

MOTOROLA INC.

FCC Part 90 Test Report
for
Motorola Inc.
on the
UHF Band 2 Two-Way Radio
Model: AAH38SDC9AA3AN

FCC ID: AZ489FT4845

Date of Report: April 9, 2001

Report Prepared by:	Miguel Paz	
Reviewer:	Mike Ramnath	

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1 JOB DESCRIPTION

1.1 Client Information

The EUT has been tested at the request of

Company: Motorola Inc.
8000 West Sunrise Boulevard
Fort Lauderdale, Florida 33323

Name of contact: Mike Ramnath
Telephone: (954) 723-5793
Fax: (954) 723-5143

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1.2 Equipment under test (EUT)

Equipment type: UHF Band 2 Two-Way Radio

FCC ID: AZ489FT4845

Model number(s): AAH38SDC9AA3AN

Serial number:

Manufacturer: Motorola Inc.

Use of Product: Voice communications

Production is planned: ☒ Yes, ☐ No

Technical Specifications:

Type of Emission	11K0F3E, 16K0F3E
Max. Allowed modulation (M)	3.0 kHz
Max. Allowed deviation (D)	5 kHz, 2.5 kHz
Range of RF Output	1 W – 4 W
Means for variation of operating power	None
The dc voltage applied to and current into the several elements of the final RF amplifying device	<i>Voltage:</i> 7.5 Vdc <i>Current:</i> 1680 mA
Frequency Range	450 to 520 MHz
Max. number of Channels	16
Antenna	Whip, Helical
Detachable antenna ?	Yes
External input	Audio

EUT received condition: Good condition prototype

Test start date: 4/9/01

Test end date: 4/30/01

1.3 Test plan reference

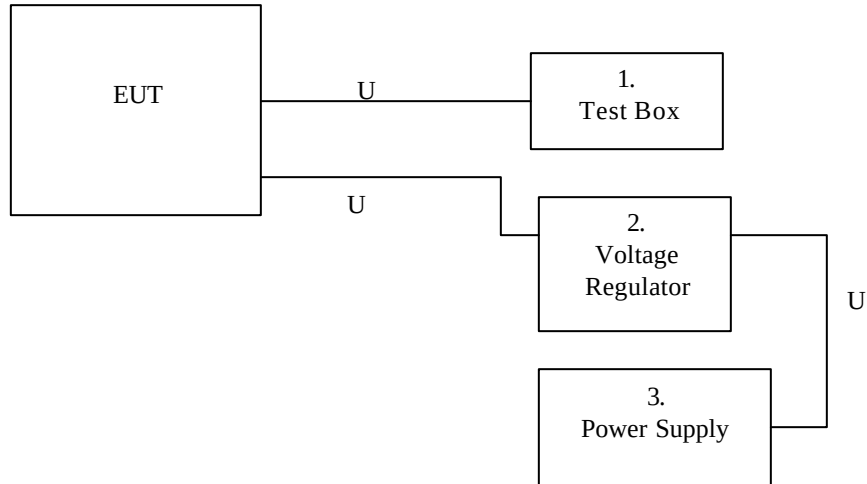
FCC Part 2.1033, FCC Part 90

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1.4 System test configuration

1.4.1 System block diagram & Support equipment

The diagram shown below details the placement of the equipment under test on the turntable. Please note that the equipment on the rear of the table was centered along the back edge. Equipment on the front of the turntable was centered along the front edge. All peripherals were separated by 10 cm.



S: Shielded	U: Unshielded	F: With Ferrite Core
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Support equipment					
Equip. #	Equipment	Manufacturer	Model #	S/N #	FCC ID
1	Test Box	Motorola Inc.	RLN4460B	Not labeled	N/A
2	Voltage Regulator	Motorola Inc.	RLN4510A	Not labeled	N/A
3.	DC Power Supply	Topward	TPS 4302	925281	N/A

1.4.2 Justification

The system was configured for testing in a typical manner in accordance with ANSI C63.4 and TIA/EIA 603-1: 1998 standards.

1.4.3 Mode(s) of operation

The EUT was powered and fully operational with option test box (speaker/microphone) connected. The unit was powered from a fully charged lithium iron battery or the external dc power supply.

1.5 Modifications required for compliance

No modifications were implemented by the Motorola Engineering during compliance testing.

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2 TEST SUMMARY

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
Transmitter Section			
2.1046 90.205	RF Power Output	1.1 W, 4.6 W	9
2.1047 90.205	Modulation Characteristics F3E analogy voice Peak frequency deviation Audio frequency response Audio Low Pass Filter Response Modulation Limiting	5 kHz, 2.5 kHz Complies Complies Complies	12
2.1049 90.210	Occupied Bandwidth	11 kHz, 16kHz	23
2.1051 90.210	Transmitter Conducted Spurious Emission	< -75dBc	36
2.1053 90.210	Transmitter Radiated Spurious Emission	< -36dBc	45
2.1055 90.213	Frequency Stability Vs. Temperature Vs. Voltage	3.41 ppm 1.33 ppm	50
90.214	Transient Frequency Behavior		51

3 RF POWER OUTPUT

3.1 Test Description

Parameter:	FCC § 2.1046
Requirement:	FCC § 90.205
Power Output (Conducted):	1.10 Watts (minimum) to 6.68 Watts (maximum)

3.2 Test Procedure

The transmitter is operated under normal conditions at the specified nominal DC input voltage. The antenna output is terminated in 50 ohms. The DC supply path to the final stage only is interrupted to allow insertion of the DC ammeter in series with the DC supply. The DC voltage drop of the ammeter is negligible. A DC voltmeter is computed as the product of the DC current (in amps) times the DC voltage (in volts). This measurement is performed at the upper and lower limits of the frequency range. At each frequency, the measurement is performed at the upper and lower limits of the specified adjustable power range.

3.3 Test Results

The supply voltage to the transmitter was set to 7.5 volts DC. The RF output power was measured with the indicated voltage and current applied into the final RF amplifying device.

RF Power Output 4.7 W, Frequency 450.025 MHz

Measured RF Output Power:	4.5 WATTS
Measured DC Voltage:	7.4256 VOLTS
Measured DC Current:	1.251 AMP
Measured DC Input Power:	9.2894 WATTS

RF Power Output 4.7 W, Frequency 481.050 MHz

Measured RF Output Power:	4.6 WATTS
Measured DC Voltage:	7.4241 VOLTS
Measured DC Current:	1.265 AMP
Measured DC Input Power:	9.3915 WATTS

RF Power Output 4.7 W, Frequency 511.975 MHz

Measured RF Output Power:	4.3 WATTS
Measured DC Voltage:	7.4142 VOLTS
Measured DC Current:	1.405 AMP
Measured DC Input Power:	10.4170 WATTS

RF Power Output 1.45 W, Frequency 450.025 MHz

Measured RF Output Power:	1.3 WATTS
Measured DC Voltage:	7.4528 VOLTS
Measured DC Current:	0.808 AMP
Measured DC Input Power:	6.0219 WATTS

RF Power Output 1.45W, Frequency 481.050 MHz

Measured RF Output Power:	1.3 WATTS
Measured DC Voltage:	7.4549 VOLTS
Measured DC Current:	0.795 AMP
Measured DC Input Power:	5.9266 WATTS

RF Power Output 1.45 W, Frequency 511.975 MHz.

Measured RF Output Power:	1.3 WATTS
Measured DC Voltage:	7.4472 VOLTS
Measured DC Current:	0.719 AMP
Measured DC Input Power:	5.3545 WATTS

3.4 Modifications made during testing

None

3.5 Test Instrumentation

- ☒ Hewlett-Packard 437B Power Meter
- ☒ Hewlett-Packard 34401A Digital Multimeter
- ☒ Hewlett-Packard 6622A System DC Power Supply

4 MODULATION CHARACTERISTICS

4.1 Test Description

Parameter:	FCC § 2.1047
Requirement:	FCC § 90.205

4.2 Test Procedure

4.2.1 Audio Frequency Response

The RF output of the transceiver was connected to the input of a modulation analyzer through sufficient attenuation so as not to overload the analyzer or distort the readings. An audio signal generator was coupled into the external microphone jack of the transceiver, which is located on the Motorola Test Box.

The audio signal input level was adjusted to obtain 20% of the maximum rated system deviation at 1 kHz, and recorded as DEV_{REF} . With the audio signal generator level unchanged, the generator frequency between is swept from 100 Hz to 100 kHz. The transmitter deviations (DEV_{FREQ}) were measured and the audio frequency response was calculated as

$$20 \log_{10} \frac{DEV_{FREQ}}{DEV_{REF}}$$

4.2.2 Audio Low-Pass Filter Response

An audio signal generator and an audio spectrum analyzer were connected to the input and output of the post limiter low pass filter respectively. The audio input frequency was set to 1000 Hz and the input level set to 20 dB greater than that required to produce standard test modulation. This input level was recorded as LEV_{FREQ} and held constant throughout this test. The audio signal generator frequency was swept between 1000 Hz and the upper low pass filter limit. The audio frequency response at test frequency was calculated as

$$LEV_{FREQ} - LEV_{REF}$$

4.2.3 Modulation Limiting

An audio oscillator is connected to the microphone audio input. The transmitter output is monitored with a modulation analyzer. The oscillator is adjusted, at 1 kHz, to obtain 60% of full system deviation. The oscillator level is then varied over a range of +/- 25 dB and the resulting deviation is plotted. This measurement is repeated at 300 Hz and 3 kHz.

4.3 Test Results

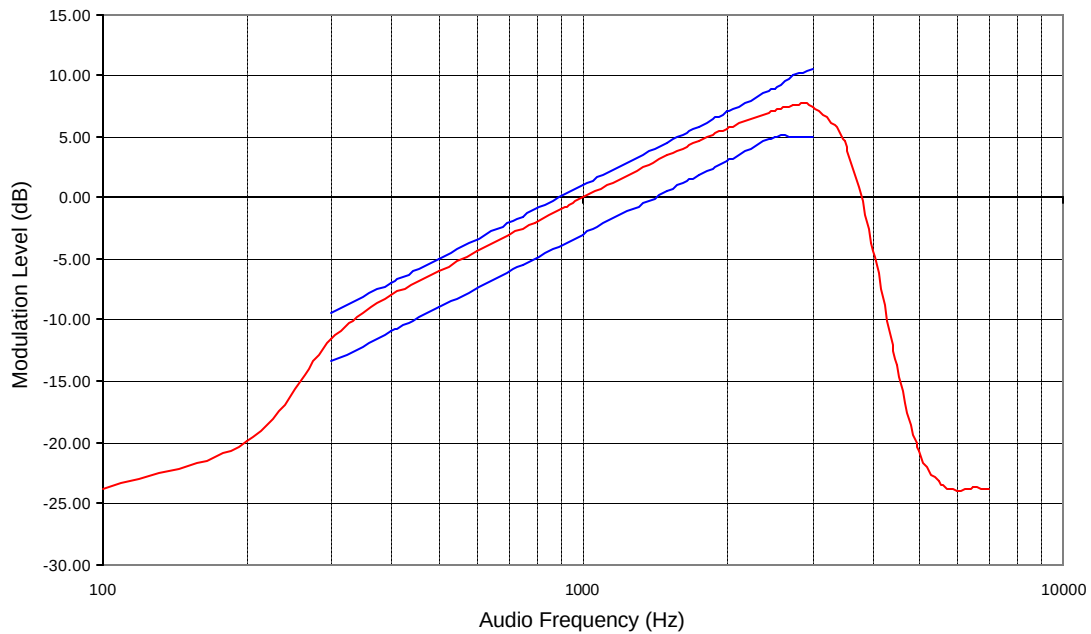
Audio Frequency Response:

Test Condition	
Frequency (MHz)	Mid Channel

Manufacturer: Motorola
 Model: PMUE1701A, UHF Band 2
 FCC ID:
 Frequency: 481.050 MHz
 Channel Spacing: 12.5 kHz

Transmitter Audio Response Characteristic Modulation Level vs. Audio Frequency

Data Taken by: EK Chong
 Approved by:
 Date: 4/17/2001



4.3 Test Results (Continued)

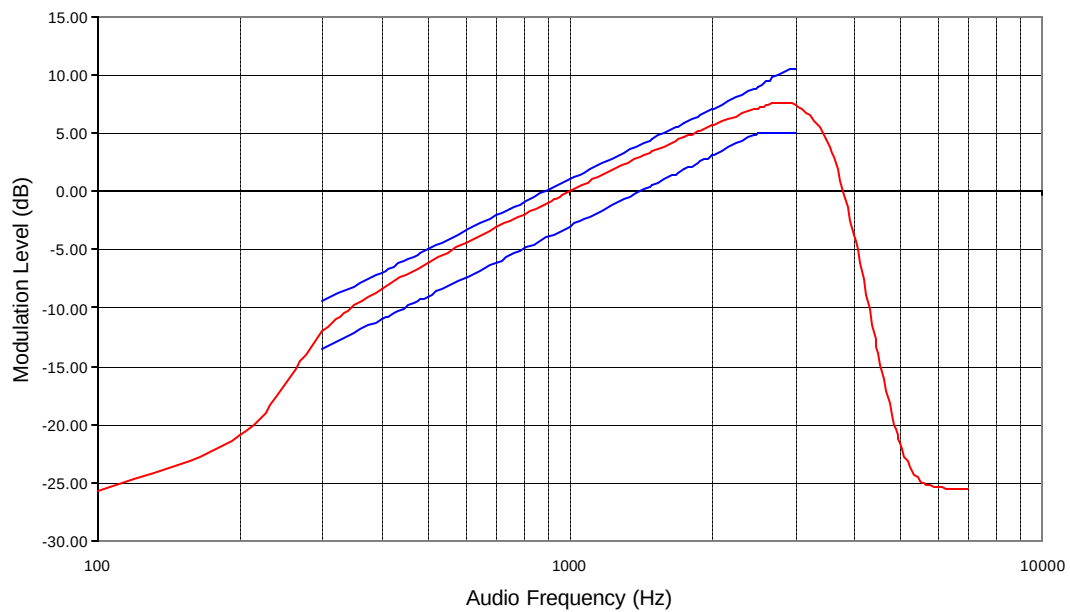
Audio Frequency Response:

Test Condition	
Frequency (MHz)	Mid Channel

Manufacturer: Motorola
 Model: PMUE1701A, UHF Band 2
 FCC ID:
 Frequency: 481.050 MHz
 Channel Spacing: 25 kHz

Transmitter Audio Response Characteristic Modulation Level vs. Audio Frequency

Data Taken by: EK Chong
 Approved by:
 Date: 4/17/2001



4.3 Test Results (Continued)

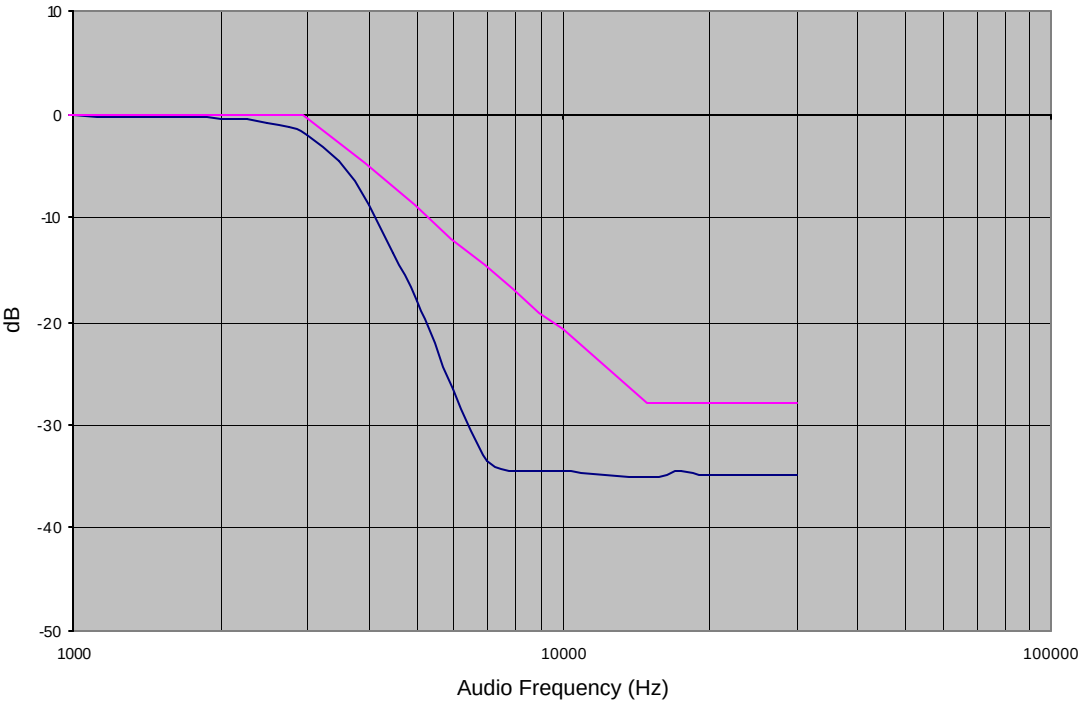
Audio Low-Pass Filter Response:

Test Condition	
Frequency (MHz)	Mid Channel

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 12.5 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Audio Low Pass Filter Response



4.3 Test Results (Continued)

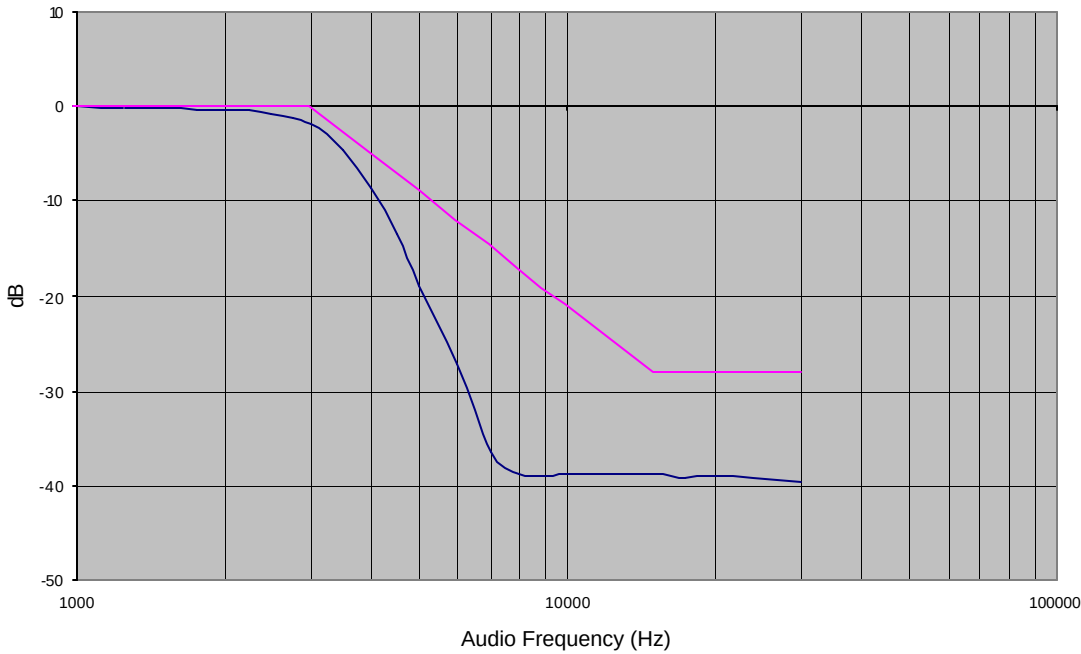
Audio Low-Pass Filter Response:

Test Condition	
Frequency (MHz)	Mid Channel

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 25 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Audio Low Pass Filter Response



4.3 Test Results (Continued)

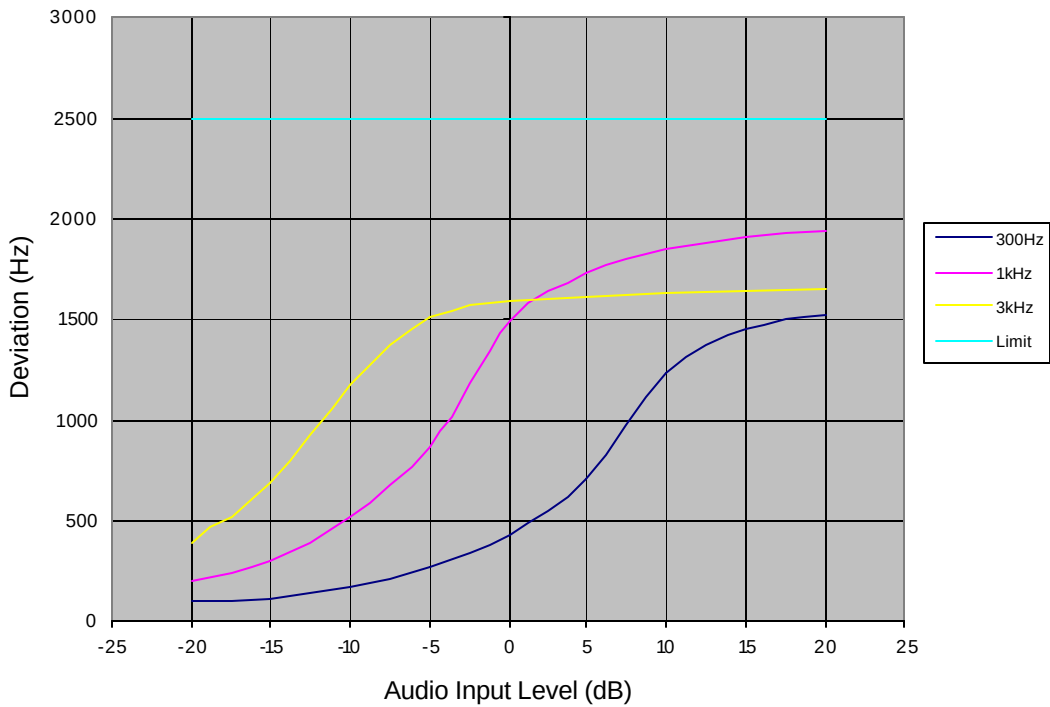
Modulation Limiting:
Carrier Squelch

Test Condition	
Frequency (MHz)	Mid Channel
Reference Deviation	1.5 kHz

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 12.5 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Modulation Limiting
Deviation vs. Audio Input Level



4.3 Test Results (Continued)

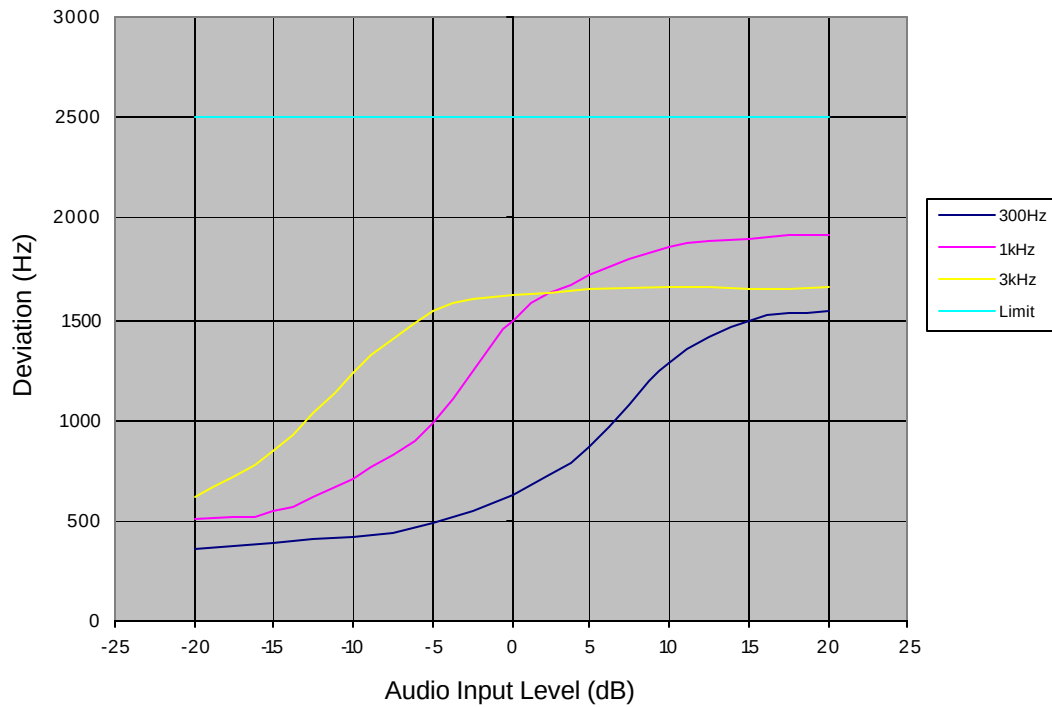
Modulation Limiting: Tone with 'PL'

Test Condition	
Frequency (MHz)	Mid Channel
Reference Deviation	1.5 kHz

Manufacturer: Motorola
 Model: PMUE1701A, UHF Band 2
 FCC ID:
 Frequency: 481.050 MHz
 Channel Spacing: 12.5 kHz

Data Taken by: EK Chong
 Approved by:
 Date: 4/18/2001

Modulation Limiting Deviation vs. Audio Input Level



4.3 Test Results (Continued)

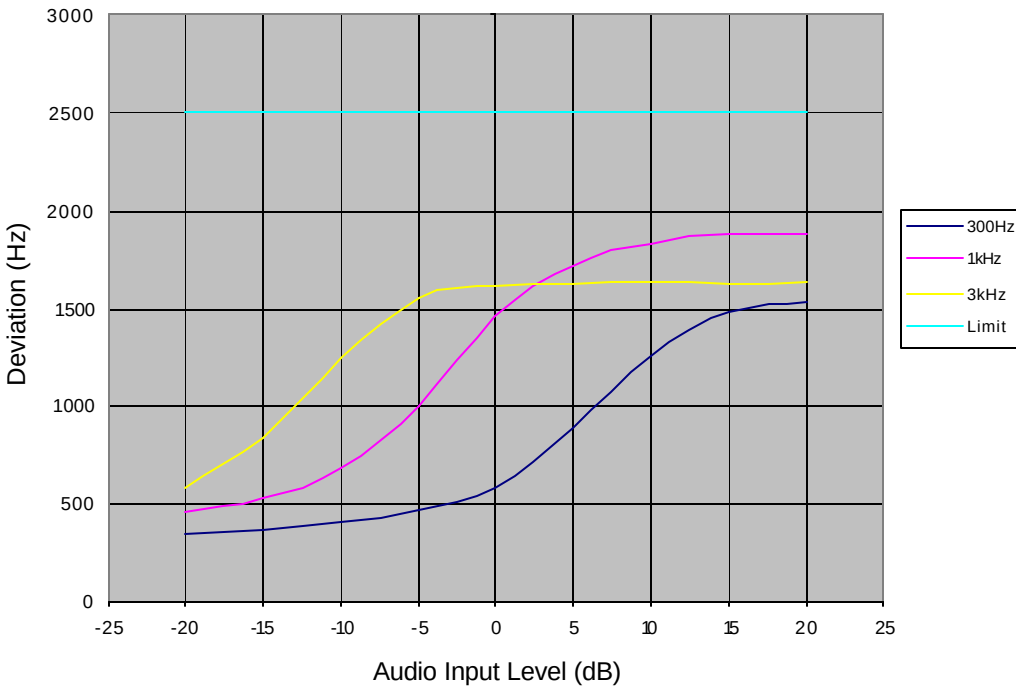
Modulation Limiting:
Tone with 'DPL'

Test Condition	
Frequency (MHz)	Mid Channel
Reference Deviation	1.5 kHz

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 12.5 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Modulation Limiting
Deviation vs. Audio Input Level



4.3 Test Results (Continued)

Modulation Limiting:
Carrier Squelch

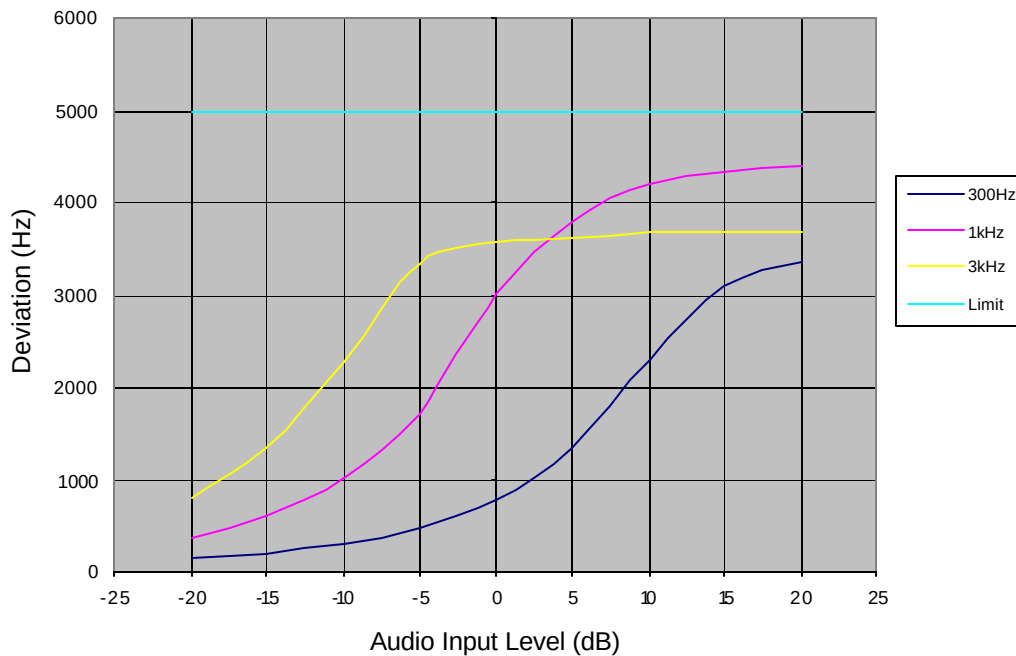
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Test Condition	
Frequency (MHz)	Mid Channel
Reference Deviation	3 kHz

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 25 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Modulation Limiting Deviation vs. Audio Input Level



4.3 Test Results (Continued)

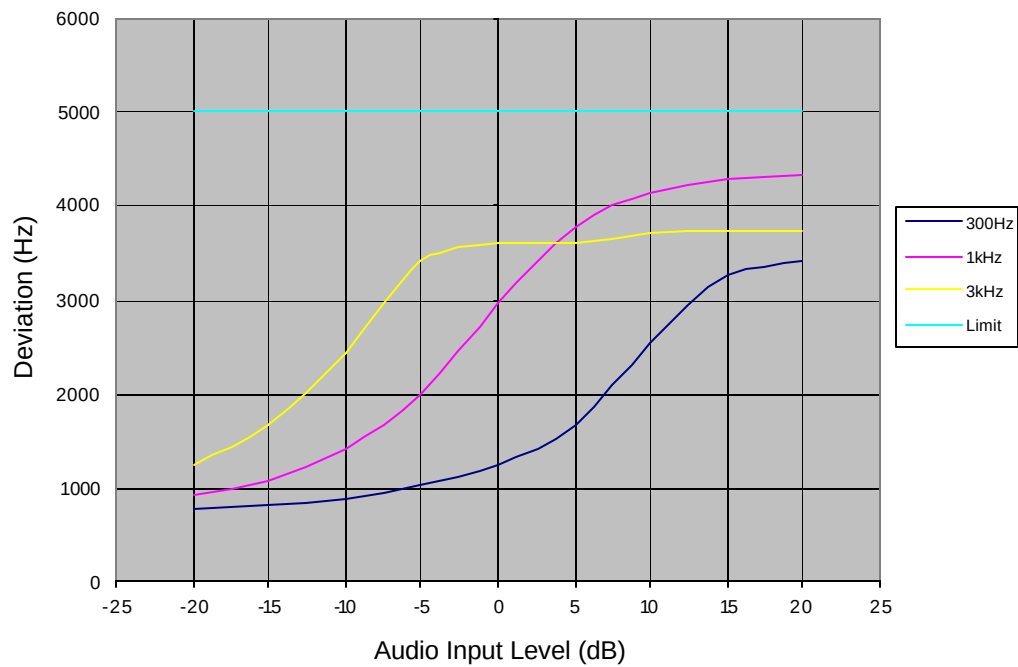
Modulation Limiting:
Tone with 'PL'

Test Condition	
Frequency (MHz)	Mid Channel
Reference Deviation	3 kHz

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 25 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Modulation Limiting
Deviation vs. Audio Input Level



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4.3 Test Results (Continued)

