10 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY; PART 90 §90.539: FREQUENCY STABILITY; RSS-119 §7: FREQUENCY STABILITY

10.1 Test Procedure

ANSI/TIA/EIA-603-2002, 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 +60°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-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 +/-15% nominal input voltage.

Limit for 800 band:

§90.213: Mobile stations over 2 W operating power - 1.5 ppm.

Limit for 700 band:

§90.539: Transmitters designed to operate in 764-776 MHz and 794-806 MHz frequency bands must meet the frequency stability requirements in this section.

(a) Mobile, portable and control transmitters must normally use automatic frequency control (AFC) to lock on to the base station signal.
(b) The frequency stability of base transmitters operating in the narrowband segment must be 100 parts per billion or better.
(c) The frequency stability of mobile, portable, and control transmitters operating in the narrowband segment must be 400 parts per billion or better when AFC is locked to the base station.

Note: When AFC is not locked to the base station, the frequency stability must be at least 1.0 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2 channel aggregate), and 2.5 ppm for 25 kHz (4 channel aggregate).

10.2 Test Data

10.2.1 Frequency Stability/Temperature Variation

PLOT 10-1: TEMPERATURE FREQUENCY STABILITY – 800 BAND

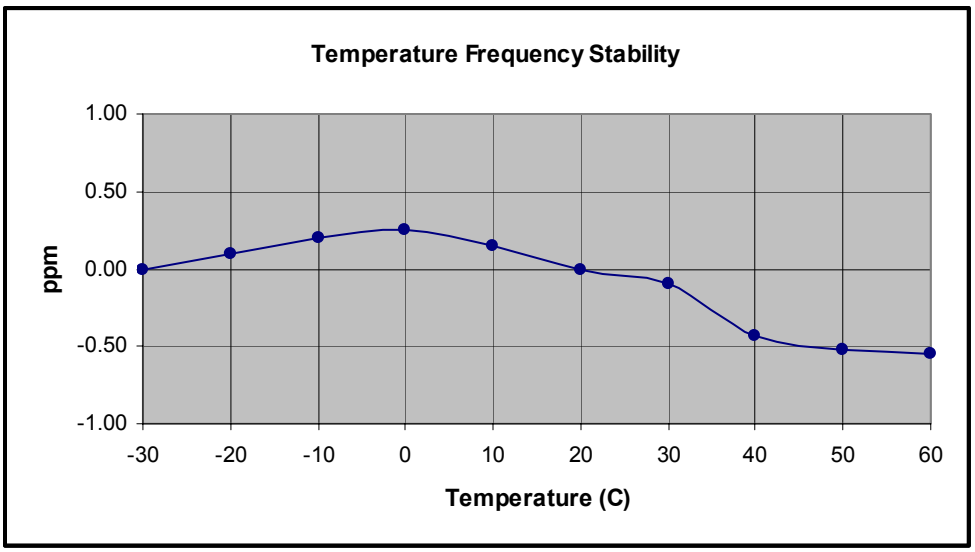


TABLE 10-1: TEMPERATURE FREQUENCY STABILITY – 806.0125 MHZ

Worst-case deviation was found to be -0.55 ppm

Temperature (C)	Measured Frequency (MHz)	ppm
-30	806.012295	0.00
-20	806.012369	0.09
-10	806.012458	0.20
0	806.012497	0.25
10	806.012412	0.15
20	806.012295	0.00
30	806.012215	-0.10
40	806.011946	-0.43
50	806.011872	-0.52
60	806.011851	-0.55

PLOT 10-2: TEMPERATURE FREQUENCY STABILITY – 700 BAND

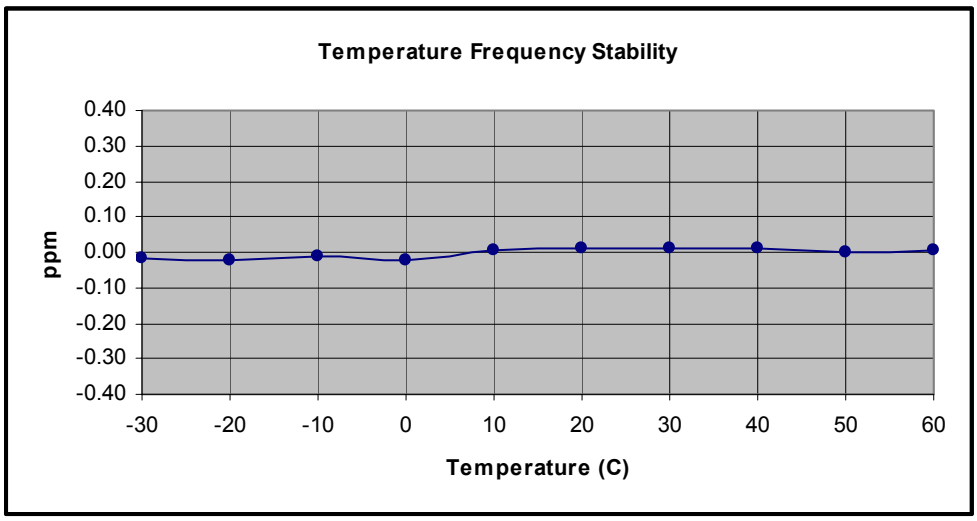


TABLE 10-2: TEMPERATURE FREQUENCY STABILITY – 794.0125 MHZ

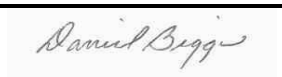
Worst-case deviation was found to be -.02 ppm

