

**SUBMITTED MEASURED DATA**

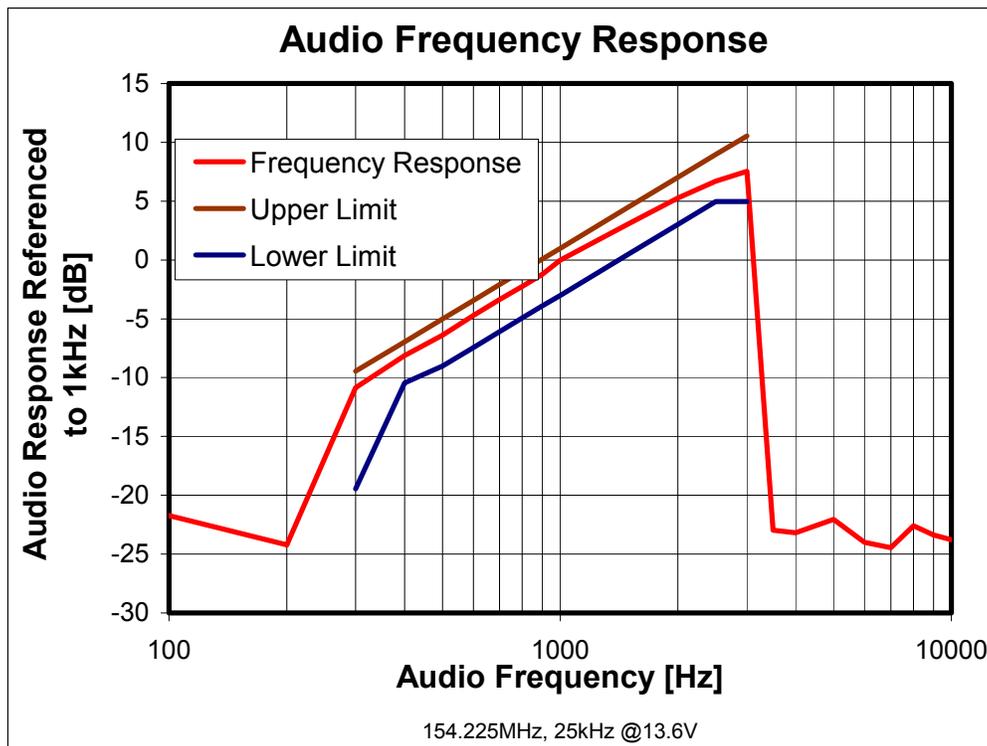
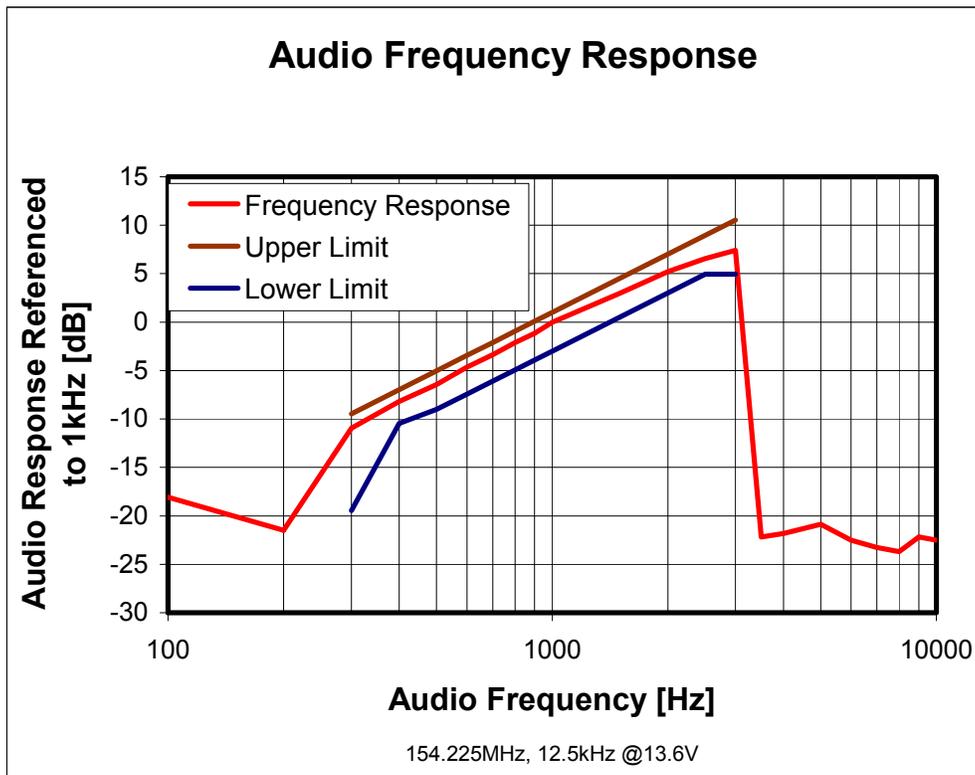
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### **1. RF POWER OUTPUT DATA**

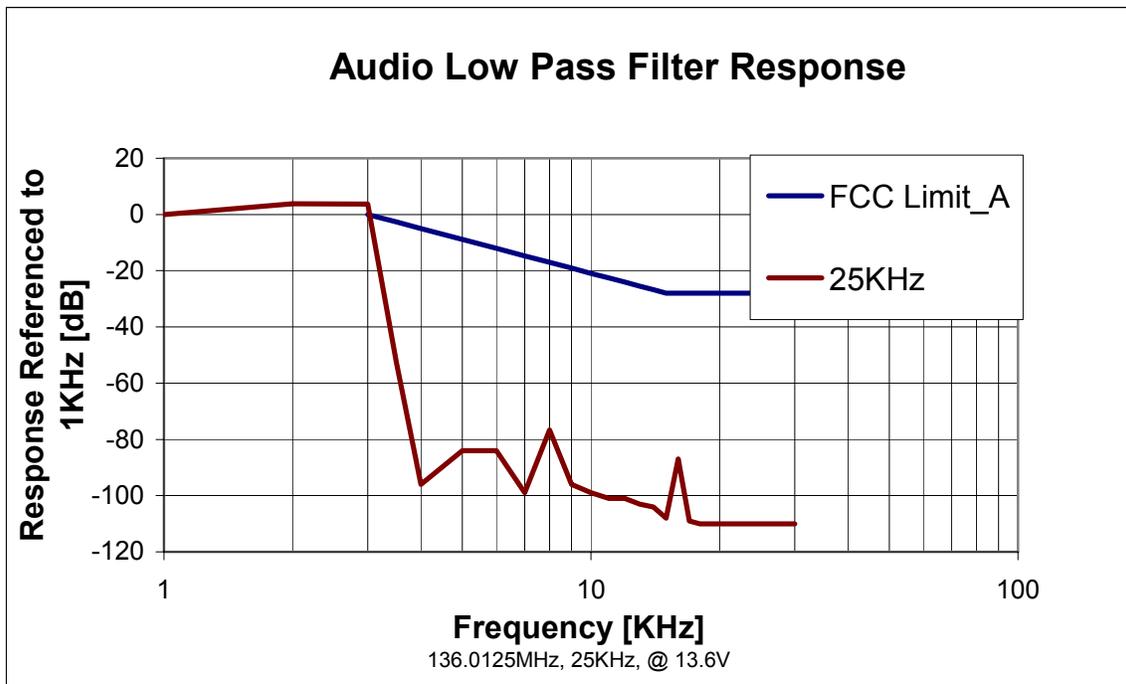
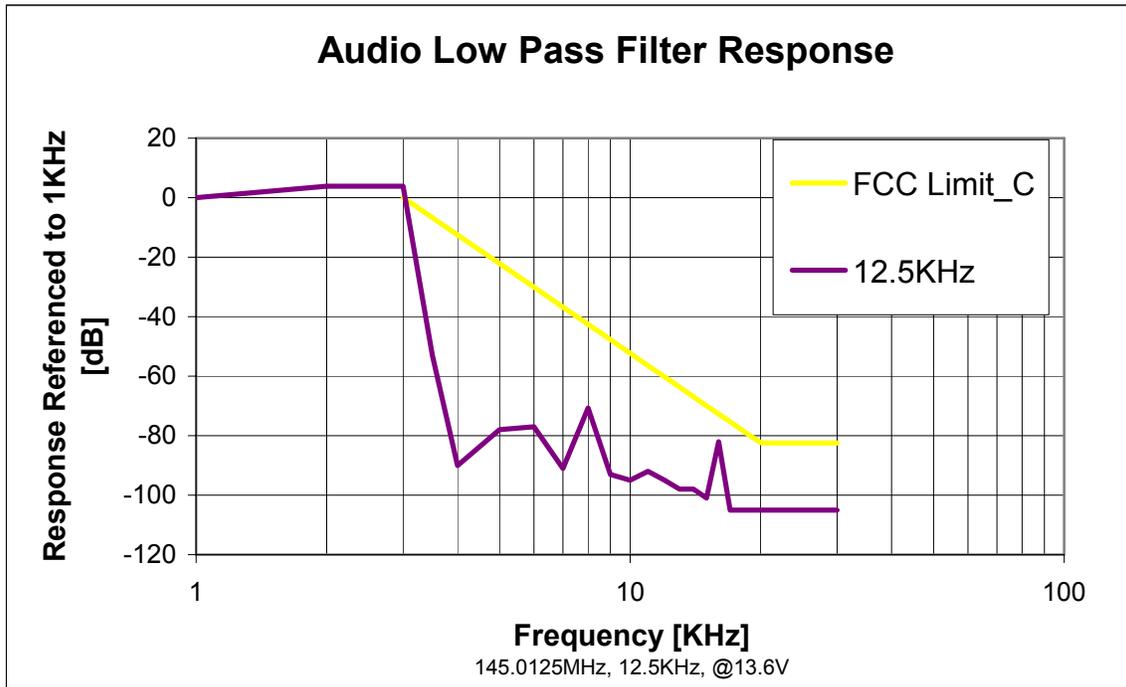
The RF power output and current was measured with the indicated nominal DC voltage applied to the radio.

