



Engineering and Testing for EMC and Safety Compliance

## APPLICATION CERTIFICATION FOR A CB RADIO

**Radio Shack Corporation**  
**100 Throckmorton Street, Suite 1300**  
**Fort Worth, TX 76102-2802**  
**Japan**

**MODEL: TRC-520**  
**FCC ID: AAO2101710**

*January 23, 2001*

| STANDARDS REFERENCED FOR THIS REPORT |                                                                                 |
|--------------------------------------|---------------------------------------------------------------------------------|
| PART 2; 1999                         | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS   |
| PART 15; 1999                        | RADIO FREQUENCIES DEVICES                                                       |
| PART 95; 1998                        | PERSONAL RADIO SERVICES                                                         |
| OET BULLETIN No. 43; 1994            | PEAK ENVELOPE POWER AND OUTPUT LIMITING IN THE CITIZENS BAND (CB) RADIO SERVICE |
| ANSI C63.4-1992                      | STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS  |
| ANSI/TIA/EIA 603-1; 1998             | ADDENDUM TO ANSI/TIA/EIA 603-1992                                               |

| FREQUENCY RANGE<br>MHz | CONDUCTED UNMODULATED<br>OUTPUT POWER (W) | FREQUENCY TOLERANCE | EMISSION DESIGNATOR |
|------------------------|-------------------------------------------|---------------------|---------------------|
| 26.965 TO 27.405       | 3.89                                      | 0.005%              | 6K00A3E             |

**REPORT PREPARED BY:**

**EMI Technician: Daniel Baltzell**  
**Administrative Writer: Melissa Fleming**

**Rhein Tech Laboratories, Inc.**

*Document Number: 2000500*

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

## 1 GENERAL INFORMATION

The following Application for FCC Type Certification of a Scanning Receiver is prepared on behalf of **Radio Shack Corporation** in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions Rules. The Equipment Under Test (EUT) was the **TRC-520, FCC ID: AAO2101710**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with 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. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

### 1.1 MODIFICATIONS

No modifications were made to the EUT during testing.

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

This is an original certification submission.

### 1.3 TEST METHODOLOGY

Radiated testing was performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### 1.4 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, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).



## 2 SYSTEM TEST CONFIGURATION

### 2.1 JUSTIFICATION

To complete the test configuration required by the FCC, the EUT was configured typically as a customer will use it. A 13.8-volt DC supply powered the device.

### 2.2 FCC RULES AND REGULATIONS PART 2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: 6K00A3E

A = Amplitude modulated double side band

3 = A single channel containing analog information

E = Telephony including sound broadcasting

Necessary Bandwidth and Emission Bandwidth:

25kHz channel bandwidth:  $B_n = 6k00A3E$

#### Calculation:

Max modulation (M) in kHz = 3KHz

$B_n = 2 \times M = 2 \times 3KHz = 6KHz = 6K00$

### 2.3 EXERCISING THE EUT

There were no special EUT exercising EUT software used, once the unit was powered on, it started transmitting.

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

### 3.1 TEST PROCEDURE

OET bulletin 43 for PEP measurement was used

The EUT RF output Power was measured in the AM mode with an HP 437 B peak power meter and HP 8903 modulation analyzer with a supply voltage of 13.8 volts. A PEP output power plot versus audio microphone input plot is attached.

### 3.2 TEST DATA

The following channels (in MHz) were tested: 1, 20, and 40

The worst-case Output Power (highest) levels are shown for the un-modulated and Peak Envelope power.

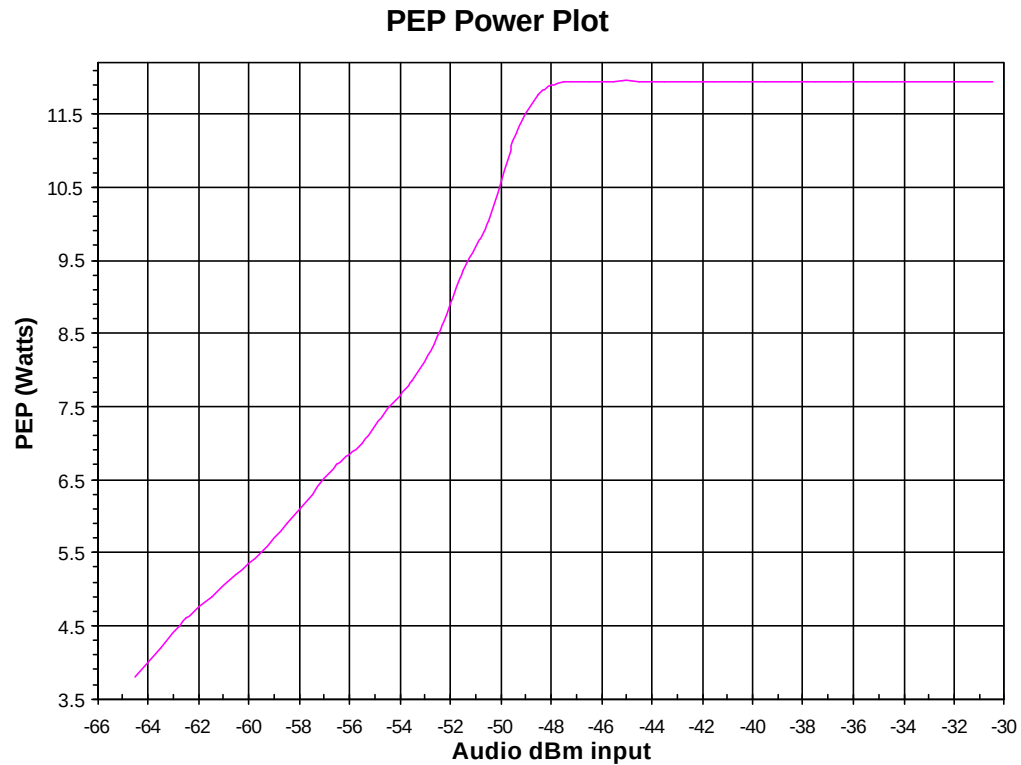
### 3.3 UNMODULATED CARRIER OUTPUT POWER AND PEAK ENVELOPE POWER (PEP)

EUT RF output Power was measured in the un-modulated mode with an HP 437 B peak power meter. The PEP was measured with an HP 8903 modulation analyzer and an HP audio signal generator.

| CHANNEL | PEAK UNMODULATED POWER (WATTS) | PEP MODULATED POWER (WATTS) |
|---------|--------------------------------|-----------------------------|
| 1       | 3.86                           | 11.95                       |
| 20      | 3.89                           | 11.95                       |
| 40      | 3.84                           | 11.94                       |



### 3.4 PEP POWER PLOT



**REP POWER OUTPUT VS AUDIO INPUT**



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#### 4 §95.625: CB TRANSMITTER FREQUENCIES AND TOLERANCE

| Channel | Assigned Frequency (MHz) | Measured Frequency (MHz) | % Deviation (%) | Limit (%) |
|---------|--------------------------|--------------------------|-----------------|-----------|
| 1       | 26.965                   | 26.9650                  | 0               | 0.005     |
| 2       | 26.975                   | 26.9750                  | 0               | 0.005     |
| 3       | 26.985                   | 26.9850                  | 0               | 0.005     |
| 4       | 27.005                   | 27.0050                  | 0               | 0.005     |
| 5       | 27.015                   | 27.0150                  | 0               | 0.005     |
| 6       | 27.025                   | 27.0250                  | 0               | 0.005     |
| 7       | 27.035                   | 27.0350                  | 0               | 0.005     |
| 8       | 27.055                   | 27.0550                  | 0               | 0.005     |
| 9       | 27.065                   | 27.0650                  | 0               | 0.005     |
| 10      | 27.075                   | 27.0750                  | 0               | 0.005     |
| 11      | 27.085                   | 27.0850                  | 0               | 0.005     |
| 12      | 27.105                   | 27.1050                  | 0               | 0.005     |
| 13      | 27.115                   | 27.1150                  | 0               | 0.005     |
| 14      | 27.125                   | 27.1250                  | 0               | 0.005     |
| 15      | 27.135                   | 27.1350                  | 0               | 0.005     |
| 16      | 27.155                   | 27.1550                  | 0               | 0.005     |
| 17      | 27.165                   | 27.1650                  | 0               | 0.005     |
| 18      | 27.175                   | 27.1750                  | 0               | 0.005     |
| 19      | 27.185                   | 27.1850                  | 0               | 0.005     |
| 20      | 27.205                   | 27.2050                  | 0               | 0.005     |
| 21      | 27.215                   | 27.2150                  | 0               | 0.005     |
| 22      | 27.225                   | 27.2250                  | 0               | 0.005     |
| 23      | 27.255                   | 27.2550                  | 0               | 0.005     |
| 24      | 27.235                   | 27.2350                  | 0               | 0.005     |
| 25      | 27.245                   | 27.2450                  | 0               | 0.005     |
| 26      | 27.265                   | 27.2650                  | 0               | 0.005     |
| 27      | 27.275                   | 27.2750                  | 0               | 0.005     |
| 28      | 27.285                   | 27.2850                  | 0               | 0.005     |
| 29      | 27.295                   | 27.2950                  | 0               | 0.005     |
| 30      | 27.305                   | 27.3050                  | 0               | 0.005     |
| 31      | 27.315                   | 27.3150                  | 0               | 0.005     |
| 32      | 27.325                   | 27.3250                  | 0               | 0.005     |
| 33      | 27.335                   | 27.3350                  | 0               | 0.005     |
| 34      | 27.345                   | 27.3450                  | 0               | 0.005     |
| 35      | 27.355                   | 27.3550                  | 0               | 0.005     |
| 36      | 27.365                   | 27.3650                  | 0               | 0.005     |
| 37      | 27.375                   | 27.3749                  | 0.000001        | 0.005     |
| 38      | 27.385                   | 27.3849                  | 0.000001        | 0.005     |
| 39      | 27.395                   | 27.3949                  | 0.000001        | 0.005     |
| 40      | 27.405                   | 27.4049                  | 0.000001        | 0.005     |



