Test Report

Prepared for: Icom Inc

Model: IC-A220

Description: Aviation Radio

Serial Number: 6100302

FCC ID: AFJ297420
IC ID: 202D-297420
To
FCC Part 87
ISED RSS-141 Issue 2

Date of Issue: May 7, 2025

On the behalf of the applicant:

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Attention of:

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Project No: p1120005

John Michalowicz
Project Test Engineer

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All results contained herein relate only to the sample tested.

Test Results Summary

Specification		Test Name	Pass, Fail, N/A	Comments
2.1046, 87.131	RSS 141 Section 4.1	Carrier Output Power (Conducted)	Pass	
2.1051, 87.139(i)(1)	RSS 141 Section 5.2	Unwanted Emissions (Transmitter Conducted)	Pass	
2.1053	RSS 141 Section 5.2	Field Strength of Spurious Radiation	Pass	
2.1049, 87.139(i)(3)	RSS 141 Section 5.2	Emission Masks (Occupied Bandwidth)	Pass	
2.1047	NA	Audio Low Pass Filter (Voice Input)	Pass	
2.1047	NA	Audio Frequency Response	Pass	
2.1047	NA	Modulation Limiting	Pass	
2.1055, 87.133(a)	RSS 141 Section 5.1	Frequency Stability (Temperature Variation)	Pass	
2.1055, 87.133(a)	RSS 141 Section 5.1	Frequency Stability (Voltage Variation)	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	May 7, 2025	John Michalowicz	Original Document
2.0	May 27, 2025	John Michalowicz	Updated report with ISED Canda information

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ANAB

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

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

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

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts: FCC Part 87.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (ºC)	**Humidity (%)**	**Pressure (mbar)**
24.6 – 27.4	23.6 – 28.0	963.1 - 972.3

EUT Description
Model: IC-A220
Description: Aviation Radio
Firmware: NA
Software: NA
Serial Number: 6100302
Additional Information: The EUT was powered with a DC power supply with 27.5 Vdc. This report is intended to support the C2PC that the manufacturer is pursuing.

EUT Operation during Tests

The EUT was placed into a constant transmit mode using the manufacturer supplied test board

Accessories:

Qty	Description	Manufacturer	Model	S/N
1	Test Board	Icom	NA	NA

Cables:

Qty	Description	Length (M)	Shielding Y/N	Shielded Hood Y/N	Termination
1	Multi pin	<1m	N	N	NA

Modifications: None

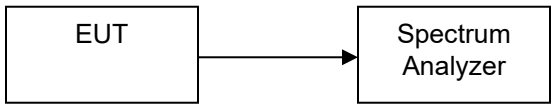
Carrier Output Power (Conducted)

Engineer: John Michalowicz
Test Date: 4/23/25

Test Procedure

The Equipment Under Test (EUT) was connected directly to a spectrum analyzer with the RBW set to greater than the OBW and the VBW set to 3 X RBW which set the RBW greater than the transmit signal ensuring there was no signal suppression while measuring a modulated signal. The peak readings were taken for each channel spacing and the result was then compared to the limit.

Test Setup



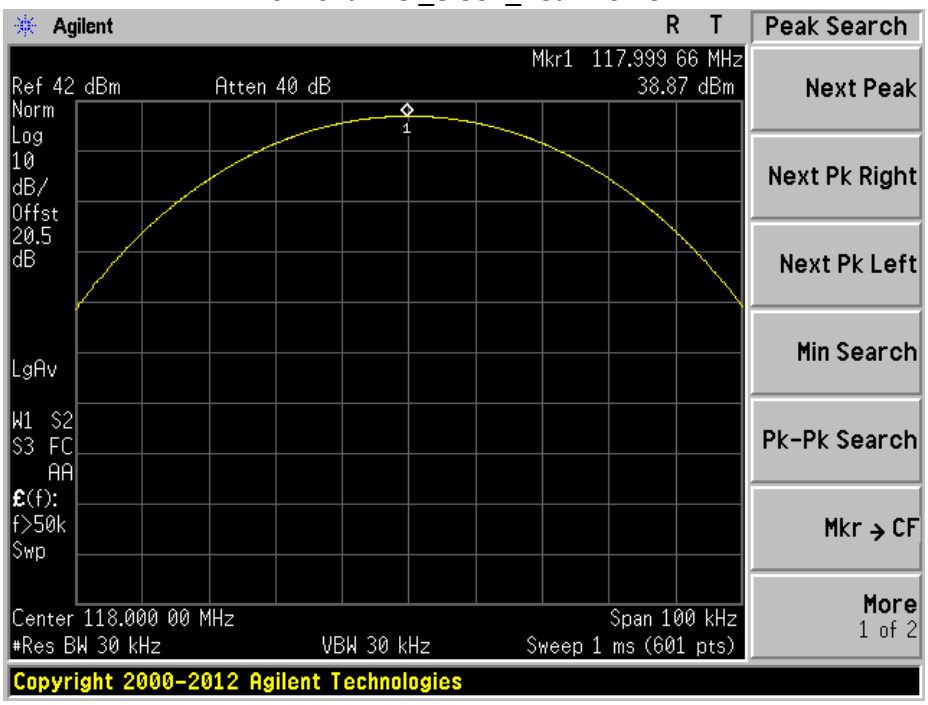
8.33k Transmitter Peak Output Power

Tuned Frequency (MHz)	OCBW (kHz)	Measured Power (dBm)	Measured Power (W)	Limit (W)	Result
118	5.487	38.87	7.709	60	Pass
127.5	5.480	38.94	7.834	60	Pass
136.99	5.483	38.94	7.834	60	Pass

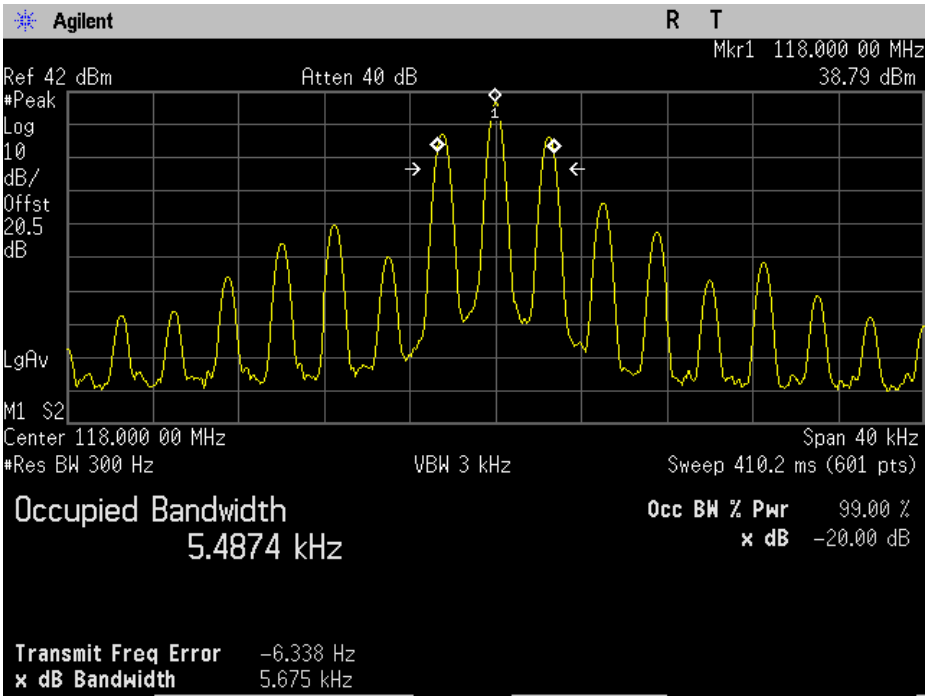
25k Transmitter Peak Output Power

Tuned Frequency (MHz)	OCBW (kHz)	Measured Power (dBm)	Measured Power (W)	Limit (W)	Result
118.025	5.490	39.0	7.943	60	Pass
127.5	5.480	39.03	7.998	60	Pass
136.975	5.493	38.97	7.888	60	Pass

