

FCC and ISED Canada Testing of the

Masimo Corporation
Sterling-LWB5

In accordance with FCC 47 CFR part 15.407 and
ISED Canada's Radio Standards Specifications
RSS-247

Prepared for: Masimo Corporation
52 Discovery
Irvine, CA 92618



America

Add value.
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FCC ID: VKF-IRISA1
IC: 7362A-IRISA1

COMMERCIAL-IN-CONFIDENCE

Document Number: TP72157766.500 | Version Number: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Peter Walsh	2020 -October-07	
Testing	Thierry Jean-Charles	2020-October-07	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

FCC Accreditation
Designation Number US1063 Tampa, FL Test Laboratory
Innovation, Science, and Economic Development Canada
Accreditation
Site Number 2087A-2 Tampa, FL Test Laboratory

EXECUTIVE SUMMARY

Samples of this product were tested and found to be in compliance with 15.407 and ISED Canada's RSS-247



A2LA Cert. No. 2955.15

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Contents

1	Report Summary	3
1.1	Report Modification Record.....	3
1.2	Introduction.....	3
1.3	Brief Summary of Results	5
1.4	Product Information	6
1.5	Deviations from the Standard.....	10
1.6	EUT Modification Record	10
1.7	Test Location	11
2	Test Details	12
2.1	Antenna Requirements.....	12
2.2	Radiated Spurious Emissions	13
3	Test Equipment Information	42
3.1	General Test Equipment Used	42
4	Diagram of Test Set-ups	43
5	Measurement Uncertainty	46
6	Accreditation, Disclaimers and Copyright.....	47



1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2020-October-07

1.2 Introduction

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations Section 15.407 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein.

The evaluation is investigating continued compliance of the Masimo Corporation wireless module, model Sterling-LWB5 (FCC ID: VKF-IRISA1, IC: 7362A-IRISA1), when integrated within the Masimo Corporation model ISirona host product. The module utilizes a new antenna type under the new host condition, thus requiring a Class II Permissive Change. There are no additional changes to the product.



Applicant	Masimo Corporation
Manufacturer	Laird Connectivity
Applicant's Email Address	Phillip.warren@masimo.com
Model Number(s)	Sterling-LWB5
FCC ID	VKF-IRISA1
ISED Certification Number	7362A-IRISA1
Host Model Number	ISirona
Serial Number(s)	SY5A0762807
Host Hardware Version(s)	Revision D
Host Software Version(s)	1.0.0
Number of Samples Tested	1
Test Specification/Issue/Date	US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart E - Unlicensed National Information Infrastructure Devices, 2019 Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-247 — Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices, Issue 2, February 2017
Test Plan/Issue/Date	2020-January-27
Order Number	72157766
Date	2020-February-21
Date of Receipt of EUT	2020-May-27
Start of Test	2020-June-02
Finish of Test	2020-August-11
Name of Engineer(s)	Thierry Jean-Charles and Jean N. Rene
Related Document(s)	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2019. Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-GEN - General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1, March 2019



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15.407 and ISED Canada's RSS-247 is shown below.

Table 1.3-1: Test Result Summary

Test Parameter	Test Plan (Yes/No)	Test Result	FCC 47 CFR Rule Part	ISED Canada's RSS	Test Report Page No
Antenna Requirement	Yes	Pass	15.203, 15.204	-----	12
6 dB Bandwidth	No	Not Tested	15.407(e)	RSS-247 6.2.4.1	
26 dB Bandwidth	No	Not Tested	15.403(i)	-----	
99% Bandwidth	No	Not Tested	-----	RSS-GEN 6.6	
Peak Output Power	No	-----	15.407(a)(1)	RSS-247 6.2	
Power Spectral Density	No	Not Tested	15.407(a)	RSS-247 6.2	
Radiated Spurious Emissions	Yes	Pass	15.407(b)	RSS-247 6.2	13
Power Line Conducted Emissions	No	Not Tested	15.207	RSS-GEN 8.8	
Frequency Stability	No	Not Tested	15.407(g)	RSS-GEN 8.11	
Duty Cycle	No	-----			



1.4 Product Information

1.4.1 Technical Description

The EUT is an integrated 802.11 a/b/g/n/ac WLAN, Bluetooth and BLE module. The EUT was evaluated when integrated within the Masimo ISirona host configuration with a new antenna type.

Technical Details

Mode of Operation:	IEEE 802.11a/n/ac
Frequency Range:	802.11a/n 20 MHz/ac 20 MHz: 5180 MHz - 5240 MHz, 5260 MHz - 5320 MHz, 5500 MHz - 5720 MHz, 5745 MHz - 5825 MHz 802.11n 40 MHz/ac 40 MHz: 5190 MHz - 5230 MHz, 5270 MHz - 5310 MHz, 5510 MHz - 5710 MHz, 5755 MHz - 5795 MHz 802.11ac 80 MHz: 5210 MHz, 5290 MHz, 5530 MHz - 5690 MHz, 5775 MHz
Number of Channels:	802.11a/n 20 MHz/ac 20 MHz: 25 802.11n 40 MHz/ac 40 MHz: 12 802.11ac 80 MHz: 6
Channel Separation:	802.11a/n 20 MHz/ac 20 MHz: 20 MHz 802.11n 40 MHz/ac 40 MHz: 40 MHz 802.11ac 80 MHz: 80 MHz
Data Rate:	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n 20 MHz: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps 802.11n 40 MHz: 13.5, 27, 40.5, 54, 81, 108, 121.5, 135 Mbps 802.11ac 20 MHz: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65, 78 Mbps 802.11ac 40 MHz: 13.5, 27, 40.5, 54, 81, 108, 121.5, 135, 162, 180 Mbps 802.11ac 80 MHz: 29.3, 58.5, 87.8, 117, 175.5, 234, 263.3, 292.5, 351, 390 Mbps
Modulations:	OFDM
Antenna Type/Gain:	Molex Antenna Model 1461531100 / 4 dBi
Input Power:	5 VDC, Host power Supply

A full description and detailed product specification details are available from the manufacturer.

Table 1.4.1-1 – Cable Descriptions

Cable/Port	Description
Ethernet	Unshielded, EUT to remote laptop.
(6) Shuttle / USB	900-00001 with 1-meter serial cable and loop ack (3-meter cable for EFT test)
Power Cord	1.5 m, not shielded, power supply to EUT
Power Cord	1.8m, not shielded, power supply to AC Mains

**Table 1.4.1-2 – Support Equipment Descriptions**

Make/Model	Description
Masimo / ISirona	Host Device, SN: SY5A0762807
Masimo / HK-AD-050A500-D5	5VDC Power supply for ISirona
Dell / Latitude E7250	Laptop, SN: 8BCHF72
Dell / LA65NS2-01	19.5V AC Adapter, SN: CN-06TM1C-72438-54L-8611-A04

Note:

The Dell laptop and power supply were used as a support equipment for testing purposes and were outside of the test environment.



Declaration of Build Status

EQUIPMENT DESCRIPTION			
Model Name/Number	Sterling-LWB5 Module / (HVIN & PMN) Sterling-LWB5		
Part Number	450-0162		
Hardware Version			
Software Version			
FCC ID (if applicable)	VKF-IRISA1		
ISED ID (if applicable)	7362A-IRISA1		
Technical Description (Please provide a brief description of the intended use of the equipment)	802.11a/b/g/n/ac dual-band LWB5 and Bluetooth Module		

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	5850 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	32.768 kHz
Class A Digital Device (Use in commercial, industrial or business environment) ☒	
Class B Digital Device (Use in residential environment only) ☐	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	☐	☐	
External DC	Nominal Voltage	Maximum Current	
	3.7VDC		
Battery	Nominal Voltage	Battery Operating End Point Voltage	
	N/A	N/A	

EXTREME CONDITIONS			
Maximum temperature	+40	°C	Minimum temperature
			+5
			°C

Ancillaries
Please list all ancillaries which will be used with the device.

I hereby declare that the information supplied is correct and complete.

Name: Phillip Warren

Position held: Manager, Engineering

Date: 26-June-2020



1.4.2 Modes of Operation

The EUT was evaluated while integrated within the ISirona host device for the 5 GHz Wi-Fi.

1.4.3 Monitoring of Performance

The host device was set in the orientation of typical installation.

The detailed channels and modes of operation used for the evaluation are reported below.

Table 1.4.3-1: IEEE 802.11a/n/ac Test Configuration

Band of Operation	Mode of Operation	Frequency (MHz)	Channel	Power Setting	Modulation Index (Data Rate)
U-NII-1 (5.15 - 5.25 GHz)	802.11a/n 20 MHz	5180	36	13	802.11a: 6 Mbps 802.11n 20 MHz: MCS0 (6.5Mbps)
		5200	40		
		5240	48		
	802.11n 40 MHz	5190	38	10	MCS0 (13.5 Mbps)
		5230	46		
	802.11ac 80 MHz	5210	42	10	MCS0 (29.3 Mbps)
U-NII-2A (5.25 - 5.35 GHz)	802.11a/n 20 MHz	5260	52	13	802.11a: 6 Mbps 802.11n 20 MHz: MCS0 (6.5Mbps)
		5300	60		
		5320	64		
	802.11n 40 MHz	5270	54	10	MCS0 (13.5 Mbps)
		5310	62		
	802.11ac 80 MHz	5290	58	10	MCS0 (29.3 Mbps)
U-NII-2C (5.47 - 5.725 GHz)	802.11a/n 20 MHz	5500	100	13	802.11a: 6 Mbps 802.11n 20 MHz: MCS0 (6.5Mbps)
		5580	116		
		5720	144		
	802.11n 40 MHz	5510	102	10	MCS0 (13.5 Mbps)
		5550	110		
		5710	142		
	802.11ac 80 MHz	5530	106	10	MCS0 (29.3 Mbps)
		5610	122		
		5690	138		
U-NII-3 (5.725 - 5.85 GHz)	802.11a/n 20 MHz	5745	149	13	802.11a: 6 Mbps 802.11n 20 MHz: MCS0 (6.5Mbps)
		5785	157		
		5825	165		
	802.11n 40 MHz	5755	151	10	MCS0 (13.5 Mbps)
		5795	159		
	802.11ac 80 MHz	5775	155	10	MCS0 (29.3 Mbps)

Notes:

- Testing on the 802.11n 20 MHz / 40 MHz modes were deemed sufficient to demonstrate compliance of the 802.11ac 20 MHz/ 40 MHz modes.
- Operation in the 5600 – 5660 MHz band is not applicable to Innovation Science Economic Development Canada.



1.4.4 Performance Criteria

The EUT was evaluated for radiated band-edge and spurious emissions within the restricted bands to determine compliance for the new antenna/host configuration.

Table 1.4.4 -1: Performance Criteria

Parameter	Requirement
Antenna Requirement	FCC: Section 15.203. 15.204
Peak Output Power	FCC: Section 15.407(a)(1); ISSED Canada RSS-247 6.2
Radiated Spurious Emissions	FCC: Sections 15.407(b); ISSED Canada: RSS-247 6.2

1.5 Deviations from the Standard

The EUT was evaluated without any deviation from the test standards.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
None			

The equipment was tested as provided without any modifications.



1.7 Test Location

TÜV SÜD Product Service conducted the following tests at our Tampa FL Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
AC Powered Operating		
Antenna Requirement	Thierry Jean-Charles	A2LA
Peak Output Power	Thierry Jean-Charles	A2LA
Radiated Spurious Emissions	Thierry Jean-Charles	A2LA
Duty Cycle	Thierry Jean-Charles and Jean N. Rene	A2LA

Office Address:

TÜV SÜD America, Inc.
5610 W. Sligh Ave, Suite 100
Tampa, FL 33634
USA



2 Test Details

2.1 Antenna Requirements

2.1.1 Specification Reference

FCC: Section 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

S/N: SY5A0762807

2.1.3 Date of Test

7/1/2020

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

Ambient Temperature	N/A
Relative Humidity	N/A
Atmospheric Pressure	N/A

2.1.6 Test Results

Limit Clause FCC Sections: 15.203, 15.204

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EUT in the ISirona host configuration uses a Molex Antenna Model 1461531100 / 4 dBi with an I-PEX MHF4 connector. The EUT meets the requirements of FCC Section 15.203.

2.1.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

As this was a visual inspection, no test equipment was used.



2.2 Radiated Spurious Emissions

2.2.1 Specification Reference

FCC Sections: 15.407(b);
ISED Canada: RSS-247 6.2

2.2.2 Equipment Under Test and Modification State

SN: SY5A0762807

2.2.3 Date of Test

6/2/2020 To 7/14/2020

2.2.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 40 GHz.

For measurements below 30 MHz, the receive antenna height was set to 1 m and the EUT was rotated through 360 degrees. The resolution bandwidth was set to 200 Hz below 150 kHz and to 9 kHz above 150 kHz.

For the evaluation above 30 MHz, the EUT was rotated through 360° and the receive antenna height was varied from 1 m to 4 m so that the maximum radiated emissions level would be detected.

For frequencies from 30 MHz to 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz

For radiated emissions tests made over the frequency range of 1 GHz to 40 GHz, each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209. The other emissions were evaluated per the limits of FCC Section 15.407(b) / IC RSS-247 6.2. The EIRP limits of FCC Section 15.407(b) / IC RSS-247 6.2 were converted to field strength limits using a correction factor of 95.2 dB. Peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 1 kHz.

2.2.5 Duty Cycle Correction

No duty cycle correction factor was applied during the evaluation.

2.2.6 Environmental Conditions

Ambient Temperature	26.4 °C
Relative Humidity	37.6 %
Atmospheric Pressure	1016.4 mbar



2.2.7 Test Results

AC Powered Operating

Limit Clause FCC Part 407(b); ISED Canada: RSS-247 6.2

Frequency Range (MHz)	5250-5250	5250-5350	5470-5725	5725-5850
Out of Band e.i.r.p Emission	≤ 27 dBm/MHz outside 5150-5350 MHz		≤ -27 dBm/MHz outside 5470-5725 MHz	See FCC 15.407(b)(4) and ISED Canada RSS-247 6.2.4.2

Note: Compliance to the restricted band requirements applies.

Limit Clause FCC Sections 15.209, ISED Canada: RSS-GEN 8.9

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.4090-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Table 2.2.7-1: Radiated Emissions Test Results – below 1000 MHz

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.6	32.07	40	7.93	113	V	180	24.9
33.16	31.87	40	8.13	100	V	168	23.5
43.8	25.27	40	14.73	108	V	228	17.4
72.04	28.72	40	11.28	137	V	-1	13.1
72.2	25.71	40	14.29	129	V	115	13.1
95.88	30.19	43.5	13.31	106	V	254	16.8
96.36	30.33	43.5	13.17	110	V	75	16.9
122.48	29.64	43.5	13.86	100	V	213	19.3
151.52	31.93	43.5	11.57	156	H	90	17.5
200	44.09	43.5	-0.59	154	H	108	16.5
599.96	38.89	46	7.11	131	H	11	27.1
799.96	41.42	46	4.58	103	H	215	28.8

Note:

- The emissions at 200 MHz are generated by the digital device and are independent of the radio module. The host device is a Class A device. These emissions are reported for informational purposes only and should be ignored in the context of this evaluation. The emissions were determined to be compliant to the requirements of FCC Section 15.109(b) under the Supplier's Declaration of Conformity assessment.



