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## FCC PART 95 AND IC RSS-210 FRS TEST REPORT

<b>APPLICANT</b>	ADVANCED WIRELESS COMMUNICATIONS
	20809 KENSINGTON BLVD.
	LAKEVILLE MINNESOTA 55044 USA
<b>FCC ID</b>	Q9STB208
<b>IC CERT #</b>	4651A-TB208
<b>MODEL NUMBER</b>	I-RAD
<b>PRODUCT DESCRIPTION</b>	FM UHF PTT RADIO TRANSCEIVER WITH FRS
<b>DATE SAMPLE RECEIVED</b>	8/7/2007
<b>DATE TESTED</b>	8/22/2007
<b>TESTED BY</b>	Richard Block
<b>APPROVED BY</b>	Mario de Aranzeta
<b>TIMCO REPORT NO.</b>	2770DUT7 RSS-210 TestReport.doc
<b>TOTAL PAGES</b>	16
<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.**



Certificate # 0955-01

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## ATTESTATIONS

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

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



Test Certificate # 0955-01

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 by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

**Authorized by:** Mario de Aranzeta  
**Signature:** <Mario de Aranzeta>  
**Function:** Engineer/Lab Supervisor  
**Date:** 8/22/2007  
**Tested by:** Richard Block  
**Signature:** on file  
**Function:** Test Technician

**GENERAL INFORMATION**

**DUT Specification**

The test results relate only to the items tested.	
<b>DUT Description</b>	FM UHF PTT RADIO RECEIVER WITH FRS
<b>FCC ID</b>	Q9STB208
<b>Model Number</b>	I-RAD
<b>IC Certification</b>	4651A-TB208
<b>Operating Frequency</b>	462.5625-467.7125
<b>No. of Channels</b>	22
<b>Type of Emission</b>	11K2F3E
<b>Modulation</b>	FM
<b>DUT Power Source</b>	<input type="checkbox"/> 110-120Vac/50- 60Hz
	<input type="checkbox"/> DC Power
	<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>	Internal
<b>Antenna Connector</b>	N/A
<b>Test Condition:</b>	The DUT was tested in the laboratory in an environment with normal temperature and humidity. The temperature was 26°C with a relative humidity of 50%.
<b>Modifications:</b>	None
<b>Test Exercise:</b>	The DUT was placed in continuous transmit mode of operation.
<b>Applicable Standards:</b>	ANSI/TIA 603-C:2004, FCC CFR 47 Part 90, 95B, ANSI C63.4:2003, IC RSS-119

## TEST PROCEDURES

**Bandwidth:** The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

**Power Output:** RF power was conducted per TIA/EIA STANDARD 603 using the substitution method

**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 TIA 603 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum TIA 603 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. The ambient temperature of the DUT was 76°F with a humidity of 55%.

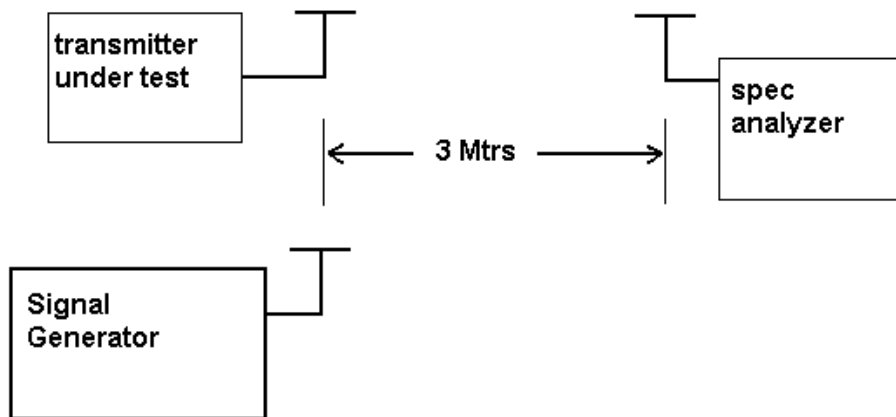
**RF POWER OUTPUT**

**Rule Part No.:** 2.1033(c)(6)(7), 2.1046(a), Part 95, RSS-210

1. **Requirements:** Power output shall not exceed 0.50 Watts effective radiated power for the FRS channels. There can be no provisions for increasing the power or varying the power.

