HCT CO.,LTD.
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 / ISED REPORT

FCC Certification

Applicant Name:
JVC KENWOOD Corporation

Address:
3-12,MORIYACHO,KANAGAWA-KU,YOKOHAMA-SHI,KANAHAWS,221-0022JAPAN

Date of Issue:
May 18, 2017
Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
Report No.: HCT-R-1704-F015-1
HCT FRN: 0005866421
ISED Registration Number : 5944A-5

FCC ID	**: K44479100**
IC	**: 282F-479100**
APPLICANT	**: JVC KENWOOD Corporation**

FCC Model(s):	NX-3320-K, NX-3320-K2, NX-3320-K3
IC Model(s):	NX-3320-K, NX-3320-K2, NX-3320-K3
EUT Type:	UHF DIGITAL TRANSCEIVER
Frequency Range:	FCC : 406.1 MHz - 512 MHz IC : 406.1 MHz – 430 MHz and 450 MHz – 470 MHz
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 §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 : Kwon Jeong
Engineer of Telecommunication testing center

Approved by : Jong Seok Lee
Manager of Telecommunication testing center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1704-F015	April 28, 2017	- First Approval Report
HCT-R-1704-F015-1	May 18, 2017	- Added the Type of Emission on page 7 - Added the Necessary Bandwidth on page 435 (7K60FXD, 7K60FXE) - Deleted the 16K0F3E for FCC (Deleted frequency range. : 406.1 MHz – 470 MHz)

Table of Contents

1. GENERAL INFORMATION

Manufacturer:	JVC KENWOOD Corporation
Address:	1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan
FCC ID:	K44479100
IC:	282F-479100
EUT Type:	UHF DIGITAL TRANSCEIVER
FCC Model(s):	NX-3320-K, NX-3320-K2, NX-3320-K3
IC Model(s):	NX-3320-K, NX-3320-K2, NX-3320-K3
Date(s) of Tests:	March 31, 2017 ~ April 20, 2017
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

2. EUT DESCRIPTION

EUT Type	UHF DIGITAL TRANSCEIVER	
FCC Model Name	NX-3320-K, NX-3320-K2, NX-3320-K3	
IC Model Name	NX-3320-K, NX-3320-K2, NX-3320-K3	
Power Supply	DC 7.5 V	
Output Power	5 W (Power output continuously variable to 1 W)	
Battery type	KNB-55L	Li-Ion Battery Pack (1480mA)
	KNB-56N	Ni-MH Battery Pack (1400mA)
	KNB-57L	Li-Ion Battery Pack (2000mA)
	KNB-68LC	Li-Ion Battery Pack (2000mA)
	KBP-5	AA Alkaline Battery Pack
Antenna type	KRA-23M	UHF Low Profile Helical Antenna (440-490 MHz)
	KRA-23M2	UHF Low Profile Helical Antenna (470-520 MHz)
	KRA-23M3	UHF Low Profile Helical Antenna (400-450 MHz)
	KRA-27M	UHF Whip Antenna (440-490 MHz)
	KRA-27M2	UHF Whip Antenna (470-520 MHz)
	KRA-27M3	UHF Whip Antenna (400-450 MHz)
	KRA-42M	UHF Stubby Antenna (440-490 MHz)
	KRA-42M2	UHF Stubby Antenna (470-520 MHz)
	KRA-42M3	UHF Stubby Antenna (400-450 MHz)
	KRA-29P	Broad-band UHFAntenna (406-470MHz)
Channel Bandwidth	*25 kHz / 12.5 kHz / 6.25 kHz - 25 kHz is for IC - 25 kHz is for FCC 470 – 512 MHz	
Operating Temperature	-30 ℃ ~ +60 ℃	
Frequency Range	FCC : 406.1 MHz - 512 MHz IC : 406.1 MHz – 430 MHz and 450 MHz – 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

11K0F3E	(Analogue)
16K0F3E	(Analogue) : 16K0F3E for IC, 16K0F3E for FCC 470 – 512 MHz
7K60FXD, 7K60FXE	(DMR)
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 = 2 ppm Channel Spacing : 12.5 kHz = 5 ppm 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 7.10		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	Freq.(MHz)	Carrier Output Power			
			High		Low	
			dBm	W	dBm	W
Digital	11K0F3E	406.15	36.812	4.800	30.228	1.054
		429.95	36.673	4.648	29.956	0.990
		450.05	36.674	4.649	29.912	0.980
		469.95	36.496	4.463	29.547	0.901
		491.05	36.703	4.681	29.951	0.989
		511.95	36.645	4.618	29.797	0.954
		470.05	36.564	4.533	29.546	0.901
	16K0F3E	491.05	36.885	4.881	29.985	0.997
		511.95	36.793	4.779	29.844	0.965
		470.05	36.795	4.781	29.678	0.929
	7K60FXD, 7K60FXE	406.15	36.851	4.843	30.192	1.045
		429.95	36.703	4.681	29.948	0.988
		450.05	36.515	4.482	29.830	0.962
		469.95	36.642	4.615	29.655	0.924
		491.05	36.763	4.746	29.975	0.994
		511.95	36.715	4.694	29.833	0.962
	8K30F1E, 8K30F1D, 8K30F7W	406.15	36.934	4.936	30.190	1.045
		429.95	36.789	4.774	29.971	0.993
		450.05	36.510	4.477	29.870	0.971
		469.95	36.571	4.540	29.602	0.912
		491.05	36.736	4.716	29.967	0.992
		511.95	36.700	4.677	29.822	0.960
	4K00F1E, 4K00F1D, 4K00F7W	406.15	36.818	4.806	36.818	4.806
		429.95	36.713	4.691	36.690	4.667
		450.05	36.520	4.487	36.507	4.474
		469.95	36.719	4.698	29.669	0.927
		491.05	36.813	4.801	29.980	0.995
		511.95	36.758	4.740	29.776	0.950

Mode	Type of Emission	Freq.(MHz)	Carrier Output Power			
			High		Low	
			dBm	W	dBm	W
Digital	4K00F2D	406.15	N/A		30.201	1.047
		429.95			29.979	0.995
		450.05			29.865	0.969
		469.95			29.655	0.924
		491.05			29.965	0.992
		511.95			29.822	0.960

For IC

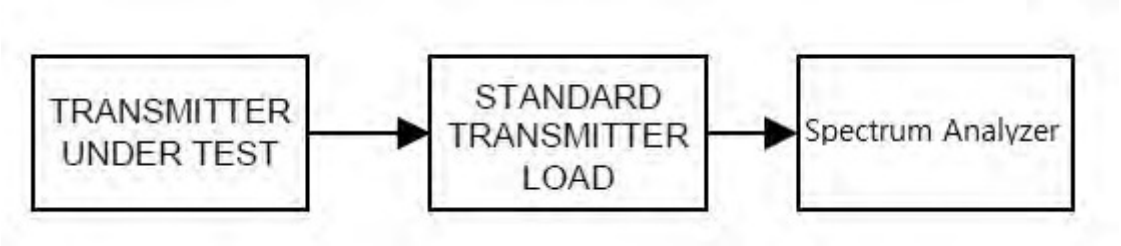
Mode	Type of Emission	Freq.(MHz)	Carrier Output Power			
			High		Low	
			dBm	W	dBm	W
Digital	11K0F3E	406.15	36.829	4.818	30.245	1.058
		429.95	36.678	4.654	29.977	0.995
		450.05	36.611	4.583	29.929	0.984
		469.95	36.502	4.469	29.567	0.905
	16K0F3E	406.15	36.842	4.833	30.246	1.058
		429.95	36.705	4.682	29.967	0.993
		450.05	36.553	4.522	29.969	0.993
		469.95	36.532	4.500	29.542	0.900
	7K60FXD, 7K60FXE	406.15	36.823	4.812	30.206	1.049
		429.95	36.686	4.662	29.966	0.992
		450.05	36.503	4.470	29.848	0.966
		469.95	36.624	4.596	29.662	0.925
	8K30F1E, 8K30F1D, 8K30F7W	406.15	36.937	4.940	30.206	1.049
		429.95	36.692	4.669	29.993	0.998
		450.05	36.508	4.475	29.884	0.974
		469.95	36.547	4.515	29.629	0.918
	4K00F1E, 4K00F1D, 4K00F7W	406.15	36.827	4.816	36.817	4.805
		429.95	36.700	4.677	36.683	4.659
		450.05	36.517	4.484	36.499	4.466
		469.95	36.678	4.654	29.681	0.929
Digital	4K00F2D	406.15	N/A		30.215	1.051
		429.95			29.994	0.999
		450.05			29.879	0.972
		469.95			29.650	0.923

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

(1) Frequency Stability (Temperature Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	**406.149910682**	**-0.219914**
-20	**406.149929582**	**-0.173379**
-10	**406.149933393**	**-0.163996**
0	**406.149949691**	**-0.123868**
10	**406.149961548**	**-0.094674**
20	**406.150012714**	**0.031305**
30	**406.150029516**	**0.072673**
40	**406.150034857**	**0.085823**
50	**406.150057406**	**0.141342**

450.05 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	**450.049902450**	**-0.216754**
-20	**450.049917295**	**-0.183768**
-10	**450.049930650**	**-0.154094**
0	**450.049948210**	**-0.115076**
10	**450.049962348**	**-0.083662**
20	**450.049978414**	**-0.047963**
30	**450.050034407**	**0.076452**
40	**450.050031494**	**0.069979**
50	**450.050040860**	**0.090790**

469.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	**469.949897866**	**-0.217330**
-20	**469.949914209**	**-0.182553**
-10	**469.949920394**	**-0.169392**
0	**469.949946242**	**-0.114391**
10	**469.949971058**	**-0.061585**
20	**469.950059302**	**0.126189**
30	**469.950023859**	**0.050769**
40	**469.950033105**	**0.070444**
50	**469.950063259**	**0.134608**

511.95 MHz (High Power)

Temperature (Degree C)	Frequency (MHz)	Frequency stability (ppm)
-30	**511.949890537**	**-0.213816**
-20	**511.949904434**	**-0.186671**
-10	**511.949925465**	**-0.145590**
0	**511.949934264**	**-0.128403**
10	**511.949959684**	**-0.078750**
20	**511.950046149**	**0.090143**
30	**511.950036640**	**0.071569**
40	**511.950036640**	**0.071569**
50	**511.950077890**	**0.152144**

(2) Frequency Stability (Voltage Variation)

406.15 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25+/-5	85	6.38	**406.150015783**	**0.038860**
25+/-5	100	7.50	**406.150018428**	**0.045371**
25+/-5	115	8.63	**406.150015505**	**0.038175**

450.05 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25+/-5	85	6.38	**450.049978624**	**-0.047496**
25+/-5	100	7.50	**450.049975239**	**-0.055019**
25+/-5	115	8.63	**450.049976166**	**-0.052958**

469.95 MHz (High Power)

Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25+/-5	85	6.38	**469.950060648**	**0.129053**
25+/-5	100	7.50	**469.950059332**	**0.126252**
25+/-5	115	8.63	**469.950058350**	**0.124161**

511.95 MHz (High Power)

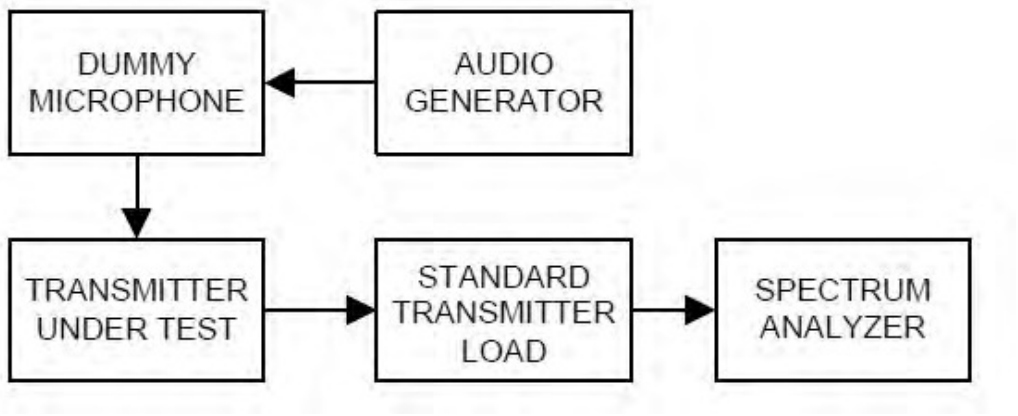
Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Frequency stability (ppm)
25+/-5	85	6.38	**511.950046854**	**0.091520**
25+/-5	100	7.50	**511.950043325**	**0.084627**
25+/-5	115	8.63	**511.950043627**	**0.085218**

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

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

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

5) Sampling Time : 10 times

6) Detector Mode = Positive Peak.

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

▣ LIMIT

Frequency Band (MHz)	Channel bandwidth (kHz)	Authorized Bandwidth (kHz)
406.1 – 512 and 406.1 – 430, 450-470	12.5	11.25
	6.25	6
	25	20

▣ TEST RESULTS

Conducted 99% Bandwidth Measurements for 11K0F3E

11K0F3E Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel bandwidth		
406.15	12.5 kHz	9.886	High Power
429.95		7.552	
450.05		9.951	
469.95		9.894	
491.05		9.861	
511.95		9.889	
470.05		9.896	
406.15	12.5 kHz	9.883	Low Power
429.95		7.555	
450.05		9.956	
469.95		9.899	
491.05		9.842	
511.95		9.892	
470.05		9.895	

Conducted 99% Bandwidth Measurements for 16K0F3E

16K0F3E Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel bandwidth		
406.15	25.0 kHz	14.644	High Power
429.95		10.821	
450.05		14.924	
469.95		14.718	
491.05		14.603	
511.95		14.723	
470.05		14.710	
406.15	25.0 kHz	14.643	Low Power
429.95		10.831	
450.05		14.643	
469.95		14.717	
491.05		14.595	
511.95		14.729	
470.05		14.708	

Conducted 99% Bandwidth Measurements for 7K60FXD, 7K60FXE

7K60FXD, 7K60FXE Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel bandwidth		
406.15	12.5 kHz	7.514	High Power
429.95		7.355	
450.05		7.800	
469.95		7.537	
491.05		7.441	
511.95		7.535	
406.15	12.5 kHz	7.515	Low Power
429.95		7.320	
450.05		7.791	
469.95		7.534	
491.05		7.448	
511.95		7.565	

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

8K30F1E, 8K30F1D, 8K30F7W Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel bandwidth		
406.15	12.5 kHz	7.753	High Power
429.95		7.701	
450.05		8.228	
469.95		7.638	
491.05		7.572	
511.95		7.652	
406.15	12.5 kHz	7.810	Low Power
429.95		7.746	
450.05		8.212	
469.95		7.641	
491.05		7.576	
511.95		7.664	

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

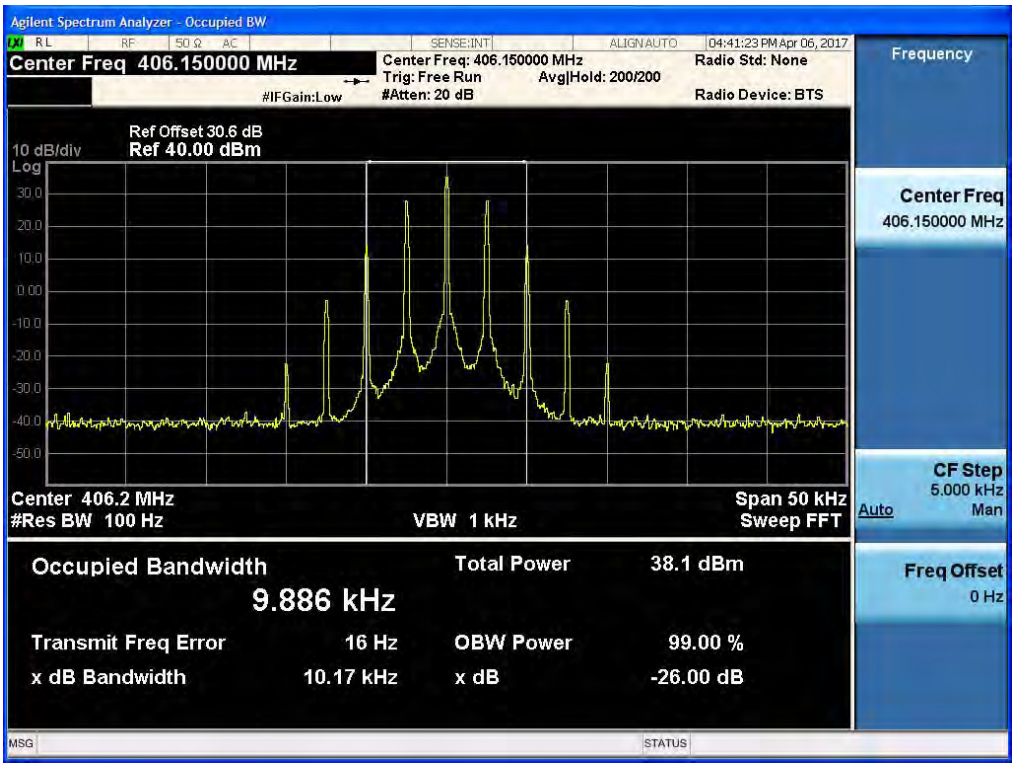
8K30F1E, 8K30F1D, 8K30F7W Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel bandwidth		
406.15	6.25 kHz	3.656	High Power
429.95		3.683	
450.05		3.719	
469.95		3.517	
491.05		3.502	
511.95		3.538	
406.15	6.25 kHz	3.650	Low Power
429.95		3.601	
450.05		3.708	
469.95		3.507	
491.05		3.484	
511.95		3.538	

Conducted 99% Bandwidth Measurements for 4K00F2D

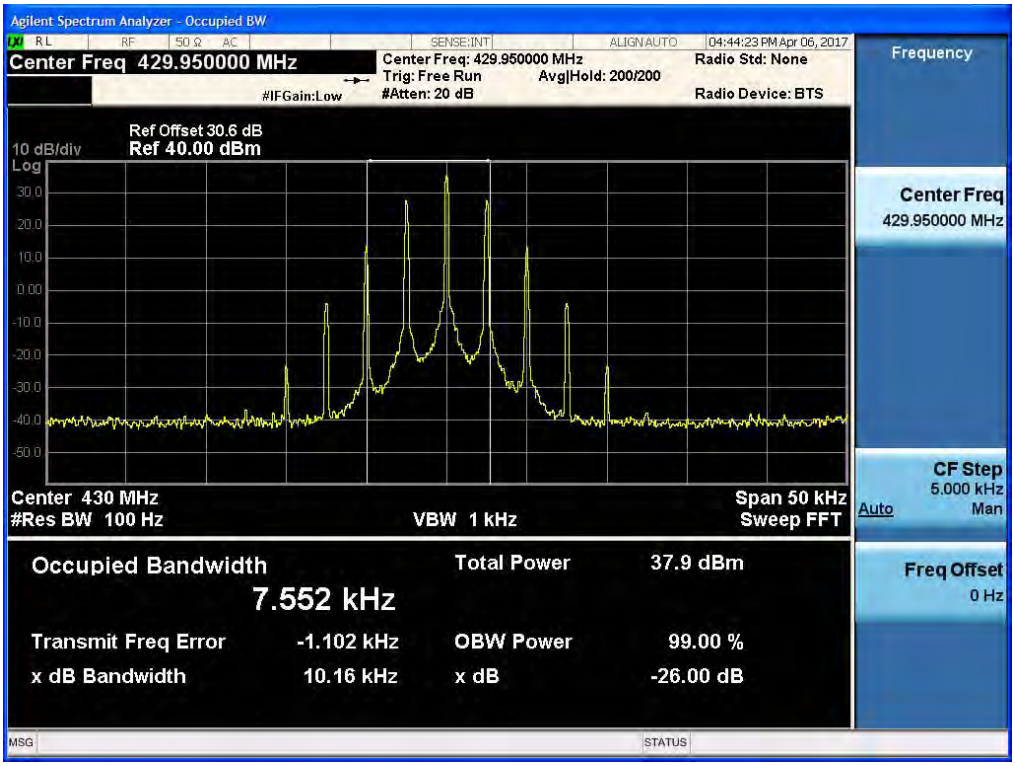
4K00F2D Mode		Measured Bandwidth [kHz]	Setting
Frequency [MHz]	Channel bandwidth		
406.15	6.25 kHz	3.260	Low Power
429.95		3.253	
450.05		3.275	
469.95		3.258	
491.05		3.254	
511.95		3.266	

