

## **TEST SET-UP PROCEDURES AND TEST EQUIPMENT USED**

Pursuant to 47 CFR 2.1041

Measurements are made per FCC's CFR 47 Rule Part 2 or Telecommunications Industries Association/Electronic Industries Association (TIA/EIA) "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards" (TIA/EIA-603-C) as noted.

This exhibit presents a brief summary of how the measurements were made, the required limits, and the test equipment used.

The following procedures are presented with this application:

- 1) Test Equipment List
- 2) Transmit Audio Frequency Response
- 3) Post Limiter Lowpass Filter Response
- 4) Modulation Limiting Characteristic

## **Test Equipment List**

Pursuant to 47 CFR 2.1033(c)

The following test equipment was used to perform the measurements of the submitted data. The calibration of this equipment is performed at regular intervals.

**Transmitter Frequency:**

HP 5385A Frequency Counter with High-Stability Reference

**Temperature Measurement:**

HP 2804A Quartz Thermometer

**Transmitter RF Power:**

HP 438A Power Meter with HP 8482A Power Sensor

**DC Voltages and Currents:**

Fluke 8010A Digital Voltmeter

**Transmit Audio Responses:**

HP 8901A Modulation Analyzer, HP 8903B Audio Analyzer, HP 6621A System DC Power Supply, PC with Labview

**Transmit Audio Lowpass Splatter Filter Response:**

HP E4431B Signal Generator, HP 8903B Audio Analyzer, Rohde & Schwarz UPV Audio Analyzer, HP 6621A System DC Power Supply, PC with Labview

**Modulation Limiting Characteristic:**

HP 8657A Signal Generator, HP 8903B Audio Analyzer, HP 8901B Modulation Analyzer  
HP 6542A Power Supply

## **Measurement Procedures Used for Submitted Data**

### **EXHIBIT 7A - Transmitter Audio Frequency Response – Pursuant to 47 CFR 2.1047(a)**

The transmitter output is monitored with an HP 8901B Modulation Analyzer, whose FM demodulator output is fed to an HP 8903B Audio Analyzer. De-emphasis is disabled and filtering above 15 kHz, internal to the test equipment, is used. An audio oscillator signal, derived from the HP 8903B Audio Analyzer, is connected to the microphone audio input of the transmitter. At a frequency of 1 kHz, the level is adjusted to obtain 20% of full system deviation to ensure that limiting does not occur at any frequency in the range of 300 Hz - 3000 Hz. A constant input level is then maintained and the oscillator frequency is varied between the range of 100 Hz to 5000 Hz. The frequency response is plotted, using a reference of 0 dB at 1 kHz. Note: This measurement was duplicated from FCC ID: ABZ99FT3082 filing because both radios share the identical Transmitter.

### **EXHIBIT 7B - Transmitter Audio Post Limiter Lowpass Filter Response – Pursuant to 47 CFR 2.1047(a)**

The audio oscillator portion of an HP 8903B Audio Analyzer is connected to the input of the post limiter lowpass filter. The output of the lowpass filter (OMAP TX SSI) is measured with the Rohde & Schwarz UPV Audio Analyzer. The response is swept between the limits of 100 Hz and 30 kHz. Oscillator level is chosen to be the as high as possible that will not cause limiting at any frequency, and is maintained constant vs. frequency. Note: This measurement was duplicated from FCC ID: ABZ99FT3082 filing because both radios share the identical Transmitter.

### **EXHIBIT 7C - Modulation Limiting Characteristic – Pursuant to 47 CFR 2.1047(b)**

An audio oscillator is connected to the microphone audio input. The transmitter output is monitored with an HP 8901B Modulation Analyzer. The flat frequency response FM demodulator output of the HP 8901B is fed to an HP 8903B Audio Analyzer. The 20 kHz lowpass filter of the modulation analyzer is used to reduce the level of residual high frequency noise. The oscillator level is adjusted at 1 kHz to obtain 60% of full-system deviation. The oscillator level is then varied over a range of  $\pm 20$  dB in 5 dB increments, and the resulting deviation is plotted. This measurement is repeated at 300 Hz and 3 kHz. The above procedure is performed four times, for conditions with Tone Private Line, Digital Private Line, Trunking (these are continuous subaudible signaling formats), and without subaudible signalling (referred to as “carrier squelch mode”). Note: This measurement was duplicated from FCC ID: ABZ99FT3082 filing because both radios share the identical Transmitter.

