1601 North A.W. Grimes Blvd., Suite B
Round Rock, TX 78665
e-mail: info@ptitest.com
(512) 244-3371 Fax: (512) 244-1846

October 14, 2011

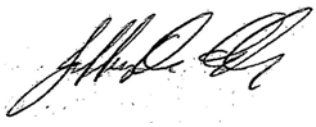
Behlul Poonawalla
FreeFlight Systems
3700 Interstate 35 South
Waco, Texas 76706

Dear Behlul:

Enclosed is the Wireless Test Report for the FDL-978-TX Transmitter by FreeFlight Systems. This report can be used to demonstrate compliance with FCC requirements for wireless devices in the United States.

If you have any questions, please contact me.

Sincerely,



Jeffrey A. Lenk
President

Enclosure

Project 12679-10

FreeFlight Systems
FDL-978-TX Transmitter

Wireless Certification Report

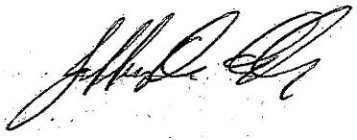
Prepared for:
FreeFlight Systems
3700 Interstate 35 South
Waco, Texas 76706

By

Professional Testing (EMI), Inc.
1601 N. A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

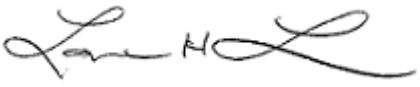
September 20, 2011
Revised October 14, 2011

Reviewed by



Jeffrey A. Lenk
President

Written by



Layne Lueckemeyer
Product Development Engineer

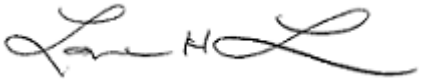
Table of Contents

Certificate of Compliance

Applicant:	FreeFlight Systems
Applicant's Address:	3700 Interstate 35 South Waco, Texas 76706
FCC ID:	T7YFDL978XXXX
Emission Designator	1M26F1D
Project Number:	12679-10
Test Dates:	June 17, 22, October 13, 14, 2011

The **FreeFlight Systems FDL-978-TX Transmitter** was tested to and found to be in compliance with FCC 47 CFR Part 87.

I, Layne Lueckemeyer, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.



Layne Lueckemeyer
Product Development Engineer

This report has been reviewed and accepted by FreeFlight Systems. The undersigned is responsible for ensuring that this device will continue to comply with the FCC rules.

_____
Representative of FreeFlight Systems

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States.

Professional Testing (EMI), Inc. (PTI), follows the guidelines of NIST for all uncertainty calculations, estimates, and expressions thereof for EMC testing. The procedure of ANSI C63.4: 2009 were utilized for making all emissions measurements.

1.2 EUT Description

The FDL-978-TX is designed to share aircraft position, velocity, and other flight data with other aircraft and ground station equipment. The FDL-978-TX satisfies the TSO-C154c requirements and the RTCA/DO-282B MOPS for UAT ADS-B class B1/B1S equipment. The FDL-978-TX collects position, velocity, and other aircraft information from an aircraft GPS, pressure altitude sensor, and pilot interface controller and transmits this data out once per second.

The GPS data, pressure altitude data, and pilot control inputs are received by the FDL-978-TX through configurable RS-232/422/485 serial, ARINC 429 serial, and/or discrete interfaces. Status information about the FDL-978-TX health and state are output on the configured serial links and/or discrete signals for display to the pilot. The EUT was tested while in a continuous transmit mode. The EUT was tuned to the transmit frequency 978 MHz to perform power, occupied bandwidth, spurious and harmonic tests, and frequency stability tests. The EUT continuously transmitted at maximum power. The system tested consisted of the following:

Manufacturer	Model	FCC ID Number
FreeFlight Systems	FDL-978-TX Transmitter	T7YFDL978XXXX

The following rules apply to the operation of the EUT:

Guidelines	Paragraph No.	Required	Result
RF Power Output	2.1046 / 87.131	Y	Pass
Modulation Characteristics	2.1047	Y	Pass
Occupied Bandwidth	2.1049(c) / 87.135	Y	Pass
Spurious Emissions at Antenna Terminals	2.1051 / 87.139 (l)	Y	Pass
Field Strength of Spurious Emissions	2.1053 / 87.139	Y	Pass
Frequency Stability	2.1055 / 87.133 / 87.147	Y	Pass

1.3 Modifications

No modifications were made to the EUT during the performance of the test program.

1.4 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. This site is registered with the FCC under Section 2.948 and Industry Canada per RS-212, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas, 78758, while the main office is located at 1601 N. A.W. Grimes Blvd., Suite B, Round Rock, Texas, 78665.

1.5 Applicable Documents

Document	Title	Release
TIA/EIA 603D	Land Mobile FM or PM Communications Equipment, Measurement and Performance Standards	2010
47 CFR	Part 87 – Aviation Services	

2.0 RF Power Output Measurements

RF power output measurements were made on the selected fundamental transmit frequency of the EUT.

2.1 Test Procedure

The output of the EUT was connected directly to an attenuator and then to the measuring receiver. And either a peak or quasi-peak detector was used for the measurement, as indicated on the report. The detector selection was based on how closely the emission level approached the limit.

The transmitter was switched on, and the measurement receiver was tuned to the frequency of the transmitter under test.

If necessary, the input attenuator setting of the measuring receiver was adjusted in order to increase the sensitivity of the measuring receiver. A diagram showing the test setup is given as Figure 2.1.1.

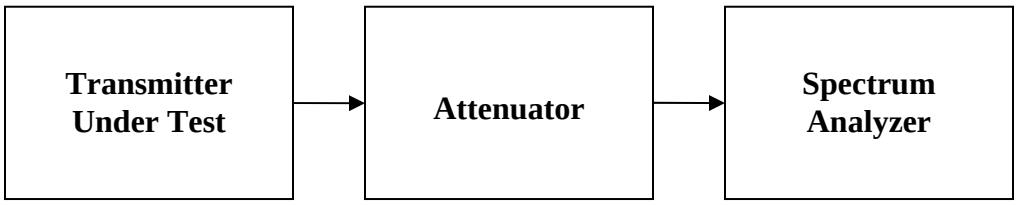


Figure 2.1.1: RF Power Output Test Setup

2.2 Test Criteria

The specifications of CFR47 Paragraph 2.1046(a) and applicable Parts of 2 and 87.131 are met. There are no deviations to the specifications.

2.3 Test Results

RF Power Output measurements for the EUT were taken on June 17, 2011, and the EUT was found to be in compliance with applicable requirements.

