





# RADIO TEST REPORT

FCC ID

: UDX-600107010

Equipment

: SMART Camera

**Brand Name** 

: CISCO

**Model Name** 

: MV63X-HW, MV63-HW

**Applicant** 

: Cisco Systems, Inc.

Manufacturer

: Cisco Systems, Inc.

170 West Tasman Drive, San Jose, CA 95134 USA

170 West Tasman Drive, San Jose, CA 95134 USA

Standard

: 47 CFR FCC Part 15.247

The product was received on Sep. 14, 2022, and testing was started from Sep. 21, 2022 and completed on Oct. 11, 2022. 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-A10\_10 Ver1.3

Page Number

: 1 of 32

Issued Date

: Oct. 31, 2022

Report Version : 01

## **Table of Contents**

Histo	ory of this test report	3
Sumi	mary of Test Result	4
1	General Description	5
1.1	Information	5
1.2	Testing Location Information	8
1.3	Measurement Uncertainty	8
2	Test Configuration of EUT	9
2.1	Test Channel Mode	9
2.2	The Worst Case Measurement Configuration	10
2.3	EUT Operation during Test	12
2.4	Accessories	12
2.5	Support Equipment	13
2.6	Test Setup Diagram	14
3	Transmitter Test Result	17
3.1	AC Power-line Conducted Emissions	17
3.2	DTS Bandwidth	19
3.3	Maximum Conducted Output Power	20
3.4	Power Spectral Density	23
3.5	Emissions in Non-restricted Frequency Bands	25
3.6	Emissions in Restricted Frequency Bands	26
4	Test Equipment and Calibration Data	30
• •	endix A. Test Results of AC Power-line Conducted Emissions endix B. Test Results of DTS Bandwidth	

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

Report Template No.: CB-A10\_10 Ver1.3

Appendix H. Test Photos Photographs of EUT v01

**Appendix C. Test Results of Maximum Conducted Output Power** 

Appendix G. Test Results of Radiated Emission Co-location

Appendix E. Test Results of Emissions in Non-restricted Frequency Bands Appendix F. Test Results of Emissions in Restricted Frequency Bands

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

Page Number : 2 of 32

Report No.: FR291332AC

Issued Date : Oct. 31, 2022

Report Version : 01

# History of this test report

Report No.: FR291332AC

Report No.	Version	Description	Issued Date
FR291332AC	01	Initial issue of report	Oct. 31, 2022

TEL: 886-3-656-9065 Page Number : 3 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

# **Summary of Test Result**

Report No.: FR291332AC

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

## **Declaration of Conformity:**

- The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
- 2. The measurement uncertainty please refer to report "Measurement Uncertainty".

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

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

Reviewed by: Sam Chen Report Producer: Wendy Pan

TEL: 886-3-656-9065 Page Number : 4 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

# 1 General Description

## 1.1 Information

## 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), VHT20	2412-2462	1-11 [11]
2400-2483.5	n (HT40), VHT40	2422-2452	3-9 [7]

Report No.: FR291332AC

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	1TX
2.4-2.4835GHz	802.11g	20	1TX
2.4-2.4835GHz	802.11n HT20	20	1TX
2.4-2.4835GHz	VHT20	20	1TX
2.4-2.4835GHz	802.11n HT40	40	1TX
2.4-2.4835GHz	VHT40	40	1TX

#### Note:

- ◆ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
- BWch is the nominal channel bandwidth.

TEL: 886-3-656-9065 Page Number : 5 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

#### 1.1.2 Antenna Information

	ı	Port						Gain (dBi)																					
Ant.			Brand	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model Antenna	Connector WLAN		WLAN 5GHz			
,	WLAN	Bluetooth	Diana	Name	Туре		2.4GHz	UNII 1	UNII 2A	UNII 2C	UNII 3	Bluetooth																	
1	1	-	SERCOMM	HC910	PIFA Antenna	I-PEX	3.38	5.50	5.50	4.79	5.17	-																	
2	2	1	SERCOMM	HC910	PIFA Antenna	I-PEX	2.54	5.33	5.33	6.64	5.68	2.54																	

Report No.: FR291332AC

Note: The above information was declared by manufacturer.

#### For 2.4GHz function:

## For IEEE 802.11b/g/n/VHT mode (1TX/1RX):

The EUT supports the antenna with TX and RX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.

The Port 1 generated the worst case, so it was selected to test and record in the report.

#### For 5GHz function:

#### For IEEE 802.11a/n/ac mode (1TX/1RX):

#### For UNII 1 and UNII 2A:

The EUT supports the antenna with TX and RX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.

The Port 1 generated the worst case, so it was selected to test and record in the report.

#### For UNII2C and UNII 3:

The EUT supports the antenna with TX and RX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.

The Port 2 generated the worst case, so it was selected to test and record in the report.

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

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

TEL: 886-3-656-9065 Page Number : 6 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11b	0.99	0.04	n/a (DC>=0.98)	n/a (DC>=0.98)
802.11g	0.983	0.07	n/a (DC>=0.98)	n/a (DC>=0.98)
VHT20	0.983	0.07	n/a (DC>=0.98)	n/a (DC>=0.98)
VHT40	0.948	0.23	937.5u	3k

Report No.: FR291332AC

NI	^	+	_	•
١V	v	ι	J	

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

## 1.1.4 EUT Operational Condition

EUT Power Type	From PoE				
Beamforming Function		With beamforming	$\boxtimes$	Without beamforming	
Function	$\boxtimes$	Point-to-multipoint		Point-to-point	
<b>Test Software Version</b>	QRCT (Version :4.0.72.1)				

Note: The above information was declared by manufacturer.

## 1.1.5 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Brand Name	Model Name	EUT	Memory Capacities
CISCO	MV63X-HW	EUT 1	1TB
CISCO	MV63-HW	EUT 2	256GB

Note 1: From the above EUT 1 for all test items and EUT 2 for Emissions in Restricted Frequency Bands below 1GHz were selected as representative EUT for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

TEL: 886-3-656-9065 Page Number : 7 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 1.1.6 Applicable Standards

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

Report No.: FR291332AC

- 47 CFR FCC Part 15.247
- ANSI C63.10-2013

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

- FCC KDB 558074 D01 v05r02
- FCC KDB 414788 D01 v01r01

## 1.2 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	TH03-CB	Jay Lo	23.4-23.6 / 58-66	Sep. 23, 2022 ~ Sep. 26, 2022
Radiated <1GHz	03CH05-CB	Simmon Cheng	23.4~24.4 / 55~60	Sep. 28, 2022~ Sep. 29, 2022
Radiated >1GHz	03CH03-CB	Simmon Cheng	22.9~23.8 / 56~57	Sep. 21, 2022~ Sep. 24, 2022
Radiated Co-location	03CH05-CB	Simmon Cheng	24.9~25.2 / 61~63	Oct. 11, 2022
AC Conduction	CO02-CB	Joe Chu	22~23 / 59~60	Sep. 29, 2022

# 1.3 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	3.2 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.2 dB	Confidence levels of 95%
Bandwidth Measurement	2.0 %	Confidence levels of 95%

TEL: 886-3-656-9065 Page Number : 8 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

# 2 Test Configuration of EUT

## 2.1 Test Channel Mode

Mode	Power Setting
802.11b_Nss1,(1Mbps)_1TX	-
2412MHz	17.5
2417MHz	
2437MHz	18
2457MHz	
2462MHz	18.5
802.11g_Nss1,(6Mbps)_1TX	-
2412MHz	18
2417MHz	21
2437MHz	23.5
2457MHz	22
2462MHz	19.5
VHT20_Nss1,(MCS0)_1TX	-
2412MHz	17.5
2417MHz	21
2437MHz	23.5
2457MHz	22
2462MHz	19
VHT40_Nss1,(MCS0)_1TX	-
2422MHz	14
2427MHz	15
2437MHz	18
2452MHz	15.5

Report No.: FR291332AC

#### Note:

• Evaluated VHT20/VHT40 mode only due to the similar modulation. The power setting of HT20/HT40 mode are the same or lower than VHT20/VHT40.

TEL: 886-3-656-9065 Page Number : 9 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

# 2.2 The Worst Case Measurement Configuration

Th	The Worst Case Mode for Following Conformance Tests		
Tests Item	AC power-line conducted emissions		
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz		
Operating Mode	Normal Link		
1	EUT 1 connected via Ethernet - Day mode + PoE 1		
2	2 EUT 1 connected via Ethernet - Night mode + PoE 1		
Mode 2 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 ~ 6 will follow this same test mode.			
3	EUT 1 connected via WLAN 2.4GHz - Night mode + PoE 1		
4	EUT 1 connected via WLAN 2.4GHz - Night mode + PoE 2		
5	EUT 1 connected via WLAN 5GHz - Night mode + PoE 1		
6	EUT 1 connected via WLAN 5GHz - Night mode + PoE 2		
For operating mode 2 is the worst case and it was record in this test report.			

Report No.: FR291332AC

The Worst Case Mode for Following Conformance Tests		
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands	
Test Condition	Conducted measurement at transmit chains	
Test Mode	EUT 1	

TEL: 886-3-656-9065 Page Number : 10 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

	e Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands	
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.	
Operating Mode < 1GHz	Normal Link	
1	EUT 1 at Z axis connected via Ethernet - Day mode + PoE 1	
2	EUT 1 at Y axis connected via Ethernet - Day mode + PoE 1	
3	EUT 1 at X axis connected via Ethernet - Day mode + PoE 1	
Mode 2 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4 will follow this same test mode.		
4	EUT 1 at Y axis connected via Ethernet - Night mode + PoE 1	
Mode 4 has been evaluate follow this same test mode	ed to be the worst case among Mode 1 $\sim$ 4, thus measurement for Mode 5 $\sim$ 8 will $\sim$	
5	EUT 1 at Y axis connected via WLAN 2.4GHz - Night mode + PoE 1	
6	EUT 1 at Y axis connected via WLAN 2.4GHz - Night mode + PoE 2	
7	EUT 1 at Y axis connected via WLAN 5GHz - Night mode + PoE 1	
8	EUT 1 at Y axis connected via WLAN 5GHz - Night mode + PoE 2	
Mode 4 has been evaluate this same test mode.	d to be the worst case among Mode 1~8, thus measurement for Mode 9 will follow	
9	EUT 2 at Y axis connected via Ethernet - Night mode + PoE 1	
For operating mode 9 is the	e 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 X axis. So the measurement will follow this same test configuration.	
1	EUT 1 at X axis	

Report No.: FR291332AC

The Worst Case Mode for Following Conformance Tests		
Tests Item Simultaneous Transmission Analysis - Radiated Emission Co-location		
Test Condition Radiated measurement		
Operating Mode Normal Link		
1	EUT 1 at Y axis + Bluetooth+WLAN 2.4GHz	
2 EUT 1 at Y axis + Bluetooth+WLAN 5GHz		

TEL: 886-3-656-9065 Page Number : 11 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

The Worst Case Mode for Following Conformance Tests			
Tests Item Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation			
Operating Mode			
1 EUT 1 + Bluetooth+WLAN 2.4GHz			
2 EUT 1 + Bluetooth+WLAN 5GHz			
Refer to Sporton Test Report No.: FA291332 for Co-location RF Exposure Evaluation.			

Report No.: FR291332AC

Note: The PoEs are for measurement only, would not be marketed.

PoEs information as below:

Power	Brand	Model
PoE 1	PHIHONG	POEA33U-1ATE
PoE 2	CISCO	MA-PWR-MV-LV

## 2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

## 2.4 Accessories

Wall Bracket\*4

TEL: 886-3-656-9065 Page Number : 12 of 32
FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

# 2.5 Support Equipment

## For AC Conduction:

Support Equipment				
No.				
Α	PoE 1	PHIHONG	POEA33U-1ATE	N/A
В	LAN NB	DELL	E6430	N/A
С	Smart phone	Samsung	Galaxy J2	N/A

Report No.: FR291332AC

## For Radiated (below 1GHz):

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	PoE 1	PHIHONG	POEA33U-1ATE	N/A	
В	Notebook	Lenovo	L440	N/A	
С	iPhone 12	Apple	A2403	BCG-E3544A	

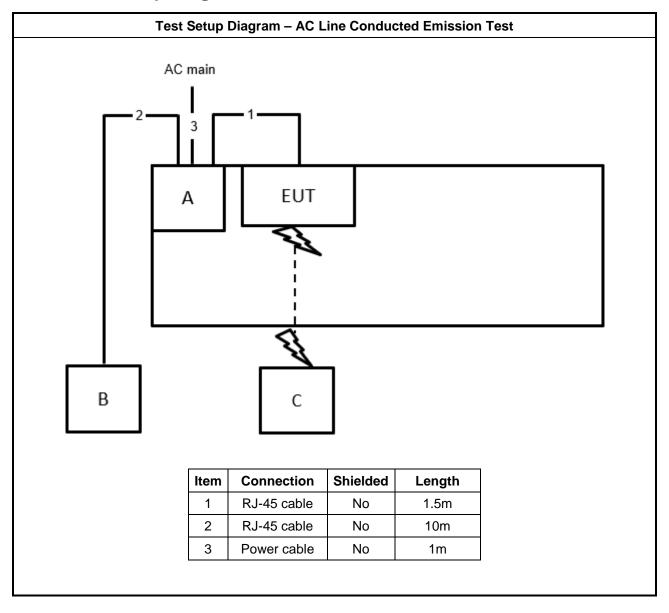
#### For Radiated (above 1GHz) and RF Conducted:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Notebook	Lenovo	L440	N/A	
В	PoE 1	PHIHONG	PORA33U-1ATE	N/A	

TEL: 886-3-656-9065 Page Number : 13 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022



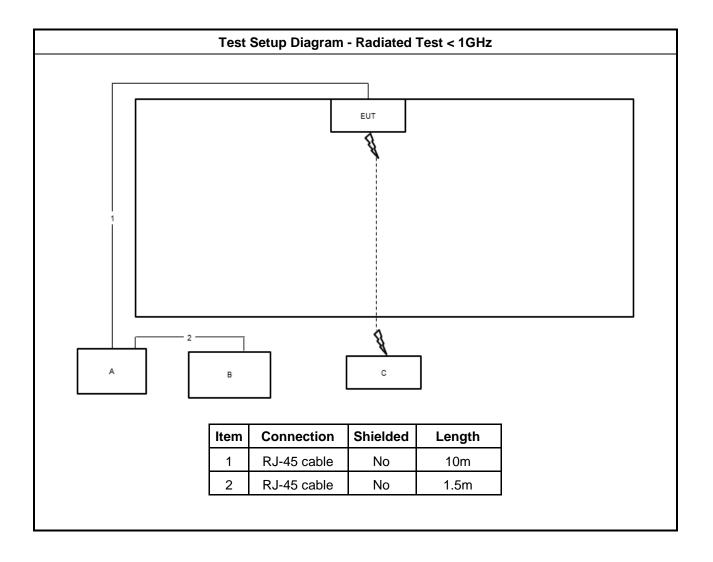
#### **Test Setup Diagram** 2.6



Report No.: FR291332AC

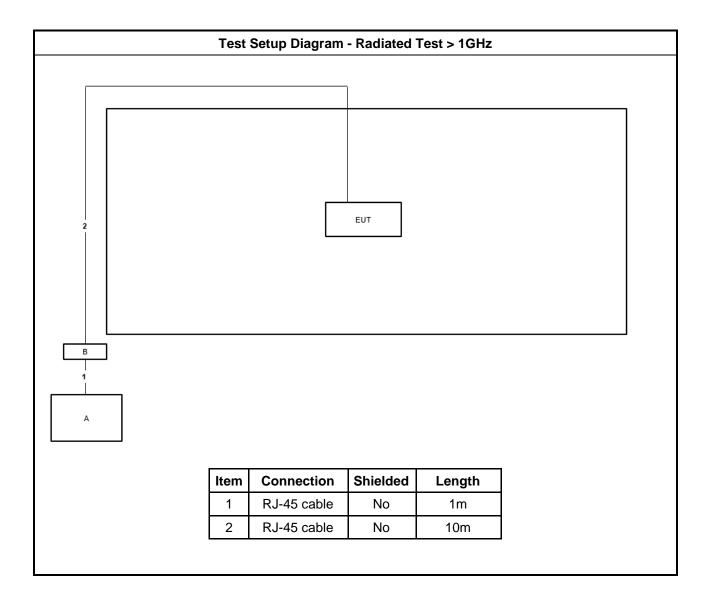
: 14 of 32 TEL: 886-3-656-9065 Page Number FAX: 886-3-656-9085 : Oct. 31, 2022 Issued Date

Report No.: FR291332AC



TEL: 886-3-656-9065 Page Number : 15 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

Report No.: FR291332AC



TEL: 886-3-656-9065 Page Number : 16 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 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.		

Report No.: FR291332AC

## 3.1.2 Measuring Instruments

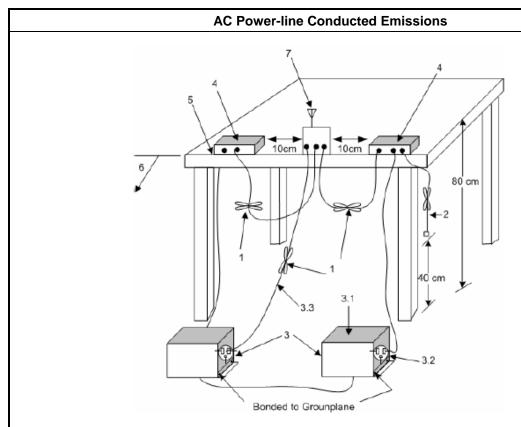
Refer a test equipment and calibration data table in this test report.

## 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: 17 of 32
FAX: 886-3-656-9085 Issued Date: Oct. 31, 2022

## 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.: FR291332AC

- 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 : 18 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 3.2 DTS Bandwidth

## 3.2.1 6dB Bandwidth Limit

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

Report No.: FR291332AC

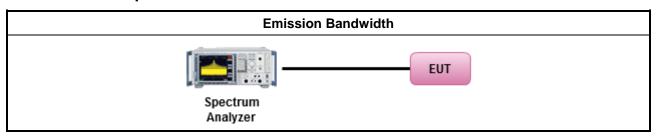
## 3.2.2 Measuring Instruments

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:									
	$\boxtimes$	Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.								
		Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.								
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.								