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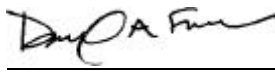
## 5 CONFORMANCE STATEMENT

| STANDARDS REFERENCED FOR THIS REPORT |                                                                                 |
|--------------------------------------|---------------------------------------------------------------------------------|
| PART 2; 1999                         | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS   |
| PART 15; 1999                        | RADIO FREQUENCIES DEVICES                                                       |
| PART 95; 1998                        | PERSONAL RADIO SERVICES                                                         |
| OET BULLETIN NO. 43; 1994            | PEAK ENVELOPE POWER AND OUTPUT LIMITING IN THE CITIZENS BAND (CB) RADIO SERVICE |
| ANSI C63.4-1992                      | STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS  |
| ANSI/TIA/EIA 603-1; 1998             | ADDENDUM TO ANSI/TIA/EIA 603-1992                                               |

| FREQUENCY RANGE MHz | CONDUCTED CW<br>OUTPUT POWER (W) | FREQUENCY TOLERANCE | EMISSION DESIGNATOR |
|---------------------|----------------------------------|---------------------|---------------------|
| 26.965 TO 27.405    | 3.89                             | 0.005%              | 6K00A3E             |

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. Modifications were not made during testing to the equipment in order to achieve compliance with these standards.

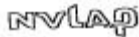
Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature: 

Date: January 23, 2001

Typed/Printed Name: Desmond A. Fraser

Position: President  
(NVLAP Signatory)



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

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



## 6 EMISSIONS EQUIPMENT LIST

| RTL Asset Number | Manufacturer       | Model                               | Part Type                                        | Serial Number      | Calibration due date |
|------------------|--------------------|-------------------------------------|--------------------------------------------------|--------------------|----------------------|
| 900969           | Hewlett Packard    | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)              | 2412A00414         | 03/23/01             |
| 900929           | Hewlett Packard    | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)              | 2811A01276         | 03/28/01             |
| 900901           | Hewlett Packard    | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)              | 3145A01599         | 11/02/01             |
| 900339           | Hewlett Packard    | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)              | 2521A00743         | 03/27/01             |
| 900042           | Hewlett Packard    | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)              | 2521A01032         | 11/05/01             |
| 900924           | Amplifier Research | 75A220                              | Amplifier (10 kHz – 220 MHz)                     |                    | N/A                  |
| 900933           | Hewlett Packard    | 11975A                              | Power Amplifier (2 - 8 GHz)                      | 2304A00348         | 11/15/01             |
| 901067           | Hewlett Packard    | 8903B                               | Audio Analyzer                                   | 2303A00307         | 06/28/01             |
| 901055           | Hewlett Packard    | 8901A Opt. 002-003                  | Modulation Analyzer                              | 2545A04102         | 06/08/01             |
| 900926           | Hewlett Packard    | 8753D                               | RF Vector Network Analyzer                       | 3410A09659         | 03/28/01             |
| 901089           | Hewlett Packard    | HP875ET                             | Transmission/Reflection Network Analyzer         | US39170052         | N/A                  |
| 900968           | Hewlett Packard    | 8567A                               | Spectrum Analyzer (10 kHz – 1.5 GHz)             | 2602A00160         | 03/23/01             |
| 900903           | Hewlett Packard    | 8567A                               | Spectrum Analyzer (10 kHz – 1.5 GHz)             | 2841A00614         | 11/02/01             |
| 900897           | Hewlett Packard    | 8567A                               | Spectrum Analyzer (10 kHz – 1.5 GHz)             | 2727A00535         | 11/08/01             |
| 900931           | Hewlett Packard    | 8566B                               | Spectrum Analyzer (100 Hz – 22 GHz)              | 3138A07771         | 03/27/01             |
| 900912           | Hewlett Packard    | 8568A                               | RF Spectrum Analyzer (100 Hz – 1.5 GHz)          | 2634A02704         | 08/02/01             |
| 900824           | Hewlett Packard    | 8591E                               | RF Spectrum Analyzer (9 KHz – 1.8 GHz)           | 3710A06135         | 11/14/01             |
| 900724           | ARA                | LPB-2520                            | Log Periodic / Biconical Antenna (25-1000 MHz)   | 1037               | 2/1/01               |
| 900725           | ARA                | LPB-2520                            | Log Periodic / Biconical Antenna (25-1000 MHz)   | 1036               | 07/12/01             |
| 900967           | A.H. Systems       | TDS-206/535-1 through TDS-206/535-4 | Tuned Dipole set (30 – 1000 MHz)                 | 126, 128, 129, 132 | 12/15/00             |
| 900154           | Compliance Design  | Roberts Dipole                      | Adjustable Elements Dipole antenna (30-1000MHz)  | N/A                | 7/26/01              |
| 900814           | Electro-Metrics    | RGA-60                              | Double Ridges Guide Antenna (1-18 GHz)           | 2310               | 2/26/01              |
| 900081           | EMCO               | 3146                                | Log-Periodic Antenna (200-1000 MHz)              | 1850               |                      |
| 900800           | EMCO               | 3301B                               | Active Monopole (Rod antenna) (30 Hz – 50 MHz)   | 9809-4071          | 05/02/01             |
| 900151           | Rohde and Schwarz  | HFH2-Z2                             | Loop Antenna (9kHz-30 MHz)                       | 82825/019          | 05/26/01             |
| 900791           | Schaffner –Chase   | CSL6112                             | Bilog antenna (30 MHz – 2GHz)                    | 2099               | 2/22/01              |
| 901053           | Schaffner –Chase   | CBL6112B                            | Bilog Chase antenna (200 MHz – 2 GHz)            | 2648               | 05/24/01             |
| 900060           | Hewlett Packard    | 86634B                              | Auxiliary Section for External Pulse Modulator   | 1314A02913         | 11/08/01             |
| 901041           | ACO Pacific        | 511E                                | Sound Level Calibrator                           | 028751             | In calibration       |
| 900970           | Hewlett Packard    | 85662A                              | Spectrum Analyzer Display                        | 254211239          | 03/23/01             |
| 900930           | Hewlett Packard    | 85662A                              | Spectrum Analyzer Display                        | 3144A20839         | 03/28/01             |
| 900911           | Hewlett Packard    | 85662A                              | Spectrum Analyzer Display                        | 2542A12739         | 08/02/01             |
| 900902           | Hewlett Packard    | 85662A                              | Spectrum Analyzer Display                        | 2848A17585         | 11/02/01             |
| 900896           | Hewlett Packard    | 85662A                              | Spectrum Analyzer Display                        | 2816A16471         | 11/02/01             |
| 900914           | Hewlett Packard    | 8546OA                              | RF Filter Section, (100 KHz to 6.5 GHz)          | 3330A00107         | 11/07/01             |
| 901057           | Hewlett Packard    | 3336B                               | Synthesizer/Level Generator                      | 2514A02585         | 06/21/01             |
| 900059           | Hewlett Packard    | 8660C                               | Signal Generator (9 KHz – 3200 MHz)              | 1947A02956         | 11/08/01             |
| 900960           | Hewlett Packard    | 8444A                               | Tracking Generator (0.5 – 1500MHz)               | 2325A07827         | 03/08/01             |
| 900917           | Hewlett Packard    | 8648C                               | Synthesized. Signal Generator (9 KHz – 3200 MHz) | 3537A01741         | 03/28/01             |



