HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC/ IC Certification

Applicant Name:
JVC KENWOOD Corporation

Address:
1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan

Date of Issue:
August 25, 2014

Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCT-R-1407-F039-2

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID	**: K44431501**
IC	**: 282F-431501**
APPLICANT	**: JVC KENWOOD Corporation**

FCC Model(s):	NX-5300-K5, NX-5300-K6, NX-5300-F5, NX-5300-F6
IC Model(s):	NX-5300-K5, NX-5300-K6
EUT Type:	UHF DIGITAL TRANSCEIVER
Frequency Range:	FCC : 406.1 - 470 MHz IC : 406.1 – 430 MHz and 450 – 470 MHz
FCC Rule Part(s):	Part 90 and Part 2
IC Rule:	RSS- Gen Issue 3, RSS-119 Issue 11

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. 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)

Report prepared by
: Kwon Jeong
Test Engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1407-F039	July 24, 2014	- First Approval Report
HCT-R-1407-F039-1	August 21, 2014	-Delete 16K0F3E Bandwidth for FCC
HCT-R-1407-F039-2	August 25, 2014	Add the Occupied Bandwidth test results

Table of Contents

1. GENERAL INFORMATION

Applicant:	JVC KENWOOD Corporation
Address:	1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan
FCC ID:	K44431501
IC:	282F-431501
EUT Type:	UHF DIGITAL TRANSCEIVER
FCC Model name(s):	NX-5300-K5, NX-5300-K6, NX-5300-F5, NX-5300-F6
IC Model name(s):	NX-5300-K5, NX-5300-K6
Date(s) of Tests:	June 30, 2014 ~ July 13, 2014
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	UHF DIGITAL TRANSCEIVER
FCC Model Name	NX-5300-K5, NX-5300-K6, NX-5300-F5, NX-5300-F6
IC Model Name	NX-5300-K5, NX-5300-K6
Power Supply	DC 7.5 V
Battery type	Li-ion Battery (KNB-L1, KNB-L2, KNB-L3)
Channel Bandwidth	FCC : 12.5 kHz / 6.25 kHz, IC : 25kHz / 12.5 kHz / 6.25 kHz
Frequency Range	FCC : 406.1 - 470 MHz IC : 406.1 – 430 MHz and 450 – 470 MHz

3. TEST METHODOLOGY

TIA-603-D dated June 24, 2010 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 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-D-2010 Clause 2.2.17. 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.

3.5 Type of Emission

16K0F3E	(Analogue)
11K0F3E	(Analogue)
8K10F1E, 8K10F1D	(P25 phase1)
8K10F1W	(P25 phase 2, TDMA)
8K30F1E, 8K30F1D, 8K30F7W	(NXDN)
4K00F1E, 4K00F1D, 4K00F7W	(NXDN)
4K00F2D	(CWID) : Use only low power

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.

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. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	IC Part Section(s)	Test Limit	Test Condition	Test Result
Carrier RF Output Power	§90.205(i) §2.1046(a)	RSS119-i11(5.4)	Varies	CONDUCTED	PASS
Unwanted Emissions	§2.1051	RSS119-i11(5.8)			PASS
99% Bandwidth(IC)	NA	NA	NA		PASS
Carrier Frequency Stability	§90.213(a), §2.1055	RSS119-i11(5.3)	Channel Spacing : 6.25 kHz = 1 ppm Channel Spacing : 12.5 kHz = 2.5 ppm Channel Spacing : 25 kHz = 5 ppm		PASS
Audio Frequency Response	§2.1047(a)	RSS119-i11(5.8.1)	Varies		PASS
Audio Low Pass Filter	§2.1047(a)	RSS119-i11(5.8.1)			PASS
Modulation Limiting	§2.1047(b)	RSS119-i11(5.8.1)			PASS
Transient Frequency Behavior	§90.214	RSS119-i11(5.2)	Varies		PASS
Emission Mask	§90.210, §2.1049(c)(1)	RSS119-i11(5.5)	Varies		PASS
Field Strength of Spurious Radiation	§2.1053	RSS119-i11(5.8)	Varies	RADIATED	PASS
Receiver Spurious Emissions	§15.109(a)	RSS119-i11(5.11) RSS-Gen	cf. Section 7.9		PASS
Necessary Bandwidth	§2.202(g)		-	-	-

7. TEST RESULT

7.1 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-D Standard.

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

▣ TEST RESULTS

For FCC

Mode	Type of Emission	Channel Spacing	Freq.(MHz)	Carrier Output Power			
				Low		High	
				dBm	W	dBm	W
Analog	11K0F3E	12.5 kHz	406.15	30.32	1.076	37.00	5.012
			429.95	30.02	1.005	36.87	4.864
			469.95	30.37	1.089	36.98	4.989
Digital	8K10F1E, 8K10F1D	12.5 kHz	406.15	30.40	1.096	36.67	4.645
			429.95	30.00	1.000	36.48	4.446
			469.95	30.41	1.099	36.96	4.966
	8K10F1W	12.5 kHz	406.15	30.27	1.064	36.94	4.943
			429.95	29.94	0.986	36.74	4.721
			469.95	30.35	1.084	36.87	4.864
	8K30F1E, 8K30F1D, 8K30F7W	12.5 kHz	406.15	30.25	1.059	37.00	5.012
			429.95	29.99	0.998	36.81	4.797
			469.95	30.41	1.099	36.88	4.875
	4K00F1E, 4K00F1D, 4K00F7W	6.25 kHz	406.15	30.38	1.091	36.84	4.831
			429.95	30.02	1.005	36.60	4.571
			469.95	30.39	1.094	36.70	4.677
	4K00F2D	6.25 kHz	406.15	30.42	1.102	N/A	
			429.95	29.96	0.991		
			469.95	30.31	1.074		

For IC

Mode	Type of Emission	Channel Spacing	Freq.(MHz)	Carrier Output Power			
				Low		High	
				dBm	W	dBm	W
Analog	11K0F3E	12.5 kHz	418.05	30.14	1.033	36.86	4.853
			450.05	30.02	1.005	36.92	4.920
			460.05	29.92	0.982	36.98	4.989
	16K0F3E	25.0 kHz	406.15	30.32	1.076	36.97	4.977
			418.05	30.21	1.050	36.79	4.775
			429.95	30.06	1.014	36.71	4.688
			450.05	30.10	1.023	36.87	4.864
			460.05	29.94	0.986	36.99	5.000
			469.95	30.25	1.059	36.90	4.898
Digital	8K10F1E, 8K10F1D	12.5 kHz	418.05	30.11	1.026	36.80	4.786
			450.05	29.98	0.995	36.87	4.864
			460.05	29.90	0.977	36.94	4.943
	8K10F1W	12.5 kHz	418.05	30.19	1.045	36.88	4.875
			450.05	30.05	1.012	36.96	4.966
			460.05	29.95	0.989	37.00	5.012
	8K30F1E, 8K30F1D, 8K30F7W	12.5 kHz	418.05	30.42	1.102	36.87	4.864
			450.05	30.28	1.067	36.88	4.875
			460.05	30.18	1.042	36.92	4.920
	4K00F1E, 4K00F1D, 4K00F7W	6.25 kHz	418.05	30.43	1.104	36.87	4.864
			450.05	30.30	1.072	36.89	4.887
			460.05	30.18	1.042	36.97	4.977
	4K00F2D	6.25 kHz	418.05	30.46	1.112	N/A	
			450.05	30.29	1.069		
			460.05	29.89	0.975		

7.2 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-D 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.

*Note: In order to simplify the report, attached data were only the worst case frequency stability.

▣ TEST RESULTS - 11K0F3E For FCC

(1) Frequency Stability (Temperature Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149850705	-0.368
-20	406.149849367	-0.371
-10	406.149862112	-0.340
0	406.149873031	-0.313
10	406.149891873	-0.266
20	406.149907665	-0.227
30	406.149943821	-0.138
40	406.149948168	-0.128
50	406.149957171	-0.105

429.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949843023	-0.365
-20	429.949840330	-0.371
-10	429.949856273	-0.334
0	429.949858282	-0.330
10	429.949877162	-0.286
20	429.949898856	-0.235
30	429.949102830	-0.459
40	429.949934192	-0.153
50	429.949953292	-0.109

469.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949826384	-0.369
-20	469.949824907	-0.373
-10	469.949853888	-0.311
0	469.949872903	-0.270
10	469.949880972	-0.253
20	469.949904854	-0.202
30	469.949912936	-0.185
40	469.949926984	-0.155
50	469.949949698	-0.107

406.15 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149856892	-0.352
-20	406.149846805	-0.377
-10	406.149858213	-0.349
0	406.149872376	-0.314
10	406.149898484	-0.250
20	406.149921617	-0.193
30	406.149936562	-0.156
40	406.149947777	-0.129
50	406.149955077	-0.111

429.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949840922	-0.370
-20	429.949838228	-0.376
-10	429.949858113	-0.330
0	429.949862108	-0.321
10	429.949873072	-0.295
20	429.949167580	-0.308
30	429.949934283	-0.153
40	429.949942692	-0.133
50	429.949952438	-0.111

469.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949827293	-0.368
-20	469.949823487	-0.376
-10	469.949858168	-0.302
0	469.949866172	-0.285
10	469.949890334	-0.233
20	469.949908186	-0.195
30	469.949913393	-0.184
40	469.949929291	-0.150
50	469.949948364	-0.110

(2) Frequency Stability (Voltage Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	406.149910496	-0.220
25	100	7.50	406.149909390	-0.223
25	115	8.63	406.149911091	-0.219

429.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	429.949898670	-0.236
25	100	7.50	429.949896535	-0.241
25	115	8.63	429.949897457	-0.238

469.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	469.949903735	-0.205
25	100	7.50	469.949903065	-0.206
25	115	8.63	469.949904543	-0.203

406.15 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	406.149920856	-0.195
25	100	7.50	406.149920823	-0.195
25	115	8.63	406.149920583	-0.196

429.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	429.949915083	-0.198
25	100	7.50	429.949915425	-0.197
25	115	8.63	429.949915216	-0.197

469.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	469.949907267	-0.197
25	100	7.50	469.949907968	-0.196
25	115	8.63	469.949906670	-0.199

▣ TEST RESULTS - 11K0F3E For IC

(1) Frequency Stability (Temperature Variation)

418.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	418.049846067	-0.368
-20	418.049843929	-0.373
-10	418.049856118	-0.344
0	418.049874293	-0.301
10	418.049881368	-0.284
20	418.049897982	-0.244
30	418.049918874	-0.194
40	418.049934562	-0.157
50	418.049951650	-0.116

450.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	450.049834551	-0.368
-20	450.049832249	-0.373
-10	450.049860276	-0.310
0	450.049872294	-0.284
10	450.049884398	-0.257
20	450.049895389	-0.232
30	450.049901406	-0.219
40	450.049936587	-0.141
50	450.049948605	-0.114

460.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	460.049830768	-0.368
-20	460.049829041	-0.372
-10	460.049852671	-0.320
0	460.049868118	-0.287
10	460.049893189	-0.232
20	460.049934258	-0.143
30	460.049913021	-0.189
40	460.049934308	-0.143
50	460.049947360	-0.114

418.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	418.049844813	-0.371
-20	418.049842655	-0.376
-10	418.049880284	-0.286
0	418.049882296	-0.282
10	418.049896773	-0.247
20	418.049942843	-0.137
30	418.049958782	-0.099
40	418.049959962	-0.096
50	418.049954233	-0.109

450.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	450.049833964	-0.369
-20	450.049831438	-0.375
-10	450.049850198	-0.333
0	450.049872293	-0.284
10	450.049898777	-0.225
20	450.049933983	-0.147
30	450.049943764	-0.125
40	450.049948861	-0.114
50	450.049949259	-0.113

460.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	460.049831216	-0.367
-20	460.049828563	-0.373
-10	460.049860184	-0.304
0	460.049872196	-0.278
10	460.049884285	-0.252
20	460.049927285	-0.158
30	460.049930182	-0.152
40	460.049962111	-0.082
50	460.049948838	-0.111

(2) Frequency Stability (Voltage Variation)

418.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	418.049877130	-0.294
25	100	7.50	418.049897540	-0.245
25	115	8.63	418.049898328	-0.243

450.05MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	450.049929384	-0.157
25	100	7.50	450.049928637	-0.159
25	115	8.63	450.049930163	-0.155

460.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	460.049933944	-0.144
25	100	7.50	460.049933993	-0.143
25	115	8.63	460.049934508	-0.142

418.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	418.049941323	-0.140
25	100	7.50	418.049942284	-0.138
25	115	8.63	418.049940957	-0.141

450.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	450.049931760	-0.152
25	100	7.50	450.049932378	-0.150
25	115	8.63	450.049931497	-0.152

460.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	460.049924881	-0.163
25	100	7.50	460.049925834	-0.161
25	115	8.63	460.049924799	-0.163

▣ TEST RESULTS - 4K00F1E, 4K00F1D, 4K00F7W For IC

(1) Frequency Stability (Temperature Variation)

418.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	418.049851362	-0.356
-20	418.049848159	-0.363
-10	418.049854238	-0.349
0	418.049871064	-0.308
10	418.049893912	-0.254
20	418.049925624	-0.178
30	418.049939284	-0.145
40	418.049941663	-0.140
50	418.049954846	-0.108

450.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	450.049838775	-0.358
-20	450.049836001	-0.364
-10	450.049848182	-0.337
0	450.049856337	-0.319
10	450.049857284	-0.317
20	450.049934500	-0.146
30	450.049912652	-0.194
40	450.049939712	-0.134
50	450.049952488	-0.106

460.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	460.049834500	-0.360
-20	460.049832678	-0.364
-10	460.049853734	-0.318
0	460.049872286	-0.278
10	460.049893631	-0.231
20	460.049938310	-0.134
30	460.049939193	-0.132
40	460.049946770	-0.116
50	460.049951971	-0.104

418.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	418.049852778	-0.352
-20	418.049850627	-0.357
-10	418.049869034	-0.313
0	418.049879454	-0.288
10	418.049903293	-0.231
20	418.049946167	-0.129
30	418.049958694	-0.099
40	418.049940716	-0.142
50	418.049956318	-0.104

450.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	450.049840719	-0.354
-20	450.049838328	-0.359
-10	450.049853111	-0.326
0	450.049873103	-0.282
10	450.049896281	-0.230
20	450.049936649	-0.141
30	450.049943004	-0.127
40	450.049948916	-0.114
50	450.049952480	-0.106

511.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	460.049837079	-0.354
-20	460.049833320	-0.362
-10	460.049856534	-0.312
0	460.049872618	-0.277
10	460.049903766	-0.209
20	460.049930254	-0.152
30	460.049941232	-0.128
40	460.049948018	-0.113
50	460.049951508	-0.105

(2) Frequency Stability (Voltage Variation)

418.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	418.049927406	-0.174
25	100	7.50	418.049926111	-0.177
25	115	8.63	418.049928173	-0.172

450.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	450.049934516	-0.146
25	100	7.50	450.049934374	-0.146
25	115	8.63	450.049935212	-0.144

460.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	460.049938344	-0.134
25	100	7.50	460.049938290	-0.134
25	115	8.63	460.049935801	-0.140

418.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	418.049943269	-0.136
25	100	7.50	418.049943955	-0.134
25	115	8.63	418.049943287	-0.136

450.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	450.049934740	-0.145
25	100	7.50	450.049935364	-0.144
25	115	8.63	450.049934179	-0.146

460.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	460.049928232	-0.156
25	100	7.50	460.049929056	-0.154
25	115	8.63	460.049927703	-0.157

▣ TEST RESULTS - 16K0F3E For IC

(1) Frequency Stability (Temperature Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149849269	-0.371
-20	406.149848353	-0.373
-10	406.149899258	-0.248
0	406.149901362	-0.243
10	406.149909234	-0.223
20	406.149915509	-0.208
30	406.149930011	-0.172
40	406.149930288	-0.172
50	406.149932655	-0.166

418.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	418.049841036	-0.380
-20	418.049845320	-0.370
-10	418.049872118	-0.306
0	418.049893272	-0.255
10	418.049899369	-0.241
20	418.049949056	-0.122
30	418.049948942	-0.122
40	418.049940183	-0.143
50	418.049923913	-0.182

450.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	450.049828846	-0.380
-20	450.049833143	-0.371
-10	450.049856664	-0.318
0	450.049877672	-0.272
10	450.049892261	-0.239
20	450.049946028	-0.120
30	450.049928982	-0.158
40	450.049940343	-0.133
50	450.049925317	-0.166

460.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	460.049826179	-0.378
-20	460.049829733	-0.370
-10	460.049842278	-0.343
0	460.049871612	-0.279
10	460.049900235	-0.217
20	460.049946040	-0.117
30	460.049944518	-0.121
40	460.049940534	-0.129
50	460.049935155	-0.141

406.15 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149846375	-0.378
-20	406.149849826	-0.370
-10	406.149856414	-0.354
0	406.149877270	-0.302
10	406.149890032	-0.271
20	406.149908572	-0.225
30	406.149911622	-0.218
40	406.149914688	-0.210
50	406.149918030	-0.202

418.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	418.049841168	-0.380
-20	418.049845576	-0.369
-10	418.049880616	-0.286
0	418.049892672	-0.257
10	418.049934212	-0.157
20	418.049951027	-0.117
30	418.049941333	-0.140
40	418.049933180	-0.160
50	418.049912409	-0.210

450.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	450.049829918	-0.378
-20	450.049833767	-0.369
-10	450.049856262	-0.319
0	450.049877193	-0.273
10	450.049893700	-0.236
20	450.049941585	-0.130
30	450.049940701	-0.132
40	450.049942632	-0.127
50	450.049907958	-0.205

460.05 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	460.049826615	-0.377
-20	460.049829741	-0.370
-10	460.049846256	-0.334
0	460.049855683	-0.314
10	460.049896810	-0.224
20	460.049934964	-0.141
30	460.049934103	-0.143
40	460.049930111	-0.152
50	460.049910092	-0.195

(2) Frequency Stability (Temperature Variation)

429.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949838695	-0.375
-20	429.949840527	-0.371
-10	429.949850118	-0.349
0	429.949871236	-0.299
10	429.949894109	-0.246
20	429.949904137	-0.223
30	429.949913287	-0.202
40	429.949928000	-0.167
50	429.949946823	-0.124

469.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949823921	-0.375
-20	469.949827433	-0.367
-10	469.949839721	-0.341
0	469.949850762	-0.318
10	469.949877837	-0.260
20	469.949914519	-0.182
30	469.949928213	-0.153
40	469.949942218	-0.123
50	469.949945352	-0.116

429.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949838542	-0.376
-20	429.949840788	-0.370
-10	429.949861623	-0.322
0	429.949874627	-0.292
10	429.949888612	-0.259
20	429.949927460	-0.169
30	429.949936634	-0.147
40	429.949942618	-0.133
50	429.949952742	-0.110

469.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949824625	-0.373
-20	469.949827422	-0.367
-10	469.949838291	-0.344
0	469.949840731	-0.339
10	469.949891565	-0.231
20	469.949918174	-0.174
30	469.949923031	-0.164
40	469.949941038	-0.125
50	469.949950564	-0.105

(2) Frequency Stability (Voltage Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	406.149922425	-0.191
25	100	7.50	406.149917505	-0.203
25	115	8.63	406.149920310	-0.196

418.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	418.049946974	-0.127
25	100	7.50	418.049946941	-0.127
25	115	8.63	418.049947627	-0.125

450.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	450.049945555	-0.121
25	100	7.50	450.049945649	-0.121
25	115	8.63	450.049945970	-0.120

460.05MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	460.049944465	-0.121
25	100	7.50	460.049944948	-0.120
25	115	8.63	460.049944730	-0.120

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	406.149922425	-0.191
25	100	7.50	406.149917505	-0.203
25	115	8.63	406.149920310	-0.196

418.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	418.049948269	-0.124
25	100	7.50	418.049948946	-0.122
25	115	8.63	418.049948071	-0.124

450.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	450.049939630	-0.134
25	100	7.50	450.049940106	-0.133
25	115	8.63	450.049939434	-0.135

460.05 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	460.049932886	-0.146
25	100	7.50	460.049933383	-0.145
25	115	8.63	460.049932292	-0.147

(4) Frequency Stability (Voltage Variation)

429.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	429.949974370	-0.060
25	100	7.50	429.949961030	-0.091
25	115	8.63	429.949998782	-0.003

469.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	469.949914014	-0.183
25	100	7.50	469.949937930	-0.132
25	115	8.63	469.949947880	-0.111

429.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	429.949925484	-0.173
25	100	7.50	429.949962210	-0.088
25	115	8.63	429.949952600	-0.110

469.95 MHz (Low Power)

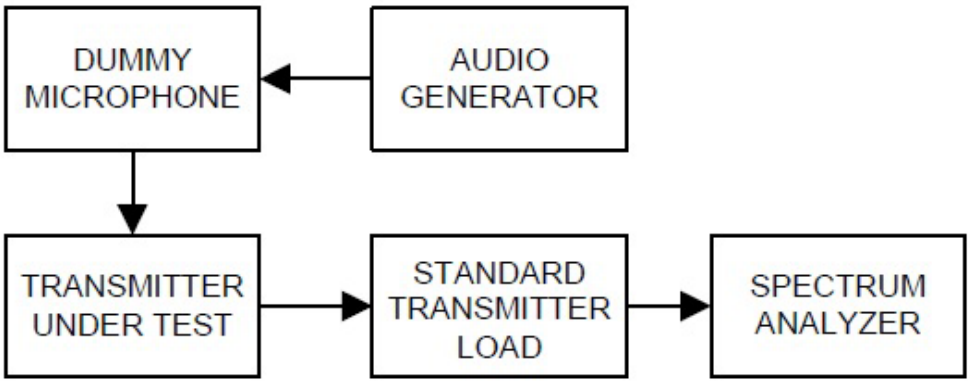
Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.38	469.949915448	-0.180
25	100	7.50	469.949916220	-0.178
25	115	8.63	469.949915256	-0.180

7.3 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-D 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-D 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 (Non modulation and Authorized Band 6 kHz),
100Hz (Non modulation and Authorized Band 11.25 kHz),
300Hz (Non modulation and 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.

