



849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

FCC
UHF PORTABLE PART 90
TEST REPORT

APPLICANT	VERTEX STANDARD USA, INC.
	8000 WEST SUNRISE BLVD. FT. LAUDERDALE FL 33322 USA
FCC ID	AXI11274720
MODEL NUMBER	VX-264-G7-5
PRODUCT DESCRIPTION	PORTABLE TRANSCEIVER
STANDARD APPLIED	CFR 47 Part 90
DATE SAMPLE RECEIVED	10/21/2014
DATE TESTED	11/2-4/2014
REPORT ISSUE DATE	11/5/2014
TESTED BY	Cory Leverett
APPROVED BY	Sid Sanders
TIMCO REPORT NO.	1892AUT14TestReport.docx
TEST RESULTS	☒ PASS ☐ FAIL

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WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**

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GENERAL REMARKS

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Summary

The device under test does:

- ☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Authorized Signatory Name:

Cory Douglas Leverett
Engineering Project Manager

Date: 11/04/2014



GENERAL INFORMATION

EUT Specification

EUT Description	PORTABLE TRANSCEIVER
FCC ID	AXI11274720
Model Number	VX-264-G7-5
Operating Frequency	450-512MHz
Test Frequencies	450, 456, 470MHz
Type of Emission	11K0F3E for Channel Spacing 12.5, and 16K0F3E for Channel Spacing 25kHz
Modulation	Analog FM
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☐ DC Power 12V
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☐ Mobile
	☒ Portable
Test Conditions	The temperature was 24-26°C with a relative humidity of 50-65%.
Revision History to the EUT	None
Test Exercise	The EUT was placed in continuous transmit mode.
Applicable Standards	ANSI/TIA 603-C:2004, FCC CFR 47 Part 90
Test Facility	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.

TEST REPORT SUMMARY

Rule Part No.	Scope of Work	Status Pass/Fail/NA
Part 2.1033(c)(8) , Part 2.1046(a) , Part 90	RF Power Output	Pass
Part 2.1033(c) (4) Part 2.1047(a)(6)	Modulation Characteristics	Pass
2.1049(c) ,	Occupied Bandwidths	Pass
2.1051(a) 90.210(b) , 90.210(d)	Antenna Conducted Emission Mask	Pass
2.1053 , Part 90.210 (b), 90.210 (d)	Field Strength Spurious Emissions	Pass
Part 2.1055 , Part 90.213	Frequency Stability	Pass
Part 90.214	Transient Frequency Behavior	Pass

RADIO EQUIPMENT TESTING PROCEDURES

Power Line Conducted Interference: The procedure used was ANSI/TIA 603-D:2010, using a 50uH LISN. Both lines were observed with the EUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RF Power Output: The RF power output was measured at the antenna feed point by using a 50-ohm, resistive wattmeter to the RF output connector. For the device with a fixed or integral antenna, the RF power is measured as ERP. The substitution method was used.

Audio Frequency Response: The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-D: 2010. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

Occupied Bandwidth: The measurements were made with the spectrum analyzer's resolution bandwidth set as shown on plot.

Spurious Emissions at Antenna Terminals: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from the lowest frequency generated to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard ANSI/TIA 603-D: 2010. The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Field Strength of Spurious Radiation: The test procedure used was ANSI/TIA 603-D:2010, using an Rohde & Schwarz – EMI test receiver. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

Frequency Stability:

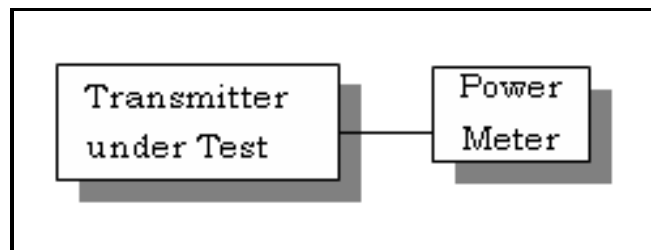
The EUT is placed in a temperature chamber, the EUT is allowed to soak at room temperature for 20 minutes and a reference frequency is read. The temperature is then lowered to -30 C and stepped up to 50 C soaking 20 minutes at each temperature then a frequency is read.

RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), Part 90

Test Requirements: Manufacturer's Specification

Test Setup Diagram:



Test Data:

RF power of the EUT can be set at 1W or 5W. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures

Tuned Frequency (MHz)	HI		LOW	
	Watts	dBm	Watts	dBm
450.25	4.7	36.7	.9	29.7
460.00	4.8	36.8	.9	29.7
469.75	4.9	36.9	.9	29.8
470.25	4.9	36.9	.9	29.8
491.00	5.0	37.0	1.0	30.1
511.75	5.0	37.0	1.0	30.0

DC INPUT TO THE FINAL AMPLIFIER

Rule Part: Part 2.1033 (C)(8)

Test Data:

FOR LOW POWER SETTING INPUT POWER: $(7.4V)(0.9A) = 6.66\text{Watts}$

FOR HIGH POWER SETTING INPUT POWER: $(7.4V)(1.5A) = 11.1\text{Watts}$

MODULATION CHARACTERISTICS

Rule Part No.: Part 2.1047(a)(b)

Test Requirements:

Method of Measurement:

Part 2.1033(c)

Part 90.209

Part 90.207

Part 2.1033(c) (4) Type of Emission: 11K0F3E

$B_n = 2M + 2DK$

$M = 3000$

$D = 2500$

$K=1$

$B_n = 2(3000) + 2(2500) = 11.0k$

Type of Emission: 16K0F3E

$B_n = 2M + 2DK$

$M = 3000$

$D = 5000$

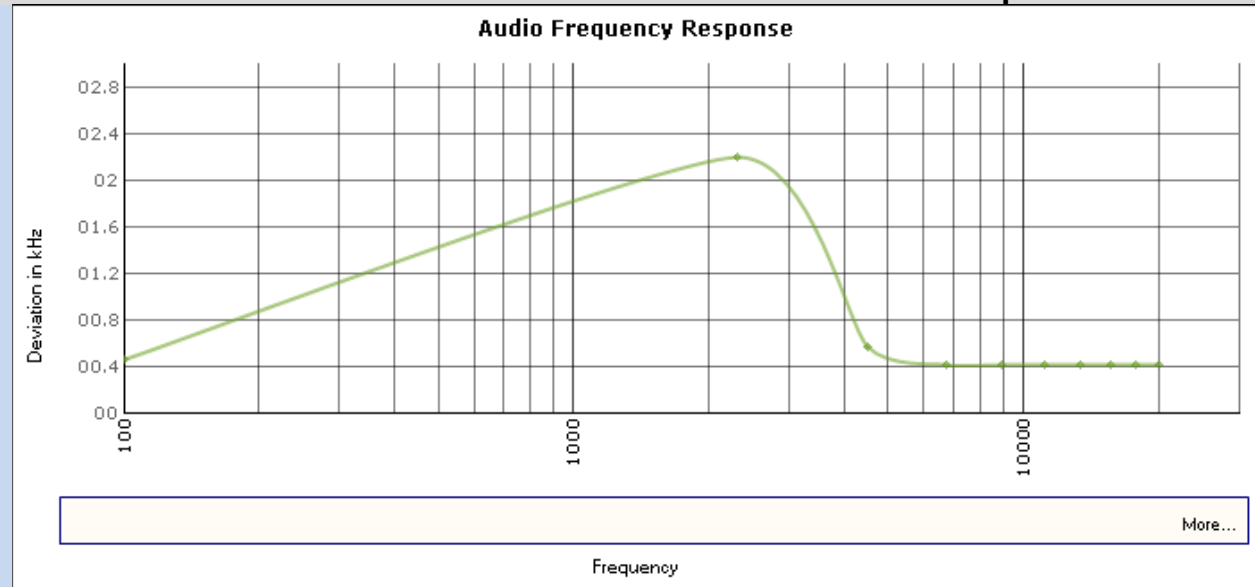
$K=1$

$B_n = 2(3000) + 2(5000) = 16.0k$

VOICE MODULATED COMMUNICATION EQUIPMENT

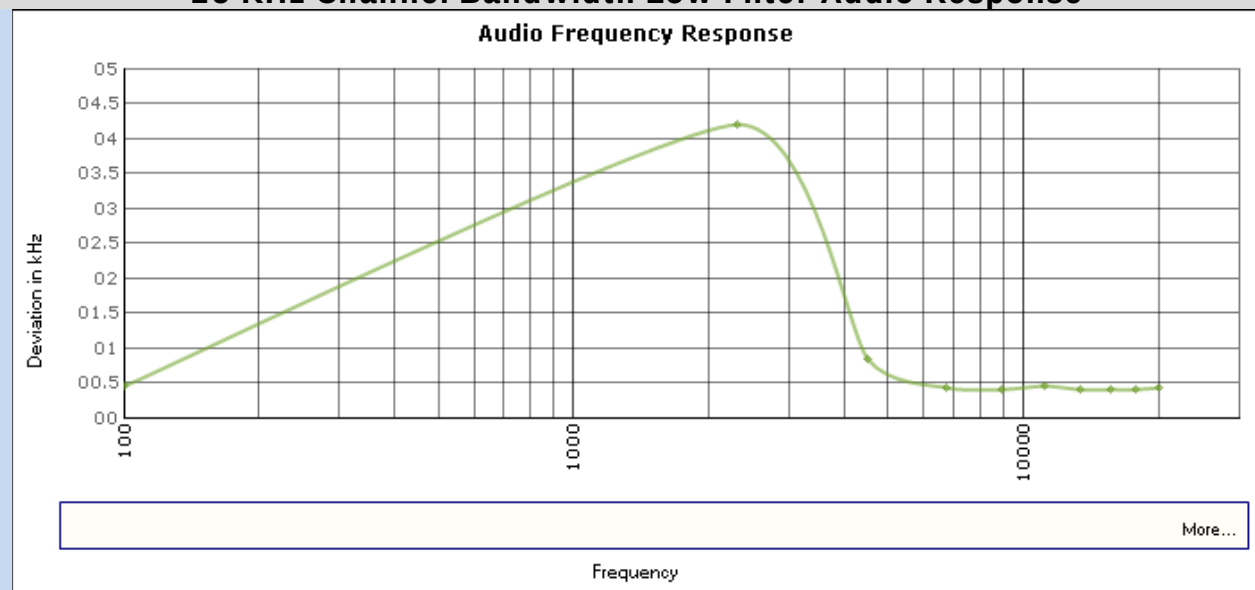
Rule Part No: Part 2.1047(a) A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

12.5 KHz Channel Bandwidth Low Filter Audio Response



Result Meets The Requirement

25 KHz Channel Bandwidth Low Filter Audio Response



Result Meets The Requirement

Applicant: VERTEX STANDARD USA, INC.

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AUDIO INPUT VERSUS MODULATION

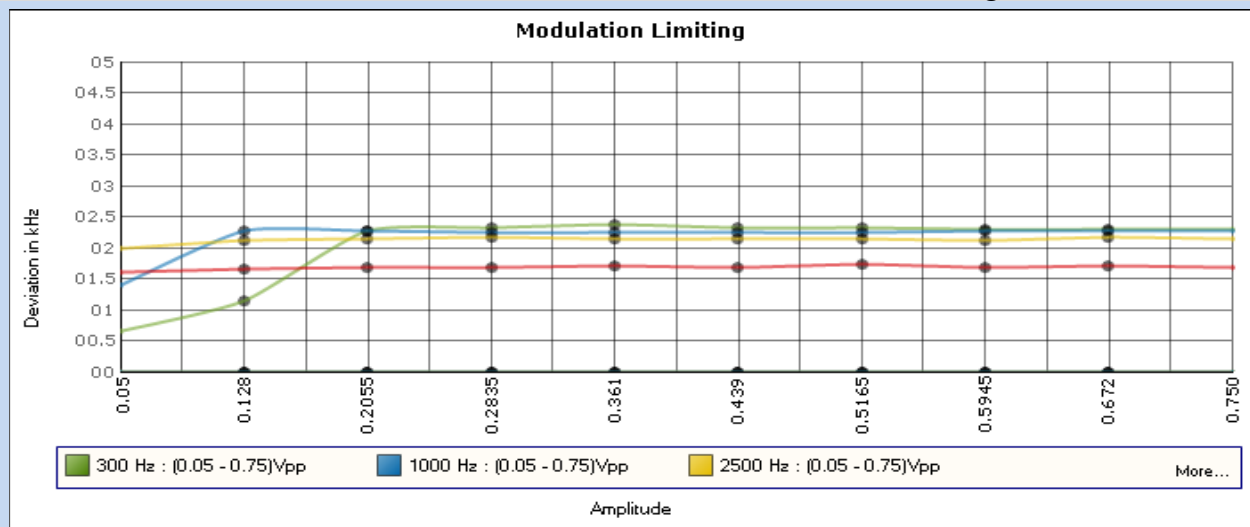
Rule Part No.: Part 2.1047(b) & 90

Requirements:

Modulation cannot exceed 100% deviation,

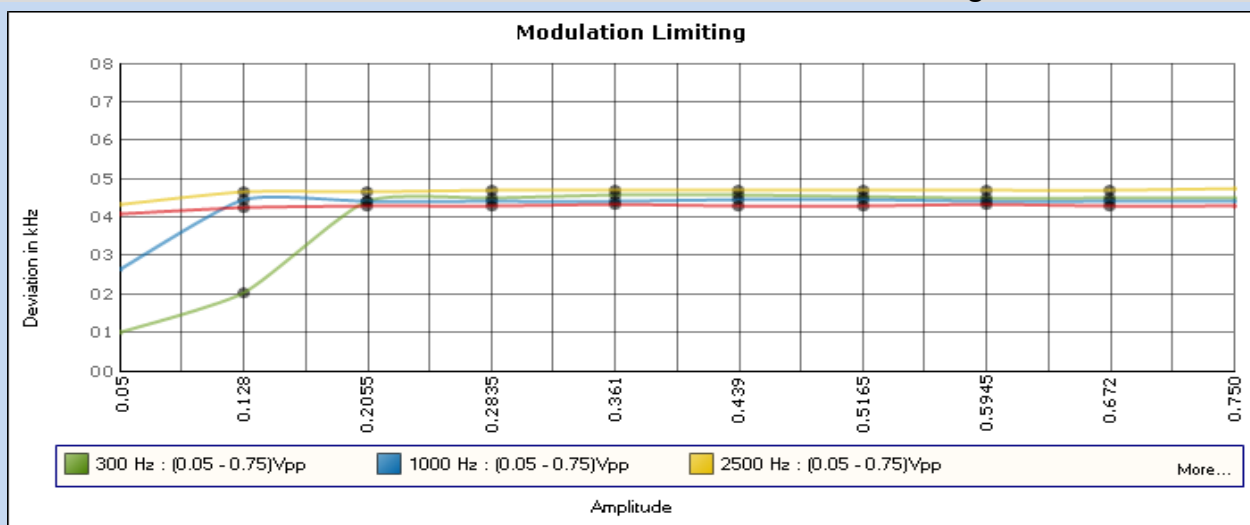
Test data:

