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TEST REPORT

FCC/ISED Test for NX-3210R-K3
Certification

APPLICANT
JVCKENWOOD Corporation

REPORT NO.
HCT-RF-2402-FI004

DATE OF ISSUE
February 22, 2024

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Applicant	**JVCKENWOOD Corporation** 1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 JAPAN
Product Name Model Name	VHF DIGITAL TRANSCEIVER NX-3210R-K3
FCC ID	K44523700
IC	282F-523700
Date(s) of Tests	January 08, 2024 ~ February 16, 2024
Test Standard Used	Part 2, 22, 74, 90 / RSS- Gen Issue 5, RSS-119 Issue 12
Frequency Range	FCC: 150 MHz - 174 MHz ISED: 138 MHz - 144 MHz, 148 MHz - 174 MHz MHz
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	February 22, 2024	Initial Release

Notice

Content
The measurements shown in this report were made in accordance with the procedures specified in § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s).
When confirmation of authenticity of this test report is required, please contact www.hct.co.kr
The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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1. GENERAL INFORMATION

Manufacturer:	JVCKENWOOD Corporation
Address:	1-16-2 Hakusan Midori-ku Yokohama-shi Kanagawa 226-8525 Japan
FCC ID:	K44523700
IC:	282F-523700
EUT Type:	VHF DIGITAL TRANSCEIVER
Model(s):	NX-3210R-K3
Date(s) of Tests:	January 08, 2024 ~ February 16, 2024

2. EUT DESCRIPTION

Power Supply Voltage	DC 7.5V ± 20%
Output Power	5 W (Power output continuously variable to 1 W) (Max : 5.5 W)
Battery type	KNB-L1: 2000mAh Li-ion Battery KNB-L2: 2600mAh Li-ion Battery KNB-L3: 3400mAh Li-ion Battery KNB-L11: 3900mAh Li-ion Battery
Antenna	KRA-22M VHF Low Profile Helical Antenna (146-162 MHz) KRA-22M2 VHF Low Profile Helical Antenna (162-174 MHz) KRA-22M3 VHF Low Profile Helical Antenna (135-150 MHz) KRA-26M VHF Helical Antenna (146-162 MHz) KRA-26M2 VHF Helical Antenna (162-174 MHz) KRA-26M3 VHF Helical Antenna (135-150MHz) KRA-41M VHF Stubby antenna (146-162 MHz) KRA-41M2 VHF Stubby antenna (162-174 MHz) KRA-41M3 VHF Stubby antenna (136-150 MHz) KRA-25 High gain VHF helically loaded whip antenna (148-162 MHz) KRA-28 Broad-band VHF helically loaded whip antenna (140-170 MHz)
Peak Antenna gain	0 dBd
Type of Emission	16K0F3E : Analogue 11K0F3E : Analogue 8K30F1E, 8K30F1D, 8K30F7W : NXDN 4K00F1E, 4K00F1D, 4K00F7W : NXDN 4K00F2D : CWID
Channel Bandwidth	6.25 kHz: 4K00F1E, 4K00F1D, 4K00F7W/ 4K00F2D 12.5 kHz: 11K0F3E/ 8K30F1E, 8K30F1D, 8K30F7W 25 kHz: 16K0F3E
Operating Temperature	-30 °C ~ +60 °C
Frequency Range	150 MHz - 174 MHz (FCC) 138 MHz - 144 MHz, 148 MHz - 174 MHz MHz (ISED)
Test Frequency	138.05 MHz / 150.05 MHz / 162.05 MHz / 173.95 MHz
Maximum deviation	16K0F3E : ± 5 kHz 11K0F3E : ± 2.5 kHz
Frequency Stability	± 2.0 ppm
PMN (Product Marketing Number)	NX-3210R-K3
HVIN (Hardware Version Identification Number)	NX-3210R-K3
FVIN (Firmware Version Identification Number)	N/A
HMN (Host Marketing Name)	N/A
Serial number	A1A11001

3. TEST METHODOLOGY

TIA-603-E dated March 2016 entitled “Land Mobile FM or PM Communications Equipment Measurement and Performance Standards” were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the FCC Rules Part 2, 22, 74 and Part 90.

3.3 GENERAL TEST PROCEDURES

Radiated Emissions
Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using a positive peak detector.
A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
The power is calculated by the following formula;

$$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting is programmed.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea.
For ISED, test facility was accepted dated January 26, 2021 (CAB identifier: KR0032).

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6. WORST CASE CONFIGURATION AND MODE

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + Microphone (High Power/ Low Power)
     Stand alone + Accessories (High Power/ Low Power)
     Stand alone + Microphone + Accessories (High Power/ Low Power)
   - Worstcase : Stand alone + Microphone (High Power)
2. All type of battery were investigated and the worst case configuration results are reported.
   - Type : KNB-L1, KNB-L2, KNB-L3, KNB-L11
   - Worstcase : KNB-L11
3. All Antenna were investigated and the worst case configuration results are reported.
   - Type : KRA-22M, KRA-22M2, KRA-22M3, KRA-26M, KRA-26M2, KRA-26M3,
     KRA-41M, KRA-41M2, KRA-41M3, KRA-25, KRA-28
   - Worstcase : KRA-26M, KRA-26M2, KRA-26M3
4. All type of microphones were investigated and the worst case configuration results are reported.
   - Type : KEP-1, KHS-11BL, KHS-12BL, KHS-14, KHS-15-BH, KHS-15-OH, KMC-70, KMC-72
   - Worstcase : KMC-72
5. All type of emission were investigated and the worst case configuration results are reported.
   - Type : 16K0F3E/ 11K0F3E/ 8K30F1E, 8K30F1D, 8K30F7W/ 4K00F1E, 4K00F1D, 4K00F7W/ 4K00F2D
   - Worstcase : 16K0F3E/ 8K30F1E, 8K30F1D, 8K30F7W/ 4K00F1E, 4K00F1D, 4K00F7W
6. Measurements value show only up to 8 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Conducted test

1. Conducted Spurious Emission & Frequency Stability :
   All Power of operation were investigated and the worst case configuration results are reported.
   - Power : High Power/ Low Power
   - Worstcase : High Power
2. Transient Frequency Behavior :
   All type of emission were investigated and the worst case configuration results are reported.
   - Type : 16K0F3E/ 11K0F3E/ 8K30F1E, 8K30F1D, 8K30F7W/ 4K00F1E, 4K00F1D, 4K00F7W/ 4K00F2D
   - Worstcase : 16K0F3E/ 8K30F1E, 8K30F1D, 8K30F7W/ 4K00F1E, 4K00F1D, 4K00F7W

7. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	ISED Part Section(s)	Test Condition	Test Result
Carrier RF Output Power	§ 2.1046, § 22.565, § 74.461, § 90.205	RSS119 (5.4)	CONDUCTED	PASS
Unwanted Emissions	§ 2.1051 § 22.359, § 74.462, § 74.535, § 90.210	RSS119 (5.8)	CONDUCTED	PASS
99% Bandwidth(ISED)	NA	RSS119 (5.5)		PASS
Carrier Frequency Stability	§ 2.1055, § 22.355, § 74.464, § 90.213(a)	RSS119 (5.3)		PASS
Audio Frequency Response	§ 2.1047(a)	-		PASS
Audio Low Pass Filter	§ 2.1047(a)	-		PASS
Modulation Limiting	§ 2.1047(b)	-		PASS
Transient Frequency Behavior	§ 74.462, § 90.214	RSS119 (5.9)		PASS
Emission Mask	§ 2.1049, § 22.359, § 74.462, § 74.535, § 90.210	RSS119 (5.8)		PASS
Field Strength of Spurious Radiation	§ 2.1053 § 22.359, § 74.462, § 74.535, § 90.210	RSS119 (5.8)	RADIATED	PASS
Receiver Spurious Emissions	NA	RSS-Gen(7)		PASS
Necessary Bandwidth	§ 2.202(g)	-	-	-

Test Description	Test Limit(FCC)	Test Limit(ISED)
Carrier RF Output Power	Varies	60W
Unwanted Emissions	6.25 kHz: 55+ 10 log (P)dB 12.5 kHz: 50 + 10 log (P)dB 25 kHz: 43 + 10 log (P)dB	6.25 kHz: 55+ 10 log (P)dB 12.5 kHz: 50 + 10 log (P)dB 25 kHz: 43 + 10 log (P)dB
99% Bandwidth(ISED)	N/A	6.25 kHz: 6 kHz 12.5 kHz: 11.25kHz 25 kHz: 20 kHz
Carrier Frequency Stability	6.25 kHz = 2 ppm 12.5 kHz = 5 ppm 25 kHz = 5 ppm	6.25 kHz = 2 ppm 12.5 kHz = 5 ppm 25 kHz = 5 ppm
Audio Frequency Response	Varies	N/A
Audio Low Pass Filter		
Modulation Limiting	25 kHz = 5 kHz 12.5 kHz = 2.5 kHz	N/A
Transient Frequency Behavior	See Note3	See Note3
Emission Mask	See Note2	See Note2
Field Strength of Spurious Radiation	6.25 kHz: 55+ 10 log (P)dB 12.5 kHz: 50 + 10 log (P)dB 25 kHz: 43 + 10 log (P)dB	6.25 kHz: 55+ 10 log (P)dB 12.5 kHz: 50 + 10 log (P)dB 25 kHz: 43 + 10 log (P)dB
Receiver Spurious Emissions	N/A	See Note1

Note:

1. Receiver Spurious Emissions Limit :

Frequency (MHz)	Field Strength (μv/m at 3 meters)
30 – 88	100
88 - 216	150
216 – 960	200
Above 960	500

2. Emission Mask Limit :

Channel Bandwidth: 25kHz

Displacement Frequency (% of Authorized Bandwidth)	Minimum Attenuation (dB)
50 to 100	25 dB
100 to 250	35 dB
>250	$43 + 10 \log_{10}(COP)$

Channel Bandwidth: 12.5kHz

Channel Spacing (kHz)	Displacement Frequency Range	Minimum Attenuation (dB)
12.5 & 15	>5.625 kHz to 12.5 kHz	$7.27(f_d - 2.88)$
	>12.5 kHz	Whichever is less attenuation; 70 or $50 + 10 \log_{10}(COP)$

Channel Bandwidth: 6.25kHz

Channel Spacing (kHz)	Displacement Frequency Range	Minimum Attenuation (dB)
6.25 & 7.5	>3.0 kHz to 4.6 kHz	Whichever is less attenuation; 65 or $30 + 16.67(f_d - 3)$ or $55 + 10 \log_{10}(COP)$
	Greater than 4.6 kHz	Whichever is less attenuation; 65 or $55 + 10 \log_{10}(COP)$

3. Transient Frequency Behavior Limit :

Channel Bandwidth (kHz)	Time Intervals (Notes 1, 2)	Maximum Frequency Difference (kHz)	Transient Duration Limit (ms)	
			138-174 MHz	406.1-512 MHz
25	t_1	±25	5	10
	t_2	±12.5	20	25
	t_3	±25	5	10
12.5	t_1	±12.5	5	10
	t_2	±6.25	20	25
	t_3	±12.5	5	10
6.25	t_1	±6.25	5	10
	t_2	±3.125	20	25
	t_3	±6.25	5	10

8. TEST RESULT

8.1 Carrier Output Power

▣ Definition

The conducted carrier power output rating for a transmitter is the power available at the output terminals of the transmitter when the output terminals are connected to the standard transmitter load.

▣ TEST CONFIGURATION

▣ TEST PROCEDURE

According to 2.2.1 in TIA-603-E Standard.

a) Connect the equipment as illustrated.
b) Detector: AVG RMS measurement
c) Measure the transmitter output power during the defined duty cycle(see 1.3.2).
Correct for all losses in the RF path.
d) The value recorded in step b) is the conducted carrier output power rating.

▣ TEST RESULTS(Carrier Output Power)

Certification	Type of Emission	Channel Bandwidth (kHz)	Test Frequency (MHz)	Carrier Output Power (AVG RMS measurement)			
				High Power		Low Power	
				dBm	W	dBm	W
ISED	16K0F3E	25	138.05	36.841	4.831	30.633	1.157
FCC/ ISED			150.05	36.802	4.789	30.068	1.016
FCC/ ISED			162.05	36.916	4.916	30.128	1.030
FCC/ ISED			173.95	36.748	4.730	30.274	1.065
ISED	11K0F3E	12.5	138.05	36.719	4.698	30.609	1.150
FCC/ ISED			150.05	36.711	4.690	30.029	1.007
FCC/ ISED			162.05	36.815	4.802	30.125	1.029
FCC/ ISED			173.95	36.724	4.704	30.262	1.062
ISED	8K30F1E, 8K30F1D, 8K30F7W	12.5	138.05	36.811	4.798	30.658	1.163
FCC/ ISED			150.05	36.799	4.785	30.093	1.022
FCC/ ISED			162.05	36.928	4.930	30.139	1.033
FCC/ ISED			173.95	36.726	4.706	30.269	1.064
ISED	4K00F1E, 4K00F1D, 4K00F7W	6.25	138.05	36.721	4.700	30.608	1.150
FCC/ ISED			150.05	36.697	4.674	30.041	1.009
FCC/ ISED			162.05	36.835	4.825	30.117	1.027
FCC/ ISED			173.95	36.762	4.745	30.259	1.062
ISED	4K00F2D	6.25	138.05	36.761	4.743	30.626	1.155
FCC/ ISED			150.05	36.725	4.705	30.054	1.013
FCC/ ISED			162.05	36.846	4.837	30.116	1.027
FCC/ ISED			173.95	36.760	4.742	30.268	1.064

▣ TEST RESULTS(ERP)

Certification	Type of Emission	Channel Bandwidth (kHz)	Test Frequency (MHz)	Carrier Output Power (AVG RMS measurement)			
				High Power		Low Power	
				dBm	W	dBm	W
ISED	16K0F3E	25	138.05	36.841	4.831	30.633	1.157
FCC/ ISED			150.05	36.802	4.789	30.068	1.016
FCC/ ISED			162.05	36.916	4.916	30.128	1.030
FCC/ ISED			173.95	36.748	4.730	30.274	1.065
ISED	11K0F3E	12.5	138.05	36.719	4.698	30.609	1.150
FCC/ ISED			150.05	36.711	4.690	30.029	1.007
FCC/ ISED			162.05	36.815	4.802	30.125	1.029
FCC/ ISED			173.95	36.724	4.704	30.262	1.062
ISED	8K30F1E, 8K30F1D, 8K30F7W	12.5	138.05	36.811	4.798	30.658	1.163
FCC/ ISED			150.05	36.799	4.785	30.093	1.022
FCC/ ISED			162.05	36.928	4.930	30.139	1.033
FCC/ ISED			173.95	36.726	4.706	30.269	1.064
ISED	4K00F1E, 4K00F1D, 4K00F7W	6.25	138.05	36.721	4.700	30.608	1.150
FCC/ ISED			150.05	36.697	4.674	30.041	1.009
FCC/ ISED			162.05	36.835	4.825	30.117	1.027
FCC/ ISED			173.95	36.762	4.745	30.259	1.062
ISED	4K00F2D	6.25	138.05	36.761	4.743	30.626	1.155
FCC/ ISED			150.05	36.725	4.705	30.054	1.013
FCC/ ISED			162.05	36.846	4.837	30.116	1.027
FCC/ ISED			173.95	36.760	4.742	30.268	1.064

Note:

1. ERP = Carrier Output Power + Peak Antenna gain(0 dBd)

8.2 Carrier Frequency Stability

▣ Definition

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

▣ TEST CONFIGURATION

▣ TEST PROCEDURE

According to 2.2.2 in TIA-603-E Standard.

a) Connect the equipment as illustrated.

b) Operate the equipment in standby conditions for 15 minutes before proceeding.

c) Record the carrier frequency of the transmitter as *MCF* MHz

d) Calculate the ppm frequency error by the following:

ppm error = ((MCF_{MHz} / ACF_{MHz})-1)*10^6

where

MCF_{MHz} is the Measured Carrier Frequency in MHz

ACF_{MHz} is the Assigned Carrier Frequency in MHz

e) The value recorded in step d) is the carrier frequency stability.

▣ TEST RESULTS

(1) Frequency Stability (Temperature Variation)

Type of Emission	Test Frequency (MHz)	Temperature (Degree C)	Frequency (MHz)	Result_FCC (ppm)	Result_ISED (ppm)	Limit (ppm)
16K0F3E	138.05	-30	138.050055327	0.401	0.020	5.0
		-20	138.050055201	0.400	0.019	
		-10	138.050027121	0.196	-0.184	
		0	138.050066751	0.484	0.103	
		+10	138.050049012	0.355	-0.025	
		+20 (Ref)	138.050052510	0.380	0.000	
		+30	138.050042683	0.309	-0.071	
		+40	138.050045288	0.328	-0.052	
		+50	138.050050597	0.367	-0.014	
	150.05	-30	150.050084791	0.565	0.143	5.0
		-20	150.050076553	0.510	0.088	
		-10	150.050091924	0.613	0.191	
		0	150.050061095	0.407	-0.015	
		+10	150.050077315	0.515	0.094	
		+20 (Ref)	150.050063277	0.422	0.000	
		+30	150.050090927	0.606	0.184	
		+40	150.050076961	0.513	0.091	
		+50	150.050069346	0.462	0.040	
	162.05	-30	162.050058012	0.358	-0.090	5.0
		-20	162.050081805	0.505	0.057	
		-10	162.050046669	0.288	-0.160	
		0	162.050057201	0.353	-0.095	
		+10	162.050043917	0.271	-0.177	
		+20 (Ref)	162.050072588	0.448	0.000	
		+30	162.050101223	0.625	0.177	
		+40	162.050071399	0.441	-0.007	
		+50	162.050097549	0.602	0.154	
	173.95	-30	173.950099102	0.570	0.081	5.0
		-20	173.950086119	0.495	0.006	
		-10	173.950101755	0.585	0.096	
		0	173.950081197	0.467	-0.022	
		+10	173.950077494	0.445	-0.044	
		+20 (Ref)	173.950085072	0.489	0.000	
		+30	173.950062397	0.359	-0.130	
		+40	173.950063214	0.363	-0.126	
		+50	173.950057134	0.328	-0.161	

Type of Emission	Test Frequency (MHz)	Temperature (Degree C)	Frequency (MHz)	Result_FCC (ppm)	Result_ISED (ppm)	Limit (ppm)
11K0F3E	138.05	-30	138.050037656	0.273	-0.213	5.0
		-20	138.050059560	0.431	-0.054	
		-10	138.050038199	0.277	-0.209	
		0	138.050070073	0.508	0.022	
		+10	138.050095284	0.690	0.205	
		+20 (Ref)	138.050067044	0.486	0.000	
		+30	138.050083353	0.604	0.118	
		+40	138.050094921	0.688	0.202	
		+50	138.050064208	0.465	-0.021	
	150.05	-30	150.050093915	0.626	0.127	5.0
		-20	150.050080821	0.539	0.040	
		-10	150.050098969	0.660	0.161	
		0	150.050059975	0.400	-0.099	
		+10	150.050055236	0.368	-0.131	
		+20 (Ref)	150.050074819	0.499	0.000	
		+30	150.050063331	0.422	-0.077	
		+40	150.050095459	0.636	0.138	
		+50	150.050103487	0.690	0.191	
	162.05	-30	162.050078175	0.482	-0.033	5.0
		-20	162.050112278	0.693	0.178	
		-10	162.050076544	0.472	-0.043	
		0	162.050093433	0.577	0.061	
		+10	162.050088581	0.547	0.031	
		+20 (Ref)	162.050083490	0.515	0.000	
		+30	162.050056358	0.348	-0.167	
		+40	162.050062389	0.385	-0.130	
		+50	162.050106595	0.658	0.143	
	173.95	-30	173.950116864	0.672	0.171	5.0
		-20	173.950083745	0.481	-0.019	
		-10	173.950116976	0.672	0.172	
		0	173.950086380	0.497	-0.004	
		+10	173.950094333	0.542	0.042	
		+20 (Ref)	173.950087072	0.501	0.000	
		+30	173.950087998	0.506	0.005	
		+40	173.950108223	0.622	0.122	
		+50	173.950065960	0.379	-0.121	

Type of Emission	Test Frequency (MHz)	Temperature (Degree C)	Frequency (MHz)	Result_FCC (ppm)	Result_ISED (ppm)	Limit (ppm)
8K30F1E, 8K30F1D, 8K30F7W	138.05	-30	138.050057756	0.418	-0.007	5.0
		-20	138.050048009	0.348	-0.078	
		-10	138.050045959	0.333	-0.092	
		0	138.050083993	0.608	0.183	
		+10	138.050077617	0.562	0.137	
		+20 (Ref)	138.050058712	0.425	0.000	
		+30	138.050077043	0.558	0.133	
		+40	138.050046813	0.339	-0.086	
		+50	138.050071385	0.517	0.092	
	150.05	-30	150.050055159	0.368	-0.068	5.0
		-20	150.050090635	0.604	0.169	
		-10	150.050050011	0.333	-0.102	
		0	150.050036914	0.246	-0.189	
		+10	150.050083194	0.554	0.119	
		+20 (Ref)	150.050065297	0.435	0.000	
		+30	150.050048507	0.323	-0.112	
		+40	150.050070926	0.473	0.038	
		+50	150.050055054	0.367	-0.068	
	162.05	-30	162.050096397	0.595	0.147	5.0
		-20	162.050062576	0.386	-0.061	
		-10	162.050075289	0.465	0.017	
		0	162.050064489	0.398	-0.050	
		+10	162.050097315	0.601	0.153	
		+20 (Ref)	162.050072514	0.447	0.000	
		+30	162.050077451	0.478	0.030	
		+40	162.050092895	0.573	0.126	
		+50	162.050062727	0.387	-0.060	
	173.95	-30	173.950095824	0.551	0.043	5.0
		-20	173.950060762	0.349	-0.158	
		-10	173.950086112	0.495	-0.012	
		0	173.950077330	0.445	-0.063	
		+10	173.950116973	0.672	0.165	
		+20 (Ref)	173.950088284	0.508	0.000	
		+30	173.950110324	0.634	0.127	
		+40	173.950080382	0.462	-0.045	
		+50	173.950066026	0.380	-0.128	

Type of Emission	Test Frequency (MHz)	Temperature (Degree C)	Frequency (MHz)	Result_FCC (ppm)	Result_ISED (ppm)	Limit (ppm)
4K00F1E, 4K00F1D, 4K00F7W	138.05	-30	138.050071882	0.521	0.050	2.0
		-20	138.050042898	0.311	-0.160	
		-10	138.050051023	0.370	-0.101	
		0	138.050049107	0.356	-0.115	
		+10	138.050036293	0.263	-0.208	
		+20 (Ref)	138.050065020	0.471	0.000	
		+30	138.050079696	0.577	0.106	
		+40	138.050056113	0.406	-0.065	
		+50	138.050074517	0.540	0.069	
	150.05	-30	150.050091040	0.607	0.115	2.0
		-20	150.050095281	0.635	0.143	
		-10	150.050045140	0.301	-0.191	
		0	150.050095370	0.636	0.144	
		+10	150.050079909	0.533	0.041	
		+20 (Ref)	150.050073768	0.492	0.000	
		+30	150.050050317	0.335	-0.156	
		+40	150.050081526	0.543	0.052	
		+50	150.050055866	0.372	-0.119	
	162.05	-30	162.050068311	0.422	-0.084	2.0
		-20	162.050106287	0.656	0.150	
		-10	162.050063997	0.395	-0.111	
		0	162.050081534	0.503	-0.003	
		+10	162.050096108	0.593	0.087	
		+20 (Ref)	162.050081945	0.506	0.000	
		+30	162.050111435	0.688	0.182	
		+40	162.050102697	0.634	0.128	
		+50	162.050087737	0.541	0.036	
	173.95	-30	173.950080782	0.464	0.093	2.0
		-20	173.950054410	0.313	-0.058	
		-10	173.950048913	0.281	-0.090	
		0	173.950092125	0.530	0.158	
		+10	173.950057896	0.333	-0.038	
		+20 (Ref)	173.950064560	0.371	0.000	
		+30	173.950038933	0.224	-0.147	
		+40	173.950047684	0.274	-0.097	
		+50	173.950042983	0.247	-0.124	

Type of Emission	Test Frequency (MHz)	Temperature (Degree C)	Frequency (MHz)	Result_FCC (ppm)	Result_ISED (ppm)	Limit (ppm)
4K00F2D	138.05	-30	138.050028545	0.207	-0.179	2.0
		-20	138.050043497	0.315	-0.071	
		-10	138.050030923	0.224	-0.162	
		0	138.050055070	0.399	0.013	
		+10	138.050079311	0.575	0.188	
		+20 (Ref)	138.050053303	0.386	0.000	
		+30	138.050078381	0.568	0.182	
		+40	138.050041139	0.298	-0.088	
		+50	138.050037840	0.274	-0.112	
	150.05	-30	150.050063533	0.423	0.009	2.0
		-20	150.050042242	0.282	-0.133	
		-10	150.050070904	0.473	0.058	
		0	150.050072576	0.484	0.069	
		+10	150.050066885	0.446	0.031	
		+20 (Ref)	150.050062170	0.414	0.000	
		+30	150.050039940	0.266	-0.148	
		+40	150.050040200	0.268	-0.146	
		+50	150.050081850	0.545	0.131	
	162.05	-30	162.050097530	0.602	0.162	2.0
		-20	162.050045708	0.282	-0.157	
		-10	162.050066677	0.411	-0.028	
		0	162.050087148	0.538	0.098	
		+10	162.050093677	0.578	0.139	
		+20 (Ref)	162.050071208	0.439	0.000	
		+30	162.050087439	0.540	0.100	
		+40	162.050052683	0.325	-0.114	
		+50	162.050097740	0.603	0.164	
	173.95	-30	173.950078272	0.450	-0.037	2.0
		-20	173.950107492	0.618	0.131	
		-10	173.950061641	0.354	-0.133	
		0	173.950072777	0.418	-0.069	
		+10	173.950094168	0.541	0.054	
		+20 (Ref)	173.950084788	0.487	0.000	
		+30	173.950100814	0.580	0.092	
		+40	173.950095155	0.547	0.060	
		+50	173.950104979	0.604	0.116	

(2) Frequency Stability (Voltage Variation)

Type of Emission	Test Frequency (MHz)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)	Limit (ppm)
16K0F3E	138.05	80	6.00	138.050053541	0.388	5.0
		100	7.50	138.050054027	0.391	
		120	9.00	138.050053465	0.387	
	150.05	80	6.00	150.050063657	0.424	5.0
		100	7.50	150.050063671	0.424	
		120	9.00	150.050063241	0.421	
	162.05	80	6.00	162.050072723	0.449	5.0
		100	7.50	162.050072792	0.449	
		120	9.00	162.050072196	0.446	
	173.95	80	6.00	173.950085165	0.490	5.0
		100	7.50	173.950085422	0.491	
		120	9.00	173.950084706	0.487	

Type of Emission	Test Frequency (MHz)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)	Limit (ppm)
11K0F3E	138.05	80	6.00	138.050067119	0.486	5.0
		100	7.50	138.050066995	0.485	
		120	9.00	138.050066712	0.483	
	150.05	80	6.00	150.050074982	0.500	5.0
		100	7.50	150.050074812	0.499	
		120	9.00	150.050074414	0.496	
	162.05	80	6.00	162.050083476	0.515	5.0
		100	7.50	162.050083067	0.513	
		120	9.00	162.050082793	0.511	
	173.95	80	6.00	173.950087107	0.501	5.0
		100	7.50	173.950086971	0.500	
		120	9.00	173.950086483	0.497	

Type of Emission	Test Frequency (MHz)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)	Limit (ppm)
8K30F1E, 8K30F1D, 8K30F7W	138.05	80	6.00	138.050058880	0.427	5.0
		100	7.50	138.050058727	0.425	
		120	9.00	138.050058487	0.424	
	150.05	80	6.00	150.050065458	0.436	5.0
		100	7.50	150.050065176	0.434	
		120	9.00	150.050064857	0.432	
	162.05	80	6.00	162.050072675	0.448	5.0
		100	7.50	162.050072490	0.447	
		120	9.00	162.050072055	0.445	
	173.95	80	6.00	173.950087683	0.504	5.0
		100	7.50	173.950087374	0.502	
		120	9.00	173.950086817	0.499	

Type of Emission	Test Frequency (MHz)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)	Limit (ppm)
4K00F1E, 4K00F1D, 4K00F7W	138.05	80	6.00	138.050064857	0.470	2.0
		100	7.50	138.050064861	0.470	
		120	9.00	138.050064439	0.467	
	150.05	80	6.00	150.050073819	0.492	2.0
		100	7.50	150.050073746	0.491	
		120	9.00	150.050073224	0.488	
	162.05	80	6.00	162.050081774	0.505	2.0
		100	7.50	162.050081363	0.502	
		120	9.00	162.050080973	0.500	
	173.95	80	6.00	173.950065212	0.375	2.0
		100	7.50	173.950066105	0.380	
		120	9.00	173.950065038	0.374	

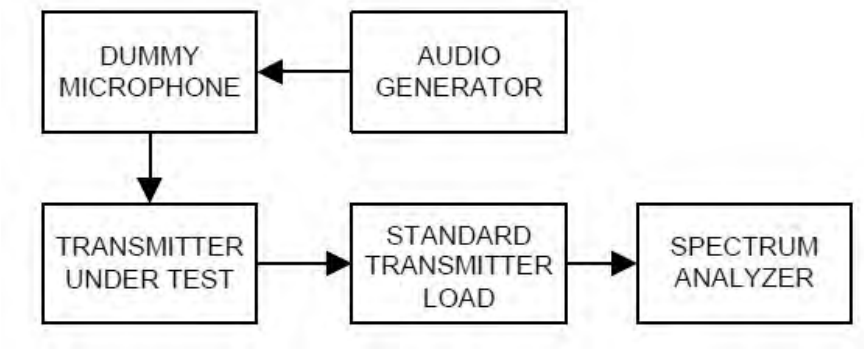
Type of Emission	Test Frequency (MHz)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)	Limit (ppm)
4K00F2D	138.05	80	6.00	138.050054118	0.392	2.0
		100	7.50	138.050054242	0.393	
		120	9.00	138.050053865	0.390	
	150.05	80	6.00	150.050062397	0.416	2.0
		100	7.50	150.050062462	0.416	
		120	9.00	150.050061919	0.413	
	162.05	80	6.00	162.050071260	0.440	2.0
		100	7.50	162.050071157	0.439	
		120	9.00	162.050070574	0.436	
	173.95	80	6.00	173.950084663	0.487	2.0
		100	7.50	173.950084635	0.487	
		120	9.00	173.950084065	0.483	

8.3 Occupied Bandwidth

▣ Definition

The transmitter sideband spectrum denotes the sideband power produced at a discrete frequency separation from the carrier up to the test bandwidth (see TIA-603-E Section 1.3.4.4) due to all sources of unwanted noise within the transmitter in a modulated condition.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

According to TIA-603-E Section 2.2.11.2 / RSS-119 Section 5.5

a) For EUT supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for +/- 2.5 kHz deviation (or 50 % modulation). (FM modulation).

b) With level constant, the signal level was increased 16 dB.

c) For EUT supporting digital modulation, the digital modulation mode was operated to its maximum extent.

d) Adjust the spectrum analyzer for the following setting:

1) RBW : 100Hz (Authorized Band 6 kHz),
100Hz (Authorized Band 11.25 kHz),
300Hz (Authorized Band 20 kHz)

2) VBW : Video Bandwidth at least 10 times the resolution bandwidth.

4) Sweep Speed : Sweep Speed slow enough to maintain measurement calibration.

5) Sampling Time : 10 times

6) Detector Mode = Positive Peak.

e) The occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

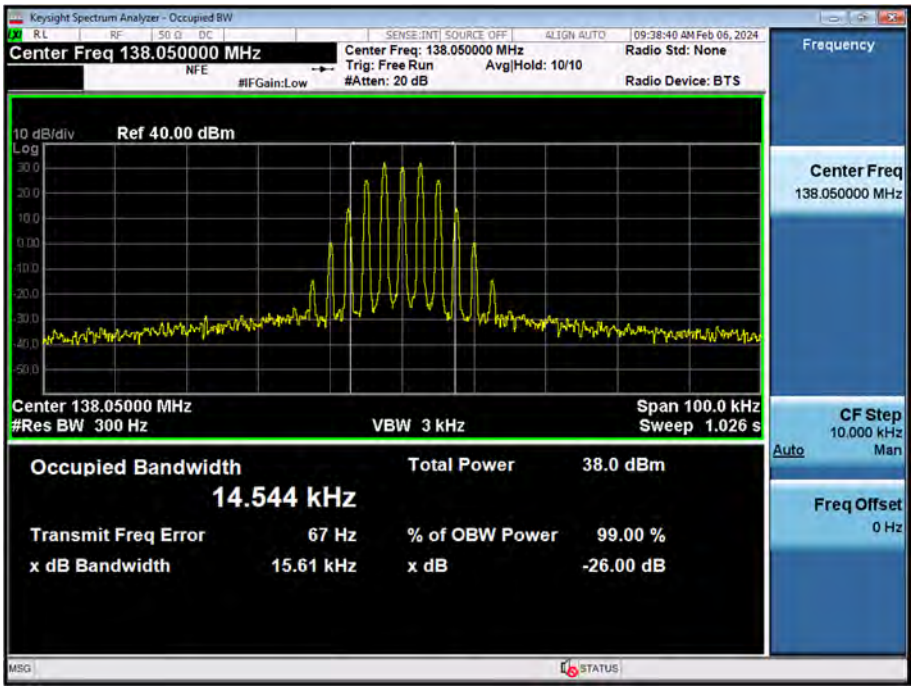
▣ TEST RESULTS

Certification	Type of Emission	Channel Bandwidth (kHz)	Test Frequency (MHz)	Measured 99% OBW at Maximum Freq. Deviation(kHz)		Limit (kHz)
				High Power	Low Power	
ISED	16K0F3E	25	138.05	14.544	14.528	20.00
FCC/ ISED			150.05	10.704	10.672	
FCC/ ISED			162.05	10.691	10.674	
FCC/ ISED			173.95	14.583	14.549	
ISED	11K0F3E	12.5	138.05	9.896	9.897	11.25
FCC/ ISED			150.05	9.886	9.871	
FCC/ ISED			162.05	7.558	7.554	
FCC/ ISED			173.95	9.899	9.895	
ISED	8K30F1E, 8K30F1D, 8K30F7W	12.5	138.05	7.689	7.665	11.25
FCC/ ISED			150.05	7.635	7.619	
FCC/ ISED			162.05	7.615	7.611	
FCC/ ISED			173.95	7.662	7.651	
ISED	4K00F1E, 4K00F1D, 4K00F7W	6.25	138.05	3.618	3.613	6.00
FCC/ ISED			150.05	3.564	3.603	
FCC/ ISED			162.05	3.600	3.614	
FCC/ ISED			173.95	3.615	3.599	
ISED	4K00F2D	6.25	138.05	3.311	3.315	6.00
FCC/ ISED			150.05	3.315	3.311	
FCC/ ISED			162.05	3.312	3.315	
FCC/ ISED			173.95	3.308	3.305	