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| RTL Asset Number | Manufacturer         | Model          | Part Type                                        | Serial Number | Calibration due date |
|------------------|----------------------|----------------|--------------------------------------------------|---------------|----------------------|
| 900821           | Hewlett Packard      | 33120A         | 15 MHz Function / Arbitrary Waveform Generator   | US36029992    | 11/14/01             |
| 900059           | Hewlett Packard      | 8660C          | Synthesized. Signal Generator (9 kHz – 3200 MHz) | 1947A02956    | 11/08/01             |
| 900195           | Tektronix            | CFG280         | Function Generator (0.1 Hz – 11 MHz)             | TW12167       | N/A                  |
| 900927           | Tektronix            | ASG 100        | Audio Signal Generator                           | B03274 V2.3   | N/A                  |
| 900268           | Taylor               | 5565           | Hygrometer / Thermometer                         | N/A           | 09/05/01             |
| 901056           | Hewlett Packard      | 8954A, Opt.H03 | Transceiver Interface                            | 2924A00830    | 06/02/01             |
| 901088           | Hewlett Packard      | 8954A          | Transceiver Interface                            | 2146A00139    | 07/28/01             |
| 901082           | AFJ International    | AFJ LS16       | LISN (9 kHz – 30 MHz)                            | 16010020081   | 06/16/01             |
| 901083           | AFJ International    | AFJ LS16       | LISN (9 kHz – 30 MHz)                            | 16010020082   | 06/16/01             |
| 901084           | AFJ International    | AFJ LS16       | LISN (9 kHz – 30 MHz)                            | 16010020080   | 06/16/01             |
| 901090           | Bajog electronic     | 4V-100/200     | LISN (150 kHz – 30 MHz)                          | 00-44-007     | 08/03/01             |
| 900726           | Solar                | 7225-1         | LISN                                             | N/A           | 03/29/01             |
| 900727           | Solar                | 7225-1         | LISN                                             | N/A           | 03/29/01             |
| 900078           | Solar                | 7225-1         | LISN                                             | N/A           | 03/29/01             |
| 900077           | Solar                | 7225-1         | LISN                                             | N/A           | 03/29/01             |
| 901054           | Hewlett Packard      | HP 3586B       | Selective Level Meter                            | 1928A01892    | 06/08/01             |
| 900793           | Hewlett Packard      | 432A           | Thermistor Power Meter                           | 1848a22632    | N/A                  |
| 900721           | Hewlett Packard      | 8447D          | Preamplifier (0.1-1300 MHz)                      | 2727A05397    | N/A                  |
| 900889           | Hewlett Packard      | 85685A         | RF Preselector for HP 8566B or 8568B (20Hz-2GHz) | 3146A01309    | 11/14/01             |
| 900566           | Amplifier Research   | FP 2000        | Isotropic Field Probe                            | 20760         | 08/29/01             |
| 900854           | Solar Electronics Co | 9119-IN        | RF Current Probe                                 | 972501        |                      |
| 900849           | Solar Electronics Co | 9121-IN        | Injection Probe (10 MHz – 1 GHz)                 | 953501        |                      |
| 900848           | Solar Electronics Co | 9320-IN        | RF Current Probe                                 | 990521        |                      |
| 900913           | Hewlett Packard      | 85462A         | EMI Receiver RF Section (9 KHz – 6.5 GHz)        | 3325A00159    | 03/29/01             |



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## 7 RADIATED EMISSIONS MEASUREMENTS FOR RECEIVERS AND DIGITAL INTERFACE DEVICES

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, 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. The spectrum was examined from 30 MHz to 1000 MHz using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, and EMCO log periodic and biconical antenna. In order to gain sensitivity, a New Circuits ZHL-4240W preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

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. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When any clock exceeds 108 MHz, the EUT was tested between 1 and 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

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

### 8.1 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% modulation at 1000 Hz. The substitution method from TIA/EIA-603 was used for this test.

### 8.2 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.

#### 8.2.1 RADIATED EMISSIONS: (TRANSMITTER INTO A 50 OHM LOAD, CHANNEL 20)

| Emission Frequency (MHz) | Analyzer Reading (dBuV) | Signal Generator Reading (dBm) | Cable Loss and TX Antenna Gain Correction (dB) | Corrected Signal Generator Level (dBm) ERP | 3.89W Power (dBm) | Margin from Power (dB) |
|--------------------------|-------------------------|--------------------------------|------------------------------------------------|--------------------------------------------|-------------------|------------------------|
| 54.410                   | 47.8                    | -72.4                          | -1.6                                           | -74.0                                      | 35.9              | -109.9                 |
| 81.615                   | 55.4                    | -59.4                          | -0.6                                           | -60.0                                      | 35.9              | -95.9                  |
| 108.820                  | 50.2                    | -59.8                          | -0.7                                           | -60.5                                      | 35.9              | -96.4                  |
| 136.025                  | 74.0                    | -34.4                          | -1.4                                           | -35.8                                      | 35.9              | -71.7                  |
| 163.230                  | 57.8                    | -51.7                          | -1.2                                           | -52.9                                      | 35.9              | -88.8                  |
| 190.435                  | 68.1                    | -37.7                          | -2.2                                           | -39.9                                      | 35.9              | -75.8                  |
| 217.640                  | 81.3                    | -25.2                          | -2.4                                           | -27.6                                      | 35.9              | -63.5                  |

*\*All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature: 

Date: January 13, 2001

Typed/Printed Name: Daniel Baltzell



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## 8.2.2 RADIATED EMISSIONS: (RECEIVER) CH 20 AT 27.205 MHz

See section Radiated emissions measurements for receivers and digital interface devices for test methodology. The 1<sup>st</sup> LO = 16.51 MHz @ CH 20, 2<sup>nd</sup> LO = 10.24 MHz, 1<sup>st</sup> IF = 10.695, and 2<sup>nd</sup> IF = 0.455 MHz were investigated and tested. The worst-case emission was detected when CH 20 (27.205 MHz) – 2<sup>nd</sup> LO (10.24 MHz) = 16.965 MHz. The emissions below represent this mode.

| Emission Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|--------------------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------------|----------------|-------------|
| 151.806                  | Qp            | V                      | 270                     | 1.0                | 54.4                    | -16.9                         | 37.5                    | 43.5           | -6.0        |
| 303.406                  | Qp            | H                      | 120                     | 1.0                | 56.8                    | -13.2                         | 43.6                    | 46.0           | -2.4        |
| 455.109                  | Qp            | H                      | 120                     | 1.0                | 45.9                    | -9.2                          | 36.7                    | 46.0           | -9.3        |
| 606.813                  | Qp            | H                      | 180                     | 2.5                | 49.0                    | -5.8                          | 43.2                    | 46.0           | -2.8        |
| 758.516                  | Qp            | H                      | 260                     | 1.2                | 43.6                    | -3.8                          | 39.8                    | 46.0           | -6.2        |
| 910.219                  | Qp            | H                      | 320                     | 1.0                | 41.5                    | -2.4                          | 39.1                    | 46.0           | -6.9        |

*\*All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature: \_\_\_\_\_

Date: January 13, 2001

Typed/Printed Name: Daniel Baltzell



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

OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

### **9.1 TEST PROCEDURE**

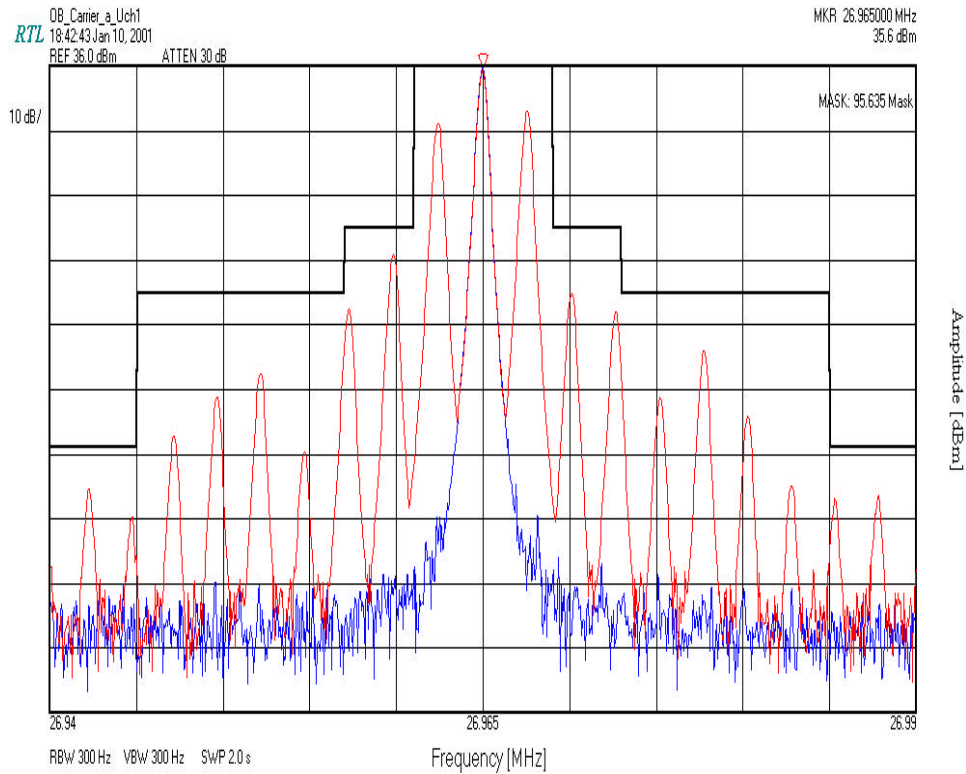
ANSI/TIA/EIA-603-1992, section 2.2.11

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% modulation. The plots are in compliance with paragraph 95.633 (a) of the rules



