Test Report

Prepared for: Honeywell

Model: HSD Phase 4-CA

Description: Aircraft Earth Station

FCC ID: K6KHSD-PHASE4

Serial Number: 0020

Project No: p2420009

Test Result: PASS

To

FCC Part 25

Date of Issue: June 26, 2025

On the behalf of the applicant:	**EMS Technologies Canada, LTD** **400 Maple Grove Road** **Ottawa, ON, Canada** **K2V 1B8**
Attention of:	**Amitesh Kumar** **Ph: (613) 591-9064** **E-Mail:Amitesh.Kumar@Honeywell.com**

Prepared By:

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ANAB Cert#: AT-2901
FCC Site Reg. #750616
ISED Site Reg. #2044A-2

Greg Corbin

Project Test Engineer

Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
25.204(a) 2.1046	Power and Emissions	Pass	
25.202(f) 2.1051 2.1053	Emission Limitations	Pass	
2.1049	Occupied Bandwidth	Pass	
25.216(c)(f)(h) 2.1051	Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service	Pass	
25.216(i) 2.1051	Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service _ carrier off state	Pass	
25.202(d) 2.1055	Frequency Stability Frequency vs Temperature	Pass	
25.202(d) 2.1055	Frequency Stability Frequency vs Voltage	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*.

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	6/26/2025	Greg Corbin	Original Document

Table of Contents

Table of Annexes

Acronyms and Abbreviations

Acronyms	Description
AES	Aircraft Earth Station
GUI	Graphical User Interface
HGA	High Gain Antenna
SDU	Satellite Data Unit
SBB	Swift Broadband
DNLA	Diplexer and Low Noise Amplifier

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. #750616

IC Site Reg. #2044A-2

Standard Test Conditions and Engineering Practices

Unless otherwise indicated, the procedures contained in FCC Part 25, ANSI C63.26-2015, 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.

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 (°C)	**Humidity (%)**	**Pressure (mbar)**
25.5 – 31.3	17.4 – 39.6	957.9 - 966

EUT Description

Model:	HSD Phase 4-CA
Serial:	0020 (used for all tests except frequency stability) 0018 (used for frequency stability, refer to page 29 for details)
Firmware:	N/A
Software:	LI-g0412671 ver:B00
Description:	Aircraft Earth Station
Additional Information:	High-speed data, satellite communications terminals that provide world-wide voice and data services to aircraft through high-speed communication links with the Inmarsat Satellite Network.
Receipt of Sample(s):	4/16/2025
EUT Condition:	**Visual Damage** No **State of Development** Production/Production Equivalent

FCC Test Requirements

The HSD Phase 4 CA system operates within the frequency range of 1626.5 – 1660.5 MHz, requiring compliance with FCC Parts 25 and 87.

FCC Part 87 regulates the frequency range of 1646.5 to 1660.5 MHz for Mobile Earth Stations (MES) in the Mobile Satellite Service (MSS), which covers a portion of the required operational frequencies. To cover the full frequency range of 1626.5 to 1660.5 MHz, FCC Part 25 for Aircraft Earth Stations (AES) in the Aeronautical Mobile-Satellite Service and Aeronautical Mobile Service must also be considered.

The HSD Phase 4 CA SDU contains two channel cards: channel card #1, supports two SBB communication channels, while channel card #2 supports three Classic Aero communication channels and one SBB communication channel. The SBB services provide non-safety voice and data in the cabin, whereas the Classic Aero services are designated for safety classified voice and packet data. These services are enabled through separate RF transceiver ICs dedicated to each communication channel.

According to 47CFR 25.109(c), earth stations in the AMS(R)S service are subject to licensing under 47CFR Part 87. The "(R)" in AMS(R)S indicates that the spectrum is used for aeronautical communications related to the safety and regularity of flights. Due to the safety nature of Classic Aero service, Honeywell considers the SBB non-safety AMSS service to fall under the scope of FCC Part 25, while the Classic Aero AMS(R)S safety service is subject to both FCC Parts 87 and Part 25, as the Classic Aero operating frequency range is from 1626.5 to 1660.5 MHz.

This report shows compliance to Part 25 for the SBB service from 1626.5 – 1660.5 MHz and the Classic Aero service from 1626.5 - 1646.5 MHz.

There is a separate CTL test report (p2490002_Part 87_rev 1.0) showing compliance to the 47CFR Part 87 regulations for the HSD Phase 4 CA Classic Aero service operated from 1646.5 – 1660.5 MHz using G1D and G1E emission designators in the AMS(R)S service.

The following table contains Part 25 frequency allocation and the emission designator information for the SBB and Classic Aero service.

Table 1 – Frequency Allocation and Emission Designators

Frequency Range	Bearer	Service	Modulation	Symbol Rate	Data Rate	Necessary Bandwidth	FCC Designator	Authorized Bandwidth
MHz				ksym/s	kb/s	kHz		kHz
1646.5 – 1660.5	R/T600	Classic R/T	π/2 BPSK	0.6	0.6	0.84	840HG1D	25
	R/T1200	Classic R/T	π/2 BPSK	1.2	1.2	1.68	1K68G1D	25
	R/T10500	Classic R/T	Aviation QPSK	5.25	10.5	10.5	10K5G1D	25
	C8400	Classic C	Aviation QPSK	4.2	8.4	6.8	6K80G1E	25
1626.5 – 1660.5	R5T1XD	SBB	16QAM	33.6	134.4	50	50K0D7W	225
	R5T2XD	SBB	16QAM	67.2	268.8	100	100KD7W	225
	R5T4.5XD	SBB	16QAM	151.2	604.8	200	200KD7W	225
	R20T1XD	SBB	16QAM	33.6	134.4	50	50K0D7W	225
	R20T2XD	SBB	16QAM	67.2	268.8	100	100KD7W	225
	R20T4.5XD	SBB	16QAM	151.2	604.8	200	200KD7W	225
	R5T2QD	SBB	π/4 QPSK	67.2	134.4	100	100KG7W	225
	R5T4.5QD	SBB	π/4 QPSK	151.2	302.4	200	200KG7W	225
	R20T0.5QD	SBB	π/4 QPSK	16.8	33.6	25	25K0G7W	225
	R20T1QD	SBB	π/4 QPSK	33.6	67.2	50	50K0G7W	225
	R20T2QD	SBB	π/4 QPSK	67.2	134.4	100	100KG7W	225
	R20T4.5QD	SBB	π/4 QPSK	151.2	302.4	200	200KG7W	225
	FR80T2.5X16	SBB	16QAM	84	336	110	110KD7W	225
	FR80T5X16	SBB	16QAM	168	672	200	200KD7W	225
	FR80T2.5X32	SBB	32QAM	84	420	110	110KD7W	225
	FR80T2.5X64	SBB	64QAM	84	504	110	110KD7W	225
	FR80T5X32	SBB	32QAM	168	420	200	200KD7W	225
	FR80T5X64	SBB	64QAM	168	504	200	200KD7W	225

Antenna Gain

The manufacturer lists 2 types of antennas with the gain specified from 12 - 17 dBi.
The manufacturer states the minimum cable loss from the SDU RF output to the Antenna RF input is 2.5 dB. This cable loss will be used in the final EIRP calculation

Unit Assembly	Part Number	Gain - dBi
AMT 700 HGA	1428-A-1010-02	12 - 17
AMT-3800 HGA	1242-A-0101-xx	12 - 17

EUT Operation during Tests

The HSD was mounted in a test tray with several multi-conductor cables interfacing it to the computer.
There was an RF cable as part of the tray cable bundle that provided the out for the modems.
The cable loss for the RF tray cable was characterized and the insertion loss was included in all measurements.
The manufacturer provided a GUI to control the channel parameters and turn the output on.

The HSD system can be powered by either 115 vac or 28 vdc.
For all tests except frequency stability the tests were performed using 28 vdc.
Frequency Stability was performed with 115 vac and 28 vdc as required.

Test Frequencies

Test Frequency MHz	Service	Bearer
1626.5 1636.5 1646.5	Classic Aero	RTS600
	Classic Aero	RTS1200
	Classic Aero	RTS10500
	Classic Aero	C8400
1626.5 1646.5 1660.5	SBB	R5T1XD, R20T1XD **
	SBB	R5T2XD R20T2XD **
	SBB	R5T4.5XD, R20T4.5XD **
	SBB	R5T2QD, R20T2QD **
	SBB	R5T4.5QD, R20T4.5QD **
	SBB	R20T0.5QD
	SBB	R20T1QD
	SBB	FR80T2.5X16
	SBB	FR80T5X16
	SBB	FR80T2.5X32
	SBB	FR80T2.5X64
	SBB	FR80T5X32
	SBB	FR80T5X64

The Test Frequency and Bearer will be used to uniquely identify the test results.

** These bearers contain the same digital information and only the 1st bearer in each row was tested.

Accessories:				
Qty	**Description**	**Manufacturer**	**P/N**	**S/N**
1	HSD test tray	Honeywell	200-91171-102	N/A
1	Computer	Comark	TCS-025-02022-001	T18114398

Cables:					
Qty	**Description**	**Length (M)**	**Shielding Y/N**	**Shielded Hood Y/N**	**Termination**
1	Multi-conductor cable bundle	8	Y	Y	EUT or computer

Modifications:	
	None

Conducted Output Power

Engineer: Greg Corbin

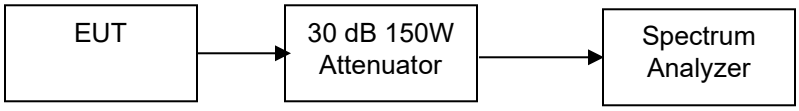
Test Date: 4/28/2025

Test Procedure

EUT was connected as shown in the test set-up below.
The Channel power tool on the spectrum analyzer was used to measure the modulated output power in a 4 kHz RBW.
The Backoff in the GUI was set to 0.
Output power for low, middle, high channels were recorded.

RBW = 4 kHz
Detector = RMS
Antenna Gain = max antenna gain (+17 dBi) + RF cable loss (-2.5 dB) = 17 – 2.5 = 14.5 dBi.
The final EIRP (dBm) = final conducted power (dBm) + antenna gain(dB).
Output Power (dBW) = Output Power (dBm) – 30.

