

Report No. : FR112814-03AB



# RADIO TEST REPORT

FCC ID

: O2U-8679

Equipment

: Wireless Access Point

**Brand Name** 

con

**Model Name** 

: CH8679

Applicant

: COMPAL BROADBAND NETWORKS,INC.

13F-1, No.1, Taiyuan 1st St., Zhubei City, Hsinchu

County 30288, Taiwan, R.O.C.

Manufacturer

: COMPAL BROADBAND NETWORKS, INC.

13F-1, No.1, Taiyuan 1st St., Zhubei City, Hsinchu

County 30288, Taiwan, R.O.C.

Standard

: 47 CFR FCC Part 15.407

The product was received on Feb. 03, 2021, and testing was started from Feb. 20, 2021 and completed on Jul. 24, 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: Sam Chen

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

Page Number : 1 of 32

Issued Date : Aug. 18, 2021

Report Version : 01

## **Table of Contents**

Histo	ry of this test report	3
Sumi	mary of Test Result	4
1	General Description	5
1.1	Information	5
1.2	Applicable Standards	8
1.3	Testing Location Information	8
1.4	Measurement Uncertainty	9
2	Test Configuration of EUT	10
2.1	Test Channel Mode	10
2.2	The Worst Case Measurement Configuration	11
2.3	EUT Operation during Test	11
2.4	Accessories	12
2.5	Support Equipment	12
2.6	Test Setup Diagram	13
3	Transmitter Test Result	16
3.1	AC Power-line Conducted Emissions	16
3.2	Emission Bandwidth	18
3.3	Maximum Output Power	19
3.4	Power Spectral Density	21
3.5	Unwanted Emissions	25
4	Test Equipment and Calibration Data	30

Appendix A. Test Results of AC Power-line Conducted Emissions

Appendix B. Test Results of Emission Bandwidth

Appendix C. Test Results of Maximum Output Power

**Appendix D. Test Results of Power Spectral Density** 

**Appendix E. Test Results of Unwanted Emissions** 

**Appendix F. Test Photos** 

Photographs of EUT v01

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

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

Page Number : 2 of 32

Issued Date : Aug. 18, 2021

Report No. : FR112814-03AB

Report Version : 01

# History of this test report

Report No. : FR112814-03AB

Report No.	Version	Description	Issued Date
FR112814-03AB	01	Initial issue of report	Aug. 18, 2021

TEL: 886-3-656-9065 Page Number : 3 of 32
FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## **Summary of Test Result**

Report No.: FR112814-03AB

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	-
Note: Refe	erence to Sport	on Project No.: 112814.		

#### **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: Wendy Pan

TEL: 886-3-656-9065 Page Number : 4 of 32
FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

# **General Description**

#### Information 1.1

### 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	ac (viiioo), ax (iic vvoo)	5775	155 [1]

Report No. : FR112814-03AB

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	802.11ac VHT20	20	4TX
5.15-5.25GHz	802.11ax HEW20	20	4TX
5.15-5.25GHz	802.11n HT40	40	4TX
5.15-5.25GHz	802.11ac VHT40	40	4TX
5.15-5.25GHz	802.11ax HEW40	40	4TX
5.15-5.25GHz	802.11ac VHT80	80	4TX
5.15-5.25GHz	802.11ax HEW80	80	4TX
5.725-5.85GHz	802.11a	20	4TX
5.725-5.85GHz	802.11n HT20	20	4TX
5.725-5.85GHz	802.11ac VHT20	20	4TX
5.725-5.85GHz	802.11ax HEW20	20	4TX
5.725-5.85GHz	802.11n HT40	40	4TX
5.725-5.85GHz	802.11ac VHT40	40	4TX
5.725-5.85GHz	802.11ax HEW40	40	4TX
5.725-5.85GHz	802.11ac VHT80	80	4TX
5.725-5.85GHz	802.11ax HEW80	80	4TX

TEL: 886-3-656-9065 Page Number : 5 of 32 FAX: 886-3-656-9085 : Aug. 18, 2021 Issued Date Report Version : 01

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

#### 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.

Report No.: FR112814-03AB

- ◆ HEW20, HEW40, HEW80 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- BWch is the nominal channel bandwidth.

#### 1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
AIII.	Fort	Brand	Wiodel Name	Antenna Type	Connector	2.4GHz	5GHz
1	1	CBN	CH8679	PCB Dipole	I-Pex	4.0	-
2	2	CBN	CH8679	PCB Dipole	I-Pex	4.0	-
3	3	CBN	CH8679	PCB PIFA	I-Pex	3.2	-
4	4	CBN	CH8679	PCB PIFA	I-Pex	3.1	-
5	1	CBN	CH8679	PCB Dipole	I-Pex	-	3.5
6	2	CBN	CH8679	PCB Dipole	I-Pex	-	3.5
7	3	CBN	CH8679	PCB Dipole	I-Pex	-	4.9
8	4	CBN	CH8679	PCB Dipole	I-Pex	-	5.3

Note: The above information was declared by manufacturer.

#### For 2.4GHz function:

#### For IEEE 802.11b (1TX/1RX):

Only Port 1 can be used as transmitting/receiving.

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

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

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

#### For 5GHz function:

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

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

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

TEL: 886-3-656-9065 Page Number : 6 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.992	0.03	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ax HEW20	0.994	0.03	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ax HEW40	0.989	0.05	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11ax HEW80	0.976	0.11	942.5u	3k

Report No. : FR112814-03AB

NI	$\sim$	t	۵	•
ľ	v	ι	ᆫ	

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

## 1.1.4 EUT Operational Condition

EUT Power Type		From Power Adapter				
Beamforming Function		With beamforming  Without beamforming		Without beamforming		
Function		Outdoor P2M	$\boxtimes$	Indoor P2M		
T dilotion		Fixed P2P		Client		
Test Software Version		DUT GUI V610.32				
Serial Number		520281028900069201120301				

Note: The above information was declared by manufacturer.

TEL: 886-3-656-9065 Page Number : 7 of 32
FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 1.2 Applicable Standards

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

Report No.: FR112814-03AB

- 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

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	TH03-CB	Owen Hsu	23.7-25.5 / 54-55	Feb. 25, 2021~ Mar. 11, 2021
Radiated<1GHz	10CH01-CB	Zack Kuo	25~27 / 58~59	Jul. 12, 2021
Radiated > 1GHz	03CH02-CB	20.4-21.	20.4-21.4 / 55-57	Feb. 20, 2021~
radiated > TOTIZ	03CH04-CB	Brace rang	20.8-22 / 55-58	Mar. 24, 2021
AC Conduction	CO01-CB	Wei Li	22~23 / 54~57	Jul. 09, 2021

TEL: 886-3-656-9065 Page Number : 8 of 32
FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 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)

Report No.: FR112814-03AB

Test Date: Before May 08, 2021

Test Items	Uncertainty	Remark
Radiated Emission (1GHz ~ 18GHz)	5.0 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.9 dB	Confidence levels of 95%
Conducted Emission	2.8 dB	Confidence levels of 95%
Output Power Measurement	1.4 dB	Confidence levels of 95%
Power Density Measurement	2.8 dB	Confidence levels of 95%
Bandwidth Measurement	0.4%	Confidence levels of 95%

Test Date: After May 07, 2021

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.2 dB	Confidence levels of 95%

TEL: 886-3-656-9065 Page Number : 9 of 32
FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

# 2 Test Configuration of EUT

## 2.1 Test Channel Mode

Mode	Power Setting
802.11a_Nss1,(6Mbps)_4TX	-
5180MHz	19.5
5200MHz	19.5
5240MHz	19.5
5745MHz	24.5
5785MHz	24.5
5825MHz	25
802.11ax HEW20_Nss1,(MCS0)_4TX	-
5180MHz	19
5200MHz	20
5240MHz	20
5745MHz	24.5
5785MHz	24.5
5825MHz	24.5
802.11ax HEW40_Nss1,(MCS0)_4TX	-
5190MHz	15.5
5230MHz	23
5755MHz	24
5795MHz	24.5
802.11ax HEW80_Nss1,(MCS0)_4TX	-
5210MHz	14
5775MHz	21

Report No.: FR112814-03AB

#### Note:

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

TEL: 886-3-656-9065 Page Number : 10 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item AC power-line conducted emissions		
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz	
Operating Mode	Normal Link	
1	EUT + adapter	

Report No.: FR112814-03AB

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

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.	
Operating Mode < 1GHz	Normal Link	
1	EUT + adapter	
Operating Mode > 1GHz	CTX	

The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation		
Operating Mode		
1	WLAN 2.4GHz+WLAN 5GHz	
Refer to Sporton Test Report No.: FA112814-03 for Co-location RF Exposure Evaluation.		

Note: The EUT can only be used in Y-axis position.

## 2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

TEL: 886-3-656-9065 Page Number : 11 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 2.4 Accessories

		Accessories	
Equipment Name	Brand Name	Model Name	Rating
Adapter	Frecom	F42L1-120350SPAU	Input: 100-240V~50/60Hz, 1.4A Output: 12V, 3.5A
Other			
RJ-45 cable*1, Non-shielded, 1.5m			
Cradle*1			

Report No. : FR112814-03AB

## 2.5 Support Equipment

For AC Conduction and Radiated (below 1GHz)::

		Support Eq	uipment	
No.	Equipment	Brand Name	Model Name	FCC ID
Α	2.5G PC	DELL	T3400	N/A
В	Phone	SAMPO	HT-B 907WL	N/A
С	Phone	SAMPO	HT-B 907WL	N/A
D	2.4G NB	DELL	E6430	N/A
Е	5G NB	DELL	E6430	N/A
F	LAN NB	DELL	E6430	N/A
G	Flash disk3.0	Transcend	JetFlash-700	N/A
I	СО	CASA	C2200	N/A
Η	CO NB	Lenovo	R400	N/A

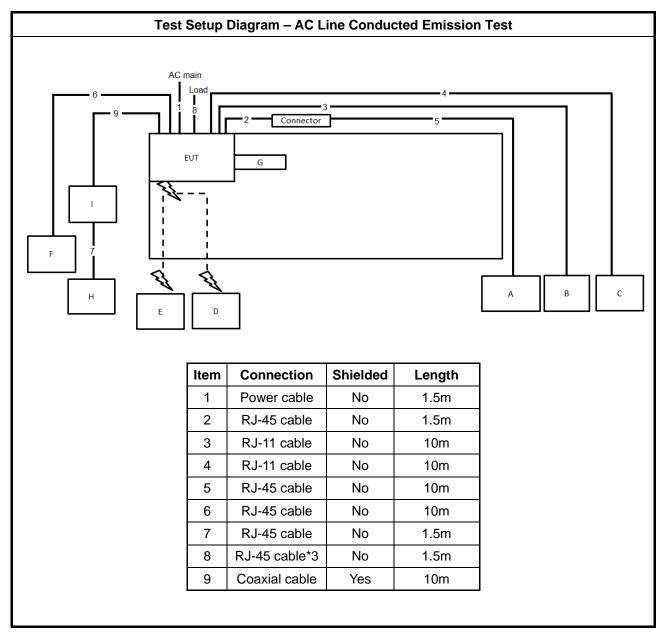
For Radiated (above 1GHz) and RF Conducted:

1011	adiated (above 10112) at	ia iti oonaaotoa.		
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
Α	Notebook (LAN)	DELL	E4300	N/A

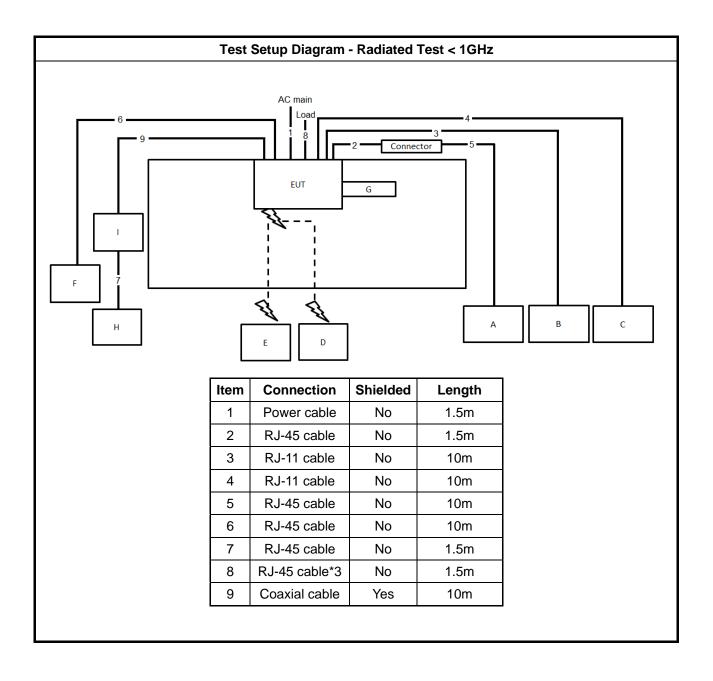
TEL: 886-3-656-9065 Page Number : 12 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021



## 2.6 Test Setup Diagram



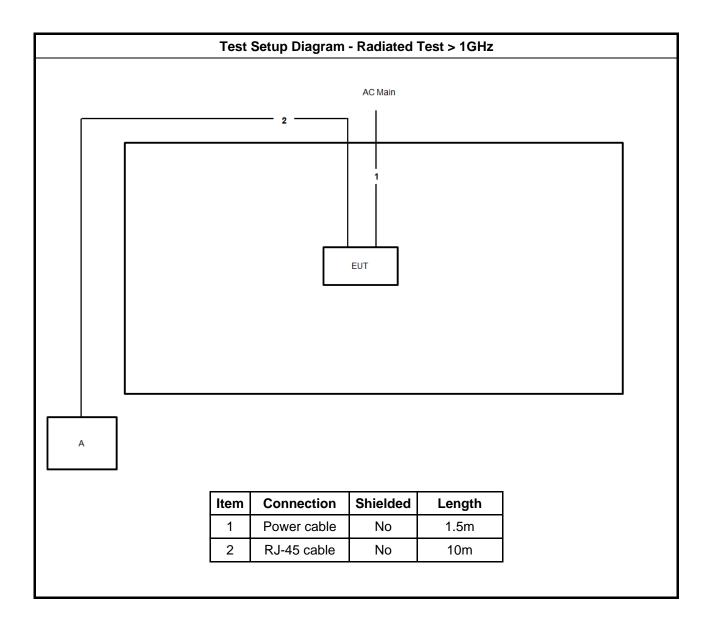
TEL: 886-3-656-9065 Page Number : 13 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021



 TEL: 886-3-656-9065
 Page Number
 : 14 of 32

 FAX: 886-3-656-9085
 Issued Date
 : Aug. 18, 2021

Report No.: FR112814-03AB



TEL: 886-3-656-9065 Page Number : 15 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 3 Transmitter Test Result

## 3.1 AC Power-line Conducted Emissions

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

AC Pow	er-line Conducted Emissions L	_imit
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.		

Report No.: FR112814-03AB

### 3.1.2 Measuring Instruments

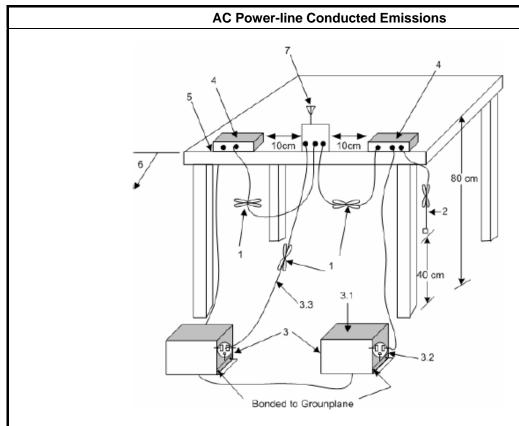
Refer a test equipment and calibration data table in this test report.

#### 3.1.3 Test Procedures

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

TEL: 886-3-656-9065 Page Number : 16 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 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.

Report No.: FR112814-03AB

- 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

TEL: 886-3-656-9065 Page Number : 17 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

	Emission Bandwidth Limit
UNI	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.

Report No.: FR112814-03AB

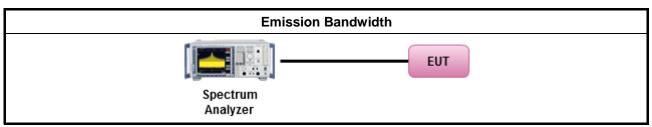
## 3.2.2 Measuring Instruments

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

TEL: 886-3-656-9065 Page Number : 18 of 32
FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

## 3.3 Maximum Output Power

### 3.3.1 Limit

	Maximum Output Power Limit
UN	I 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 ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$
	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 $P_{Out} = 30 - (G_{TX} - 23)$ .
	• Mobile or Portable Client: the maximum conducted output power (P <sub>Out</sub> ) shall not exceed the lesse of 250 mW. If G <sub>TX</sub> > 6 dBi, then P <sub>Out</sub> = 24 – (G <sub>TX</sub> – 6).
	For the 5.25-5.35 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser o 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX}$ > 6 dBi, ther $P_{Out}$ = 24 – ( $G_{TX}$ – 6).
	For the 5.47-5.725 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesse 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:
	<ul> <li>Indoor AP &amp; subordinate device &lt; 36 dBm</li> </ul>
	■ 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 $1.0~\rm W$ o $17+10~\rm log$ 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>
	<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>

Report No. : FR112814-03AB

 TEL: 886-3-656-9065
 Page Number
 : 19 of 32

 FAX: 886-3-656-9085
 Issued Date
 : Aug. 18, 2021

Report No.: FR112814-03AB

 $\mathbf{P}_{\text{Out}}$  = maximum conducted output power in dBm,

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

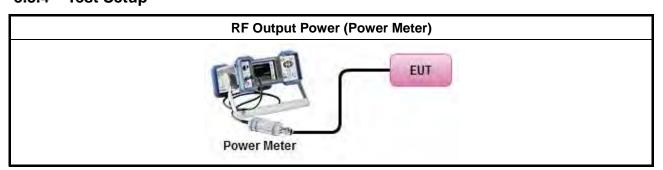
### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

	Test Method							
-	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

TEL: 886-3-656-9065 Page Number : 20 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

# 3.4 Power Spectral Density

## 3.4.1 Limit

	Peak Power Spectral Density Limit							
UNI	UNII 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 $P_{Out} = 17 - (G_{TX} - 23)$ .							
	<ul> <li>Mobile or Portable Client: the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G<sub>TX</sub> &gt; 6 dBi, then PPSD= 11 - (G<sub>TX</sub> - 6)</li> </ul>							
	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-	LAN 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) ≤ 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	SD = neak nower spectral density that he same method as used to determine the conducted output							

Report No. : FR112814-03AB

 TEL: 886-3-656-9065
 Page Number : 21 of 32

 FAX: 886-3-656-9085
 Issued Date : Aug. 18, 2021

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.

Report No.: FR112814-03AB

## 3.4.2 Measuring Instruments

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

TEL: 886-3-656-9065 Page Number : 22 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

### 3.4.3 Test Procedures

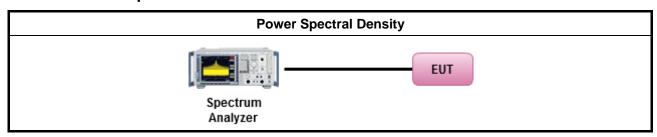
		Test Method						
•	outp func	k power spectral density procedures that the same method as used to determine the conducted out power shall be used to determine the peak power spectral density and use the peak search tion on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density I 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	y cycle ≥ 98% or external video / power trigger]						
	$\boxtimes$	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 $						

Report No. : FR112814-03AB

 TEL: 886-3-656-9065
 Page Number
 : 23 of 32

 FAX: 886-3-656-9085
 Issued Date
 : Aug. 18, 2021

## 3.4.4 Test Setup



Report No. : FR112814-03AB

## 3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

TEL: 886-3-656-9065 Page Number : 24 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

#### 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					

Report No.: FR112814-03AB

- 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.

TEL: 886-3-656-9065 Page Number : 25 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

	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 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. (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 5.725 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

Report No.: FR112814-03AB

## 3.5.2 Measuring Instruments

measurements).

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

TEL: 886-3-656-9065 Page Number : 26 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

#### 3.5.3 Test Procedures

#### **Test Method**

Report No.: FR112814-03AB

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

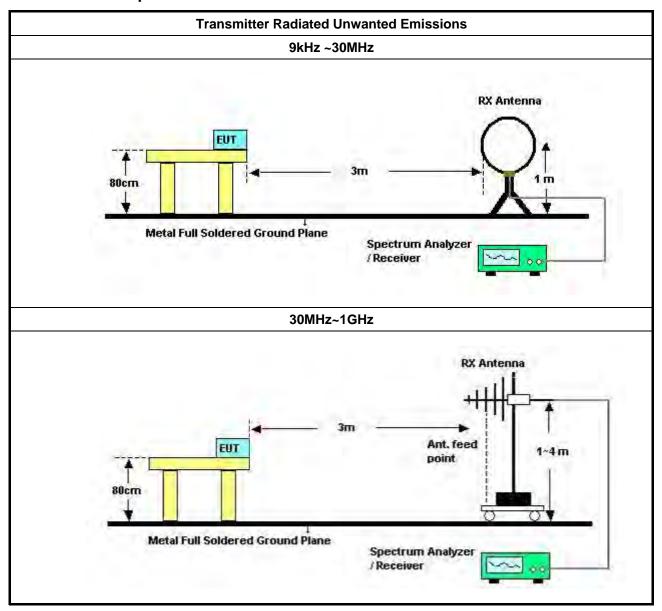
TEL: 886-3-656-9065 Page Number : 27 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

Report Version : 01

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

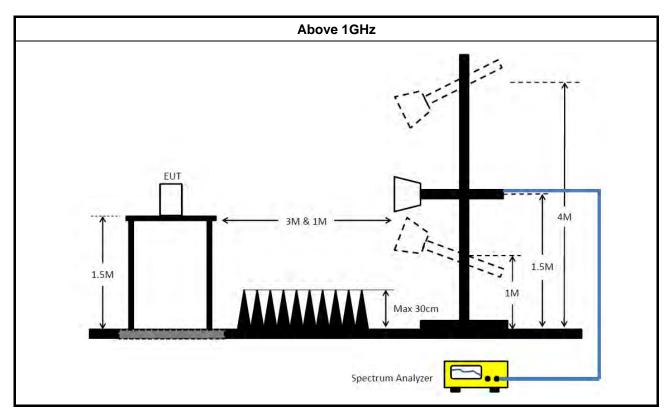


## 3.5.4 Test Setup



TEL: 886-3-656-9065 Page Number : 28 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

Report No.: FR112814-03AB



#### 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

TEL: 886-3-656-9065 Page Number : 29 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

# 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)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 14, 2021	Apr. 13, 2022	Radiation (10CH01-CB)
10m Semi Anechoic Chamber NSA	TDK	SAC-10M	10CH01-CB	30MHz~1GHz 10m,3m	Jan. 28, 2021	Jan. 27, 2022	Radiation (10CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10783	9kHz ~ 1.3GHz	Mar. 11, 2021	Mar. 10, 2022	Radiation (10CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10784	9kHz ~ 1.3GHz	Mar. 11, 2021	Mar. 10, 2022	Radiation (10CH01-CB)
Low Cable	Woken	SUCOFLEX 104	low cable-01	25MHz ~ 1GHz	Oct. 20, 2020	Oct. 19, 2021	Radiation (10CH01-CB)
High Cable	Woken	SUCOFLEX 104	low cable-02	25MHz ~ 1GHz	Oct. 20, 2020	Oct. 19, 2021	Radiation (10CH01-CB)
Bilog Antenna with 6dB Attenator	Chase & EMCI	CBL6111A &N-6-06	1543 &AT-N0609	30MHz ~ 1GHz	Jul. 01, 2021	Jun. 30, 2022	Radiation (10CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	May 05, 2021	May 04, 2022	Radiation (10CH01-CB)
Spectrum Analyzer	Rohde&Schwa rz	FSV30	101026	9kHz ~ 30GHz	Mar. 08, 2021	Mar. 07, 2022	Radiation (10CH01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (10CH01-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH04-CB	1GHz ~18GHz 3m	Feb. 26, 2020	Feb. 25, 2021	Radiation (03CH04-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH04-CB	1GHz ~18GHz 3m	Feb. 25, 2021	Feb. 24, 2022	Radiation (03CH04-CB)
Horn Antenna	ETS · Lindgren	3115	00143147	750MHz~18GH z	Oct. 23, 2020	Oct. 22, 2021	Radiation (03CH04-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2020	Jul. 20, 2021	Radiation (03CH04-CB)

Report No. : FR112814-03AB

TEL: 886-3-656-9065 Page Number : 30 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

RF Cable-high

Woken

RG402

Calibration Calibration Instrument Brand Model No. Serial No. Characteristics Remark Date **Due Date** Radiation 0.5GHz ~ Pre-Amplifier Agilent 83017A MY53270063 Jul. 14, 2020 Jul. 13, 2021 26.5GHz (03CH04-CB) TTA1840-35-H Radiation Pre-Amplifier **MITEQ** 1864479 18GHz ~ 40GHz Jul. 08, 2020 Jul. 07, 2021 G (03CH04-CB) Spectrum Radiation FSP40 100142 9kHz~40GHz Feb. 19, 2021 R&S Feb. 18, 2022 Analyzer (03CH04-CB Radiation RF Cable-high RG402 High Cable-21 1GHz - 18GHz Oct. 05, 2020 Oct. 04, 2021 Woken (03CH04-CB) Hiah Radiation 1GHz - 18GHz RF Cable-high Woken RG402 Nov. 05, 2020 Nov. 04, 2021 Cable-21+67 (03CH04-CB) 18GHz ~ 40 High Radiation RF Cable-high Jul. 16, 2020 Jul. 15, 2021 Woken RG402 (03CH04-CB) Cable-40G#1 GHz High 18GHz ~ 40 Radiation RF Cable-high RG402 Jul. 16, 2020 Jul. 15, 2021 Woken (03CH04-CB) Cable-40G#2 GH<sub>2</sub> Radiation Test Software **SPORTON** SENSE V5.10 N.C.R. N.C.R. (03CH04-CB) 3m Semi Anechoic 1GHz ~18GHz Radiation SAC-3M RIKEN 03CH02-CB Mar. 28, 2020 Mar. 27, 2021 Chamber (03CH02-CB) **VSWR** Radiation 9610-4976 1GHz ~ 18GHz Horn Antenna **EMCO** 3115 Apr. 21, 2020 Apr. 20, 2021 (03CH02-CB) Radiation **BBHA 9170** BBHA9170252 15GHz ~ 40GHz Jul. 21, 2020 Jul. 20, 2021 Horn Antenna Schwarzbeck (03CH02-CB) 1GHz ~ Radiation Pre-Amplifier Agilent 83017A MY39501305 Jul. 13, 2020 Jul. 12, 2021 26.5GHz (03CH02-CB) Radiation TTA1840-35-H Pre-Amplifier MITEQ 1864479 18GHz ~ 40GHz Jul. 08, 2020 Jul. 07, 2021 G (03CH02-CB) Spectrum Radiation R&S **FSU** 100015 9kHz~26GHz Oct. 15, 2020 Oct. 14, 2021 (03CH02-CB) analyzer Radiation RG402 High Cable-18 1GHz ~ 18GHz Oct. 05, 2020 Oct. 04, 2021 RF Cable-high Woken (03CH02-CB) Radiation High RG402 1GHz ~ 18GHz Oct. 05, 2020 Oct. 04, 2021 RF Cable-high Woken Cable-18+19 (03CH02-CB) 18GHz ~ 40 High Radiation RF Cable-high Jul. 16, 2020 Jul. 15, 2021 Woken RG402 (03CH02-CB) Cable-40G#1 GHz 18GHz ~ 40 High Radiation RF Cable-high Woken RG402 Jul. 16, 2020 Jul. 15, 2021 (03CH02-CB) Cable-40G#2 GH<sub>2</sub> Spectrum Conducted R&S FSV40 101028 9kHz~40GHz Dec. 31, 2020 Dec. 30, 2021 analyzer (TH03-CB) 300MHz~40GH Conducted Power Sensor Anritsu MA2411B 1726195 Aug. 17, 2020 Aug. 16, 2021 z (TH03-CB) 300MHz~40GH Conducted Power Meter Anritsu ML2495A 1035008 Aug. 17, 2020 Aug. 16, 2021 (TH03-CB) Conducted

