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## FCC PART 90 2.4GHz VIDEO TRANSMITTER TEST REPORT

<b>APPLICANT</b>	VOSTEK ELECTRONICS
	1032 PAPE AVE. P.O. BOX 60043 TORONTO ONTARIO M4K 3Z3 CANADA
<b>FCC ID</b>	OGRLX-3000
<b>MODEL NUMBER</b>	LX-3000/MIL
<b>PRODUCT DESCRIPTION</b>	TV TRANSMITTER
<b>STANDARD APPLIED</b>	CFR 47 Part 90
<b>DATE SAMPLE RECEIVED</b>	5/30/2014
<b>DATE TESTED</b>	5/30/2014 - 6/02/2014
<b>REPORT ISSUE DATE</b>	6/02/2014
<b>TESTED BY</b>	Cory D Leverett
<b>APPROVED BY</b>	Sid Sanders
<b>TIMCO REPORT NO.</b>	906UT14TestReport
<b>TEST RESULTS</b>	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL  
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**

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## GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

## 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 requirements.

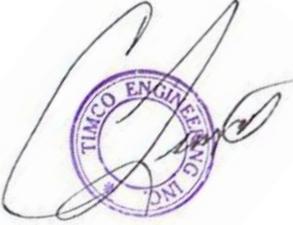
I attest that the necessary measurements were made, under my supervision, at:

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

## Authorized Signatory Name:

Cory Leverett  
Engineering Project Manager

**Date: 06/02/2014**



Applicant: VOSTEK ELECTRONICS  
FCC ID: OGRLX-3000  
Report: \\VOSTEK\_OGR\906UT14\906UT14TestReport

## GENERAL INFORMATION

### EUT Specification

<b>EUT Description</b>	TV TRANSMITTER
<b>FCC ID</b>	OGRLX-3000
<b>Model Number</b>	LX-3000/MIL
<b>Operating Frequency</b>	2452MHz & 2481MHz
<b>Test Frequencies</b>	2452MHz & 2481MHz
<b>No. of Channels</b>	2
<b>Type of Emission</b>	6M00F3F (Video)/ 6M00KF3E (Audio)
<b>Modulation</b>	FM
<b>EUT Power Source</b>	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input checked="" type="checkbox"/> DC Power 12V
	<input type="checkbox"/> Battery Operated Exclusively
<b>Test Item</b>	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
<b>Type of Equipment</b>	<input type="checkbox"/> Fixed
	<input checked="" type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
<b>Test Conditions</b>	The temperature was 26°C with a relative humidity of 50%.
<b>Revision History to the EUT</b>	None
<b>Test Exercise</b>	The EUT was placed in continuous transmit mode.
<b>Applicable Standards</b>	ANSI/TIA 603-D:2010, FCC CFR 47 Part 90
<b>Test Facility</b>	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.

Applicant: VOSTEK ELECTRONICS  
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### TEST 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
Sweep/Signal Generator	Anritsu	68369B	985112	08/29/13	08/29/15
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	07/03/12	07/03/14
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 4.0	N/A	N/A
EMI Test Receiver	Rhode & Schwarz	ESIB 40	100274	03/16/12	06/16/14
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/14
*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

**\*EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

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## TEST PROCEDURE

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

**Bandwidth 20 dB:** The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = as shown on plot and the video bandwidth (VBW) = as shown on plot. and the span = as shown on plot.

**Power Output:** The RF power output was measured at the antenna feed point using a peak power meter.

**Antenna Conducted Emissions:** 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 10<sup>th</sup> harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**Radiation Interference:** 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.

