

**Report on Test Measurements**

*Measurements Report*

The measurement report shows compliance information against the pertinent technical standards. Each section of the report contains either verbiage or graphs which show compliance to applicable standards as required. Each section also explains testing method and indicates what the applicable specification is.

A list of test equipment for all sections, and certification signoff page are included at the end of the measurement report.

**SUBMITTED MEASURED DATA – INDEX**

**EXHIBIT DESCRIPTION**

E1-1	RF Output-Data
E1-2	Audio Frequency Response – Modulation Characteristics: Setup, Specifications, Index
E1-2.1	Audio Frequency Response – Modulation Characteristics, 12.5 kHz Channels
E1-3	Audio Modulation Limiting – Modulation Characteristics: Setup, Specifications, Index
E1-3.1	Audio Modulation Limiting – Modulation Characteristics, 12.5 kHz Channels
E1-4	Occupied Bandwidth: Setup, Specifications, and Index
	Measurements for Rule Part 24D 50 kHz Channel Plan:
E1-4.1	Carrier with 2500 Hz Audio Tone
E1-4.2	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling
E1-4.3	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling
	Measurements for 12.5 kHz Channels:
E1-4.4	Carrier with 2500 Hz Audio Tone
E1-4.5	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling
E1-4.6	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling
E1-4.7	Carrier with Digitized Voice / Data
E1-5	Conducted Spurious Emissions: Setup, Specifications, and Index
E1-5.1	Conducted Spurious Emissions, Harmonics, Power 75 Watts, Low / Mid / High Frequencies
E1-5.2	Conducted Spurious Emissions, Harmonics, Power 20 Watts, Low / Mid / High Frequencies
E1-5.3	Conducted Spurious Emissions, Close-In, 200 MHz Span, Power Output at 75 Watts
E1-5.4	Conducted Spurious Emissions, Close-In, 20 MHz Span, Power Output at 75 Watts
E1-6	Radiated Spurious Emissions: Setup, Specifications, and Index
E1-6.1	Radiated Spurious Emissions, Harmonics, Power 75 Watts, Middle of Band
E1-6.2	Radiated Spurious Emissions, Harmonics, Power 20 Watts, Middle of Band
E1-7	Frequency Stability: Setup, Specifications, and Index
E1-7.1	Frequency Stability Vs Temperature
E1-7.2	Frequency Stability Vs Voltage
E1-11	Test Equipment Used
E1-12	Statement of Certification

## Report on Test Measurements

*RF Power Output Data*

The RF power output was measured with the indicated voltage applied to and current into the final RF amplifying device. The DC current indicated is the total for the final RF amplifier stage, consisting of four parallel power transistors.

## Analog Voice Frequency Modulation Mode:

Measured RF output	<u>75</u>	Watts
DC Voltage	<u>28.5</u>	Volts
DC Current	<u>9.0</u>	Amperes
Input power for final RF amplifying device(s)	<u>255</u>	Watts
Primary Radio Input Supply Voltage	<u>120</u>	Volts AC
Minimum Measured RF output	<u>20</u>	Watts, Average
Normal DC Voltage	<u>28.5</u>	Volts
Normal DC Current	<u>3.6</u>	Amperes
Input power for final RF amplifying device(s)	<u>105</u>	Watts
Primary Radio Input Supply Voltage	<u>120</u>	Volts AC

## Digital 4-Level Frequency Shift Key Modulation Mode:

Measured RF output	<u>75</u>	Watts
DC Voltage	<u>28.5</u>	Volts
DC Current	<u>9.0</u>	Amperes
Input power for final RF amplifying device(s)	<u>255</u>	Watts
Primary Radio Input Supply Voltage	<u>120</u>	Volts AC
Minimum Measured RF output	<u>20</u>	Watts, Average
Normal DC Voltage	<u>28.5</u>	Volts
Normal DC Current	<u>3.6</u>	Amperes
Input power for final RF amplifying device(s)	<u>105</u>	Watts
Primary Radio Input Supply Voltage	<u>120</u>	Volts AC

## Report on Test Measurements

*Audio Frequency Response*Specification Requirement per TIA 603:

Audio Frequency Response, 25 kHz Channels: The audio frequency response from 300 Hz to 3000 Hz shall not vary more than +1 dB or -3 dB from a true 6 dB per octave pre-emphasis characteristic as referenced to the 1000 Hz level, with an additional 6 dB per octave attenuation allowed from 500 Hz to 300 Hz, and an additional 6 dB per octave attenuation is allowed from 2500 Hz to 3000 Hz in equipment operating in the 25 MHz to 869 MHz range.

Audio Frequency Response, 12.5 kHz Channels: The audio frequency response from 300 Hz to 3000 Hz shall not vary more than +1 dB or -3 dB from a true 6 dB per octave pre-emphasis characteristic as referenced to the 1000 Hz level, with an additional 6 dB per octave attenuation allowed from 500 Hz to 300 Hz. An additional 6 dB per octave rolloff is allowed from 2300 Hz to 2700 Hz, and an additional 12 dB per octave is allowed from 2700 Hz to 3000 Hz in equipment operating in the 896 MHz to 940 MHz range or for 12.5 kHz channel operation.

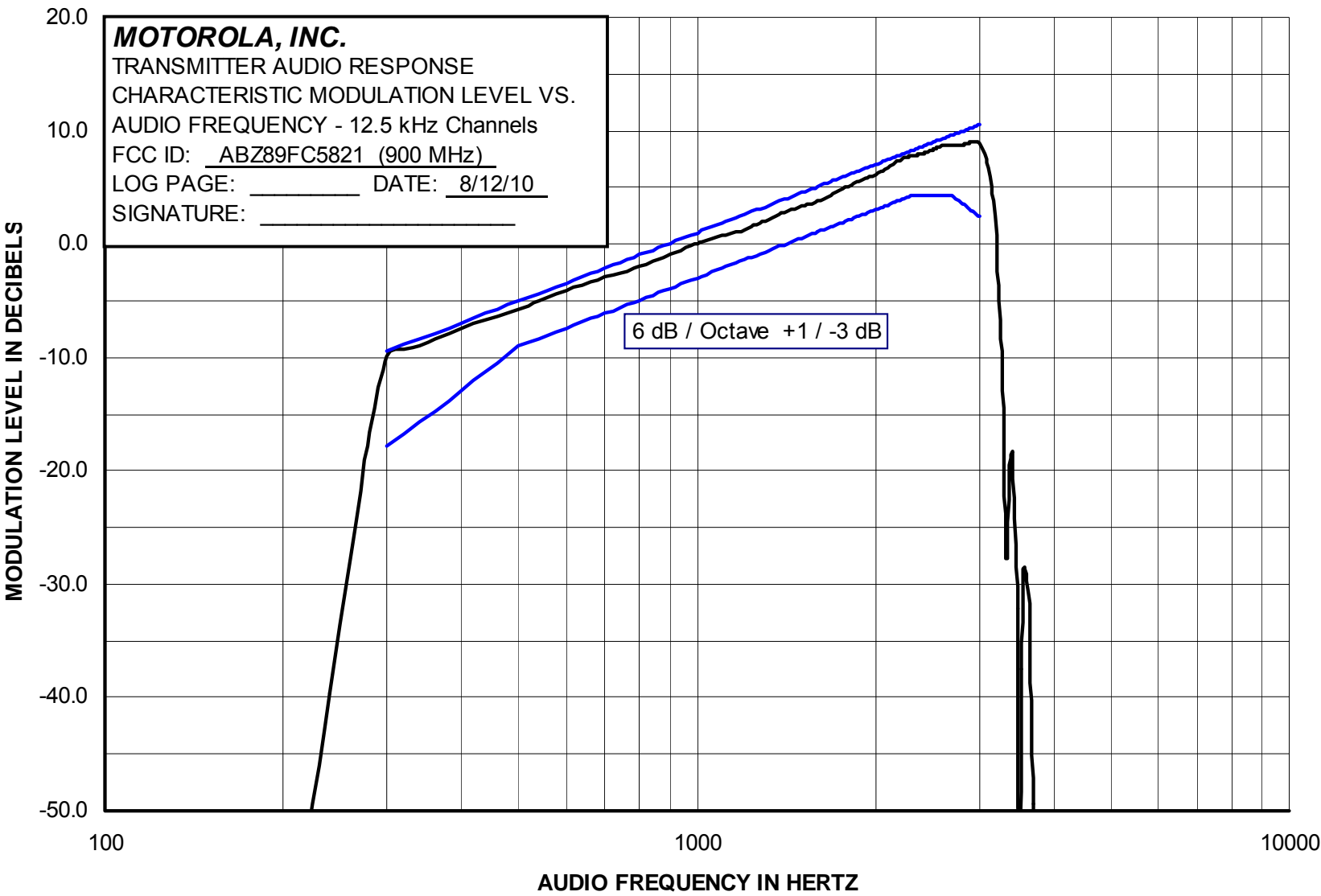
Modulation: Audio Test Tone

Carrier Frequency: A carrier at 938.0125 MHz was measured. This frequency is near the center of the operating band 935-941 MHz

EXHIBIT	DESCRIPTION
E1-2.1	Audio Frequency Response – Modulation Characteristics, 12.5 kHz Channels The specification limit is shown on the response plot

Report on Test Measurements

Audio Frequency Response – 12.5 kHz Channels



**Report on Test Measurements***Modulation Limiting*Specification Requirement per TIA 603:

Modulation Limiting, 25 kHz Channels: The maximum instantaneous peak and steady state deviations shall not exceed the rated system deviation of +/- 5 kHz at any audio frequency or change in level as specified in the method of measurement.

The minimum value of modulation limiting shall be at least 60% of the rated system deviation, or 3 kHz.

Modulation Limiting, 12.5 kHz Channels: The maximum instantaneous peak and steady state deviations shall not exceed the rated system deviation of +/- 2.5 kHz at any audio frequency or change in level as specified in the method of measurement.

The minimum value of modulation limiting shall be at least 60% of the rated system deviation, or 1.5 kHz.

