TIMCO ENGINEERING, Inc.

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FCC PART 90

TEST REPORT

APPLICANT	RIIMIC, LLC DBA SUNAIR ELECTRONICS
	2941 W. CYRPRESS CREEK ROAD
	FT. LAUDERDALE, FL 33309
FCC ID	XVKRT-9000
MODEL NUMBER	RT-9000
PRODUCT DESCRIPTION	HF TRANSCEIVER
DATE SAMPLE RECEIVED	10/23/2007
DATE TESTED	11/12/2007
TESTED BY	Richard Block
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	98BUT10TestReport.doc
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENTS

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 requirements.

ACCREDITED

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: 11/12/2007

GENERAL INFORMATION

DUT Specification

DUT Description	HF TRANSCEIVER
FCC ID	XVKRT-9000
Model Number	RT-9000
Serial Number	N/A
Operating Frequency	1.6-30.0 MHz
No. of Channels	Single
Type of Emission	J3E, J2B, A1A, and R3E
Modulation	SSB, CW, AM
DUT Power Source	☒ 110–120Vac/50– 60Hz
	☐ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable

REPORT SUMMARY

Applicable Rule(s)	ANSI C63.4: 2003 and ANSI/TIA 603-C: 2004

TEST ENVIRONMENT

Test Facility	Timco Engineering, Inc. 849 NW State Road 45 Newberry, FL 32669 USA.
Test Condition in the laboratory	Temperature: 26°C Relative humidity: 50%

TEST SETUP SUMMARY

Test Setup Diagram/ Description	The DUT was placed on the turntable per setup per ANSI C63.4: 2003. A test set up photo is provided for clarification.
Deviation from the standard/procedure	No deviation
Modification of DUT	No modification

SUPPORTING PERIPHERAL EQUIPMENT

None

EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/11/07	5/11/10
AC Voltmeter	HP	400FL	2213A14499	CAL 3/23/09	3/23/10
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 11/22/09	11/22/11
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 11/21/09	11/21/11
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 11/24/09	11/24/11
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 11/21/09	11/21/11
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 3/30/09	3/30/11
Antenna: Dipole Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/3/09	3/3/12
Antenna: Dipole Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 4/5/09	4/5/12
Hygro-Thermometer	Extech	445703	0602	CAL 1/30/09	1/30/11
Modulation Analyzer	HP	8901A	3435A06868	CAL 5/9/09	5/9/11
Digital Multimeter	Fluke	FLUKE-77-3	79510405	CAL 5/14/09	5/14/11
System One	Audio Precision	System One	SYS1-45868	CHAR 2/27/08	2/27/10
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 4/25/08	4/25/10

TEST PROCEDURE

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 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.

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.

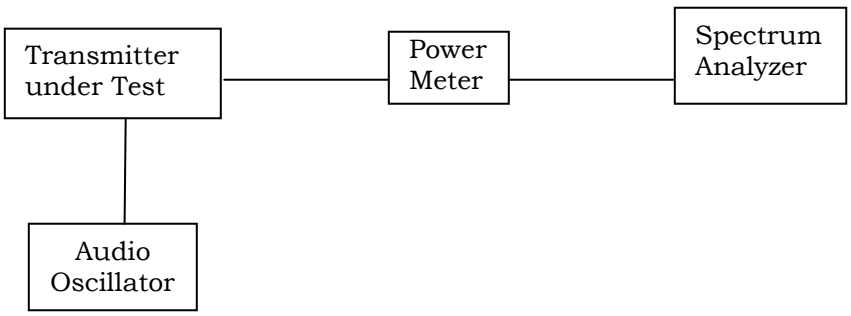
RF POWER OUTPUT

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

Test Requirements:

Method of Measurement: RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal applied voltage, and the transmitter properly adjusted the RF output measures:

Test Setup Diagram:



Test Data:

OUTPUT POWER: HIGH – 125 Watts
LOW - 65 Watts

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

FOR LOW POWER SETTING INPUT POWER: (28V *15A = 420Watts
FOR HIGH POWER SETTING INPUT POWER: (28V * 8A = 224Watts

MODULATION CHARACTERISTICS

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

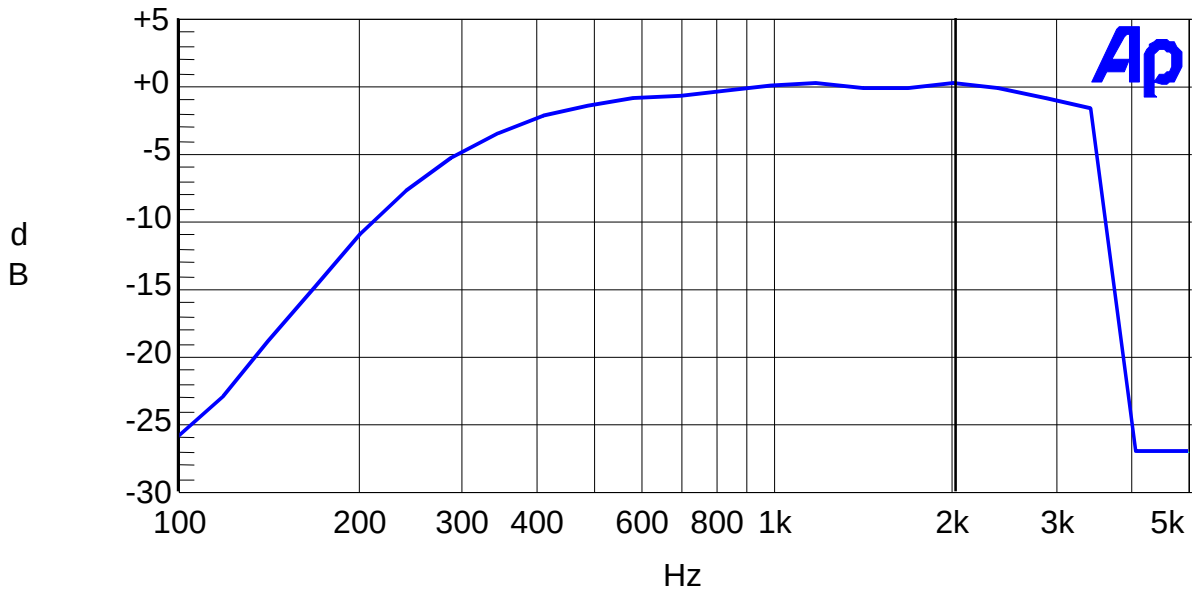
Test Requirements:

Method of Measurement:

Audio frequency response

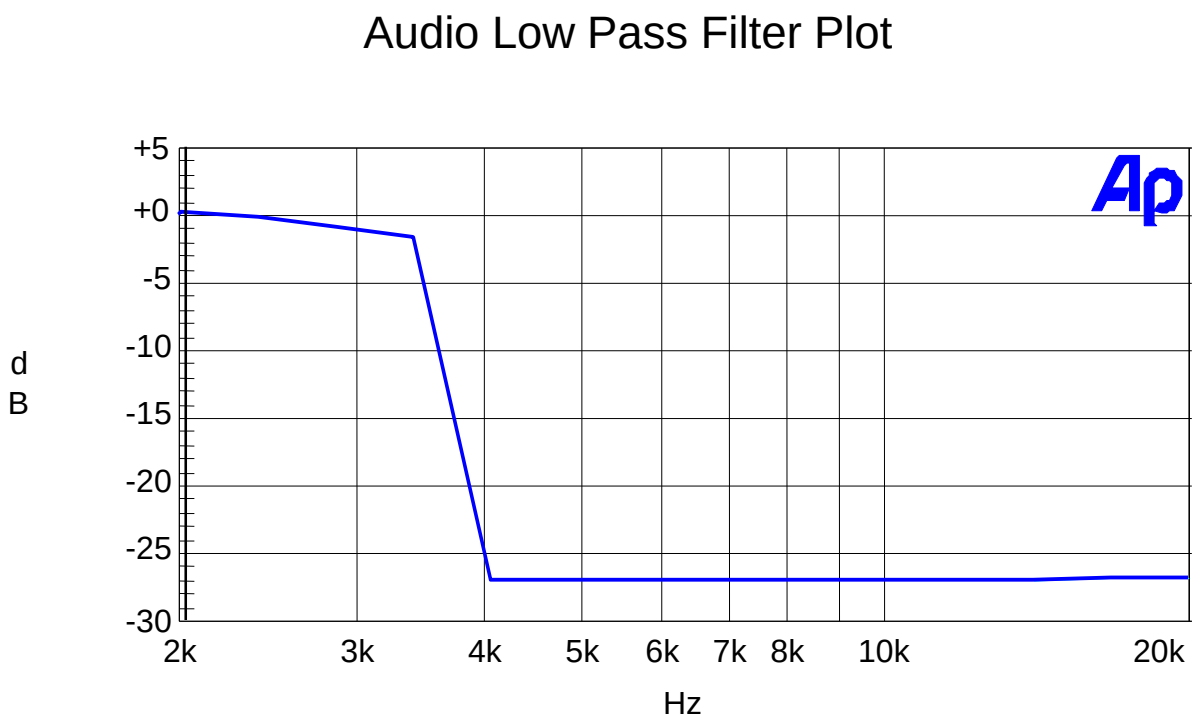
The audio frequency response was measured in accordance with ANSI/TIA 603-C:2004 with no exception. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

