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**FCC PART 95  
MURS TRANSCEIVER  
TEST REPORT**

<b>APPLICANT</b>	GOTENNA
	102 S 6TH STREET BROOKLYN NY 11249 USA
<b>FCC ID</b>	2ABVK02629
<b>MODEL NUMBER</b>	02629
<b>PRODUCT DESCRIPTION</b>	MURS RADIO WITH BT
<b>FCC STANDARD APPLIED</b>	47 CFR § 95 Personal Radio Service Subpart J– Multi-Use Radio Service (MURS)
<b>DATE SAMPLE RECEIVED</b>	7/21/2014
<b>DATES TESTED</b>	8/6/2014 & 10/3/2014
<b>TESTED BY</b>	Cory Leverett
<b>APPROVED BY</b>	Sid Sanders
<b>TIMCO REPORT NO.</b>	1267AUT14TestReport.docx
<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.

The test results relate only to the items tested.

## 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 Leverett  
Engineering Project Manager

A handwritten signature in black ink is written over a circular purple stamp. The stamp contains the text "TIMCO ENGINEERING INC." around the perimeter and "001" in the center.

**Date:** February 25, 2015

## GENERAL INFORMATION

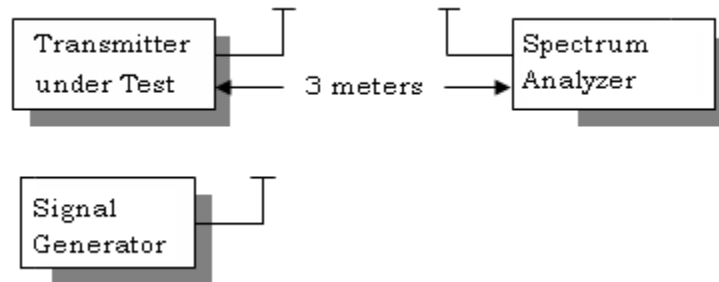
### EUT Specification

<b>EUT Description</b>	MURS RADIO WITH BT
<b>EUT Application</b>	Pairs with Smart Phone via BTLE, sends text messages over MURS channels.
<b>FCC ID</b>	2ABVK02629
<b>Model Number</b>	02629
<b>Serial Number</b>	N/A
<b>Operating Frequency</b>	151.820, 151.880, 151.940, 154.570, 154.600 MHz
<b>No. of Channels</b>	5
<b>Type of Emission</b>	9K6F1D
<b>EUT Power Source</b>	<input type="checkbox"/> 110–120Vac/50–60Hz (Optional AC power Adapter)
	<input type="checkbox"/> DC Power 13.8V
	<input checked="" 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 type="checkbox"/> Mobile
	<input checked="" type="checkbox"/> Portable
<b>Antenna</b>	Fixed
<b>Test Conditions</b>	The temperature was 26°C with a relative humidity of 50-60%.
<b>Modification to the EUT</b>	None
<b>Test Exercise</b>	The EUT was placed in continuous transmit mode of operation
<b>Applicable Standards</b>	ANSI/TIA 603-D:2004, FCC CFR 47 Part 95
<b>Test Facility</b>	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.

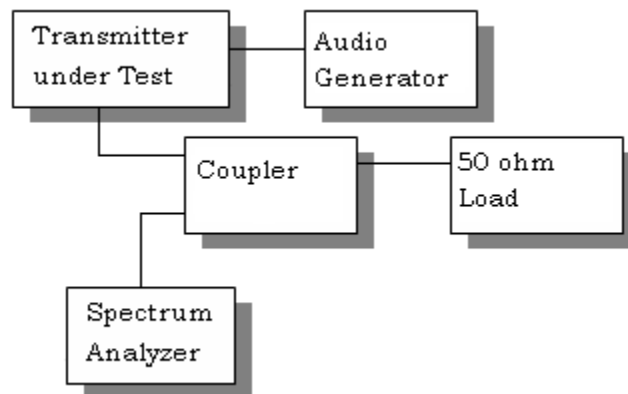
## TEST PROCEDURES:

**General:** The test procedures used are detailed in **ANSI/TIA 603-D:2004**.

**Power Output:** RF power was conducted per ANSI/TIA 603-D: 2004

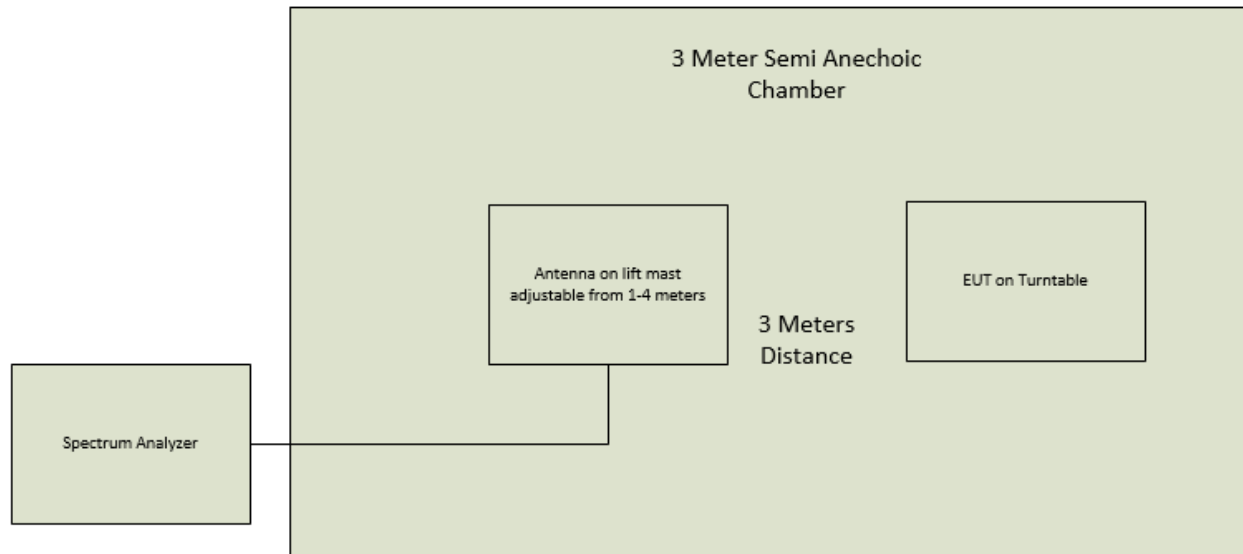


**Bandwidth:** The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 100 KHz and the video bandwidth (VBW) = 300 KHz and the span set as shown on plot.

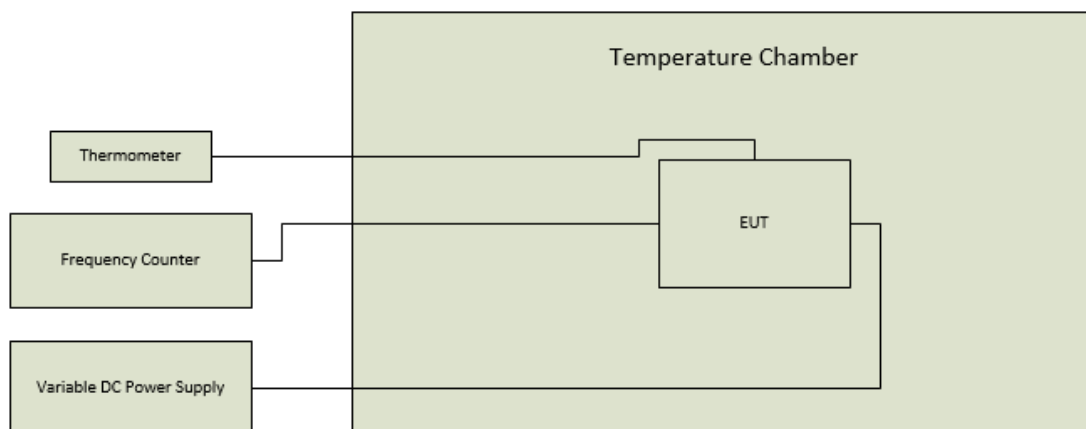


**Antenna Conducted Emissions:** The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10<sup>th</sup> Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**Radiation Interference:** The test procedure used was ANSI/TIA 603-C: 2004 using an Agilent spectrum receiver with pre-selector. 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 was placed into a temperature chamber. After a reference frequency is measured at room temperature, The EUT frequency is measured at the required extreme temperatures after a 20 minute soak time at each said temperature. The EUT antenna output port was connected to a frequency counter for the frequency measurement of an unmodulated CW signal. The voltage was also varied + and – 15% with a variable DC power supply and the frequency measured and compared to the reference frequency.



