



Engineering Solutions & Electromagnetic Compatibility Services

## FCC Certification Report

**Mesa Engineering, Inc.  
5801 Dierker Drive  
Houston, TX 77041  
(713) 895-7000**

**Model: ATRG2-MOD**

**FCC ID: S3VATRG2-MOD**

**March 26, 2013**

Standards Referenced for this Report	
Part 2: 2012	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2012	Private Land Mobile Radio Services
ANSI/TIA-603-C-2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards

Frequency Range (MHz)	Conducted Output Power (W)	Frequency Tolerance (ppm)	Emission Designator
34600	0.0002	305	NON

**Report Prepared By: Daniel Baltzell**

Document Number: 2013037

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*These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.*

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## 1 Test Result Summary

Test	FCC Reference	Result
RF Power Output	2.1046(a), 90.205	Complies
Spurious Emissions at Antenna Terminals	2.1046(a), 90.210	N/A
Field Strength of Spurious Radiation	2.1053(a), 90.210	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.210	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.213	Complies

## 2 General Information

The following Type Certification Report is prepared on behalf of **Mesa Engineering, Inc.** in accordance with the Federal Communications Commission rules and regulations. The Equipment Under Test (EUT) was Model **ATRG2-MOD**, FCC ID: **S3VATRG2-MOD**.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 Parts 2 and 90. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

Testing of Spurious Emissions at Antenna Terminal cannot be accomplished since the device has an integral antenna; spurious emissions are instead accomplished by radiated means and have been found to be passing.

### 2.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to, and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

### 2.2 Related Submittal(s)/Grant(s)

N/A

## 2.3 Tested System Details

The test sample was received on March 13, 2013. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

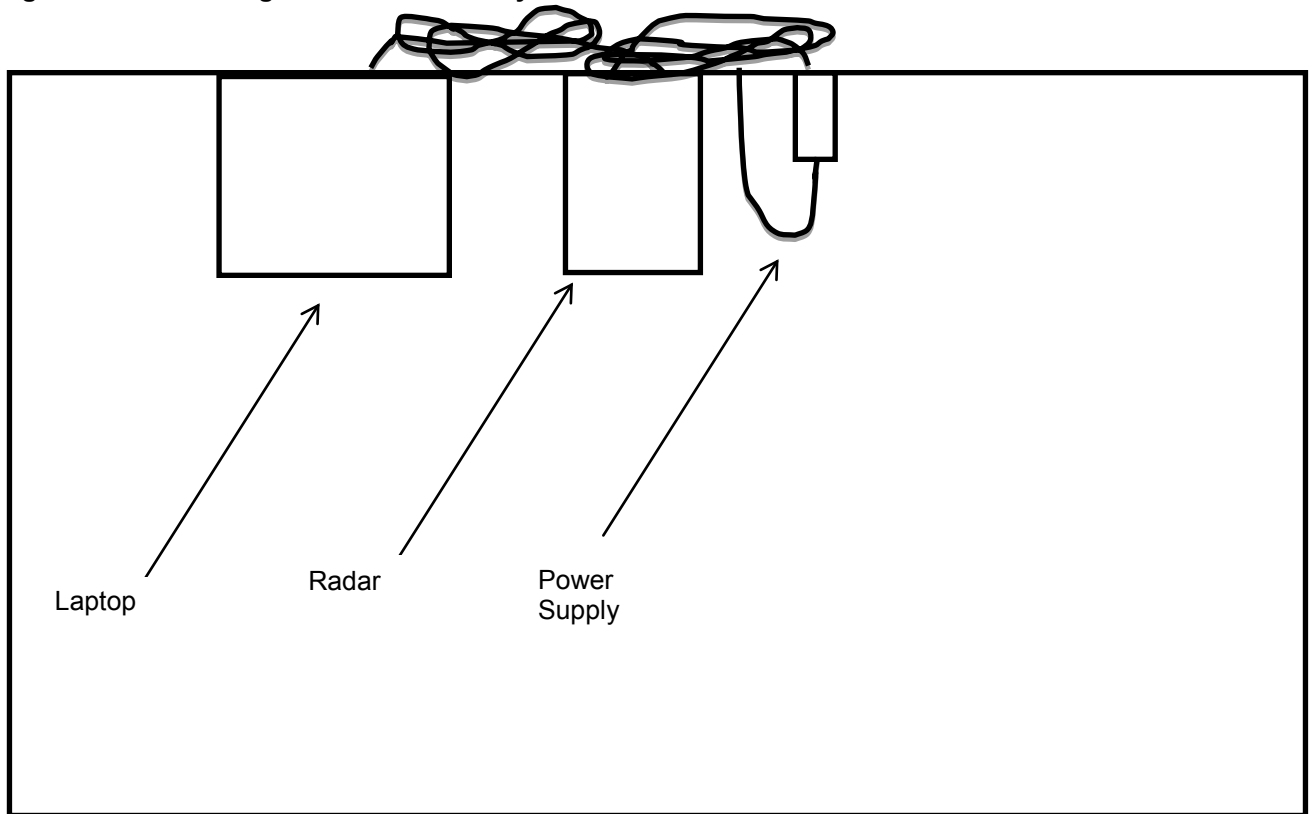
**Table 2-1: Equipment Under Test (EUT)**