Temperature (C)	Measured Frequency (MHz)	ppm
-30	794.0119865	-0.02
-20	794.0119819	-0.02
-10	794.0119915	-0.01
0	794.0119828	-0.02
10	794.0120035	0.01
20	794.0120065	0.01
30	794.0120082	0.01
40	794.0120085	0.01
50	794.0120009	0.00
60	794.0120016	0.00

TABLE 10-3: TEST EQUIPMENT USED FOR TESTING FREQUENCY STABILITY/TEMPERATURE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	02/04/06
901300	Agilent	53131A	Frequency Counter	MY40001345	11/17/05

TEST PERSONNEL:

Daniel Biggs		August 24, 2005
Test Technician/Engineer	Signature	Date Of Test

10.2.2 Frequency Stability/Voltage Variation

PLOT 10-3: VOLTAGE FREQUENCY STABILITY – 800 BAND

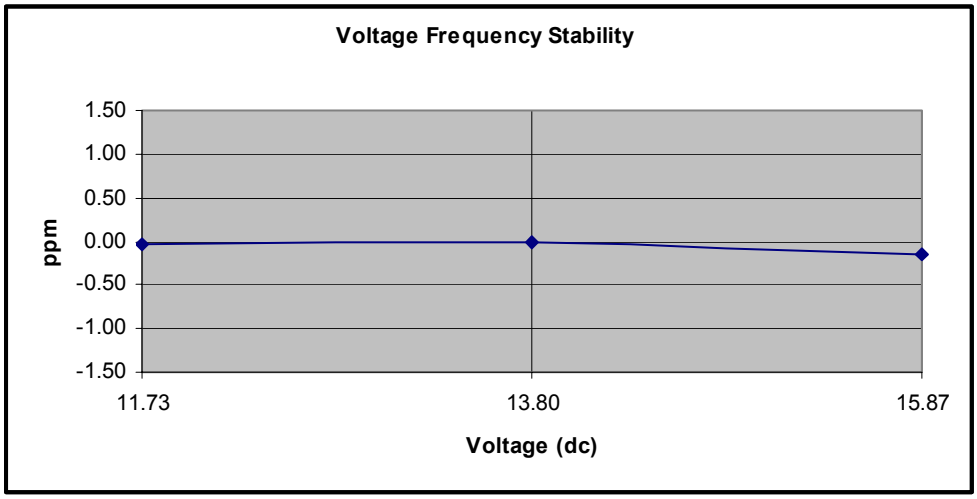


TABLE 10-4: FREQUENCY STABILITY/VOLTAGE VARIATION – 806.0125 MHZ

Worst-case variation is -.15 ppm

Voltage (VDC)	Measured Frequency (MHz)	ppm
11.73	806.011975	-0.04
13.80	806.012004	0.00
15.87	806.011884	-0.15