Output Power Test Setup



Classic Aero Output Power test results

Tuned Frequency	Modulation	Conducted Output Power	Antenna Gain	EIRP Output Power		EIRP Limit	Pass / Fail
MHz		dBm	dBi	dBm	dBW	dBW	
1626.5	C8400	46.21	14.5	60.71	30.71	40	Pass
1626.5	RTS600	45.94	14.5	60.44	30.44	40	Pass
1626.5	RTS1200	46.19	14.5	60.69	30.69	40	Pass
1626.5	RTS10500	46.34	14.5	60.84	30.84	40	Pass
1636.5	C8400	45.85	14.5	60.35	30.35	40	Pass
1636.5	RTS600	45.82	14.5	60.32	30.32	40	Pass
1636.5	RTS1200	45.79	14.5	60.29	30.29	40	Pass
1636.5	RTS10500	45.97	14.5	60.47	30.47	40	Pass
1646.5	C8400	45.84	14.5	60.34	30.34	40	Pass
1646.5	RTS600	46.31	14.5	60.81	30.81	40	Pass
1646.5	RTS1200	45.77	14.5	60.27	30.27	40	Pass
1646.5	RTS10500	46.55	14.5	61.05	31.05	40	Pass

SBB Output Power Test Results

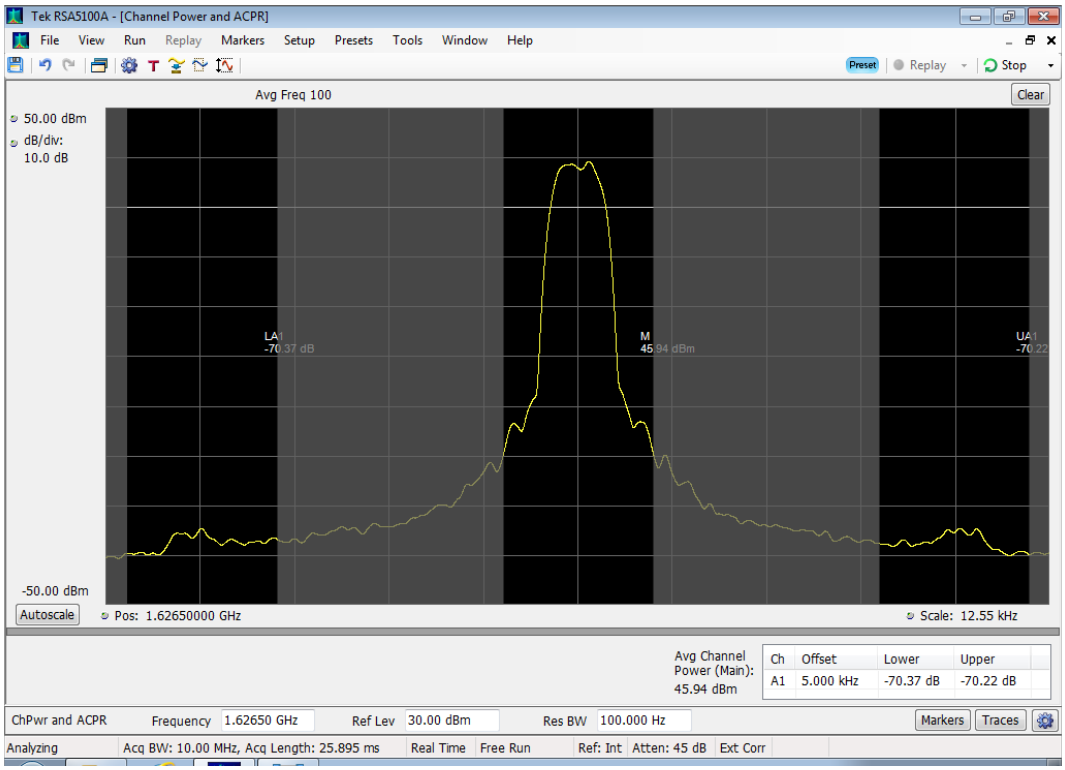
Tuned Frequency	Modulation	Conducted Output Power	Antenna Gain	EIRP Output Power		EIRP Limit	Pass / Fail
MHz		dBm	dBi	dBm	dBW	dBW	
1626.5	R5T1XD	47.05	14.5	61.55	31.55	40	Pass
1626.5	R5T2XD	47.02	14.5	61.52	31.52	40	Pass
1626.5	R5T4.5XD	47.05	14.5	61.55	31.55	40	Pass
1626.5	R5T2QD	47.14	14.5	61.64	31.64	40	Pass
1626.5	R5T4.5QD	47.09	14.5	61.59	31.59	40	Pass
1626.5	R20T0.5QD	47.35	14.5	61.85	31.85	40	Pass
1626.5	R20T1QD	47.12	14.5	61.62	31.62	40	Pass
1626.5	FR80T2.5 X16	47.31	14.5	61.81	31.81	40	Pass
1626.5	FR80T2.5 X32	47.15	14.5	61.65	31.65	40	Pass
1626.5	FR80T2.5 X64	47.17	14.5	61.67	31.67	40	Pass
1626.5	FR80T5X 16	47.18	14.5	61.68	31.68	40	Pass
1626.5	FR80T5X 32	47.15	14.5	61.65	31.65	40	Pass
1626.5	FR80T5X 64	47.26	14.5	61.76	31.76	40	Pass

Tuned Frequency	Modulation	Conducted Output Power	Antenna Gain	EIRP Output Power		EIRP Limit	Pass / Fail
MHz		dBm	dBi	dBm	dBW	dBW	
1646.5	R5T1XD	46.57	14.5	61.07	31.07	40	Pass
1646.5	R5T2XD	46.49	14.5	60.99	30.99	40	Pass
1646.5	R5T4.5XD	46.48	14.5	60.98	30.98	40	Pass
1646.5	R5T2QD	46.56	14.5	61.06	31.06	40	Pass
1646.5	R5T4.5QD	46.49	14.5	60.99	30.99	40	Pass
1646.5	R20T0.5QD	46.62	14.5	61.12	31.12	40	Pass
1646.5	R20T1QD	46.60	14.5	61.1	31.1	40	Pass
1646.5	FR80T2.5 X16	46.56	14.5	61.06	31.06	40	Pass
1646.5	FR80T2.5 X32	46.59	14.5	61.09	31.09	40	Pass
1646.5	FR80T2.5 X64	46.63	14.5	61.13	31.13	40	Pass
1646.5	FR80T5X 16	46.66	14.5	61.16	31.16	40	Pass
1646.5	FR80T5X 32	46.62	14.5	61.12	31.12	40	Pass
1646.5	FR80T5X 64	46.72	14.5	61.22	31.22	40	Pass

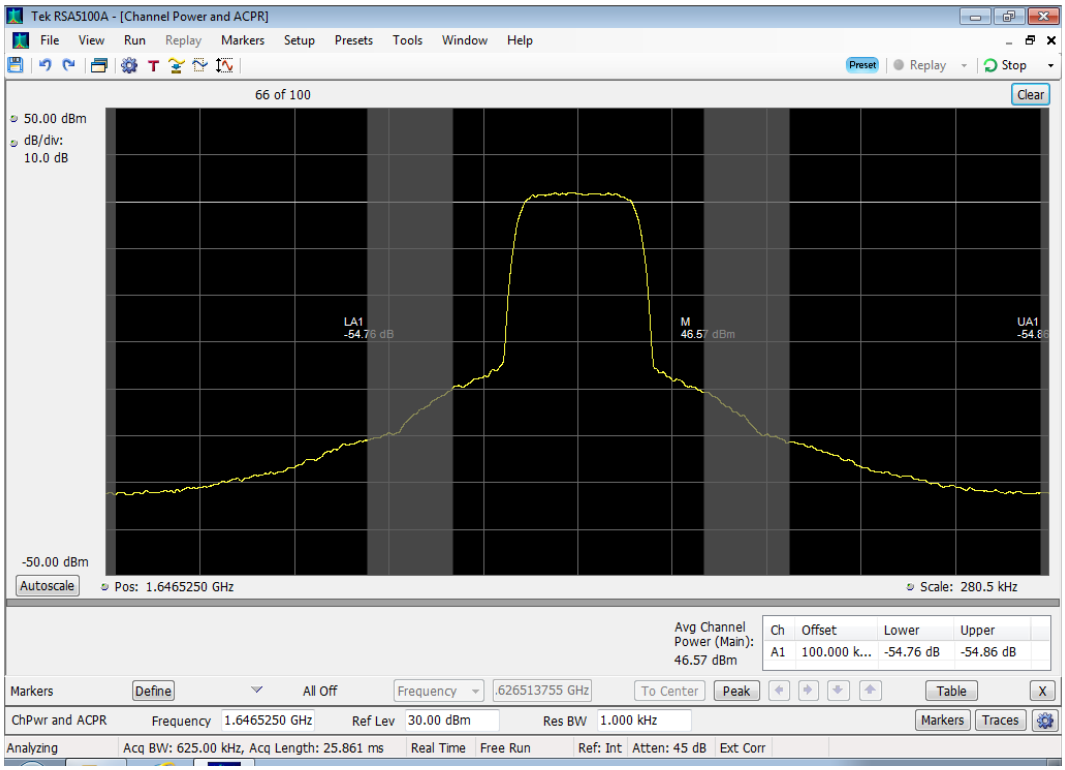
Tuned Frequency	Modulation	Conducted Output Power	Antenna Gain	EIRP Output Power		EIRP Limit	Pass / Fail
MHz		dBm	dBi	dBm	dBW	dBW	
1660.5	R5T1XD	46.76	14.5	61.26	31.26	40	Pass
1660.5	R5T2XD	46.76	14.5	61.26	31.26	40	Pass
1660.5	R5T4.5XD	46.98	14.5	61.48	31.48	40	Pass
1660.5	R5T2QD	46.99	14.5	61.49	31.49	40	Pass
1660.5	R5T4.5QD	46.76	14.5	61.26	31.26	40	Pass
1660.5	R20T0.5QD	47.13	14.5	61.63	31.63	40	Pass
1660.5	R20T1QD	46.92	14.5	61.42	31.42	40	Pass
1660.5	FR80T2.5 X16	47.07	14.5	61.57	31.57	40	Pass
1660.5	FR80T2.5 X32	47.06	14.5	61.56	31.56	40	Pass
1660.5	FR80T2.5 X64	47.09	14.5	61.59	31.59	40	Pass
1660.5	FR80T5X 16	46.92	14.5	61.42	31.42	40	Pass
1660.5	FR80T5X 32	46.92	14.5	61.42	31.42	40	Pass
1660.5	FR80T5X 64	46.97	14.5	61.47	31.47	40	Pass

Sample output power plot

Classic Output Power_RT600



SBB Output Power_R5T1XD



Emissions Limitations _ 25.202(f)