**INDEX OF SUBMITTED MEASURED DATA**

This exhibit contains the measured data for this equipment as follows:

**EXHIBIT 7A** - Transmit Audio Response (2 Graphs)

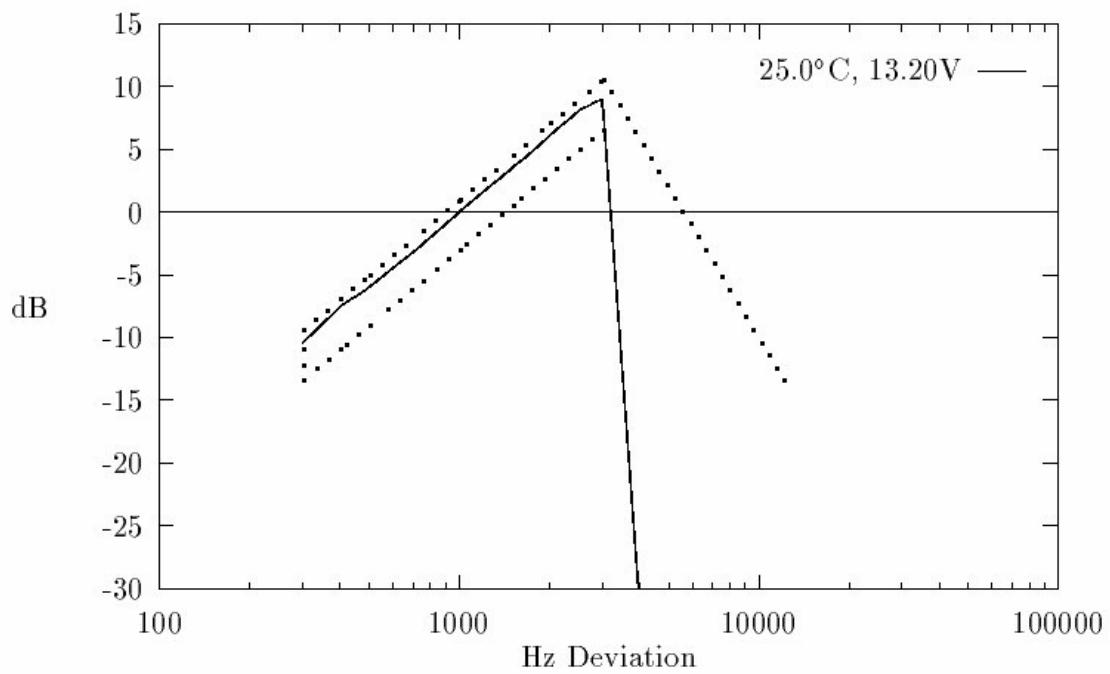
- 7A-1 – 12.5 kHz Channel Spacing
- 7A-2 – 25 kHz Channel Spacing