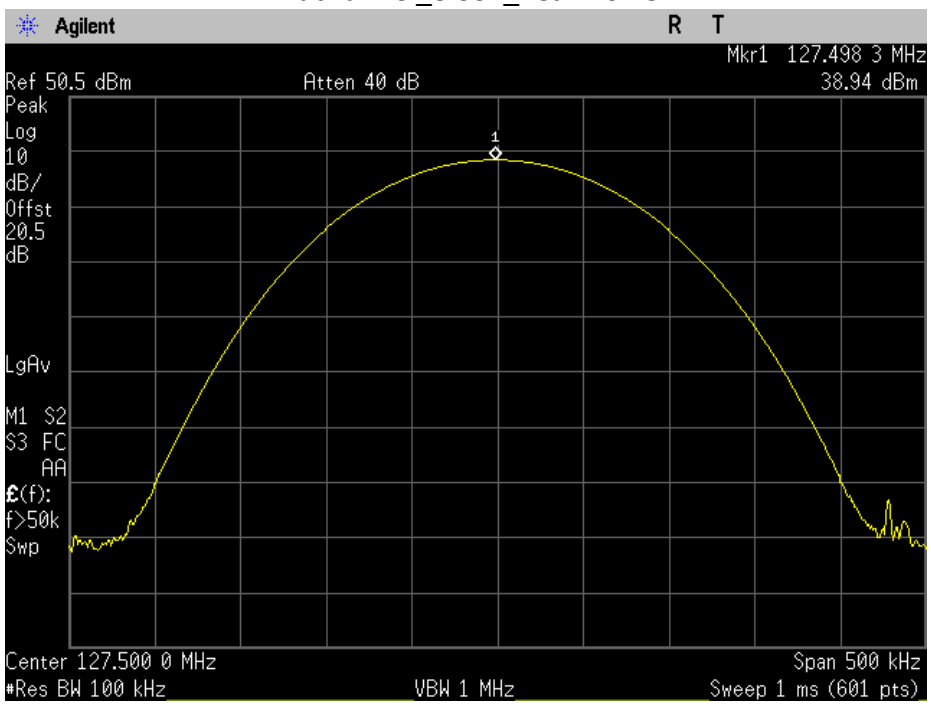
Low channel_8.33k_Peak Power



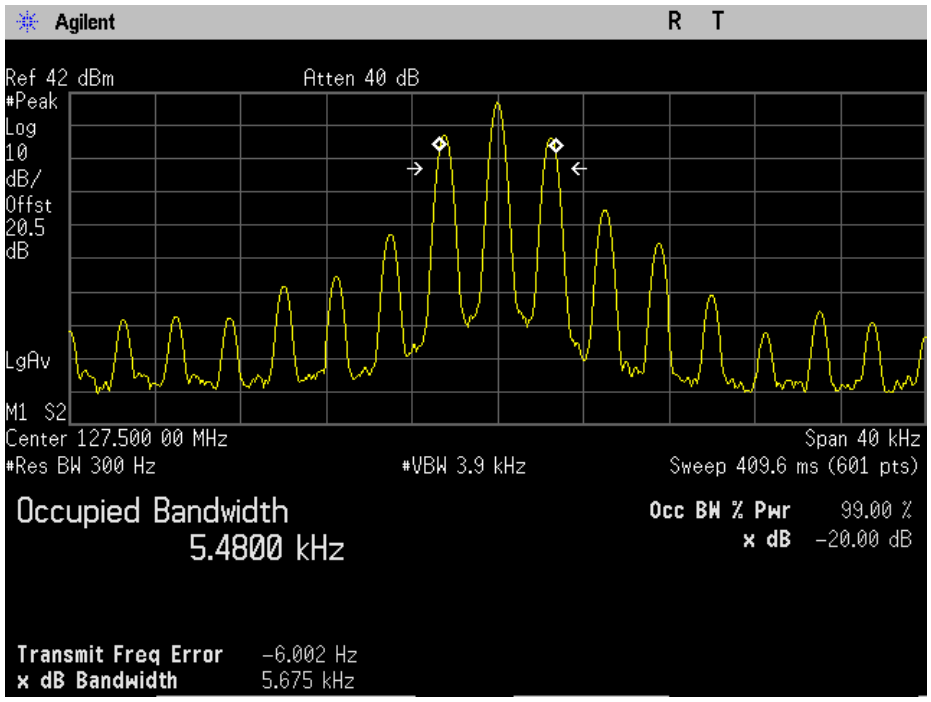
Low channel_8.33k_OCBW



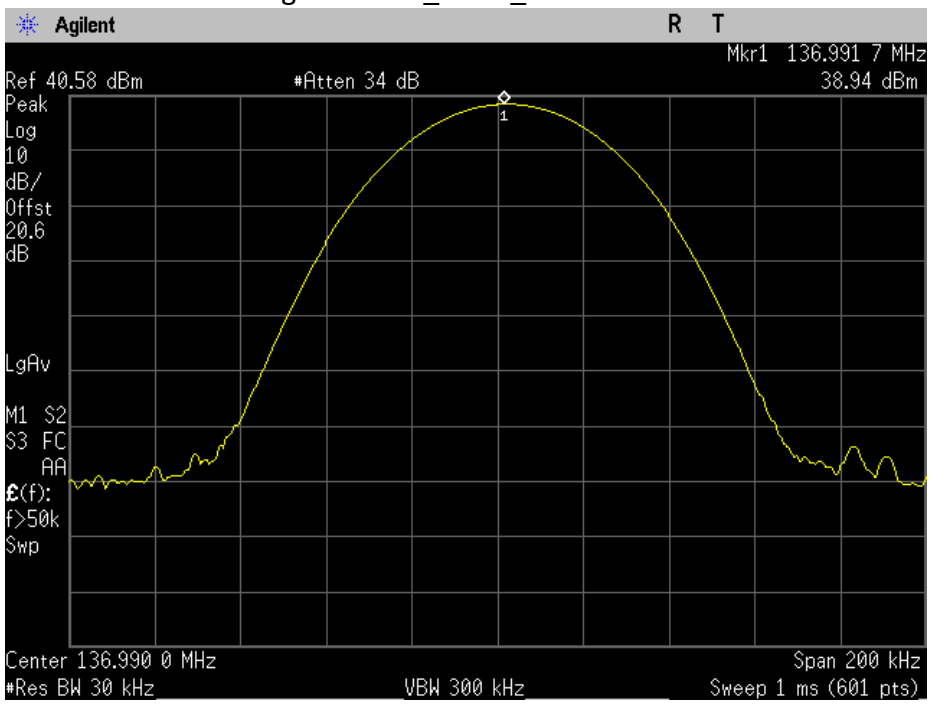
Midchannel_8.33k_Peak Power



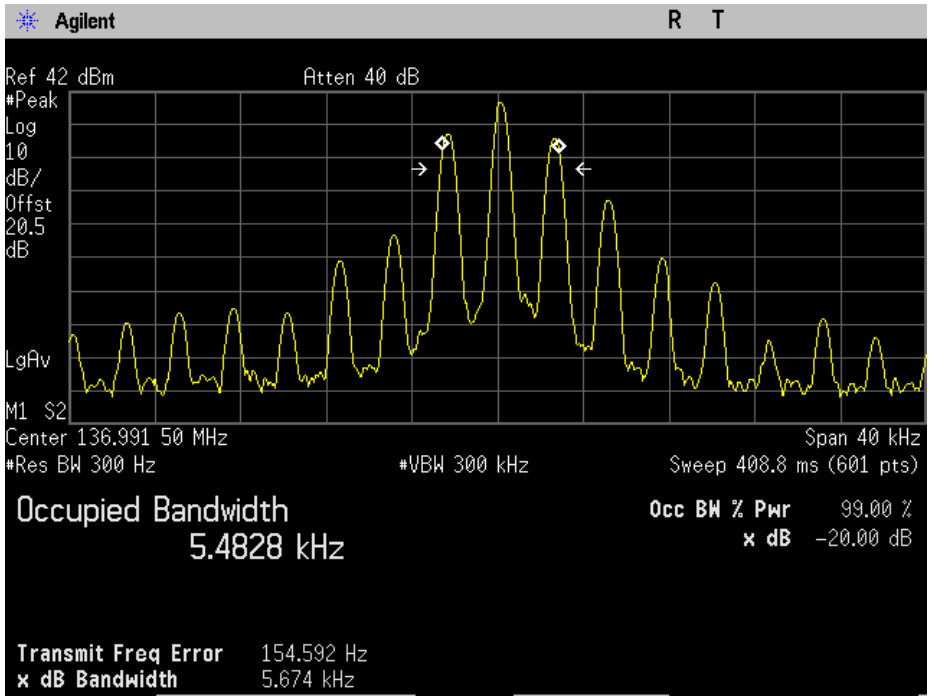
Mid channel_8.33k_OCBW



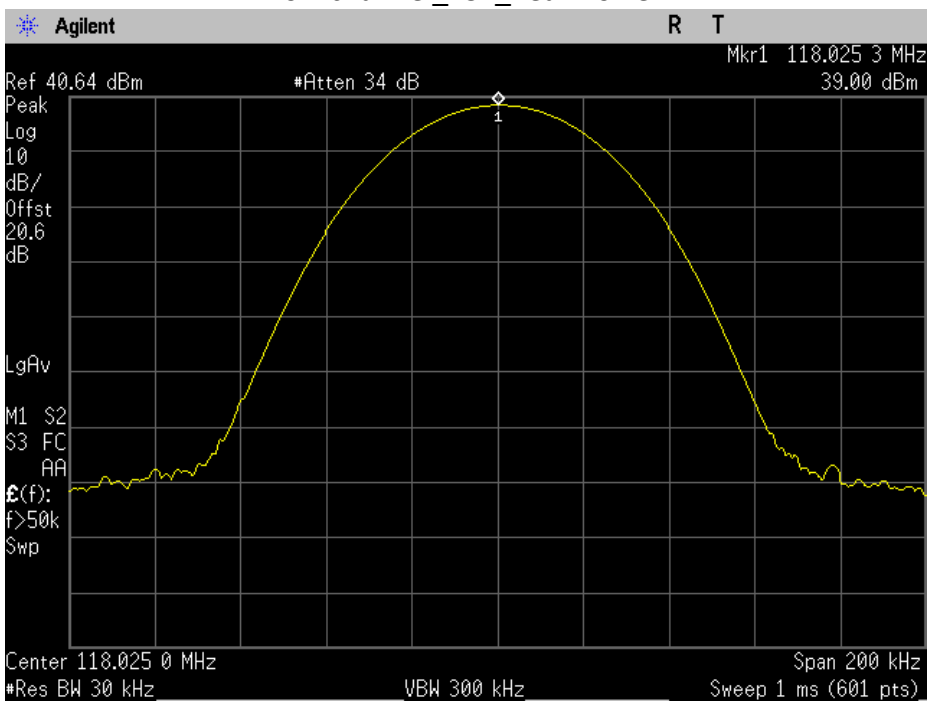
High channel_8.33k_Peak Power



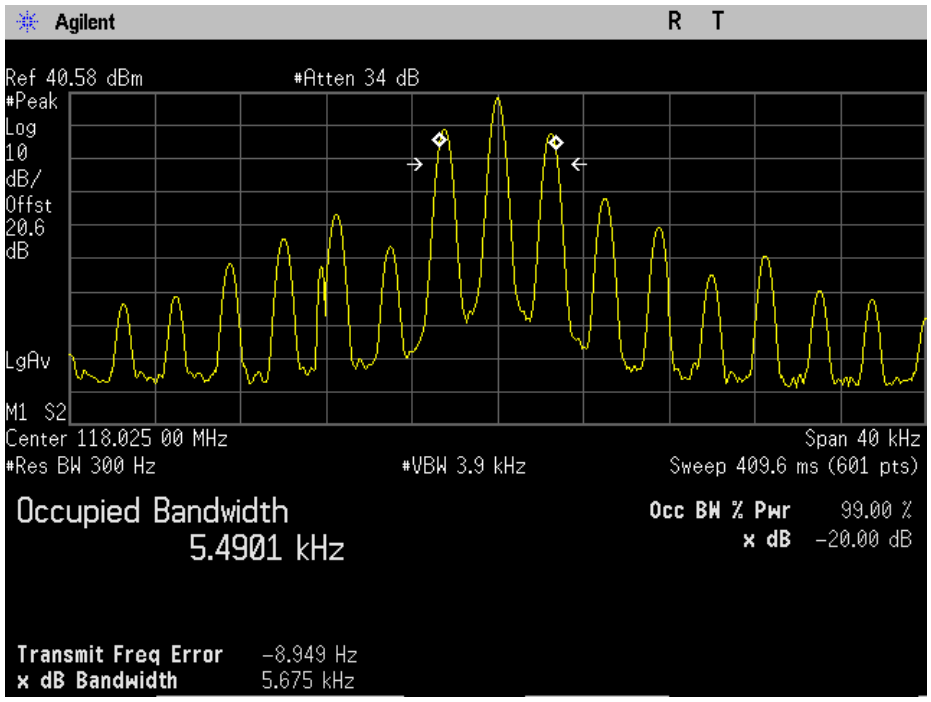
High channel_8.33k_OCBW



