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

Report on Test Measurements

Measurements Report

SUBMITTED MEASURED DATA – INDEX (Continued)

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 six parallel power transistors.

Linear Modulation Mode:

Measured RF output	**120**	Watts, Average
DC Voltage	**27.6, 25.5**	Volts *
DC Current	**0.8, 8.0**	Amperes *
Input power for final RF amplifying device(s)	**226.1**	Watts *
Primary Radio Input Supply Voltage	**120**	Volts AC
Minimum Measured RF output	**2**	Watts, Average
Normal DC Voltage	**27.6, 21.0**	Volts *
Normal DC Current	**0.45, 2.0**	Amperes *
Input power for final RF amplifying device(s)	**54.4**	Watts *
Primary Radio Input Supply Voltage	**120**	Volts AC

* Note: there are two final modules in the 900 MHz power amplifier, two numbers shown represent the current to the first stage and second stage, respectively

Frequency Modulation and Compatible 4-Level Frequency Modulation Mode:

Measured RF output	**120**	Watts
DC Voltage	**27.6, 21.0**	Volts *
DC Current	**0.8, 8.25**	Amperes *
Input power for final RF amplifying device(s)	**195.3**	Watts *
Primary Radio Input Supply Voltage	**120**	Volts AC
Minimum Measured RF output	**2**	Watts
Normal DC Voltage	**27.6, 21.0**	Volts *
Normal DC Current	**0.45, 2.0**	Amperes *
Input power for final RF amplifying device(s)	**54.4**	Watts *
Primary Radio Input Supply Voltage	**120**	Volts AC

* Note: there are two final modules in the 900 MHz power amplifier, two numbers shown represent the current to the first stage and second stage, respectively

Report on Test Measurements

Occupied Bandwidth –Digital Modulation, 12.5 kHz Channel Spacing
There is one exhibit shown for each of the digital modulations available: Linear Simulcast Modulation or LSM, Compatible 4-Level Frequency Modulation, C4FM; and H-DQPSK, P25 Two Slot TDMA Digital Modulation. Each of these can be used in system configurations based upon channel usage as described in Exhibit B. The occupied bandwidth plots reference the following setup and specification requirements.

Modulation Type	Emission Designator	Channelization	Power Setting
Linear Simulcast Modulation, LSM	8K70D1W	12.5 kHz	120 W, Average
H-DQPSK, P25 Two Slot TDMA Digital Modulation	9K80D7W	12.5 kHz	120 W, Average
Compatible 4-Level Frequency Modulation, C4FM	8K10F1E, 8K10F1D	12.5 kHz	120 Watts

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$_{10}$(P) dB, or 70 dB, (whichever is the lesser attenuation).*

Necessary Bandwidth Calculation: The necessary bandwidth of the modulation signal is not calculable per the formulas defined in 47 CFR 2.202 (b). Specifically, although the modulation for these emissions is a composite modulation, the equations given in the composite tables in 2.202 are not applicable since none of them adequately approximate the form of digital modulation used. The necessary bandwidth indicated for each is based upon a 99% power measurement of the transmitter spectrum, per 2.202 (a).

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:
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
E1-2.1	Occupied Bandwidth - Linear Simulcast Modulation (LSM)
E1-2.2	Occupied Bandwidth - H-DQPSK P25 Two Slot TDMA Digital Modulation
E1-2.3	Occupied Bandwidth - Compatible 4-Level Frequency Modulation (C4FM)

APPLICANT: MOTOROLA **EQUIPMENT TYPE: ABZ89FC5823**

Report on Test Measurements

Occupied Bandwidth – Linear Simulcast Modulation (LSM)

Occupied Bandwidth - Linear Simulcast Modulation - 8K7D1W - 120 Watts (Average)

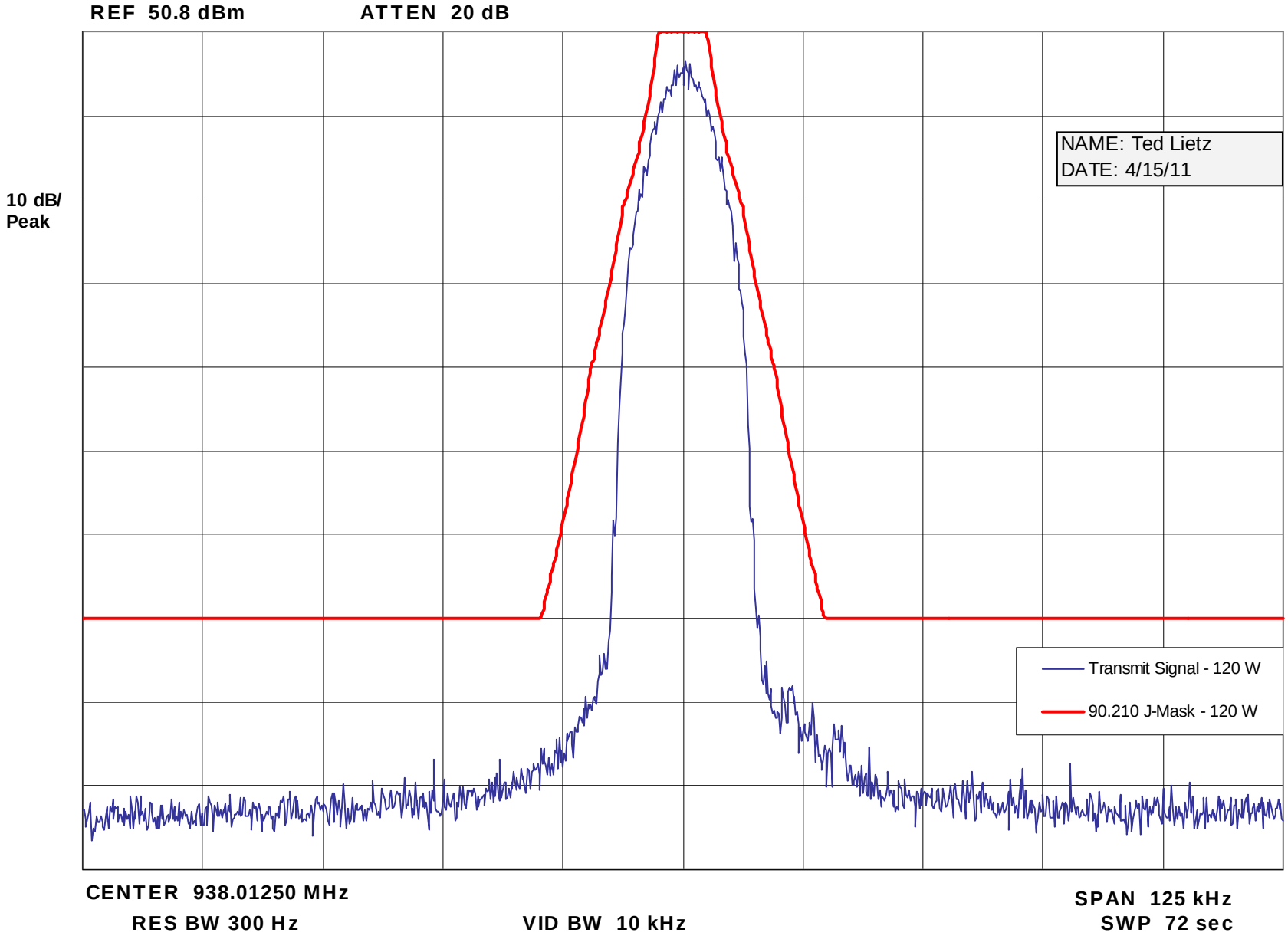


EXHIBIT E1-2.1

Report on Test Measurements

Occupied Bandwidth – H-DQPSK, P25 Two Slot TDMA Digital Modulation

Occupied Bandwidth - H-DQPSK P25 Two Slot TDMA Digital Modulation - 9K80D7W - 120 W (Avg)

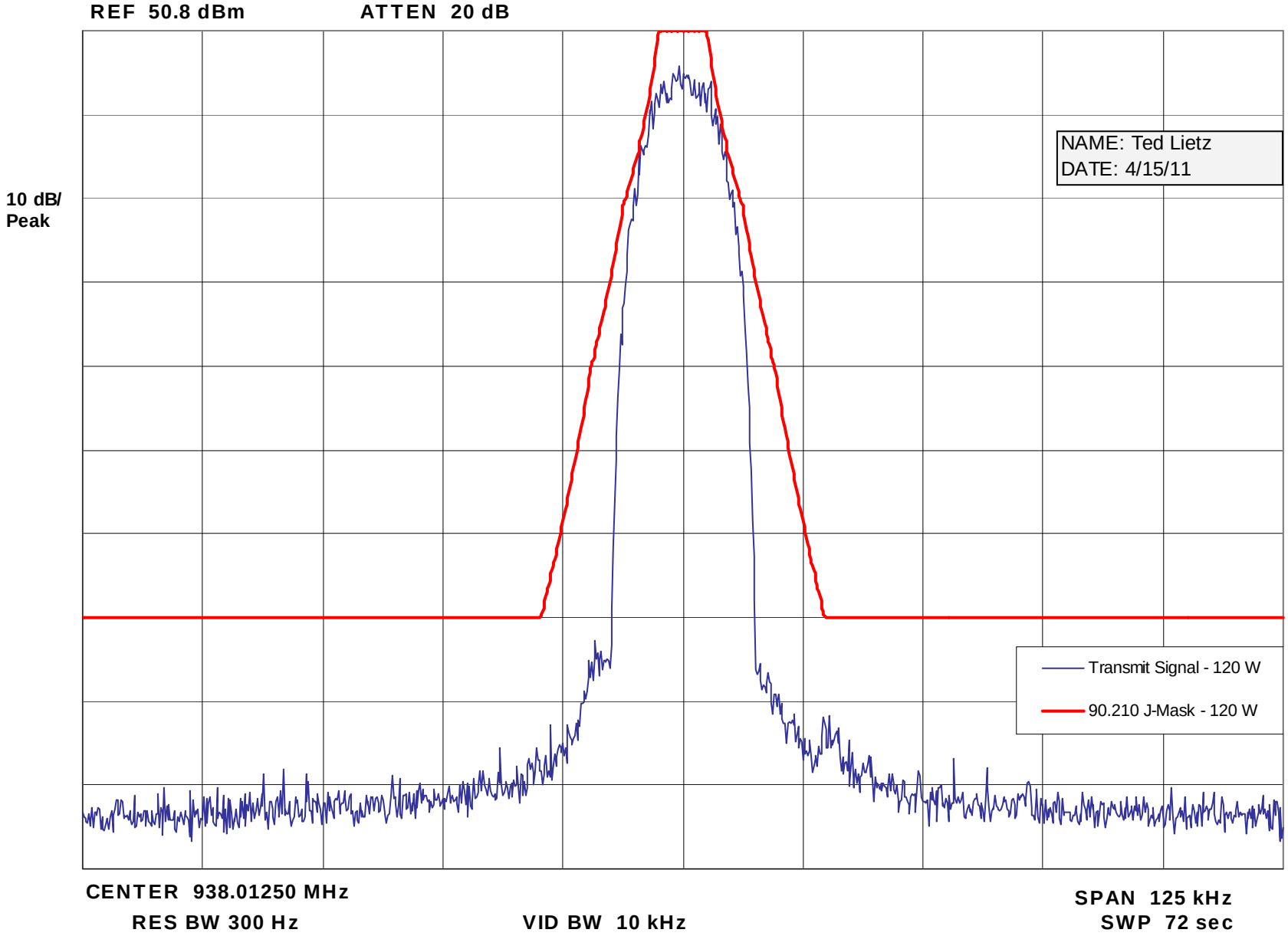


EXHIBIT E1-2.2

Report on Test Measurements

Occupied Bandwidth – Compatible 4-Level Frequency Modulation (C4FM)

Occupied Bandwidth - Compatible 4-Level Frequency Modulation - 8K10F1E and 8K10F1D - 120 W

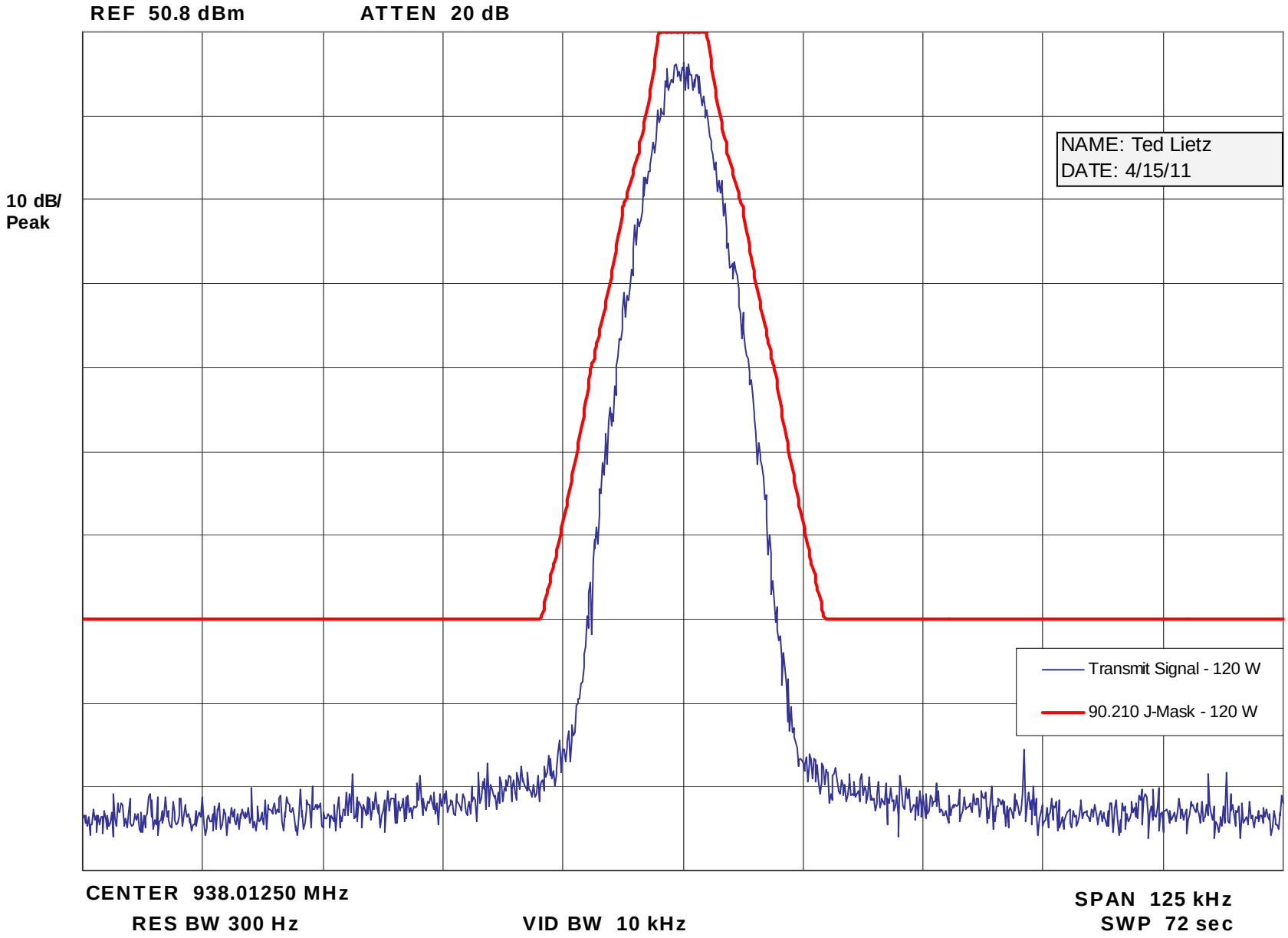


EXHIBIT E1-2.3

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_{10}(P) dB, or 70 dB, (whichever is the lesser attenuation).*

Modulation: Linear Simulcast Modulation (LSM), H-DQPSK, Compatible 4-Level Frequency Modulation (C4FM) – Pseudorandom data, or Analog Frequency Modulation as indicated

Carrier Frequencies: Carrier frequencies across the band of 935.0, 936.0, 937.0, 938.0, 939.0, 940.0, and 941.0 MHz were measured for conducted carrier harmonics. Performance measured at these frequencies is representative of the full operating band. A representative frequency of 938.0125 MHz was used for the close-in conducted measurements.