12.5 KHz Channel Bandwidth Modulation Limiting Plot



Result Meets The Requirement

25 KHz Channel Bandwidth Modulation Limiting Plot

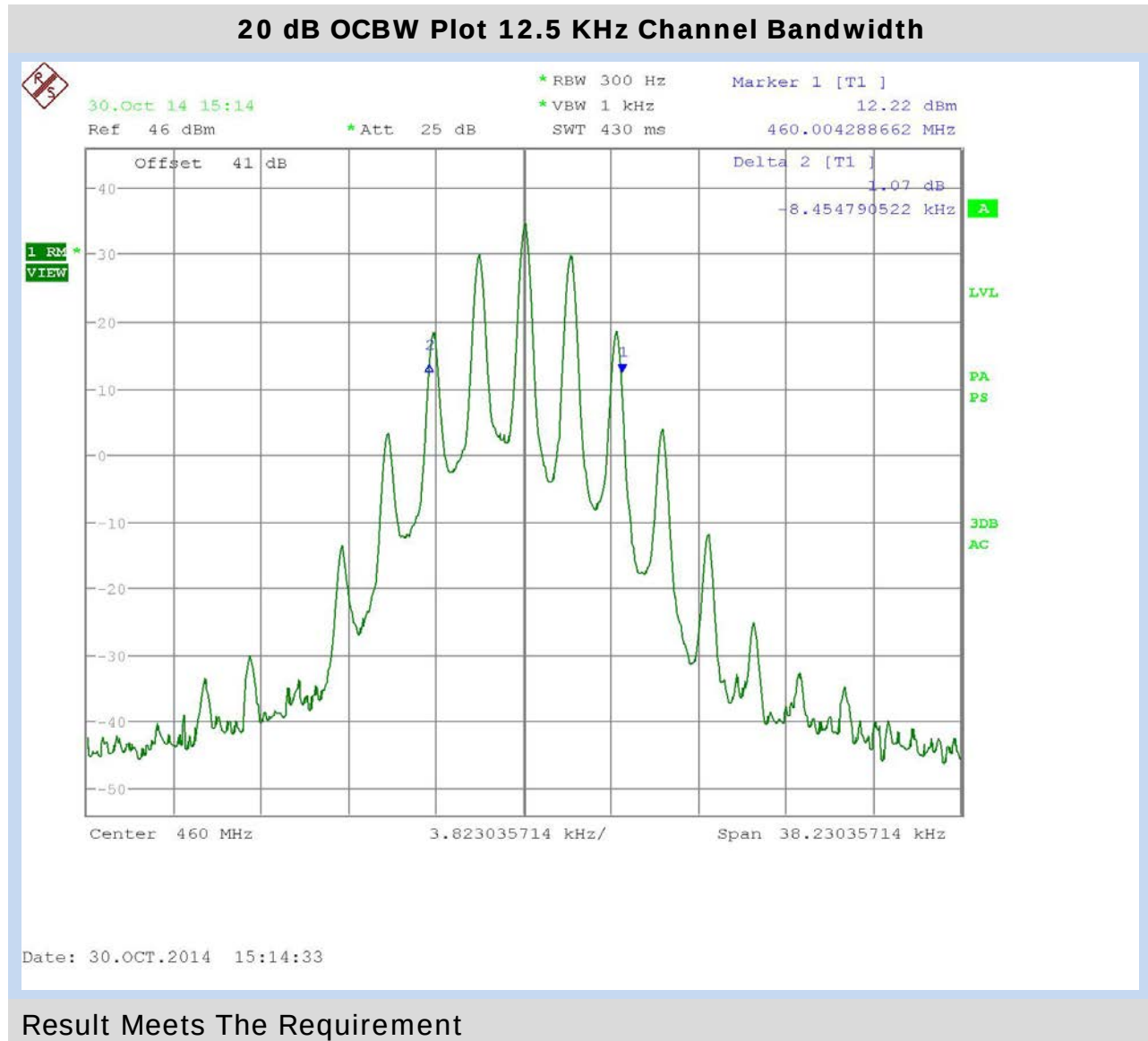


Result Meets The Requirement

OCCUPIED BANDWIDTH

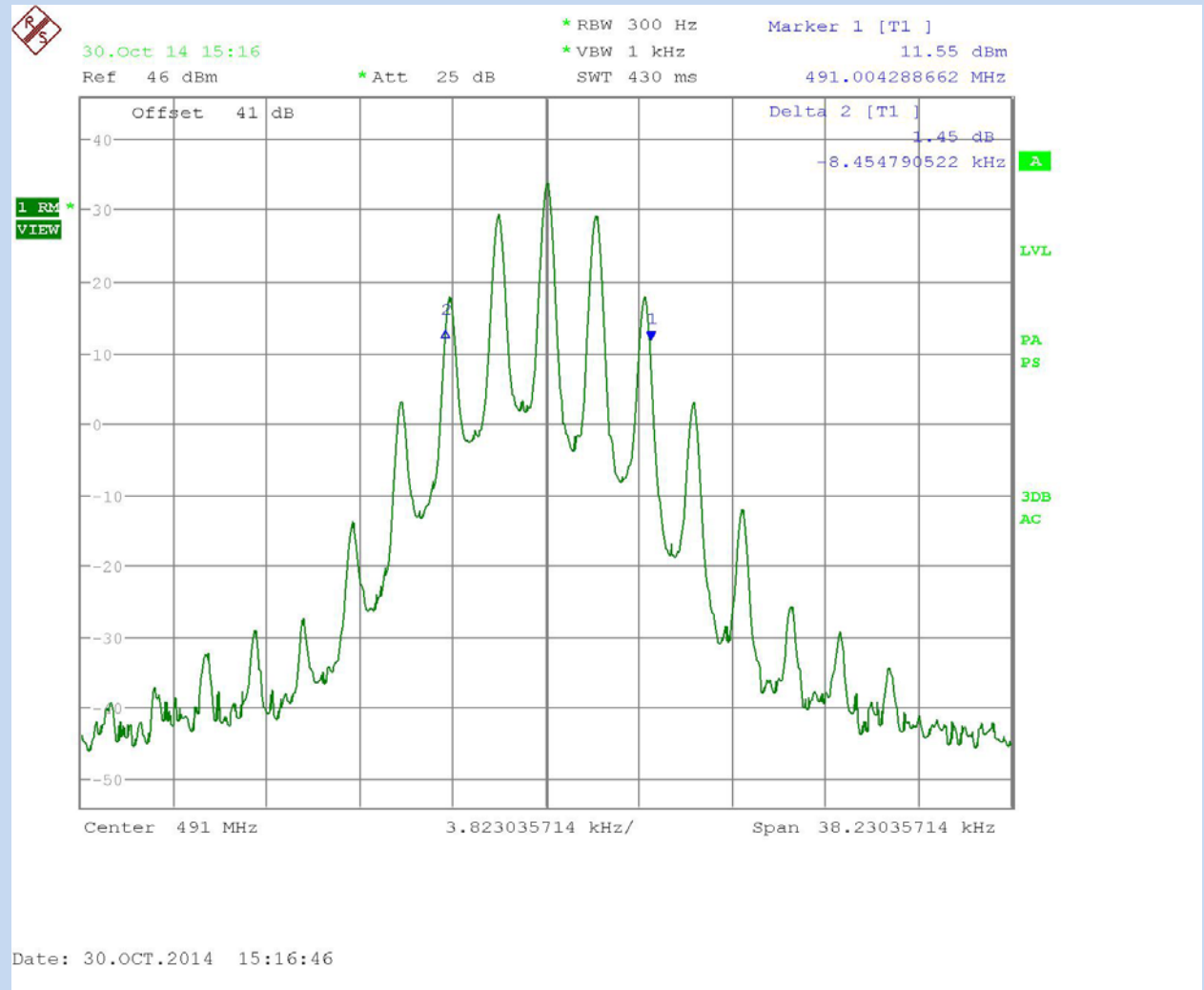
Rule Part No: Part 2.1049(c)
Part 90.209 (5)

Test Data:



Occupied Bandwidth Test Data:

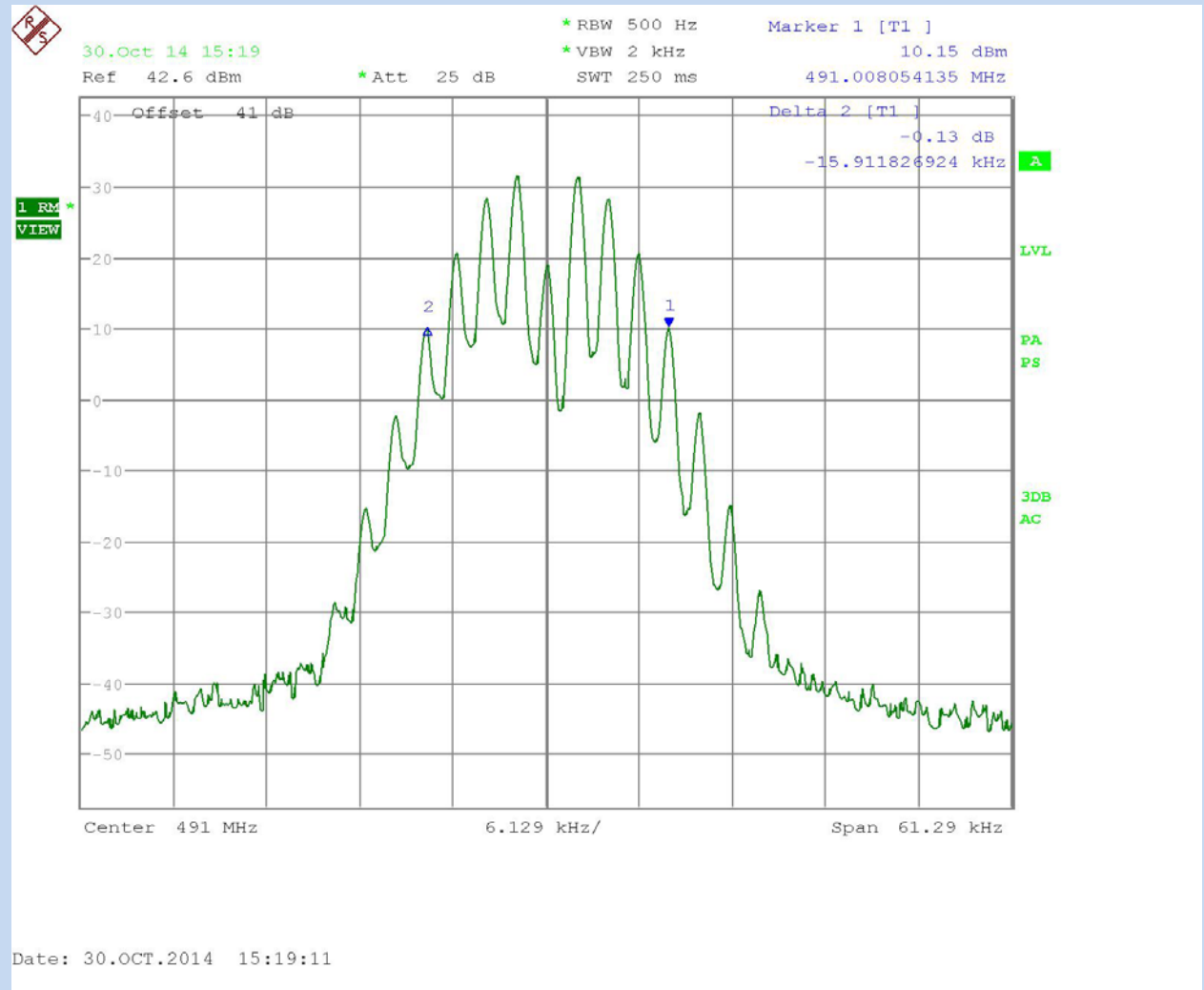
20 dB OCBW Plot 12.5 KHz Channel Bandwidth



Result Meets The Requirement

Occupied Bandwidth Test Data:

20 dB Plot of Band 2 25 KHz Channel Bandwidth



Result Meets The Requirement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rule Part No.: Part 2.1051(a)
Part 90.210 (b)
Part 90.210 (d)

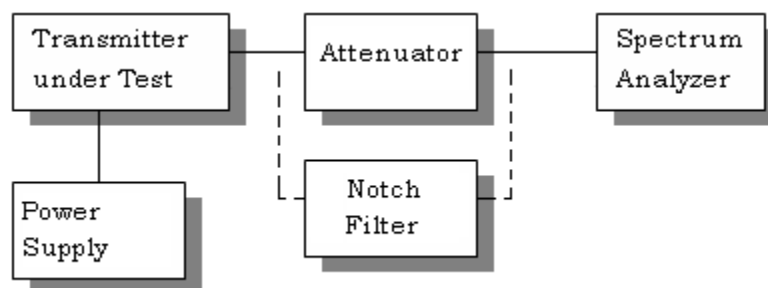
Requirements: (b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
- (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
- (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

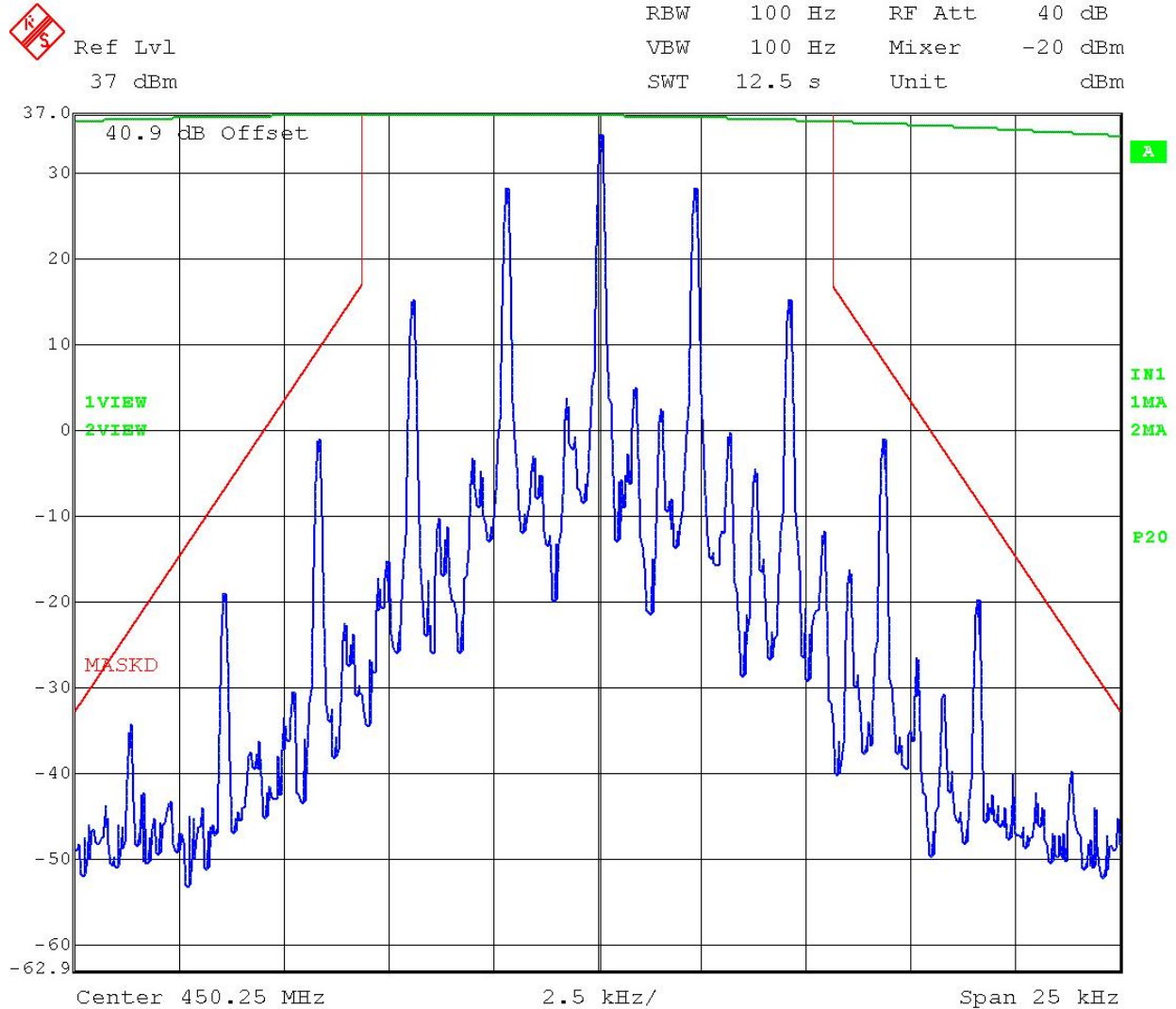
- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.

Test Setup Diagram:



Emission Mask D 12.5 KHz Authorized Bandwidth High Power Results:

Low End of Band



Date: 4.NOV.2014 15:15:21

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
450.25	37	5	57
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
900.5	-25.86	62.86	5.86
1350.75	-28.51	65.51	8.51
1801	-33.85	70.85	13.85
2251.25	-42.6	79.6	22.6
2701.5	-49.13	86.13	29.13
3151.75	-49.97	86.97	29.97
3602	-50.3	87.3	30.3
4052.25	-50.31	87.31	30.31
4502.5	-51.56	88.56	31.56

Applicant: VERTEX STANDARD USA, INC.

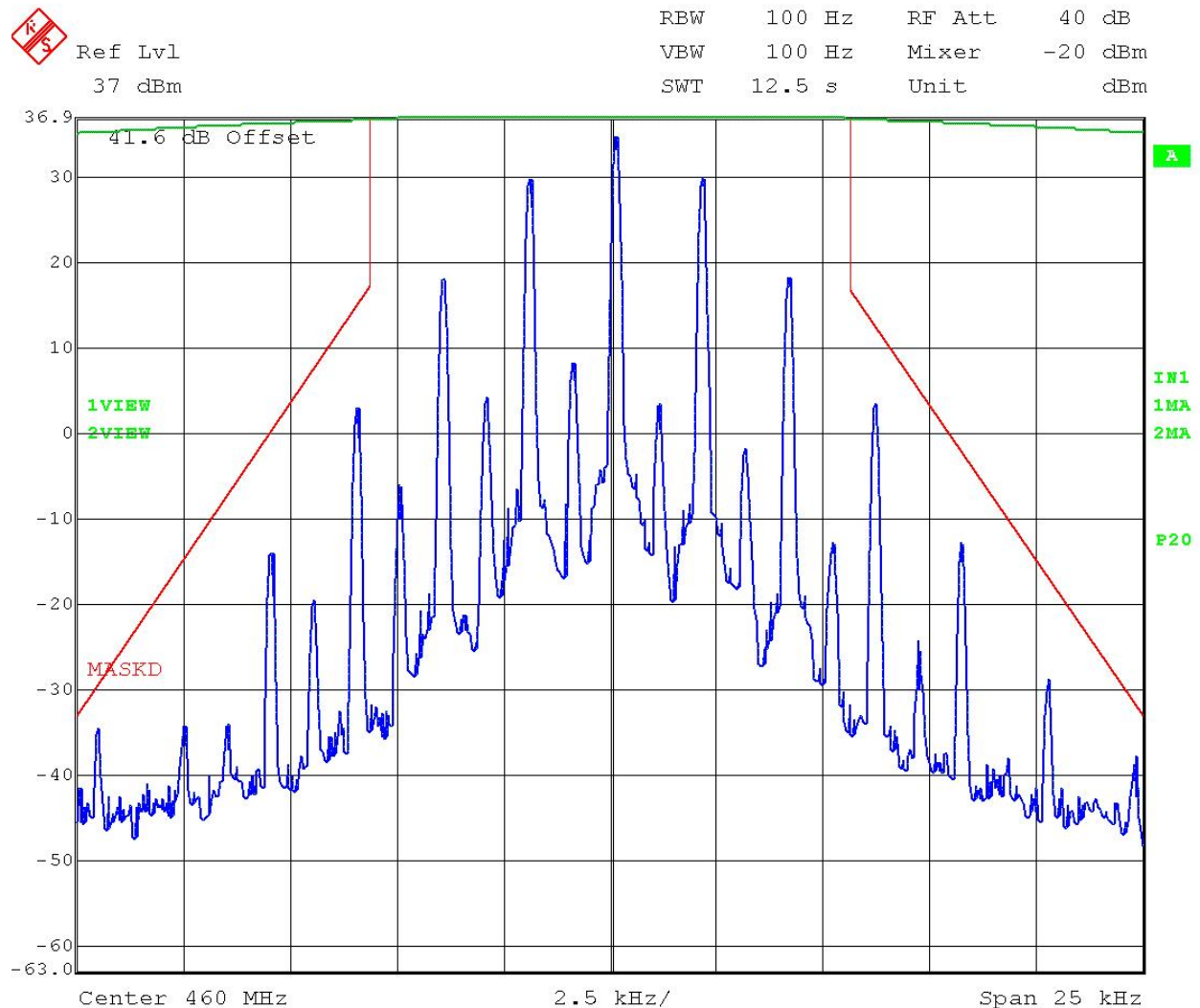
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Emission Mask D 12.5 KHz Authorized Bandwidth High Power Results:

Middle of Band



Date: 30.OCT.2014 10:15:26

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
460	37	5	57
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
920	-27.12	64.12	7.12
1380	-28.56	65.56	8.56
1840	-34.85	71.85	14.85
2300	-42.8	79.8	22.8
2760	-49.56	86.56	29.56
3220	-50.06	87.06	30.06
3680	-50.25	87.25	30.25
4140	-50.67	87.67	30.67
4600	-51.22	88.22	31.22

Applicant: VERTEX STANDARD USA, INC.