Table 2.2.7-2: Radiated Emissions Test Results – Emissions from digital device above 1 GHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
1000.01	52.76	49.34	H	-9.39	43.37	39.95	74.0	54.0	30.6	14.1
1000.01	50.05	45.23	V	-9.39	40.66	35.84	74.0	54.0	33.3	18.2
1200	56.14	53.94	H	-9.12	47.02	44.82	74.0	54.0	27.0	9.2
1200	53.72	51.05	V	-9.12	44.60	41.93	74.0	54.0	29.4	12.1
1400	61.89	60.88	H	-8.85	53.04	52.03	74.0	54.0	21.0	2.0
1400	56.24	54.25	V	-8.85	47.39	45.40	74.0	54.0	26.6	8.6
1600	53.33	50.15	H	-7.83	45.50	42.32	74.0	54.0	28.5	11.7
1600	55.60	53.25	V	-7.83	47.77	45.42	74.0	54.0	26.2	8.6
1800	54.63	-----	H	-6.07	48.56	46.05	68.2	-----	19.6	-----
1800	55.57	-----	V	-6.07	49.50	45.97	68.2	-----	18.7	-----
2000	49.35	-----	H	-4.31	45.04	39.32	68.2	-----	23.2	-----
2000	48.88	-----	V	-4.31	44.57	39.15	68.2	-----	23.6	-----
2200	50.76	44.86	H	-5.54	45.22	39.32	74.0	54.0	28.8	14.7
2200	48.10	42.53	V	-5.54	42.56	36.99	74.0	54.0	31.4	17.0

Note:

- The emissions reported were generated by the digital device and were independent from the radio mode of operation and operating channels.

Table 2.2.7-3: Radiated Emissions Test Results – U-NII-1 (5150 MHz – 5250 MHz) – 802.11a

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5150	63.54	51.20	H	0.21	63.75	51.41	74.0	54.0	10.3	2.6
5150	54.28	41.98	V	0.21	54.49	42.19	74.0	54.0	19.5	11.8
10360	44.73	-----	H	8.37	53.10	-----	68.2	-----	15.1	-----
10360	46.66	-----	V	8.37	55.03	-----	68.2	-----	13.2	-----
15540	52.40	40.58	H	13.22	65.62	53.80	74.0	54.0	8.4	0.2
15540	51.22	38.46	V	13.22	64.44	51.68	74.0	54.0	9.6	2.3
20720	40.17	30.16	H	12.14	52.31	42.30	83.5	63.5	31.2	21.2
20720	40.43	32.17	V	12.14	52.57	44.31	83.5	63.5	30.9	19.2
Middle Channel										
10400	42.06	-----	H	8.56	50.62	-----	68.2	-----	17.6	-----
10400	42.72	-----	V	8.56	51.28	-----	68.2	-----	16.9	-----
15600	46.58	34.21	H	13.36	59.94	47.57	74.0	54.0	14.1	6.4
15600	45.57	33.24	V	13.36	58.93	46.60	74.0	54.0	15.1	7.4
20800	40.85	30.48	H	12.09	52.94	42.57	83.5	63.5	30.6	20.9
20800	39.64	29.61	V	12.09	51.73	41.70	83.5	63.5	31.8	21.8
High Channel										
10480	42.09	-----	H	8.95	51.04	-----	68.2	-----	17.2	-----
10480	43.13	-----	V	8.95	52.08	-----	68.2	-----	16.1	-----
15720	43.92	31.82	H	13.63	57.55	45.45	74.0	54.0	16.4	8.5
15720	42.63	30.80	V	13.63	56.26	44.43	74.0	54.0	17.7	9.6
20960	39.88	32.62	H	11.98	51.86	44.60	83.5	63.5	31.6	18.9
20960	39.69	31.52	V	11.98	51.67	43.50	83.5	63.5	31.8	20.0

Notes:

- All the emissions above 21 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-4: Radiated Emissions Test Results – U-NII-1 (5150 MHz – 5250 MHz) – 802.11n 20 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5150	60.79	48.24	H	0.21	61.00	48.45	74.0	54.0	13.0	5.6
5150	52.95	40.66	V	0.21	53.16	40.87	74.0	54.0	20.8	13.1
10360	41.94	-----	H	8.37	50.31	-----	68.2	-----	17.9	-----
10360	42.68	-----	V	8.37	51.05	-----	68.2	-----	17.1	-----
15540	46.46	35.44	H	13.22	59.68	48.66	74.0	54.0	14.3	5.3
15540	44.38	33.01	V	13.22	57.60	46.23	74.0	54.0	16.4	7.8
20720	40.37	31.93	H	12.14	52.51	44.07	83.5	63.5	31.0	19.4
20720	40.02	31.83	V	12.14	52.16	43.97	83.5	63.5	31.3	19.5
Middle Channel										
10400	41.58	-----	H	8.56	50.14	-----	68.2	-----	18.1	-----
10400	42.91	-----	V	8.56	51.47	-----	68.2	-----	16.7	-----
15600	45.33	34.04	H	13.36	58.69	47.40	74.0	54.0	15.3	6.6
15600	46.49	33.53	V	13.36	59.85	46.89	74.0	54.0	14.2	7.1
20800	40.90	29.96	H	12.09	52.99	42.05	83.5	63.5	30.5	21.4
20800	40.66	31.73	V	12.09	52.75	43.82	83.5	63.5	30.7	19.7
High Channel										
10480	40.63	-----	H	8.95	49.58	-----	68.2	-----	18.6	-----
10480	41.55	-----	V	8.95	50.50	-----	68.2	-----	17.7	-----
15720	42.31	31.47	H	13.63	55.94	45.10	74.0	54.0	18.1	8.9
15720	43.76	31.81	V	13.63	57.39	45.44	74.0	54.0	16.6	8.6
20960	40.36	32.69	H	11.98	52.34	44.67	83.5	63.5	31.2	18.8
20960	39.74	31.73	V	11.98	51.72	43.71	83.5	63.5	31.8	19.8

Notes:

- All the emissions above 21 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-5: Radiated Emissions Test Results – U-NII-1 (5150 MHz – 5250 MHz) – 802.11n 40 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5150	68.26	49.89	H	0.21	68.47	50.10	74.0	54.0	5.5	3.9
5150	55.00	40.78	V	0.21	55.21	40.99	74.0	54.0	18.8	13.0
10380	41.00	-----	H	8.47	49.47	-----	68.2	-----	18.7	-----
10380	40.74	-----	V	8.47	49.21	-----	68.2	-----	19.0	-----
15570	42.50	30.07	H	13.29	55.79	43.36	74.0	54.0	18.2	10.6
15570	41.50	27.54	V	13.29	54.79	40.83	74.0	54.0	19.2	13.2
20760	40.30	31.94	H	12.12	52.42	44.06	83.5	63.5	31.1	19.4
20760	40.00	32.34	V	12.12	52.12	44.46	83.5	63.5	31.4	19.0
High Channel										
10460	39.79	-----	H	8.85	48.64	-----	68.2	-----	19.6	-----
10460	39.77	-----	V	8.85	48.62	-----	68.2	-----	19.6	-----
15690	40.86	28.98	H	13.56	54.42	42.54	74.0	54.0	19.6	11.5
15690	40.40	28.54	V	13.56	53.96	42.10	74.0	54.0	20.0	11.9
20920	39.52	31.27	H	12.01	51.53	43.28	83.5	63.5	32.0	20.2
20920	39.62	31.70	V	12.01	51.63	43.71	83.5	63.5	31.9	19.8

Notes:

- All the emissions above 21 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.

Table 2.2.7-6: Radiated Emissions Test Results – U-NII-1 (5150 MHz - 5250 MHz) – 802.11ac 80 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Middle Channel										
5150	64.47	51.19	H	0.21	64.68	51.40	74.0	54.0	9.3	2.6
5150	52.51	40.83	V	0.21	52.72	41.04	74.0	54.0	21.3	13.0
5350	53.43	40.99	H	0.85	54.28	41.84	74.0	54.0	19.7	12.2
10420	40.57	-----	H	8.66	49.23	-----	68.2	-----	19.0	-----
10420	40.23	-----	V	8.66	48.89	-----	68.2	-----	19.3	-----
15630	41.22	28.72	H	13.43	54.65	42.15	74.0	54.0	19.4	11.9
15630	40.17	28.36	V	13.43	53.60	41.79	74.0	54.0	20.4	12.2
20840	39.77	31.59	H	12.06	51.83	43.65	83.5	63.5	31.7	19.8
20840	39.51	30.97	V	12.06	51.57	43.03	83.5	63.5	31.9	20.5

Notes:

- All the emissions above 20.9 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-7: Radiated Emissions Test Results – U-NII-2A (5250 MHz – 5350 MHz) – 802.11a

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
10520	41.31	-----	H	9.08	50.39	-----	68.2	-----	17.8	-----
10520	41.43	-----	V	9.08	50.51	-----	68.2	-----	17.7	-----
15780	42.60	31.03	H	13.77	56.37	44.80	74.0	54.0	17.6	9.2
15780	42.35	30.69	V	13.77	56.12	44.46	74.0	54.0	17.9	9.5
21040	39.50	31.58	H	12.00	51.50	43.58	83.5	63.5	32.0	19.9
21040	39.87	30.78	V	12.00	51.87	42.78	83.5	63.5	31.6	20.7
Middle Channel										
10600	40.91	-----	H	9.21	50.12	-----	74.0	54.0	23.9	-----
10600	41.34	-----	V	9.21	50.55	-----	74.0	54.0	23.4	-----
15900	42.04	29.91	H	14.04	56.08	43.95	74.0	54.0	17.9	10.1
15900	41.22	30.11	V	14.04	55.26	44.15	74.0	54.0	18.7	9.8
21200	40.55	30.18	H	12.19	52.74	42.37	83.5	63.5	30.8	21.1
21200	40.64	30.39	V	12.19	52.83	42.58	83.5	63.5	30.7	20.9
High Channel										
5350	60.37	47.37	H	0.85	61.22	48.22	74.0	54.0	12.8	5.8
5350	51.23	39.63	V	0.85	52.08	40.48	74.0	54.0	21.9	13.5
10640	43.08	32.80	H	9.28	52.36	42.08	74.0	54.0	21.6	11.9
10640	45.06	33.14	V	9.28	54.34	42.42	74.0	54.0	19.7	11.6
15960	44.64	33.73	H	14.18	58.82	47.91	74.0	54.0	15.2	6.1
15960	45.42	33.31	V	14.18	59.60	47.49	74.0	54.0	14.4	6.5
21280	39.63	29.79	H	12.29	51.92	42.08	83.5	63.5	31.6	21.4
21280	40.57	30.81	V	12.29	52.86	43.10	83.5	63.5	30.6	20.4

Notes:

- All the emissions above 21.3 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



**Table 2.2.7-8: Radiated Emissions Test Results – U-NII-2A (5250 MHz – 5350 MHz) – 802.11n
20 MHz**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
10600	40.31	28.49	H	9.21	49.52	37.70	74.0	54.0	24.5	16.3
10600	40.65	30.32	V	9.21	49.86	39.53	74.0	54.0	24.1	14.5
15900	40.57	29.57	H	14.04	54.61	43.61	74.0	54.0	19.4	10.4
15900	41.35	29.52	V	14.04	55.39	43.56	74.0	54.0	18.6	10.4
21200	40.48	30.05	H	12.19	52.67	42.24	83.5	63.5	30.8	21.3
21200	39.83	30.42	V	12.19	52.02	42.61	83.5	63.5	31.5	20.9
Middle Channel										
10520	41.76	-----	H	9.08	50.84	-----	68.2	-----	17.4	-----
10520	41.31	-----	V	9.08	50.39	-----	68.2	-----	17.8	-----
15780	42.52	30.87	H	13.77	56.29	44.64	74.0	54.0	17.7	9.4
15780	42.62	31.06	V	13.77	56.39	44.83	74.0	54.0	17.6	9.2
21040	39.31	30.89	H	12.00	51.31	42.89	83.5	63.5	32.2	20.6
21040	38.97	30.66	V	12.00	50.97	42.66	83.5	63.5	32.5	20.8
High Channel										
5350	58.45	45.91	H	0.85	59.30	46.76	74.0	54.0	14.7	7.2
5350	51.13	39.35	V	0.85	51.98	40.20	74.0	54.0	22.0	13.8
10640	40.08	29.52	H	9.28	49.36	38.80	74.0	54.0	24.6	15.2
10640	41.50	30.81	V	9.28	50.78	40.09	74.0	54.0	23.2	13.9
15960	39.85	28.70	H	14.18	54.03	42.88	74.0	54.0	20.0	11.1
15960	40.66	28.89	V	14.18	54.84	43.07	74.0	54.0	19.2	10.9
21280	40.71	31.35	H	12.29	53.00	43.64	83.5	63.5	30.5	19.9
21280	40.77	31.08	V	12.29	53.06	43.37	83.5	63.5	30.4	20.1

Notes:

- All the emissions above 21.3 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-9: Radiated Emissions Test Results – U-NII-2A (5250 MHz – 5350 MHz) – 802.11n 40 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
10540	39.84	-----	H	9.11	48.95	-----	68.2	-----	19.3	-----
10540	39.44	-----	V	9.11	48.55	-----	68.2	-----	19.7	-----
15810	39.28	28.66	H	13.84	53.12	42.50	74.0	54.0	20.9	11.5
15810	38.94	28.20	V	13.84	52.78	42.04	74.0	54.0	21.2	12.0
21080	40.17	31.28	H	12.05	52.22	43.33	83.5	63.5	31.3	20.2
21080	40.16	31.05	V	12.05	52.21	43.10	83.5	63.5	31.3	20.4
High Channel										
5350	57.83	44.74	H	0.85	58.68	45.59	74.0	54.0	15.3	8.4
5350	50.76	39.29	V	0.85	51.61	40.14	74.0	54.0	22.4	13.9
10620	40.57	28.19	H	9.25	49.82	37.44	74.0	54.0	24.2	16.6
10620	40.64	28.70	V	9.25	49.89	37.95	74.0	54.0	24.1	16.1
15930	40.43	28.21	H	14.11	54.54	42.32	74.0	54.0	19.5	11.7
15930	40.54	27.93	V	14.11	54.65	42.04	74.0	54.0	19.4	12.0
21240	40.33	32.34	H	12.24	52.57	44.58	83.5	63.5	30.9	18.9
21240	42.00	31.37	V	12.24	54.24	43.61	83.5	63.5	29.3	19.9

Notes:

- All the emissions above 21.3 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.