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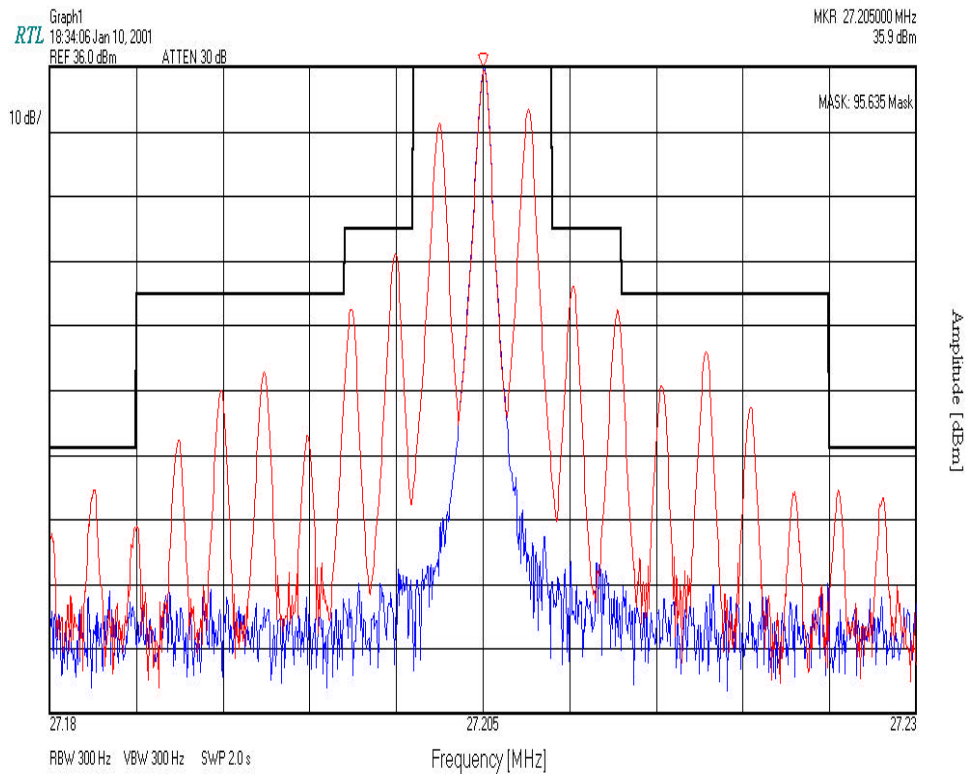
## 9.2 TEST DATA



95.633 (a) emission bandwidth for channel 1



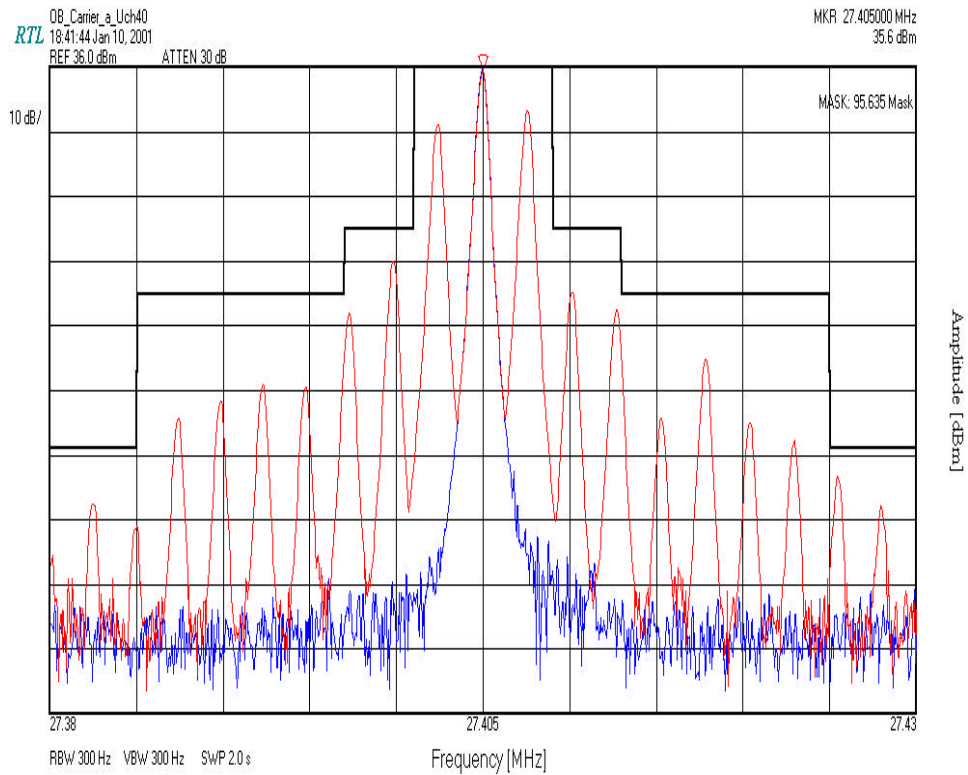
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95.633 (a) emission bandwidth for channel 20



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95.633 (a) emission bandwidth for channel 40



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

### 10.1 TEST PROCEDURE

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

The transmitter is terminated with a  $50\Omega$  load connected to a spectrum analyzer.

The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required producing 50% modulation at 1000 Hz.

### 10.2 TEST DATA

Frequency range of measurement per Part 2.1057: 9kHz to  $10 \times F_c$ . FCC Limits: -23dBm

The following channels were investigated: Channels 1, Channels 20, and Channels 40.

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 1 (Spurious harmonic emissions at the Antenna Terminal)

| Harmonic | Frequency (MHz) | Emission (dBm) | Limit (dBm) | Margin (dB) |
|----------|-----------------|----------------|-------------|-------------|
| 2        | 53.93           | -35.1          | -23         | -12.1       |
| 3        | 80.895          | -34.9          | -23         | -11.9       |
| 4        | 107.86          | -43.7          | -23         | -20.7       |
| 5        | 134.825         | -43.3          | -23         | -20.3       |
| 6        | 161.79          | -42.9          | -23         | -19.9       |
| 7        | 188.755         | -42            | -23         | -19.0       |
| 8        | 215.72          | -42            | -23         | -19.0       |
| 9        | 242.685         | -43.1          | -23         | -20.1       |
| 10       | 269.65          | -42.5          | -23         | -19.5       |

#### Channel 20 (Spurious harmonic emissions at the Antenna Terminal)

| Harmonic | Frequency (MHz) | Emission (dBm) | Limit (dBm) | Margin (dB) |
|----------|-----------------|----------------|-------------|-------------|
| 2        | 54.41           | -36.8          | -23         | -13.8       |
| 3        | 81.615          | -35.1          | -23         | -12.1       |
| 4        | 108.82          | -42.6          | -23         | -19.6       |
| 5        | 136.025         | -42.6          | -23         | -19.6       |
| 6        | 163.23          | -42.6          | -23         | -19.6       |
| 7        | 190.435         | -41.7          | -23         | -18.7       |
| 8        | 217.64          | -42.6          | -23         | -19.6       |
| 9        | 244.845         | -42.4          | -23         | -19.4       |
| 10       | 272.05          | -42.6          | -23         | -19.6       |

#### Channel 40 (Spurious harmonic emissions at the Antenna Terminal)

| Harmonic | Frequency (MHz) | Emission (dBm) | Limit (dBm) | Margin (dB) |
|----------|-----------------|----------------|-------------|-------------|
| 2        | 54.81           | -35.6          | -23         | -12.3       |
| 3        | 82.215          | -36.8          | -23         | -13.8       |
| 4        | 109.62          | -43.1          | -23         | -20.1       |
| 5        | 137.025         | -42.5          | -23         | -19.5       |
| 6        | 164.43          | -42.4          | -23         | -19.4       |
| 7        | 191.835         | -41.6          | -23         | -18.6       |
| 8        | 219.24          | -42.7          | -23         | -19.7       |
| 9        | 246.645         | -42.6          | -23         | -19.6       |
| 10       | 274.05          | -43            | -23         | -20.0       |



