

**TEST REPORT FROM:**

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TEST OF: MINICELL

To Part 2 Subpart J and Part 22 Subpart H  
of the FCC Rules and Regulations

Test Report Serial No: 73-6492

**APPLICATION FOR TYPE ACCEPTANCE:**

AMPS Cellular Phone  
Mobile Station Transmitter

Applicant:

Uniden Engineering Services  
216 John Street  
P.O. Box 580  
Lake City, SC 29560

Issue Date: April 30, 1998

Dates of Test: April 6 - 13, 1998

**CERTIFICATION OF ENGINEERING REPORT**

This report has been prepared by Communication Certification Laboratory to verify compliance of the device described below with the requirements to Part 2 Subpart J and Part 22 Subpart H of the FCC Rules and Regulations. This report may be reproduced in full, partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

- Applicant: Uniden Engineering Services
- Model Number: MINICELL
- FCC ID: AMWUH045
- Brand Name: UNIDEN

On this 30<sup>th</sup> day of April, 1998, I, individually, and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

COMMUNICATION CERTIFICATION LABORATORY



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## SECTION 1. Measurement Requirements

### 1.1 Introduction

The following data is submitted for Type Acceptance of a cellular phone for Uniden Engineering Services, in accordance with part 2, Subpart J and Part 22, Subpart H of FCC Rules and Regulations. The measurements were performed in accordance with the requirements of § 2.947, § 22.913, § 22.915, § 22.917, § 22.355 and OST Bulletin No. 53 (Cellular System Compatibility Specification).

### 1.2 Measurements Required for Type Acceptance

#### § 2.985 (§ 22.913) RF Power Output

A mobile station transmitter must be capable of reducing power in steps of 4 dB on command from a land station. Each power level must be maintained within the range of +2 dB and -4 dB of its nominal level over the ambient temperature range of -30° C to +60° C.

Due to wide frequency range, which the phone may operate, measurements were performed on a channel near the bottom, on a channel near the middle and on a channel near the top of the spectrum.

#### § 2.987 (§ 22.915) Modulation Characteristics

Cellular systems must be capable of providing service using the types of modulation described in the cellular system compatibility specification.

(a) Non-voice modulating signals. Modulating signals other than voice signals, such as data signals, may be transmitted, provided the resulting modulated emission exhibits spectral characteristics not exceeding those resulting from voice modulation.

(b) Modulation levels. The levels of the modulation signals must be set to the values specified in this paragraph and must be maintained within  $\pm 10\%$  of those values.

(1) The instantaneous frequency deviation resulting from the main modulating signal must be  $\pm 12$  kHz.

(2) The instantaneous frequency deviation resulting from the

supervisory audio tones must be  $\pm 2$  kHz.

(3) The instantaneous frequency deviation resulting from the signaling tone must be  $\pm 8$  kHz.

(4) The instantaneous frequency deviation resulting from the wideband data signals must be  $\pm 8$  kHz.

(c) Deviation limitation circuitry. Cellular transmitters must be equipped with circuitry that automatically prevents modulation levels for voice transmissions from exceeding the limits specified in this section.

(d) Audio filter characteristics. Except as provided in §22.917, radiotelephony signals applied to the modulator from the modulation limiter must be attenuated as a function of frequency as specified in this paragraph.

(1) For mobile stations, these signals must be attenuated, relative to the level at 1 kHz, as follows.

(i) In the frequency range of 3.0 to 5.9 kHz and 6.1 to 15.0 kHz, signals must be attenuated at least  $40 \log (f \div 3)$  dB, where  $f$  is the frequency of the signal in kHz.

(ii) In the frequency range of 5.9 to 6.1 kHz, signals must be attenuated at least 35 dB.

(iii) In the frequency range above 15 kHz, signals must be attenuated at least 28 dB.

#### **Result:**

The results of the modulation deviation testing are shown in section 2.2 and the test procedures are described in Appendix 1.

#### **§ 2.989 Occupied Bandwidth**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(c) Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows. For single sideband and independent sideband transmitters, the input level of the modulation signal shall be 10 dB greater than that necessary to produce rated peak envelope power.

(1) Other than sideband or independent sideband transmitters - when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input

level shall be established at the frequency of maximum response of the audio modulation circuit.

**Result:**

The results of the occupied bandwidth testing are shown in Appendix 2 and the test procedures are described in Appendix 1.

**§ 2.991 (§ 22.917) Spurious Emissions at Antenna Terminals**

**§ 22.917 (b) Conducted Spurious Emissions (F3E/F3D emission mask with audio filter)**

For F3E and F3D emissions, except as provided in paragraph (c) of this section, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB.

(2) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency: at least 60 dB or  $43 + 10 \log P$  dB, whichever is the lesser attenuation.

**Result:**

The frequency range from 30 MHz to the first multiple of the carrier frequency was investigated to measure any antenna-conducted emissions.

Shown in Tables 2 through 10 (Section 2.3) are the emission levels from 30 MHz to 45 kHz below the carrier frequency and from 45 kHz above the carrier frequency to the first multiple of the carrier frequency. Shown in Plots 1 through 7 (Appendix 2) are the emissions from 45 kHz below the carrier frequency to 45 kHz above the carrier frequency. These plots show the MINICELL tuned to the lower channel, the results with the MINICELL tuned to the upper channel were the same.

**§ 22.917 (d) Conducted Spurious Emissions (F1D emission mask)**

For F1D emissions, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB.
- (2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz: at least 45 dB.
- (3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency: at least 60 dB or  $43 + 10 \log P$  dB, whichever is the lesser attenuation.

**Result:**

The frequency range from 30 MHz to the first multiple of the carrier frequency was investigated to measure any antenna-conducted emissions.

Shown in Tables 2 through 10 (Section 2.3) are the emission levels from 30 MHz to 45 kHz below the carrier frequency and from 45 kHz above the carrier frequency to the first multiple of the carrier frequency. Shown in Plot 8 (Appendix 2) are the emissions from 45 kHz below the carrier frequency to 45 kHz above the carrier frequency. These plots show the MINICELL tuned to the lower channel, the results with the MINICELL tuned to the upper channel were the same.

**§ 22.917 (e) Conducted Spurious Emissions (Out of band emissions)**

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by: at least  $43 + 10 \log P$  dB.

**Result:**

The frequency range from the first multiple of the carrier frequency to the tenth harmonic was investigated to measure any antenna-conducted emissions.

Shown in Tables 2 through 10 (Section 2.3) are the emission levels from the first multiple of the carrier frequency to the tenth harmonic.

**§ 22.917 (f) Conducted Spurious Emissions (Mobile emission in base frequency range)**

The mean power of emissions appearing in the base station frequency range from cellular mobile transmitters operated must

be attenuated to a level not to exceed -80 dBm at the transmit antenna connector.

**Result:**

The frequency range from 869.04 MHz to 893.97 MHz was investigated to measure any antenna-conducted emissions within the base frequency range.

Shown in Table 1 (Section 2.3) are the emission levels from 869.04 MHz to 893.97 MHz.

**§ 2.993 (§ 22.917) Field Strength of Spurious Radiation**

Field strength measurements of radiated spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements must not exceed  $43 + 10\log$  (mean output power in watts) below the unmodulated carrier.

The reference level for spurious radiation was taken at an ideal dipole excited by the rated output power according to the following relationship:

$$E = \frac{\sqrt{(49.2)(Pt)}}{R}$$

Note: Reference Data for Radio Engineers, Pg. 676.  
International Telephone and Telephone Corporation,  
Fourth Edition.

Where E = electric Field Intensity in Volts/Meter  
Pt = Transmitter Power in Watts  
R = Measurements distance in Meters

At a maximum power of 0.603 Watts

$$E = \frac{\sqrt{(49.2)(0.603)}}{3} = 1.8 \text{ Volts / Meter} = 125.2 \text{ dB } \mu\text{V/m}$$

Paragraph 22.917 requires that spurious radiated emission be attenuated at least  $43 + 10 \log$  (mean output power in watts) below the unmodulated carrier. In this case, the rated power of 0.603 watts requires a minimum attenuation of  $43 + 10 \log 0.603 = 40.8$  dB below the reference level of 125.2 dB $\mu$ V/m calculated above; therefore, the criteria is 84.4 dB $\mu$ V/m (125.2 - 40.8).

#### § 2.995 (§ 22.355) Frequency Stability

The carrier frequency of the transmitter shall be maintained within 2.5 Parts Per Million (PPM) from the assigned frequency over the ambient temperature range of -30° C to +60° C, and over the supply voltage range of  $\pm 10$  % from the nominal value at +20° C.

**SECTION 2. Measurement Data****2.1 RF Power Output**Channel # 1 (825.03 MHz)  
-30° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.1	-0.9
4.07	1	-2	28	27.6	-0.4
4.07	2	-2	28	27.0	-1.0
4.07	3	-6	24	24.5	0.5
4.07	4	-10	20	20.7	0.7
4.07	5	-14	16	16.7	0.7
4.07	6	-18	12	12.5	0.5
4.07	7	-22	8	8.5	0.5
3.70	0	-2	28	27.2	-0.8
3.70	1	-2	28	27.6	-0.4
3.70	2	-2	28	27.0	-1.0
3.70	3	-6	24	24.5	0.5
3.70	4	-10	20	20.7	0.7
3.70	5	-14	16	16.7	0.7
3.70	6	-18	12	12.5	0.5
3.70	7	-22	8	8.4	0.4
3.33	0	-2	28	27.2	-0.8
3.33	1	-2	28	27.5	-0.5
3.33	2	-2	28	27.0	-1.0
3.33	3	-6	24	24.5	0.5
3.33	4	-10	20	20.7	0.7
3.33	5	-14	16	16.7	0.7
3.33	6	-18	12	12.5	0.5
3.33	7	-22	8	8.4	0.4

Channel # 333 (834.99 MHz)  
-30° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.2	-0.8
4.07	1	-2	28	27.1	-0.9
4.07	2	-2	28	27.2	-0.8
4.07	3	-6	24	24.2	0.2
4.07	4	-10	20	20.3	0.3
4.07	5	-14	16	16.3	0.3
4.07	6	-18	12	12.0	0.0
4.07	7	-22	8	8.0	0.0
3.70	0	-2	28	27.2	-0.8
3.70	1	-2	28	27.2	-0.8
3.70	2	-2	28	27.1	-0.9
3.70	3	-6	24	24.2	0.2
3.70	4	-10	20	20.3	0.3
3.70	5	-14	16	16.3	0.3
3.70	6	-18	12	12.0	0.0
3.70	7	-22	8	8.0	0.0
3.33	0	-2	28	27.2	-0.8
3.33	1	-2	28	27.1	-0.9
3.33	2	-2	28	27.1	-0.9
3.33	3	-6	24	24.1	0.1
3.33	4	-10	20	20.3	0.3
3.33	5	-14	16	16.3	0.3
3.33	6	-18	12	12.0	0.0
3.33	7	-22	8	8.0	0.0

Channel # 666 (844.98 MHz)  
-30° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.3	-0.7
4.07	1	-2	28	27.2	-0.8
4.07	2	-2	28	27.2	-0.8
4.07	3	-6	24	24.1	0.1
4.07	4	-10	20	20.4	0.4
4.07	5	-14	16	16.2	0.2
4.07	6	-18	12	11.8	-0.2
4.07	7	-22	8	7.4	-0.6
3.70	0	-2	28	27.2	-0.8
3.70	1	-2	28	27.2	-0.8
3.70	2	-2	28	27.2	-0.8
3.70	3	-6	24	24.1	0.1
3.70	4	-10	20	20.3	0.3
3.70	5	-14	16	16.2	0.2
3.70	6	-18	12	11.8	-0.2
3.70	7	-22	8	7.5	-0.5
3.33	0	-2	28	27.2	-0.8
3.33	1	-2	28	27.2	-0.8
3.33	2	-2	28	27.2	-0.8
3.33	3	-6	24	24.2	0.2
3.33	4	-10	20	20.3	0.3
3.33	5	-14	16	16.2	0.2
3.33	6	-18	12	11.8	-0.2
3.33	7	-22	8	7.4	-0.6

Channel # 1 (825.03 MHz)  
+20° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.7	-0.3
4.07	1	-2	28	27.7	-0.3
4.07	2	-2	28	27.7	-0.3
4.07	3	-6	24	25.1	1.1
4.07	4	-10	20	21.1	1.1
4.07	5	-14	16	17.4	1.4
4.07	6	-18	12	13.5	1.5
4.07	7	-22	8	9.7	1.7
3.70	0	-2	28	27.7	-0.3
3.70	1	-2	28	27.7	-0.3
3.70	2	-2	28	27.7	-0.3
3.70	3	-6	24	25.1	1.1
3.70	4	-10	20	21.1	1.1
3.70	5	-14	16	17.4	1.4
3.70	6	-18	12	13.5	1.5
3.70	7	-22	8	9.7	1.7
3.33	0	-2	28	27.8	-0.2
3.33	1	-2	28	27.7	-0.3
3.33	2	-2	28	27.7	-0.3
3.33	3	-6	24	25.1	1.1
3.33	4	-10	20	21.1	1.1
3.33	5	-14	16	17.4	1.4
3.33	6	-18	12	13.5	1.5
3.33	7	-22	8	9.7	1.7