Engineer: Greg Corbin

Test Dates:5/6/2025, 6/25/2025

Test Procedure

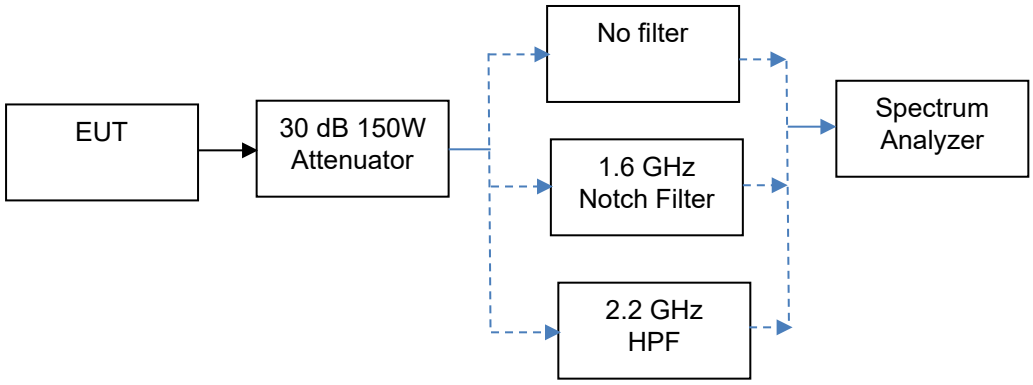
The EUT was connected directly to a spectrum analyzer and the conducted spurious emissions were measured to ensure that the EUT met the requirements specified. Only the worst-case emission at each frequency was reported. Notch and high pass filters were utilized to ensure that the fundamental power did not force the input of the spectrum analyzer into compression. These losses in addition to cable losses were input into the analyzer as a reference level offset to ensure that accurate measurements were obtained.
The emissions were investigated up to the 10th harmonic.
Due to the filters used, 3 frequency ranges were used to cover 30 MHz to 17 GHz.

30 - 1000 MHz, no filter
1 – 2.3 GHz, used tunable Notch Filter, set to the TX frequency.
2.3 - 16.5 GHz, used 2.2 GHz HPF

Freq range	RBW	Detector	# of trace points
30 – 1000 MHz	100 kHz	Peak, Max hold	10400
1 – 2.3 GHz	1 MHz	Average, with trace average	10400
2.3 – 17 GHz	1 MHz	Average, with trace average	64000

The emission limit of -13 dBm is with a 4 kHz RBW.
If any spurious emission are near the limit, the measurement was repeated using a 4 kHz RBW.
There were no spurious signals within 10 dB of the spurious emission limit so no measurements were repeated in a 4 kHz RBW.
The reference marker (MR) on the 1 – 2.3 GHz plots is the fundamental transmit signal and is exempt from the spurious emission limits.

Conducted Spurious Emissions Test Setup



Classic Aero _ Conducted Emissions Limitations Summary Table_ 25.202(f)

Frequency Range	Bearer	Tuned Frequency	Spurious Frequency	Spurious level	Limit	Margin	Pass / Fail
GHz		MHz	MHz	dBm	dBm	dB	
0.030 – 1.0	C8400	1626.5	64.8	-44.1	-13	-31.1	Pass
0.030 – 1.0	C8400	1636.5	39.1	-43.0	-13	-30	Pass
0.030 – 1.0	C8400	1646.5	58.1	-42.9	-13	-29.9	Pass
1 – 2.3	C8400	1626.5	1657.2	-29.8	-13	-16.8	Pass
1 – 2.3	C8400	1636.5	1666.6	-30.8	-13	-17.8	Pass
1 – 2.3	C8400	1646.5	1576.6	-31.8	-13	-18.8	Pass
2.3 - 17	C8400	1626.5	16635.5	-26.1	-13	-13.1	Pass
2.3 - 17	C8400	1636.5	16679.7	-25.6	-13	-12.6	Pass
2.3 - 17	C8400	1646.5	16954.9	-26.5	-13	-13.5	Pass
0.030 – 1.0	RT600	1626.5	48.0	-42.3	-13	-29.3	Pass
0.030 – 1.0	RT600	1636.5	94.8	-43.8	-13	-30.8	Pass
0.030 – 1.0	RT600	1646.5	81.6	-43.2	-13	-30.2	Pass
1 – 2.3	RT600	1626.5	1669.7	-30.5	-13	-17.5	Pass
1 – 2.3	RT600	1636.5	1674.1	-30.9	-13	-17.9	Pass
1 – 2.3	RT600	1646.5	1615.5	-31.6	-13	-18.6	Pass
2.3 - 17	RT600	1626.5	15423.1	-25.5	-13	-12.5	Pass
2.3 - 17	RT600	1636.5	16694.0	-26.9	-13	-13.9	Pass
2.3 - 17	RT600	1646.5	15478.6	-26.5	-13	-13.5	Pass
0.030 – 1.0	RT1200	1626.5	80.8	-42.9	-13	-29.9	Pass
0.030 – 1.0	RT1200	1636.5	60.4	-43.1	-13	-30.1	Pass
0.030 – 1.0	RT1200	1646.5	63.0	-44.0	-13	-31	Pass
1 – 2.3	RT1200	1626.5	1656.7	-29.8	-13	-16.8	Pass
1 – 2.3	RT1200	1636.5	1679.1	-30.3	-13	-17.3	Pass
1 – 2.3	RT1200	1646.5	1607.1	-31.1	-13	-18.1	Pass
2.3 - 17	RT1200	1626.5	16682.4	-25.4	-13	-12.4	Pass
2.3 - 17	RT1200	1636.5	16683.4	-26.6	-13	-13.6	Pass
2.3 - 17	RT1200	1646.5	16928.3	-26.4	-13	-13.4	Pass
0.030 – 1.0	RT10500	1626.5	48.1	-43.0	-13	-30	Pass
0.030 – 1.0	RT10500	1636.5	34.9	-42.6	-13	-29.6	Pass
0.030 – 1.0	RT10500	1646.5	86.8	-43.5	-13	-30.5	Pass
1 – 2.3	RT10500	1626.5	1684.3	-30.8	-13	-17.8	Pass
1 – 2.3	RT10500	1636.5	1556.1	-30.6	-13	-17.6	Pass
1 – 2.3	RT10500	1646.5	1591	-31.4	-13	-18.4	Pass
2.3 - 17	RT10500	1626.5	16999.3	-25.6	-13	-12.6	Pass
2.3 - 17	RT10500	1636.5	16909.8	-25.6	-13	-12.6	Pass
2.3 - 17	RT10500	1646.5	16928.7	-26.3	-13	-13.3	Pass

SBB _ Conducted Emissions Limitations Summary Table_ 25.202(f)

Frequency Range	Bearer	Tuned Frequency	Spurious Frequency	Spurious level	Limit	Margin	Pass / Fail
GHz		MHz	MHz	dBm	dBm	dB	
0.030 – 1.0	R5T1XD	1626.5	59.6	-42.9	-13	-29.9	Pass
0.030 – 1.0	R5T1XD	1646.5	40.9	-43.1	-13	-30.1	Pass
0.030 – 1.0	R5T1XD	1660.5	82.6	-42.3	-13	-29.3	Pass
1 – 2.3	R5T1XD	1626.5	1651	-32.0	-13	-19	Pass
1 – 2.3	R5T1XD	1646.5	1630.7	-31.4	-13	-18.4	Pass
1 – 2.3	R5T1XD	1660.5	1586.2	-30.1	-13	-17.1	Pass
2.3 - 17	R5T1XD	1626.5	16714.6	-26.2	-13	-13.2	Pass
2.3 - 17	R5T1XD	1646.5	16716.4	-32.4	-13	-19.4	Pass
2.3 - 17	R5T1XD	1660.5	16996.2	-26.3	-13	-13.3	Pass
0.030 – 1.0	R5T2XD	1626.5	60.6	-42.9	-13	-29.9	Pass
0.030 – 1.0	R5T2XD	1646.5	40.6	-43.6	-13	-30.6	Pass
0.030 – 1.0	R5T2XD	1660.5	50.5	-43.5	-13	-30.5	Pass
1 – 2.3	R5T2XD	1626.5	1545.1	-32.5	-13	-19.5	Pass
1 – 2.3	R5T2XD	1646.5	1569.7	-31.7	-13	-18.7	Pass
1 – 2.3	R5T2XD	1660.5	1.640	-30.7	-13	-17.7	Pass
2.3 - 17	R5T2XD	1626.5	16993.3	-26.2	-13	-13.2	Pass
2.3 - 17	R5T2XD	1646.5	16989.8	-27.0	-13	-14	Pass
2.3 - 17	R5T2XD	1660.5	16885.0	-26.0	-13	-13	Pass
0.030 – 1.0	R5T4.5XD	1626.5	85.4	-42.3	-13	-29.3	Pass
0.030 – 1.0	R5T4.5XD	1646.5	692.1	-43.4	-13	-30.4	Pass
0.030 – 1.0	R5T4.5XD	1660.5	74.2	-42.8	-13	-29.8	Pass
1 – 2.3	R5T4.5XD	1626.5	1657	-32.2	-13	-19.2	Pass
1 – 2.3	R5T4.5XD	1646.5	1646.6	-30.9	-13	-17.9	Pass
1 – 2.3	R5T4.5XD	1660.5	1676	-30.6	-13	-17.6	Pass
2.3 - 17	R5T4.5XD	1626.5	16693.8	-25.8	-13	-12.8	Pass
2.3 - 17	R5T4.5XD	1646.5	16737.0	-26.0	-13	-13	Pass
2.3 - 17	R5T4.5XD	1660.5	16635.1	-26.7	-13	-13.7	Pass
0.030 – 1.0	R5T2QD	1626.5	64.6	-43.5	-13	-30.5	Pass
0.030 – 1.0	R5T2QD	1646.5	45.1	-42.6	-13	-29.6	Pass
0.030 – 1.0	R5T2QD	1660.5	71.8	-43.9	-13	-30.9	Pass
1 – 2.3	R5T2QD	1626.5	1655.75	-32.1	-13	-19.1	Pass
1 – 2.3	R5T2QD	1646.5	1582.7	-31.9	-13	-18.9	Pass
1 – 2.3	R5T2QD	1660.5	1617.2	-31.9	-13	-18.9	Pass
2.3 - 17	R5T2QD	1626.5	15936.4	-25.6	-13	-12.6	Pass
2.3 - 17	R5T2QD	1646.5	15400.6	-32.8	-13	-19.8	Pass
2.3 - 17	R5T2QD	1660.5	16632.1	-26.1	-13	-13.1	Pass
0.030 – 1.0	R5T4.5QD	1626.5	68.5	-43.0	-13	-30	Pass
0.030 – 1.0	R5T4.5QD	1646.5	56.8	-42.1	-13	-29.1	Pass
0.030 – 1.0	R5T4.5QD	1660.5	62.7	-43.1	-13	-30.1	Pass
1 – 2.3	R5T4.5QD	1626.5	1672.5	-32.7	-13	-19.7	Pass
1 – 2.3	R5T4.5QD	1646.5	1587.5	-31.8	-13	-18.8	Pass
1 – 2.3	R5T4.5QD	1660.5	1631.2	-30.9	-13	-17.9	Pass
2.3 - 17	R5T4.5QD	1626.5	16673.0	-26.1	-13	-13.1	Pass
2.3 - 17	R5T4.5QD	1646.5	15501.2	-26.1	-13	-13.1	Pass
2.3 - 17	R5T4.5QD	1660.5	15940.1	-26.1	-13	-13.1	Pass
0.030 – 1.0	R20T0.5QD	1626.5	55.8	-43.4	-13	-30.4	Pass
0.030 – 1.0	R20T0.5QD	1646.5	50.0	-43.0	-13	-30	Pass
0.030 – 1.0	R20T0.5QD	1660.5	64.4	-42.4	-13	-29.4	Pass
1 – 2.3	R20T0.5QD	1626.5	1592.6	-31.6	-13	-18.6	Pass
1 – 2.3	R20T0.5QD	1646.5	1617.6	-30.9	-13	-17.9	Pass
1 – 2.3	R20T0.5QD	1660.5	1617.1	-29.9	-13	-16.9	Pass