<b>Power Level</b>	<b>Frequency [MHz]</b>	<b>Channel Spacing [KHz]</b>	<b>RF Output Power [W]</b>	<b>Nominal DC Voltage [V]</b>	<b>Nominal DC Current [A]</b>
120W	154.225	25	120	13.4	16.693
110W	154.225	25	110	13.4	15.88
55W	154.225	25	55	13.4	11.32
25W	154.225	25	24.4	13.4	7.784

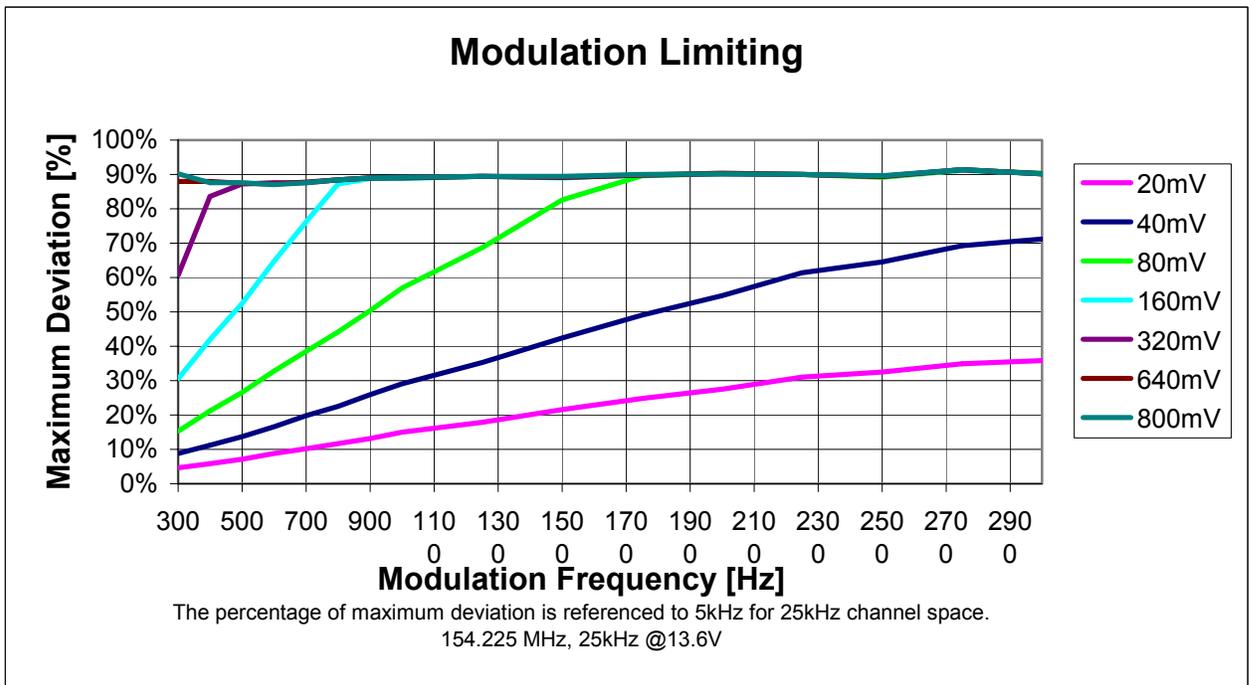
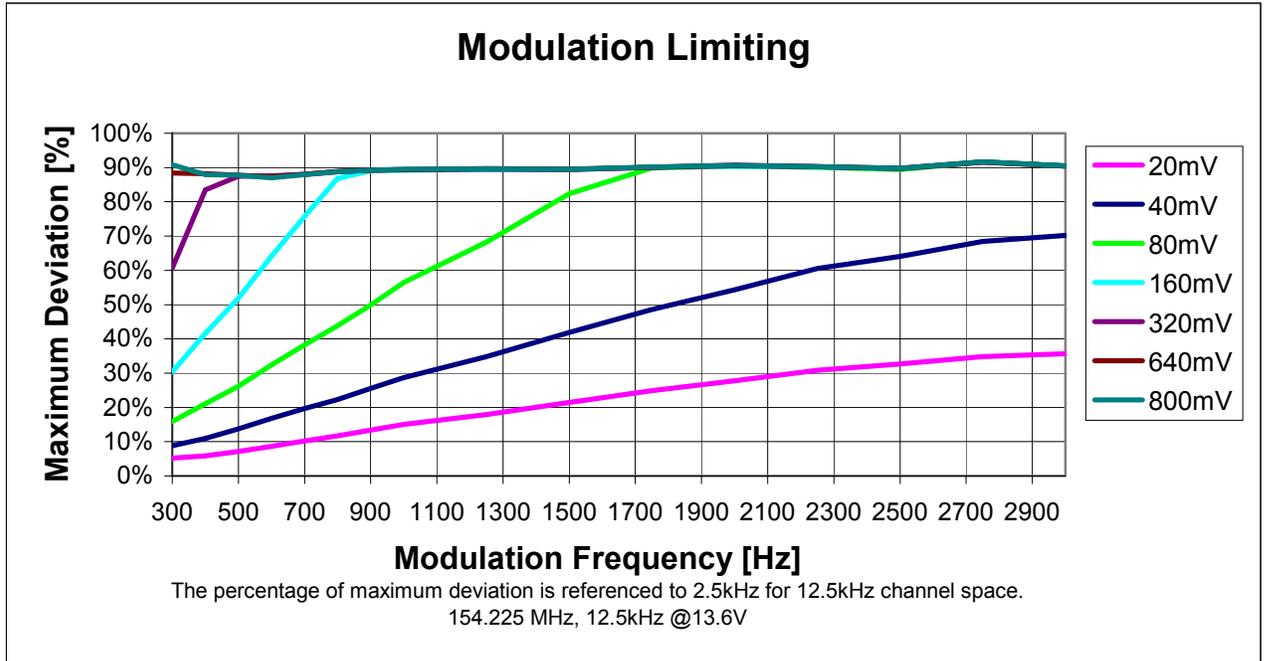
## 2. AUDIO FREQUENCY RESPONSE