▣ Plots of 99% Bandwidth

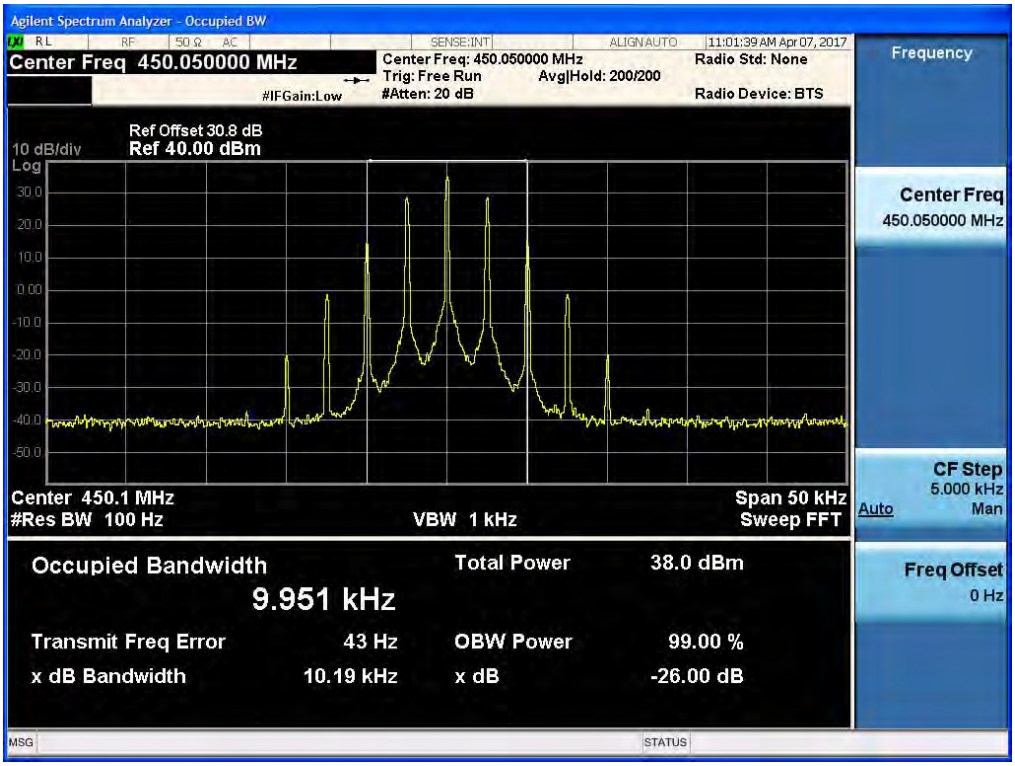
(11K0F3E _ 406.15 MHz)_High



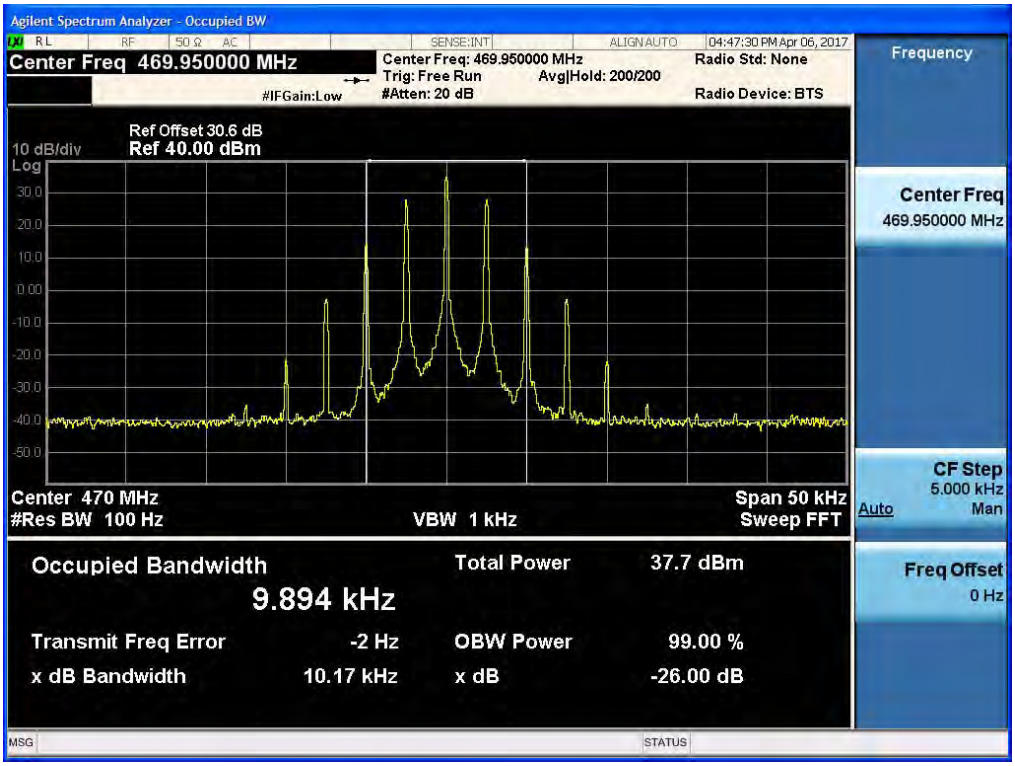
(11K0F3E _ 429.95 MHz)_High



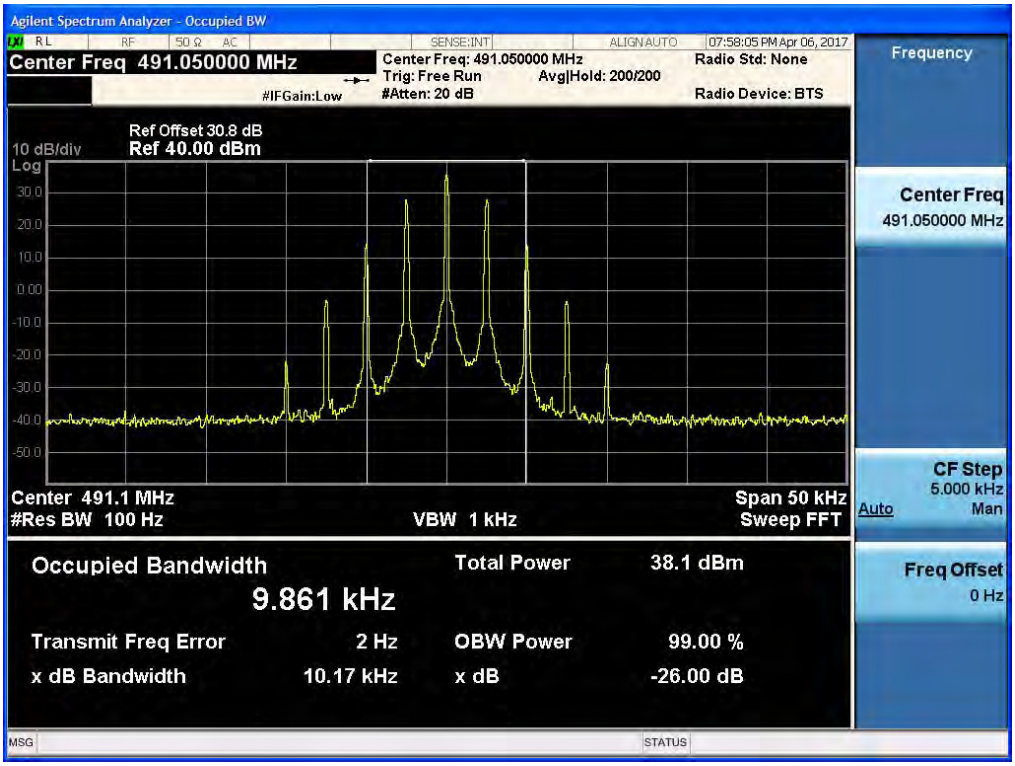
(11K0F3E _ 450.05 MHz)_High



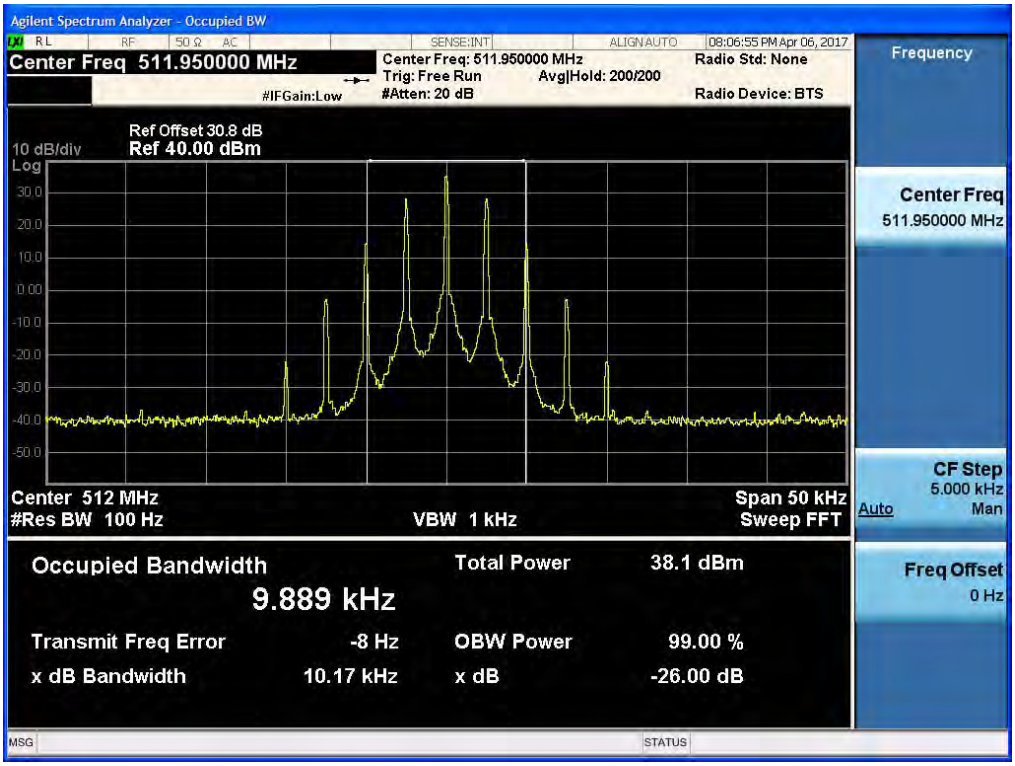
(11K0F3E _ 469.95 MHz)_High



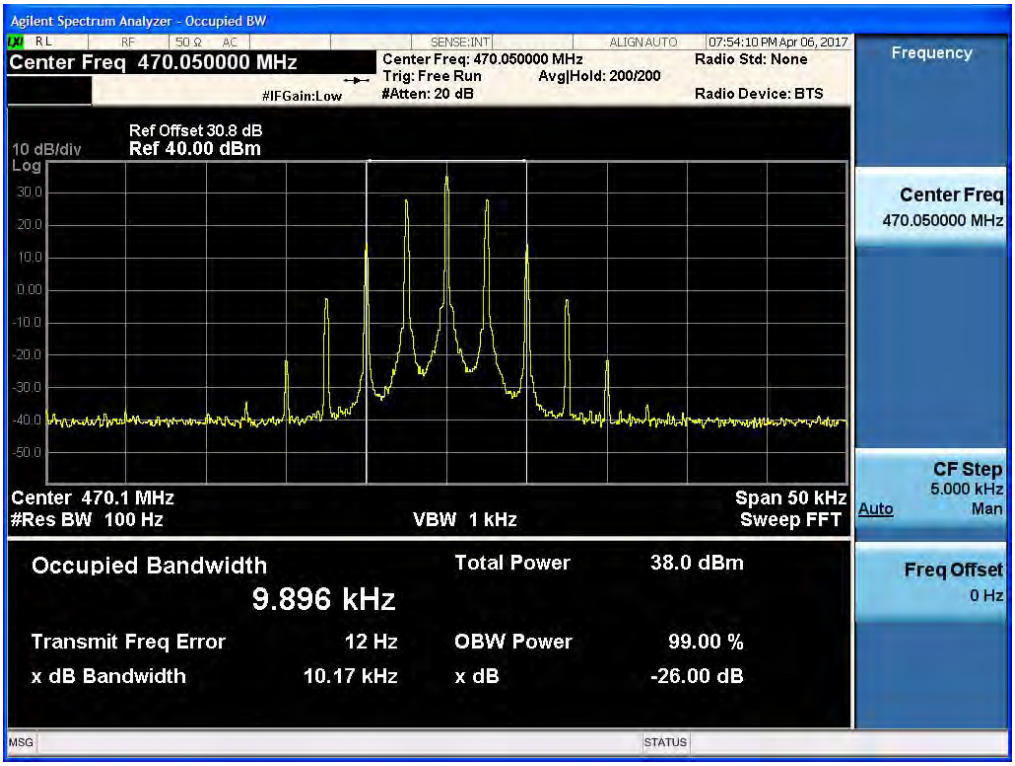
(11K0F3E _ 491.05 MHz)_High



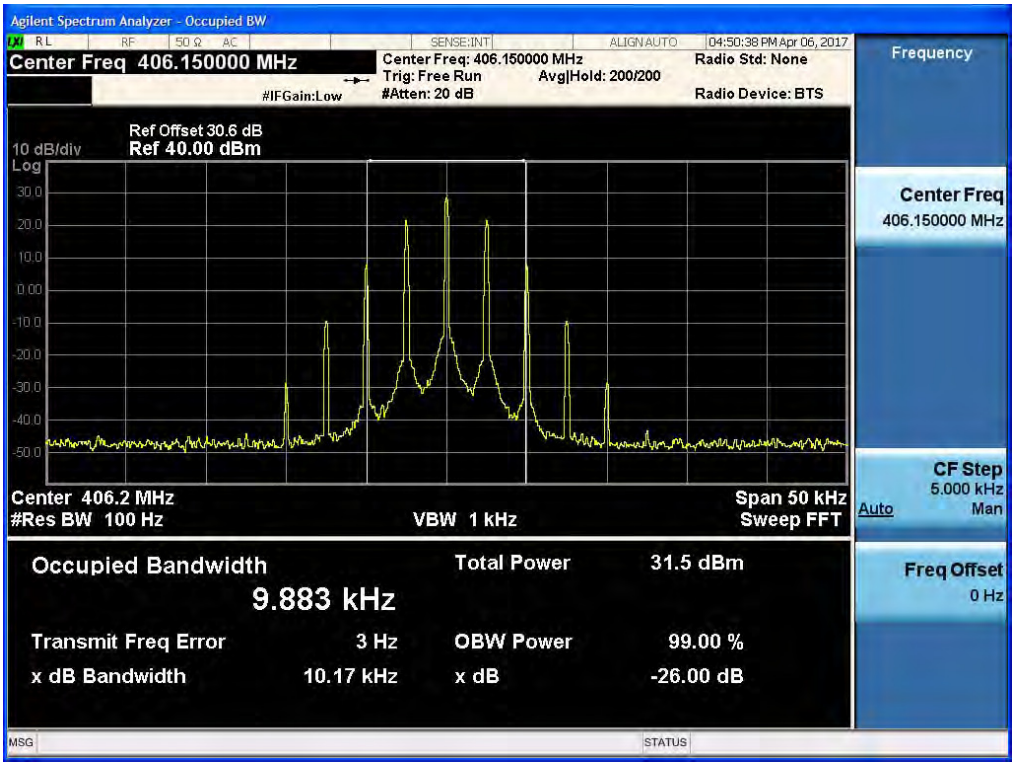
(11K0F3E _ 511.95 MHz)_High



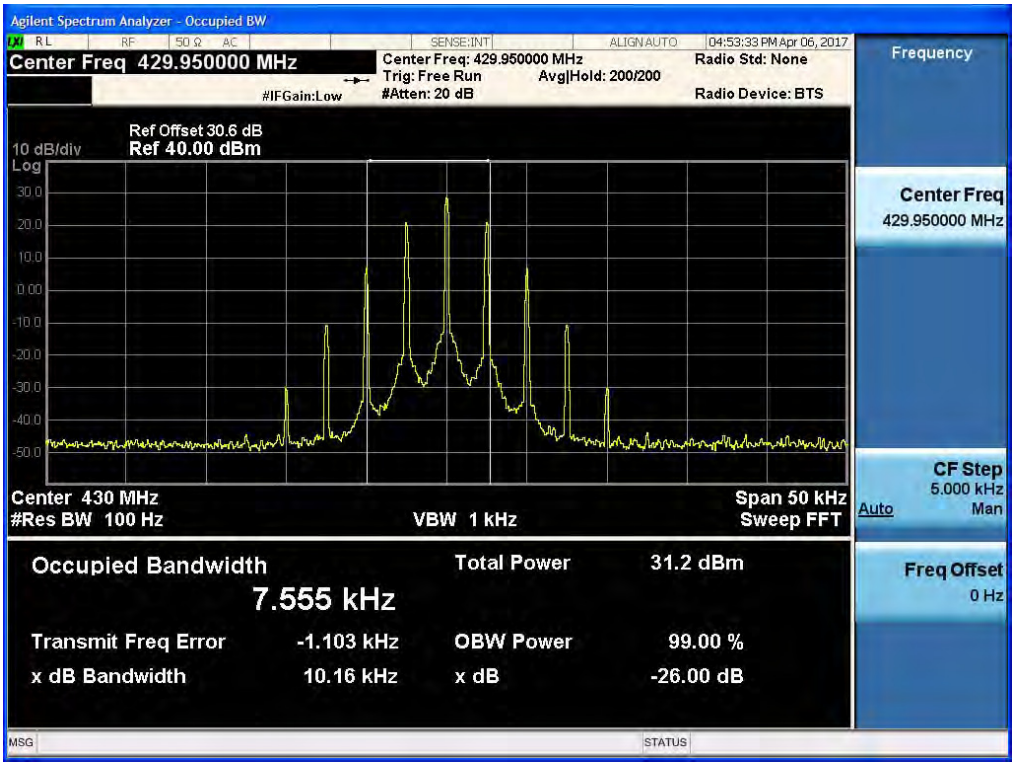
(11K0F3E _ 470.05 MHz)_High



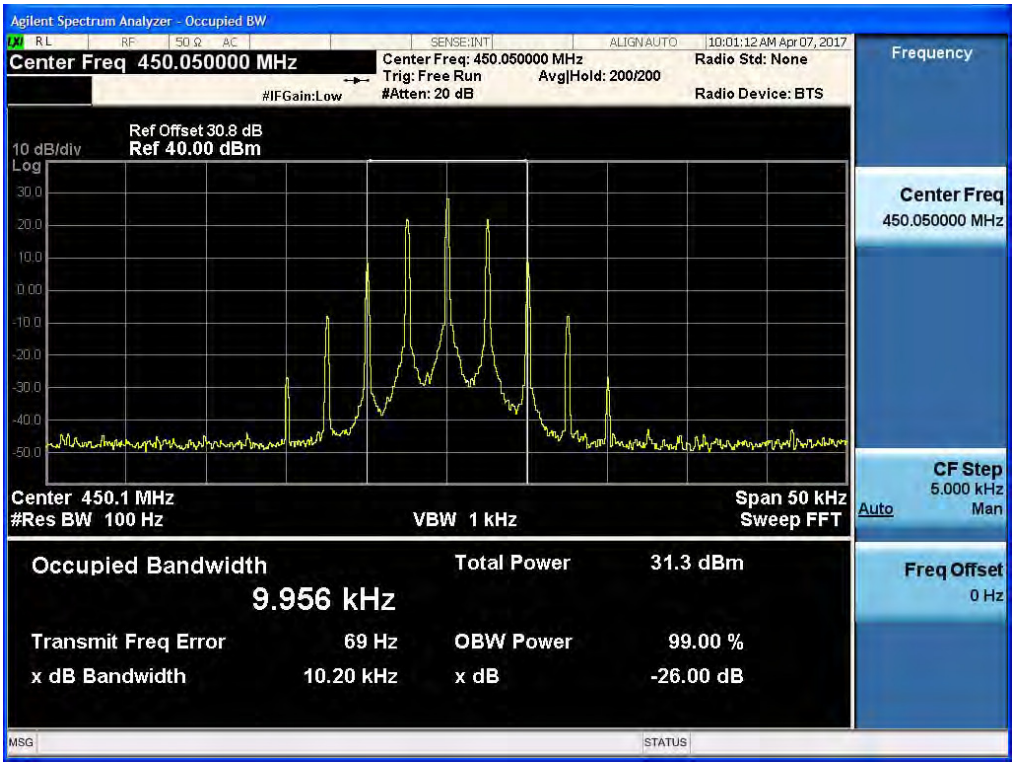
(11K0F3E _ 406.15 MHz)_Low



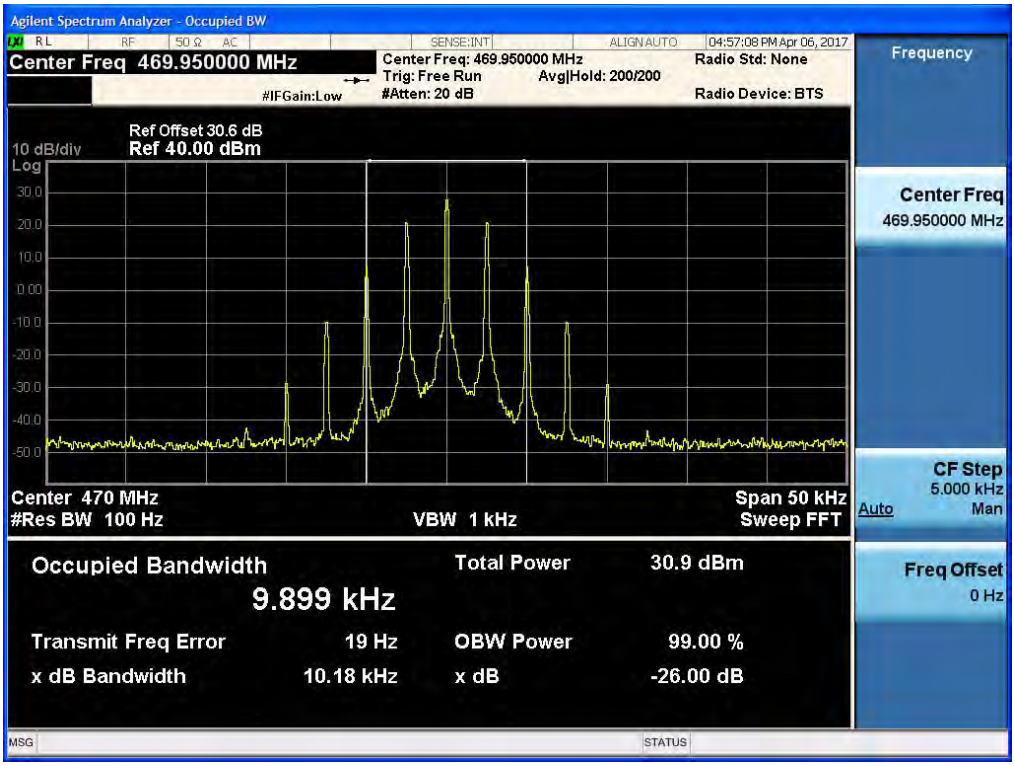
(11K0F3E _ 429.95 MHz)_Low



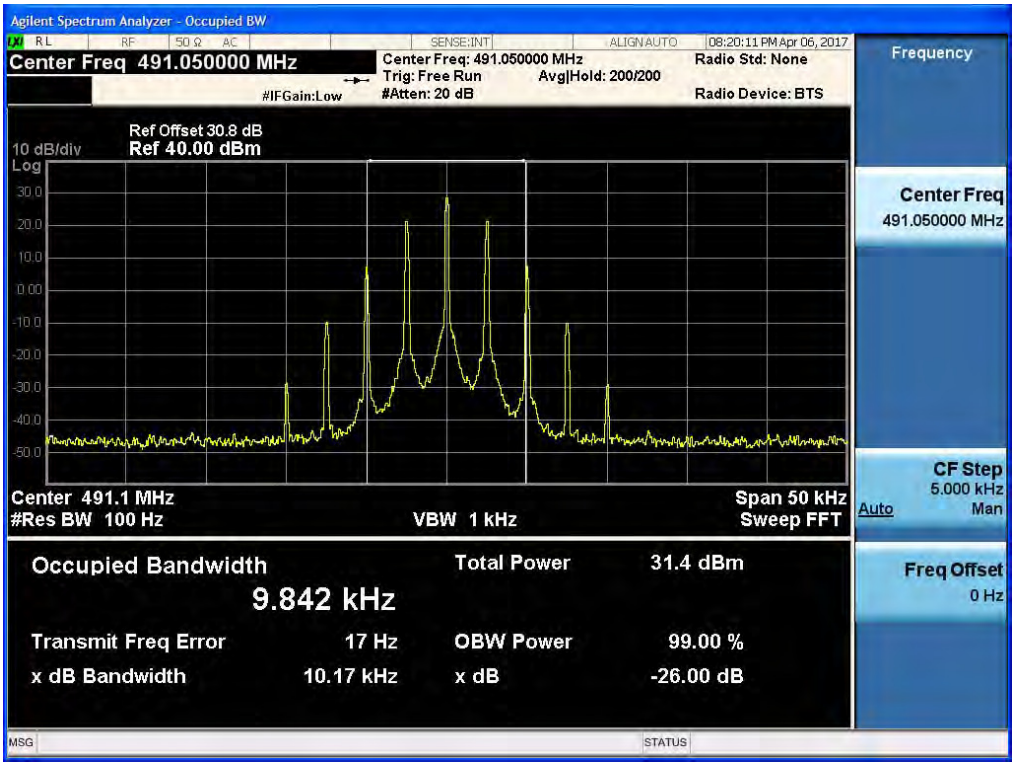
(11K0F3E _ 450.05 MHz)_Low



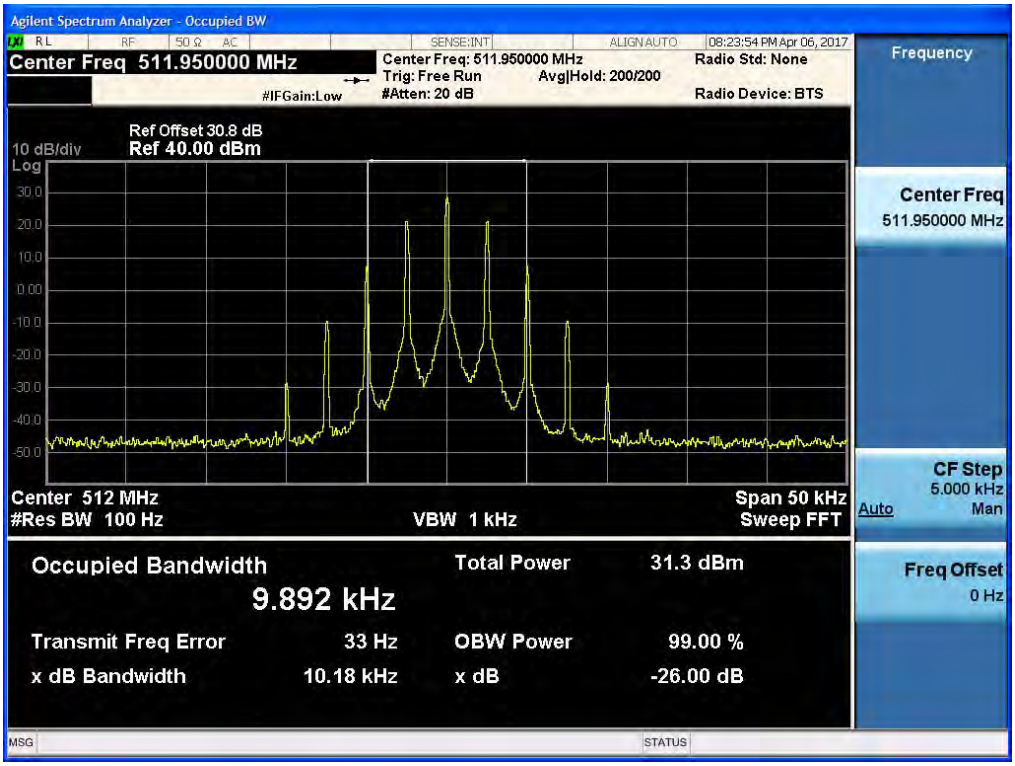
(11K0F3E _ 469.95 MHz)_Low



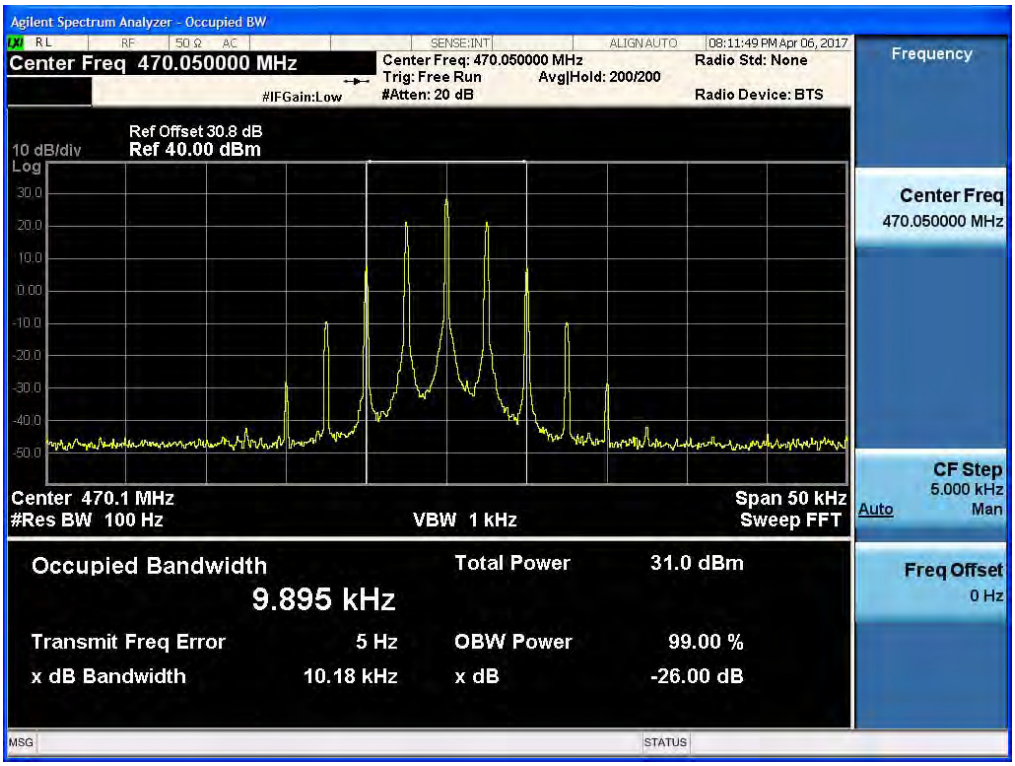
(11K0F3E _ 491.05 MHz)_Low



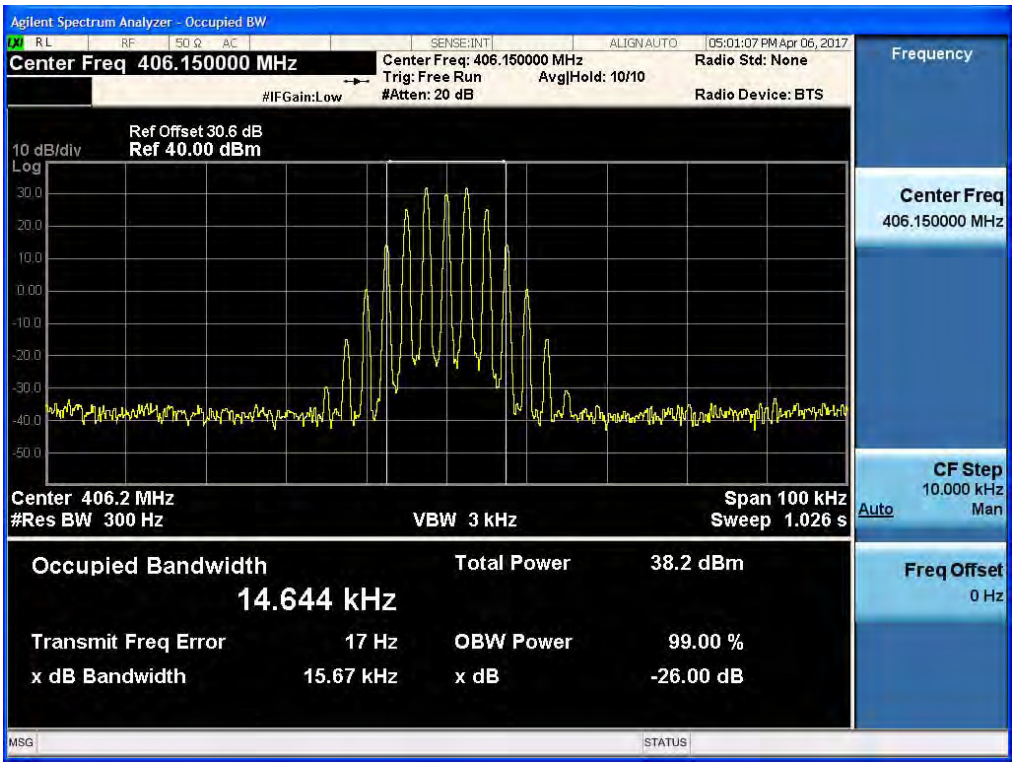
(11K0F3E _ 511.95 MHz)_Low



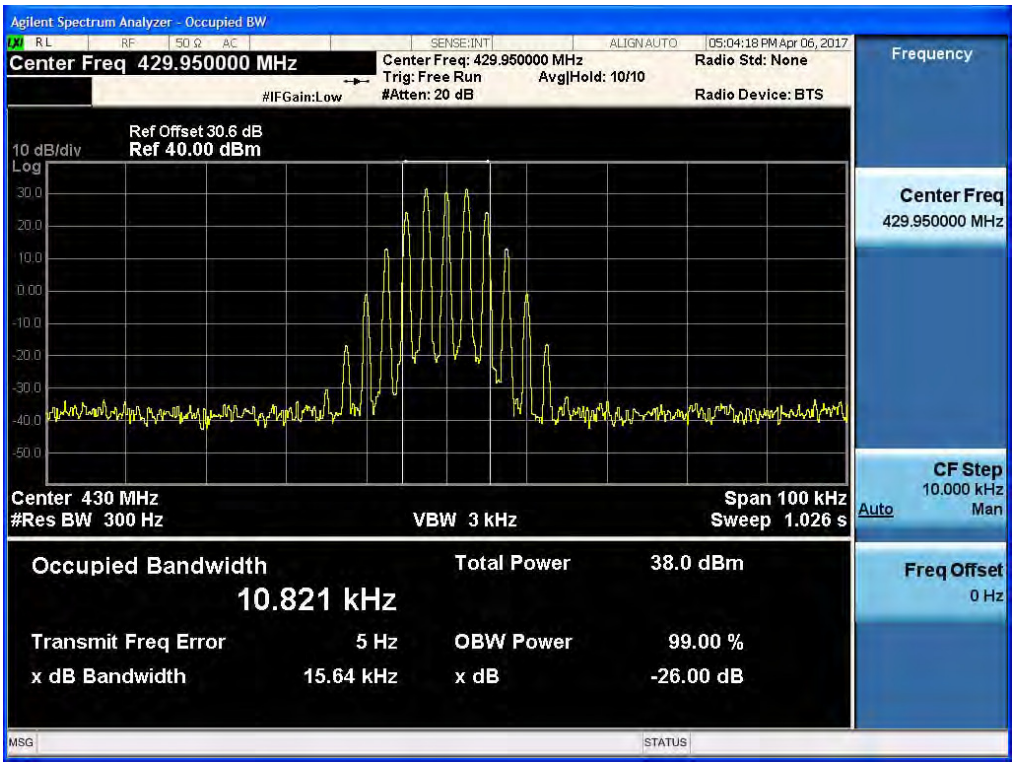
(11K0F3E _ 470.05 MHz)_Low



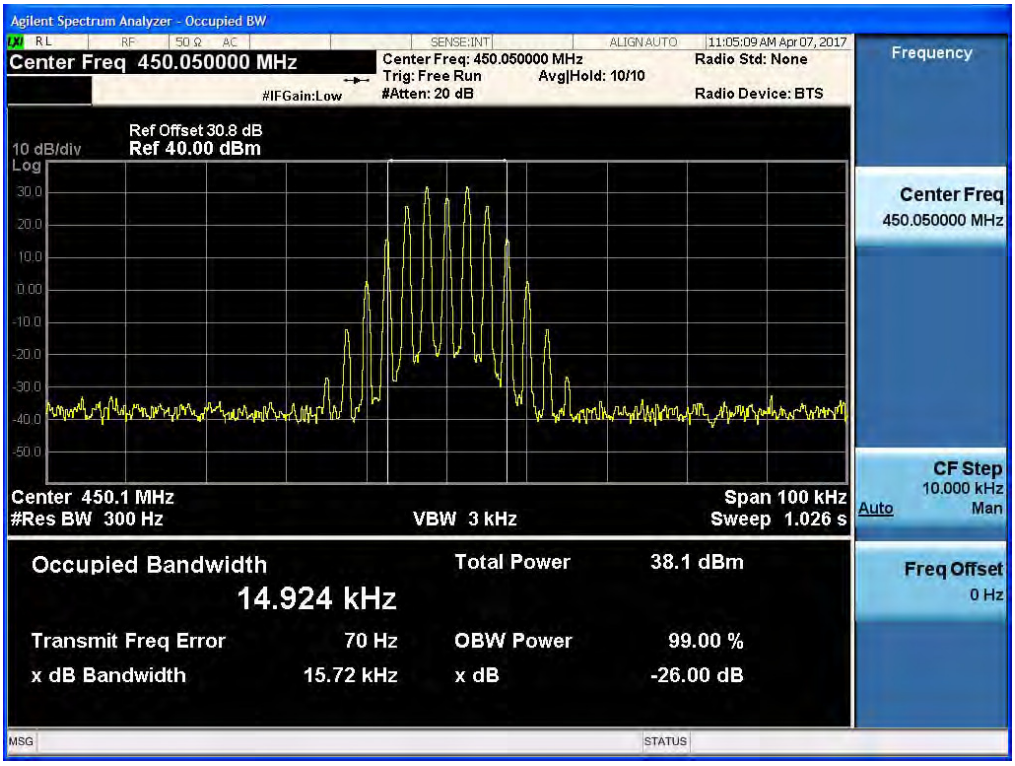
(16K0F3E _ 406.15 MHz)_High



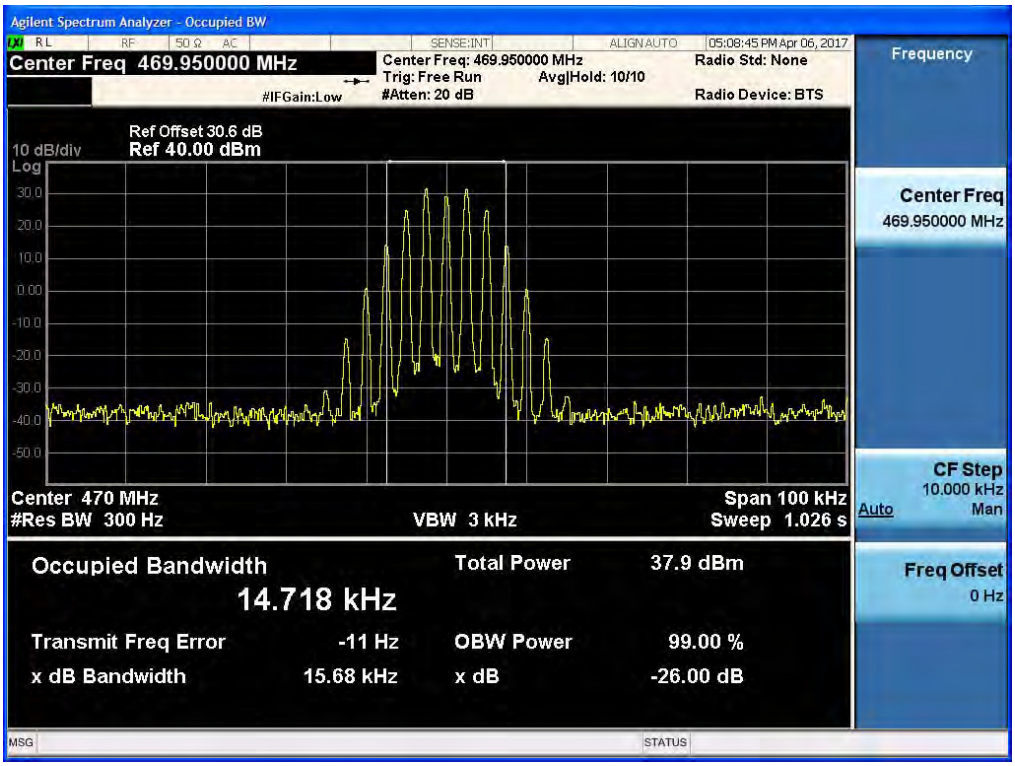
(16K0F3E _ 429.95 MHz)_High



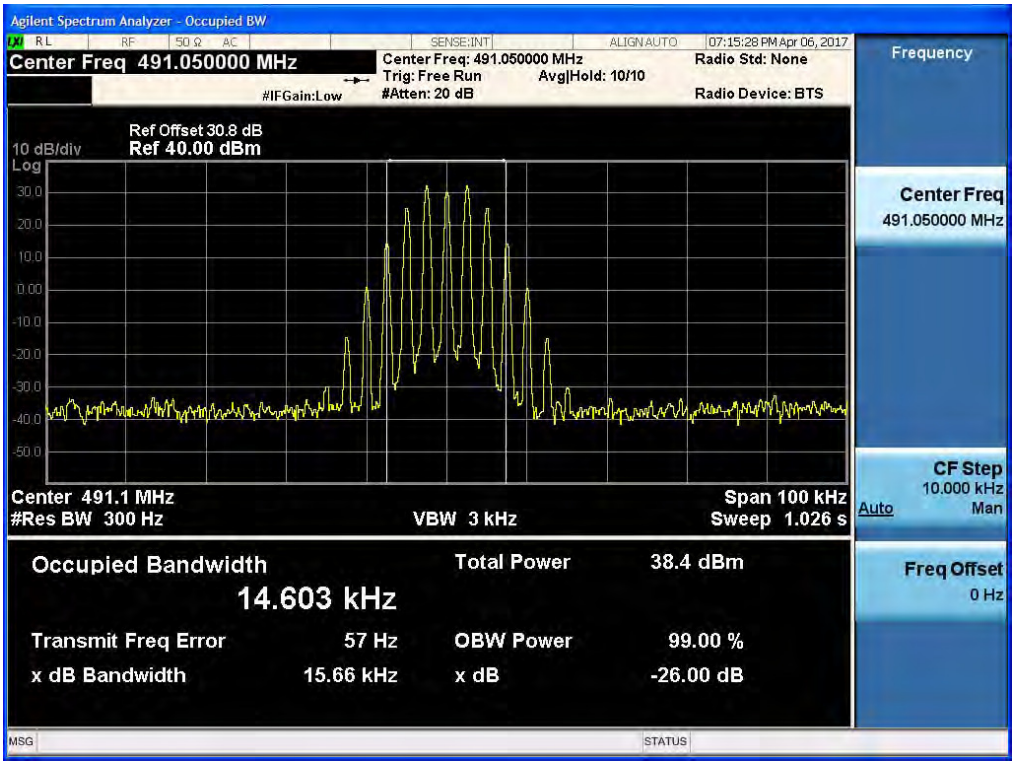
(16K0F3E _ 450.05 MHz)_High



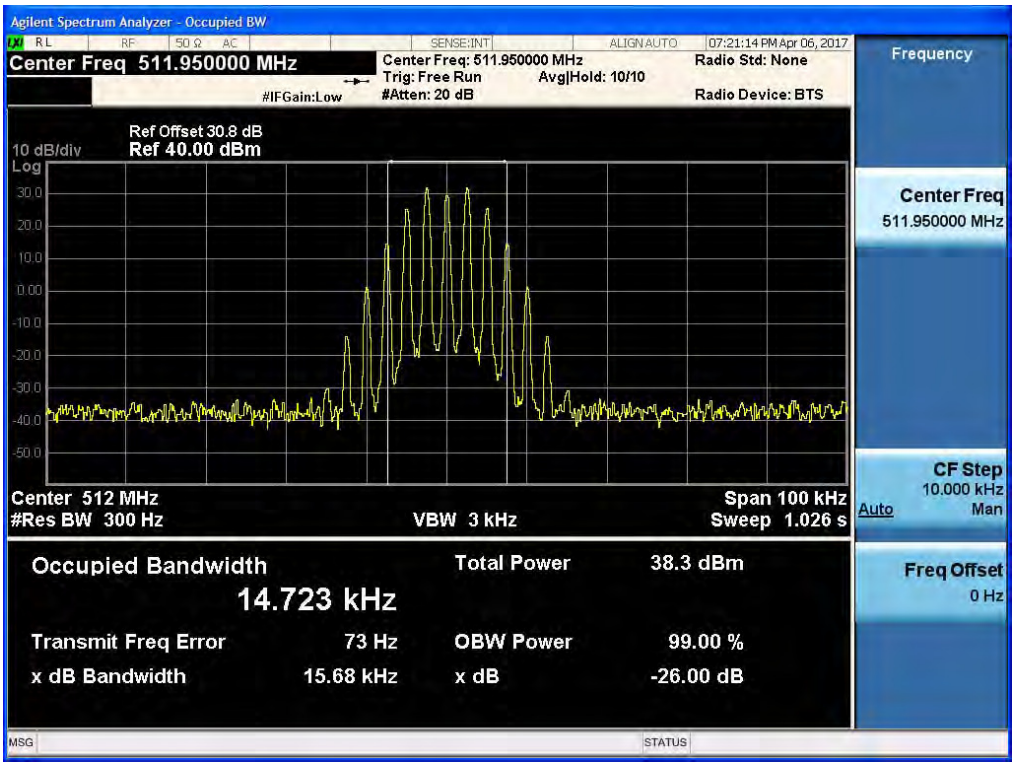
(16K0F3E _ 469.95 MHz)_High



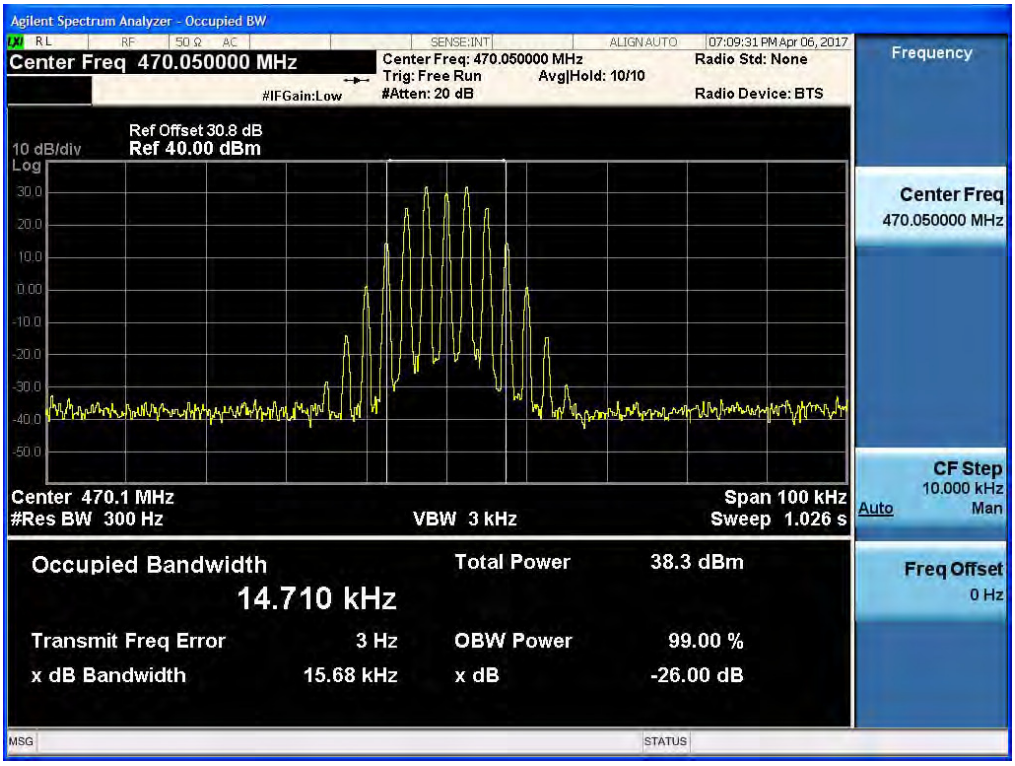
(16K0F3E _ 491.05 MHz)_High



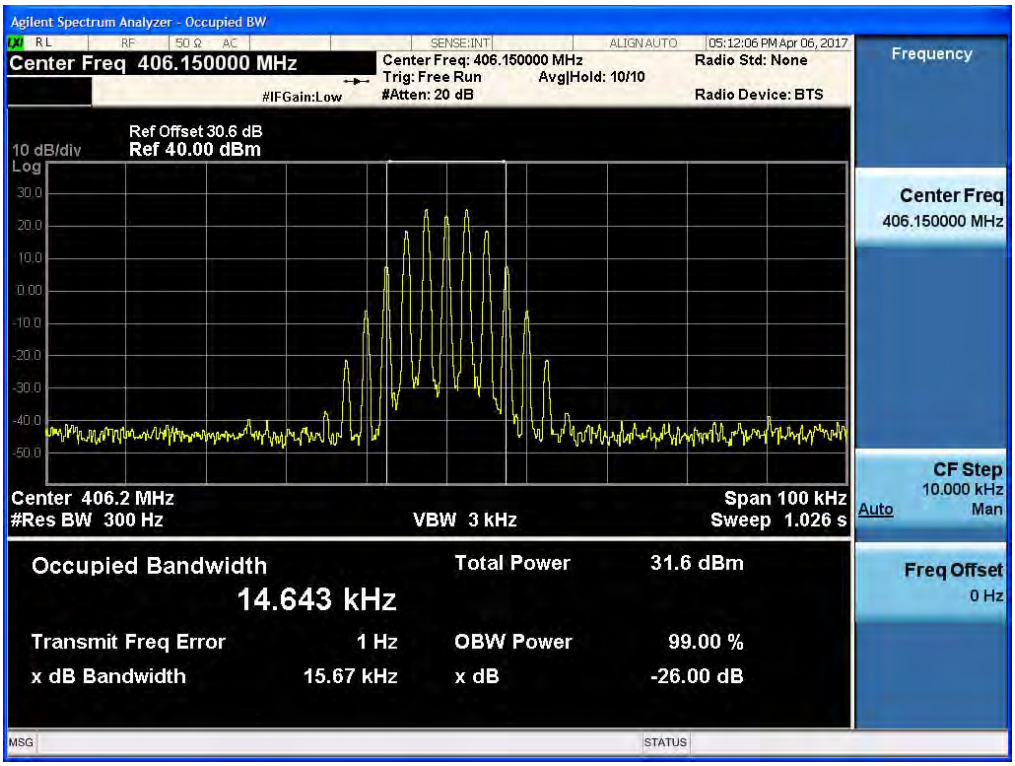
(16K0F3E _ 511.95 MHz)_High



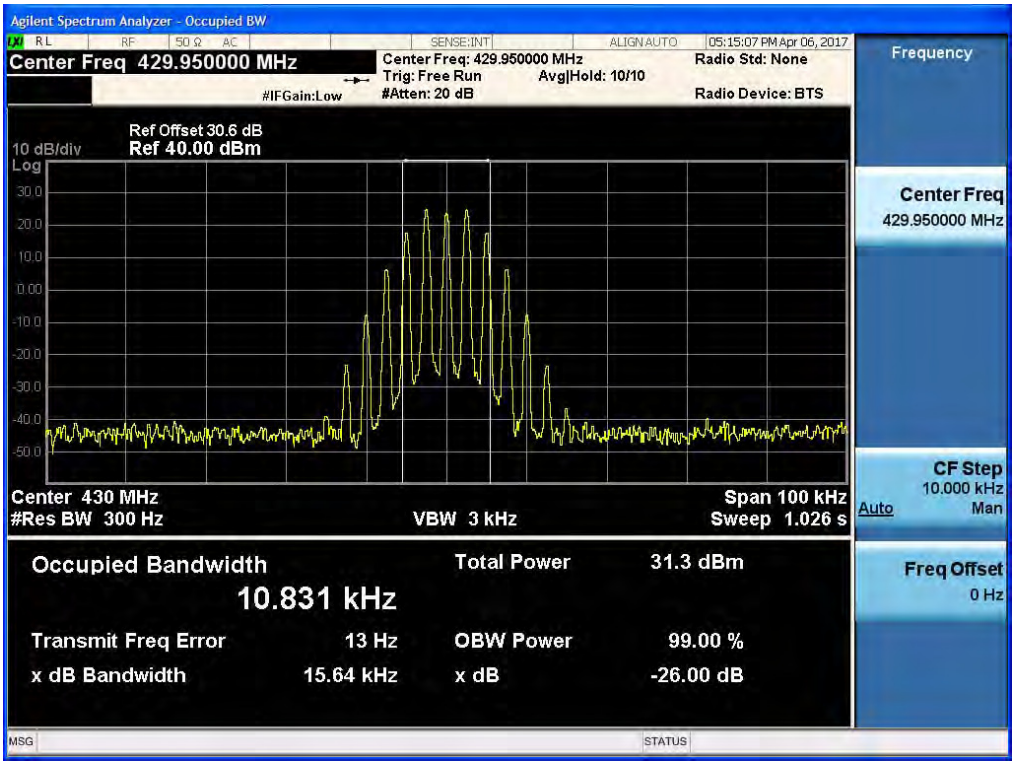
(16K0F3E _ 470.05 MHz)_High