Report No.: FR112814-03AB

TEL: 886-3-656-9065 Page Number : 31 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021

1 GHz -18 GHz

Oct. 05, 2020

Oct. 04, 2021

(TH03-CB)

Report Template No.: CB-A12\_1 Ver1.4 Report Version : 01

High Cable-11

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-12	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-13	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz –18 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)

Report No. : FR112814-03AB

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

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

TEL: 886-3-656-9065 Page Number : 32 of 32 FAX: 886-3-656-9085 Issued Date : Aug. 18, 2021



## **Conducted Emissions at Powerline**

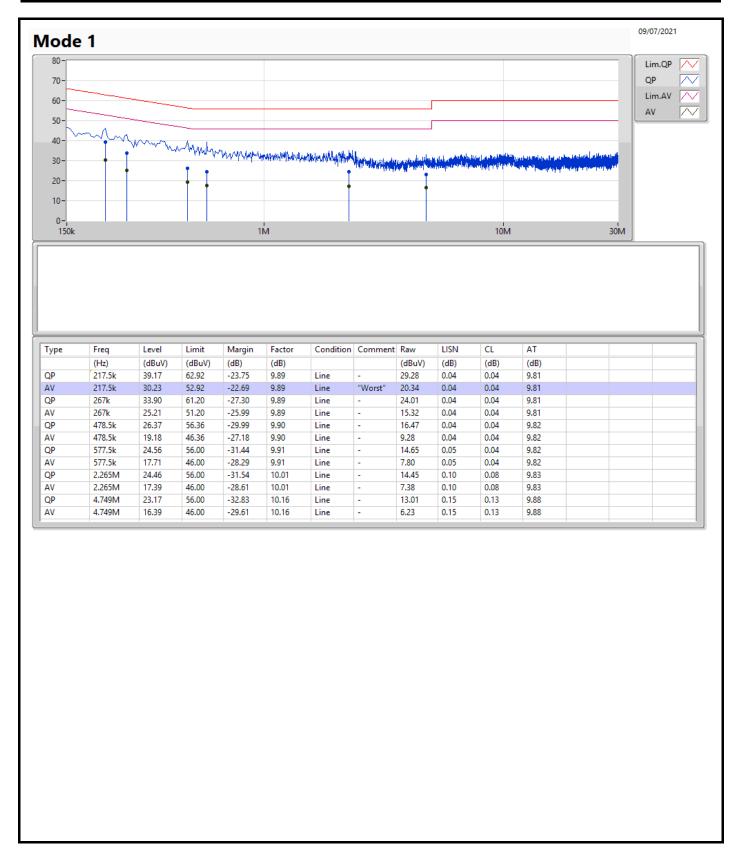
Appendix A

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	163.5k	42.71	65.27	-22.56	Neutral

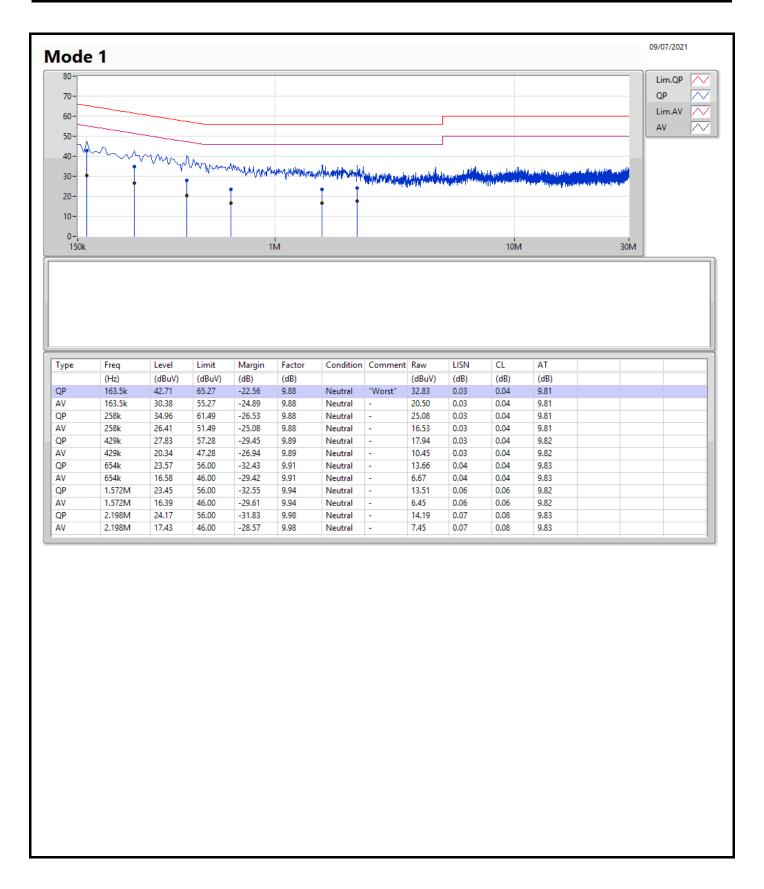
Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 3





Page No. : 2 of 3





Page No. : 3 of 3



EBW Appendix B

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	27.27M	17.181M	17M2D1D	23.1M	16.732M
802.11ax HEW20_Nss1,(MCS0)_4TX	25.05M	19.19M	19M2D1D	23.34M	19.13M
802.11ax HEW40_Nss1,(MCS0)_4TX	46.86M	38.201M	38M2D1D	43.92M	38.081M
802.11ax HEW80_Nss1,(MCS0)_4TX	90M	77.961M	78M0D1D	87.84M	77.721M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	16.35M	26.147M	26M1D1D	16.29M	18.651M
802.11ax HEW20_Nss1,(MCS0)_4TX	18.99M	24.378M	24M4D1D	18.78M	19.67M
802.11ax HEW40_Nss1,(MCS0)_4TX	38.04M	45.037M	45M0D1D	37.74M	38.441M
802.11ax HEW80_Nss1,(MCS0)_4TX	78.12M	77.841M	77M8D1D	77.64M	77.721M

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

**Max-OBW** = Maximum99% 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;

Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 11



#### Result

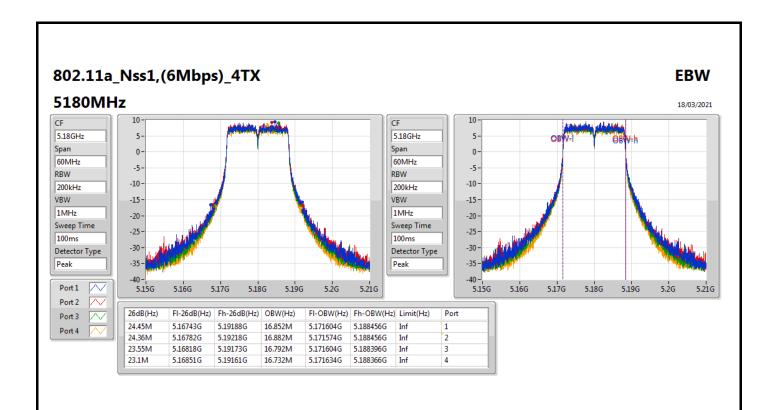
Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	24.45M	16.852M	24.36M	16.882M	23.55M	16.792M	23.1M	16.732M
5200MHz	Pass	Inf	26.64M	17.181M	25.5M	17.121M	26.49M	17.061M	25.86M	17.001M
5240MHz	Pass	Inf	27.27M	17.151M	25.83M	17.121M	26.55M	17.031M	26.28M	17.001M
5745MHz	Pass	500k	16.35M	20.06M	16.32M	22.519M	16.35M	18.651M	16.32M	20.54M
5785MHz	Pass	500k	16.35M	19.7M	16.32M	22.279M	16.35M	19.07M	16.35M	22.369M
5825MHz	Pass	500k	16.29M	22.909M	16.35M	26.147M	16.35M	21.829M	16.29M	23.118M
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5180MHz	Pass	Inf	25.05M	19.19M	23.88M	19.16M	23.43M	19.13M	24.75M	19.16M
5200MHz	Pass	Inf	24.93M	19.19M	23.94M	19.19M	24M	19.16M	23.7M	19.16M
5240MHz	Pass	Inf	24.78M	19.19M	23.58M	19.16M	23.34M	19.13M	24.51M	19.16M
5745MHz	Pass	500k	18.87M	20.84M	18.84M	23.178M	18.96M	19.73M	18.99M	21.259M
5785MHz	Pass	500k	18.96M	20.21M	18.78M	22.999M	18.99M	19.67M	18.9M	22.579M
5825MHz	Pass	500k	18.96M	20.84M	18.9M	24.378M	18.96M	19.91M	18.93M	22.759M
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5190MHz	Pass	Inf	45.66M	38.081M	45M	38.081M	43.92M	38.081M	44.1M	38.141M
5230MHz	Pass	Inf	45.72M	38.201M	46.86M	38.141M	45.66M	38.141M	45.48M	38.081M
5755MHz	Pass	500k	38.04M	38.741M	37.86M	39.28M	38.04M	38.441M	37.92M	38.621M
5795MHz	Pass	500k	37.86M	38.921M	37.86M	45.037M	37.8M	38.681M	37.74M	39.04M
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
5210MHz	Pass	Inf	90M	77.961M	89.64M	77.841M	89.88M	77.841M	87.84M	77.721M
5775MHz	Pass	500k	78.12M	77.841M	77.88M	77.841M	77.76M	77.721M	77.64M	77.721M

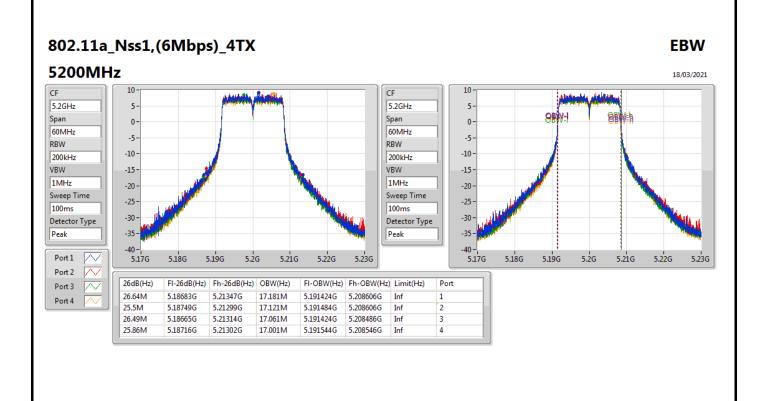
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

Sporton International Inc. Hsinchu Laboratory Page No.

Page No. : 2 of 11

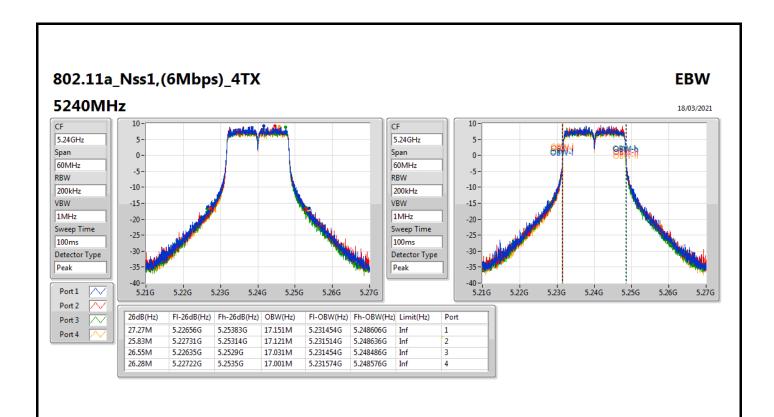
Report No. : FR112814-03AB

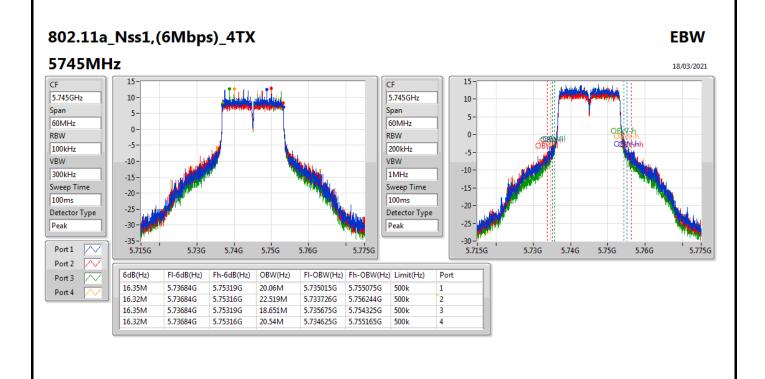




Page No. : 3 of 11

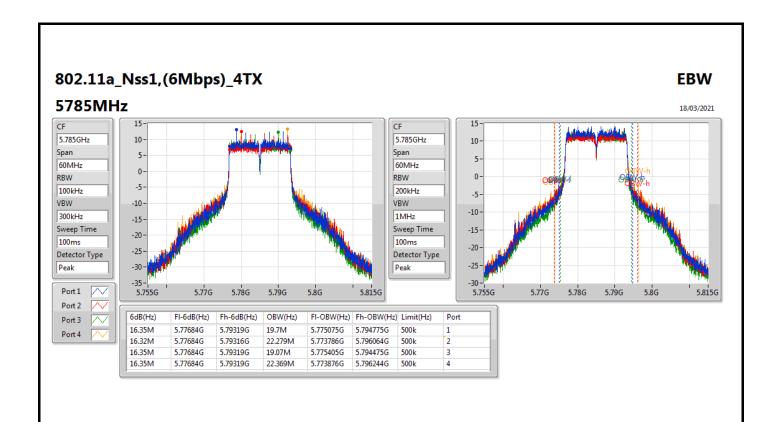
Report No. : FR112814-03AB

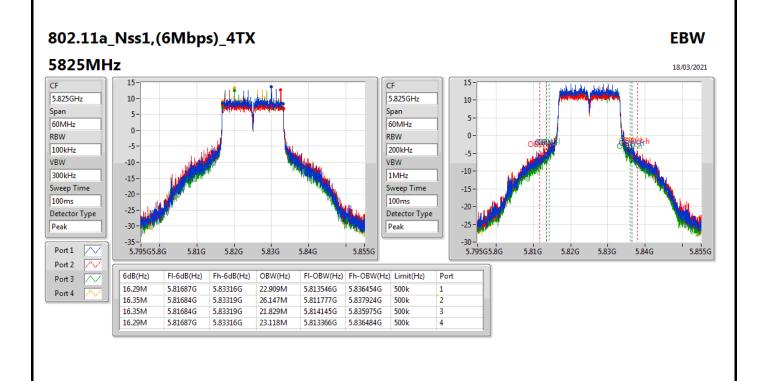




Page No. : 4 of 11

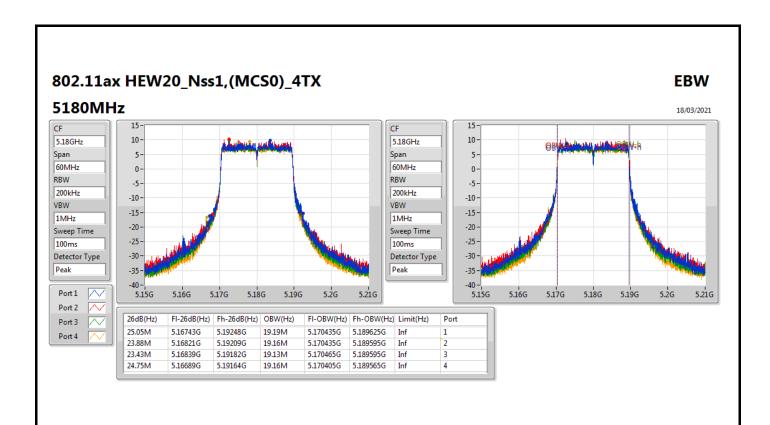
Report No. : FR112814-03AB

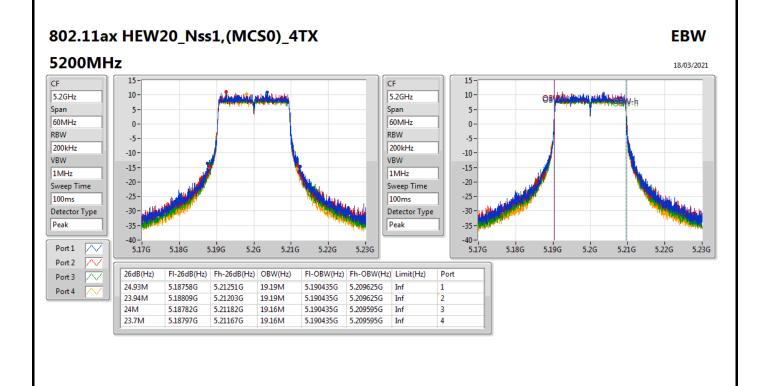




Page No. : 5 of 11

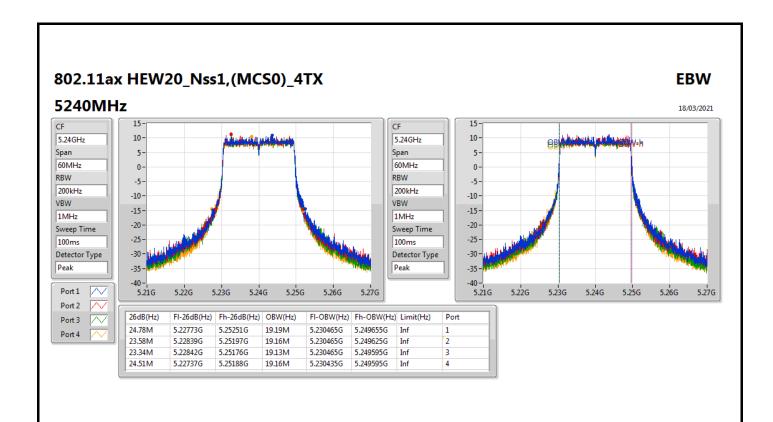
Report No. : FR112814-03AB

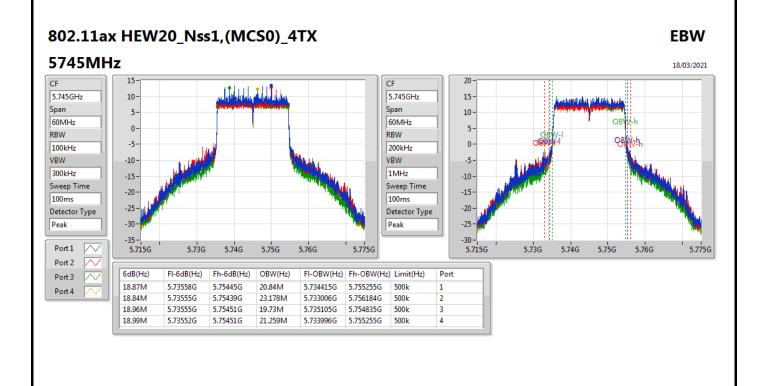




Page No. : 6 of 11

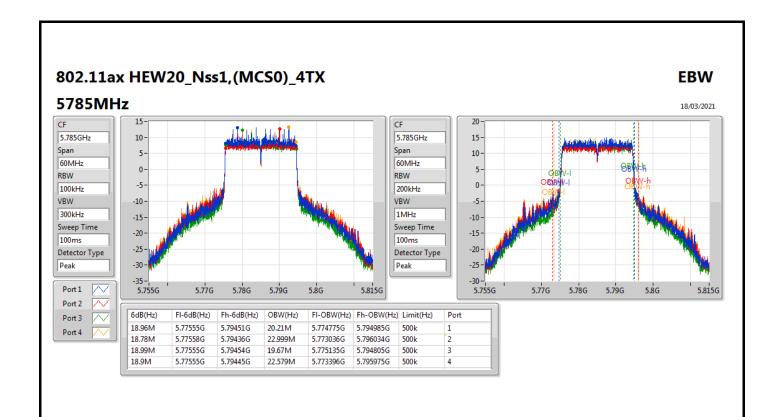
Report No. : FR112814-03AB

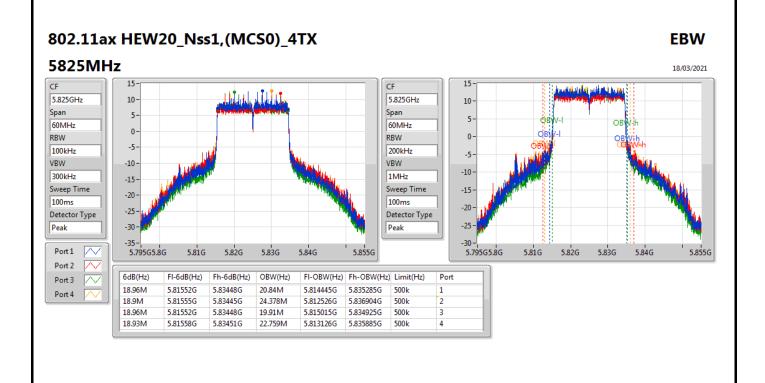




Page No. : 7 of 11

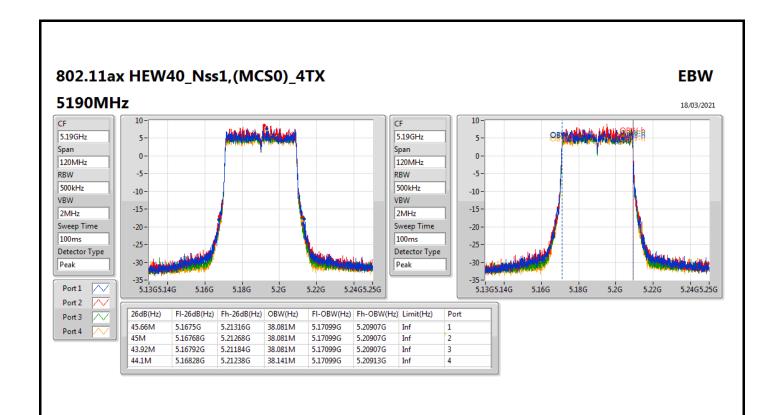
Report No. : FR112814-03AB

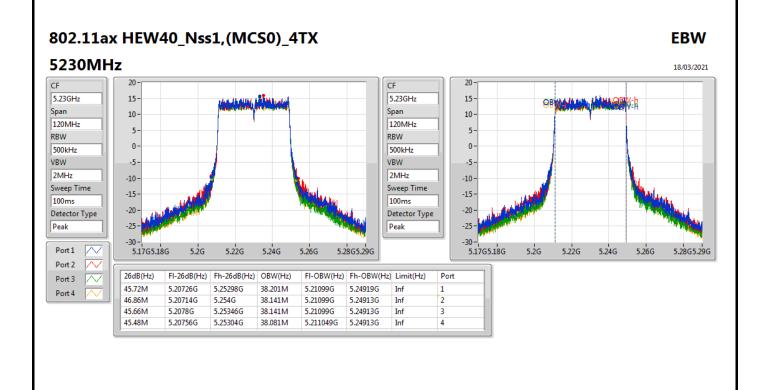




Page No. : 8 of 11

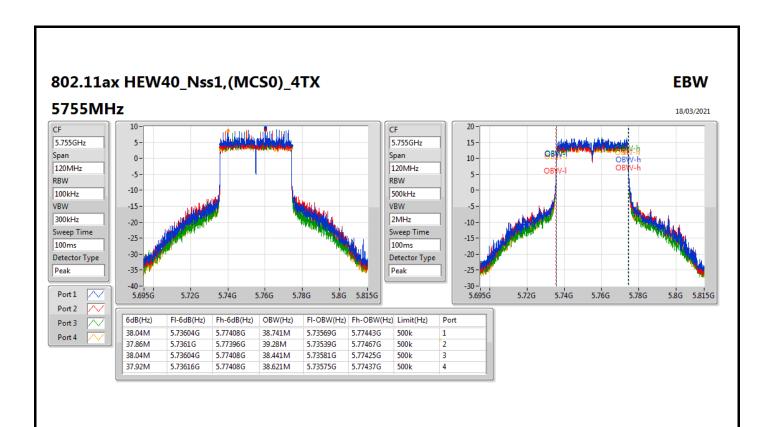
Report No. : FR112814-03AB

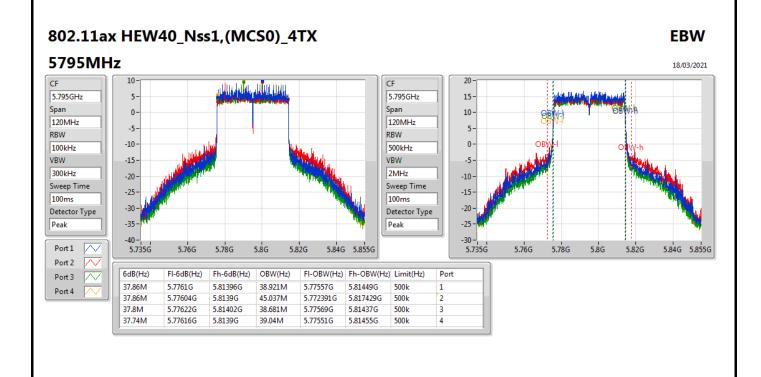




Page No. : 9 of 11

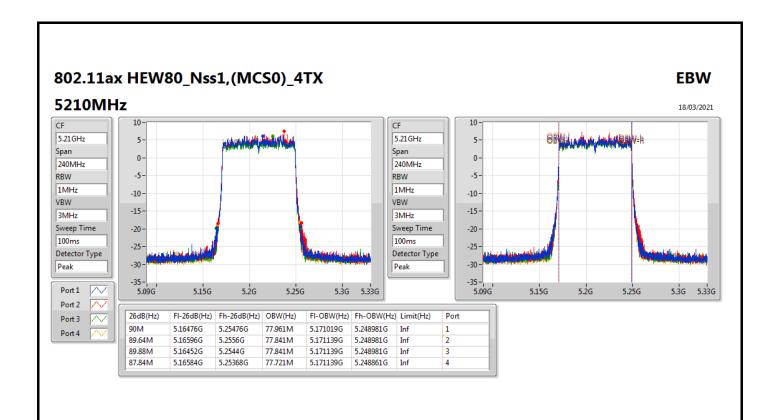
Report No. : FR112814-03AB

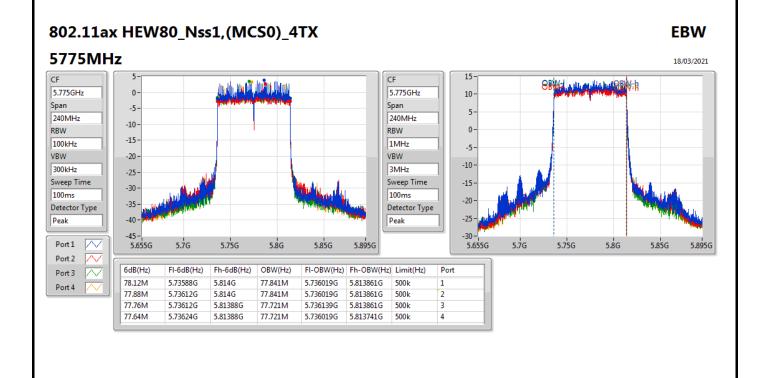




Page No. : 10 of 11

Report No. : FR112814-03AB





Page No. : 11 of 11

Report No. : FR112814-03AB



Average Power Appendix C

**Summary** 

Mode	Total Power	Total Power
	(dBm)	(W)
5.15-5.25GHz	-	-
802.11a_Nss1,(6Mbps)_4TX	25.29	0.33806
802.11ax HEW20_Nss1,(MCS0)_4TX	25.92	0.39084
802.11ax HEW40_Nss1,(MCS0)_4TX	28.54	0.71450
802.11ax HEW80_Nss1,(MCS0)_4TX	19.75	0.09441
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_4TX	29.97	0.99312
802.11ax HEW20_Nss1,(MCS0)_4TX	29.97	0.99312
802.11ax HEW40_Nss1,(MCS0)_4TX	29.74	0.94189
802.11ax HEW80_Nss1,(MCS0)_4TX	26.67	0.46452