## 3.2.4 Test Setup



## 3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

TEL: 886-3-656-9065 Page Number : 19 of 32
FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 3.3 Maximum Conducted Output Power

## 3.3.1 Maximum Conducted Output Power Limit

## **Maximum Conducted Output Power Limit**

- If G<sub>TX</sub> ≤ 6 dBi, then P<sub>Out</sub> ≤ 30 dBm (1 W)
- Point-to-multipoint systems (P2M): If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)$  dBm
- Point-to-point systems (P2P): If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
- Smart antenna system (SAS):
  - Single beam: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
  - Overlap beam: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3$  dBm
  - Aggregate power on all beams: If  $G_{TX} > 6$  dBi, then  $P_{Out} = 30 (G_{TX} 6)/3 + 8$ dB dBm

Report No.: FR291332AC

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

TEL: 886-3-656-9065 Page Number : 20 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

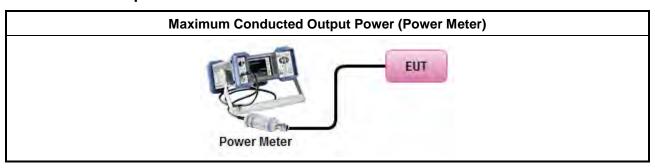
## 3.3.3 Test Procedures

		Test Method							
•	Max	imum Peak Conducted Output Power							
		Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).							
		Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).							
•	Max	imum Conducted Output Power							
	[duty cycle ≥ 98% or external video / power trigger]								
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)							
	duty	cycle < 98% and average over on/off periods with duty factor							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3							
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)							
	Mea	surement using a power meter (PM)							
		Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).							
	$\boxtimes$	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using an gate 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: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP <sub>total</sub> = $P_{total} + DG$							

Report No.: FR291332AC

TEL: 886-3-656-9065 Page Number : 21 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 3.3.4 Test Setup



Report No.: FR291332AC

## 3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

TEL: 886-3-656-9065 Page Number : 22 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022



# 3.4 Power Spectral Density

## 3.4.1 Power Spectral Density Limit

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

Report No.: FR291332AC

## 3.4.2 Measuring Instruments

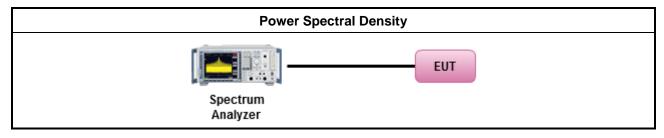
Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

	Test Method										
•	Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).										
		Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.									
•	For c	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									

TEL: 886-3-656-9065 Page Number : 23 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 3.4.4 Test Setup



Report No.: FR291332AC

## 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 : Oct. 31, 2022

## 3.5 Emissions in Non-restricted Frequency Bands

## 3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit						
RF output power procedure	Limit (dBc)					
Peak output power procedure	20					
Average output power procedure	30					

Report No.: FR291332AC

- Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.
- Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

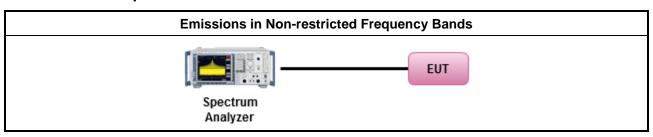
## 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

Test Method	
<ul> <li>Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.</li> </ul>	

#### 3.5.4 Test Setup



## 3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

TEL: 886-3-656-9065 Page Number : 25 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 3.6 Emissions in Restricted Frequency Bands

## 3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit									
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)						
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300						
0.490~1.705	24000/F(kHz)	33.8 - 23	30						
1.705~30.0	30	29	30						
30~88	100	40	3						
88~216	150	43.5	3						
216~960	200	46	3						
Above 960	500	54	3						

Report No.: FR291332AC

- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

#### 3.6.2 Measuring Instruments

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

TEL: 886-3-656-9065 Page Number : 26 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

## 3.6.3 Test Procedures

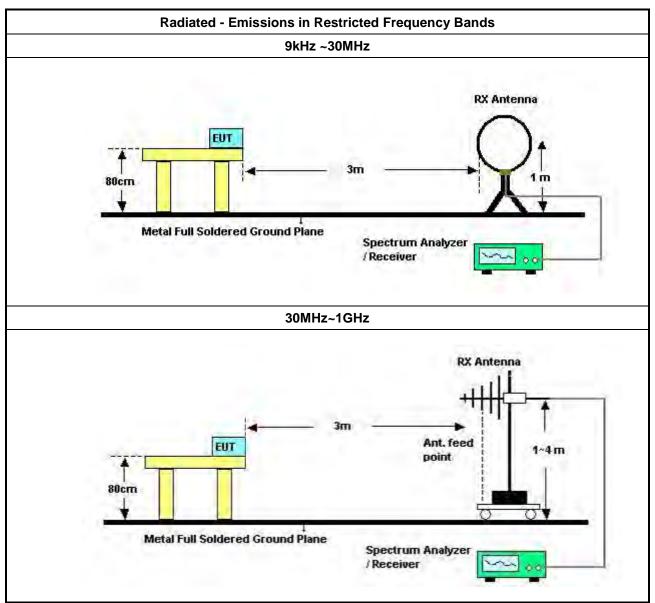
		Test Method									
•	The	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].									
•	Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.										
•	For the transmitter unwanted emissions shall be measured using following options below:										
	<ul> <li>Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.</li> </ul>										
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for cycle ≥98%).										
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).									
		☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).									
		☐ 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 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.									
•	For	the transmitter band-edge emissions shall be measured using following options below:									
<ul> <li>Refer as FCC KDB 558074 clause 8.7 &amp; C63.10 clause 11.13.1, When the performing average radiated measurements, emissions within 2 MHz of the authorized band edge measured using the marker-delta method described below.</li> </ul>											
	•	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.									
	•	Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).									
	<ul> <li>For conducted unwanted emissions into restricted bands (absolute emission limits).</li> <li>Devices with multiple transmit chains using options given below:</li> <li>(1) Measure and sum the spectra across the outputs or</li> <li>(2) Measure and add 10 log(N) dB</li> </ul>										
	•	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.									

Report No.: FR291332AC

TEL: 886-3-656-9065 Page Number : 27 of 32 FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022



## 3.6.4 Test Setup



TEL: 886-3-656-9065 Page Number : 28 of 32
FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

Above 1GHz

Spectrum Analyzer

Above 1GHz

AMAX 30cm

Spectrum Analyzer

Report No.: FR291332AC

#### 3.6.5 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.

## 3.6.6 Emissions in Restricted Frequency Bands (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.

## 3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

TEL: 886-3-656-9065 Page Number : 29 of 32
FAX: 886-3-656-9085 Issued Date : Oct. 31, 2022

# 4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz   Jan. 07, 2022		Jan. 06, 2023	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Dec. 22, 2021	Dec. 21, 2022	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	May 06, 2022	May 05, 2023	Conduction (CO02-CB)
Pulse Limiter	Schwarzbeck	VTSD 9561F-N	00378	9kHz ~ 30MHz	Mar. 18, 2022	Mar. 17, 2023	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Oct. 19, 2021	Oct. 18, 2022	Conduction (CO02-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 03, 2022	Aug. 02, 2023	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH05-CB	1GHz ~18GHz 3m	Nov. 07, 2021	Nov. 06, 2022	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 25, 2022	Mar. 24, 2023	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	BBHA 9120 D-1291	1GHz~18GHz	Jun. 23, 2022	Jun. 22, 2023	Radiation (03CH05-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 26, 2022	Apr. 25, 2023	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC12630SE	980287	1GHz – 26.5GHz	Jul. 01, 2022	Jun. 30, 2023	Radiation (03CH05-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 20, 2022	Jul. 19, 2023	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Mar. 14, 2022	Mar. 13, 2023	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Oct. 13, 2021	Oct. 12, 2022	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz Oct. 13, 2021 Oct. 12,		Oct. 12, 2022	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 13, 2021	Oct. 12, 2022	Radiation (03CH05-CB)
High Cable	Woken	WCA0929M	40G#5+7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH05-CB)

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

Report Template No.: CB-A10\_10 Ver1.3

Page Number : 30 of 32 Issued Date : Oct. 31, 2022

Report No.: FR291332AC

Report Version : 01

Calibration Calibration Instrument Model No. Serial No. Characteristics Remark **Brand Due Date** Date Radiation WCA0929M 40G#5 1GHz ~ 40 GHz Dec. 08, 2021 Dec. 07, 2022 High Cable Woken (03CH05-CB) Radiation High Cable Woken WCA0929M 40G#7 1GHz ~ 40 GHz Dec. 14, 2021 Dec. 13, 2022 (03CH05-CB) Radiation **Test Software SPORTON SENSE** N.C.R. N.C.R. V5.10 (03CH05-CB) 3m Semi Anechoic 1GHz ~18GHz Radiation **TDK** SAC-3M 03CH03-CB May 05, 2022 May 04, 2023 Chamber (03CH03-CB) 3m **VSWR** Radiation Horn Antenna **ETS**·Lindgren 3115 6821 750MHz~18GHz Jan. 21, 2022 Jan. 20, 2023 (03CH03-CB) Radiation BBHA9170252 15GHz ~ 40GHz Aug. 22, 2022 Horn Antenna Schwarzbeck **BBHA 9170** Aug. 21, 2023 (03CH03-CB) Radiation Pre-Amplifier 8449B 3008A02097 1GHz ~ 26.5GHz Agilent Jul. 01, 2022 Jun. 30, 2023 (03CH03-CB) TTA1840-35-H Radiation Pre-Amplifier **MITEQ** 1864479 18GHz ~ 40GHz Jul. 20, 2022 Jul. 19, 2023 (03CH03-CB) Spectrum Radiation R&S FSP40 100019 9kHz ~ 40GHz Jun. 10, 2022 Jun. 09, 2023 (03CH03-CB) Analyzer High Radiation RF Cable-high 1GHz ~ 18GHz Oct. 04, 2021 Oct. 03, 2022 Woken RG402 Cable-20+29 (03CH03-CB) Radiation RF Cable-high Woken 1GHz ~ 18GHz Oct. 04, 2021 Oct. 03, 2022 High Cable-29 RG402 (03CH03-CB) Radiation 1GHz ~ 40 GHz High Cable Woken WCA0929M 40G#5+7 Dec. 14, 2021 Dec. 13, 2022 (03CH03-CB) Radiation High Cable Woken WCA0929M 40G#5 1GHz ~ 40 GHz Dec. 08, 2021 Dec. 07, 2022 (03CH03-CB) Radiation High Cable WCA0929M Woken 40G#7 1GHz ~ 40 GHz Dec. 14, 2021 Dec. 13, 2022 (03CH03-CB) Radiation **SPORTON** Test Software SENSE V5.10 N.C.R. N.C.R. (03CH03-CB) Spectrum Conducted R&S FSV40 101028 9kHz~40GHz Jan. 07, 2022 Jan. 06, 2023 analyzer (TH03-CB) Conducted Power Sensor Anritsu MA2411B 1531344 300MHz~40GHz Jul. 31, 2022 Jul. 30, 2023 (TH03-CB) Conducted Power Meter Anritsu ML2495A 1728002 300MHz~40GHz Jul. 31, 2022 Jul. 30, 2023 (TH03-CB) Conducted RG402 RF Cable-high Woken High Cable-11 1 GHz -18 GHz Oct. 04, 2021 Oct. 03, 2022 (TH03-CB) Conducted RF Cable-high Woken RG402 High Cable-12 1 GHz -18 GHz Oct. 04, 2021 Oct. 03, 2022 (TH03-CB) Conducted RF Cable-high Woken RG402 High Cable-13 1 GHz -18 GHz Oct. 04, 2021 Oct. 03, 2022 (TH03-CB) Conducted RF Cable-high Woken RG402 High Cable-14 1 GHz -18 GHz Oct. 04, 2021 Oct. 03, 2022 (TH03-CB) Conducted 1 GHz -18 GHz Oct. 04, 2021 Oct. 03, 2022 RF Cable-high Woken RG402 High Cable-15 (TH03-CB)

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

Switch

Report Template No.: CB-A10\_10 Ver1.3

**SPTCB** 

SP-SWI

**SWI-03** 

1 GHz -26.5 GHz

Page Number : 31 of 32 Issued Date : Oct. 31, 2022

Dec. 12, 2022

Conducted

(TH03-CB)

Report No.: FR291332AC

Report Version : 01

Dec. 13, 2021

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	SWI-03-P1	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P2	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P3	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P4	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P5	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)

Report No.: FR291332AC

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 : Oct. 31, 2022



## **Conducted Emissions at Powerline**

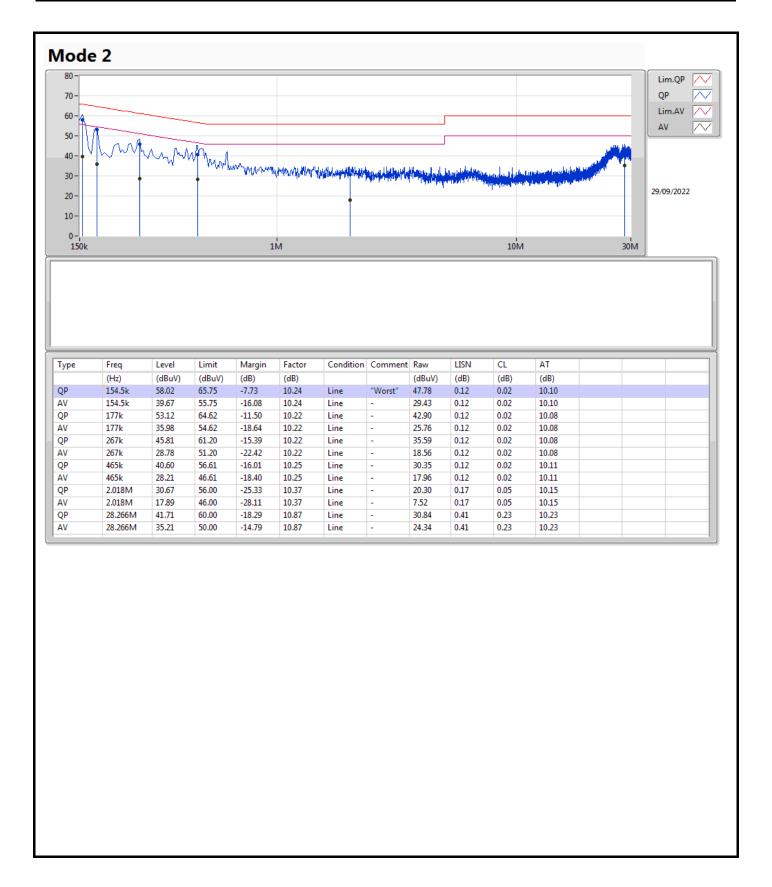
Appendix A

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 2	Pass	QP	154.5k	58.02	65.75	-7.73	Line

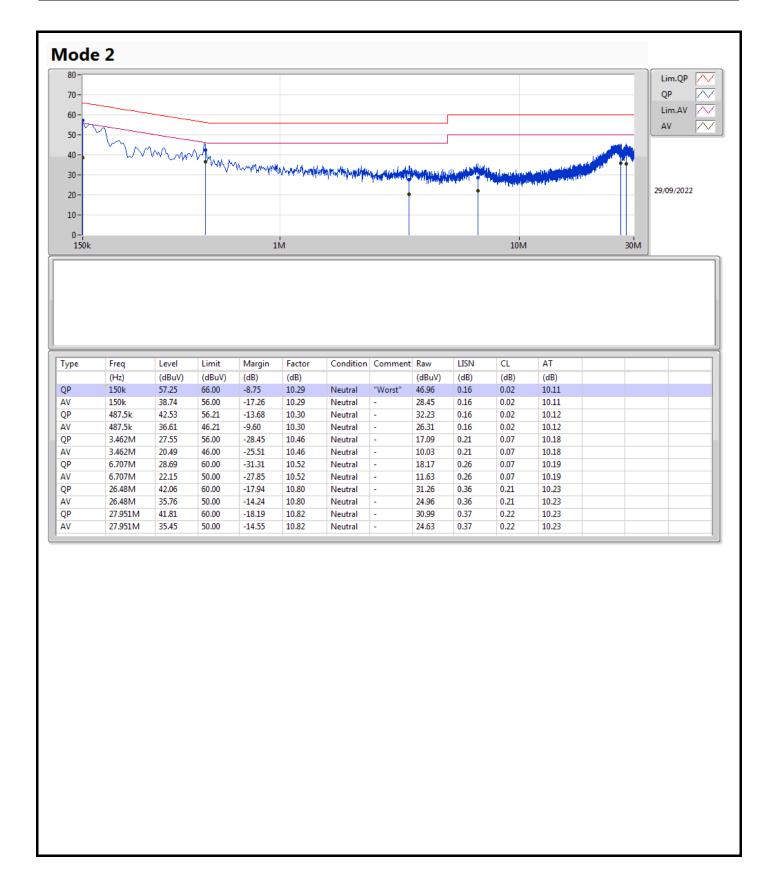
Page No. Report No. : 1 of 3 : FR291332AC Sporton International Inc. Hsinchu Laboratory





Page No. : 2 of 3 Report No. : FR291332AC





Page No. : 3 of 3 Report No. : FR291332AC



EBW Appendix B

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_1TX	9.025M	13.886M	13M9G1D	8.5M	13.842M
802.11g_Nss1,(6Mbps)_1TX	16.025M	18.456M	18M5D1D	15.725M	16.734M
VHT20_Nss1,(MCS0)_1TX	16.5M	19.033M	19M0D1D	15.05M	17.79M
VHT40_Nss1,(MCS0)_1TX	35.7M	36.432M	36M4D1D	35.7M	36.368M

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

Page No. : 1 of 8 Report No. : FR291332AC

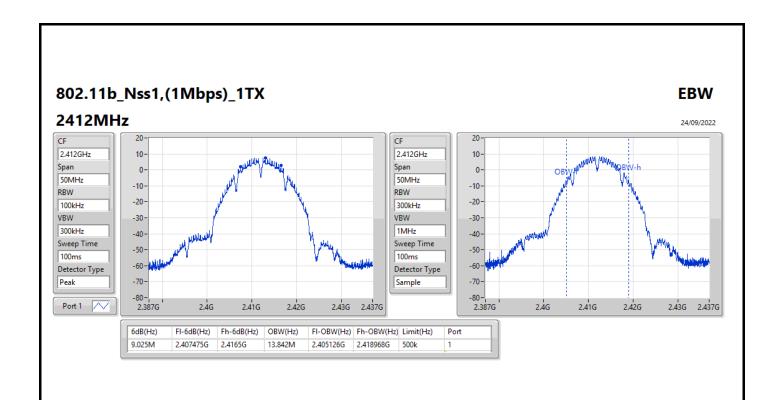


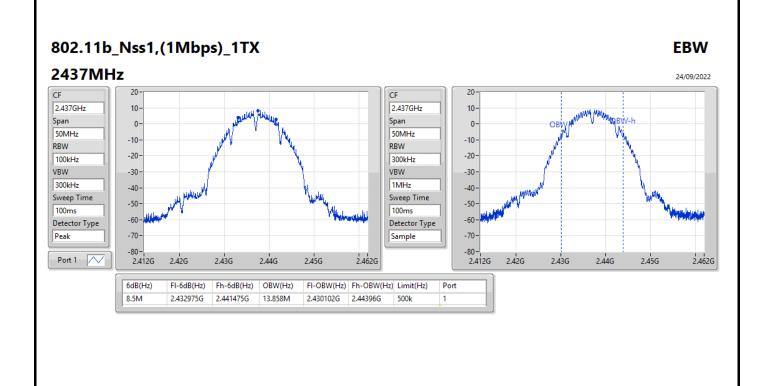
### Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	9.025M	13.842M
2437MHz	Pass	500k	8.5M	13.858M
2462MHz	Pass	500k	8.525M	13.886M
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	16M	16.734M
2437MHz	Pass	500k	16.025M	18.456M
2462MHz	Pass	500k	15.725M	16.755M
VHT20_Nss1,(MCS0)_1TX	-	-	-	-
2412MHz	Pass	500k	15.05M	17.79M
2437MHz	Pass	500k	15.425M	19.033M
2462MHz	Pass	500k	16.5M	17.861M
VHT40_Nss1,(MCS0)_1TX	-	-	-	-
2422MHz	Pass	500k	35.7M	36.375M
2437MHz	Pass	500k	35.7M	36.432M
2452MHz	Pass	500k	35.7M	36.368M

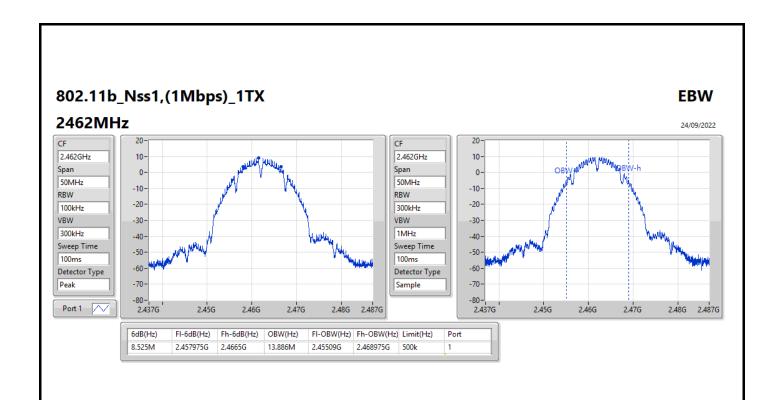
Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

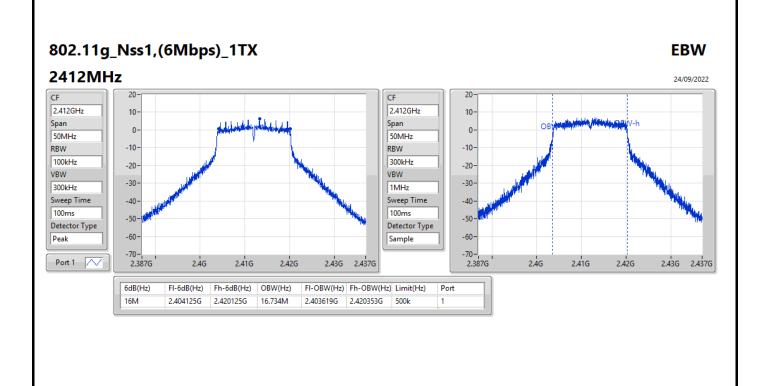
Page No. : 2 of 8 Report No. : FR291332AC





