Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Topaz3, L.L.C.
10828 NW Air World Drive
Kansas City, MO 64153

MODEL: PL1145/PL2245 Mobile Radio

FCC ID: O7KPL450

December 27, 2000

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 MOBILES 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 MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992
RSS-119, Issue 6	LAND MOBILE AND FIXED RADIO TRANSMITTERS AND RECEIVERS 27.41 TO 960.0 MHZ

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
22, 74, 90, 95(a)	464.475-467.95 MHz	1	2.5	11K0F3E
22, 74, 90, 95(a)	464.475-467.95 MHz	1	5	16K0F3E
22, 74, 90, 95(a)	464.475-467.95 MHz	2	2.5	11K0F3E
22, 74, 90, 95(a)	464.475-467.95 MHz	2	5	16K0F3E
Industry Canada Rules	**Frequency Range**	**Output Power (W)**	**Freq. Tolerance**	**Emission Designator**
RSS119	464.475-467.95 MHz	1	2.5	11K0F3E
RSS119	464.475-467.95 MHz	1	5	16K0F3E
RSS119	464.475-467.95 MHz	2	2.5	11K0F3E
RSS119	464.475-467.95 MHz	2	5	16K0F3E

REPORT PREPARED BY:

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Document Number: 2000482 / QRTL00-405

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1 GENERAL INFORMATION

The following Report of a Type Certification, is prepared on behalf of Topaz3, L.L.C. in accordance with the Federal Communications Commissions and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the SM-3450 Mobile Radio; FCC ID: O7KPL450. 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 FCC Rules and Regulations CFR 47, Industry Canada RSS-119, 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 dated March 3, 1994, submitted to 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 report.

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 FCC Part 2, FCC Part 90 Certification methodology.

Signature:  Date: December 27, 2000

Typed/Printed Name: Bruno Clavier Position: Vice President of Operations (NVLAP Signatory)

Signature:  Date: December 27, 2000

Typed/Printed Name: Daniel W. 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.

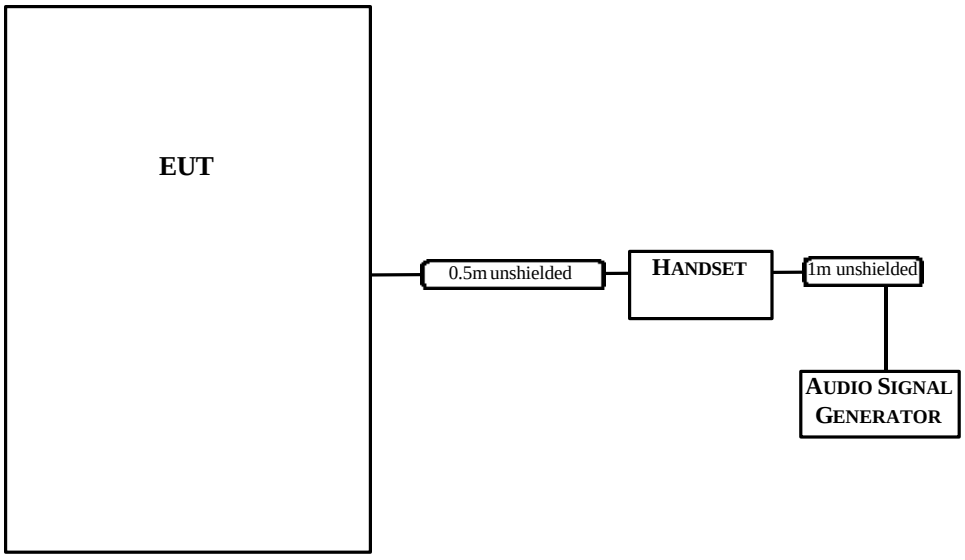
1.4 Tested System Details

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

EXTERNAL COMPONENTS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
CONDENSER MIC	MAXON AMERICA INC.	MA-2472	N/A	SAMPLE		012240
MOBILE RADIO	MAXON AMERICA INC.	SM-3000 (CANADA HI-PWR, 30W)	FCC#2	SAMPLE		012238
ANTENNA	MOSAIC	WHIP ANTENNA W/ ADAPTER	108-512 MHz	N/A		011897
CONDENSER MIC	MAXON AMERICA INC.	MA-2472	N/A	SAMPLE		012241
MOBIL RADIO (EUT)	**MAXON AMERICA INC.**	**SM-3000**	**FCC#1**	**SAMPLE**		**012239**

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(dBuV/m) = SAR(dBuV) + SCF(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(dB/m) = - PG(dB) + AF(dB/m) + CL(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:

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

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 dBuV - 11.5 dB/m = 37.8 dBuV/m

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

1.7 Conducted Measurement

The EUT is operated with a battery. Power lines conducted emissions were measured when the radio is operated using a battery charger AC/DC powered from the mains.

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 450 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

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.

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 Ω load impedance.

2.2 Test Data

The following channels (in MHz) were tested: 464.550, 467.923
The worst-case Output Power (highest) levels are shown.

CARRIER OUTPUT POWER (UNMODULATED)

2.2.1 HIGH POWER:

Channel	Frequency (MHz)	RF Power measured (Watt)*
1	464.550	2.3
2	467.923	2.2

2.2.2 LOW POWER:

Channel	Frequency (MHz)	RF Power measured (Watt)*
1	464.552	1.2

* Measurement accuracy: +/- 3%

2.2.3 RATED POWER:

Power Setting	Rated Power (W)
Low	1
High	2

2.3 Test Equipment

Power Meter HP437B s/n 2949A02966
HP 8901B s/n 2406A00178 (power mode)
Power Sensor HP8481B s/n 2702A05059
Frequency Counter HP8901B s/n 2406A00178 (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 Ω 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(dBm) – (43+10xLOG P(W))
Mask D (dBm): P(dBm) – (50+10xLOG P(W))

The following channel (in MHz) were investigated: 464.550, 467.923

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 1-6 Conducted Spurious Measurements (b/c 12239):

3.2.1 CHANNEL 1 (464.550 MHZ); 12.5K CH SP; 2 W

Frequency (MHz)	level (dBm)	limit (dB)	Margin(dB)
421.750	-53.9	-20	-33.9
929.100	-24.8	-20	-4.8
1393.649	-24.9	-20	-4.9
1858.199	-34.4	-20	-14.4
2322.756	-45.9	-20	-25.9
2787.301	-32.7	-20	-15.7
3251.846	-59.3	-20	-39.3
3716.396	-47.4	-20	-27.4
4180.948	-48.6	-20	-28.6
4645.495	-58.9	-20	-38.9

3.2.2 CHANNEL 1 (464.550 MHz); 25K CH SP; 2 W

Frequency (MHz)	level (dBm)	limit (dB)	Margin(dB)
421.750	-50.8	-13	-37.8
929.100	-29.1	-13	-16.1
1393.649	-24.9	-13	-11.9
1858.199	-34.4	-13	-21.4
2322.756	-45.7	-13	-32.7
2787.301	-32.8	-13	-19.8
3251.846	-59.2	-13	-46.2
3716.396	-49.9	-13	-36.9
4180.948	-52.7	-13	-39.7
4645.495	-58.6	-13	-45.6

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

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 Ω 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

4.2.1 CFR 47 PART 90.210 REQUIREMENTS

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.

4.2.2 RADIATED EMISSIONS (CHANNEL 1 AT 464.550 MHZ, 2 W) SUBSTITUTION METHOD

Frequency	S/G level (dBm)	Cable Loss*	Difference in gain (ref. To 1/2 wave dipole)	Emission level (dBm)	Limit (dBm) Mask B	Margin(dB)
929.1	-36.9	4.2	0.9	-40.2	20	-20.2
1393.65	-39.2	6.6	-3.6	-49.4	20	-36.4
1858.2	NF					
2322.75	NF					
2787.3	NF					
3251.85	NF					
3716.4	NF					
4180.95	NF					
4645.5	NF					

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½wave dipole antenna.