Page No. : 1 of 2



Average Power Appendix C

### 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	5.30	19.54	19.53	19.17	18.75	25.28	30.00
5200MHz	Pass	5.30	19.39	19.66	19.13	18.85	25.29	30.00
5240MHz	Pass	5.30	19.22	19.30	19.18	18.90	25.17	30.00
5745MHz	Pass	5.30	24.17	23.41	23.59	23.67	29.74	30.00
5785MHz	Pass	5.30	24.11	23.28	23.42	23.89	29.71	30.00
5825MHz	Pass	5.30	24.16	23.69	23.83	24.09	29.97	30.00
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5180MHz	Pass	5.30	19.28	19.35	18.61	18.53	24.98	30.00
5200MHz	Pass	5.30	19.88	20.04	19.56	19.49	25.77	30.00
5240MHz	Pass	5.30	20.03	20.13	19.77	19.66	25.92	30.00
5745MHz	Pass	5.30	24.43	23.69	23.74	23.90	29.97	30.00
5785MHz	Pass	5.30	24.32	23.51	23.63	24.07	29.92	30.00
5825MHz	Pass	5.30	24.02	23.35	23.48	23.95	29.73	30.00
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	5.30	15.16	15.64	14.91	14.79	21.16	30.00
5230MHz	Pass	5.30	22.68	22.78	22.19	22.41	28.54	30.00
5755MHz	Pass	5.30	23.85	23.25	23.36	23.05	29.41	30.00
5795MHz	Pass	5.30	24.05	23.57	23.52	23.71	29.74	30.00
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	5.30	13.71	14.09	13.31	13.79	19.75	30.00
5775MHz	Pass	5.30	20.95	20.47	20.64	20.52	26.67	30.00

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

Page No. : 2 of 2



**Summary** 

Mode	PD
	(dBm/RBW)
5.15-5.25GHz	
802.11a_Nss1,(6Mbps)_4TX	12.51
802.11ax HEW20_Nss1,(MCS0)_4TX	12.61
802.11ax HEW40_Nss1,(MCS0)_4TX	12.31
802.11ax HEW80_Nss1,(MCS0)_4TX	0.22
5.725-5.85GHz	
802.11a_Nss1,(6Mbps)_4TX	15.19
802.11ax HEW20_Nss1,(MCS0)_4TX	14.75
802.11ax HEW40_Nss1,(MCS0)_4TX	11.58
802.11ax HEW80_Nss1,(MCS0)_4TX	5.94

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

Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 8



Appendix D **PSD** 

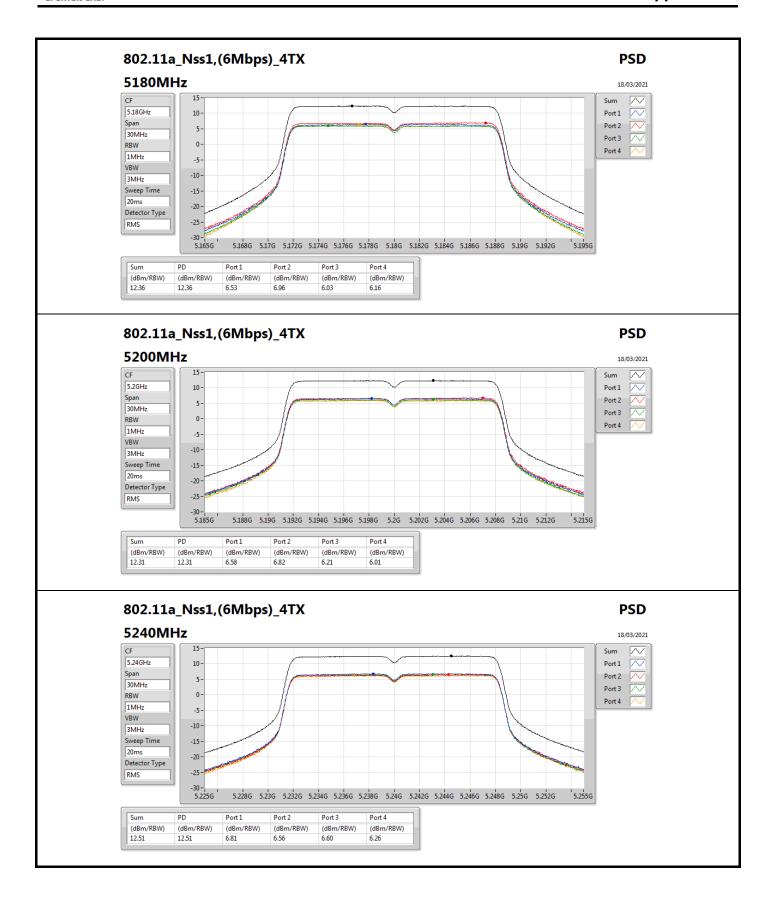
### Result

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	10.36	6.53	6.96	6.03	6.16	12.36	12.64
5200MHz	Pass	10.36	6.58	6.82	6.21	6.01	12.31	12.64
5240MHz	Pass	10.36	6.81	6.56	6.60	6.26	12.51	12.64
5745MHz	Pass	10.36	9.74	8.97	9.12	9.31	15.16	25.64
5785MHz	Pass	10.36	9.75	8.80	9.03	9.51	15.17	25.64
5825MHz	Pass	10.36	9.79	8.81	9.22	9.42	15.19	25.64
802.11ax HEW20_Nss1,(MCS0)_4TX	-	-	_	-	-	-	-	-
5180MHz	Pass	10.36	5.50	5.98	5.14	5.08	11.35	12.64
5200MHz	Pass	10.36	6.73	6.84	6.29	5.73	12.38	12.64
5240MHz	Pass	10.36	6.82	6.81	6.53	6.37	12.61	12.64
5745MHz	Pass	10.36	9.39	8.56	8.72	8.82	14.75	25.64
5785MHz	Pass	10.36	9.36	8.33	8.64	9.01	14.70	25.64
5825MHz	Pass	10.36	8.83	7.97	8.20	8.67	14.29	25.64
802.11ax HEW40_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5190MHz	Pass	10.36	-1.36	-0.68	-1.65	-1.84	4.59	12.64
5230MHz	Pass	10.36	6.51	6.67	5.89	6.29	12.31	12.64
5755MHz	Pass	10.36	5.90	5.38	5.30	5.02	11.27	25.64
5795MHz	Pass	10.36	6.06	5.54	5.49	5.69	11.58	25.64
802.11ax HEW80_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-
5210MHz	Pass	10.36	-5.71	-5.35	-6.22	-5.64	0.22	12.64
5775MHz	Pass	10.36	0.36	-0.27	0.12	-0.27	5.94	25.64

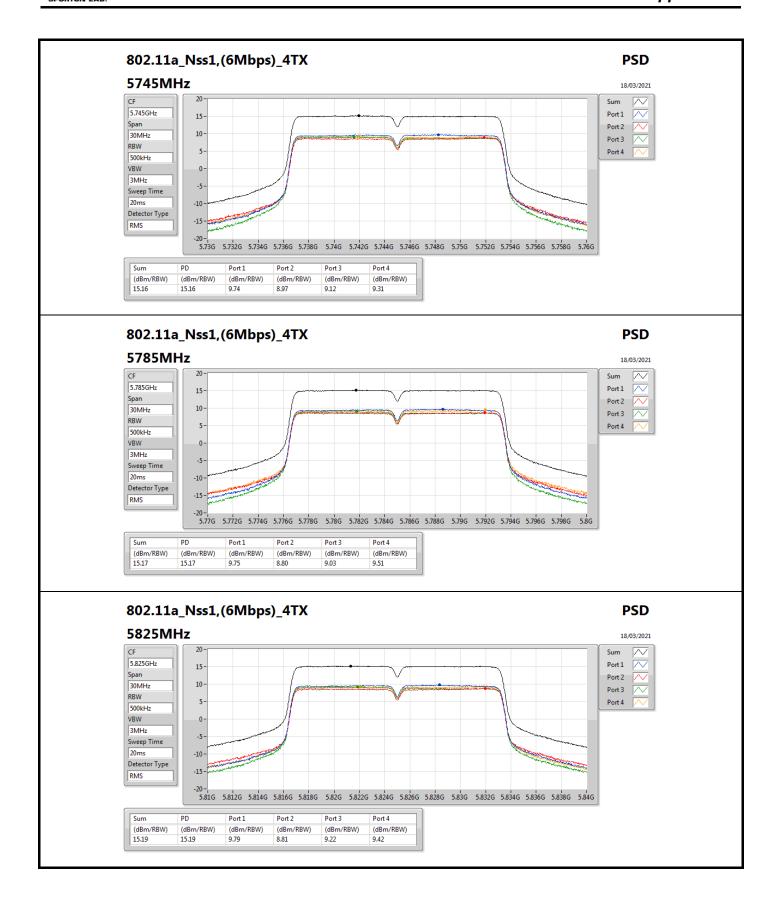
Sporton International Inc. Hsinchu Laboratory

Page No. : 2 of 8

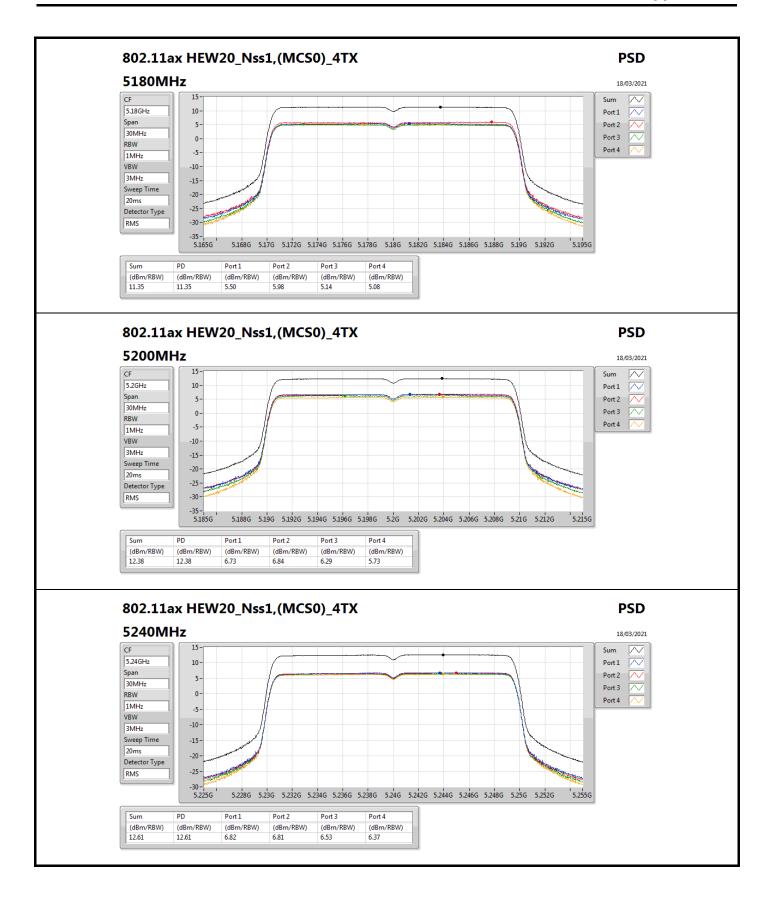
**DG** = Directional Gain; **RBW** = 500 kHz for 5.725-5.85GHz band / 1MHz for other band; **PD** = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;



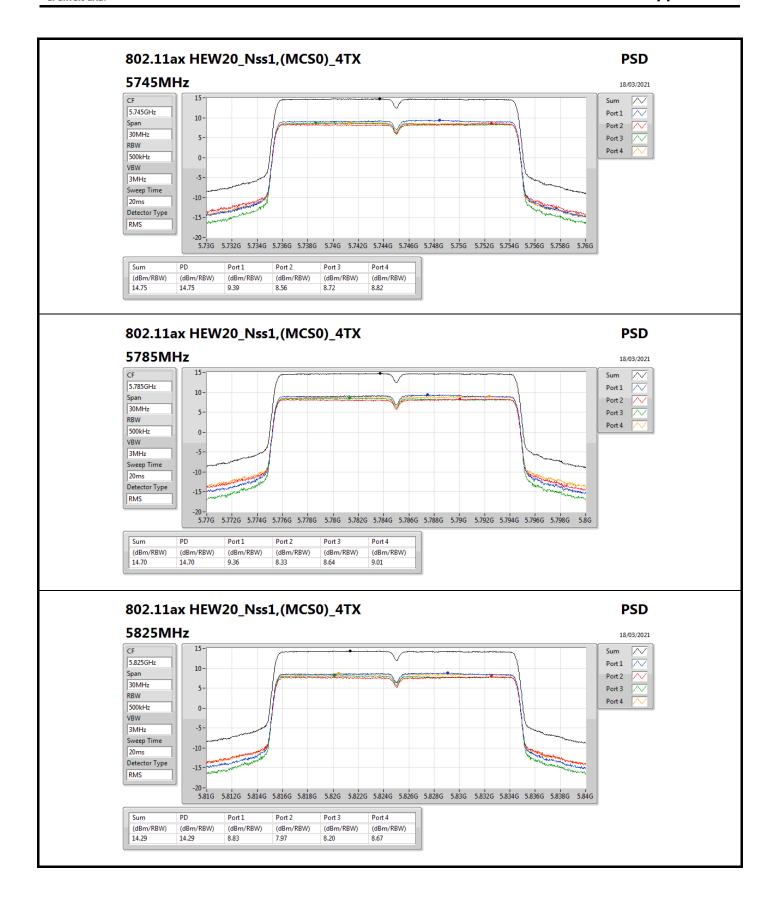
Page No. : 3 of 8



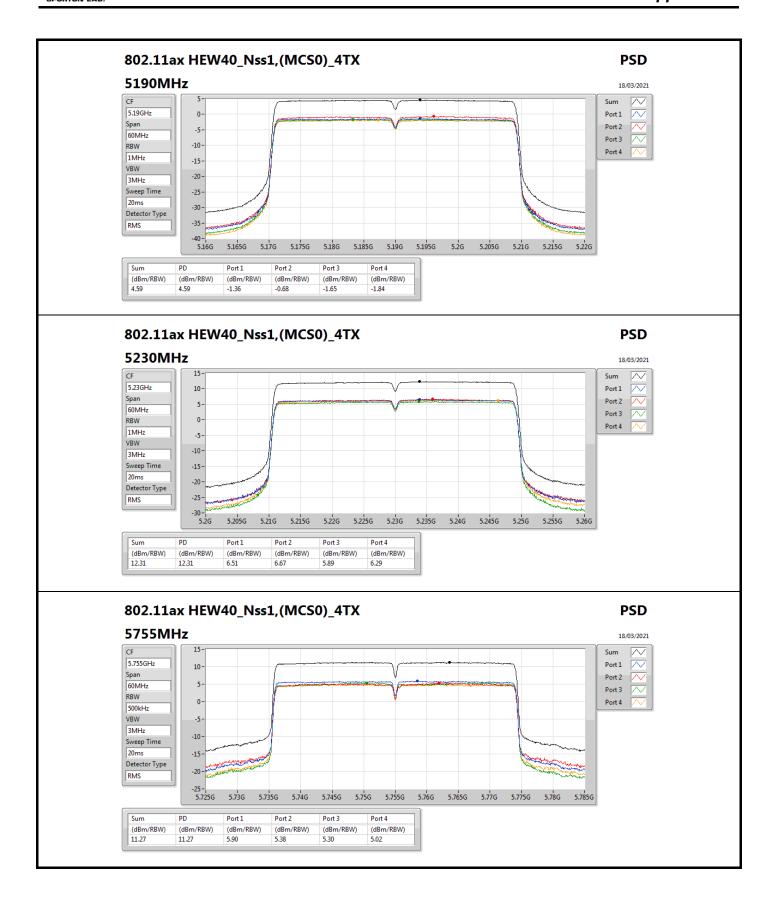
Page No. : 4 of 8



Page No. : 5 of 8

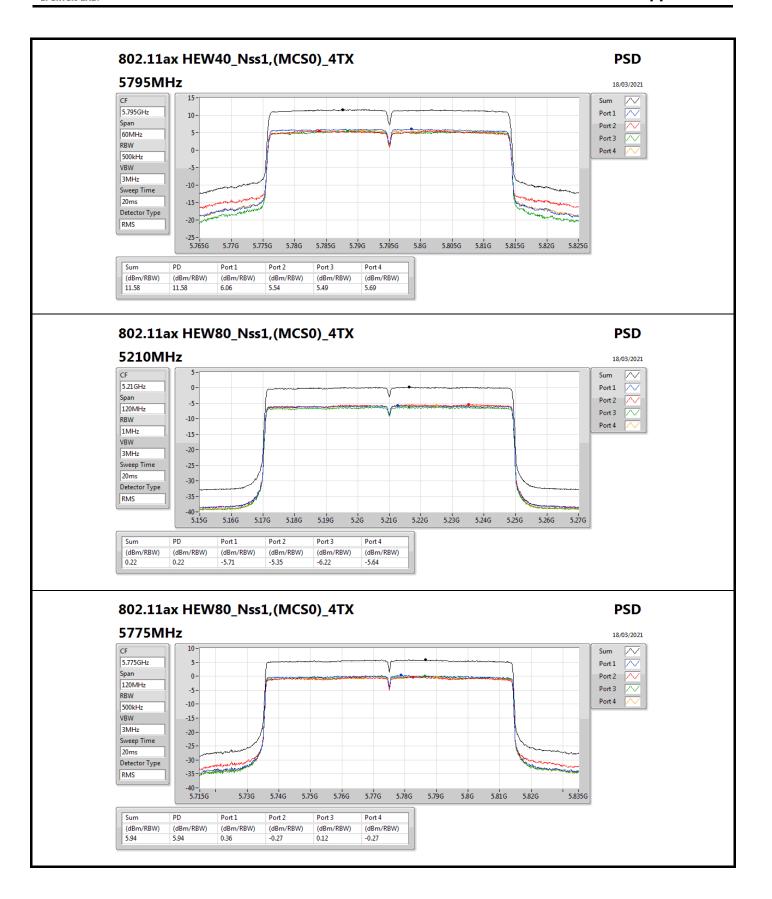


Page No. : 6 of 8



Page No. : 7 of 8

Report No. : FR112814-03AB



Page No. : 8 of 8



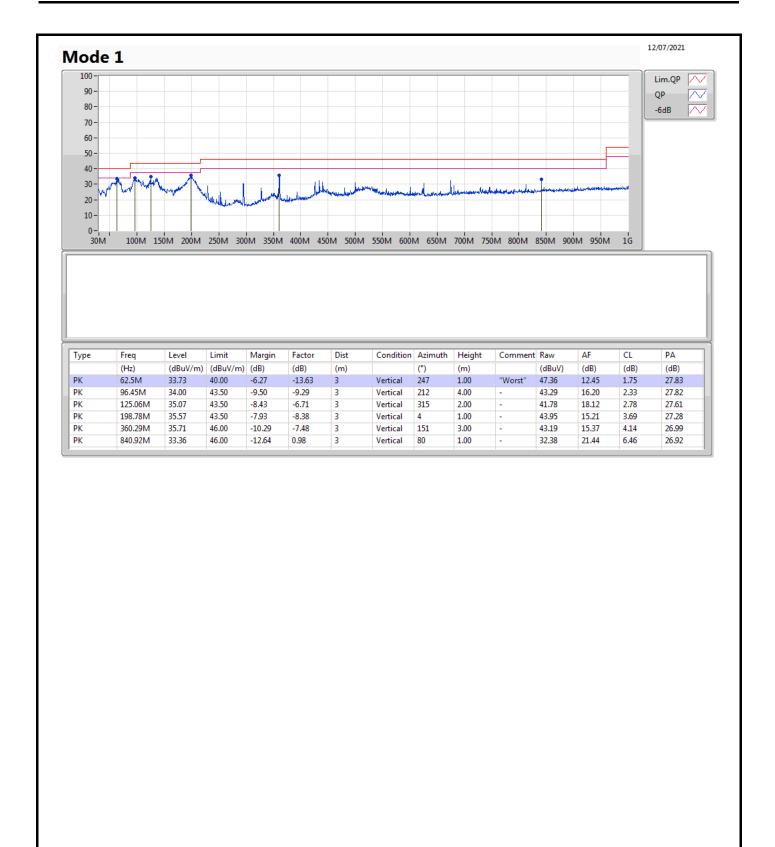
# Radiated Emissions below 1GHz

Appendix E.1

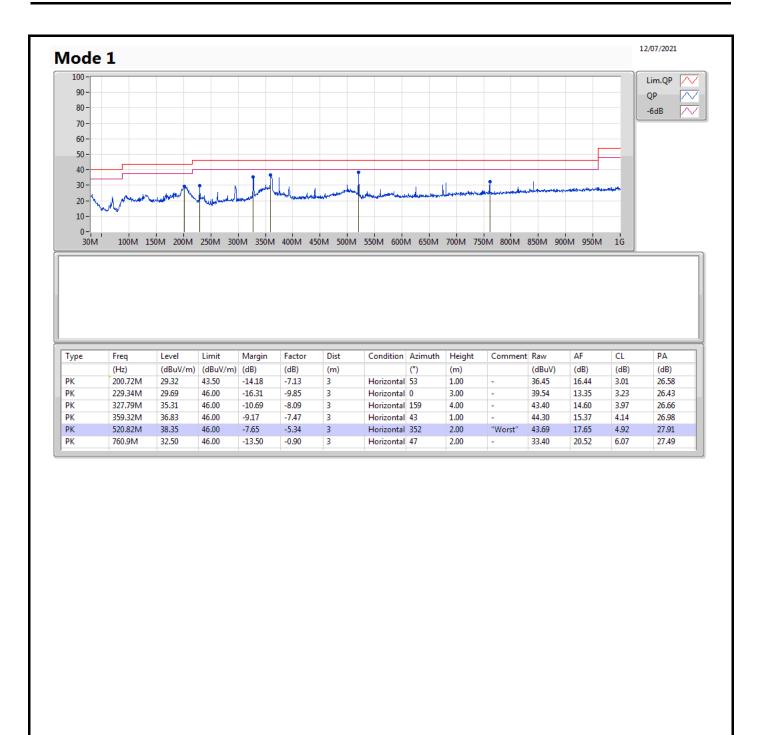
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	62.5M	33.73	40.00	-6.27	Vertical

Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 3



Page No. : 2 of 3



Page No. : 3 of 3



# RSE TX above 1GHz

Appendix E.2

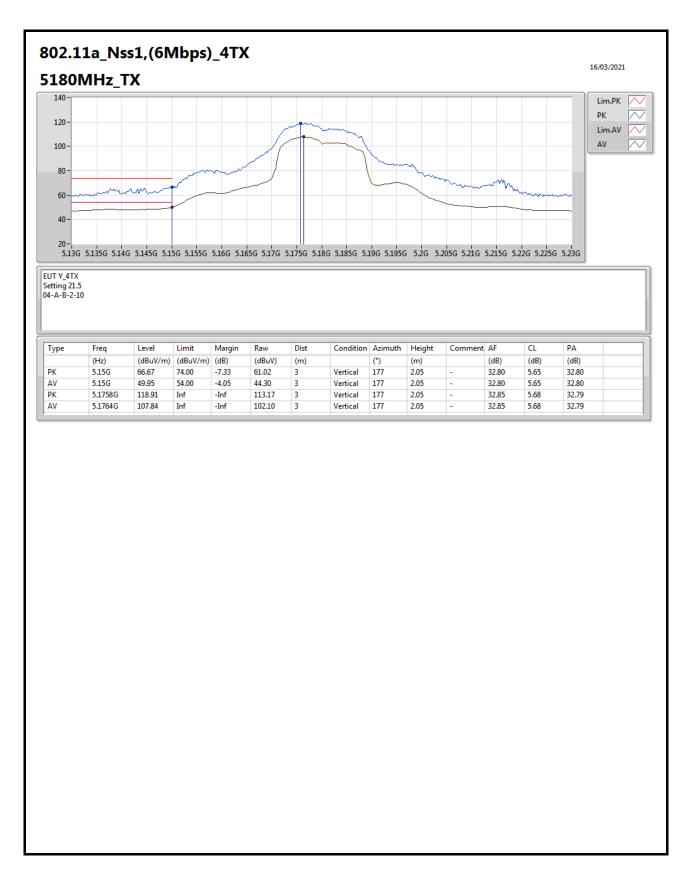
Summary

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 HEW40_Nss1,(MCS0)_4TX	Pass	PK	5.925G	68.02	68.20	-0.18	3	Vertical	328	1.02	-

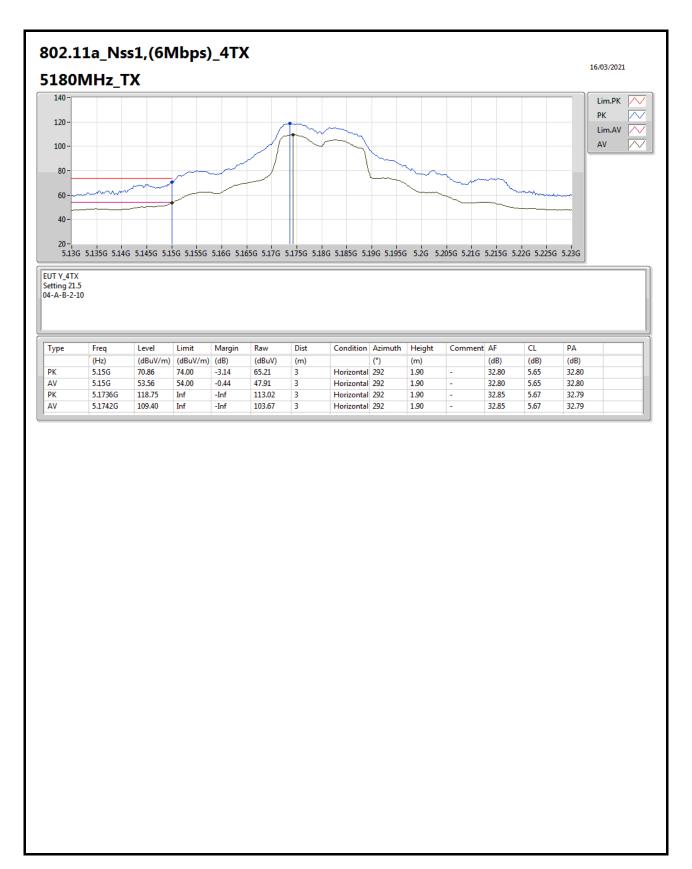
Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 73