Part	Manufacturer	Model	Serial Number	FCC ID	RTL Bar Code
Radar	Mesa Engineering	ATRG2-MOD	SUB_Radar_Assembly-00394	S3VATRG2-MOD	20876

**Table 2-2: Support Equipment**

Part	Manufacturer	Model	Serial Number	FCC ID	RTL Bar Code
HQ Power (PSSMV7U) Power Supply set to 12VDC	Amplus	20055	N/A	N/A	20856
Laptop	Dell	Latitude D620	ST: H4C4DC1	N/a	20853

**Figure 2-1: Configuration of Tested System**



**3 FCC Rules and Regulations Part 2.1033(C)(8): Voltages and Currents Through the Final Amplifying Stage**

12 VDC / 0.311 A

**4 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Part 90.205 Transmitting Power Limits**

**4.1 Test Procedure**

ANSI/TIA-603-C-2004 Section 2.2.1

The EUT was connected to a spectrum analyzer having a 50  $\Omega$  load impedance.

**4.2 Test Data**

**Table 4-1: RF Conducted Output Power – Measured**

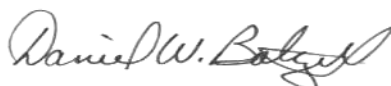
Frequency (MHz)	Spectrum Analyzer Level (dBm)	Spectrum Analyzer Level (W)
34600.0	-8.1	0.00015

**Table 4-2: Test Equipment Used For Testing RF Power Output - Conducted**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13

**Test Personnel:**

Daniel Baltzell  
Test Engineer



Signature

March 22, 2013  
Date of Test



## 5 FCC Rules and Regulations Part 2.1053(a): Field Strength of Spurious Radiation; Part 90.210: Out of Band Emissions Limit

### 5.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.12

The spurious emissions levels were measured relative to the carrier.

### 5.2 Test Data

#### 5.2.1 CFR 47 Part 90.210 Requirements

The limit for emissions is  $43+10\log(P)$ .