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

5 FCC Rules and Regulations Part 2 §2.1049 (c) (1): Occupied Bandwidth

OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

5.1 Test Procedure

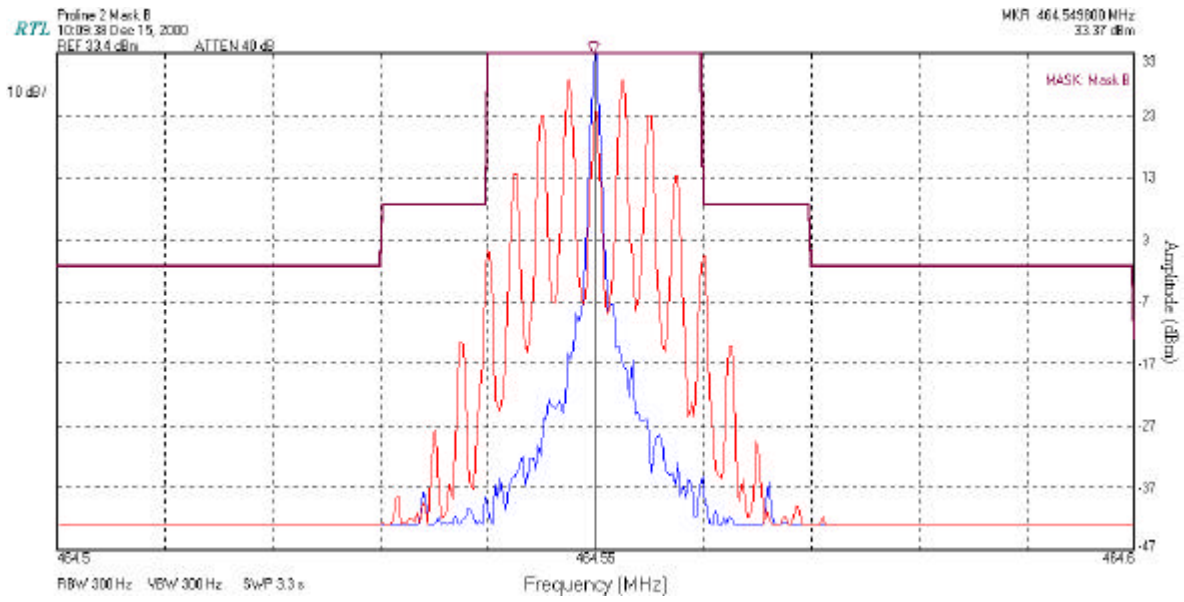
ANSI/TIA/EIA-603-1992, section 2.2.11

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.

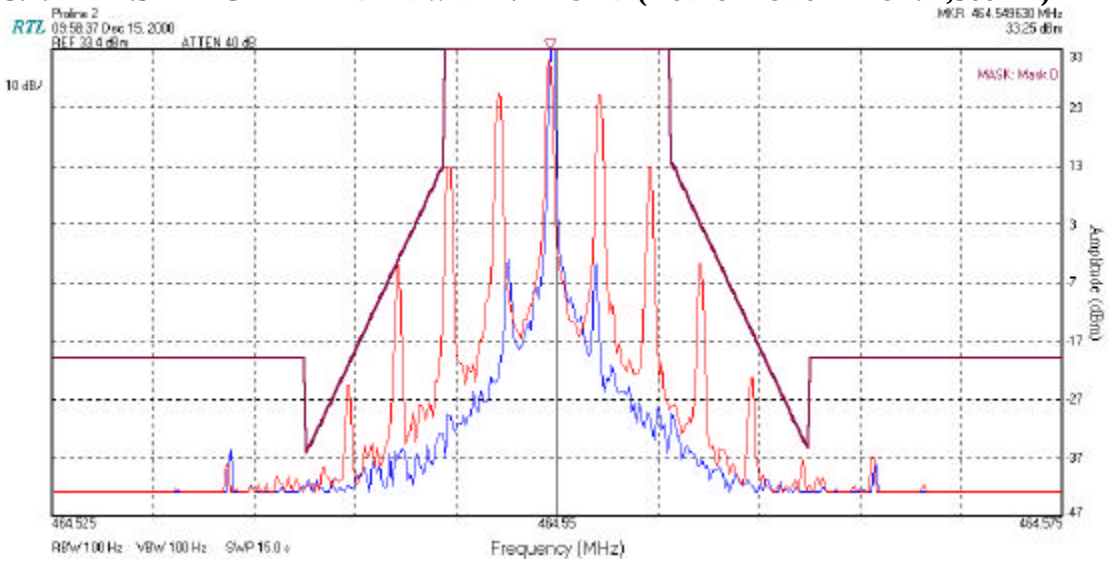
Device with digital modulation: N/A

5.2 Test Data

5.2.1 25 KHZ CHANNEL BANDWIDTH: MASK B (AUDIO MODULATION: 2,500 HZ)



5.2.2 12.5 kHz Channel Bandwidth: Mask D (Audio Modulation: 2,500 Hz)



5.3 Test Equipment

Spectrum Analyzer HP8564E s/n 3943A01719

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.

6.2 Test Data

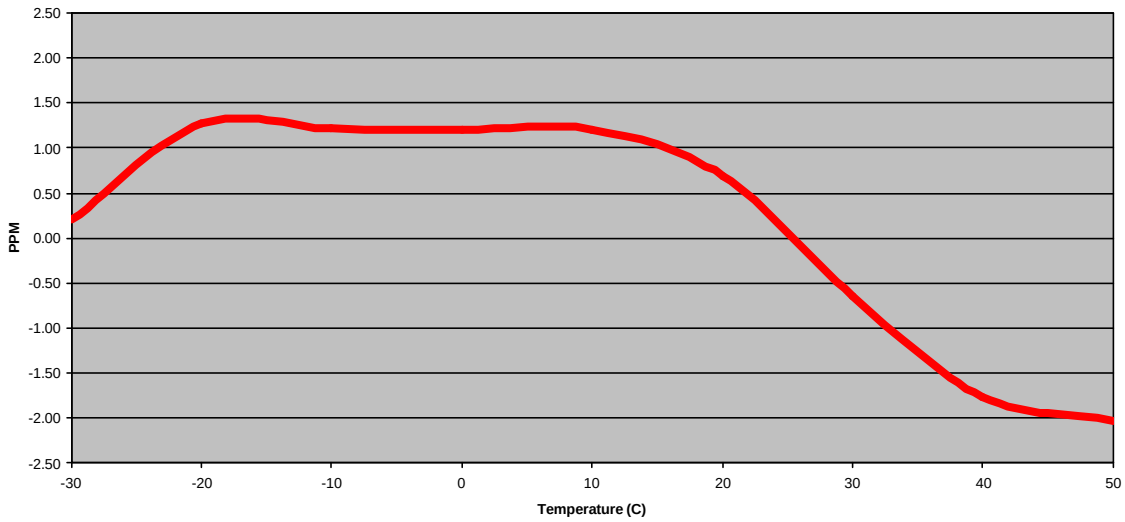
6.2.1 FREQUENCY STABILITY/TEMPERATUARE VARIATION

Limit is 2.5 ppm for device with a 12.5 kHz channel bandwidth
Limit is 5 ppm for device with a 25 kHz channel bandwidth