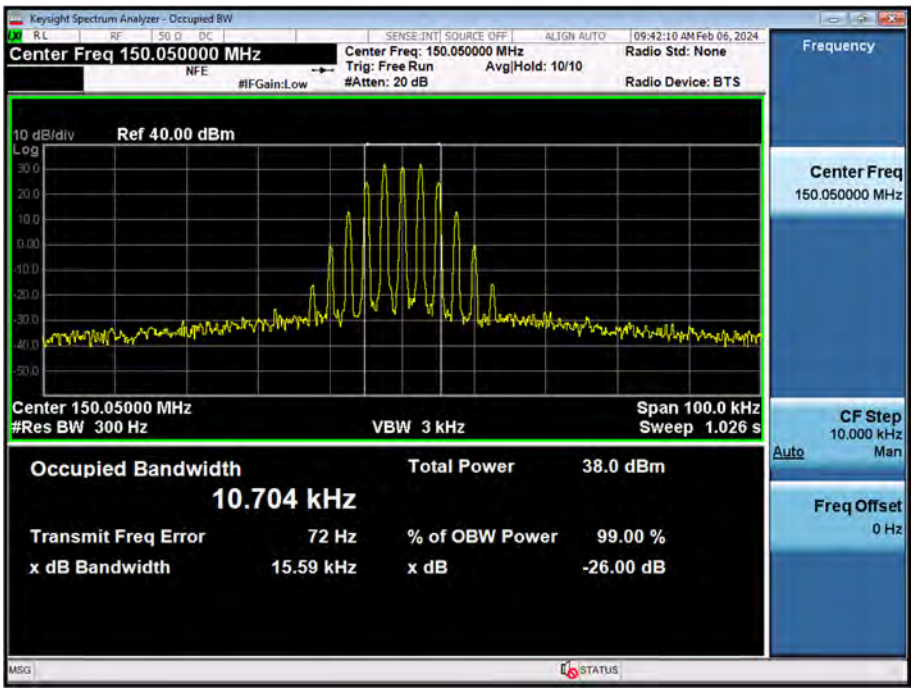
▣ Plots of 99% Bandwidth

16K0F3E

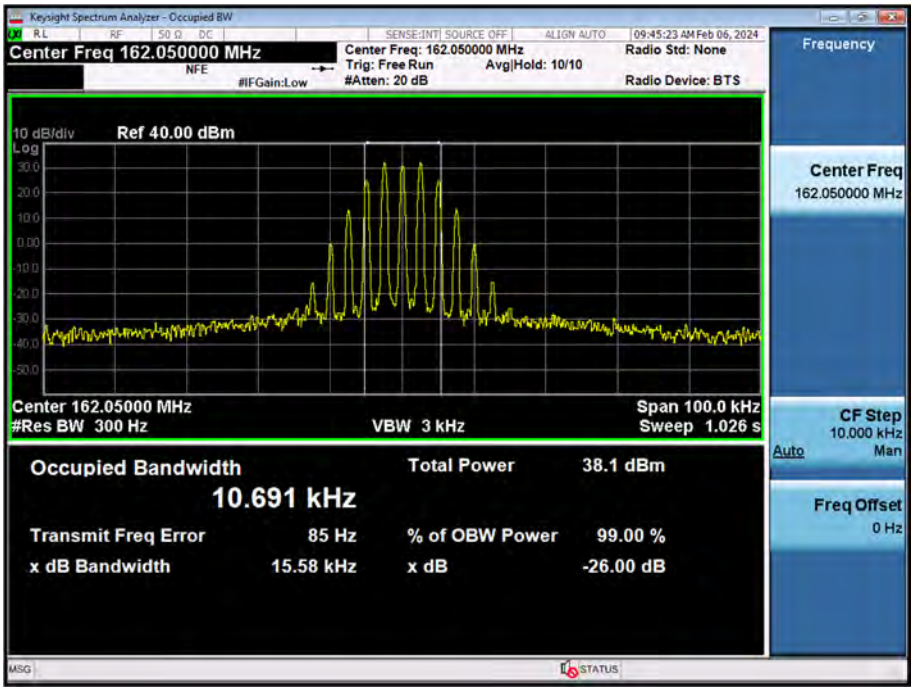
(138.05 MHz)_High



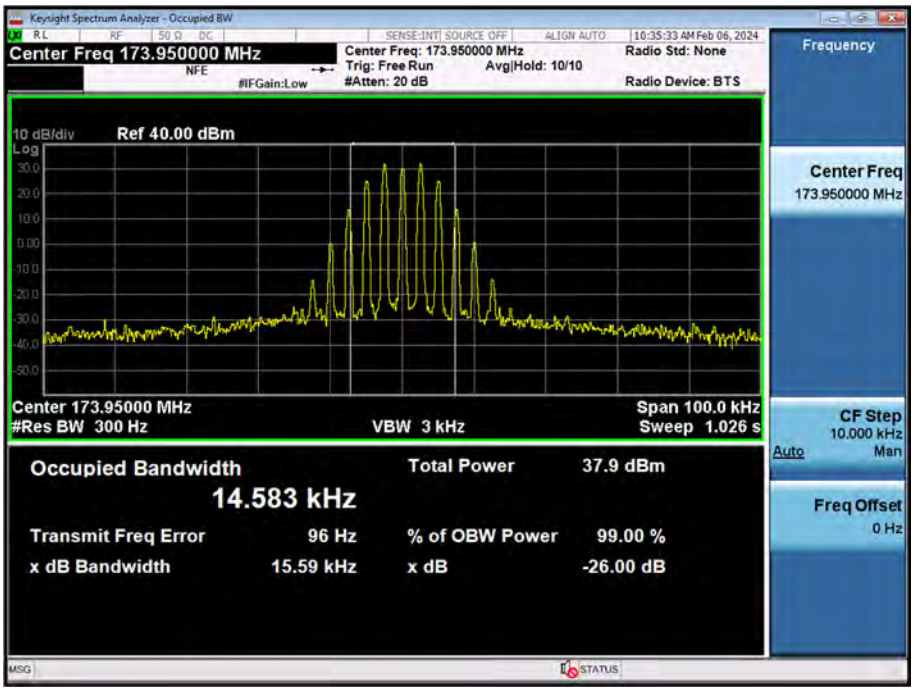
(150.05 MHz)_High



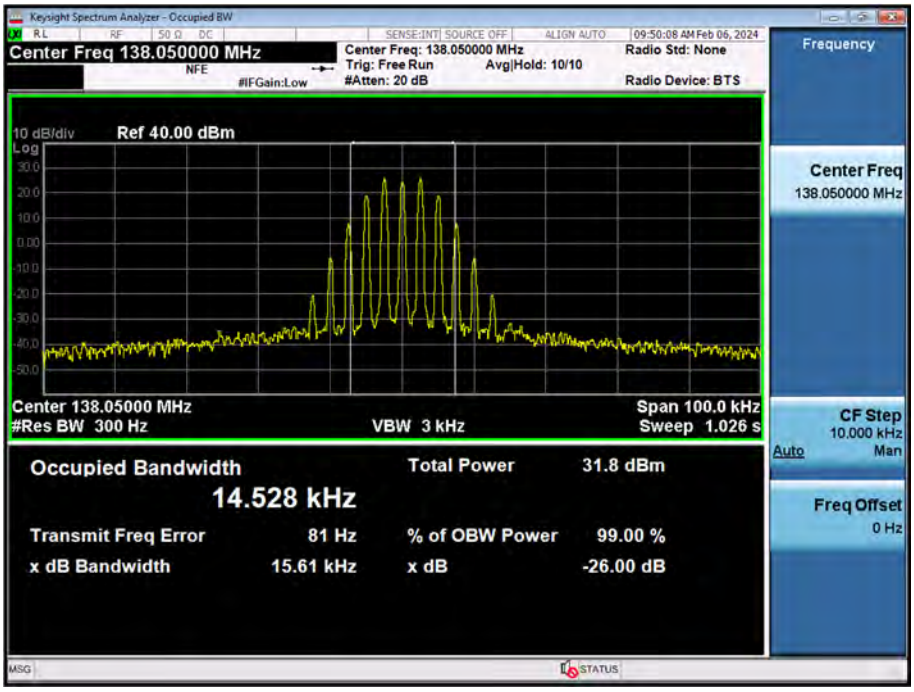
(162.05 MHz)_High



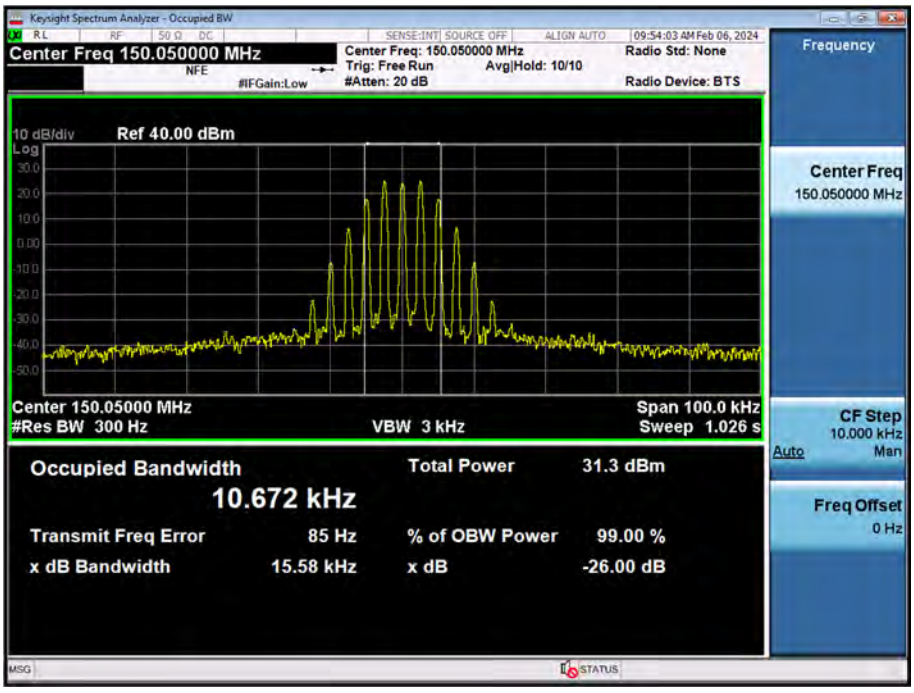
(173.95 MHz)_High



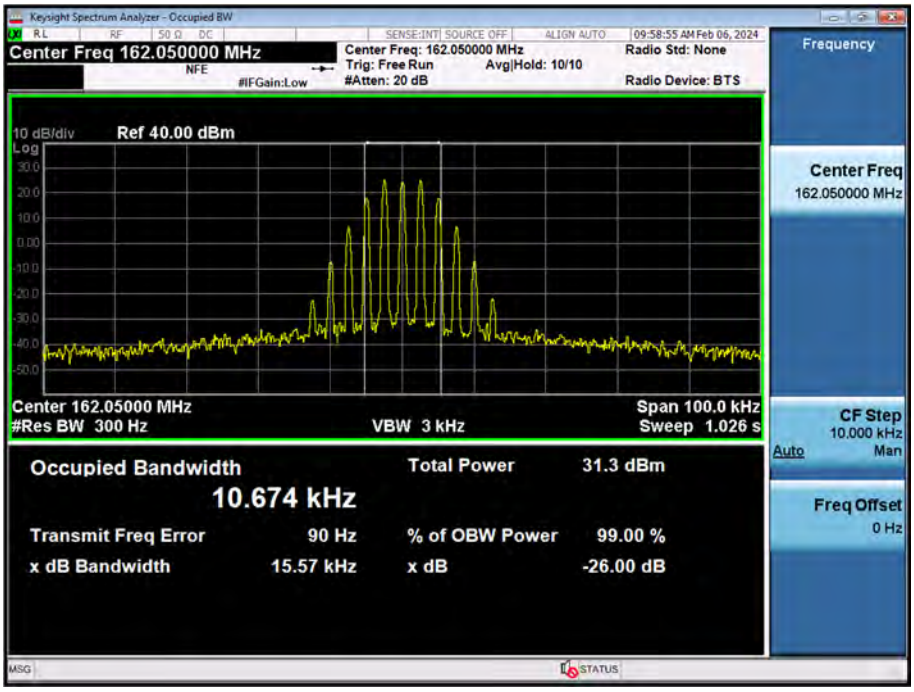
(138.05 MHz)_Low



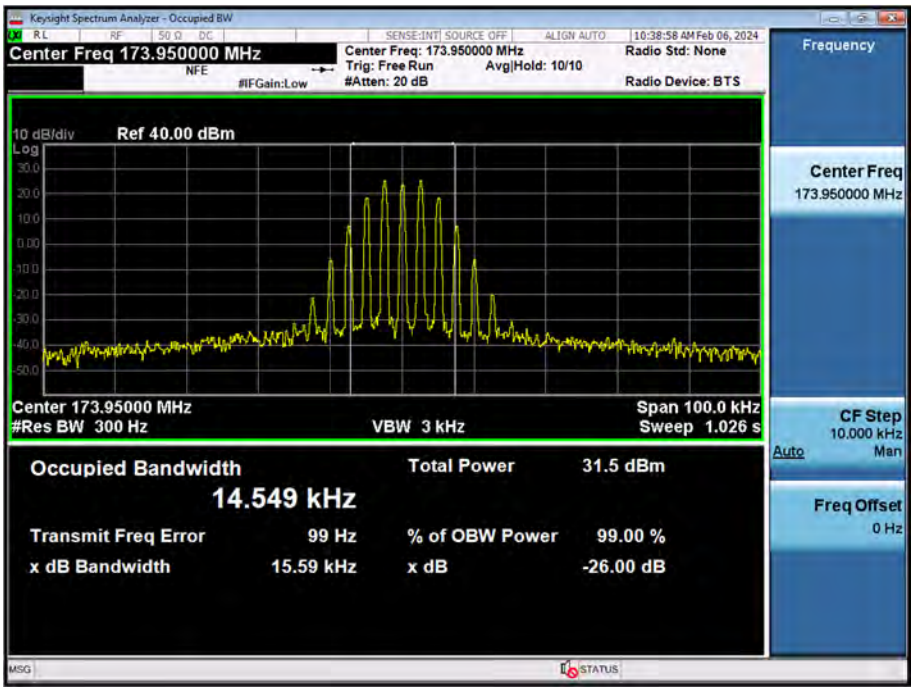
(150.05 MHz)_ Low



(162.05 MHz)_ Low

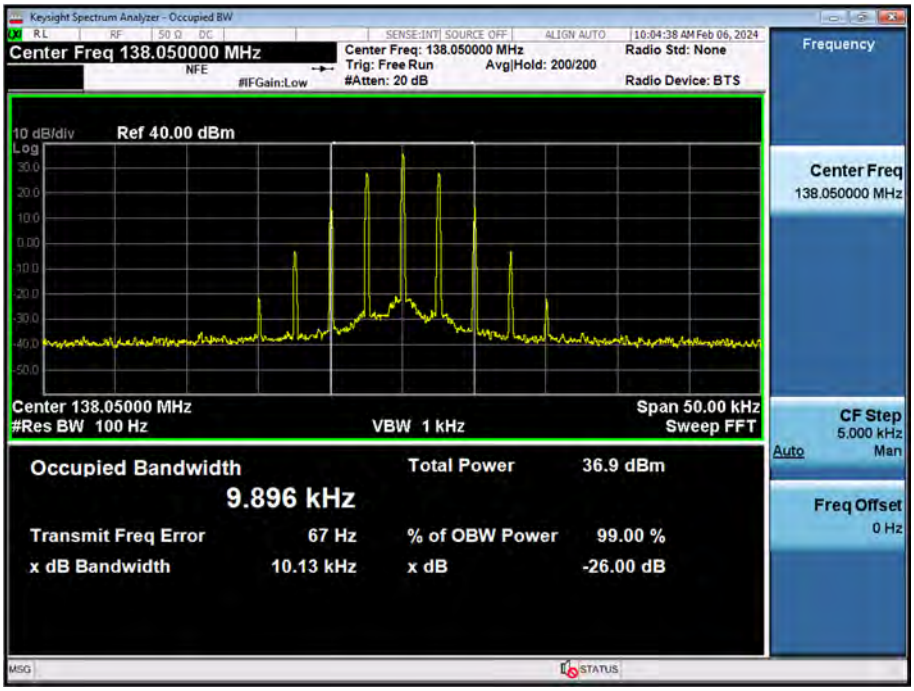


(173.95 MHz)_ Low

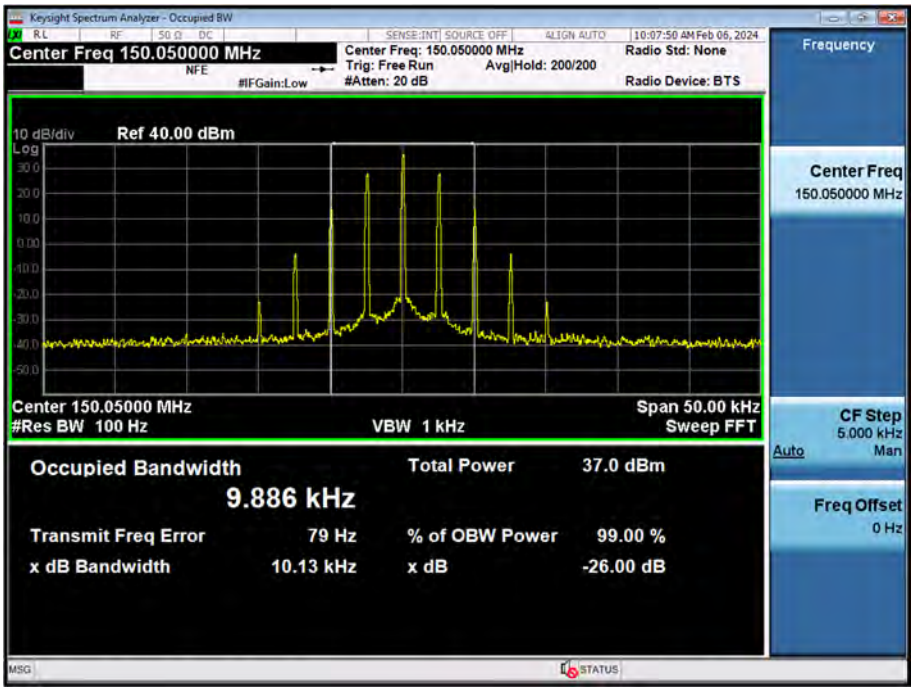


11K0F3E

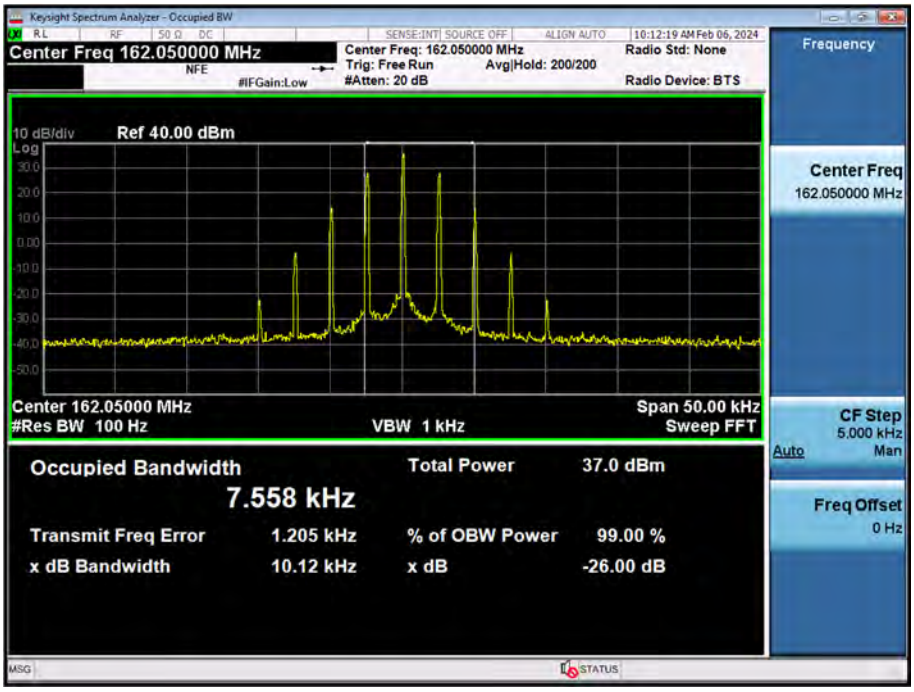
(138.05 MHz)_High



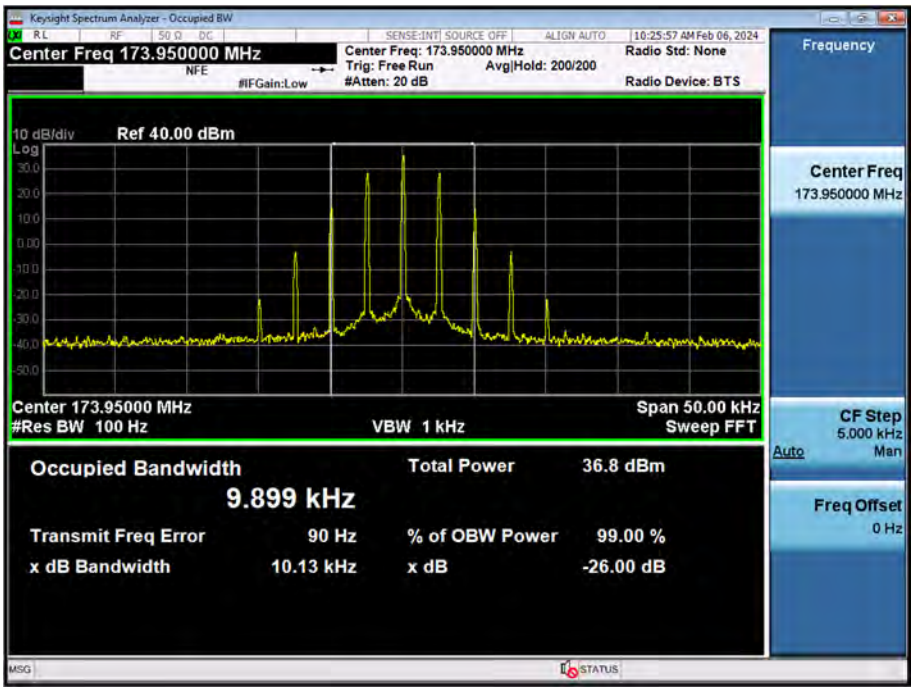
(150.05 MHz)_High



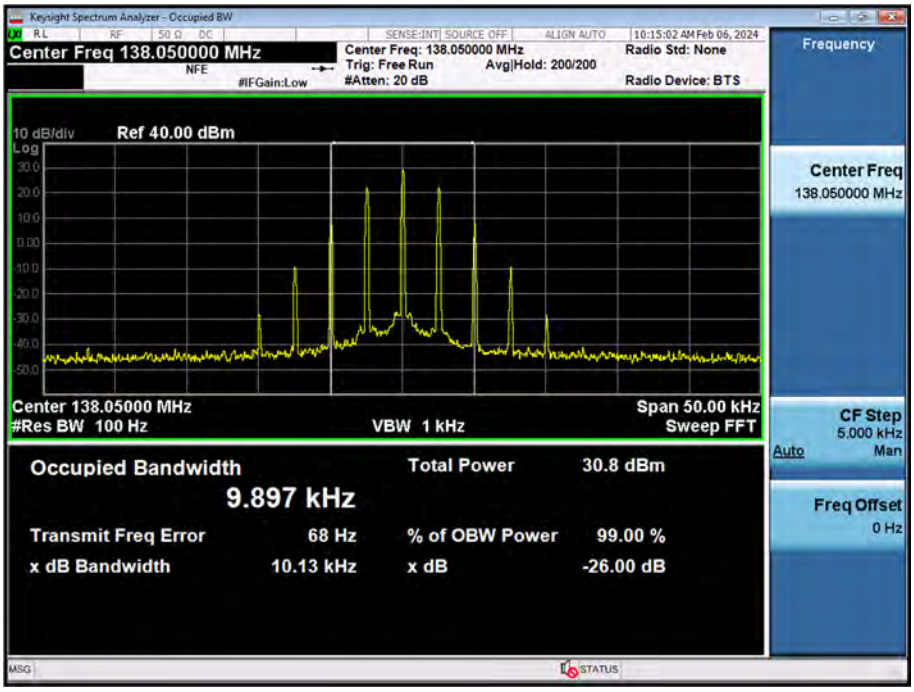
(162.05 MHz)_High



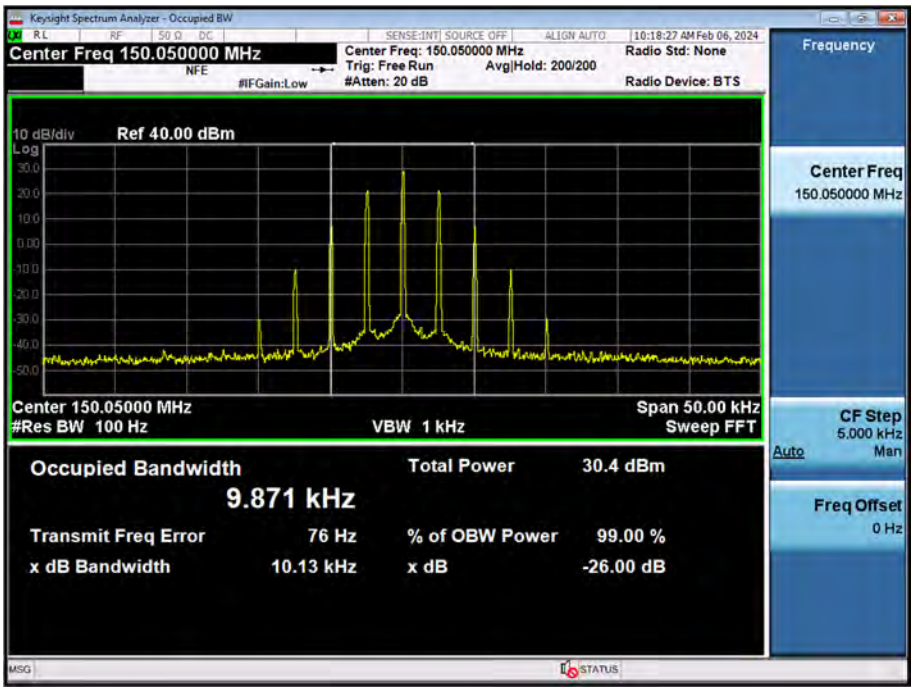
(173.95 MHz)_High



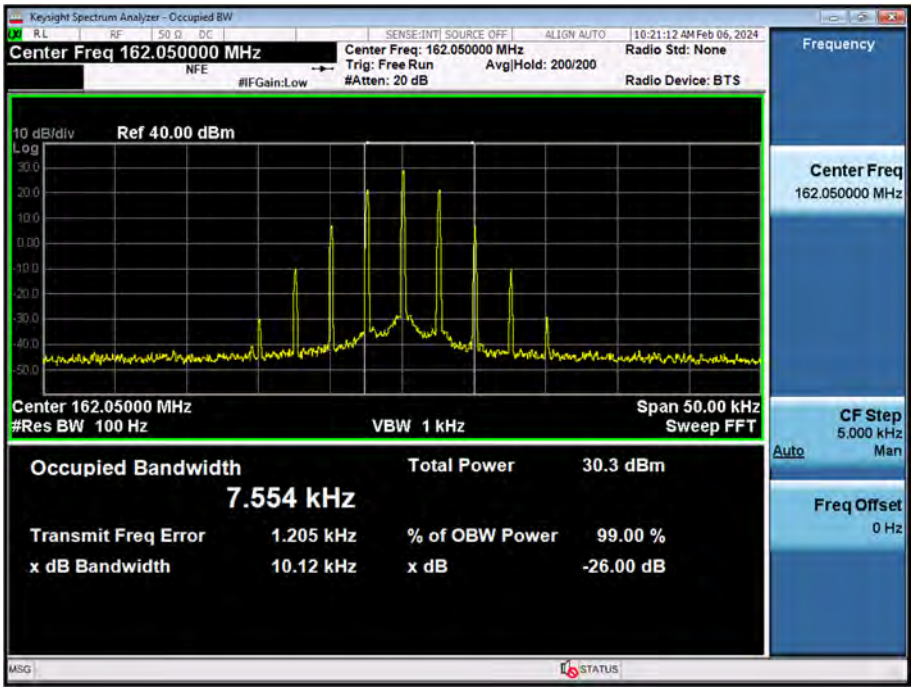
(138.05 MHz)_Low



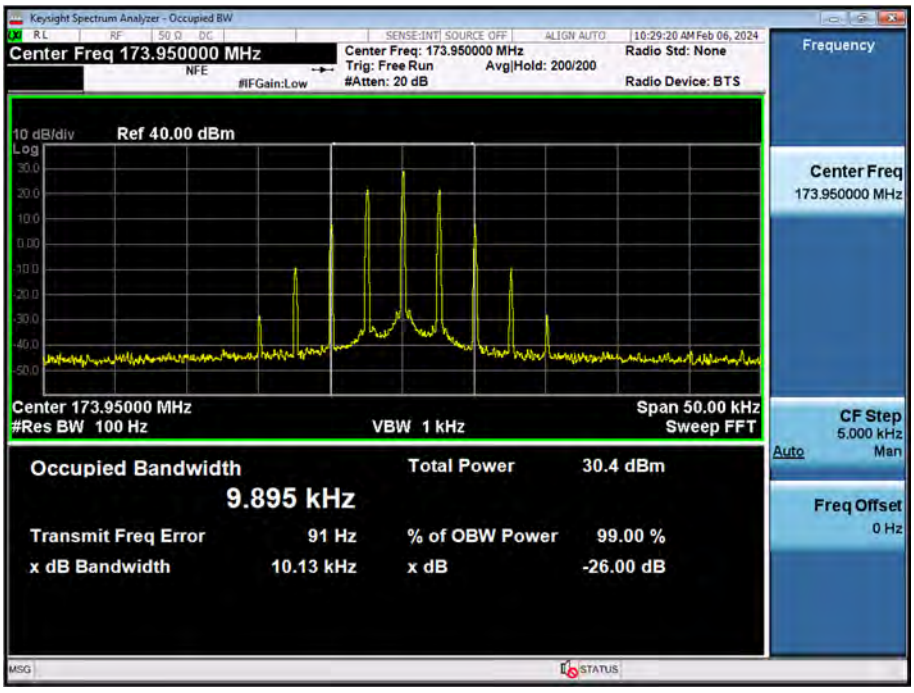
(150.05 MHz)_ Low



(162.05 MHz)_ Low

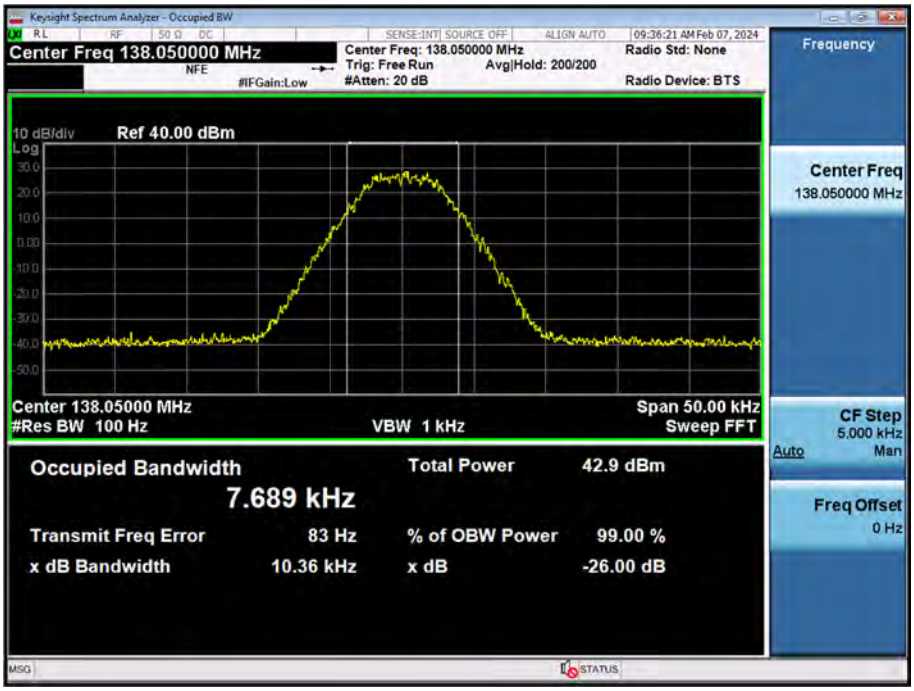


(173.95 MHz)_ Low

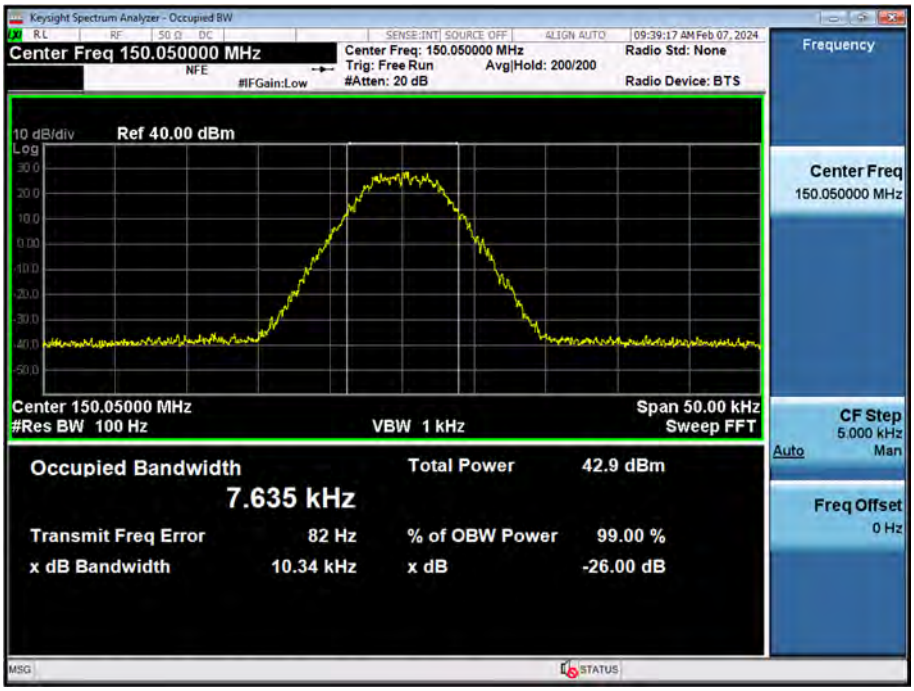


8K30F1E

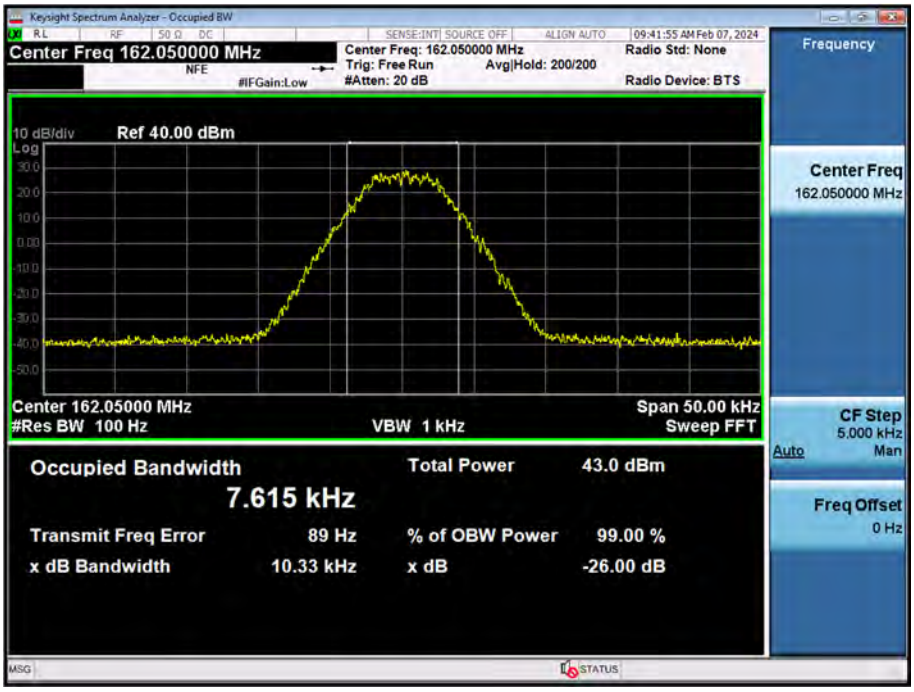
(138.05 MHz)_High



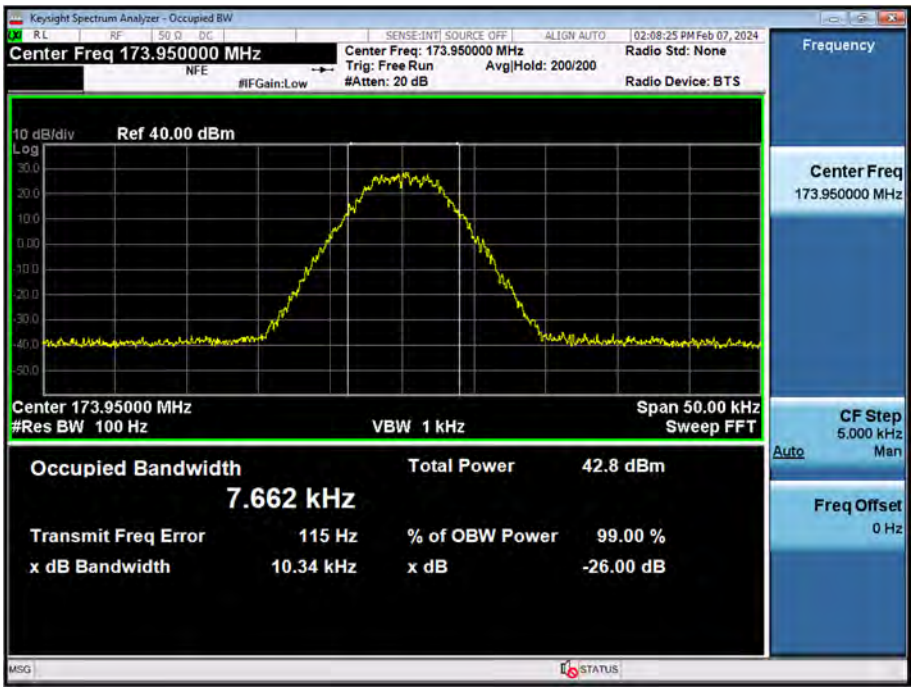
(150.05 MHz)_High



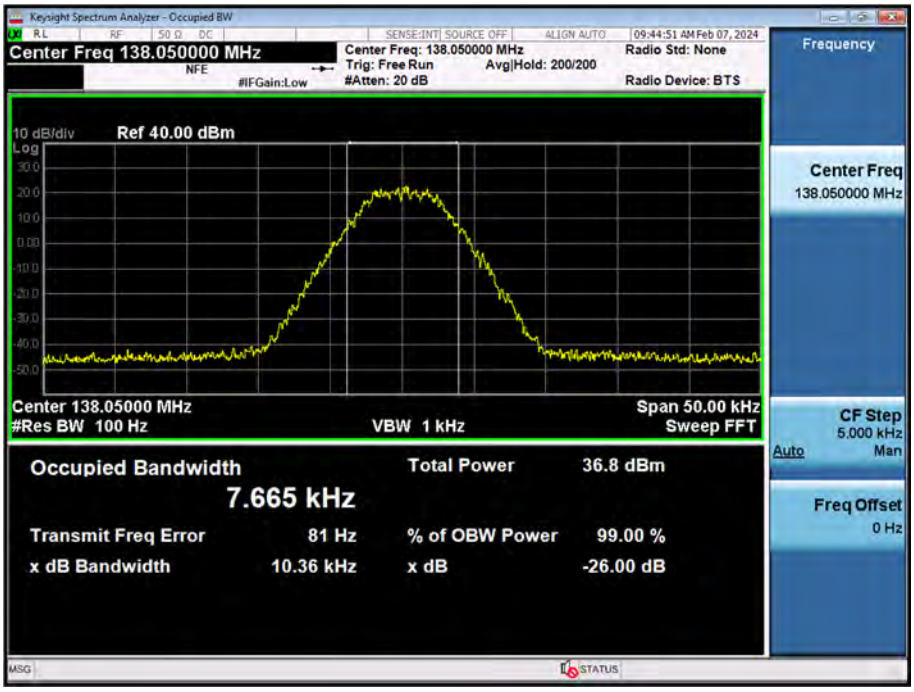
(162.05 MHz)_High



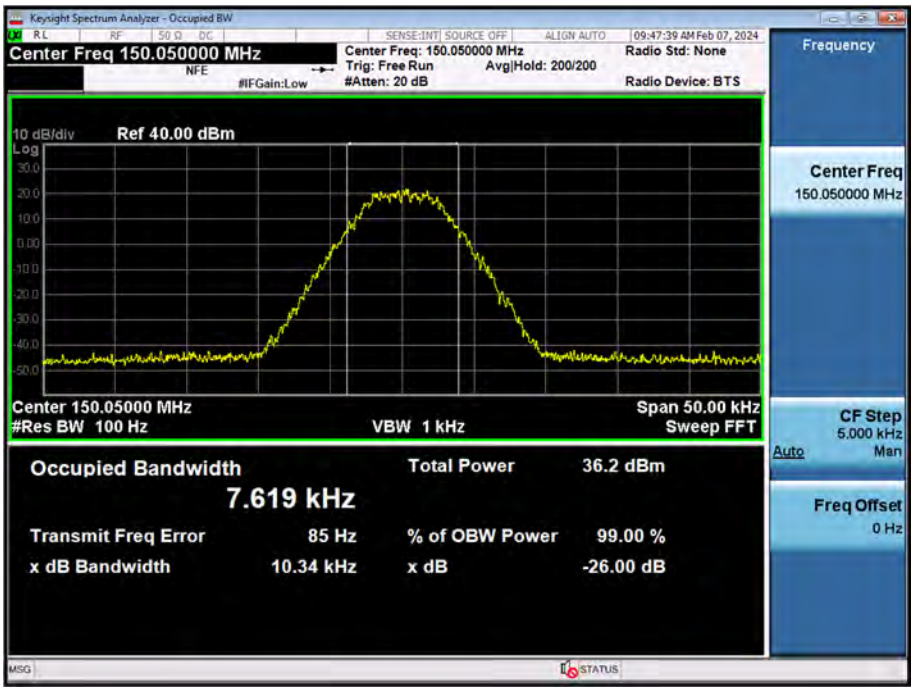
(173.95 MHz)_High



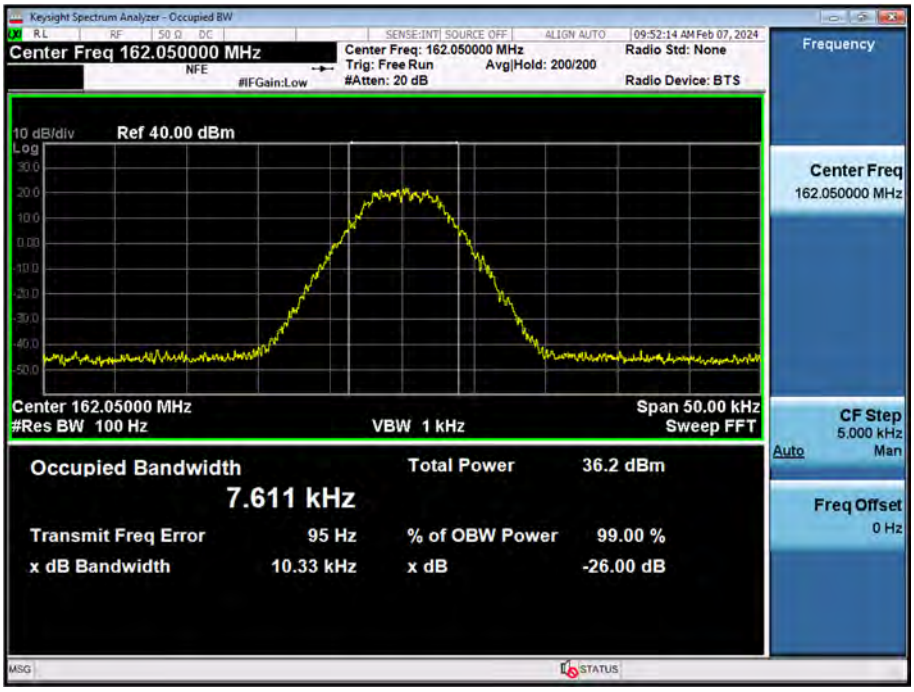
(138.05 MHz)_Low



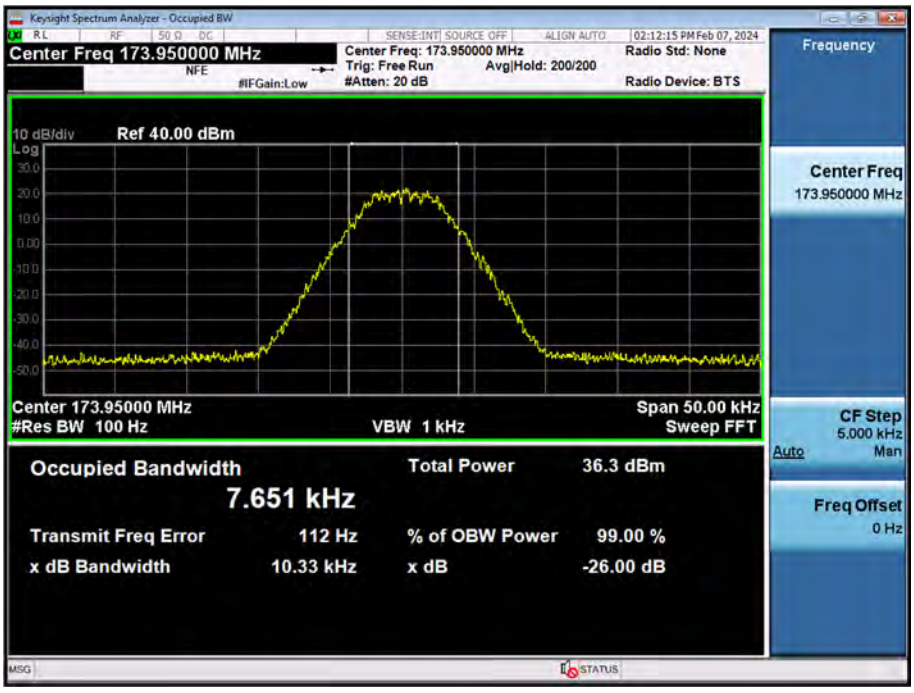
(150.05 MHz)_ Low



(162.05 MHz)_ Low

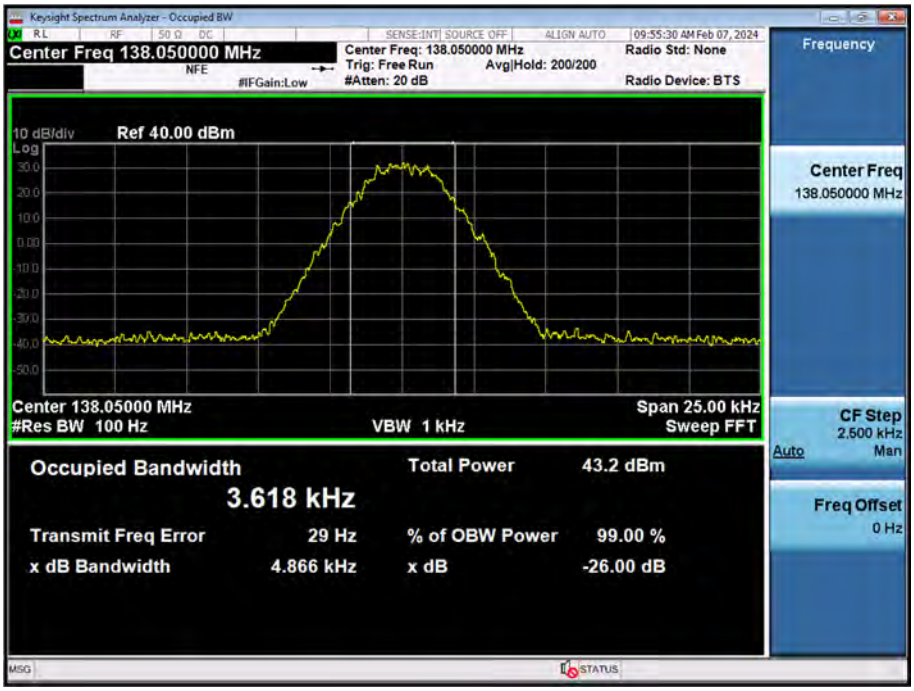


(173.95 MHz)_ Low

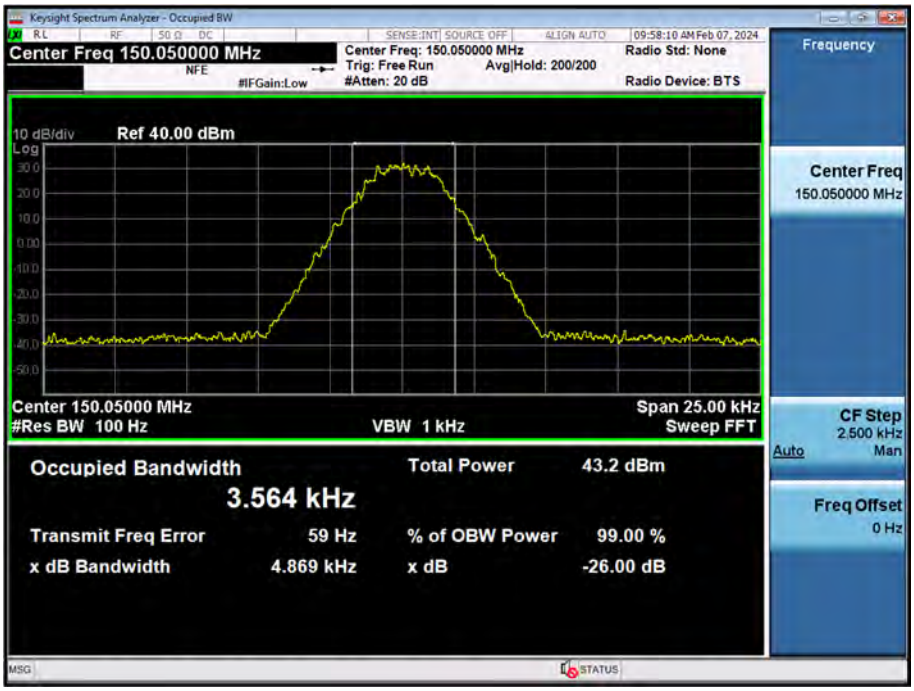


4K00F1E

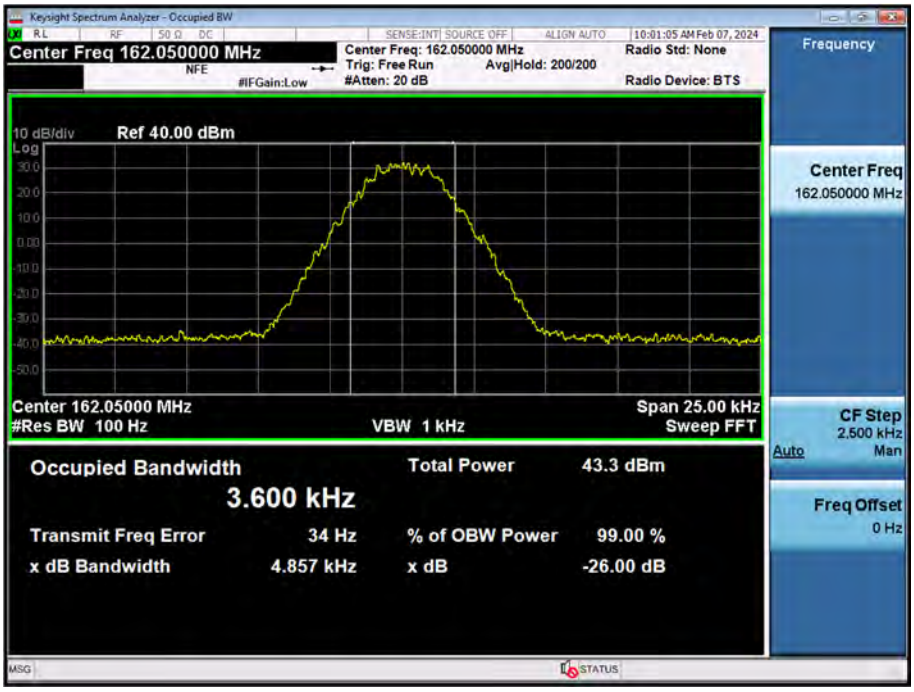
(138.05 MHz)_High



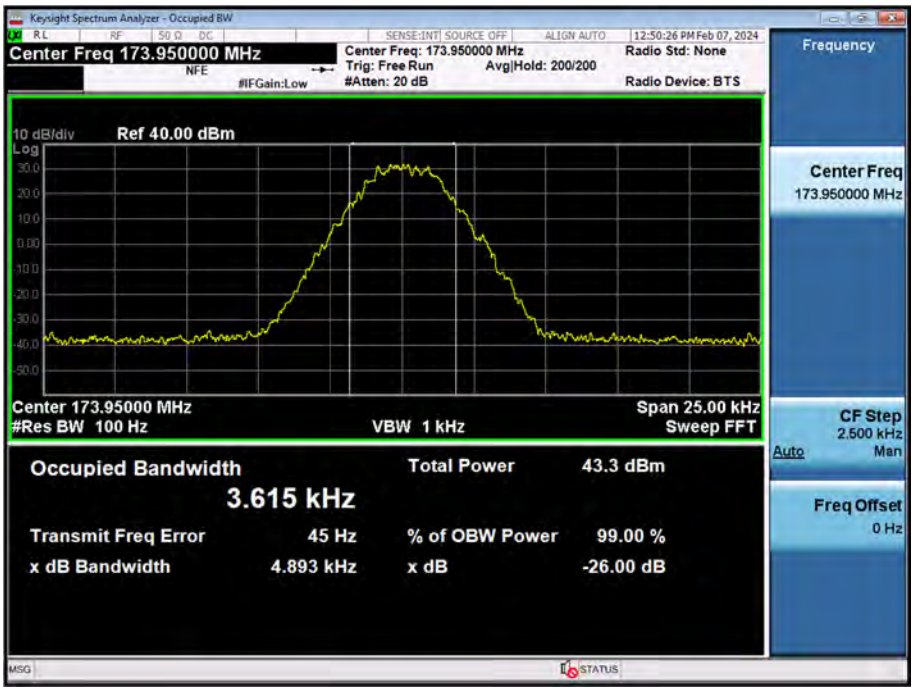
(150.05 MHz)_High



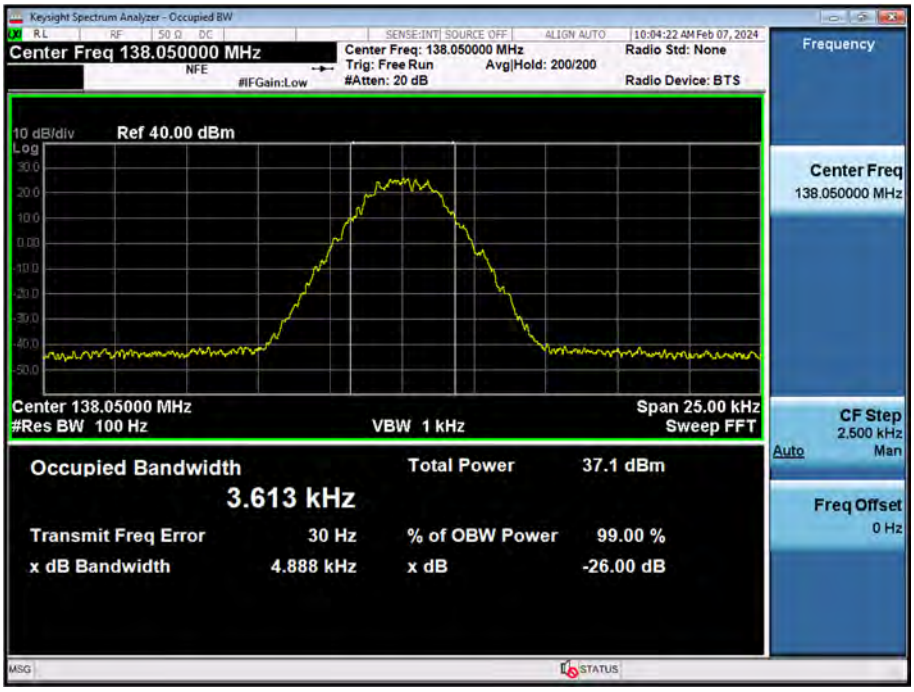
(162.05 MHz)_High



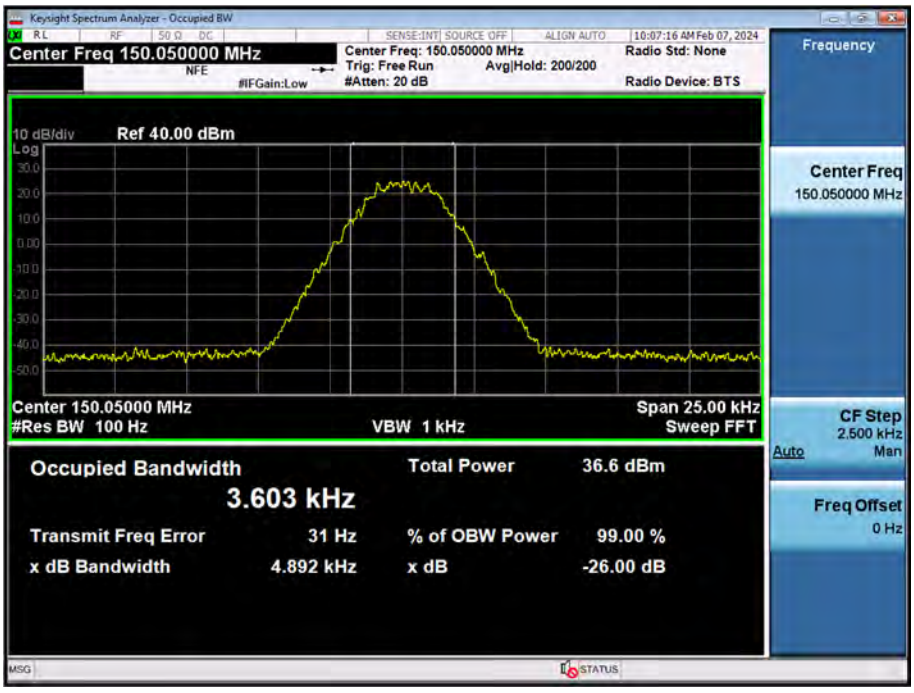
(173.95 MHz)_High



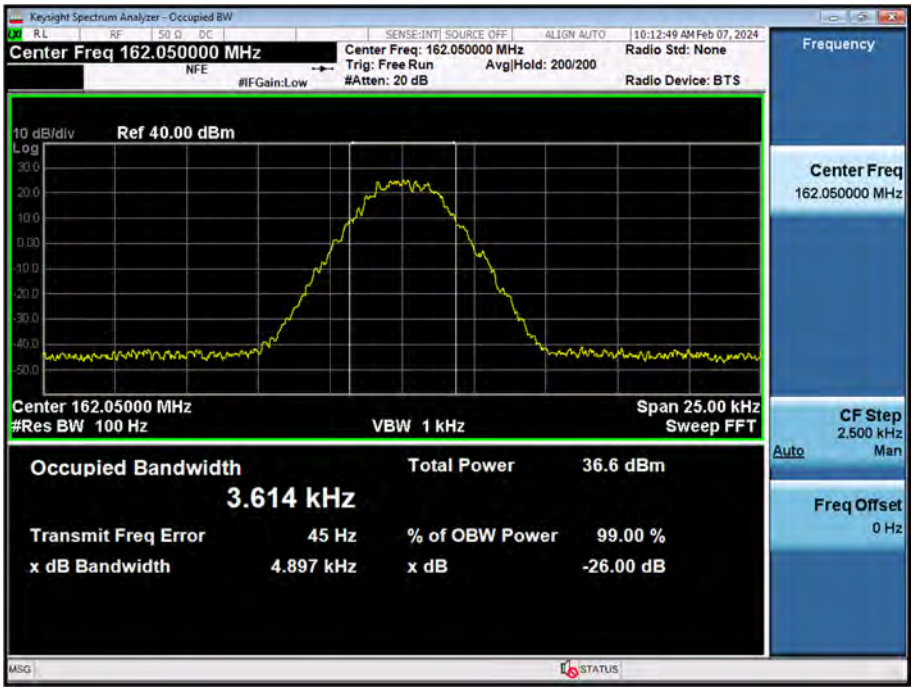
(138.05 MHz)_Low



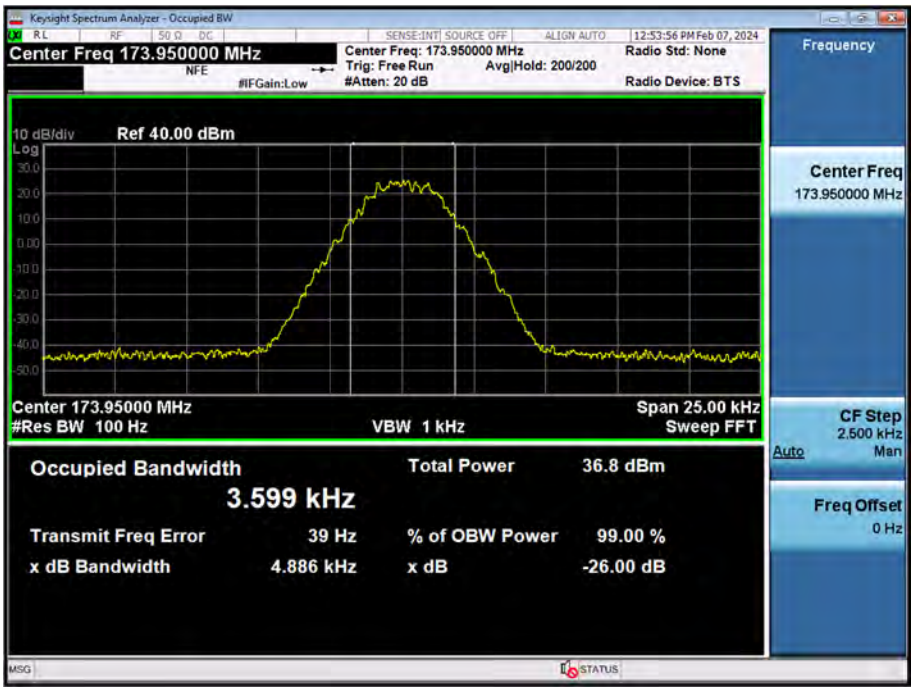
(150.05 MHz)_ Low



(162.05 MHz)_ Low

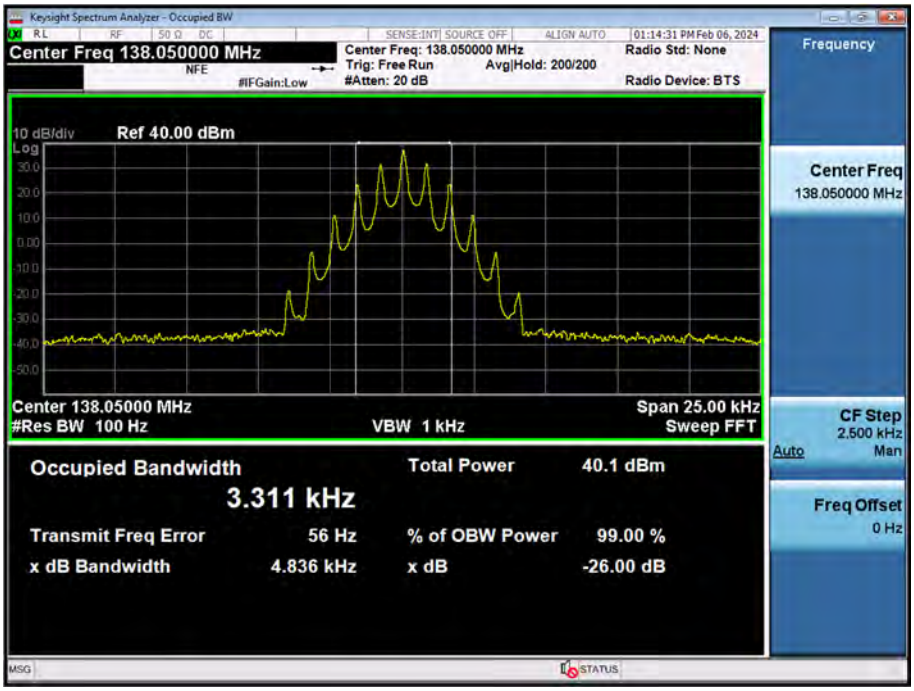


(173.95 MHz)_ Low

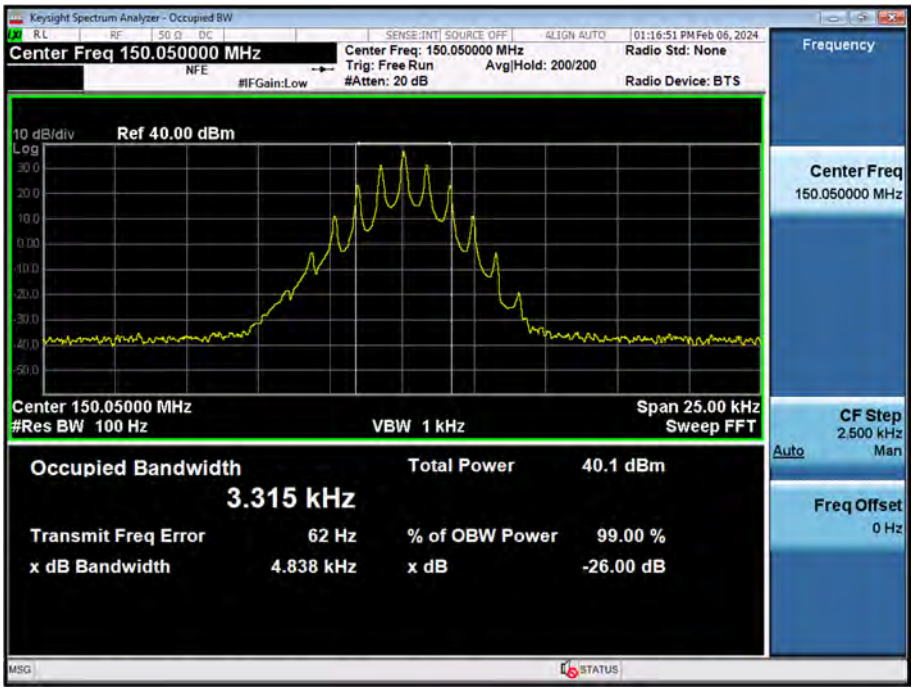


4K00F2D

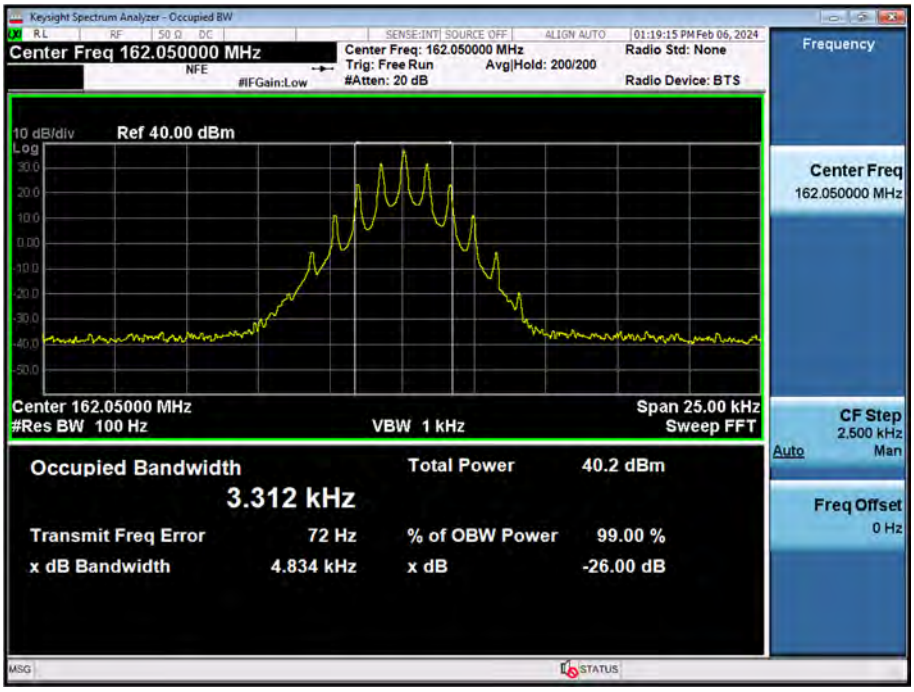
(138.05 MHz)_High



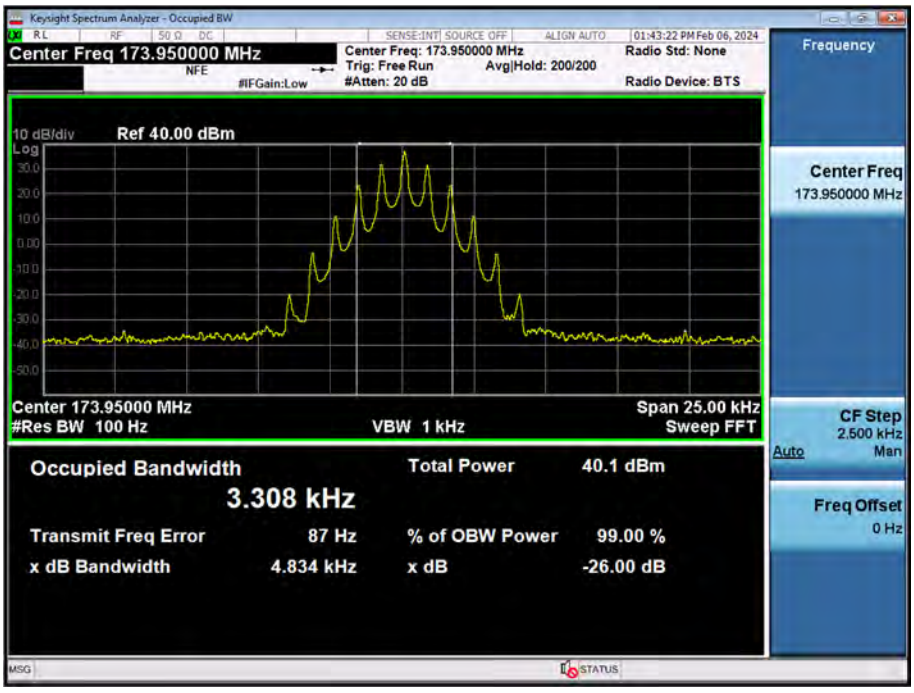
(150.05 MHz)_High



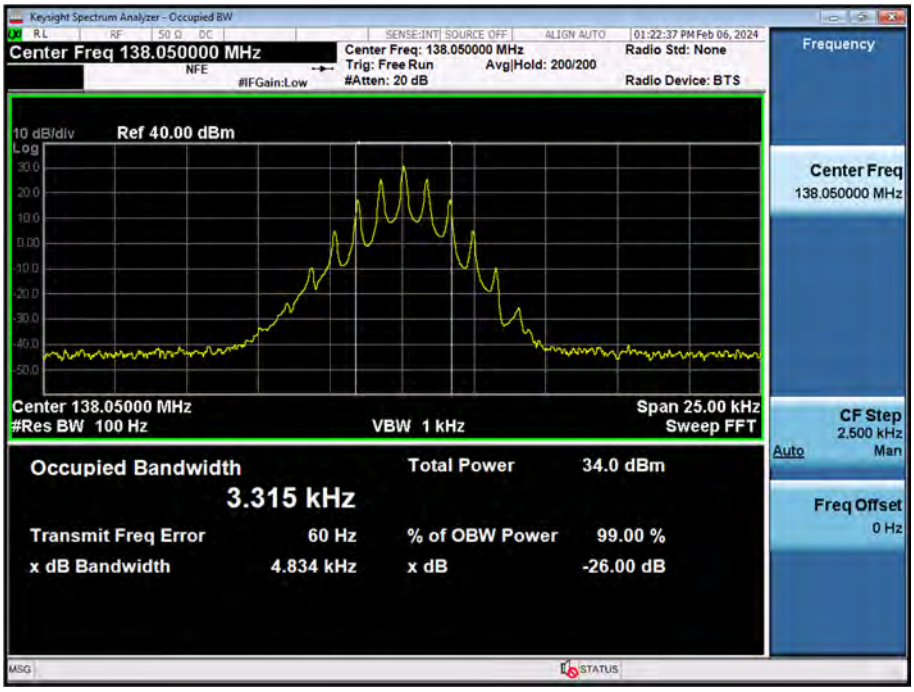
(162.05 MHz)_High



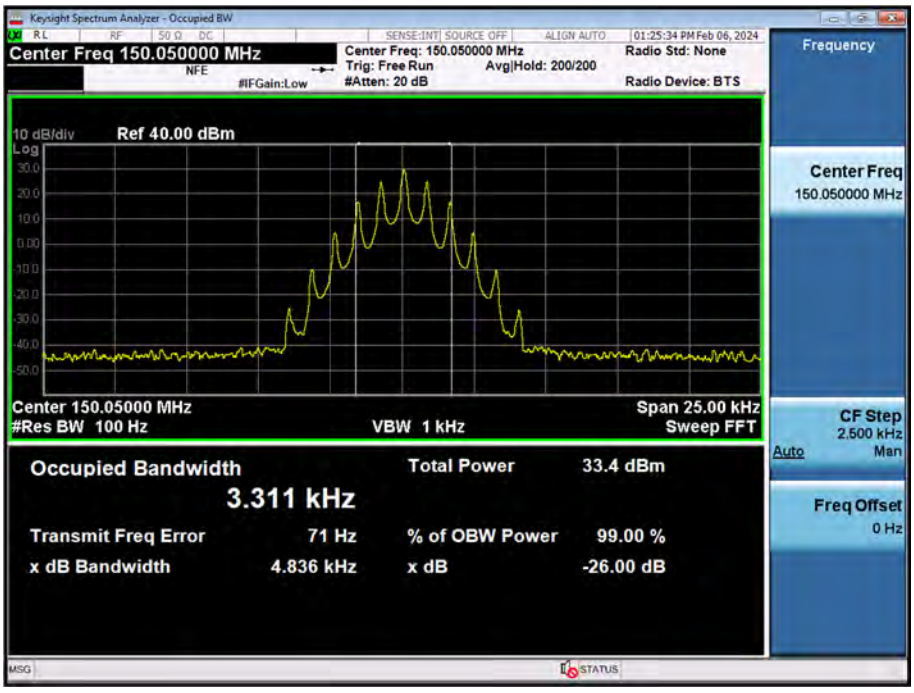
(173.95 MHz)_High



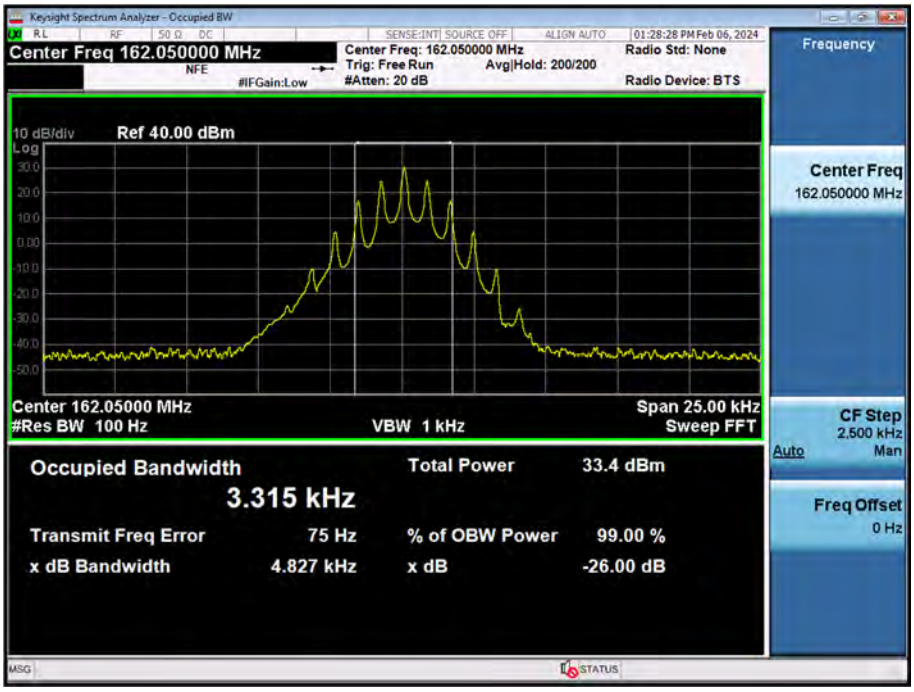
(138.05 MHz)_Low



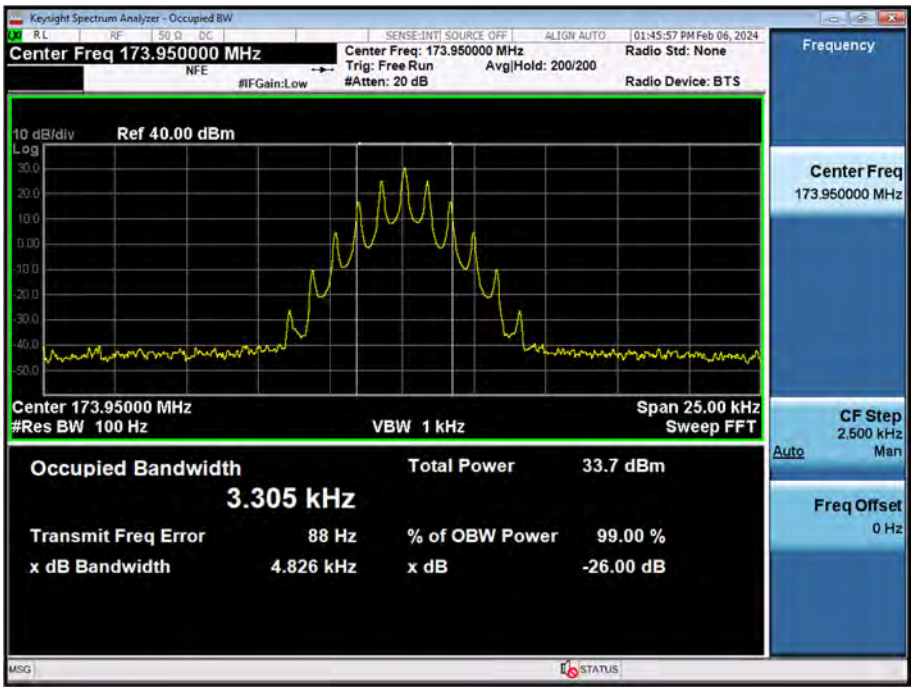
(150.05 MHz)_ Low



(162.05 MHz)_ Low



(173.95 MHz)_ Low

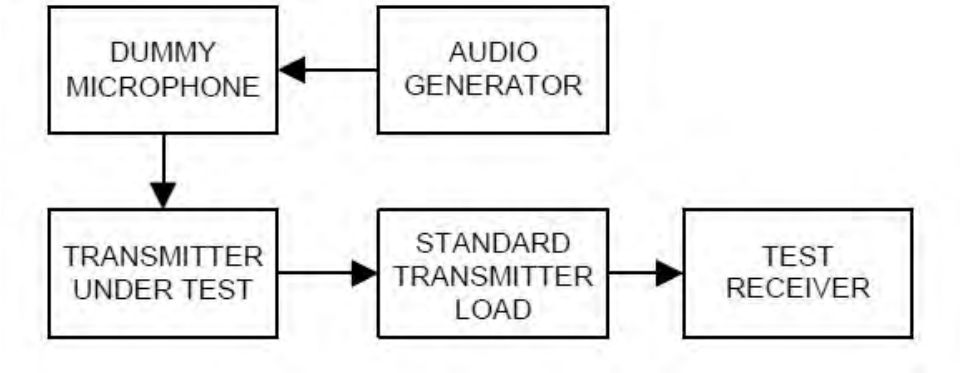


8.4 Modulation Limiting

▣ Definition

Modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of a rated system deviation.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

According to 2.2.3 in TIA-603-E Standard.

