



Engineering and Testing for EMC and Safety Compliance

## TYPE CERTIFICATION REPORT

Com-Net Ericsson Critical Radio Systems, Inc.  
3315 Old Forest Road  
P.O. Box 2000  
Lynchburg, VA 24501  
804-385 2580 (Bryan McWatters)

**MODEL: Panther 300M UHF-H (470-512MHz)**  
**FCC ID: OWDTR-0009-A**

*January 8, 2001*

| STANDARDS REFERENCED FOR THIS REPORT |                                                                                        |
|--------------------------------------|----------------------------------------------------------------------------------------|
| PART 2: 1999                         | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS          |
| PART 15: 1999                        | §15.109: RADIATED EMISSIONS LIMITS                                                     |
| PART 22: 1998                        | PUBLIC MOBILE SERVICES                                                                 |
| PART 74: 1998                        | LOW POWER AUXILIARY STATION                                                            |
| PART 90: 1998                        | PRIVATE LAND MOBILE RADIO SERVICES                                                     |
| PART 95 (A): 1998                    | GENERAL MOBILE RADIO SERVICES                                                          |
| ANSI C63.4-1992                      | STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS         |
| ANSI/TIA/EIA603- 1992                | LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT<br>MEASUREMENT AND PERFORMANCE STANDARDS |
| ANSI/TIA/EIA 603-1-1998              | ADDENDUM TO ANSI/TIA/EIA 603-1992                                                      |

| FCC Rules Parts    | Frequency Range | Output Power<br>(W) | Freq. Tolerance | Emission Designator |
|--------------------|-----------------|---------------------|-----------------|---------------------|
| 22, 74, 90, 95 (A) | 470-512 MHz     | 42                  | 2.5 ppm         | 11K0F3E             |
| 22, 74, 90, 95 (A) | 470-512 MHz     | 42                  | 2.5 ppm         | 16K0F3E             |
| 22, 74, 90, 95 (A) | 470-512 MHz     | 22                  | 2.5 ppm         | 11K0F3E             |
| 22, 74, 90, 95 (A) | 470-512 MHz     | 22                  | 2.5 ppm         | 16K0F3E             |

### REPORT PREPARED BY:

**Test Engineer: Daniel Baltzell**  
**Administrative Writer: Melissa Fleming**

*Document Number: 2000498 / QRTL00-415*

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360 Herndon Parkway, Suite 1400  
Herndon, VA 20170  
Phone: 703-689-0368; Fax: 703-689-2056; Metro: 703-471-6441



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Suite 1400  
Herndon, VA 20170  
<http://www.rheintech.com>

## 1 GENERAL INFORMATION

The following Report of an Application for Certification, is prepared on behalf of Com-Net Ericsson Critical Radio Systems, Inc. in accordance with the Federal Communications Commissions Regulations. The Equipment Under Test (EUT) was the **Panther 300M UHF-H (470-512MHz); FCC ID: OWDTR-0009-A**. The test results reported in this document relate only to the item that was tested.

The digital interface portion of this transceiver, including the receiver, was tested and found in compliance with Part 15 Class B limits. A DoC report was prepared and is available upon request.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

### 1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

### 1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for Certification



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### 1.3 CONFORMANCE STATEMENT

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the standards identified in this report.

Signature:

Date: January 9, 2001

Typed/Printed Name: Bruno Clavier

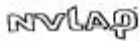
Position: Vice President of Operations  
(NVLAP Signatory)

Signature:

Date: January 9, 2001

Typed/Printed Name: Daniel Baltzell

Position: Test Engineer



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

**Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.**

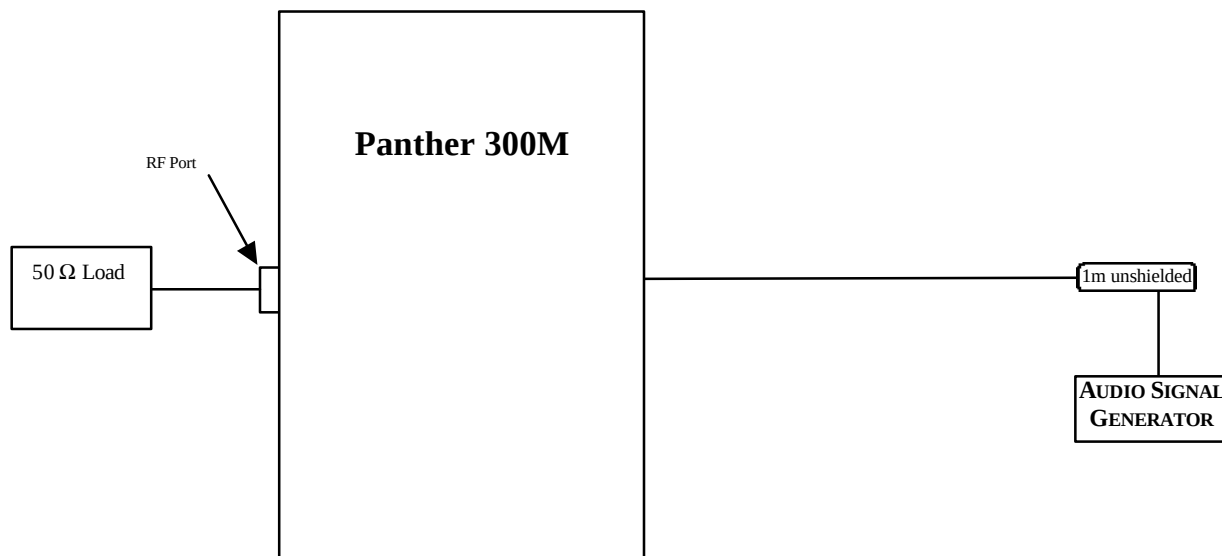


#### 1.4 TESTED SYSTEM DETAILS

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

| PART                                               | MANUFACTURER     | MODEL         | SERIAL NUMBER | FCC ID       |
|----------------------------------------------------|------------------|---------------|---------------|--------------|
| RADIO                                              | COM NET ERICSSON | 300M          | UH-05, UH-07  | OWDTR-0009-A |
| ANTENNA "I" HELICAL STUB SPRING WHIP (470-512 MHz) | COM NET ERICSSON | KRE1011219/13 | N/A           | N/A          |
| ANTENNA "G" ¼ WAVE WHIP (450-512 MHz)              | COM NET ERICSSON | KRE1011223/12 | N/A           | N/A          |
| AUDIO TEST CABLE                                   | COM NET ERICSSON | 113 2472/46   | N/A           | N/A          |
| TEST BOX                                           | COM NET ERICSSON | TQ0613        | N/A           | N/A          |
| BATTERY ELIMINATOR                                 | COM NET ERICSSON | BKB191 213/3  | N/A           | N/A          |
| MICROPHONE / SPEAKER                               | COM NET ERICSSON | KRY101 1640/1 | N/A           | N/A          |

#### 1.5 CONFIGURATION OF TESTED SYSTEM





## 1.6 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(\text{dBuV/m}) = SAR(\text{dBuV}) + SCF(\text{dB/m})$$

FI = Field Intensity

SAR = Spectrum Analyzer Reading

SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(\text{dB/m}) = -PG(\text{dB}) + AF(\text{dB/m}) + CL(\text{dB})$$

SCF = Site Correction Factor

PG = Pre-amplifier Gain

AF = Antenna Factor

CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\text{uV/m}) = 10^{FI(\text{dBuV/m})/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB/m} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$



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## 1.7 CONDUCTED MEASUREMENT

n/a. Battery powered device

## 1.8 RADIATED MEASUREMENT

Before final measurements of radiated emissions were made on the open-field three meter range, the EUT was scanned indoors at a three meter distance in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

*Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.*



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## 2 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

### 2.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.1

The EUT was connected to a coaxial attenuator having a 50  $\Omega$  load impedance.

### 2.2 TEST DATA

The following channel (in MHz) were tested: 470.023, 491.022, 511.972  
The worst-case Output Power (highest) levels are shown.

#### CARRIER OUTPUT POWER (UNMODULATED)

| Power Setting | RF Power measured (Watt)* |
|---------------|---------------------------|
| Low           | 22                        |
| High          | 42                        |

\*Measurement accuracy: +/- 3%

#### Rated Power:

| Power Setting | Rated Power (W) |
|---------------|-----------------|
| Low           | 20              |
| High          | 40              |

### 2.3 TEST EQUIPMENT

|                   |          |                                 |
|-------------------|----------|---------------------------------|
| Power Meter       | HP437B   | s/n 2949A02966                  |
|                   | HP 8901A | s/n 2545A04102 (power mode)     |
| Power Sensor      | HP8481B  | s/n 2702A05059                  |
| Frequency Counter | HP8901A  | s/n 2545A04102 (Frequency mode) |



### 3 FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

#### 3.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, Section 2.2.13

The transmitter is terminated with a 50  $\Omega$  load and interfaced with a spectrum analyzer.

The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz.

