D1D	19.8M	16.462M
802.11ax HEW20_Nss1,(MCS0)_4TX	27M	18.981M	19M0D1D	19.98M	18.771M
802.11ax HEW40_Nss1,(MCS0)_4TX	45.24M	38.021M	38M0D1D	39.42M	37.601M
802.11ax HEW80_Nss1,(MCS0)_4TX	80.28M	76.762M	76M8D1D	80.04M	76.642M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	15.12M	18.621M	18M6D1D	14.94M	16.732M
802.11ax HEW20_Nss1,(MCS0)_4TX	16.65M	19.91M	19M9D1D	15.03M	19.19M
802.11ax HEW40_Nss1,(MCS0)_4TX	35.22M	43.838M	43M8D1D	33.06M	38.441M
802.11ax HEW80_Nss1,(MCS0)_4TX	75.12M	77.841M	77M8D1D	72.48M	77.481M

 $\label{eq:max-NdB} Max - N \ dB = Maximum \ 6dB \ down \ bandwidth \ for \ 5.725-5.85 \ GHz \ band \ / \ Maximum \ 26dB \ down \ bandwidth \ for \ other \ band; \\ Min-N \ dB = Minimum \ 6dB \ down \ bandwidth \ for \ 5.725-5.85 \ GHz \ band \ / \ Maximum \ 26dB \ down \ bandwidth \ for \ other \ band; \\ Min-OBW = Minimum \ 99\% \ occupied \ bandwidth \ for \ other \ band; \\ Min-OBW = Minimum \ 99\% \ occupied \ bandwidth \ for \ other \ band; \\ Min-OBW = Minimum \ 99\% \ occupied \ bandwidth \ for \ other \ band; \\ Min-OBW = Minimum \ 99\% \ occupied \ bandwidth \ for \ other \ bandwid$ 

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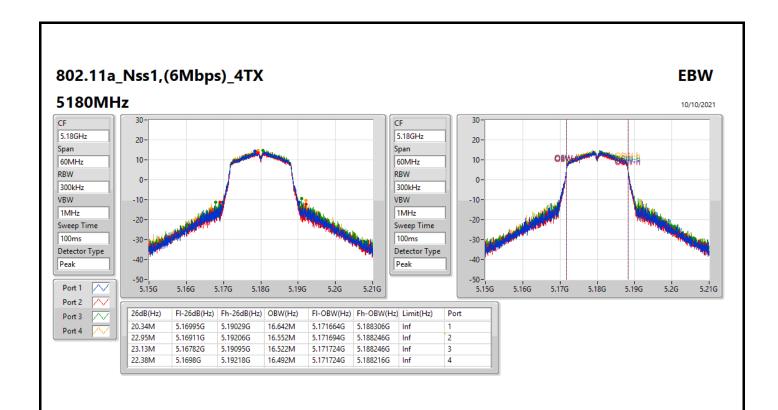
## Result

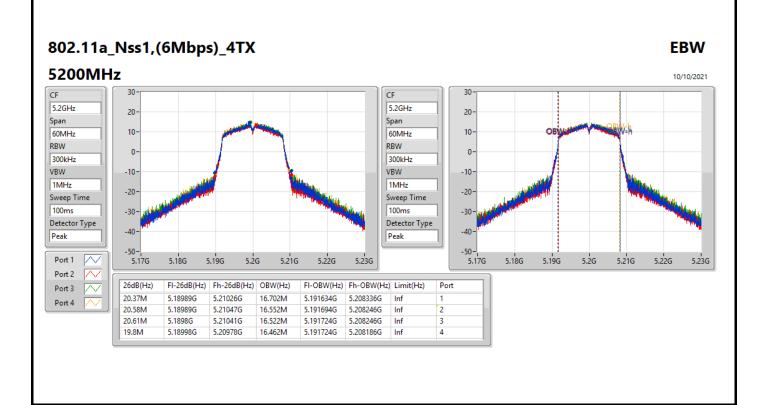
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	20.34M	16.642M	22.95M	16.552M	23.13M	16.522M	22.38M	16.492M
5200MHz	Pass	Inf	20.37M	16.702M	20.58M	16.552M	20.61M	16.522M	19.8M	16.462M
5240MHz	Pass	Inf	20.37M	16.672M	20.37M	16.492M	20.79M	16.522M	21.6M	16.522M
5745MHz	Pass	500k	15M	17.091M	15M	16.852M	15.12M	17.181M	14.94M	16.732M
5785MHz	Pass	500k	15.09M	17.511M	15.09M	17.151M	15.09M	18.621M	15.06M	17.421M
5825MHz	Pass	500k	15.03M	17.061M	15.06M	16.792M	15.06M	16.912M	15.06M	16.762M
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	22.32M	18.951M	23.58M	18.921M	23.19M	18.981M	24.27M	18.951M
5200MHz	Pass	Inf	25.35M	18.981M	22.86M	18.951M	25.08M	18.951M	27M	18.951M
5240MHz	Pass	Inf	23.04M	18.801M	21.33M	18.771M	20.37M	18.801M	19.98M	18.801M
5745MHz	Pass	500k	15.66M	19.46M	15.06M	19.31M	15.12M	19.91M	15.06M	19.31M
5785MHz	Pass	500k	16.65M	19.25M	15.57M	19.19M	15.06M	19.46M	15.36M	19.22M
5825MHz	Pass	500k	15.12M	19.37M	15.09M	19.22M	15.03M	19.49M	15.33M	19.22M
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	39.48M	37.661M	39.54M	37.601M	39.6M	37.661M	39.42M	37.601M
5230MHz	Pass	Inf	41.22M	38.021M	39.54M	37.841M	45.24M	37.901M	44.34M	37.901M
5755MHz	Pass	500k	33.84M	40.3M	35.1M	39.28M	33.06M	43.838M	35.04M	39.1M
5795MHz	Pass	500k	33.78M	38.621M	35.04M	38.501M	35.22M	38.981M	33.78M	38.441M
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	80.28M	76.642M	80.28M	76.762M	80.04M	76.762M	80.28M	76.642M
5775MHz	Pass	500k	72.48M	77.601M	75M	77.481M	75M	77.841M	75.12M	77.601M

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

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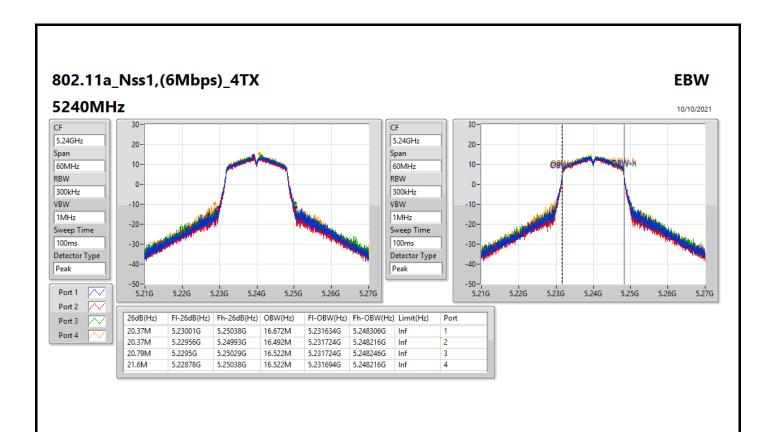
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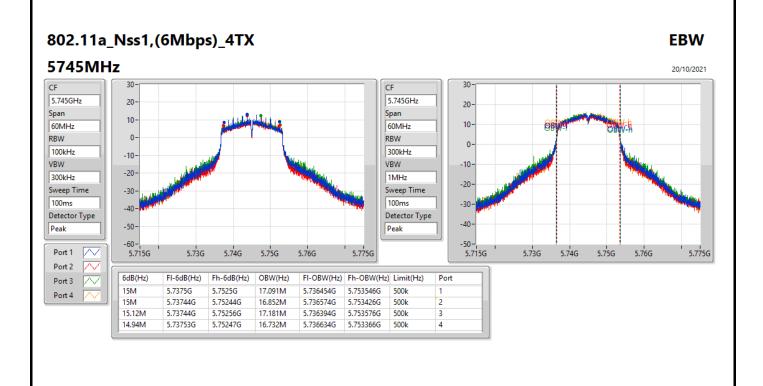




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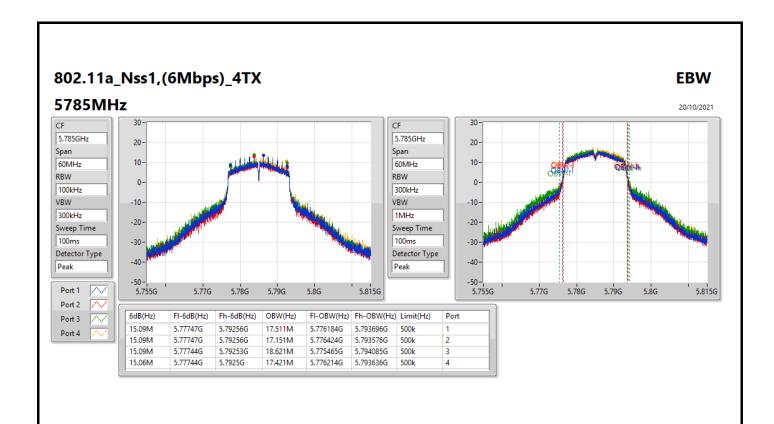
EBW Appendix B

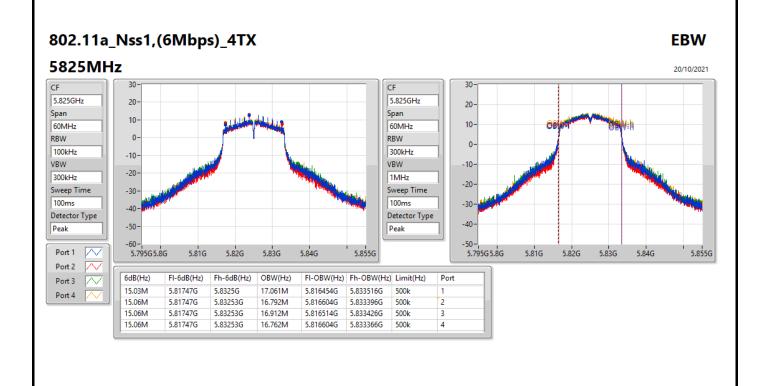




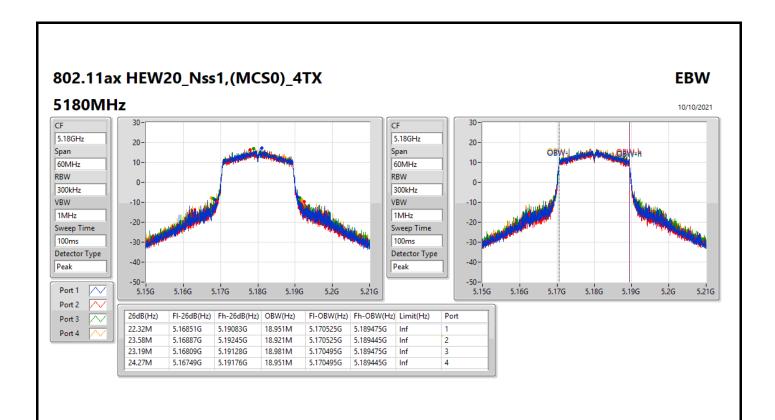
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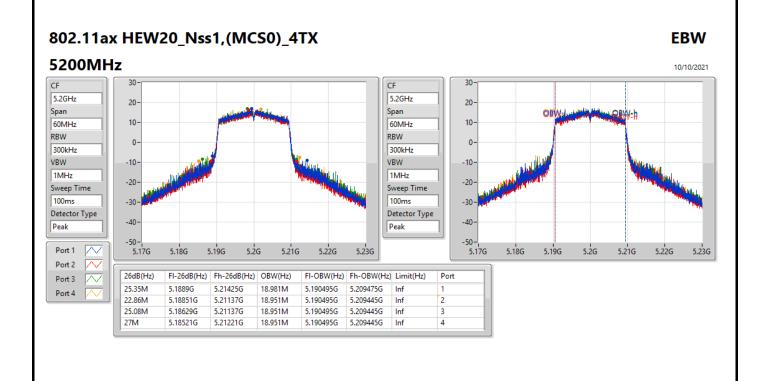
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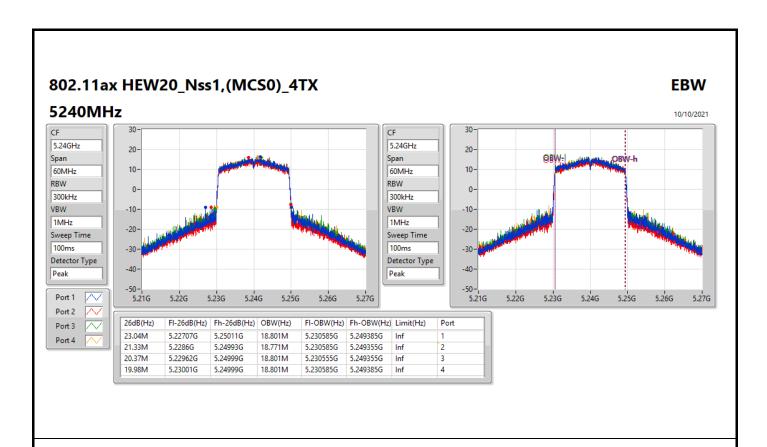


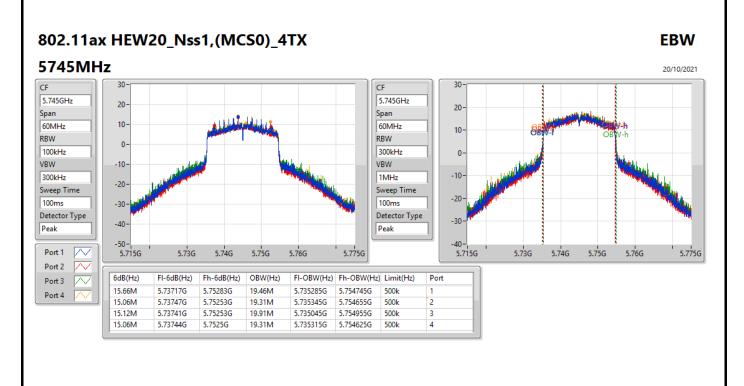
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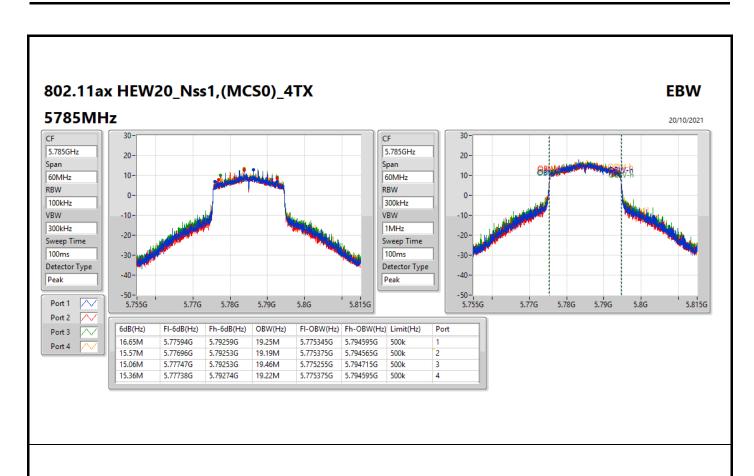


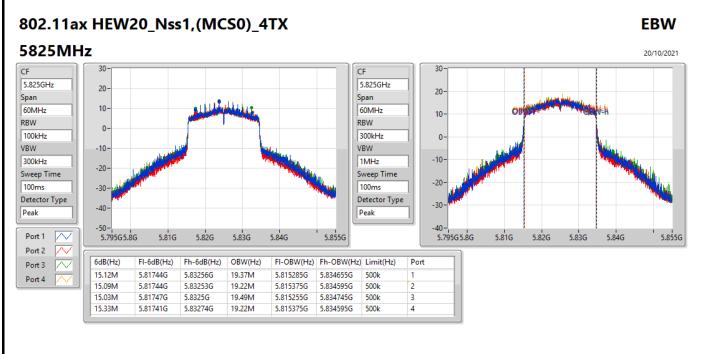
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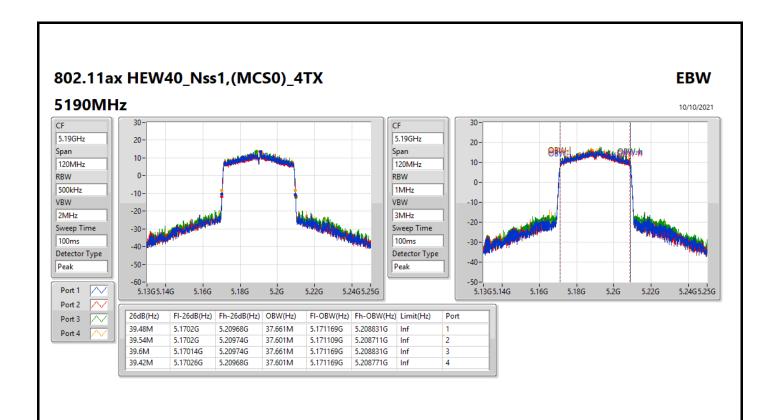
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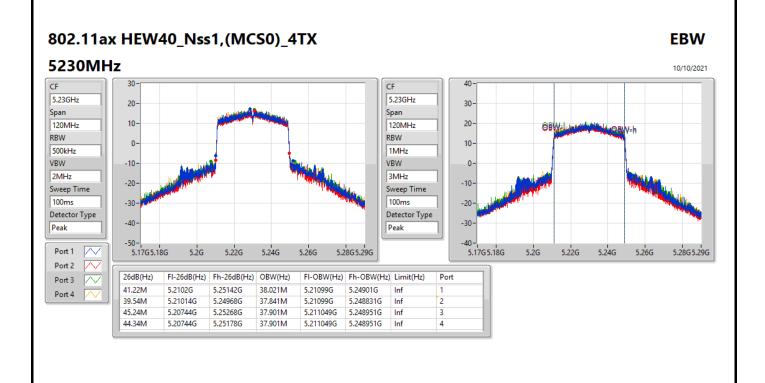