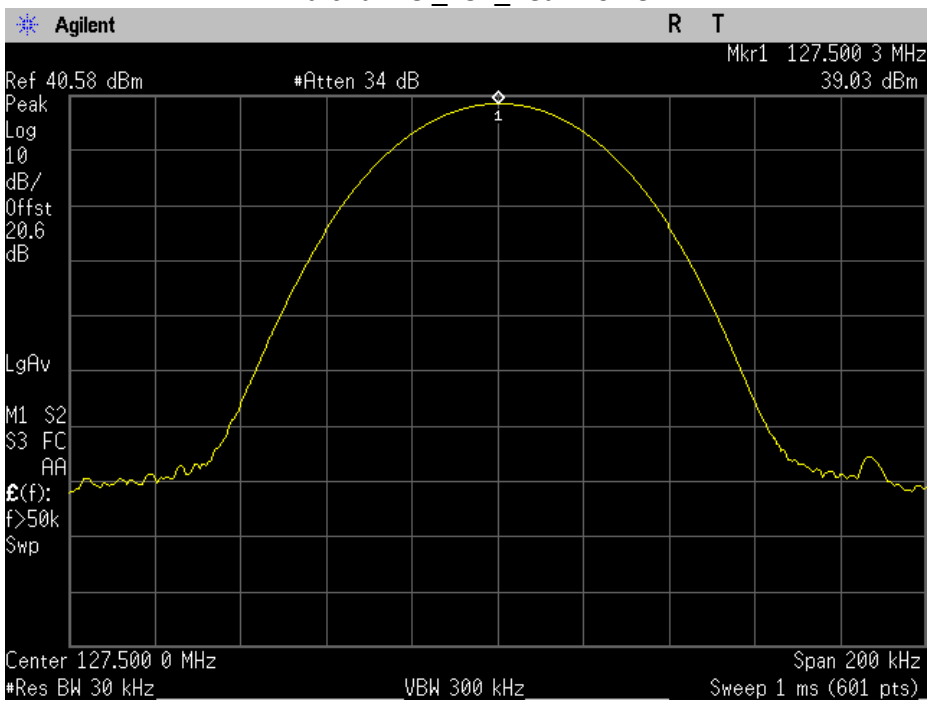
Low channel_25k_Peak Power



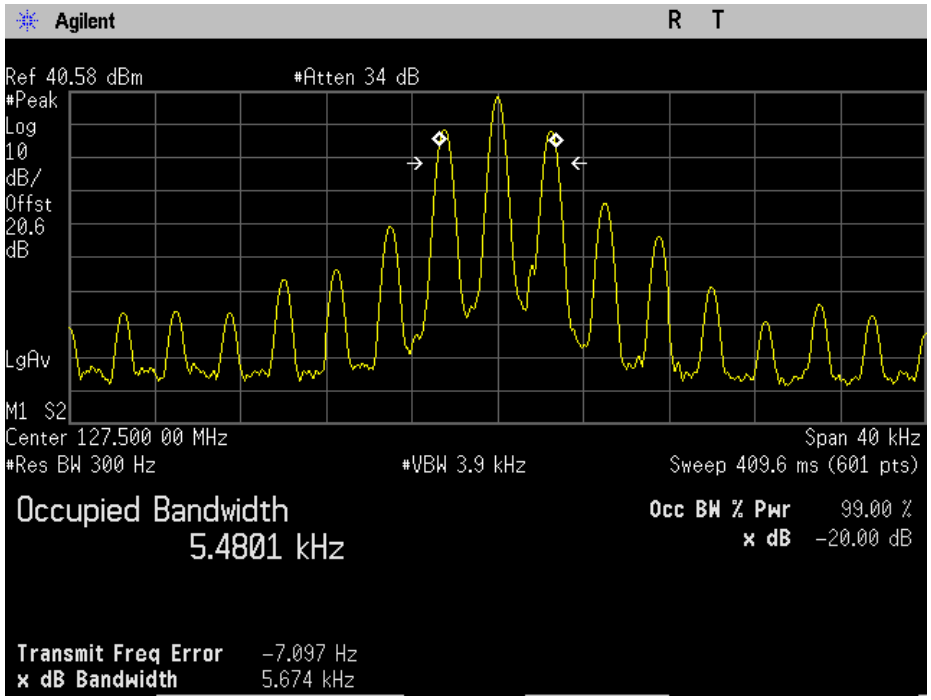
Low channel_25k_OCBW



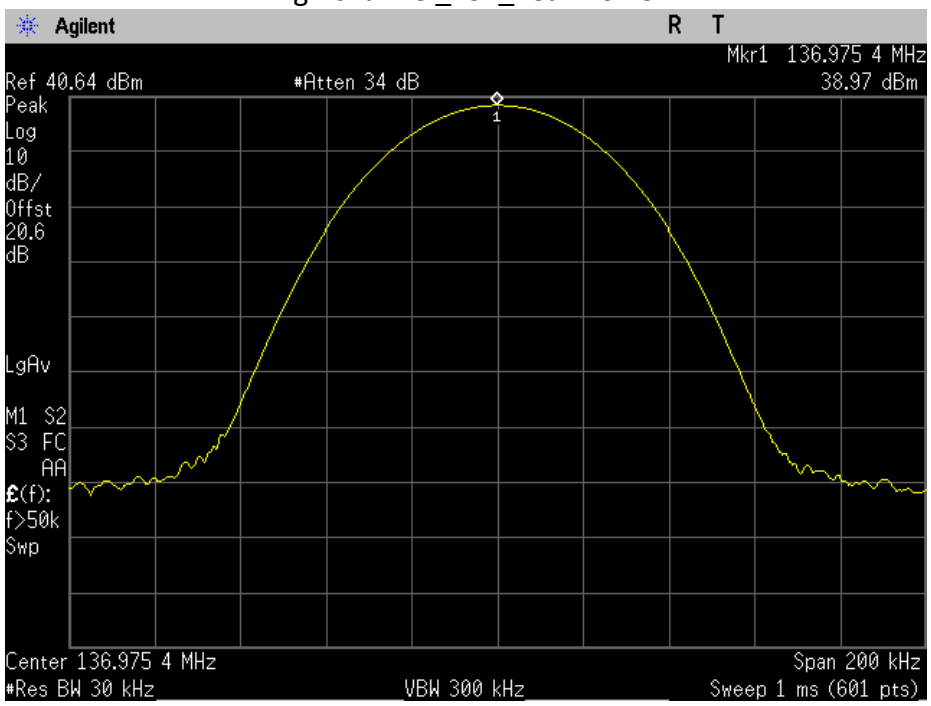
Mid channel_25k_Peak Power



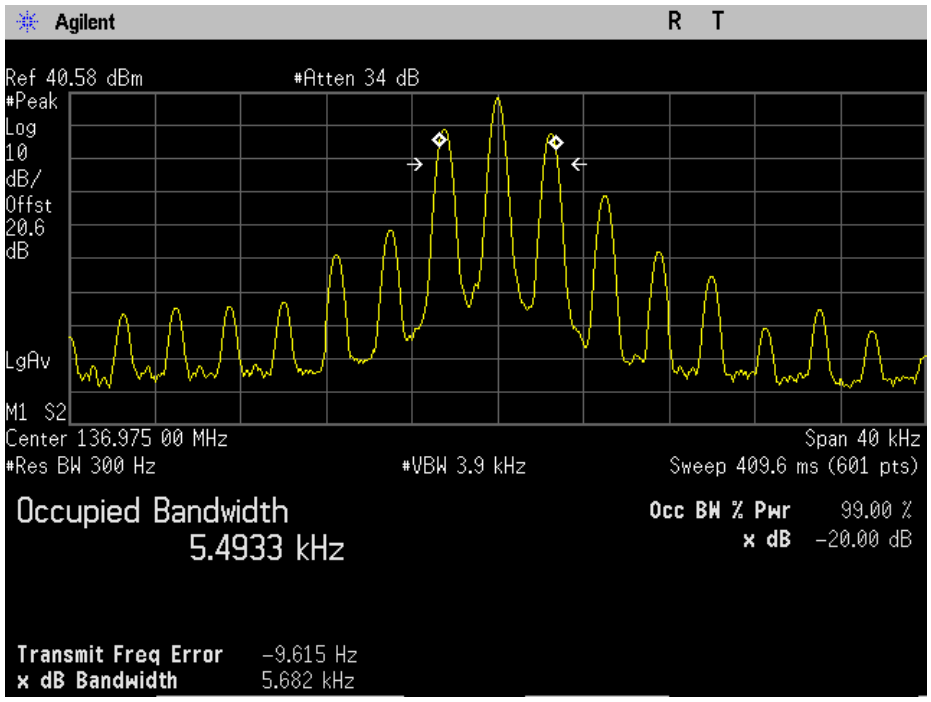
Mid channel_25k_OCBW



High channel_25k_Peak Power



High channel_25k_OCBW



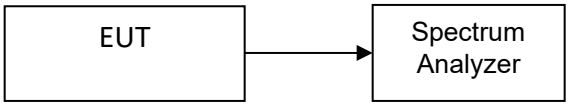
Transmitter Antenna Power Spurious/Conduced Emissions