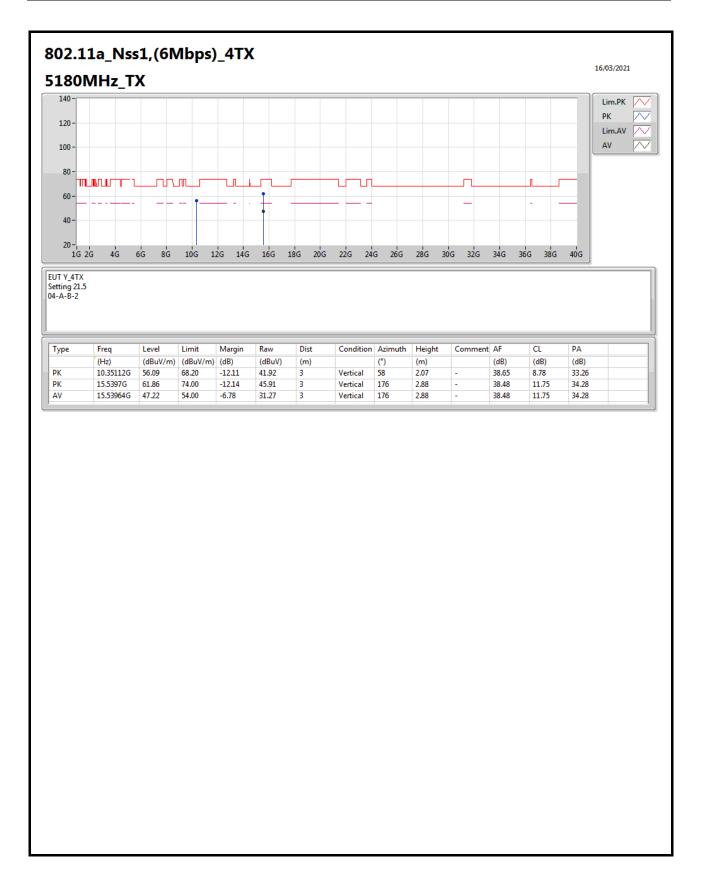




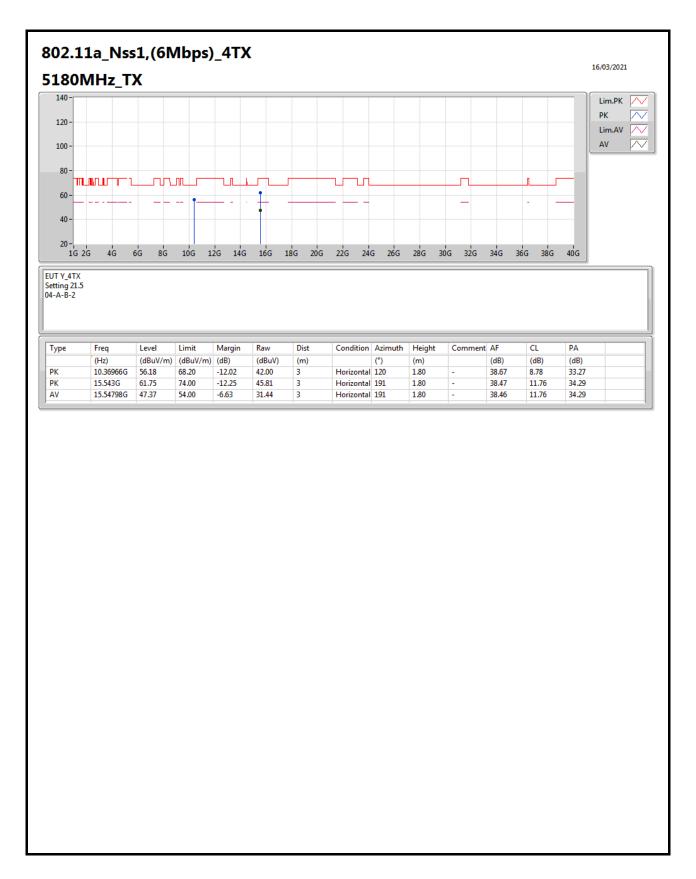




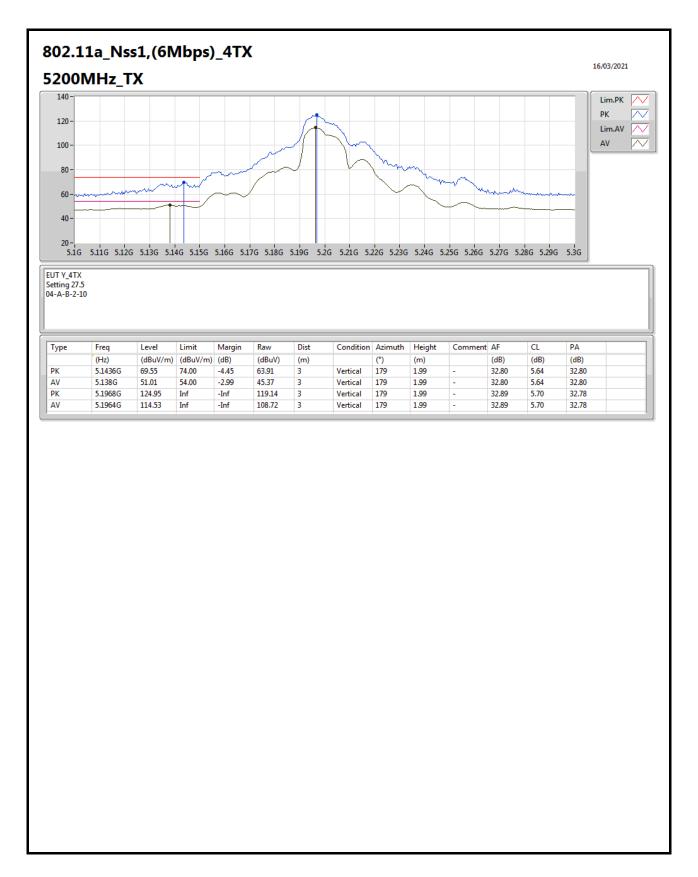






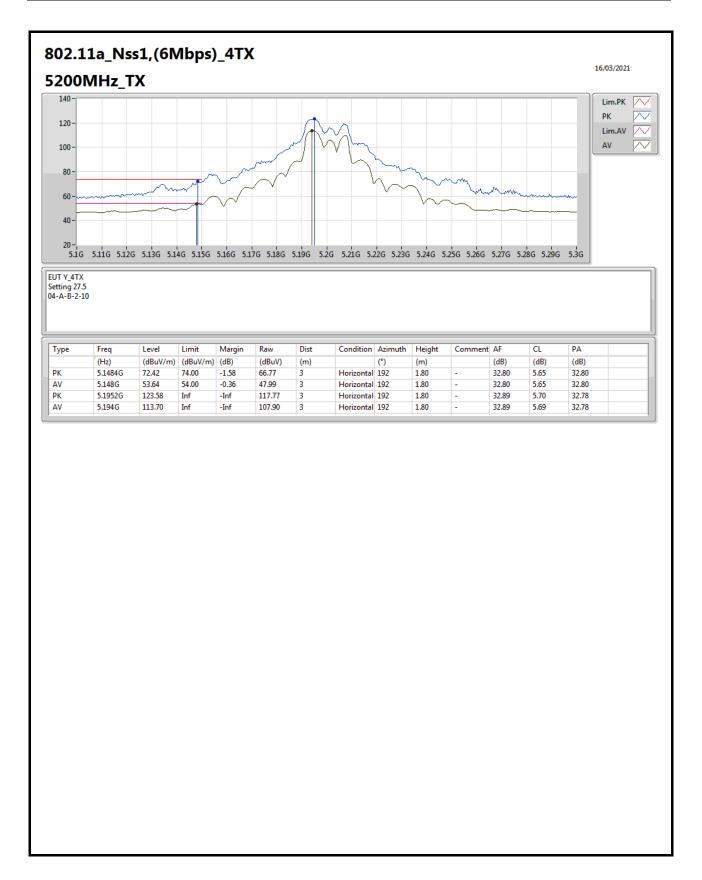




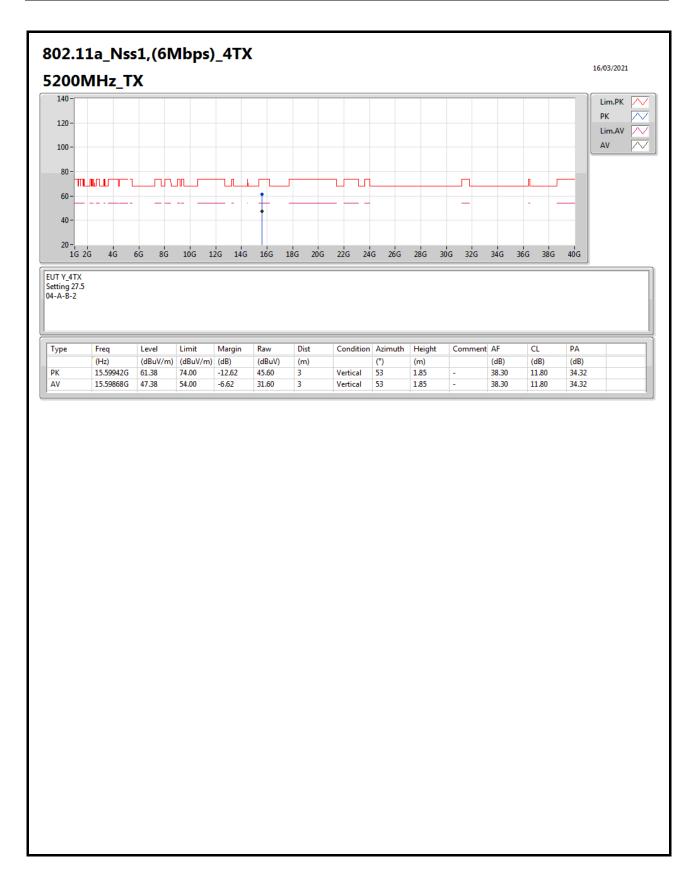


Page No. : 6 of 73

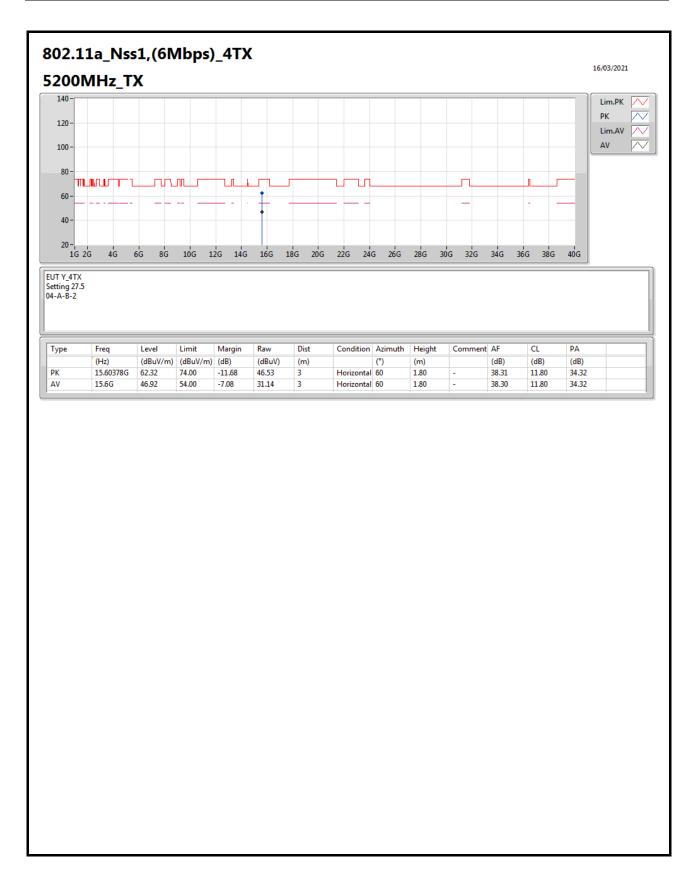




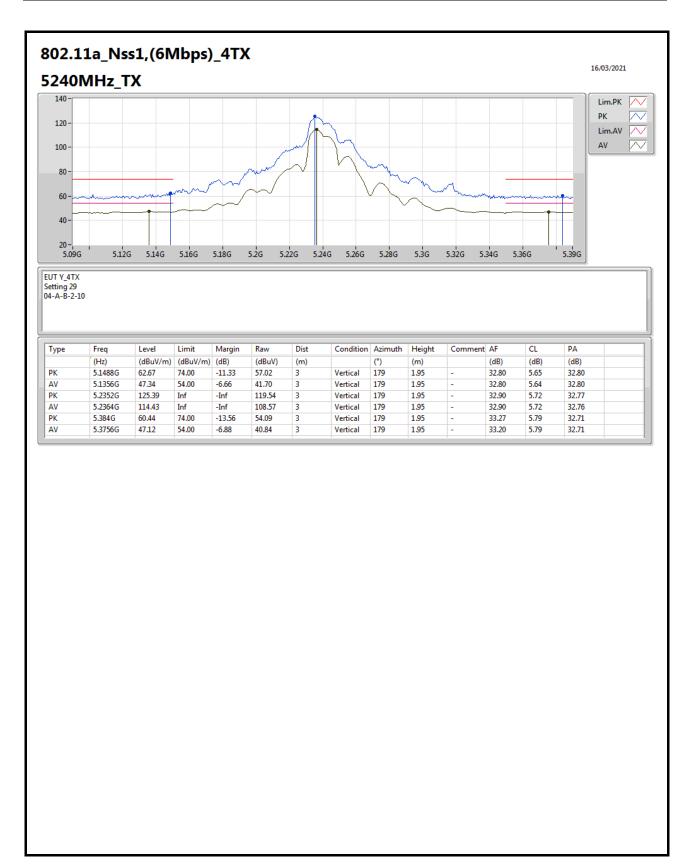








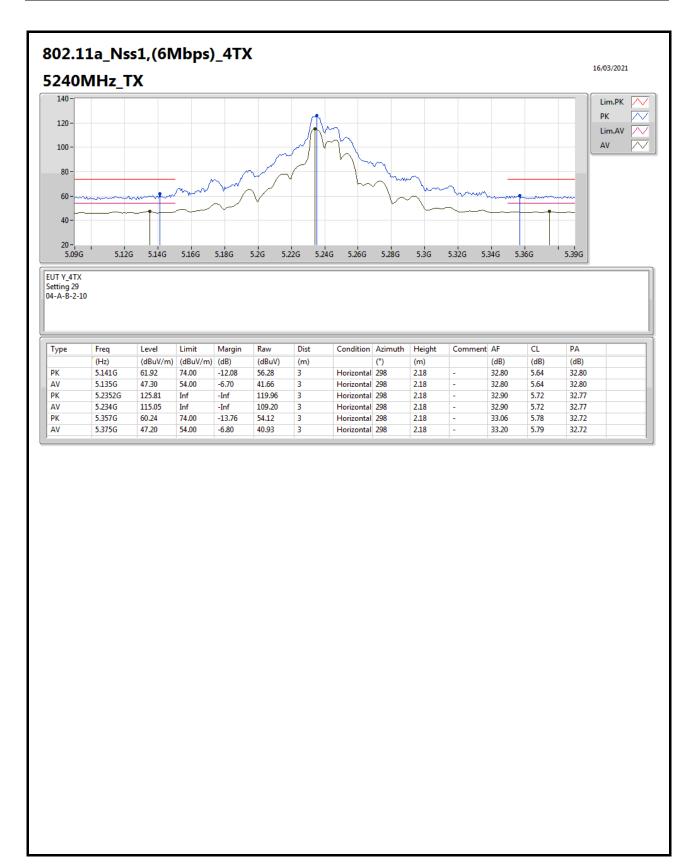




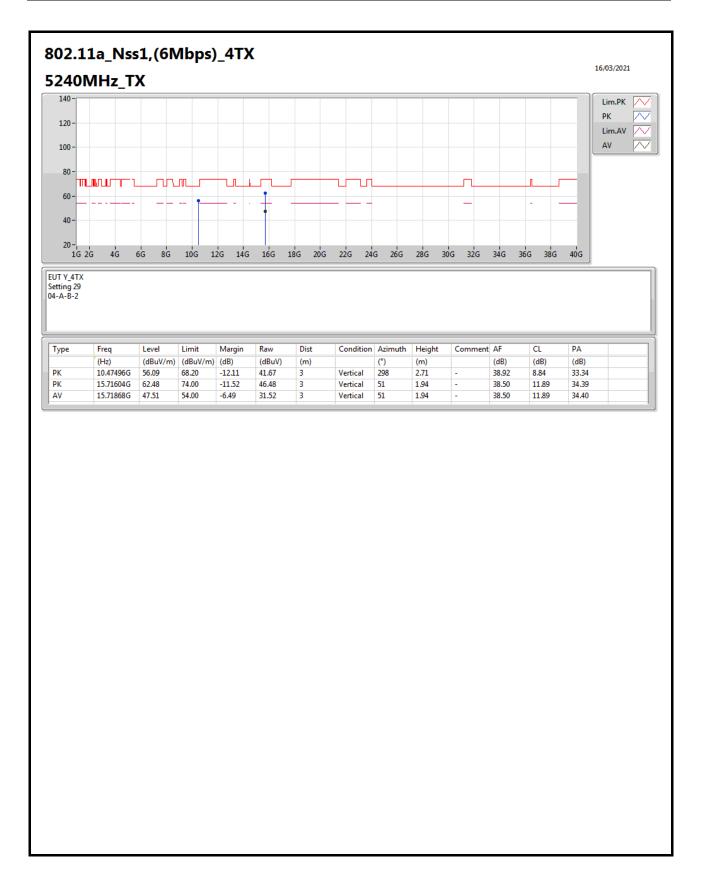
Page No. : 10 of 73

Report No. : FR112814-03AB

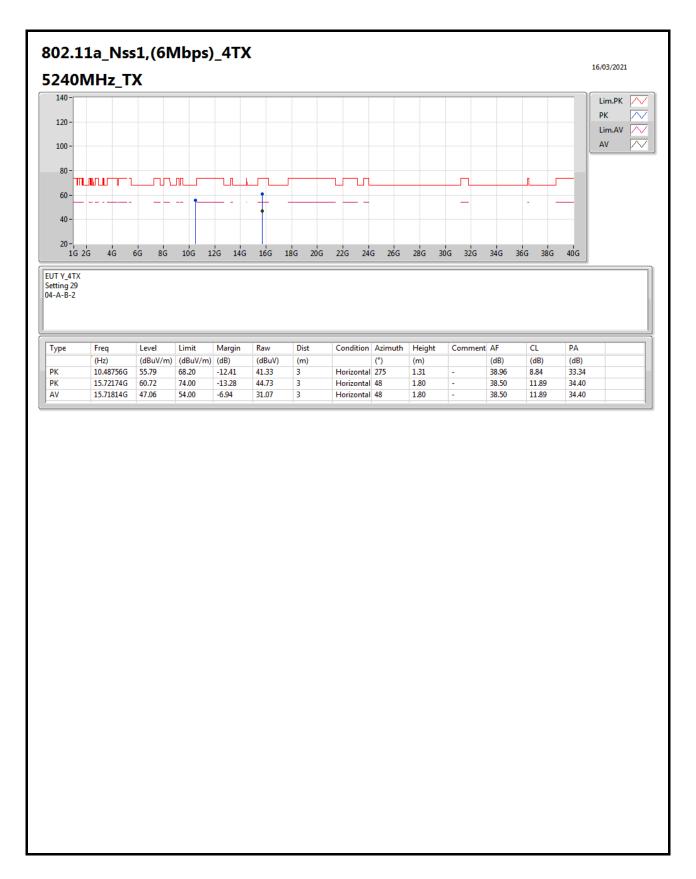




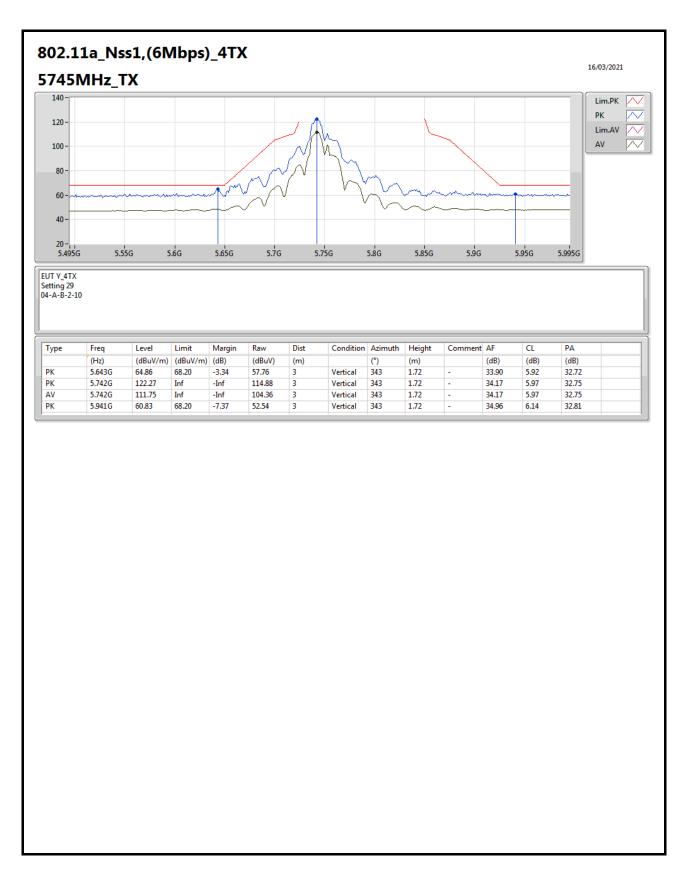








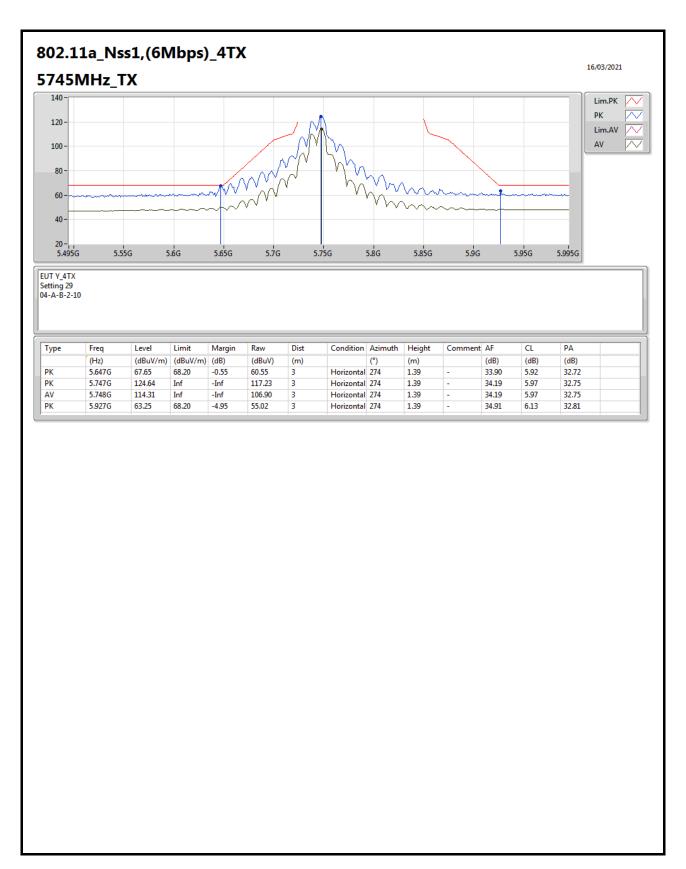




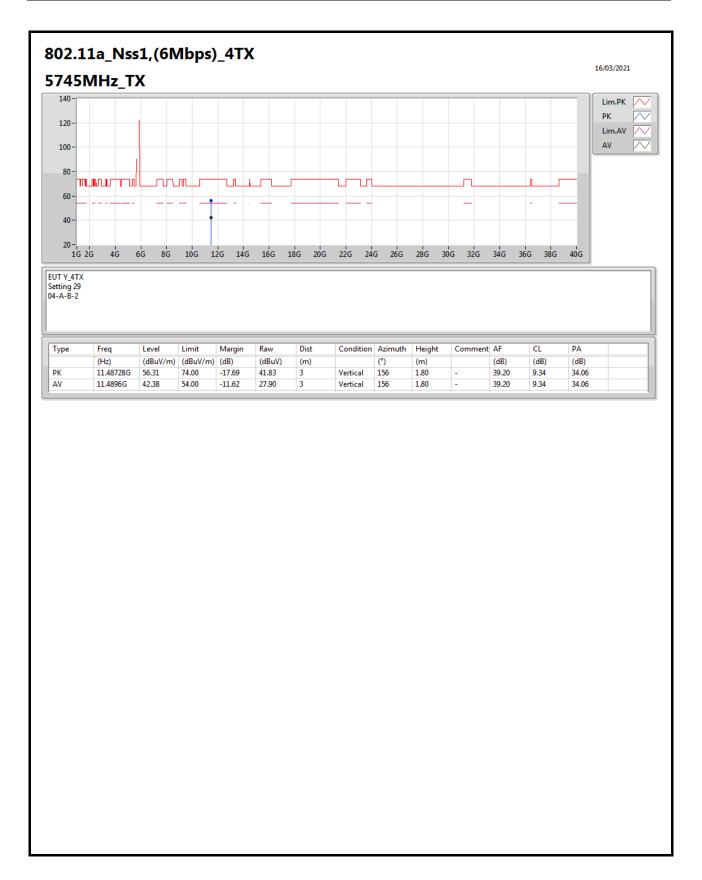
Page No. : 14 of 73

Report No. : FR112814-03AB

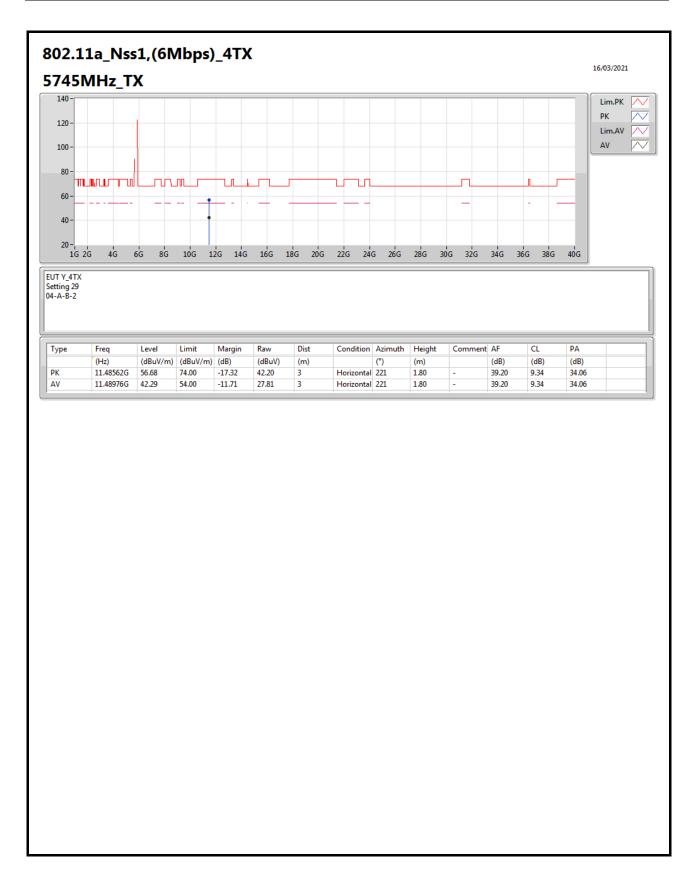