Modulation: Audio Test Tone, Varying Frequency between 300 Hz and 3000 Hz

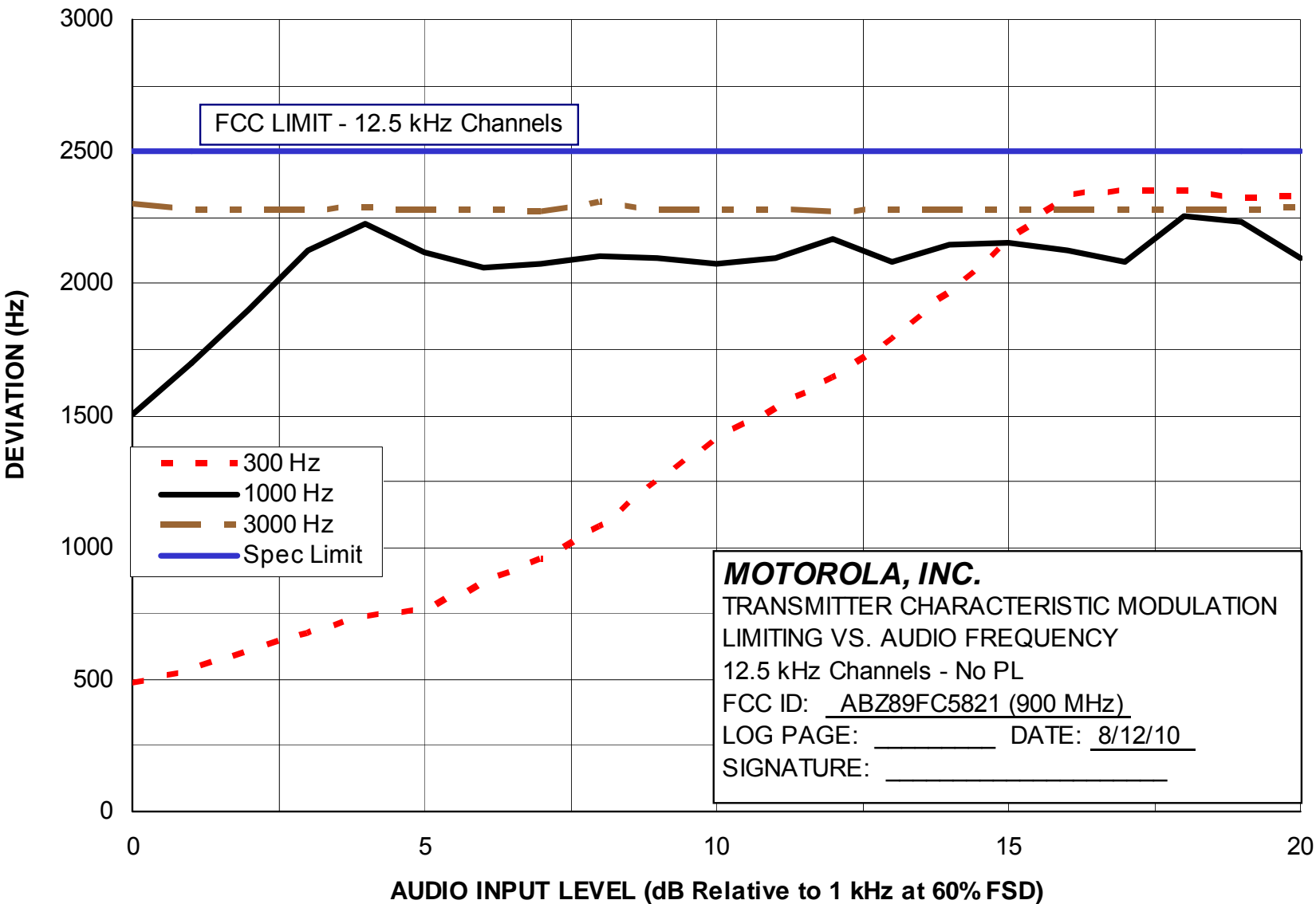
Carrier Frequency: A carrier at 938.0125 MHz was measured. This frequency is near the center of the operating band 935-941 MHz

**Modulation Limiting Response Plots:****EXHIBIT      DESCRIPTION**

E1-3.1	Modulation Limiting Response – Modulation Characteristics, 12.5 kHz Channels The specification limit is shown on the response plot
--------	---

Report on Test Measurements

Modulation Limiting – 25 kHz Channels



# Report on Test Measurements

## Occupied Bandwidth – 50 kHz Channel Spacing – 940 - 941 MHz Part 24 Operation

There is one exhibit shown for 900 MHz / Part 24 operation. This mode can be used in a system configuration based upon channel usage as described in Exhibit B. All of the following charts reference the following setup and specification requirements.

The occupied bandwidth charts reference the following setup and specification requirements.

Modulation Type: Analog Voice  
 Emission Designator: 16K0F3E  
 Channelization: 25 kHz channels, Rule Part 24D 50 kHz channel plan  
 Deviation Limit:  $\pm 5.0$  kHz Max  
 Power Setting: 75 Watts

## § 24.133 Emission Limits:

(1) For transmitters authorized for a bandwidth greater than 10 kHz

(a) The power of any emission shall be attenuated below the transmitter power (P), as measured in accordance with § 24.132(f), in accordance with the following schedule:

(i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of up to and including 40 kHz:  
*at least  $116 \log_{10} ((f_d + 10)/6.1)$  decibels;*  
*or 50 plus  $10 \log_{10} (P)$  decibels;*  
*or 70 decibels;*  
*(whichever is the lesser attenuation)*

(ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 40 kHz:  
*at least 43 plus  $10 \log_{10} (P)$  decibels;*  
*or 80 decibels;*  
*(whichever is the lesser attenuation)*

(b) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

(c) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

(d) The following minimum spectrum analyzer resolution bandwidth settings will be used: 300 Hz when showing compliance with paragraphs (a)(1)(i) and (a)(2)(i) of this section; and 30 kHz when showing compliance with paragraphs (a)(1)(ii) and (a)(2)(ii) of this section.

§ 24.132(f) All power levels specified in this section are expressed in terms of the maximum power, averaged over a 100 millisecond interval, when measured with instrumentation calibrated in terms of an rms-equivalent voltage with a resolution bandwidth equal to or greater than the authorized bandwidth.

## Necessary Bandwidth Calculation:

The necessary bandwidth of the modulation signal per the formulas defined in 47 CFR 2.202 (b) is as follows:

<i>Max Mod Freq, M</i>	<i>Max Deviation, D</i>	<i><math>2*(M+D)</math></i>	<i>Nec BW</i>
3 kHz	5 kHz	16 kHz	16K0

## Report on Test Measurements

*Occupied Bandwidth – 50 kHz Channel Spacing – 940 - 941 MHz Part 24 Operation (Continued)*

Emission Measurement Analyzer Settings:

Horizontal:	12.5 kHz per Division	Resolution Bandwidth:	300 Hz
Vertical:	10 dB per Division	Video Bandwidth:	30 kHz
Sweep Time:	72 Seconds (<2000 Hz / Second)	Span:	125 kHz
Detector Mode:	Peak		

Test Procedure:

- 1) Key the station with no modulation to obtain the unmodulated carrier reference level on the analyzer. Use the analyzer controls to set this reference to a full-scale reference line. Store this analyzer trace in trace A.
- 2) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.
- 3) Allow the analyzer to sweep, and record the resultant emission levels in trace B.
- 4) Plot the resulting analyzer trace. The occupied bandwidth mask is then added along with additional labeling as appropriate.

EXHIBIT	DESCRIPTION
E1-4.1	Carrier with 2500 Hz Audio Tone, Rule Part 24D Channels
E1-4.2	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, Rule Part 24D Channels
E1-4.3	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, Rule Part 24D Channels



## Report on Test Measurements

*Occupied Bandwidth – Analog Voice, Digitized Voice and Data Frequency Modulation, 12.5 kHz Channel Spacing*  
The exhibits in this section show occupied bandwidth plots for analog voice modulation. Data is shown with the modulating audio tone itself, the tone plus Private Line (PL) sub-audible tone signaling, and tone plus Digital Private Line (DPL) sub-audible signaling.

There is also an exhibit showing the occupied bandwidth plot for digitized voice or data modulation. The signaling utilized is 4-level frequency shift keying of the carrier frequency.

The occupied bandwidth charts reference the following setup and specification requirements.

Modulation Type:	Analog Voice	Digitized Voice, Data
Emission Designator:	11K0F3E	7K60FXE, 7K60FXD
Channelization:	12.5 kHz	12.5 kHz
Deviation Limit:	±5.0 kHz Max	
Power Setting:	75 Watts	75 Watts

Specification Requirement § 90.210(i) Emission Limits (Analog Voice):

*Emission Mask I.* For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: *At least 25 dB;*
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: *At least 35 dB;*
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: *At least 43 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.*

Specification Requirement § 90.210(j) Emission Limits (Digitized Voice / Data):

*Emission Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 2.5 kHz, but no more than 6.25 kHz: *At least 53 log ( $f_d/2.5$ ) dB;*
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: *At least 103 log ( $f_d/3.9$ ) dB;*
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 9.5 kHz: *At least 157 log ( $f_d/5.3$ ) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.*

Necessary Bandwidth Calculation (Analog Emission):

The necessary bandwidth of the modulation signal per the formulas defined in 47 CFR 2.202 (b) is as follows:

<i>Max Mod Freq, M</i>	<i>Max Deviation, D</i>	<i>2*(M+D)</i>	<i>Nec BW</i>
3 kHz	2.5 kHz	11 kHz	11K0

Necessary Bandwidth Calculation (Digital Emission): An occupied bandwidth of 7.60 kHz was measured for this emission, per 2.202 paragraph (a) of the Rules and Regulations, as that bandwidth which contains 99% of the power in the transmitted signal. For this system, the necessary bandwidth has been chosen to be the same as the occupied bandwidth, thereby per paragraph (b) (2), the necessary bandwidth is 7K60.

## Report on Test Measurements

*Occupied Bandwidth –12.5 kHz Channel Spacing (continued)*Measurement Procedure and Instrument Settings:Emission Measurement Analyzer Settings:

Horizontal:	12.5 kHz per Division	Resolution Bandwidth:	300 Hz
Vertical:	10 dB per Division	Video Bandwidth:	10 kHz
Sweep Time:	72 Seconds (<2000 Hz / Second)	Span:	125 kHz
Detector Mode:	Peak		

Test Procedure (Analog Voice):

- 1) Key the station with no modulation to obtain the unmodulated carrier reference level on the analyzer. Use the analyzer controls to set this reference to a full-scale reference line. Store this analyzer trace in trace A.
- 2) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.
- 3) Allow the analyzer to sweep, and record the resultant emission levels in trace B.
- 4) Plot the resulting analyzer trace. The occupied bandwidth mask is then added along with additional labeling as appropriate.

Test Procedure (Digitized Voice or Data):

- 1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
- 2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Use the analyzer controls to set this signal to the full-scale reference line. Allow the analyzer to sweep fully and store the sweep.
- 3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier in a 12.5 kHz bandwidth.
- 4) Use the carrier power value from the previous step to generate the emission mask limit.
- 5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.