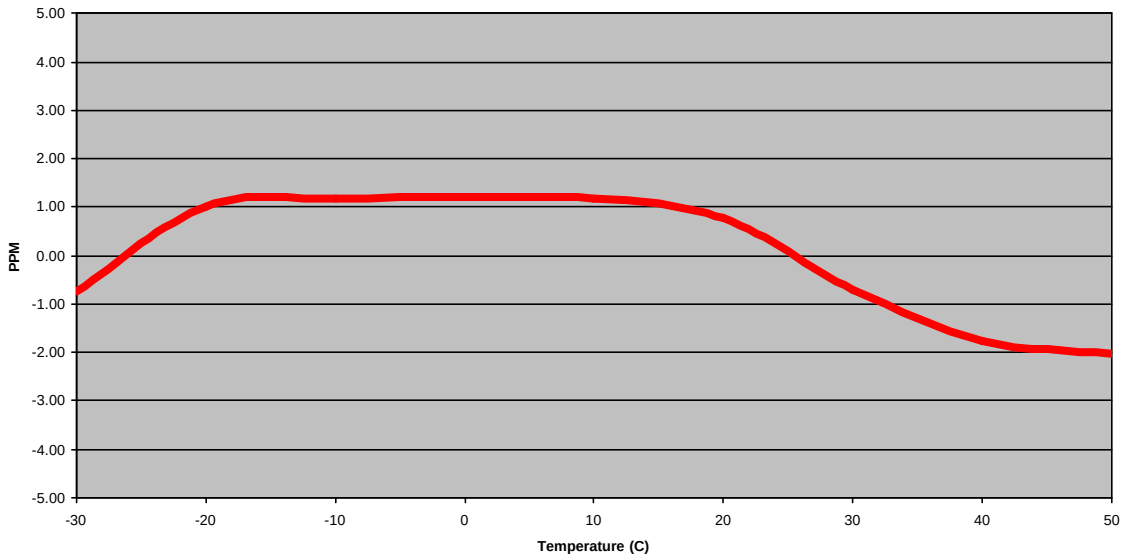
1 Watt, and 2 Watt radios were tested with 12.5kHz and 25 kHz channel bandwidth.
The worst-case temperature deviation is show below.