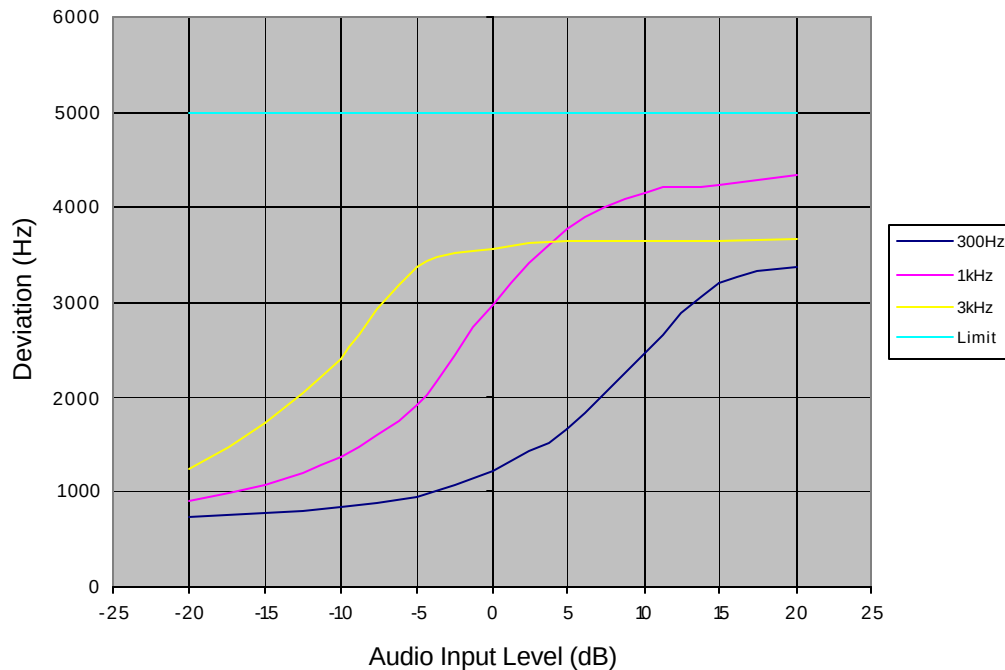
Modulation Limiting: Tone with 'DPL'

Test Condition	
Frequency (MHz)	Mid Channel
Reference Deviation	3 kHz

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 25 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/18/2001

Modulation Limiting Deviation vs. Audio Input Level



4.4 Modifications made during testing

None

4.5 Test instrumentation

- [X] Hewlett-Packard 8901B Modulation Analyzer
- [X] Hewlett-Packard 8903B Audio Analyzer
- [X] Hewlett-Packard 6622A System DC Power Supply
- [X] Hewlett-Packard 8657A Signal Generator
- [X] Sierra 30 dB Attenuator, Model: 661A-30

5 OCCUPIED BANDWIDTH

5.1 Test description

Parameter:	FCC §2.1049
Requirement:	FCC § 90.210
Emission Bandwidth:	12.5 kHz, 25 kHz

5.2 Test Procedure

The antenna was disconnected from the transmitter and the short cable was connected to the transmitter RF output.

The RF output was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth and video bandwidth of the spectrum analyzer was set at 300 Hz. With the transmitter keyed, the level of the unmodulated carrier was set to the full scale reference line of the spectrum analyzer. This is used as a 0dB reference for emission mask measurements.

The transmitter was then modulated with a 2500 Hz tone at an input level 16 dB greater than the necessary to produce 50% of rated system deviation. The resolution bandwidth of the spectrum analyzer was set to 300 Hz and the spectrum of the transmitting signal was recorded. This spectrum was compared to the required emission mask.

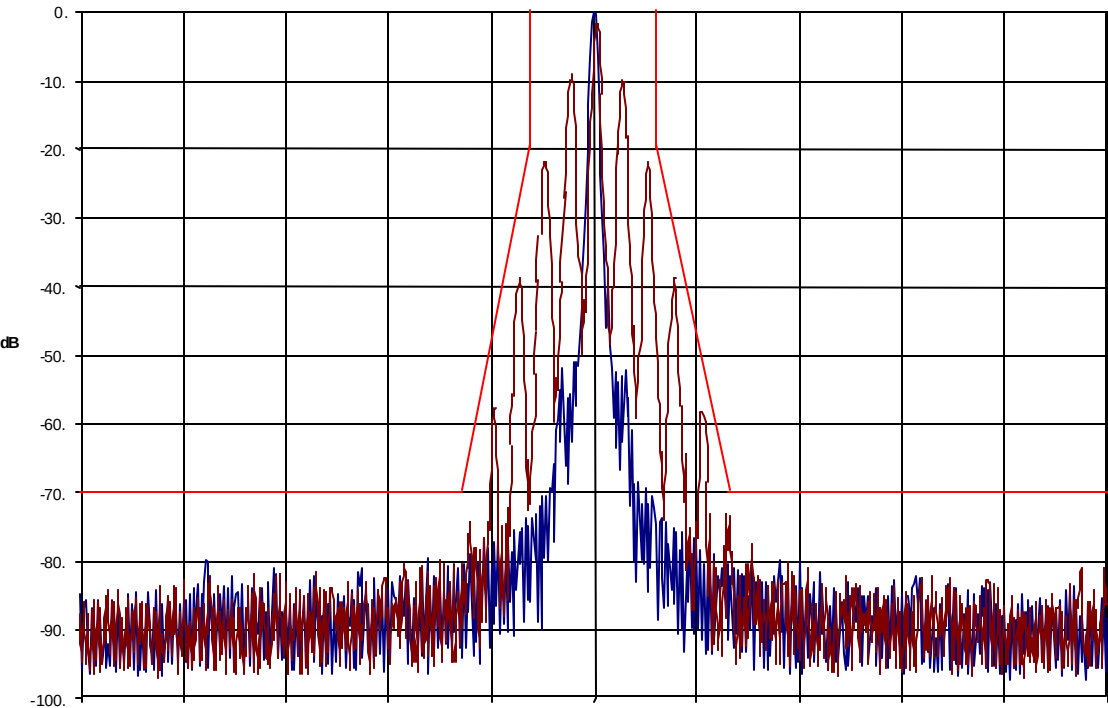
5.3 Test Results

Spectrum analyzer settings for the following Occupied Bandwidth plots:

