Test Report

Prepared for: Sierzega Elektronik GmbH

Model: SR7

Serial Number: 35057, 35058

Project No: p2440002

Test Results: Pass

To

FCC Part 15.249: 2024
and
RSS-210: Issue 10 (December 2019)

Date of Issue: June 6, 2024

On the behalf of the applicant:	**Sierzega Elektronik GmbH** **Valentinstr. 11** **Thening, 4062, Austria**
Attention of:	**Robert Sierzega, CEO** **Ph: +43 7221 64114 0** **E-Mail: Robert.Sierzega@sierzega.com**
Prepared By:	**Compliance Testing, LLC** **Mesa, AZ 85204** **(480) 926-3100 phone / (480) 926-3598 fax** **www.compliancetesting.com** **ANAB Cert#: AT-2901** **FCC Site Reg. #US2901** **ISED Site Reg. #2044A-2**

Reviewed / Authorized By:

Jeremiah Darden, Principal Engineer

Test Results Summary

Test Date Range: May 23 - June 6, 2024

Specification		Test Name	Pass, Fail, N/A	Comments
FCC	**RSS**			
15.249(a)	Annex B.10	Field Strength of Fundamental	Pass	
15.249(a), 15.249(d), 15.209(a), 15.205	Annex B.10, Section 7.1, 7.2, 7.3 / RSS-GEN 8.9 and 8.10	General Field Strength Emissions, Spurious Harmonic Emission, Restricted Bands	Pass	
15.215(c)	-	20dB Bandwidth of Emission	Pass	
-	Section 5 / RSS-Gen 6.7	99% Occupied Bandwidth	Complete	
15.207	RSS-GEN Section 8.8	A/C Powerline Conducted Emissions	Pass	Only DC power applicable
Method Deviations/Additions: No				

Statements of conformity are reported as:

- Pass - the measured value is below the acceptance limit, *acceptance limit = test limit*.
- Fail - the measured value is above the acceptance limit, *acceptance limit = test limit*.

References/Methods	Description
ANSI C63.4-2014	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ANSI C63.10:2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-GEN Issue 5: 2018	General Requirements for Compliance of Radio Apparatus
ISO/IEC 17025:2017	General requirements for the Competence of Testing and Calibrations Laboratories

Table of Contents

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	June 6, 2024	Jeremiah Darden	Original Document

Current revision of the test report replaces any prior versions. Only the current version of the test report is valid.

EUT Description

Model:	**SR7**
Serial:	**35057, 35058**
Firmware:	**V1.0**
Software:	**N/A**
Description:	**Vehicle Traffic Counter**
Additional Information:	**Highest Frequency Generated: Non Radio Frequency <1250 MHz** **EUT operates at 12VDC.** **Radar 24GHz:** **FCC ID: S6P-SR7** **IC: 5792A-SR7** **Contains FCC ID's:** **BLE: QOQ-GM220P** **Cellular: XMR201910BG95M3** **Usage: Mounted near roads and streets**
Receipt of Sample(s):	**May 16, 2024**
EUT Condition:	**Visual Damage** No **State of Development** Production/Production Equivalent

The applicant has been cautioned as to the following

15.21 - Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) - Special Accessories

Equipment marked to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Authorization Requirements

Intentional Radios may require authorization covered under the following rule parts or standards:

-47 CFR Part 2 Subpart J

-RSS-Gen — General Requirements for Compliance of Radio Apparatus

Note: These notices are specific to the methods and standards related to the testing within this report. Customers should also consider and review additional legal regulations for import/export documentation and labeling for the countries and geographies under consideration by the manufacturer.

Test and Measurement Data

Subpart 2.1033(b)

All tests and measurement data shown were performed in accordance with FCC Rule Parts: 15.249.

All tests and measurement data shown are deemed satisfactory evidence of compliance with Industry Canada Radio Standards Specification RSS-Gen and RSS-210.

Standard Engineering Practices

Unless otherwise indicated, the procedures contained in ANSI C63.10 and ANSI C63.4 were observed during testing.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing. Measurement results, unless otherwise noted, are worst case measurement.

Standard Test Conditions and Engineering Practices

Unless otherwise indicated in the specific measurement results, the ambient temperature was maintained within the range of 10º to 40ºC (50º to 104ºF) and the relative humidity levels were in the range of 10% to 90%.

Environmental Conditions		
Temperature (ºC)	**Humidity (%)**	**Barometric Pressure (mbar)**
26.56 - 27.22	26.5 – 27.6	963.9 – 966.9

Test Setup and Modes of Operation

EUT Operation during Tests
EUT was connected to power and operated with the installed software for typical operation. 24GHz radio is operated at it's highest duty cycle for FMCW operation. EUT was powered by a 12VDC. Two EUT were used for testing. S/N 35057 and S/N 35058 are identical except for the antenna orientation and transmit phase. This represents one production unit that has two antennas inside the enclosure. They do not transmit simultaneously so two units were needed to capture the 19degree antenna angle/phase and the 25 degree angle/phase.

EUT:

Qty	Description	Manufacturer	Model	S/N
1	Traffic Counter	Sierzega	SR7	35057
1	Traffic Counter	Sierzega	SR7	35058

Accessories: N/A

Cables:

Qty	Description	Length (M)	Ferrites (Y/N)	Shielding Y/N	Shielded Hood Y/N	Termination / Connection
1	Power Cable	1.8	N	N	N	EUT to 12VDC

Software/Firmware:

Name	Description	Version	Installation Info
SR7	System firmware	V1.0	Installed on EUT

Modifications to EUT(s) (Y/N): N

15.203: Antenna Requirement:

X	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
	The EUT must be professionally installed
	The antenna requirement does not apply

Antenna type stated by the manufacturer:
1 Tx Antenna with Beam Squint of 19° and 1x14 patch, 16dBi
1 Tx Antenna with Beam Squint of 25° and 1x14 patch, 16dBi
1 Rx Antenna with Beam Squint of 19° and 4x14 patch, 22.1dBi
1 Rx Antenna with Beam Squint of 25° and 1x14 patch, 16dBi

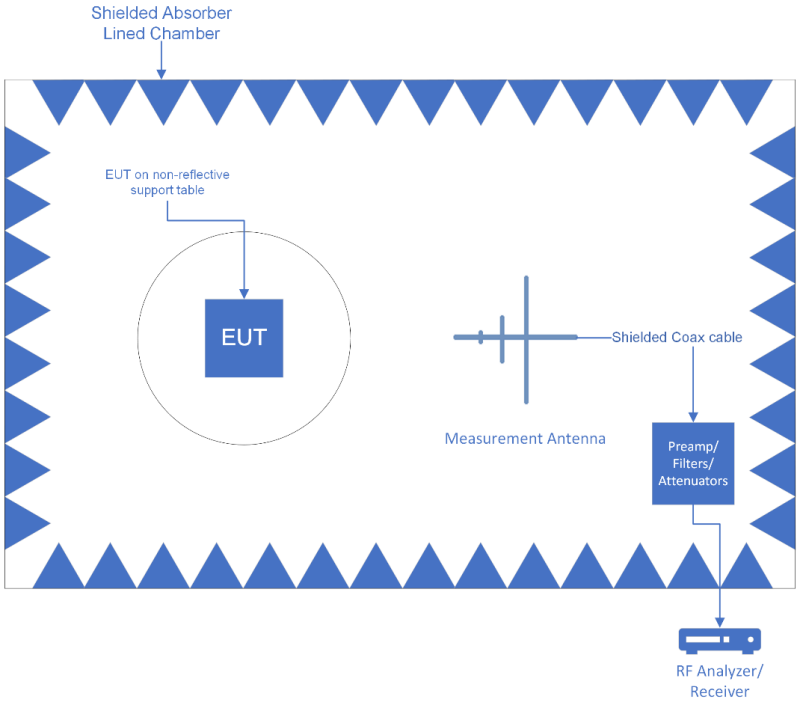
Field Strength of Fundamental

Engineer: Jeremiah Darden
Test Date: May 23, 2024

Test Procedure

RADIATED METHOD
The EUT was setup in a semi-anechoic test chamber set 3m from the receiving antenna. The EUT was set to transmit on the lowest, middle and highest frequency of operation at the maximum power level. The EUT was tested, in 3 orthogonal axis, by rotating it 360° with the receive antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the TX signal levels were maximized. A spectrum analyzer was used to verify that the EUT met the requirements for Output Power.

Test Setup



The Spectrum Analyzer was set to the following:

RBW ≥ 1MHz
VBW ≥ 3 x RBW
Span ≥ FMCW BW
Sweep time > 2 × (Signal Period) × (Span) / (RBW)
Detector = peak
Trace Mode = max hold

Where applicable Desensitization Factor per ANSI C63.10 Annex L were used based on 250microsecond chirp time stated by manufacturer and a 177MHz chirp bandwidth as measured in this report.

$$\alpha = \frac{1}{\sqrt{1+\left(\frac{2\ln(2)}{\pi}\right)^2\left(\frac{BW_{Chirp}}{T_{Chirp}B^2}\right)^2}}$$

where

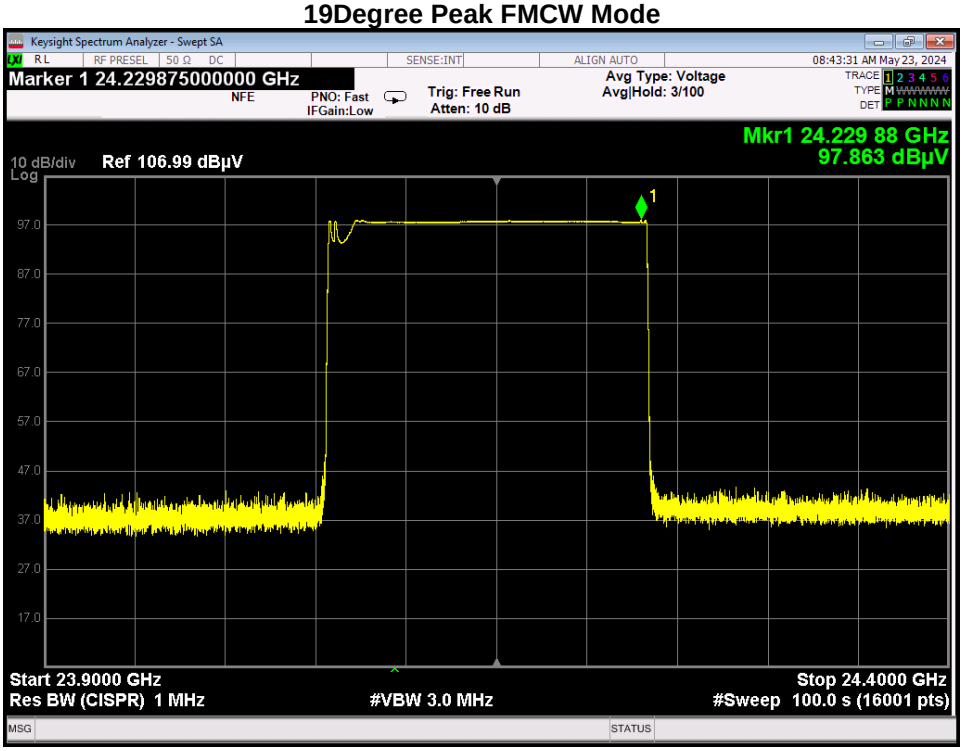
α	is the reduction in amplitude
BW_{Chirp}	is the FMCW Chirp Bandwidth
T_{Chirp}	is the FMCW Chirp Time
B	is the 3 dB IF Bandwidth = RBW

Field Strength of Fundamental Summary Table (worse case axis and polarity)

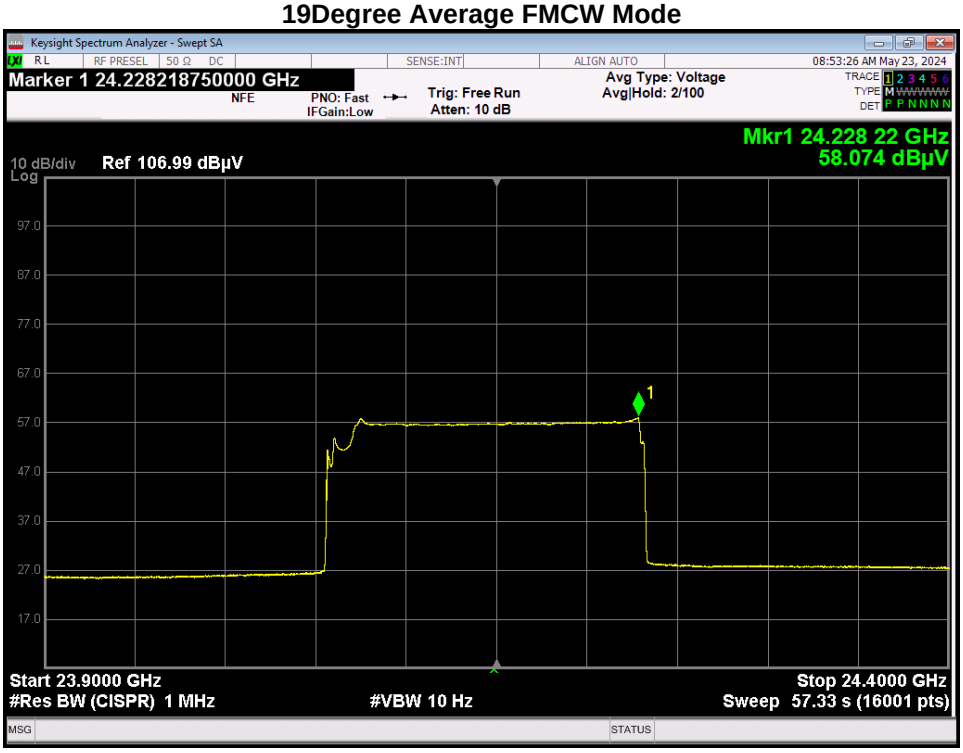
Tuned Frequency (GHz)	Mode of Operation	Measured (dBuV)	Factor (dB)	Desens Factor (dB)	Final Value (dBuV/m)	Specification Limit (dBuV/m)	Result
24.229	FMCW 19Degree PK	97.863	15.04	0.2	113.10	127.95	Pass
24.228	FMCW 19Degree AV	58.074	15.04	0.2	73.31	107.95	Pass
24.152	FMCW 25Degree PK	96.639	15.04	0.2	111.88	127.95	Pass
24.078	FMCW 25Degree AV	57.473	15.04	0.2	72.71	107.95	Pass
24.152	CW 19Degree PK*	98.051	15.04	N/A	113.09	127.95	Complete
*Taken to verify Analyzer Sweep and RBW settings in FMCW mode and calculated desensitization factor.							