Channel # 333 (834.99 MHz)  
+20° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.5	-0.5
4.07	1	-2	28	27.5	-0.5
4.07	2	-2	28	27.5	-0.5
4.07	3	-6	24	24.8	0.8
4.07	4	-10	20	20.8	0.8
4.07	5	-14	16	17.1	1.1
4.07	6	-18	12	13.1	1.1
4.07	7	-22	8	9.3	1.3
3.70	0	-2	28	27.5	-0.5
3.70	1	-2	28	27.5	-0.5
3.70	2	-2	28	27.5	-0.5
3.70	3	-6	24	24.8	0.8
3.70	4	-10	20	20.8	0.8
3.70	5	-14	16	17.1	1.1
3.70	6	-18	12	13.1	1.1
3.70	7	-22	8	9.4	1.4
3.33	0	-2	28	27.5	-0.5
3.33	1	-2	28	27.5	-0.5
3.33	2	-2	28	27.5	-0.5
3.33	3	-6	24	24.8	0.8
3.33	4	-10	20	20.8	0.8
3.33	5	-14	16	17.1	1.1
3.33	6	-18	12	13.1	1.1
3.33	7	-22	8	9.4	1.4

Channel # 666 (844.98 MHz)  
+20° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.4	-0.6
4.07	1	-2	28	27.4	-0.6
4.07	2	-2	28	27.4	-0.6
4.07	3	-6	24	24.8	0.8
4.07	4	-10	20	20.8	0.8
4.07	5	-14	16	17.1	1.1
4.07	6	-18	12	13.3	1.3
4.07	7	-22	8	9.6	1.6
3.70	0	-2	28	27.5	-0.5
3.70	1	-2	28	27.5	-0.5
3.70	2	-2	28	27.5	-0.5
3.70	3	-6	24	24.8	0.8
3.70	4	-10	20	20.9	0.9
3.70	5	-14	16	17.1	1.1
3.70	6	-18	12	13.3	1.3
3.70	7	-22	8	9.6	1.6
3.33	0	-2	28	27.4	-0.6
3.33	1	-2	28	27.4	-0.6
3.33	2	-2	28	27.5	-0.5
3.33	3	-6	24	24.8	0.8
3.33	4	-10	20	20.8	0.8
3.33	5	-14	16	17.1	1.1
3.33	6	-18	12	13.3	1.3
3.33	7	-22	8	9.6	1.6

Channel # 1 (825.03 MHz)  
 +60° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.5	-0.5
4.07	1	-2	28	27.5	-0.5
4.07	2	-2	28	27.5	-0.5
4.07	3	-6	24	24.9	0.9
4.07	4	-10	20	21.1	1.1
4.07	5	-14	16	17.3	1.3
4.07	6	-18	12	13.4	1.4
4.07	7	-22	8	9.9	1.9
3.70	0	-2	28	27.5	-0.5
3.70	1	-2	28	27.6	-0.4
3.70	2	-2	28	27.5	-0.5
3.70	3	-6	24	24.7	0.7
3.70	4	-10	20	21.0	1.0
3.70	5	-14	16	17.4	1.4
3.70	6	-18	12	13.4	1.4
3.70	7	-22	8	10.0	2.0
3.33	0	-2	28	27.6	-0.4
3.33	1	-2	28	27.5	-0.5
3.33	2	-2	28	27.6	-0.4
3.33	3	-6	24	24.7	0.7
3.33	4	-10	20	21.0	1.0
3.33	5	-14	16	17.4	1.4
3.33	6	-18	12	13.4	1.4
3.33	7	-22	8	9.9	1.9

Channel # 333 (834.99 MHz)  
+60° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.3	-0.7
4.07	1	-2	28	27.3	-0.7
4.07	2	-2	28	27.3	-0.7
4.07	3	-6	24	24.4	0.4
4.07	4	-10	20	20.7	0.7
4.07	5	-14	16	17.0	1.0
4.07	6	-18	12	13.1	1.1
4.07	7	-22	8	9.6	1.6
3.70	0	-2	28	27.3	-0.7
3.70	1	-2	28	27.3	-0.7
3.70	2	-2	28	27.3	-0.7
3.70	3	-6	24	24.4	0.4
3.70	4	-10	20	20.7	0.7
3.70	5	-14	16	17.0	1.0
3.70	6	-18	12	13.1	1.1
3.70	7	-22	8	9.6	1.6
3.33	0	-2	28	27.3	-0.7
3.33	1	-2	28	27.3	-0.7
3.33	2	-2	28	27.3	-0.7
3.33	3	-6	24	24.4	0.4
3.33	4	-10	20	20.8	0.8
3.33	5	-14	16	17.0	1.0
3.33	6	-18	12	13.1	1.1
3.33	7	-22	8	9.6	1.6

Channel # 666 (844.98 MHz)  
+60° C

Supply Voltage (VDC)	Power Level	Nominal ERP (dBW)	Nominal ERP (dBm)	Measured ERP (dBm)	Difference (dB)
4.07	0	-2	28	27.8	-0.2
4.07	1	-2	28	27.2	-0.8
4.07	2	-2	28	27.2	-0.8
4.07	3	-6	24	24.3	0.3
4.07	4	-10	20	20.6	0.6
4.07	5	-14	16	17.0	1.0
4.07	6	-18	12	13.0	1.0
4.07	7	-22	8	9.7	1.7
3.70	0	-2	28	27.8	-0.2
3.70	1	-2	28	27.2	-0.8
3.70	2	-2	28	27.2	-0.8
3.70	3	-6	24	24.3	0.3
3.70	4	-10	20	20.7	0.7
3.70	5	-14	16	16.9	0.9
3.70	6	-18	12	13.0	1.0
3.70	7	-22	8	9.7	1.7
3.33	0	-2	28	27.8	-0.2
3.33	1	-2	28	27.2	-0.8
3.33	2	-2	28	27.2	-0.8
3.33	3	-6	24	24.3	0.3
3.33	4	-10	20	20.7	0.7
3.33	5	-14	16	16.9	0.9
3.33	6	-18	12	13.0	1.0
3.33	7	-22	8	9.7	1.7

**2.2 Modulation Characteristics**

Modulating Signal	Deviation + kHz	Deviation - kHz	Criteria - 10% kHz	Criteria + 10% kHz
DTMF	13.03	12.54	10.8	13.2
Supervisory Audio Tone (5970 Hz)	2.18	2.19	1.8	2.2
Supervisory Audio Tone (6000 Hz)	2.18	2.19	1.8	2.2
Supervisory Audio Tone (6030 Hz)	2.18	2.19	1.8	2.2
Signaling Tone	8.35	8.34	7.2	8.8
Wideband Data	8.11	8.54	7.2	8.8

See Appendix 3 for modulation deviation plots.

**2.3 Conducted Spurious Emissions**

The worst case emissions were with the MINICELL transmitting wideband data. The data below represents the worst case configuration.

**Table 1**

Power Level	Frequency (MHz)	Emission Level (dBm)	Criteria (dBm)
0	879.26	-89.0	-80.0
Note: There were no emissions detected at power levels 3 and 7.			

RBW = 3 kHz VBW = 10 kHz

**Table 2**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 603 mW (27.8 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.603) = 40.8$  dB. The criteria is  $27.8 \text{ dBm} - 40.8 \text{ dB} = -13.0 \text{ dBm}$ .

Transmitting on Channel 1 (825.03 MHz) Power Level 0			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.8	-76.7	-13.0
200 - 824.985	819.2	-45.9	-13.0
825.075 - 1000	848.9	-50.0	-13.0
1000 - 2000	1650.06	-39.8	-13.0
2000 - 3000	2475.09	-24.1	-13.0
3000 - 4000	3300.12	-57.7	-13.0
4000 - 4500	4125.13	-71.6	-13.0
4500 - 5000	4950.16	-75.9	-13.0
5000 - 6000	5775.19	-73.6	-13.0
6000 - 7000	6600.22 *	-70.0	-13.0
7000 - 8000	7425.25 *	-71.3	-13.0
8000 - 9000	8250.30 *	-71.4	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**Table 3**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 324 mW (25.1 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.324) = 38.1$  dB. The criteria is  $25.1 \text{ dBm} - 38.1 \text{ dB} = -13.0 \text{ dBm}$ .

Transmitting on Channel 1 (825.03 MHz) Power Level 3			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.3	-76.0	-13.0
200 - 824.985	832.9	-44.7	-13.0
825.075 - 1000	837.1	-46.4	-13.0
1000 - 2000	1650.06	-38.0	-13.0
2000 - 3000	2475.09	-24.6	-13.0
3000 - 4000	3300.12	-62.2	-13.0
4000 - 4500	4125.13	-70.7	-13.0
4500 - 5000	4950.16	-75.7	-13.0
5000 - 6000	5775.19	-73.5	-13.0
6000 - 7000	6600.22 *	-71.7	-13.0
7000 - 8000	7425.25 *	-71.3	-13.0
8000 - 9000	8250.30 *	-71.2	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**Table 4**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 9.33 mW (9.7 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.00933) = 22.7$  dB. The criteria is  $9.7 \text{ dBm} - 22.7 \text{ dB} = -13.0 \text{ dBm}$ .

Transmitting on Channel 1 (825.03 MHz) Power Level 7			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	67.2	-75.8	-13.0
200 - 824.985	842.9	-49.2	-13.0
825.075 - 1000	847.0	-48.1	-13.0
1000 - 2000	1650.06	-42.6	-13.0
2000 - 3000	2475.09	-35.3	-13.0

Transmitting on Channel 1 (825.03 MHz)			
Power Level 7			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
3000 - 4000	3300.12	-74.8	-13.0
4000 - 4500	4125.13	-73.6	-13.0
4500 - 5000	4950.16 *	-77.8	-13.0
5000 - 6000	5775.19 *	-78.0	-13.0
6000 - 7000	6600.22 *	-71.6	-13.0
7000 - 8000	7425.25 *	-71.5	-13.0
8000 - 9000	8250.30 *	-71.7	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

Table 5

The emissions must be attenuated  $43 + 10 \log P$  dB where P = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 603 mW (27.8 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.603) = 40.8$  dB. The criteria is  $27.8 \text{ dBm} - 40.8 \text{ dB} = -13.0 \text{ dBm}$ .

Transmitting on Channel 333 (834.99 MHz)			
Power Level 0			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.2	-74.4	-13.0
200 - 834.945	819.2	-45.9	-13.0
835.035 - 1000	848.9	-50.0	-13.0
1000 - 2000	1669.98	-32.9	-13.0
2000 - 3000	2504.97	-28.4	-13.0
3000 - 4000	3339.96 *	-77.8	-13.0
4000 - 4500	4174.95	-66.8	-13.0
4500 - 5500	5009.94	-71.0	-13.0
5500 - 6000	5844.93	-69.3	-13.0
6000 - 7000	6679.92 *	-70.9	-13.0
7000 - 8000	7514.91 *	-71.2	-13.0
8000 - 9000	8349.90 *	-70.9	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**Table 6**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 324 mW (25.1 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.324) = 38.1$  dB. The criteria is 25.1 dBm - 38.1 dB = -13.0 dBm.

Transmitting on Channel 333 (834.99 MHz) Power Level 3			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.3	-75.1	-13.0
200 - 834.945	832.9	-44.7	-13.0
835.035 - 1000	837.1	-46.4	-13.0
1000 - 2000	1669.98	-33.2	-13.0
2000 - 3000	2504.97	-29.1	-13.0
3000 - 4000	3339.96 *	-78.0	-13.0
4000 - 4500	4174.95	-68.3	-13.0
4500 - 5500	5009.94	-72.2	-13.0
5500 - 6000	5844.93	-68.3	-13.0
6000 - 7000	6679.92 *	-70.5	-13.0
7000 - 8000	7514.91 *	-71.2	-13.0
8000 - 9000	8349.90 *	-69.2	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**Table 7**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 9.33 mW (9.7 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.00933) = 22.7$  dB. The criteria is 9.7 dBm - 22.7 dB = -13.0 dBm.

Transmitting on Channel 333 (834.99 MHz) Power Level 7			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.3	-74.3	-13.0
200 - 834.945	832.9	-50.3	-13.0
835.035 - 1000	837.0	-52.2	-13.0
1000 - 2000	1669.98	-41.9	-13.0
2000 - 3000	2504.97	-41.9	-13.0

Transmitting on Channel 333 (834.99 MHz)			
Power Level 7			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
3000 - 4000	3339.96 *	-78.1	-13.0
4000 - 4500	4174.95	-70.8	-13.0
4500 - 5500	5009.94 *	-77.0	-13.0
5500 - 6000	5844.93 *	-70.9	-13.0
6000 - 7000	6679.92 *	-71.1	-13.0
7000 - 8000	7514.91 *	-71.4	-13.0
8000 - 9000	8349.90 *	-70.2	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**Table 8**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 603 mW (27.8 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.603) = 40.8$  dB. The criteria is  $27.8 \text{ dBm} - 40.8 \text{ dB} = -13.0 \text{ dBm}$ .

Transmitting on Channel 666 (844.98 MHz)			
Power Level 0			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.2	-74.6	-13.0
200 - 844.935	842.9	-45.5	-13.0
845.025 - 1000	846.9	-47.1	-13.0
1000 - 2000	1689.96	-31.0	-13.0
2000 - 3000	2534.94	-27.8	-13.0
3000 - 4000	3379.92 *	-77.6	-13.0
4000 - 4500	4224.90	-74.0	-13.0
4500 - 5500	5069.88	-76.1	-13.0
5500 - 6000	5914.86	-68.7	-13.0
6000 - 7000	6759.84 *	-70.8	-13.0
7000 - 8000	7604.82 *	-70.5	-13.0
8000 - 9000	8449.80 *	-69.0	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**Table 9**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 324 mW (25.1 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.324) = 38.1$  dB. The criteria is 25.1 dBm - 38.1 dB = -13.0 dBm.