6.2.1.1 ASSIGNED FREQUENCY 464.55 MHZ (2 WATT)

Temperature Frequency Stability; 12.5 kHz channel spacing; 464.55 MHz; Proline 2

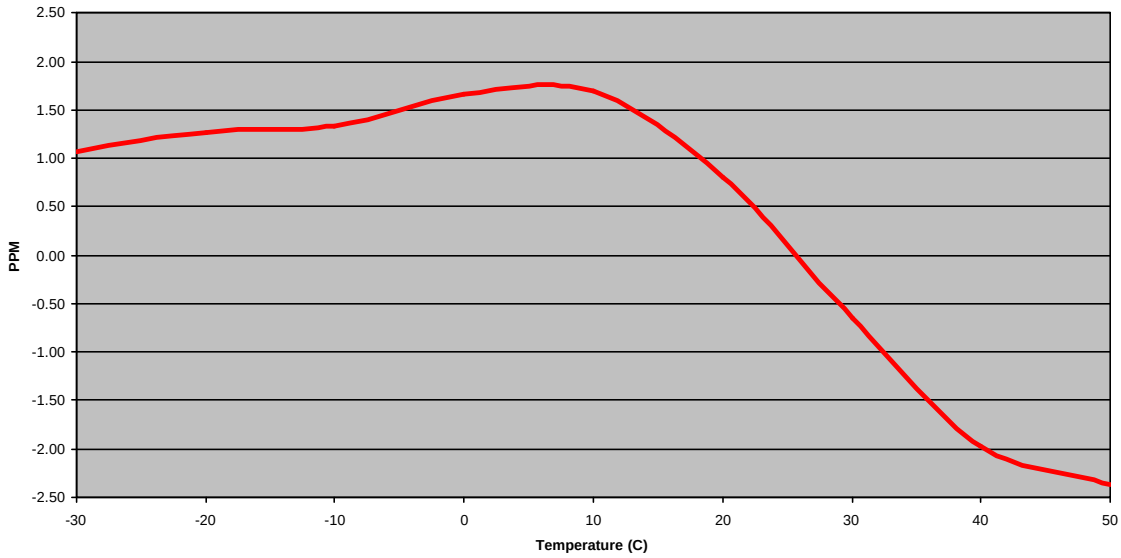


Temperature Frequency Stability; 25 kHz channel spacing; 464.55 MHz; Proline 2

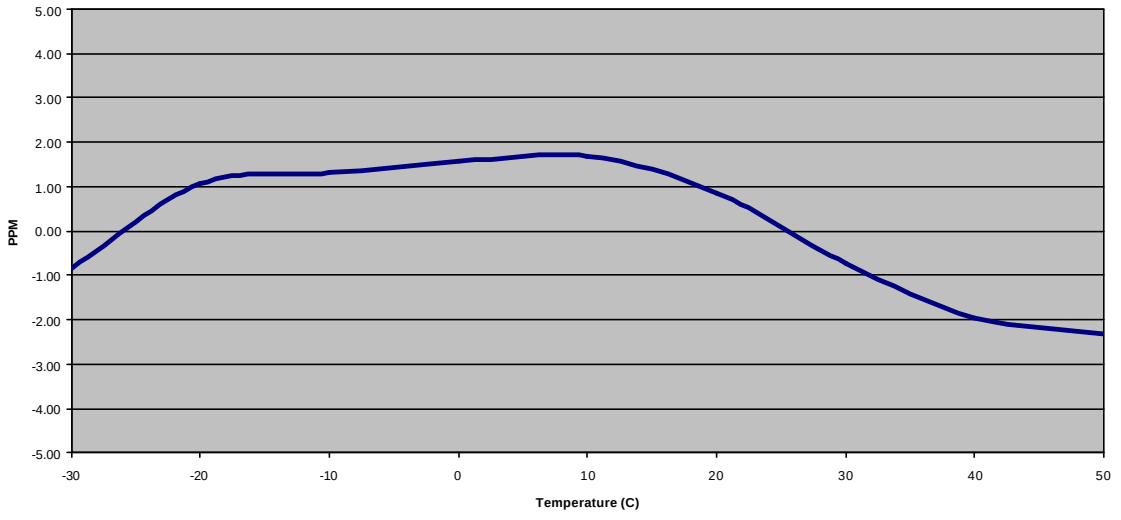


6.2.1.2 ASSIGNED FREQUENCY 464.55 MHZ (1 WATT)

Temperature Frequency Stability; 12.5 kHz channel spacing; 464.55 MHz; Proline 1

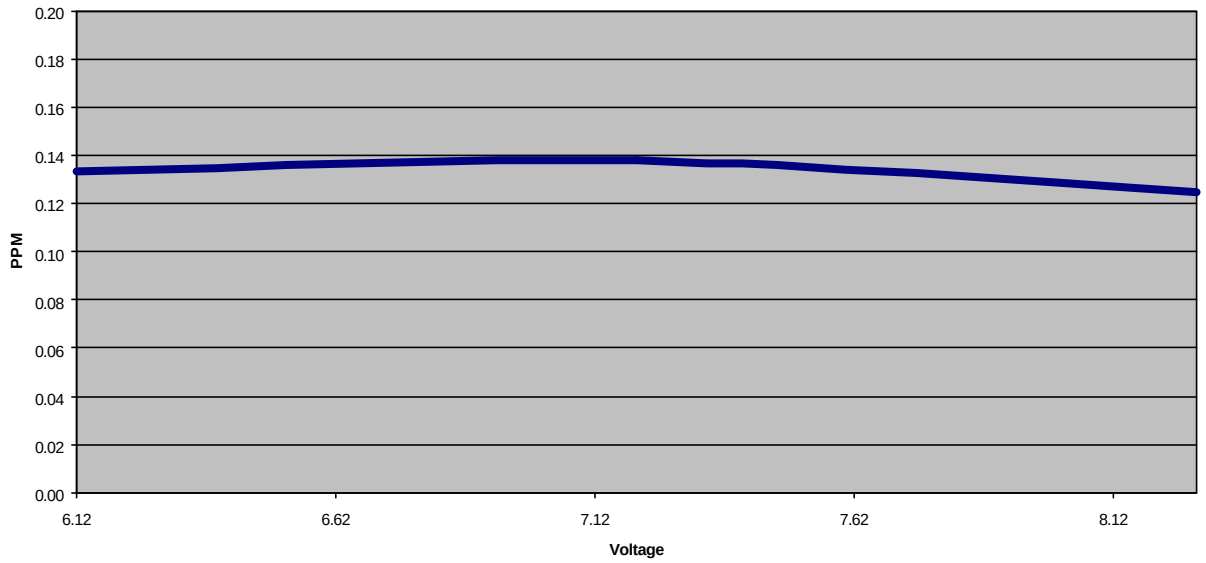


Temperature Frequency Stability; 25 kHz channel spacing; 464.55 MHz; Proline 1

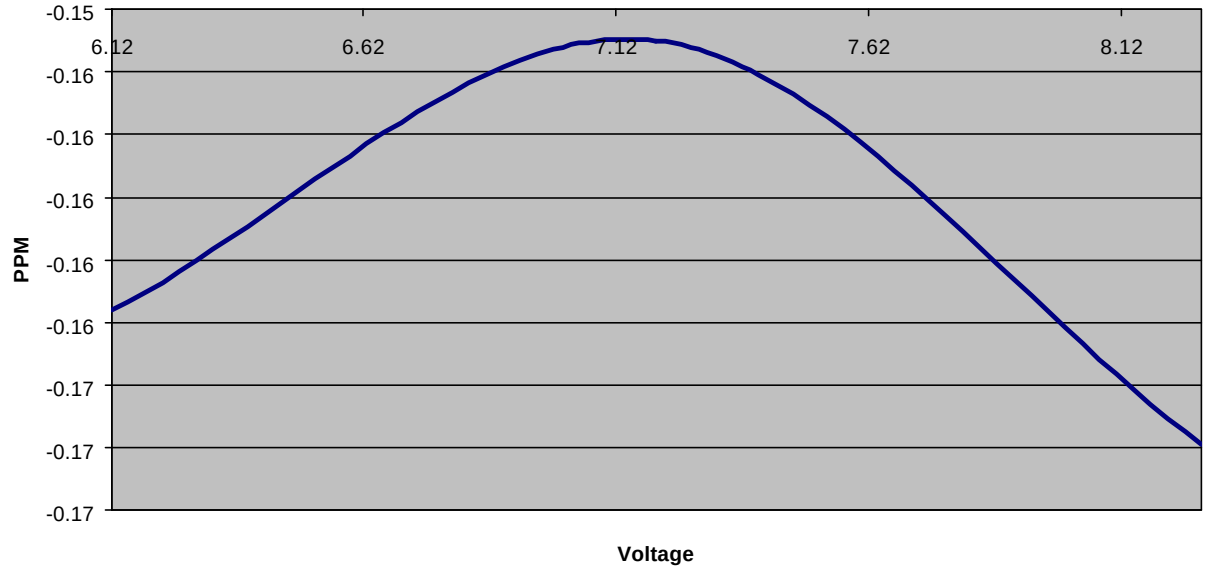


6.3 Frequency Stability/Voltage Variation

Voltage Frequency Stability; 12.5 kHz channel spacing; 7.2 Volts nominal voltage; Proline 2
(Voltage endpoint = 3.28 Volts)



Voltage Frequency Stability; 25 kHz channel spacing; 7.2 Volts nominal voltage; Proline 2
(Voltage endpoint = 3.84 Volts)



6.4 Test Equipment

Temperature Chamber Tenney TH65 s/n 11380

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

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

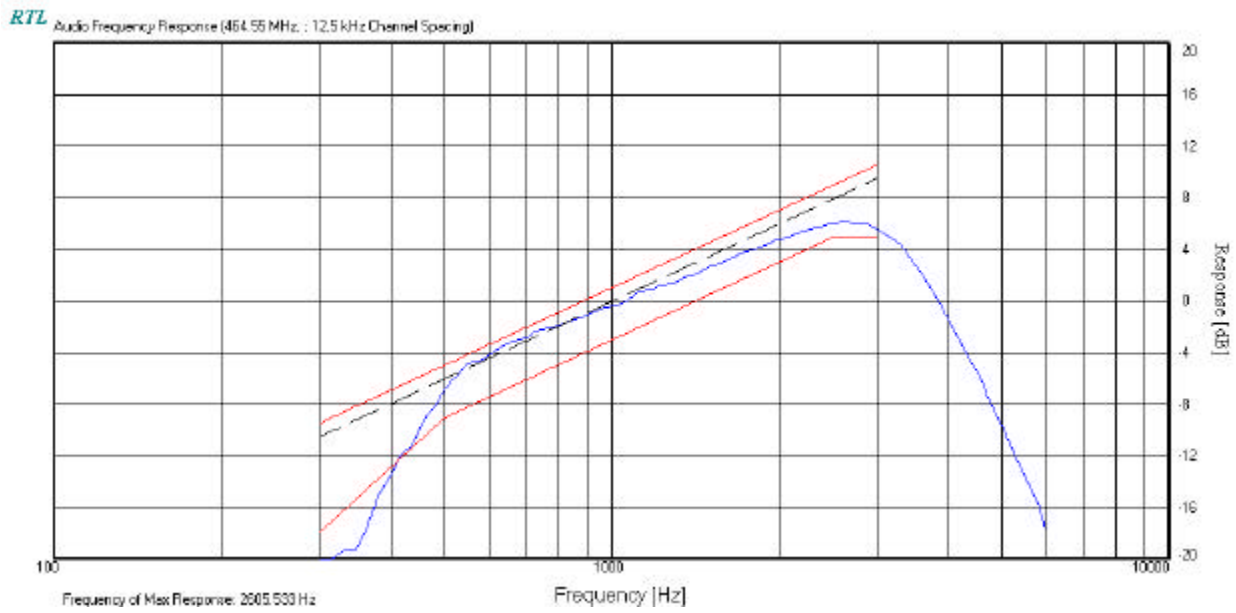
The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

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:

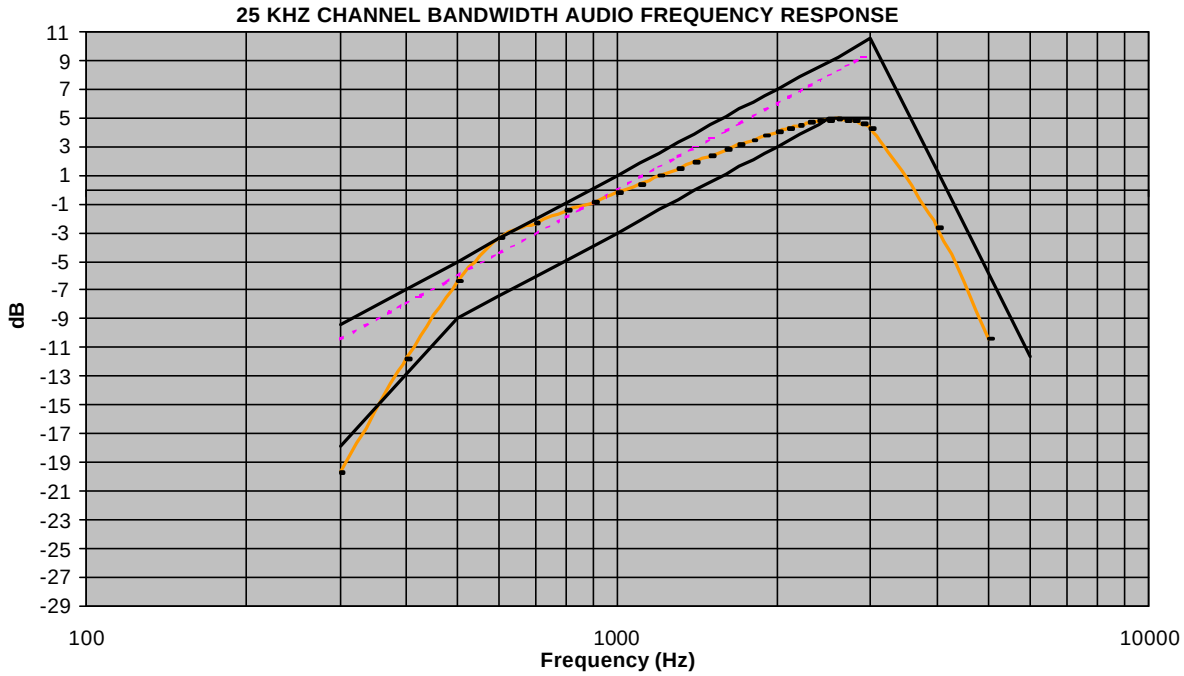
Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