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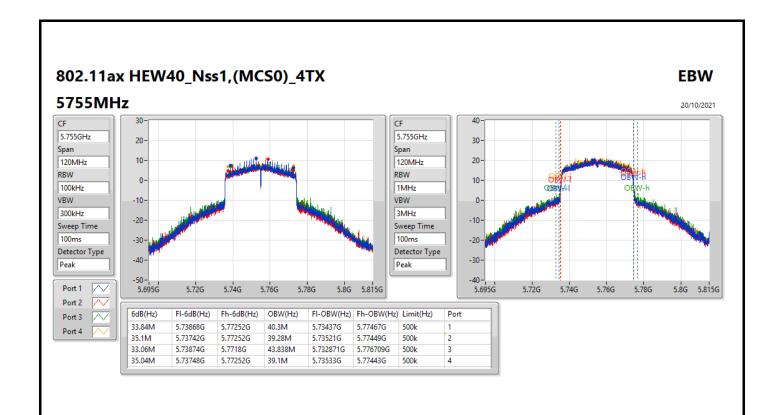
EBW Appendix B

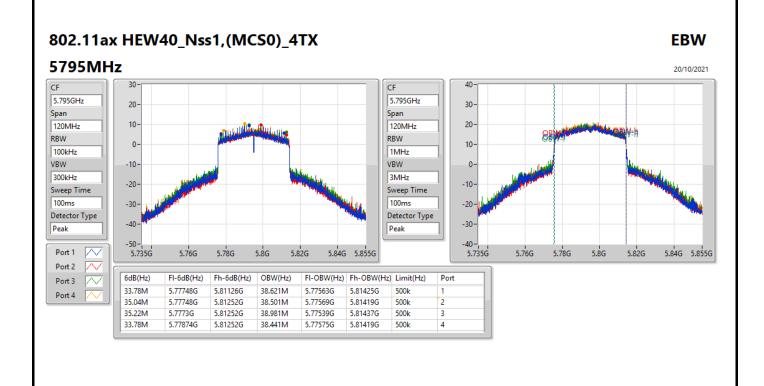




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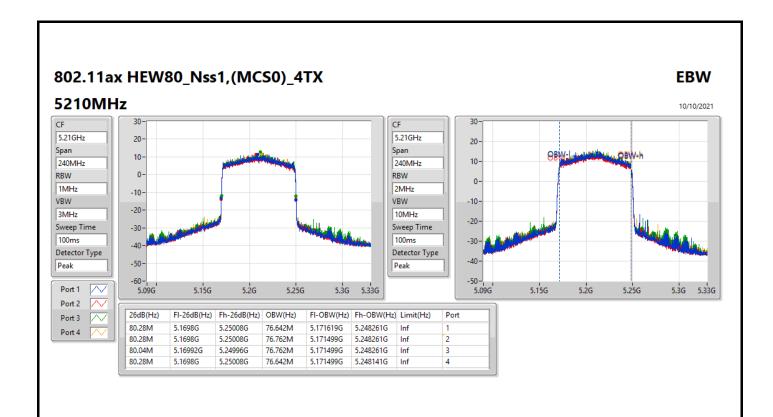
Appendix B

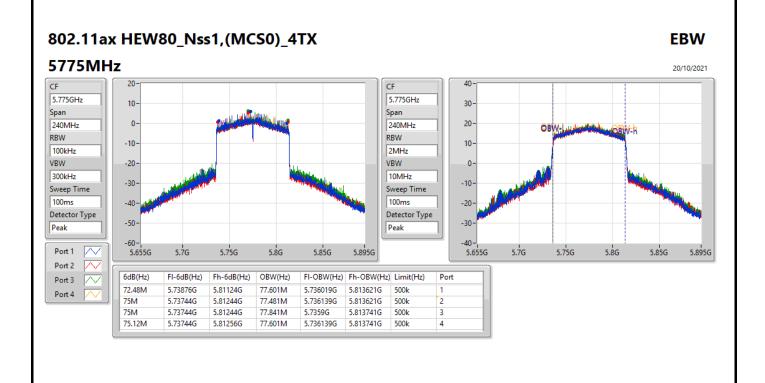




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Appendix B





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Average Power Appendix C.1

## Summary

Mode	Total Power (dBm)	Total Power (W)
5.15-5.25GHz	-	-
802.11a_Nss1,(6Mbps)_4TX	28.30	0.67608
802.11ax HEW20_Nss1,(MCS0)_4TX	28.86	0.76913
802.11ax HEW40_Nss1,(MCS0)_4TX	29.00	0.79433
802.11ax HEW80_Nss1,(MCS0)_4TX	23.41	0.21928
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_4TX	29.24	0.83946
802.11ax HEW20_Nss1,(MCS0)_4TX	29.60	0.91201
802.11ax HEW40_Nss1,(MCS0)_4TX	29.78	0.95060
802.11ax HEW80_Nss1,(MCS0)_4TX	27.41	0.55081

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Average Power Appendix C.1

# Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	3.52	22.18	21.69	22.27	22.47	28.18	30.00
5200MHz	Pass	3.52	21.95	21.42	22.04	22.34	27.97	30.00
5240MHz	Pass	3.52	22.44	21.73	22.36	22.56	28.30	30.00
5745MHz	Pass	5.09	22.58	22.13	22.77	22.92	28.63	30.00
5785MHz	Pass	5.09	23.03	22.71	23.35	23.73	29.24	30.00
5825MHz	Pass	5.09	22.45	22.18	22.59	22.88	28.55	30.00
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	3.52	22.84	22.38	22.95	23.14	28.86	30.00
5200MHz	Pass	3.52	22.55	21.97	22.65	22.88	28.55	30.00
5240MHz	Pass	3.52	22.65	21.87	22.63	22.83	28.53	30.00
5745MHz	Pass	5.09	23.35	23.14	23.57	23.92	29.53	30.00
5785MHz	Pass	5.09	22.52	22.48	22.88	23.39	28.85	30.00
5825MHz	Pass	5.09	23.49	23.31	23.6	23.88	29.60	30.00
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	3.52	19.37	18.98	19.64	19.69	25.45	30.00
5230MHz	Pass	3.52	22.87	22.59	23.20	23.22	29.00	30.00
5755MHz	Pass	5.09	23.69	23.51	23.85	23.98	29.78	30.00
5795MHz	Pass	5.09	22.61	22.58	23.04	23.44	28.95	30.00
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	3.52	17.45	16.86	17.63	17.59	23.41	30.00
5775MHz	Pass	5.09	21.20	21.02	21.53	21.77	27.41	30.00

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

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Appendix C.2 Average Power

## Summary

Mode	Total Power (dBm)	Total Power (W)
5.15-5.25GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	28.86	0.76913
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	29.00	0.79433
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	23.41	0.21928
5.725-5.85GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	27.88	0.61376
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	27.80	0.60256
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	27.41	0.55081

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Average Power Appendix C.2

#### Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
802.11ax HEW20-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	6.53	22.84	22.38	22.95	23.14	28.86	29.47
5200MHz	Pass	6.53	22.55	21.97	22.65	22.88	28.55	29.47
5240MHz	Pass	6.53	22.65	21.87	22.63	22.83	28.53	29.47
5745MHz	Pass	8.10	21.63	21.39	22.09	22.20	27.86	27.90
5785MHz	Pass	8.10	21.67	21.46	22.07	22.21	27.88	27.90
5825MHz	Pass	8.10	21.67	21.29	21.75	22.07	27.72	27.90
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	6.53	19.37	18.98	19.64	19.69	25.45	29.47
5230MHz	Pass	6.53	22.87	22.59	23.2	23.22	29.00	29.47
5755MHz	Pass	8.10	21.78	21.15	22.02	22.11	27.80	27.90
5795MHz	Pass	8.10	21.26	21.05	21.79	21.95	27.55	27.90
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	6.53	17.45	16.86	17.63	17.59	23.41	29.47
5775MHz	Pass	8.10	21.2	21.02	21.53	21.77	27.41	27.90

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

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Summary

Mode	PD (dBm/RBW)
5.15-5.25GHz	-
802.11a_Nss1,(6Mbps)_4TX	16.35
802.11ax HEW20_Nss1,(MCS0)_4TX	16.26
802.11ax HEW40_Nss1,(MCS0)_4TX	13.62
802.11ax HEW80_Nss1,(MCS0)_4TX	4.95
5.725-5.85GHz	-
802.11a_Nss1,(6Mbps)_4TX	16.25
802.11ax HEW20_Nss1,(MCS0)_4TX	15.41
802.11ax HEW40_Nss1,(MCS0)_4TX	13.32
802.11ax HEW80_Nss1,(MCS0)_4TX	8.16

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

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Appendix D **PSD** 

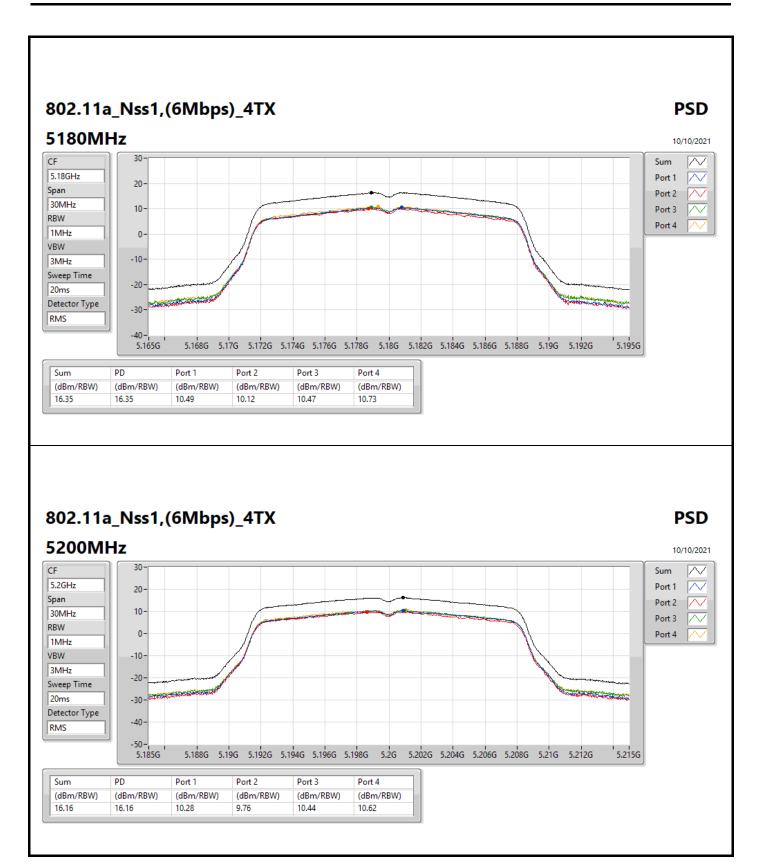
## Result

Mode	Result	DG	Port 1	Port 2	Port 3	Port 4	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	6.53	10.49	10.12	10.47	10.73	16.35	16.47
5200MHz	Pass	6.53	10.28	9.76	10.44	10.62	16.16	16.47
5240MHz	Pass	6.53	10.06	9.93	10.37	10.63	16.10	16.47
5745MHz	Pass	8.10	10.16	9.24	9.86	9.98	15.54	27.90
5785MHz	Pass	8.10	10.09	9.91	10.43	11.17	16.25	27.90
5825MHz	Pass	8.10	9.95	9.68	10.33	10.62	16.03	27.90
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	6.53	10.33	9.97	10.37	10.55	16.26	16.47
5200MHz	Pass	6.53	10.36	10.14	10.38	10.58	16.16	16.47
5240MHz	Pass	6.53	10.33	9.72	10.32	10.63	16.15	16.47
5745MHz	Pass	8.10	9.69	9.28	9.59	9.76	15.35	27.90
5785MHz	Pass	8.10	9.11	9.08	9.80	9.92	15.23	27.90
5825MHz	Pass	8.10	9.49	9.33	9.59	9.94	15.41	27.90
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	6.53	3.75	3.74	4.06	4.30	9.95	16.47
5230MHz	Pass	6.53	7.80	7.19	7.75	8.03	13.62	16.47
5755MHz	Pass	8.10	7.38	7.16	7.85	8.02	13.32	27.90
5795MHz	Pass	8.10	6.07	6.48	6.76	6.90	12.42	27.90
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	6.53	-0.79	-1.57	-0.54	-0.57	4.95	16.47
5775MHz	Pass	8.10	2.38	1.89	2.73	2.86	8.16	27.90

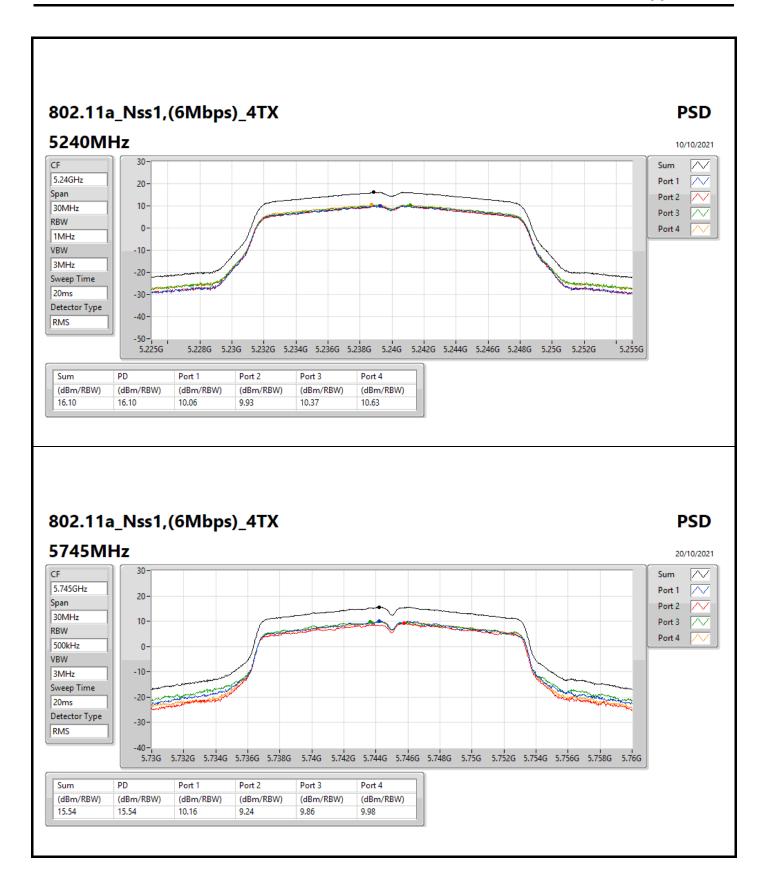
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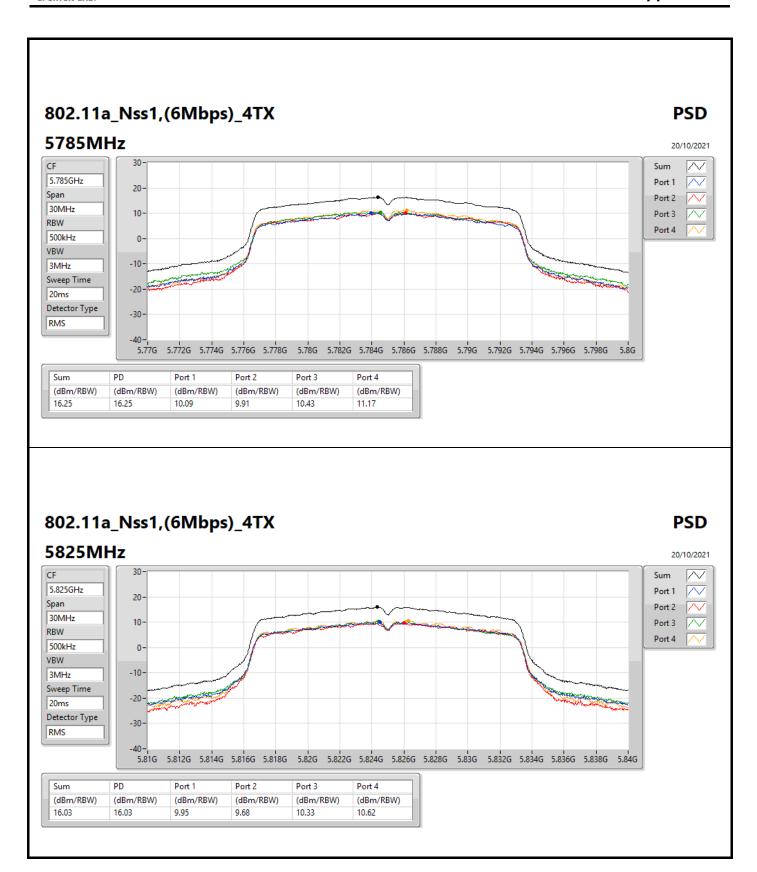
DG = Directional Gain; RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;