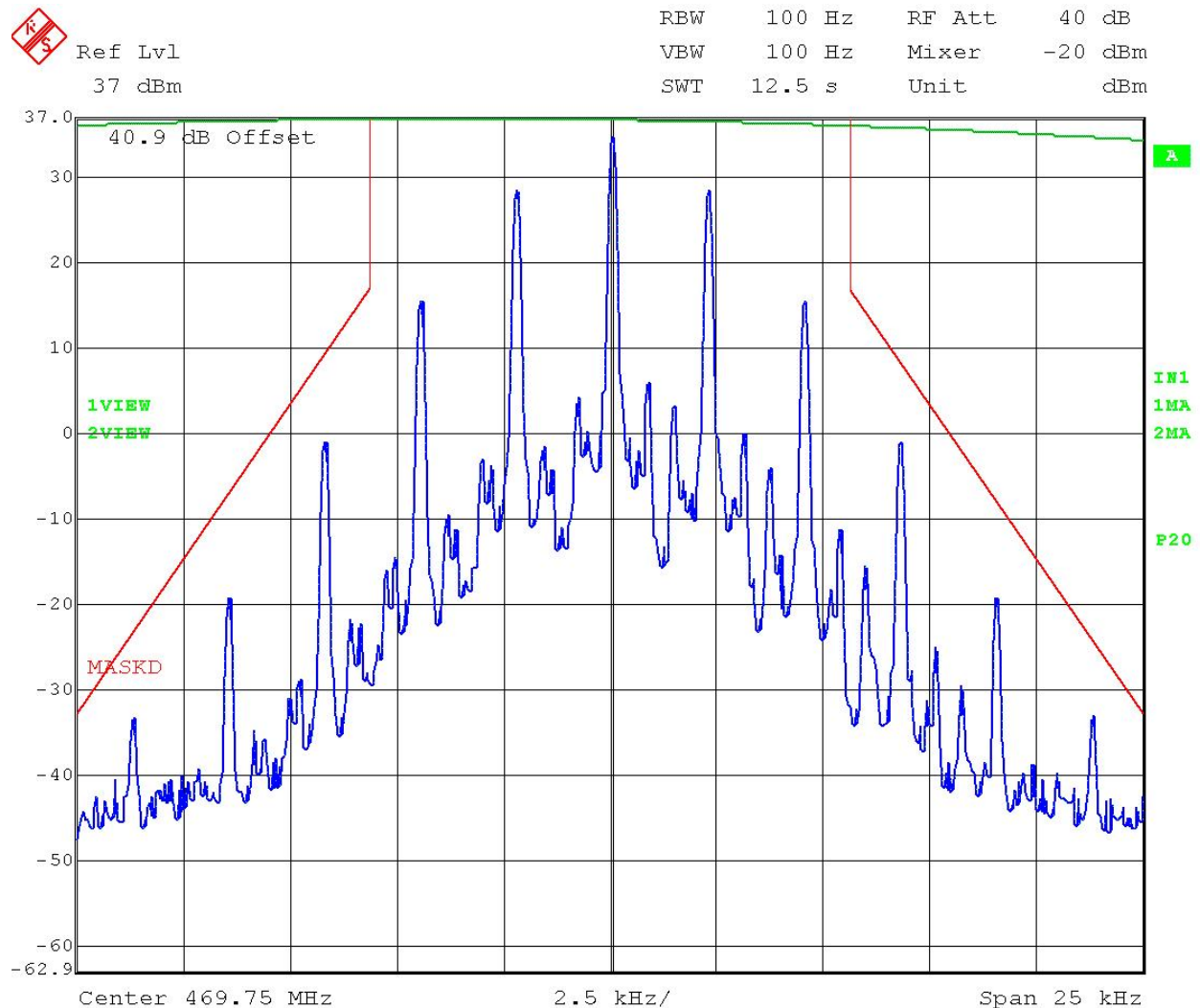
FCC ID: AXI11274720

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Emission Mask D 12.5 KHz Authorized Bandwidth High Power Results:

Middle of Band



Date: 4.NOV.2014 15:13:39

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
469.75	37	5	57
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
939.5	-25.98	62.98	5.98
1409.25	-27.13	64.13	7.13
1879	-35.69	72.69	15.69
2348.75	-43.45	80.45	23.45
2818.5	-50.11	87.11	30.11
3288.25	-50.44	87.44	30.44
3758	-50.7	87.7	30.7
4227.75	-50.92	87.92	30.92
4697.5	-51.9	88.9	31.9

Applicant: VERTEX STANDARD USA, INC.

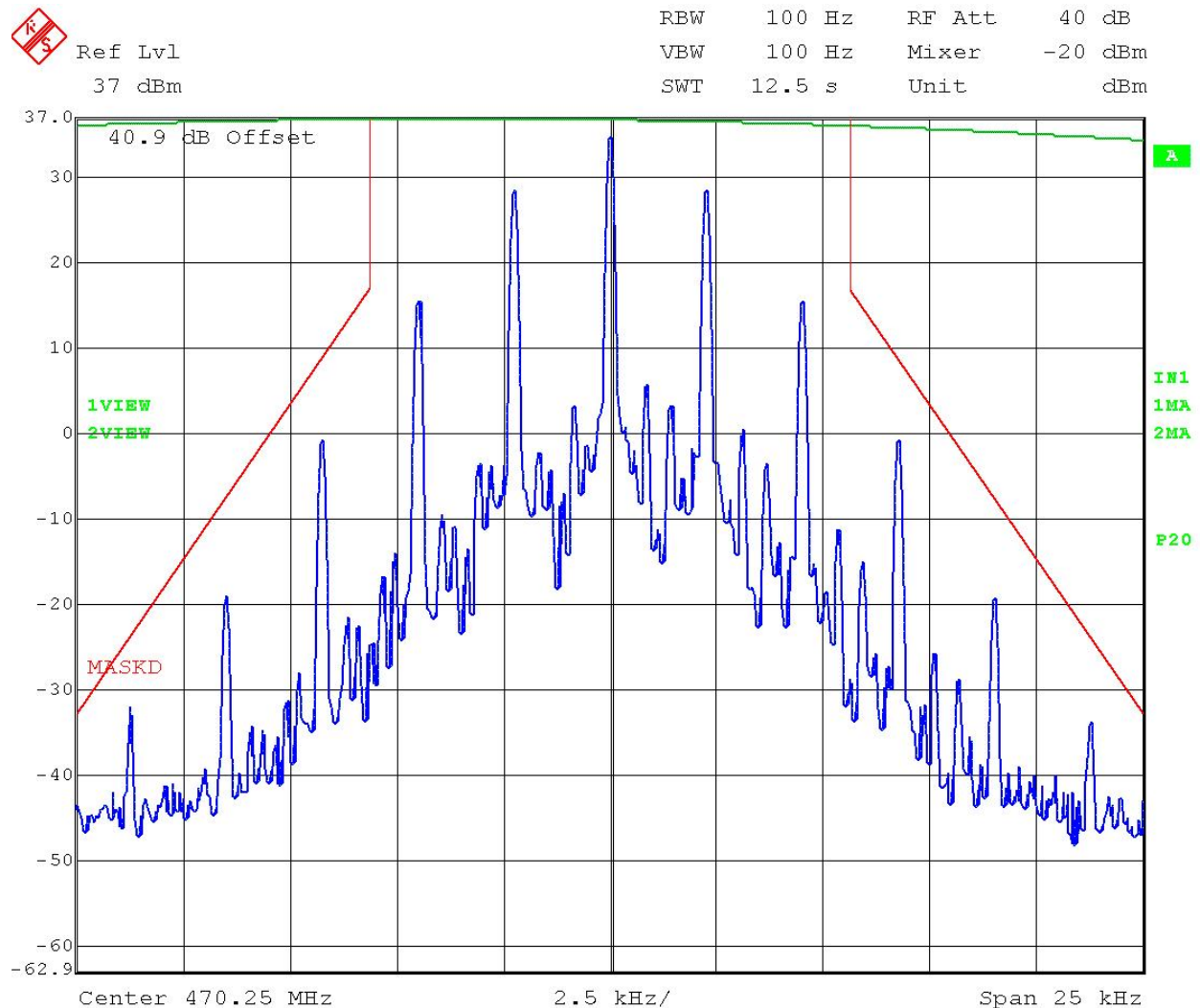
FCC ID: AXI11274720

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Emission Mask D 12.5 KHz Authorized Bandwidth High Power Results:

Middle of Band



Date: 4.NOV.2014 15:12:01

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
470.25	37	5	57
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
940.5	-24.52	61.52	4.52
1410.75	-26.85	63.85	6.85
1881	-33.41	70.41	13.41
2351.25	-40.36	77.36	20.36
2821.5	-47.56	84.56	27.56
3291.75	-49.12	86.12	29.12
3762	-50.18	87.18	30.18
4232.25	-50.33	87.33	30.33
4702.5	-51.56	88.56	31.56

Applicant: VERTEX STANDARD USA, INC.

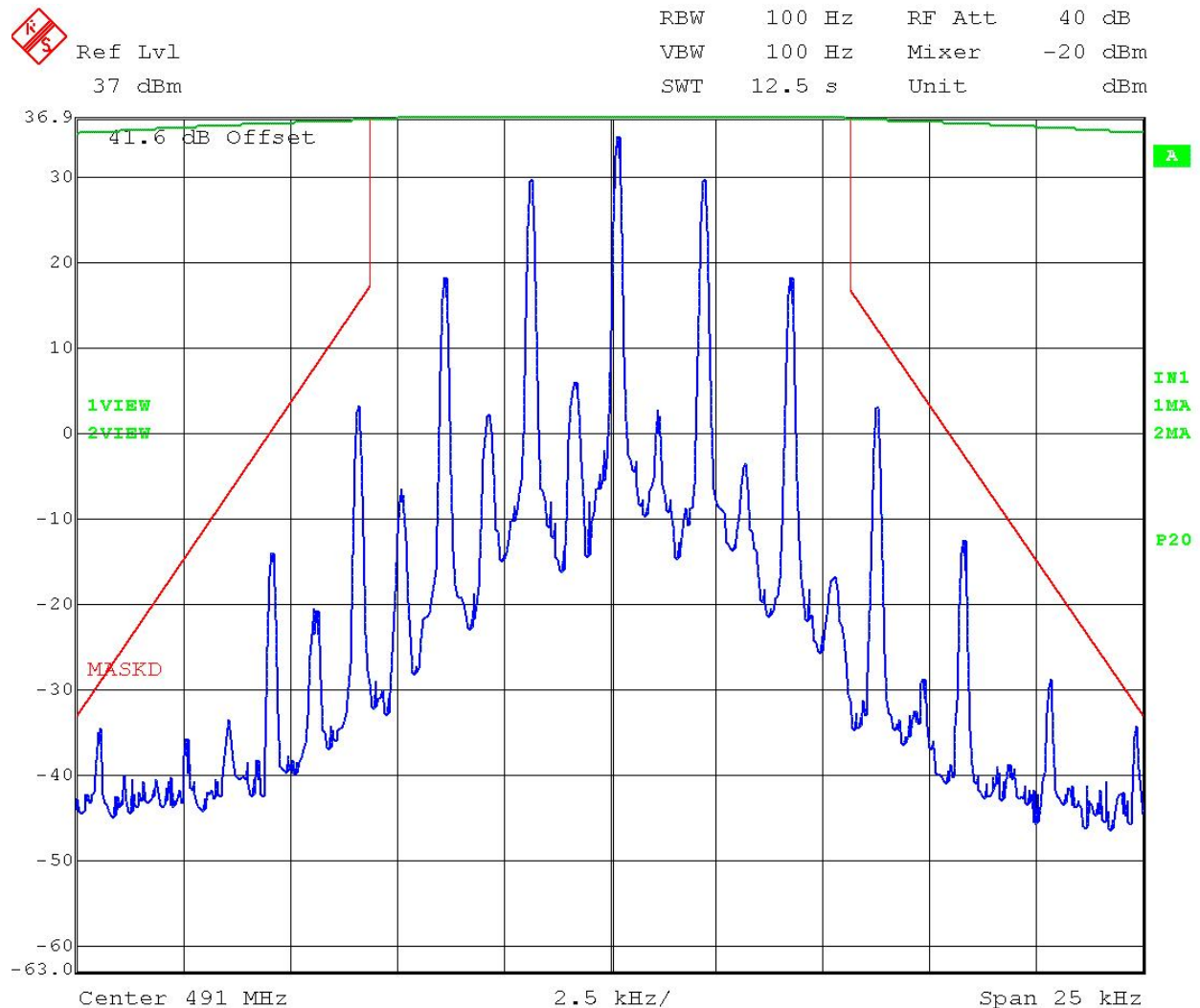
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Emission Mask D 12.5 KHz Authorized Bandwidth High Power Results:

Middle of Band



Date: 30.OCT.2014 10:12:32

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
491	37	5	57
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
982	-26.86	63.86	6.86
1473	-27.56	64.56	7.56
1964	-34.96	71.96	14.96
2455	-41.96	78.96	21.96
2946	-49.63	86.63	29.63
3437	-49.78	86.78	29.78
3928	-50.2	87.2	30.2
4419	-50.29	87.29	30.29
4910	-51.29	88.29	31.29

Applicant: VERTEX STANDARD USA, INC.

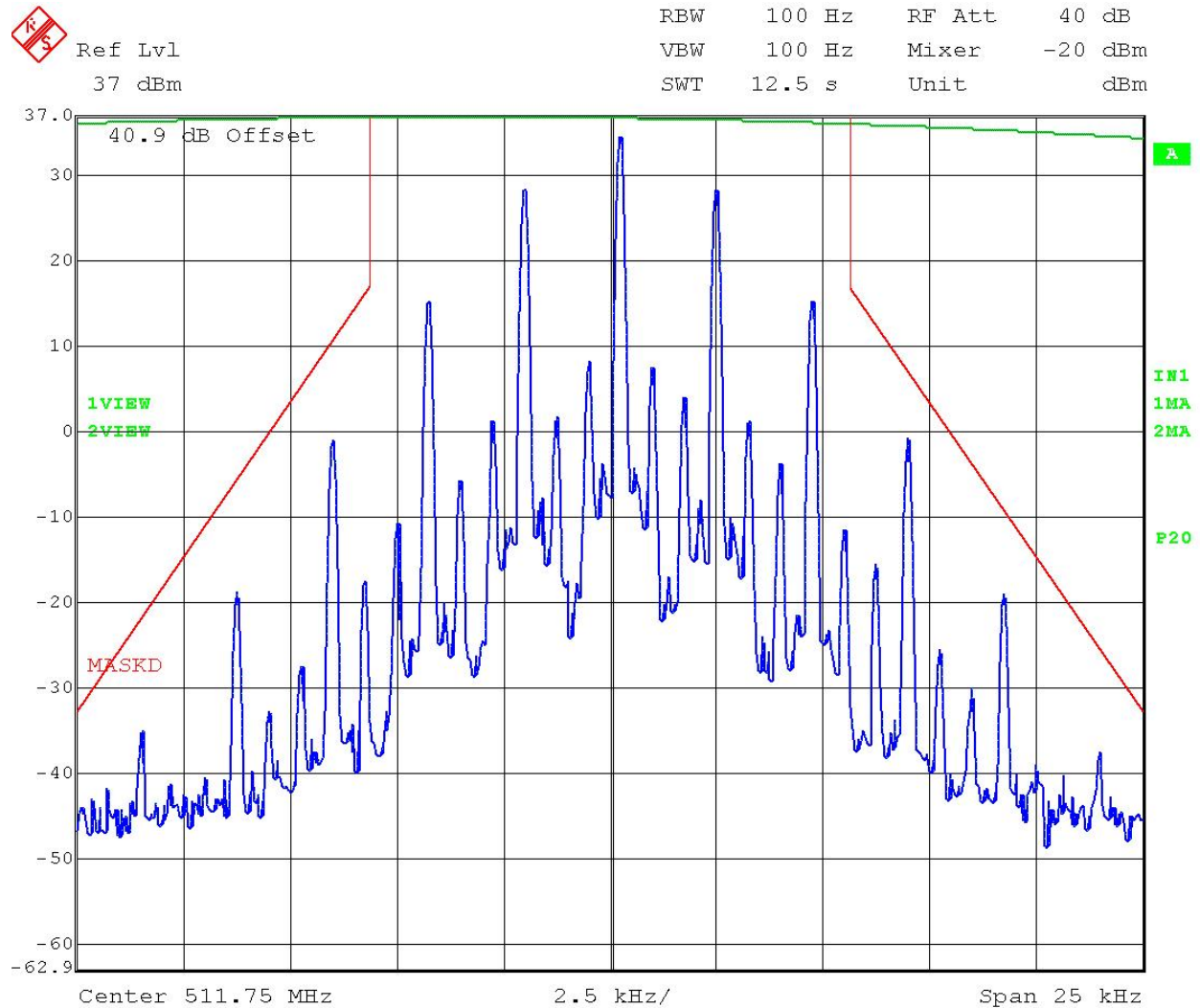
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Emission Mask D 12.5 KHz Authorized Bandwidth High Power Results:

High End of Band



Date: 4.NOV.2014 14:44:09

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
511.75	37	5	57
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
1023.5	-26.08	63.08	6.08
1535.25	-27.03	64.03	7.03
2047	-34.94	71.94	14.94
2558.75	-42.8	79.8	22.8
3070.5	-49.45	86.45	29.45
3582.25	-49.55	86.55	29.55
4094	-50.2	87.2	30.2
4605.75	-50.29	87.29	30.29
5117.5	-51.29	88.29	31.29

Applicant: VERTEX STANDARD USA, INC.