PLOT 10-4: VOLTAGE FREQUENCY STABILITY – 700 BAND

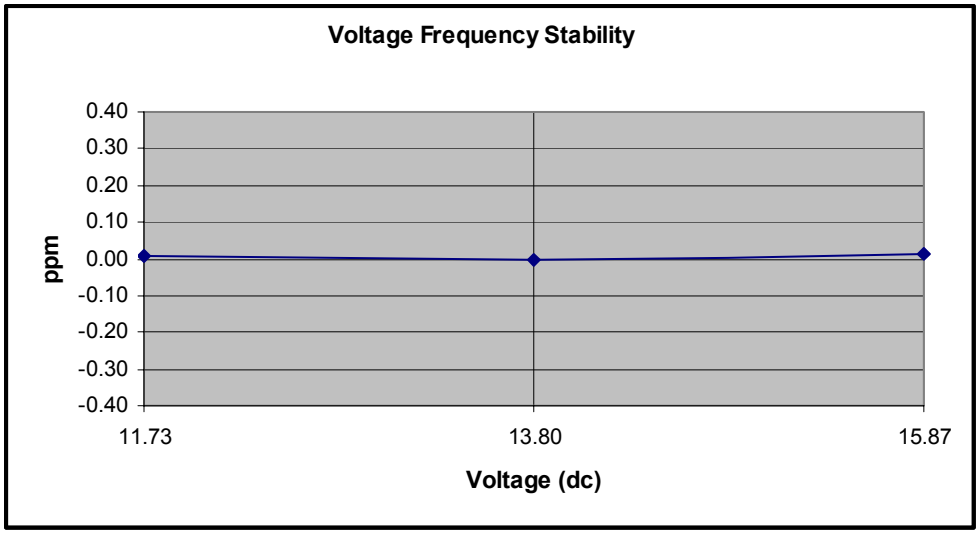


TABLE 10-5: FREQUENCY STABILITY/VOLTAGE VARIATION – 794.0125 MHZ

Worst-case variation is -.01 ppm

Voltage (VDC)	Measured Frequency (MHz)	ppm
11.73	794.0119865	0.01
13.80	794.0119819	0.00
15.87	794.0119915	0.01

TABLE 10-6: TEST EQUIPMENT USED FOR TESTING FREQUENCY STABILITY/VOLTAGE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901300	Agilent	53131A	Frequency Counter	MY40001345	11/17/05
901350	Meterman	33XR	Multimeter	040402802	08/03/06

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	August 25, 2005
Test Technician/Engineer	Signature	Date Of Test

11 FCC PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

11.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.6

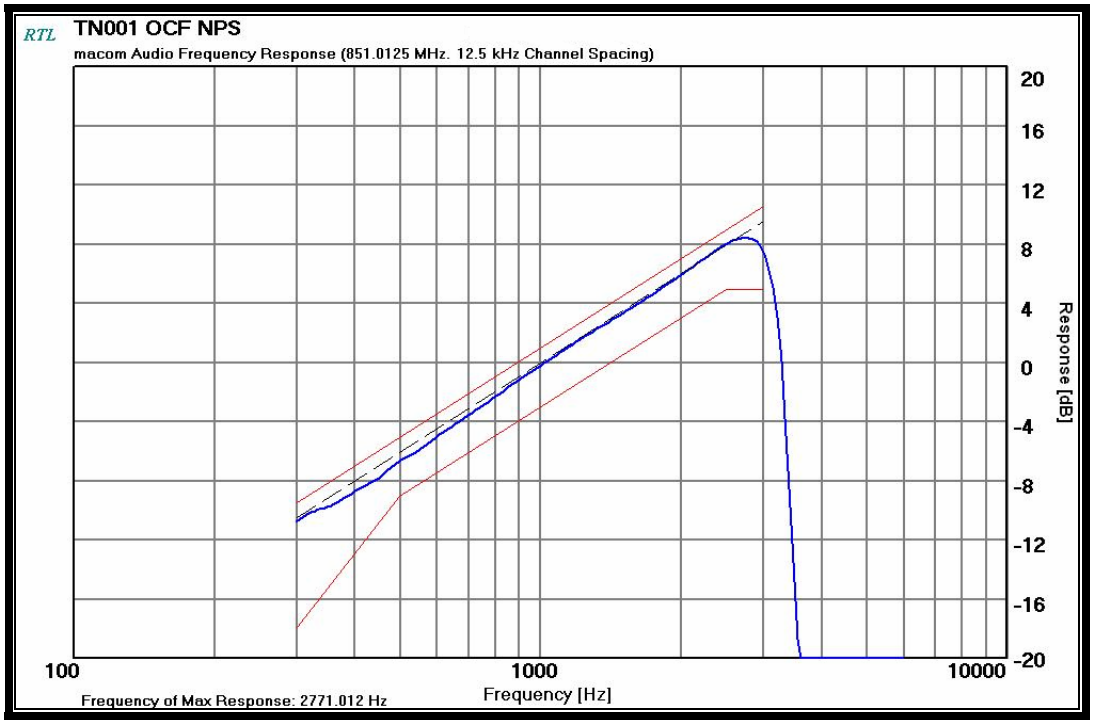
The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was 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 100 Hz to 5 kHz 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)