EXHIBIT	DESCRIPTION
E1-4.4	Carrier with 2500 Hz Audio Tone, 12.5 kHz Channels
E1-4.5	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, 12.5 kHz Channels
E1-4.6	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, 12.5 kHz Channels
E1-4.7	Carrier with Digitized Voice / Data, 12.5 kHz Channels

APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

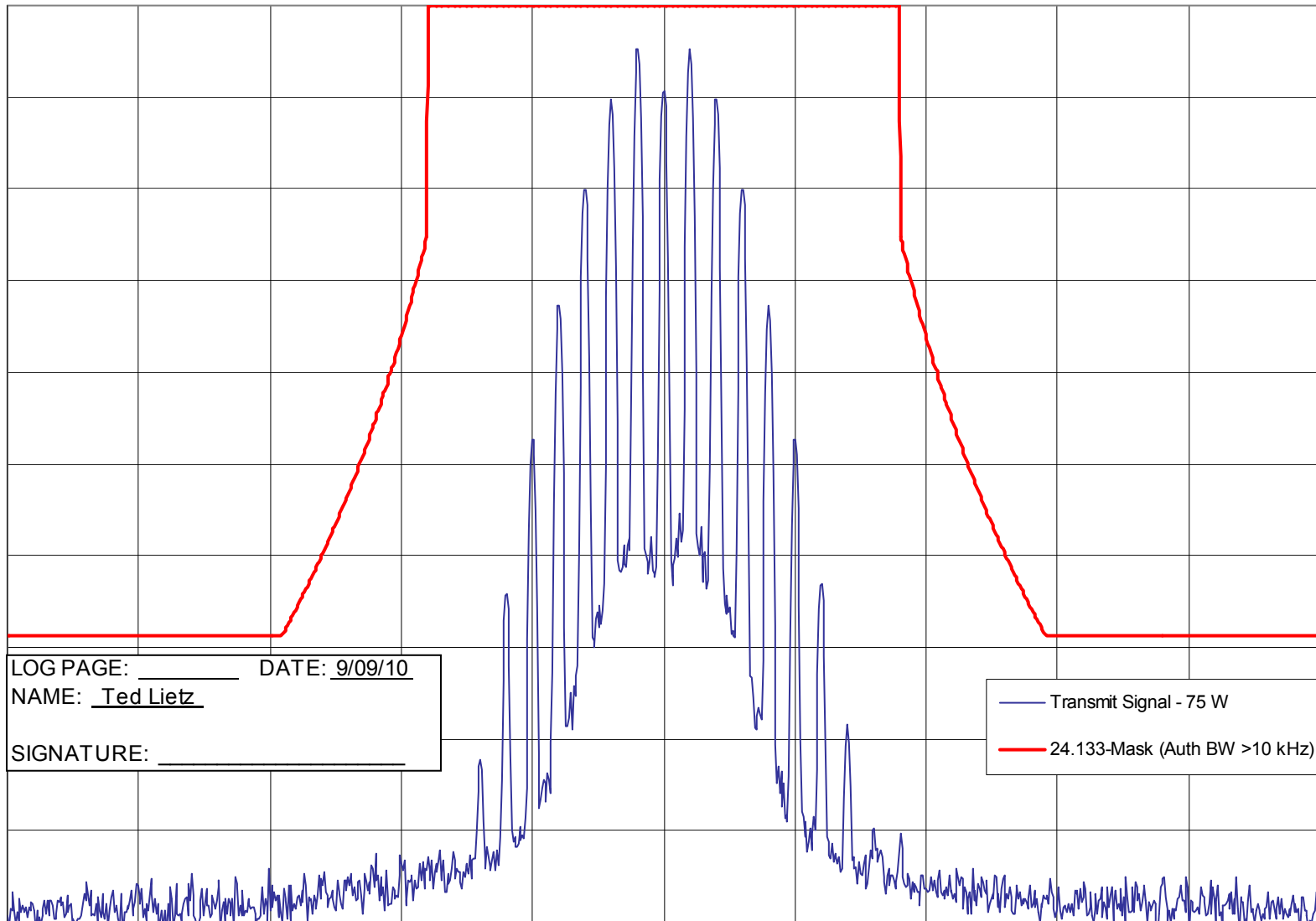
*Occupied Bandwidth – Carrier with 2500 Hz Audio Tone, Rule Part 24D Channels*

Occupied Bandwidth - Rule Part 24D Channels - Carrier with 2500 Hz Audio Tone - 16K0F3E

REF 50 dBm

ATTEN 20 dB

10 dB/  
Peak



CENTER 940.51250 MHz

RES BW 300 Hz

VID BW 3 kHz

SPAN 125 kHz

SWP 72 sec

EXHIBIT E1-4.1

APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

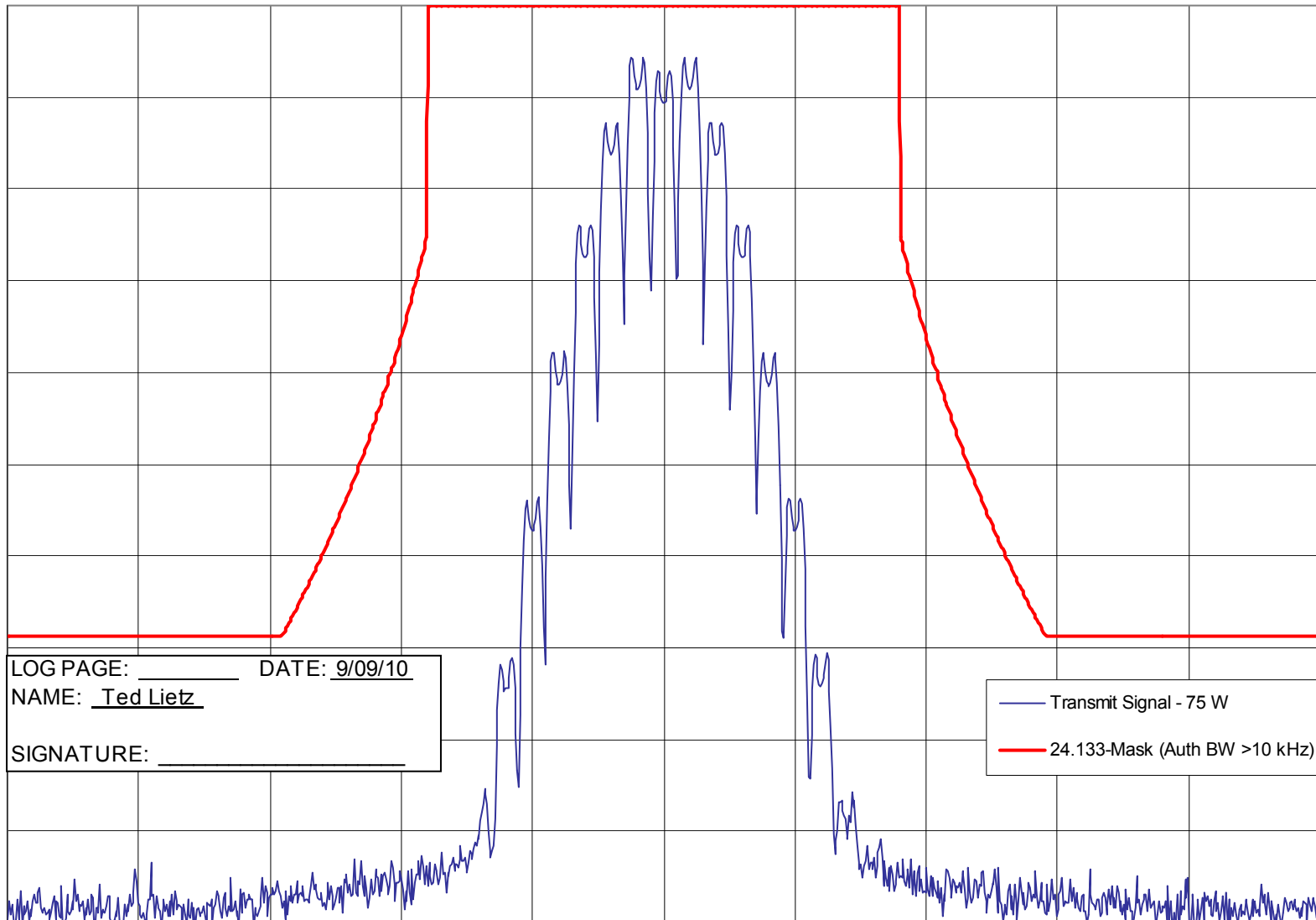
*Occupied Bandwidth – Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, Rule Part 24D Channels*

Occupied Bandwidth - Rule Part 24D Channels - Carrier 2500 Hz Audio and 123 Hz PL - 16K0F3E

REF 50 dBm

ATTEN 20 dB

10 dB/  
Peak



CENTER 940.51250 MHz

RES BW 300 Hz

VID BW 3 kHz

SPAN 125 kHz

SWP 72 sec

EXHIBIT E1-4.2

APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

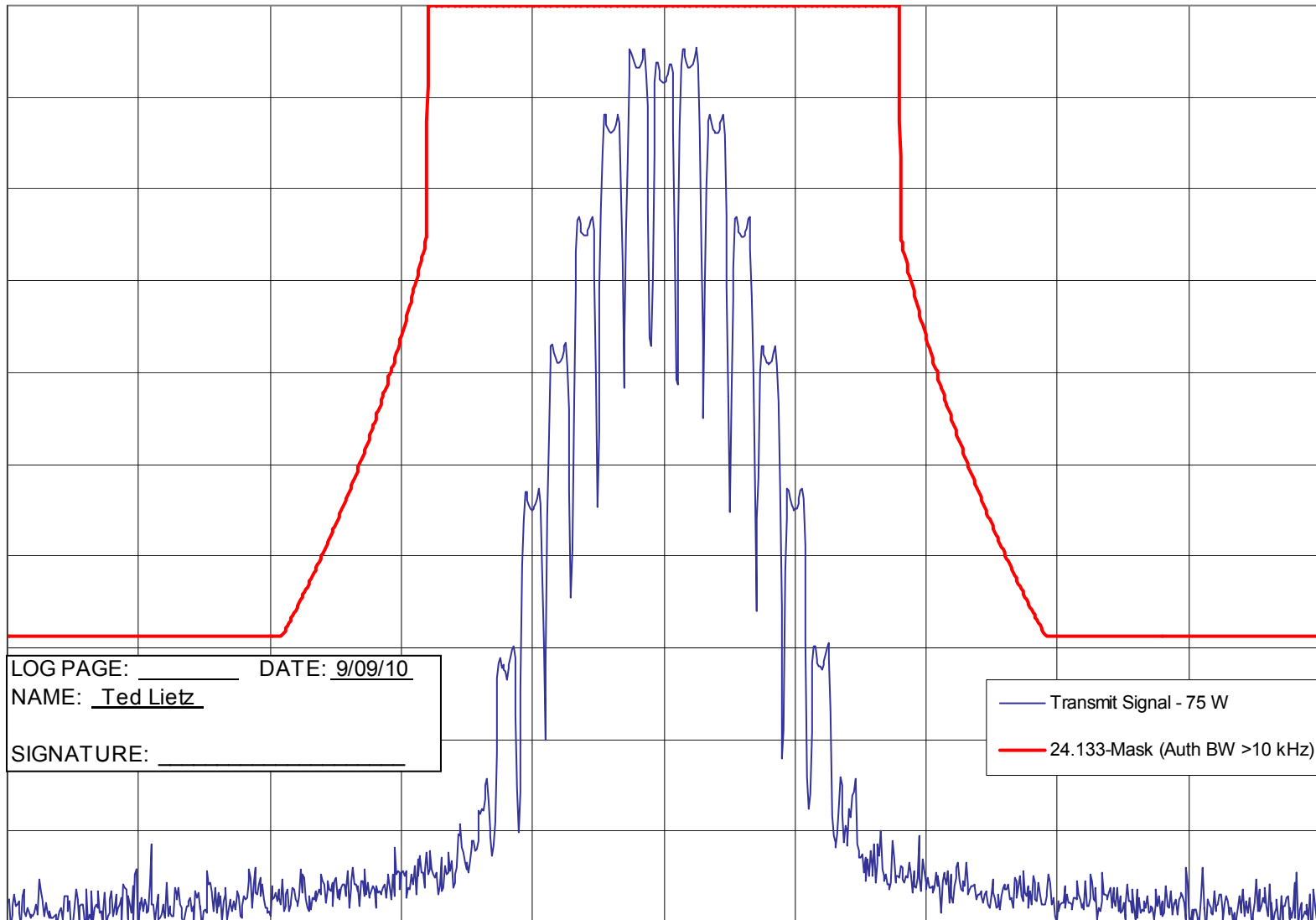
*Occupied Bandwidth – Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, Rule Part 24D Channels*