▣ **LIMIT**

Frequency Band (MHz)	Channel Spacing (kHz)	Authorized Bandwidth (kHz)
406.1 – 430 and 450 - 470	25	20
	12.5	11.25
	6.25	6

▣ TEST RESULTS

Conducted 99% Bandwidth Measurements for 11K0F3E

11K0F3E Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	12.5 kHz	9.889	High Power
418.05		9.889	
429.95		9.880	
450.05		9.885	
460.05		9.876	
469.95		9.883	
406.15	12.5 kHz	9.911	Low Power
418.05		9.886	
429.95		9.897	
450.05		9.914	
460.05		9.901	
469.95		9.884	

Conducted 99% Bandwidth Measurements for 16K0F3E

16K0F3E Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	25.0 kHz	14.595	High Power
418.05		12.795	
429.95		12.782	
450.05		12.765	
460.05		12.702	
469.95		12.755	
406.15	25.0 kHz	14.492	Low Power
418.05		12.814	
429.95		12.780	
450.05		12.793	
460.05		12.757	
469.95		12.745	

Conducted 99% Bandwidth Measurements for 8K10F1E,8K10F1D

8K10F1E 8K10F1D Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	12.5 kHz	7.904	High Power
418.05		7.940	
429.95		7.877	
450.05		7.921	
460.05		7.909	
469.95		7.886	
406.15	12.5 kHz	7.924	Low Power
418.05		7.934	
429.95		7.889	
450.05		7.930	
460.05		7.907	
469.95		7.921	

Conducted 99% Bandwidth Measurements for 8K10F1W

8K10F1W Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	12.5 kHz	8.091	High Power
418.05		8.168	
429.95		8.093	
450.05		8.165	
460.05		8.133	
469.95		8.048	
406.15	12.5 kHz	8.075	Low Power
418.05		8.164	
429.95		8.095	
450.05		8.180	
460.05		8.163	
469.95		8.070	

Conducted 99% Bandwidth Measurements for 8K30F1E,8K30F1D,8K30F7W

8K30F1E 8K30F1D 8K30F7W Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	12.5 kHz	7.545	High Power
418.05		7.604	
429.95		7.552	
450.05		7.604	
460.05		7.592	
469.95		7.549	
406.15	12.5 kHz	7.552	Low Power
418.05		7.586	
429.95		7.586	
450.05		7.578	
460.05		7.579	
469.95		7.562	

Conducted 99% Bandwidth Measurements for 4K00F1E,4K00F1D,4K00F7W

4K00F1E 4K00F1D 4K00F7W Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	6.25 kHz	3.461	High Power
418.05		3.466	
429.95		3.428	
450.05		3.461	
460.05		3.461	
469.95		3.448	
406.15	6.25 kHz	3.429	Low Power
418.05		3.444	
429.95		3.474	
450.05		3.472	
460.05		3.455	
469.95		3.451	

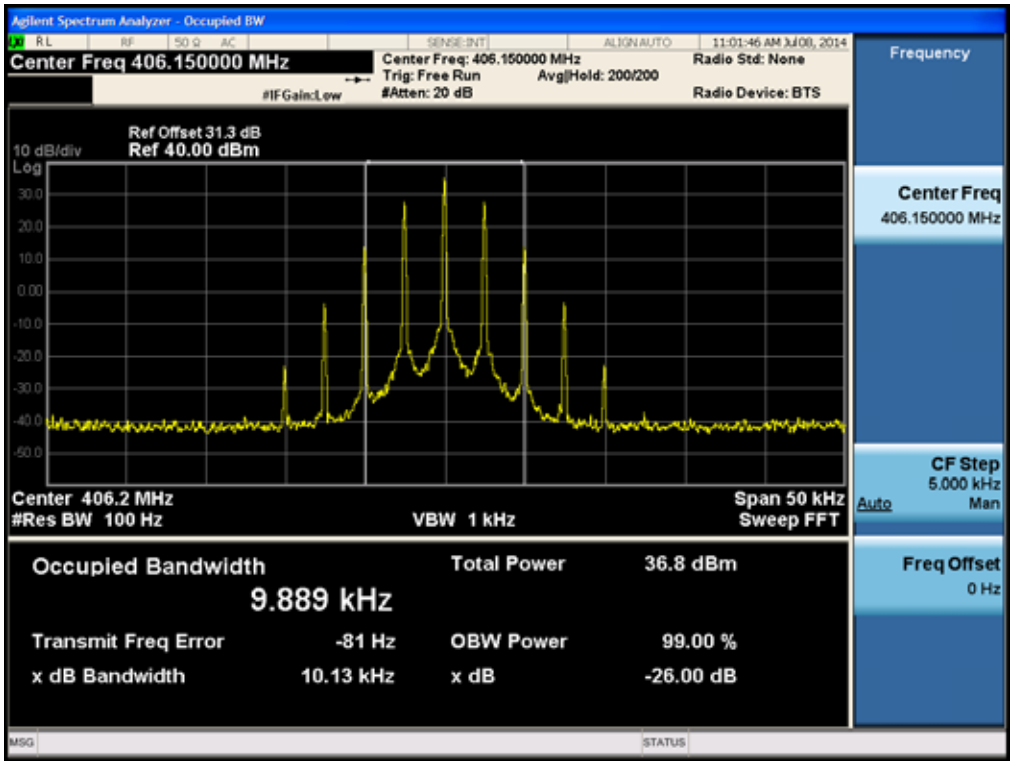
Conducted 99% Bandwidth Measurements for 4K00F2D

4K00F2D Mode		Measured Bandwidth [MHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	6.25 kHz	3.318	Low Power
418.05		3.318	
429.95		3.322	
450.05		3.321	
460.05		3.313	
469.95		3.316	

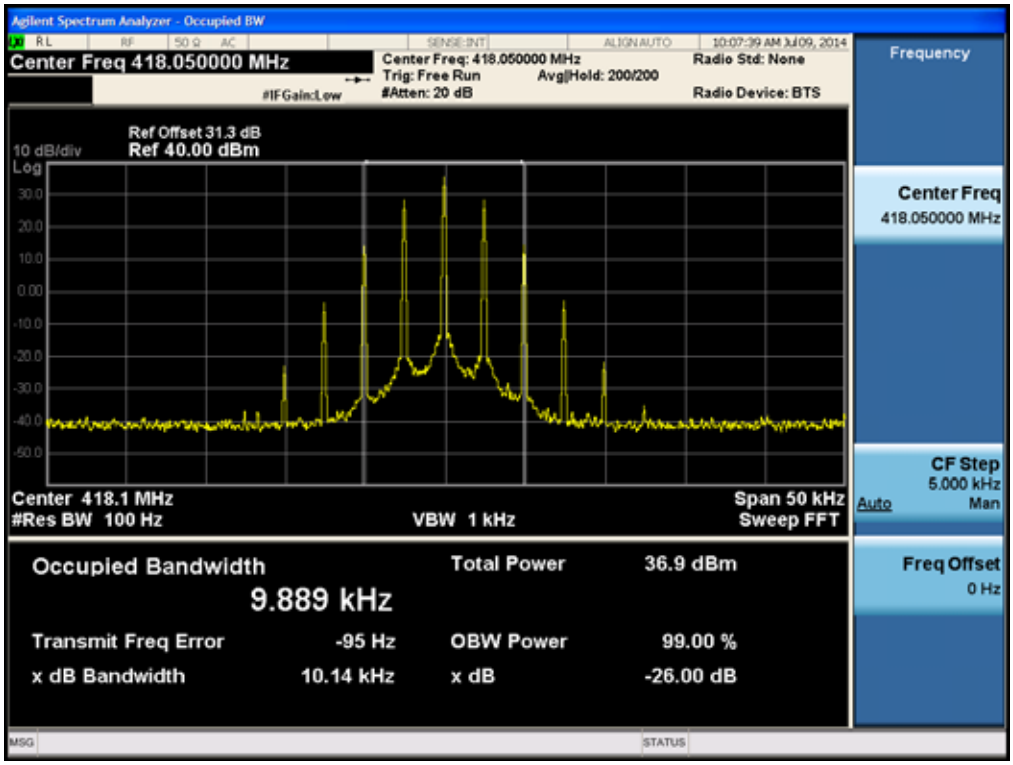
▣ Test Plots

*Note : In order to simplify the report, attached Plot were only the worst case Modulation.

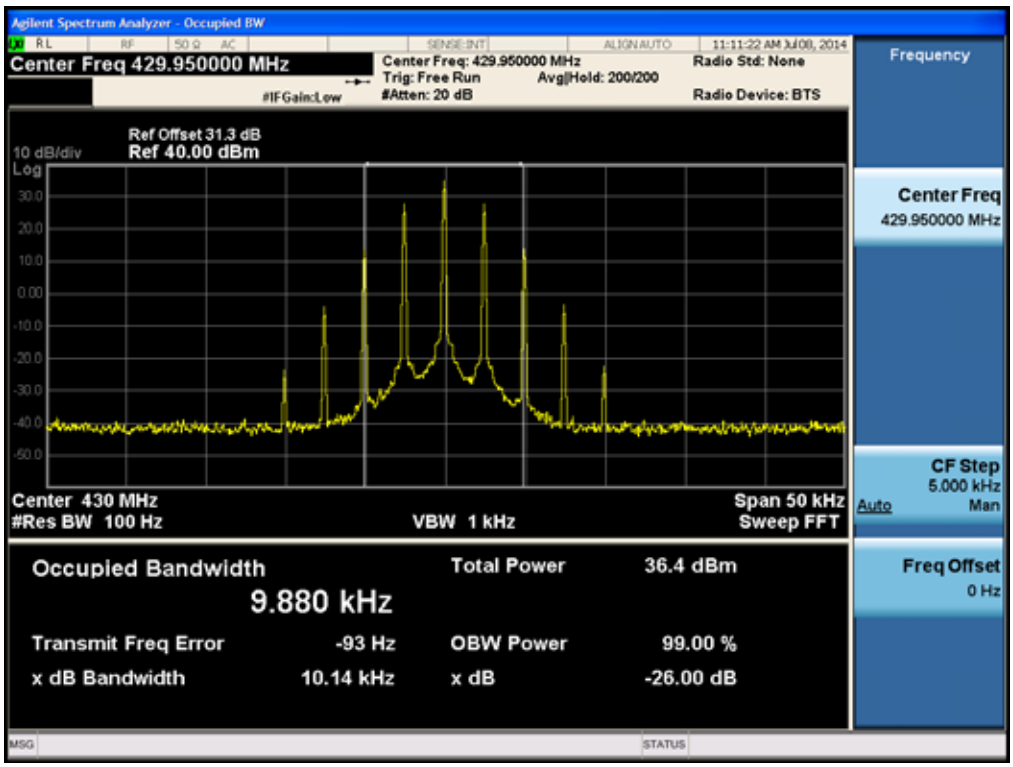
99% Bandwidth plot (11K0F3E-406.15 MHz)_High



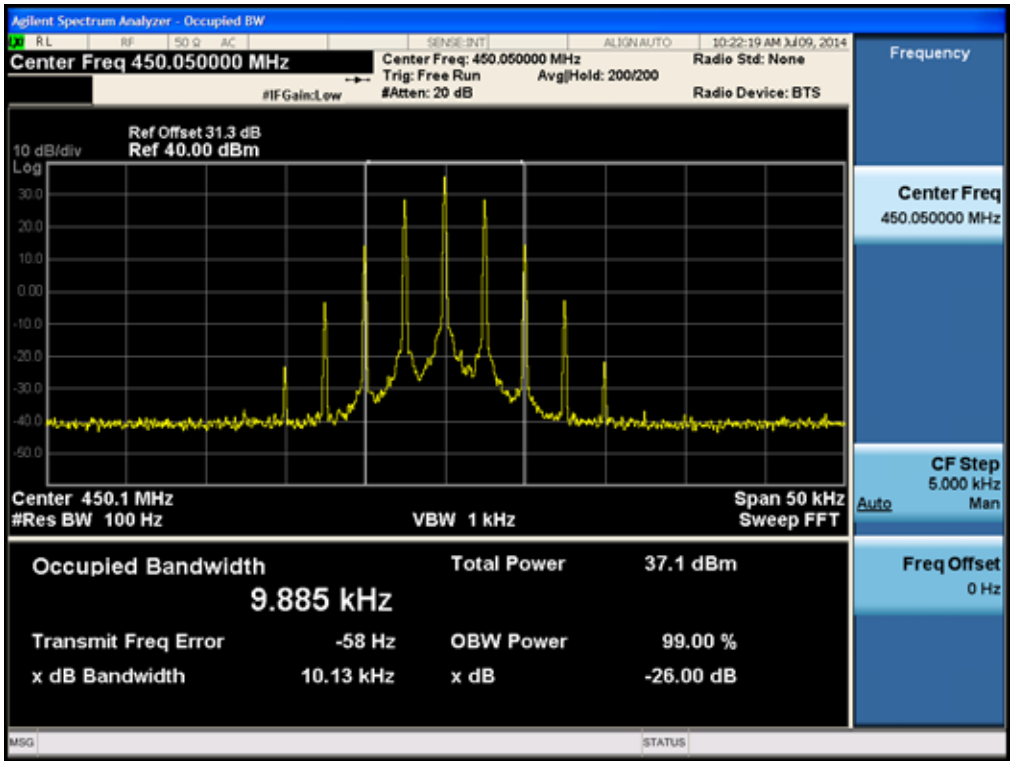
99% Bandwidth plot (11K0F3E-418.05 MHz)_ High



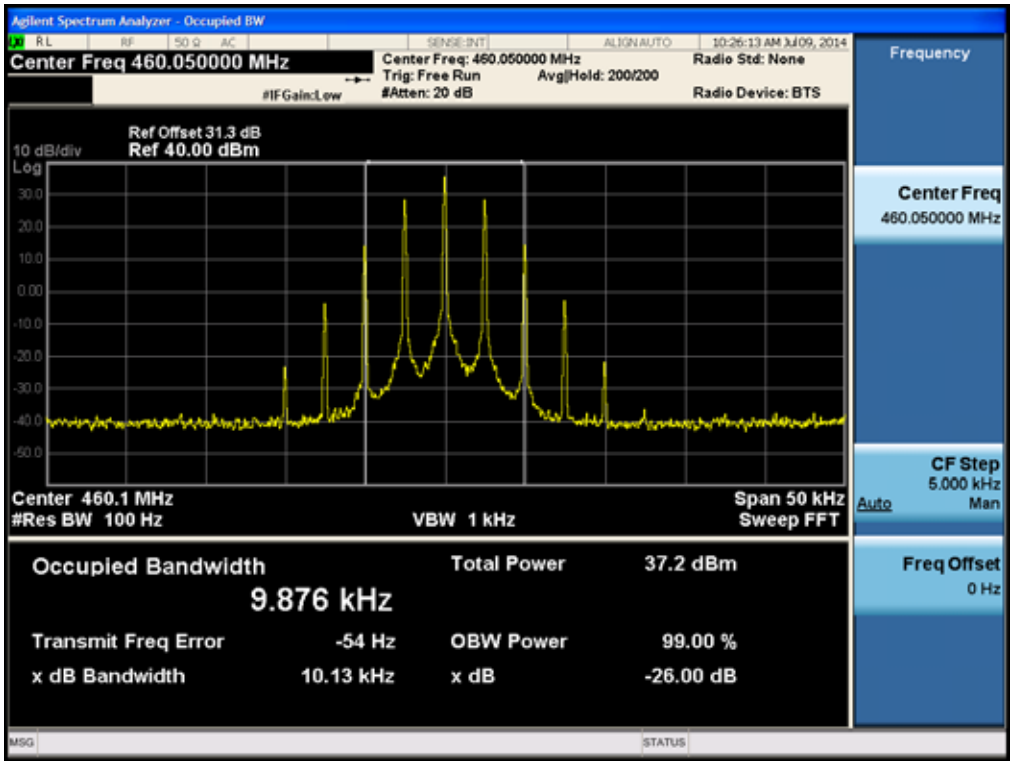
99% Bandwidth plot (11K0F3E-429.95 MHz)_High



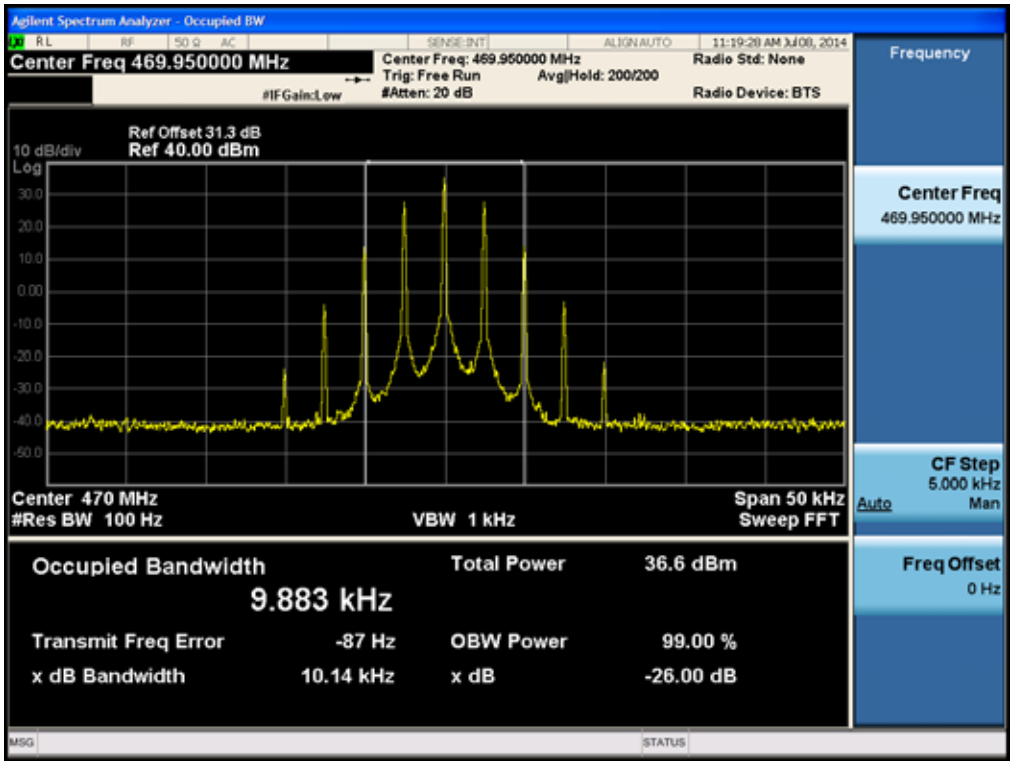
99% Bandwidth plot (11K0F3E-450.05 MHz)_ High