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

12.5 kHz Channel Spacing, 2500 Hz Audio:
Emission Mask D

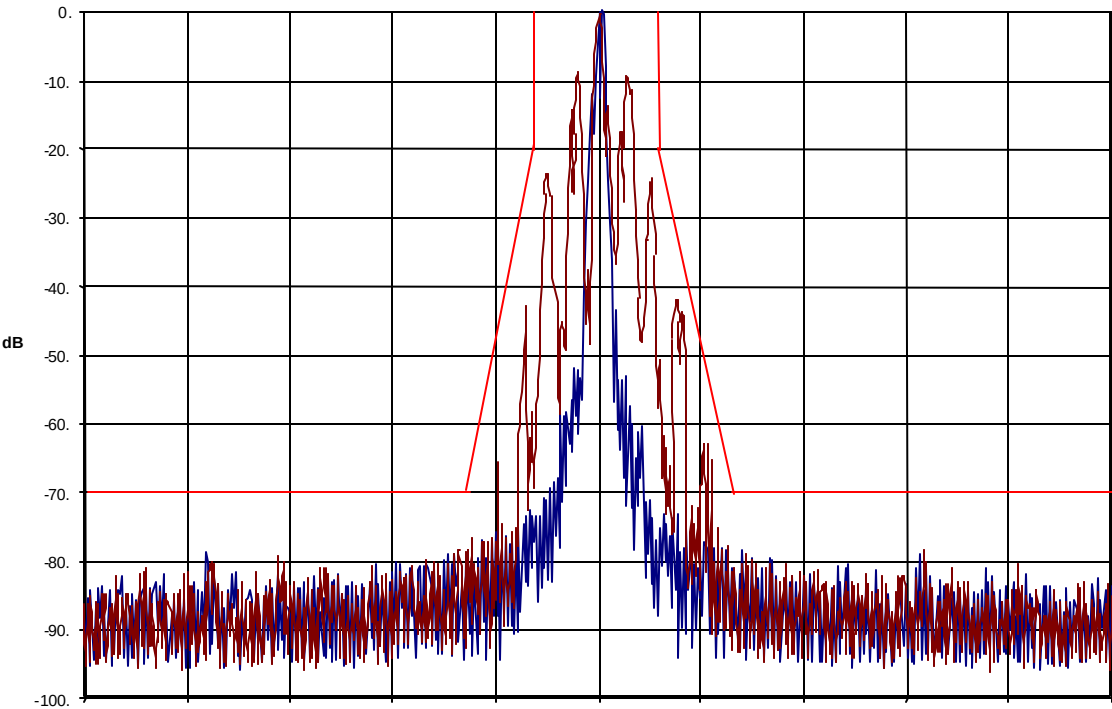


5.3 Test Results(Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

12.5 kHz Channel Spacing, 2500 Hz Audio + PL:
Emission Mask D

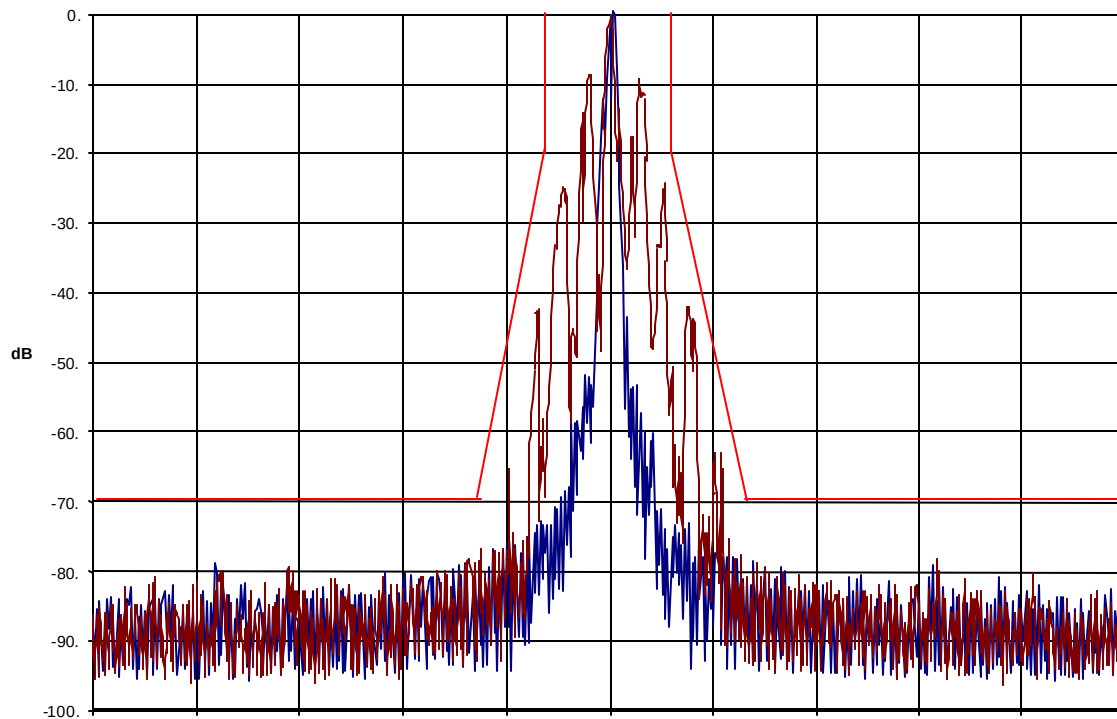


5.3 Test Results *(Continue)*

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

12.5 kHz Channel Spacing, 2500 Hz Audio + DPL:
Emission Mask D

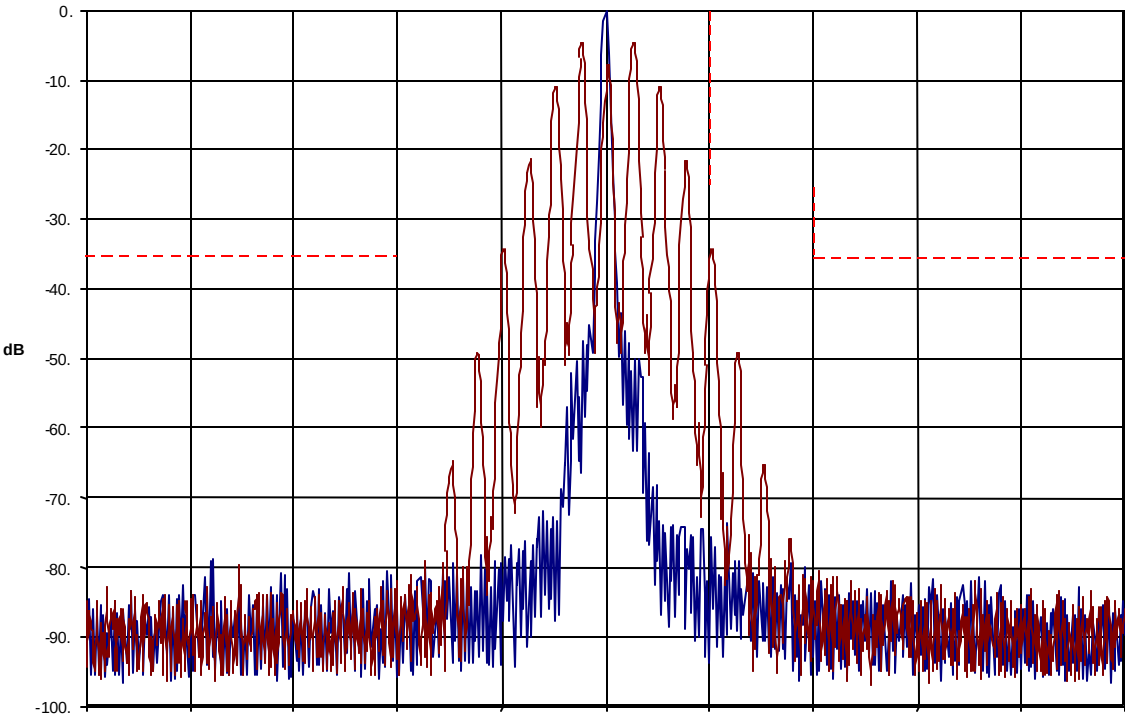


5.3 Test Results(Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

25 kHz Channel Spacing, 2500 Hz Audio:
Emission Mask B

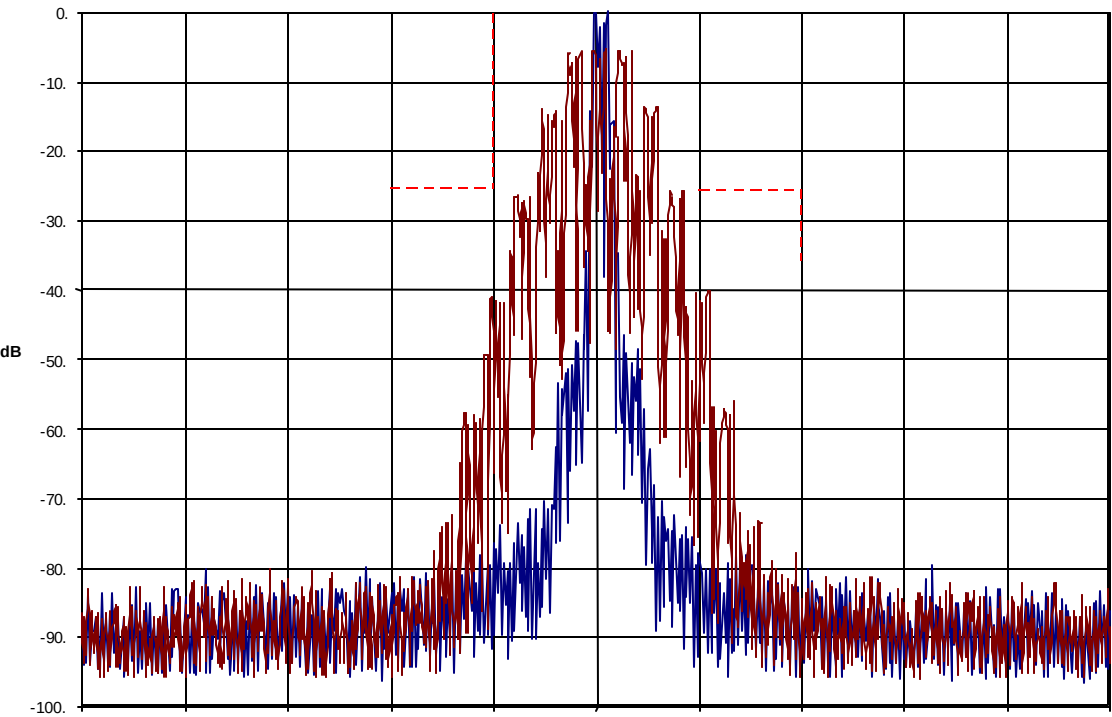


5.3 Test Results (Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

25 kHz Channel Spacing, 2500 Hz Audio + PL:
Emission Mask B

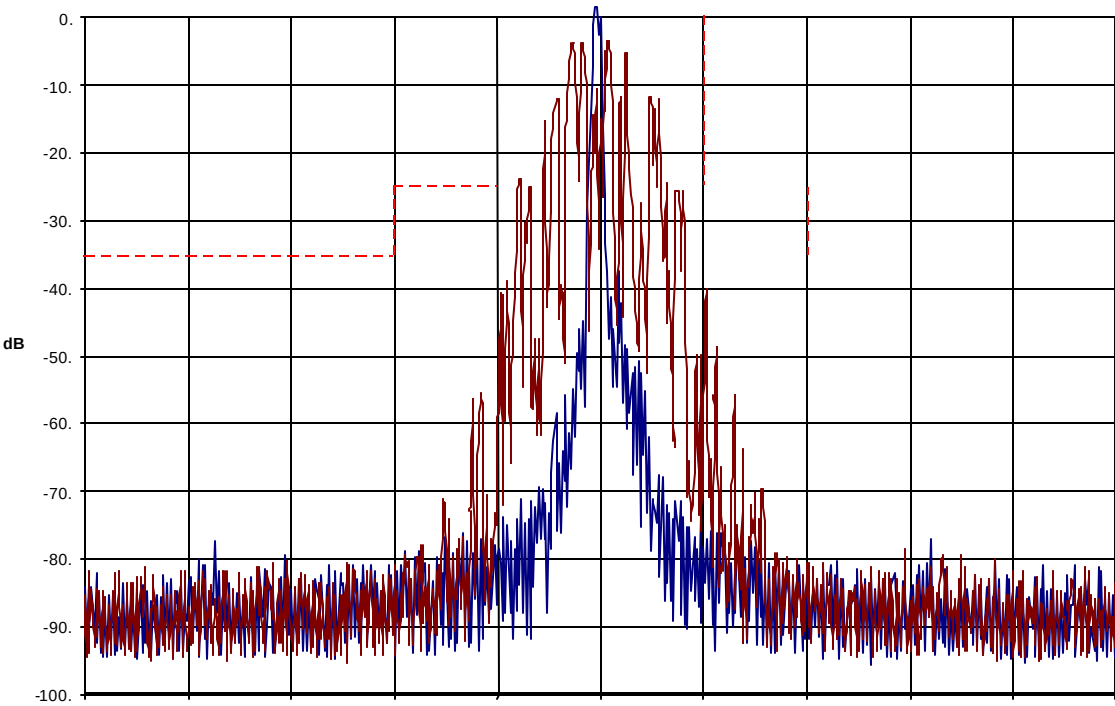


5.3 Test Results (Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

25 kHz Channel Spacing, 2500 Hz Audio + DPL:
Emission Mask B

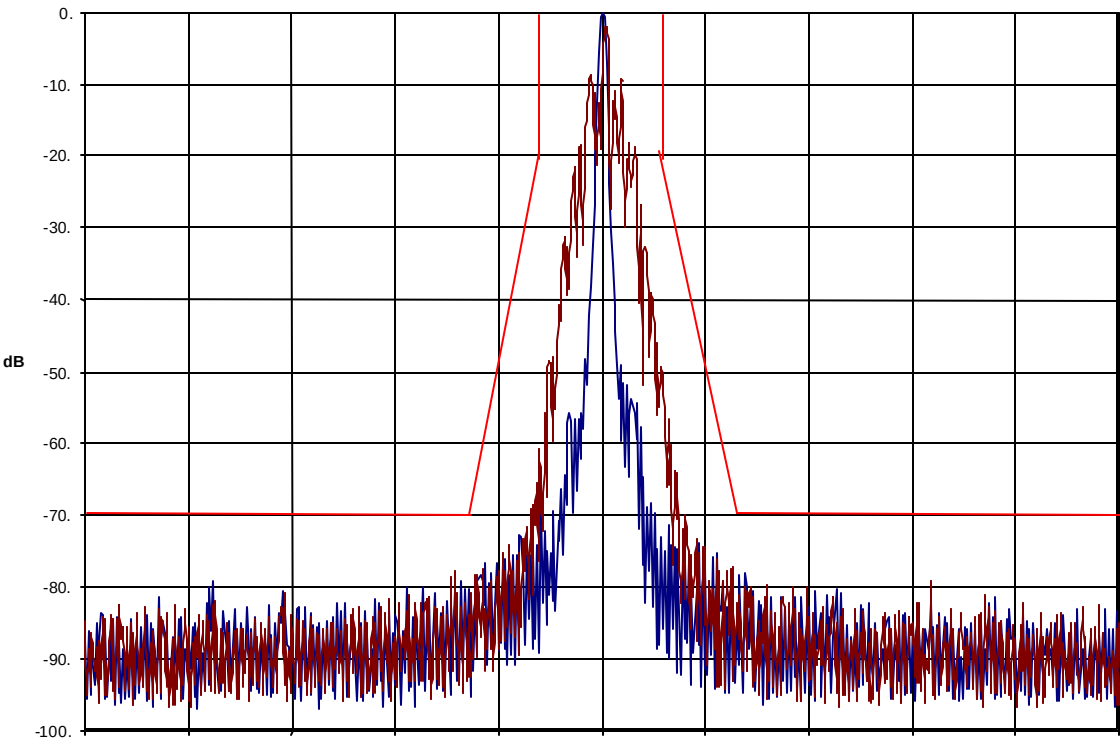


5.3 Test Results(Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

12.5 kHz Channel Spacing, DTMF Modulation:
Emission Mask D

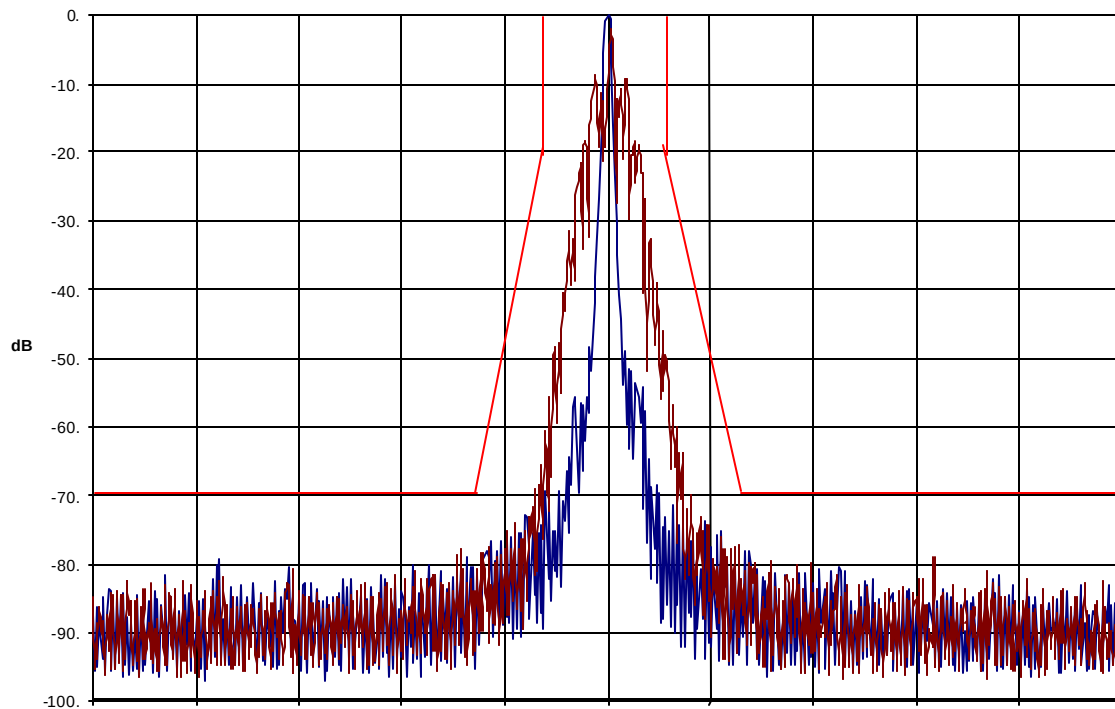


5.3 Test Results *(Continue)*

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

12.5 kHz Channel Spacing, DTMF Modulation + PL:
Emission Mask D

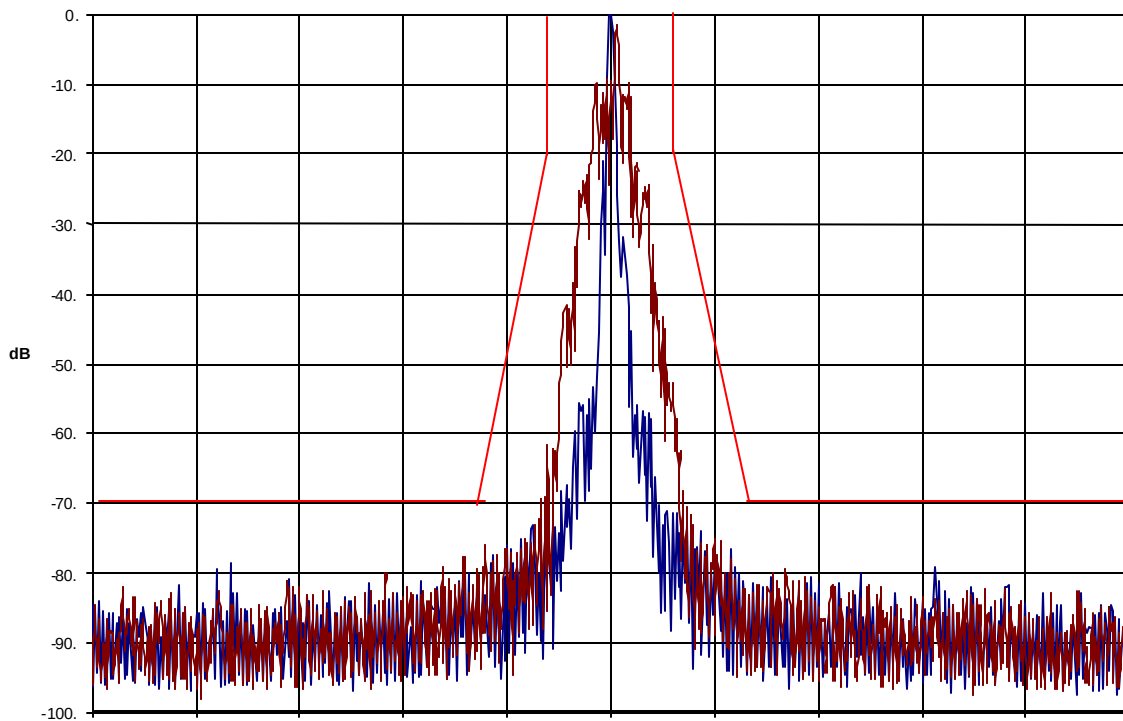


5.3 Test Results *(Continue)*

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

12.5 kHz Channel Spacing, DTMF Modulation + DPL:
Emission Mask D

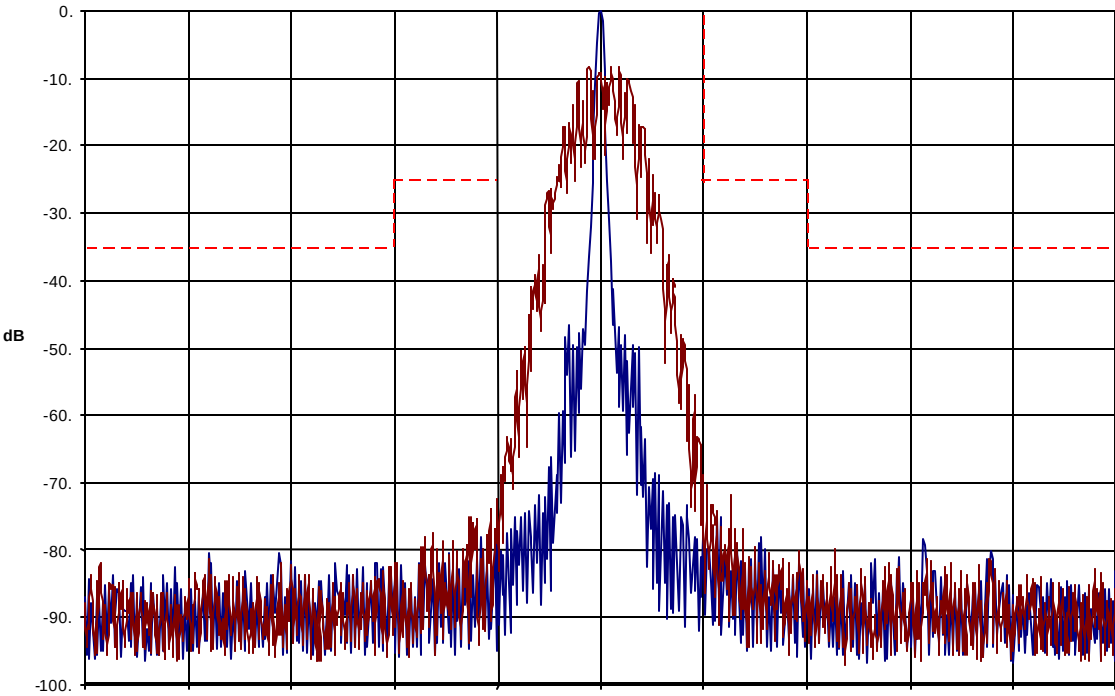


5.3 Test Results (Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

25 kHz Channel Spacing, DTMF Modulation:
Emission Mask B

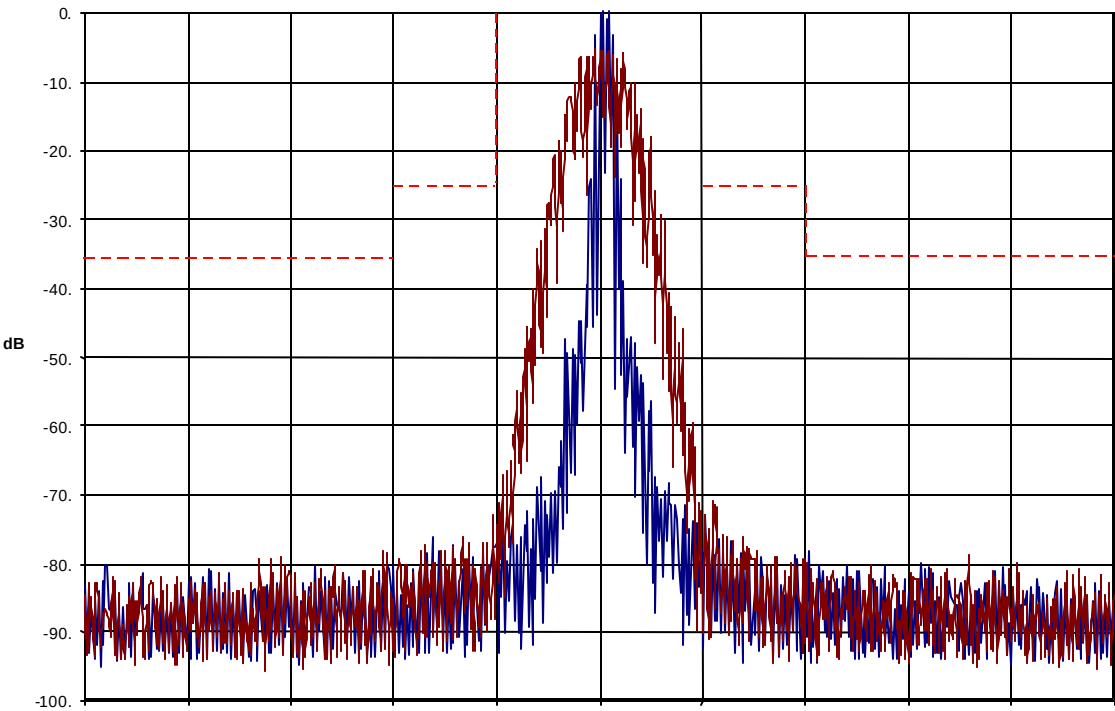


5.3 Test Results (Continue)

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

25 kHz Channel Spacing, DTMF Modulation + PL:
Emission Mask B

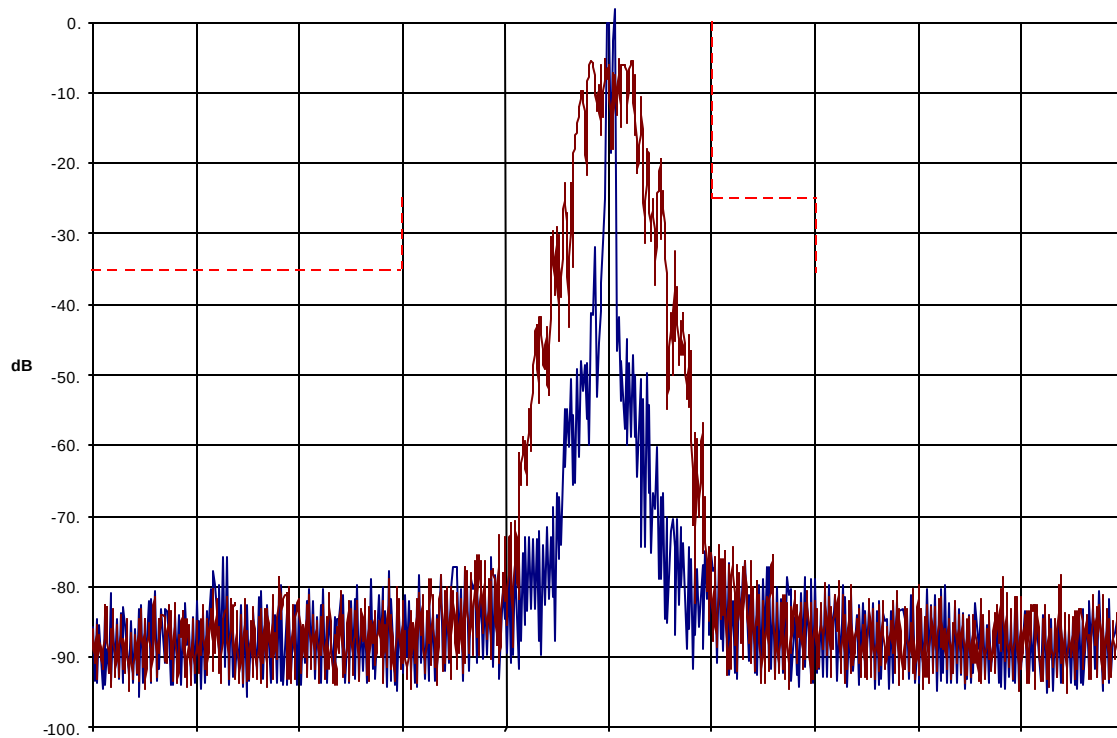


5.3 Test Results *(Continue)*

Occupied Bandwidth:

Test Condition	
Frequency (MHz)	Mid Channel
Resolution Bandwidth (Hz)	300
Video Bandwidth (Hz)	3000
Span (kHz)	100
Sweep Speed (sec)	3
Scale (DB/)	10
Attenuator (dB)	30

25 kHz Channel Spacing, DTMF Modulation + DPL:
Emission Mask B



5.4 Modifications made during testing

None

5.5 Test instrumentation

☒ Hewlett-Packard 6622A System DC Power Supply
☒ Hewlett-Packard 8563E Spectrum Analyzer
☒ Computer

6 TRANSMITTER CONDUCTED SPURIOUS EMISSIONS

6.1 Test description

Parameter:	FCC § 2.1051
Requirement:	FCC § 90.210

6.2 Test Procedure

The output of the transmitter is connected, via a suitable attenuator, to the input of an HP8561B spectrum analyzer. After a carrier reference level has been established, a tunable notch filter is inserted between the attenuator and the spectrum analyzer to allow suppression of the carrier level. The effect of the notch filter on other frequencies, if any, is plotted. This data is measured at the upper and lower frequency limits of the frequency range. If transmit power is adjusted, the measurement is repeated at various power levels including minimum and maximum.

FCC Limits -- Per Applicable Rule Parts

Conducted spurious emissions shall be attenuated below the maximum level of emission of the carrier frequency in accordance with the following formula:

For 25 kHz Channel Bandwidth:

Spurious attenuation in dB = $43 + 10 \log_{10}(\text{Power output in watts})$

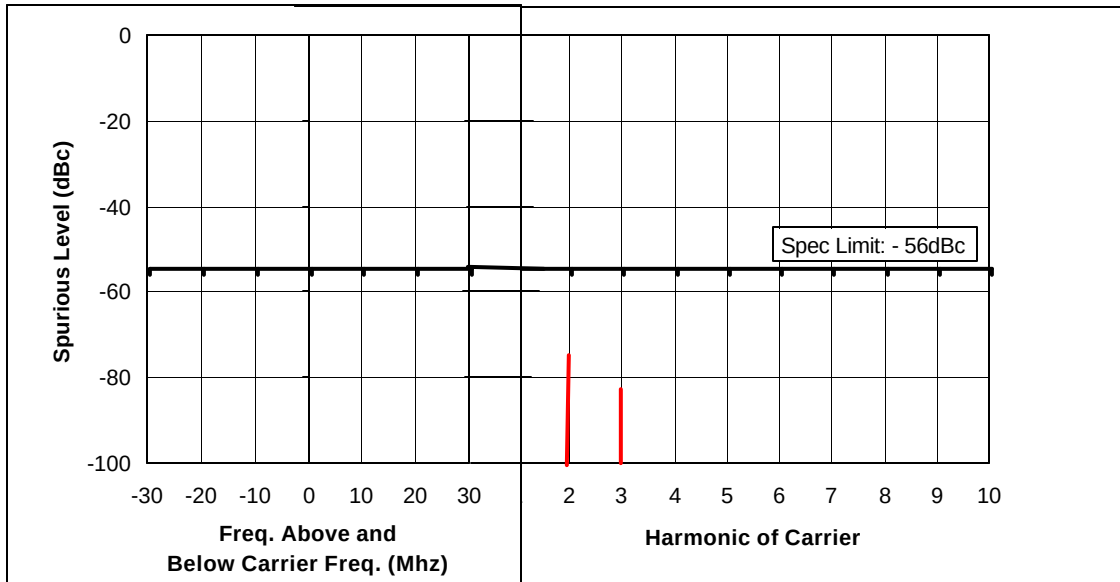
For 12.5kHz Channel Bandwidth:

Spurious attenuation in dB = $50 + 10 \log_{10}(\text{Power output in watts})$

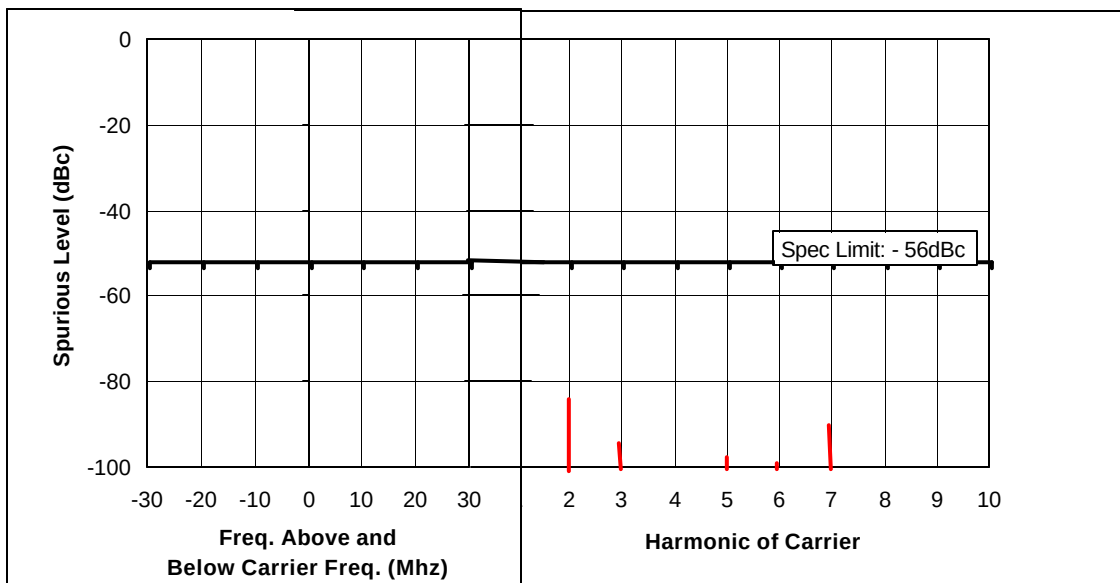
6.3 Test Results

Conducted Spurious Emissions:

Test Condition	
Power Output	4W at 450.025 MHz
Channel Spacing	12.5 kHz



Test Condition	
Power Output	4W at 481.050 MHz
Channel Spacing	12.5 kHz

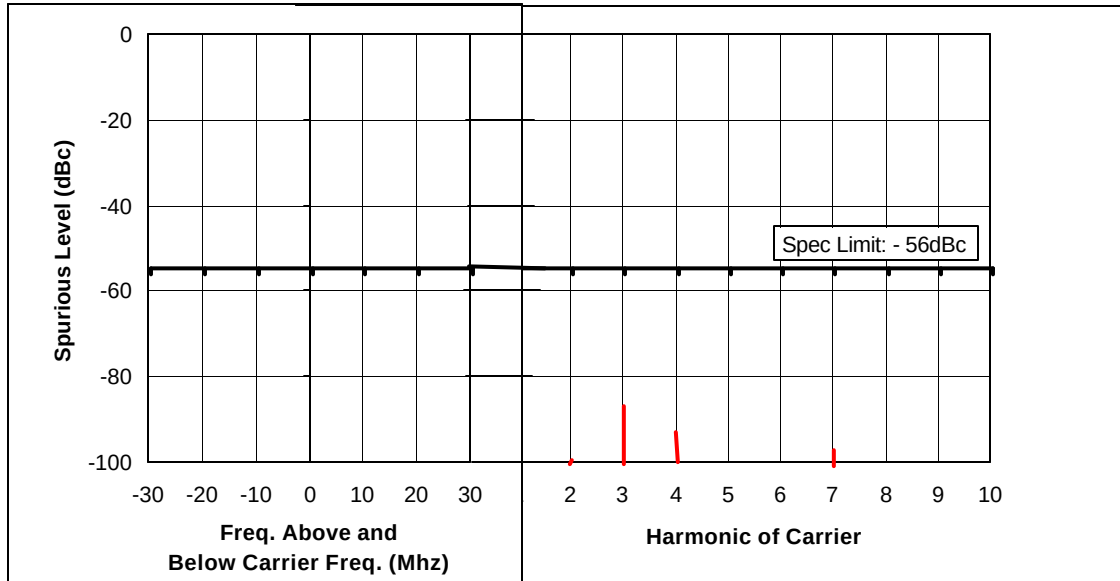


Note: Other emissions not reported were more than 34dB below the limit

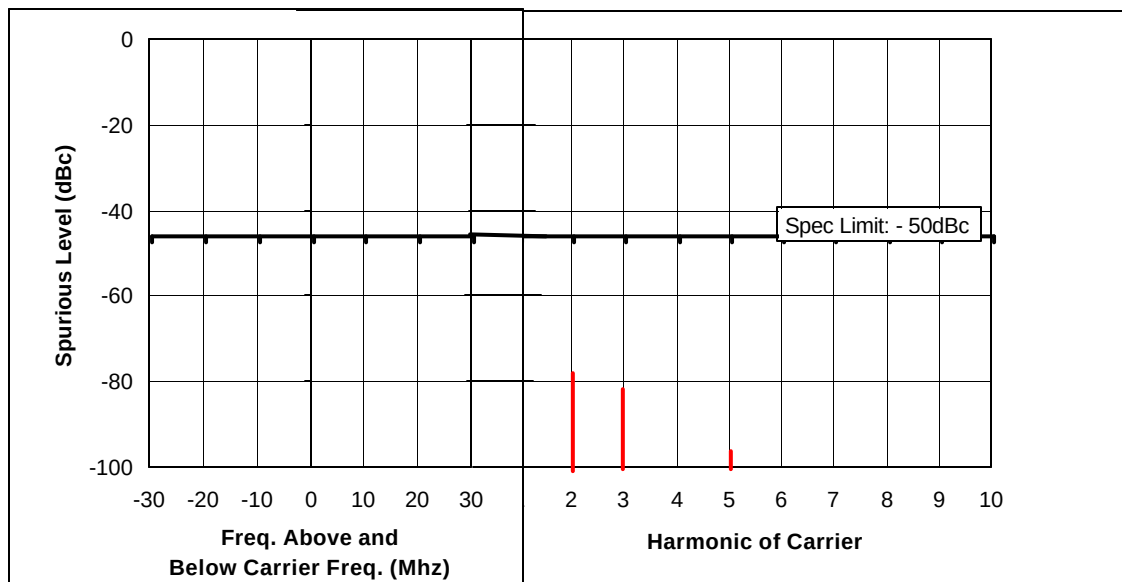
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6.3 Test Results (Continued)

Test Condition	
Power Output	4W at 511.975 MHz
Channel Spacing	12.5 kHz



Test Condition	
Power Output	1W at 450.025 MHz
Channel Spacing	12.5 kHz

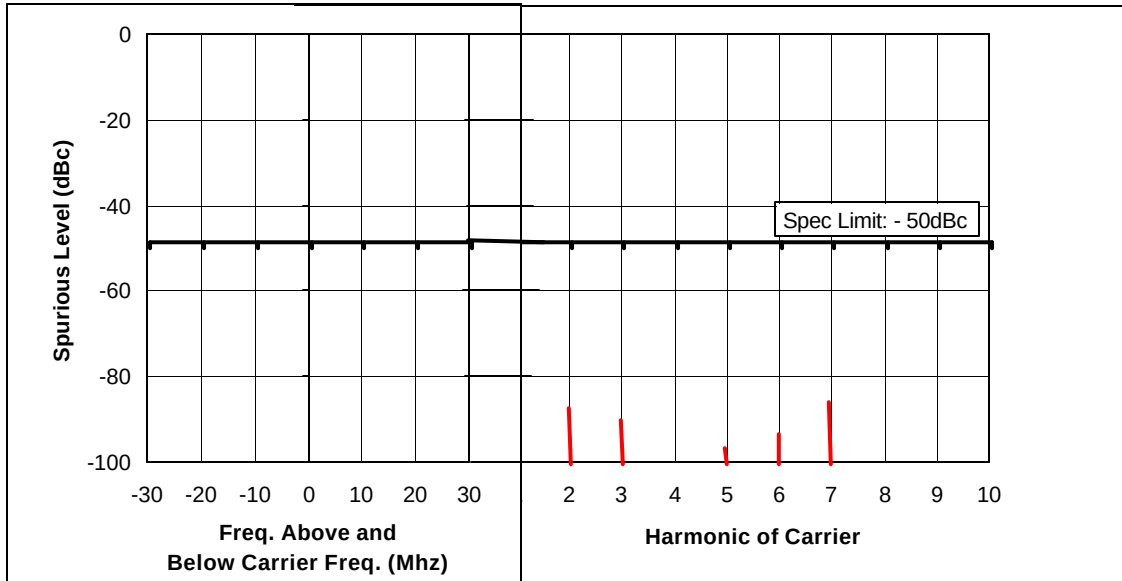


Note: Other emissions not reported were more than 34dB below the limit

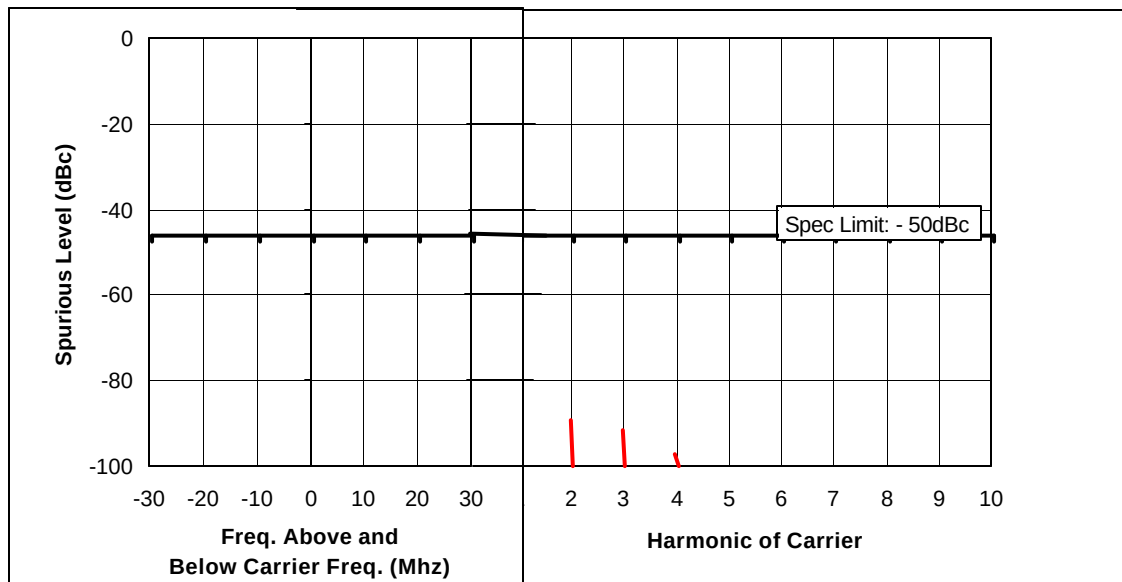
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6.3 Test Results (Continued)