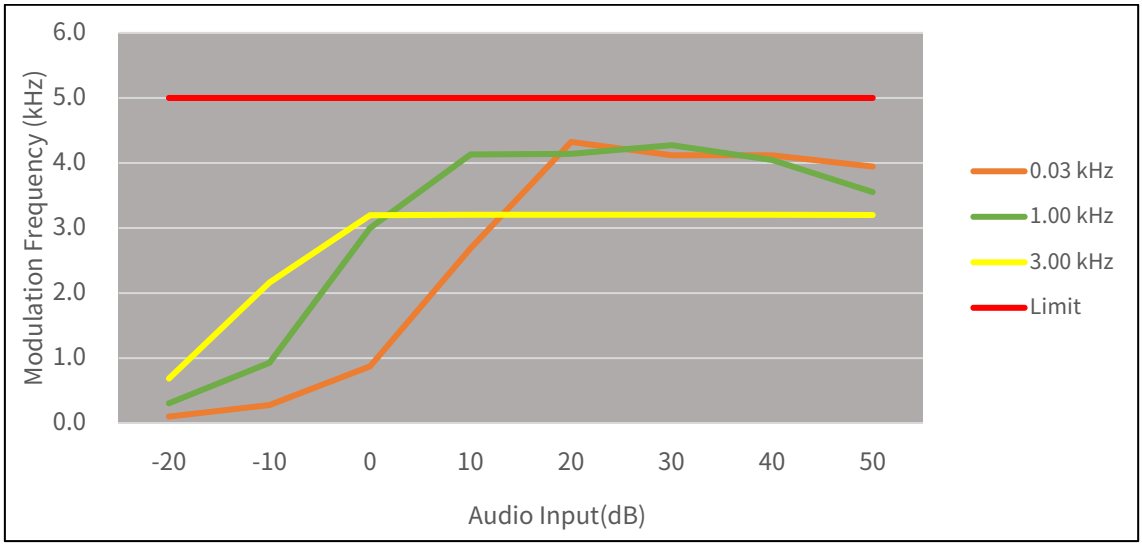
a) Connect the equipment as illustrated.
b) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
c) Set the test receiver to measure peak positive deviation.
   Set the audio bandwidth for ≤0.25 Hz to ≥15,000 Hz.
   Turn the de-emphasis function off.
d) Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level obtain 60% of full rated system deviation.
e) Increase the level form the audio frequency generator by 20 dB in one step(rise time between the 10% and 90% points shall be 0.1 second maximum).
f) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
g) With the level from the audio frequency generator held constant at the level obtained in step e), Slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation.
h) Set the test receiver to measure peak negative deviation and repeat steps d) through g).
i) The values recorded in steps g) and h) are the modulation limiting.

▣ TEST RESULTS (16K0F3E)

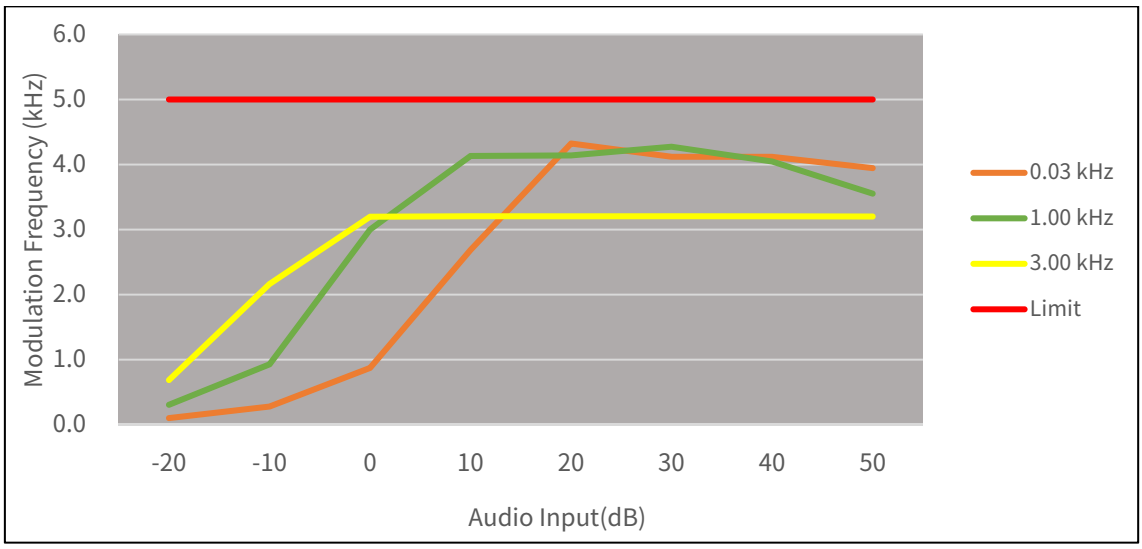
Positive Peaks

HIGH POWER

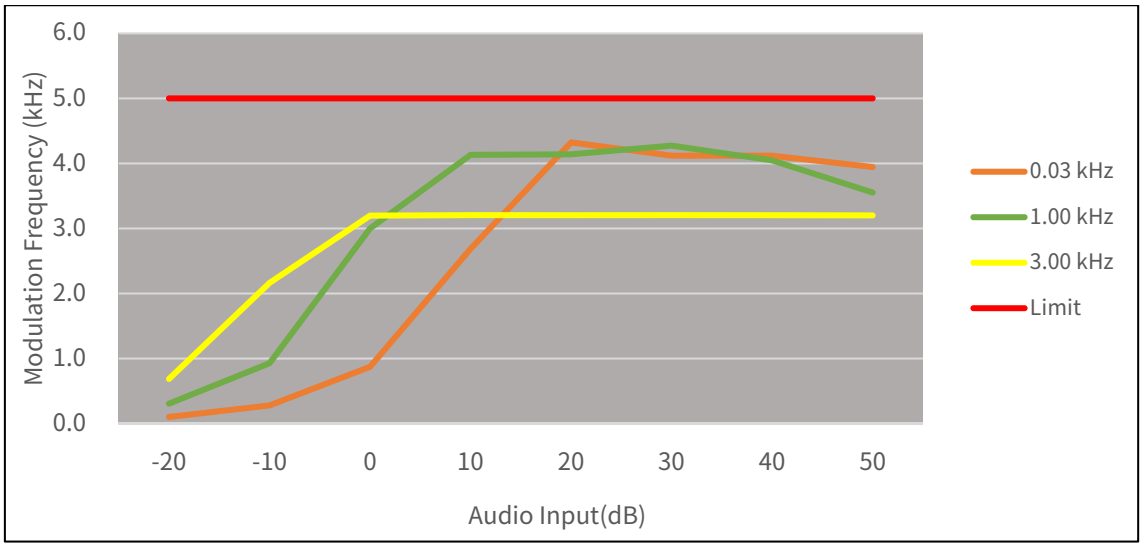
138.05 MHz



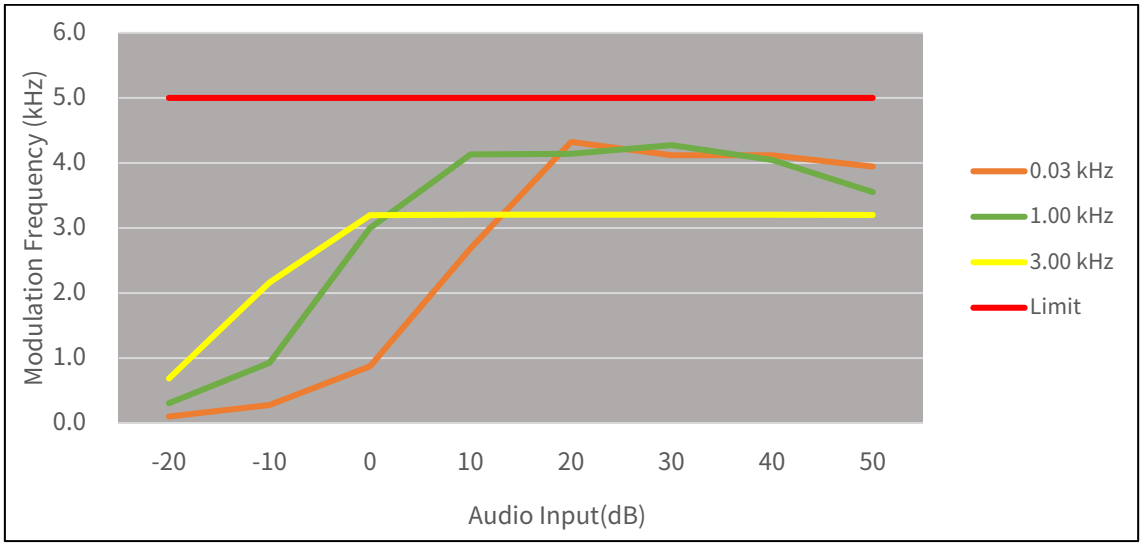
150.05 MHz



162.05 MHz

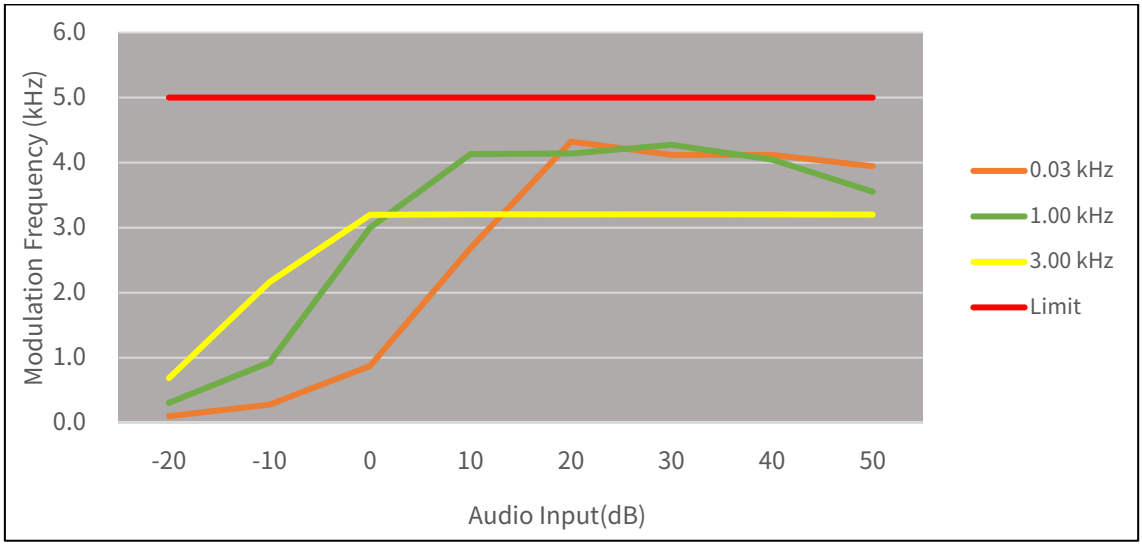


173.95 MHz

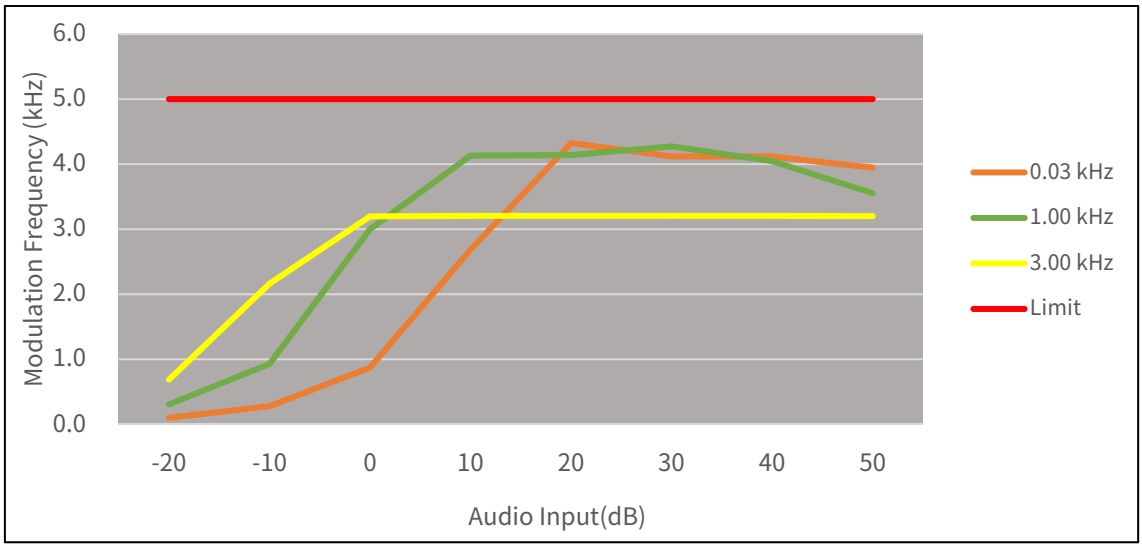


LOW POWER

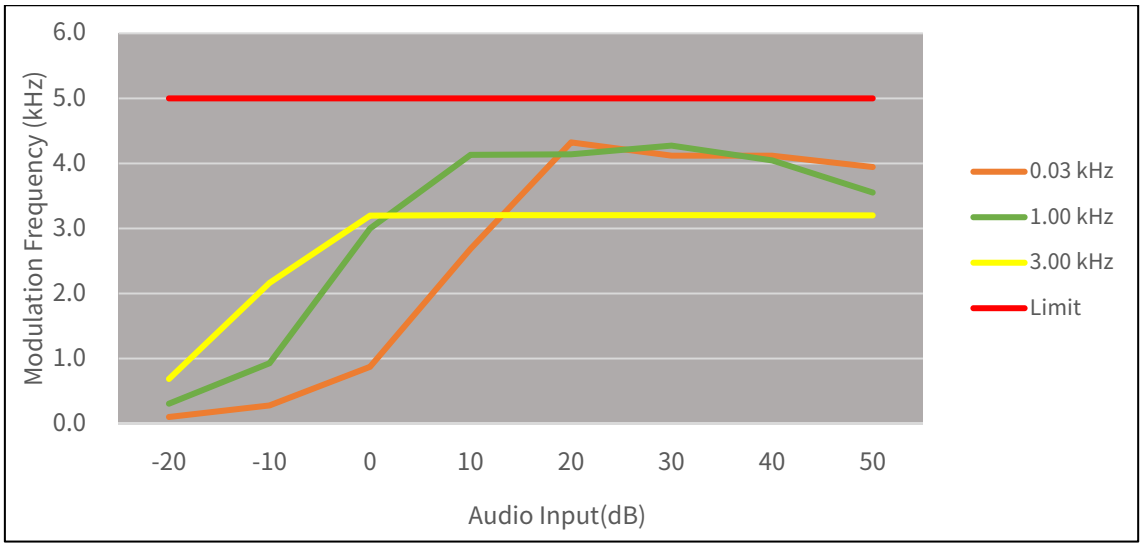
138.05 MHz



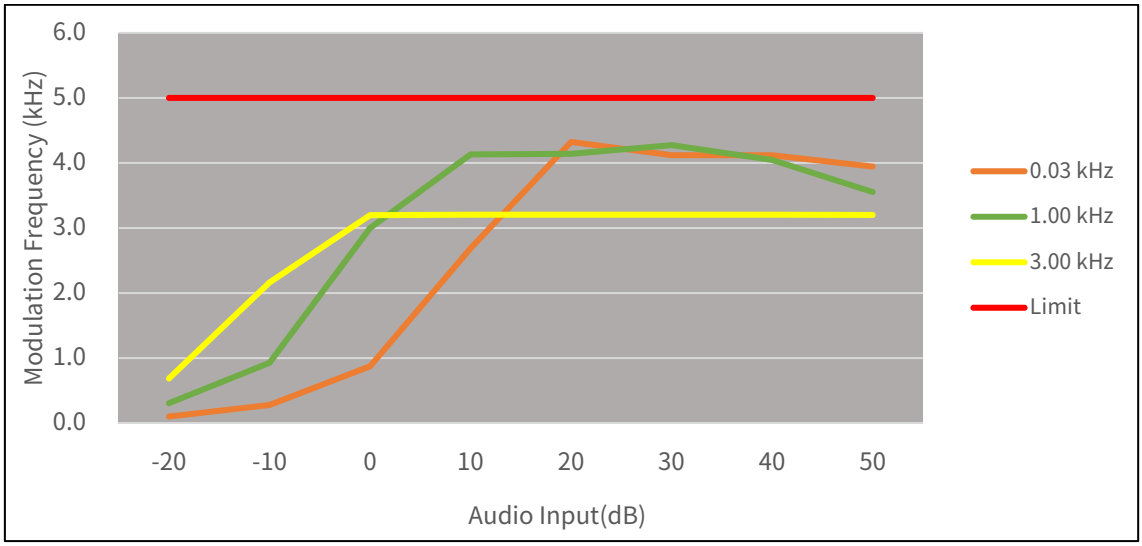
150.05 MHz



162.05 MHz



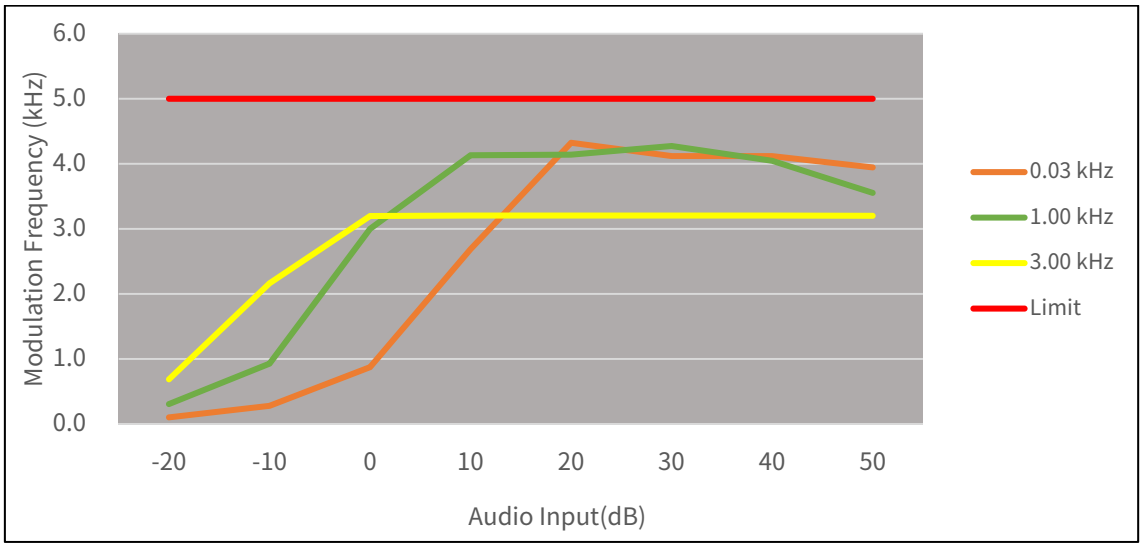
173.95 MHz



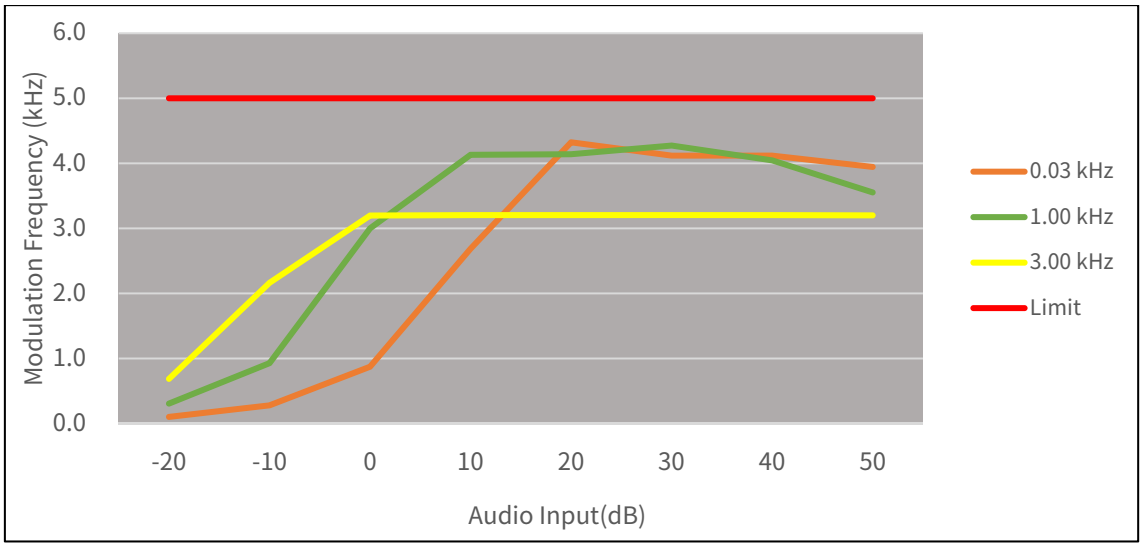
Negative Peaks

HIGH POWER

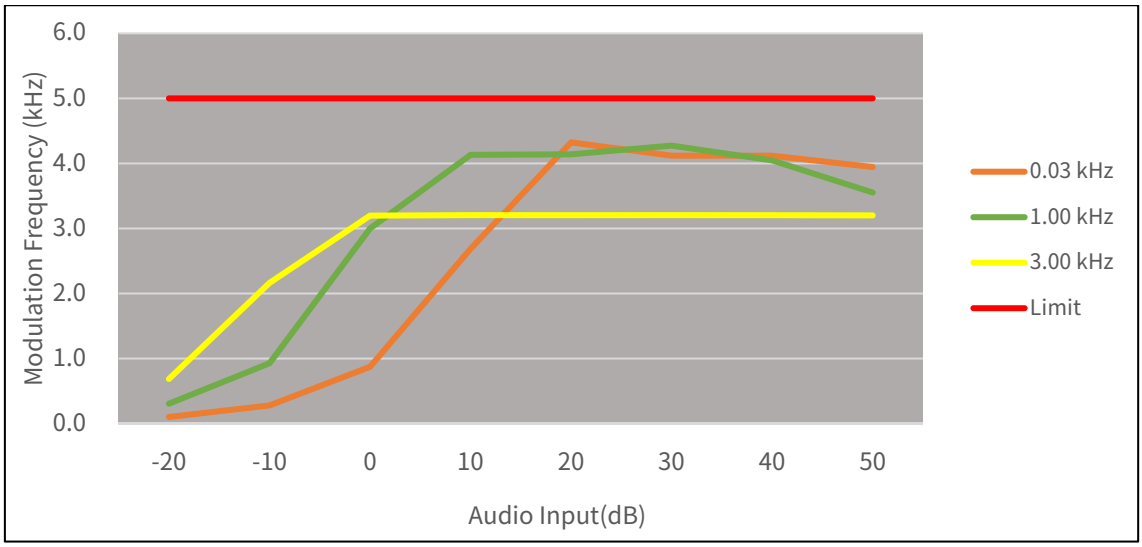
138.05 MHz



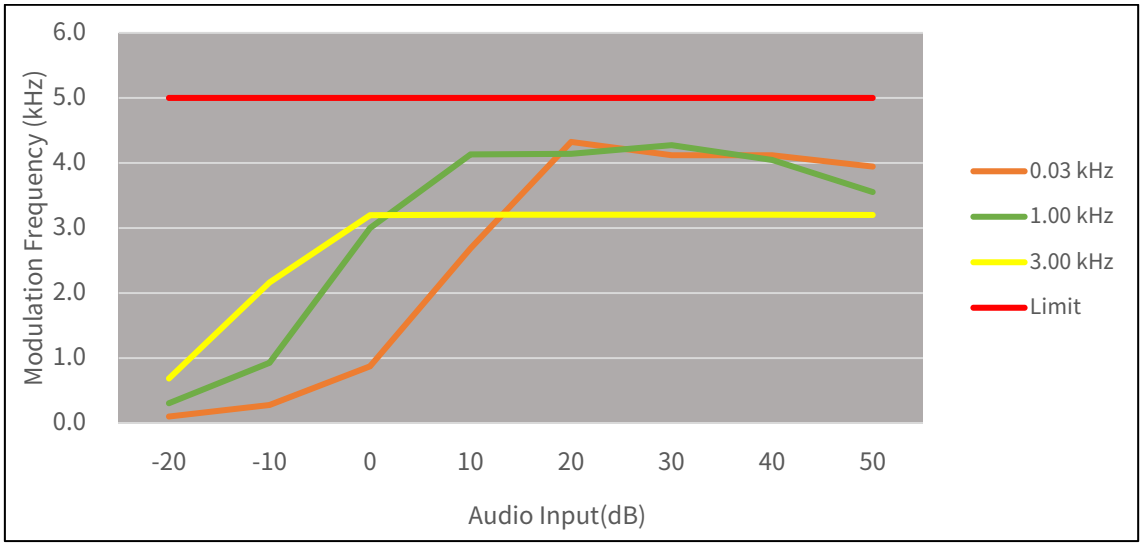
150.05 MHz



162.05 MHz

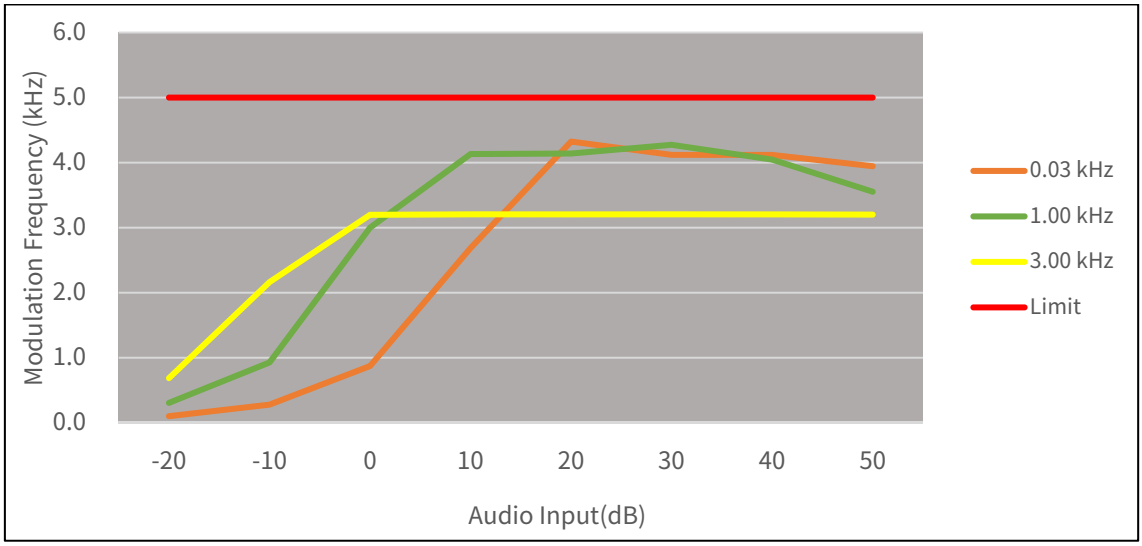


173.95 MHz

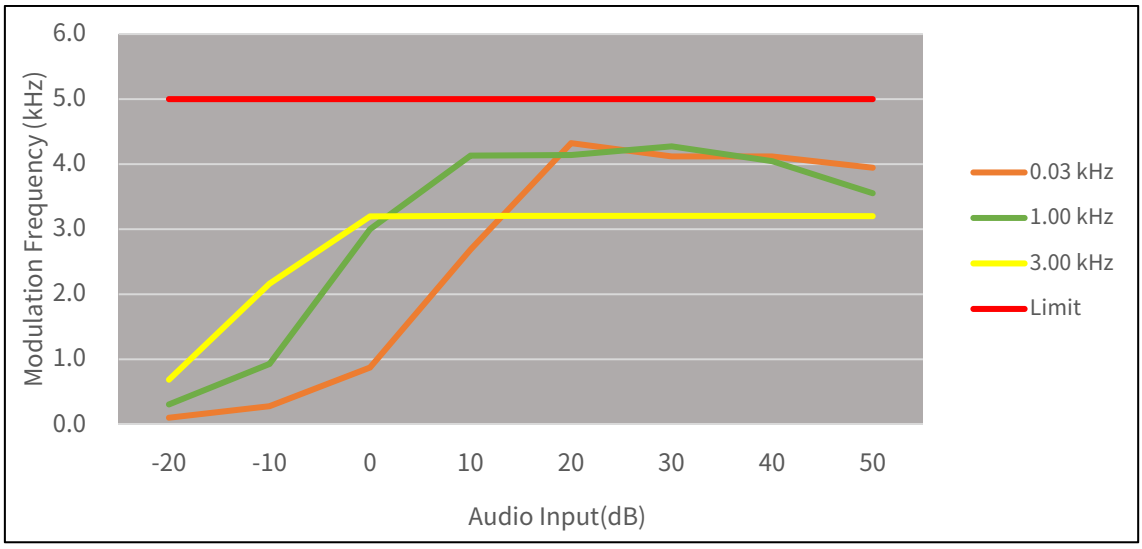


LOW POWER

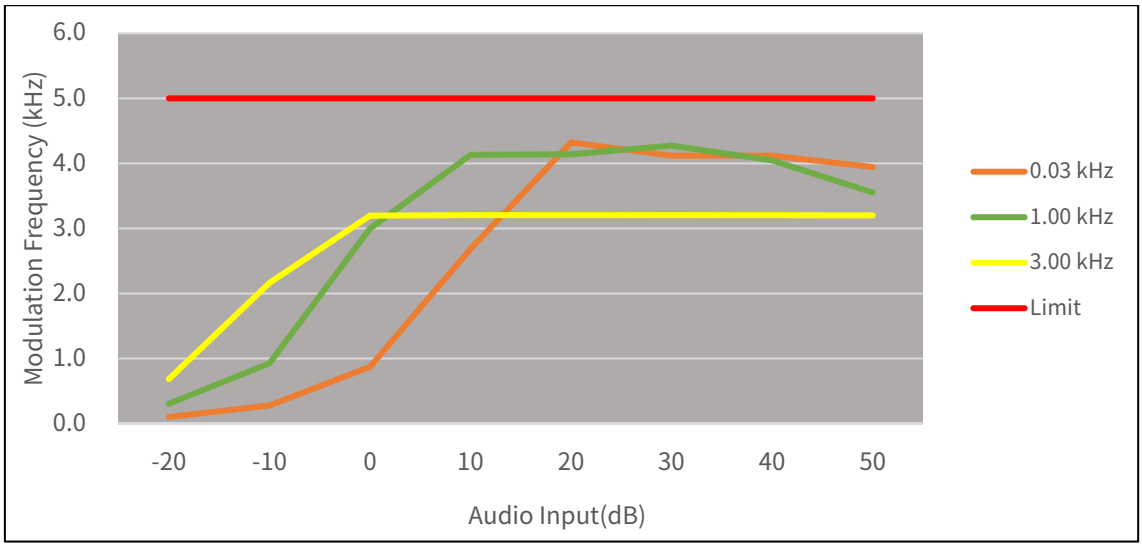
138.05 MHz



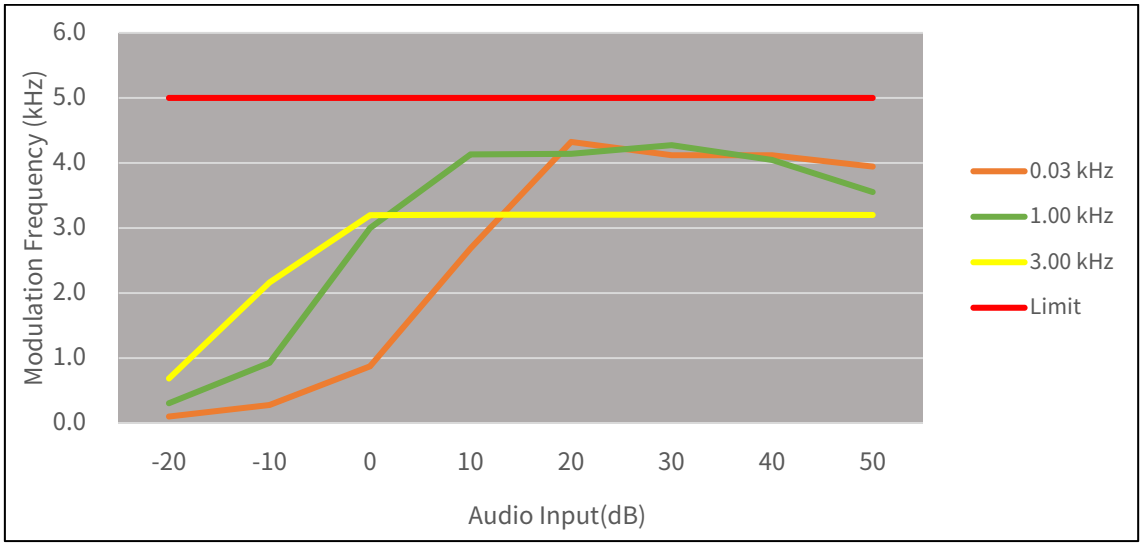
150.05 MHz



162.05 MHz



173.95 MHz

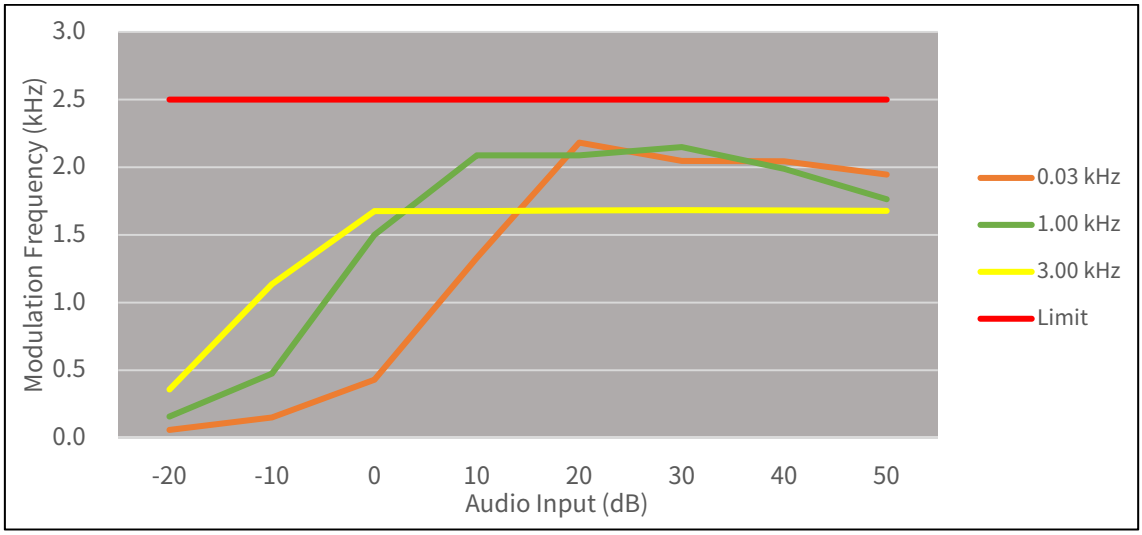


▣ TEST RESULTS(11K0F3E)