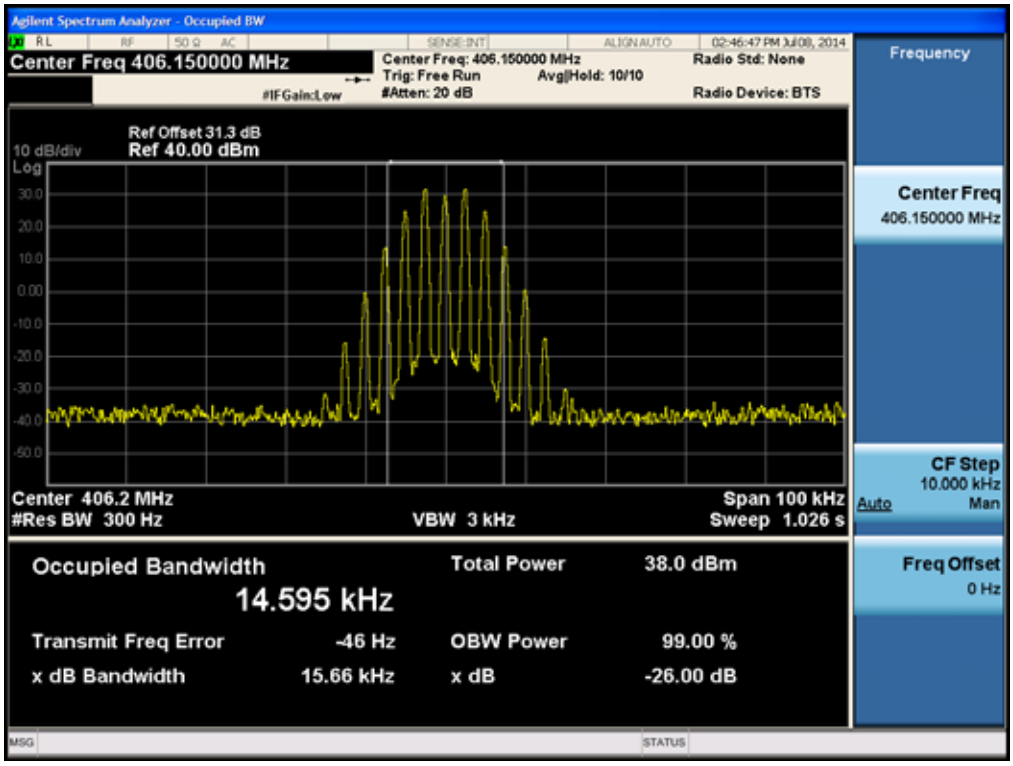
99% Bandwidth plot (11K0F3E-460.06 MHz)_High



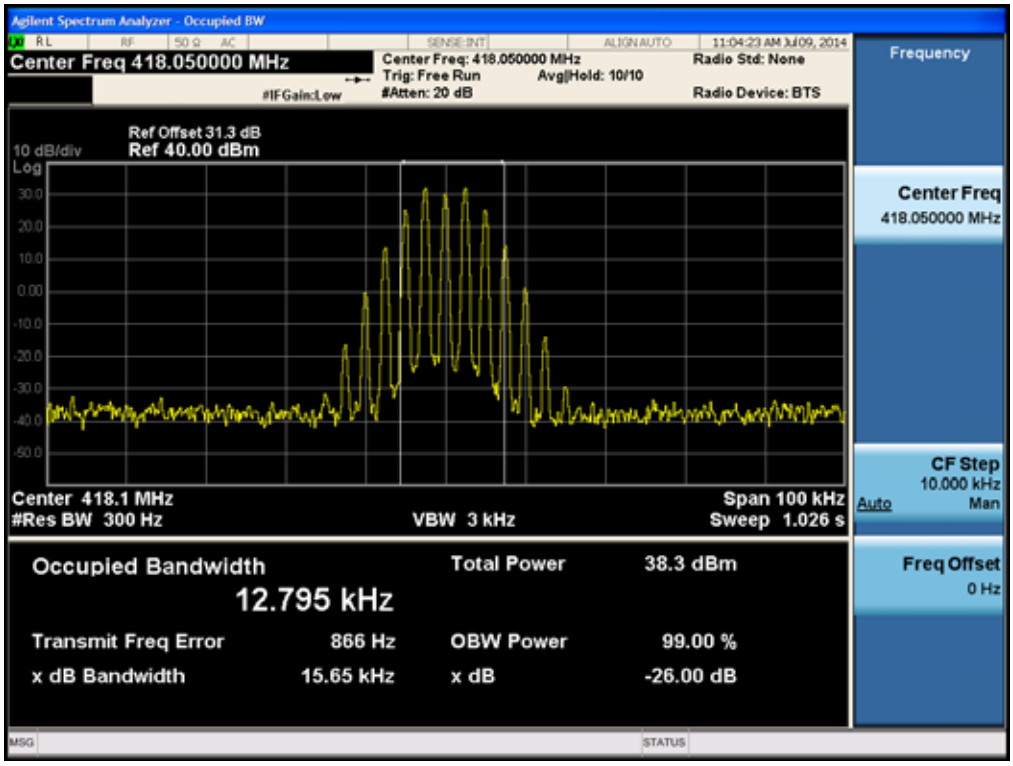
99% Bandwidth plot (11K0F3E-469.95 MHz)_ High



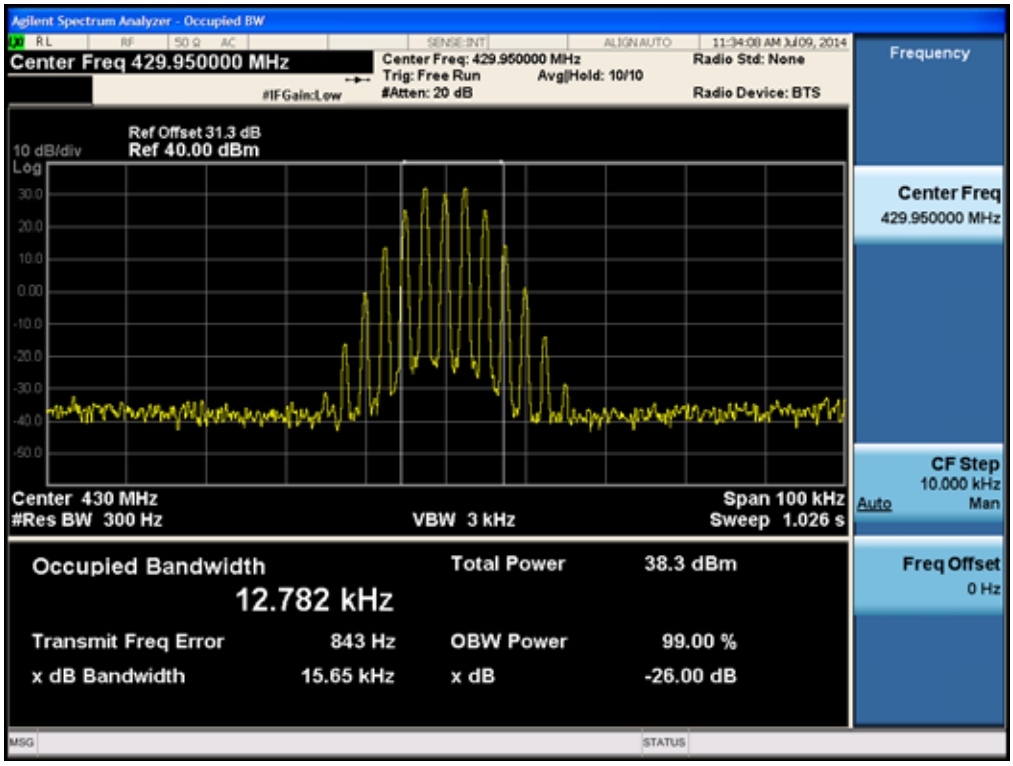
99% Bandwidth plot (16K0F3E-406.15 MHz)_High



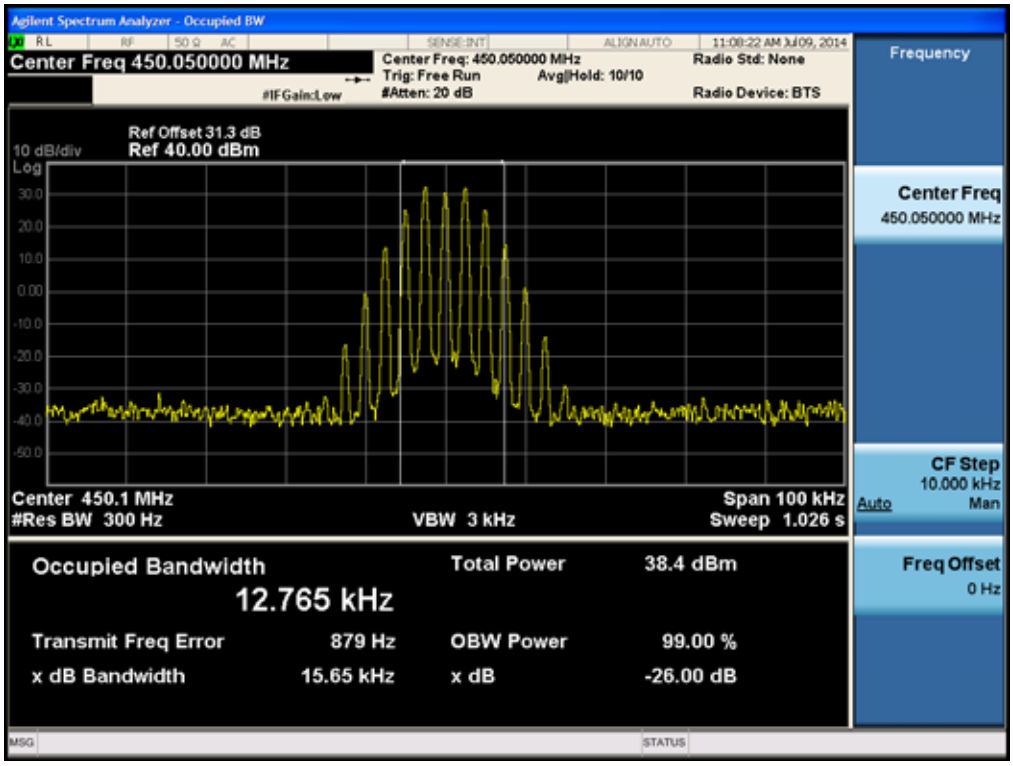
99% Bandwidth plot (16K0F3E-418.05 MHz)_High



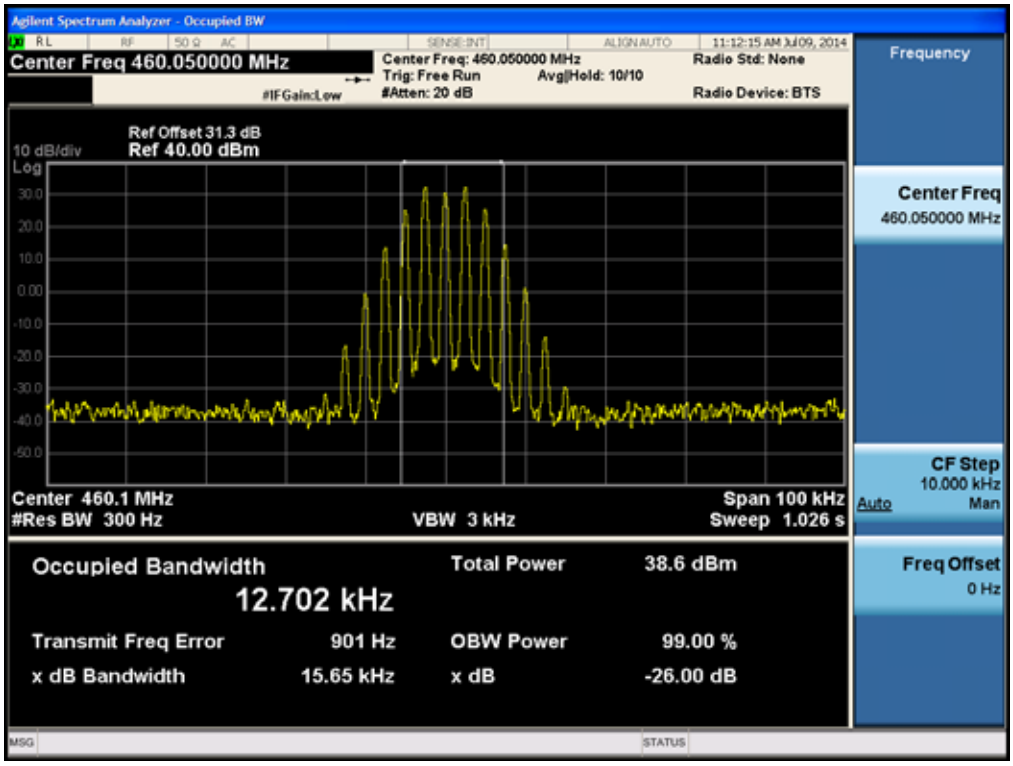
99% Bandwidth plot (16K0F3E-429.95 MHz)_High



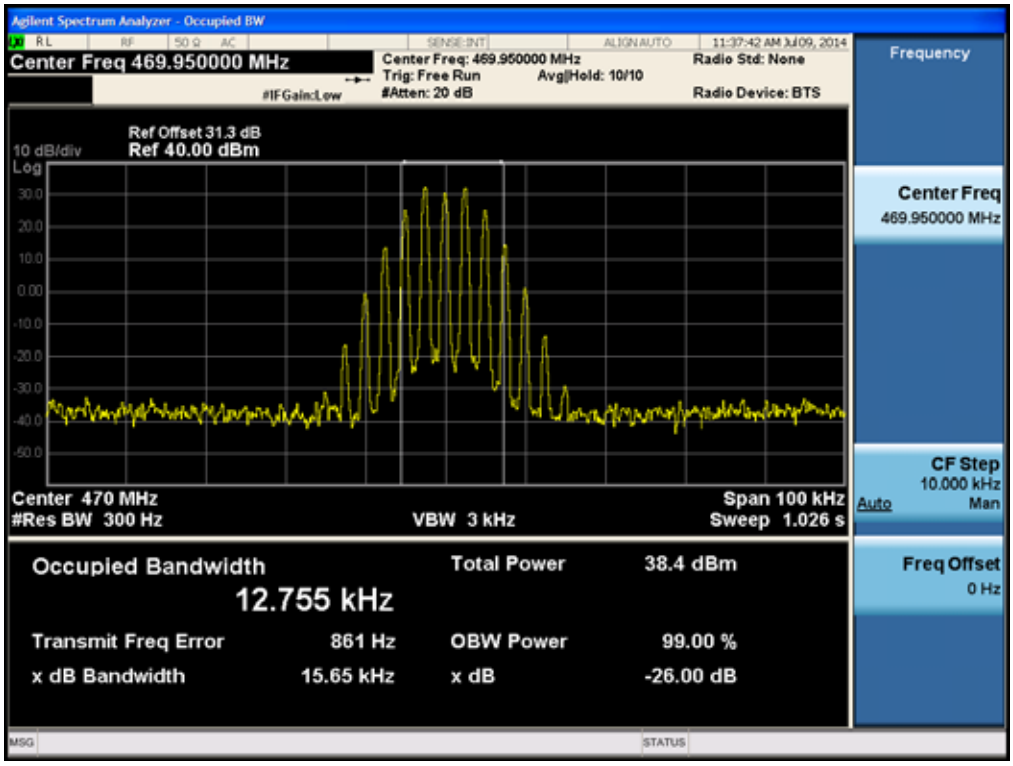
99% Bandwidth plot (16K0F3E-450.05 MHz)_High



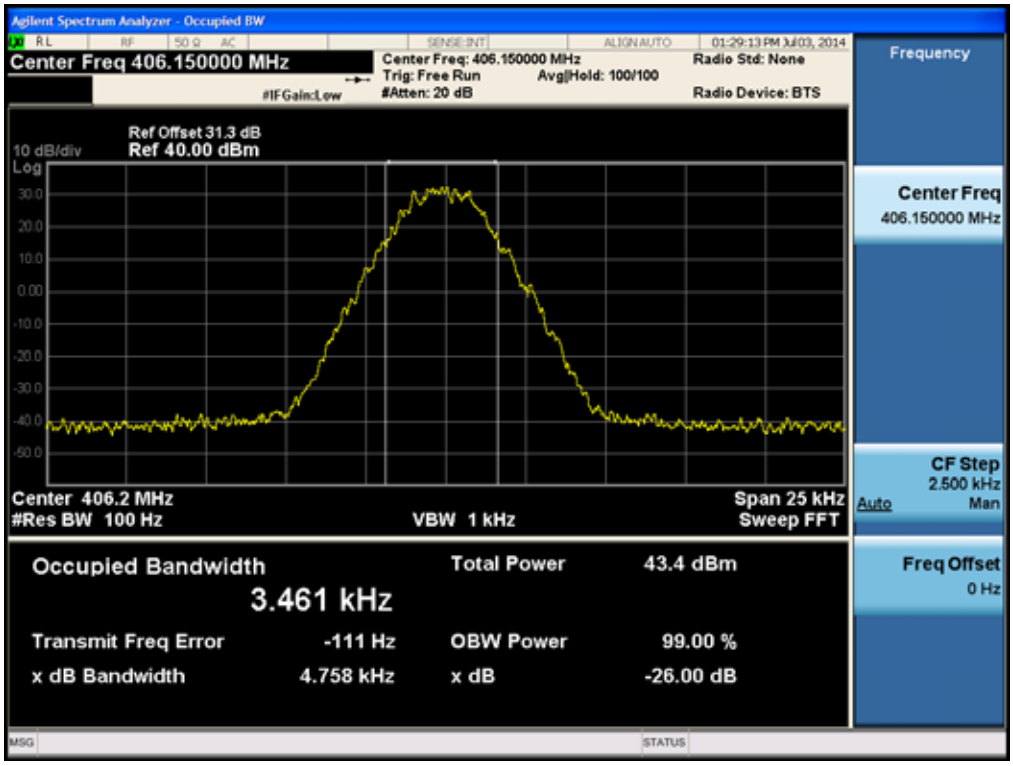
99% Bandwidth plot (16K0F3E-460.05 MHz)_High



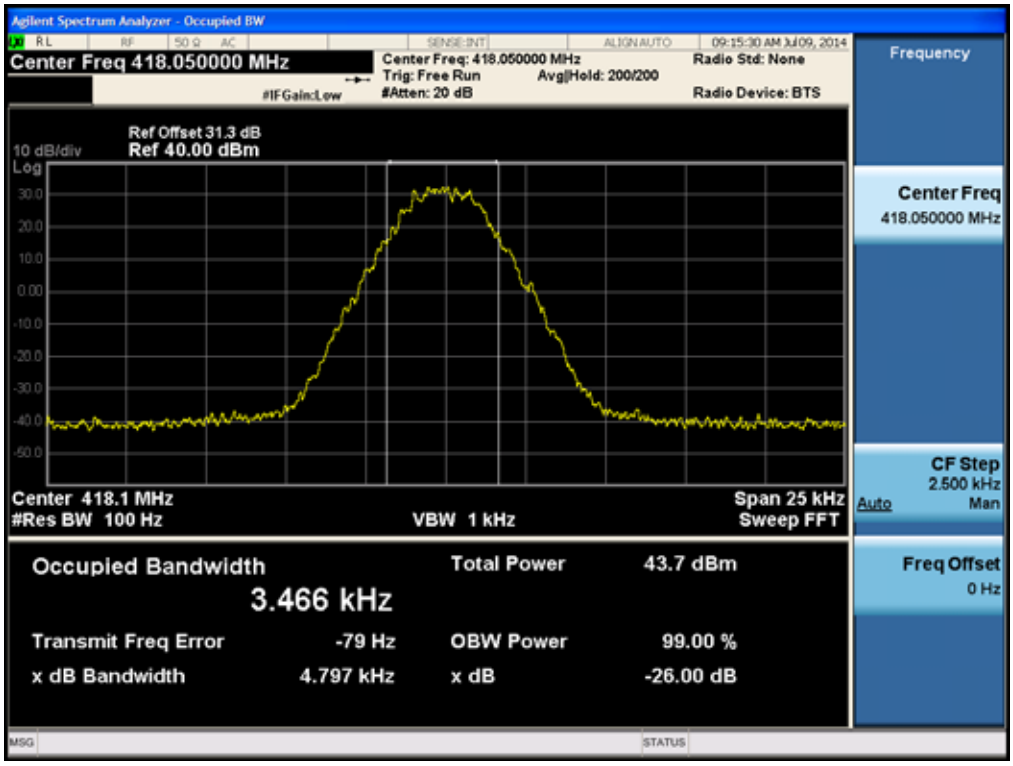
99% Bandwidth plot (16K0F3E-469.95 MHz)_High