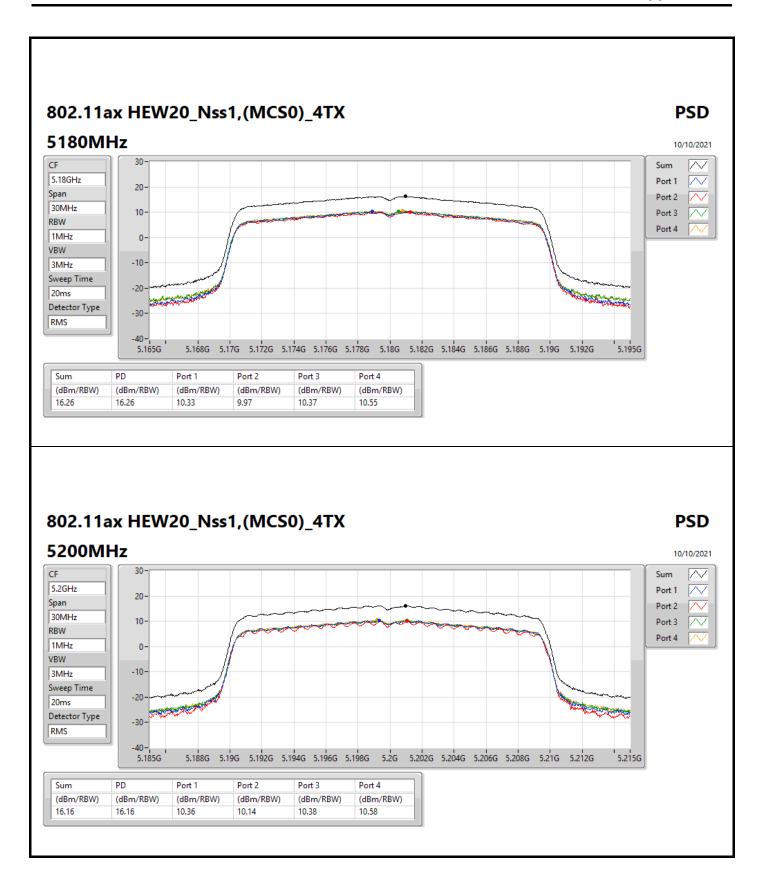
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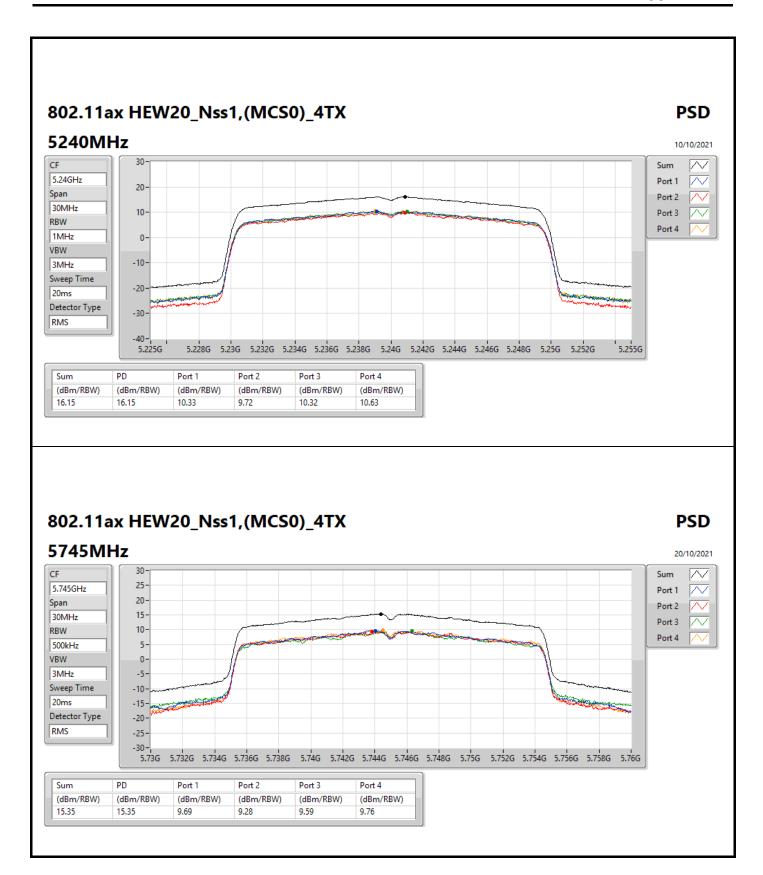
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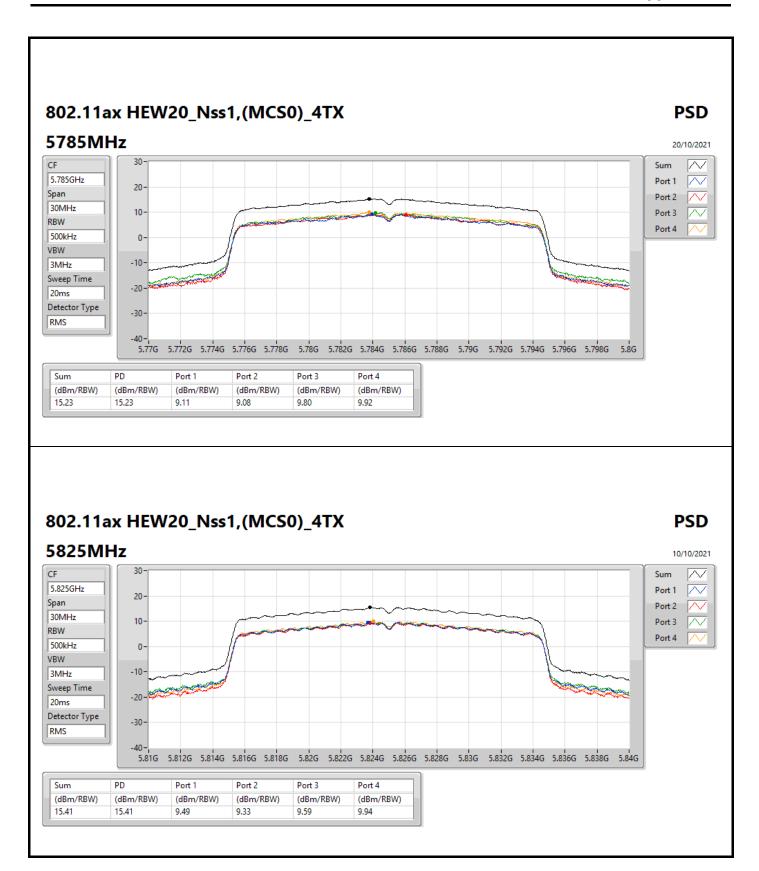
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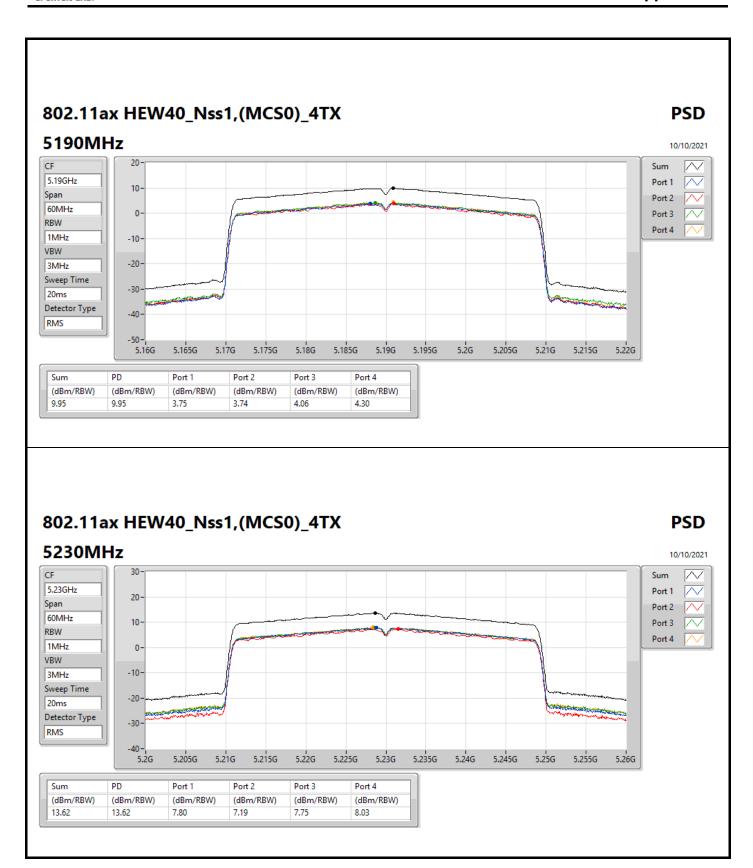
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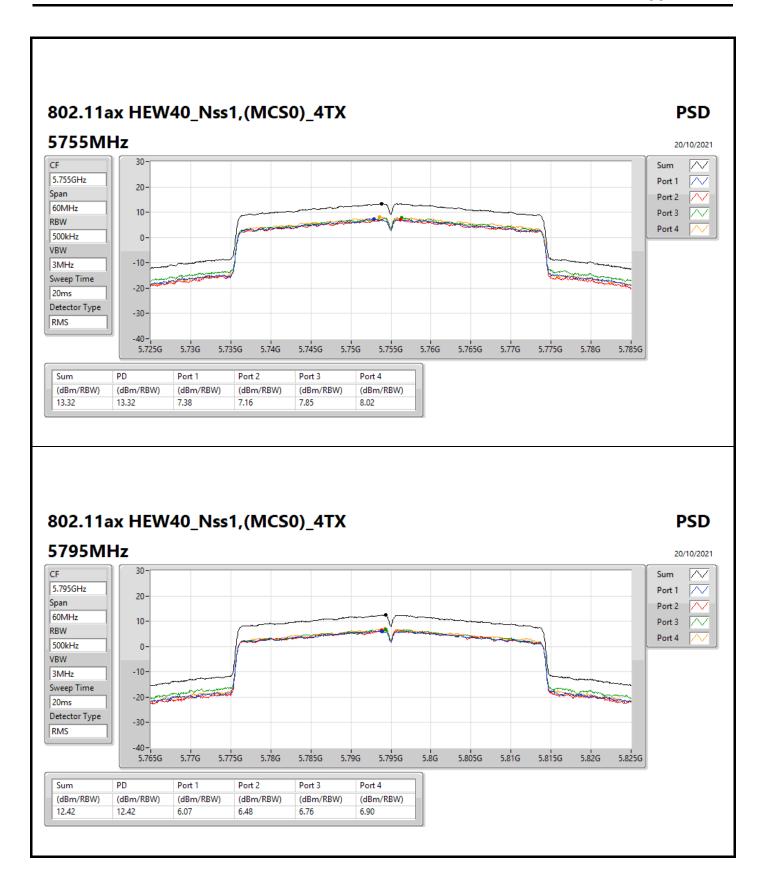
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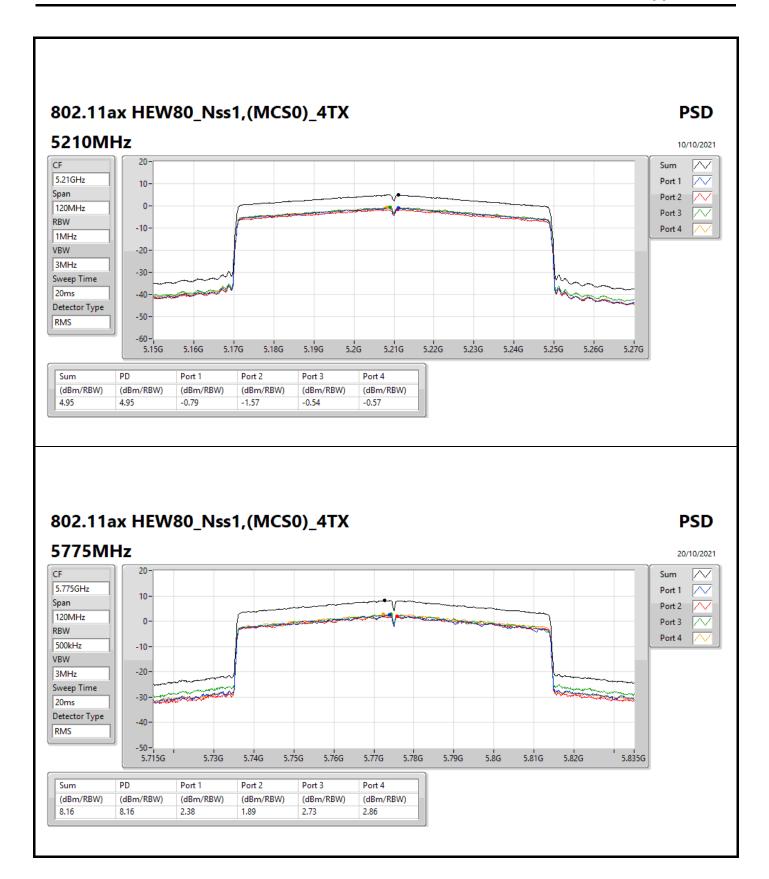
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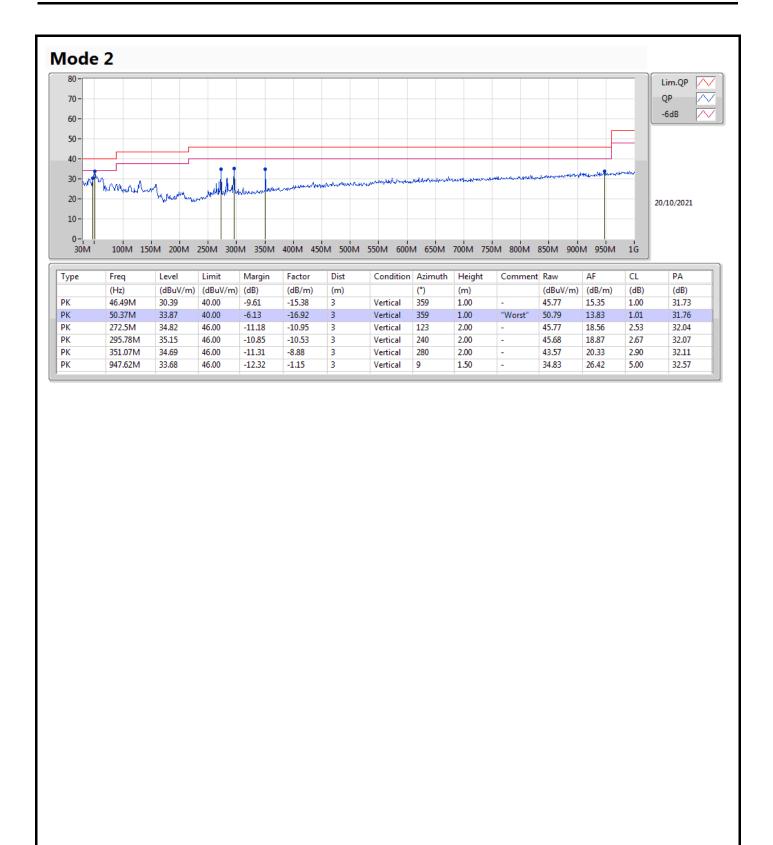
# Radiated Emissions below 1GHz

Appendix E.1

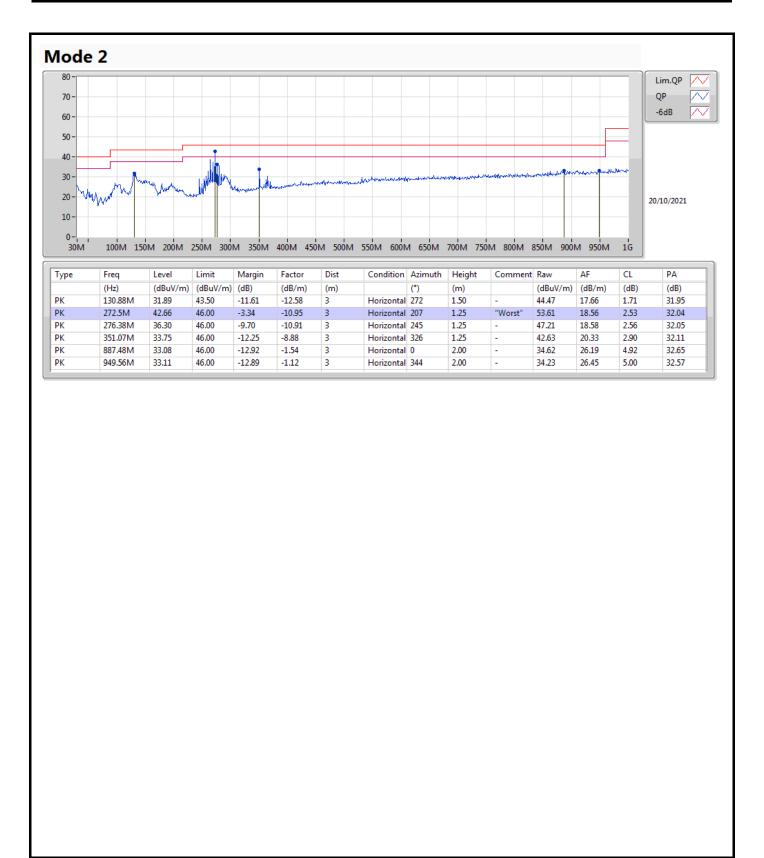
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 2	Pass	PK	272.5M	42.66	46.00	-3.34	Horizontal

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# RSE TX above 1GHz

Appendix E.2

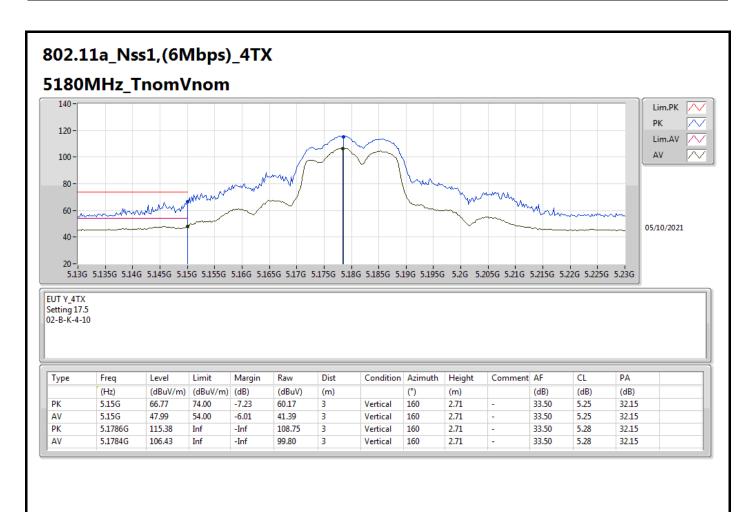
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
5.725-5.85GHz	-	-		-	-	-	-	-	-	-	-
802.11ax HEW20_Nss1,(MCS0)_4TX	Pass	PK	17.2337G	67.17	68.20	-1.03	3	Horizontal	227	1.78	-

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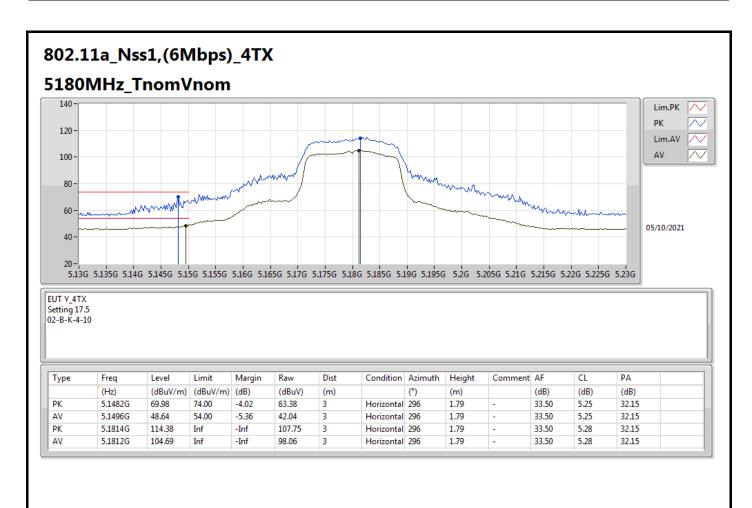
: FR190215AB





