74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC REPORT

FCC / IC Certification

Applicant Name:
JVC KENWOOD Corporation

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

Date of Issue:
October 05 , 2015

Test Site/Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1510-F002-1

HCT FRN: 0005866421

IC Recognition No.: 5944A-5

FCC ID:	**K44475500**
IC:	**282F-475500**
APPLICANT:	**JVC KENWOOD Corporation**

FCC Model(s):	TK-D340-K2, TK-D340-M2, TK-D340U-K2
IC Model(s):	TK-D340-K2
EUT Type:	UHF DIGITAL TRANSCEIVER
FCC Rule Part(s):	Part 90 and Part 2
IC Rule:	RSS-Gen (Issue 4), RSS-119 Issue 12

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §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)

Report prepared by	Approved by
: Jong Seok Lee	: Kyoung Houn Seo
Test engineer of RF Team	Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1510-F002	October 02, 2015	- First Approval Report
HCT-R-1510-F002-1	October 05, 2015	- Revised the Type of Emission

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	JVC KENWOOD Corporation
Address:	1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan
FCC ID:	K44475500
IC:	282F-475500
EUT Type:	UHF DIGITAL TRANSCEIVER
FCC Model(s):	TK-D340-K2, TK-D340-M2, TK-D340U-K2
IC Model(s):	TK-D340-K2
Date(s) of Tests:	September 01, 2015 ~ September 30, 2015
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA (IC Recognition No. : 5944A-5)

2. EUT DESCRIPTION

EUT Type	UHF DIGITAL TRANSCEIVER
FCC Model Name	TK-D340-K2, TK-D340-M2, TK-D340U-K2
IC Model Name	TK-D340-K2
Power Supply	DC 7.5 V
Output Power	4 W (Power output continuously variable to 1 W)
Battery type	Li-ion Battery (KNB-45L, KNB-69L, KNB-29N, KNB-53N)
Antenna type	KRA-42M UHF Stubby Antenna (440 MHz – 490 MHz)
	KRA-42M3 UHF Stubby Antenna (400 MHz – 450 MHz)
	KRA-23M UHF Low Profile Helical Antenna (440 MHz – 490 MHz)
	KRA-23M3 UHF Low Profile Helical Antenna (400 MHz – 450 MHz)
	KRA-27M UHF Whip Antenna (440 MHz – 490 MHz)
	KRA-27M3 UHF Whip Antenna (400 MHz – 450 MHz)
Channel Bandwidth	FCC : 12.5 kHz IC : 25kHz / 12.5 kHz
Operating Temperature	-30 ℃~ +60 ℃
Frequency Range	FCC : 406.1 MHz - 470 MHz IC : 406.1 MHz – 430 MHz and 450 MHz – 470 MHz
Test Frequency	406.15 MHz(FCC and IC) 429.95 MHz(FCC and IC) 469.95 MHz(FCC and IC)

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)
7K60FXD/7K60FXE (Digital)

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. TEST FACILITY

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, 17383, Rep. of 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 : 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(5.9)	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 7.1		PASS
Necessary Bandwidth	§2.202(g)		-	-	-

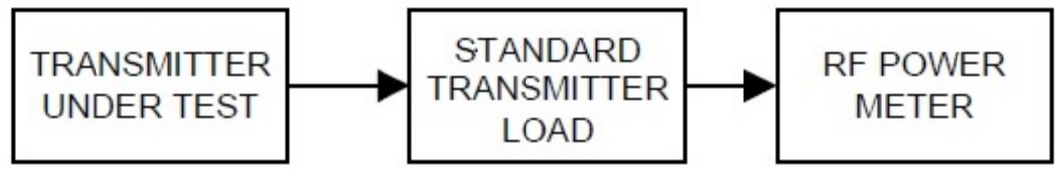
7. TEST RESULT

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	30.410	1.099	36.818	4.806
			429.95	30.503	1.123	36.820	4.808
			469.95	30.847	1.215	36.660	4.634
Digital	7K60FXD/7K60FXE	12.5 kHz	406.15	30.312	1.074	36.635	4.608
			429.95	30.336	1.080	36.755	4.737
			469.95	30.750	1.189	36.473	4.439

For IC

Mode	Type of Emission	Channel Spacing	Freq.(MHz)	Carrier Output Power			
				Low		High	
				dBm	W	dBm	W
Analog	11K0F3E	12.5 kHz	406.15	30.361	1.087	36.724	4.704
			429.95	30.394	1.095	36.740	4.720
			469.95	30.617	1.153	36.574	4.543
	16K0F3E	25.0 kHz	406.15	30.180	1.042	36.516	4.483
			429.95	30.314	1.075	36.617	4.588
			469.95	30.501	1.122	36.485	4.451
Digital	7K60FXD/7K60FXE	12.5 kHz	406.15	30.181	1.043	36.394	4.359
			429.95	30.258	1.061	36.637	4.610
			469.95	30.749	1.188	36.349	4.314

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 - 7K60FXD/7K60FXE For FCC AND IC

(1) Frequency Stability (Temperature Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149750590	-0.614083
-20	406.149751045	-0.612963
-10	406.149755520	-0.601945
0	406.149757497	-0.597077
10	406.149753744	-0.606318
20	406.149827419	-0.424919
30	406.149731259	-0.661679
40	406.149706465	-0.722726
50	406.149672137	-0.807246

429.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949729042	-0.630208
-20	429.949717550	-0.656937
-10	429.949706011	-0.683775
0	429.949691838	-0.716739
10	429.949657955	-0.795546
20	429.949788300	-0.492383
30	429.949624069	-0.874360
40	429.949633239	-0.853032
50	429.949625655	-0.870671

469.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949723203	-0.588992
-20	469.949726115	-0.582796
-10	469.949738959	-0.555465
0	469.949745734	-0.541049
10	469.949748375	-0.535429
20	469.949769442	-0.490601
30	469.949653218	-0.737913
40	469.949643358	-0.758893
50	469.949609148	-0.831688

406.15 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149721233	-0.686365
-20	406.149750557	-0.614165
-10	406.149751736	-0.611262
0	406.149772664	-0.559734
10	406.149775492	-0.552771
20	406.149763262	-0.582882
30	406.149685421	-0.774539
40	406.149674658	-0.801039
50	406.149661993	-0.832222

429.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949699507	-0.698902
-20	429.949726222	-0.636767
-10	429.949733284	-0.620342
0	429.949734380	-0.617793
10	429.949744558	-0.594120
20	429.949744872	-0.593391
30	429.949623639	-0.875360
40	429.949622613	-0.877746
50	429.949627237	-0.866992

469.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949700078	-0.638200
-20	469.949720538	-0.594663
-10	469.949725490	-0.584126
0	469.949726017	-0.583005
10	469.949738196	-0.557089
20	469.949738437	-0.556577
30	469.949721867	-0.591835
40	469.949696305	-0.646228
50	469.949655941	-0.732118

(2)Frequency Stability (Voltage Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	406.149826665	-0.426776
25	100	7.40	406.149825616	-0.429359
25	115	8.51	406.149826530	-0.427108

429.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	429.949786899	-0.495642
25	100	7.40	429.949785199	-0.499596
25	115	8.51	429.949786979	-0.495456

469.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	469.949766446	-0.496976
25	100	7.40	469.949765924	-0.498088
25	115	8.51	469.949769169	-0.491181

406.15 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	406.149762992	-0.583548
25	100	7.40	406.149762772	-0.584090
25	115	8.51	406.149763142	-0.583179

429.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	429.949744842	-0.593459
25	100	7.40	429.949744655	-0.593896
25	115	8.51	429.949744953	-0.593202

469.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	469.949737793	-0.557946
25	100	7.40	469.949737774	-0.557987
25	115	8.51	469.949738968	-0.555445

▣TEST RESULTS - 11K0F3E For FCC AND IC

(1) Frequency Stability (Temperature Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149976009	-0.059069
-20	406.149974195	-0.063536
-10	406.149984909	-0.037156
0	406.149947542	-0.129159
10	406.149984015	-0.039357
20	406.150069292	0.170608
30	406.149936853	-0.155477
40	406.149920787	-0.195034
50	406.149921210	-0.193992

429.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949964587	-0.082365
-20	429.949975614	-0.056718
-10	429.949987159	-0.029866
0	429.949998547	-0.003379
10	429.949983073	-0.039370
20	429.950049509	0.115150
30	429.949930942	-0.160619
40	429.949907681	-0.214720
50	429.949928706	-0.165819

469.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.950016457	0.035019
-20	469.950027564	0.058653
-10	469.950029294	0.062334
0	469.950021561	0.045879
10	469.950009440	0.020087
20	469.950063112	0.134294
30	469.949950441	-0.105456
40	469.949923992	-0.161736
50	469.949960921	-0.083156

406.15 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149906560	-0.230063
-20	406.149917740	-0.202536
-10	406.149979445	-0.050609
0	406.149980992	-0.046800
10	406.149980258	-0.048608
20	406.150028951	0.071283
30	406.149928181	-0.176829
40	406.149914073	-0.211565
50	406.149932843	-0.165350

429.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949905978	-0.218681
-20	429.949920885	-0.184010
-10	429.949976287	-0.055153
0	429.949978845	-0.049203
10	429.949978197	-0.050711
20	429.950029361	0.068290
30	429.949926803	-0.170245
40	429.949923370	-0.178230
50	429.949927415	-0.168822

469.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949949995	-0.106405
-20	469.949991888	-0.017261
-10	469.949996112	-0.008273
0	469.949999331	-0.001424
10	469.949998694	-0.002779
20	469.950051275	0.109107
30	469.949941080	-0.125375
40	469.949942849	-0.121611
50	469.949937197	-0.133638

(2)Frequency Stability (Voltage Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	406.150068354	0.168298
25	100	7.40	406.150067228	0.165524
25	115	8.51	406.150067711	0.166714

429.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	429.950047958	0.111544
25	100	7.40	429.950047256	0.109912
25	115	8.51	429.950047979	0.111592

469.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	469.950060757	0.129283
25	100	7.40	469.950061465	0.130791
25	115	8.51	469.950061925	0.131769

406.15 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	406.150028997	0.071395
25	100	7.40	406.150028717	0.070705
25	115	8.51	406.150028282	0.069634

429.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	429.950029350	0.068264
25	100	7.40	429.950029368	0.068306
25	115	8.51	429.950029535	0.068694

469.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	469.950050848	0.108199
25	100	7.40	469.950051067	0.108664
25	115	8.51	469.950050726	0.107939

▣TEST RESULTS –16K0F3E For ONLY IC

(1) Frequency Stability (Temperature Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149973190	-0.066010
-20	406.149980489	-0.048039
-10	406.149955833	-0.108746
0	406.149946475	-0.131786
10	406.149981200	-0.046288
20	406.150032694	0.080496
30	406.149961110	-0.095753
40	406.149922165	-0.191641
50	406.149928464	-0.176132

429.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949953684	-0.107724
-20	429.949964705	-0.082091
-10	429.949971568	-0.066129
0	429.949986760	-0.030794
10	429.949943437	-0.131557
20	429.950039458	0.091774
30	429.949932395	-0.157239
40	429.949912067	-0.204519
50	429.949914074	-0.199851

469.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.950018317	0.038976
-20	469.950029351	0.062456
-10	469.950030510	0.064922
0	469.950023659	0.050344
10	469.950006847	0.014570
20	469.950062845	0.133727
30	469.949956726	-0.092082
40	469.949930731	-0.147397
50	469.949927806	-0.153621

406.15 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	406.149904576	-0.234948
-20	406.149909952	-0.221711
-10	406.149952670	-0.116533
0	406.149964782	-0.086712
10	406.149990496	-0.023400
20	406.150042918	0.105669
30	406.149929882	-0.172641
40	406.149926150	-0.181829
50	406.149938987	-0.150223

429.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	429.949895900	-0.242121
-20	429.949917945	-0.190848
-10	429.949934657	-0.151978
0	429.949955277	-0.104019
10	429.949979736	-0.047131
20	429.950029791	0.069290
30	429.949915641	-0.196207
40	429.949913507	-0.201170
50	429.949934172	-0.153106

469.95 MHz (Low Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	469.949914162	-0.182653
-20	469.949916079	-0.178574
-10	469.949924577	-0.160492
0	469.949942377	-0.122615
10	469.949996981	-0.006424
20	469.950044779	0.095285
30	469.949942259	-0.122866
40	469.949932028	-0.144637
50	469.949932525	-0.143579

(2)Frequency Stability (Voltage Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	406.150032851	0.080885
25	100	7.40	406.150033333	0.082070
25	115	8.51	406.150033279	0.081938

429.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	429.950038724	0.090067
25	100	7.40	429.950039080	0.090895
25	115	8.51	429.950039302	0.091411

469.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	469.950061253	0.130339
25	100	7.40	469.950062319	0.132608
25	115	8.51	469.950062814	0.133661

406.15 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	406.150042369	0.104318
25	100	7.40	406.150040840	0.100554
25	115	8.51	406.150041452	0.102060

429.95 MHz (Low Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	429.950029362	0.068293
25	100	7.40	429.950028239	0.065679
25	115	8.51	429.950028535	0.066369

469.95 MHz (Low Power)

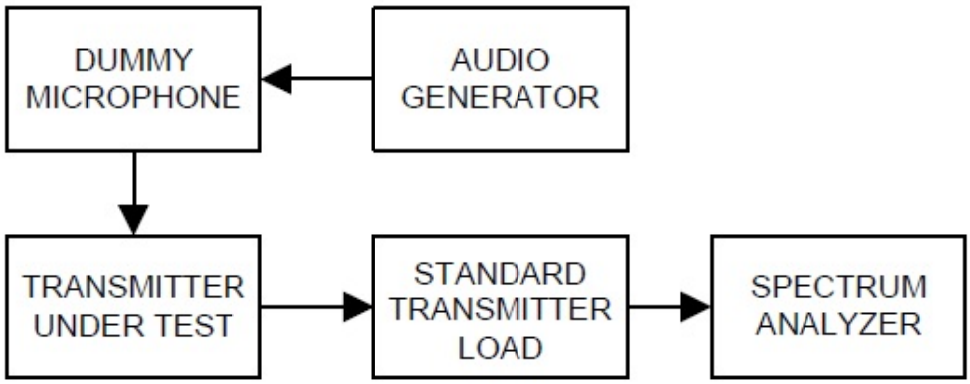
Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25	85	6.29	469.950044578	0.094856
25	100	7.40	469.950044241	0.094139
25	115	8.51	469.950044584	0.094871

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

▣TEST RESULTS

Conducted 99% Bandwidth Measurements for 7K60FXD/7K60FXE

7K60FXD/7K60FXE Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	12.5 kHz	7.373	High Power
429.95		7.456	
469.95		7.456	
406.15	12.5 kHz	7.386	Low Power
429.95		7.467	
469.95		7.412	

Conducted 99% Bandwidth Measurements for 11K0F3E

11K0F3E Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	12.5 kHz	5.243	High Power
429.95		5.250	
469.95		5.245	
406.15	12.5 kHz	5.262	Low Power
429.95		5.265	
469.95		5.245	

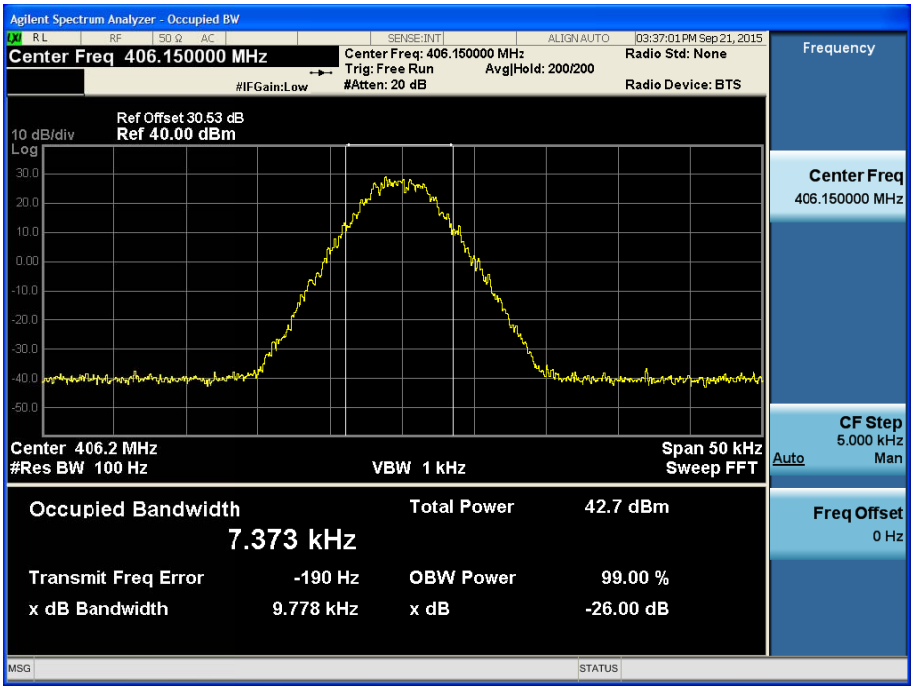
Conducted 99% Bandwidth Measurements for 16K0F3E

16K0F3E Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel Spacing		
406.15	25 kHz	10.654	High Power
429.95		10.651	
469.95		10.632	
406.15	25 kHz	10.653	Low Power
429.95		10.654	
469.95		10.659	

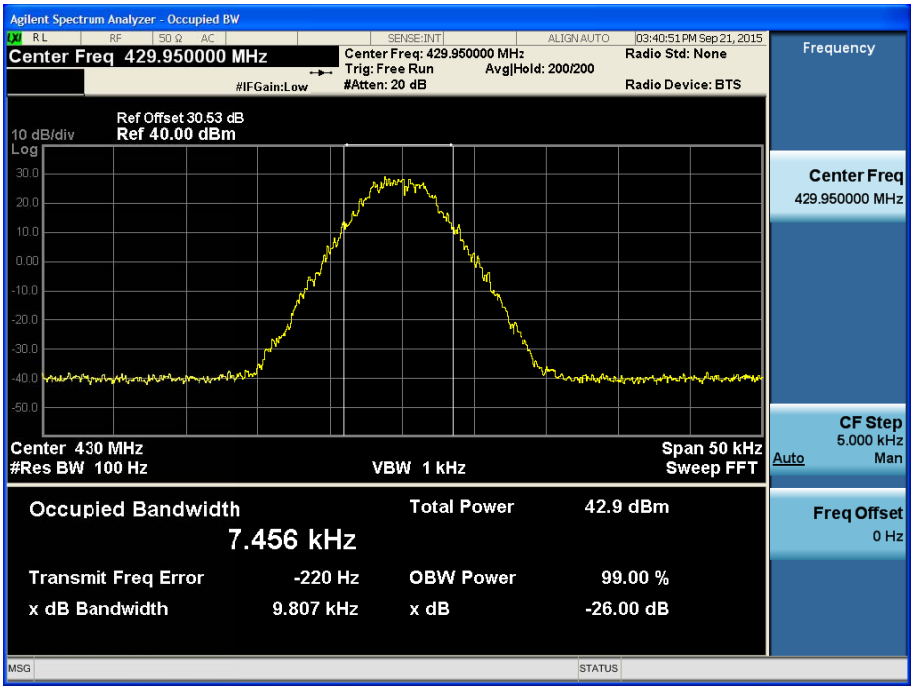
▣TEST PLOT

7K60FXD/7K60FXE:

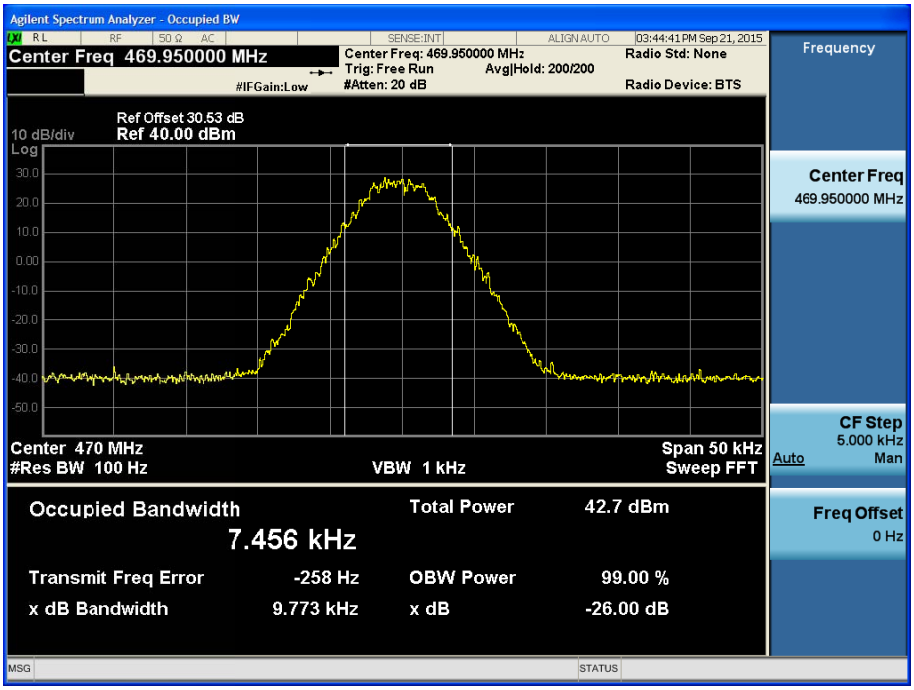
99% Bandwidth plot_HIGH POWER_7K60FXD/7K60FXE _406.15 MHz_Low