Table 2.3.1: RF Power Output Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0856	Narda	702-60	Attenuator, Step, 60dB, DC-12.4GHz	CBU
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer Display (high band)	December 22, 2012
XXXX	Pasternack	LLS	1 section	CBU

Table 2.3.3: RF Power Output Test Results

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	87.131	N/A	Conducted	1 MHz	1 MHz	Peak
COMMENT	Transmitting						

RF Power Output

Frequency Measured (MHz)	Measured Power (dBm)	Measured Power (W)
978	45.97	39.54

Note: E.R.P(dBm) = RF Power Output (dBm) + Path Loss (dB)

3.0 Occupied Bandwidth

Occupied bandwidth measurements were performed on the EUT to determine compliance with FCC 87.135 and FCC 2.1049.

3.1 Test Procedure

The output of the EUT was connected directly to an attenuator and then to the measuring receiver. The transmitter was switched on, and the measurement receiver was tuned to the frequency of the transmitter under test. If necessary, the input attenuator setting of the measuring receiver was adjusted in order to increase the sensitivity of the measuring receiver. A diagram showing the test setup is given as Figure 3.1.1.

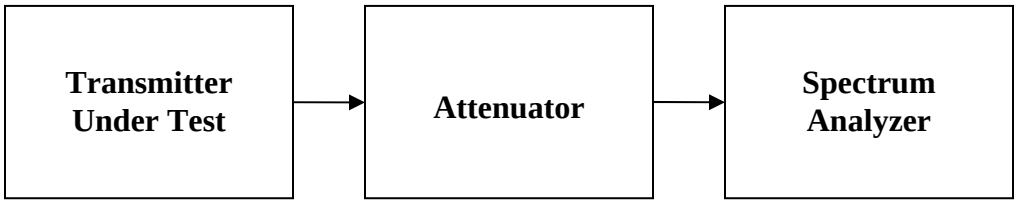


Figure 3.1.1: Occupied Bandwidth Test Setup

3.2 Test Criteria

According to FCC CFR 47 Part 87, Section 87.135, the necessary bandwidth for a given class of emission is the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

3.3 Test Results

Occupied bandwidth measurements were taken on October 14, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Table 3.3.1.

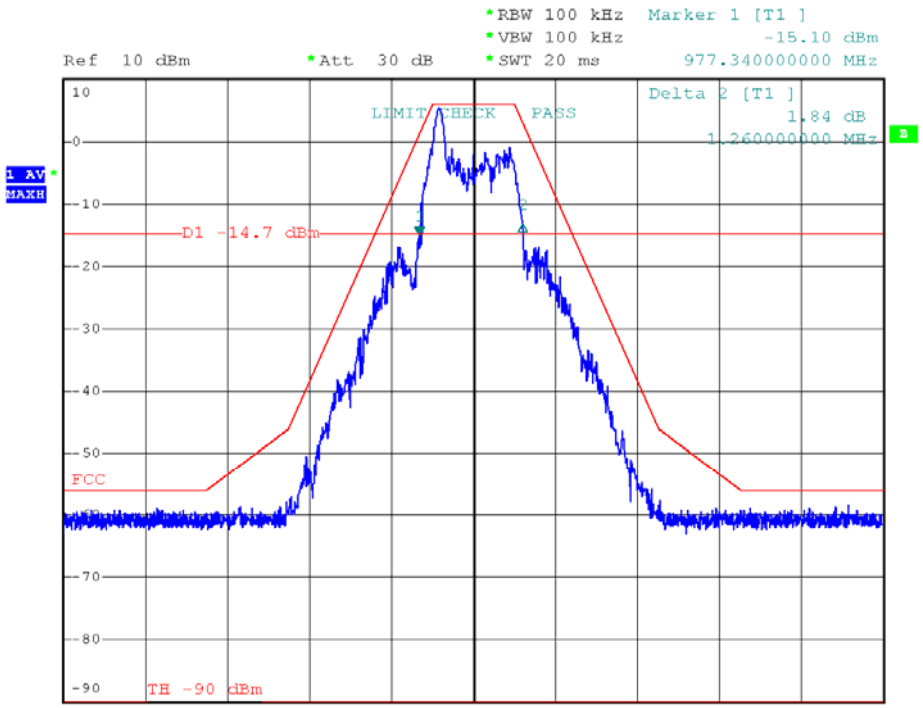
Table 3.3.1: Occupied Bandwidth Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0856	Narda	702-60	Attenuator, Step, 60dB, DC-12.4GHz	CBU
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer Display (high band)	December 22, 2012
XXXX	Pasternack	LLS	1 section	CBU

Table 3.3.2: Occupied Bandwidth Test Results, Data Sheet 1

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	October 14, 2011	87.135	N/A	Direct	100 kHz	100 kHz	Peak
COMMENT	Transmitting 20 dB Bandwidth – 1.26 MHz						

20 dB



162.025 MHz

Date: 14.OCT.2011 13:19:04

Result = Pass

4.0 Spurious Emissions at Antenna Terminals

Spurious emissions at antenna terminals measurements were performed on the EUT to determine compliance with FCC 87.139 and FCC 2.1051.

4.1 Test Procedure

The output of the EUT was connected directly to an attenuator and then to the measuring receiver. The transmitter was switched on, and the measurement receiver was tuned to the frequency of the transmitter under test. If necessary, the input attenuator setting of the measuring receiver was adjusted in order to increase the sensitivity of the measuring receiver. A diagram showing the test setup is given as Figure 4.1.1.

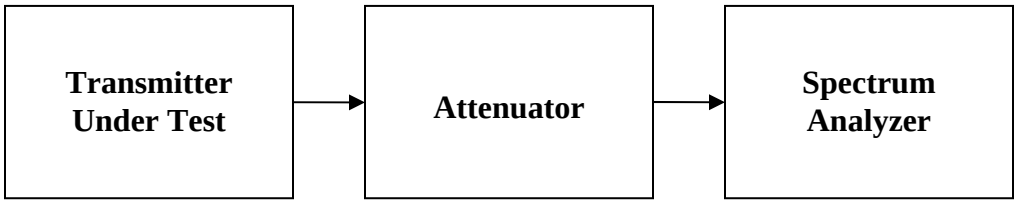


Figure 4.1.1: Spurious Emissions at Antenna Terminals Test Setup

4.2 Test Criteria

According to CFR 47 section 87.139, Universal Access Transceiver transmitters with an output power of 5 Watts or more must limit their emissions by at least 43 + 10 log (P) dB on any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth. Those emissions shall be measured with a bandwidth of 100 kHz. P in the above equation is the average transmitter power measured within the occupied bandwidth in Watts.

