Test Report

Prepared for: Houston Radar LLC

Model: PX150

FCC ID: TIAPX150

ISED ID: 21838-PX150

Serial Number: ae97f489b0

Project No: p2450014

Test Results: Pass

To

FCC Part 15.255
and
RSS-210: Issue 11 (June25, 2024)

Date of Issue: April 19, 2025

On the behalf of the applicant:	**Houston Radar LLC** **702 Julie Rivers Drive** **Sugar Land, Texas 77478**
Attention of:	**Jake Bailey** **Ph: (832) 540-6611** **E-Mail: jake@houston-radar.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:

Greg Corbin,
Project Test Engineer

Test Results Summary

Specification		Test Name	Pass, Fail, N/A	Comments
FCC	ISED			
15.255 (c)(2)(v)	RSS-210 Annex J.3.2	Output Power	Pass	
15.255 (v)	RSS-GEN 6.7	Occupied Bandwidth	Pass	
15.255 (d)	RSS-210 Annex J.4	Radiated Spurious`	Pass	
15.255 (f)	RSS-210 Annex J.6	Frequency Stability	Pass	
15.207	RSS-GEN 8.8	AC Powerline Conducted Emission	Pass	

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
FCC KDB 364244 D01 v01	Radar Devices Certifying Under the Provisions of 15.255
ISO/IEC 17025:2017	General requirements for the Competence of Testing and Calibrations Laboratories

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	4/19/2025	Greg Corbin	Original Document

Table of Contents

ANAB

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

FCC Site Reg. #349717

IC Site Reg. #2044A-2

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

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)
24.4 – 27.6	26.4 – 31.9	964 – 973.7

EUT Description

Model:	PX150
Serial:	ae971f489b0
Firmware:	N/A
Software:	1.1.26
HVIN	PX150
PMN	PX150
UPN	21838-px150
FVIN	PX150
Description:	Trajectory Tracking Traffic Radar Sensor and Data Collector
Additional Information:	Field Disturbance Radar designed for license free portable or permanent traffic data measurement and collection. Freq Range = 61 – 61.5 GHz Modulation = FMCW
Receipt of Sample(s):	3/24/2025
EUT Condition:	**Visual Damage** No **State of Development** Production/Production Equivalent

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

Test Setup and Modes of Operation

For alignment and maximizing signal levels at mm-wave frequencies, the EUT was placed in CW mode of operation.
For final data, the EUT was placed in FMCW mode of operation.

EUT Operation during Tests

The EUT operational state was monitored with a ping using a Tera Term terminal throughout the test.
The EUT is DC powered.
For all RF tests the DC power was set to 12 VDC with a lab power supply.
For the AC line conducted test a representative AC to DC power supply was used with a 24 vdc output. (Meanwell PN:OWA-60U-24)

Accessories:				
Qty	**Description**	**Manufacturer**	**Model**	**S/N**
1	Laptop PC	HP	ZBOOK	N/A
1	Laptop PC power supply	HP	N/A	N/A
1	AC to DC Power Supply	Meanwell	OWA-60U-24	GC21504512
1	RS232 to USB adapter	N/A	N/A	N/A

Cables:						
Qty	**Description**	**Length (M)**	**Ferrites (Y/N)**	**Shielding Y/N**	**Shielded Hood Y/N**	**Termination / Connection**
1	Multi-conductor molded cable	7	N	N	N	DC power, Ethernet, RS 2232
1	USB cable	1	N	N	N	Laptop PC to RS232/USB adapter

Modifications:	**None**

Radiated Output Power
Engineer: Greg Corbin
Test Date: 3/24/2025

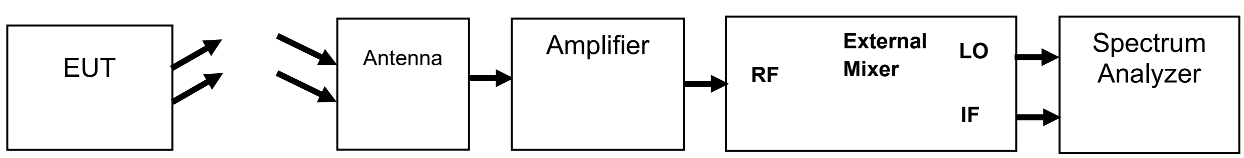
Test Procedure

The EIRP was measured using the procedures outlined in ANSI C63.10:2013 section 9.
The radiated output power was measured in normal operation with the FMCW signal sweeping from 61 – 61.5 GHz.
The EUT FMCW output was recorded from 61 – 61.5 GHz with the spectrum analyzer trace set to peak detector with max hold.
RBW = 1 MHz
VBW = 3 MHz
Raw data was recorded with all correction factors added manually in the table below.
A mixer with an internal pre-selector filter was used for the fundamental signal.
The EIRP output power was calculated using Equation 22 in ANSI C63.10-2020.

C63.10-2020, EQ 22
$EIRP = 21.98 - 20*\log(\lambda) + 20\log(d_{Meas}) + P - G$
EIRP is the equivalent isotropic radiated power, in dBm
λ is the wavelength of the emission under investigation [300/f(MHz)], in m
d_{Meas} is the measurement distance, in m
P is the power measured at the output of the measurement antenna, in dBm
G is the gain of the measurement antenna, in dBi
NOTE—The measured power P includes all applicable instrument correction factors up to the connection to the measurement antenna

Due to the signal BW of 484 MHz being greater than the RBW of 1 MHz a desensitization factor was added to the measurement per C63.10-2020 4.1.5.2.8 and Annex L.

Test Setup



Radiated Output Power Test Results

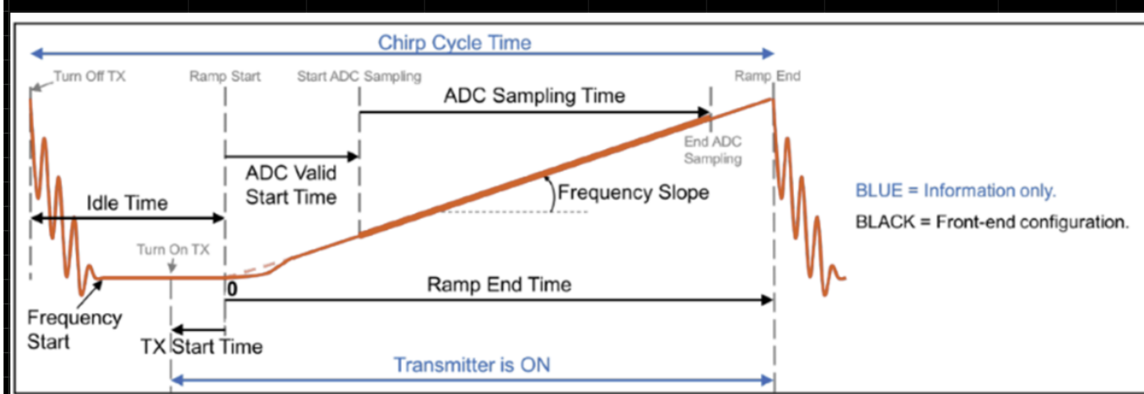
Freq Range	Freq	Amplitude		Det	d_{Meas}	Desense	λ	Part of "P"			G	P	EIRP	Limit	Margin
	Radiated Spurious (raw data)				Distance	FMCW De-sense	Wave-length	Cable Insertion Loss	Ext. Amplifier Gain	RX Mixer C/F	RX Ant Gain	RX Power Level	EIRP Calc @ 3m	EIRP Limit FCC and ISED	
	Freq	Amplitude													
GHz	MHz	dBuV	dBm	PK / AVG	m	dB		dB	dB	dB	dB	dBm	dBm	dBm	dB
61 – 61.5	61105	64.60	-42.40	PK	3	2.27	0.004917	0.50	36.79	44.75	23.15	-31.67	22.87	43.00	-20.13
61 – 61.5	61482	37.04	-69.96	Avg	3	0	0.004879	0.50	36.58	44.71	23.16	-61.33	-6.74	40.00	-46.74
57 – 61 61.5 - 71	60996	30.07	-76.93	PK	3	0	0.004918	0.50	36.59	44.71	23.16	-68.31	-13.78	13.00	-26.78
57 – 61 61.5 - 71	60998	5.94	-101.06	Avg	3	0	0.004918	0.50	36.80	44.76	23.14	-92.60	-38.05	10.00	-48.05