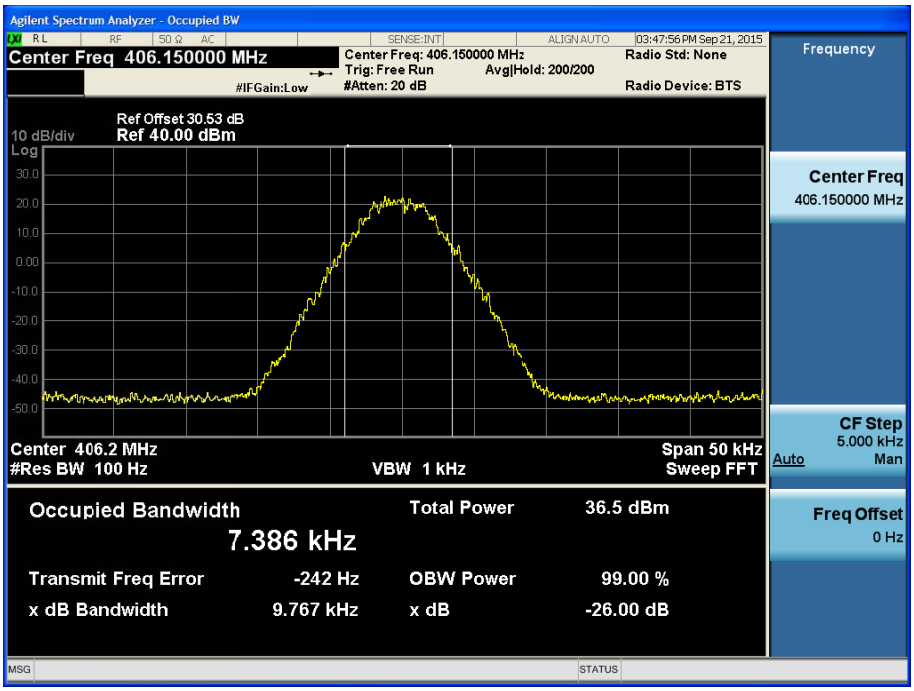
99% Bandwidth plot_HIGH POWER_7K60FXD/7K60FXE _429.95 MHz_Middle



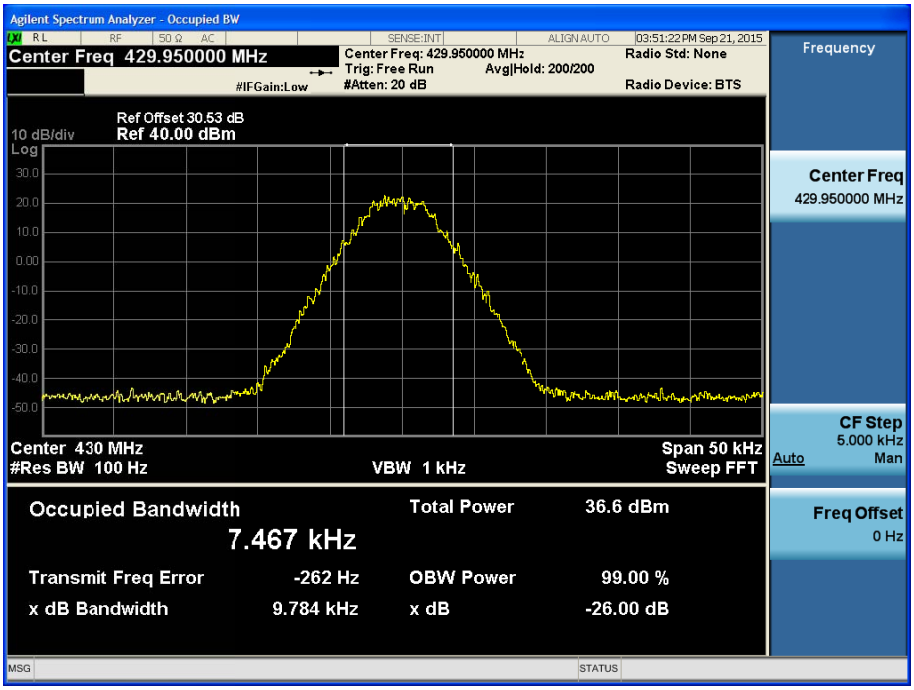
99% Bandwidth plot_HIGH POWER_7K60FXD/7K60FXE _469.95 MHz_High



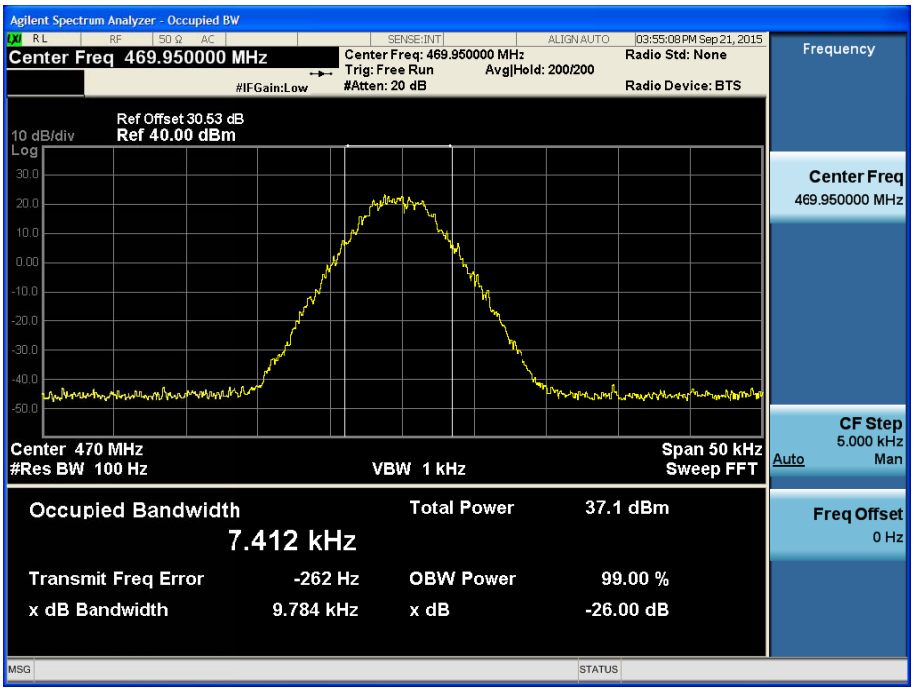
99% Bandwidth plot_LOW POWER_7K60FXD/7K60FXE _406.15 MHz_Low



99% Bandwidth plot_LOW POWER_7K60FXD/7K60FXE _429.95 MHz_Middle

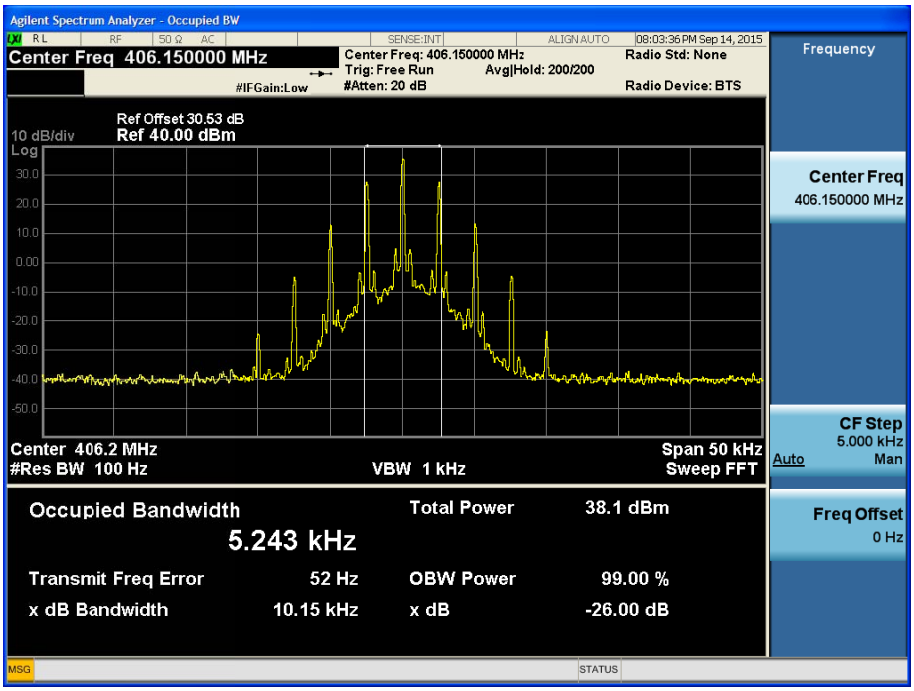


99% Bandwidth plot_LOW POWER_7K60FXD/7K60FXE _469.95 MHz_High

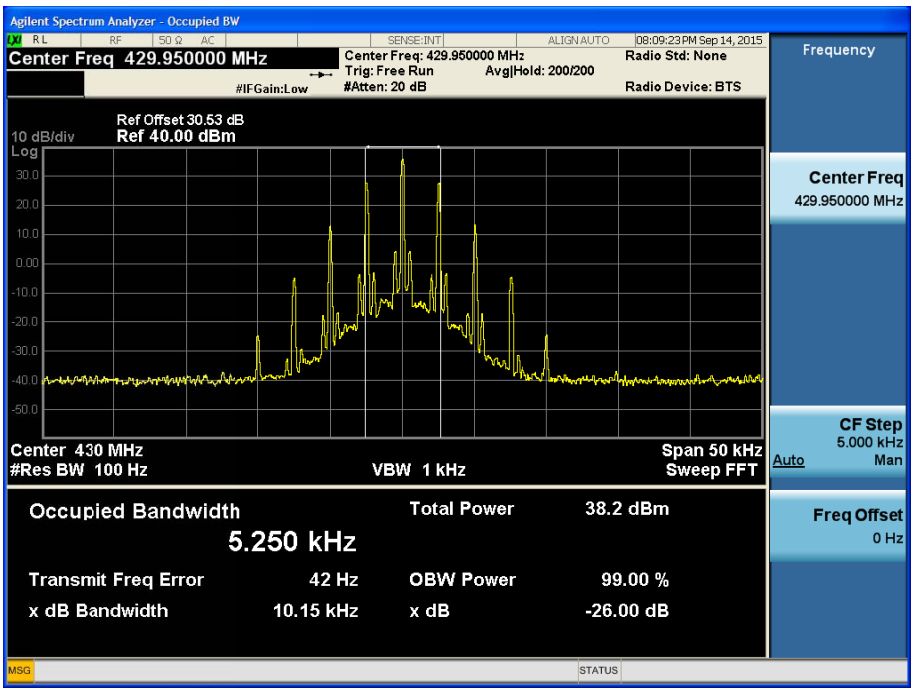


11K0F3E:

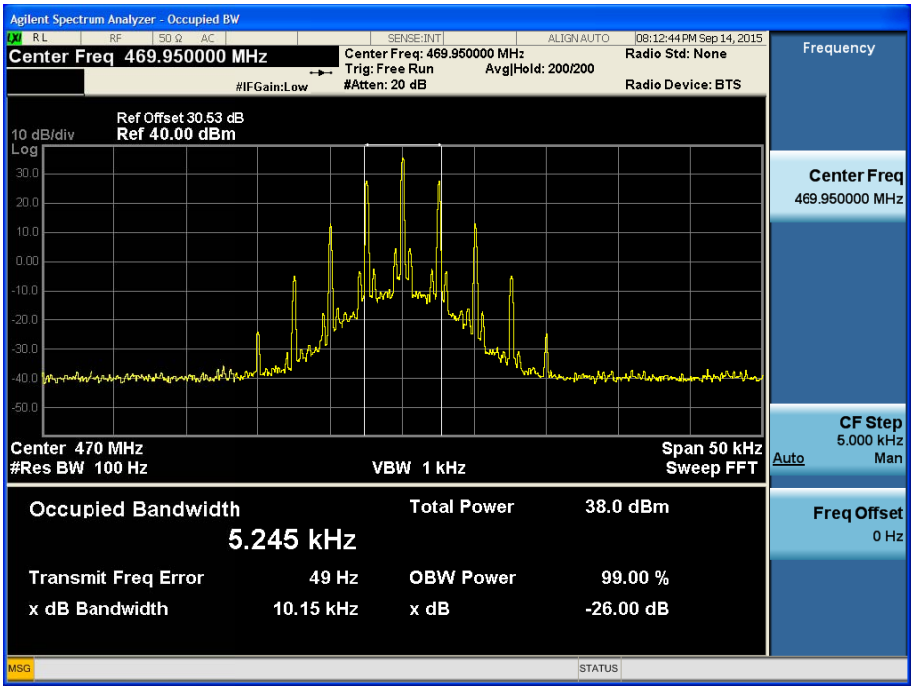
99% Bandwidth plot_HIGH POWER_11K0F3E_406.15 MHz_Low



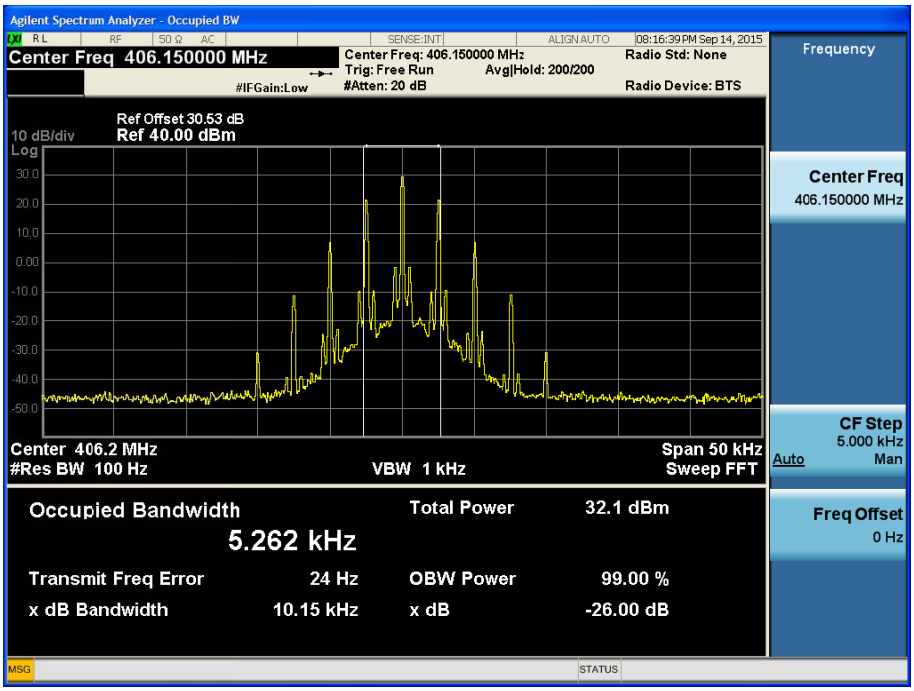
99% Bandwidth plot_HIGH POWER_11K0F3E_429.95 MHz_Middle



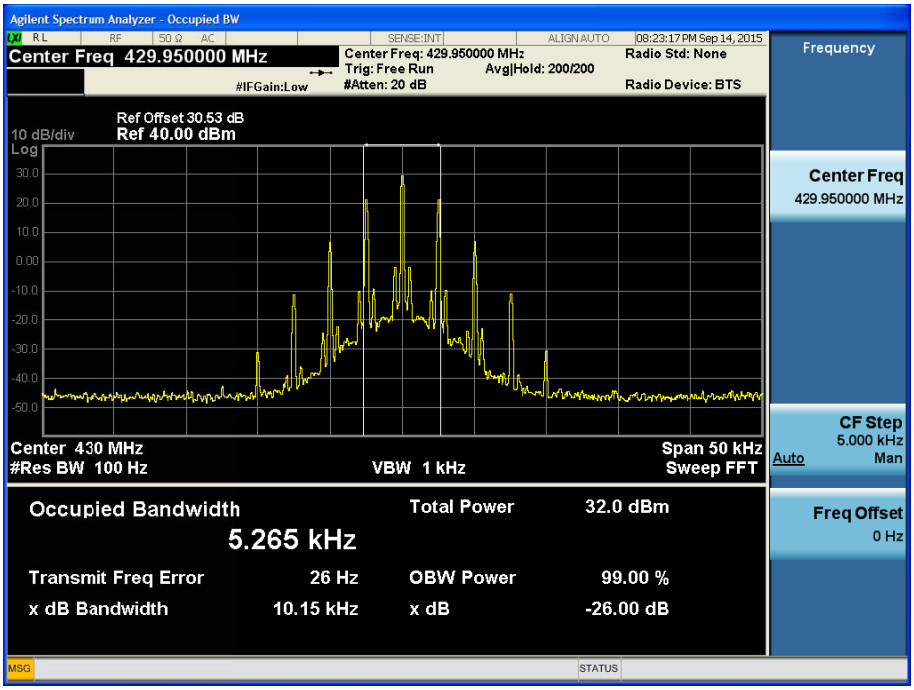
99% Bandwidth plot_HIGH POWER_11K0F3E_469.95 MHz_High



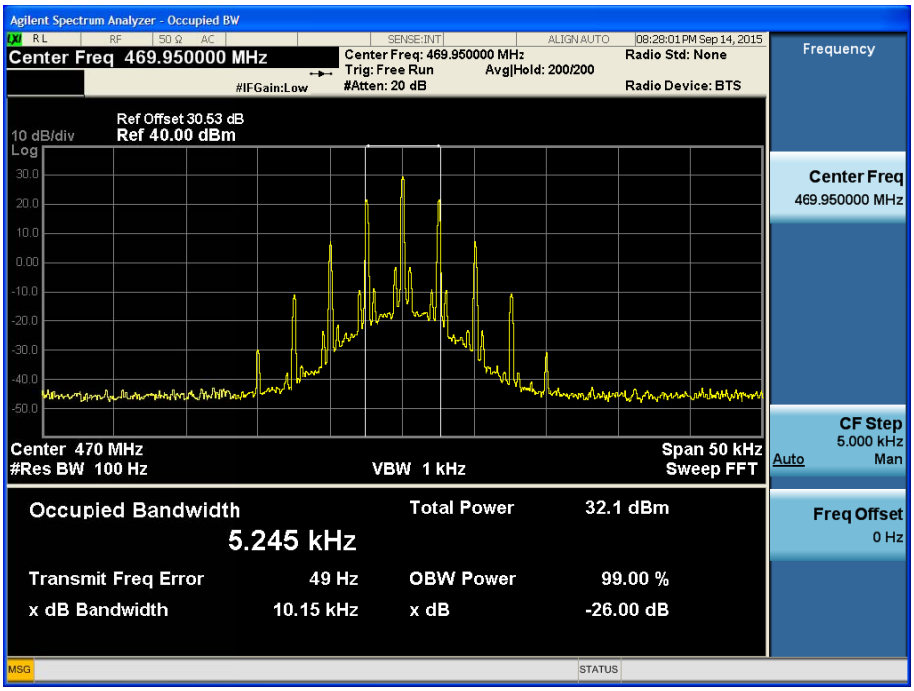
99% Bandwidth plot_LOW POWER_11K0F3E _406.15 MHz_Low