EXHIBIT	DESCRIPTION
E1-3.1	Conducted Spurious Emissions, Harmonics, Power Output 120 Watts, LSM The specification limit is -70.0 dBc
E1-3.2	Conducted Spurious Emissions, Harmonics, Power Output 2 Watts, LSM The specification limit is -53.0 dBc
E1-3.3	Conducted Spurious Emissions, Harmonics, Power Output 120 Watts, H-DQPSK The specification limit is -70.0 dBc
E1-3.4	Conducted Spurious Emissions, Harmonics, Power Output 2 Watts, H-DQPSK The specification limit is -53.0 dBc
E1-3.5	Conducted Spurious Emissions, Harmonics, Power Output 120 Watts, C4FM The specification limit is -70.0 dBc
E1-3.6	Conducted Spurious Emissions, Harmonics, Power Output 2 Watts, C4FM The specification limit is -53.0 dBc
E1-3.7	Conducted Spurious Emissions, Harmonics, Power Output 120 Watts, Analog The specification limit is -70.0 dBc
E1-3.8	Conducted Spurious Emissions, Harmonics, Power Output 2 Watts, Analog The specification limit is -53.0 dBc
E1-3.9	Conducted Spurious Emissions, Close-In, 200 MHz Span, Power Output at 120 Watts, LSM The specification limit is -70.0 dBc
E1-3.10	Conducted Spurious Emissions, Close-In, 200 MHz Span, Power Output at 120 Watts, H-DQPSK The specification limit is -70.0 dBc
E1-3.11	Conducted Spurious Emissions, Close-In, 200 MHz Span, Power Output at 120 Watts, C4FM The specification limit is -70.0 dBc
E1-3.12	Conducted Spurious Emissions, Close-In, 200 MHz Span, Power Output at 120 Watts, Analog The specification limit is -70.0 dBc

