

FCC and ISED Test Report
Iridium Satellite LLC
Iridium Transceiver
Model: 9704



In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and ISED RSS-GEN (Iridium)

Prepared for: Iridium Satellite LLC
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McLean
VA 22102
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FCC ID: Q639704 IC: 4629A-9704

COMMERCIAL-IN-CONFIDENCE

Document 75961753-03 Issue 01

SIGNATURE			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	02 December 2024

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

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Pier-Angelo Lorusso	02 December 2024	
Testing	Thomas Biddlecombe	02 December 2024	

FCC Accreditation 492497/UK2010 Octagon House, Fareham Test Laboratory
ISED Accreditation 12669A/UK0003 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 25: 2023, FCC 47 CFR Part 2: 2023, Industry Canada RSS-170: Issue 4 (09-2022) and ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021) for the tests detailed in section 1.3.

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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	15-November-2024

Table 1

1.2 Introduction

Applicant	Iridium Satellite LLC
Manufacturer	Iridium Satellite LLC
Model Number(s)	9704
Serial Number(s)	1A007Z and 1A00C1
Hardware Version(s)	S5L5-V5
Software Version(s)	SX-1.4.9
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 25: 2023 FCC 47 CFR Part 2: 2023 Industry Canada RSS-170: Issue 4 (09-2022) ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021)
Order Number	93134
Date	12-June-2024
Date of Receipt of EUT	05-September-2024
Start of Test	09-September-2024
Finish of Test	16-October-2024
Name of Engineer(s)	Pier-Angelo Lorusso and Thomas Biddlecombe
Related Document(s)	ANSI C63.26 (2015)



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and ISED RSS-GEN is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 25	Part 2	RSS-170	RSS-GEN			
Configuration and Mode: DC Powered – Iridium C2 (Worst Case)							
2.1	25.202(f)	2.1053	5.8	6.13	Radiated Spurious Emissions	Pass	ANSI C63.26 (2015)
Configuration and Mode: DC Powered - Iridium (C1)							
2.2	-	2.1047 (d)	-	-	Modulation Characteristics	Declaration	
2.3	-	2.1049	-	6.7	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.4	25.202(d)	2.1055	5.3	6.11	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.5	25.202(f)	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.6	25.204	2.1046	5.5	6.12	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)
2.7	25.216	-	5.9, 5.10	-	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service	Pass	ANSI C63.26 (2015)
Configuration and Mode: DC Powered - Iridium (B1)							
2.2	-	2.1047 (d)	-	-	Modulation Characteristics	Declaration	
2.3	-	2.1049	-	6.7	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.4	25.202(d)	2.1055	5.3	6.11	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.5	25.202(f)	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.6	25.204	2.1046	5.5	6.12	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)



2.7	25.216		5.9	5.10	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service	Pass	ANSI C63.26 (2015)
Configuration and Mode: DC Powered - Iridium (C2)							
2.2		2.1047 (d)			Modulation Characteristics	Declaration	ANSI C63.26 (2015) INFO TO BE PROVIDED BY CLIENT
2.3		2.1049		6.7	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.4	25.202(d)	2.1055,	5.3	6.11	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.5	25.202(f)	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.6	25.204	2.1046,	5.5	6.12	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)
2.7	25.216		5.9	5.10	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service	Pass	ANSI C63.26 (2015)

Table 2



1.4 Application Form

Equipment Description

Technical Description: (Please provide a brief description of the intended use of the equipment including the technologies the product supports)		A data terminal for communication with the Iridium satellite network.	
Manufacturer:		Iridium Satellite LLC	
Model:		Iridium 9704 Transceiver	
Part Number:		IRID0258A	
Hardware Version:		S5L5-V5	
Software Version:		SX-1.4.9	
FCC ID of the product under test – see guidance here		Q639704	
IC ID of the product under test – see guidance here		4629A-9704	
Device Category	Mobile <input checked="" type="checkbox"/>	Portable <input type="checkbox"/>	Fixed <input type="checkbox"/>
Equipment is fitted with an Audio Low Pass Filter		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Table 3

Intentional Radiators

Technology	Iridium					
Frequency Range (MHz to MHz)	1616 to 1626.5					
Conducted Declared Output Power (dBm)	+32.0					
Antenna Gain (dBi)	5					
Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)	0.04167 0.08333					
Modulation Scheme(s) (e.g. GFSK, QPSK etc)	QPSK					
ITU Emission Designator (see guidance here) (not mandatory for Part 15 devices)	41K7Q7W 83K3Q7W					
Bottom Frequency (MHz)	1616.04167					
Middle Frequency (MHz)	1621.04167					
Top Frequency (MHz)	1625.9583					

Table 4



Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	3255MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	19.2MHz
Class A Digital Device (Use in commercial, industrial or business environment) <input checked="" type="checkbox"/>	
Class B Digital Device (Use in residential environment only) <input type="checkbox"/>	

Table 5

AC Power Source

AC supply frequency:		Hz
Voltage		V
Max current:		A
Single Phase <input type="checkbox"/> Three Phase <input checked="" type="checkbox"/>		

Table 6

DC Power Source

Nominal voltage:	3.7	V
Extreme upper voltage:	4.5	V
Extreme lower voltage:	3.5	V
Max current:	10.0	A

Table 7

Battery Power Source

Voltage:		V
End-point voltage:		V (Point at which the battery will terminate)
Alkaline <input type="checkbox"/> Leclanche <input type="checkbox"/> Lithium <input type="checkbox"/> Nickel Cadmium <input type="checkbox"/> Lead Acid* <input type="checkbox"/> *(Vehicle regulated)		
Other <input type="checkbox"/>	Please detail:	

Table 8

Charging

Can the EUT transmit whilst being charged	Yes <input type="checkbox"/> No <input type="checkbox"/>
---	--

Table 9

Temperature

Minimum temperature:	-40	°C
Maximum temperature:	85	°C

Table 10



Cable Loss

Adapter Cable Loss (Conducted sample)	0	dB
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Table 11

Antenna Characteristics

Antenna connector <input checked="" type="checkbox"/>		State impedance	50	Ohm
Temporary antenna connector <input type="checkbox"/>		State impedance		Ohm
Integral antenna <input type="checkbox"/>	Type:		Gain	dBi
External antenna <input type="checkbox"/>	Type:		Gain	dBi
<p>For external antenna only:</p> <p>Standard Antenna Jack <input type="checkbox"/> If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed <input type="checkbox"/></p> <p>Non-standard Antenna Jack <input type="checkbox"/></p> <p>All part 15 applications will need to show how the antenna gain was derived either from a manufacturer data sheet or a measurement. Where the gain of the antenna is inherently accounted for as a result of the measurement, such as field strength measurements on a part 15.249 or 15.231 device, so the gain does not necessarily need to be verified. However, enough information regarding the construction of the antenna shall be provided. Such information maybe photographs, length of wire antenna etc.</p>				

Table 12

Ancillaries (if applicable) Details in P5042-TP-006

Manufacturer:		Part Number:	
Model:		Country of Origin:	

Table 13

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

Name: Ben Goode
Position held: Principal RF Engineer
Date: 30/08/2024



1.5 Product Information

1.5.1 Technical Description

A data terminal for communication with the Iridium satellite network

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 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
Model: 9704, Serial Number: 1A00C1			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: 9704, Serial Number: 1A007Z			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 14

1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: DC Powered – Iridium C2 (Worst Case)		
Radiated Spurious Emissions	Pier-Angelo Lorusso	UKAS
Configuration and Mode: DC Powered - Iridium (C1)		
Occupied Bandwidth	Thomas Biddlecombe	UKAS
Frequency Tolerance	Thomas Biddlecombe	UKAS
Spurious Emissions at Antenna Terminals	Thomas Biddlecombe	UKAS
Equivalent Isotropic Radiated Power	Thomas Biddlecombe	UKAS
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service	Thomas Biddlecombe	UKAS
Configuration and Mode: DC Powered - Iridium (B1)		
Occupied Bandwidth	Thomas Biddlecombe	UKAS
Frequency Tolerance	Thomas Biddlecombe	UKAS
Spurious Emissions at Antenna Terminals	Thomas Biddlecombe	UKAS
Equivalent Isotropic Radiated Power	Thomas Biddlecombe	UKAS
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite	Thomas Biddlecombe	UKAS



Test Name	Name of Engineer(s)	Accreditation
Service		
Configuration and Mode: DC Powered - Iridium (C2)		
Occupied Bandwidth	Thomas Biddlecombe	UKAS
Frequency Tolerance	Thomas Biddlecombe	UKAS
Spurious Emissions at Antenna Terminals	Thomas Biddlecombe	UKAS
Equivalent Isotropic Radiated Power	Thomas Biddlecombe	UKAS
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service	Thomas Biddlecombe	UKAS

Table 15

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom



2 Test Details

2.1 Radiated Spurious Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(f)
FCC 47 CFR Part 2, Clause 2.1053
Industry Canada RSS-170, Clause 5.8
ISED RSS-GEN, Clause 6.13

2.1.2 Equipment Under Test and Modification State

Model: 9704, S/N: 1A00C1 - Modification State 0

2.1.3 Date of Test

09-September-2024 to 10-September-2024

2.1.4 Test Method

A preliminary profile of the Radiated Spurious Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber.

Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Testing was performed in accordance with ANSI C63.26, Clause 5.5.

Pre-scans and final measurements were performed using the direct field strength method.

Field strength measurements were performed and then converted to Equivalent Power Measurements in accordance with ANSI C63.26, Clause 5.2.7 equation c)

Example calculation:

$E \text{ (dBuV/m)} + 20\log(d) - 104.8 = \text{EIRP (dBm)}$ where (d) is the measurement distance.
 $82.2 \text{ (dBuV/m)} + 20\log(3) - 104.8 = \text{EIRP (dBm)}$
 $-13.0 = \text{EIRP (dBm)}$

2.1.5 Example Test Setup Diagram

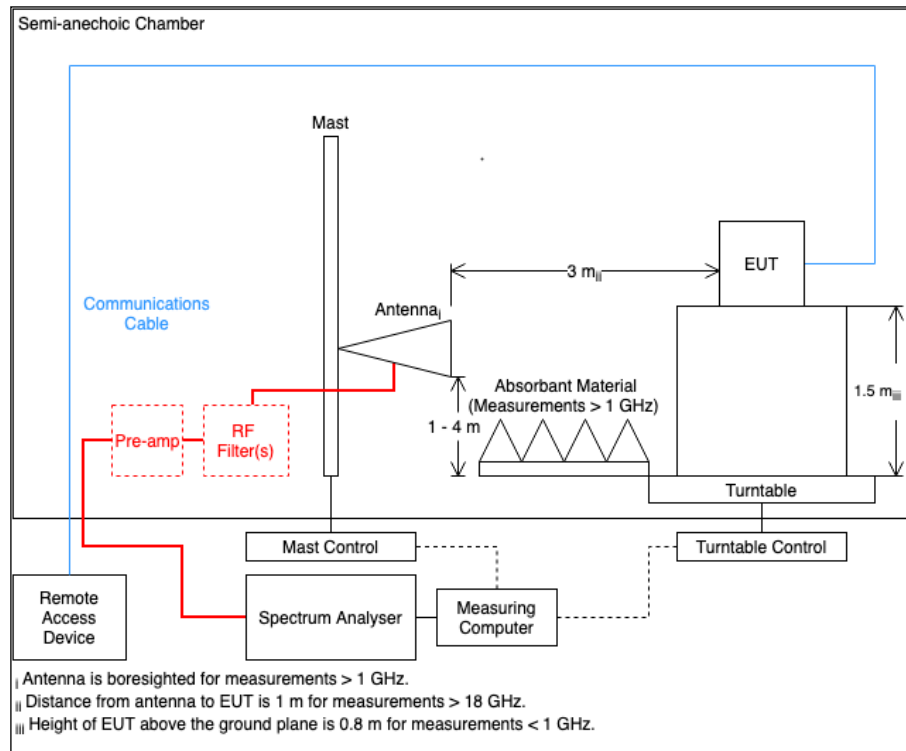


Figure 1

2.1.6 Environmental Conditions

Ambient Temperature	23.1 - 24.7 °C
Relative Humidity	45.3 - 56.6 %



2.1.7 Test Results

DC Powered - Iridium C2 (Worst Case)

Frequency (MHz)	Level (dBm)	Polarisation	Orientation
*			

Table 16 - 1616.04167 MHz, 30 MHz to 1626.5 MHz

*No emissions were found within 10 dB of the limit.

