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**FCC PART 90  
AND IC RSS-119, RSS-GEN  
CLASS II PERMISSIVE CHANGE  
TEST REPORT**

<b>APPLICANT</b>	SUMMATION RESEARCH INC.
	3950 DOW ROAD MELBOURNE FL 32934-9215
<b>FCC ID</b>	OQW-STR1820
<b>IC CERTIFICATION</b>	9110A-STR1820
<b>MODEL NUMBER</b>	STR-1820
<b>PRODUCT DESCRIPTION</b>	LAND MOBILE RADIO FOR DATA COMMUNICATIONS
<b>DATE SAMPLE RECEIVED</b>	12/6/2011
<b>DATE TESTED</b>	12/7/2011
<b>TESTED BY</b>	Nam Nguyen
<b>APPROVED BY</b>	Mario de Aranzeta
<b>TIMCO REPORT NO.</b>	2861AT11TestReport.doc
<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.



Testing Certificate # 0955-01

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:

Mario de Aranzeta C.E.T.  
Compliance Engineer/ Lab. Supervisor

**Date: December 8, 2011**

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**GENERAL INFORMATION**  
**DUT Specification**

<b>DUT Description</b>	LAND MOBILE RADIO FOR DATA COMMUNICATIONS
<b>FCC ID</b>	OQW-STR1820
<b>IC Certification</b>	9110A-STR1820
<b>Model Number</b>	STR-1820
<b>Serial Number</b>	N/A
<b>Test Frequencies</b>	(450.0, 464.1, and 470.0) MHz
<b>No. of Channels</b>	59
<b>Type of Emission</b>	11K2F3D, 16K0F3D, 16K0F2D, 11K2F2D, 11K2F1D, 4K00F1D
<b>Modulation</b>	FM
<b>DUT 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>Modification to the DUT</b>	None
<b>Test Exercise</b>	The DUT was placed in continuous transmit mode.
<b>Applicable Standards</b>	ANSI/TIA 603-C:2004, FCC CFR 47 Part 90, IC RSS-119, RSS-GEN
<b>Test Facility</b>	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.

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## TEST PROCEDURES

**Power Line Conducted Interference:** The procedure used was ANSI/TIA 603-C: 2004 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) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set 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-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 micro volt at the output of the antenna.

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## **MODULATION CHARACTERISTICS**

### **Part 2.1033(c)**

**Part 2.1033(c) (4)** Type of Emission: FSK and AFSK data. Typically 1200 baud.

### **FCC Part 90.209, IC RSS-119 5.5**

### **FCC Part 90.207**

Type of Emission: 11K2F3D 11K2F2D

$$B_n = 2(M/2) + 2DK$$

$$M = 3000$$

$$D = 2100$$

$$K=1$$

$$B_n = 2(3000) + 2(2200) = 10.4k$$

Type of Emission: 11K2F1D

$$B_n = 2M + 2DK$$

$$M = B/2 = 9600/2 = 4800$$

$$D = 800$$

$$K=1$$

$$B_n = 2(4800) + 2(800) = 11.2k$$

Type of Emission: 4K00F1D

SOQPSK

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## **OCCUPIED BANDWIDTH**

### **FCC Part 2.1049(c), RSS-GEN 4.6 EMISSION BANDWIDTH** **FCC Part 90.210(b) RSS-119 4.2 25kHz Channel Spacing**

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least 43 + 10log(P)dB.

### **Part 90.210(c) 12.5kHz Channel Spacing Not Equipped with a Low Pass Filter**

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz but not more than 10 kHz: At least  $83 \log(fd/5)$  dB; (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least  $29 \log(fd/11)$  dB or 50 dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least  $43 + 10 \log(P_0)$  dB.

### **Part 90.210(d) Emission Mask D - 12.5 kHz channel BW equipment.**

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

### **Part 90.210(e) Emission Mask E - 6.25 kHz channel BW equipment.**

For transmitters designed to operate with a 6.25 kHz 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 3.0 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(fd - 3.0)$  dB or  $55 + 10 \log(P)$  or 65, whichever is the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least  $55 + 10\log(P)$  dB or 65 dB, whichever is the lesser attenuation.