Test Condition	
Power Output	1W at 481.050 MHz
Channel Spacing	12.5 kHz



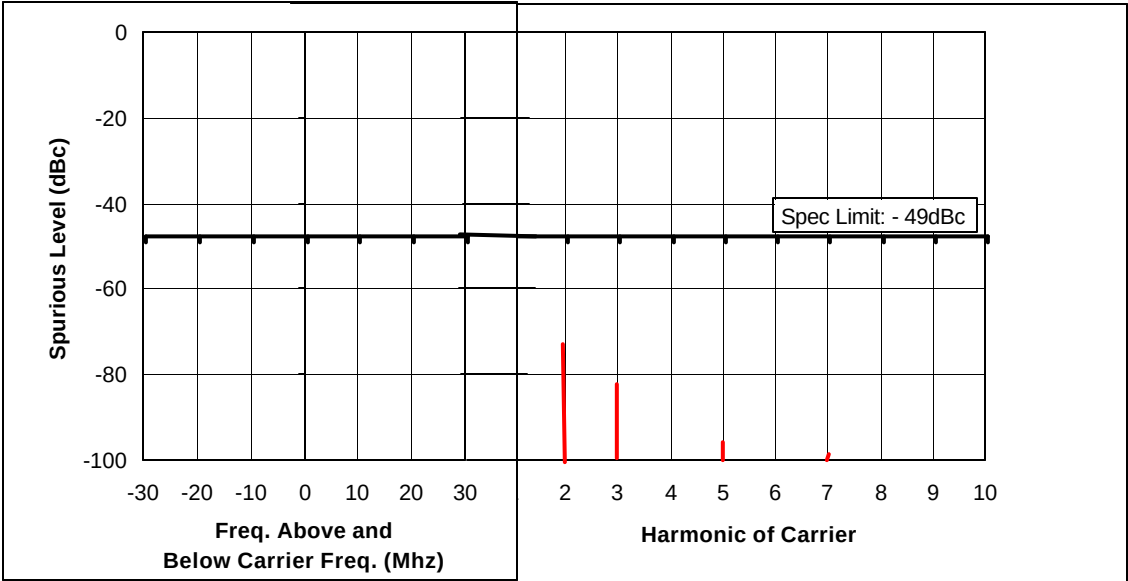
Test Condition	
Power Output	1W at 511.975 MHz
Channel Spacing	12.5 kHz



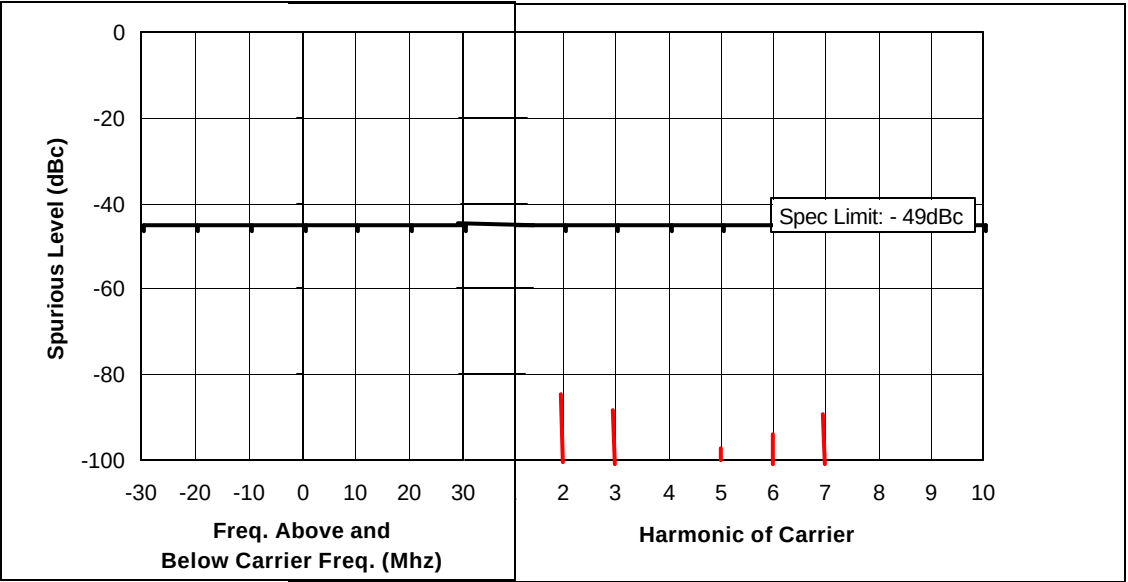
Note: Other emissions not reported were more than 34dB below the limit

6.3 Test Results (Continued)

Test Condition	
Power Output	4W at 450.025 MHz
Channel Spacing	25 kHz



Test Condition	
Power Output	4W at 481.050 MHz
Channel Spacing	25 kHz

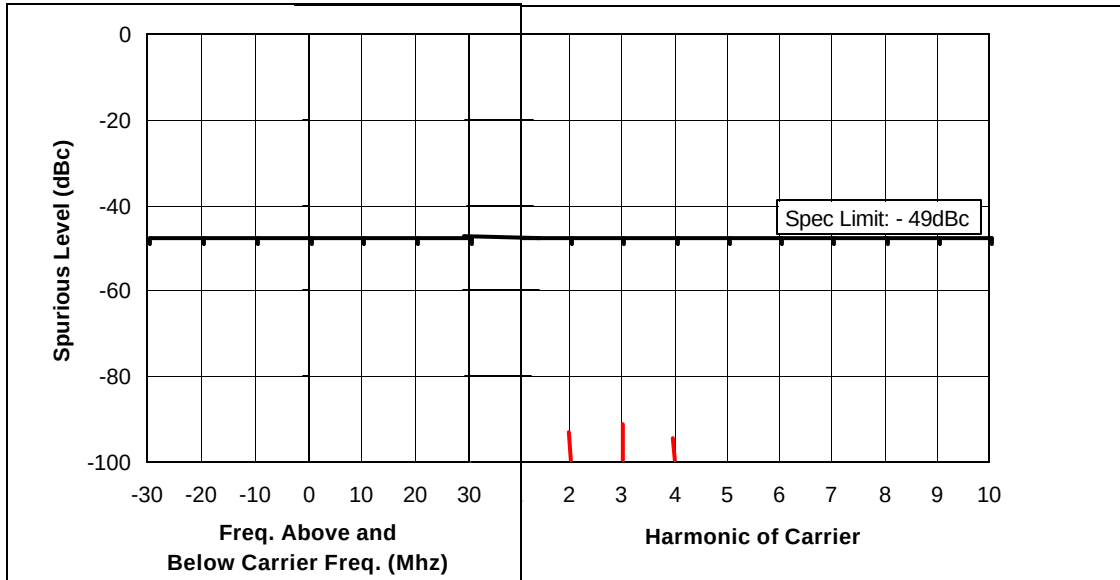


Note: Other emissions not reported were more than 34dB below the limit

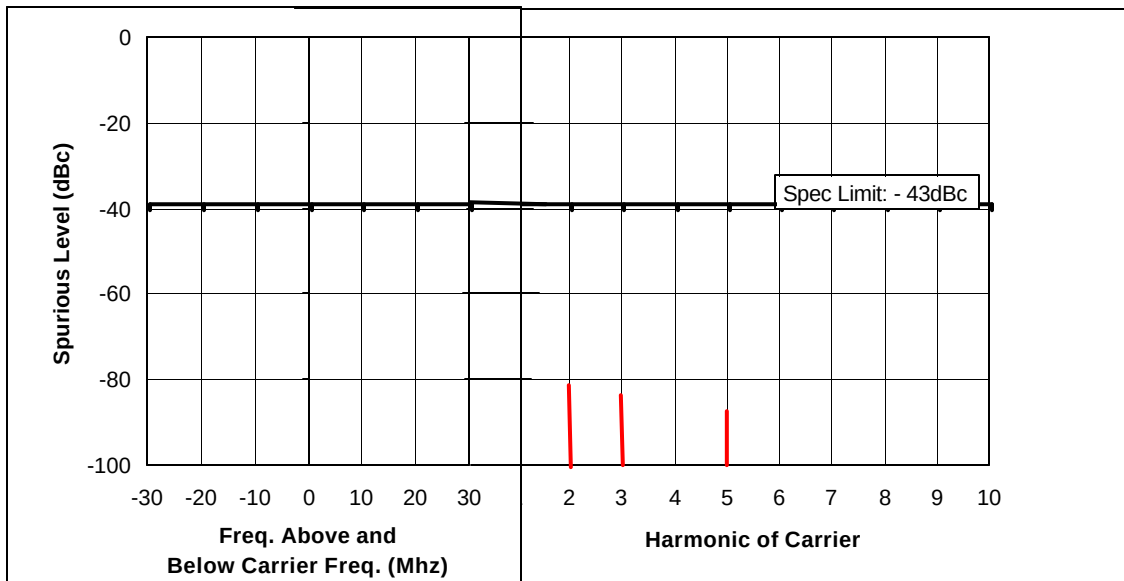
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6.3 Test Results (Continued)

Test Condition	
Power Output	4W at 511.975 MHz
Channel Spacing	25 kHz



Test Condition	
Power Output	1W at 450.025 MHz
Channel Spacing	25 kHz

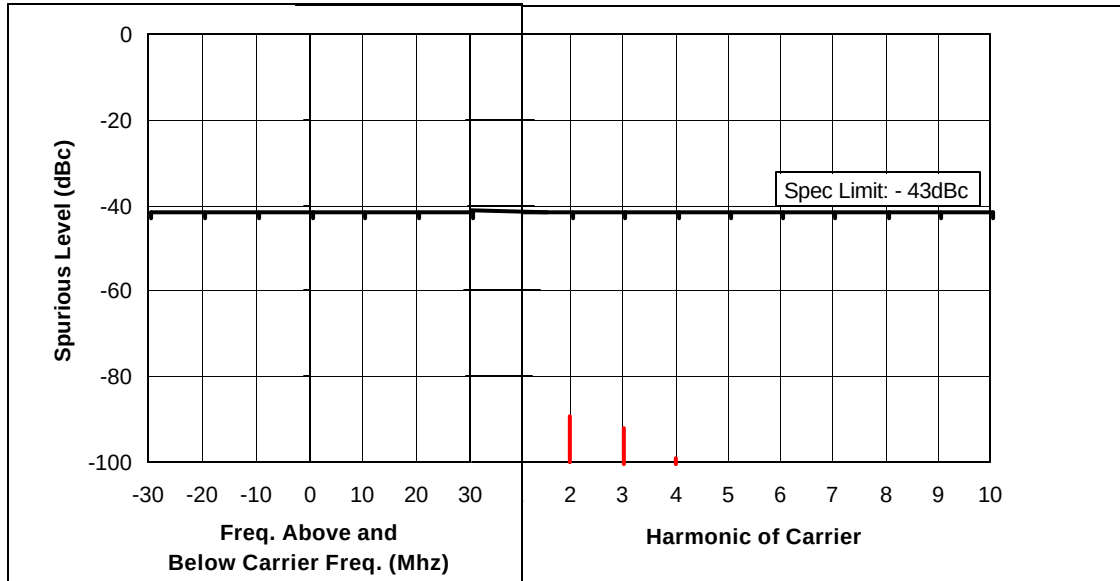


Note: Other emissions not reported were more than 34dB below the limit

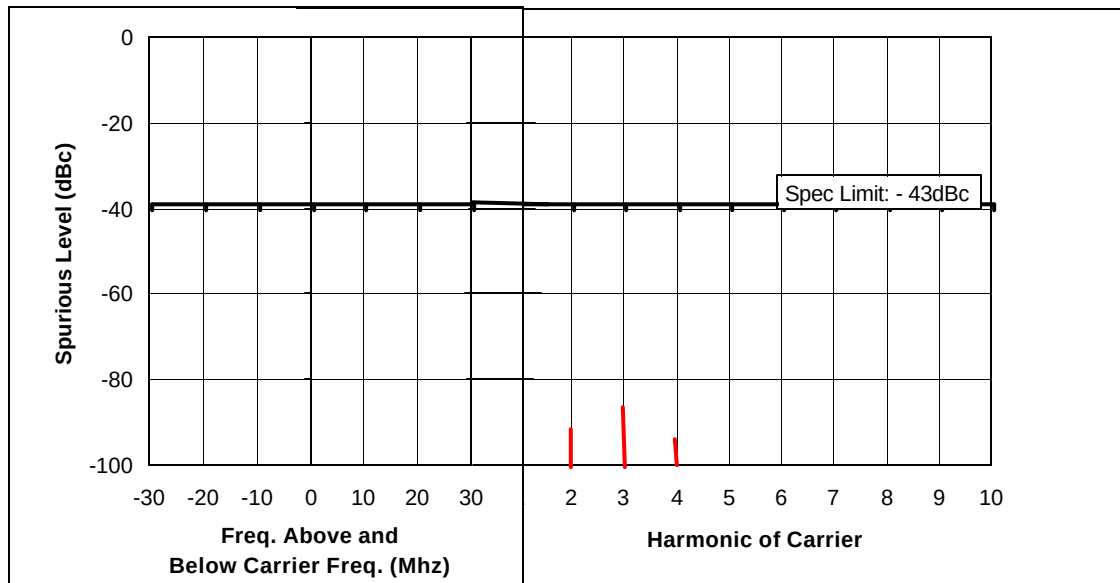
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6.3 Test Results (Continued)

Test Condition	
Power Output	1W at 481.050 MHz
Channel Spacing	25 kHz



Test Condition	
Power Output	1W at 511.975 MHz
Channel Spacing	25 kHz



Note: Other emissions not reported were more than 34dB below the limit

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6.4 Modifications made during testing

None

6.5 Test instrumentation

- ☒ Agilent 8595E Spectrum Analyzer
- ☒ Hewlett-Packard 6622A System DC Power Supply
- ☒ MiniCircuit NHP -700 High Pass Filter
- ☒ Sierra 30 dB Attenuator, Model: 661A-30

7 TRANSMITTER RADIATED SPURIOUS EMISSIONS

7.1 Test description

Parameter:	FCC §2.1053
Requirement:	FCC § 90.210
--	--

7.2 Test Procedure

The transmitter was placed on a wooden turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

The spurious harmonic attenuation was measured as the difference between ERP in dBm at the fundamental frequency and at the spurious emission frequency.