2.3 - 17	R20T0.5QD	1626.5	16997.9	-26.2	-13	-13.2	Pass
2.3 - 17	R20T0.5QD	1646.5	16618.4	-26.0	-13	-13	Pass
2.3 - 17	R20T0.5QD	1660.5	15531.7	-26.4	-13	-13.4	Pass
0.030 – 1.0	R20T1QD	1626.5	72.3	-43.1	-13	-30.1	Pass
0.030 – 1.0	R20T1QD	1646.5	42.8	-44.0	-13	-31	Pass
0.030 – 1.0	R20T1QD	1660.5	68.2	-43.1	-13	-30.1	Pass
1 – 2.3	R20T1QD	1626.5	1641.2	-31.7	-13	-18.7	Pass
1 – 2.3	R20T1QD	1646.5	1657.8	-32.1	-13	-19.1	Pass
1 – 2.3	R20T1QD	1660.5	1579.2	-30.2	-13	-17.2	Pass
2.3 - 17	R20T1QD	1626.5	16993.7	-25.5	-13	-12.5	Pass
2.3 - 17	R20T1QD	1646.5	15524.8	-26.0	-13	-13	Pass
2.3 - 17	R20T1QD	1660.5	16781.9	-25.7	-13	-12.7	Pass
0.030 – 1.0	FR80T2.5 X16	1626.5	44.8	-43.1	-13	-30.1	Pass
0.030 – 1.0	FR80T2.5 X16	1646.5	34.8	-42.9	-13	-29.9	Pass
0.030 – 1.0	FR80T2.5 X16	1660.5	68.8	-43.5	-13	-30.5	Pass
1 – 2.3	FR80T2.5 X16	1626.5	1655.5	-31.3	-13	-18.3	Pass
1 – 2.3	FR80T2.5 X16	1646.5	1568.2	-31.4	-13	-18.4	Pass
1 – 2.3	FR80T2.5 X16	1660.5	1682	-30.6	-13	-17.6	Pass
2.3 - 17	FR80T2.5 X16	1626.5	16561.3	-30.8	-13	-17.8	Pass
2.3 - 17	FR80T2.5 X16	1646.5	16603.4	-26.3	-13	-13.3	Pass
2.3 - 17	FR80T2.5 X16	1660.5	16755.5	-26.3	-13	-13.3	Pass
0.030 – 1.0	FR80T2.5 X32	1626.5	77.4	-43.9	-13	-30.9	Pass
0.030 – 1.0	FR80T2.5 X32	1646.5	78.3	-43.5	-13	-30.5	Pass
0.030 – 1.0	FR80T2.5 X32	1660.5	57.4	-43.3	-13	-30.3	Pass
1 – 2.3	FR80T2.5 X32	1626.5	1658.5	-31.6	-13	-18.6	Pass
1 – 2.3	FR80T2.5 X32	1646.5	1628	-31.5	-13	-18.5	Pass
1 – 2.3	FR80T2.5 X32	1660.5	1650.8	-30.7	-13	-17.7	Pass
2.3 - 17	FR80T2.5 X32	1626.5	16635.0	-25.5	-13	-12.5	Pass
2.3 - 17	FR80T2.5 X32	1646.5	16947.7	-25.4	-13	-12.4	Pass
2.3 - 17	FR80T2.5 X32	1660.5	16652.4	-26.5	-13	-13.5	Pass
0.030 – 1.0	FR80T2.5 X64	1626.5	80.4	-43.0	-13	-30	Pass
0.030 – 1.0	FR80T2.5 X64	1646.5	79.1	-43.1	-13	-30.1	Pass
0.030 – 1.0	FR80T2.5 X64	1660.5	639.9	-43.6	-13	-30.6	Pass
1 – 2.3	FR80T2.5 X64	1626.5	1655.2	-31.8	-13	-18.8	Pass
1 – 2.3	FR80T2.5 X64	1646.5	1561.5	-30.8	-13	-17.8	Pass
1 – 2.3	FR80T2.5 X64	1660.5	1583.6	-31.0	-13	-18	Pass
2.3 - 17	FR80T2.5 X64	1626.5	16749.0	-26.8	-13	-13.8	Pass
2.3 - 17	FR80T2.5 X64	1646.5	16655.6	-31.7	-13	-18.7	Pass
2.3 - 17	FR80T2.5 X64	1660.5	16649.6	-27.1	-13	-14.1	Pass
0.030 – 1.0	FR80T5X 16	1626.5	95.1	-41.6	-13	-28.6	Pass
0.030 – 1.0	FR80T5X 16	1646.5	31.5	-44.9	-13	-31.9	Pass
0.030 – 1.0	FR80T5X 16	1660.5	39.6	-43.3	-13	-30.3	Pass
1 – 2.3	FR80T5X 16	1626.5	1670	-30.8	-13	-17.8	Pass
1 – 2.3	FR80T5X 16	1646.5	1569.7	-31.2	-13	-18.2	Pass
1 – 2.3	FR80T5X 16	1660.5	1577.8	-30.9	-13	-17.9	Pass
2.3 - 17	FR80T5X 16	1626.5	16936.1	-25.8	-13	-12.8	Pass
2.3 - 17	FR80T5X 16	1646.5	15500.3	-25.3	-13	-12.3	Pass
2.3 - 17	FR80T5X 16	1660.5	16730.8	-26.8	-13	-13.8	Pass
0.030 – 1.0	FR80T5X 32	1626.5	63.4	-41.8	-13	-28.8	Pass
0.030 – 1.0	FR80T5X 32	1646.5	78.4	-43.5	-13	-30.5	Pass
0.030 – 1.0	FR80T5X 32	1660.5	86.1	-43.3	-13	-30.3	Pass
1 – 2.3	FR80T5X 32	1626.5	1563.2	-31.5	-13	-18.5	Pass
1 – 2.3	FR80T5X 32	1646.5	1620.6	-30.6	-13	-17.6	Pass
1 – 2.3	FR80T5X 32	1660.5	1680.6	-31.4	-13	-18.4	Pass
2.3 - 17	FR80T5X 32	1626.5	16955.6	-25.5	-13	-12.5	Pass
2.3 - 17	FR80T5X 32	1646.5	16719.4	-26.1	-13	-13.1	Pass
2.3 - 17	FR80T5X 32	1660.5	15522.3	-25.6	-13	-12.6	Pass

0.030 – 1.0	FR80T5X 64	1626.5	40.6	-43.3	-13	-30.3	Pass
0.030 – 1.0	FR80T5X 64	1646.5	87.2	-43.1	-13	-30.1	Pass
0.030 – 1.0	FR80T5X 64	1660.5	639.7	-41.2	-13	-28.2	Pass
1 – 2.3	FR80T5X 64	1626.5	1656.3	-32.0	-13	-19	Pass
1 – 2.3	FR80T5X 64	1646.5	1583.2	-30.9	-13	-17.9	Pass
1 – 2.3	FR80T5X 64	1660.5	1616.8	-30.6	-13	-17.6	Pass
2.3 - 17	FR80T5X 64	1626.5	16685.9	-26.1	-13	-13.1	Pass
2.3 - 17	FR80T5X 64	1646.5	16661.2	-26.7	-13	-13.7	Pass
2.3 - 17	FR80T5X 64	1660.5	16640.1	-25.3	-13	-12.3	Pass

Annex A.1 – Conducted Emissions Limitations – SBB - 25.202(f)

Annex A.2 – Conducted Emissions Limitations - Classic Aero - 25.202(f)

Refer to Annex A.1 for Conducted Emission Limitations plots for SBB.
Refer to Annex A.2 for Conducted Emission Limitations plots for Classic Aero.

Emissions Limitations _ Radiated

Engineer: Greg Corbin

Test Dates: 5/7/2025

Test Procedure

The EUT was tested in a semi-anechoic chamber with the turntable set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure that the signal levels were maximized. All cable and antenna correction factors were input into the spectrum analyzer ensuring an accurate measurement in ERP/EIRP with the resultant power in dBm.

The frequency of investigation was from 30 MHz to the 10th Harmonic.

This test is used to verify the emissions from cabinet radiation, as such only a sample of modulations and frequencies were used to verify the emissions produced by cabinet radiations.

The EUT was set to transmit at maximum power with the RF output terminated into 50-ohm 150w terminations.