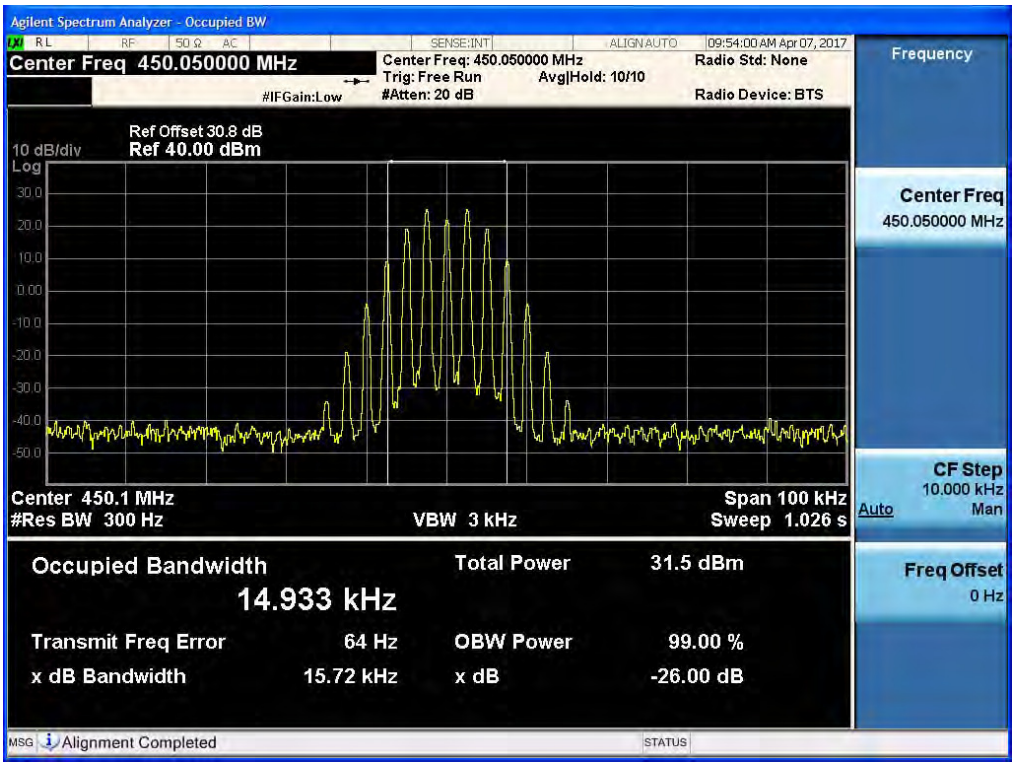
(16K0F3E _ 406.15 MHz)_Low



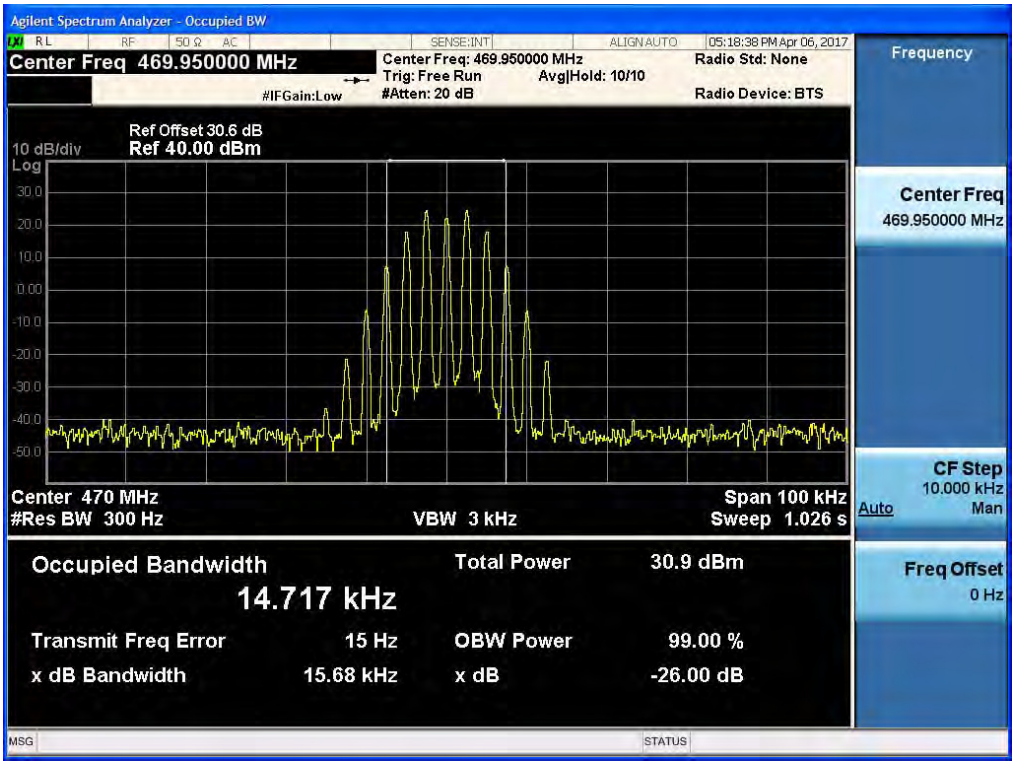
(16K0F3E _ 429.95 MHz)_Low



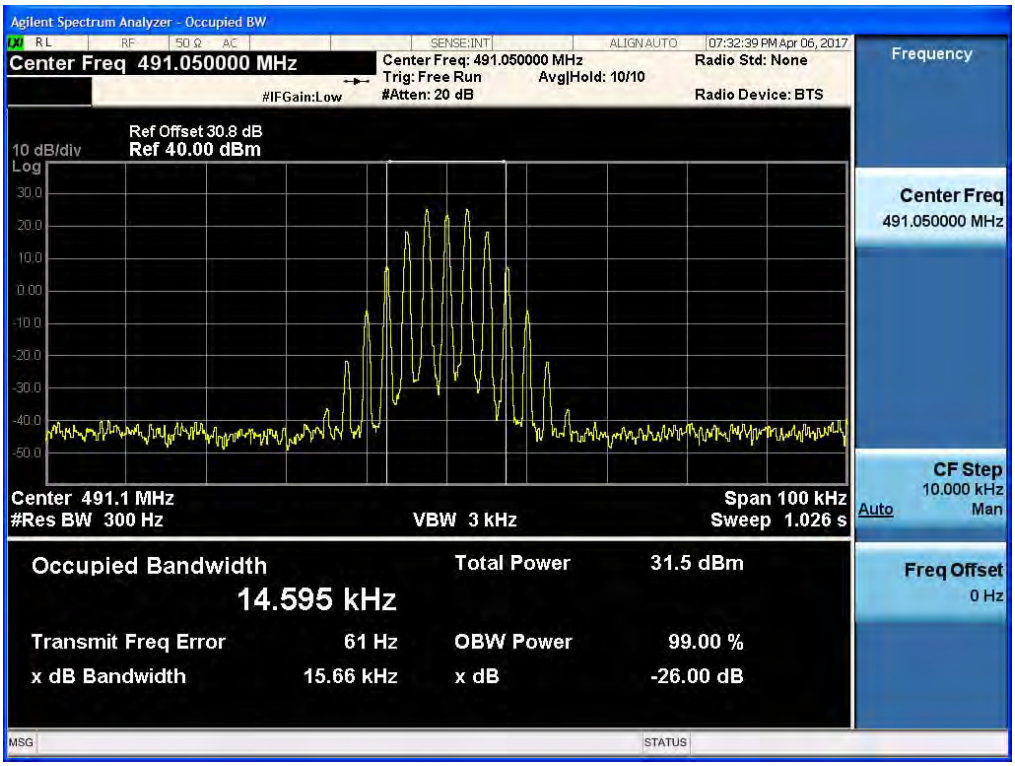
(16K0F3E _ 450.05 MHz)_Low



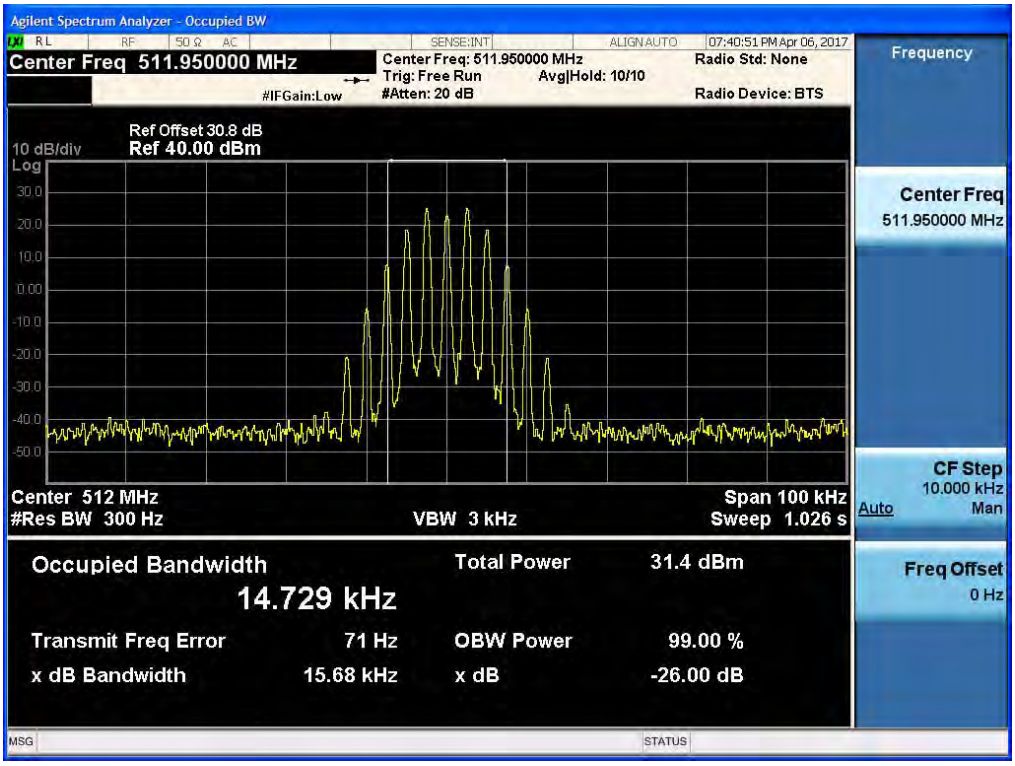
(16K0F3E _ 469.95 MHz)_Low



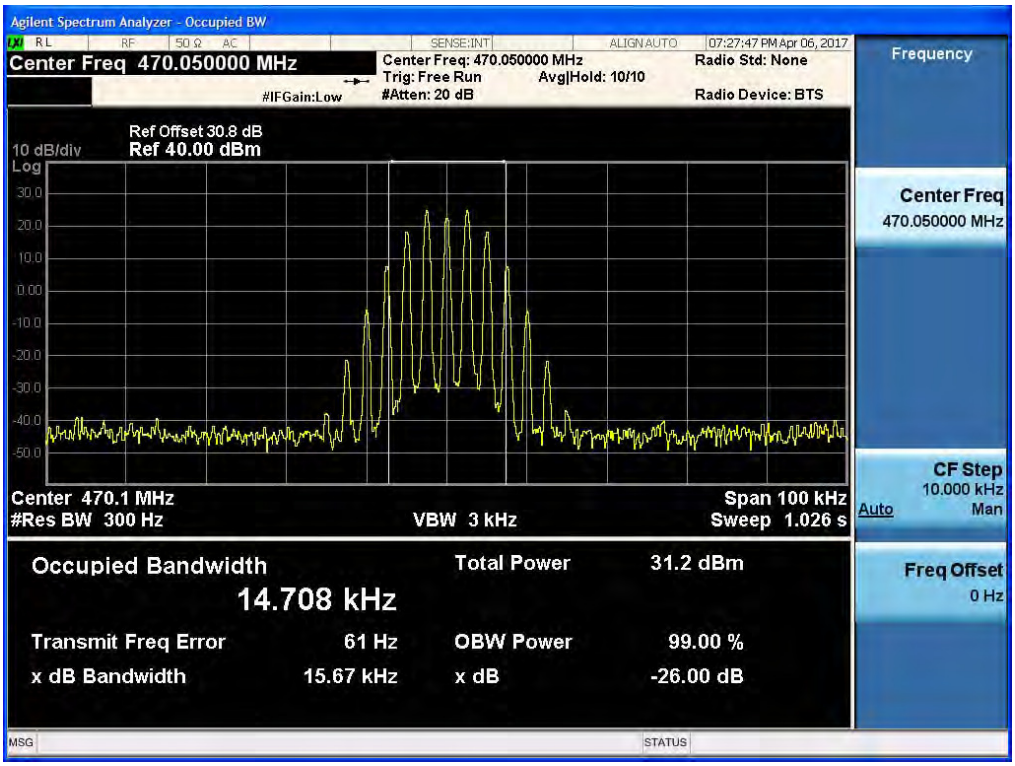
(16K0F3E _ 491.05 MHz)_Low



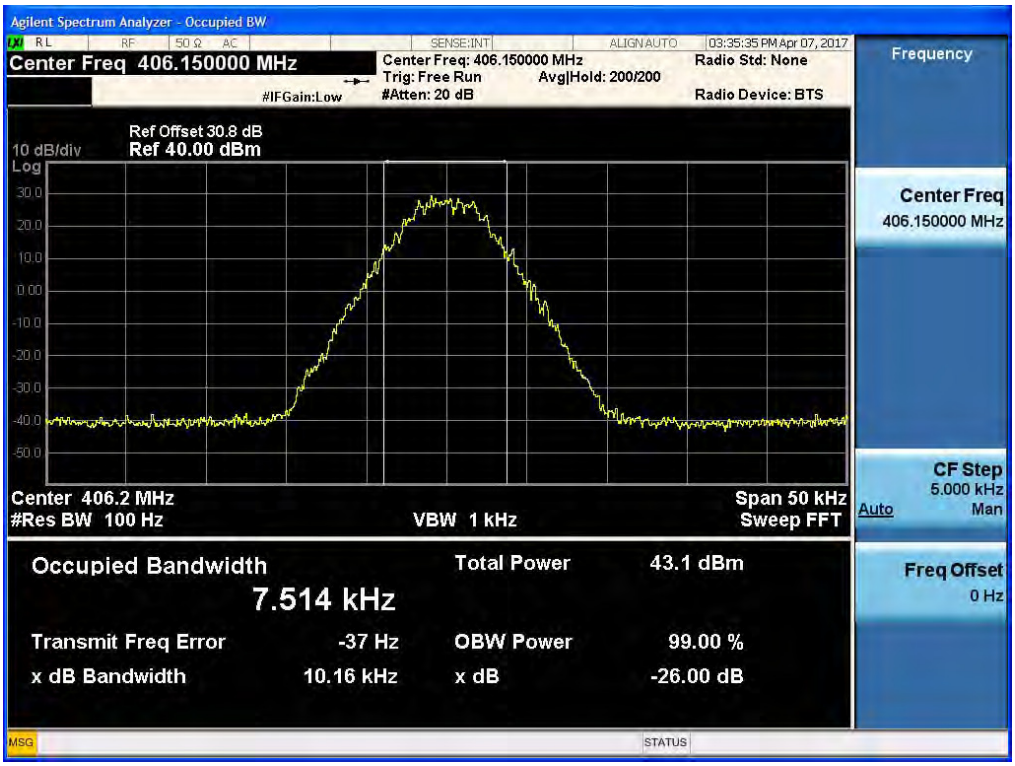
(16K0F3E _ 511.95 MHz)_Low



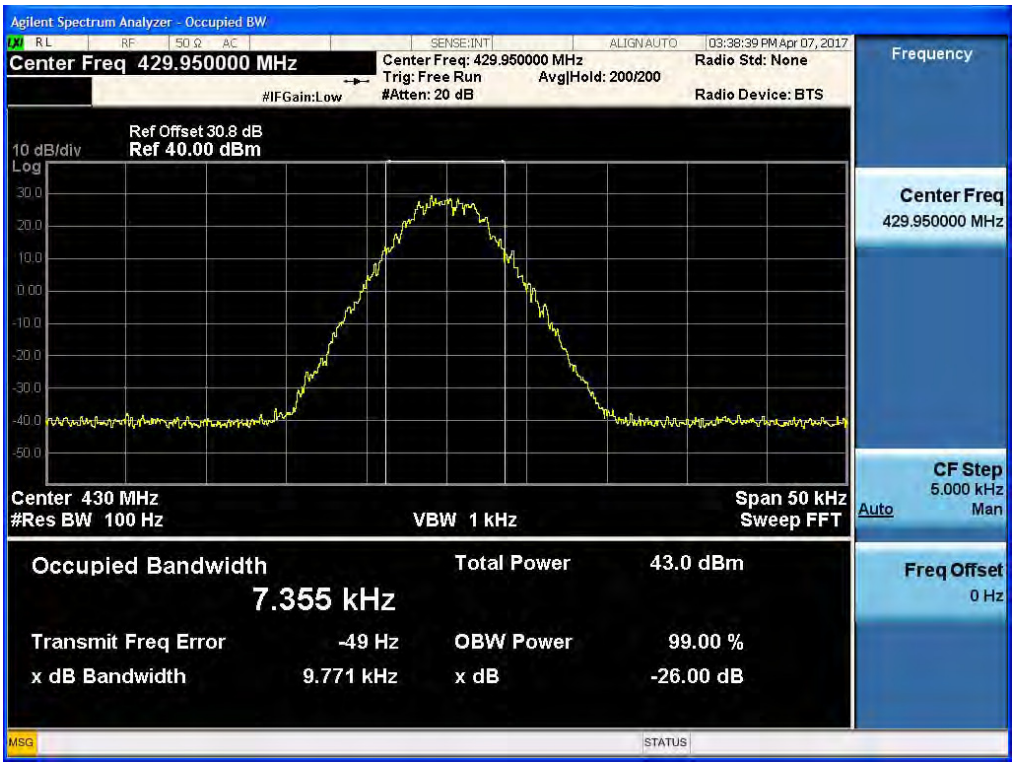
(16K0F3E _ 470.05 MHz)_Low



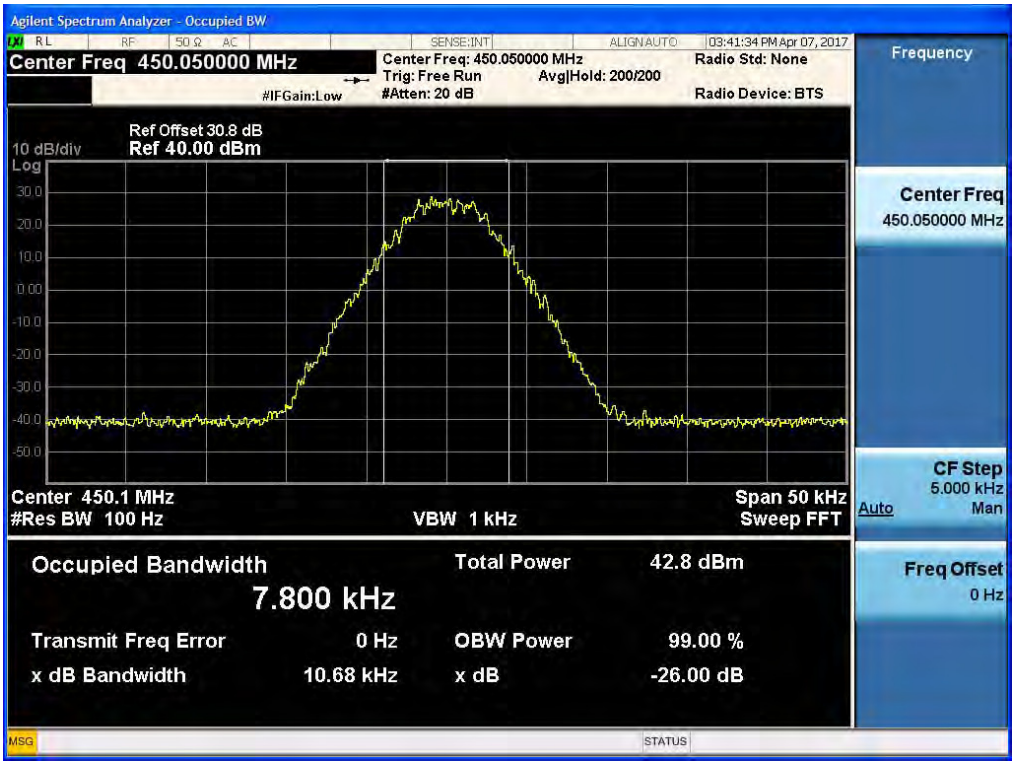
(7K60FXD, 7K60FXE _ 406.15 MHz)_High



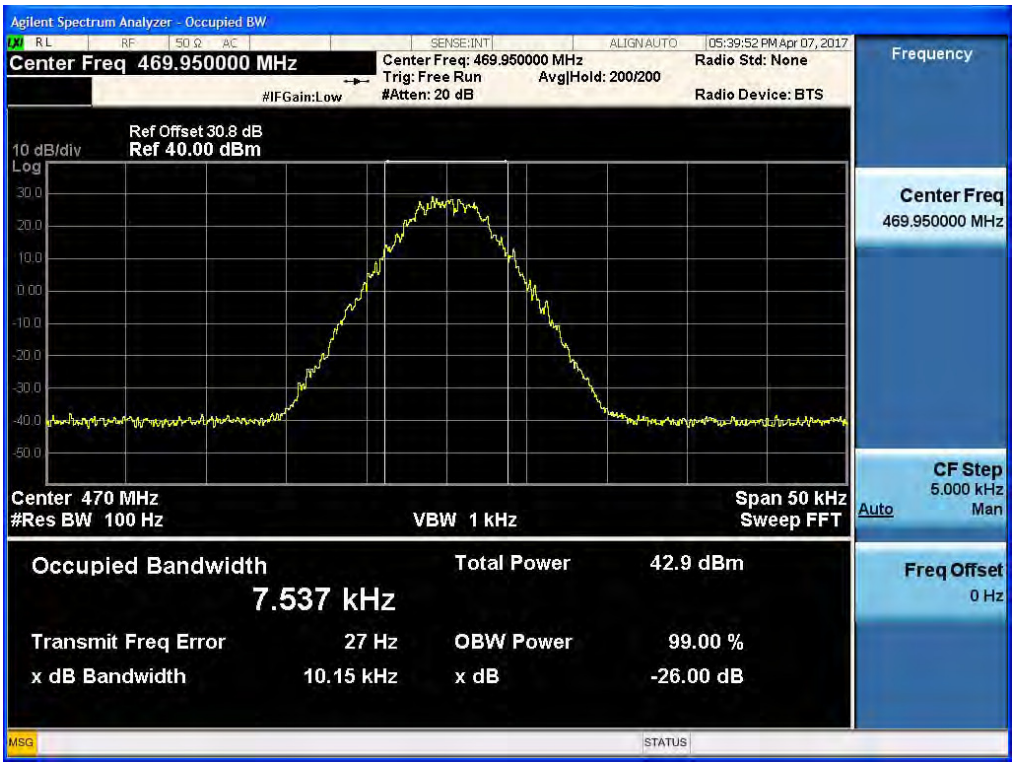
(7K60FXD, 7K60FXE _ 429.95 MHz)_High



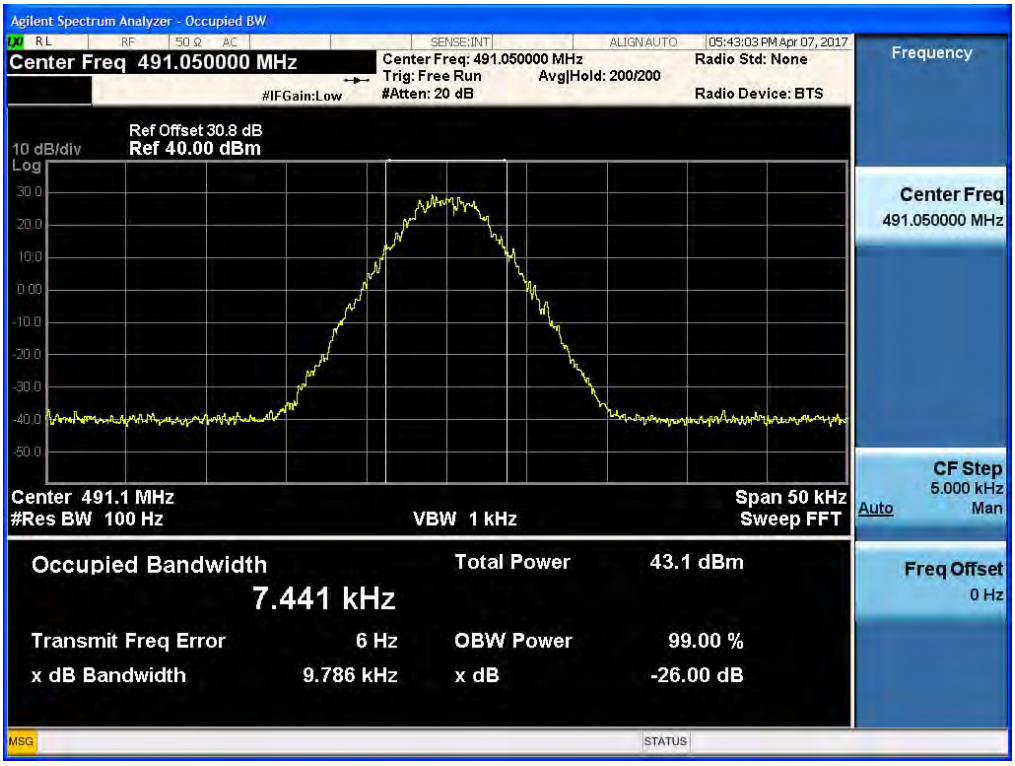
(7K60FXD, 7K60FXE _ 450.05 MHz)_High



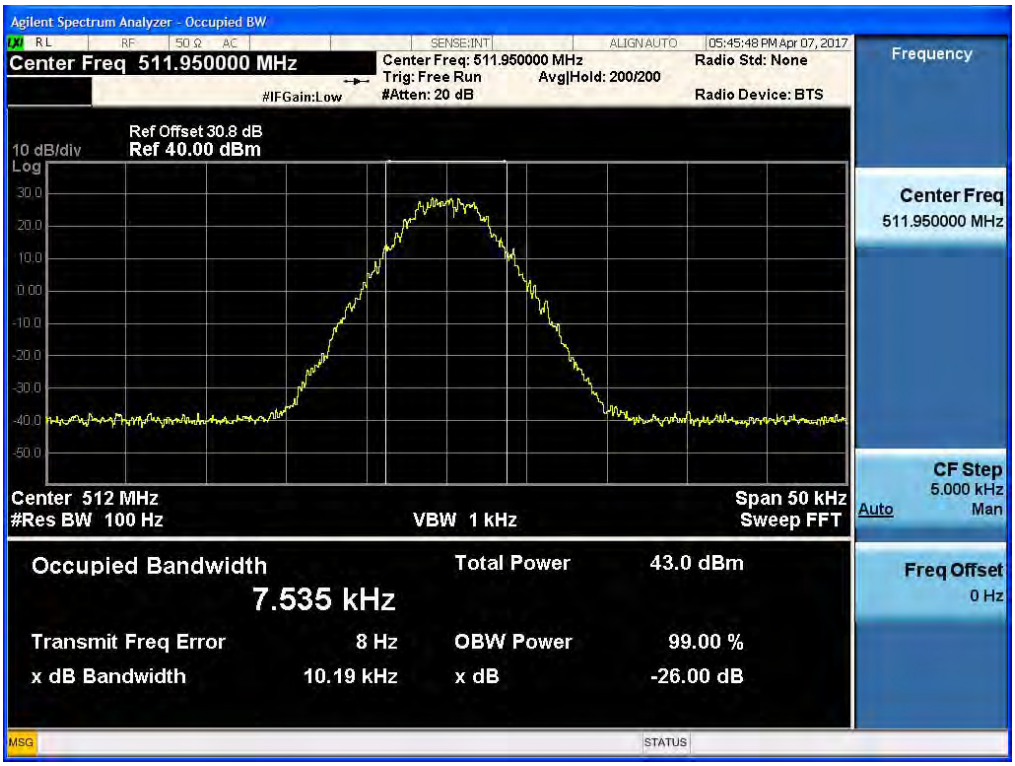
(7K60FXD, 7K60FXE _ 469.95 MHz)_High



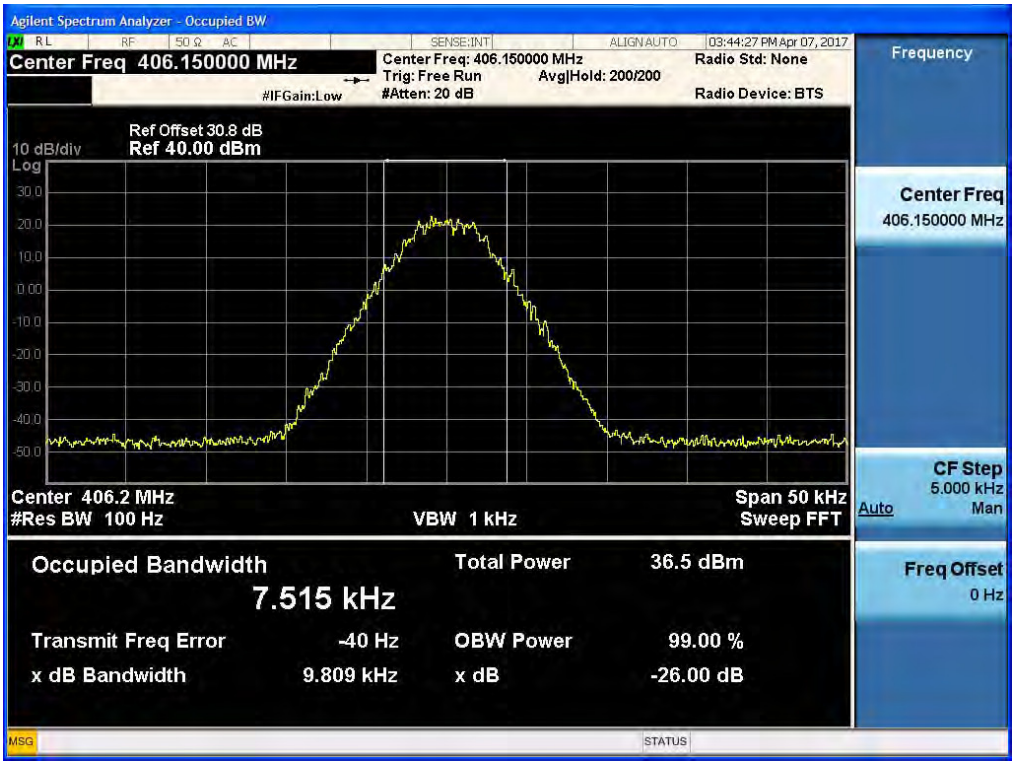
(7K60FXD, 7K60FXE _ 491.05 MHz)_High



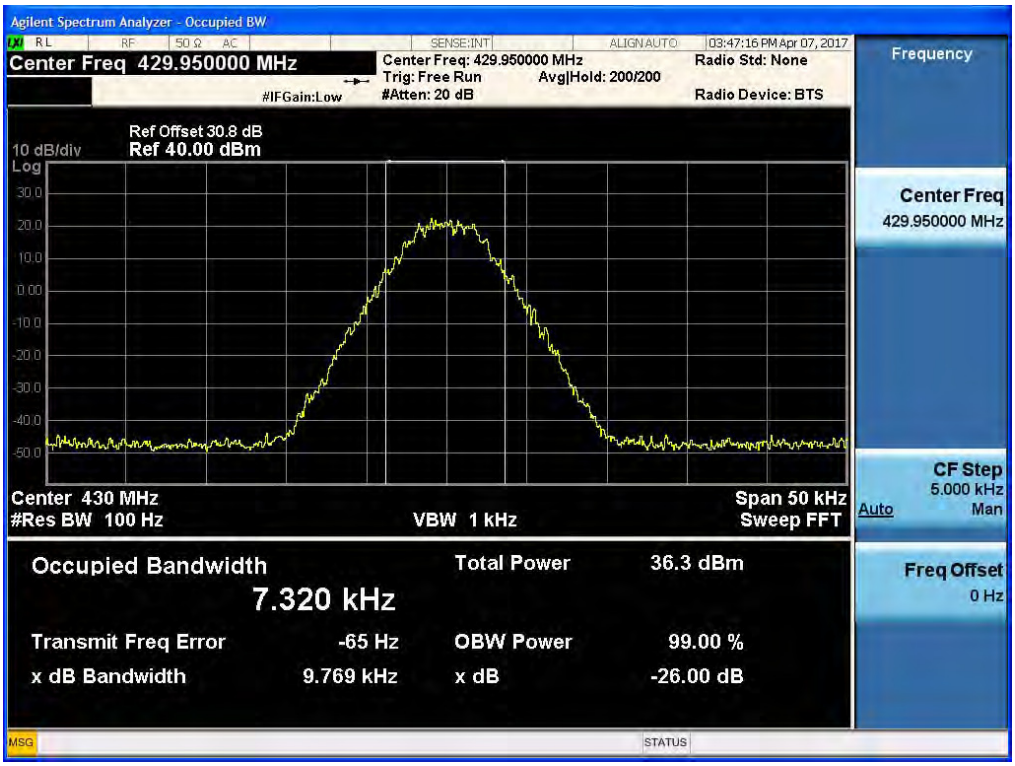
(7K60FXD, 7K60FXE _ 511.95 MHz)_High



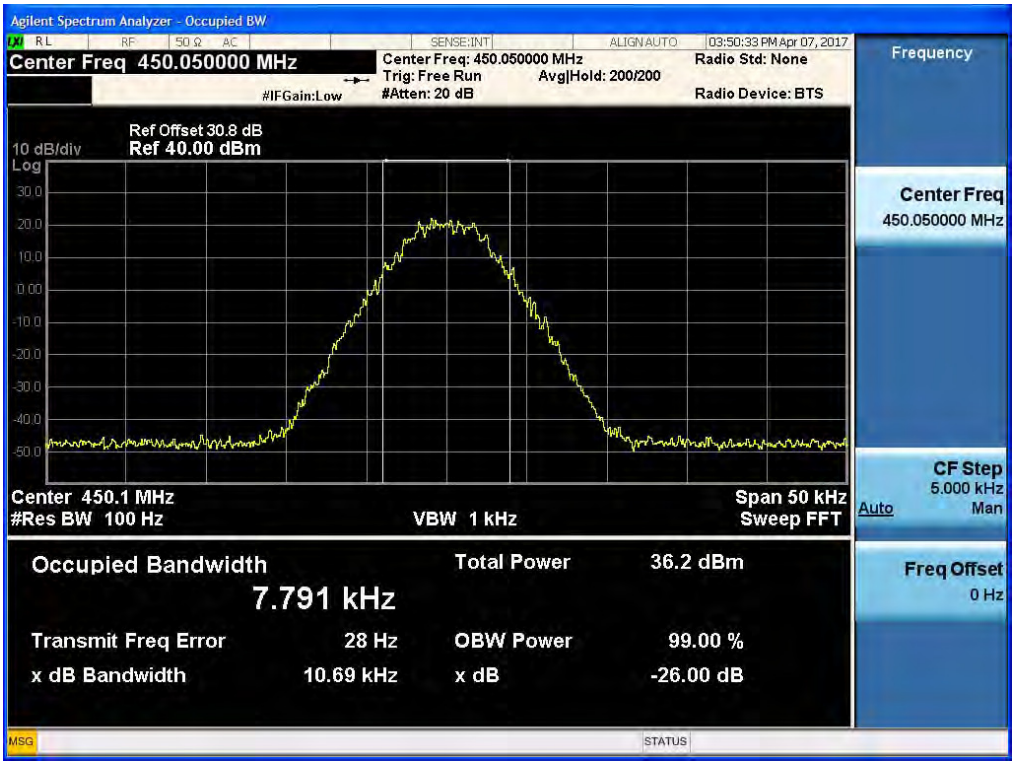
(7K60FXD, 7K60FXE _ 406.15 MHz)_Low



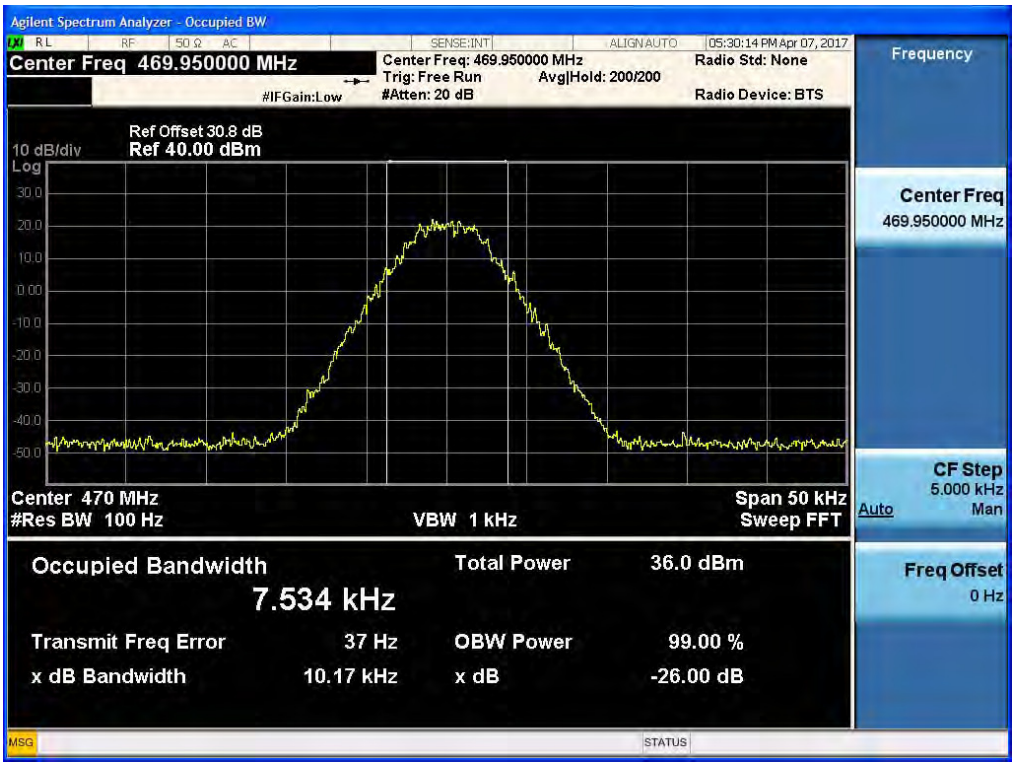
(7K60FXD, 7K60FXE _ 429.95 MHz)_Low



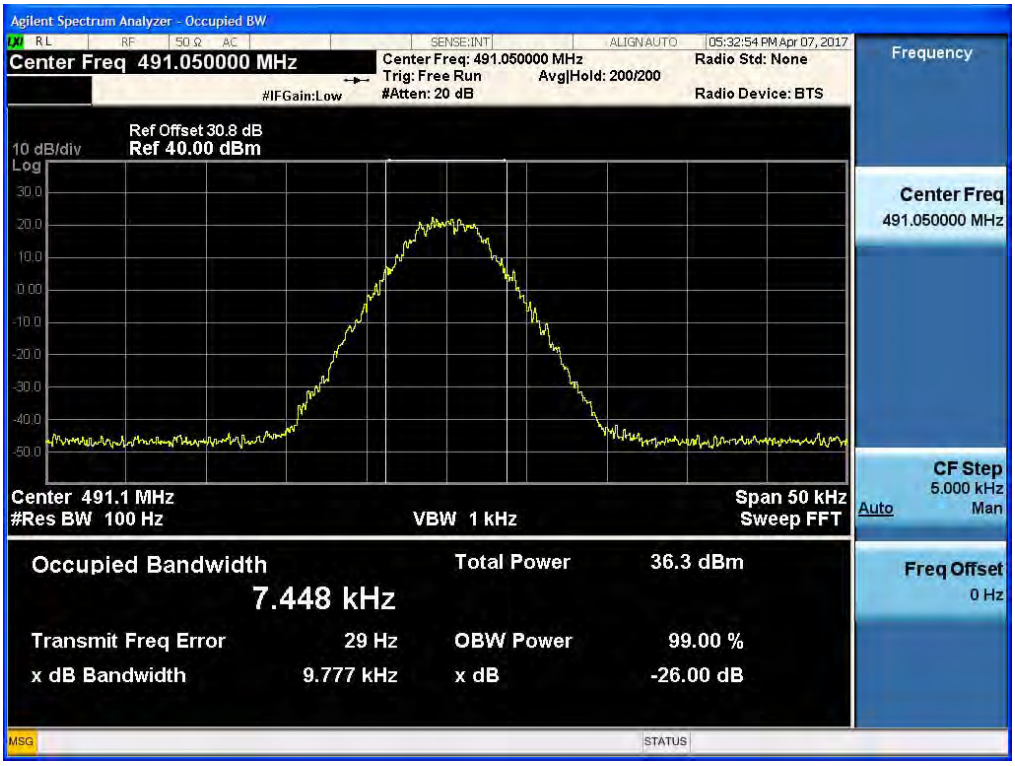
(7K60FXD, 7K60FXE _ 450.05 MHz)_Low



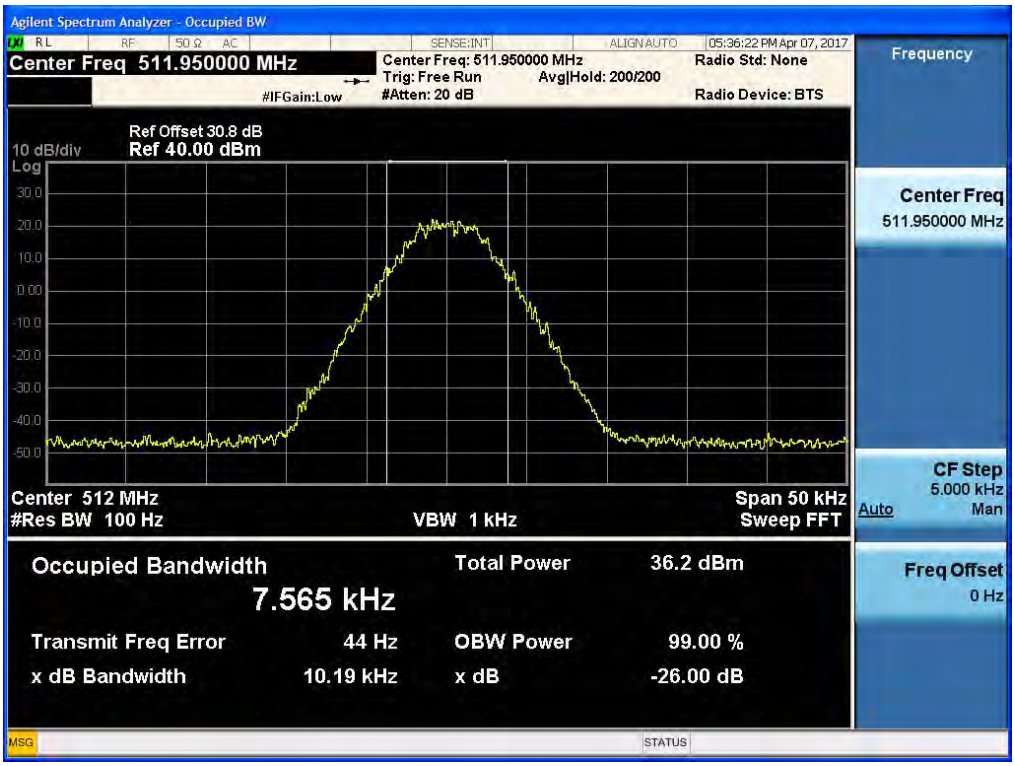
(7K60FXD, 7K60FXE _ 469.95 MHz)_Low



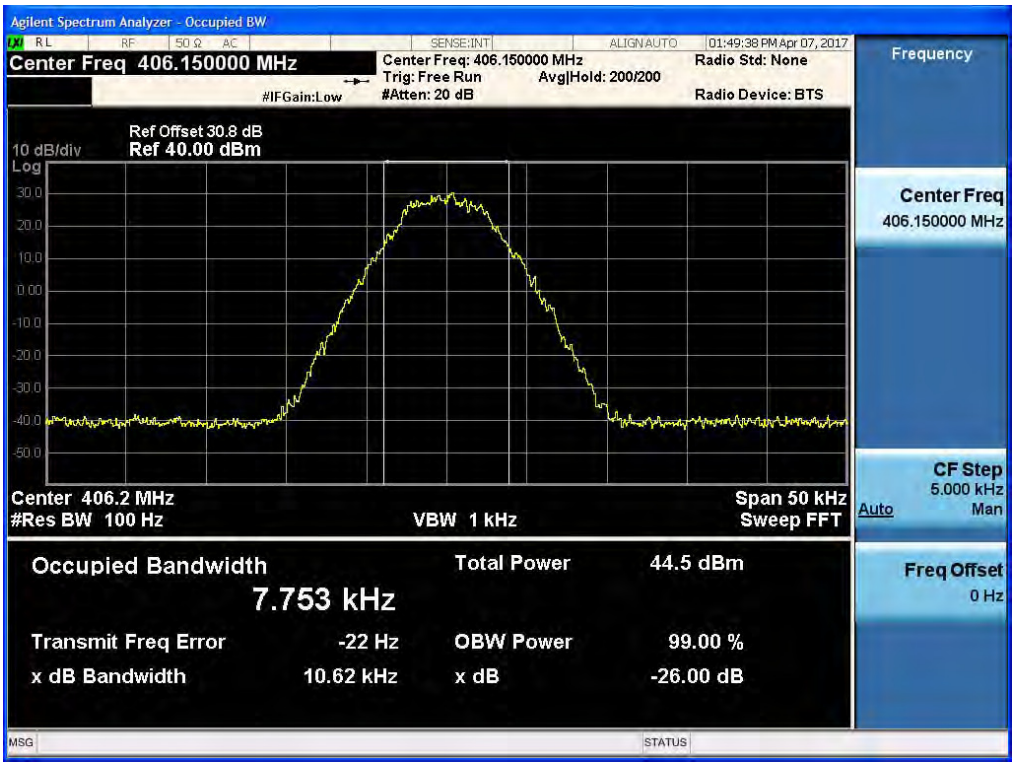
(7K60FXD, 7K60FXE _ 491.05 MHz)_Low



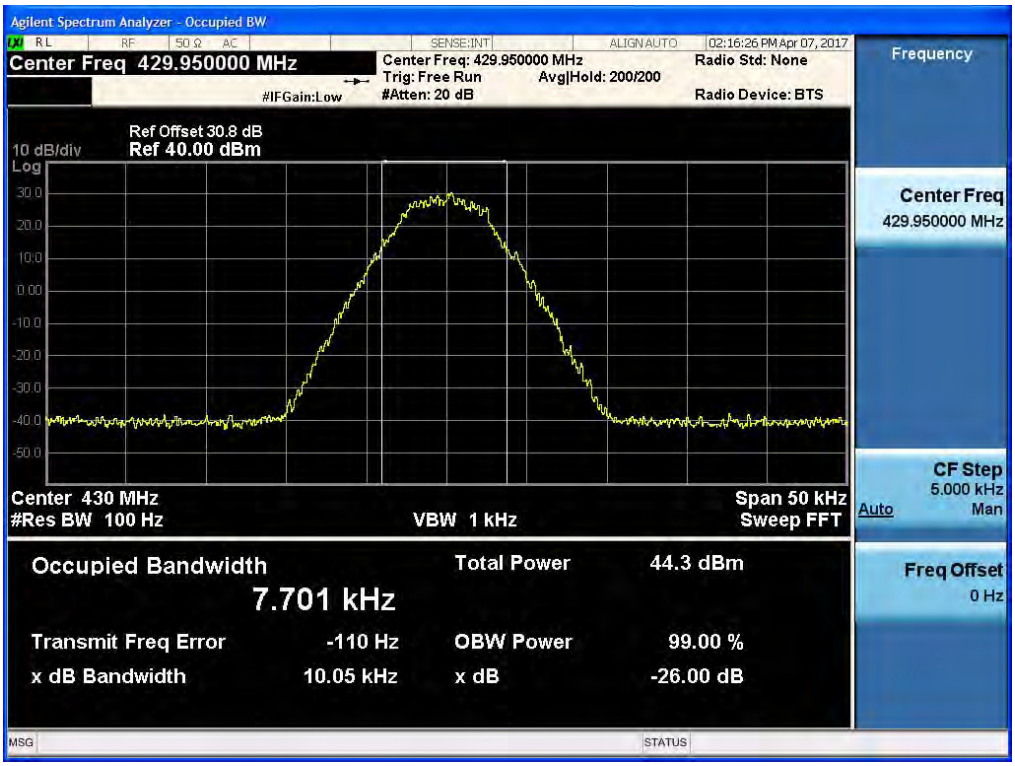
(7K60FXD, 7K60FXE _ 511.95 MHz)_Low



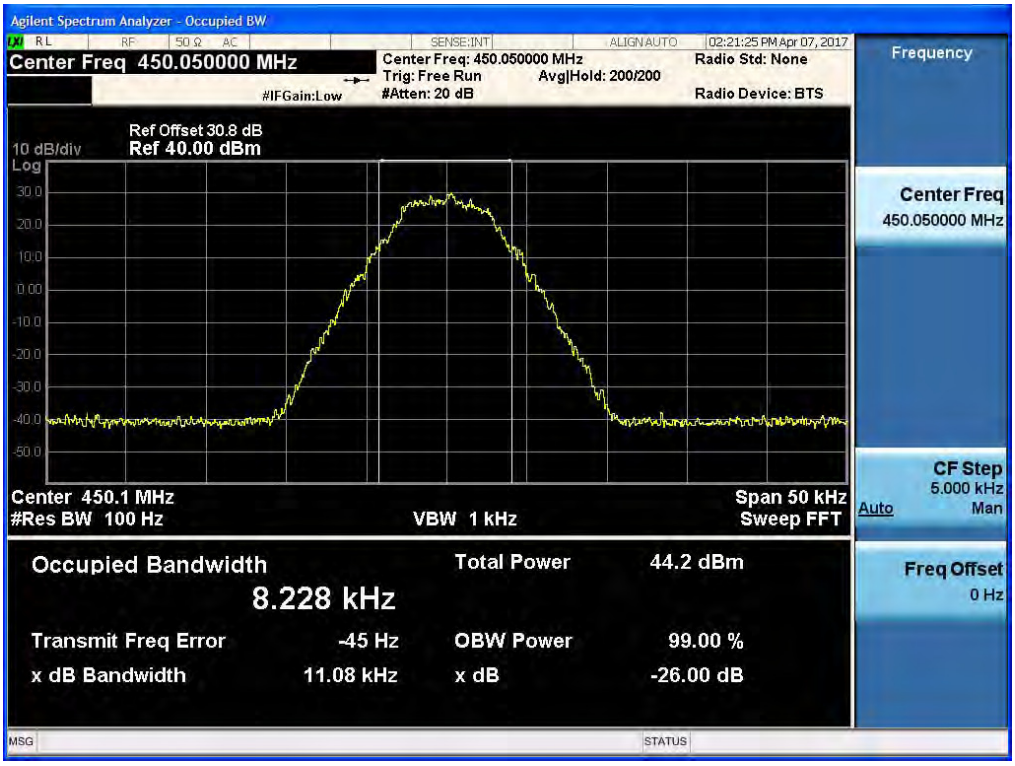
(8K30F1E, 8K30F1D, 8K30F7W _ 406.15 MHz)_High