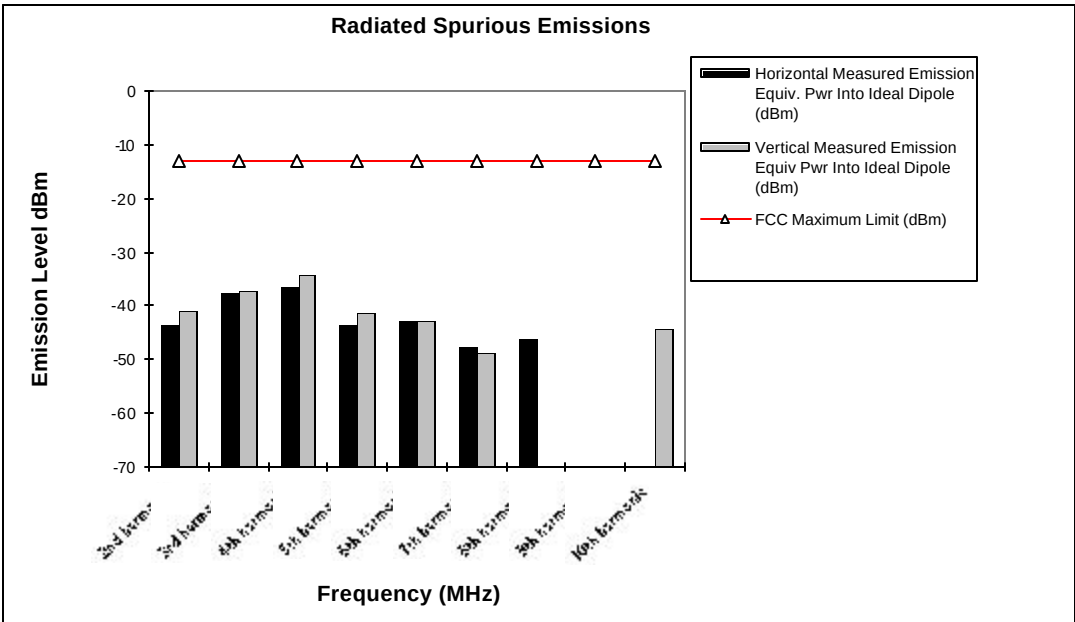
Spurious attenuation in dB = $43 + 10\log_{10}(\text{power out in Watts})$

7.3 Test Results

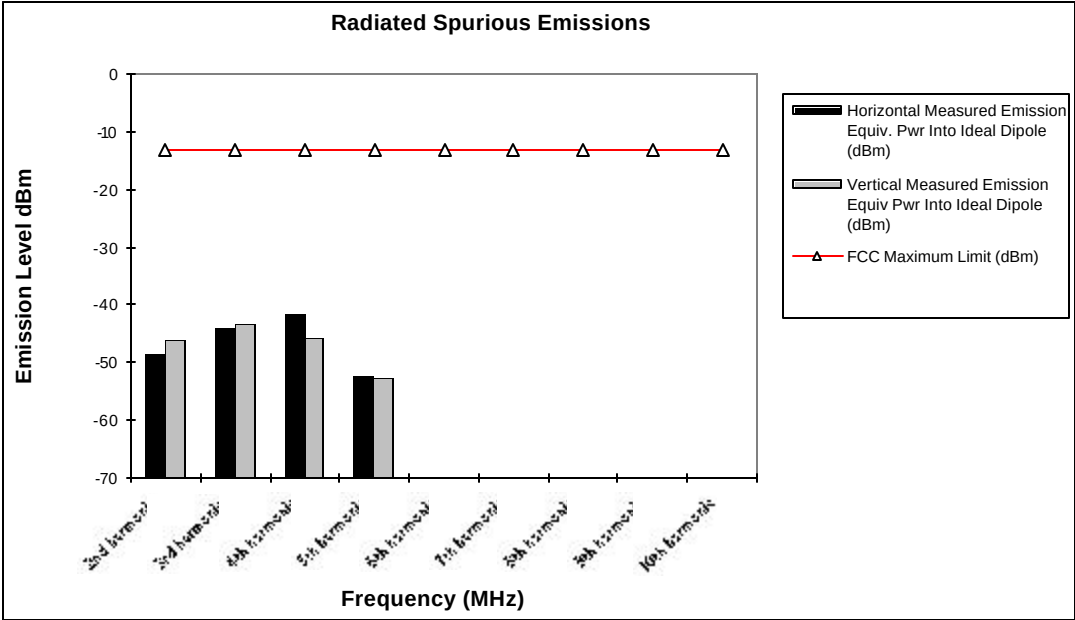
Please see the following page.

RADIATED SPURIOUS EMISSIONS

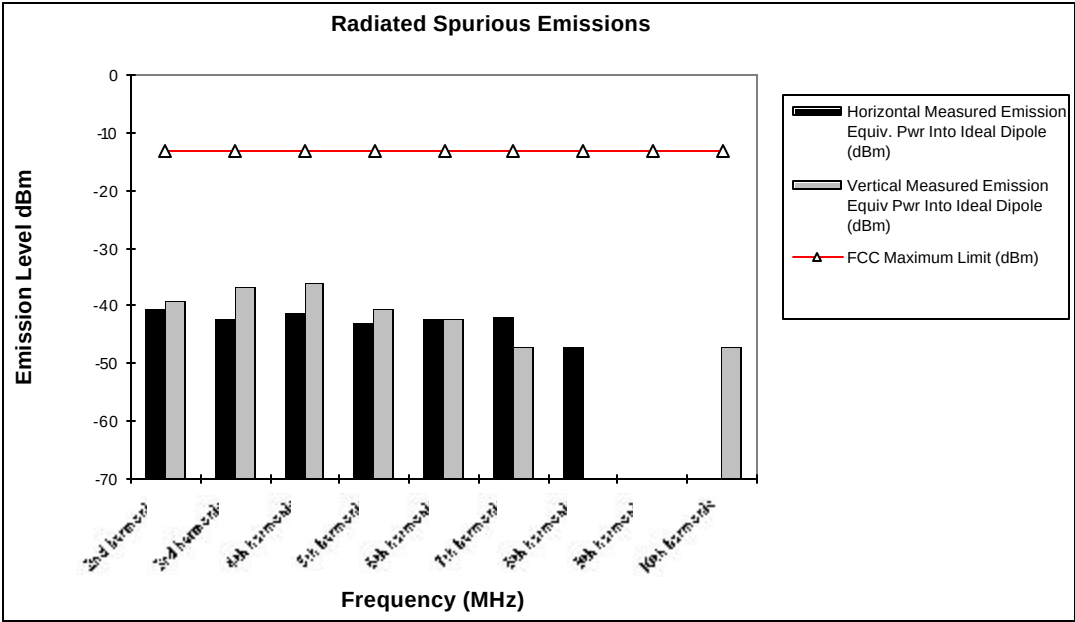
7.3.1 TX Radiated Spurious Emissions 25 kHz High Power Worst Case



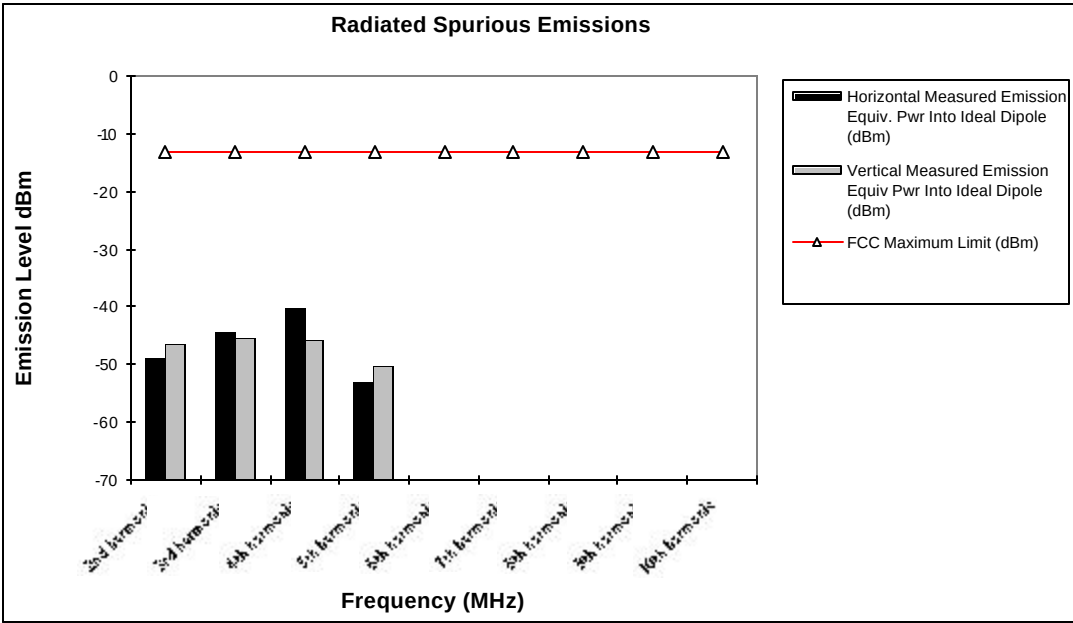
7.3.2 TX Radiated Spurious Emissions 25 kHz Low Power Worst Case



7.3.3 TX Radiated Spurious Emissions 12.5 kHz High Power Worst Case



7.3.4 TX Radiated Spurious Emissions 12.5 kHz Low Power Worst Case



8 FREQUENCY STABILITY

8.1 Test description

Parameter:	FCC §2.1055
Requirement:	FCC § 90.213
Frequency Tolerance:	Within 0.0025% (2.5ppm)

8.2 Test Procedure

The ppm frequency error of the transmitter was calculated by:

$$ppm\ error = \frac{MCF}{ACF} \cdot 10^6$$

Where MCF is the Measured Carrier Frequency in MHz
ACF is the Assigned Carrier Frequency in MHz

8.2.1 Frequency Stability vs. Temperature

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

8.2.2 Frequency Stability vs. Voltage

At room temperature (25 +/- 5° C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured from 85% to 115% of the nominal operating input voltage.

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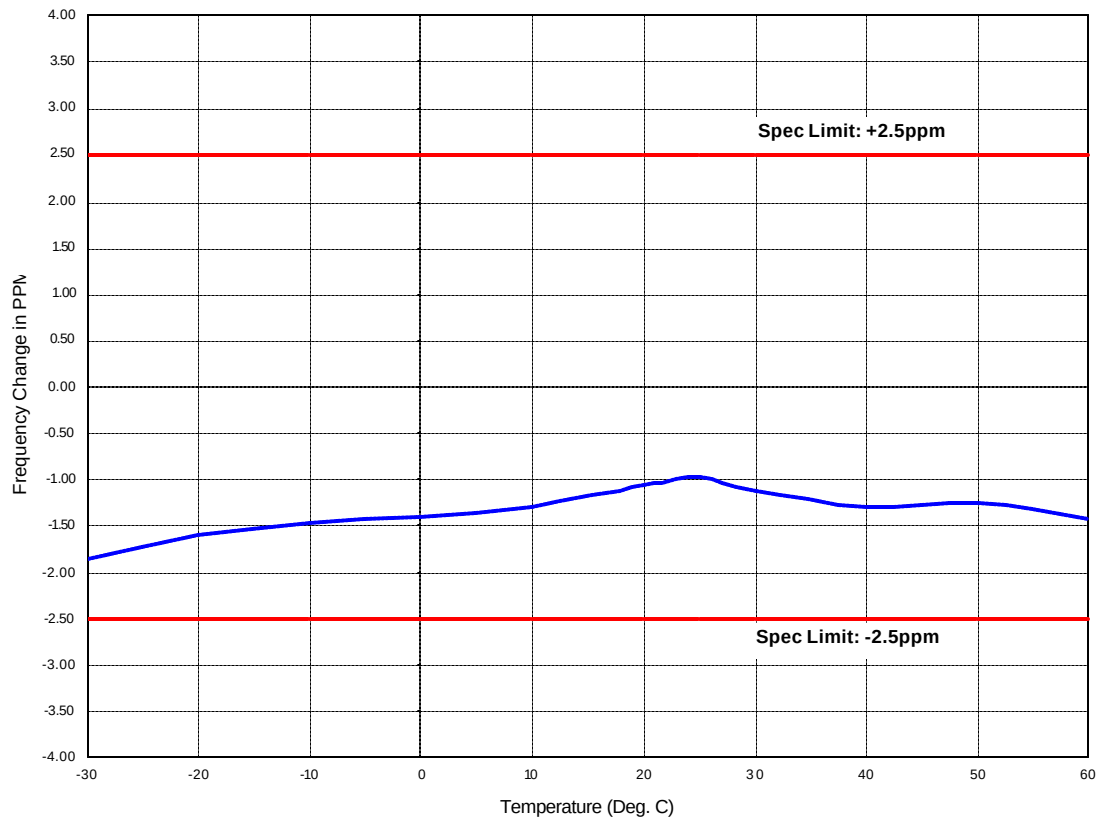
8.3 Test Results

Test Condition	
Frequency (MHz)	Mid Channel

Manufacturer: Motorola
Model: PMUE1701A, UHF Band 2
FCC ID:
Frequency: 481.050 MHz
Channel Spacing: 25 kHz

Data Taken by: EK Chong
Approved by:
Date: 4/23/2001

Stability Characteristic Frequency vs. Temperature



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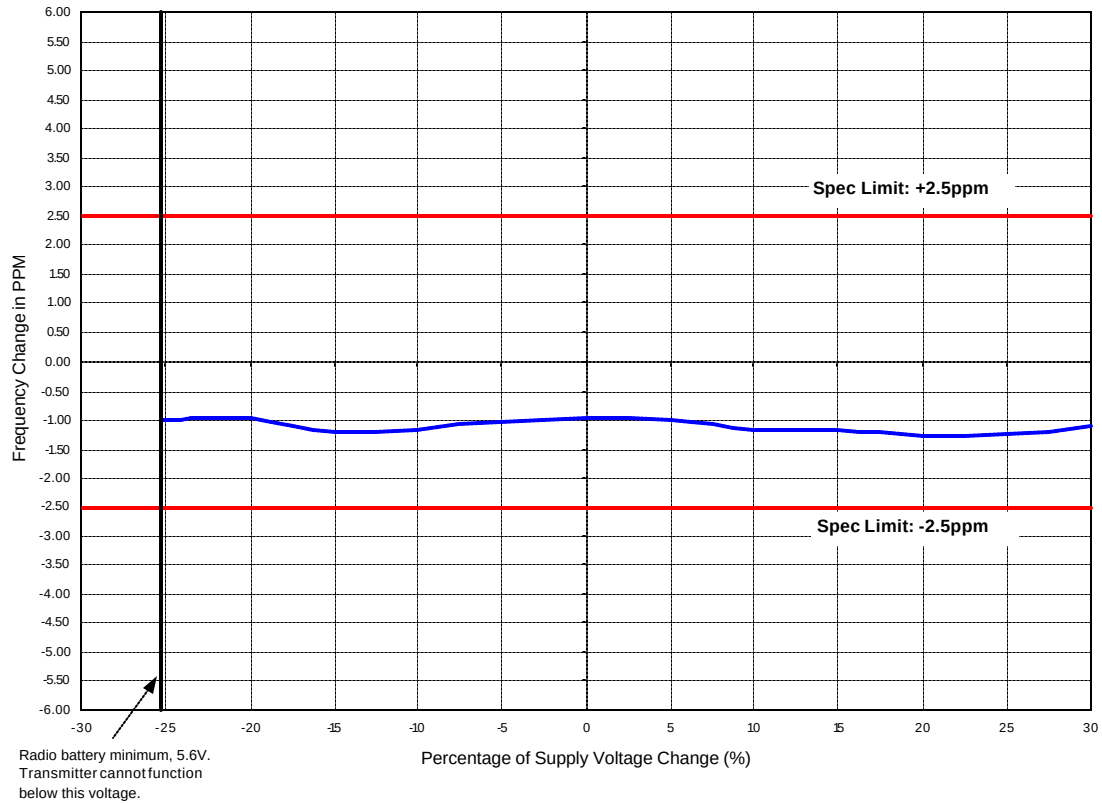
8.3 Test Results (Continue)

Test Condition	
Frequency (MHz)	Mid Channel

Manufacturer: Motorola
 Model: PMUE1701A, UHF Band 2
 FCC ID:
 Frequency: 481.050 MHz
 Channel Spacing: 25 kHz

Data Taken by: EK Chong
 Approved by:
 Date: 4/23/2001

Stability Characteristic Frequency vs. Voltage



8.4 Modifications made during testing

None

8.5 Test instrumentation

- ☒ Votsch Temperature Chamber, VT4010
- ☒ Hewlett-Packard 8901B Modulation Analyzer
- ☒ Hewlett-Packard 6622A System DC Power Supply
- ☒ Sierra 30 dB Attenuator, Model: 661A-30

9 TRANSIENT FREQUENCY BEHAVIOR

9.1 Test description

Parameter:	--
Requirement:	FCC § 90.214
:	

9.2 Test Procedure

Test setup was configured according to the paragraph 2.2.19 of the TIA/EIA 603-1. A digital oscilloscope was used to capture the transient response.

9.3 Test Results

Please see the following plots.