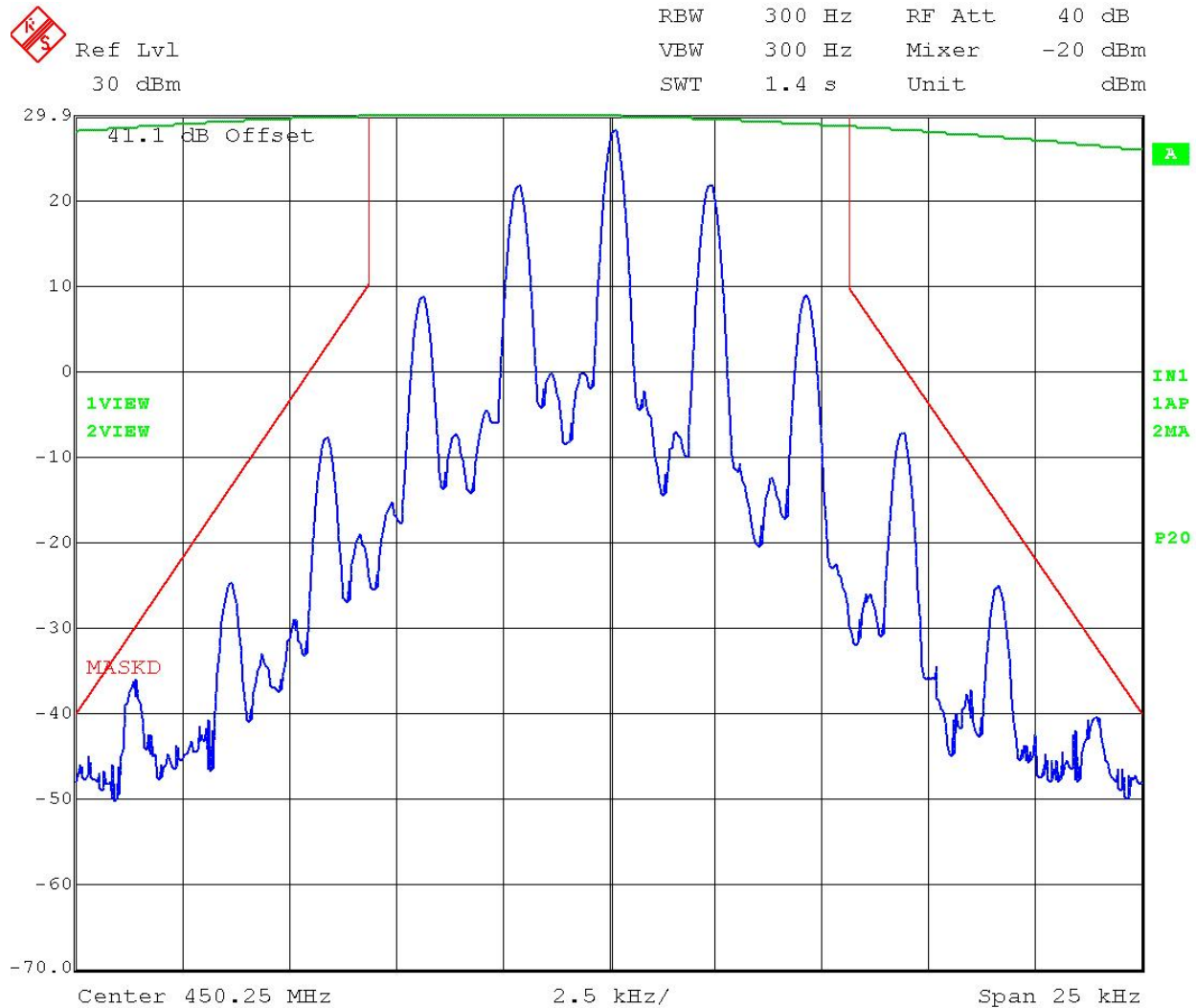
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Emission Mask D 12.5 KHz Authorized Bandwidth Low Power Results:

Low End of Band



Date: 4.NOV.2014 15:18:30

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
450.25	30	1	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
900.5	-29.65	59.65	9.65
1350.75	-42.49	72.49	22.49
1801	-41.06	71.06	21.06
2251.25	-48.59	78.59	28.59
2701.5	-57.28	87.28	37.28
3151.75	-61.12	91.12	41.12
3602	-60.34	90.34	40.34
4052.25	-59.79	89.79	39.79
4502.5	-70.8	100.8	50.8

Applicant: VERTEX STANDARD USA, INC.

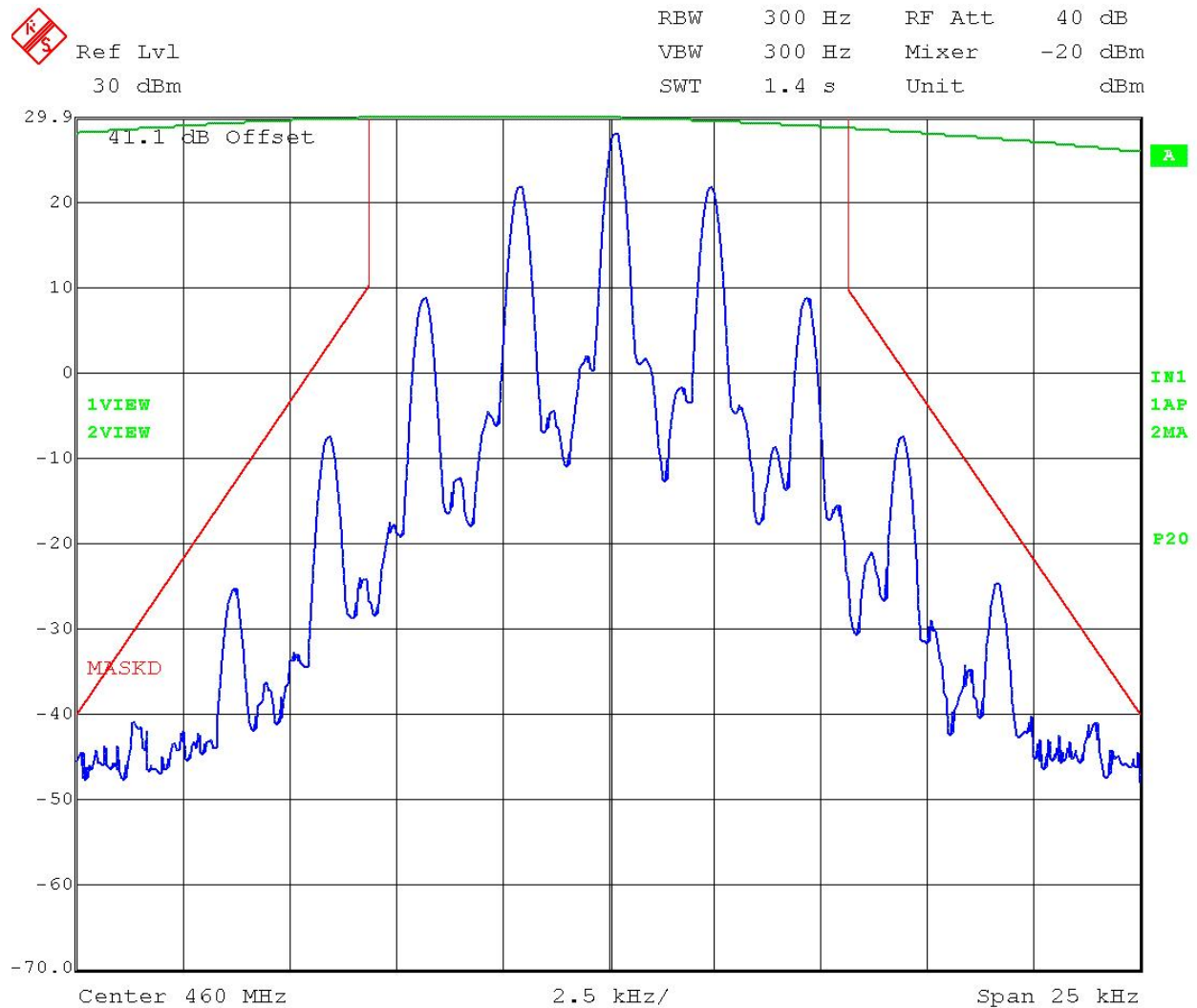
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Emission Mask D 12.5 KHz Authorized Bandwidth Low Power Results:

Middle of Band



Date: 4.NOV.2014 15:19:24

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
460	30	1	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
920	-27.1	57.1	7.1
1380	-42.96	72.96	22.96
1840	-39.37	69.37	19.37
2300	-47.33	77.33	27.33
2760	-55.41	85.41	35.41
3220	-59.98	89.98	39.98
3680	-60.07	90.07	40.07
4140	-60.58	90.58	40.58
4600	-60.6	90.6	40.6

Applicant: VERTEX STANDARD USA, INC.

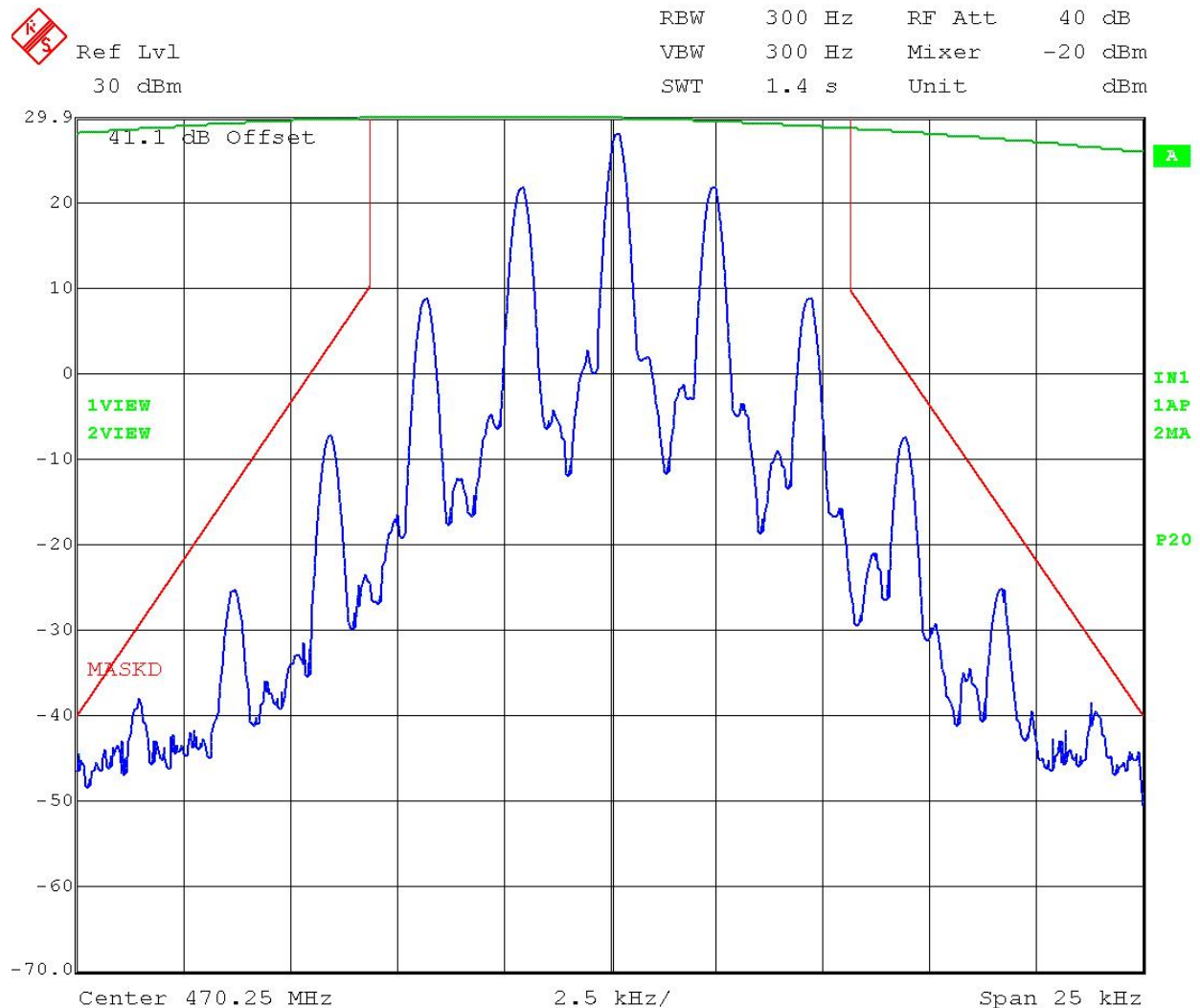
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Emission Mask D 12.5 KHz Authorized Bandwidth Low Power Results:

Middle of Band



Date: 4.NOV.2014 15:21:38

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
470.25	30	1	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
940.5	-27.07	57.07	7.07
1410.75	-43.28	73.28	23.28
1881	-37.65	67.65	17.65
2351.25	-45.18	75.18	25.18
2821.5	-54.29	84.29	34.29
3291.75	-58.83	88.83	38.83
3762	-59.59	89.59	39.59
4232.25	-60.22	90.22	40.22
4702.5	-60.5	90.5	40.5

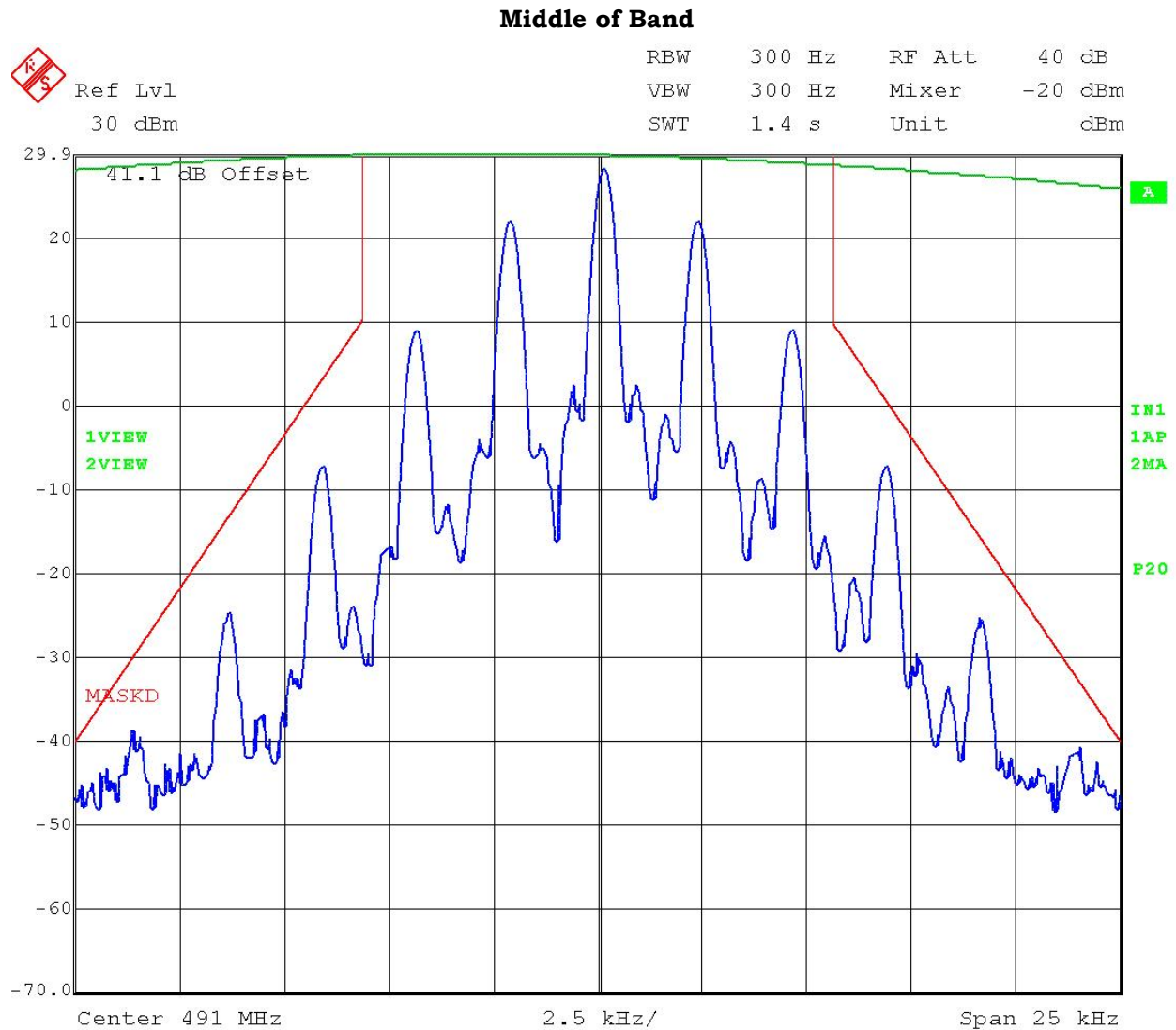
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Emission Mask D 12.5 KHz Authorized Bandwidth Low Power Results:



Date: 4.NOV.2014 15:24:33

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
491	30	1	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
982	-28.31	58.31	8.31
1473	-30.58	60.58	10.58
1964	-41.05	71.05	21.05
2455	-49.52	79.52	29.52
2946	56.99	-26.99	-76.99
3437	-59.29	89.29	39.29
3928	-60.36	90.36	40.36
4419	-60.32	90.32	40.32
4910	-58.36	88.36	38.36

Applicant: VERTEX STANDARD USA, INC.