11.2 Test Data

PLOT 11-1: MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE – NPSPAC



PLOT 11-2: MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE – SMR

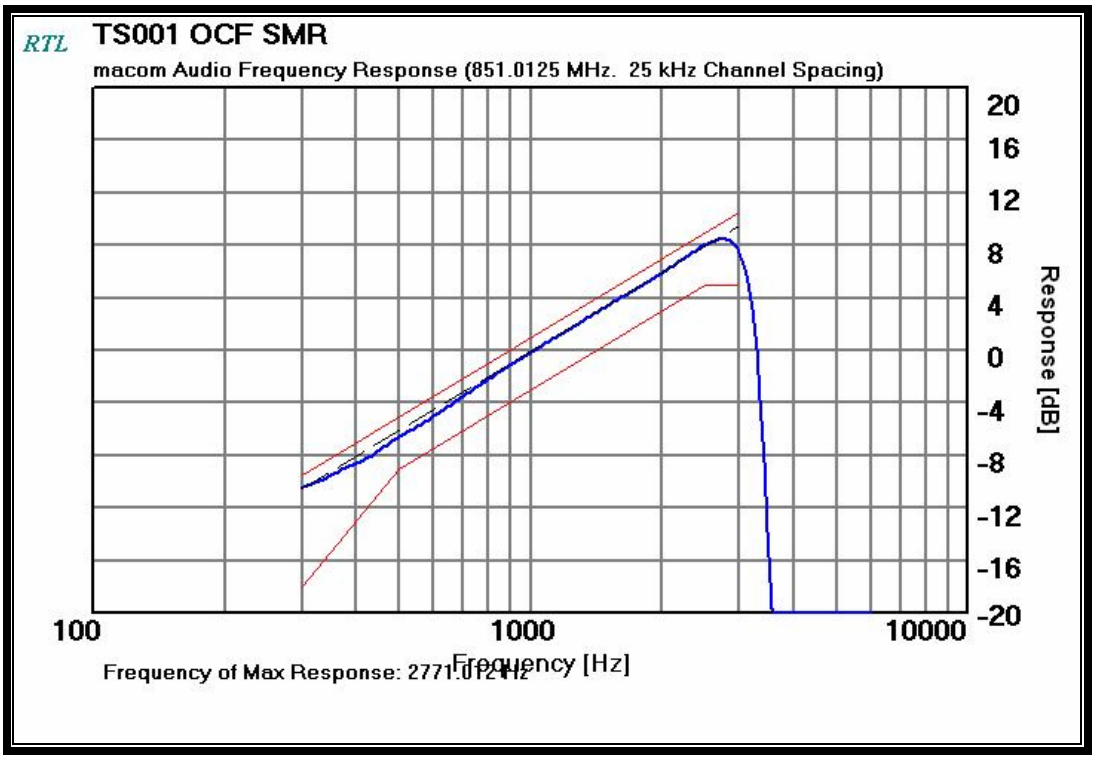


TABLE 11-1: TEST EQUIPMENT USED FOR TESTING AUDIO FREQUENCY RESPONSE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/13/06
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	August 8, 2005
Test Technician/Engineer	Signature	Date Of Test