7.2 Test Data

7.2.1 12.5 kHz CHANNEL BANDWIDTH AUDIO FREQUENCY RESPONSE



7.2.2 25 KHZ CHANNEL BANDWIDTH AUDIO FREQUENCY RESPONSE



7.3 Test Equipment

Audio generator	HP3336B	s/n 2127A00559
Modulation analyzer	HP8901B	s/n 2545A04102

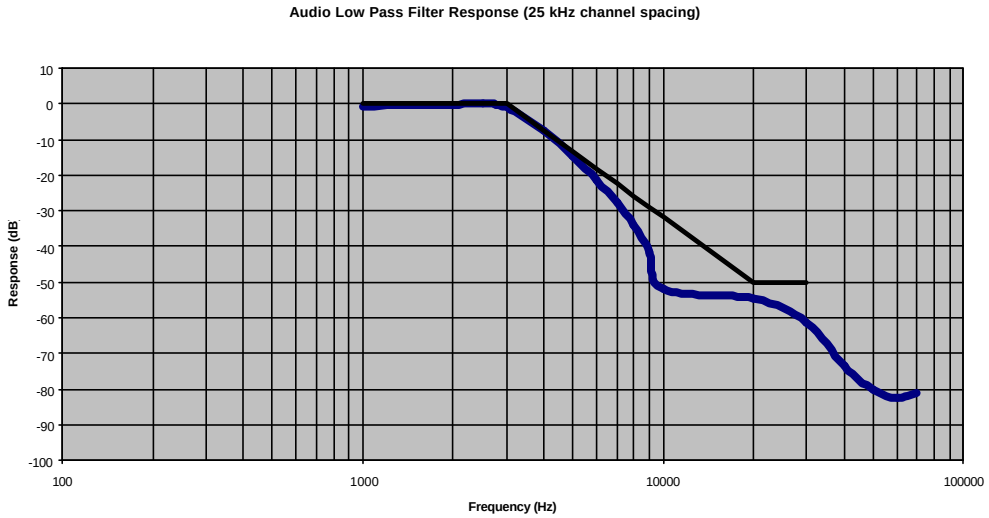
8 FCC Rules and Regulations Part 2 §2.1047 (a): Modulation Characteristics – AUDIO LOW PASS FILTER

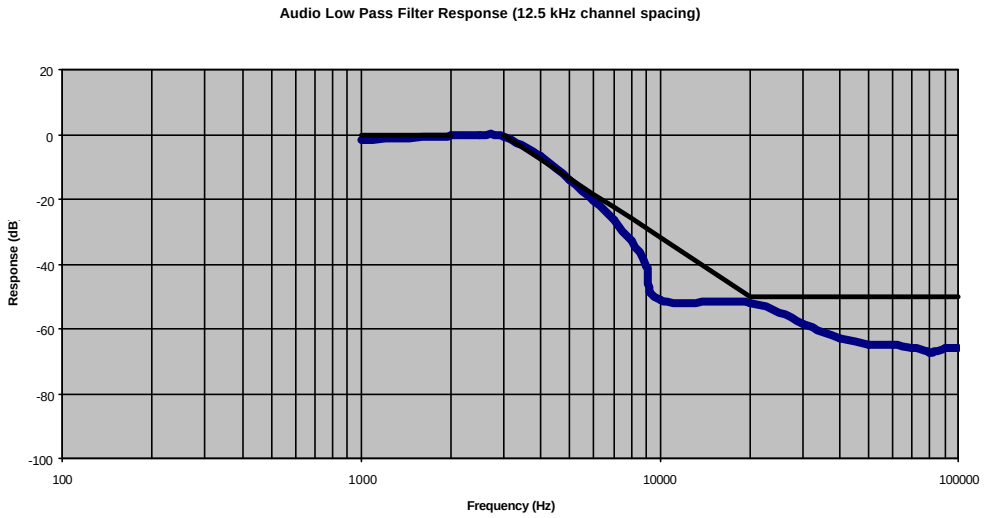
8.1 Test Procedure

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.

8.2 Test Data





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

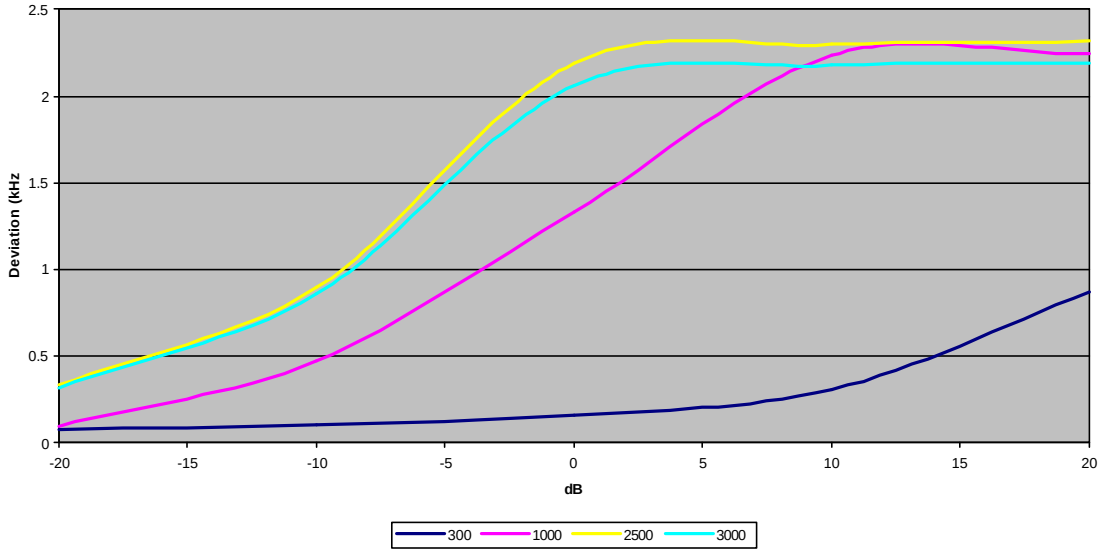
9 FCC Rules and Regulations Part 2 §2.1047 (b): Modulation Characteristics - MODULATION LIMITING