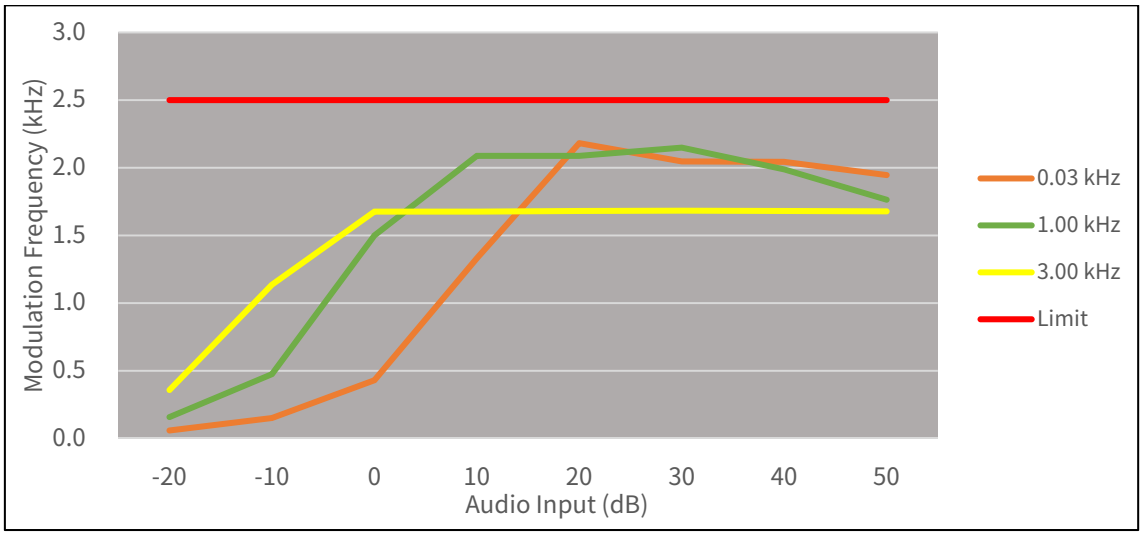
Positive Peaks

HIGH POWER

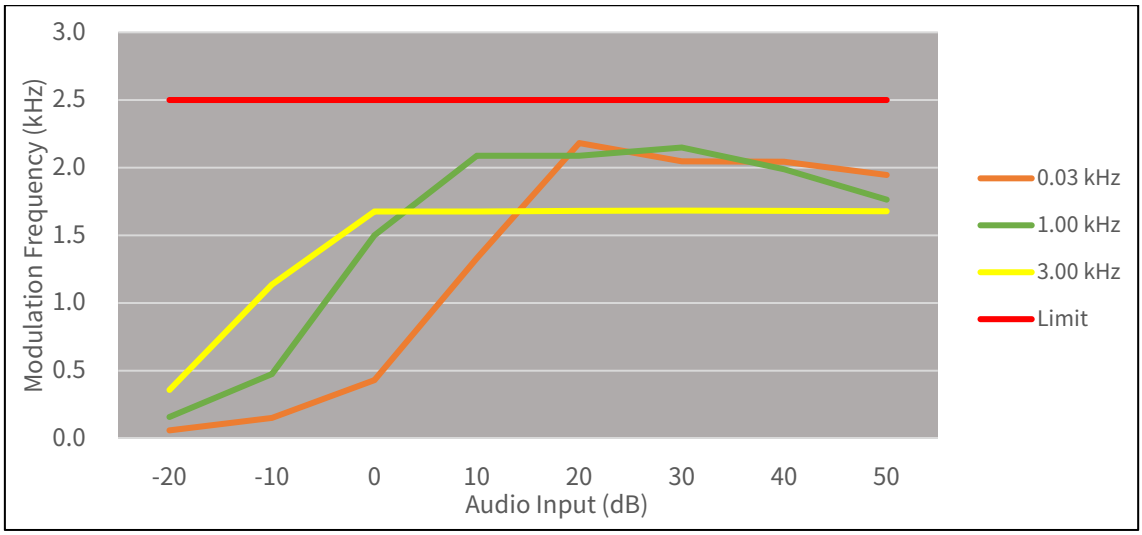
138.05 MHz



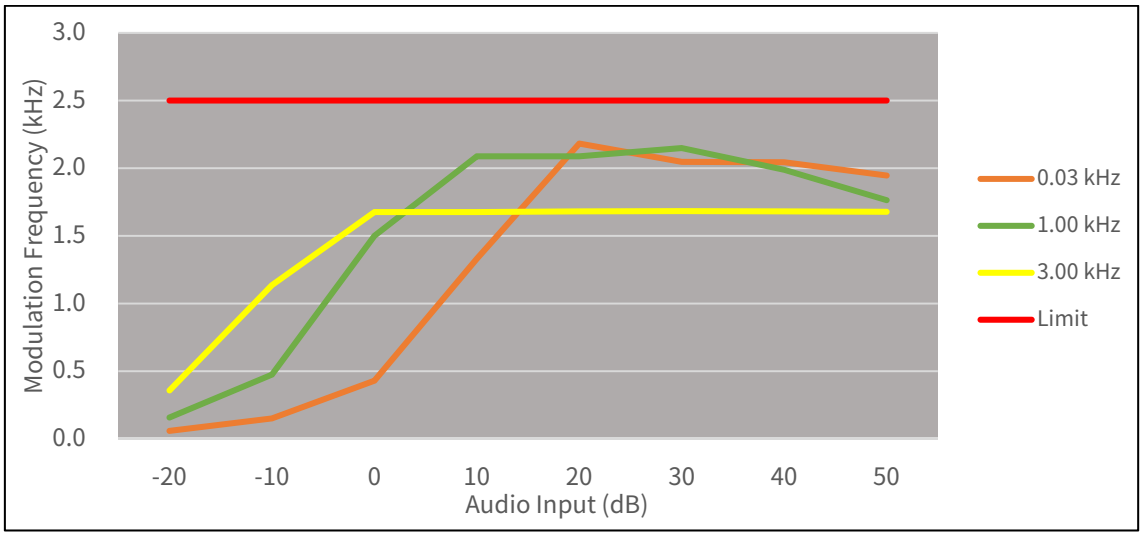
150.05 MHz



162.05 MHz

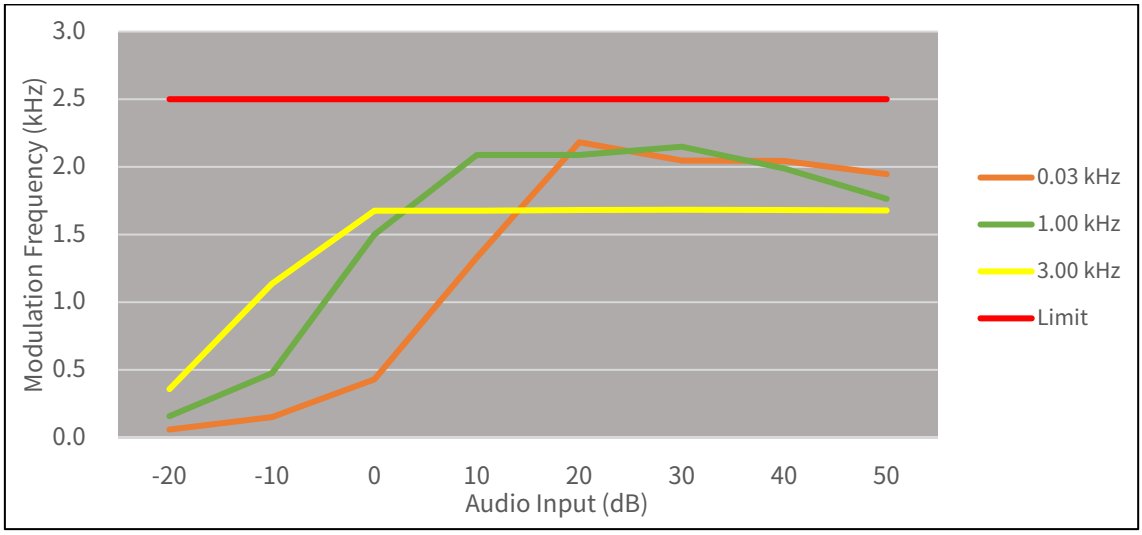


173.95 MHz

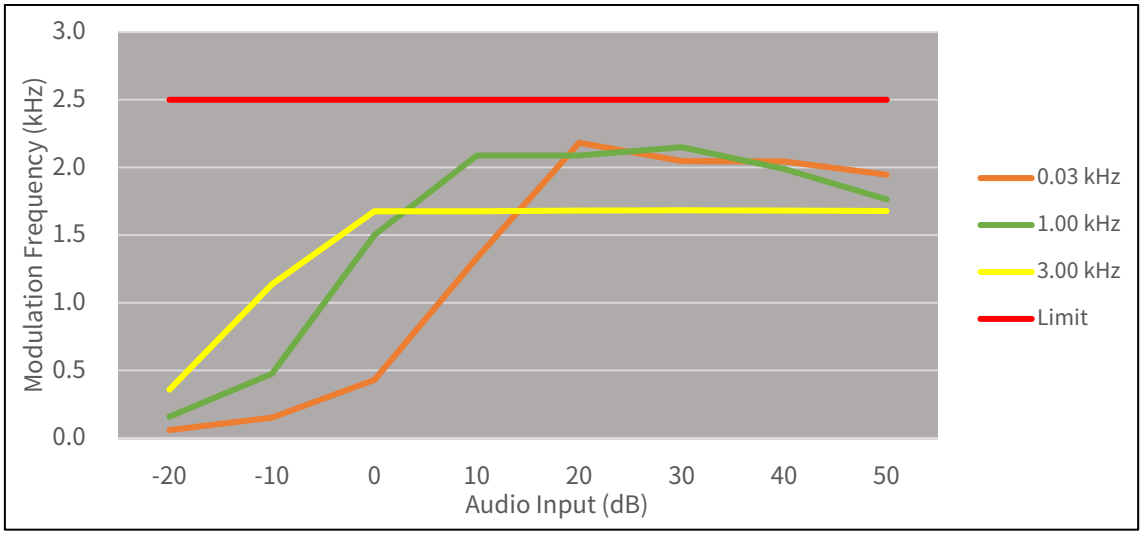


LOW POWER

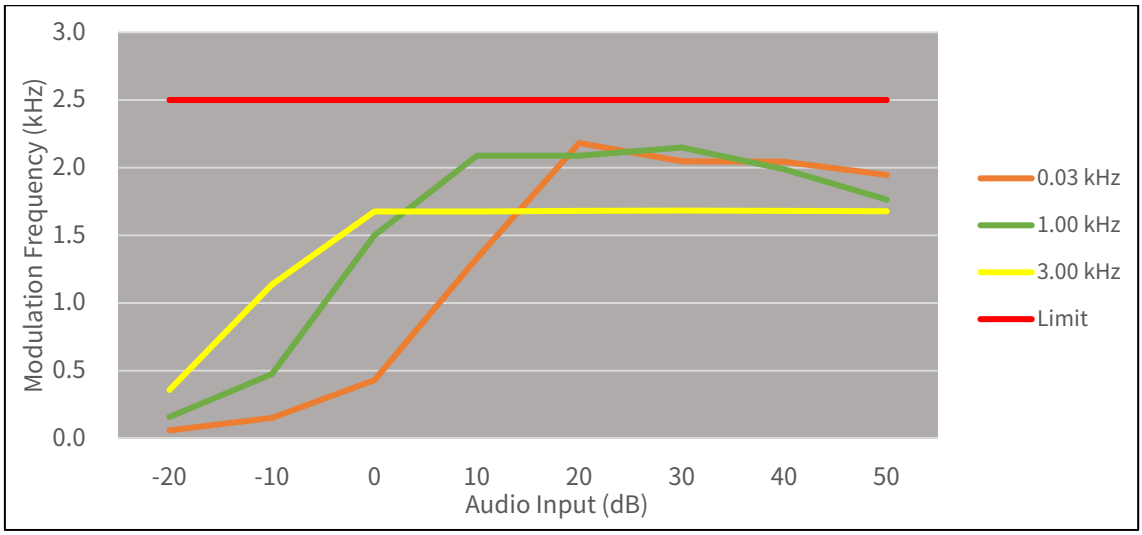
138.05 MHz



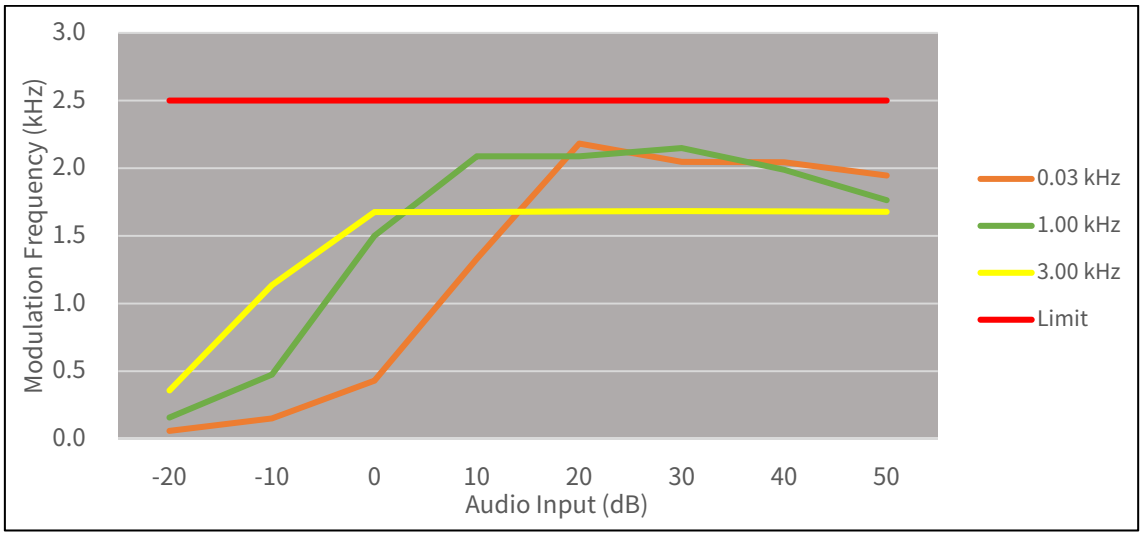
150.05 MHz



162.05 MHz



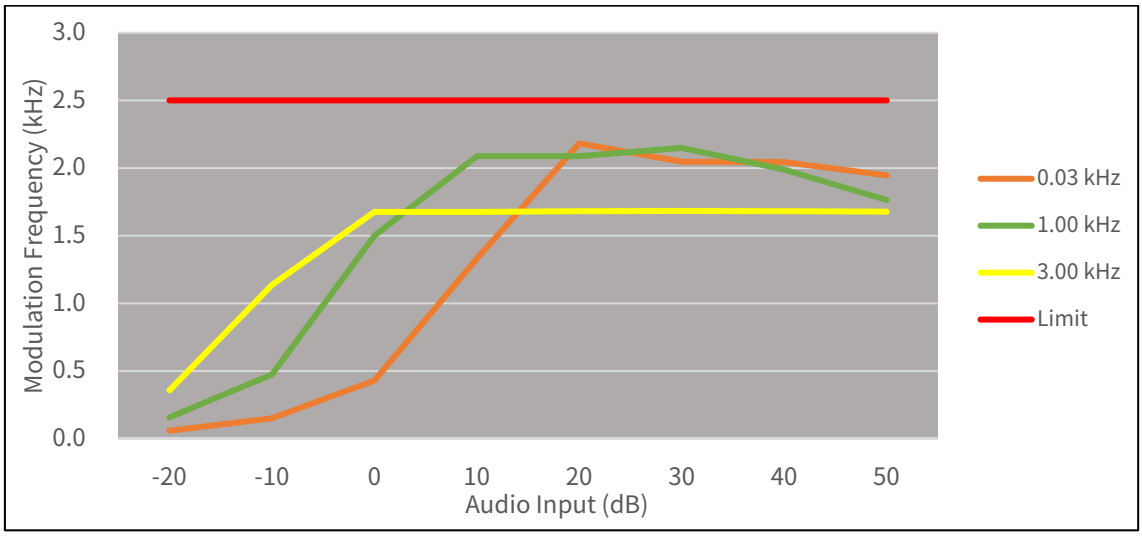
173.95 MHz



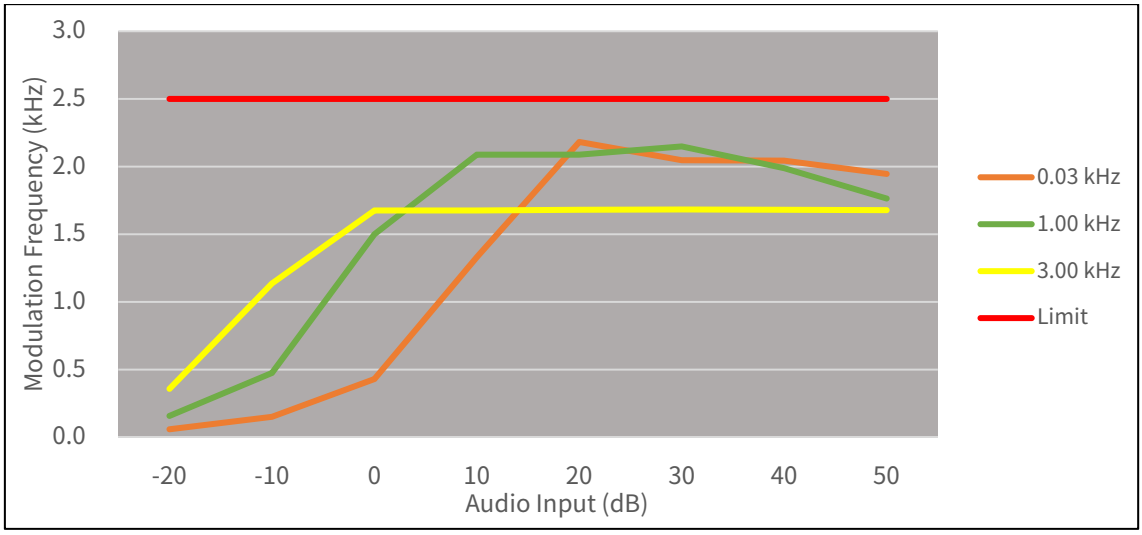
Negative Peaks

HIGH POWER

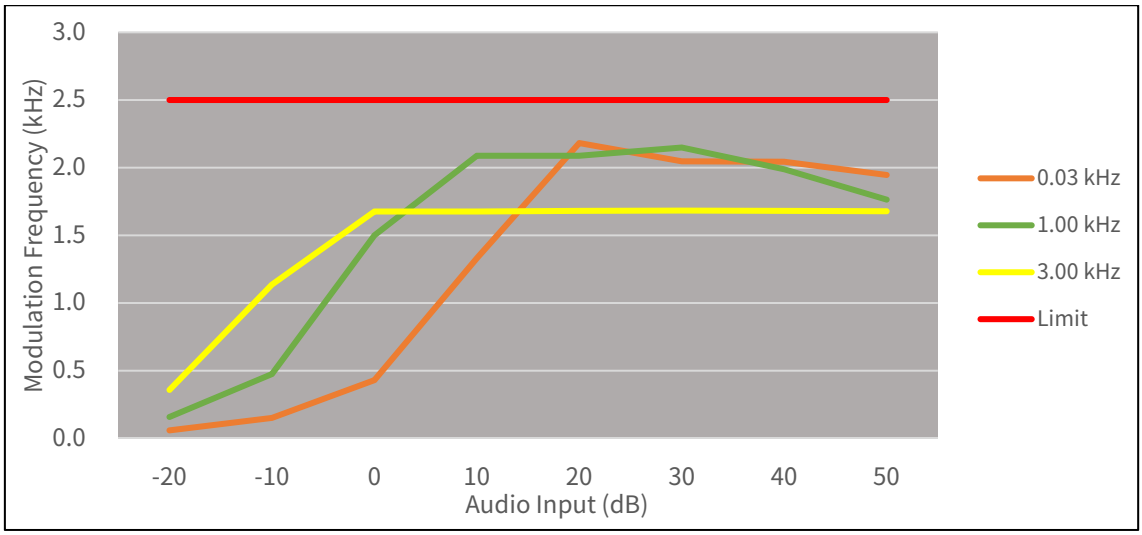
138.05 MHz



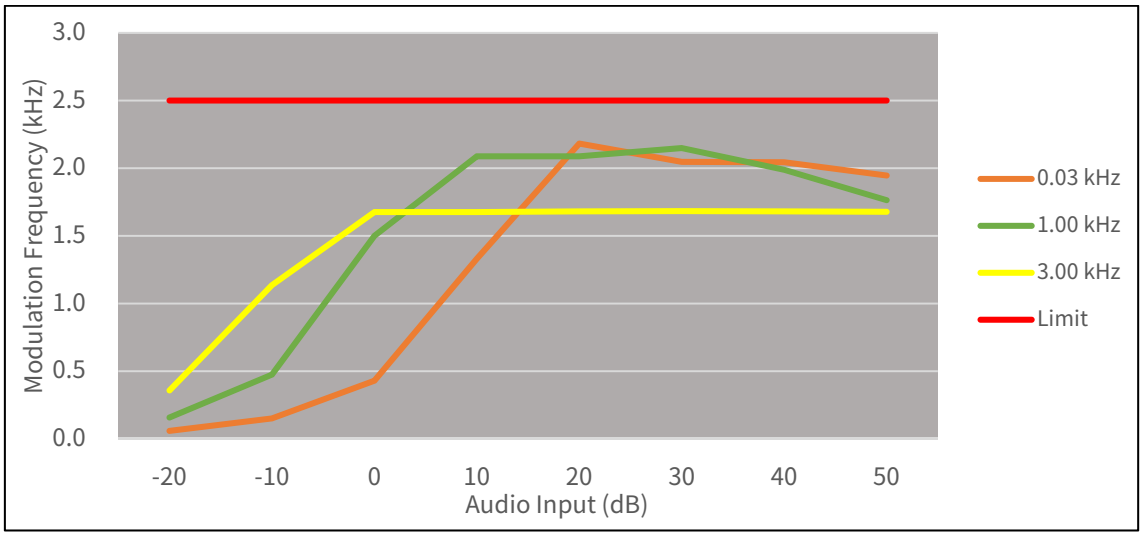
150.05 MHz



162.05 MHz

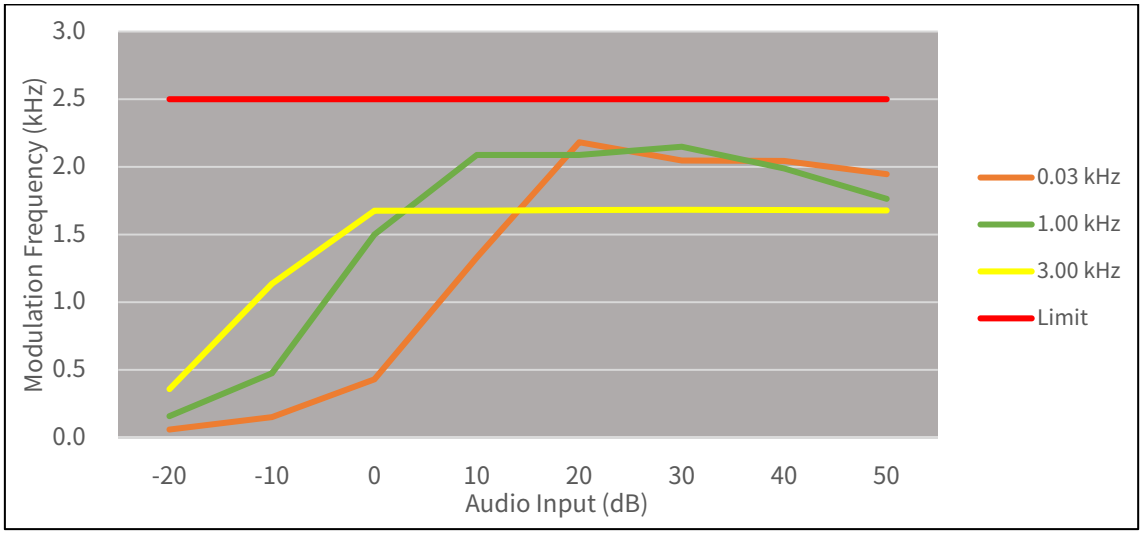


173.95 MHz

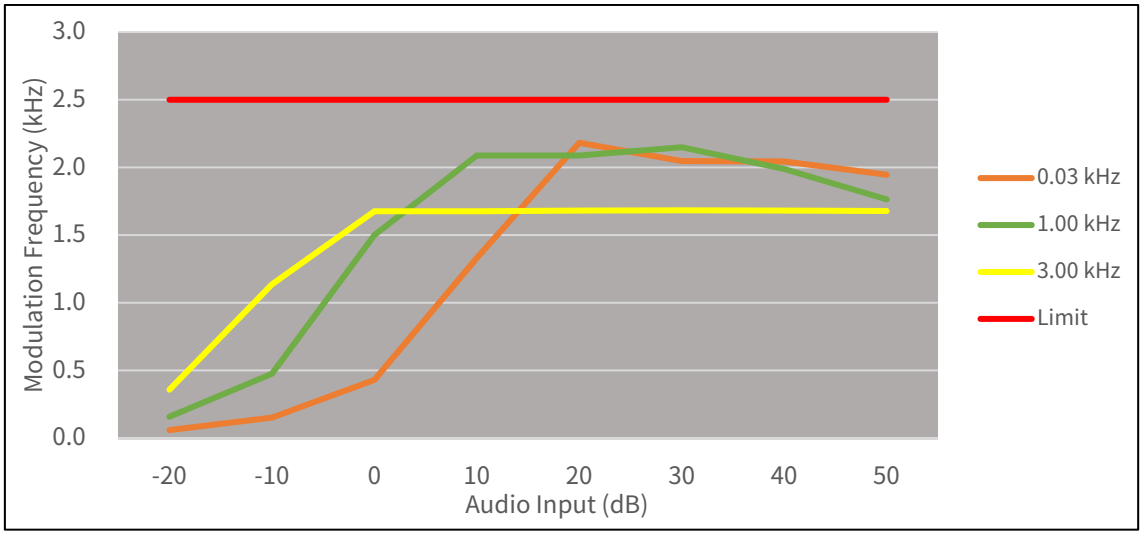


LOW POWER

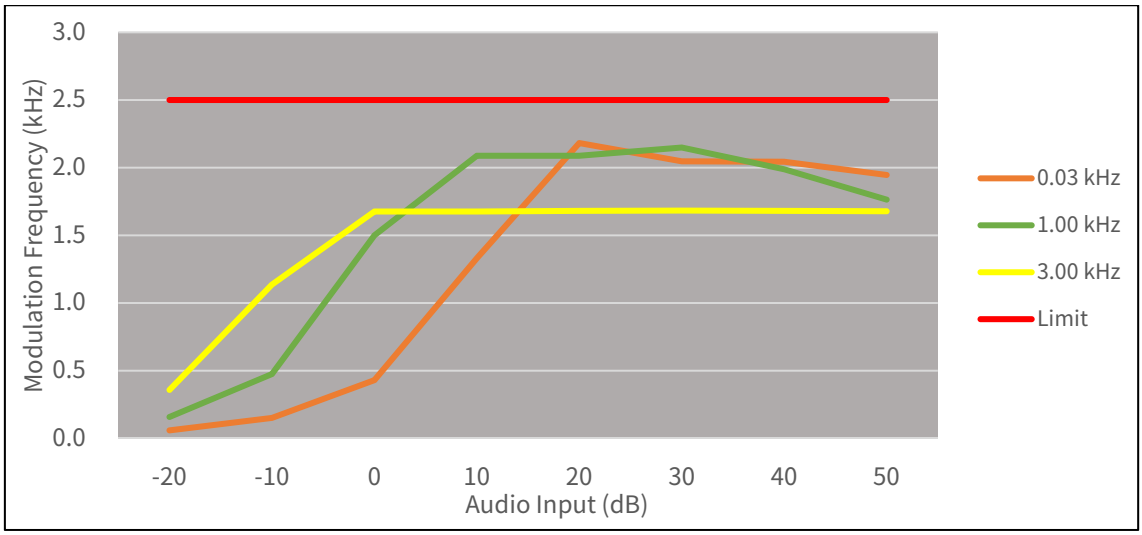
138.05 MHz



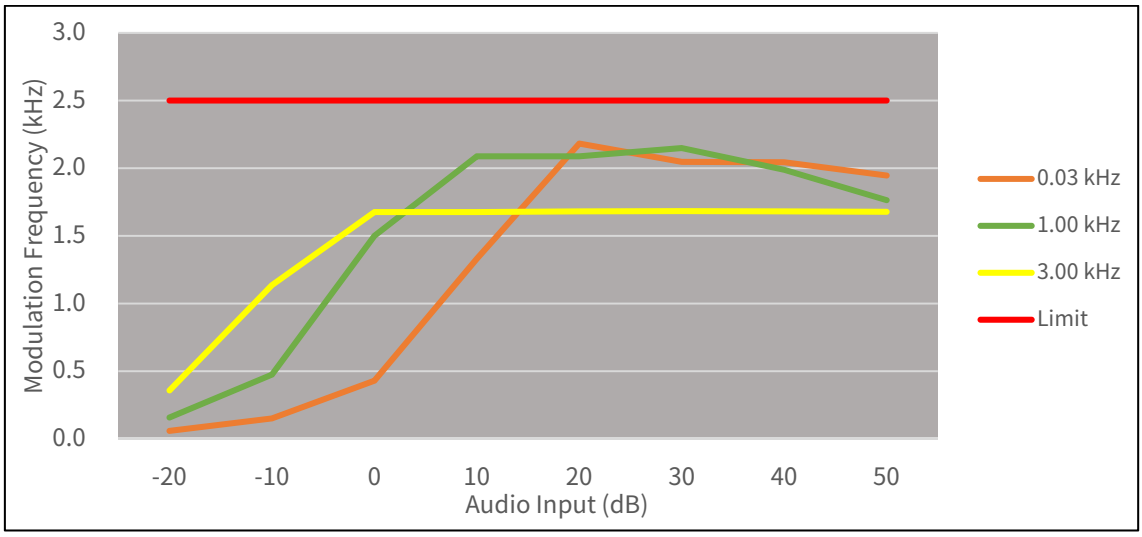
150.05 MHz



162.05 MHz



173.95 MHz

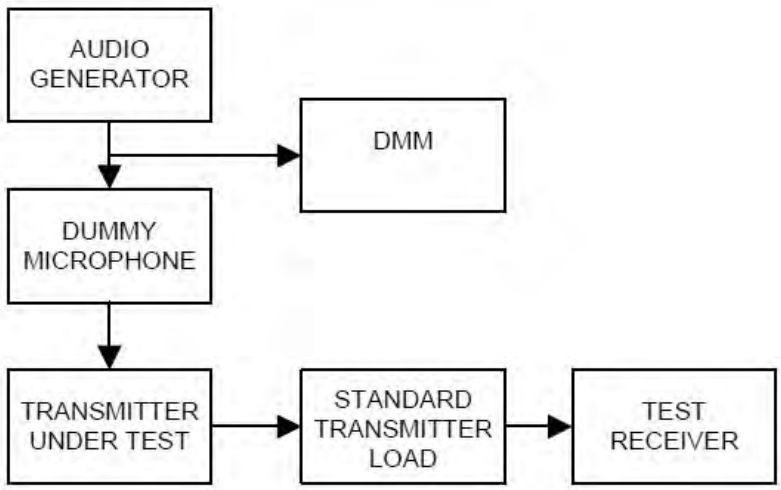


8.5 Audio Frequency Response / Audio Low Pass Filter Response

▣ Definition

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

According to 2.2.6 in TIA-603-E Standard.

a) Connect the equipment as illustrated.

b) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤ 50 Hz to ≥ 15,000 Hz. Turn the de-emphasis function off.

c) Set the DMM to measure rms voltage.

d) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.

e) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.

f) Set the test receiver to measure rms deviation and record the deviation reading.

g) Record the DMM reading as $V_{REF.}$

h) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz.

i) Vary the audio frequency generator output level until the deviation reading that was recorded in step f) is obtained.

j) Record the DMM reading as $V_{FREQ.}$

k) Calculate the audio frequency response at the present frequency as:
audio frequency response = $20 * \log_{10}(V_{FREQ}/V_{REF})$

l) Repeat steps h) through k) for all the desired test frequencies.

Note

Audio Filter of the above result is substituted with the same structure as Audio Frequency Response.

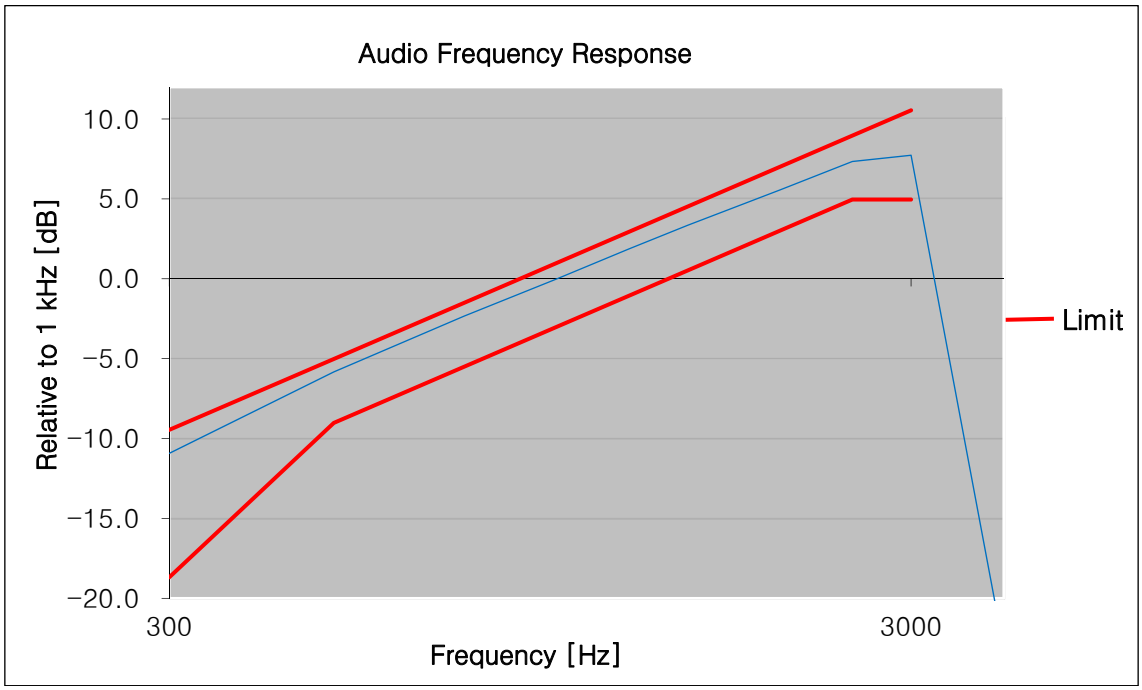
On the transmission condition below 3kHz, Transceiver shows pre-emphasis condition of transmission function.

On the transmission condition above 3kHz, Transceiver shows Audio Low Pass Filter.

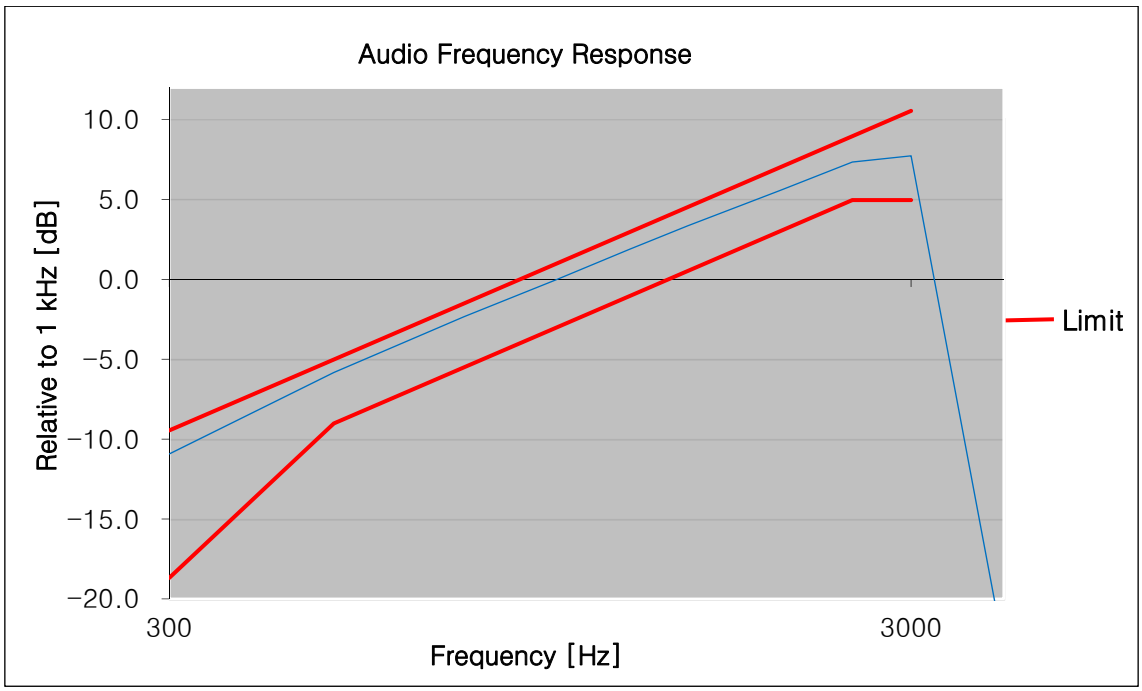
▣ TEST RESULTS (16K0F3E)

HIGH POWER

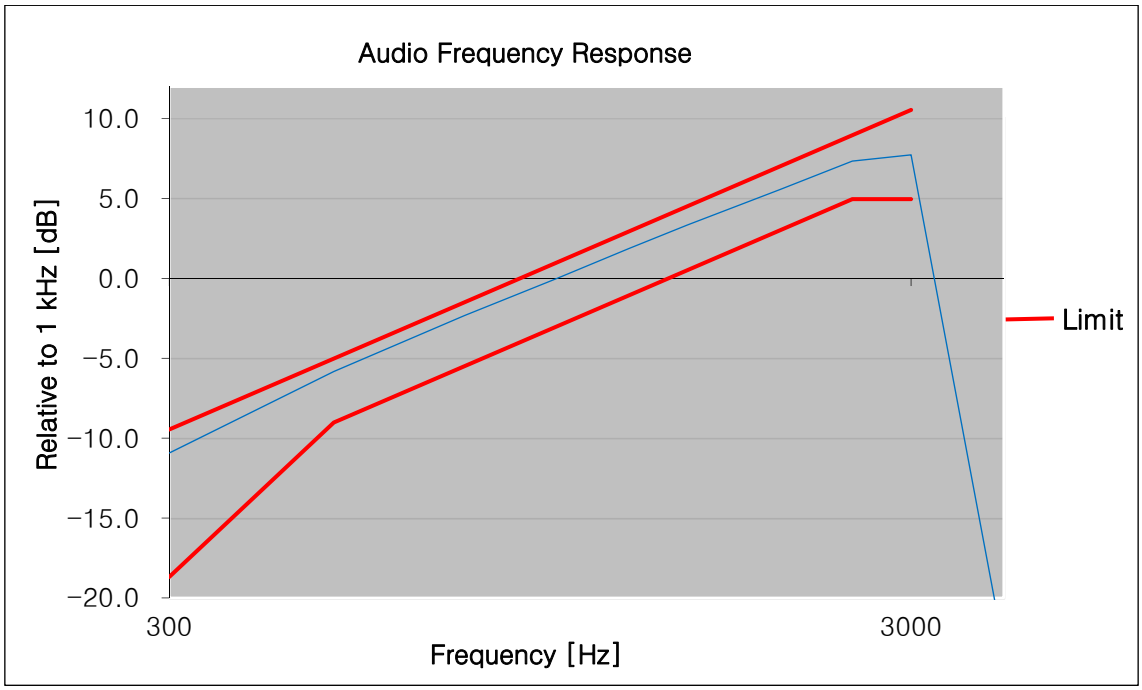
138.05 MHz



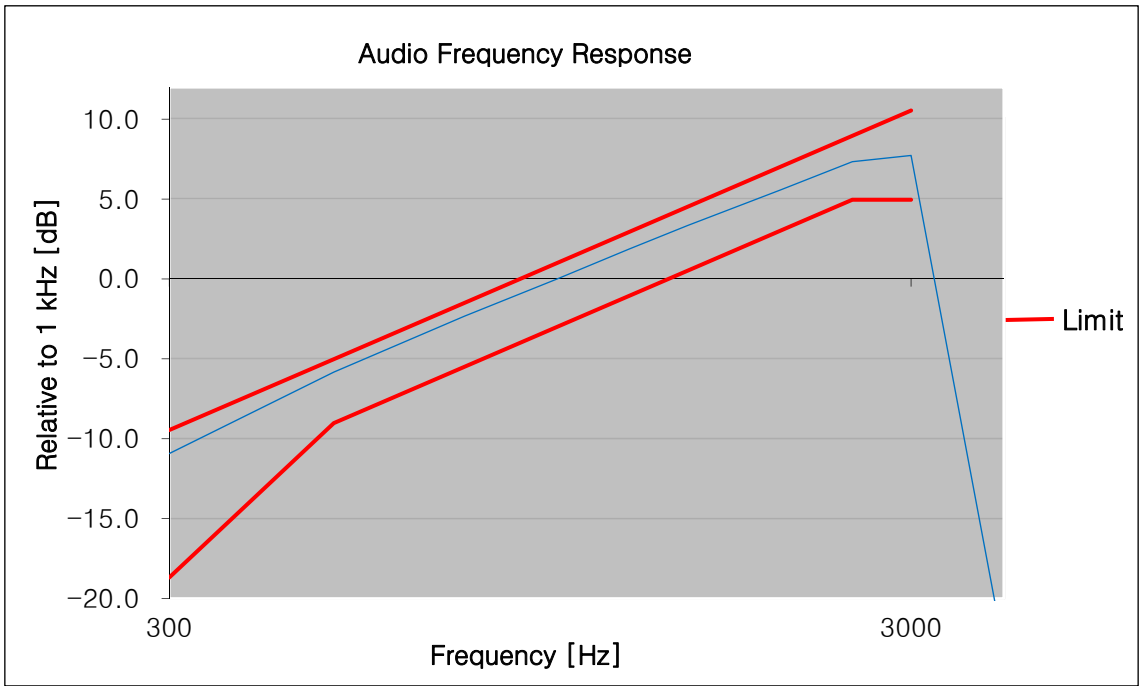
150.05 MHz



162.05 MHz

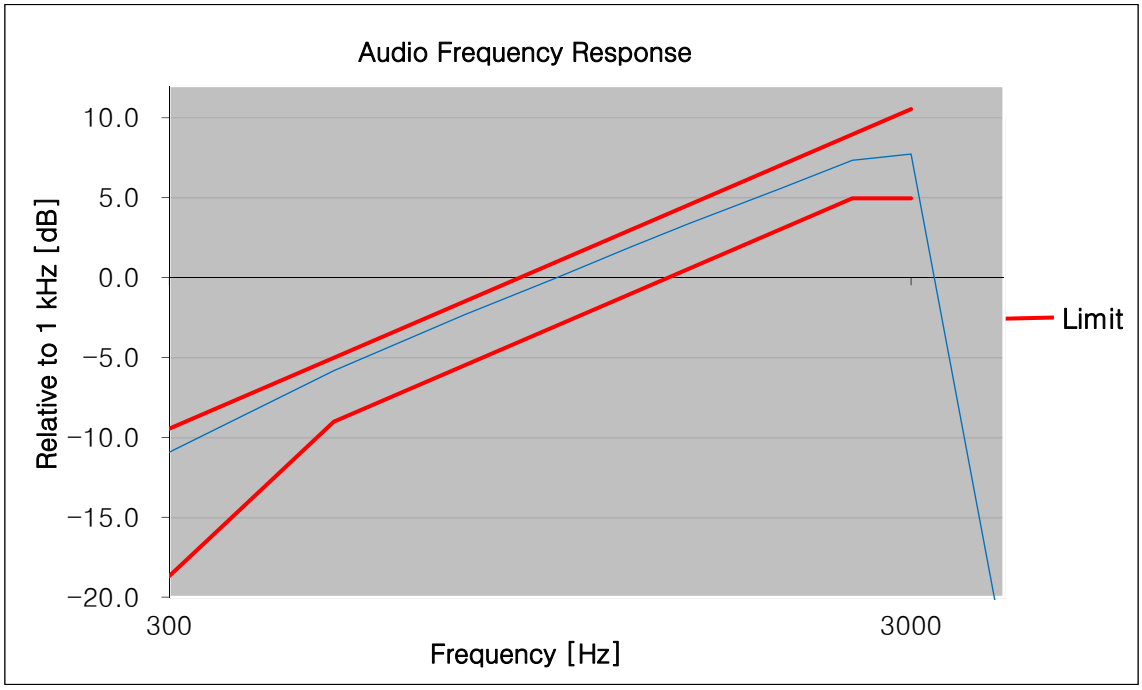


173.95 MHz

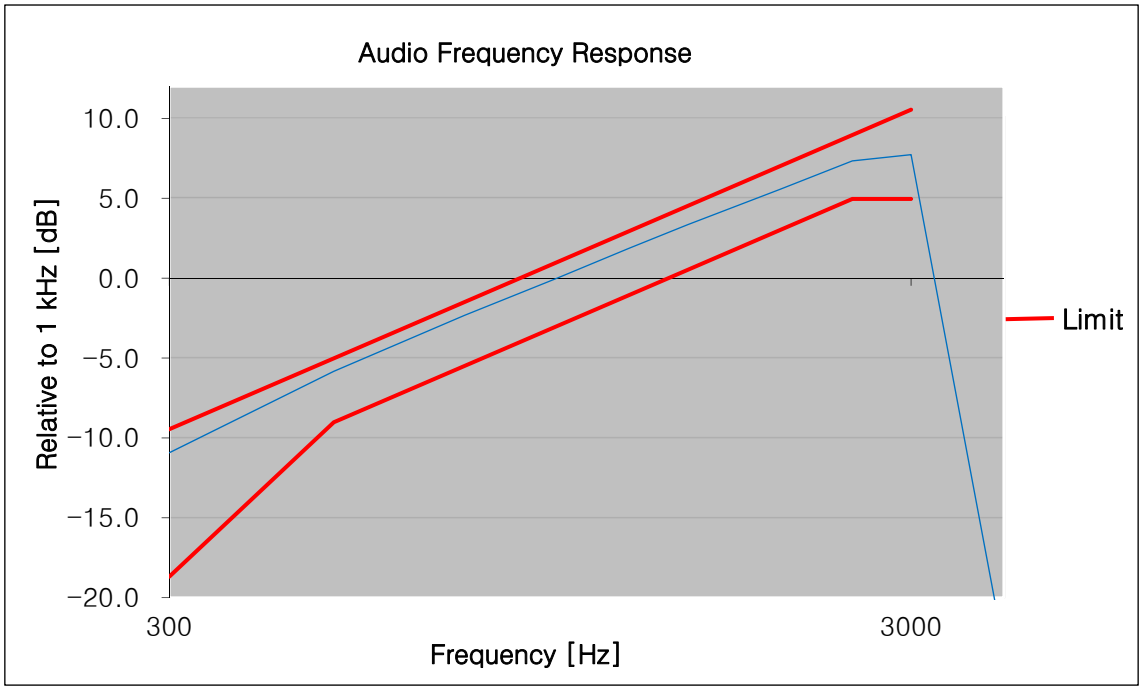


LOW POWER

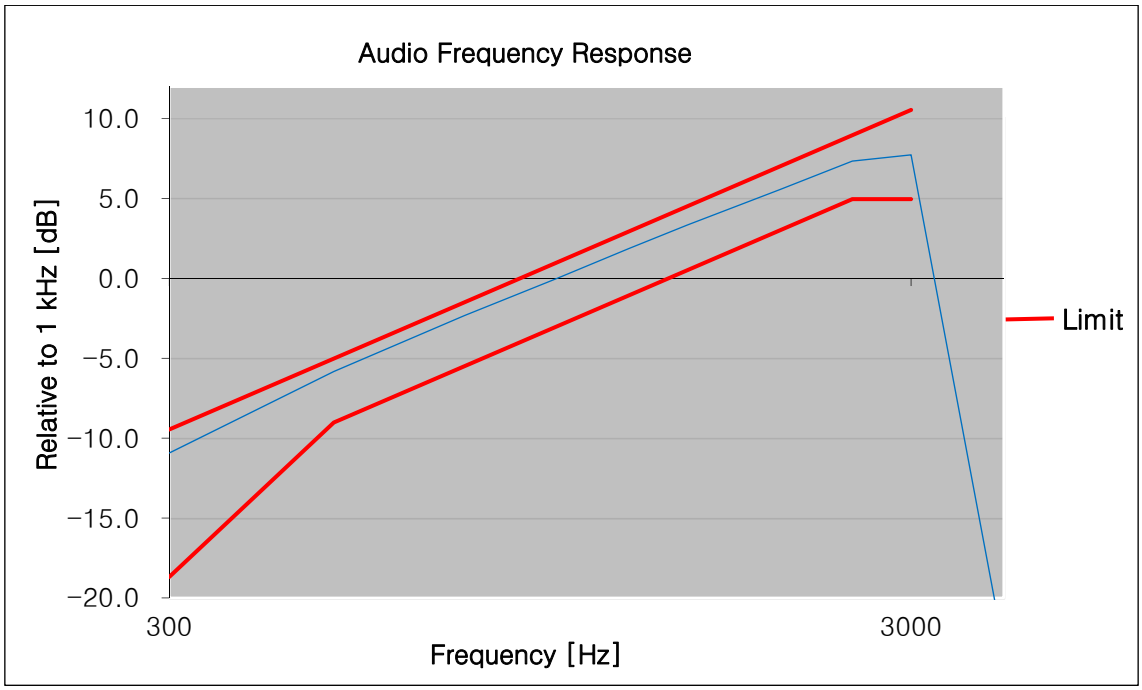
138.05 MHz



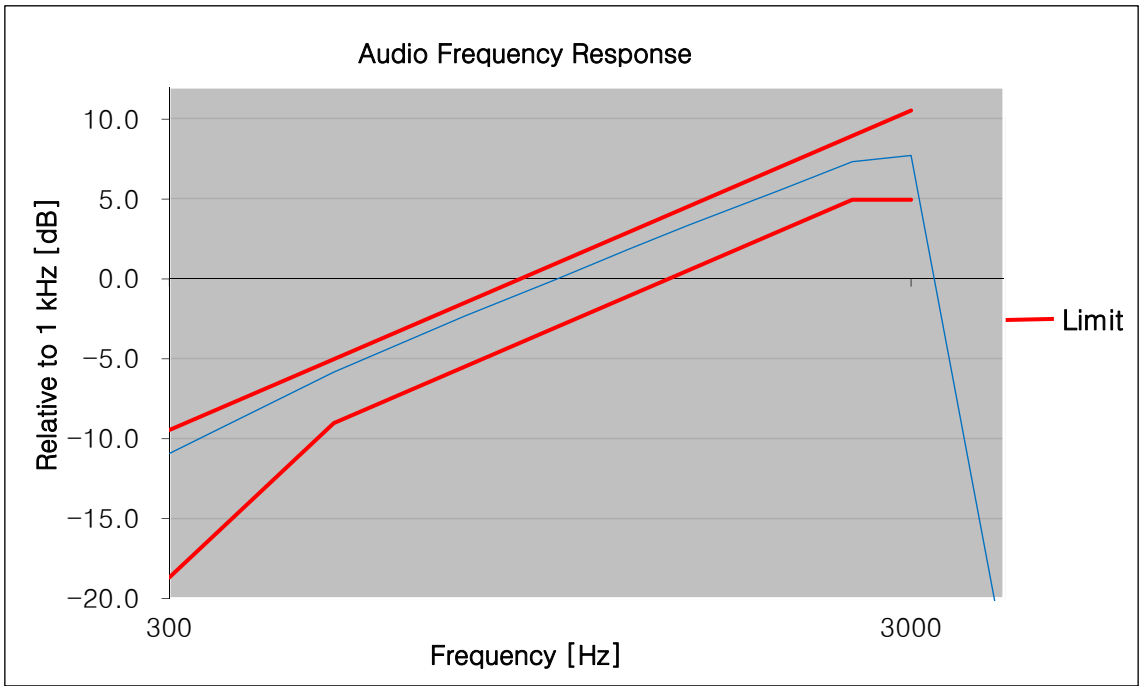
150.05 MHz



162.05 MHz



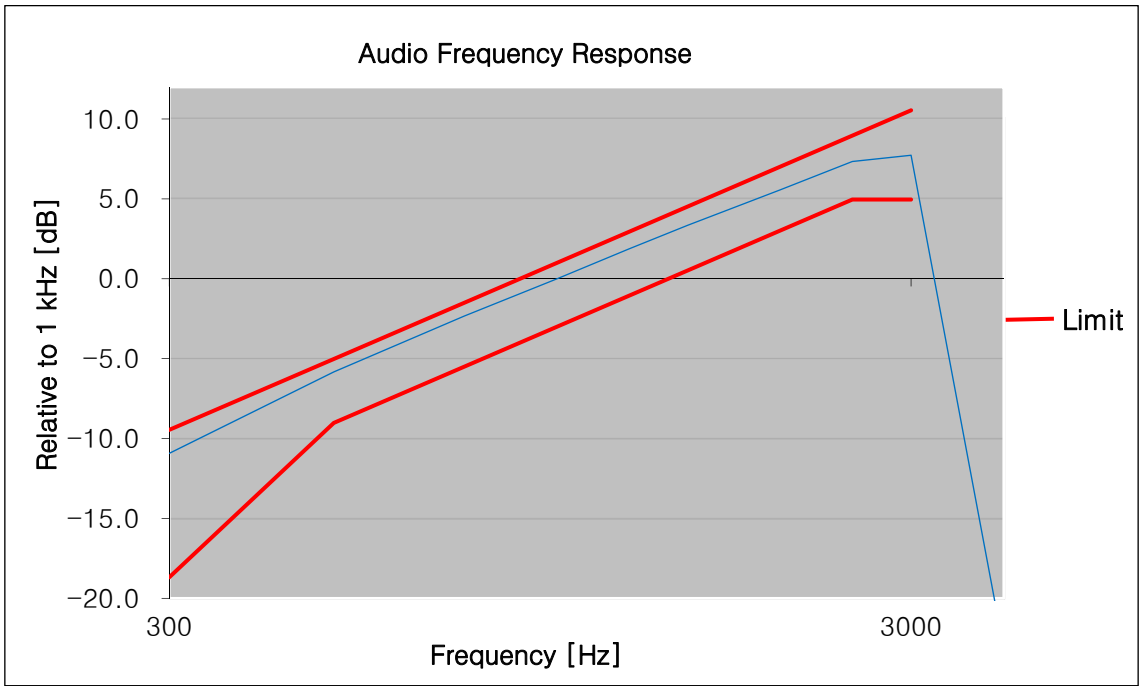
173.95 MHz



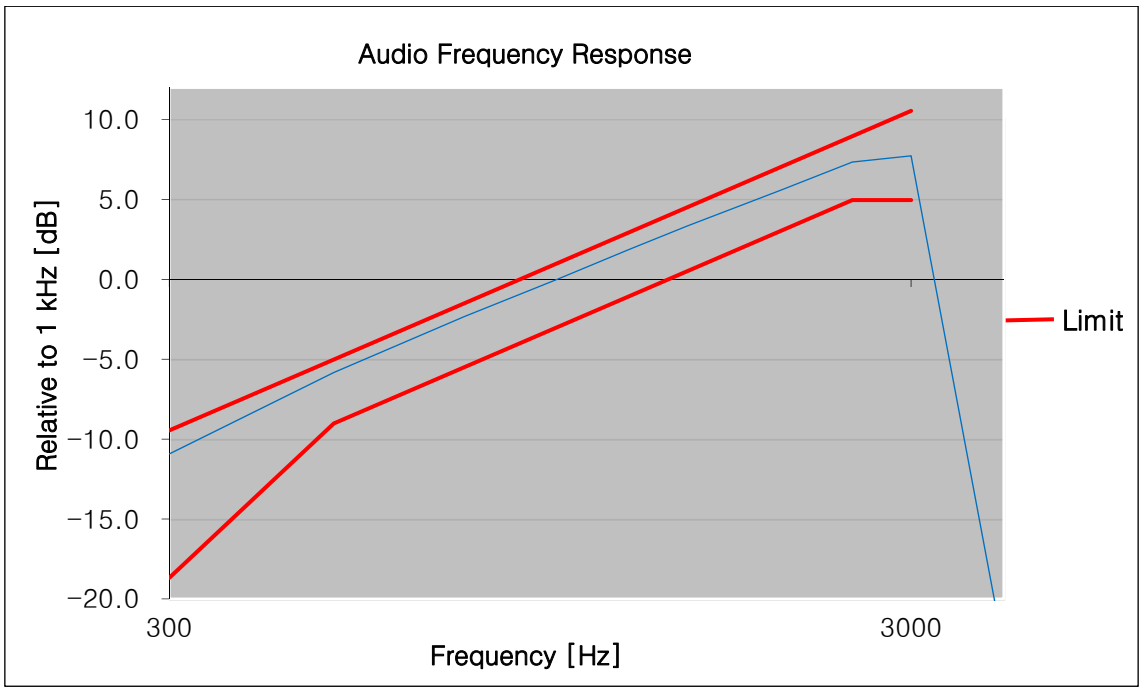
▣ TEST RESULTS (11K0F3E)

HIGH POWER

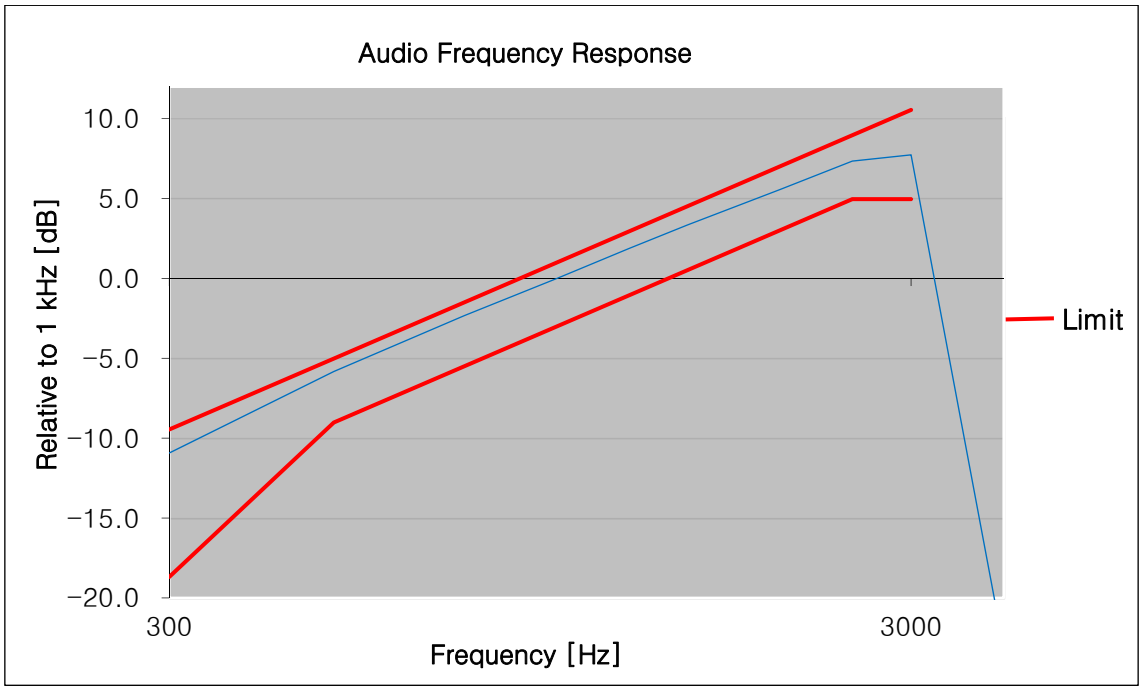
138.05 MHz



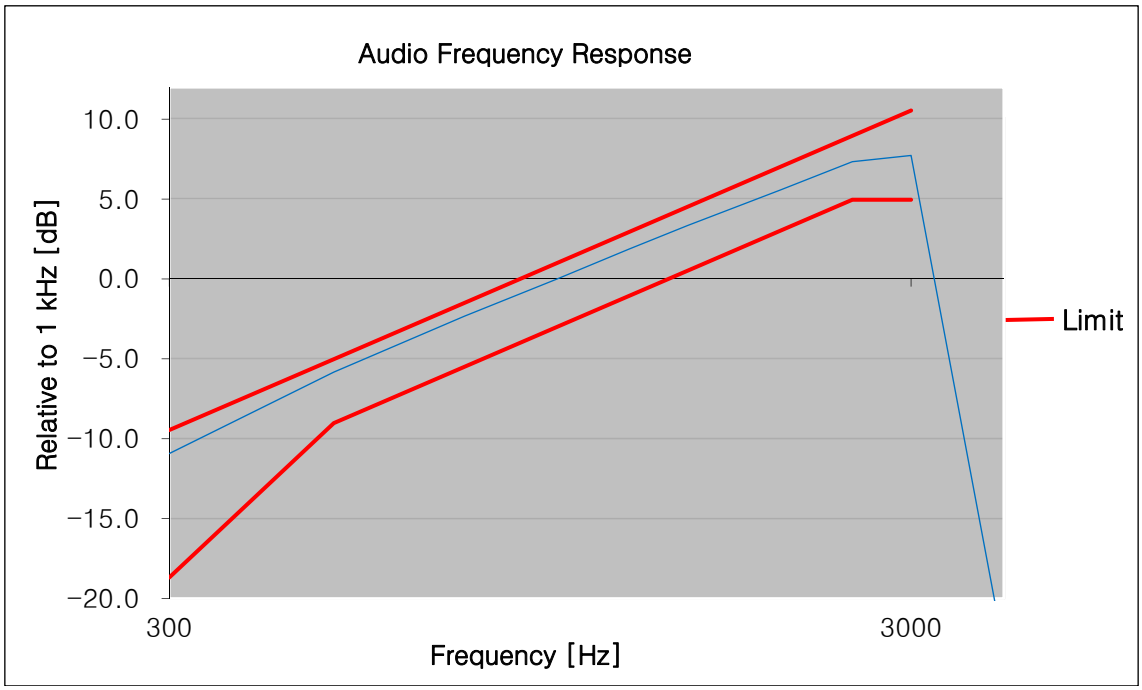
150.05 MHz



162.05 MHz

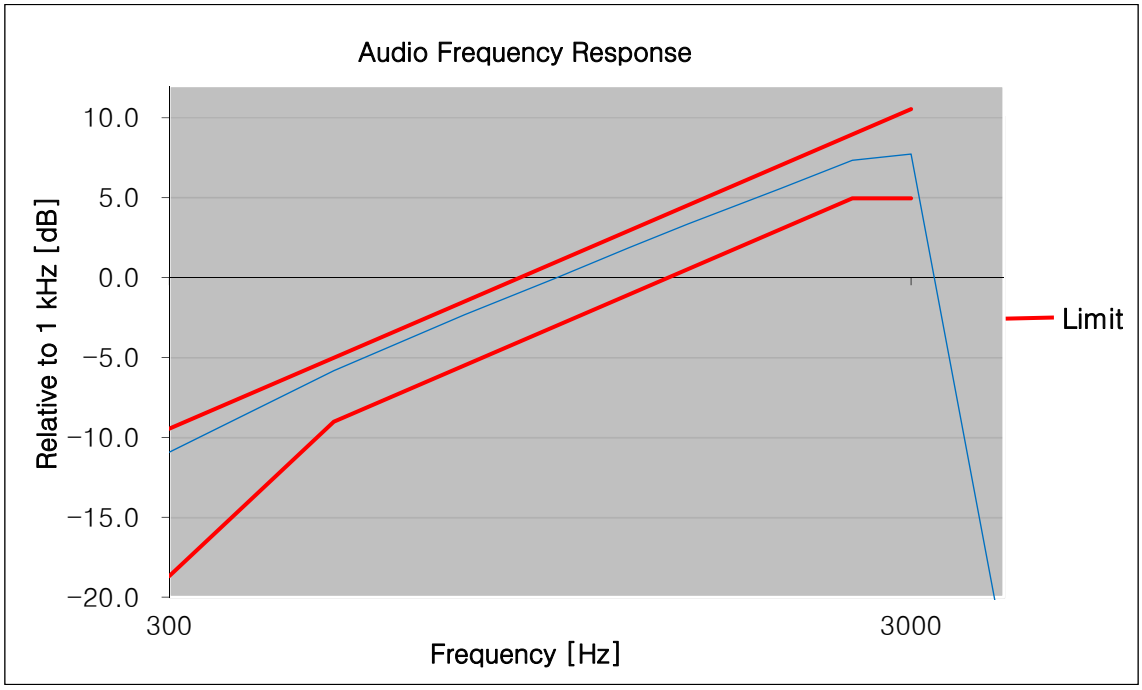


173.95 MHz

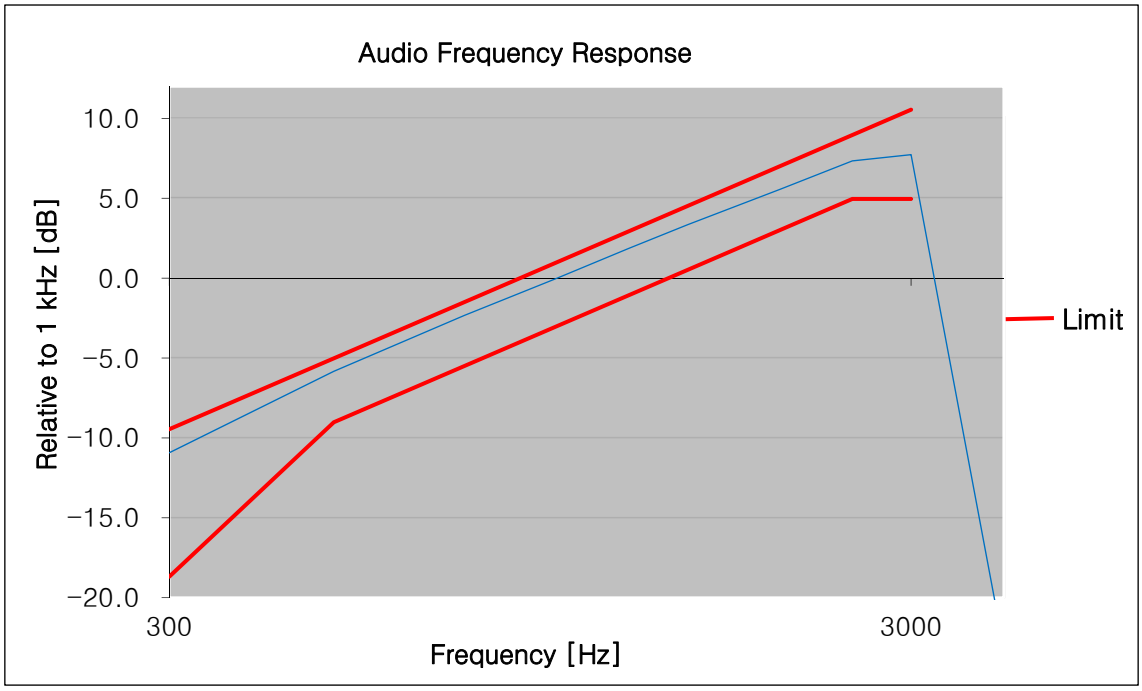


LOW POWER

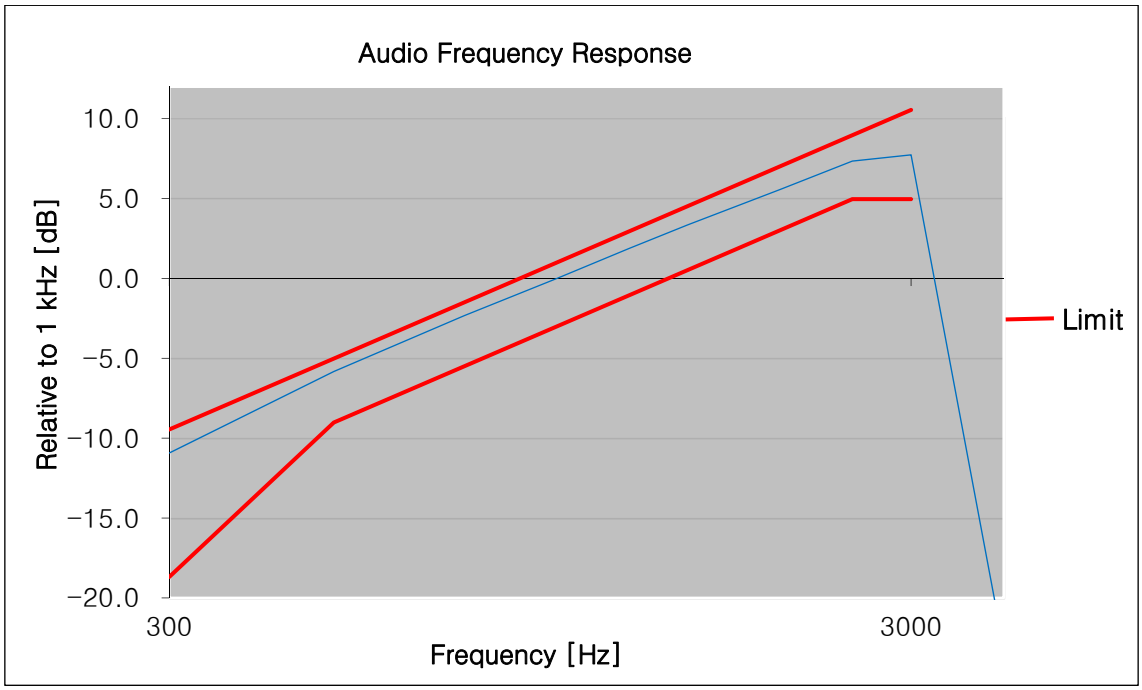
138.05 MHz



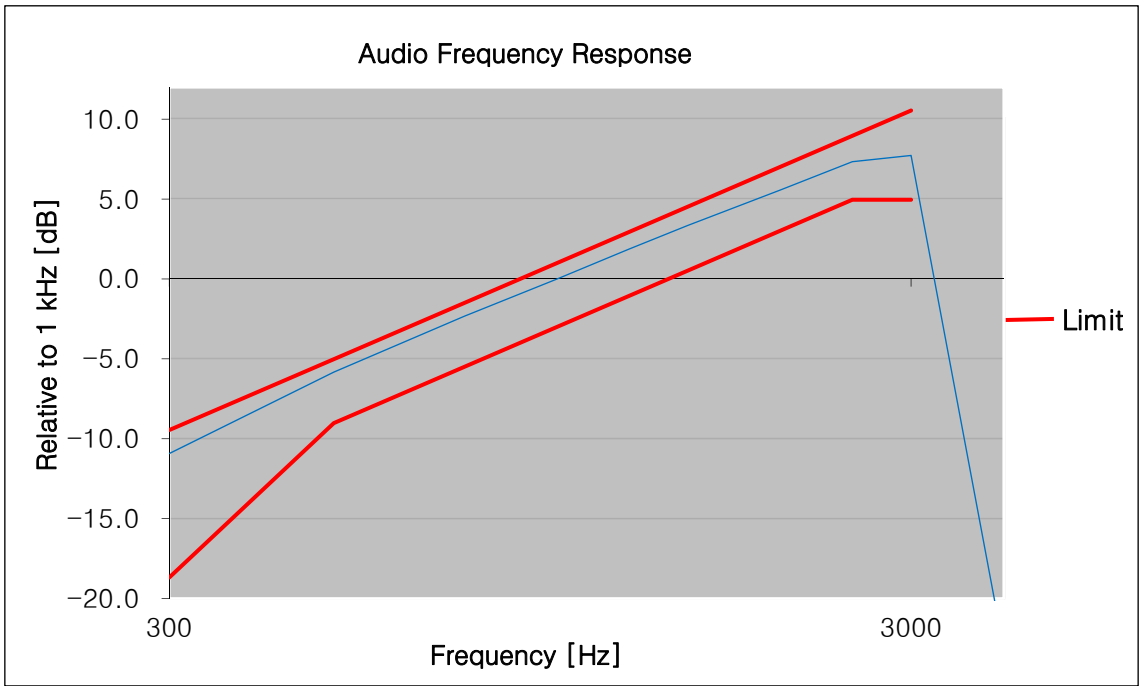
150.05 MHz



162.05 MHz



173.95 MHz

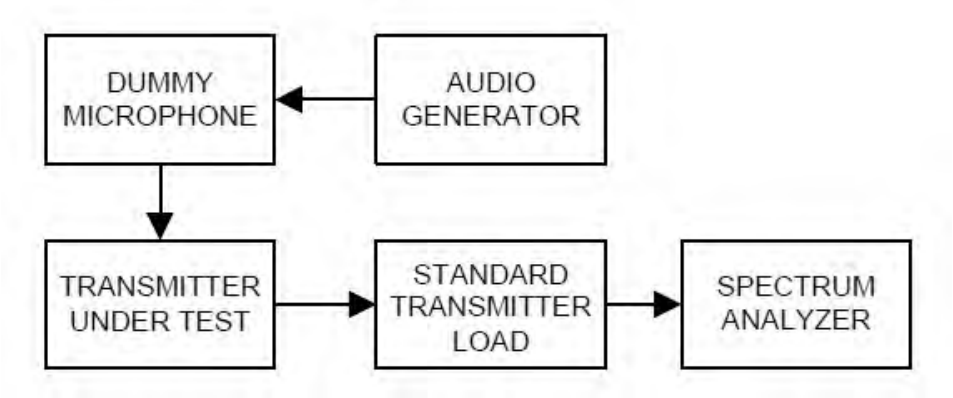


8.6 Emission Mask

▣ Definition

The transmitter sideband spectrum denotes the sideband power produced at a discrete frequency separation from the carrier up to the test bandwidth (see 1.3.4.4) due to all sources of unwanted noise within the transmitter in a modulated condition.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

According to 2.2.11 in TIA-603-E Standard.

a) Connect the equipment as illustrated. Use the table to determine the spectrum analyzer resolution bandwidth:

Spectrum Analyzer Resolution Bandwidth

Frequency Band (MHz)	Mask for Equipment with Audio Low Pass Filter	Mask for Equipment without Low Pass Filter	Spectrum Analyzer Resolution Bandwidth (Hz)
25-50	B	C	300
72-76	B	C	300
138-174	NTIA	NTIA	300
150-174	B	C	300
150-174	D or E	D or E	100
406-420	NTIA	NTIA	300
421-512	B	C	300
421-512	D or E	D or E	100
806-821/851-866	B or EA	G or EA	300
821-824/866-869	B	H	300
896-901/935-940	I	J	300

b) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth per the above table

2) Video Bandwidth at least 10 times the resolution bandwidth.