Report on Test Measurements

Conducted Emission – Harmonics – 120 Watts LSM

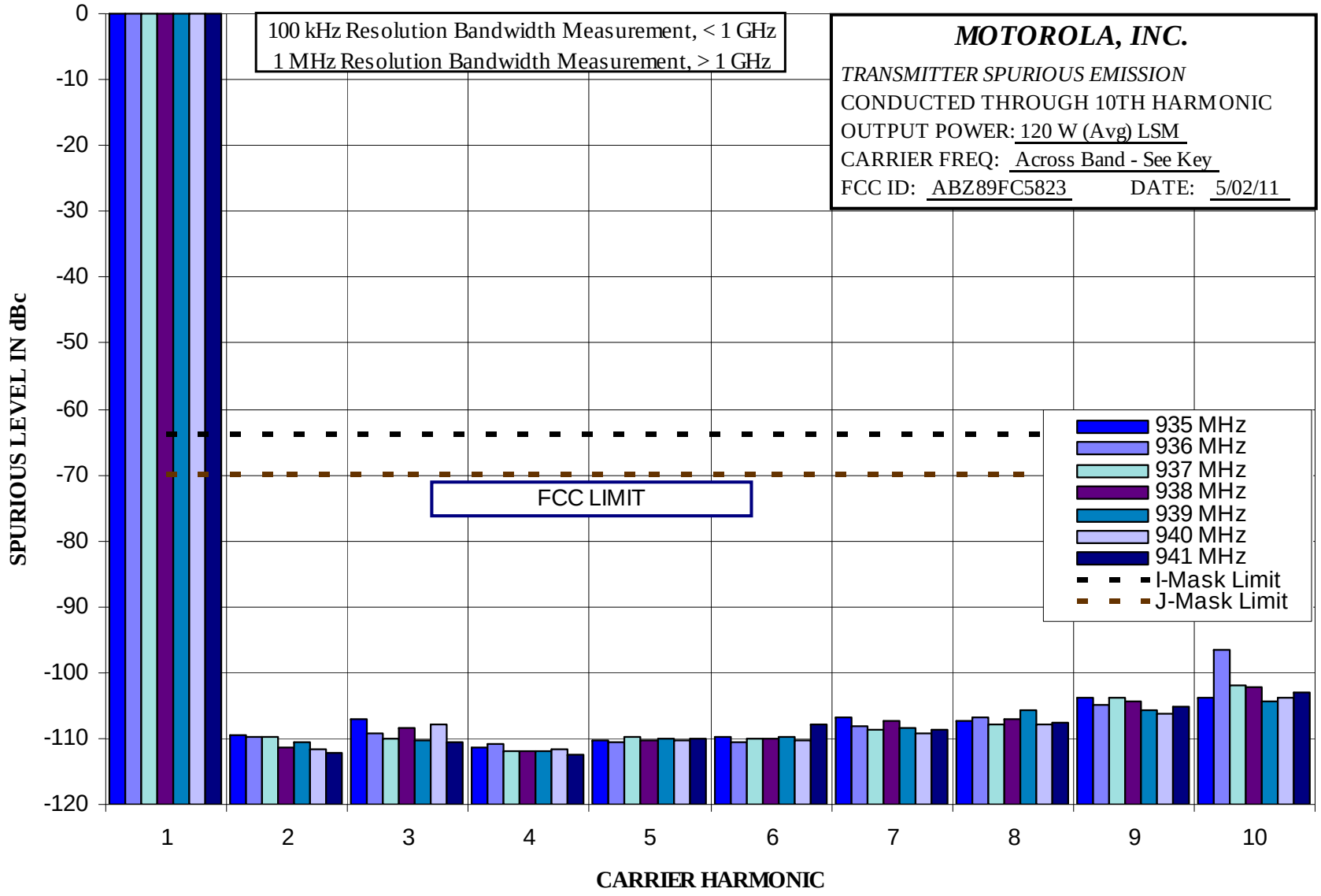


EXHIBIT E1-3.1

Report on Test Measurements

Conducted Emission – Harmonics – 2 Watts LSM

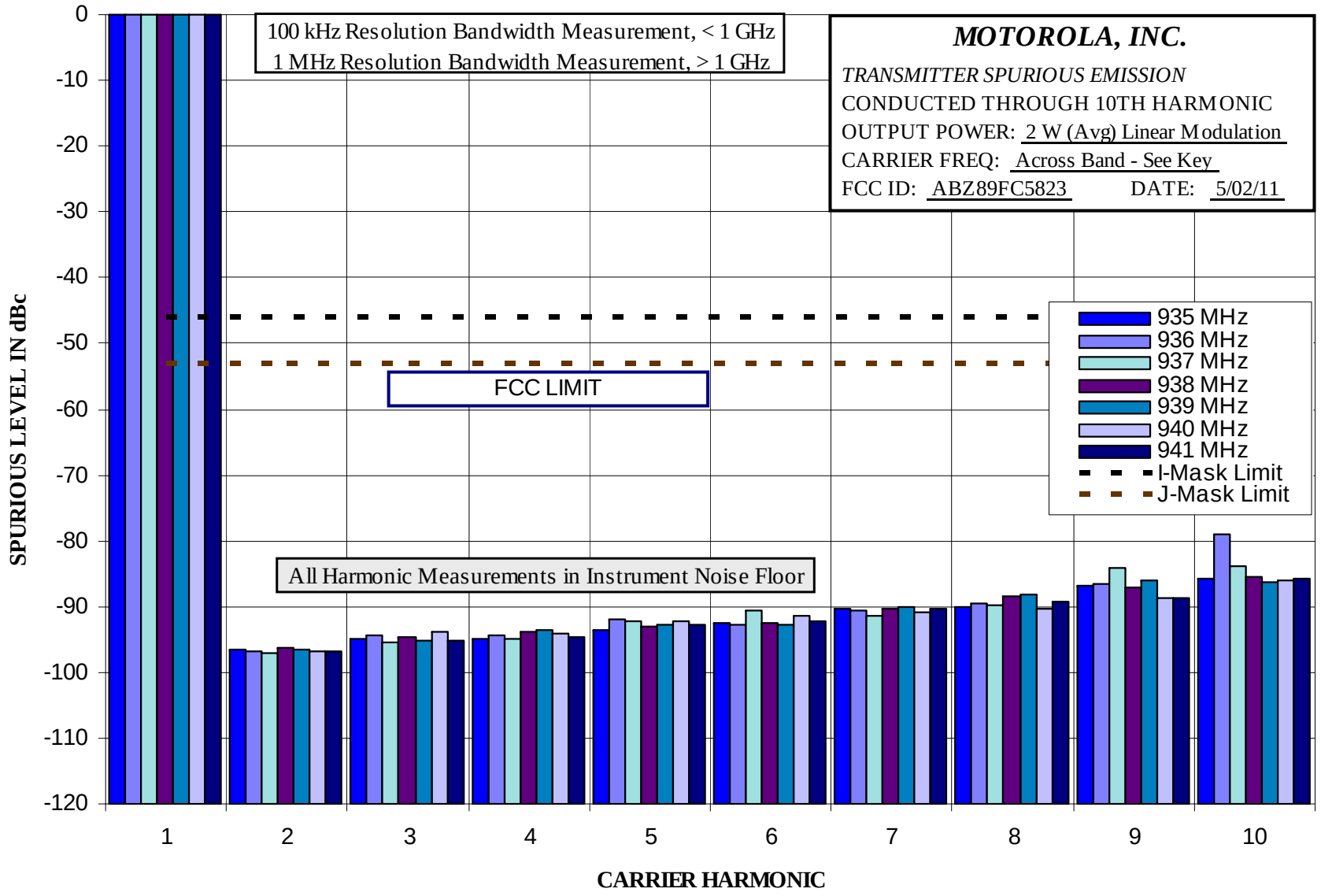


EXHIBIT E1-3.2

Report on Test Measurements

Conducted Emission – Harmonics – 120 Watts H-DQPSK

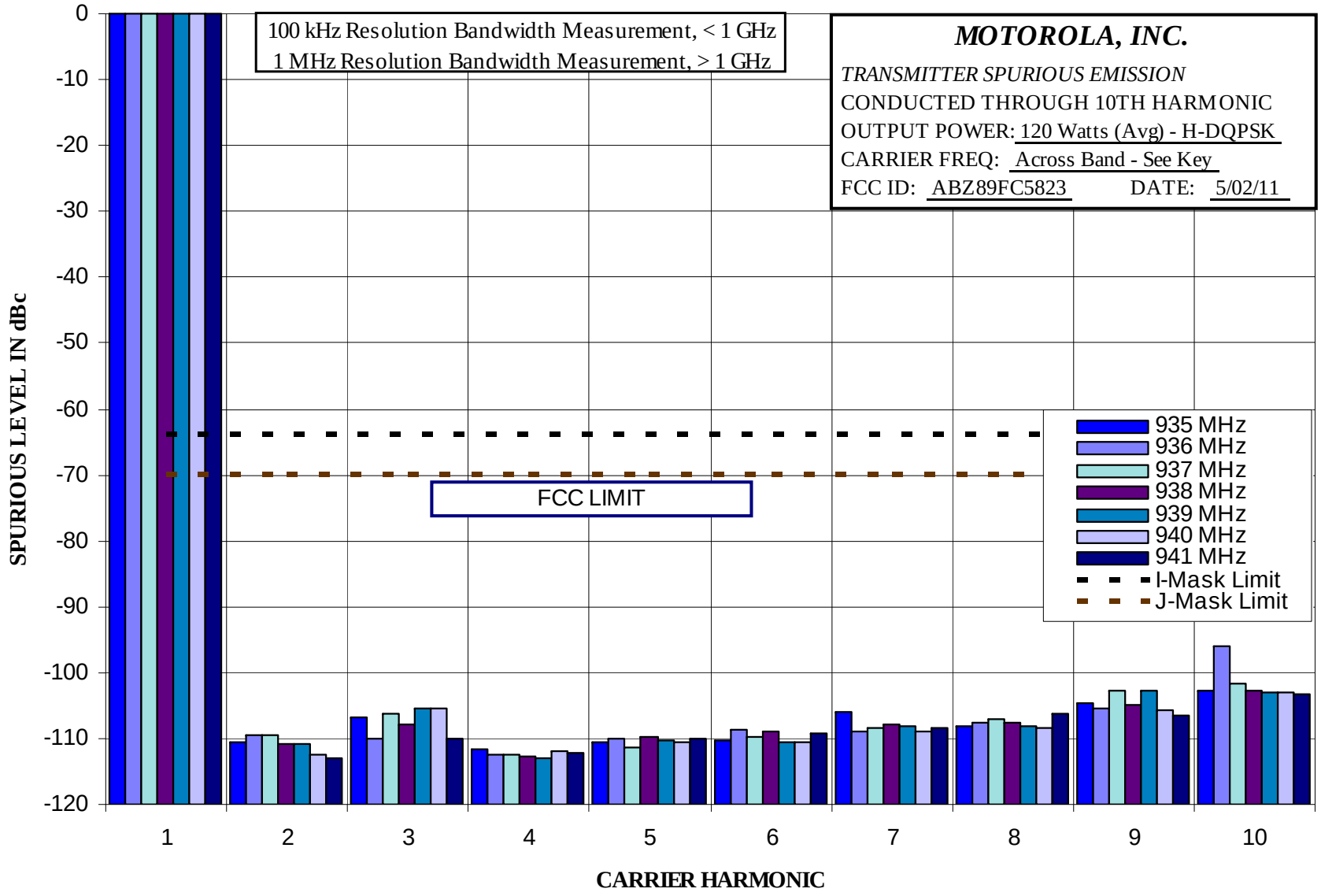


EXHIBIT E1-3.3

Report on Test Measurements

Conducted Emission – Harmonics – 2 Watts H-DQPSK

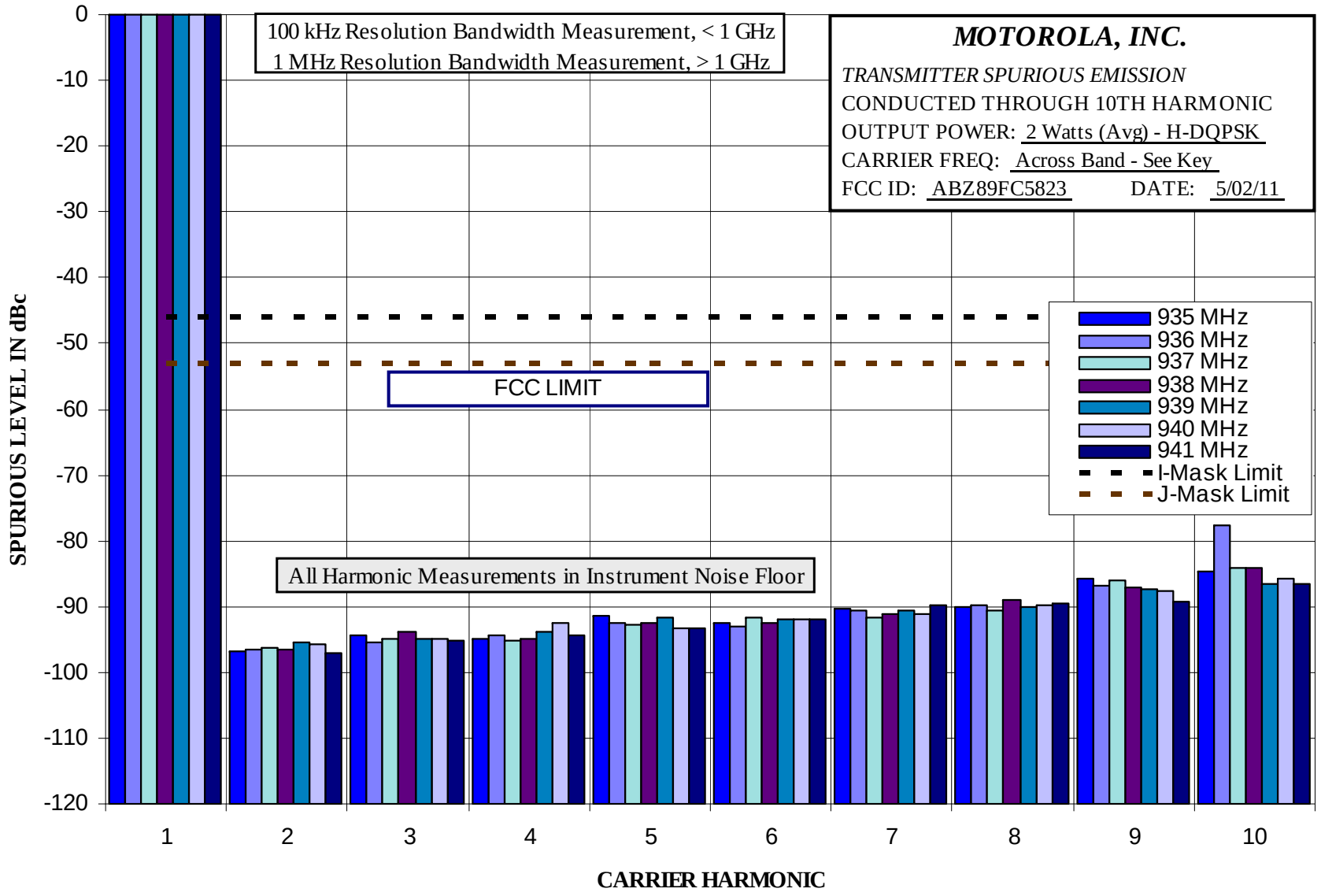


EXHIBIT E1-3.4

Report on Test Measurements

Conducted Emission – Harmonics – 120 Watts C4FM