12 FCC PART 2 §2.1047(A): MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER; RSS-119 §6.6: AUDIO LOW-PASS FILTER

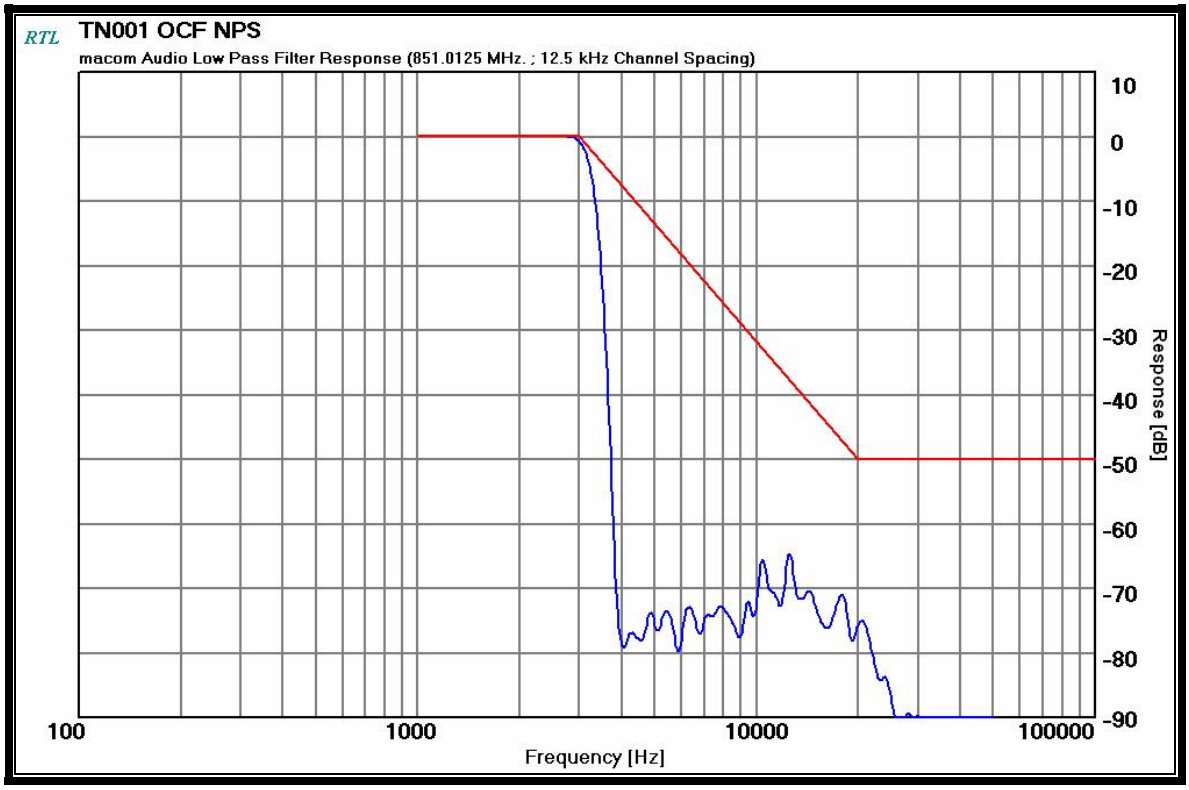
12.1 Test Procedure

ANSI/TIA/EIA-603-2002, 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

PLOT 12-1: MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER – NPSPAC



PLOT 12-2: MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER – SMR

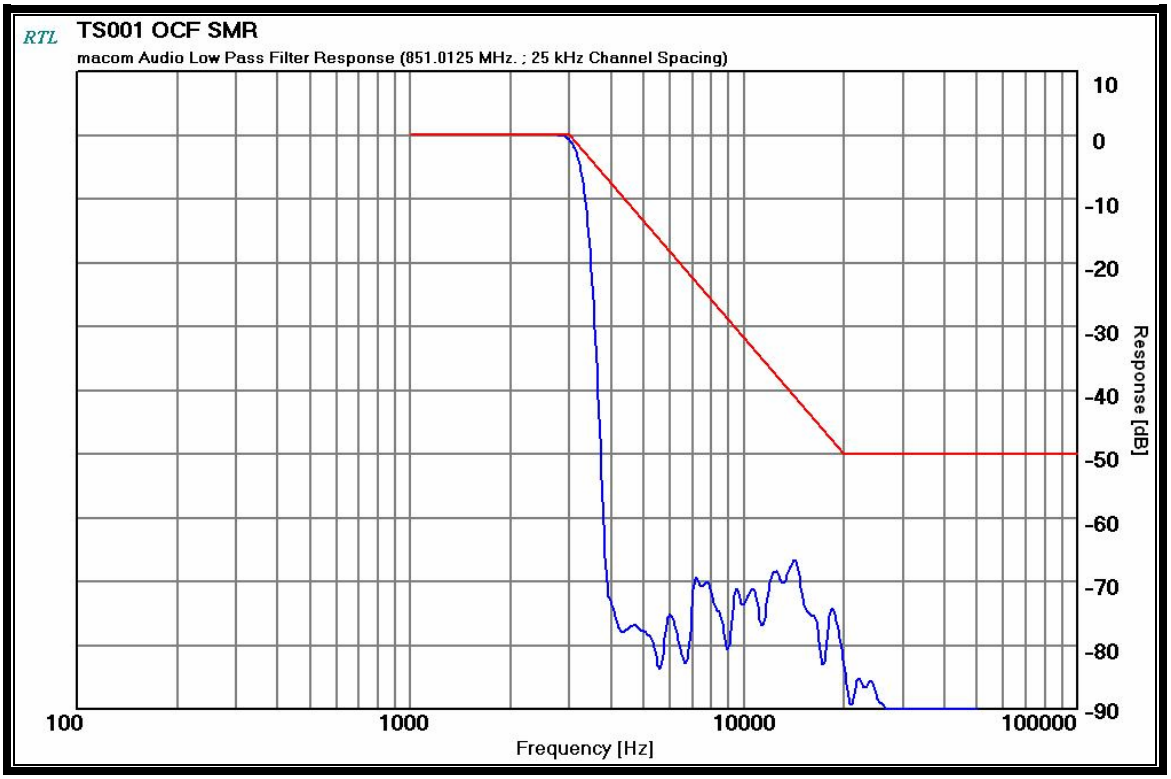


TABLE 12-1: TEST EQUIPMENT USED FOR TESTING AUDIO LOW PASS FILTER RESPONSE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/13/06
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	August 8, 2005
Test Technician/Engineer	Signature	Date Of Test

13 FCC RULES AND REGULATIONS PART 2 §2.1047(B): MODULATION CHARACTERISTICS - MODULATION LIMITING; RSS-119 §6.6: FM MODULATION LIMITING AND AUDIO LOW-PASS FILTER