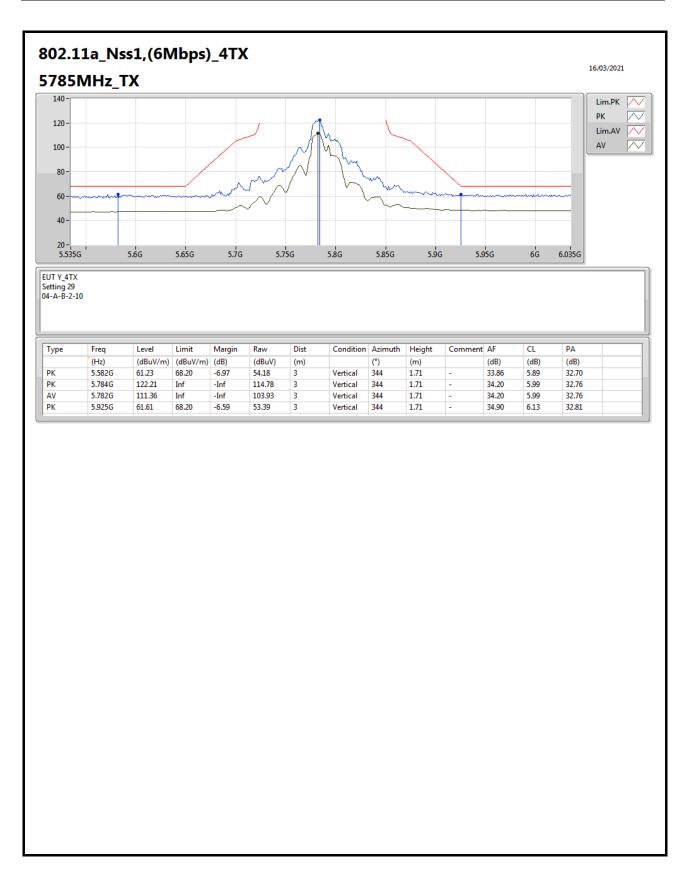




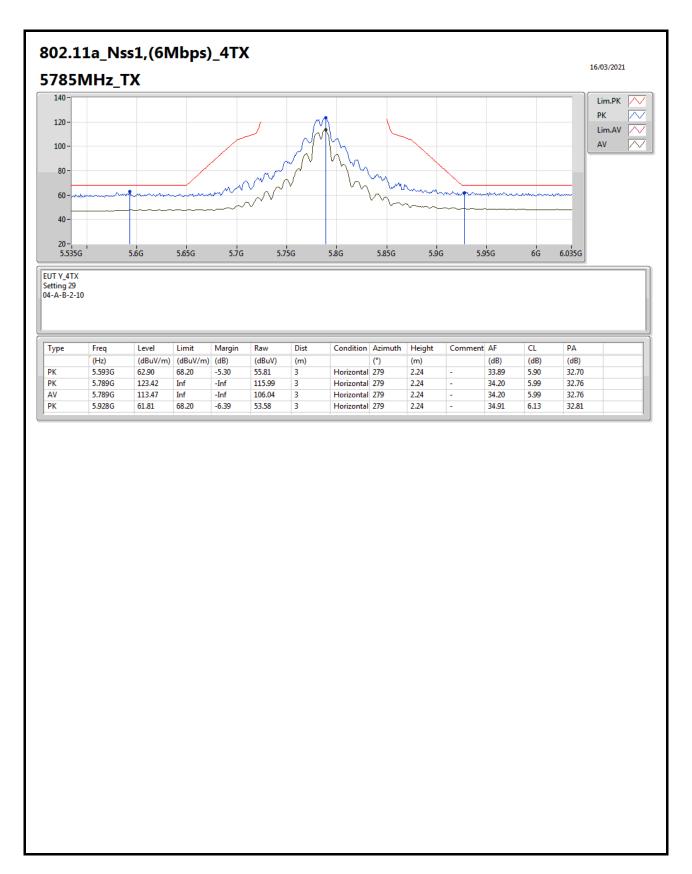




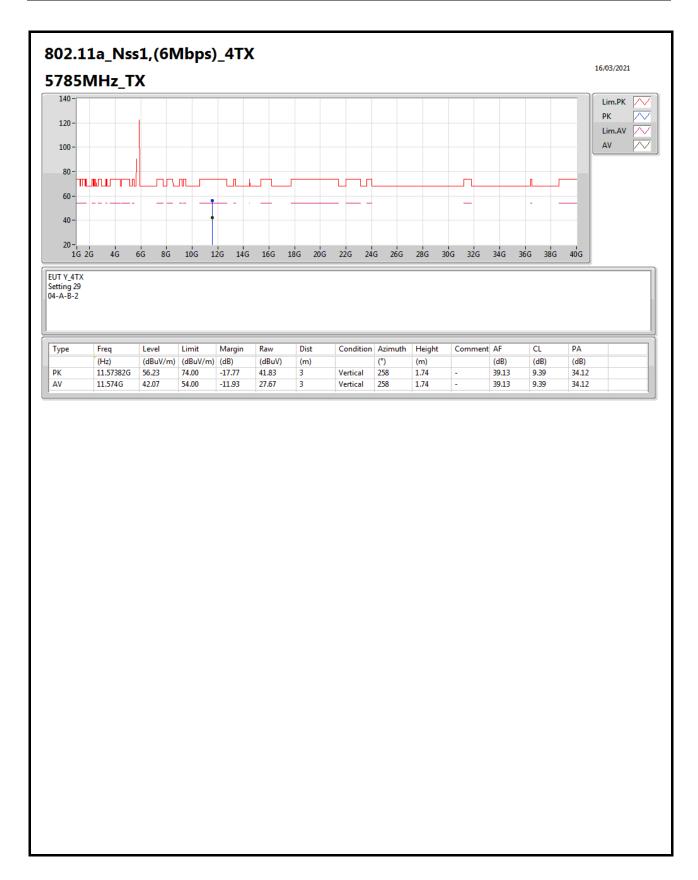








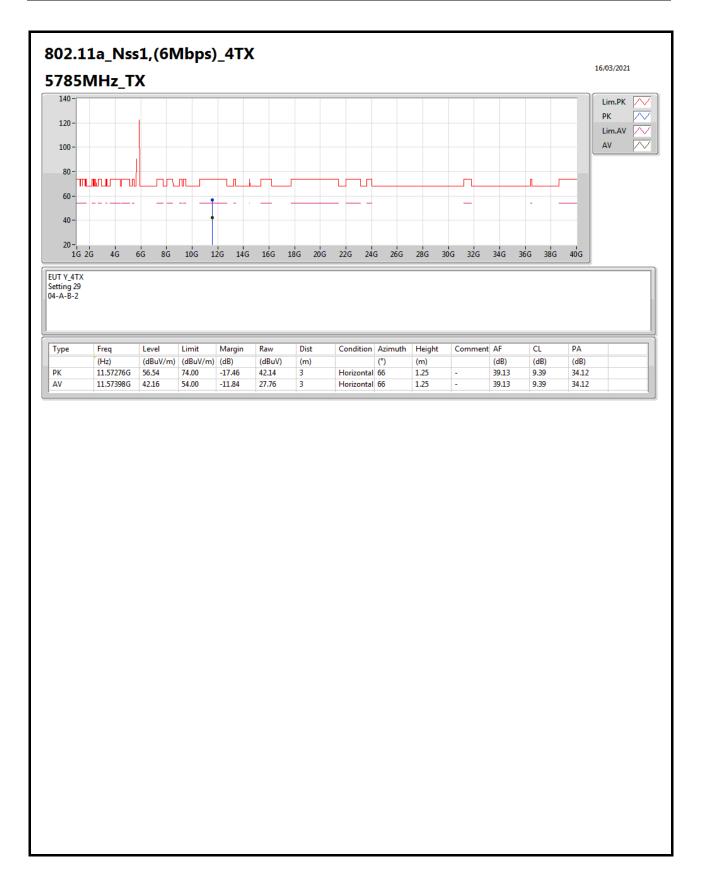




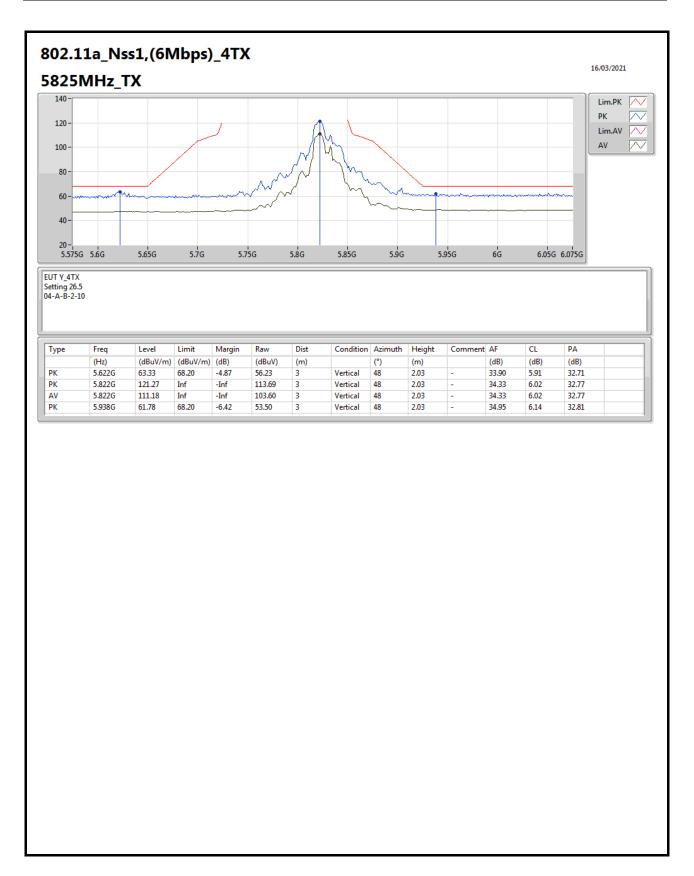
Page No. : 20 of 73

Report No. : FR112814-03AB

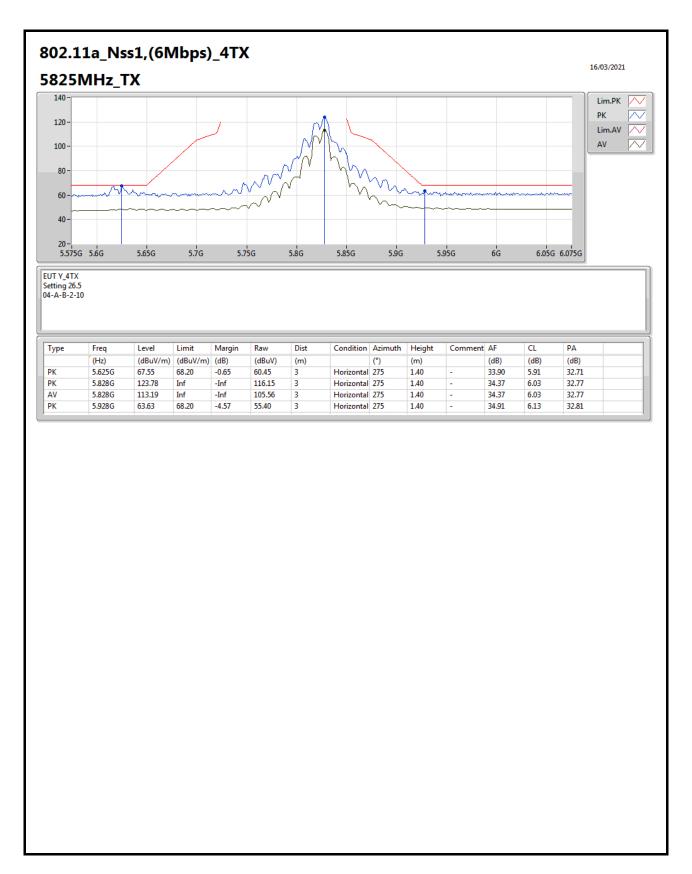




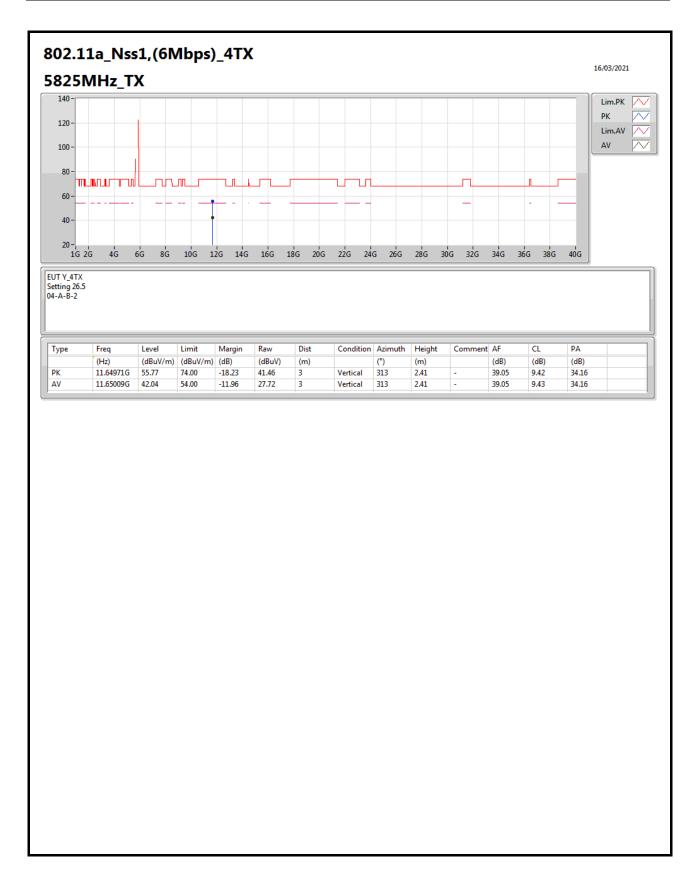




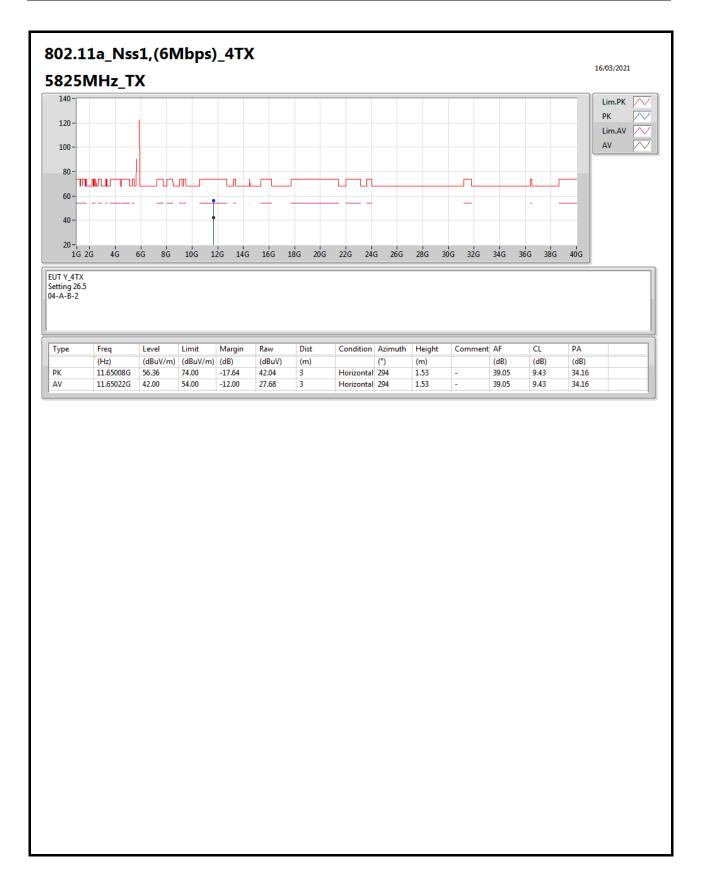




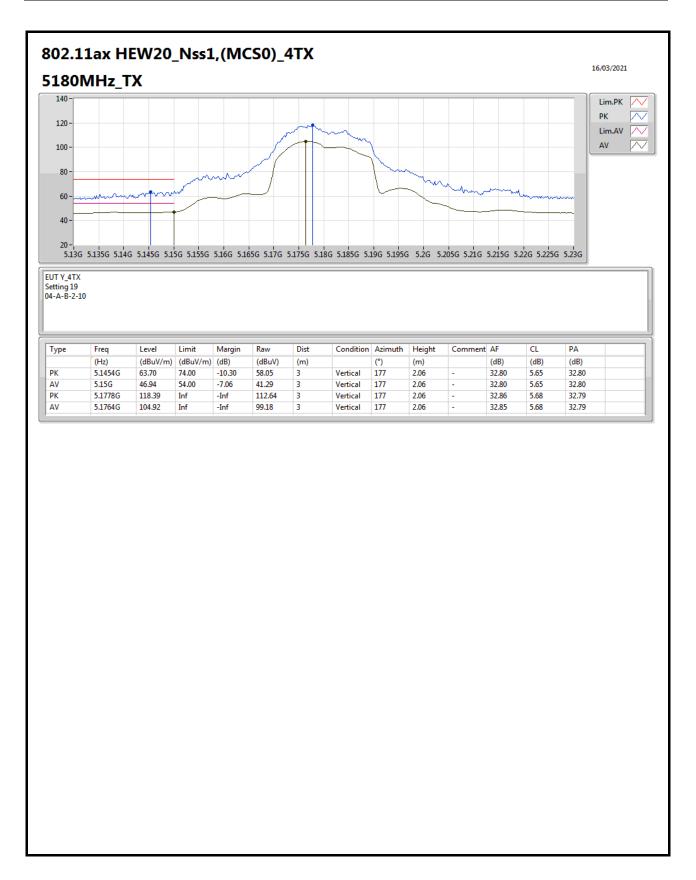




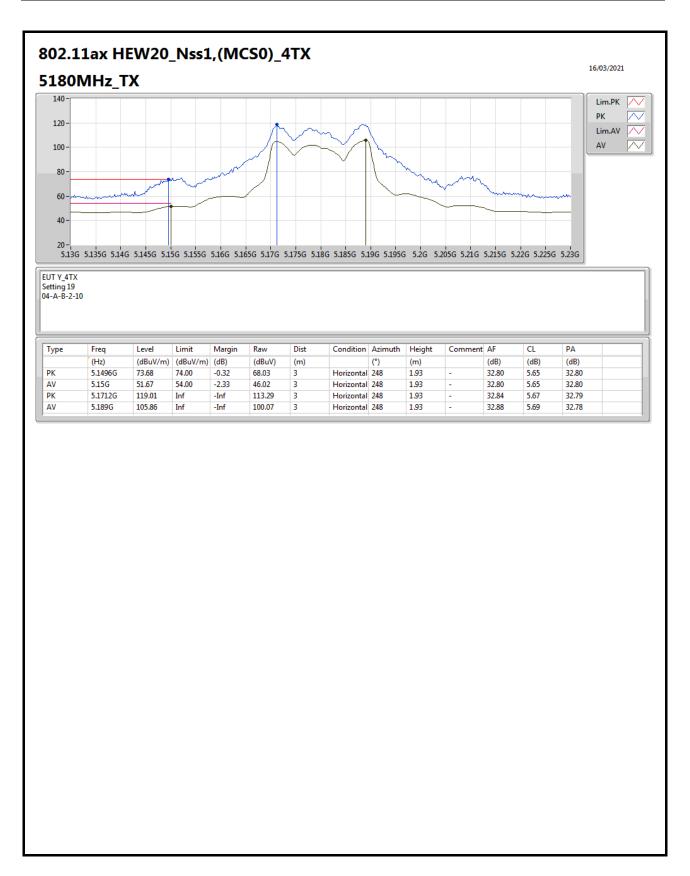




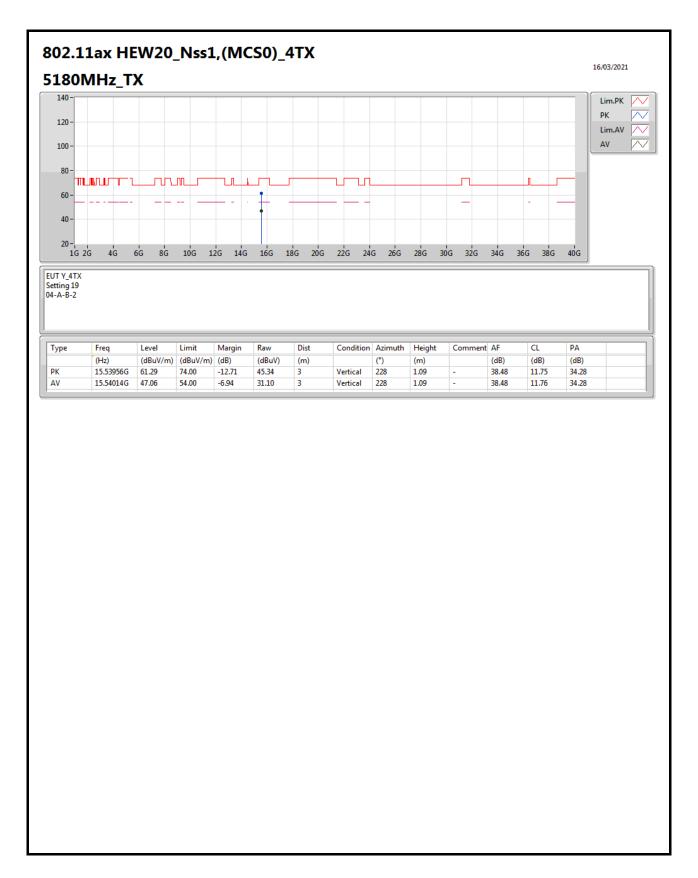




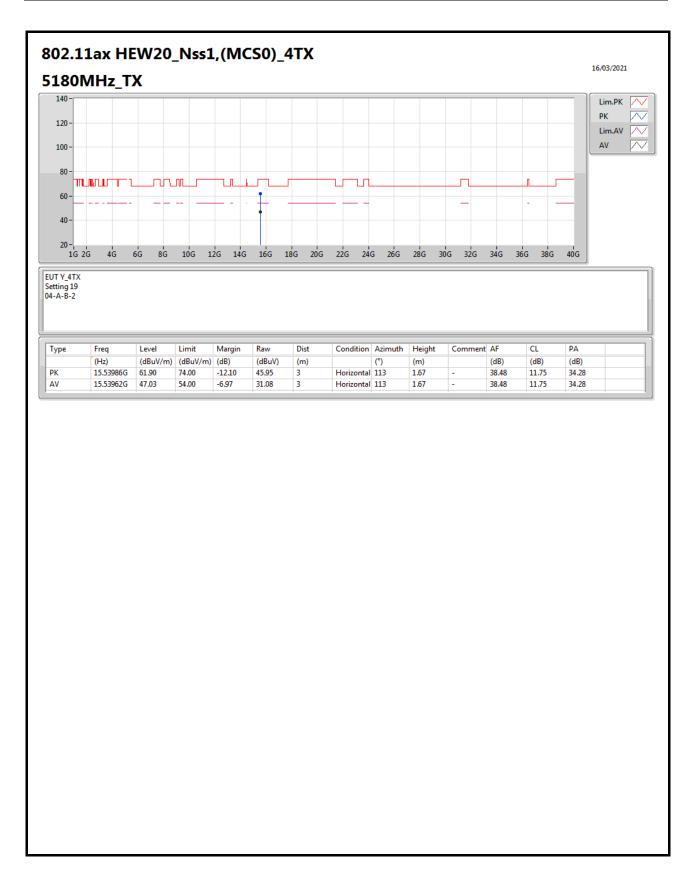




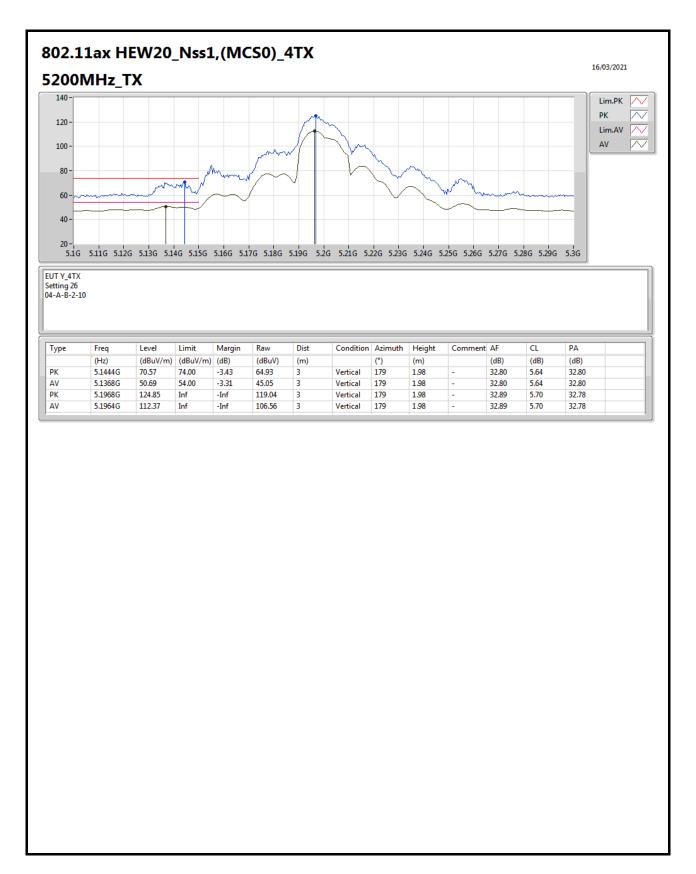




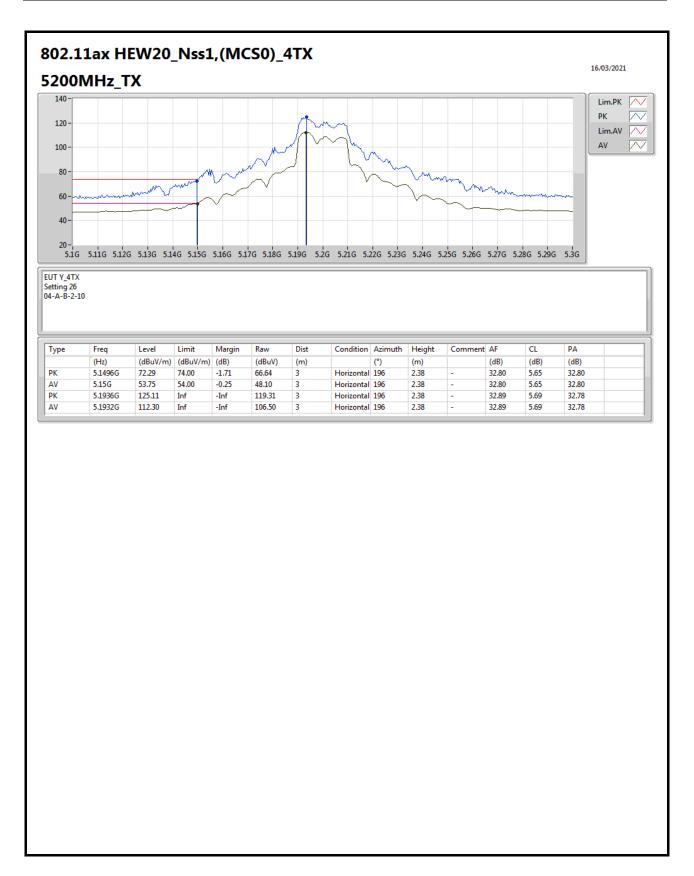




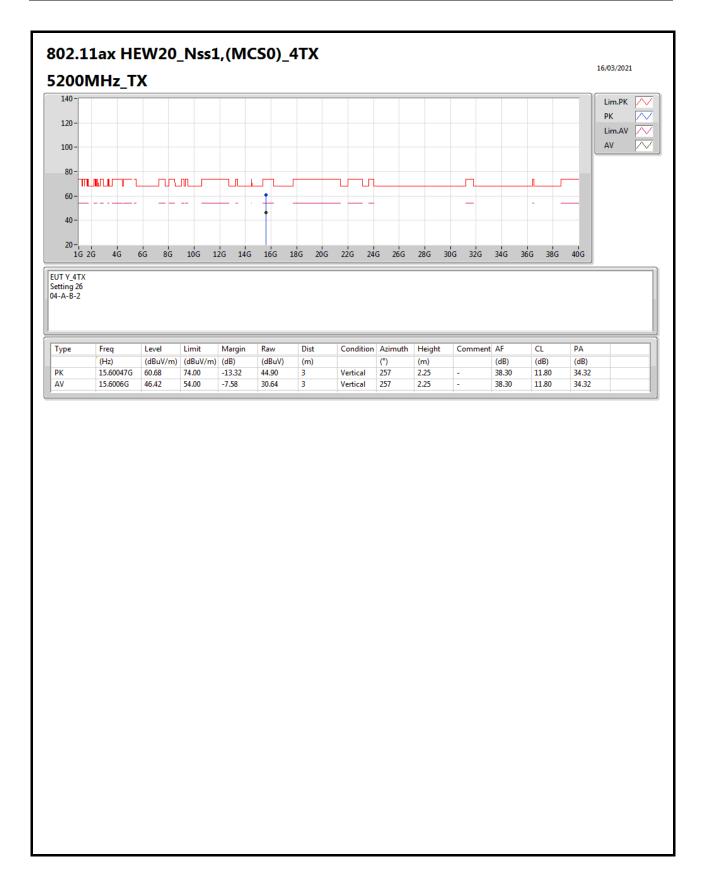