99% Bandwidth plot_LOW POWER_11K0F3E _429.95 MHz_Middle

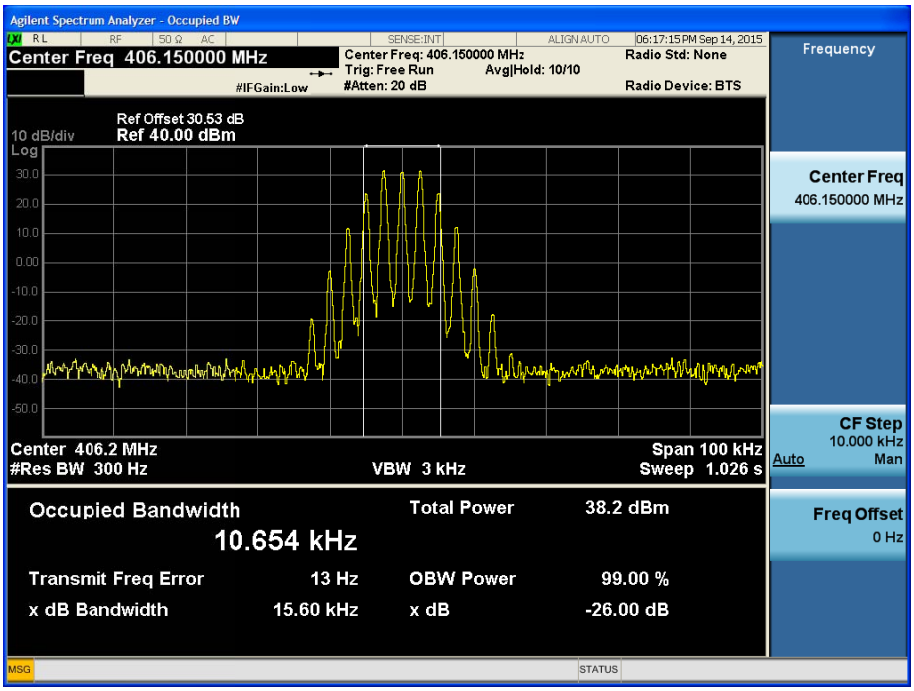


99% Bandwidth plot_LOW POWER_11K0F3E _469.95 MHz_High

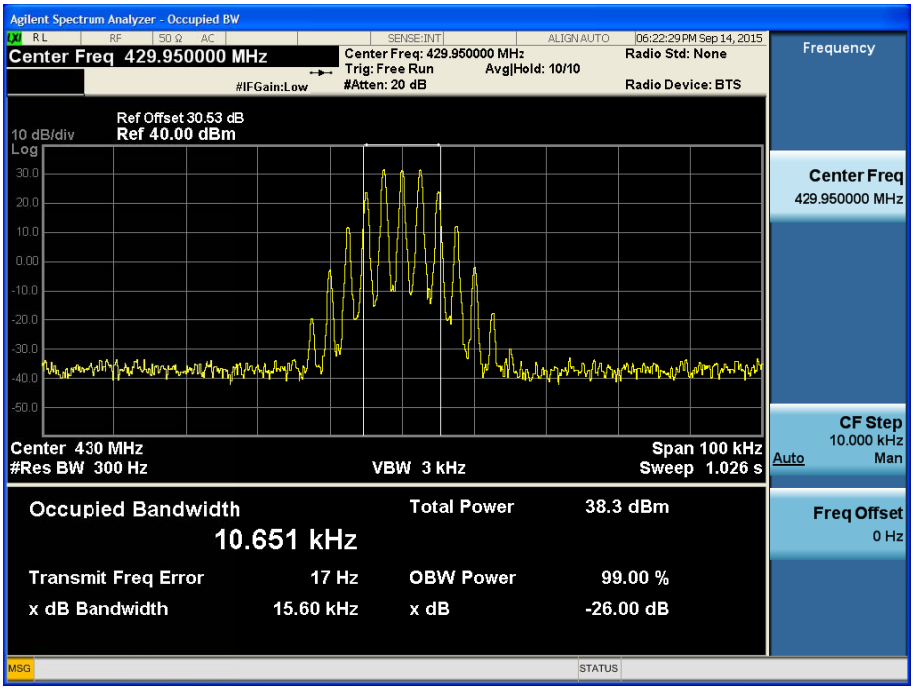


16K0F3E:

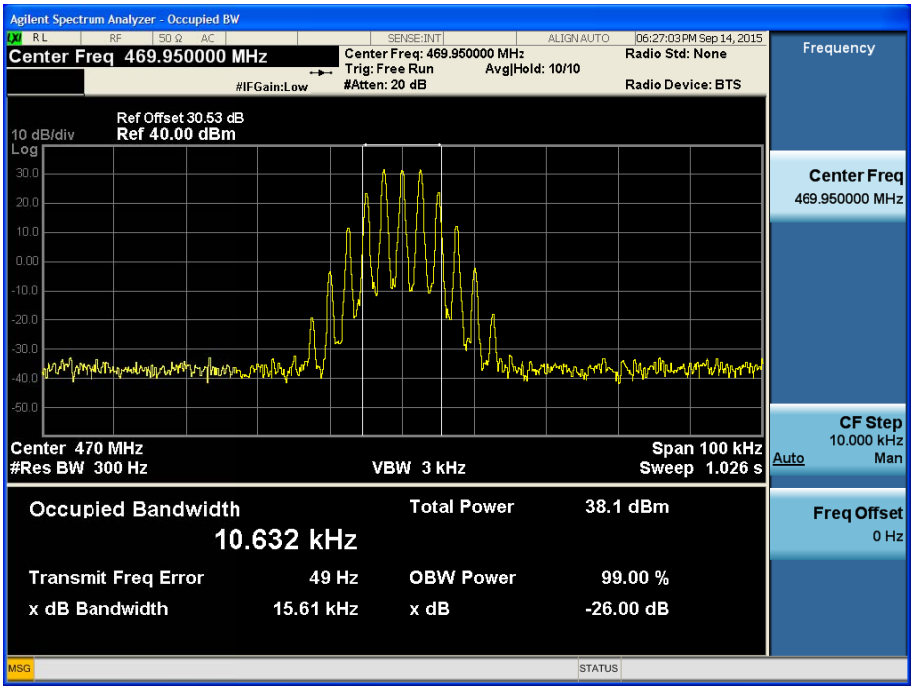
99% Bandwidth plot_HIGH POWER_ 16K0F3E_406.15 MHz_Low



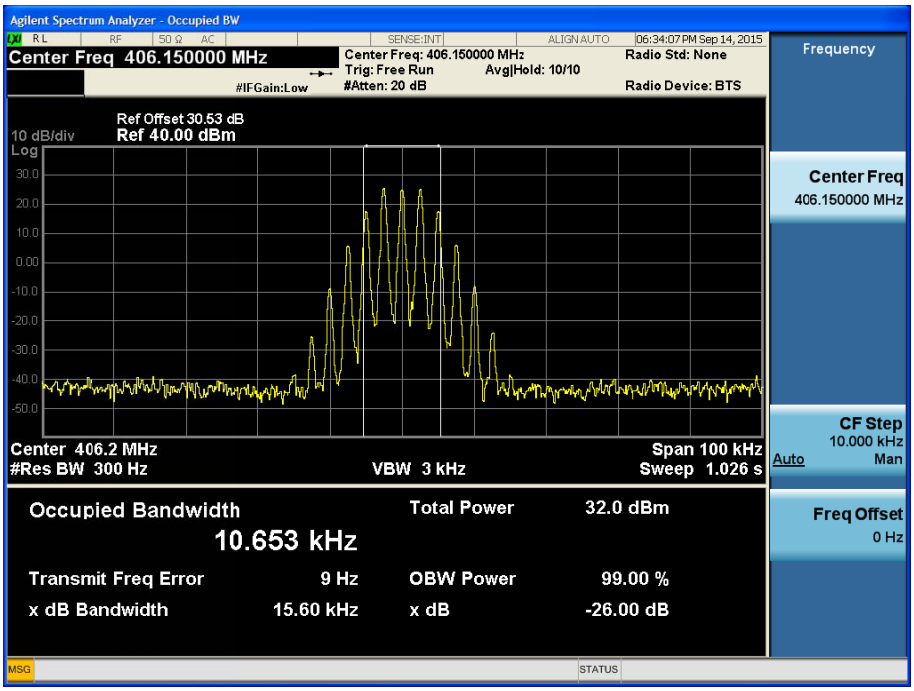
99% Bandwidth plot_HIGH POWER_ 16K0F3E_429.95 MHz_Middle



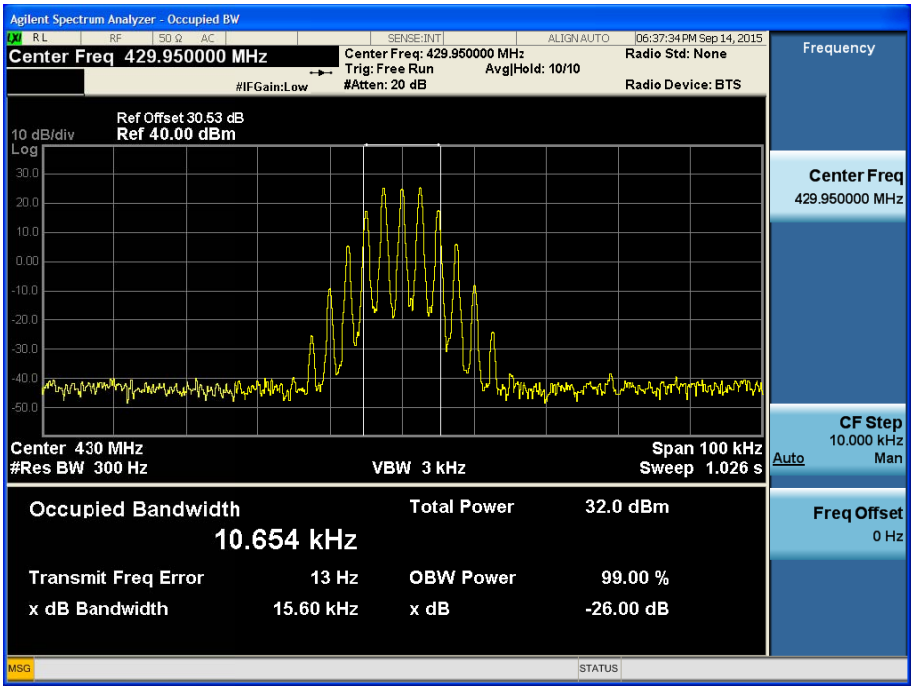
99% Bandwidth plot_HIGH POWER_ 16K0F3E_469.95 MHz_High



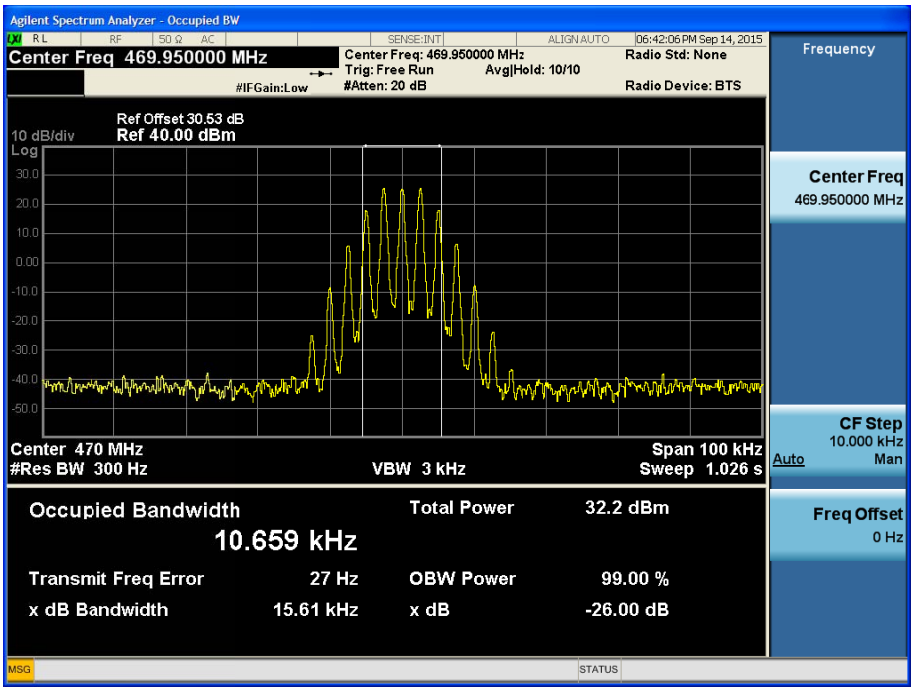
99% Bandwidth plot_LOW POWER_ 16K0F3E _406.15 MHz_Low



99% Bandwidth plot_LOW POWER_ 16K0F3E _429.95 MHz_Middle



99% Bandwidth plot_LOW POWER_ 16K0F3E _469.95 MHz_High

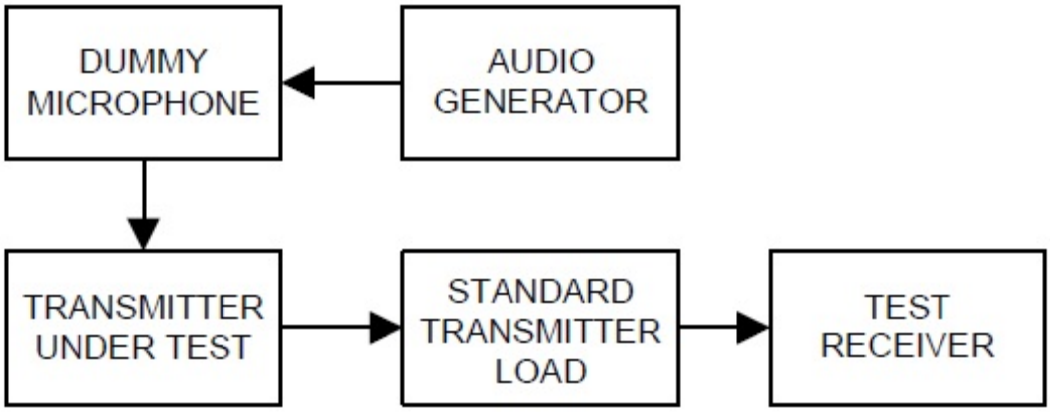


7.4 Modulation Limiting

▣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).

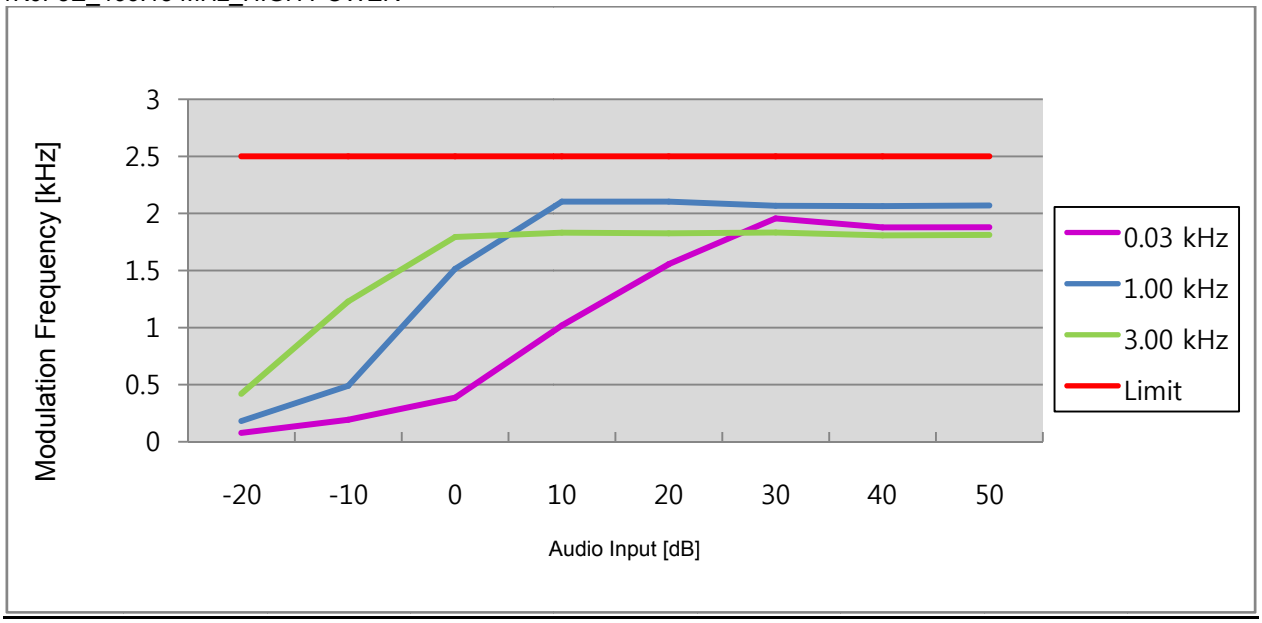
i) The values recorded in steps g) and h) are the modulation limiting.