4.3 Test Results

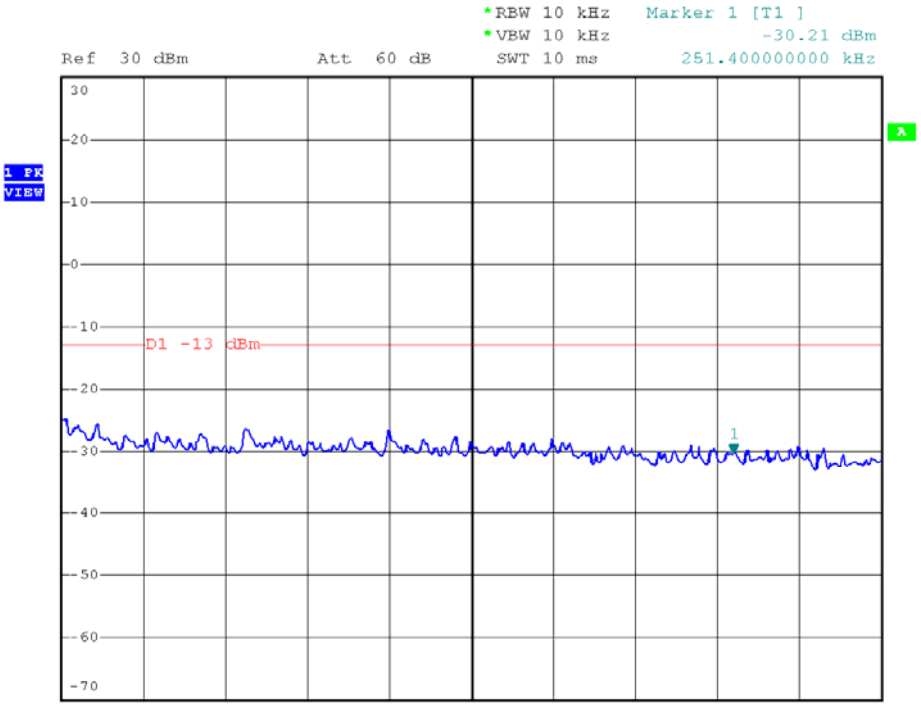
Spurious emissions at the antenna terminals were taken on June 22, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Table 4.3.1.

Table 4.3.1: Spurious Emissions at Antenna Terminals Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0856	Narda	702-60	Attenuator, Step, 60dB, DC-12.4GHz	CBU
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer Display (high band)	December 22, 2012
XXXX	Pasternack	LLS	1 section	CBU

Table 4.3.2: Spurious Emissions at Antenna Terminals Test Results, Data Sheet 1

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 22, 2011	87.139	N/A	Direct	10 kHz	10 kHz	Peak
COMMENT	Transmitting (Span: 30 kHz to 300 kHz)						



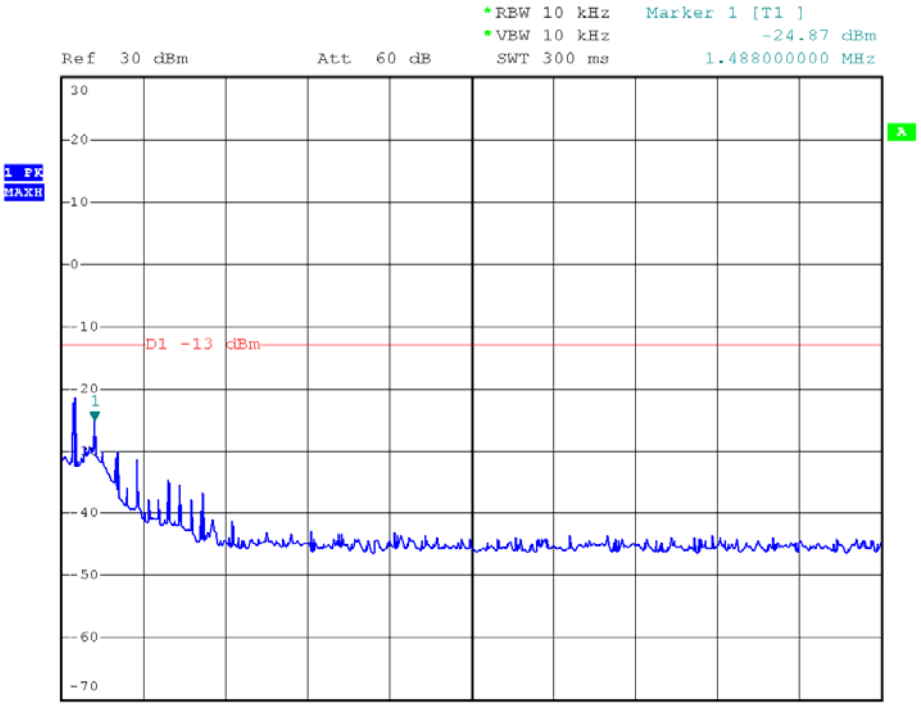
162.025 MHz

Date: 22.JUN.2011 16:03:56

Limit calculation explanations:
Maximum Transmitter Power (P) 45.97 dBm
Required attenuation 43 + 10log (P) (39.54) = 58.97 dB
Emission Limits P – [43 + 10log (P) (39.54)] = –13 dBm

Table 4.3.3: Spurious Emissions at Antenna Terminals Test Results, Data Sheet 2

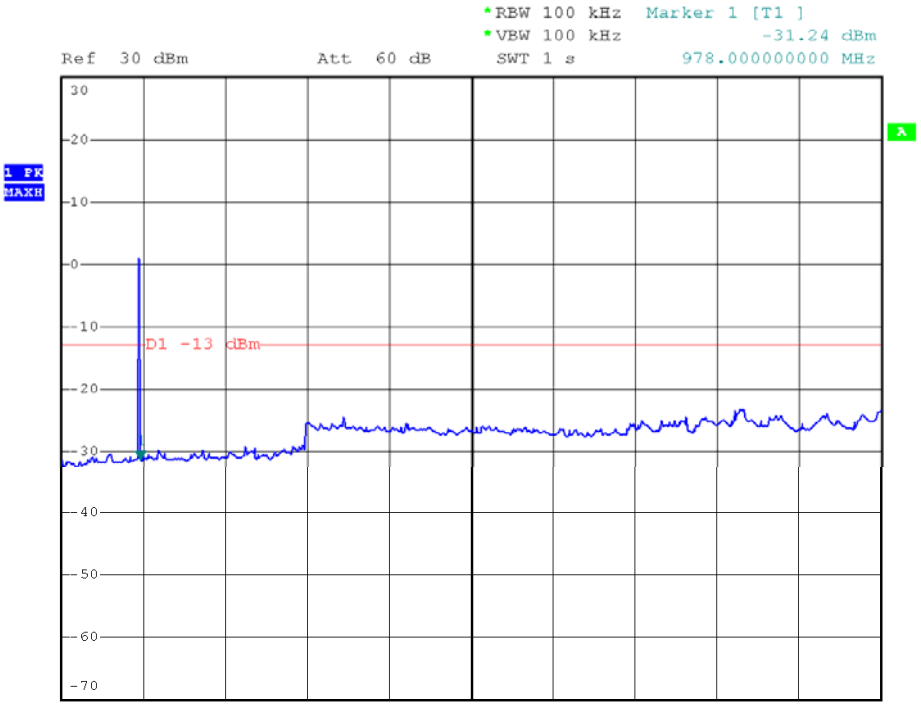
Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 22, 2011	87.139	N/A	Direct	10 kHz	10 kHz	Peak
COMMENT	Transmitting (Span: 300 kHz to 30 MHz)						