Page No. : 3 of 8 Report No. : FR291332AC



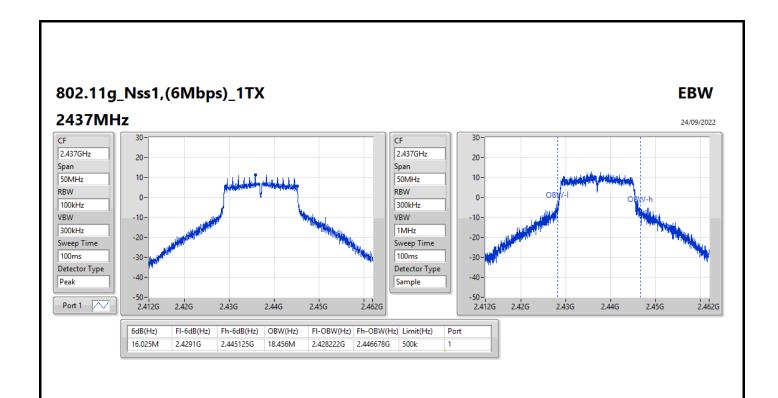


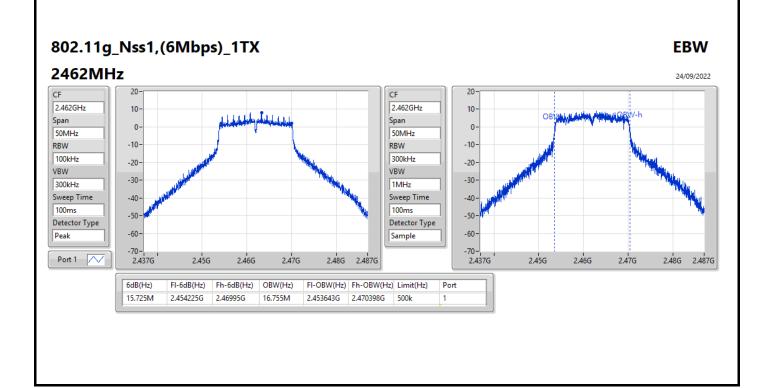
Page No. : 4 of 8 Report No. : FR291332AC



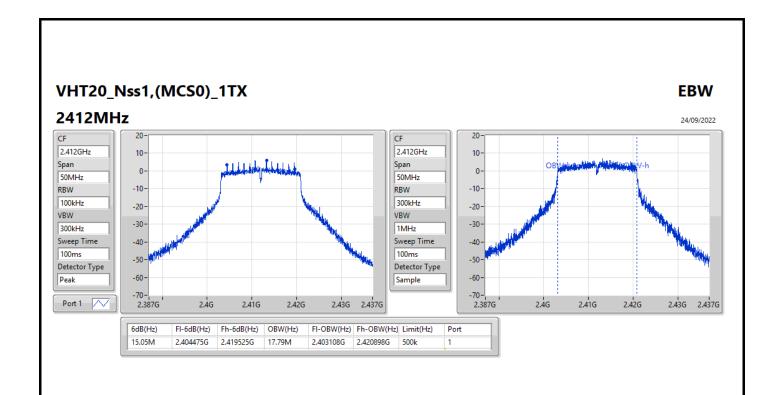
SPORTON LAB

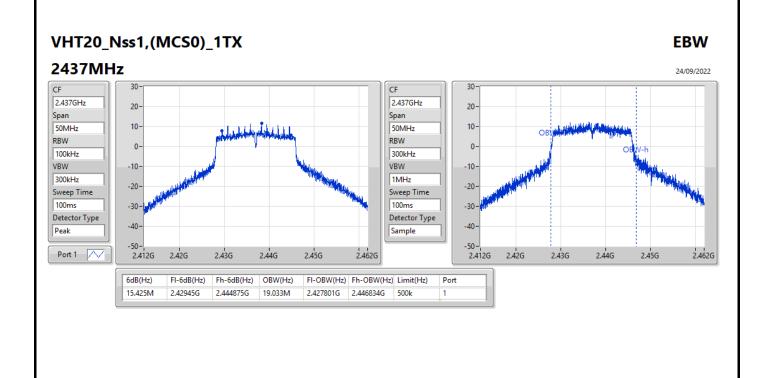
Appendix B **EBW** 



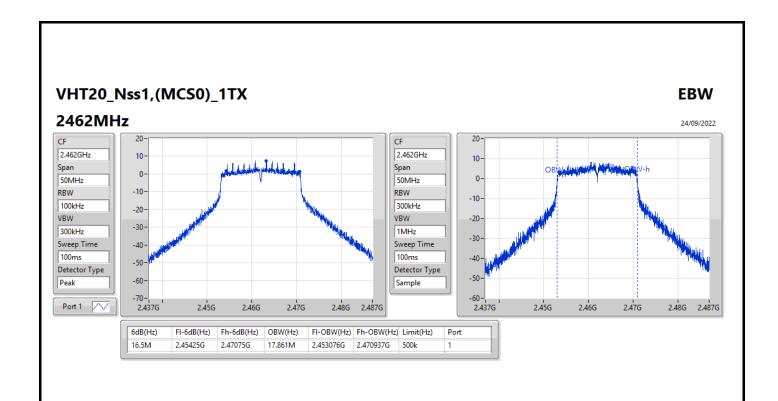


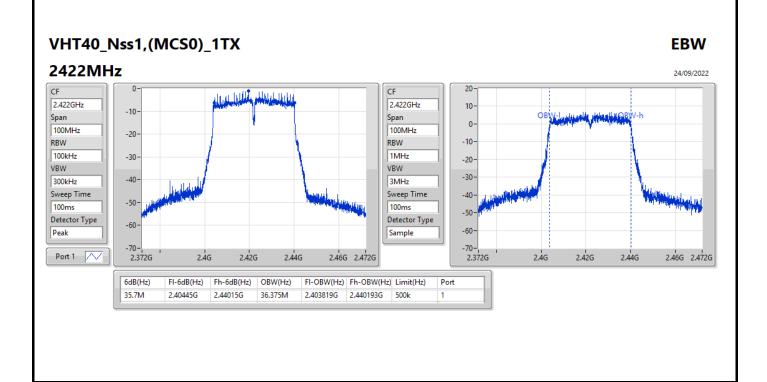
Page No. 5 of 8 Report No. : FR291332AC





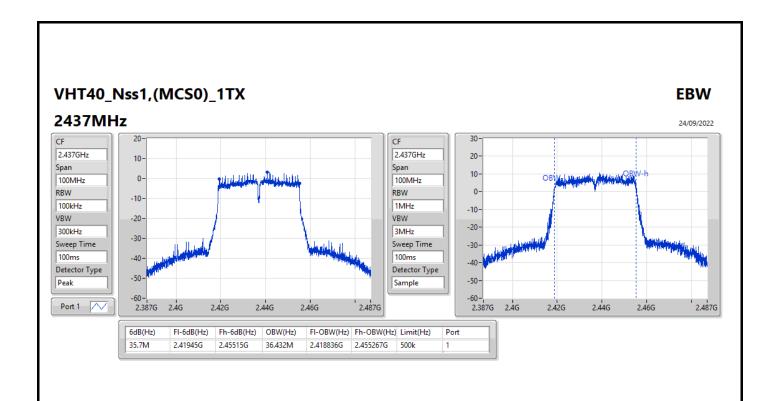
Page No. : 6 of 8 Report No. : FR291332AC

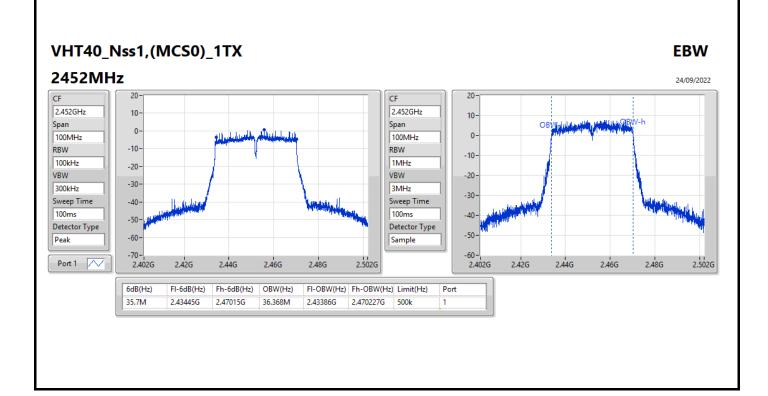




Page No. : 7 of 8 Report No. : FR291332AC SPORTON LAB.

Appendix B **EBW** 





Page No. 8 of 8 Report No. : FR291332AC



Average Power Appendix C

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_1TX	18.09	0.06442
802.11g_Nss1,(6Mbps)_1TX	21.51	0.14158
VHT20_Nss1,(MCS0)_1TX	21.46	0.13996
VHT40_Nss1,(MCS0)_1TX	16.79	0.04775

Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 2 Report No. : FR291332AC



Average Power Appendix C

# Result

Mode	Result	DG	Port 1	Total Power	Power Limit
		(dBi)	(dBm)	(dBm)	(dBm)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	3.38	17.05	17.05	30.00
2437MHz	Pass	3.38	17.27	17.27	30.00
2462MHz	Pass	3.38	18.09	18.09	30.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	3.38	16.64	16.64	30.00
2417MHz	Pass	3.38	19.64	19.64	30.00
2437MHz	Pass	3.38	21.51	21.51	30.00
2457MHz	Pass	3.38	20.42	20.42	30.00
2462MHz	Pass	3.38	18.20	18.20	30.00
VHT20_Nss1,(MCS0)_1TX	-	-	-	-	-
2412MHz	Pass	3.38	15.95	15.95	30.00
2417MHz	Pass	3.38	19.40	19.40	30.00
2437MHz	Pass	3.38	21.46	21.46	30.00
2457MHz	Pass	3.38	20.36	20.36	30.00
2462MHz	Pass	3.38	17.35	17.35	30.00
VHT40_Nss1,(MCS0)_1TX	-	-	-	-	-
2422MHz	Pass	3.38	13.15	13.15	30.00
2427MHz	Pass	3.38	14.15	14.15	30.00
2437MHz	Pass	3.38	16.79	16.79	30.00
2452MHz	Pass	3.38	14.60	14.60	30.00

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

Page No. : 2 of 2 Report No. : FR291332AC



Summary

our many	
Mode	PD
	(dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_1TX	-5.42
802.11g_Nss1,(6Mbps)_1TX	-4.35
VHT20_Nss1,(MCS0)_1TX	-5.17
VHT40_Nss1,(MCS0)_1TX	-12.01

RBW = 3kHz;

Page No. : 1 of 8 Report No. : FR291332AC

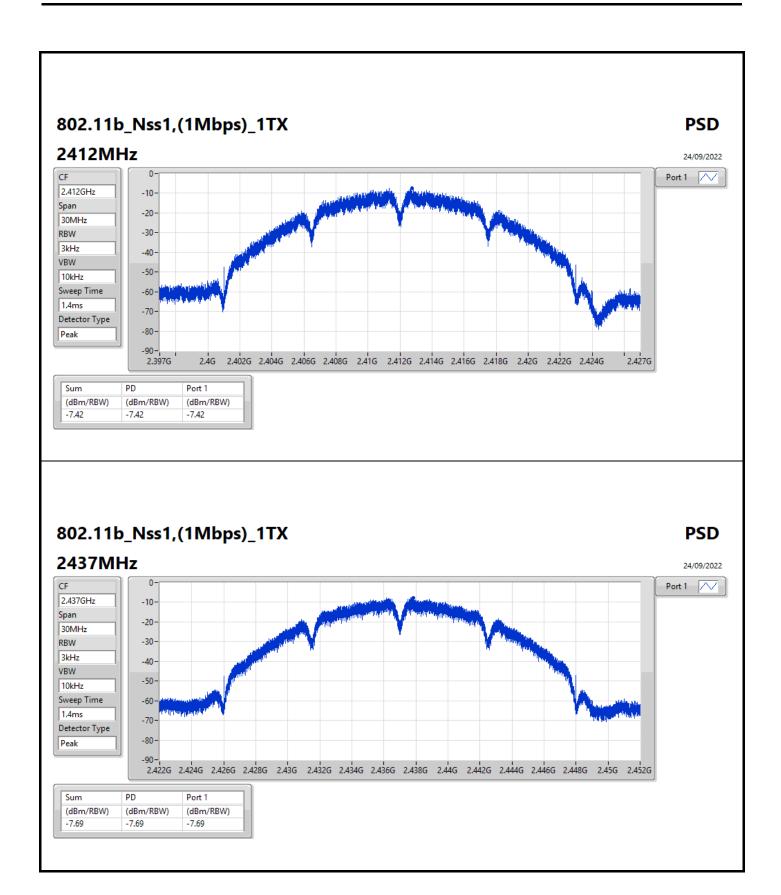


### Result

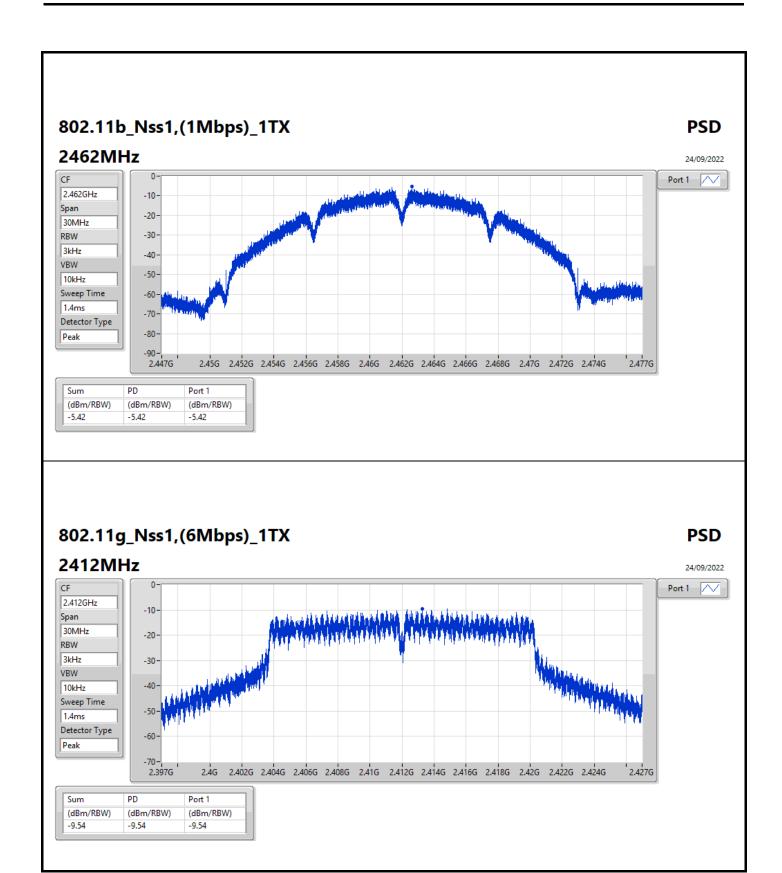
Mode	Result	DG	Port 1	PD	PD Limit
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	3.38	-7.42	-7.42	8.00
2437MHz	Pass	3.38	-7.69	-7.69	8.00
2462MHz	Pass	3.38	-5.42	-5.42	8.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	3.38	-9.54	-9.54	8.00
2437MHz	Pass	3.38	-4.35	-4.35	8.00
2462MHz	Pass	3.38	-7.28	-7.28	8.00
VHT20_Nss1,(MCS0)_1TX	-	-	=	-	-
2412MHz	Pass	3.38	-9.35	-9.35	8.00
2437MHz	Pass	3.38	-5.17	-5.17	8.00
2462MHz	Pass	3.38	-8.16	-8.16	8.00
VHT40_Nss1,(MCS0)_1TX	-	-	-	-	-
2422MHz	Pass	3.38	-13.90	-13.90	8.00
2437MHz	Pass	3.38	-12.01	-12.01	8.00
2452MHz	Pass	3.38	-12.92	-12.92	8.00

Page No. Report No. : 2 of 8 : FR291332AC

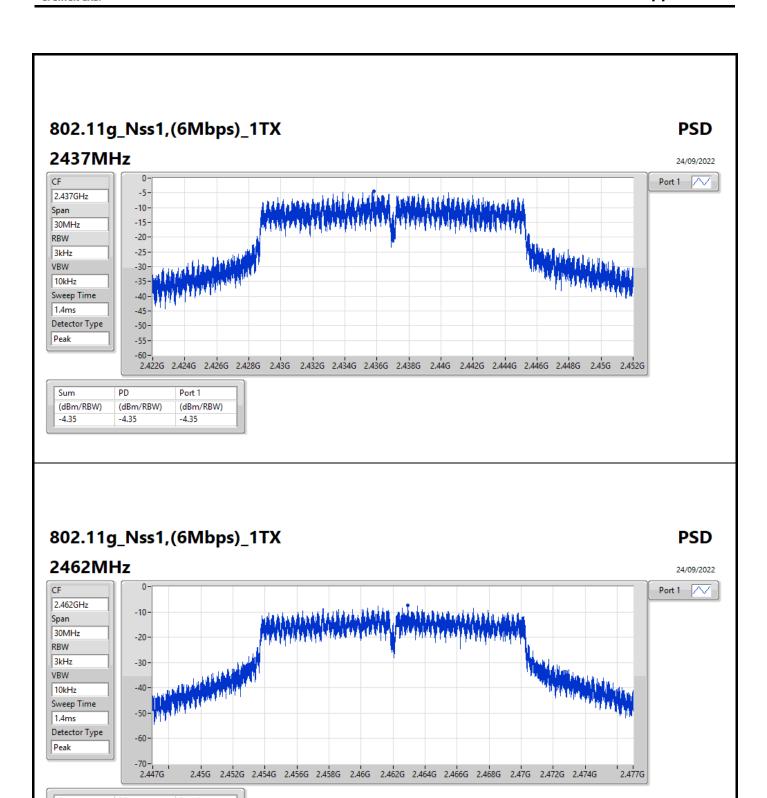
DG = Directional Gain; RBW = 3kHz; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;



Page No. : 3 of 8 Report No. : FR291332AC



Page No. : 4 of 8 Report No. : FR291332AC



(dBm/RBW)

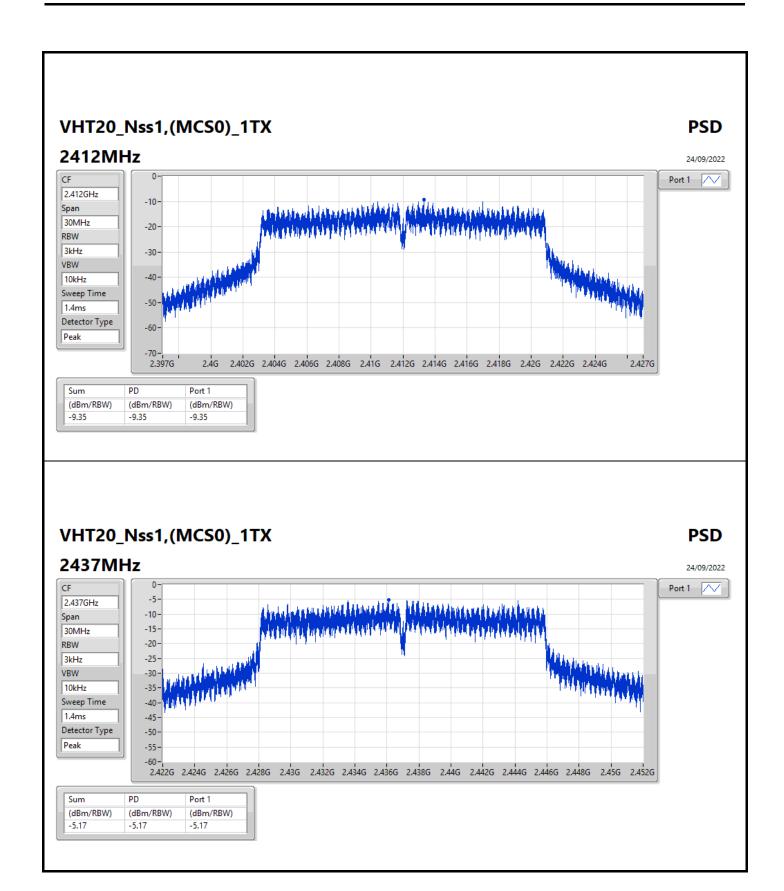
-7.28

(dBm/RBW)