▣TEST RESULTS

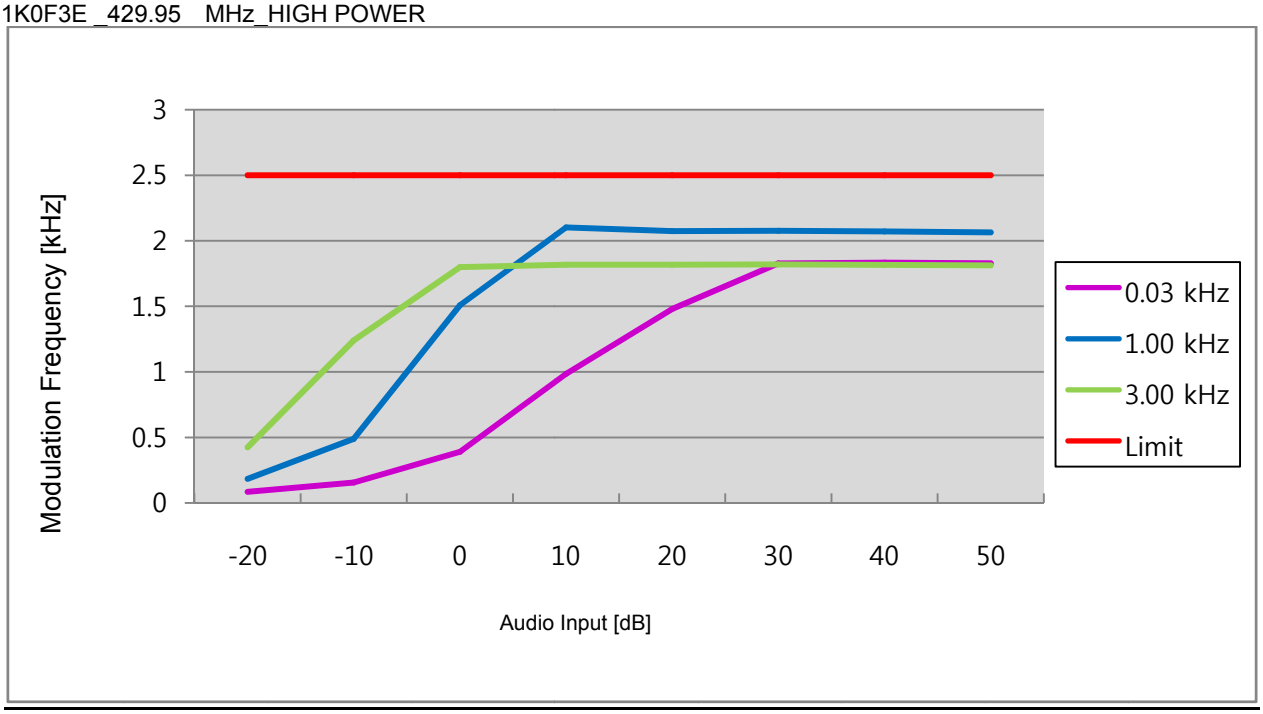
11K0F3E For FCC AND IC

Positive Peaks

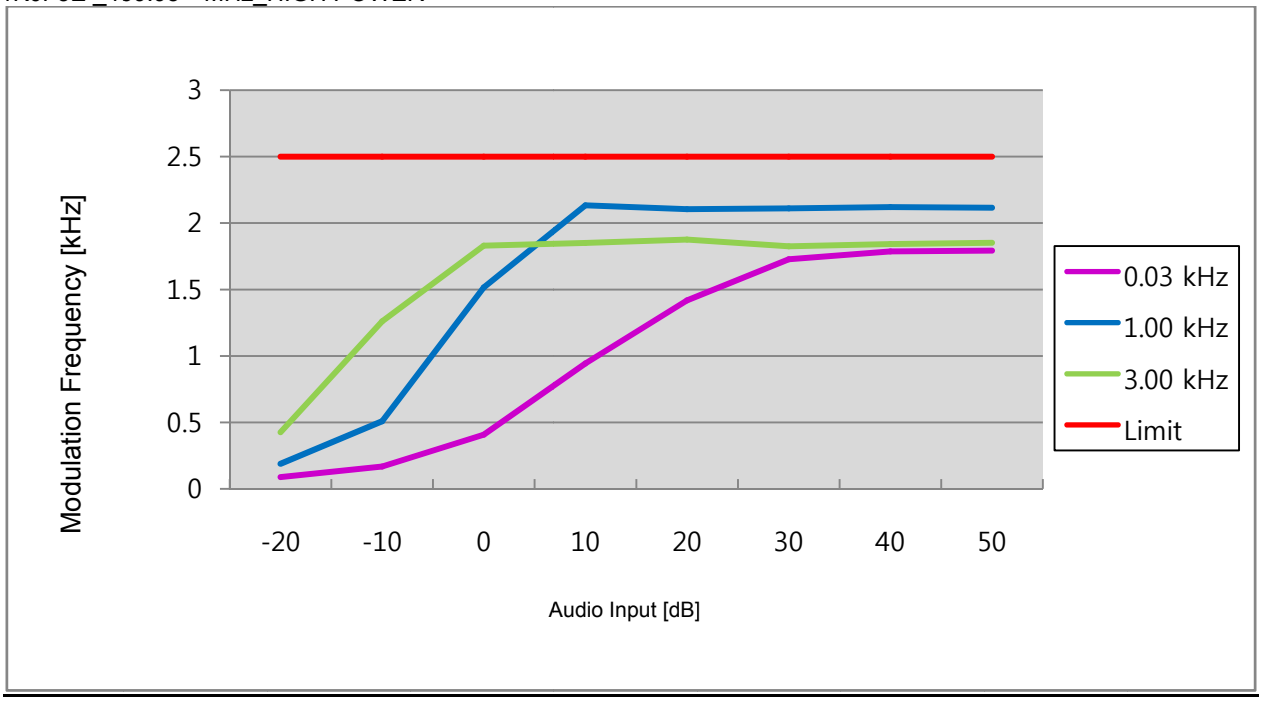
11K0F3E_406.15 MHz_HIGH POWER



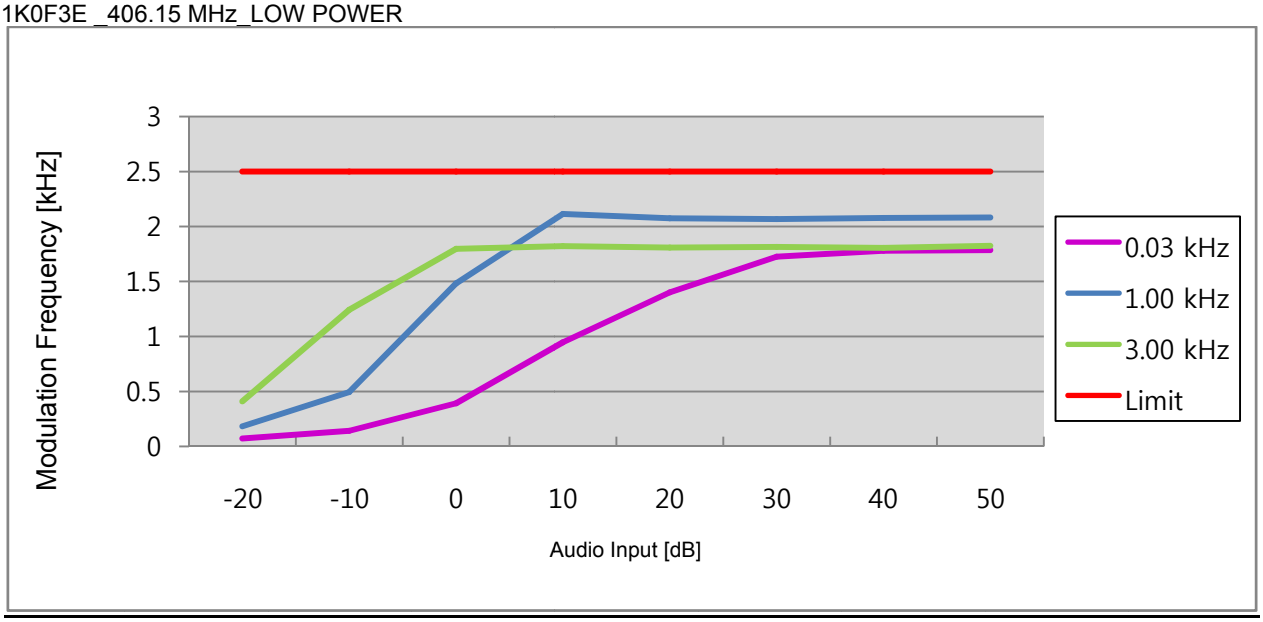
11K0F3E _429.95 MHz_HIGH POWER



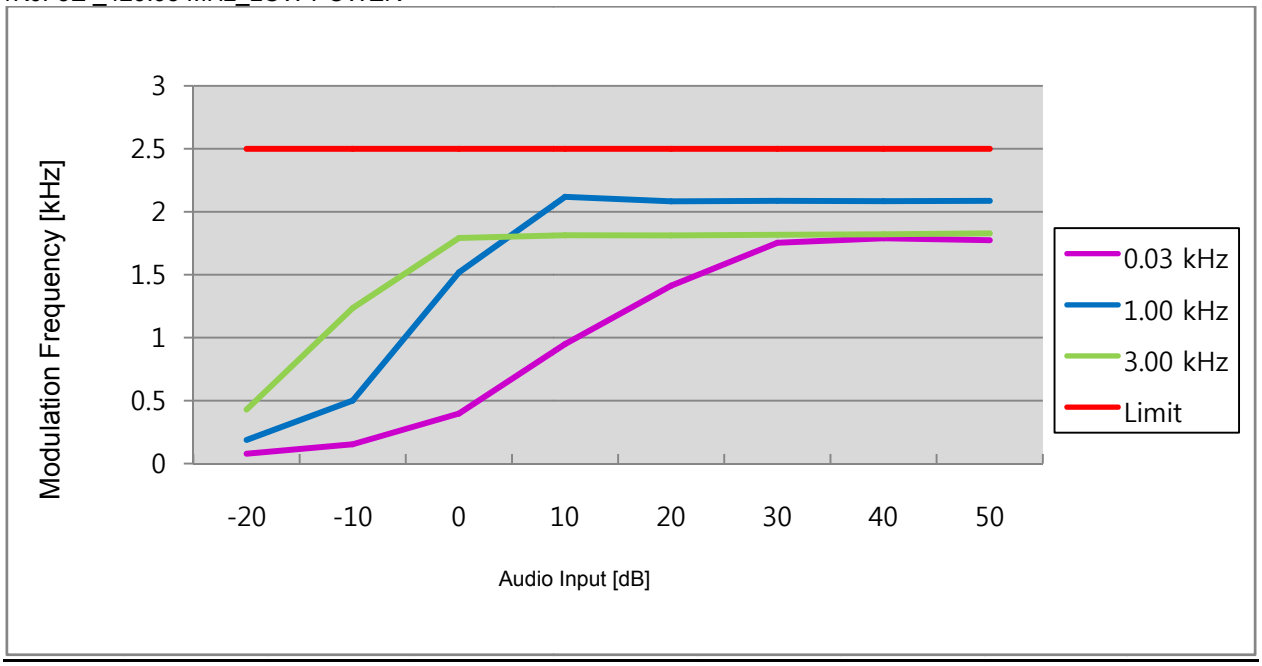
11K0F3E _469.95 MHz_HIGH POWER



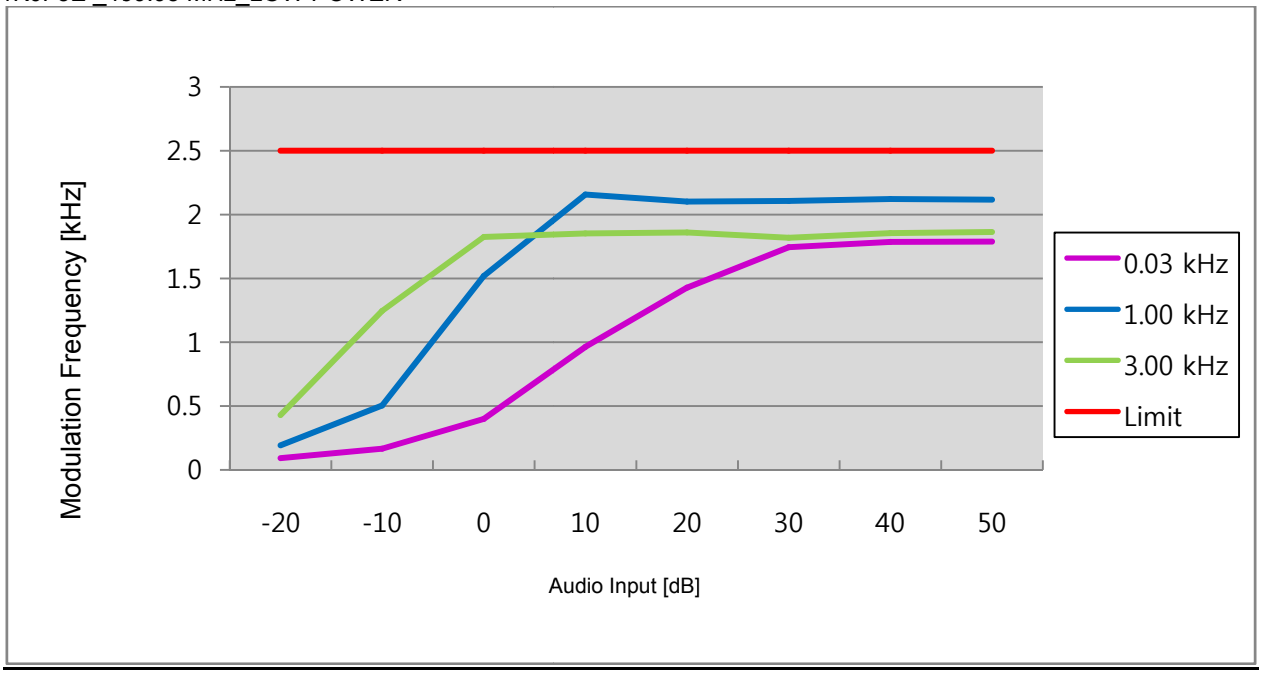
11K0F3E _406.15 MHz_LOW POWER



11K0F3E _429.95 MHz_LOW POWER

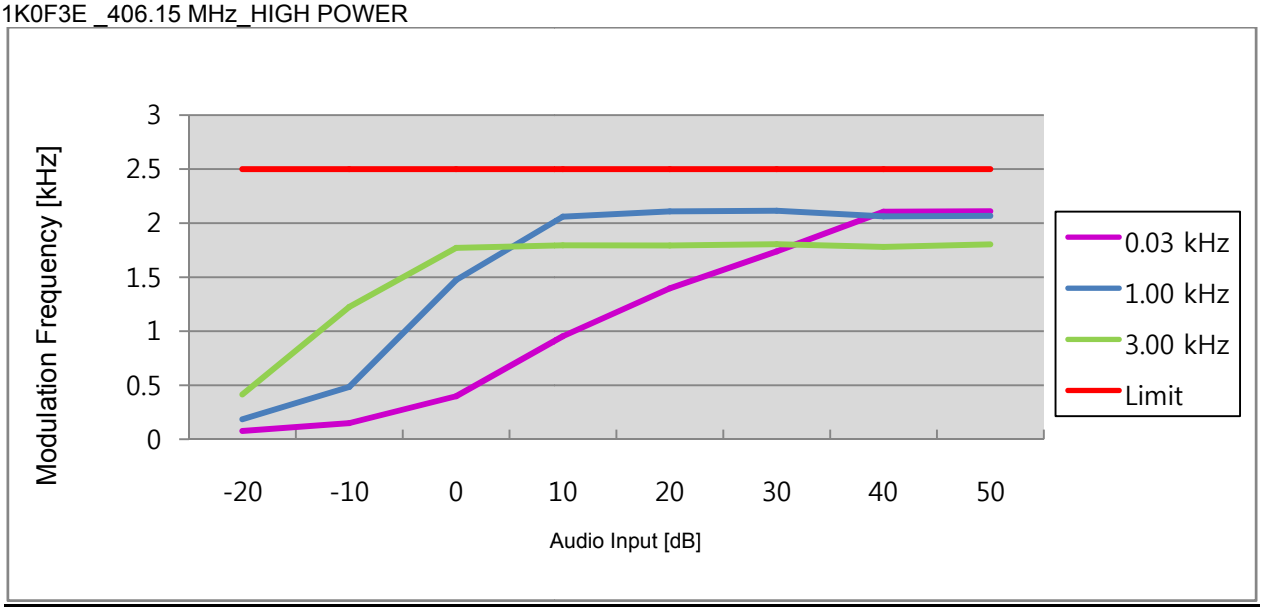


11K0F3E _469.95 MHz_LOW POWER

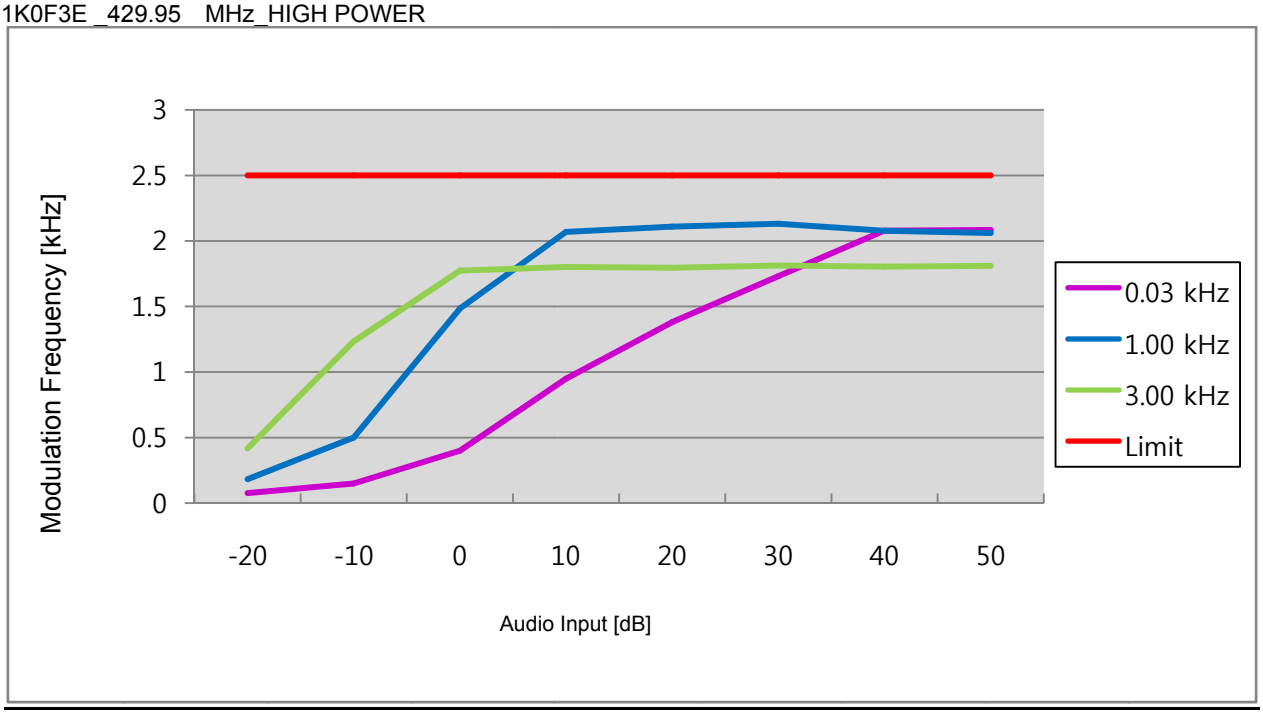


Negative Peaks

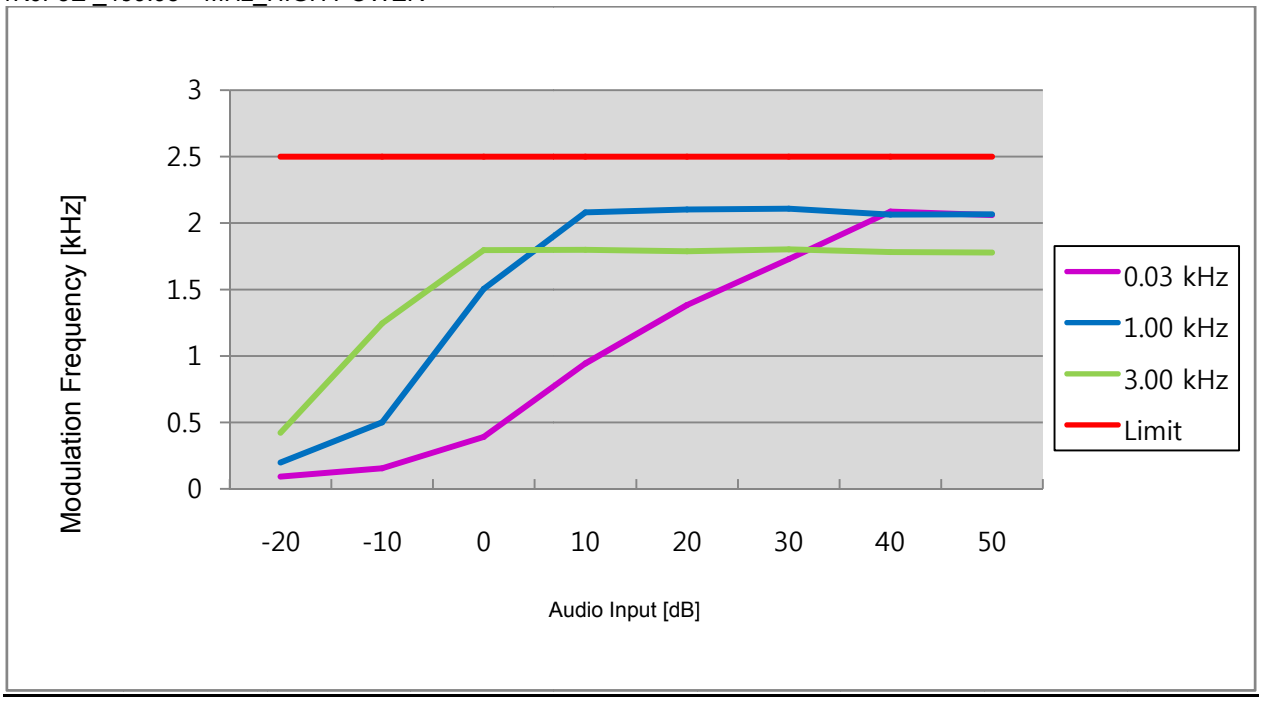
11K0F3E _406.15 MHz_HIGH POWER



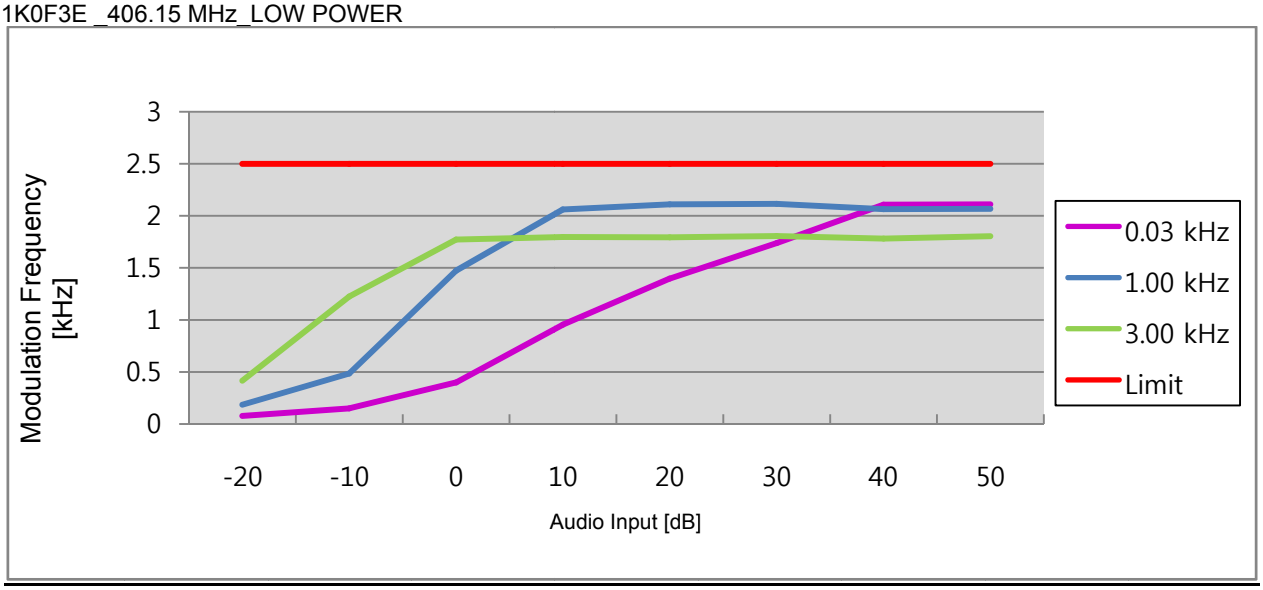
11K0F3E _429.95 MHz_HIGH POWER



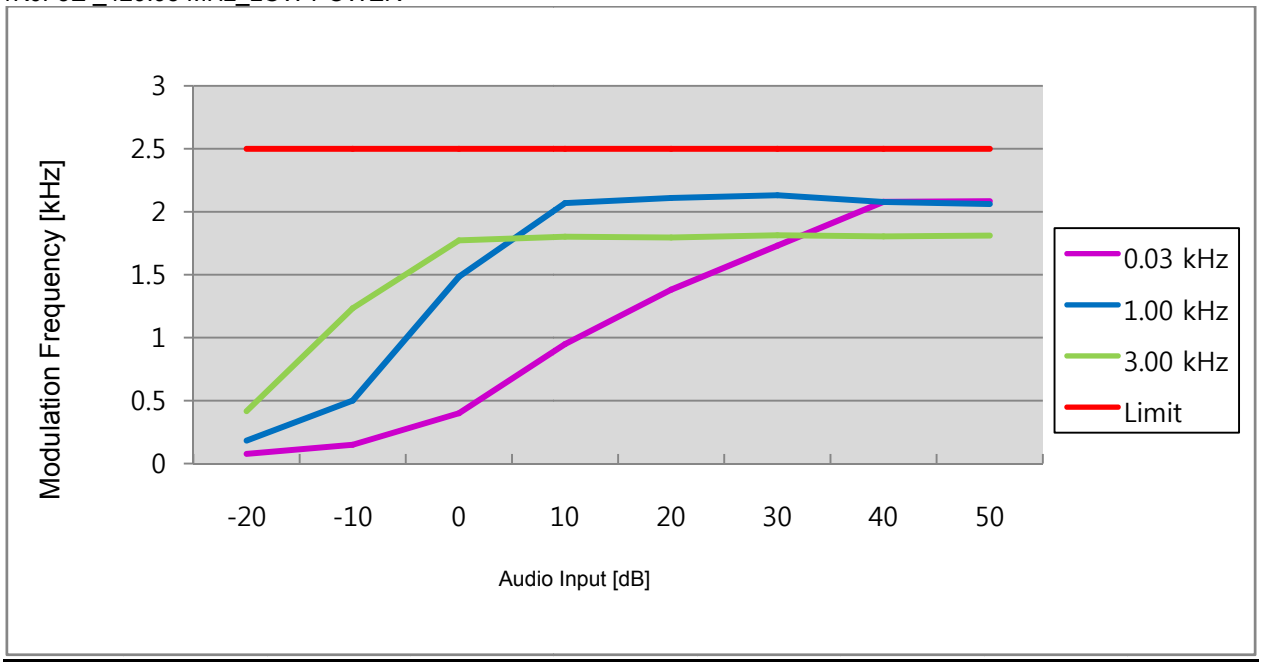