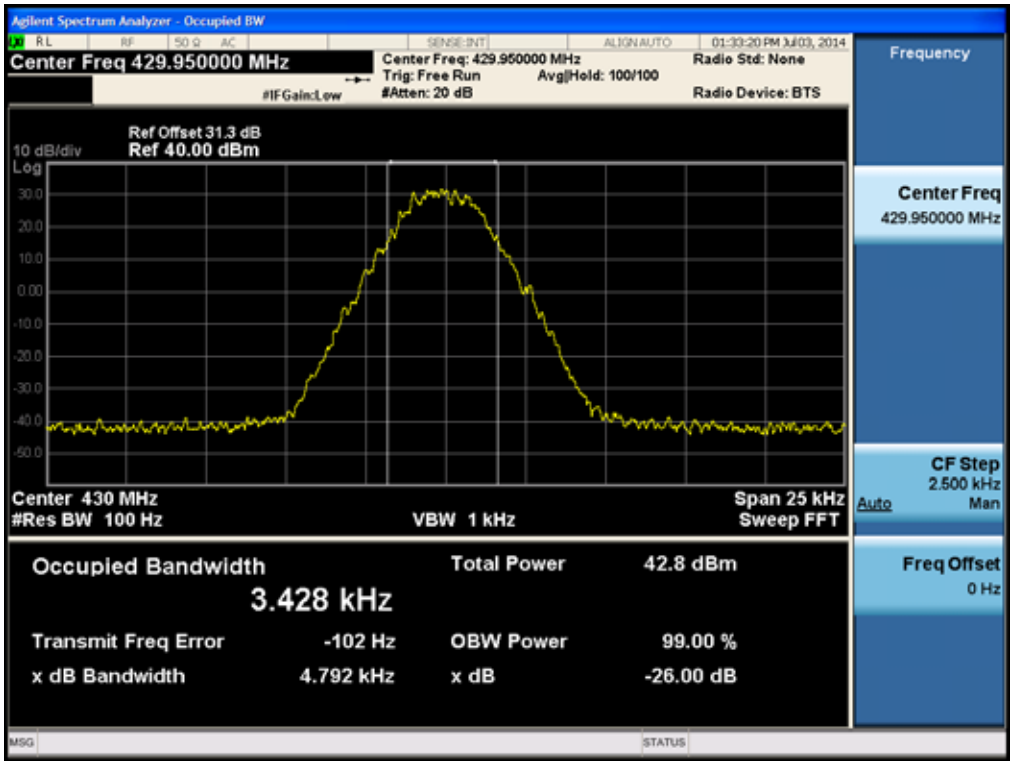
99% Bandwidth plot (4K00F1E,4K00F1D,4K00F7W -406.15 MHz)_High



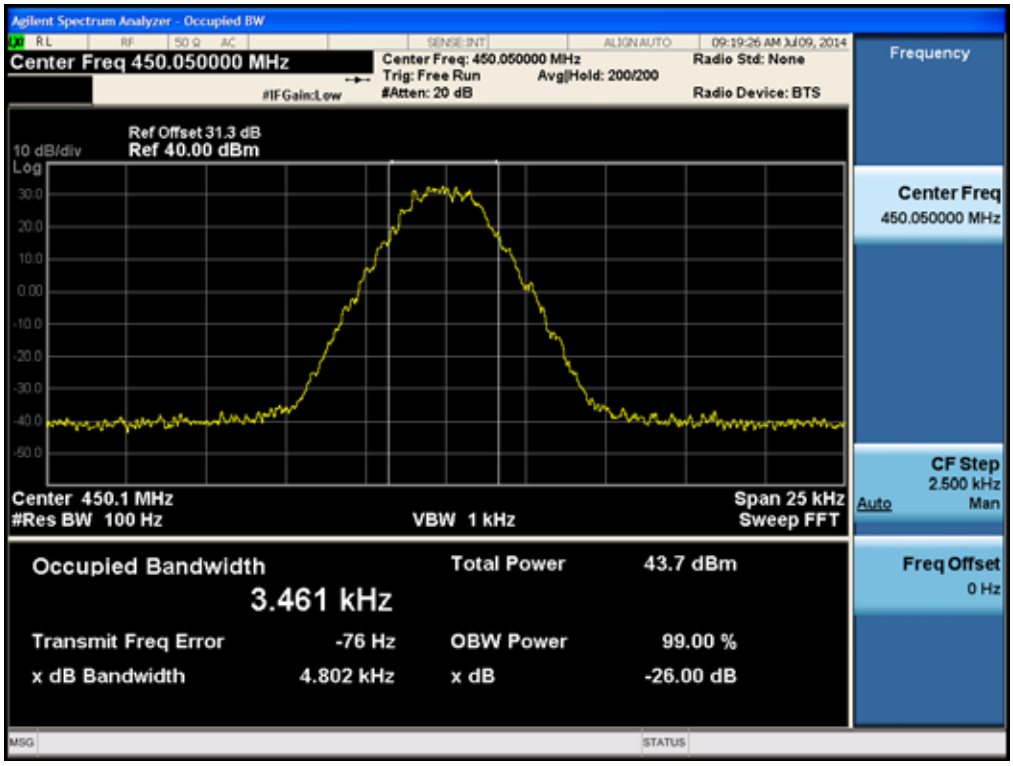
99% Bandwidth plot (4K00F1E,4K00F1D,4K00F7W -418.05 MHz)_High



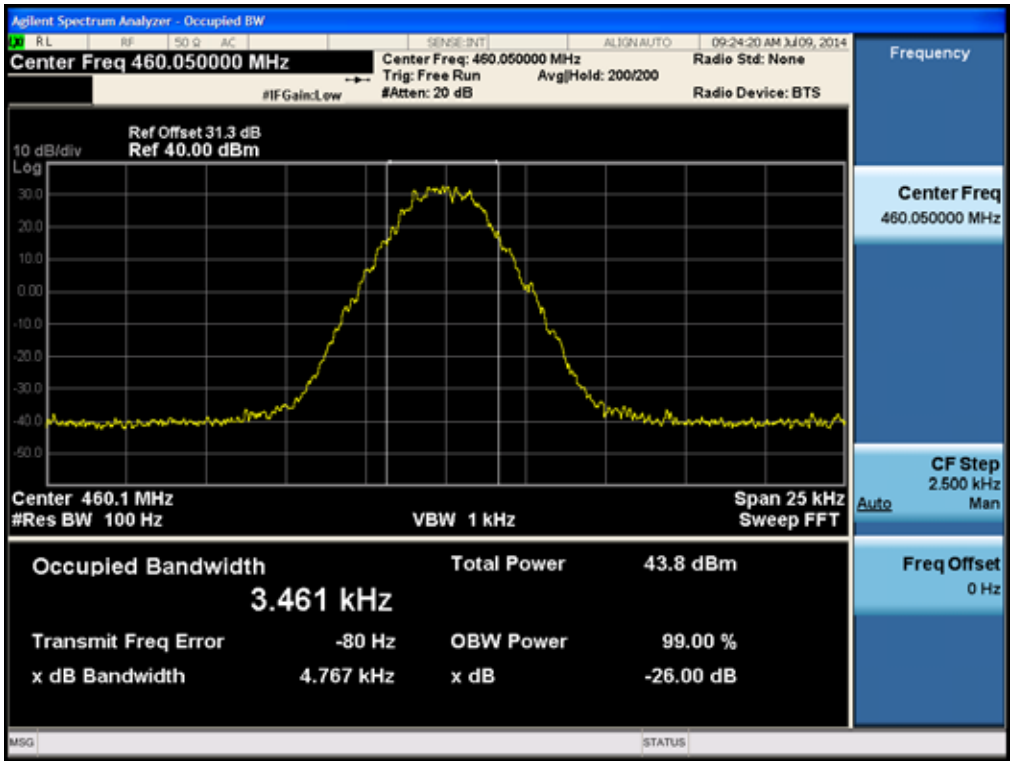
99% Bandwidth plot (4K00F1E,4K00F1D,4K00F7W -429.95 MHz)_ High



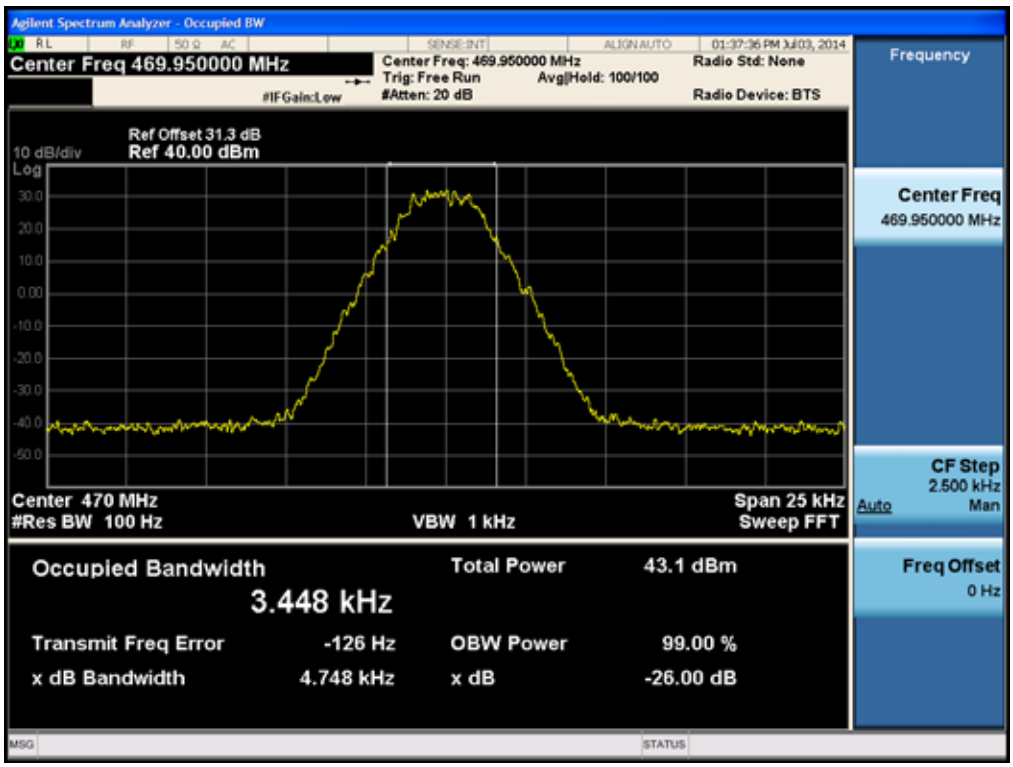
99% Bandwidth plot (4K00F1E,4K00F1D,4K00F7W -450.05 MHz)_High



99% Bandwidth plot (4K00F1E,4K00F1D,4K00F7W -460.05 MHz)_High



99% Bandwidth plot (4K00F1E,4K00F1D,4K00F7W -469.95 MHz)_High

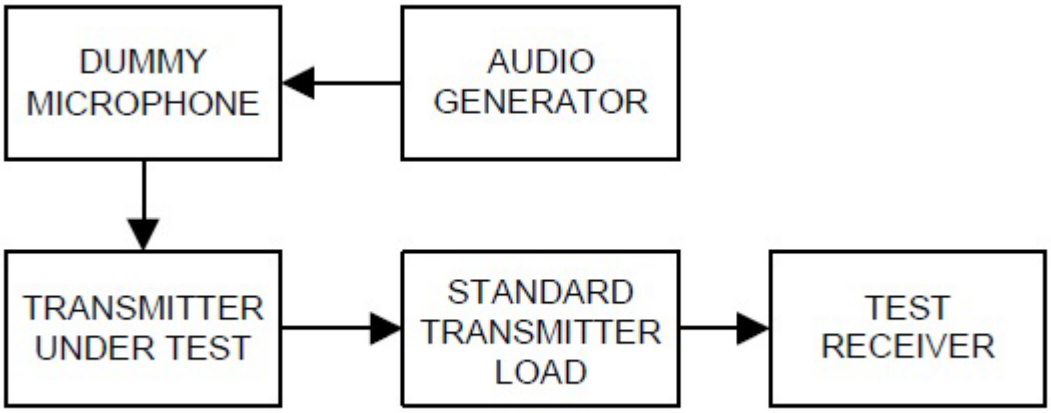


7.4 Modulation Limiting

▣ 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-D 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).

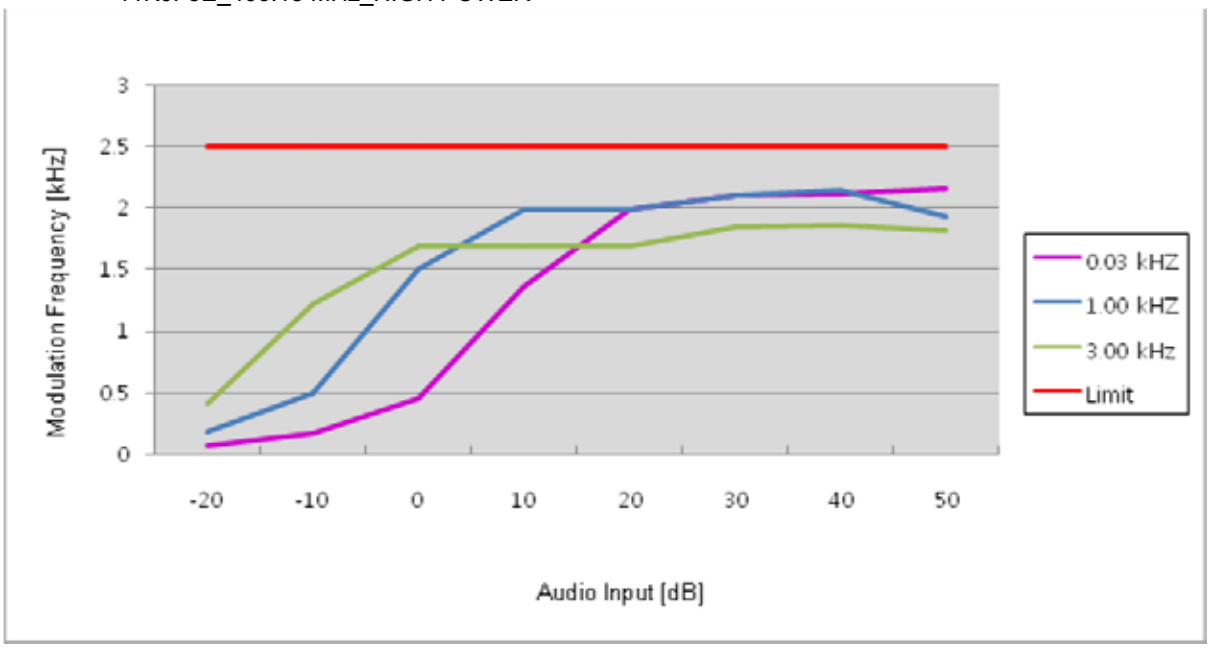
i) The values recorded in steps g) and h) are the modulation limiting.