**Method of Measurement:** RF power is measured as ERP as the antenna is permanently attached. The substitution method was used. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

**Test Setup Diagram:**



**Test Data:**

**0.275 Watts ERP**

**Rule Part No.:** 2.1033 (C)(8) DC Input into the final amplifier

INPUT POWER:  $(3.7V)(0.55A) = 2.04$  Watts

**MODULATION CHARACTERISTICS**

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

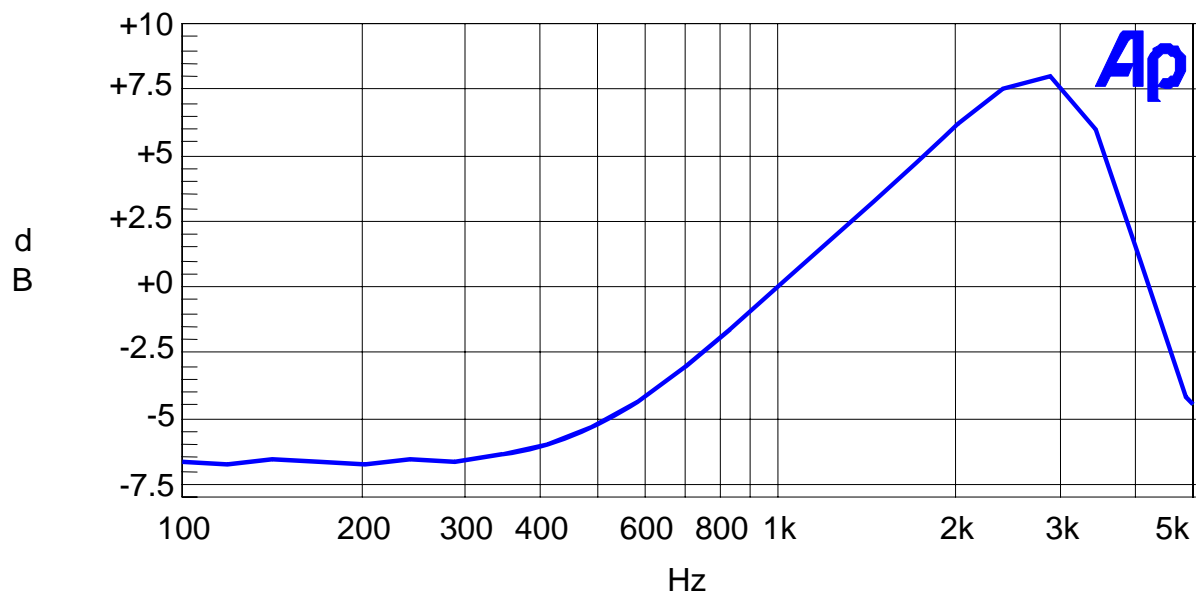
**Test Requirements:**

**Method of Measurement:**

The audio frequency response was measured in accordance with ANSI/TIA- 603-C:2004. The audio frequency response curve is shown below. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