11K0F3E _469.95 MHz_HIGH POWER



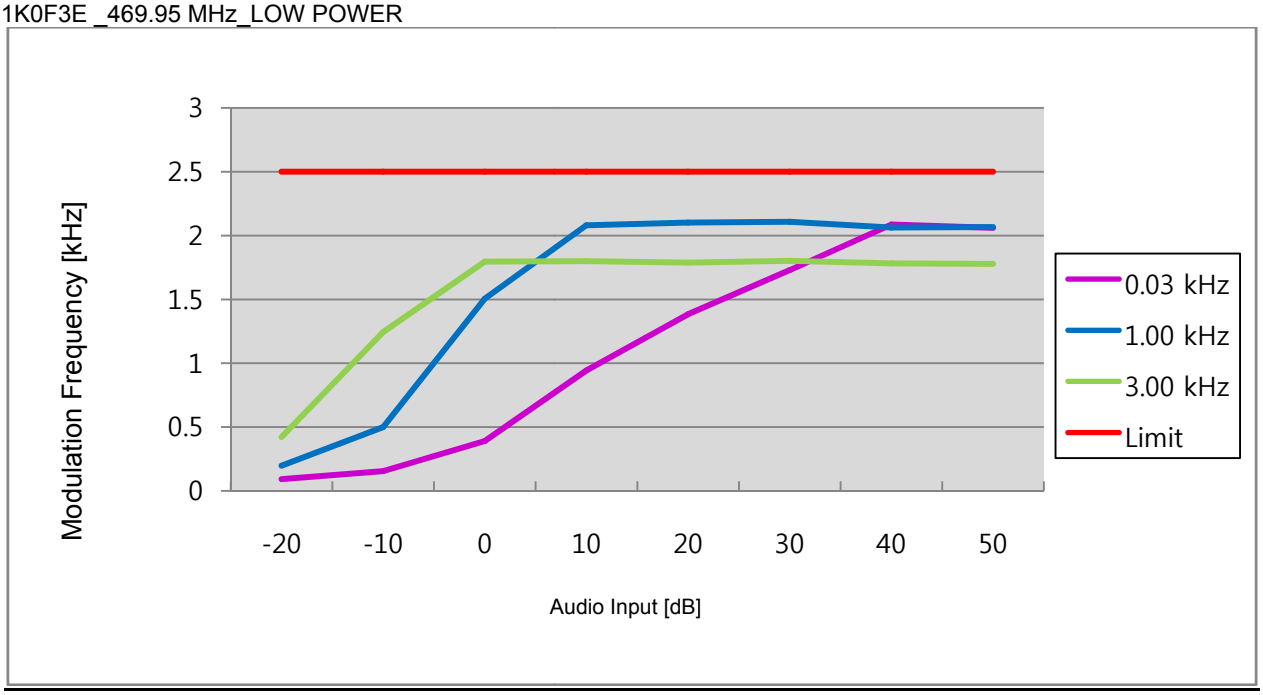
11K0F3E _406.15 MHz_LOW POWER



11K0F3E _429.95 MHz_LOW POWER



11K0F3E _469.95 MHz_LOW POWER

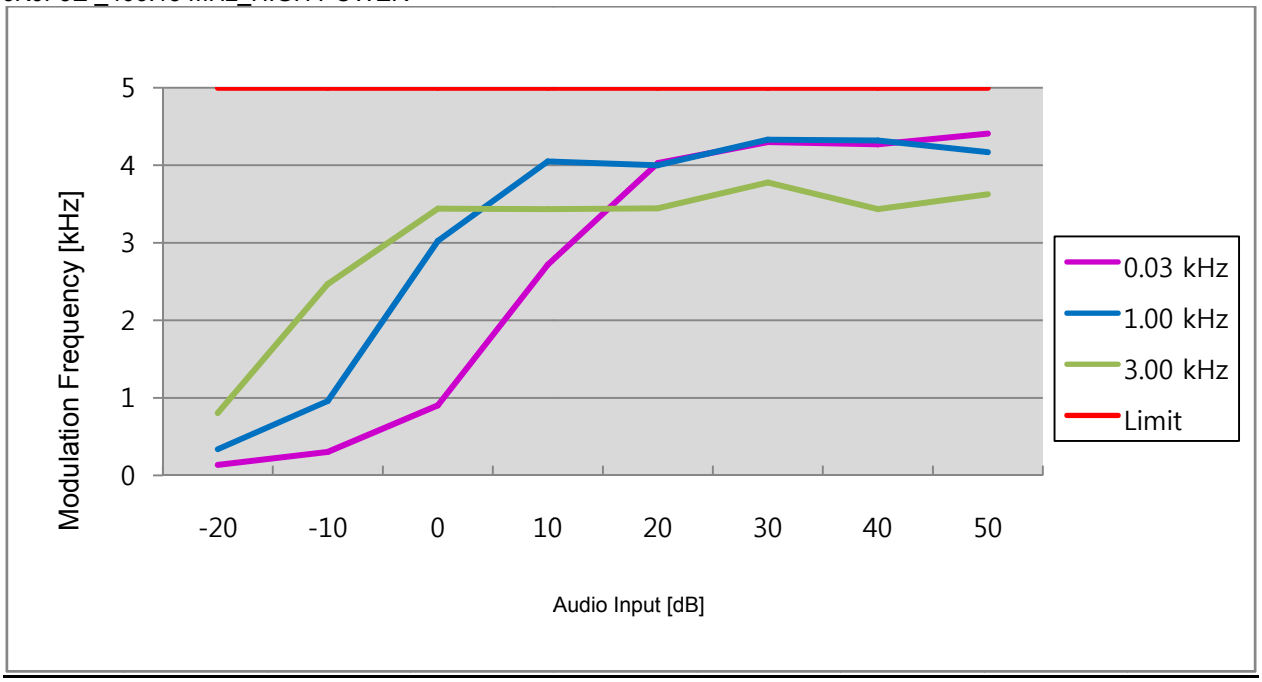


▣TEST RESULTS

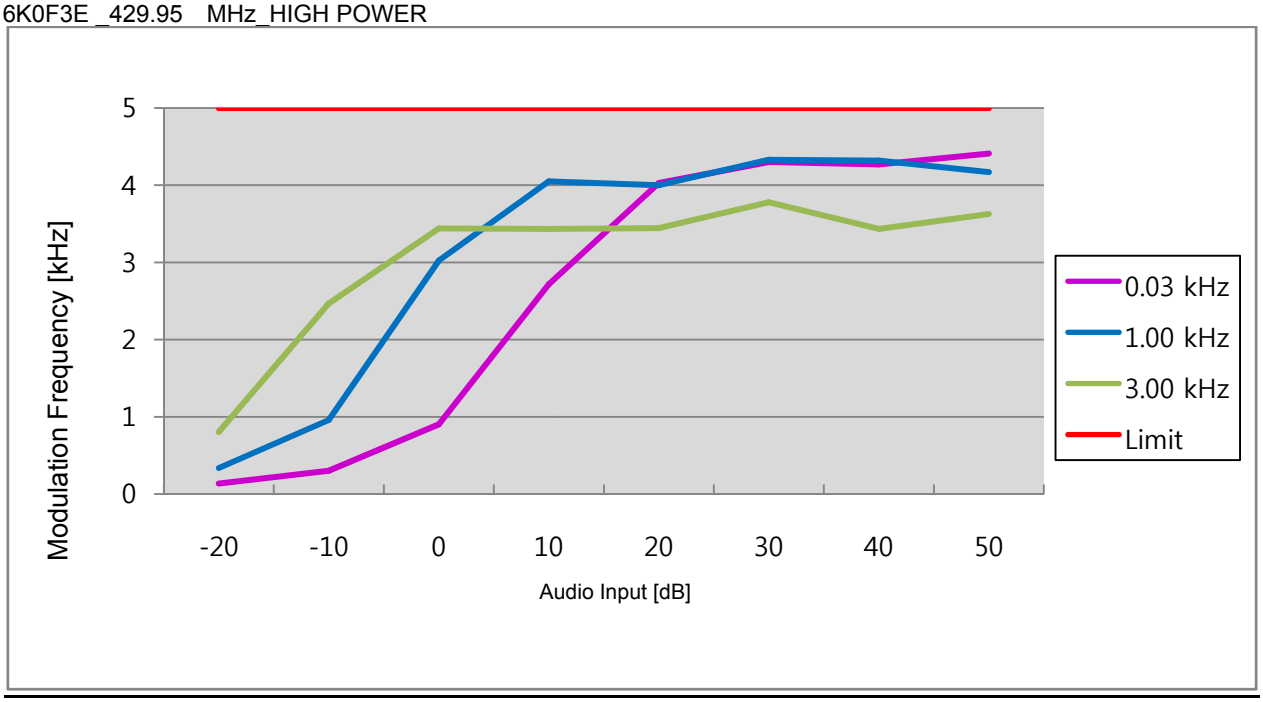
16K0F3E For ONLY IC

Positive Peaks

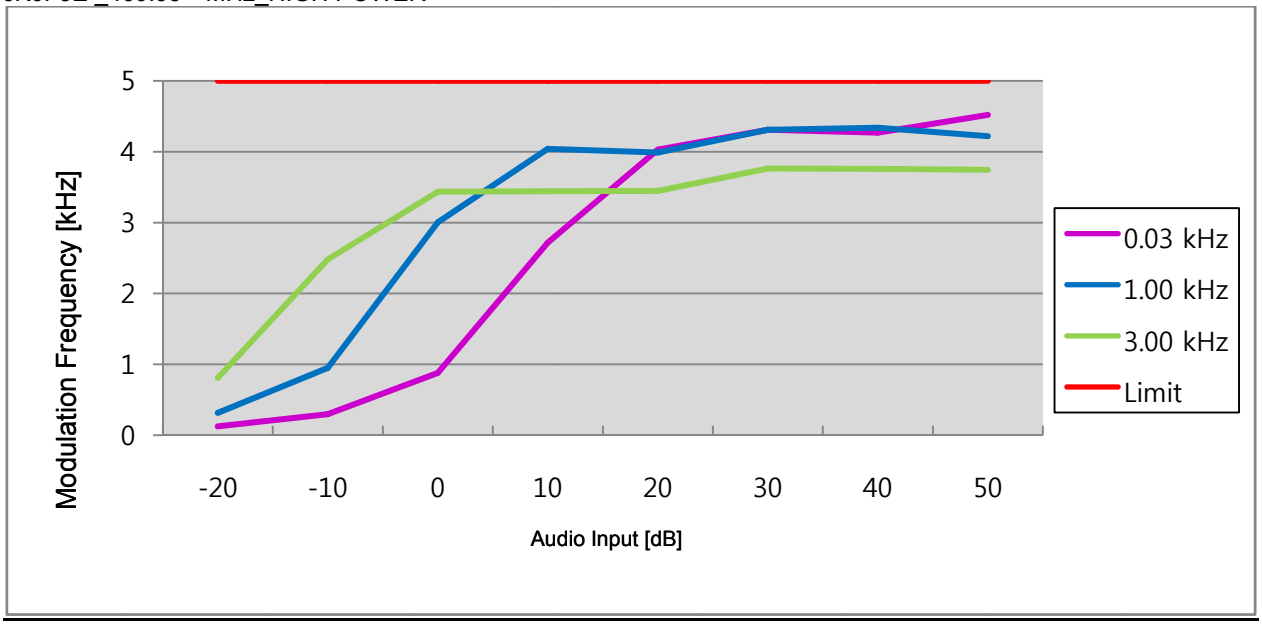
16K0F3E _406.15 MHz_HIGH POWER



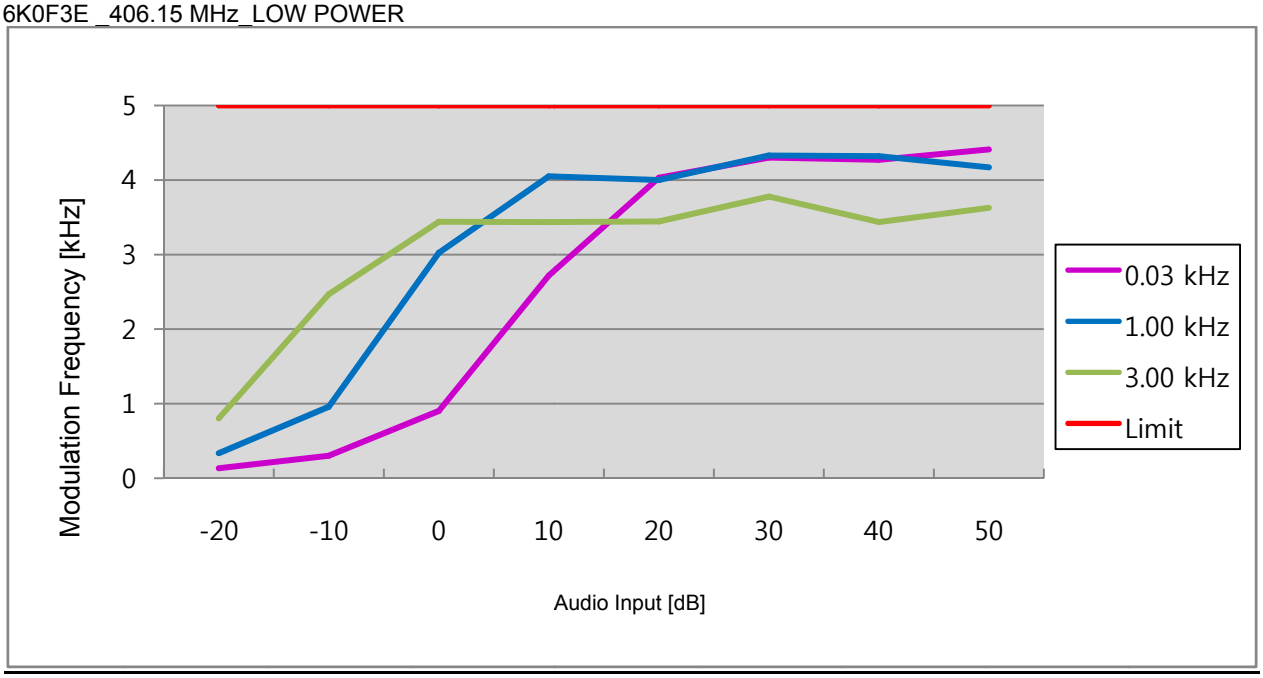
16K0F3E _429.95 MHz_HIGH POWER



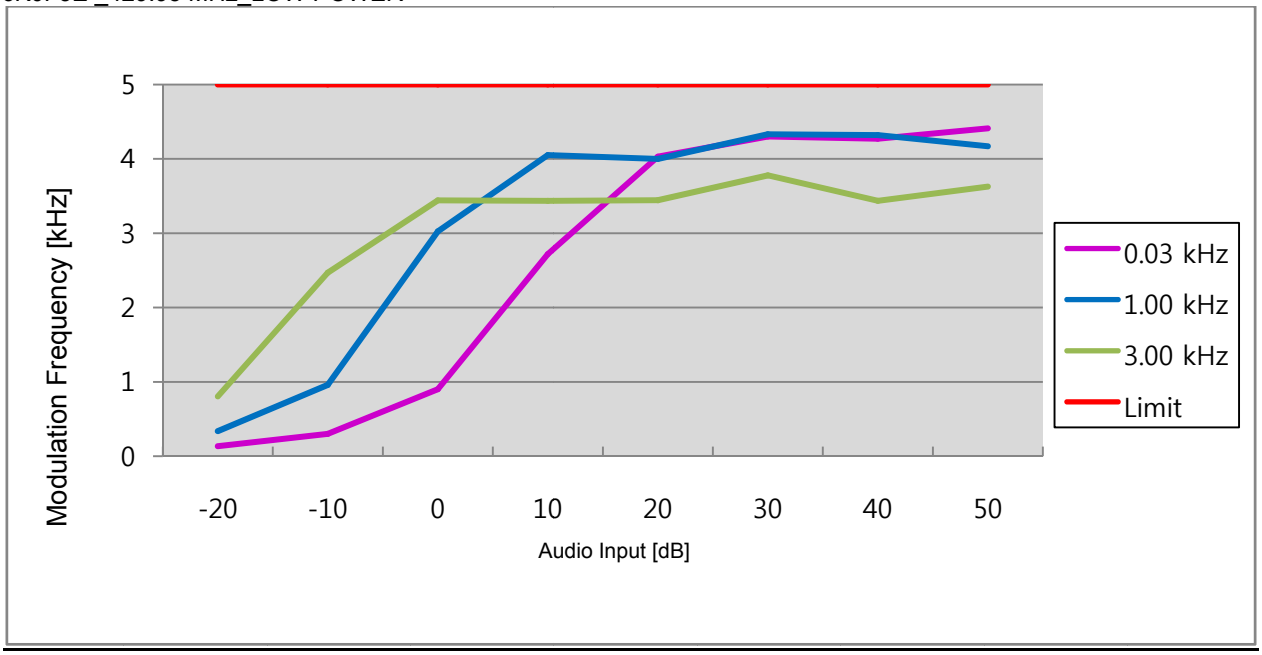
16K0F3E _469.95 MHz_HIGH POWER



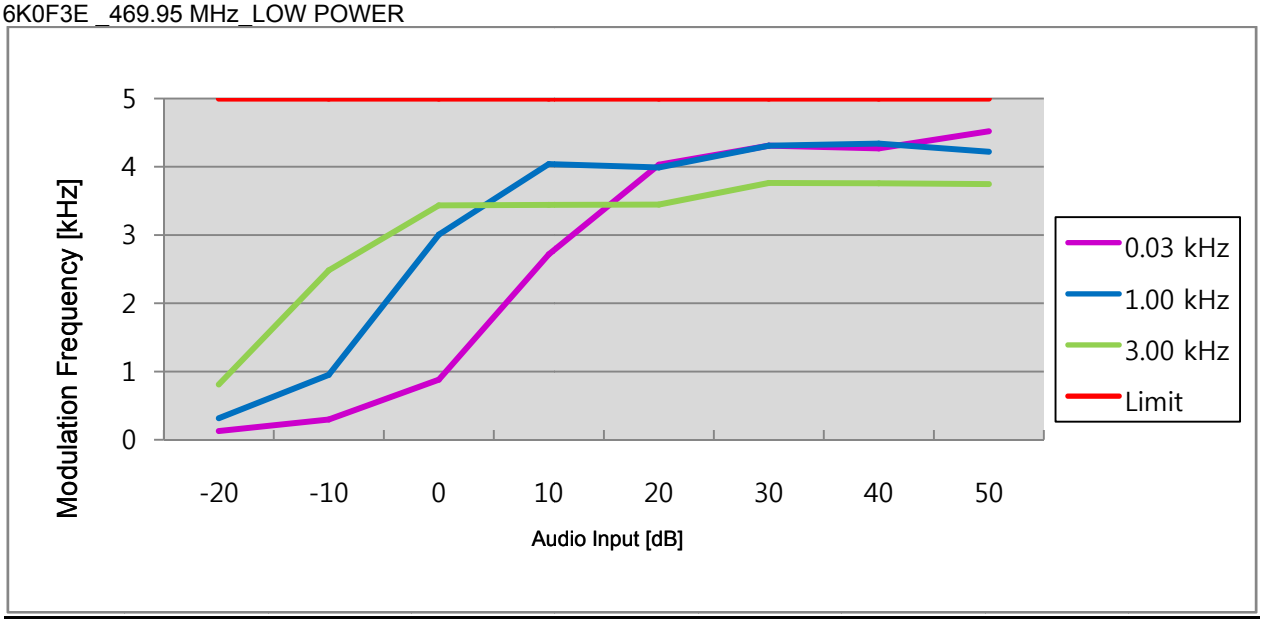
16K0F3E _406.15 MHz_LOW POWER



16K0F3E _429.95 MHz_LOW POWER

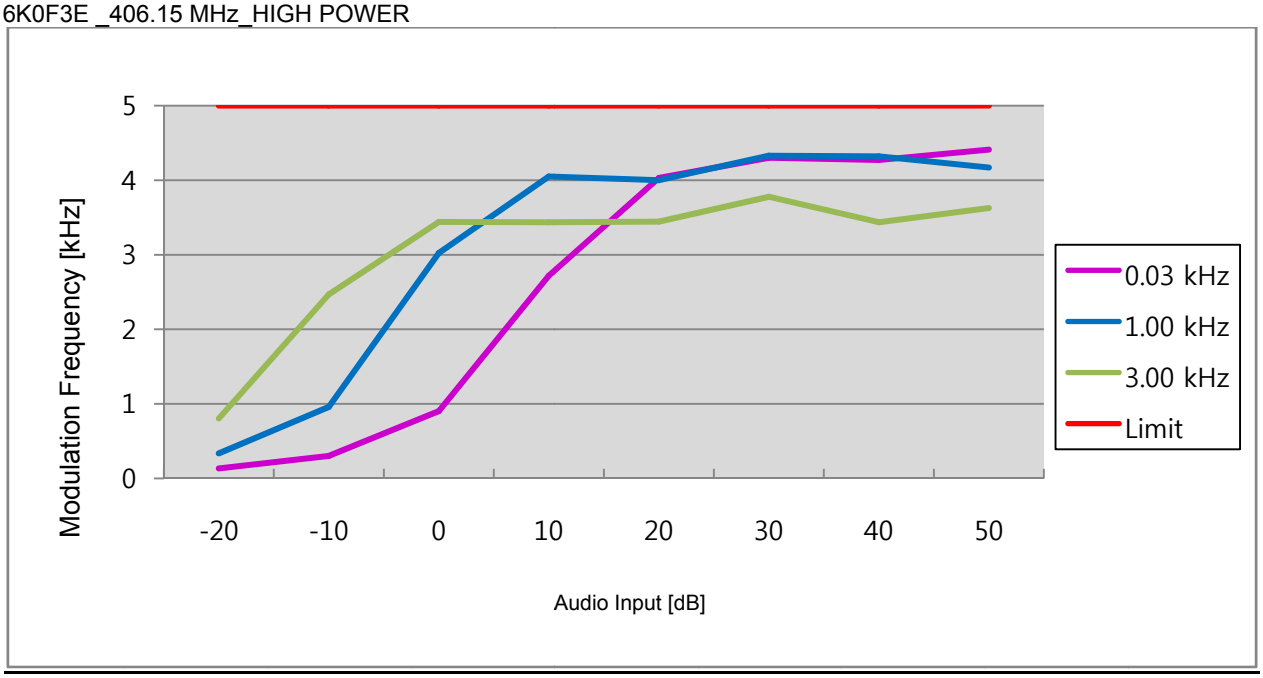


16K0F3E _469.95 MHz_LOW POWER

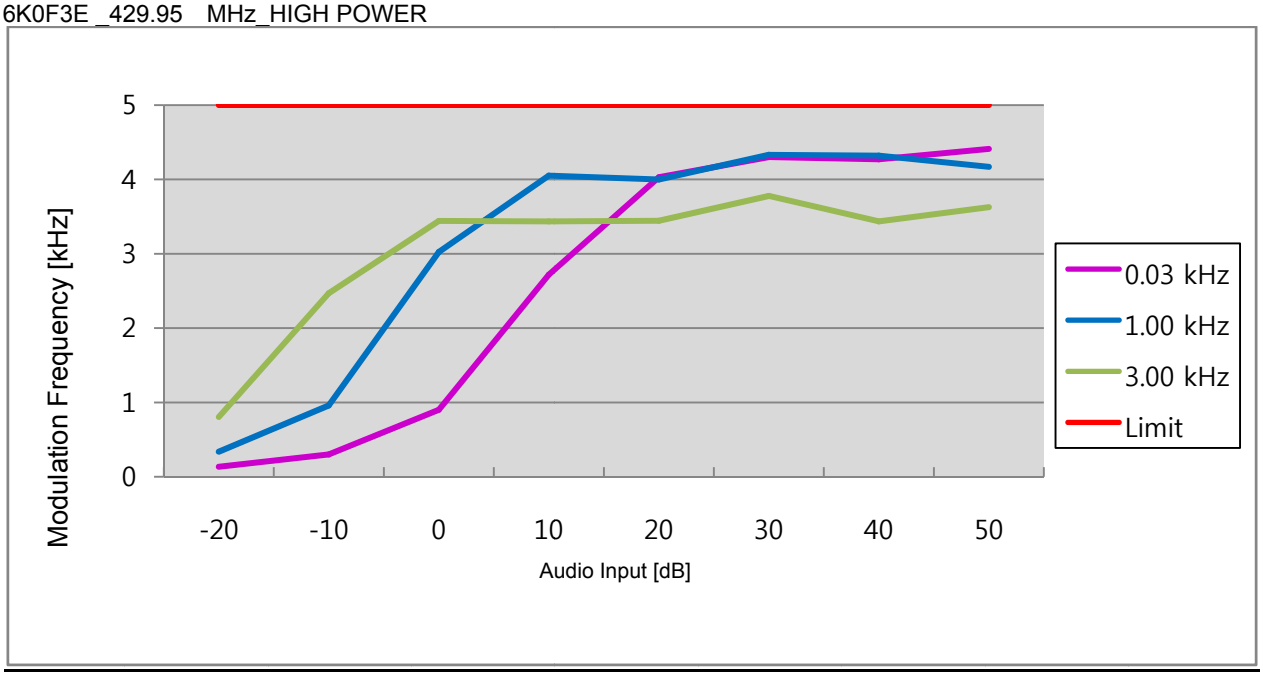