Desense calculation

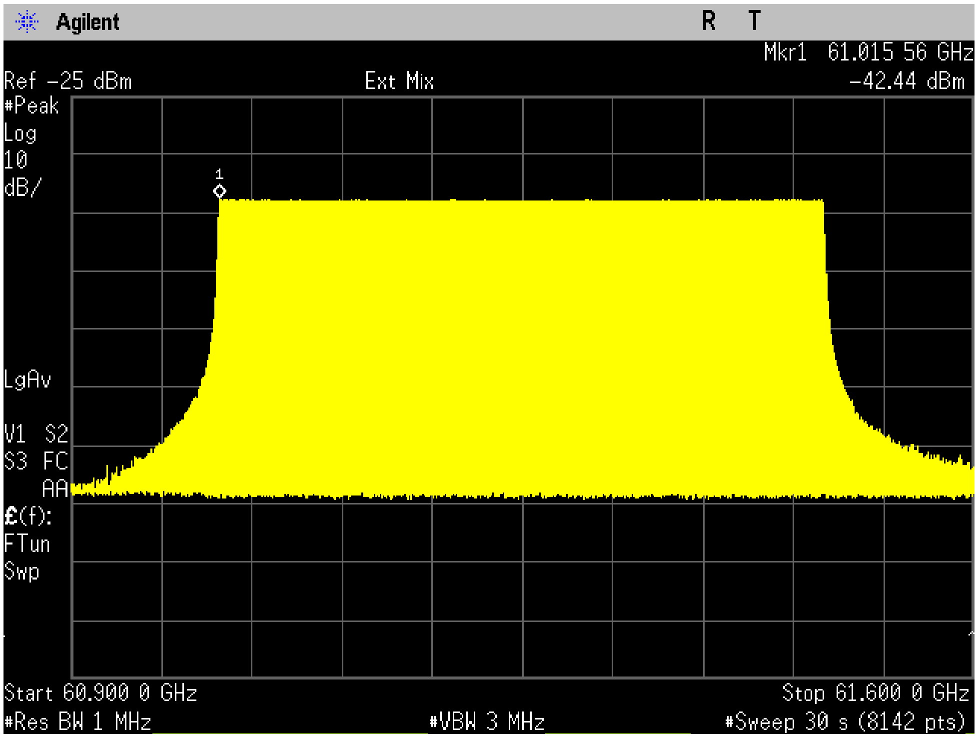
Unit	Value	Description or Formula
BW_{chirp} (MHz)	483	FMCW Chirp Bandwidth
T_{chirp} (uS)	157	FMCW Chirp Time
B (MHz)	1	3 dB IF Bandwidth = RBW
α (linear)	0.593	$\alpha = \dfrac{1}{\sqrt{1+\left(\dfrac{2\ln(2)}{\pi}\right)^{2}\left(\dfrac{BW_{Chirp}}{T_{Chirp}B^{2}}\right)^{2}}}$
α (dB)	-2.27	=10*LOG(α (linear))

Manufacturer provided Timing Diagram

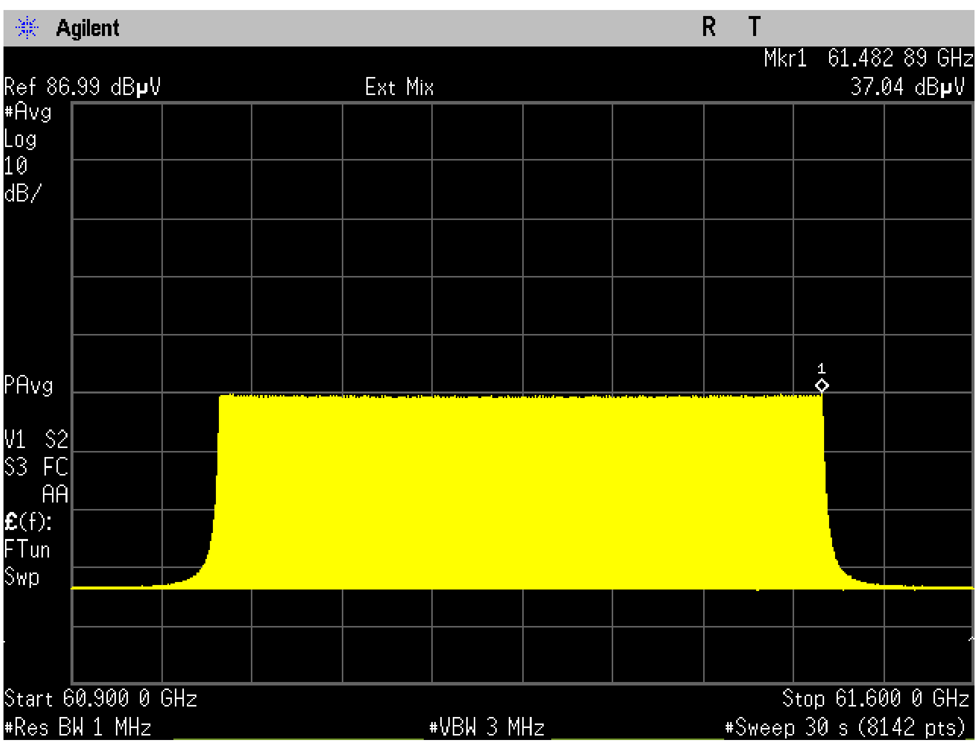
Profile Parameters	Value	unit	Calculated Parameters	Value	unit	time tx is on per cycle	cycle time	duty cycle
Start Frequency	61.0109375	GHz	ADC Sampling Time	128	us			
Idle Time	4	us	Transmitter is ON	155	us	0.01984	0.05	0.3968
ADC Valid Start Time	20	us	Chirp Cycle Time	157	us			
Ramp End Time	153	us						
Ramp Slope	3.125	MHz/us						
TX Start Time	2	us						
Number of ADC Samples	256							
ADC Sample Rate	2000	KHz						



Output Power_
61 - 61.5 GHz_ Peak det_Ant+Amp+Presel_1 MHz RBW_30 sec sweep



61 - 61.5 GHz_ Avg det_Ant+Amp+Presel_1 MHz RBW_30 sec sweep



Occupied Bandwidth

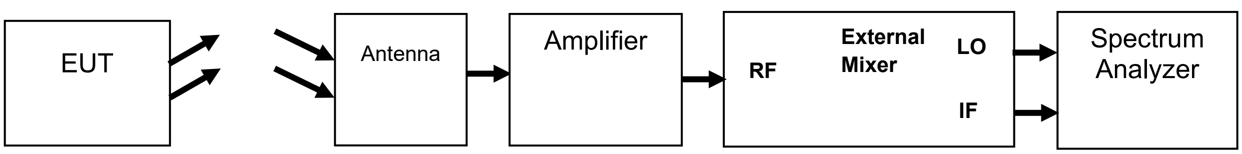
Engineer: Greg Corbin
Test Date: 3/25/2025

Test Procedure

The equipment was set-up as shown in the test set-up below.
The EUT was tested in FMCW mode with the spectrum analyzer set to peak detector, max hold.
A slow sweep of 100 seconds was used to capture the full emission bandwidth.
A mixer with an internal preselector was used to measure the occupied bandwidth.

RBW = 1 MHz
The 26 dB bandwidth was recorded.

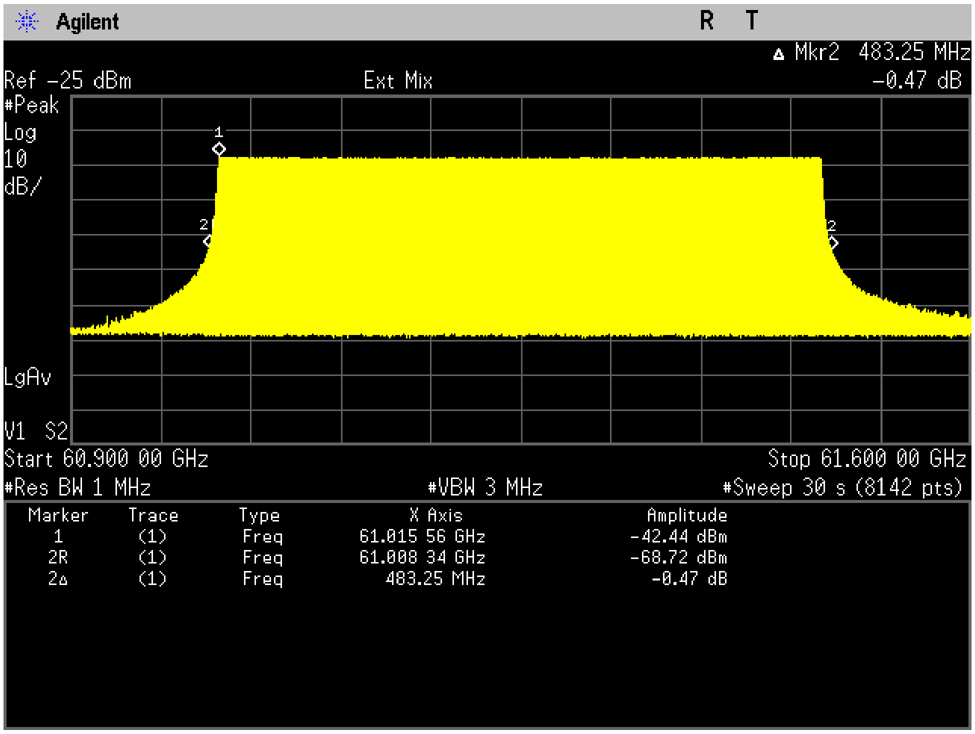
Test Setup



Frequency	Reference BW	Occupied Bandwidth	Limit	Pass / Fail
GHz	dB	MHz	MHz	
61.0 – 61.5	26	483.25	<500	Pass

Occupied Bandwidth Plot

-26 dB Bandwidth



Radiated Spurious Emissions

Engineer: Greg Corbin

Test Date: 3/24/25, 3/27/2025

Test Procedure

Radiated spurious emissions were recorded in an anechoic chamber with the EUT at a 3-meter distance for measurements from 30 MHz to 75 GHz and 1-meter distance from the receive antenna for measurements from 75 – 200 GHz.

The EUT was placed in FMCW Chirp mode for all spurious measurements.