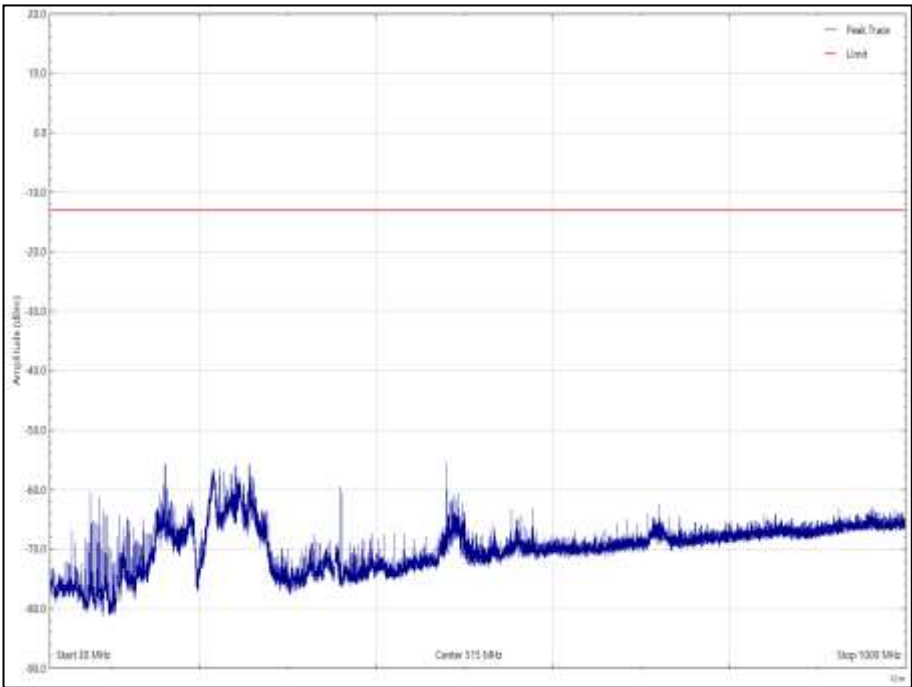


Figure 2 - 1616.04167 MHz - 30 MHz to 1GHz, Horizontal, X Orientation



Figure 3 - 1616.04167 MHz - 30 MHz to 1GHz, Vertical, X Orientation

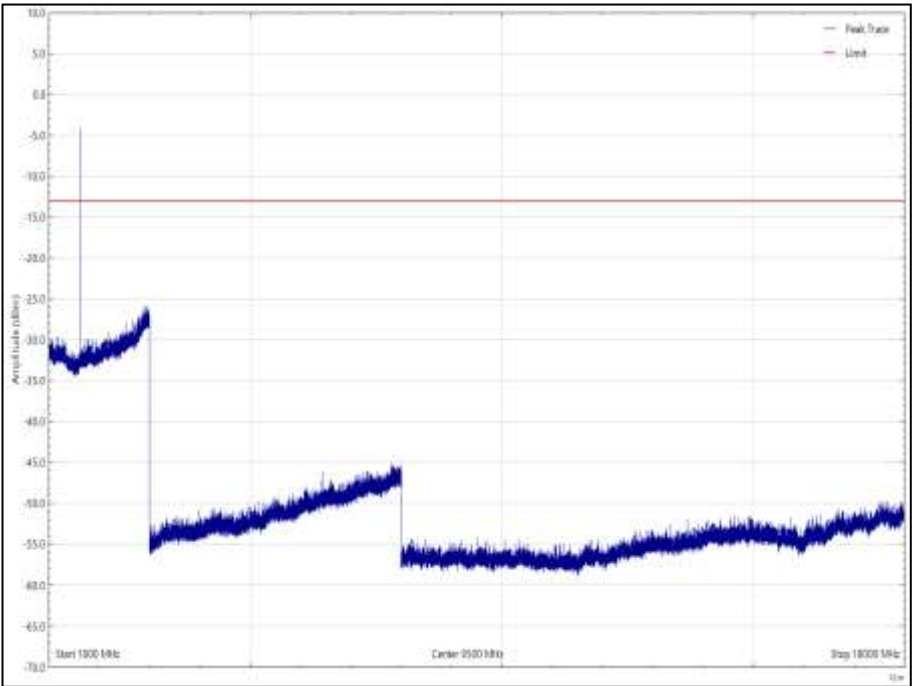


Figure 4 - 1616.04167 MHz - 1 GHz to 18 GHz, Horizontal, X Orientation

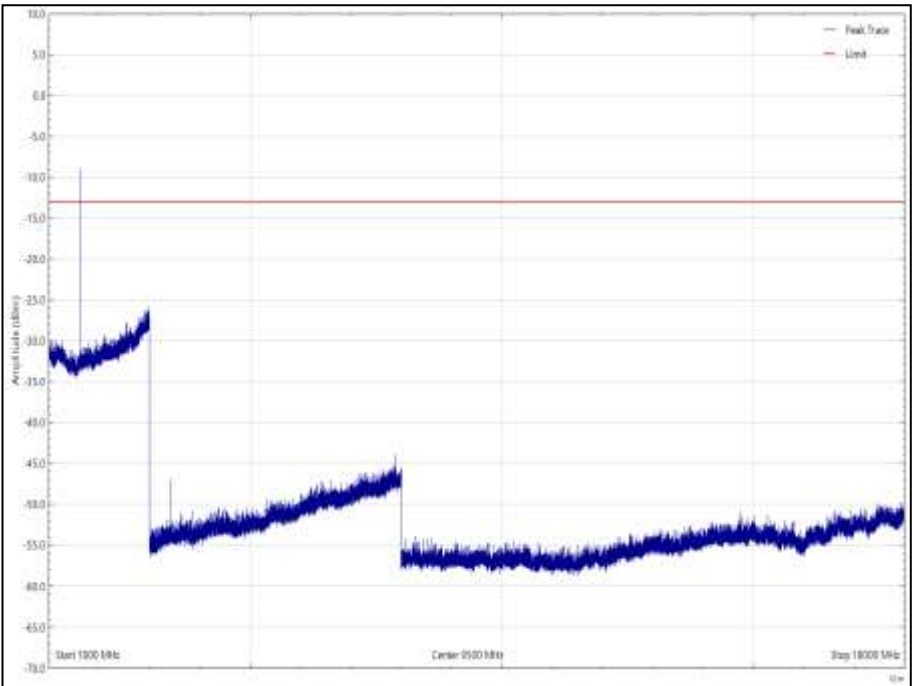


Figure 5 - 1616.04167 MHz - 1 GHz to 18 GHz, Vertical, X Orientation

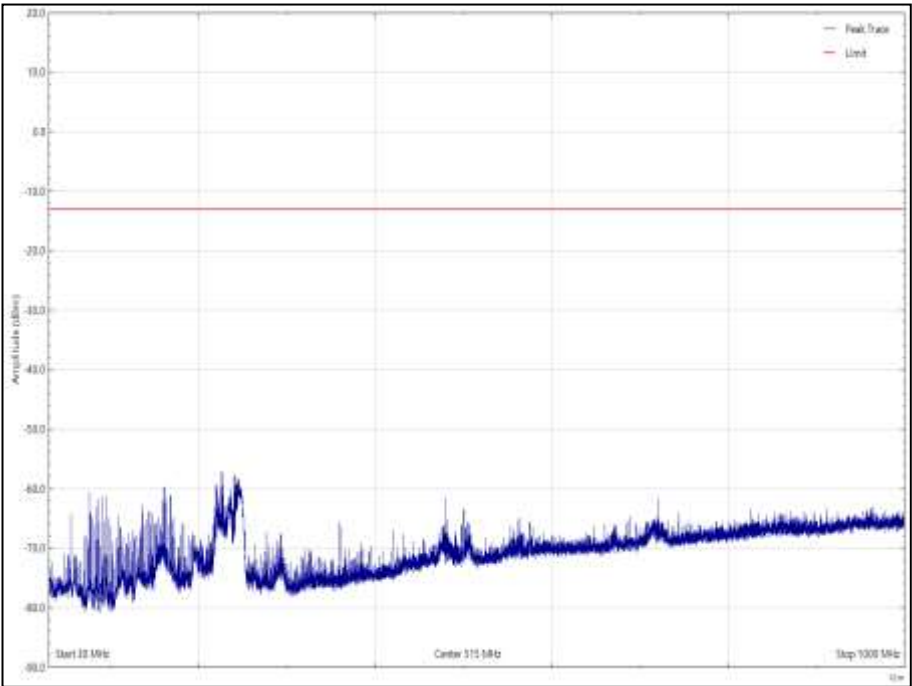


Figure 6 - 1616.04167 MHz - 30 MHz to 1GHz, Horizontal, Y Orientation

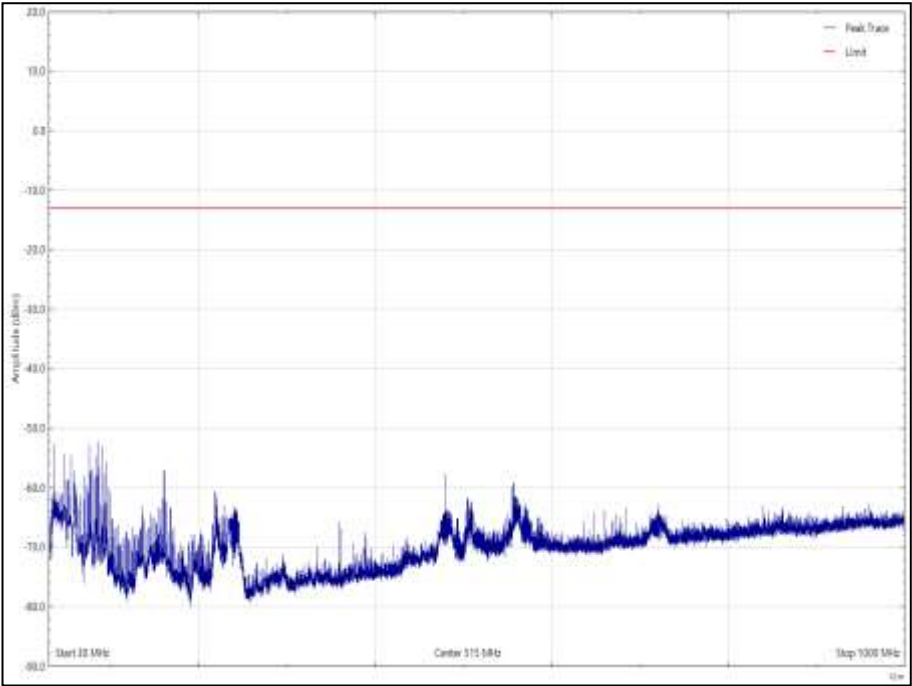


Figure 7 - 1616.04167 MHz - 30 MHz to 1GHz, Vertical, Y Orientation

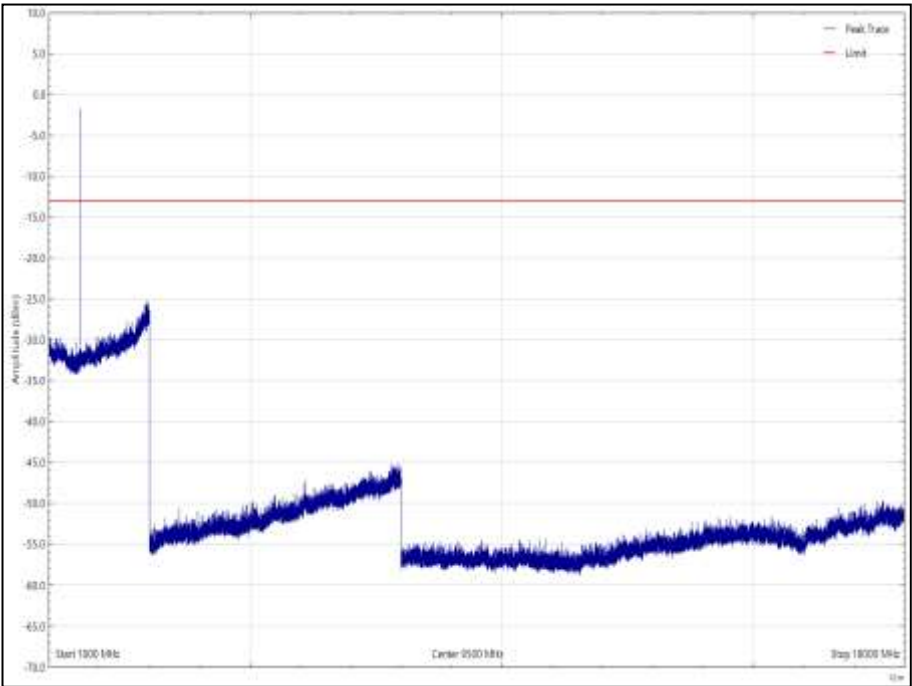


Figure 8 - 1616.04167 MHz - 1 GHz to 18 GHz, Horizontal, Y Orientation

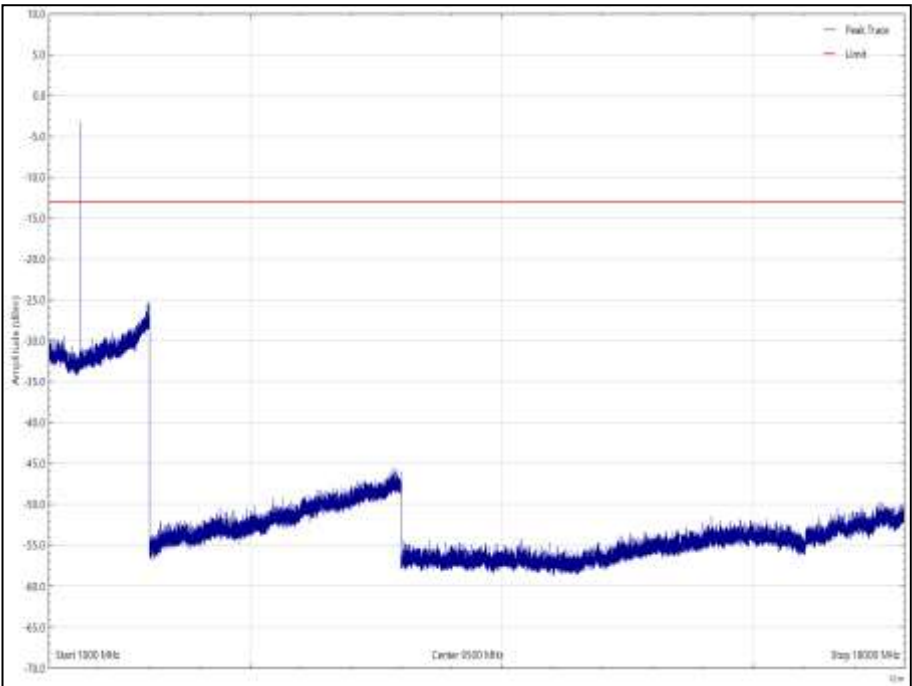


Figure 9 - 1616.04167 MHz - 1 GHz to 18 GHz, Vertical, Y Orientation

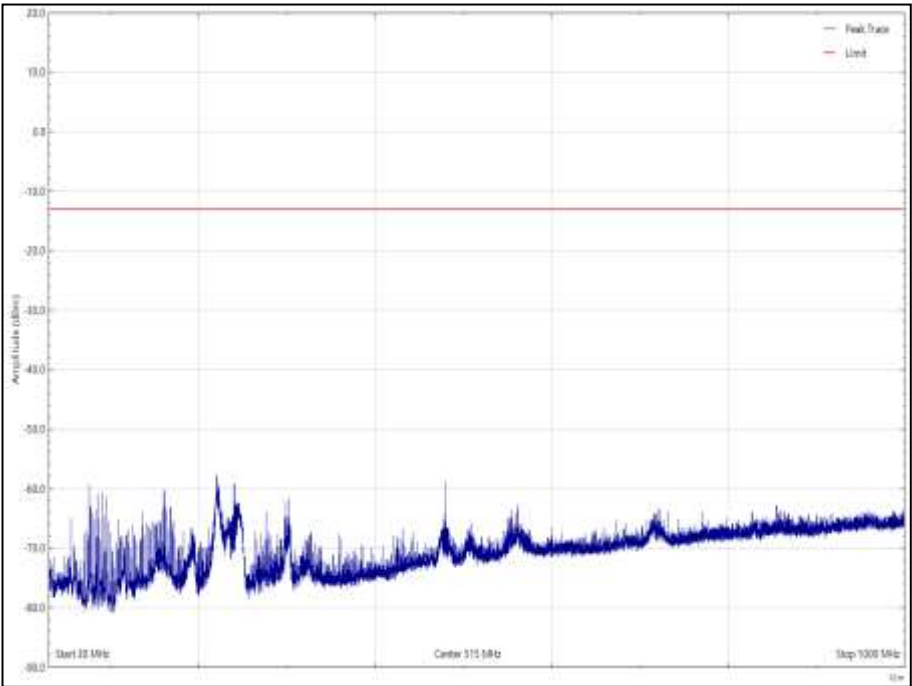


Figure 10 - 1616.04167 MHz - 30 MHz to 1GHz, Horizontal, Z Orientation

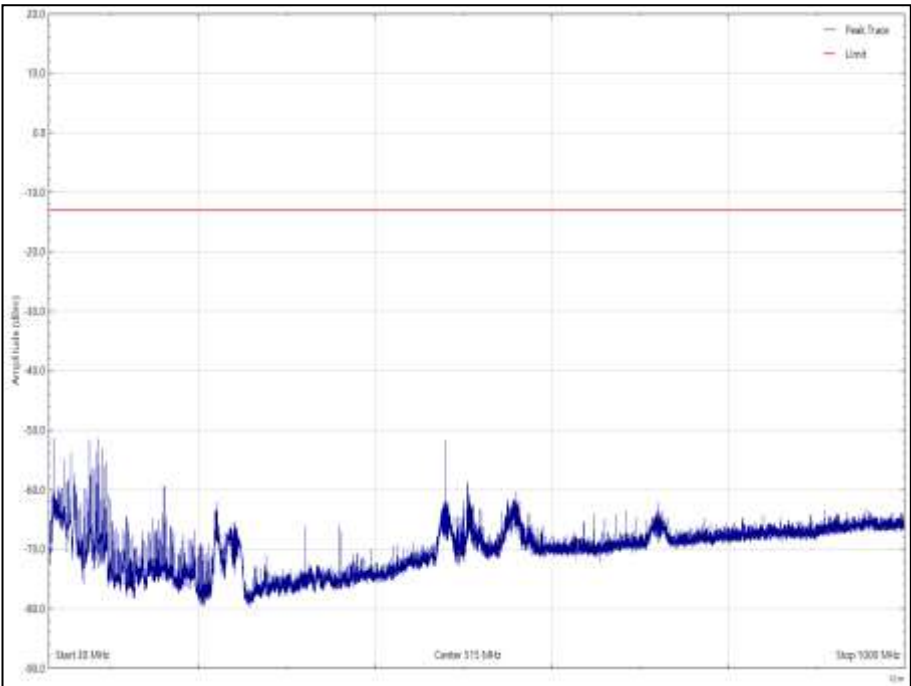


Figure 11 - 1616.04167 MHz - 30 MHz to 1GHz, Vertical, Z Orientation

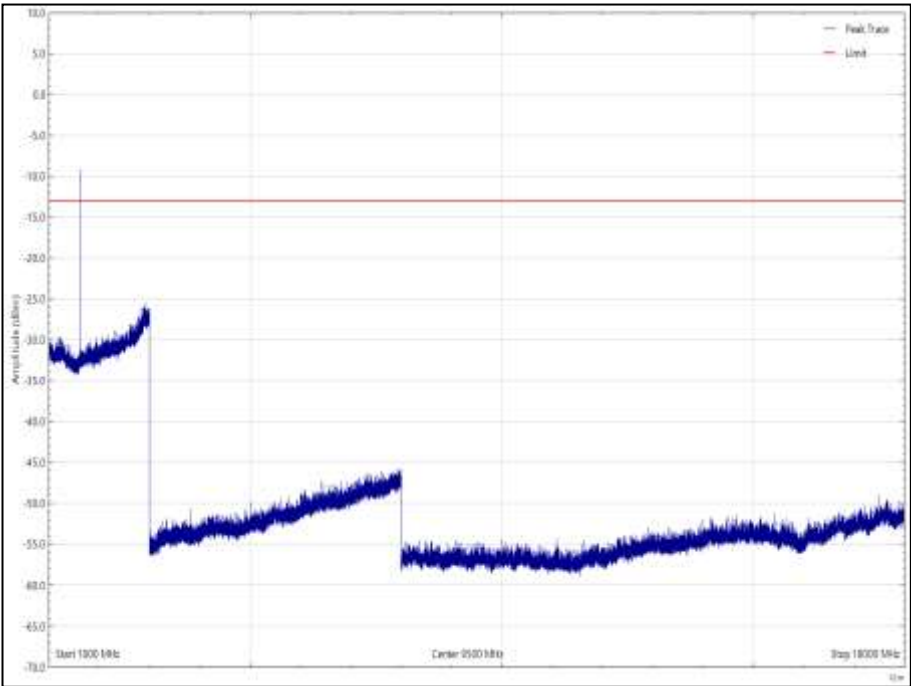


Figure 12 - 1616.04167 MHz - 1 GHz to 18 GHz, Horizontal, Z Orientation

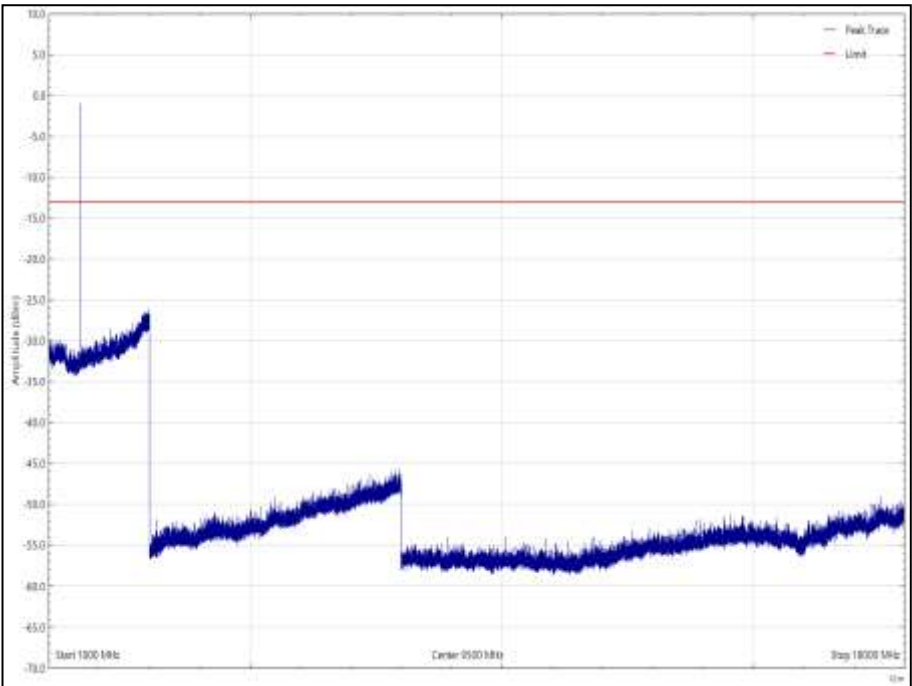


Figure 13 - 1616.04167 MHz - 1 GHz to 18 GHz, Vertical, Z Orientation



Frequency (MHz)	Level (dBm)	Polarisation	Orientation
*			

Table 17 - 1621.04167 MHz, 30 MHz to 1626.5 MHz

*No emissions were found within 10 dB of the limit.