**AUDIO FREQUENCY RESPONSE PLOT**

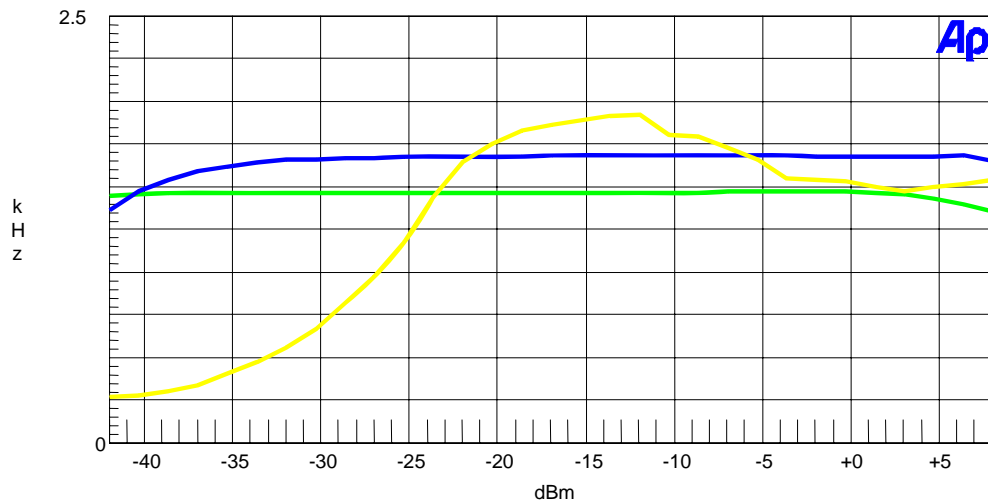
**AUDIO FREQUENCY RESPONSE PLOT -- 12.5kHz**



**Audio input versus modulation**

**Method of Measurement:** , The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C:2004. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

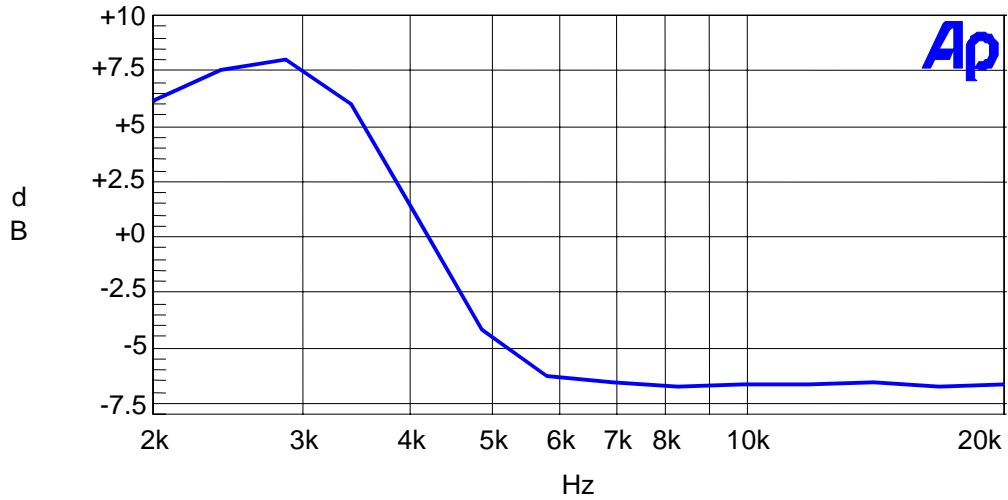
MODULATION LIMITING PLOT -- 12.5kHz





**Post Limiter Filter**

**AUDIO LOW PASS FILTER PLOT -- 12.5kHz**



## EMISSION DESIGNATOR AND FREQUENCIES

**Part 2.1033(c) (4)** Type of Emission: 11K2F3E  
**95.631**

$$\begin{aligned} B_n &= 2M + 2DK \\ M &= 3000 \\ D &= 2500 \\ K &= 1 \\ B_n &= 2(3000) + 2(2500) = 11k \end{aligned}$$

FRS Authorized Bandwidth 12.5KHz

**Part 2.1033(c)(5)** FRS Frequency Range:  
**95.627**

- |             |                  |
|-------------|------------------|
| 1. 462.5625 | 8. 467.5625      |
| 2. 462.5875 | 9. 467.5875      |
| 3. 462.6125 | 10. 467.6125     |
| 4. 462.6375 | 11. 467.6375     |
| 5. 462.6625 | 12. 467.6625     |
| 6. 462.6875 | 13. 467.6875     |
| 7. 462.7125 | 14. 467.7125 MHz |