▣ TEST RESULTS

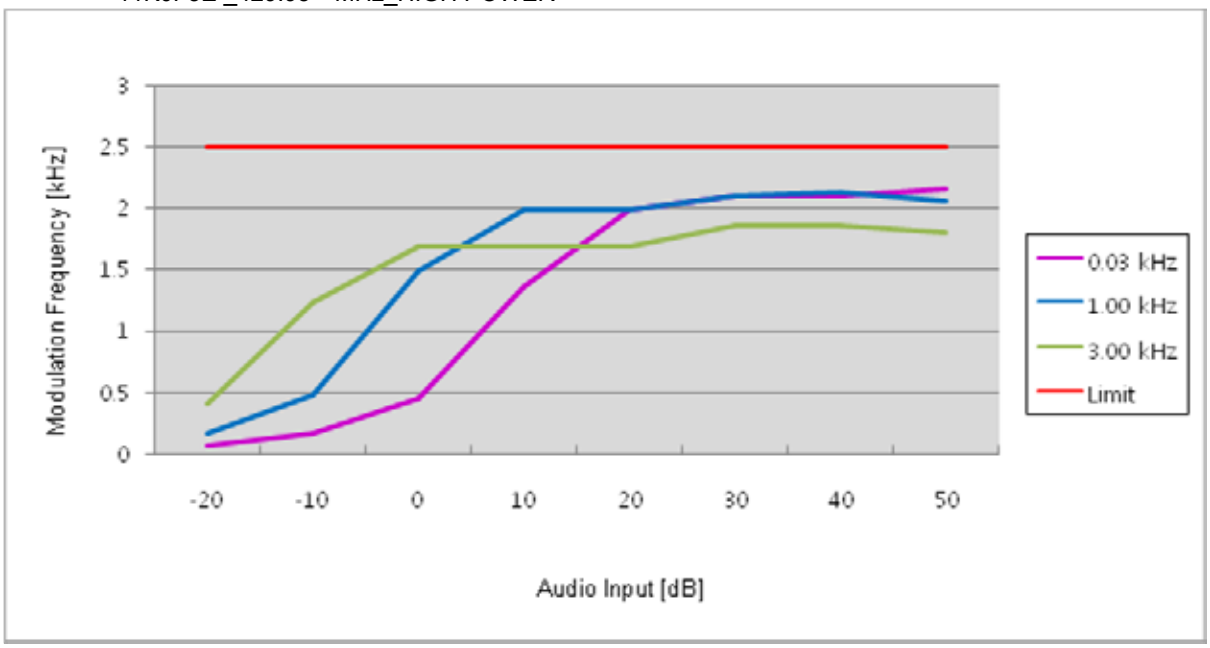
11K0F3E For FCC

Positive Peaks

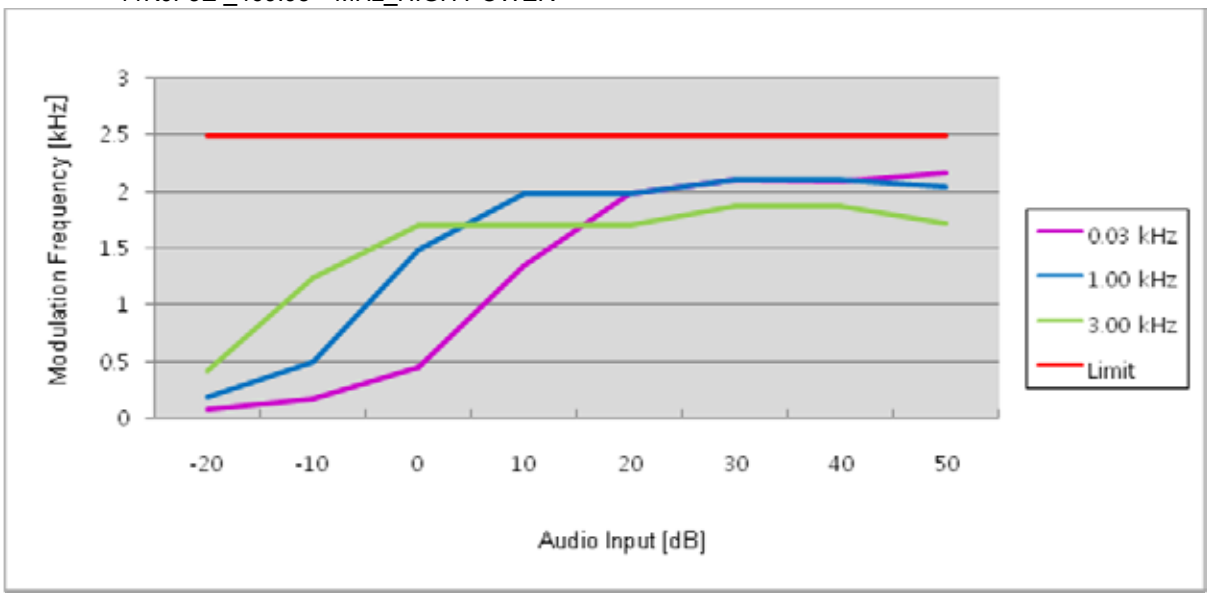
11K0F3E_406.15 MHz_HIGH POWER



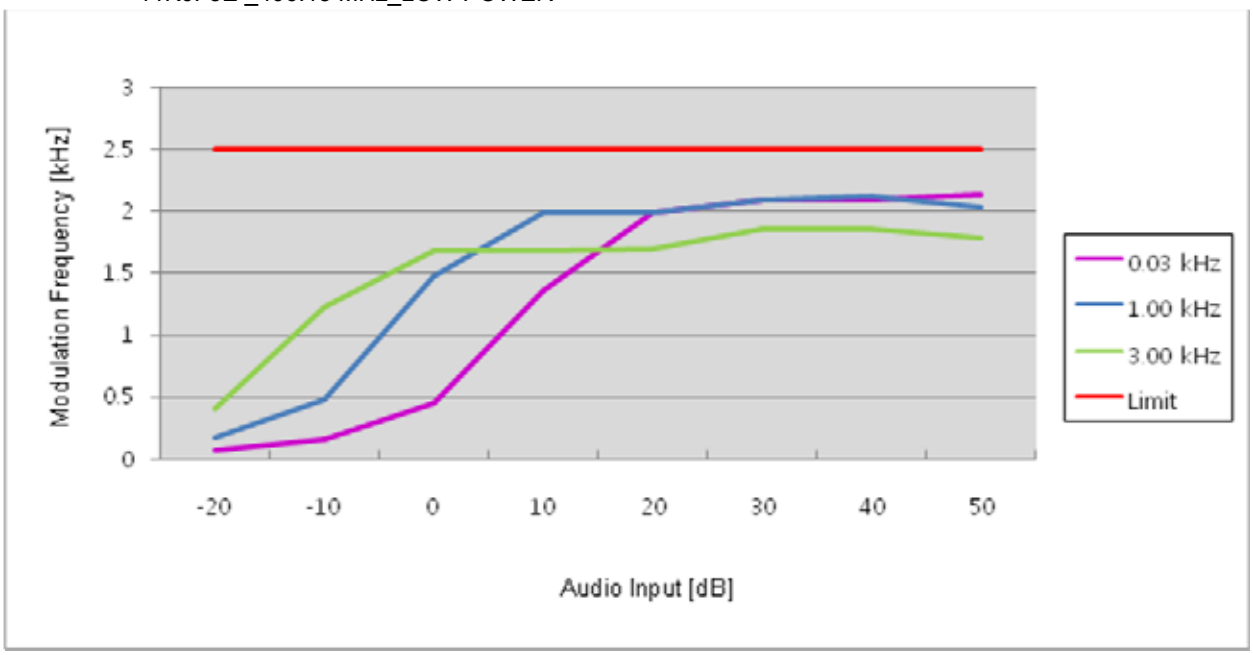
11K0F3E _429.95 MHz_HIGH POWER



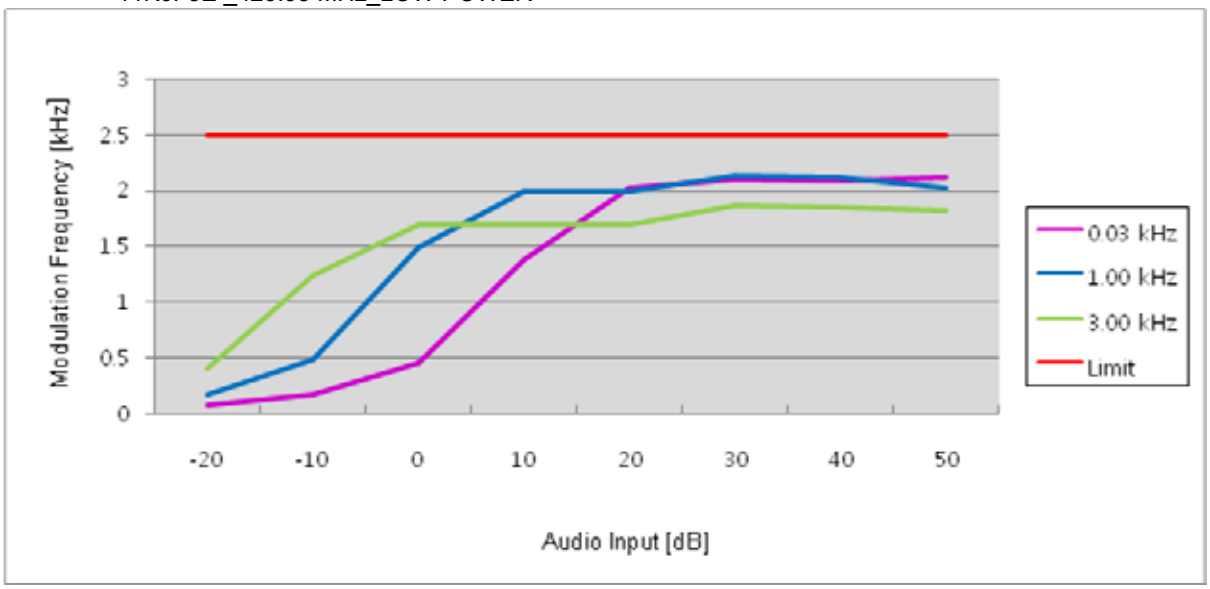
11K0F3E _469.95 MHz_HIGH POWER



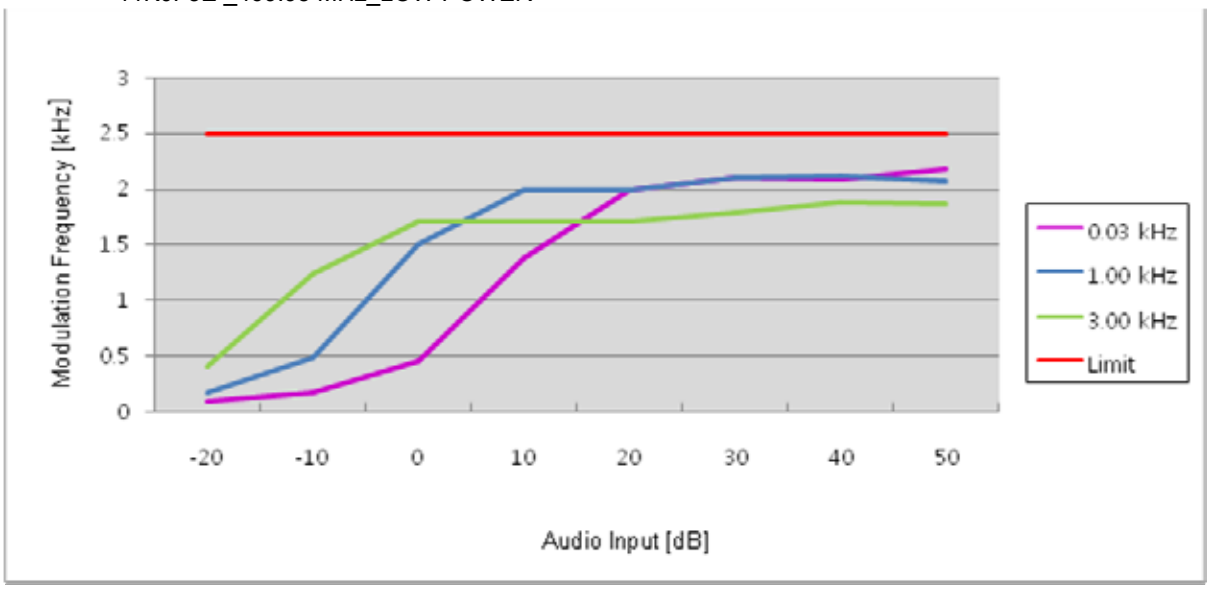
11K0F3E _406.15 MHz_LOW POWER



11K0F3E _429.95 MHz_LOW POWER



11K0F3E _469.95 MHz_LOW POWER

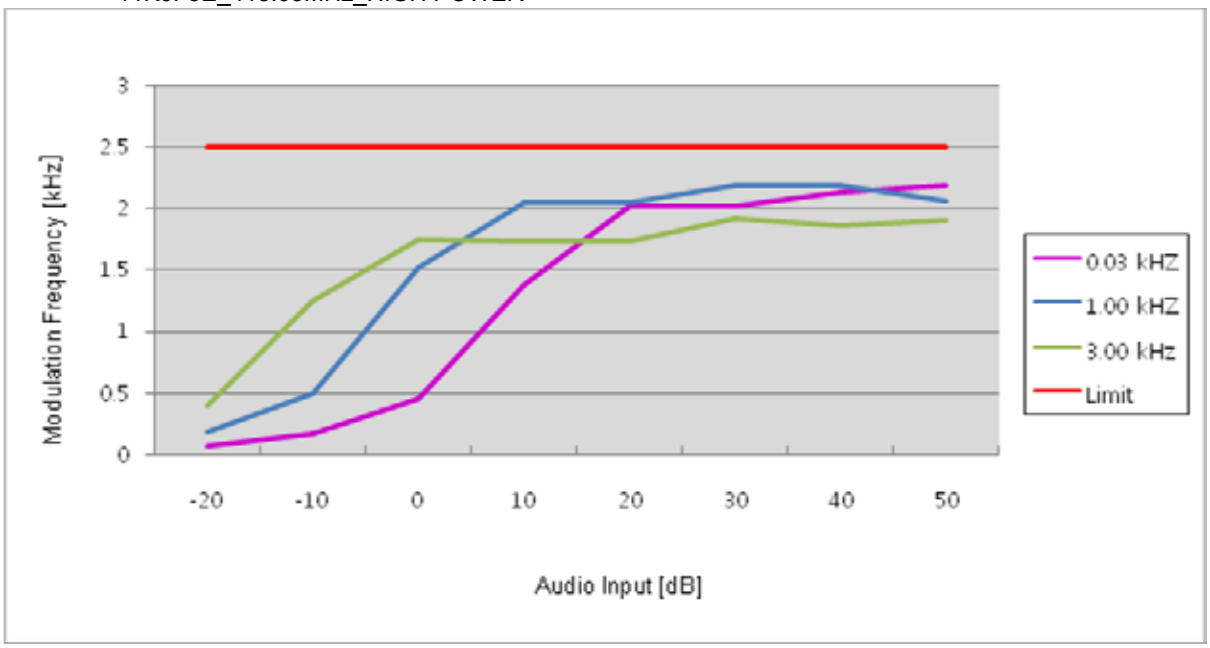


▣ TEST RESULTS

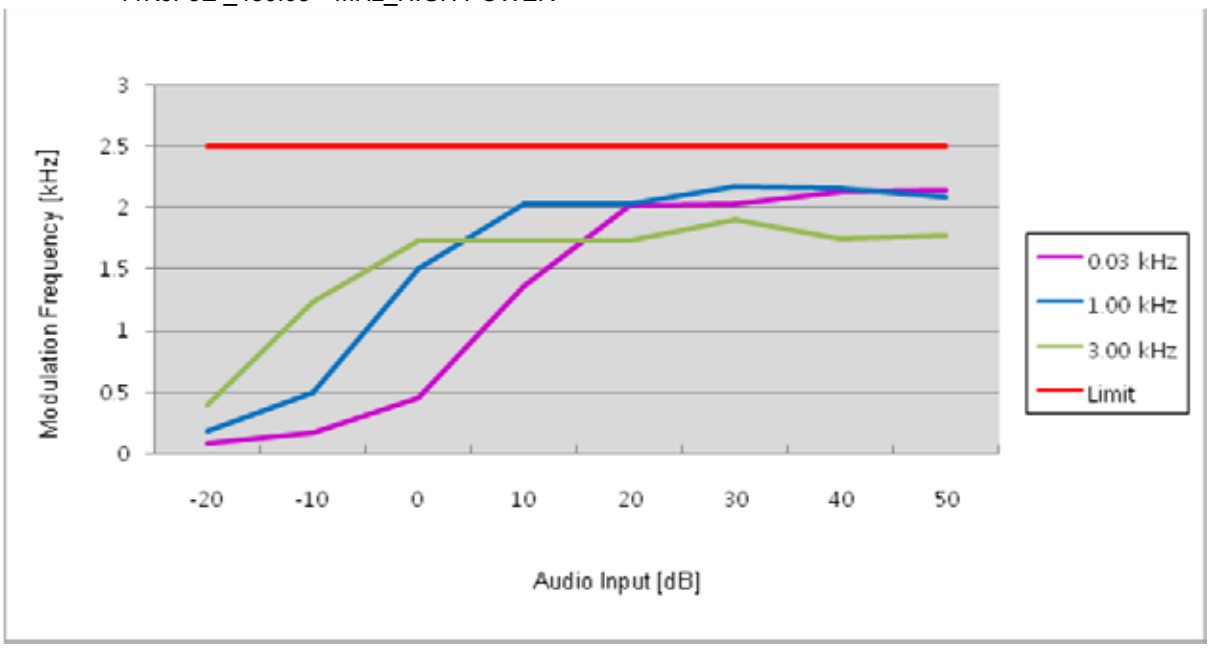
11K0F3E For IC

Positive Peaks

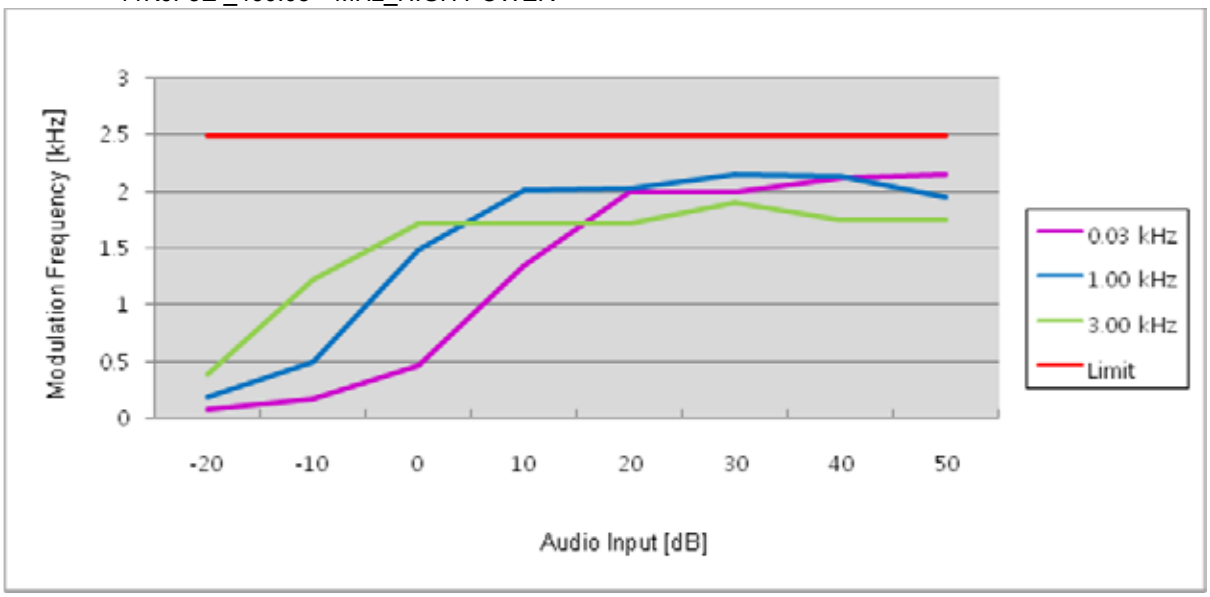
11K0F3E_418.05MHz_HIGH POWER



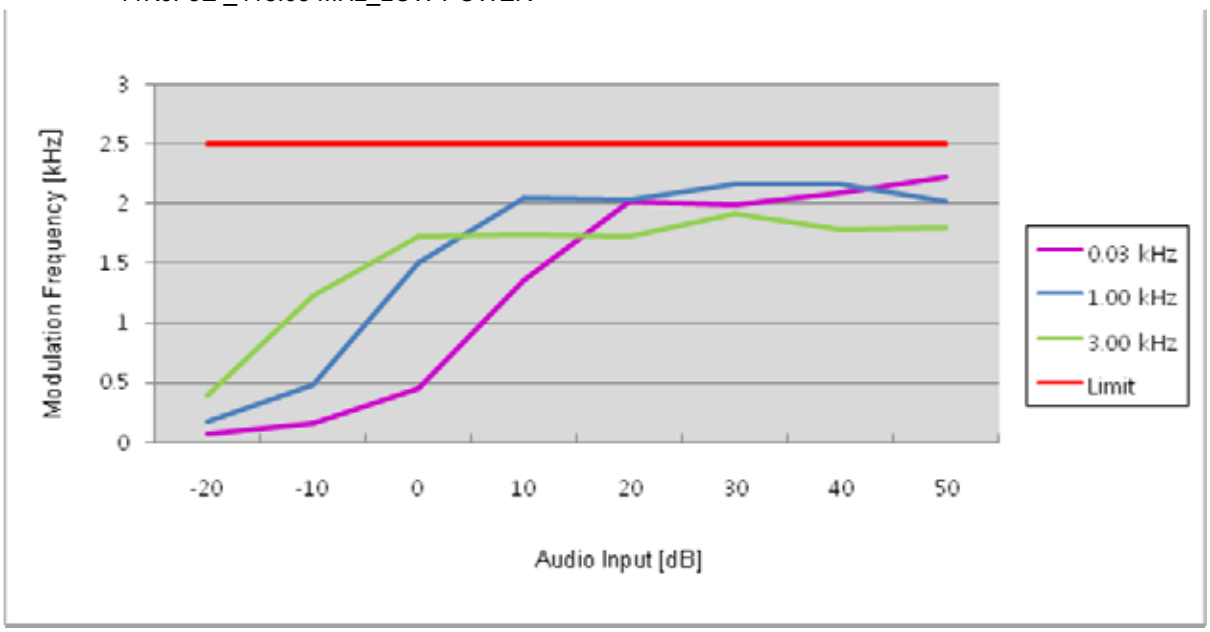