Table 2.2.7-10: Radiated Emissions Test Results – U-NII-2A (5250 MHz – 5350 MHz) – 802.11ac 80 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Middle Channel										
5350	56.64	43.81	H	0.85	57.49	44.66	74.0	54.0	16.5	9.3
5350	51.20	39.09	V	0.85	52.05	39.94	74.0	54.0	21.9	14.1
10580	39.54	-----	H	9.18	48.72	-----	68.2	-----	19.5	-----
10580	40.37	-----	V	9.18	49.55	-----	68.2	-----	18.7	-----
15870	39.92	28.93	H	13.97	53.89	42.90	74.0	54.0	20.1	11.1
15870	39.08	28.61	V	13.97	53.05	42.58	74.0	54.0	20.9	11.4
21160	39.54	31.06	H	12.15	51.69	43.21	83.5	63.5	31.8	20.3
21160	39.96	29.69	V	12.15	52.11	41.84	83.5	63.5	31.4	21.7

Notes:

- All the emissions above 21.2 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-11: Radiated Emissions Test Results – U-NII-2C (5500 MHz – 5725 MHz) – 802.11a

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5460	59.50	46.56	H	1.21	60.71	47.77	74.0	54.0	13.3	6.2
5460	51.85	40.06	V	1.21	53.06	41.27	74.0	54.0	20.9	12.7
5470	60.93	-----	H	1.24	62.17	-----	68.2	-----	6.0	-----
5470	52.77	-----	V	1.24	54.01	-----	68.2	-----	14.2	-----
11000	43.74	32.73	H	9.89	53.63	42.62	74.0	54.0	20.4	11.4
11000	45.00	33.76	V	9.89	54.89	43.65	74.0	54.0	19.1	10.4
16500	52.00	-----	H	14.64	66.64	-----	68.2	-----	1.6	-----
16500	48.95	-----	V	14.64	63.59	-----	68.2	-----	4.6	-----
22000	38.94	-----	H	13.59	52.53	-----	77.7	-----	25.2	-----
22000	40.65	-----	V	13.59	54.24	-----	77.7	-----	23.5	-----
Middle Channel										
11160	42.43	31.71	H	9.89	52.32	41.60	74.0	54.0	21.7	12.4
11160	41.48	30.45	V	9.89	51.37	40.34	74.0	54.0	22.6	13.7
16740	50.29	-----	H	14.67	64.96	-----	68.2	-----	3.2	-----
16740	47.73	-----	V	14.67	62.40	-----	68.2	-----	5.8	-----
22320	38.66	29.19	H	13.96	52.62	43.15	83.5	63.5	30.9	20.4
22320	38.49	28.27	V	13.96	52.45	42.23	83.5	63.5	31.1	21.3
High Channel										
11440	44.42	33.77	H	9.89	54.31	43.66	74.0	54.0	19.7	10.3
11440	42.71	31.38	V	9.89	52.60	41.27	74.0	54.0	21.4	12.7
17160	52.61	-----	H	14.85	67.46	-----	68.2	-----	0.7	-----
17160	53.31	-----	V	14.85	68.16	-----	68.2	-----	0.0	-----
22880	38.93	29.09	H	14.60	53.53	43.69	83.5	63.5	30.0	19.8
22880	38.74	30.18	V	14.60	53.34	44.78	83.5	63.5	30.2	18.7
28600	45.54	-----	V	11.65	57.19	-----	77.7	-----	20.6	-----

Notes:

- All the emissions above 28.6 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



**Table 2.2.7-12: Radiated Emissions Test Results – U-NII-2C (5500 MHz – 5725 MHz) – 802.11n
20 MHz**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5460	58.51	45.55	H	1.21	59.72	46.76	74.0	54.0	14.3	7.2
5460	50.61	39.55	V	1.21	51.82	40.76	74.0	54.0	22.2	13.2
5470	59.89	-----	H	1.24	61.13	-----	68.2	-----	7.1	-----
5470	51.60	-----	V	1.24	52.84	-----	68.2	-----	15.4	-----
11000	41.24	30.07	H	9.89	51.13	39.96	74.0	54.0	22.9	14.0
11000	40.83	29.81	V	9.89	50.72	39.70	74.0	54.0	23.3	14.3
16500	45.14	-----	H	14.64	59.78	-----	68.2	-----	8.4	-----
16500	43.49	-----	V	14.64	58.13	-----	68.2	-----	10.1	-----
22000	39.28	-----	H	13.59	52.87	-----	77.7	-----	24.9	-----
22000	38.98	-----	V	13.59	52.57	-----	77.7	-----	25.2	-----
Middle Channel										
11160	41.69	30.53	H	9.89	51.58	40.42	74.0	54.0	22.4	13.6
11160	40.78	29.50	V	9.89	50.67	39.39	74.0	54.0	23.3	14.6
16740	48.80	-----	H	14.67	63.47	-----	68.2	-----	4.7	-----
16740	45.99	-----	V	14.67	60.66	-----	68.2	-----	7.5	-----
22320	38.11	29.54	H	13.96	52.07	43.50	83.5	63.5	31.4	20.0
22320	38.01	27.66	V	13.96	51.97	41.62	83.5	63.5	31.5	21.9
High Channel										
11440	41.90	31.07	H	9.89	51.79	40.96	74.0	54.0	22.2	13.0
11440	42.54	31.58	V	9.89	52.43	41.47	74.0	54.0	21.6	12.5
17160	51.46	-----	H	14.85	66.31	-----	68.2	-----	1.9	-----
17160	49.93	-----	V	14.85	64.78	-----	68.2	-----	3.4	-----
22880	38.78	29.35	H	14.60	53.38	43.95	83.5	63.5	30.1	19.5
22880	39.34	30.18	V	14.60	53.94	44.78	83.5	63.5	29.6	18.7

Notes:

- All the emissions above 22.9 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



**Table 2.2.7-13: Radiated Emissions Test Results – U-NII-2C (5500 MHz – 5725 MHz) – 802.11n
40 MHz**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5460	59.74	45.48	H	1.21	60.95	46.69	74.0	54.0	13.1	7.3
5460	50.80	39.28	V	1.21	52.01	40.49	74.0	54.0	22.0	13.5
5470	63.06	-----	H	1.24	64.30	-----	68.2	-----	3.9	-----
5470	52.50	-----	V	1.24	53.74	-----	68.2	-----	14.5	-----
11020	39.52	27.79	H	9.89	49.41	37.68	74.0	54.0	24.6	16.3
11020	40.24	28.41	V	9.89	50.13	38.30	74.0	54.0	23.9	15.7
16530	41.21	-----	H	14.65	55.86	-----	68.2	-----	12.3	-----
16530	40.94	-----	V	14.65	55.59	-----	68.2	-----	12.6	-----
22040	38.77	28.40	H	13.63	52.40	42.03	83.5	63.5	31.1	21.5
Middle Channel										
11180	40.70	28.79	H	9.89	50.59	38.68	74.0	54.0	23.4	15.3
11180	40.53	28.55	V	9.89	50.42	38.44	74.0	54.0	23.6	15.6
16770	42.28	-----	H	14.67	56.95	-----	68.2	-----	11.3	-----
16770	42.16	-----	V	14.67	56.83	-----	68.2	-----	11.4	-----
22360	39.59	30.01	H	14.00	53.59	44.01	83.5	63.5	29.9	19.5
22360	40.00	29.98	V	14.00	54.00	43.98	83.5	63.5	29.5	19.5
High Channel										
11420	41.34	29.77	H	9.89	51.23	39.66	74.0	54.0	22.8	14.3
11420	41.27	29.05	V	9.89	51.16	38.94	74.0	54.0	22.8	15.1
17130	43.93	-----	H	14.82	58.75	-----	68.2	-----	9.4	-----
17130	44.40	-----	V	14.82	59.22	-----	68.2	-----	9.0	-----
22840	39.43	29.89	H	14.56	53.99	44.45	83.5	63.5	29.5	19.1
22840	40.15	30.76	V	14.56	54.71	45.32	83.5	63.5	28.8	18.2

Notes:

- All the emissions above 22.9 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-14: Radiated Emissions Test Results – U-NII-2C (5500 MHz – 5725 MHz) – 802.11ac 80 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5460	61.36	49.49	H	1.21	62.57	50.70	74.0	54.0	11.4	3.3
5460	51.68	40.02	V	1.21	52.89	41.23	74.0	54.0	21.1	12.8
5470	62.82	-----	H	1.24	64.06	-----	68.2	-----	4.1	-----
5470	51.61	-----	V	1.24	52.85	-----	68.2	-----	15.3	-----
11060	39.28	26.80	H	9.89	49.17	36.69	74.0	54.0	24.8	17.3
11060	39.65	27.07	V	9.89	49.54	36.96	74.0	54.0	24.5	17.0
16590	39.83	-----	H	14.65	54.48	-----	68.2	-----	13.7	-----
16590	39.41	-----	V	14.65	54.06	-----	68.2	-----	14.1	-----
22120	38.35	28.04	H	13.72	52.07	41.76	83.5	63.5	31.4	21.7
22120	38.61	28.01	V	13.72	52.33	41.73	83.5	63.5	31.2	21.8
Middle Channel										
11220	39.39	27.58	H	9.89	49.28	37.47	74.0	54.0	24.7	16.5
11220	39.80	27.90	V	9.89	49.69	37.79	74.0	54.0	24.3	16.2
16830	41.11	-----	H	14.68	55.79	-----	68.2	-----	12.4	-----
16830	40.80	-----	V	14.68	55.48	-----	68.2	-----	12.7	-----
22440	39.44	30.27	H	14.10	53.54	44.37	83.5	63.5	30.0	19.1
22440	39.00	29.22	V	14.10	53.10	43.32	83.5	63.5	30.4	20.2
High Channel										
11380	40.09	28.32	H	9.89	49.98	38.21	74.0	54.0	24.0	15.8
11380	41.00	28.82	V	9.89	50.89	38.71	74.0	54.0	23.1	15.3
17070	41.97	-----	H	14.76	56.73	-----	68.2	-----	11.5	-----
17070	42.63	-----	V	14.76	57.39	-----	68.2	-----	10.8	-----
22760	39.66	30.52	H	14.46	54.12	44.98	83.5	63.5	29.4	18.5
22760	39.07	28.98	V	14.46	53.53	43.44	83.5	63.5	30.0	20.1

Notes:

- All the emissions above 22.8 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-15: Radiated Emissions Test Results – U-NII-3 (5725 MHz – 5850 MHz) – 802.11a

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5725	71.93	-----	H	1.71	73.64	-----	122.2	-----	48.6	-----
11490	46.74	35.88	H	9.89	56.63	45.77	74.0	54.0	17.4	8.2
11490	46.59	35.34	V	9.89	56.48	45.23	74.0	54.0	17.5	8.8
17235	52.80	-----	H	14.93	67.73	-----	68.2	-----	0.5	-----
17235	52.34	-----	V	14.93	67.27	-----	68.2	-----	0.9	-----
22980	38.81	29.57	H	14.72	53.53	44.29	83.5	63.5	30.0	19.2
22980	39.18	29.62	V	14.72	53.90	44.34	83.5	63.5	29.6	19.2
28725	47.47	-----	H	11.91	59.38	-----	77.7	-----	18.4	-----
28725	47.60	-----	V	11.91	59.51	-----	77.7	-----	18.2	-----
Middle Channel										
11570	44.21	33.06	H	10.09	54.30	43.15	74.0	54.0	19.7	10.8
11570	41.98	31.10	V	10.09	52.07	41.19	74.0	54.0	21.9	12.8
17355	50.15	-----	H	15.04	65.19	-----	68.2	-----	3.0	-----
17355	50.76	-----	V	15.04	65.80	-----	68.2	-----	2.4	-----
23140	40.27	-----	H	14.74	55.01	-----	77.7	-----	22.7	-----
23140	38.77	-----	V	14.74	53.51	-----	77.7	-----	24.2	-----
High Channel										
5851	73.17	-----	H	1.91	75.08	-----	119.9	-----	44.8	-----
5850	64.91	-----	V	1.91	66.82	-----	122.2	-----	55.4	-----
11650	46.51	34.96	H	10.32	56.83	45.28	74.0	54.0	17.2	8.7
11650	46.19	34.74	V	10.32	56.51	45.06	74.0	54.0	17.5	8.9
17475	47.84	-----	H	15.16	63.00	-----	68.2	-----	5.2	-----
17475	50.25	-----	V	15.16	65.41	-----	68.2	-----	2.8	-----
23300	39.22	-----	H	14.74	53.96	-----	77.7	-----	23.8	-----
23300	39.03	-----	V	14.74	53.77	-----	77.7	-----	24.0	-----
29125	47.46	-----	V	12.73	60.19	-----	77.7	-----	17.6	-----

Notes:

- All the emissions above 29.2 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



**Table 2.2.7-16: Radiated Emissions Test Results – U-NII-3 (5725 MHz – 5850 MHz) – 802.11n
20 MHz**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5722.5	72.65	-----	H	1.70	74.35	-----	116.5	-----	42.1	-----
5722.5	64.68	-----	V	1.70	66.38	-----	116.5	-----	50.1	-----
11490	42.31	31.79	H	9.89	52.20	41.68	74.0	54.0	21.8	12.3
11490	41.84	29.02	V	9.89	51.73	38.91	74.0	54.0	22.3	15.1
17235	50.99	-----	H	14.93	65.92	-----	68.2	-----	2.3	-----
17235	50.11	-----	V	14.93	65.04	-----	68.2	-----	3.2	-----
22980	39.60	29.67	H	14.72	54.32	44.39	83.5	63.5	29.2	19.1
22980	39.83	29.99	V	14.72	54.55	44.71	83.5	63.5	29.0	18.8
Middle Channel										
11570	44.90	32.40	H	10.09	54.99	42.49	74.0	54.0	19.0	11.5
11570	41.62	30.82	V	10.09	51.71	40.91	74.0	54.0	22.3	13.1
17355	50.52	-----	H	15.04	65.56	-----	68.2	-----	2.6	-----
17355	50.20	-----	V	15.04	65.24	-----	68.2	-----	3.0	-----
23140	40.30	-----	H	14.74	55.04	-----	77.7	-----	22.7	-----
23140	39.49	-----	V	14.74	54.23	-----	77.7	-----	23.5	-----
High Channel										
5850	63.86	-----	H	1.91	65.77	-----	122.2	-----	56.4	-----
5850	56.15	-----	V	1.91	58.06	-----	122.2	-----	64.1	-----
11650	43.50	32.28	H	10.32	53.82	42.60	74.0	54.0	20.2	11.4
11650	41.54	31.08	V	10.32	51.86	41.40	74.0	54.0	22.1	12.6
17475	47.99	-----	H	15.16	63.15	-----	68.2	-----	5.0	-----
17475	47.77	-----	V	15.16	62.93	-----	68.2	-----	5.3	-----
23300	39.60	-----	H	14.74	54.34	-----	77.7	-----	23.4	-----
23300	39.94	-----	V	14.74	54.68	-----	77.7	-----	23.1	-----

Notes:

- All the emissions above 22.9 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-17: Radiated Emissions Test Results – U-NII-3 (5725 MHz – 5850 MHz) – 802.11n 40 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
5716	67.85	-----	H	1.69	69.54	-----	109.7	-----	40.1	-----
5717.25	57.57	-----	V	1.69	59.26	-----	110.0	-----	50.8	-----
11510	40.71	28.40	H	9.92	50.63	38.32	74.0	54.0	23.4	15.7
11510	40.36	28.16	V	9.92	50.28	38.08	74.0	54.0	23.7	15.9
17265	43.73	-----	H	14.96	58.69	-----	68.2	-----	9.5	-----
17265	44.39	-----	V	14.96	59.35	-----	68.2	-----	8.9	-----
22280	39.28	30.91	H	13.91	53.19	44.82	83.5	63.5	30.3	18.7
22280	38.66	28.25	V	13.91	52.57	42.16	83.5	63.5	30.9	21.3
High Channel										
5850	55.77	-----	H	1.91	57.68	-----	122.2	-----	64.5	-----
5850	52.01	-----	V	1.91	53.92	-----	122.2	-----	68.3	-----
11590	41.97	30.79	H	10.15	52.12	40.94	74.0	54.0	21.9	13.1
11590	41.57	30.43	V	10.15	51.72	40.58	74.0	54.0	22.3	13.4
17385	44.11	-----	H	15.07	59.18	-----	68.2	-----	9.0	-----
17385	44.52	-----	V	15.07	59.59	-----	68.2	-----	8.6	-----
23180	39.37	-----	H	14.74	54.11	-----	77.7	-----	23.6	-----
23180	39.55	-----	V	14.74	54.29	-----	77.7	-----	23.4	-----

Notes:

- All the emissions above 22.9 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.