Audio Frequency Response Plot



VOICE MODULATED COMMUNICATION EQUIPMENT

Part 2.1047(a) Voice modulated communication equipment: For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.



AUDIO INPUT VERSUS MODULATION

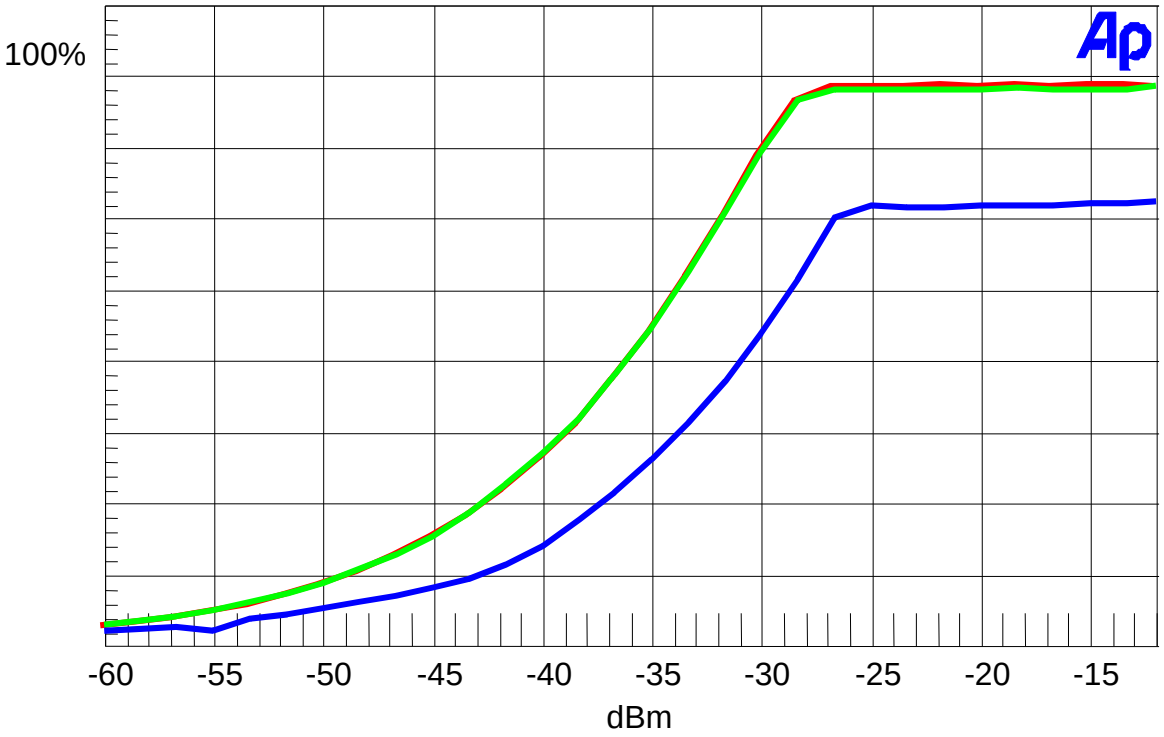
Rule Part No.: Part 2.1047(b) & 90

Test Requirements:

Method of Measurement: **Modulation cannot exceed 100%,** 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.

Test data:

Modulation Limiting Plot
2.5khz Red 1khz Green 300hz Blue



OTHER MODULATION CHARACTERISTICS

Part 2.1033(c)
Part 2.1033(c) (4) Type of Emission: SSB, CW, and AM
Part 90.209

Part 2.1033(c) (4) Type of Emission: 100HA1A
Part 90.209
Part 90.207 Bn = BK

B = 20
K = 5
Bn = 100 Hz

Part 2.1033(c) (4) Type of Emission: 3K00R3E
Part 90.209
Part 90.207 Bn = M

M = 3000

Bn = 3000 Hz

Part 2.1033(c) (4) Type of Emission: 2K70J3E
Part 90.209
Part 90.207 Bn = M-LF

M = 3000-300

Bn = 2700 Hz

Part 2.1033(c) (4) Type of Emission: 170HJ2B
Part 90.209
Part 90.207 Bn = 2M+2DK where M = B/2

B = 50
K=1.2
D = 50
Bn = 2M+2DK = (50) +120 = 170 Hz

OCCUPIED BANDWIDTH

Part 2.1049(c) EMISSION BANDWIDTH:
Part 90.210(b) 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 than10 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(fd2/11)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(Po)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:

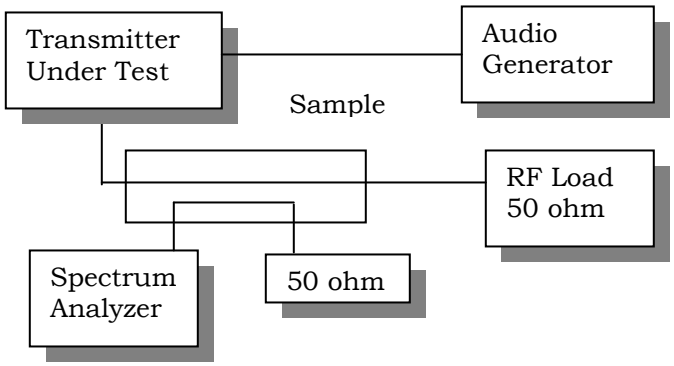
(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 (fd - 2.88 kHz) dB.
(3) On 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 + 10log(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 f0 to 3.0 kHz removed from f0: 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 kHz) or 55 + 10 Log(P) or 65, whichever us the lesser attenuation.
(3) On any frequency removed from the center of the authorized bandwidth by more than 4.6kHz: At least 55 + 10log(P) dB or 65 dB, whichever is the lesser attenuation.