Field Strength of Fundamental Plots

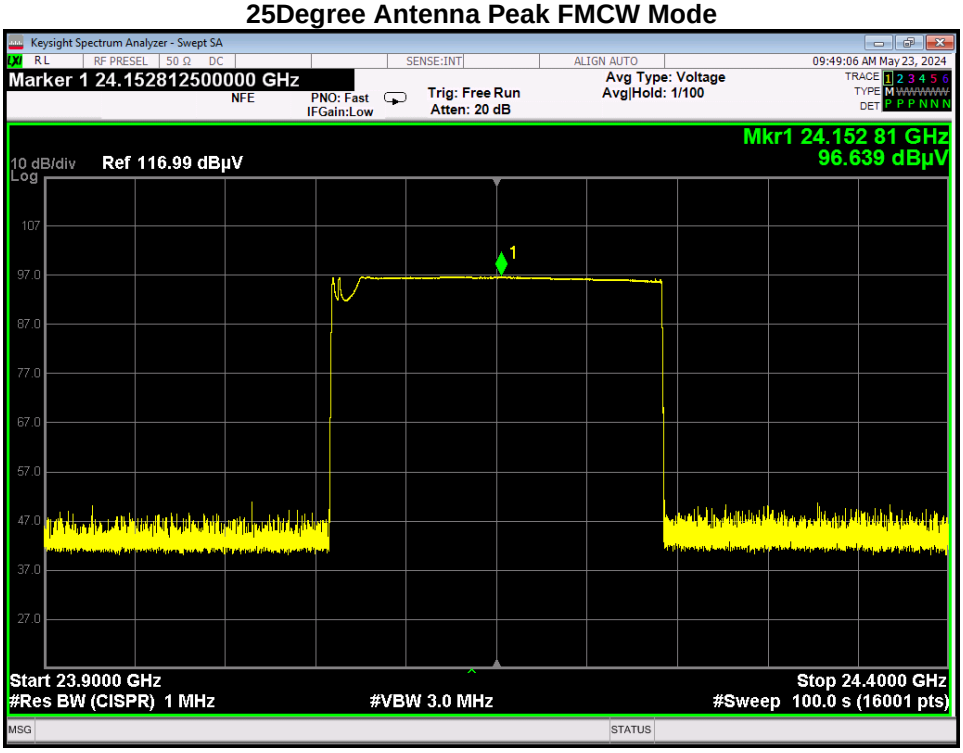
19Degree Peak FMCW Mode



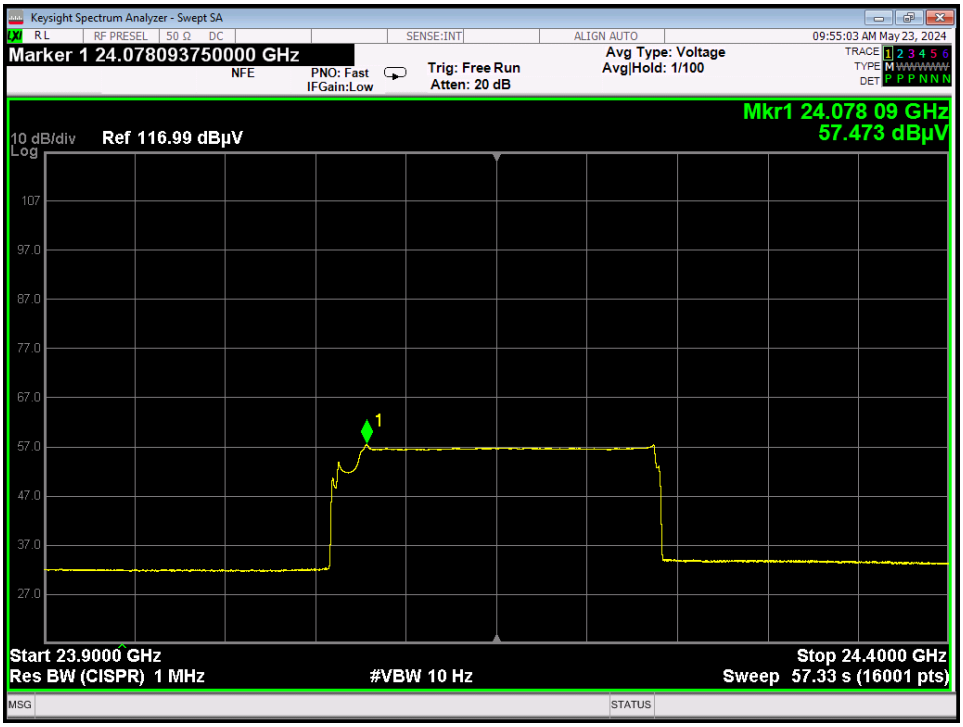
19Degree Average FMCW Mode



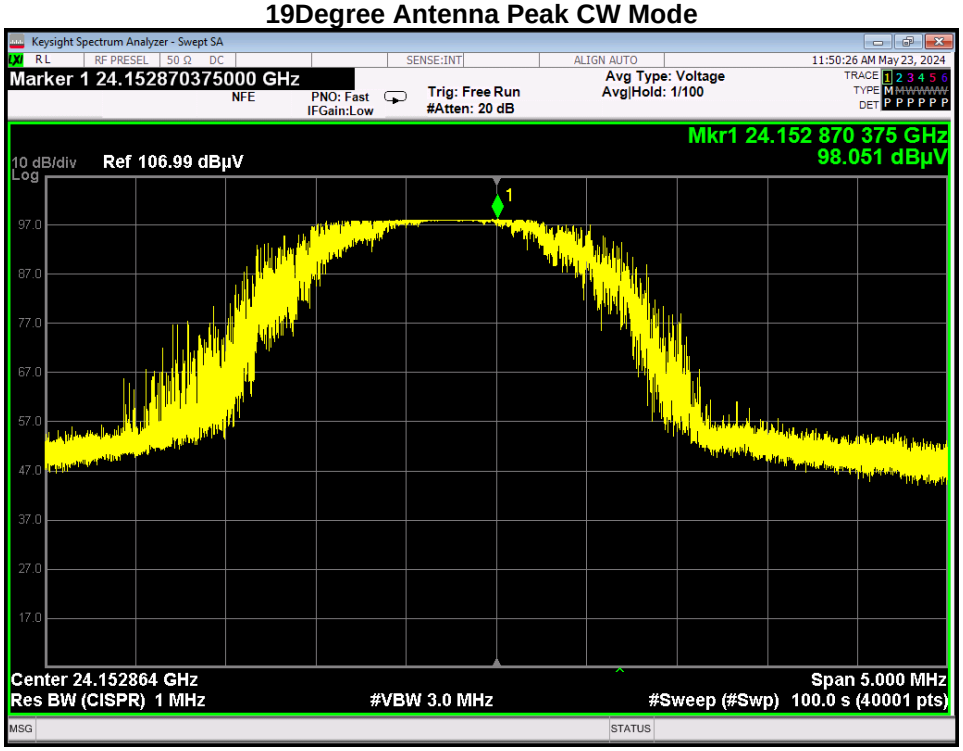
25Degree Antenna Peak FMCW Mode



25Degree Antenna Average FMCW Mode



19Degree Antenna Peak CW Mode



General Field Strength Emissions / Spurious Harmonic Emissions / Restricted Bands

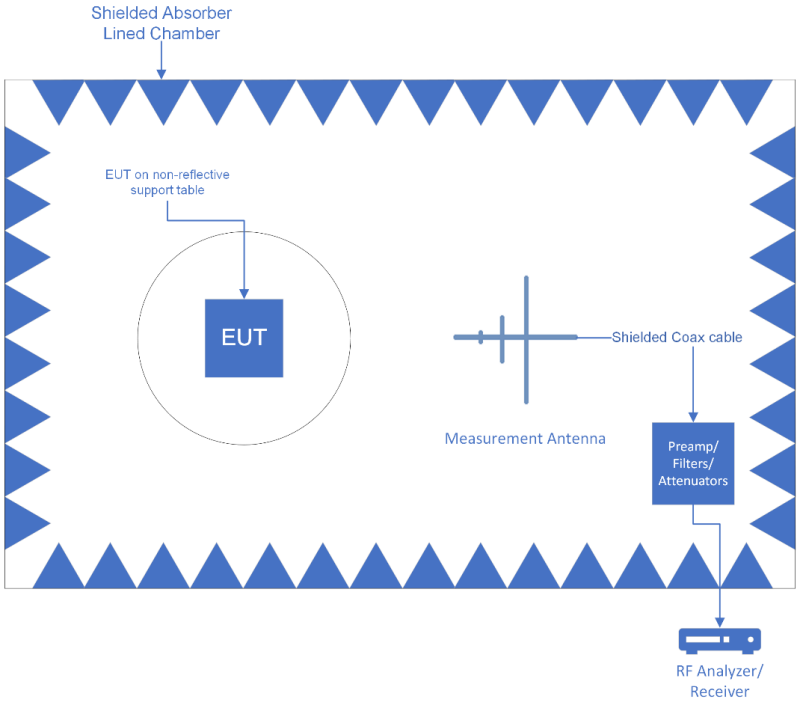
Engineer: Jeremiah Darden

Test Date: May 22 – May 31, 2024

Test Procedure
Radiated Spurious Emissions: 9kHz – 1000 MHz and Above 1GHz

The EUT was setup in a semi-anechoic test chamber set 3m from the receiving antenna. The EUT was set to transmit on the lowest, middle and highest frequency of operation at the maximum power level into its permanently attached antenna. The EUT was tested, in 3 orthogonal axis, by rotating it 360° with the receive antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the TX signal levels were maximized. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Spurious Emissions. All emissions across the required range were evaluated.

Basic Test Setup



	Settings Below 1GHz	Settings Above 1GHz
RBW	120 kHz	1 MHz
VBW	300 kHz	3 MHz
Detector	Quasi Peak	Peak / Average

Sample Calculations

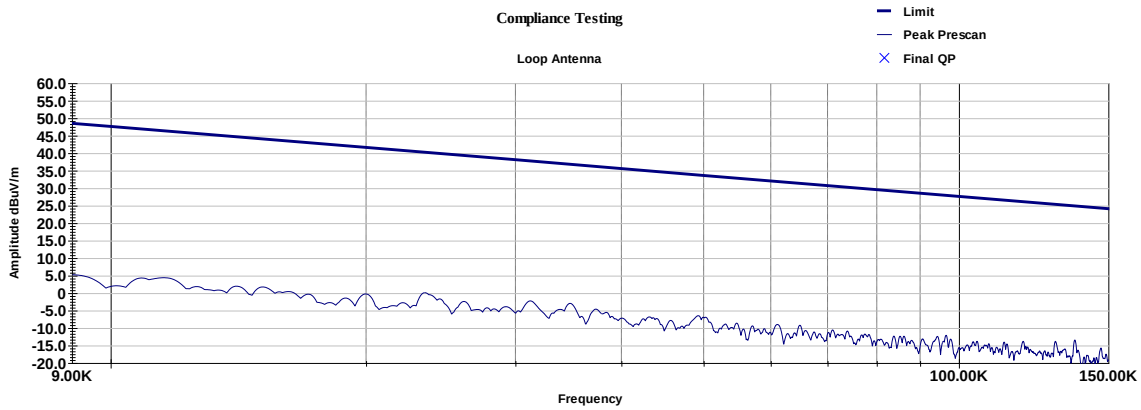
Corrected Value = Measured Value + Correction factor

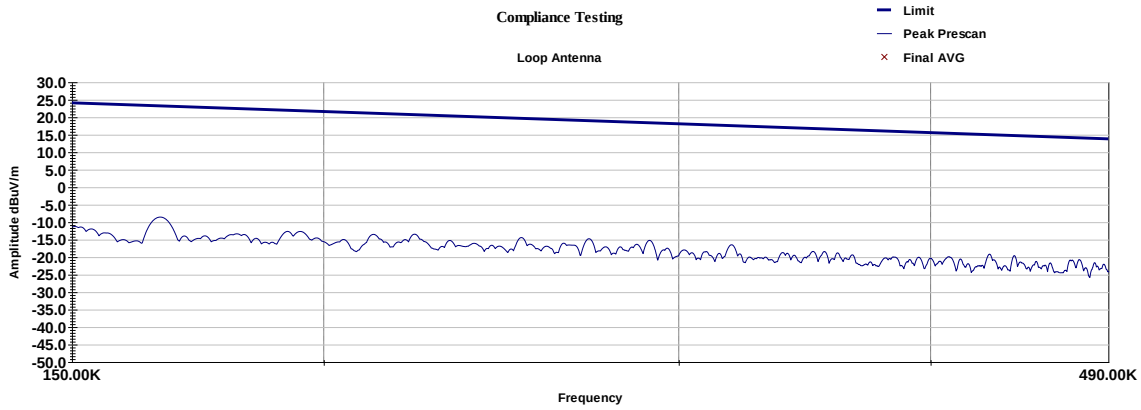
Correction factor = Antenna Correction Factor + Cable loss + Preamp/Attenuator Factor

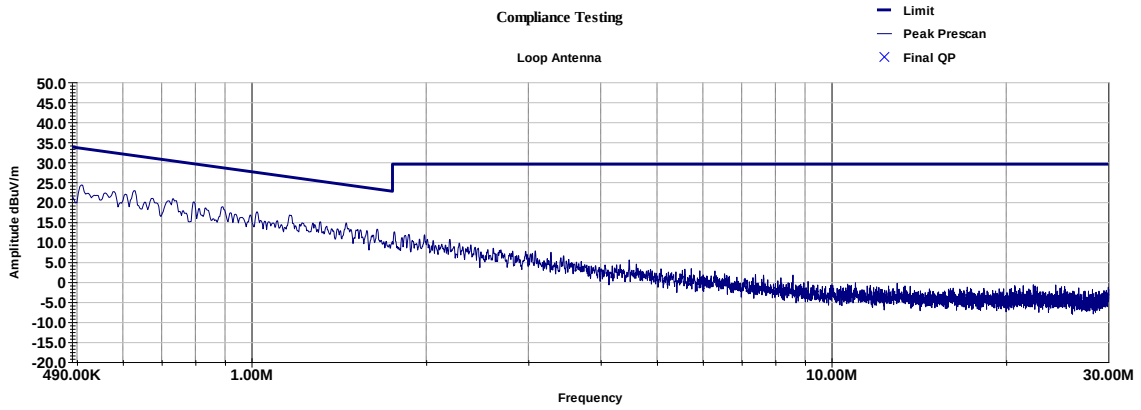
The Spectrum Analyzer was set to the following:
RBW ≥ 1MHz
VBW ≥ 3 x RBW
Span ≥ FMCW BW
Sweep time > 2 × (Signal Period) × (Span) / (RBW)
Detector = peak
Trace Mode = max hold

Radiated Emissions 9kHz-30MHz

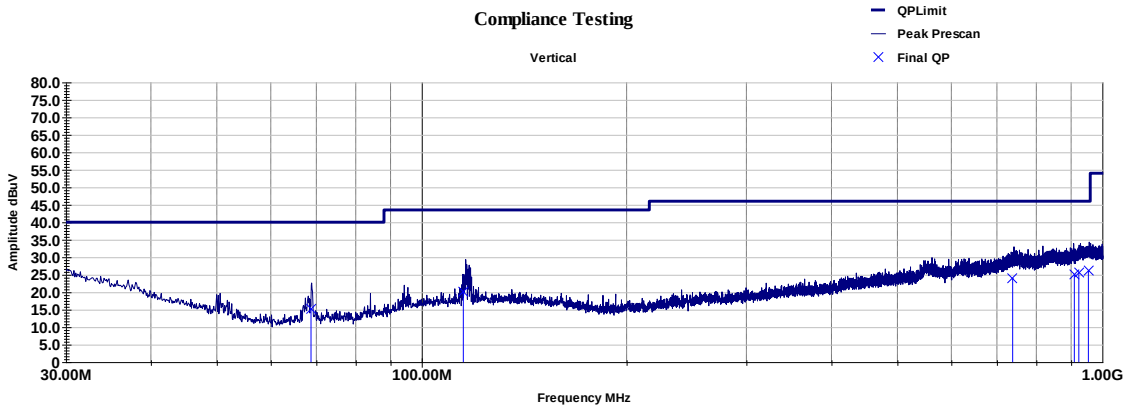
No Emissions to measure within scanned frequency range