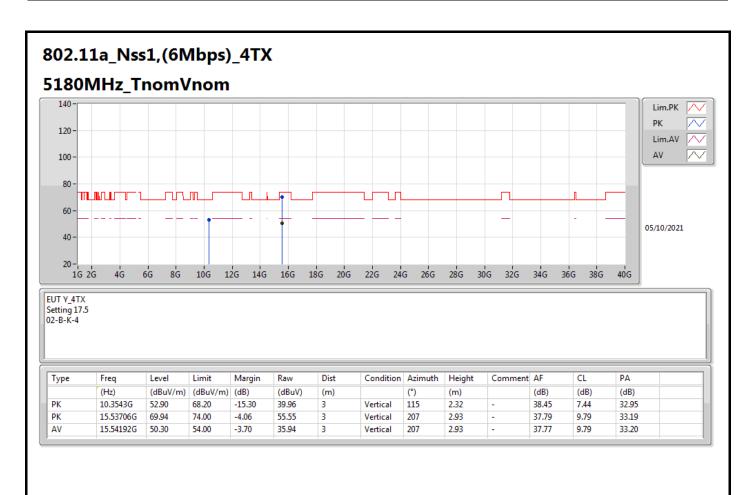
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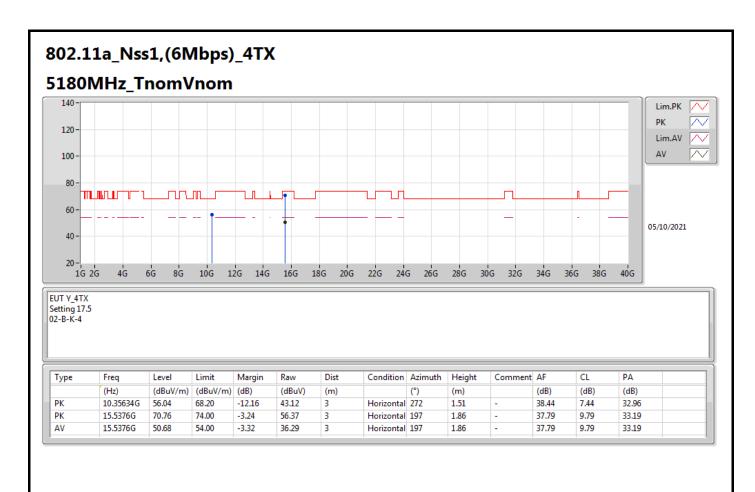
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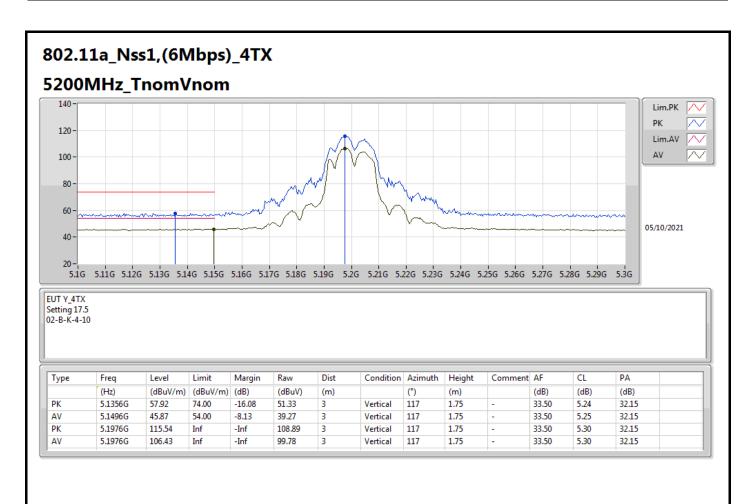
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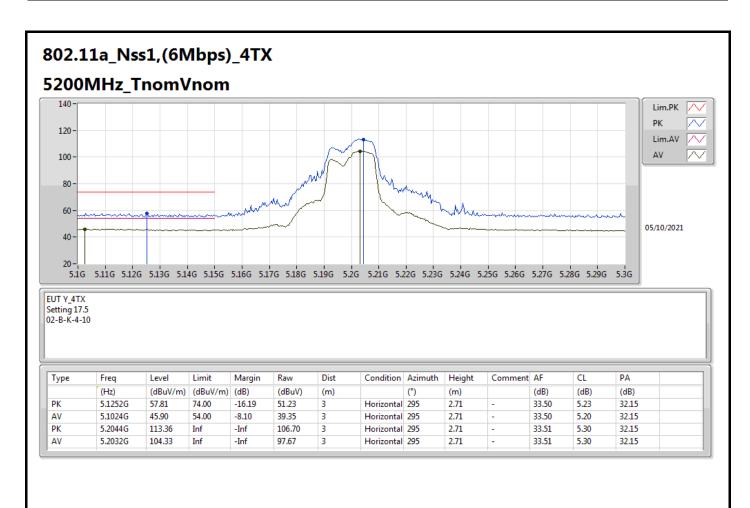
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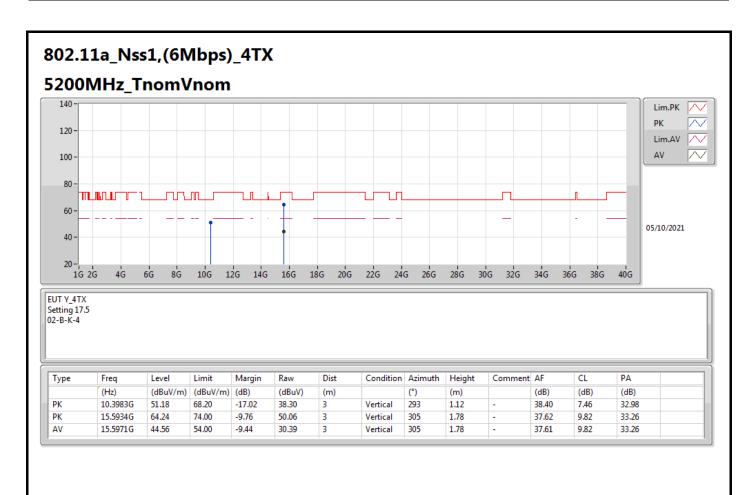
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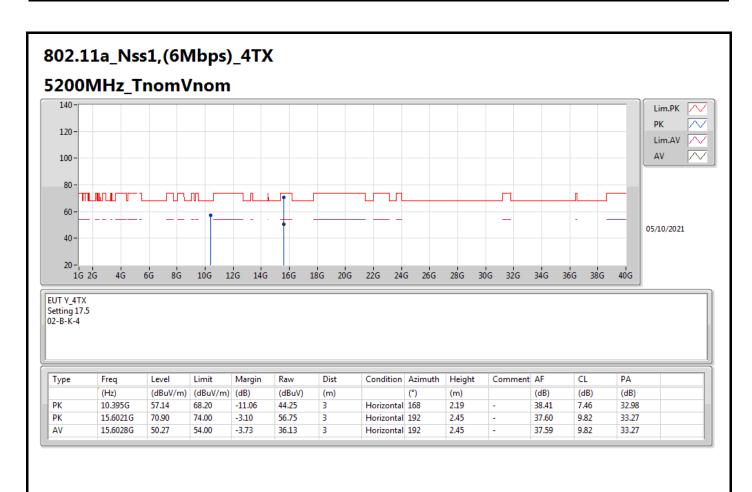
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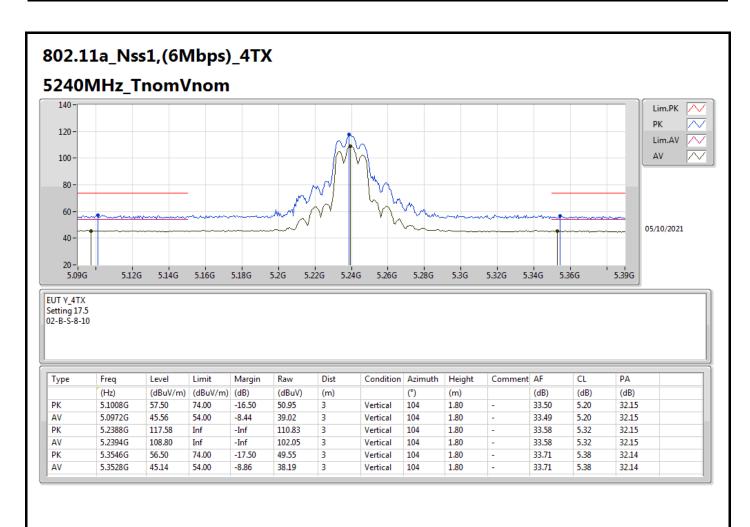
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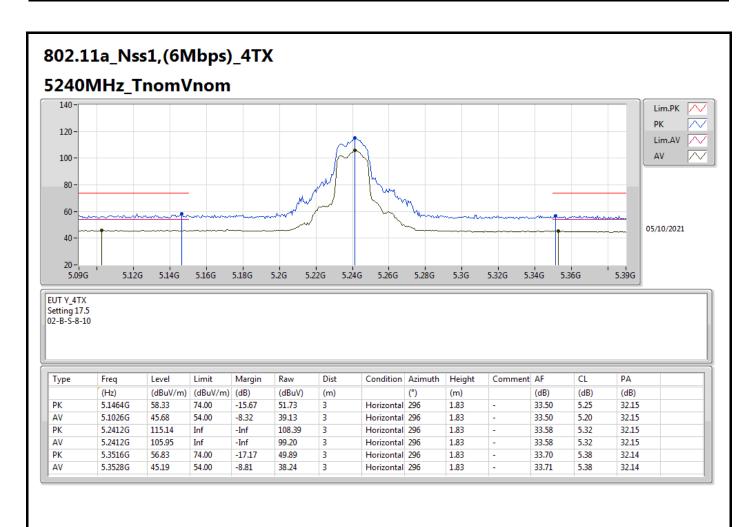
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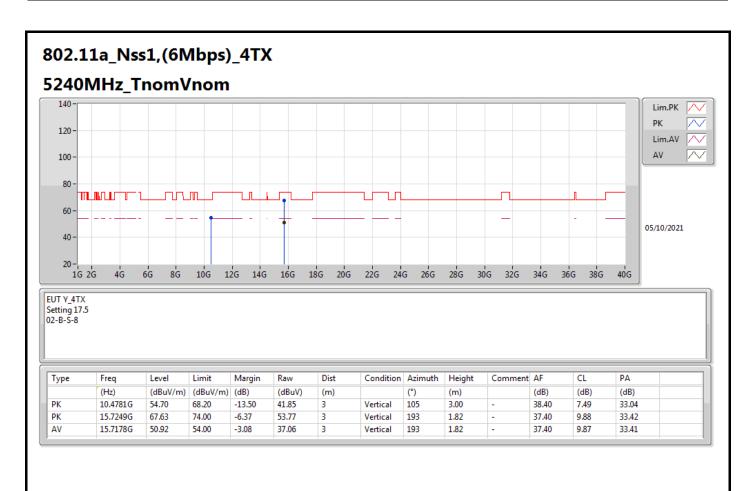
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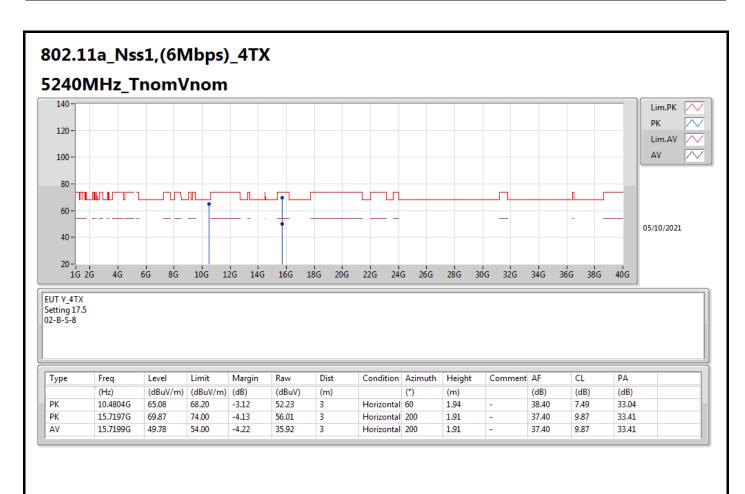
Page No. : 11 of 73 Report No. : FR190215AB