Transmitting on Channel 666 (844.98 MHz) Power Level 3			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.2	-74.8	-13.0
200 - 844.935	842.9	-44.8	-13.0
845.025 - 1000	847.0	-45.1	-13.0
1000 - 2000	1689.96	-32.3	-13.0
2000 - 3000	2534.94	-27.4	-13.0
3000 - 4000	3379.92 *	-78.3	-13.0
4000 - 4500	4224.90	-73.1	-13.0
4500 - 5500	5069.88	-76.5	-13.0
5500 - 6000	5914.86 *	-71.1	-13.0
6000 - 7000	6759.84 *	-71.2	-13.0
7000 - 8000	7604.82 *	-69.9	-13.0
8000 - 9000	8449.80 *	-68.8	-13.0

\* Noise Floor

RBW = 30 kHz VBW = 100 kHz

**Table 10**

The emissions must be attenuated  $43 + 10 \log P$  dB where  $P$  = Mean power of the unmodulated carrier. The maximum power of the unmodulated carrier was measured to 9.33 mW (9.7 dBm), therefore, the emissions must be attenuated  $43 + 10 \log (0.00933) = 22.7$  dB. The criteria is 9.7 dBm - 22.7 dB = -13.0 dBm.

Transmitting on Channel 666 (844.98 MHz) Power Level 7			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	199.3	-74.2	-13.0
200 - 844.935	842.9	-49.2	-13.0
845.025 - 1000	847.0	-48.1	-13.0
1000 - 2000	1689.96	-39.5	-13.0
2000 - 3000	2534.94	-37.4	-13.0

Transmitting on Channel 666 (844.98 MHz)			
Power Level 7			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
3000 - 4000	3379.92 *	-78.1	-13.0
4000 - 4500	4224.90	-74.4	-13.0
4500 - 5500	5069.88 *	-77.2	-13.0
5500 - 6000	5914.86 *	-71.7	-13.0
6000 - 7000	6759.84 *	-71.8	-13.0
7000 - 8000	7604.82 *	-71.3	-13.0
8000 - 9000	8449.80 *	-70.7	-13.0
* Noise Floor			

RBW = 30 kHz VBW = 100 kHz

**2.5 Radiated Spurious Emissions**

Transmitting on Channel 1 (825.03 MHz)					
Antenna Polarity	Frequency (MHz)	Uncorr. Level (dB $\mu$ V)	Correction Factor (dB)	Field Strength (dB $\mu$ V/m)	Criteria (dB $\mu$ V/m)
V	1650.0	18.0	32.4	50.4	84.4
V	2475.0	23.5	35.6	59.1	84.4
V	3300.1	16.4	37.9	54.3	84.4
V	4125.1	16.3 *	38.7	55.0	84.4
V	4950.1	17.5 *	40.1	57.6	84.4
V	5775.2	16.4 *	41.6	58.0	84.4
V	6600.2	22.7 *	42.6	65.3	84.4
V	7425.2	22.5 *	43.2	65.7	84.4
V	8250.3	22.9 *	45.9	68.8	84.4
H	1650.0	16.2	32.4	48.6	84.4
H	2475.0	22.1	35.6	57.7	84.4
H	3300.1	16.7	37.9	54.6	84.4
H	4125.1	16.3 *	38.7	55.0	84.4
H	4950.1	17.5 *	40.1	57.6	84.4
H	5775.2	16.4 *	41.6	58.0	84.4
H	6600.2	22.7 *	42.6	65.3	84.4
H	7425.2	22.5 *	43.2	65.7	84.4
H	8250.3	22.9 *	45.9	68.8	84.4

Note 1: \* Noise Floor Measurements

Note 2: All emissions from 30 MHz to the first harmonic were more than 20 dB below the limit.

Note 3: The radiated emissions were measured at power levels 0, 3 and 7. The worst case emissions were with the phone transmitting on power level 0; therefore, this data was used to determine compliance.

Transmitting on Channel 333 (834.99 MHz)					
Antenna Polarity	Frequency (MHz)	Uncorr. Level (dB $\mu$ V)	Correction Factor (dB)	Field Strength (dB $\mu$ V/m)	Criteria (dB $\mu$ V/m)
V	1650.0	17.3	32.4	49.7	84.4
V	2475.0	17.6	35.6	53.2	84.4
V	3300.1	16.6	37.9	54.5	84.4
V	4125.1	16.3 *	38.7	55.0	84.4
V	4950.1	17.5 *	40.1	57.6	84.4
V	5775.2	16.4 *	41.6	58.0	84.4
V	6600.2	22.7 *	42.6	65.3	84.4
V	7425.2	22.5 *	43.2	65.7	84.4
V	8250.3	22.9 *	45.9	68.8	84.4
H	1650.0	15.9	32.4	48.3	84.4
H	2475.0	20.6	35.6	56.2	84.4
H	3300.1	16.8	37.9	54.7	84.4
H	4125.1	16.3 *	38.7	55.0	84.4
H	4950.1	17.5 *	40.1	57.6	84.4
H	5775.2	16.4 *	41.6	58.0	84.4
H	6600.2	22.7 *	42.6	65.3	84.4
H	7425.2	22.5 *	43.2	65.7	84.4
H	8250.3	22.9 *	45.9	68.8	84.4
Note 1: * Noise Floor Measurements					
Note 2: All emissions from 30 MHz to the first harmonic were more than 20 dB below the limit.					
Note 3: The radiated emissions were measured at power levels 0, 3 and 7. The worst case emissions were with the phone transmitting on power level 0; therefore, this data was used to determine compliance.					

Transmitting on Channel 666 (844.98 MHz)					
Antenna Polarity	Frequency (MHz)	Uncorr. Level (dB $\mu$ V)	Correction Factor (dB)	Field Strength (dB $\mu$ V/m)	Criteria (dB $\mu$ V/m)
V	1650.0	21.0	32.4	53.4	84.4
V	2475.0	23.8	35.6	59.4	84.4
V	3300.1	16.4	37.9	54.3	84.4
V	4125.1	16.3 *	38.7	55.0	84.4
V	4950.1	17.5 *	40.1	57.6	84.4
V	5775.2	16.4 *	41.6	58.0	84.4
V	6600.2	22.7 *	42.6	65.3	84.4
V	7425.2	22.5 *	43.2	65.7	84.4
V	8250.3	22.9 *	45.9	68.8	84.4
H	1650.0	21.5	32.4	53.9	84.4
H	2475.0	21.4	35.6	57.0	84.4
H	3300.1	16.3	37.9	54.2	84.4
H	4125.1	16.3 *	38.7	55.0	84.4
H	4950.1	17.5 *	40.1	57.6	84.4
H	5775.2	16.4 *	41.6	58.0	84.4
H	6600.2	22.7 *	42.6	65.3	84.4
H	7425.2	22.5 *	43.2	65.7	84.4
H	8250.3	22.9 *	45.9	68.8	84.4

Note 1: \* Noise Floor Measurements

Note 2: All emissions from 30 MHz to the first harmonic were more than 20 dB below the limit.

Note 3: The radiated emissions were measured at power levels 0, 3 and 7. The worst case emissions were with the phone transmitting on power level 0; therefore, this data was used to determine compliance.

**2.6 Frequency Stability**

Channel # 1 (825.03 MHz)

Ambient Temperature (° C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
-30	825.03	825.03028	0.34	2.5
-20	825.03	825.03008	0.10	2.5
-10	825.03	825.03011	0.13	2.5
0	825.03	825.03007	0.08	2.5
10	825.03	825.03073	0.88	2.5
20	825.03	825.03017	0.21	2.5
30	825.03	825.02989	-0.13	2.5
40	825.03	825.02981	-0.23	2.5
50	825.03	825.03014	0.17	2.5
60	825.03	825.03026	0.32	2.5

Voltage (DC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
4.07	825.03	825.03024	0.29	2.5
3.70	825.03	825.03017	0.21	2.5
3.33	825.03	825.03024	0.29	2.5

**Sample Calculation**

$$\text{Deviation (PPM)} = \frac{\text{FM} - \text{TF}}{\text{TF}} * 10^6$$

FM = Frequency Measured

TF = Intended Transmit Frequency

Appendix 1 - Test Procedures**Radiated Spurious Emissions**

The radiated emissions were tested as per ANSI C63.4.

The radiated emissions from the MINICELL were measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings. A preamplifier with a fixed gain of 26 dB was used to increase the sensitivity of the measuring instrumentation. The spectrum analyzer's resolution bandwidth was set to 100 kHz and the video bandwidth was set to 300 kHz, for readings in the 30 to 1000 MHz frequency range. Above 1000 MHz the spectrum analyzer's resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz for peak readings and the resolution bandwidth was set to 1 MHz and the video bandwidth was set to 1 Hz for average readings.

An EMCO BiconiLog antenna was used to measure the frequency range of 30 to 1000 MHz, and a double ridge guide antenna was used to measure the frequency range of 1 to 20 GHz, at a distance of 3 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding the antenna factors.

The configuration of the MINICELL was varied to find the maximum radiated emission. All interconnecting cables were moved to search for the worst case radiated emissions. The computing equipment was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

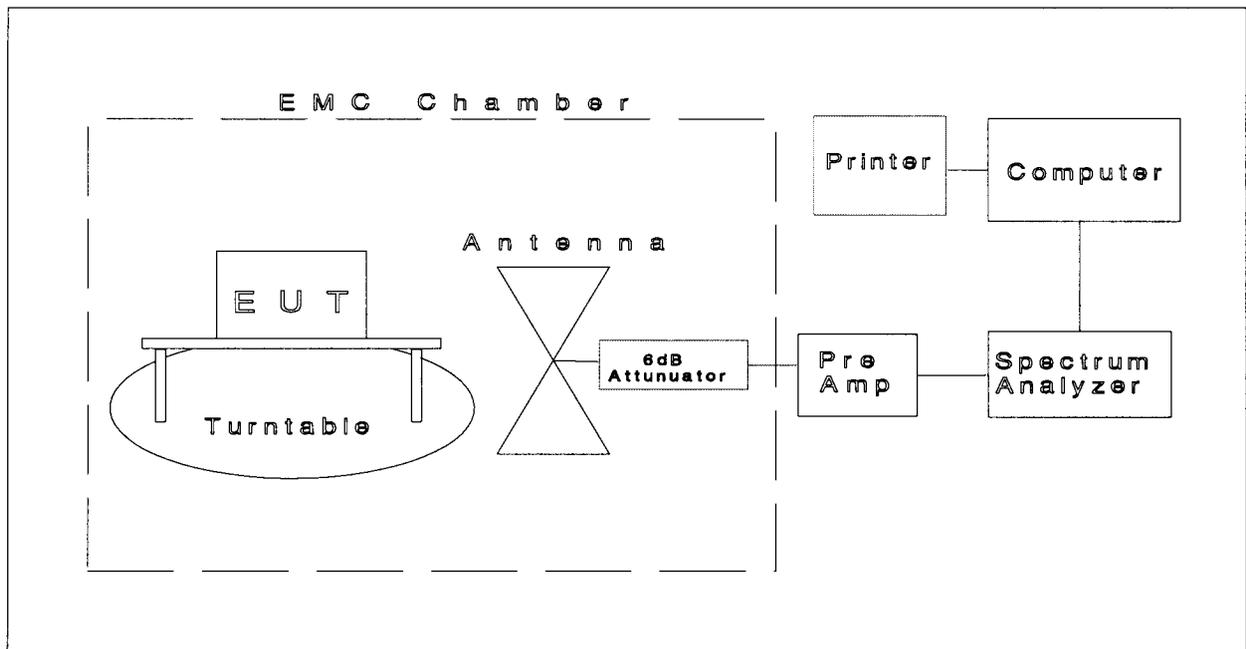
The MINICELL was measured on a non-conducting table 0.8 m above the ground plane. The table is placed on a turntable which is level with the ground plane. The turntable has slip rings which supply AC power to the computing equipment.

Type of Equipment	Manufacturer	Model Number	Serial Number
Anechoic Chamber	CCL	N/A	N/A
Test Software	CCL	Radiated Emissions	Revision 1.3
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	8565A	3107A01582
Biconilog Antenna	EMCO	3141	1045

Type of Equipment	Manufacturer	Model Number	Serial Number
Double Ridged Guide Antenna	EMCO	3115	9409-4355
Radiated Emissions Cable Anechoic Chamber	CCL	Cable B	N/A
Pre-Amplifier	Hewlett Packard	8447D	1937A03151
Power-Amplifier	Hewlett Packard	8447E	2434A01975
6 dB Attenuator	Hewlett Packard	8491A	32835

All the equipment listed above is calibrated every 12 months by an independent calibration laboratory or by CCL personal following outlined calibration procedures.

### R a d i a t e d   E m i s s i o n s   T e s t



#### Peak Transmit Power

The EUT was placed inside a temperature chamber and directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The measurements were

performed at -30° C, +20° C and +60° C and tuned to three different channels, as per 47 CFR 15.31(m), one near the bottom of the spectrum, one near the middle of the spectrum and one near the top of the spectrum.

Testing was performed as per ANSI-C63.4 1992, Methods of Measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

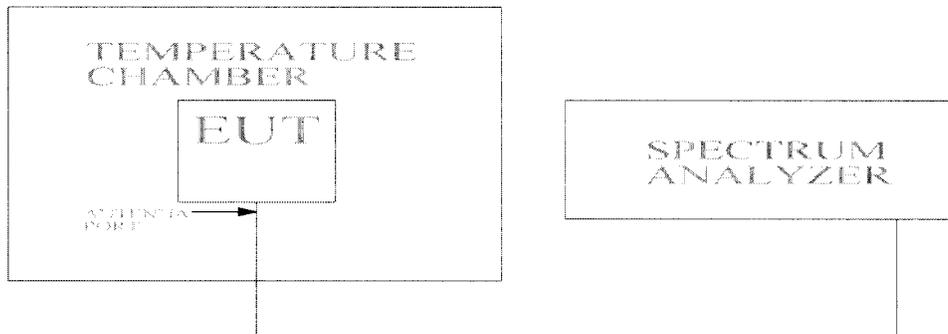
**Peak Transmit Power**

RBW = 100 kHz  
 VBW = 300 kHz

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	8565A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A
Temperature Chamber	Tenney Engineering, Inc.	Tenney Jr.	11184-83

All the equipment listed above is calibrated every 12 months by an independent calibration laboratory or by CCL personal following outlined calibration procedures.