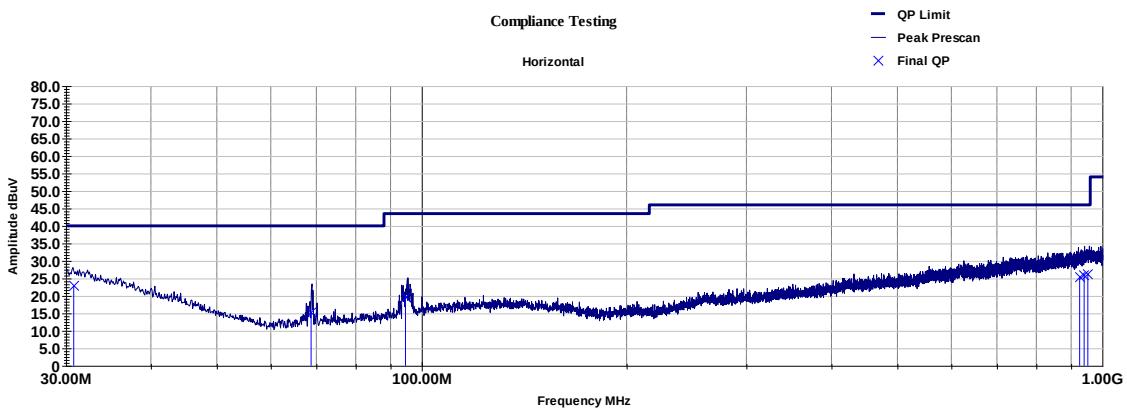




Radiated Emissions 30-1000MHz



Frequency	Azimuth	Height	Raw QP	Correction	Final QP	Limit	QP Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
68.748	5.00	100.00	43.70	-28.45	15.30	40.00	-24.70
115.122	164.00	121.00	42.99	-22.80	20.20	43.50	-23.30
738.397	316.00	151.00	33.61	-9.66	23.90	46.00	-22.10
909.746	352.00	196.00	33.41	-8.34	25.10	46.00	-20.90
923.494	253.00	359.00	33.42	-7.79	25.60	46.00	-20.40
953.923	124.00	364.00	33.34	-7.17	26.20	46.00	-19.80
Final = Raw + Path Loss							
Margin = Final - Limit							



Frequency	Azimuth	Height	Raw QP	Correction	Final QP	Limit	QP Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
30.807	330.00	325.00	38.47	-15.65	22.80	40.00	-17.20
68.781	260.00	400.00	43.70	-28.52	15.20	40.00	-24.80
94.657	115.00	245.00	44.92	-25.24	19.70	43.50	-23.80
926.183	308.00	326.00	33.44	-8.05	25.40	46.00	-20.60
940.325	143.00	325.00	33.47	-7.47	26.00	46.00	-20.00
952.246	344.00	247.00	33.30	-7.17	26.10	46.00	-19.90
Final = Raw + Path Loss							
Margin = Final - Limit							

Radiated Emissions Above 1000MHz

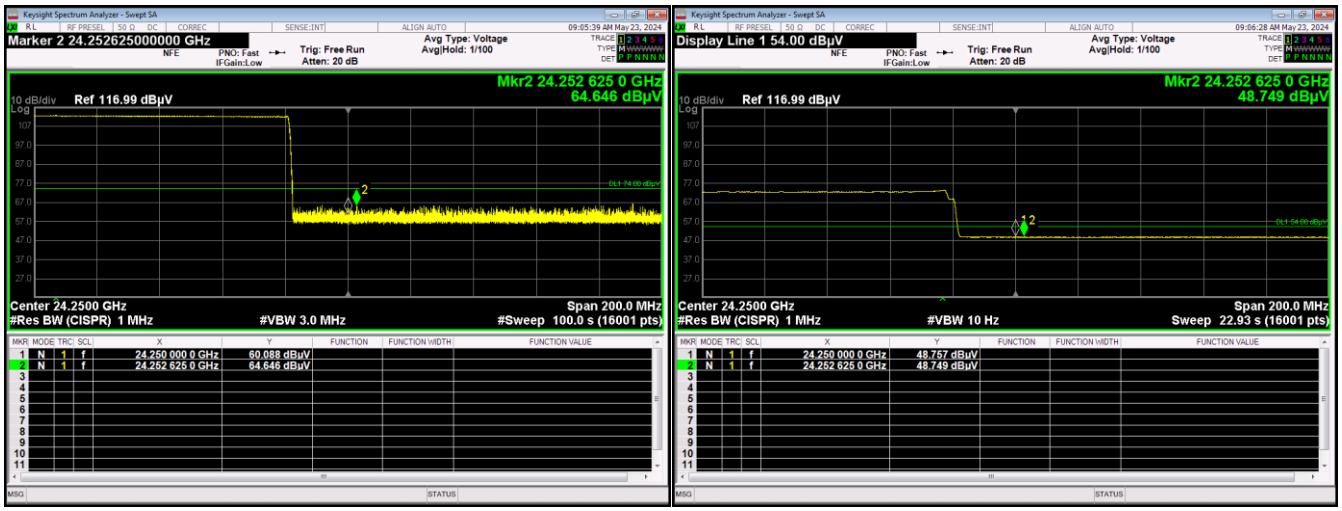
Band Edge

Band Edge Summary Table

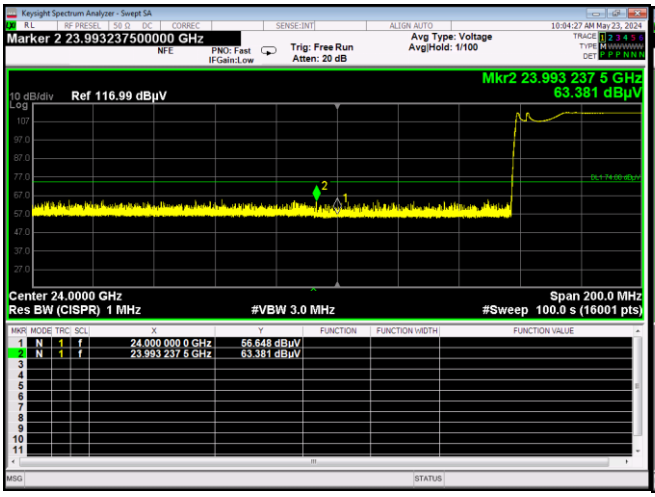
Tuned Frequency (MHz)	Mode of Operation	AVG Measured Value (dBuV/m)	PK Measured Value (dBuV/m)	AVG / PK Specification Limit (dBuV/m)	Result
23.993	FMCW – 19 Degree	46.55	64.63	54 / 74	Pass
24.252	FMCW – 19 Degree	48.75	64.65	54 / 74	Pass
23.993	FMCW – 25 Degree	46.75	63.38	54 / 74	Pass
24.253	FMCW – 25 Degree	48.85	65.63	54 / 74	Pass

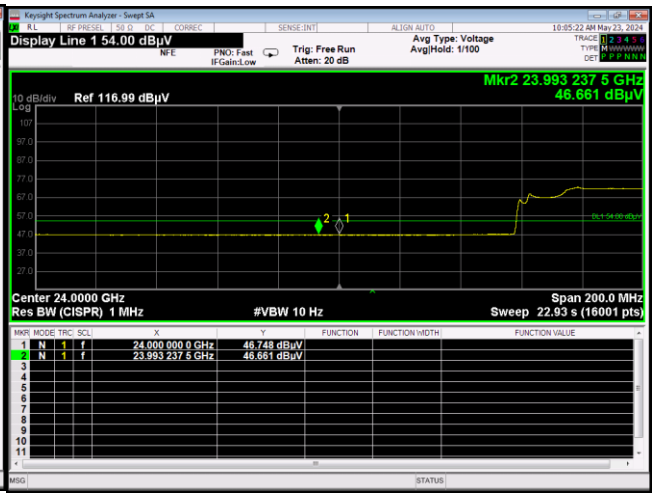
Band Edge – 19Degree Antenna FMCW LOW (Peak | AVG)

Band Edge – 19Degree Antenna FMCW High (Peak | AVG)

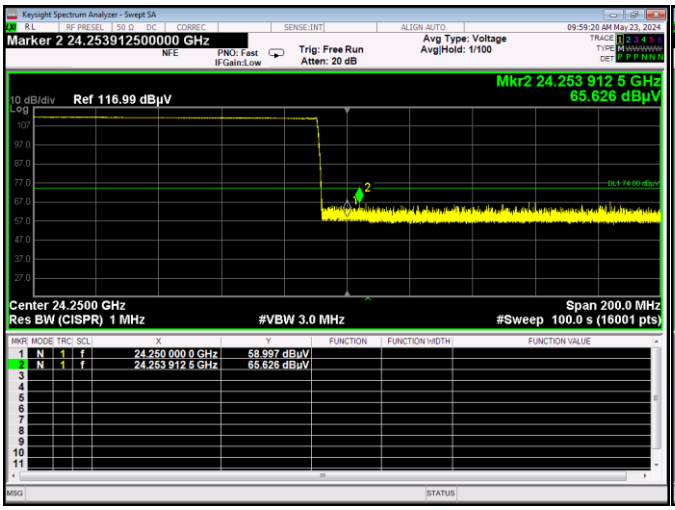


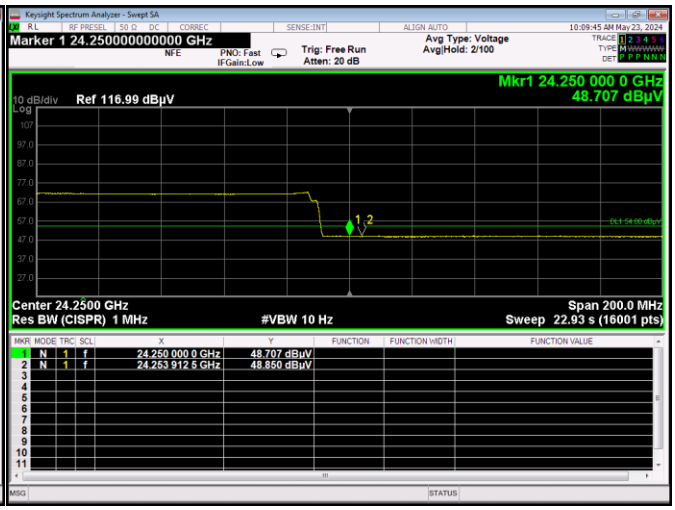
Band Edge – 25Degree Antenna FMCW LOW (Peak | AVG)





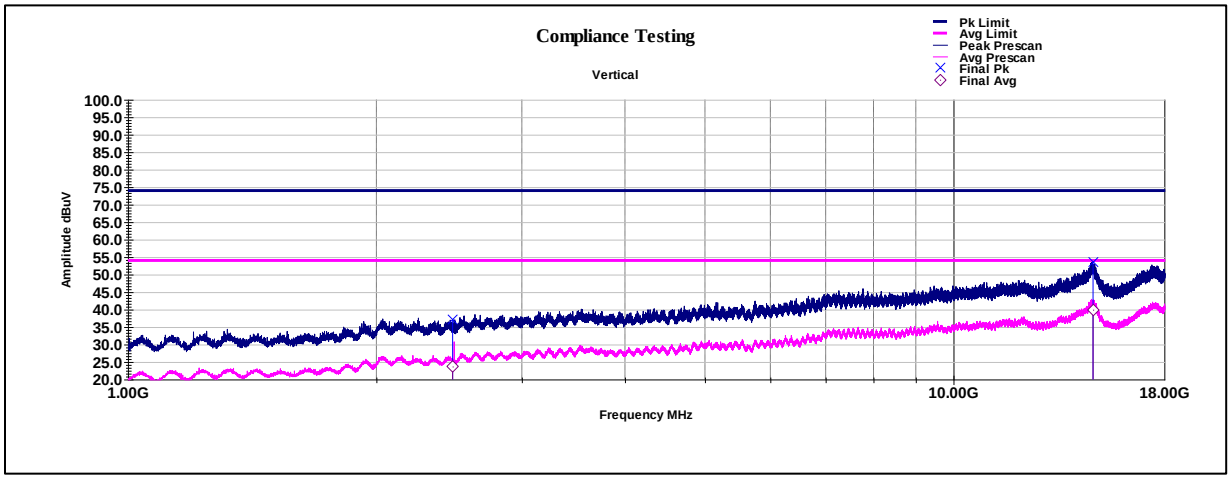
Band Edge – 25Degree Antenna FMCW High (Peak | AVG)



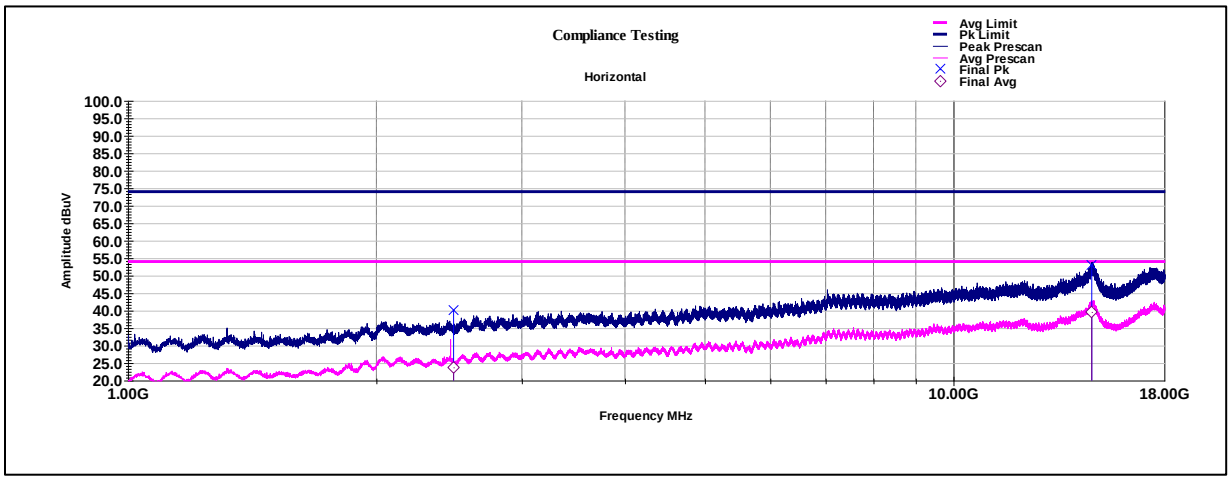


1-18GHz – FMCW Mode

19Degree Antenna



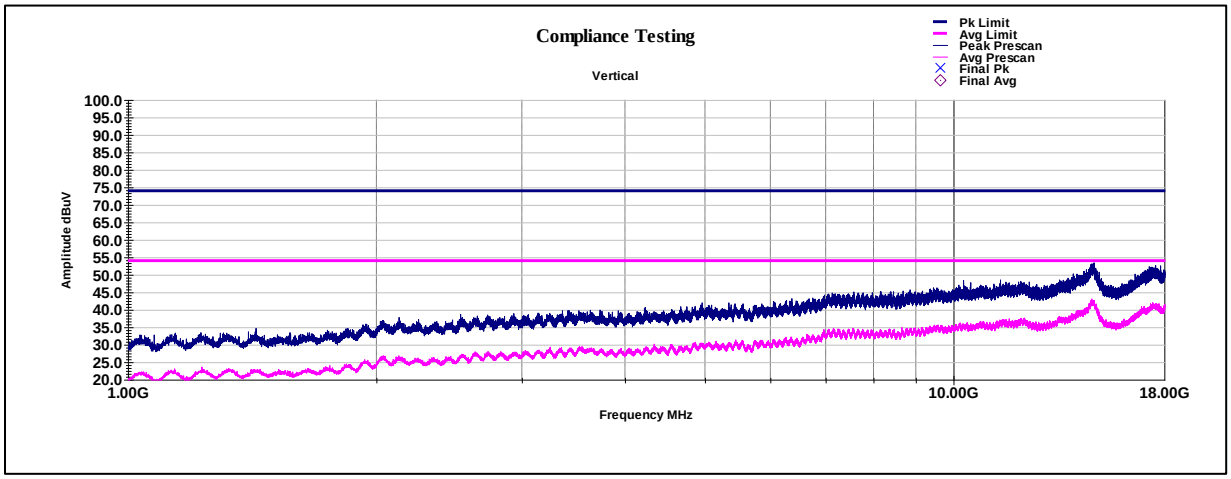
Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
GHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2.47370175	281.00	372.00	49.16	35.72	-12.04	37.12	74.00	-36.88	23.68	54	-30.32
14.7587465	242.00	230.00	47.37	33.66	6.29	53.66	74.00	-20.34	39.95	54	-14.05
Final = Raw + Path Loss											
Margin = Final - Limit											