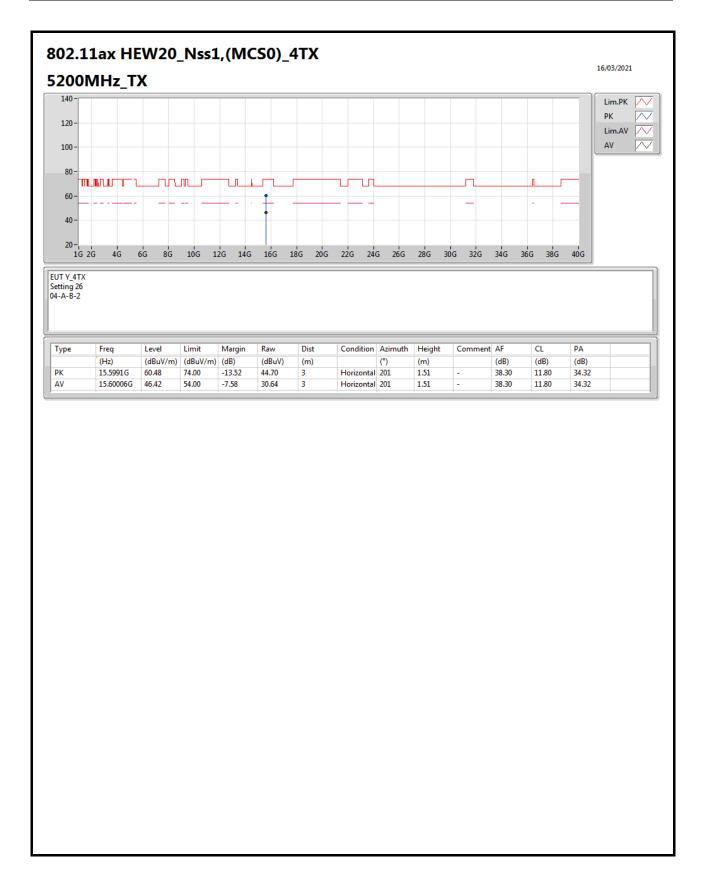




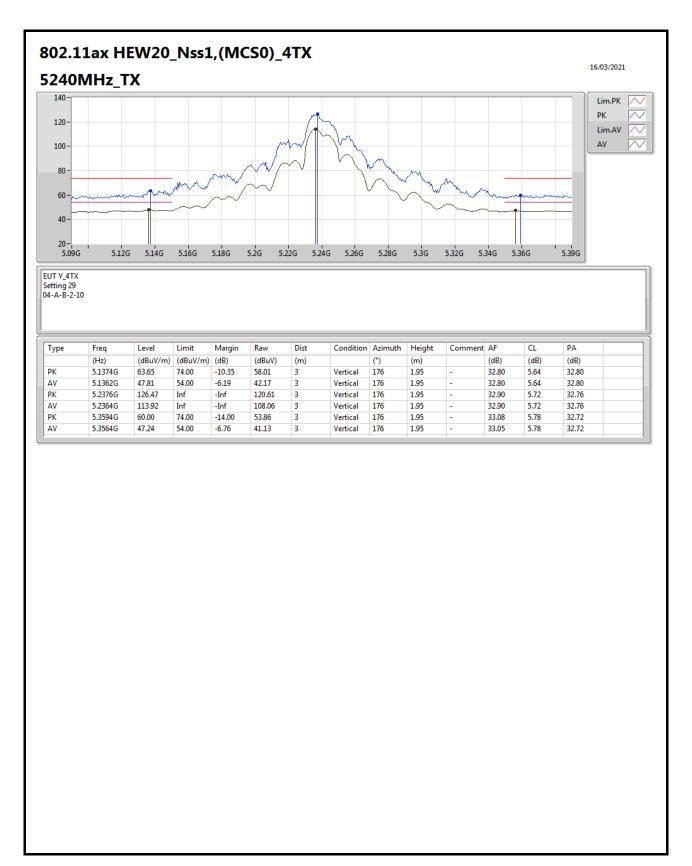
Page No. : 32 of 73

Report No. : FR112814-03AB





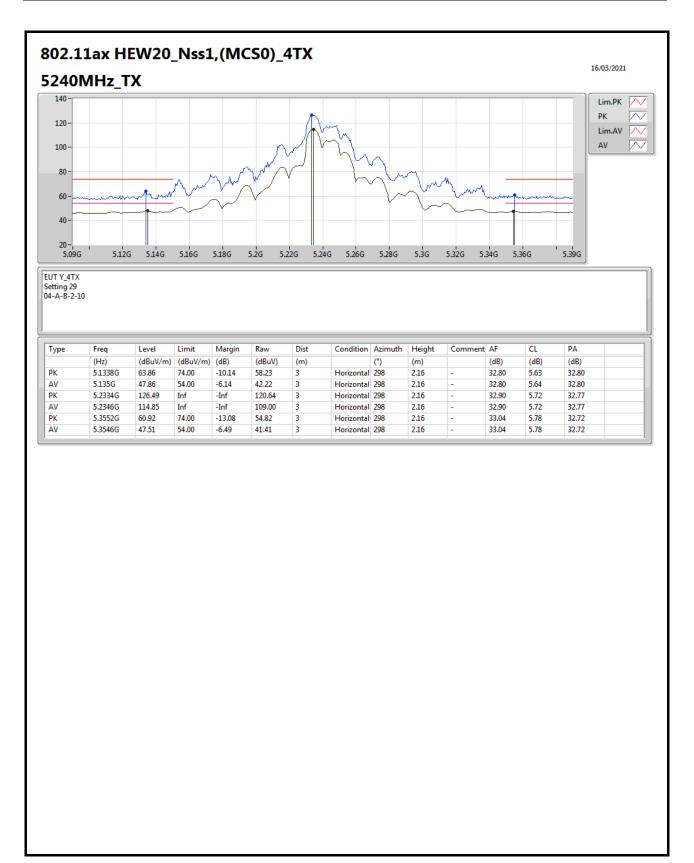




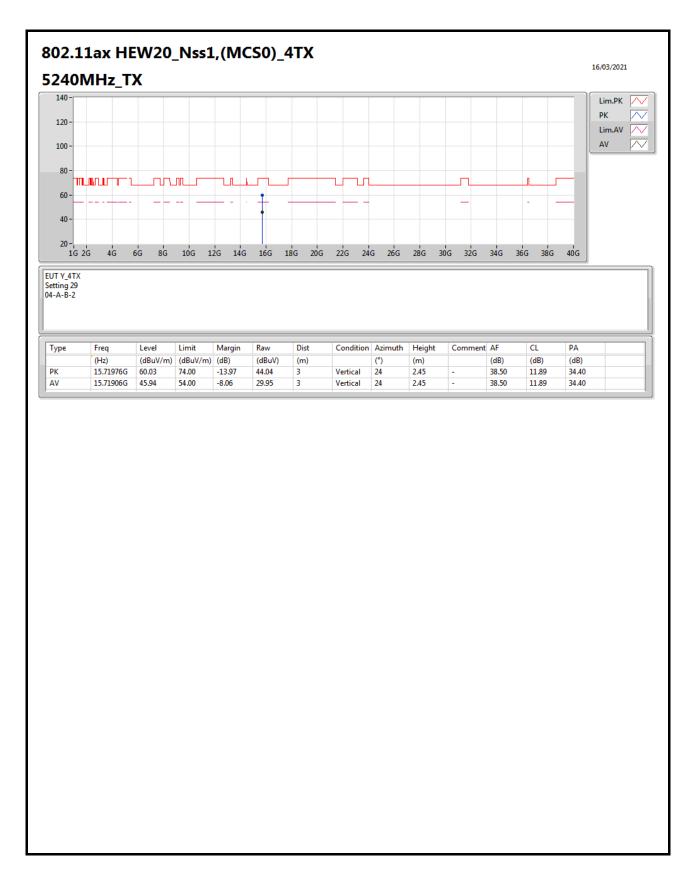
Page No. : 34 of 73

Report No. : FR112814-03AB

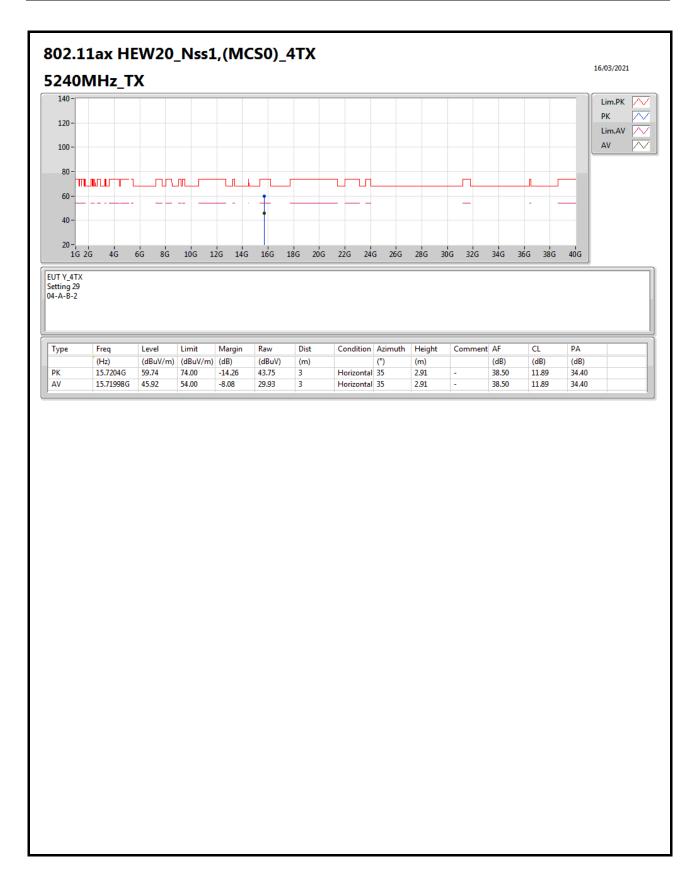




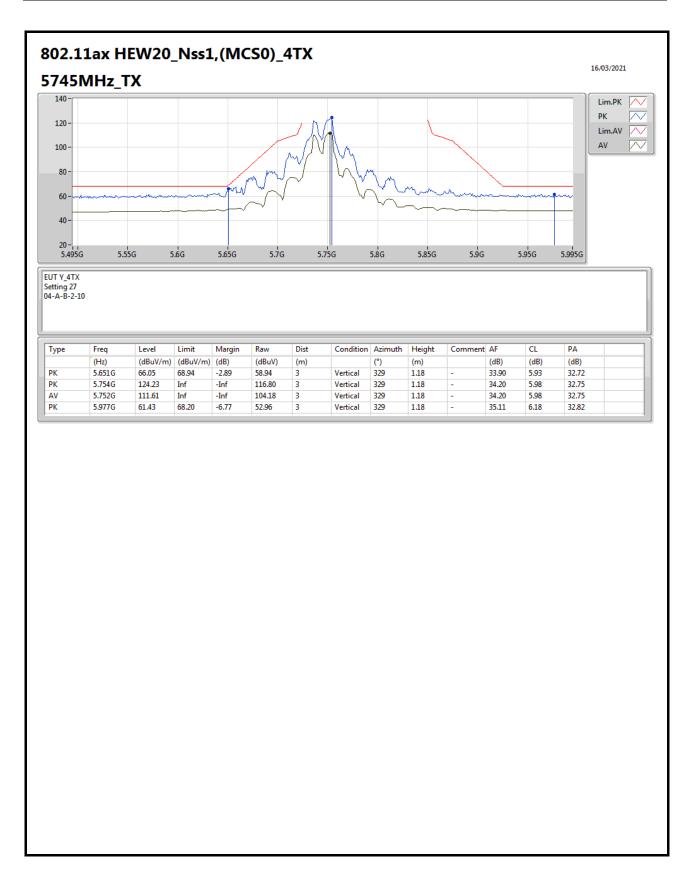








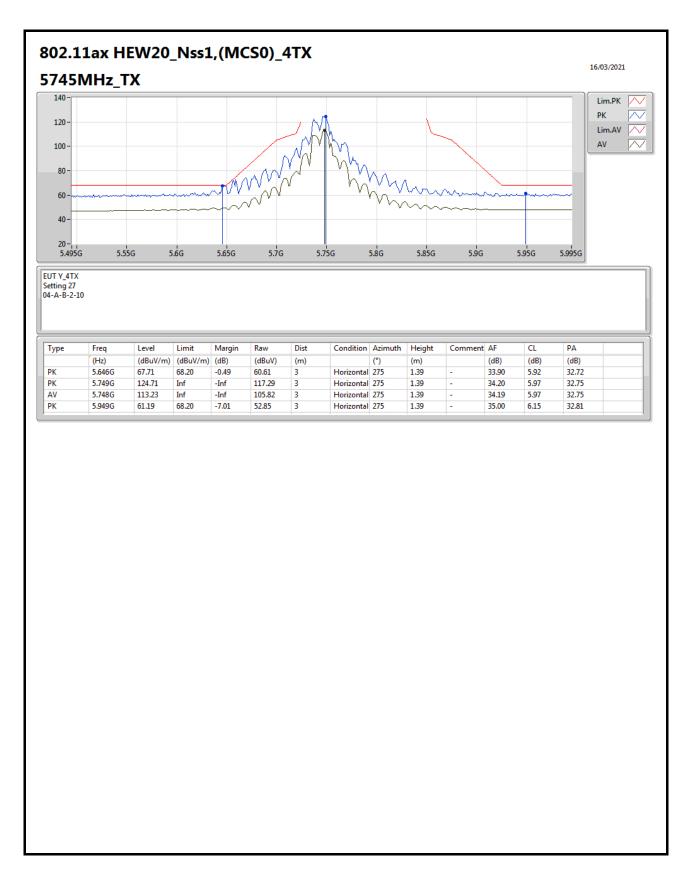




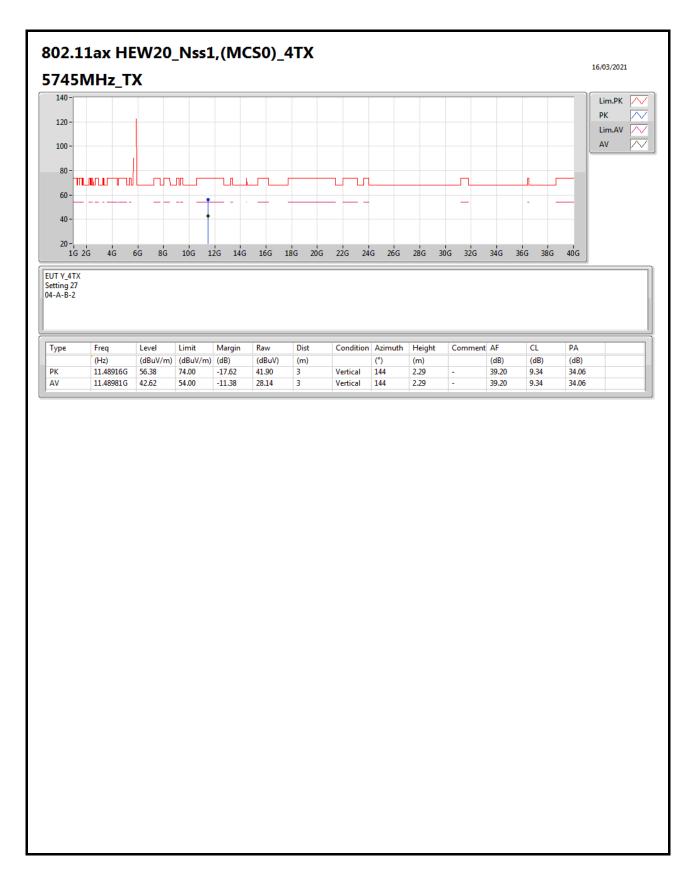
Page No. : 38 of 73

Report No. : FR112814-03AB

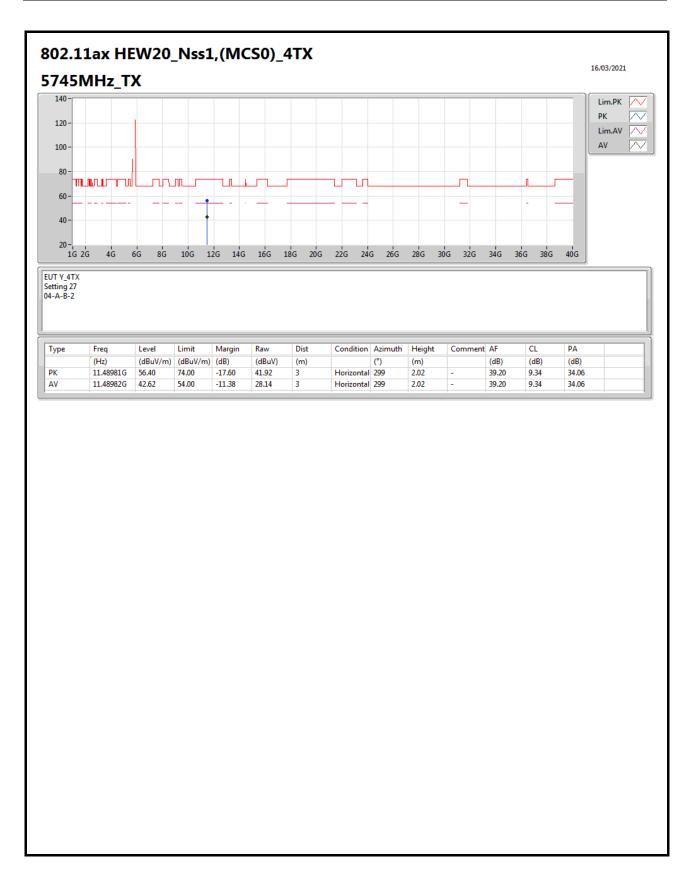








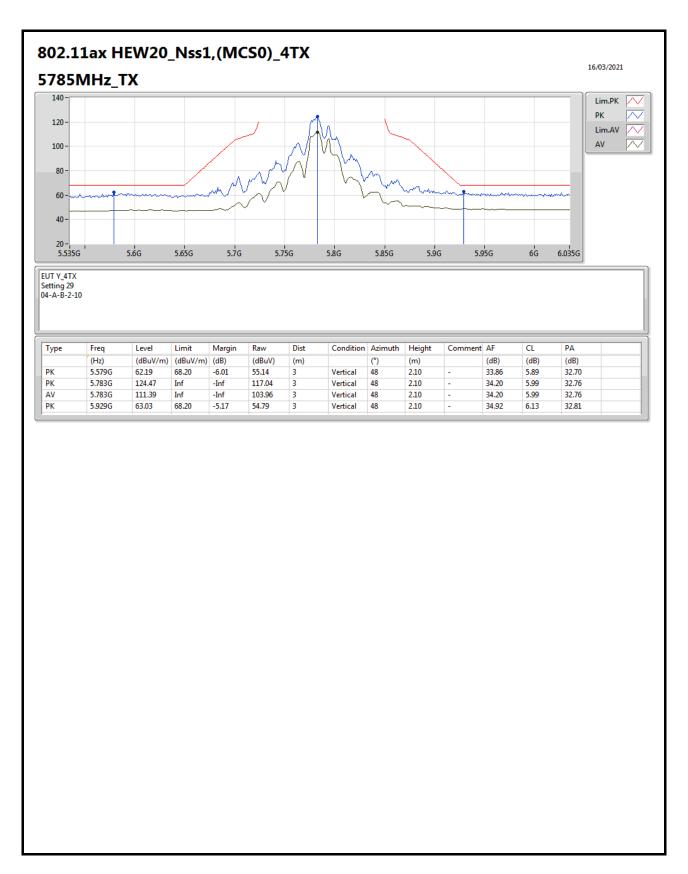




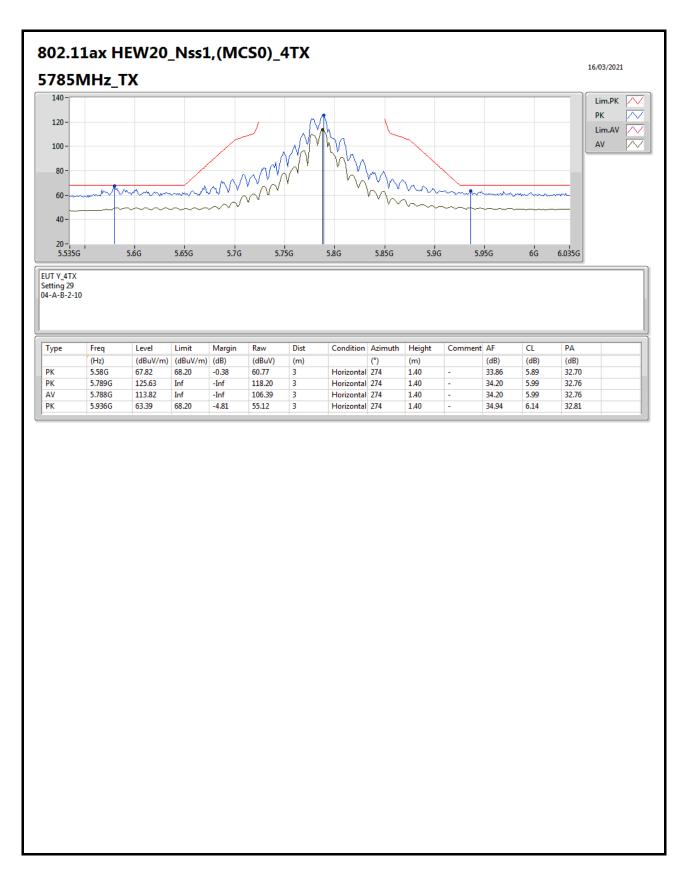
Page No. : 41 of 73

Report No. : FR112814-03AB

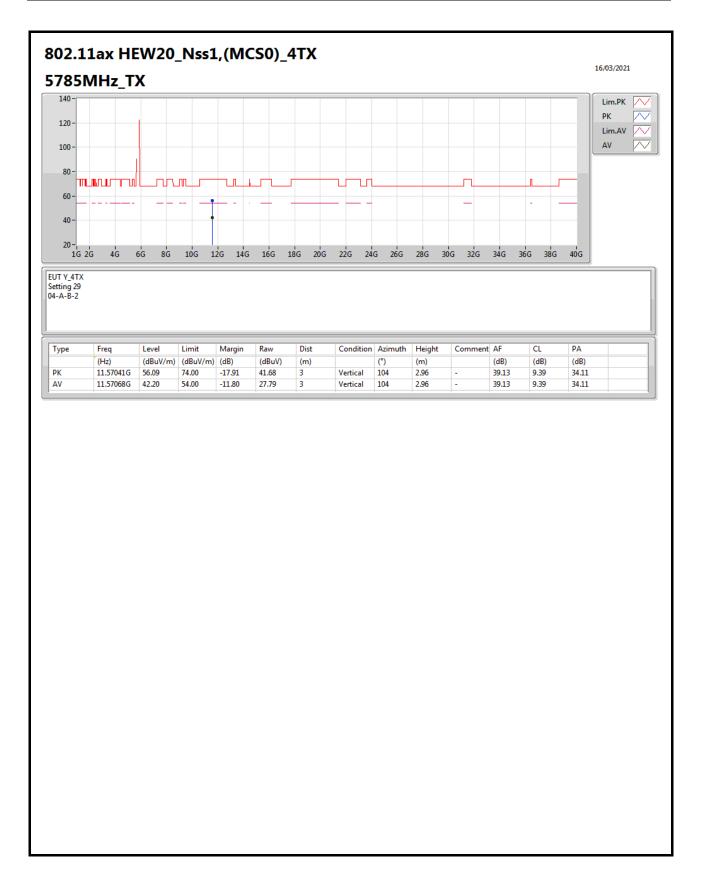