**Test Configuration Block Diagram**



**Conducted Spurious Emissions and Occupied Bandwidth**

The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The carrier was modulated with wideband data, this produced the worst case emissions. The measurements were performed with the phone at three different power levels and tuned to three channels, as per 47 CFR 15.31(m), one near the bottom of the spectrum, one near the middle of the spectrum and one near the top of the spectrum.

Testing was performed as per ANSI-C63.4 1992, Methods of Measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

**Conducted Spurious Emissions****45 kHz above and below the carrier**

RBW = 300 Hz

VBW = 1 kHz

**Greater than 45 kHz above and below the carrier**

RBW = 30 kHz

VBW = 100 kHz

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	8565A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A
Plotter	Hewlett Packard	7470A	2210A01469



#### **Modulation Deviation Limiting (Plots 1 through 4)**

Turn on the phone to a channel near the center of the band and adjust for full rated system deviation, as per manufacturer's procedure and instructions. Adjust the audio input for  $\pm 8$  kHz peak frequency deviation at 1000 Hz with the 2:1 compressor enabled and the SAT disabled, this is the reference level. Vary the frequency of the audio signal from 100 Hz to 5000 Hz and measure and record the peak frequency deviation.

Repeat the measurements with the audio input level increased by 10 dB and 20 dB.

Repeat the measurements with the audio input level decreased by 10 dB and 20 dB.

Repeat all of the above measurements with the compressor disabled.

#### **Minimum Performance Standard**

Over the frequency range 100 to 5000 Hz, maximum system deviation shall not exceed  $\pm 12$  kHz.

#### **Transmit Audio Frequency and Limiting Response (Plots 5 through 6)**

Operate the transmitter with the compressor disabled, and

monitor the output with a frequency deviation meter without the standard 750  $\mu$ sec de-emphasis, with expander disabled, and without C-message weighted filter. Apply a sine wave audio input to the transmitter external audio input port, vary the modulation frequency from 300 to 3000 Hz, and record the input levels necessary to maintain a constant  $\pm 2.9$  kHz system deviation.

To test the band limiting condition: adjust the audio input frequency to 1000 Hz, and adjust the input level to 20 dB greater than that required to produce  $\pm 8$  kHz deviation. Note the output level on the frequency deviation meter. Using this output level as reference (0 dB), vary the modulation frequency from 3000 to 20,000 Hz, and record the change in output while maintaining a constant audio input level.

#### Minimum Performance Standard

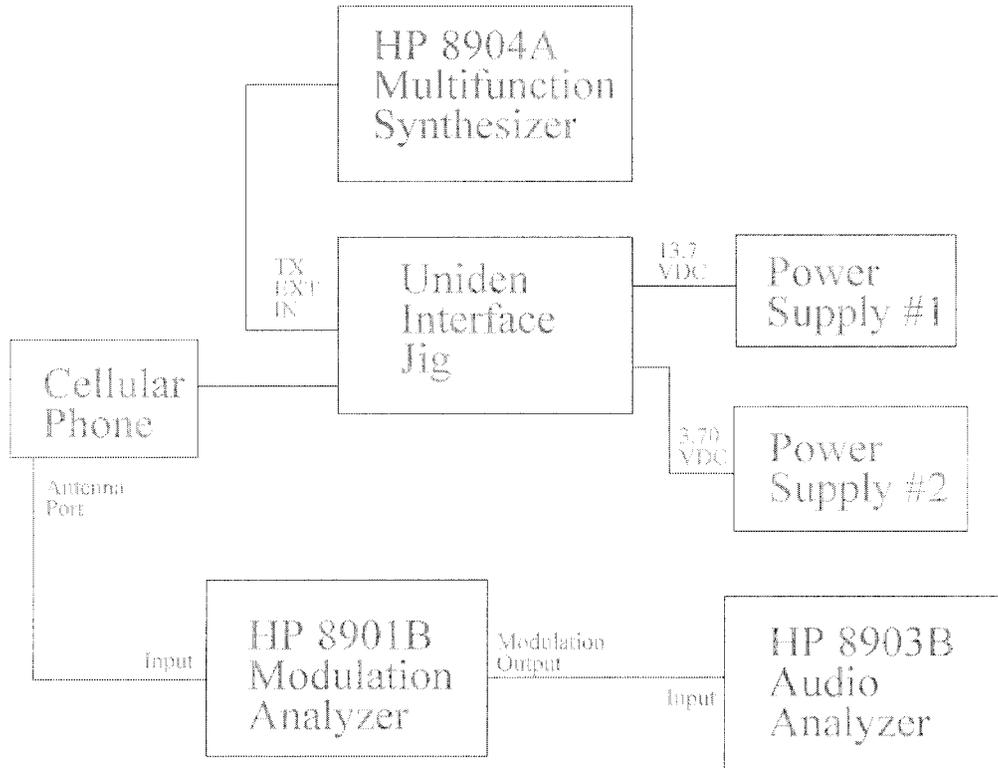
Over the frequency range 300 to 3000 Hz, the input level to maintain a constant  $\pm 2.9$  kHz system deviation shall not vary more than +1 to -3 dB from a true 6 dB/octave pre-emphasis characteristic (with the exception of a permissible 6 dB/octave roll-off from 2500 to 3000 Hz relative to the true level at 2500 Hz).

Between 3000 to 20,000 Hz the response attenuation shall not exceed the values defined in §22.915 (d) (1).

Type of Equipment	Manufacturer	Model Number	Serial Number
Multifunction Synthesizer	Hewlett Packard	8904A	2948A04120
Modulation Analyzer	Hewlett Packard	8901B	3019A02755
Audio Analyzer	Hewlett Packard	8903B	3011A12156
Interface Jig	Uniden	UH-045Z	N/A
Power Supply #1	Lambda	LXTD-5152	A75750
Power Supply #2	Lambda	LM 262	079749

All the equipment listed above is calibrated every 12 months by an independent calibration laboratory or by CCL personal following outlined calibration procedures.

**Test Configuration Block Diagram**



**Carrier Frequency Stability**

The EUT was placed inside of a temperature chamber and directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The measurements were performed from -30° C to +60° C in 10° increments.

The spectrum analyzer's was configured as follows:

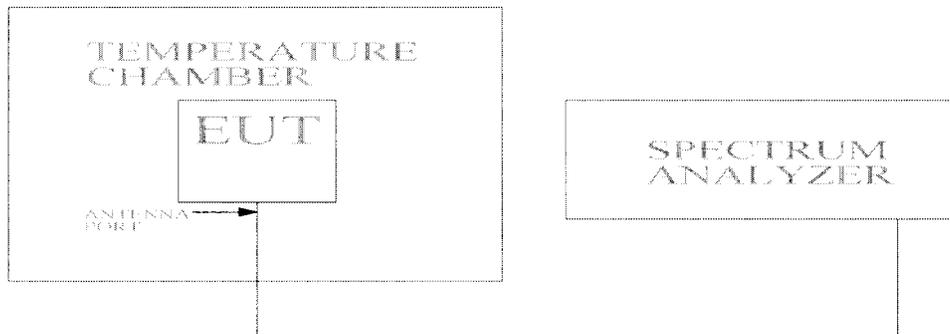
**Peak Transmit Power**

- RBW = 1 kHz
- VBW = 3 kHz
- Span = 20 kHz
- Sweep = Auto

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	8565A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A
Temperature Chamber	Tenney Engineering, Inc.	Tenney Jr.	11184-83

All the equipment listed above is calibrated every 12 months by an independent calibration laboratory or by CCL personal following outlined calibration procedures.