Method of Measurement: ANSI/TIA 603-C:2004

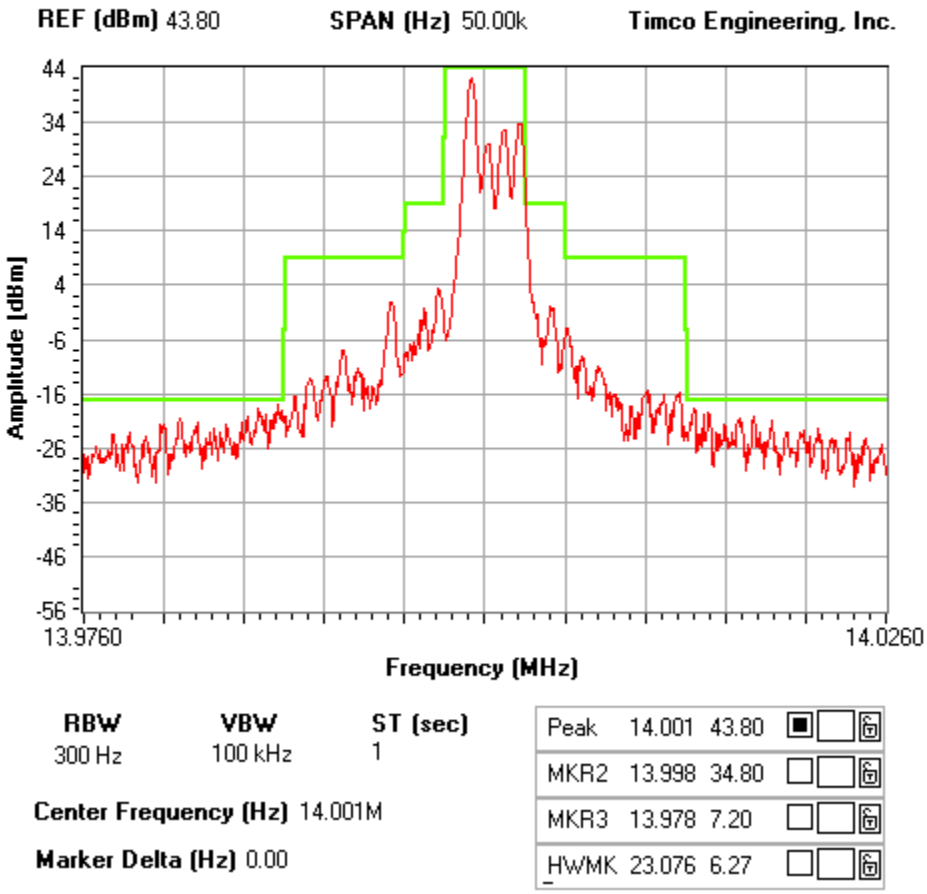
Test Setup Diagram:



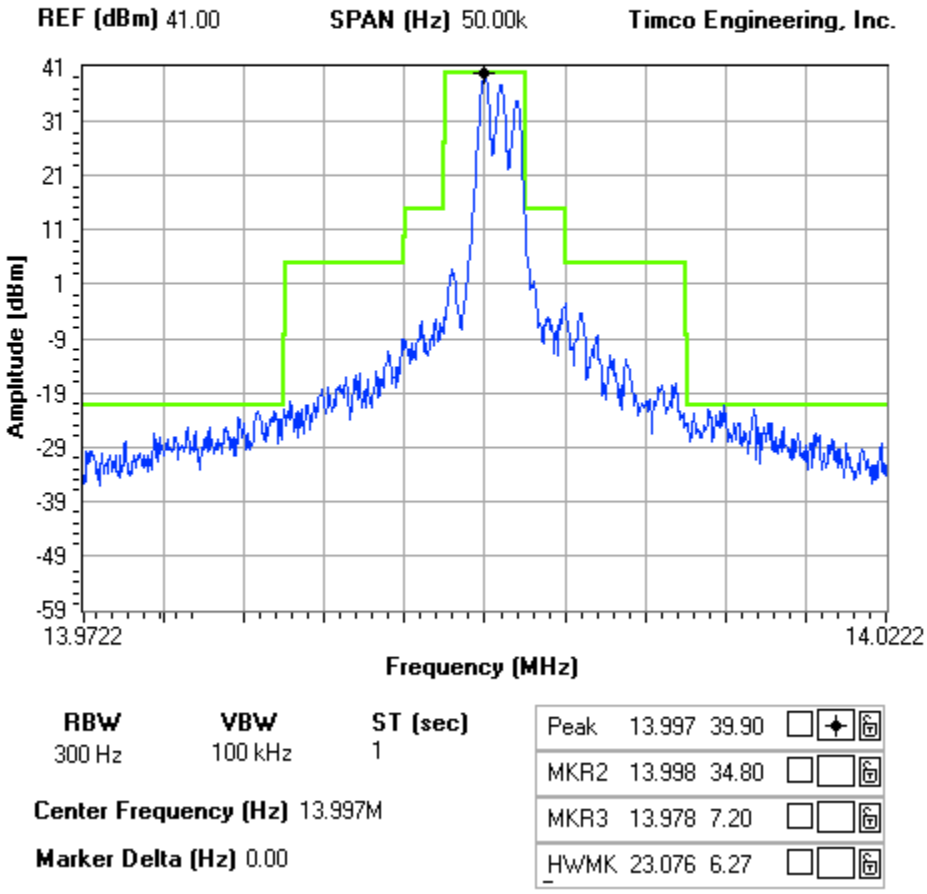
Test Data: See the plots below

OCCUPIED BANDWIDTH PLOTS

NOTES:
OCCUPIED BANDWIDTH -- AM
SUNAIR ELECTRONICS -- FCC ID: XXX R9000

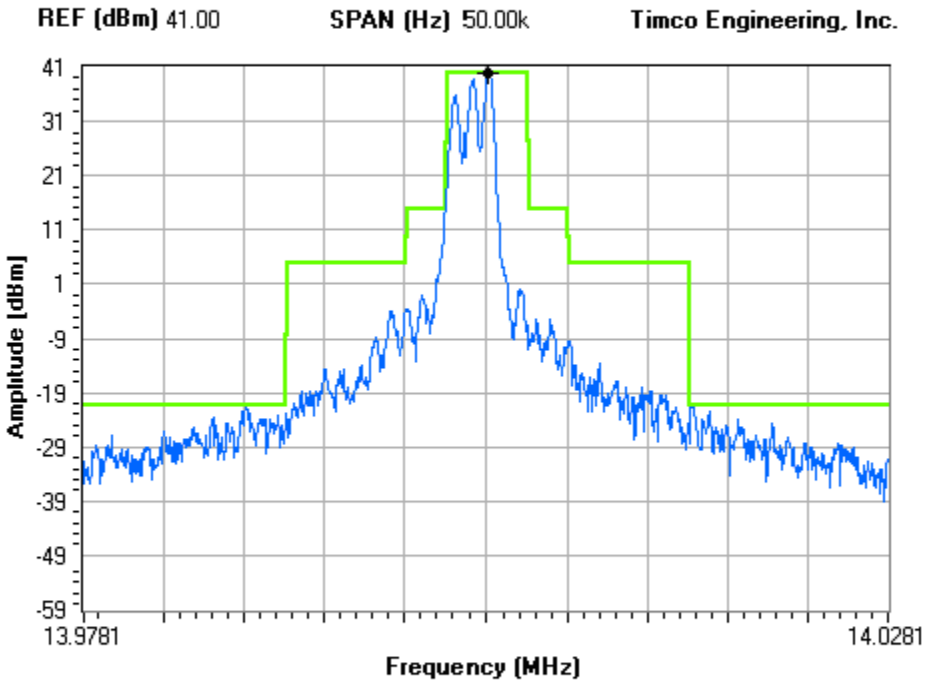


NOTES:
OCCUPIED BANDWIDTH -- LSB
SUNAIR ELECTRONICS -- FCC ID: XXX R9000



NOTES:

OCCUPIED BANDWIDTH -- USB
SUNAIR ELECTRONICS -- FCC ID: XXX R9000



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Requirements: 25kHz Channel Spacing = 64 dBc (for 125Watts)