FCC ID: AXI11274720

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Emission Mask D 12.5 KHz Authorized Bandwidth Low Power Results:

High End of Band



Date: 4.NOV.2014 15:22:44

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
511.75	30	1	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
1023.5	-30.81	60.81	10.81
1535.25	-43.34	73.34	23.34
2047	-49.43	79.43	29.43
2558.75	-50.45	80.45	30.45
3070.5	-41.85	71.85	21.85
3582.25	-48.07	78.07	28.07
4094	-54.91	84.91	34.91
4605.75	-59.97	89.97	39.97
5117.5	-57.33	87.33	37.33

Applicant: VERTEX STANDARD USA, INC.

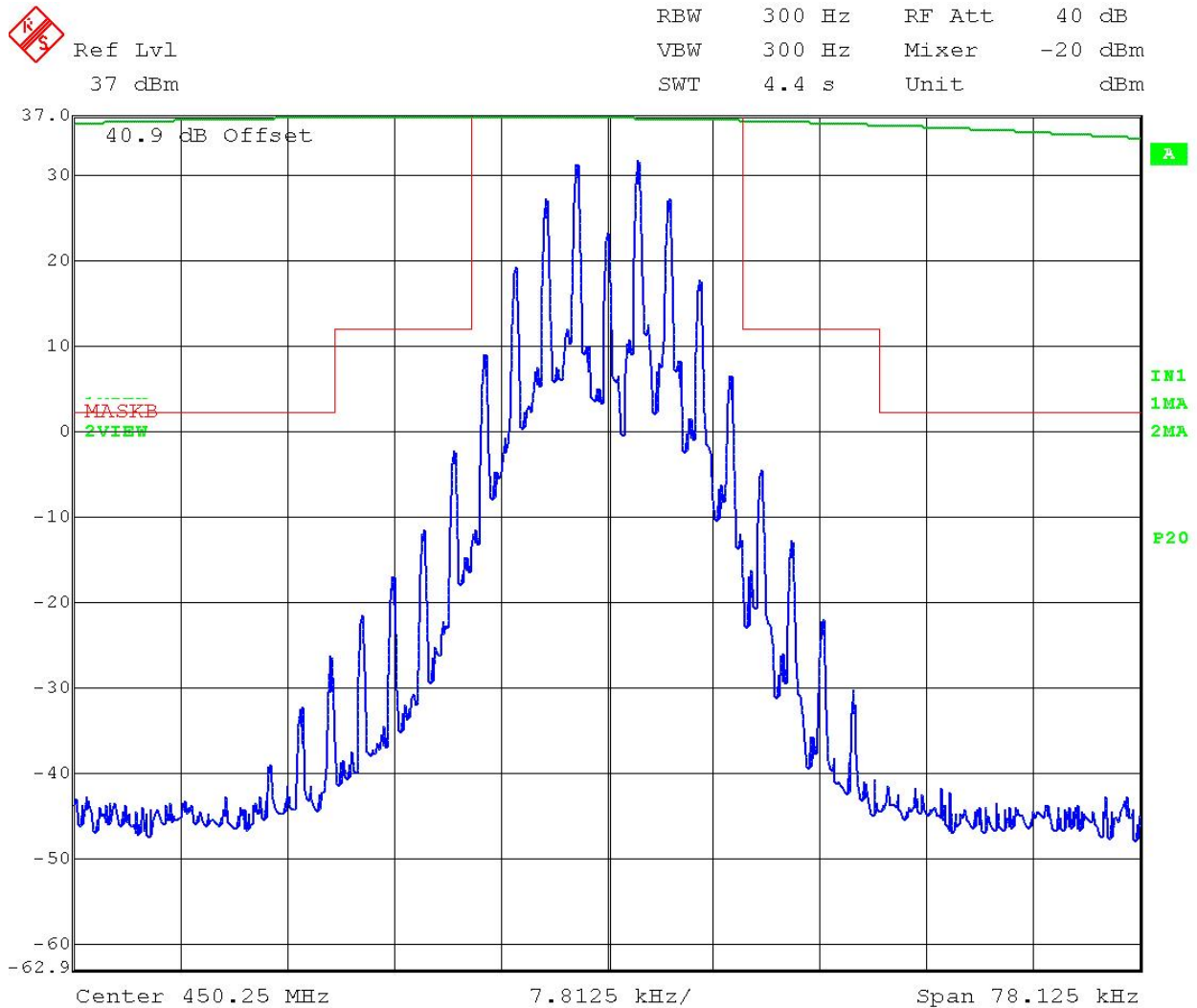
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth High Power Results:

Low End of Band



Date: 4.NOV.2014 14:24:09

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
450.25	37	5	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
900.5	-29.46	66.46	16.46
1350.75	-45.92	82.92	32.92
1801	-51.75	88.75	38.75
2251.25	-56.78	93.78	43.78
2701.5	-57.45	94.45	44.45
3151.75	-57.88	94.88	44.88
3602	-57.99	94.99	44.99
4052.25	-56.75	93.75	43.75
4502.5	-56.14	93.14	43.14

Applicant: VERTEX STANDARD USA, INC.

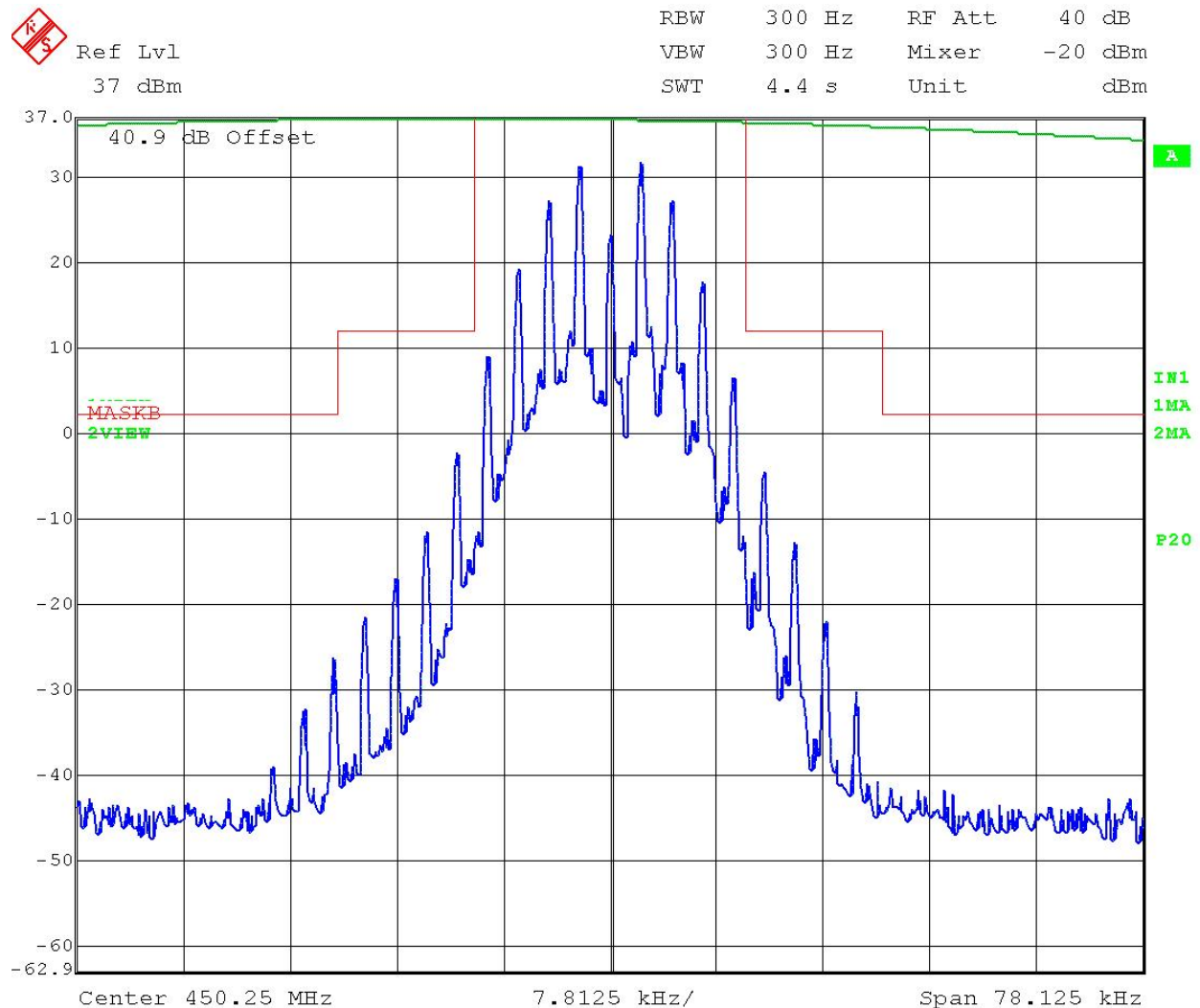
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth High Power Results:

Middle of Band



Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
460	37	5	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
920	-31.12	68.12	18.12
1380	-46.43	83.43	33.43
1840	-51.65	88.65	38.65
2300	-56.98	93.98	43.98
2760	-58.02	95.02	45.02
3220	-57.37	94.37	44.37
3680	-58.19	95.19	45.19
4140	-56.45	93.45	43.45
4600	-56.31	93.31	43.31

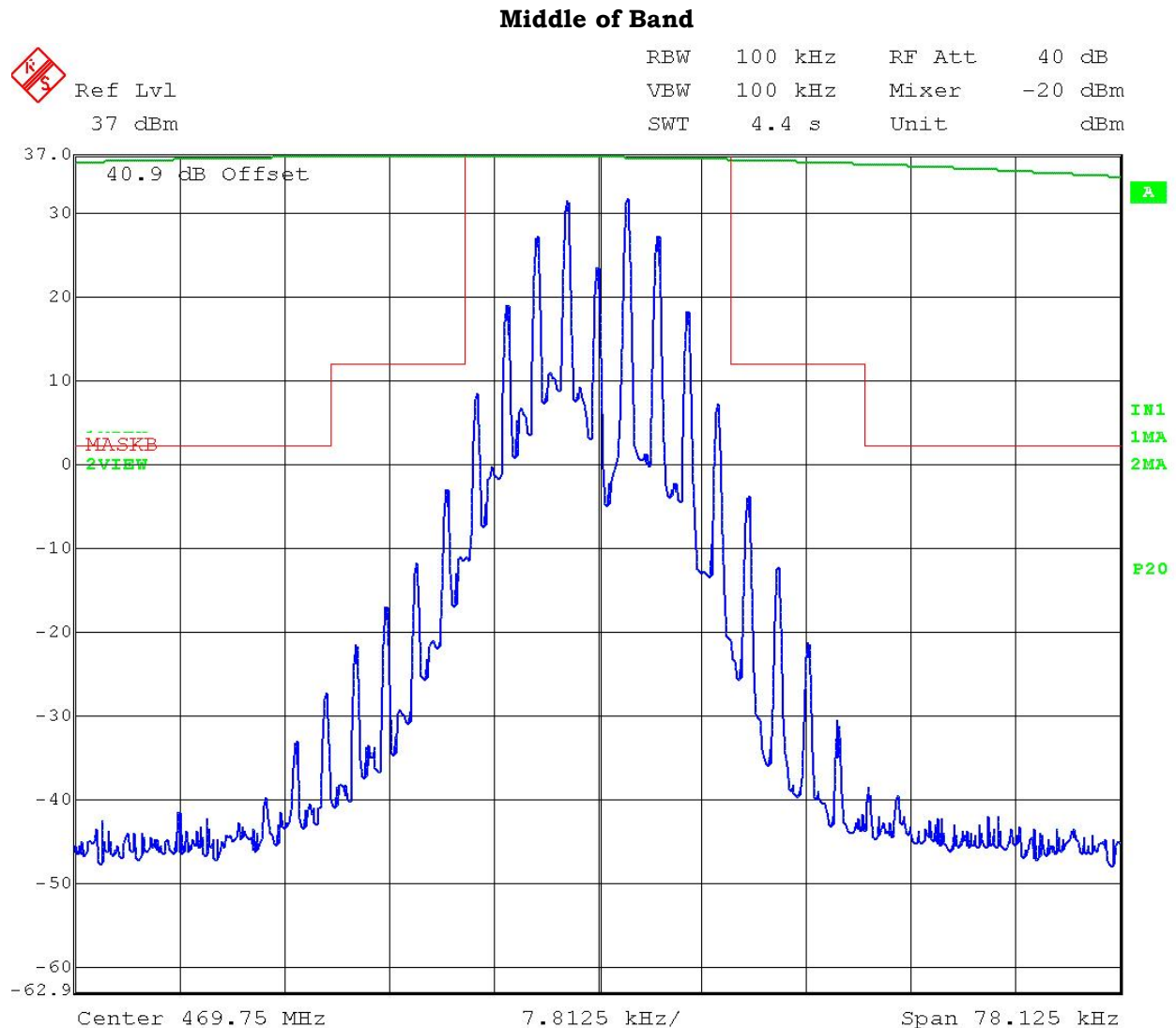
Applicant: VERTEX STANDARD USA, INC.

FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth High Power Results:



Date: 4.NOV.2014 14:20:57

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
469.75	37	5	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
939.5	-32.8	69.8	19.8
1409.25	-46.7	83.7	33.7
1879	-50.38	87.38	37.38
2348.75	-57.04	94.04	44.04
2818.5	-56.79	93.79	43.79
3288.25	-58.27	95.27	45.27
3758	-57.34	94.34	44.34
4227.75	-59.28	96.28	46.28
4697.5	-57.97	94.97	44.97

Applicant: VERTEX STANDARD USA, INC.

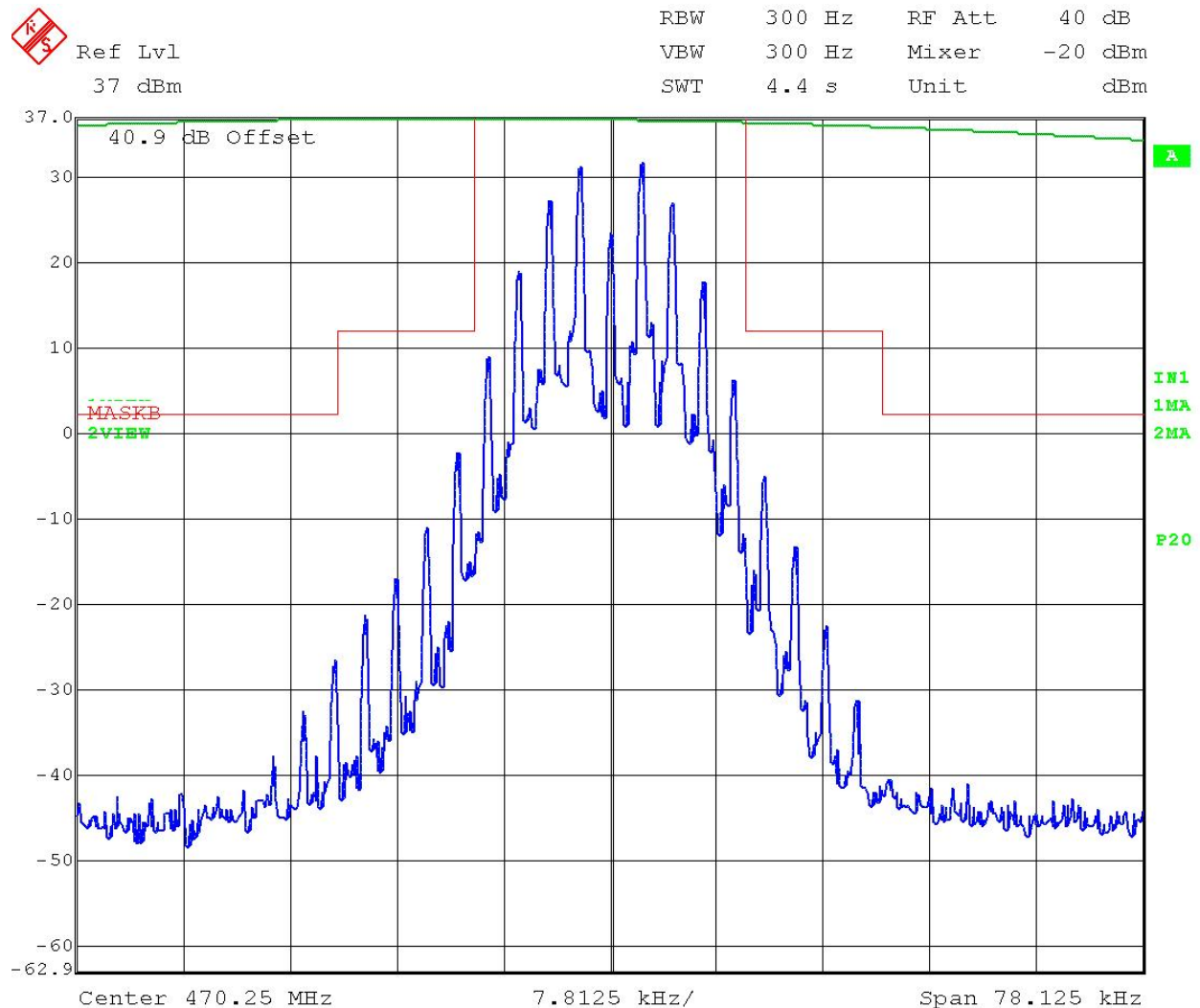
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth High Power Results:

Middle of Band



Date: 4.NOV.2014 14:33:17

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
470.25	37	5	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
940.5	-35.72	72.72	22.72
1410.75	-44.2	81.2	31.2
1881	-43.26	80.26	30.26
2351.25	-54.33	91.33	41.33
2821.5	-60.06	97.06	47.06
3291.75	-60.74	97.74	47.74
3762	-58.98	95.98	45.98
4232.25	-59.9	96.9	46.9
4702.5	-59.13	96.13	46.13

Applicant: VERTEX STANDARD USA, INC.