**EXHIBIT 7B** - Transmit Audio Post Limiter Lowpass Filter Response (Graph)

**EXHIBIT 7C** - Modulation Limiting Characteristics (6 Graphs)

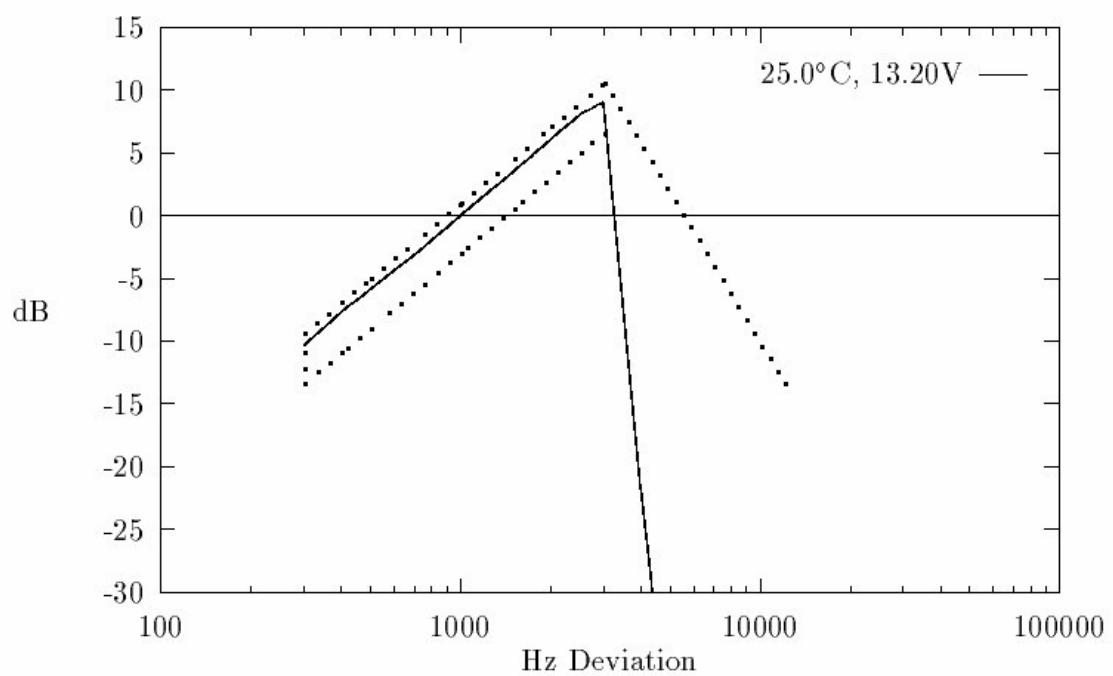
- 7C-1 – 12.5 kHz Carrier Squelch Mode
- 7C-2 – 12.5 kHz Tone Private Line (CTCSS) Mode
- 7C-3 – 12.5 kHz Digital Private Line (CDCSS) Mode
- 7C-4 – 25 kHz Carrier Squelch Mode
- 7C-5 – 25 kHz Tone Private Line (CTCSS) Mode
- 7C-6 – 25 kHz Digital Private Line (CDCSS) Mode