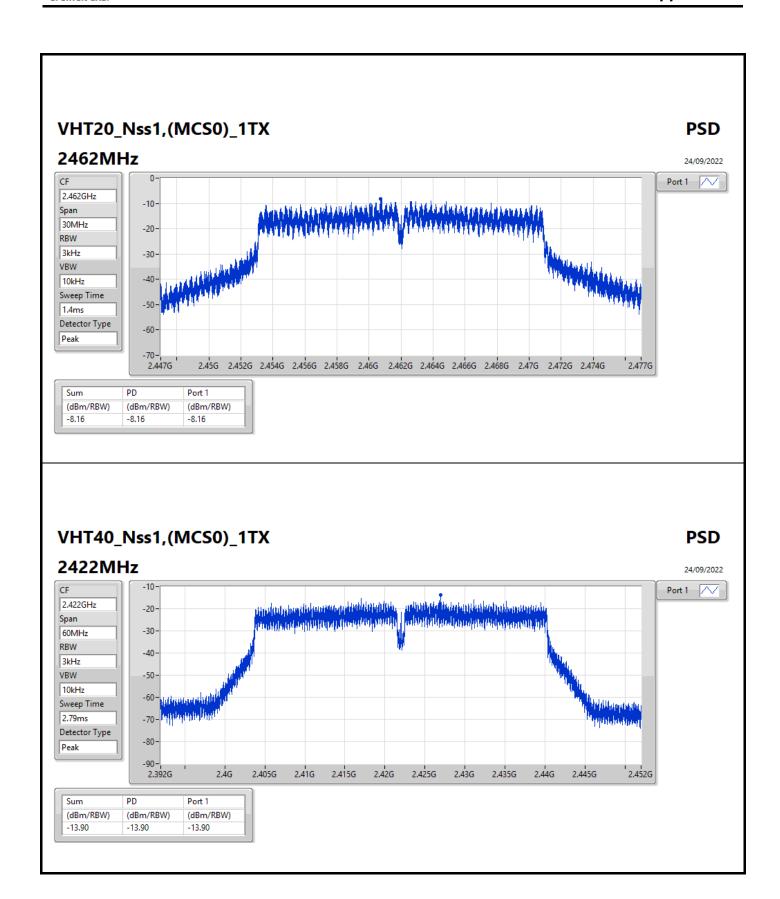
(dBm/RBW)

-7.28

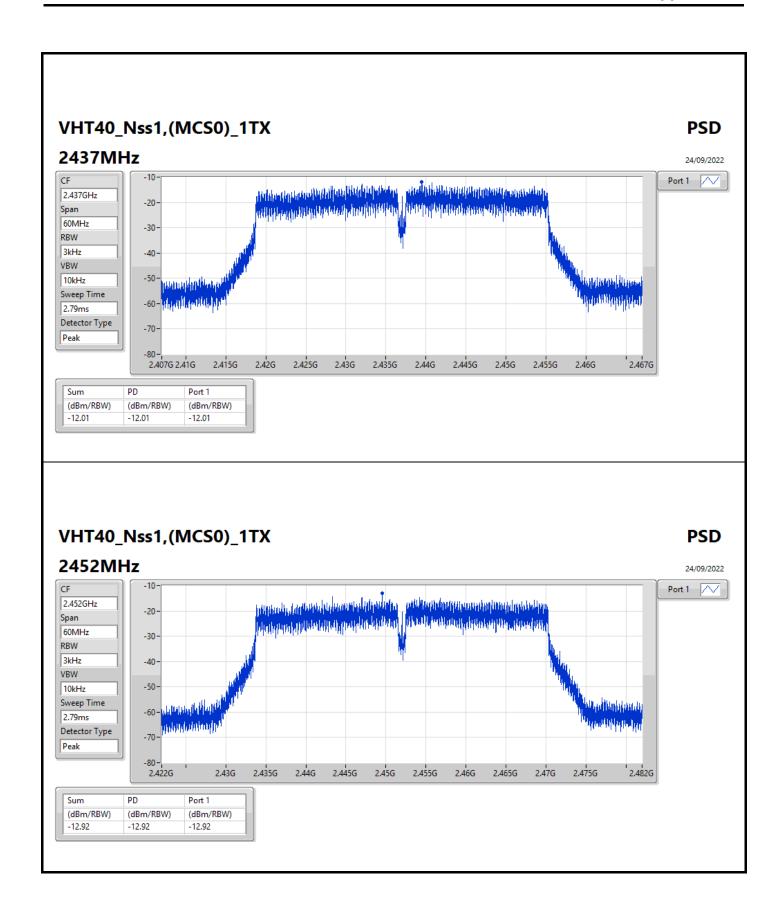
Page No. : 5 of 8 Report No. : FR291332AC



Page No. : 6 of 8 Report No. : FR291332AC



Page No. : 7 of 8 Report No. : FR291332AC



Page No. : 8 of 8 Report No. : FR291332AC



Appendix E



Summary

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
2.4-2.4835GHz	-	-	-	-		-	-	-	-			-		-	-
802.11b_Nss1,(1Mbps)_1TX	Pass	2.4625G	9.32	-20.68	1.76935G	-54.87	2.39802G	-38.97	2.4G	-39.19	2.48776G	-51.94	21.98253G	-49.52	1
802.11g_Nss1,(6Mbps)_1TX	Pass	2.43574G	11.20	-18.80	1.77779G	-54.29	2.39988G	-22.74	2.4G	-24.04	2.4888G	-49.76	21.828G	-48.20	1
VHT20_Nss1,(MCS0)_1TX	Pass	2.43574G	11.52	-18.48	47.18M	-53.98	2.39972G	-23.25	2.4G	-25.12	2.49066G	-49.94	21.86172G	-48.93	1
VHT40_Nss1,(MCS0)_1TX	Pass	2.442G	3.12	-26.88	41.16M	-54.03	2.39956G	-33.61	2.4G	-40.76	2.4839G	-41.53	21.92059G	-48.58	1

Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 8 Report No. : FR291332AC





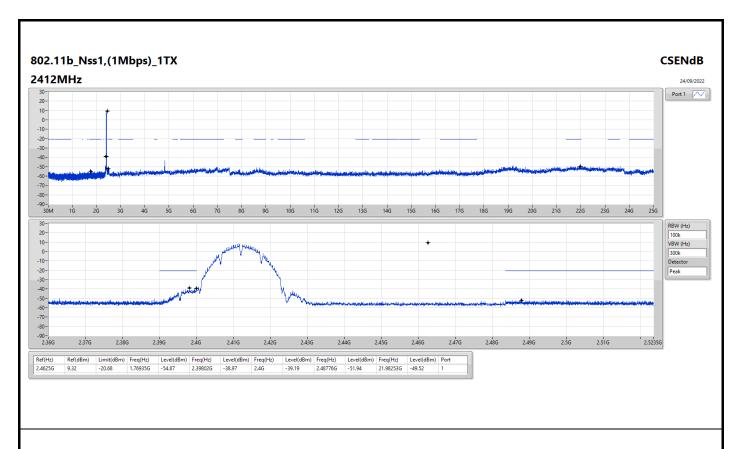


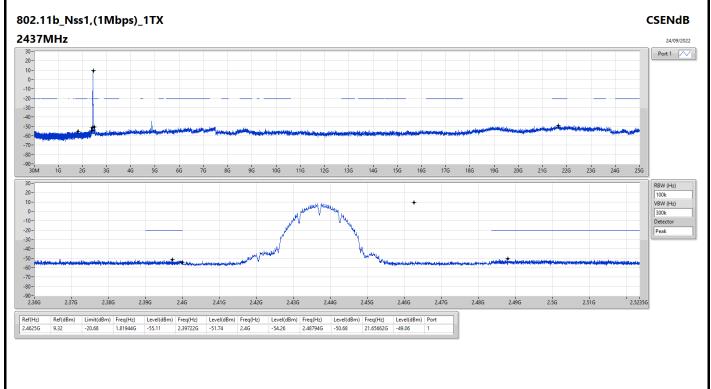
# Result

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.4625G	9.32	-20.68	1.76935G	-54.87	2.39802G	-38.97	2.4G	-39.19	2.48776G	-51.94	21.98253G	-49.52	1
2437MHz	Pass	2.4625G	9.32	-20.68	1.81944G	-55.11	2.39722G	-51.74	2.4G	-54.26	2.48794G	-50.68	21.65662G	-49.06	1
2462MHz	Pass	2.4625G	9.32	-20.68	2.0038G	-55.23	2.395G	-52.55	2.4835G	-55.52	2.48652G	-49.79	6.4901G	-50.46	1
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43574G	11.20	-18.80	1.77779G	-54.29	2.39988G	-22.74	2.4G	-24.04	2.4888G	-49.76	21.828G	-48.20	1
2437MHz	Pass	2.43574G	11.20	-18.80	2.16545G	-54.40	2.39982G	-37.99	2.4G	-41.95	2.48822G	-42.04	21.73529G	-48.27	1
2462MHz	Pass	2.43574G	11.20	-18.80	80.1M	-54.44	2.39206G	-50.83	2.4835G	-39.29	2.48386G	-34.74	21.8561G	-48.76	1
VHT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.43574G	11.52	-18.48	47.18M	-53.98	2.39972G	-23.25	2.4G	-25.12	2.49066G	-49.94	21.86172G	-48.93	1
2437MHz	Pass	2.43574G	11.52	-18.48	175.63M	-54.93	2.39952G	-37.66	2.4G	-41.40	2.48884G	-42.54	21.97129G	-49.32	1
2462MHz	Pass	2.43574G	11.52	-18.48	1.99303G	-55.06	2.39446G	-49.34	2.4835G	-39.09	2.4842G	-38.34	21.53862G	-48.78	1
VHT40_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.442G	3.12	-26.88	104.43M	-53.53	2.4G	-38.94	2.4G	-39.02	2.4907G	-51.54	21.99912G	-48.24	1
2437MHz	Pass	2.442G	3.12	-26.88	41.16M	-54.03	2.39956G	-33.61	2.4G	-40.76	2.4839G	-41.53	21.92059G	-48.58	1
2452MHz	Pass	2.442G	3.12	-26.88	1.94873G	-53.67	2.39964G	-52.44	2.4835G	-42.76	2.4845G	-37.92	21.90096G	-48.63	1

Page No. : 2 of 8 Report No. : FR291332AC

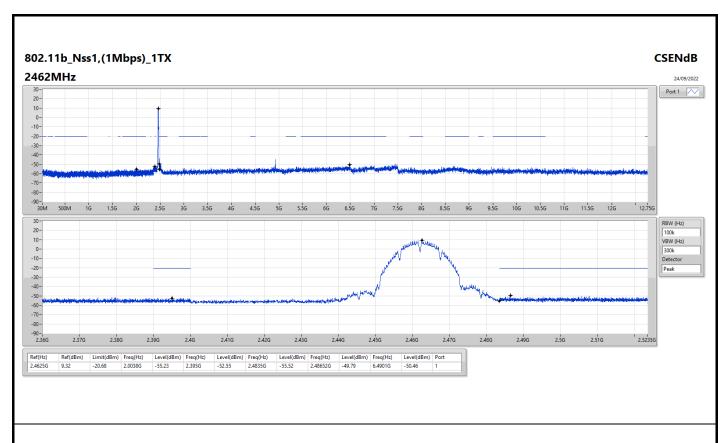


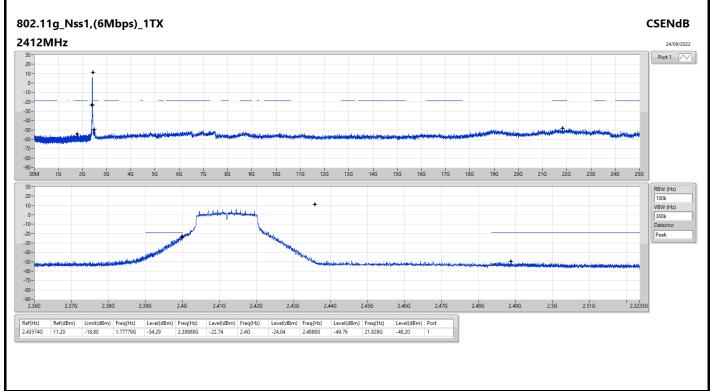




Page No. : 3 of 8 Report No. : FR291332AC

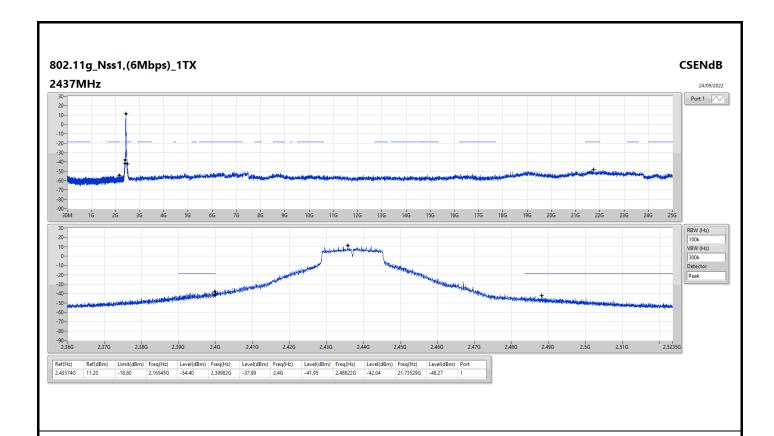


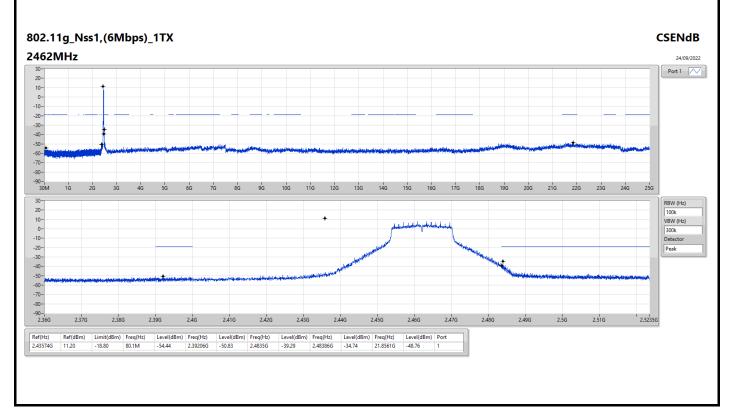




Page No. : 4 of 8 Report No. : FR291332AC

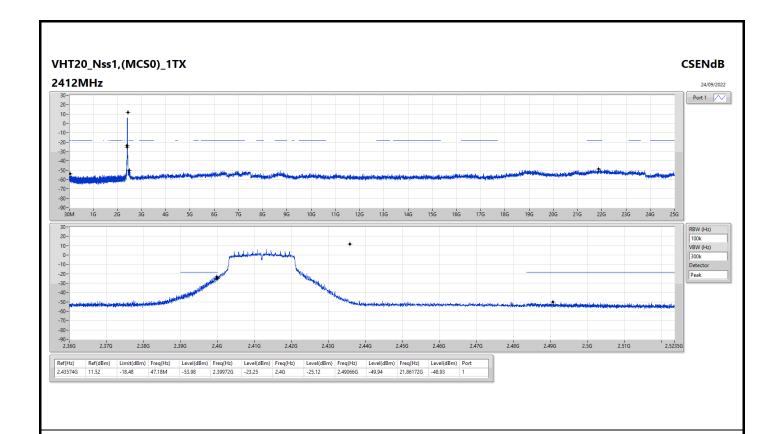


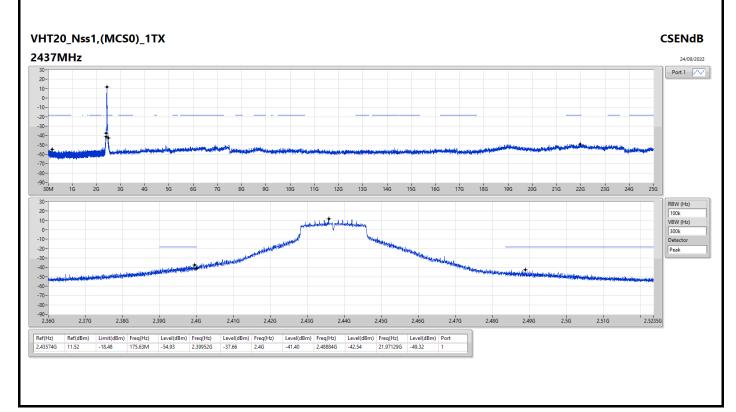




Page No. : 5 of 8 Report No. : FR291332AC

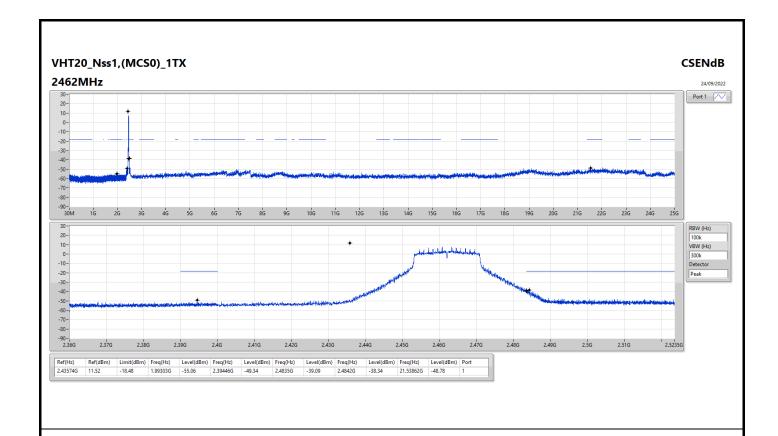


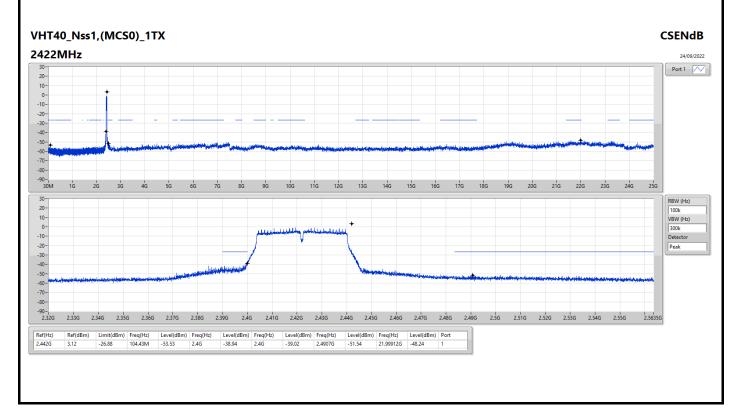




Page No. : 6 of 8 Report No. : FR291332AC

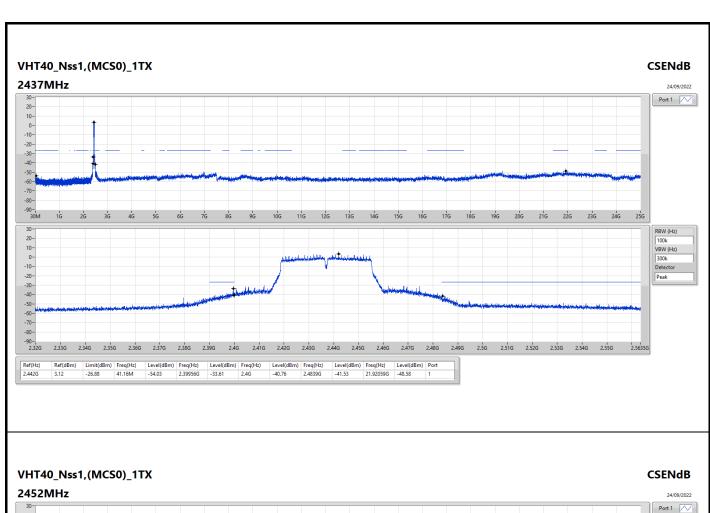


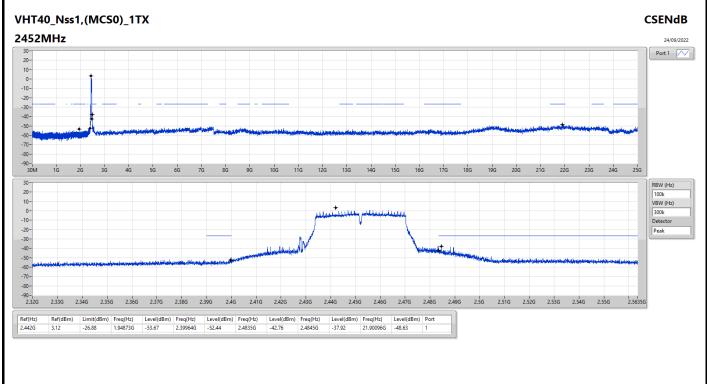




Page No. : 7 of 8 Report No. : FR291332AC







Page No. : 8 of 8 Report No. : FR291332AC



# Radiated Emissions below 1GHz

Appendix F.1

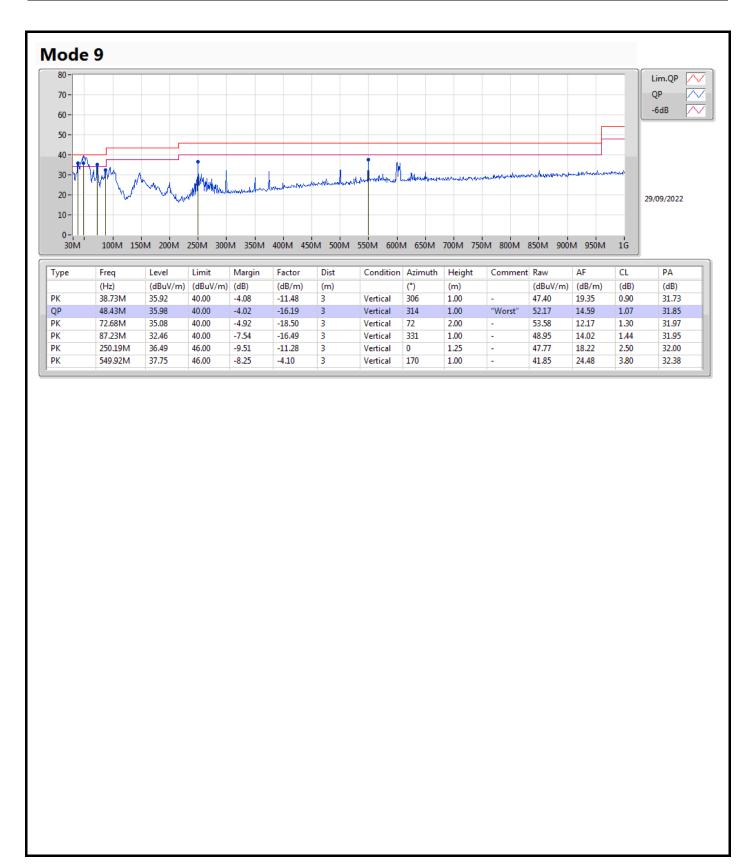
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 9	Pass	QP	48.43M	35.98	40.00	-4.02	Vertical