### 3. LOW PASS FILTER RESPONSE



### 4. MODULATION LIMITING



## 5. OCCUPIED BANDWIDTH

### OCCUPIED BANDWIDTH DATA

#### BANDWIDTH CALCULATIONS:

Carson's Rule for FM modulation is utilized to compute the bandwidth shown in the FCC emission designator. Carson's Rule is:

$$BW = 2 * (M + D) \quad \text{where: } BW = \text{Bandwidth}$$

$$M = \text{Maximum modulating frequency}$$

$$D = \text{Deviation}$$

Shown below are the calculations required for FCC ID: **AZ492FT3808**

#### Standard Audio Modulation (25 kHz Channelization, Analog Voice):

Emission Designator 16K0F3E

In this case, the maximum modulating frequency is 3 kHz with a 5 kHz deviation.

$$BW = 2(M+D) = 2*(3 \text{ kHz} + 5 \text{ kHz}) = 16 \text{ kHz} \implies 16K0$$

F3E portion of the designator indicates voice.

Therefore, the entire designator for 25 kHz channelization analog voice is 16K0F3E.

#### Standard Audio Modulation (12.5 kHz Channelization, Analog Voice):

Emission Designator 11K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

$$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} \implies 11K0$$

F3E portion of the designator indicates voice.

Therefore, the entire designator for 12.5 kHz channelization analog voice is 11K0F3E.

#### Digital (12.5 kHz Channelization, Digital Data):

Emission Designator 8K10F1D

Measurements per Rule Part 2.202 Section C (4) were done because Part 2.202 Section g Table III A, 1 formulation produces an excessive result using the value of K recommended in the Table. Therefore, the 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X KHz, in this case, 8.10 kHz. Measurements were performed in accordance with TIA/EIA 102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

F1D portion of the designator indicates digital data.

Therefore, the entire designator for 12.5 kHz channelization digital data is 8K10F1D.

Digital (12.5 kHz Channelization, Digital Voice):

Emission Designator 8K10F1E

Measurements per Rule Part 2.202 Section C (4) were done because Part 2.202 Section g Table III A, 1 formulation produces an excessive result using the value of K recommended in the Table. Therefore, the 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X KHz, in this case, 8.10 kHz. Measurements were performed in accordance with TIA/EIA 102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

F1E portion of the designator indicates digital voice.

Therefore, the entire designator for 12.5 kHz channelization digital voice is 8K10F1E.

Digital (12.5 kHz Channelization, Digital Voice Encryption):

Emission Designator 8K10F1E (Per 47CFR 90.212(b))

Measurements per Rule Part 2.202 Section C (4) were done because Part 2.202 Section g Table III A, 1 formulation produces an excessive result using the value of K recommended in the Table. Therefore, the 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X KHz, in this case, 8.10 kHz. Measurements were performed in accordance with TIA/EIA 102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

F1E portion of the designator indicates digital voice.

Therefore, the entire designator for 12.5 kHz channelization digital voice (with encryption) is 8K10F1E.

Secure Mode (20.0 kHz Channelization, Digital Voice Encryption):

Emission Designator 20K0F1E

In this case, the maximum modulating frequency is 6.0 kHz with a 4.0 kHz deviation.

$$BW = 2(M+D) = 2*(6.0 \text{ kHz} + 4.0 \text{ kHz}) = 20 \text{ kHz} \implies 20K0$$

F1E portion of the designator indicates digital voice.

Therefore, the entire designator for 20.0 kHz channelization secure mode (digital voice encryption) is 20K0F1E.

Note: The 90.203(j) efficiency standard for "F1D" emission is met by sending 2 bits at a time, at a rate of 4800 symbols/second. This yields 9600 bits/second, which is achieved using the modulation technique described in the note below. Modulation results from one of the digital 4-level standard symbol patterns applied to the modulation at a rate of 9600 bits/second. The modulation technique is 4-level FM. The information bits are commonly represented by a symbol that corresponds to one of 4 levels of FM deviation according to the following table.

<u>Information Bits</u>	<u>Symbol</u>	<u>C4FM Deviation</u>
01	+3	+1.8 kHz
00	+1	+0.6 kHz
10	-1	-0.6 kHz
11	-3	-1.8 kHz

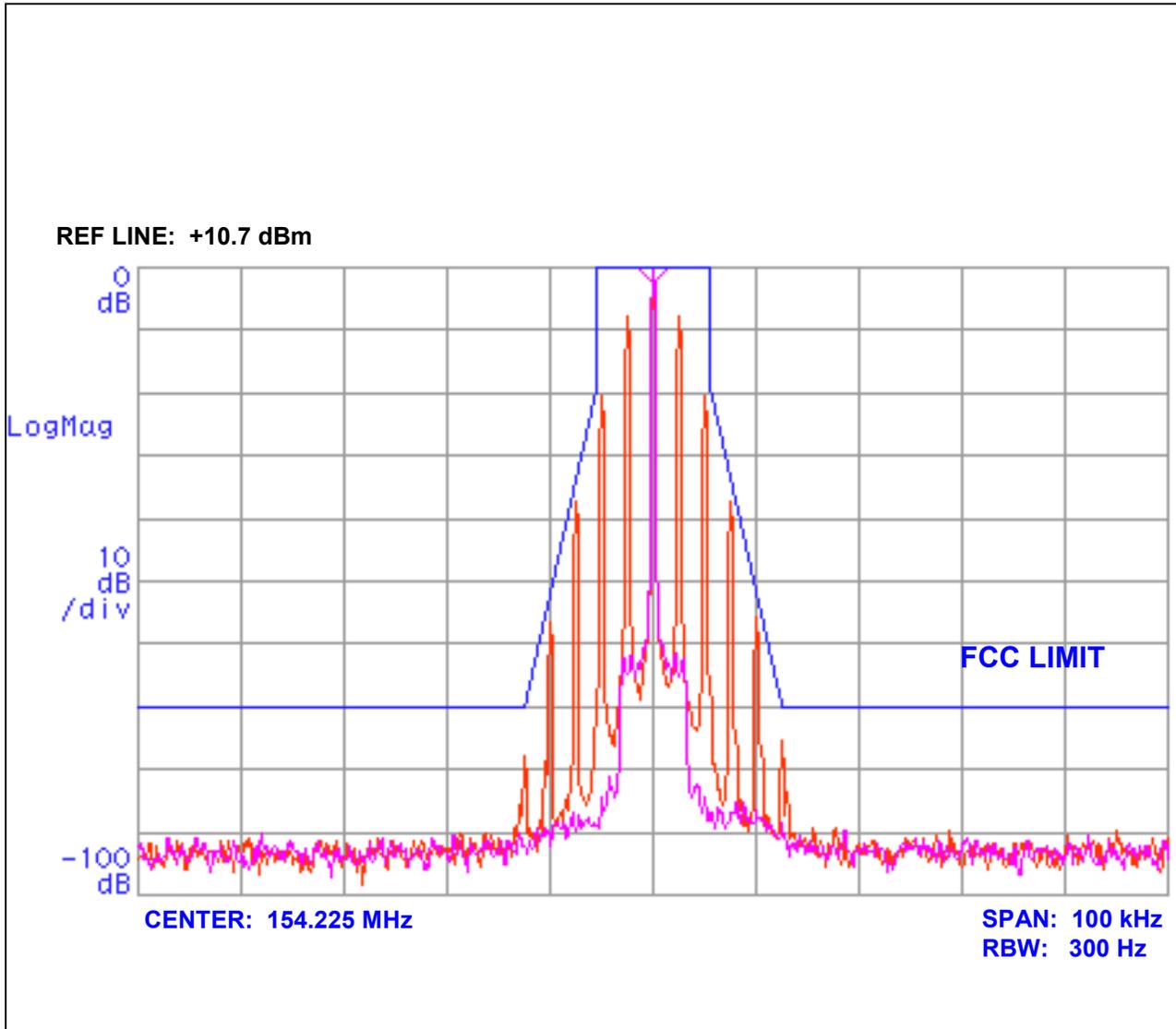
For example, an 8-bit binary pattern of 0010 1101 would be sent as symbols +1, -1, -3, +3, which would cause a modulation signal (Frequency-Shift-Keyed) of +1.8 kHz, -600 Hz, -1.8 kHz, and +1.8 kHz. This results in 9600 bits/second of information being sent on a 12.5 kHz channel, which is the equivalent of 4800 bits/second per 6.25 kHz.