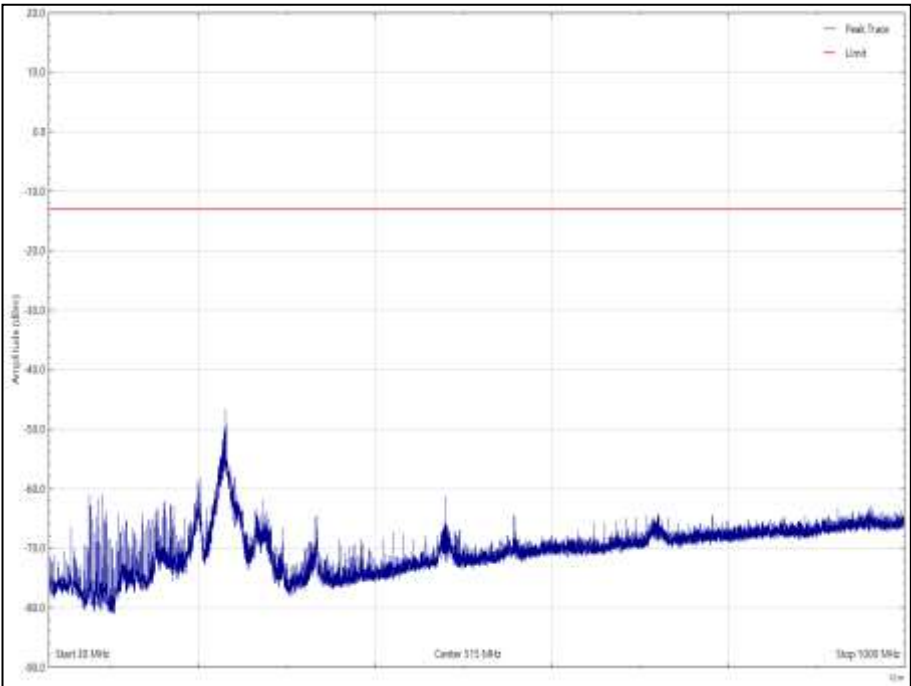


Figure 14 - 1621.04167 MHz - 30 MHz to 1GHz, Horizontal, X Orientation

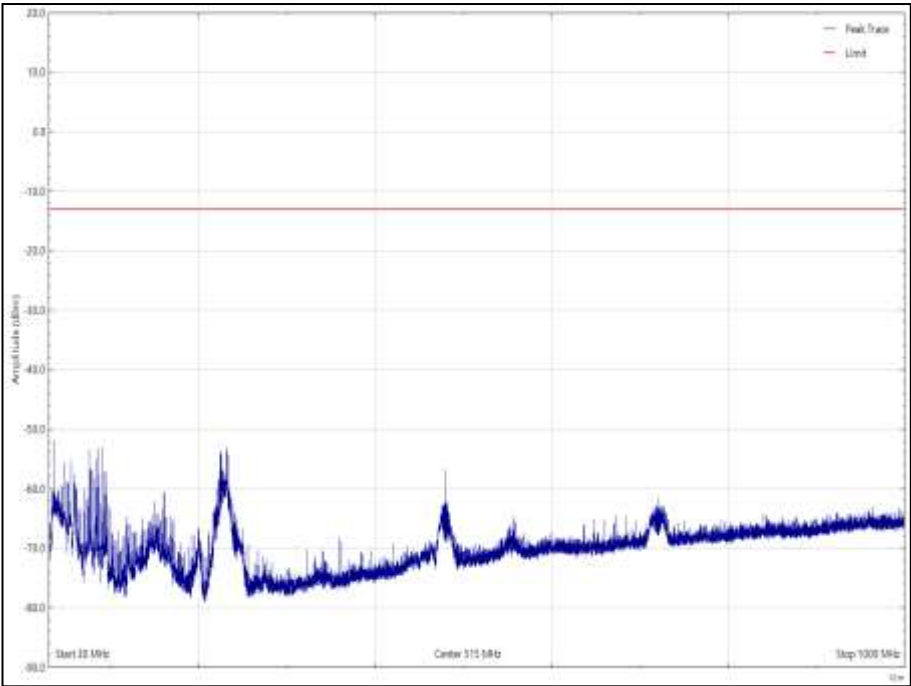




Figure 15 - 1621.04167 MHz - 30 MHz to 1GHz, Vertical, X Orientation

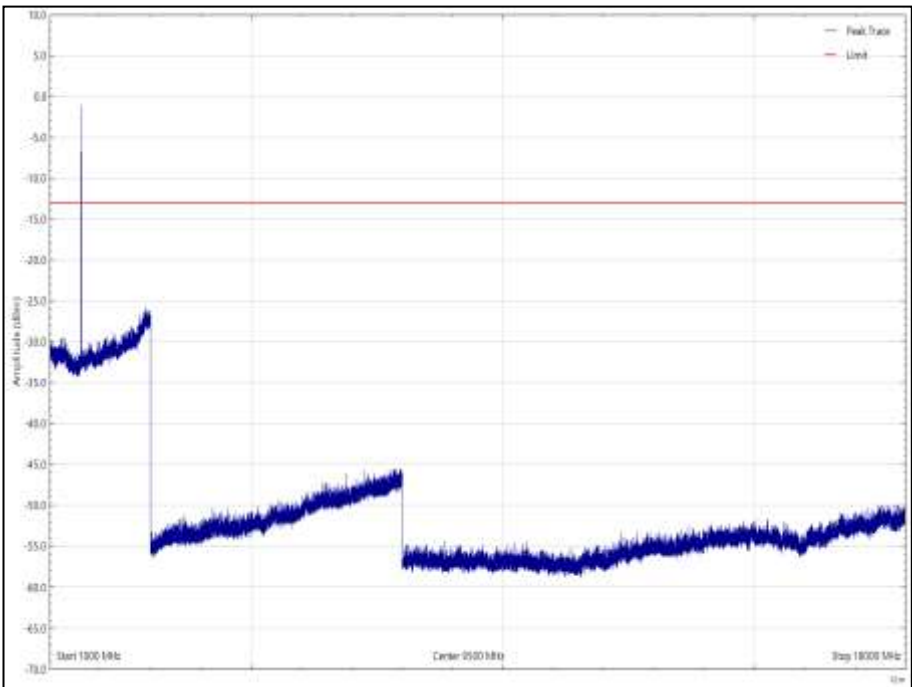


Figure 16 - 1621.04167 MHz - 1 GHz to 18 GHz, Horizontal, X Orientation

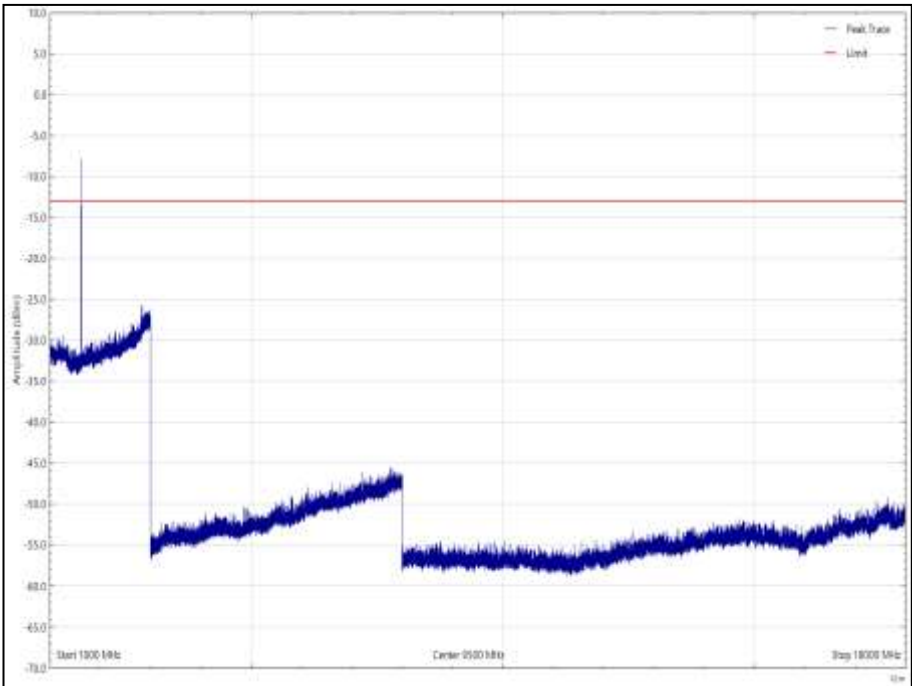


Figure 17 - 1621.04167 MHz - 1 GHz to 18 GHz, Vertical, X Orientation

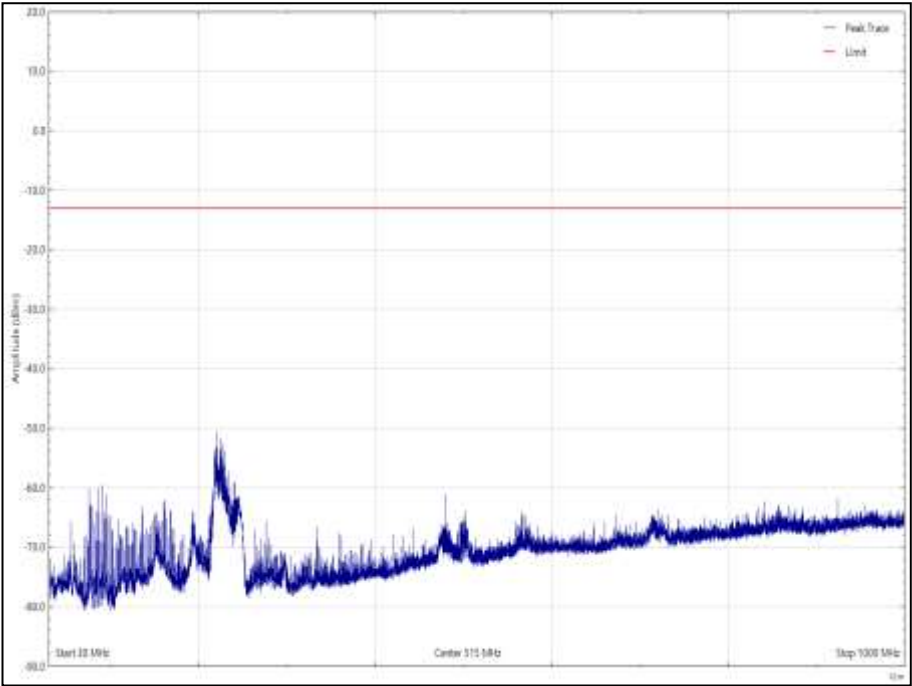


Figure 18 - 1621.04167 MHz - 30 MHz to 1GHz, Horizontal, Y Orientation

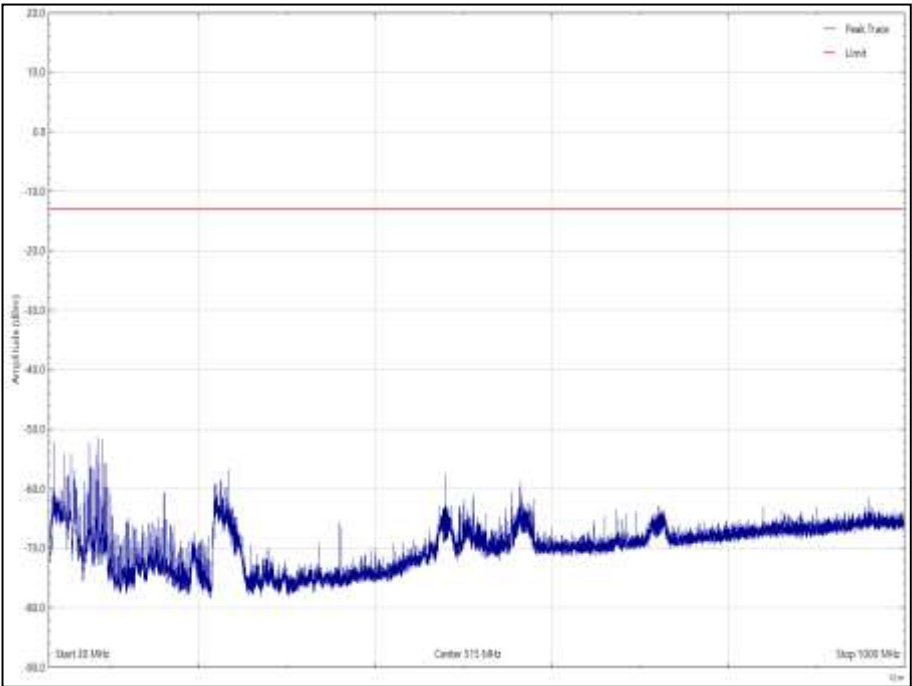


Figure 19 - 1621.04167 MHz - 30 MHz to 1GHz, Vertical, Y Orientation

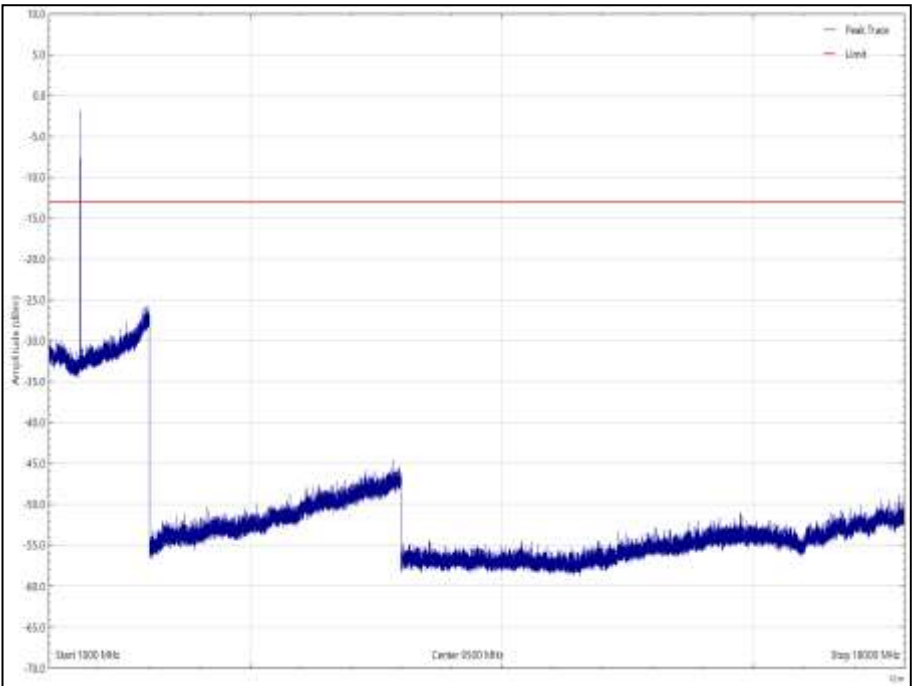


Figure 20 - 1621.04167 MHz - 1 GHz to 18 GHz, Horizontal, Y Orientation

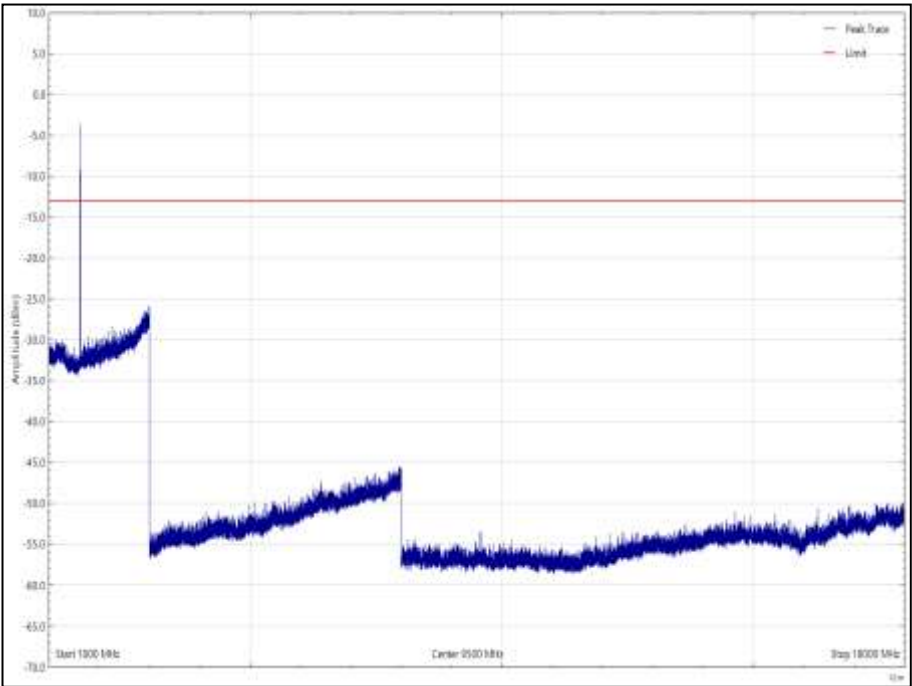


Figure 21 - 1621.04167 MHz - 1 GHz to 18 GHz, Vertical, Y Orientation

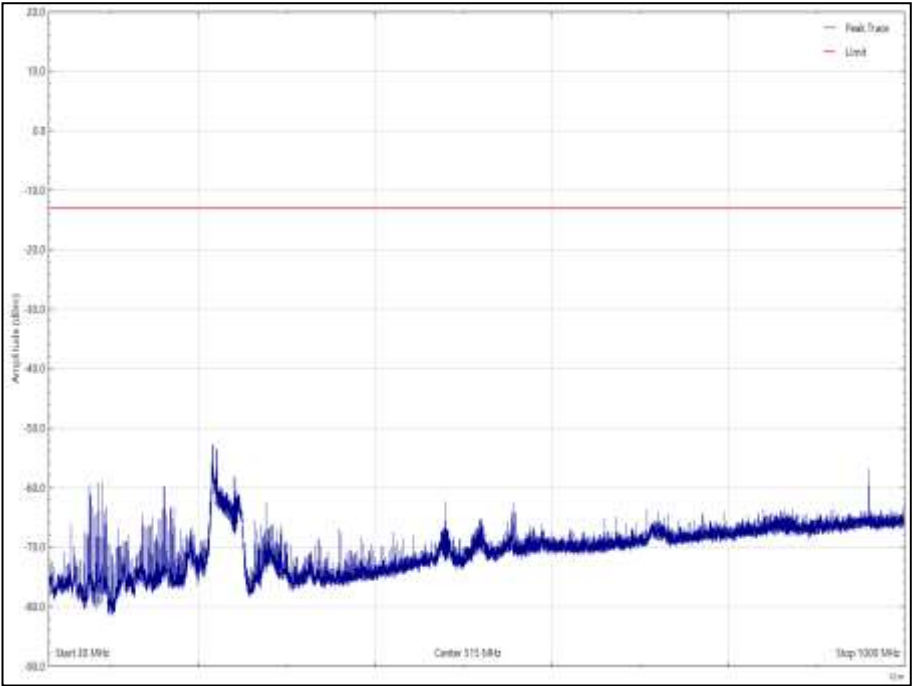


Figure 22 - 1621.04167 MHz - 30 MHz to 1GHz, Horizontal, Z Orientation

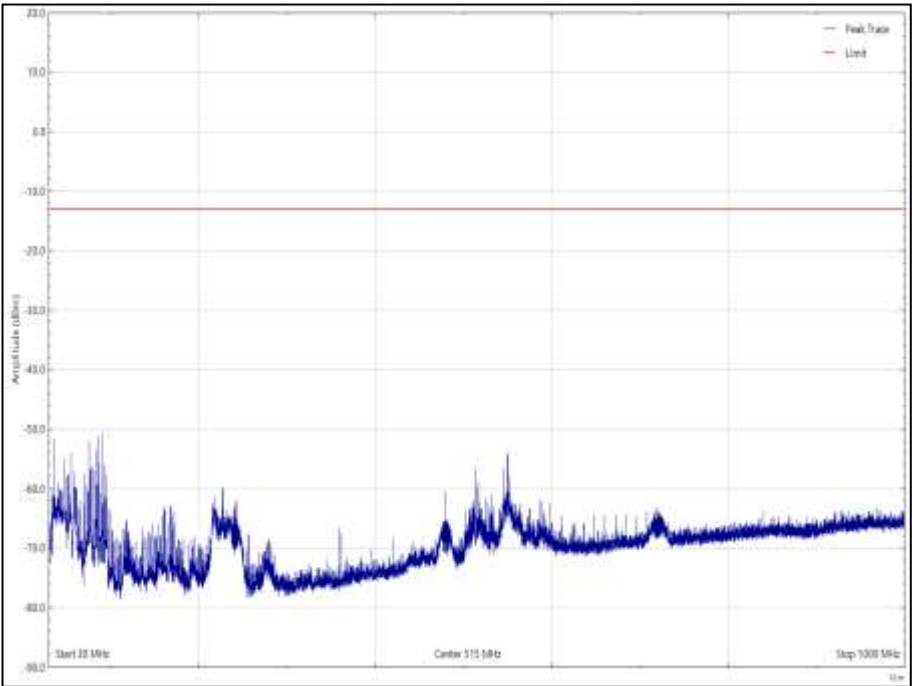


Figure 23 - 1621.04167 MHz - 30 MHz to 1GHz, Vertical, Z Orientation

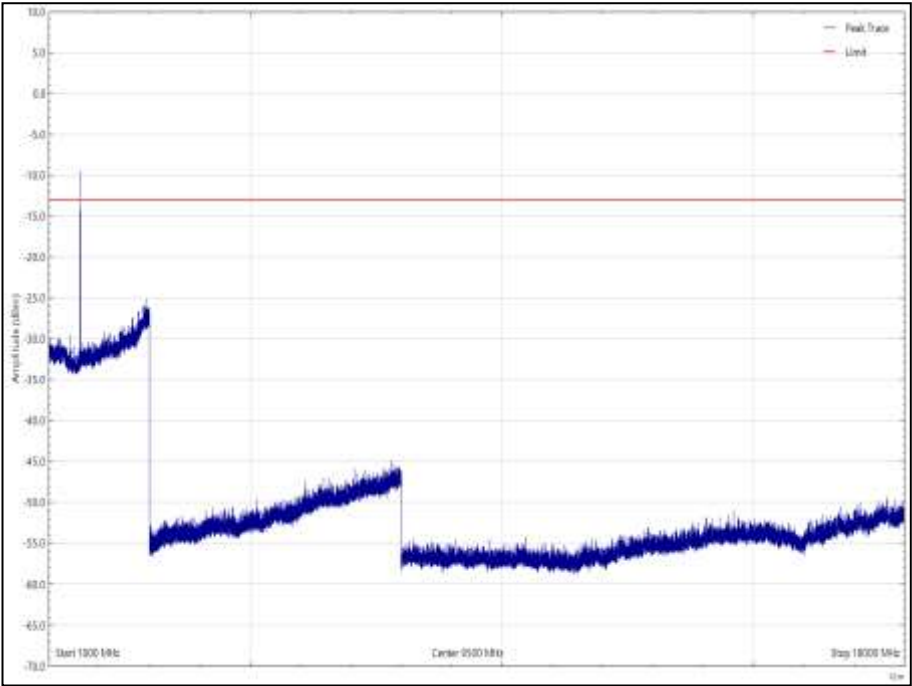


Figure 24 - 1621.04167 MHz - 1 GHz to 18 GHz, Horizontal, Z Orientation

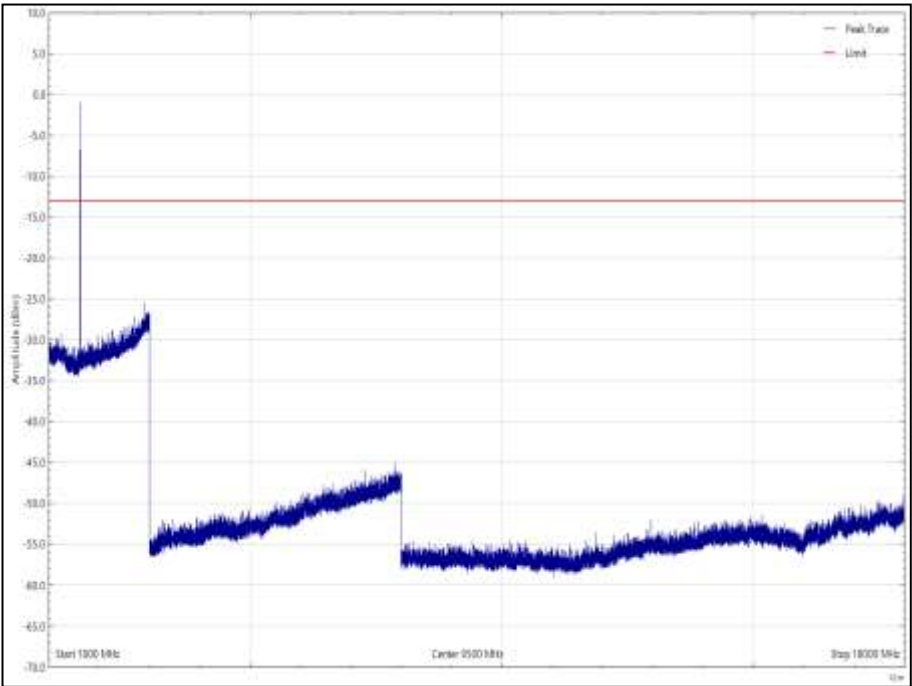


Figure 25 - 1621.04167 MHz - 1 GHz to 18 GHz, Vertical, Z Orientation



Frequency (MHz)	Level (dBm)	Polarisation	Orientation
*			

Table 18 - 1625.9583 MHz, 30 MHz to 1626.5 MHz

*No emissions were found within 10 dB of the limit.

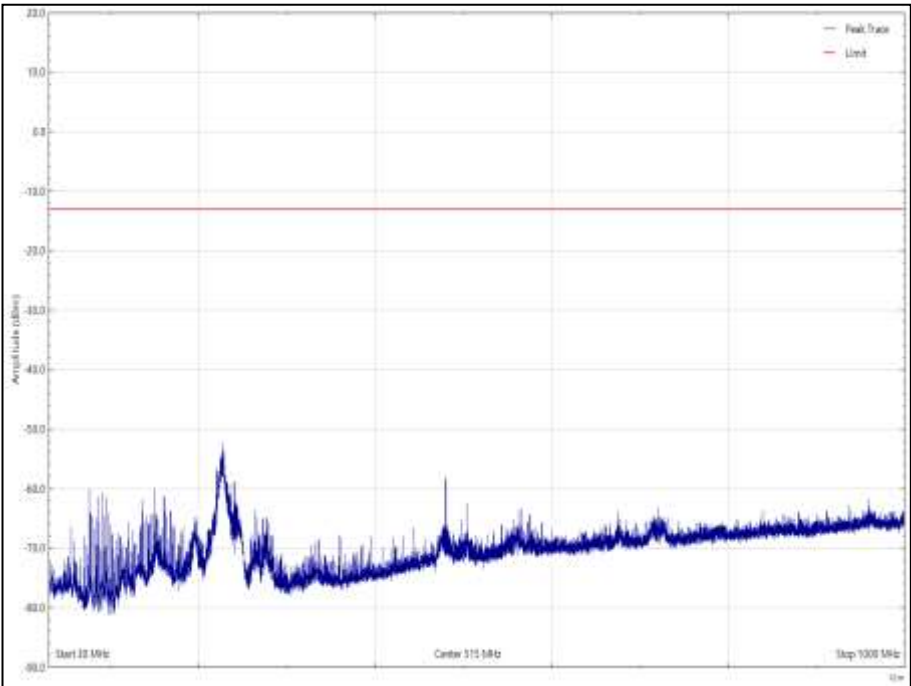


Figure 26 - 1625.9583 MHz - 30 MHz to 1GHz, Horizontal, X Orientation

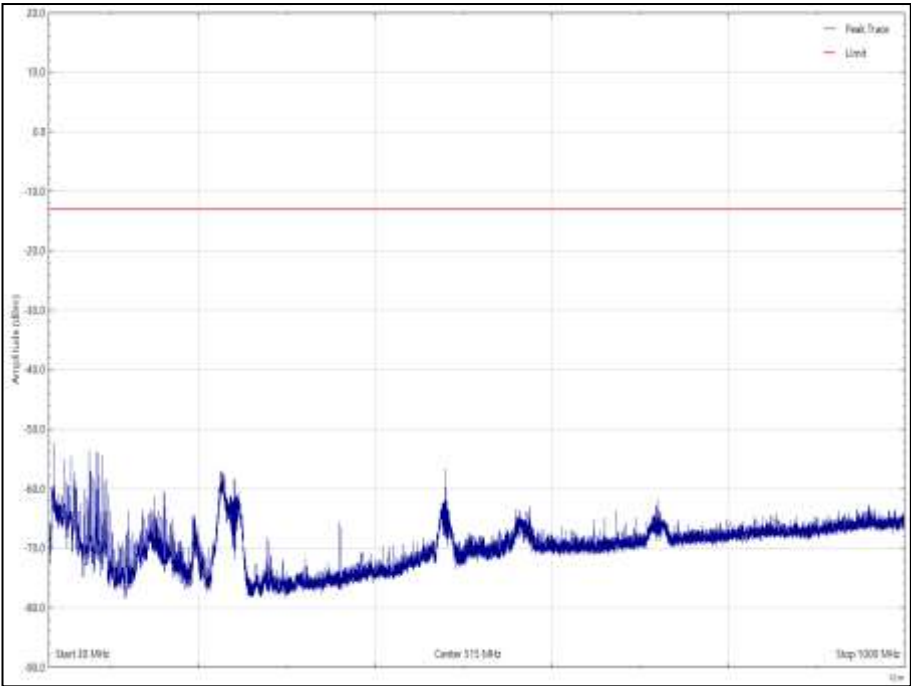




Figure 27 - 1625.9583 MHz - 30 MHz to 1GHz, Vertical, X Orientation

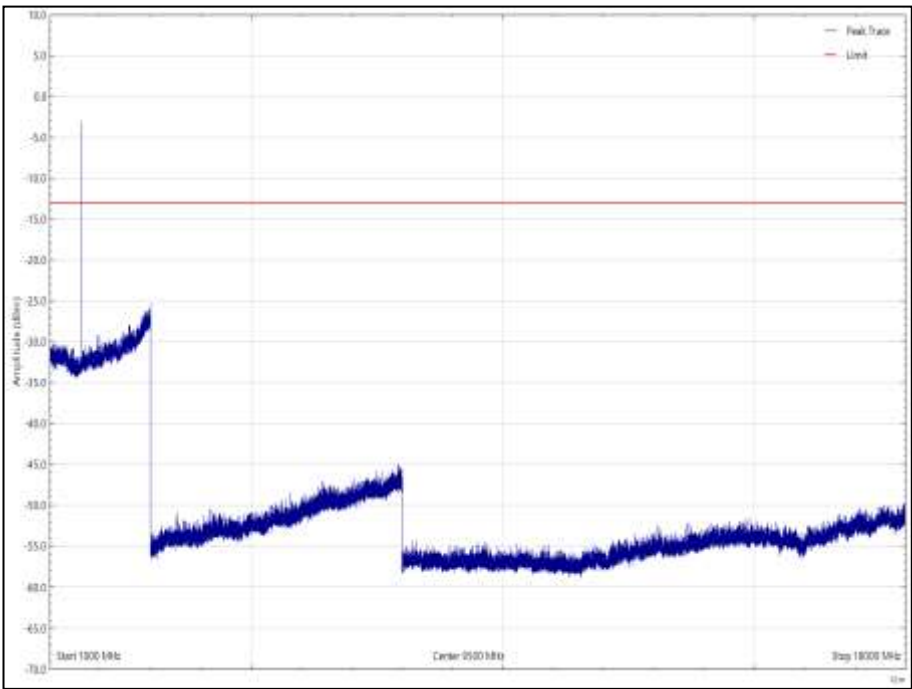


Figure 28 - 1625.9583 MHz - 1 GHz to 18 GHz, Horizontal, X Orientation

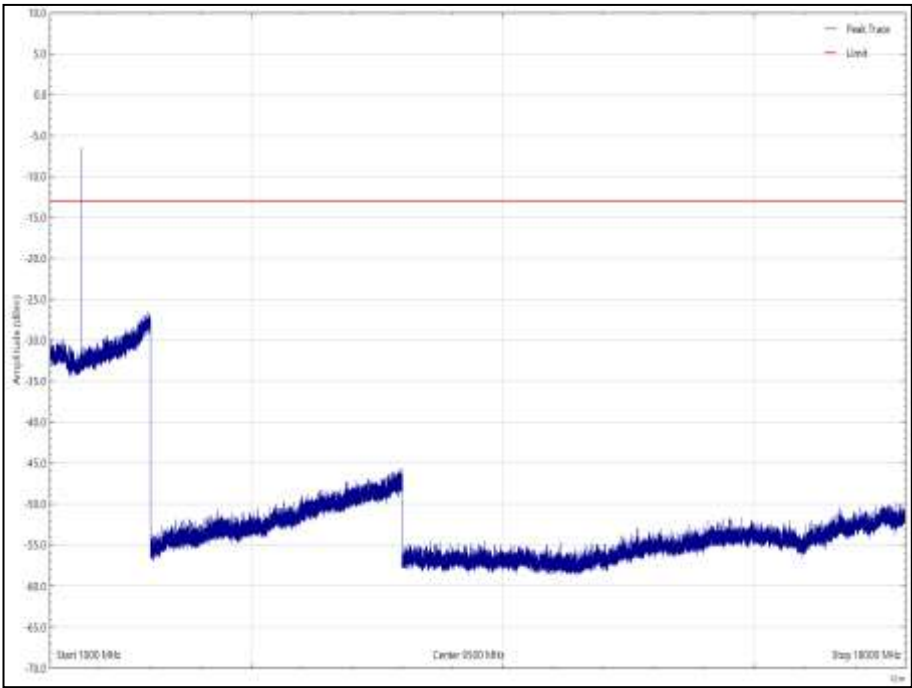


Figure 29 - 1625.9583 MHz - 1 GHz to 18 GHz, Vertical, X Orientation

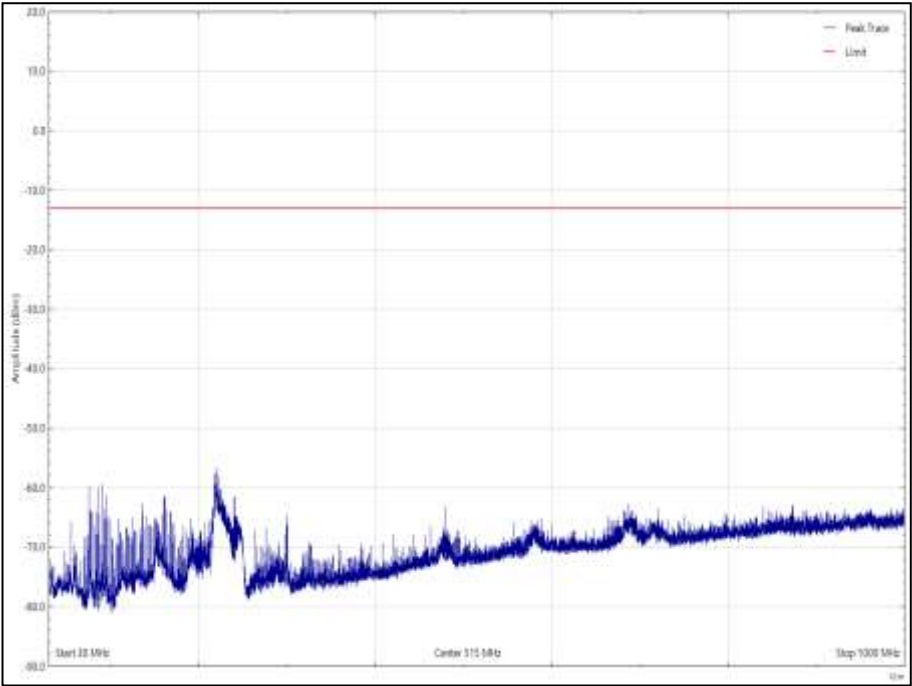


Figure 30 - 1625.9583 MHz - 30 MHz to 1GHz, Horizontal, Y Orientation

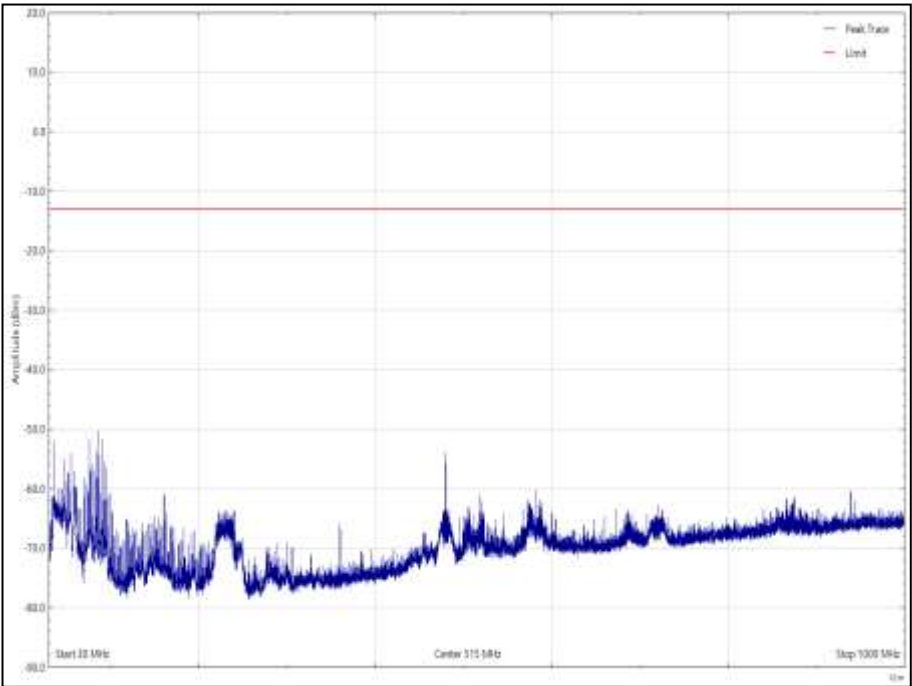


Figure 31 - 1625.9583 MHz - 30 MHz to 1GHz, Vertical, Y Orientation

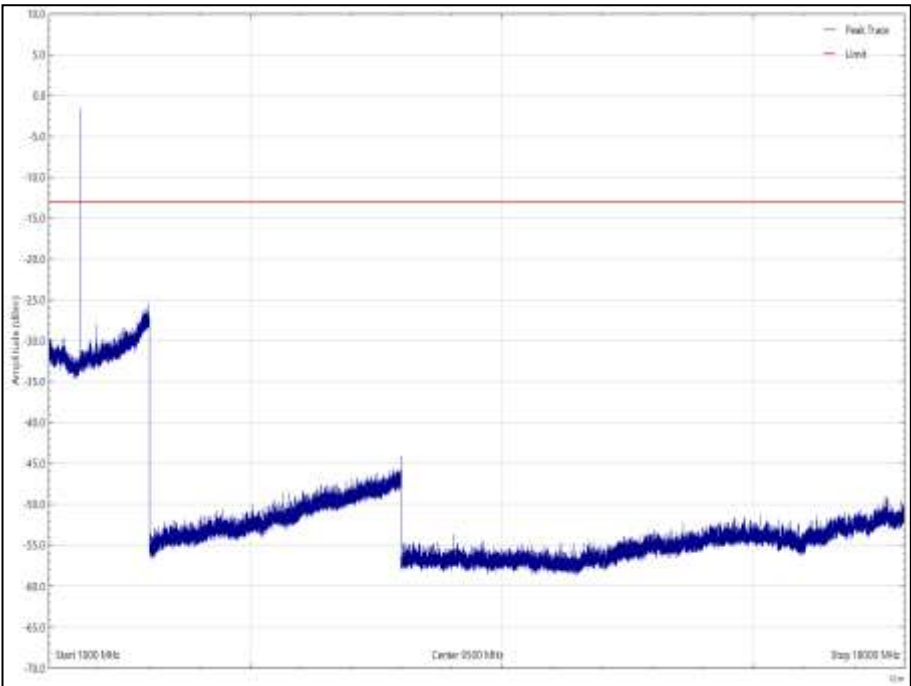


Figure 32 - 1625.9583 MHz - 1 GHz to 18 GHz, Horizontal, Y Orientation

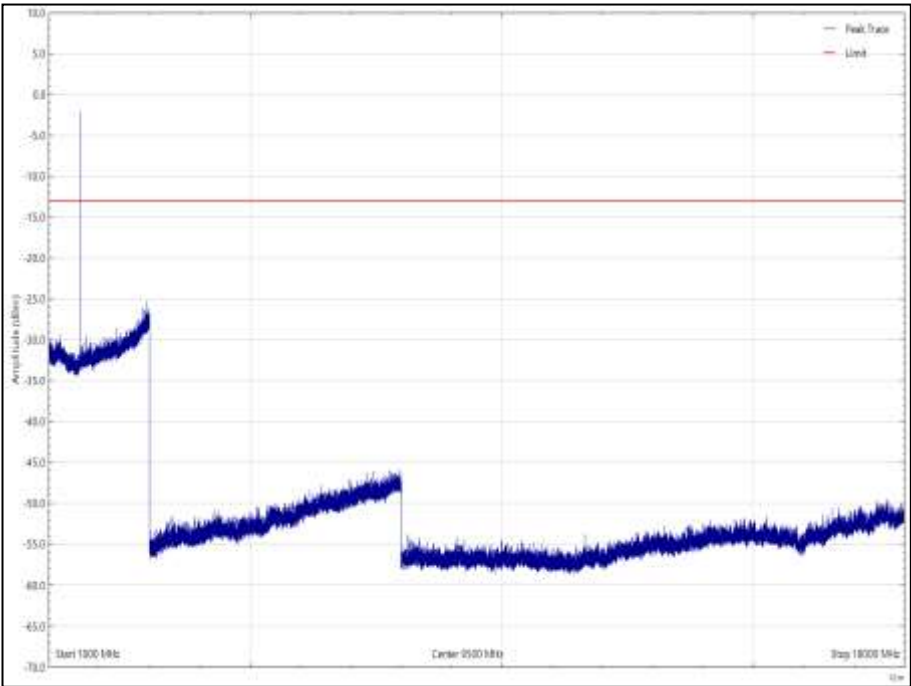


Figure 33 - 1625.9583 MHz - 1 GHz to 18 GHz, Vertical, Y Orientation

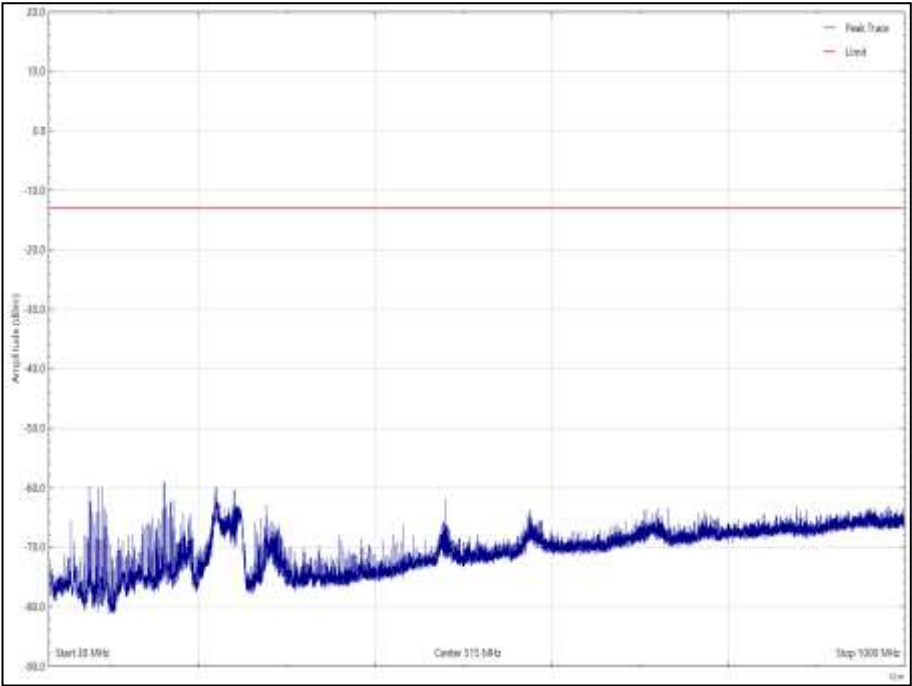


Figure 34 - 1625.9583 MHz - 30 MHz to 1GHz, Horizontal, Z Orientation

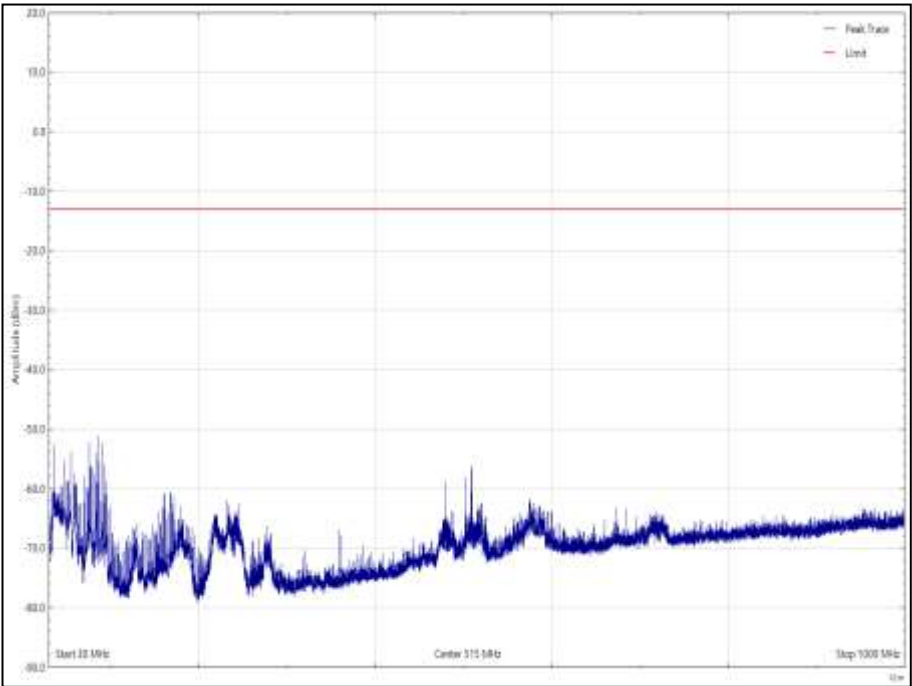


Figure 35 - 1625.9583 MHz - 30 MHz to 1GHz, Vertical, Z Orientation

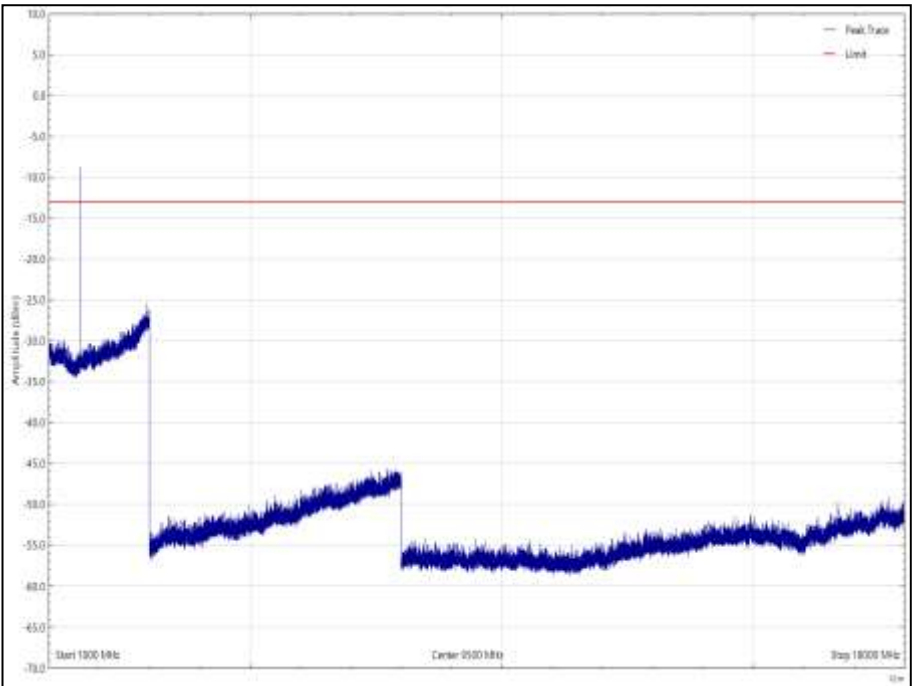


Figure 36 - 1625.9583 MHz - 1 GHz to 18 GHz, Horizontal, Z Orientation

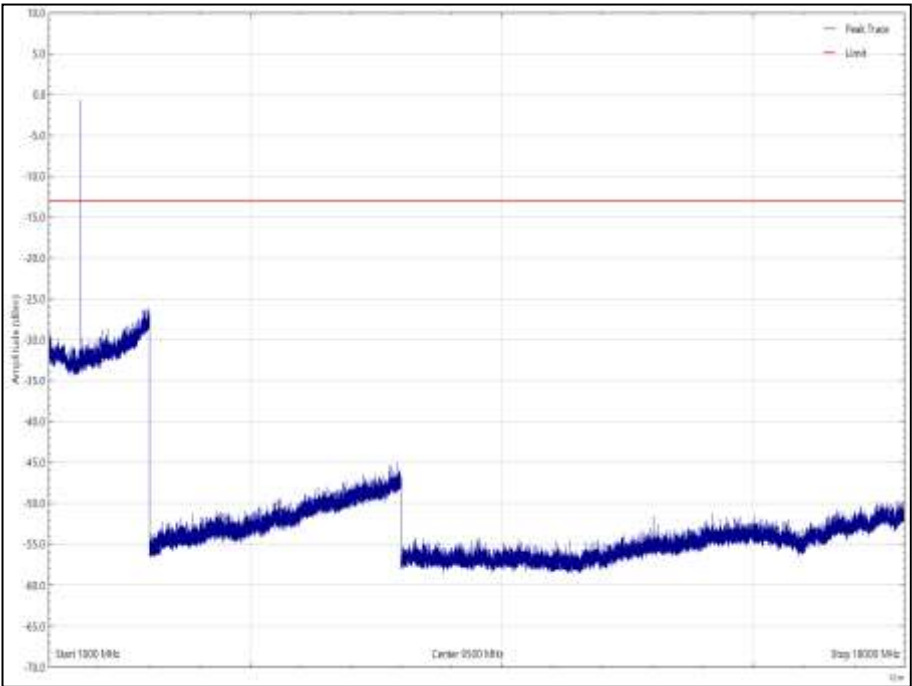


Figure 37 - 1625.9583 MHz - 1 GHz to 18 GHz, Vertical, Z Orientation



FCC 47 CFR Part 2, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;

35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;

$43 + 10 \log p$ (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

ISED RSS-170, Limit Clause 5.8

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the occupied bandwidth or necessary bandwidth, whichever is greater;

35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the occupied bandwidth or necessary bandwidth, whichever is greater;

$43 + 10 \log p$ (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the occupied bandwidth or necessary bandwidth, whichever is greater.