**Table 5-1: Test Data**

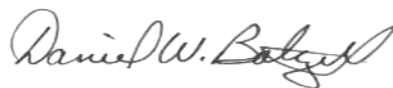
Frequency (GHz)	Spectrum Analyzer Amplitudes – Average Detector (1MHz/10MHz RBW/VBW) (dBuV)	Mixer Conversion Loss and Antenna Factor (dB/m)	Corrected Spectrum Analyzer Level (dBuV/m)	$43+10\log(P)$ Limit = -13 dBm converted to dBuV/m	Margin (dB)
69.197852	8.1	42.2	50.3	82.2	-31.9
103.796778	-15.9	49.0	33.1	82.2	-49.1
138.397234	-17.9	52.0	34.1	82.2	-48.1
172.994630	-13.9	59.8	45.9	82.2	-36.3

**Table 5-2: Test Equipment Used For Testing Field Strength of Spurious Radiation**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901303	EMCO	3160-10	Horn Antenna (26.5 - 40.0 GHz) WR-28	960452-007	6/19/13
900826	ATM	08-443-6R	Horn Antenna (90 - 140 GHz)	8041904-1	1/23/14
900712	ATM	15-443-6R	Horn Antenna (50 - 75 GHz)	8051805-1	1/23/14
900713	ATM	05-443-6R	Horn Antenna (140 - 220 GHz)	S0685	1/23/14
900873	CMT	RA28-K-F-4B-C	Waveguide (26.5 - 40 GHz)	990706-001	1/23/14
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901586	Rohde & Schwarz	1089.0876.00	Mixer (50 - 75 GHz)	100098	1/23/14
901587	Rohde & Schwarz	SAM-220	Mixer (140 - 220 GHz)	20005	6/3/13
901588	Rohde & Schwarz	SAM-140	Mixer (90 - 140 GHz)	20022	6/3/13

**Test Personnel:**

Daniel Baltzell  
 Test Engineer



Signature

March 22, 2013  
 Date of Test

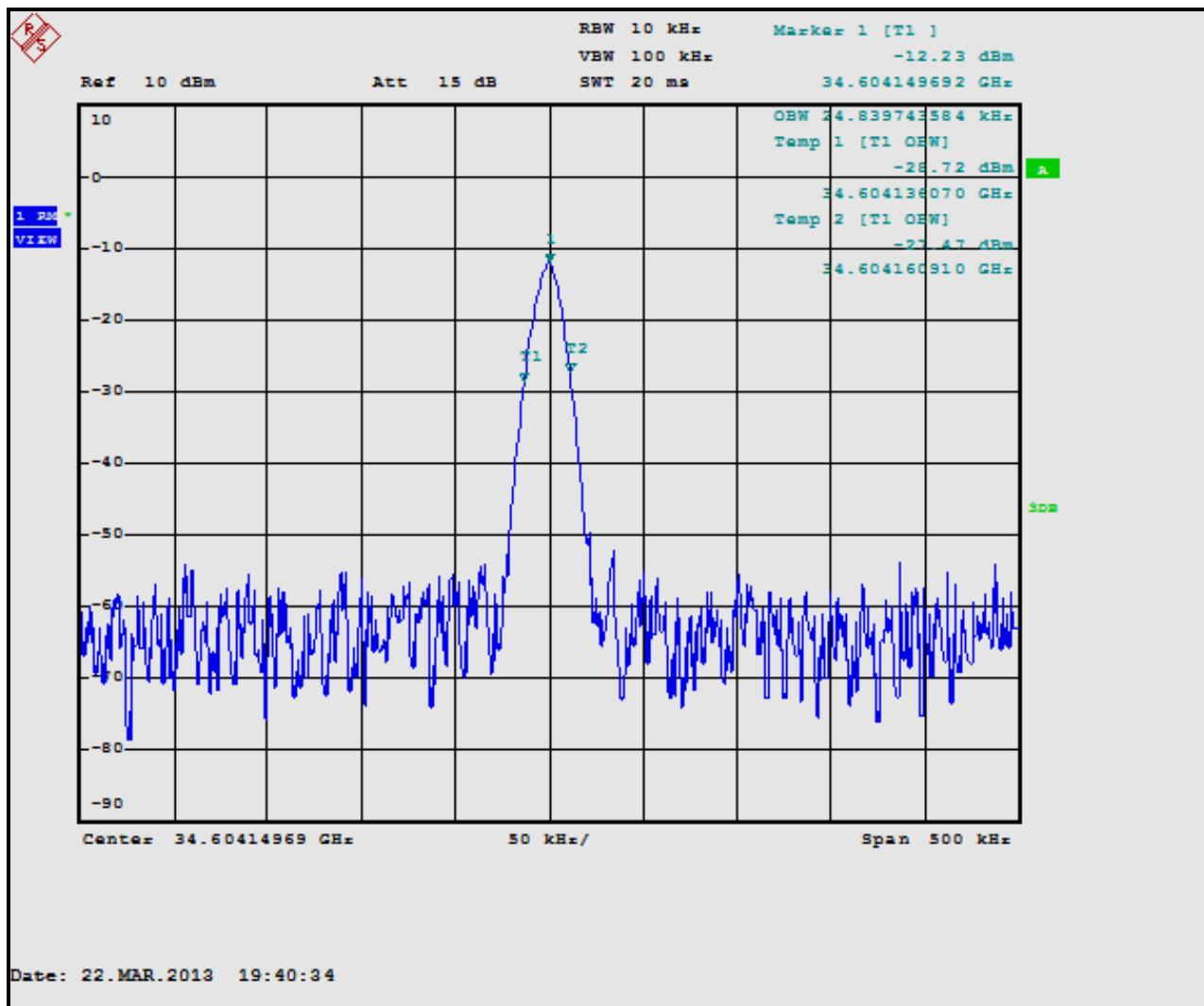
## 6 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth