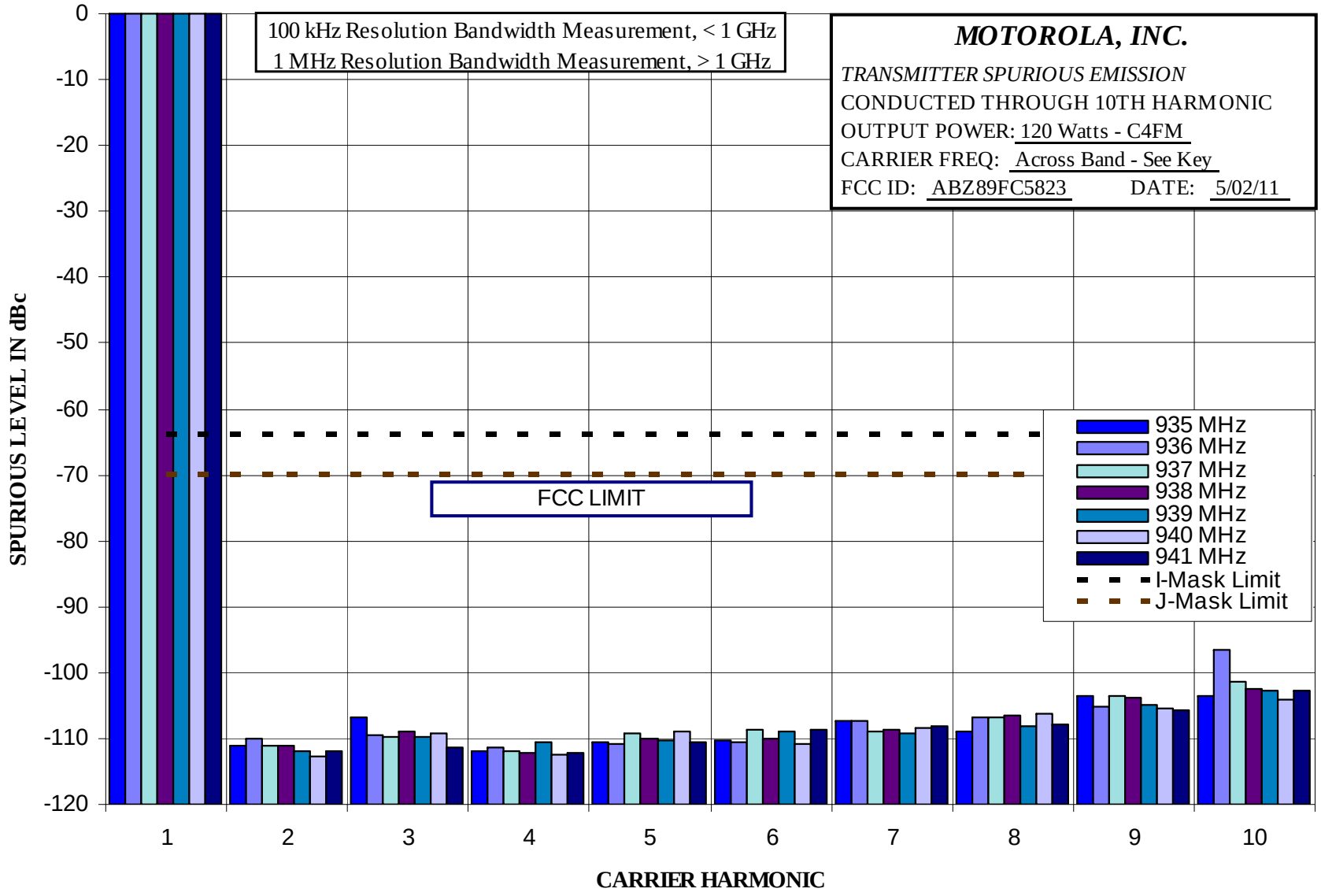


EXHIBIT E1-3.5

Report on Test Measurements

Conducted Emission – Harmonics – 2 Watts C4FM

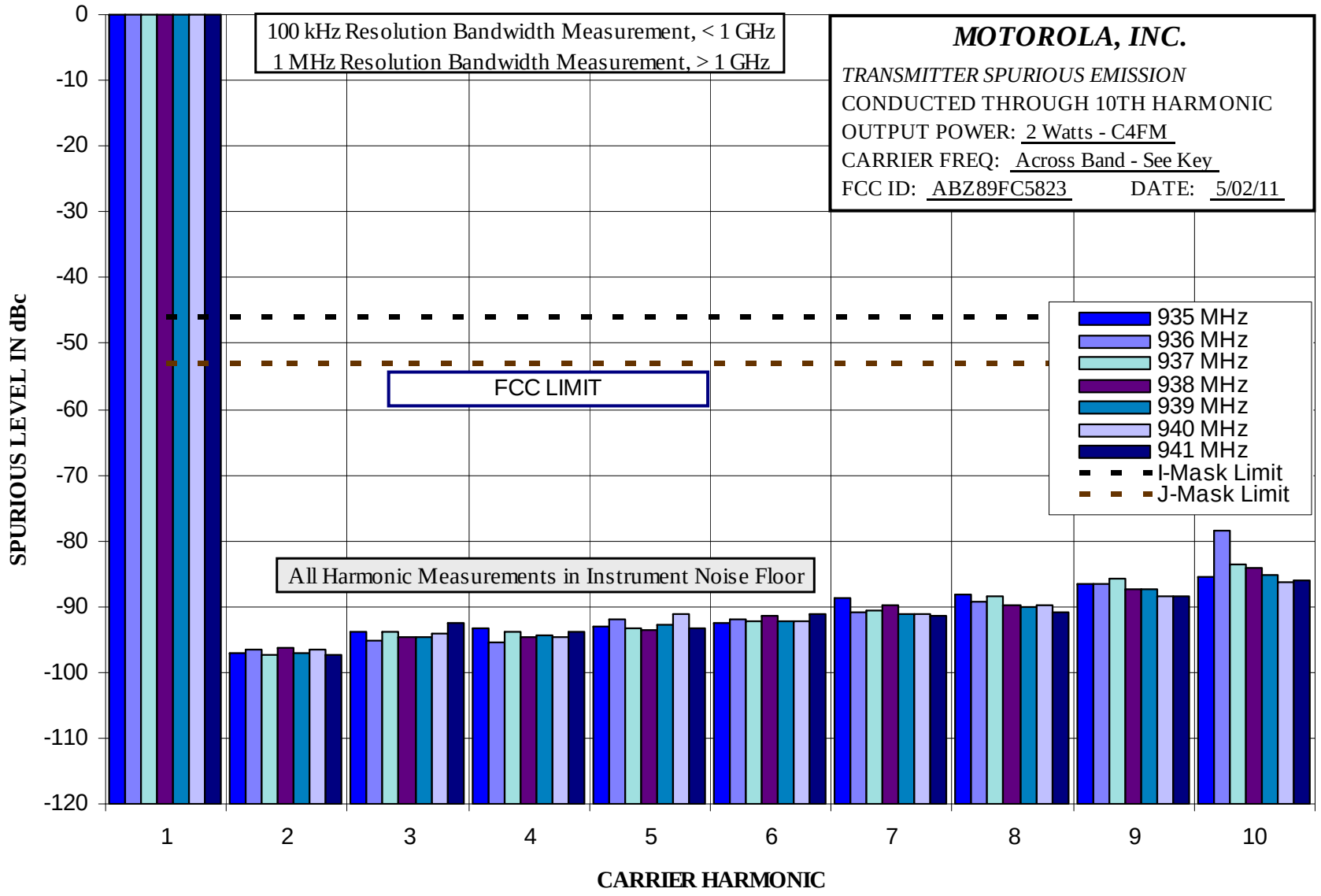


EXHIBIT E1-3.6

Report on Test Measurements

Conducted Emission – Harmonics – 120 Watts Analog

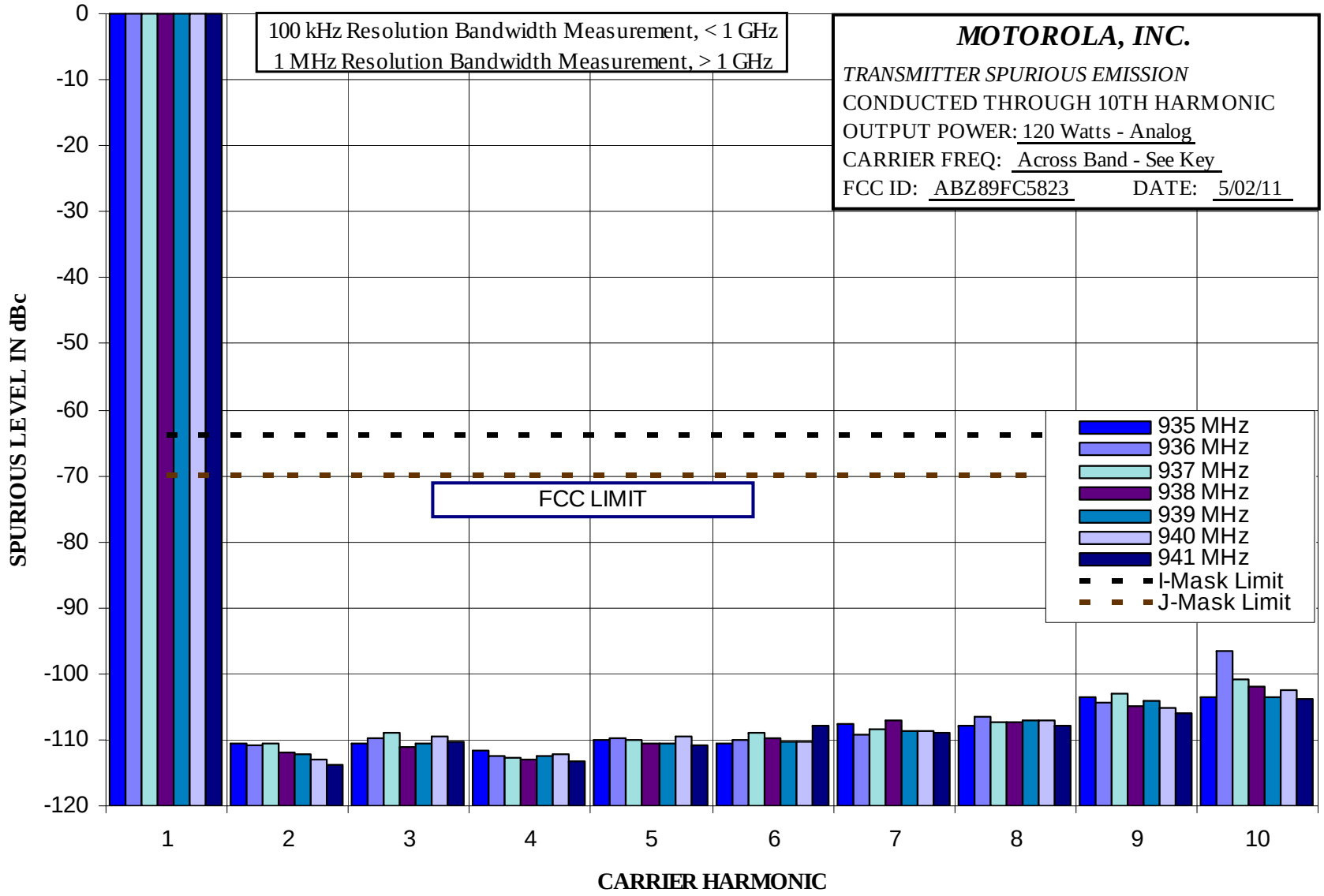


EXHIBIT E1-3.7

Report on Test Measurements

Conducted Emission – Harmonics – 2 Watts Analog

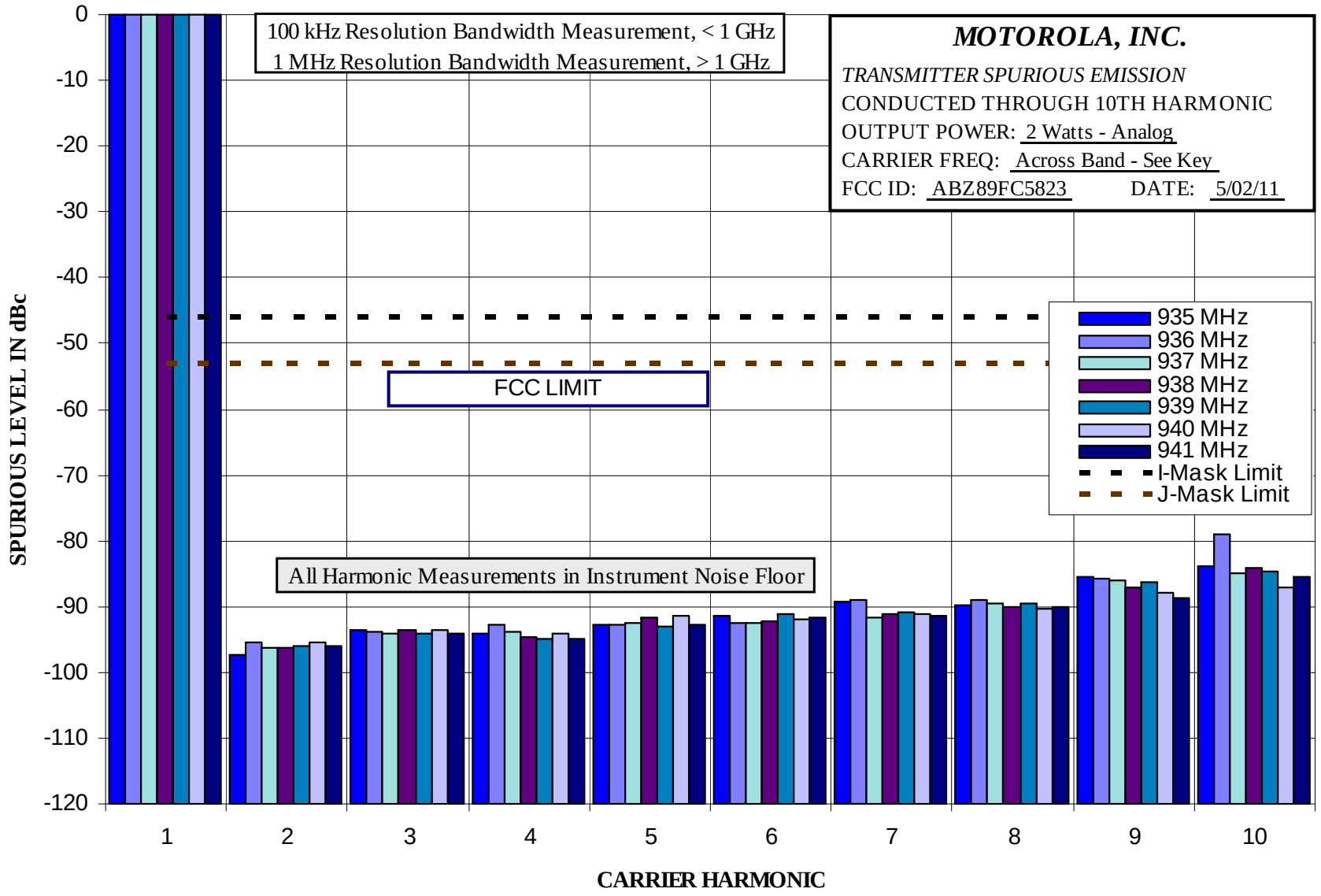


EXHIBIT E1-3.8

Report on Test Measurements

Conducted Emission – Close-In – 120 Watts LSM – 200 MHz Span

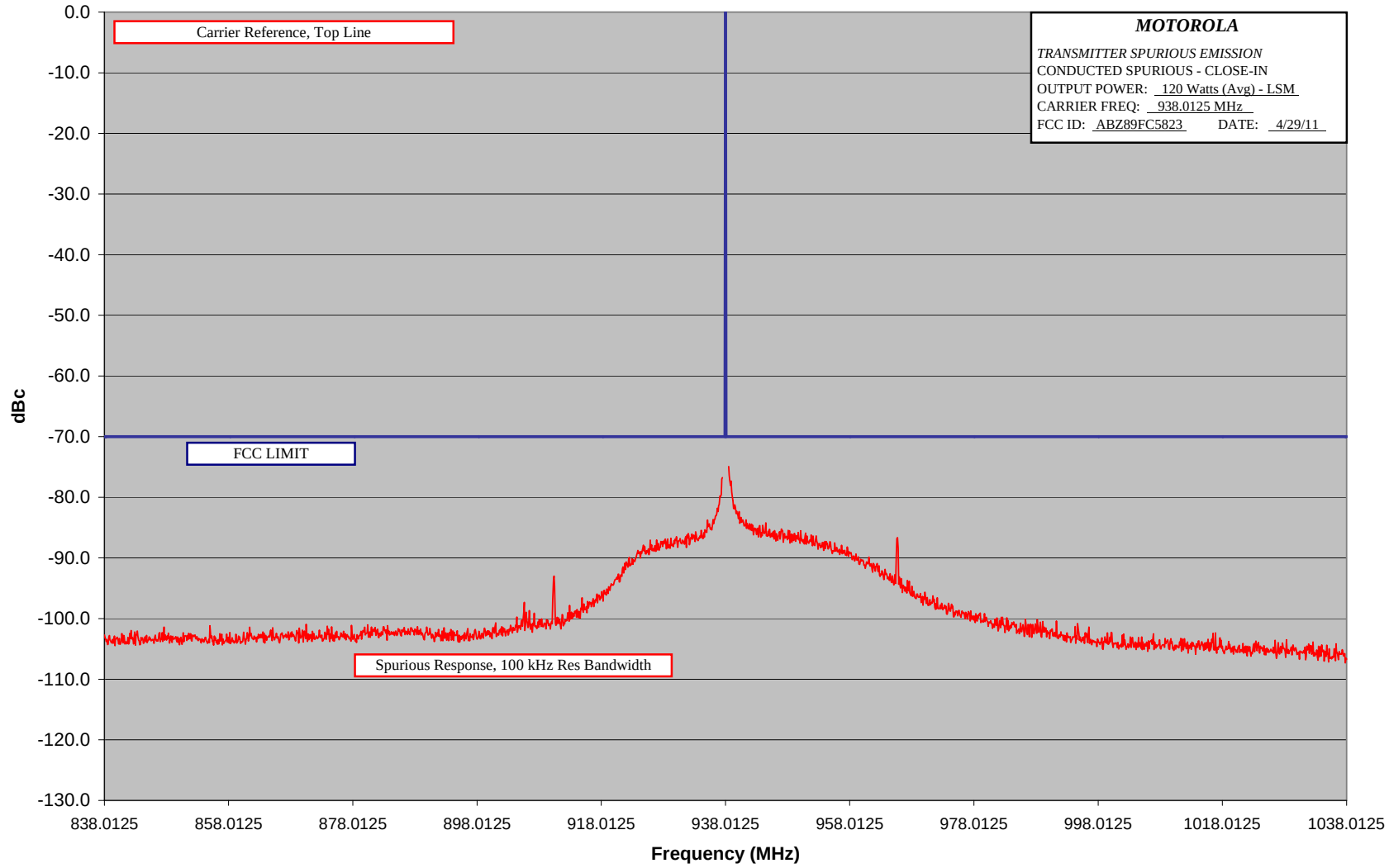
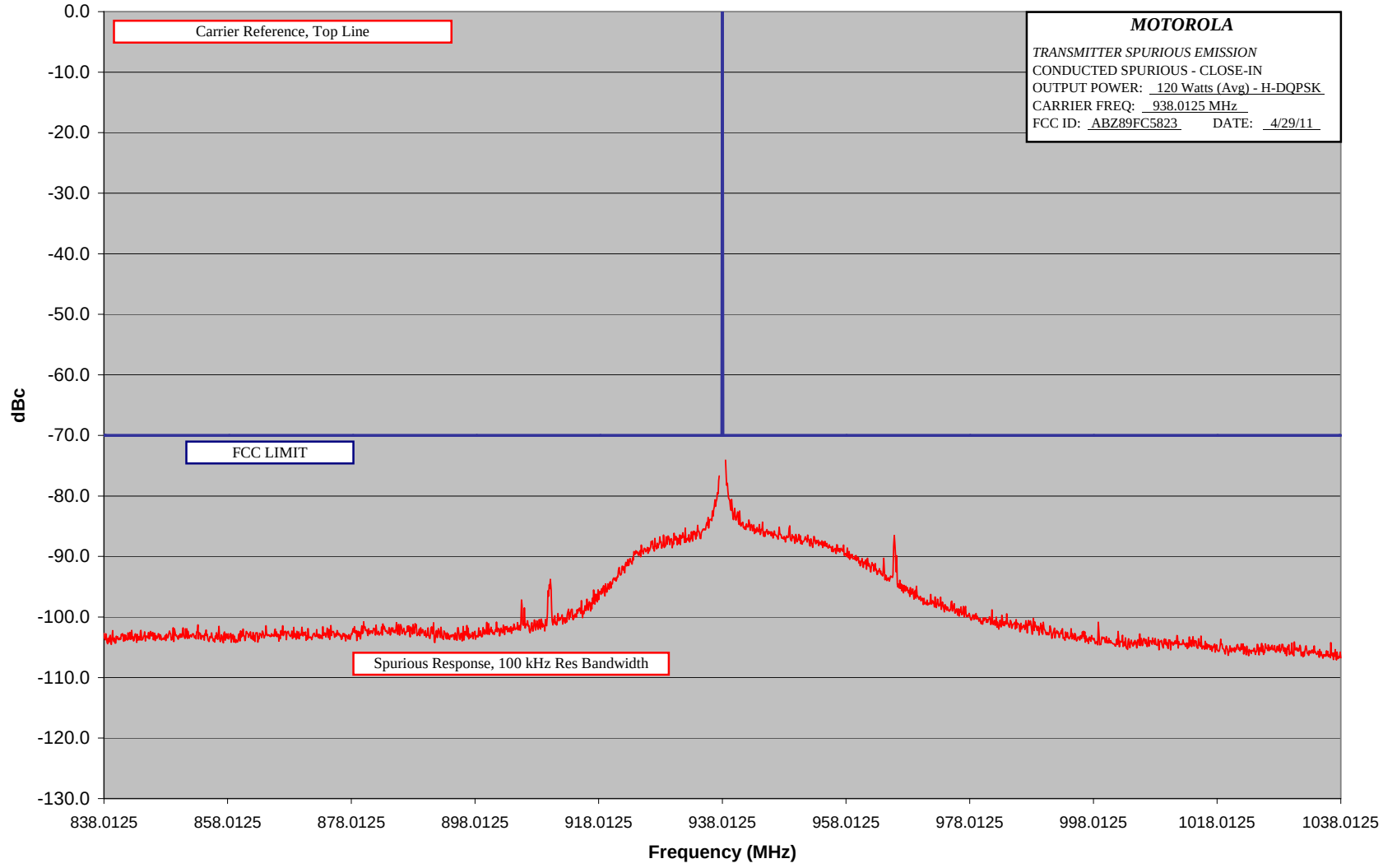