2.1.8 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Dual Power Supply Unit	Hewlett Packard	6253A	292	-	O/P Mon
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
True RMS Multimeter	Fluke	179	4006	12	22-Mar-2025
Test Receiver	Rohde & Schwarz	ESW44	5084	12	04-Nov-2024
Emissions Software	TUV SUD	EmX V3.4.2	5125	-	Software
3m Semi-Anechoic Chamber	Rainford	RF Chamber 11	5136	36	24-Nov-2024
Mast	Maturo	TAM 4.0-P	5158	-	TU
Mast and Turntable Controller	Maturo	Maturo NCD	5159	-	TU
Turntable	Maturo	TT 15WF	5160	-	TU
Antenna (DRG, 1 GHz to 10.5 GHz)	Schwarzbeck	BBHA9120B	5215	12	14-Jul-2025
Antenna (DRG, 7.5 GHz to 18 GHz)	Schwarzbeck	HWRD750	5216	12	14-Jul-2025
Pre-Amplifier (1 GHz to 26.5 GHz)	Agilent Technologies	8449B	5445	12	23-May-2025
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	13-May-2025
Cable (K-Type to K-Type, 1 m)	Junkosha	MWX241-01000KMSKMS/A	5512	12	23-May-2025
Cable (SMA to SMA, 2 m)	Junkosha	MWX221-02000AMSAMS/A	5518	12	18-Apr-2025
Pre-Amplifier (8 GHz to 18 GHz)	Wright Technologies	APS06-0061	5595	12	26-Oct-2024
Antenna (Tri-log, 30 MHz to 1 GHz)	Schwarzbeck	VULB 9168	5942	24	24-May-2026
Cable (N to N 8m)	Junkosha	MWX221-08000NMSNMS/B	6330	12	17-Feb-2025

Table 19

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment



2.2 Modulation Characteristics

2.2.1 Specification Reference

FCC 47 CFR Part 2 Clause 2.1047 (d)

2.2.2 Equipment Under Test and Modification State

Model: 9704, S/N: 1A009B - Modification State 0

2.2.3 Date of Test

14-October-2024

2.2.4 Test Method

A declaration was made by the manufacturer.

2.2.5 Test Results

DC Powered - Iridium (C1)

When operating its radio, multiple channel modulation schemes are used with selectable bandwidths.

Most of these channels use quadrature phase shift keying (QPSK) modulation with 20% (40% for 25 ksym/s channels) square-root raised cosine pulse shaping, and a symbol transmission rate selected from 25ksym/s, 30ksym/s or 60ksym/s depending on the channel operating bandwidth. The highest symbol rate traffic channel also uses a QPSK modulation scheme with 20% square-root raised cosine pulse shaping, at a transmission rate of 60ksym/s

FCC 47 CFR Part 2, Limit Clause 2.1047 (d)

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.



2.3 Occupied Bandwidth

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
ISED RSS-GEN, Clause 6.7

2.3.2 Equipment Under Test and Modification State

Model: 9704, S/N: 1A007Z - Modification State 0

2.3.3 Date of Test

14-October-2024

2.3.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.4.4.

2.3.5 Environmental Conditions

Ambient Temperature	21.6 °C
Relative Humidity	60.4 %

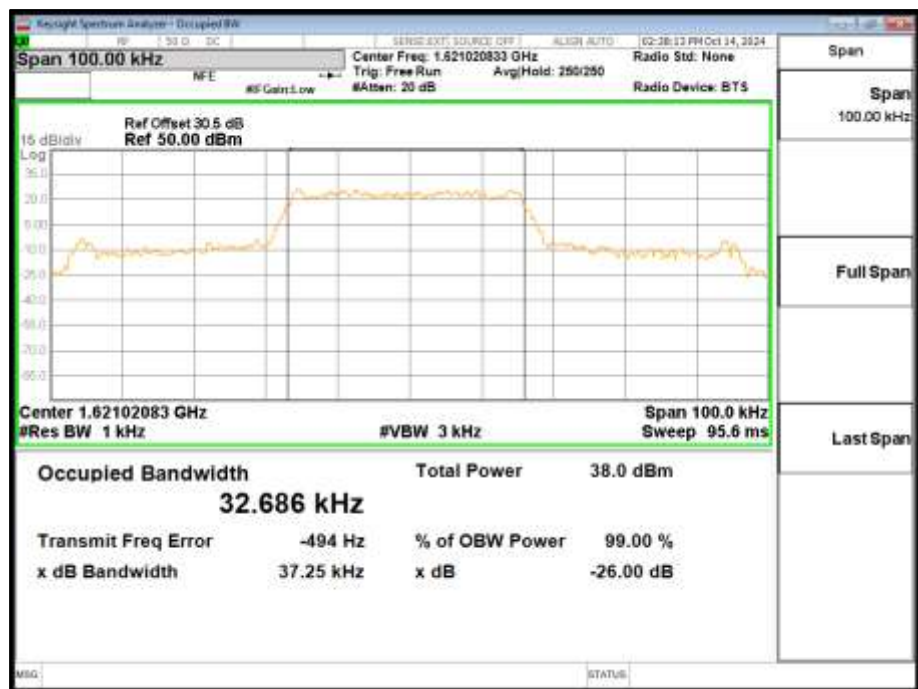


Figure 39 - 1621.020833 MHz

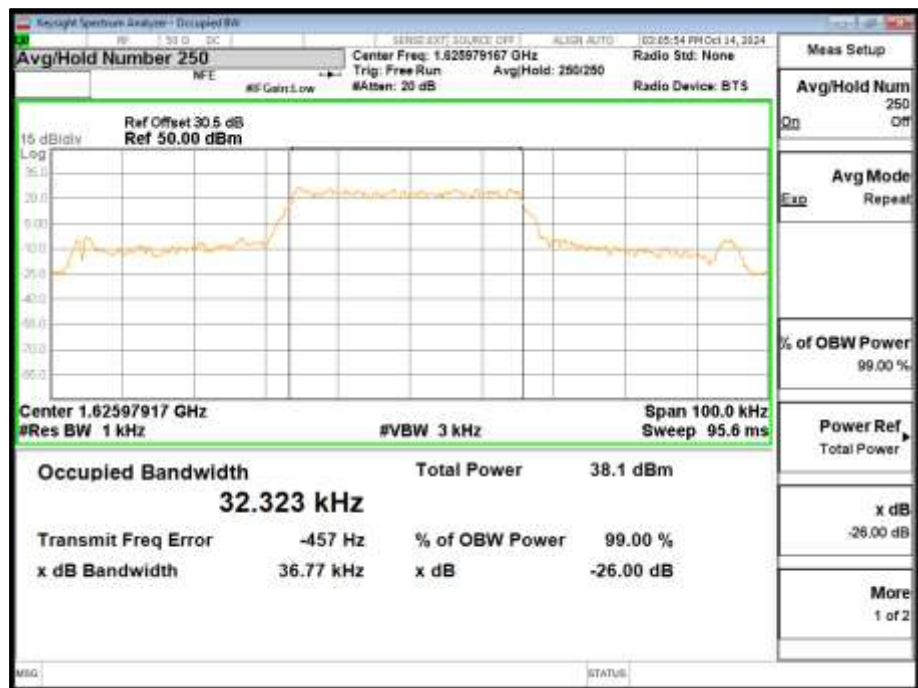


Figure 40 - 1625.979167 MHz



DC Powered - Iridium (B1)

Occupied Bandwidth (kHz)		
1616.020833 MHz	1621.020833 MHz	1625.979167 MHz
32.052	31.834	31.419

Table 21



Figure 41 - 1616.020833 MHz

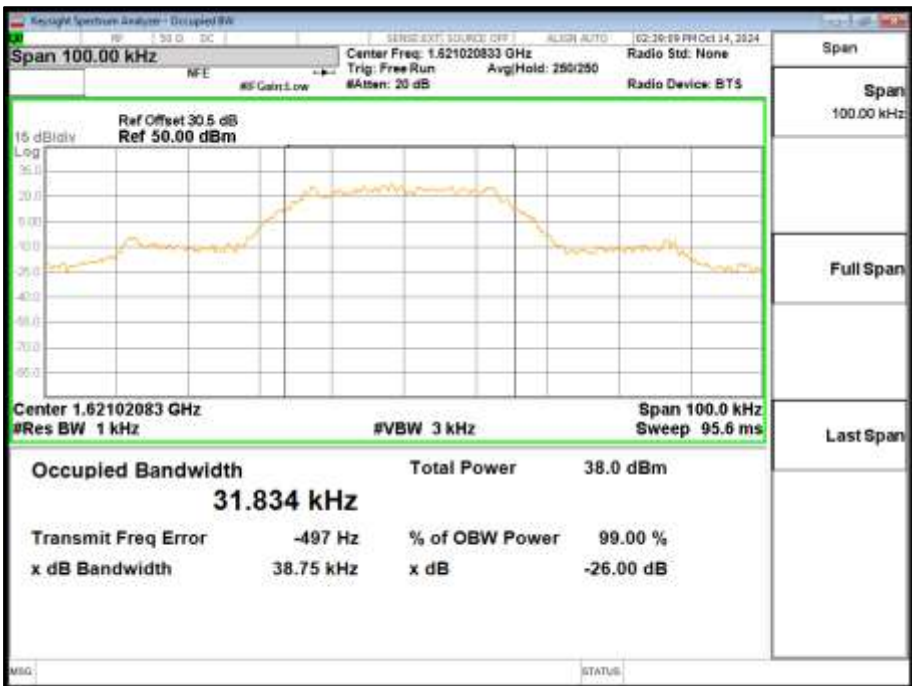




Figure 42 - 1621.020833 MHz



Figure 43 - 1625.979167 MHz



DC Powered - Iridium (C2)

Occupied Bandwidth (kHz)		
1616.041667 MHz	1621.041667 MHz	1625.958333 MHz
65.094	64.878	64.782

Table 22

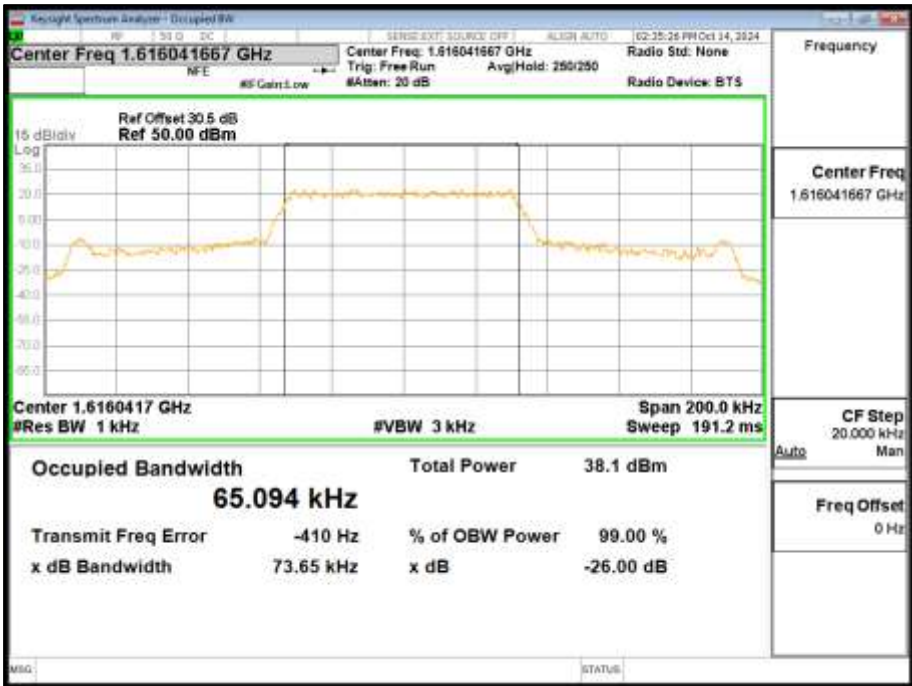


Figure 44 - 1616.041667 MHz





Figure 45 - 1621.041667 MHz

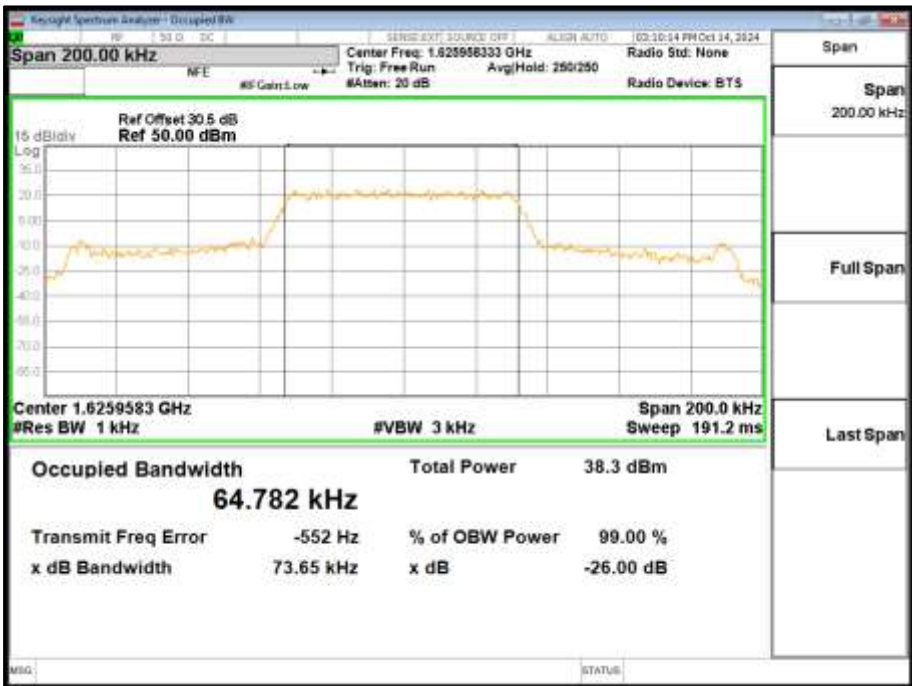


Figure 46 - 1625.958333 MHz



2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
True RMS Multimeter	Fluke	79 Series III	411	12	12-Jan-2025
Hygrometer	Rotronic	I-1000	3220	12	28-Nov-2024
GPSDR Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	09-Mar-2025
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	18-Apr-2025
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5419	12	02-Aug-2025
Programmable Power Supply 188 W	Rohde & Schwarz	HMP2020x0	6598	-	O/P Mon

Table 23

O/P Mon – Output Monitored using calibrated equipment



2.4 Frequency Tolerance

2.4.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(d)
FCC 47 CFR Part 2, Clause 2.1055
Industry Canada RSS-170, Clause 5.3

2.4.2 Equipment Under Test and Modification State

Model: 9704, S/N: 1A007Z - Modification State 0

2.4.3 Date of Test

15-October-2024

2.4.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.6.

The measurement was made with the carrier modulated using a spectrum analyser. The mid-point frequency was determined from the upper and lower -10 dBc points.

2.4.5 Environmental Conditions

Ambient Temperature	22.7 °C
Relative Humidity	47.9 %



2.4.6 Test Results

DC Powered - Iridium (C1)

Temperature (°C)	Voltage (V _{DC})	1616.020833 MHz		1621.020833 MHz		1625.979167 MHz	
		Frequency Error (%)	Frequency Error (ppm)	Frequency Error (%)	Frequency Error (ppm)	Frequency Error (%)	Frequency Error (ppm)
-30	3.7	0.000045	0.448	0.000047	0.473	0.000044	0.444
-20	3.7	0.000025	0.253	0.000031	0.312	0.000024	0.241
-10	3.7	0.000068	0.676	0.000060	0.598	0.000060	0.598
0	3.7	0.000024	0.240	0.000035	0.351	0.000042	0.418
10	3.7	0.000007	0.067	0.000006	0.065	0.000008	0.082
20	3.5	0.000021	0.208	0.000011	0.110	0.000004	0.041
20	3.7	0.000013	0.127	0.000012	0.116	0.000004	0.040
20	4.5	0.000009	0.091	0.000018	0.180	0.000004	0.044
30	3.7	0.000016	0.162	0.000028	0.283	0.000030	0.303
40	3.7	0.000059	0.592	0.000071	0.709	0.000056	0.563
50	3.7	0.000065	0.650	0.000078	0.782	0.000053	0.535

Table 24

DC Powered - Iridium (B1)

Temperature (°C)	Voltage (V _{DC})	1616.020833 MHz		1621.020833 MHz		1625.979167 MHz	
		Frequency Error (%)	Frequency Error (ppm)	Frequency Error (%)	Frequency Error (ppm)	Frequency Error (%)	Frequency Error (ppm)
-30	3.7	0.000088	0.876	0.000038	0.378	0.000089	0.891
-20	3.7	0.000036	0.365	0.000008	0.076	0.000062	0.618
-10	3.7	0.000053	0.530	0.000090	0.903	0.000073	0.728
0	3.7	0.000045	0.453	0.000066	0.661	0.000011	0.109
10	3.7	0.000018	0.179	0.000047	0.471	0.000018	0.182
20	3.5	0.000011	0.110	0.000024	0.236	0.000030	0.304
20	3.7	0.000007	0.075	0.000011	0.114	0.000024	0.244
20	4.5	0.000000	0.003	0.000039	0.393	0.000010	0.105
30	3.7	0.000015	0.150	0.000016	0.155	0.000025	0.246
40	3.7	0.000030	0.304	0.000049	0.492	0.000079	0.792
50	3.7	0.000067	0.674	0.000071	0.711	0.000092	0.919

Table 25



DC Powered - Iridium (C2)

Temperature (°C)	Voltage (V _{DC})	1616.041667 MHz		1621.041667 MHz		1625.958333 MHz	
		Frequency Error (%)	Frequency Error (ppm)	Frequency Error (%)	Frequency Error (ppm)	Frequency Error (%)	Frequency Error (ppm)
-30	3.7	0.000054	0.537	0.000019	0.194	0.000043	0.429
-20	3.7	0.000034	0.344	0.000038	0.383	0.000032	0.320
-10	3.7	0.000053	0.530	0.000014	0.143	0.000073	0.733
0	3.7	0.000036	0.363	0.000049	0.487	0.000027	0.269
10	3.7	0.000019	0.194	0.000038	0.381	0.000025	0.247
20	3.5	0.000012	0.115	0.000018	0.177	0.000005	0.048
20	3.7	0.000031	0.311	0.000003	0.030	0.000040	0.405
20	4.5	0.000040	0.402	0.000007	0.075	0.000008	0.076
30	3.7	0.000039	0.393	0.000017	0.173	0.000051	0.514
40	3.7	0.000077	0.768	0.000063	0.631	0.000044	0.440
50	3.7	0.000079	0.792	0.000055	0.549	0.000083	0.829

Table 26

FCC 47 CFR Part 2, Limit Clause 25.202(d)

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

ISED RSS-170, Limit Clause 5.3

For MES equipment, the carrier frequency shall not drift from the reference frequency by more than ± 10 ppm.



2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
True RMS Multimeter	Fluke	79 Series III	411	12	12-Jan-2025
Thermocouple Thermometer	Fluke	51	3173	12	31-May-2025
Hygrometer	Rotronic	I-1000	3220	12	28-Nov-2024
GPSDR Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	09-Mar-2025
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5419	12	02-Aug-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
Climatic Chamber	Weiss Technik	TempEvent T/180/40/3	5894	12	15-Aug-2024
Programmable Power Supply 188 W	Rohde & Schwarz	HMP2020x0	6598	-	O/P Mon

Table 27

O/P Mon – Output Monitored using calibrated equipment



2.5 Spurious Emissions at Antenna Terminals

2.5.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(f)
FCC 47 CFR Part 2, Clause 2.1051
Industry Canada RSS-170, Clause 5.8
ISED RSS-GEN, Clause 6.13

2.5.2 Equipment Under Test and Modification State

S/N: 1A007Z - Modification State 0

2.5.3 Date of Test

16-October-2024 – 11-November-2024

2.5.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.7.

Where a RBW > 4 kHz was used, this was considered worst case. For measurements below 3 GHz, a gated trigger was used and measurements were averaged over the active part of the burst. For measurements above 3 GHz, a 3 GHz high pass filter was used, therefore the trace was set to max hold which again was considered worst case.

The antenna gain declared by the manufacturer was included in the reference level offset.

2.5.5 Environmental Conditions

Ambient Temperature	20.1 - 23.5 °C
Relative Humidity	55.8 - 60.2 %



2.5.6 Test Results

DC Powered - Iridium (C1)