Occupied Bandwidth - Rule Part 24D Channels - Carrier 2500 Hz Audio and 627 DPL - 16K0F3E

REF 50 dBm

ATTEN 20 dB

10 dB/  
Peak



CENTER 940.51250 MHz

RES BW 300 Hz

VID BW 3 kHz

SPAN 125 kHz

SWP 72 sec

EXHIBIT E1-4.3

APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

*Occupied Bandwidth – Carrier with 2500 Hz Audio Tone, 12.5 kHz Channels*

Occupied Bandwidth - 12.5 kHz Channels - Carrier with 2500 Hz Audio Tone - 11K0F3E

REF 50 dBm

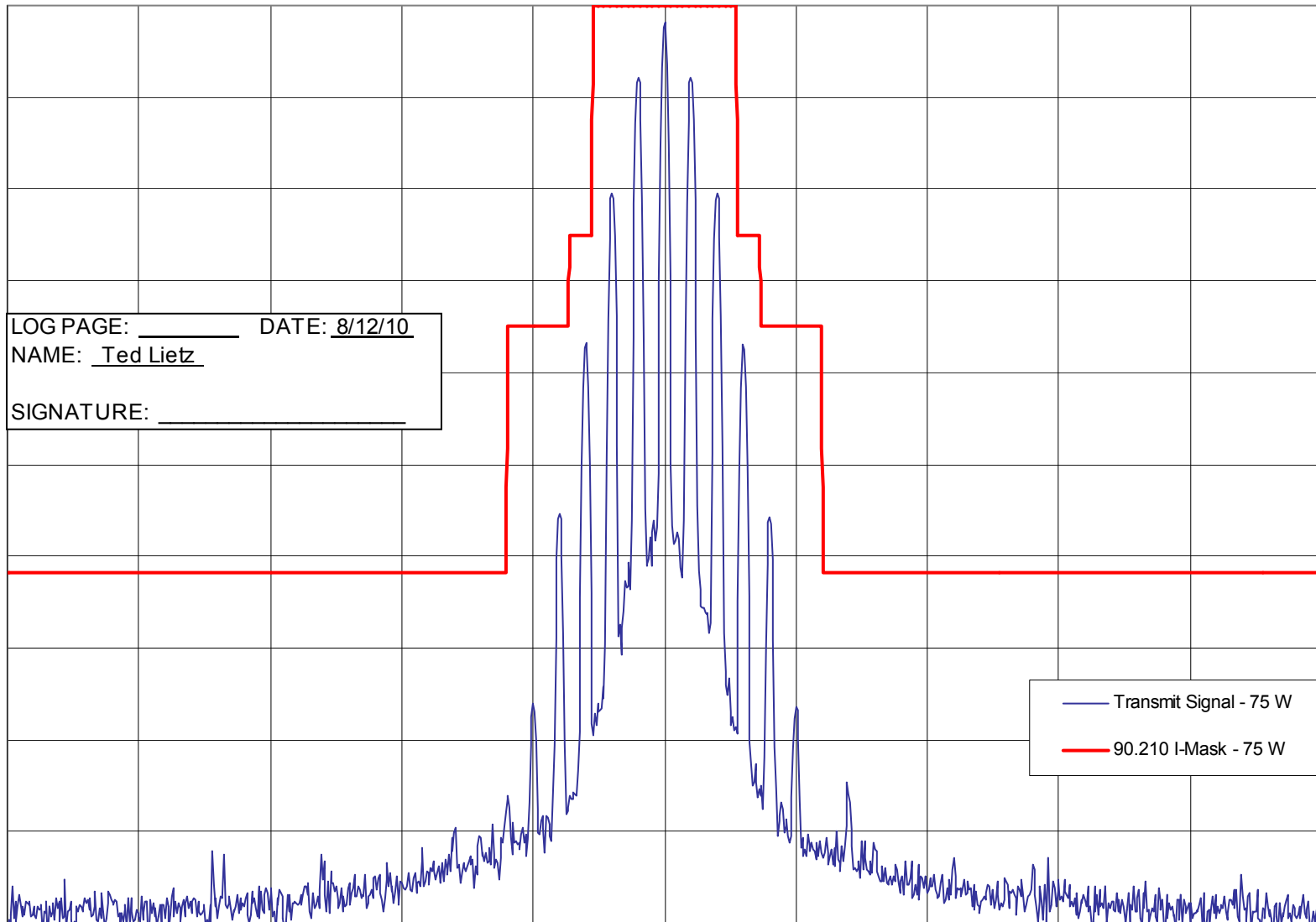
ATTEN 20 dB

10 dB/  
Peak

LOG PAGE: \_\_\_\_\_ DATE: 8/12/10

NAME: Ted Lietz

SIGNATURE: \_\_\_\_\_



CENTER 938.01250 MHz

RES BW 300 Hz

VID BW 3 kHz

SPAN 125 kHz

SWP 72 sec

EXHIBIT E1-4.4

APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

*Occupied Bandwidth – Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, 12.5 kHz Channels*

Occupied Bandwidth - 12.5 kHz Channels - Carrier with 2500 Hz Audio and 123 Hz PL - 11K0F3E

REF 48.8 dBm

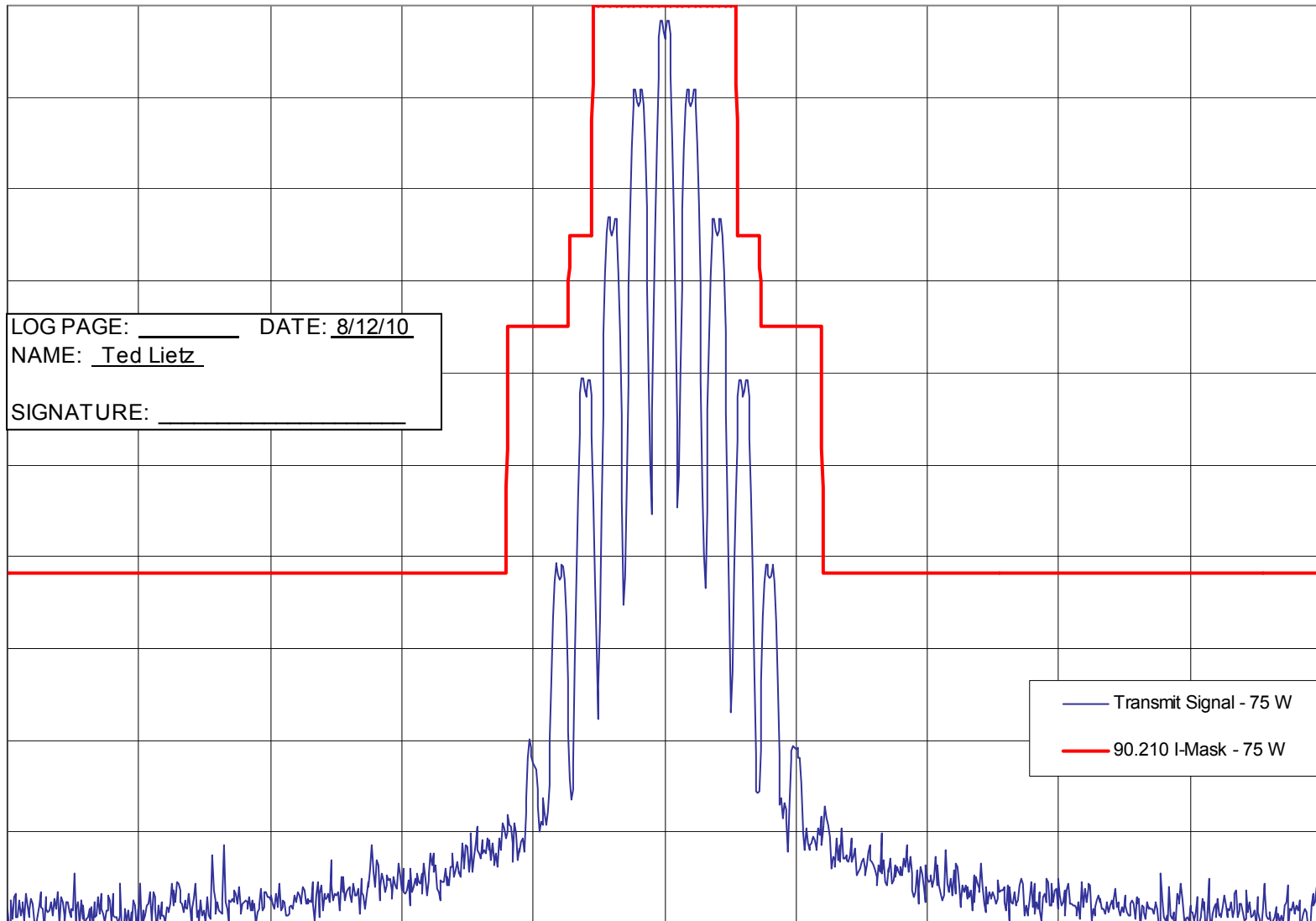
ATTEN 20 dB

10 dB/  
Peak

LOG PAGE: \_\_\_\_\_ DATE: 8/12/10

NAME: Ted Lietz

SIGNATURE: \_\_\_\_\_



CENTER 938.01250 MHz

RES BW 300 Hz

VID BW 3 kHz

SPAN 125 kHz

SWP 72 sec

EXHIBIT E1-4.5

APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

*Occupied Bandwidth – Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, 12.5 kHz Channels*

Occupied Bandwidth - 12.5 kHz Channels - Carrier with 2500 Hz Audio and 627 DPL - 11K0F3E