### Transmitter Channel 1 (Spurious emissions at the Antenna Terminal)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|-------------|-------------|
| 13.65           | -32.9          | -23         | -9.9        |
| 16.44           | -35            | -23         | -12.0       |
| 23.97           | -36.1          | -23         | -13.1       |
| 26.64           | -40.7          | -23         | -17.7       |
| 26.82           | -39.7          | -23         | -16.7       |
| 27.24           | -41.1          | -23         | -64.1       |
| 27.6            | -41.5          | -23         | -18.5       |
| 27.84           | -40.6          | -23         | -17.6       |
| 28.41           | -40.7          | -23         | -17.7       |
| 30.12           | -37.9          | -23         | -14.9       |
| 54.01           | -36.1          | -23         | -13.1       |
| 64.92           | -42.9          | -23         | -19.9       |
| 81.16           | -36.2          | -23         | -13.2       |
| 168.3           | -42.8          | -23         | -19.8       |
| 189.5           | -41.9          | -23         | -18.9       |
| 310.6           | -42.8          | -23         | -19.8       |
| 432.1           | -41            | -23         | -18.0       |
| 459.2           | -41            | -23         | -18.0       |
| 486.3           | -40.9          | -23         | -17.9       |

### Transmitter Channel 20 (Spurious emissions at the Antenna Terminal)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|-------------|-------------|
| 13.74           | -40.4          | -23         | -17.4       |
| 16.68           | -34.2          | -23         | -11.2       |
| 24.06           | -36.1          | -23         | -13.1       |
| 26.52           | -41.5          | -23         | -18.5       |
| 27              | -40.9          | -23         | -17.9       |
| 27.45           | -41.1          | -23         | -64.1       |
| 27.78           | -40.8          | -23         | -17.8       |
| 27.93           | -41.0          | -23         | -18.0       |
| 28.41           | -40.8          | -23         | -17.8       |
| 30.52           | -37.1          | -23         | -14.1       |
| 54.48           | -34.7          | -23         | -11.4       |
| 81.85           | -35.8          | -23         | -12.8       |
| 191.2           | -42.6          | -23         | -19.6       |
| 381.4           | -42.8          | -23         | -19.8       |
| 408.8           | -42.0          | -23         | -19.0       |
| 436.2           | -40.9          | -23         | -17.9       |
| 463.5           | -39.3          | -23         | -16.3       |
| 490.6           | -42.2          | -23         | -19.2       |
| 626             | -42.9          | -23         | -19.9       |
| 743             | -42.6          | -23         | -19.6       |
| 863             | -42.9          | -23         | -19.9       |



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**Channel 40 (Spurious emissions at the Antenna Terminal)**

| <b>Frequency<br/>(MHz)</b> | <b>Emission<br/>(dBm)</b> | <b>Limit<br/>(dBm)</b> | <b>Margin<br/>(dB)</b> |
|----------------------------|---------------------------|------------------------|------------------------|
| 13.86                      | -38.4                     | -23                    | -15.4                  |
| 16.89                      | -32.2                     | -23                    | -9.2                   |
| 24.18                      | -35.7                     | -23                    | -12.7                  |
| 26.91                      | -41.1                     | -23                    | -18.1                  |
| 27.3                       | -41                       | -23                    | -18                    |
| 27.39                      | -38.8                     | -23                    | -15.8                  |
| 27.66                      | -41.1                     | -23                    | -54.1                  |
| 28.05                      | -40.1                     | -23                    | -17.1                  |
| 28.41                      | -41.2                     | -23                    | -18.2                  |
| 30.81                      | -37.9                     | -23                    | -14.9                  |
| 54.88                      | -39.0                     | -23                    | -16.0                  |
| 82.49                      | -39.1                     | -23                    | -16.1                  |
| 406.9                      | -42.8                     | -23                    | -19.8                  |
| 439.3                      | -41.4                     | -23                    | -18.4                  |
| 466.9                      | -40                       | -23                    | -17                    |
| 494.5                      | -40.7                     | -23                    | -17.7                  |
| 630.5                      | -42.6                     | -23                    | -19.6                  |
| 861                        | -42.9                     | -23                    | -19.9                  |



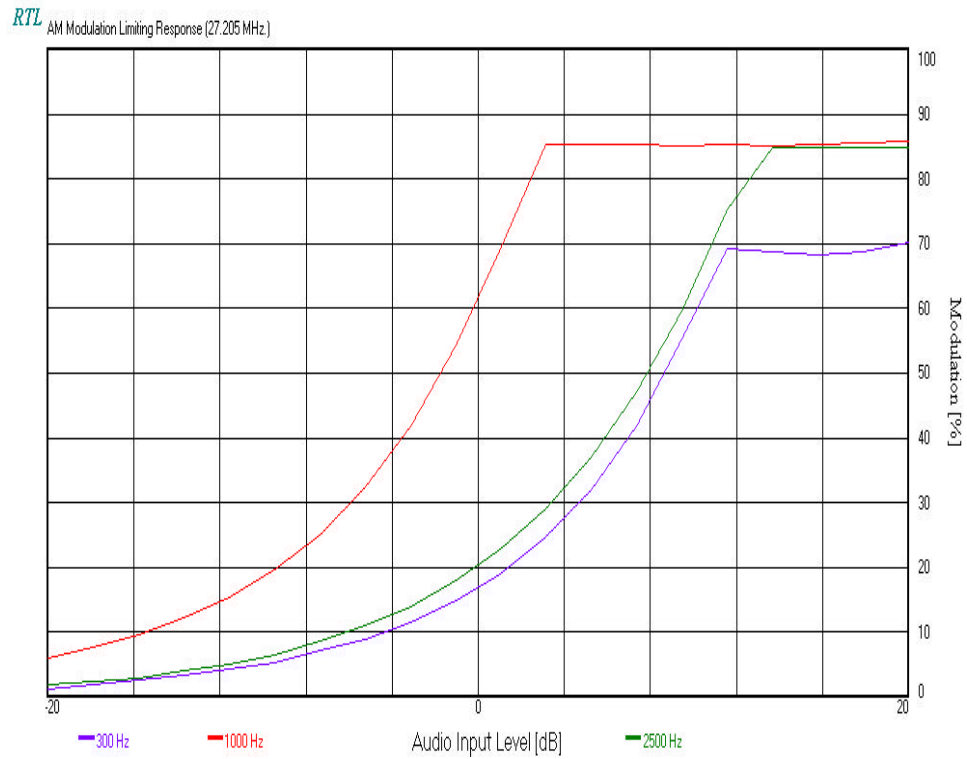
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# **11 FCC PART 2 § 2.1047(B): MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS (MODULATION LIMITING)**

The audio input level is adjusted for 50% modulation at 1000 Hz. Using this level as a reference (0 dB) the audio input level is varied from the reference to a level 20 dB above it for modulation frequencies of 300, 1000, and 2500 Hz. The % modulation obtained as a function of the input level is recorded and displayed as positive and negative peaks. The curves show compliance with paragraph §95.637 of the rules.