## RF POWER OUTPUT

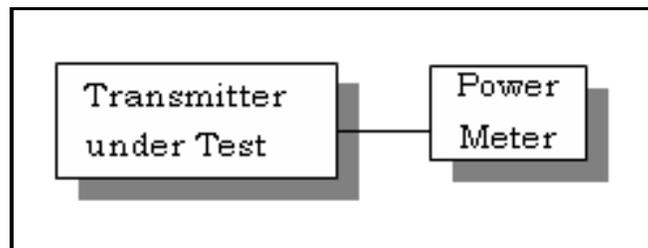
**Rule Part No.:** Part 2.1046(a), Part 90

**Test Requirements:** Manufacturer's Specification

**Method of Measurement:** RF power is measured by using a 50-ohm, resistive wattmeter to the RF output connector. 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:

For the device with a fixed or integral antenna, the RF power is measured as ERP. The substitution method was used. The RF output measures:

**Test Setup Diagram:**



**Test Data: RF power of the DUT is 5 Watts.**

OUTPUT POWER:

Tuned Frequency (MHz)	RF Power (Watts)
2452	5
2481	5

**Part 2.1033 (C)(8) DC Input into the final amplifier**

INPUT POWER:  $(12.6V)(1.1A) = 13.86Watts$

## **OTHER MODULATION CHARACTERISTICS**

**Part 2.1033(c)**

**Part 90.209**

**Part 90.207**

**Part 2.1033(c) (4)** Type of Emission: 6M00F3F, 6M00F3E

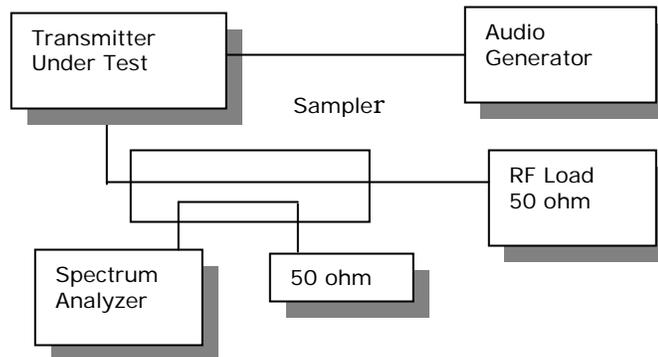
The device is a video transmitter employing wideband FM for the audio & video modulation.

## OCCUPIED BANDWIDTH

Part 2.1049(c) EMISSION BANDWIDTH:

Method of Measurement: ANSI/TIA 603-D: 2010

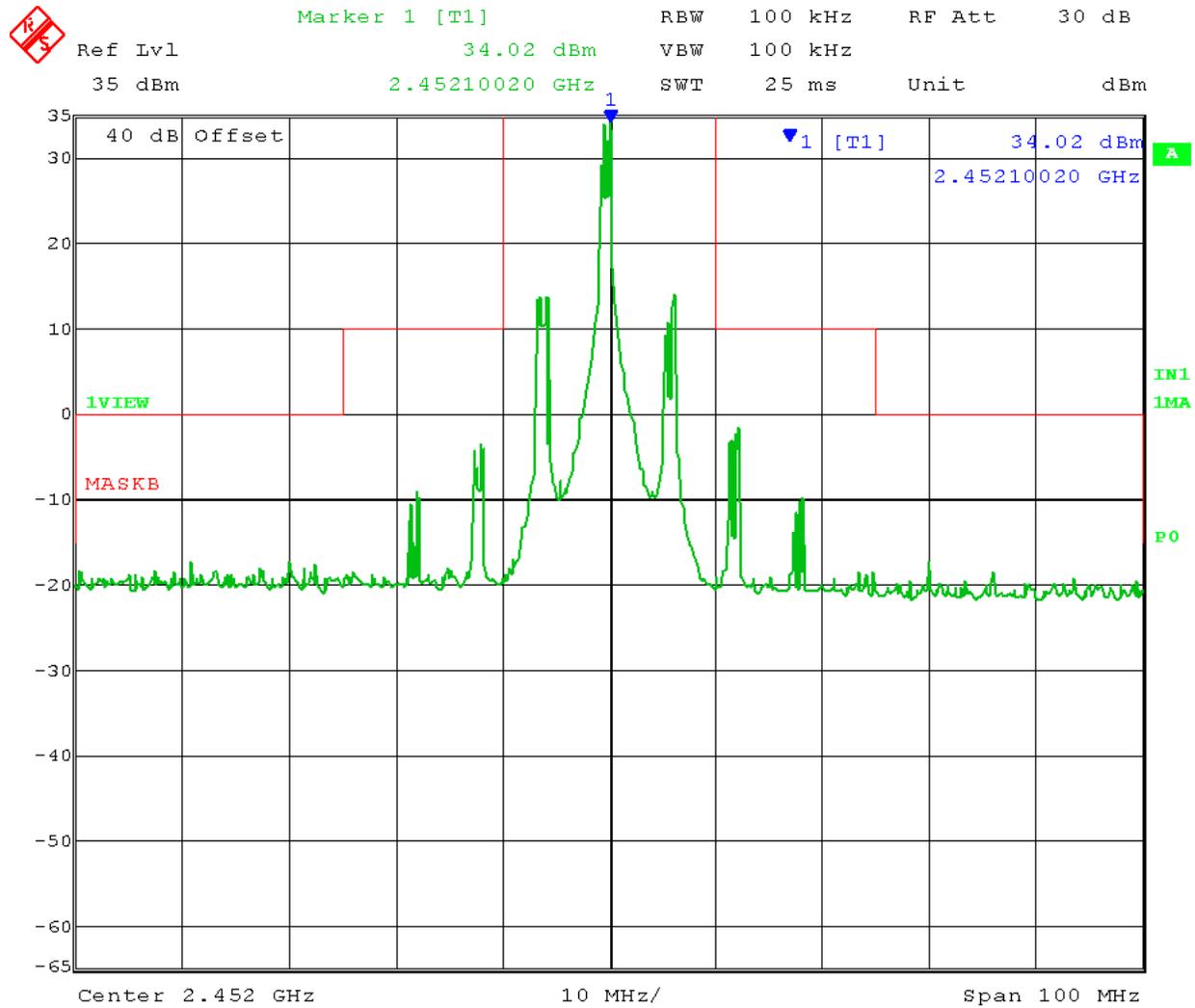
Test Setup Diagram:



**Test Data:** See the plots on following pages.

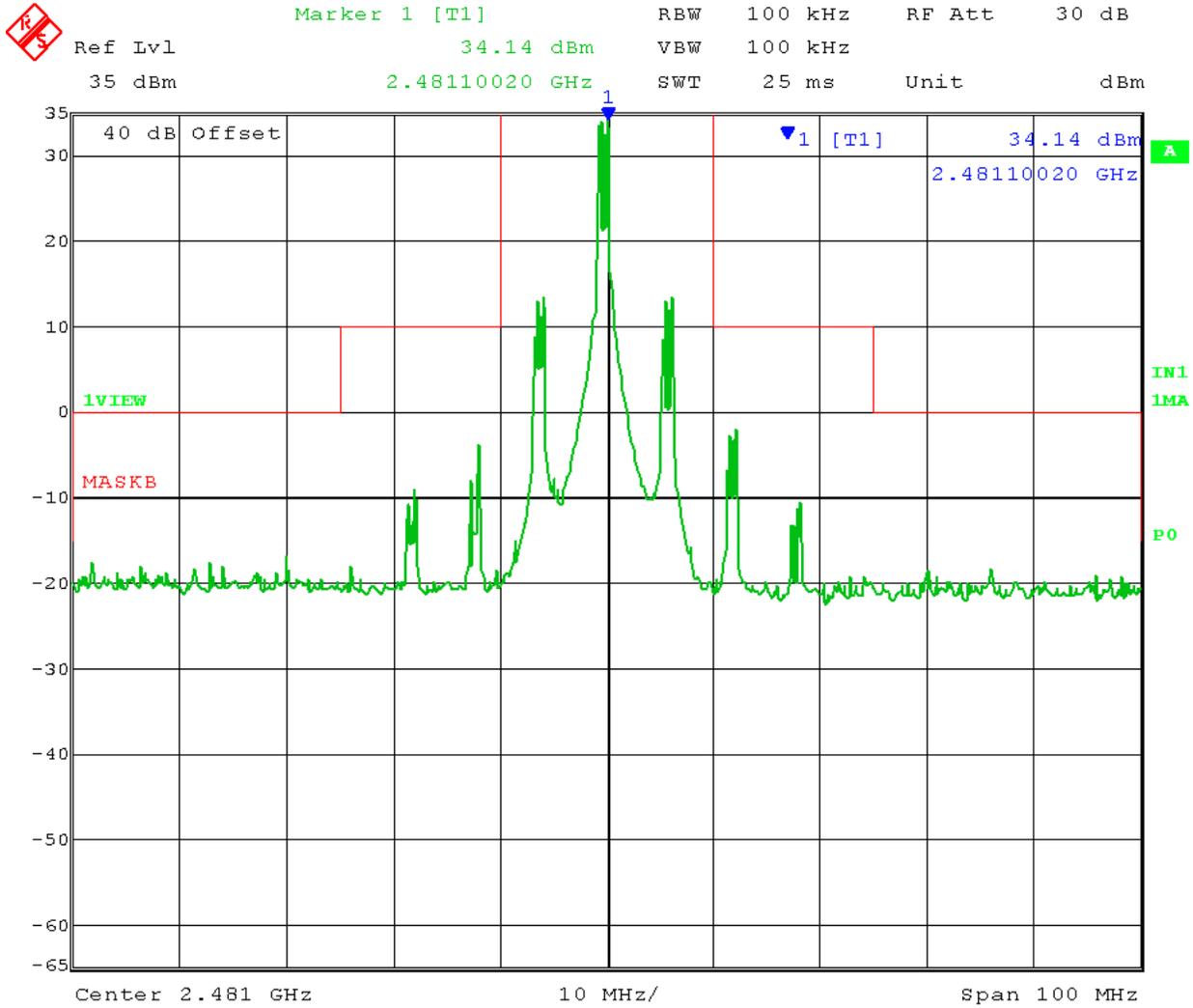
### OCCUPIED BANDWIDTH PLOTS:

#### Low End of the Band 2452 MHz



Part 90.210

High End of the Band 2481 MHz



## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

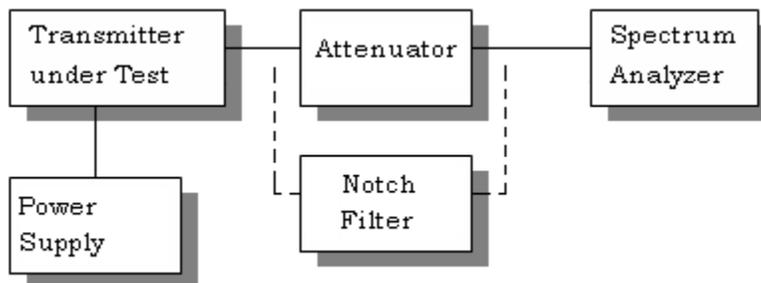
**Rule Part No.:** Part 2.1051(a)

**Requirements:**

$$43 + 10 \log (5) = 50 \text{ dBc}$$

**Method of Measurement:** The carrier was modulated 100% . 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.

### Method of Measuring Conducted Spurious Emissions



**Test Data:** See tables on the following pages.

### High Power Low end of Band

		dBm	Watts	Limit dBc
	Power Output	36.99	5	50
	Frequency	dBm	dBc	Margin
	2452	-36.99	0	0
	4904	-18.62	55.61	5.61
	7356	-26.94	63.93	13.93
	9808	-27.67	64.66	14.66
	12260	NE		
	14712	NE		
	17164	NE		
	19616	NE		
	22068	NE		
	24520	NE		

NE = No emission found greater than the noise floor of the analyzer.

### High Power High End of Band

	dBm	dBm	Watts	Limit dBc
Power Output	36.99	36.99	5	50
	frequency	dBm	dBc	Margin
	2481	36	0	0
	4962	-19.1	56.09	6.09
	7443	-26.2	63.19	13.19
	9924	-28.4	65.39	15.39
	12405	NE		
	14886	NE		
	17367	NE		
	19848	NE		
	22329	NE		
	24810	NE		

NE = No emission found greater than the noise floor of the analyzer.