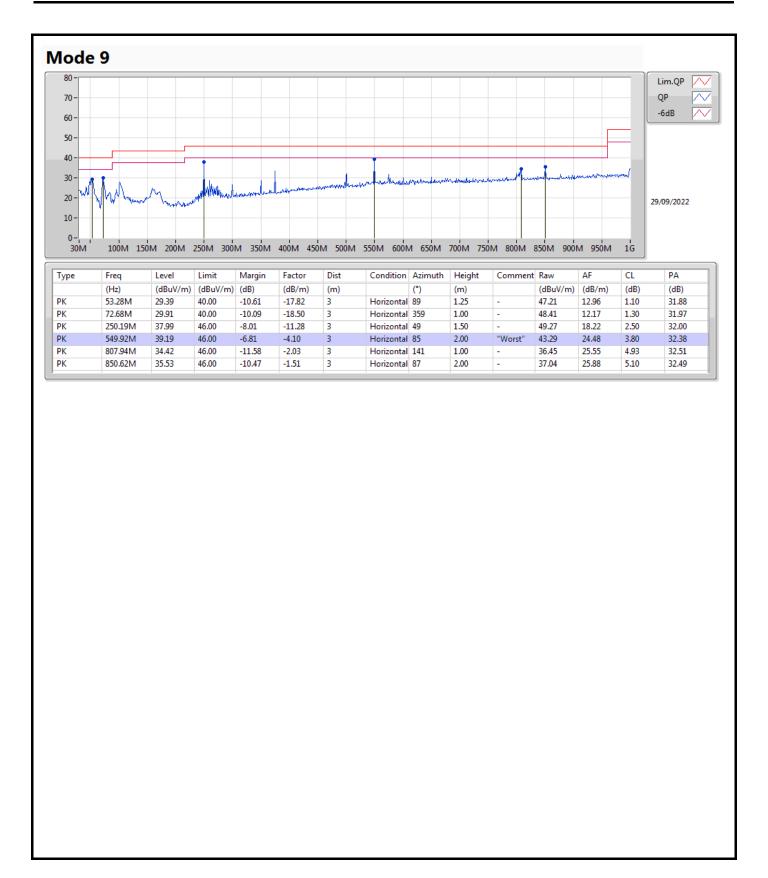
Page No. Report No. Sporton International Inc. Hsinchu Laboratory

: 1 of 3 : FR291332AC





Page No. : 2 of 3 Report No. : FR291332AC



Page No. : 3 of 3 Report No. : FR291332AC



Appendix F.2

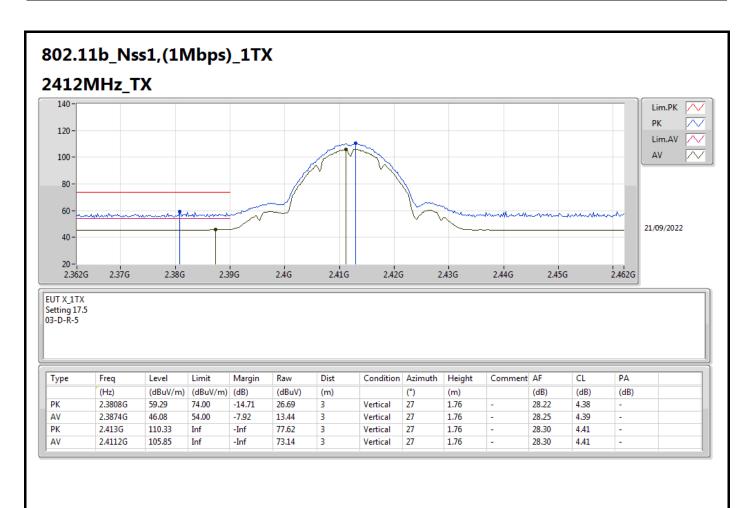
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
2.4-2.4835GHz	-	-	-				-				-
VHT40_Nss1,(MCS0)_1TX	Pass	AV	2.3896G	53.94	54.00	-0.06	3	Vertical	30	1.34	-

Sporton International Inc. Hsinchu Laboratory

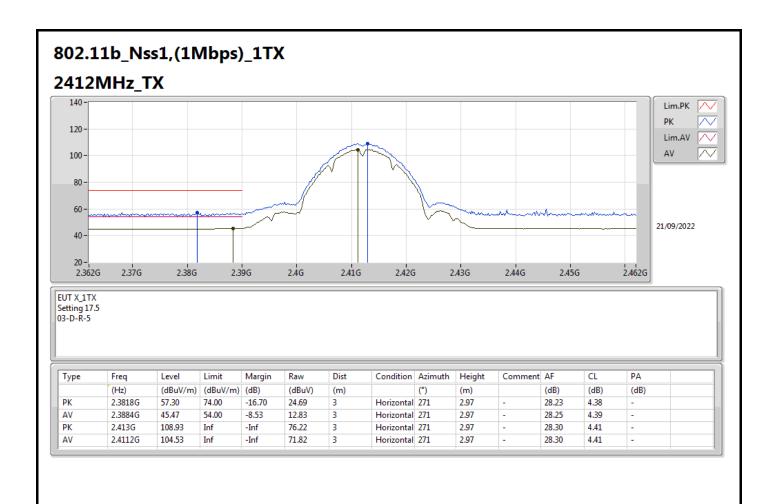
Page No. : 1 of 59 Report No. : FR291332AC





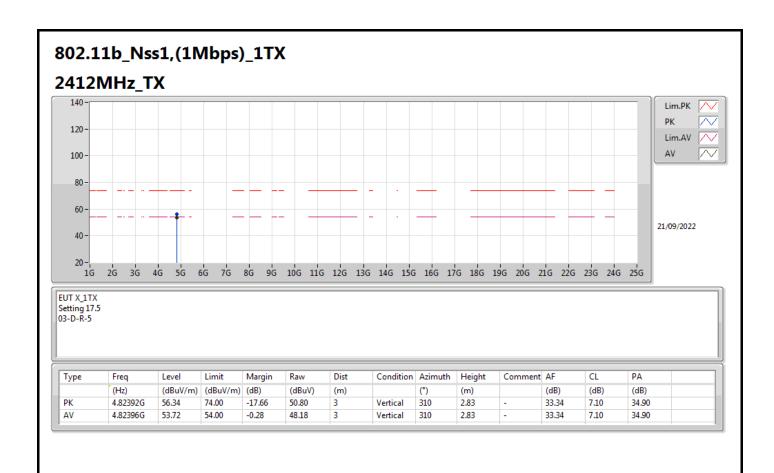
Page No. : 2 of 59 Report No. : FR291332AC





Page No. : 3 of 59 Report No. : FR291332AC





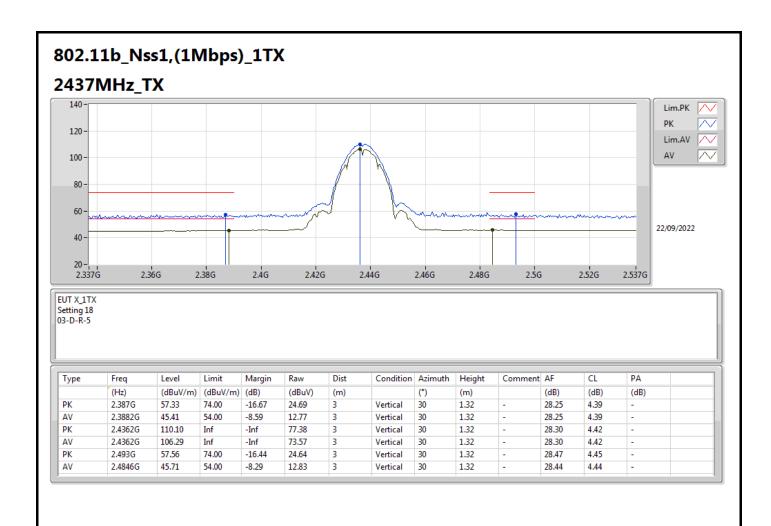
Page No. : 4 of 59 Report No. : FR291332AC





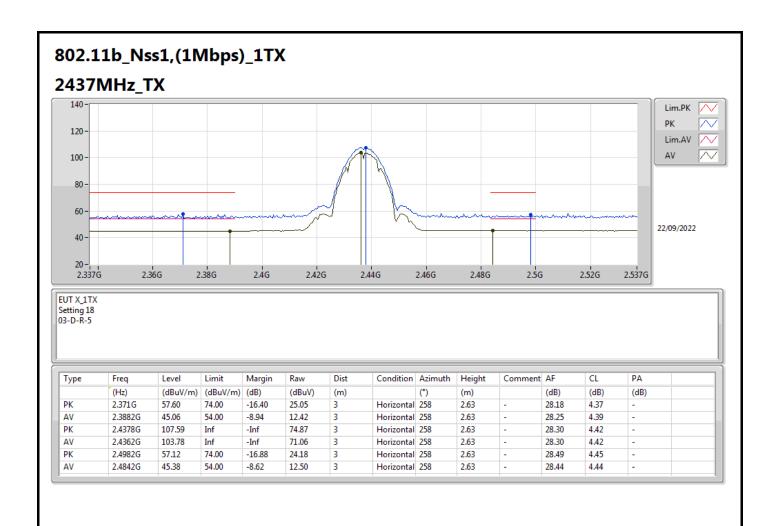
Page No. : 5 of 59 Report No. : FR291332AC





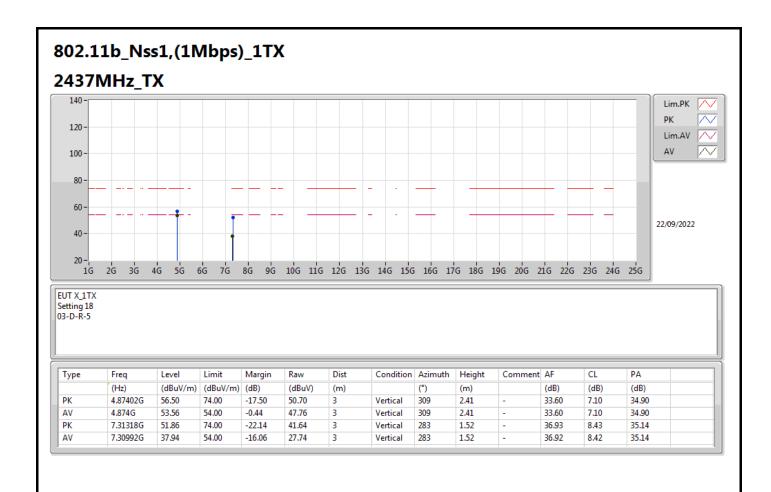
Page No. : 6 of 59 Report No. : FR291332AC





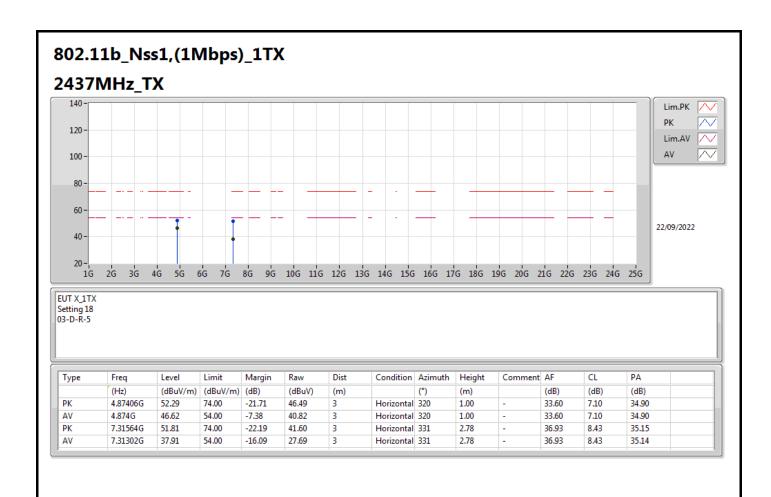
Page No. : 7 of 59 Report No. : FR291332AC





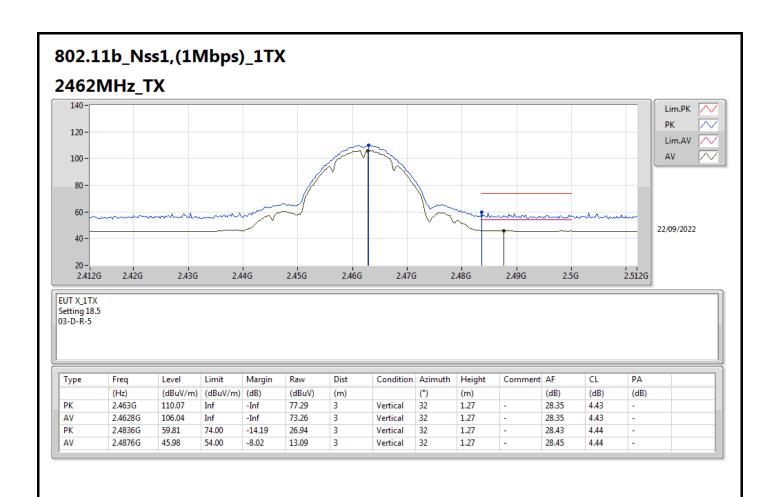
Page No. : 8 of 59 Report No. : FR291332AC





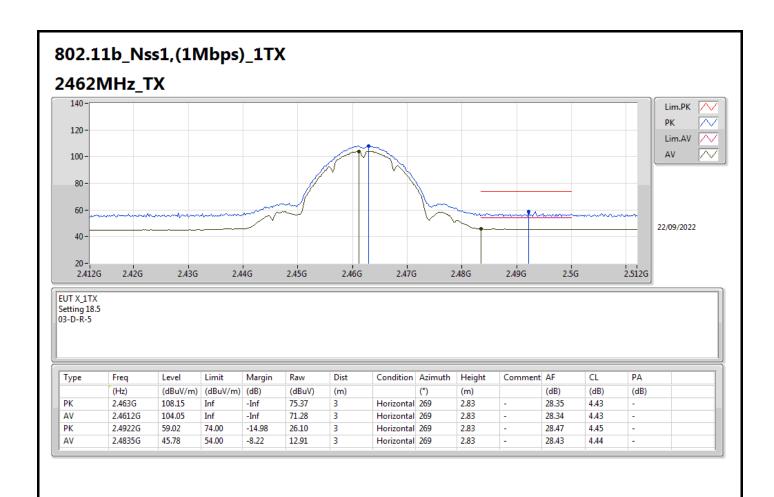
Page No. : 9 of 59 Report No. : FR291332AC





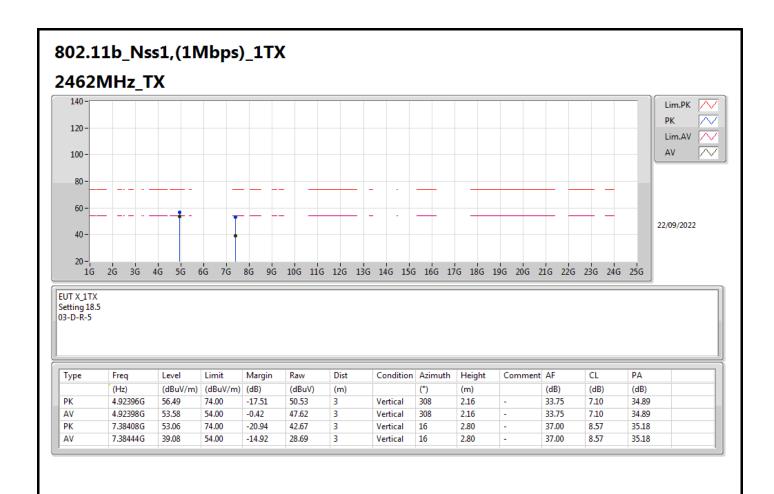
Page No. : 10 of 59 Report No. : FR291332AC





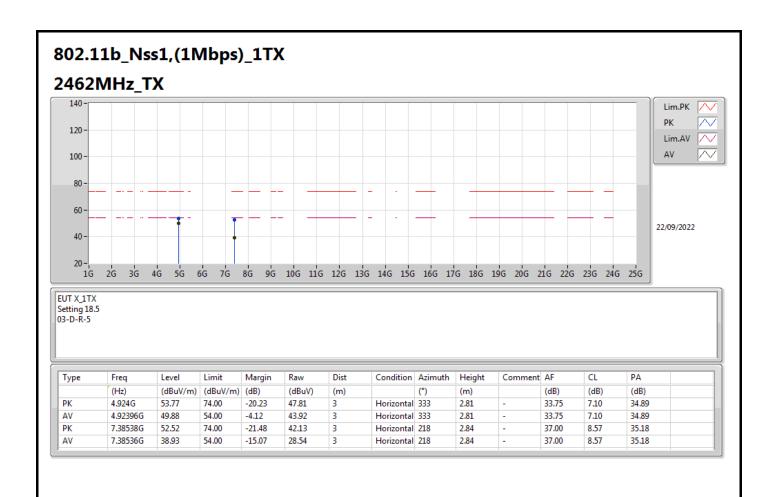
Page No. : 11 of 59 Report No. : FR291332AC





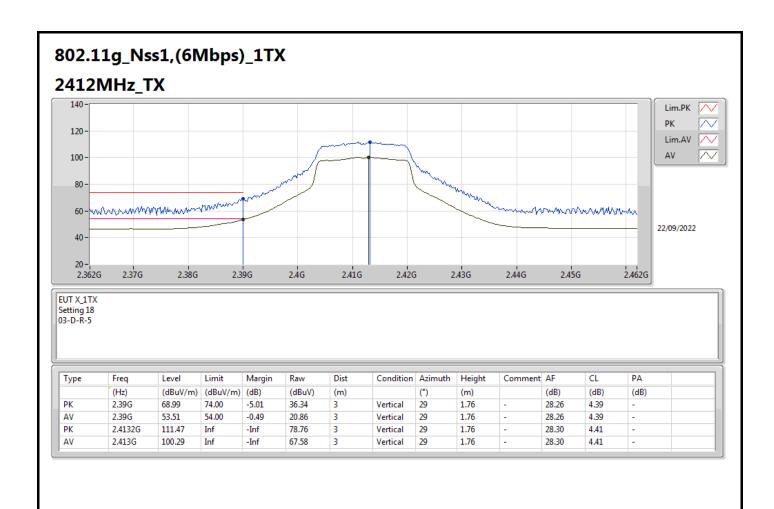
Page No. : 12 of 59 Report No. : FR291332AC





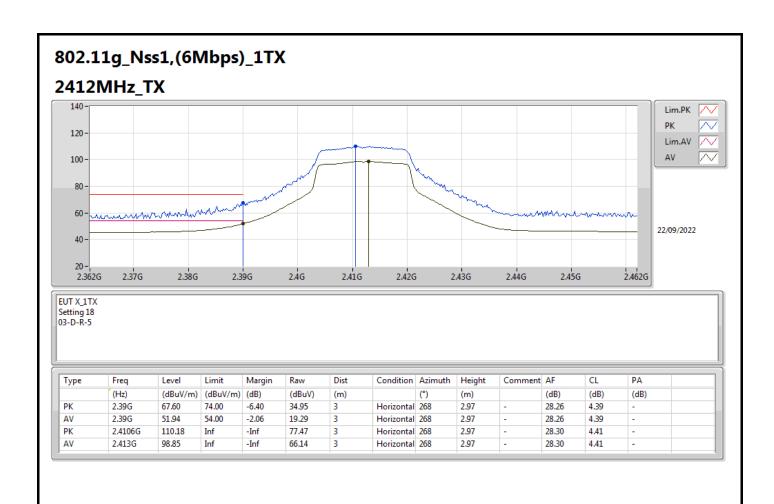
Page No. : 13 of 59 Report No. : FR291332AC