Negative Peaks

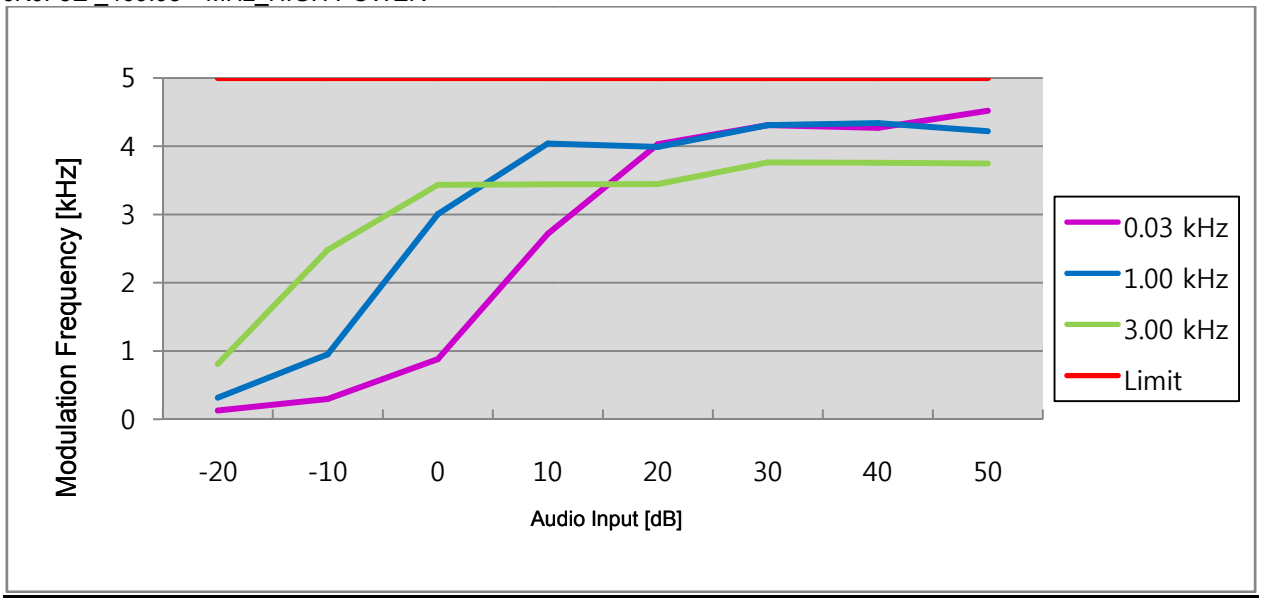
16K0F3E _406.15 MHz_HIGH POWER



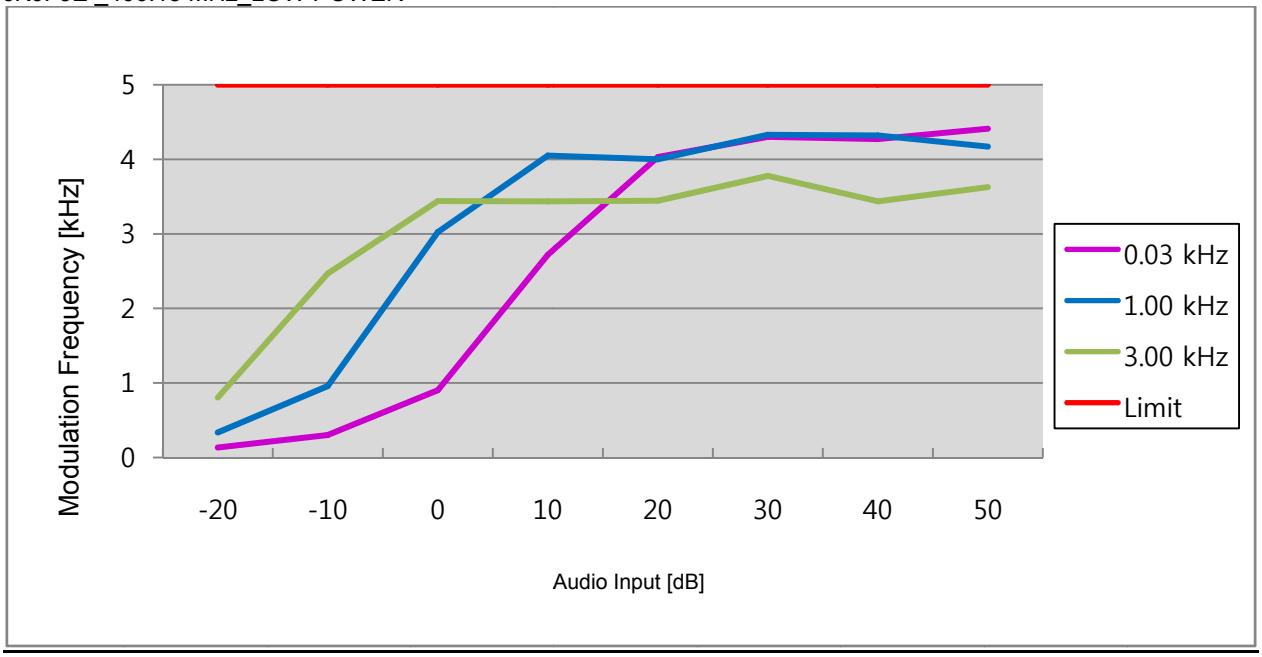
16K0F3E _429.95 MHz_HIGH POWER



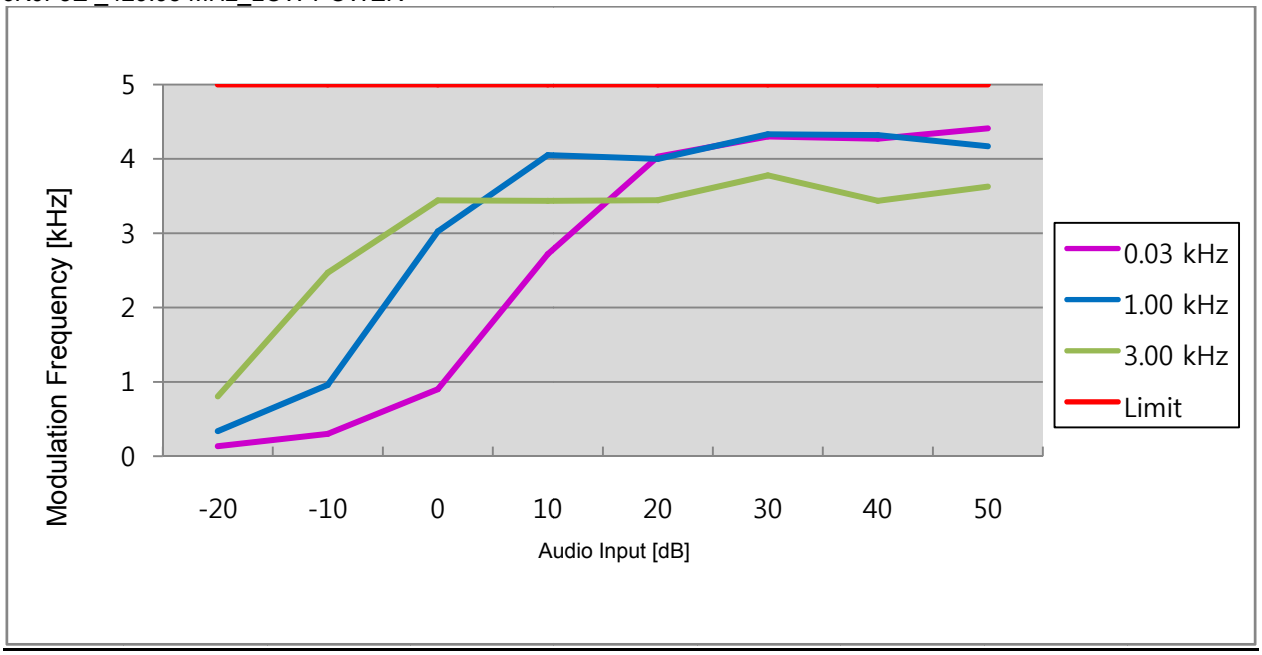
16K0F3E _469.95 MHz_HIGH POWER



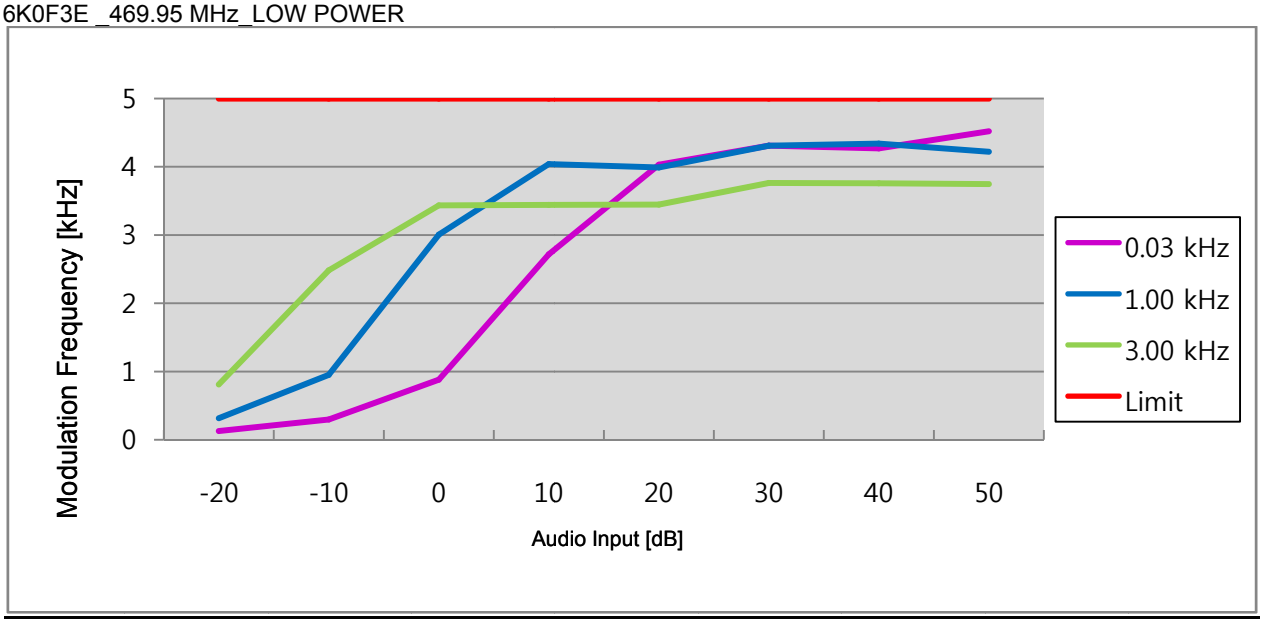
16K0F3E _406.15 MHz_LOW POWER



16K0F3E _429.95 MHz_LOW POWER



16K0F3E _469.95 MHz_LOW POWER

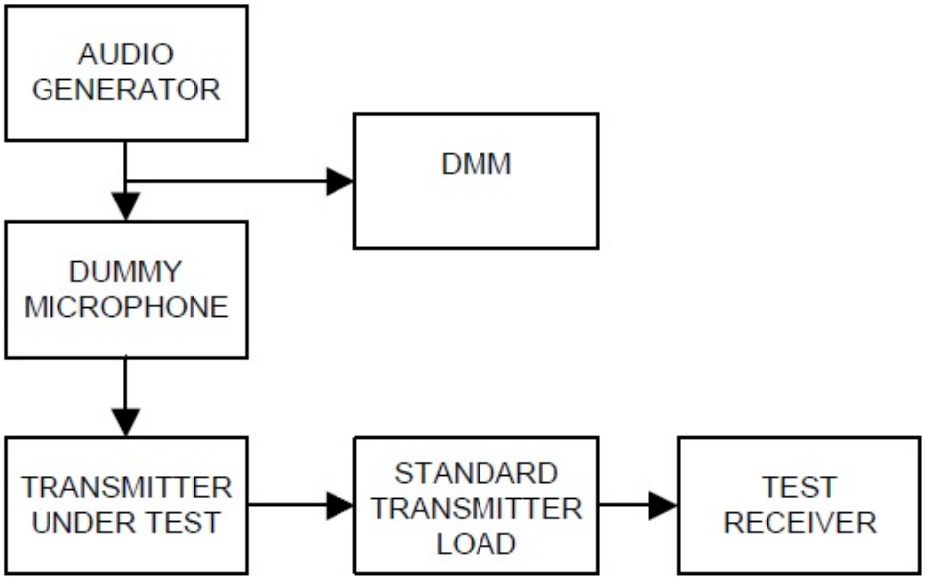


7.5 Audio Frequency Response / Audio Low Pass Filter Response

▣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-D 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.

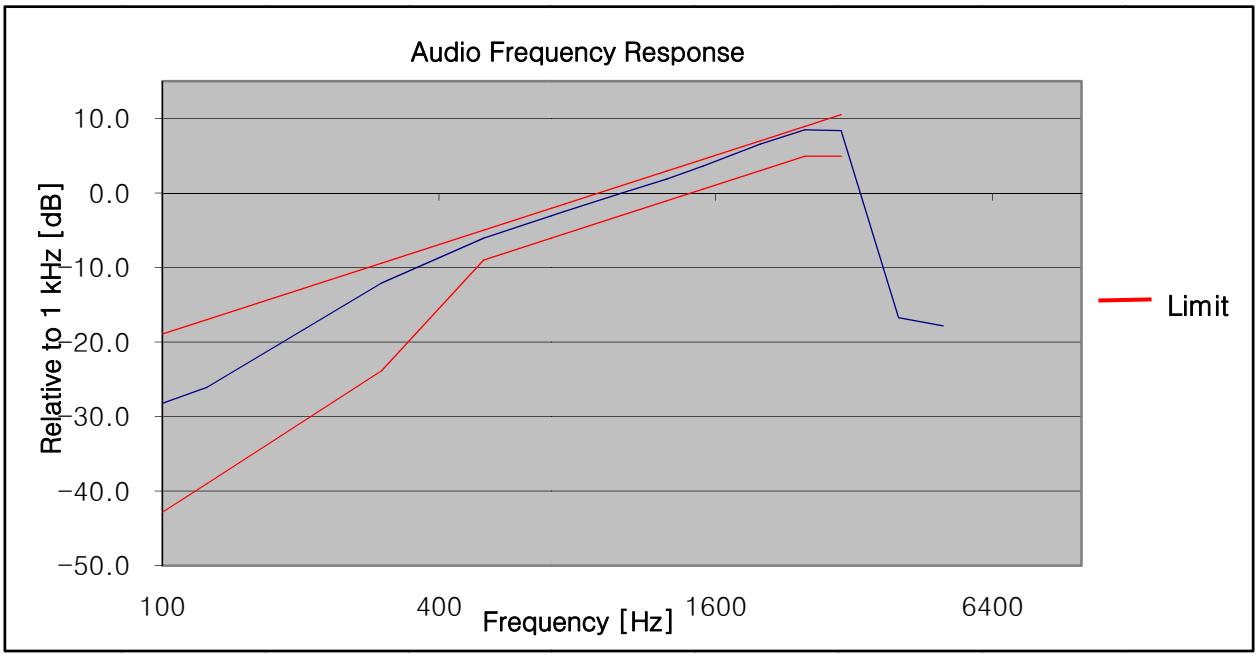
On the transmission condition below 3kHz, Transceiver shows pre-emphasis condition of transmission function.