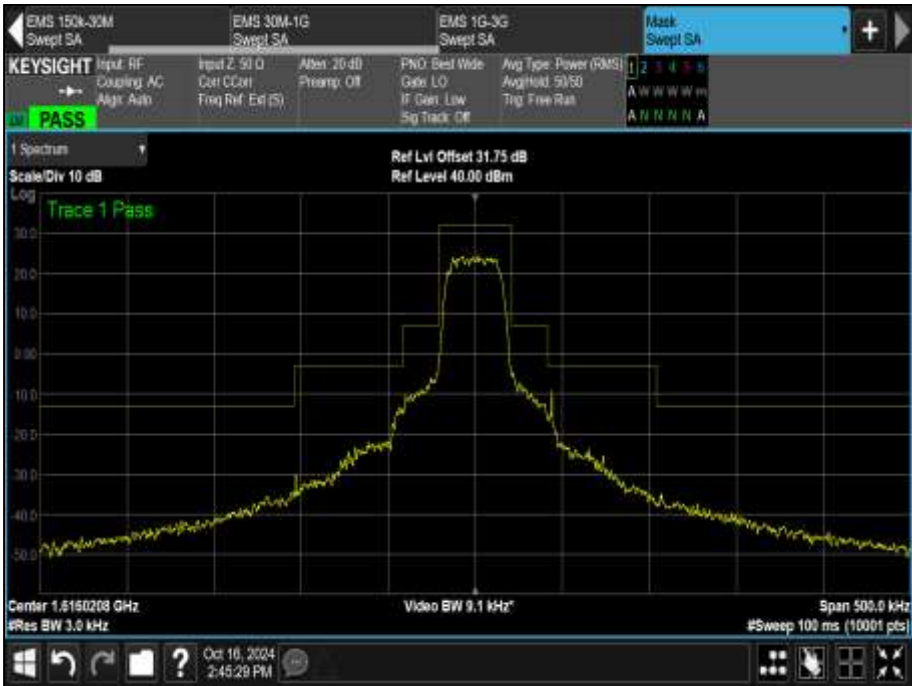


Figure 47 - 1616.020833 MHz - Emission Mask



Figure 48 - 1616.020833 MHz - 9 kHz to 150 kHz



Figure 49 - 1616.020833 MHz - 150 kHz to 30 MHz



Figure 50 - 1616.020833 MHz - 30 MHz to 1 GHz



Figure 51 - 1616.020833 MHz - 1 GHz to 3 GHz

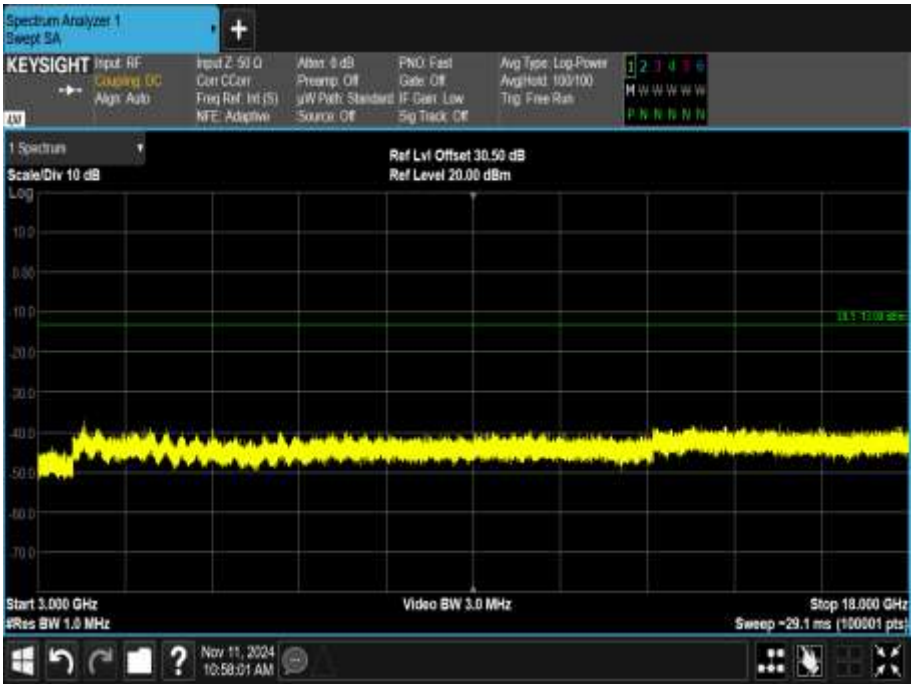


Figure 52 - 1616.020833 MHz - 3 GHz to 18 GHz

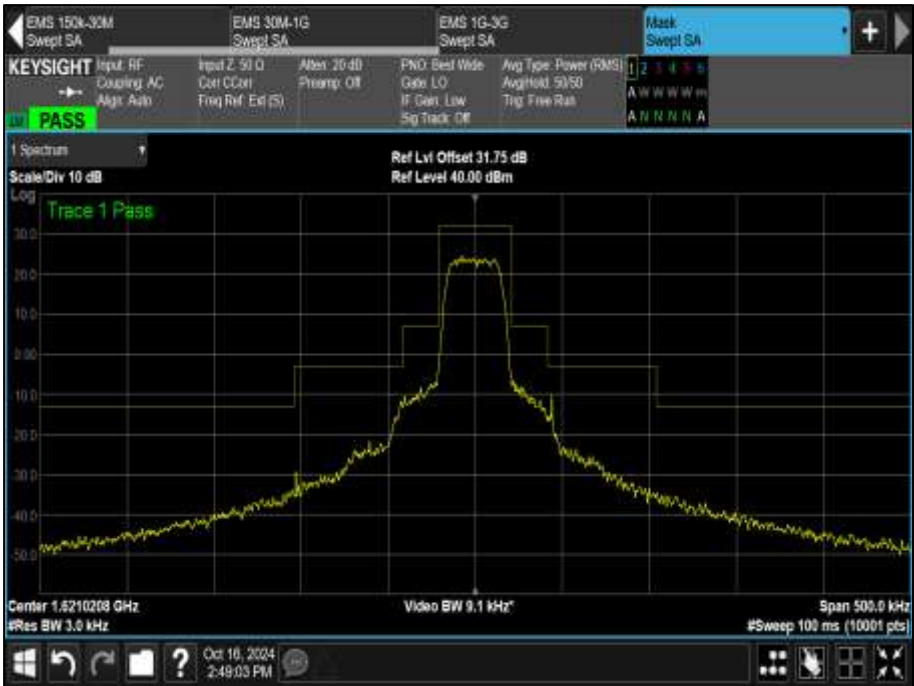


Figure 53 - 1621.020833 MHz - Emission Mask



Figure 54 - 1621.020833 MHz - 9 kHz to 150 kHz



Figure 55 - 1621.020833 MHz - 150 kHz to 30 MHz

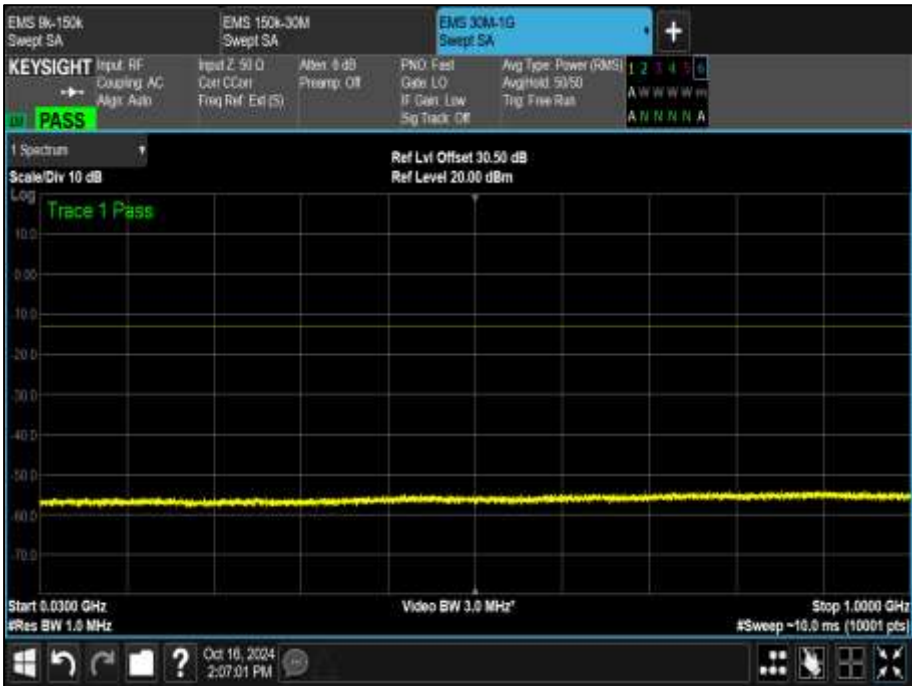


Figure 56 - 1621.020833 MHz - 30 MHz to 1 GHz



Figure 57 - 1621.020833 MHz - 1 GHz to 3 GHz

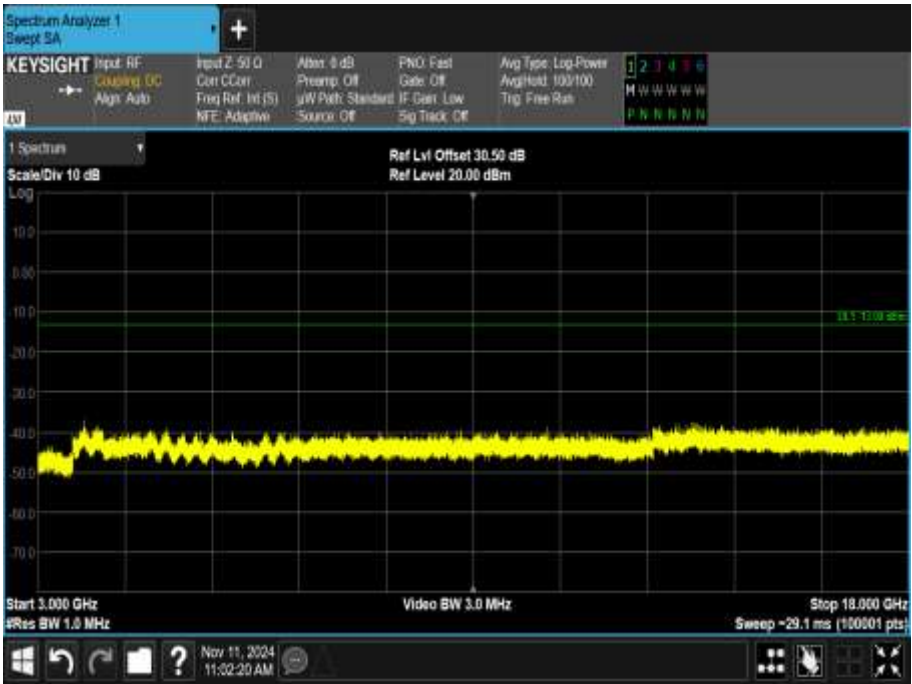


Figure 58 - 1621.020833 MHz - 3 GHz to 18 GHz

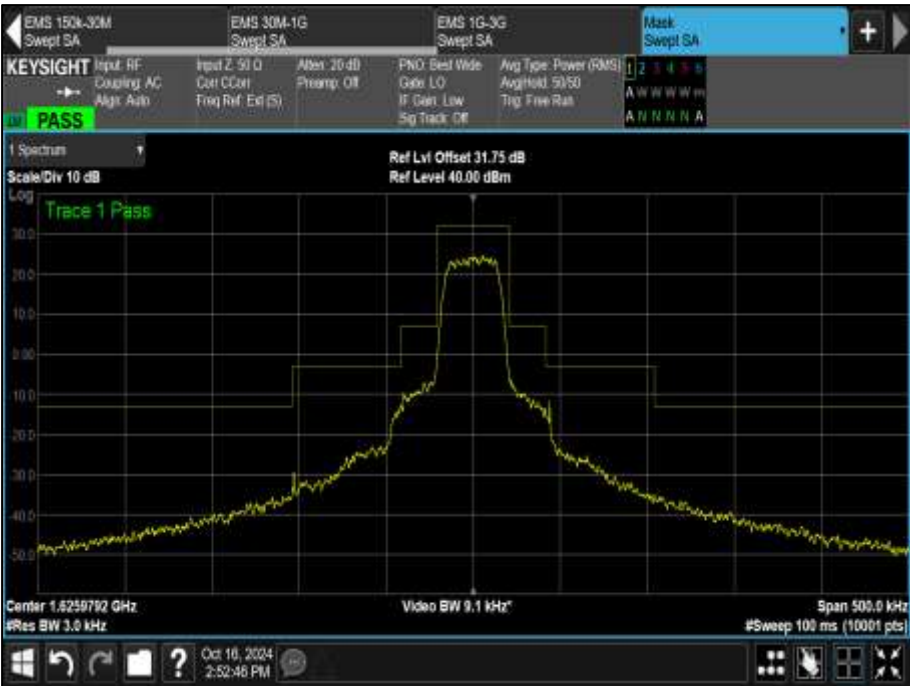


Figure 59 - 1625.979167 MHz - Emission Mask



Figure 60 - 1625.979167 MHz - 9 kHz to 150 kHz

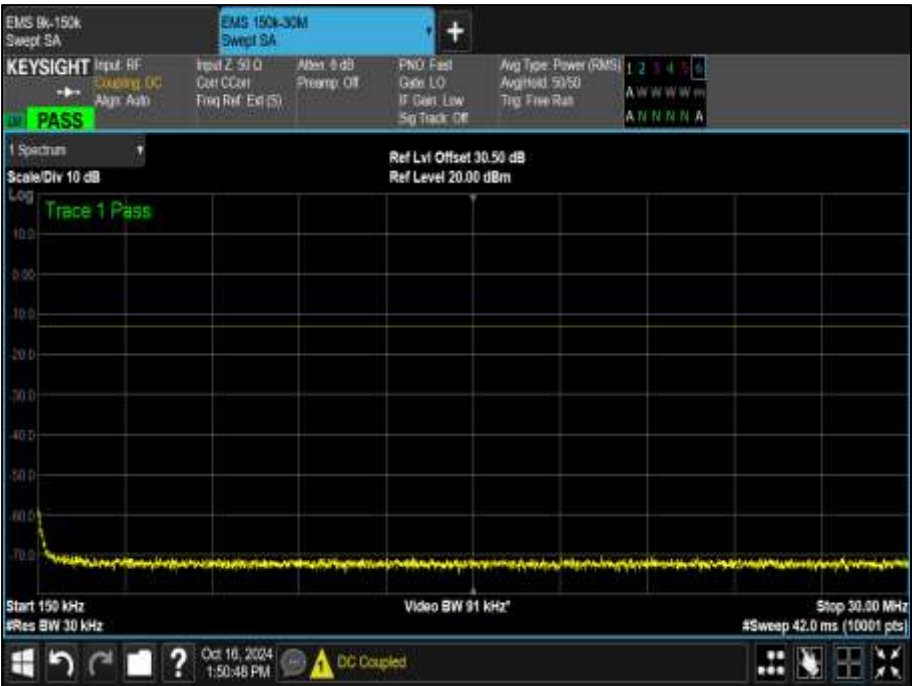


Figure 61 - 1625.979167 MHz - 150 kHz to 30 MHz



Figure 62 - 1625.979167 MHz - 30 MHz to 1 GHz



Figure 63 - 1625.979167 MHz - 1 GHz to 3 GHz

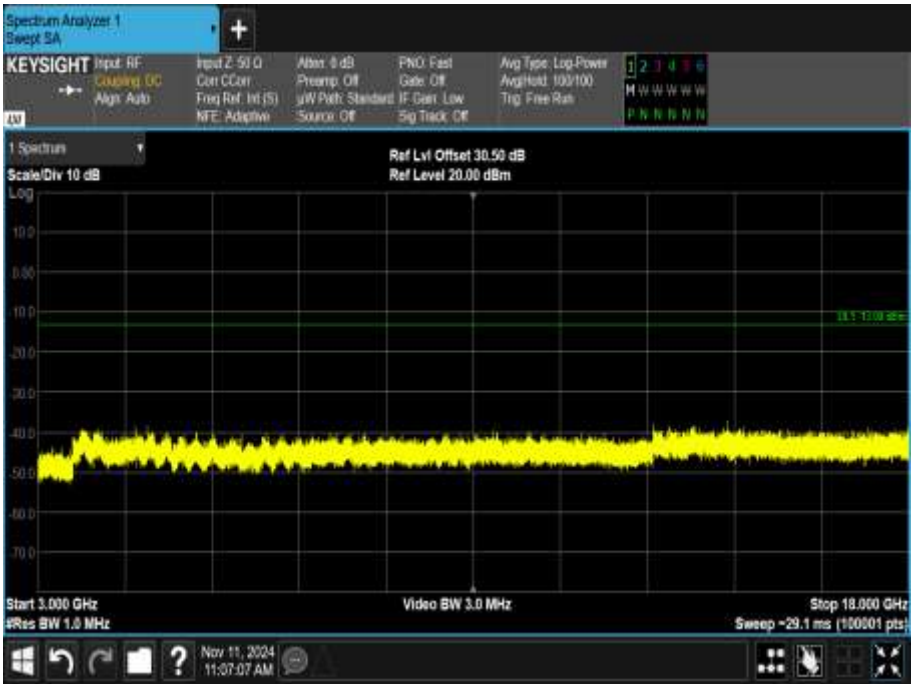


Figure 64 - 1625.979167 MHz - 3 GHz to 18 GHz



DC Powered - Iridium (B1)

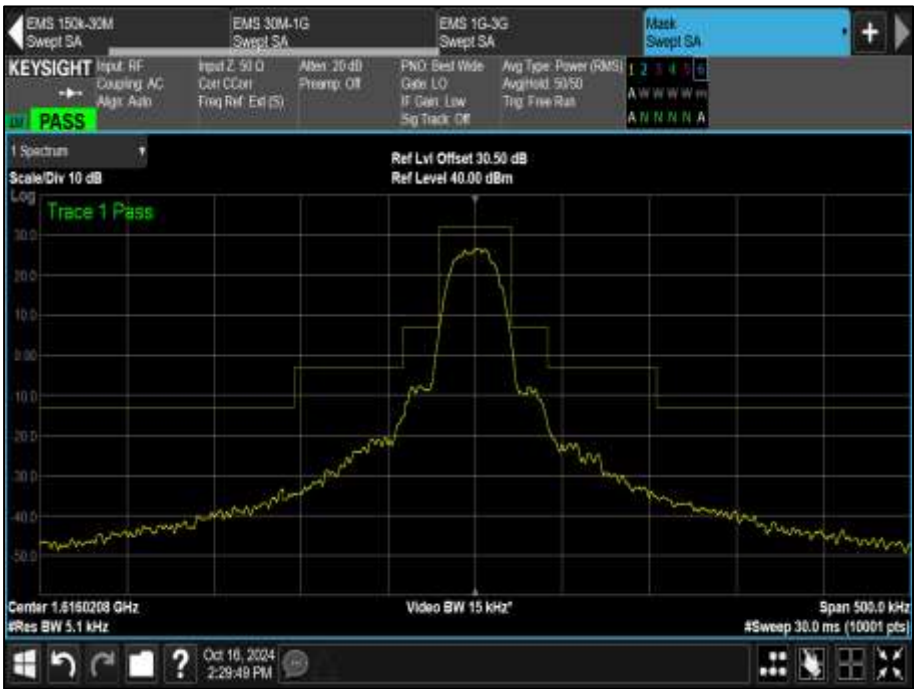


Figure 65 - 1616.020833 MHz - Emission Mask



Figure 66 - 1616.020833 MHz - 9 kHz to 150 kHz

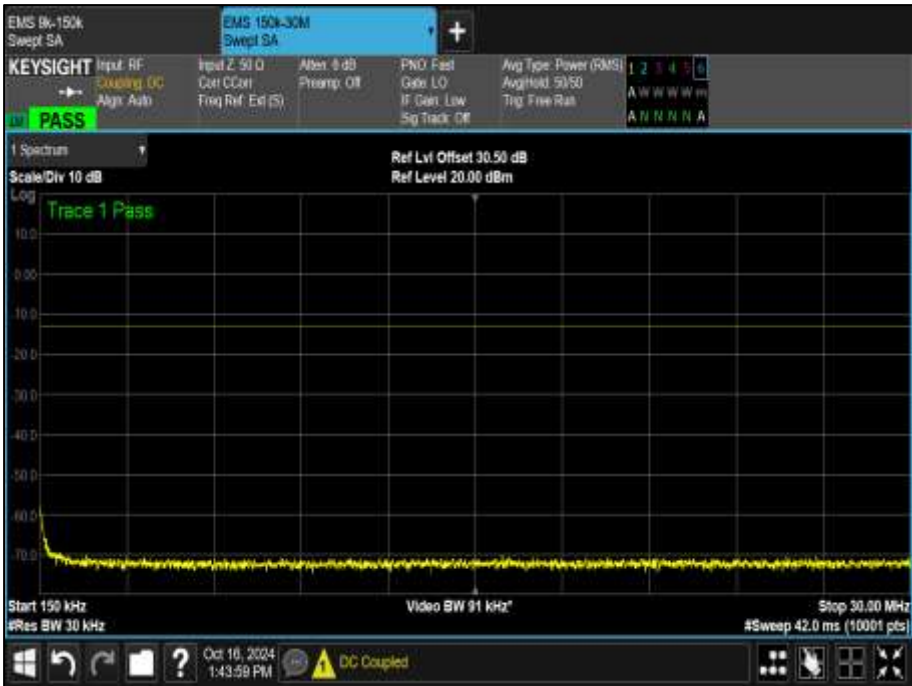


Figure 67 - 1616.020833 MHz - 150 kHz to 30 MHz

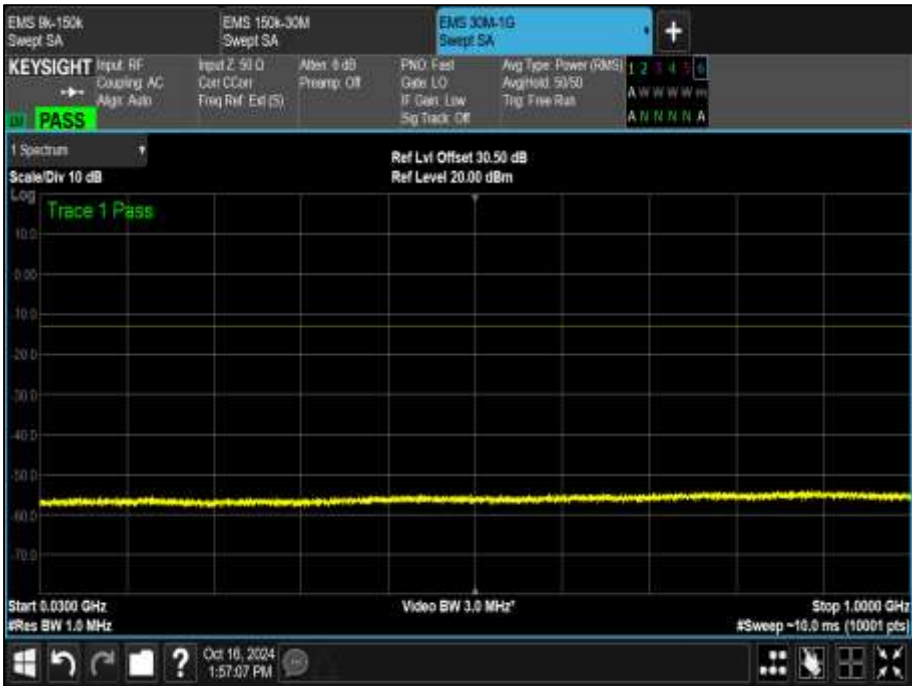


Figure 68 - 1616.020833 MHz - 30 MHz to 1 GHz



Figure 69 - 1616.020833 MHz - 1 GHz to 3 GHz

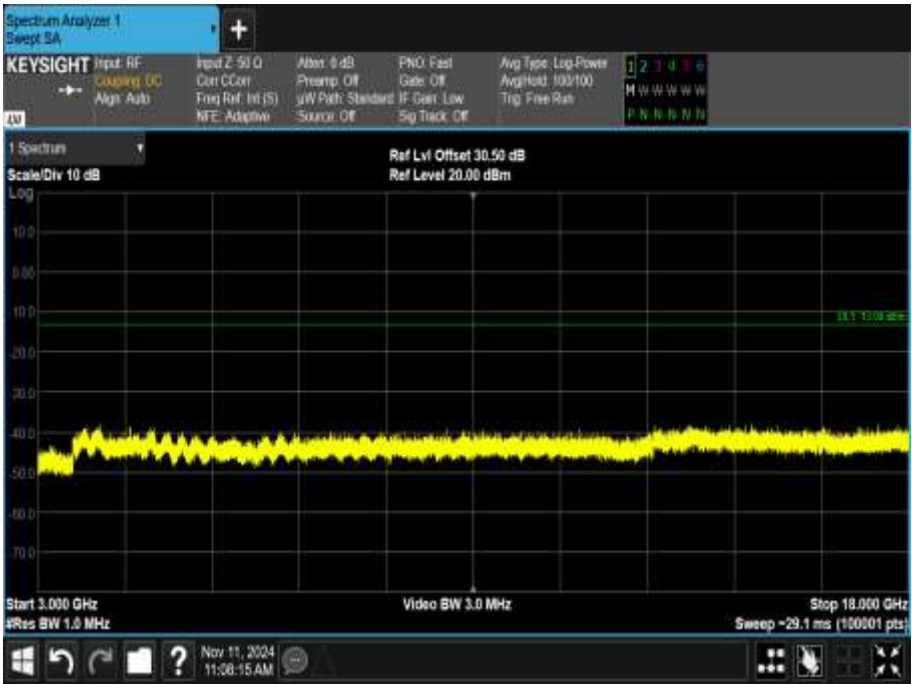


Figure 70 - 1616.020833 MHz - 3 GHz to 18 GHz

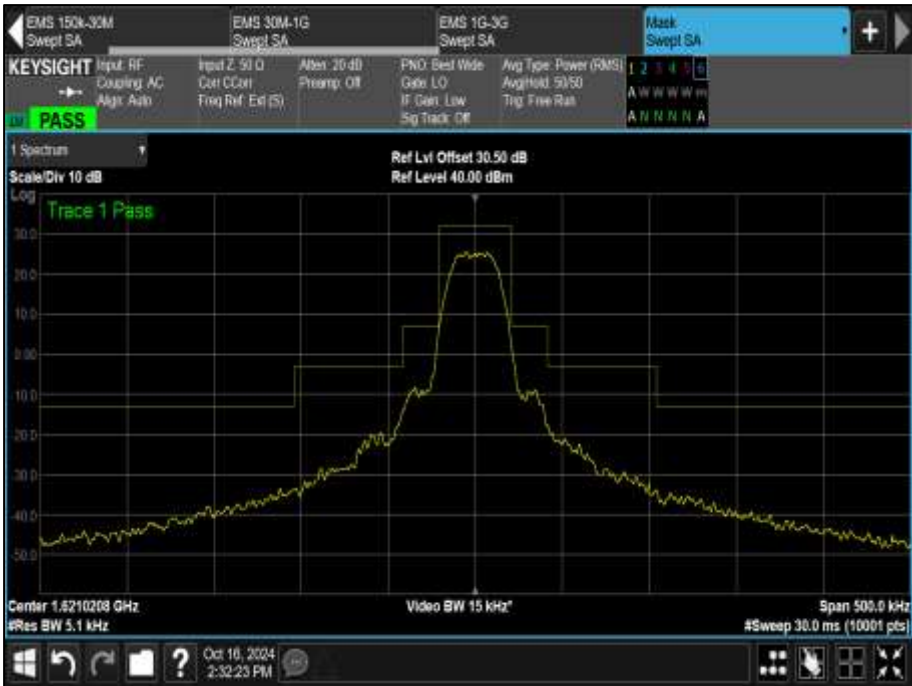


Figure 71 - 1621.020833 MHz - Emission Mask



Figure 72 - 1621.020833 MHz - 9 kHz to 150 kHz



Figure 73 - 1621.020833 MHz - 150 kHz to 30 MHz



Figure 74 - 1621.020833 MHz - 30 MHz to 1 GHz



Figure 75 - 1621.020833 MHz - 1 GHz to 3 GHz

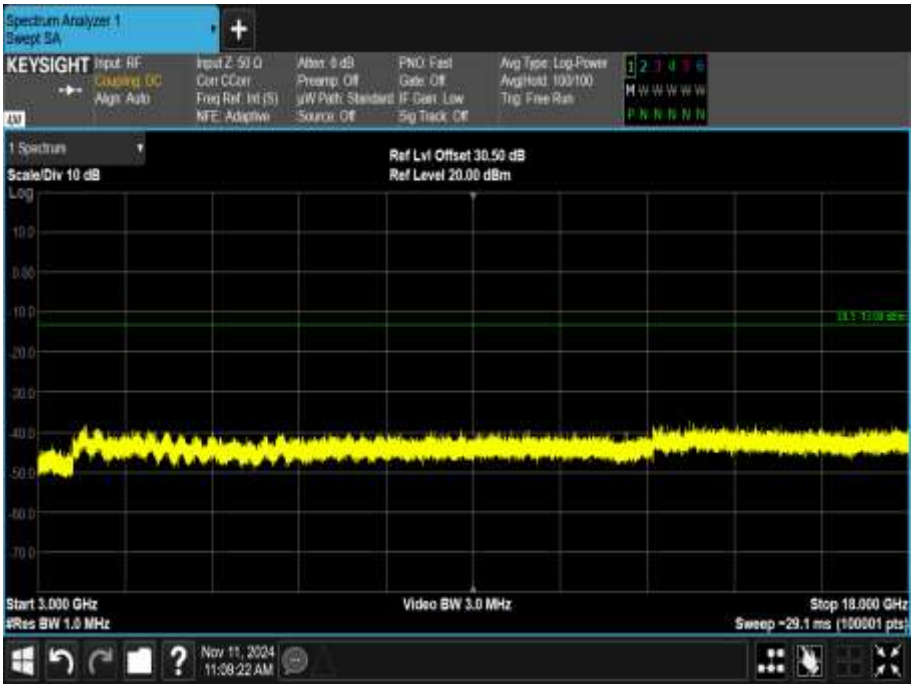


Figure 76 - 1621.020833 MHz - 3 GHz to 18 GHz

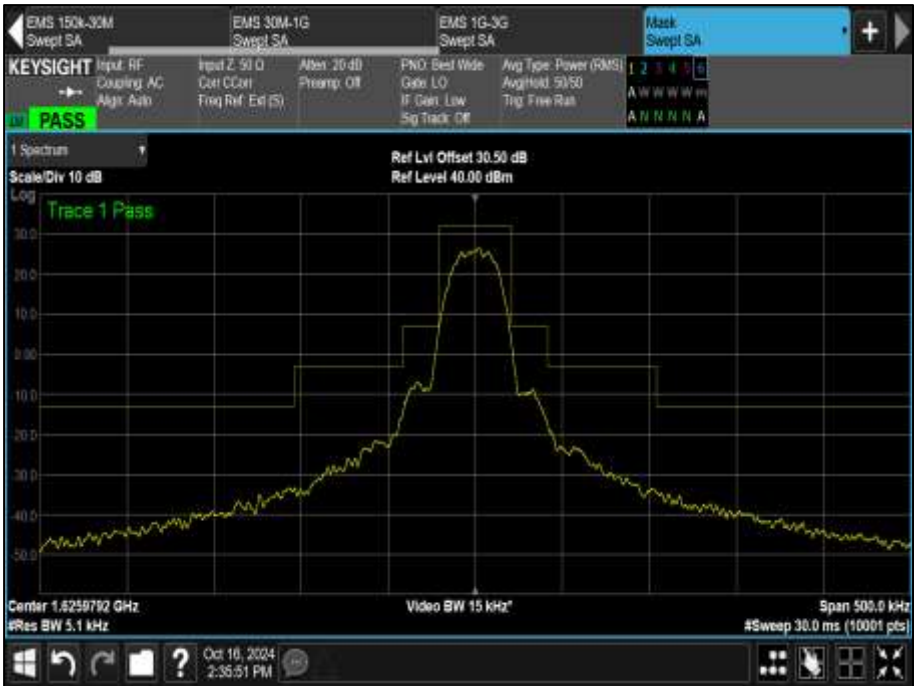


Figure 77 - 1625.979167 MHz - Emission Mask



Figure 78 - 1625.979167 MHz - 9 kHz to 150 kHz



Figure 79 - 1625.979167 MHz - 150 kHz to 30 MHz



Figure 80 - 1625.979167 MHz - 30 MHz to 1 GHz



Figure 81 - 1625.979167 MHz - 1 GHz to 3 GHz

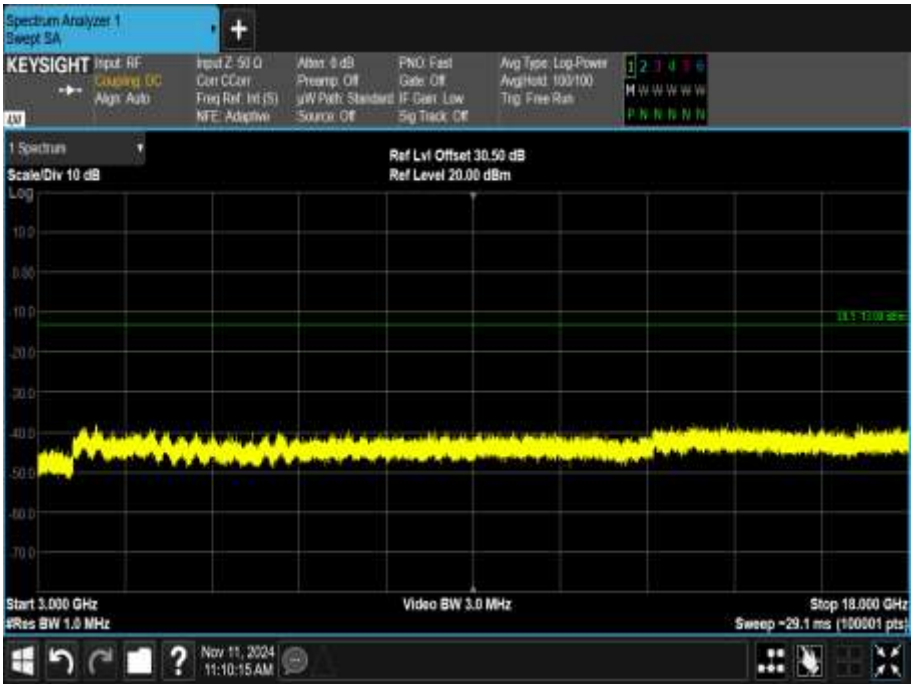


Figure 82 - 1625.979167 MHz - 3 GHz to 18 GHz



DC Powered - Iridium (C2)