Table 2.2.7-18: Radiated Emissions Test Results – U-NII-3 (5725 MHz – 5850 MHz) – 802.11ac 80 MHz

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Middle Channel										
5700.75	63.83	-----	H	1.67	65.50	-----	105.4	-----	39.9	-----
5725	56.38	-----	V	1.71	58.09	-----	122.2	-----	64.1	-----
5868.25	55.34	-----	H	1.94	57.28	-----	107.1	-----	49.8	-----
5878.75	52.08	-----	V	1.96	54.04	-----	102.4	-----	48.4	-----
11570	44.90	32.40	H	10.09	54.99	42.49	74.0	54.0	19.0	11.5
11570	41.62	30.82	V	10.09	51.71	40.91	74.0	54.0	22.3	13.1
17355	50.52	-----	H	15.04	65.56	-----	68.2	-----	2.6	-----
17355	50.20	-----	V	15.04	65.24	-----	68.2	-----	3.0	-----
23140	40.30	-----	H	14.74	55.04	-----	77.7	-----	22.7	-----
23140	39.49	-----	V	14.74	54.23	-----	77.7	-----	23.5	-----

Notes:

- All the emissions above 22.8 GHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 18 GHz were measured using a test distance of 1m. The limits are corrected accordingly using a distance factor of $20 \cdot \log(3/1) = 9.54$ dB.

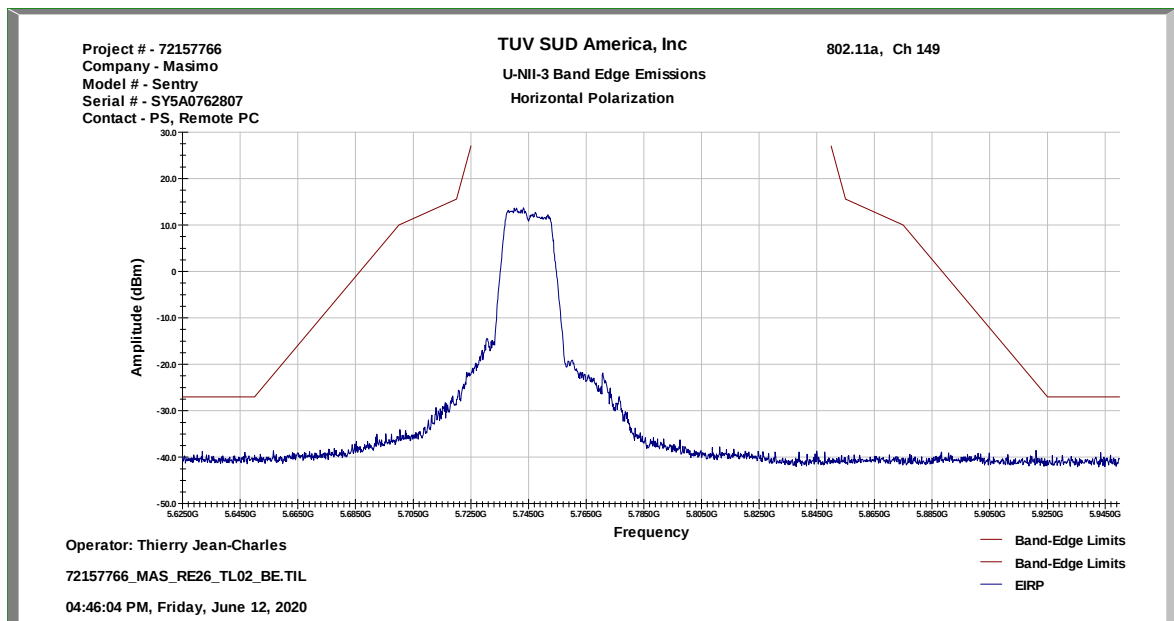


Figure 2.2.7-1: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11a – Horizontal Polarization – Low Channel

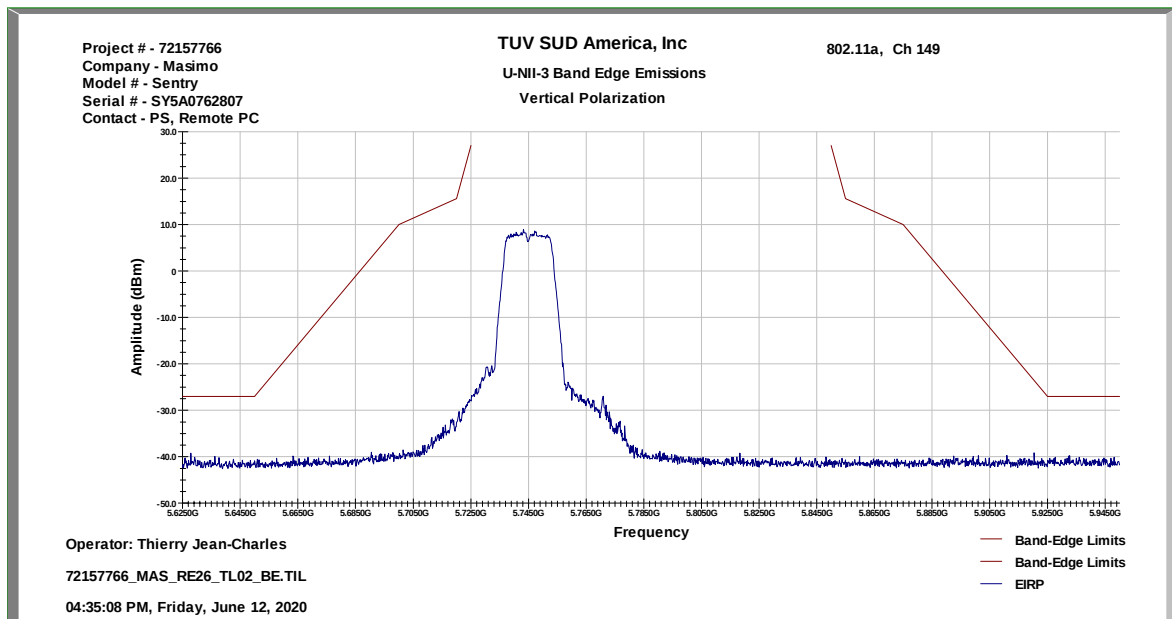


Figure 2.2.7-2: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11a – Vertical Polarization – Low Channel

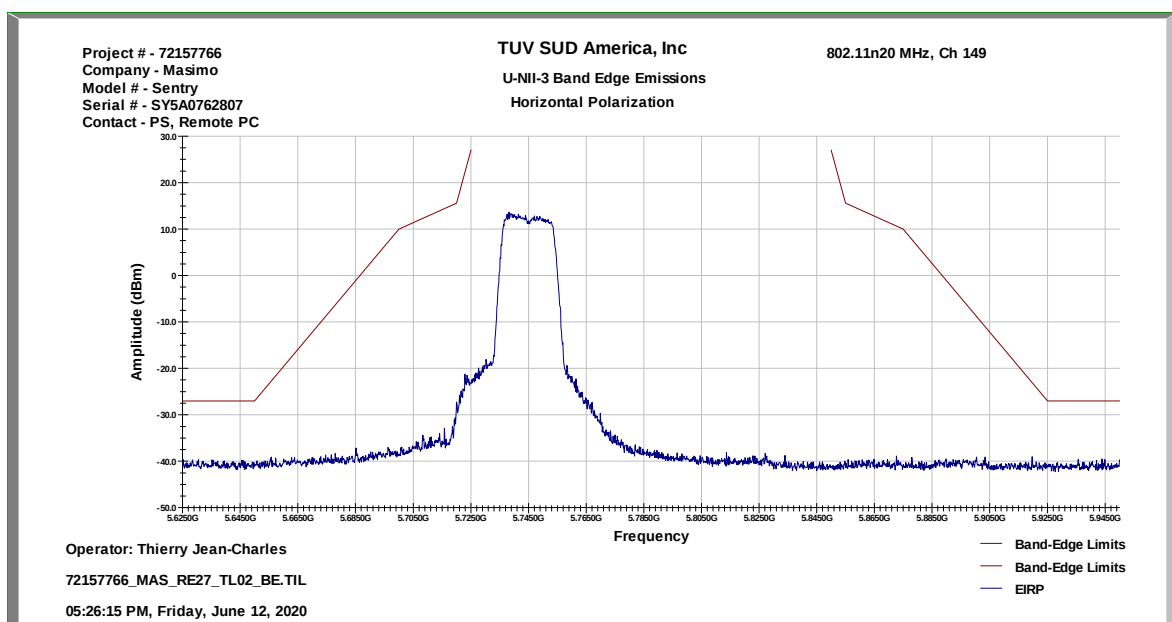


Figure 2.2.7-3: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 20 MHz – Horizontal Polarization – Low Channel

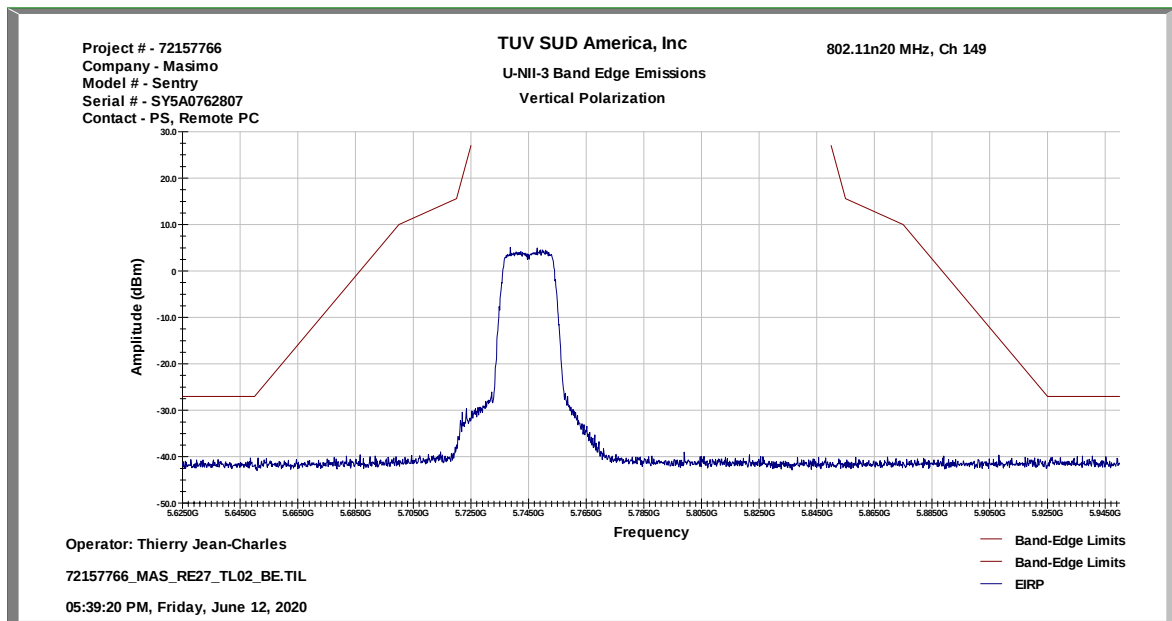


Figure 2.2.7-4: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 20 MHz – Vertical Polarization – Low Channel

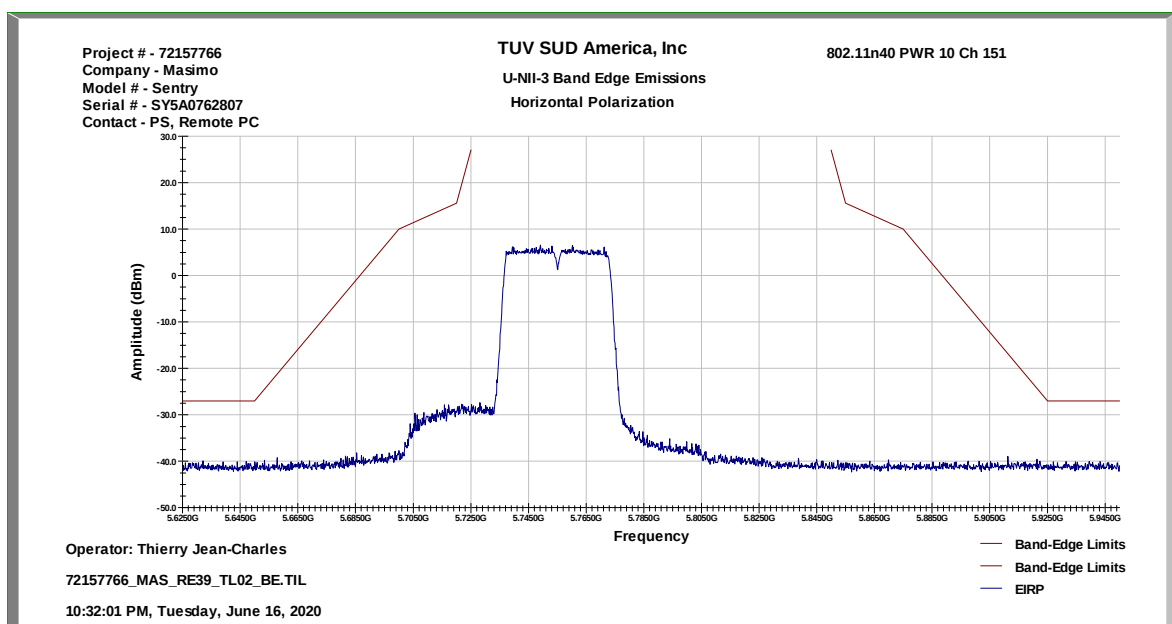


Figure 2.2.7-5: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 40 MHz – Horizontal Polarization – Low Channel