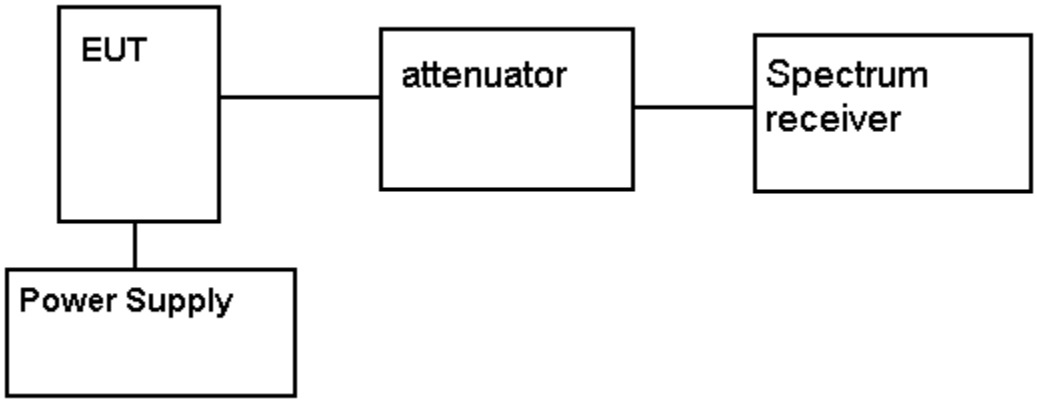
Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard ANSI/TIA 603-C:2004.

Test Data:

TF	EF	dB below carrier		TF	EF	dB below carrier
2.000	2.000	0.0		14.000	14.000	0.0
	4.000	64.5			28.000	68.0
	6.000	72.2			42.000	70.2
	8.000	74.6			56.000	75.1
	10.000	75.4			70.000	76.0
	12.000	75.6			84.000	76.4
	14.000	75.2			98.000	75.7
	16.000	75.3			112.000	76.3
	18.000	75.3			126.000	75.8
	20.000	75.9			140.000	75.9

TF	EF	dB below carrier
29.000	29.000	0.0
	58.000	74.9
	87.000	72.2
	116.000	76.0
	145.000	76.4
	174.000	75.6
	203.000	77.0
	232.000	75.6
	261.000	76.0
	290.000	75.5

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.

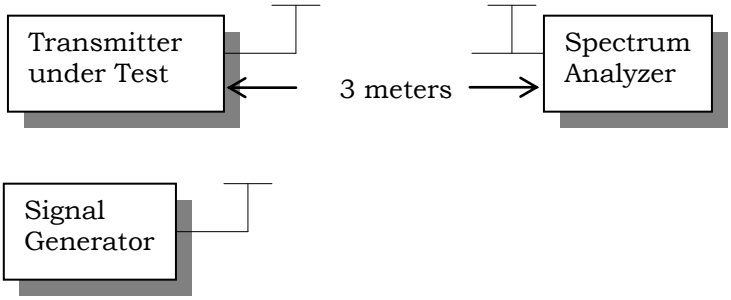
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

Requirements: 43+10LOG(125) = 64 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-C:2004 using the substitution method.

Test Setup Diagram:



Test Data:

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
2.00	0	0
4.00	H	77.47
6.00	H	76.77
8.00	H	88.57
10.00	H	85.57
12.00	H	83.47
14.00	H	85.47
16.00	H	85.67
18.00	H	79.97
20.00	H	86.07

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
14.00	0	0
28.00	H	84.27
42.00	V	116.27
56.00	V	113.56
70.00	V	100.27
84.00	V	111.17
98.00	H	97.07
112.00	H	110.57
126.00	V	111.07
140.00	H	110.47

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
29.00	0	0
58.00	V	115.06
87.00	V	107.37
116.00	V	92.17
145.00	V	99.97
174.00	V	99.07
203.00	V	83.87
232.00	H	101.47
261.00	H	97.17
290.00	V	89.97

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 90.213

Requirements: Temperature range requirements: -30 to +50° C.
±2.5 PPM

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

Test Data:

Assigned Frequency (Ref. Frequency) (MHz)		**14.000813**	
Temperature (°C)	**Frequency (MHz)**	**Frequency Stability (PPM)**	**Frequency Stability (Hz)**
-30°C	14.000820	0.50	7
-20°C	14.000823	0.71	10
-10°C	14.000822	0.64	9
-0°C	14.000819	0.43	6
10°C	14.000814	0.07	1
20°C	14.000813	0.00	0
30°C	14.000817	0.29	4
40°C	14.000815	0.14	2
50°C	14.000812	-0.07	-1

TEST SETUP PHOTO