EXHIBIT E1-3.9

Report on Test Measurements

Conducted Emission – Close-In – 120 Watts H-DQPSK – 200 MHz Span



Report on Test Measurements

Conducted Emission – Close-In – 120 Watts C4FM – 200 MHz Span

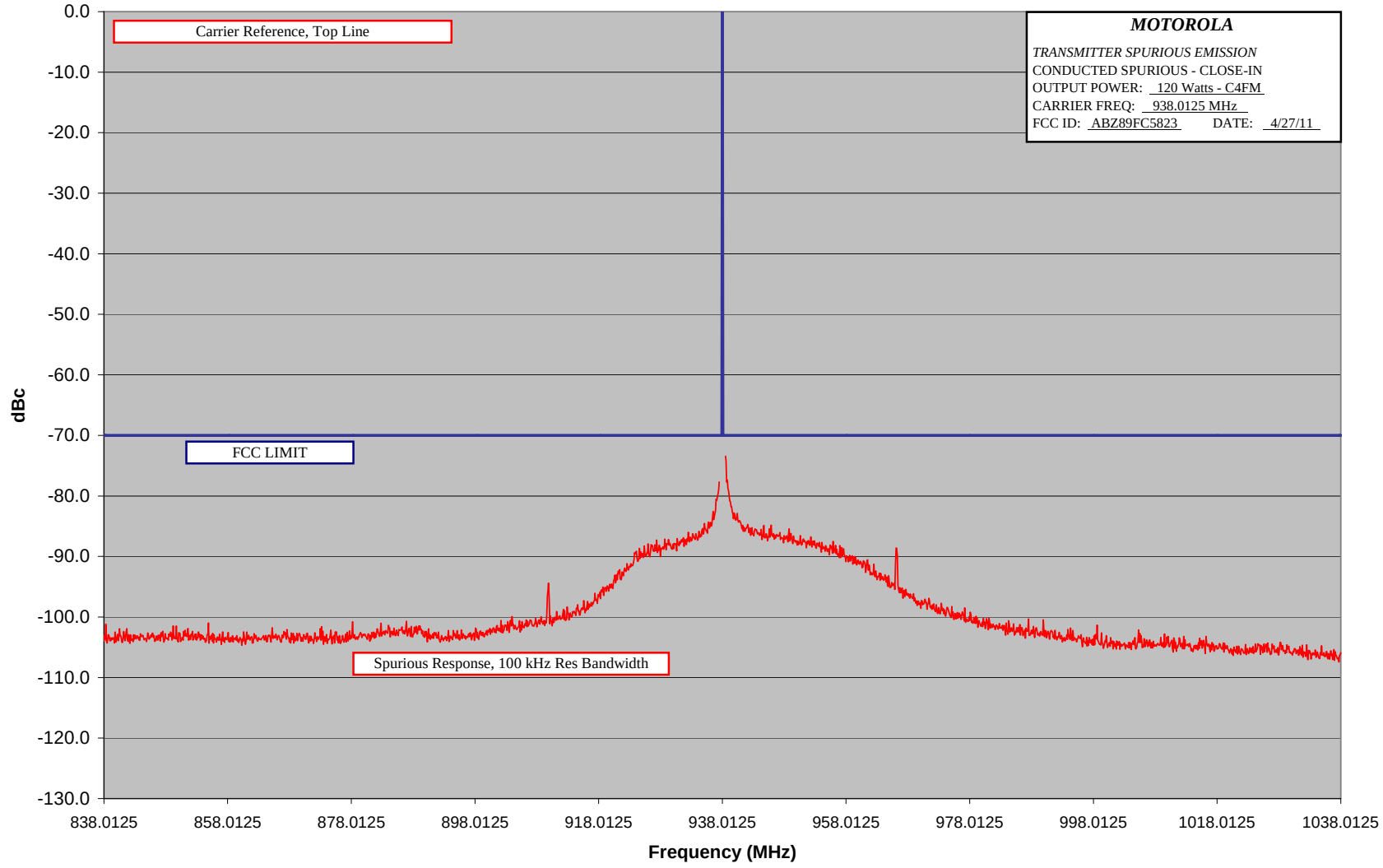


EXHIBIT E1-3.11

APPLICANT: MOTOROLA **EQUIPMENT TYPE: ABZ89FC5823**

Report on Test Measurements

Conducted Emission – Close-In – 120 Watts Analog – 200 MHz Span

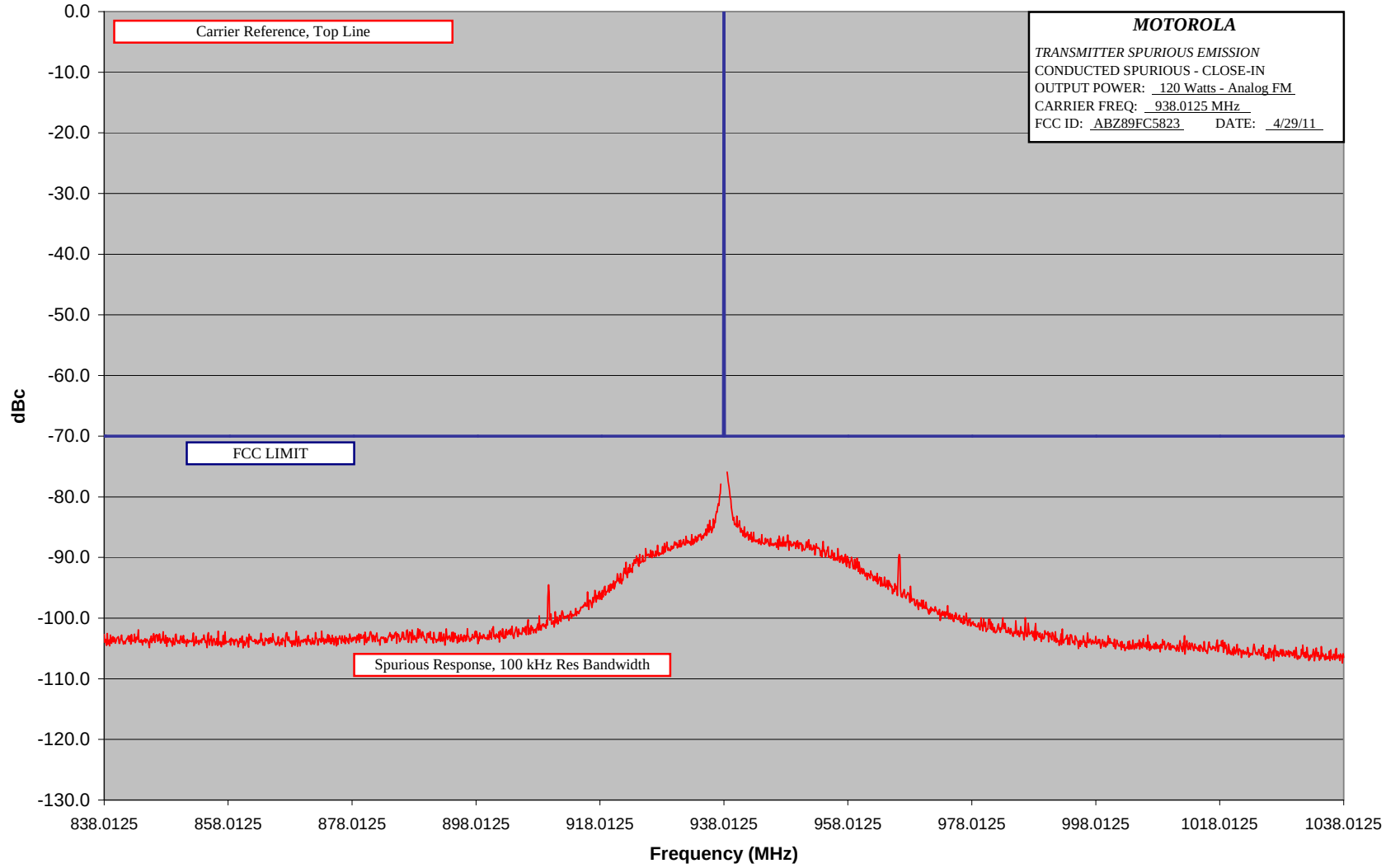


EXHIBIT E1-3.12

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 — *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_{10}(P) dB or 70 dB; (whichever is the lesser attenuation).*

Modulation: Linear Simulcast Modulation (LSM), Pseudorandom data. This modulation is representative of performance for each of the available modulations.

Carrier Frequencies: A carrier frequency of 938.4000 MHz was measured. The radiated result at this frequency is representative of performance across the 935-941 MHz operating band.

EXHIBIT	DESCRIPTION
E1-4.1	Radiated Spurious Emissions, Harmonics, Power Output 120 Watts, LSM The specification limit is -70.0 dBc
E1-4.2	Radiated Spurious Emissions, Harmonics, Power Output 2 Watts, LSM The specification limit is -53.0 dBc

Report on Test Measurements

Radiated Emission – Harmonics – 120 Watts – Linear Simulcast Modulation (LSM)

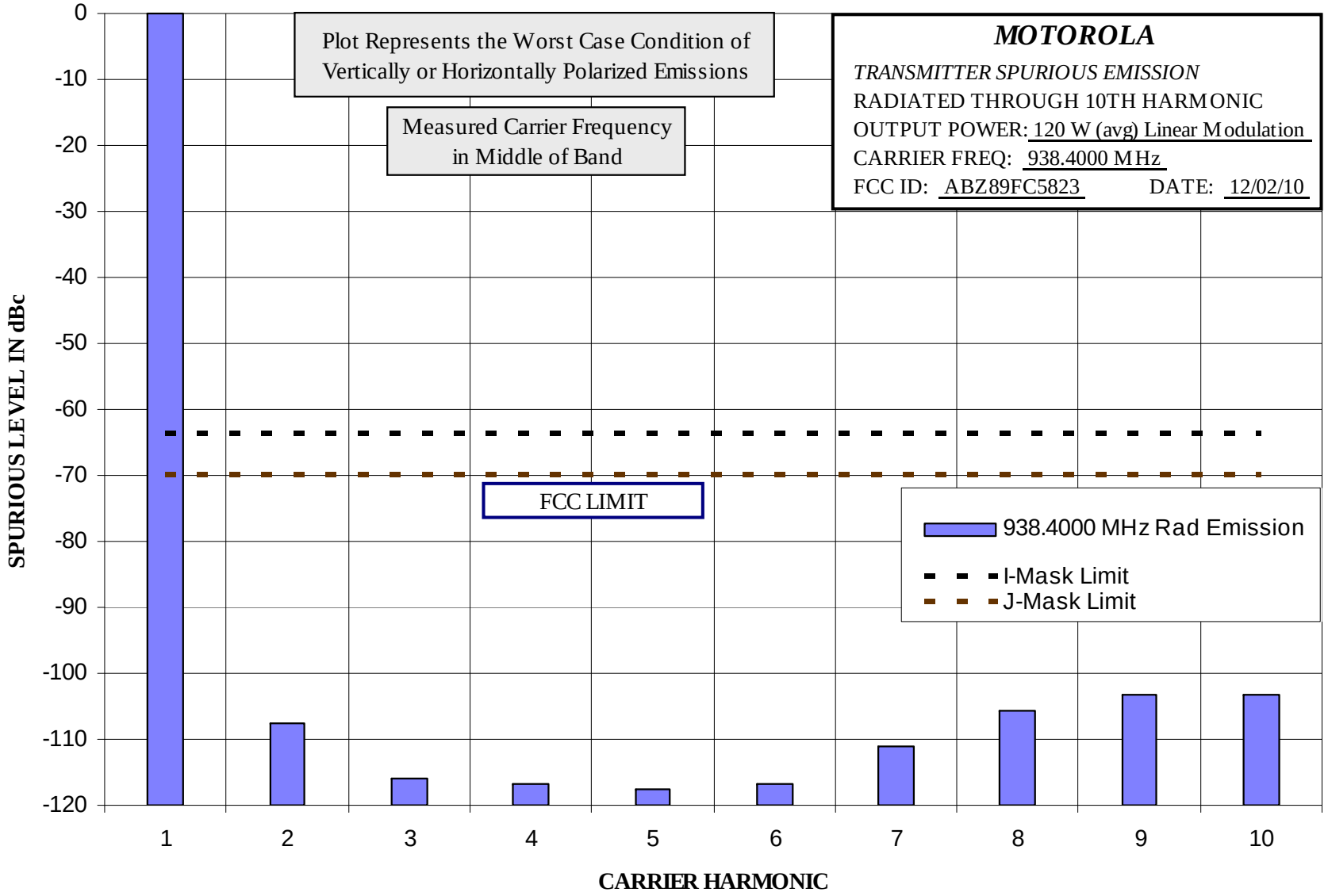
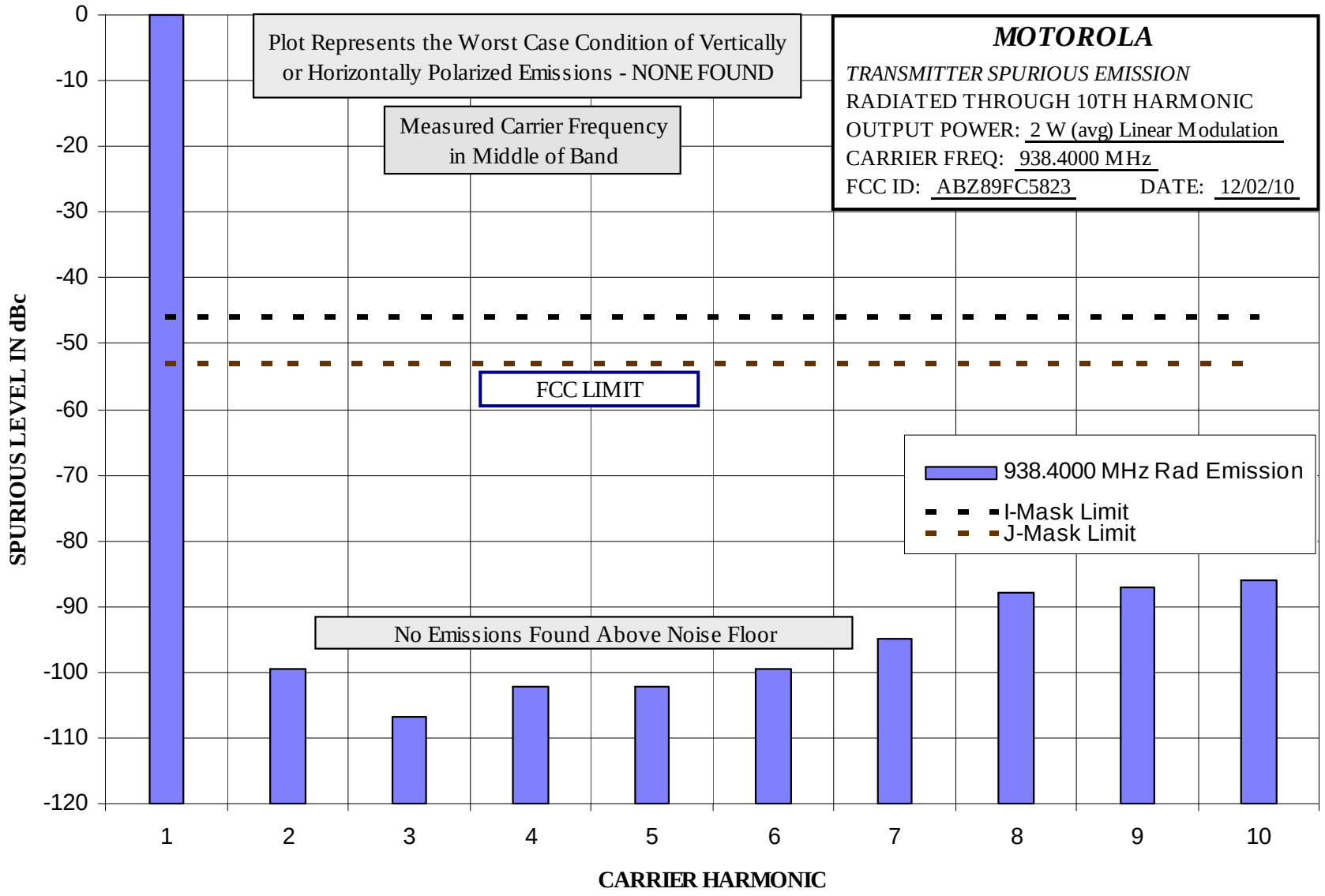


EXHIBIT E1-4.1

Report on Test Measurements

Radiated Emission – Harmonics – 2 Watts – Linear Simulcast Modulation (LSM)



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.

EXHIBIT	DESCRIPTION
E1-5.1	Frequency Stability Vs Temperature
E1-5.2	Frequency Stability Vs Voltage