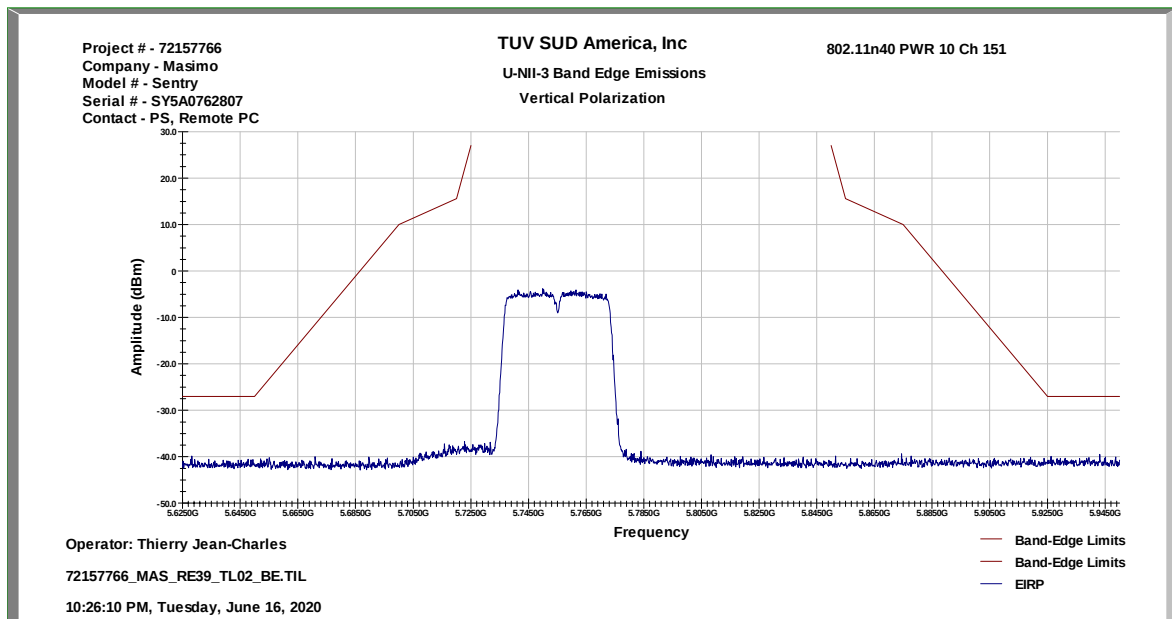


Figure 2.2.7-6: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 40 MHz – Vertical Polarization – Low Channel

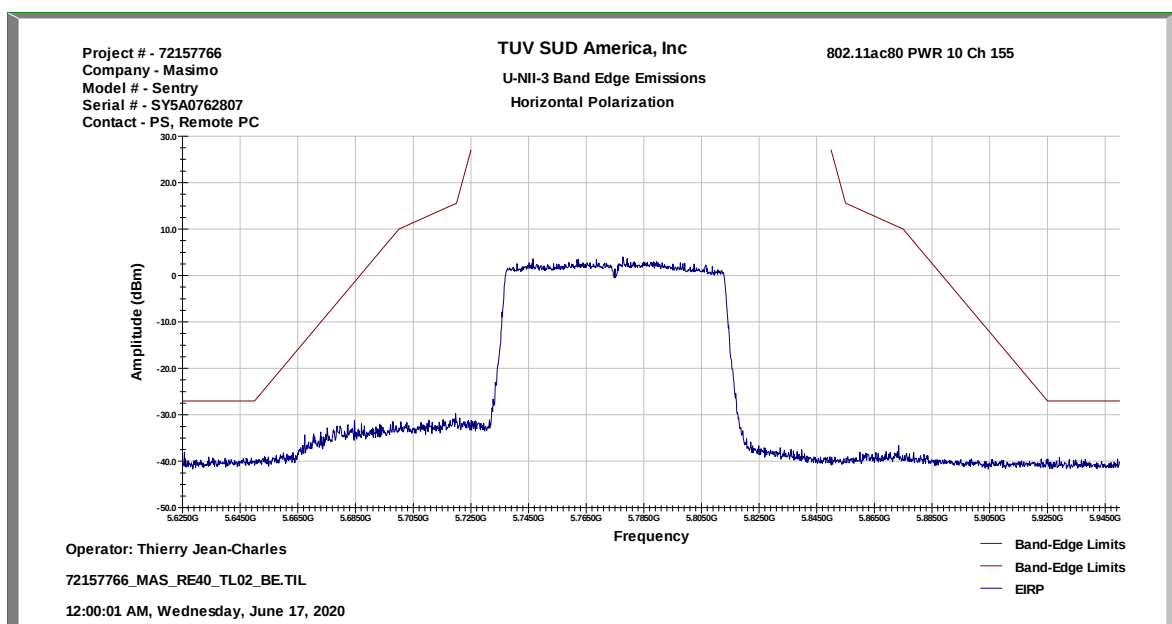


Figure 2.2.7-7: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11ac 80 MHz – Horizontal Polarization

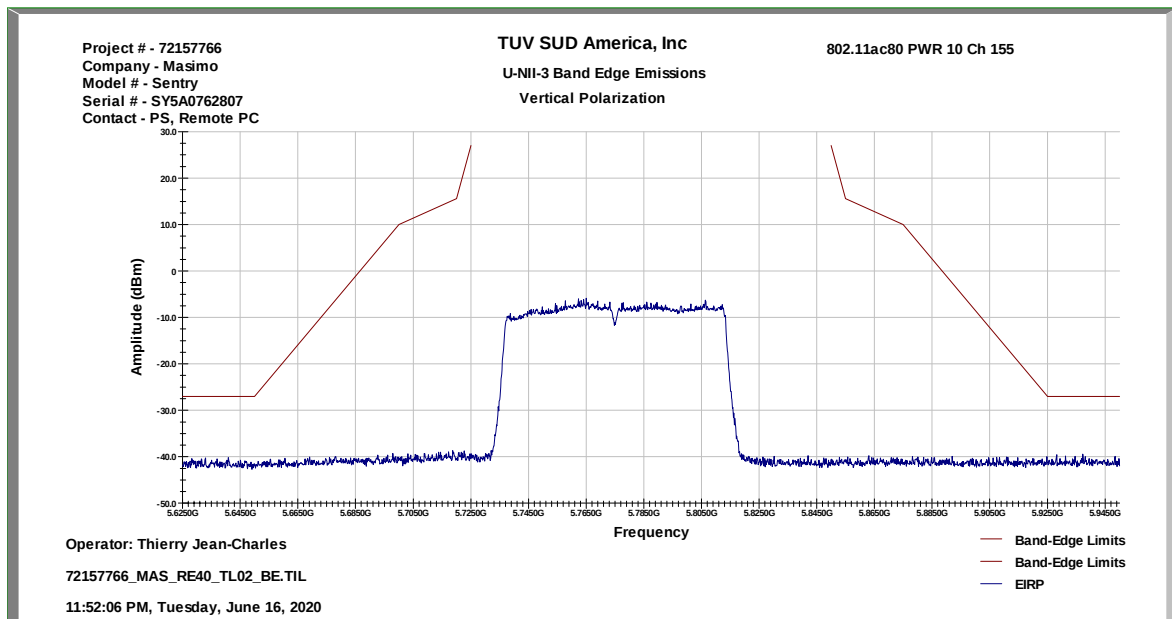


Figure 2.2.7-8: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11ac 80 MHz – Vertical Polarization

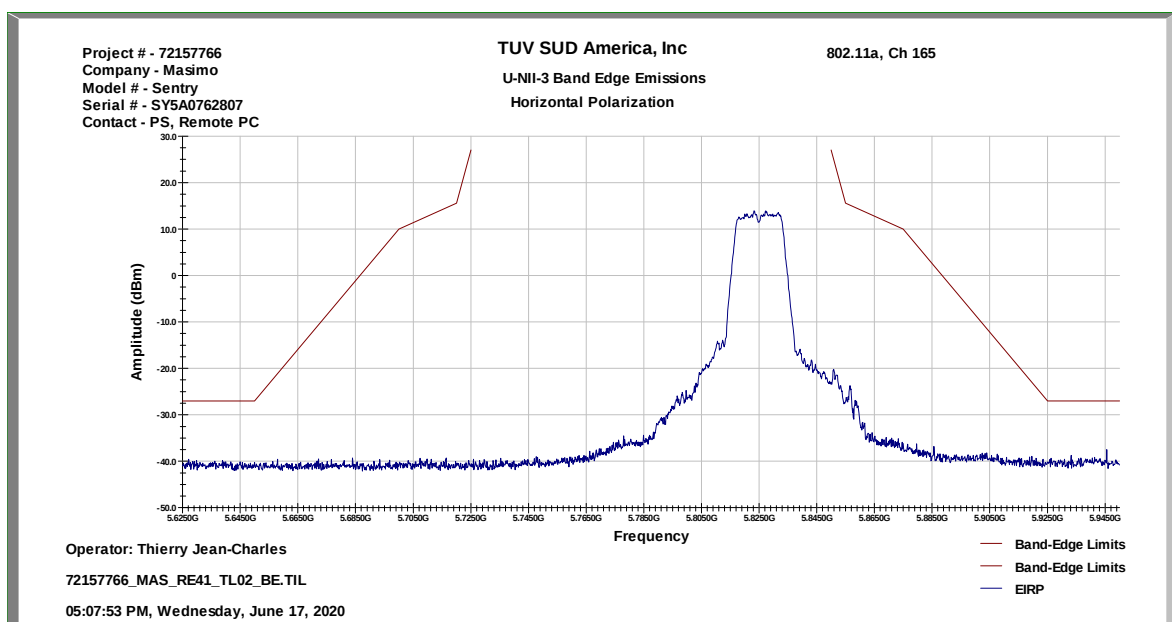


Figure 2.2.7-9: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11a – Horizontal Polarization – High Channel

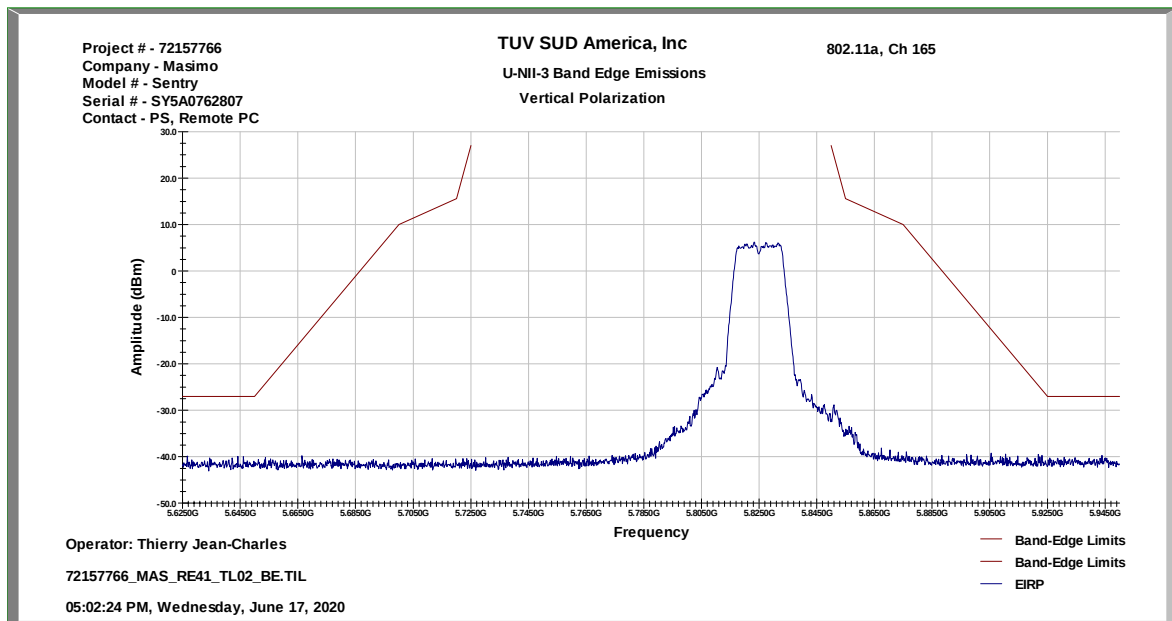


Figure 2.2.7-10: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11a – Vertical Polarization – High Channel

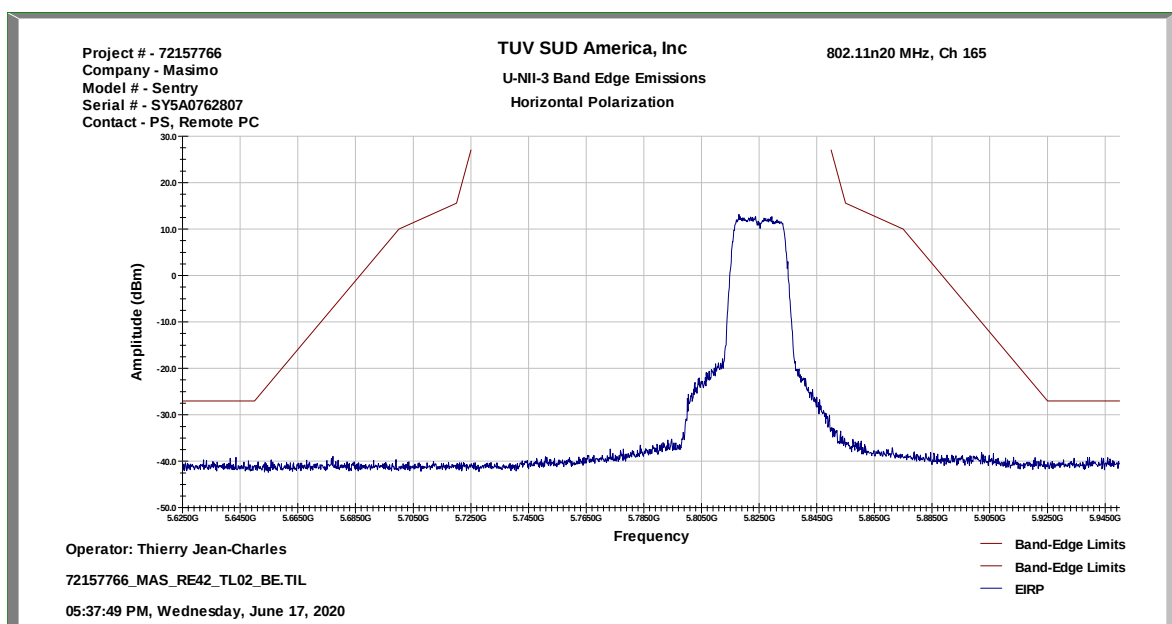


Figure 2.2.7-11: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 20 MHz– Horizontal Polarization – High Channel