REF 50 dBm

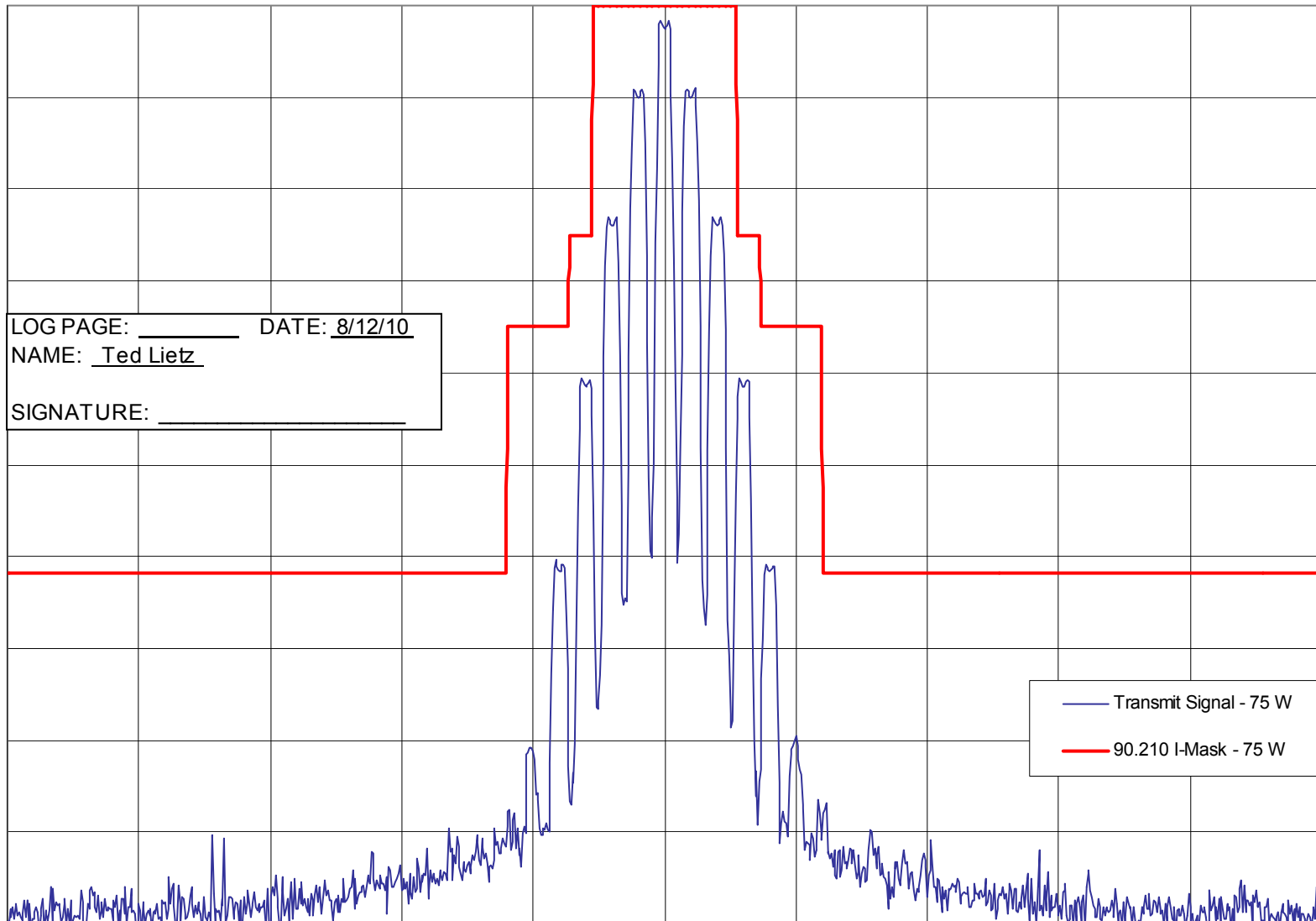
ATTEN 20 dB

10 dB/  
Peak

LOG PAGE: \_\_\_\_\_ DATE: 8/12/10

NAME: Ted Lietz

SIGNATURE: \_\_\_\_\_



CENTER 938.01250 MHz

RES BW 300 Hz

VID BW 3 kHz

SPAN 125 kHz

SWP 72 sec

EXHIBIT E1-4.6



Report on Test Measurements

Occupied Bandwidth – Carrier with Digitized Voice /Data, 12.5 kHz Channels

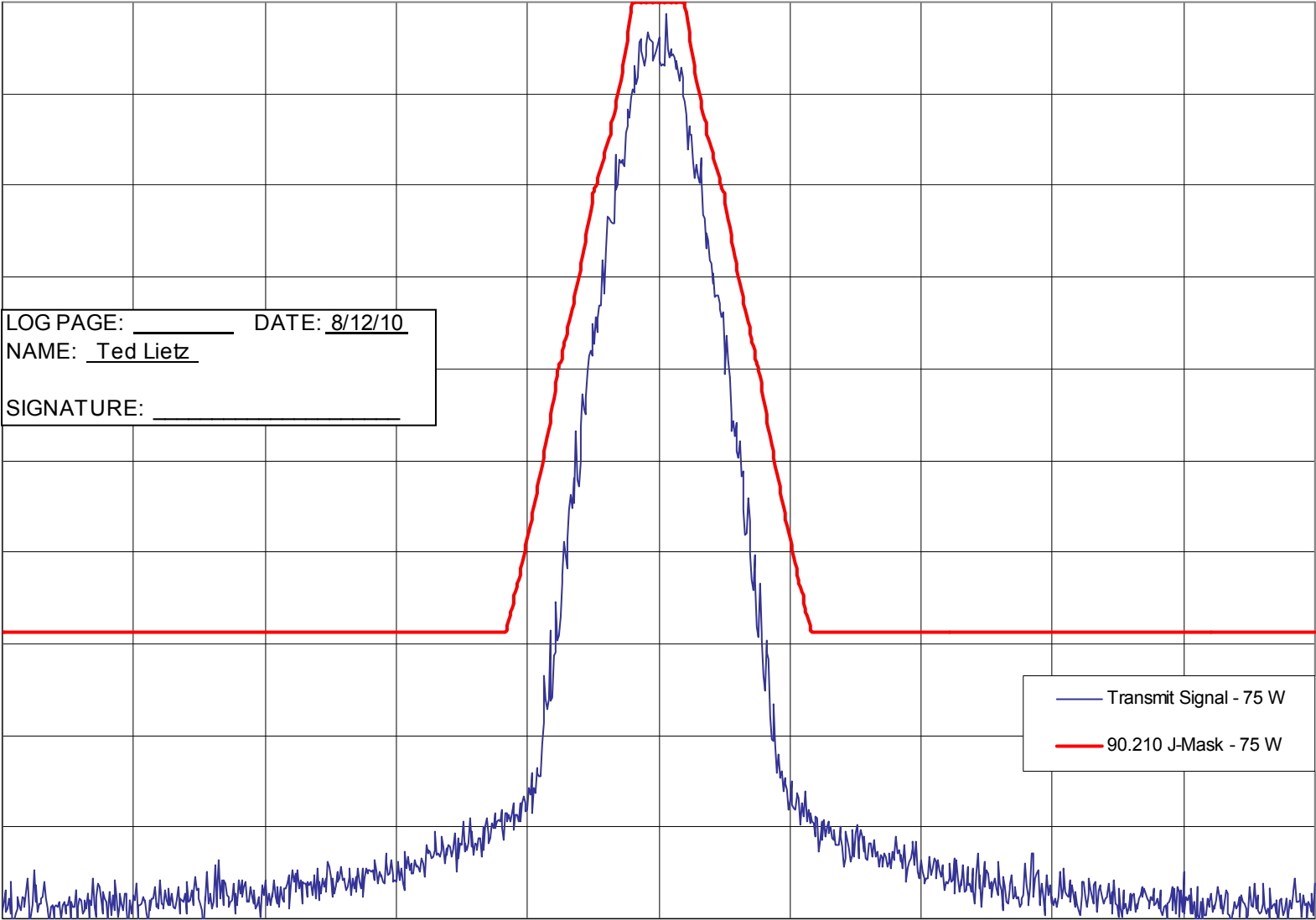
Occupied Bandwidth - 4-Level Frequency Shift Keying Modulation - 7K60FXD, 7K60FXE - 75 Watts

REF 48.8 dBm

ATTEN 20 dB

10 dB/  
Peak

LOG PAGE: \_\_\_\_\_ DATE: 8/12/10  
 NAME: Ted Lietz  
 SIGNATURE: \_\_\_\_\_



CENTER 938.01250 MHz

RES BW 300 Hz

VID BW 10 kHz

SPAN 125 kHz

SWP 72 sec

Report on Test Measurements

Conducted Spurious Emissions, Harmonics and Close-In

Specification Requirement § 90.210(i) Emission Limits:

Emission Mask I: For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

On any frequency removed from the assigned frequency by a displacement frequency ( $F_d$  in kHz) of:

- |   |   |
|---|---|
| 1) >6.8 kHz up to and including 9.0 kHz | At least 25 dB;                                 |
| 2) >9.0 kHz up to and including 15 kHz  | At least 35 dB;                                 |
| 3) >15 kHz                              | at least 43 plus $10 \log_{10}(P)$ dB or 70 dB; |
|   | (whichever is the lesser attenuation).          |

Specification Requirement § 90.210(j) Emission Limits:

Emission Mask J. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

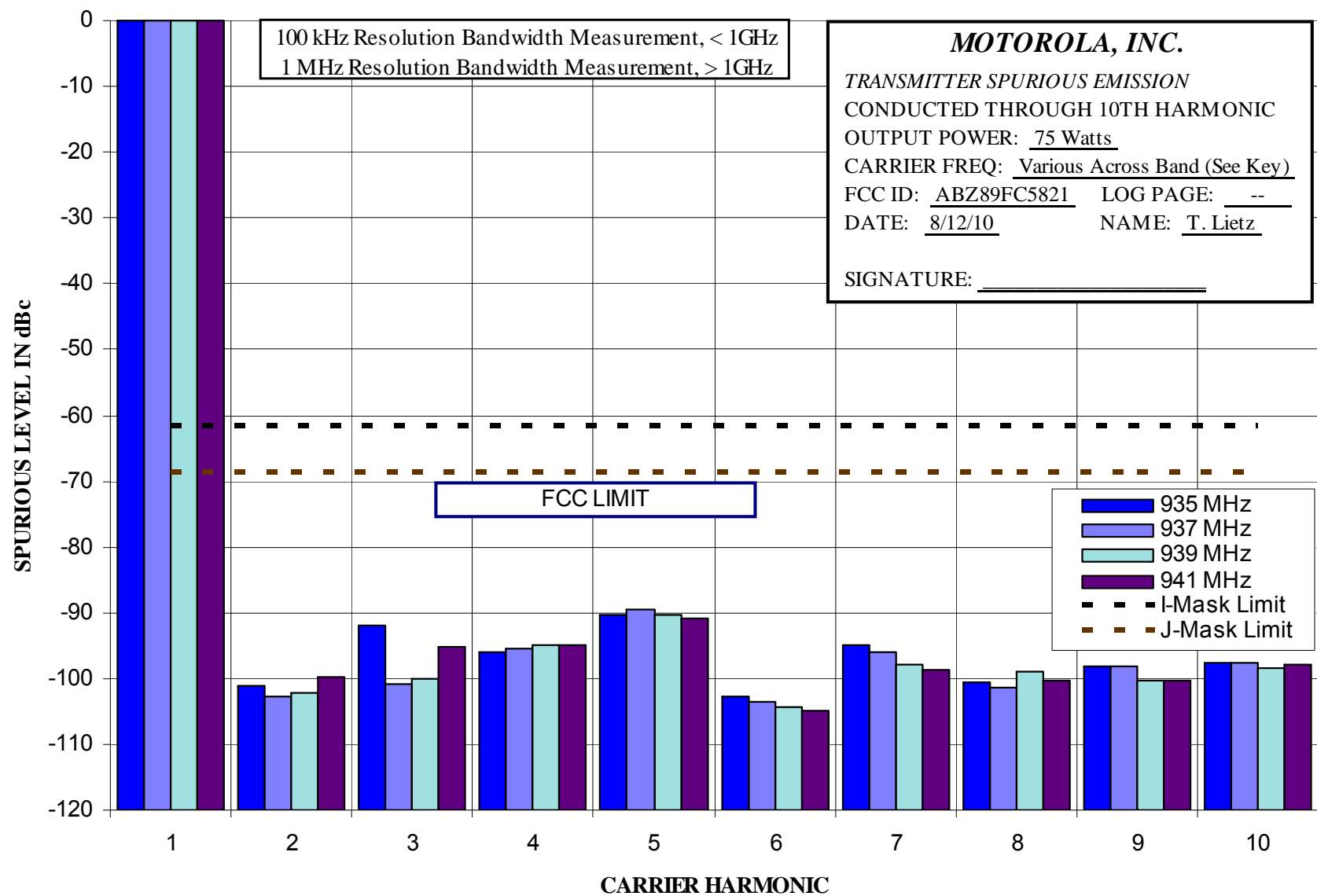
- |  |   |
|--|---|
| 1) >2.5 kHz up to and including 6.25 kHz | At least $53 \log(f_d/2.5)$ dB;                                     |
| 2) >6.25 kHz up to and including 9.5 kHz | At least $103 \log(f_d/3.9)$ dB;                                    |
| 3) >9.5 kHz                              | At least $157 \log(f_d/5.3)$ dB, or $50 + 10 \log(P)$ dB, or 70 dB, |
|  | whichever is the lesser attenuation.                                |

Carrier Frequencies: For harmonics, carrier frequencies of 935, 937, 939, and 941 MHz were measured. These frequencies represent the low end, middle, and high end of the operating band. For Close-in, a carrier frequency in the middle of the operating band, 938.0125 MHz, was used.