### 6.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.11

### 6.2 Test Data

Plot 6-1: Occupied Bandwidth

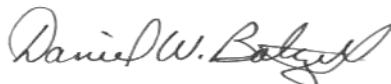


**Table 6-1: Test Equipment Used For Testing Occupied Bandwidth**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13

**Test Personnel:**

Daniel Baltzell  
Test Engineer



Signature

March 22, 2013  
Date of Test

## 7 FCC Rules and Regulation Part 2.1055 and 90.213: Frequency Stability

### 7.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency. The EUT was evaluated over the temperature range -30°C to +50°C. The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. The measurement was noted and normalized to 20°C. The voltage stability was measured at +/- 15% and normalized to 20°C.

### 7.2 Test Data

**Table 7-1: Temperature Frequency Stability – 34600 MHz**

Temperature (°C)	Frequency (Hz)	Deviation (ppm)
-30	34 592 393 429	-219.84
-20	34 592 868 509	-206.11
-10	34 594 023 397	-172.73
0	34 594 829 727	-149.43
10	34 597 269 311	-78.92
20 (reference)	34 600 000 000	0.00
30	34 602 257 692	65.25
40	34 606 707 384	193.86
50	34 610 553 538	305.02

**Table 7-2: Voltage Frequency Stability – 34600 MHz**

Voltage (VDC)	Frequency (Hz)	Deviation (ppm)x
10.2	34 600 006 811	0.20
12 (reference)	34 600 000 000	0.00
13.8	34 600 012 099	0.35

The worst-case deviation was found to be 305 ppm.

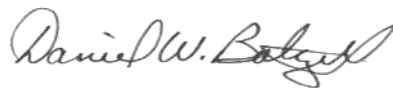
Result: Only measurement and reporting is required, there is no FCC requirement at this frequency.

**Table 7-3: Test Equipment Used For Testing Frequency Stability**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	01/13/14
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/03/13
901350	Meterman	33XR	Multimeter	040402802	12/28/13

**Test Personnel:**

Daniel Baltzell  
Test Engineer



Signature

March 22, 2013  
Date of Test

**8 FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth**

Type of Emission: NON

**9 Conclusion**

The data in this measurement report shows that the **Mesa Engineering, Inc. Model ATRG2-MOD, FCC ID: S3VATRG2-MOD**, complies with all the applicable requirements of Parts 2 and 90 of the FCC Rules.