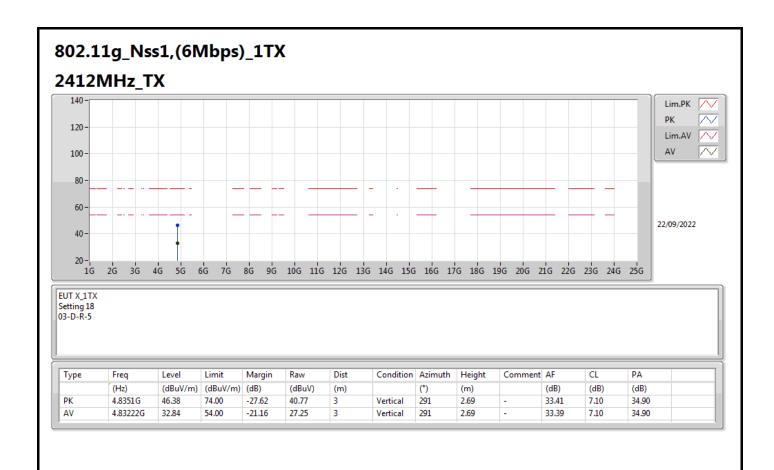
Page No. : 14 of 59 Report No. : FR291332AC





Page No. : 15 of 59 Report No. : FR291332AC





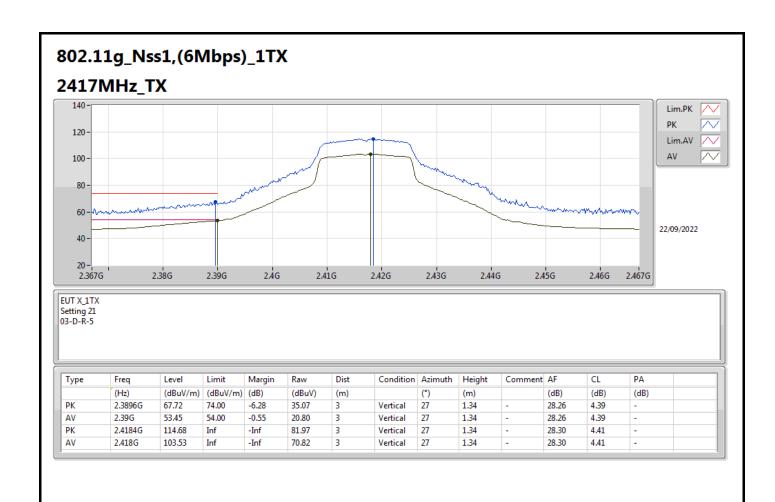
Page No. : 16 of 59 Report No. : FR291332AC





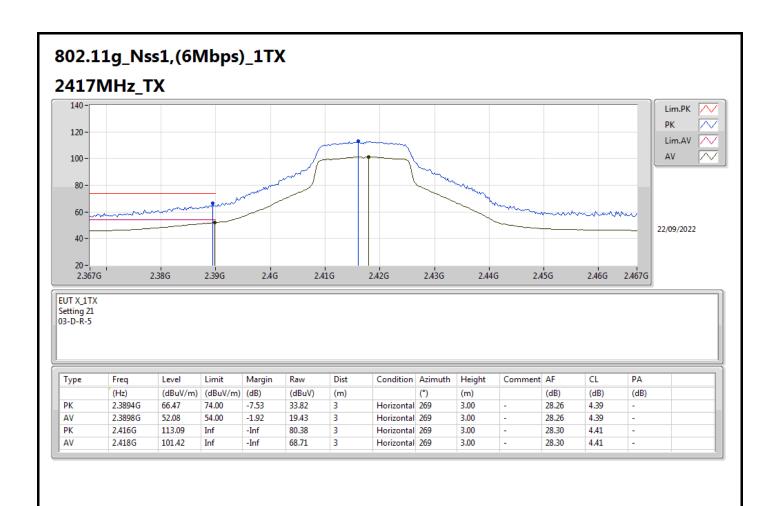
Page No. : 17 of 59 Report No. : FR291332AC





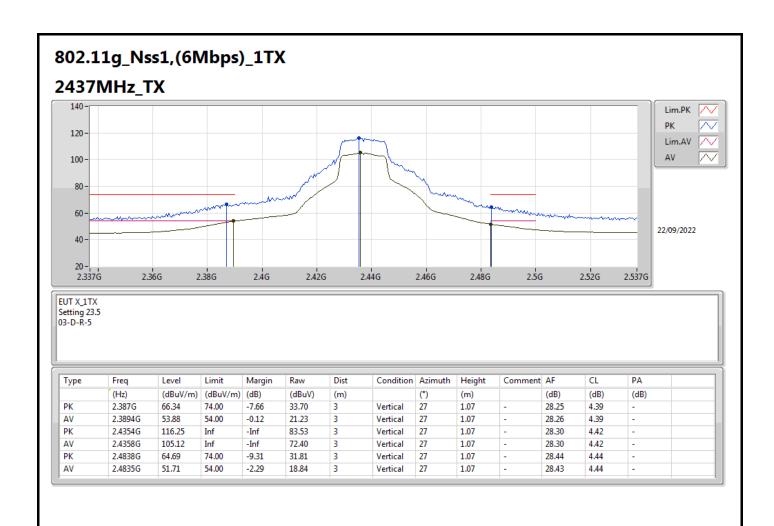
Page No. : 18 of 59 Report No. : FR291332AC





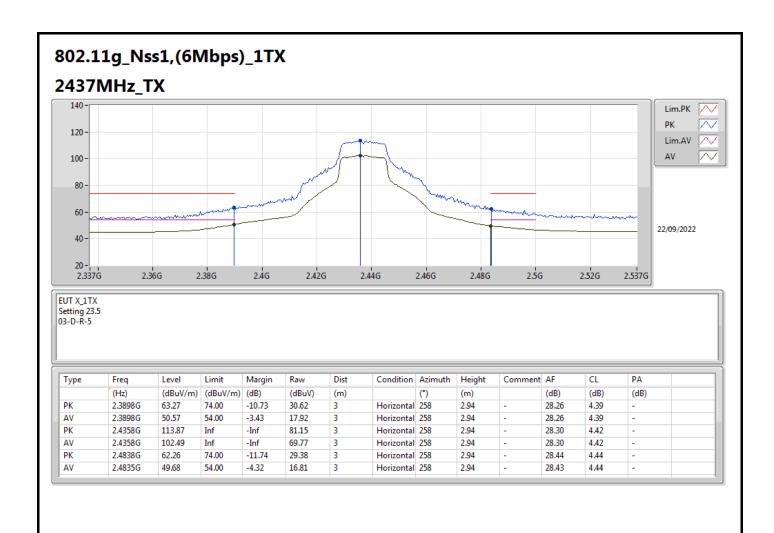
Page No. : 19 of 59 Report No. : FR291332AC





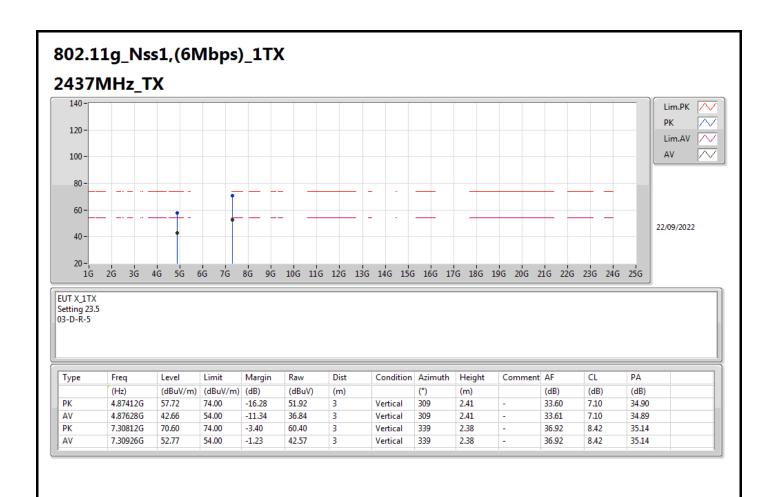
Page No. : 20 of 59 Report No. : FR291332AC





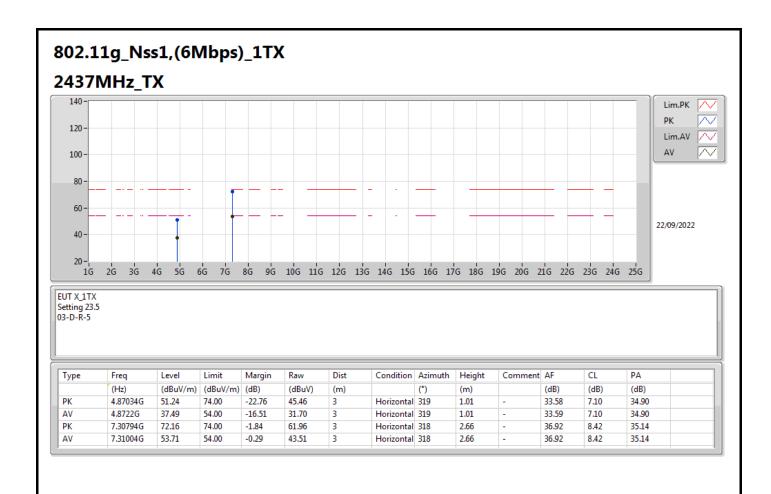
Page No. : 21 of 59 Report No. : FR291332AC





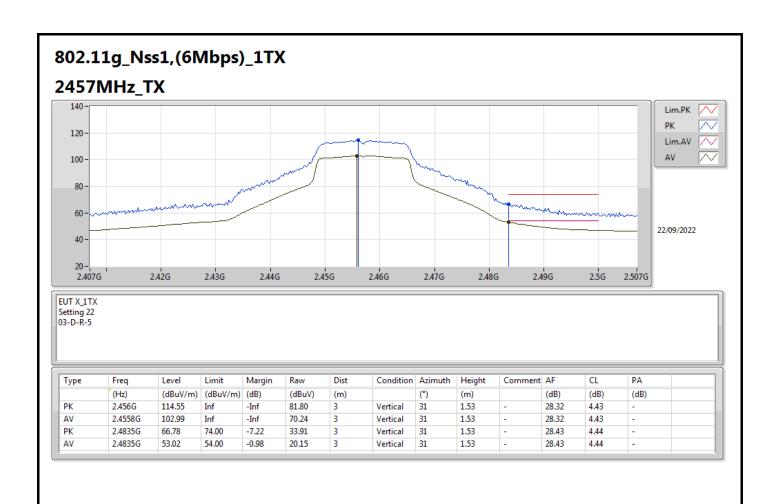
Page No. : 22 of 59 Report No. : FR291332AC





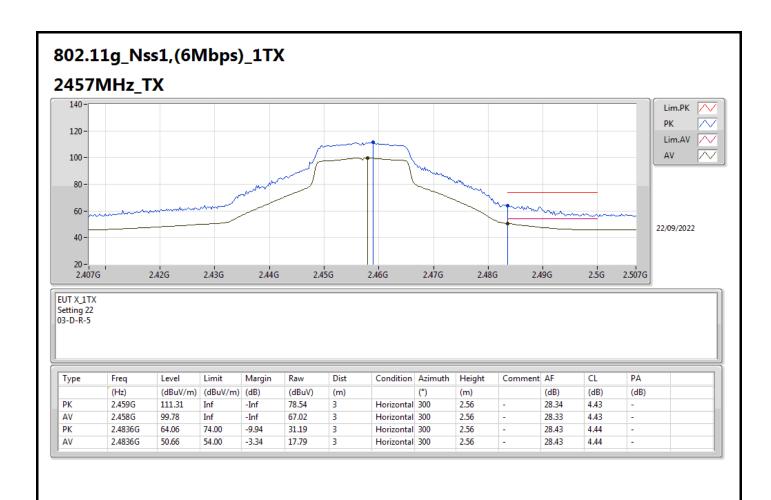
Page No. : 23 of 59 Report No. : FR291332AC





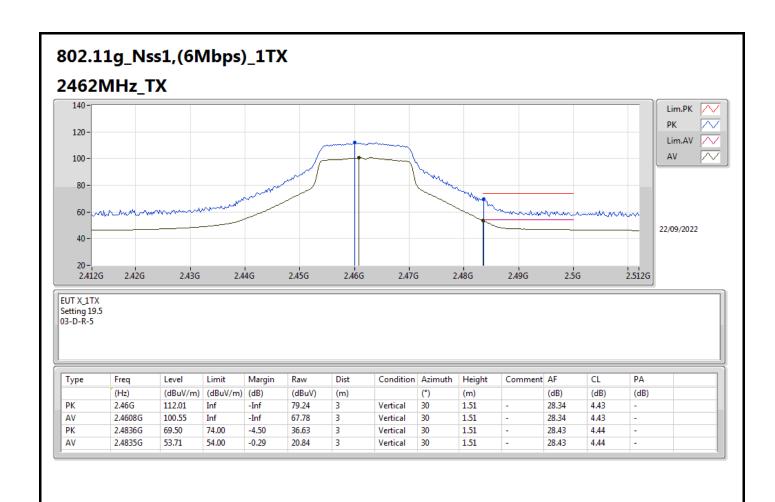
Page No. : 24 of 59 Report No. : FR291332AC





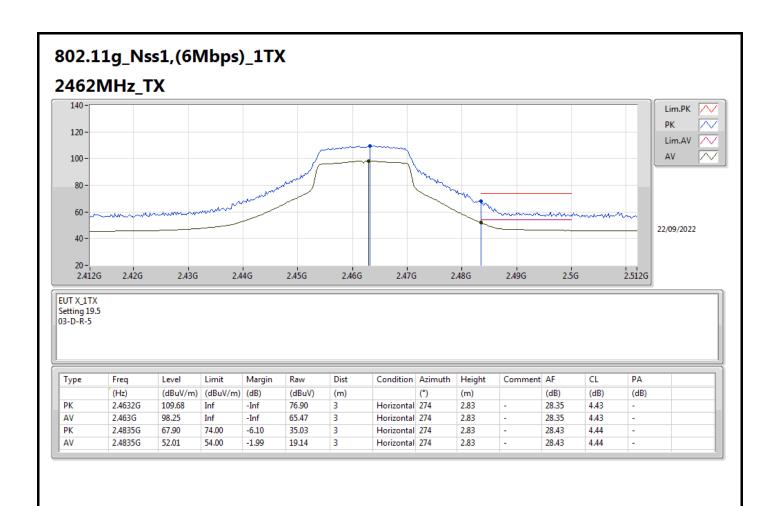
Page No. : 25 of 59 Report No. : FR291332AC





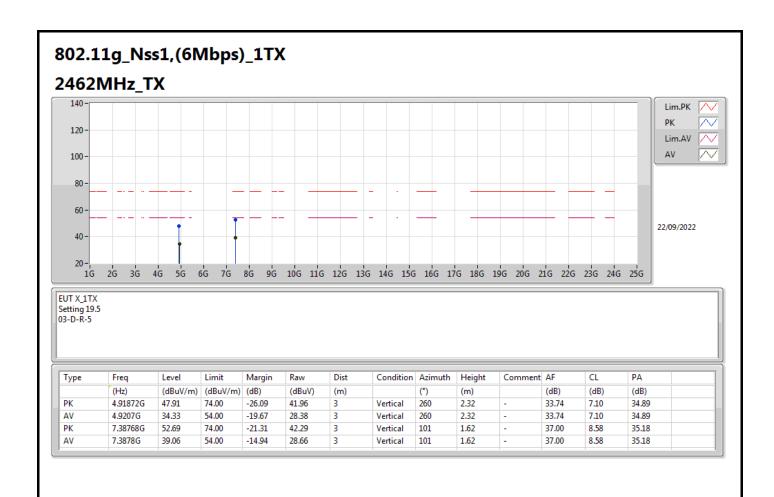
Page No. : 26 of 59 Report No. : FR291332AC





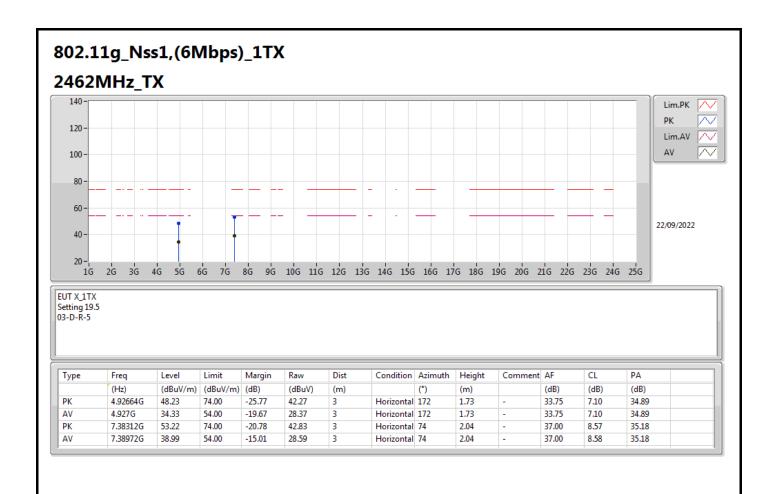
Page No. : 27 of 59 Report No. : FR291332AC





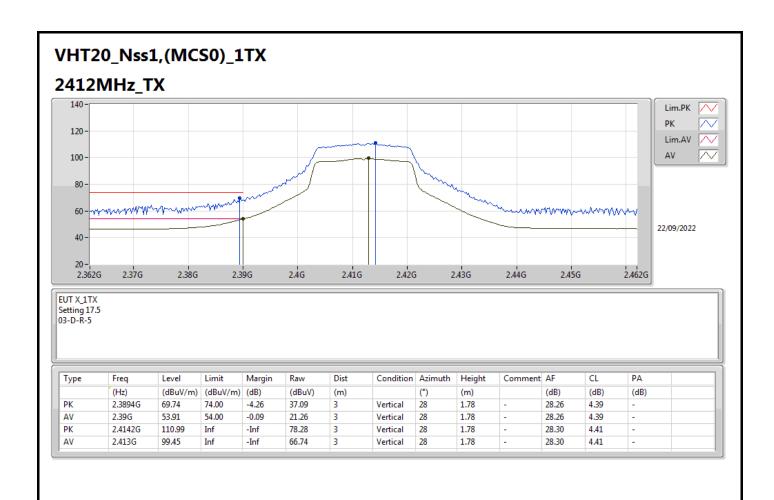
Page No. : 28 of 59 Report No. : FR291332AC





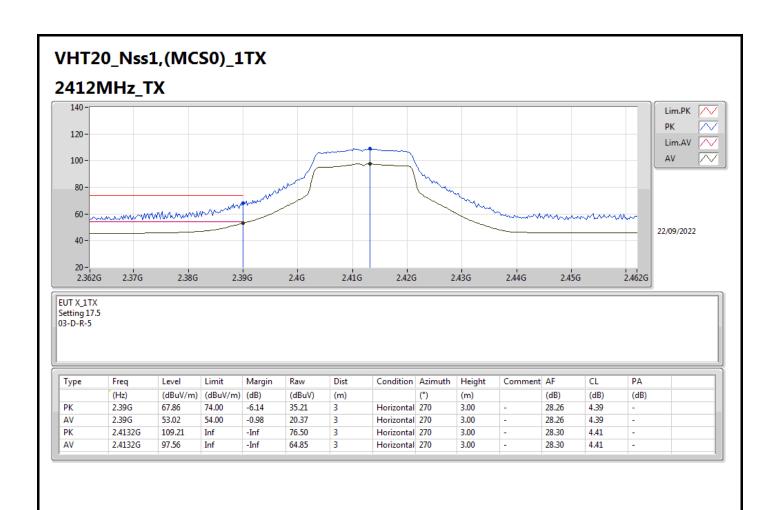
Page No. : 29 of 59 Report No. : FR291332AC