11K0F3E _450.05 MHz_HIGH POWER



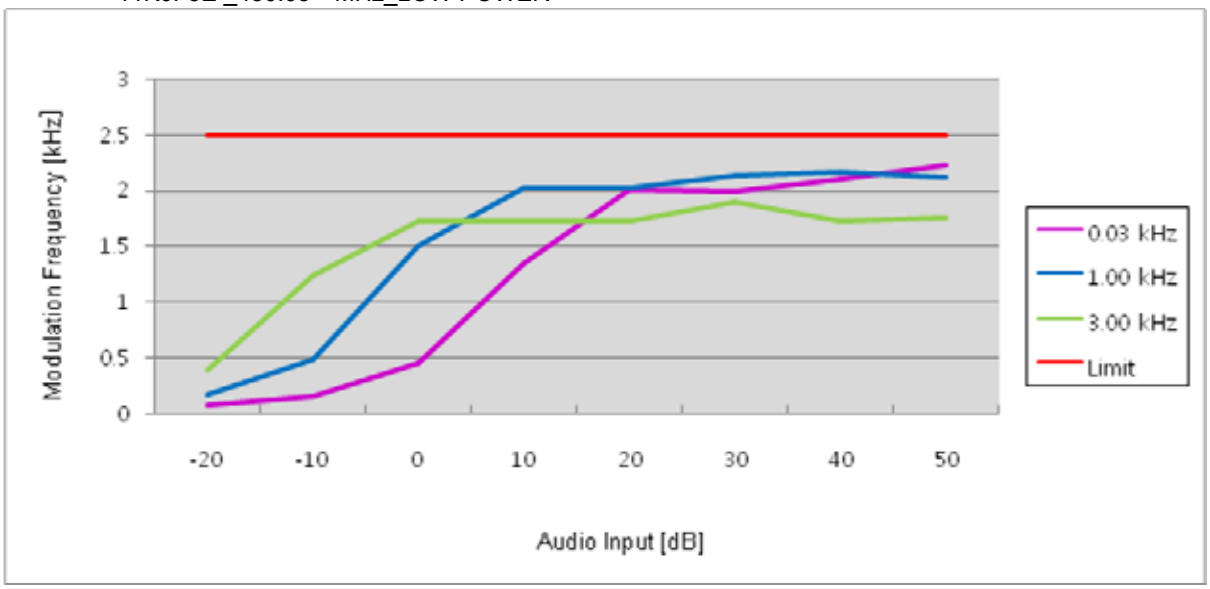
11K0F3E _460.05 MHz_HIGH POWER



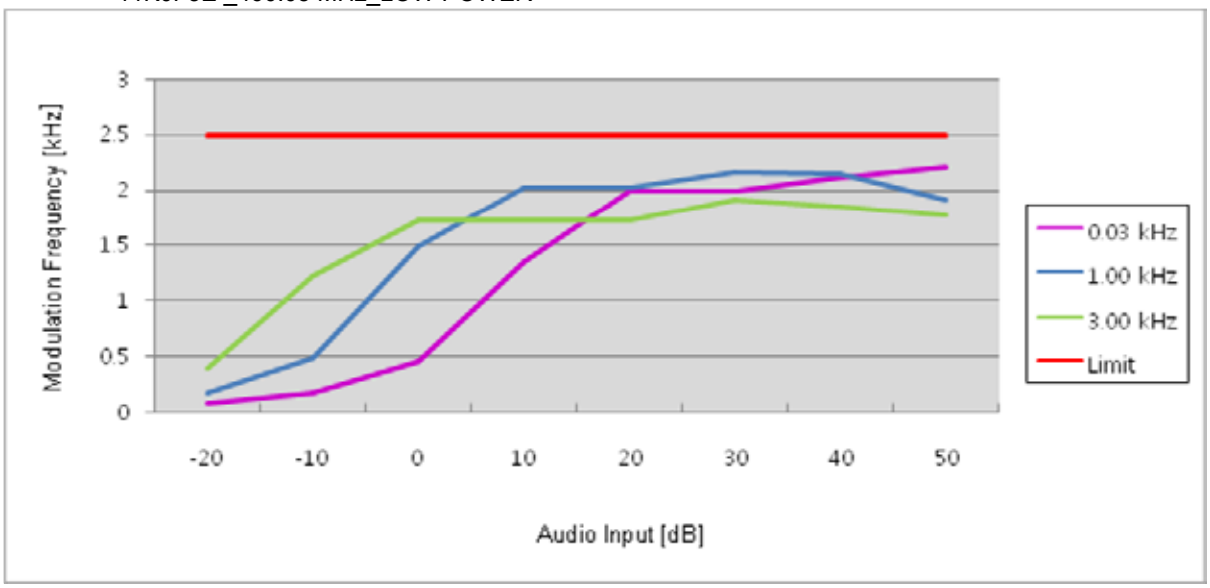
11K0F3E _418.05 MHz_LOW POWER



11K0F3E _450.05 MHz_LOW POWER



11K0F3E _460.05 MHz_LOW POWER

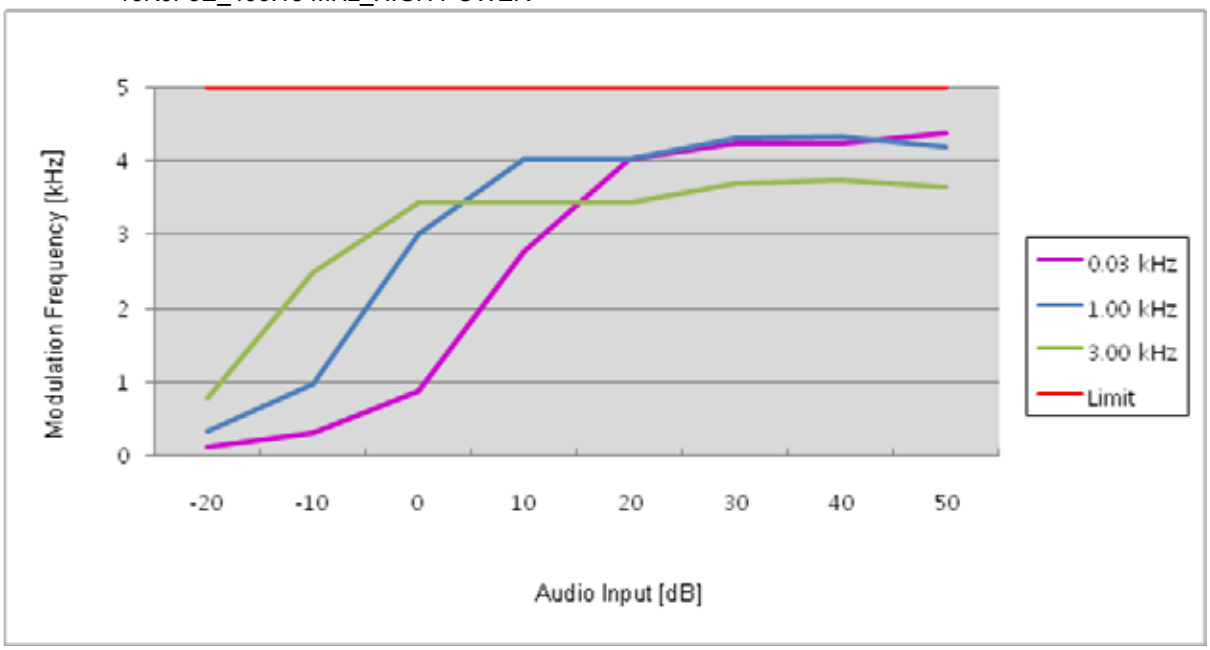


▣ TEST RESULTS

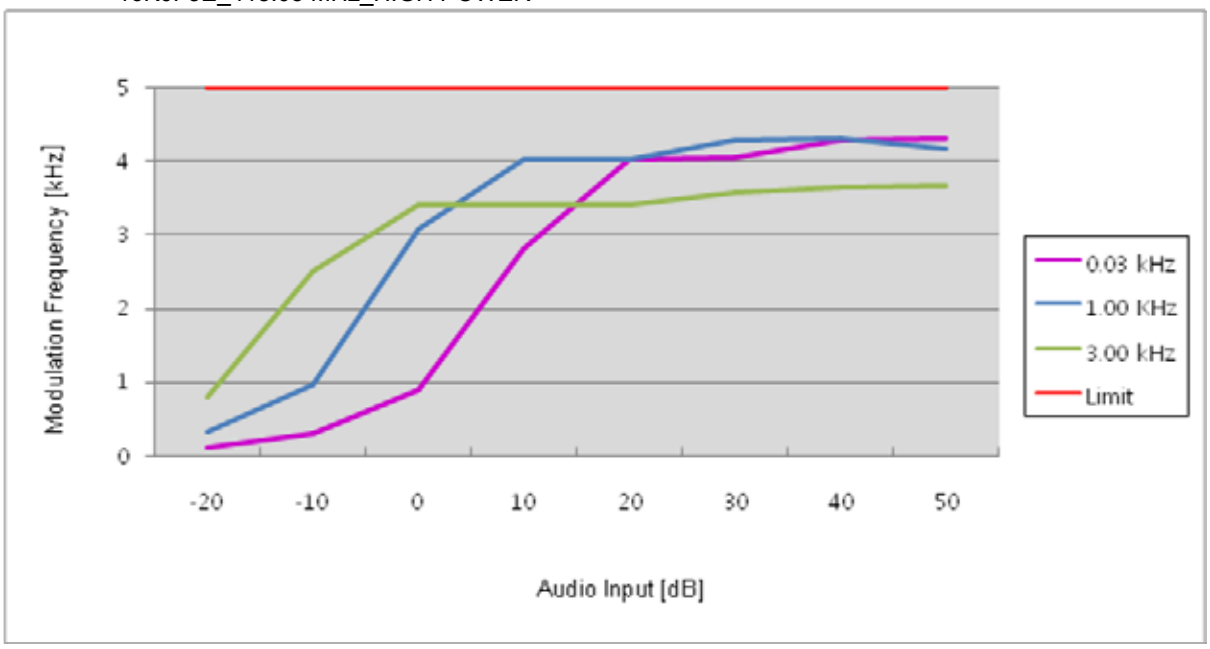
16K0F3E_ For IC

Positive Peaks

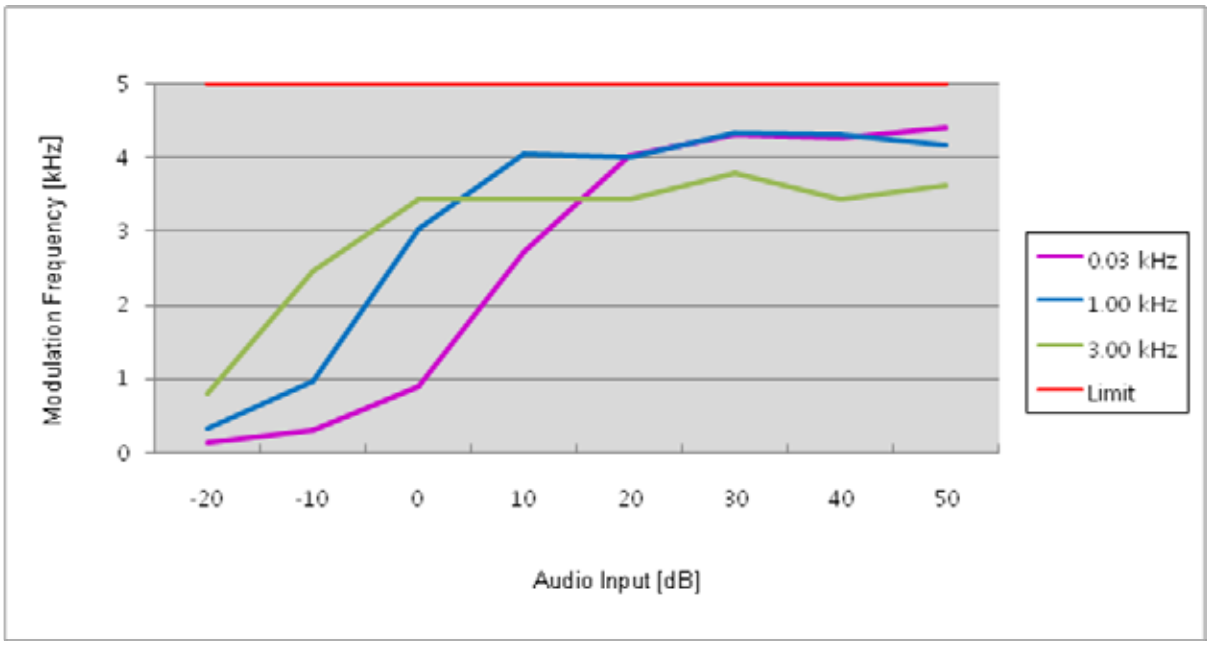
16K0F3E_406.15 MHz_HIGH POWER



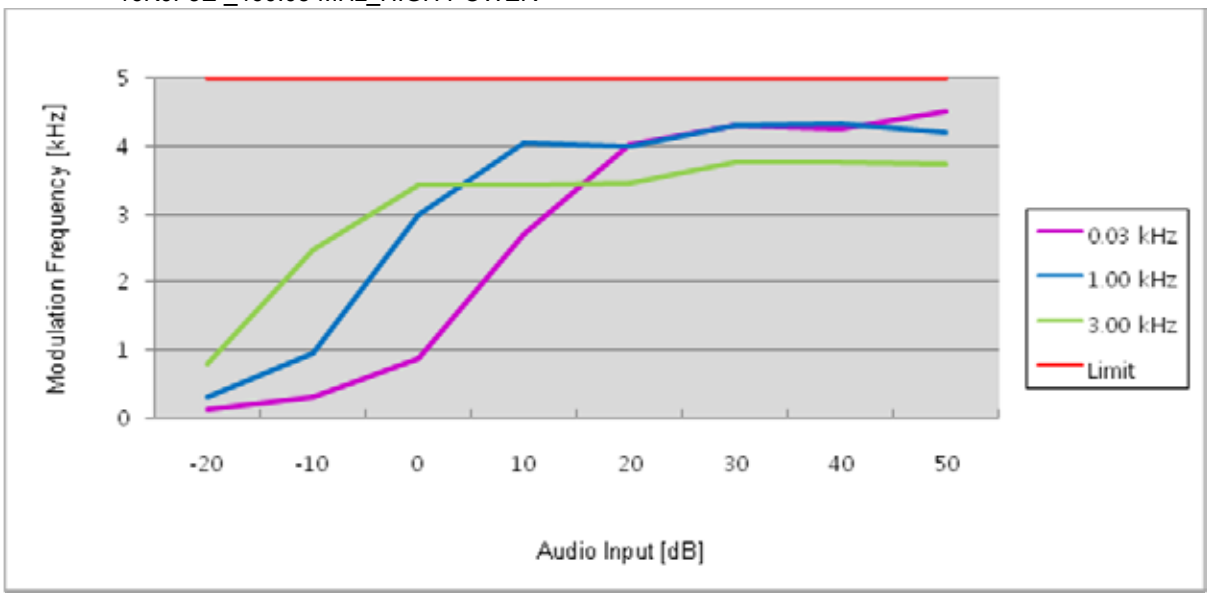
16K0F3E_418.05 MHz_HIGH POWER



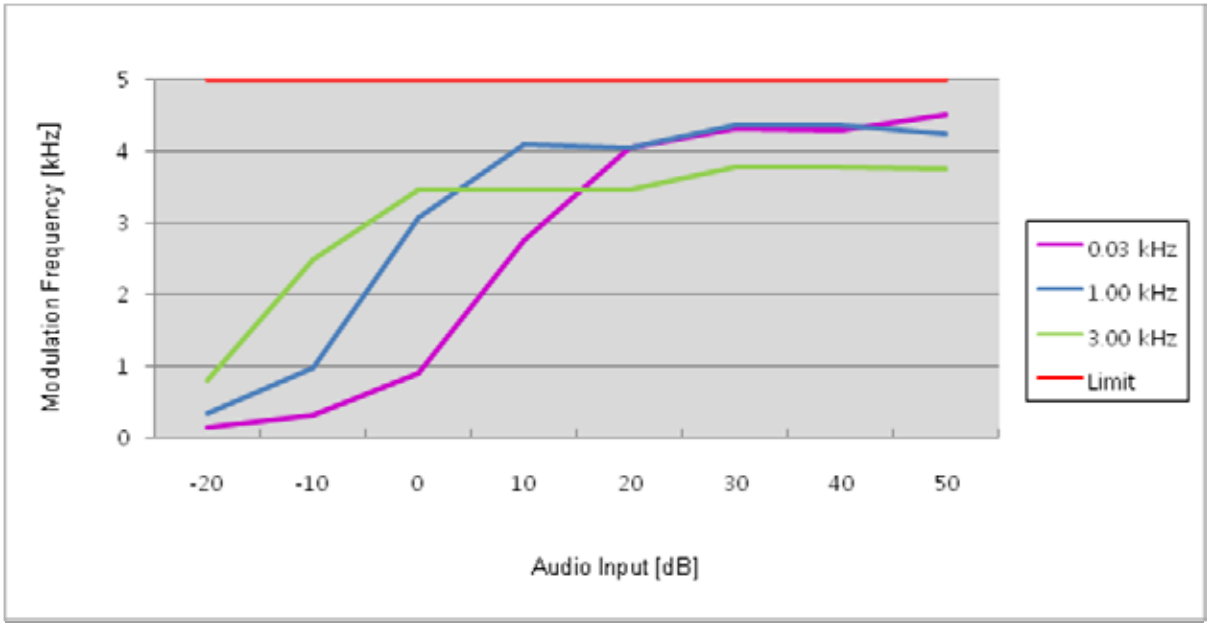
16K0F3E _450.05 MHz_HIGH POWER


Modulation Frequency [kHz]
5
4
3
2
1
0
-20
-10
0
10
20
30
40
50
Audio Input [dB]
0.03 kHz
1.00 kHz
3.00 kHz
Limit