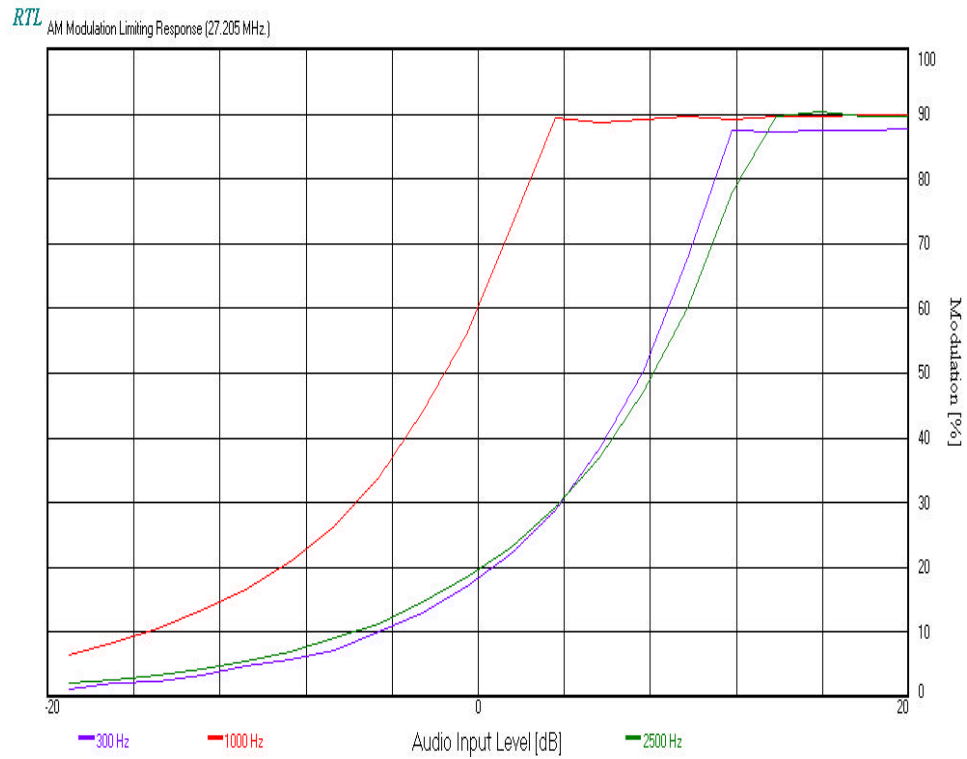


## Modulation Limiting Positive Peak





## Modulation Limiting Negative Peak





## 12 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER

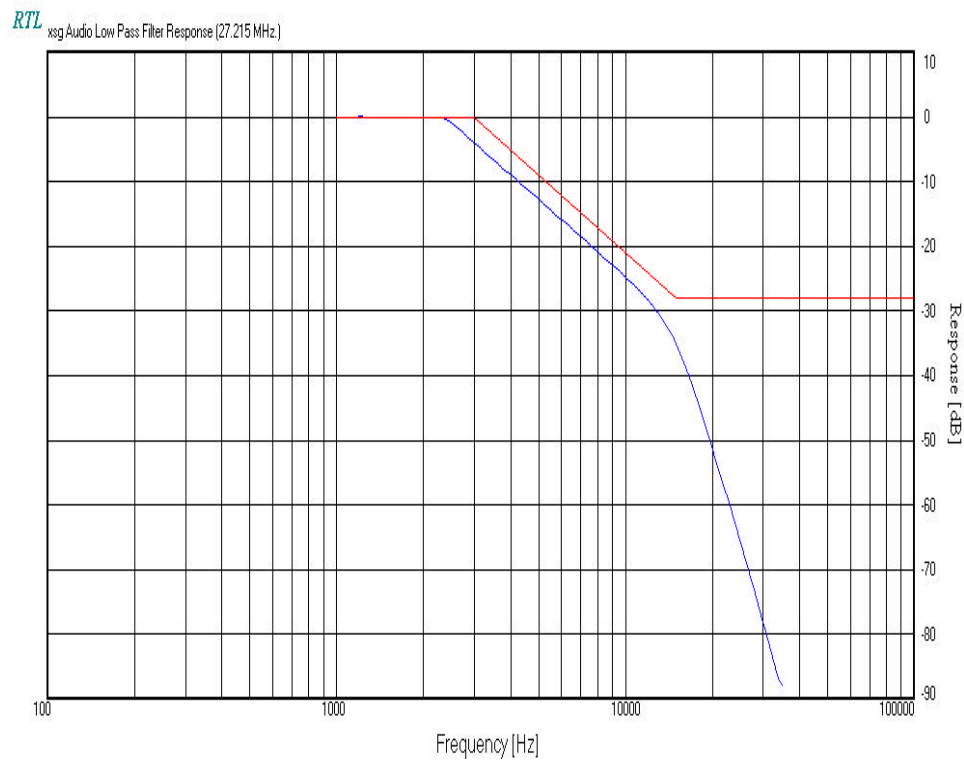
### 12.1 TEST PROCEDURE

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.

### 12.2 TEST DATA

AUDIO LOW PASS FILTER





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

### 12.4 TEST PROCEDURE

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

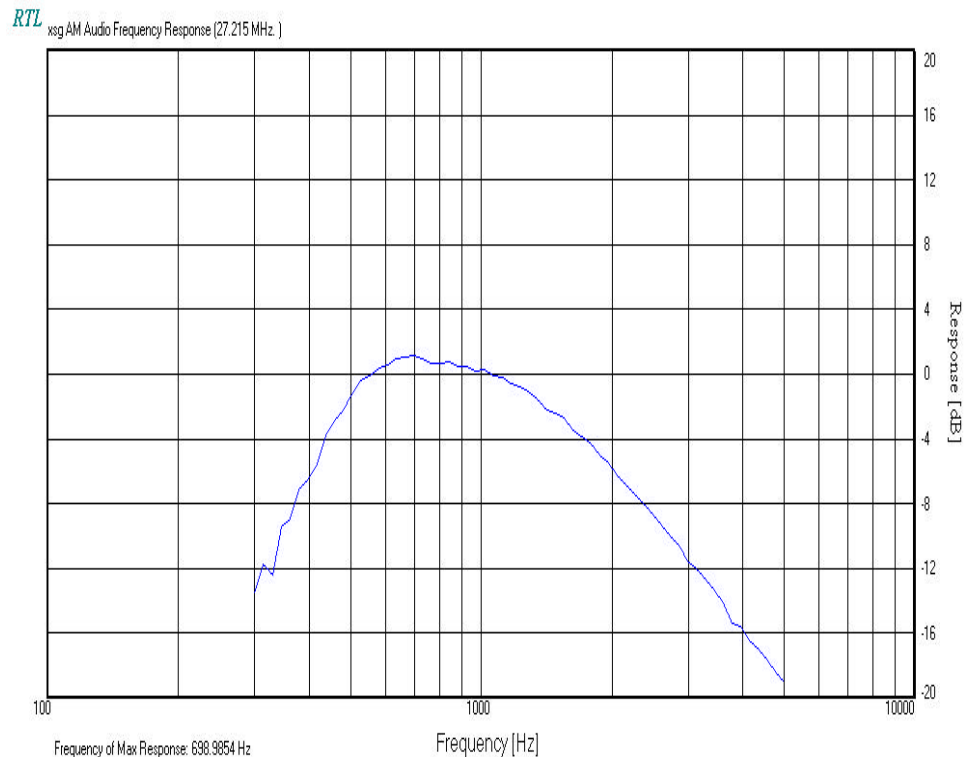
The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz is set to produce 50% of modulation. This point is shown as the 0 dB reference level, noted Modref. The audio signal generator was varied from 100Hz to 5kHz with the input level held constant. The modulation in kHz was recorded using a modulation analyzer as Modfreq.

The response in dB relative to 1 kHz was calculated as follows: Audio Frequency Response =  $20 \text{ LOG} (\text{Modfreq}/\text{Modref})$ . The maximum audio frequency response = 699 Hz