**OCCUPIED BANDWIDTH**

**Part 2.1049(c)**      EMISSION BANDWIDTH:  
 95.635(b)(1)(3)(7)

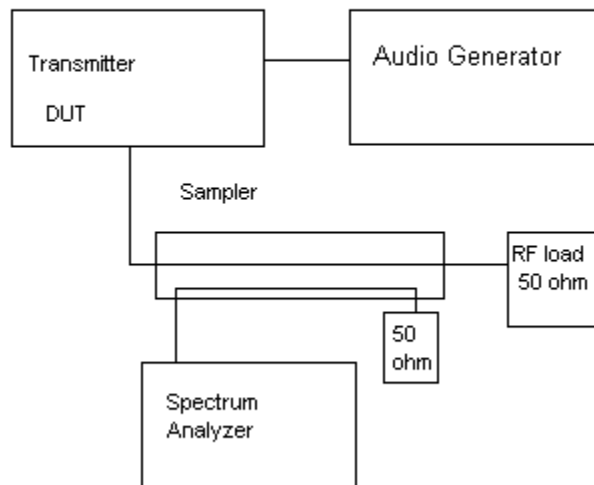
At least 25dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth. At least 35 dB on any frequency removed from the center of the authorized BW by more than 100% up to and including 250% of the authorized BW. At least  $43 + \log_{10}(TP)$  dB on any frequency removed from the center of the authorized bandwidth by more than 250%. See the following plot.

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

Test procedure diagram

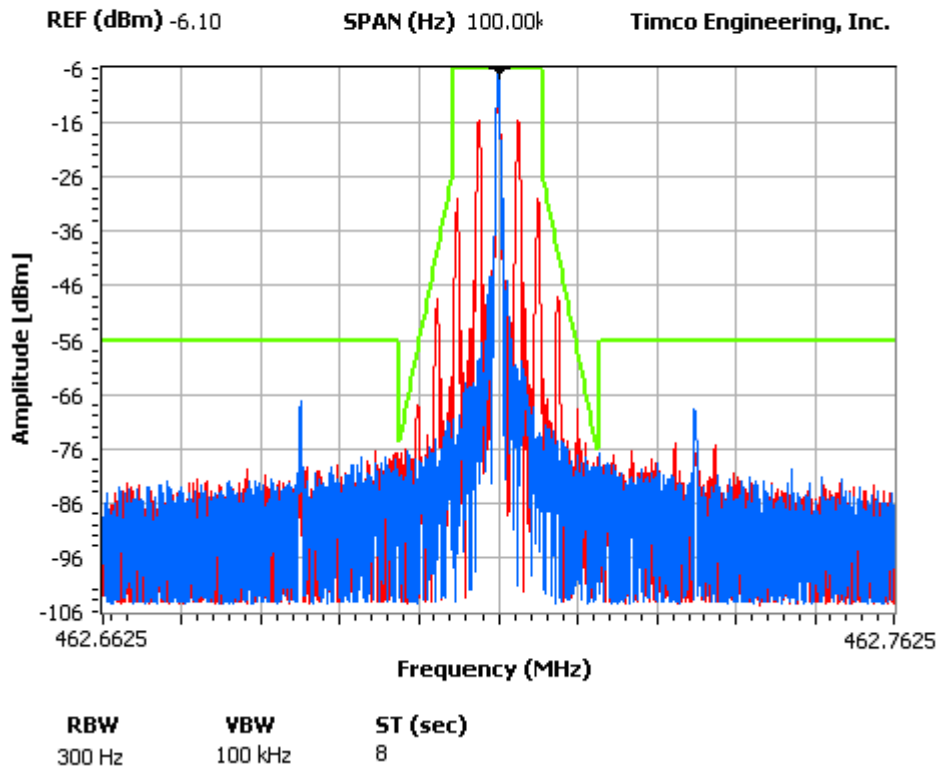
**OCCUPIED BANDWIDTH MEASUREMENT**

Occupied BW Test Equipment Setup



**NOTES:**

OCCUPIED BANDWIDTH -- 12.5kHz  
 ADVANCED WIRELESS



Applicant: ADVANCED WIRELESS COMMUNICATIONS

FCC ID: Q9STB208

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**SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)**