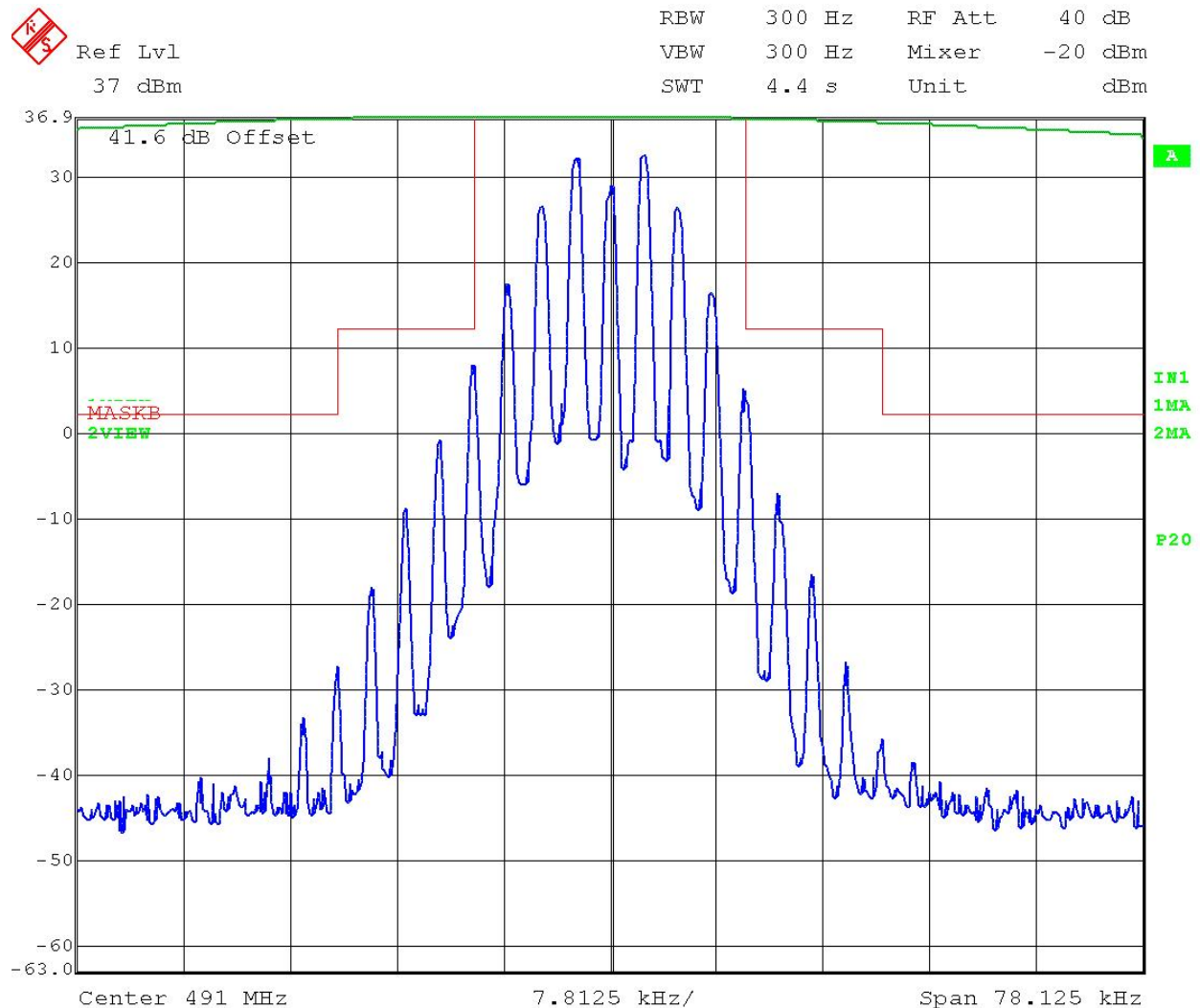
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth High Power Results:

Middle of Band



Date: 30.OCT.2014 09:50:46

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
491	37	5	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
982	-30.14	67.14	17.14
1473	-41.12	78.12	28.12
1964	-50.32	87.32	37.32
2455	-43.65	80.65	30.65
2946	-57.52	94.52	44.52
3437	-59.36	96.36	46.36
3928	-60.56	97.56	47.56
4419	-59.45	96.45	46.45
4910	-59.98	96.98	46.98

Applicant: VERTEX STANDARD USA, INC.

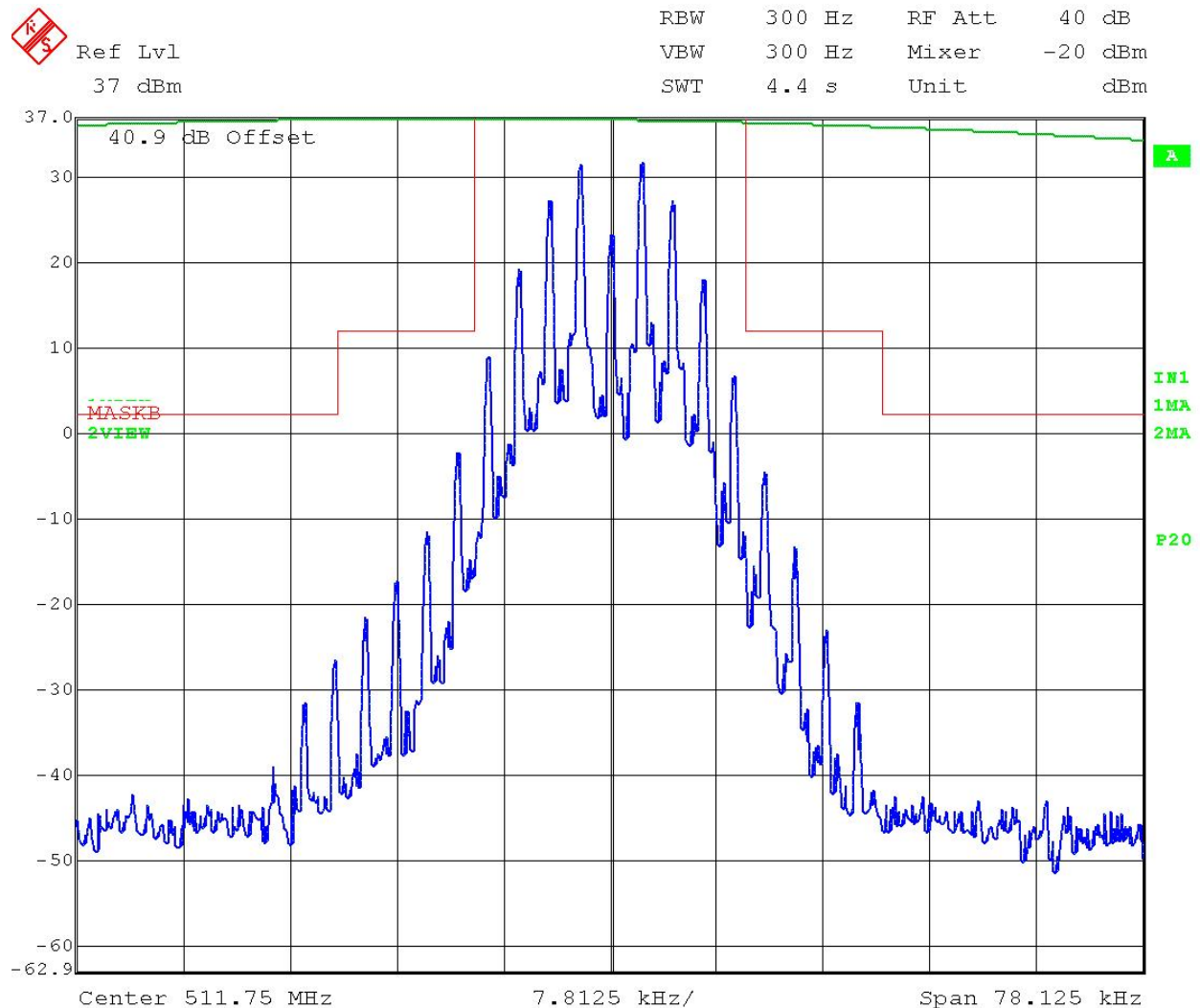
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth High Power Results:

High End of Band

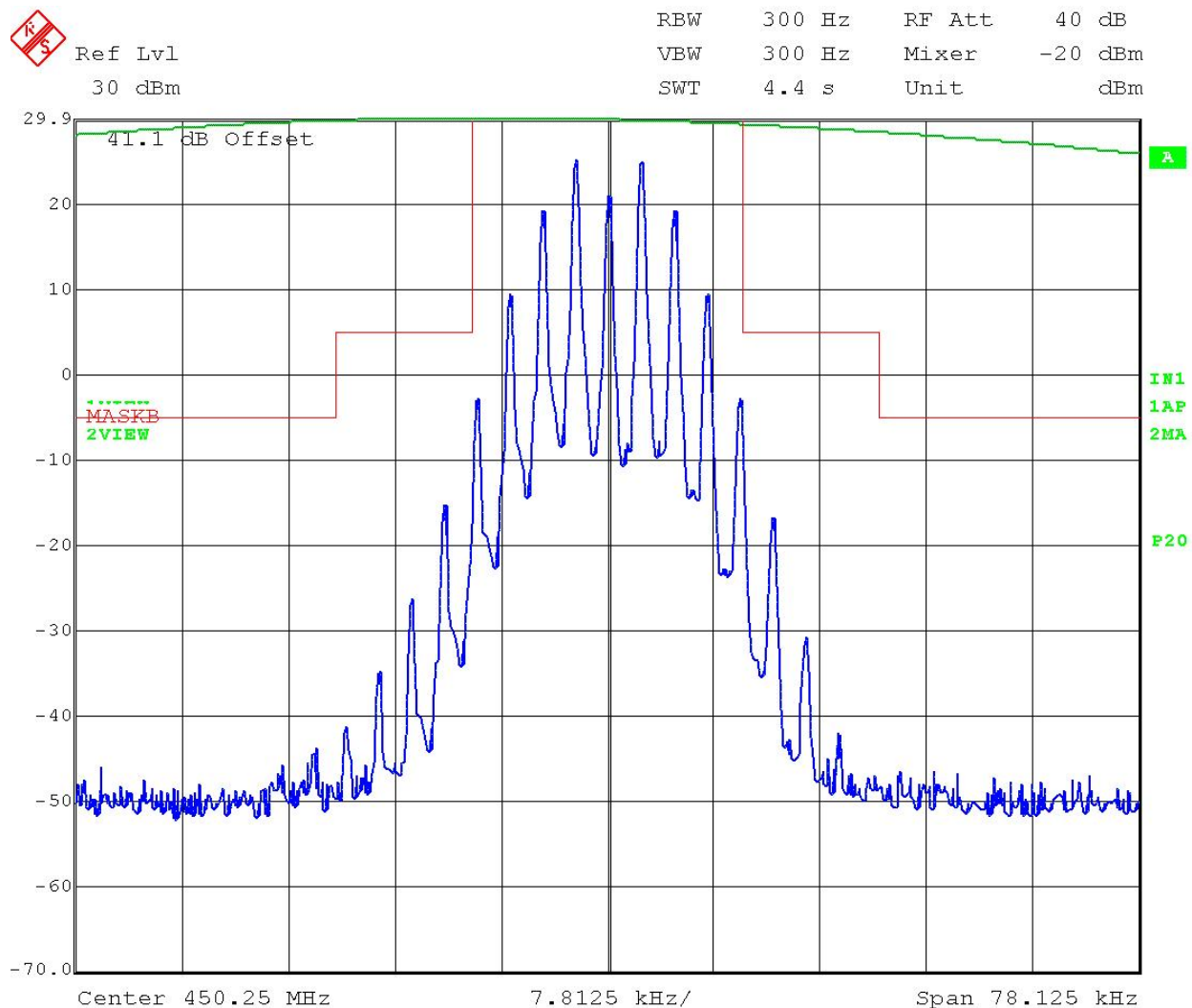


Date: 4.NOV.2014 14:38:11

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
511.75	37	5	50
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
1023.5	-30.7	67.7	17.7
1535.25	-40.94	77.94	27.94
2047	-49.74	86.74	36.74
2558.75	-42.78	79.78	29.78
3070.5	-57.12	94.12	44.12
3582.25	-59.94	96.94	46.94
4094	-60.14	97.14	47.14
4605.75	-59.43	96.43	46.43
5117.5	-59.98	96.98	46.98

Emission Mask B 25 KHz Authorized Bandwidth Low Power Results:

Low End of Band



Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
450.25	30	1	43
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
900.5	-30.98	60.98	17.98
1350.75	-44.36	74.36	31.36
1801	-49.15	79.15	36.15
2251.25	-50.51	80.51	37.51
2701.5	-41.96	71.96	28.96
3151.75	-48.17	78.17	35.17
3602	-54.93	84.93	41.93
4052.25	-59.81	89.81	46.81
4502.5	-57.25	87.25	44.25

Applicant: VERTEX STANDARD USA, INC.

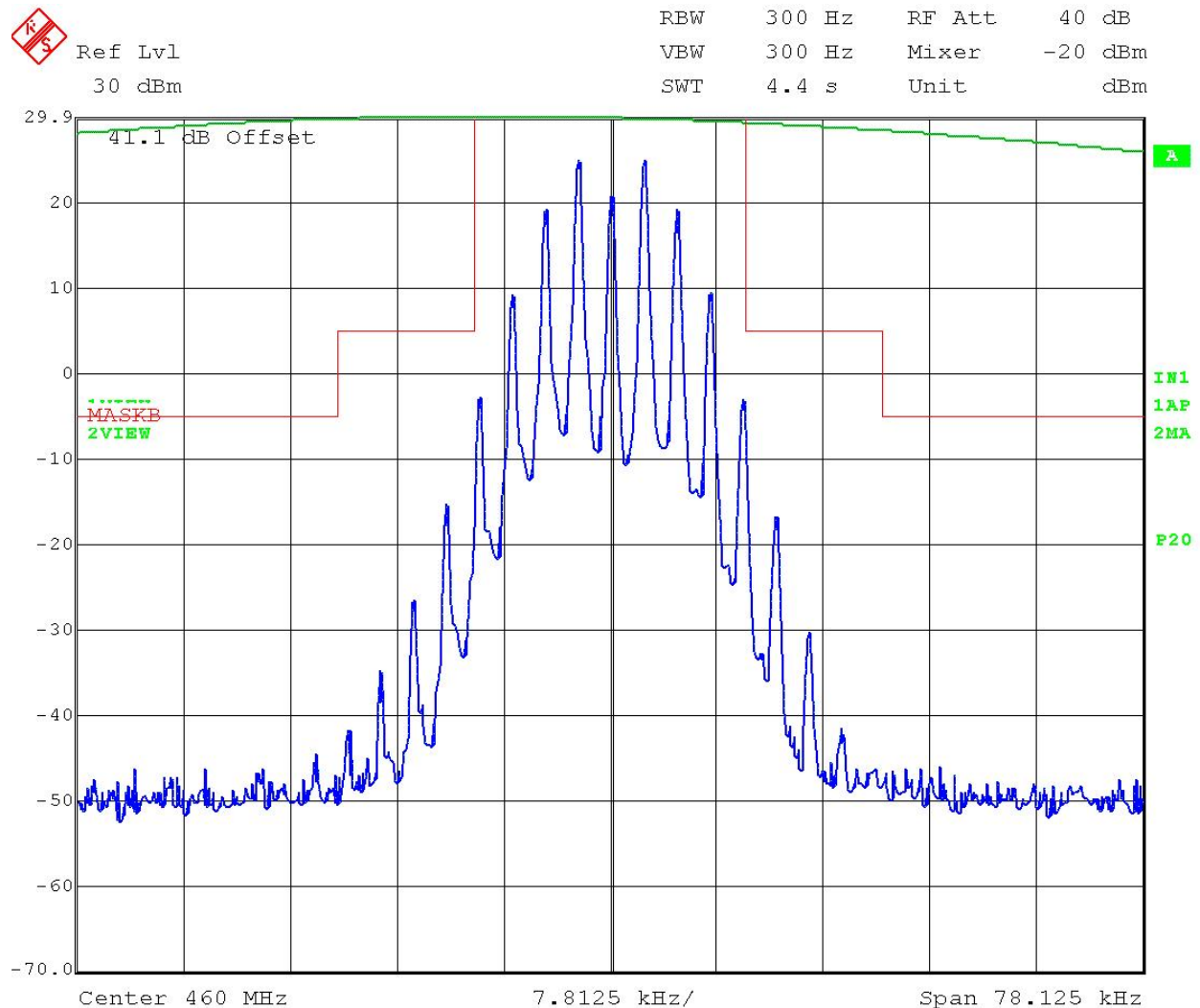
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth Low Power Results:

Middle of Band



Date: 4.NOV.2014 15:33:22

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
460	30	1	43
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
920	-31.88	61.88	18.88
1380	-46.7	76.7	33.7
1840	-59.94	89.94	46.94
2300	-61.02	91.02	48.02
2760	-60.2	90.2	47.2
3220	-63.06	93.06	50.06
3680	-69.2	99.2	56.2
4140	-70.46	100.46	57.46
4600	-70.74	100.74	57.74

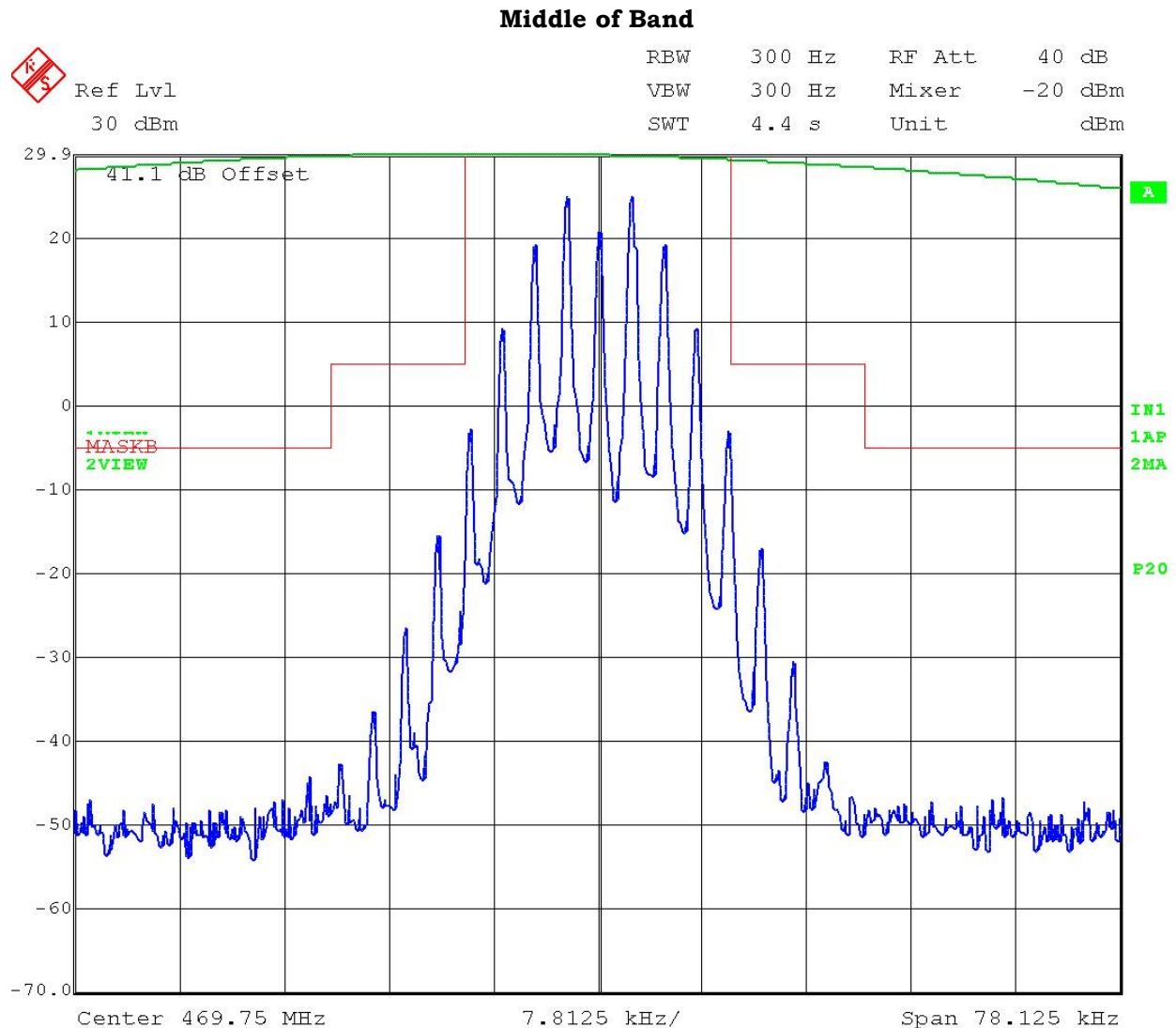
Applicant: VERTEX STANDARD USA, INC.

FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth Low Power Results:



Date: 4.NOV.2014 15:32:17

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
469.75	30	1	43
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
939.5	-32.08	62.08	19.08
1409.25	-46.99	76.99	33.99
1879	-39.99	69.99	26.99
2348.75	-48.46	78.46	35.46
2818.5	-60.57	90.57	47.57
3288.25	-68.1	98.1	55.1
3758	-69.68	99.68	56.68
4227.75	-68	98	55
4697.5	-70.22	100.22	57.22

Applicant: VERTEX STANDARD USA, INC.

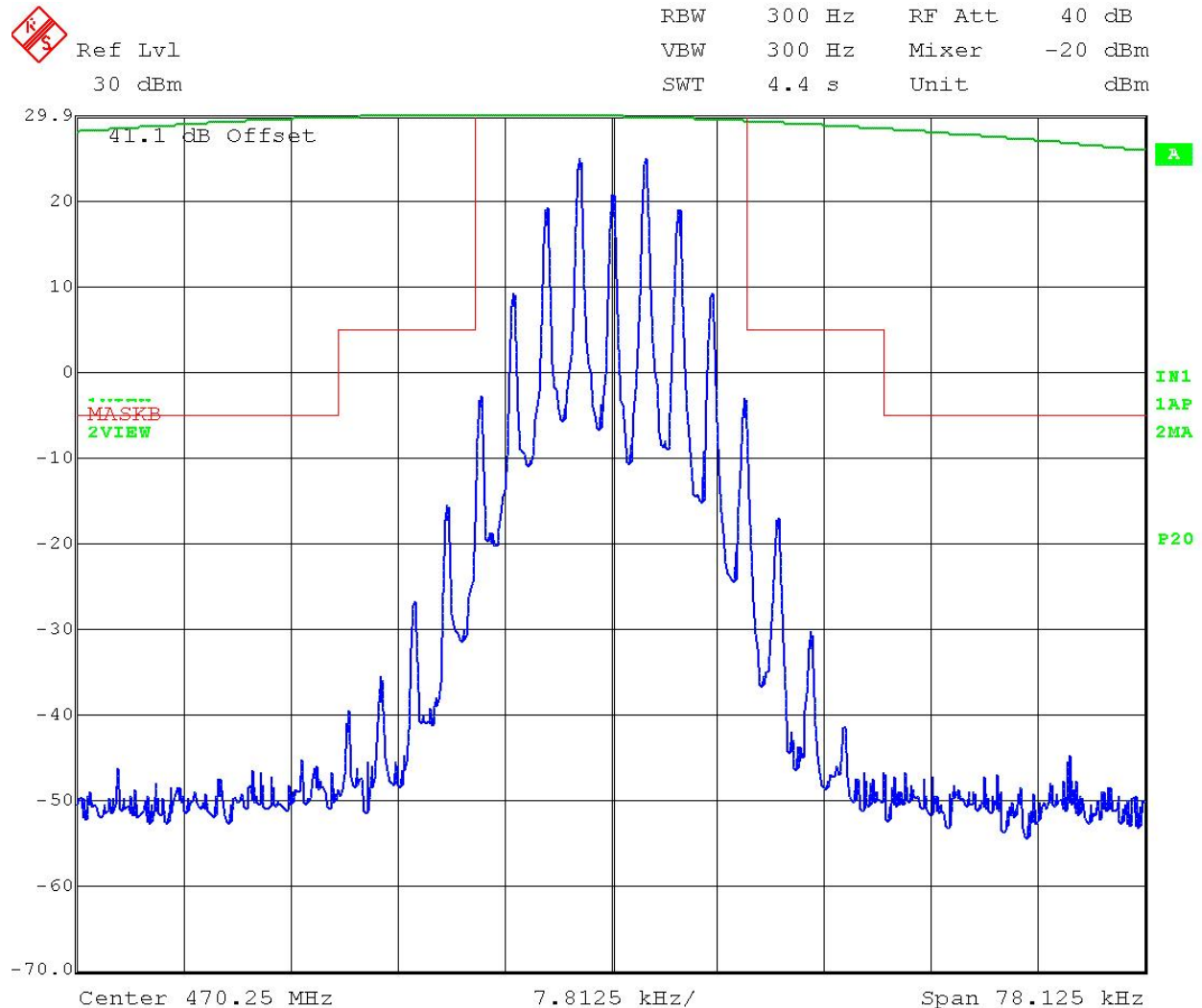
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth Low Power Results:

Middle of Band



Date: 4.NOV.2014 15:31:20

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
470.25	30	1	43
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
940.5	-31.85	61.85	18.85
1410.75	-46.23	76.23	33.23
1881	-39.71	69.71	26.71
2351.25	-49.12	79.12	36.12
2821.5	-60.58	90.58	47.58
3291.75	-68.45	98.45	55.45
3762	-69.63	99.63	56.63
4232.25	-68.12	98.12	55.12
4702.5	70.41	-40.41	-83.41

Applicant: VERTEX STANDARD USA, INC.

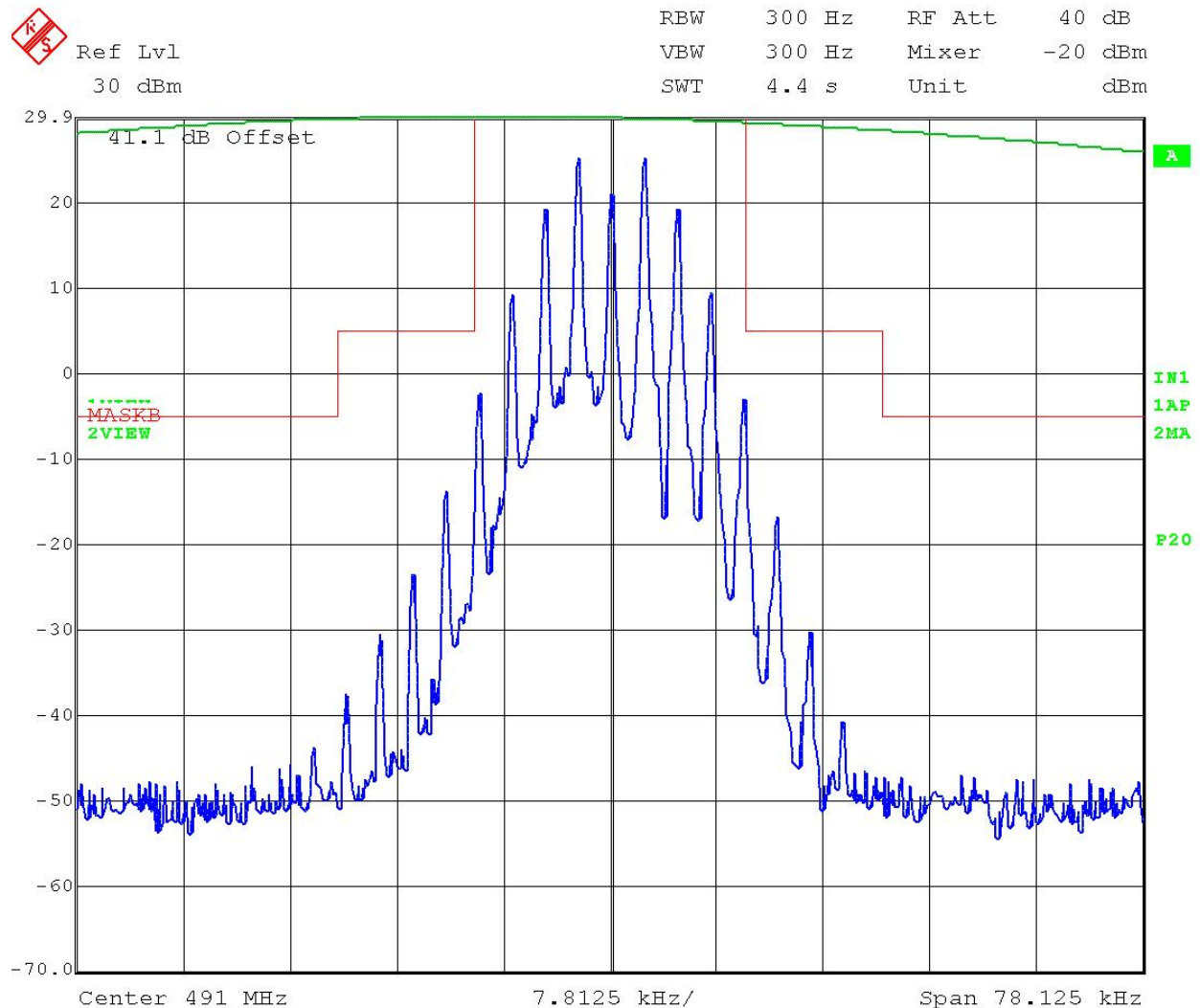
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth Low Power Results:

Middle of Band



Date: 4.NOV.2014 15:28:39

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
491	30	1	43
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
982	-28.31	58.31	15.31
1473	-30.58	60.58	17.58
1964	-41.05	71.05	28.05
2455	-49.52	79.52	36.52
2946	56.99	-26.99	-69.99
3437	-59.29	89.29	46.29
3928	-60.36	90.36	47.36
4419	-60.32	90.32	47.32
4910	-58.36	88.36	45.36

Applicant: VERTEX STANDARD USA, INC.

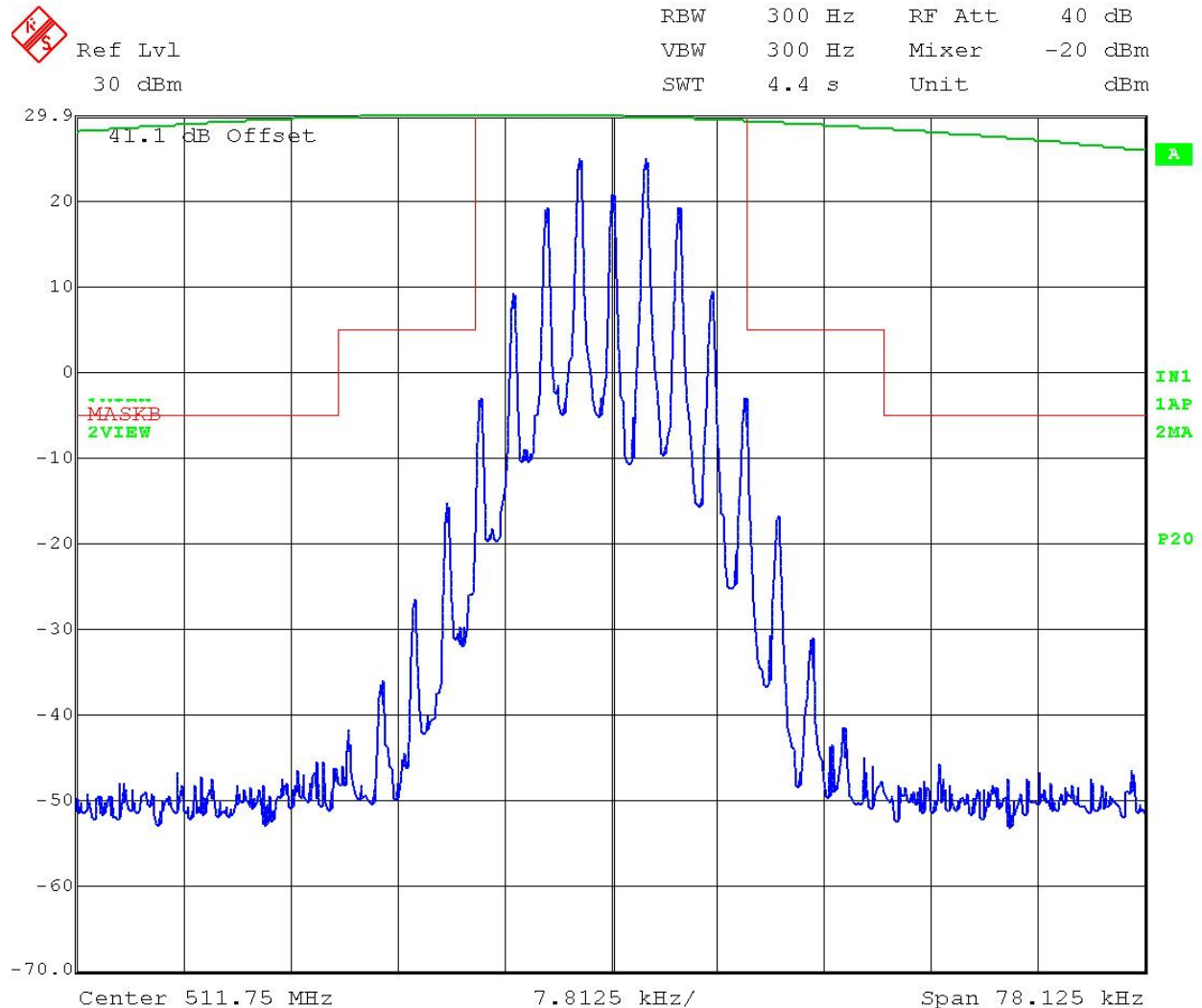
FCC ID: AXI11274720

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Emission Mask B 25 KHz Authorized Bandwidth Low Power Results:

High End of Band



Date: 4.NOV.2014 15:30:18

Carrier Frequency (MHz)	Power Output (dBm)	Power Output (W)	Limit (dBc)
511.75	30	1	43
Emission Frequency (MHz)	Measured Level (dBm)	Level Below Carrier (dBc)	Margin dB
1023.5	-31.12	61.12	18.12
1535.25	-43.39	73.39	30.39
2047	-49.29	79.29	36.29
2558.75	-50.42	80.42	37.42
3070.5	-41.93	71.93	28.93
3582.25	-48.12	78.12	35.12
4094	-55.02	85.02	42.02
4605.75	-59.61	89.61	46.61
5117.5	-57.33	87.33	44.33

Applicant: VERTEX STANDARD USA, INC.

FCC ID: AXI11274720

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FIELD STRENGTH OF SPURIOUS RADIATION

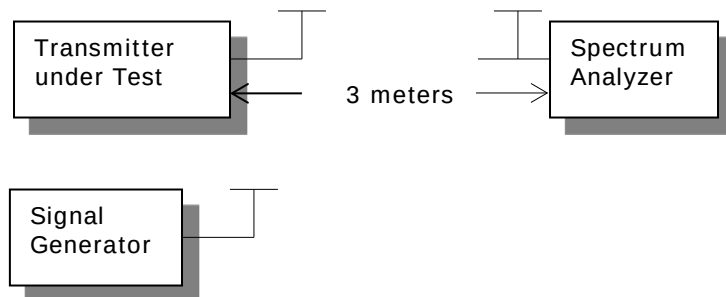
Rule Parts. No.: Part 2.1053
Part 90.210 (d)

Requirements:

High Power: 12.5kHz Channel Spacing = $50 + 10\log(5) = 57$ dBc
Low Power: 12.5kHz Channel Spacing = $50 + 10\log(1) = 50$ dBc

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-D: 2010 using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

Test Setup Diagram:



Test Data:

The following frequencies were selected based on the antenna conducted results, the worst case for each band and power level are presented.