**Test Configuration Block Diagram**



Appendix 2 - Spurious Emissions/Occupied Bandwidth Plots

MKR 825.030 00 MHz  
28.00 dBm

ATTEN 20 dB

REF 33.7 dBm

10 dB/

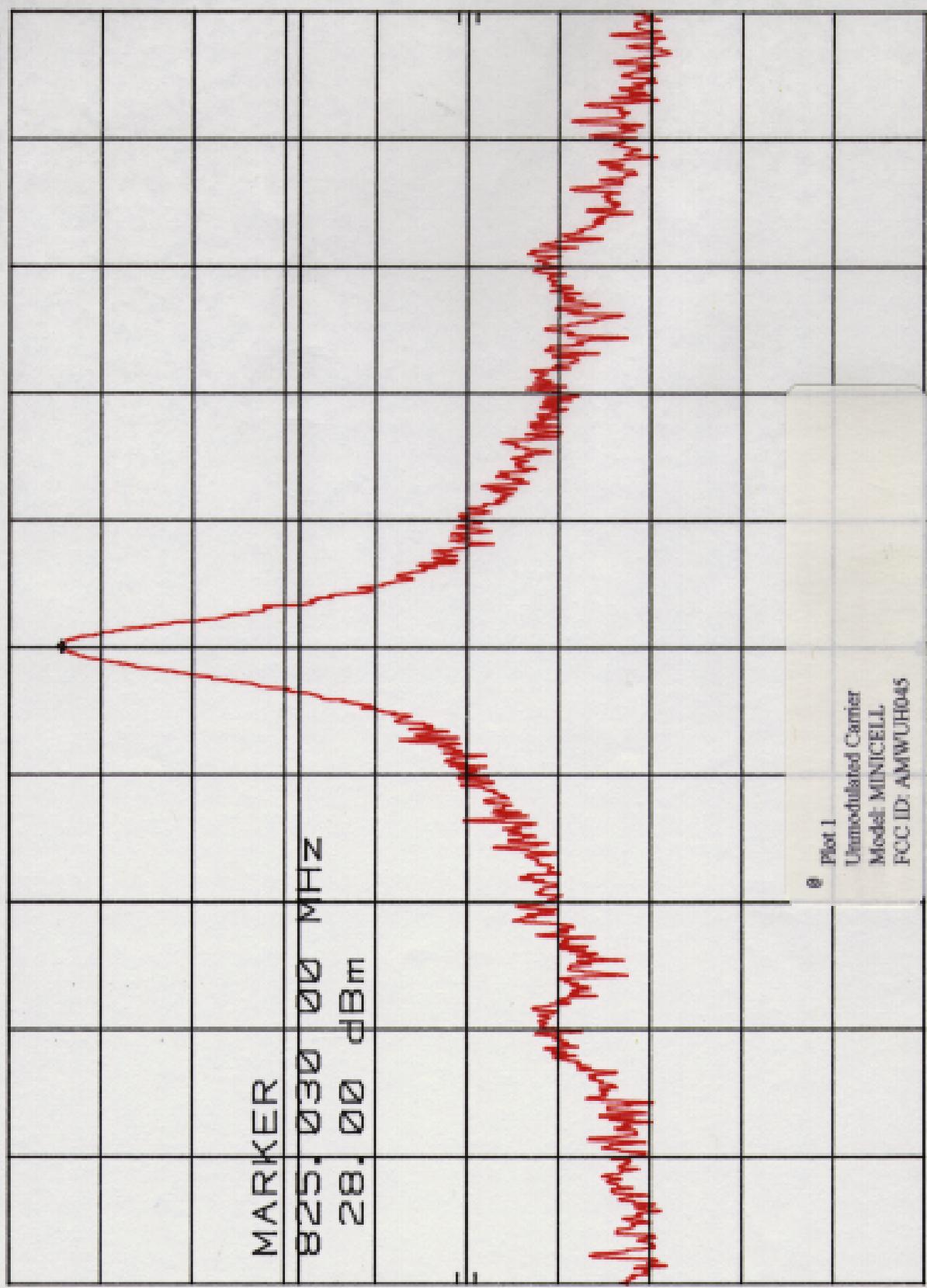
10 dB/

OFFSET  
31.0  
dB

DL  
2.0  
dBm

MARKER

825.030 00 MHz  
28.00 dBm



CENTER 825.030 0 MHz  
RES BW 300 Hz

VBW 1 kHz

SPAN 20.0 kHz  
SWP 1.00 sec

MKR 825.030 1 MHz  
28.00 dBm

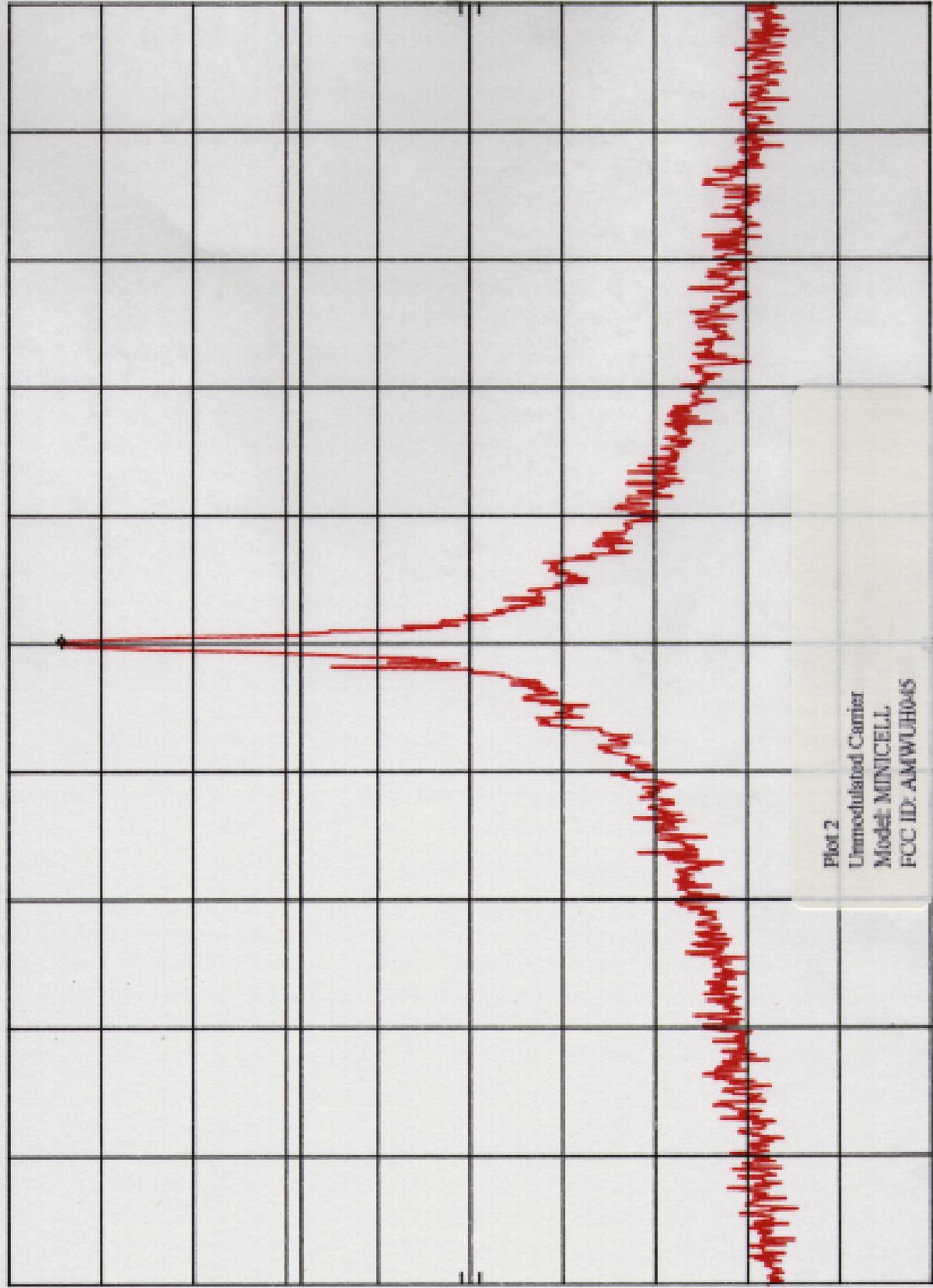
REF 33.7 dBm  
ATTEN 20 dB

10 dB/

10 dB/

OFFSET  
31.0  
dB

DL  
2.0  
dBm



CENTER 825.030 MHz  
RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz  
SWP 3.00 sec

MKR 825.030 1 MHz  
27.60 dBm

ATTEN 20 dB

REF 33.7 dBm

h<sub>0</sub>

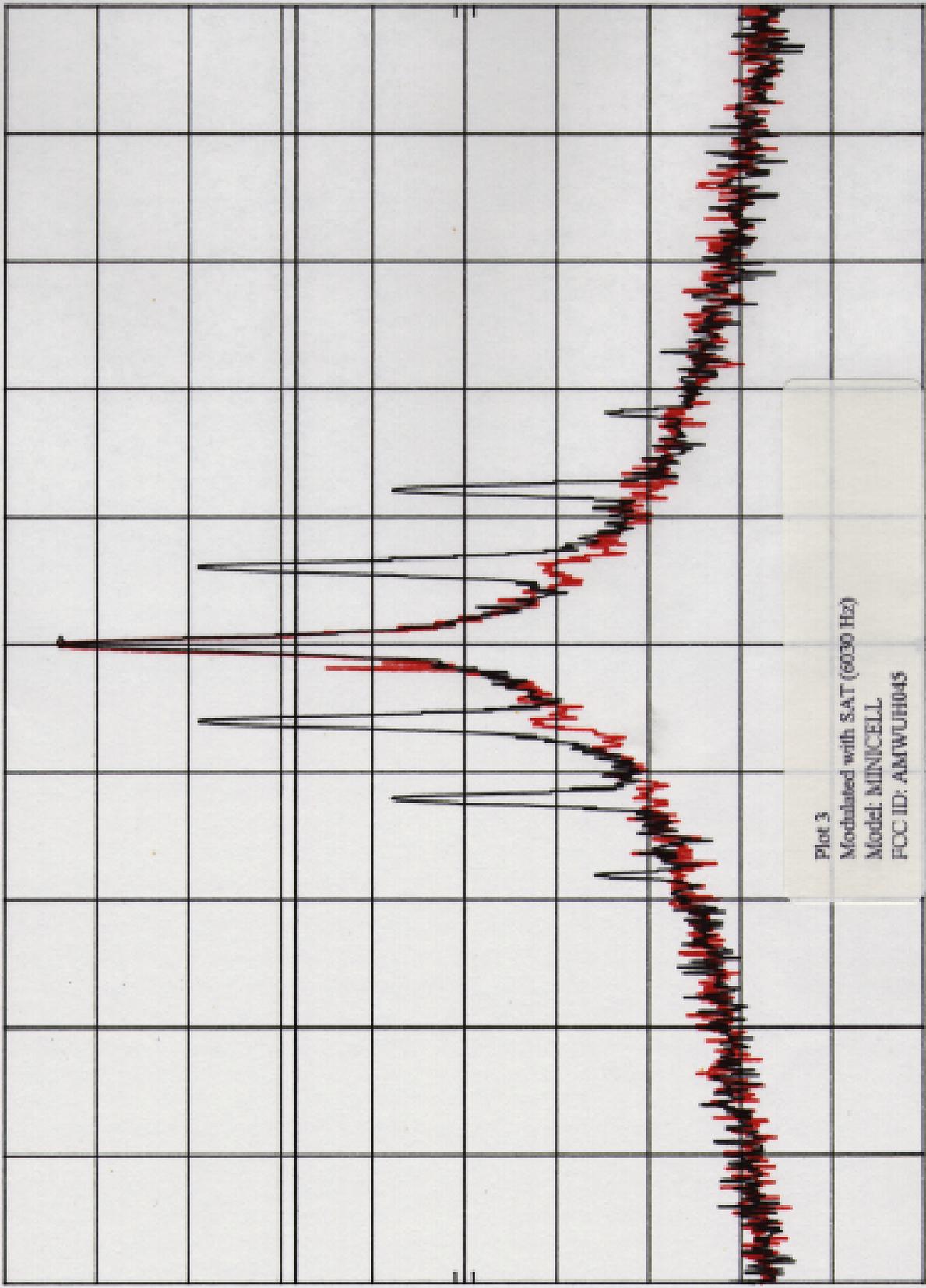
10 dB/

OFFSET

31.0  
dB

DL

2.0  
dBm



SPAN 100 KHz  
SWP 3.00 sec

VBW 1 KHz

Hz

CENTER 825.030 MHz  
RES BW 300

MKR 825.030 1 MHz  
28.00 dBm

ATTEN 20 dB

REF 33.7 dBm

10 dB/

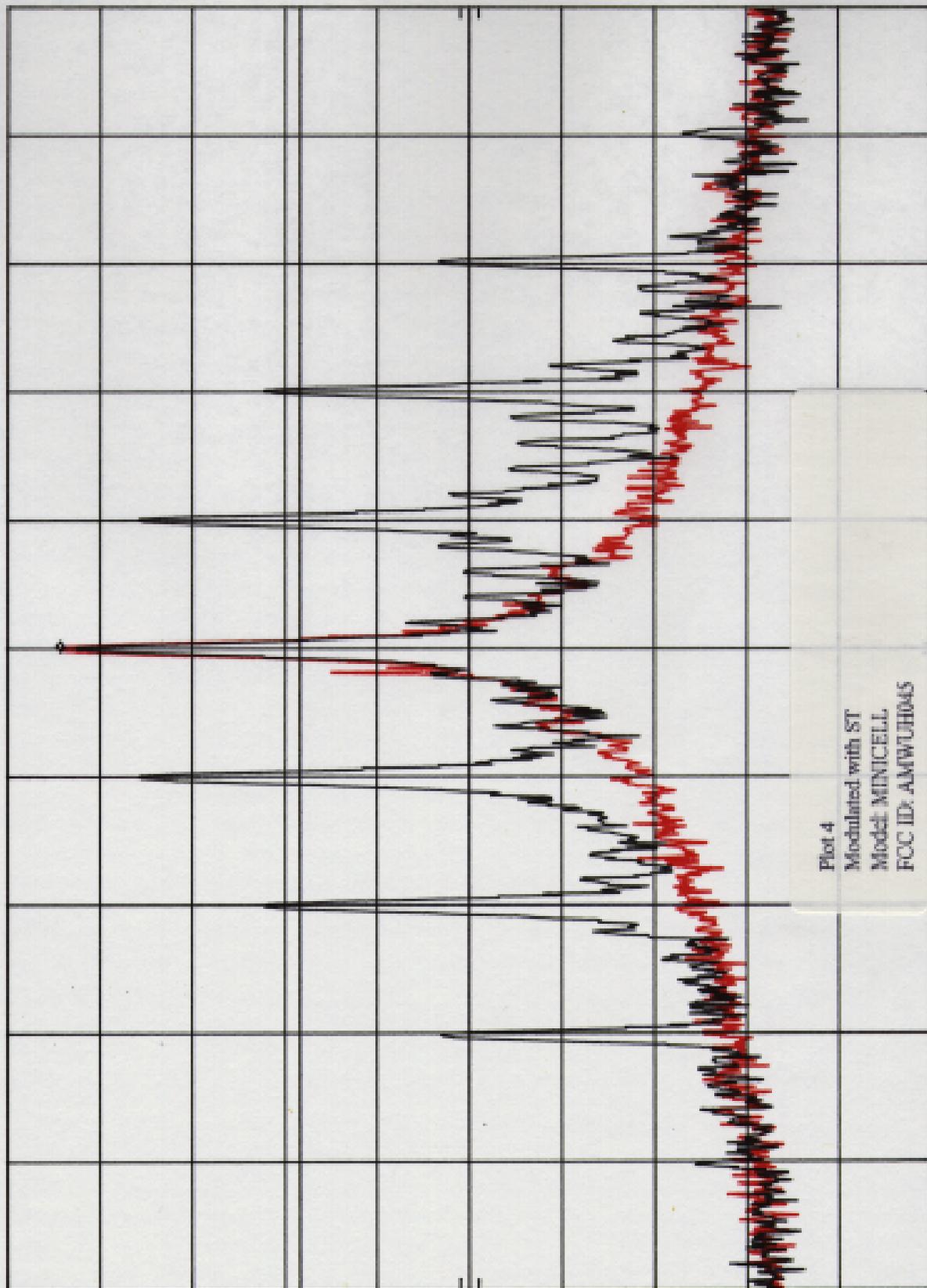
10 dB/

OFFSET

31.0  
dB

DL

2.0  
dBm



CENTER 825.030 MHz  
RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz  
SWP 3.00 sec