#### 12.4.1 TEST DATA

Audio Frequency Response



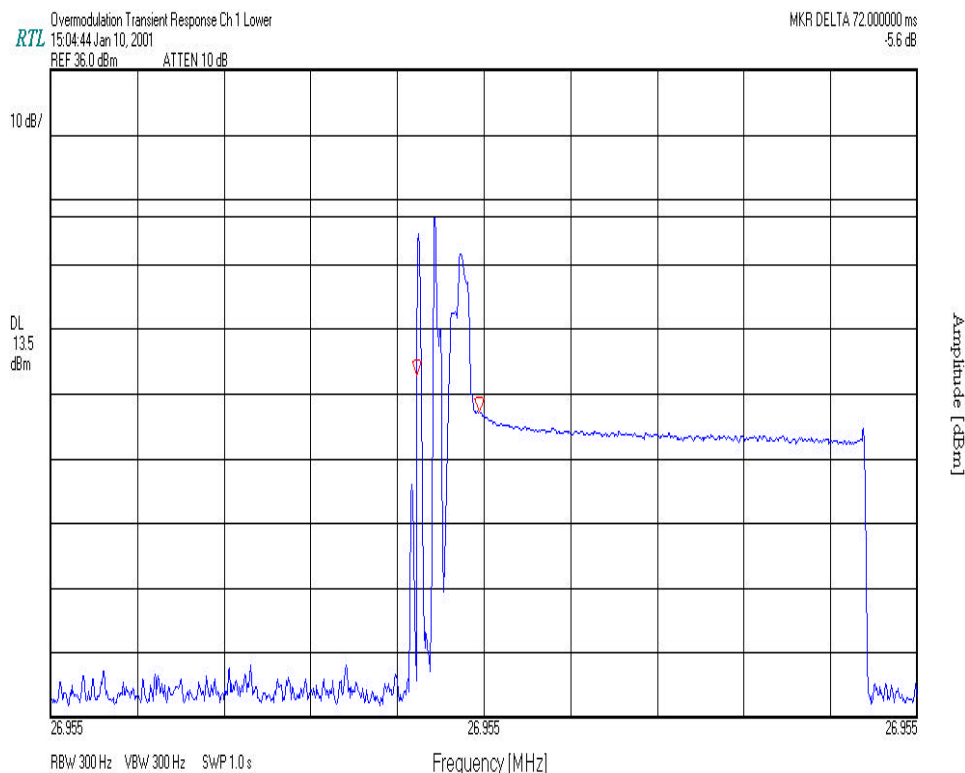


## 12.5 FCC RULES AND REGULATIONS PART 2 §2.987 (B) (2): MODULATION CHARACTERISTICS–OVERMODULATION TRANSIENT RESPONSE

### 12.6 TEST PROCEDURE

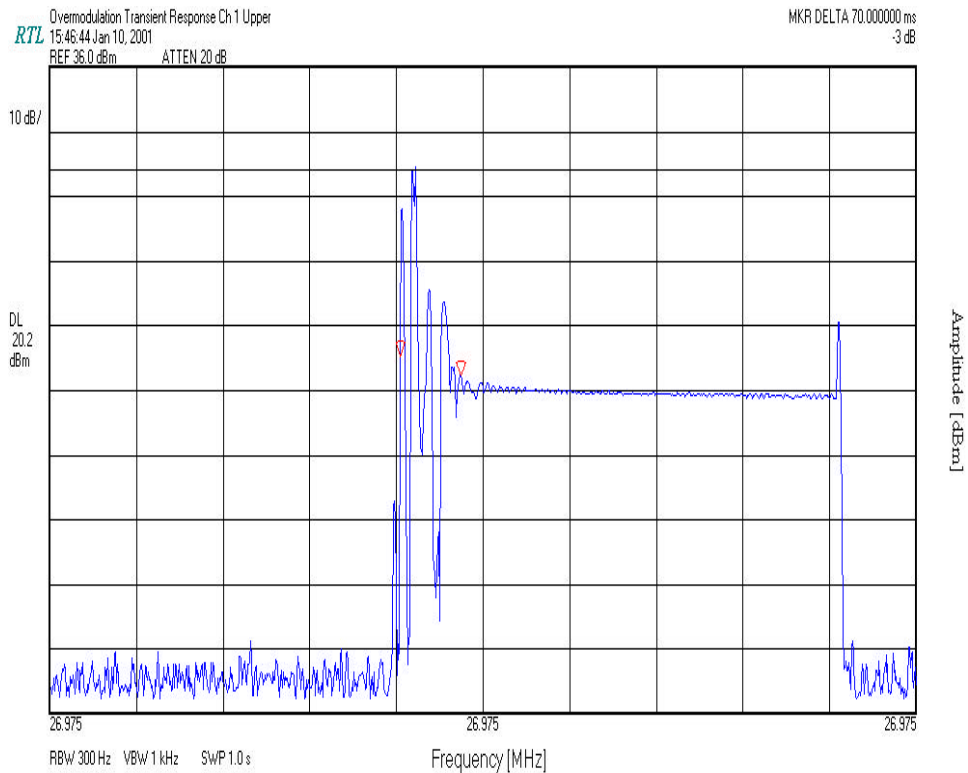
#### FCC Rules and Regulations

Over modulation transient response was measured by applying to the microphone input a 2500 Hz one Pulse Per Second tone, 16 dB above that which is required to produce a 50% modulation at the frequency of maximum response. The spectrum analyzer was set for occupied bandwidth measurements. The spectrum analyzer tuned to the upper and lower adjacent channels ( +/-10kHz) at 0 span to observe the transient caused by the pulsed modulation, sweep time is 10 seconds, reference level 36 dBm.





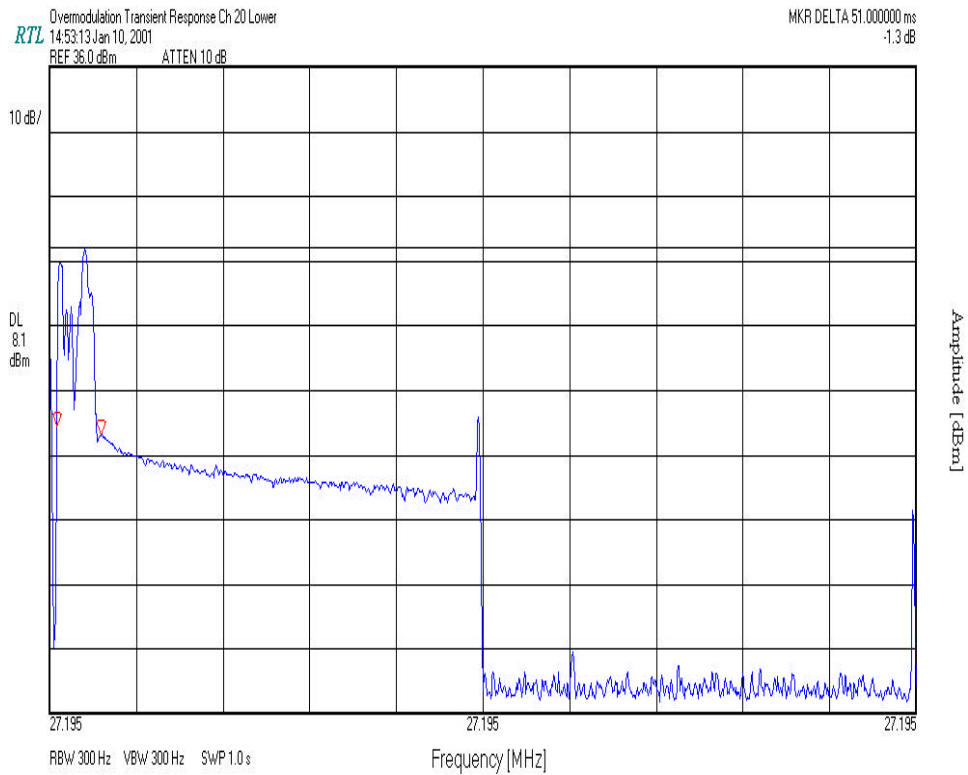
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**Over modulation transient response upper channel 1**



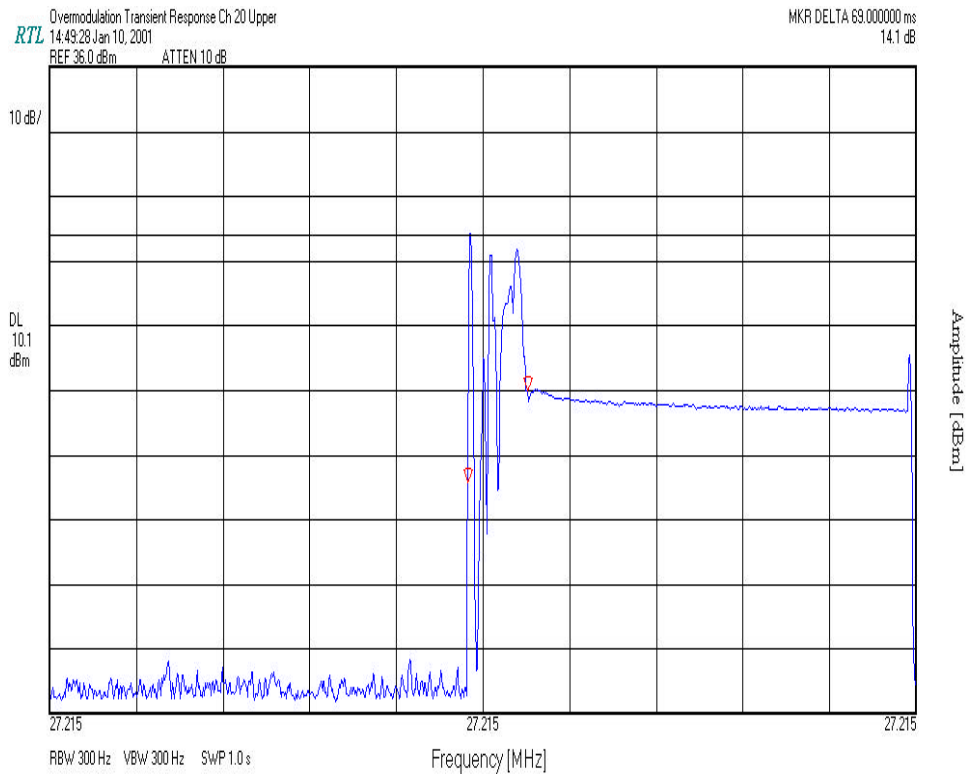
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**Over modulation transient response lower channel 20**