#### 3.2 TEST DATA

Frequency range of measurement per Part 2.1057: 9kHz to 10 x Fc

Limits: Mask B (dBm):  $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

Mask D (dBm):  $P(\text{dBm}) - (50 + 10 \times \text{LOG } P(\text{W}))$

The following channel (in MHz) were investigated: 470.023, 491.022, 511.972

The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Channel 4 (470.025 MHz) – 40 Watt and 12.5 kHz Channel Bandwidth: Mask D

| Frequency (MHz) | Level Measured (dBm)* | Limit (dBm) | Margin (dB) |
|-----------------|-----------------------|-------------|-------------|
| 940.050         | -33.7                 | -20.0       | -13.7       |
| 1410.075        | -30.4                 | -20.0       | -10.4       |
| 1880.100        | -41.2                 | -20.0       | -21.2       |
| 2350.125        | -50.3                 | -20.0       | -30.3       |
| 2820.150        | -56.3                 | -20.0       | -36.3       |
| 3290.175        | -46.1                 | -20.0       | -26.1       |
| 3760.200        | -39.8                 | -20.0       | -19.8       |
| 4230.225        | -51.6                 | -20.0       | -31.6       |
| 4700.250        | -57.8                 | -20.0       | -37.8       |

Channel 5 (491.025 MHz) – 40 Watt and 12.5 kHz Channel Bandwidth: Mask D

| Frequency (MHz) | Level Measured (dBm)* | Limit (dBm) | Margin (dB) |
|-----------------|-----------------------|-------------|-------------|
| 982.050         | -36.0                 | -20.0       | -16.0       |
| 1473.075        | -32.0                 | -20.0       | -12.0       |
| 1964.100        | -31.2                 | -20.0       | -11.2       |
| 2455.125        | -42.2                 | -20.0       | -22.2       |
| 2946.150        | -43.0                 | -20.0       | -23.0       |
| 3437.175        | -45.4                 | -20.0       | -25.4       |
| 3928.200        | -42.1                 | -20.0       | -22.1       |
| 4419.225        | -39.6                 | -20.0       | -19.6       |
| 4910.250        | -54.8                 | -20.0       | -34.8       |



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Channel 6 (511.972 MHz) – 40 Watt and 12.5 kHz Channel Bandwidth: Mask D

| Frequency<br>(MHz) | Level Measured<br>(dBm)* | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|--------------------------|----------------|----------------|
| 1023.944           | -34.0                    | -20.0          | -14.0          |
| 1535.916           | -33.7                    | -20.0          | -13.7          |
| 2047.888           | -53.4                    | -20.0          | -33.4          |
| 2559.860           | -40.1                    | -20.0          | -20.1          |
| 3071.832           | -42.3                    | -20.0          | -22.3          |
| 3583.804           | -47.8                    | -20.0          | -27.8          |
| 4095.776           | -39.1                    | -20.0          | -19.1          |
| 4607.748           | -54.9                    | -20.0          | -34.9          |
| 5119.720           | -53.2                    | -20.0          | -33.2          |

### 3.3 TEST EQUIPMENT

Audio Generator:

|                                 |         |                |
|---------------------------------|---------|----------------|
| Synthesized Level Generator     | HP3336B | s/n 2127A00559 |
| Audio Signal Analyzer Tektronix | ASG 100 | s/n B032374    |

Spectrum Analyzer:

|         |                |
|---------|----------------|
| HP8564E | s/n 3943A01719 |
| HP8546A | s/n 3525A00159 |



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## **4 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION**

### **4.1 TEST PROCEDURE**

ANSI/TIA/EIA-603-1992, section 2.2.12

The transmitter is terminated with a 50  $\Omega$  load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz.

Refer to section “Radiated Measurement” in this report for further information.



## 4.2 TEST DATA

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

| Radiated Emissions (Channel 1 at 470.025 MHz)<br>Substitution Method |                              |                  |                               |                                        |             |             |
|----------------------------------------------------------------------|------------------------------|------------------|-------------------------------|----------------------------------------|-------------|-------------|
| Frequency (MHz)                                                      | Signal Generator Level (dBm) | Cable Loss (dB)* | Corrected Antenna Gain (dB)** | Corrected Signal Generator Level (dBm) | Limit (dBm) | Margin (dB) |
| 940.050                                                              | -23.3                        | 4.2              | -1.2                          | -28.7                                  | -20.0       | -8.7        |
| 1410.075                                                             | -19.9                        | 6.7              | 3.8                           | -22.8                                  | -20.0       | -2.8        |
| 1880.100                                                             | -33.5                        | 15.9             | 5.9                           | -43.5                                  | -20.0       | -23.5       |
| 2350.125                                                             | NF                           |                  |                               |                                        |             |             |
| 2820.150                                                             | NF                           |                  |                               |                                        |             |             |
| 3290.175                                                             | NF                           |                  |                               |                                        |             |             |
| 3760.200                                                             | NF                           |                  |                               |                                        |             |             |
| 4230.225                                                             | NF                           |                  |                               |                                        |             |             |
| 4700.250                                                             | NF                           |                  |                               |                                        |             |             |

| Radiated Emissions (Channel 2 at 491.025 MHz)<br>Substitution Method |        |      |      |       |       |       |
|----------------------------------------------------------------------|--------|------|------|-------|-------|-------|
| 982.050                                                              | -57.5  | 4.2  | -1.4 | -63.1 | -20.0 | -43.1 |
| 1473.075                                                             | -19.87 | 6.7  | 4.6  | -22.0 | -20.0 | -2.0  |
| 1964.100                                                             | -23.4  | 18.7 | 7.0  | -35.1 | -20.0 | -15.1 |
| 2455.125                                                             | NF     |      |      |       |       |       |
| 2946.150                                                             | NF     |      |      |       |       |       |
| 3437.175                                                             | NF     |      |      |       |       |       |
| 3928.200                                                             | NF     |      |      |       |       |       |
| 4419.225                                                             | NF     |      |      |       |       |       |
| 4910.250                                                             | NF     |      |      |       |       |       |

\*This insertion loss corresponds to the cable connecting the RF Signal Generator to the  $\frac{1}{2}$  wave dipole antenna.

\*\* Difference in gain (ref. To a 1/2 wave dipole)

## 4.3 TEST EQUIPMENT

|                     |               |                |
|---------------------|---------------|----------------|
| Antenna:            | CHASE CBL6112 | s/n 2099       |
| Amplifier:          | HP8449B       | s/n 3008A00505 |
| Spectrum analyzer:  | HP8564E       | s/n 3943A01719 |
| RF Signal Generator | HP8648C       | s/n 3537A01741 |
| Synthesized Sweeper | HP83752A      | s/n 3610A00846 |



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## **5 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH**

OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

### **5.1 TEST PROCEDURE**

ANSI/TIA/EIA-603-1992, section 2.2.11

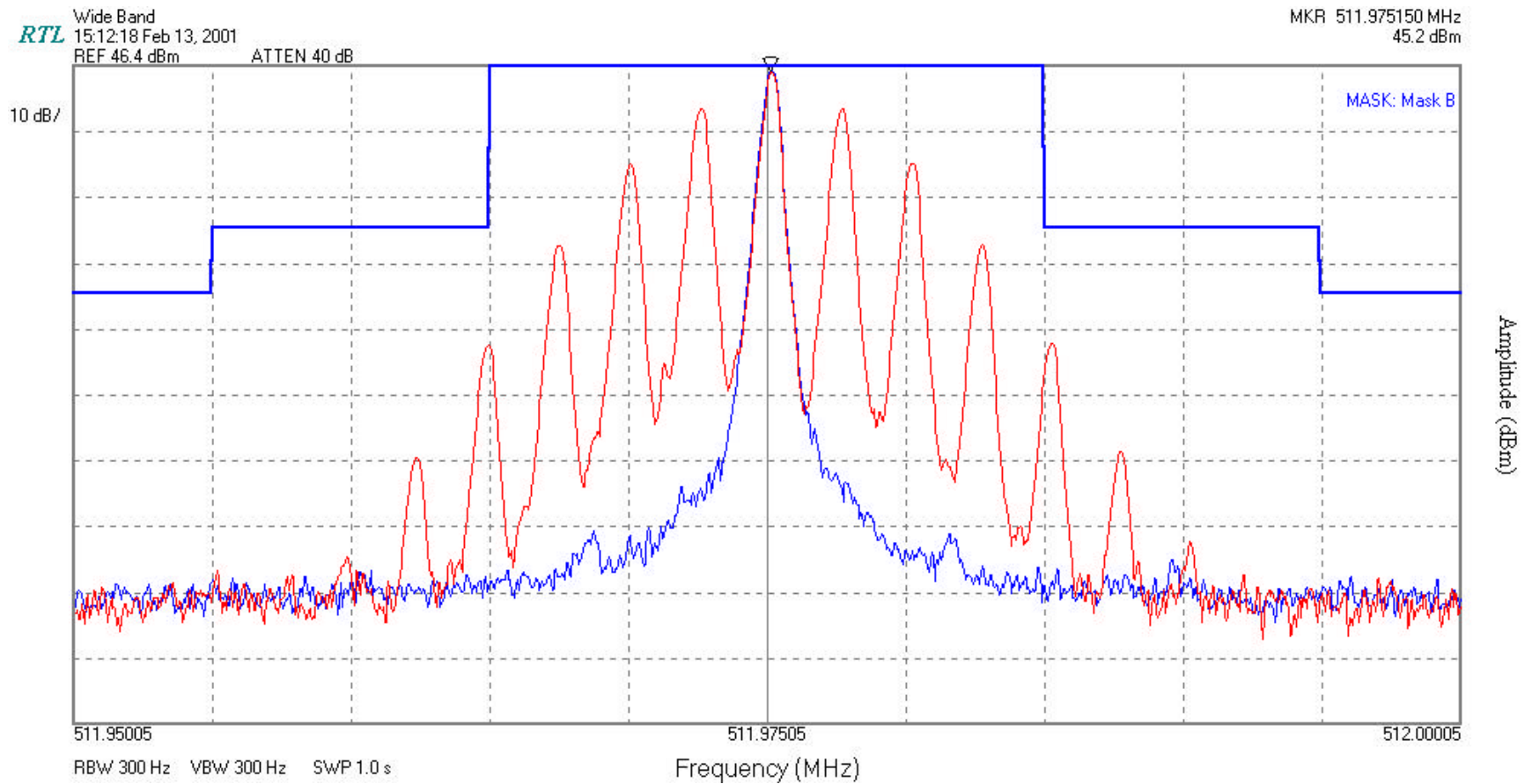
Device with audio modulation: Transmitter is modulated with a 2500 Hz sine wave at an input level of 16 dB greater than that required to produce 50% of rated system deviation at 1000 Hz.