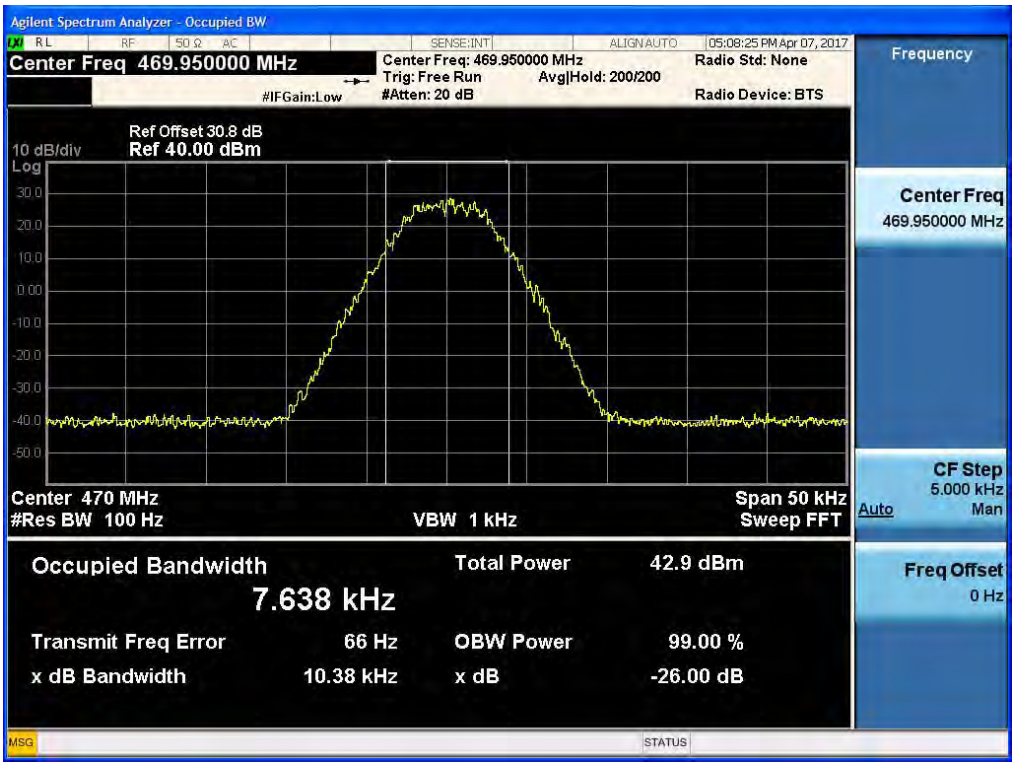
(8K30F1E, 8K30F1D, 8K30F7W _ 429.95 MHz)_High



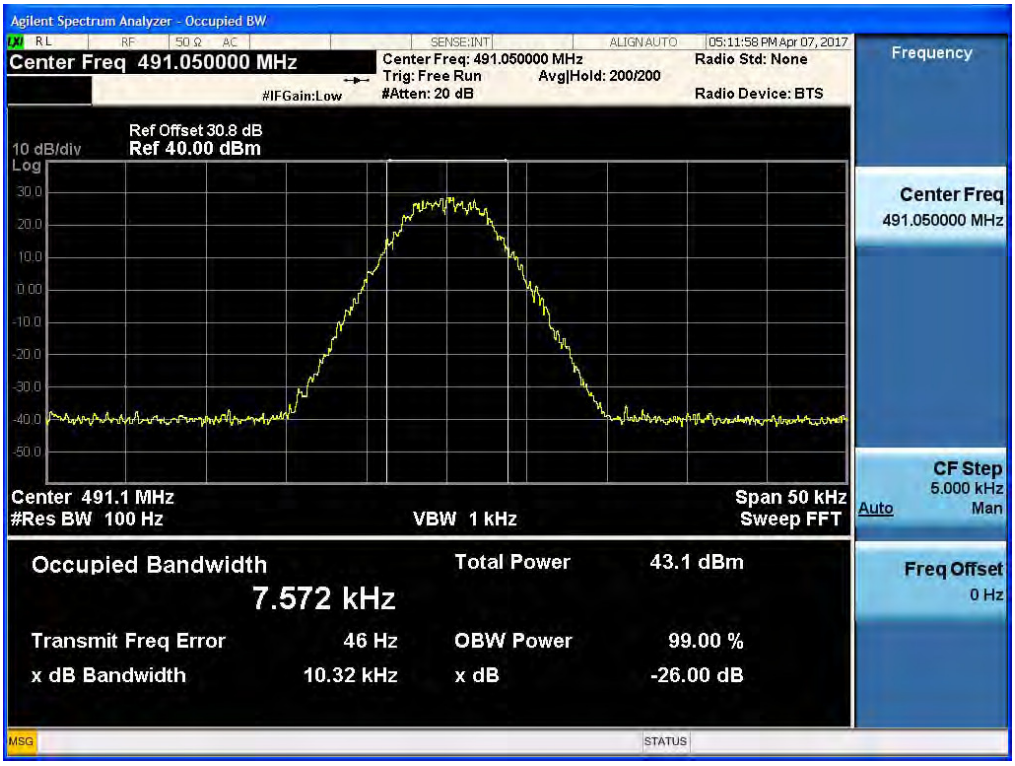
(8K30F1E, 8K30F1D, 8K30F7W _ 450.05 MHz)_High



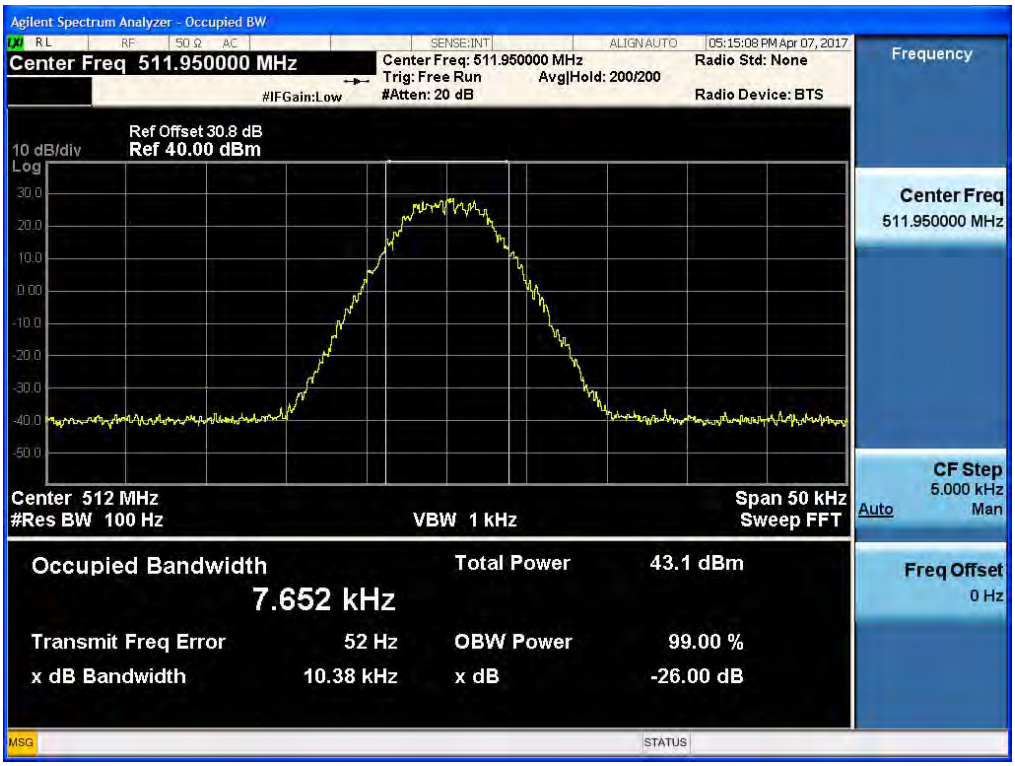
(8K30F1E, 8K30F1D, 8K30F7W _ 469.95 MHz)_High



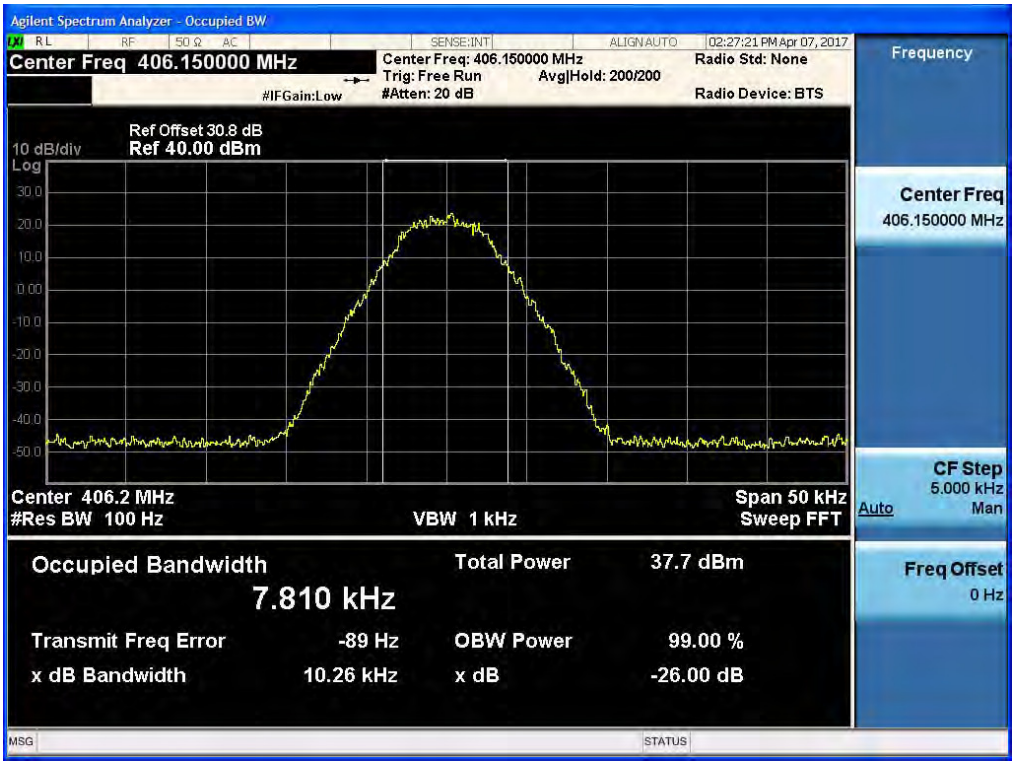
(8K30F1E, 8K30F1D, 8K30F7W _ 491.05 MHz)_High



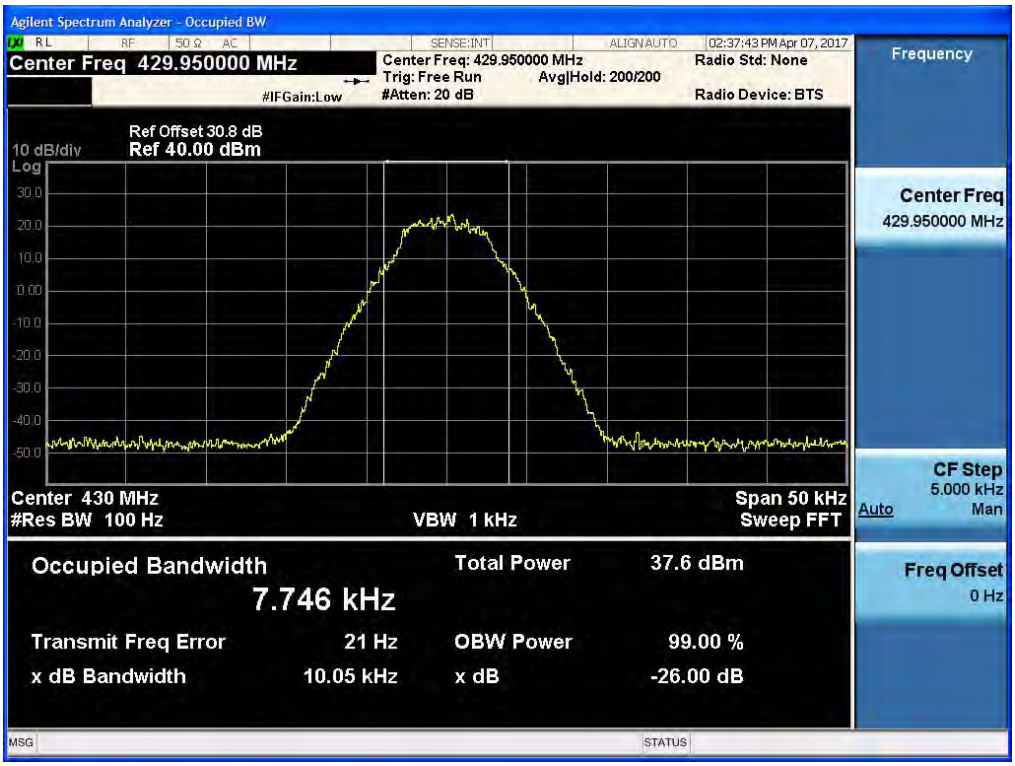
(8K30F1E, 8K30F1D, 8K30F7W _ 511.95 MHz)_High



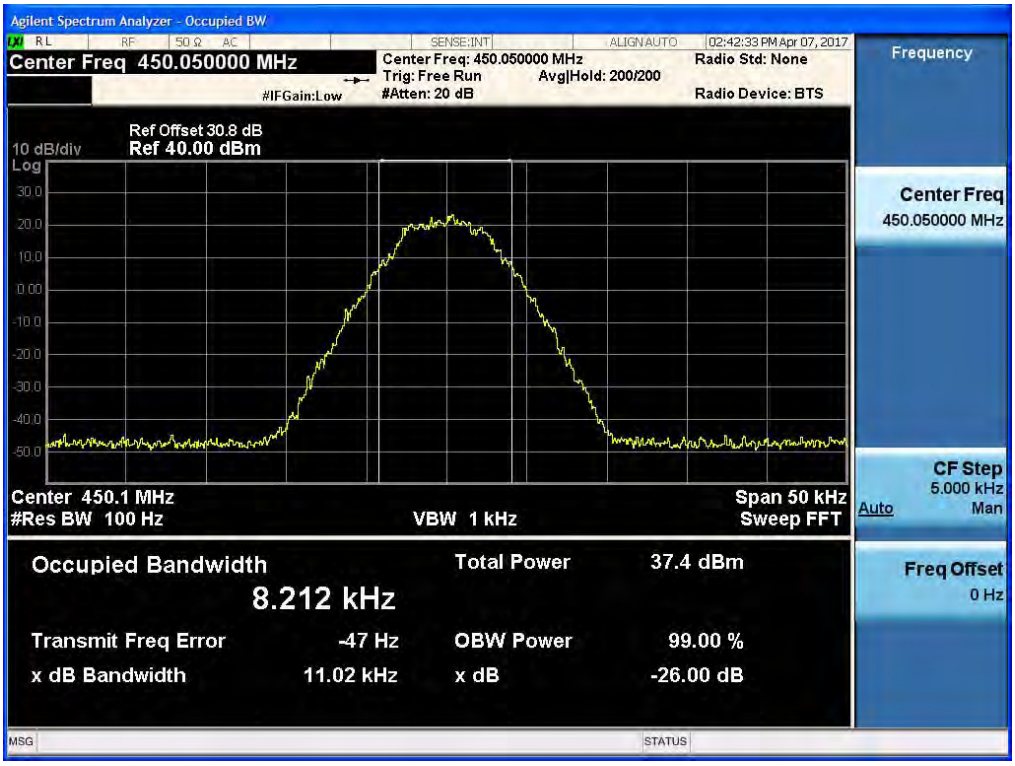
(8K30F1E, 8K30F1D, 8K30F7W _ 406.15 MHz)_Low



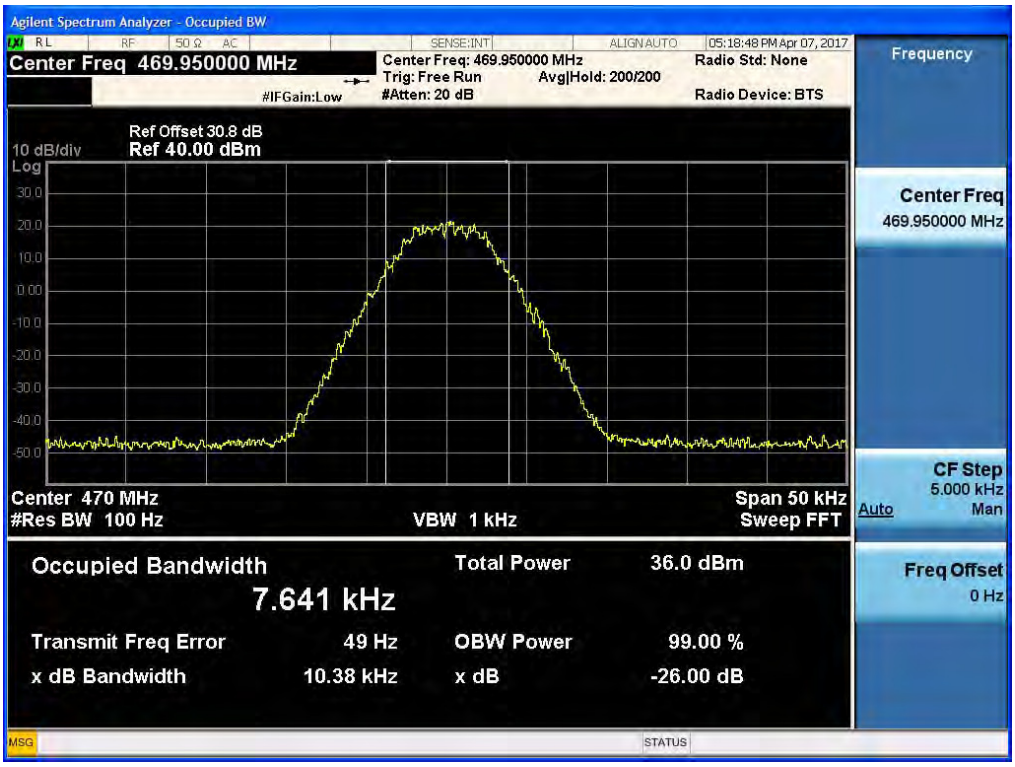
(8K30F1E, 8K30F1D, 8K30F7W _ 429.95 MHz)_Low



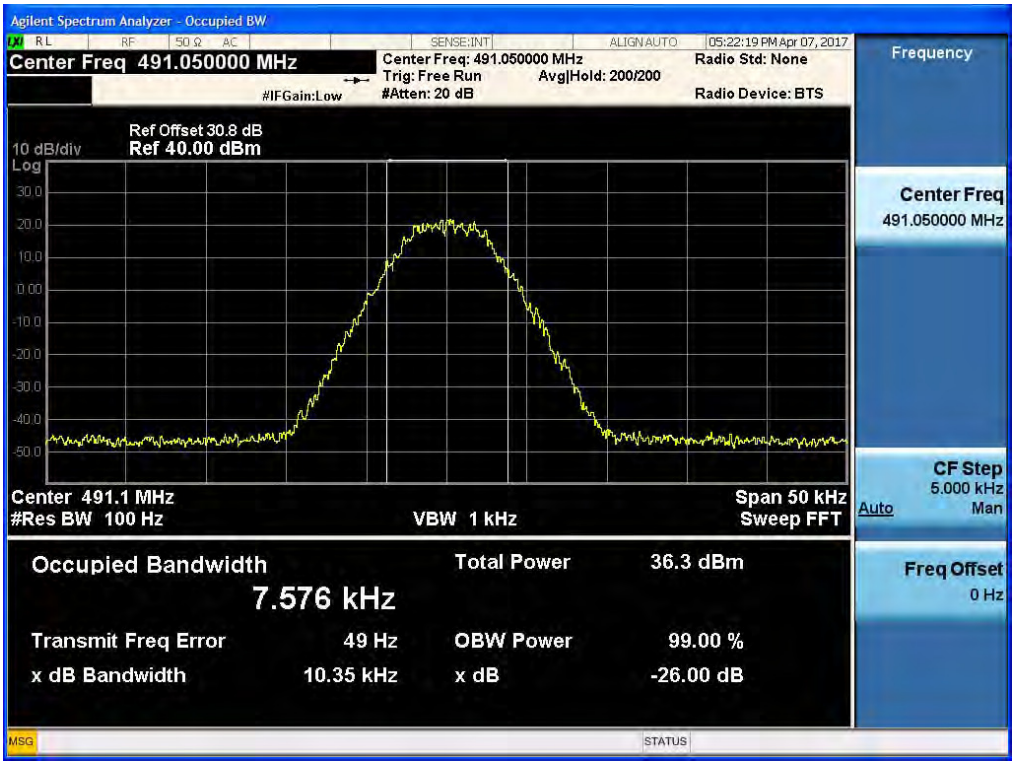
(8K30F1E, 8K30F1D, 8K30F7W _ 450.05 MHz)_Low



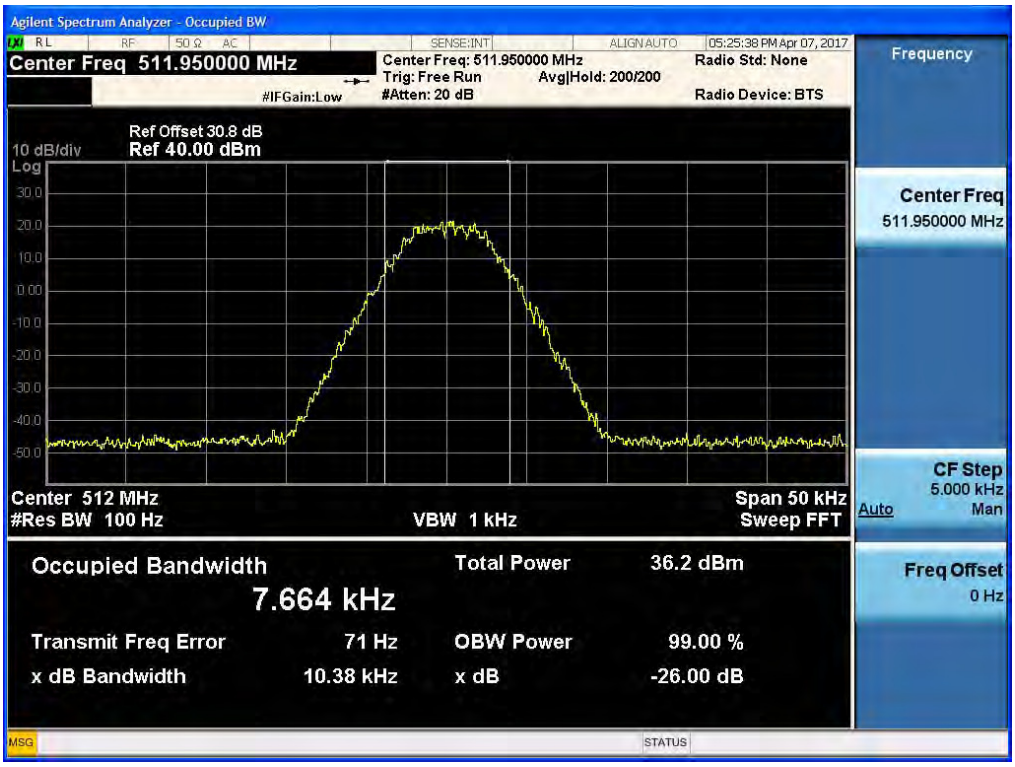
(8K30F1E, 8K30F1D, 8K30F7W _ 469.95 MHz)_Low



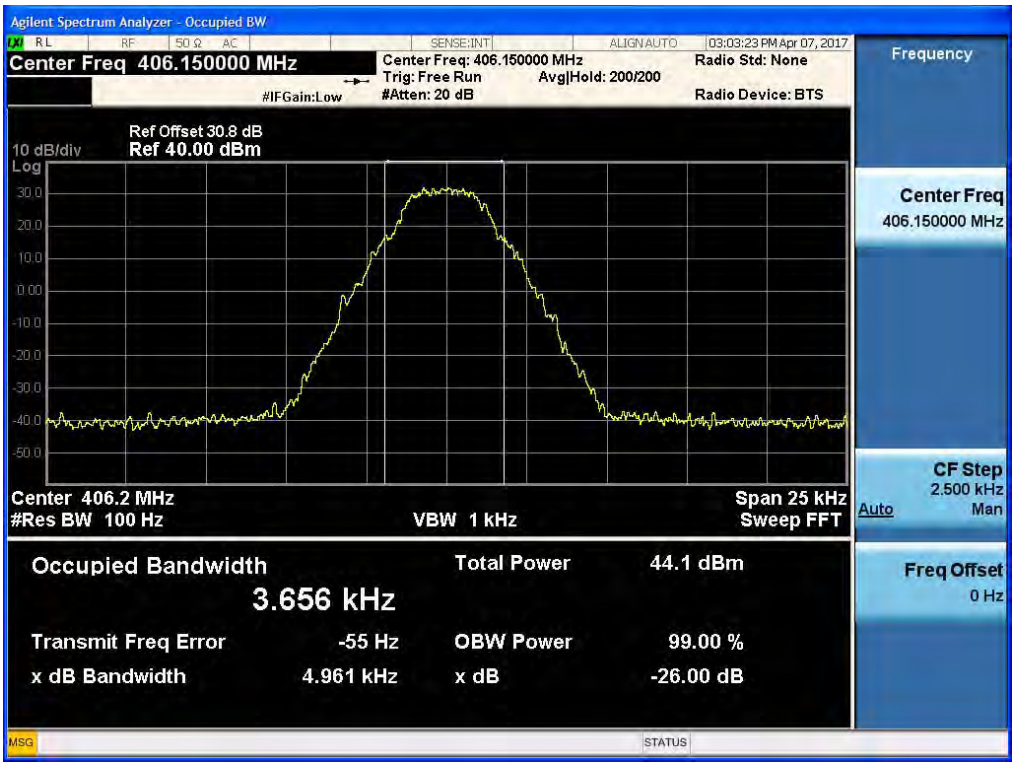
(8K30F1E, 8K30F1D, 8K30F7W _ 491.05 MHz)_Low



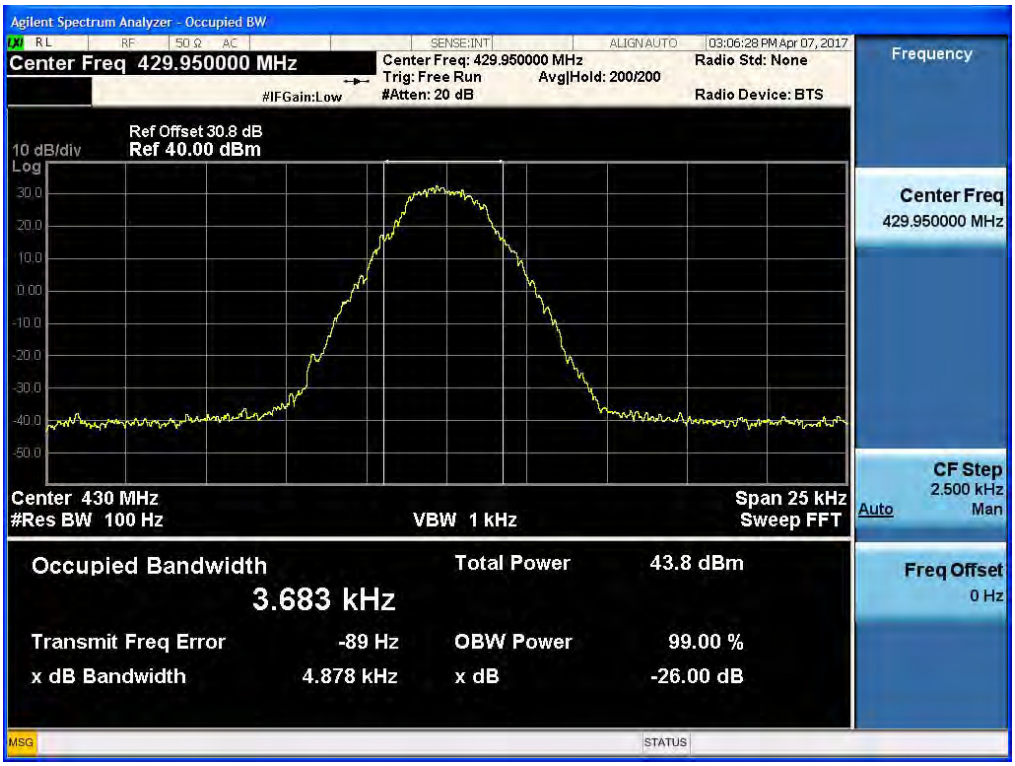
(8K30F1E, 8K30F1D, 8K30F7W _ 511.95 MHz)_Low



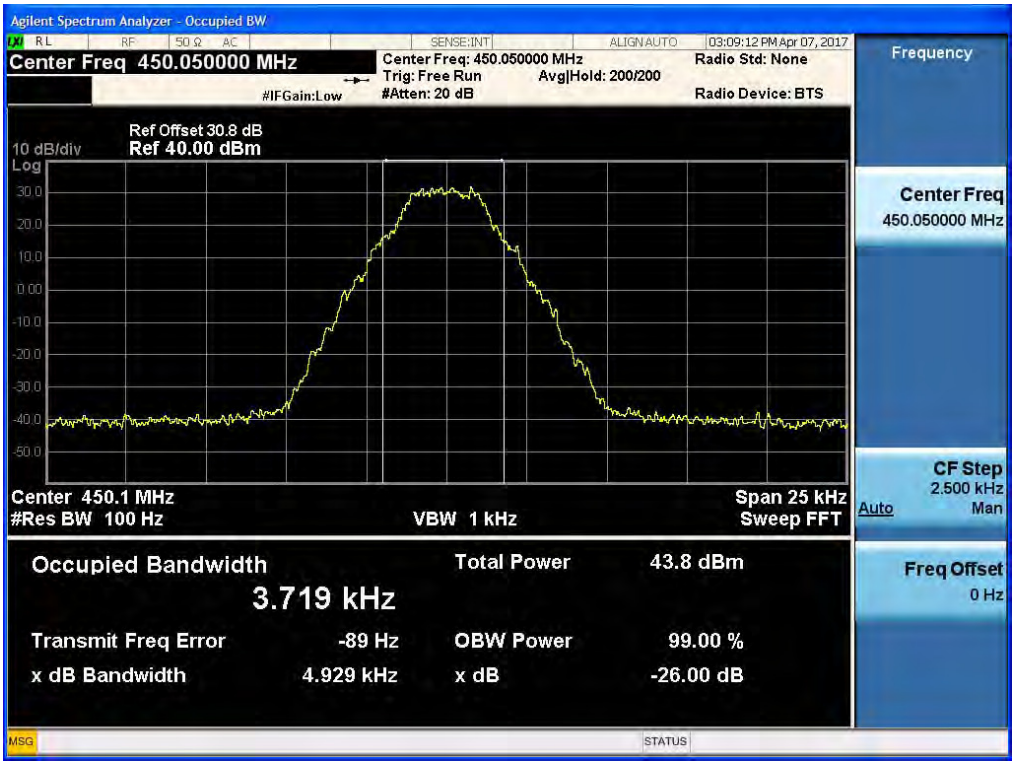
(4K00F1E, 4K00F1D, 4K00F7W _ 406.15 MHz)_High



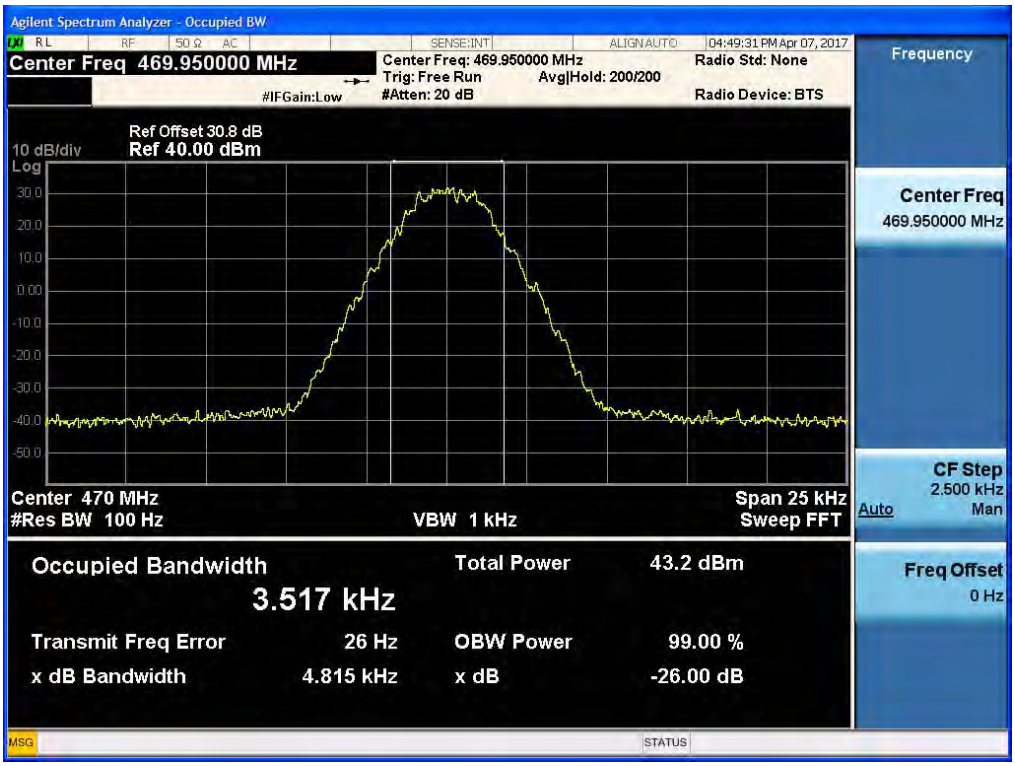
(4K00F1E, 4K00F1D, 4K00F7W _ 429.95 MHz)_High



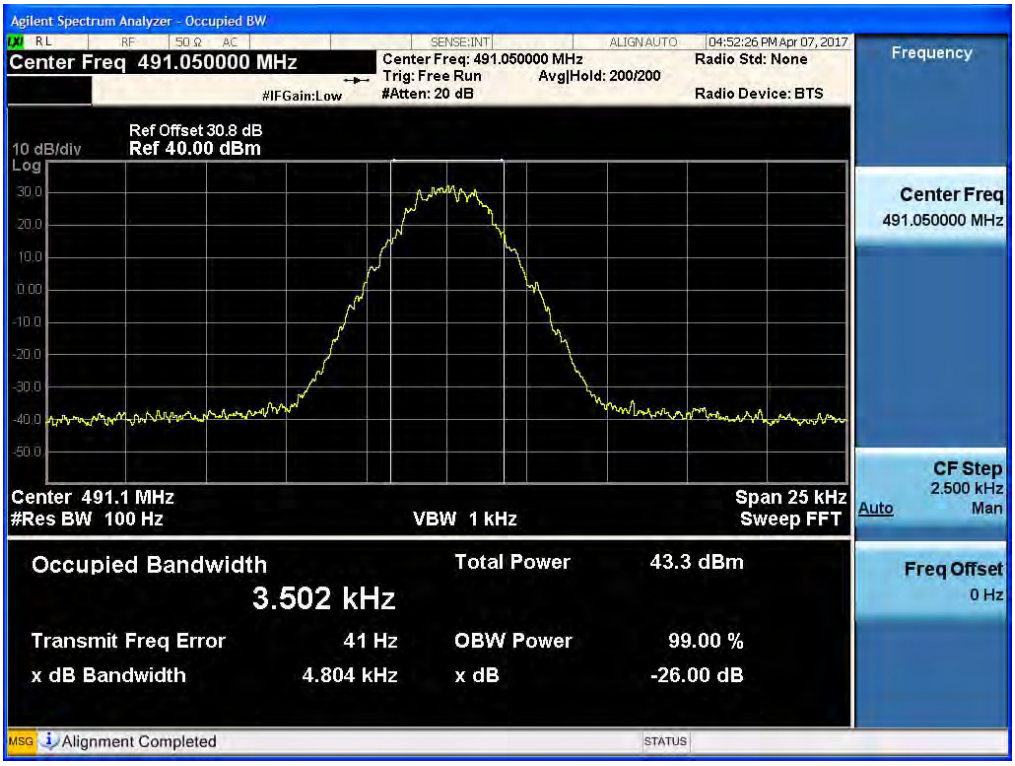
(4K00F1E, 4K00F1D, 4K00F7W _ 450.05 MHz)_High



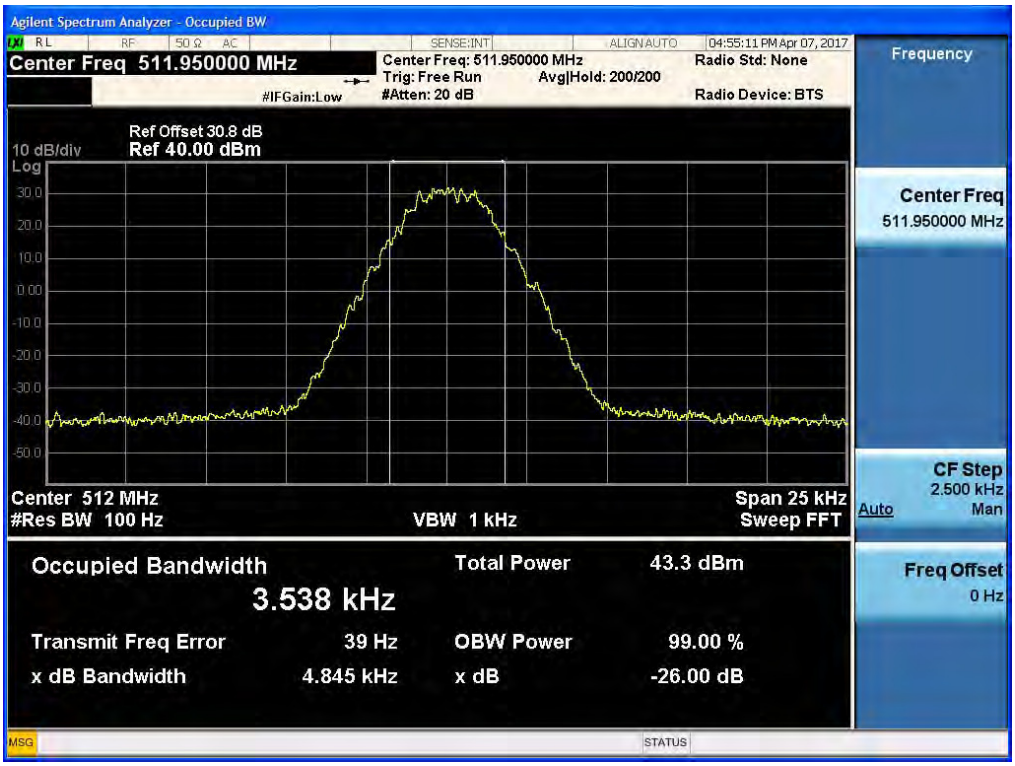
(4K00F1E, 4K00F1D, 4K00F7W _ 469.95 MHz)_High



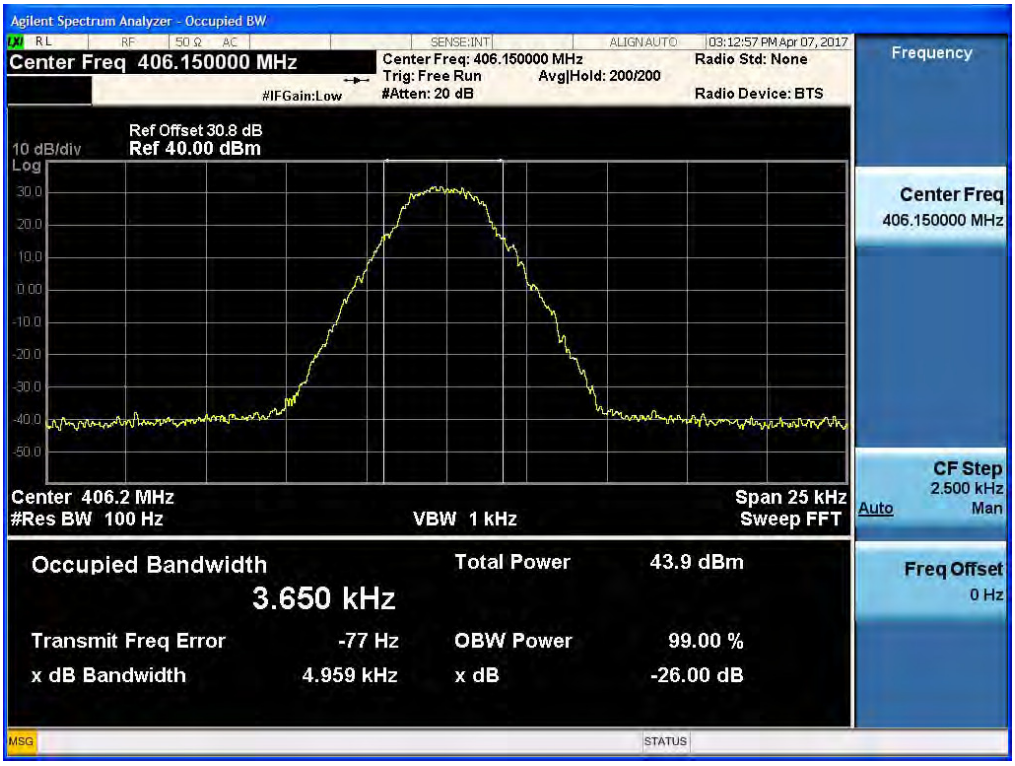
(4K00F1E, 4K00F1D, 4K00F7W _ 491.05 MHz)_High