2.1051 Not applicable, no antenna terminal allowed.

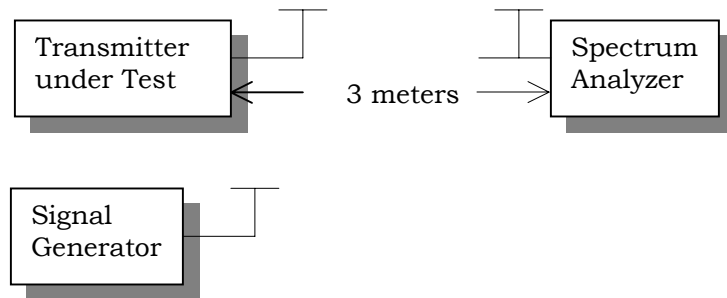
## FIELD STRENGTH OF SPURIOUS EMISSIONS - TX

**Rule Parts. No.:** Part 2.1053  
95.635(b)(7)  
RSS-210

**Requirements:**  $43+10\log(0.275) = 37.4$  dB

**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. 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:

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)		Emission Frequency MHz	Ant. Polarity V/H	dB Below Carrier (dBc)
462.7125	0	0.00		467.5625	0	0.00
925.4250	V	66.73		935.1250	V	63.73
1388.1375	V	77.04		1402.6875	H	79.54
1850.8500	H	73.76		1870.2500	H	73.26
2313.5625	H	82.36		2337.8125	V	78.36
2776.2750	H	74.66		2805.3750	V	68.86
3238.9875	H	69.17		3272.9375	V	59.17
3701.7000	V	76.93		3740.5000	V	75.73
4164.4125	V	77.18		4208.0625	H	78.48
4627.1250	V	77.68		4675.6250	V	79.88

Applicant: ADVANCED WIRELESS COMMUNICATIONS

FCC ID: Q9STB208

IC Cert: 4651A-TB208

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**FREQUENCY STABILITY**

**Rule Parts. No.:** Part 2.1055, Part 95.621(b), RSS-210

**Requirements:** Temperature and voltage tests were performed to verify that the frequency remains within the 0.00025 %, 2.5 ppm specification limit. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25° 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° 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° C.

**Method of Measurements:** ANSI/TIA 603-C:2004.

**Test Data:**

<b>Assigned Frequency (Ref. Frequency) (MHz)</b>		<b>462.712500</b>
<b>Temperature (°C)</b>	<b>Frequency (MHz)</b>	<b>Frequency Stability (PPM)</b>
-30	462.711744	-1.63
-20	462.712286	-0.46
-10	462.712745	0.53
0	462.712936	0.94
+10	462.713022	1.13
+20	462.712775	0.59
+30	462.712626	0.27
+40	462.712563	0.14
+50	462.712884	0.83

<b>Battery %</b>	<b>Frequency (MHz)</b>	<b>Frequency Stability (PPM)</b>
-15%	462.712423	-0.17

**TEST EQUIPMENT LIST**

<b>Device</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Cal/Char Date</b>	<b>Due Date</b>
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
3-Meter Semi- Anechoic Chamber	Panashield	N/A	N/A	LISTED 5/11/07	5/10/10
Antenna: Biconnical	Electro- Metrics	BIA-25	1171	CAL 6/20/07	6/20/09
Antenna: Log-Periodic	Electro- Metrics	LPA-25	1122	CAL 12/1/06	12/1/08
LISN	Electro- Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08
Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 3/15/07	3/15/09

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