## TEST REPORT SUMMARY

Rule Part No.	Scope of Work	Status Pass/Fail/NA
<a href="#">Part 2.1033(c)(6)(7), Part 2.1046(a), PART 95 Subpart A, Part 95 Subpart B, RSS-210</a>	RF Power Output	Pass
<a href="#">2.1049(c), 95.635(b)(1)(3)(7)</a>	Emission Mask and Occupied Bandwidths	Pass
<a href="#">2.1051</a>	Antenna Conducted Emissions	Pass
<a href="#">2.1053, IC RSS-210</a>	Field Strength Spurious Emissions	Pass
<a href="#">Part 2.1055 Part 95.621(b), IC RSS-210</a>	Frequency Stability	Pass

## TEST REPORT REVISION HISTORY

Date of Revision	Description of changes	Report Rev Number
10/6/2014	Original Report	1267AUT14_Rev1
2/25/2015	Changed Designator from F3E to F1D	1267AUT14_Rev1.1

## RF POWER OUTPUT

**Rule Part No.:** [FCC Part 2.1033\(c\)\(6\)\(7\)](#), [FCC Part 95.639\(h\)](#), [FCC Part 95.649](#)

**Requirements:** No MURS unit, under any condition of modulation, shall exceed 2 Watts transmitter power output. There can be no provisions for increasing the power or varying the power.

**Method of Measurement:** RF power is measured as conducted; a sample was provided with an antenna connector. With a nominal battery voltage and the transmitter properly adjusted the RF output measures:

### Test Data:

Output power

Level dBm	Watts
32.22dBm	1.67W

Results: Pass



## EMISSION DESIGNATOR AND FREQUENCIES

[2.1033\(c\) \(3\)](#) Type of Emission: 9K6F1D  
[95.632](#)

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 2.0K$$

$$B_n = 2(3000) + 2(1800) = 9.6K$$

Authorized Bandwidth – 11.25 kHz for frequencies:  
151.820, 151.880, 151.940 MHz

Authorized Bandwidth - 20 kHz for frequencies:  
154.570, 154.600 MHz

[2.1033\(c\) \(5\)](#) MURS Frequency Range:  
[95.632](#)

1. 151.820
2. 151.880
3. 151.940
4. 154.570
5. 154.600

## OCCUPIED BANDWIDTH

### Requirements:

[Part 2.1049\(c\), 95.633\(f\)](#)


(f) The authorized bandwidth for any emission type transmitted by a MURS transmitter is specified as follows:

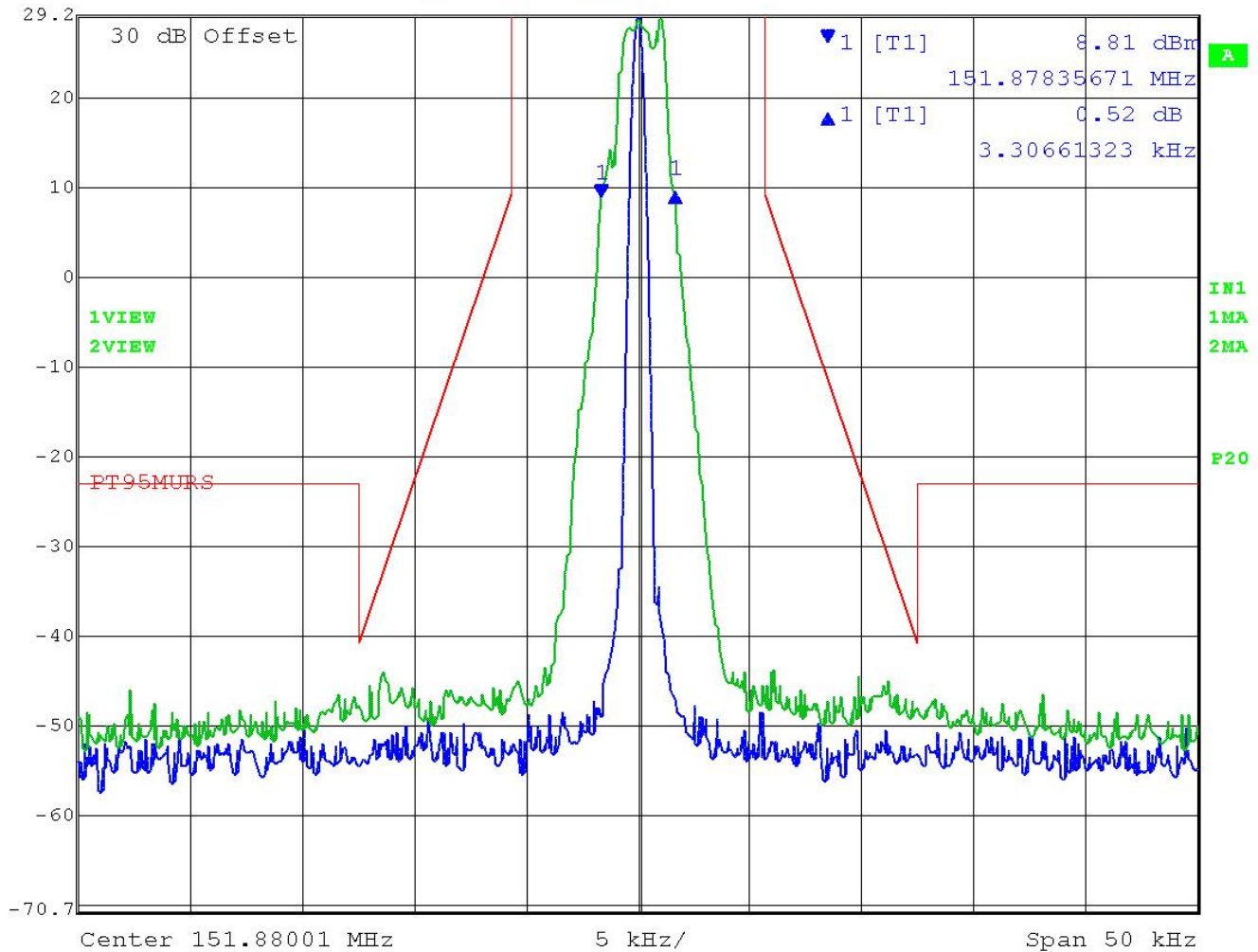
- (1) Emissions on frequencies 151.820 MHz, 151.880 MHz, and 151.940 MHz are limited to 11.25 kHz.
- (2) Emissions on frequencies 154.570 and 154.600 MHz are limited to 20.0 kHz.
- (3) Provided, however, that all A3E emissions are limited to 8 kHz.

## OCCUPIED BANDWIDTH

### Results:

**151.88 MHz Bandwidth = 3.3 KHz**


	Delta 1 [T1]	RBW	300 Hz	RF Att	40 dB	
	Ref Lvl	0.52 dB	VBW	1 kHz	Mixer	-20 dBm
	29.2 dBm	3.30661323 kHz	SWT	2.8 s	Unit	dBm