Engineer: John Michalowicz
Test Date: 4/23/25

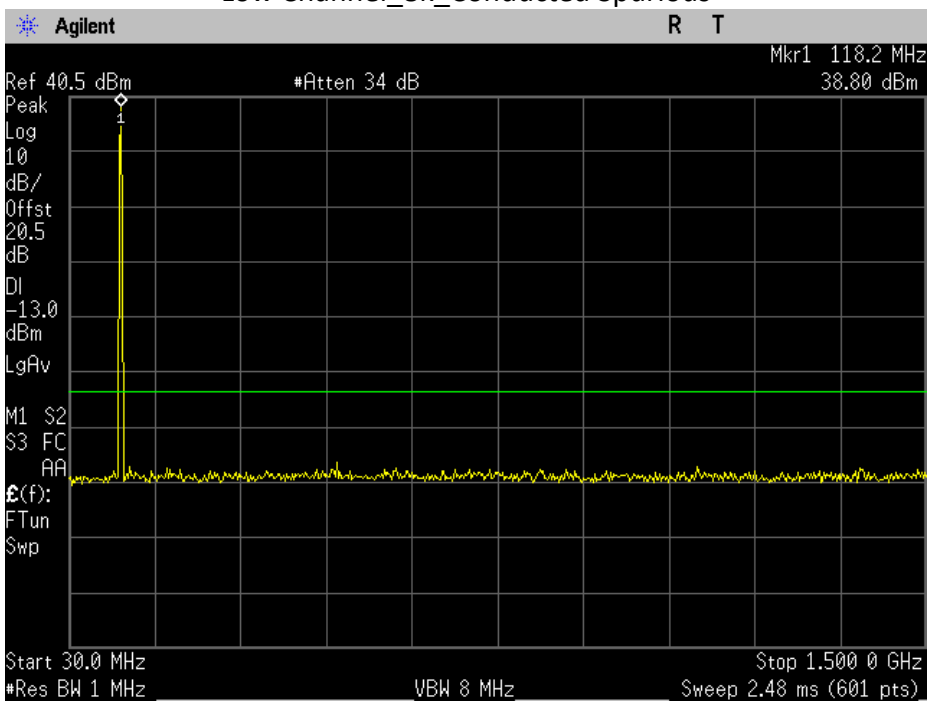
Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. The RBW was set according to the requirements of 87.139 (a)(3).