Note: The "F1D" and "F1E" signal parameters are described as follows: The modulation is 4-level FSK with +/-600 Hz and +/-1.8 kHz shifting (+/-600 Hz and +/-1.8 kHz are the 4 distinct levels of signals). The digital voice test pattern is created by a 2500 Hz sine wave modulated at a level that is 16 dB above that required producing 50% deviation at the radio output. The digital data test signal is generated by an internally generated pseudo random test pattern based on ITU-T 0.153 (formally CCITT V.52).

**OCCUPIED BANDWIDTH (EMISSION DESIGNATOR 11K0F3E) MASK D**

MAX POWER SETTING  
FREQ = 154.225 MHz

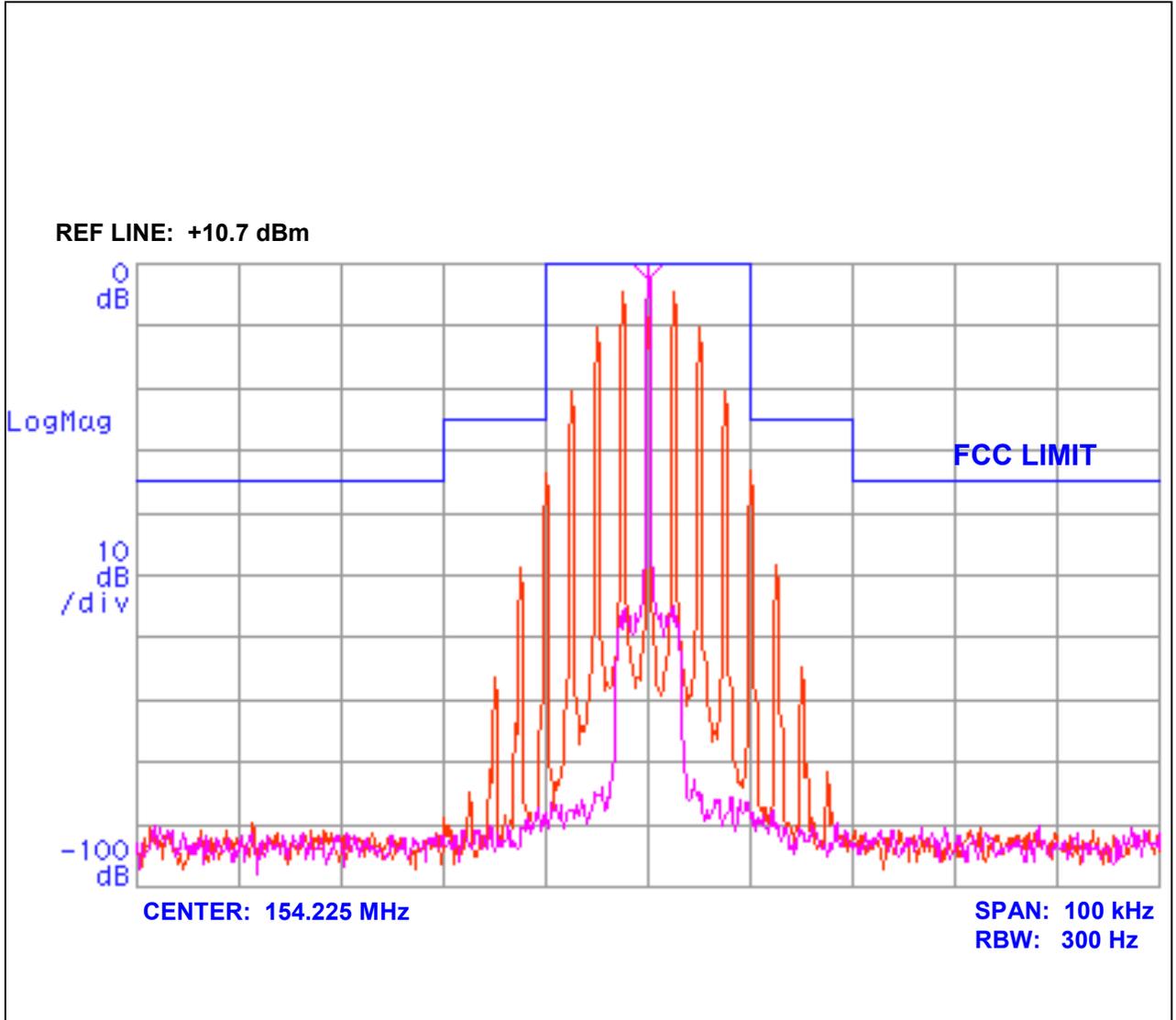
ANALOG VOICE  
CHANNEL SPACING = 12.5 kHz