3) Sweep Speed slow enough to maintain measurement calibration.

4) Detector Mode = Positive Peak.

5) Span that will allow proper viewing of the test bandwidth (see 1.3.4.4).

c) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0 dB reference for the measurement.

d) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulating circuit. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.

e) Record the resulting spectrum analyzer presentation of the emission level with an on-line recording device or in a photograph. It is recommended that the emission limit (as given in 3.2.11) be drawn on the plotted graph or photograph. The spectrum analyzer presentation is the sideband spectrum.

▣ Plots of Emission Mask

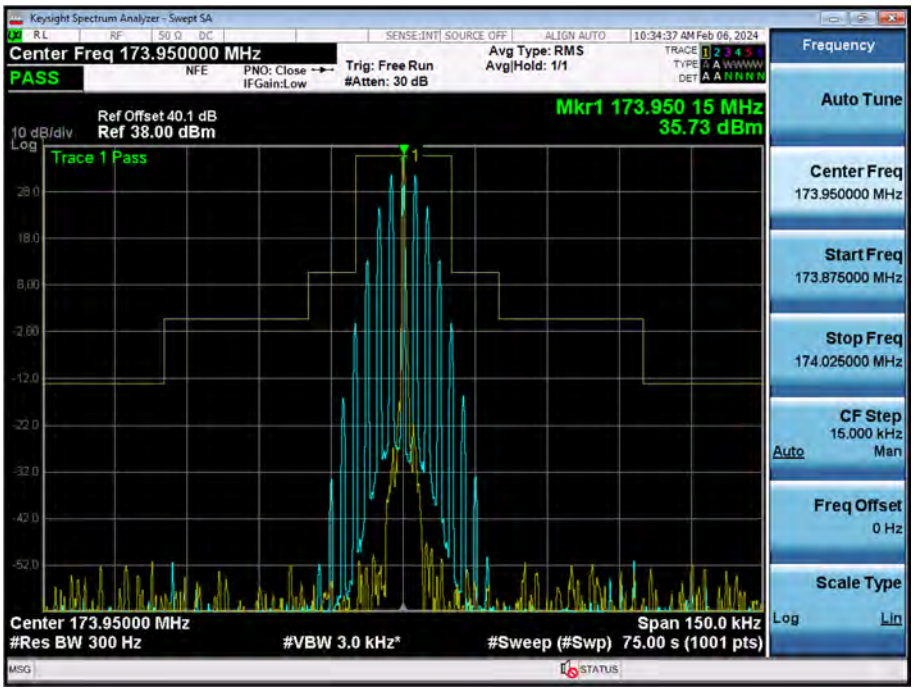
16K0F3E

(138.05 MHz)_High

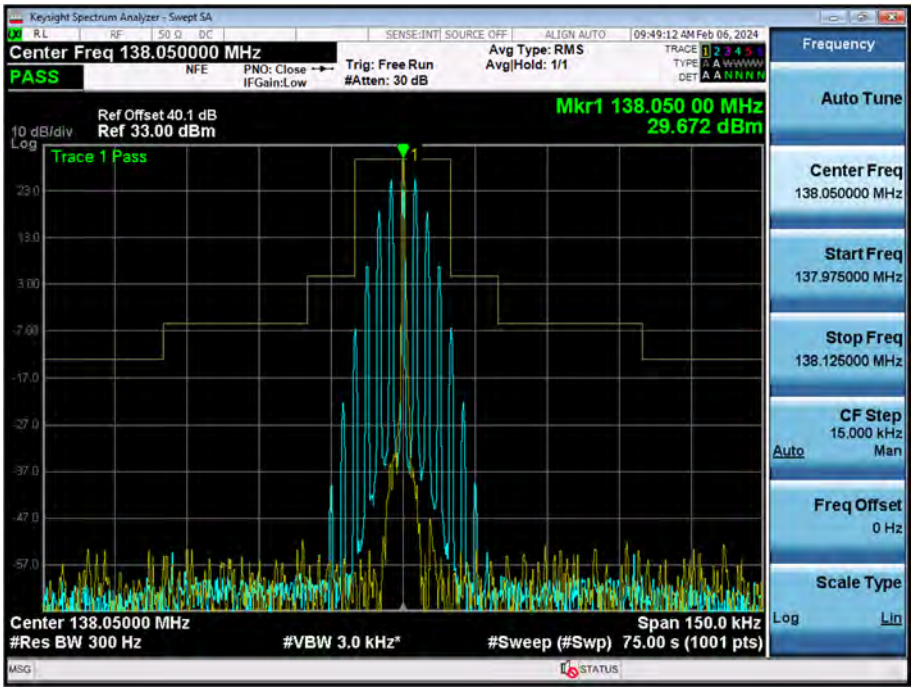
(150.05 MHz)_High

(162.05 MHz)_High

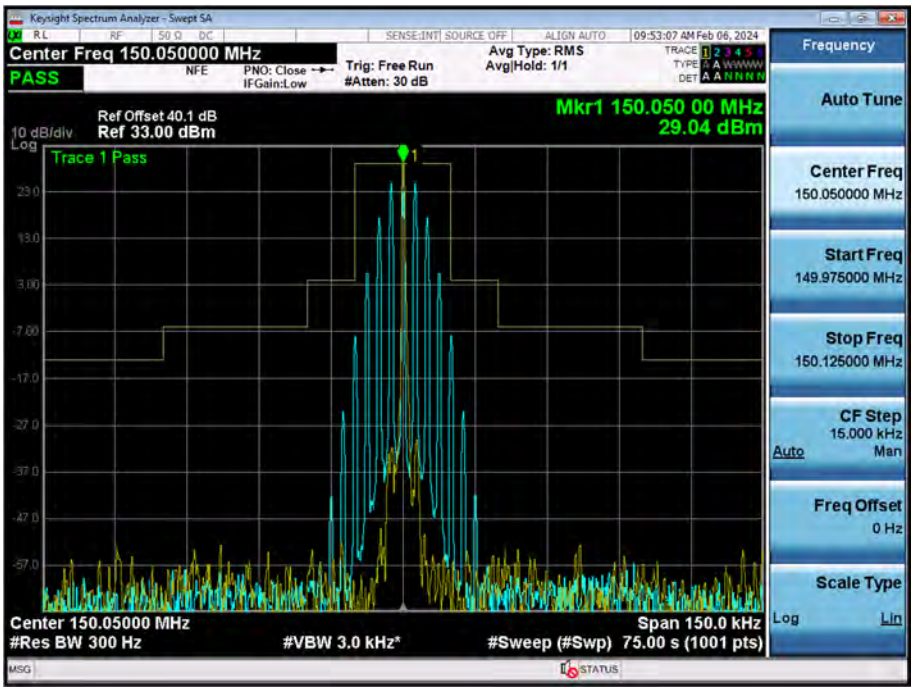
(173.95 MHz)_High



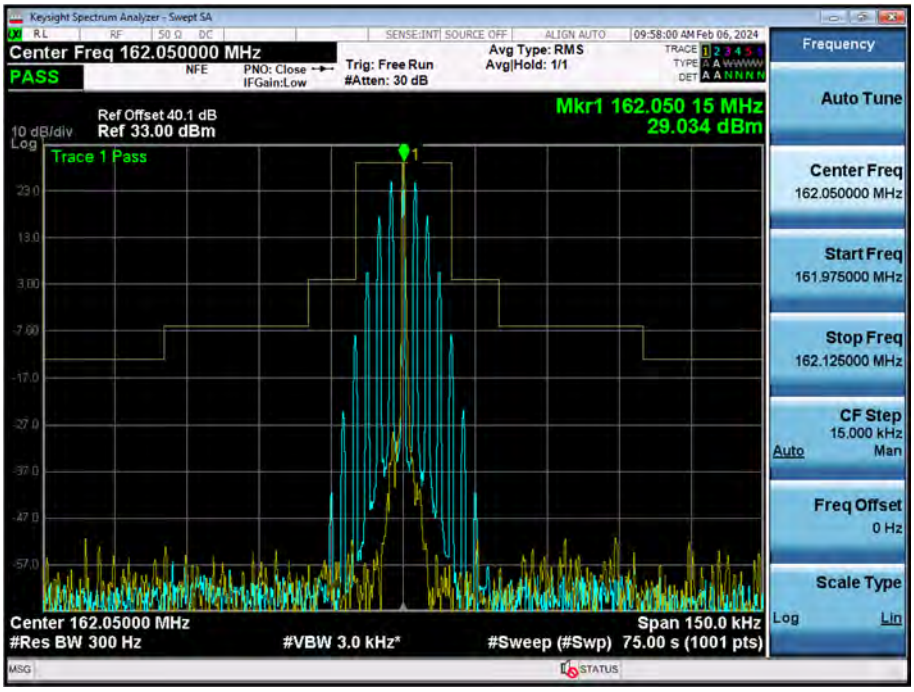
(138.05 MHz) _ Low



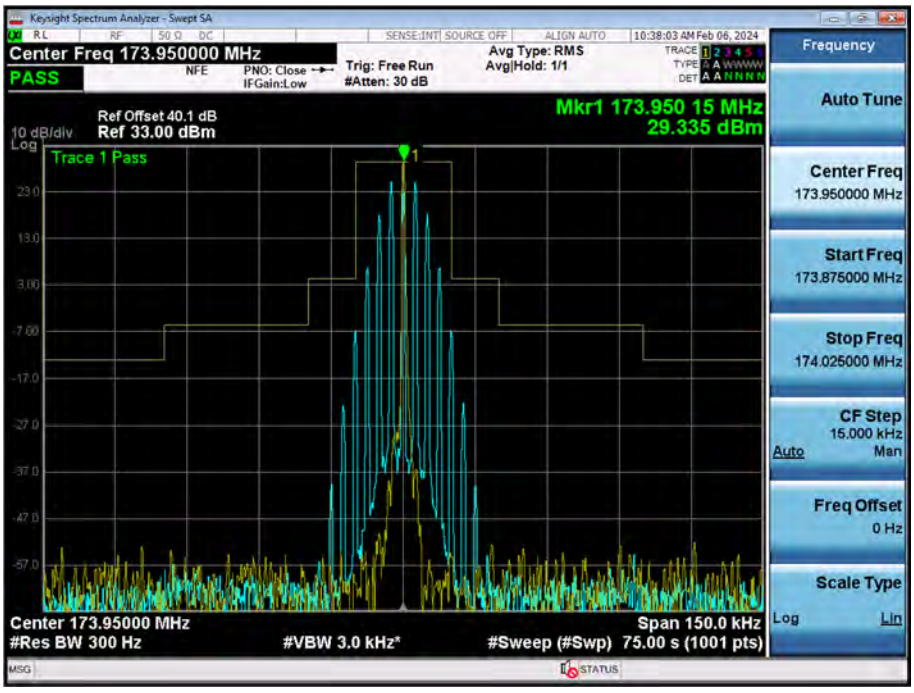
(150.05 MHz)_ Low



(162.05 MHz)_ Low

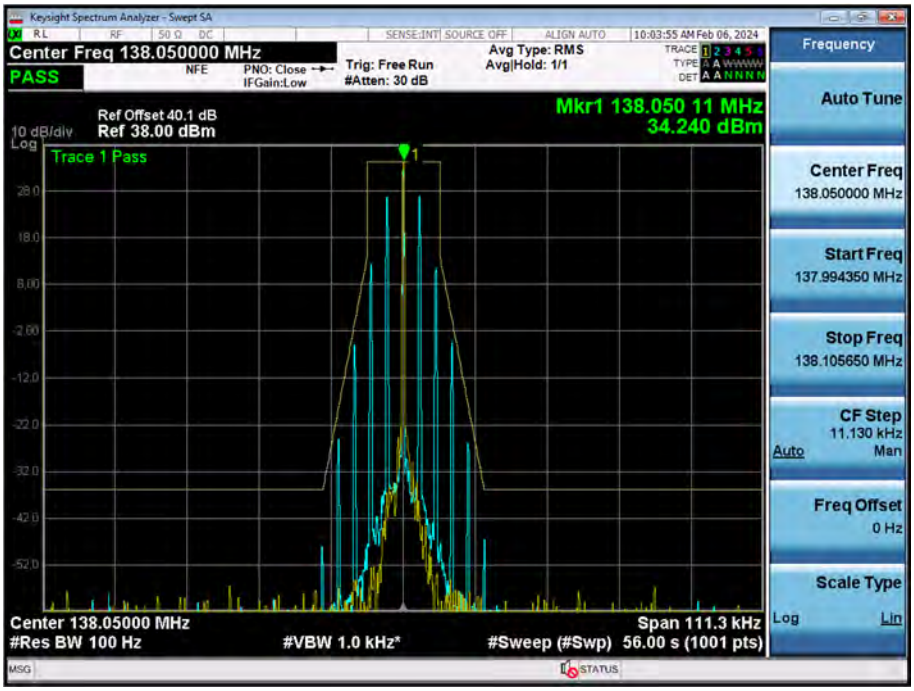


(173.95 MHz)_Low



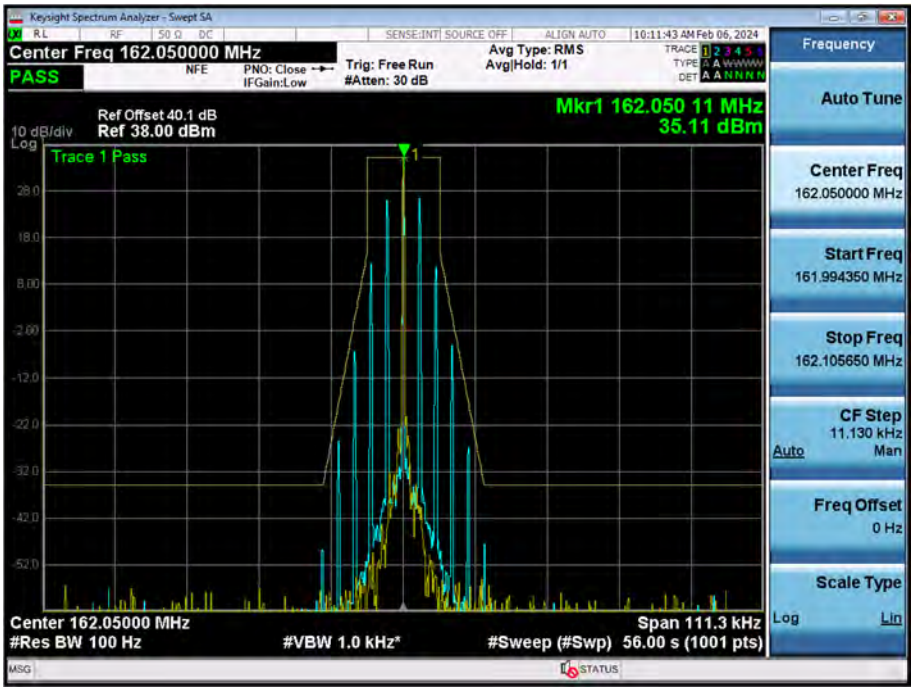
11K0F3E

(138.05 MHz)_High



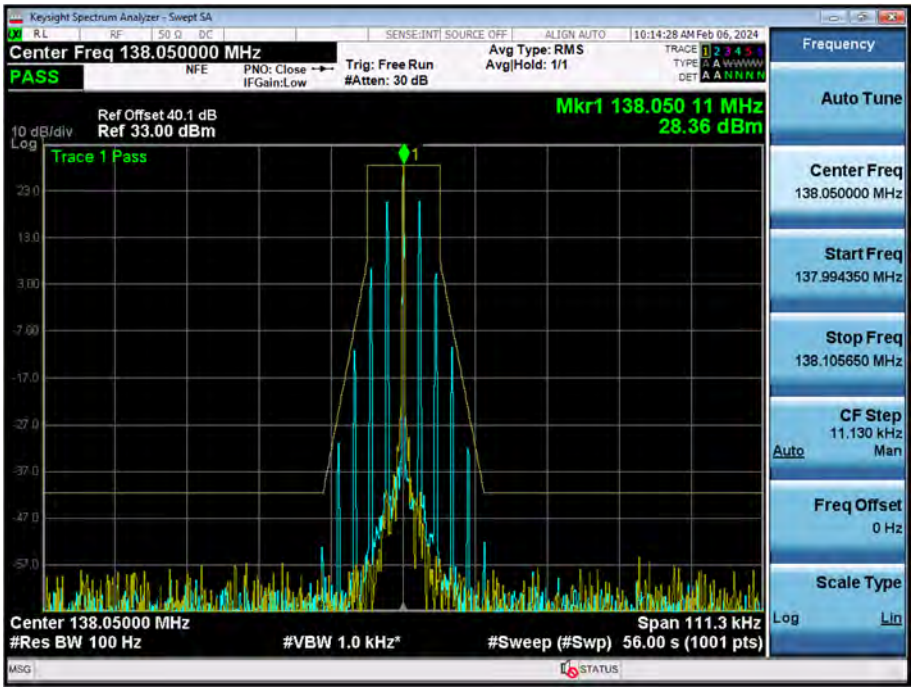
(150.05 MHz)_High

(162.05 MHz)_High

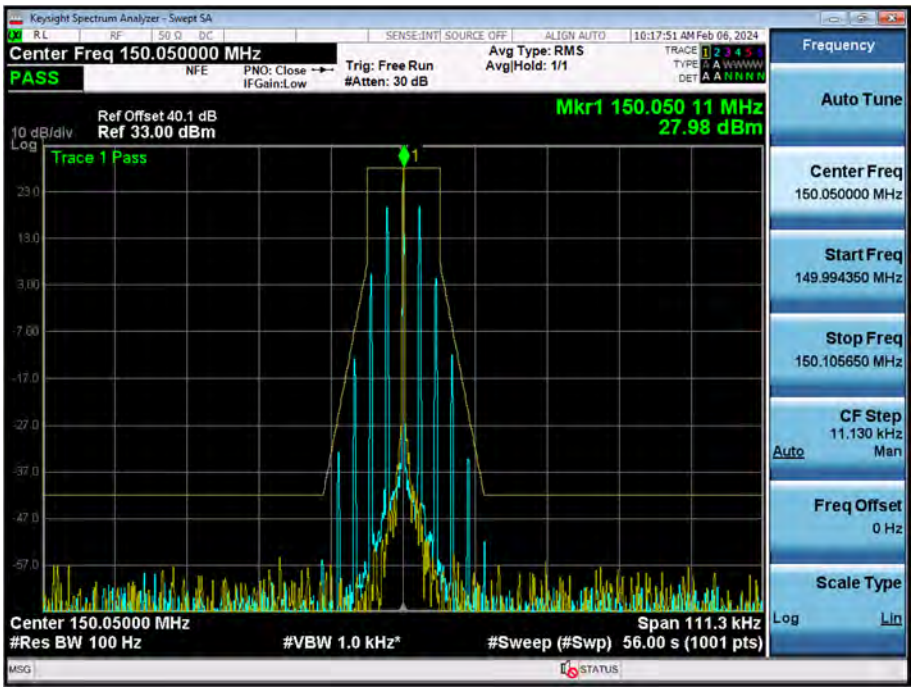


(173.95 MHz)_High

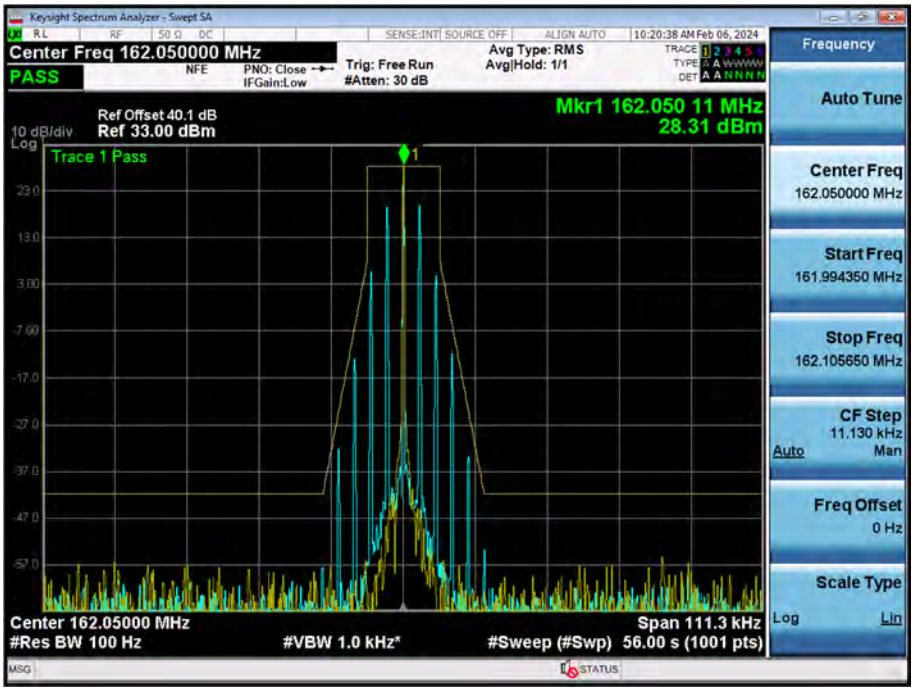
(138.05 MHz) _ Low



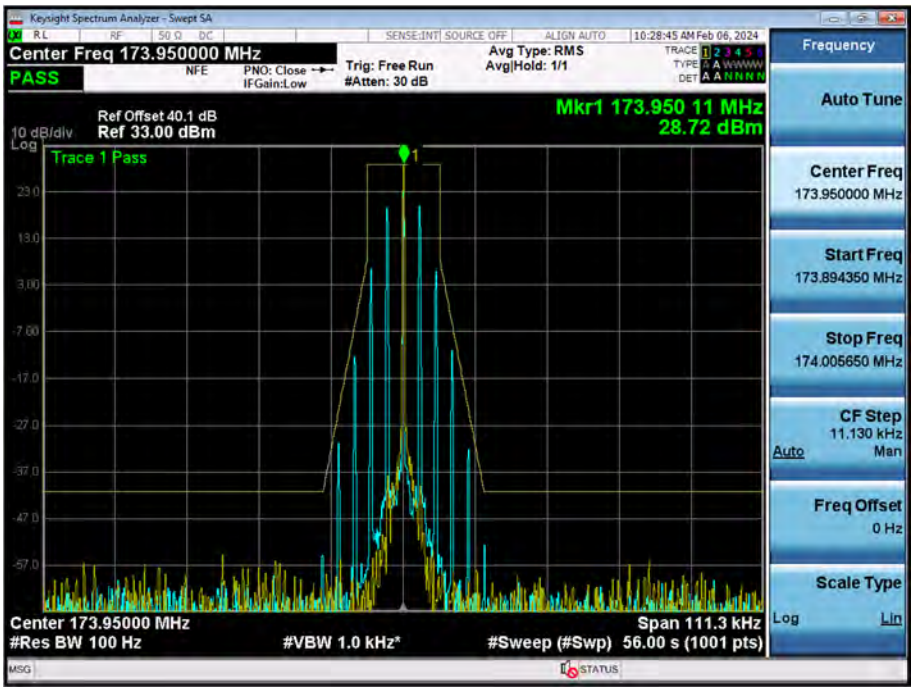
(150.05 MHz)_ Low



(162.05 MHz)_ Low

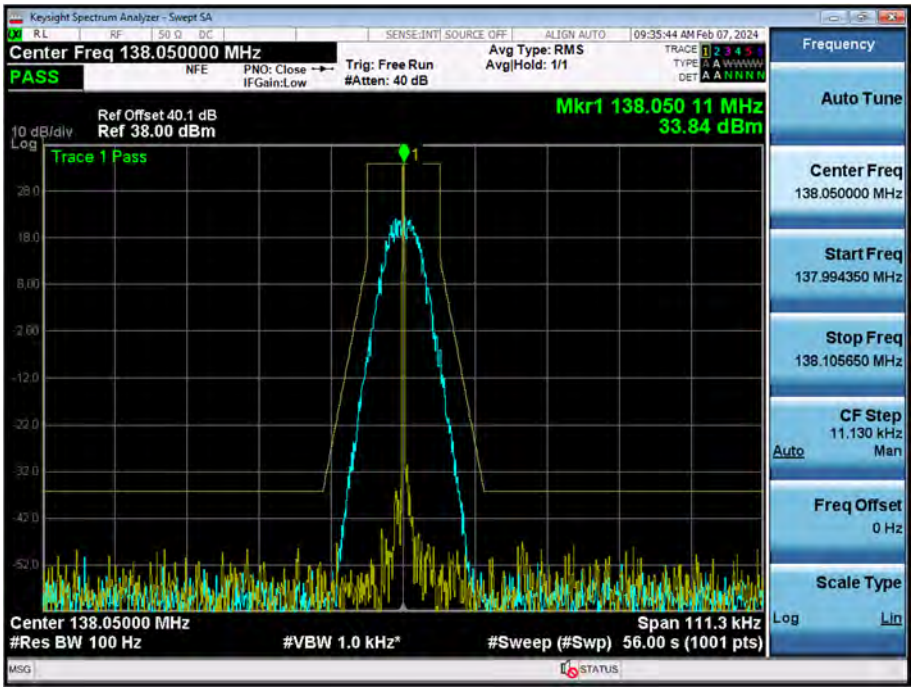


(173.95 MHz)_Low

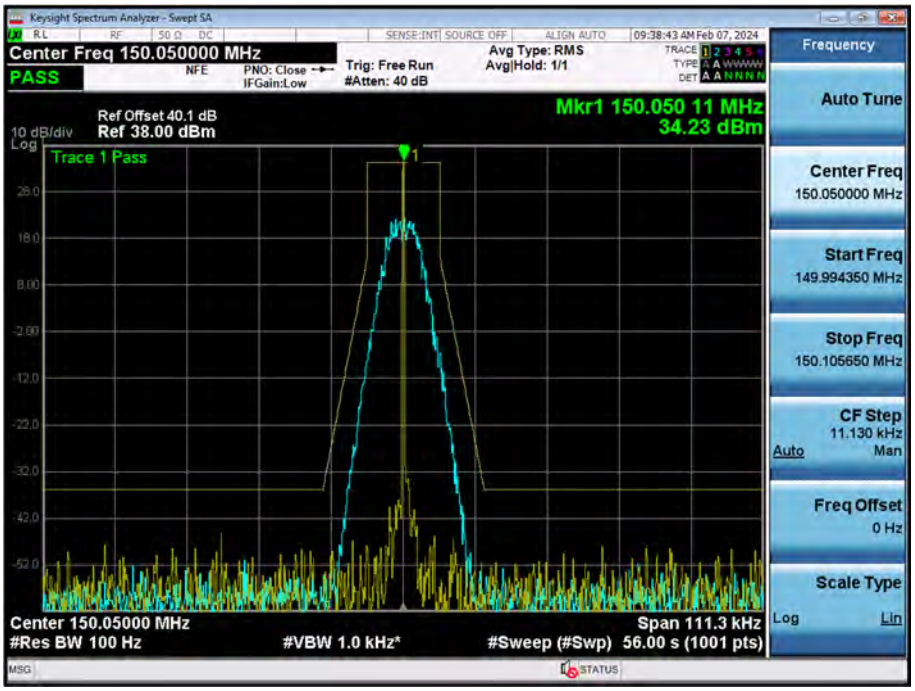


8K30F1E, 8K30F1D, 8K30F7W

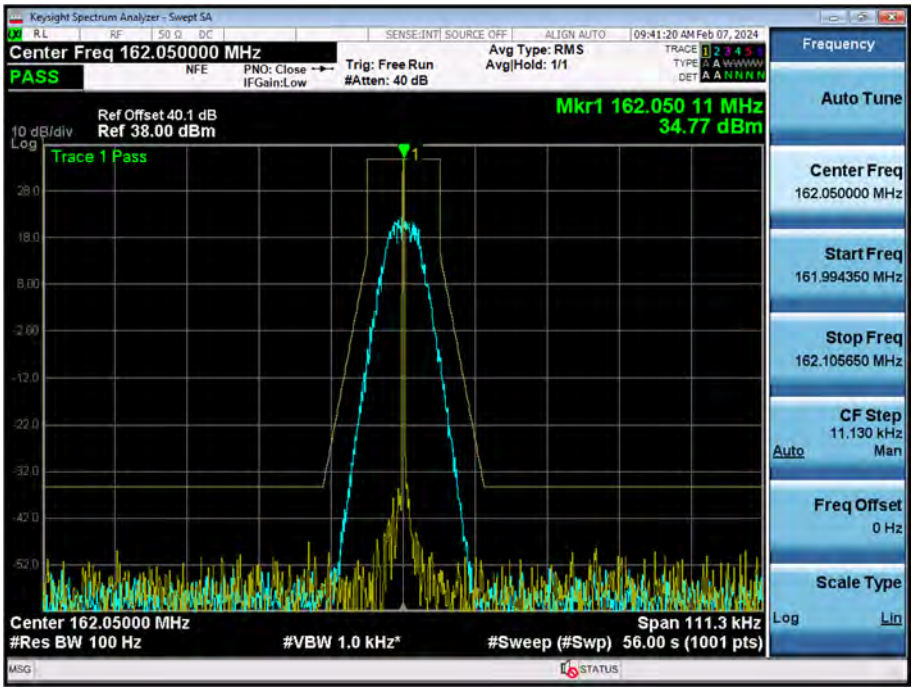
(138.05 MHz)_High



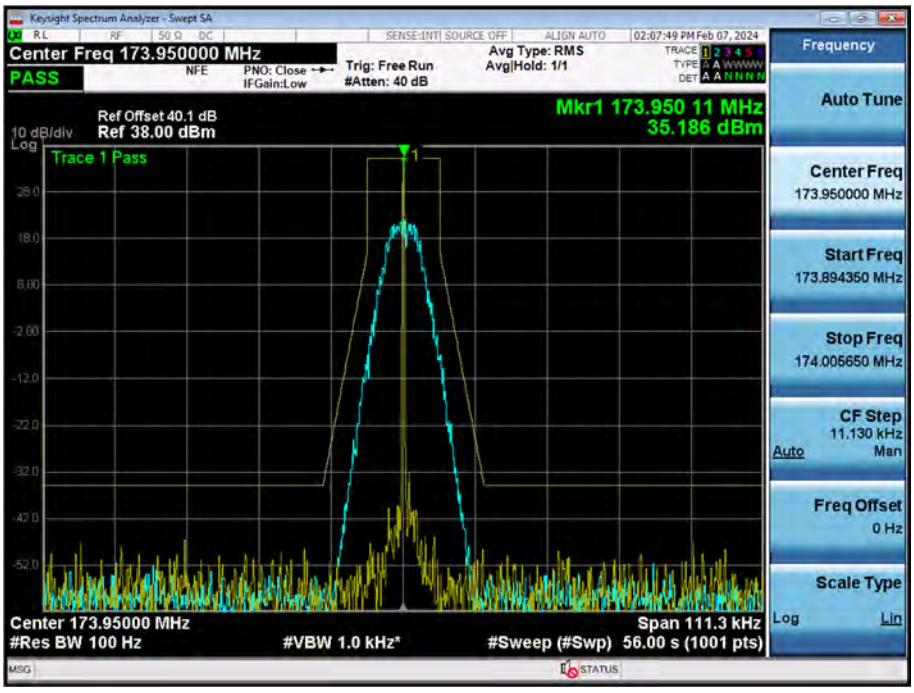
(150.05 MHz)_High



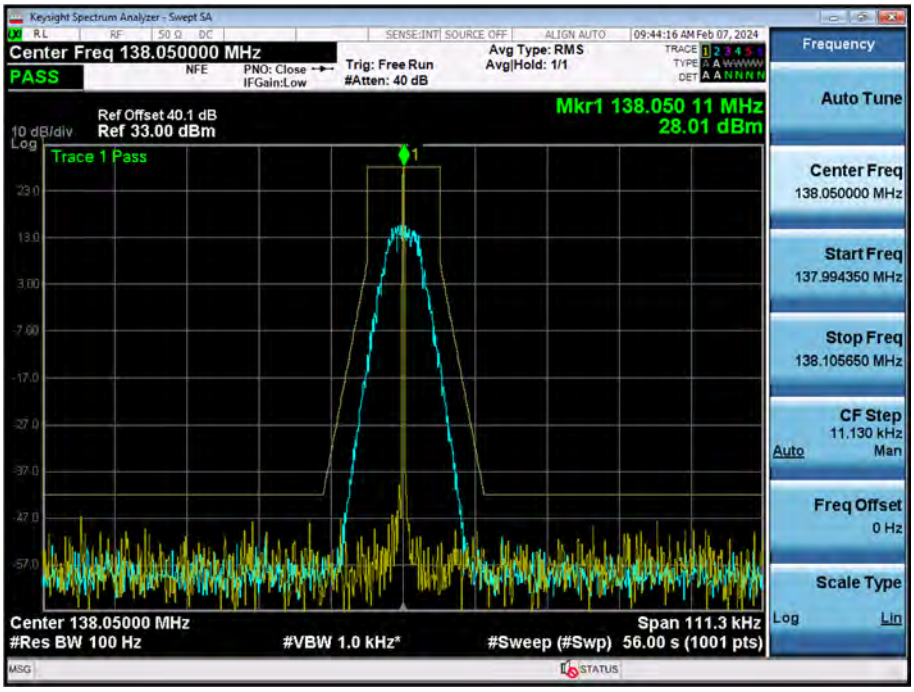
(162.05 MHz)_High



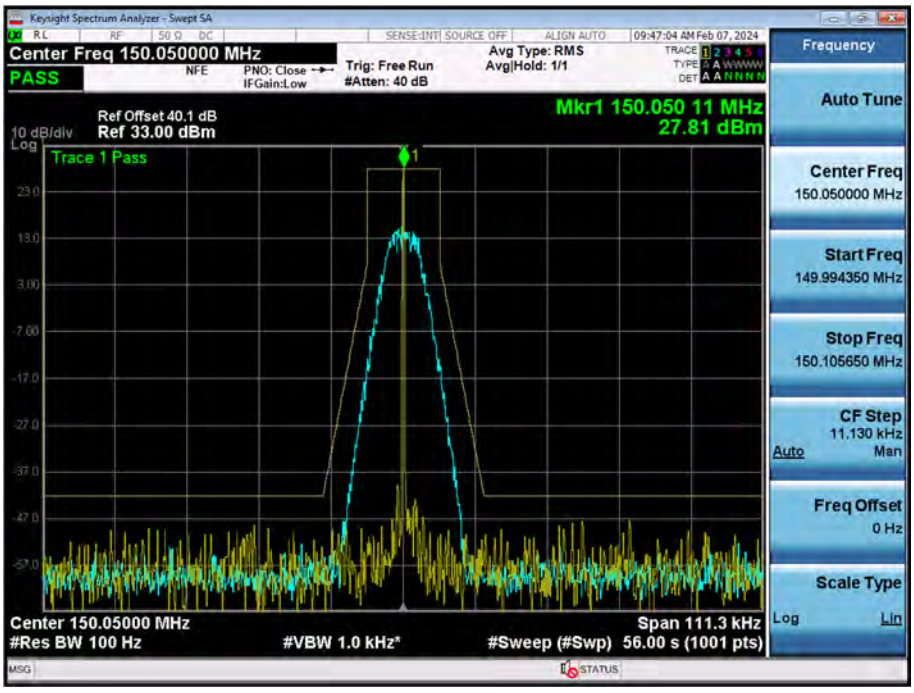
(173.95 MHz)_High



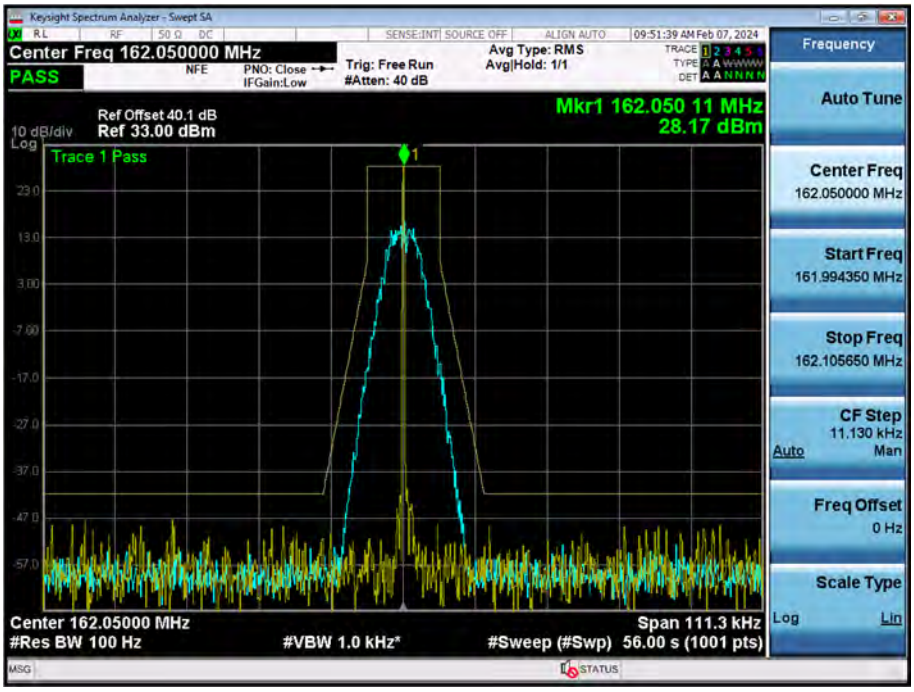
(138.05 MHz) _ Low



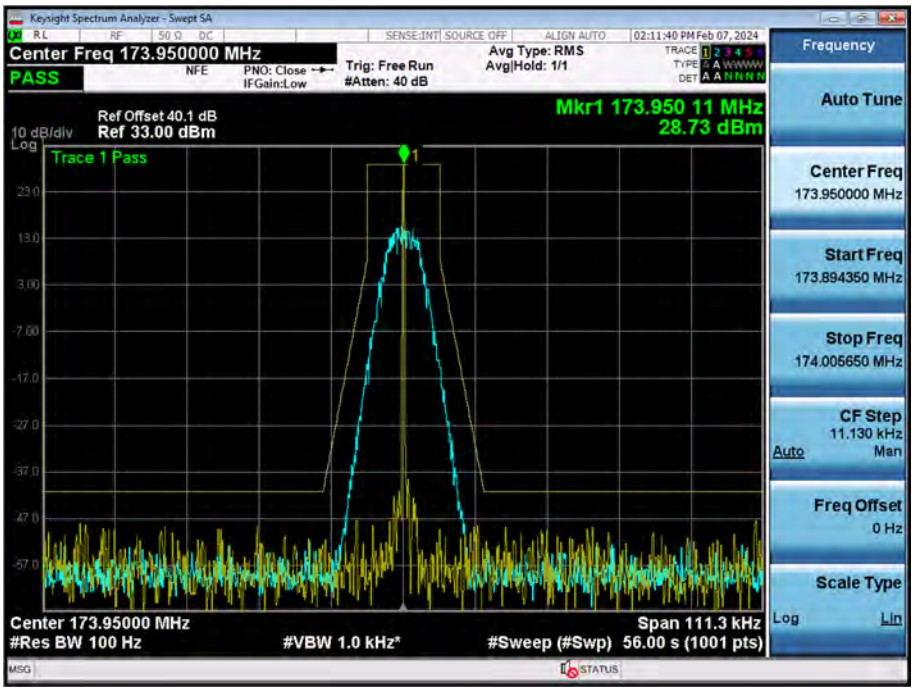
(150.05 MHz)_ Low



(162.05 MHz)_ Low

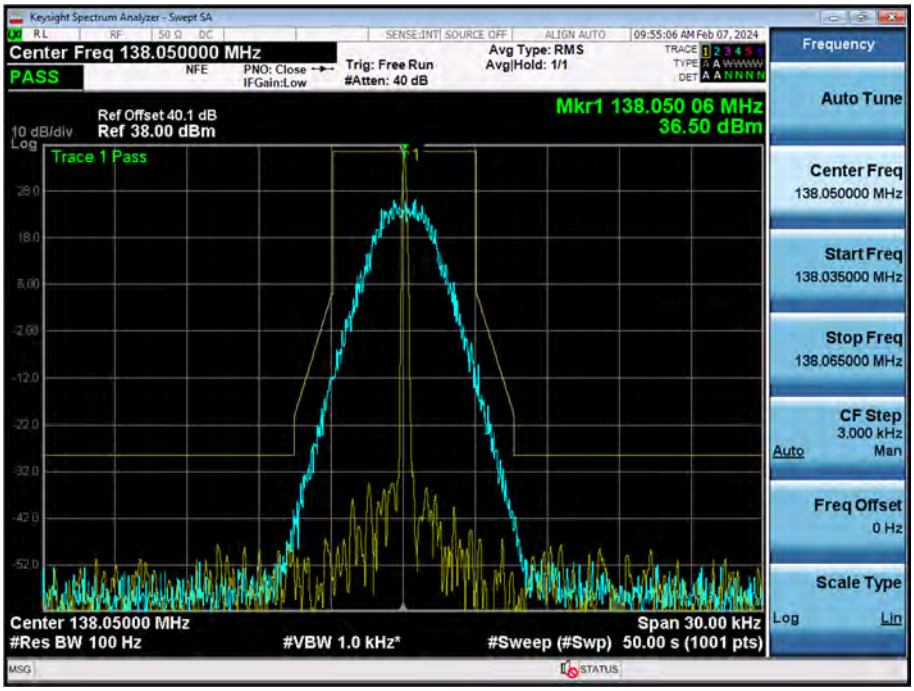


(173.95 MHz)_Low

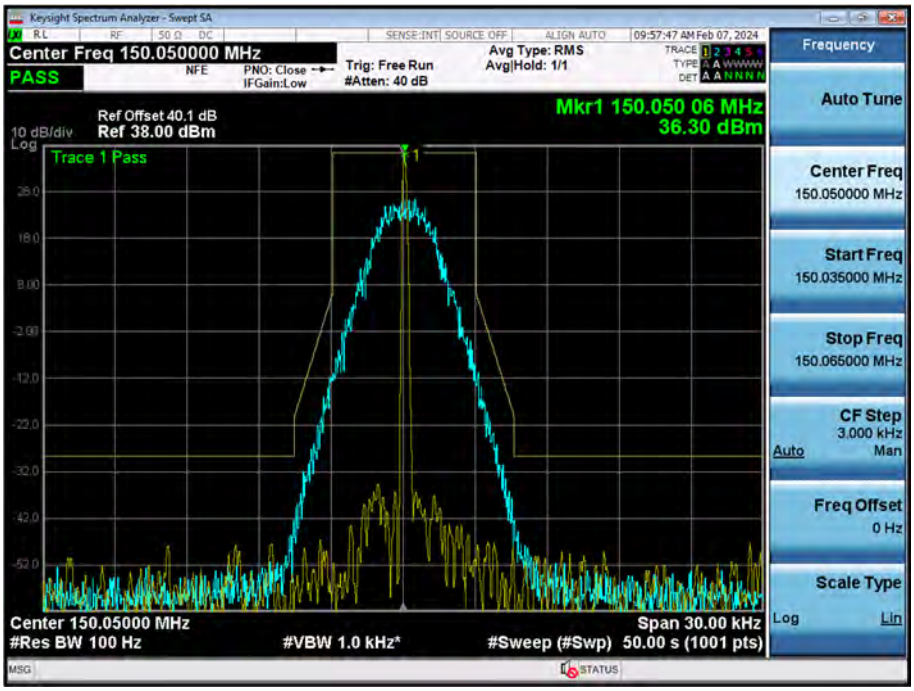


4K00F1E, 4K00F1D, 4K00F7W

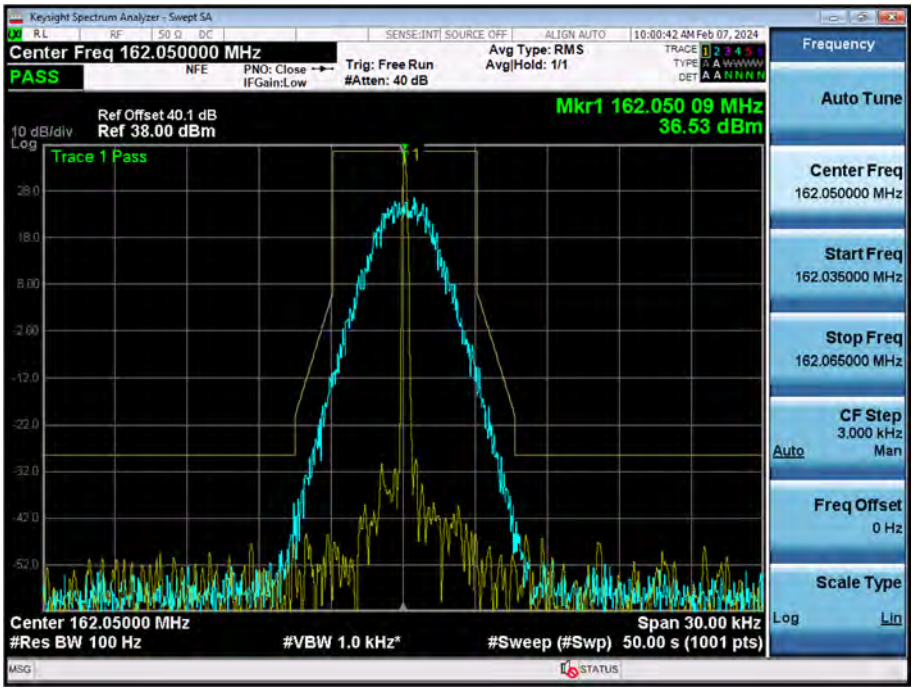
(138.05 MHz)_High



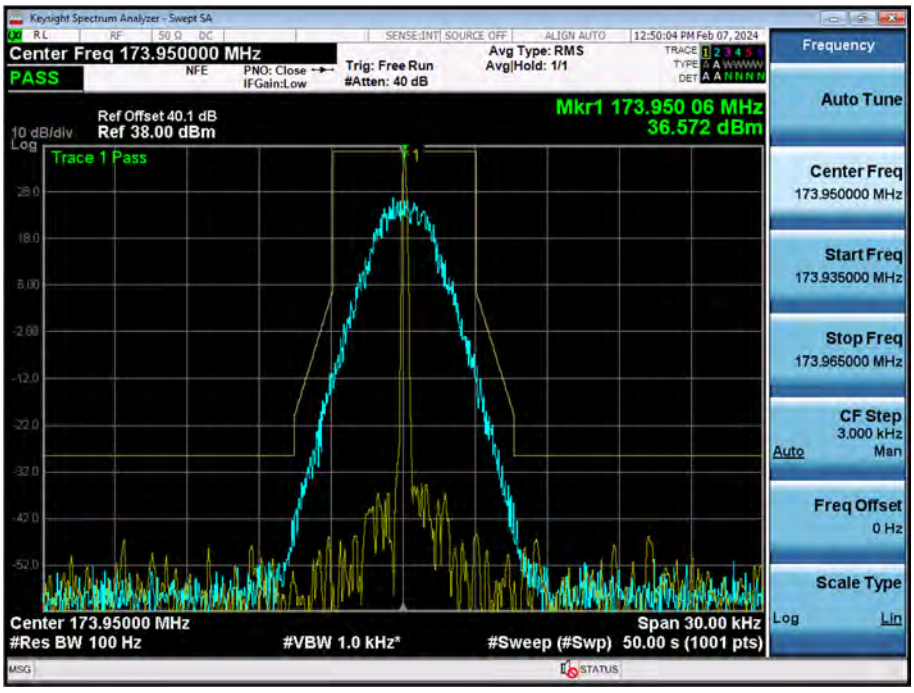
(150.05 MHz)_High



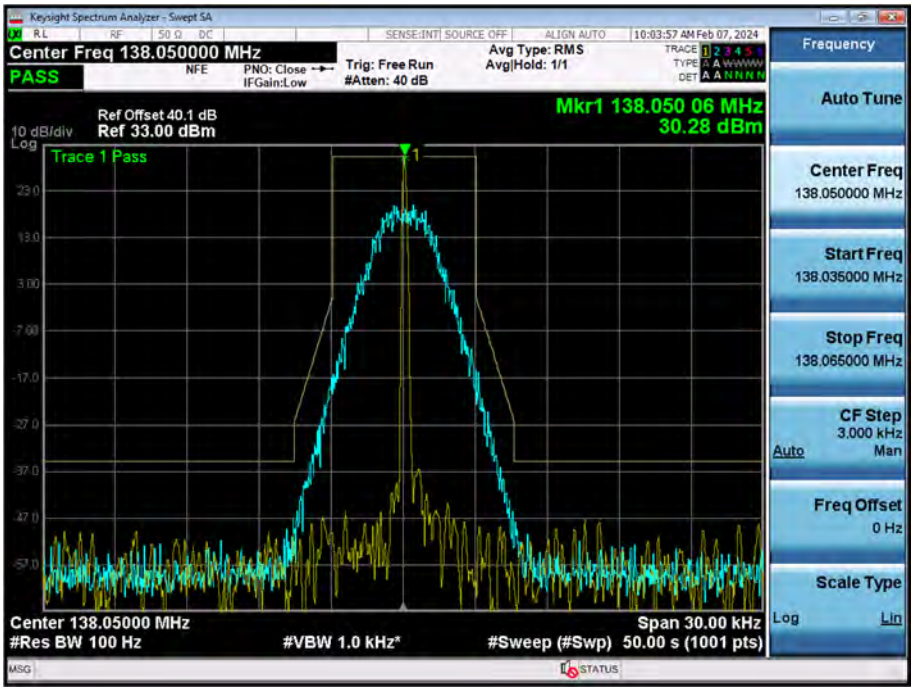
(162.05 MHz)_High



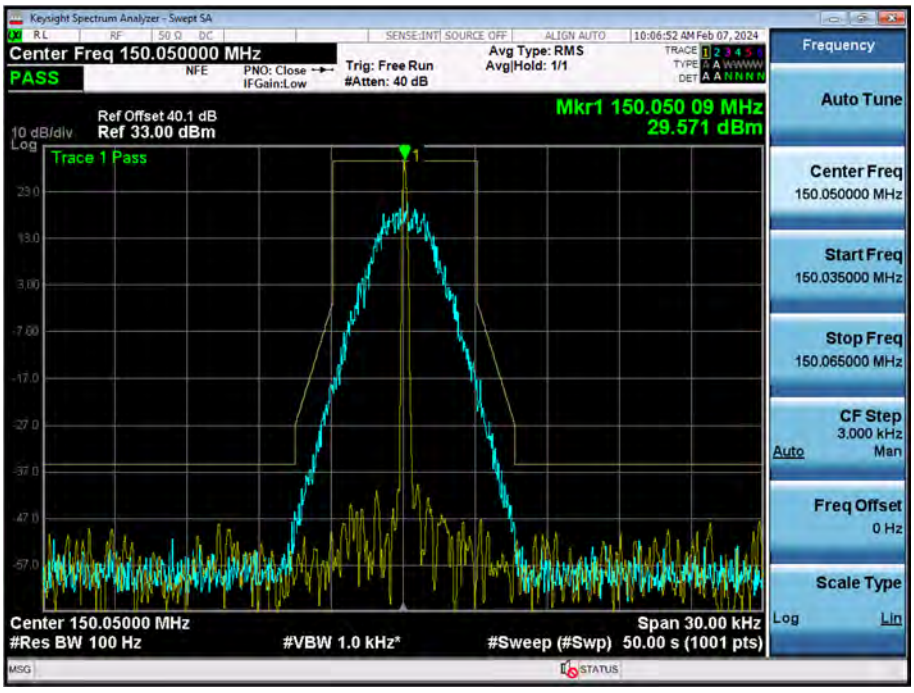
(173.95 MHz)_High



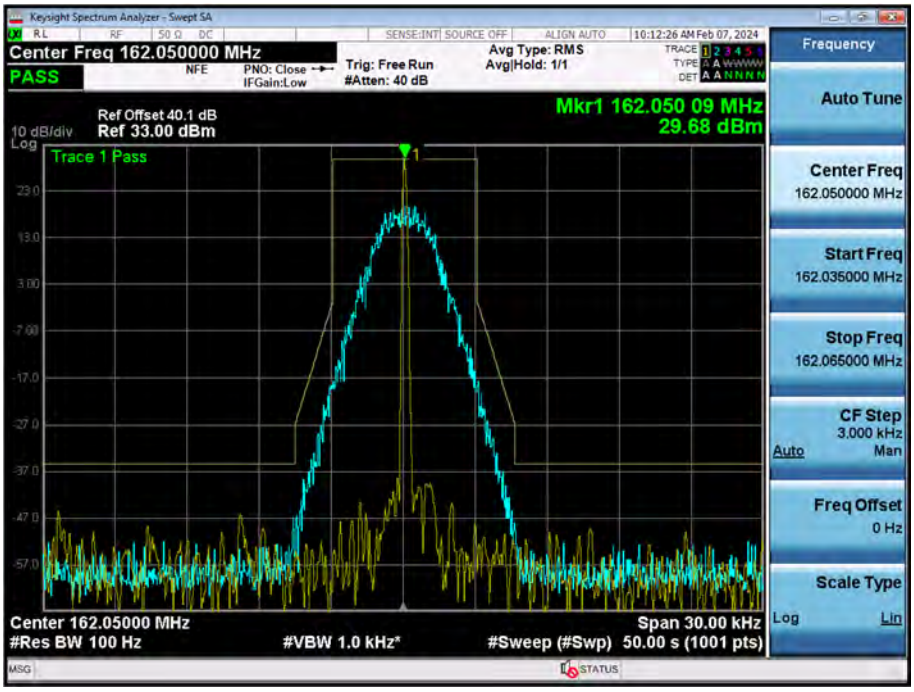
(138.05 MHz) _ Low



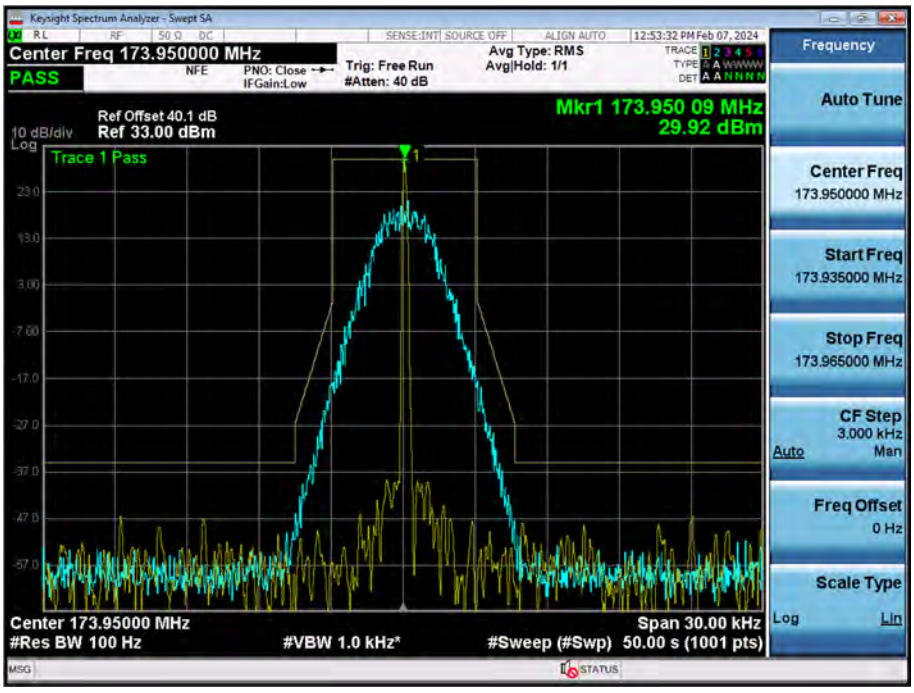
(150.05 MHz)_ Low



(162.05 MHz)_ Low

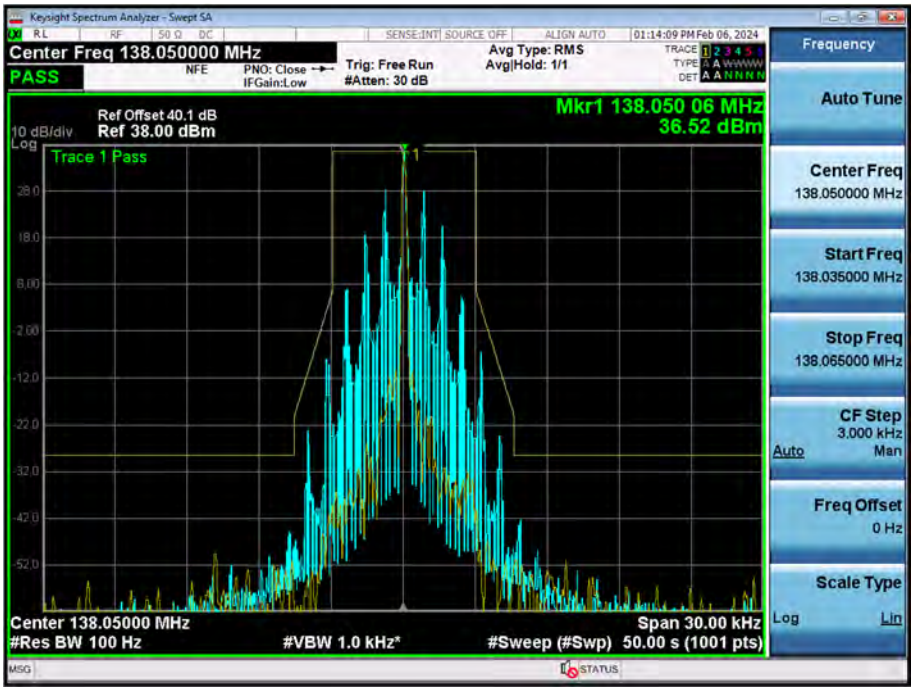


(173.95 MHz)_Low

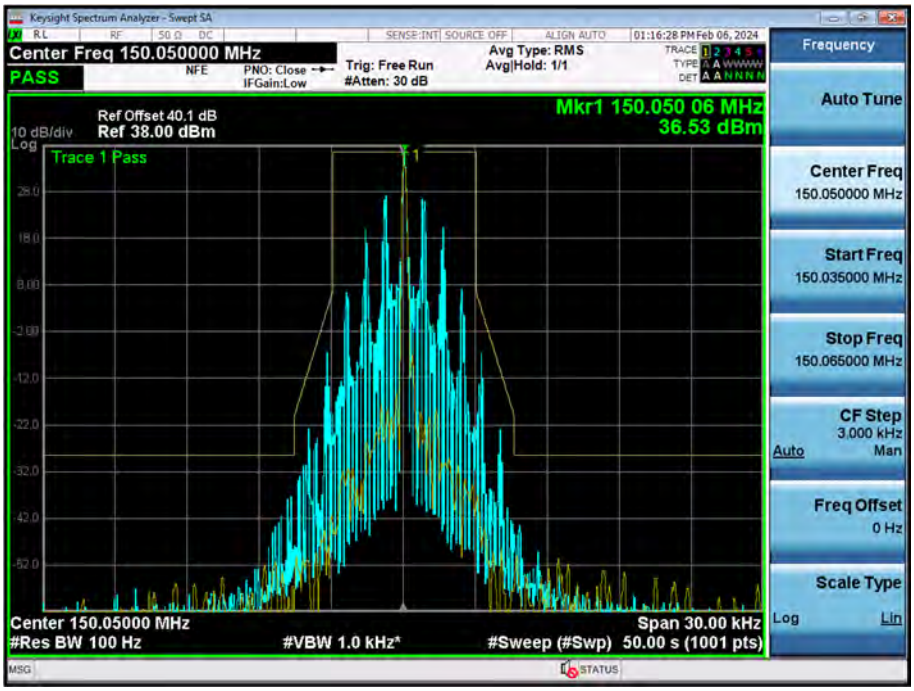


4K00F2D

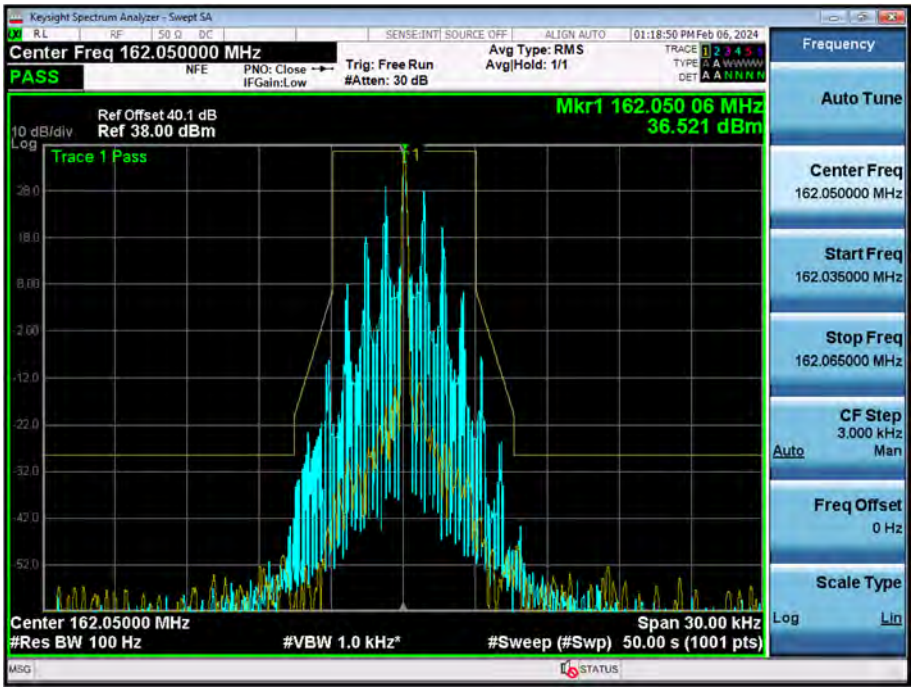
(138.05 MHz)_High



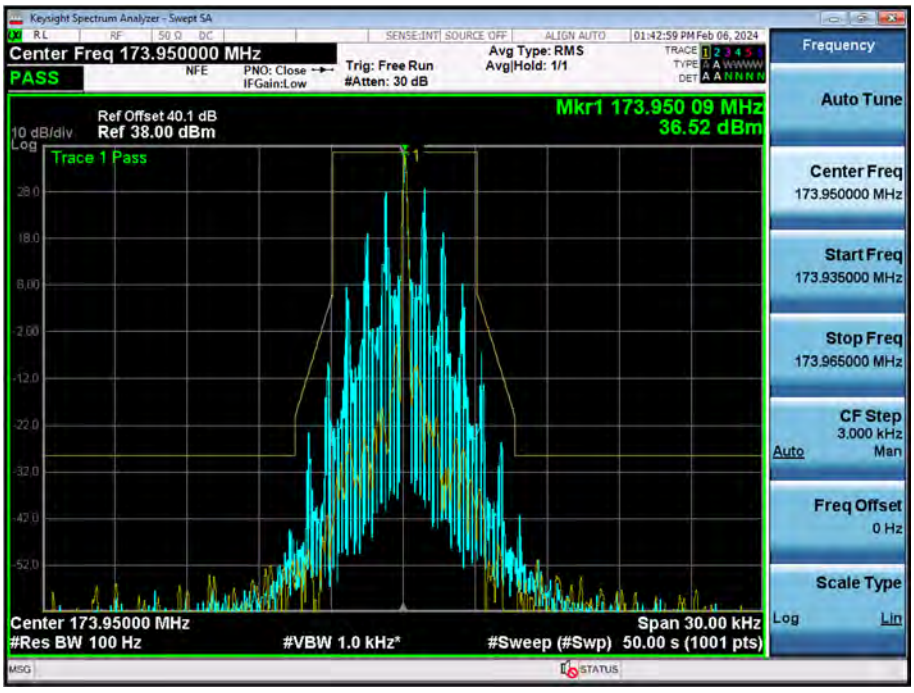
(150.05 MHz)_High



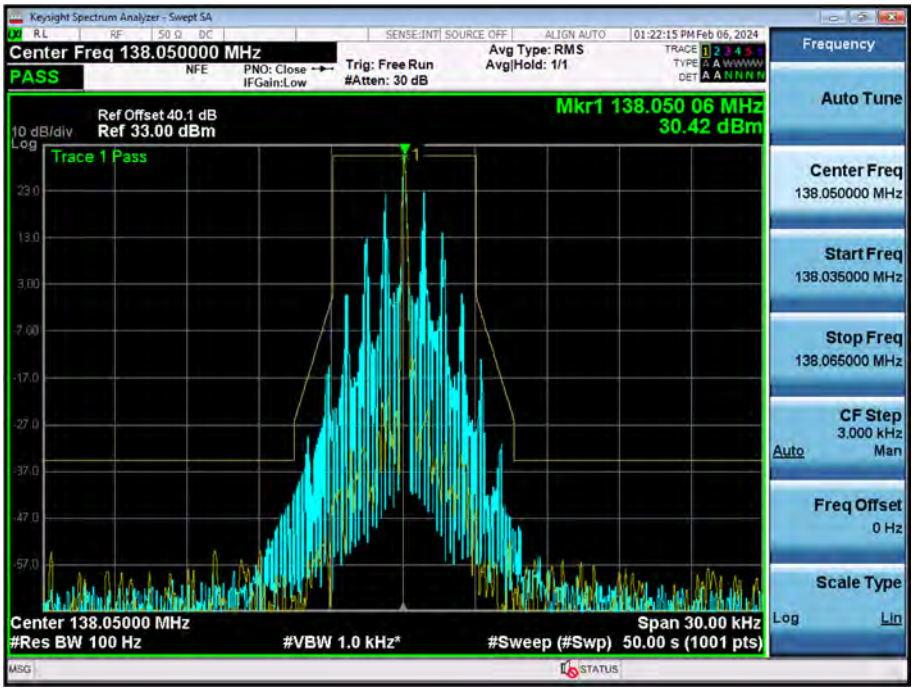
(162.05 MHz)_High



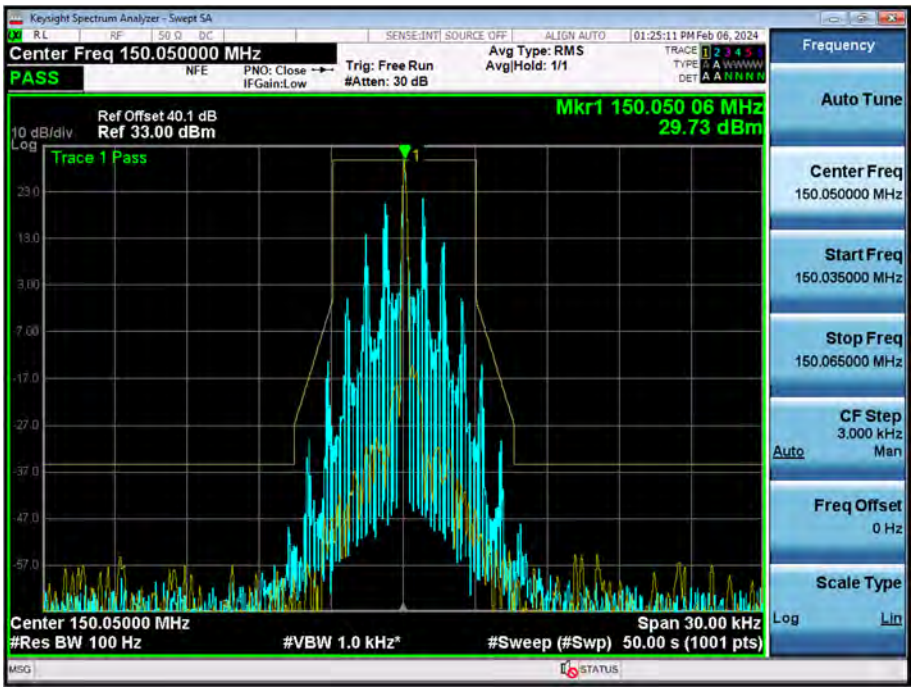
(173.95 MHz)_High



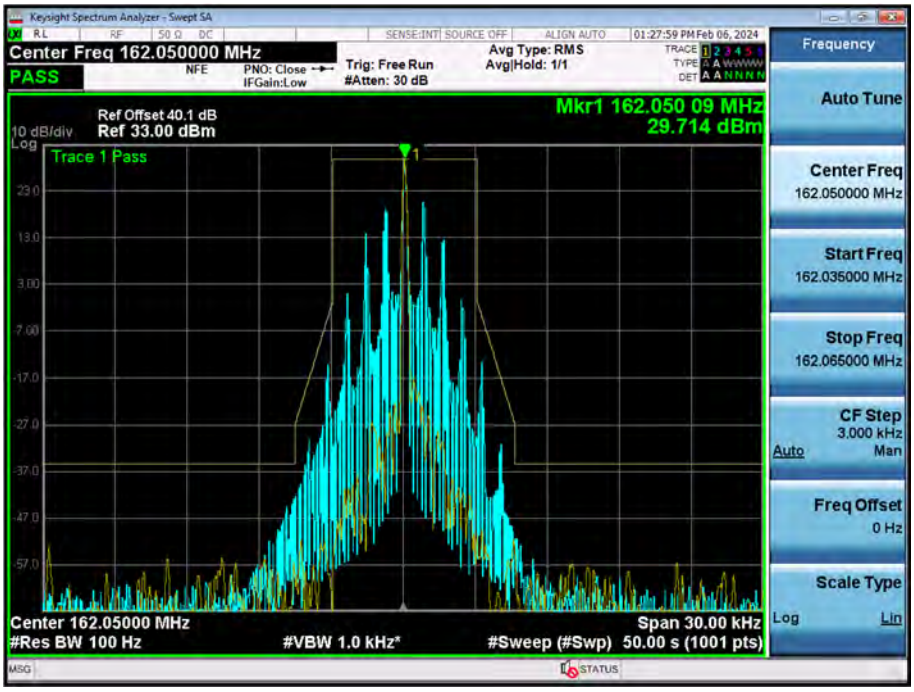
(138.05 MHz) _ Low



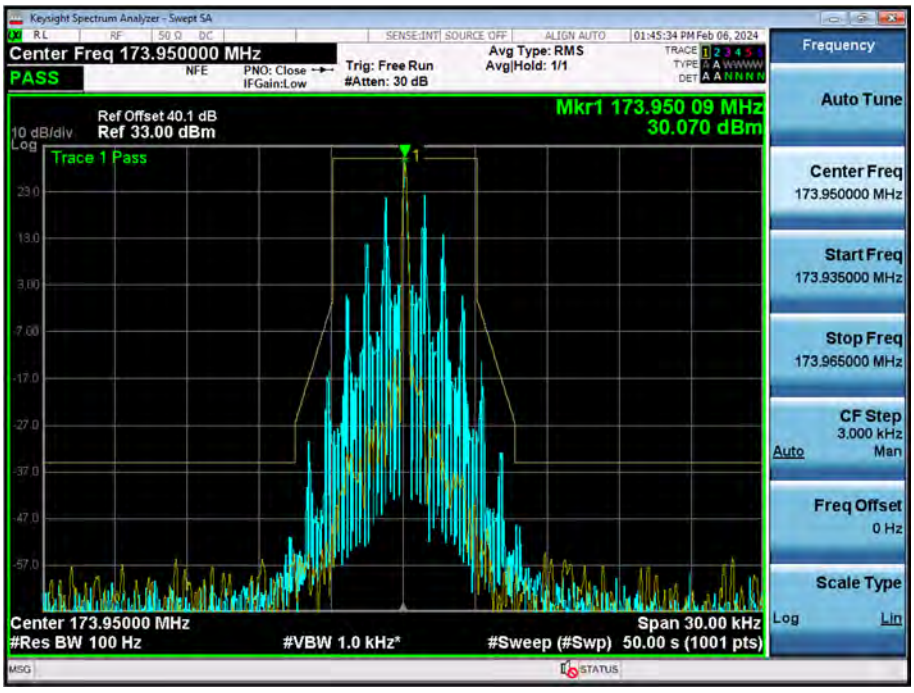
(150.05 MHz)_ Low



(162.05 MHz)_ Low



(173.95 MHz)_Low



8.7 Transient Frequency Behavior

▣ Definition

Transient frequency behavior is a measure of the difference, as a function in time, of the actual transmitter frequency to the assigned transmitter frequency when the transmitted RF output power is switched on or off.

▣ TEST CONFIGURATION

▣ TEST PROCEDURE

According to 2.2.19 in TIA-603-E Standard.

a) Connect the equipment as illustrated.

b) Connect the output of the standard transmitter load to the RF power meter.
Supply sufficient attenuation via the RF attenuator to provide a level that is approximately 40 dB below the maximum allowable input to the modulation domain analyzer.

c) Unkey the transmitter.

d) Disconnect the RF power meter and connect the modulation domain analyzer in its place.
Set the envelope trigger of the modulation domain analyzer to the minimum level that will trigger when the transmitter is keyed.

e) Reduce the attenuation of the RF attenuator so that the input to the modulation domain analyzer is increased by 30 dB when the transmitter is keyed.

f) Set the modulation domain analyzer to trigger on the rising edge of the waveform in order to capture a single-shot turn-on of the transmitter signal.

g) Adjust the display of the modulation domain analyzer for proper viewing of the transmitter transient behavior. Set the time base reference to the left for observing the transmitter turn-on transient.

h) Key the transmitter.

i) Observe the stored display of the modulation domain analyzer.
The signal trace shall be maintained within the allowable limits during the periods t_1 and t_2, and shall also remain within limits following t_2.

j) Adjust the modulation domain analyzer to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transient of the transmitter signal.

k) Adjust the display of the modulation domain analyzer for proper viewing of the transmitter transient behavior. Set the time base reference to the right for observing the transmitter turn-off transient.

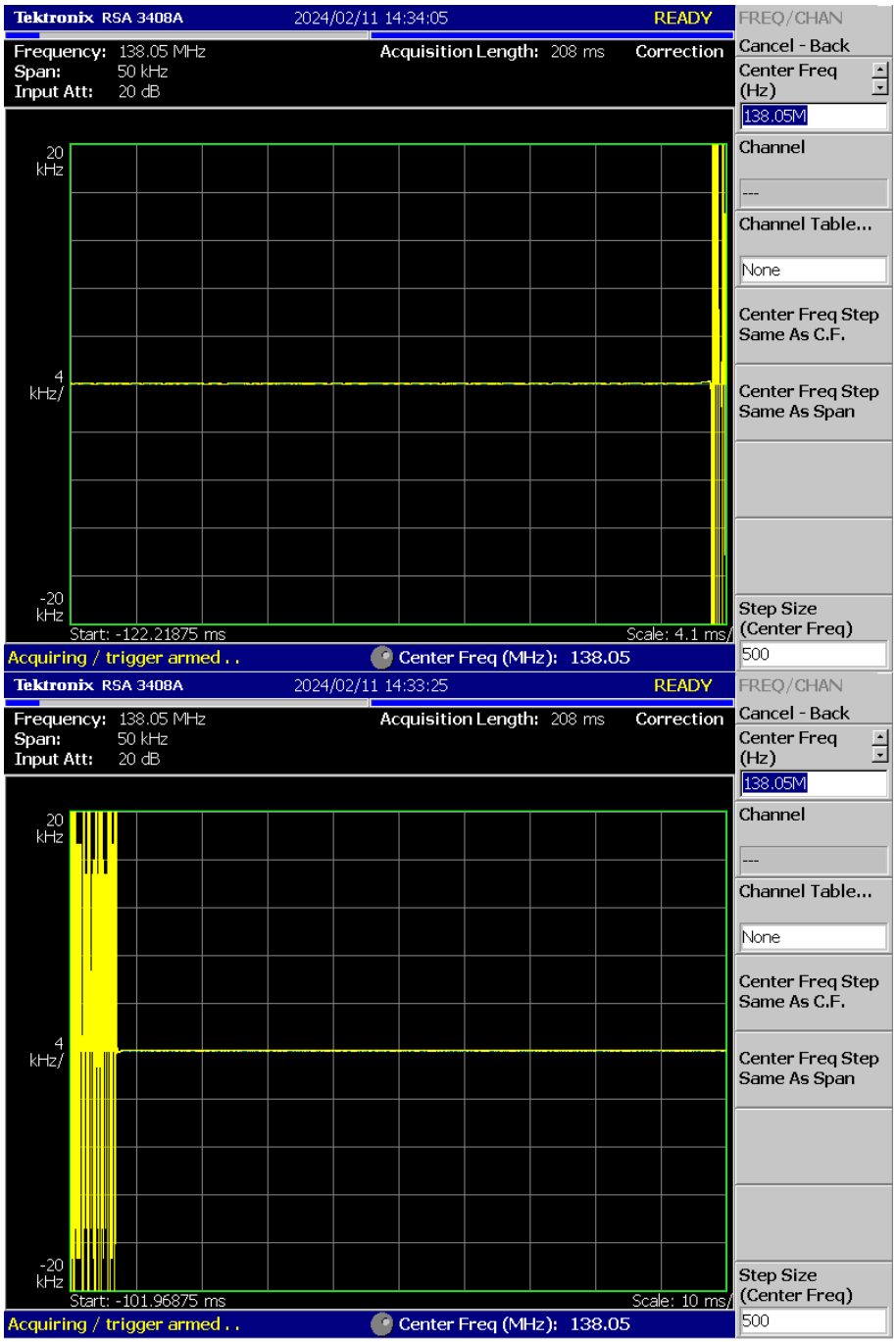
l) Unkey the transmitter.

m) Observe the stored display of the modulation domain analyzer. The signal trace shall be maintained within the allowable limits during the period t_3.