For 1 – 18 GHz, the correction factors (RX antenna, RX cable loss, and pre-amplifier as needed, were entered into the spectrum analyzer before recording the plot. The correction factors are included in the Field Strength Table in this section of the report.
For 18 – 200 GHz raw data was recorded, and the correction factors were added in the spurious emission tables below.
If no spurious signals were observed, the spectrum analyzer noise floor was recorded
The highest emission was recorded in the table below for each frequency band.

RBW = 100 kHz (30 – 1000 MHz)
RBW = 1 MHz (1 – 200 GHz)
VBW = 3x RBW

Spurious limits fall into 2 categories.
Radiated emissions below 40 GHz shall not exceed the general limits in § 15.209
Limits are Field Strength limits calculated using EQ 19 in C63.10-2020

- Avg limit = 54dBuV/m
- Peak limit = 74 dBuV/m

C63.10-2020, EQ 19
'E = 126.8 - 20*log(λ) + P - G
E is the field strength of the emission at the measurement distance, in dBuV/m
λ is the wavelength of the emission under investigation [300/f(MHz)], in m
P is the power measured at the output of the measurement antenna, in dBm
G is the gain of the measurement antenna, in dBi
NOTE—The measured power P includes all applicable instrument correction factors up to the connection to the measurement antenna

Between 40 GHz and 200 GHz, the power density level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.
Calculate Power Density using EQ 25 in C63.10-2020 per the following steps.

1. Measure Raw Data in dBm, no correction factors in analyzer
2. Calculate received power level P (dBm)
3. Calculate EIRP in dBm using EQ 22
4. Convert EIRP in dBm to EIRP in Watts using EQ 24
5. Calculate Power Density in W/m^2 from EQ 25
6. Convert W/m^2 to pW/m^2 ,
7. pW/cm2 = W/m^2 / .000,000,01 (Pico-Watts per square centimeter = Watts per square meter divided by .000,000,01)

Equations Used in Spurious Emissions calculations.

C63.10-2020, EQ 22
$EIRP = 21.98 - 20*\log(\lambda) + 20\log(d_{Meas}) + P - G$

EIRP is the equivalent isotropic radiated power, in dBm
λ is the wavelength of the emission under investigation [300/f(MHz)], in m
d_{Meas} is the measurement distance, in m
P is the power measured at the output of the measurement antenna, in dBm
G is the gain of the measurement antenna, in dBi
NOTE—The measured power P includes all applicable instrument correction factors up to the connection to the measurement antenna
Convert EIRP in dBm to EIRP in Watts using EQ 24

C63.10-2020, EQ 24
$EIRP\ Linear = 10^{((EIRP_{LOG} - 30)/10)}$

$EIRP_{Linear}$ is the EIRP in watts
$EIRP_{Log}$ is the EIRP in dBm

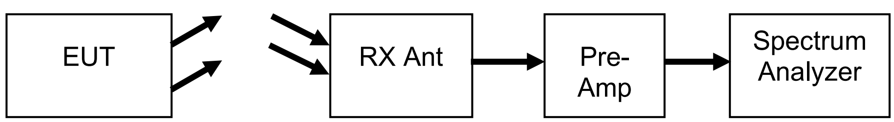
C63.10-2020, EQ 25
$PD = EIRP_{Linear} / (4*\pi*d^2)$

PD_ is the power density at the distance specified by the limit, in W/m2
***$EIRP_{Linear}$* _** is the equivalent isotropic radiated power, in watts
d _is the distance at which the power density limit is specified, in m

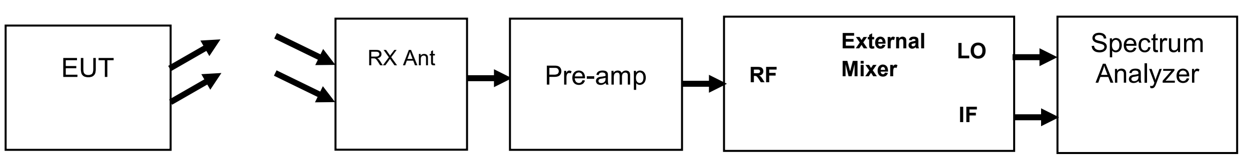
Convert pW/cm2 to W/m^2
pW/cm2 = W/m^2 / .000,000,01 (Pico-Watts per square centimeter = Watts per square meter divided by .000,000,01)

Test Set-ups

30 MHz – 50 GHz



50 – 200 GHz



Radiated Spurious Emissions Test Results

30 MHz to 40 GHz
Field Strength

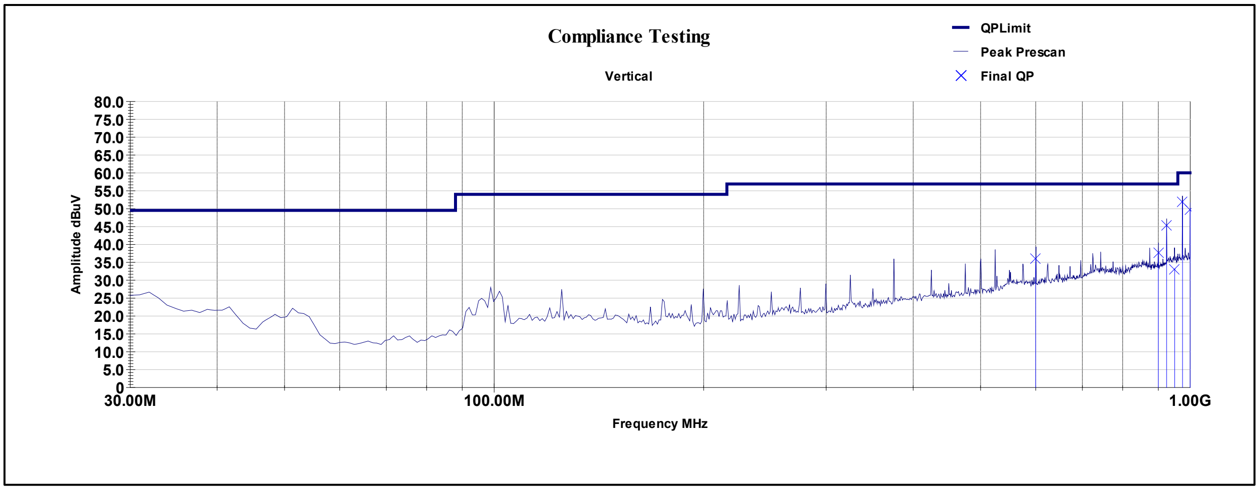
Freq Range	Freq	Amplitude		Det	d_{Meas}	λ	Part of "P"			G	P	Field Strength		Margin
	Radiated Spurious (raw data)				Dist	Wave-length	Cable Insertion Loss	Ext. Amp Gain	RX Mixer C/F	RX Ant Gain	RX Power Level	Calc at 3m	Limit FCC and ISED	
	Freq	Amplitude												
GHz	MHz	dBuV	dBm	QP PK AVG	m		dB	dB	dB	dB	dBm	dBm	dBm	dB
0.30 - 1	974.975	52.03	-54.97	QP	3	0.30770	3.57	33.50	0.00	1.6	-84.90	50.54	54	-3.46
1 - 18	1024.979	65.98	-41.02	Avg	3	0.29268	3.65	43.91	0.00	5.9	-81.28	50.29	54	-3.71
18 - 40	37708.6	34.3	-72.70	Avg	3	0.00795	4.10	46.75	0.00	16.4	-115.35	37.04	54	-16.96

40 – 200 GHz
Power Density

Freq Range	Freq	Amplitude		d_{Meas}		λ	Part of "P"		
	Radiated Spurious (raw data)			Distance		Wave-length	Cable Insertion Loss	Ext. Amp Gain	RX Mixer C/F
	Freq	Amplitude		used	Corr. Factor				
GHz	MHz	dBuV	dBm	m	m		dB	dB	dB
40 - 50	42400	46.4	-60.60	3.00	0	0.007075	10.61	47.85	0.00
50 - 57	50516	17.02	-89.98	3.00	0	0.005939	0.50	36.59	44.71
71 - 75	71650	16.42	-90.58	3.00	0	0.004187	0.50	43.73	45.73
75 - 110	97443.7	20.19	-86.81	3.00	-9.54	0.003079	1.00	36.99	43.66
110 - 170	131110	46.17	-60.83	3.00	-9.54	0.002288	0.50	49.44	12.14
170 - 200	199580.4	26.08	-80.92	3.00	-9.54	0.001503	0.50	27.31	12.62

Freq Range	G	P	EIRP Calc @ 3m		Power Density		Power Density Limit	Margin
	RX Ant Gain	RX Power Level						
GHz	dB	dBm	dBm	Watts	W/m²	pW/cm²	pW/cm²	pW/cm²
40 - 50	23.23	-97.84	-46.54	2.217E-08	1.96E-10	0.02	90.00	-89.98
50 - 57	23.16	-81.36	-28.47	1.422E-06	1.26E-08	1.26	90.00	-88.74
71 - 75	22.44	-88.08	-31.44	7.185E-07	6.35E-09	0.64	90.00	-89.36
75 - 110	23.34	-69.60	-20.72	8.463E-06	7.48E-08	7.48	90.00	-82.52
110 - 170	22.99	-88.09	-36.29	2.351E-07	2.08E-09	0.21	90.00	-89.79
170 - 200	23.00	-85.57	-30.13	9.71E-07	8.59E-09	0.86	90.00	-89.14