Device with digital modulation: n/a



## 5.2 TEST DATA

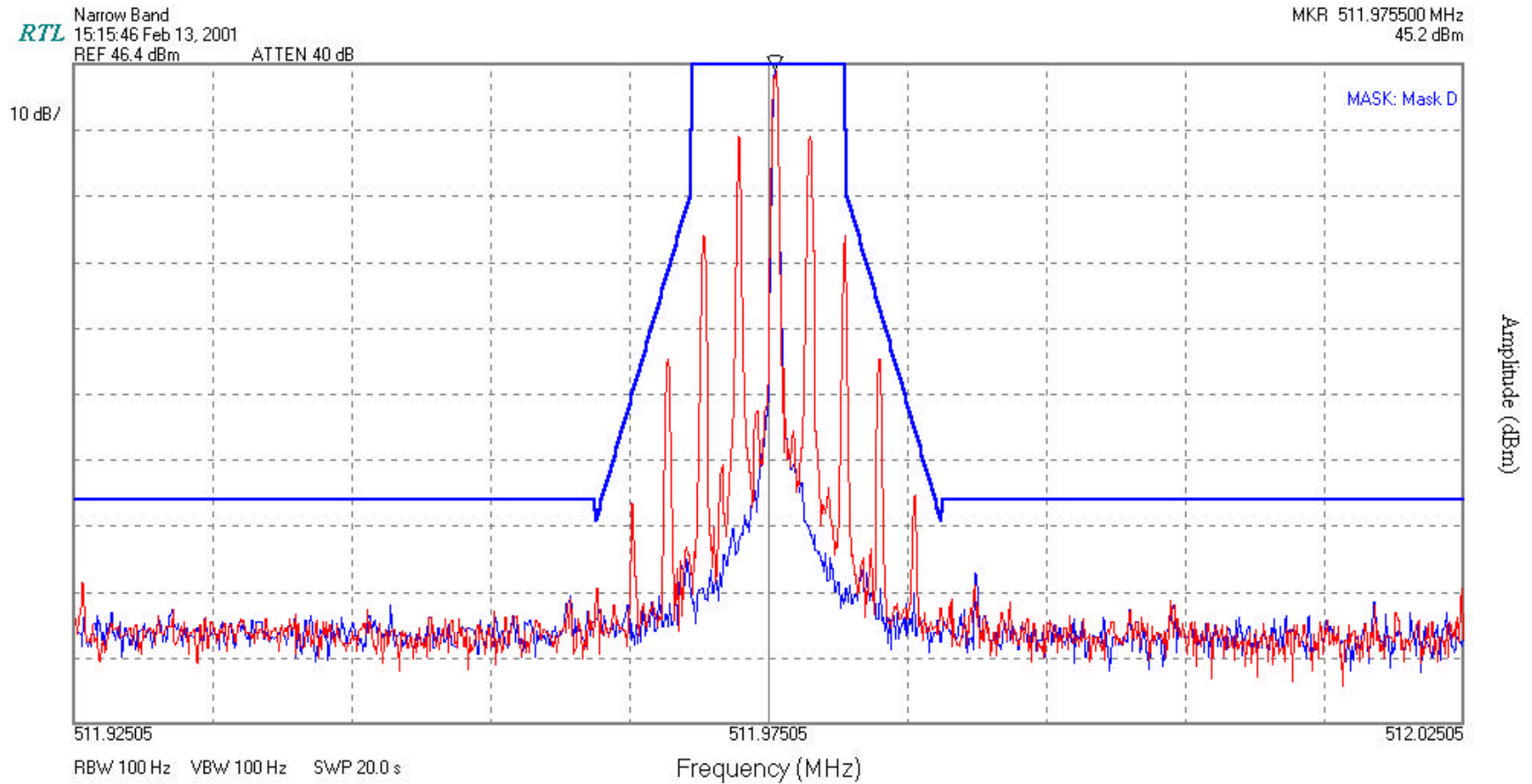
Channel 3: 4.0W for 25 kHz Channel Bandwidth: Mask B (Audio Modulation: 2,500 Hz)





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### 5.2.1 CHANNEL 6: 40W FOR 12.5 kHz CHANNEL BANDWIDTH: MASK D (AUDIO MODULATION: 2,500 Hz)



### 5.3 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719



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## **6 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY**

### **6.1 TEST PROCEDURE**

ANSI/TIA/EIA-603-1992, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +50°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½ an hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter.

Additionally, the power supply voltage of the EUT was varied from 85% to 115% of the nominal voltage.

The worst-case test data are shown.