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

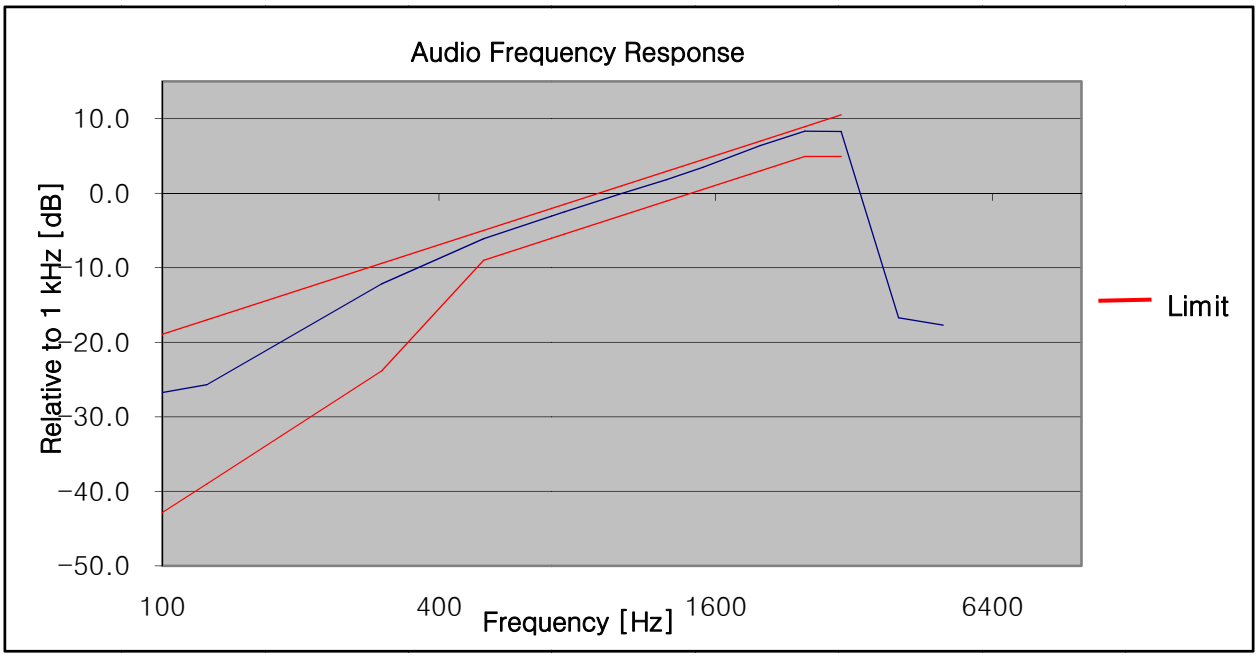
▣TEST RESULTS

11K0F3E For FCC AND IC

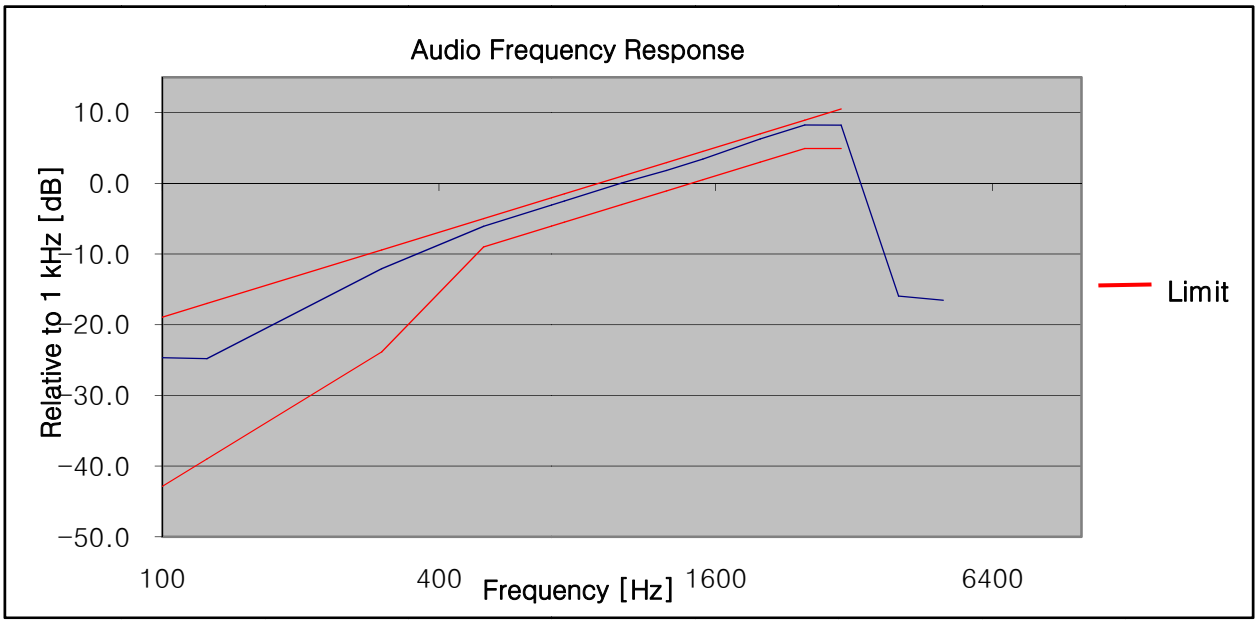
11K0F3E _406.15 MHz_HIGH POWER



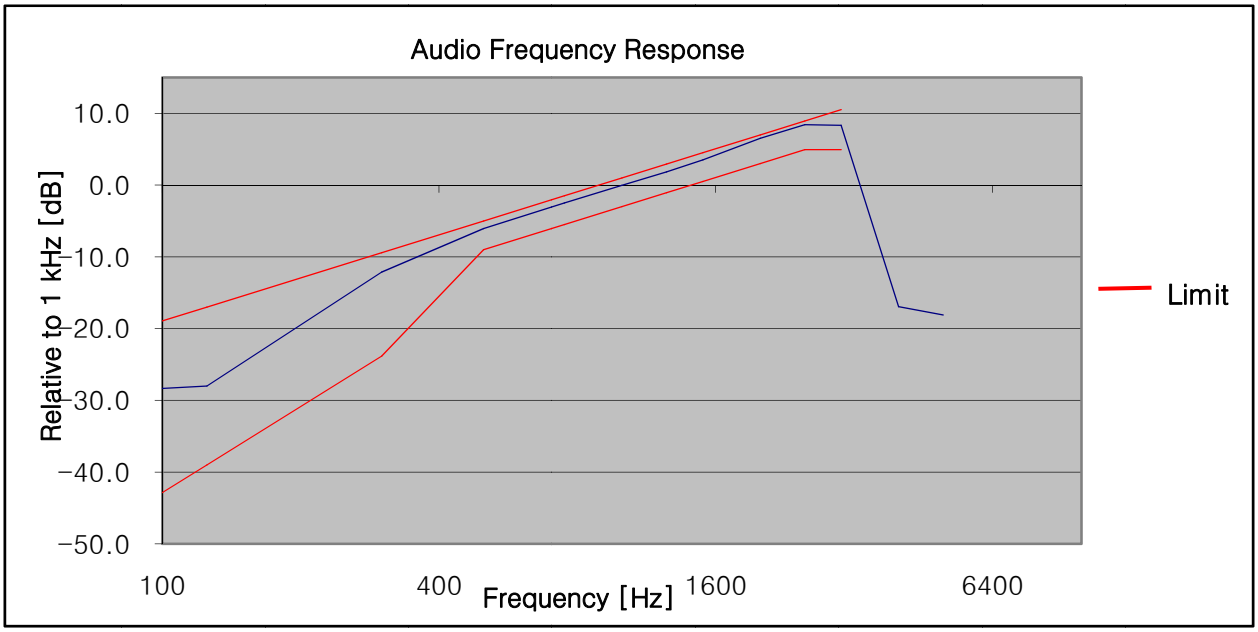
11K0F3E _429.95 MHz_HIGH POWER



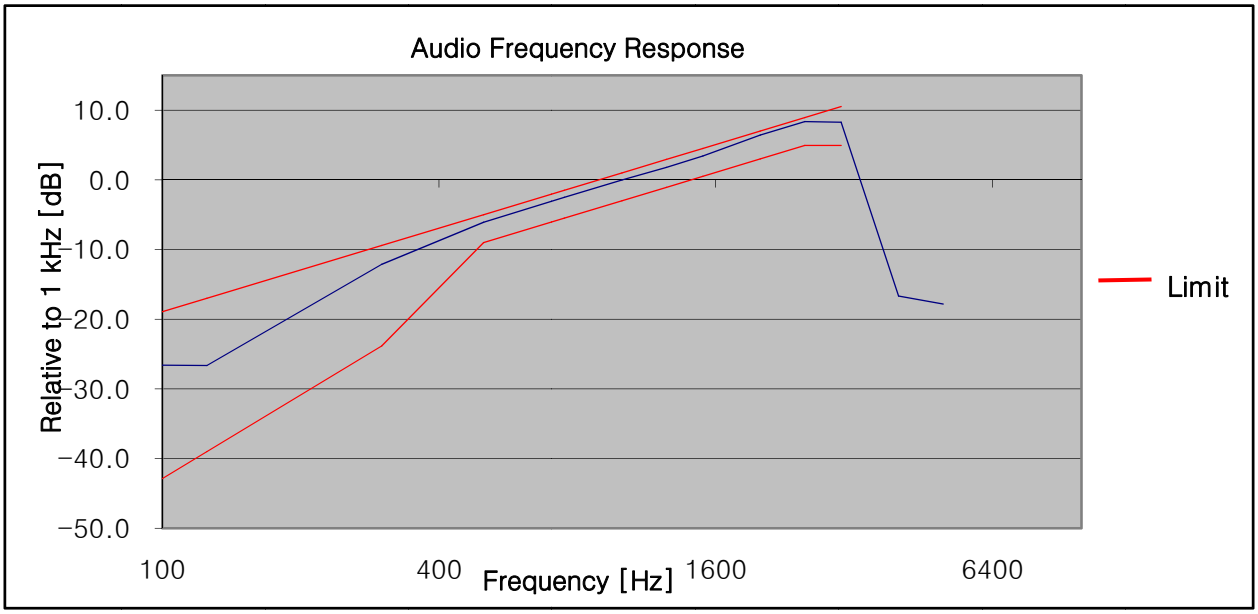
11K0F3E _469.95 MHz_HIGH POWER



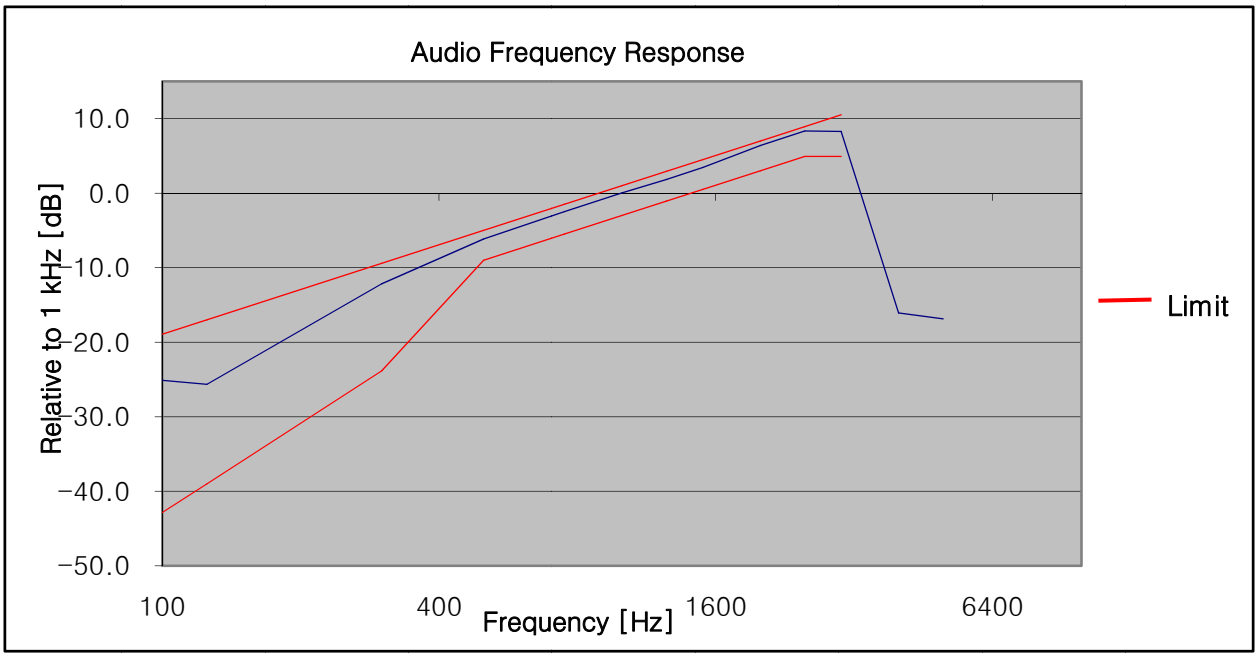
11K0F3E _406.15 MHz_LOW POWER



11K0F3E _429.95 MHz_LOW POWER

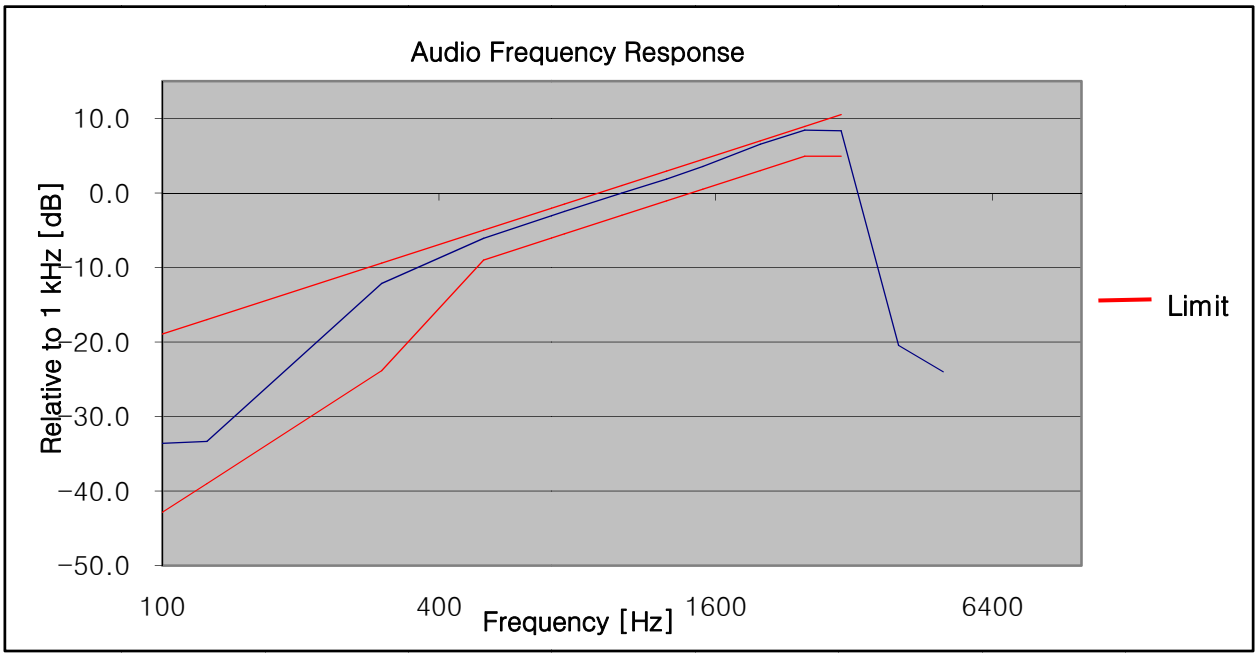


11K0F3E _469.95 MHz_LOW POWER

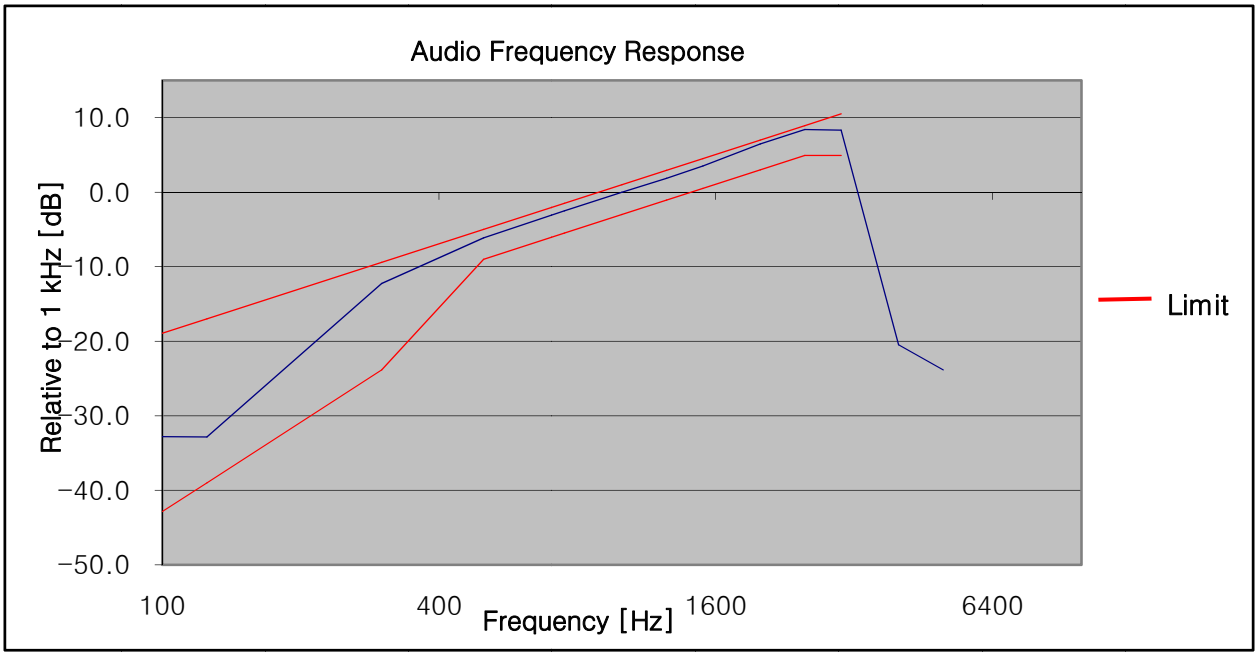


16K0F3E For ONLY IC

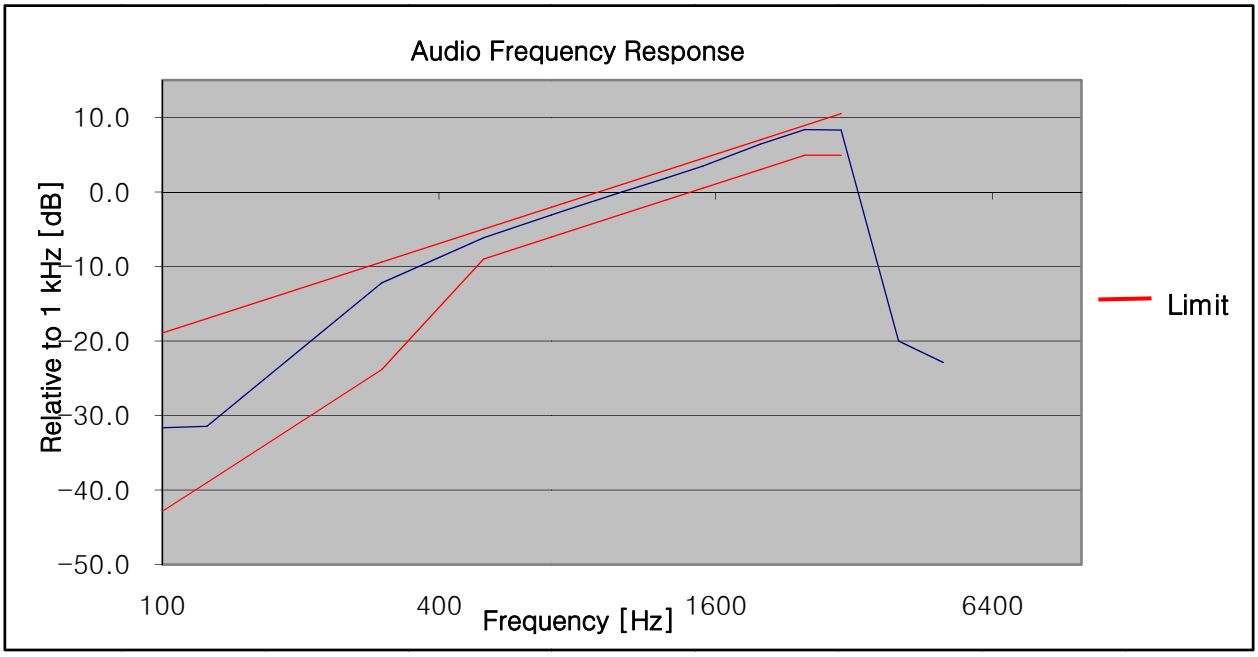
16K0F3E _406.15 MHz_HIGH POWER



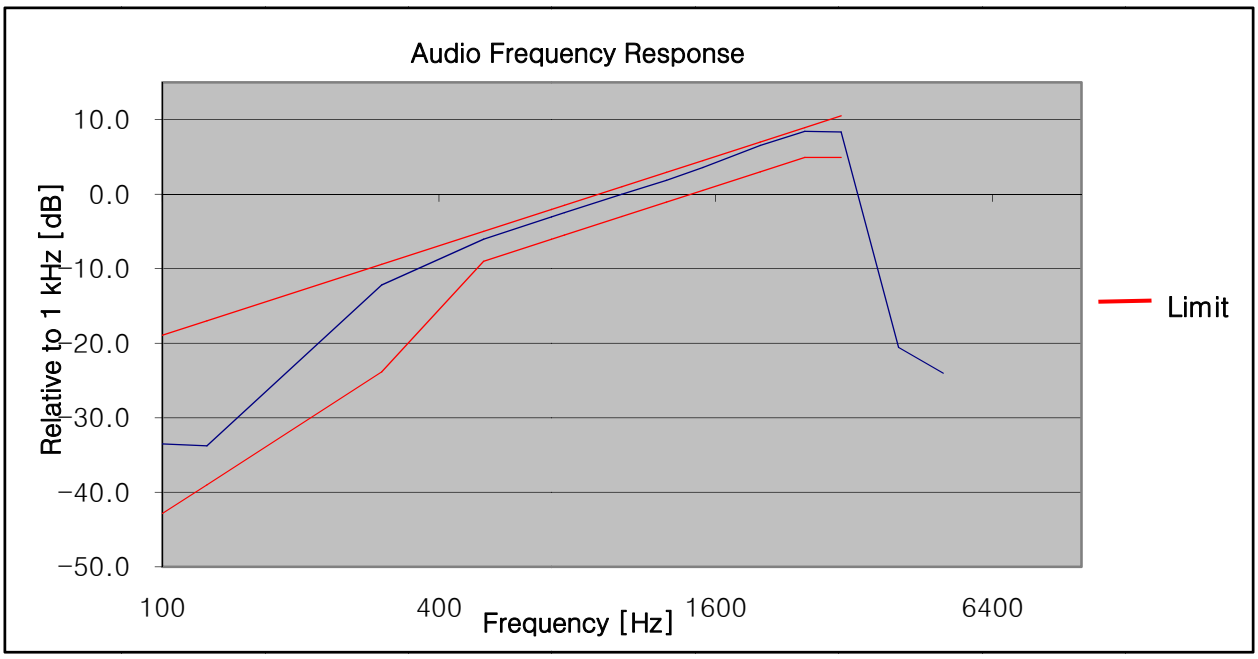
16K0F3E _429.95 MHz_HIGH POWER



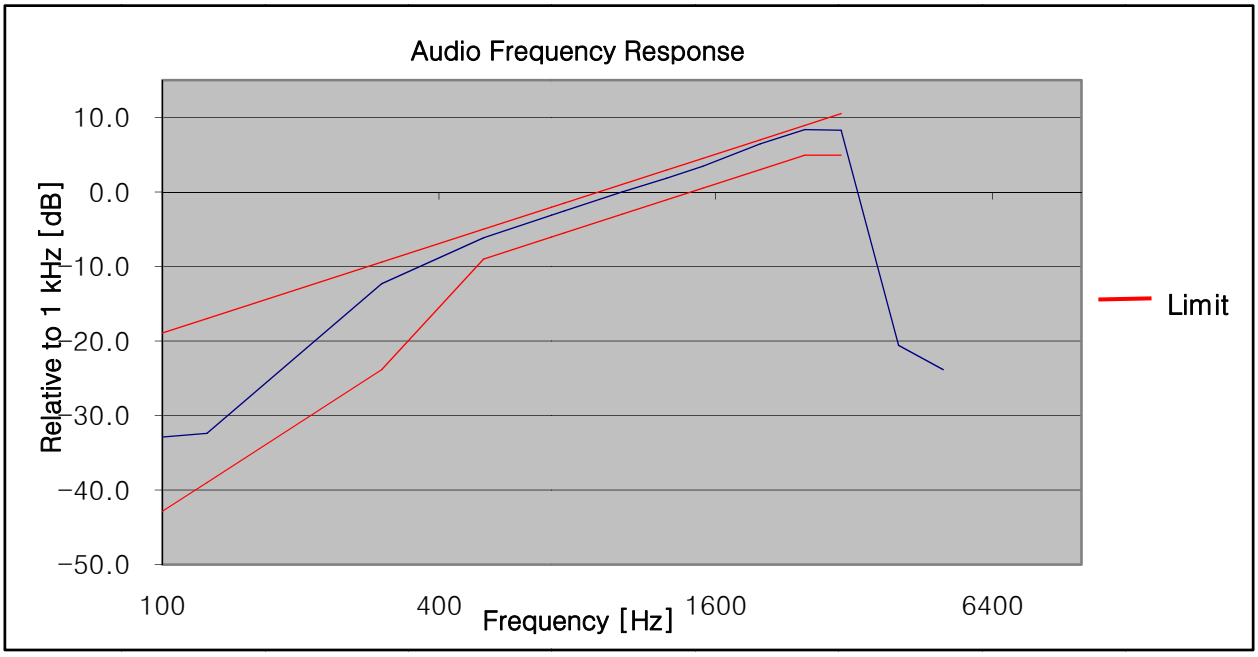
16K0F3E _469.95 MHz_HIGH POWER



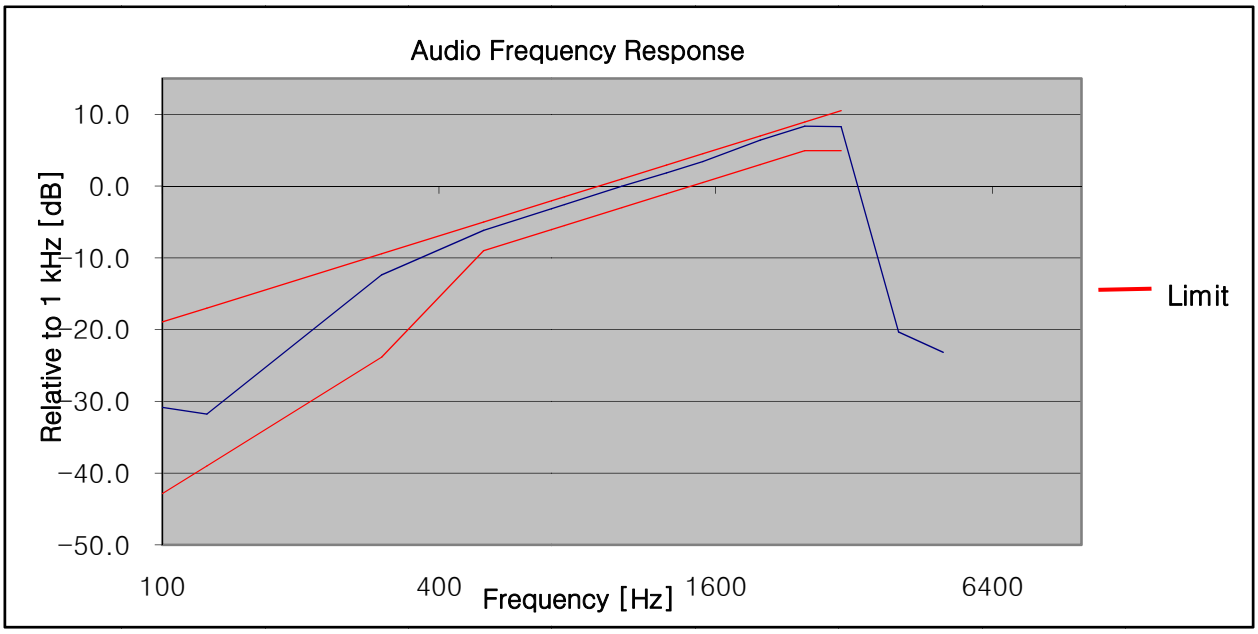
16K0F3E _406.15 MHz_LOW POWER



16K0F3E _429.95 MHz_LOW POWER