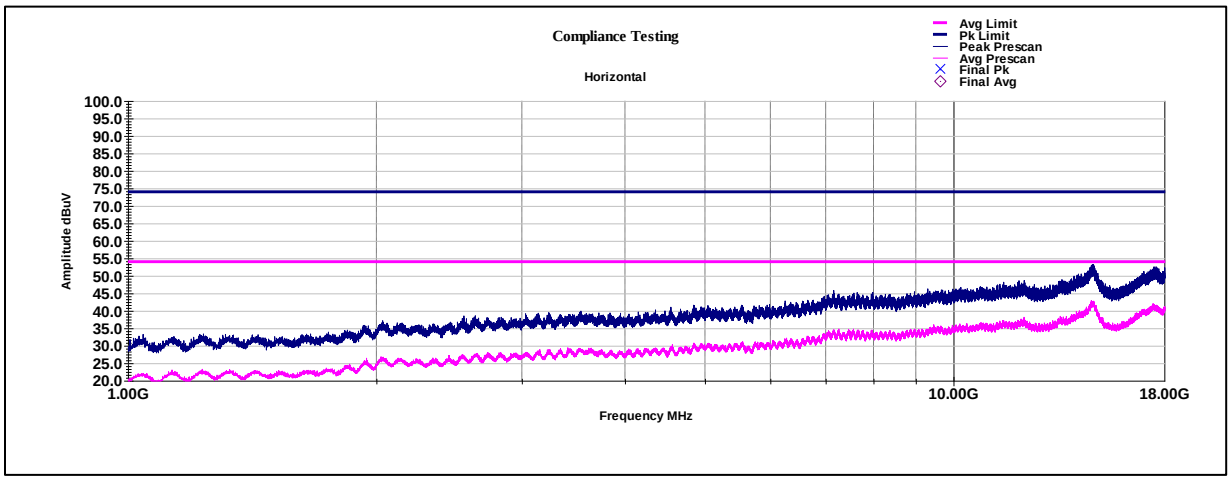


Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
GHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2.48021575	192.00	365.00	52.19	35.76	-11.98	40.21	74.00	-33.80	23.77	54	-30.23
14.702839	135.00	325.00	46.49	32.96	6.63	53.12	74.00	-20.88	39.60	54	-14.41
Final = Raw + Path Loss											
Margin = Final - Limit											

25degree Antenna

No Emissions to measure within 10dB of limit

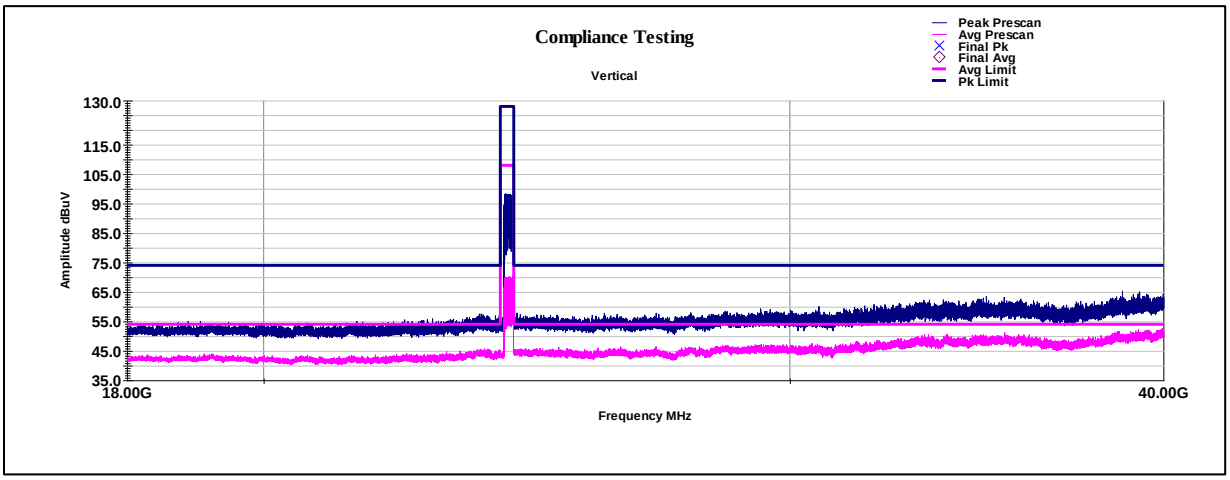


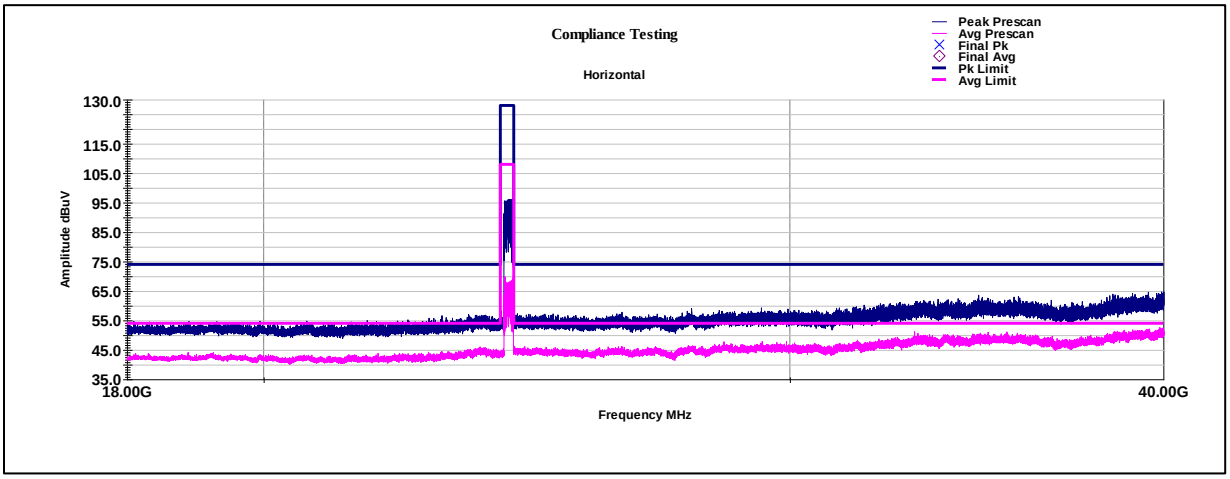


18-40GHz - FMCW Mode

19Degree Antenna

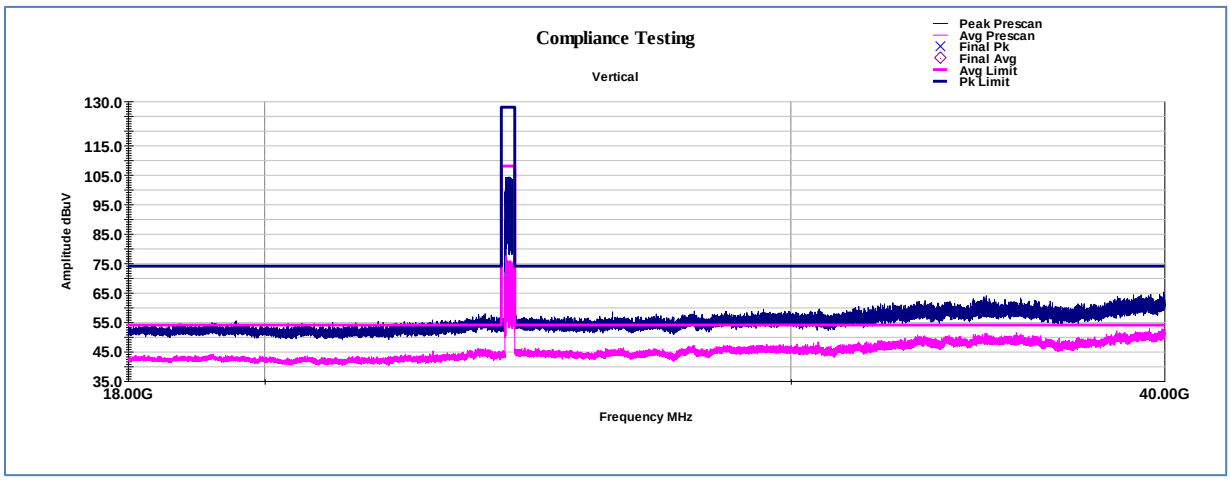
No out of band emissions to measure.

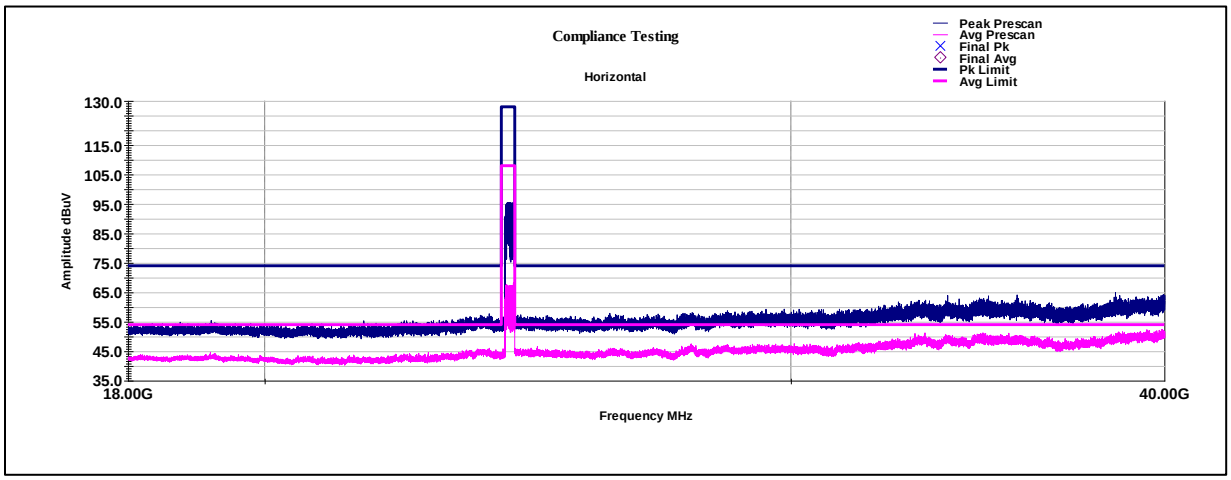




25degree Antenna

No out of band emissions to measure.



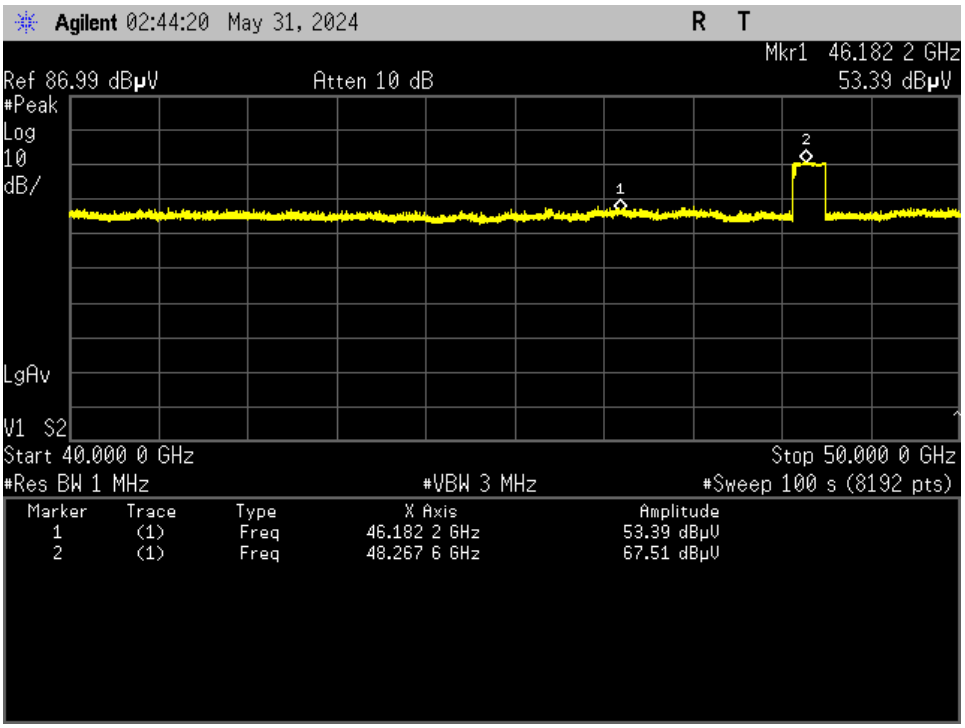

Compliance Testing
Horizontal
Peak Prescan
Avg Prescan
Final Pk
Final Avg
Pk Limit
Avg Limit
130.0
115.0
105.0
95.0
85.0
75.0
65.0
55.0
45.0
35.0
Amplitude dBuV
18.00G
40.00G
Frequency MHz

40-100GHz - FMCW Mode

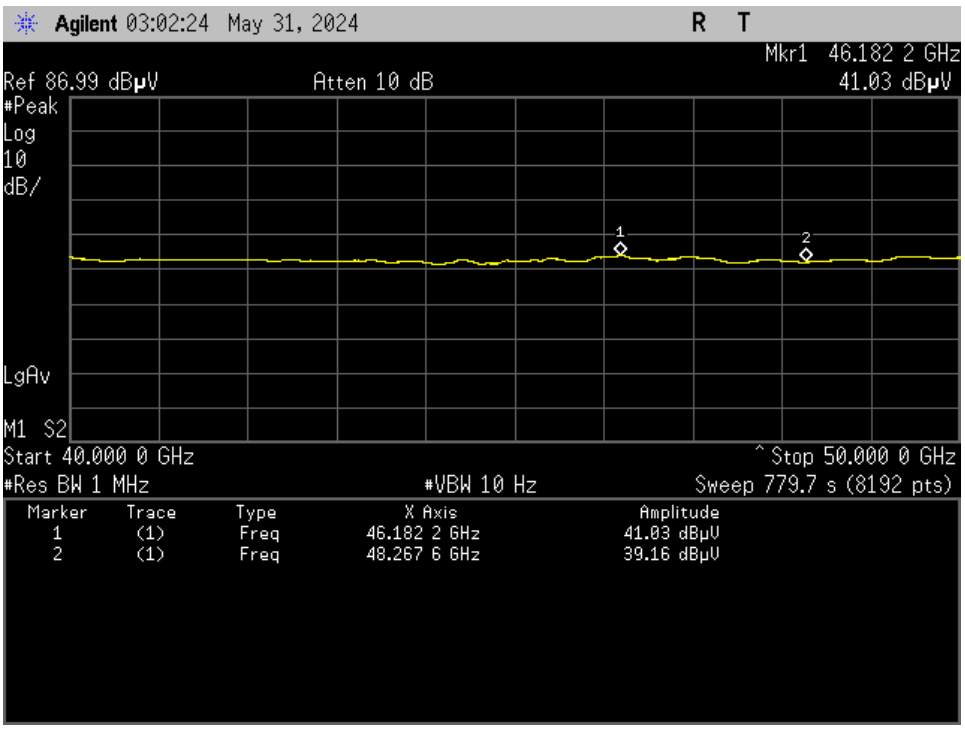
Description	Det	Range (GHz)	Freq (GHz)	Amplitude (dBuV)	Limit Distance (m)	Measured Distance (m)	Correction (dB)	Cable Loss (dB)	Amp (dB)	Mixer (dB)	Antenna F (dB/m)	Field Strength (dBuV/m)	Limit (dBuV/m)	Margin	Compliance
Full Sweep 25deg	Peak	40 - 50	46.18	53.39	3.00	1.00	-9.54	15.64	42.6	0.00	40.14	57.03	74.00	-16.97	Pass
Full Sweep 25deg	AVG	40 - 50	46.18	41.03	3.00	1.00	-9.54	15.64	42.6	0.00	40.14	44.67	54.00	-9.33	Pass
2nd Harm 25deg	Peak	40 - 50	48.151	68.27	3.00	1.00	-9.54	16.62	43.1	0.00	40.48	72.73	87.95	-15.22	Pass
2nd Harm25deg	AVG	40 - 50	48.267	39.29	3.00	1.00	-9.54	16.62	43.1	0.00	40.48	43.75	67.95	-24.20	Pass
Full Sweep19deg	Peak	40 - 50	46.197	54.14	3.00	1.00	-9.54	15.64	42.6	0.00	40.14	57.78	74.00	-16.22	Pass
Full Sweep19deg	AVG	40 - 50	46.197	41.33	3.00	1.00	-9.54	15.64	42.6	0.00	40.14	44.97	54.00	-9.03	Pass
2nd Harm 19deg	Peak	40 - 50	48.3	62.21	3.00	1.00	-9.54	16.62	43.1	0.00	40.48	66.67	87.95	-21.28	Pass
2nd Harm19deg	AVG	40 - 50	48.301	39.27	3.00	1.00	-9.54	16.62	43.1	0.00	40.48	43.73	67.95	-24.22	Pass
Full Sweep 25deg Signal ID on*	Peak	50 - 75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3rd harm 19deg**	Peak	50 - 75	72.137	16.32	3.00	1.00	-9.54	0.50	33.5	35.50	44.01	53.29	87.95	-34.66	Pass
3rd harm 19deg**	AVG	50 - 75	72.137	1.29	3.00	1.00	-9.54	0.50	33.5	35.50	44.01	38.26	67.95	-29.69	Pass
3rd harm 25deg**	Peak	50 - 75	72.128	14.87	3.00	1.00	-9.54	0.50	33.5	35.50	44.01	51.84	87.95	-36.11	Pass
3rd harm 25deg**	AVG	50 - 75	72.128	1.31	3.00	1.00	-9.54	0.50	33.5	35.50	44.01	38.28	67.95	-29.67	Pass
Full Sweep 19deg signal ID on*	Peak	75 - 100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4th harm 19deg**	Peak	75 - 100	96.103	14.73	3.00	1.00	-9.54	1.50	38.4	41.50	46.60	56.42	87.95	-31.53	Pass
4th harm 19deg**	AVG	75 - 100	96.141	3.93	3.00	1.00	-9.54	1.50	38.4	41.50	46.60	45.62	67.95	-22.33	Pass
4th harm 25deg**	Peak	75 - 100	96.141	15.90	3.00	1.00	-9.54	1.50	38.4	41.50	46.60	57.59	87.95	-30.36	Pass
4th harm 25deg**	AVG	75 - 100	96.141	3.94	3.00	1.00	-9.54	1.50	38.4	41.50	46.60	45.63	67.95	-22.32	Pass