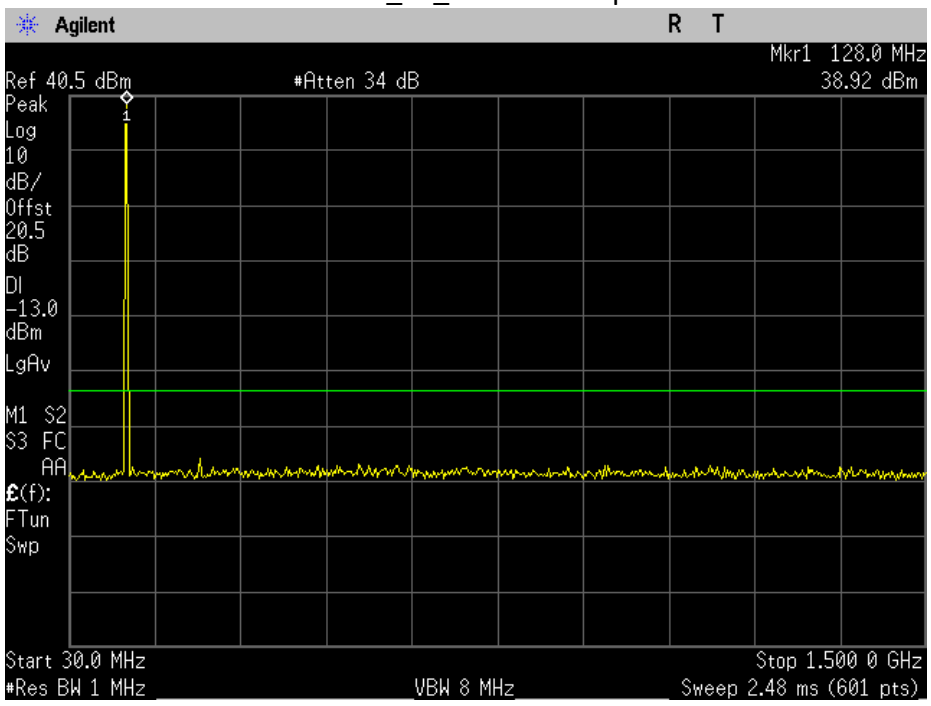
Test Setup



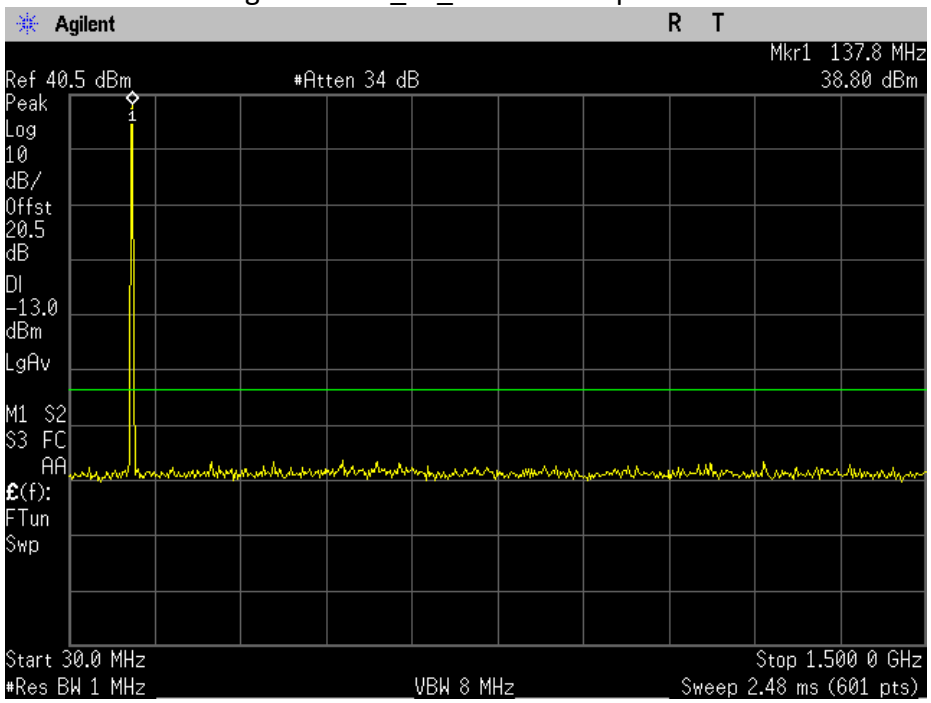
Low Channel_8k_Conducted Spurious



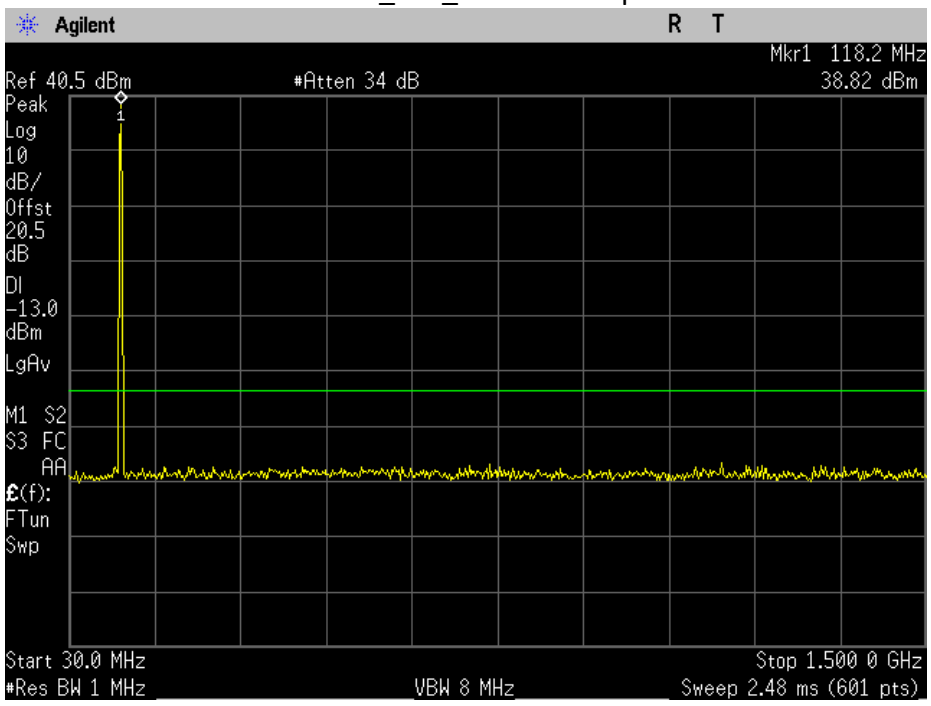
Mid Channel_8k_Conducted Spurious



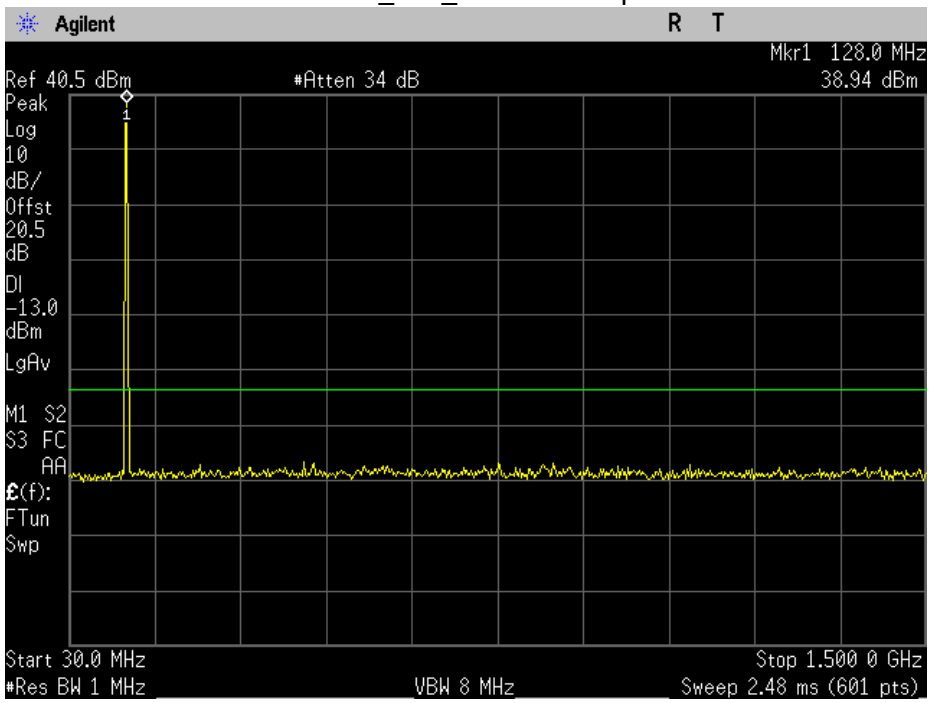
High Channel_8k_Conducted Spurious



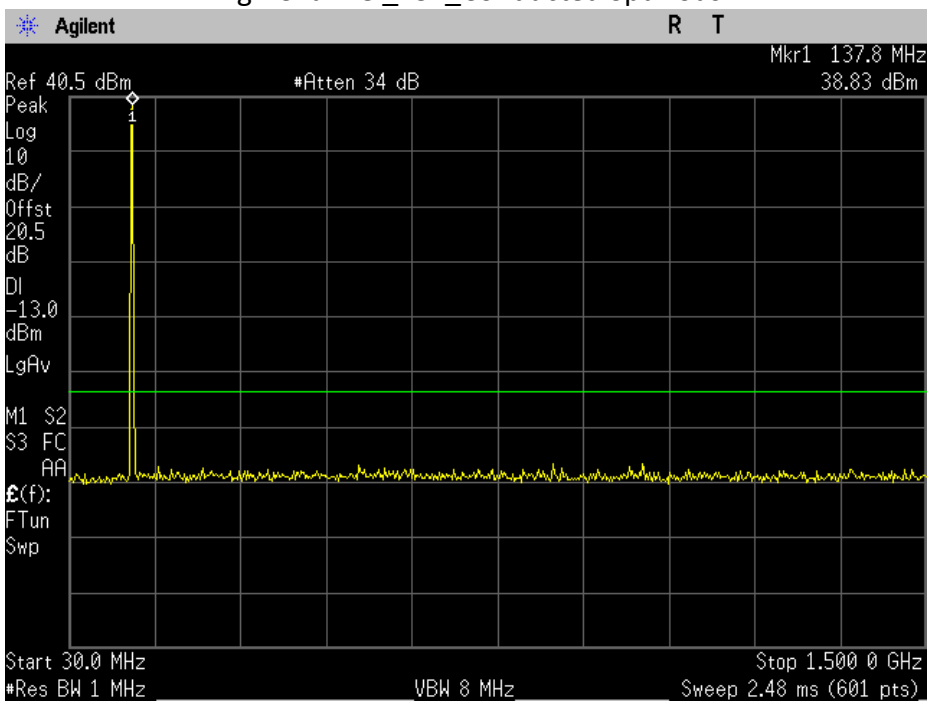
Low Channel_25k_Conducted Spurious



Mid Channel_25k_Conducted Spurious



High Channel_25k_Conducted Spurious



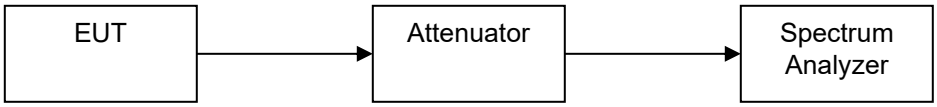
Emission Masks (Occupied Bandwidth)

Engineer: John Michalowicz
Test Date: 4/23/25

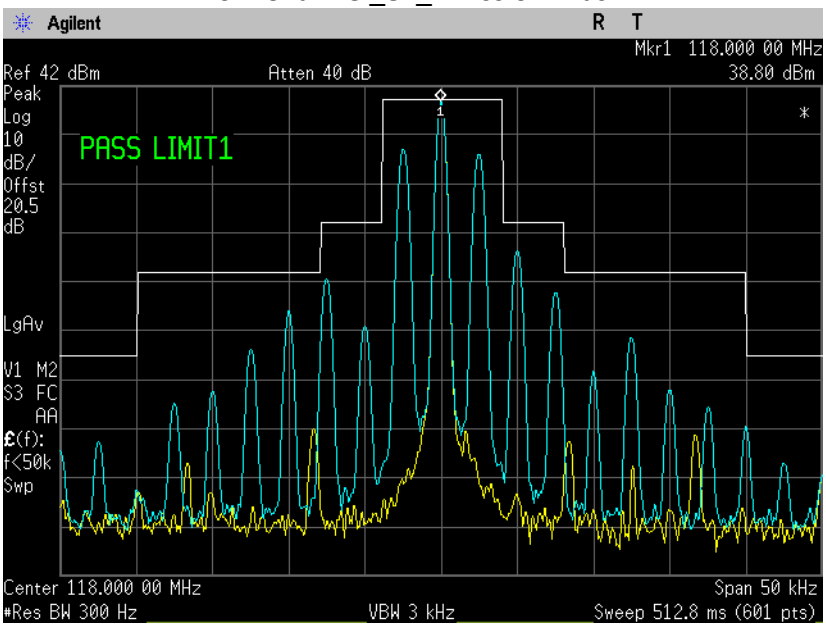
Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the EUT meets the required emissions mask. A reference level plot is provided to verify that the peak power was established prior to testing the mask. The transmitter is digital modulation therefore no data input is required to measure the emission mask. The RBW was set as close as possible to 1% of the occupied bandwidth to ensure accurate readings.