### RESULTS: PASS

Applicant: VOSTEK ELECTRONICS

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## FIELD STRENGTH OF SPURIOUS EMISSIONS

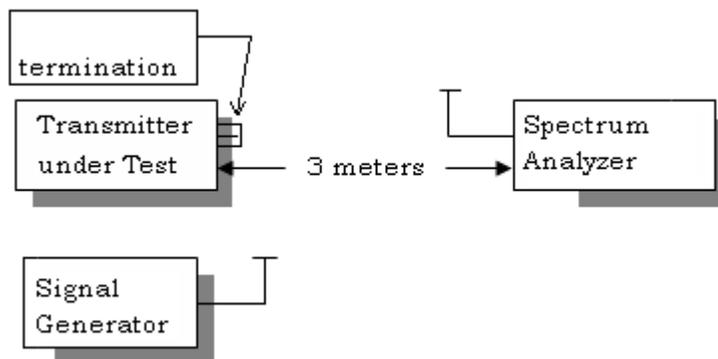
**Rule Parts. No.:** Part 2.1053

**Requirements:**

$$43 + 10 \log(4) = 49.0 \text{ dBc}$$

**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:** See tables on the following pages

**HIGH POWER: Low End of the Band**

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - MHz
2452	Fixed	36.99	5	50	12

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
4904.00	H	76.68	27.66
7356.00	H	69.79	20.77
9808.00	H	68.66	19.64
12260.00	H	69.86	20.84
14712.00	H	66.89	17.86
17164.00	H	NE	NA
19616.00	H	NE	NA
22068.00	H	NE	NA
24520.00	H	NE	NA

NE = No emission found greater than the noise floor of the analyzer.

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - MHz
2452	Fixed	36.99	5	50	12

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
4904.00	V	43.80	28.70
7356.00	V	43.55	22.67
9808.00	V	54.90	20.20
12260.00	V	55.99	19.02
14712.00	V	66.93	17.16
17164.00	V	NE	NA
19616.00	V	NE	NA
22068.00	V	NE	NA
24520.00	V	NE	NA

NE = No emission found greater than the noise floor of the analyzer.

**HIGH POWER: High End of the Band**

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - MHz
2481	Fixed	36.99	5	50	12

NE = No emission found greater than the noise floor of the analyzer.

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
4962.00	H	79.28	30.25
7443.00	H	70.31	21.29
9924.00	H	71.54	22.52
12405.00	H	68.56	19.54
14786.00	H	66.69	17.67
17367.00	H	NE	NA
19848.00	H	NE	NA
22329.00	H	NE	NA
24810.00	H	NE	NA

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - MHz
2481	Fixed	36.99	5	50	12

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
4962.00	V	76.29	27.27
7443.00	V	70.96	21.94
9924.00	V	71.81	22.79
12405.00	V	69.72	20.70
14786.00	V	64.48	15.46
17367.00	V	NE	NA
19848.00	V	NE	NA
22329.00	V	NE	NA
24810.00	V	NE	NA

NE = No emission found greater than the noise floor of the analyzer.

**RESULTS: PASS**

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## FREQUENCY STABILITY

**Rule Parts. No.:** Part 2.1055, Part 90.213

**Requirements:** Frequency stability is to be specified in the station authorization.  
Stability In the temperature range: -30 to +50° C, and Voltage  
Variation +, -15%.

**Method of Measurements:** ANSI/TIA 603-D: 2010.

### Test Data:

Temperature	Frequency MHz	Cycles	PPM
25°C (reference)	2451.992436		
-30°C	2451.932174	-60262	-24.577
-20°C	2451.945983	-46453	-18.945
-10°C	2451.962277	-30159	-12.300
0°C	2451.973319	-19117	-7.797
10°C	2451.981115	-11321	-4.617
20°C	2451.98569	-6746	-2.751
30°C	2451.989573	-2863	-1.168
40°C	2451.9953	2864	1.168
50°C	2452.001001	8565	3.493
Battery Voltage	Frequency	Cycles	PPM
-15%	2451.991347	-1089	-0.444
15%	2451.991931	-505	-0.206