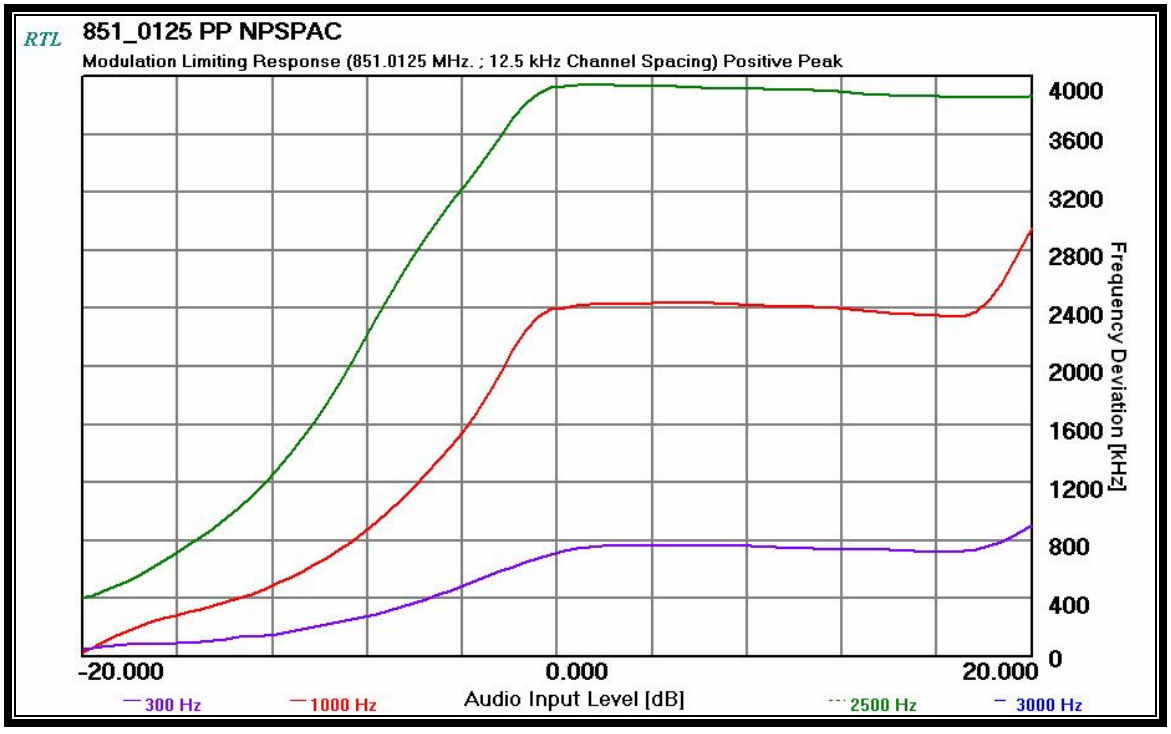
13.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.3

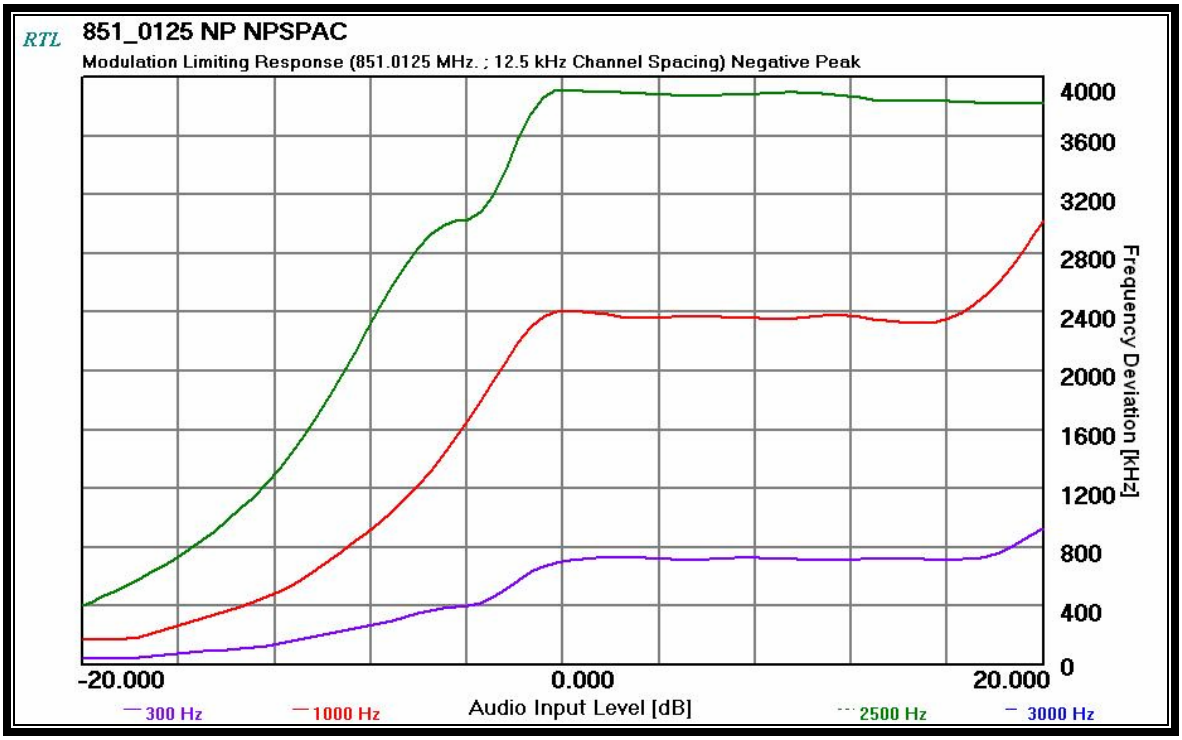
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