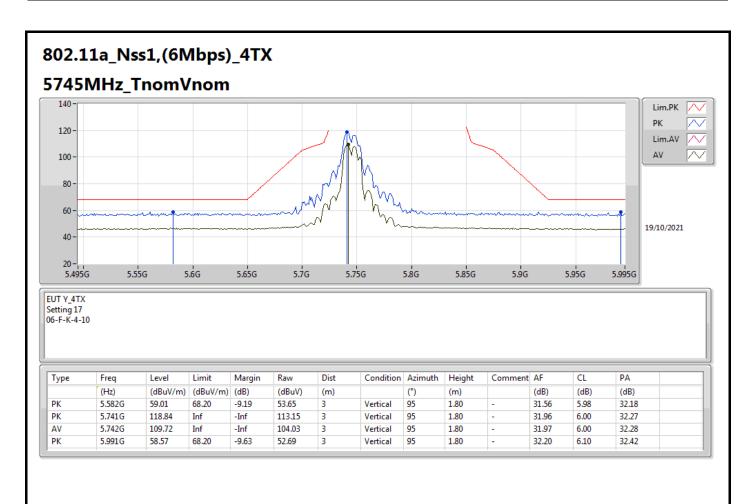
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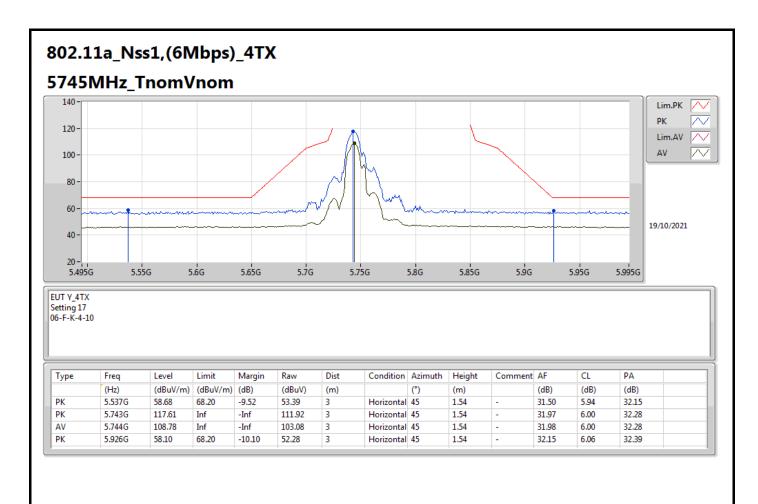
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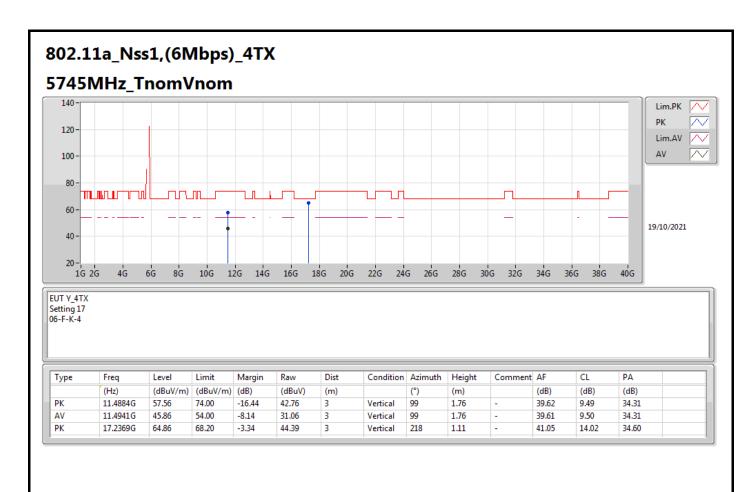
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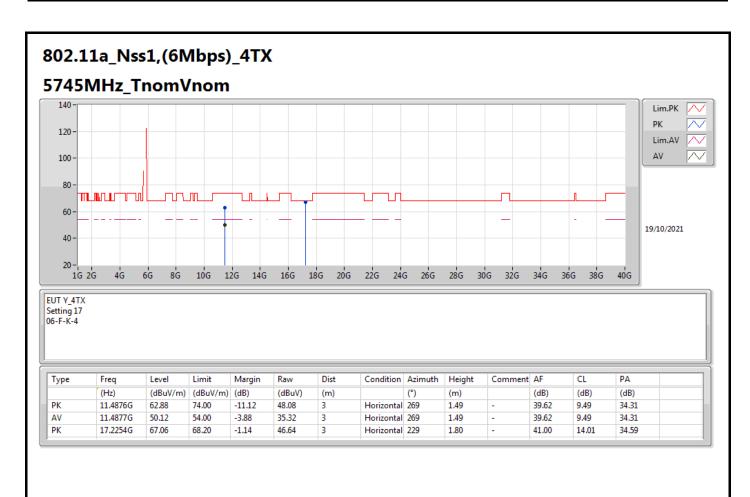
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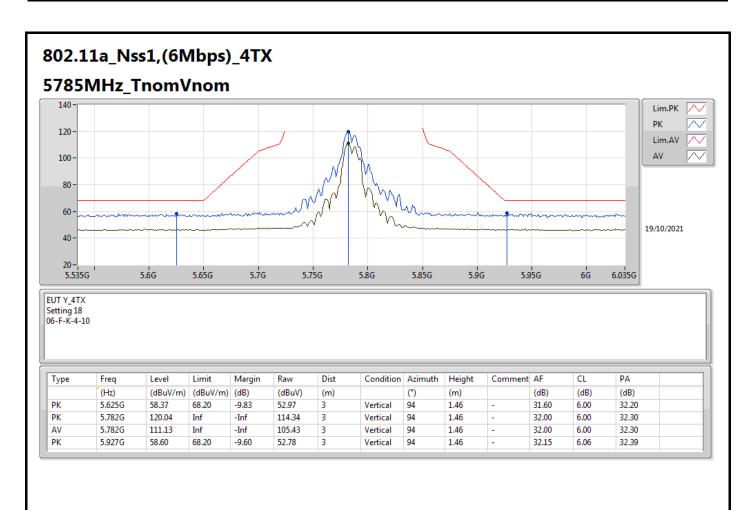
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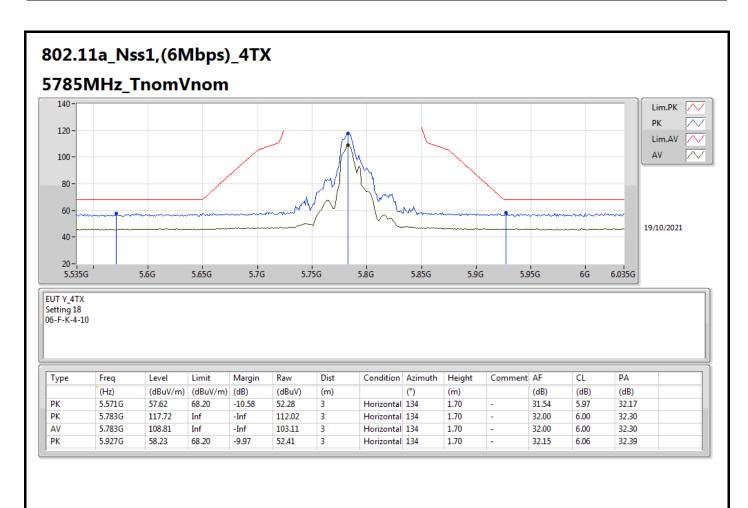
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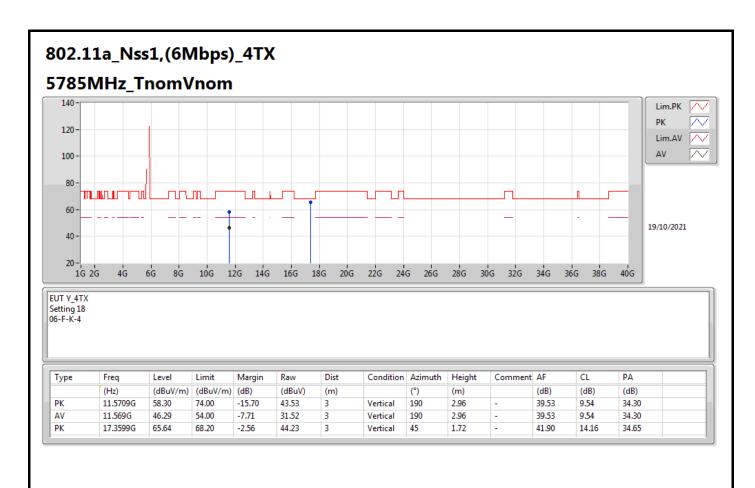
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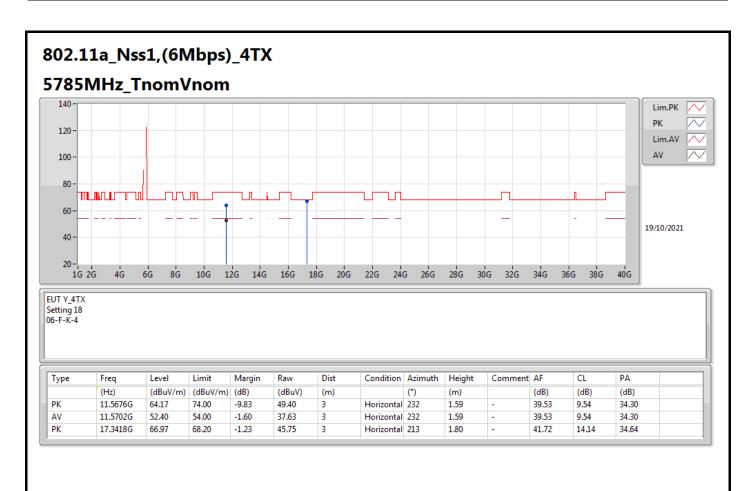
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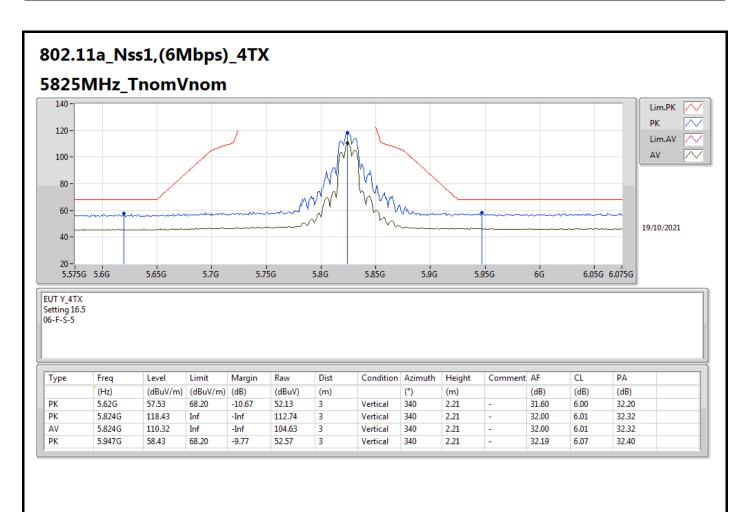
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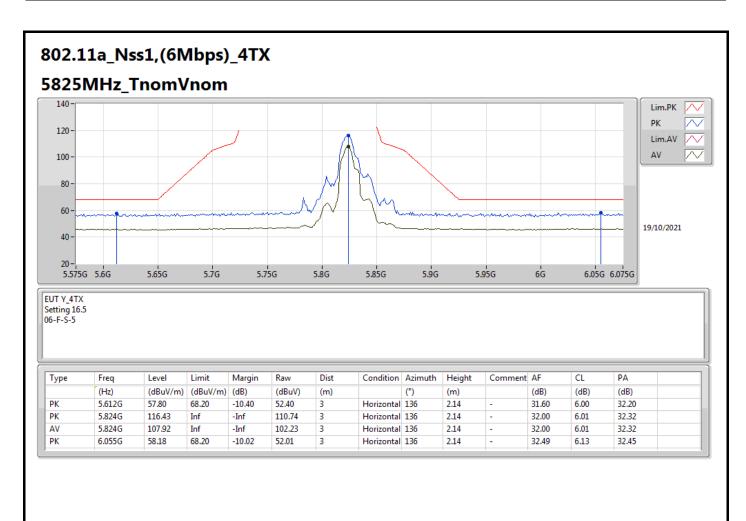
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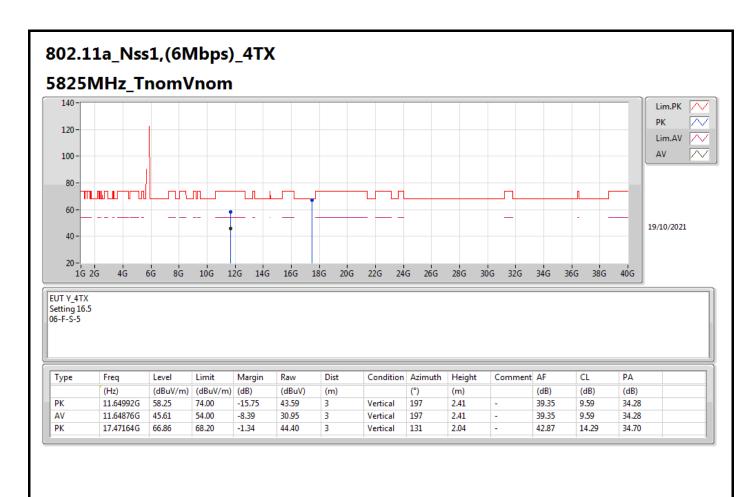
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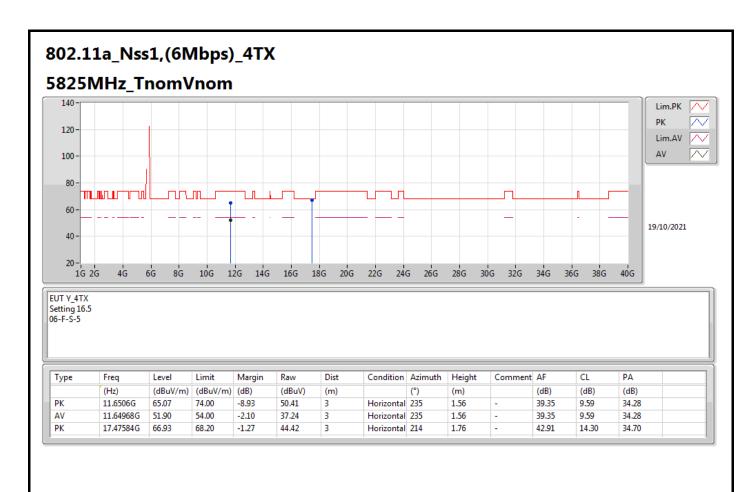
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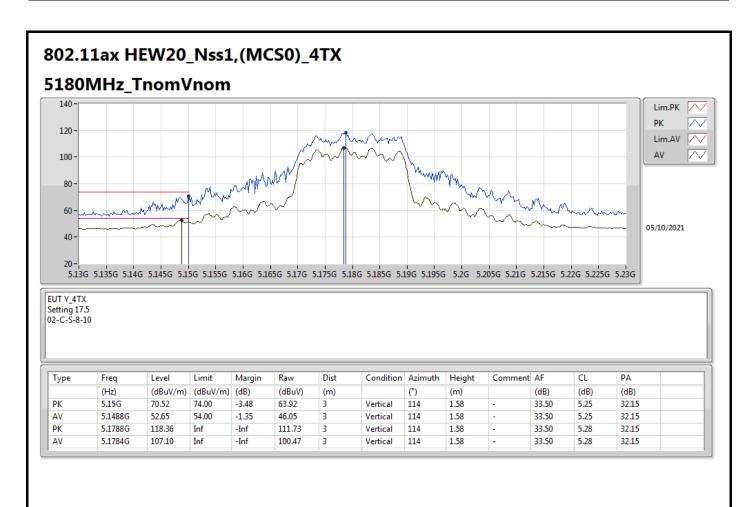
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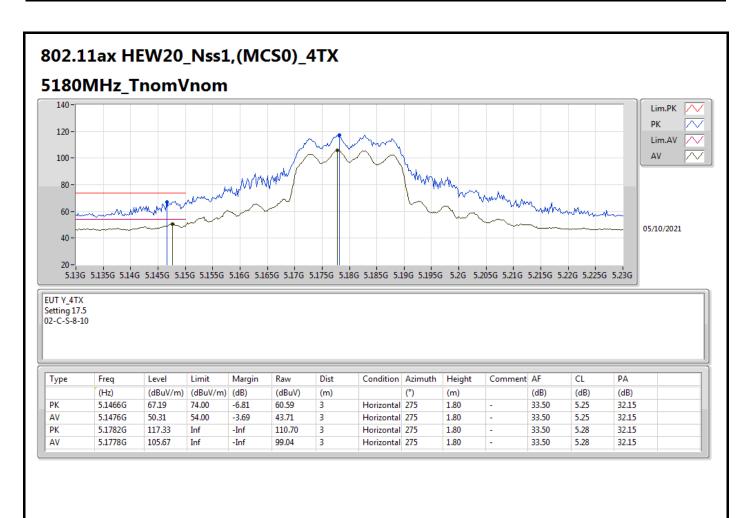
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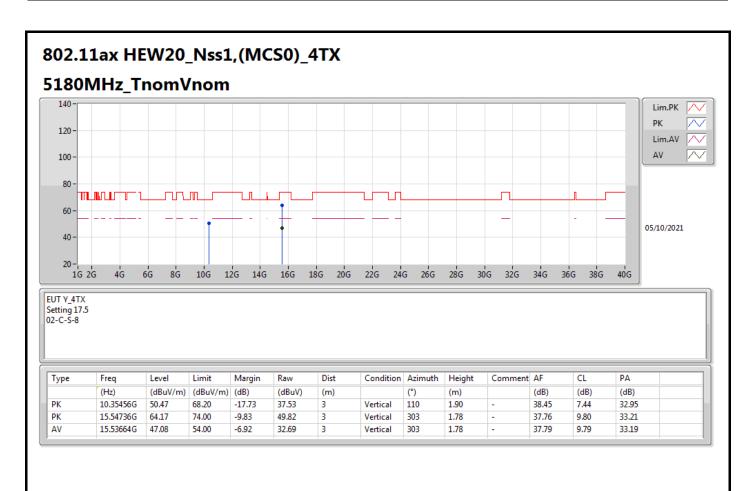
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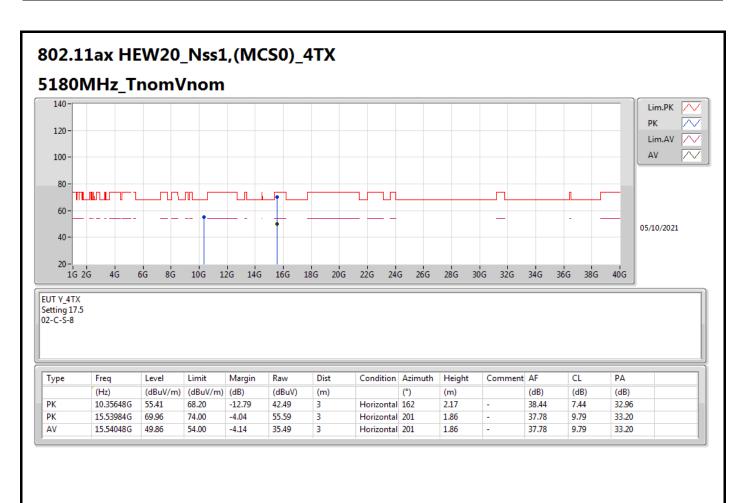
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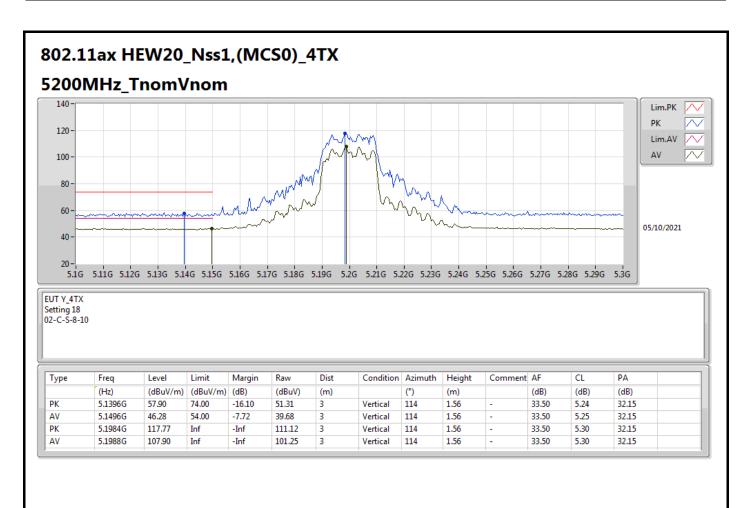
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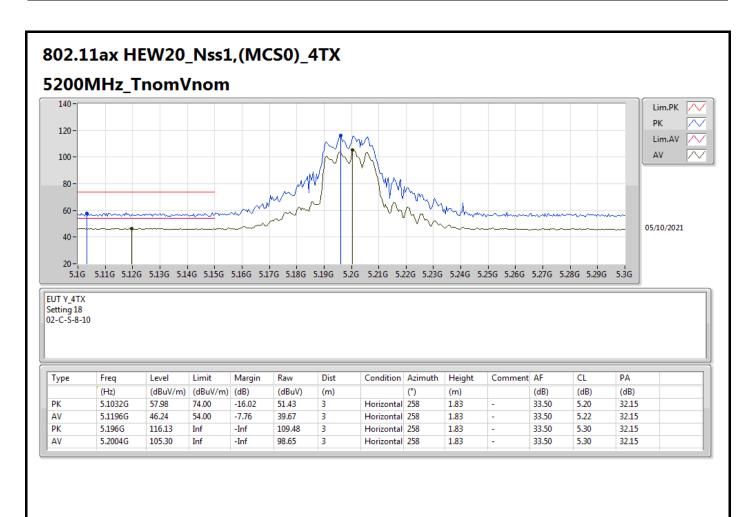
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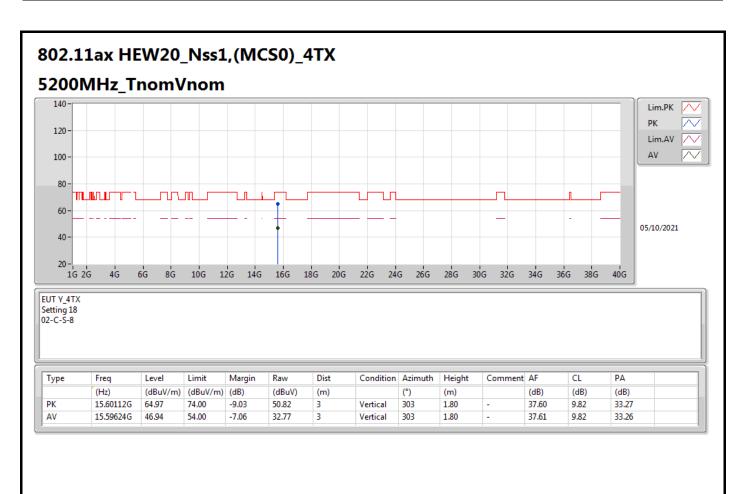
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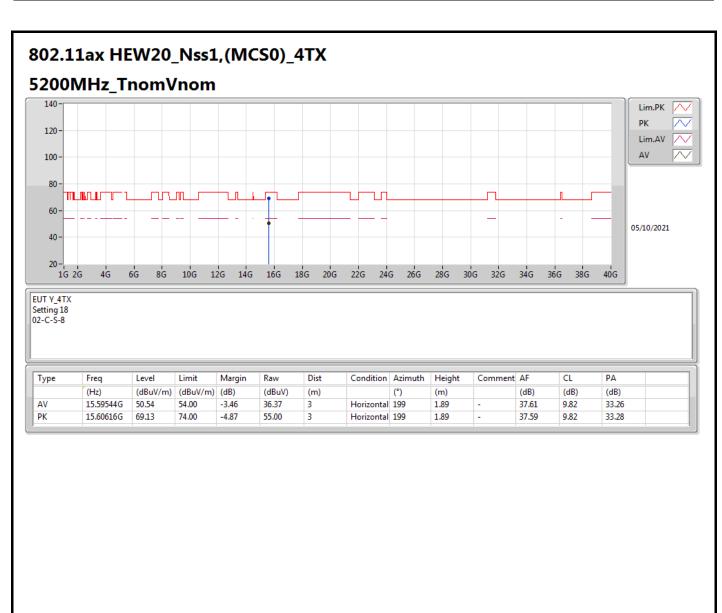
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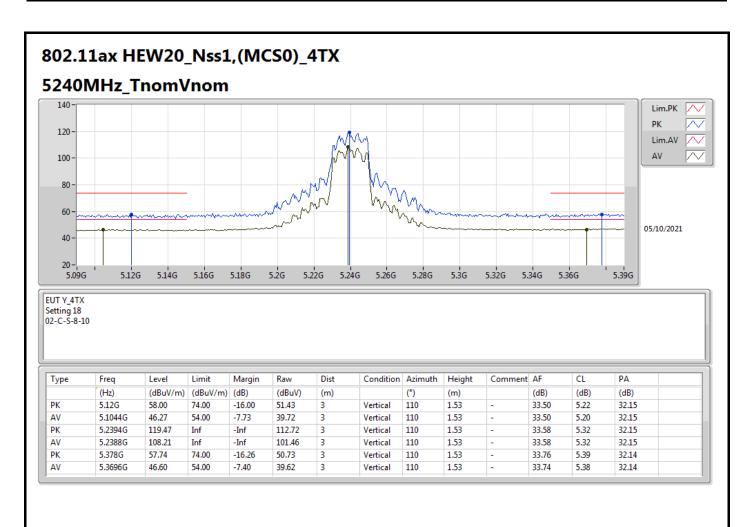
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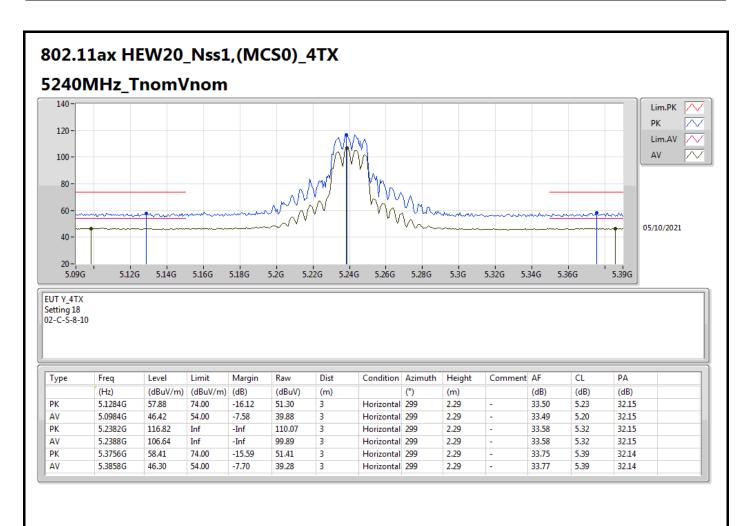
Page No. : 33 of 73 Report No. : FR190215AB