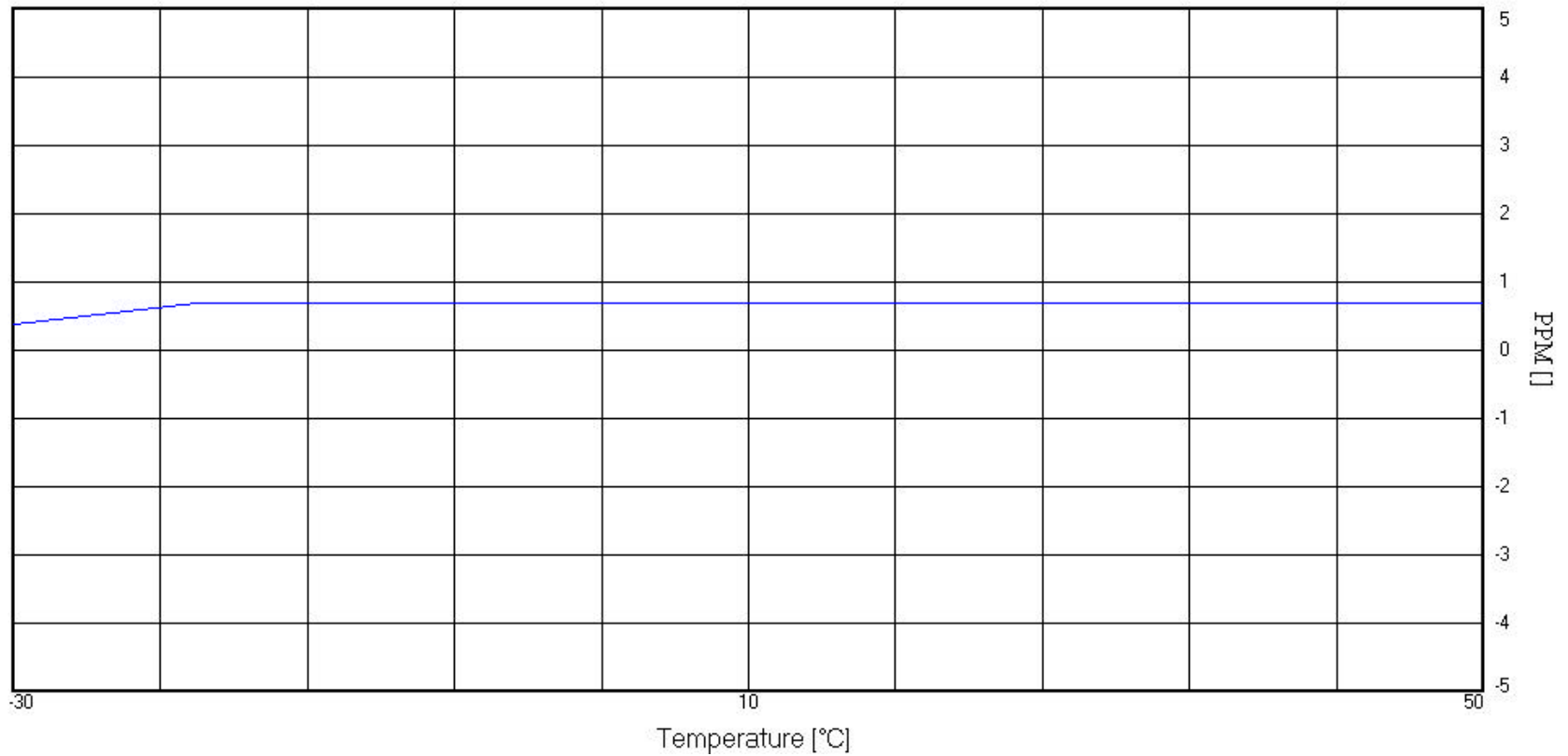


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## 6.2 TEST DATA

### 6.2.1 FREQUENCY STABILITY/FREQUENCY VARIATION

*RTL*

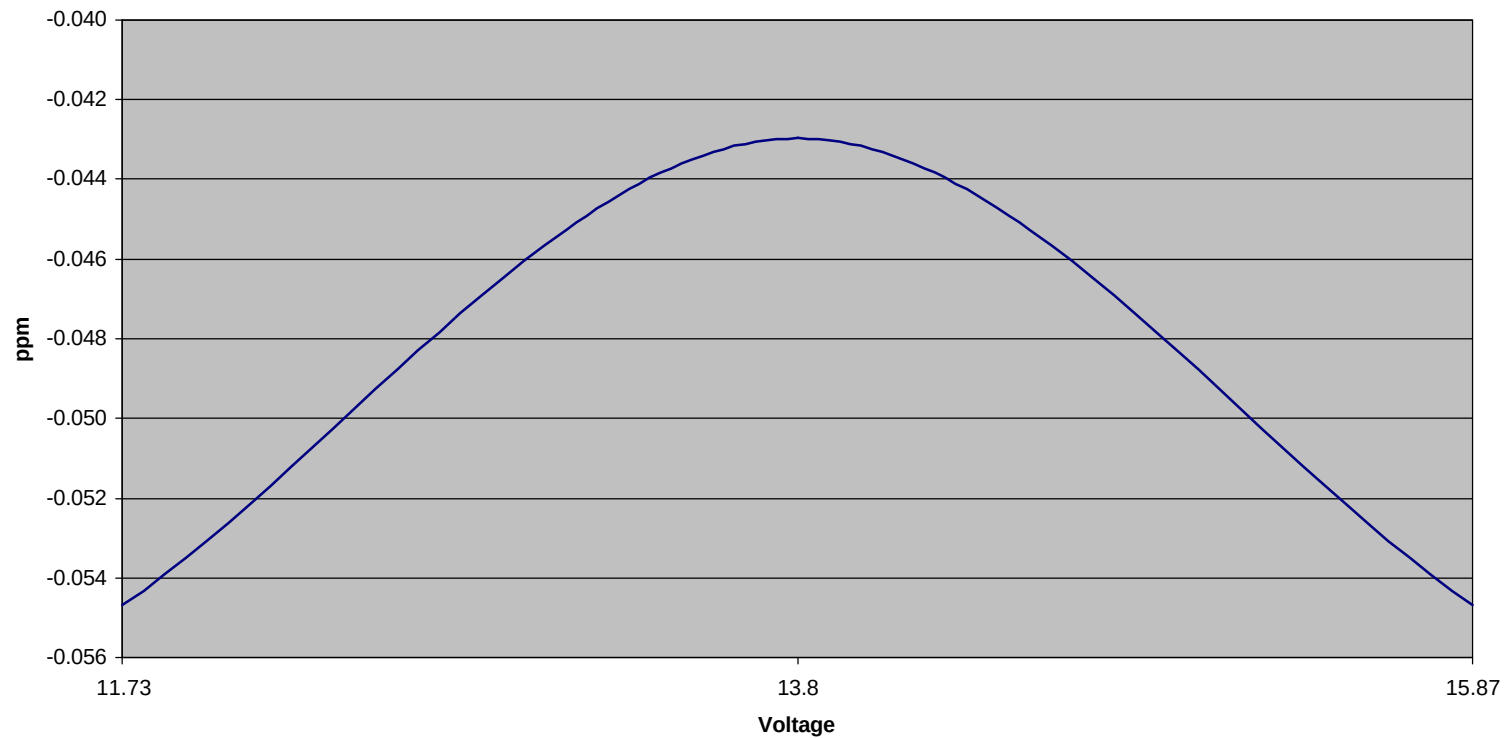




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## 6.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

Voltage Frequency Stability (13.8 Nominal) Worst Case -0.055 ppm



## 6.3 7.3 TEST EQUIPMENT

Temperature Chamber Tenney TH65 s/n 11380

Frequency Counter HP8901A (Frequency Mode) s/n 2545A04102



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## **7 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE**

### **7.1 TEST PROCEDURE**

ANSI/TIA/EIA-603-1992, section 2.2.6

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz is set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref.

The audio signal generator was varied from 100Hz to 5kHz with the input level held constant.

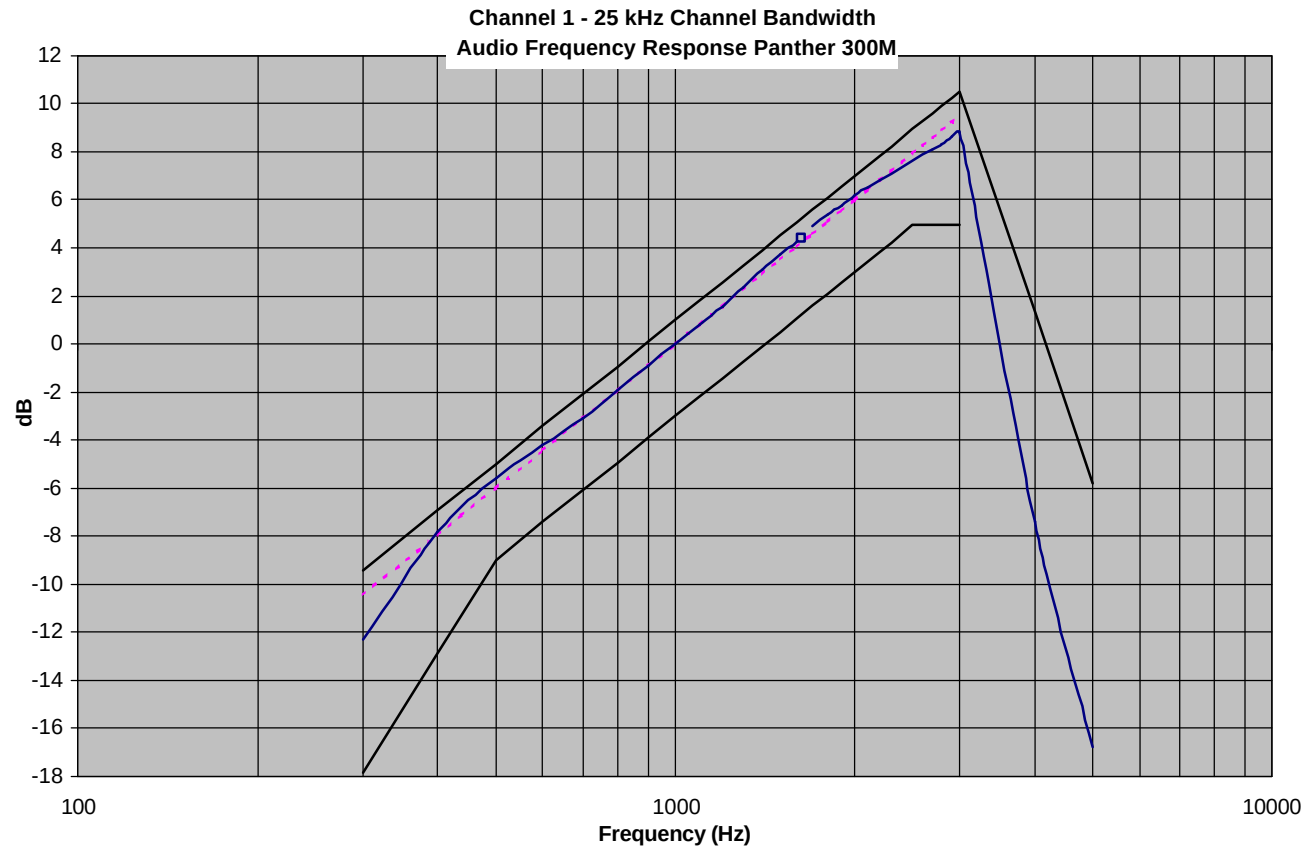
The deviation in kHz was recorded using a modulation analyzer as DEVfreq.

The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response =  $20 \text{ LOG (DEVfreq/DEVref)}$