APPLICANT: MOTOROLA **EQUIPMENT TYPE: ABZ89FC5823**

Report on Test Measurements

Frequency Stability Vs Temperature

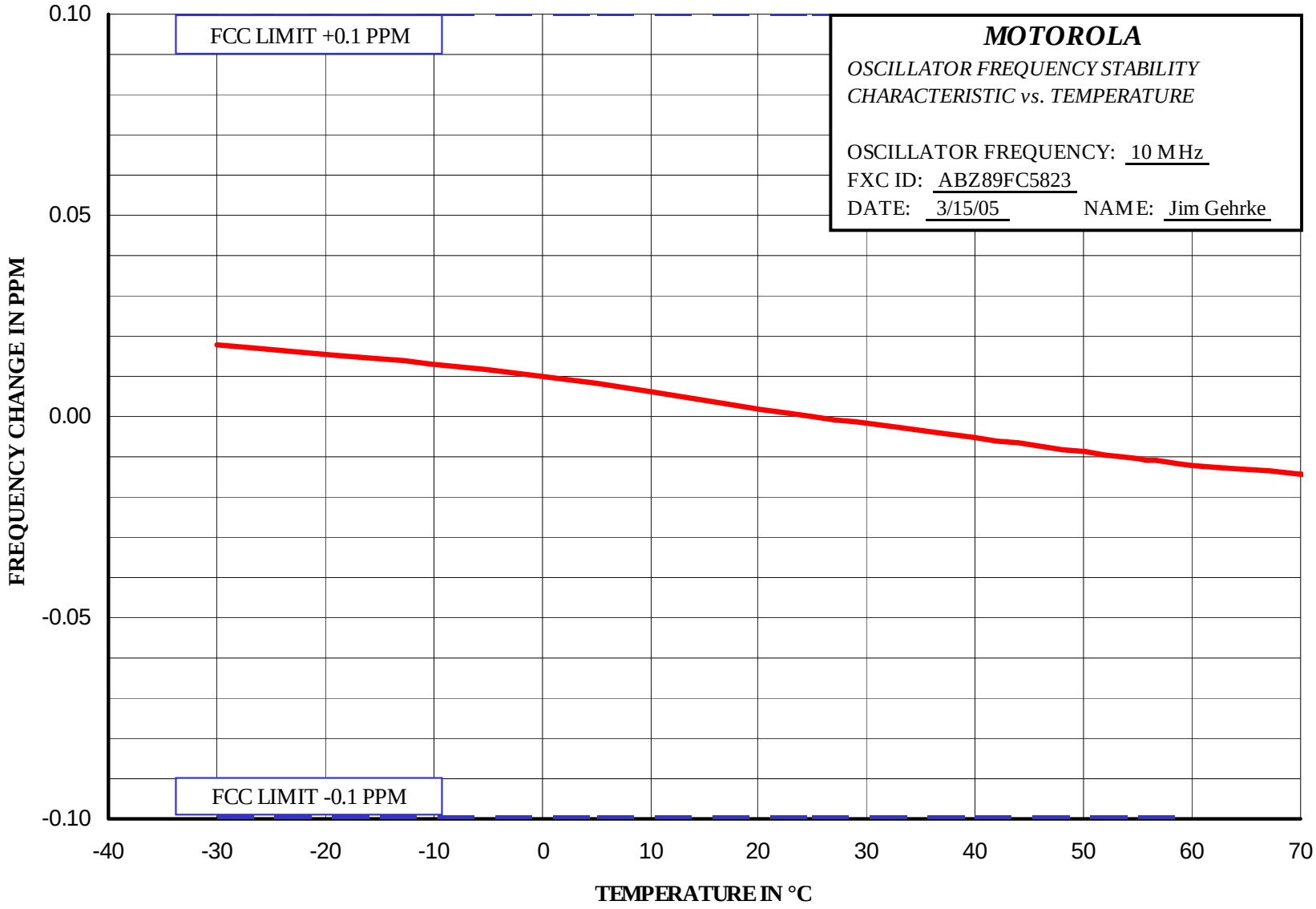


EXHIBIT E1-5.1

APPLICANT: MOTOROLA **EQUIPMENT TYPE: ABZ89FC5823**

Report on Test Measurements

Frequency Stability Vs Voltage

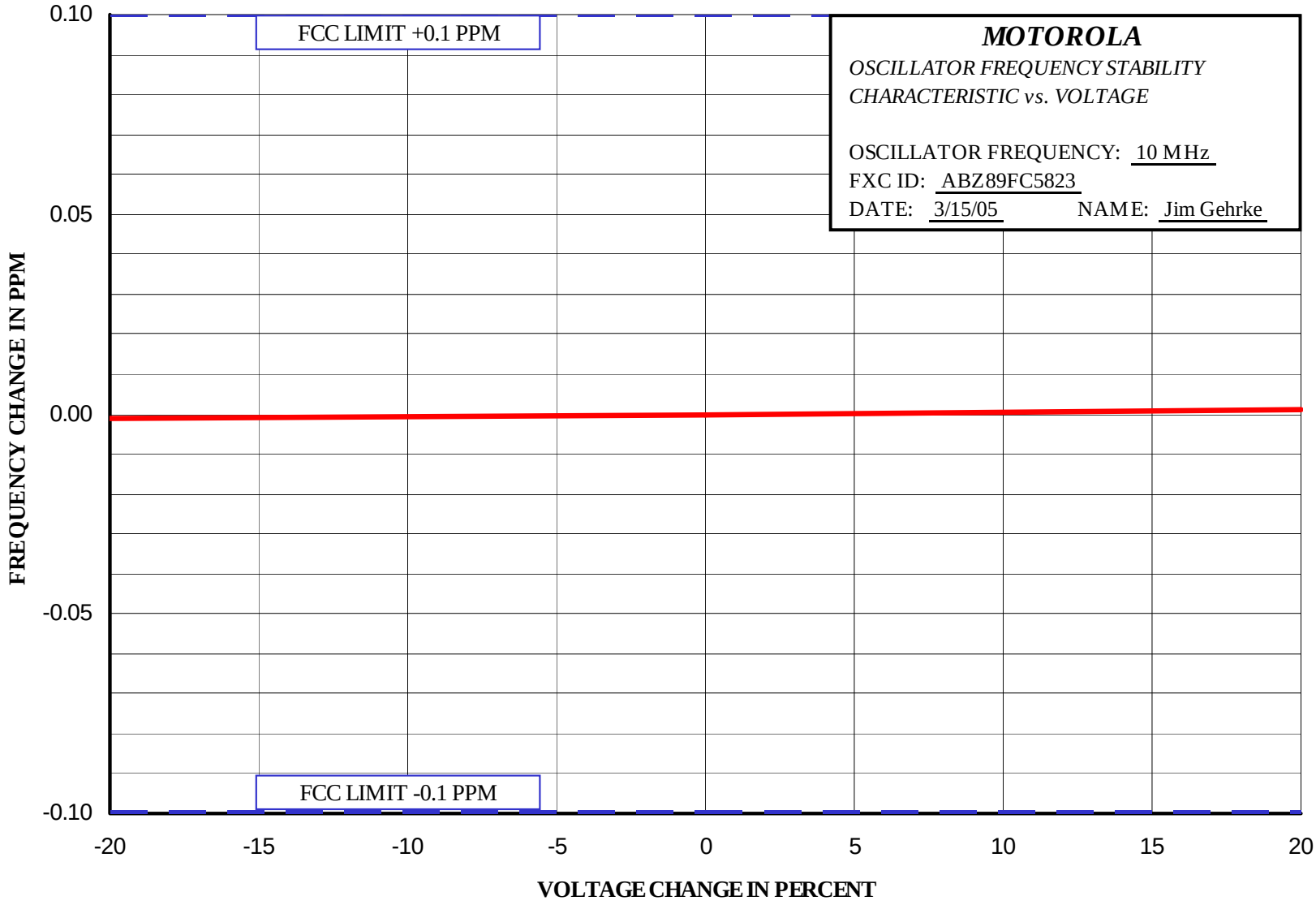


EXHIBIT E1-5.2

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:	For 25 kHz channels, a carrier at 940.5125 MHz was measured. This frequency is near the center of the operating band 940 – 941 MHz
	For 12.5 kHz channels, a carrier at 938.0125 MHz was measured. This frequency is near the center of the operating band 935 – 941 MHz

EXHIBIT	DESCRIPTION
E1-7.1	Audio Frequency Response – Modulation Characteristics, 25 kHz Channels
E1-7.2	Audio Frequency Response – Modulation Characteristics, 12.5 kHz Channels
	The specification limit is shown on the response plots

APPLICANT: MOTOROLA **EQUIPMENT TYPE: ABZ89FC5823**

Report on Test Measurements

Audio Frequency Response – 25 kHz Channels

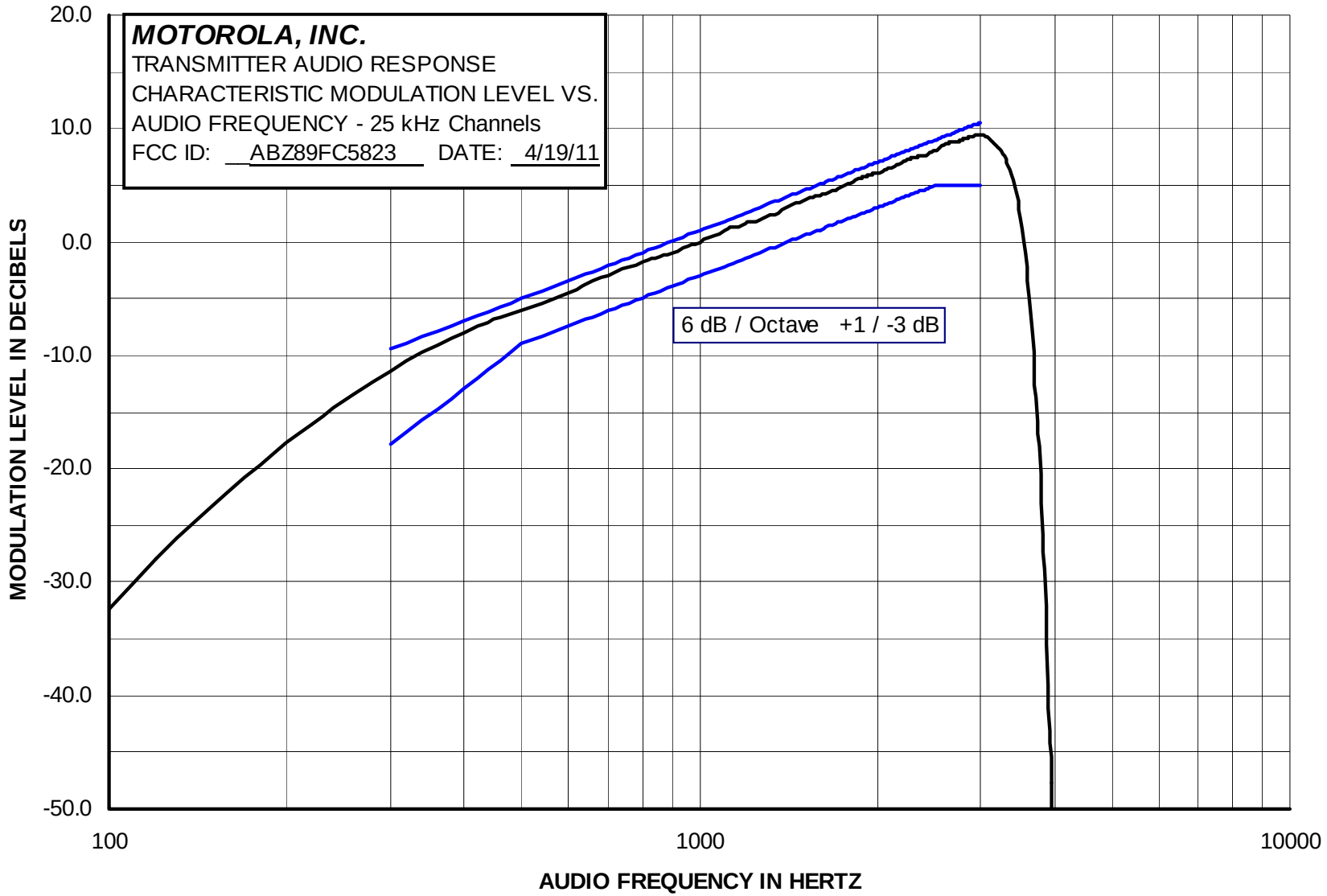


EXHIBIT E1-7.1

Report on Test Measurements

Audio Frequency Response – 12.5 kHz Channels

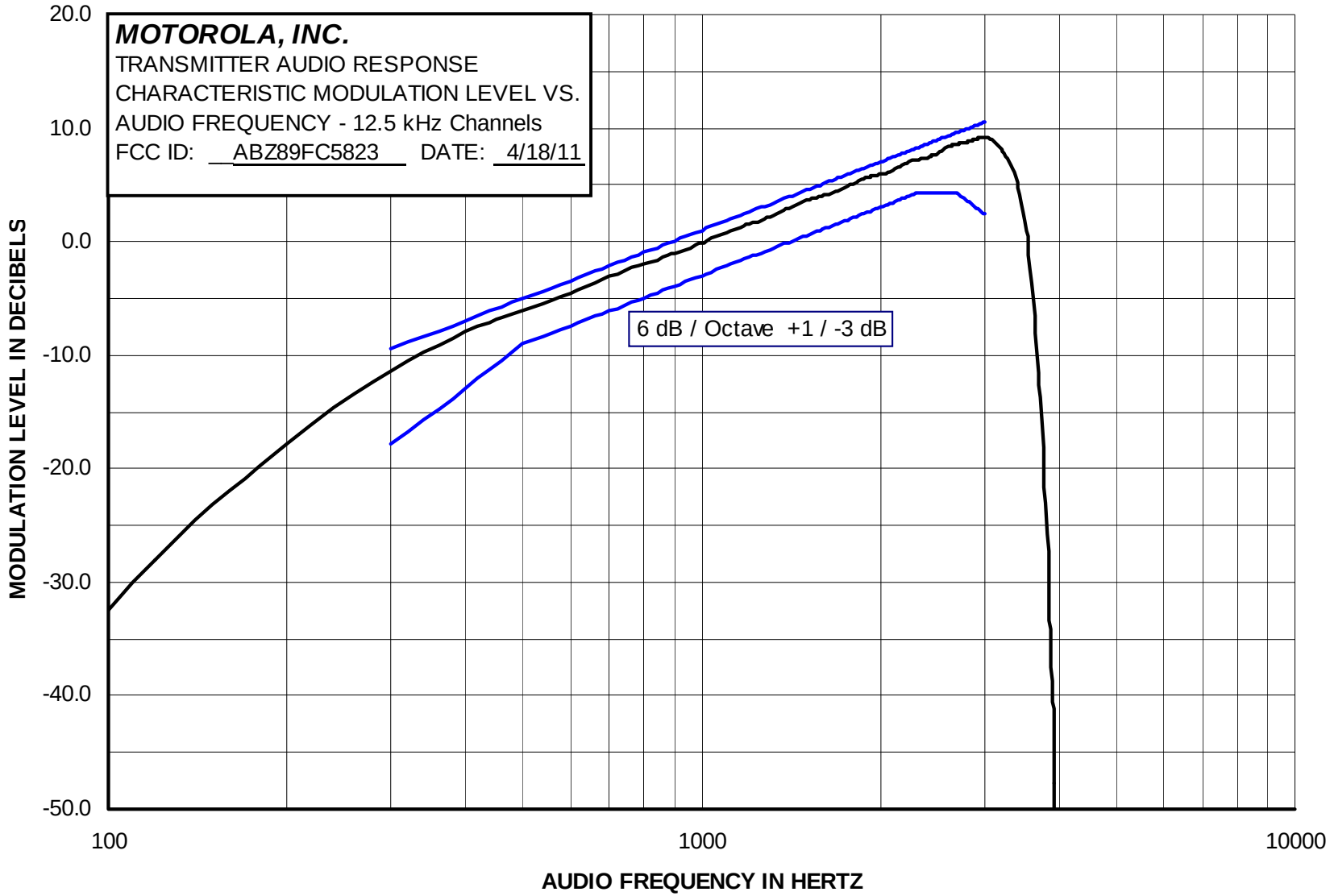


EXHIBIT E1-7.2

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:	For 25 kHz channels, a carrier at 940.5125 MHz was measured. This frequency is near the center of the operating band 940 – 941 MHz
	For 12.5 kHz channels, 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**
E1-8.1	Modulation Limiting Response – Modulation Characteristics, 25 kHz Channels
E1-8.2	Modulation Limiting Response – Modulation Characteristics, 12.5 kHz Channels