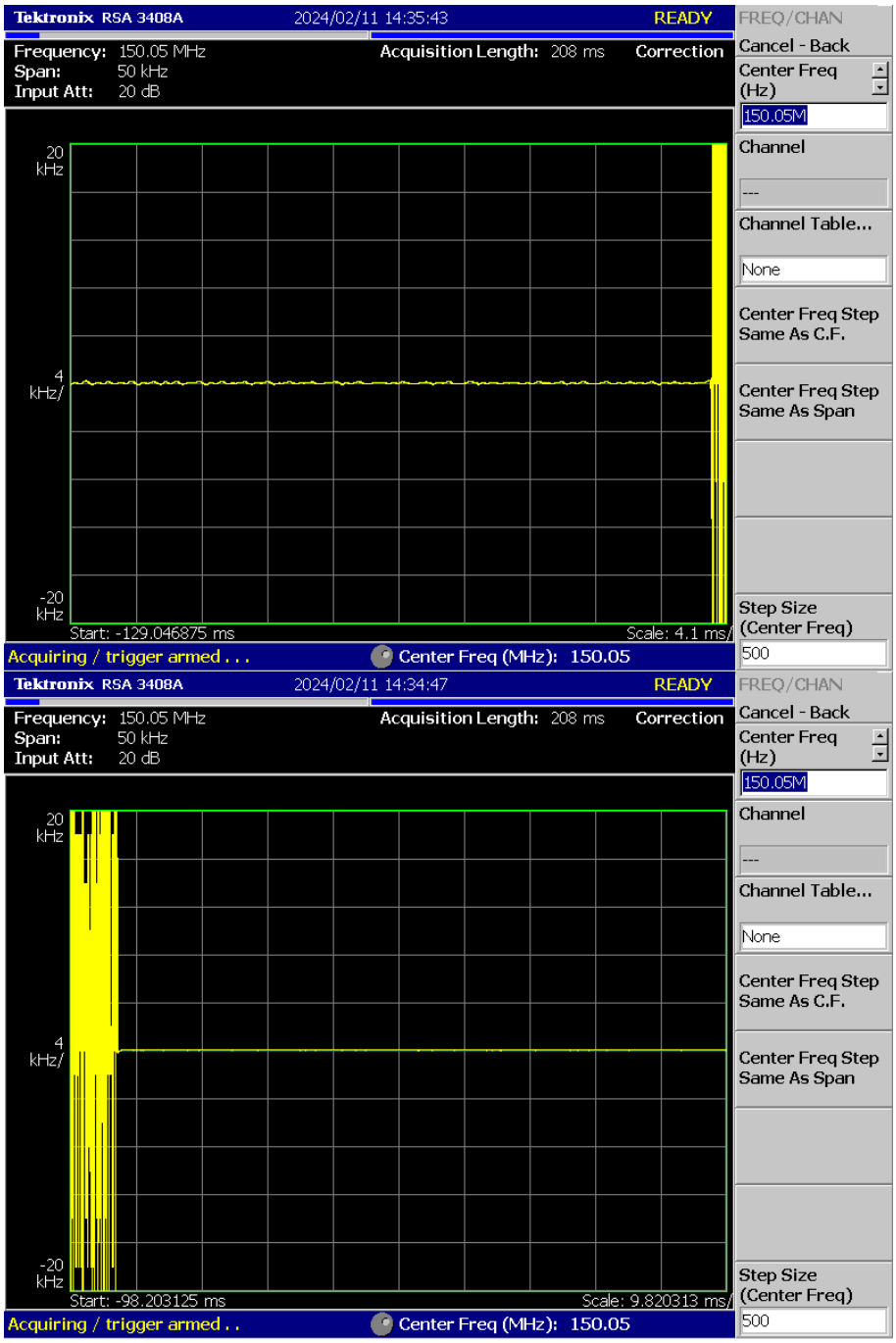
▣ Plots of Transient Frequency Behavior

16K0F3E

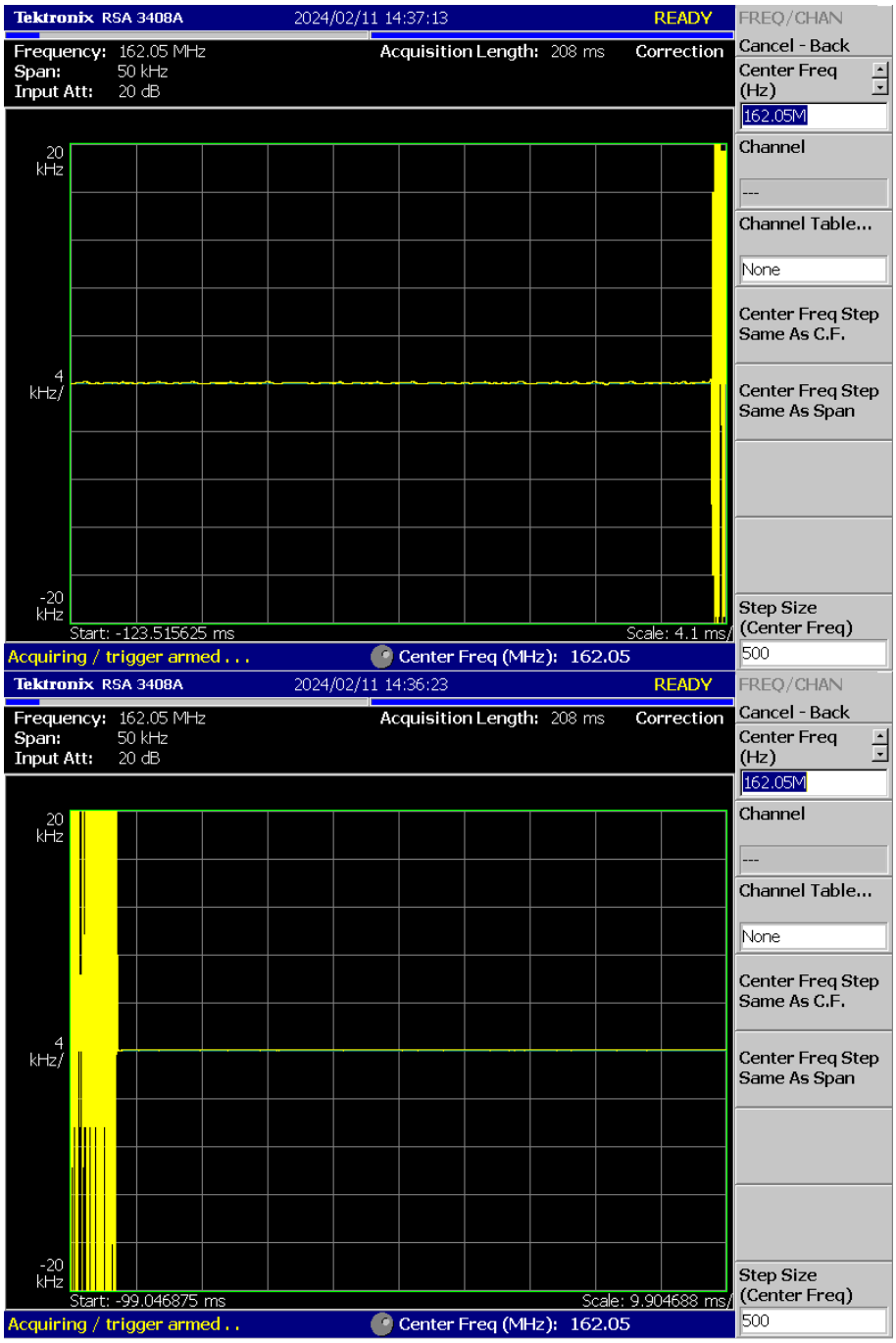
(138.05 MHz)_High



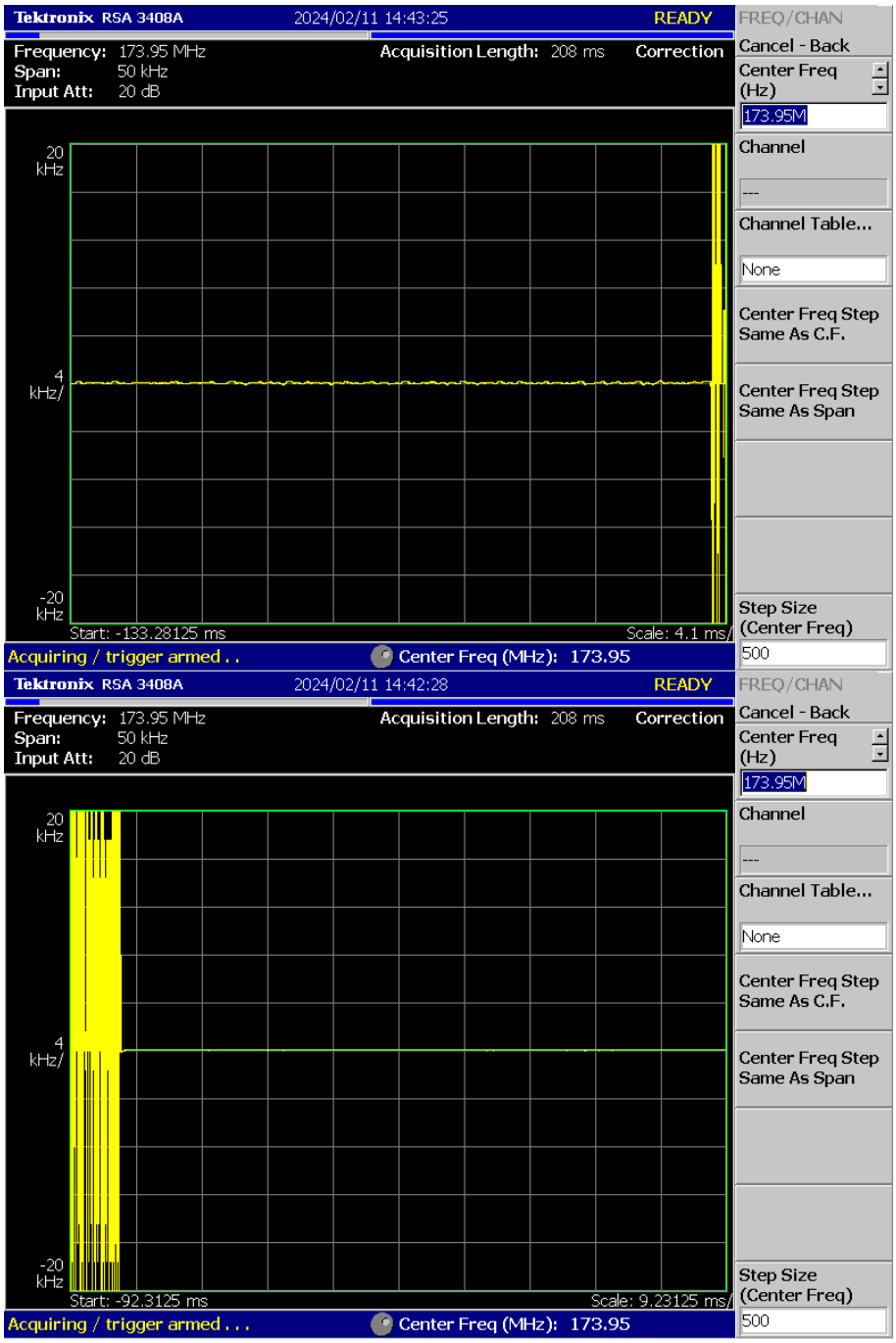
(150.05 MHz)_High



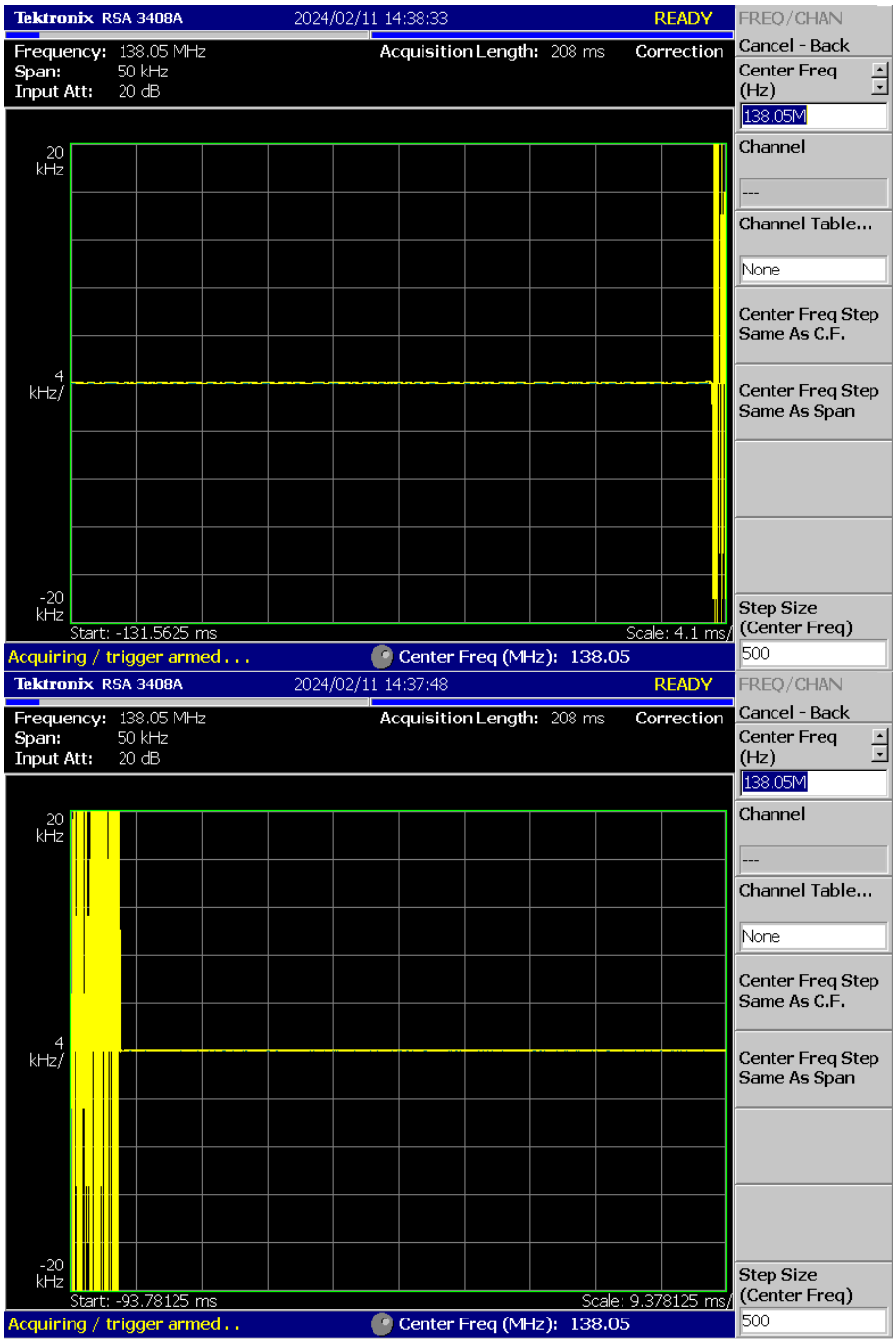
(162.05 MHz)_High



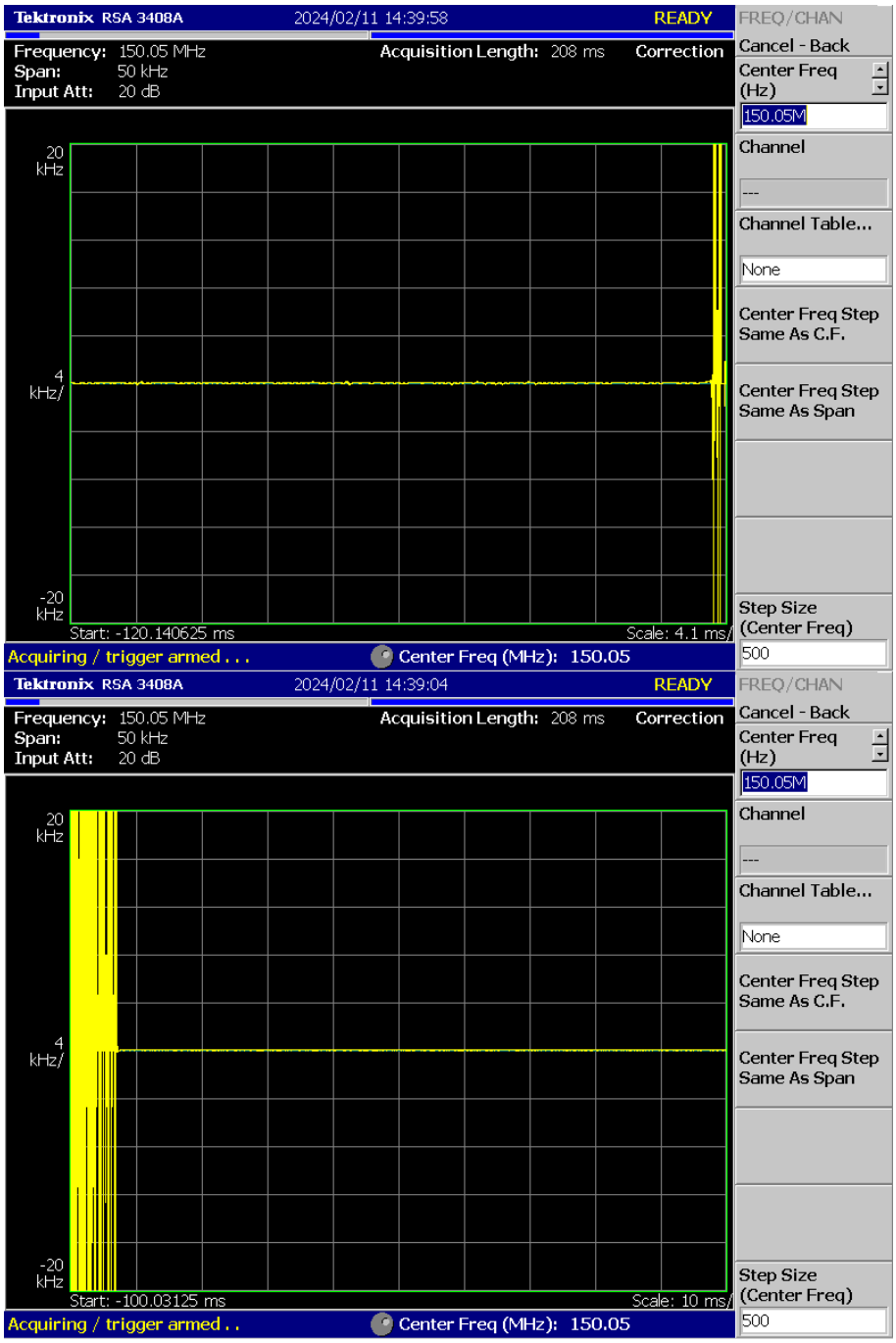
(173.95 MHz)_High



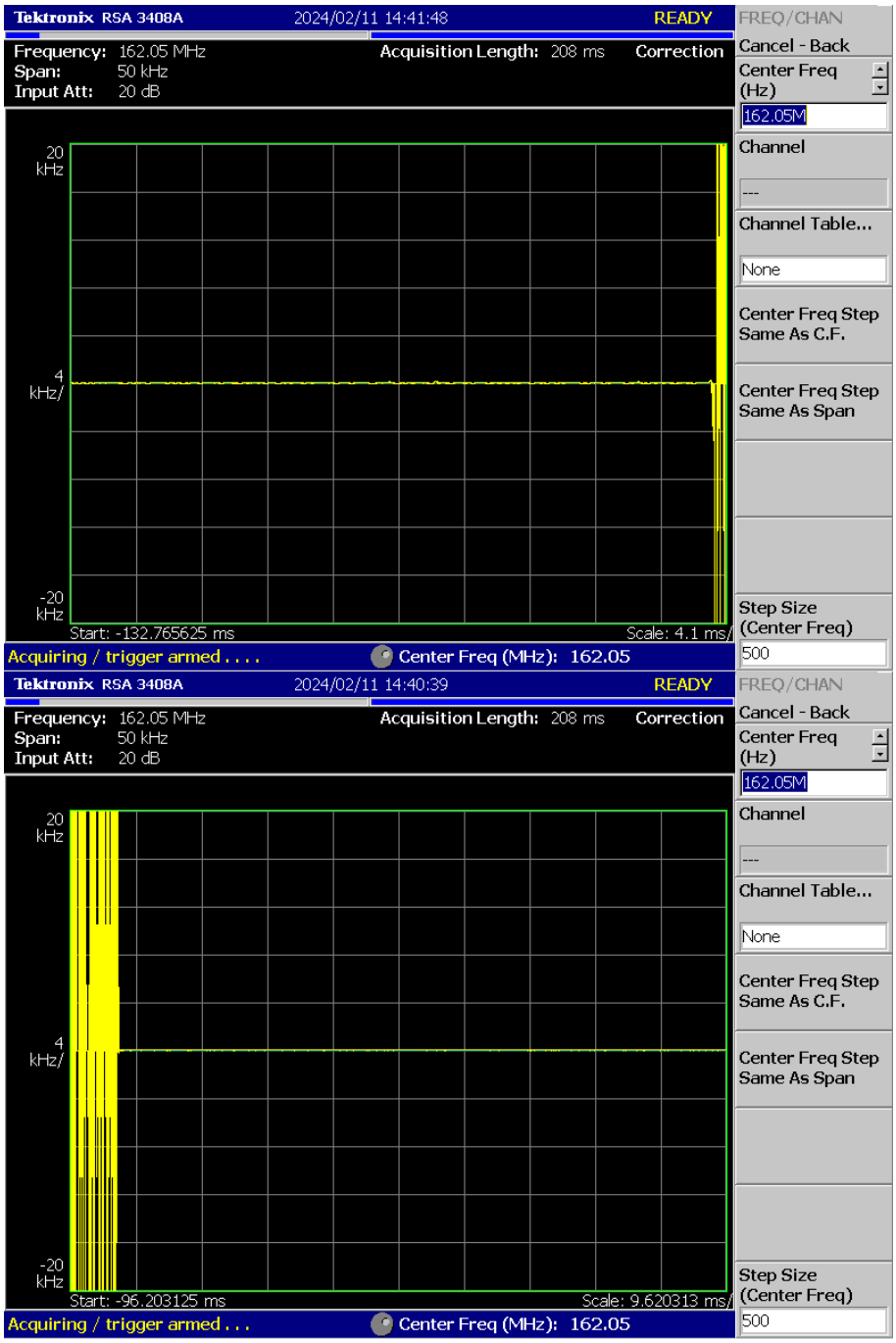
(138.05 MHz)_Low



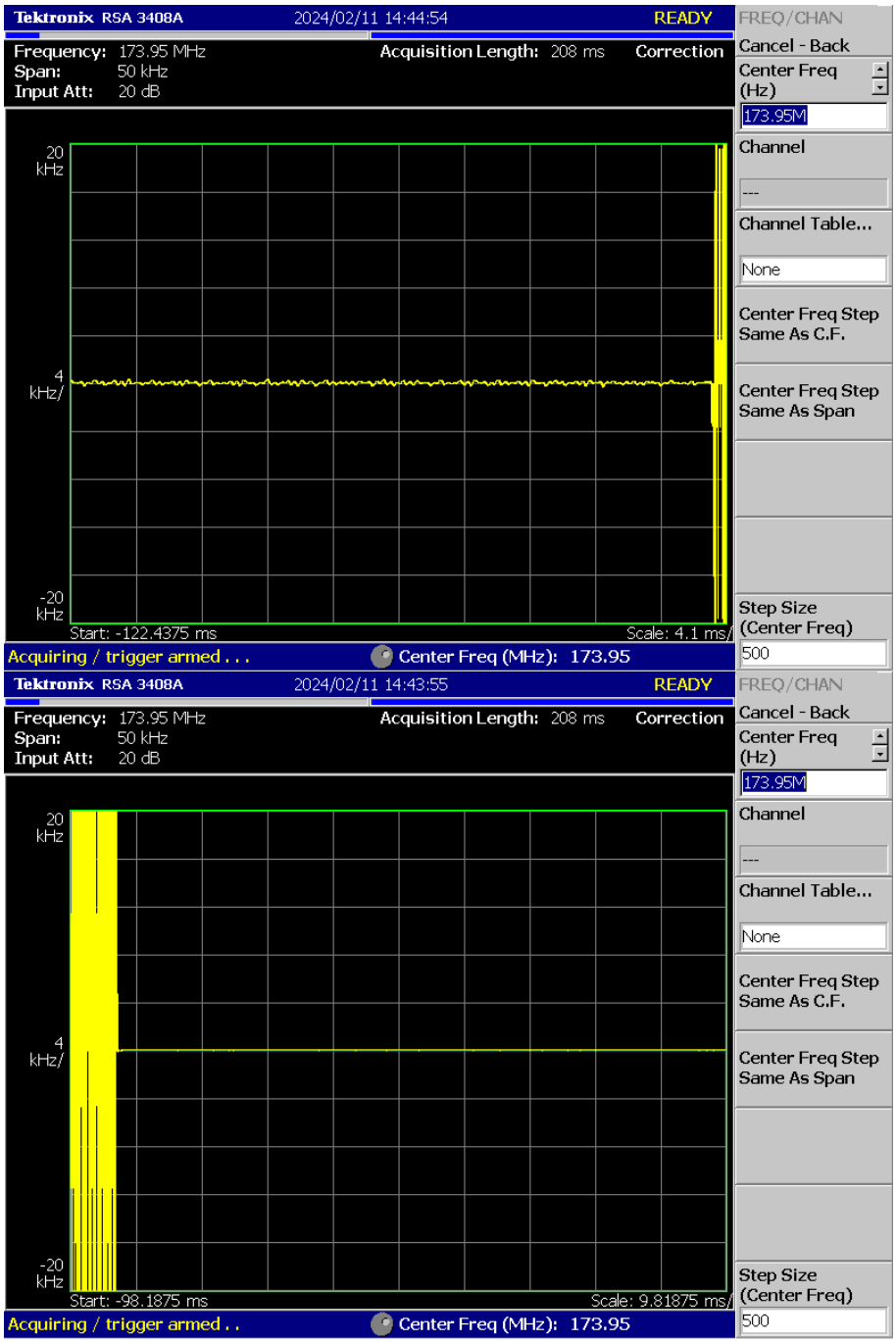
(150.05 MHz)_ Low



(162.05 MHz)_ Low

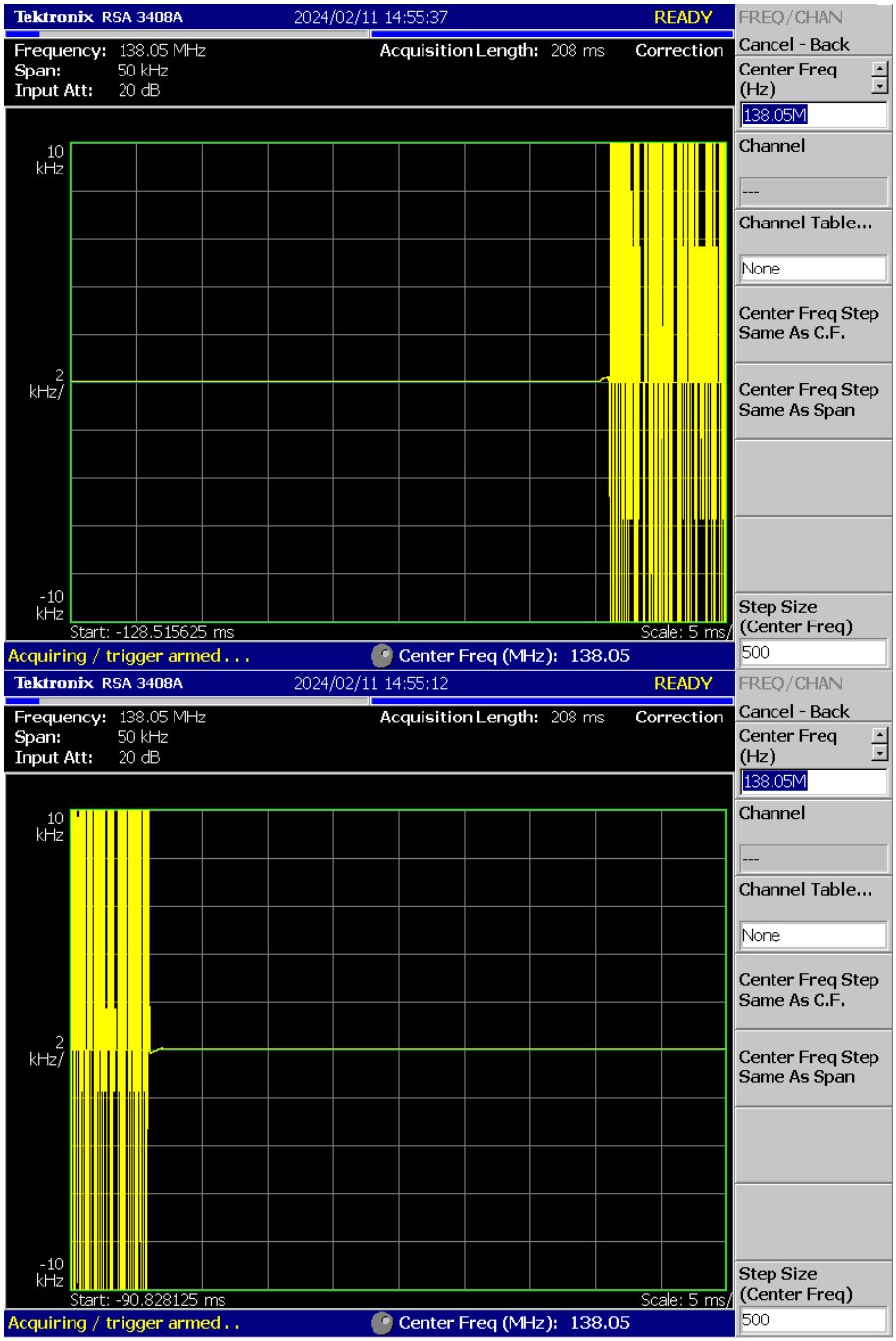


(173.95 MHz)_ Low

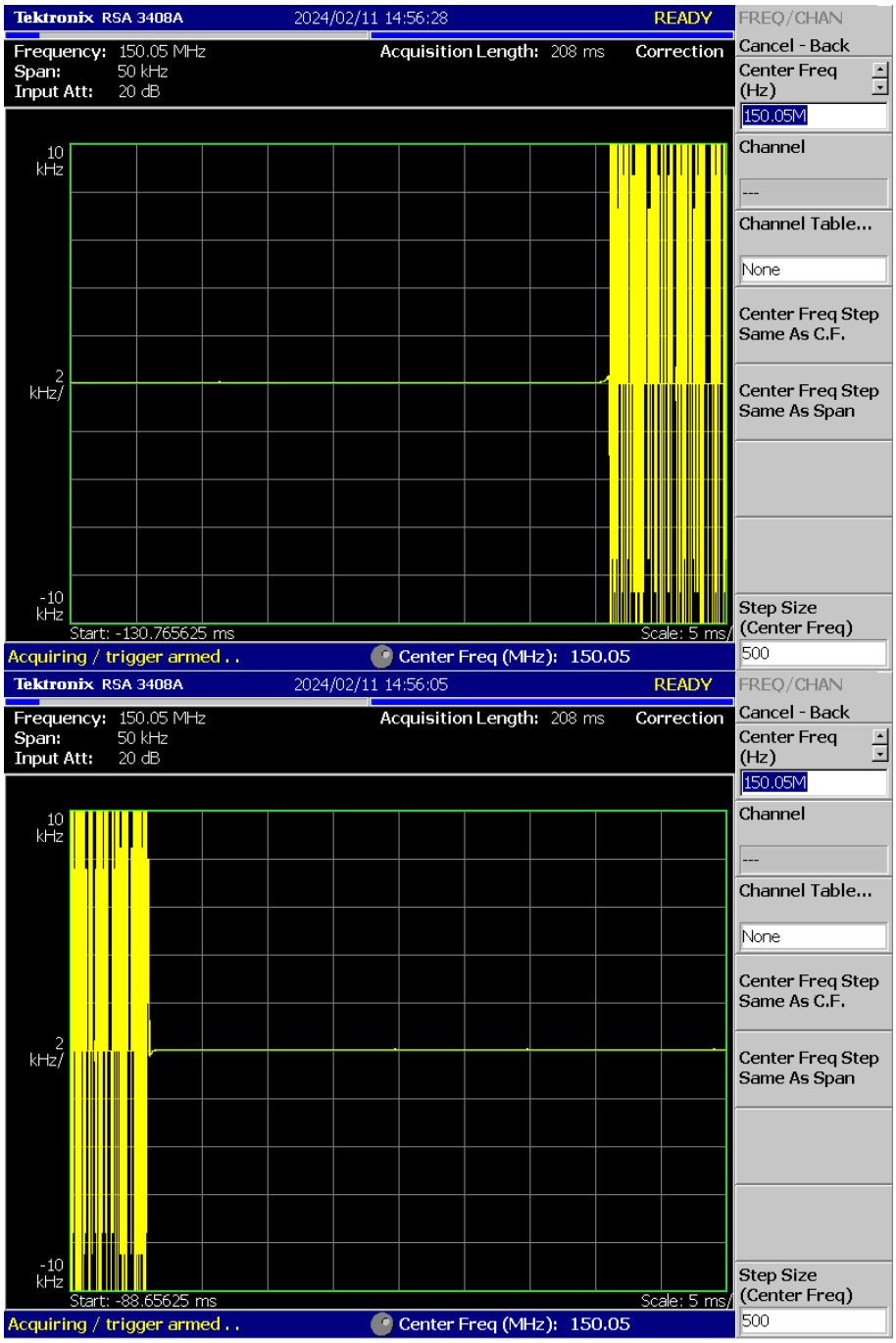


8K30F1E, 8K30F1D, 8K30F7W

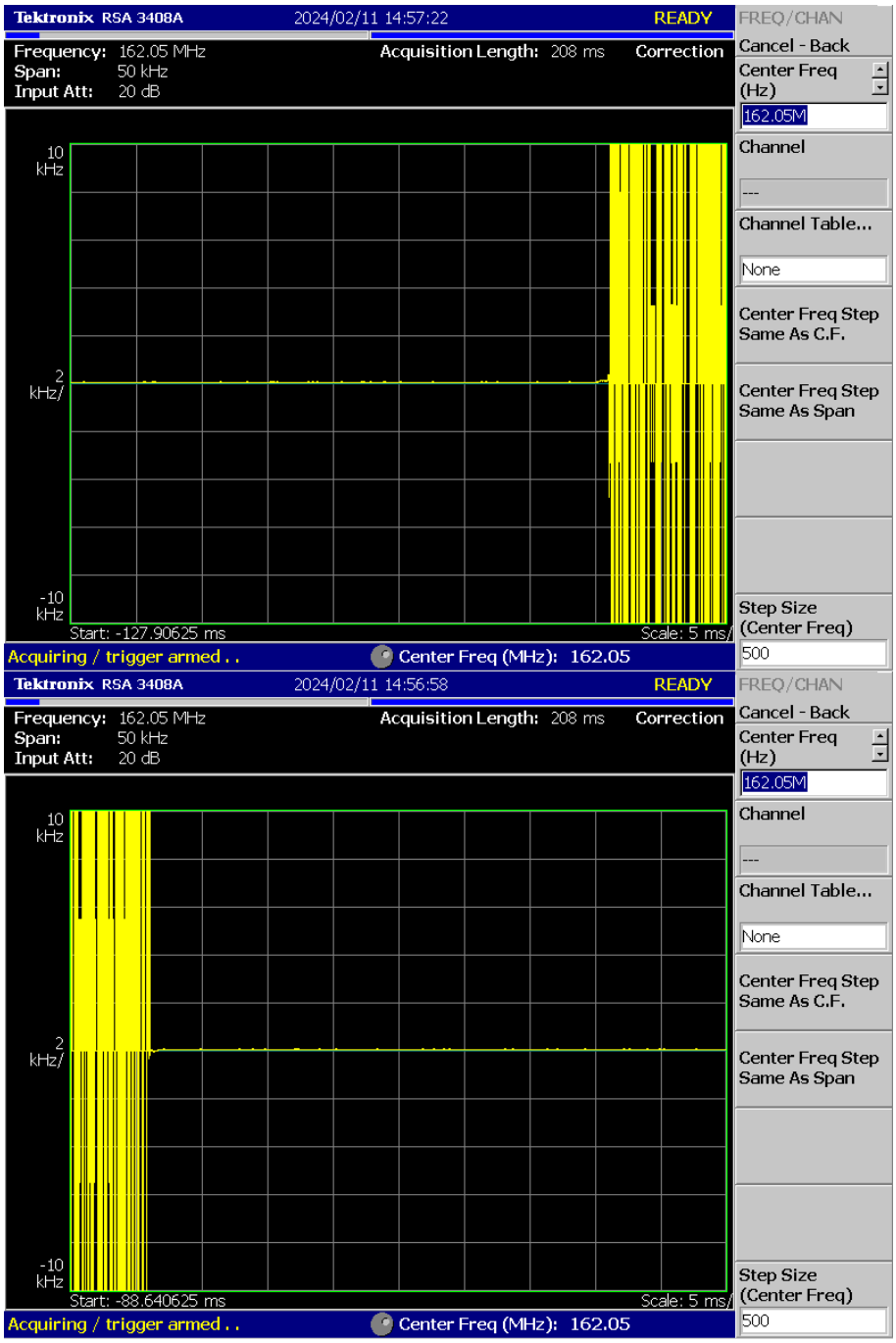
(138.05 MHz)_High



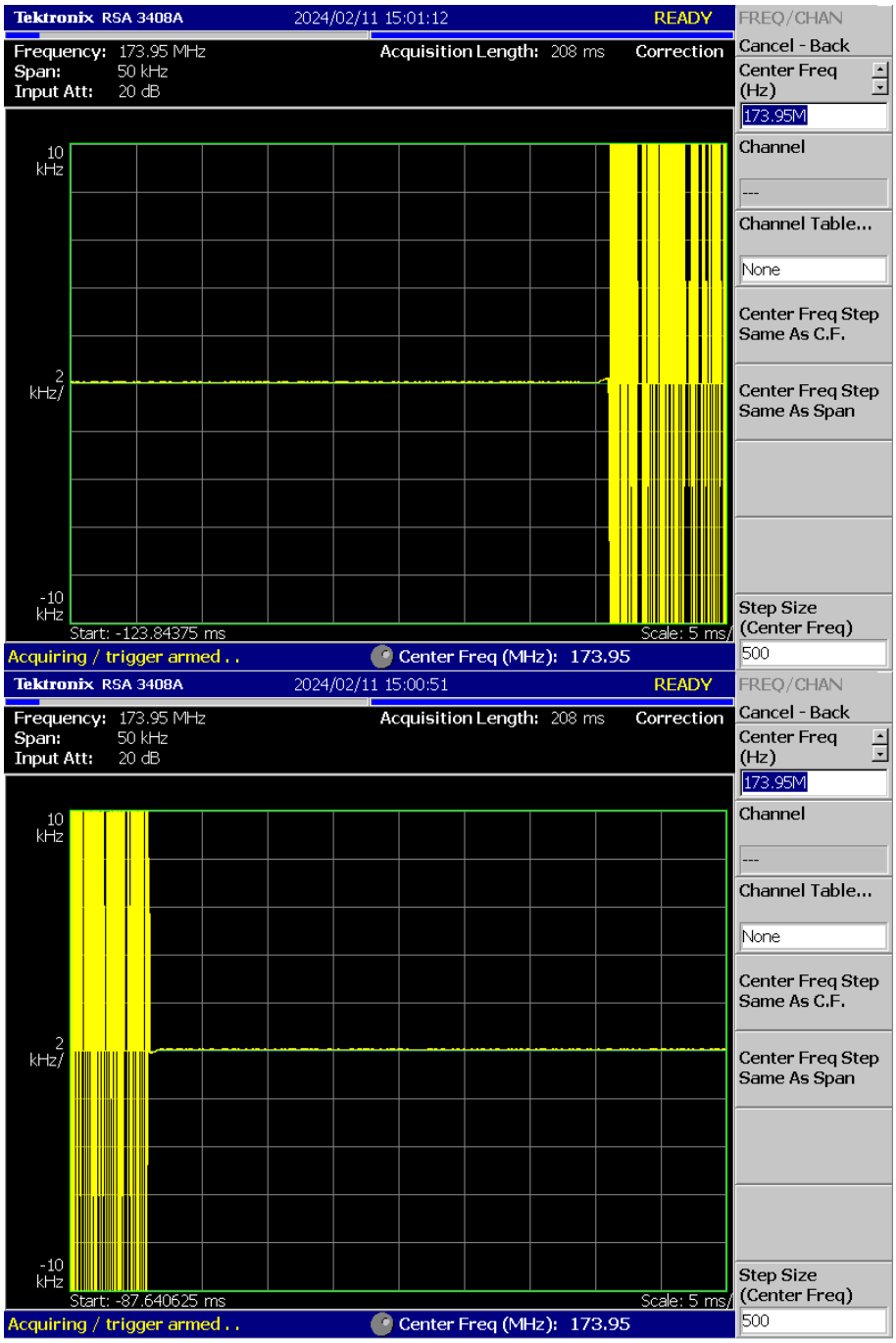
(150.05 MHz)_High



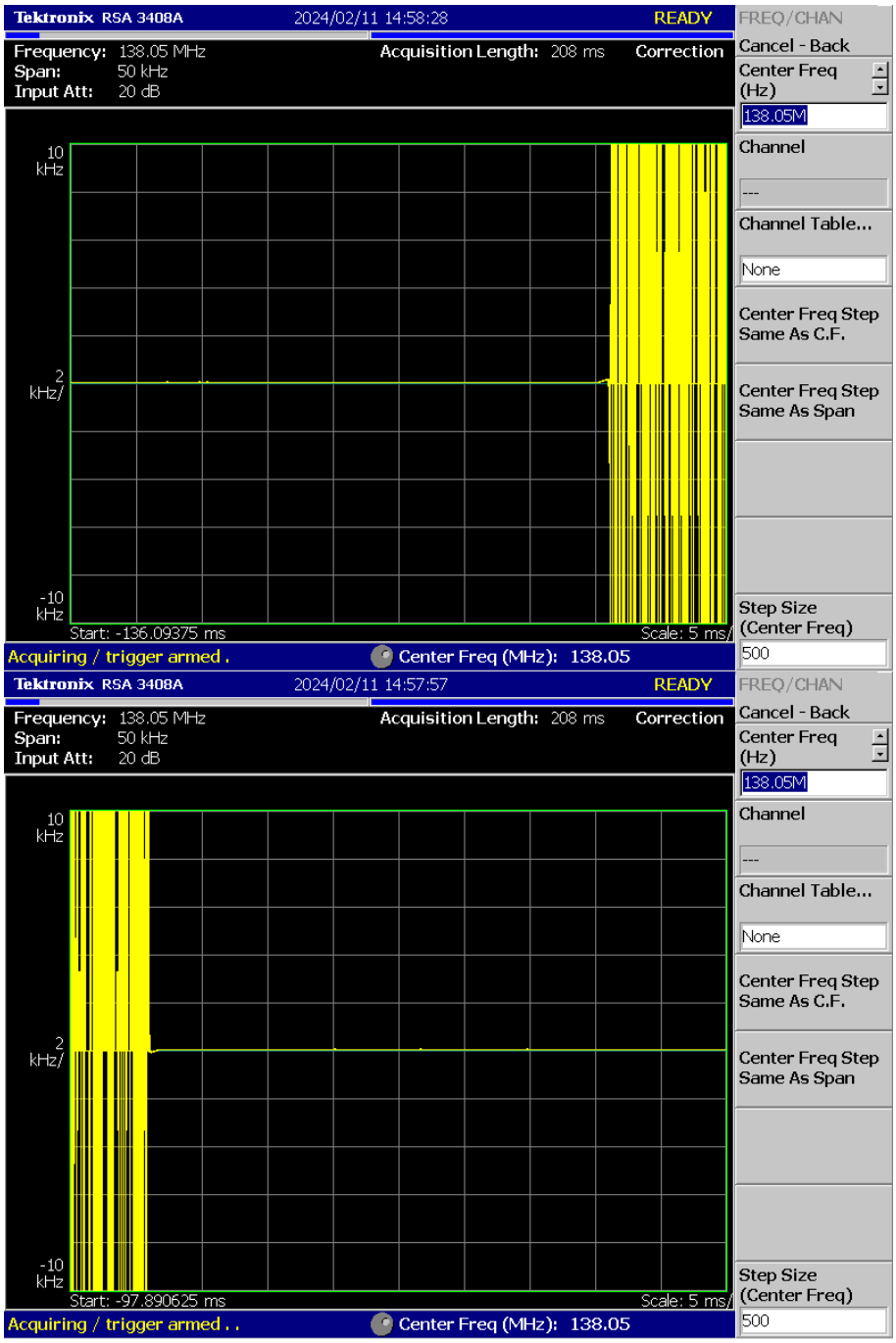
(162.05 MHz)_High



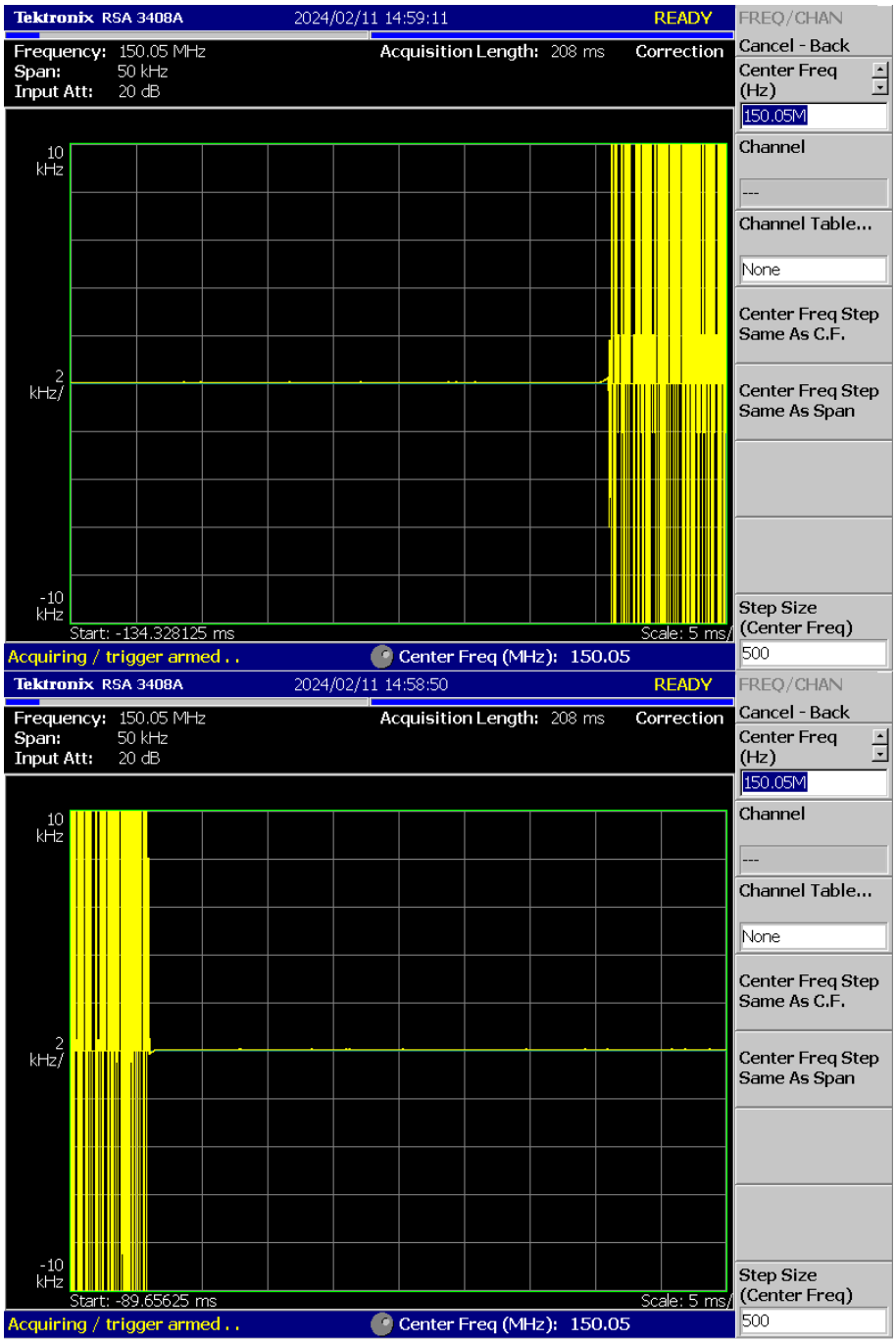
(173.95 MHz)_High



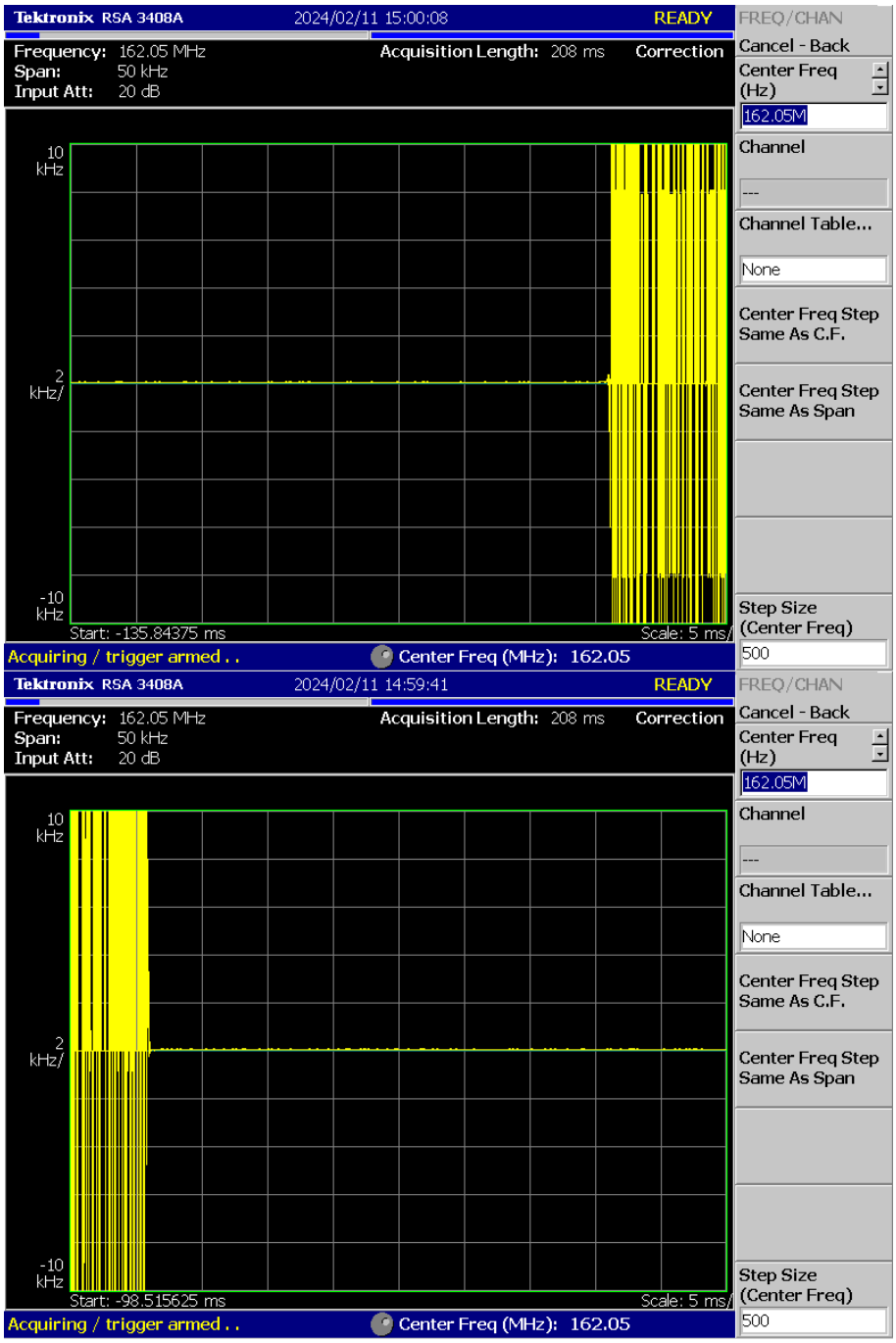
(138.05 MHz)_Low



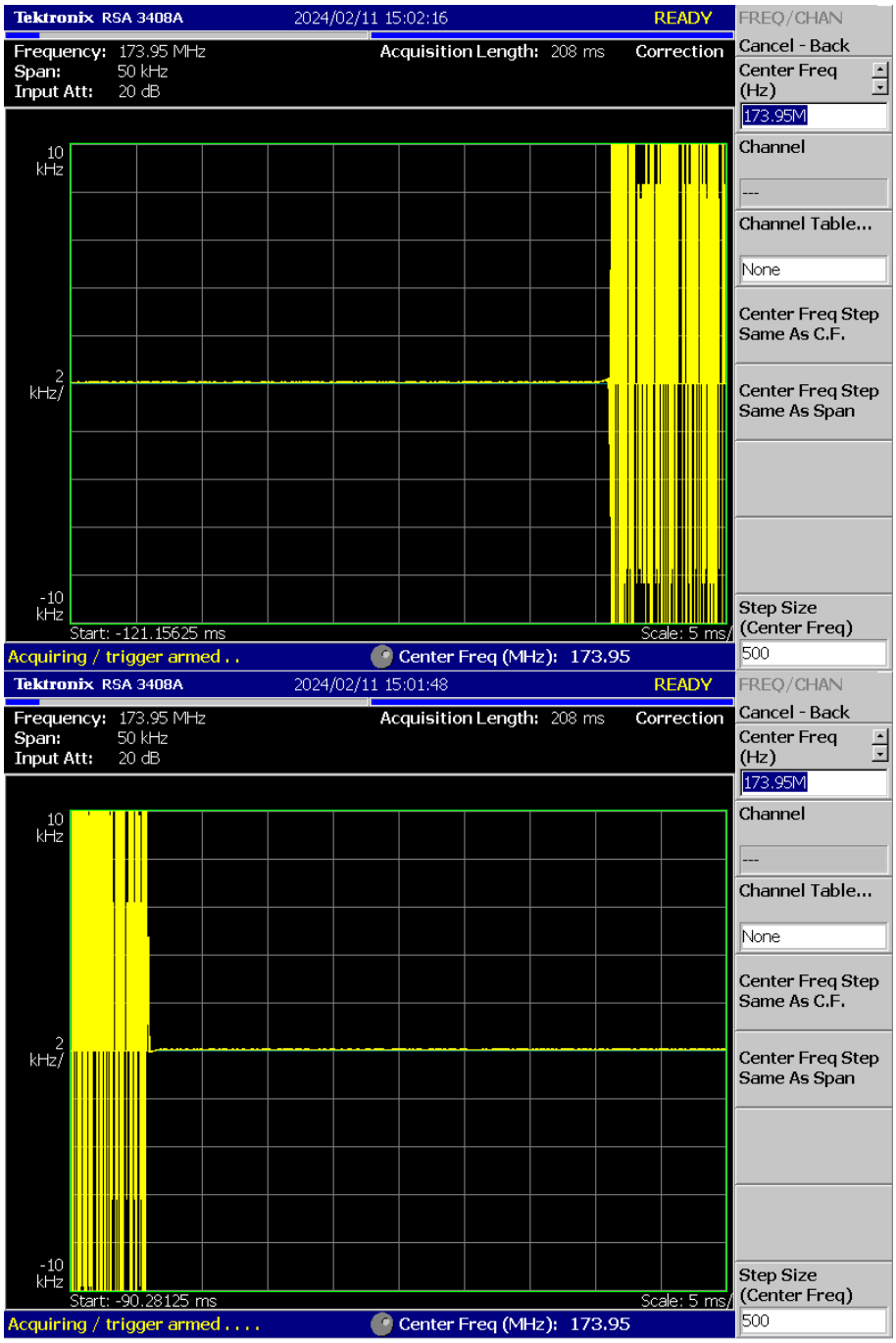
(150.05 MHz)_ Low



(162.05 MHz)_ Low