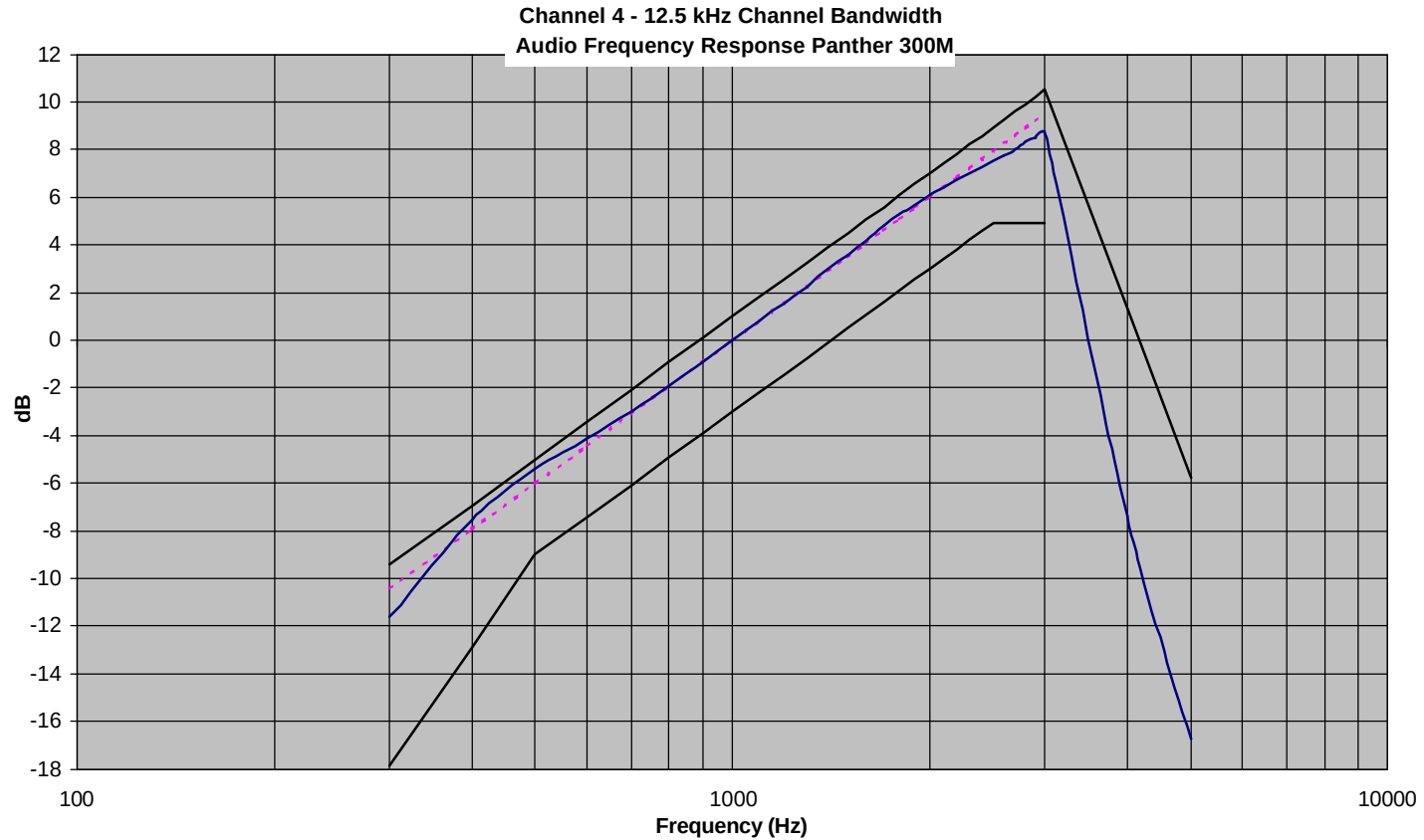


## 7.2 TEST DATA





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### 7.3 TEST EQUIPMENT

|                     |         |                |
|---------------------|---------|----------------|
| Audio generator     | HP3336B | s/n 2127A00559 |
| Modulation analyzer | HP8901A | s/n 2545A04102 |



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## **8 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO LOW PASS FILTER RESPONSE**

### **8.1 TEST PROCEDURE**

ANSI/TIA/EIA-603-1992, 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.



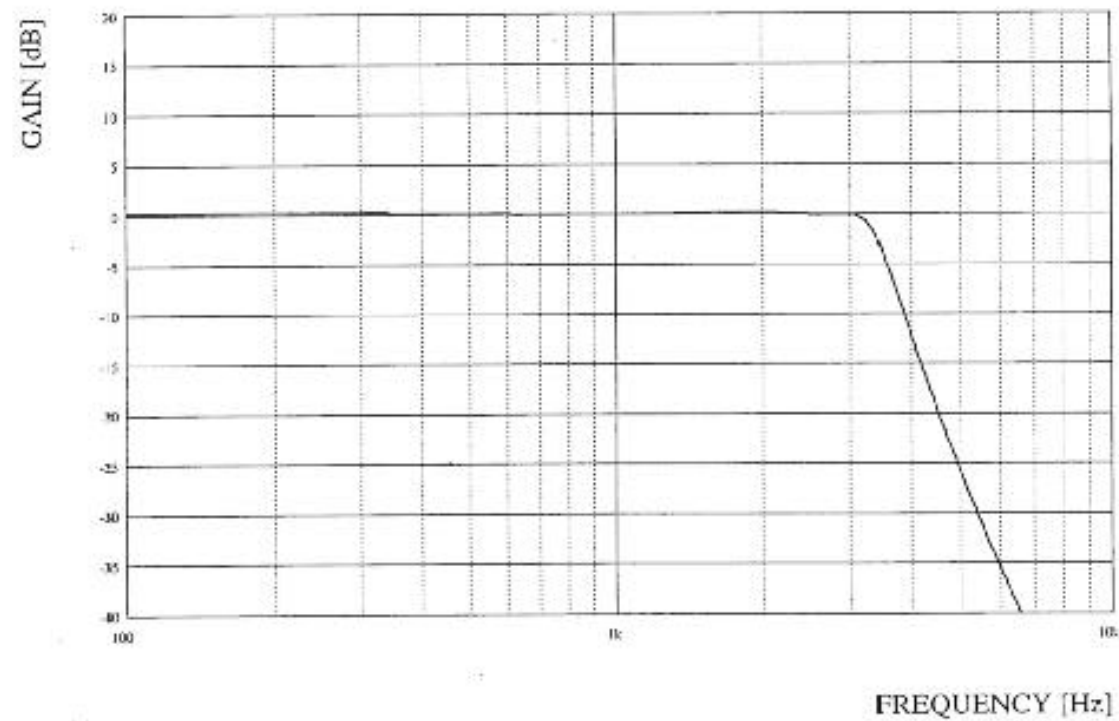
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## 8.2 TEST DATA

Note: The vertical scale is in dB relative to 1 kHz.

25 kHz channel bandwidth:

Fig 4.A LPF( $F_c=3.0\text{kHz}$ ) Frequency Response (Reference)

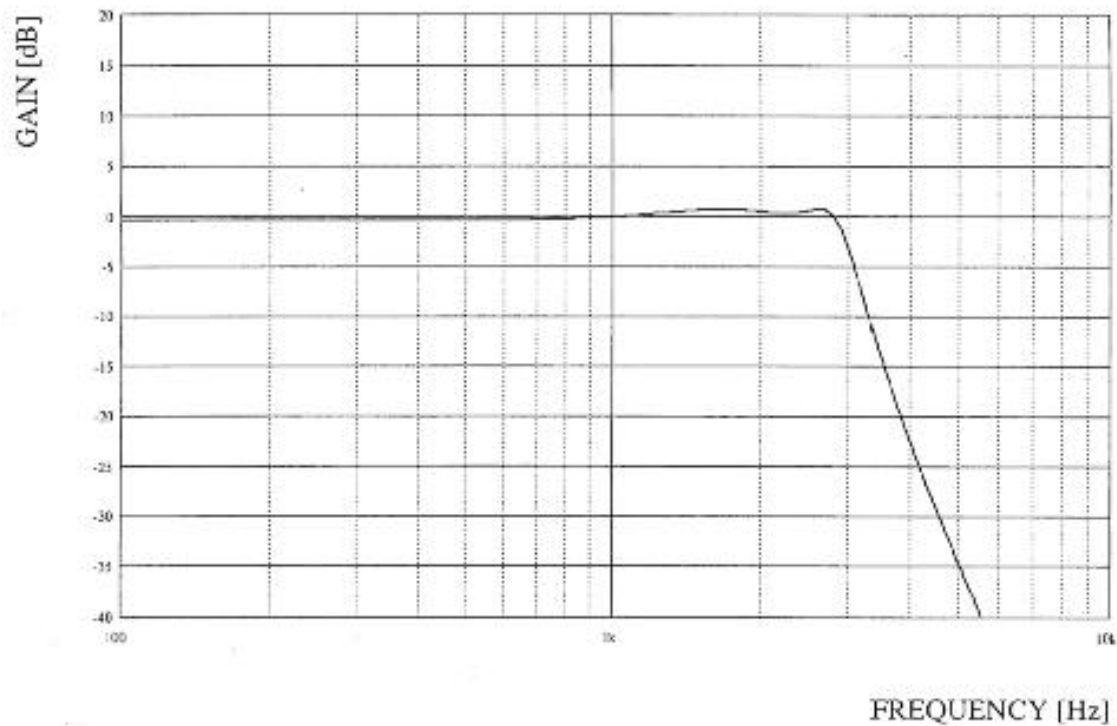




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12.5 kHz channel bandwidth:

Fig.4 B LPF( $F_c=2.55\text{kHz}$ ) Frequency Response (Reference)



### 8.3 TEST EQUIPMENT

|                             |         |                |
|-----------------------------|---------|----------------|
| Audio generator             | HP3336B | s/n 2127A00559 |
| Modulation analyzer         | HP8901A | s/n 2545A04102 |
| Selective level meter       | HP3586B | s/n 1928A01892 |
| Synthesizer/Level generator | HP3336B | s/n 2514A02585 |



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## **9 FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING**