Figure 83 - 1616.041667 MHz - Emission Mask



Figure 84 - 1616.041667 MHz - 9 kHz to 150 kHz



Figure 85 - 1616.041667 MHz - 150 kHz to 30 MHz



Figure 86 - 1616.041667 MHz - 30 MHz to 1 GHz



Figure 87 - 1616.041667 MHz - 1 GHz to 3 GHz

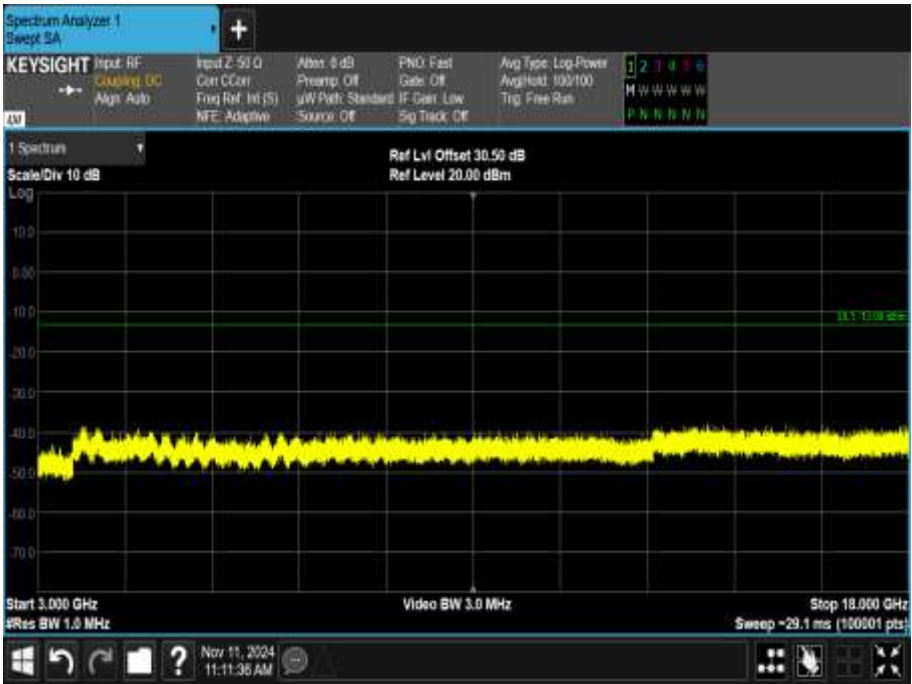


Figure 88 - 1616.041667 MHz - 3 GHz to 18 GHz



Figure 89 - 1621.041667 MHz - Emission Mask



Figure 90 - 1621.041667 MHz - 9 kHz to 150 kHz

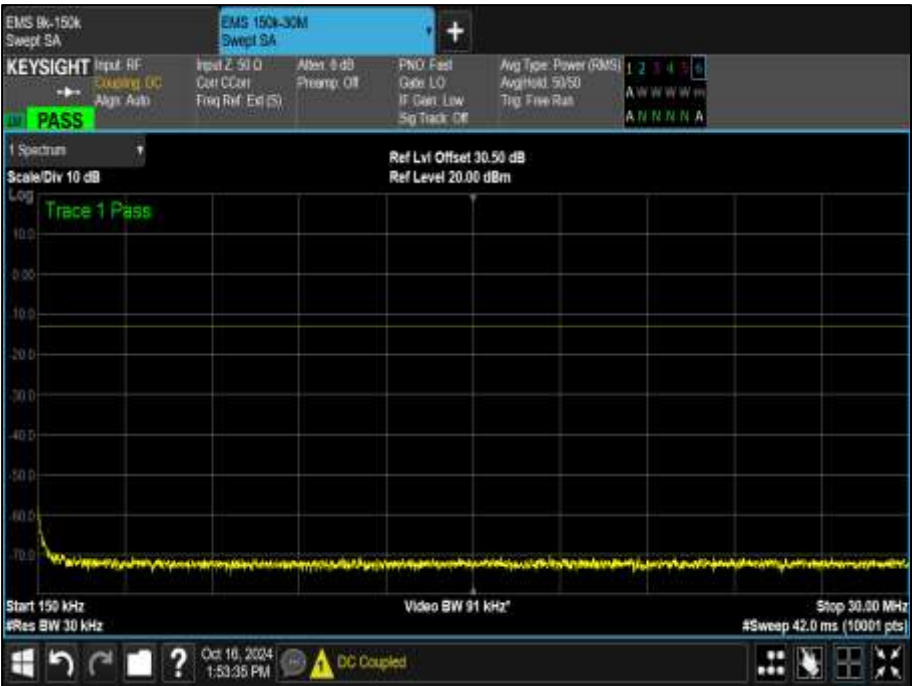


Figure 91 - 1621.041667 MHz - 150 kHz to 30 MHz



Figure 92 - 1621.041667 MHz - 30 MHz to 1 GHz



Figure 93 - 1621.041667 MHz - 1 GHz to 3 GHz

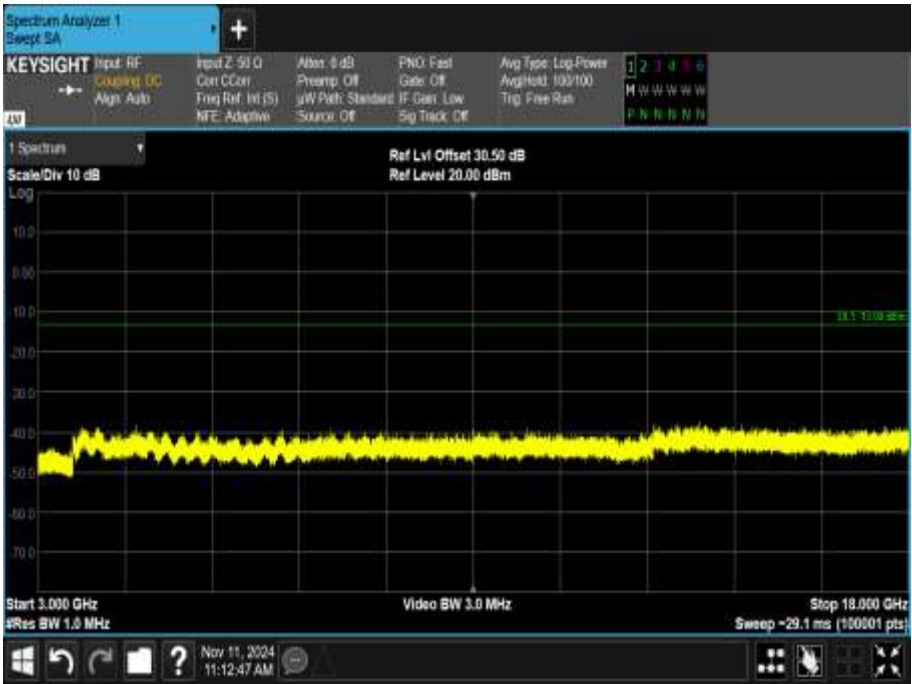


Figure 94 - 1621.041667 MHz - 3 GHz to 18 GHz



Figure 95 - 1625.958333 MHz - Emission Mask



Figure 96 - 1625.958333 MHz - 9 kHz to 150 kHz



Figure 97 - 1625.958333 MHz - 150 kHz to 30 MHz



Figure 98 - 1625.958333 MHz - 30 MHz to 1 GHz



Figure 99 - 1625.958333 MHz - 1 GHz to 3 GHz

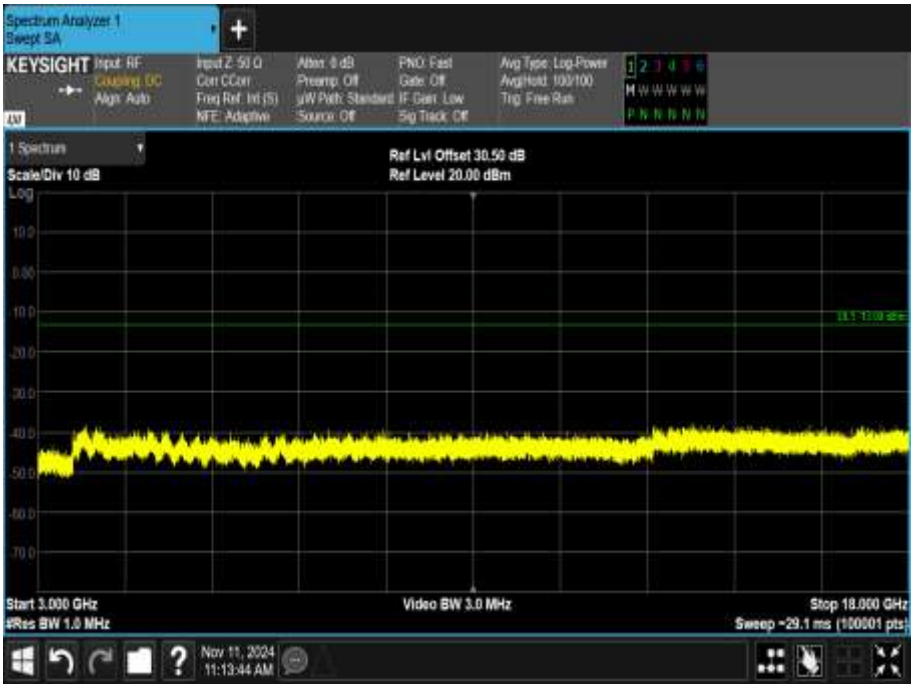


Figure 100 - 1625.958333 MHz - 3 GHz to 18 GHz



FCC 47 CFR Part 2, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

- 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50 %, up to and including 100 % of the authorised bandwidth;
- 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100 %, up to and including 250 % of the authorised bandwidth;
- $43 + 10 \log p$ (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250 % of the authorised bandwidth.

ISED RSS-170, Limit Clause 5.8

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

- 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50 %, up to and including 100 % of the occupied bandwidth or necessary bandwidth, whichever is greater
- 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100 %, up to and including 250 % of the occupied bandwidth or necessary bandwidth, whichever is greater
- $43 + 10 \log p$ (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250 % of the occupied bandwidth or necessary bandwidth, whichever is greater.



2.5.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
True RMS Multimeter	Fluke	79 Series III	411	12	12-Jan-2025
Hygrometer	Rotronic	I-1000	3220	12	28-Nov-2024
GPSDR Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	09-Mar-2025
PXA Signal Analyser	Keysight Technologies	N9030B	5432	12	22-Jul-2025
3 GHz High pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	5220	12	03-Apr-2025
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5419	12	02-Aug-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
Programmable Power Supply 188 W	Rohde & Schwarz	HMP2020x0	6598	-	O/P Mon

Table 28

O/P Mon – Output Monitored using calibrated equipment



2.6 Equivalent Isotropic Radiated Power

2.6.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.204

2.6.2 Equipment Under Test and Modification State

Model: 9704 S/N: 1A007Z - Modification State 0

2.6.3 Date of Test

16-October-2024

2.6.4 Test Method

Power Spectral Density measurements in a 4 kHz bandwidth were performed in accordance with ANSI C63.26, clause 5.2.3.5 (Peak-PSD).

The RBW was configured to 3 kHz and the reference level offset increased to account for the correction factor required to show the result as 4 kHz bandwidth. The correction factor was obtained using the following formula:

$$10\text{Log}(4/3) = 1.25 \text{ dB}$$

Total EIRP measurements were performed in accordance with ANSI C63.26, clause 5.2.4.4 (average power with integration). The Antenna Gain was added to the measured Conducted Output Power to determine the EIRP.

2.6.5 Environmental Conditions

Ambient Temperature	22.7 - 23.5 °C
Relative Humidity	47.9 - 60.2 %



2.6.6 Test Results

DC Powered - Iridium (C1)

EIRP (dBm/4kHz)		
1616.020833 MHz	1621.020833 MHz	1625.979167 MHz
36.53	37.00	37.24

Table 29 - EIRP/4 kHz Results Table

1616.020833 MHz		1621.020833 MHz		1625.979167 MHz	
EIRP (dBm)	Δ from rated power (dB)	EIRP (dBm)	Δ from rated power (dB)	EIRP (dBm)	Δ from rated power (dB)
36.840	0.160	36.869	0.131	36.715	0.285

Table 30 - EIRP Results Table

DC Powered - Iridium (B1)

EIRP (dBm/4kHz)		
1616.020833 MHz	1621.020833 MHz	1625.979167 MHz
37.82	37.49	37.94

Table 31 - EIRP/4 kHz Results Table

1616.020833 MHz		1621.020833 MHz		1625.979167 MHz	
EIRP (dBm)	Δ from rated power (dB)	EIRP (dBm)	Δ from rated power (dB)	EIRP (dBm)	Δ from rated power (dB)
37.087	0.087	37.072	0.072	37.062	0.062

Table 32 - EIRP Results Table

DC Powered - Iridium (C2)

EIRP (dBm/4kHz)		
1616.041667 MHz	1621.041667 MHz	1625.958333 MHz
34.40	36.00	35.20

Table 33 - EIRP/4 kHz Results Table

1616.041667 MHz		1621.041667 MHz		1625.958333 MHz	
EIRP (dBm)	Δ from rated power (dB)	EIRP (dBm)	Δ from rated power (dB)	EIRP (dBm)	Δ from rated power (dB)
36.938	0.062	36.841	0.159	36.883	0.117

Table 34 - EIRP Results Table



FCC 47 CFR Part 25, Limit Clause 25.204

+40 dBW in any 4 kHz band for $\theta \leq 0^\circ$

+40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

Industry Canada RSS-170, Limit Clause 5.3

The application for MES certification shall state the MES e.i.r.p. that is necessary for satisfactory communication. The maximum permissible e.i.r.p. will be the stated necessary e.i.r.p. plus a 2 dB margin. If a detachable antenna is used, the certification application shall state the recommended antenna type and manufacturer, the antenna gain and the maximum transmitter output power at the antenna terminal.

2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
True RMS Multimeter	Fluke	79 Series III	411	12	12-Jan-2025
Hygrometer	Rotronic	I-1000	3220	12	28-Nov-2024
GPSDR Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	09-Mar-2025
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5419	12	02-Aug-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
Programmable Power Supply 188 W	Rohde & Schwarz	HMP2020x0	6598	-	O/P Mon

Table 35

O/P Mon – Output Monitored using calibrated equipment



2.7 Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service

2.7.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.216
Industry Canada RSS-170, Clause 5.9 & 5.10

2.7.2 Equipment Under Test and Modification State

Model: 9704, S/N: 1A007Z - Modification State 0

2.7.3 Date of Test

16-October-2024

2.7.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.7 within the requirements of FCC CFR 47 Part 25, Clause 25.216 and Industry Canada RSS-170, clause 5.9.1.

2.7.5 Environmental Conditions

Ambient Temperature	23.5 °C
Relative Humidity	60.2 %



2.7.6 Test Results

DC Powered - Iridium (C1)

Frequency (MHz)	Level (dBW)
*	

Table 36 - 1616.020833 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

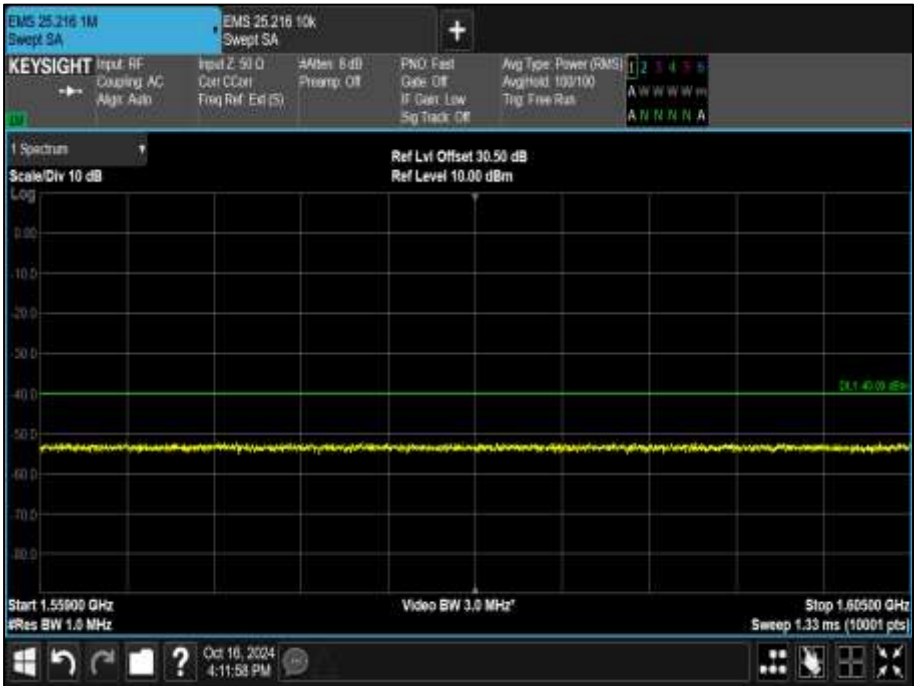


Figure 101 - 1616.020833 MHz – Broadband Emission Results 1559-1605 MHz

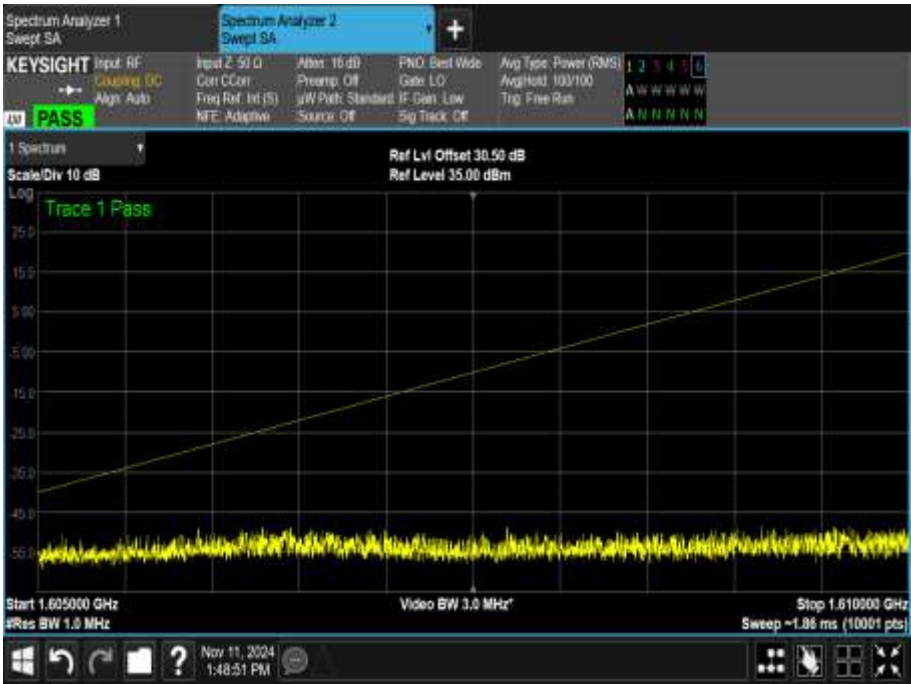


Figure 102 - 1616.020833 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 37 - 1616.020833 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.



Figure 103 - 1616.020833 MHz – Discrete Emission Results 1559-1605 MHz

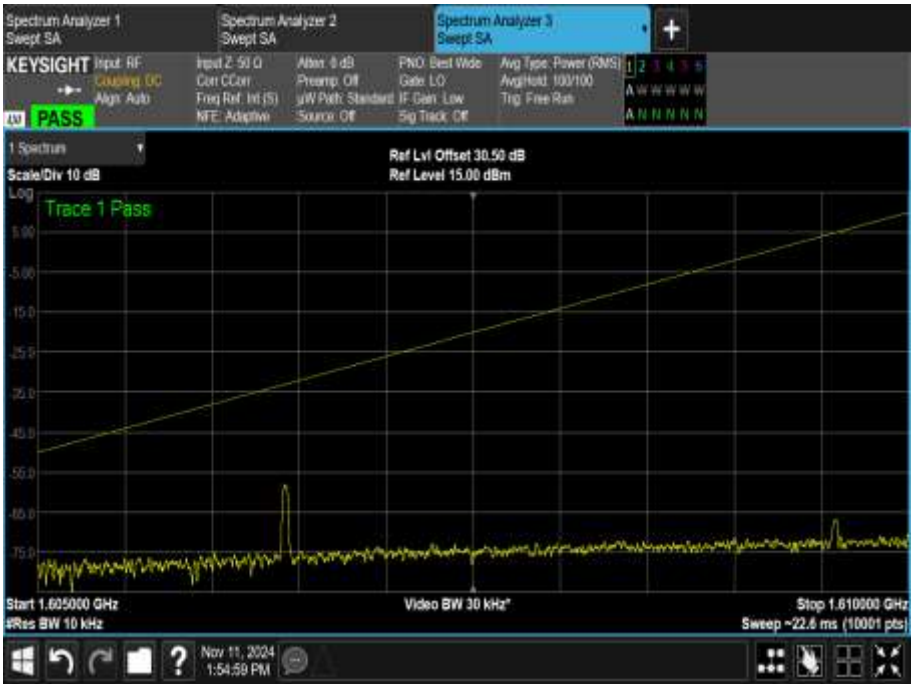


Figure 104 - 1616.020833 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 38 - 1621.020833 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

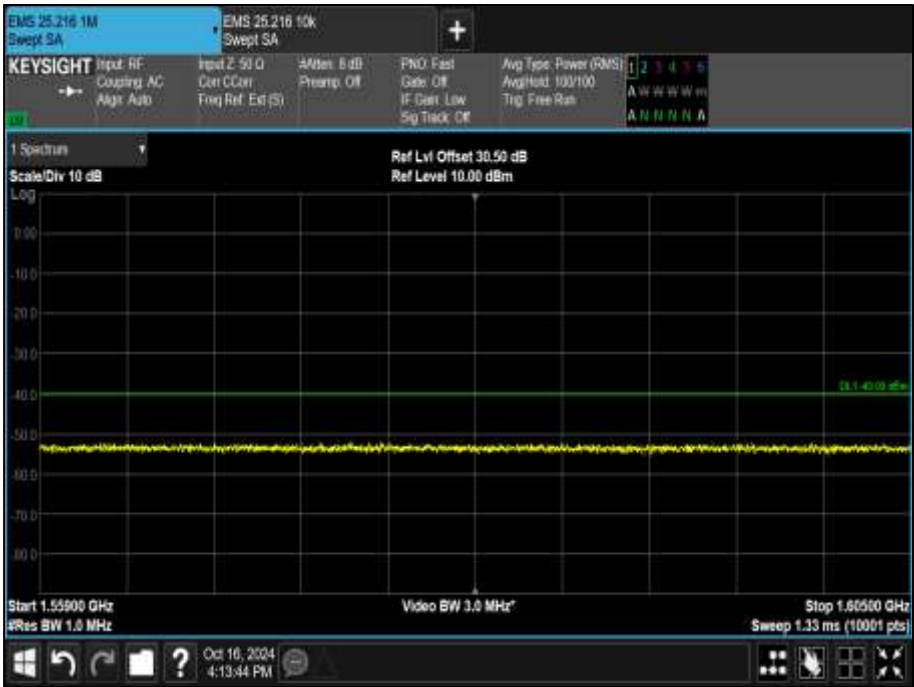


Figure 105 - 1621.020833 MHz – Broadband Emission Results 1599-1605 MHz

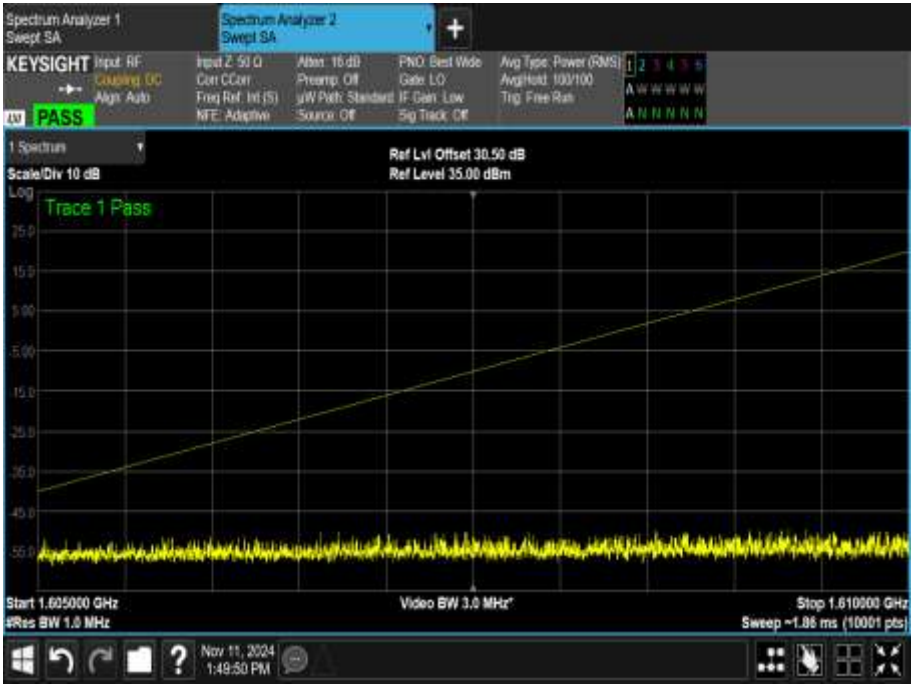




Figure 106 - 1621.020833 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 39 - 1621.020833 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.