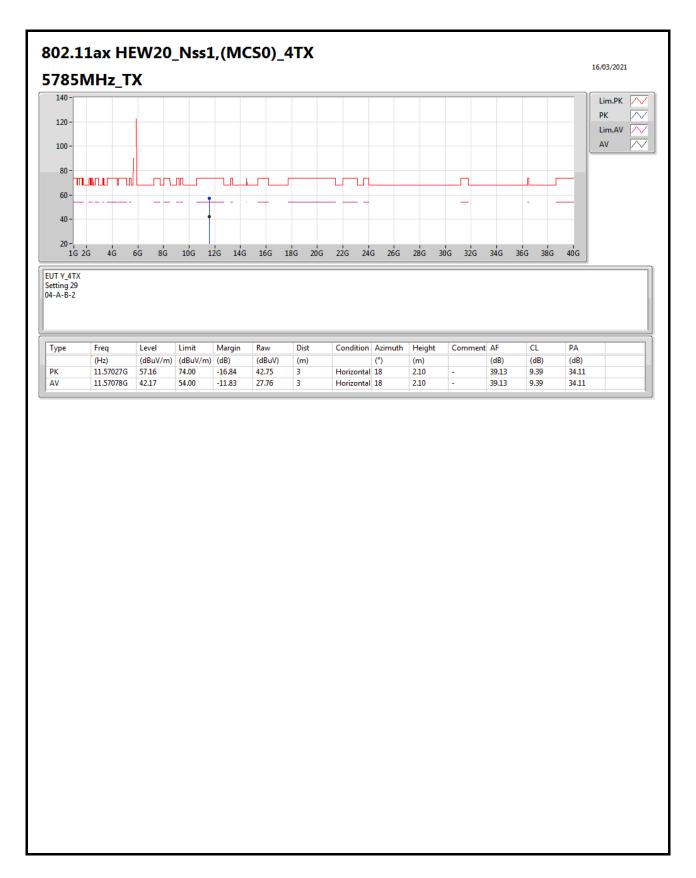




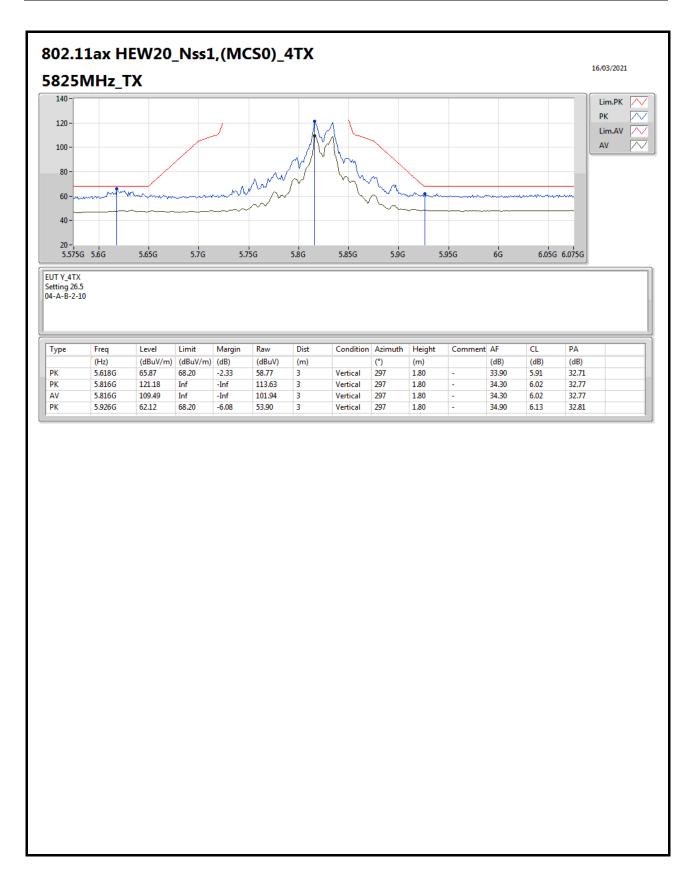




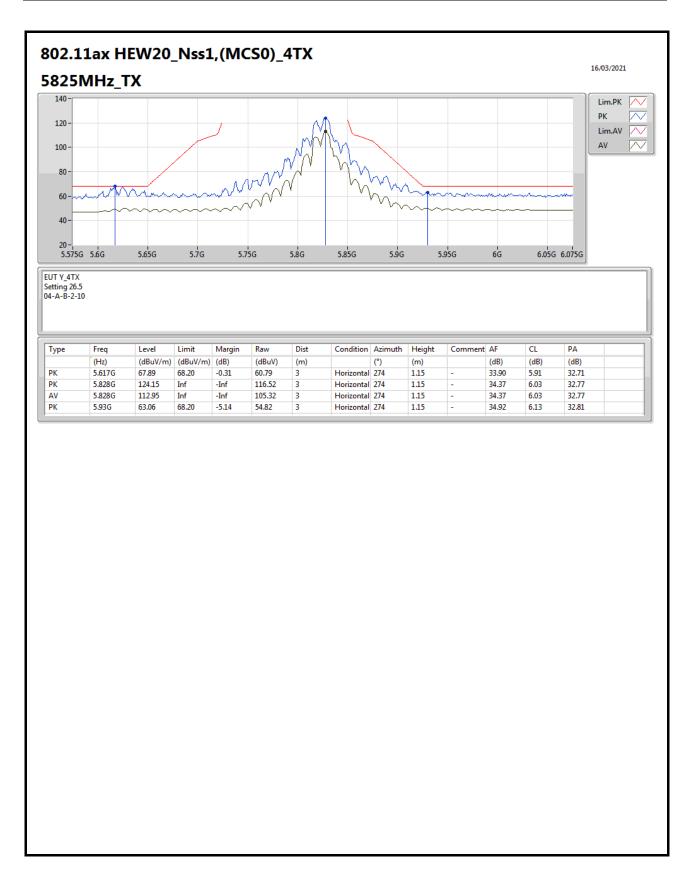




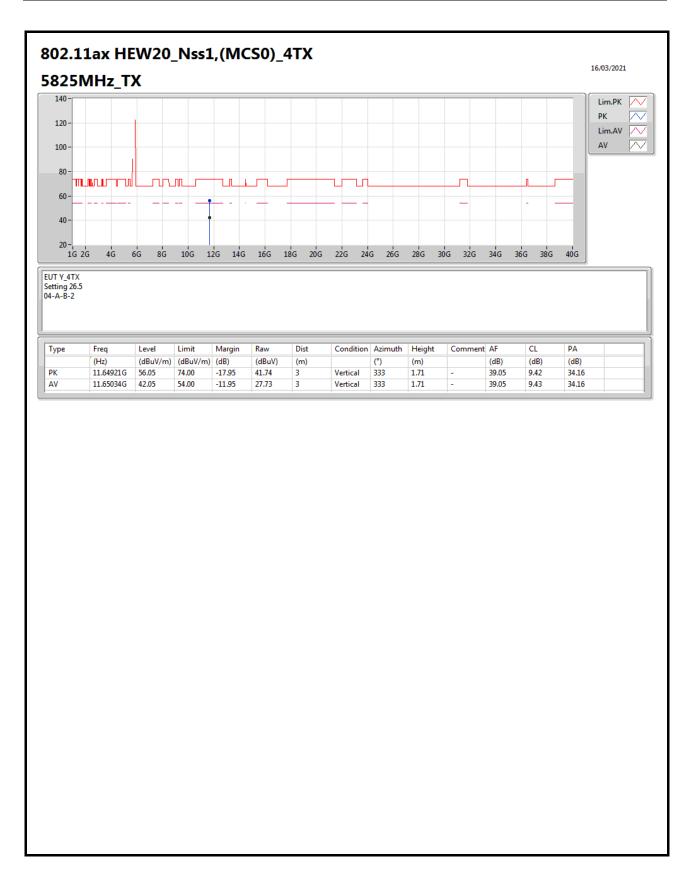




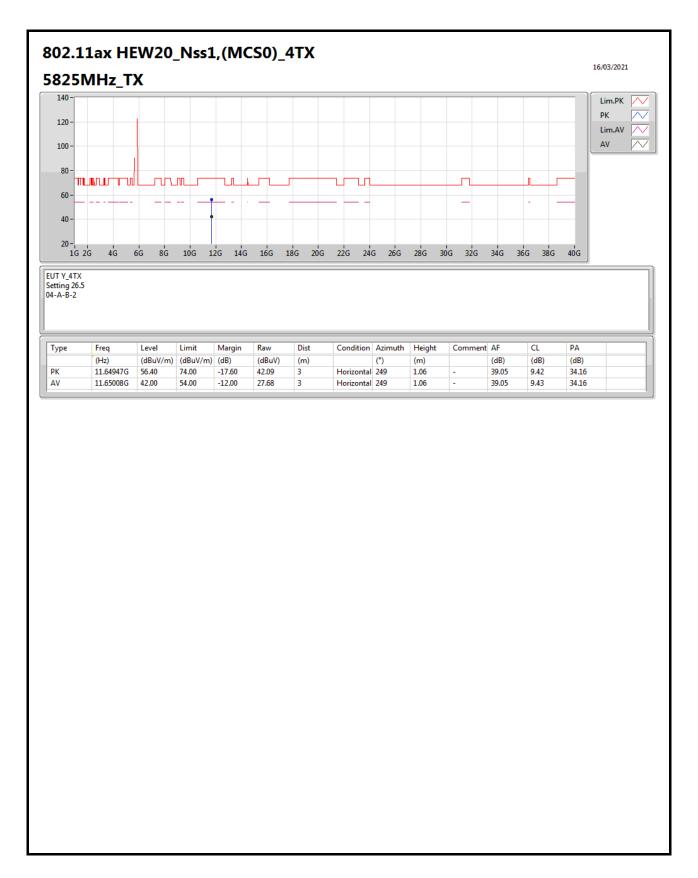




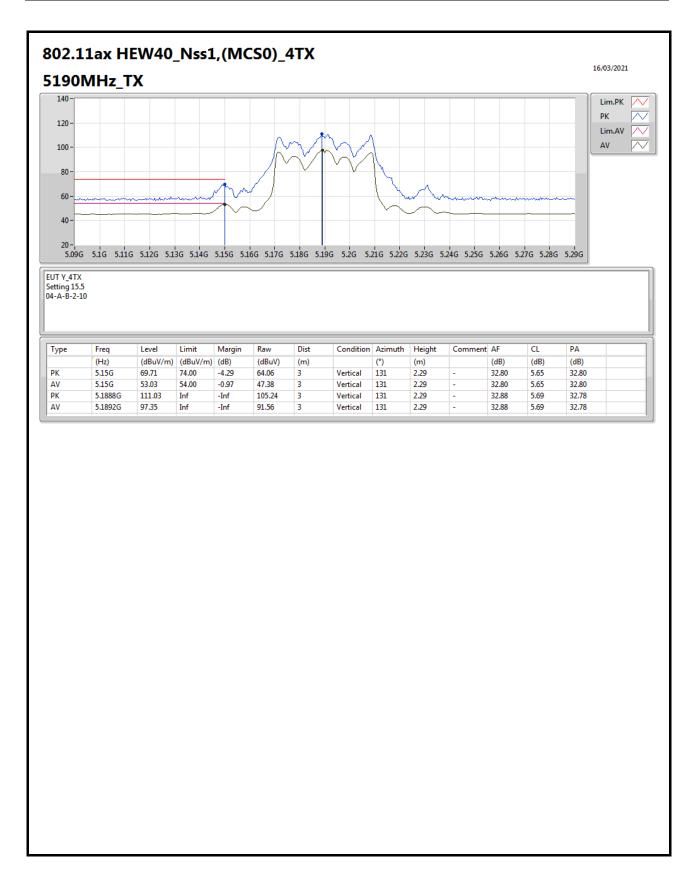




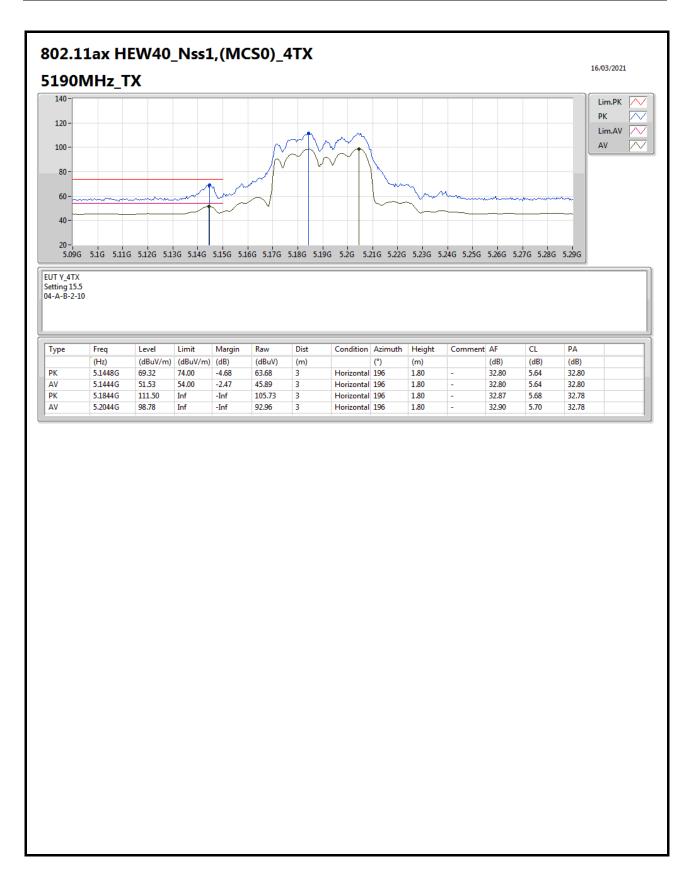




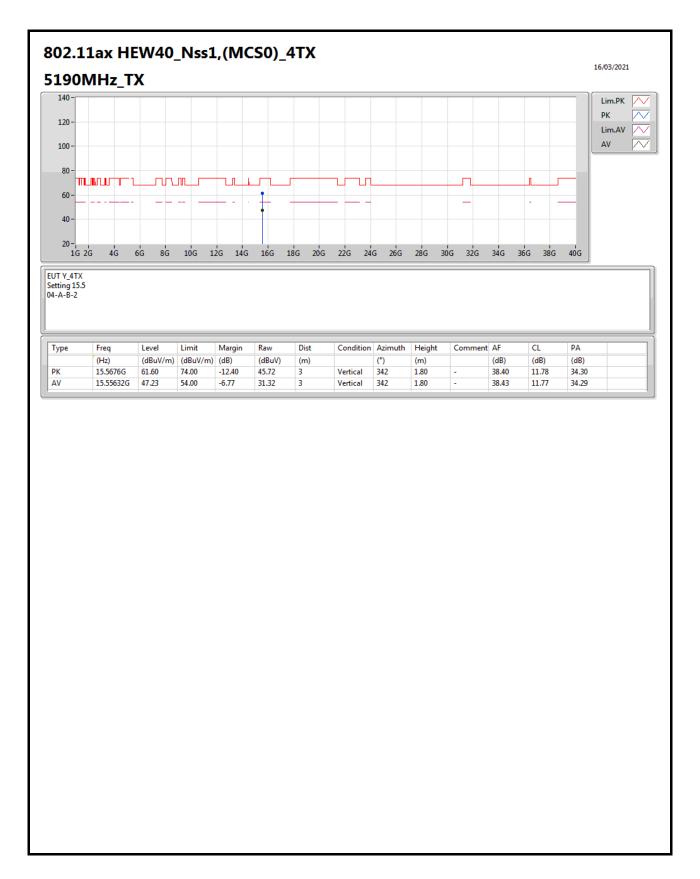




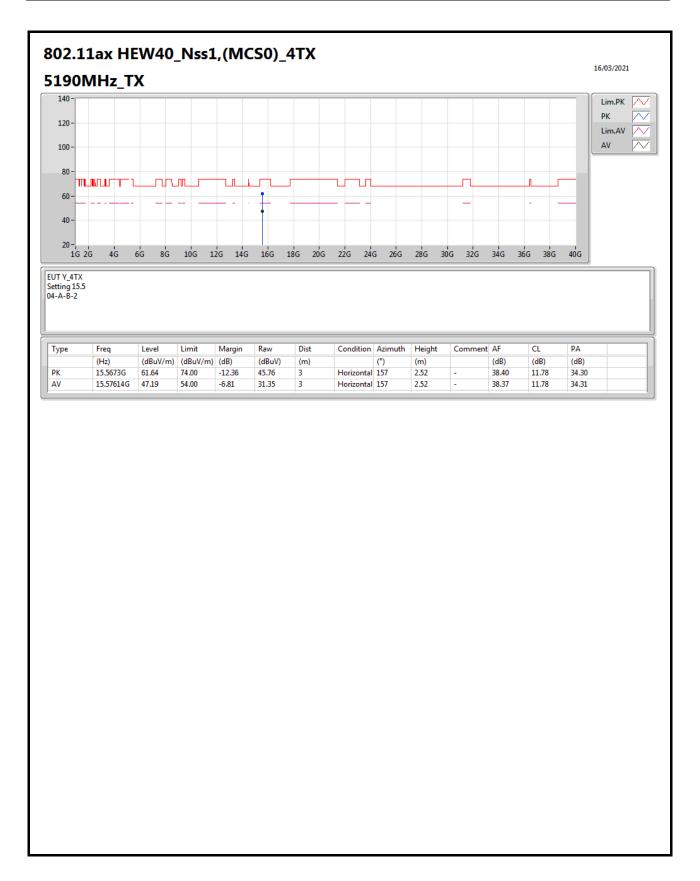




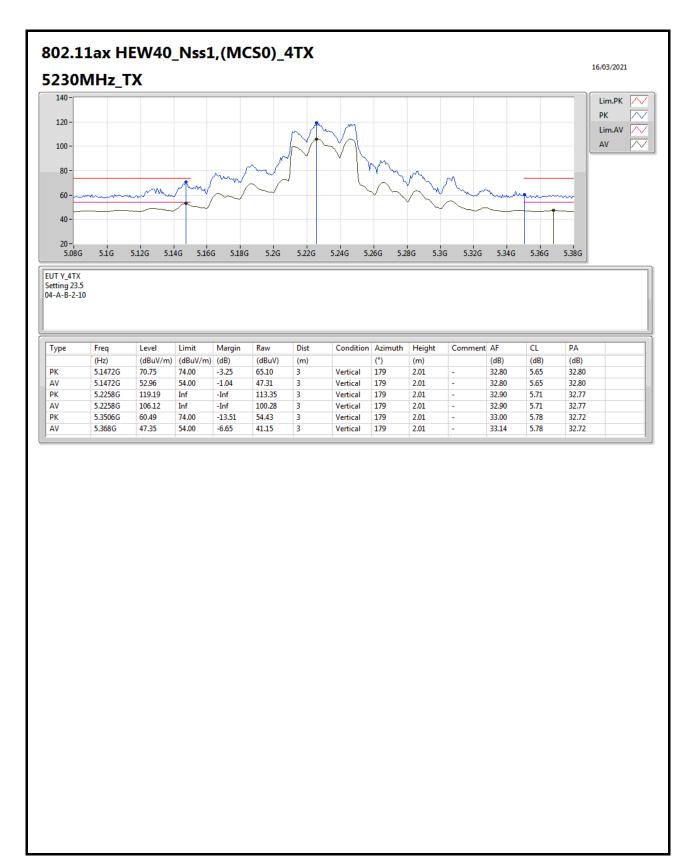




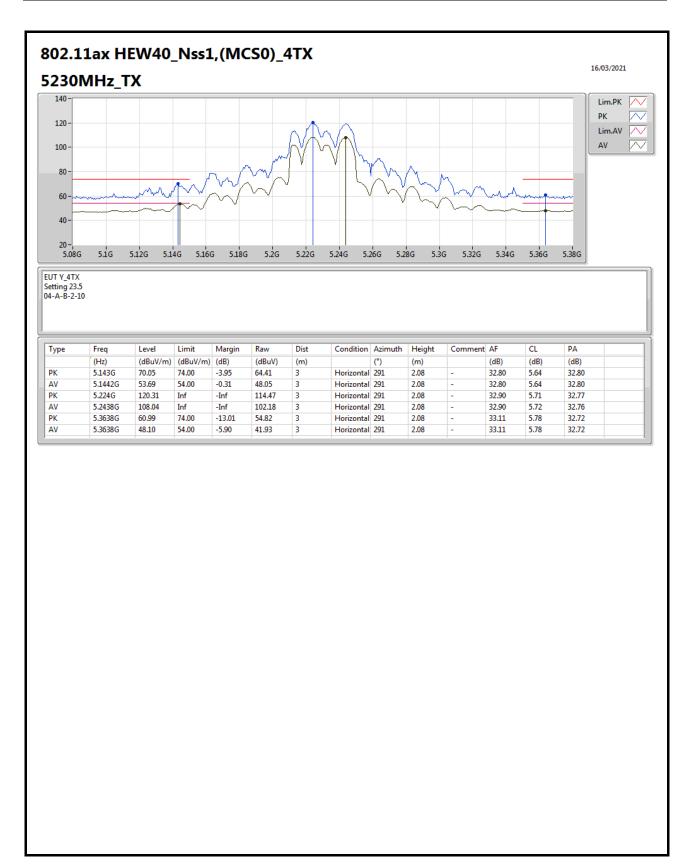




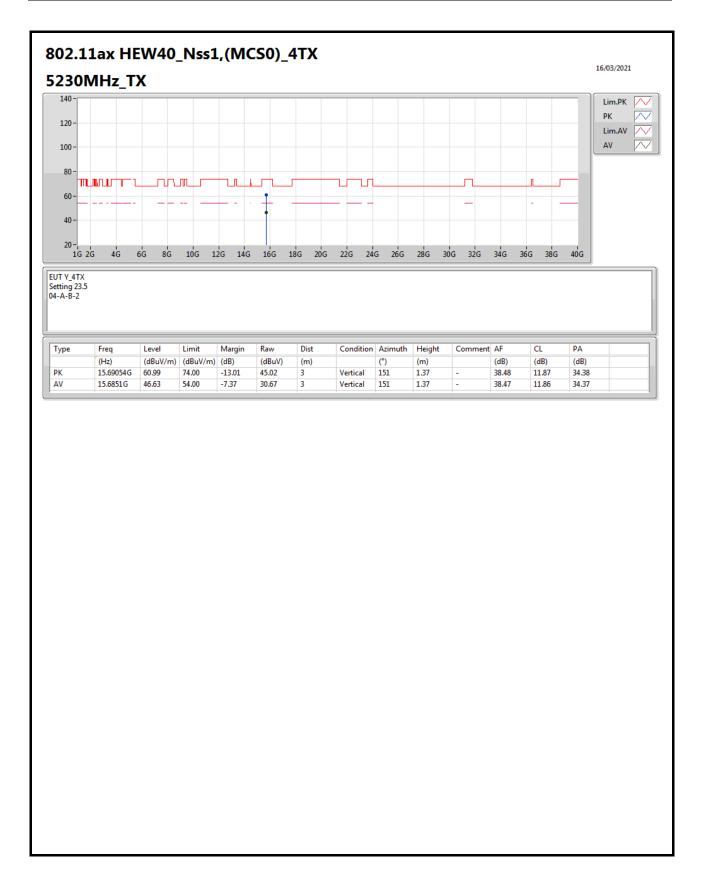




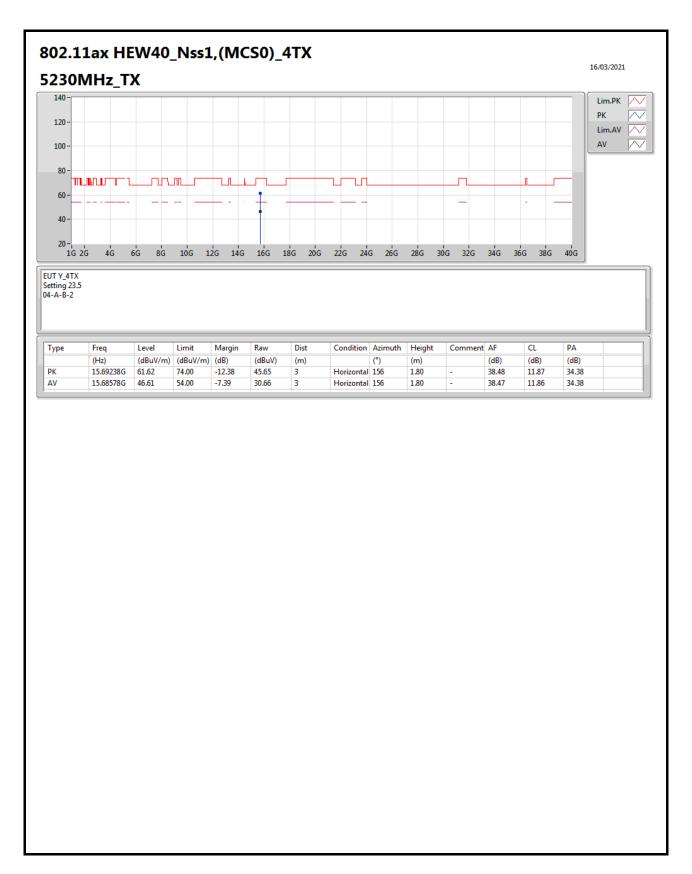




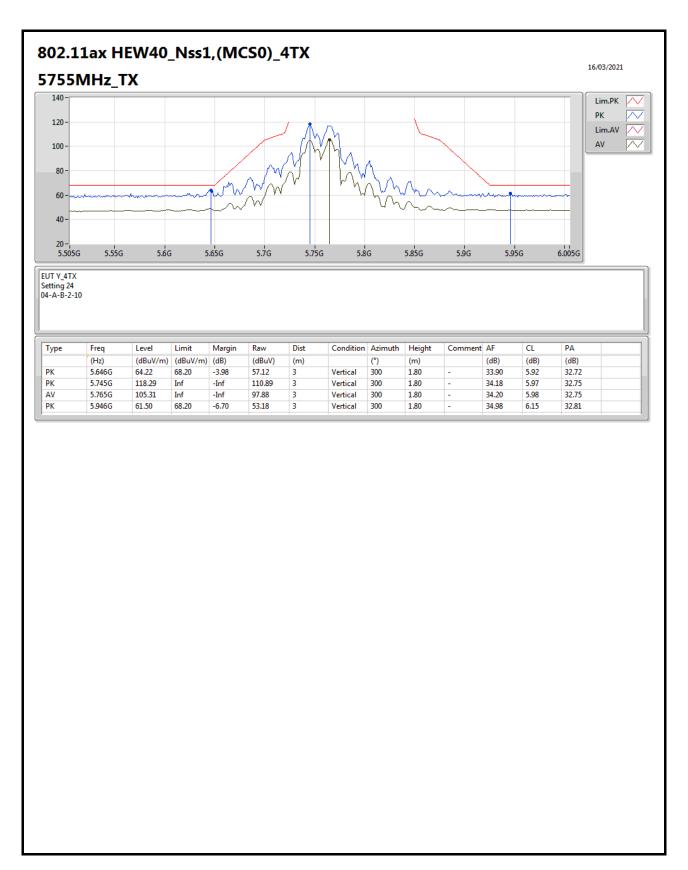






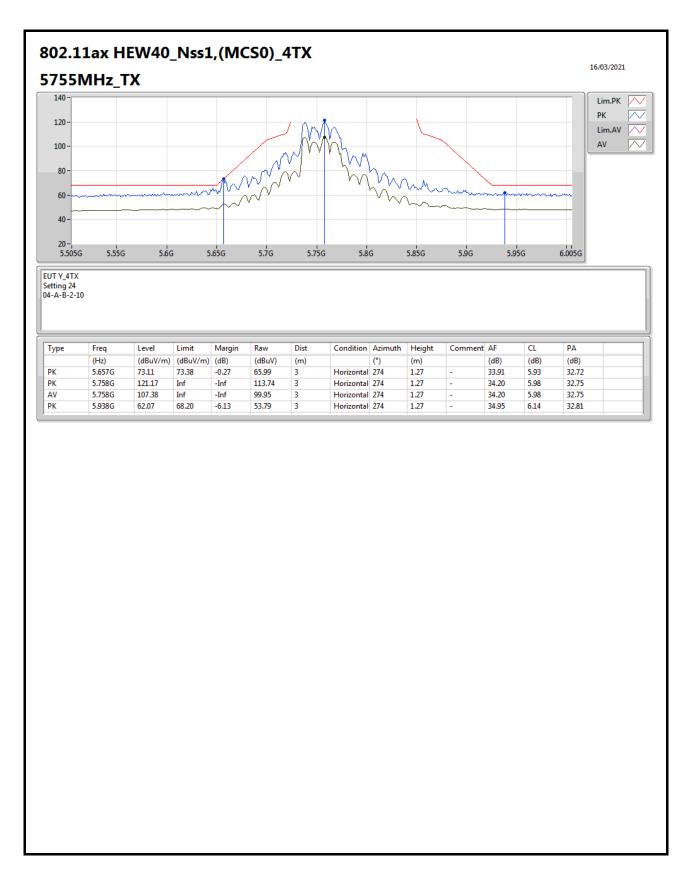




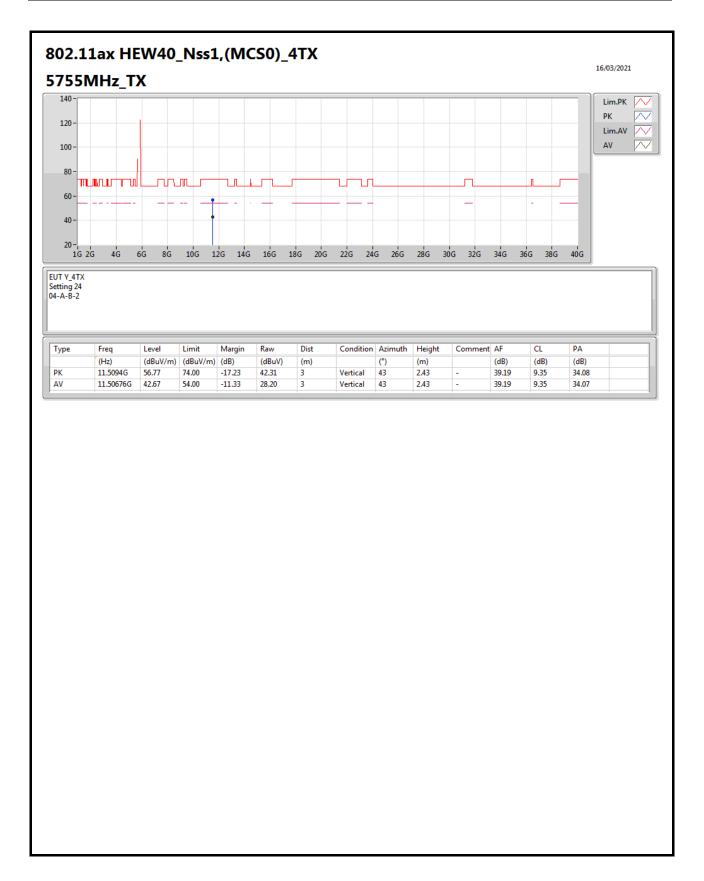