EXHIBIT	DESCRIPTION
E1-5.1	Conducted Spurious Emissions, Harmonics, Power Output 75 Watts The specification limit is -68.8 dBc (12.5 kHz channels) or -61.8 dBc (25 kHz channels)
E1-5.2	Conducted Spurious Emissions, Harmonics, Power Output 20 Watts The specification limit is -63.0 dBc (12.5 kHz channels) or -56.0 dBc (25 kHz channels)
E1-5.3	Conducted Spurious Emissions, Close-In, 200 MHz Span, Power Output at 75 Watts The specification limit is -68.8 dBc (12.5 kHz channels) or -61.8 dBc (25 kHz channels)
E1-5.4	Conducted Spurious Emissions, Close-In, 20 MHz Span, Power Output at 75 Watts The specification limit is -68.8 dBc (12.5 kHz channels) or -61.8 dBc (25 kHz channels)

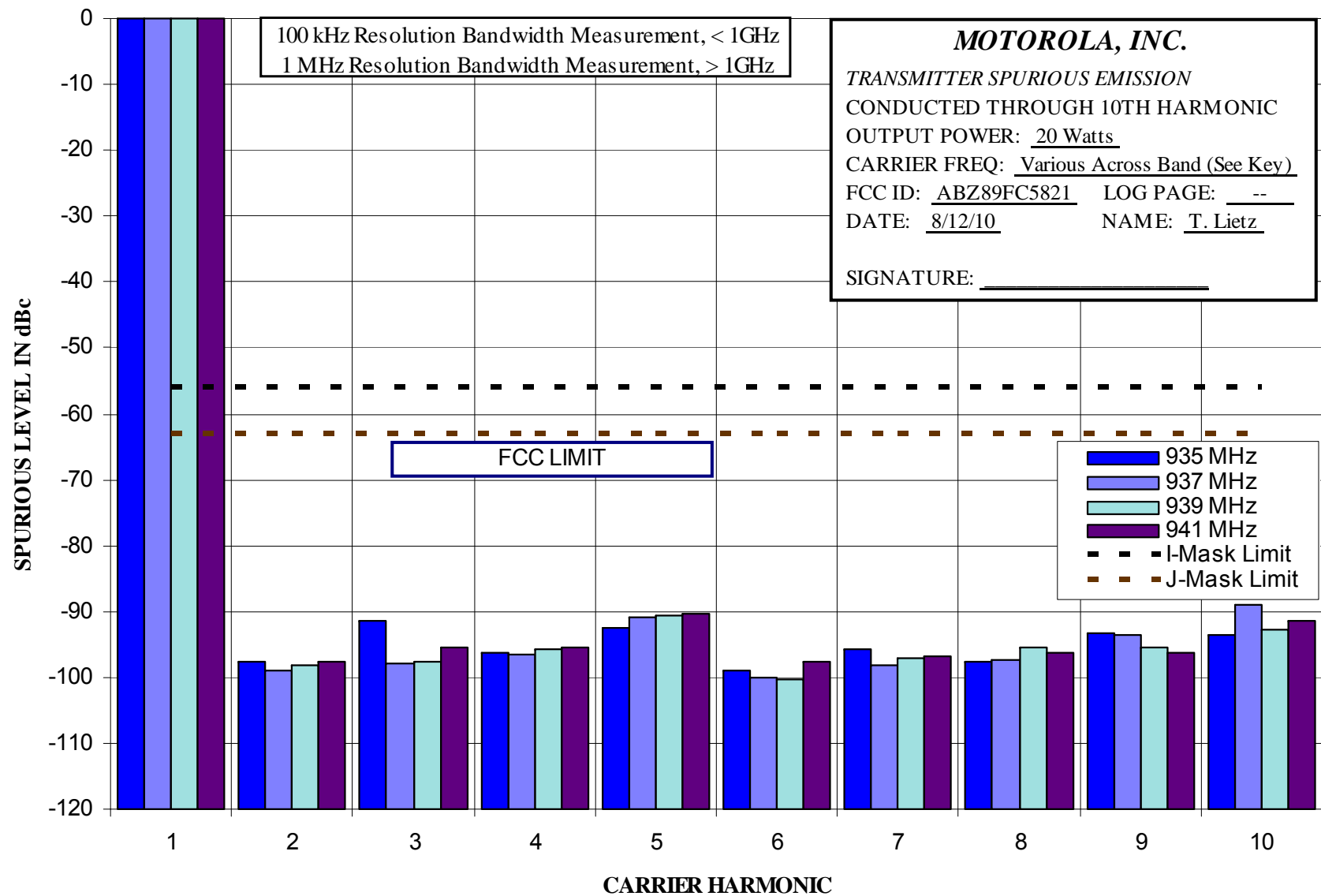
Report on Test Measurements

Conducted Emission – Harmonics – 75 Watts



Report on Test Measurements

Conducted Emission – Harmonics – 20 Watts

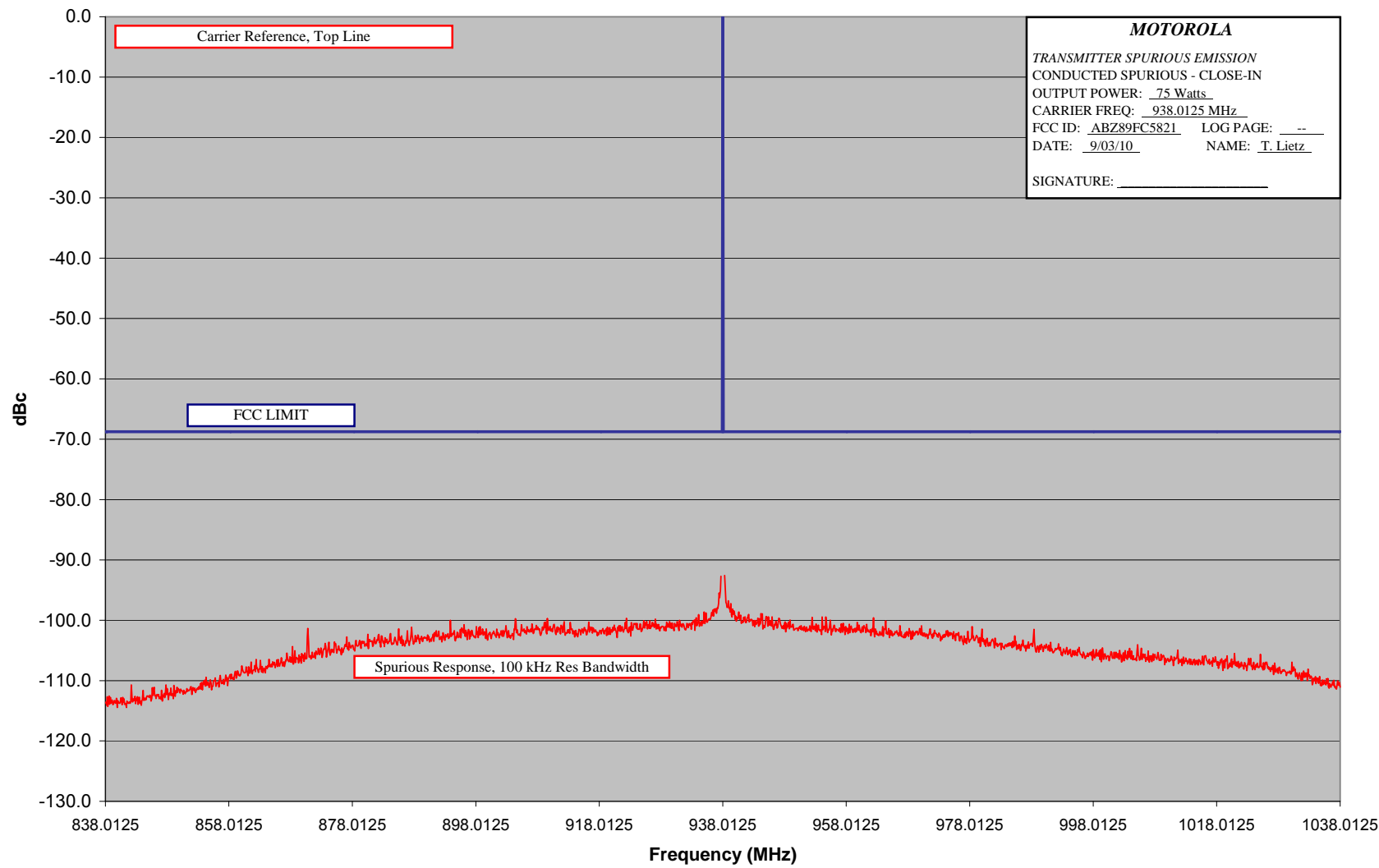


APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

Conducted Emission – Close-In – 75 Watts – 200 MHz Span

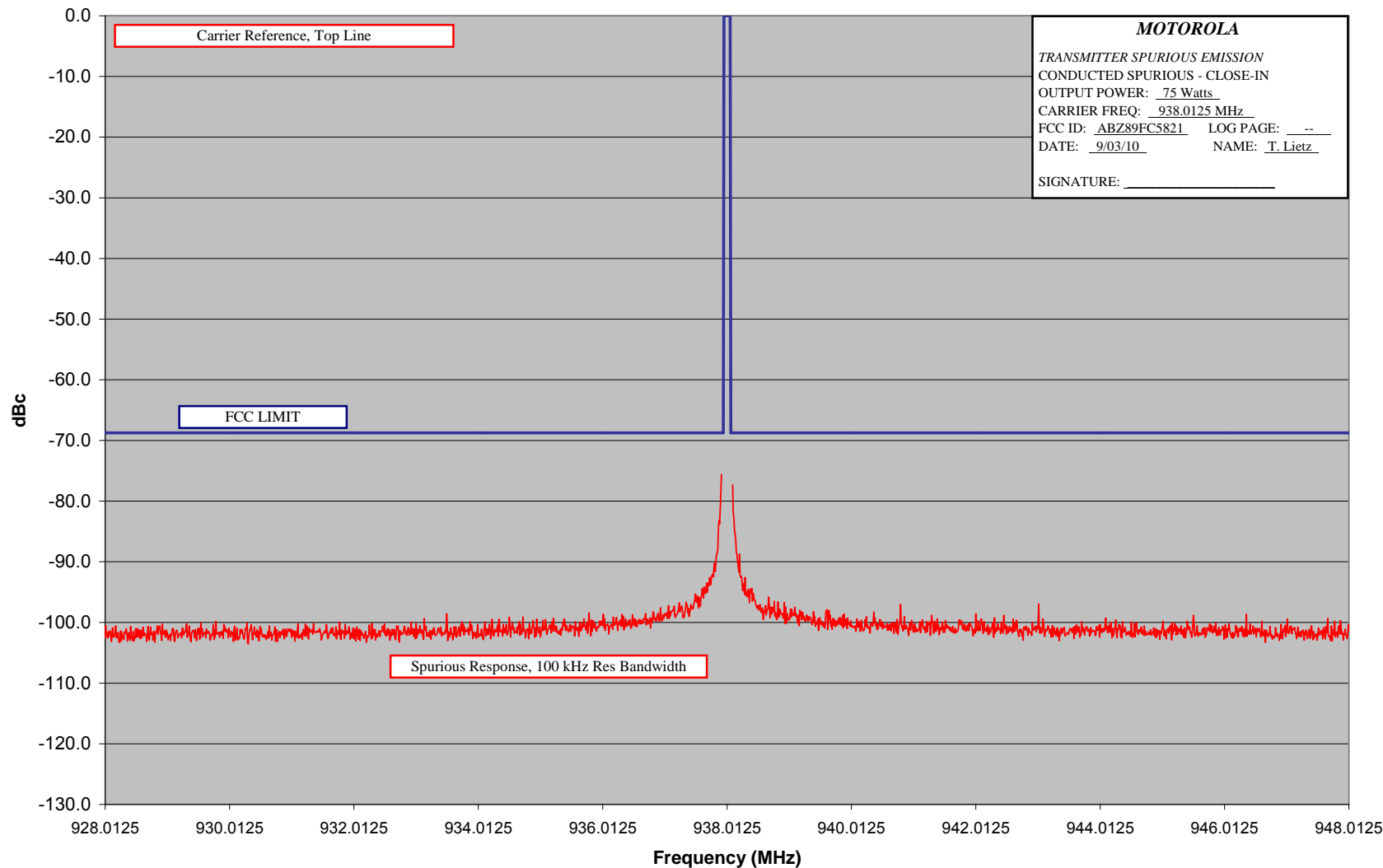


APPLICANT: MOTOROLA

EQUIPMENT TYPE: ABZ89FC5821

Report on Test Measurements

Conducted Emission – Close-In – 75 Watts – 20 MHz Span



## Report on Test Measurements

*Radiated Spurious Emissions, Harmonics*Specification Requirement § 90.210(i) Emission Limits:

*Emission Mask I.* For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

On any frequency removed from the assigned frequency by a displacement frequency ( $F_d$  in kHz) of:

- |   |  |
|---|--|
| 1) >6.8 kHz up to and including 9.0 kHz | <i>At least 25 dB;</i>   |