13.2 Test Data

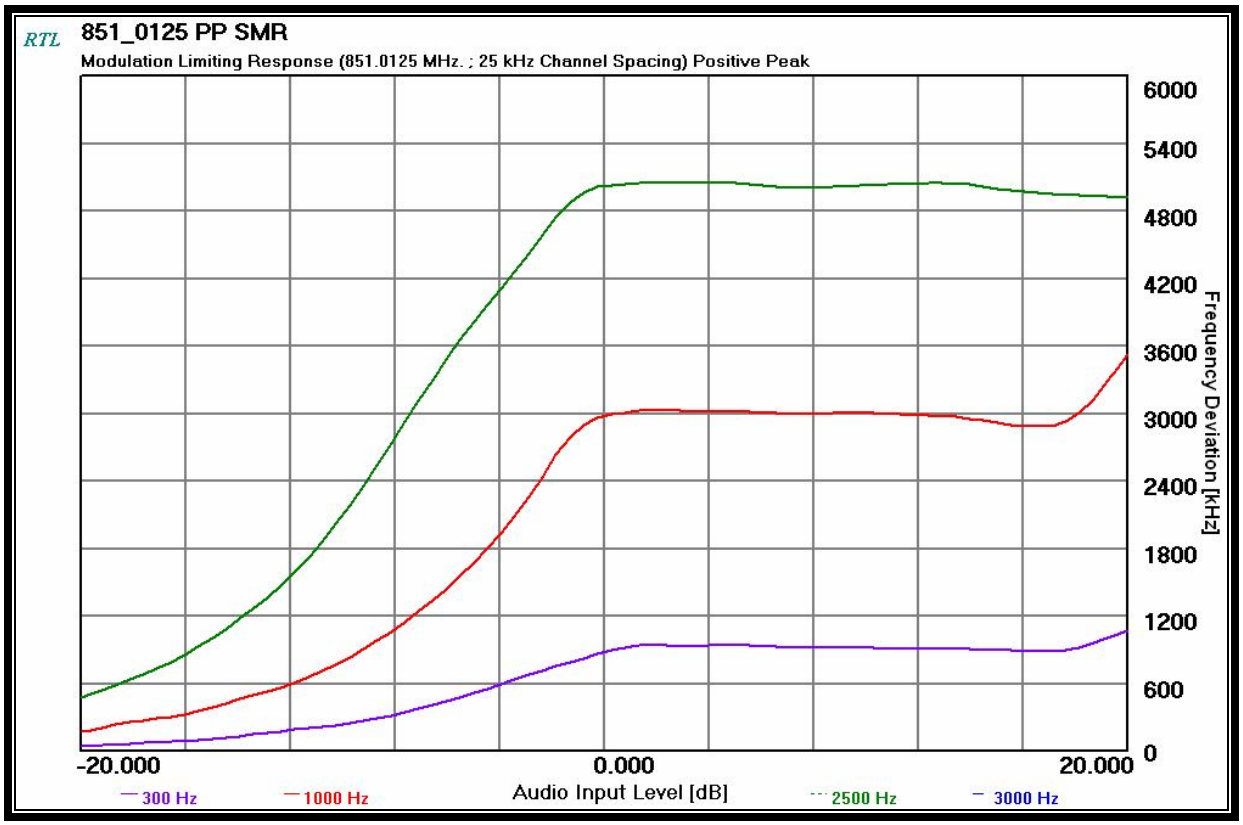
PLOT 13-1: MODULATION CHARACTERISTICS – MODULATION LIMITING: NPSPAC; POSITIVE PEAK