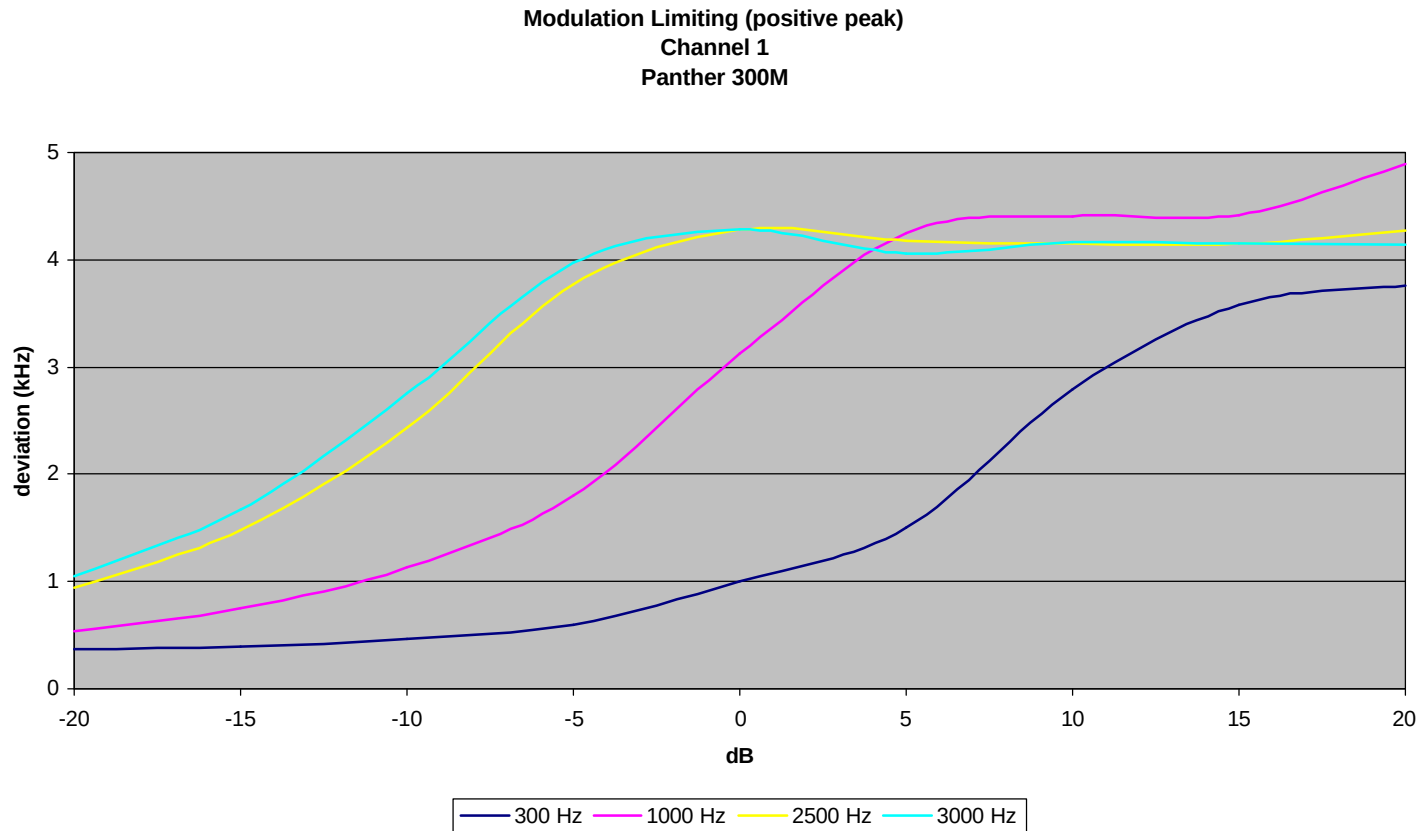
### **9.1 TEST PROCEDURE**

ANSI/TIA/EIA-603-1992, section 2.2.3

The transmitter is adjusted for full rated system deviation. The audio input level is adjusted for 60% of rated system deviation at 1000Hz. Using this level as a reference (0dB) the audio input level is varied from the reference to a level +20 dB above it and –20 dB under it, for modulation frequencies of 300Hz, 1,000Hz, and 2,500Hz. The system deviation obtained as a function of the input level is recorded. Both Positive and Negative Peak deviations were recorded.



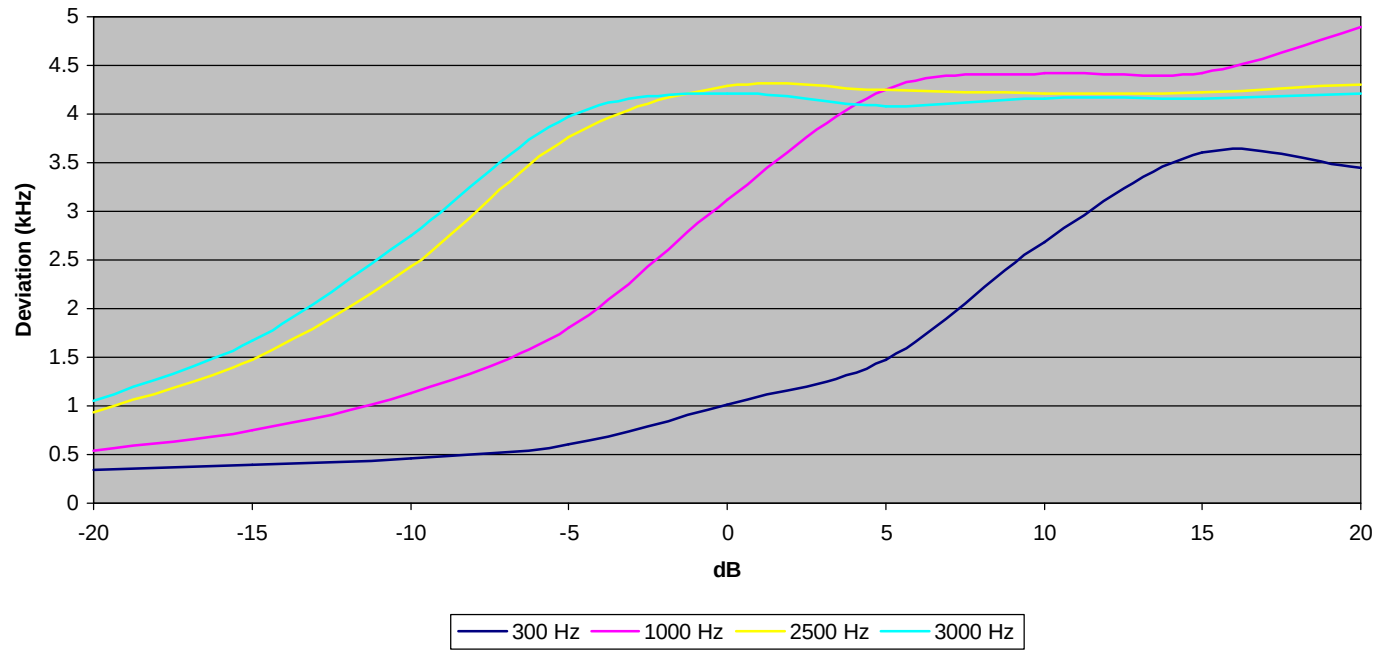
## 9.2 TEST DATA





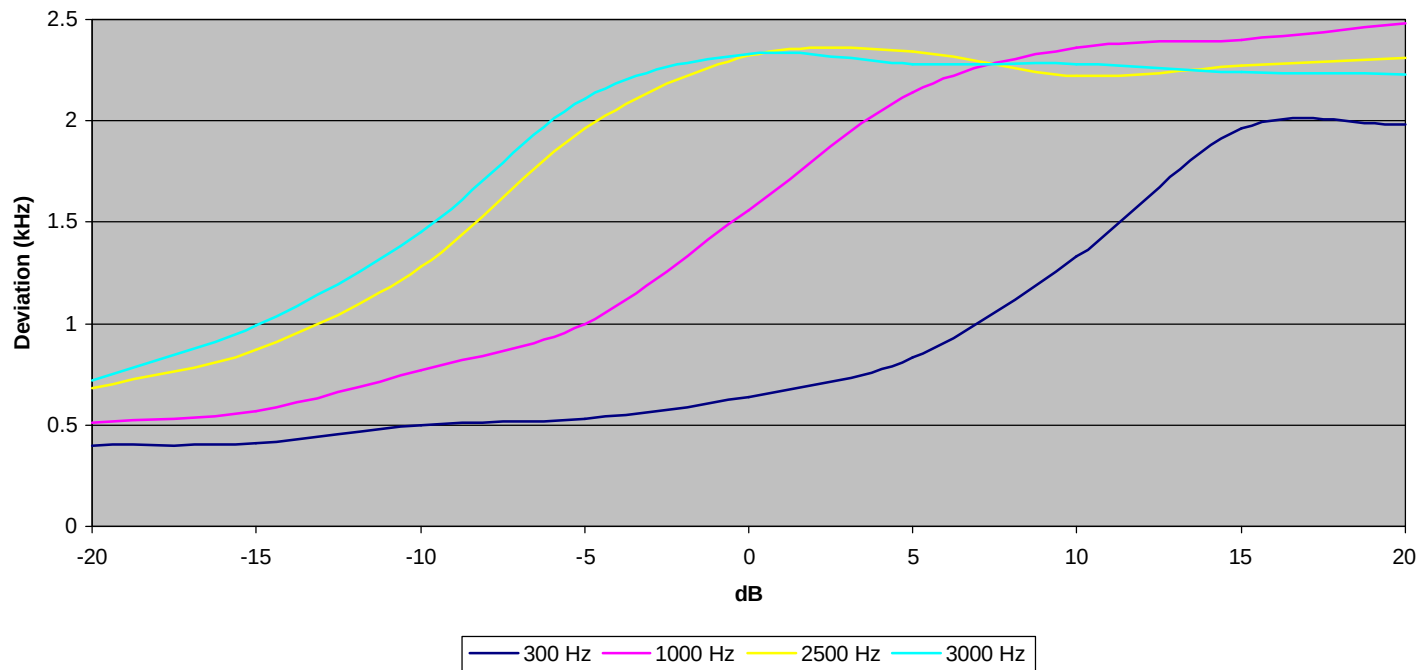
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**Modulation Limiting (negative peak)**  
**Channel 1**  
**Panther 300M**