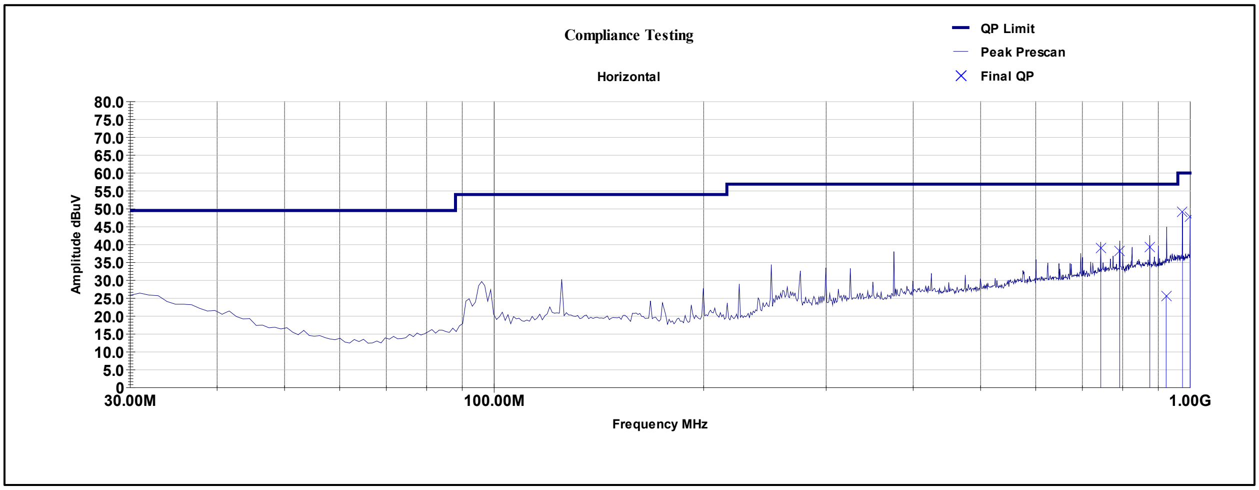
30 – 1000 MHz
Vertical



30 – 1000 MHz
Vertical
Note: Used Raw data from this table for the Power Density calculations

Frequency	Azimuth	Height	Raw QP	Correction	Final QP	Limit	QP Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
599.946	33.00	100.00	43.53	-7.49	36.00	56.90	-20.90
899.964	165.00	168.00	39.44	-1.76	37.70	56.90	-19.20
924.958	158.00	100.00	46.10	-0.74	45.40	56.90	-11.50
950.025	136.00	100.00	33.29	-0.17	33.10	56.90	-23.80
974.975	158.00	100.00	52.03	-0.11	51.90	60.00	-8.10
999.97	158.00	100.00	49.52	0.08	49.60	60.00	-10.40
Final = Raw + Path Loss							
Margin = Final - Limit							

30 – 1000 MHz
Horizontal

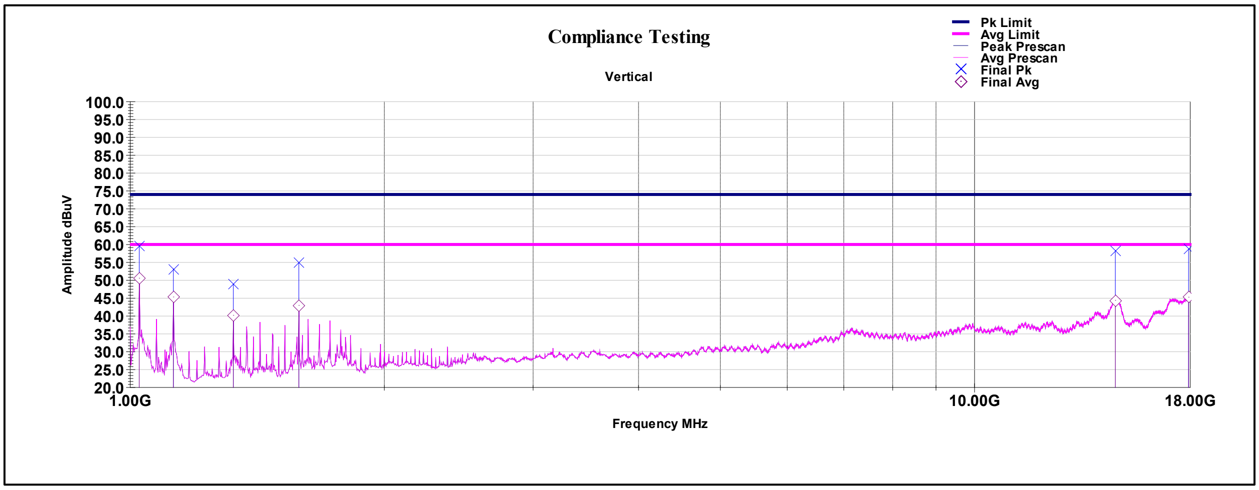


30 – 1000 MHz
Horizontal
Note: Used Raw data from this table for the Power Density calculations

Frequency	Azimuth	Height	Raw QP	Correction	Final QP	Limit	QP Margin
MHz	deg	cm	dBuV	dB	dBuV/m	dBuV/m	dB
743.994	123.00	100.00	43.34	-4.24	39.10	56.90	-17.80
792.008	261.00	100.00	41.79	-3.70	38.10	56.90	-18.80
875.01	231.00	219.00	41.66	-2.34	39.30	56.90	-17.60
923.617	269.00	359.00	27.29	-1.56	25.70	56.90	-31.20
974.965	64.00	105.00	49.63	-0.61	49.00	60.00	-11.00
999.94	234.00	270.00	47.91	-0.12	47.80	60.00	-12.20
Final = Raw + Path Loss							
Margin = Final - Limit							

1 - 18 GHz

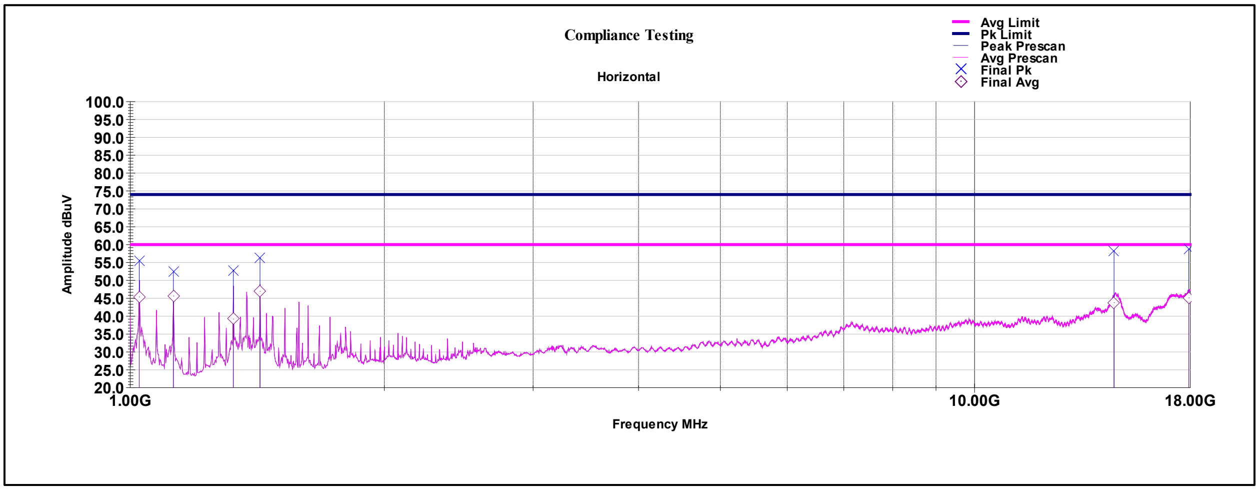
1 – 18 GHz
Vertical



1 – 18 GHz
Vertical
Note: Used Raw data from this table for the Power Density calculations

Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1024979250	148.00	100.00	74.93	65.98	-15.41	59.52	74.00	-14.48	50.58	60	-9.43
1125009000	135.00	100.00	68.10	60.27	-14.96	53.14	74.00	-20.86	45.31	60	-14.69
1324988000	136.00	100.00	62.71	54.07	-13.89	48.82	74.00	-25.18	40.18	60	-19.82
1584190250	176.00	105.00	68.24	56.29	-13.34	54.90	74.00	-19.10	42.95	60	-17.05
14674719000	136.00	129.00	48.26	34.30	10.06	58.32	74.00	-15.68	44.36	60	-15.64
17923581250	36.00	100.00	46.30	32.82	12.44	58.74	74.00	-15.26	45.27	60	-14.73
Final = Raw + Path Loss											
Margin = Final - Limit											