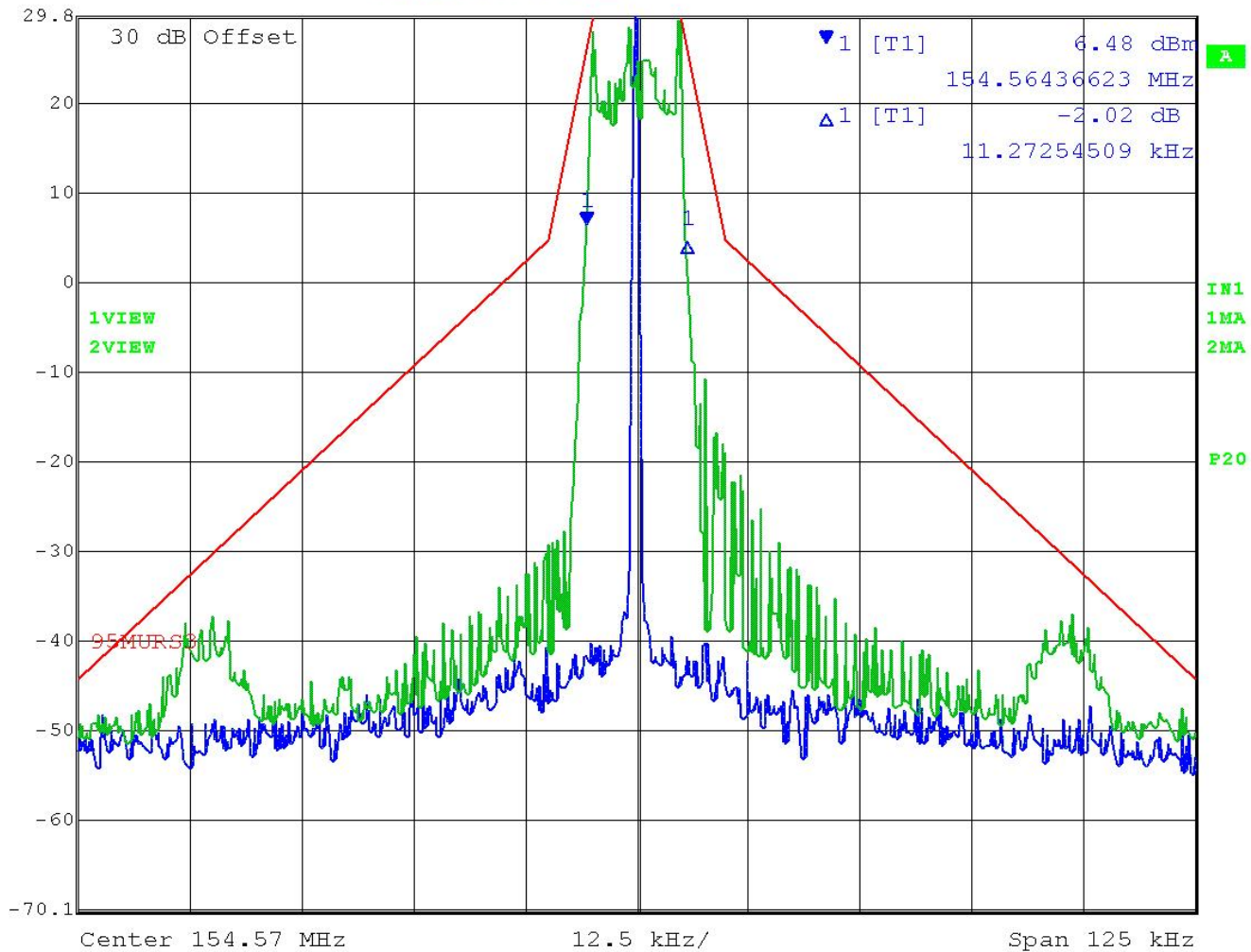


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## OCCUPIED BANDWIDTH

**154.57 MHz Bandwidth = 11.27 KHz**


 Ref Lvl 29.8 dBm      Marker 1 [T1] 154.56436623 MHz      RBW 300 Hz      RF Att 40 dB  
 VBW 1 kHz      Mixer -20 dBm  
 SWT 7 s      Unit dBm



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## UNWANTED RADIATION (Conducted)

### Requirements:

**Rule Parts. No.:** [FCC Part 2.1053](#), [Part 95.635\(e\)](#)

Frequency	Mask with audio low pass filter	Mask without audio low pass filter
151.820, 151.880, 151.940 MHz	(1)	(1)
154.570, 154.600 MHz	(2)	(3)

(1) Emission Mask 1—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:

(i) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.

(ii) 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  $7.27(f_d - 2.88)$  dB.

(iii) 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.

(2) Emission Mask 2—For transmitters designed to operate with a 25 kHz channel bandwidth that are equipped with an audio low-pass filter, the power of any emission must be below the unmodulated carrier power (P) as follows:

(i) 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.

(ii) 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.

(iii) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: at least  $43 + 10 \log (P)$  dB.

(3) Emission Mask 3—For transmitters designed to operate with a 25 kHz channel bandwidth that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but not more than 10 kHz: at least  $83 \log (f_d/5)$  dB.

(ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: at least  $29 \log (f_d^2/11)$  dB or 50 dB, whichever is the lesser attenuation.

(iii) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: at least  $43 + 10 \log (P)$  dB.