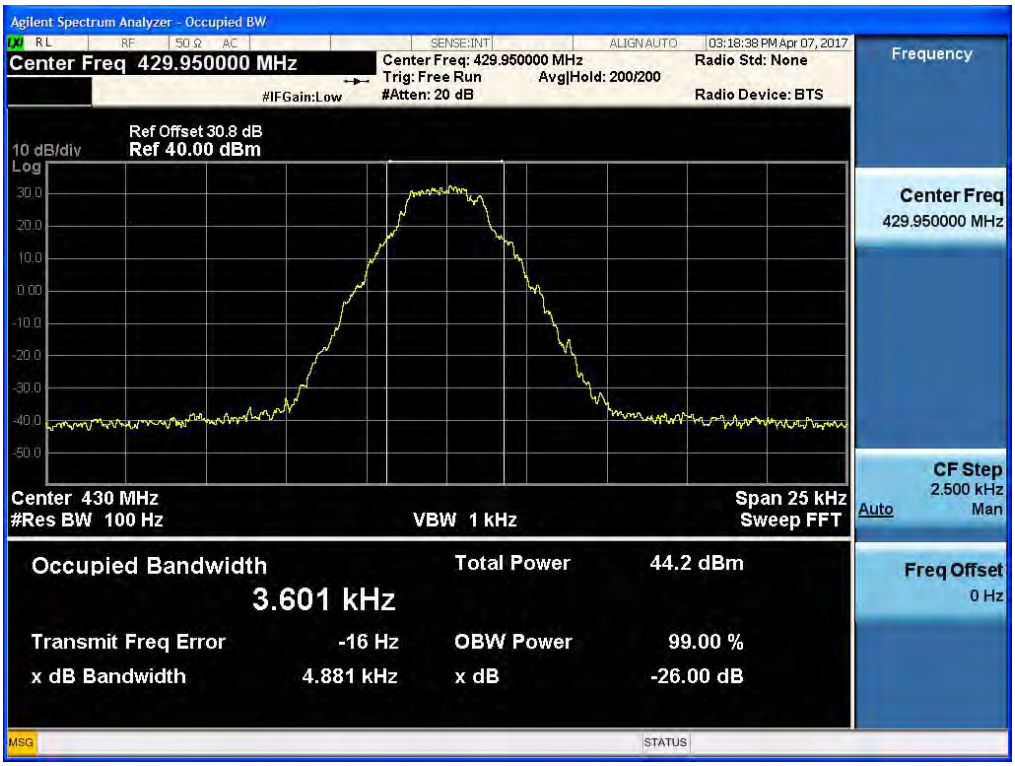
(4K00F1E, 4K00F1D, 4K00F7W _ 511.95 MHz)_High



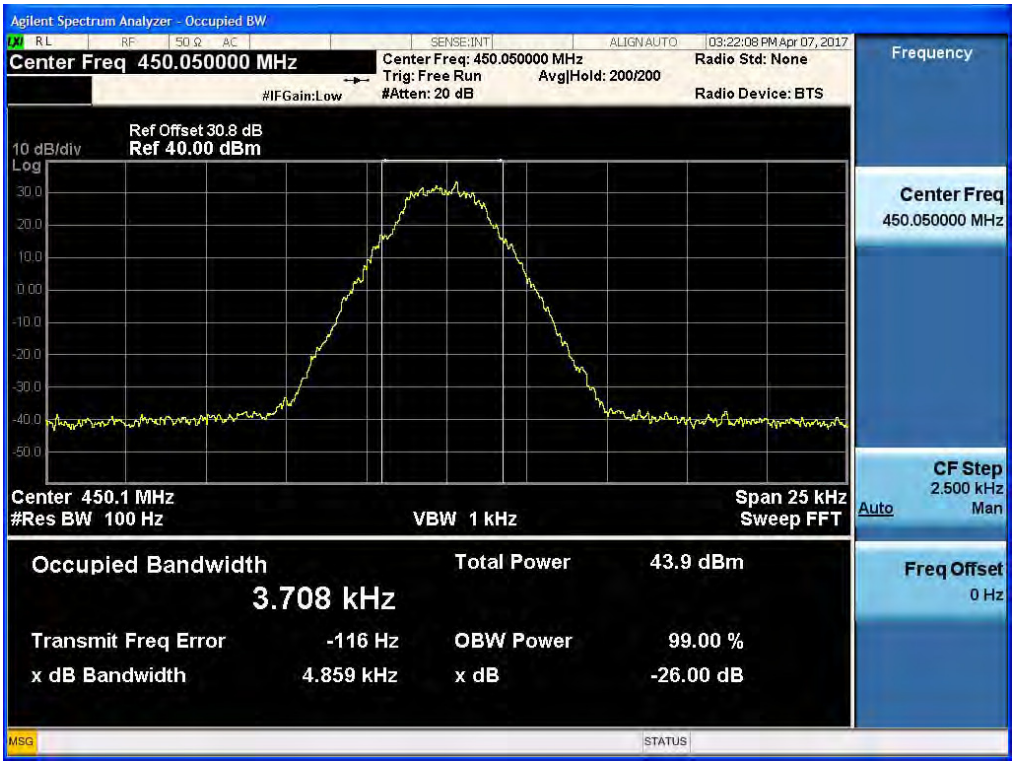
(4K00F1E, 4K00F1D, 4K00F7W _ 406.15 MHz)_Low



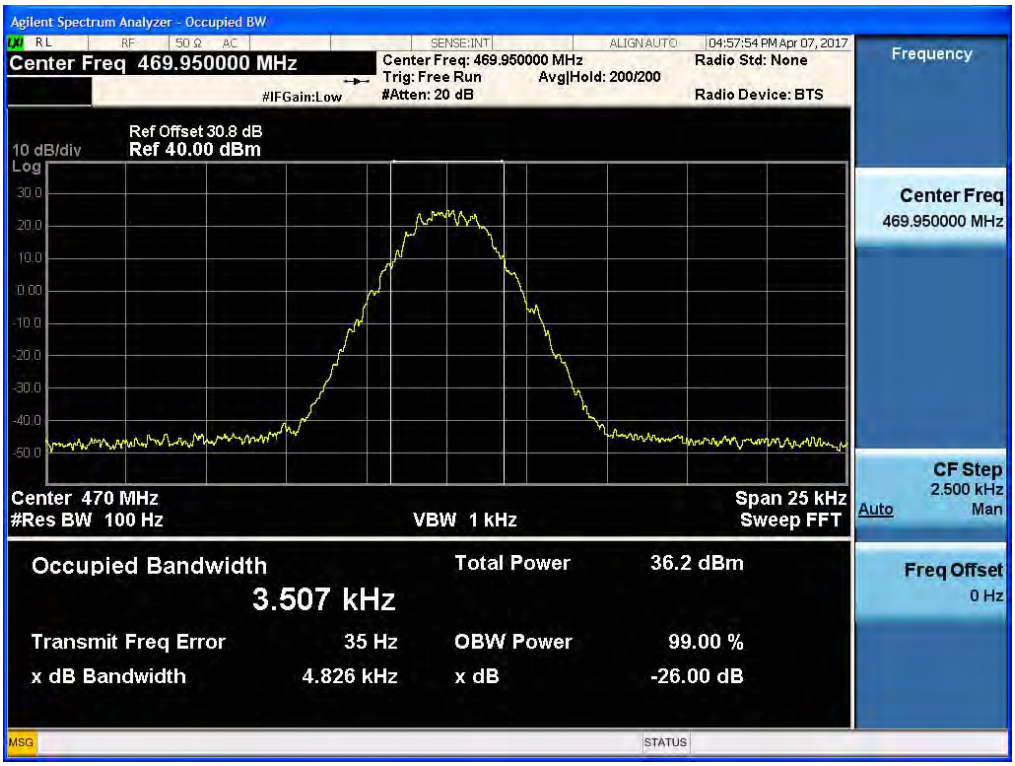
(4K00F1E, 4K00F1D, 4K00F7W _ 429.95 MHz)_Low



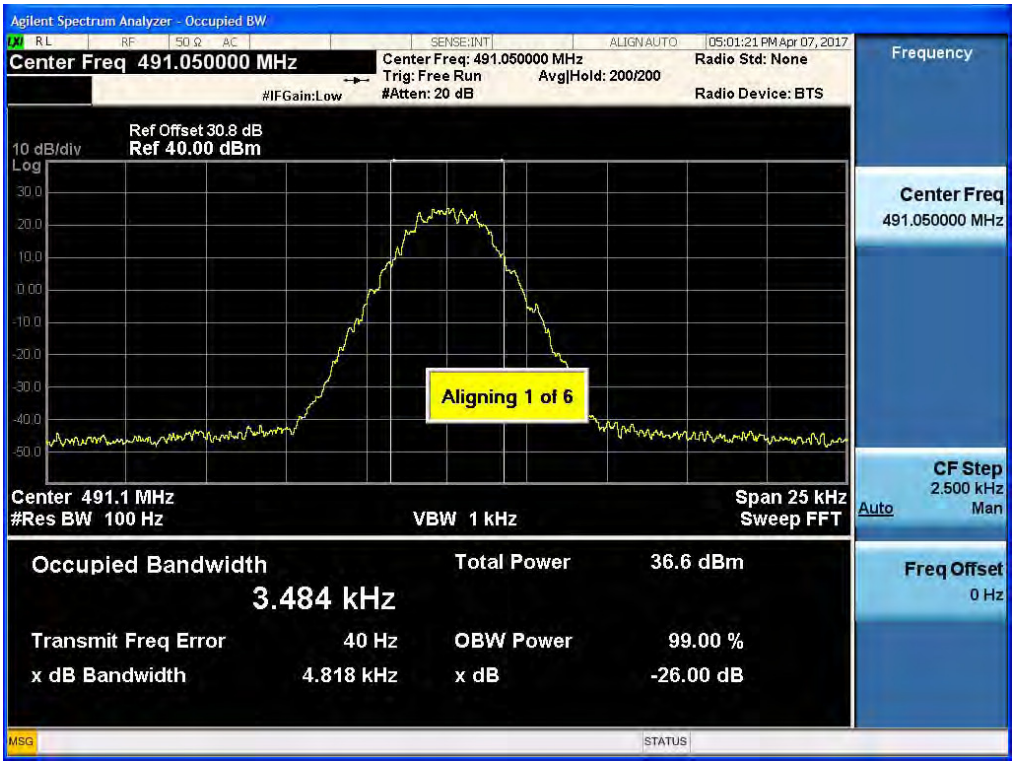
(4K00F1E, 4K00F1D, 4K00F7W _ 450.05 MHz)_Low



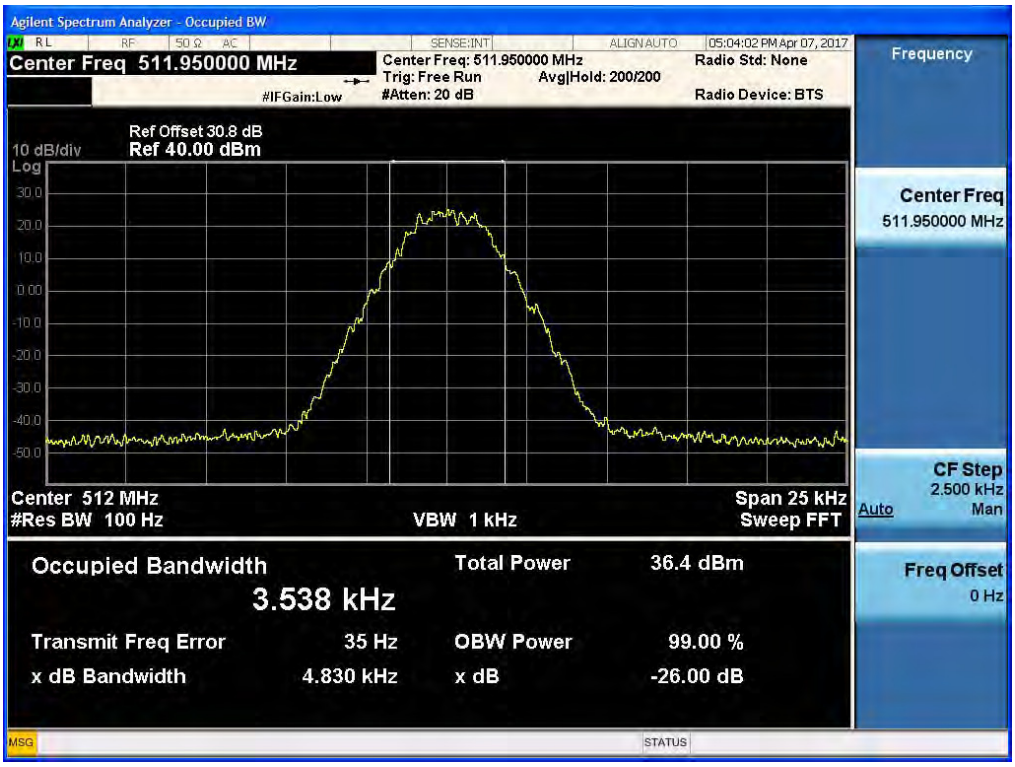
(4K00F1E, 4K00F1D, 4K00F7W _ 469.95 MHz)_Low



(4K00F1E, 4K00F1D, 4K00F7W _ 491.05 MHz)_Low



(4K00F1E, 4K00F1D, 4K00F7W _ 511.95 MHz)_Low



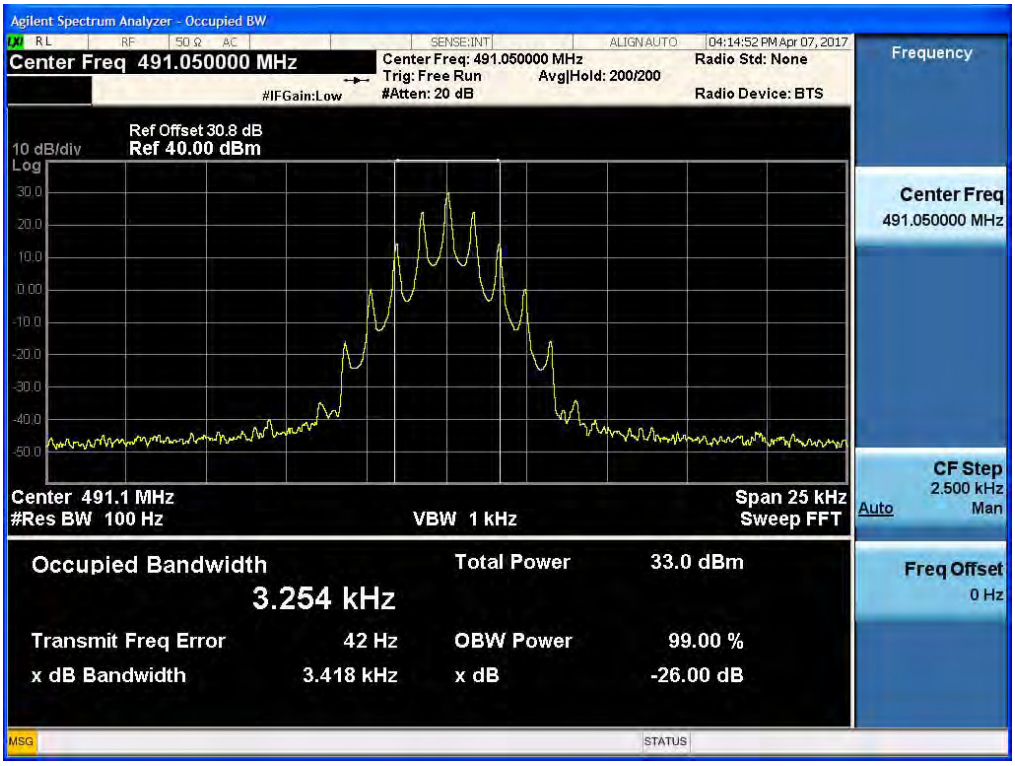
(4K00F2D_ 406.15 MHz)_Low

(4K00F2D_ 429.95 MHz)_Low

(4K00F2D_ 450.05 MHz)_Low

(4K00F2D_ 469.95 MHz)_Low

(4K00F2D_ 491.05 MHz)_Low



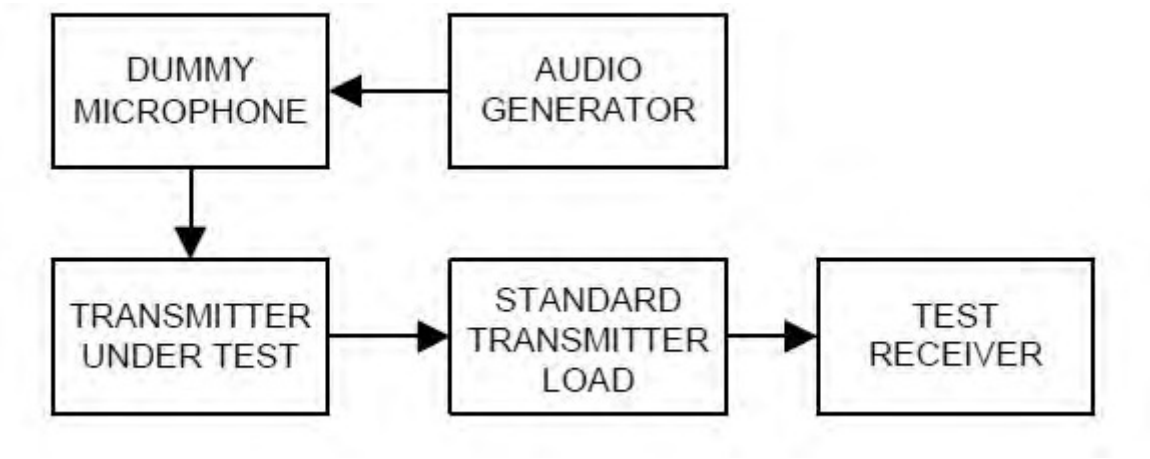
(4K00F2D_ 511.95 MHz)_Low

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.

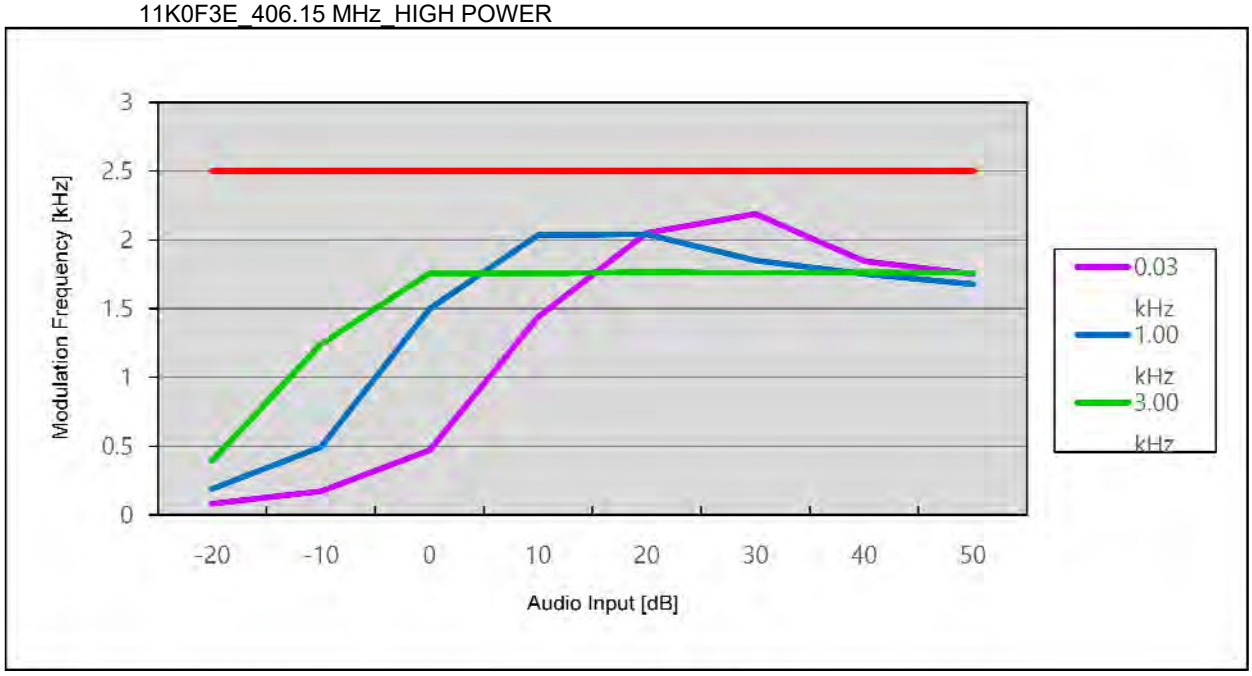
a) Connect the equipment as illustrated.
b) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
c) Set the test receiver to measure peak positive deviation.
   Set the audio bandwidth for ≤0.25 Hz to ≥15,000 Hz.
   Turn the de-emphasis function off.
d) Apply a 1000 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