PLOT 13-2: MODULATION CHARACTERISTICS – MODULATION LIMITING: NPSPAC; NEGATIVE PEAK



PLOT 13-3: MODULATION CHARACTERISTICS – MODULATION LIMITING: SMR; POSITIVE PEAK



PLOT 13-4: MODULATION CHARACTERISTICS – MODULATION LIMITING: SMR; NEGATIVE PEAK

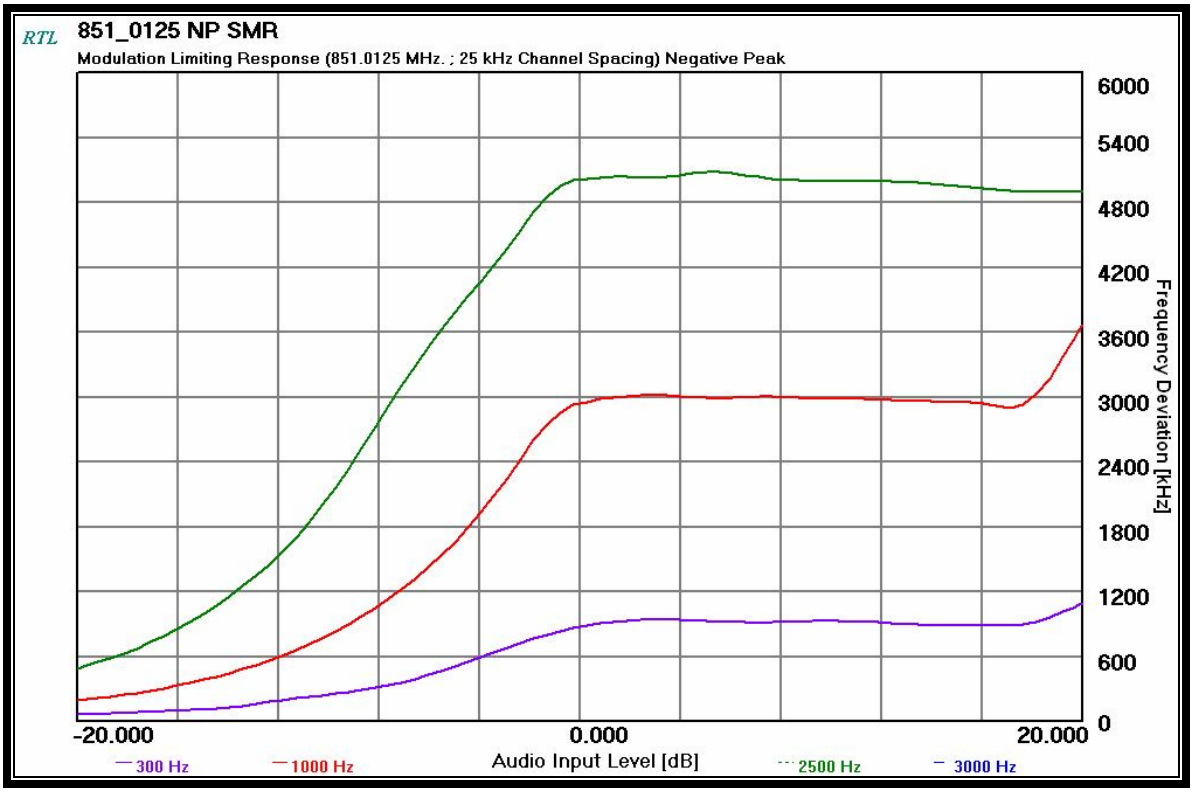


TABLE 13-1: TEST EQUIPMENT USED FOR TESTING MODULATION LIMITING

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/13/06
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	August 9, 2005
Test Technician/Engineer	Signature	Date Of Test

14 FCC RULES AND REGULATIONS PART 2 §2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Analog FM

764-767/773-776 MHz Talkaround; 794-797/803-806 MHz Trunked/Conventional
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 11.0 kHz
Emission designator: 11K0F3E

806-824 MHz Trunked/Conventional; 851-869 MHz Talkaround
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

806-824 MHz Trunked/Conventional; 851-869 MHz Talkaround on NPSPAC Channels
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 14K0F3E

OTP Modulation

794-797/803-806 MHz Trunked
Calculation:
Data rate in bps (R) = 19,200
Peak deviation of carrier (D) = 3,750 Hz
Number of state in each symbol (S) = 4
K = 0.334
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 12.1 kHz
Emission designator: 12K1F9W

806-809, 809-821, 821-824 MHz SMR/NPSPAC Trunked
Calculation:
Data rate in bps (R) = 19,200
Peak deviation of carrier (D) = 3750 Hz
Number of state in each symbol (S) = 4
K = 0.334
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 12.1 kHz
Emission designator: 12K1F9W

2-Level Voice/Data

806-809, 821-824 NPSPAC Trunked/Conventional; 851-854, 866-869 MHz NPSPAC Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 2,400 Hz
2D/R = 0.5
Bn = (3.86*D)+(0.027*R) = 11,856 kHz
Emission designator: 11K9F1D, 11K9F1E

806-809, 809-821, 821-824 SMR Trunked/Conventional; 851-854, 854-866, 866-869 MHz SMR Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 3,000 Hz
2D/R = 0.625
Bn = (3.86*D)+(0.027*R) = 14,172 kHz
Emission designator: 14K2F1D, 14K2F1E

P25 Voice/Data

764-767/773-776 Talkaround; 794-797/803-806 MHz Trunked/Conventional
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = $[R/\log_2(4) + 2(D)(1)]$ = 8,400 kHz
Emission designator: 8K4F1D, 8K4F1E

806-824, 851-869 MHz Trunked or Conventional, Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = $[R/\log_2(4) + 2(D)(1)]$ = 8,400 kHz
Emission designator: 8K4F1D, 8K4F1E

15 CONCLUSION

The data in this measurement report shows that the **M/A-COM, Inc**. Model **M7200 Series Mobile Radio; FCC ID: BV8M7200,** complies with all the requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 6, 2000.