16K0F3E _469.95 MHz_LOW POWER

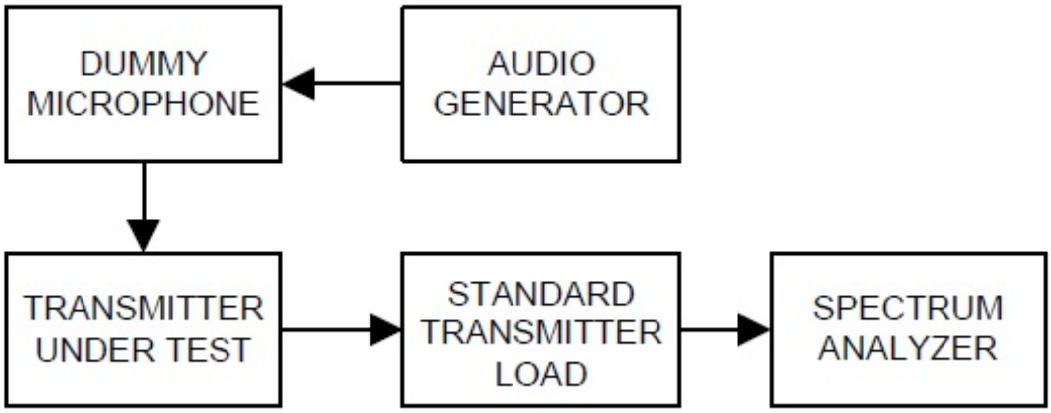


7.6 Emission Mask

▣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-D 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.

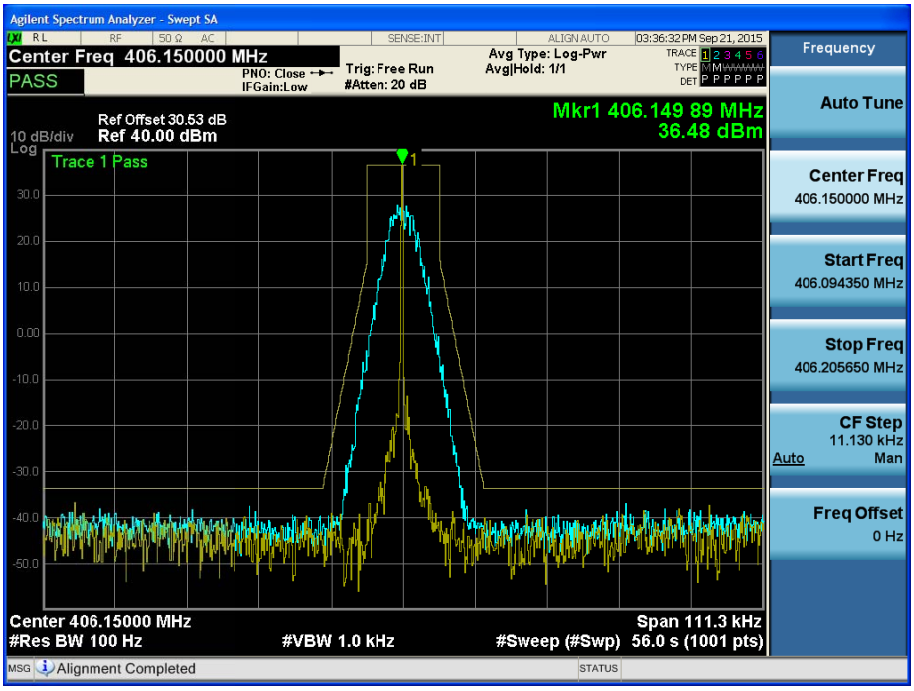
d) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulating circuit. Transmitters employing digital modulation techniques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

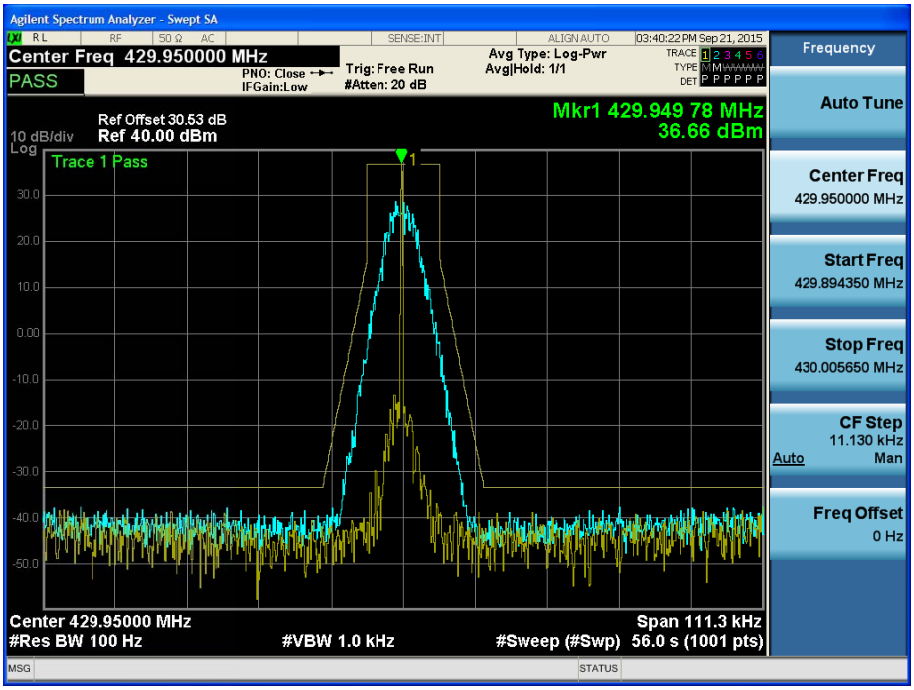
▣TEST RESULTS

7K60FXD/7K60FXE For FCC AND IC

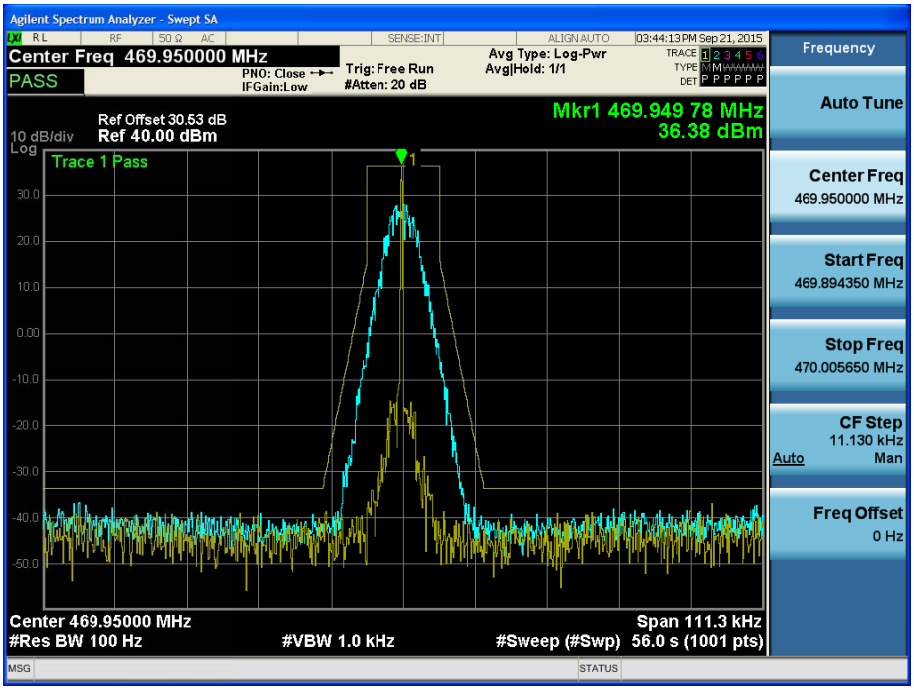
HIGH POWER_7K60FXD/7K60FXE _406.15 MHz_Low



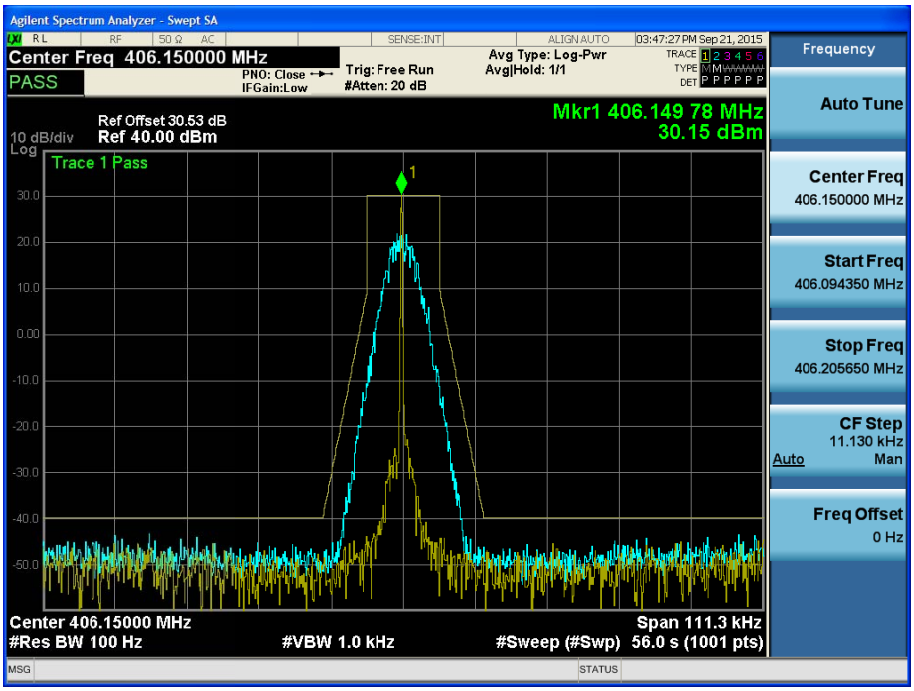
HIGH POWER_7K60FXD/7K60FXE _429.95 MHz_Middle



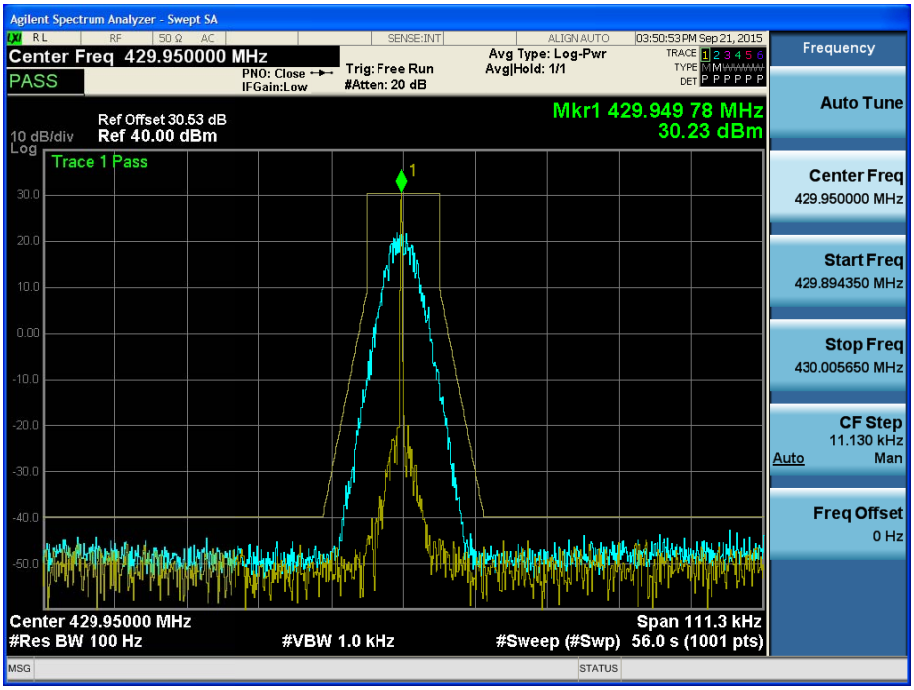
HIGH POWER_7K60FXD/7K60FXE _469.95 MHz_High



LOW POWER_7K60FXD/7K60FXE _406.15 MHz_Low



LOW POWER_7K60FXD/7K60FXE _429.95 MHz_Middle



LOW POWER_7K60FXD/7K60FXE _469.95 MHz_High