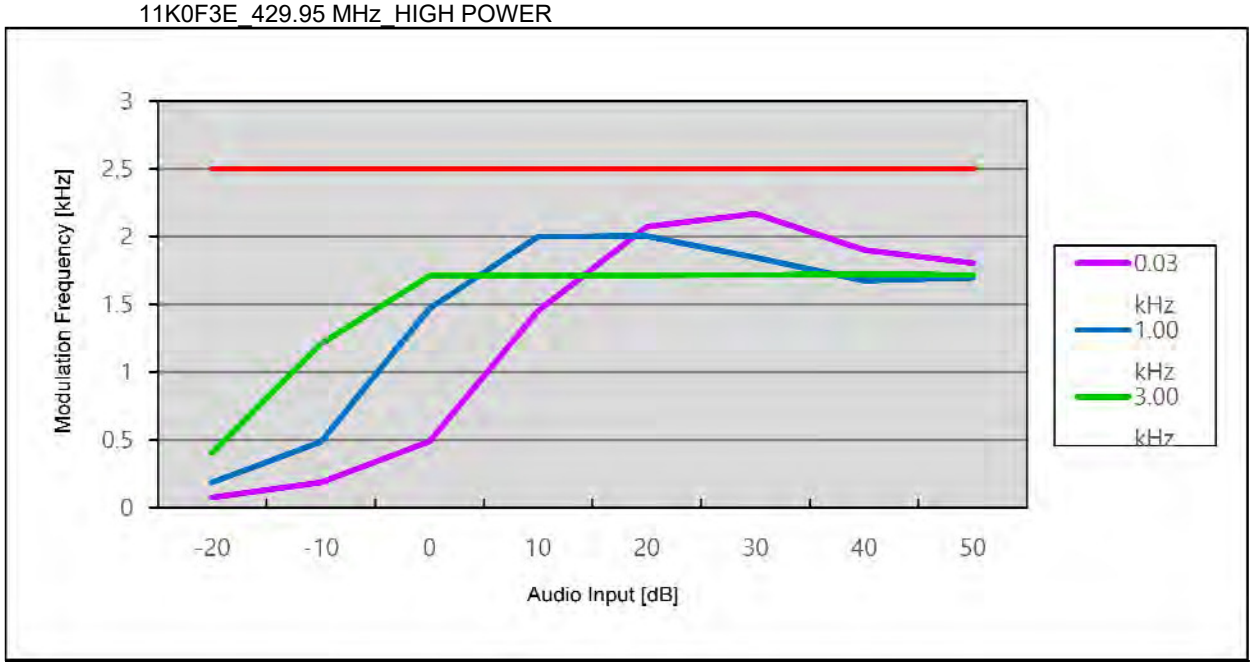
11K0F3E

Positive Peaks

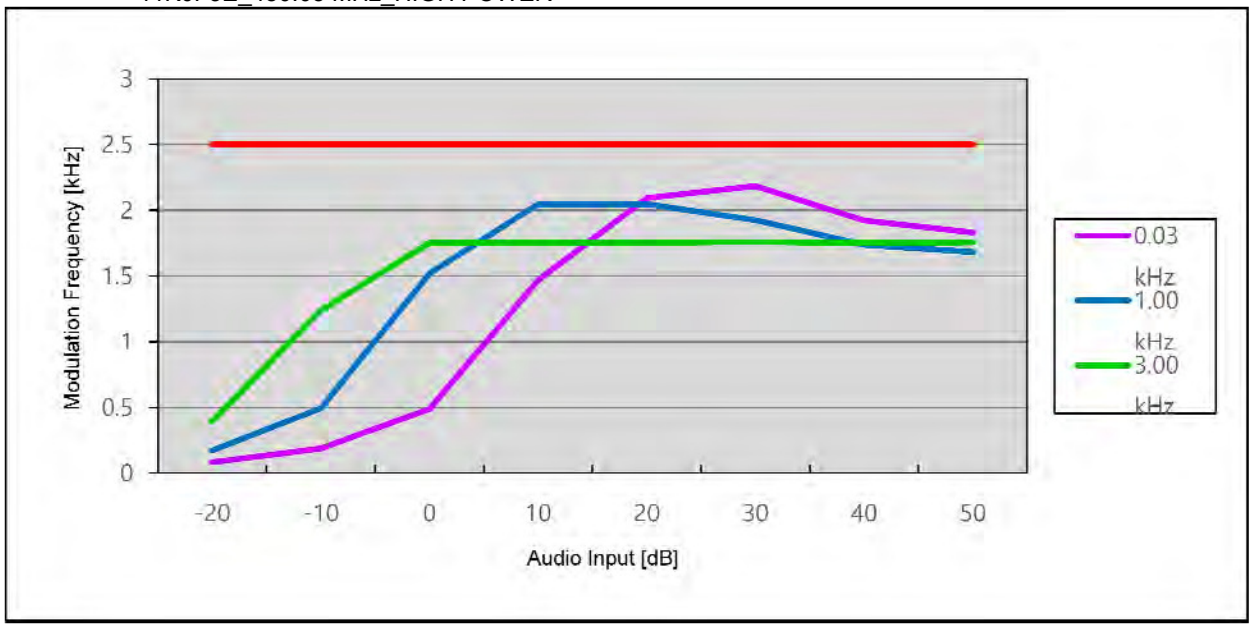
11K0F3E_406.15 MHz_HIGH POWER



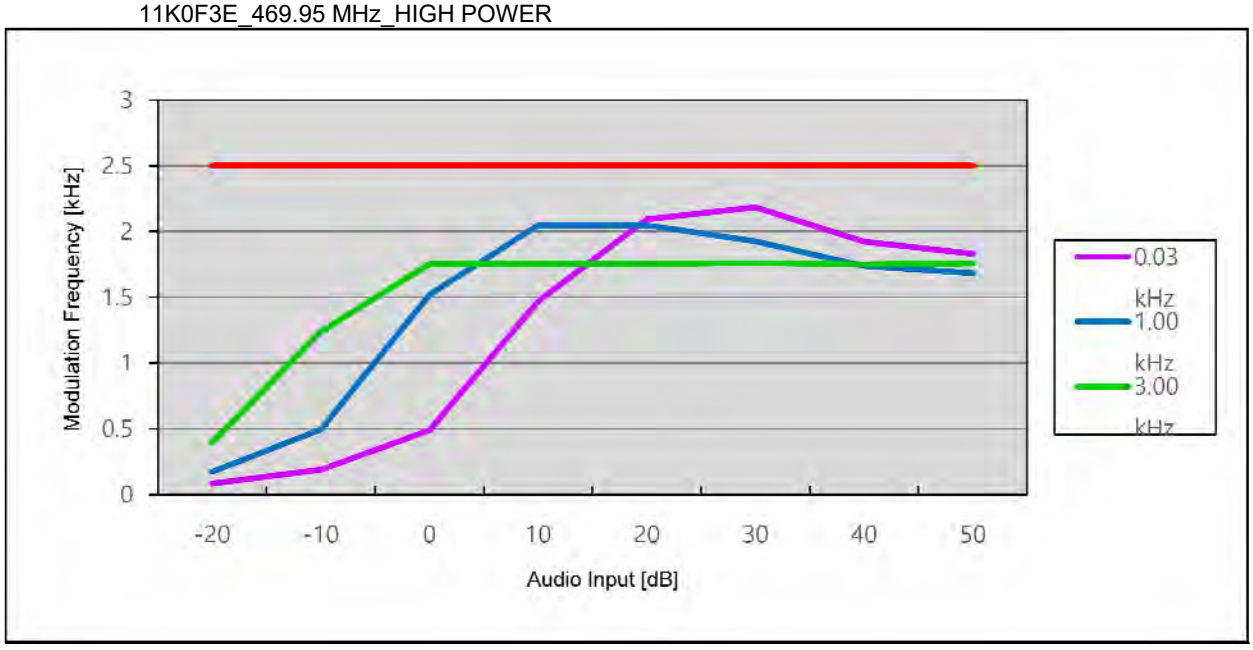
11K0F3E_429.95 MHz_HIGH POWER



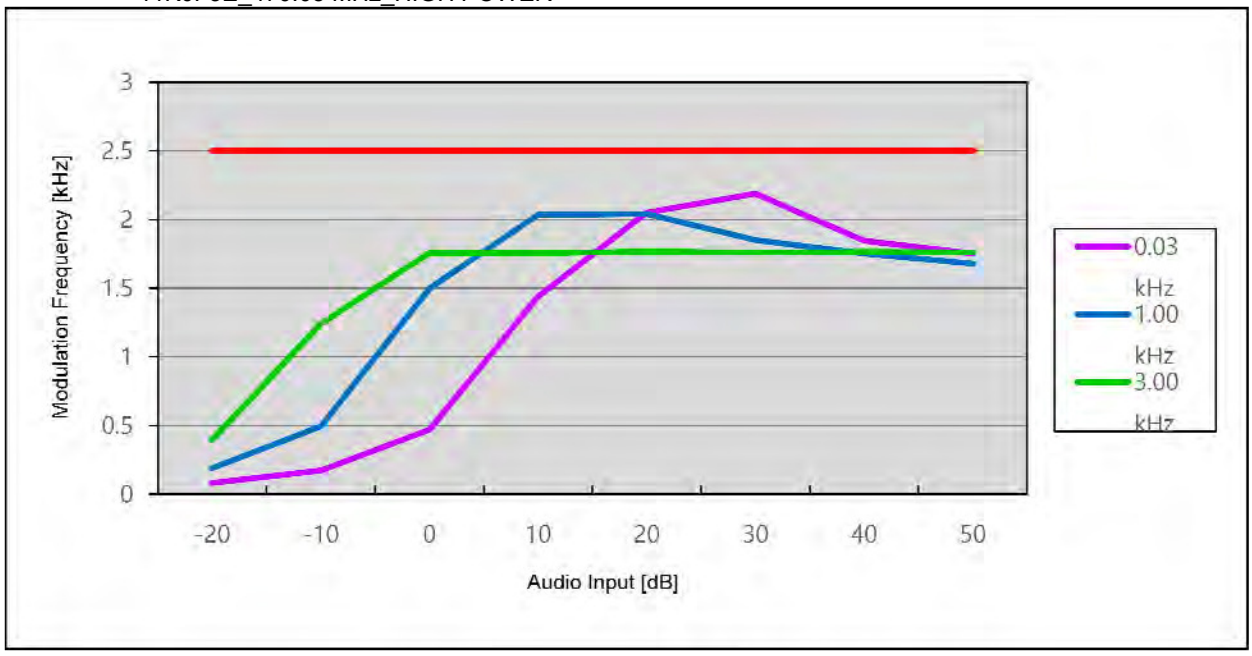
11K0F3E_450.05 MHz_HIGH POWER



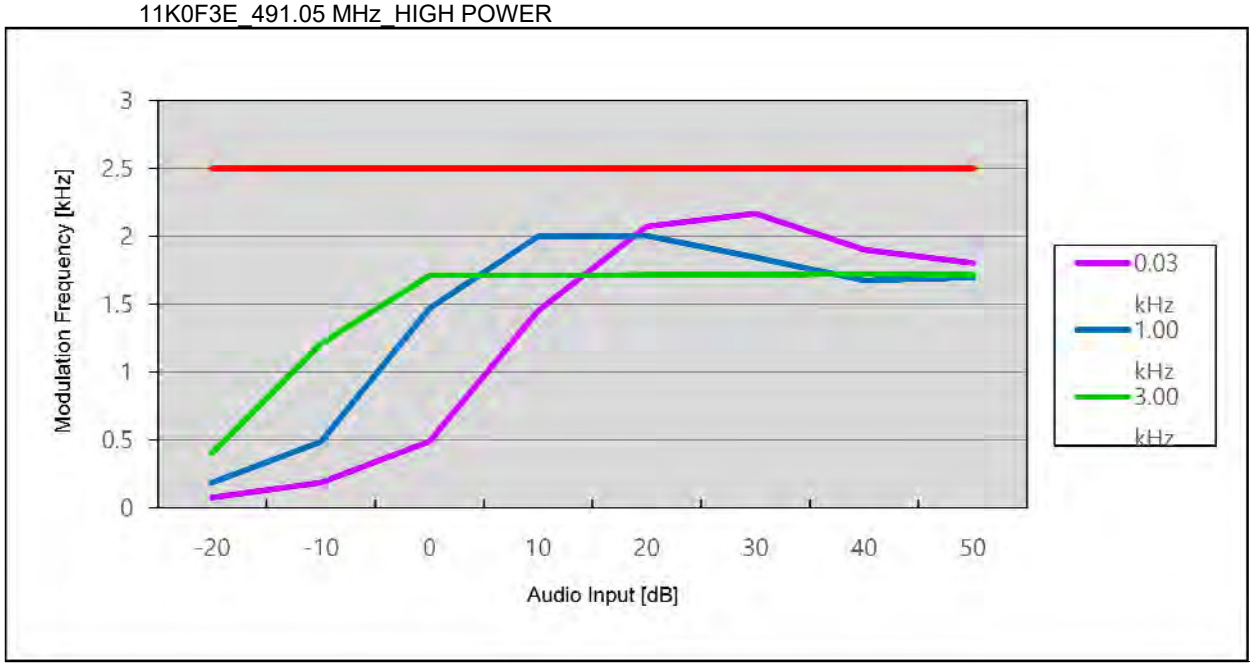
11K0F3E_469.95 MHz_HIGH POWER



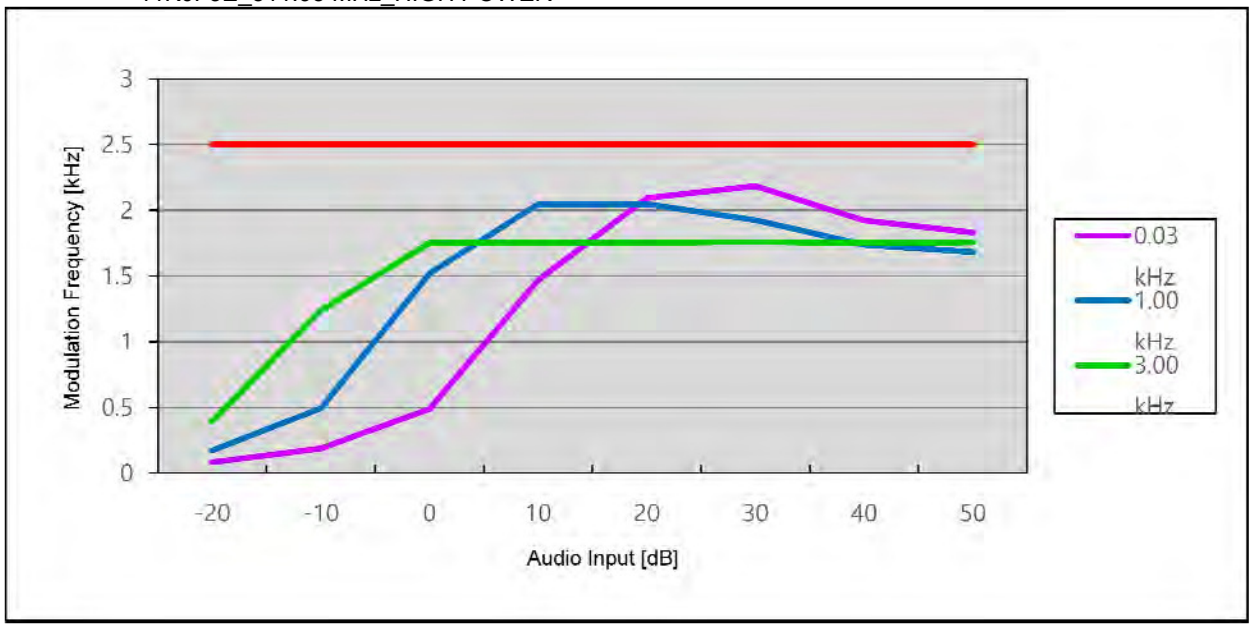
11K0F3E_470.05 MHz_HIGH POWER



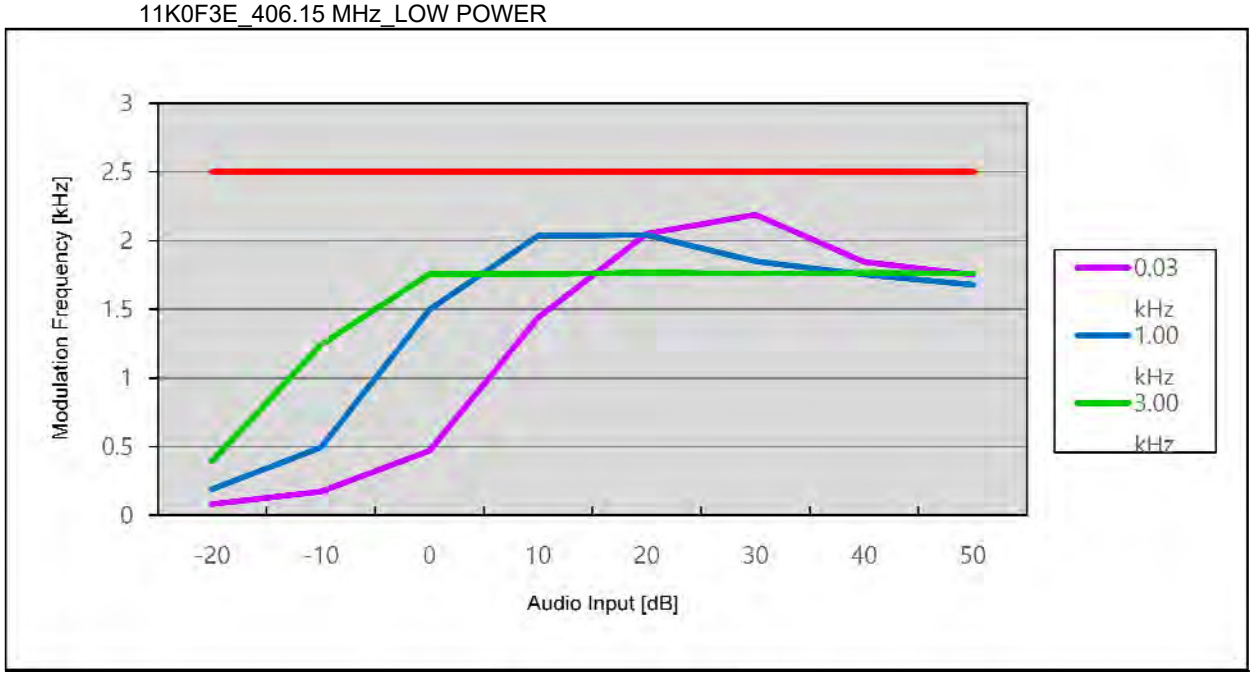
11K0F3E_491.05 MHz_HIGH POWER



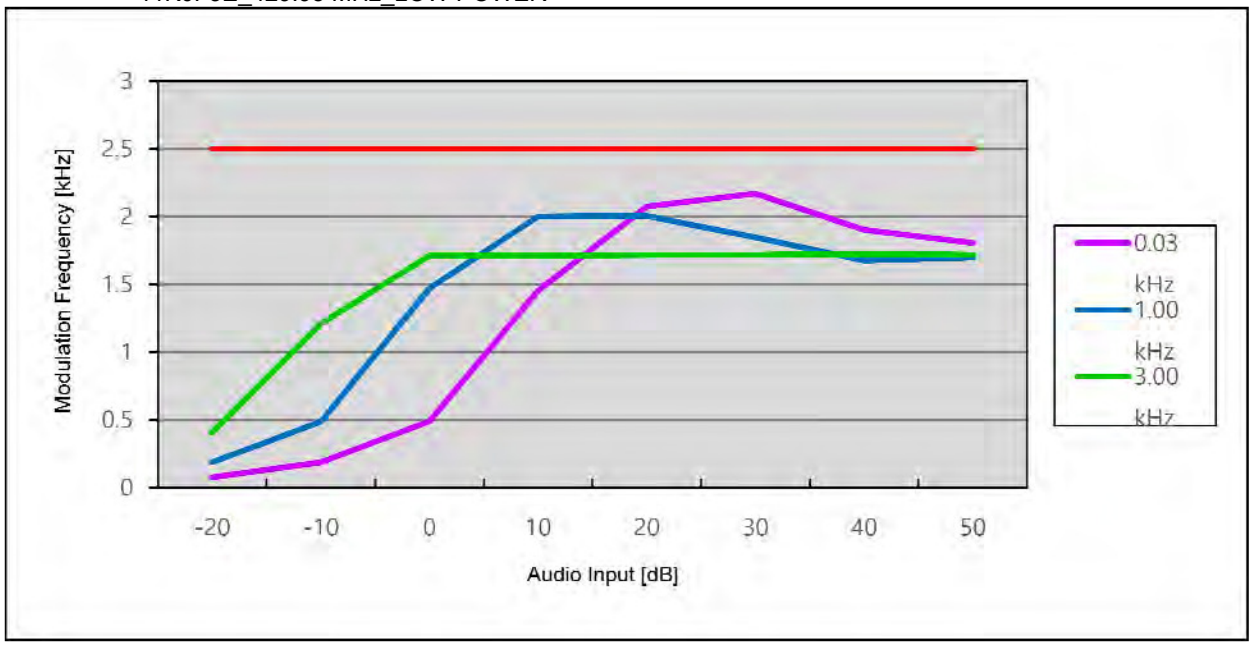
11K0F3E_511.95 MHz_HIGH POWER



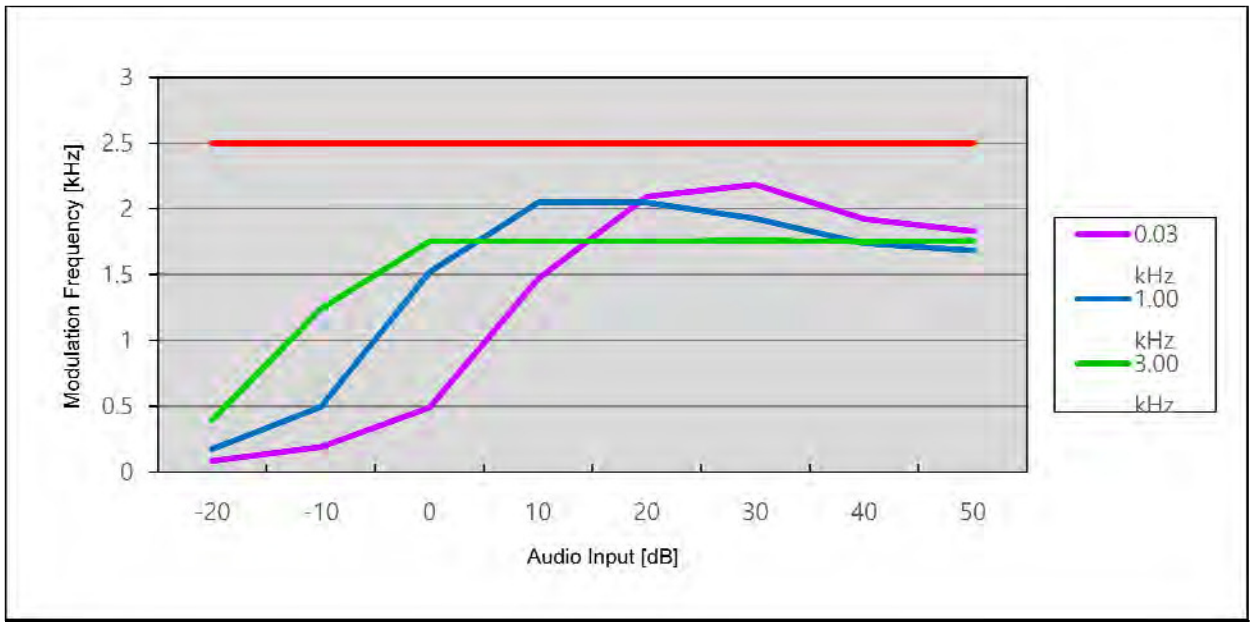
11K0F3E_406.15 MHz_LOW POWER



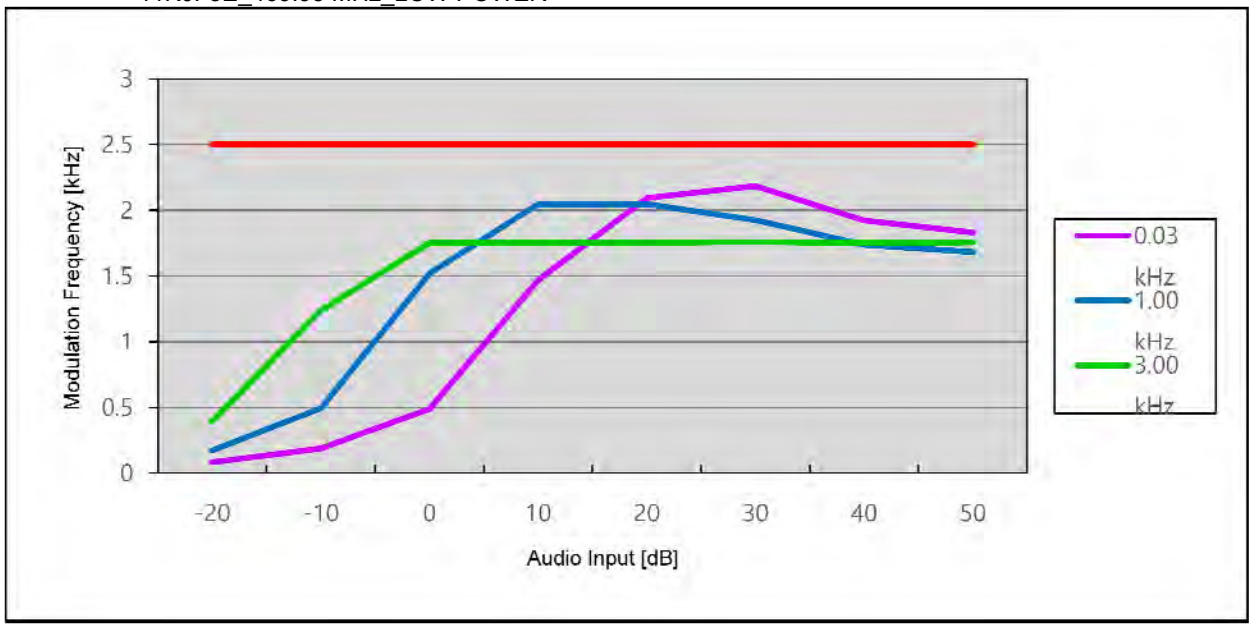
11K0F3E_429.95 MHz_LOW POWER



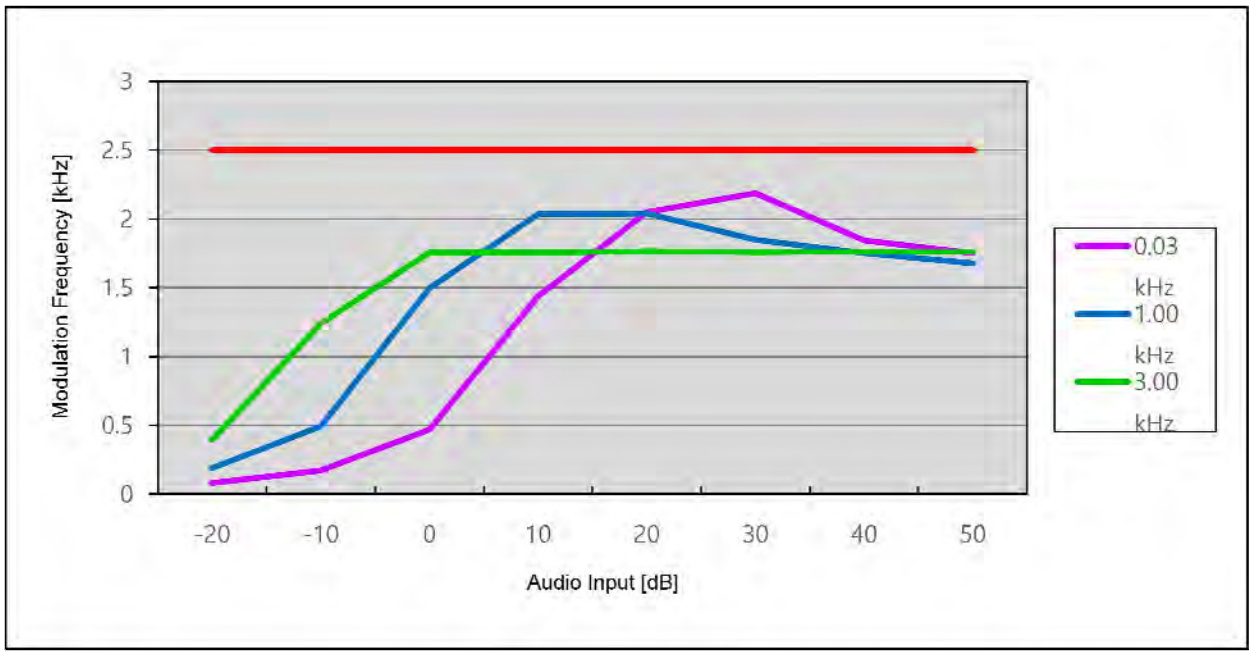
11K0F3E_450.05 MHz_LOW POWER



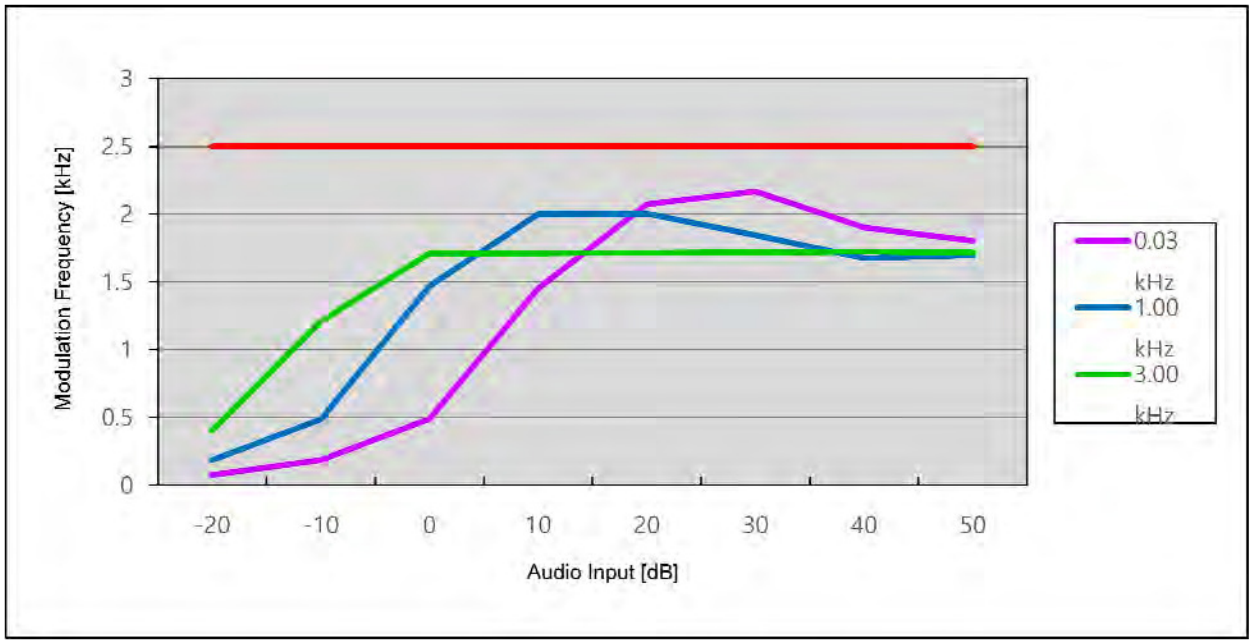
11K0F3E_469.95 MHz_LOW POWER



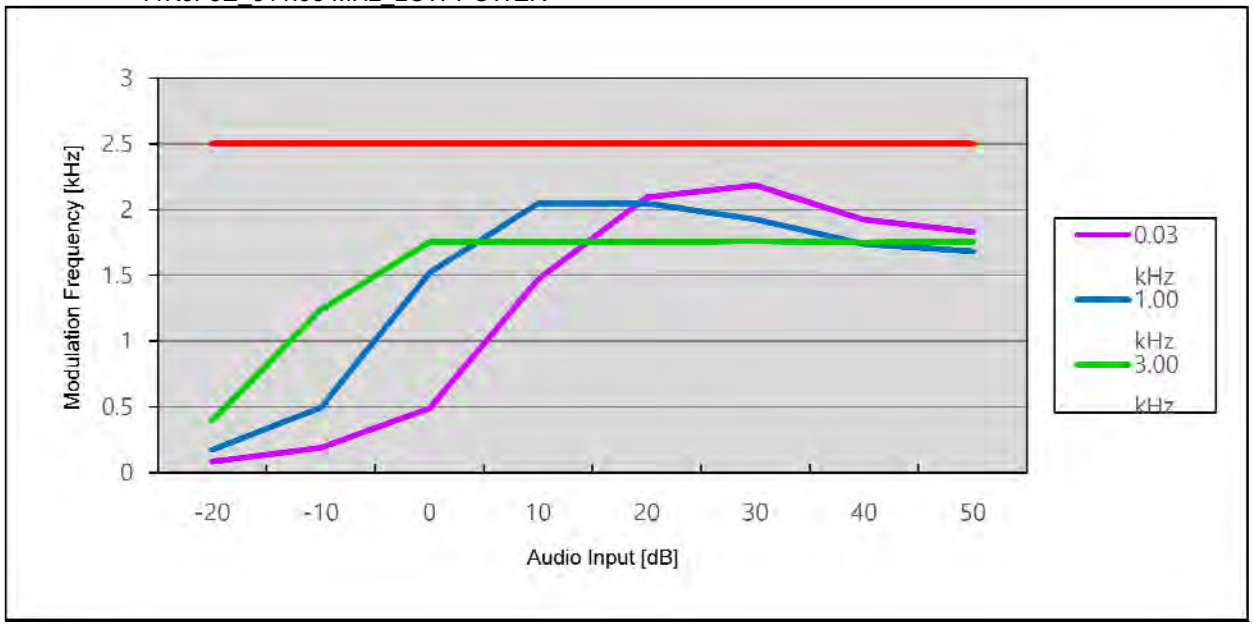
11K0F3E_470.05 MHz_LOW POWER



11K0F3E_491.05 MHz_LOW POWER

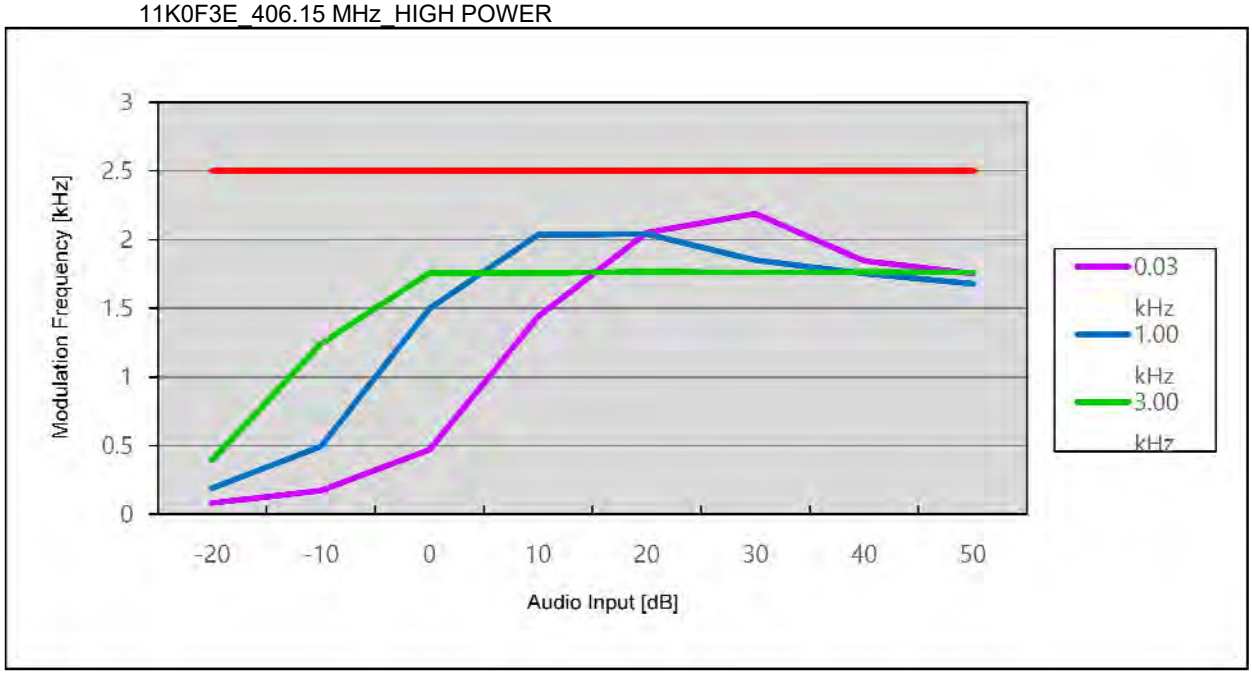


11K0F3E_511.95 MHz_LOW POWER

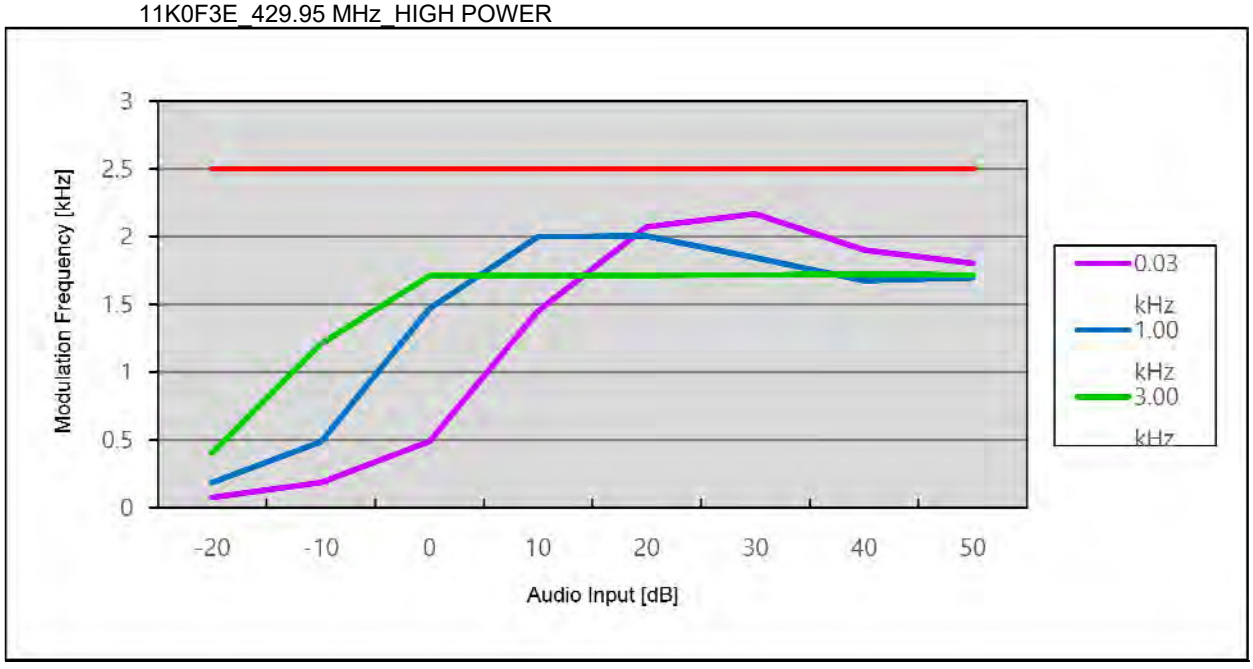


Negative Peaks

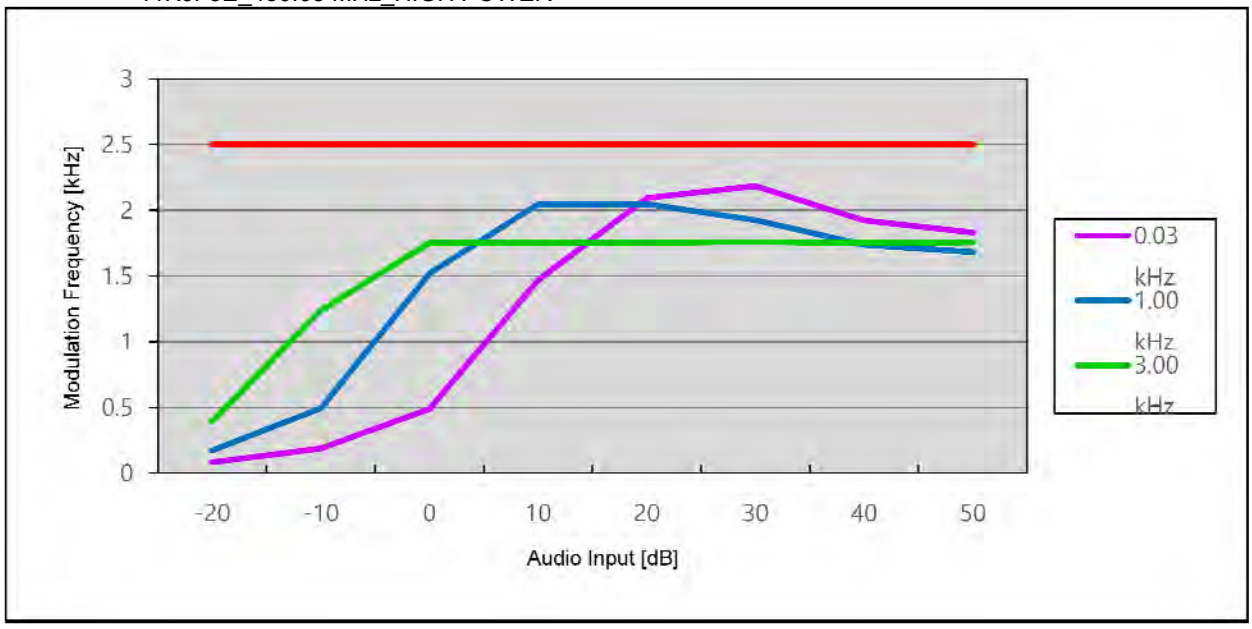
11K0F3E_406.15 MHz_HIGH POWER



11K0F3E_429.95 MHz_HIGH POWER

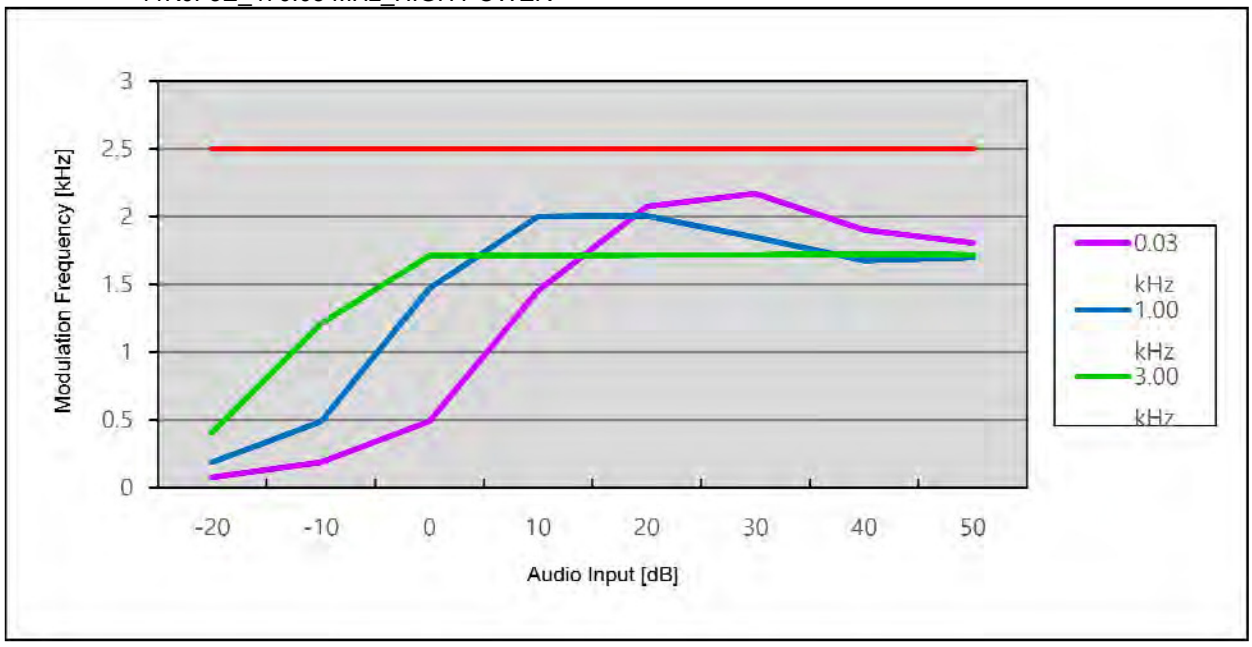


11K0F3E_450.05 MHz_HIGH POWER

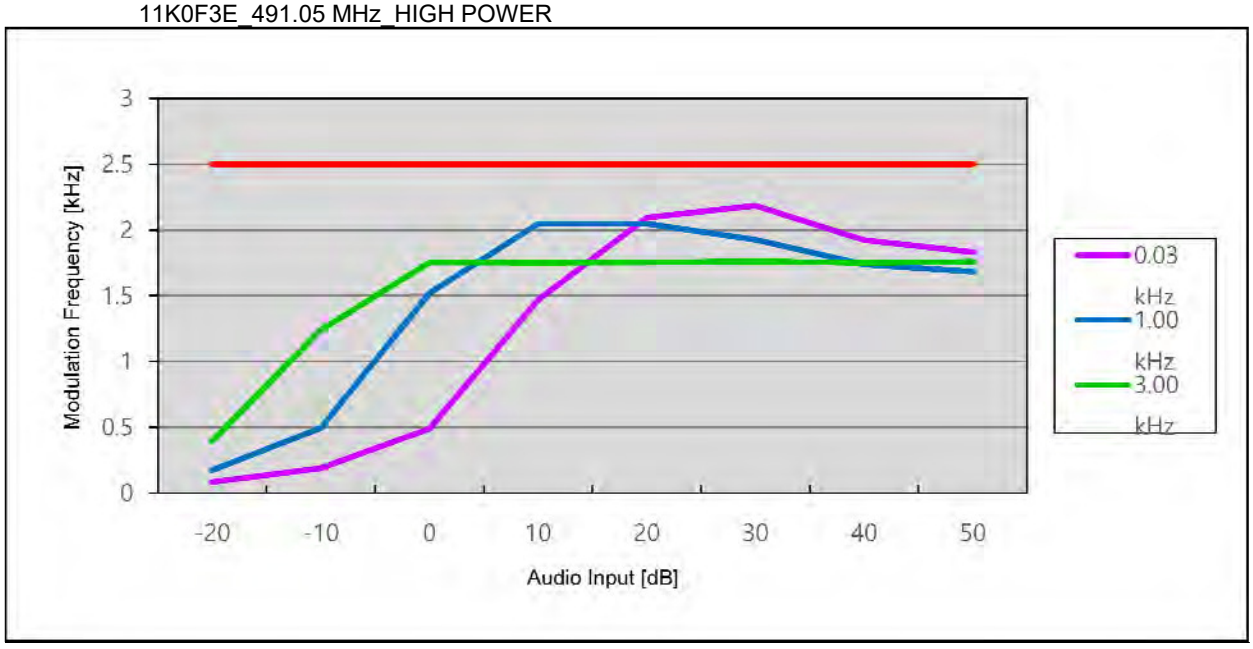


11K0F3E_469.95 MHz_HIGH POWER

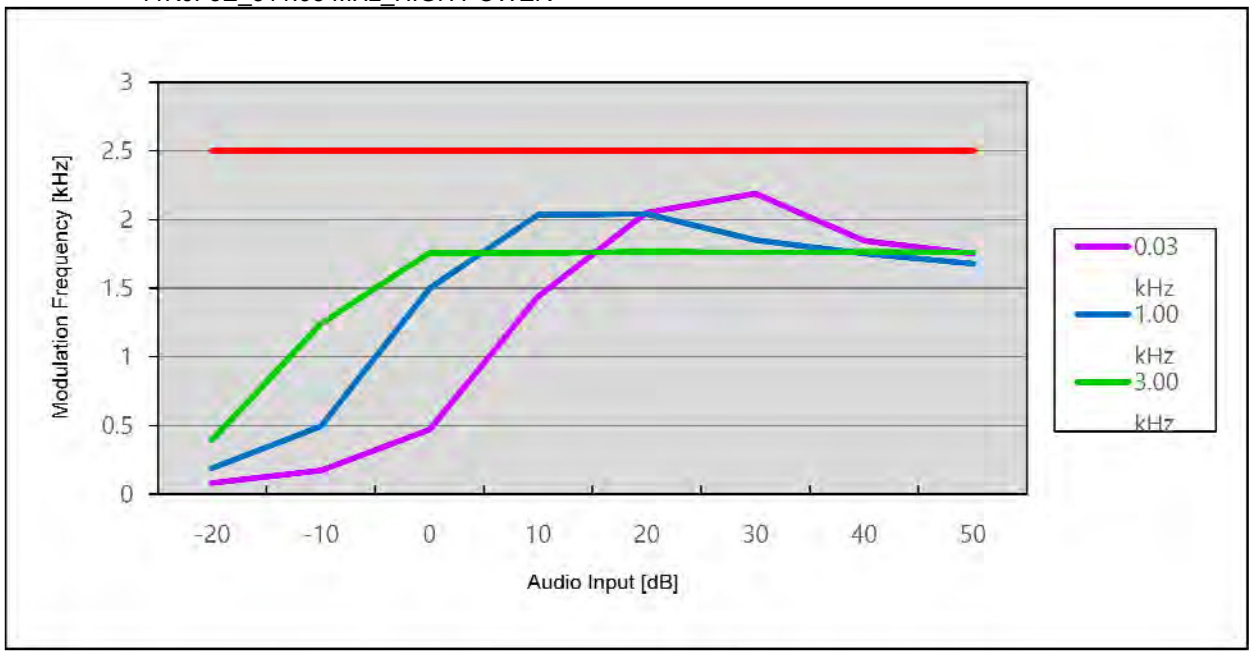
11K0F3E_470.05 MHz_HIGH POWER



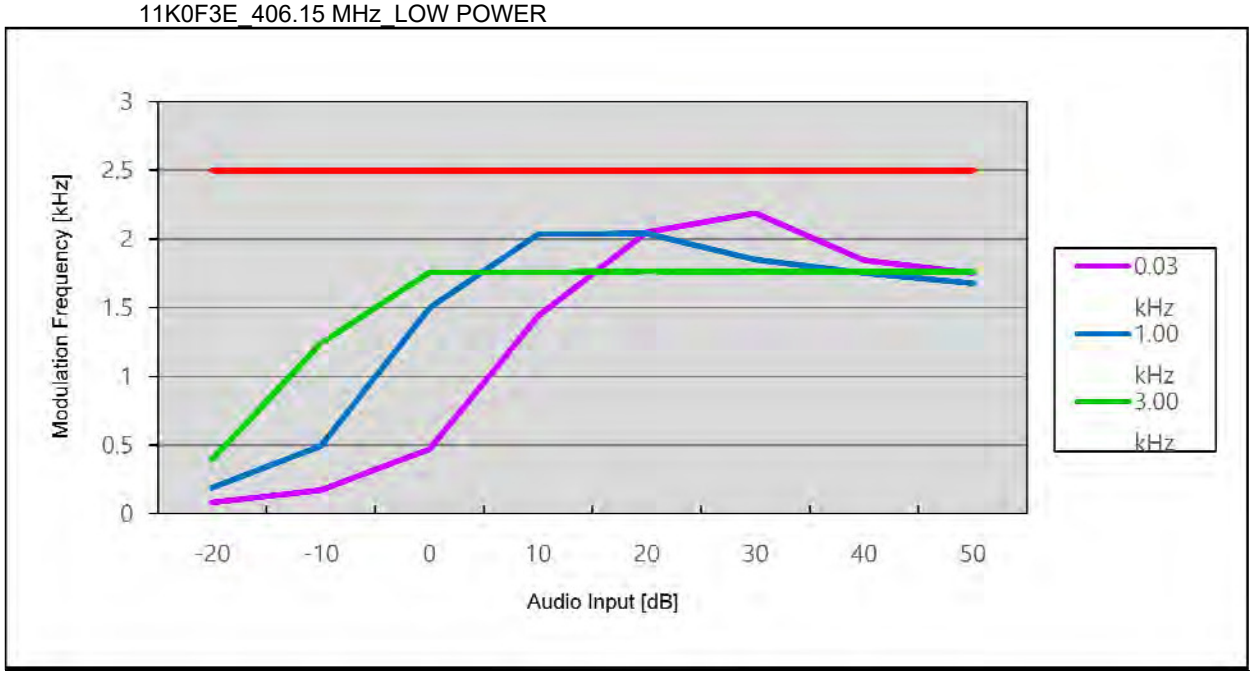
11K0F3E_491.05 MHz_HIGH POWER



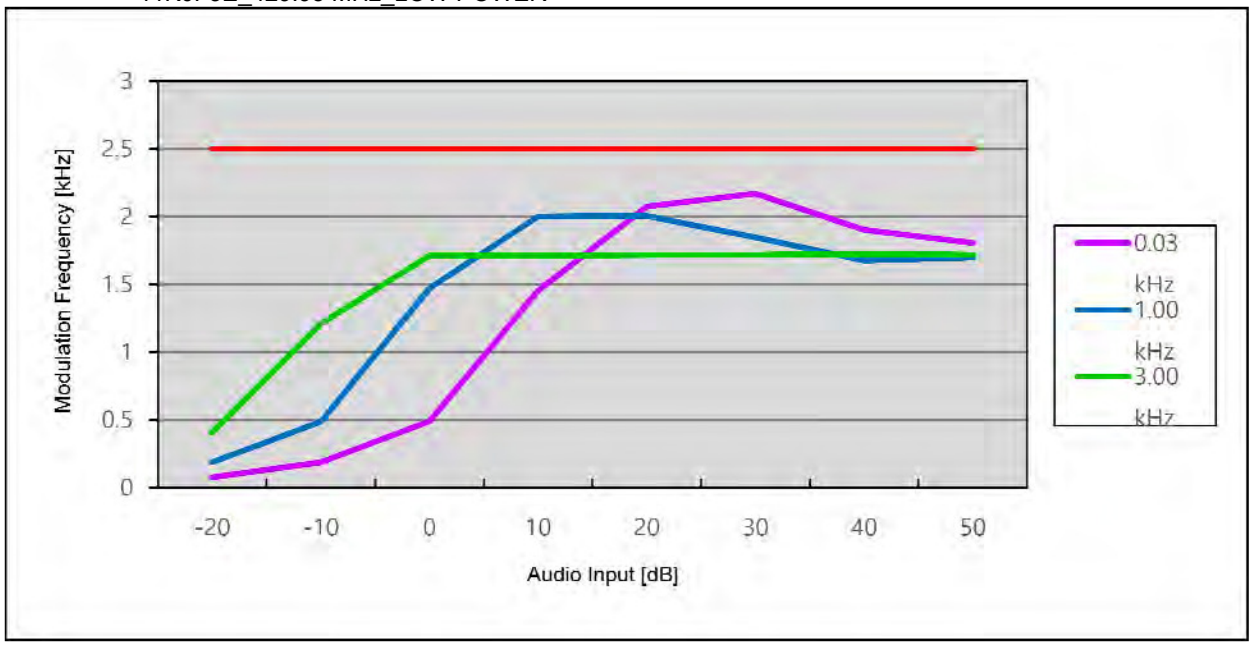
11K0F3E_511.95 MHz_HIGH POWER



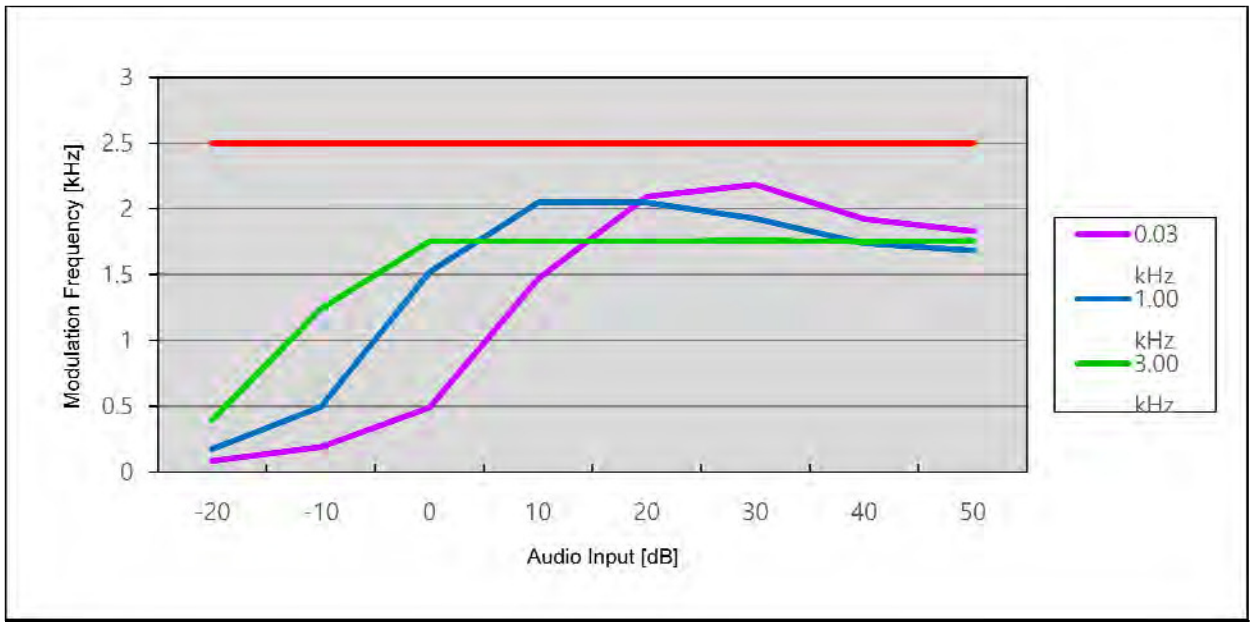