**OCCUPIED BANDWIDTH (EMISSION DESIGNATOR 16K0F3E) MASK B**

MAX POWER SETTING  
FREQ = 154.225 MHz

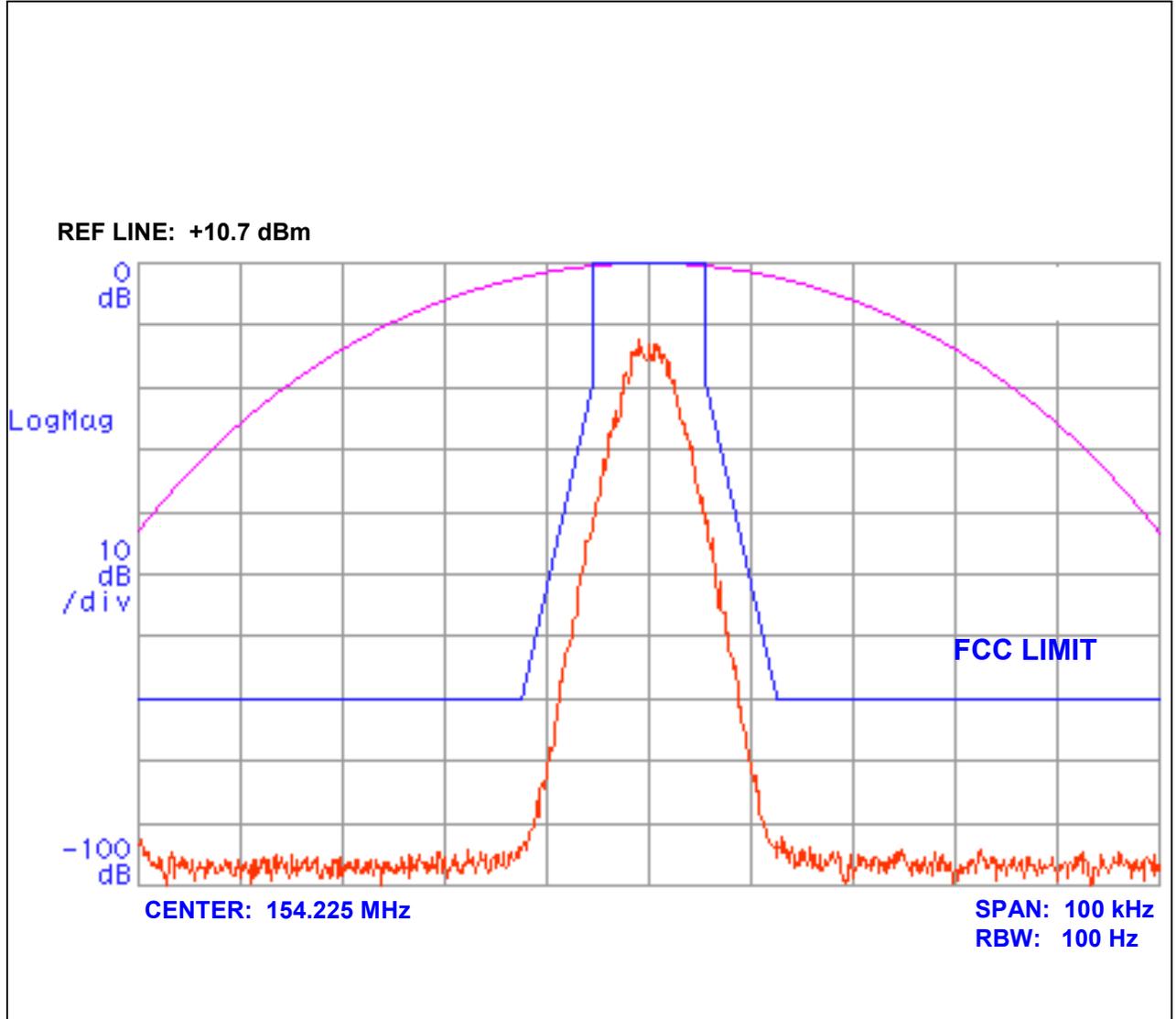
ANALOG VOICE  
CHANNEL SPACING = 25.0 kHz



**OCCUPIED BANDWIDTH (EMISSION DESIGNATOR 8K10F1D) MASK D**

MAX POWER SETTING  
FREQ = 154.225 MHz

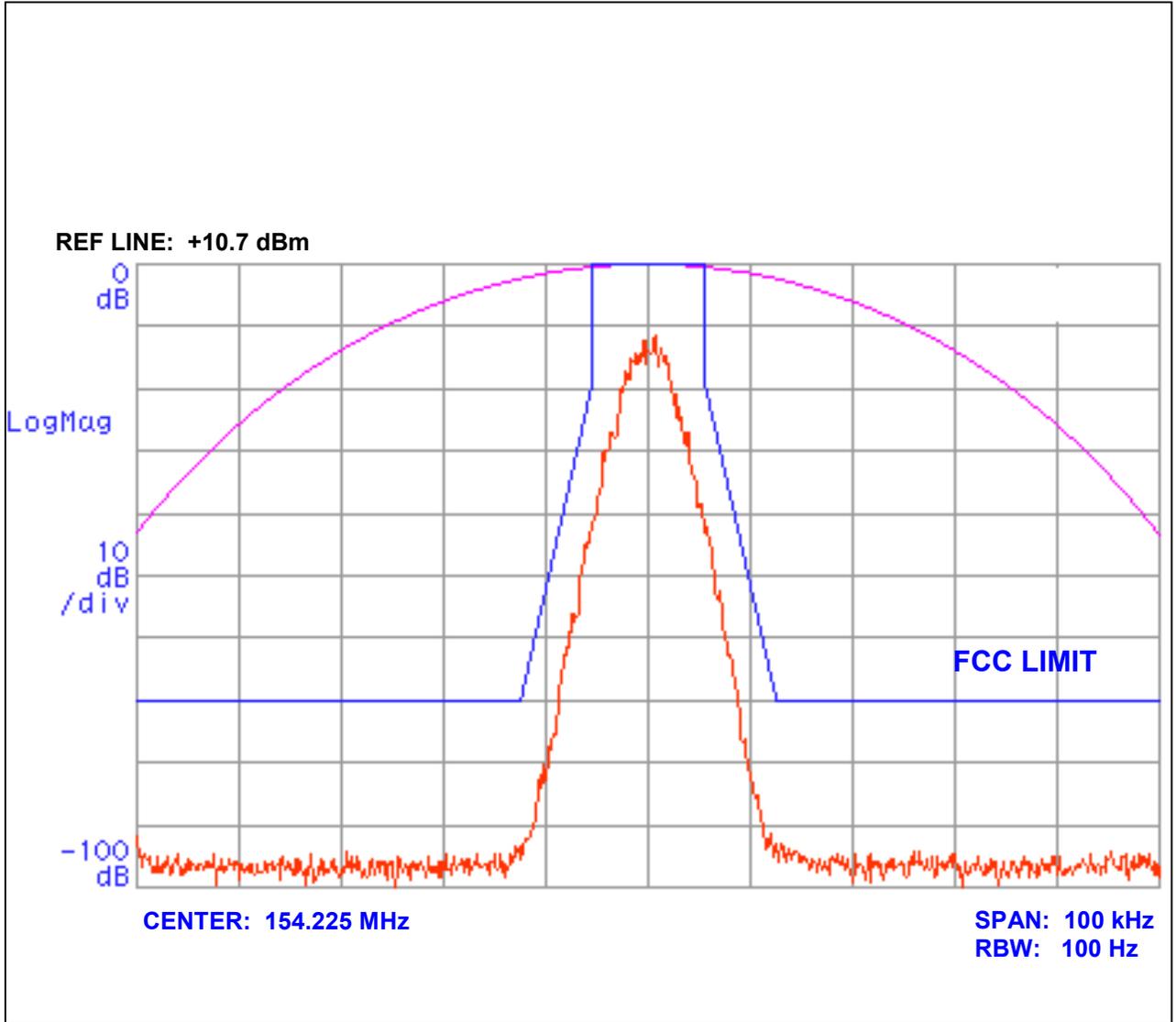
DIGITAL DATA  
CHANNEL SPACING = 12.5 kHz