Limit calculation explanations:
Maximum Transmitter Power (P) 45.97 dBm
Required attenuation 43 + 10log (P) (39.54) = 58.97 dB
Emission Limits P – [43 + 10log (P) (39.54)] = –13 dBm

Table 4.3.4: Spurious Emissions at Antenna Terminals Test Results, Data Sheet 3

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 22, 2011	87.139	N/A	Direct	100 kHz	100 kHz	Peak
COMMENT	Transmitting (Span: 30 MHz to 10 GHz)						



162.025 MHz

Date: 22.JUN.2011 17:26:33

Limit calculation explanations:
Maximum Transmitter Power (P) 45.97 dBm
Required attenuation 43 + 10log (P) (39.54) = 58.97 dB
Emission Limits P – [43 + 10log (P) (39.54)] = –13 dBm

5.0 Field Strength of Spurious Emissions

Out of band spurious/harmonic emissions measurements were performed on the EUT to determine compliance to FCC sections 2.1053, 15.109, and 87.139.

5.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a rotating turntable at a distance of 10 meters from the measurement antenna.

For spurious emissions below 1 GHz, quasi-peak detection was used with a resolution bandwidth of 120 kHz. All measurements below 1 GHz were normalized to 3 meters using a 20 dB/decade distance extrapolation. The emissions were maximized by rotating the EUT and raising and lowering the measurement antenna from 1 to 4 meters.

Spurious/harmonic emissions above 1 GHz peak were measured with average and peak detection with a resolution bandwidth of 1 MHz and measured at a distance of 1 meter. Average detection was used to determine compliance of the EUT if the peak did not meet the average limit. Non-harmonic emissions must satisfy the average limit and the peak limit (20 dB above average). A diagram showing the test setup is given as Figure 5.1.1. Above 1 GHz, testing was completed at the transmit frequency to determine compliance.

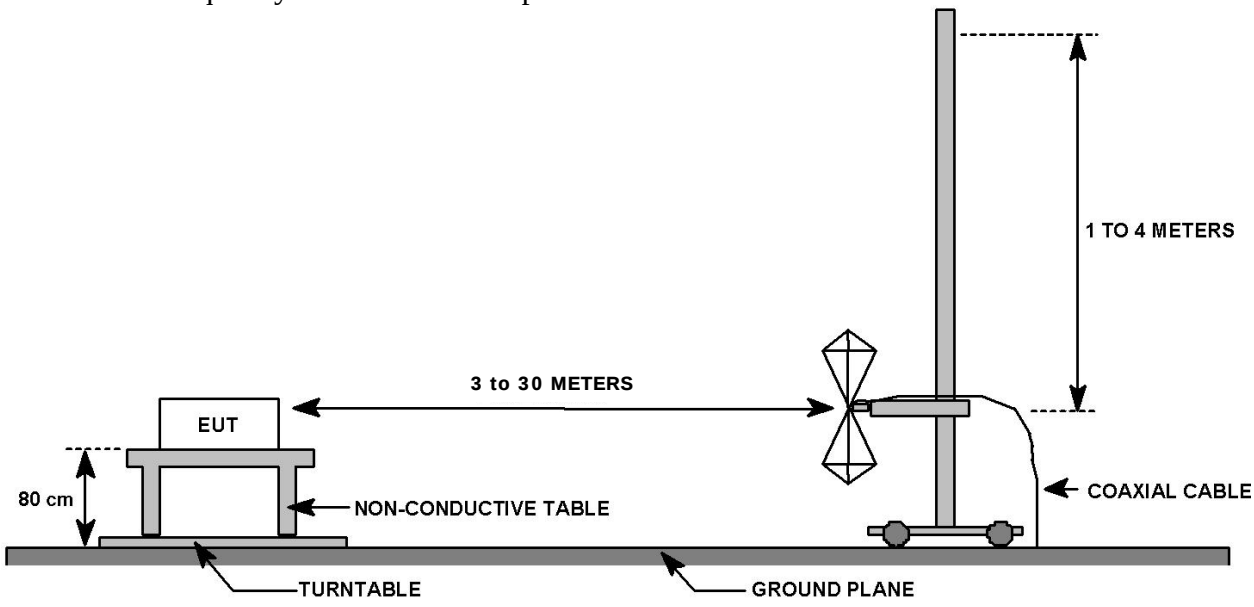


Figure 5.1.1: Radiated Emission Test Setup

5.2 Test Criteria

The radiated limits of FCC 15.209 are shown below. The limits specified are at 3 meters. The limits are quasi-peak for emissions below 1 GHz and average for emissions above 1 GHz. Also above 1 GHz, the peak limit is 20 dB above the average limit.

Frequency MHz	Specification Distance (Meters)	Field Strength (dBuV/m)	Test Distance (Meters)	Field Strength (dBuV/m)
30 to 88	3	40.0	10	29.5
88 to 216	3	43.5	10	33
216 to 960	3	46.0	10	35.5
Above 960	3	54.0	1	63.5

5.3 Test Results

Out of band spurious emissions measurements were taken on June 17, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Table 5.3.1.