*Measurements with Signal ID image suppression activated on measurement equipment used to identify applicable signals. No signals above noise floor identified
**Noise Floor

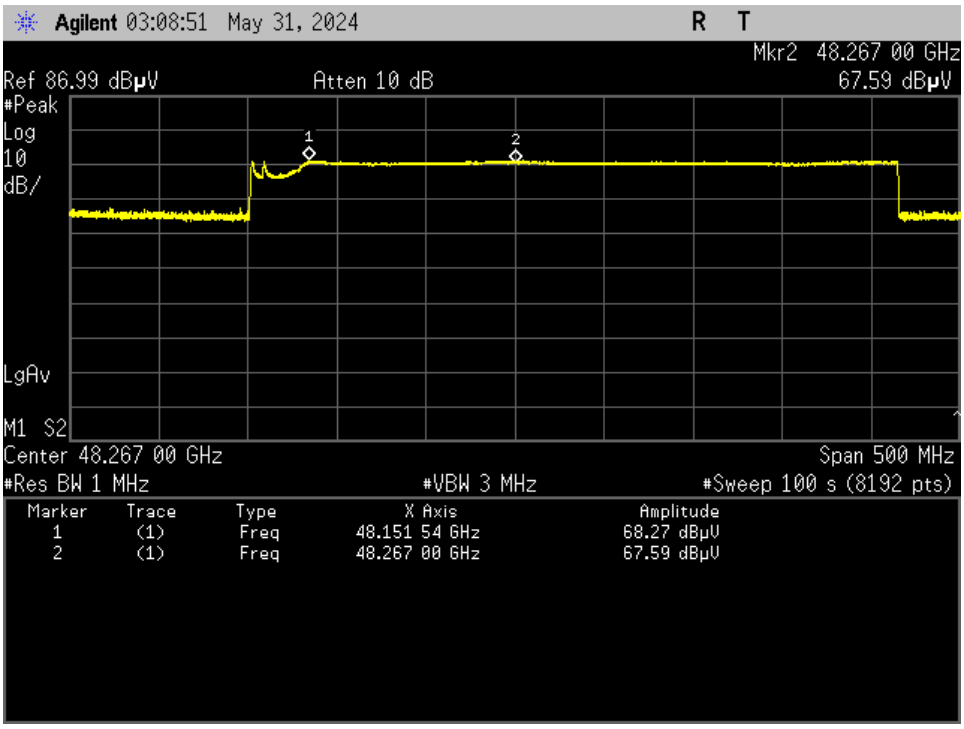
Spurious Harmonic 25deg 15_249 40-50GHz peak



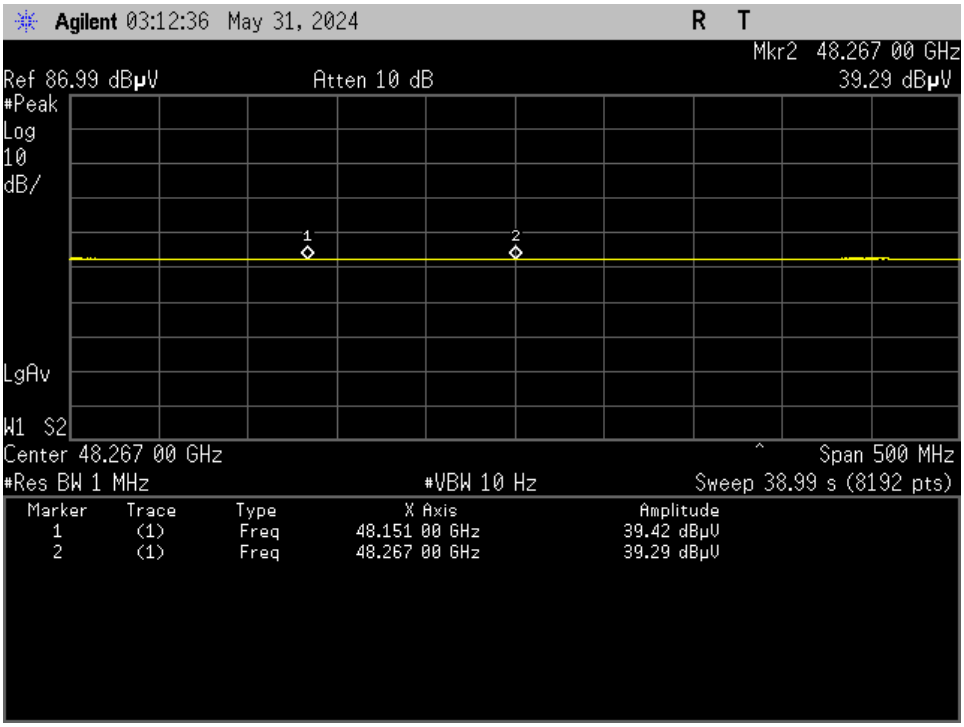
Spurious Harmonic 25deg 15_249 40-50GHz avg



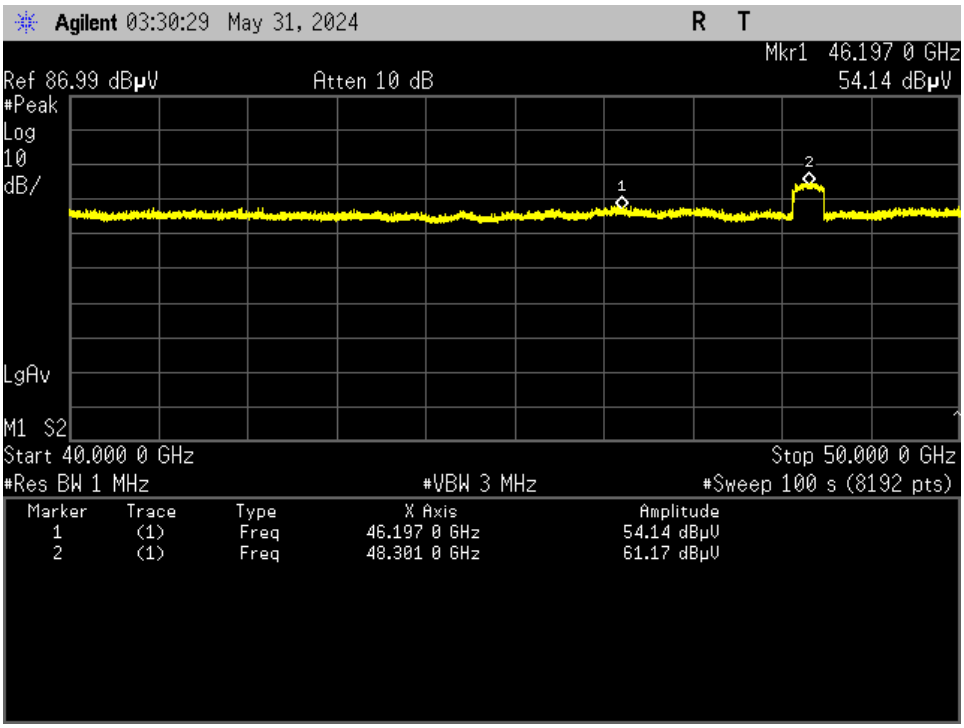
Spurious Harmonic 25deg 15_249 2nd harm peak



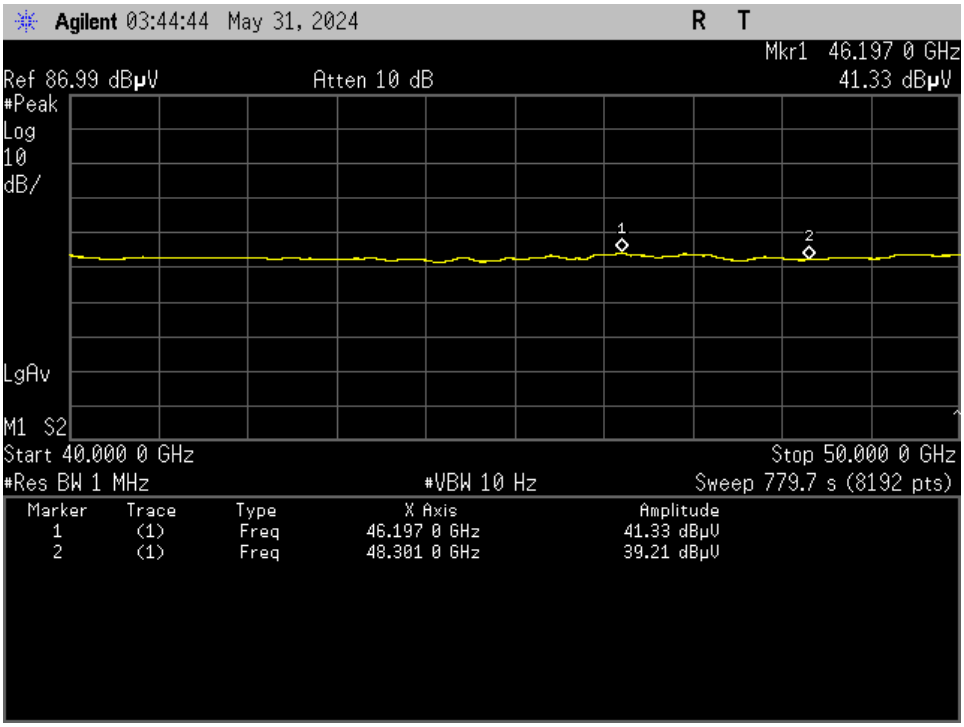
Spurious Harmonic 25deg 15_249 2nd harm avg



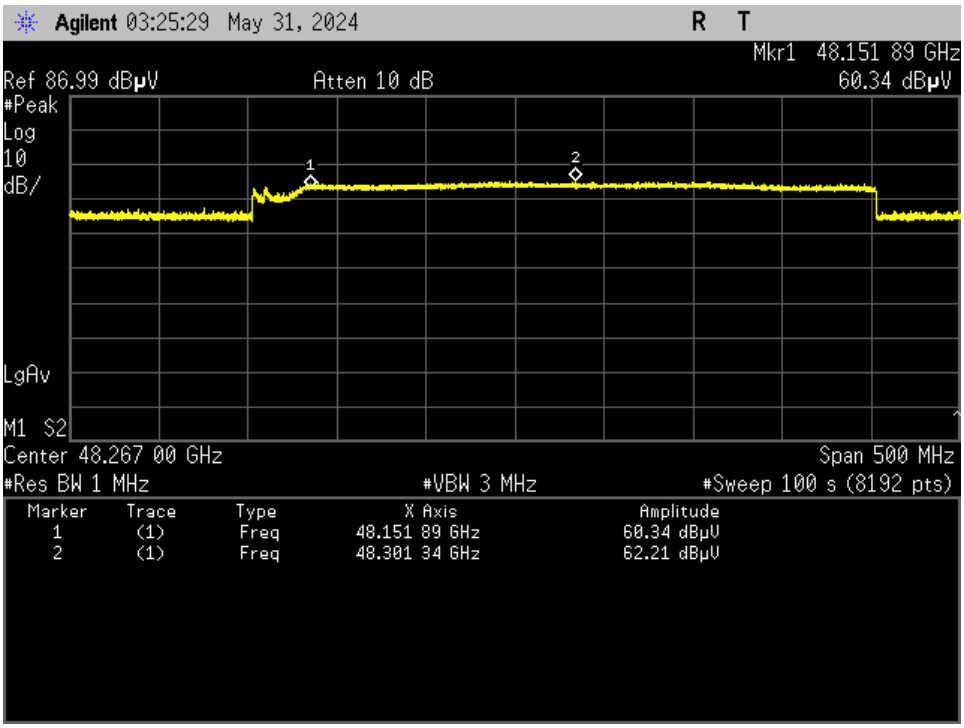
Spurious Harmonic 19deg 15_249 40-50GHz peak



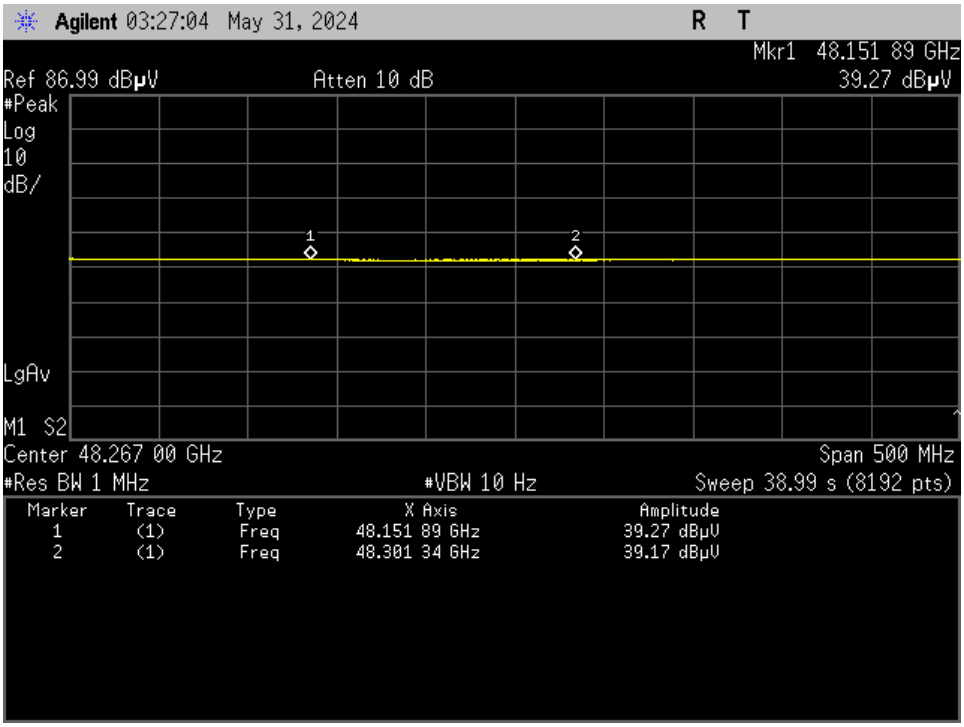
Spurious Harmonic 19deg 15_249 40-50GHz avg