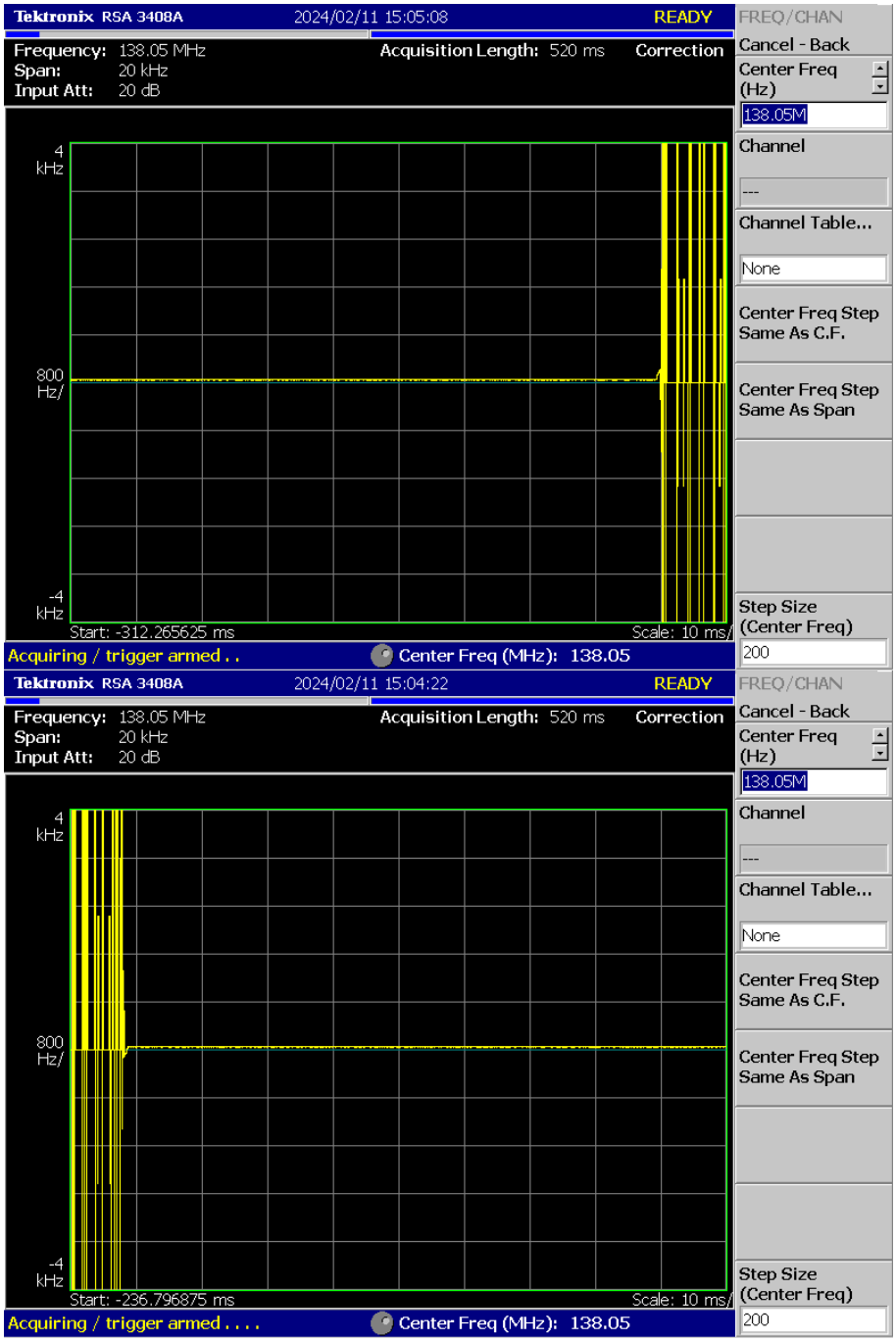


(173.95 MHz)_ Low

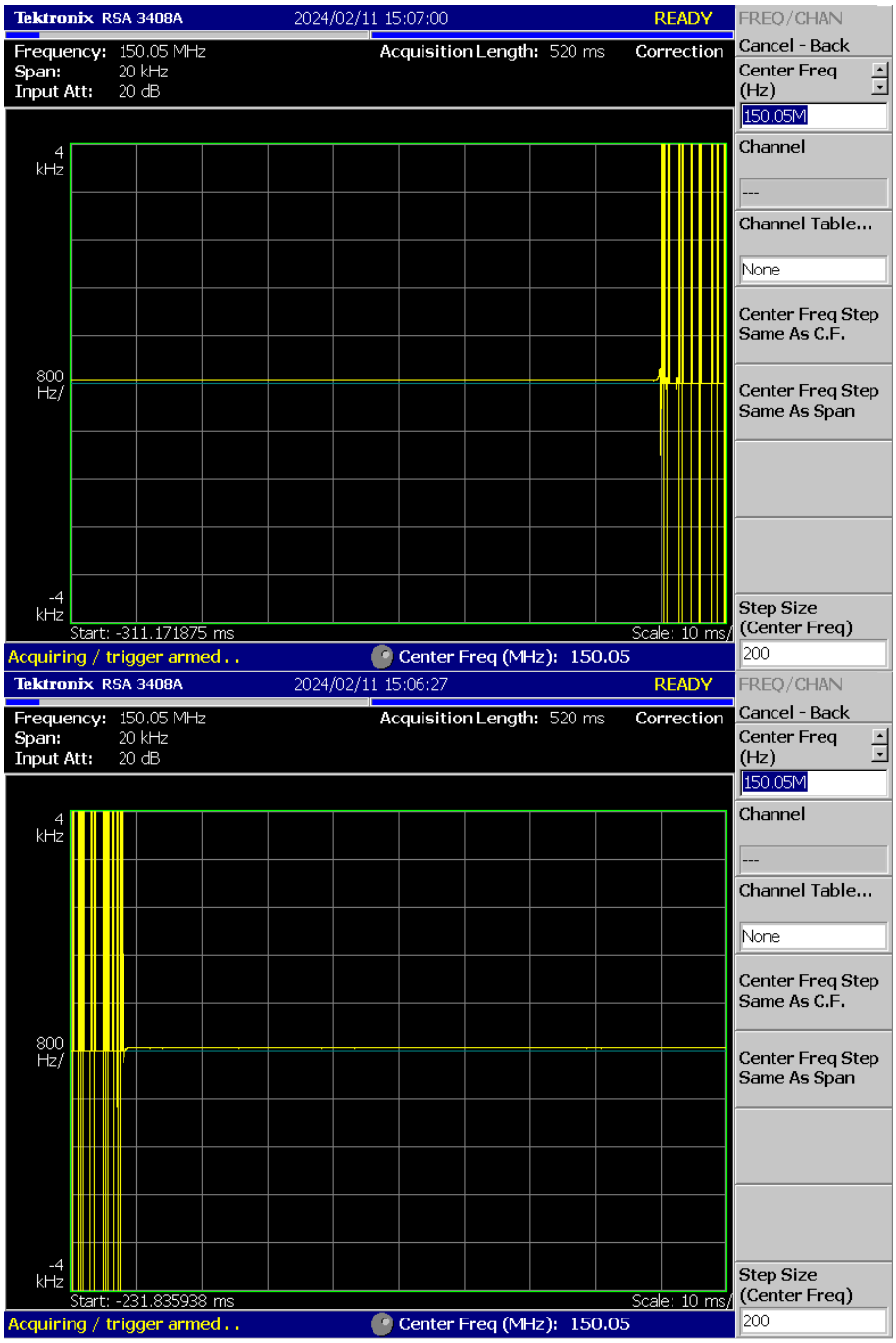


4K00F1E, 4K00F1D, 4K00F7W

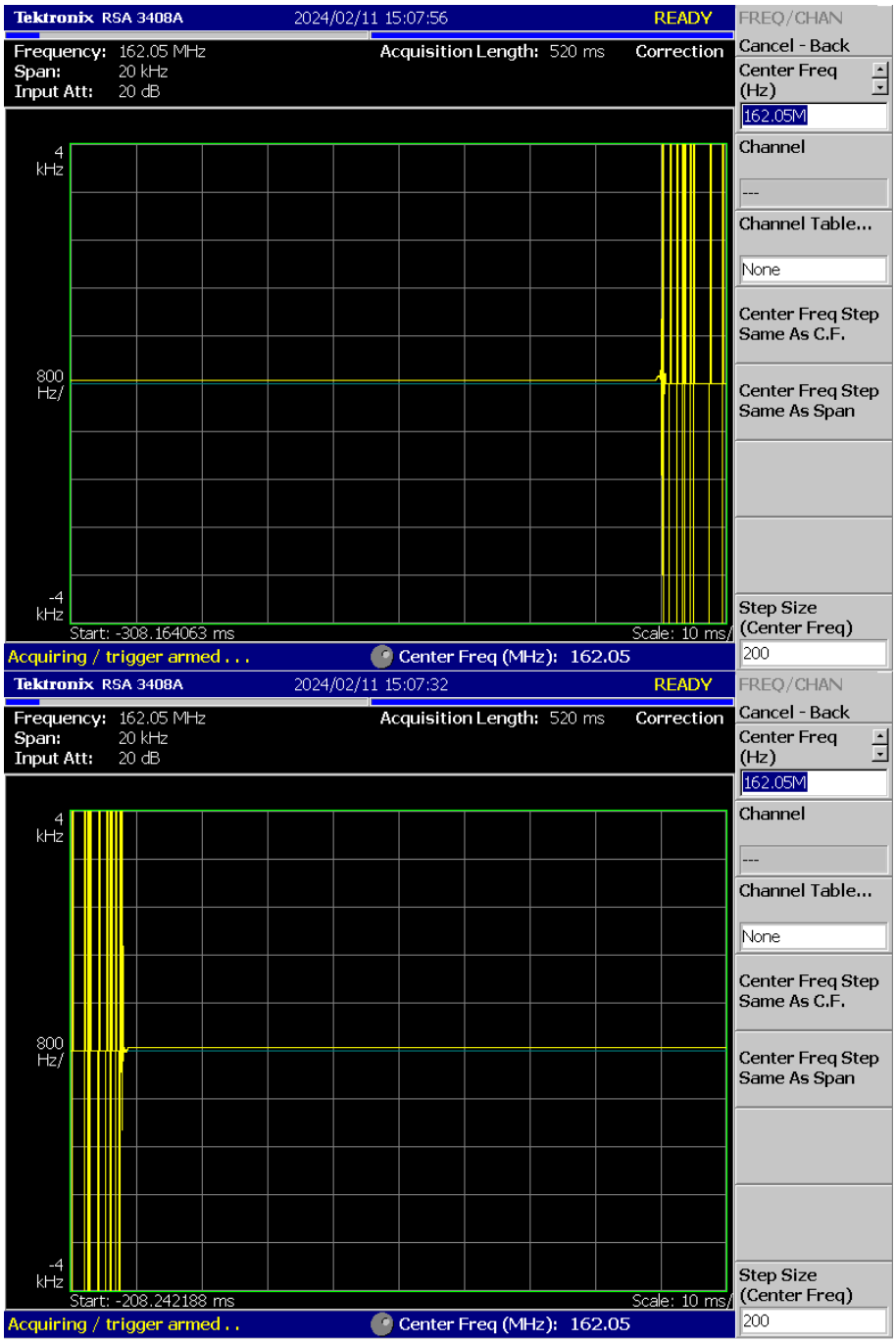
(138.05 MHz)_High



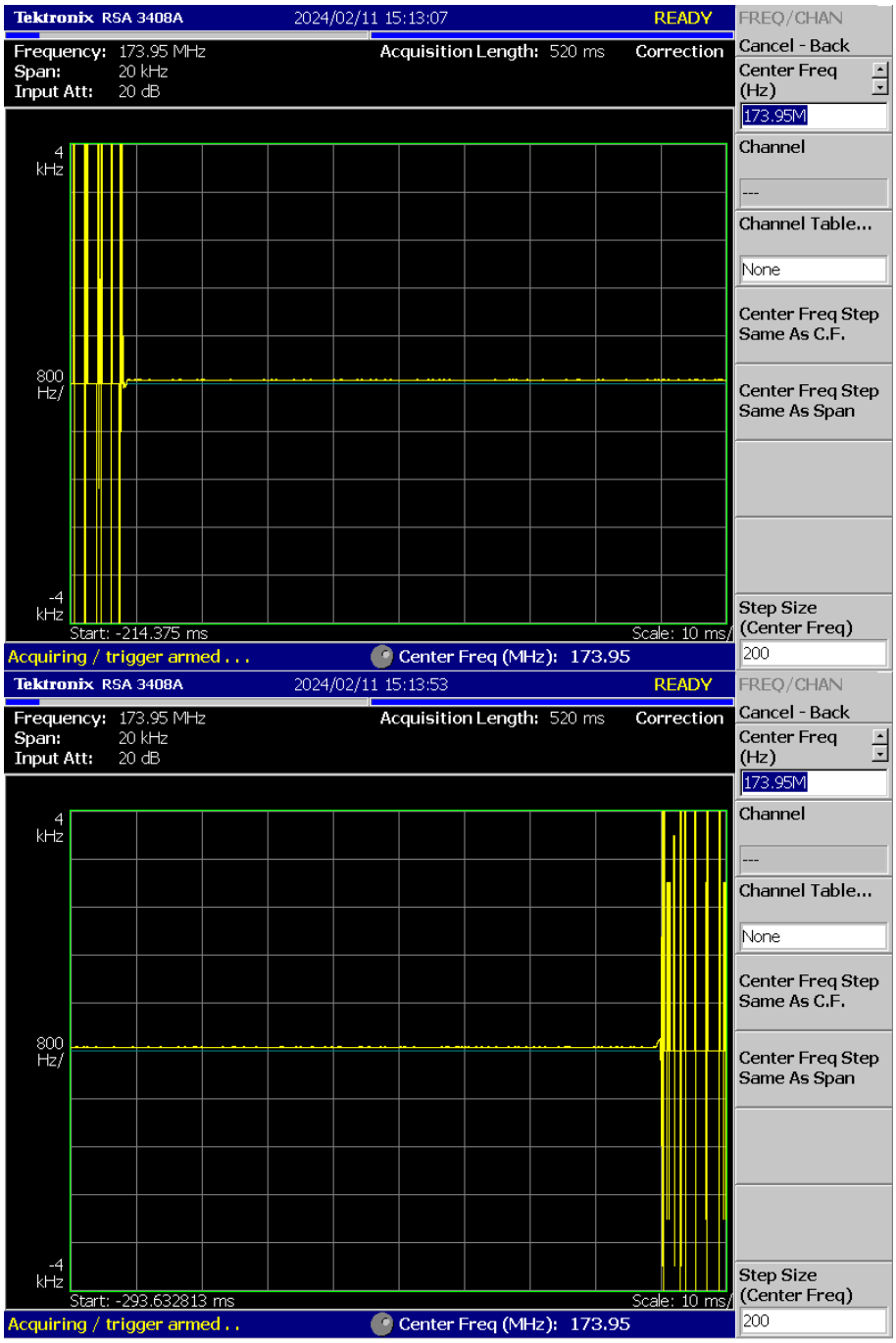
(150.05 MHz)_High



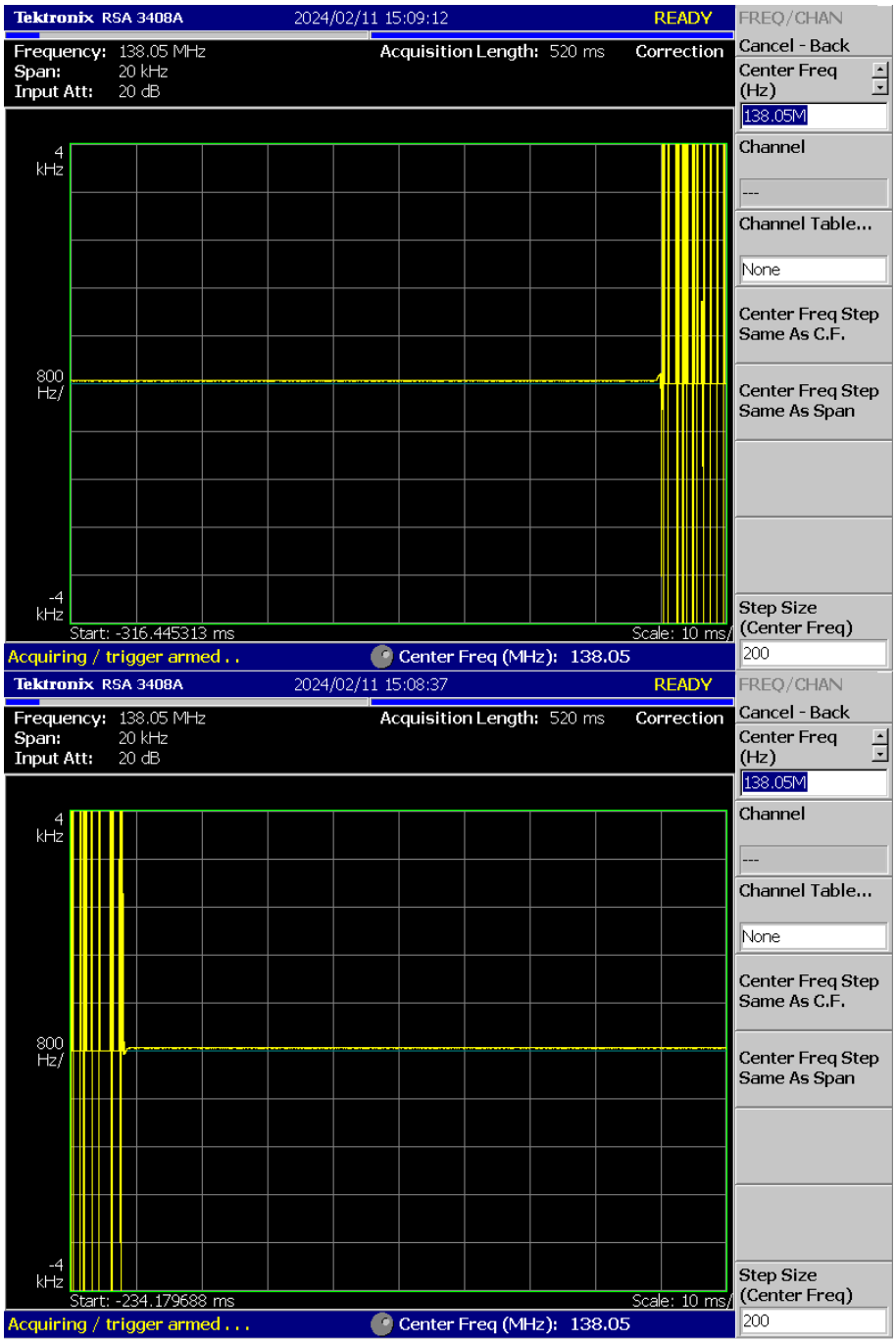
(162.05 MHz)_High



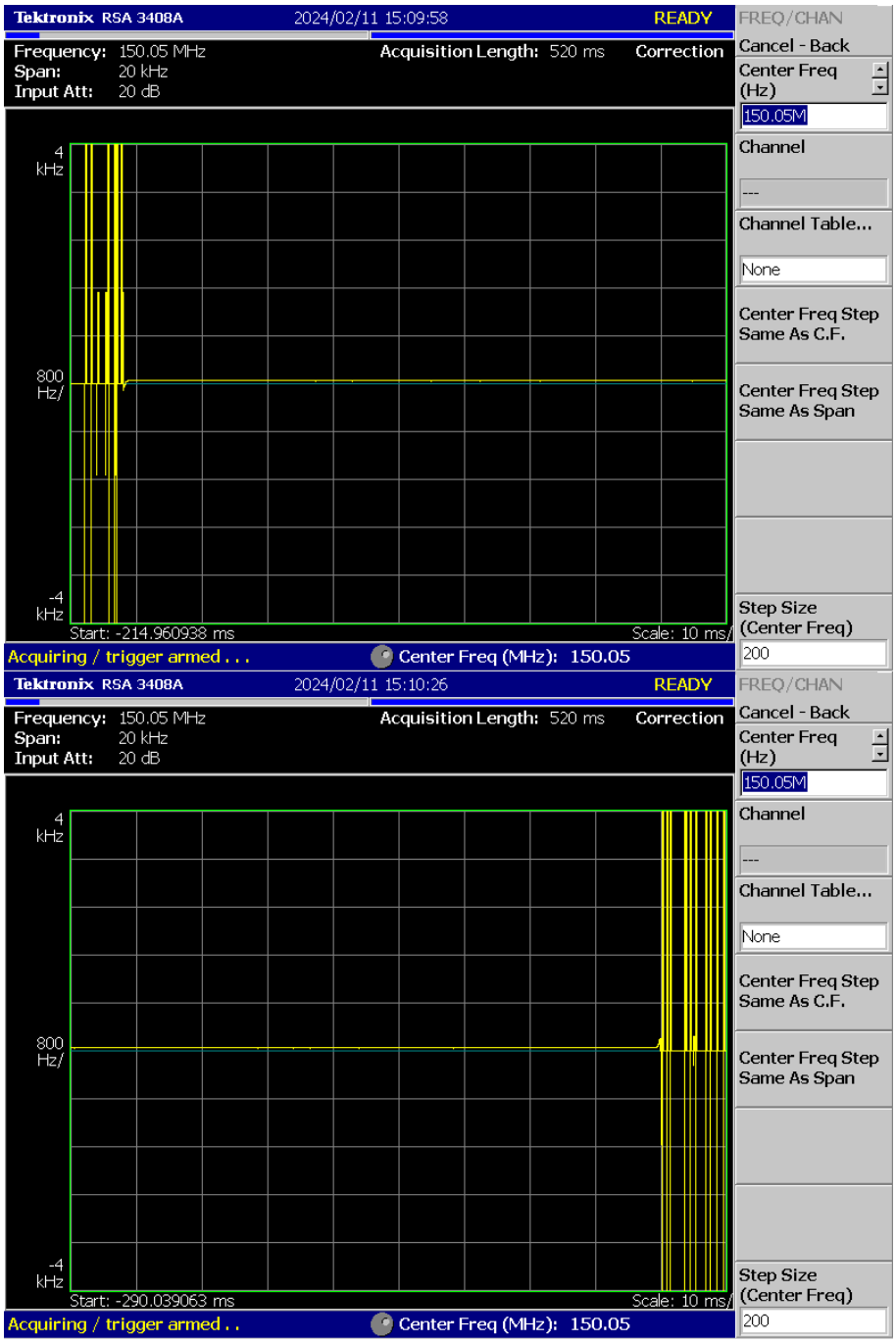
(173.95 MHz)_High



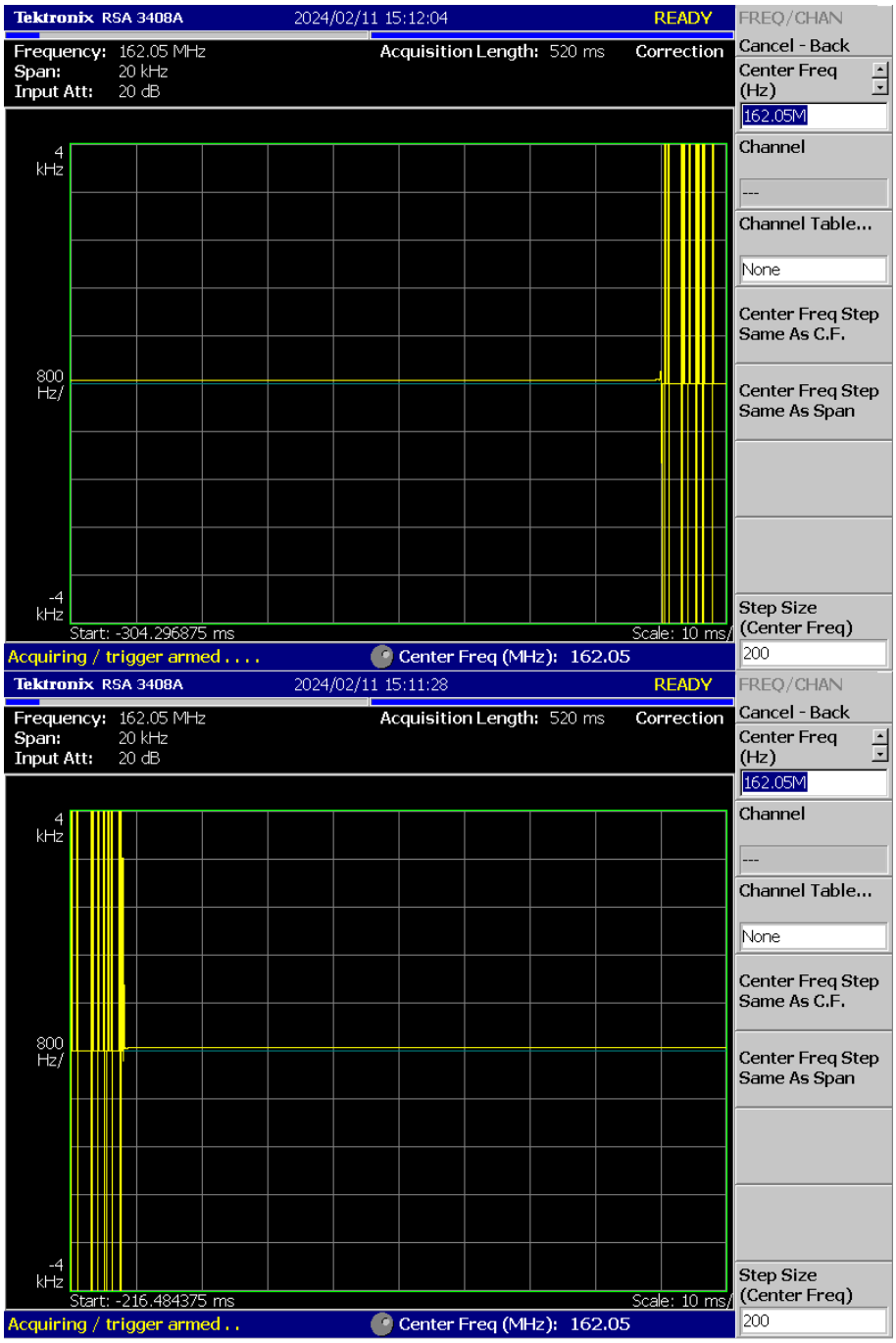
(138.05 MHz)_Low



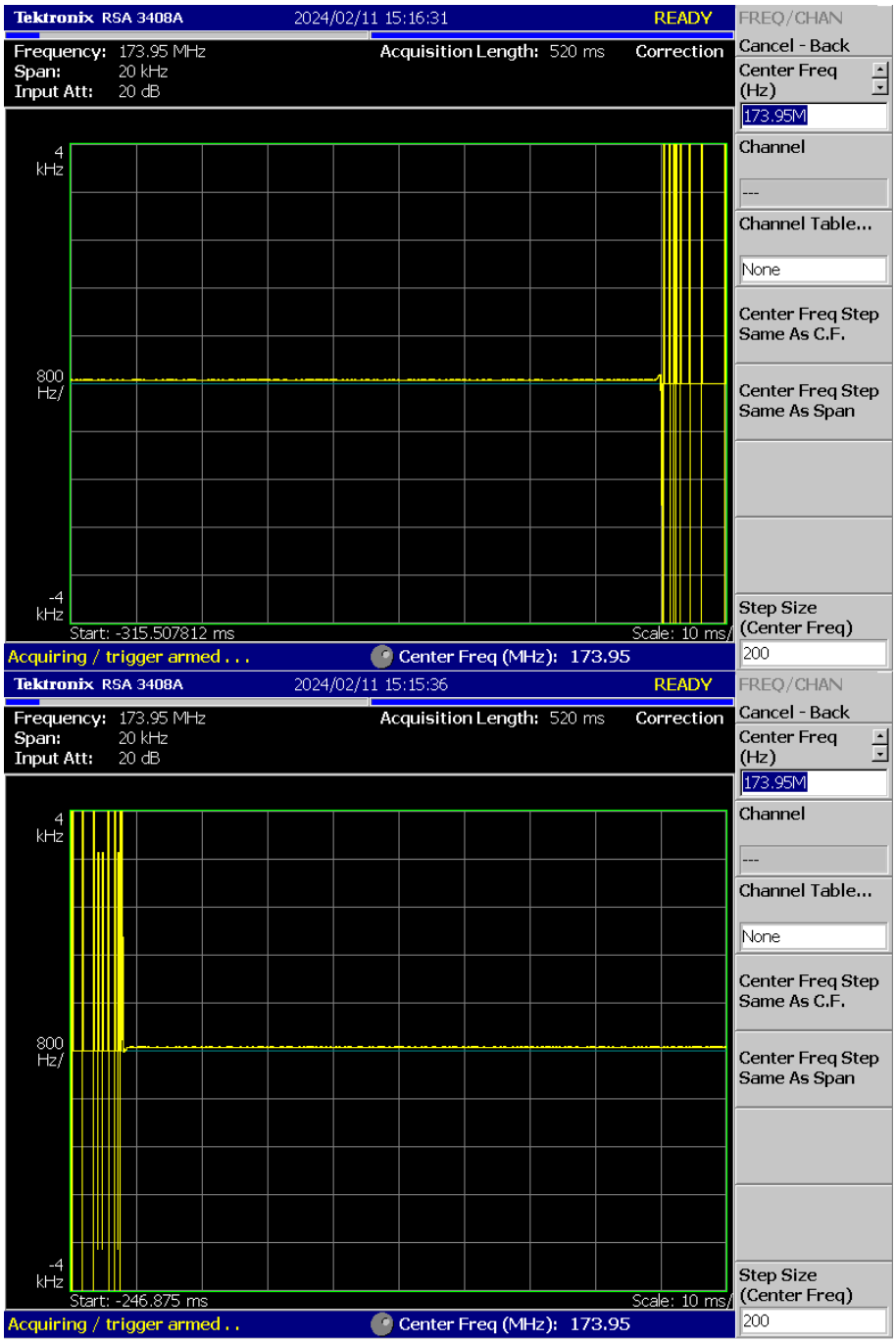
(150.05 MHz)_ Low



(162.05 MHz)_ Low



(173.95 MHz)_ Low

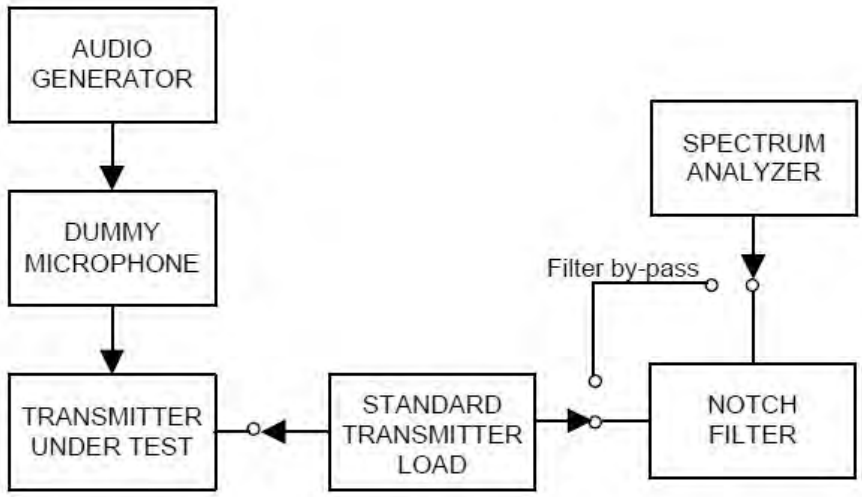


8.8 Unwanted Emissions : Conducted Spurious Emission

▣ Definition

Conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

According to 2.2.13 in TIA-603-E Standard.

a) Connect the equipment as illustrated, with the notch filter by-passed.

b) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.

c) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulation circuit.

d) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.