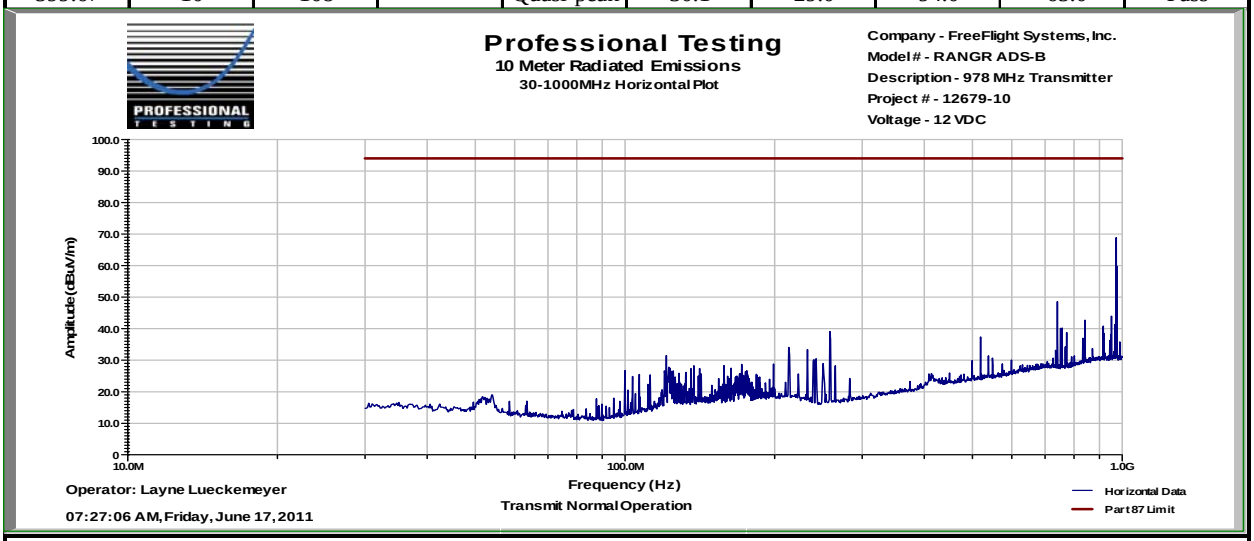
Table 5.3.1: Field Strength of Spurious Emissions Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	8/10/2011
85	HP	85650A	Quasi-Peak Adapter CISPR	7/28/2011
0949	HP	85662A	Spec Anal Dsply for AN	N/A
1525	HP	8566B	Spectrum Analyzer 100Hz-22GHz	6/7/2012
238	HP	85685A	RF Preselector	7/27/2011
1497	EMCO	3108	Antenna, Bi Con, 30-300MHz	8/4/2011
1278	HP	85650A	Quasi Peak Adapter	7/28/2011
1834	HP	85662A	Spec Anal Dsply	N/A
1145	HP	8568B	Spectrum Analyzer 100Hz-1.5GHz	7/28/2011
1035	HP	85685A	RF Preselector	4/13/2012
1486	EMCO	3147	Antenna, Log Periodic, .2-5GHz	8/4/2011
1497	EMCO	3108	Antenna, Bi Con, 30-300MHz	8/4/2011
C026	N/A	RG214	Cable Coax, N-N, 25m	8/10/2011
C027	N/A	RG214	Cable Coax, N-N, 25m	8/10/2011
1414	HP	8447D	Preamp	7/15/2011
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	4/7/2012
1594	Miteq	AFS4-01001800	Amplifier, 1-26.5GHz, 42dB	1/28/2012
1529	Miteq	AFS4-01001800	Amplifier, 1-26.5GHz, 36dB	7/16/2011
C030	N/A	0	Cable Coax, N-N, 30m	3/21/2012
1780	ETS-Lindgren	3117	Antenna, DRG Horn, 1 - 18 GHz	1/14/2012
948	EMCO	3301B	Antenna, Rod, Active, 30Hz-50MHz	9/15/2011

Table 5.3.2: Field Strength of Spurious Emissions Test Results, 30 MHz to 1 GHz, Horizontal Polarization

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	87.139	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak
COMMENT	Transmitting						

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
54.72	10	50	4	Quasi-peak	29.3	14.5	94.0	-79.5	Pass
100.031	10	99	4	Quasi-peak	41.9	26.7	94.0	-67.3	Pass
123.57	10	197	4	Quasi-peak	37.5	25.2	94.0	-68.8	Pass
500.035	10	336	4	Quasi-peak	28.5	25.2	94.0	-68.8	Pass
520.042	10	210	4	Quasi-peak	32.8	29.9	94.0	-64.1	Pass
599.67	10	108	4	Quasi-peak	30.1	29.0	94.0	-65.0	Pass



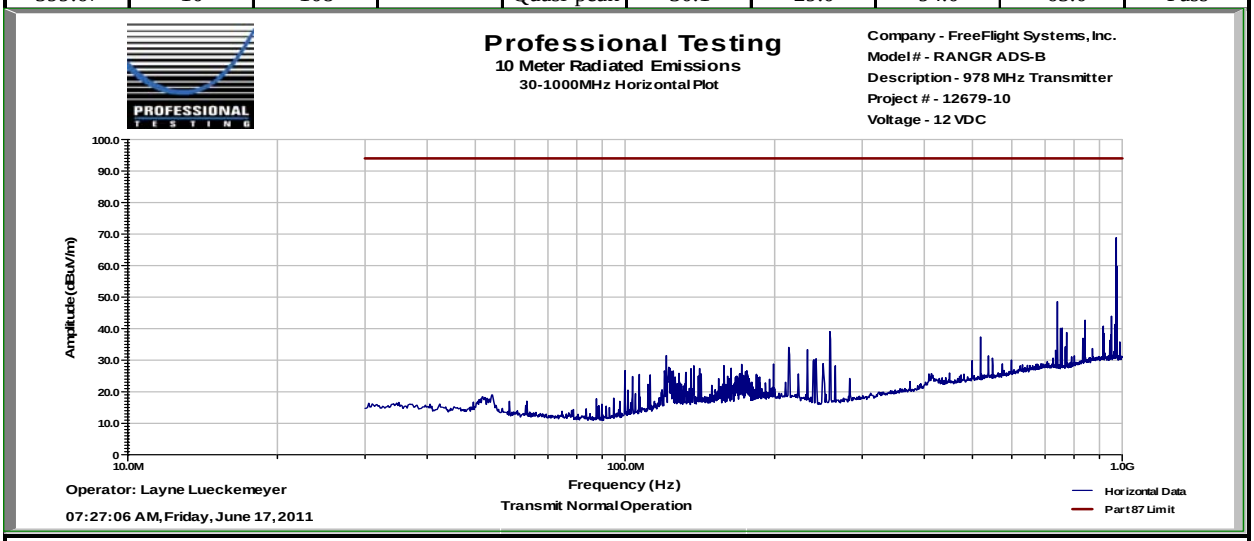
30MHz to 1GHz, Horizontal Polarity

Result = Pass

Table 5.3.3: Field Strength of Spurious Emissions Test Results, 30 MHz to 1 GHz, Vertical Polarization