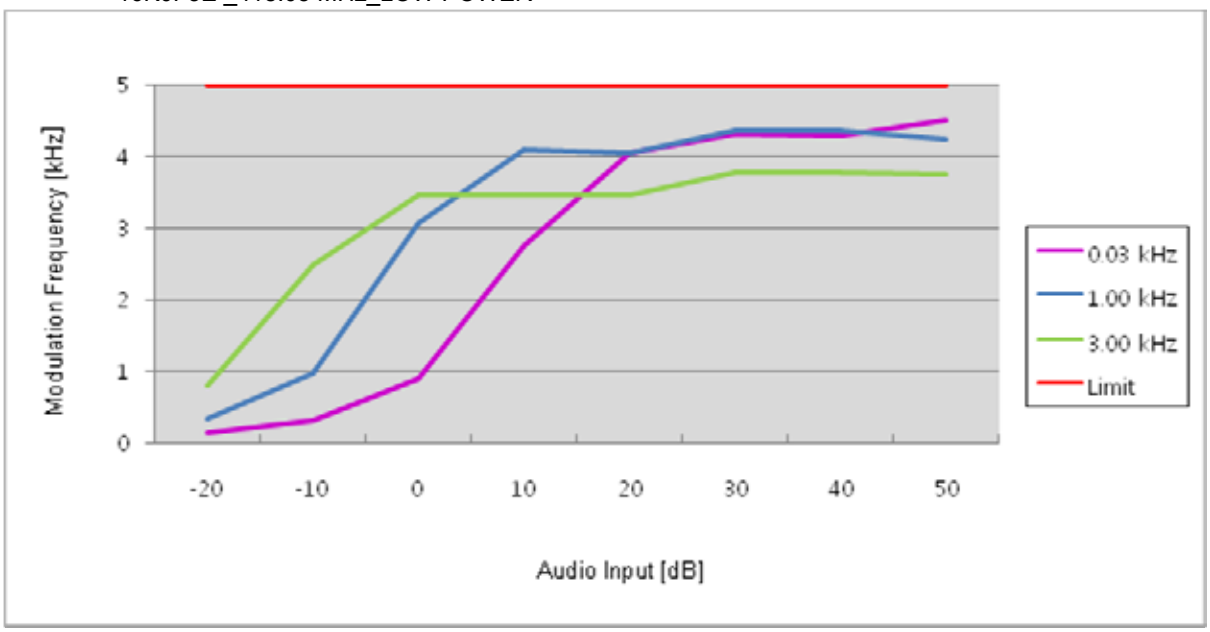
16K0F3E _460.05 MHz_HIGH POWER



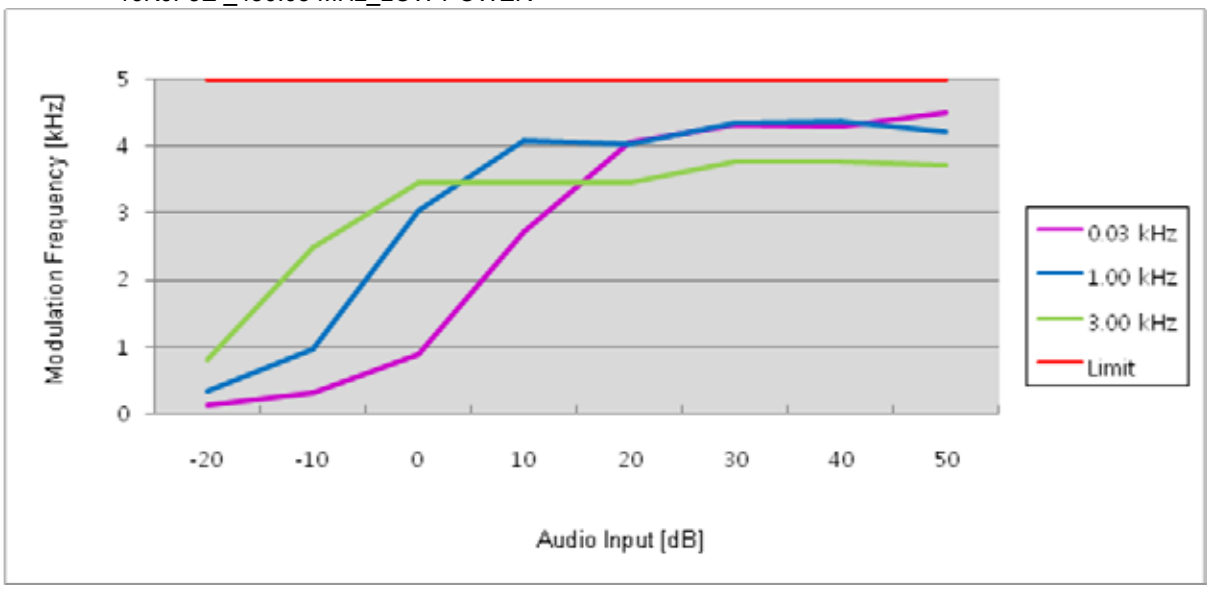
16K0F3E _406.15 MHz_LOW POWER



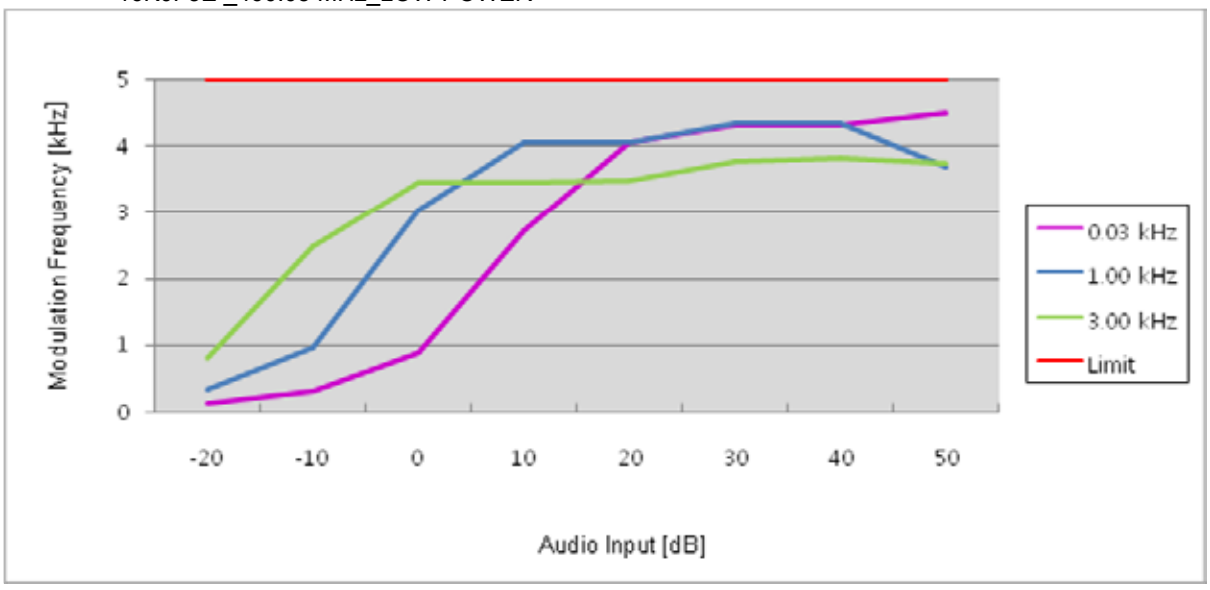
16K0F3E _418.05 MHz_LOW POWER



16K0F3E _450.05 MHz_LOW POWER



16K0F3E _460.05 MHz_LOW POWER

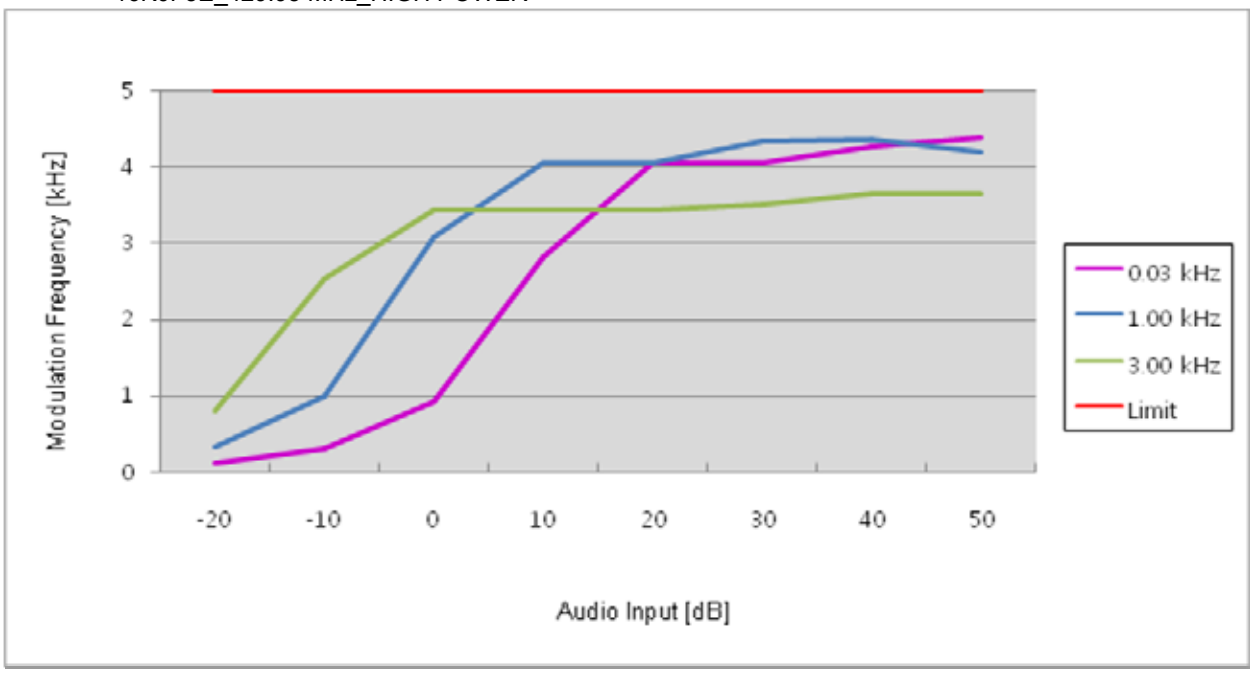


▣ TEST RESULTS

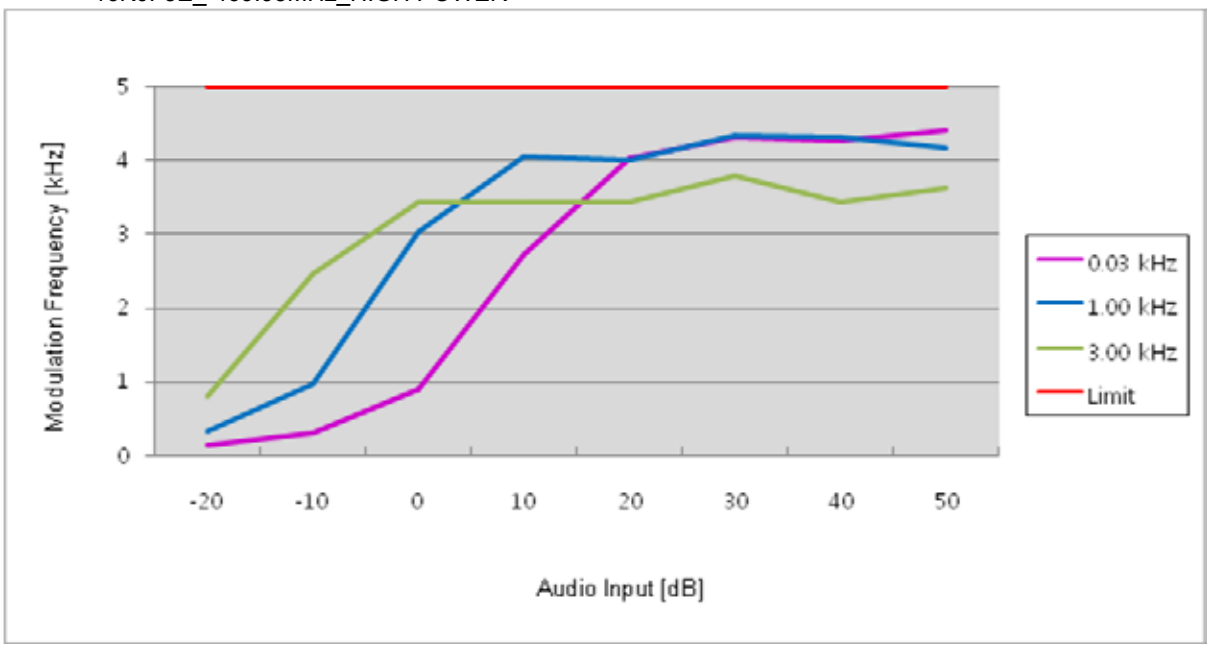
16K0F3E_ For IC

Positive Peaks

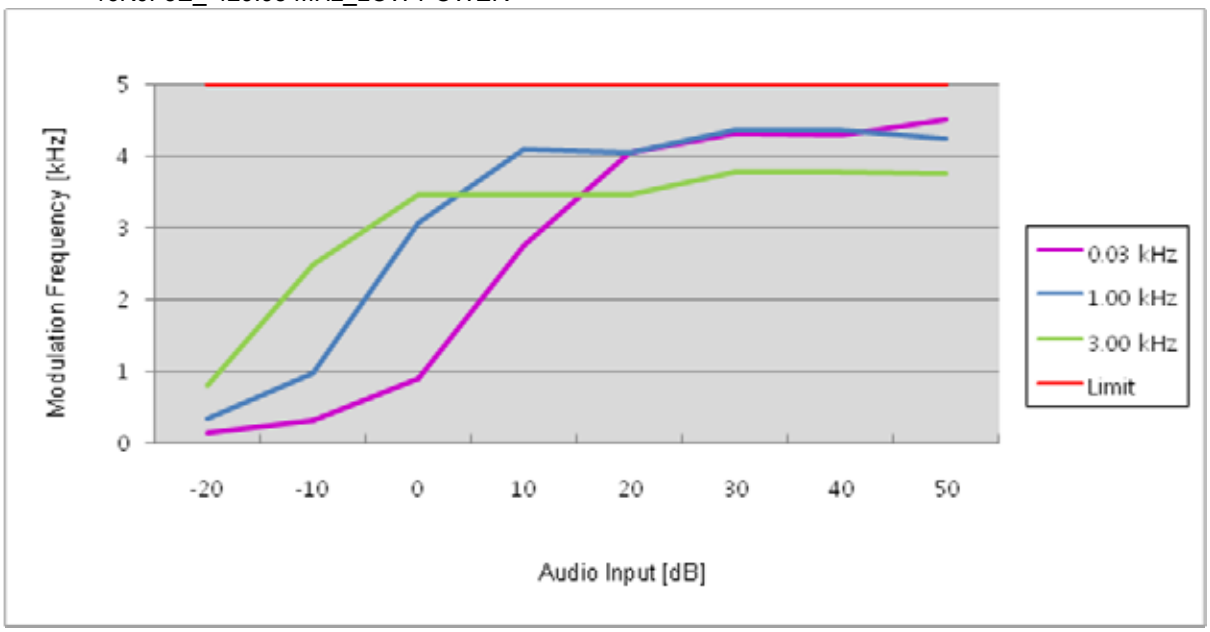
16K0F3E_429.95 MHz_HIGH POWER



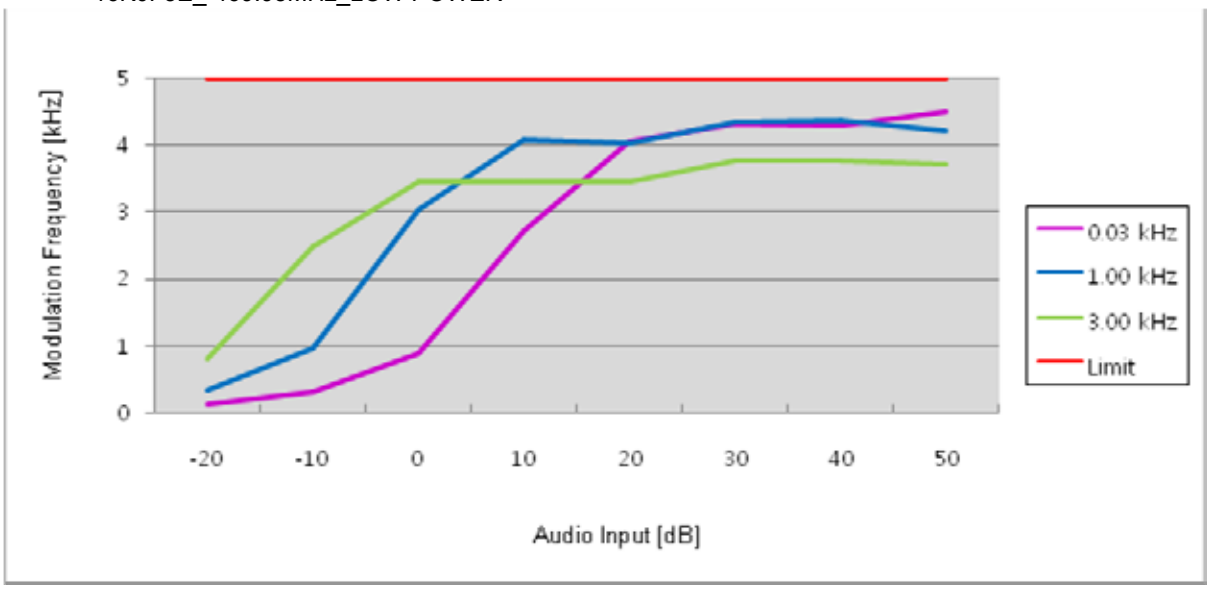
16K0F3E_ 469.95MHz_HIGH POWER



16K0F3E_ 429.95 MHz_LOW POWER



16K0F3E_ 469.95MHz_LOW POWER

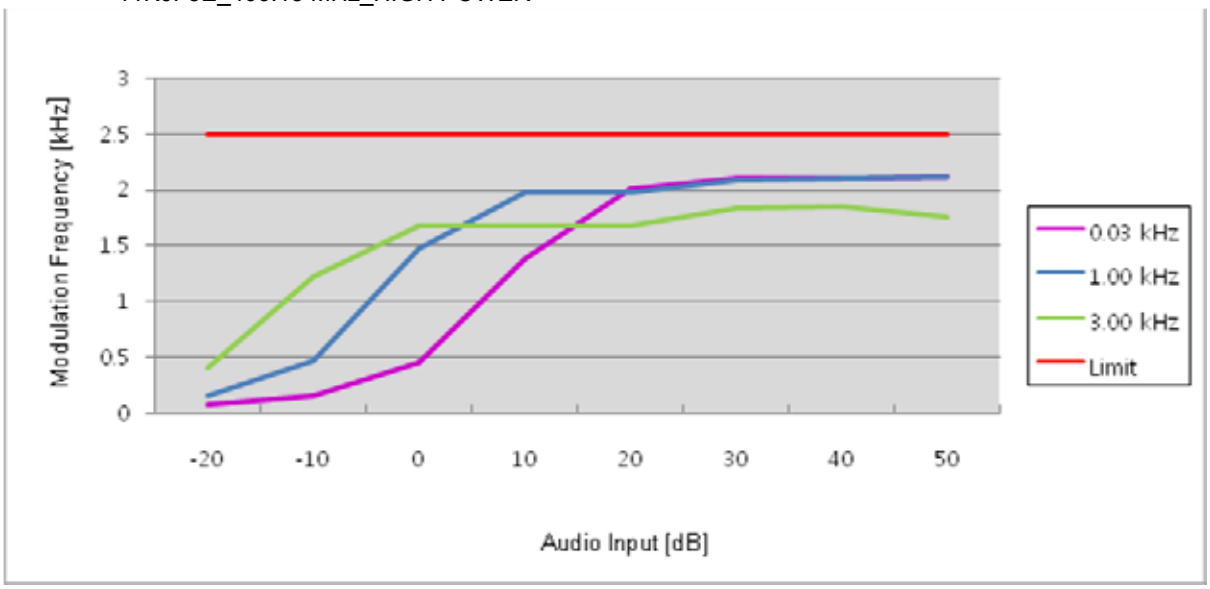


▣ TEST RESULTS

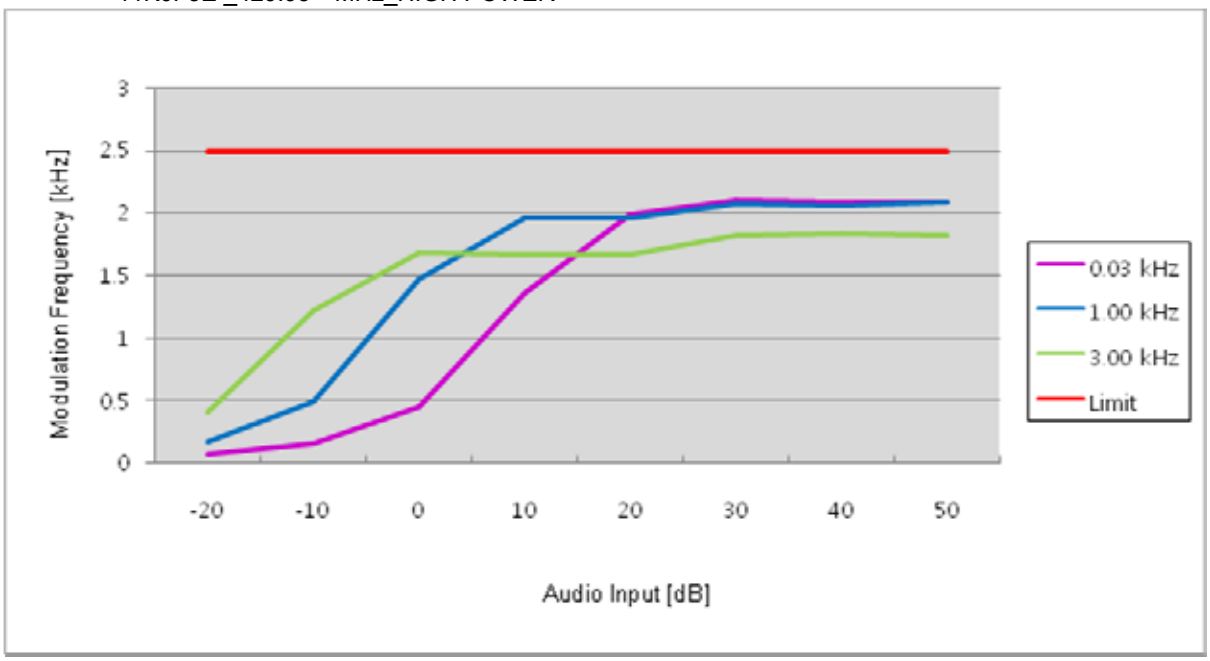
11K0F3E For FCC

Negative Peaks

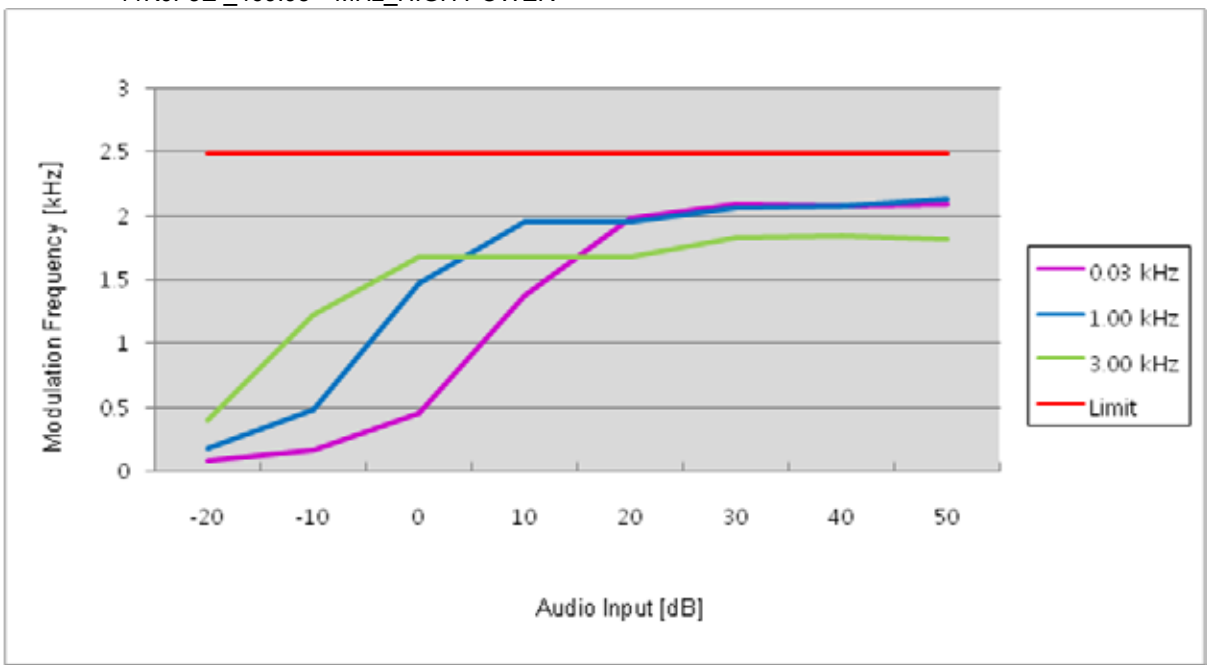