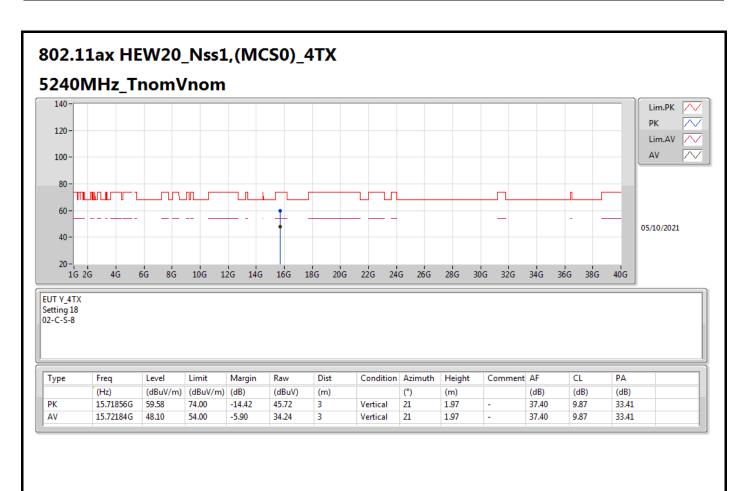
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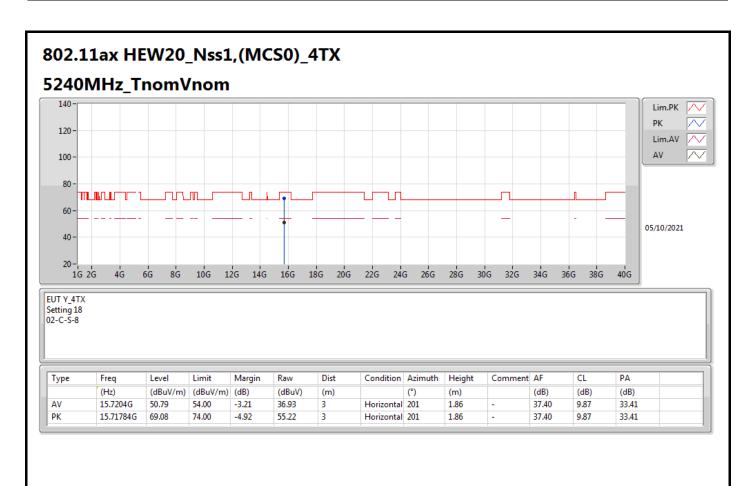
Page No. : 35 of 73 Report No. : FR190215AB





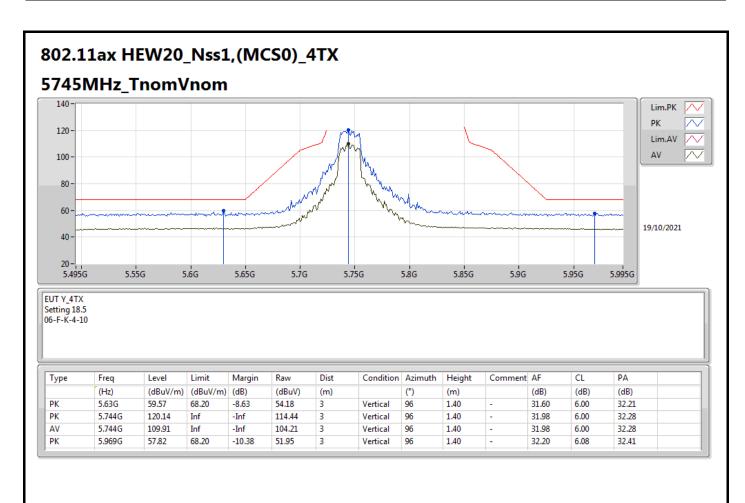
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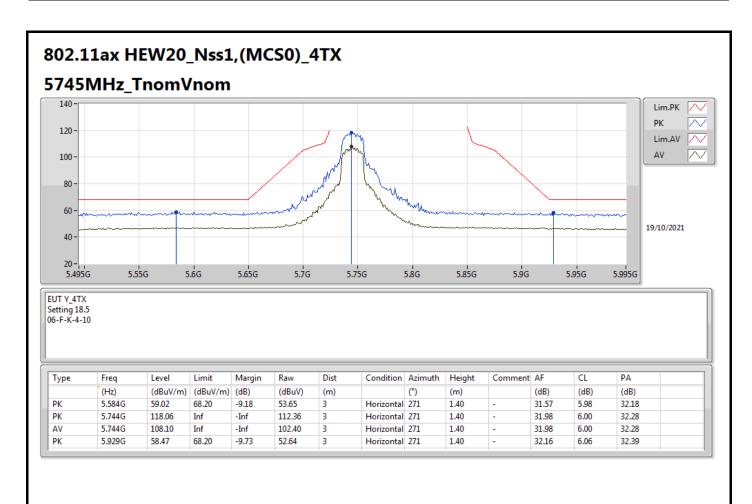
Page No. : 37 of 73 Report No. : FR190215AB





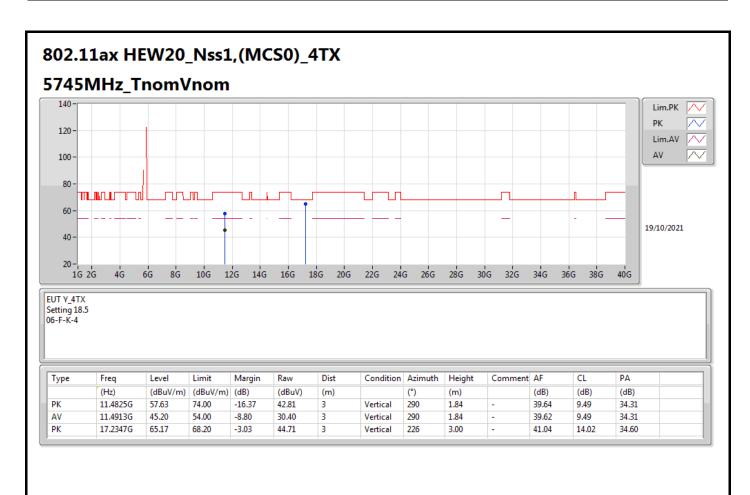
Page No. : 38 of 73 Report No. : FR190215AB





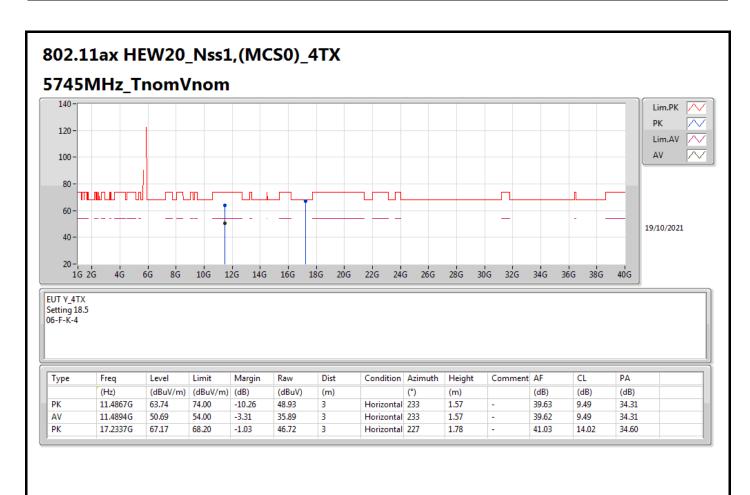
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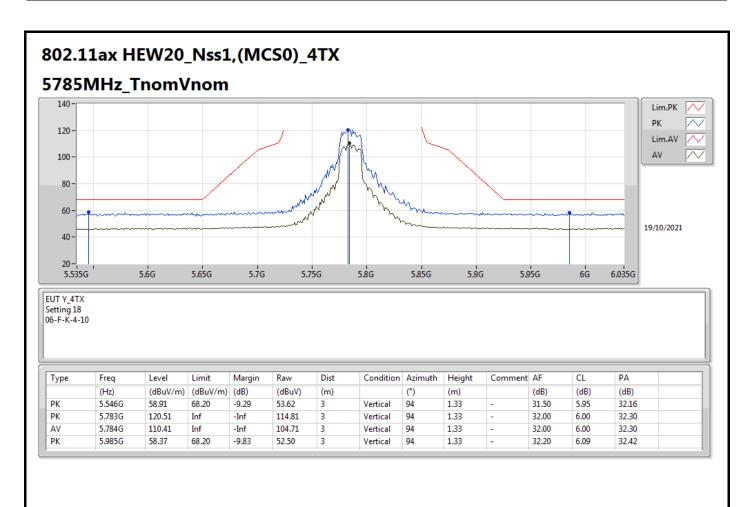
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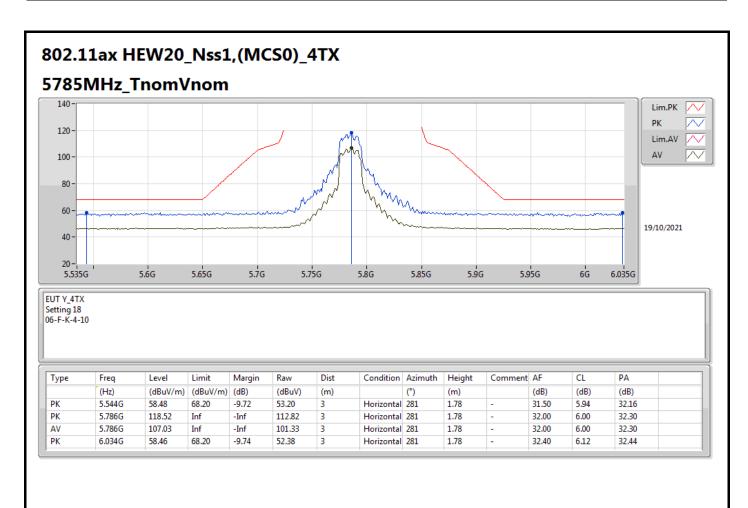
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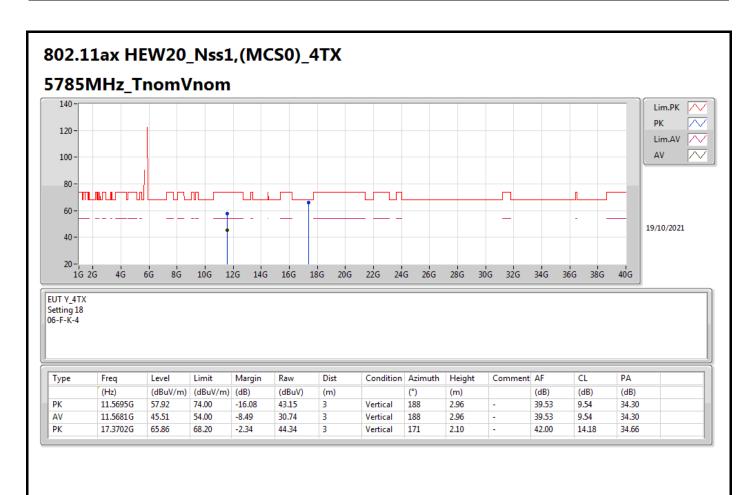
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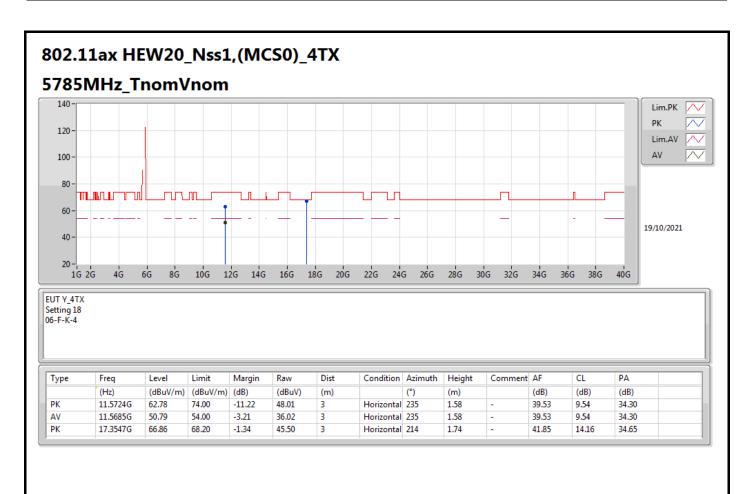
Page No. : 43 of 73 Report No. : FR190215AB





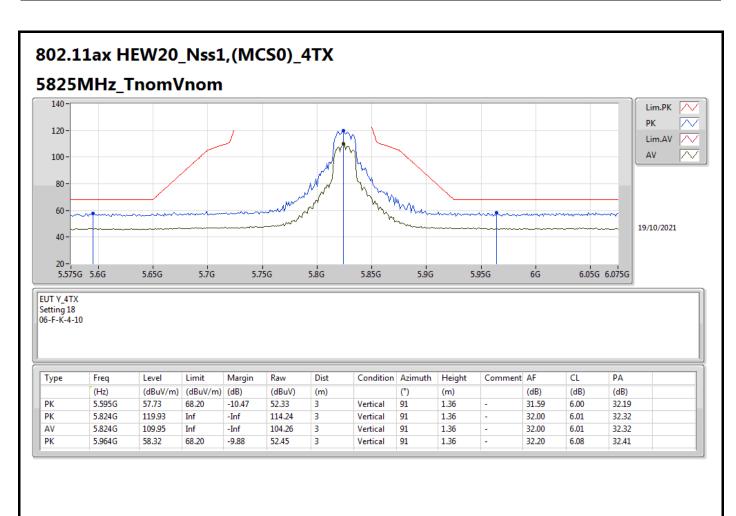
Page No. : 44 of 73 Report No. : FR190215AB





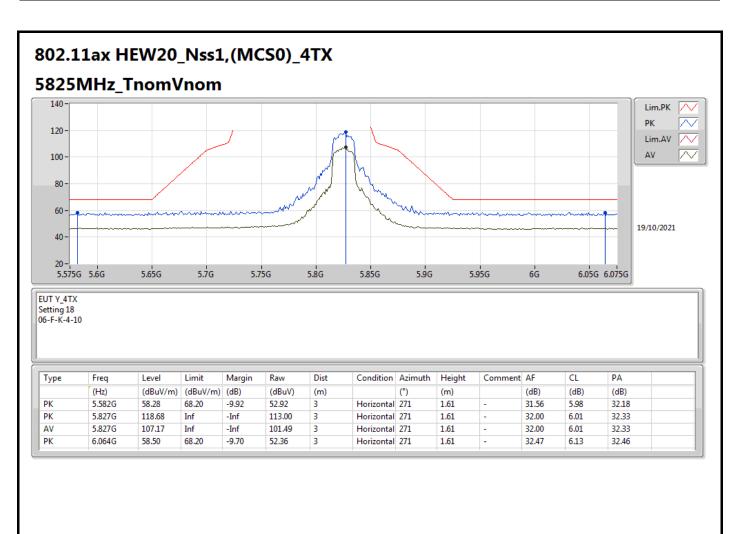
Page No. : 45 of 73 Report No. : FR190215AB





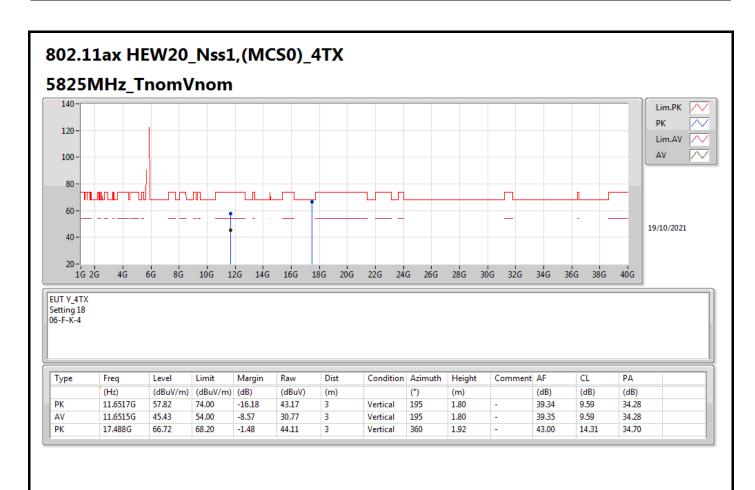
Page No. : 46 of 73 Report No. : FR190215AB