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	87.139	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak
COMMENT	Transmitting						

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
54.72	10	50	4	Quasi-peak	29.3	14.5	94.0	-79.5	Pass
100.031	10	99	4	Quasi-peak	41.9	26.7	94.0	-67.3	Pass
123.57	10	197	4	Quasi-peak	37.5	25.2	94.0	-68.8	Pass
500.035	10	336	4	Quasi-peak	28.5	25.2	94.0	-68.8	Pass
520.042	10	210	4	Quasi-peak	32.8	29.9	94.0	-64.1	Pass
599.67	10	108	4	Quasi-peak	30.1	29.0	94.0	-65.0	Pass



30MHz to 1GHz, Horizontal Polarity

Result = Pass

Table 5.3.4: Field Strength of Spurious Emissions Test Results, 1 GHz to 10 GHz, Horizontal Polarization

Project #	Date	Rule	Distance	Antenna	RBW	VBW
12679-10	October 13, 2011	87.139	3 m	Horn	1 MHz	1 MHz
COMMENT	Transmitting					

Frequency Measured (MHz)	Meter Reading (dBm)	Substitution Level (dBm)	Substitution Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1956	-71.7	-55.9	6.2	-49.7	-13.0	-36.7
2934	-84.3	-46.1	7.1	-39.0	-13.0	-26.0
3912	-84.7	-40.5	8.0	-32.5	-13.0	-19.5
4890	-83.2	-36.6	9.1	-27.5	-13.0	-14.5
5868	-77.1	-39.6	8.4	-31.2	-13.0	-18.2
6846	-82.9	-35.9	9.6	-26.3	-13.0	-13.3
7827	-81.2	-37.4	9.0	-28.4	-13.0	-15.4
8802	-80.3	-34.8	9.6	-25.2	-13.0	-12.2
9780	-81.8	-33.2	9.8	-23.4	-13.0	-10.4

Result = Pass

Table 5.3.5: Field Strength of Spurious Emissions Test Results, 1 GHz to 10 GHz, Vertical Polarization

Project #	Date	Rule	Distance	Antenna	RBW	VBW
12679-10	October 13, 2011	87.139	3 m	Horn	1 MHz	1 MHz
COMMENT	Transmitting					

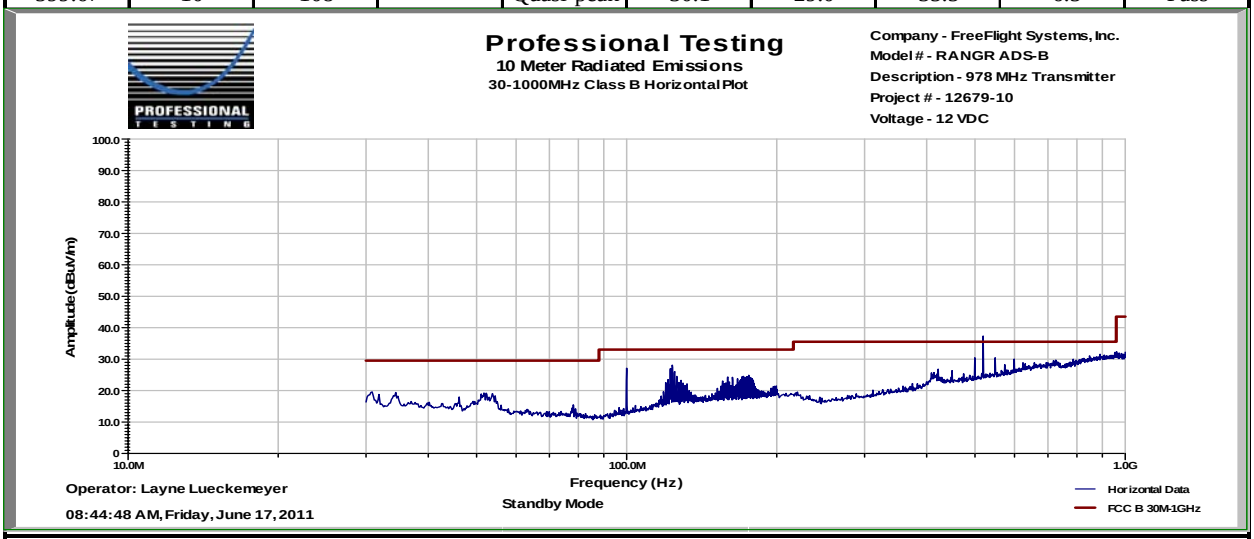
Frequency Measured (MHz)	Meter Reading (dBm)	Substitution Level (dBm)	Substitution Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1956	-82.4	-53.5	6.2	-47.3	-13.0	-34.3
2934	-84.3	-49.4	7.1	-42.3	-13.0	-29.3
3912	-84.7	-49.1	8.0	-41.1	-13.0	-28.1
4890	-83.2	-36.6	9.1	-27.5	-13.0	-14.5
5868	-77.9	-39.6	8.4	-31.2	-13.0	-18.2
6846	-82.7	-38.9	9.6	-29.3	-13.0	-16.3
7827	-81.5	-38.6	9.0	-29.6	-13.0	-16.6
8802	-81.1	-33.6	9.6	-24.0	-13.0	-11.0
9780	-81.8	-33.2	9.8	-23.4	-13.0	-10.4

Result = Pass

Table 5.3.6: Field Strength of Spurious Emissions Test Results, 30 MHz to 1 GHz, Horizontal Polarization

Project #	Date	Class	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	FCC B	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi-Peak
COMMENT	Standby Mode						

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
54.72	10	50	4	Quasi-peak	29.3	14.5	29.5	-15.0	Pass
100.031	10	99	4	Quasi-peak	41.9	26.7	33.0	-6.3	Pass
123.57	10	197	4	Quasi-peak	37.5	25.2	33.0	-7.8	Pass
500.035	10	336	4	Quasi-peak	28.5	25.2	35.5	-10.3	Pass
520.042	10	210	4	Quasi-peak	32.8	29.9	35.5	-5.6	Pass
599.67	10	108	4	Quasi-peak	30.1	29.0	35.5	-6.5	Pass