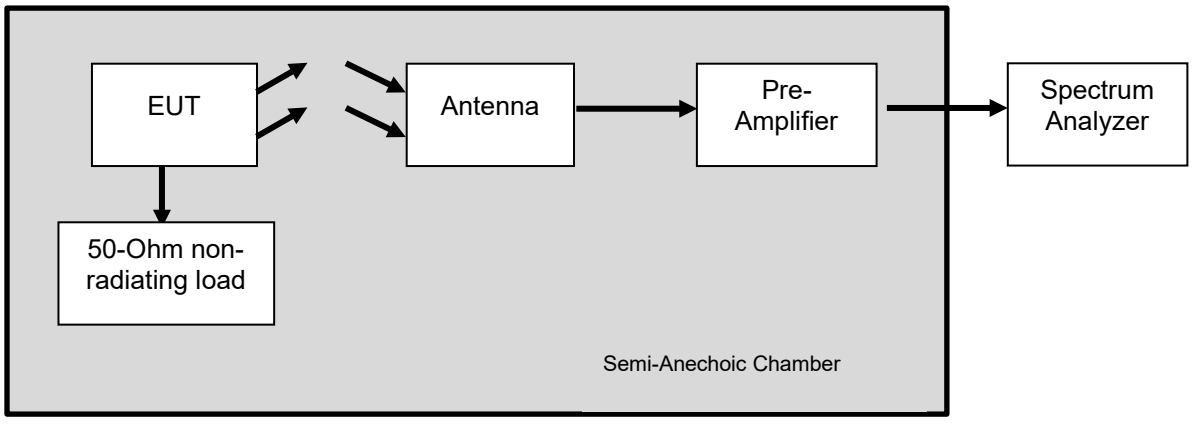
The RBW was set to 100 kHz for measurements below 1 GHz and 1 MHz for measurements above 1 GHz.
The VBW was set to 3 times the RBW.
Pre-scans were performed with a peak detector set to max hold.
Additional measurements for any emissions near or over the limit were measured with an average detector.
There were no peak emissions within 10 dB of the limit, so no average emission data was recorded.

The Radiated Emission measurements were compared to the 87.139(a)(3) limit

Limit in dB=43+10log10pY(transmitter power in Watts)

For 1 – 17 GHz measurements, Marker 1 (M1) in the graphs is the fundamental transmit frequency and is excluded from the measurements.

Radiated Spurious Emissions Test Setup



Radiated Emissions Limitations Summary Table

Frequency Range	Bearer	Tuned Frequency	Spurious Frequency	Spurious level	Limit	Margin	Pass / Fail
GHz		MHz	MHz	dBm	dBm	dB	
0.030 – 1.0	Classic - RT600	1626.5	247.69	-48.5	-13	-35.5	Pass
0.030 – 1.0	Classic - RT1200	1646.5	356.34	-53.5	-13	-40.5	Pass
0.030 – 1.0	SBB - FR80T2.5X16	1626.5	248.47	-49.4	-13	-36.4	Pass
0.030 – 1.0	SBB - FR80T2.5X32	1646.5	351.01	-56.6	-13	-43.6	Pass
0.030 – 1.0	SBB - FR80T5X16	1660.5	351.68	-54.3	-13	-41.3	Pass
0.030 – 1.0	SBB - FR80T5X32	1646.5	248.56	-49.7	-13	-36.7	Pass
0.030 – 1.0	SBB - R5T1XD	1626.5	351.3	-54.4	-13	-41.4	Pass
0.030 – 1.0	SBB - R5T2QD	1626.5	350.62	-56.3	-13	-43.3	Pass
0.030 – 1.0	SBB - R5T2XD	1646.5	249.05	-49.4	-13	-36.4	Pass
0.030 – 1.0	SBB - R5T4.5QD	1646.5	353.92	-53.5	-13	-40.5	Pass
0.030 – 1.0	SBB - R5T4.5XD	1660.5	247.01	-49.5	-13	-36.5	Pass
0.030 – 1.0	SBB - R20T1QD	1660.5	249.05	-56.2	-13	-43.2	Pass
1 - 17	Classic - RT600	1626.5	14743.5	-39.2	-13	-26.2	Pass
1 - 17	Classic - RT1200	1646.5	14646.1	-39.4	-13	-26.4	Pass
1 - 17	SBB - FR80T2.5X16	1626.5	14646.6	-39.1	-13	-26.1	Pass
1 - 17	SBB - FR80T2.5X32	1646.5	14694.6	-37.6	-13	-24.6	Pass
1 - 17	SBB - FR80T5X16	1660.5	14659.8	-37.8	-13	-24.8	Pass
1 - 17	SBB - FR80T5X32	1646.5	14695.0	-38.5	-13	-25.5	Pass
1 - 17	SBB - R5T1XD	1626.5	14745.3	-38.0	-13	-25	Pass
1 - 17	SBB - R5T2QD	1626.5	14678.6	-38.3	-13	-25.3	Pass
1 - 17	SBB - R5T2XD	1646.5	14738.9	-38.3	-13	-25.3	Pass
1 - 17	SBB - R5T4.5QD	1646.5	14665.8	-38.2	-13	-25.2	Pass
1 - 17	SBB - R5T4.5XD	1660.5	14678.6	-39.0	-13	-26	Pass
1 - 17	SBB - R20T1QD	1660.5	14724.7	-38.7	-13	-25.7	Pass

Annex B – Radiated Emissions Limitations

Refer to Annex B for Radiated Emission Limitations plots.

Occupied Bandwidth

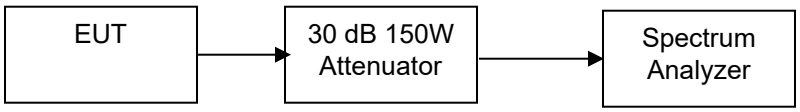
Engineer: Greg Corbin

Test Date:4/30/2025

Test Procedure

The EUT was connected directly to a spectrum analyzer. The 99% and -26 dB occupied bandwidth of the modulated output was measured and plotted.

Occupied Bandwidth Test Set-up



Occupied Bandwidth Test Results

Modulation	Frequency (MHz)	Measured Bandwidth (kHz)	
		99%	-26 dB
RT600	1646.5	0.771	0.948
RT1200	1646.5	1.46	1.73
RT10500	1646.5	8.52	9.99
C8400	1646.5	5.61	6.56
R5T1XD	1646.5	37.0	42.2
R5T2XD	1646.5	73.3	83.4
R5T4.5XD	1646.5	165	189
R5T2QD	1646.5	73.3	83.8
R5T4.5QD	1646.5	165	189
R20T0.5QD	1646.5	18.4	20.7
R20T1QD	1646.5	36.8	41.4
FR80T2.5 X16	1646.5	87.1	96.6
FR80T2.5 X32	1646.5	87.1	96.5
FR80T2.5 X64	1646.5	86.9	96.4
FR80T5X 16	1646.5	174	193
FR80T5X 32	1646.5	174	194
FR80T5X 64	1646.5	174	193

Annex C – Occupied Bandwidth

Refer to Annex C for Occupied Bandwidth plots.

Emission Masks

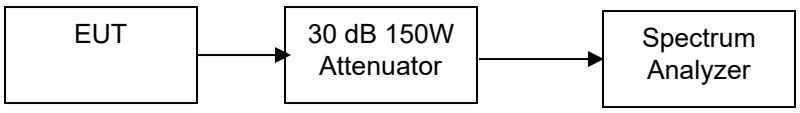
Engineer: Greg Corbin

Test Date: 5/1/2025, 6/25/2025

Test Procedure

The EUT was connected as shown to the spectrum analyzer to verify that the EUT met the requirements for emission masks per part 25.202(f).
The mask reference level was set to the same level as the output power.
The emission masks were recorded for each modulation at the low, middle, and high channels.
The RBW = 4 kHz

Emission Mask Test Setup



Annex D – Emission Mask

Refer to Annex D for Emission Mask plots.

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service 25.216(c)

Engineer: Greg Corbin

Test Date: 6/17/2025, 6/25/2025

Test Procedure

The EUT was connected as shown and the spurious emissions were recorded per FCC Part 25.216(c).

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.

The test was performed for the low , middle, and high channels for each modulation.
Antenna Gain = max antenna gain (+17 dBi) + RF cable loss (-2.5 dB) = 17 – 2.5 = 14.5 dBi.

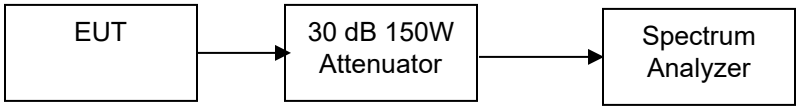
DNLA Type F or Type J diplexers are used between the SDU output and the antenna input.
The DNLA diplexers provide additional loss that is included in the final spurious calculations.
The DNLA Type F and Type J diplexers have the same insertion loss for each frequency range.
The DNLA diplexer insertion loss is included in the final emission level.
The insertion loss of the DNLA diplexer is >95 dB for the 1159 – 1605 MHz frequency range.

Final Emission Level = Emission Level + Antenna Gain + DNLA insertion loss

Limit:
,-80dBW/700 Hz (-50 dBm/700 Hz)
-70 dBW/1 MHz (-40 dBm/1 MHz)

With the added insertion loss of the DNLA diplexer the spurious emissions are >-65 dB below the limit.
Only the worst case (highest emission level) for the Classic Aero and SBB are shown in the summary table below.
Refer to Annex E for the individual graphs.

Test Setup



1559 – 1605 MHz Spurious Emissions Summary (worse case)
25.216(c), RBW = 700 Hz

Service and Bearer	Tuned Frequency	Emission Frequency	Emission Level	Antenna Gain	DNLA Insertion Loss	Final Emission Level	Limit	Margin	Pass / Fail
	MHz	MHz	dBm	dB	dB	dBm	dBm	dB	
Classic Aero RT600	1626.5	1566.4	-57.1	14.5	-95	-137.6	-50	-87.6	P
SBB – R5T1XD	1660.5	1579.2	-62.1	14.5	-95	-142.6	-50	-92.6	P

1559 – 1605 MHz Spurious Emissions Summary (worse case)
25.216(c), RBW = 1 MHz

Bearer	Tuned Frequency	Emission Frequency	Emission Level	Antenna Gain	DNLA Insertion Loss	Final Emission Level	Limit	Margin	Pass / Fail
	MHz	MHz	dBm	dB	dB	dBm	dBm	dB	
Classic Aero C8400	1646.5	1565.4	-30.9	14.5	-95	-111.4	-40	-71.4	P
SBB – R5T2QD	1660.5	1582.7	-27.9	14.5	-95	-108.4	-40	-68.4	P

Annex E – Spurious Emissions per FCC 25.216(c)

Refer to Annex E for Spurious Emissions plots per FCC 25.216(c)

DNLA diplexer Type F and Type J rejection

Freq Range	Rejection
MHz	dB
.010 to 1525	80
1525 to 1559	120
1559 to 1585	111
1585 to 1605	95
1605 to1610	62
1610 to 1610.6	40
1610.6 to 1613.8	40
1613.8 to 1614	40
1614 to 1620	30
1620 to 1624.5	20
1624.5 to 1625.5	10
1625.5 to 1626.5	Decreases
1626.5 to 1633	1.3
1633 to 1660.5	0.8
1660.5 to 1735	Increases
1735 to 1865	50
1865 to 3250	20
3250 to 3330	50
3330 to 4000	40
4000 to 12000	50
12000 to 18000	15

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service 25.216(f)

Engineer: Greg Corbin

Test Date: 6/17/2025, 6/25/2025

Test Procedure

The EUT was connected as shown and the spurious emissions were recorded per FCC Part 25.216(f).