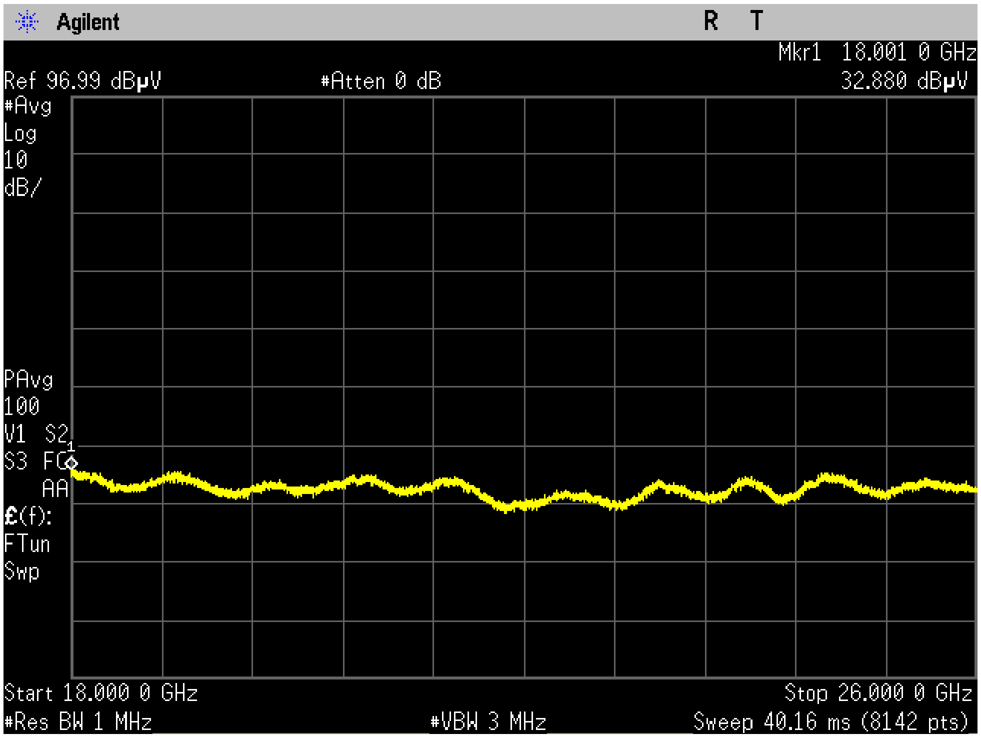
1 – 18 GHz
Horizontal



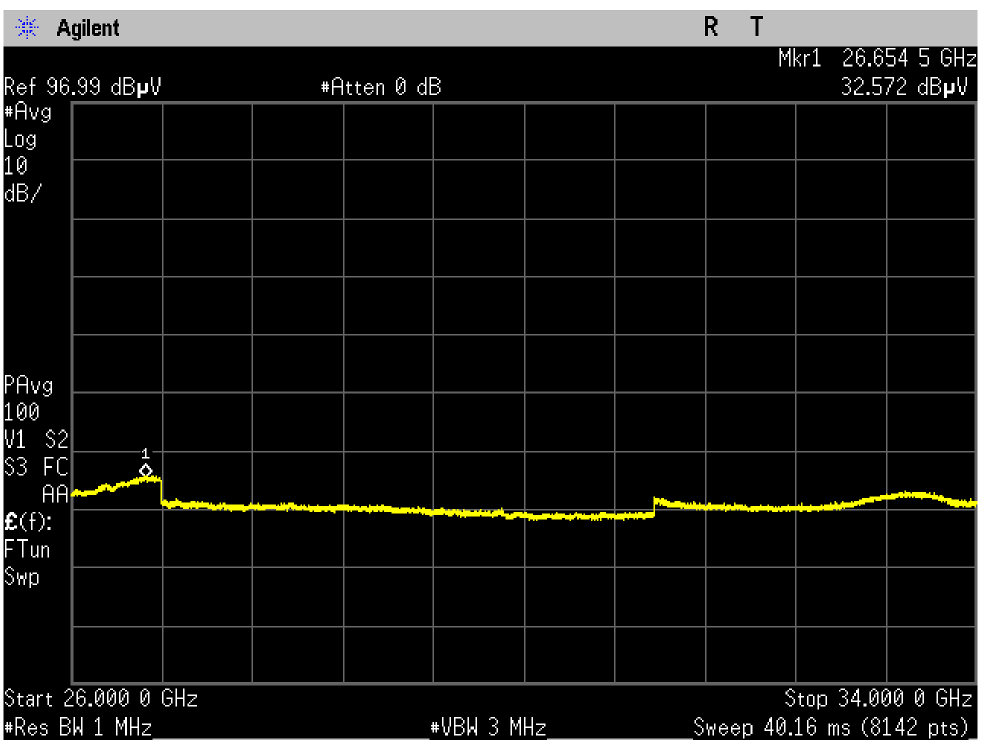
1 – 18 GHz
Horizontal
Note: Used Raw data from this table for the Power Density calculations

Frequency	Azimuth	Height	Raw Pk	Raw Avg	Correction	Final Pk	Pk Limit	Pk Margin	Final Avg	Avg Limit	Avg Margin
MHz	deg	cm	dBuV	dBuV	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
1025050250	257.00	384.00	70.99	60.78	-15.41	55.58	74.00	-18.42	45.37	60	-14.63
1125008250	336.00	384.00	67.30	60.55	-14.96	52.34	74.00	-21.66	45.60	60	-14.41
1324978250	301.00	325.00	66.76	53.08	-13.89	52.86	74.00	-21.14	39.19	60	-20.81
1424939000	204.00	195.00	69.86	60.54	-13.63	56.23	74.00	-17.77	46.91	60	-13.09
14625358750	46.00	162.00	48.43	33.99	9.77	58.19	74.00	-15.81	43.76	60	-16.24
17931718750	314.00	138.00	46.14	32.63	12.47	58.62	74.00	-15.38	45.11	60	-14.90
Final = Raw + Path Loss											
Margin = Final - Limit											