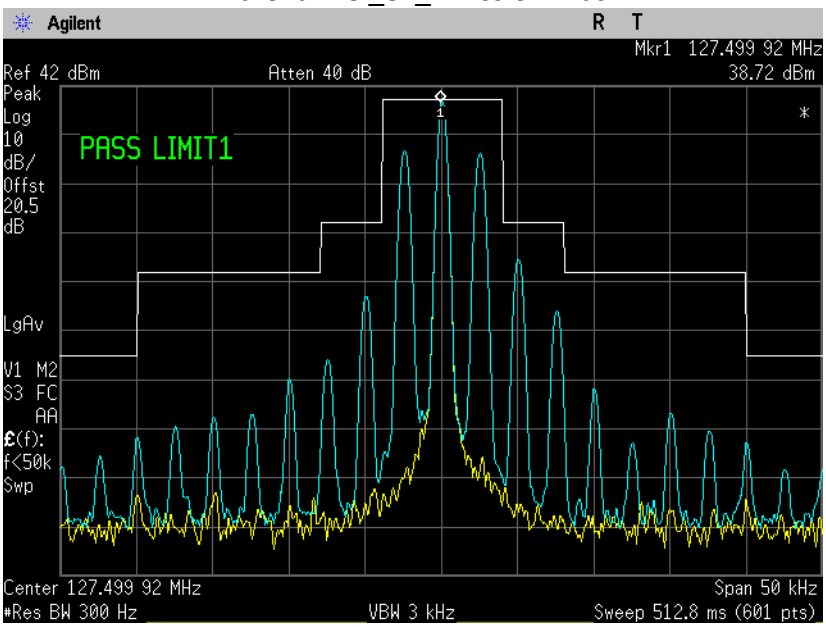
Test Setup



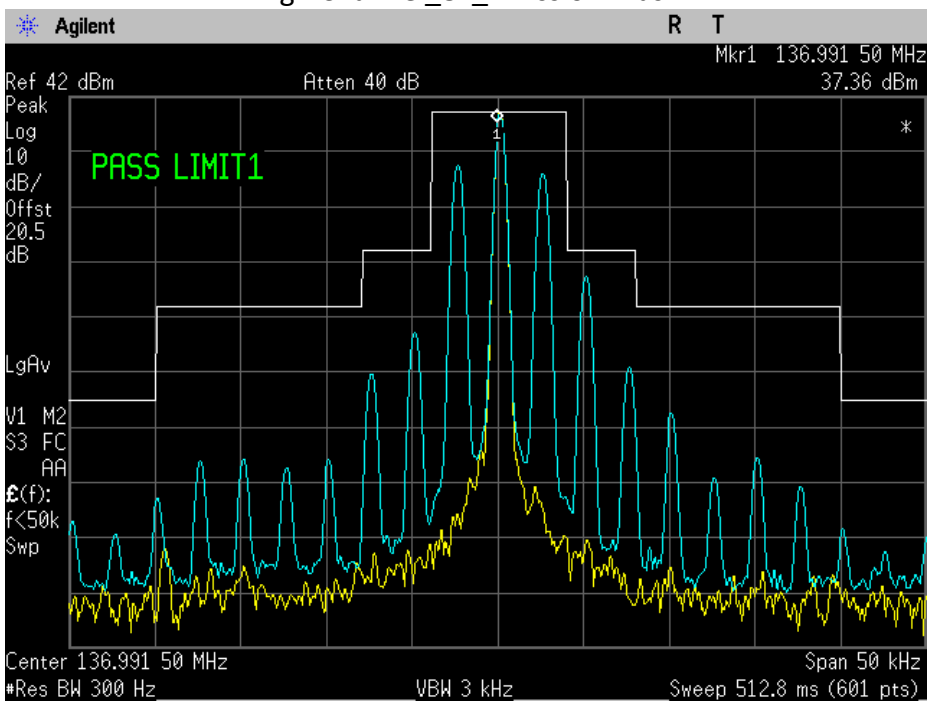
Low Channel_8k_Emission Mask



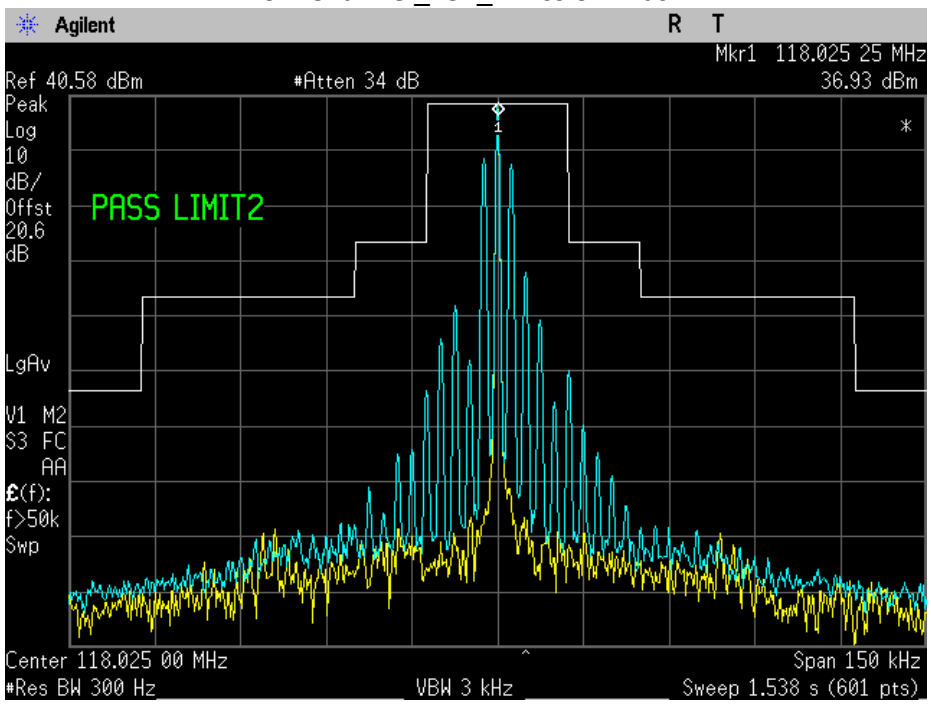
Mid Channel_8k_Emission Mask



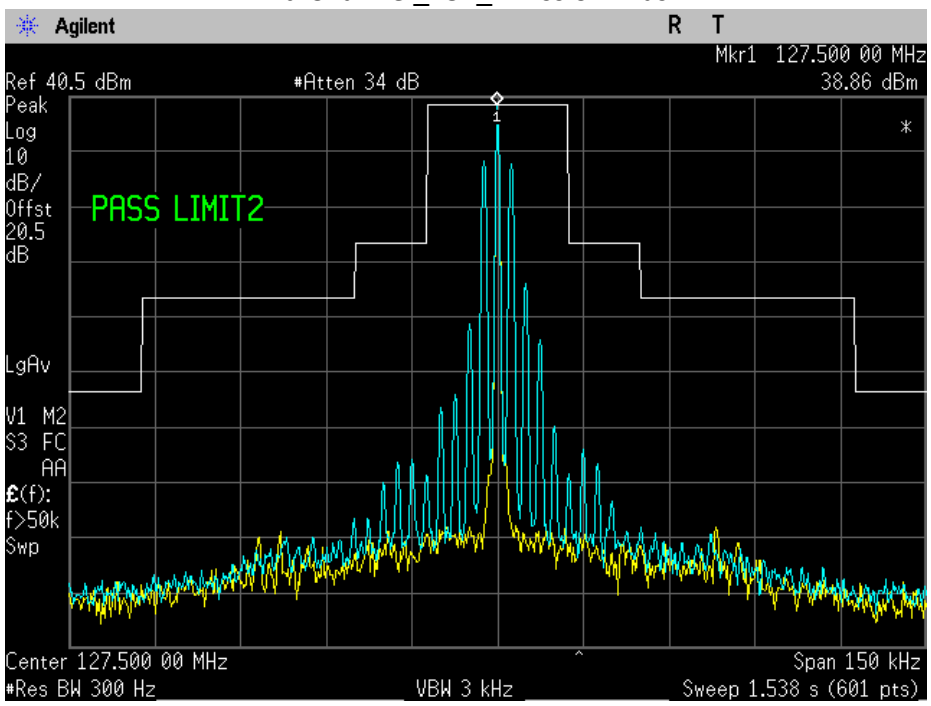
High Channel_8k_Emission Mask



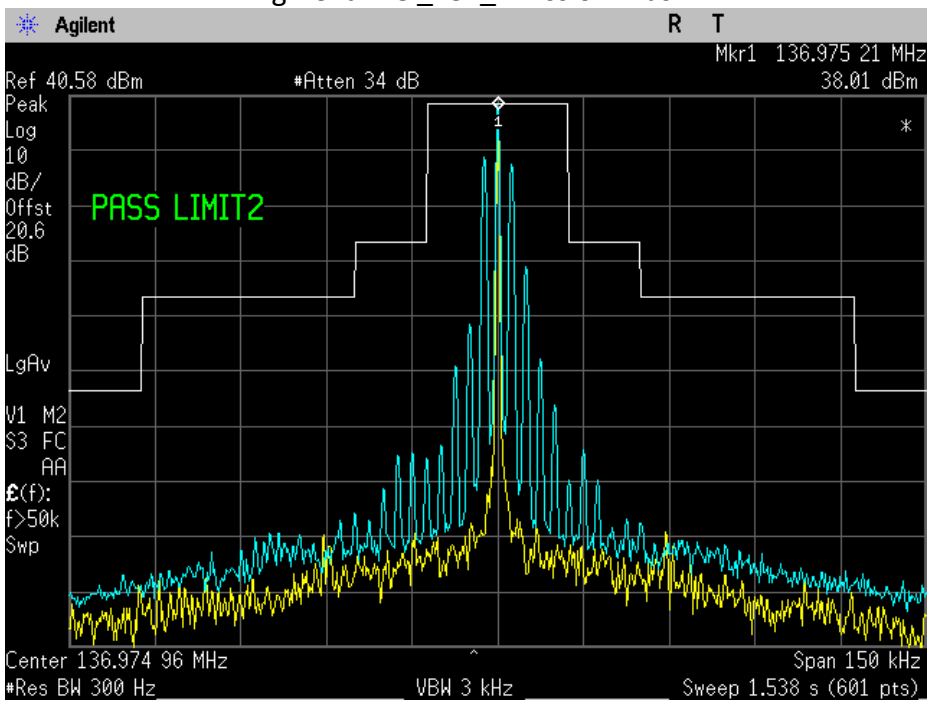
Low Channel_25k_Emission Mask



Mid Channel_25k_Emission Mask



High Channel_25k_Emission Mask



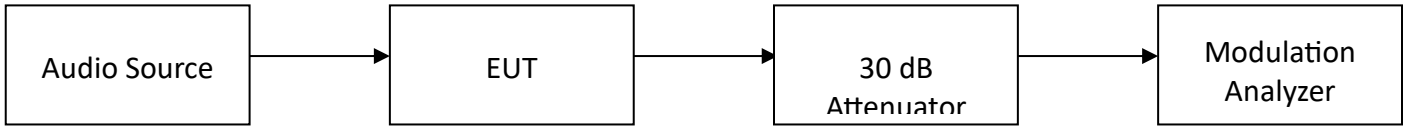
Audio Low Pass Filter (Voice Input)

Engineer: JohnMichalowicz
Test Date: 05/03/25

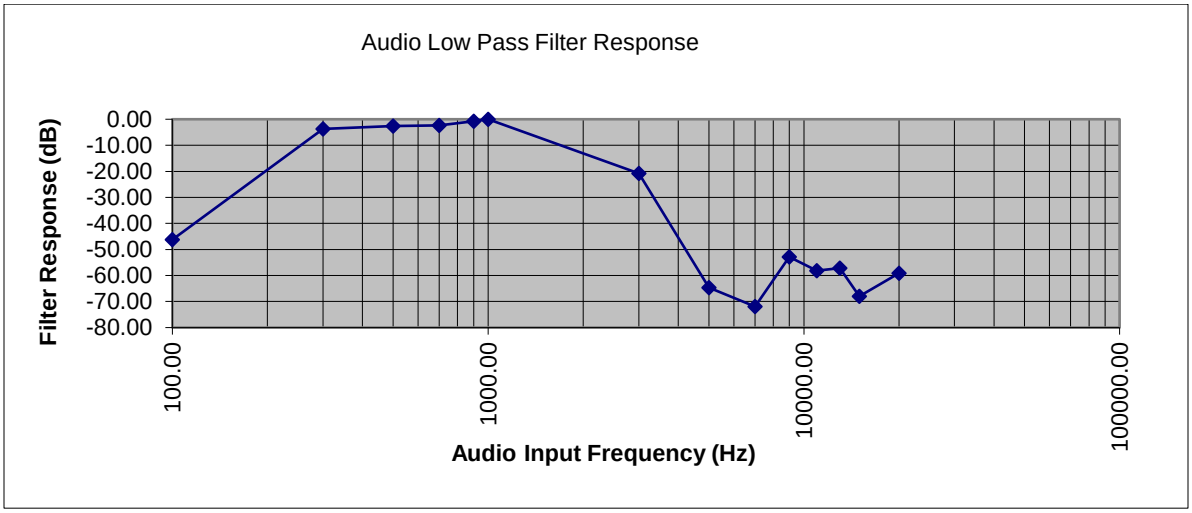
Measurement Procedure

The EUT was connected directly to a modulation analyzer through an attenuator. The audio source was tuned across the required audio frequency range and the audio low pass filter response was measured and plotted. The modulation analyzer is a real time spectrum analyzer with integrated demodulation, audio measurement capabilities, and timing analysis.