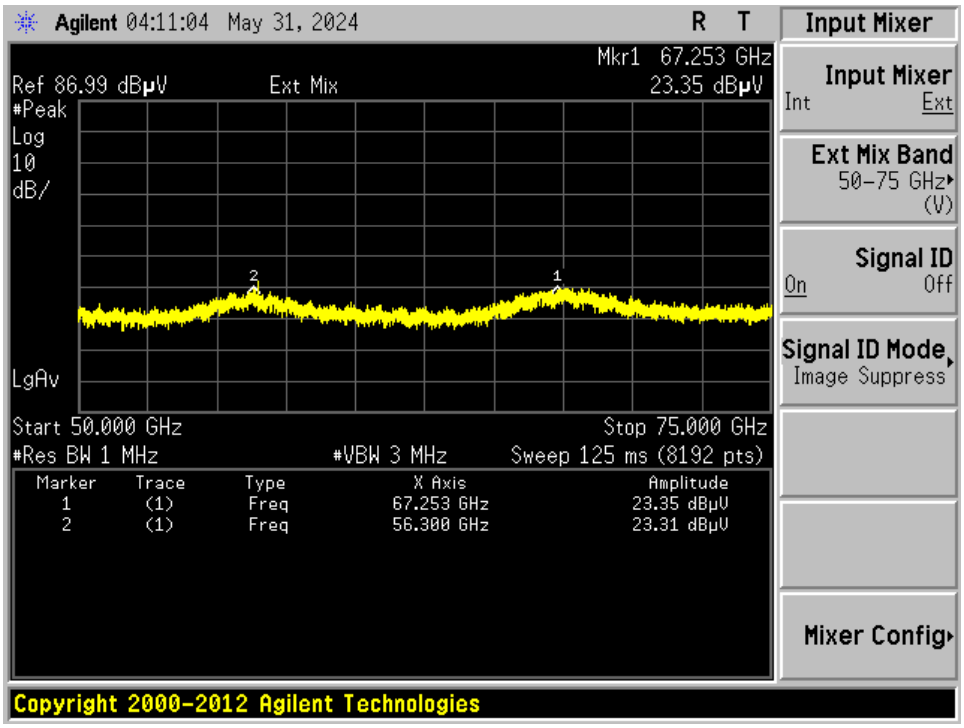
Spurious Harmonic 19deg 15_249 2nd harm peak



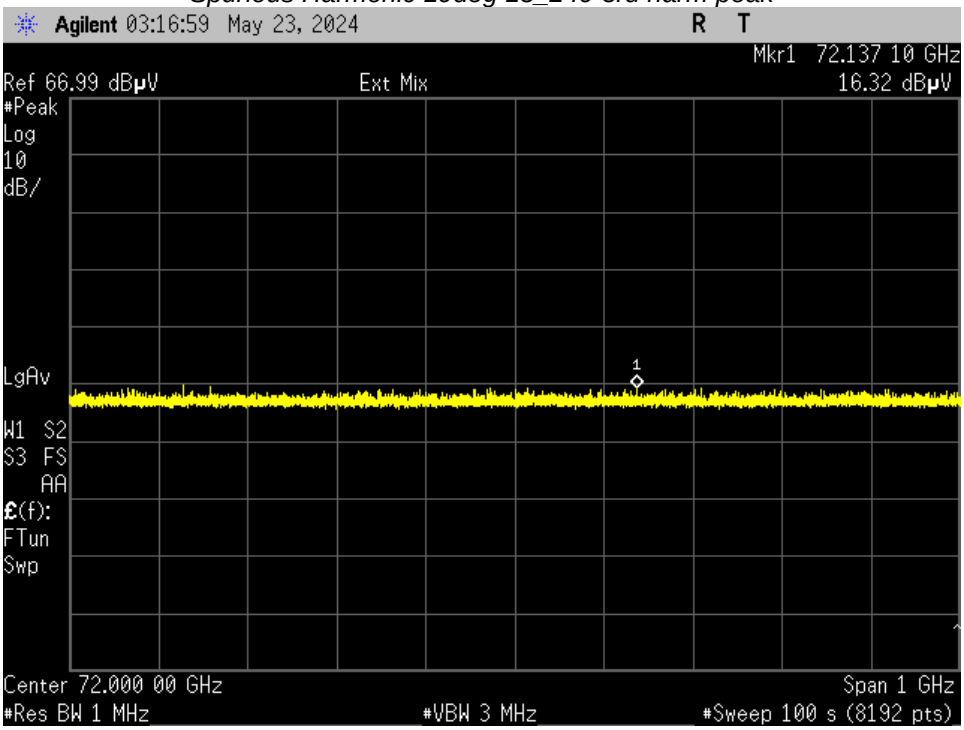
Spurious Harmonic 19deg 15_249 2nd harm avg



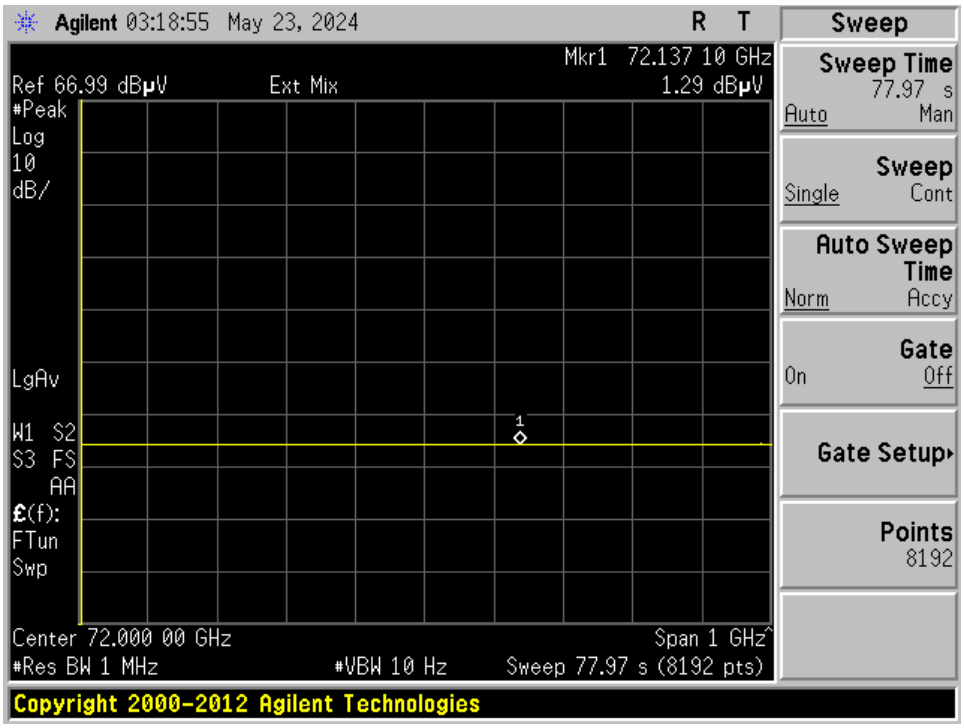
Spurious Harmonic 25deg 15_249 50-75GHz signal id on



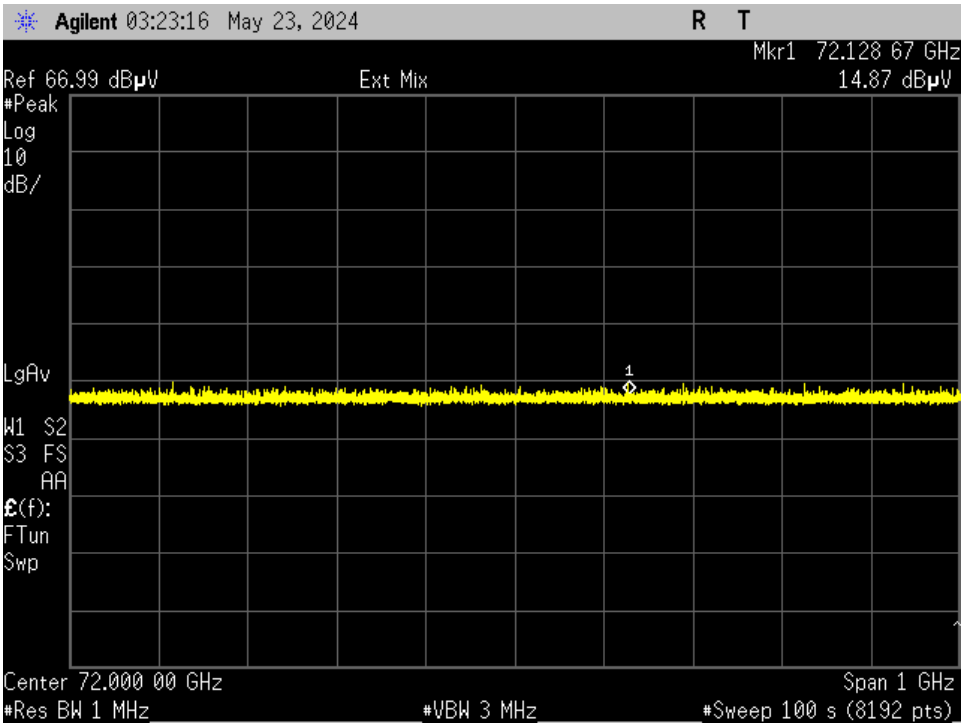
Spurious Harmonic 19deg 15_249 3rd harm peak



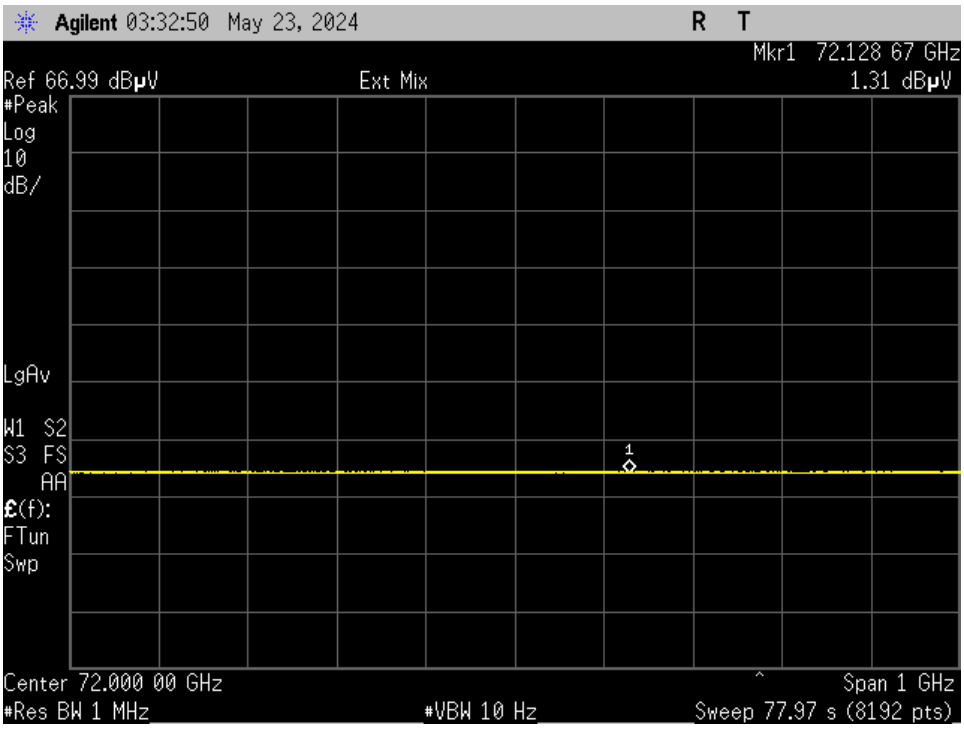
Spurious Harmonic 19deg 15_249 3rd harm w presel avg



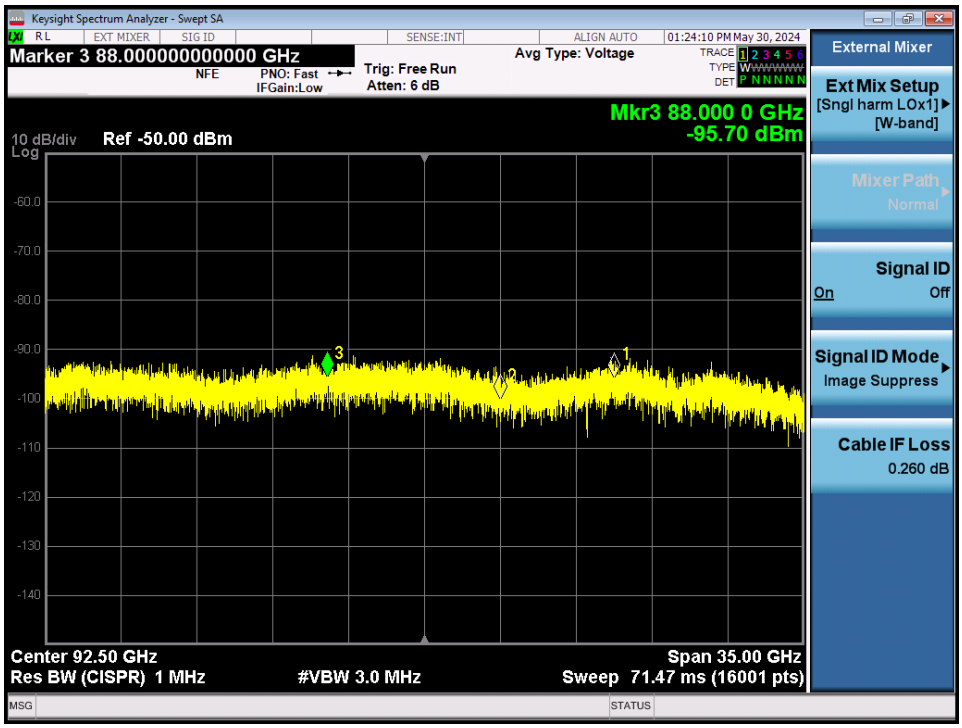
Spurious Harmonic 25deg 15_249 3rd harm Peak



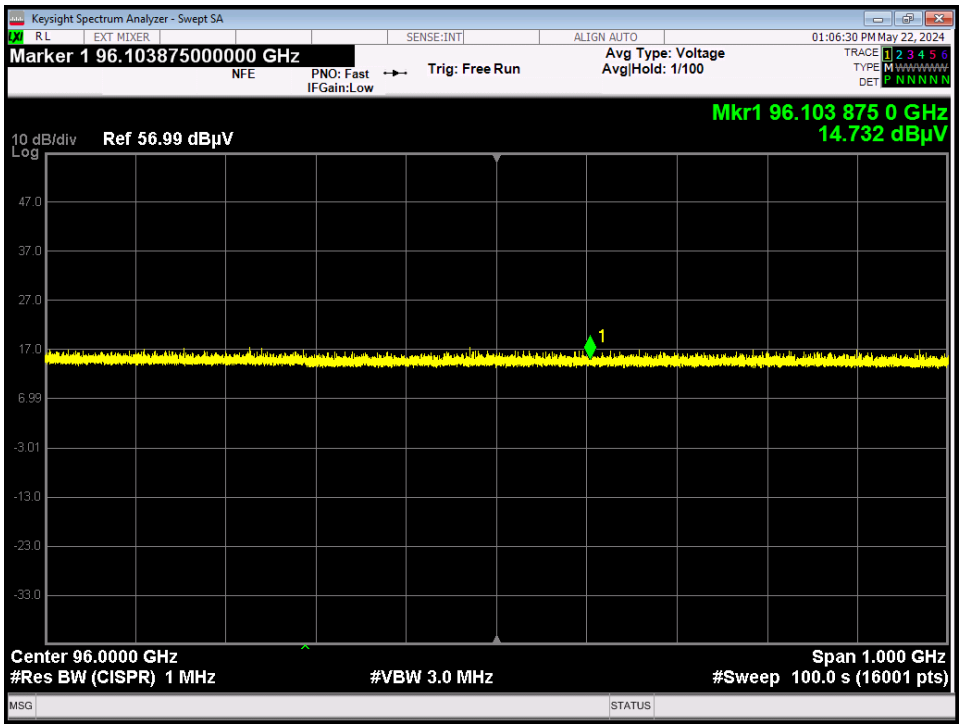
Spurious Harmonic 25deg 15_249 3rd harm avg