25.216(f)
Mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies in the 1610-1660.5 MHz band shall suppress the power density of emissions in the 1605-1610 MHz band to an extent determined by linear interpolation from −70 dBW/MHz at 1605 MHz to −10 dBW/MHz at 1610 MHz.

Limits:
1605 - 1610_ -70 dBW/MHz to -10 dBW/MHz
1605 - 1610_ -40 dBm/MHz to +20 dBm/MHz

The test was performed for the low , middle, and high channels for each modulation.
Antenna Gain = max antenna gain (+17 dBi) + RF cable loss (-2.5 dB) = 17 – 2.5 = 14.5 dBi.

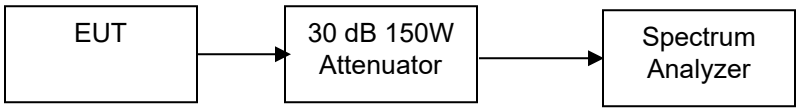
DNLA Type F or Type J diplexers are used between the SDU output and the antenna input.
The DNLA diplexers provide additional loss that is included in the final spurious calculations.
The DNLA Type F and Type J diplexers have the same insertion loss for each frequency range.
The DNLA diplexer insertion loss is included in the final emission level.
The insertion loss of the DNLA diplexer is >62 dB for the 1605 – 1610 MHz frequency range.

Final Emission Level = Emission Level + Antenna Gain + DNLA insertion loss

With the added insertion loss of the DNLA diplexer the spurious emissions are >-35 dB below the limit.

The highest emission level occurs at the lowest frequency of the 1605 due to the more stringent limit of -70 dBW (-40 dBm) at 1605 MHz.
Only the worst case (highest emission level) for the Classic Aero and SBB are shown in the summary table below.
Refer to Annex F for the individual graphs.

Test Setup



1605 - 1610 MHz Spurious Emissions Summary (worse case)
25.216(F), RBW = 1 MHz

Bearer	Tuned Frequency	Emission Frequency	Emission Level	Antenna Gain	DNLA Insertion Loss	Final Emission Level	Limit	Margin	Pass / Fail
	MHz	MHz	dBm	dB	dB	dBm	dBm	dB	
Classic Aero RT10500	1626.5	1605	-29.1	14.5	-62	-76.6	-40	-36.6	P
SBB – FR80T5X32	1660.5	1605	-31.3	14.5	-62	-78.8	-40	-38.8	P

Annex F – Spurious Emissions per FCC 25.216(f)

Refer to Annex F for Spurious Emissions plots per FCC 25.216(f)

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service 25.216(h)

Engineer: Greg Corbin

Test Date: 6/18/2025, 6/25/2025

Test Procedure

The EUT was connected as shown and the spurious emissions were recorded per FCC Part 25.216(h).

25.216h

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 1626.5-1660.5 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 −46 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 −56 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

Limit:
1605 - 1610_ -70 dBW/MHz to -46 dBW/MHz
1605 - 1610_ -40 dBm/MHz to -16 dBm/MHz

1605 - 1610_ -80 dBW/700Hz to -56 dBW/700Hz
1605 - 1610_ -50 dBm/700Hz to -26 dBm/700Hz

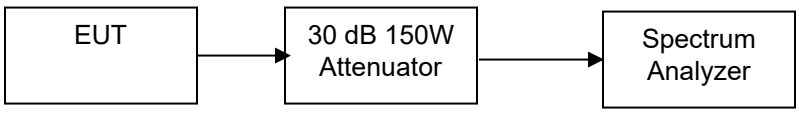
The test was performed for the low , middle, and high channels for each modulation.
Antenna Gain = max antenna gain (+17 dBi) + RF cable loss (-2.5 dB) = 17 – 2.5 = 14.5 dBi.

DNLA Type F or Type J diplexers are used between the SDU output and the antenna input.
The DNLA diplexers provide additional loss that is included in the final spurious calculations.
The DNLA Type F and Type J diplexers have the same insertion loss for each frequency range.
The DNLA diplexer insertion loss is included in the final emission level.
The insertion loss of the DNLA diplexer is >62 dB for the 1605 – 1610 MHz frequency range.

Final Emission Level = Emission Level + Antenna Gain + DNLA insertion loss

With the added insertion loss of the DNLA diplexer the spurious emissions are >-60 dB below the limit.
Only the worst case (highest emission level) for the Classic Aero and SBB are shown in the summary table below.
Refer to Annex G for the individual graphs.

Test Setup



1605 - 1610 MHz Spurious Emissions Summary (worse case)
25.216(h), RBW = 700 Hz

Service and Bearer	Tuned Frequency	Emission Frequency	Emission Level	Antenna Gain	DNLA Insertion Loss	Final Emission Level	Limit	Margin	Pass / Fail
	MHz	MHz	dBm	dB	dB	dBm	dBm	dB	
Classic Aero RT10500	1626.5	1605	-60.5	14.5	-62	-108	-50	-58	P
Classic Aero C8400	1636.5	1607.468	-55.2	14.5	-62	-102.7	-38.15	-64.55	P
SBB – R5T4.5QD	1646.5	1605	-62.85	14.5	--62	-110.35	-50	-60.35	P

1605 - 1610 MHz Spurious Emissions Summary (worse case)
25.216(h), RBW = 1 MHz

Bearer	Tuned Frequency	Emission Frequency	Emission Level	Antenna Gain	DNLA Insertion Loss	Final Emission Level	Limit	Margin	Pass / Fail
	MHz	MHz	dBm	dB	dB	dBm	dBm	dB	
Classic Aero RT10500	1626.5	1605	-29.1	14.5	-62	-76.6	-40	-71.4	P
SBB – FR80T5X32	1660.5	1605	-31.3	14.5	-62	-78.8	-40	-68.4	P

Annex G – Spurious Emissions per FCC 25.216(h)

Refer to Annex G for Spurious Emissions plots per FCC 25.216(h)

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service 25.216(i)

Engineer: Greg Corbin
Test Date: 6/18/2025

Test Procedure

The EUT was connected as shown with the TX output off and the Carrier Off State was recorded per FCC Part 25.216(i).

25.216i Carrier Off State
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.

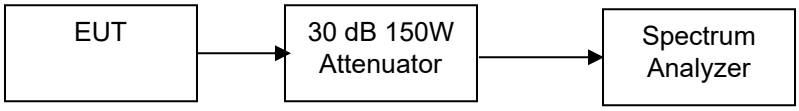
Limit:
1559 - 1610 MHz_ -80 dBW/MHz, -50dBm/MHz

Antenna Gain = max antenna gain (+17 dBi) + RF cable loss (-2.5 dB) = 17 – 2.5 = 14.5 dBi.

DNLA Type F or Type J diplexers are used between the SDU output and the antenna input.
The DNLA diplexers provide additional loss that is included in the final spurious calculations.
The DNLA Type F and Type J diplexers have the same insertion loss for each frequency range.
The DNLA diplexer insertion loss is included in the final emission level.
The minimum insertion loss of the DNLA diplexer is >62 dB at 1610 MHz for the 1559 – 1610 MHz frequency range.

Final Emission Level = Emission Level + Antenna Gain + DNLA insertion loss

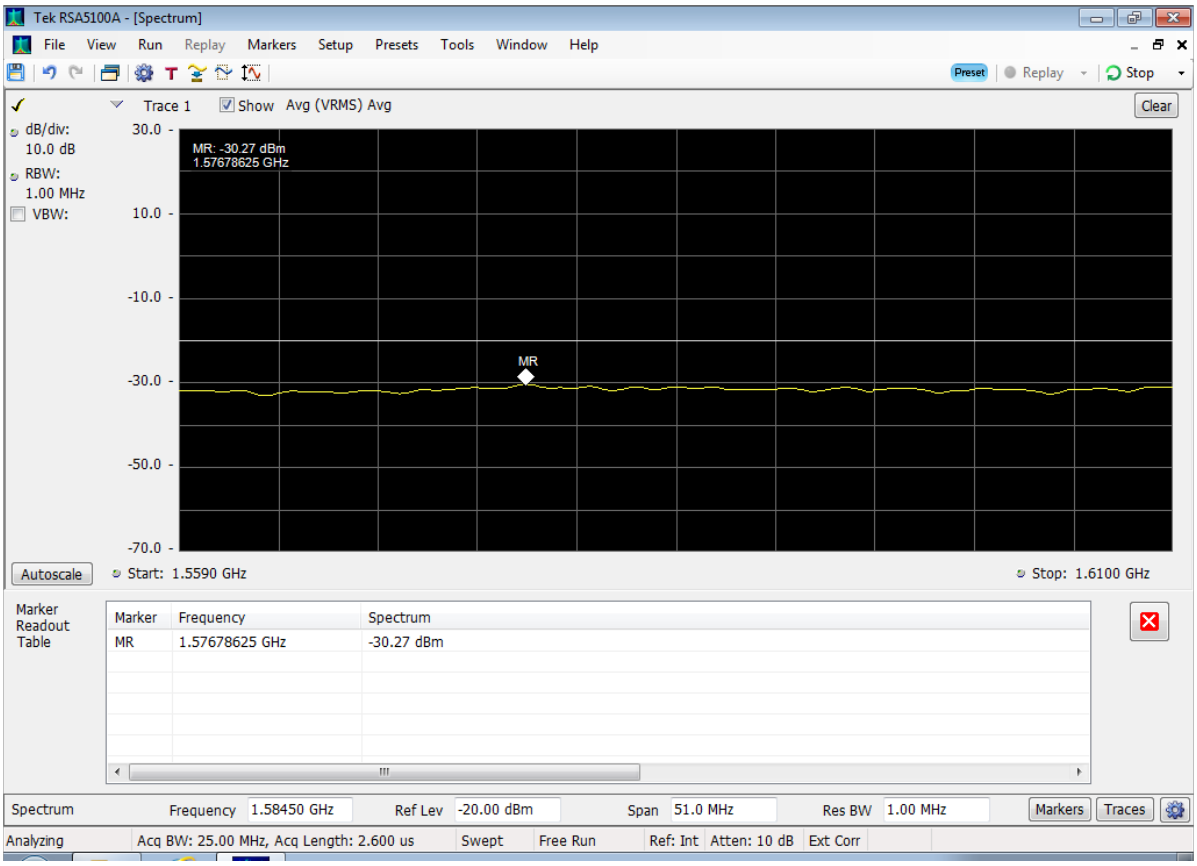
Test Setup



1559 - 1610 MHz Spurious Emissions Carrier Off State
25.216(i), RBW = 1 MHz

State	Frequency Range	Emission Frequency	Emission Level	Antenna Gain	DNLA Insertion Loss	Final Emission Level	Limit	Margin	Pass / Fail
	MHz	MHz	dBm	dB	dB	dBm	dBm	dB	
Carrier Off State	1559 - 1610	1576.7	-30.3	14.5	-62	-77.8	-50	-27.8	P