MKR 025.030 1 MHz  
28.00 dBm

ATTEN 20 dB

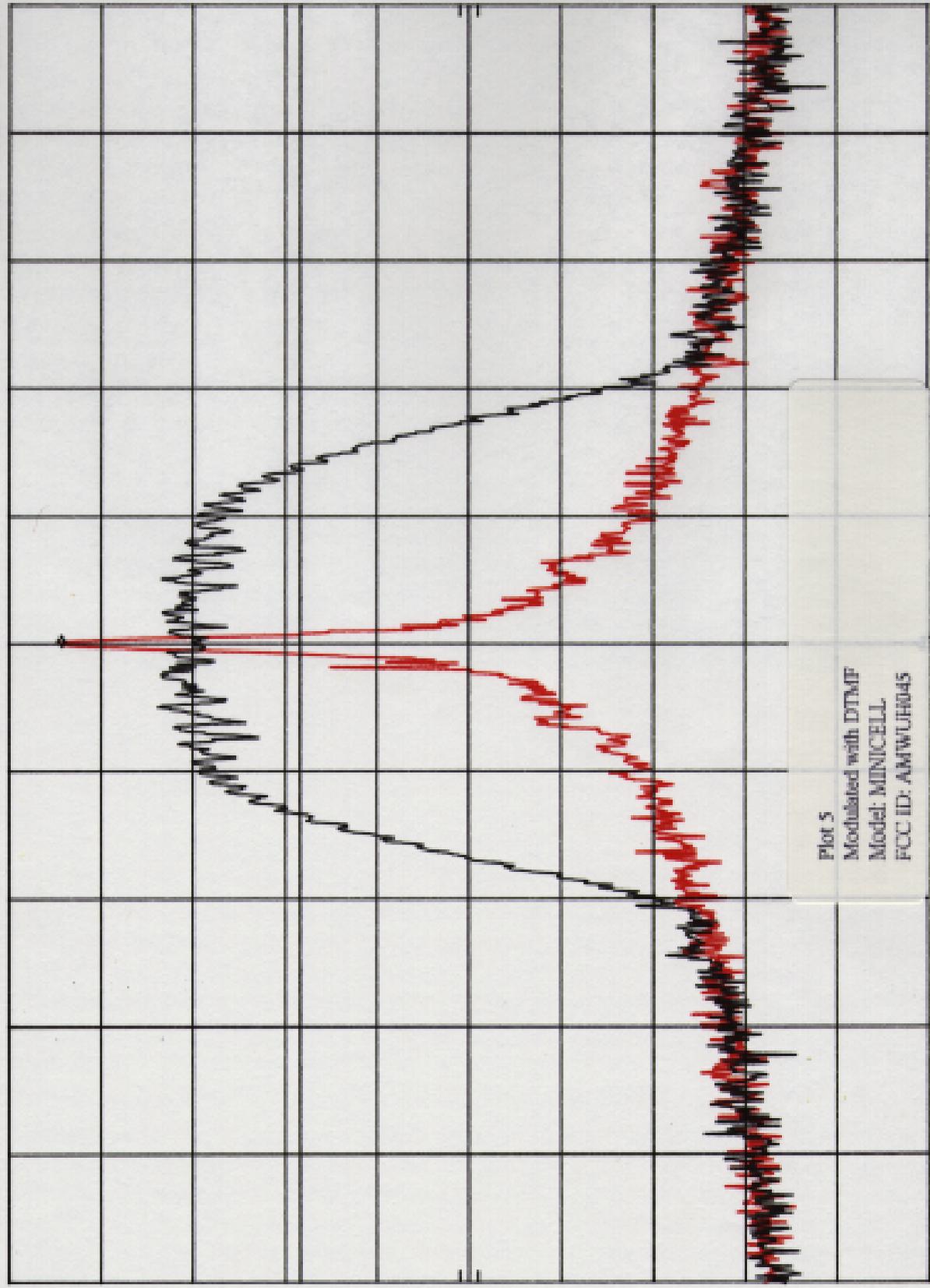
REF 33.7 dBm

10 dB/

10 dB/

OFFSET  
31.0  
dB

DL  
2.0  
dBm



SPAN 100 KHz  
SWP 3.00 sec

VBW 1 KHz

CENTER 025.030 MHz  
RES BW 300 Hz

MKR 825.030 1 MHz  
28.00 dBm

ATTEN 20 dB

REF 33.7 dBm

10 dB/

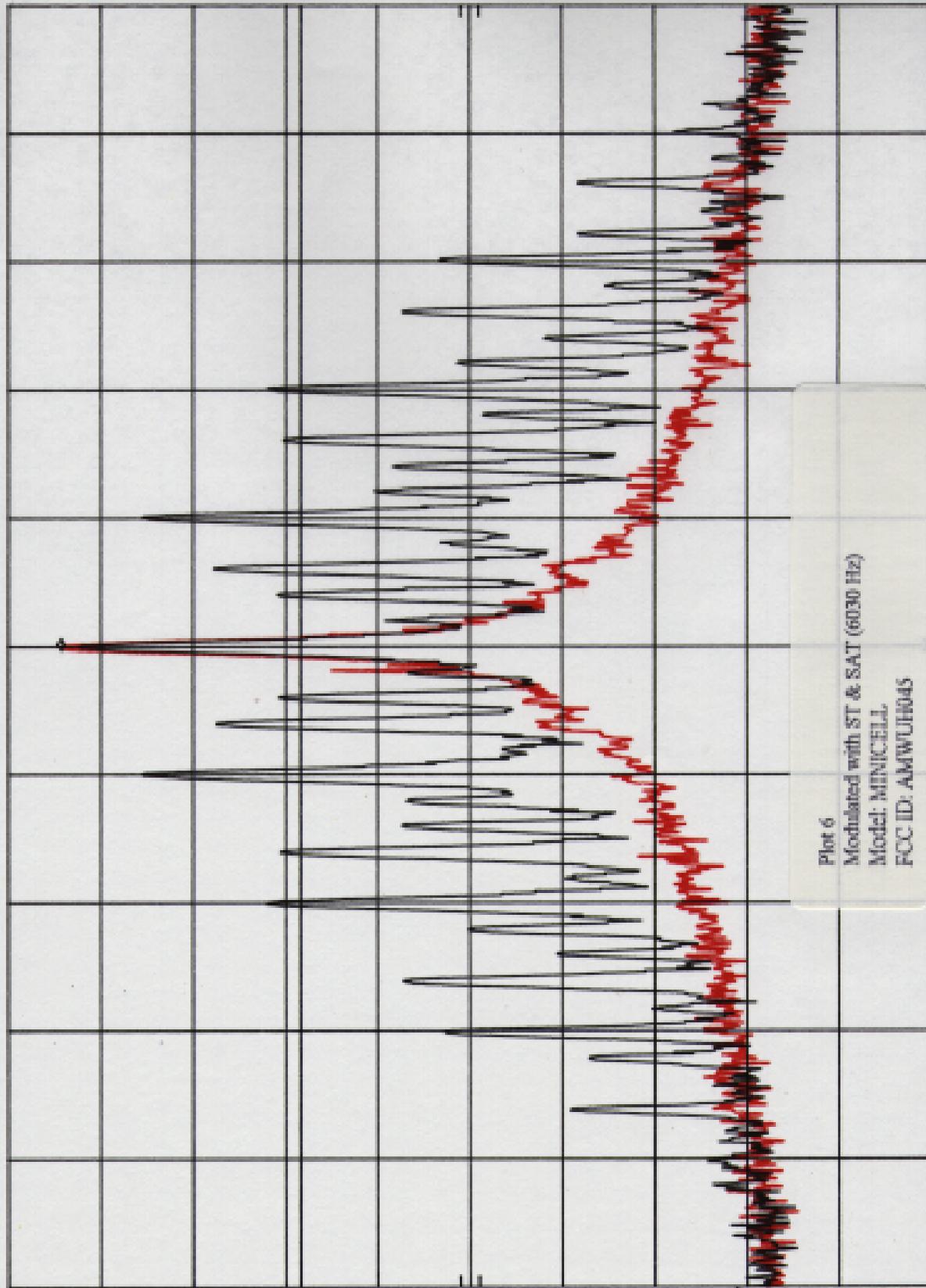
10 dB/

OFFSET

31.0  
dB

DL

2.0  
dBm



CENTER 825.030 MHz

RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz

SWP 3.00 sec

MKR 025.030 1 MHz  
28.00 dBm

ATTEN 20 dB

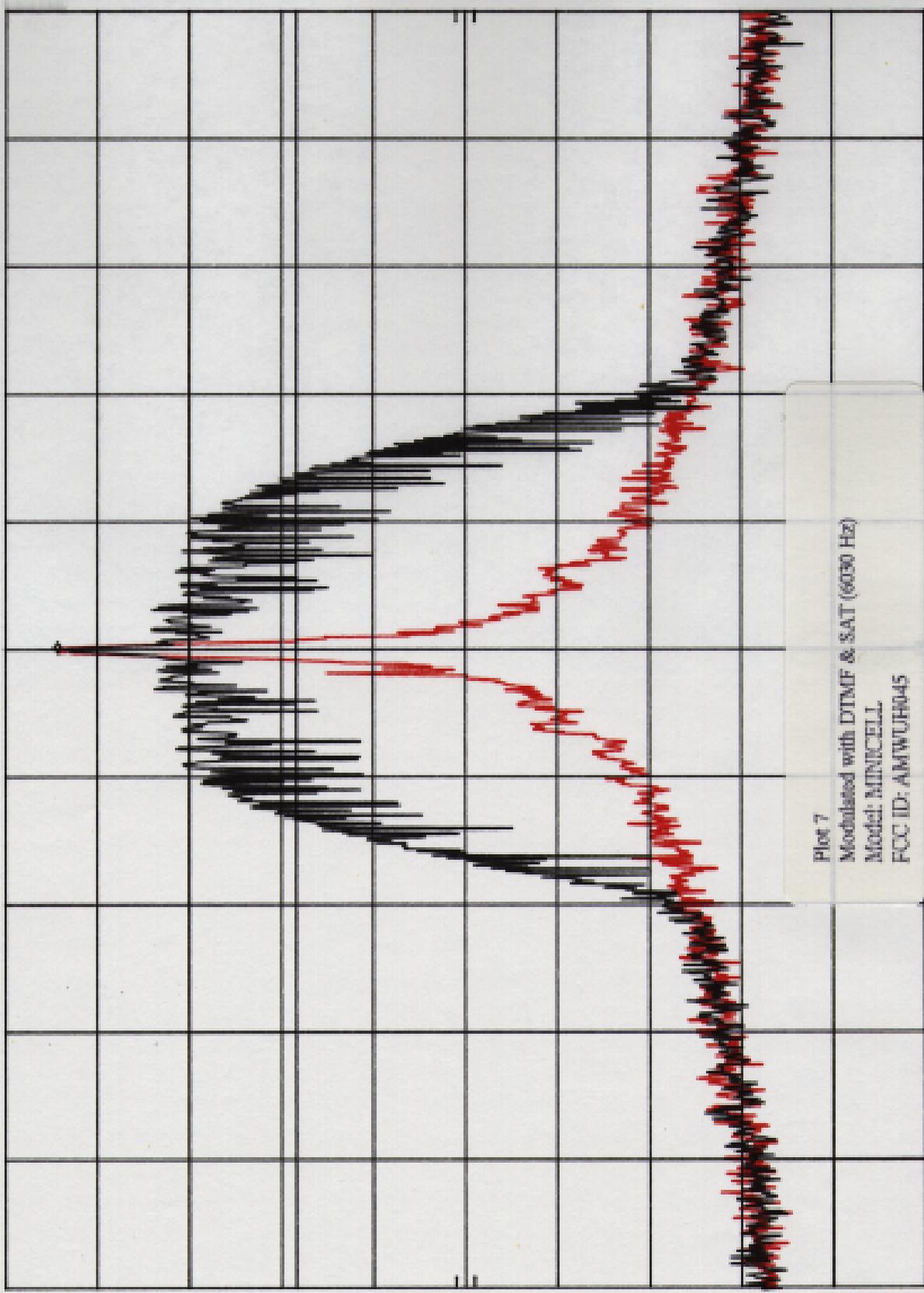
REF 33.7 dBm

10 dB/

10 dB/

OFFSET  
31.0  
dB

DL  
2.0  
dBm



Plot 7  
Modulated with DTMF & SAT (6030 Hz)  
Model: MINICELL  
FCC ID: AMWUJ045