Report on Test Measurements

Modulation Limiting – 25 kHz Channels

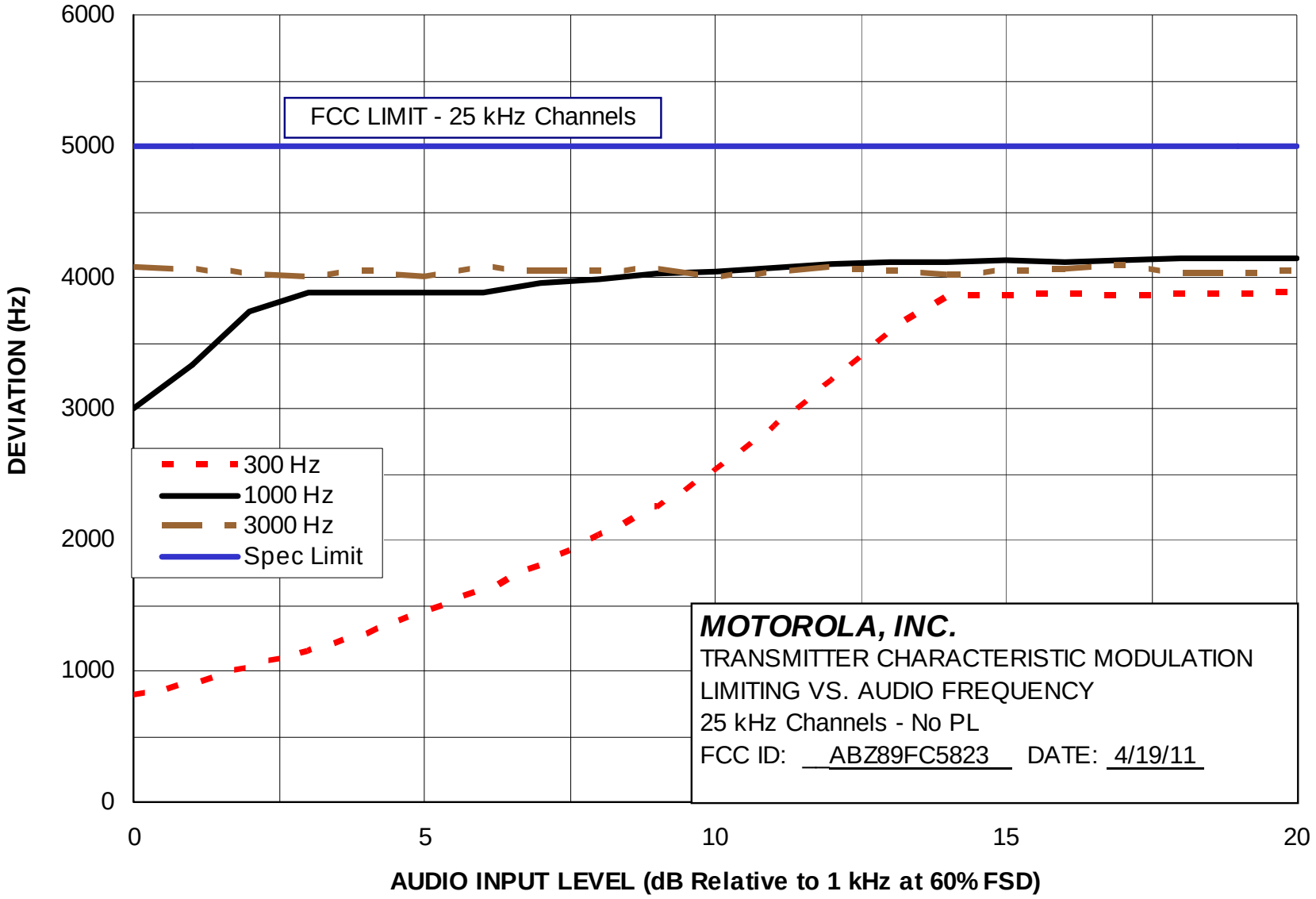


EXHIBIT E1-8.1

Report on Test Measurements

Modulation Limiting – 12.5 kHz Channels

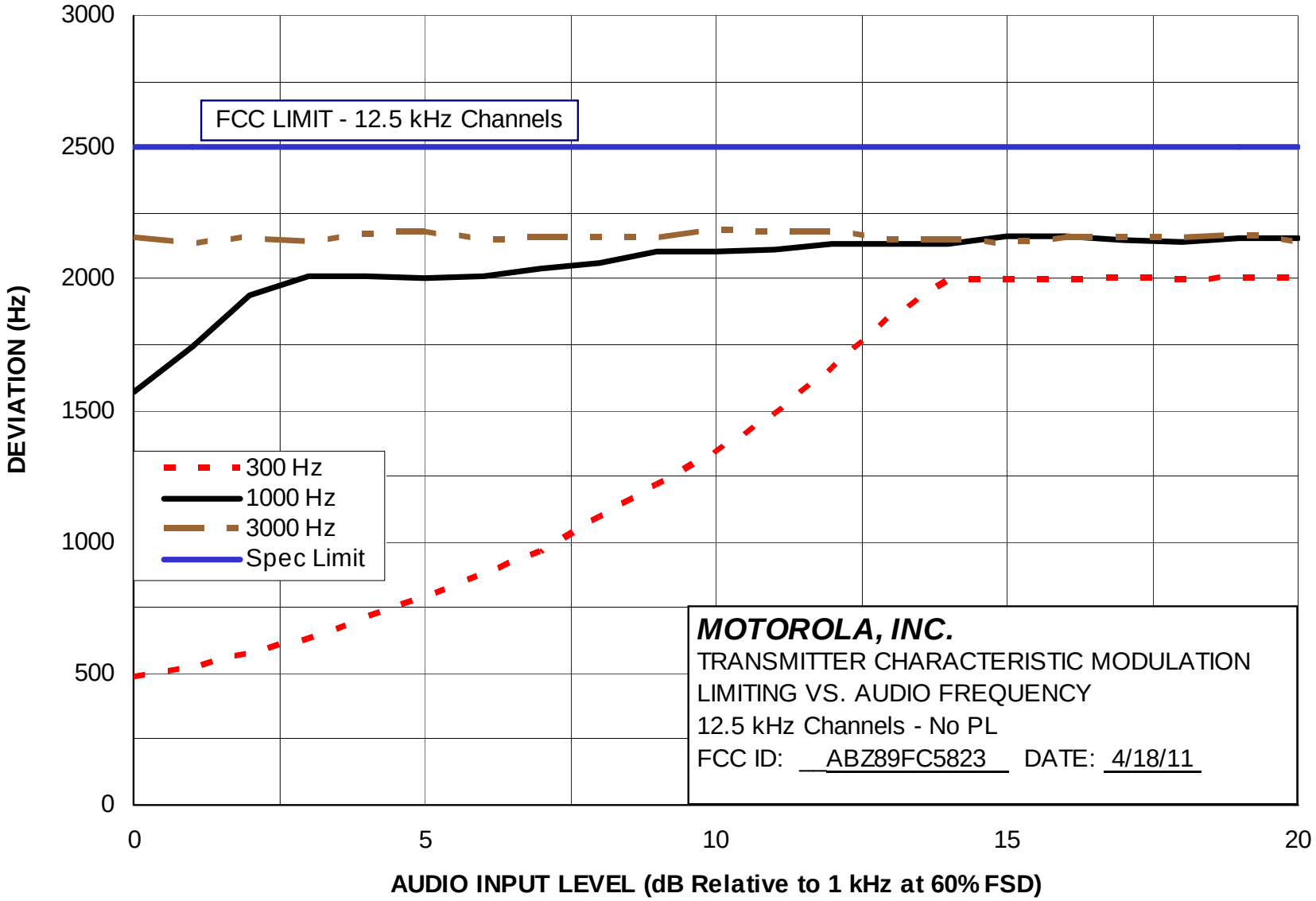


EXHIBIT E1-8.2

Report on Test Measurements

Occupied Bandwidth – Analog Voice Frequency Modulation, 50 kHz Channels – 940-941 MHz Part 24 Operation

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.

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:	±5.0 kHz Max
Power Setting:	120 Watts

Specification Requirement § 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 (fd in kHz) of up to and including 40 kHz:

at least 116 $\log_{10}$(P) ((fd+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 (fd 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:

Max Mod Freq, M	*Max Deviation, D*	*2*(M+D)*	*Nec BW*
3 kHz	5 kHz	16 kHz	16K0

Report on Test Measurements

Occupied Bandwidth – Analog Voice Frequency Modulation, 50 kHz Channels – 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:	3 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
E1-9.1	Carrier with 2500 Hz Audio Tone, 25 kHz Channels
E1-9.2	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, 25 kHz Channels
E1-9.3	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, 25 kHz Channels

Report on Test Measurements

Occupied Bandwidth – Analog Voice 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.

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

Modulation Type:	Analog Voice
Emission Designator:	11K0F3E
Channelization:	12.5 kHz
Deviation Limit:	±5.0 kHz Max
Power Setting:	120 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_{10}(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:

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

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.

EXHIBIT	**DESCRIPTION**
E1-9.4	Carrier with 2500 Hz Audio Tone, 12.5 kHz Channels
E1-9.5	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, 12.5 kHz Channels
E1-9.6	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, 12.5 kHz Channels

Report on Test Measurements

Occupied Bandwidth – Carrier with 2500 Hz Audio Tone, 25 kHz Channels

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

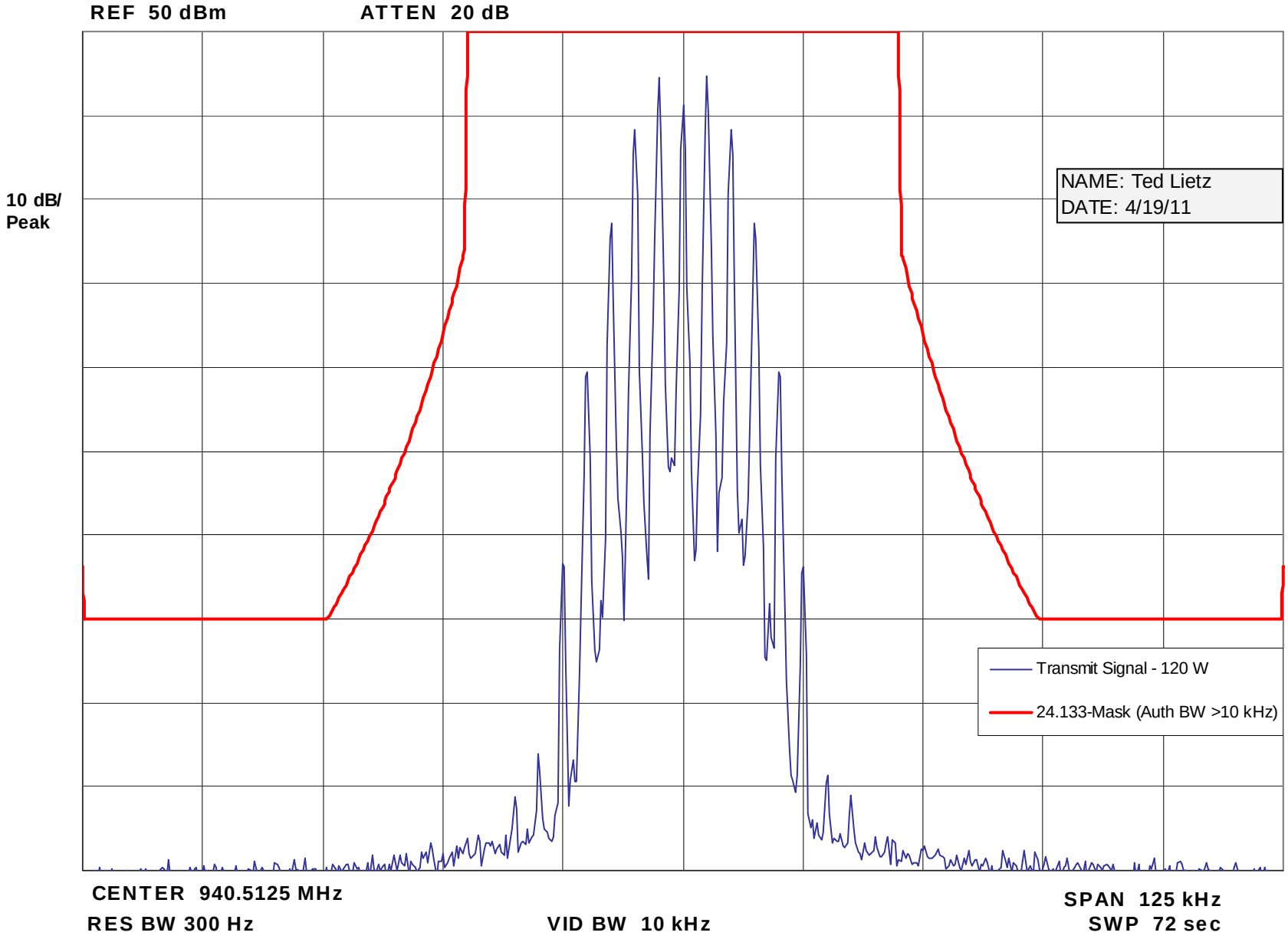


EXHIBIT E1-9.1

Report on Test Measurements

Occupied Bandwidth – Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, 25 kHz Channels

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

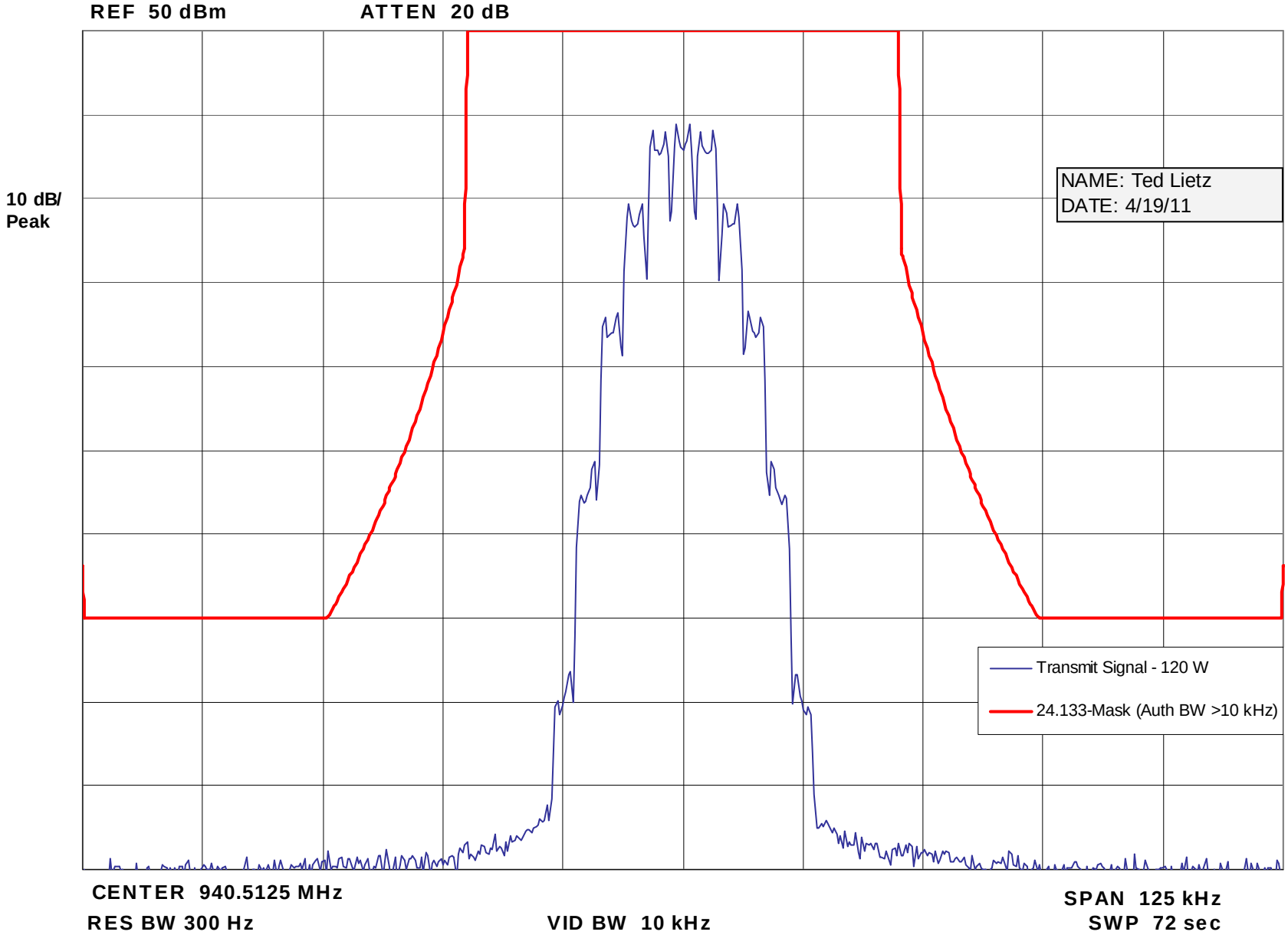


EXHIBIT E1-9.2

Report on Test Measurements

Occupied Bandwidth – Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, 25 kHz Channels