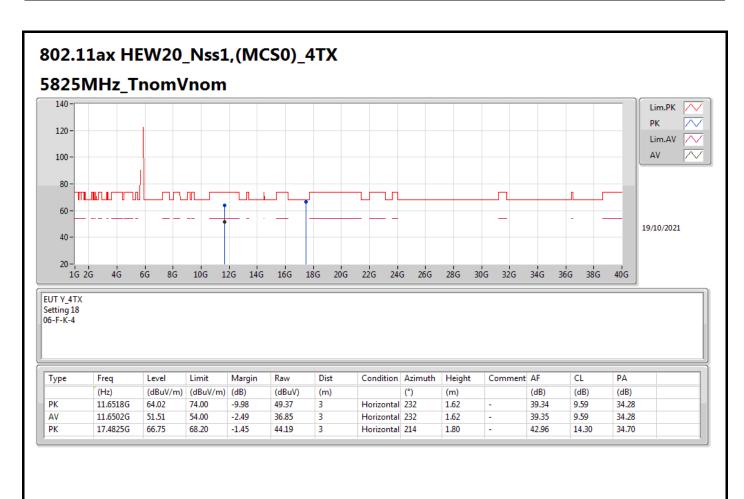
Page No. : 47 of 73 Report No. : FR190215AB





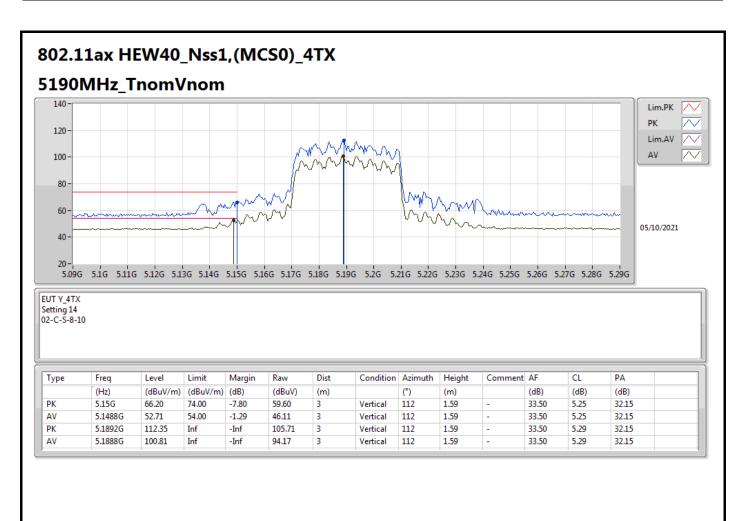
Page No. : 48 of 73 Report No. : FR190215AB





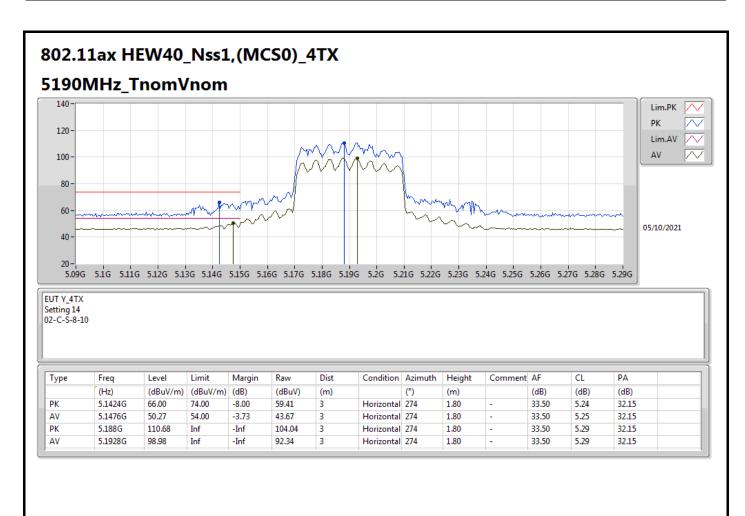
Page No. : 49 of 73 Report No. : FR190215AB





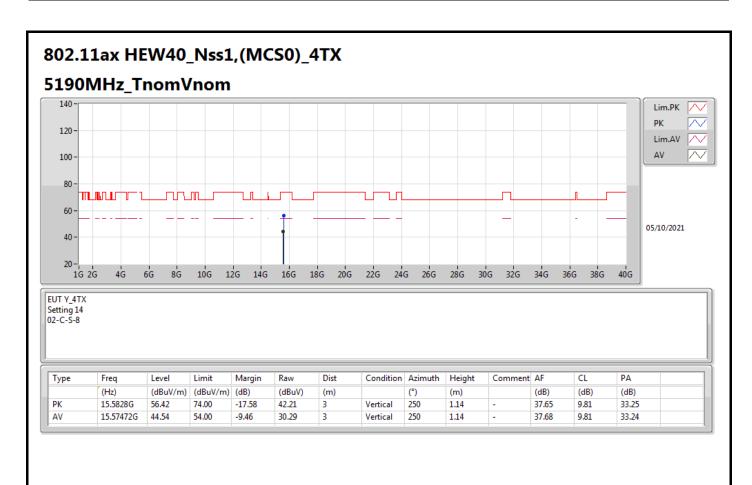
Page No. : 50 of 73 Report No. : FR190215AB





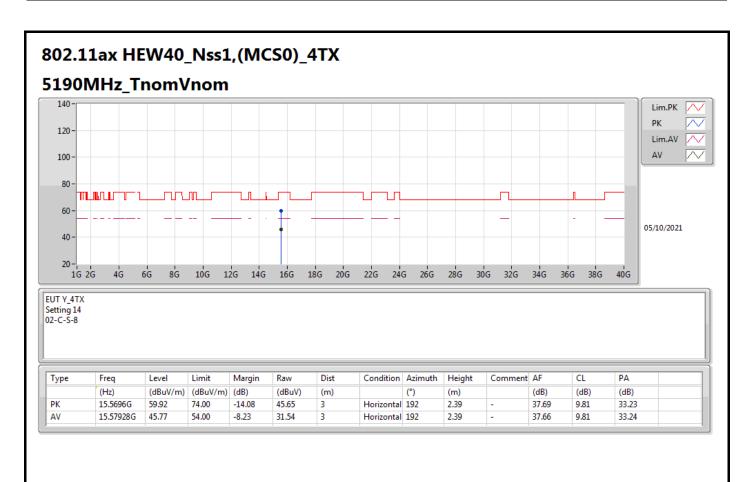
Page No. : 51 of 73 Report No. : FR190215AB





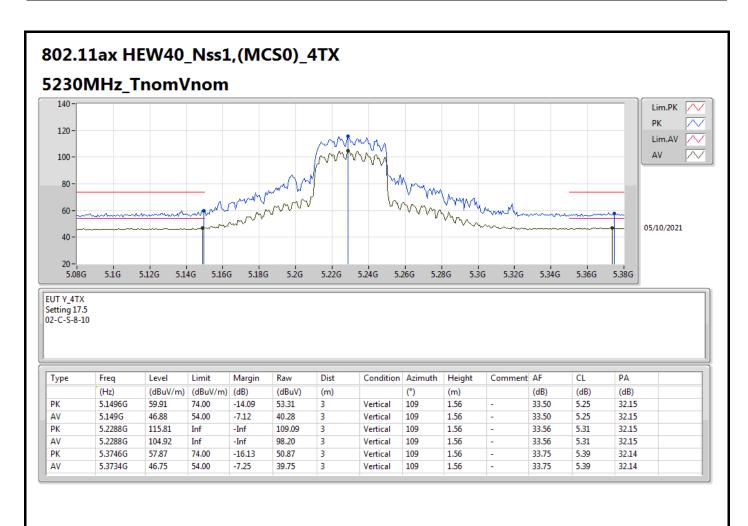
Page No. : 52 of 73 Report No. : FR190215AB





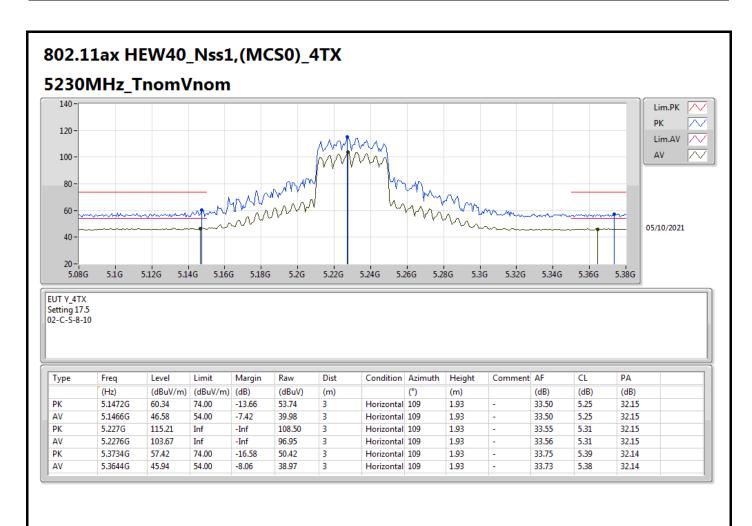
Page No. : 53 of 73 Report No. : FR190215AB





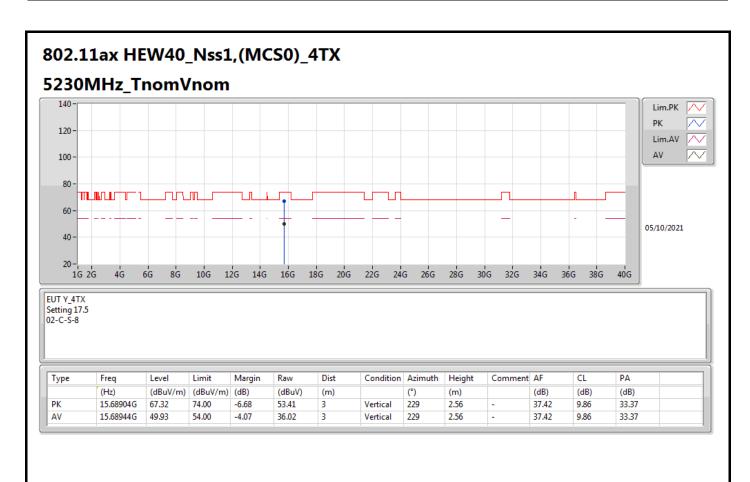
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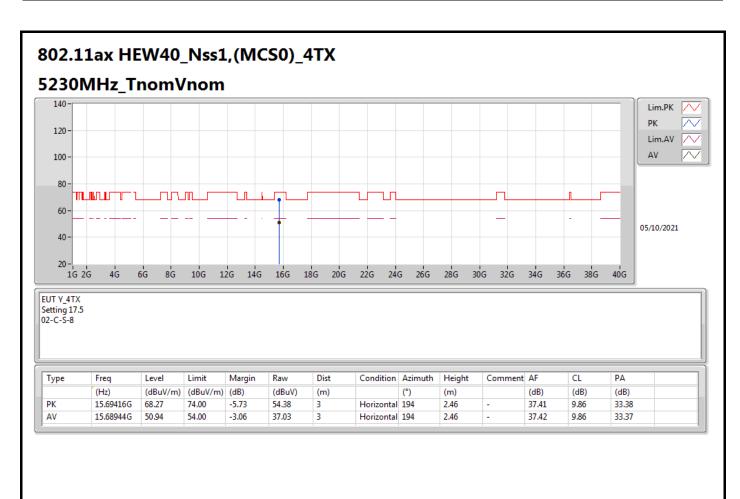
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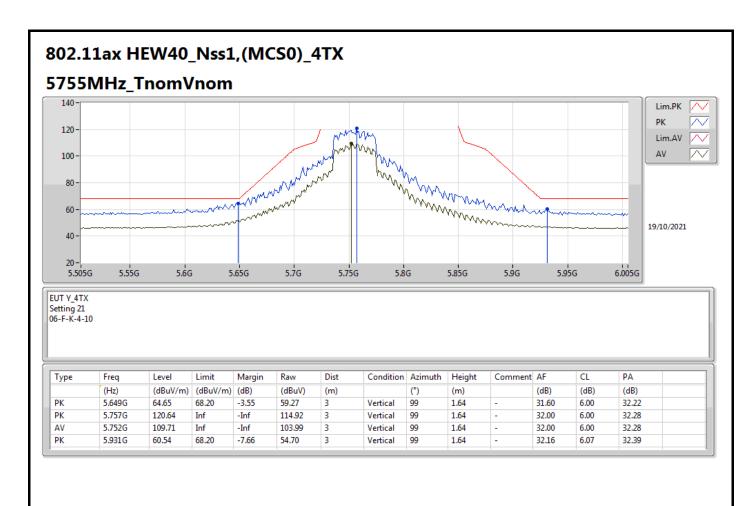
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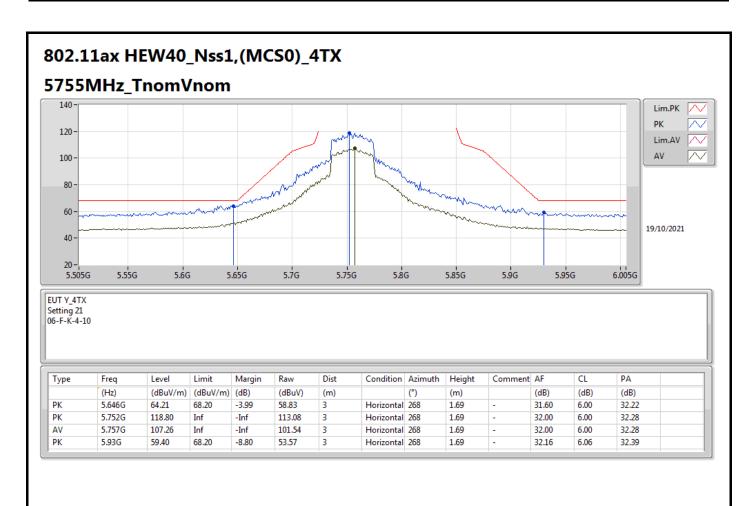
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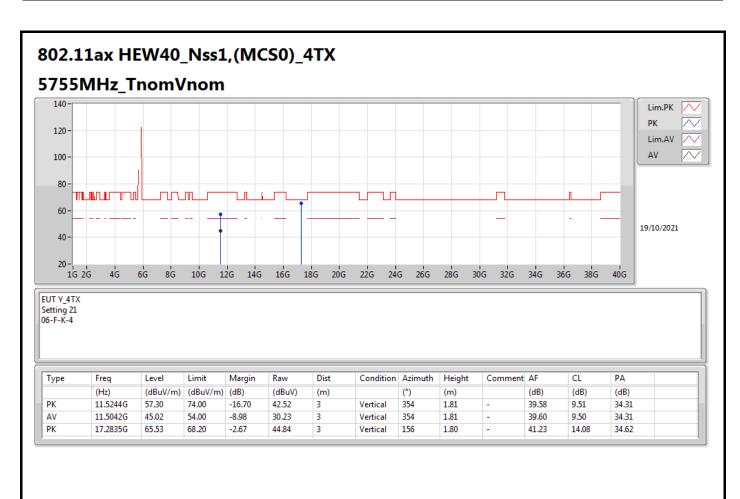
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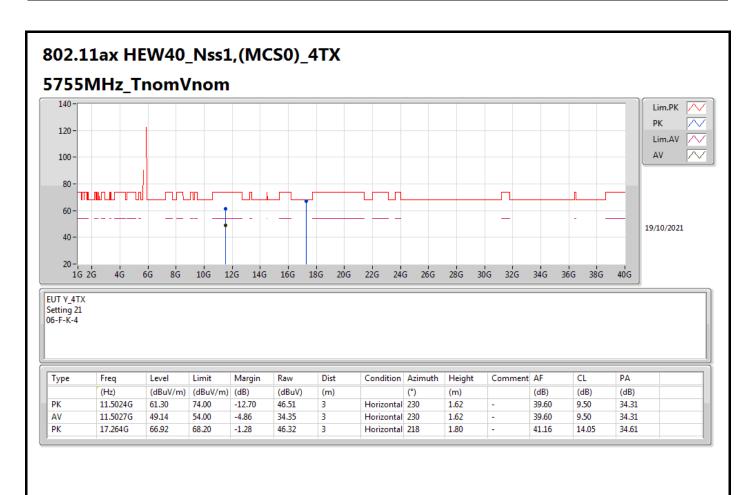
Page No. : 59 of 73 Report No. : FR190215AB