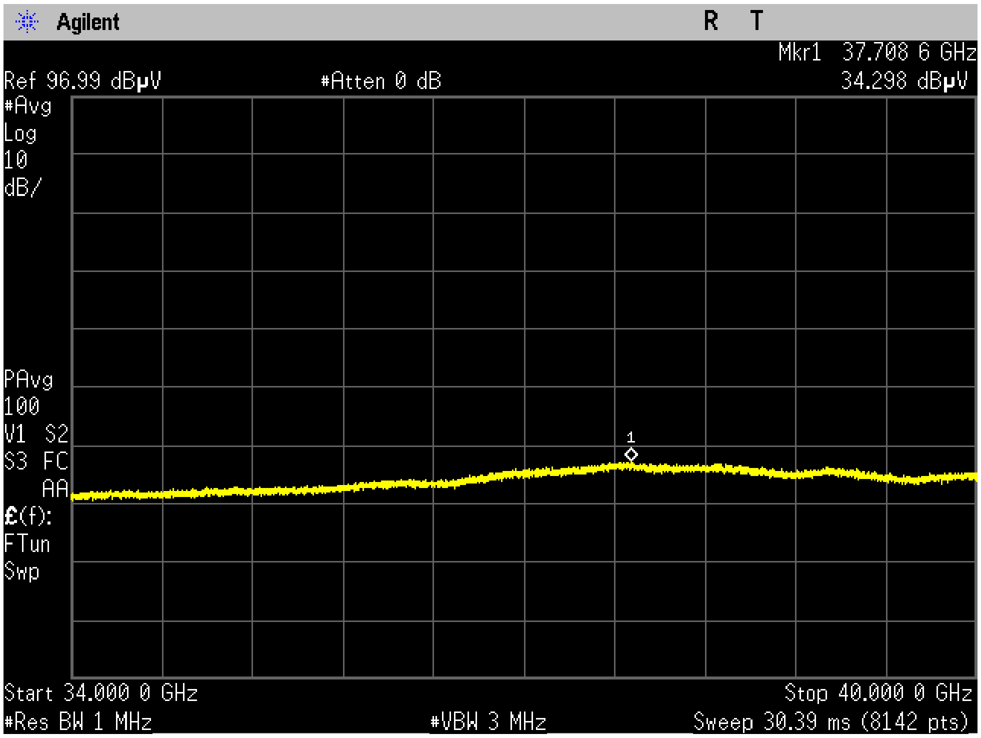
18 – 26 GHz



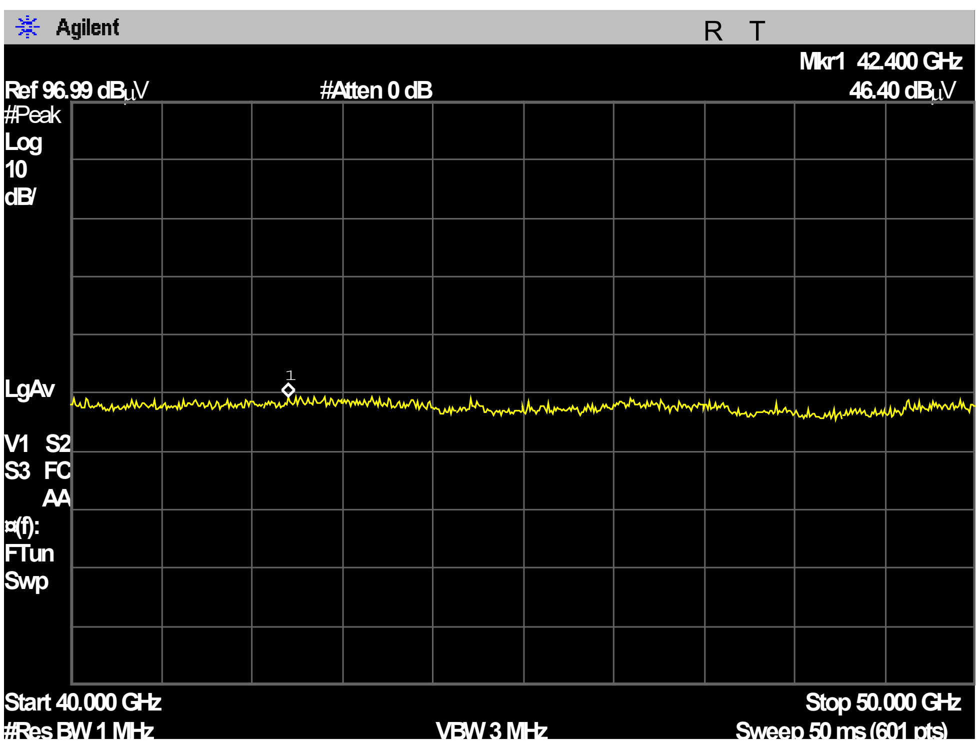
26 – 34 GHz



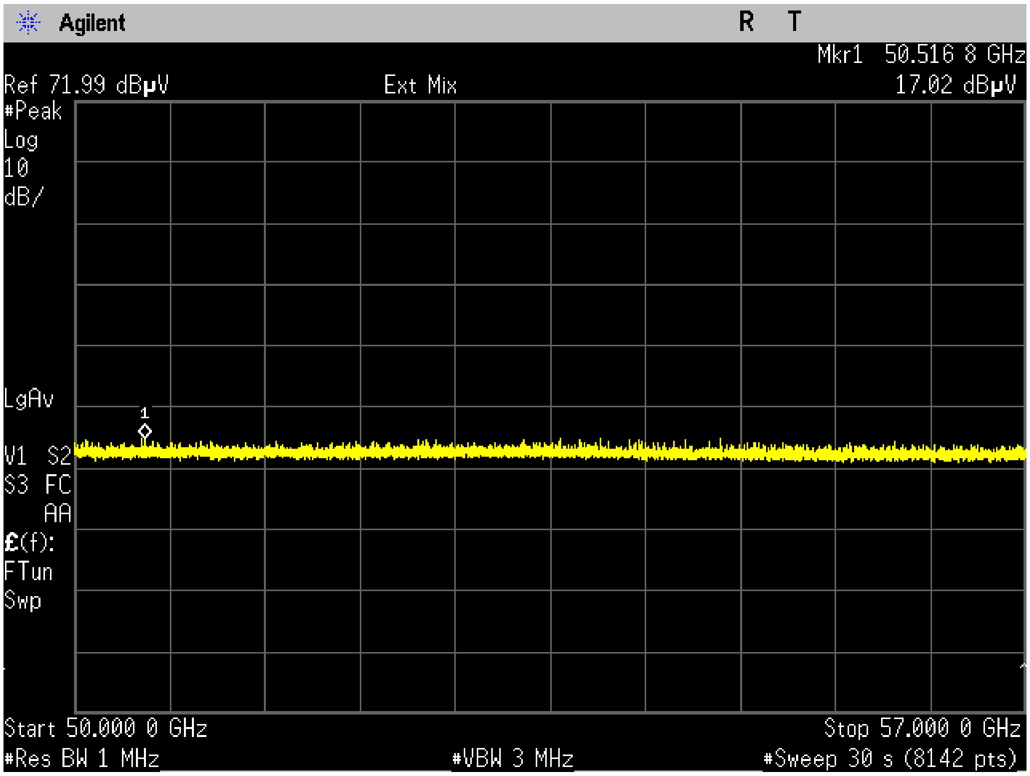
34 - 40 GHz



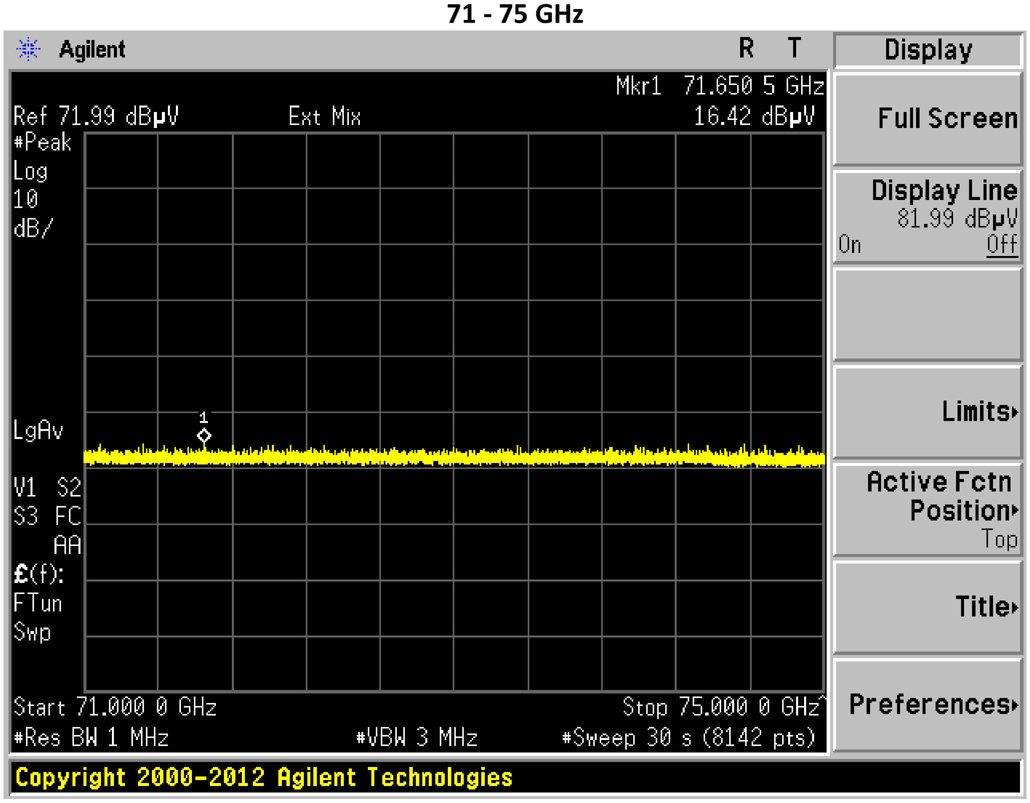
40 – 50 GHz