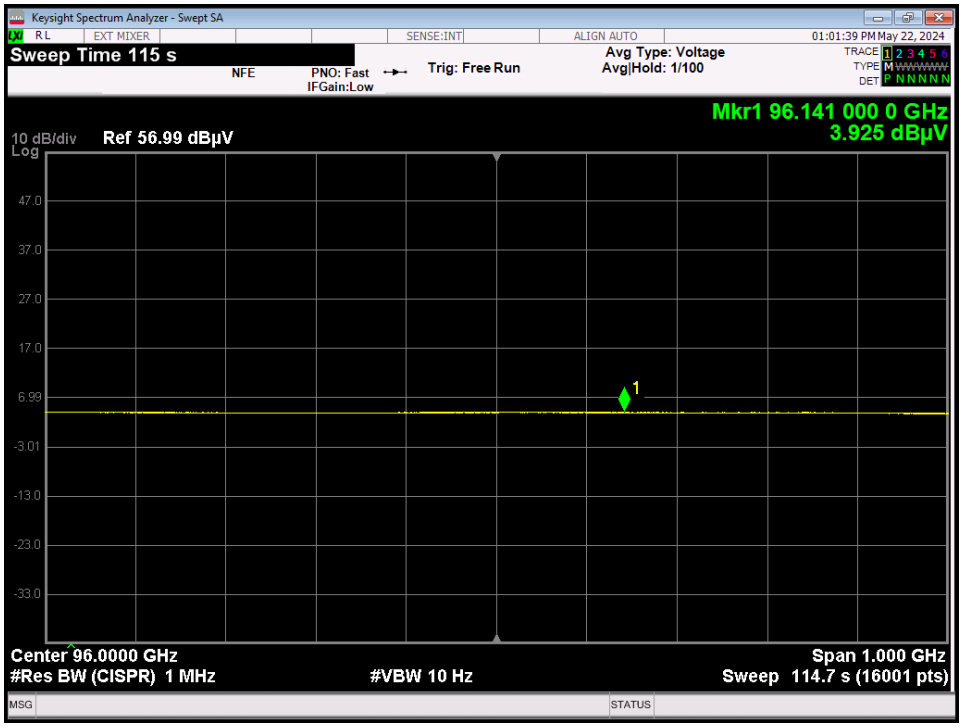
Spurious Harmonic 25deg 15_249 75-100GHz signal id on



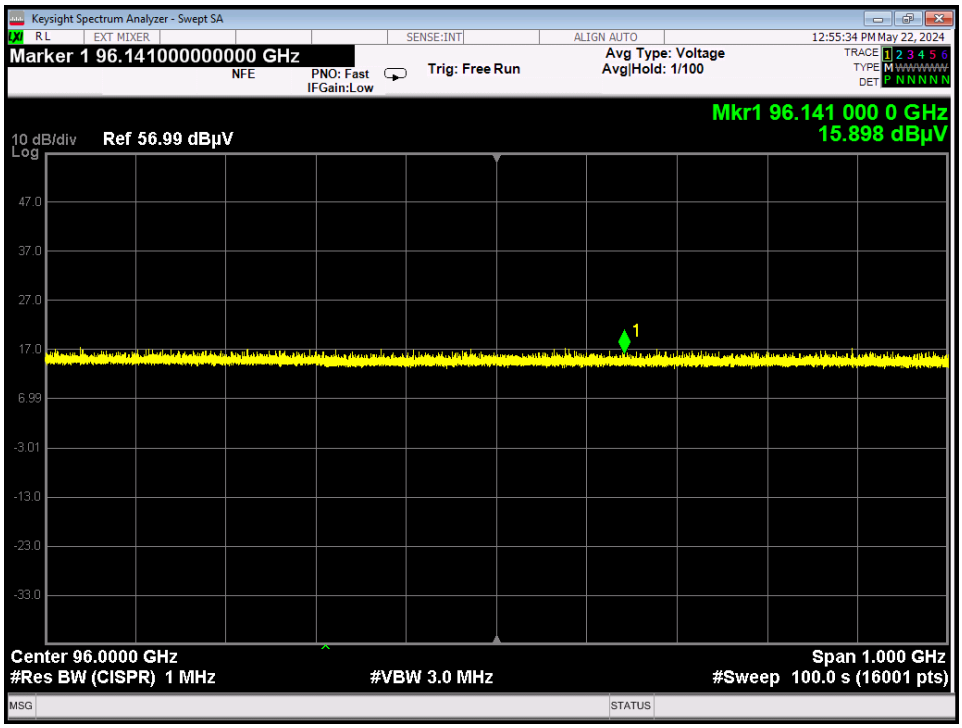
Spurious Harmonic 19deg 15_249 4th harm peak



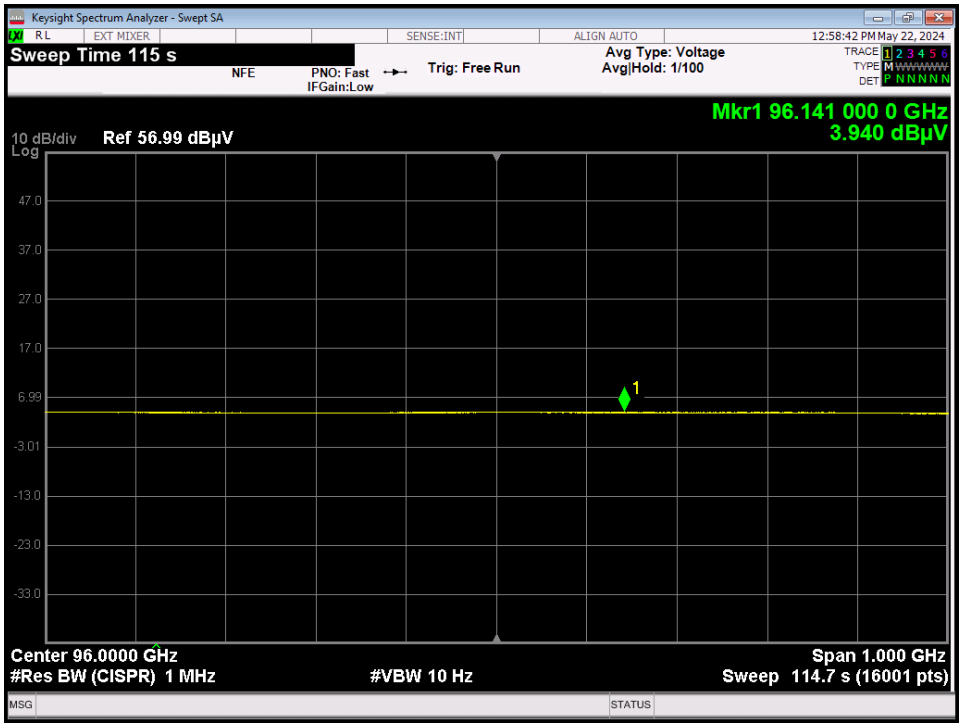
Spurious Harmonic 19deg 15_249 4th harm avg



Spurious Harmonic 25deg 15_249 4th harm peak



Spurious Harmonic 25deg 15_249 4th harm avg



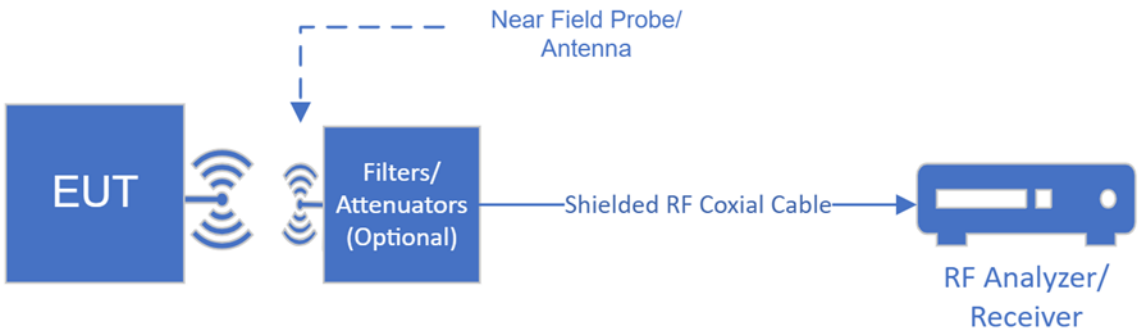
20dB Bandwidth of Emission

Engineer: Jeremiah Darden
Test Date: June 6, 2024

Test Procedure

CONDUCTED METHOD
An antenna probe was placed next to the permanently attached antenna and then connected to a short shielded coax Cable. A spectrum analyzer was directly connected to this cable. The EUT was set to transmit at the full FMCW bandwidth at the maximum power level. The analyzer was offset to read the maximum power measured from radiated field strength measurements. A spectrum analyzer was used to verify that the EUT met the Bandwidth requirements.

Test Setup



The Spectrum Analyzer was set to the following:

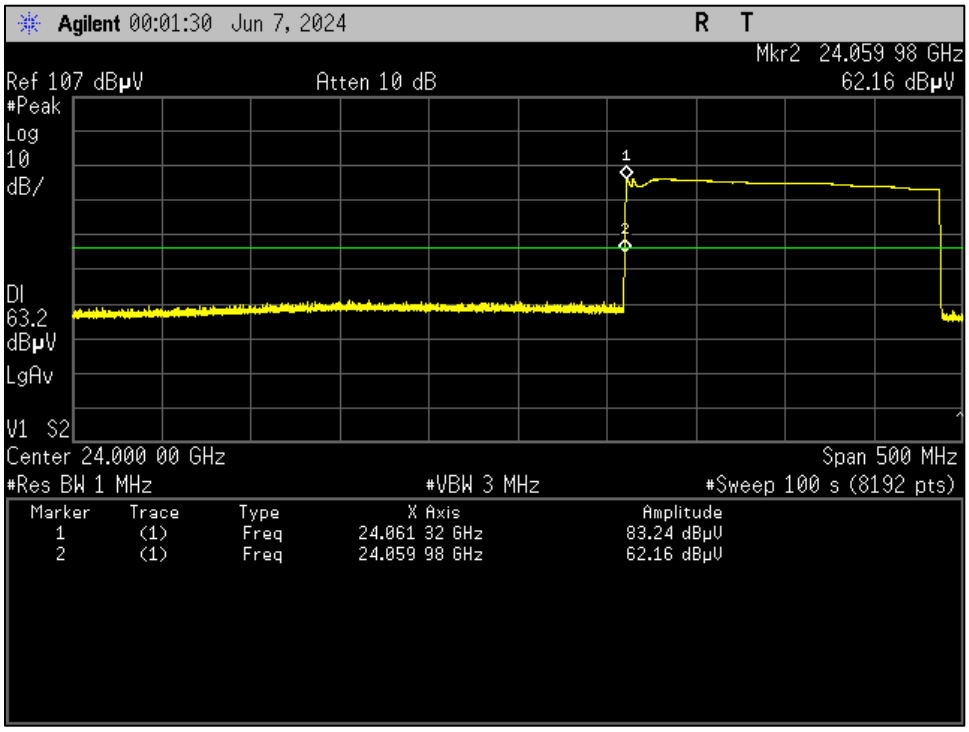
RBW = 1 MHz
VBW ≥ 3 x RBW
Peak Detector
Trace mode = max hold
Sweep > 2 × (Signal Period) × (Span) / (RBW)
Span ≥1.5 x EBW
Marker = Placed at -20dB point from fundamental peak.

20 dB Bandwidth of Emission Summary

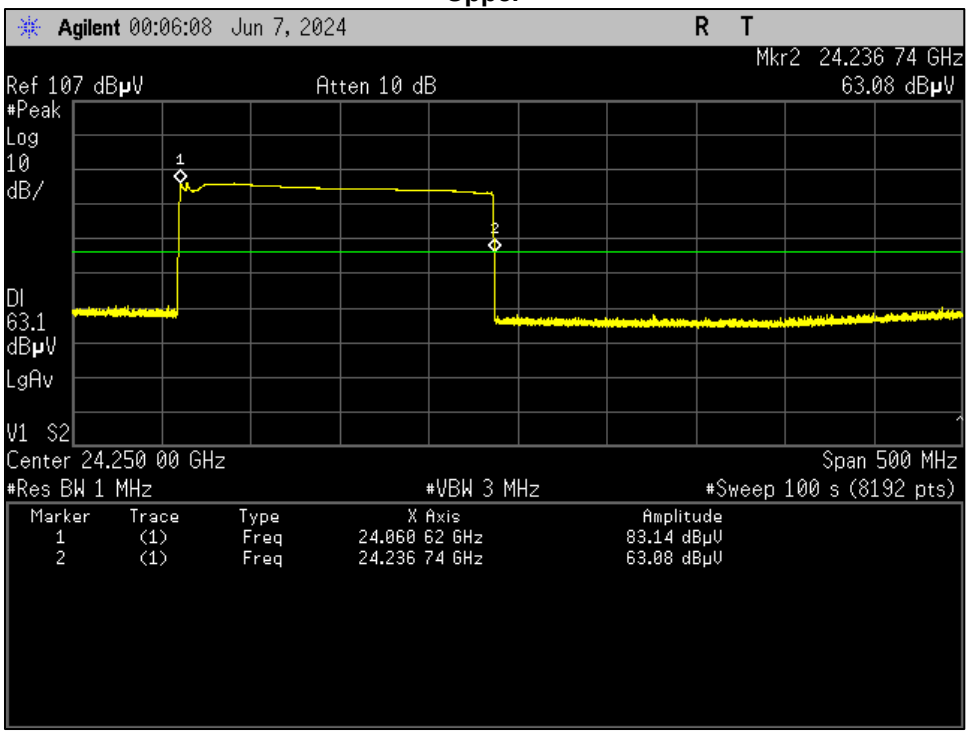
Frequency Evaluated (GHz)	Mode of Operation	Frequency Range at -20dB (MHz)	Specification Limit (GHz)	Result
24.00	FMCW	24.059	≥ 24.00	Pass
24.25	FMCW	24.236	≤ 24.25	Pass

20 dB Spectrum Plots

Lower



Upper



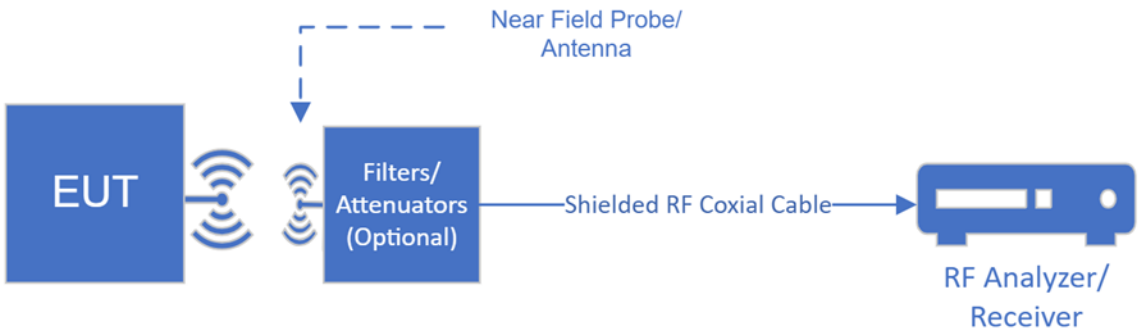
99% Occupied Bandwidth

Engineer: Jeremiah Darden
Test Date: June 6, 2024

Test Procedure

CONDUCTED METHOD
An antenna probe was placed next to the permanently attached antenna and then connected to a short shielded coax Cable. A spectrum analyzer was directly connected to this cable. The EUT was set to transmit at the full FMCW bandwidth at the maximum power level. The analyzer was offset to read the maximum power measured from radiated field strength measurements. A spectrum analyzer was used to verify that the EUT met the Bandwidth requirements.