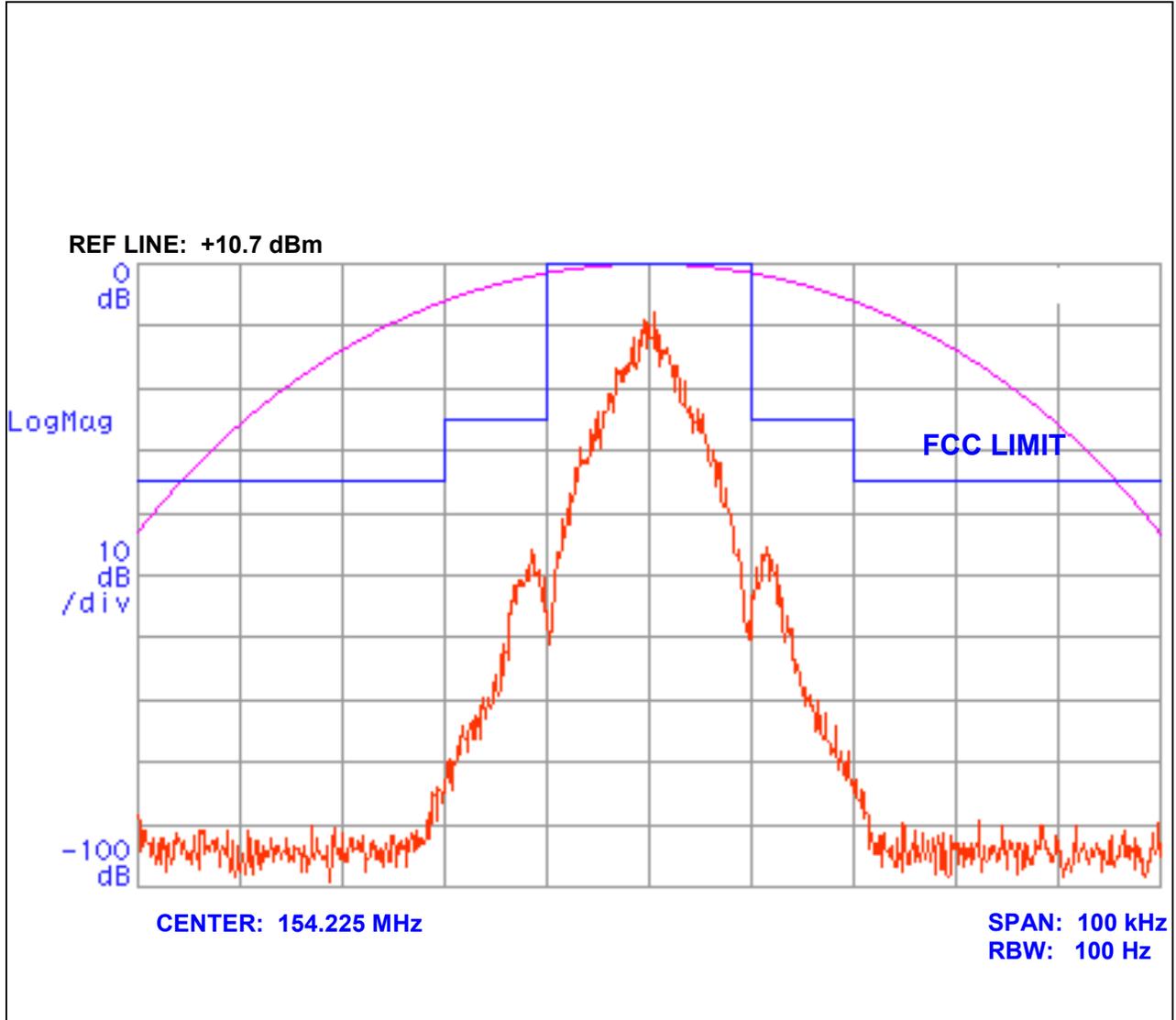
**OCCUPIED BANDWIDTH (EMISSION DESIGNATOR 8K10F1E) MASK D**

MAX POWER SETTING  
FREQ = 154.225 MHz

DIGITAL VOICE  
CHANNEL SPACING = 12.5 kHz



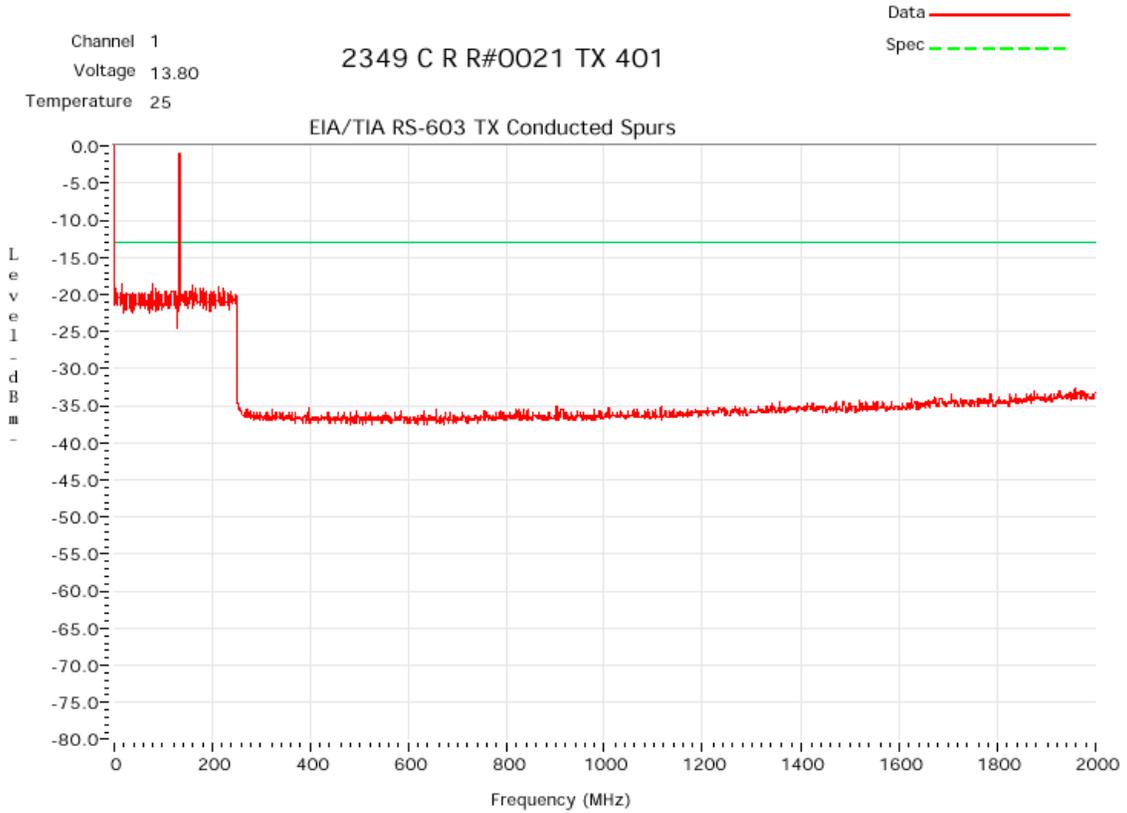
**OCCUPIED BANDWIDTH (EMISSION DESIGNATOR 20K0F1E) MASK B**  
MAX POWER SETTING      DIGITAL VOICE ENCRYPTION  
FREQ = 155.225 MHz      CHANNEL SPACING = 20.0 kHz