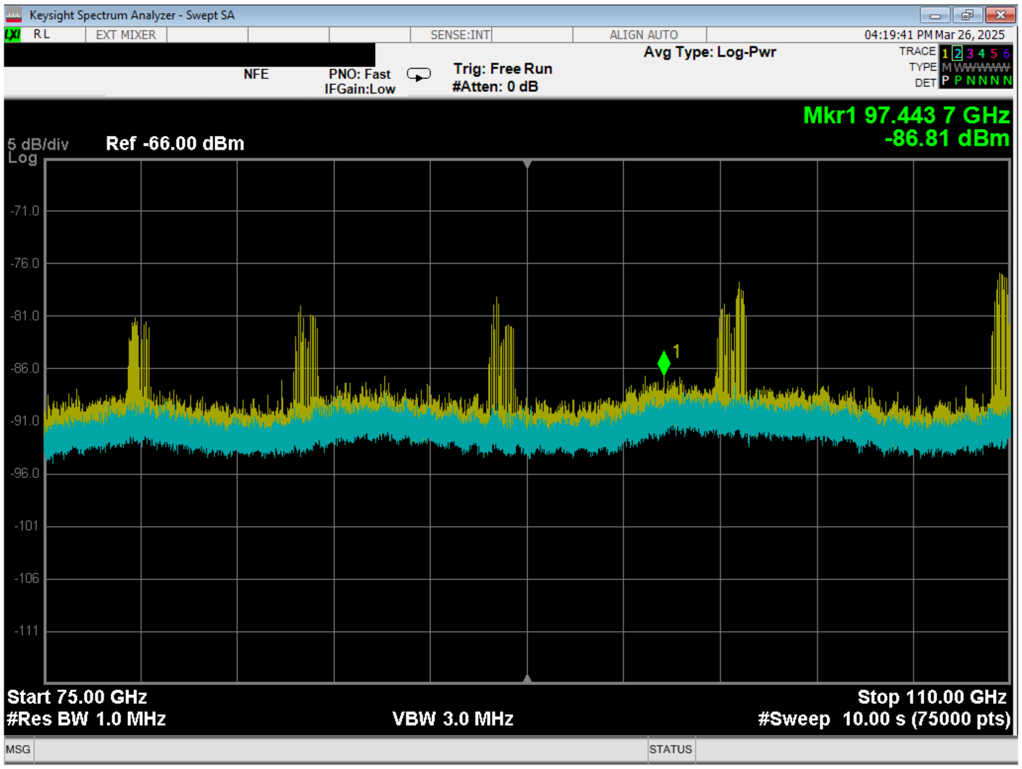
50 - 57 GHz



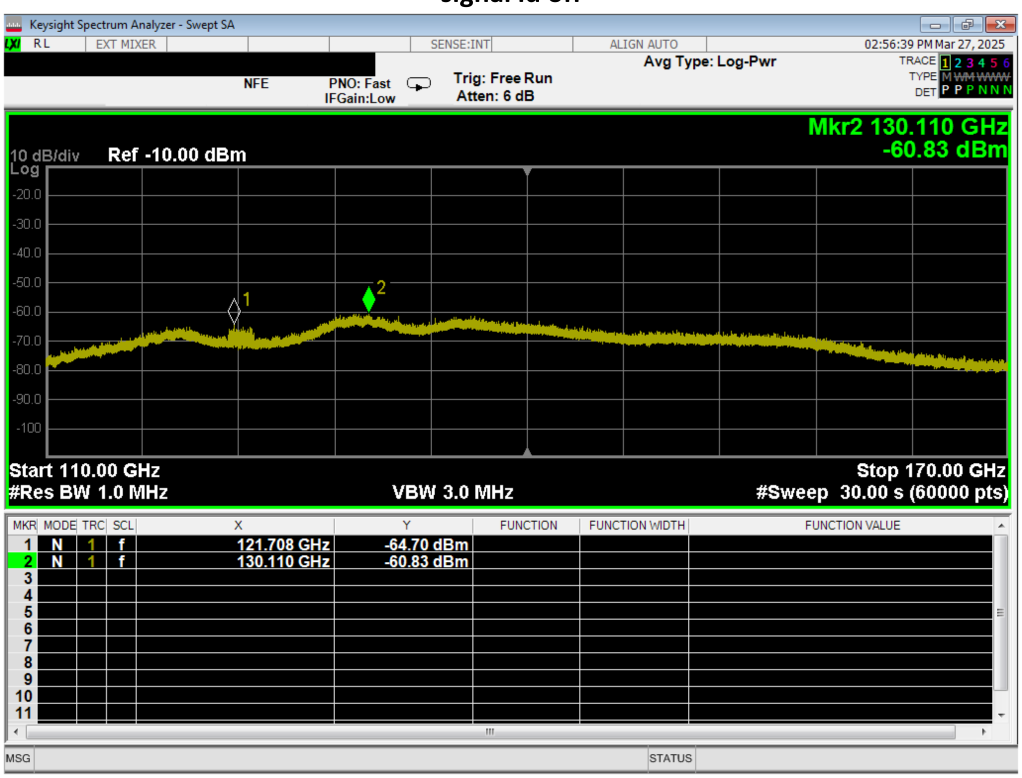
71 - 75 GHz



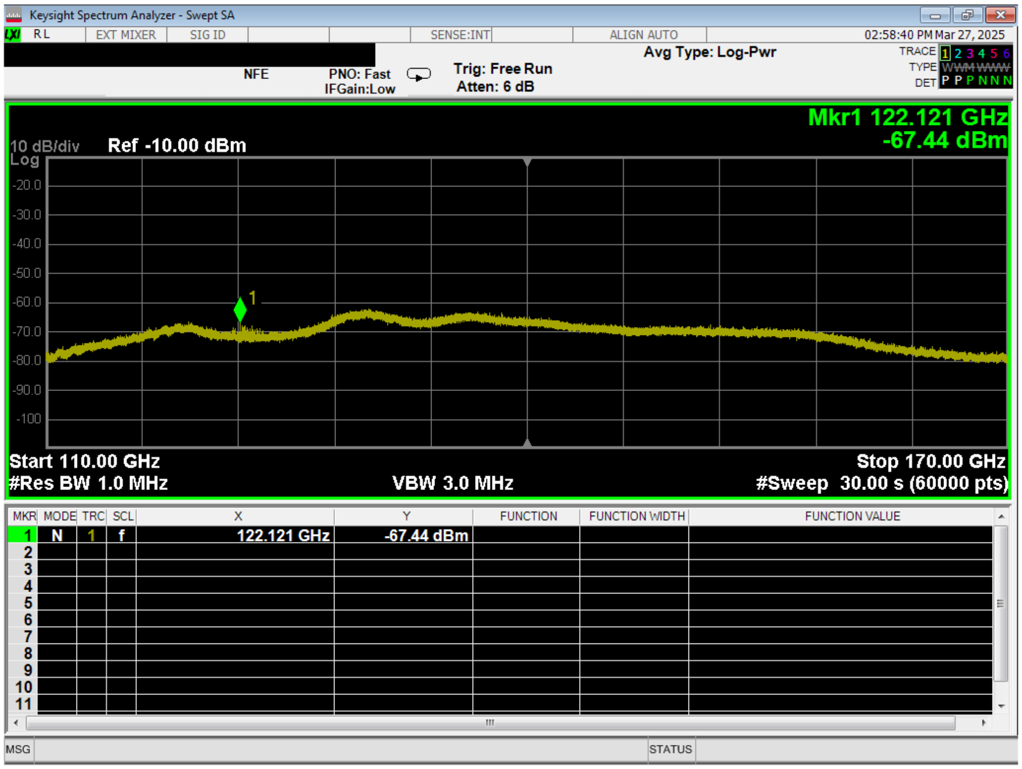
75 – 110 GHz
Trace 1 signal ID off_ Trace 2 signal ID on