**TRANSMIT AUDIO RESPONSE  
12.5 kHz CHANNEL SPACING**



**EXHIBIT 7A-1**

**TRANSMIT AUDIO RESPONSE  
25 kHz CHANNEL SPACING**



## POST-LIMITER LOWPASS FILTER RESPONSE

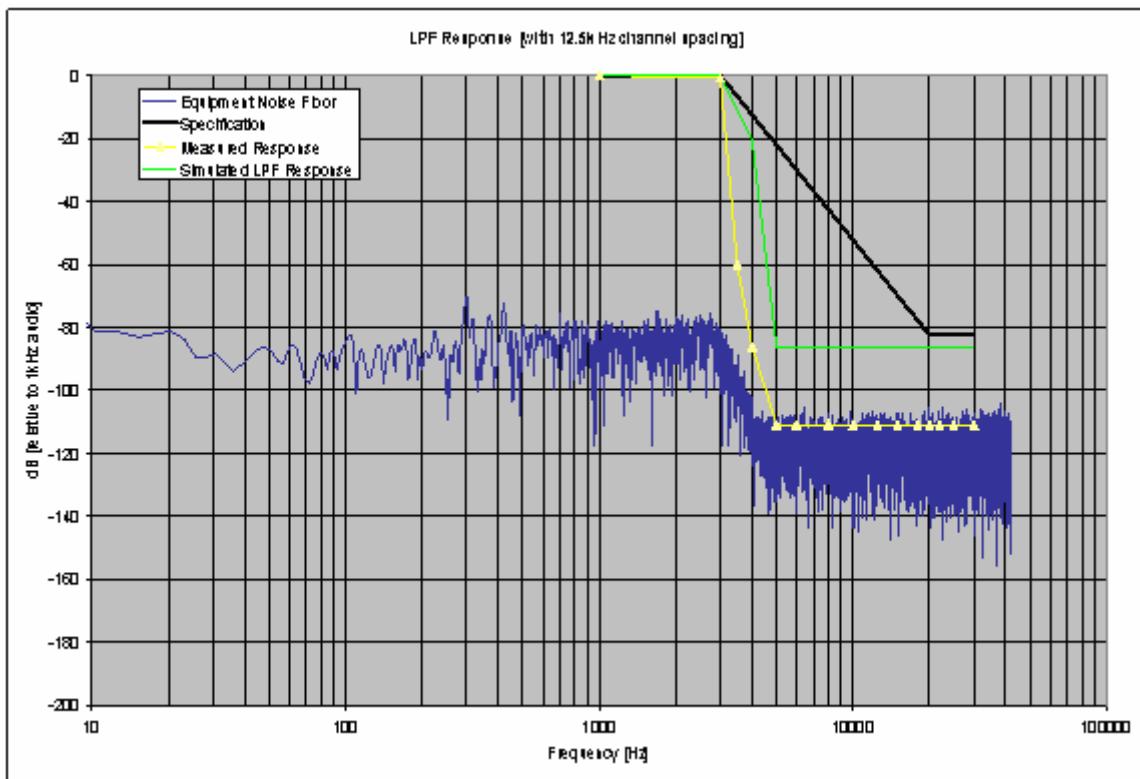
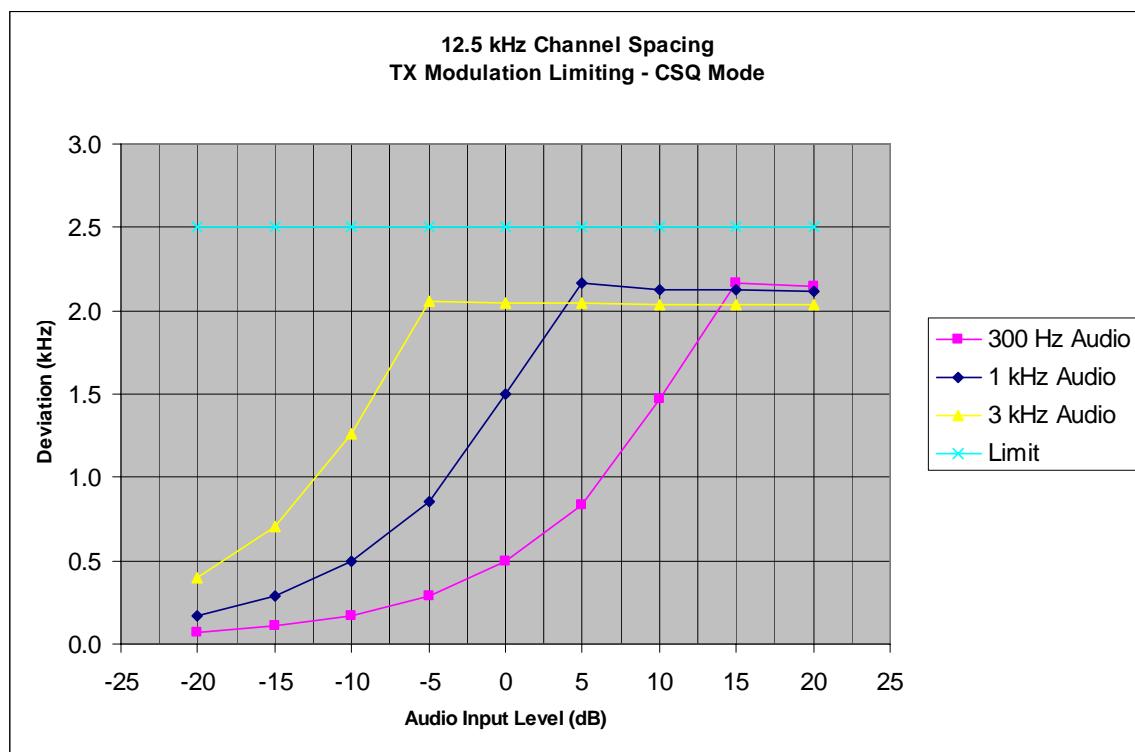
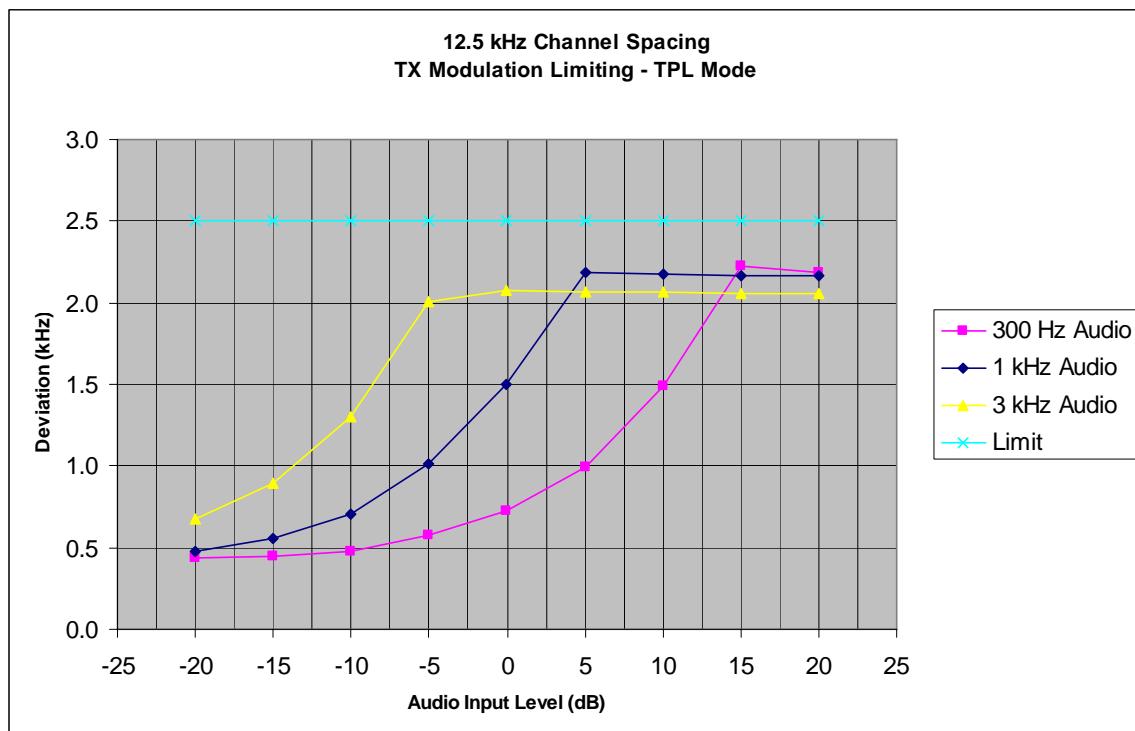