CENTER 025.030 MHz  
RES BW 300 Hz  
VBW 1 kHz  
SPAN 100 kHz  
SWP 3.00 sec

MKR 825.030 1 MHz  
28.00 dBm

ATTEN 20 dB

REF 33.7 dBm

10 dB/

10 dB/

OFFSET

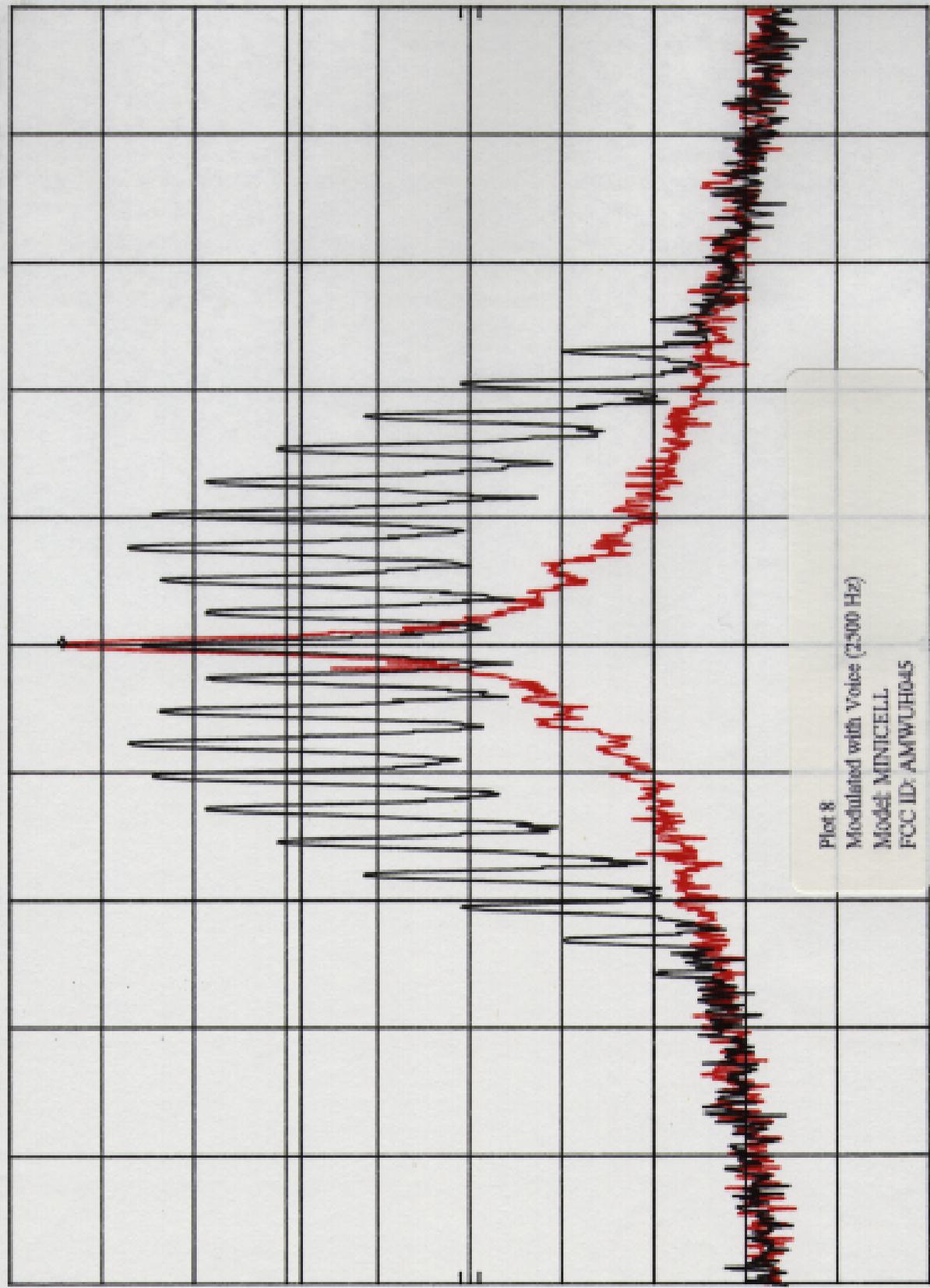
31.0

dB

DL

2.0

dBm



Plot 8  
Modulated with Voice (2500 Hz)  
Model: MINICELL  
FCC ID: AMWUJ045

CENTER 825.030 MHz  
RES BW 300 Hz  
SPAN 100 kHz  
SWP 3.00 sec  
VBW 1 kHz

MKR 825.030 1 MHz  
20.00 dBm

ATTEN 20 dB

REF 33.7 dBm

10 dB/

10 dB/

OFFSET

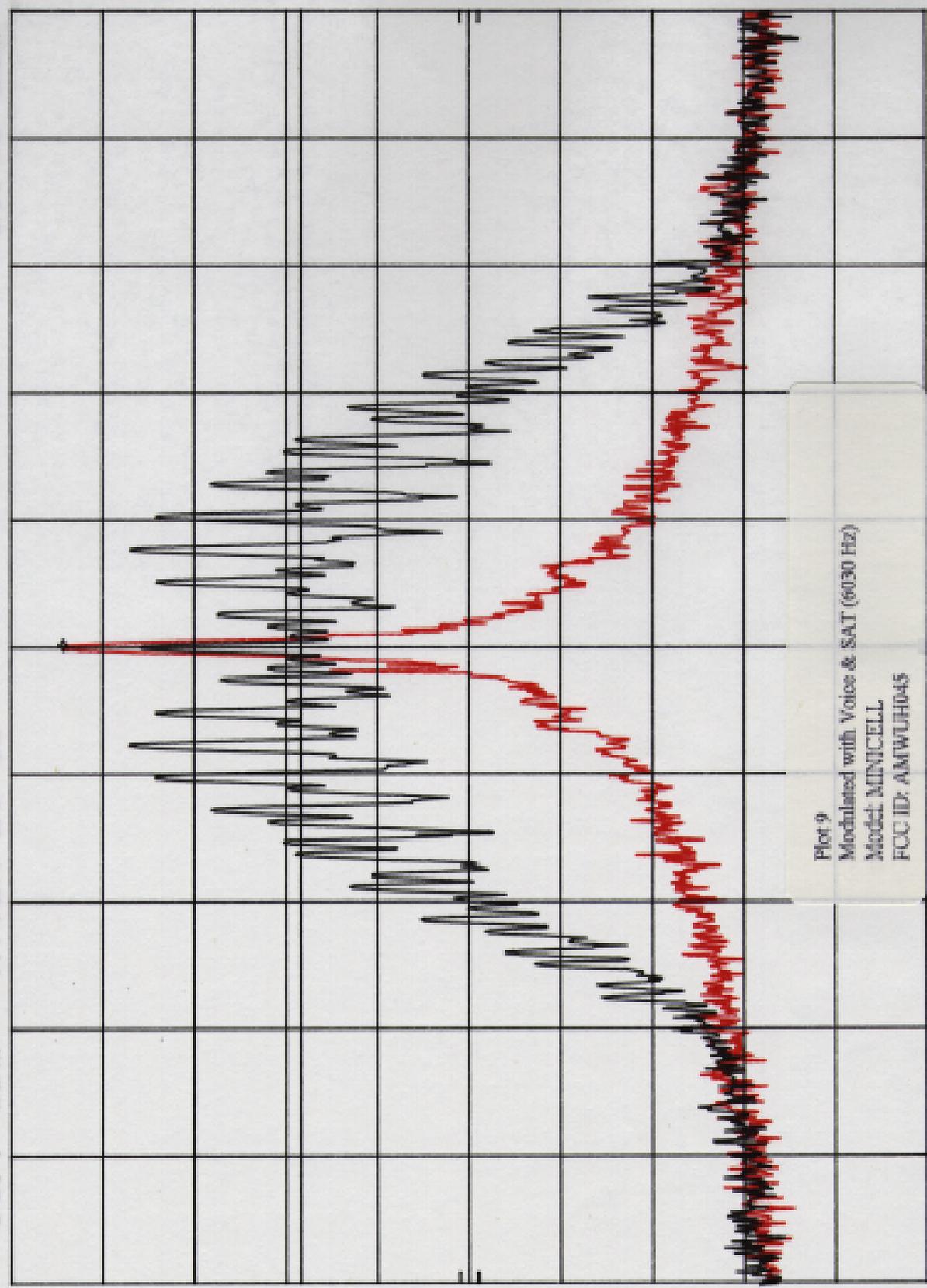
31.0

dB

DL

2.0

dBm



CENTER 825.030 MHz

RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz

SWP 3.00 sec

MKR 825.030 1 MHz  
20.00 dBm

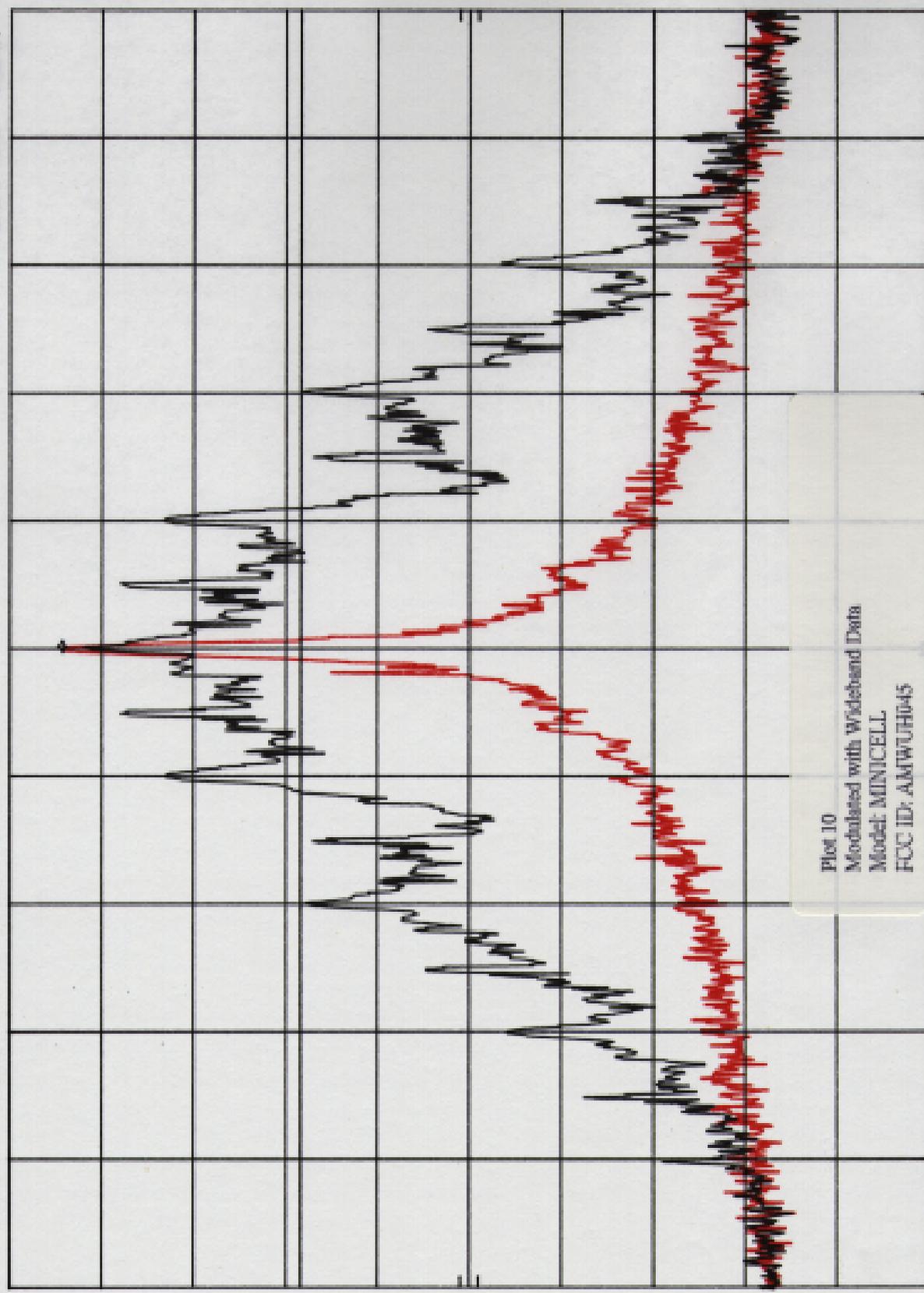
REF 33.7 dBm  
ATTEN 20 dB

10 dB/

10 dB/

OFFSET  
31.0  
dB

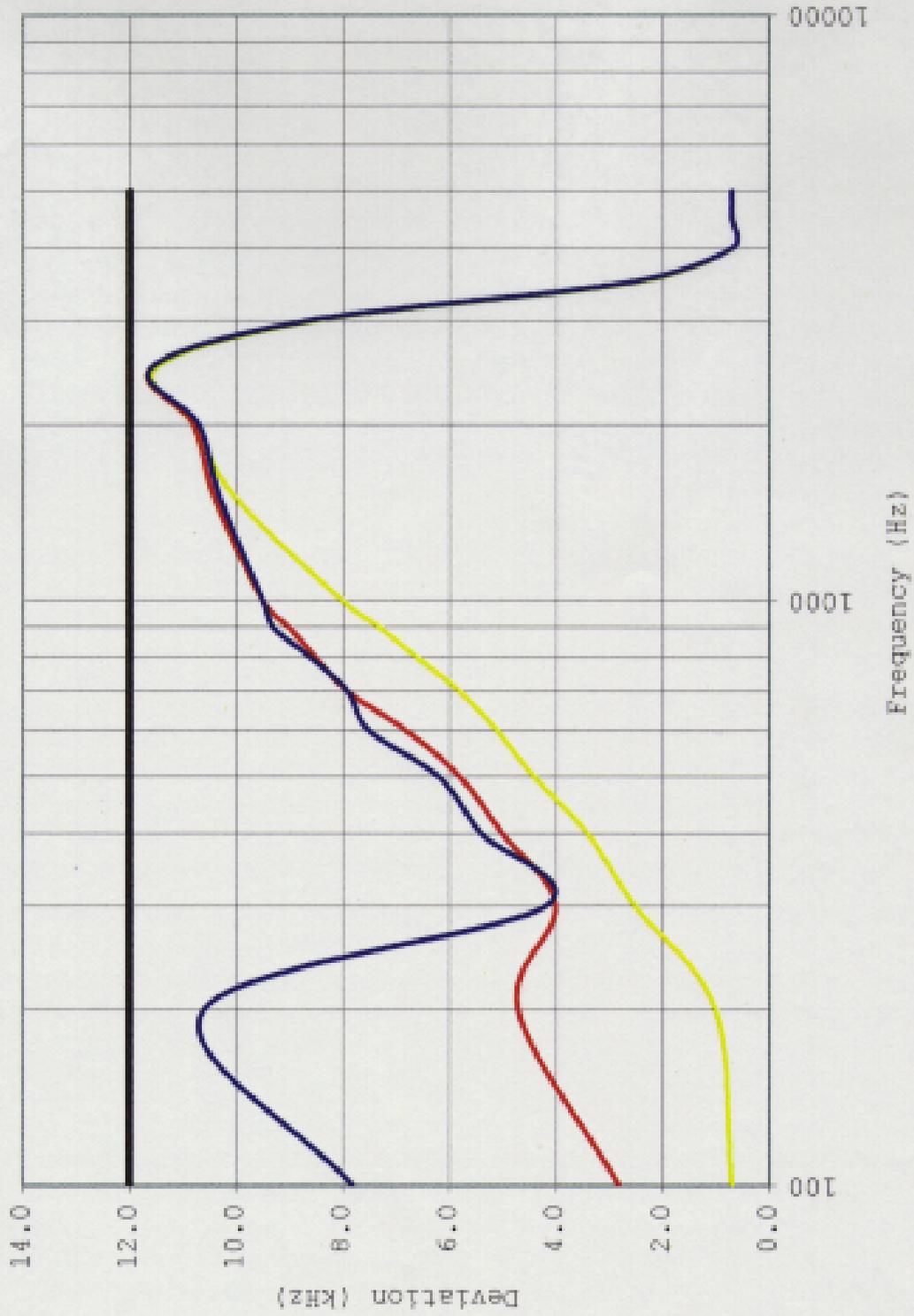
DL  
2.0  
dBm



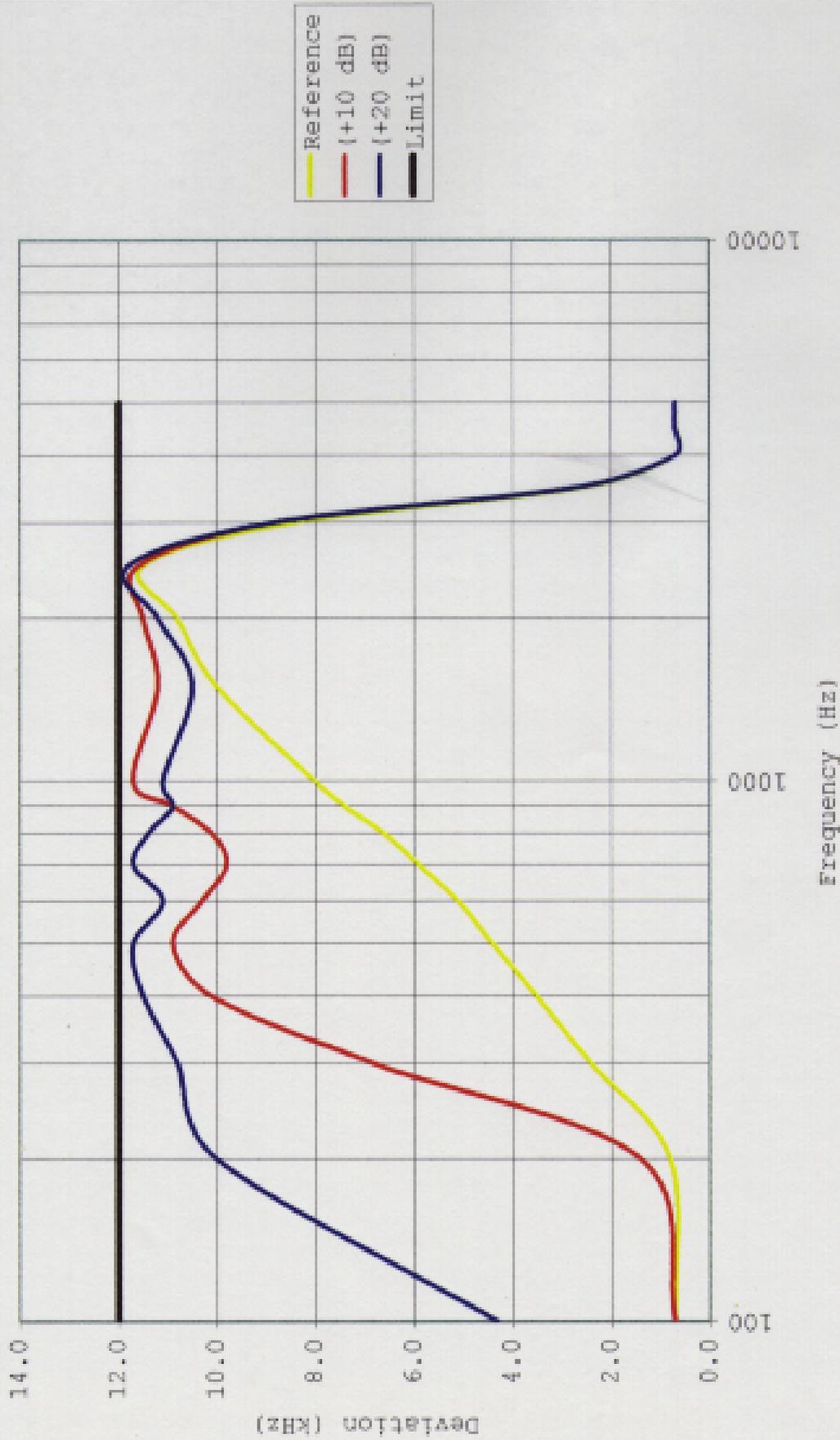
CENTER 825.030 MHz  
RES BW 300 Hz  
SPAN 100 KHz  
SWP 3.00 sec