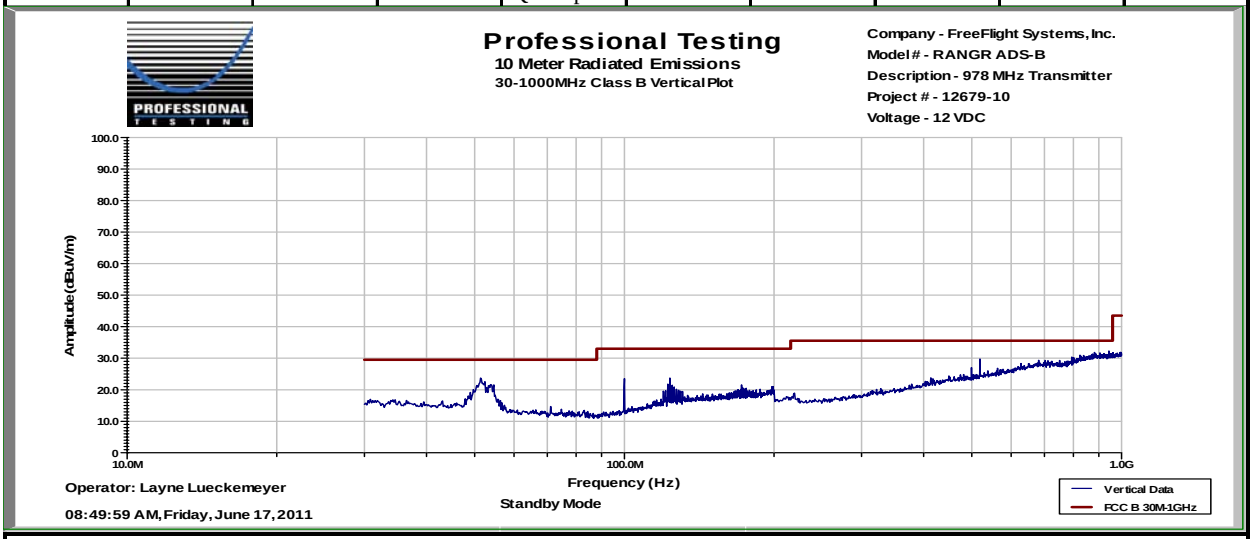
30MHz to 1GHz, Horizontal Polarity

Result = Pass

Table 5.3.7: Field Strength of Spurious Emissions Test Results, 30 MHz to 1 GHz, Vertical Polarization

Project #	Date	Class	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	FCC B	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak
COMMENT	Standby Mode						

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
54.72	10	239	1	Quasi-peak	31.9	17.1	29.5	-12.4	Pass
100.031	10	152	1.5	Quasi-peak	37.9	22.7	33.0	-10.3	Pass
123.57	10	214	1.3	Quasi-peak	30.6	18.3	33.0	-14.7	Pass
500.035	10	35	2.6	Quasi-peak	28.5	25.2	35.6	-10.4	Pass
520.042	10	146	1	Quasi-peak	32.9	30.0	35.6	-5.6	Pass
599.67	10	91	1	Quasi-peak	29.8	28.7	35.6	-6.9	Pass



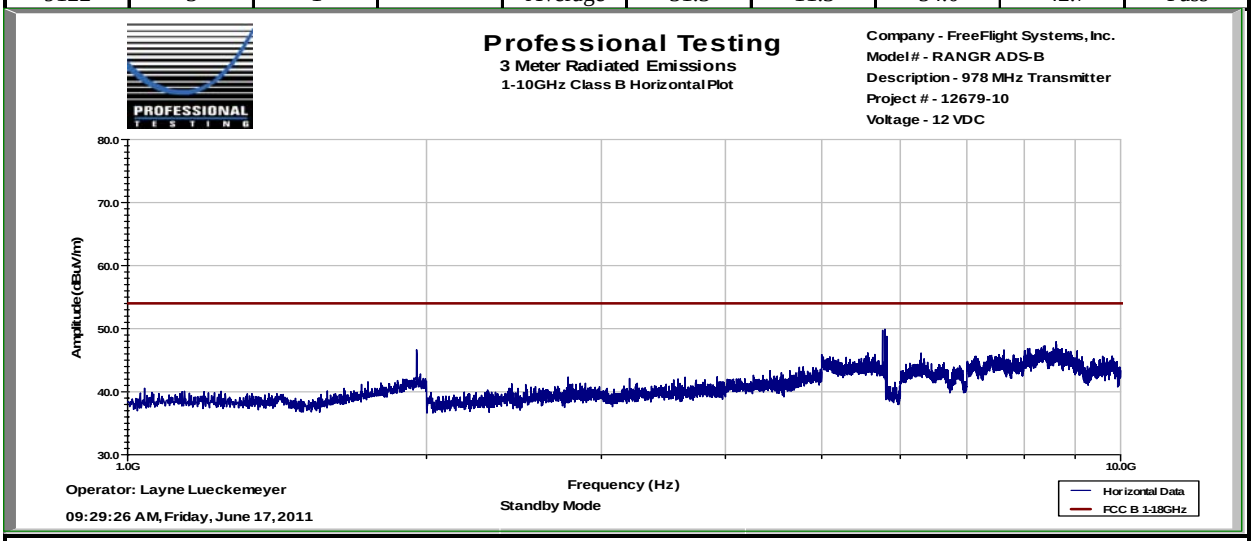
30MHz to 1GHz, Vertical Polarity

Result = Pass

Table 5.3.8: Field Strength of Spurious Emissions Test Results, 1 GHz to 10 GHz, Horizontal Polarization

Project #	Date	Class	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	FCC B	3 m	Horn	1 MHz	1 MHz	Average
COMMENT	Standby Mode						

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
1997	3	1	1	Average	48.9	15.6	54.0	-38.4	Pass
4376	3	1	1	Average	45.1	16.9	54.0	-37.1	Pass
5995	3	1	1	Average	50.1	23.9	54.0	-30.1	Pass
7184	3	1	1	Average	47.3	23.4	54.0	-30.6	Pass
8018	3	1	1	Average	40.4	18.0	54.0	-36.0	Pass
9122	3	1	1	Average	31.3	11.3	54.0	-42.7	Pass