2) Video Bandwidth ≥3 times the resolution bandwidth.

3) Sweep Speed ≤2000 Hz per second.

4) Detector Mode = mean or average power.

e) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:

1) The lowest radio frequency generated in the equipment to the carrier frequency minus the test bandwidth (see 1.3.4.4).

2) The carrier frequency plus the test bandwidth to a frequency less than 2 times the carrier frequency.

f) Record the frequencies and levels of spurious emissions from step e).

g) Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step f). Record the signal generator levels in dBm.

h) Insert the notch filter.

i) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.

2) Video Bandwidth ≥3 times the resolution bandwidth.

3) Sweep Speed ≤2000 Hz per second.

4) Detector Mode = mean or average power.

j) Key the transmitter. Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from a frequency equal to 2 times the carrier frequency and to the tenth harmonic of the carrier frequency.

▣ TEST RESULTS

Type of Emission	Test Frequency (MHz)	Measured Frequency (MHz)	Resilt (dBm)	Limit (dBm)	Margin (dB)
16K0F3E	138.05	0.01	-68.348	-13.000	55.348
		29.69	-65.434	-13.000	52.434
		276.11	-51.867	-13.000	38.867
		3755.94	-39.029	-13.000	26.029
	150.05	0.01	-70.365	-13.000	57.365
		26.10	-64.321	-13.000	51.321
		300.08	-50.139	-13.000	37.139
		3765.39	-37.588	-13.000	24.588
	162.05	0.01	-69.268	-13.000	56.268
		0.80	-65.412	-13.000	52.412
		730.41	-54.570	-13.000	41.570
		3788.79	-38.297	-13.000	25.297
	173.95	0.01	-69.207	-13.000	56.207
		0.17	-64.572	-13.000	51.572
		347.90	-53.677	-13.000	40.677
		3761.79	-38.088	-13.000	25.088

Type of Emission	Test Frequency (MHz)	Measured Frequency (MHz)	Resilt (dBm)	Limit (dBm)	Margin (dB)
11K0F3E	138.05	0.02	-68.921	-20.000	48.921
		1.44	-63.157	-20.000	43.157
		276.11	-50.858	-20.000	30.858
		4901.25	-39.023	-20.000	19.023
	150.05	0.01	-69.145	-20.000	49.145
		0.26	-63.627	-20.000	43.627
		300.08	-49.874	-20.000	29.874
		3797.34	-38.618	-20.000	18.618
	162.05	0.01	-69.873	-20.000	49.873
		0.32	-65.200	-20.000	45.200
		486.14	-52.092	-20.000	32.092
		4920.15	-38.954	-20.000	18.954
	173.95	0.01	-68.227	-20.000	48.227
		0.27	-64.463	-20.000	44.463
		347.90	-53.517	-20.000	33.517
		3791.94	-38.304	-20.000	18.304

Type of Emission	Test Frequency (MHz)	Measured Frequency (MHz)	Resilt (dBm)	Limit (dBm)	Margin (dB)
8K30F1E, 8K30F1D, 8K30F7W	138.05	0.01	-68.318	-20.000	48.318
		18.92	-64.739	-20.000	44.739
		276.11	-53.761	-20.000	33.761
		3815.79	-39.214	-20.000	19.214
	150.05	0.01	-68.291	-20.000	48.291
		24.13	-63.151	-20.000	43.151
		300.08	-50.800	-20.000	30.800
		4920.15	-38.000	-20.000	18.000
	162.05	0.01	-64.137	-20.000	44.137
		0.18	-63.876	-20.000	43.876
		486.14	-50.711	-20.000	30.711
		4930.05	-38.881	-20.000	18.881
	173.95	0.01	-66.424	-20.000	46.424
		20.36	-64.496	-20.000	44.496
		793.08	-52.830	-20.000	32.830
		4062.40	-38.233	-20.000	18.233

Type of Emission	Test Frequency (MHz)	Measured Frequency (MHz)	Resilt (dBm)	Limit (dBm)	Margin (dB)
4K00F1E, 4K00F1D, 4K00F7W	138.05	0.01	-66.616	-25.000	41.616
		20.36	-64.391	-25.000	39.391
		276.11	-52.719	-25.000	27.719
		3801.84	-37.831	-25.000	12.831
	150.05	0.01	-67.198	-25.000	42.198
		0.33	-63.906	-25.000	38.906
		300.08	-50.926	-25.000	25.926
		4068.70	-38.428	-25.000	13.428
	162.05	0.01	-66.712	-25.000	41.712
		3.05	-64.115	-25.000	39.115
		486.14	-51.786	-25.000	26.786
		3770.79	-38.420	-25.000	13.420
	173.95	0.01	-67.686	-25.000	42.686
		4.84	-64.785	-25.000	39.785
		347.90	-53.208	-25.000	28.208
		3800.04	-38.022	-25.000	13.022

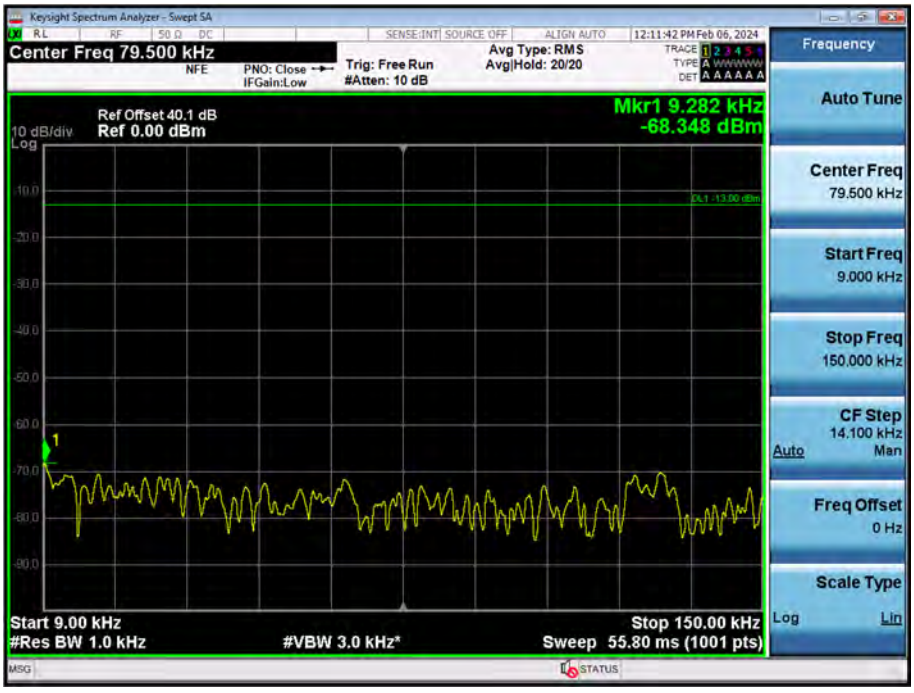
Type of Emission	Test Frequency (MHz)	Measured Frequency (MHz)	Resilt (dBm)	Limit (dBm)	Margin (dB)
4K00F2D	138.05	0.01	-68.418	-25.000	43.418
		0.33	-64.226	-25.000	39.226
		276.11	-52.072	-25.000	27.072
		3797.79	-38.025	-25.000	13.025
	150.05	0.01	-68.263	-25.000	43.263
		4.79	-64.447	-25.000	39.447
		300.08	-50.198	-25.000	25.198
		3759.99	-39.148	-25.000	14.148
	162.05	0.13	-69.275	-25.000	44.275
		0.20	-64.526	-25.000	39.526
		324.13	-53.472	-25.000	28.472
		3798.69	-38.329	-25.000	13.329
	173.95	0.01	-69.245	-25.000	44.245
		7.95	-65.182	-25.000	40.182
		347.90	-52.978	-25.000	27.978
		3730.74	-38.668	-25.000	13.668

▣ Plots of Unwanted Emissions : Conducted Spurious Emission

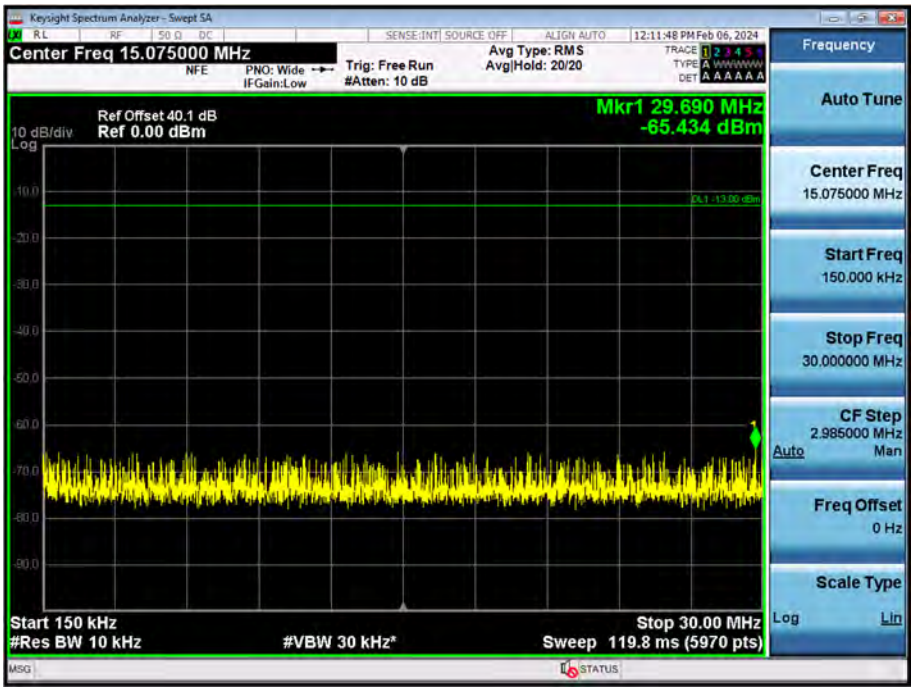
16K0F3E

(138.05 MHz)_High

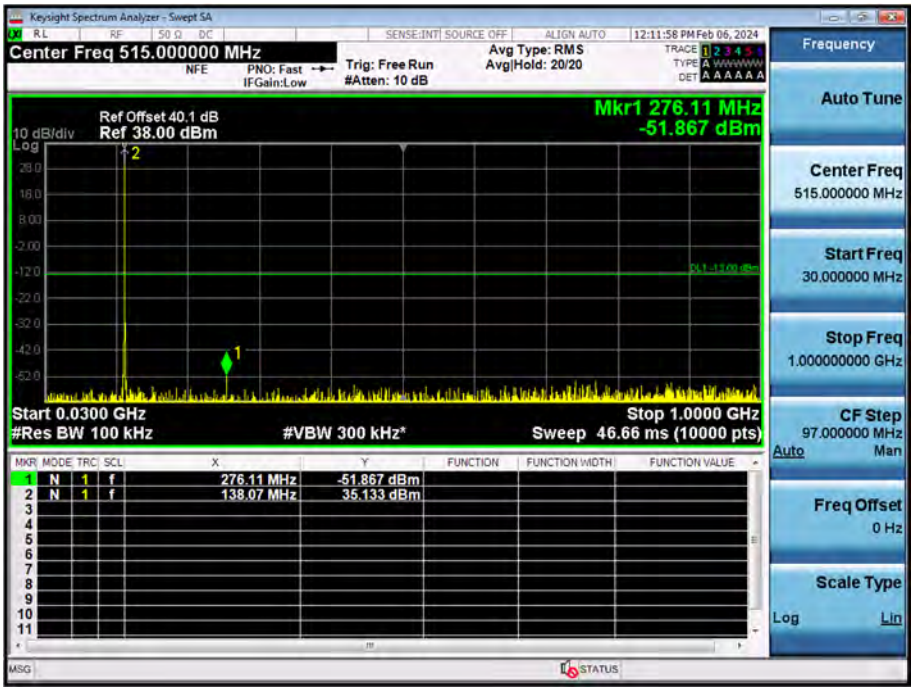
9 kHz~150 kHz



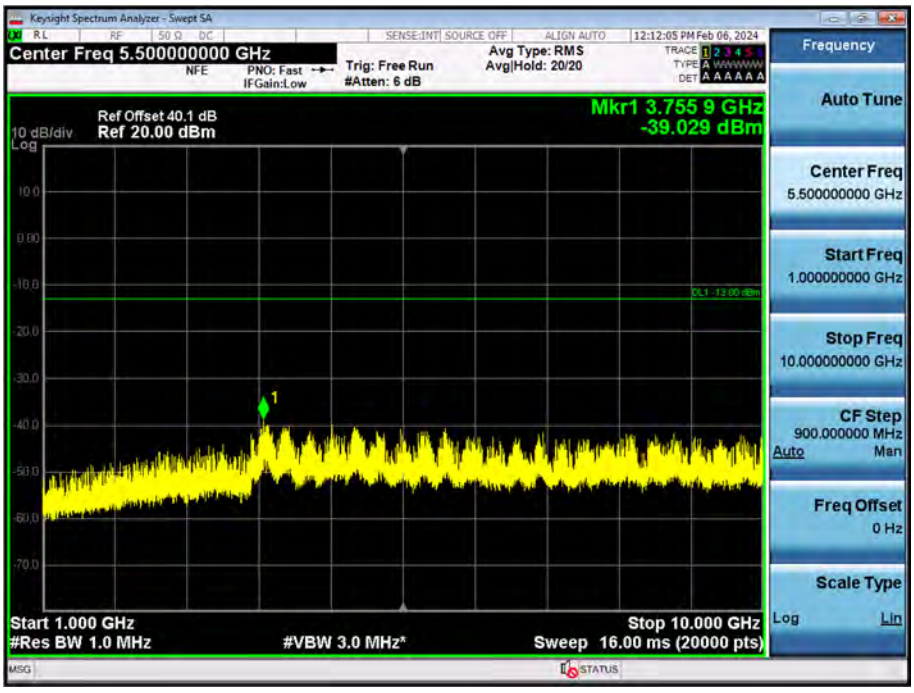
150 kHz~30 MHz



30 MHz~1 GHz

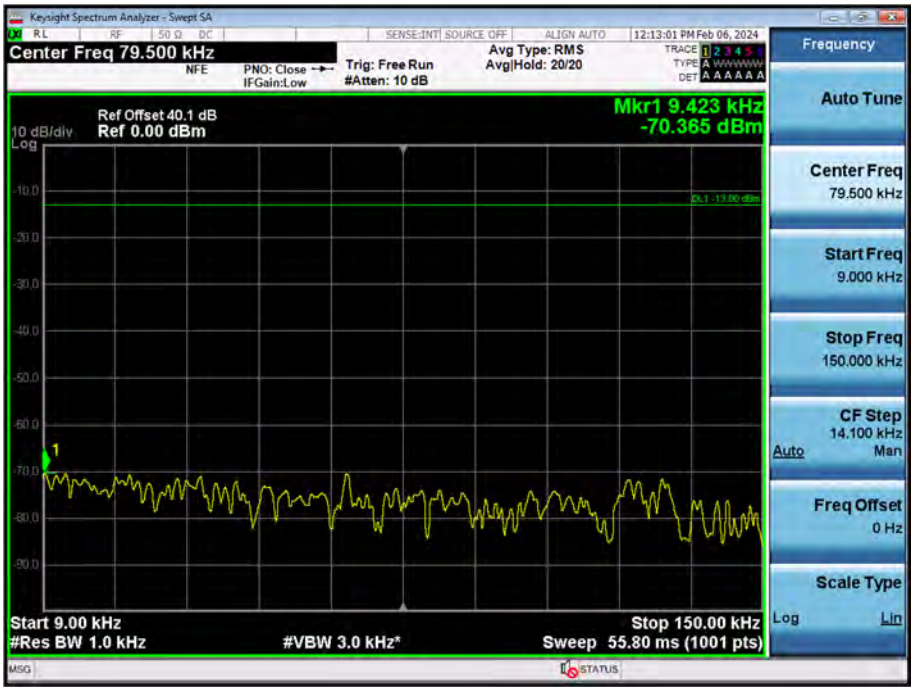


1 GHz~10 GHz

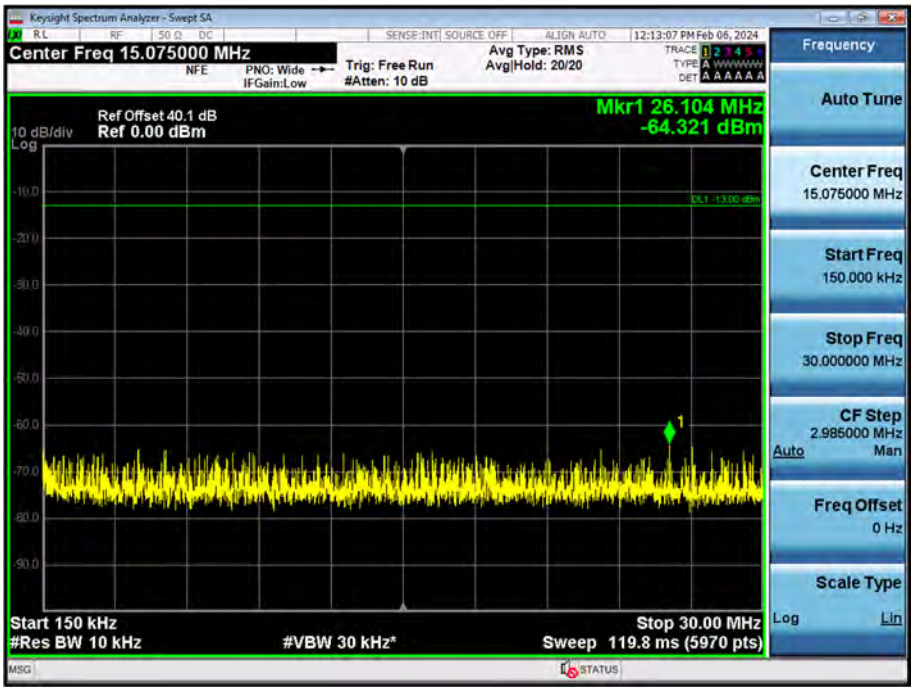


(150.05 MHz)_High

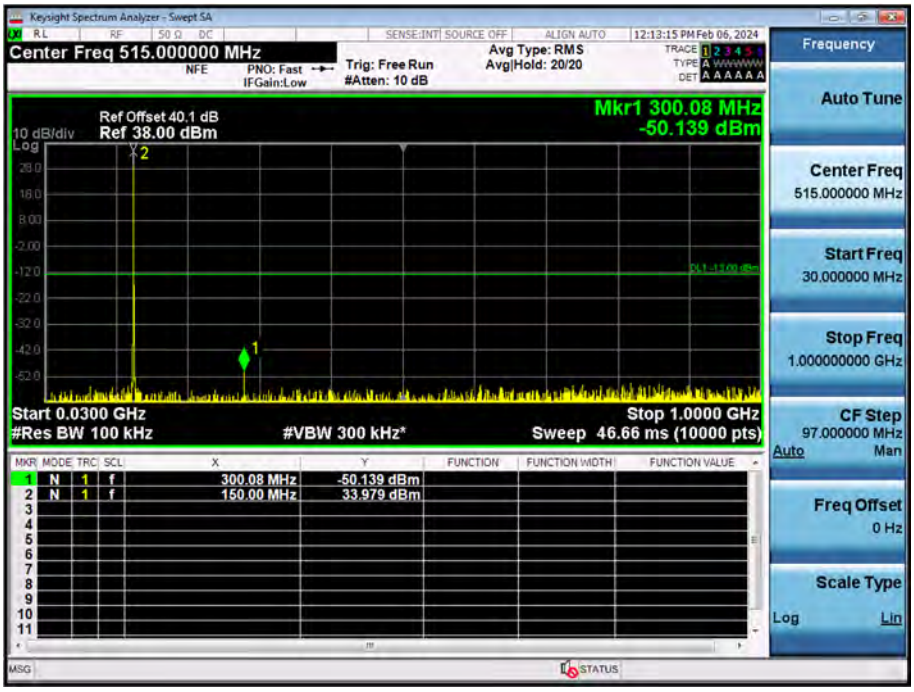
9 kHz~150 kHz



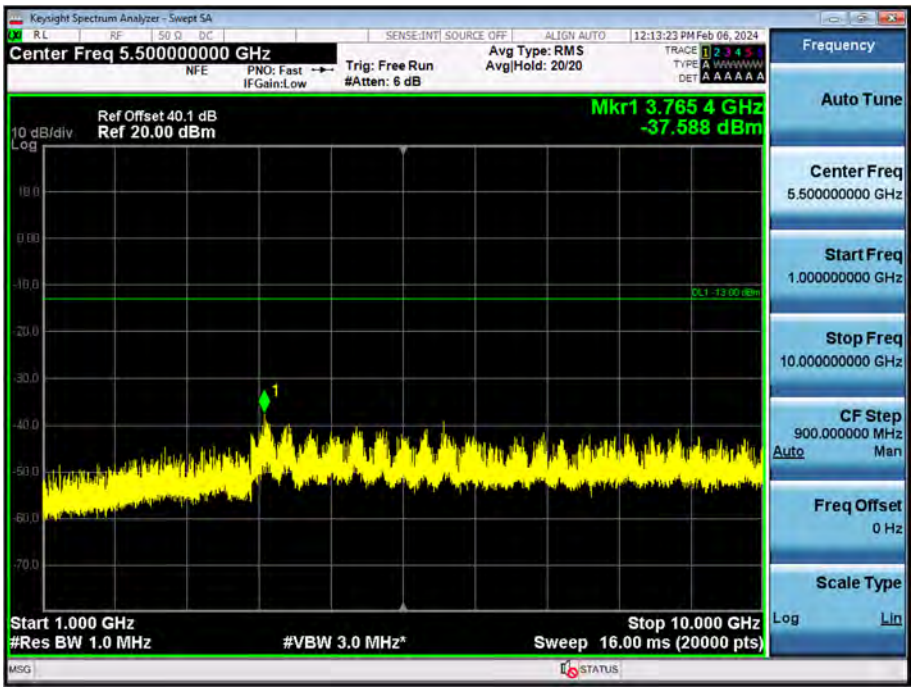
150 kHz~30 MHz



30 MHz~1 GHz

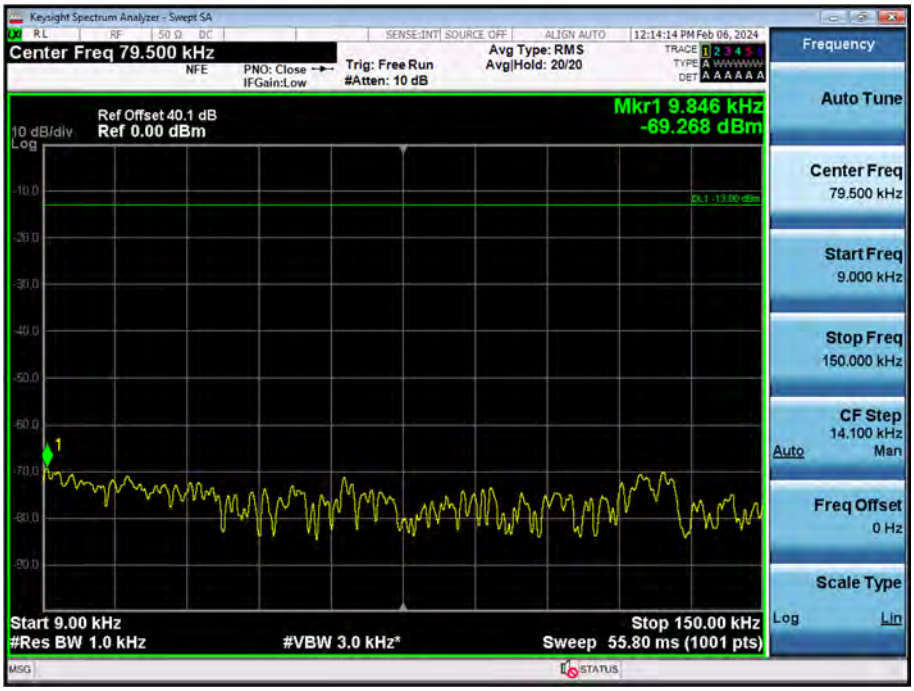


1 GHz~10 GHz

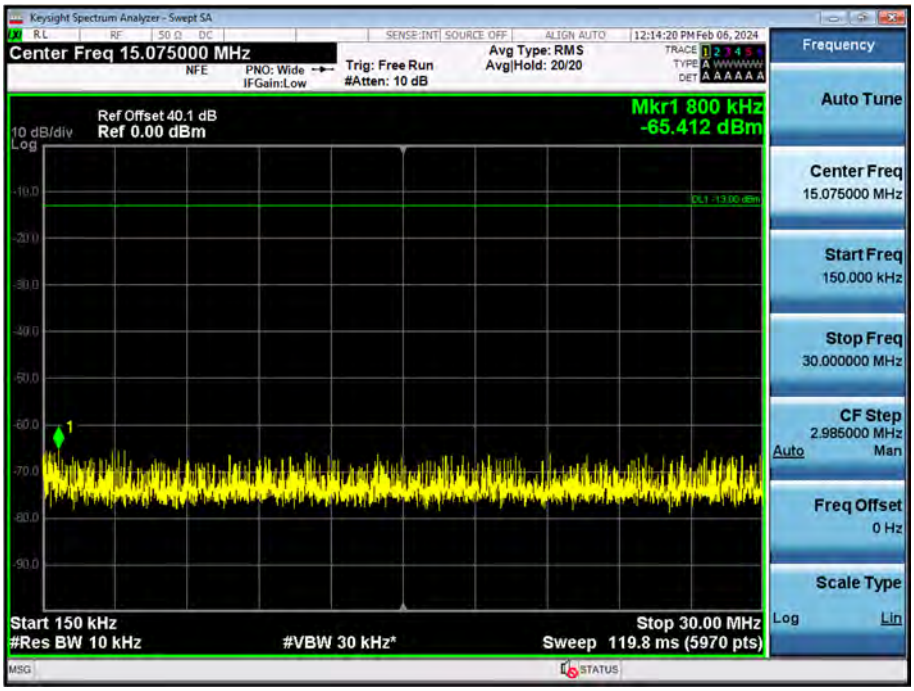


(162.05 MHz)_High

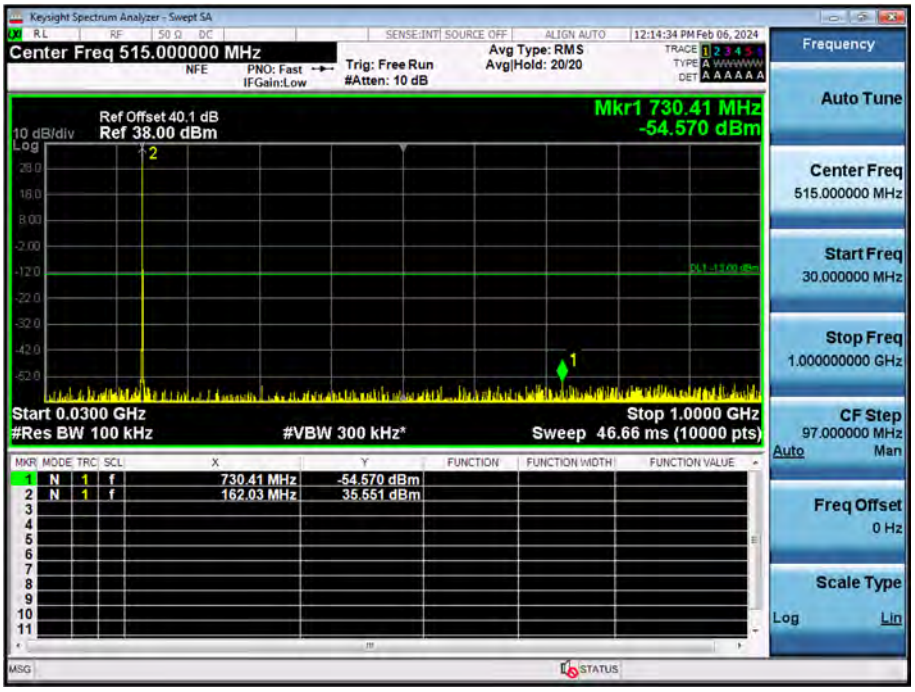
9 kHz~150 kHz



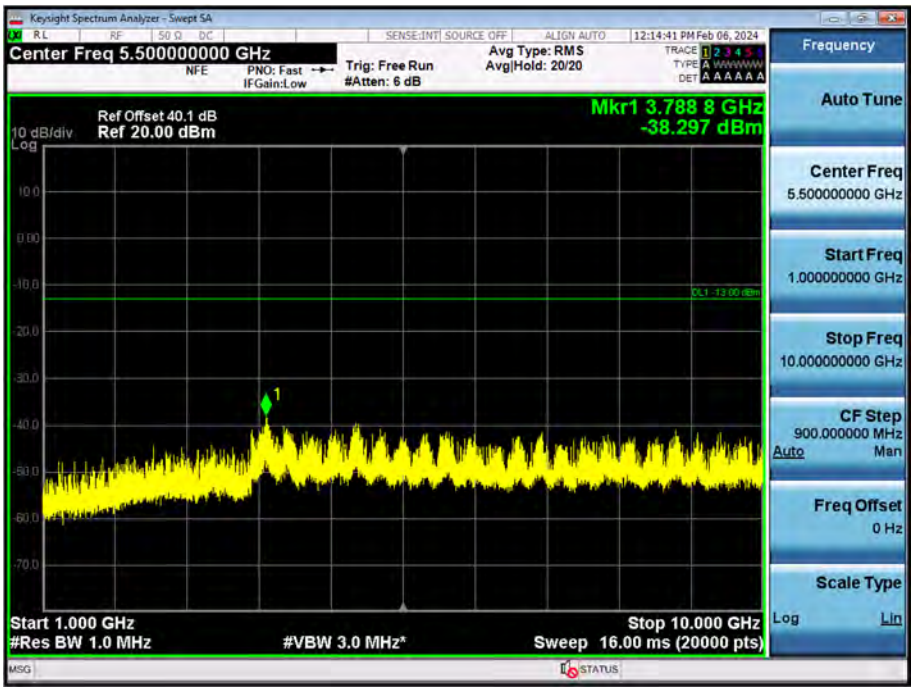
150 kHz~30 MHz



30 MHz~1 GHz

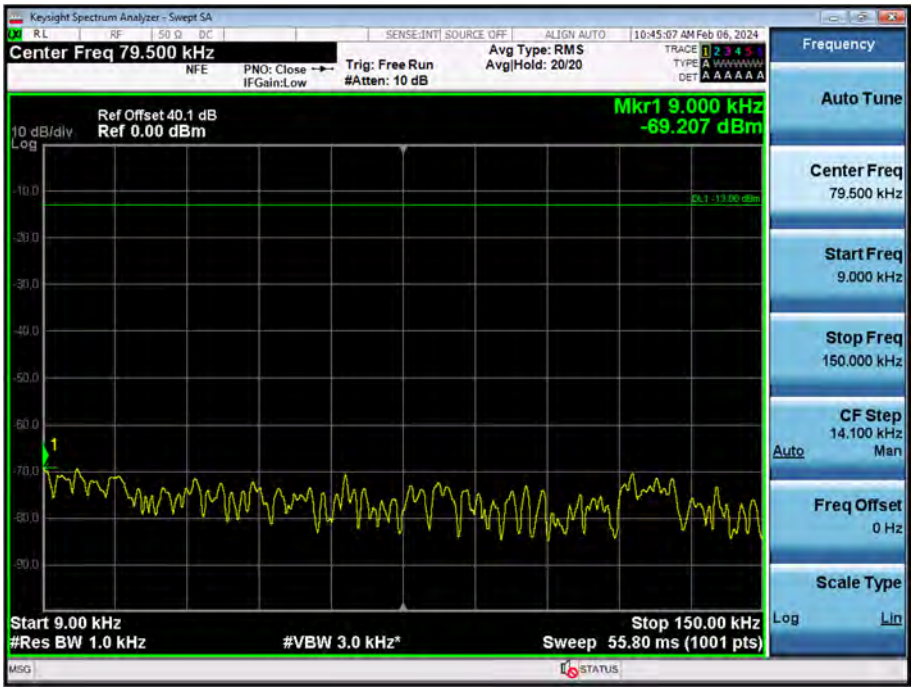


1 GHz~10 GHz

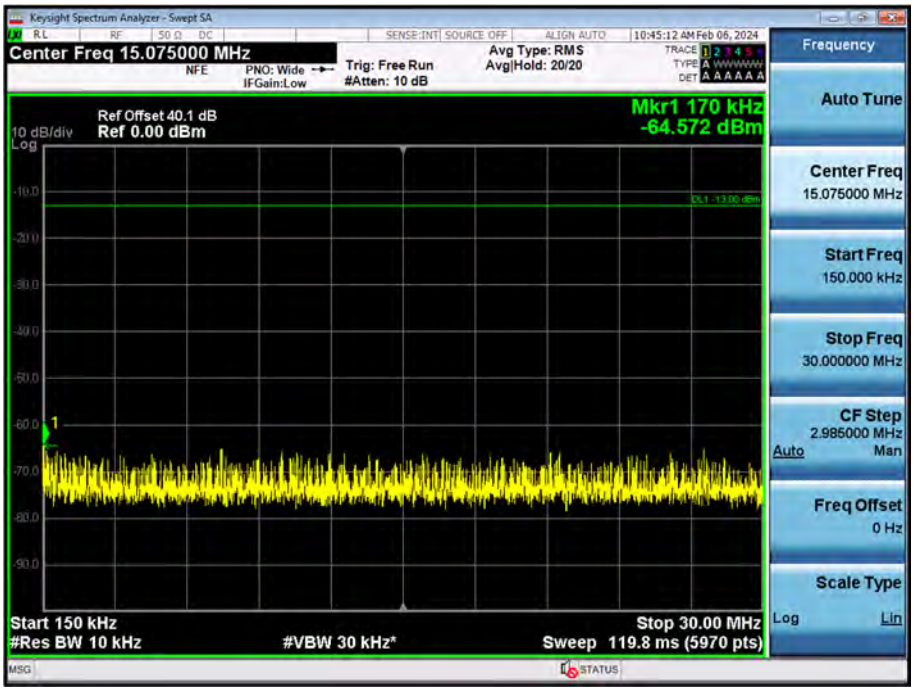


(173.95 MHz)_High

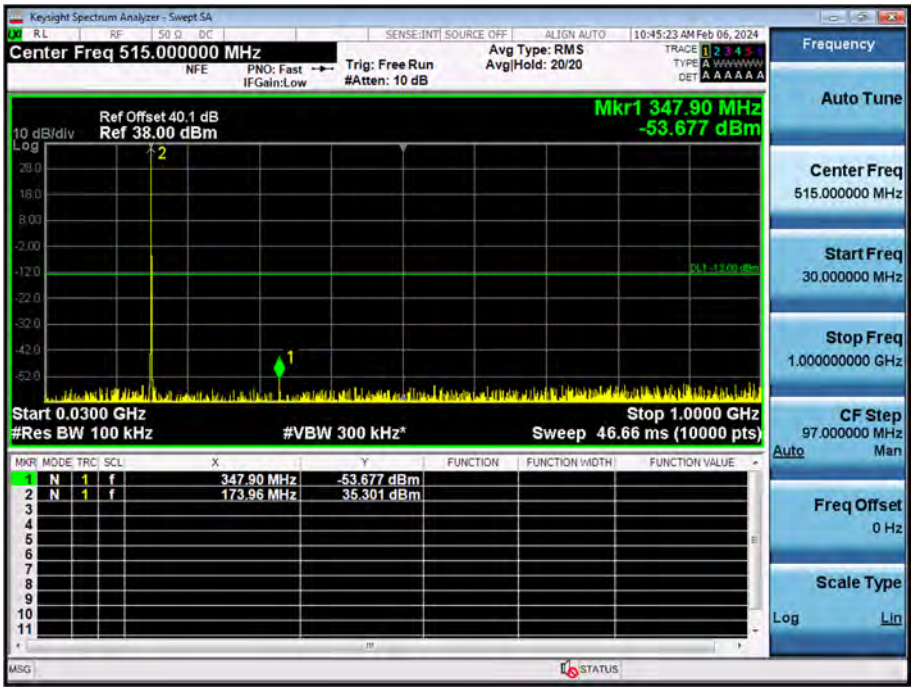
9 kHz~150 kHz



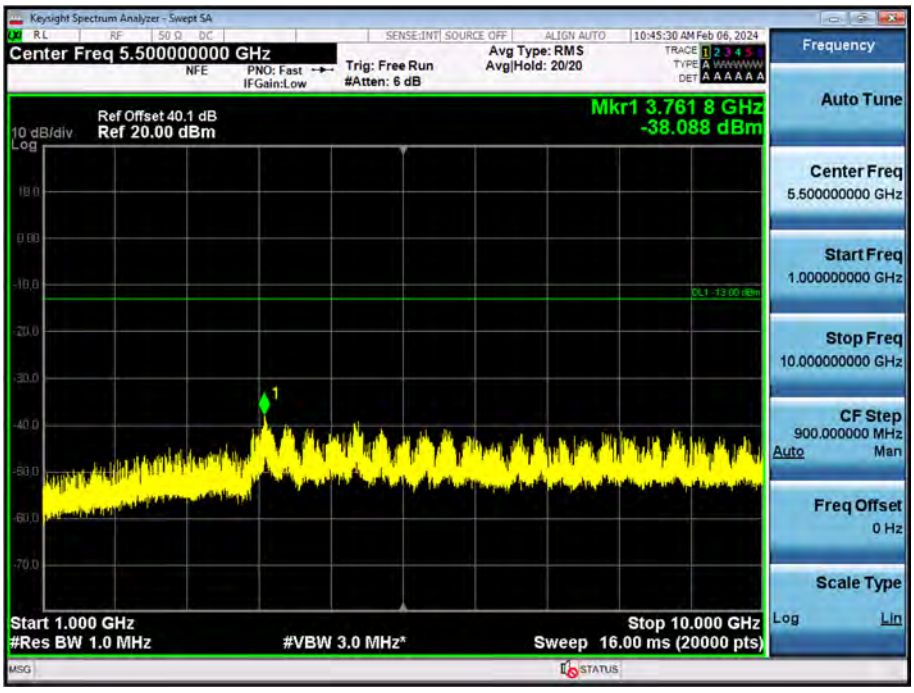
150 kHz~30 MHz



30 MHz~1 GHz

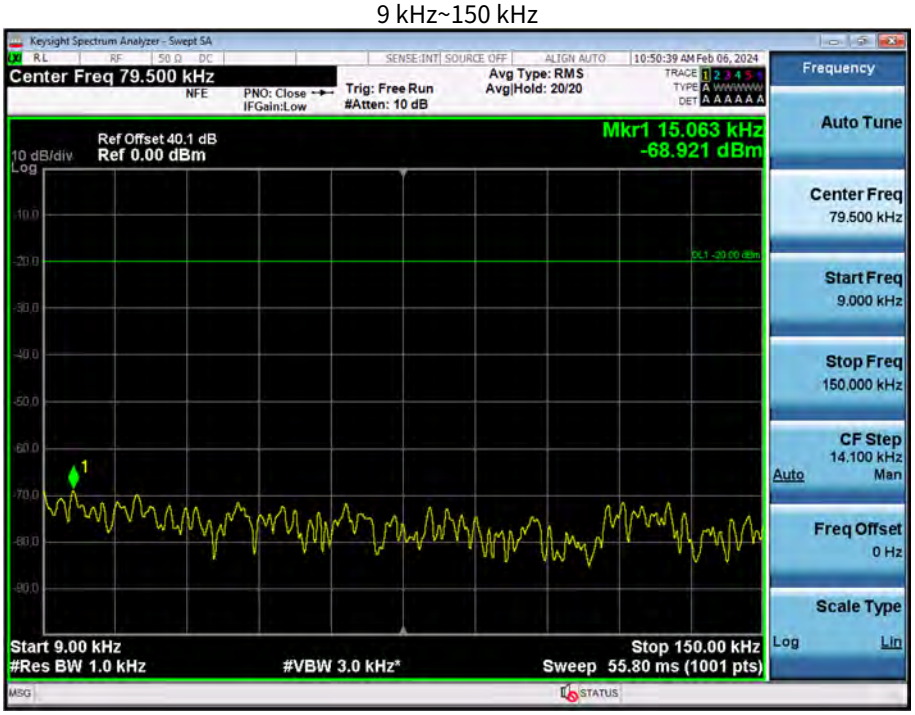


1 GHz~10 GHz

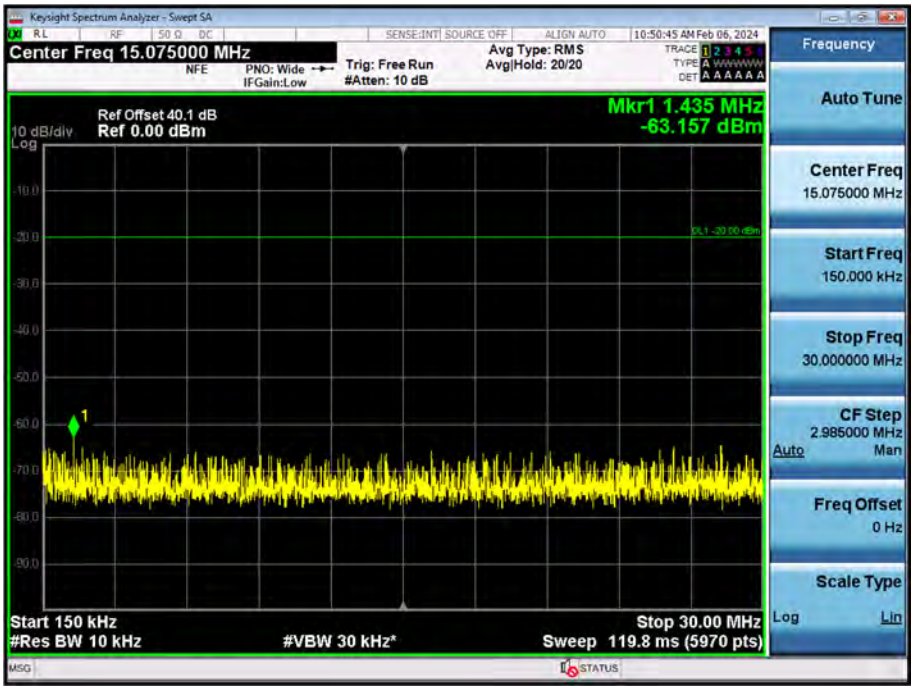


11K0F3E

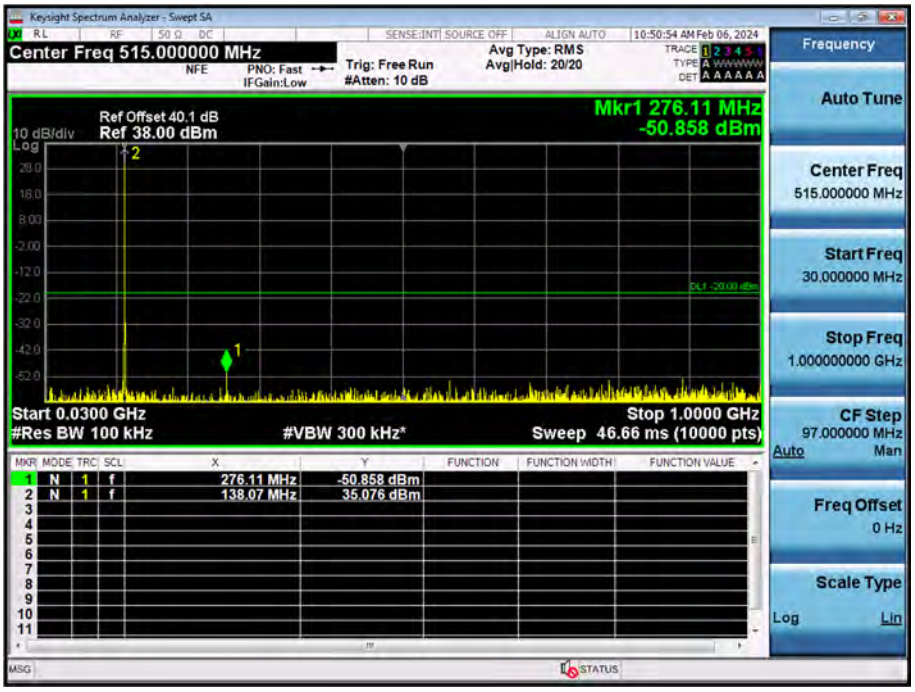
(138.05 MHz)_High
9 kHz~150 kHz



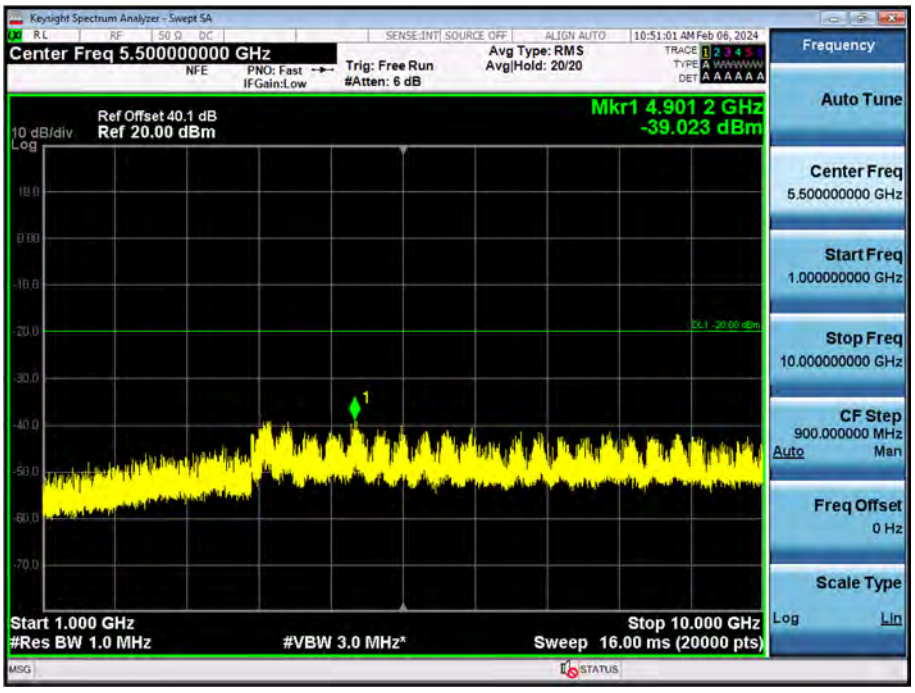
150 kHz~30 MHz



30 MHz~1 GHz

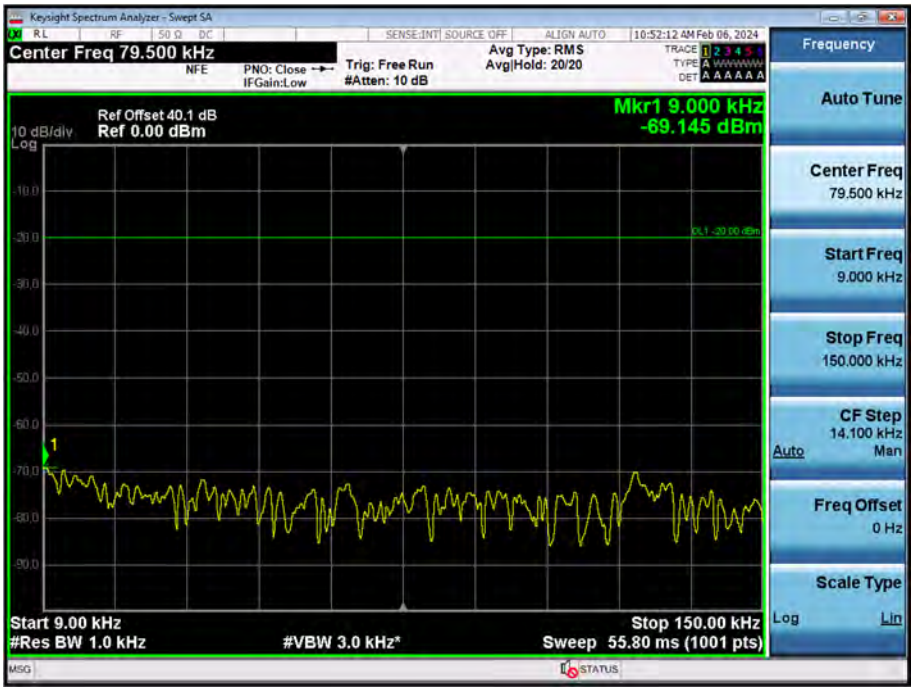


1 GHz~10 GHz



(150.05 MHz)_High

9 kHz~150 kHz



150 kHz~30 MHz