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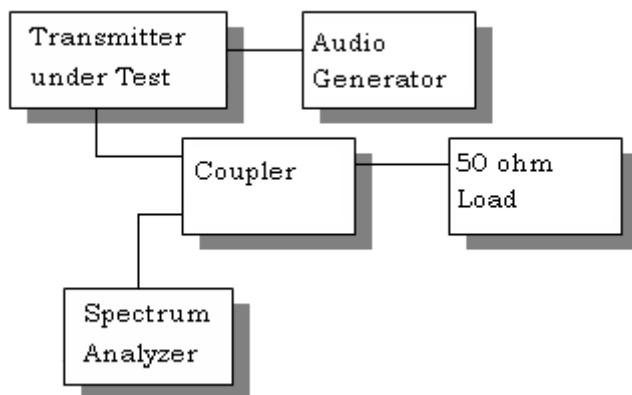
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## OCCUPIED BANDWIDTH MEASUREMENT

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

**Test Setup Diagram:**

OCCUPIED BANDWIDTH MEASUREMENT



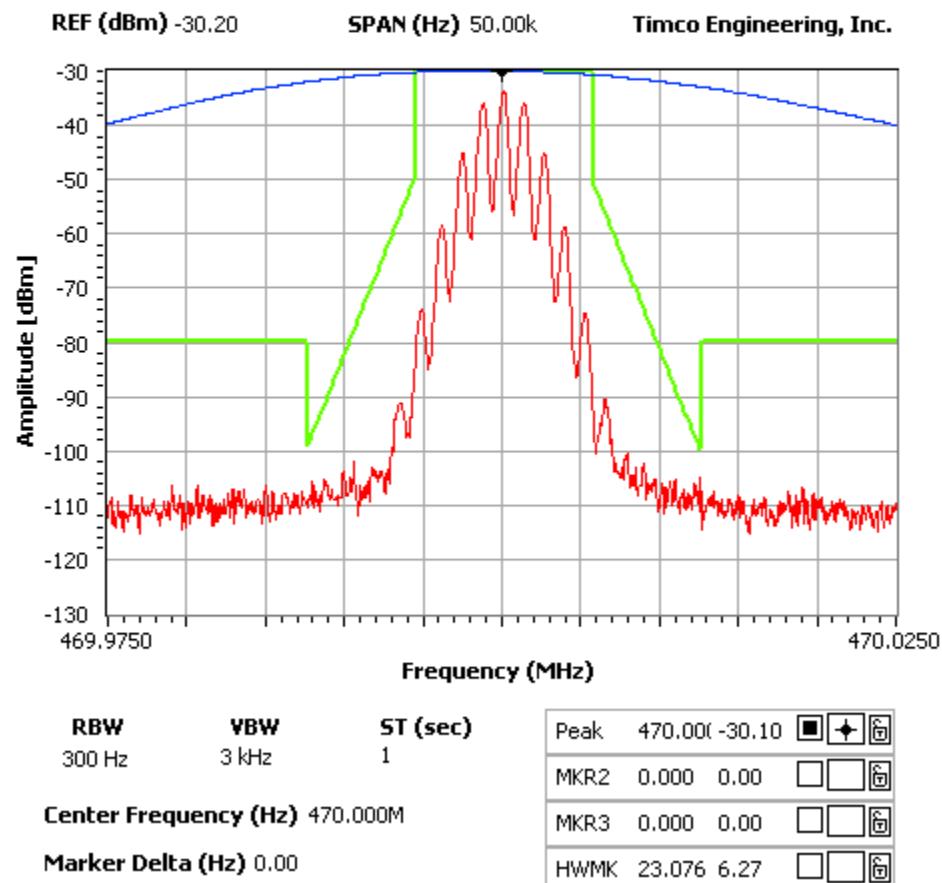
**Test Data:** See the plots below

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## 12.5kHz - DIGITAL

**NOTES:**

 SUMMATION RESEARCH INC. - FCC ID: OQW-STR1820  
 OCCUPIED BANDWIDTH PLOT - 12.5 kHz FSK / Digital Out

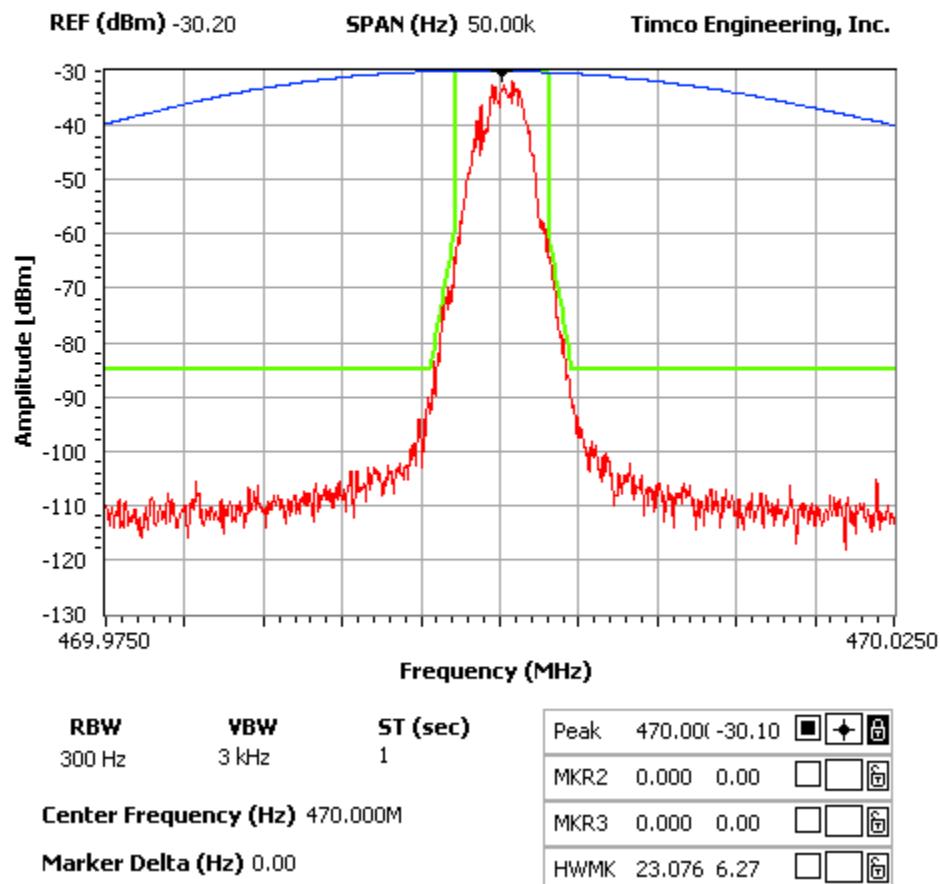
**FCC 90.210 Mask D**


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## 6.25 kHz - DIGITAL

**NOTES:**

 SUMMATION RESEARCH INC. - FCC ID: OQW-STR1820  
 OCCUPIED BANDWIDTH PLOT - 6.25 kHz SOQPSK / Digital Out

**FCC 90.210 Mask E**


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## SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

**Rule Part No.:** FCC Part 2.1051(a), RSS-GEN 7.1.4

**Requirements:** 12.5kHz Channel Spacing = 64.8 dBc (for 30 Watts)  
 12.5kHz Channel Spacing = 57.0 dBc (for 5 Watts)

6.25 kHz Channel Spacing = 69.8 dBc (for 30 Watts)  
 6.25 kHz Channel Spacing = 62 dBc (for 5 Watts)

**Method of Measurement:** The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard ANSI/TIA 603-C: 2004.

### Test Data:

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