11K0F3E_406.15 MHz_HIGH POWER



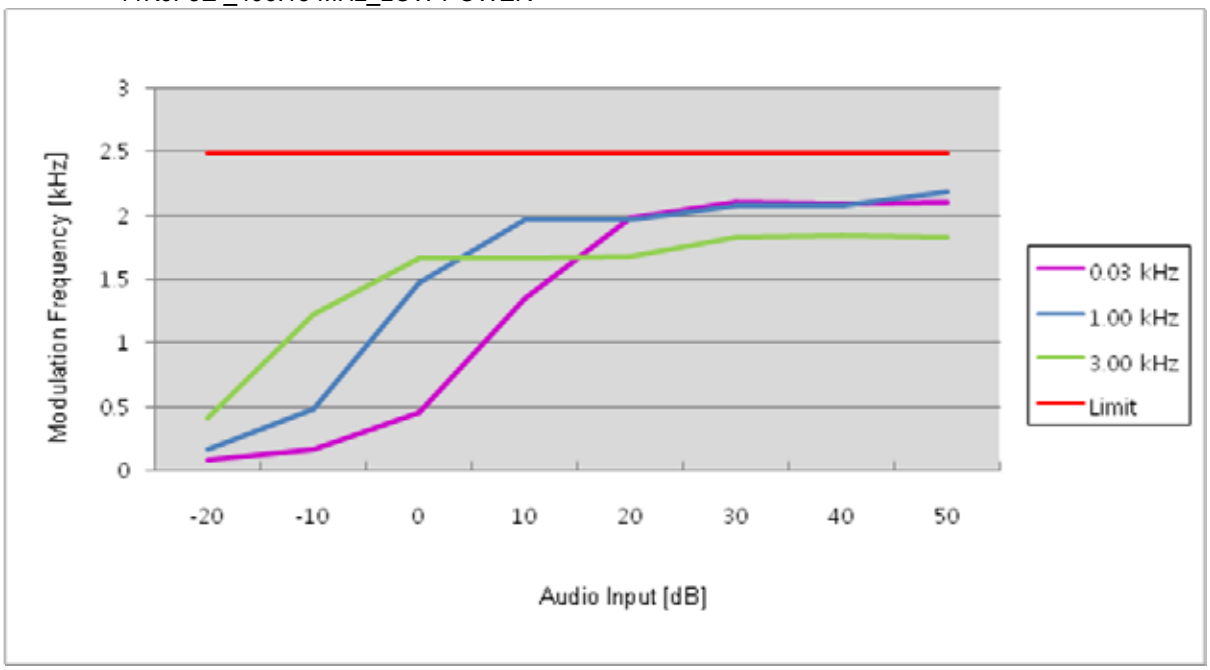
11K0F3E _429.95 MHz_HIGH POWER



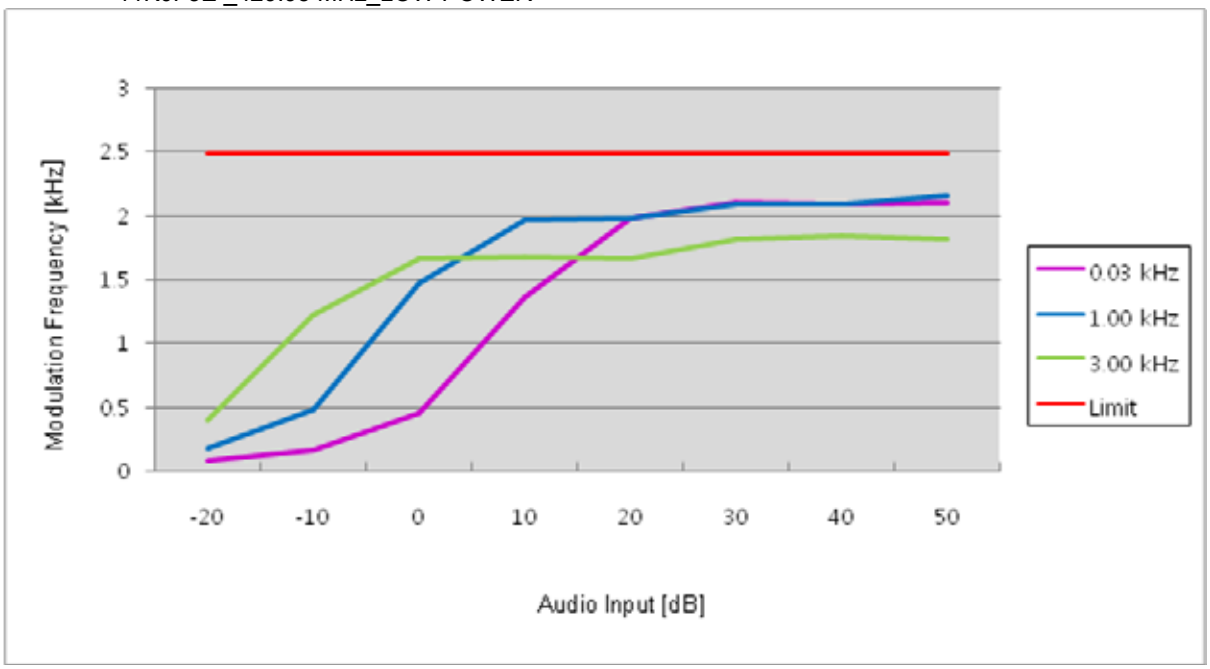
11K0F3E _469.95 MHz_HIGH POWER



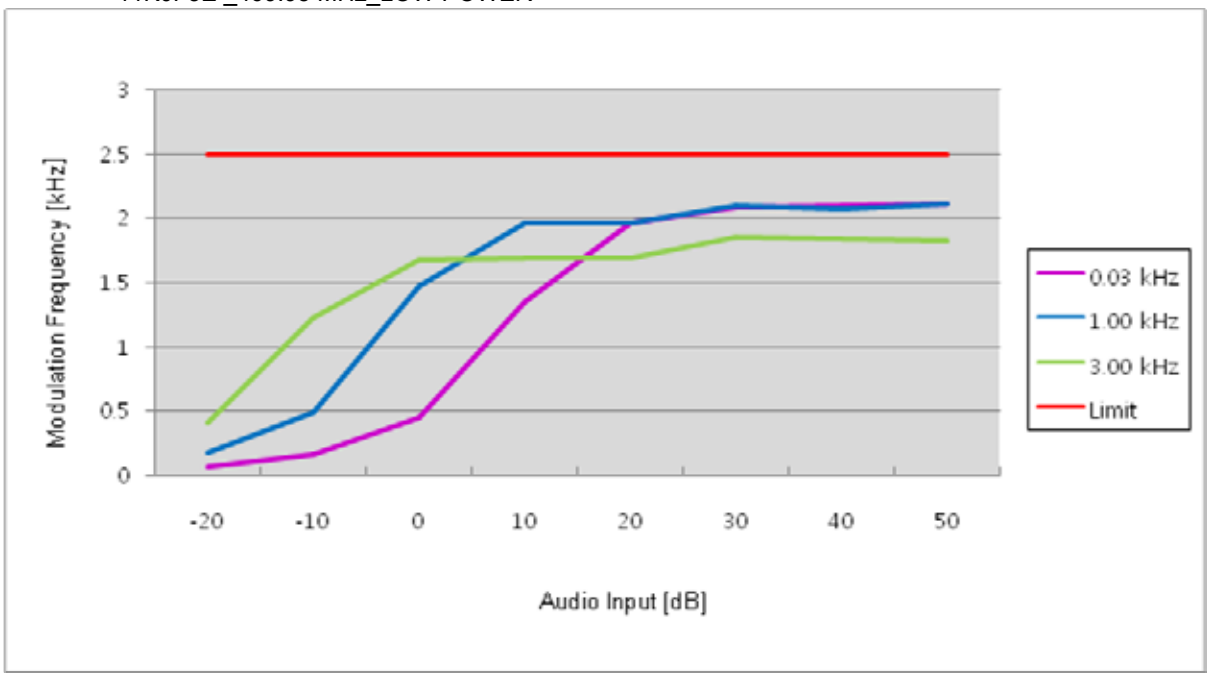
11K0F3E _406.15 MHz_LOW POWER



11K0F3E _429.95 MHz_LOW POWER



11K0F3E _469.95 MHz_LOW POWER

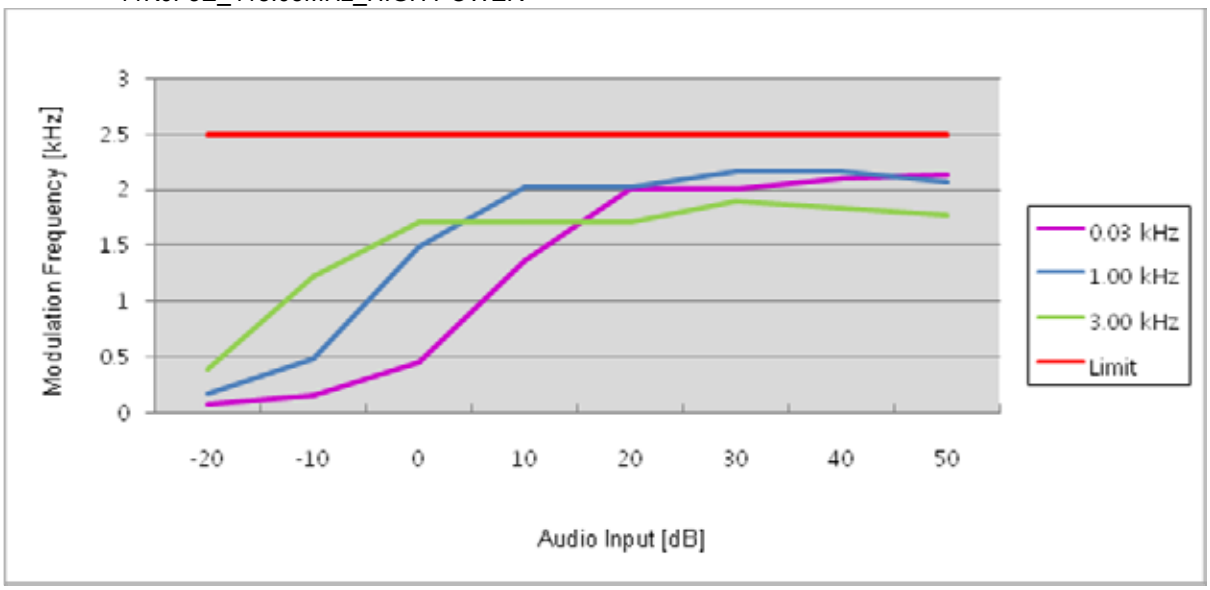


▣ TEST RESULTS

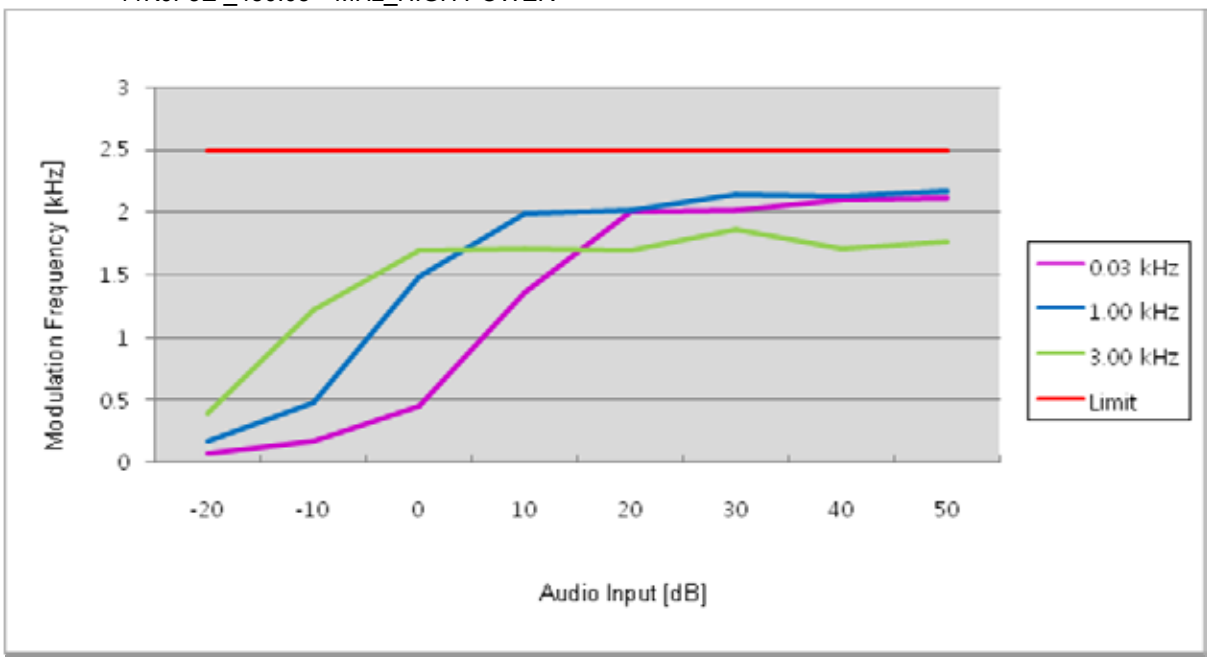
11K0F3E For IC

Negative Peaks

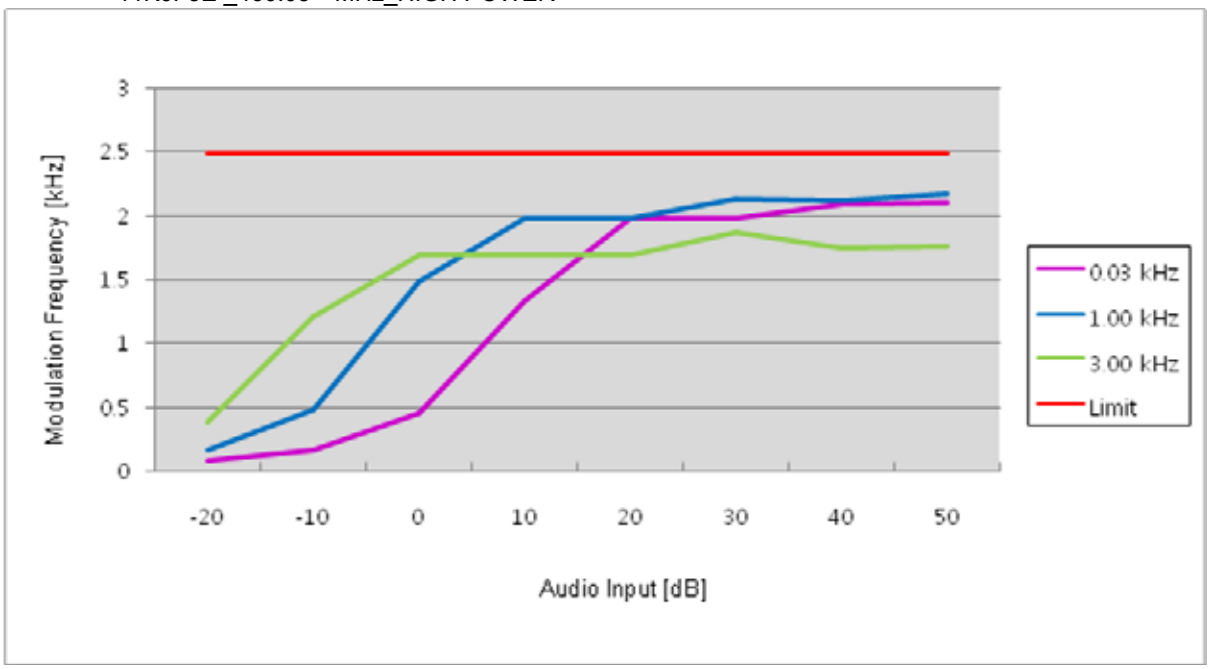
11K0F3E_418.05MHz_HIGH POWER



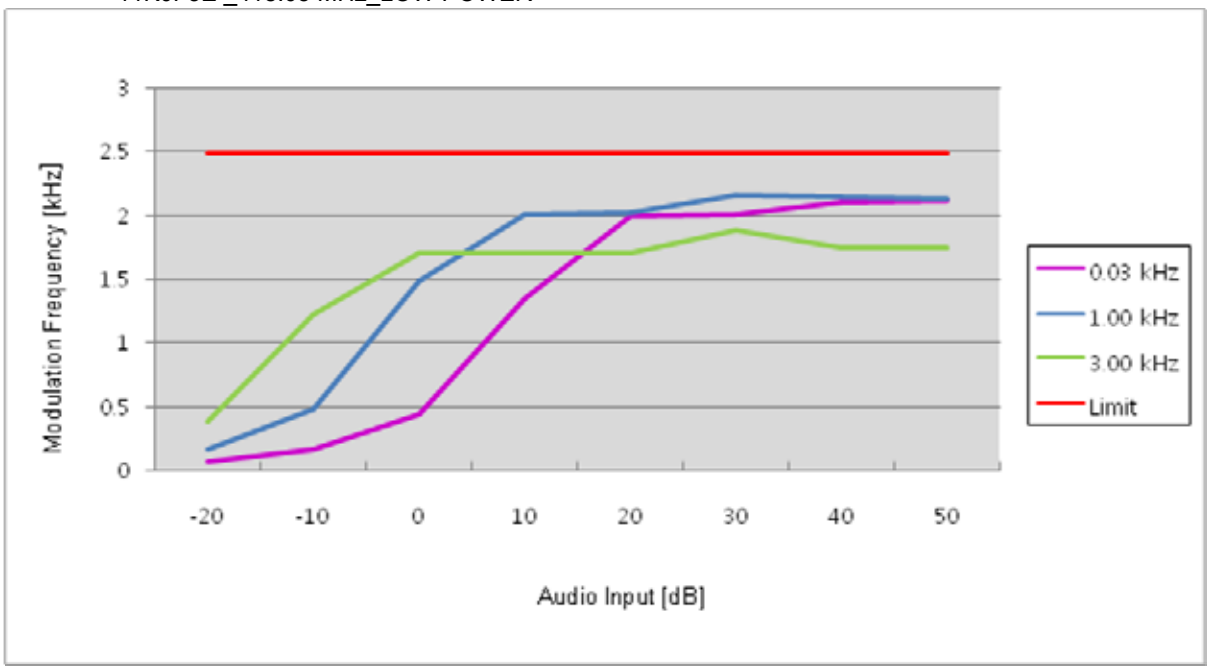
11K0F3E _450.05 MHz_HIGH POWER



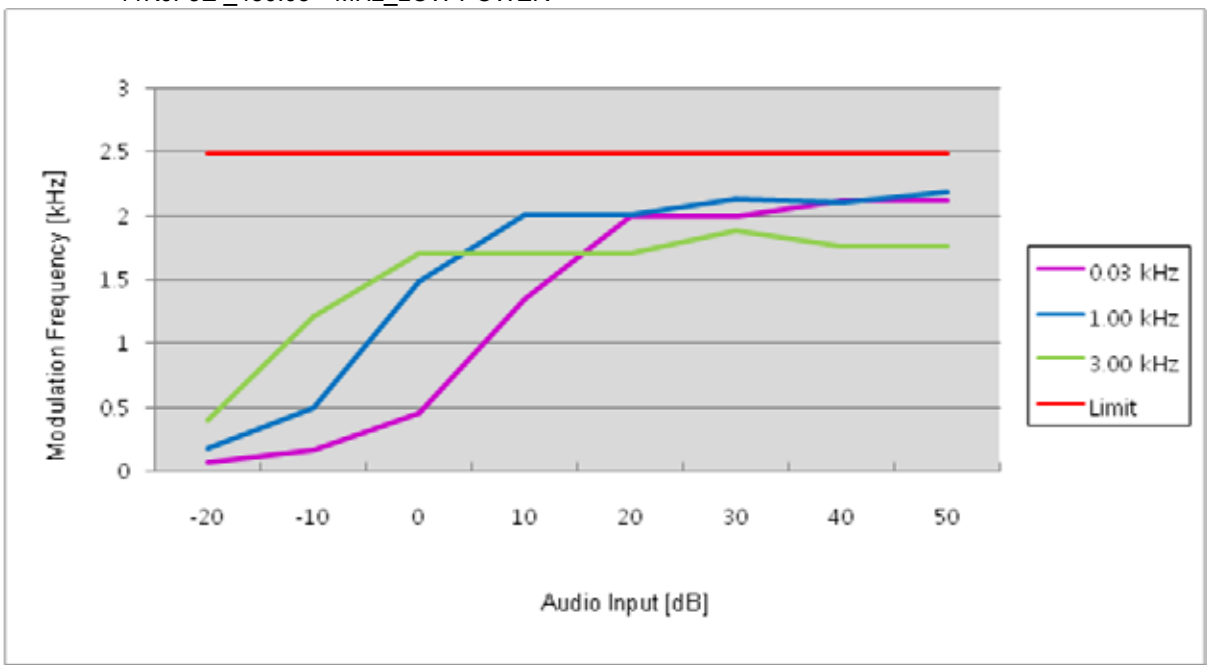
11K0F3E _460.05 MHz_HIGH POWER



11K0F3E _418.05 MHz_LOW POWER



11K0F3E _450.05 MHz_LOW POWER



11K0F3E _460.05 MHz_LOW POWER