Appendix 3 - Modulation Characteristics Plots

Modulation Deviation Limiting  
Compressor Enabled

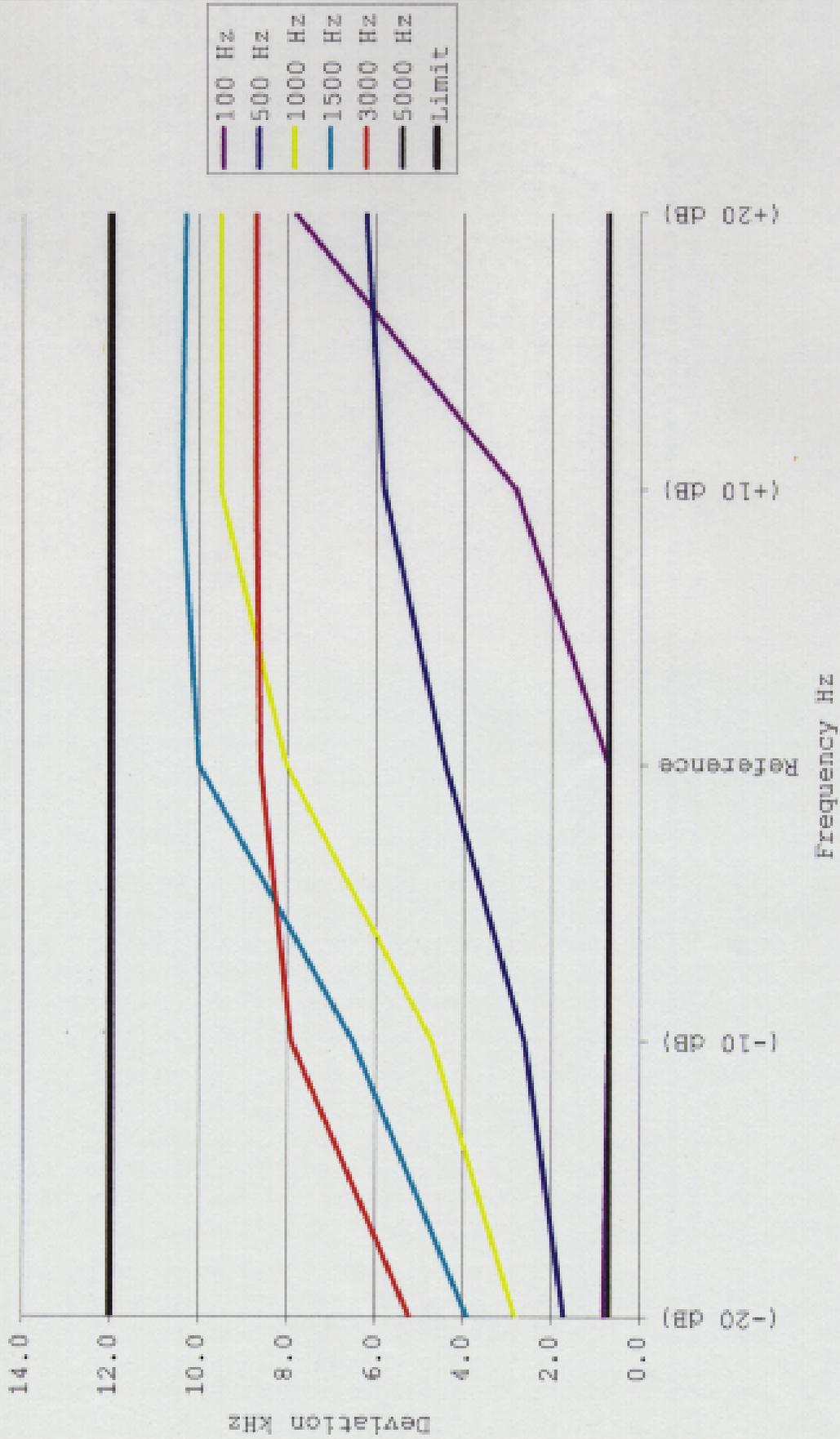


Modulation Deviation Limiting  
Compressor Disabled

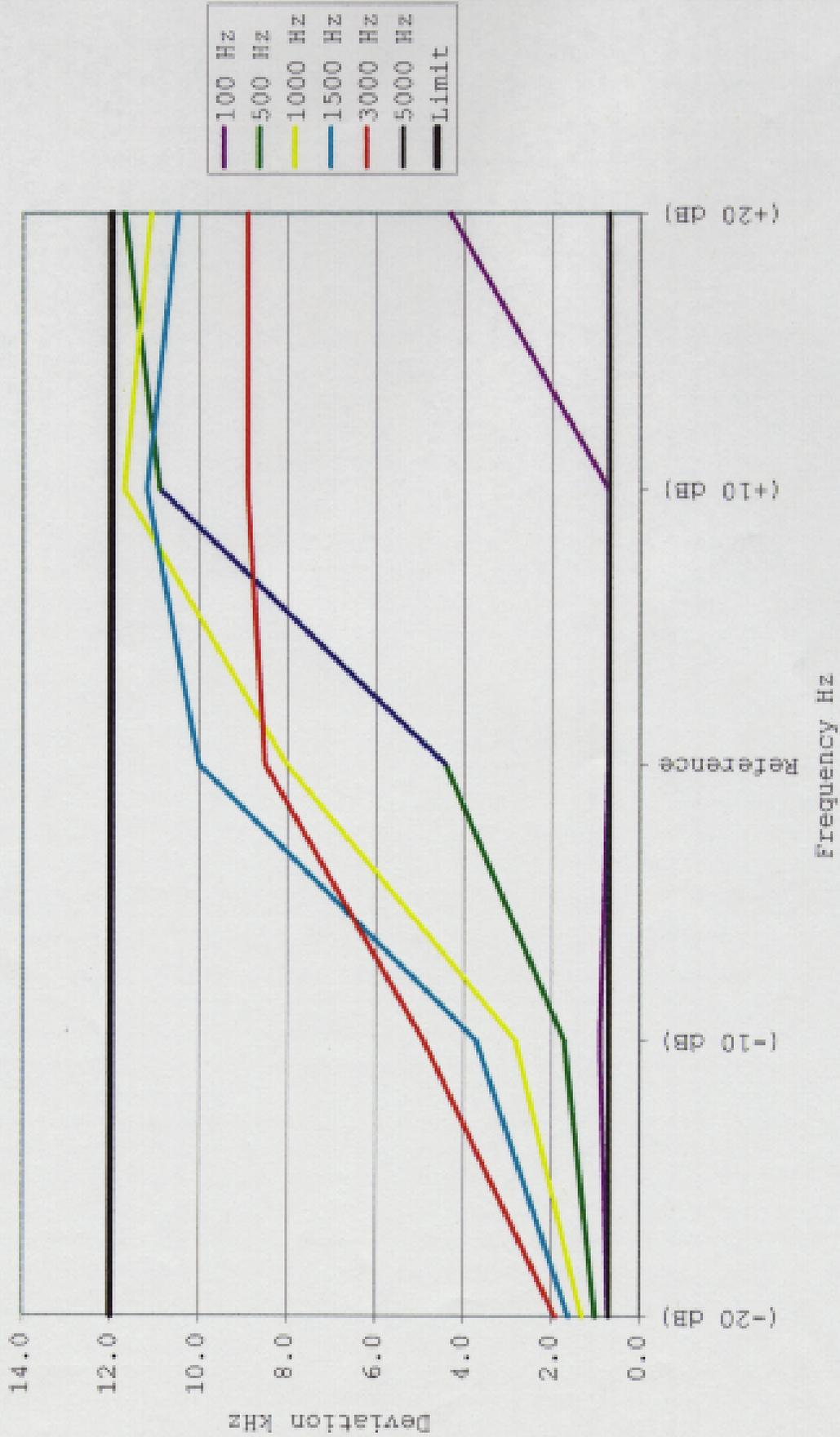


Plot 2

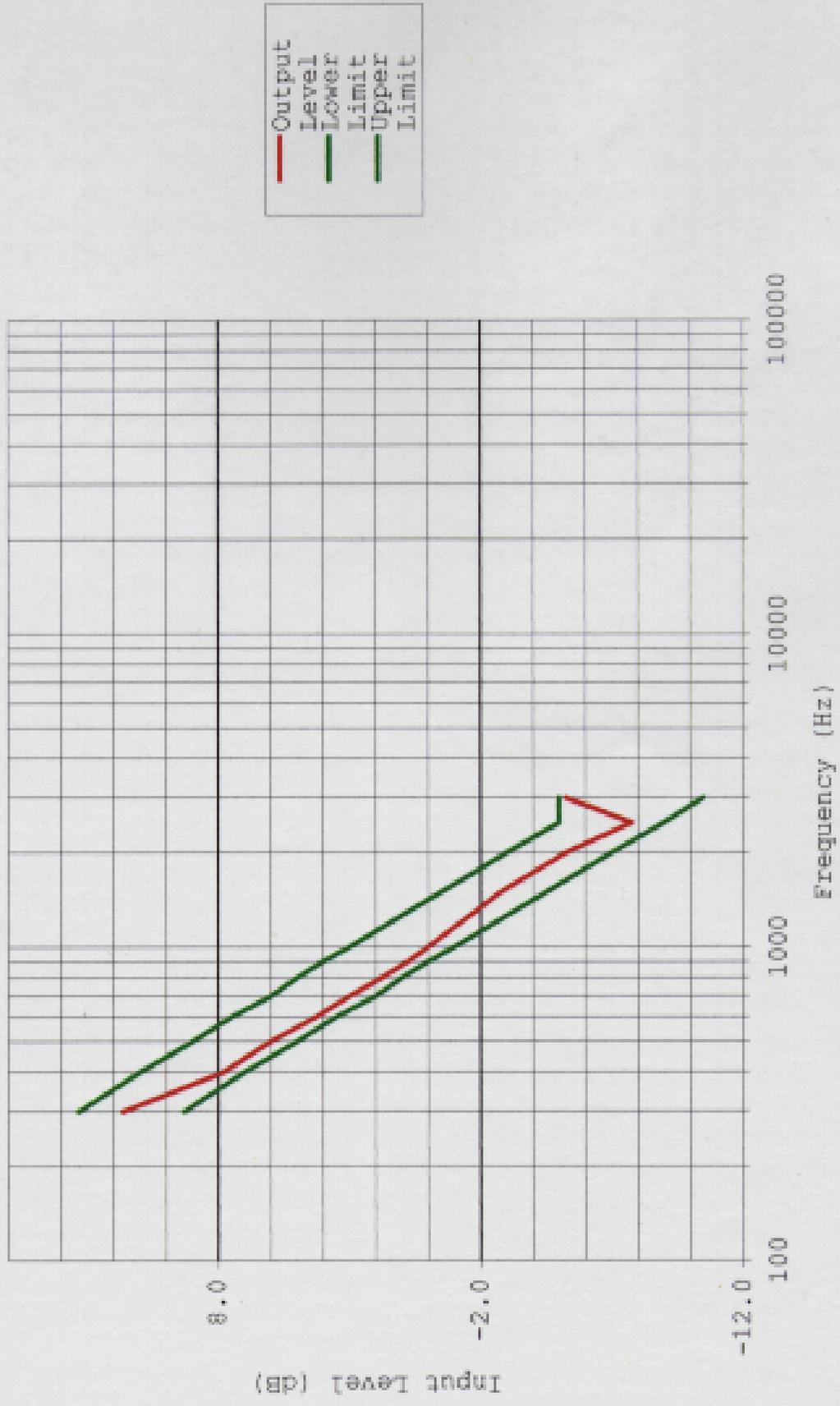
Modulation Deviation Limiting  
Compressor Enabled



Modulation Deviation Limiting  
Compressor Disabled



Transmit Audio Frequency and Limiting Response



Output  
Level  
Lower  
Limit  
Upper  
Limit

Transmit Audio Frequency and Limiting Response



Plot 6