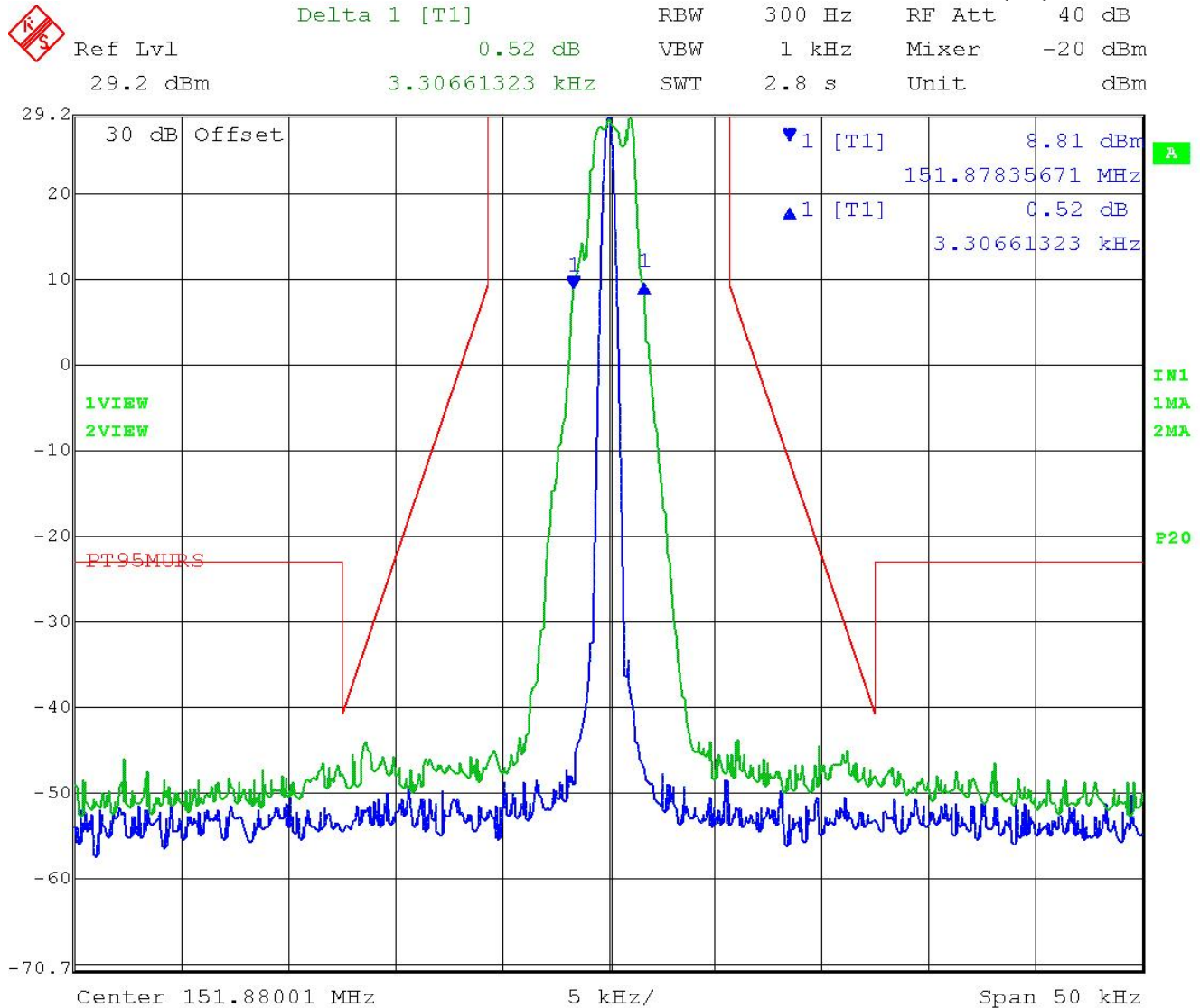
**Test procedure:** ANSI/TIA-603-C: 2004 paragraph 2.2.11.

## UNWANTED RADIATION (Conducted)

### Test Results:

- (i) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (ii) 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  $7.27(f_d - 2.88)$  kHz) dB.