### 6. CONDUCTED SPURIOUS EMISSIONS

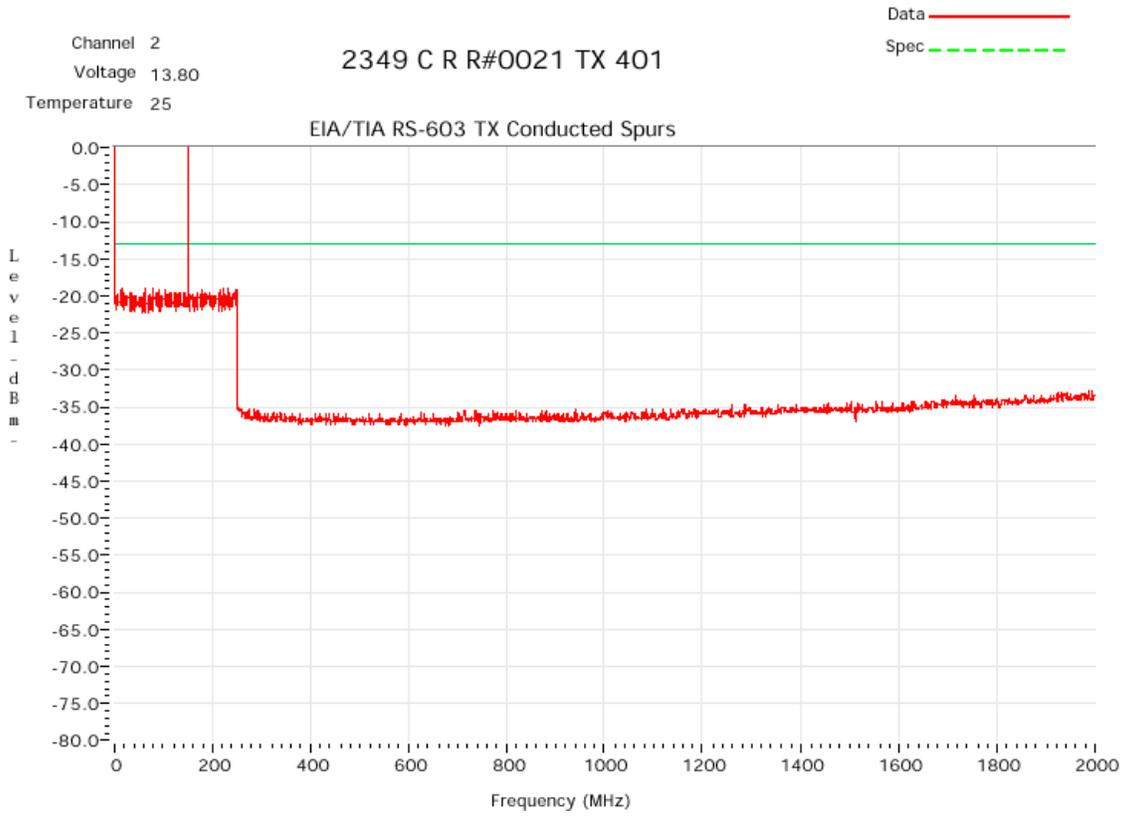
CONDUCTED SPURIOUS EMISSIONS  
TX FREQ = 136.0125 MHz

MAX POWER SETING  
CHANNEL SPACING = 25 kHz



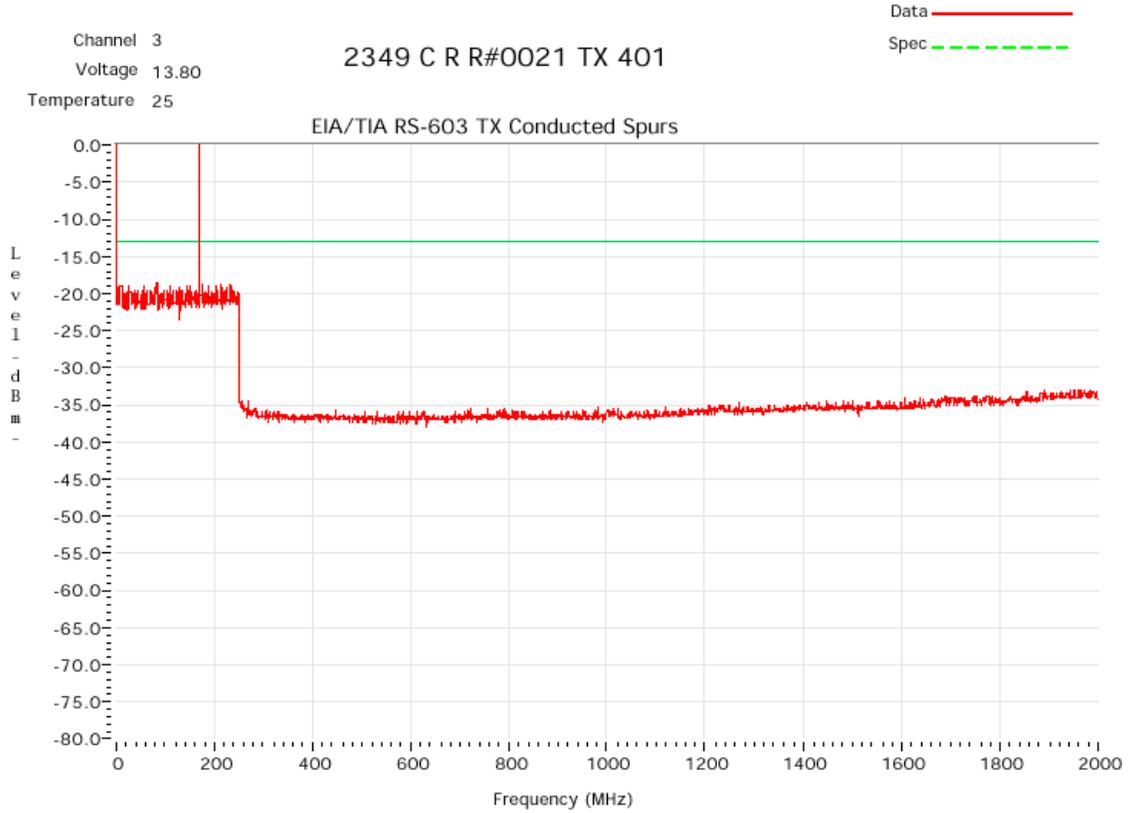
CONDUCTED SPURIOUS EMISSIONS  
TX FREQ = 155.0125 MHz

MAX POWER SETING  
CHANNEL SPACING = 25 kHz



**CONDUCTED SPURIOUS EMISSIONS**  
**TX FREQ = 173.9875 MHz**

**MAX POWER SETING**  
**CHANNEL SPACING = 25 kHz**



### 7. RADIATED SPURIOUS EMISSIONS

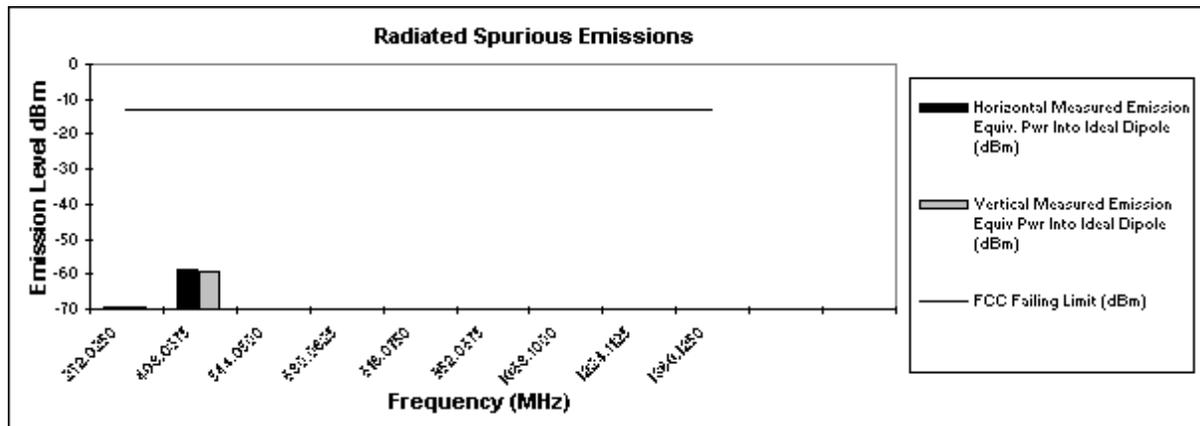
**Transmit Radiated Spurious Emissions**

**Tx Power: 120 Watts**

**136.0125 MHz**

**Channel Spacing 25kHz | S/N 26**

Frequency (MHz)	FCC Failing Limit (dBm)	Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm)
272.0250	-13	-69.47	-69.60
408.0375	-13	-58.61	-59.42
544.0500	-13	*	*
680.0625	-13	*	*
816.0750	-13	*	*
952.0875	-13	*	*
1088.1000	-13	*	*
1224.1125	-13	*	*
1360.1250	-13	*	*



\* Indicates the spurious emission could not be detected due to noise limitations or ambients.

The data presented here was taken using the substitution method as found in the TIA/EIA-603 document.