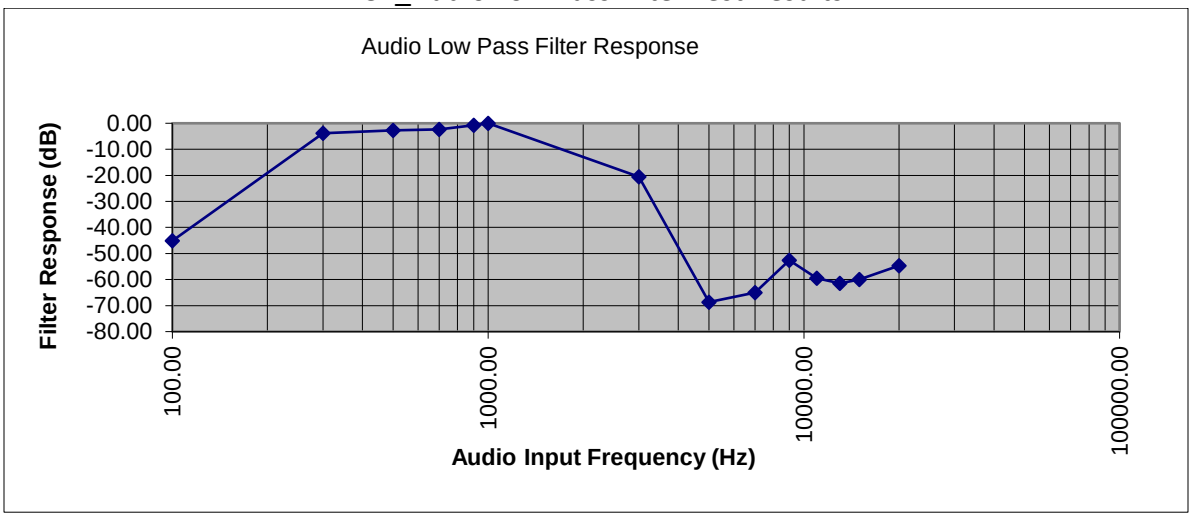
Test Setup



8.3k_Audio Low Pass Filter Test Results



25k_Audio Low Pass Filter Test Results



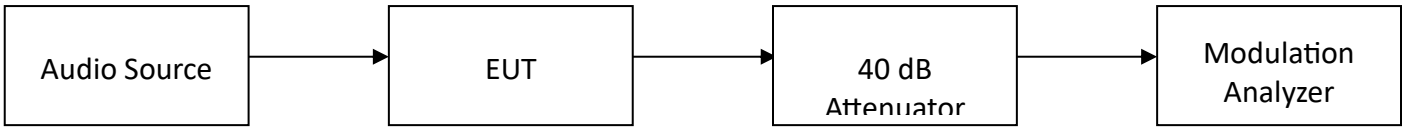
Audio Frequency Response

Engineer: John Michalowicz
Test Date: 05/03/25

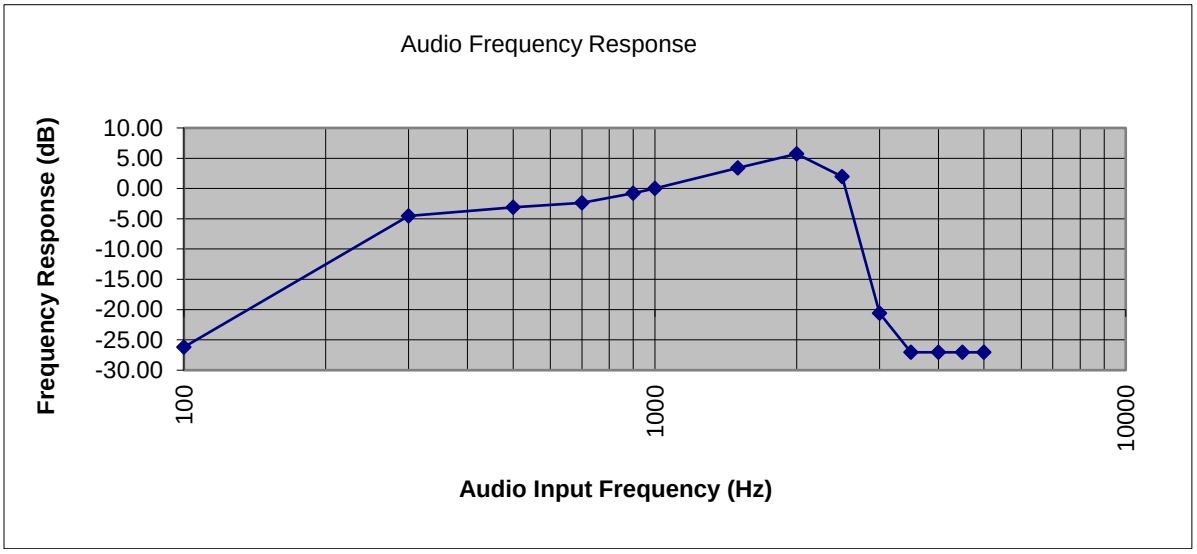
Measurement Procedure

The EUT was connected directly to a modulation analyzer through an attenuator. The audio source was tuned across the required audio frequency range and the audio frequency response was measured and plotted. The modulation analyzer is a real time spectrum analyzer with integrated demodulation, audio measurement capabilities, and timing analysis.

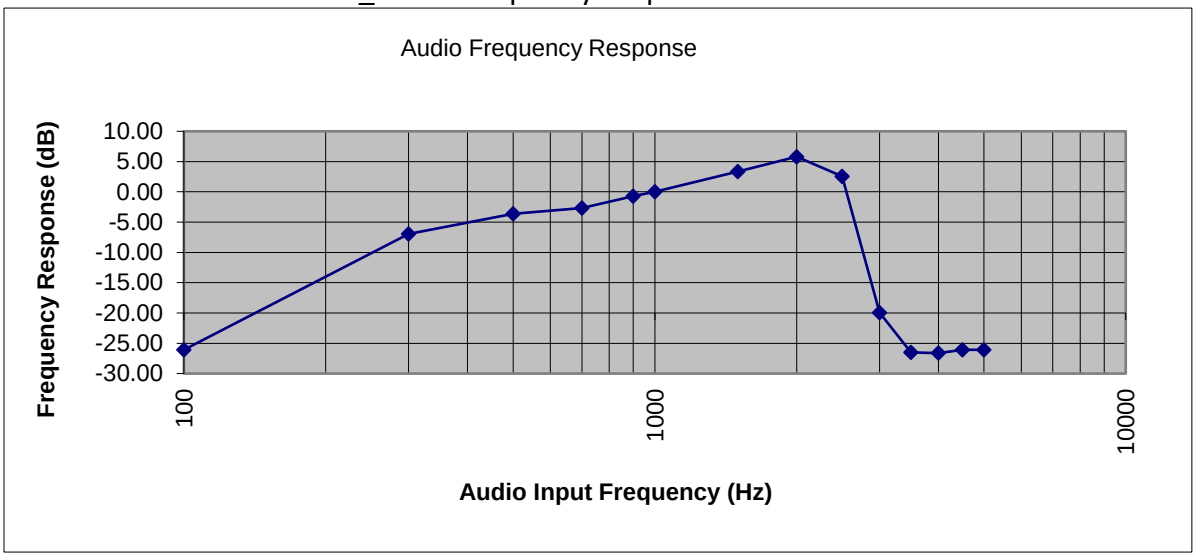
Test Setup



8k_Audio Frequency Response Test Results



25k_Audio Frequency Response Test Results



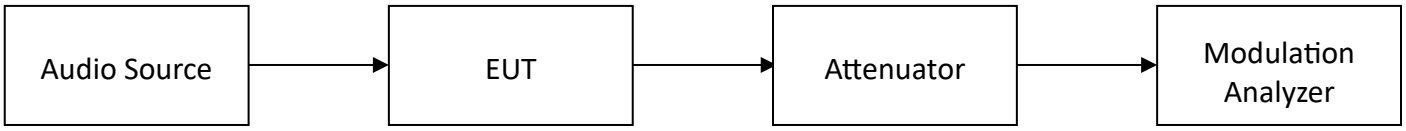
Modulation Limiting

Engineer: John Michalowicz
Test Date: 05/03/25

Measurement Procedure

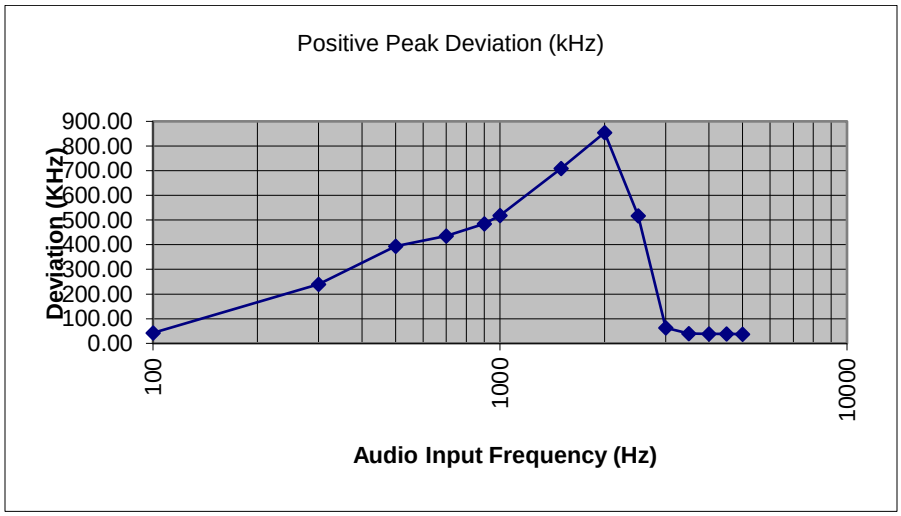
The EUT was connected directly to a modulation analyzer through an attenuator. The audio source was tuned across the required audio frequency range and the modulation limiting response was measured and plotted. The modulation analyzer is a real time spectrum analyzer with integrated demodulation, audio measurement capabilities, and timing analysis.