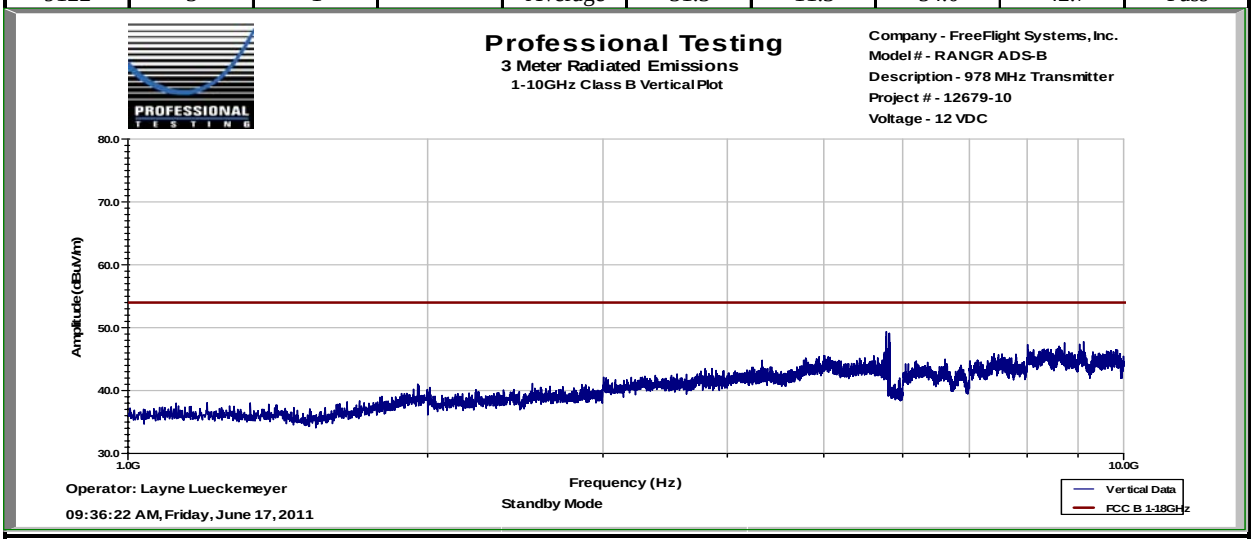
1GHz to 10GHz, Horizontal Polarity

Result = Pass

Table 5.3.9: Field Strength of Spurious Emissions Test Results, 1 GHz to 10 GHz, Vertical Polarization

Project #	Date	Class	Distance	Antenna	RBW	VBW	Detector
12679-10	June 17, 2011	FCC B	3 m	Horn	1 MHz	1 MHz	Average
COMMENT	Standby Mode						

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
2067	3	1	1	Average	46.3	13.2	54.0	-40.8	Pass
4376	3	1	1	Average	45.1	16.9	54.0	-37.1	Pass
5995	3	1	1	Average	48.9	22.7	54.0	-31.3	Pass
7184	3	1	1	Average	47.3	23.4	54.0	-30.6	Pass
8018	3	1	1	Average	40.4	18.0	54.0	-36.0	Pass
9122	3	1	1	Average	31.3	11.3	54.0	-42.7	Pass



1GHz to 10GHz, Vertical Polarity

Result = Pass

6.0 Frequency Stability

Frequency stability measurements were performed on the EUT to determine compliance to FCC sections 87.133, 87.147, and 2.1055.

6.1 Test Procedure

The temperature stability of the frequency-generating components of the transmitter were observed. The transmitter was placed in a temperature chamber with a programming coil that enables a transmission to be requested from outside the chamber. A receiving antenna outside the chamber picked up the transmitted signal, which was fed to the spectrum analyzer. With the transmitter programmed to transmit at 978 MHz, the chamber temperature was set to 20° C.

After reaching the set temperature, the transmitter was allowed to stabilize. The transmitted signal was captured by the spectrum analyzer, and the frequency was determined. The temperature in the chamber was then increased to 30° C. At each temperature, at least 20 minutes were allowed for stabilization of the transmitter, a transmission was made, and the frequency determined.

The temperature was increased in 10° C intervals to +50° C. The temperature was then returned to 20° C, stabilized, and then decreased to -30° C in 10° intervals. The temperature was stabilized at each 10° interval before a reading was made. The frequency at each temperature was recorded, compared to the 978 MHz tuned frequency, and recorded in Table 6.3.1. As evidenced by the data in the table, all readings are within the deviation limit of ±2.5 ppm at 978 MHz.

A diagram showing the test setup is shown in Figure 6.1.1

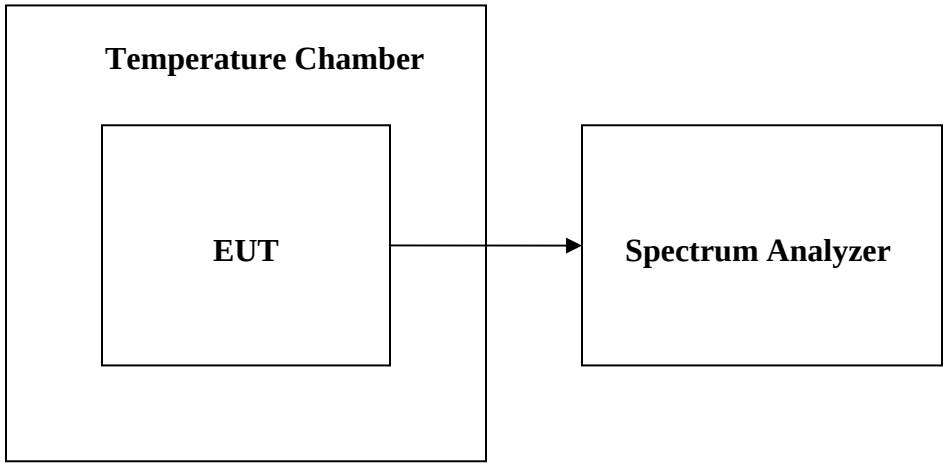


Figure 6.1.1: Frequency Stability Test Setup

6.2 Test Criteria

According to FCC Part 2, Section 2.1055(a) (1), the frequency stability shall be measured with variation of ambient temperature from –30ºC to +50 ºC.

6.3 Test Results

Frequency stability measurements were taken on June 22, 2011, and the EUT was found to be in compliance with applicable requirements.

Table 6.3.1: Frequency Stability Test Results

Project #	Date	Rule	Distance	Antenna	RBW	VBW	Detector
12679-10	June 22, 2011	87.133	Direct	Direct	100 kHz	100 kHz	Peak
COMMENT	Reference Frequency = 978.000000 MHz						

Temperature (ºC)	Measured Frequency (MHz)	Deviation (Hz)	Deviation (PPM)
-30	978.000105	105	.110
-20	978.000010	10	.010
-10	978.000196	196	.200
0	977.999999	1	.001
10	978.000167	167	.171
20	978.000000	0	0
30	978.000990	990	1.012
40	978.000020	20	.020
50	978.000081	81	.083

Result = Pass

End of Report

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