Figure 9.3-1: Transient Frequency Behavior

Power: 4W at 481.050 MHz
Channel Spacing: 12.5 kHz
Switch – On condition

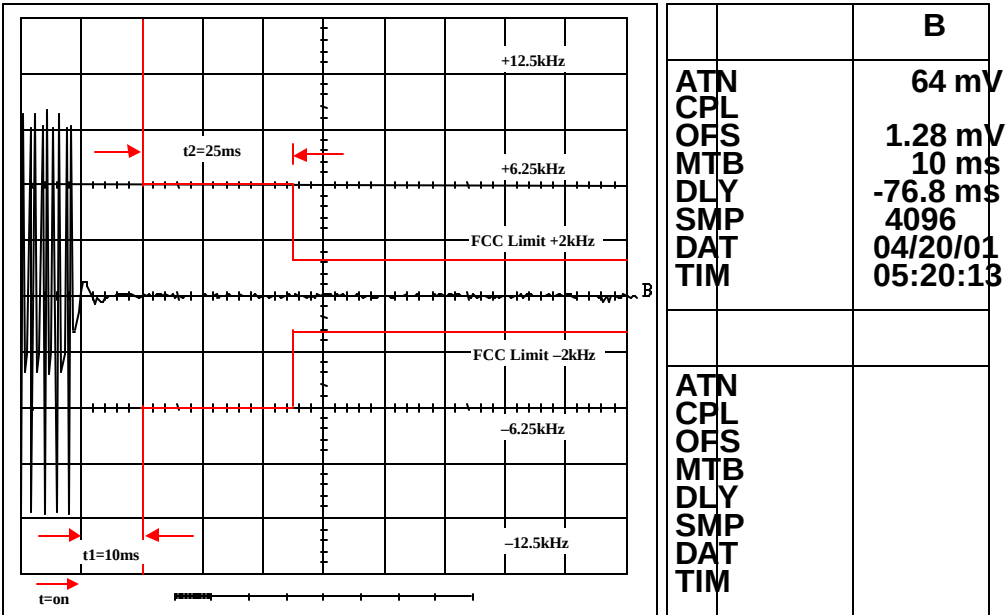


Figure 9.3-2: Transient Frequency Behavior

Power: 4W at 481.050 MHz
Channel Spacing: 12.5 kHz
Switch – Off condition

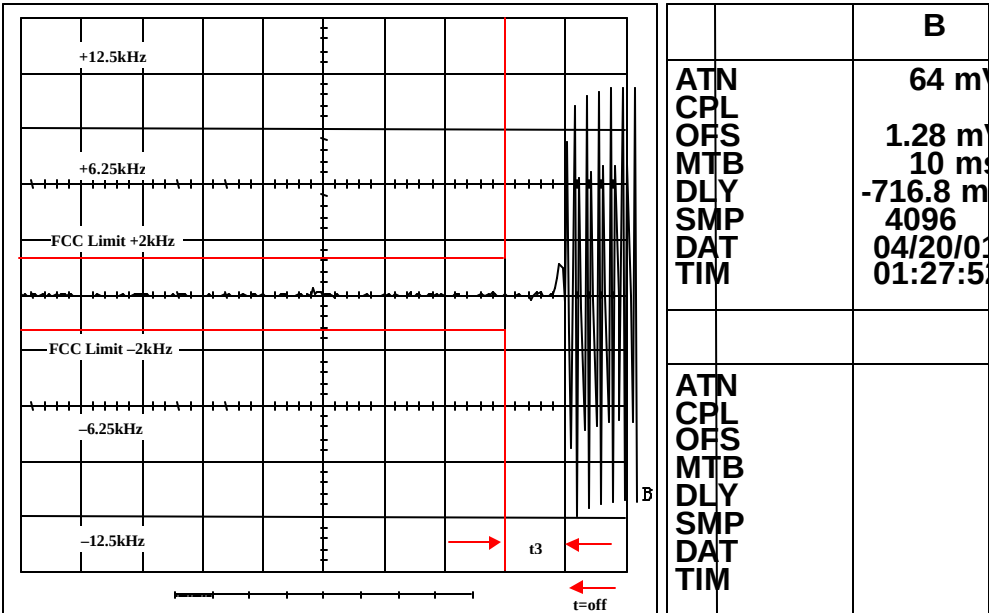


Figure 9.3-3: Transient Frequency Behavior

Power: 1W at 481.050 MHz
Channel Spacing: 12.5 kHz
Switch – On condition

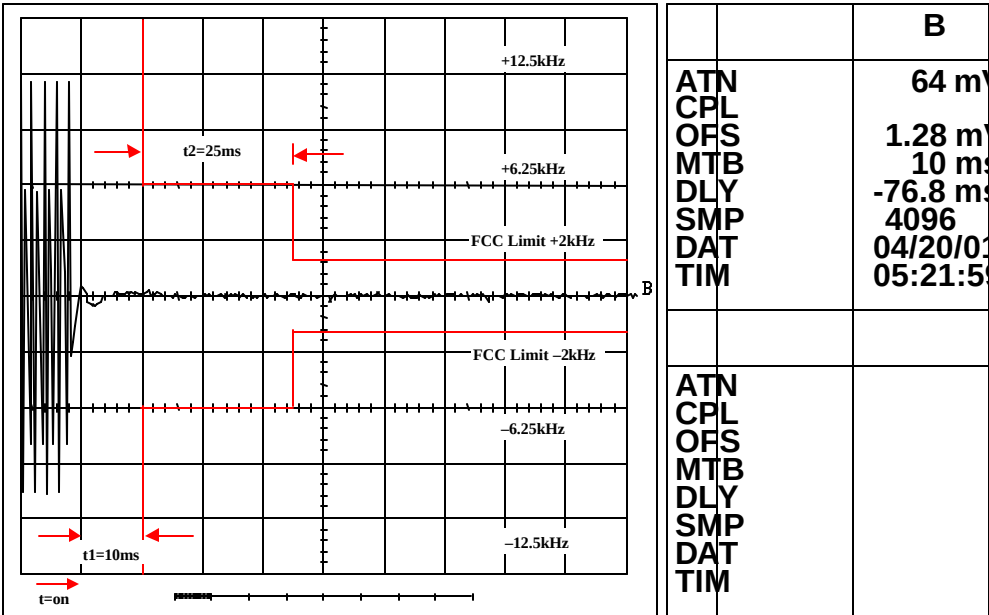


Figure 9.3-4: Transient Frequency Behavior

Power: 1W at 481.050 MHz
Channel Spacing: 12.5 kHz
Switch – Off condition

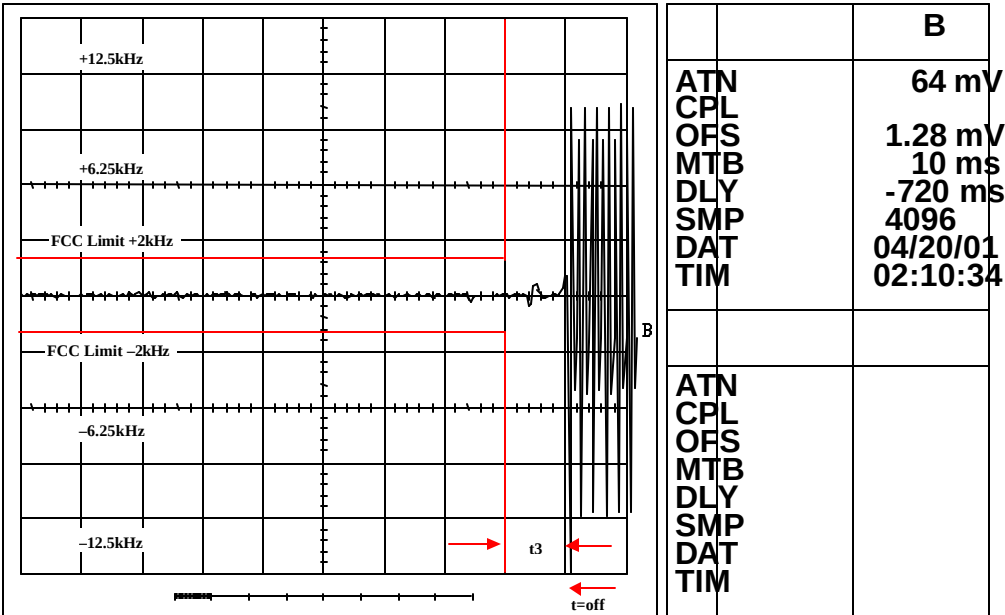


Figure 9.3-5: Transient Frequency Behavior

Power: 4W at 481.050 MHz
Channel Spacing: 25 kHz
Switch – On condition

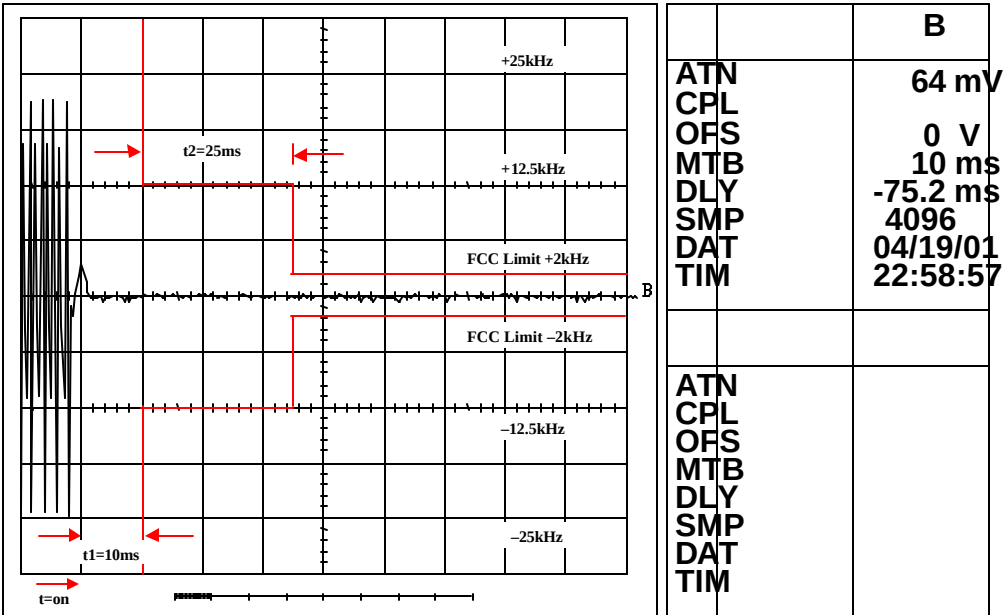


Figure 9.3-6: Transient Frequency Behavior

Power: 4W at 481.050 MHz
Channel Spacing: 25 kHz
Switch – Off condition

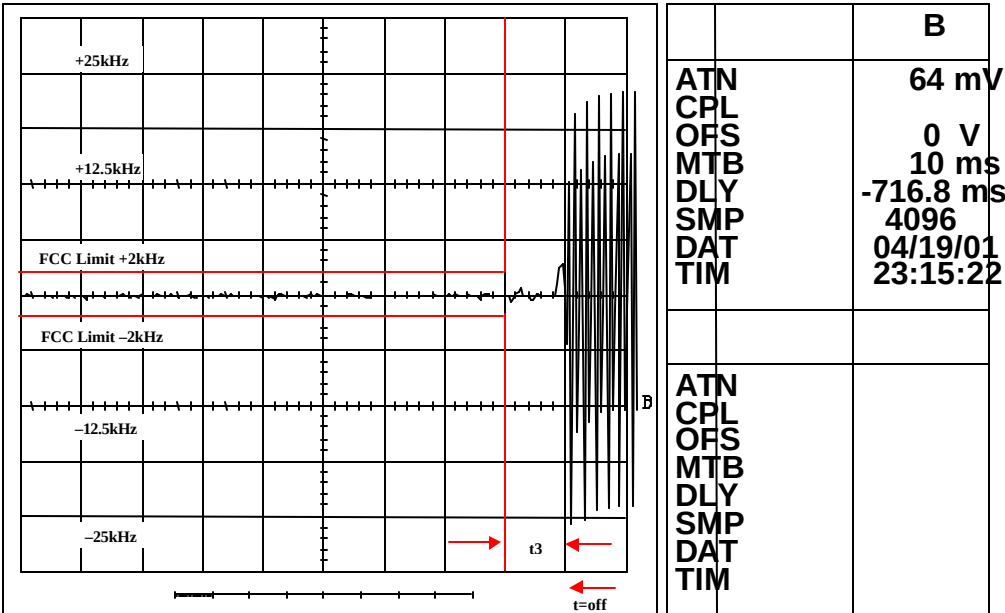


Figure 9.3-7: Transient Frequency Behavior

Power: 1W at 481.050 MHz
Channel Spacing: 25 kHz
Switch – On condition

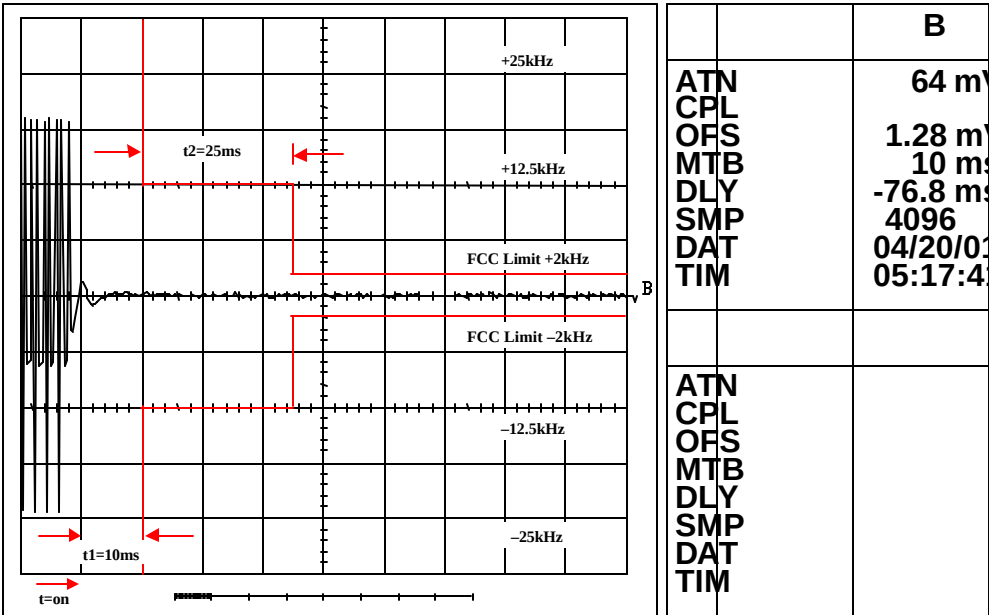
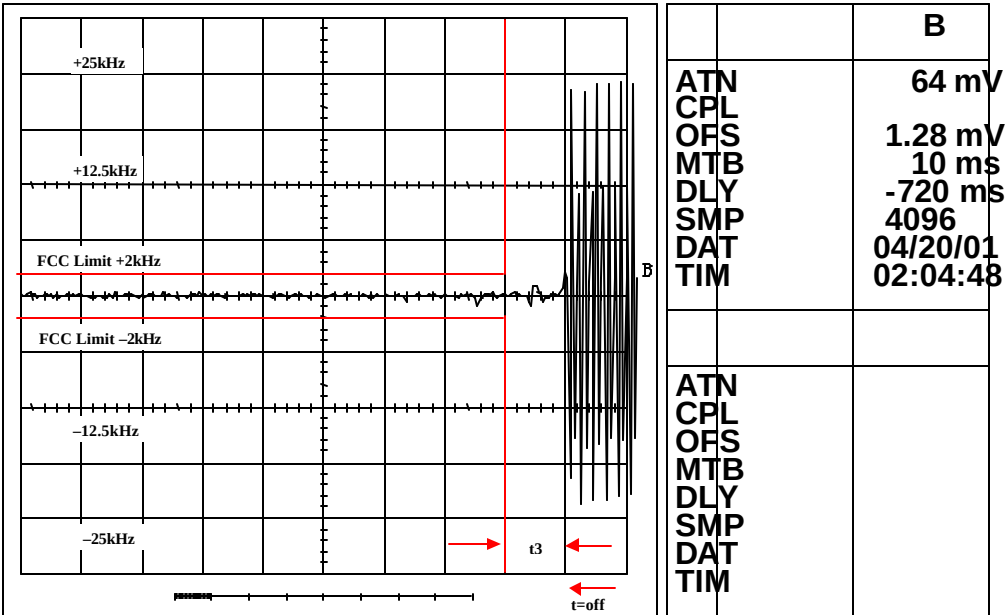


Figure 9.3-8: Transient Frequency Behavior

Power: 1W at 481.050 MHz
Channel Spacing: 25 kHz
Switch – Off condition



9.4 Modifications made during testing

None

9.5 Test instrumentation

- ☒ Philips PM3392A AutoRanging CombiScope
- ☒ Hewlett-Packard 6622A System DC Power Supply
- ☒ Hewlett-Packard 8657A Signal Generator
- ☒ Hewlett-Packard 8901B Modulation Analyzer
- ☒ Narda Bi-directional Coaxial Coupler, Model: 3020A
- ☒ Wavetek Negative RF Detector
- ☒ Weinschel 50 Ohm Termination
- ☒ Weinschel 10 dB Attenuator
- ☒ Sierra 30 dB Attenuator, Model: 661A-30