Test Setup

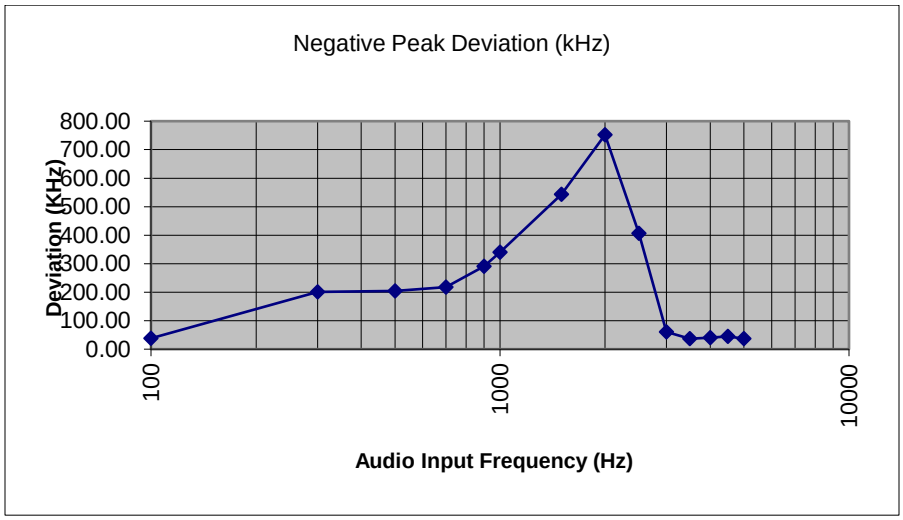


8k_Modulation Limiting Test Results

Positive Peak Deviation

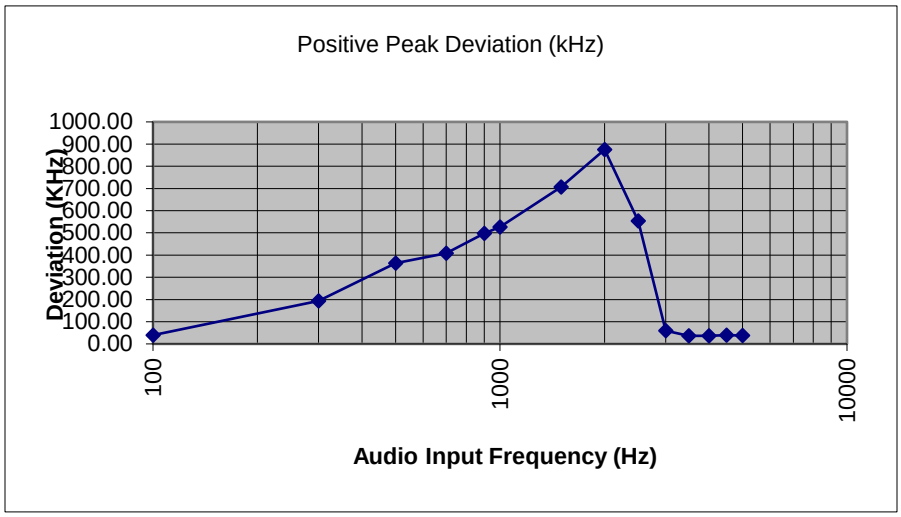


Negative Peak Deviation

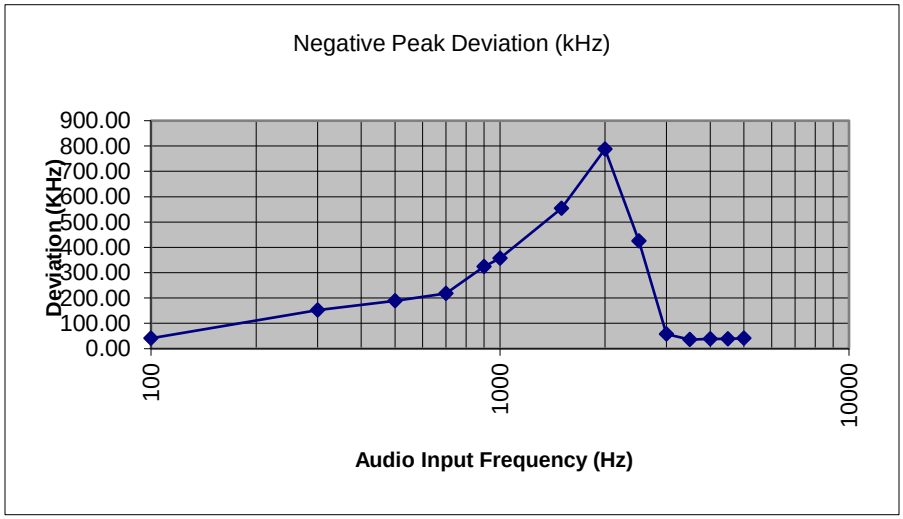


25k_Modulation Limiting Test Results

Positive Peak Deviation



Negative Peak Deviation



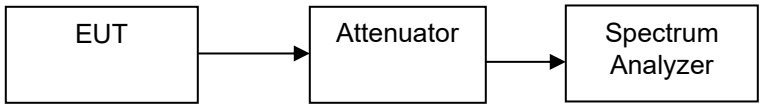
Frequency Stability (Temperature Variation)

Engineer: John Michalowicz
Test Date: 4/29/25

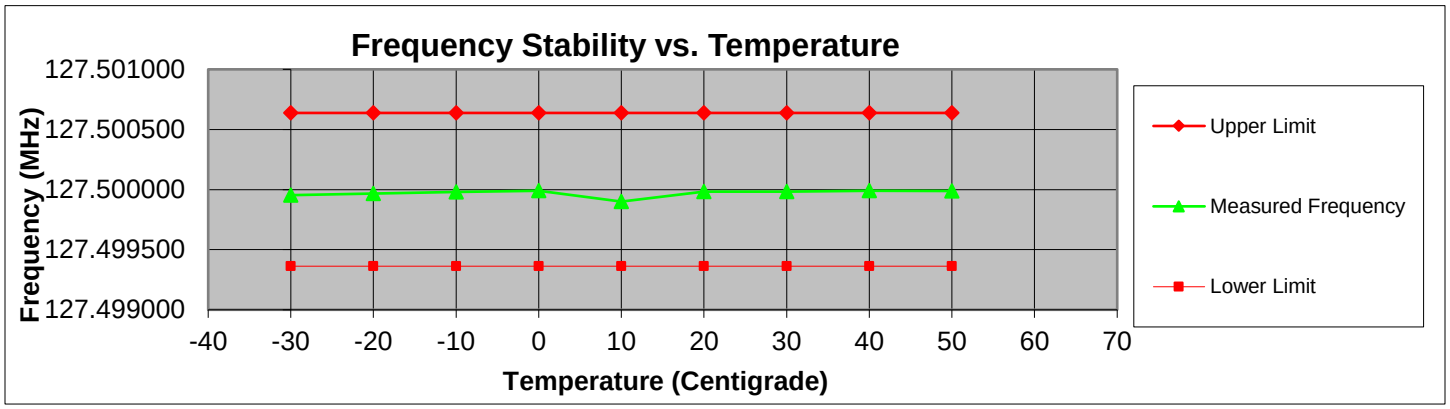
Test Procedure

The EUT was placed in an environmental test chamber and the RF output was connected directly to a frequency counter. The temperature was varied from -30ºC to 50ºC in 10ºC increments. After a sufficient time for temperature stabilization the RF output frequency was measured.

Test Setup



Measurement Results



Tuned Frequency (MHz)	Frequency Tolerance PPM	Upper Limit (MHz)	Lower Limit (MHz)
127.500	5.0	127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363
		127.500638	127.499363

Temperature centigrade	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
-30	127.499953	-0.000684	0.000591
-20	127.499966	-0.000671	0.000603
-10	127.499980	-0.000658	0.000617
0	127.499990	-0.000647	0.000627
10	127.499900	-0.000737	0.000537
20	127.499983	-0.000654	0.000620
30	127.499983	-0.000654	0.000620
40	127.499990	-0.000647	0.000627
50	127.499987	-0.000650	0.000625

Frequency Stability (Voltage Variation)

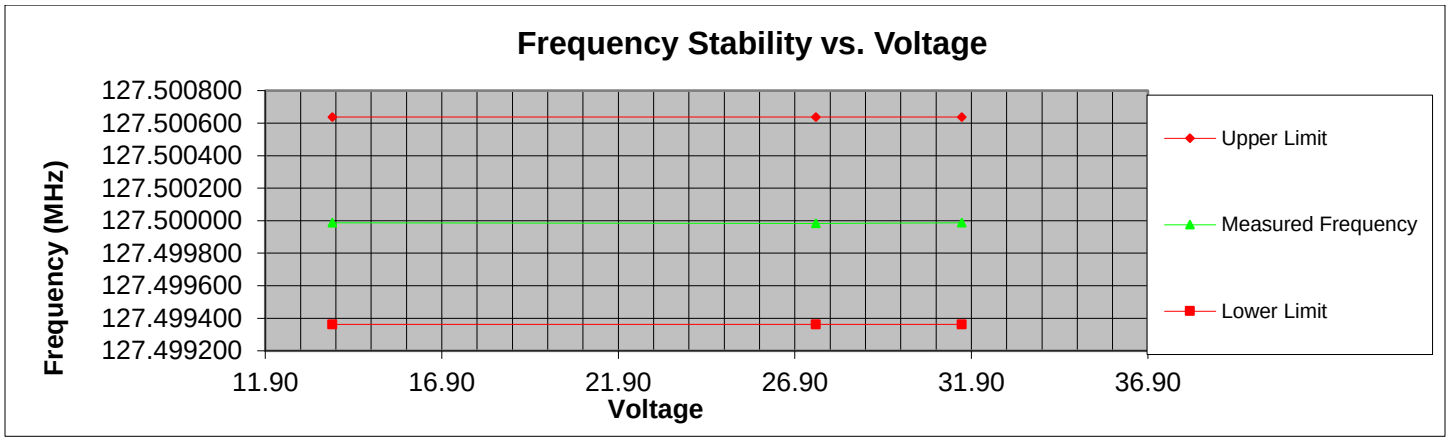
Engineer: John Michalowicz
Test Date: 4/29/25

Test Procedure

The EUT was placed in a temperature chamber at 20±5°C and connected directly to a spectrum analyzer. The power supply voltage to the EUT was varied from 85% of the low mode nominal and to 115% of the high mode nominal value and the RF output was measured.

Test Setup

Test Results



Tuned Frequency (MHz)	Frequency Tolerance PPM	Upper Limit (MHz)	Lower Limit (MHz)	Nominal Voltage	Voltage	Measured Frequency (MHz)	Upper Margin (MHz)	Lower Margin (MHz)
127.500	5.0	127.500638	127.499363	27.50	13.80	127.499987	-0.000650	0.000625
		127.500638	127.499363		27.50	127.499983	-0.000654	0.000620
		127.500638	127.499363		31.63	127.499987	-0.000650	0.000625

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Temperature Chamber	Tenney	Tenney Jr	i00027	NR	
Function Generator	HP	33120A	i00118	Verified on:	
Data Logger	Fluke	Hydra Data Bucket	i00343	6/19/2024	6/19/25
Spectrum Analyzer	Textronix	RSA5126A	i00424	6/25/2024	6/25/25
MXE EMI receiver	Keysight	N9038A	i00552	3/17/25	3/17/26
Temp./humidity/pressure monitor (rad. immunity)	Omega Engineering	iBTHX-W-5	i00629	1/25/25	1/25/26
Spectrum Analyzer	Keysight	E4448A	i00688	10/26/24	10/26/25

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

END OF TEST REPORT.