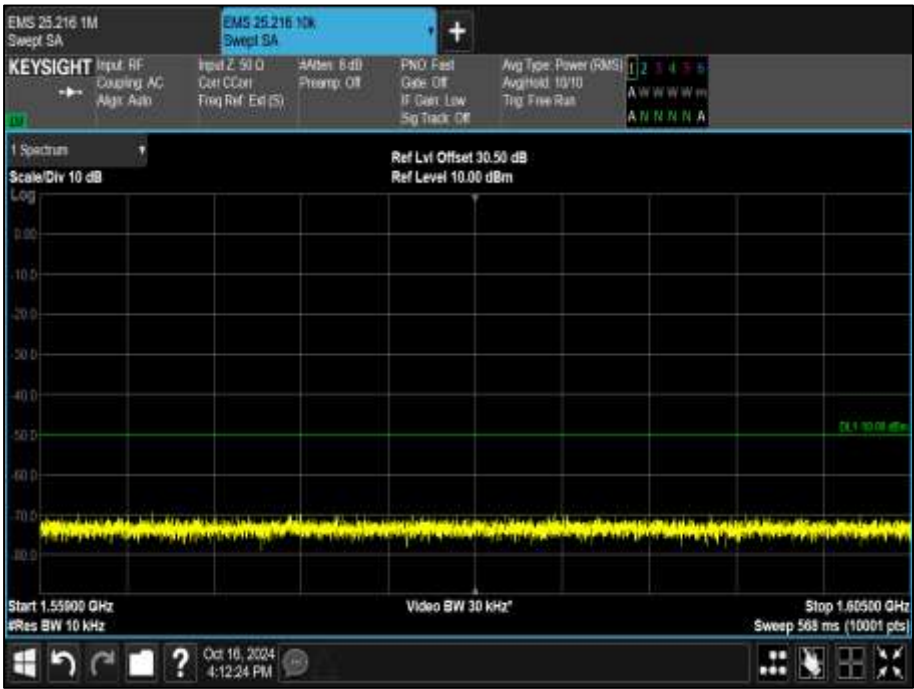


Figure 107 - 1621.020833 MHz – Discrete Emission Results 1559-1605 MHz

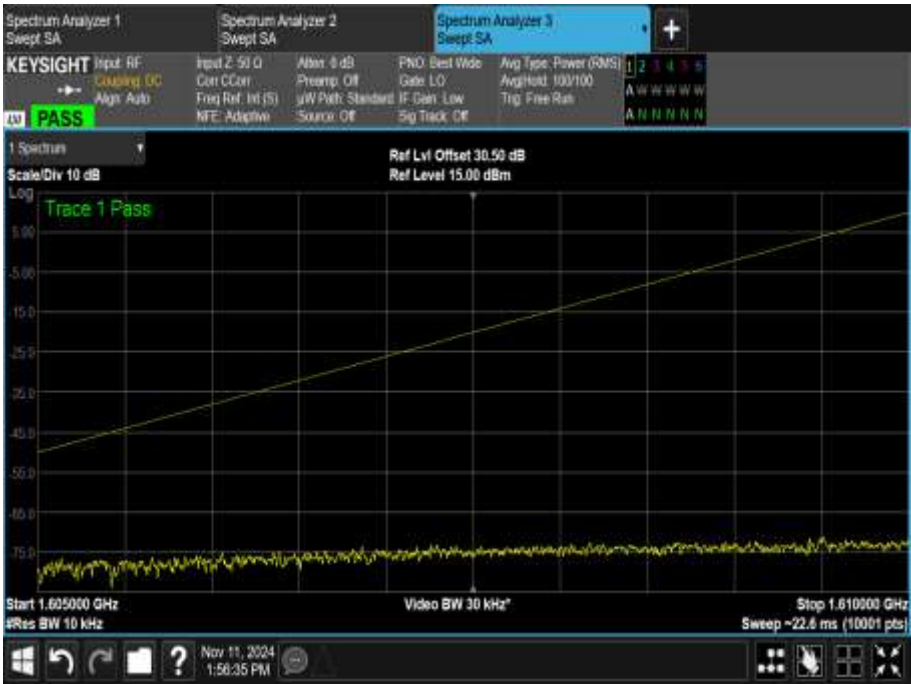


Figure 108 - 1621.020833 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 40 - 1625.979167 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

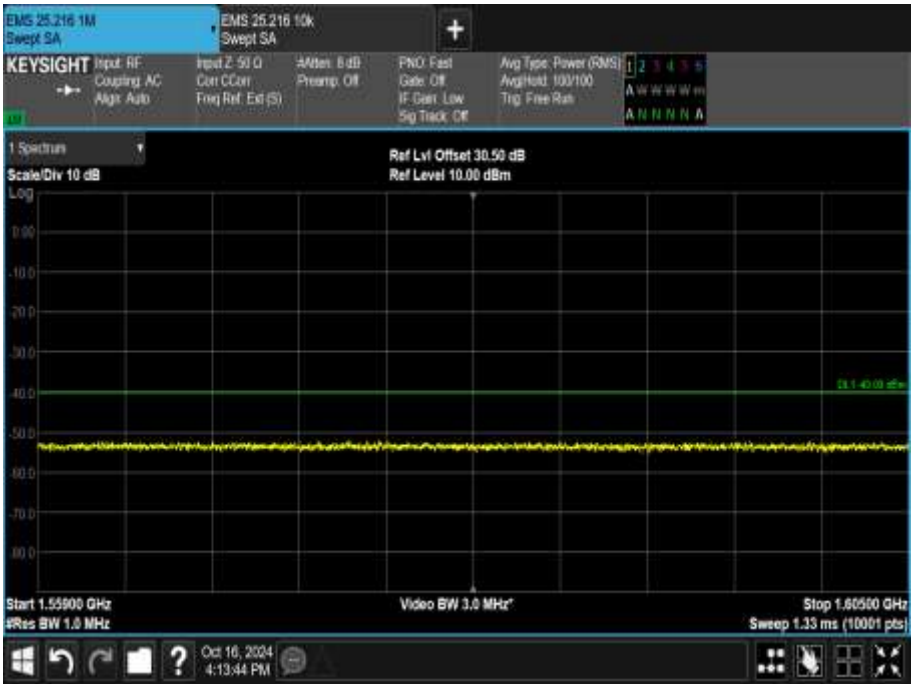


Figure 109 - 1625.979167 MHz – Broadband Emission Results 1559-1605 MHz

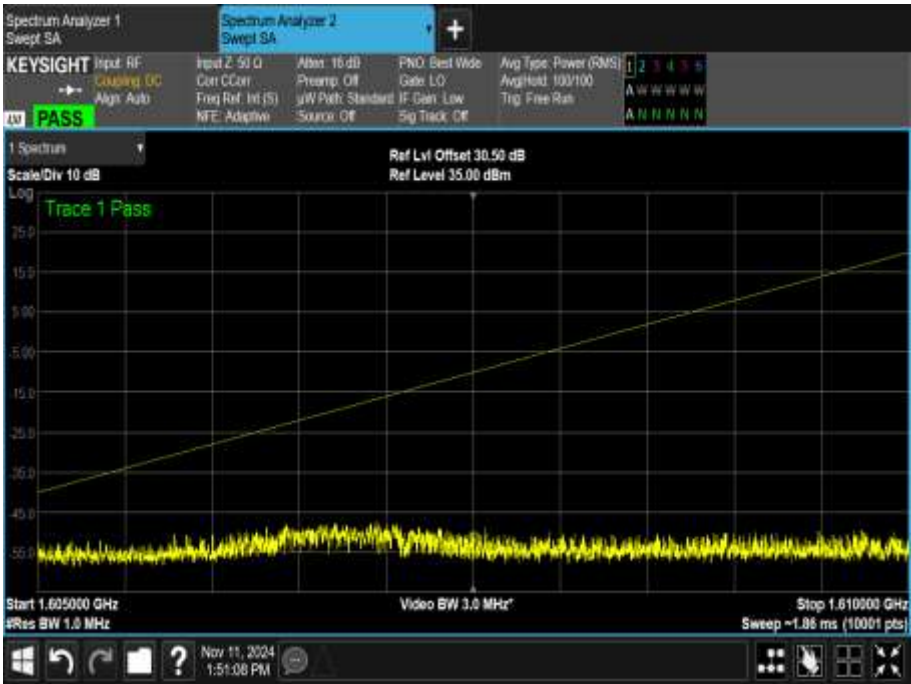


Figure 110 - 1625.979167 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 41 - 1625.979167 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.

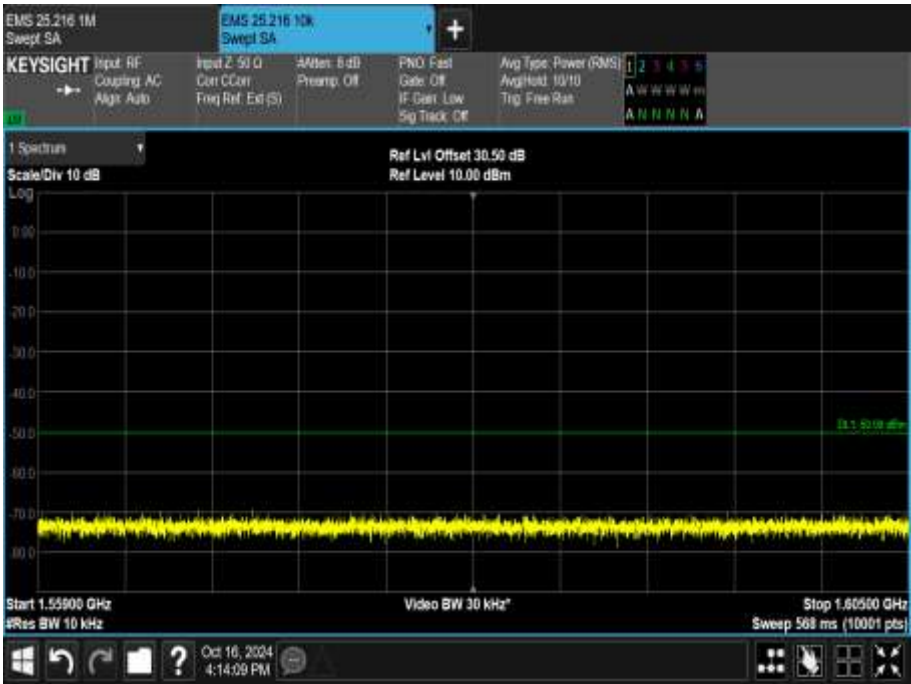


Figure 111 - 1625.979167 MHz – Discrete Emission Results 1559-1605 MHz

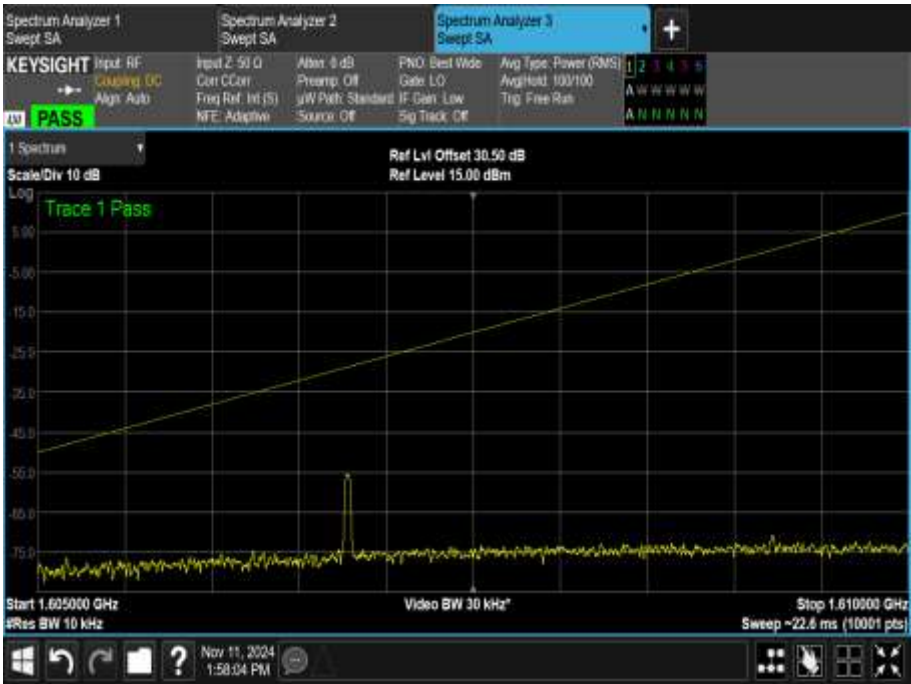


Figure 112 - 1625.979167 MHz – Discrete Emission Results 1605-1610 MHz



DC Powered - Iridium (B1)

Frequency (MHz)	Level (dBW)
*	

Table 42 - 1616.020833 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

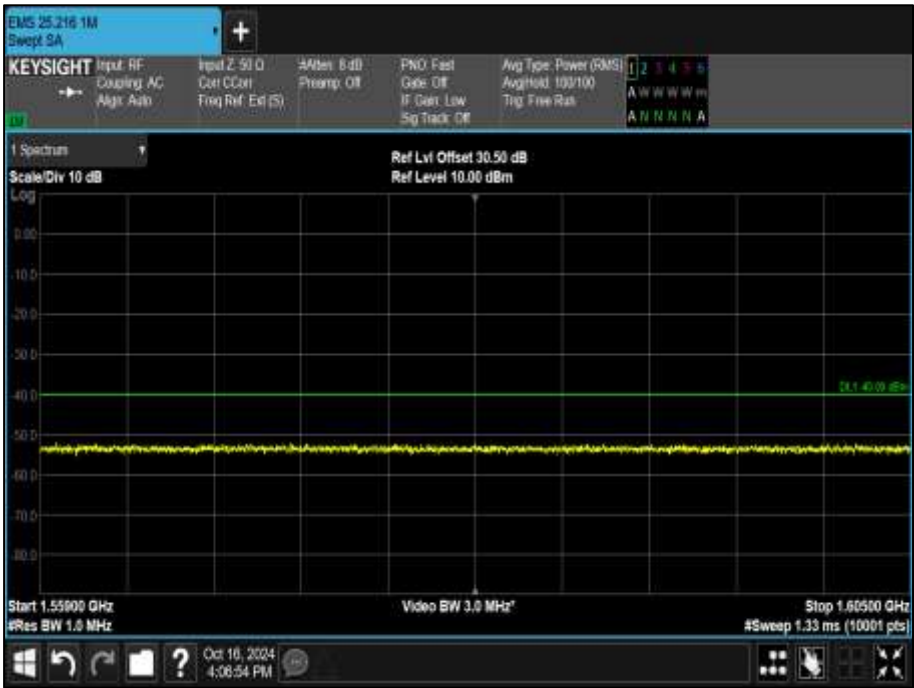


Figure 113 - 1616.020833 MHz – Broadband Emission Results 1559-1605 MHz

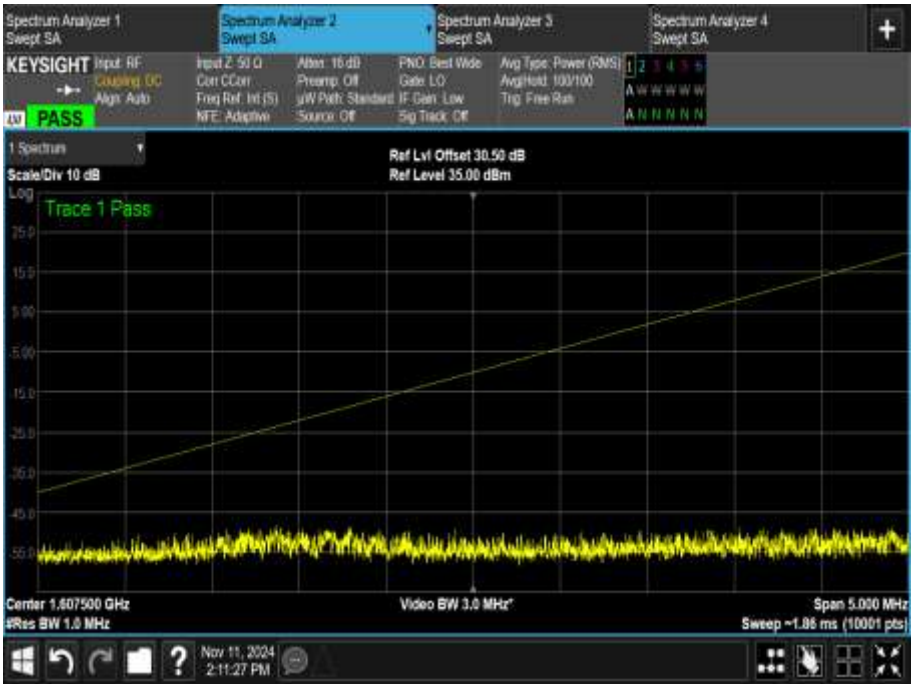


Figure 114 - 1616.020833 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 43 - 1616.020833 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.



Figure 115 - 1616.020833 MHz – Discrete Emission Results 1559-1605 MHz

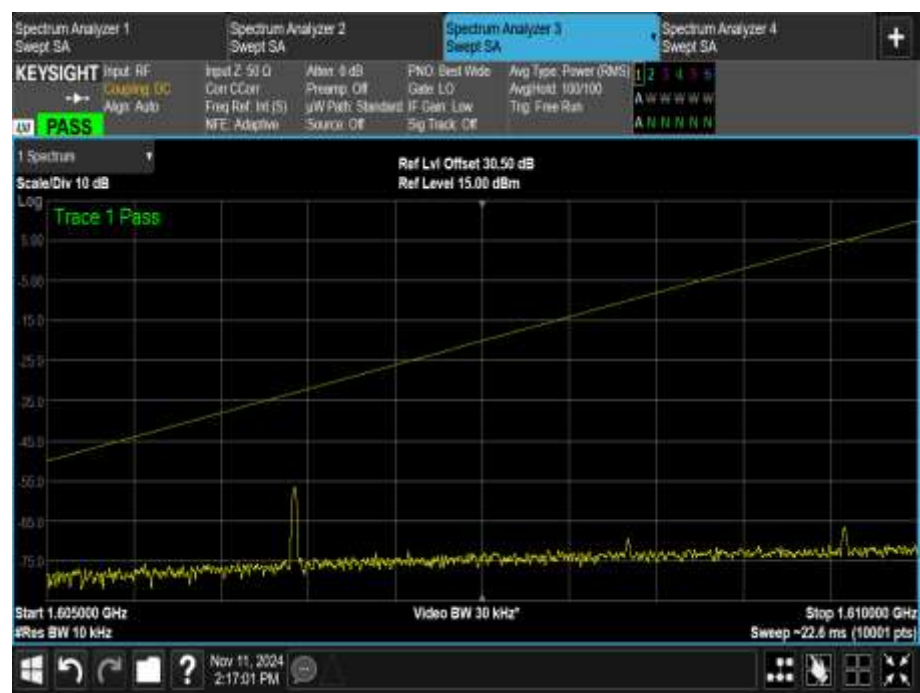


Figure 116 - 1616.020833 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 44 - 1621.020833 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

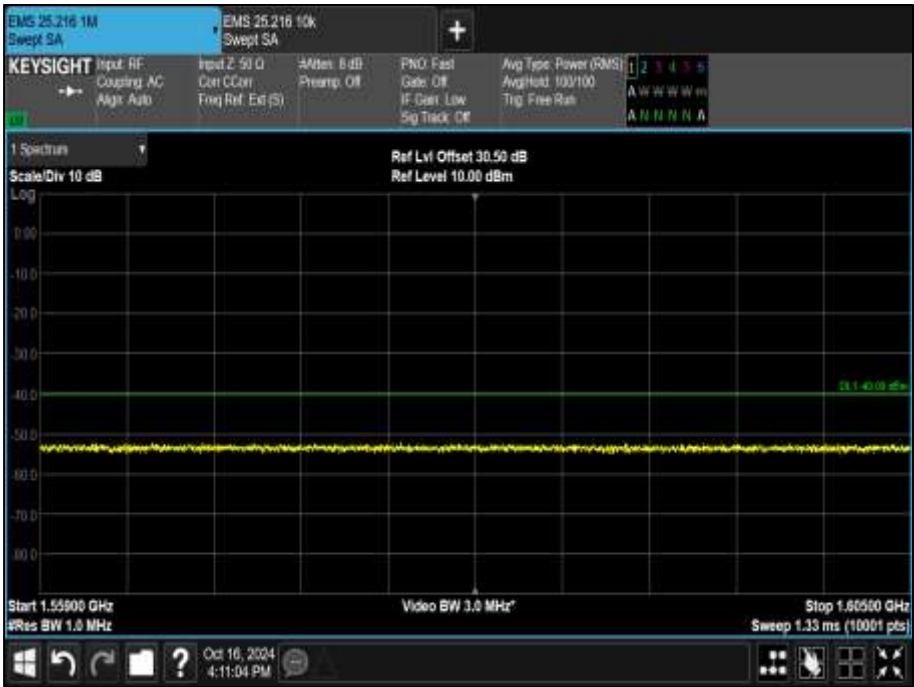


Figure 117 - 1621.020833 MHz – Broadband Emission Results 1559-1605 MHz

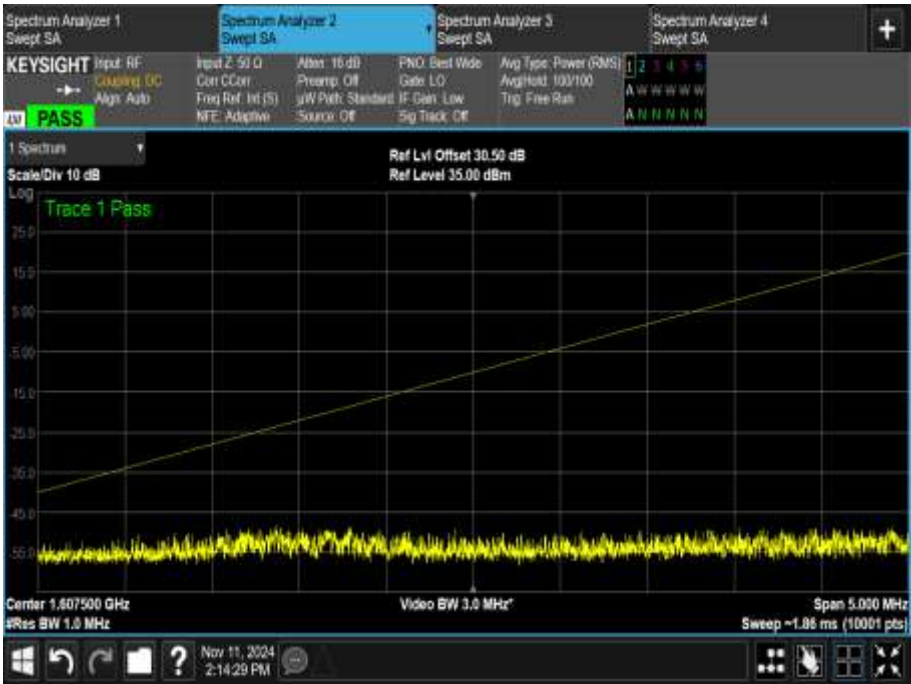


Figure 118 - 1621.020833 MHz – Broadband Emission Results 1605-1610 MHz

Frequency (MHz)	Level (dBW)
*	

Table 45 - 1621.020833 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.

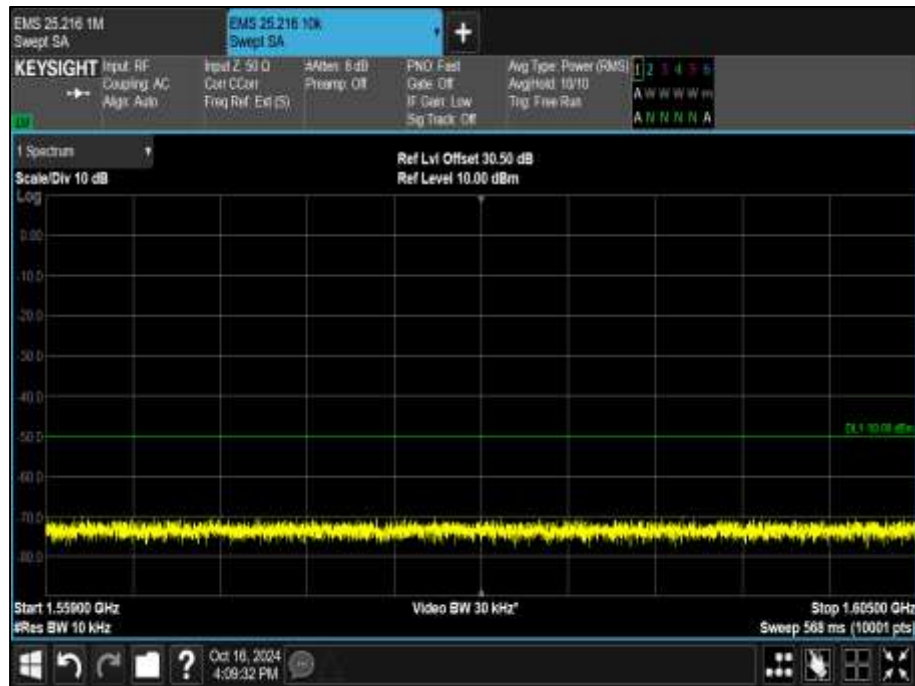


Figure 119 - 1621.020833 MHz – Discrete Emission Results 1559-1605 MHz



Figure 120 - 1621.020833 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 46 - 1625.979167 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

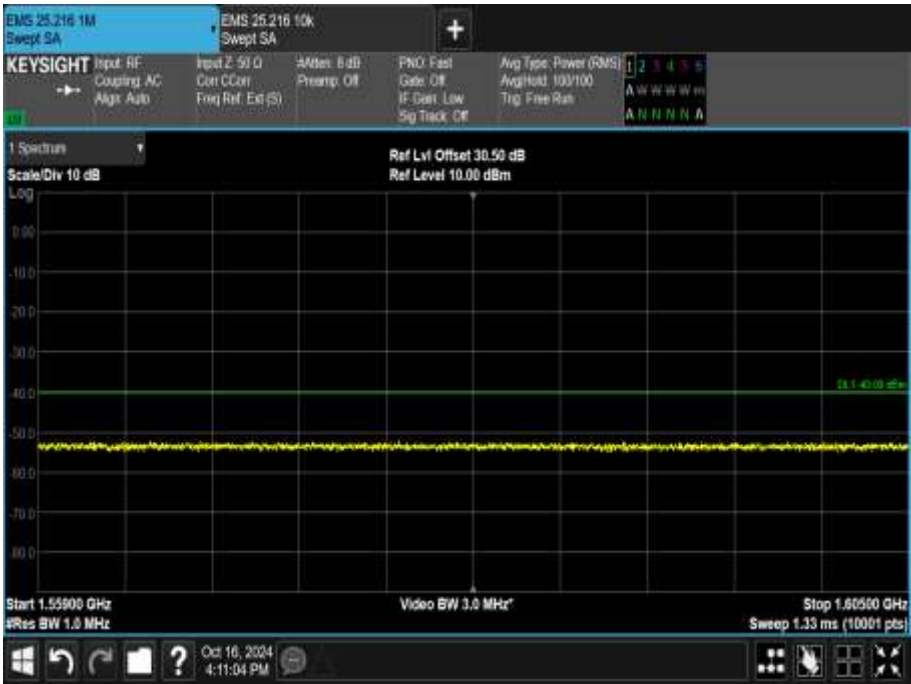


Figure 121 - 1625.979167 MHz – Broadband Emission Results 1559-1605 MHz



Figure 122 - 1625.979167 MHz – Broadband Emission Results 1605-1610 MHz

Frequency (MHz)	Level (dBW)
*	

Table 47 - 1625.979167 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.