1559 - 1610 MHz Spurious Emissions Carrier Off State



Frequency Tolerance (Temperature Variation)

Test Engineer: Greg Corbin

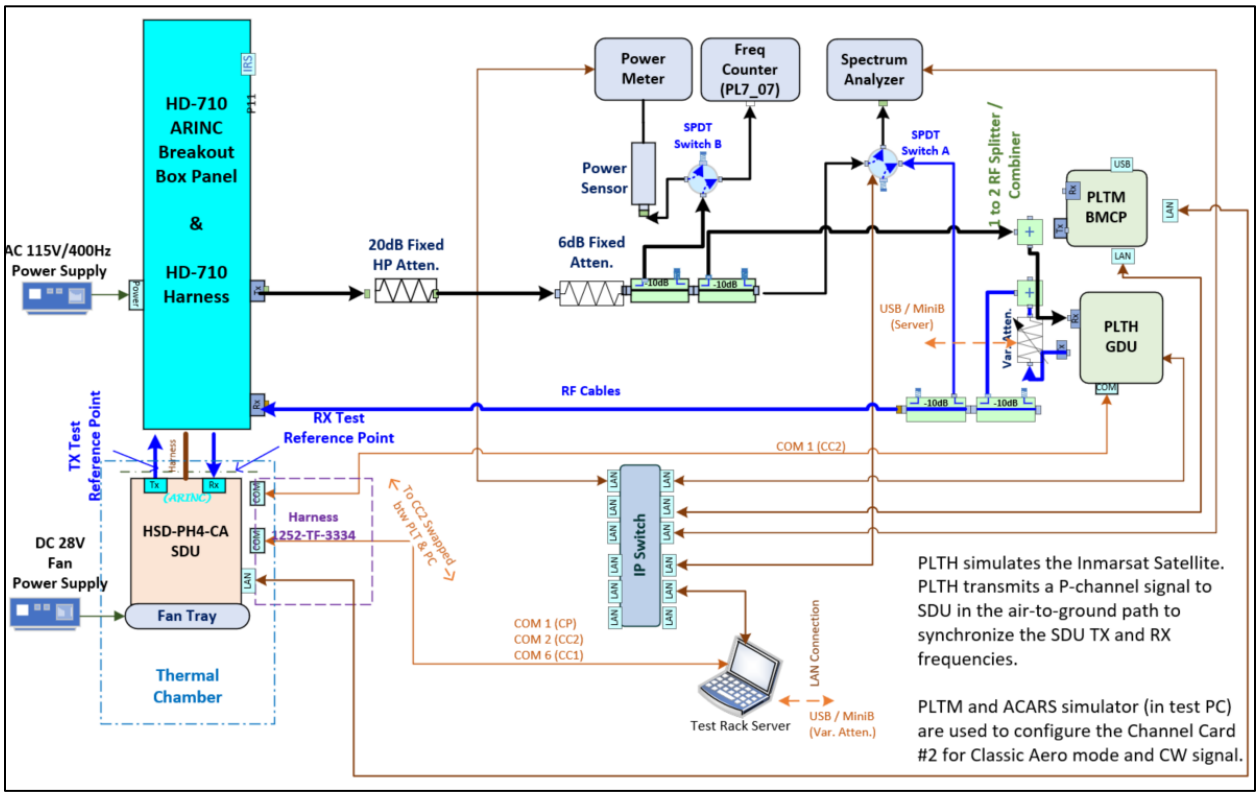
Test Date: 6/24/2025

Test Procedure

In normal operation the EUT has the transmit frequency locked to the ground station network control equipment to control the frequency of the transmit signal.
The frequency stability test was performed at the manufacturer's facility since the network control equipment could not be sent to the CTL test lab.
CTL provided the equipment required to measure the frequency (spectrum analyzer), monitor the temperature (data logger) and to set the AC and DC voltage for the voltage variation test (DMM).
The EUT was placed in an environmental test chamber and the temperature was raised from -30°C to 50°C in 10°C increments.
FCC limit = 0.001 %

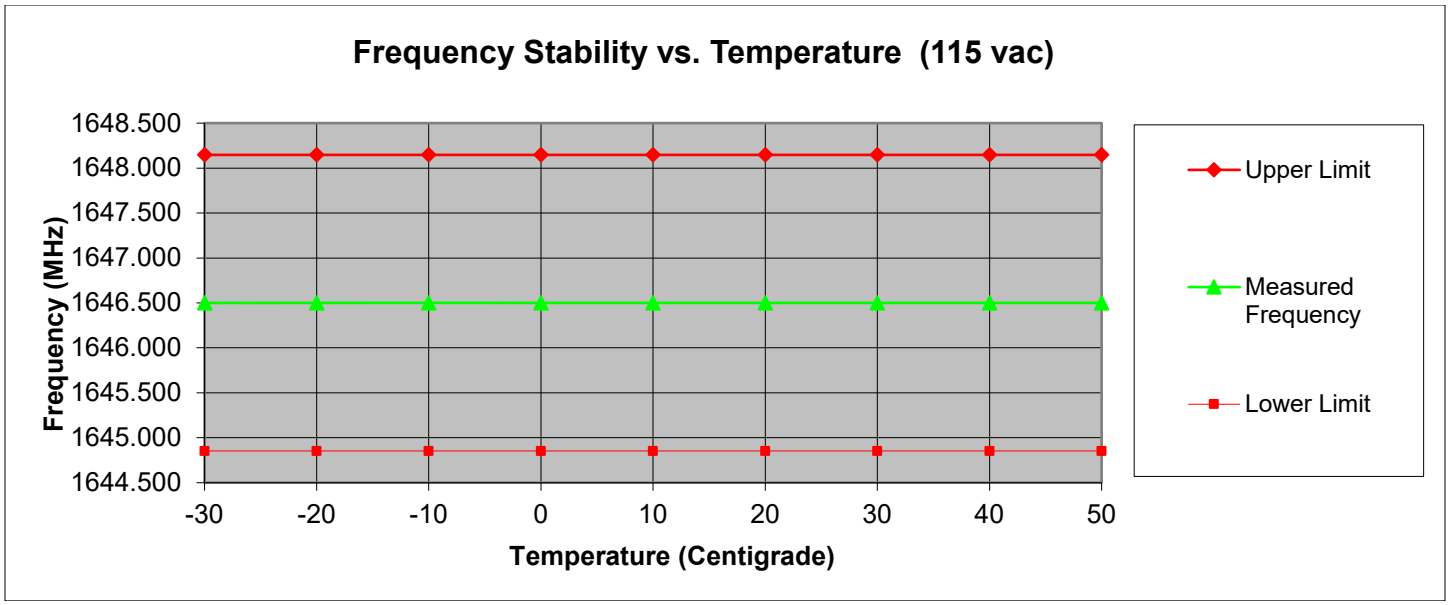
The test-set-up block diagram shown below was provided by the manufacturer to show the network control equipment.
The manufacturer's test equipment does not have a ISO 17025 calibration so the spectrum analyzer, data logger, and DMM were provided by CTL with ISO 17025 calibrations to record the frequency, monitor the temperature and vary the input voltage.
CTL monitored the entire test remotely via video cameras.
A different SDU (SN:0018) was used for the frequency Stability test.
The EUT can be powered with either +28 vdc or 115 vac.
For the temperature variation test the input voltage was set to 115 vac.

Frequency Stability Test Set-up



Frequency vs Temperature test results

Tuned Frequency (MHz)	Frequency Tolerance (%)	Upper Limit (MHz)	Lower Limit (MHz)	Temperature centigrade	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
1646.500	0.001	1648.1465000	1644.8535000	-30	1646.499706	1.6467940	1.6462060
		1648.1465000	1644.8535000	-20	1646.500505	1.6459950	1.6470050
		1648.1465000	1644.8535000	-10	1646.500882	1.6456180	1.6473820
		1648.1465000	1644.8535000	0	1646.500735	1.6457650	1.6472350
		1648.1465000	1644.8535000	10	1646.500253	1.6462470	1.6467530
		1648.1465000	1644.8535000	20	1646.499825	1.6466750	1.6463250
		1648.1465000	1644.8535000	30	1646.499772	1.6467280	1.6462720
		1648.1465000	1644.8535000	40	1646.500102	1.6463980	1.6466020
		1648.1465000	1644.8535000	50	1646.500507	1.6459930	1.6470070



Frequency Tolerance (Voltage Variation)