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

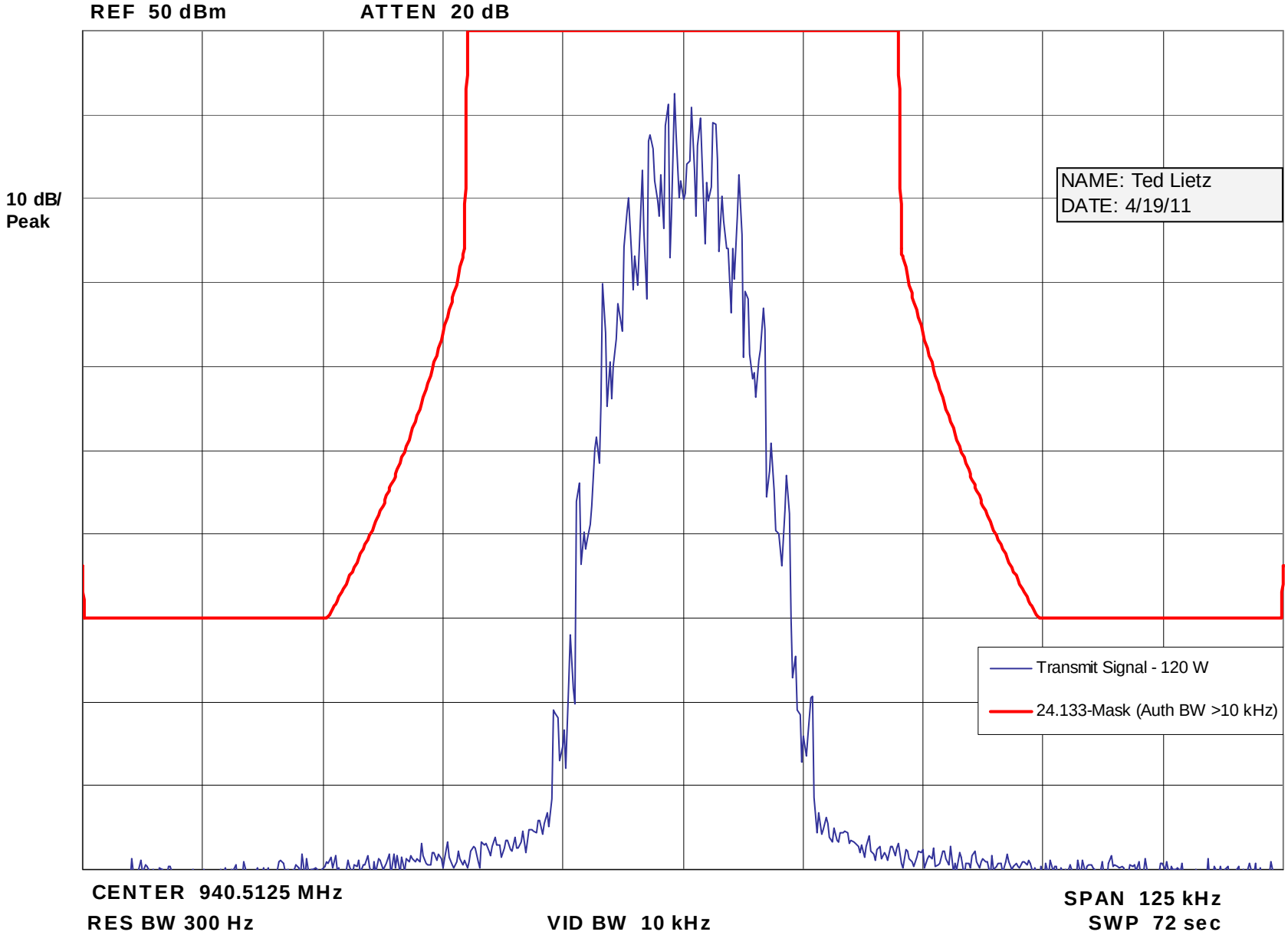


EXHIBIT E1-9.3

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

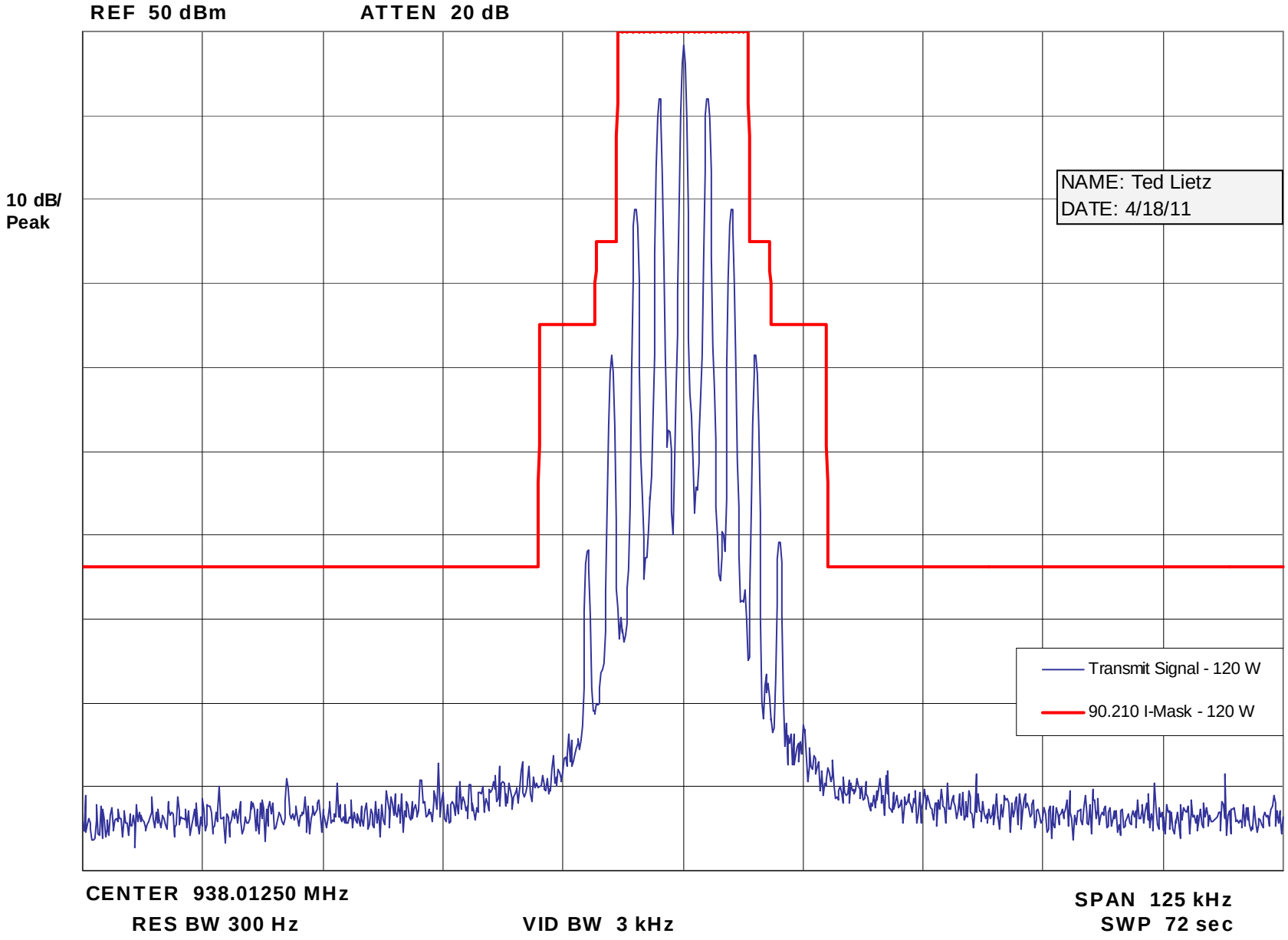


EXHIBIT E1-9.4

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

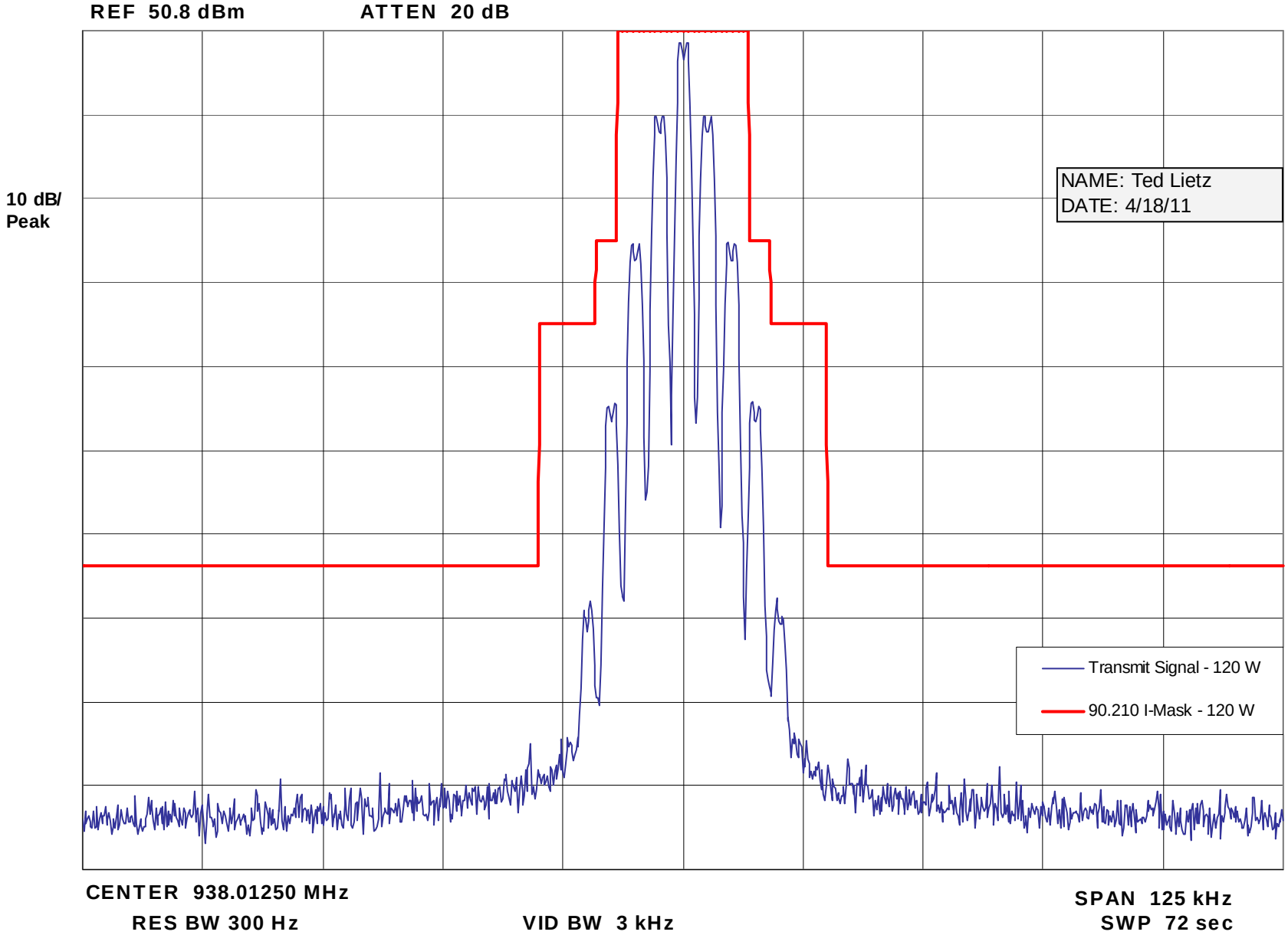


EXHIBIT E1-9.5

APPLICANT: MOTOROLA **EQUIPMENT TYPE: ABZ89FC5823**

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

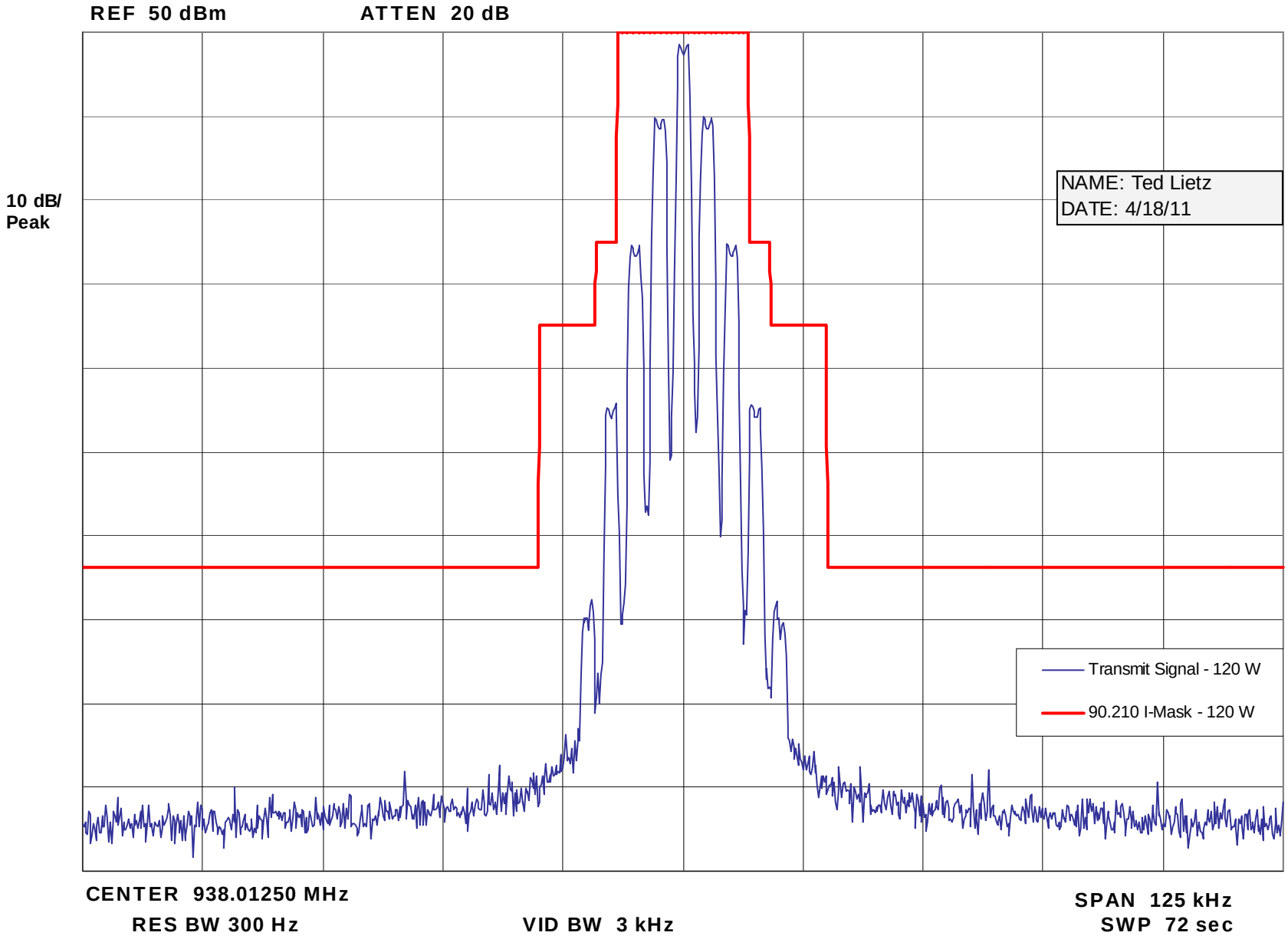


EXHIBIT E1-9.6

Report on Test Measurements

Test Equipment List

MODEL	MANUFACTURER	DESCRIPTION	Serial No.	Last Cal	Next Cal
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	10/18/10	10/18/13
83712A	Hewlett Packard	Signal Generator	3429A00455	10/27/08	10/27/11
8671B	Hewlett Packard	Signal Generator	2611A00159	10/20/10	10/20/13
85460A	Hewlett Packard	EMI Analyzer, Filter	3704A00467	09/10/10	09/10/13
85462A	Hewlett Packard	EMI Analyzer, RF/Display	3906A00500	09/10/10	09/10/13
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	12/02/10	12/02/11
(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

__29__ years of Design and Development experience in the field of two-way radio communication.

NAME: Ken Weiss

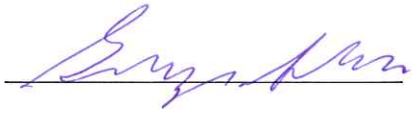
SIGNATURE: 

DATE: May 4, 2011

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: May 4, 2011

POSITION: Engineering Section Manager