### 151.88MHz Emission < 250% removed from center Mask 1(i,ii)



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## UNWANTED RADIATION (Conducted)

### 151.88 MHz Emission > 100% removed from center

**Requirements: 95.635 (e)(1)(iii)** 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.

Emission Frequency (MHz)	Power Mode	Power Output (dBm)	Power Output (Watts)	FCC Requirement dBc	Bandwidth BW - kHz
151.88	Hi	32.22	1.67	52.22	12.5
Emission Frequency (MHz)	Level dBm		Below Carrier (dBc)	Margin	
303.76	-29.87		62.09	9.87	
455.64	-46.16		78.38	26.16	
607.52	-51.54		83.76	31.54	
759.4	-61.52		93.74	41.52	
911.28	-59.58		91.8	39.58	
1063.16	-58.31		90.53	38.31	
1215.04	-57.5		89.72	37.5	
1366.92	-57.5		89.72	37.5	
1518.8	-61.62		93.84	41.62	

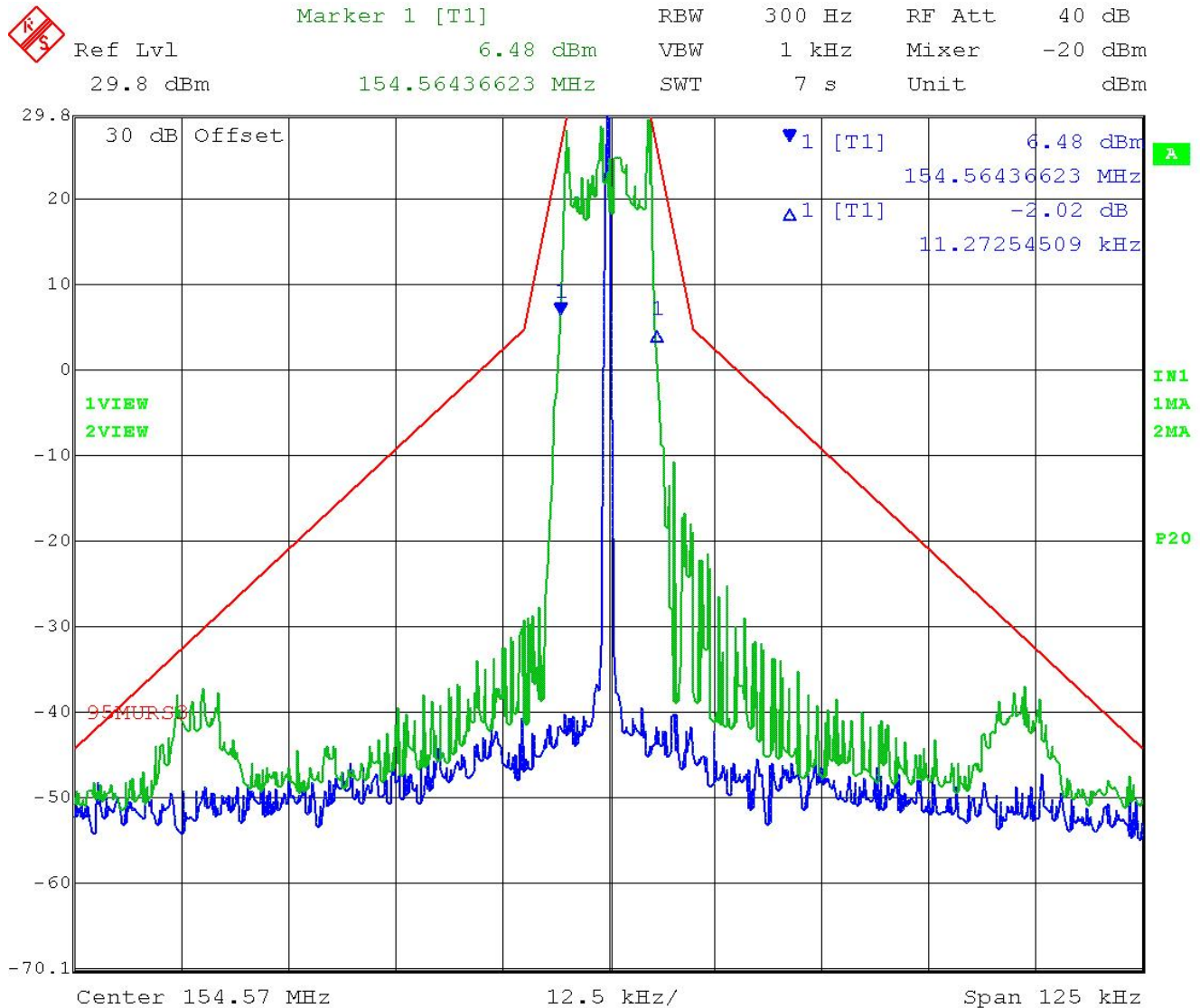
Results : Pass



## UNWANTED RADIATION (Conducted)

- (i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but not more than 10 kHz: at least  $83 \log (f_d/5)$  dB.
- (ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: at least  $29 \log (f_d/11)$  dB or 50 dB, whichever is the lesser attenuation.