9.1 Test Procedure

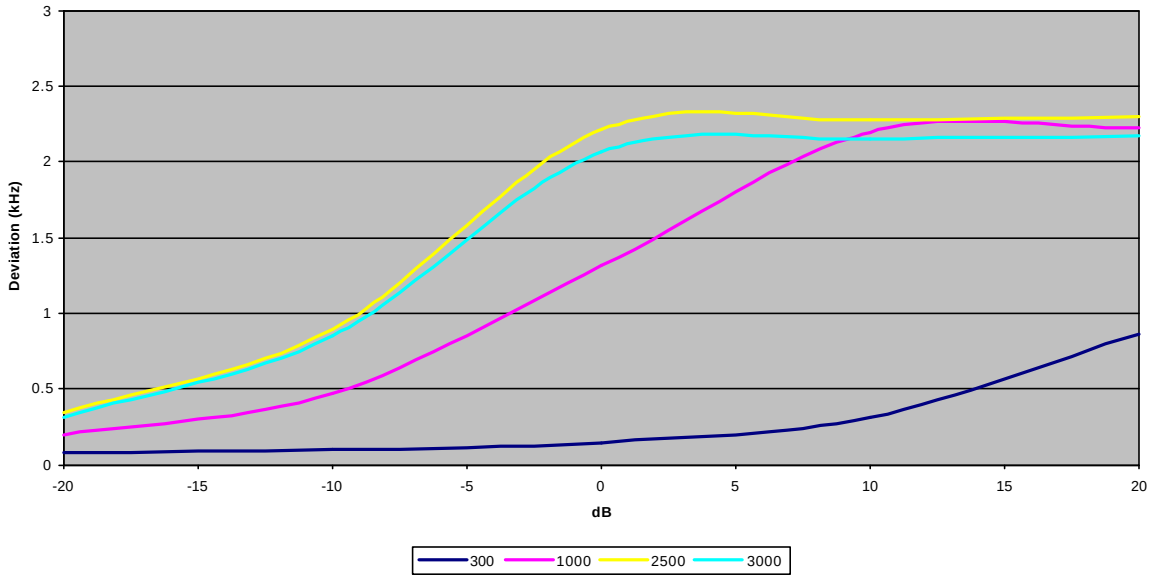
ANSI/TIA/EIA-603-1992, section 2.2.3

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. Test Data

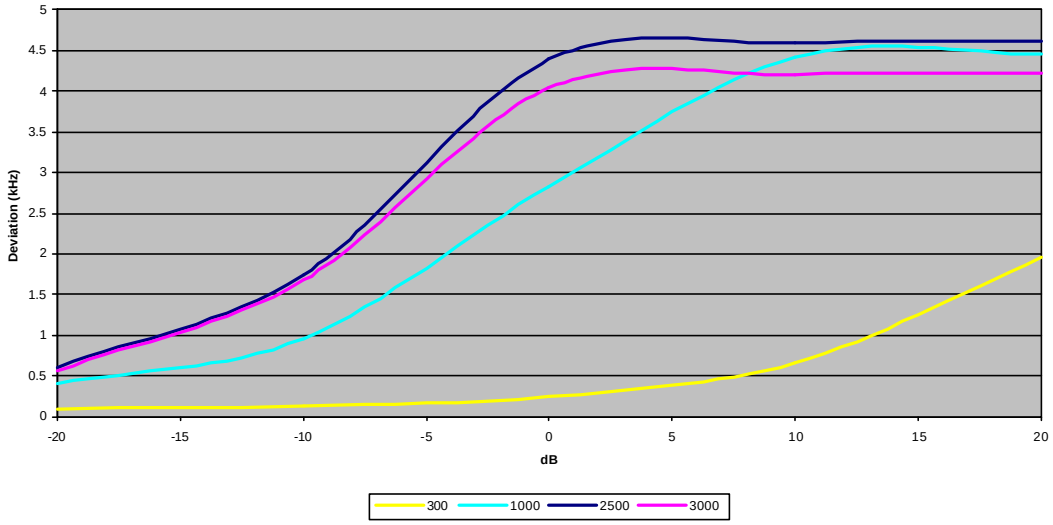
Modulation Limiting (464.55 MHz; 12.5 kHz channel spacing; Positive Peak)



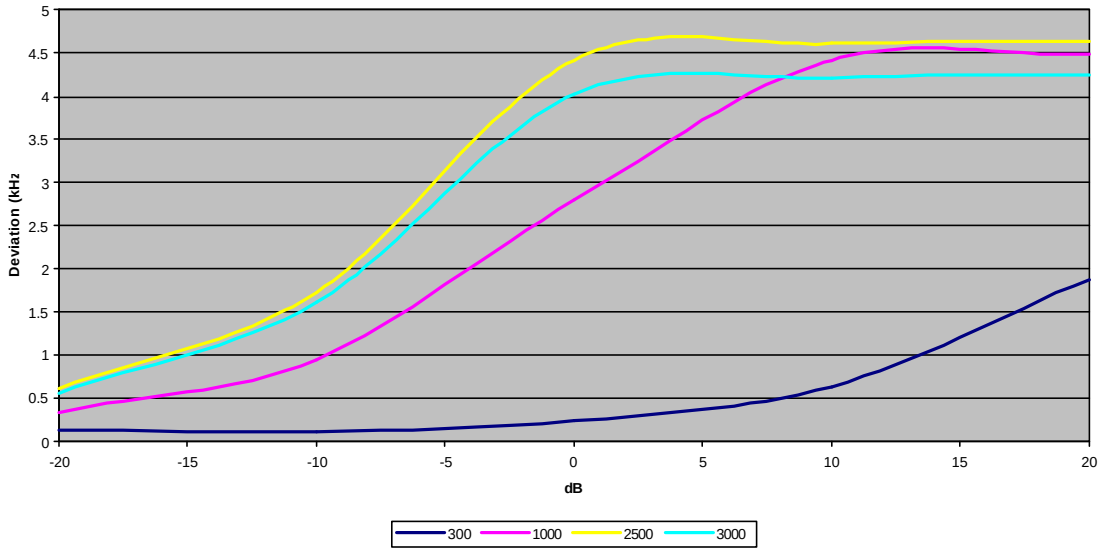
Modulation Limiting (464.55 MHz; 12.5 kHz channel spacing; Negative Peak)



Modulation Limiting (464.55 MHz; 25 kHz channel spacing; Positive Peak)



Modulation Limiting (464.55 MHz; 25 kHz channel spacing; Negative Peak)



9.2 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 Data

10.2.1 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.

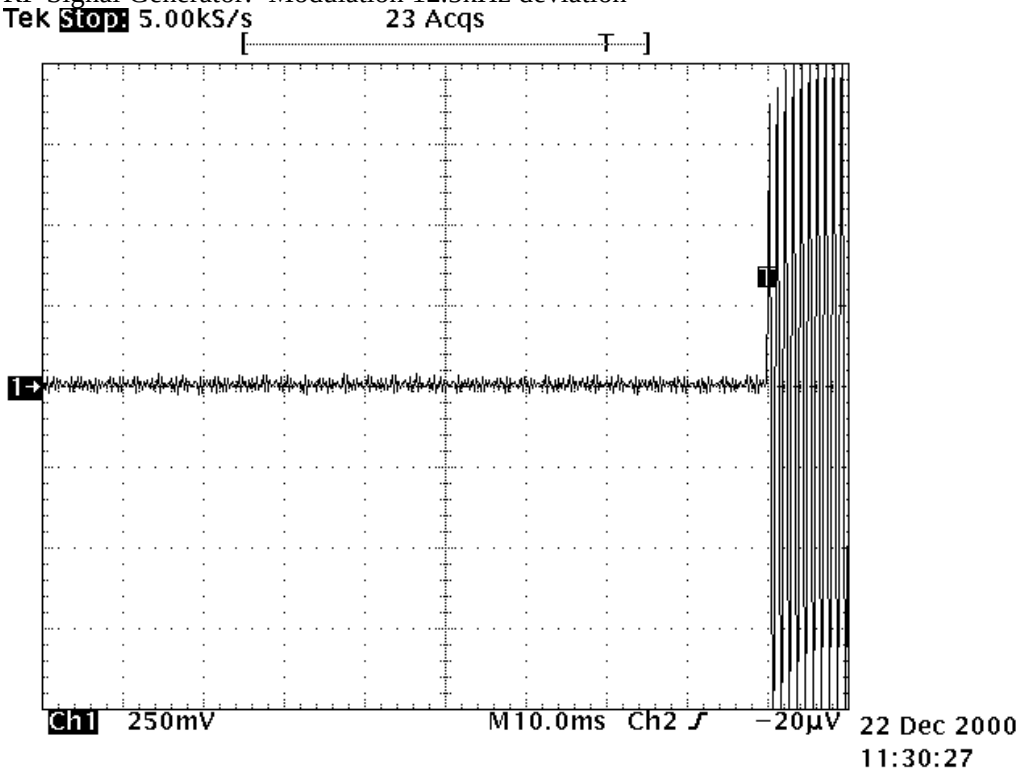
10.2.2 MAXIMUM FREQUENCY DIFFERENCE BETWEEN TIME T2 AND T3: CALCULATION:

The frequency stability is required to be 2.5ppm.
Calculation:
4 div. on scope represent 12.5kHz for narrow band channel.
Therefore, 464.55M times 2.5 ppm times +/- 4 Divisions divided by 12.5kHz equals about +/- 0.4 division. 0.4 Div. correspond to 1.161 kHz

10.2.3 CARRIER OFF TIME:

10.2.3.1 CHANNEL 1 : 464.55 MHZ NB(12.5KHZ) HIGH POWER: 2 W RATED

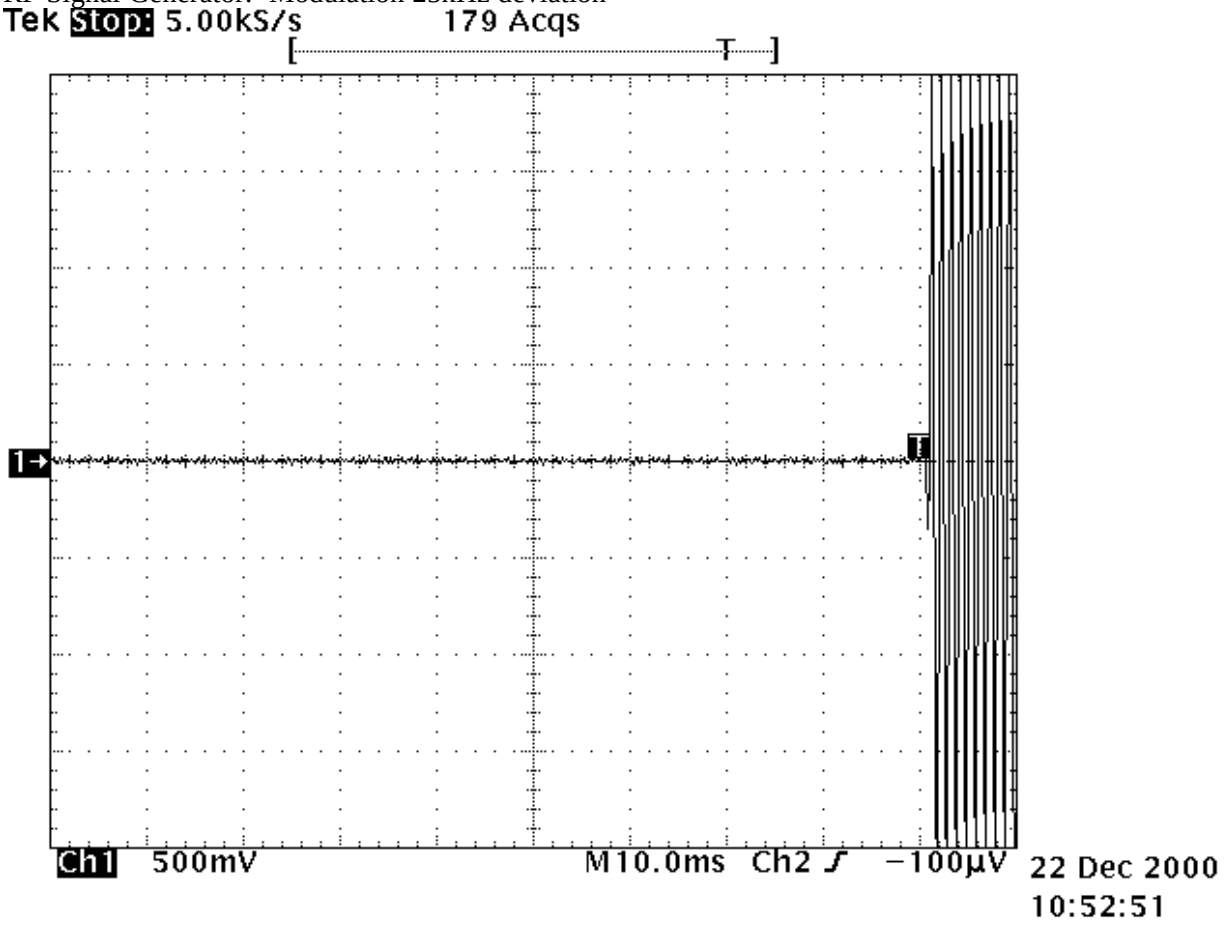
RF Signal Generator: Modulation 12.5kHz deviation



Timebase: 10 ms/div
Trigger: On positive edge of Ch2, level –20uV
Ch1: 250mV/div, Probe 1.000:1
Vertical scale: +/- 4 div. corresponds to +/- 12.5 kHz