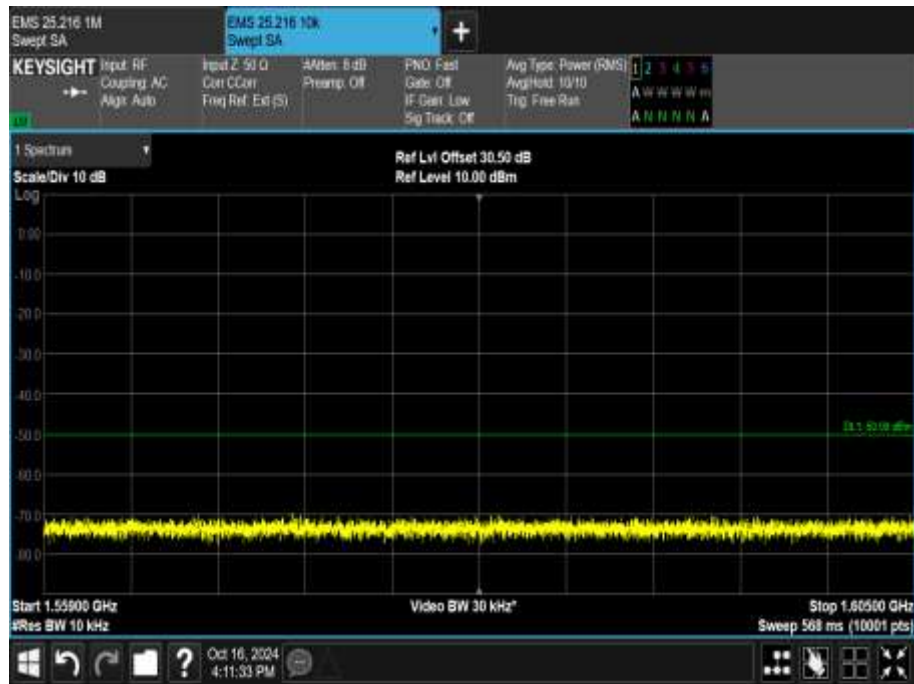


Figure 123 - 1625.979167 MHz – Discrete Emission Results 1559-1605 MHz

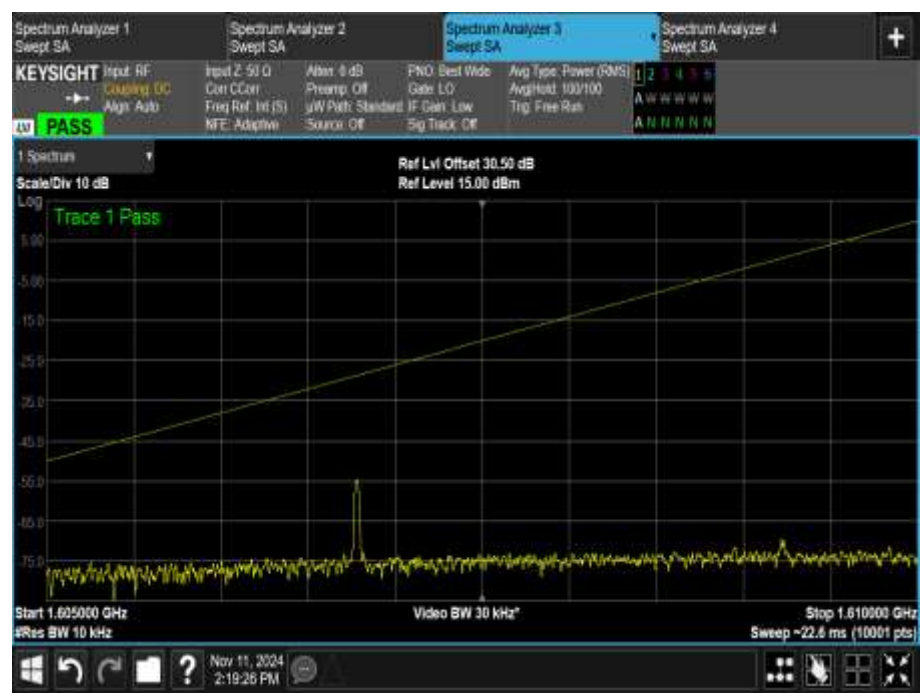


Figure 124 - 1625.979167 MHz – Discrete Emission Results 1605-1610 MHz



DC Powered - Iridium (C2)

Frequency (MHz)	Level (dBW)
*	

Table 48 - 1616.041667 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

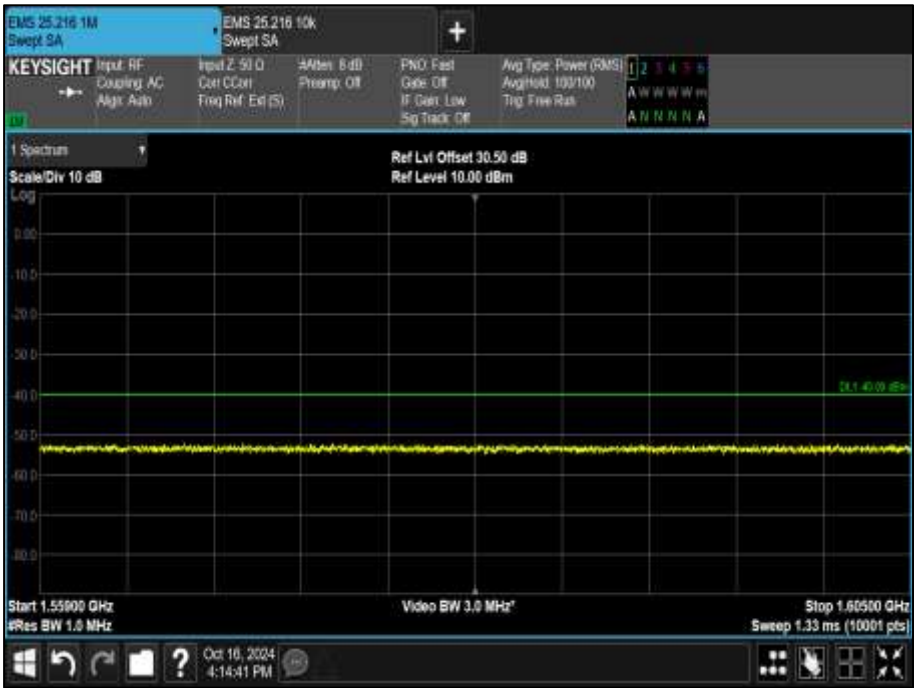


Figure 125 - 1616.041667 MHz – Broadband Emission Results 1559-1605 MHz

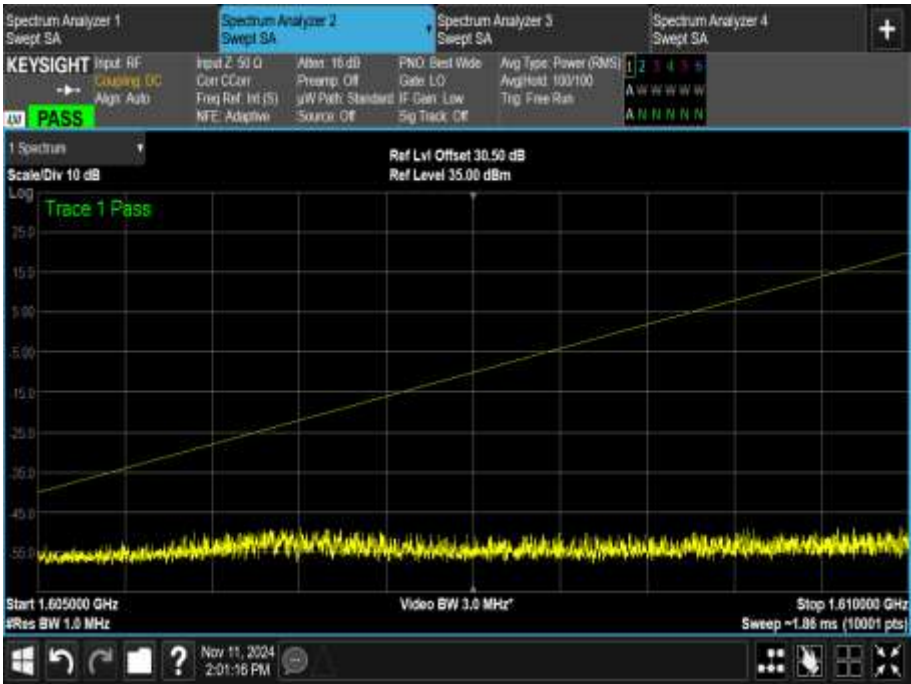


Figure 126 - 1616.041667 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 49 - 1616.041667 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.



Figure 127 - 1616.041667 MHz – Discrete Emission Results 1559-1605 MHz



Figure 128 - 1616.041667 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 50 - 1621.041667 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.



Figure 129 - 1621.041667 MHz – Broadband Emission Results 1559-1605 MHz

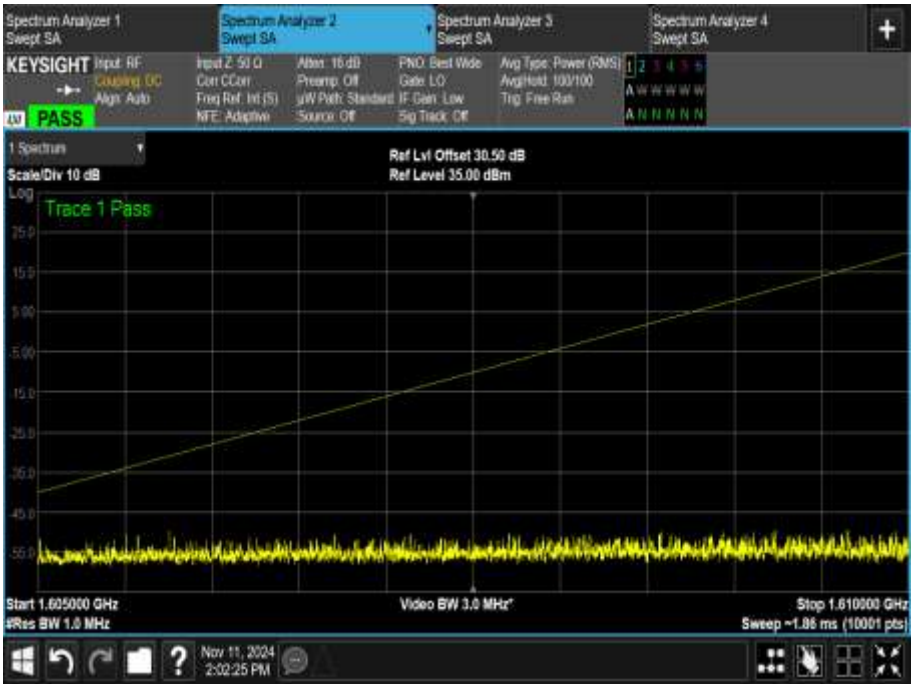


Figure 130 - 1621.041667 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 51 - 1621.041667 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.

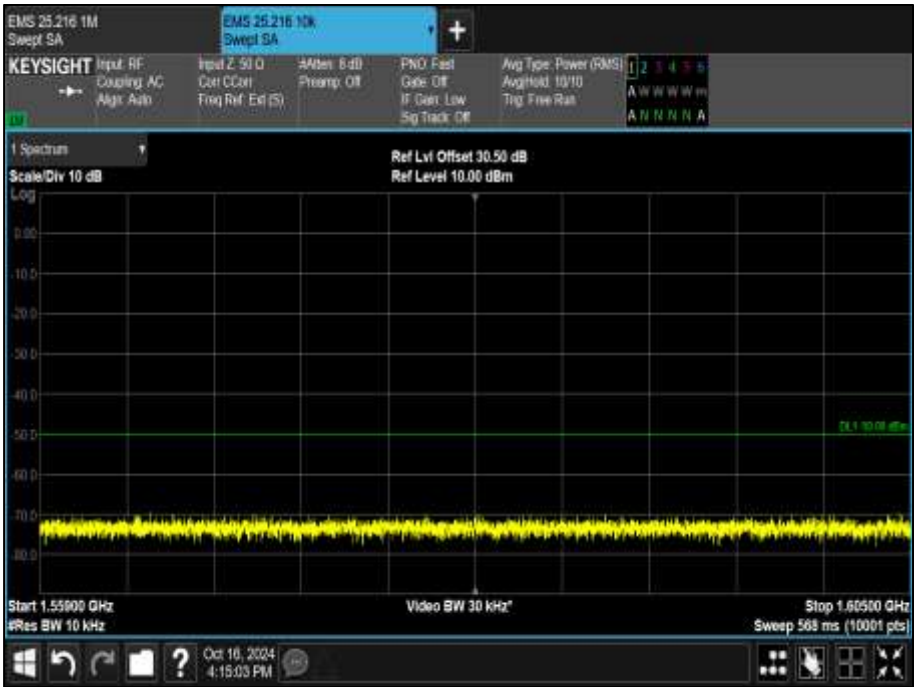


Figure 131 - 1621.041667 MHz – Discrete Emission Results 1559-1605 MHz



Figure 132 - 1621.041667 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 52 - 1625.958333 MHz – Broadband Emission Results

*No emissions were detected within 10 dB of the limit.

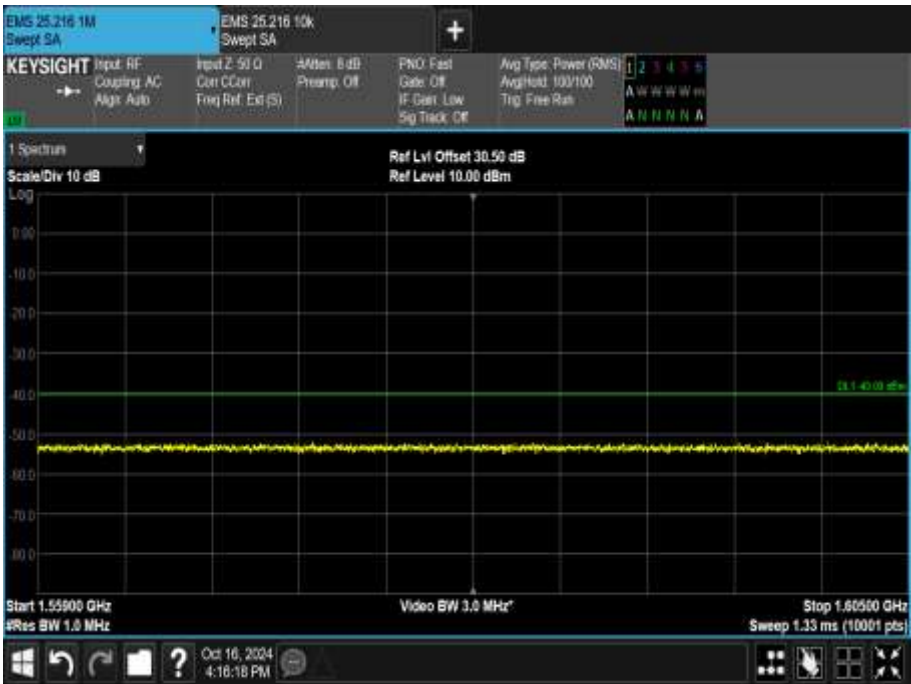


Figure 133 - 1625.958333 MHz – Broadband Emission Results 1559-1605 MHz

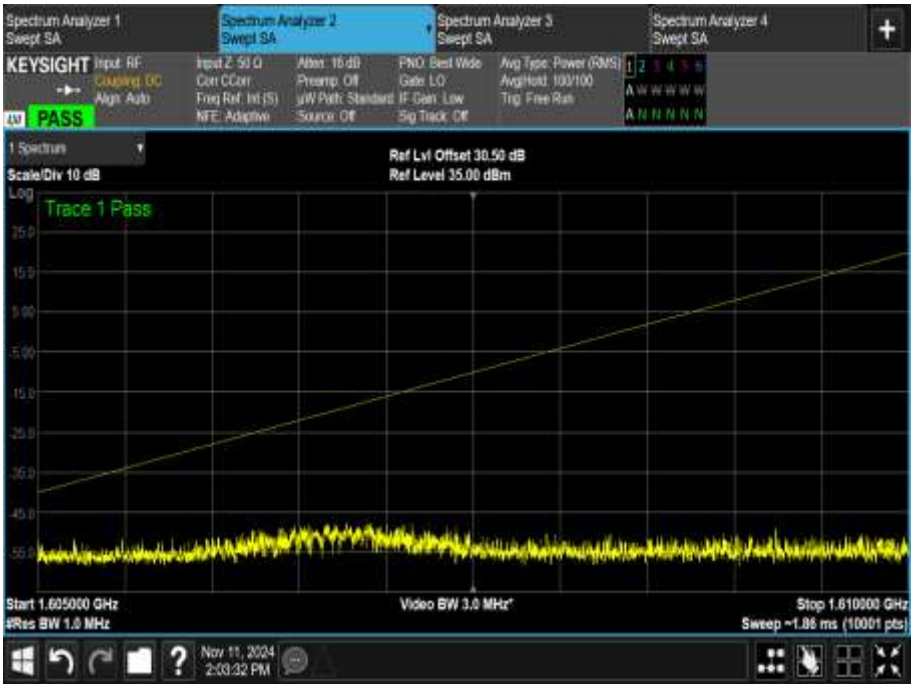


Figure 134 - 1625.958333 MHz – Broadband Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 53 - 1625.958333 MHz – Discrete Emission Results

*No emissions were detected within 10 dB of the limit.



Figure 135 - 1625.958333 MHz – Discrete Emission Results 1559-1605 MHz

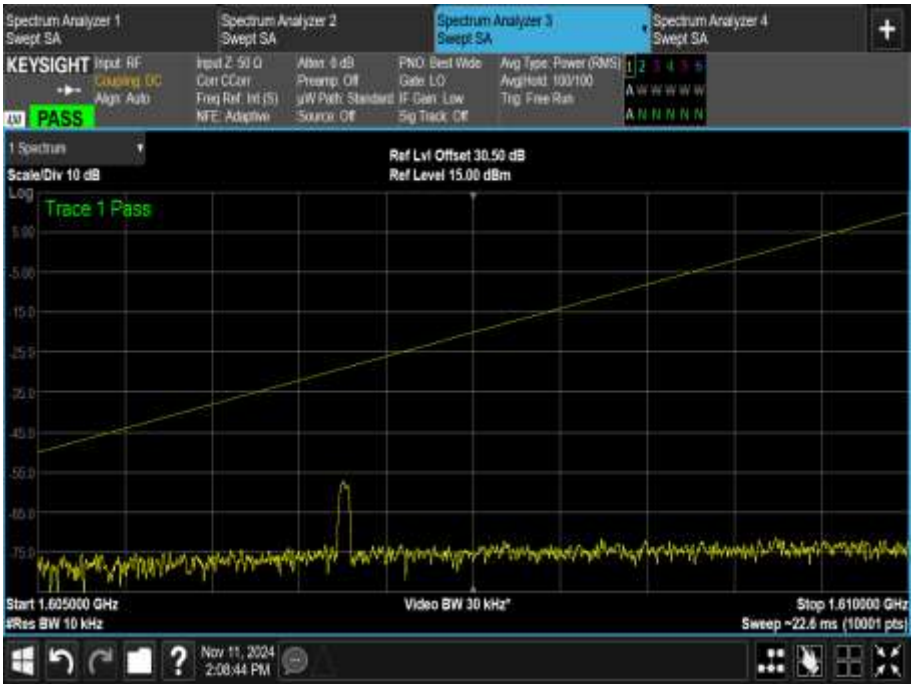


Figure 136 - 1625.958333 MHz – Discrete Emission Results 1605-1610 MHz



Frequency (MHz)	Level (dBW)
*	

Table 54 - Carrier-off state

*No emissions were detected within 10 dB of the limit.

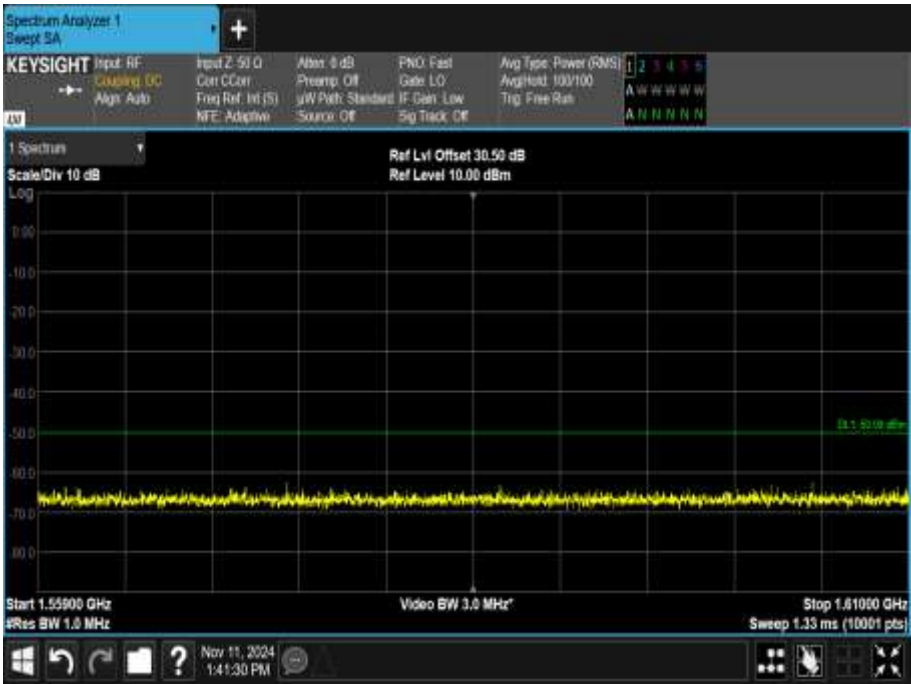


Figure 137 - Carrier-off state Emissions



FCC 47 CFR Part 25, Limit Clause 25.216

25.216(c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559–1605 MHz band.

25.216(g) Mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies in the 1610–1626.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band-segment to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -10 dBW/MHz at 1610 MHz averaged over any 2 millisecond active transmission interval. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from -80 dBW at 1605 MHz to -20 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

25.216(i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559–1610 MHz band averaged over any two millisecond interval.

ISED, RSS-170, Limit Clause 5.9 and 5.10

MESs with transmitting frequencies in the bands 1610-1626.5 MHz and 1626.5-1660.5 MHz shall comply with the unwanted emission limits specified below:

Band 1610-1626.5 MHz:

For MESs with transmitting frequencies between 1610 MHz and 1626.5 MHz, the e.i.r.p. density of unwanted emissions shall not exceed the limits shown below, which are the same as those for the band 1605-1610 MHz, averaged over any 2 ms active transmission interval:

-70 dBW/MHz at 1605 MHz, linearly interpolated to -10 dBW/MHz at 1610 MHz, for broadband emissions

-80 dBW/kHz at 1605 MHz, linearly interpolated to -20 dBW/kHz at 1610 MHz, for discrete emissions

Band 1626.5-1660.5 MHz:

For MESs with transmitting frequencies between 1610 MHz and 1626.5 MHz, the e.i.r.p. density of unwanted emissions shall not exceed the limits shown below, which are the same as those for the band 1605-1610 MHz, averaged over any 2 ms active transmission interval:

-70 dBW/MHz at 1605 MHz, linearly interpolated to -46 dBW/MHz at 1610 MHz, for broadband emissions

-80 dBW/kHz at 1605 MHz, linearly interpolated to -56 dBW/kHz at 1610 MHz, for discrete emissions



Carrier-off state emissions:

MESs with transmitting frequencies between 1 GHz and 3 GHz shall not exceed -80 dBW/MHz, which is the e.i.r.p. density of carrier-off state emissions in the band 1559-1610 MHz.

2.7.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
True RMS Multimeter	Fluke	79 Series III	411	12	12-Jan-2025
Hygrometer	Rotronic	I-1000	3220	12	28-Nov-2024
GPSDR Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	09-Mar-2025
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5419	12	02-Aug-2025
PXA Signal Analyser	Keysight Technologies	N9030B	5432	12	22-Jul-2025
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	18-Sep-2025
Programmable Power Supply 188 W	Rohde & Schwarz	HMP2020x0	6598	-	O/P Mon

Table 55

O/P Mon – Output Monitored using calibrated equipment

3 Photographs

3.1 Test Setup Photographs



Figure 138 - General EUT Image



Figure 139 - 30MHz to 1GHz Setup X Plane

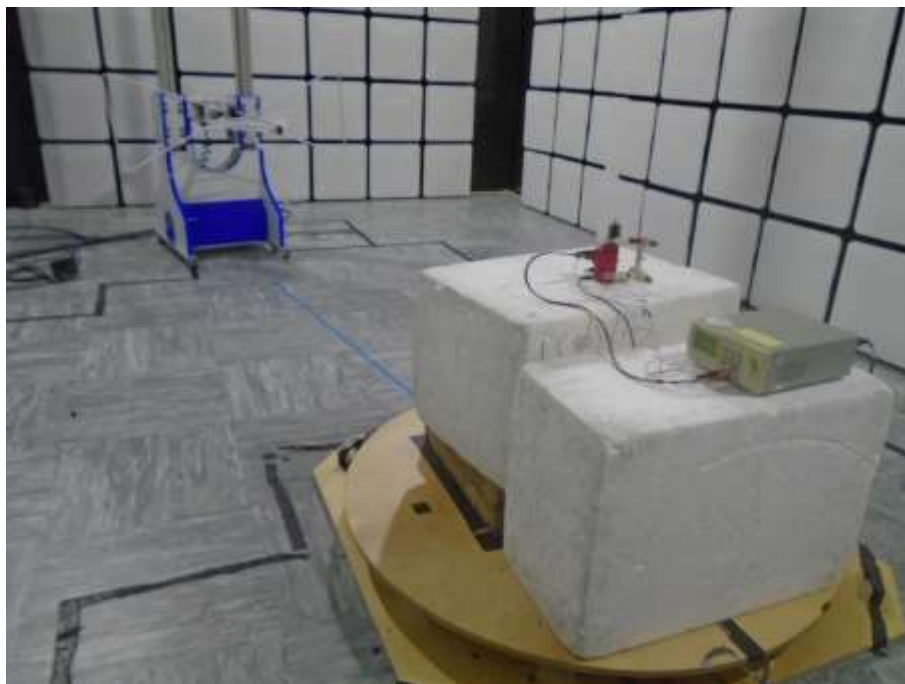


Figure 140 – 30MHz to 1GHz Setup Y Plane



Figure 141 – 30MHz to 1GHz Setup Z Plane

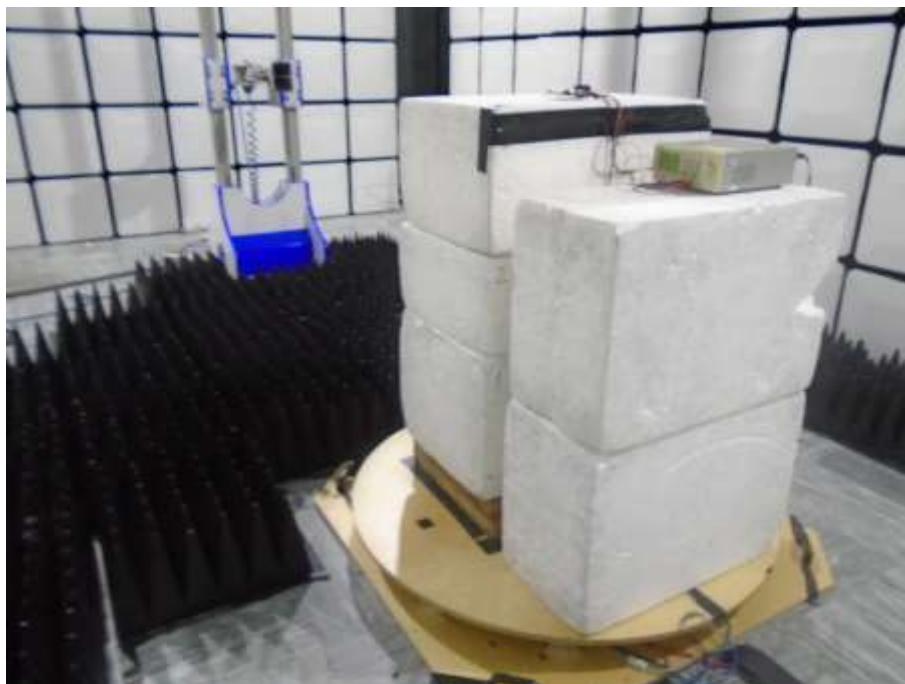


Figure 142 – 1GHz to 8GHz Setup X Plane

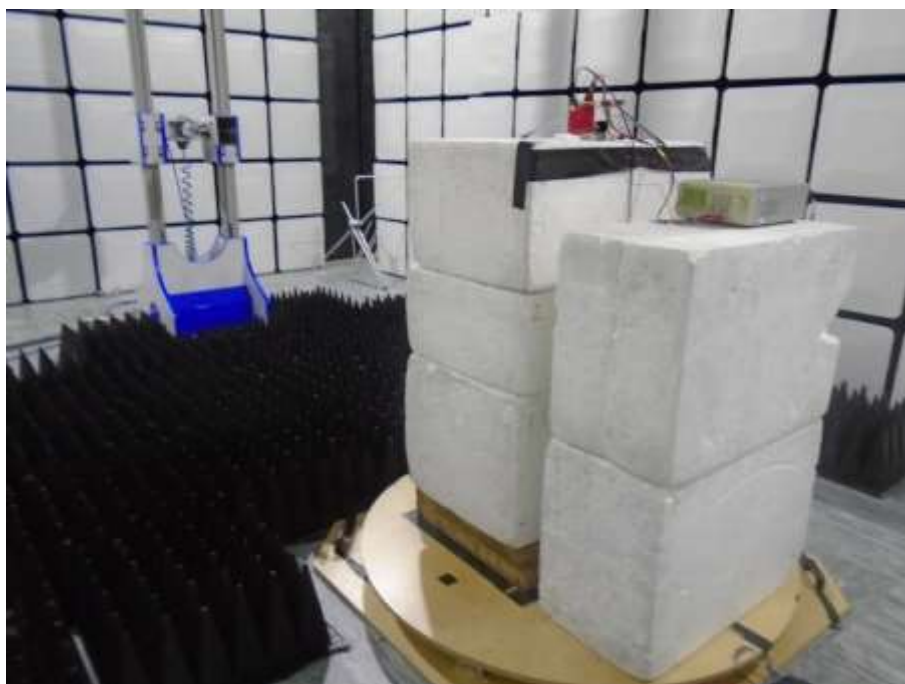


Figure 143 - 1GHz to 8GHz Setup Y Plane



Figure 144 – 1GHz to 8GHz Setup Z Plane



Figure 145 – 8GHz to 18GHz Setup X Plane



Figure 146 – 8GHz to 18GHz Setup Y Plane



Figure 147 – 8GHz to 18GHz Setup Z Plane



4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 18 GHz: ± 6.3 dB
Modulation Characteristics	-
Occupied Bandwidth	± 958.87 Hz
Frequency Tolerance	± 958.87 Hz
Spurious Emissions at Antenna Terminals	± 3.08 dB
Equivalent Isotropic Radiated Power	Conducted: ± 3.2 dB Radiated: ± 6.3 dB (1 GHz to 18 GHz)
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio Navigation Satellite Service	Conducted: ± 3.45 dB Radiated: ± 6.3 dB

Table 56

Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.