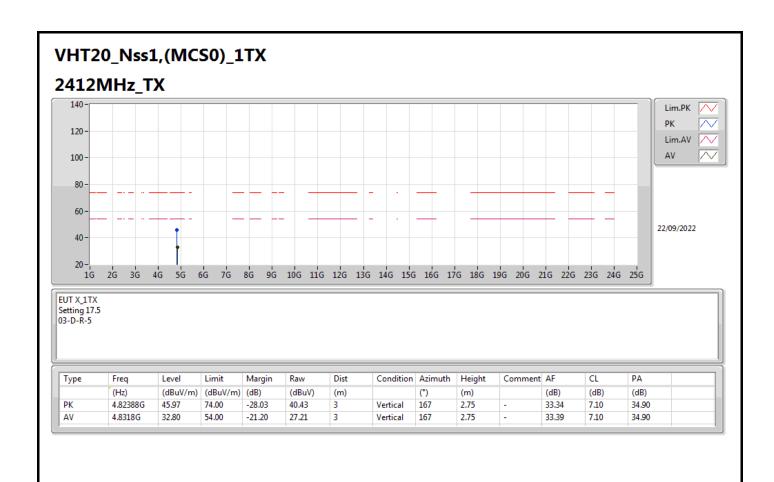
Page No. : 30 of 59 Report No. : FR291332AC





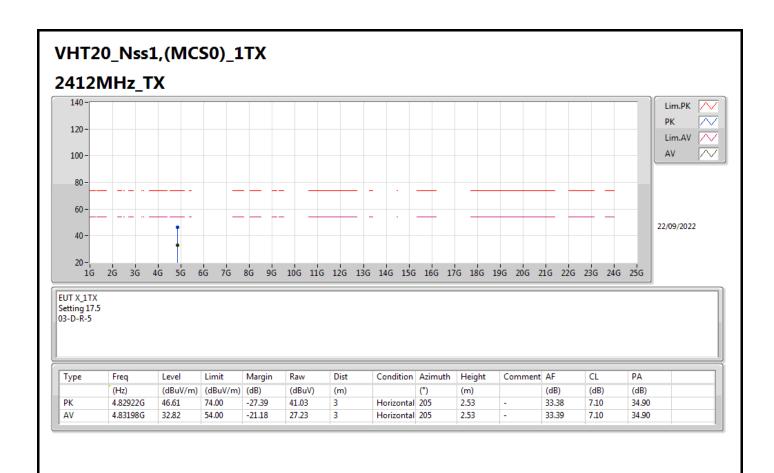
Page No. : 31 of 59 Report No. : FR291332AC





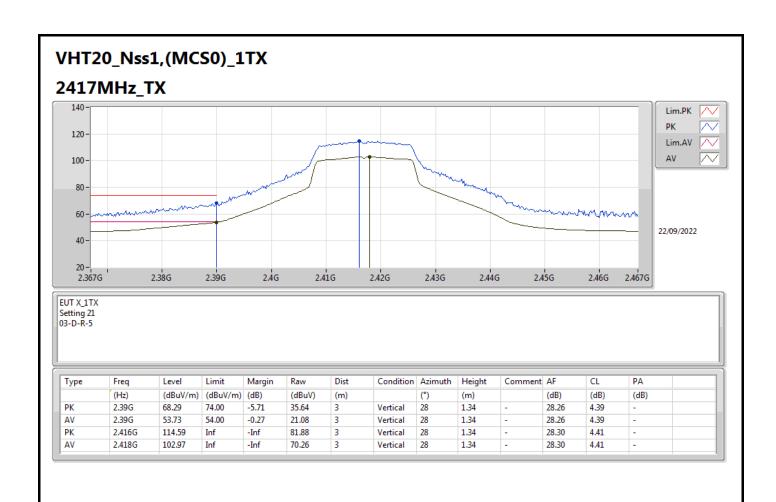
Page No. : 32 of 59 Report No. : FR291332AC





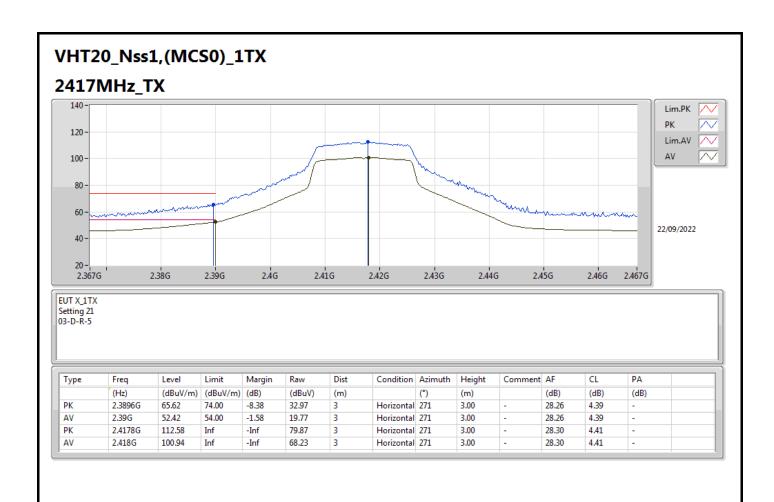
Page No. : 33 of 59 Report No. : FR291332AC





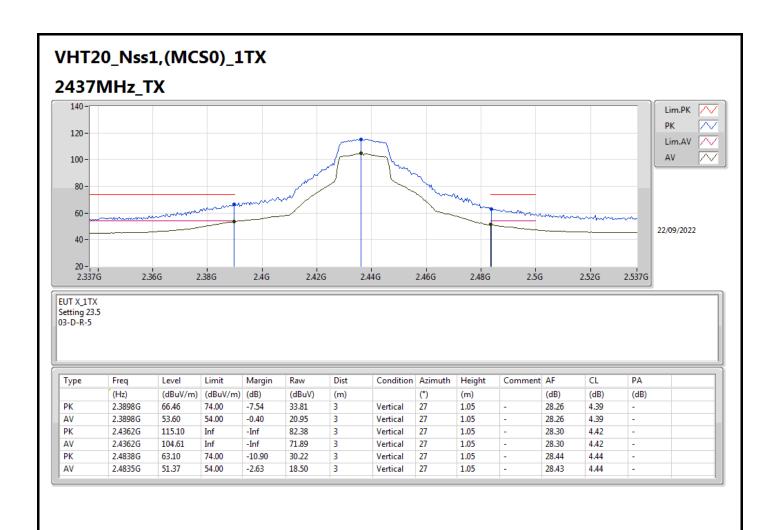
Page No. : 34 of 59 Report No. : FR291332AC





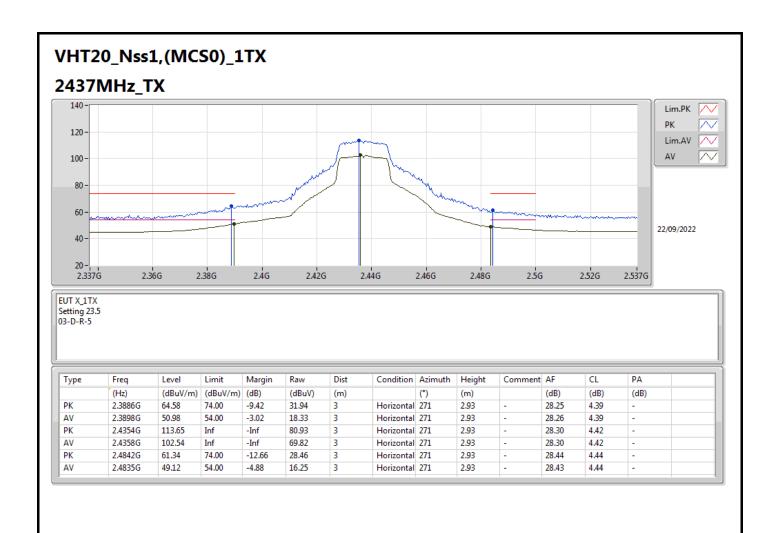
Page No. : 35 of 59 Report No. : FR291332AC





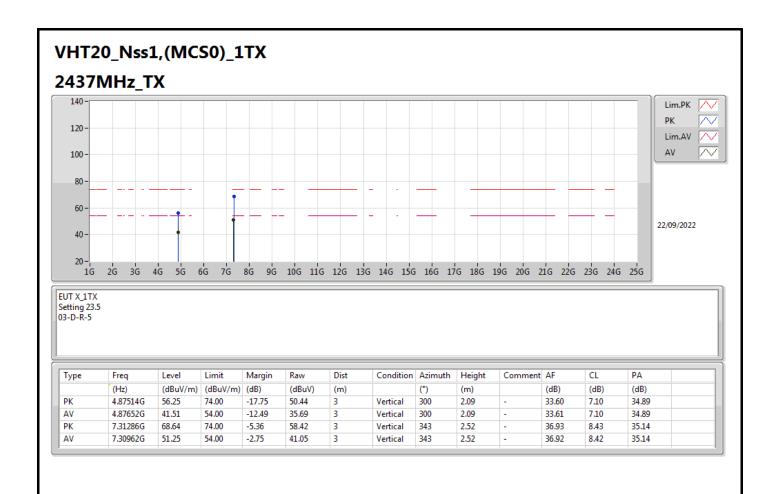
Page No. : 36 of 59 Report No. : FR291332AC





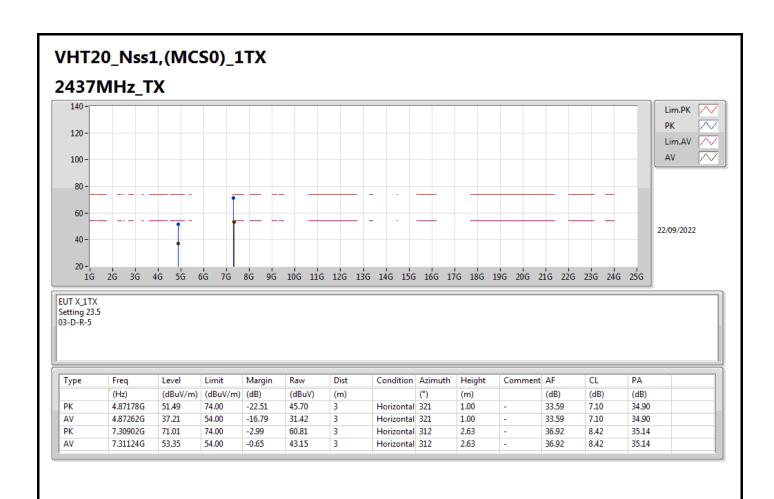
Page No. : 37 of 59 Report No. : FR291332AC





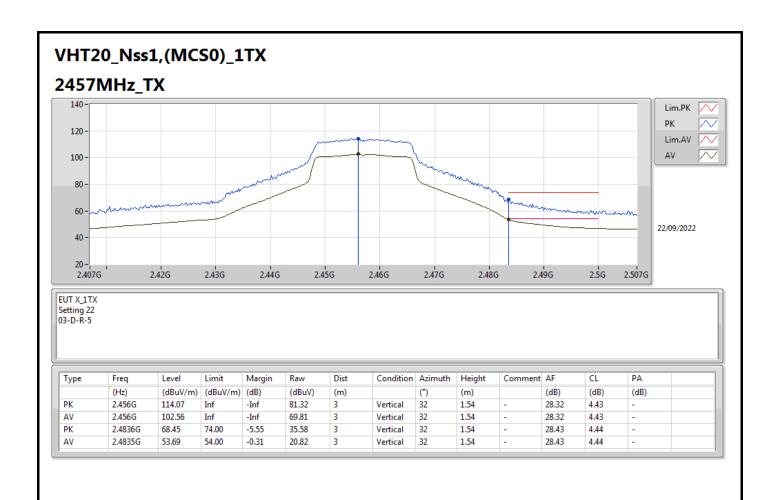
Page No. : 38 of 59 Report No. : FR291332AC





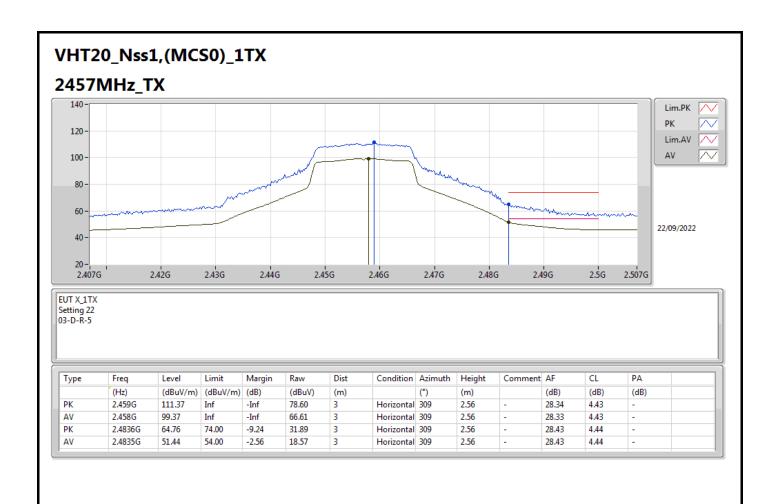
Page No. : 39 of 59 Report No. : FR291332AC





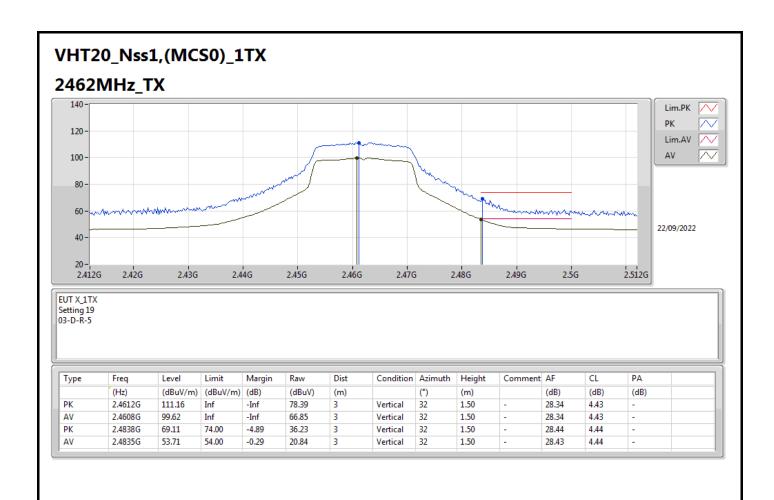
Page No. : 40 of 59 Report No. : FR291332AC





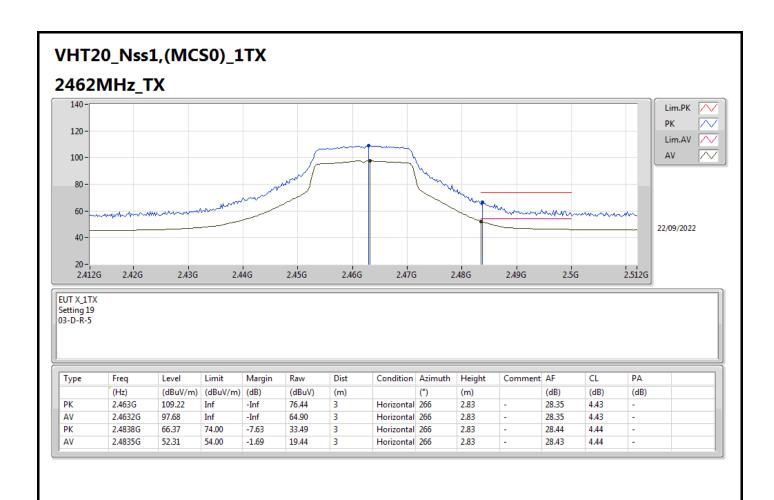
Page No. : 41 of 59 Report No. : FR291332AC





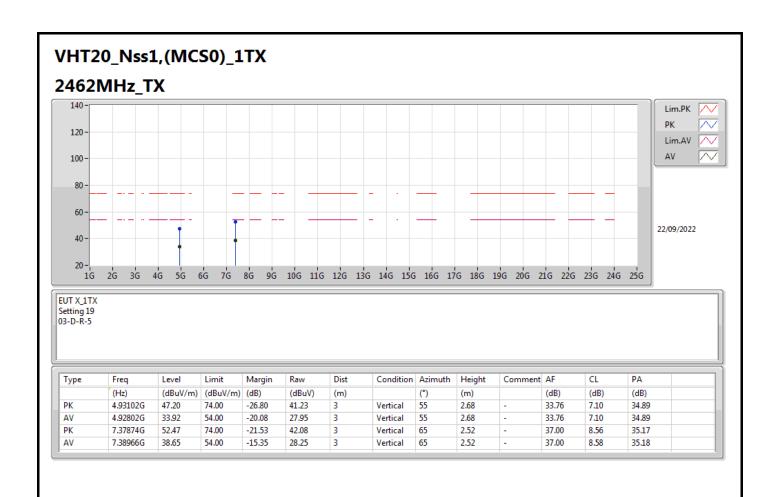
Page No. : 42 of 59 Report No. : FR291332AC





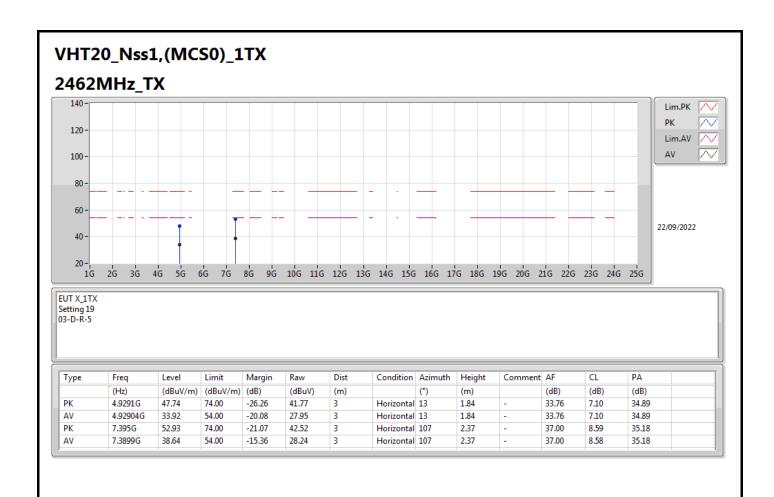
Page No. : 43 of 59 Report No. : FR291332AC





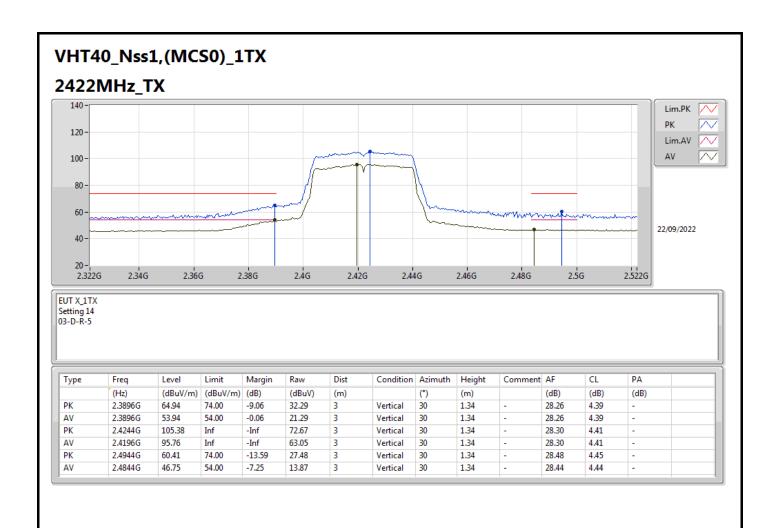
Page No. : 44 of 59 Report No. : FR291332AC





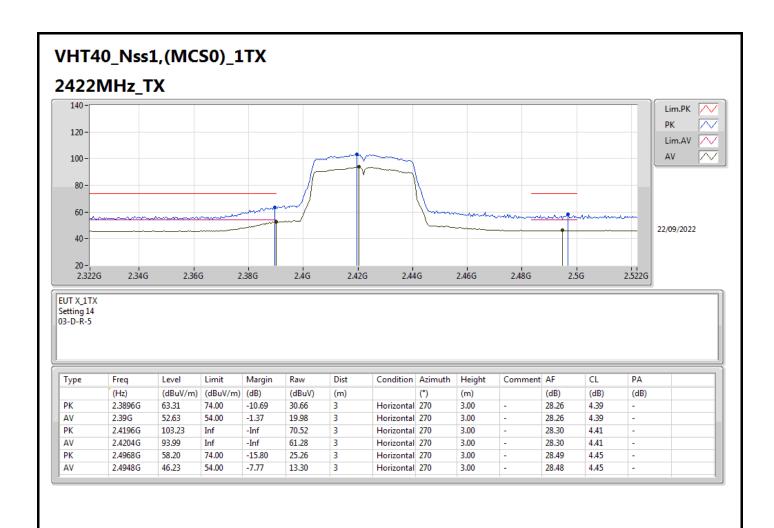
Page No. : 45 of 59 Report No. : FR291332AC