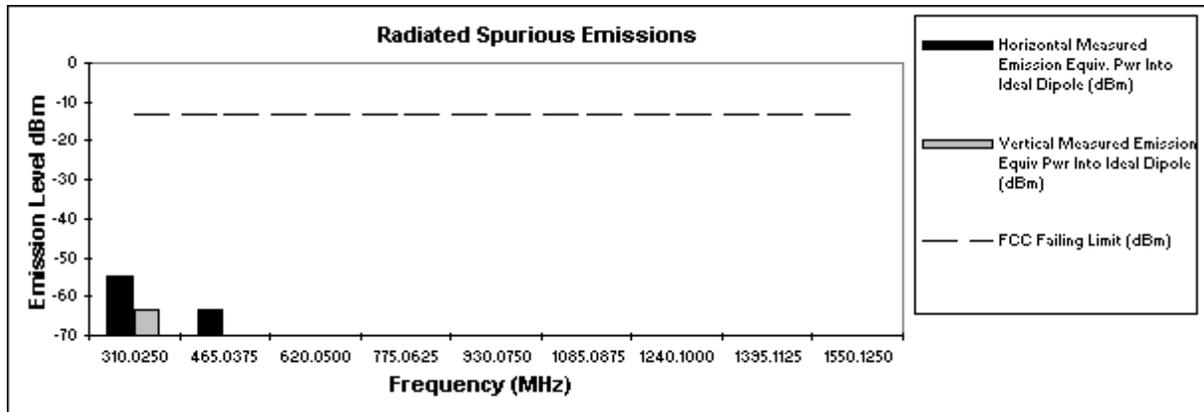
**Transmit Radiated Spurious Emissions**

**Tx Power: 120 Watts**

**155.0125 MHz**

**Channel Spacing 25kHz | S/N 26**

Frequency (MHz)	FCC Failing Limit (dBm)	Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm)
310.0250	-13	-54.68	-63.64
465.0375	-13	-63.23	*
620.0500	-13	*	*
775.0625	-13	*	*
930.0750	-13	-72.10	*
1085.0875	-13	*	*
1240.1000	-13	*	*
1395.1125	-13	*	*
1550.1250	-13	*	*



\* Indicates the spurious emission could not be detected due to noise limitations or ambients.

The data presented here was taken using the substitution method as found in the TIA/EIA-603 document.

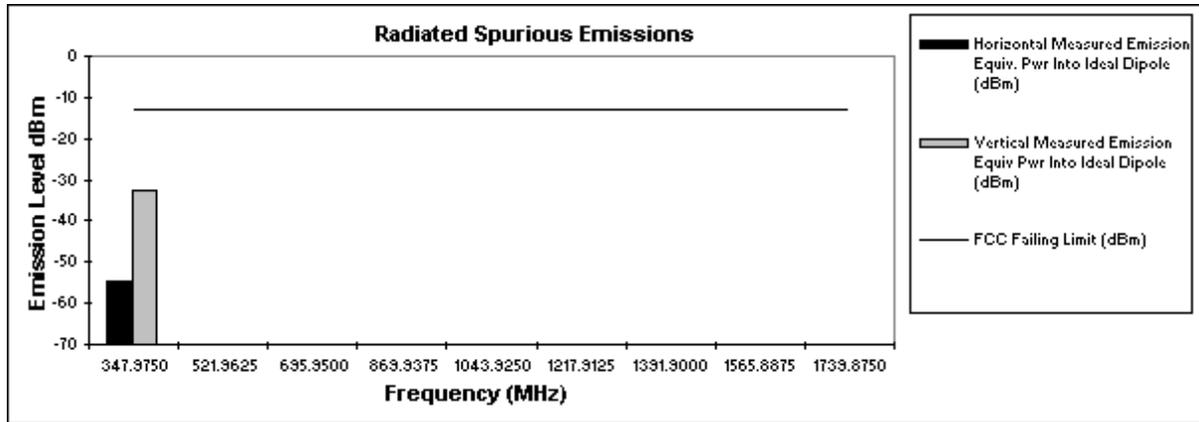
**Transmit Radiated Spurious Emissions**

**Tx Power: 120 Watts**

**173.9875 MHz**

**Channel Spacing 25kHz | S/N 26**

Frequency (MHz)	FCC Failing Limit (dBm)	Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm)
347.9750	-13	-54.79	-32.70
521.9625	-13	*	*
695.9500	-13	*	*
869.9375	-13	*	*
1043.9250	-13	*	*
1217.9125	-13	*	*
1391.9000	-13	*	*
1565.8875	-13	*	*
1739.8750	-13	*	*



\* Indicates the spurious emission could not be detected due to noise limitations or ambients.

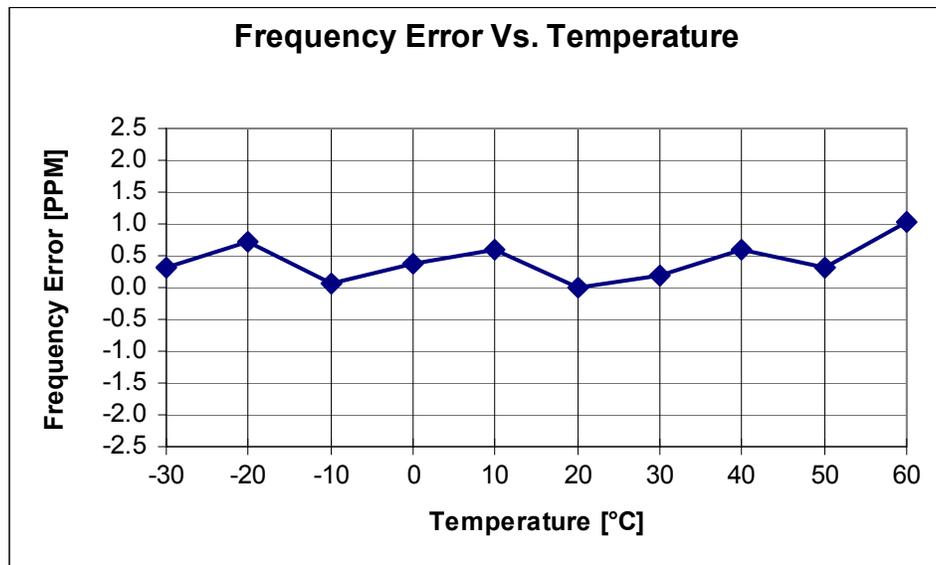
The data presented here was taken using the substitution method as found in the TIA/EIA-603 document.

## 8. FREQUENCY STABILITY

### A. FREQUENCY STABILITY Vs. TEMPERATURE

Frequency Error Vs Temperature  
 Transmit Frequency 154.225MHz  
 Output Power 120W  
 Limit: +/- 2.5 ppm

Temperature [°C]	Frequency [Hz]	Frequency Error [Hz]	Frequency Error [PPM]
-30	154224950	50	0.32
-20	154224890	110	0.71
-10	154224990	10	0.06
0	154224940	60	0.39
10	154224910	90	0.58
20	154225000	0	0.00
30	154224970	30	0.19
40	154224910	90	0.58
50	154224950	50	0.32
60	154224840	160	1.04



**B. FREQUENCY STABILITY Vs. SUPPLY VOLTAGE**

Frequency Error Vs Supply  
Voltage  
Transmit Frequency 154.225MHz  
Output Power 120W  
Limit: +/- 2.5 ppm

Voltage [V]	Frequency [Hz]	Frequency Error [Hz]	Frequency Error [PPM]
10.8	154224980	20	0.13
11.3	154224990	10	0.06
11.8	154224990	10	0.06
12.3	154224990	10	0.06
12.8	154224980	20	0.13
13.3	154224980	20	0.13
13.8	154224990	10	0.06
14.3	154224980	20	0.13
14.8	154224990	10	0.06
15.3	154224980	20	0.13
15.8	154224980	20	0.13
16.3	154224980	20	0.13
16.8	154224980	20	0.13