11K0F3E_406.15 MHz_LOW POWER



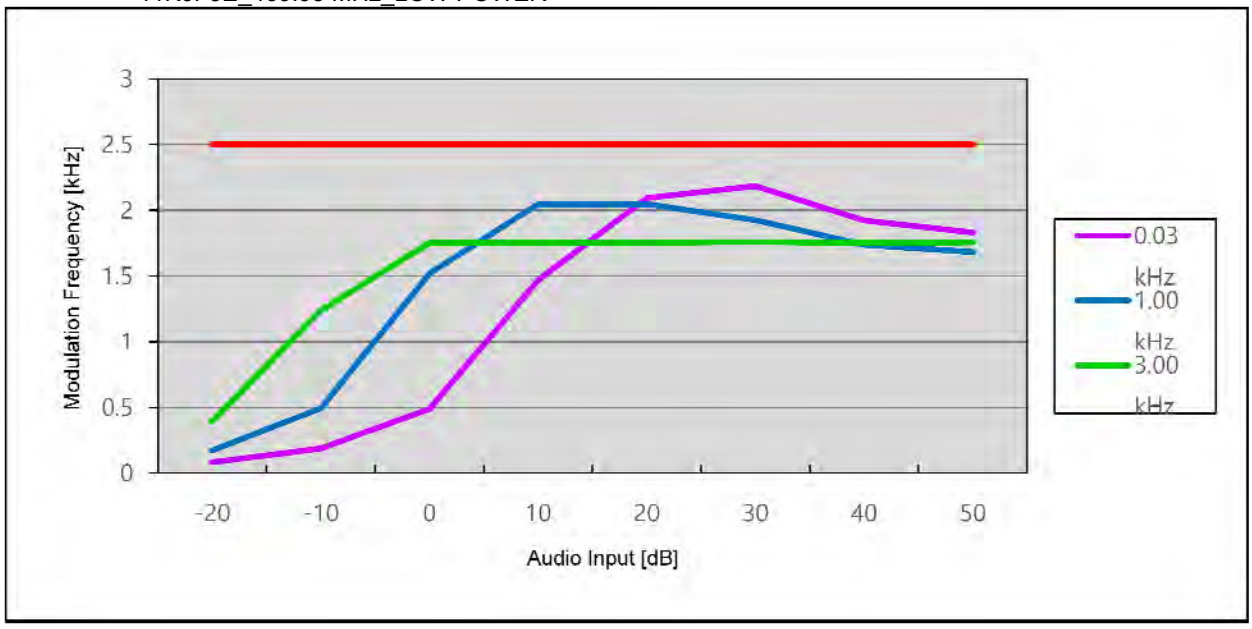
11K0F3E_429.95 MHz_LOW POWER



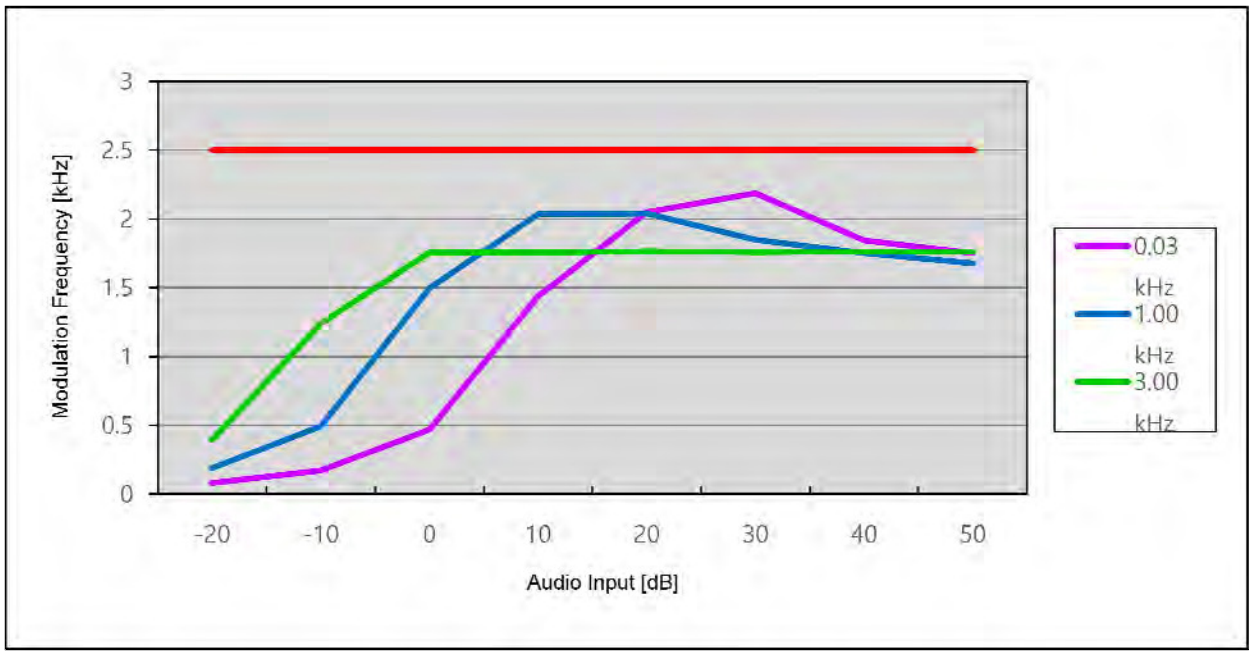
11K0F3E_450.05 MHz_LOW POWER



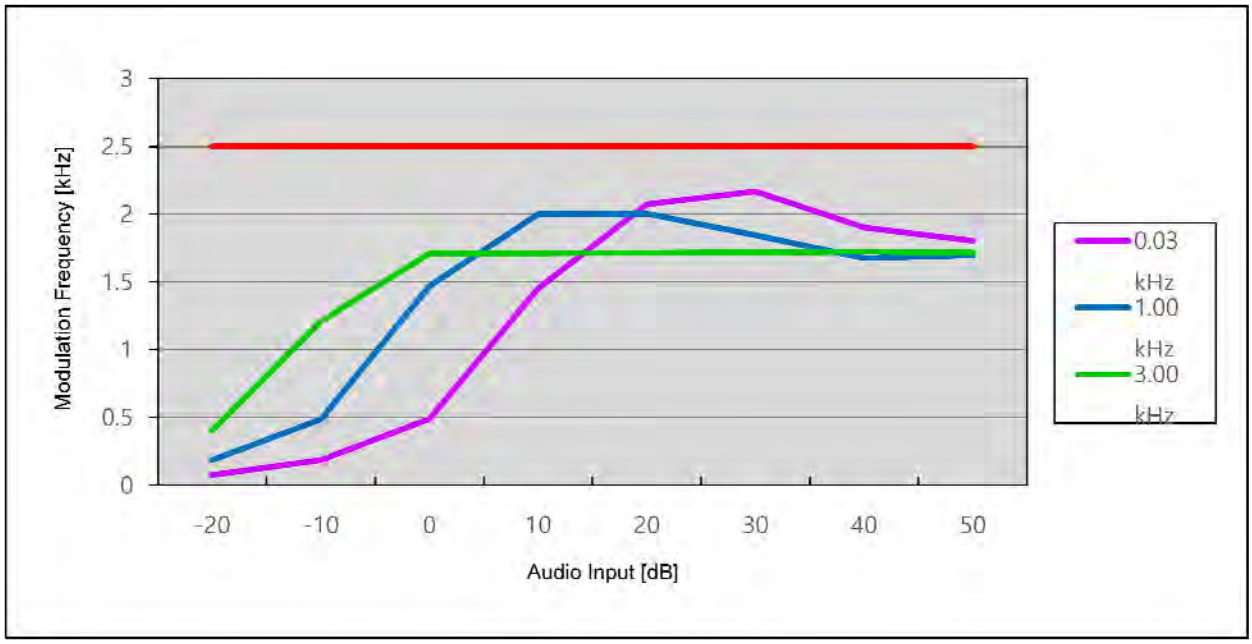
11K0F3E_469.95 MHz_LOW POWER



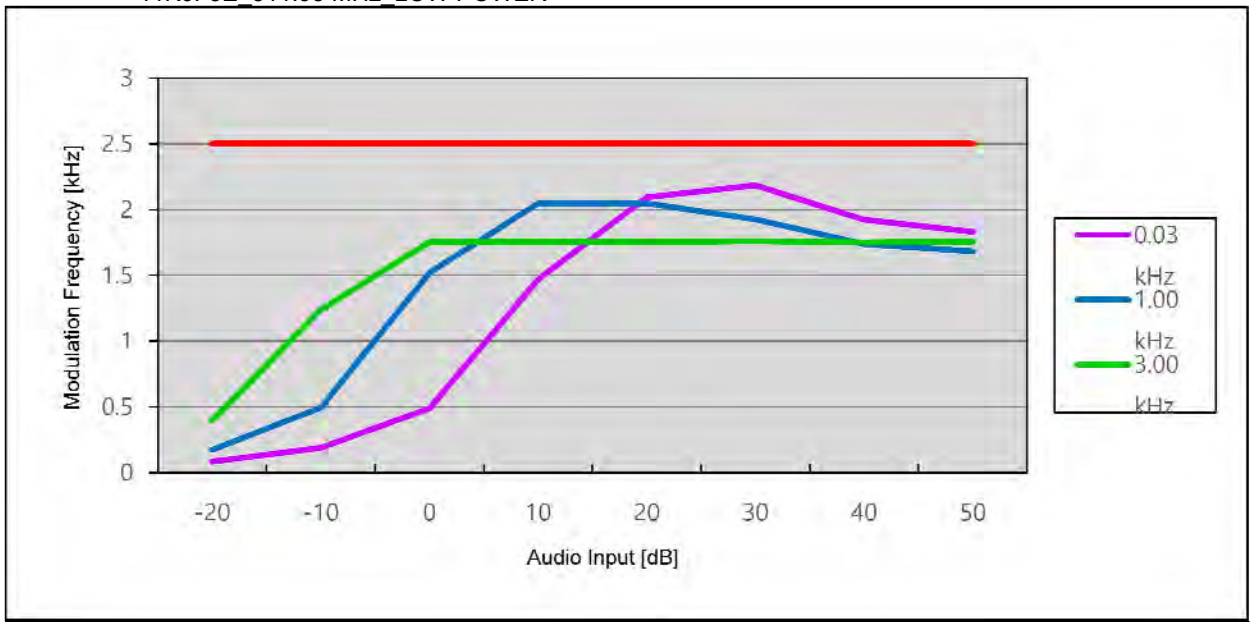
11K0F3E_470.05 MHz_LOW POWER



11K0F3E_491.05 MHz_LOW POWER



11K0F3E_511.95 MHz_LOW POWER

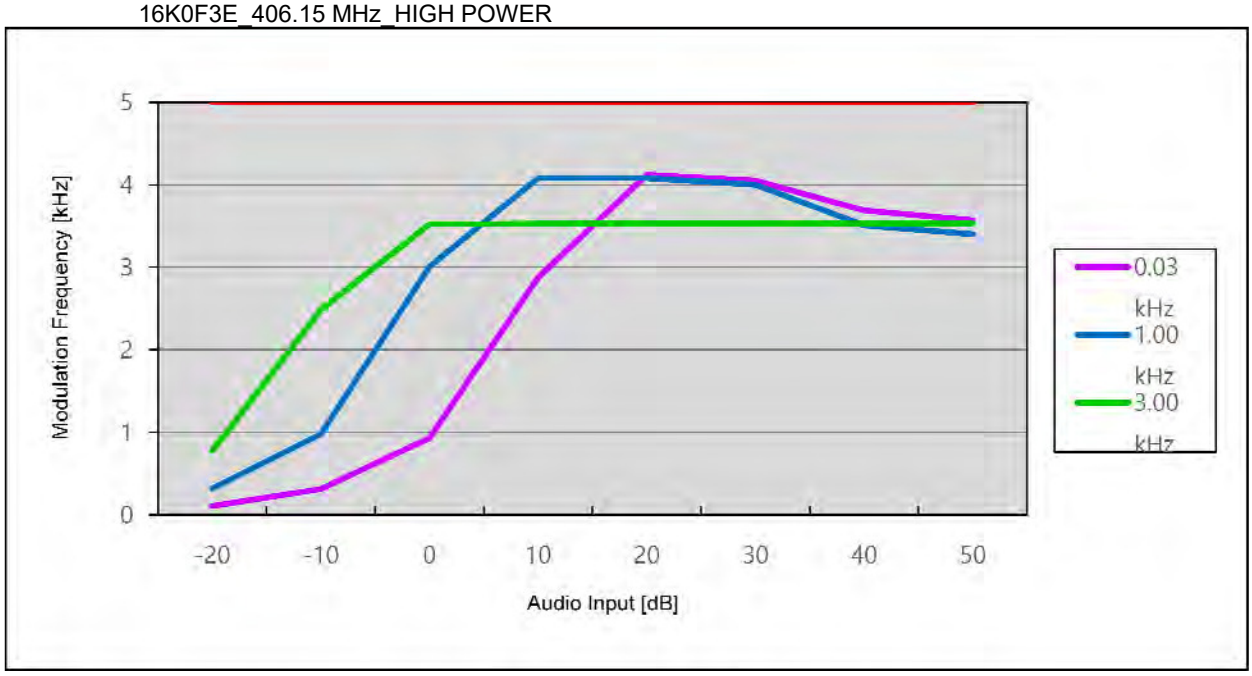


▣ TEST RESULTS

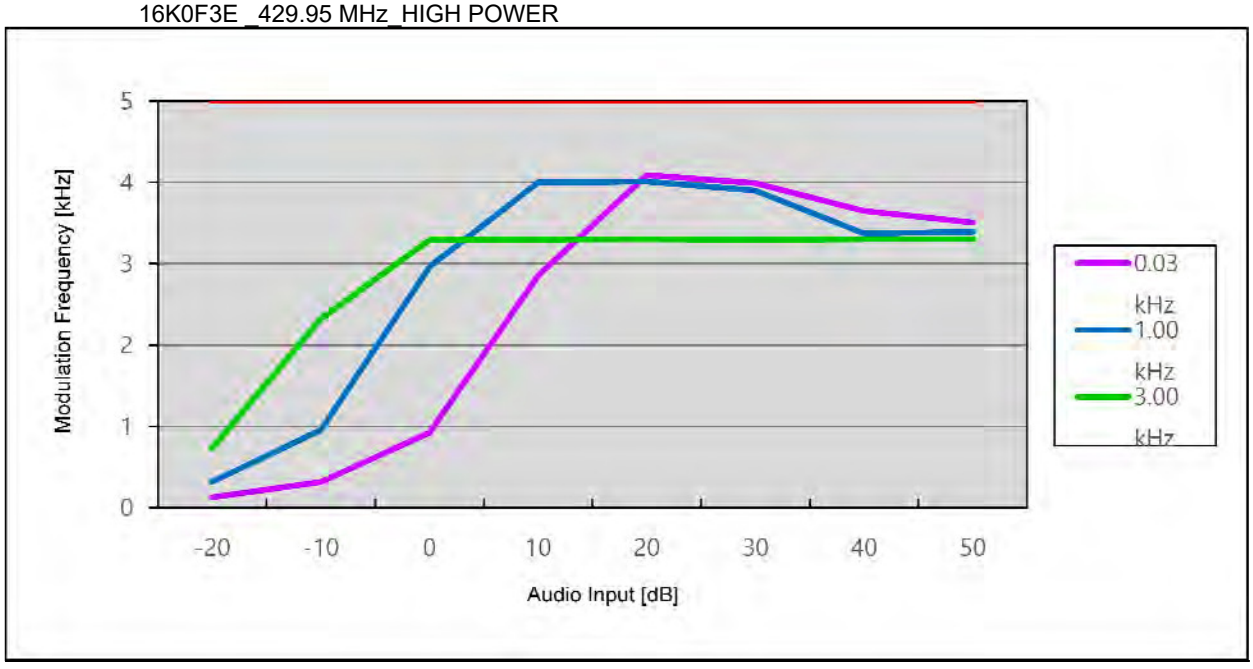
16K0F3E

Positive Peaks

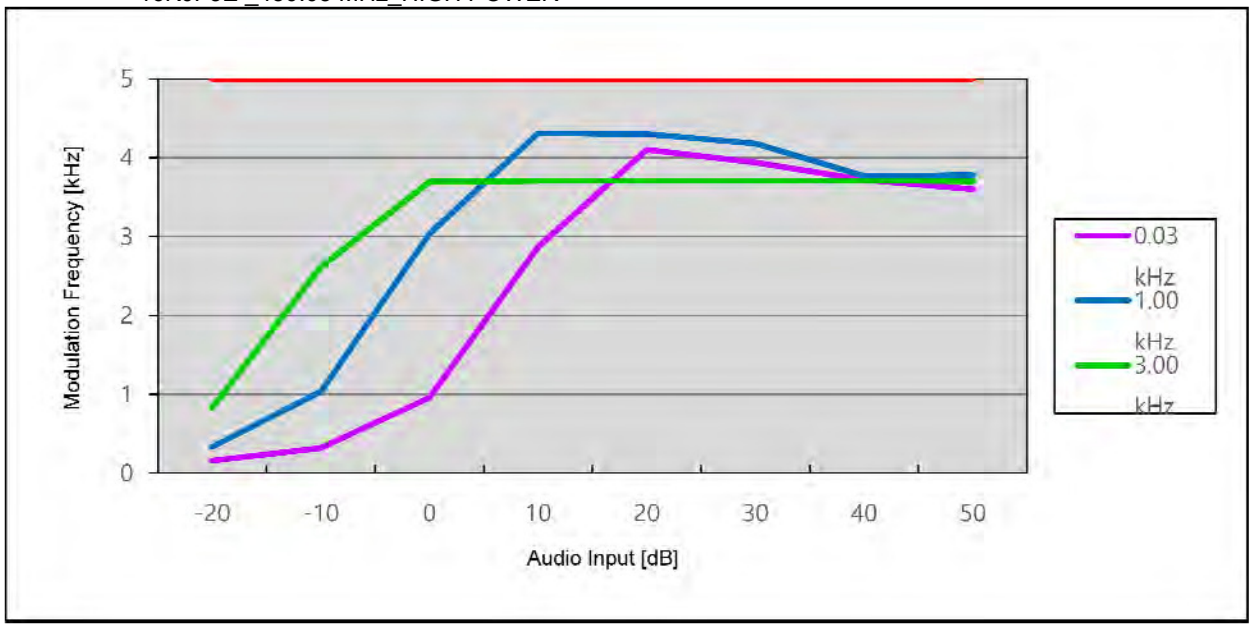
16K0F3E_406.15 MHz_HIGH POWER



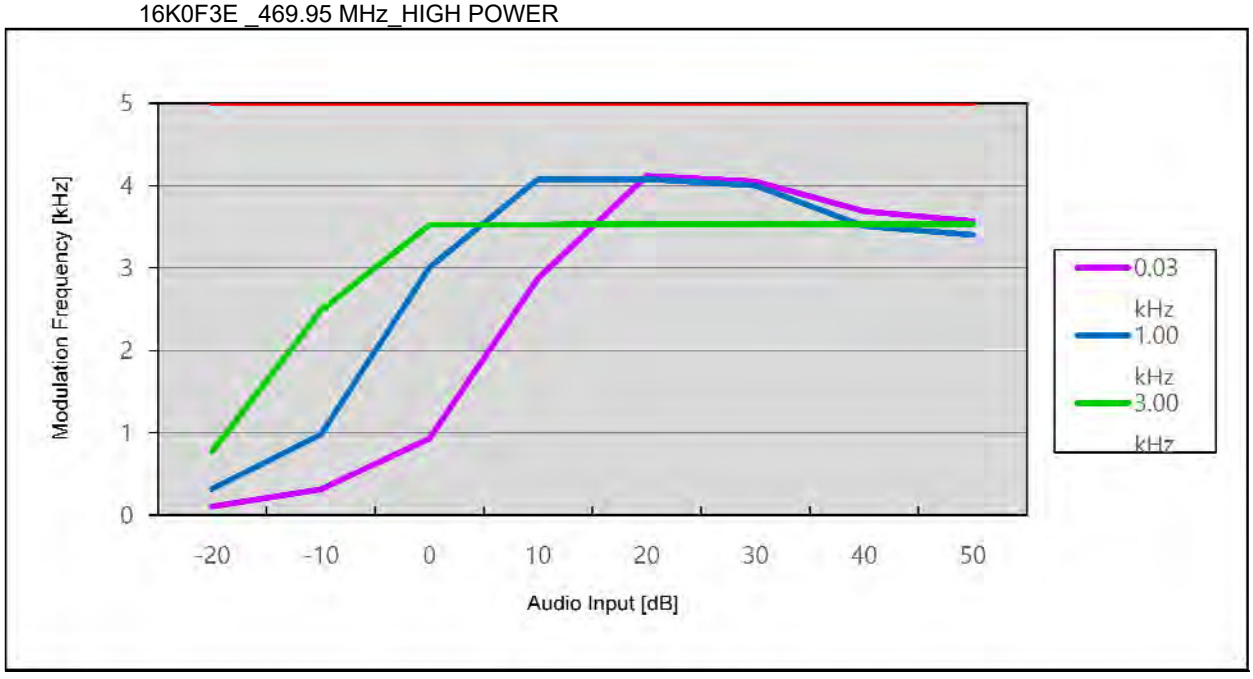
16K0F3E _429.95 MHz_HIGH POWER



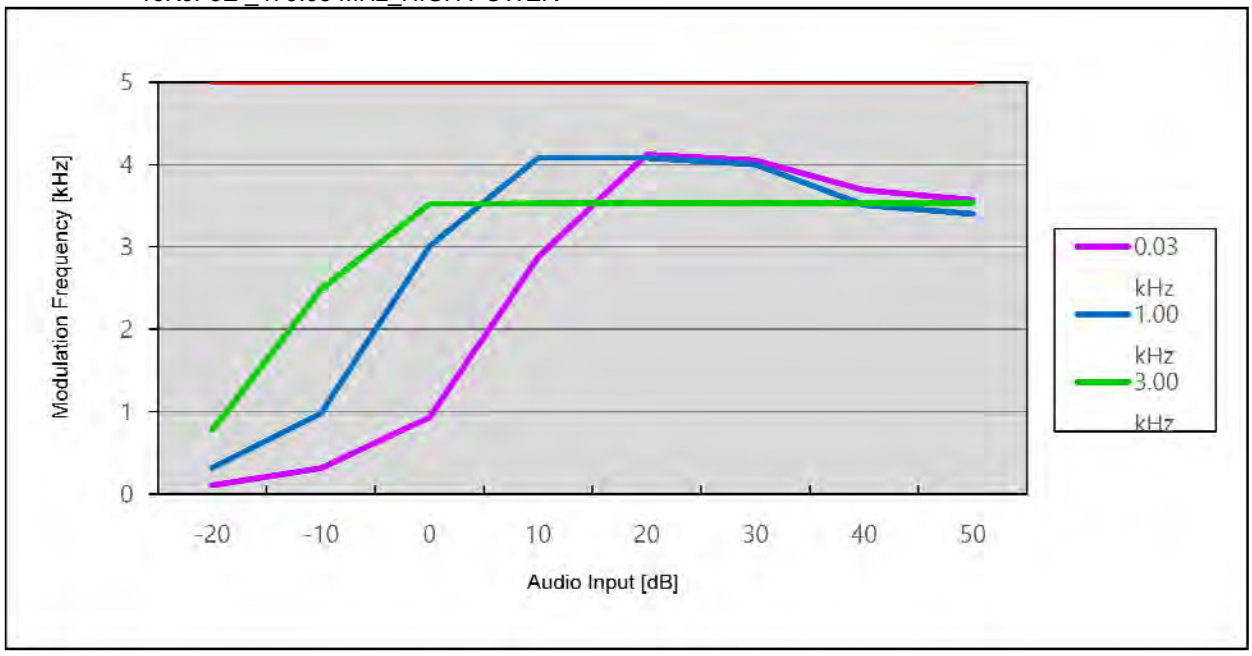
16K0F3E _450.05 MHz_HIGH POWER



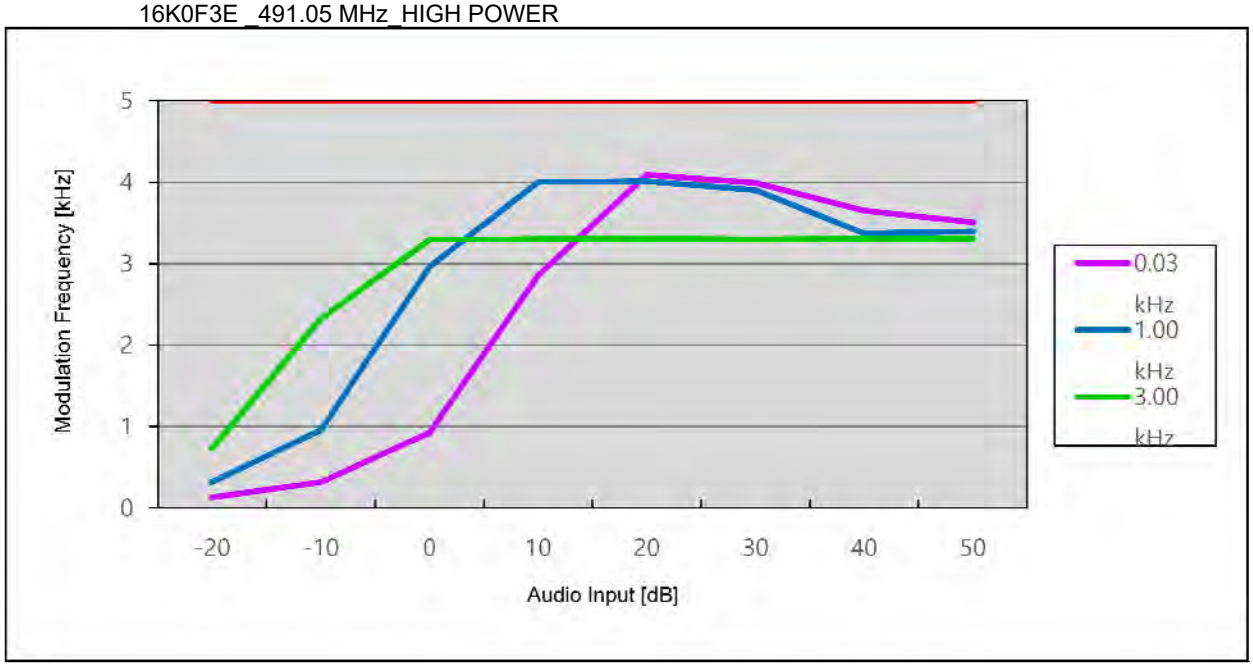
16K0F3E _469.95 MHz_HIGH POWER



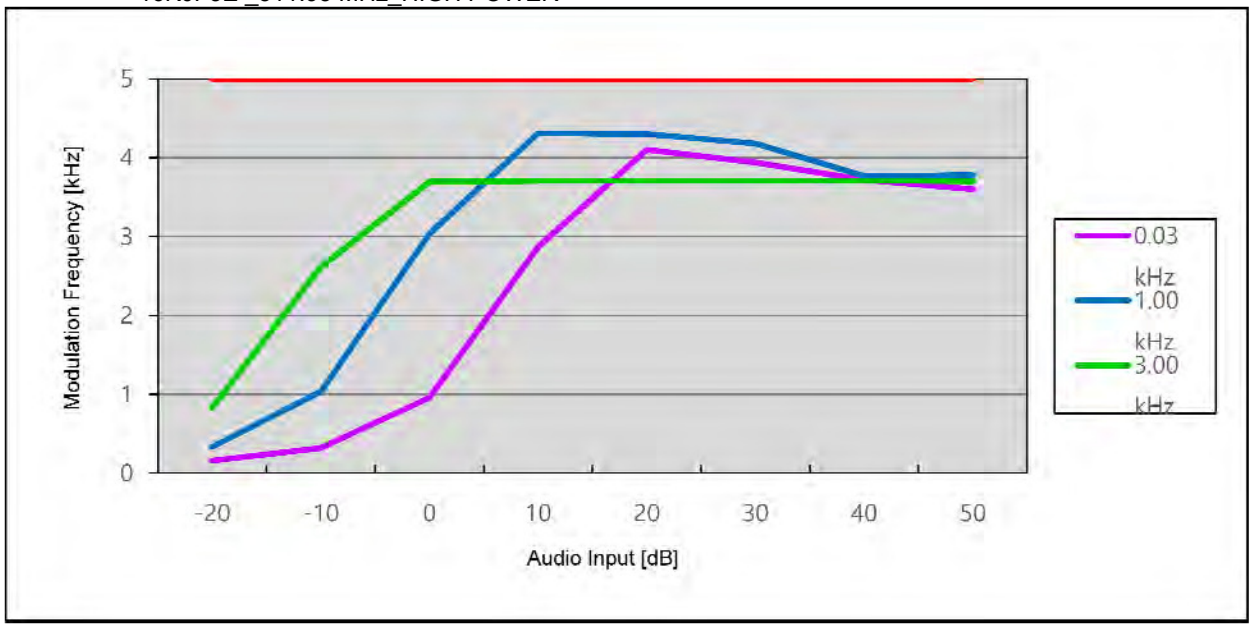
16K0F3E _470.05 MHz_HIGH POWER



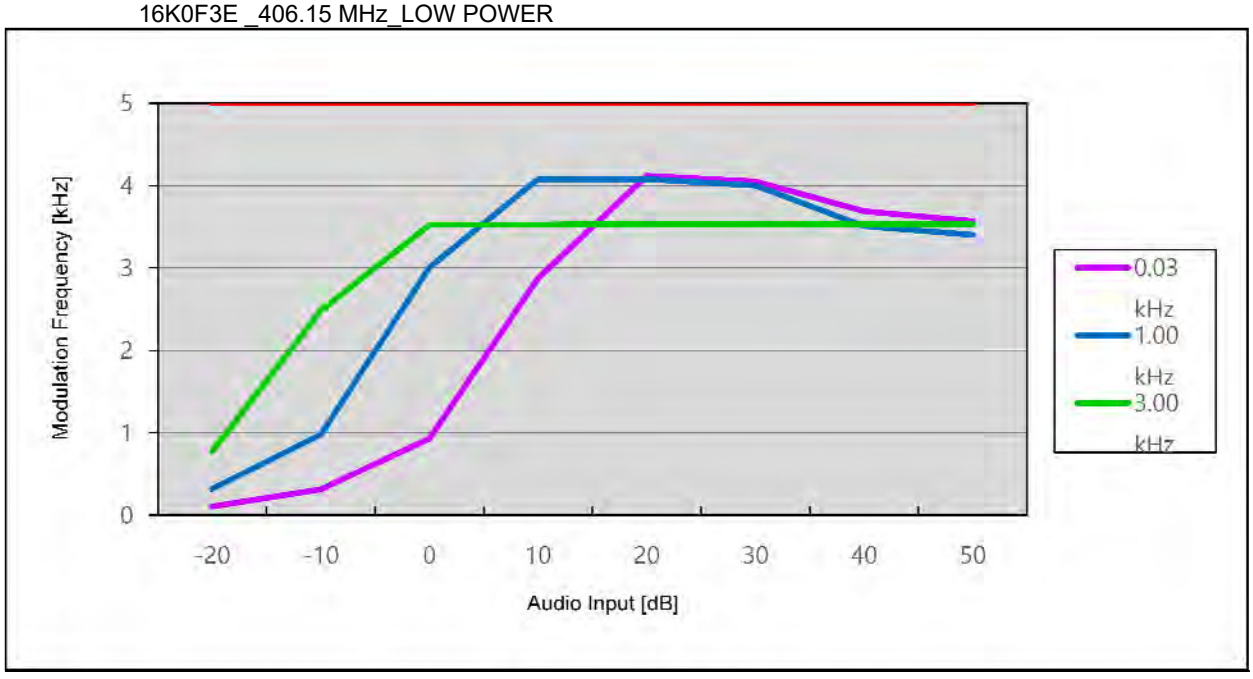
16K0F3E _491.05 MHz_HIGH POWER



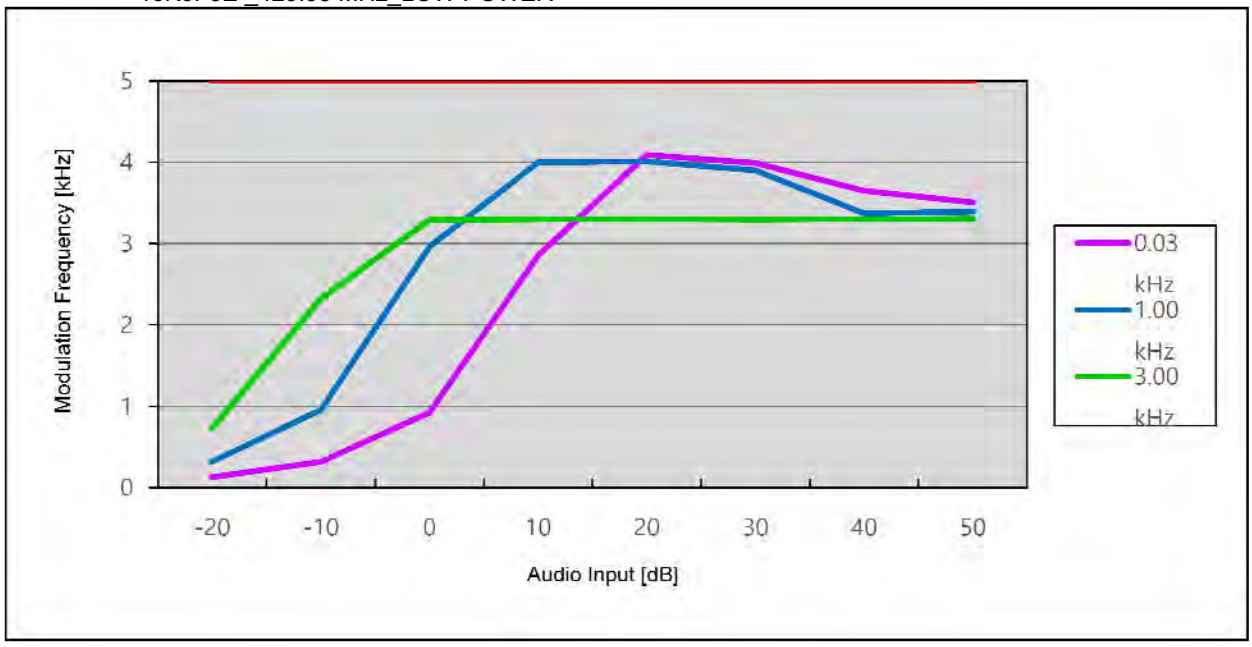
16K0F3E _511.95 MHz_HIGH POWER



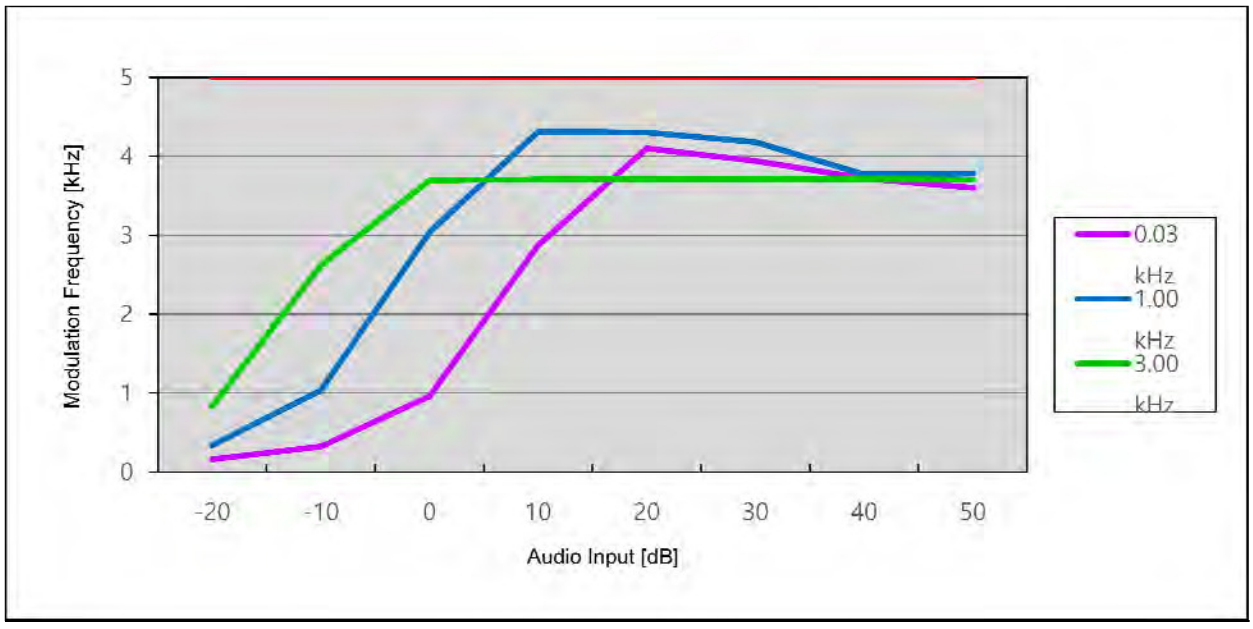
16K0F3E _406.15 MHz_LOW POWER



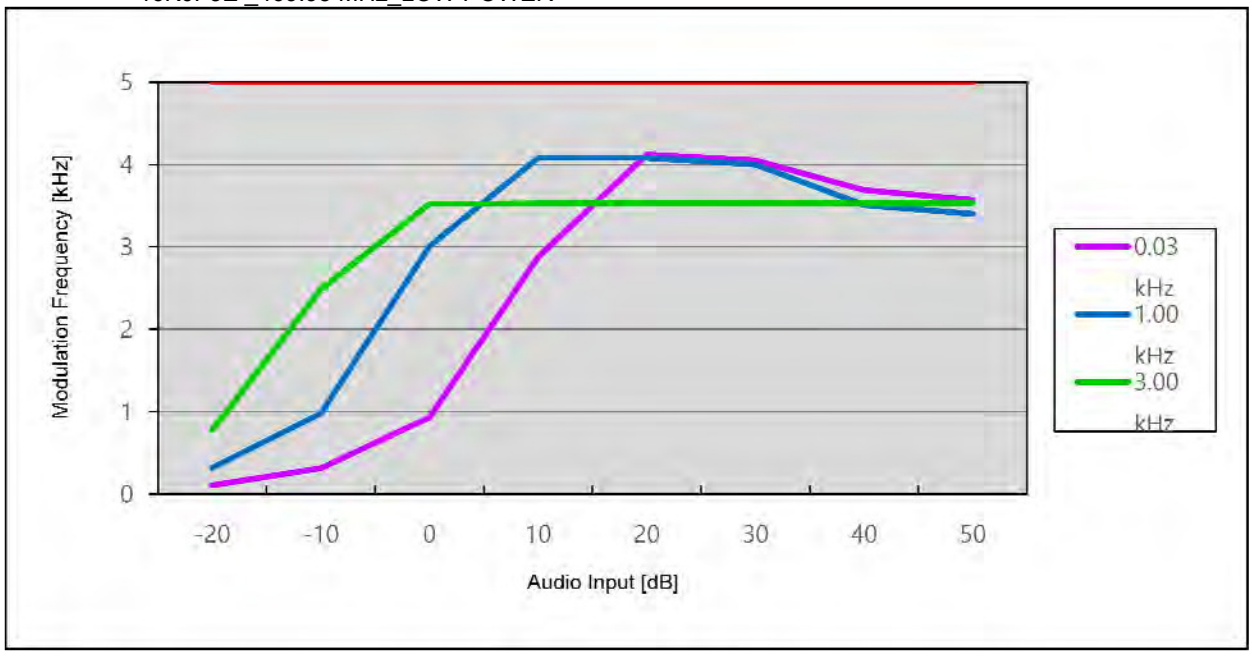
16K0F3E _429.95 MHz_LOW POWER



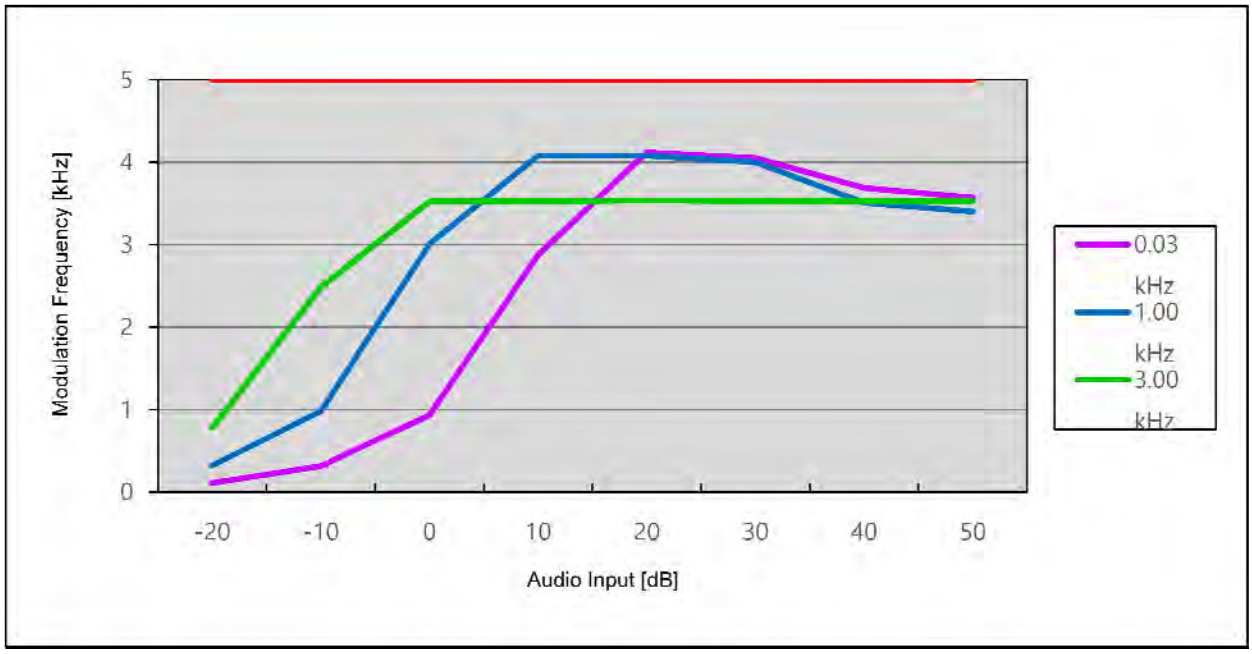
16K0F3E _450.05 MHz_LOW POWER



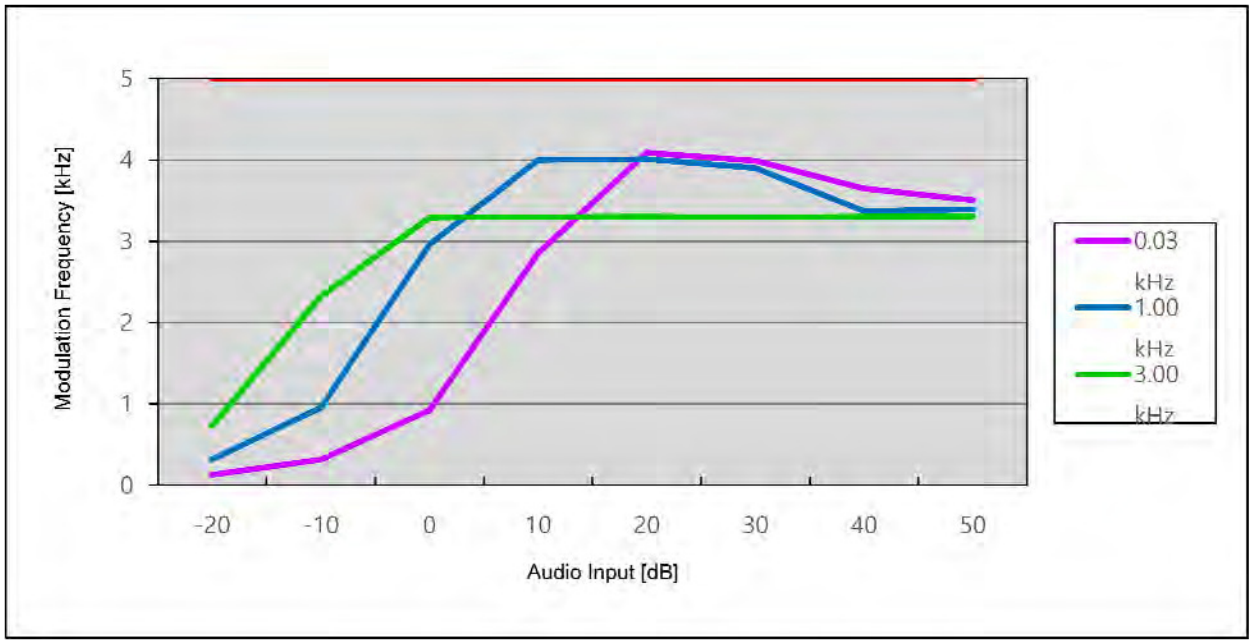
16K0F3E _469.95 MHz_LOW POWER



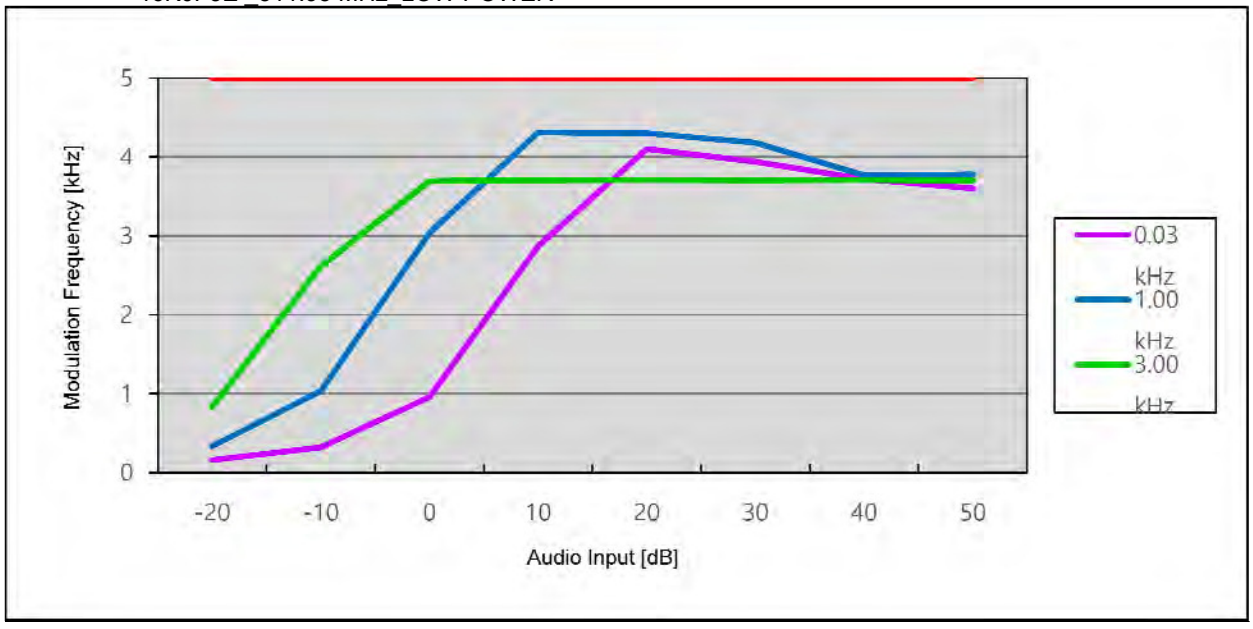
16K0F3E _470.05 MHz_LOW POWER



16K0F3E _491.05 MHz_LOW POWER

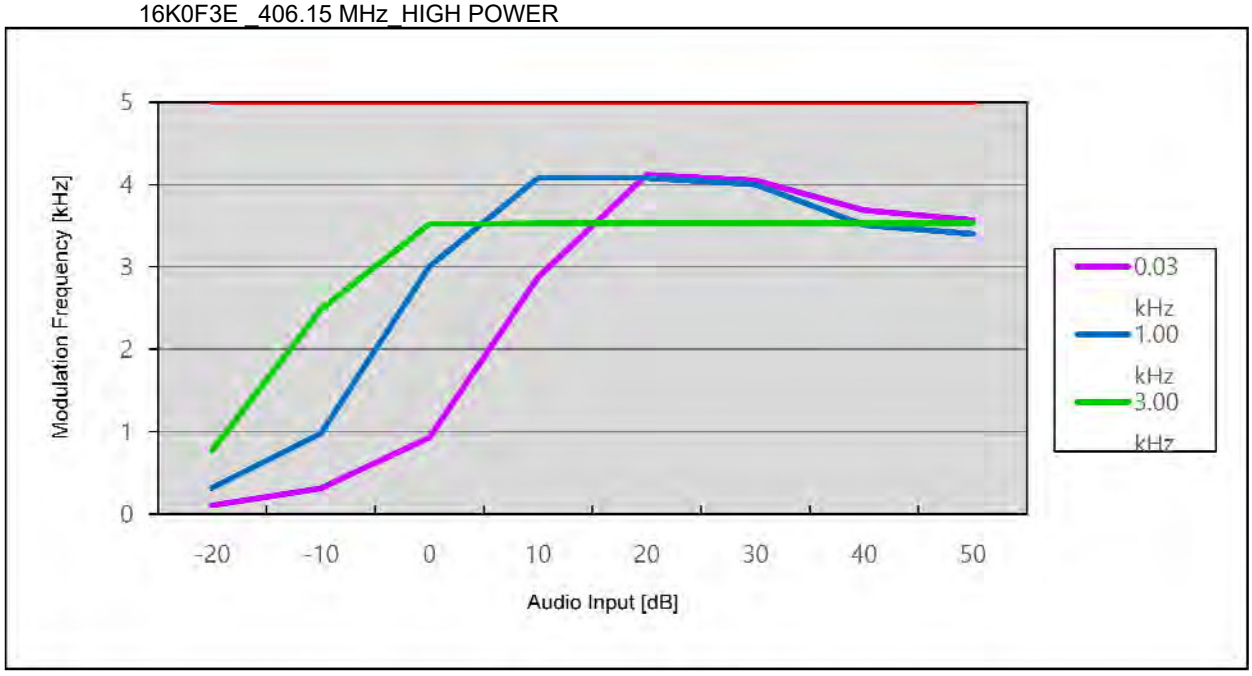


16K0F3E _511.95 MHz_LOW POWER

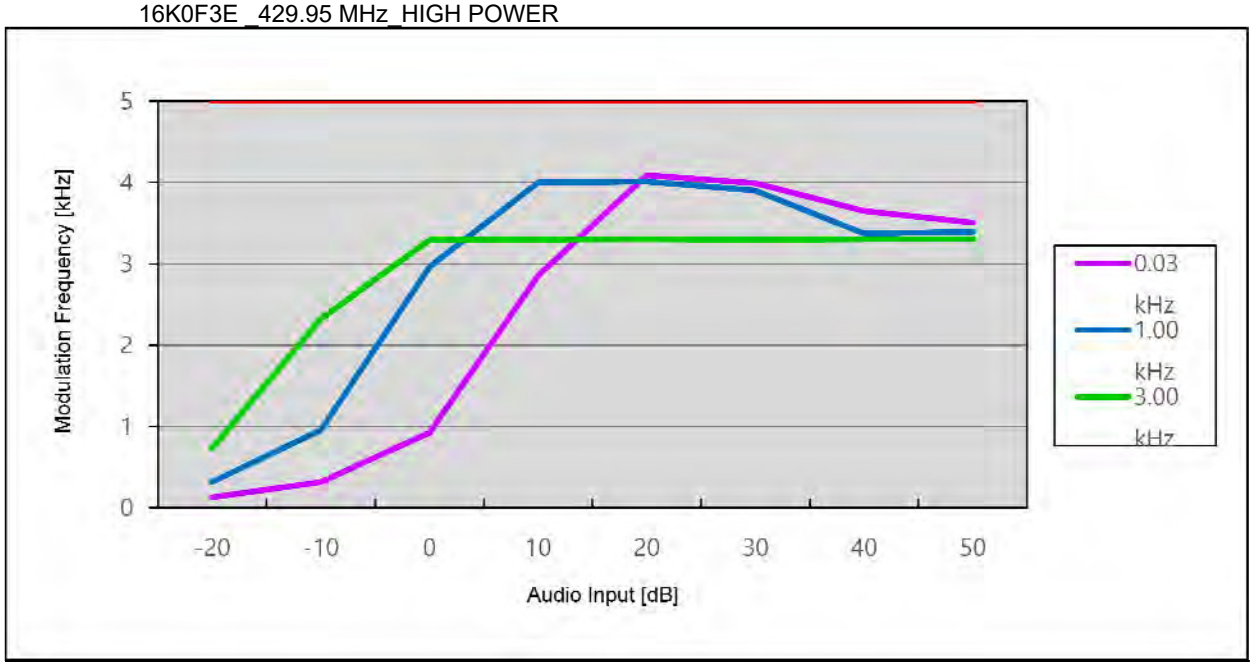


Negative Peaks

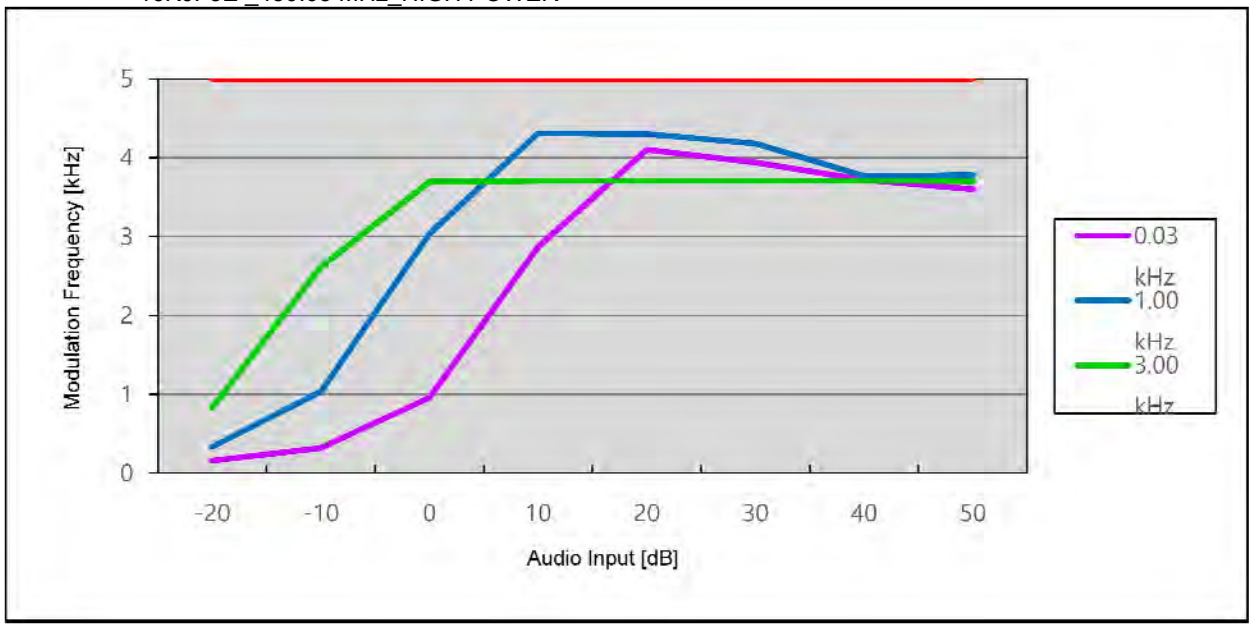