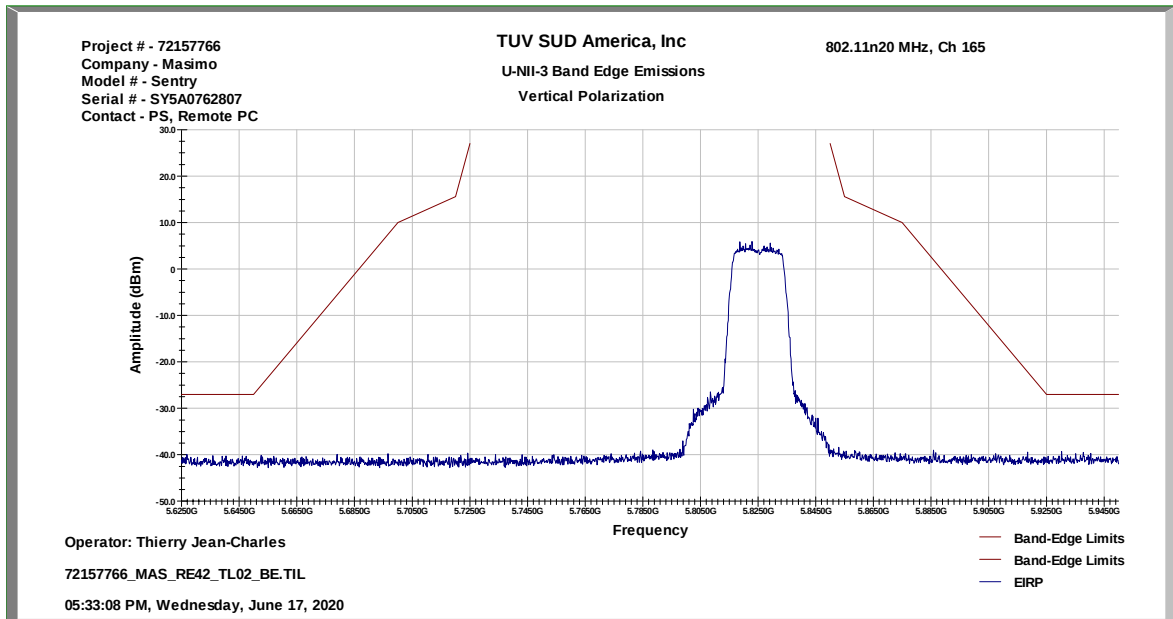


Figure 2.2.7-12: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 20 MHz – Vertical Polarization – High Channel

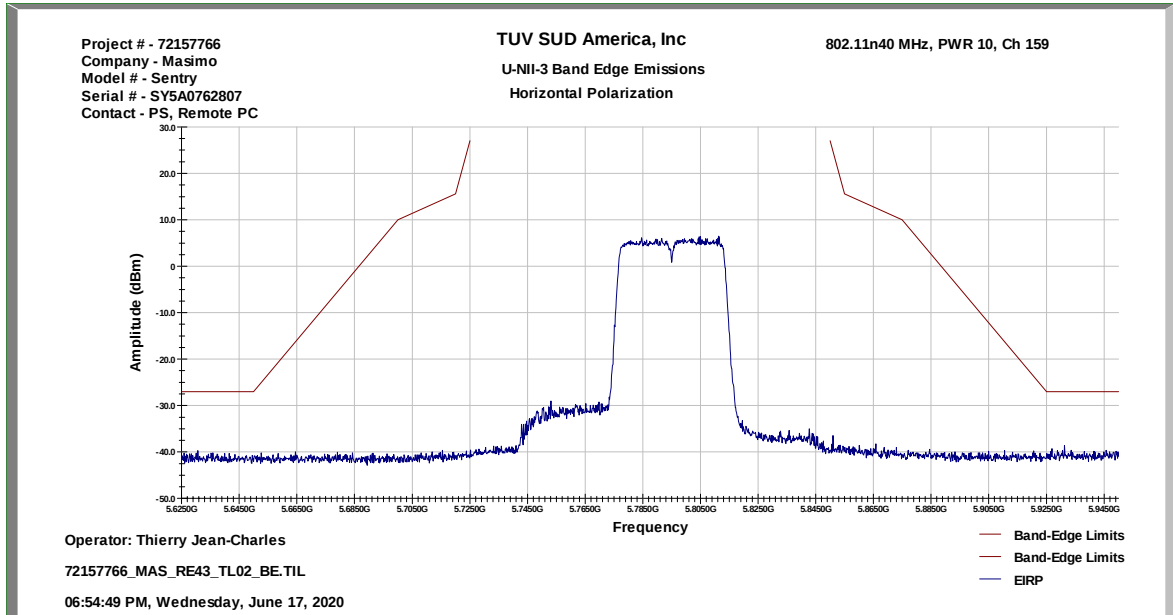


Figure 2.2.7-13: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 40 MHz – Horizontal Polarization – High Channel

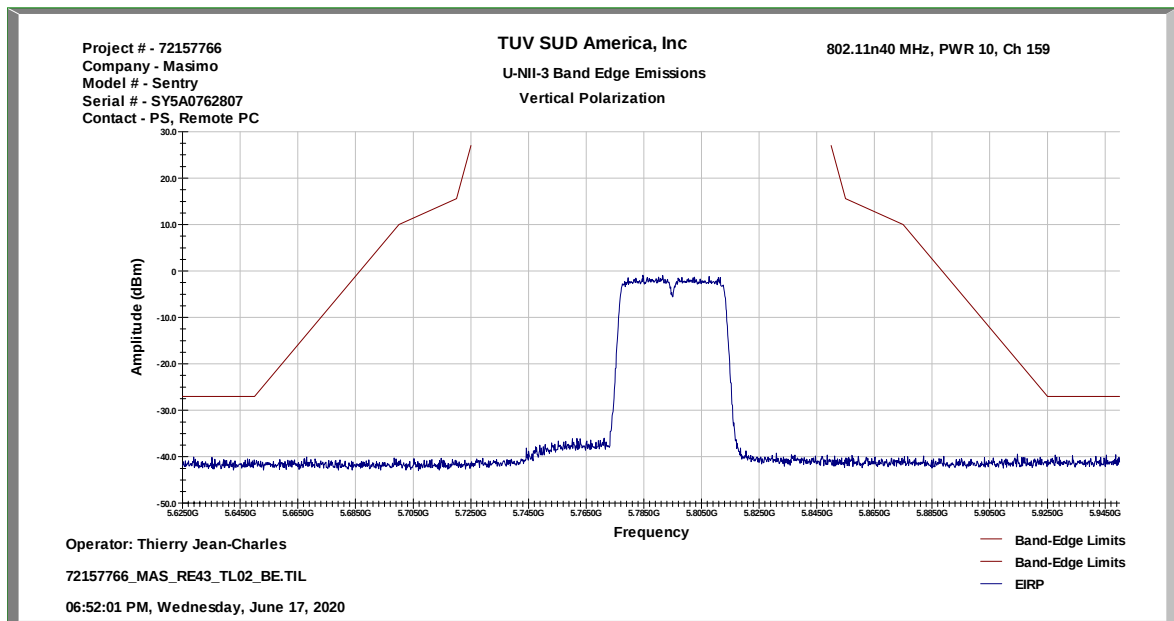


Figure 2.2.7-14: Radiated Emissions Test Results – U-NII-3 Emissions Mask – 802.11n 40 MHz– Vertical Polarization – High Channel

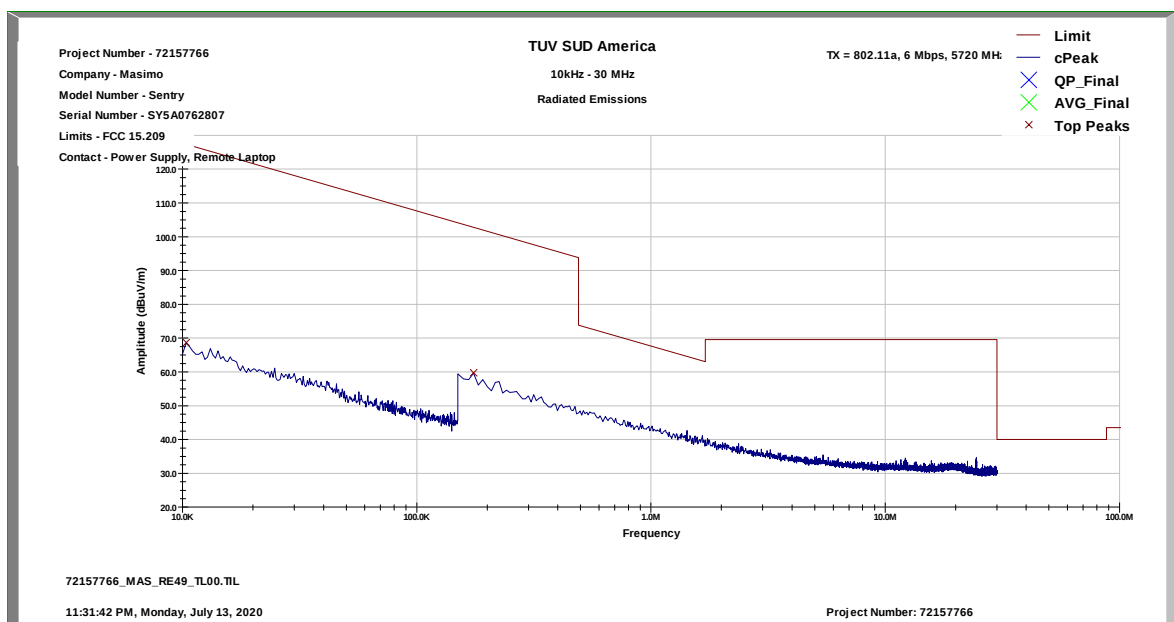


Figure 2.2.7-15: Radiated Emissions Representative Scan – below 30 MHz

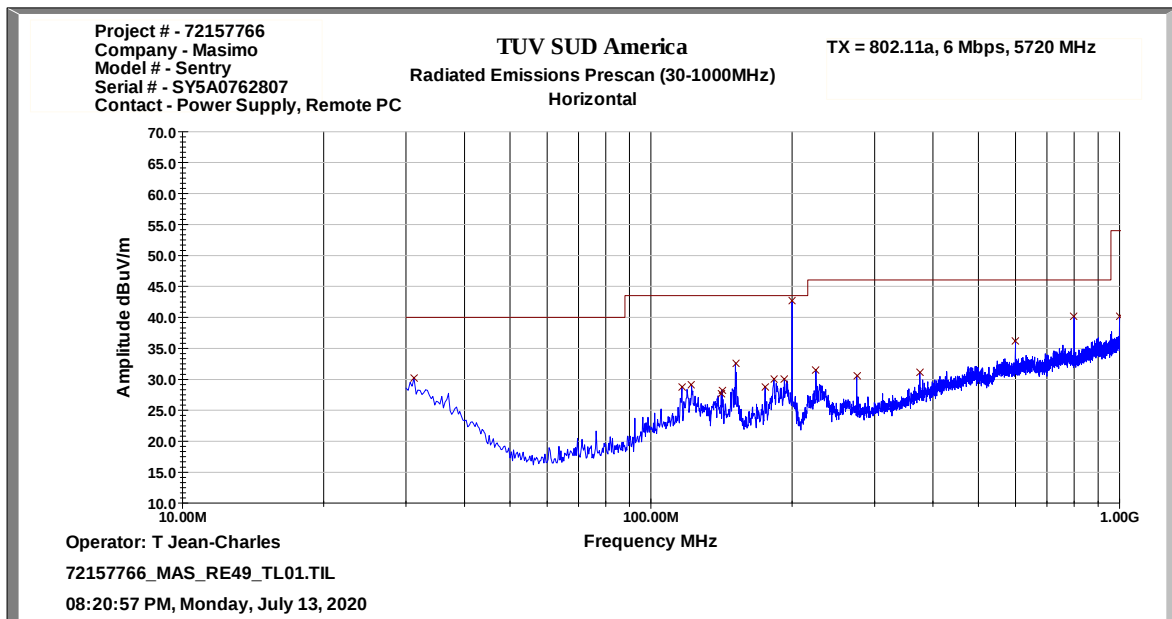


Figure 2.2.7-16: Radiated Emissions Representative Scan – 30 MHz – 1 GHz – Horizontal Polarization

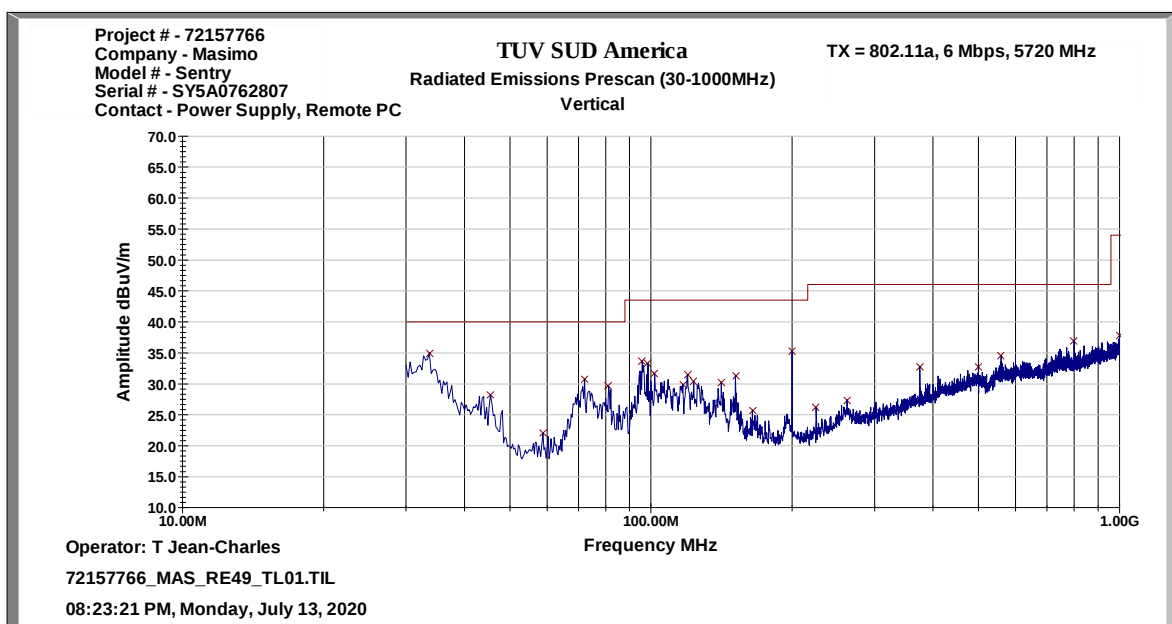


Figure 2.2.7-17: Radiated Emissions Representative Scan – 30 MHz – 1 GHz – Vertical Polarization

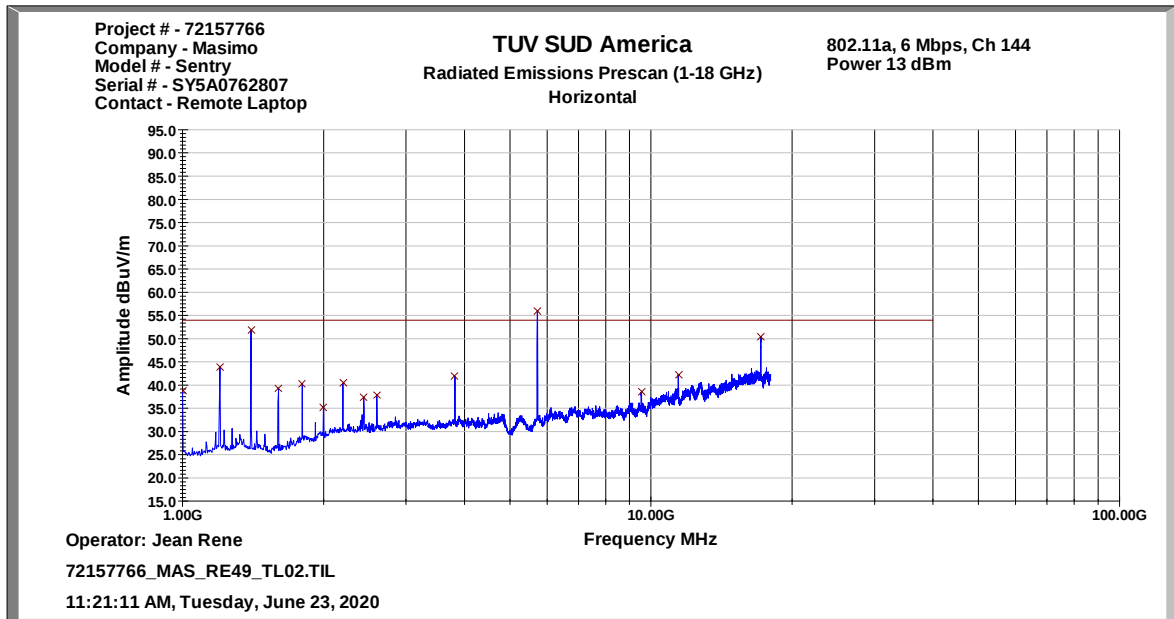


Figure 2.2.7-18: Radiated Emissions Representative Scan – 1 GHz – 18 GHz – Horizontal Polarization