Test Setup



The Spectrum Analyzer was set to the following:

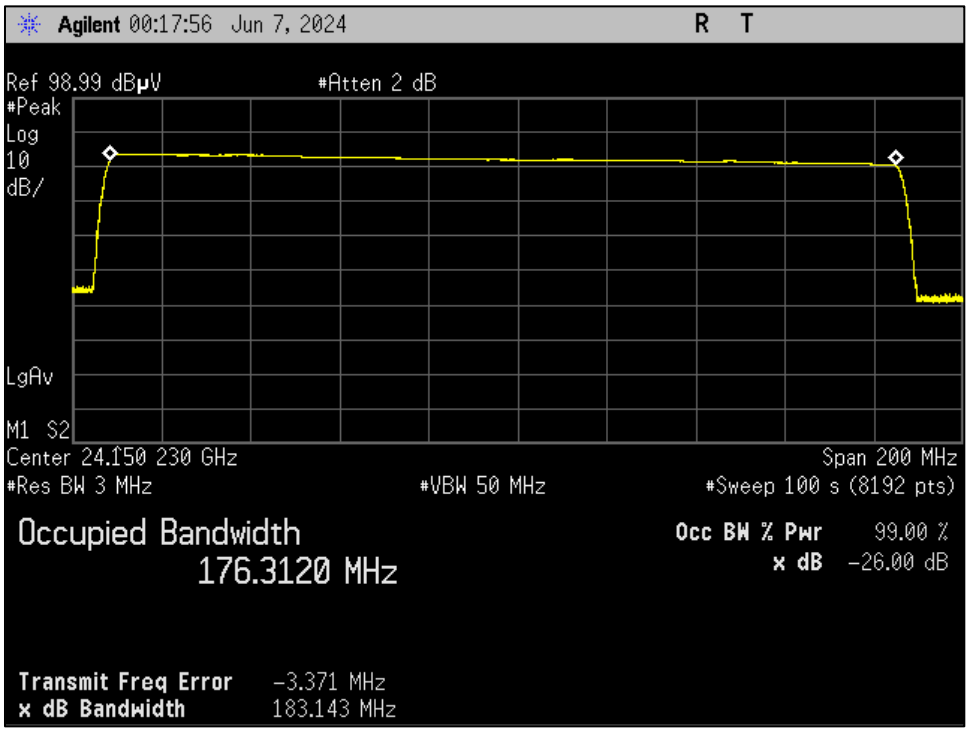
RBW = 1-3% of OBW
VBW ≥ 3 x RBW
Peak Detector
Trace mode = max hold
Sweep > 2 × (Signal Period) × (Span) / (RBW)
Span >= 1.5 x EBW

99% Bandwidth Summary

Frequency (GHz)	Mode of Operation	Measured Bandwidth (MHz)	Result
24.00-24.25	FMCW	176.3	Complete

99% Bandwidth Plots

FMCW Mode



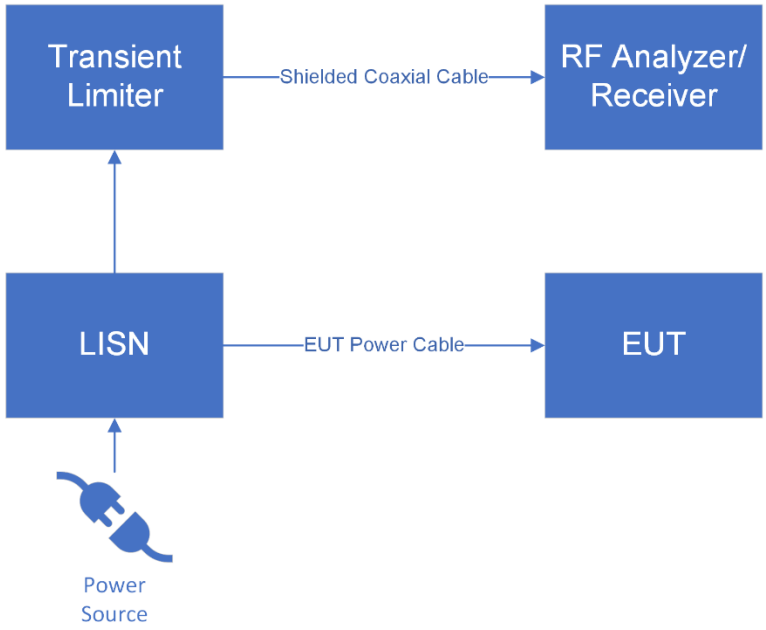
Powerline Conducted Emissions

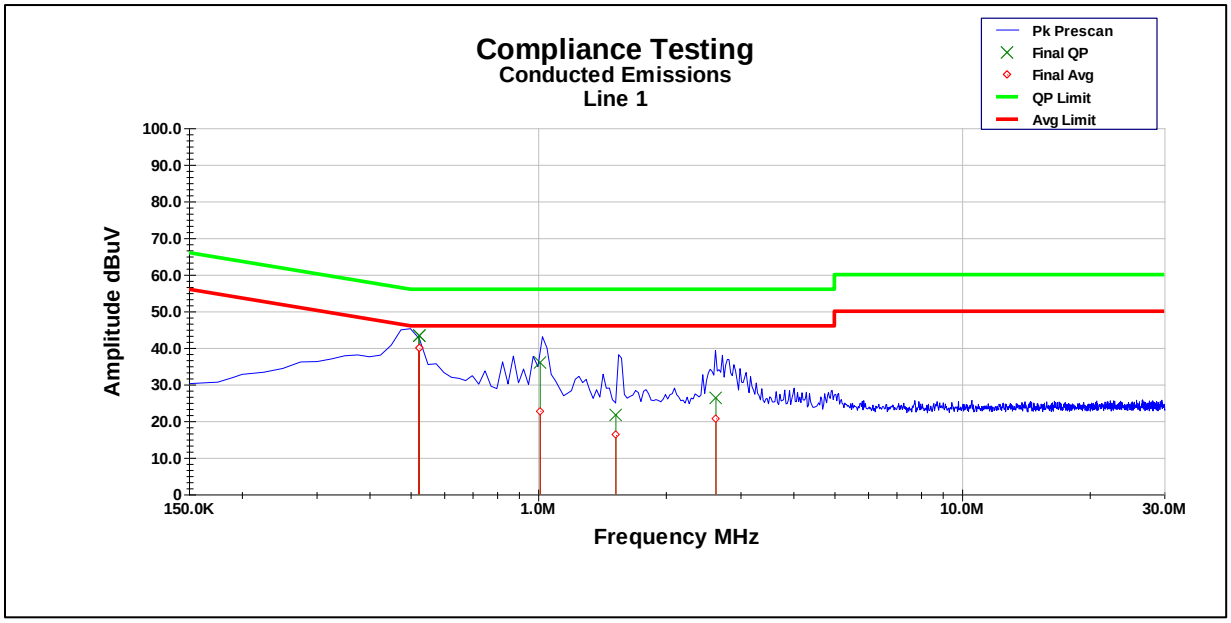
Engineer: Jeremiah Darden
Test Date: May 31, 2024

Test Procedure

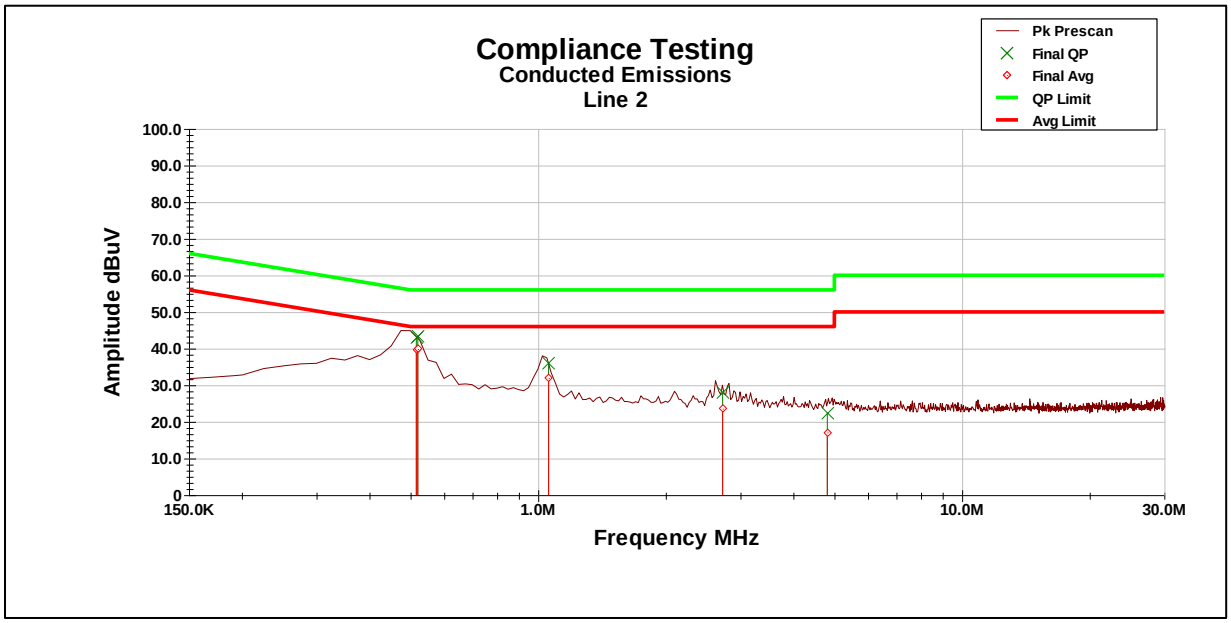
The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Basic Test Setup





Frequency	Raw QP	Raw Avg	Path Loss	Final QP	Final Avg	QP Limit	QP Margin	Avg Limit	Avg Margin
-	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dB	dBuV	dB
523.13 KHz	33.10	29.90	10.10	43.20	40.00	56.00	-12.80	46.00	-6.00
524.38 KHz	33.30	29.90	10.10	43.30	40.00	56.00	-12.70	46.00	-6.00
1.0118 MHz	25.90	12.70	10.10	36.00	22.80	56.00	-20.00	46.00	-23.20
1.526 MHz	11.70	6.10	10.10	21.80	16.20	56.00	-34.20	46.00	-29.80
2.6281 MHz	16.20	10.60	10.10	26.30	20.80	56.00	-29.70	46.00	-25.20
Final = Raw + Path Loss									
Margin = Final - Limit									



Frequency	Raw QP	Raw Avg	Path Loss	Final QP	Final Avg	QP Limit	QP Margin	Avg Limit	Avg Margin
-	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dB	dBuV	dB
516.13 KHz	32.86	29.50	10.00	42.90	39.60	56.00	-13.10	46.00	-6.40
520.38 KHz	33.14	29.80	10.00	43.20	39.90	56.00	-12.80	46.00	-6.10
1.0586 MHz	25.86	21.90	10.10	35.90	31.90	56.00	-20.10	46.00	-14.10
2.7244 MHz	17.75	13.50	10.10	27.80	23.60	56.00	-28.20	46.00	-22.40
4.8119 MHz	12.34	7.00	10.10	22.50	17.10	56.00	-33.50	46.00	-28.90
Final = Raw + Path Loss									
Margin = Final - Limit									

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	ARA	DRG-118/A	i00271	8/11/22	8/11/24
ultra wideband LNA 10MHz-45GHz	RF-Lambda USA	RLNA00M45GA	i00555	02/19/24	02/19/25
RF Amplifier 10MHz-50GHz, 40dB gain amp.	Eravant	SBB-0115034019-2F2F-E3	i00722	02/7/24	02/7/25
temperature/humidity/pressure probe	Omega Engineering, Inc.	iBTHX-W-5	i00629	01/25/23	01/24/25
temperature/humidity/pressure probe	Omega Engineering, Inc.	iBTHX-W	i00686	01/25/23	01/24/25
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	2/7/23	2/7/25
Active Loop Antenna 1 kHz - 30 MHz	EMCO	6507	I00326	11/21/23	11/21/25
Harmonic Mixer	Hewlett Packard	11970V	00463	8/11/21	8/11/24
Harmonic Mixer	Hewlett Packard	11970W	00464	8/11/21	8/11/24
PSA Spectrum Analyzer	Agilent	E4445A	i00471	1/5/24	1/5/25
Horn Antenna standard gain	CMI	H06R	i00475	NR	NR
Horn Antenna, standard gain	CMI	H010R	i00476	NR	NR
Horn Antenna standard gain	CMI	Ho15R	i00477	NR	NR
Harmonic Mixer	OML	M06HWD	i00480	8/18/21	8/18/24
Harmonic Mixer	OML	M06HWD	i00480	8/18/21	8/18/24
Horn Antenna, standard gain	CMI	H022R	i00484	NR	NR
MXE EMI receiver	Keysight	N9038A	i00552	03/01/24	03/01/25
Network analyzer	HP	8753D	i00505	11/03/23	11/02/24
‘Antenna, Horn 18-40GHz	EMCO	3116	I00085	03/14/23	03/13/25
LNA (50-75GHz), 35 dB gain	Eravant	SBL-5037533550-1515-E1	I00588	Verified on: 5/15/24	
Horn, Pyramidal WR4	Omi	H04R	I00473	NR	
WR-04 harmonic Mixer	OML	M04HWD	I00481	Verified on: 5/15/24	
WR4.3 amplifier	Virginia Diodes	WR4.3AMP	I00682	Verified on: 5/15/24	
Preselector 50-75GHz	Agilent/HP	11974V	I00726	Verified on: 5/15/24	
LNA	Eravant	SBL-7531143550-1010-E1	i00589	Verified on: 5/15/24	

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Harmonic Mixer	Hewlett Packard	11970Q	i00621	8/10/21	8/10/24
ultra wideband LNA 10MHz-45GHz	RF-Lambda USA	RLNA00M45GA	I00555	Verified on: 4/9/24	
RF Amplifier 10MHz-50GHz, 40dB gain amp.	Eravant	SBB-0115034019-2F2F-E3	I00722	Verified on: 2/7/24	
LNA	Eravant	SBL-1141743065-0606-E1	i00658	Verified on: 5/15/24	

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

Measurement Uncertainty

Measurement Uncertainty for Compliance Testing is listed in the table below.

Measurement	U_{lab}
Radio Frequency	± 3.3 x 10^{-8}
RF Power, conducted	± 1.5 dB
RF Power Density, conducted	± 1.0 dB
Conducted Emissions	± 1.8 dB
Radiated Emissions 9kHz-30MHz	± 3.6 dB
Radiated Emissions 30MHz-1000MHz	± 4.25 dB
Radiated Emissions – 1GHz-18GHz	± 4.5 dB
Temperature	± 1.5 deg C
Humidity	± 4.3 %
DC voltage	± 0.20 VDC
AC Voltage	± 1.2 VAC

The reported expanded uncertainty +/- U_{lab}(dB) has been estimated at a 95% confidence level (k=2)
U_{lab} is less than or equal to U_{EMC} therefore;

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

END OF TEST REPORT