16K0F3E_406.15 MHz_HIGH POWER



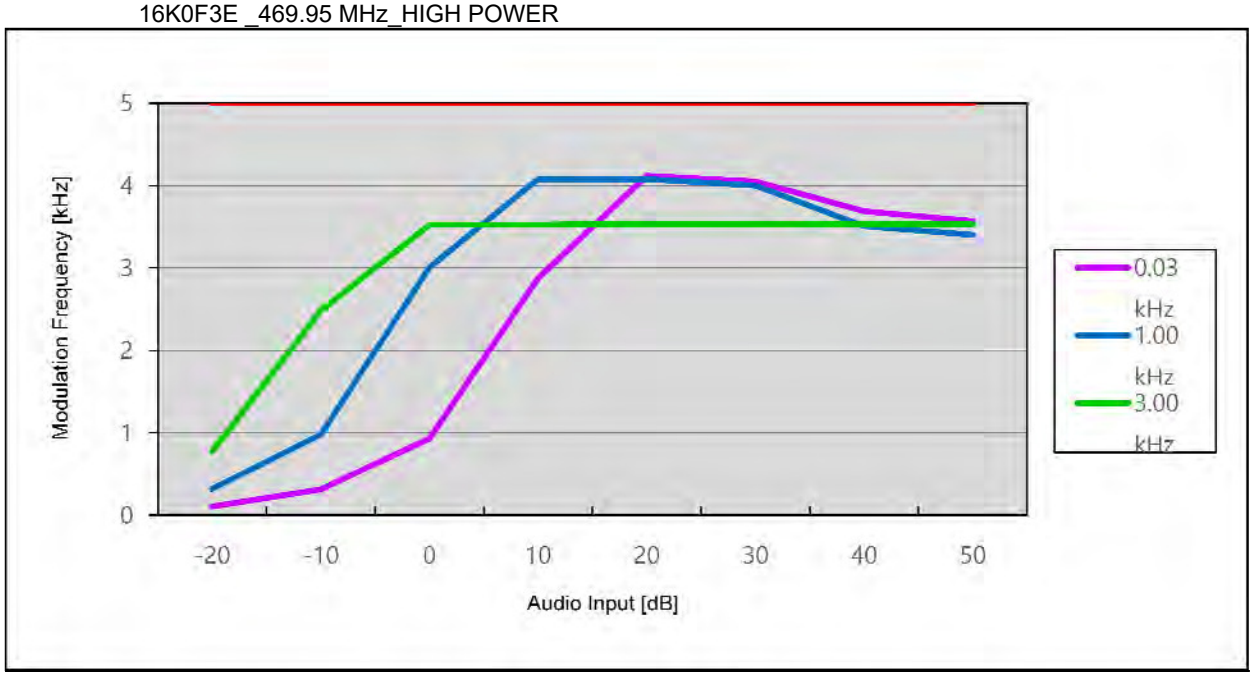
16K0F3E_429.95 MHz_HIGH POWER



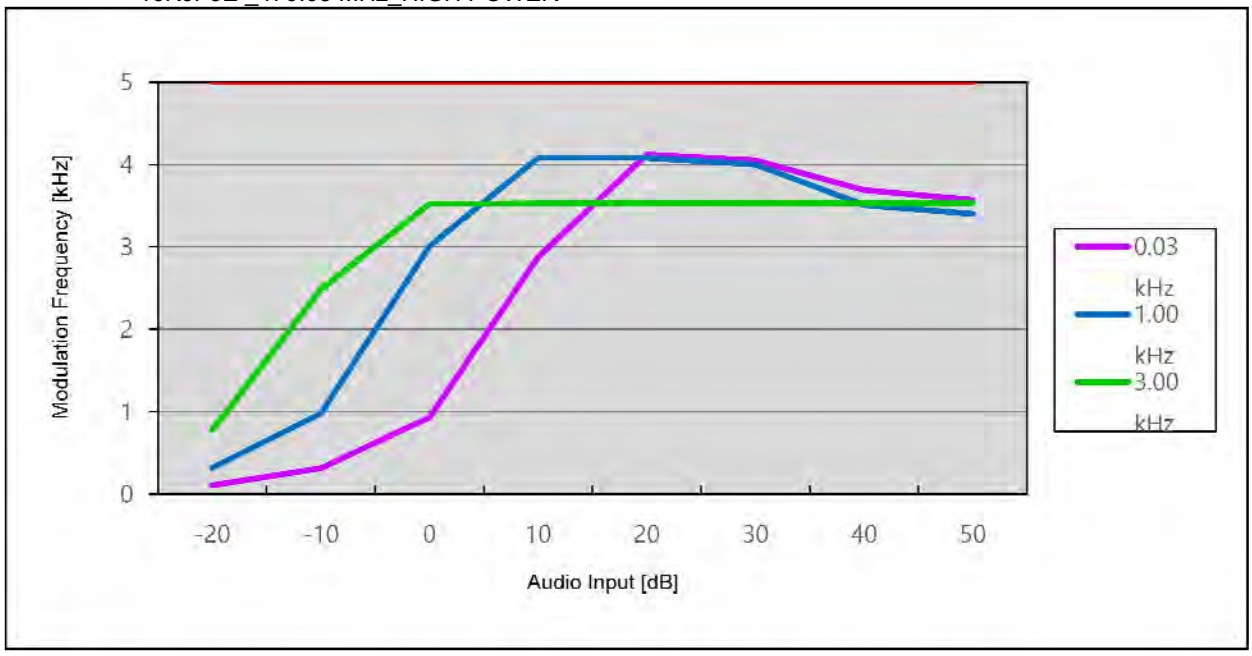
16K0F3E _450.05 MHz_HIGH POWER



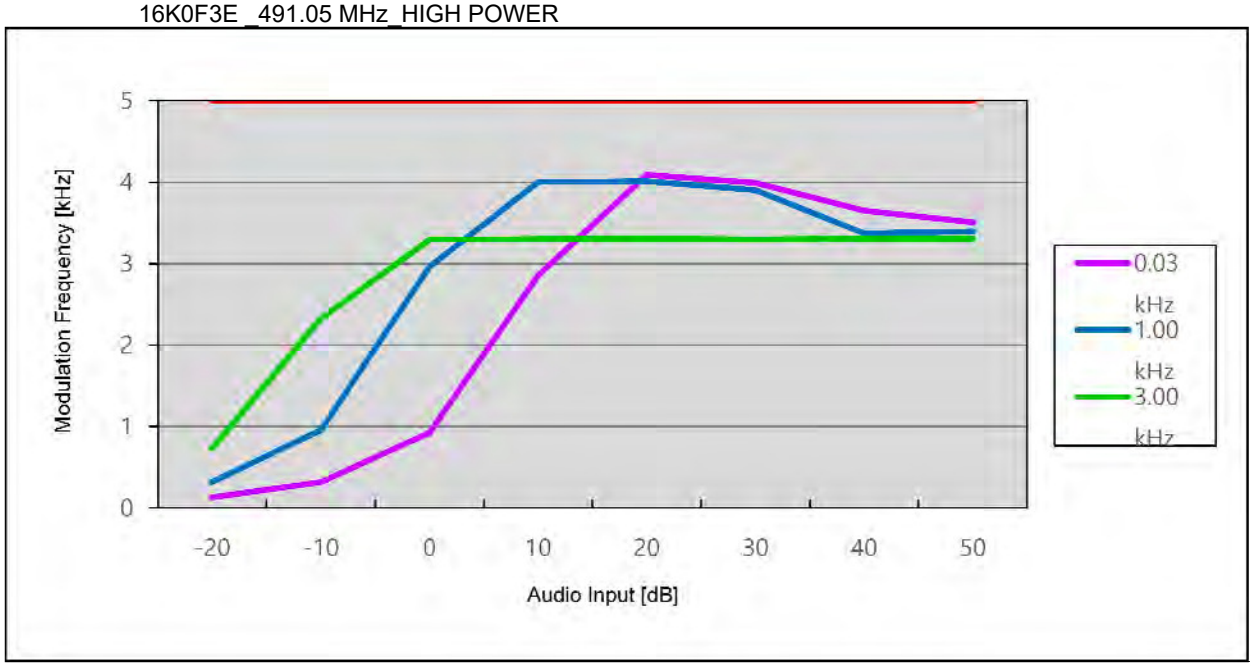
16K0F3E _469.95 MHz_HIGH POWER



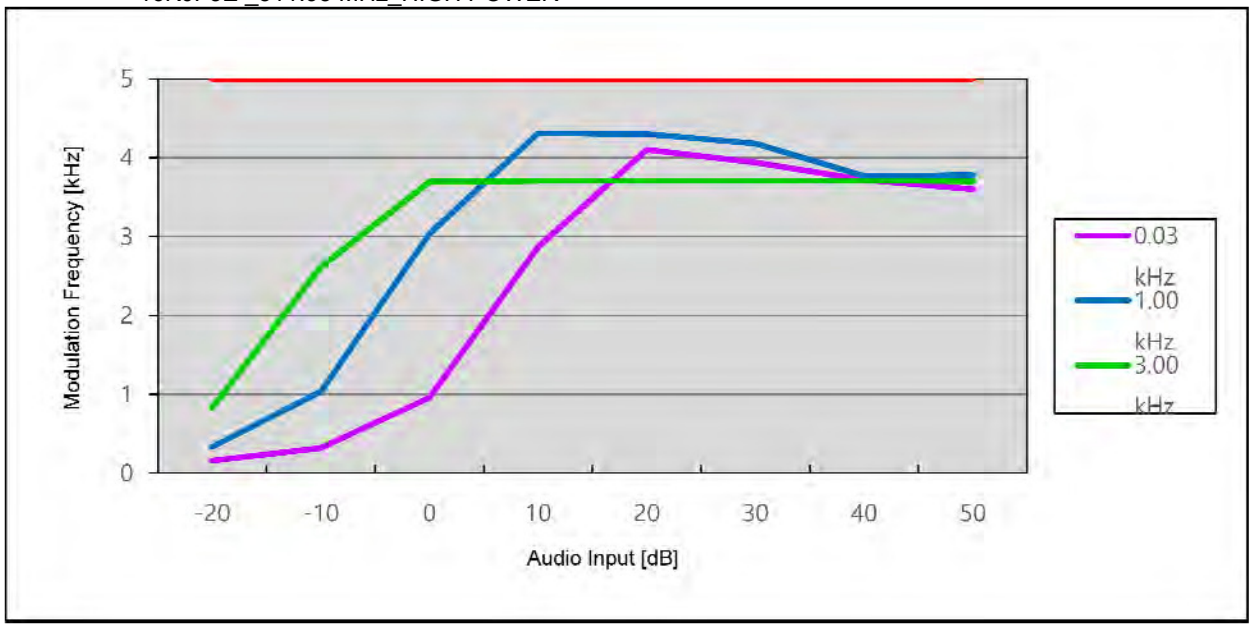
16K0F3E _470.05 MHz_HIGH POWER



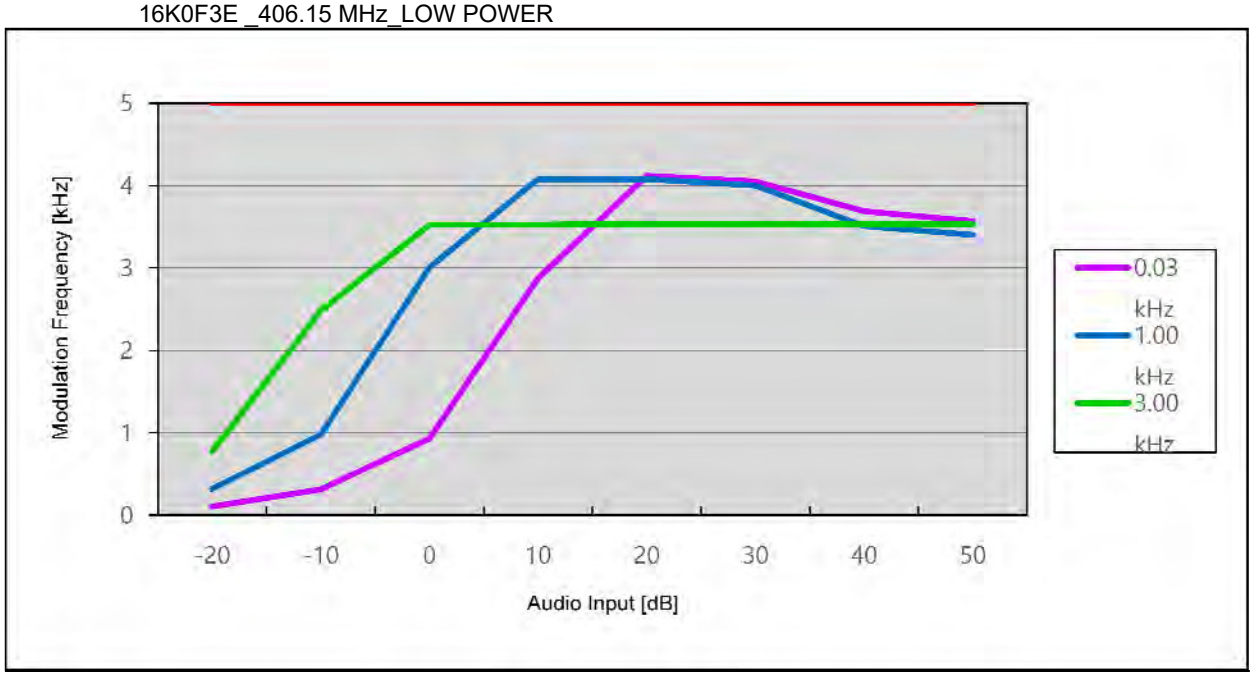
16K0F3E _491.05 MHz_HIGH POWER



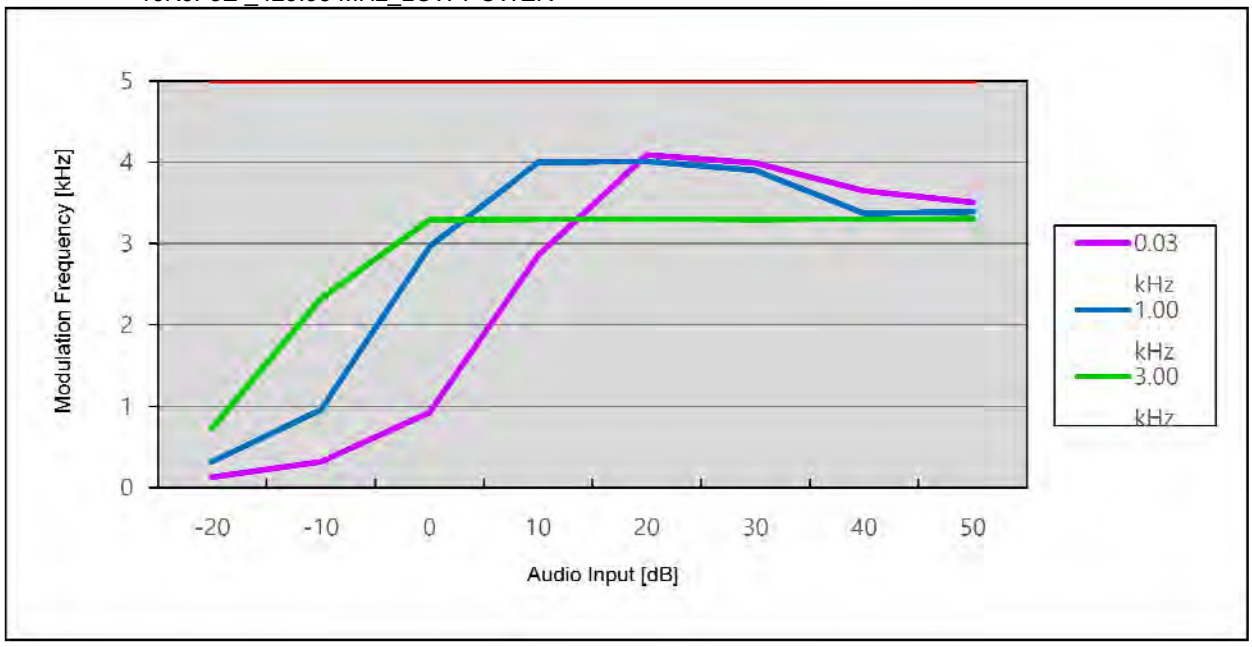
16K0F3E _511.95 MHz_HIGH POWER



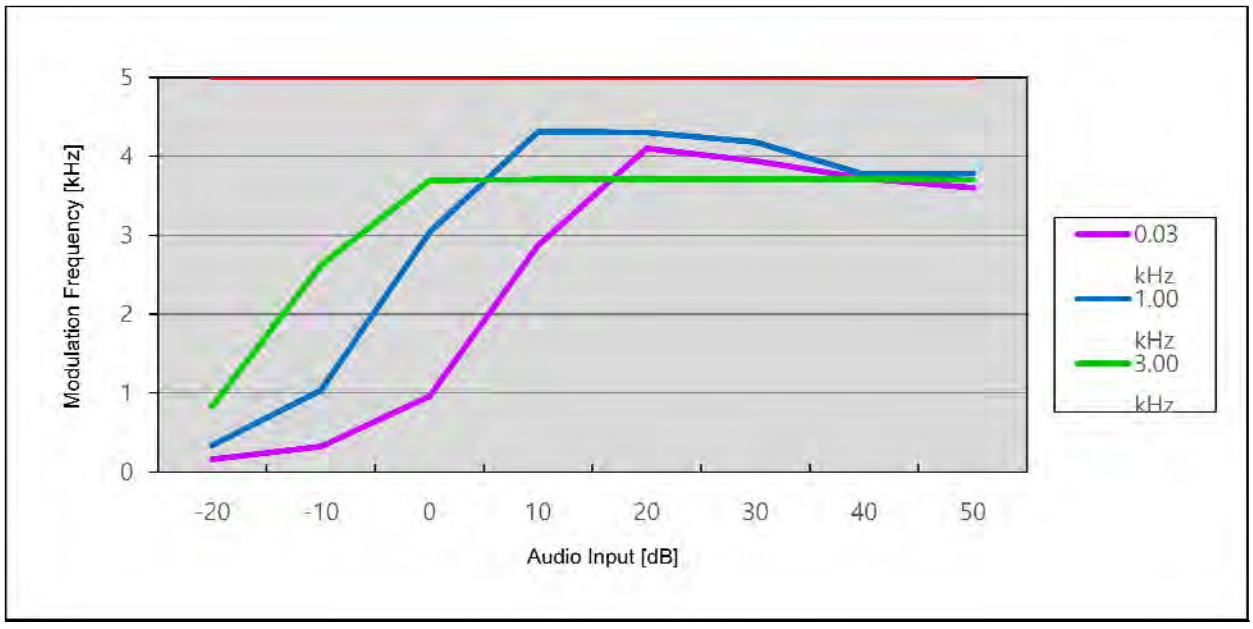
16K0F3E _406.15 MHz_LOW POWER



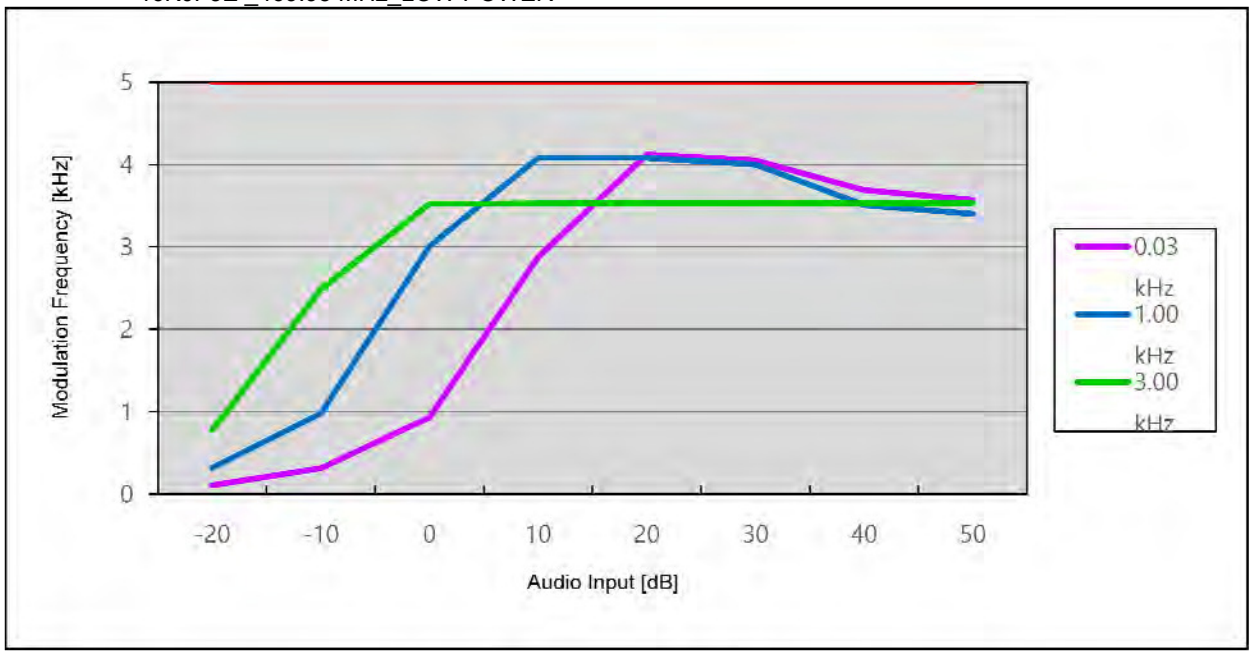
16K0F3E _429.95 MHz_LOW POWER



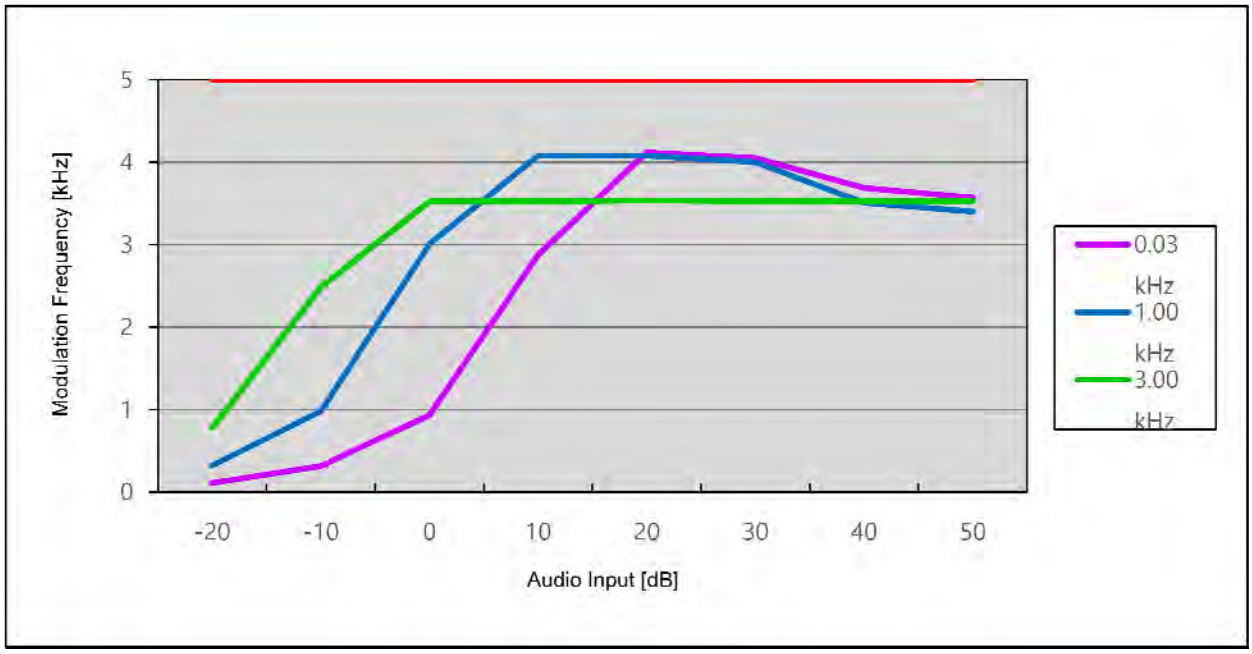
16K0F3E _450.05 MHz_LOW POWER



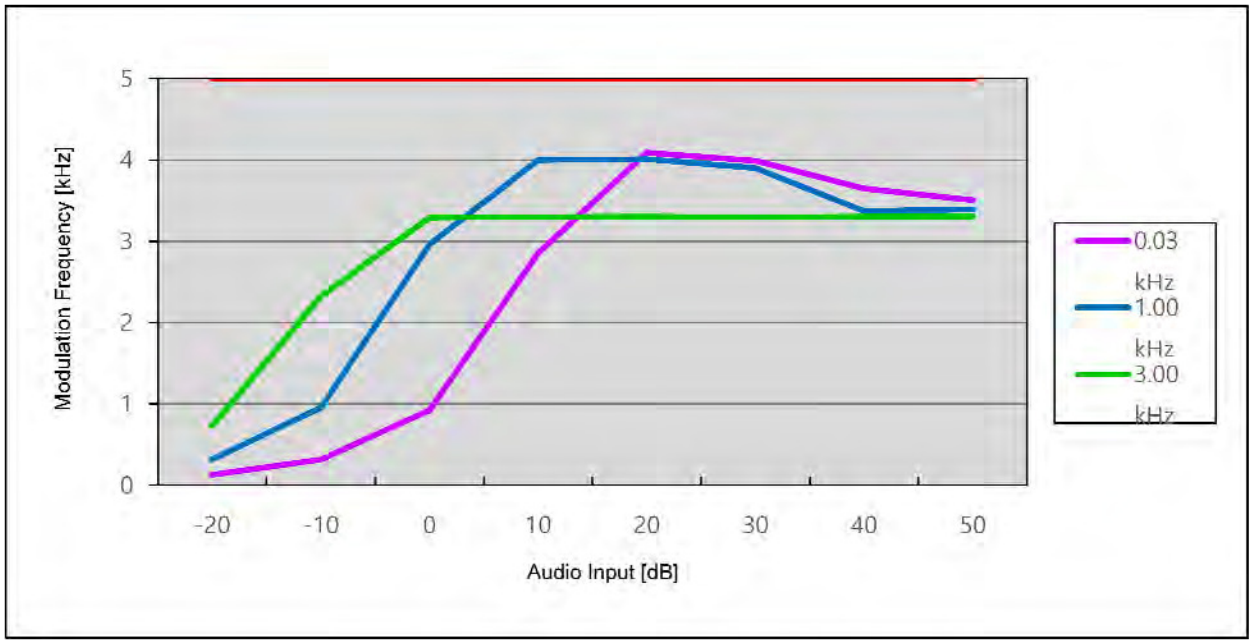
16K0F3E _469.95 MHz_LOW POWER



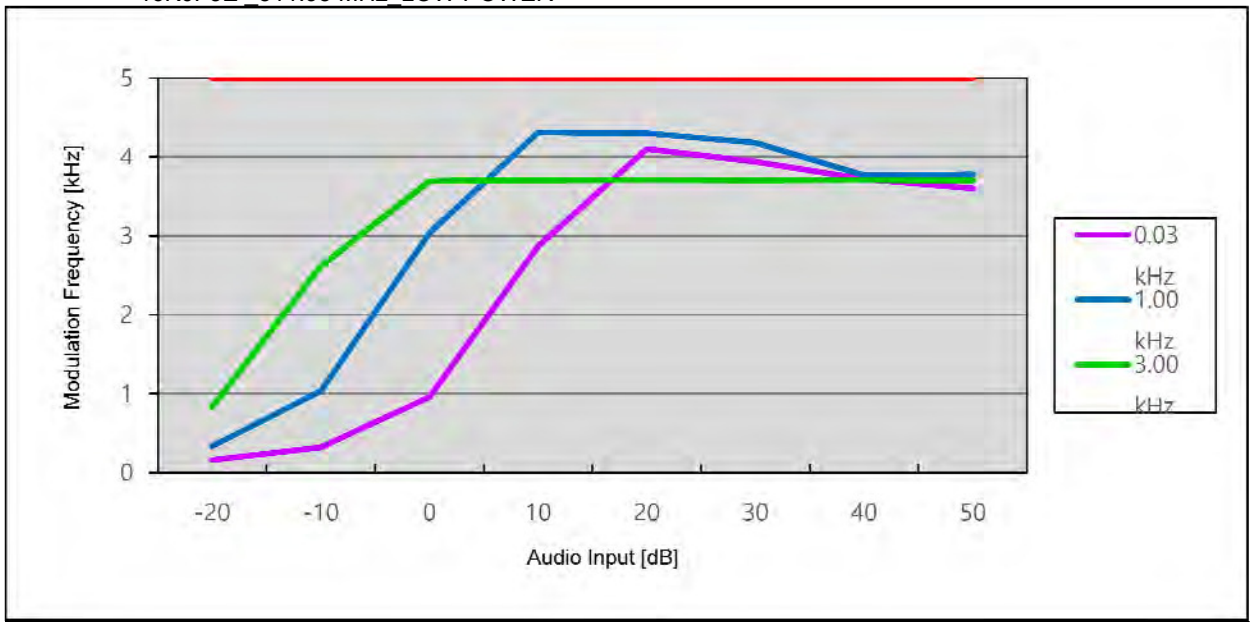
16K0F3E _470.05 MHz_LOW POWER



16K0F3E _491.05 MHz_LOW POWER



16K0F3E _511.95 MHz_LOW POWER

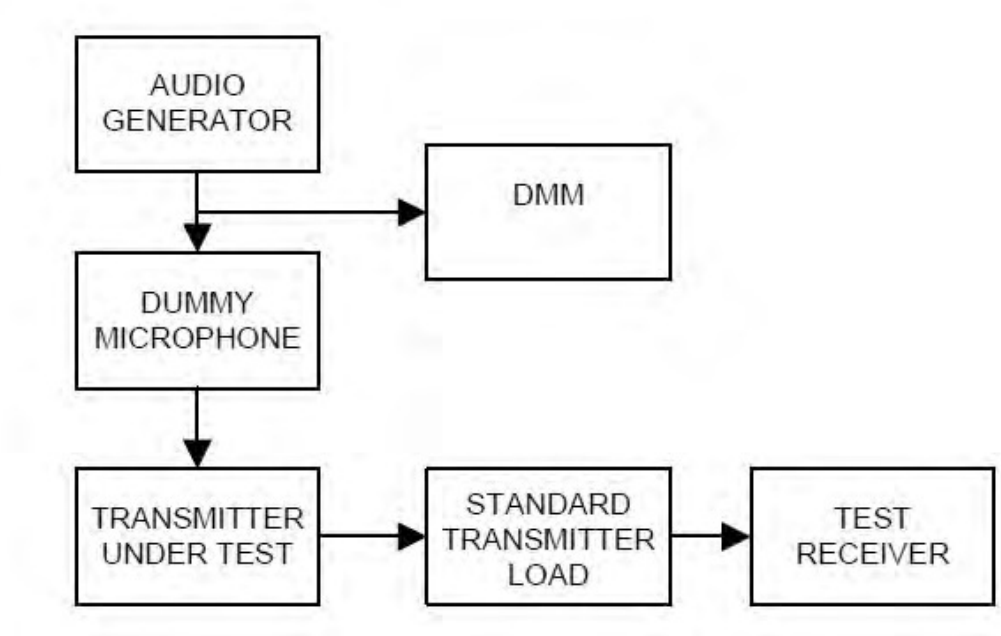


7.5 Audio Frequency Response / Audio Low Pass Filter Response

▣ 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

Frequency (Hz)	Attenuation Rel. to 1kHz (dB)	Upper limit (dB)	Lower limit (dB)
100	-29.85	-18.93	-42.86
125	-30.57	-17.00	-39.00
300	-10.47	-9.42	-23.84
500	-5.7	-5.00	-9.00
750	-2.37	-1.49	-5.49
1000	0.03	1.00	-3.00
1250	1.91	2.93	-1.07
1500	3.45	4.51	0.51
2000	5.8	7.00	3.00
2500	7.68	8.93	4.93
3000	8.17	10.51	4.93
4000	-18.37	-	-
5000	-18.33	-	-
6000	-18.24	-	-
7000	-18.26	-	-
8000	-18.28	-	-
9000	-18.43	-	-
10000	-18.34	-	-
20000	-18.3	-	-
30000	-18.26	-	-
40000	-18.26	-	-
50000	-18.28	-	-

11K0F3E_406.15 MHz_HIGH POWER