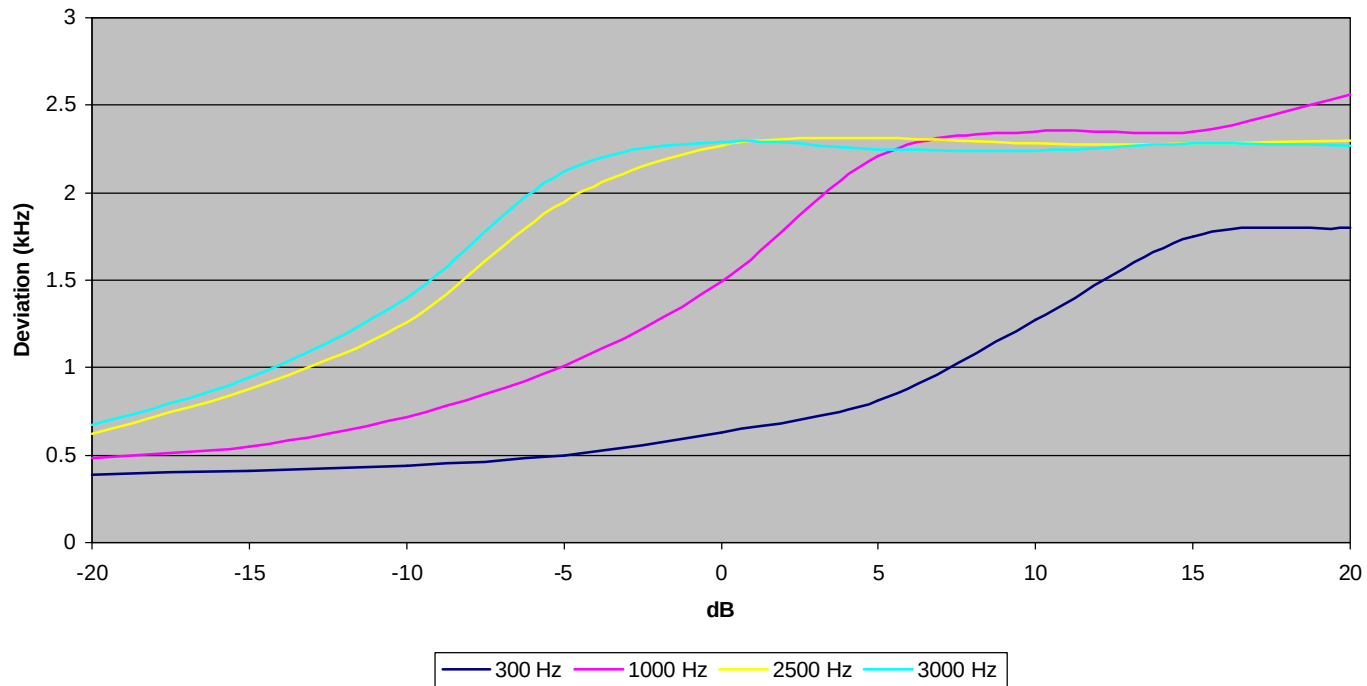
**Modulation Limiting (positive peak)**  
**Channel 4**  
**Panther 300M**





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**Modulation Limiting (negative peak)**  
**Channel 4**  
**Panther 300M**



### 9.3 TEST EQUIPMENT

|                     |         |                |
|---------------------|---------|----------------|
| Audio generator     | HP3336B | s/n 2127A00559 |
| Modulation analyzer | HP8901A | s/n 2545A04102 |



## 10 FCC RULES AND REGULATIONS PART 90 §90.214 : TRANSIENT FREQUENCY BEHAVIOR

### 10.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.19

### 10.2 TEST EQUIPMENT

Detector: HP8471D s/n 2952A  
RF signal generator: HP8648C s/n 3537A01741  
Modulation Analyzer: HP8901A s/n 2545A04102  
Oscilloscope: Tektronix TDS540B s/n B020129  
Receiver: HP 8546A s/n 3525A00159

### 10.3 TEST DATA

#### Limits:

Requirements for EUT with 25 kHz channel spacing:

| Time Intervals (*)(**) | Maximum Frequency Difference(***) | 150-174 MHz | 421-512 MHz |
|------------------------|-----------------------------------|-------------|-------------|
| t1(****)               | ± 25 kHz                          | 5.0 mSec    | 10.0 mSec   |
| t2                     | ± 12.5 kHz                        | 20.0 mSec   | 25.0 mSec   |
| t3(****)               | ± 25 kHz                          | 5.0 mSec    | 10.0 mSec   |

Requirements for EUT with 12.5 kHz channel spacing:

| Time Intervals (*)(**) | Maximum Frequency Difference(***) | 150-174 MHz | 421-512 MHz |
|------------------------|-----------------------------------|-------------|-------------|
| t1(****)               | ± 12.5 kHz                        | 5.0 mSec    | 10.0 mSec   |
| t2                     | ± 6.25 kHz                        | 20.0 mSec   | 25.0 mSec   |
| t3(****)               | ± 12.5 kHz                        | 5.0 mSec    | 10.0 mSec   |

(\*) t on is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t 1 is the time period immediately following ton.

t2 is the time period immediately following t1.

t3 is the time period from the instant when the transmitter is turned off until toff.

toff is the instant when the 1 kHz test signal starts to rise.

(\*\*) During the time from the end of t2 to the beginning of t3, the frequency difference must not exceed the limits specified in § 90.213.

(\*\*\*) Difference between the actual transmitter frequency and the assigned transmitter frequency.

(\*\*\*\*) If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

#### Maximum frequency difference between time T2 and T3: Calculation for Channel 6:

The frequency stability is required to be 2.5 ppm.

Calculation for Channel 6:

4 div. on scope represent 12.5kHz for narrow band channel.

Therefore, 511.972 MHz times 2.5 ppm times +/- 4 Divisions divided by 12.5kHz equals about +/- 0.4 division.

0.4 Div. correspond to 1.280 kHz



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Carrier ON time:

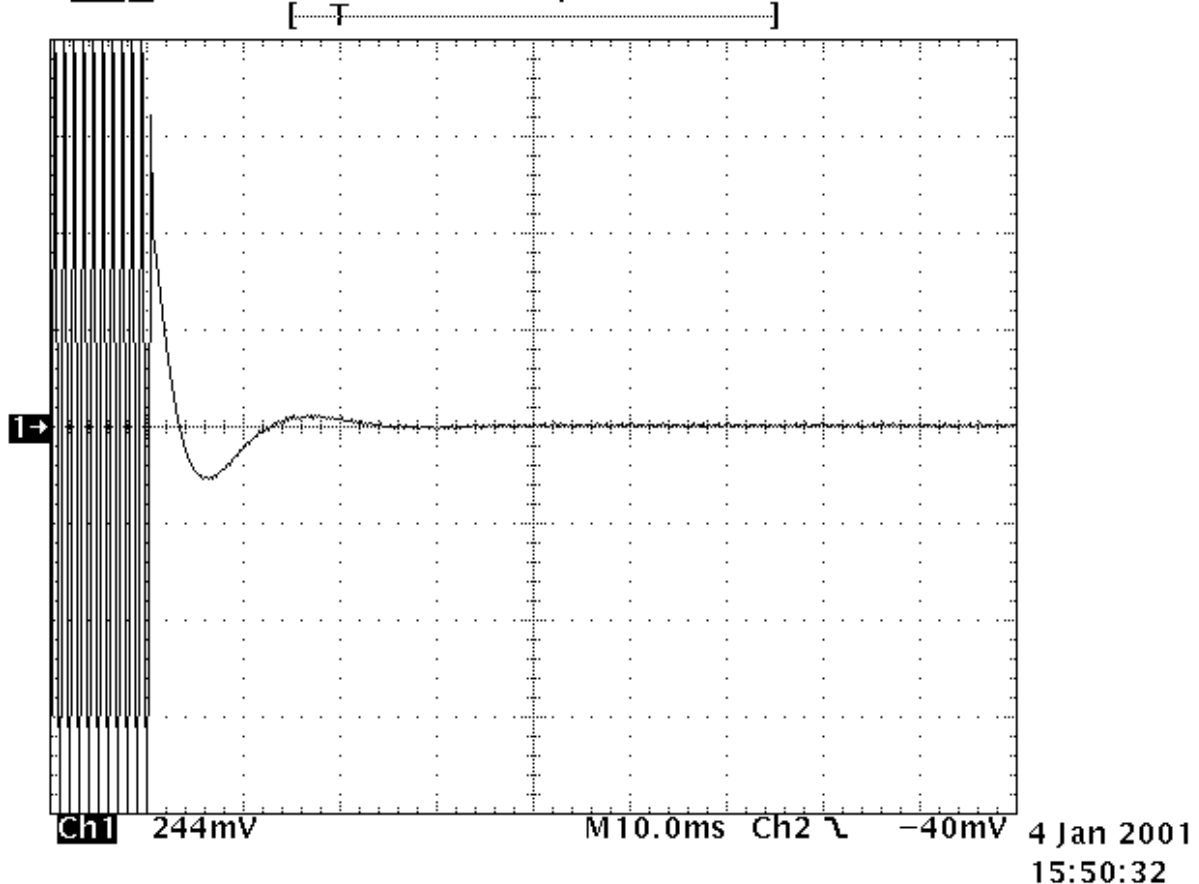
High Power: 40 W rated

Channel 6 : 511.972 MHz NB(12.5kHz)

RF Signal Generator: Modulation 12.5kHz deviation

Tek **Stop:** 5.00kS/s

1 Acqs



Timebase: 10 ms/div

Trigger: On negative edge of Ch2, level -40mV

Ch1: 244mV/div, Probe 1.000:1

Vertical scale: +/- 4 div. corresponds to +/- 12.5 kHz



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Carrier ON Time:

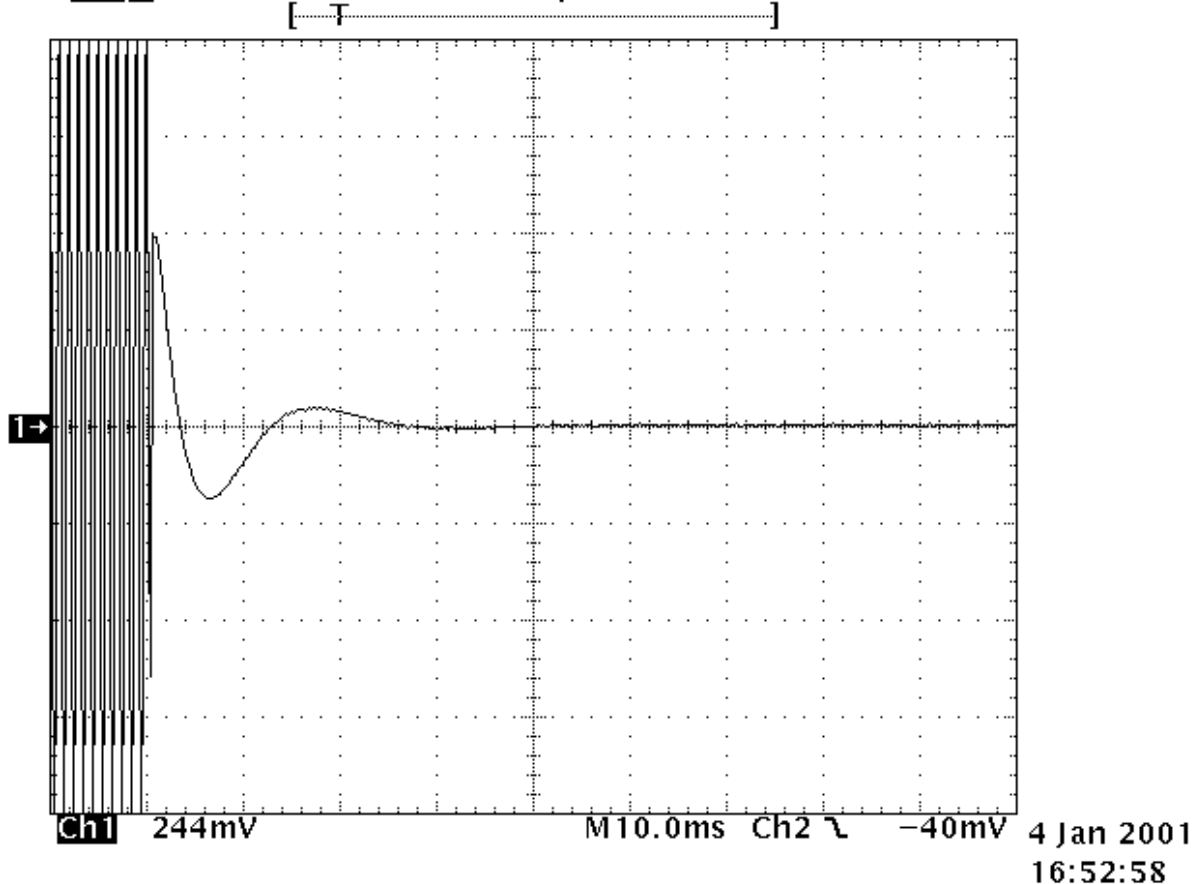
High Power: 40 W rated

Channel 5 : 491.022 MHz NB(12.5kHz)

RF Signal Generator: Modulation 12.5kHz deviation

Tek **Stop:** 5.00kS/s

5 Acqs



Timebase: 10 ms/div

Trigger: On negative edge of Ch2, level -40mV

Ch1: 244 mV/div, Probe 1.000:1

Vertical scale: +/- 4 div. corresponds to +/- 12.5 kHz



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Carrier ON time:

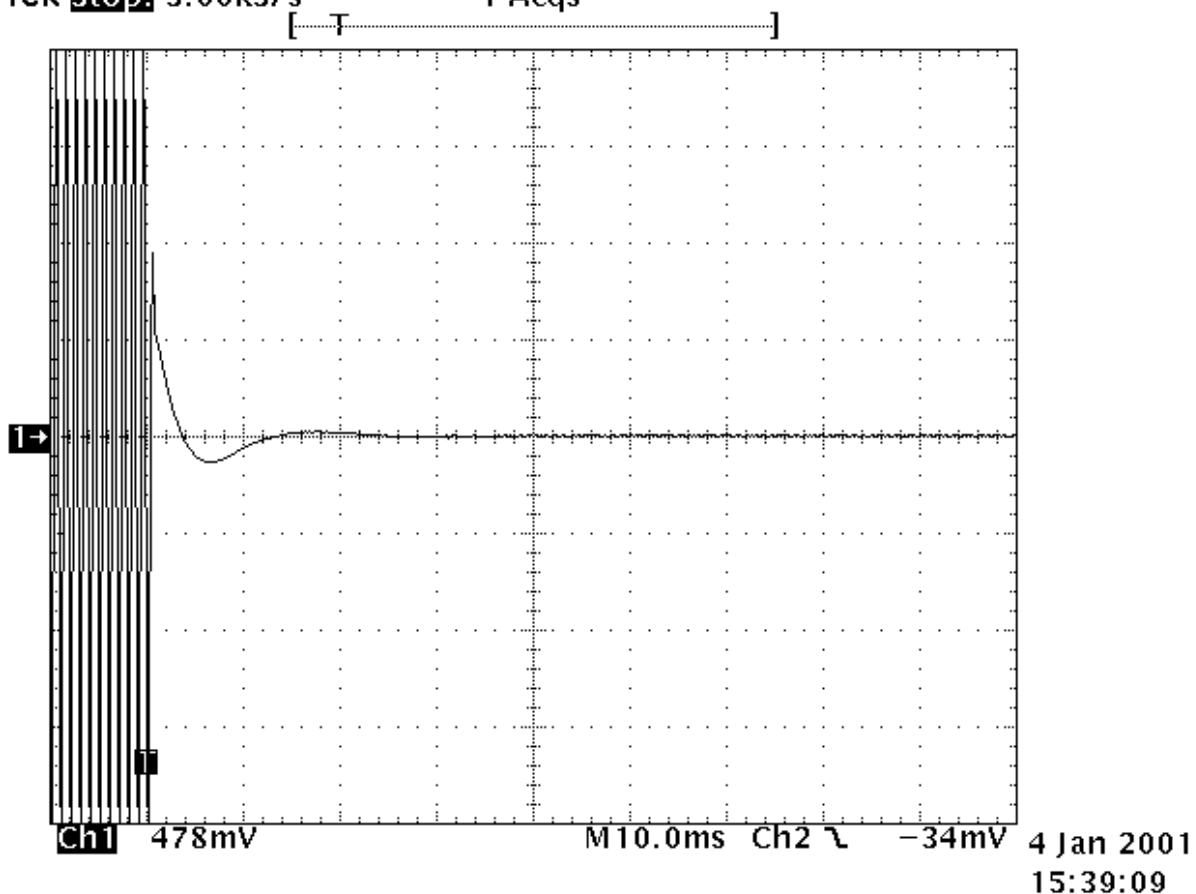
High Power: 40 W rated

Channel 3 : 511.972 MHz WB(25kHz)

RF Signal Generator: Modulation 25kHz deviation

Tek **Stop:** 5.00kS/s

1 Acqs

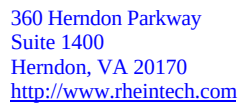


Timebase: 10 ms/div

Trigger: On negative edge of Ch2, level -34mV

Ch1: 478mV/div, Probe 1.000:1

Vertical scale: +/- 4 div. corresponds to +/- 25 kHz



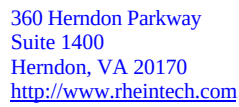
Tek Stop: 5.00kS/s 14 Acqs

10.0ms

ch1 244mV Ch2 -40mV

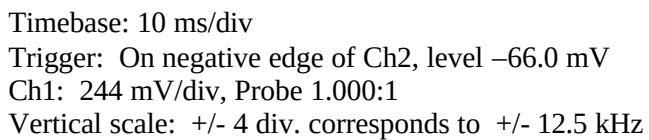
4 Jan 2001 15:48:54

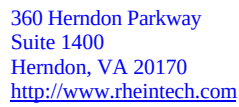
Timebase: 10 ms/div  
Trigger: On negative edge of Ch2, level -40mV  
Ch1: 244 mV/div, Probe 1.000:1  
Vertical scale: +/- 4 div. corresponds to +/- 12.5 kHz



RF Signal Generator: Modulation 12.5kHz deviation

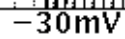
0 Acqs





RF Signal Generator: Modulation 25kHz deviation

12 Acqs



4 Jan 2001  
15:45:53

Vertical scale:  $\pm 4$  div. corresponds to  $\pm 25$  kHz



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## **11 12.0 FCC RULES AND REGULATIONS PART 2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH**

Type of Emission: F3E

Necessary Bandwidth and Emission Bandwidth:

12.5kHz (NB channel) :  $B_n = 11K0F3E$

25kHz (WB channel):  $B_n = 16K0F3E$

### Calculation:

Max modulation(M) in kHz : 3

Max deviation (D) in kHz: 2.5 (NB) and 5 (BB)

Constant factor (K) : 1

$B_n = 2 \times M + 2 \times D \times K$

## **12 FCC RULES AND REGULATIONS PART 1.1307, 1.1310, 2.1091, 2.1093: RF EXPOSURES COMPLIANCE**

The SAR Test Report is provided in the RF exposure exhibit.