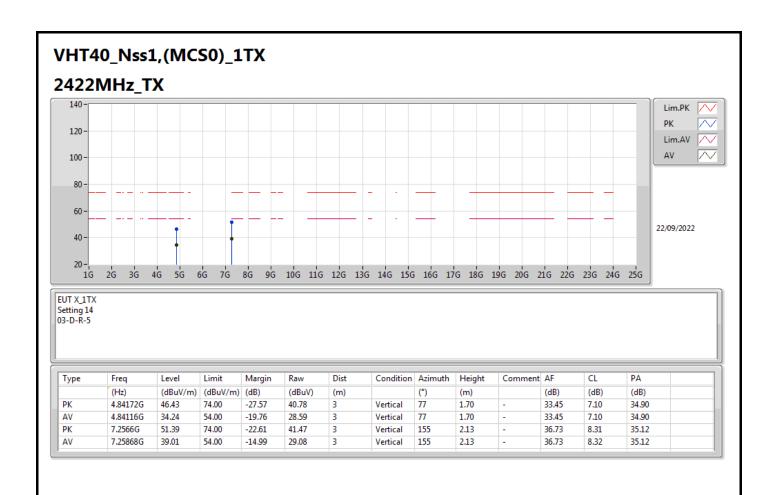
Page No. : 46 of 59 Report No. : FR291332AC





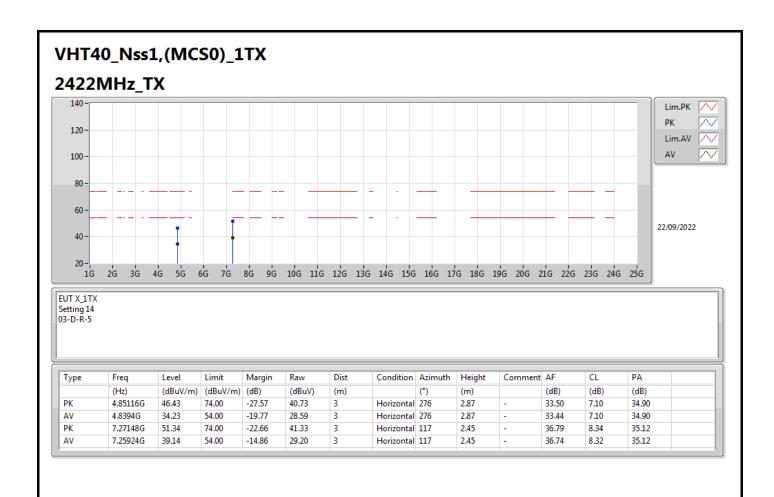
Page No. : 47 of 59 Report No. : FR291332AC





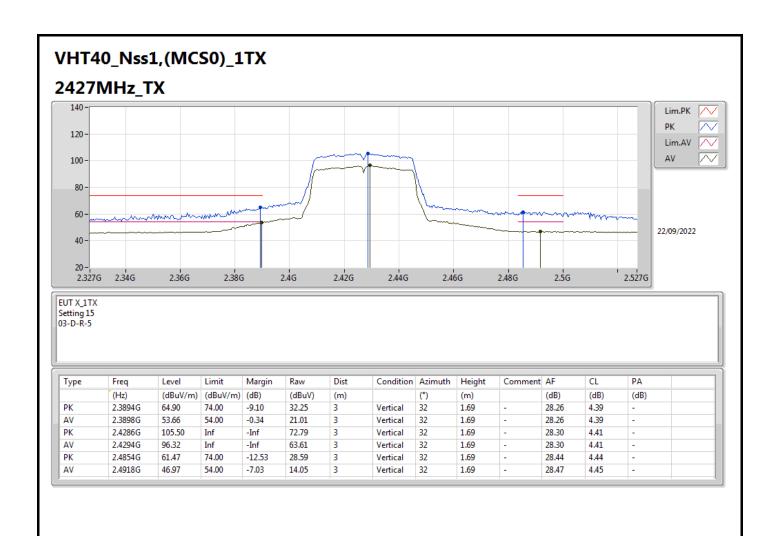
Page No. : 48 of 59 Report No. : FR291332AC





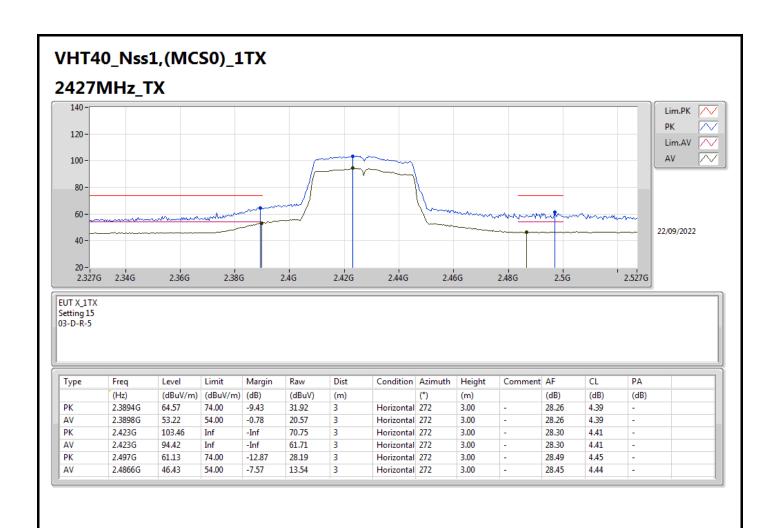
Page No. : 49 of 59 Report No. : FR291332AC





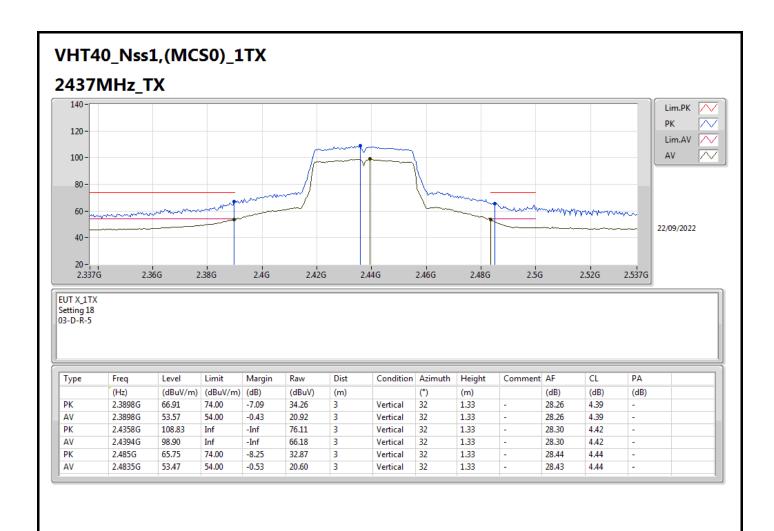
Page No. : 50 of 59 Report No. : FR291332AC





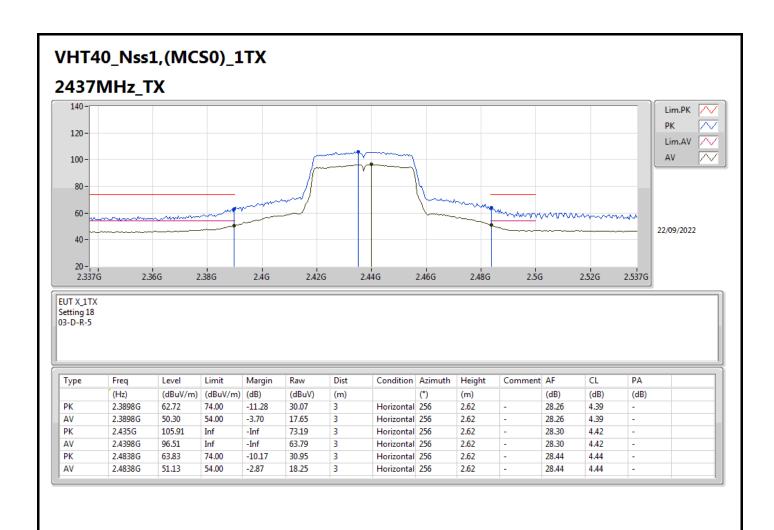
Page No. : 51 of 59 Report No. : FR291332AC





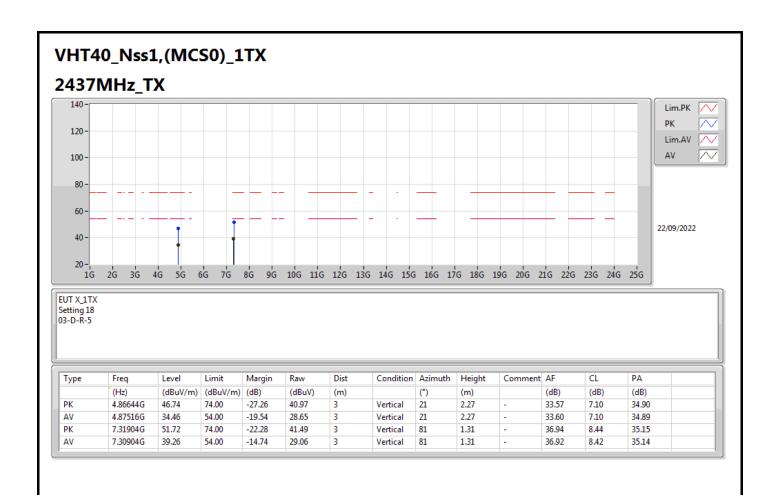
Page No. : 52 of 59 Report No. : FR291332AC





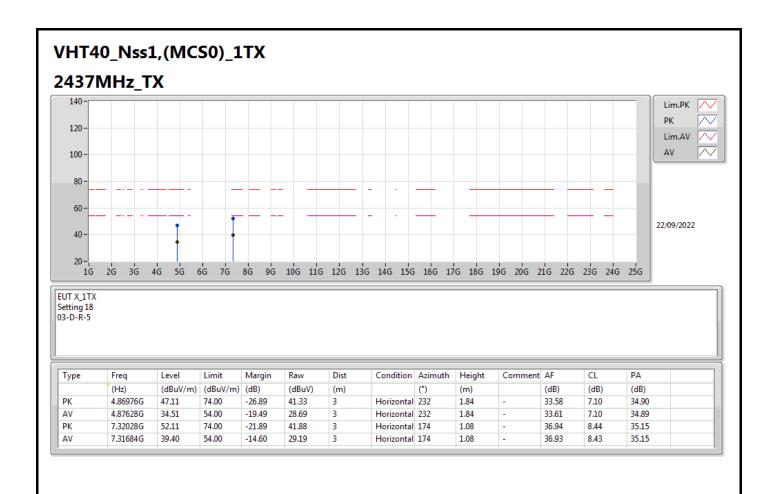
Page No. : 53 of 59 Report No. : FR291332AC





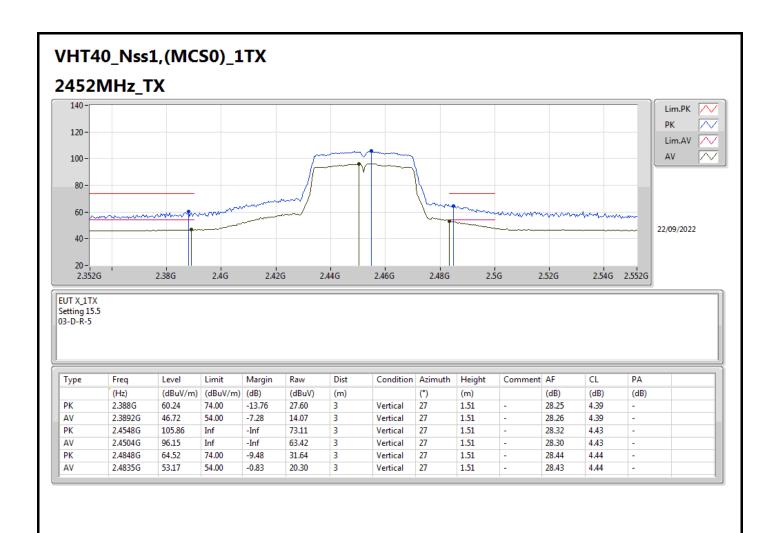
Page No. : 54 of 59 Report No. : FR291332AC





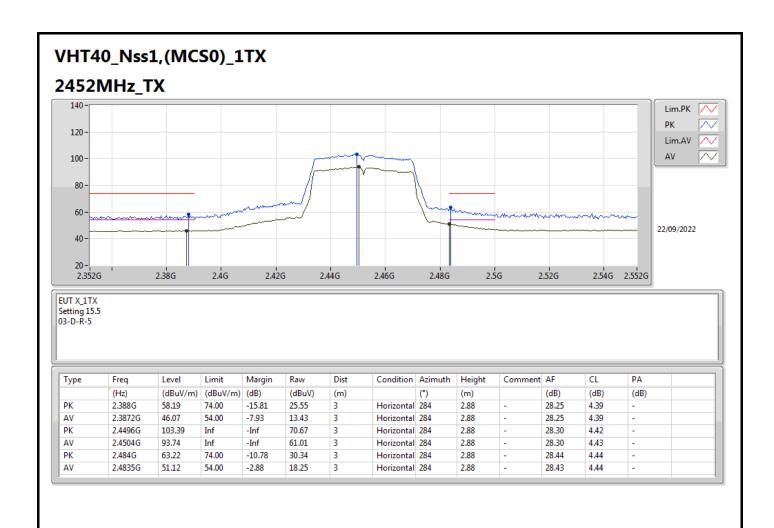
Page No. : 55 of 59 Report No. : FR291332AC





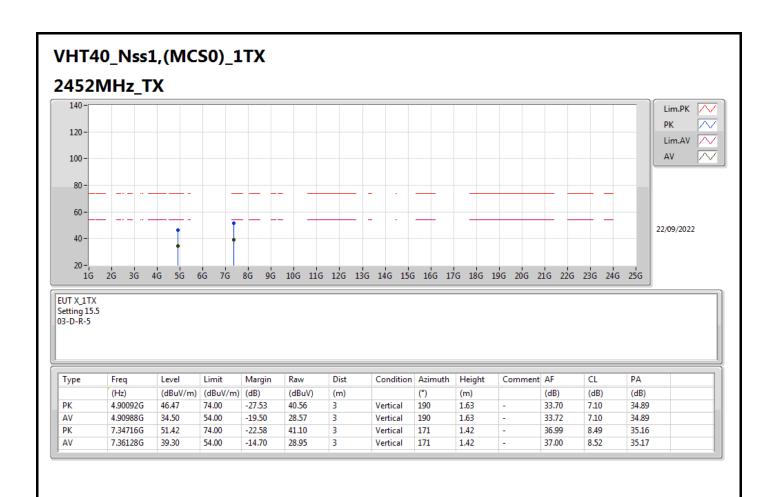
Page No. : 56 of 59 Report No. : FR291332AC





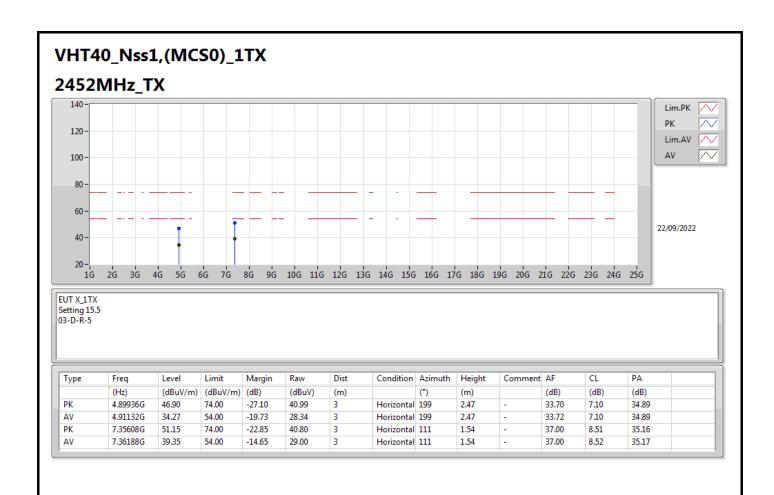
Page No. : 57 of 59 Report No. : FR291332AC





Page No. : 58 of 59 Report No. : FR291332AC





Page No. : 59 of 59 Report No. : FR291332AC



## Radiated Emissions above 1GHz

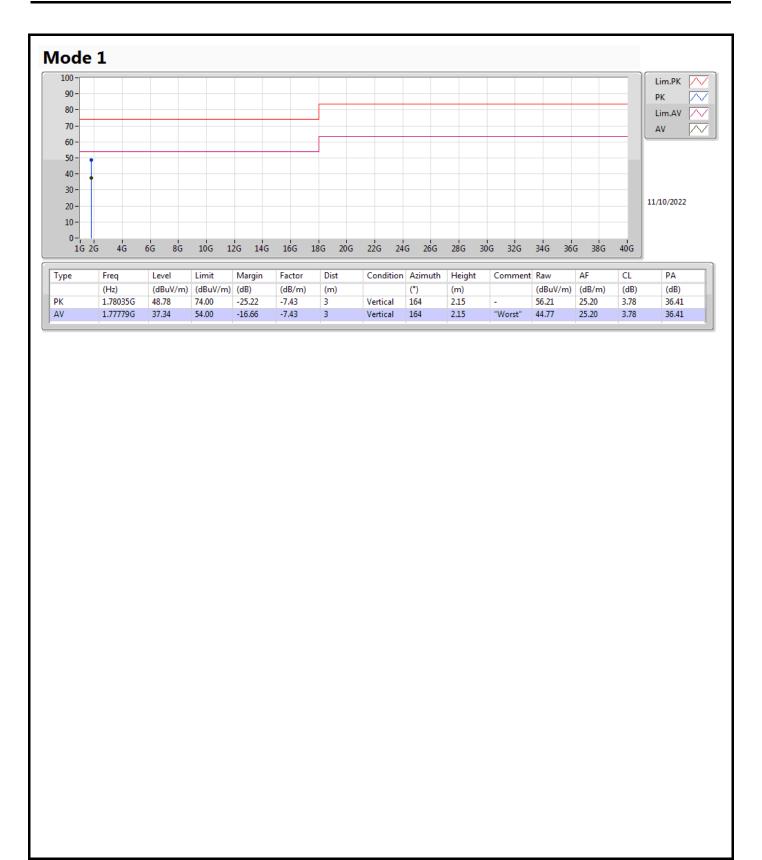
Appendix G

Summary

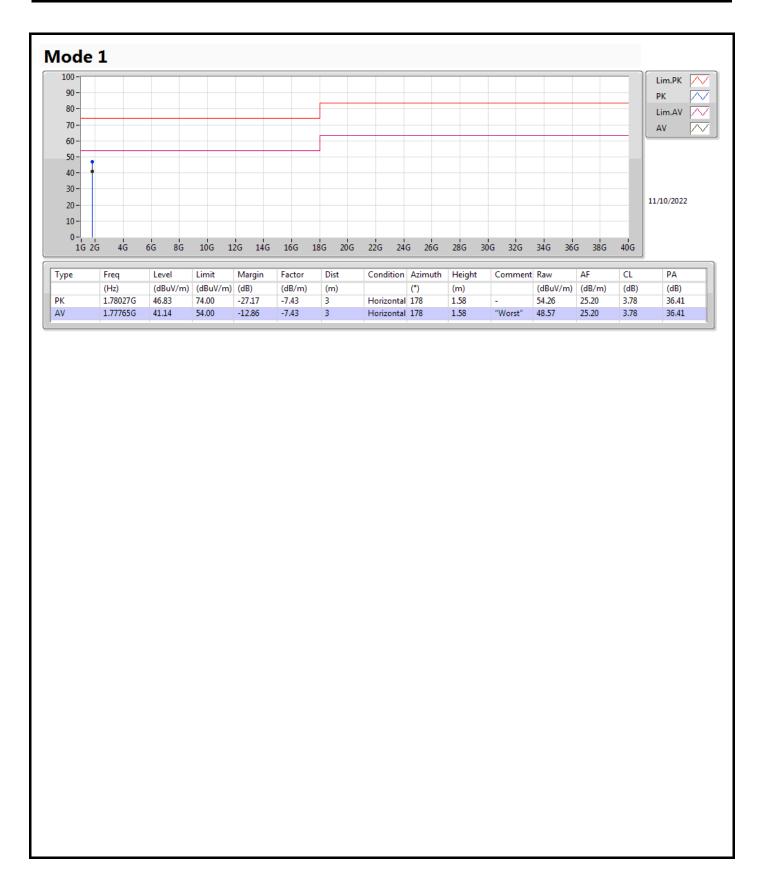
Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	1.77765G	41.14	54.00	-12.86	Horizontal

Page No. Report No. Sporton International Inc. Hsinchu Laboratory

: 1 of 3 : FR291332AC



Page No. : 2 of 3 Report No. : FR291332AC



Page No. : 3 of 3 Report No. : FR291332AC