Page No. : 58 of 73 Report No. : FR112814-03AB

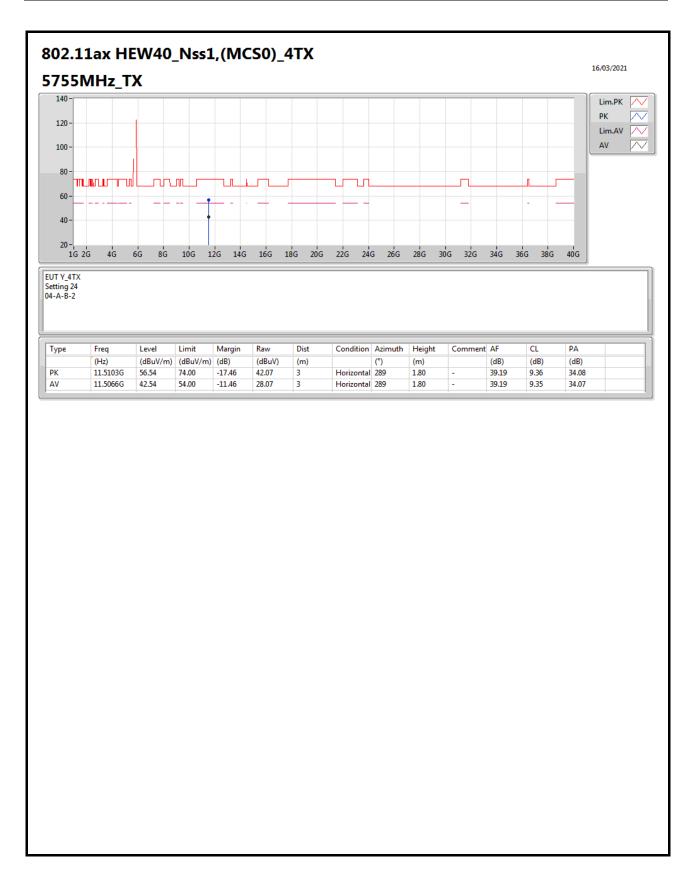




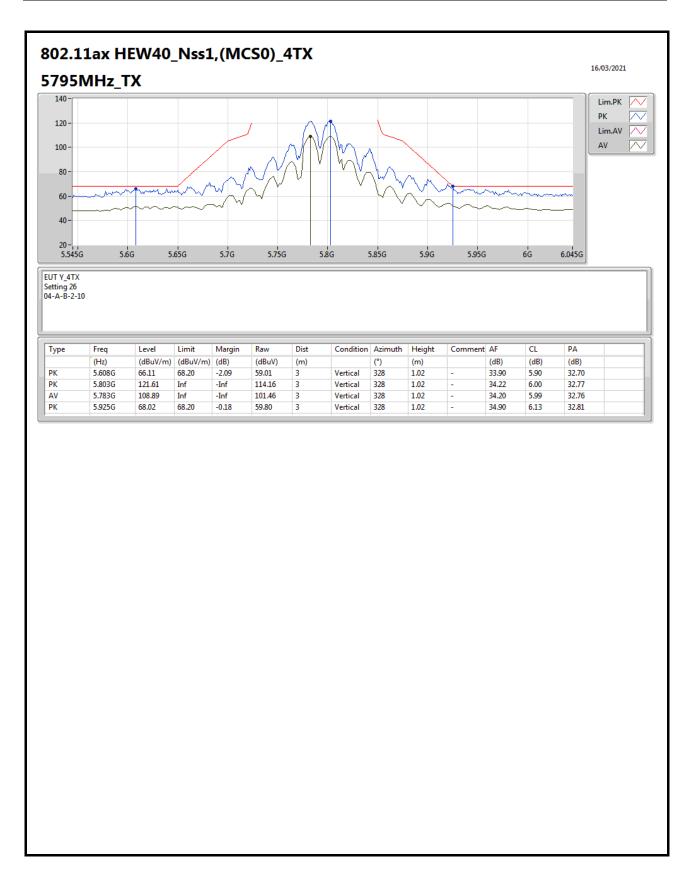




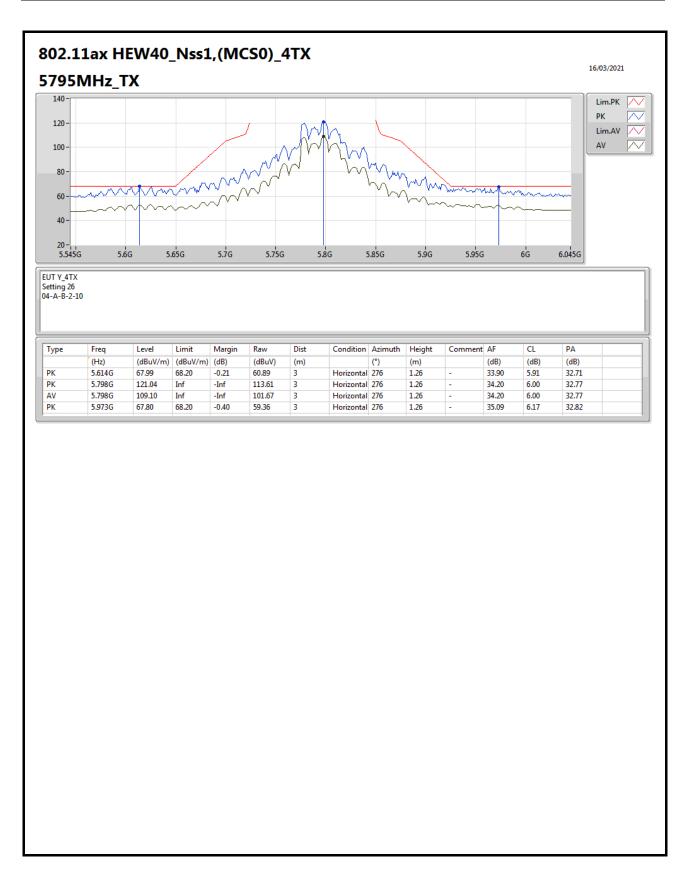




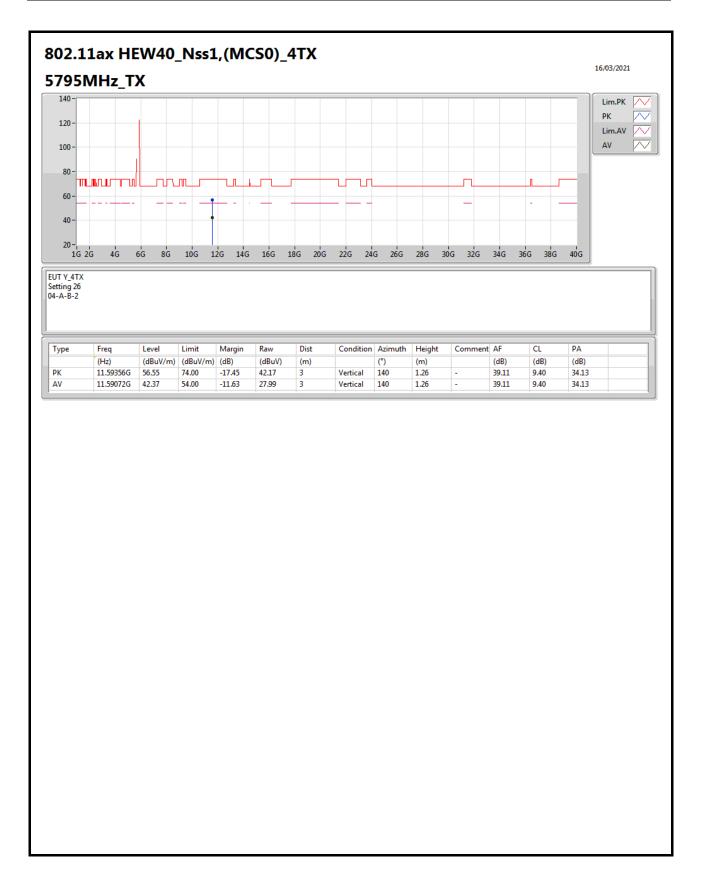




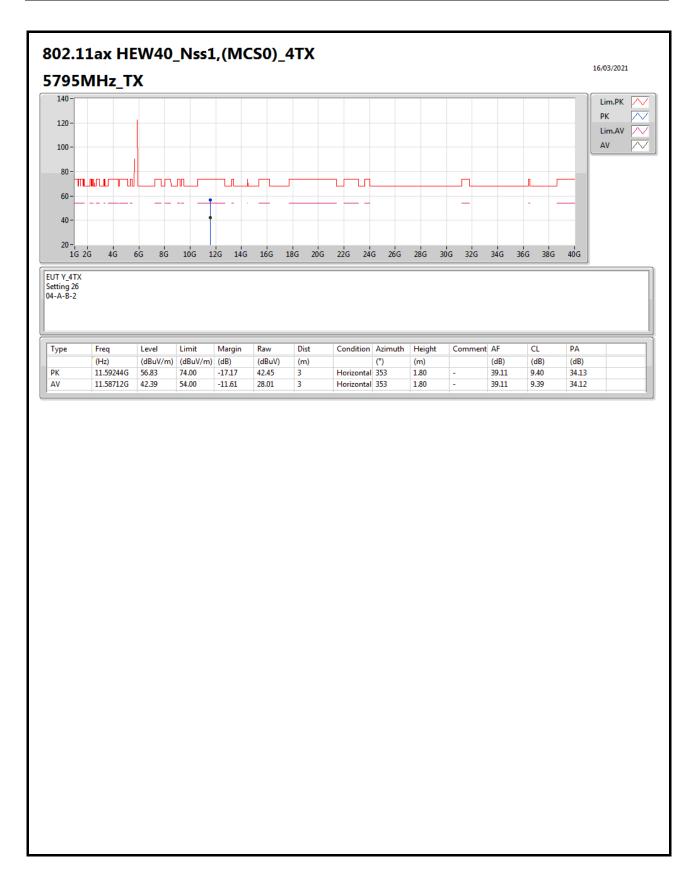




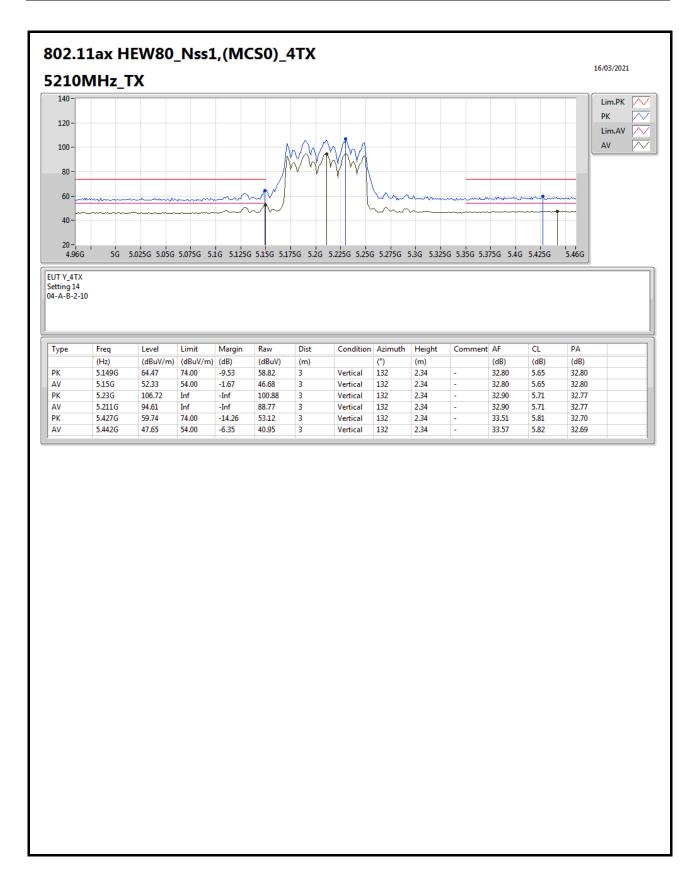




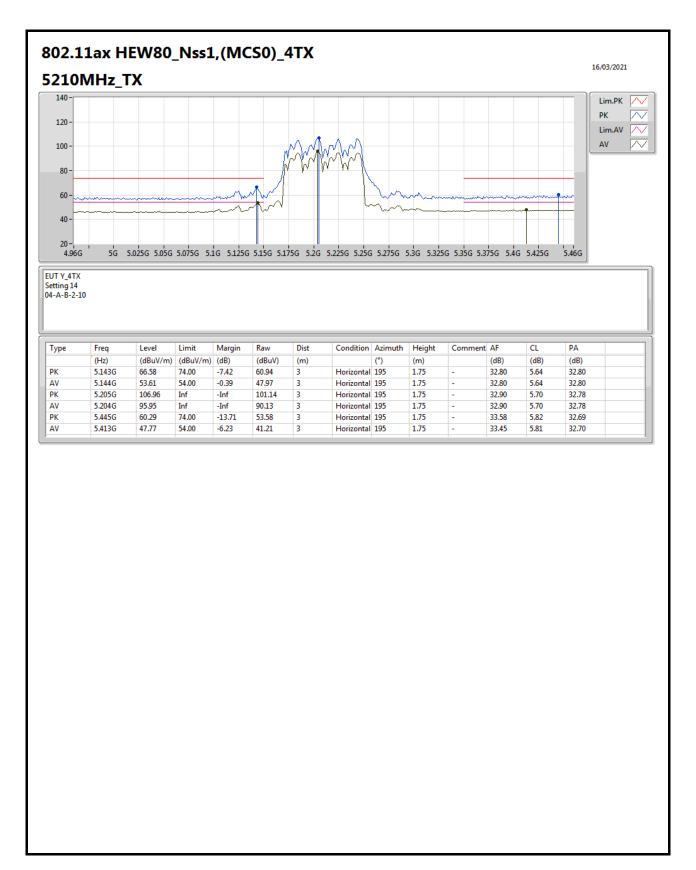




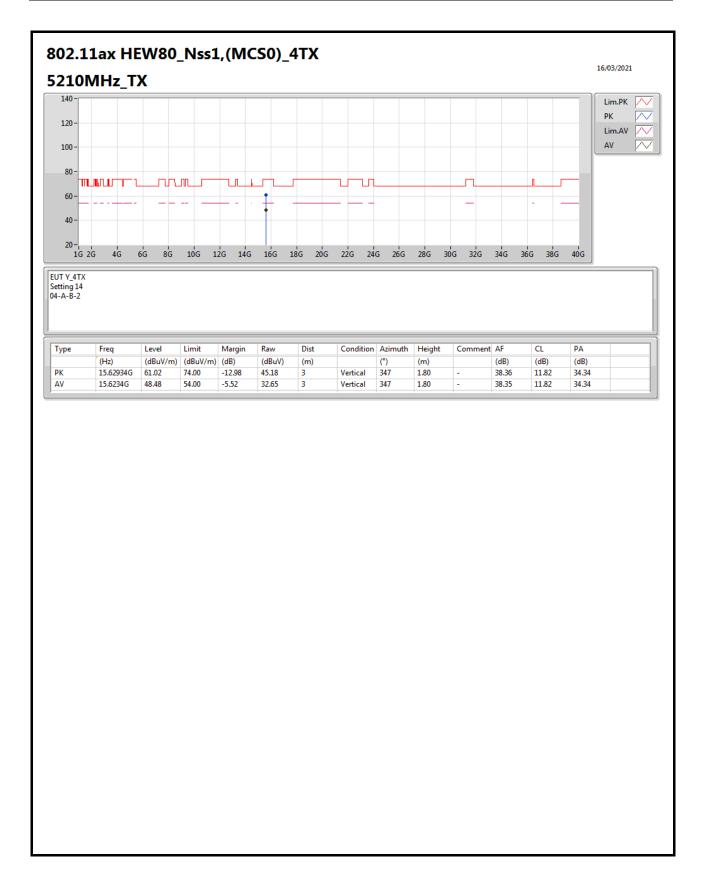




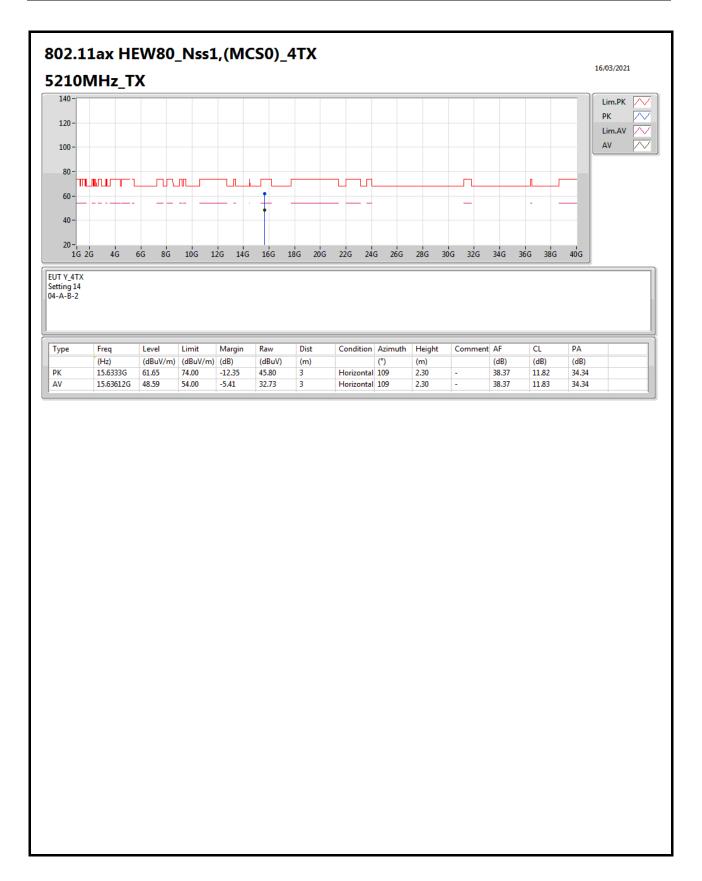




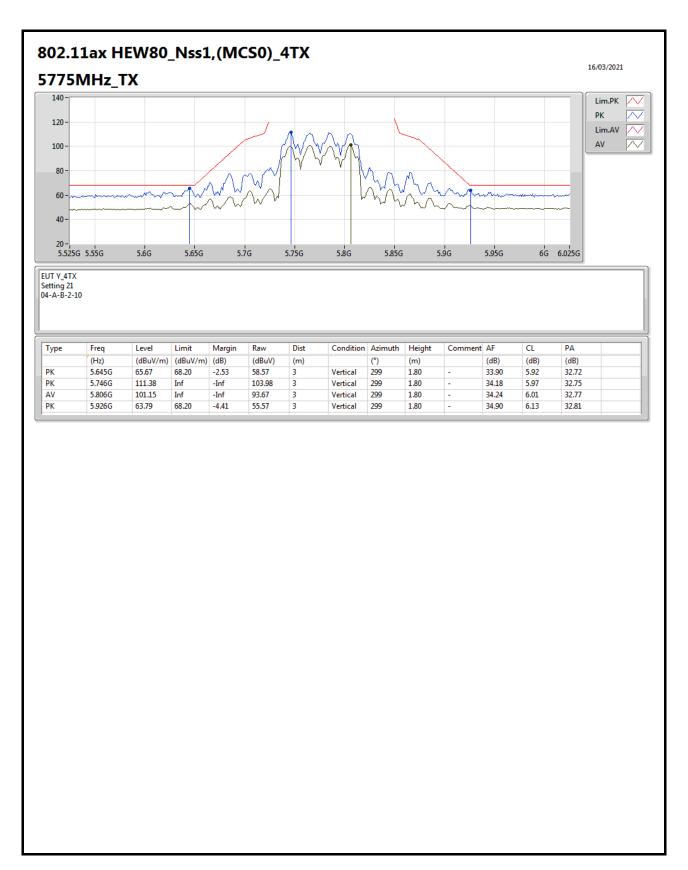




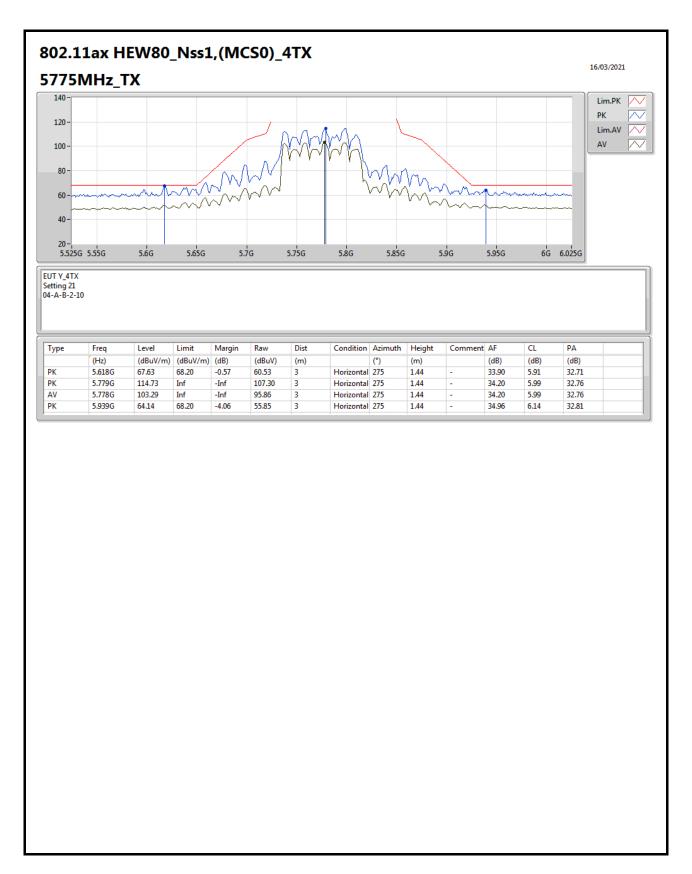




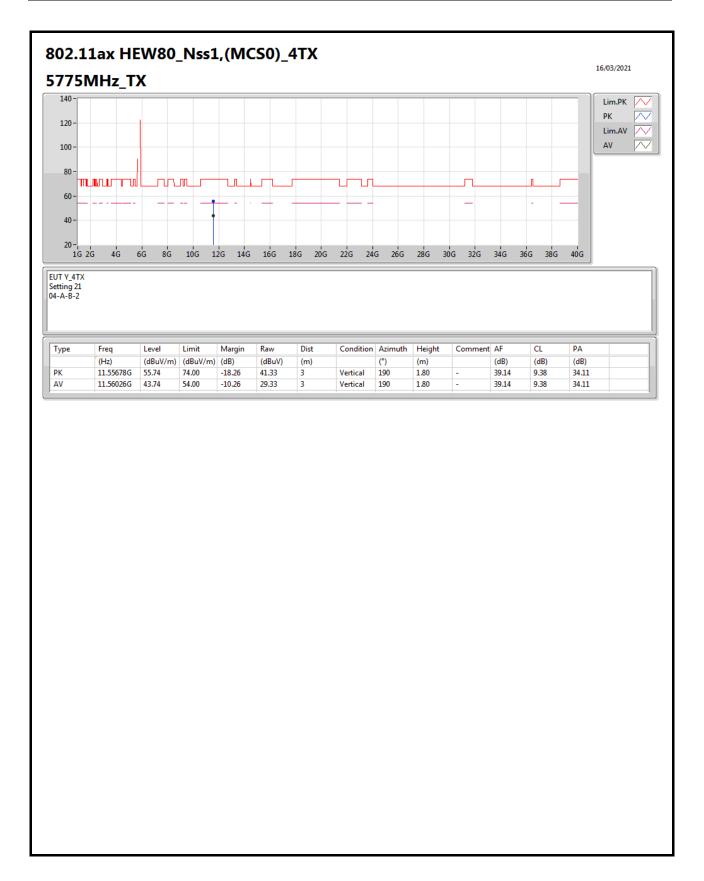








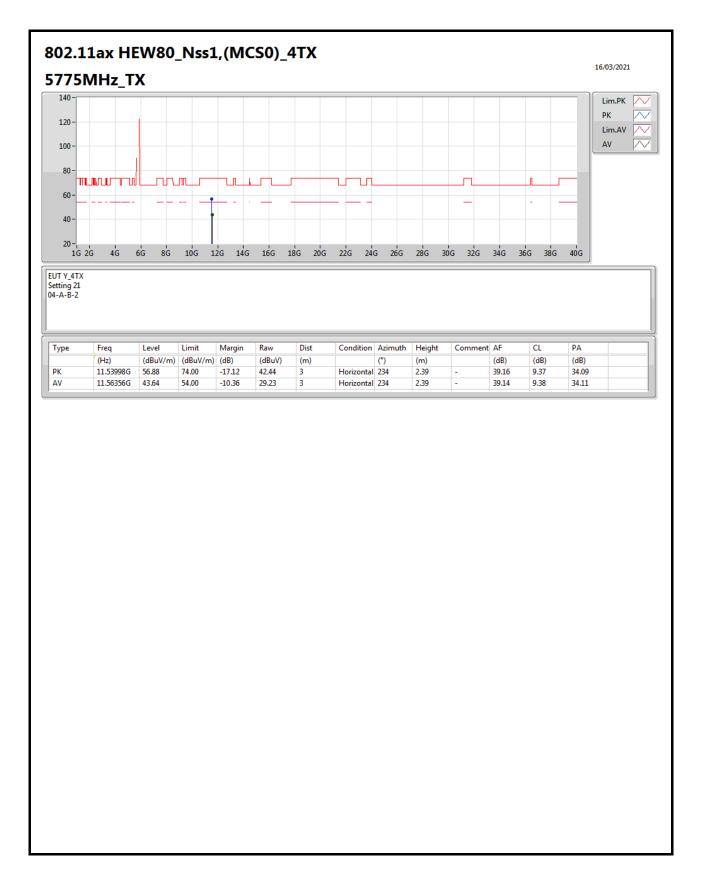




Page No. : 72 of 73

Report No. : FR112814-03AB





Page No. : 73 of 73 Report No. : FR112814-03AB