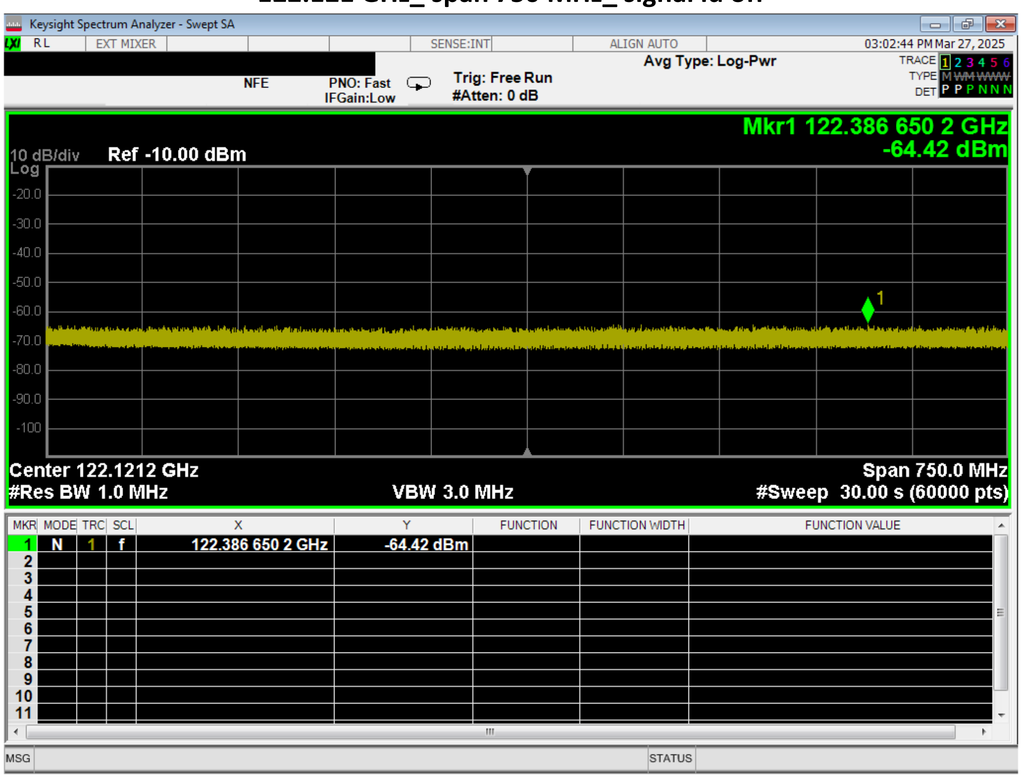
110 – 170 GHz
signal id off



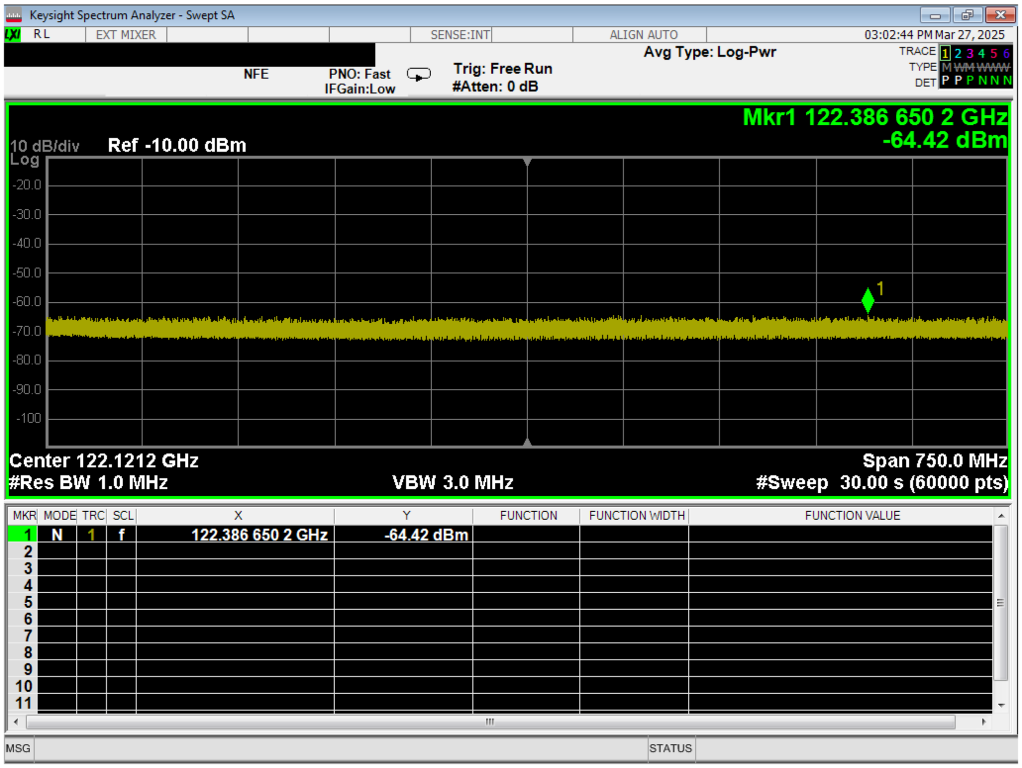
110 – 170 GHz
signal id on



122.121 GHz_ span 750 MHz_ signal id off



170 – 200 GHz
Signal id off



Frequency Stability

Engineer: Greg Corbin

Test Date: 3/28/2025

Test Procedure

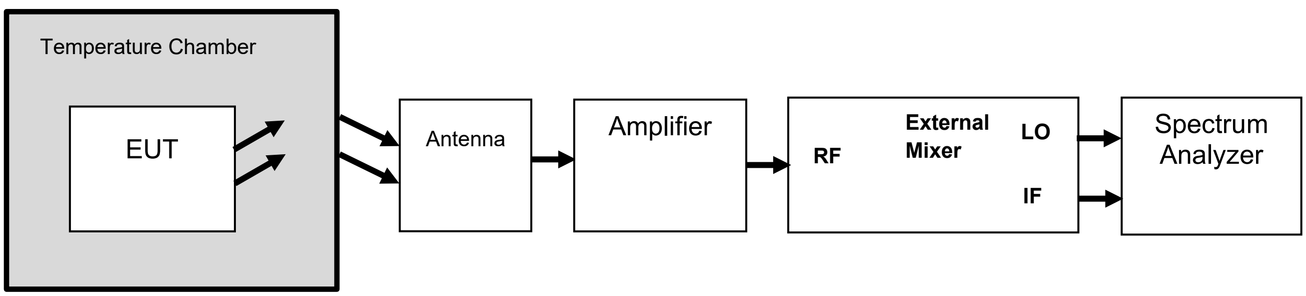
The EUT was tested in an environmental chamber with the transmitting antenna pointing at the access port.
A receive antenna was located at the access port receiving the EUT transmitting signal.

15.255(f) states:
Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range −20 to + 50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

A spectrum analyzer was used to measure the frequency stability.
The EUT lower and upper band edge was recorded every 10 degrees from -20 to +50 deg C.
At 20 deg C, the EUT input voltage was varied +/- 15%.

The EUT operated completely within the band of 61 – 61.5 GHz in all temperature conditions.

Test Setup



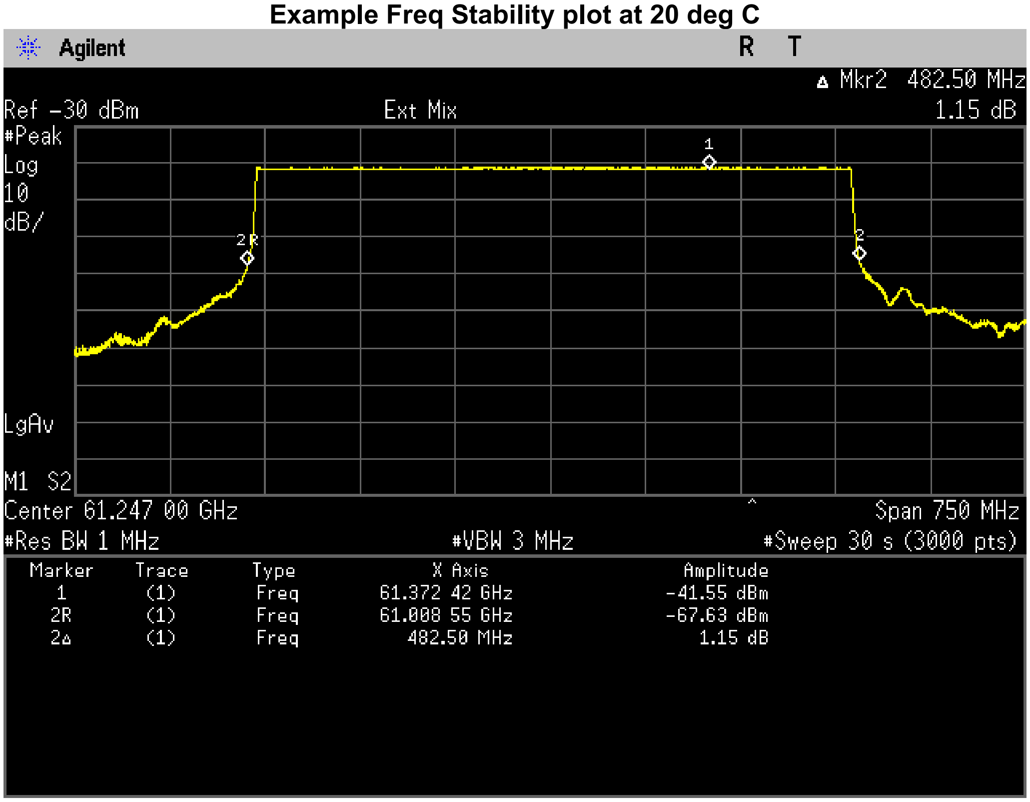
Frequency Stability vs Temperature

Temperature	Band Edge Limit		Band Edge Measured		Margin		Pass / Fail
	Lower	Upper	Lower	Upper	Lower	Upper	
deg C	GHz	GHz	GHz	GHz	GHz	GHz	
-20	61000	61500	61008.55	61495.8	8.55	4.2	Pass
-10	61000	61500	61010.05	61494.54	10.05	5.46	Pass
0	61000	61500	61007.97	61492.21	7.97	7.79	Pass
10	61000	61500	61007.71	61497.71	7.71	2.29	Pass
20	61000	61500	61008.55	61491.05	8.55	8.95	Pass
30	61000	61500	61007.8	61496.55	7.8	3.45	Pass
40	61000	61500	61006.29	61493.79	6.29	6.21	Pass
50	61000	61500	61007.3	61492.55	7.3	7.45	Pass

Frequency Stability vs Voltage

Temperature	Input Voltage	Band Edge Limit		Band Edge Measured		Margin from Band Edge		Pass / Fail
		Lower	Upper	Lower	Upper	Lower	Upper	
deg C	vdc	MHz	MHz	MHz	MHz	MHz	MHz	
20	10.2	61000	61500	61008.05	61494.3	8.05	5.7	Pass
	12	61000	61500	61008.55	61491.05	8.55	8.95	Pass
	13.8	61000	61500	61008.05	61494.3	8.05	5.7	Pass

Example Freq Stability plot at 20 deg C



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Temperature Chamber	Thermotron	SE-1000-3-3	i00557	NR	
Data Logger	Fluke	Hydra Data Bucket	i00343	6/19/24	6/19/25
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/13/23	7/13/26
Temp./humidity/ pressure monitor (Main Lab)	Omega Engineering	iBTHX-W-5	i00686	1/25/25	1/25/26
Voltmeter	Fluke	79III	i00499	10/15/24	10/15/25
PSA Spectrum Analyzer	Agilent	E4448A	i00688	10/26/24	10/26/25
MXE EMI receiver	Keysight	N9038A	i00552	3/17/25	3/17/26
Bi-Log antenna	Chase	CBL6111C	i00267	3/5/24	3/5/26
Horn Antenna	ARA	DRG-118/A	i00271	8/9/24	8/9/26
Horn Antenna (18-40GHz)	EMCO	3116	i00085	3/18/25	3/18/27
Horn Antenna, standard gain	CMI	HO22R	i00484	NR	NR
Horn Antenna, standard gain	CMI	HO15R	i00477	NR	NR
Horn Antenna, standard gain	CMI	HO10R	i00476	NR	NR
Horn Antenna, standard gain	CMI	HO6R	i00475	NR	NR
Horn Antenna, standard gain	CMI	HO4R	i00473	NR	NR
Harmonic Mixer	Agilent	11970W	i00464	Verified on: 7/11/24	
Mixer with Preselector	Hewlett Packard	11974	i00726	Verified on: 9/23/24	
Spectrum Analyzer Extension Module	VDI	WR4.3SAX-M	i00740	Verified on: 7/11/24	
Spectrum Analyzer Extension Module	VDI	WR6.5SAX-M	i00741	Verified on: 9/24/24	
LNA	Preamplifier	SBL-1141743065-0606-E1	i00658	Verified on: 9/30/24	
Preamplifier	Eravant	SBB-0115034019-2F2F-E3	i00588	Verified on: 9/3/24	
LNA	Eravant	SBL-7531143550-1010-E1	i00589	Verified on: 9/3/24	
Preamplifier	VDI	VDIWR4.3PAMP	i00682	Verified on: 9/24/24	
Preamplifier	Eravant	SBB-0115034019-2F2F-E3	i00722	Verified on: 9/9/24	
Preamplifier	Com Power	PAM-103	i00734	Verified on: 9/9/24	
Power Meter w/859V power sensor (75 – 110 GHz)	VDI	PM5B with 859V sensor	i00736	6-25-24	6-5-25
Waveguide taper WR10 to WR6.5	VDI	WR6.5TA	i00737	N/A	

Waveguide taper WR10 to WR4.3	VDI	WR4.3TA	i00738	N/A
Waveguide Extension, WR-15	Eravant	SWG-15020-FB	i00664	N/A
Waveguide Extension, WR-15	VDI	WR15SWG2R4	i00749	N/A
Waveguide Extension, WR-10	Eravant	SWG-10020-FB	i00665	N/A
Waveguide Extension, WR-06	OML	N/A	i00748	N/A
Waveguide Extension, WR-04	Eravant	STQ-WG-04020-F1-A-R	i00750	N/A

In addition to the equipment listed above, standard RF connectors and cables were utilized in the testing of the equipment described. 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 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