Radiated Emissions Test Data:

High Power Setting 12.5 KHz Bandwidth:

Tuned Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	Requirement dB	Bandwidth - BW - kHz
450.25	Hi	37.00	5.01	57.00	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
900.50	H	86.52		29.52	
1,350.75	H	90.10		33.10	
1,801.00	H	91.18		34.18	
2,251.25	H	91.68		34.68	
2,701.50	H	92.00		35.00	
3,151.75	H	90.76		33.76	
3,602.00	H	94.54		37.54	
4,052.25	H	90.39		33.39	
4,502.50	H	94.60		37.60	

Tuned Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
511.75	Hi	37.00	5.01	57.00	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
1,023.50	H	82.78		25.78	
1,535.25	H	91.57		34.57	
2,047.00	H	91.84		34.84	
2,558.75	H	89.92		32.92	
3,070.50	H	89.67		32.67	
3,582.25	H	89.49		32.49	
4,094.00	H	90.14		33.14	
4,605.75	H	100.82		43.82	
5,117.50	H	94.17		37.17	

Radiated Emissions Test Data:

Low Power Setting 12.5 KHz Bandwidth:

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	Requirement dB	Bandwidth - BW - kHz
450.25	Lo	30.00	1.00	50.00	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
900.23	H	83.13		33.13	
1,350.34	H	89.57		39.57	
1,800.45	H	85.98		35.98	
2,250.56	H	86.51		36.51	
2,700.68	H	82.13		32.13	
3,150.79	H	82.08		32.08	
3,600.90	H	89.00		39.00	
4,051.01	H	84.68		34.68	
4,501.13	V	87.07		37.07	

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	Requirement dB	Bandwidth - BW - kHz
470.25	Lo	30.00	1.00	50.00	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
940.23	H	79.07		29.07	
1,410.34	H	90.68		40.68	
1,880.45	V	85.47		35.47	
2,350.56	H	85.03		35.03	
2,820.68	H	82.25		32.25	
3,290.79	H	81.69		31.69	
3,760.90	H	88.11		38.11	
4,231.01	H	87.89		37.89	
4,701.13	V	90.36		40.36	

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 90.213

Requirements: Temperature range requirements: -30 to +50° C.
Voltage Variation +, -15%
±2.5 PPM

Test Data:

25°C Reference

Temperature	Frequency MHz	PPM
25°C (reference)	469.749859	
-30°C	469.749521	-0.720
-20°C	469.749627	-0.494
-10°C	469.749713	-0.311
0°C	469.749782	-0.164
10°C	469.749897	0.081
20°C	469.749957	0.209
30°C	469.749977	0.251
40°C	469.74998	0.258
50°C	469.749974	0.245
Battery Voltage	Frequency	PPM
-15%	469.749857	-0.004
15%	469.749856	-0.006

TRANSIENT FREQUENCY BEHAVIOR

Part 90.214 Transient Frequency Behavior

REQUIREMENTS: Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time Intervals	Maximum frequency difference	All Equipment	
		150-174 MHz	421-512 MHz

Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels

t_1^4	± 25.0 kHz	5.0 ms	10.0 ms
t_2	± 12.5 kHz	20.0 ms	25.0 ms
t_3^4	± 25.0 kHz	5.0 ms	10.0 ms

Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels

t_1^4	± 12.5 kHz	5.0 ms	10.0 ms
t_2	± 6.25 kHz	20.0 ms	25.0 ms
t_3^4	± 12.5 kHz	5.0 ms	10.0 ms

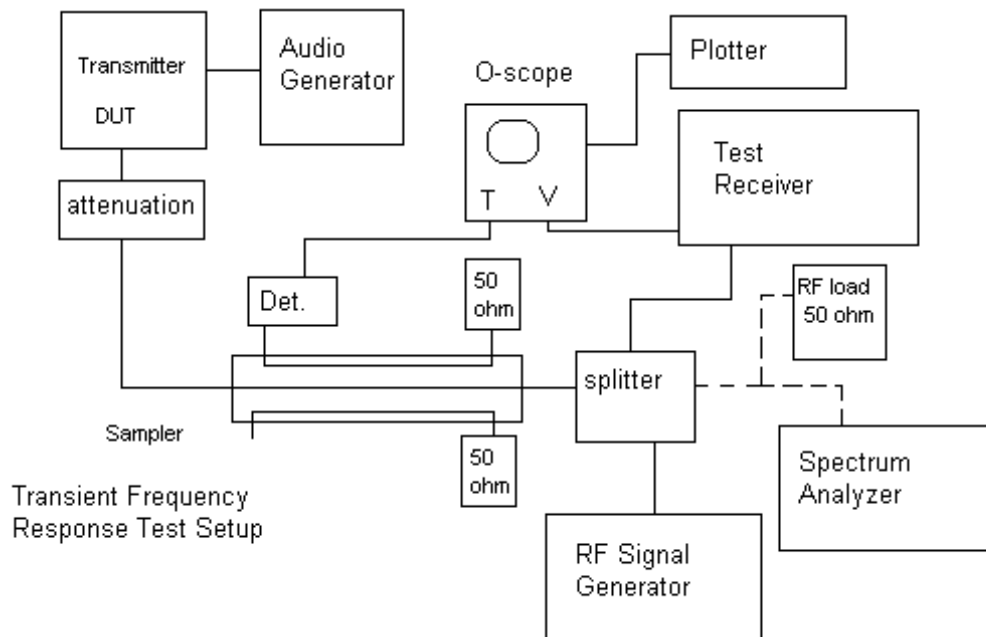
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels

t_1^4	± 6.25 kHz	5.0 ms	10.0 ms
t_2	± 3.125 kHz	20.0 ms	25.0 ms
t_3^4	± 6.25 kHz	5.0 ms	10.0 ms

TEST PROCEEDURE: ANSI/TIA 603-D:2010, the levels were set as follows:

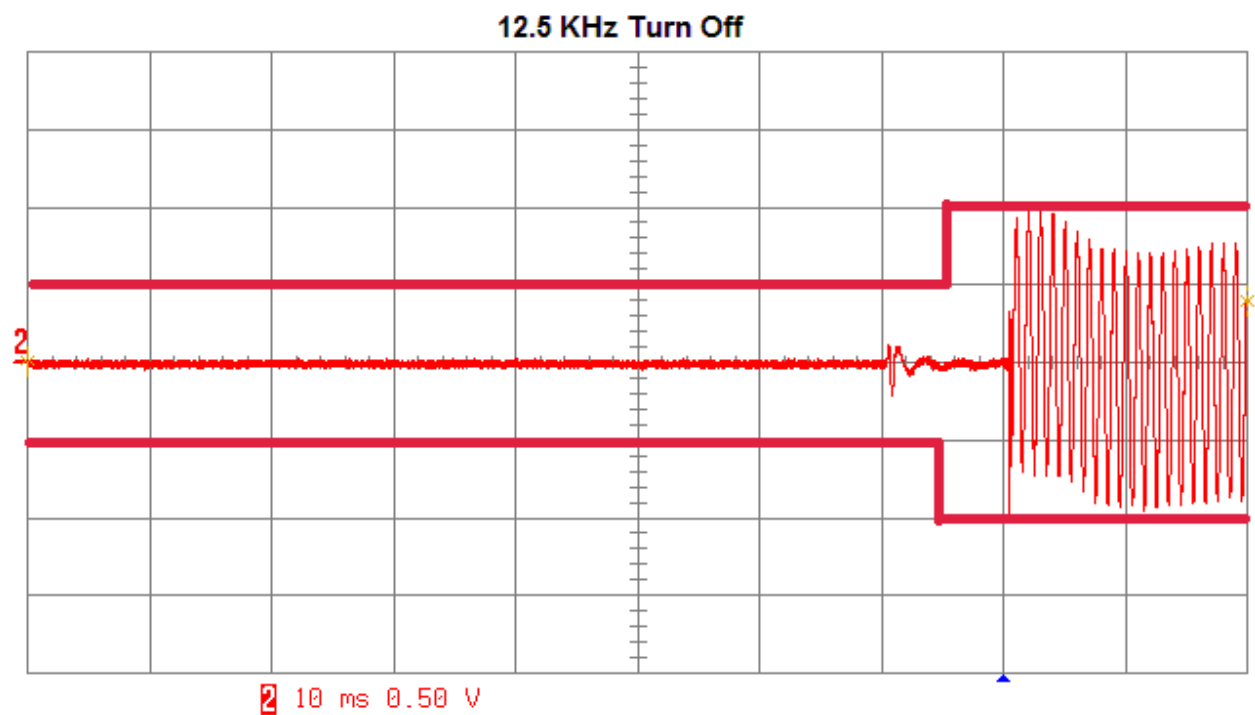
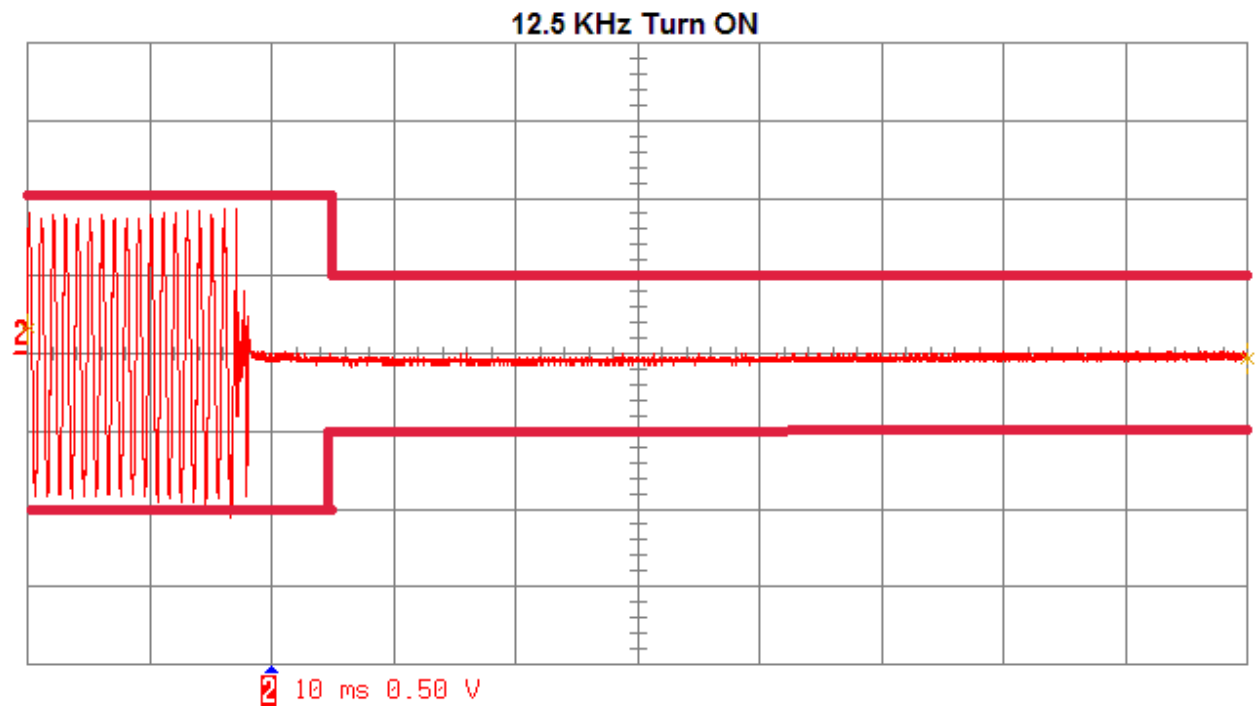
1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30 dB.
4. With the levels set as above, the transient frequency behavior was observed and recorded.

Transient Frequency Behavior Setup Diagram:



Transient Frequency Behavior Test Data:

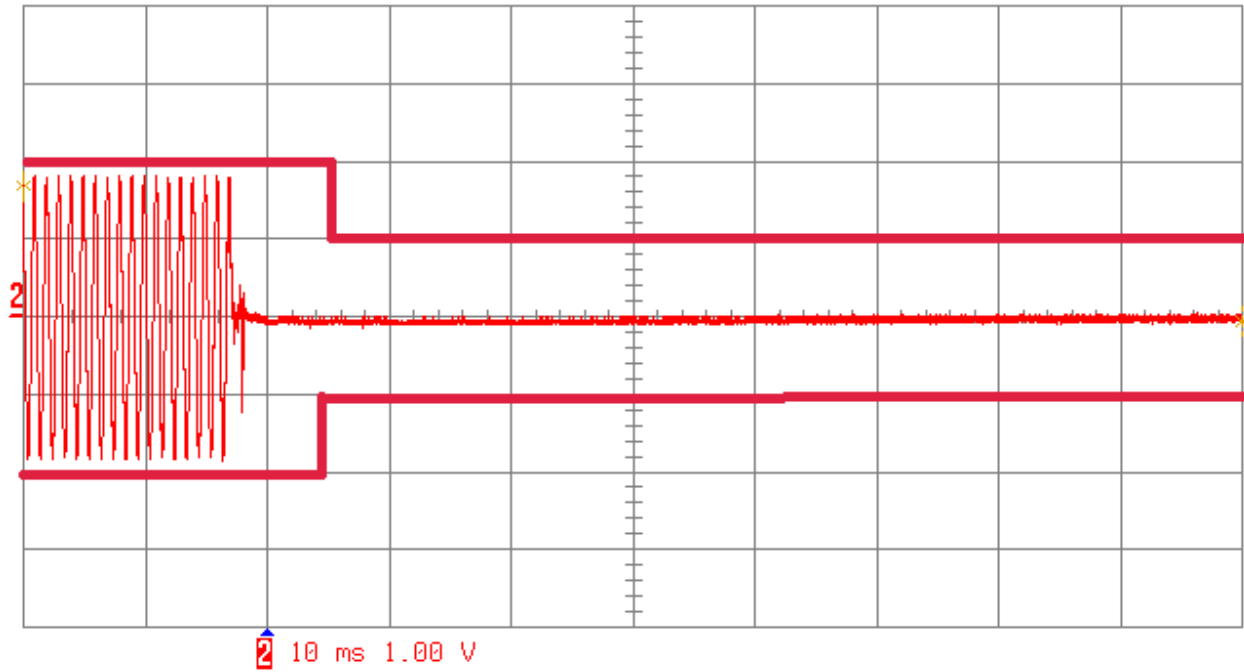
12.5 KHz Channel Bandwidth



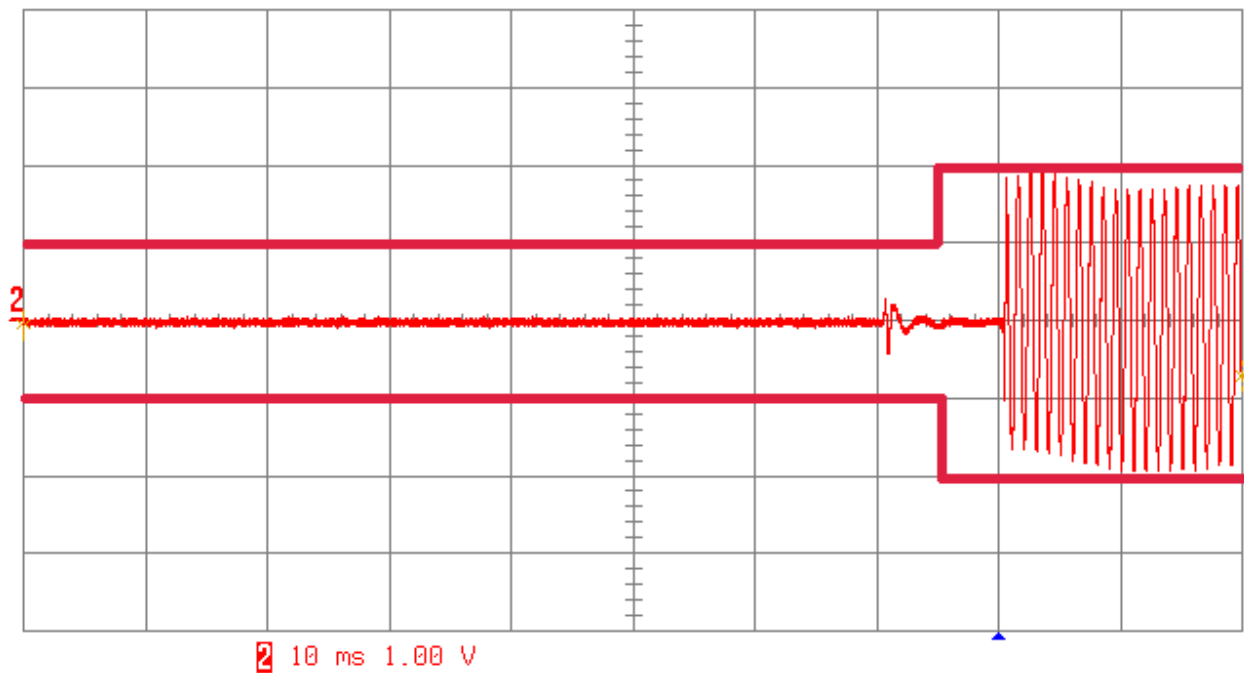
Transient Frequency Behavior Test Data:

25 KHz Channel Bandwidth

25 KHz Turn On



25 KHz Turn Off



EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconnical	Eaton	94455-1	1096	05/10/13	05/10/15
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Antenna: Dipole Kit	Electro-Metrics	TDA-30/1-4	152	N/A	N/A
Frequency Counter	HP	5385A	2730A03025	08/22/13	08/22/15
Signal Generator	HP	8640B	2308A21464	02/23/14	02/23/16
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Digital Multimeter	Fluke	77	35053830	08/22/13	08/22/15
Temperature Chamber	Thermotron Corp.	S1.2 Mini Max	25-1420-09	07/03/14	07/03/16
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	12/07/13	12/07/15
Software: Field Strength Program	Timco	N/A	Version 5.0	N/A	N/A
EMI Test Receiver	Rhode & Schwarz	ESU 40	100320	03/21/13	03/21/15
Frequency Counter	HP	5385A	3242A07460	06/16/13	06/16/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
DC Power Supply	HP	6286A	1744A03842	N/A	N/A
Attenuator	Narda	766-30	N/A	8/1/13	8/1/15
Coaxial Cable # 65	N/A	E9917 RG233/U	Timco # 65	6/26/13	6/26/15
Coaxial Cable Chamber 3 pc Set	Semiflex	N/A	Chamber 3pc set	1/13/14	1/13/16