| 2) >9.0 kHz up to and including 15 kHz  | <i>At least 35 dB;</i>   |
| 3) >15 kHz                              | <i>at least 43 plus <math>10 \log_{10}(P)</math> dB or 70 dB;</i><br><i>(whichever is the lesser attenuation).</i> |

Specification Requirement § 90.210(j) Emission Limits:

*Emission Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

- |  |   |
|--|---|
| 1) >2.5 kHz up to and including 6.25 kHz | <i>At least <math>53 \log(f_d/2.5)</math> dB;</i>   |
| 2) >6.25 kHz up to and including 9.5 kHz | <i>At least <math>103 \log(f_d/3.9)</math> dB;</i>  |
| 3) >9.5 kHz                              | <i>At least <math>157 \log(f_d/5.3)</math> dB, or <math>50 + 10 \log(P)</math> dB, or 70 dB,</i><br><i>whichever is the lesser attenuation.</i> |

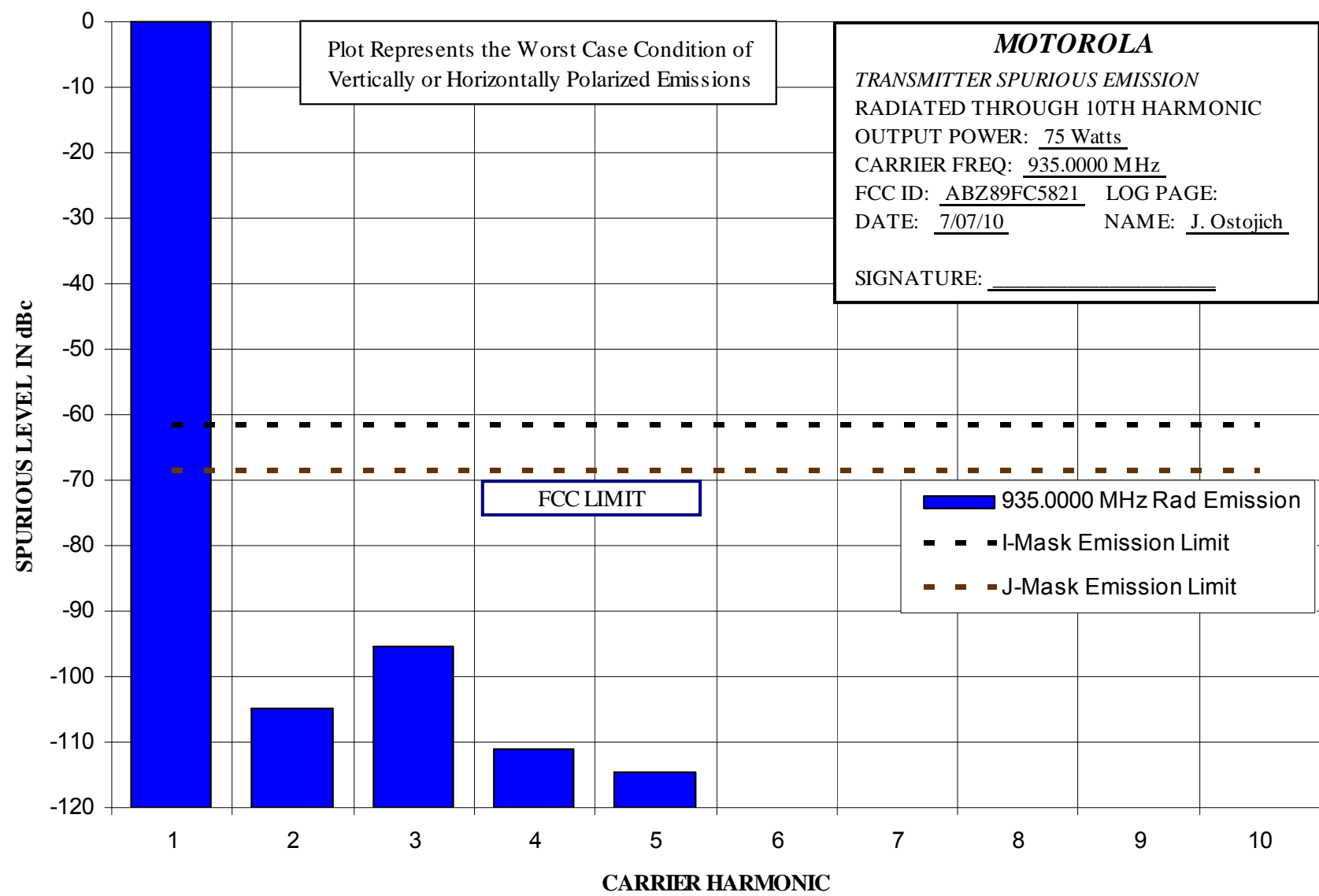
Carrier Frequencies: A carrier frequency of 935.0000 MHz was measured. This is a representative frequency in the operating band.

EXHIBIT	DESCRIPTION
---------	-------------

E1-6.1	Radiated Spurious Emissions, Harmonics, Power Output 75 Watts The specification limit is -68.8 dBc (12.5 kHz channels) or -61.8 dBc (25 kHz channels)
E1-6.2	Radiated Spurious Emissions, Harmonics, Power Output 20 Watts The specification limit is -63.0 dBc (12.5 kHz channels) or -56.0 dBc (25 kHz channels)

Report on Test Measurements

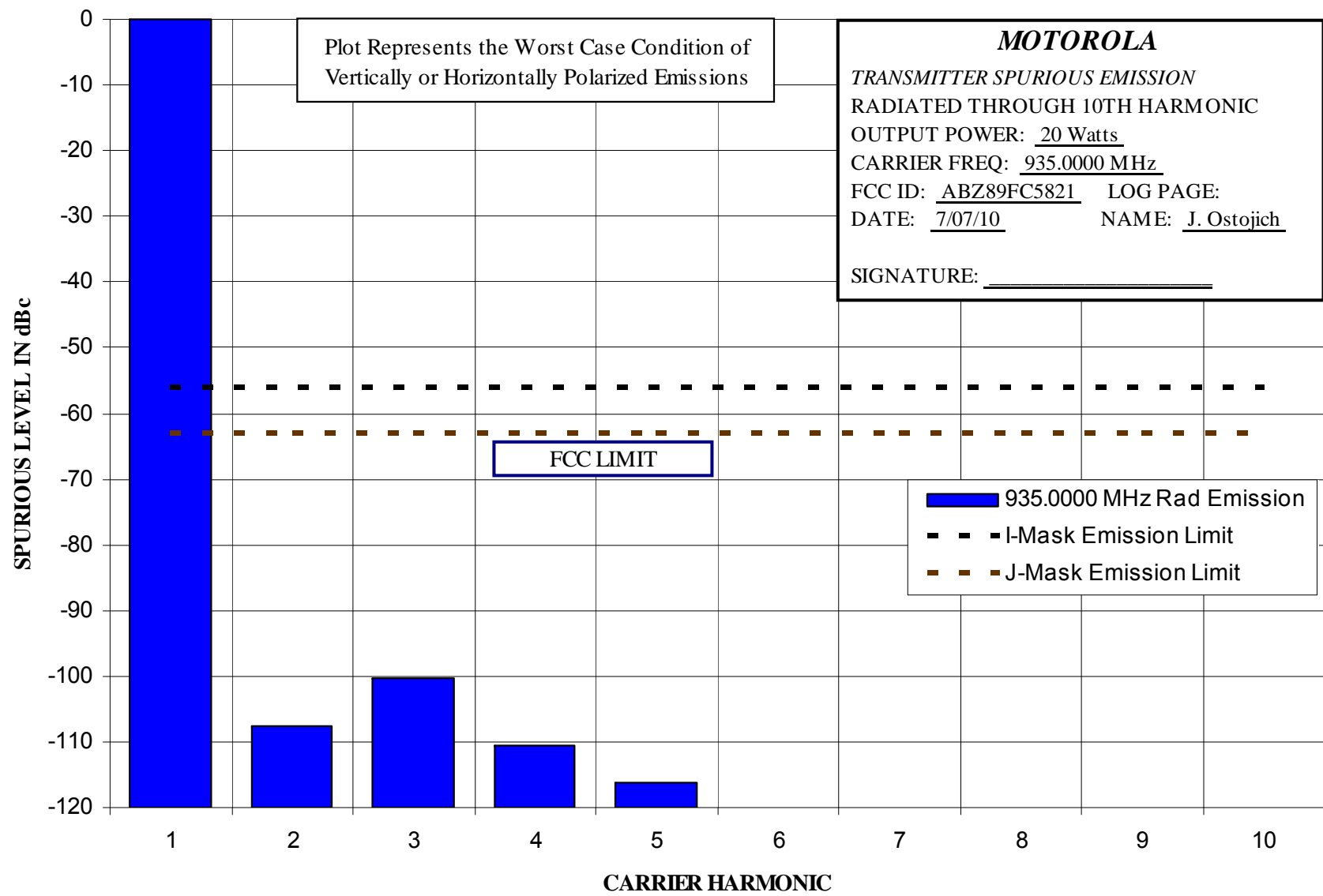
Radiated Emission – Harmonics – 75 Watts





Report on Test Measurements

Radiated Emission – Harmonics – 20 Watts



**Report on Test Measurements***Oscillator Frequency Stability*

Manufacturer data for the system site frequency standard was used in generation of the following frequency stability exhibits.