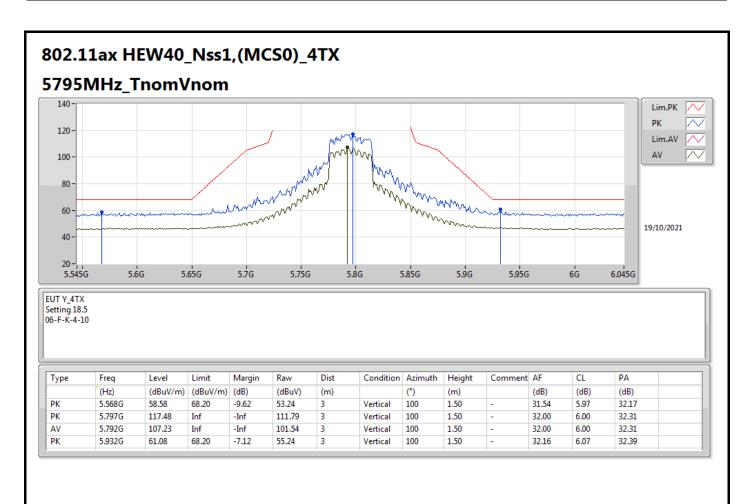
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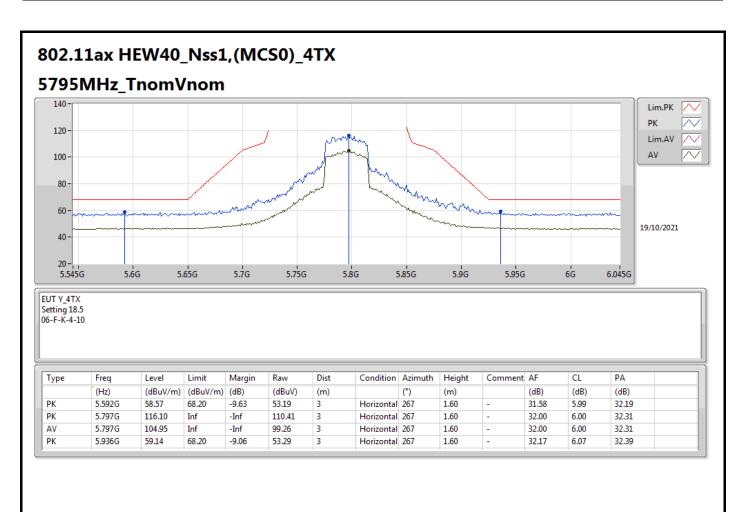
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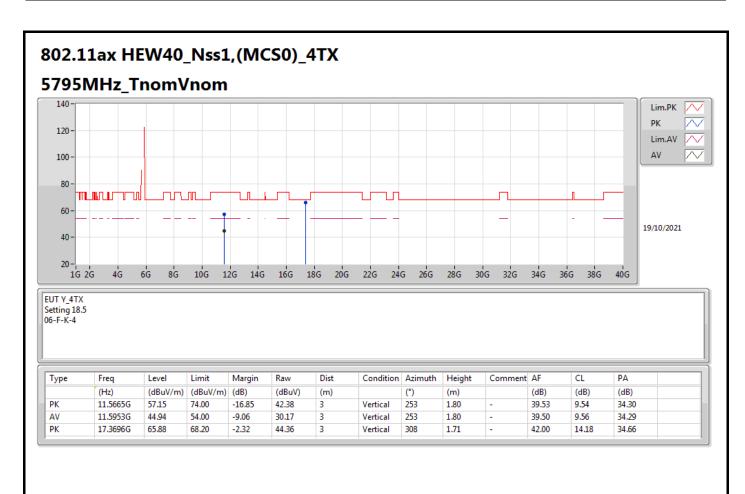
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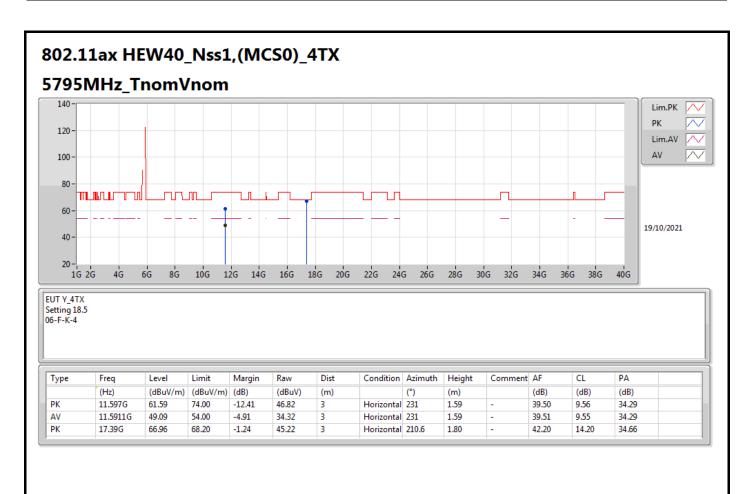
Page No. : 63 of 73 Report No. : FR190215AB





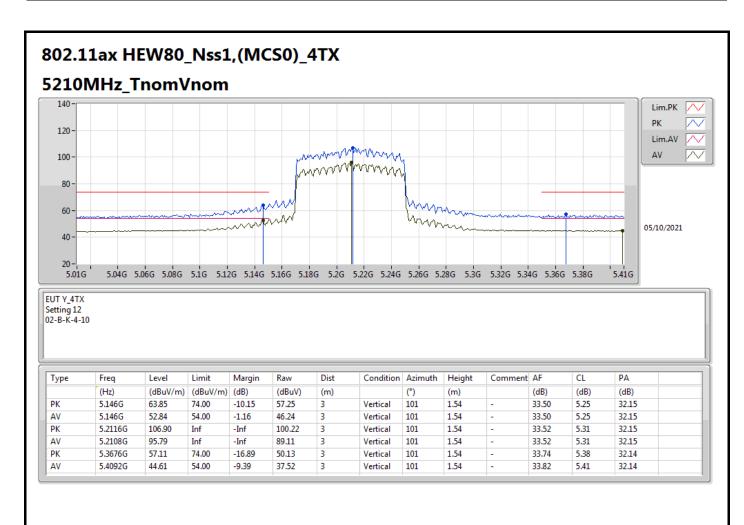
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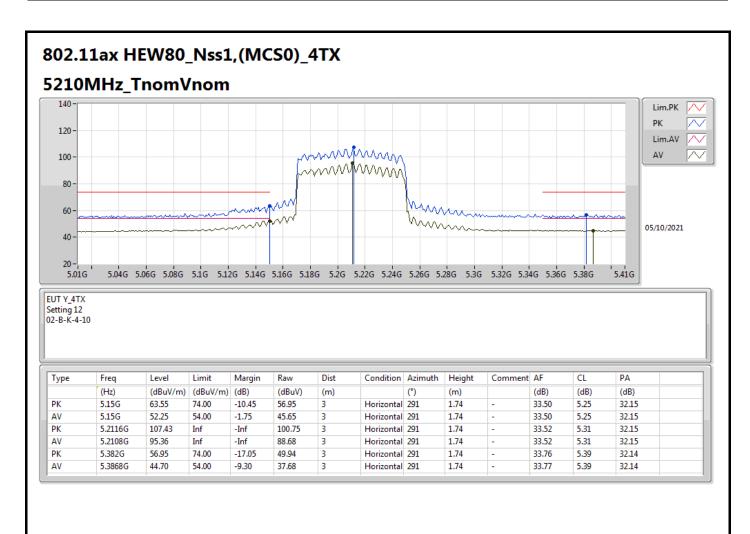
Page No. : 65 of 73 Report No. : FR190215AB





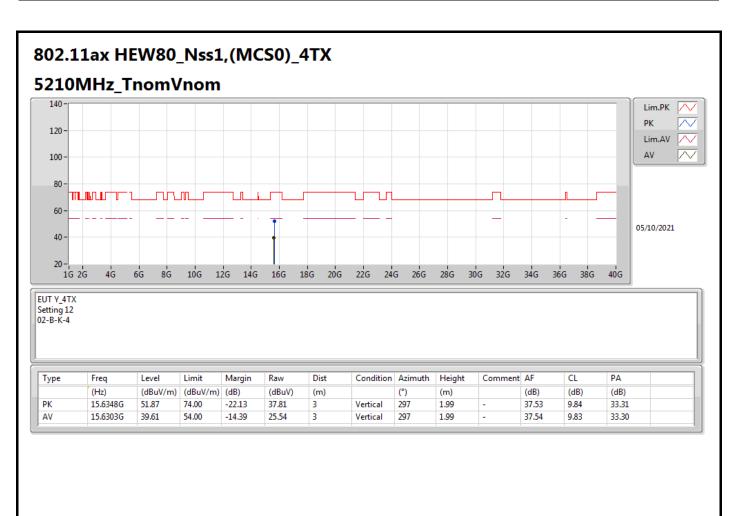
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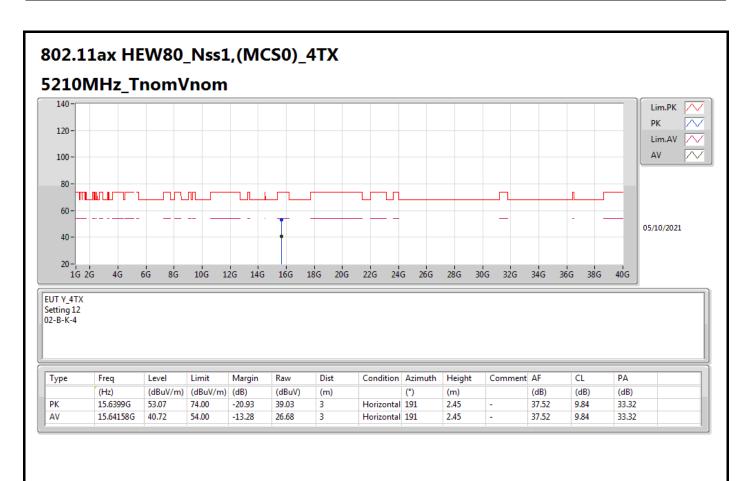
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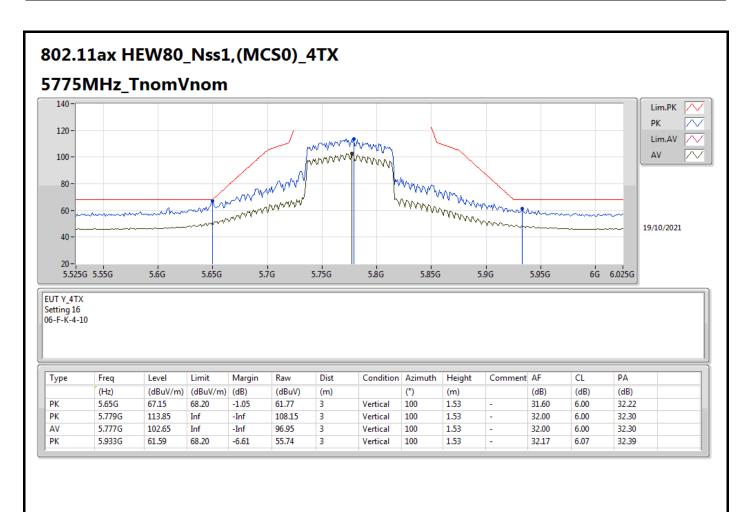
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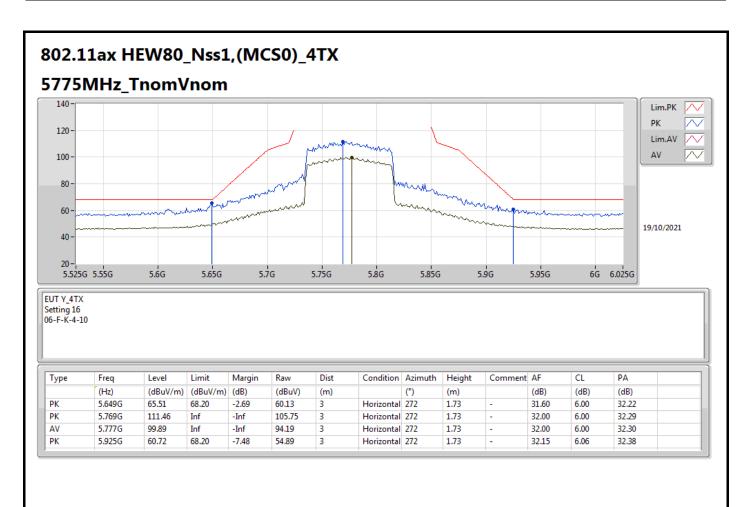
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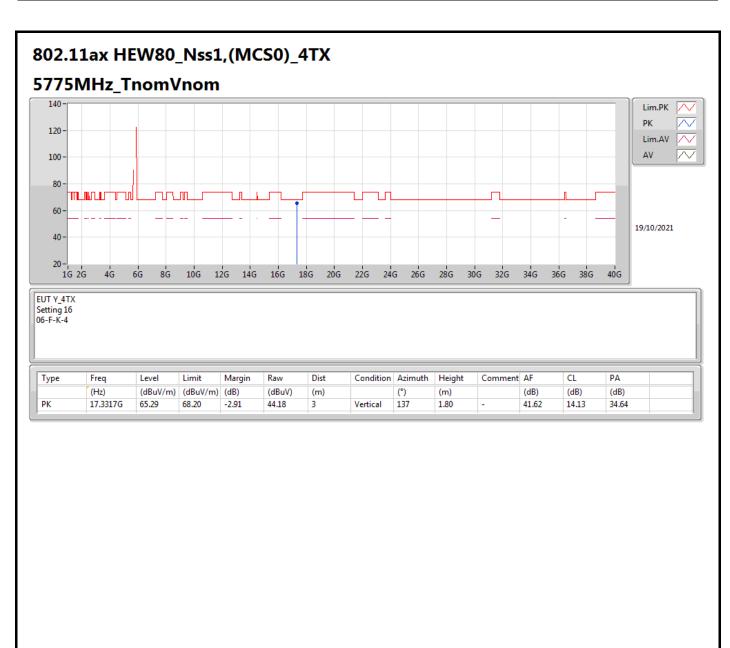
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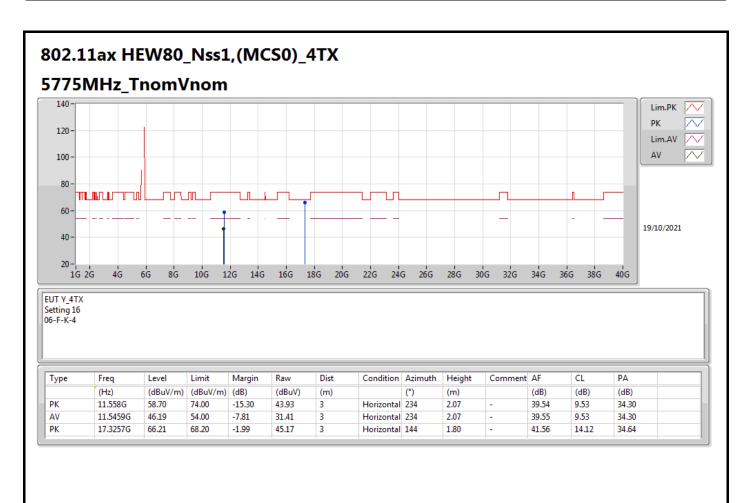
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## Radiated Emissions Co-location

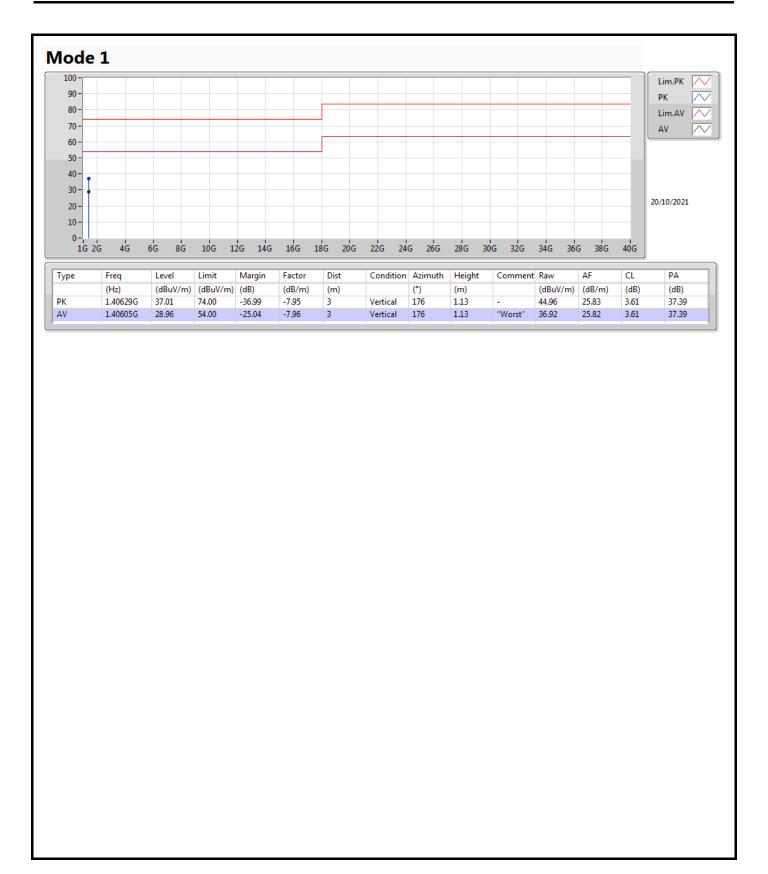
Appendix F

Summary

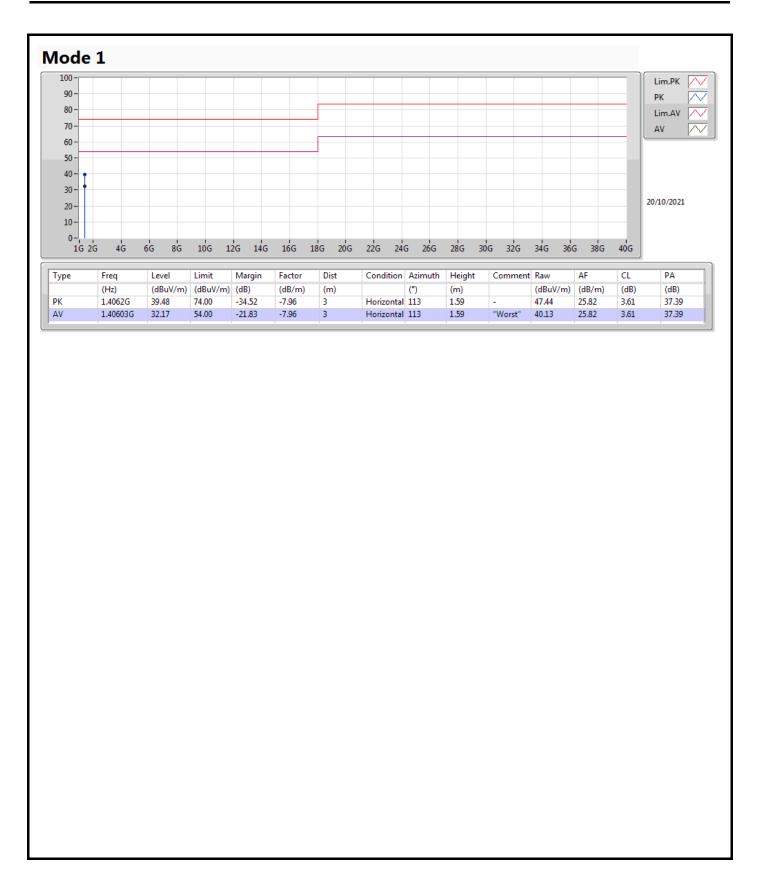
Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	1.40603G	32.17	54.00	-21.83	Horizontal

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