10.2.3.2 CHANNEL 4 : 440.025 MHZ WB(25KHZ) HIGH POWER: 2 W RATED

RF Signal Generator: Modulation 25kHz deviation

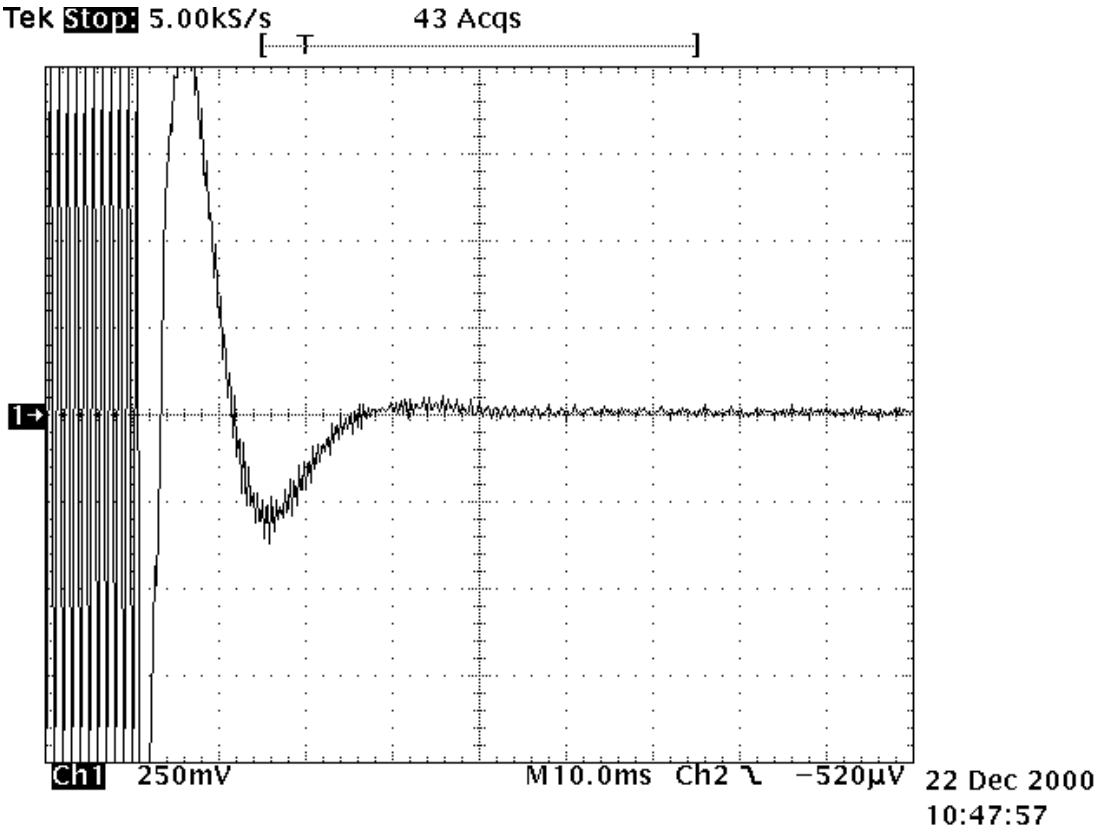


Timebase: 10 ms/div
Trigger: On positive edge of Ch2, level –100uV
Ch1: 500mV/div, Probe 1.000:1
Vertical scale: +/- 4 div. corresponds to +/- 25 kHz

10.2.4 CARRIER ON TIME:

10.2.4.1 CHANNEL 1 : 464.55 MHZ NB(12.5KHZ) HIGH POWER: 2 W RATED

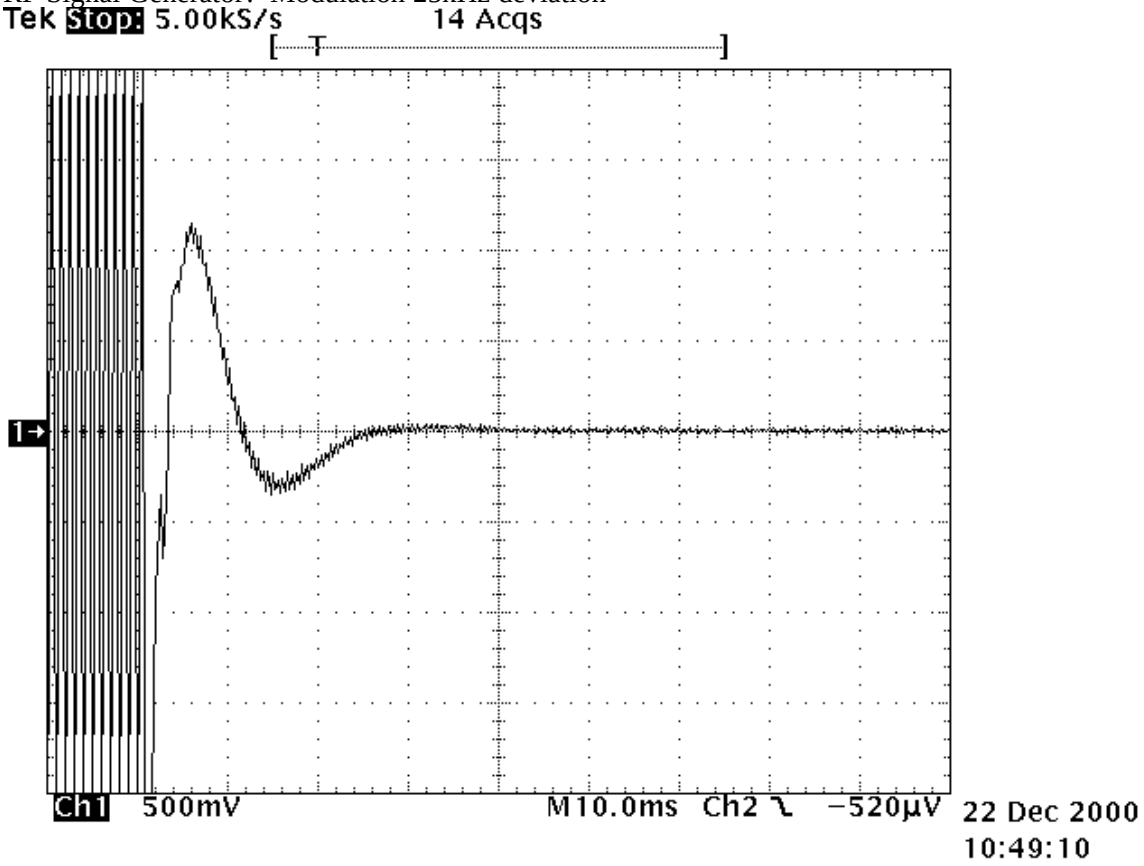
RF Signal Generator: Modulation 12.5kHz deviation



Timebase: 10 ms/div
Trigger: On negative edge of Ch2, level –520uV
Ch1: 250 mV/div, Probe 1.000:1
Vertical scale: +/- 4 div. corresponds to +/- 12.5 kHz

10.2.4.2 CHANNEL 1 : 464.55 MHZ WB (25KHZ) HIGH POWER: 2 W RATED

RF Signal Generator: Modulation 25kHz deviation



Timebase: 10 ms/div
Trigger: On negative edge of Ch2, level –520uV
Ch1: 500 mV/div, Probe 1.000:1
Vertical scale: +/- 4 div. corresponds to +/- 25 kHz

11 FCC Rules and Regulations Part 15 §15.107 (a): Conducted Emissions (Class B Limits)

NEUTRAL SIDE (Line 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)
0.450	Pk	43.0	-0.8	42.2	48.0	-5.8
0.543	Pk	41.3	-0.7	40.6	48.0	-7.4
0.847	Pk	31.1	-0.7	30.4	48.0	-17.6
1.290	Pk	34.6	-0.9	33.7	48.0	-14.3
1.609	Pk	28.1	-1.0	27.1	48.0	-20.9
2.050	Pk	20.8	-1.2	19.6	48.0	-28.4
16.350	Pk	17.8	-3.2	14.6	48.0	-33.4
29.140	Pk	17.7	-4.1	13.6	48.0	-34.4

HOT SIDE (Line 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)
0.458	Pk	43.9	-0.8	43.1	48.0	-4.9
0.552	Pk	37.4	-0.7	36.7	48.0	-11.3
0.757	Pk	34.5	-0.8	33.7	48.0	-14.3
1.051	Pk	33.2	-0.8	32.4	48.0	-15.6
1.216	Pk	31.0	-0.9	30.1	48.0	-17.9
1.631	Pk	23.4	-1.0	22.4	48.0	-25.6
2.400	Pk	18.6	-1.3	17.3	48.0	-30.7
10.440	Pk	15.8	-2.3	13.5	48.0	-34.5
24.800	Pk	17.8	-4.0	13.8	48.0	-34.2

12 FCC Rules and Regulations Part 15 §15.109 (a): Radiated Emissions (Class B Limits)

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)
32.000	Qp	V	350	1.0	15.8	-11.7	4.1	40	-35.9
44.000	Qp	V	90	1.0	31	-19.1	11.9	40	-28.1
48.000	Qp	V	0	1.0	29.4	-20.8	8.6	40	-31.4
260.000	Qp	V	350	1.0	20.4	-14.4	6	46	-40
442.857	Qp	V	0	1.0	32.1	-9.2	22.9	46	-23.1
885.701	Qp	V	350	1.0	48.4	-2.8	45.6	46	-0.4

13 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) : Bn = 11K0F3E
25kHz (WB channel): Bn = 16K0F3E

Calculation:
Max modulation(M) in kHz : 3
Max deviation (D) in kHz: 2.5 (NB) and 5 (BB)
Constant factor (K) : 1
Bn = 2xM+2xDK