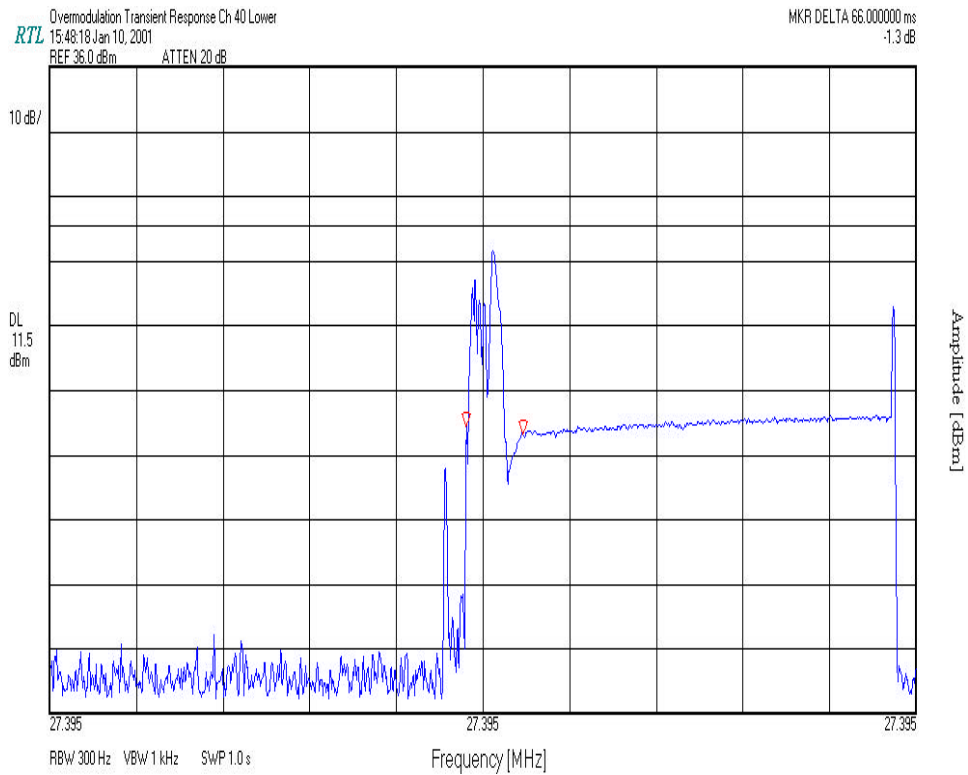
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**Over modulation transient response upper channel 20**



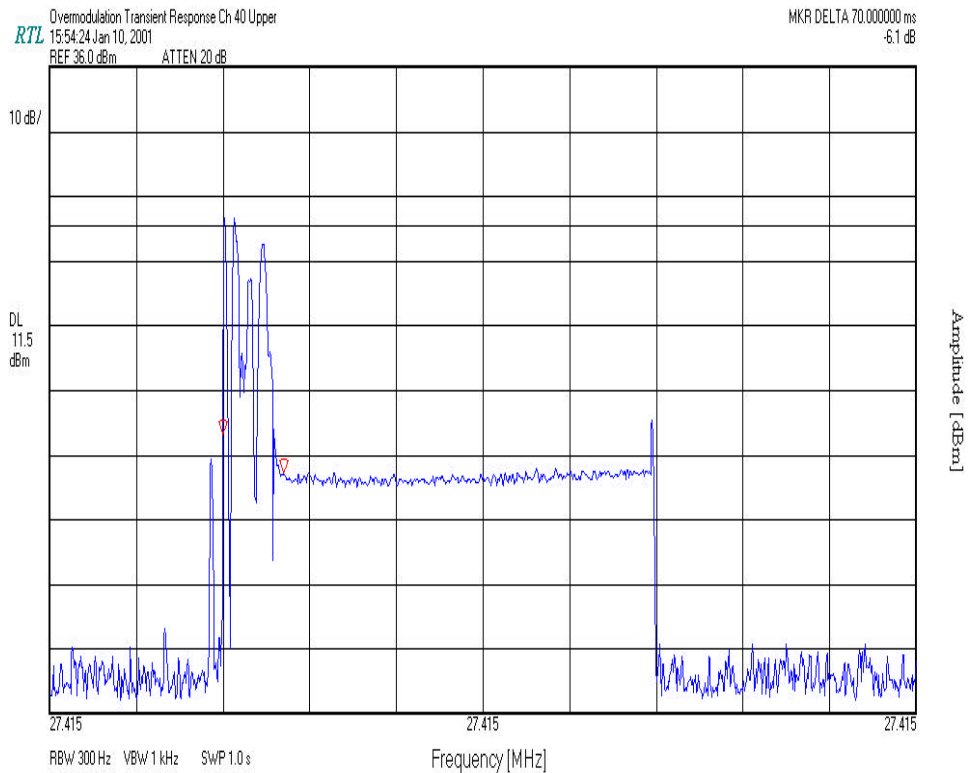
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**Over modulation transient response lower channel 40**



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**Over modulation transient response upper channel 40**



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

### 13.1 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.

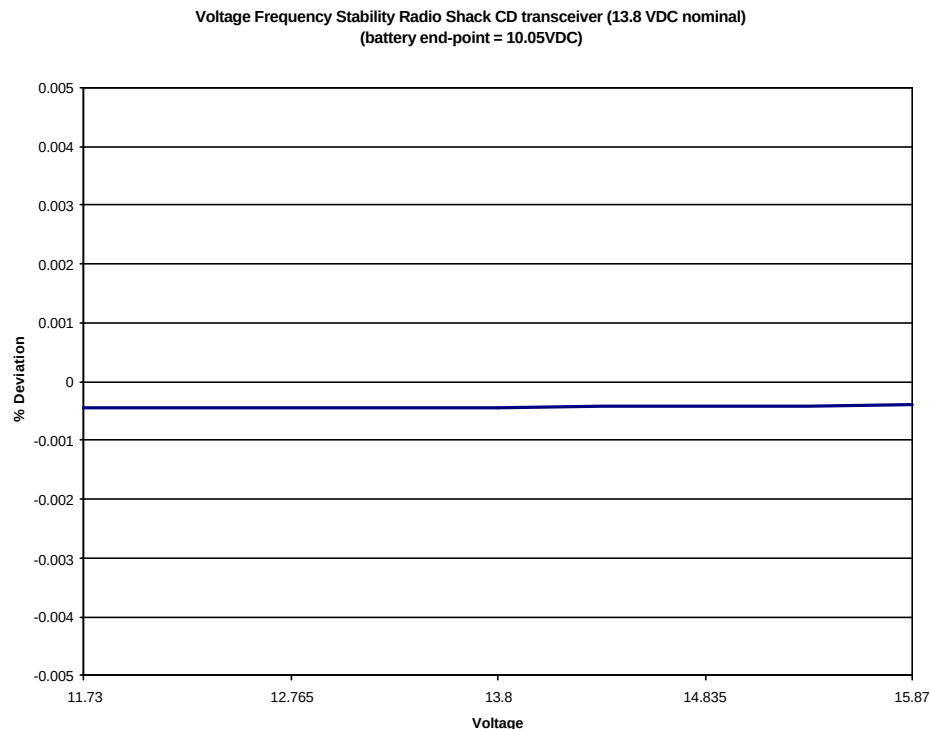
The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT.

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 ½an 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.

### 13.2 TEST DATA

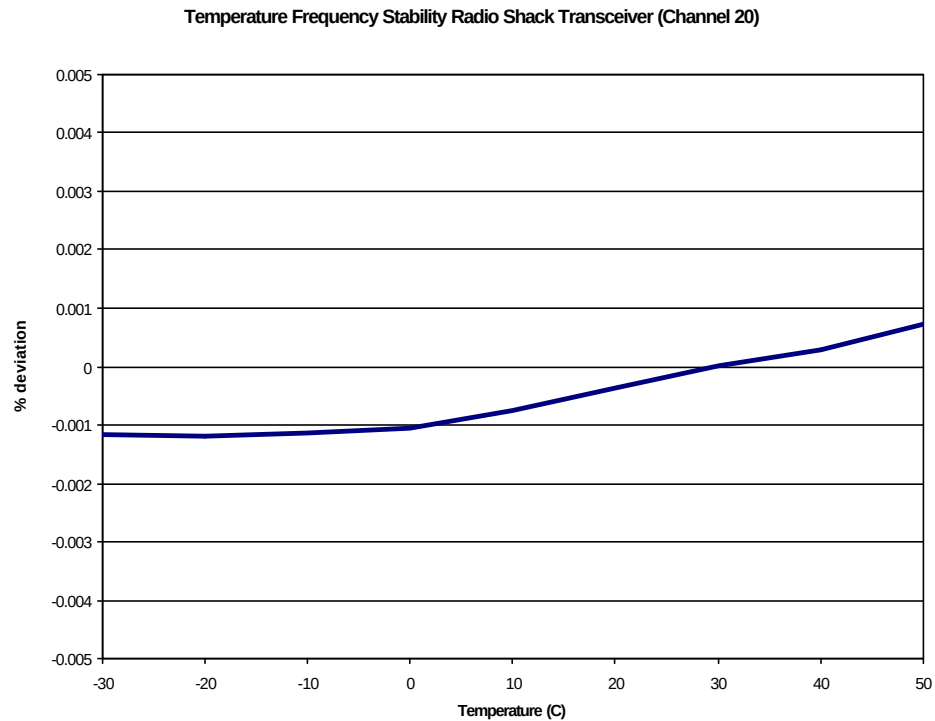
#### 13.2.1 FREQUENCY STABILITY/VOLTAGE VARIATION



The worst-case voltage deviation is show above. Limit is 0.005% frequency tolerance.



### 13.2.2 FREQUENCY STABILITY/TEMPERATURE VARIATION



The worst-case temperature deviation is show above. Limit is 0.005% frequency tolerance.

## 14 FCC RULES AND REGULATIONS PART 95.667: CB TRANSMITTER POWER

Please see the Bills of Materials section of this report.