Engineer: Greg Corbin

Test Date: 6/24/2025

Test Procedure

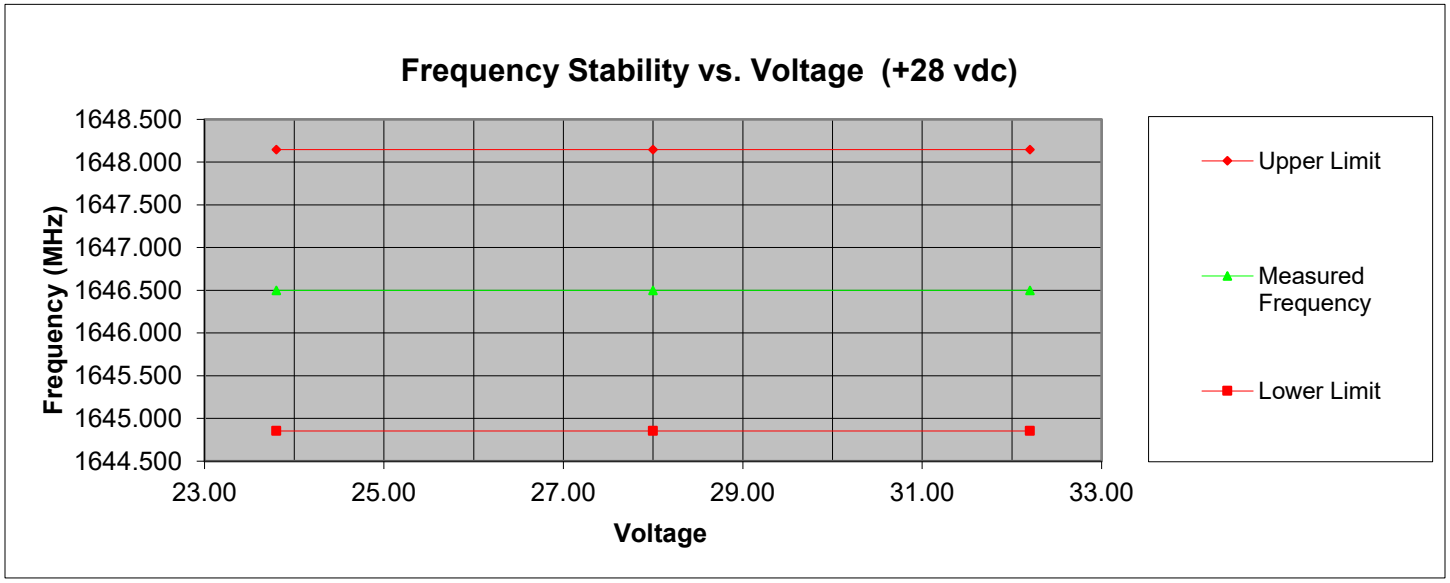
The EUT was tested as described in the Frequency Tolerance Temperature Variation test in this report.

The EUT can be powered with either +28 vdc or 115 vac.
At 20 deg C, the EUT output frequency was measured at the nominal voltage (28 vdc and 115 vac) and at the ± 15% voltage levels for the EUT.

FCC limit = 0.001%

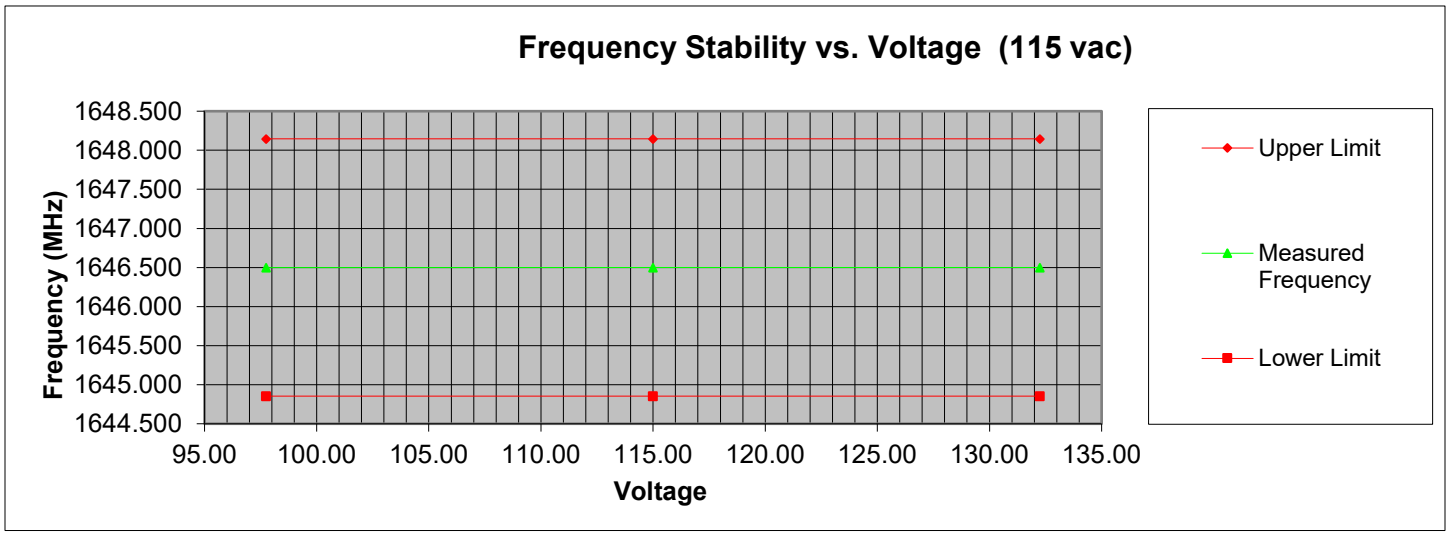
Voltage vs Temperature test results (+28 vdc)

Tuned Frequency (MHz)	Frequency Tolerance (%)	Upper Limit (MHz)	Lower Limit (MHz)	Nominal Voltage (vdc)	Voltage (vdc)	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
1646.500	0.001	1648.1465000	1644.8535000	28.00	23.80	1646.499765	-1.6467350	1.6462650
		1648.1465000	1644.8535000		28.00	1646.499763	-1.6467370	1.6462630
		1648.1465000	1644.8535000		32.20	1646.499871	-1.6466290	1.6463710



Voltage vs Temperature test results (115 vac)

Tuned Frequency (MHz)	Frequency Tolerance (%)	Upper Limit (MHz)	Lower Limit (MHz)	Nominal Voltage (vac)	Voltage (vac)	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
1646.500	0.001	1648.1465000	1644.8535000	115	97.75	1646.499801	-1.6466990	1.6463010
		1648.1465000	1644.8535000		115.00	1646.499825	-1.6466750	1.6463250
		1648.1465000	1644.8535000		132.25	1646.499788	-1.6467120	1.6462880



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	ARA	DRG-118/A	i00271	8/9/2024	8/9/26
Data Logger	Fluke	Hydra Data Bucket	i00343	6/19/2024	6/19/25 **
Attenuator, 30 dB, 150W	Narda	769-30	i00347	Verified on: 4/28/25	
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	2/27/25	2/27/27
Tunable Notch Filter	Trilithic	3VNF1500/25090-50-KK	i00410	Verified on: 5/6/25	
Spectrum Analyzer	Textronix	RSA5126A	i00424	6/25/2024	6/25/25 **
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/13/23	7/13/26
Voltmeter	Fluke	79III	i00499	10/15/24	10/15/25
MXE EMI receiver	Keysight	N9038A	i00552	3/17/25	3/17/26
Spectrum analyzer	Agilent	E4402B	i00580	6/9/25	6/9/26
High Pass Filter (2.2 GHz)	Wainwright	WHKX2.2/12.75G-10SS	I00677	Verified on: 5/6/25	
Temp./humidity/pressure monitor	Omega Engineering	iBTHX-W-5	i00686	1/25/25	1/25/26
Preamplifier	Eravant	SBB-0115034019-2F2F-E3	i00722	Verified on: 12/4/24	
Preamplifier	COM-Power	PAM-103	i00734	Verified on: 6/27/24	

** 30 day calibration extension approved by quality manager.

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

Measurement Uncertainty

Measurement Uncertainty (U_{lab}) 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	± 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_{ETSI} 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

Honeywell Network Support Equipment
(for reference only)
Honeywell Network support equipment as described on page 30 for the frequency stability test.
Frequency stability test was monitored with CTL 17025 calibrated equipment as described on page 30 and listed on page 34.

Description	Manufacturer / Model / Part Number	QTY	Serial Number / Asset Number
Test Rack	Honeywell	1	Rack 0057/ Asset #7698
20dB High Power Fixed Attenuator	Centric RF 100W C18N1005-20 N Attenuator 18GHz 100W 20dB Bidirectional	1	S/N: 3075
6 dB Fixed Attenuator, DC - 18000 MHz, 50Ω	Mini Circuits BW-S6W20+	1	N/A
DIR COUPLER, 0.5-18.5 GHz, 10 dB, SMA(F)	Krytar 1851	2	SN: 214149, 215241
2 Ways Power Splitter, 10 - 2000 MHz, 50Ω	Mini-Circuits ZFSC-2-11-S+	2	N/A
RF Switch	Mini-Circuits RF-2CSPDT-A18 DC to 18GHz	1	S/N 11703270091
Directional 10dB Coupler	Pasternack NB DIR Coupler PE2242-10	2	NA
Variable Attenuator	Vaunix LDA-602EH	1	S/N: 17465
Power Meter	Keysight N1914A EPM Series Power Meter	1	Asset /#06738 / TEA156436
Power Sensor	Agilent E4413A E Series CW Power Sensor	1	Assest #NC0674 TEA156222
Test PC	COMARK ETL ID 06-ETL50-001 P/N TCS-025-02022-001	1	S/N T17264835 Asset #7700
Physical Layer tester for SBB MTRs	Squarepeg PLTM_02033	1	PLTM_02033 / Asset #7466
Physical Layer Tester for Classic tests - RFU	Squarepeg PLTH_106 FRU	1	PLTH_106 / Asset #05926
Physical Layer Tester for Classic tests - CU	Squarepeg PLTH_106 CU	1	PLTH_106 / Asset #05925
ARINC Fan Tray 8MCU with 28VDC fan	ECS P/N 6100-101	1	LOT# 962211501
DC Fan	EG&G ROTRON FSCM-82877 P/N 011097	1	S/N ACE473
HSD-MK2 Cable Assembly	EMS-1252-TF-3801 Rev B	1	S/N 002-2024
Breakout Panel	Honeywell 1252-TF-3497 Rev 02	1	N/A
Maintenance Cable	Honeywell 1252-TF-3334 Rev.1.0	1	N/A
AC Power Suppler	apt Associated Power Technologies 7000 Series Programmable AC power source	1	Asset #06936
DC Power Supply	XANTREX XFR 35-35	1	EMS asset 01854
DC Power Suppler	Sorensen DLM- 40-15	1	Asset #7011 / TEA156391

Thermal Chamber	ESPEC	1	CHMB0005 / Asset #04844 / TEA153615
ARINC Fan Tray 8MCU with 28VDC fan	ECS P/N200-91117-102	1	LOT# 213224352123
DC Fan	ECS P/N S0085-138 / AETECK ROTRON 011858000	1	S/N I15250093
DC Fan	ECS P/N S0085-138 / AETECK ROTRON 011858000	1	S/N I23030253

END OF TEST REPORT