EXHIBIT 7B

## MODULATION LIMITING CHARACTERISTIC 12.5 kHz CARRIER SQUELCH MODE

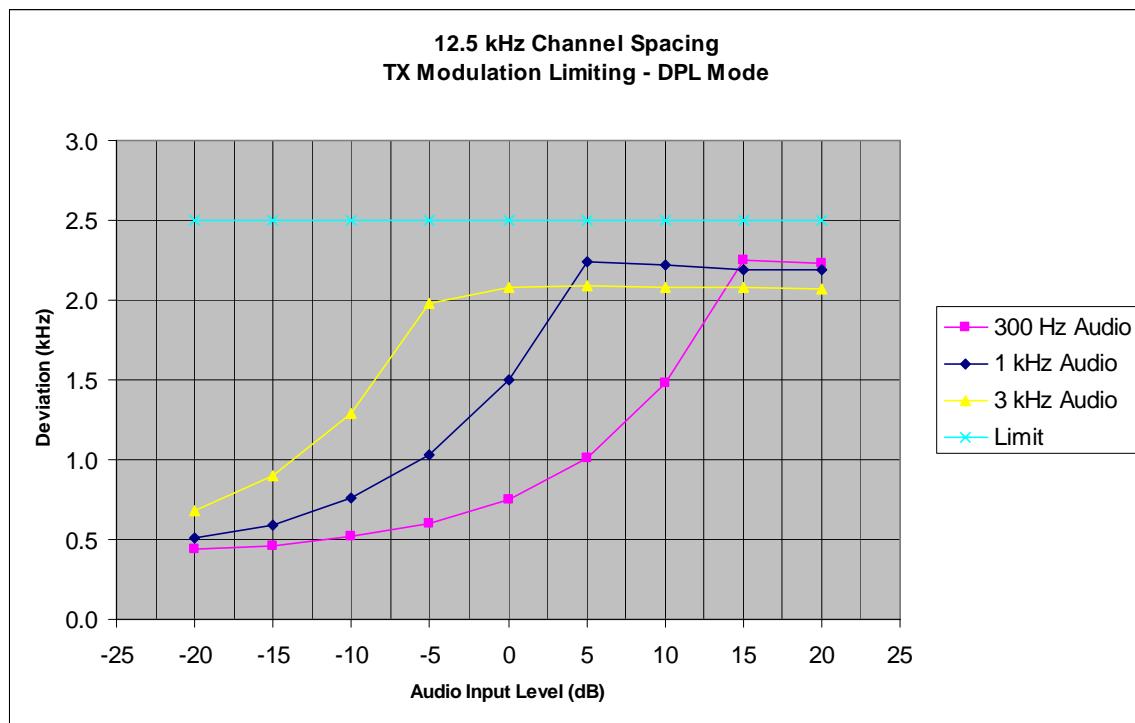


## MODULATION LIMITING CHARACTERISTIC 12.5 kHz TONE PL MODE

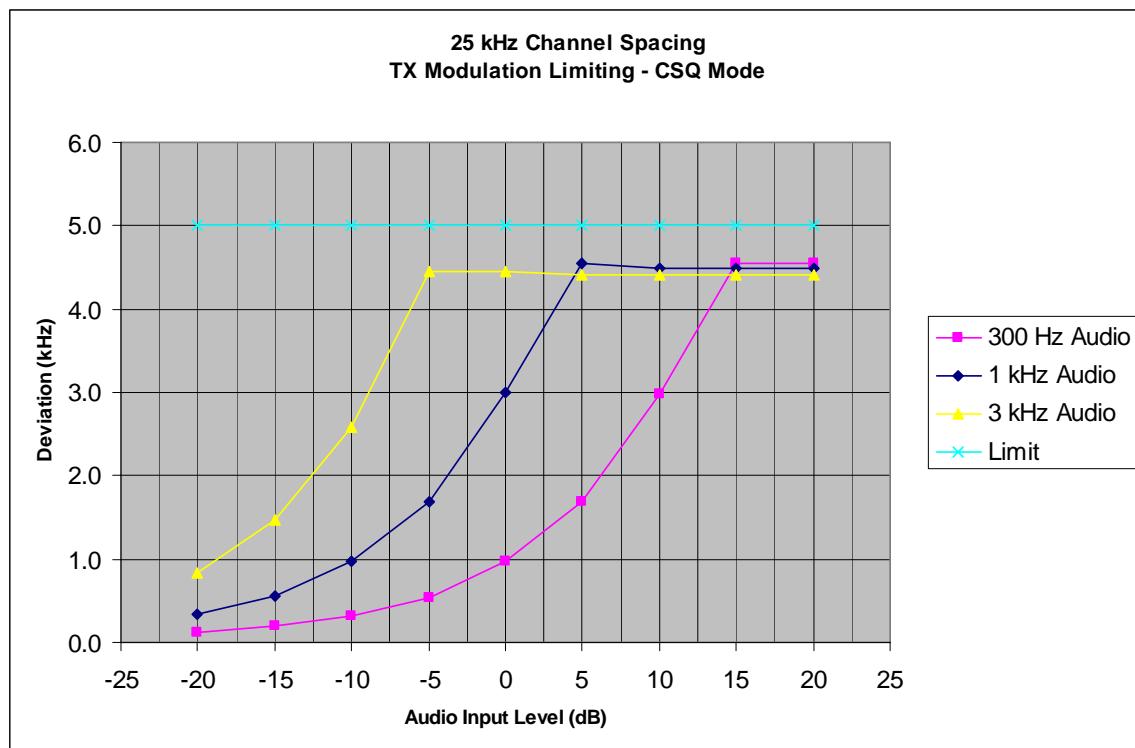


## EXHIBIT 7C-2

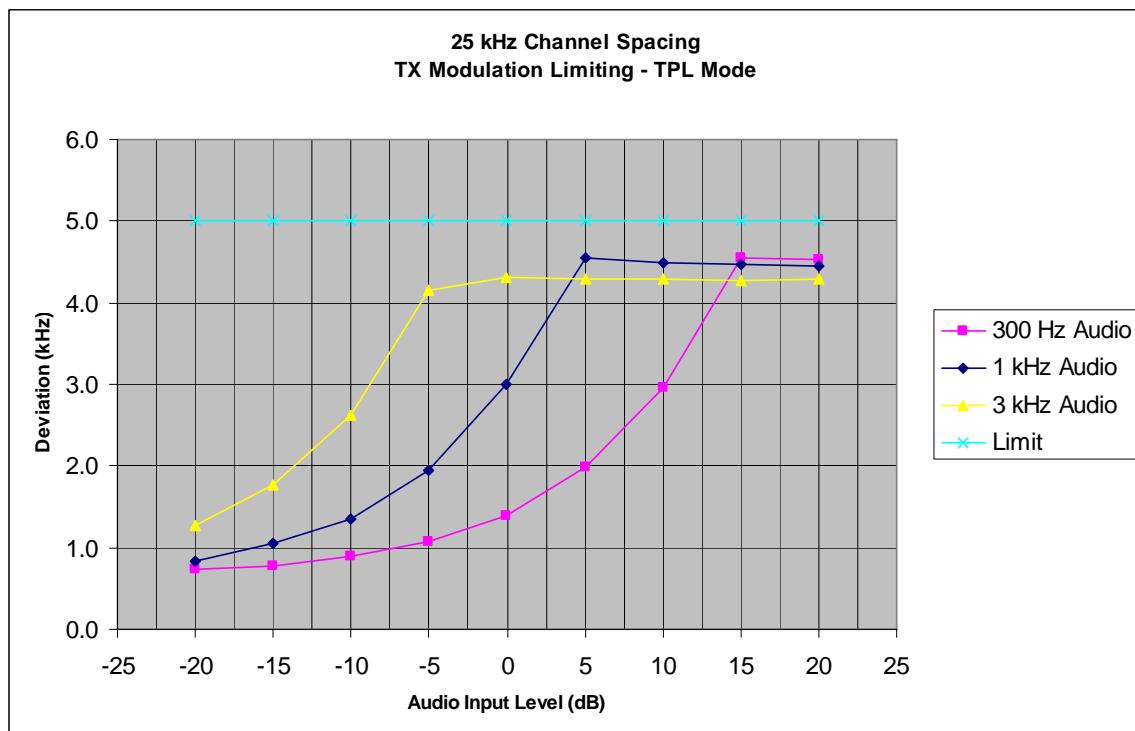
**MODULATION LIMITING CHARACTERISTIC  
12.5 kHz DPL MODE**



## MODULATION LIMITING CHARACTERISTIC 25 kHz CARRIER SQUELCH MODE



**MODULATION LIMITING CHARACTERISTIC  
25 kHz TONE PL MODE**



**MODULATION LIMITING CHARACTERISTIC  
25 kHz DPL MODE**