450.0	900.00	84.6		450.0	900.00	85
	1350.00	86.7			1350.00	77.8
	1800.00	99.3			1800.00	81.2
	2250.00	98.7			2250.00	98.2
	2700.00	103.4			2700.00	97.5
	3150.00	113.4			3150.00	95.3
	3600.00	105.4			3600.00	99.9
	4050.00	95			4050.00	86.1
	4500.00	102.7			4500.00	96.8

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
<b>464.1</b>	928.20	85.1		<b>464.1</b>	928.20	86
	1392.30	82.4			1392.30	84.9
	1856.40	97.2			1856.40	89.7
	2320.50	102.3			2320.50	95.3
	2784.60	103.9			2784.60	96.7
	3248.70	103.4			3248.70	97
	3712.80	101.6			3712.80	95.3
	4176.90	102.4			4176.90	96.9
	4641.00	103.8			4641.00	96.9

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<b>TF HIGH POWER</b>	<b>EF</b>	<b>dB below carrier</b>		<b>TF LOW POWER</b>	<b>EF</b>	<b>dB below carrier</b>
<b>470.0</b>	940.00	83.6		<b>470.0</b>	940.00	83.3
	1410.00	79.5			1410.00	88.7
	1880.00	83.3			1880.00	91.6
	2350.00	101.9			2350.00	107.5
	2820.00	113.4			2820.00	108.1
	3290.00	106.2			3290.00	102.8
	3760.00	106.8			3760.00	104
	4230.00	104.4			4230.00	99.4
	4700.00	108.3			4700.00	107

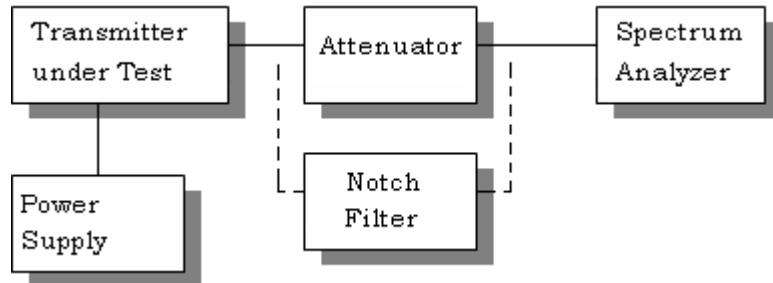
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### **Method of Measuring Conducted Spurious Emissions**



**METHOD OF MEASUREMENT:** The procedure used was ANSI/TIA 603-C:2004. The measurements were made at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

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