Specification Requirement: Reference Part 90.213

Fixed and Base stations, operating at 935-940 MHz, must have a frequency stability of better than +/- 0.1 PPM.

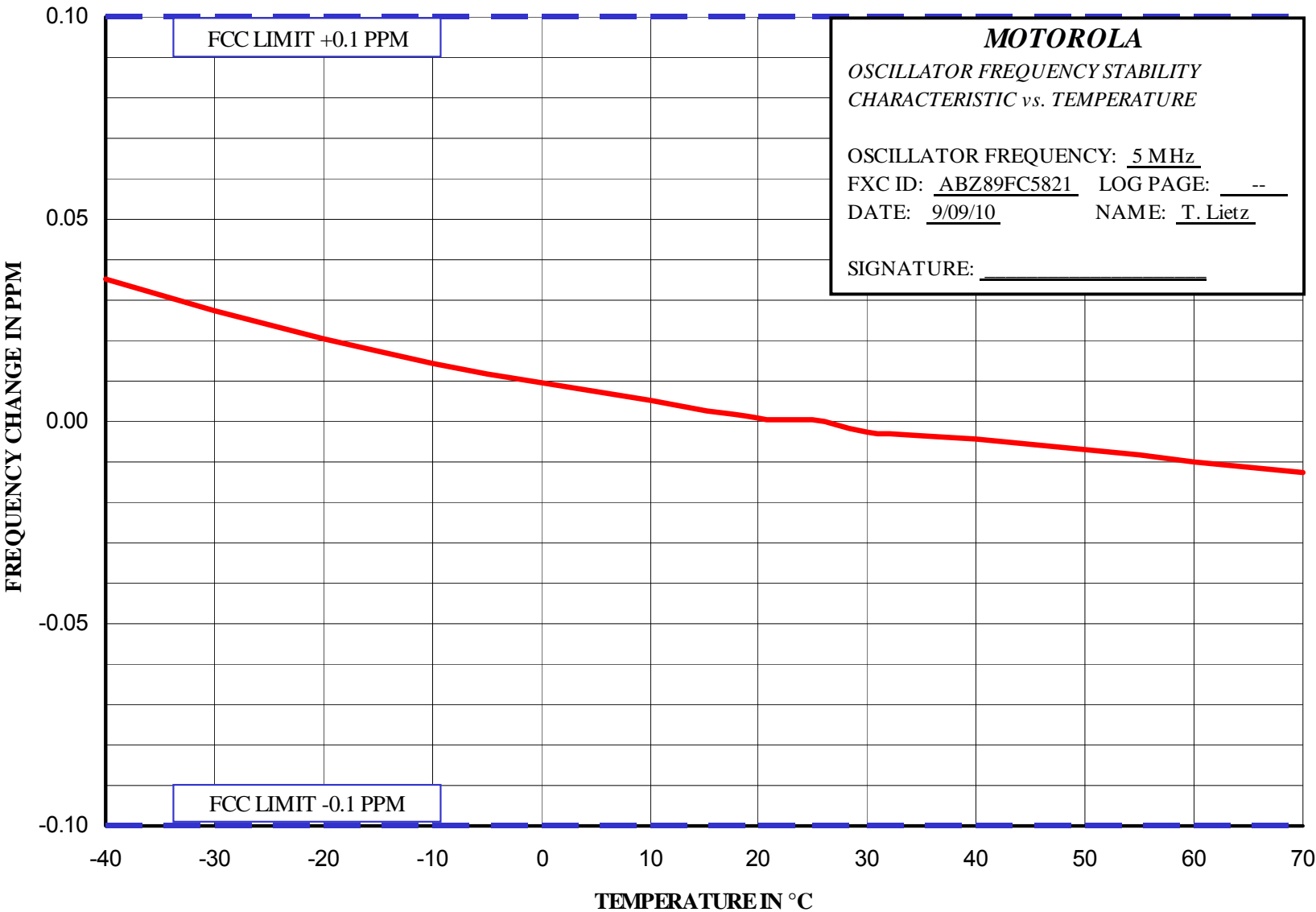
Specification Requirement: Reference Part 24.135

(a) The frequency stability of the transmitter shall be maintained within  $\pm 0.0001$  percent ( $\pm 1$  ppm) of the center frequency over a temperature variation of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of  $20^{\circ}\text{C}$ .

<b>EXHIBIT</b>	<b>DESCRIPTION</b>
E1-7.1	Frequency Stability Vs Temperature
E1-7.2	Frequency Stability Vs Voltage

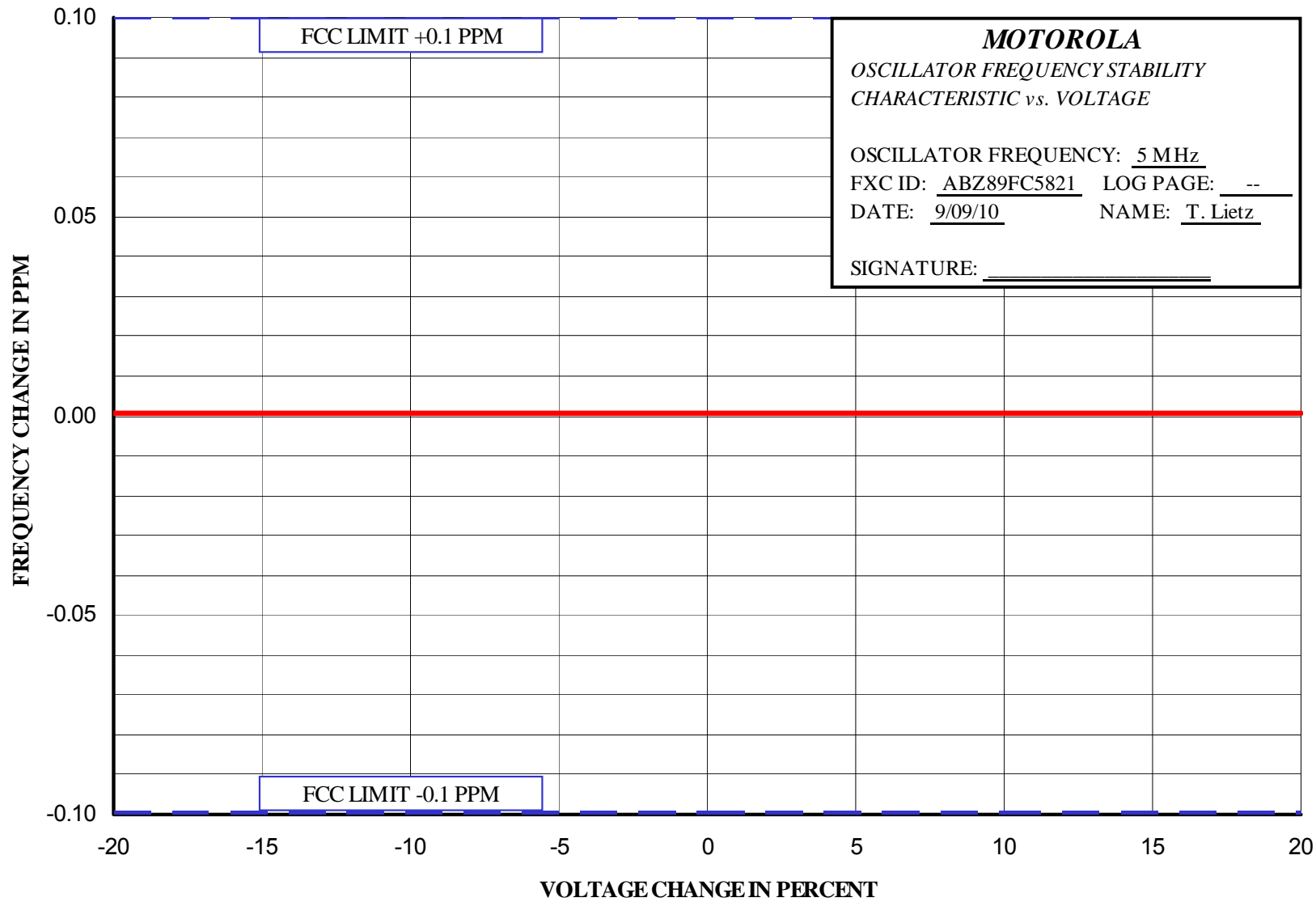
Report on Test Measurements

Frequency Stability Vs Temperature



Report on Test Measurements

Frequency Stability Vs Voltage



## Report on Test Measurements

*Test Equipment List*

<b>MODEL</b>	<b>MANUFACTURER</b>	<b>DESCRIPTION</b>	<b>Serial No.</b>	<b>Last Cal</b>	<b>Next Cal</b>
437B	Hewlett Packard	RF Power Meter	2912A01517	05/13/08	05/13/11
8481A	Hewlett Packard	RF Power Sensor	2702A76706	07/25/08	07/25/11
E4443A	Agilent	Spectrum Analyzer	MY43360090	09/18/09	09/18/12
83712A	Hewlett Packard	Signal Generator	3429A00455	10/27/08	10/27/11
8671B	Hewlett Packard	Signal Generator	2611A00159	10/24/07	10/24/10
85460A	Hewlett Packard	EMI Analyzer, Filter	3704A00467	07/21/07	07/21/10
85462A	Hewlett Packard	EMI Analyzer, RF/Display	3906A00500	07/21/07	07/21/10
8593E	Hewlett Packard	EMI Analyzer	3513A01649	06/12/10	06/12/13
89441A	Agilent	Vector Signal Analyzer	3416A00835	05/27/09	05/27/12
89441A	Agilent	Vector Signal Analyzer	3509A01047	05/13/08	05/13/11
N9030A	Agilent	PXA Signal Analyzer	US49230267	01/17/10	01/17/11
(Various)	Weinschel, Kathrein, Bird	RF Loads	Various	no calibration required	
TWPC-4510-1	Telewave	Cavity	5244	no calibration required	
3020A, etc.	Narda	Directional Coupler	Various	no calibration required	

Report on Test Measurements

*Statement of Certification*

The technical data supplied with this application, having been taken under my supervision is hereby duly certified. The following is a statement of my qualifications:

College Degree: BSEE, Valparaiso University, Valparaiso, Indiana, USA  
MSEE, Illinois Institute of Technology, Chicago, Illinois, USA

28 years of Design and Development experience in the field of two-way radio communication.

NAME: Ken Weiss

SIGNATURE: 

DATE: September 9, 2009

POSITION: Senior Staff Engineer

I hereby certify that the above application was prepared under my direction and that to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct:

NAME: Greg Alms

SIGNATURE: 

DATE: September 9, 2009

POSITION: Engineering Section Manager