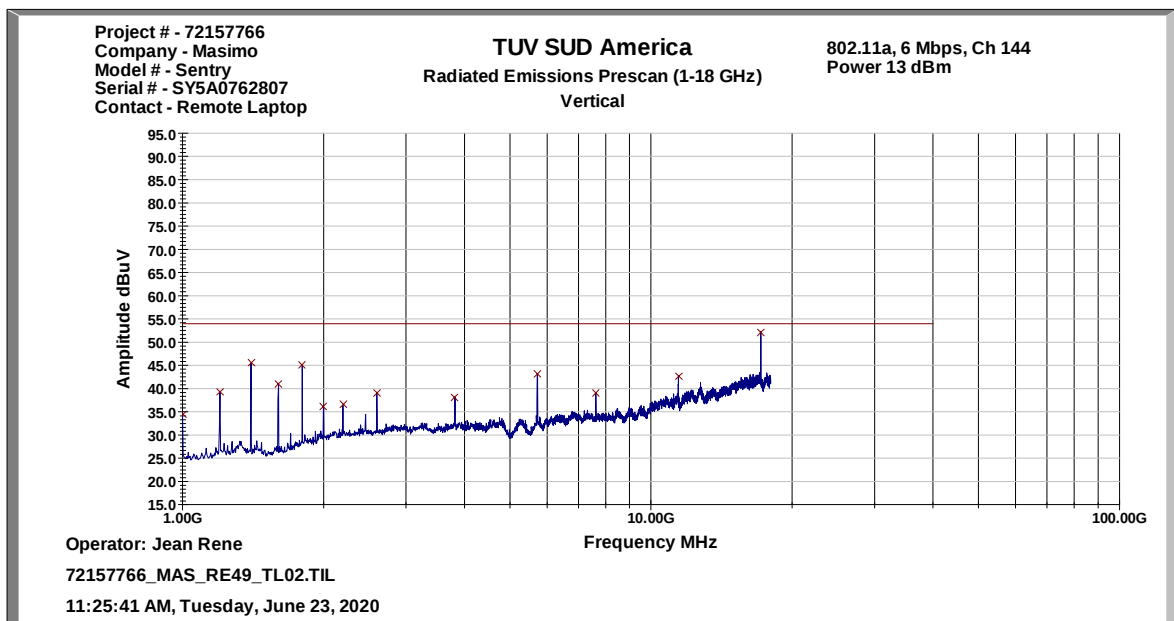


Figure 2.2.7-19: Radiated Emissions Representative Scan – 1 GHz – 18 GHz – Vertical Polarization

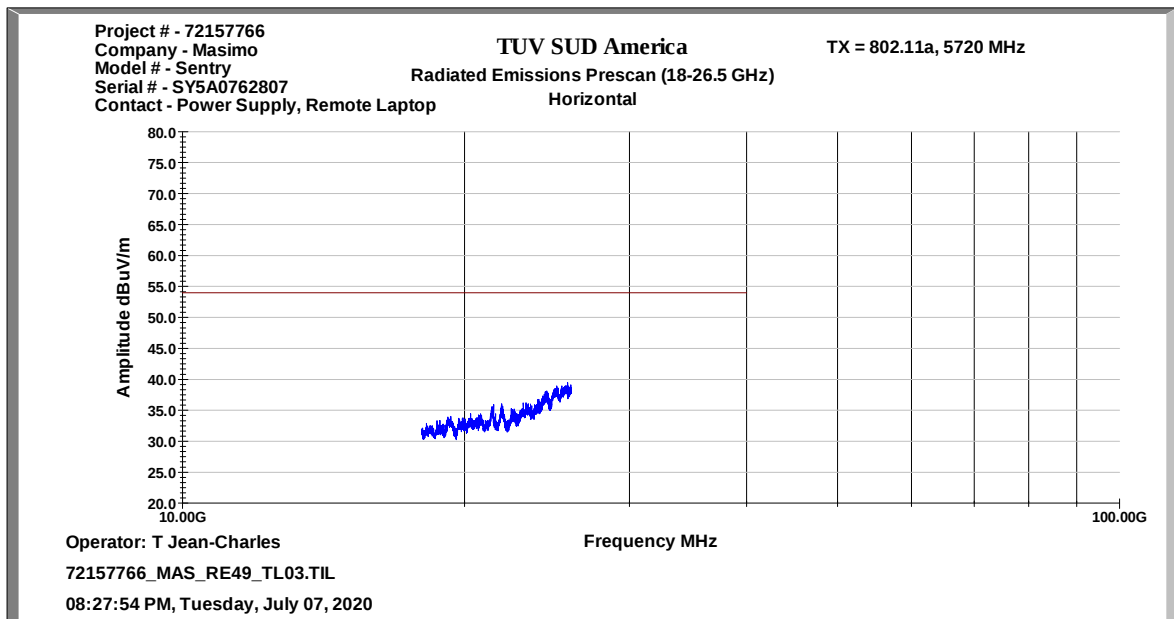


Figure 2.2.7-20: Radiated Emissions Representative Scan – 18 GHz – 26.5 GHz – Horizontal Polarization

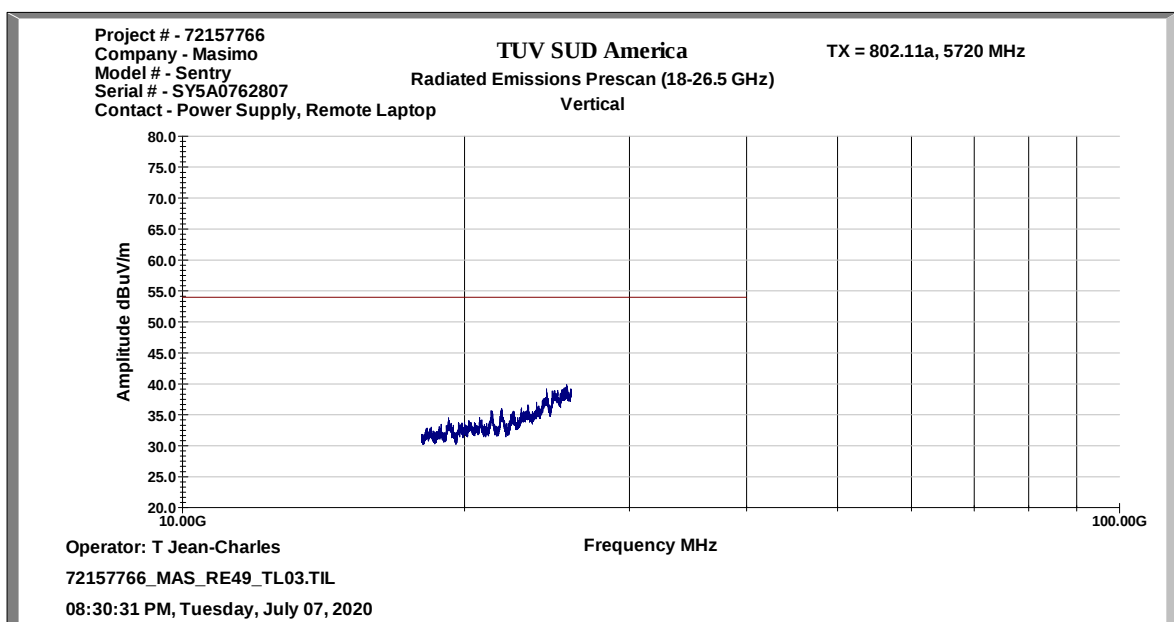


Figure 2.2.7-21: Radiated Emissions Representative Scan – 18 GHz – 26.5 GHz – Vertical Polarization

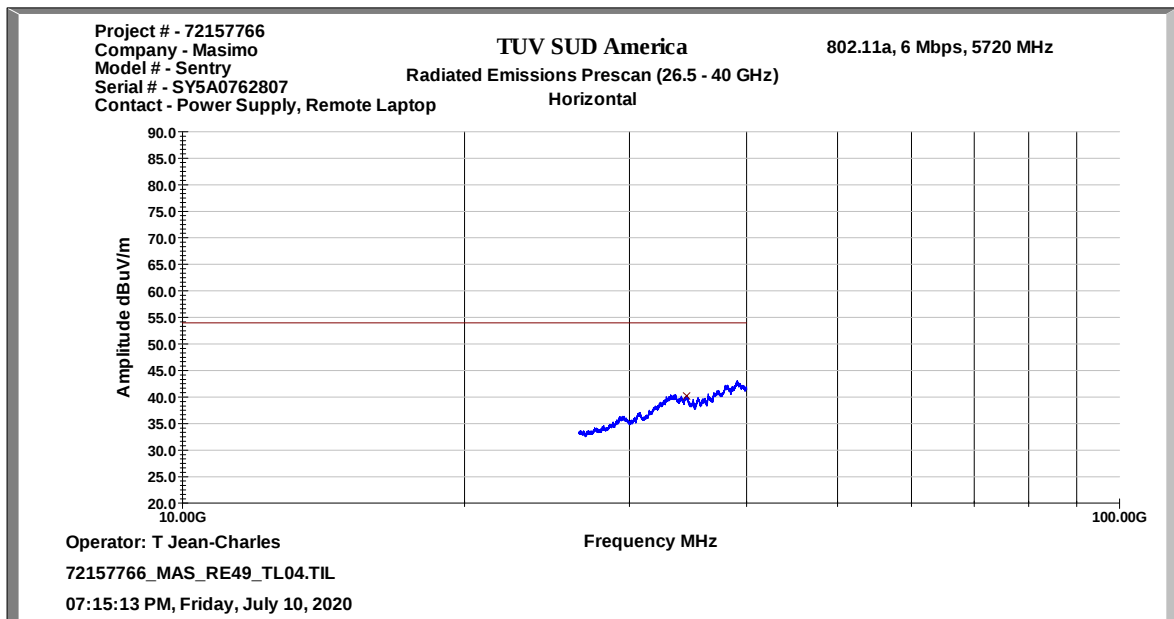


Figure 2.2.7-22: Radiated Emissions Representative Scan – 26.5 GHz – 40 GHz – Horizontal Polarization

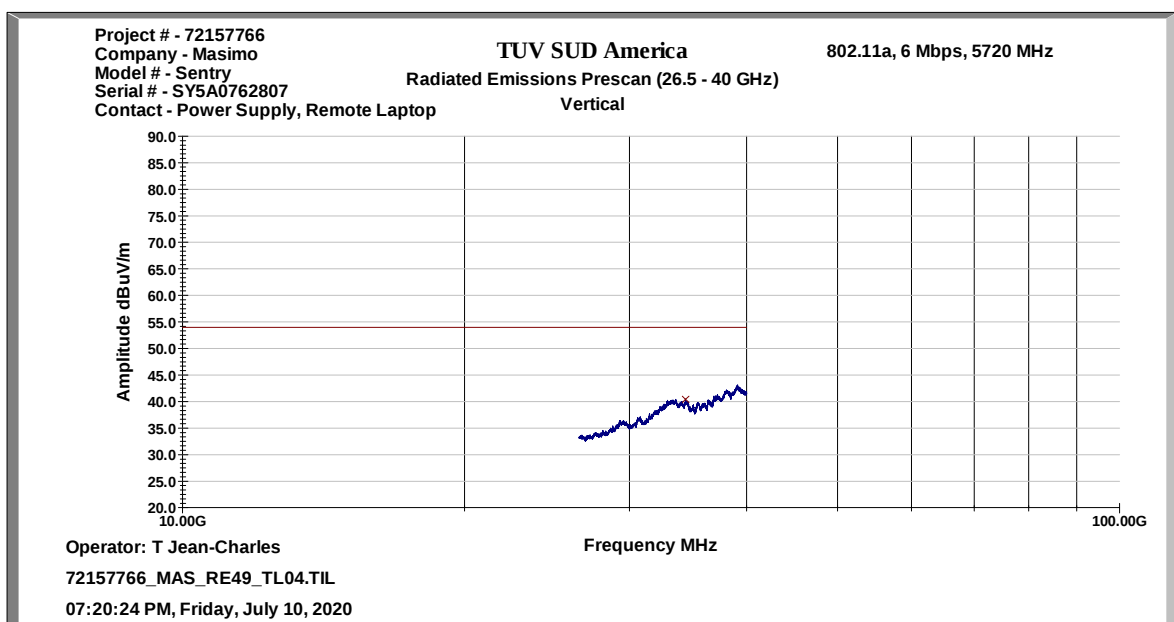


Figure 2.2.7-23: Radiated Emissions Representative Scan – 26.5 GHz – 40 GHz – Vertical Polarization



2.2.8 Sample Calculations

$$R_c = R_u + CF_T$$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_u	=	Uncorrected Reading
R_c	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak

Corrected Level: $52.76 + (-9.39) = 43.37$ dB μ V/m

Margin: 74 dB μ V/m – 43.37 dB μ V/m = 30.63 dB

Example Calculation: Average

Corrected Level: $49.34 + (-9.39) - 0 = 39.95$ dB μ V/m

Margin: 54 dB μ V/m – 39.95 dB μ V/m = 14.05 dB



2.2.9 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
9kHz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	24	27-Nov-2020
Cable (40GHz)	Suhner	SF-102A	BEMC00653	N/A	12	12-Oct-2020
10dB Attenuator	Merrimac	FAN-6-10K	BEMC02086	N/A	12	12-Oct-2020
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
The 11970A Harmonic Mixer 26.5-40 GHz	Agilent Technologies	11970A	BEMC02099	N/A	24	02-Apr-2021
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	31-Oct-2021
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	26-Sep-2021
Horn Antenna	Schwarzbeck	BBHA-9170	TEMC00029	N/A	60	23-Aug-2021
EMC Chamber	Panasheild	N/A	TEMC00031	N/A	36	28-Jan-2021
Double Ridge Guide Horn	ETS Lindgren	3117	TEMC00061	N/A	24	07-Feb-2022
18 GHz-40 GHz Microwave Preamplifier	COM-power	PAM-840A	TEMC00147	N/A	12	16-Mar-2021
PAM-118A	Com-Power Corporation	PAM-118A	TEMC00160	N/A	12	16-Mar-2021
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR
5 GHz Band Reject Filter	Micro-Tronics	BRM50716	TEMC00188	N/A	12	06-Sep-2020
A81-0303 18 GHz Cable Set	Teledyne Storm Products	A81-0303-360/96	TEMC00201	N/A	12	22-Apr-2021
Mixer LO Cable Set	Times Microwave Systems	LMR-400-UF, LMR-240-UF	TEMC00212	N/A	12	13-Jun-2021
Mixer IF Cable Set	Times Fiber Communications	M17/60-RG142, M17/84-RG223	TEMC00213	N/A	12	13-Jun-2021
Amplifier 2.0-8.0 GHz	Hewlett Packard	11975A	TEMC00214	N/A	12	13-Jun-2021
1571AN 40 GHz Cable	IW Microwave	KPS-1571AN	TEMC00218	N/A	12	06-Jul-2021