### 154.57MHz Emission < 250% removed from center Mask 3 (i,ii)



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## UNWANTED RADIATION (Conducted)

### 154.57MHz Emission > 250% removed from center Mask 3 (iii)

**Requirements: 95.635 (e)(3)(iii)** On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: at least 43 + 10 log (P) dB.

Emission Frequency (MHz)	Power Mode	Power Output (dBm)	Power Output (Watts)	FCC Requirement dBc	Bandwidth BW - kHz
154.57	Hi	32.22	1.67	45.22	25
Emission Frequency (MHz)	Level dBm	Below Carrier (dBc)	Margin		
309.14	-36.03	68.25	23.03		
463.71	-43.33	75.55	30.33		
618.28	-55.12	87.34	42.12		
772.85	-56.47	88.69	43.47		
927.42	-58.28	90.5	45.28		
1081.99	-57.87	90.09	44.87		
1236.56	-58.61	90.83	45.61		
1391.13	-53.4	85.62	40.4		
1545.7	-61.31	93.53	48.31		

**Results: Pass**

## UNWANTED RADIATION (Radiated)

Rule Parts. No.: [FCC Part 2.1053](#), [95.635\(C\)](#).

**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-C:2004 using the substitution method. Only the worst case for each antenna polarity is shown.

### Test Data:

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
151.88	Fixed	31.5	1.41	52.3	11.25
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
303.76	V	100.81		48.51	
455.64	V	73.49		21.19	
607.52	V	69.00		16.7	
759.40	H	77.94		25.64	
911.28	V	80.29		27.99	
1,063.16	V	83.67		31.37	
1,215.04	V	85.46		33.16	
1,366.92	H	81.12		28.82	
1,518.80	V	79.30		27	

**Results: Pass**

## FREQUENCY STABILITY

**Rule Parts. No.:** [FCC Part 2.1055](#) [FCC PART 95.632\(C\)](#)

(c) MURS transmitters must maintain a frequency stability of 5.0 ppm, or 2.0 ppm if designed to operate with a 6.25 kHz bandwidth

Temperature and voltage tests were performed to verify that the frequency remains within the 0.00050%, 5.0-ppm specification limit if the device is designed to operate with 11.25 kHz or 12.5 kHz authorized bandwidth and .00020%, 2.0 ppm if the device is designed to operate with 6.25 kHz authorized bandwidth. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15-second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15-second intervals. The worst-case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50 degrees C.

Readings were also taken at plus and minus 15% of the battery voltage of 6 VDC.

**Method of Measurements:** ANSI/TIA 603-D:2004

### Test Data:

Temperature	Frequency MHz	Cycles	PPM
25°C (reference)	151.819824		
-30°C	151.819863	-39	-0.257
-20°C	151.819888	-64	-0.422
-10°C	151.819862	-38	-0.250
0°C	151.819847	-23	-0.151
10°C	151.819845	-21	-0.138
20°C	151.819837	-13	-0.086
30°C	151.819793	31	0.204
40°C	151.819833	-9	-0.059
50°C	151.819873	-49	-0.323
Battery Voltage	Frequency	Cycles	PPM
-15%	151.819826	-2	-0.013
15%	151.819827	-3	-0.020



## EMC 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	5352B	2632A00165	06/26/13	06/26/15
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Digital Multimeter	Fluke	77	35053830	08/22/13	08/22/15
Temperature Chamber Small	Thermotron Corp.	S1.2 Mini Max	25-1420-09	07/03/12	10/03/14
Software: Field Strength Program	Timco	N/A	Version 4.0	N/A	N/A
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/15
LISN	Electro-Metrics	EM-7820	2682	02/26/13	02/26/15
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	10/05/12	10/05/14
EMI Test Receiver R & S ESU 40	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

## EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3