TU - Traceability Unscheduled

O/P MON - Traceability Unscheduled

N/A - Not Applicable



3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
9kHz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	24	27-Nov-2020
Cable (40GHz)	Suhner	SF-102A	BEMC00653	N/A	12	12-Oct-2020
10dB Attenuator	Merrimac	FAN-6-10K	BEMC02086	N/A	12	12-Oct-2020
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
The 11970A Harmonic Mixer 26.5-40 GHz	Agilent Technologies	11970A	BEMC02099	N/A	24	02-Apr-2021
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	31-Oct-2021
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	26-Sep-2021
Horn Antenna	Schwarzbeck	BBHA-9170	TEMC00029	N/A	60	23-Aug-2021
EMC Chamber	Panasheild	N/A	TEMC00031	N/A	36	28-Jan-2021
Double Ridge Guide Horn	ETS Lindgren	3117	TEMC00061	N/A	24	07-Feb-2022
18 GHz-40 GHz Microwave Preamplifier	COM-power	PAM-840A	TEMC00147	N/A	12	16-Mar-2021
PAM-118A	Com-Power Corporation	PAM-118A	TEMC00160	N/A	12	16-Mar-2021
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR
5 GHz Band Reject Filter	Micro-Tronics	BRM50716	TEMC00188	N/A	12	06-Sep-2020
A81-0303 18 GHz Cable Set	Teledyne Storm Products	A81-0303-360/96	TEMC00201	N/A	12	22-Apr-2021
Mixer LO Cable Set	Times Microwave Systems	LMR-400-UF, LMR-240-UF	TEMC00212	N/A	12	13-Jun-2021
Mixer IF Cable Set	Times Fiber Communications	M17/60-RG142, M17/84-RG223	TEMC00213	N/A	12	13-Jun-2021
Amplifier 2.0-8.0 GHz	Hewlett Packard	11975A	TEMC00214	N/A	12	13-Jun-2021
1571AN 40 GHz Cable	IW Microwave	KPS-1571AN	TEMC00218	N/A	12	06-Jul-2021

TU - Traceability Unscheduled

O/P MON - Traceability Unscheduled

N/A - Not Applicable

NCR – No Calibration Required

4 Diagram of Test Set-ups

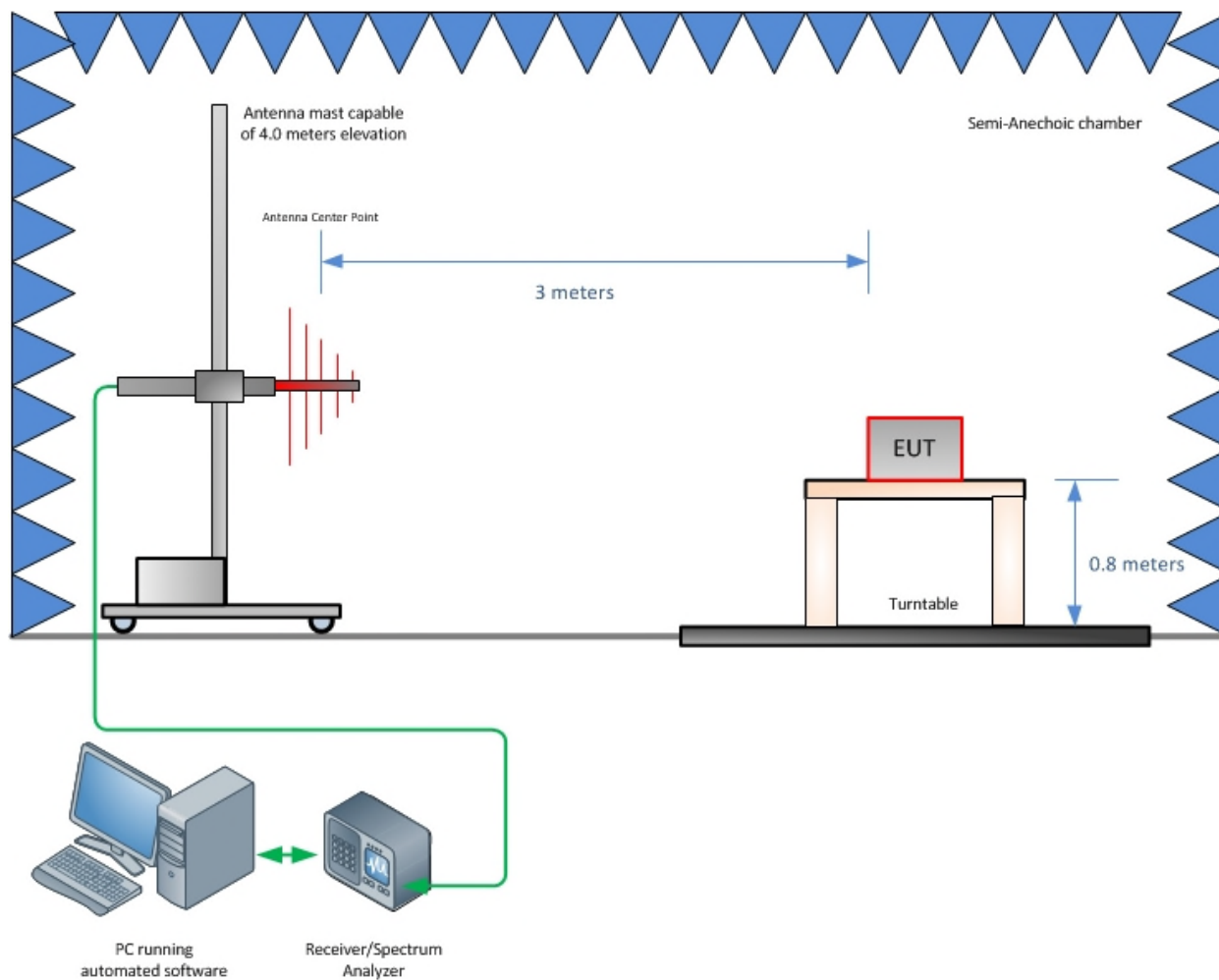


Figure 4-1 - Radiated Emissions Test Setup up to 1 GHz

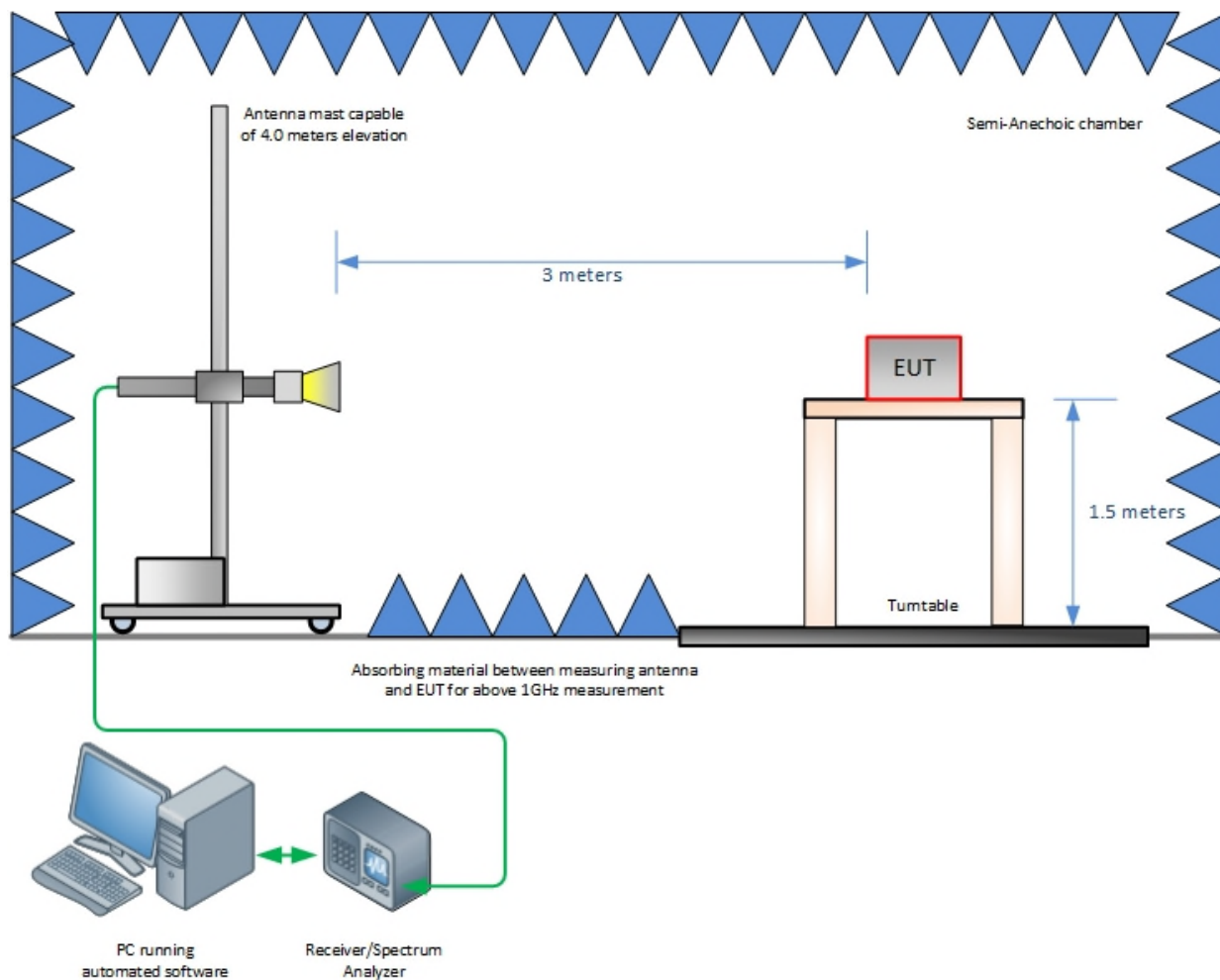


Figure 4-2 - Radiated Emissions Test Setup above 1 GHz

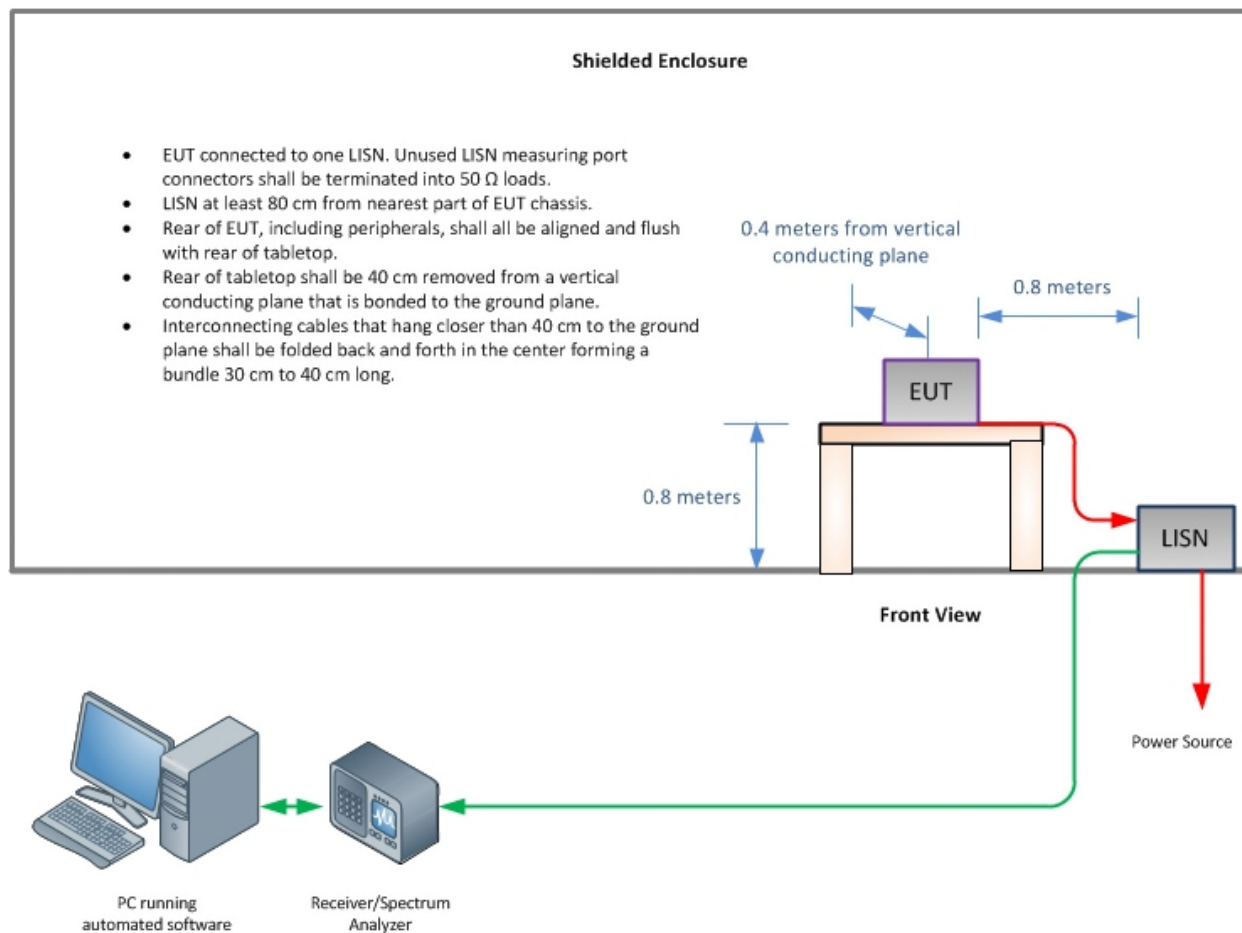


Figure 4-3 – Conducted Emissions Test Setup

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Table 5-1 - Values of U_{CISPR} and U_{Lab}

Measurement	U_{CISPR}	U_{Lab}
Conducted disturbance (mains port) (9 kHz – 150 kHz) (150 kHz – 30 MHz)	3.8 dB 3.4 dB	3.71 dB 3.31 dB
Conducted disturbance (telecom port) (150 kHz – 30 MHz 55 dB LCL) (150 kHz – 30 MHz 65 dB LCL) (150 kHz – 30 MHz 75 dB LCL)	5.0 dB 5.0 dB 5.0 dB	4.11 dB 4.50 dB 4.94 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1 000 MHz) (1 – 6 GHz) (6-18 GHz)	6.3 dB 5.2 dB 5.5 dB	5.85 dB 4.48 dB 4.48 dB

Notes:

U_{CISPR} resembles a value of measurement uncertainty for a specific test, which was determined by considering uncertainties associated with the quantities listed in CISPR 16-4-2:2011.



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