

Makago[®] Electronics, Inc. *Turning ideas into products!*

16980 Via Tazon, Suite 140, San Diego, CA 92127

Phone: (858) 613-8747 Fax: (858) 613-8748

e-mail: wjansen@makago.com

January 6, 2006

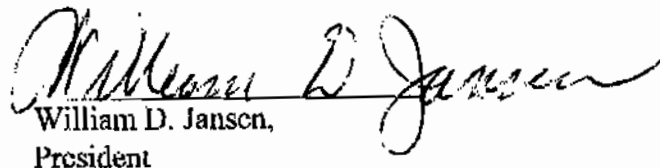
TUV America, Inc. TCB

10040 Mesa Rim Road

San Diego, CA 92921

Makago Electronics grants permission to Tanner Racing Products by Mittler Bros. dba Mittler Corporation to use the test report SC502203-08.

By:


William D. Jansen,
President

MEASUREMENT AND TECHNICAL REPORT

MAKAGO ELECTRONICS INCORPORATED
16980 Via Tazan, Suite 140
San Diego, CA 92127

DATE: 13 May 2005

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type: Ultimate RF Scale Transceiver Board		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: Defer until:	No: X
Company Name agrees to notify the Commission by: of the intended date of announcement of the product so that the grant can be issued on that date.	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*
(*) FCC Part 15, Paragraph(s) 15.109(a), 15.209(a), and 15.249(a)		
Report Prepared by:	TÜV AMERICA, INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 Fax: 858 546 0364	

TABLE OF CONTENTS

	Pages
1.0 GENERAL INFORMATION	<u>3</u>
1.1 Product Description	<u>3</u>
1.2 Related Submittal Grant	<u>3</u>
1.3 Tested System Details	<u>3</u>
1.4 Test Methodology	<u>3</u>
1.5 Test Facility	<u>3</u>
2.0 SYSTEM TEST CONFIGURATION	<u>4</u>
2.1 Justification	<u>4</u>
2.2 EUT Exercise Software	<u>4</u>
2.3 Special Accessories	<u>4</u>
2.4 Equipment Modifications	<u>4</u>
2.5 Configuration of Test System	<u>4</u>
3.0 RECEIVER SPURIOUS EMISSIONS EQUIPMENT/DATA RADIATED EMISSIONS EQUIPMENT/DATA RADIATED SPURIOUS EMISSIONS EQUIPMENT/DATA	<u>5 - 7</u>
4.0 ATTESTATION STATEMENT	<u>8</u>

1.0 GENERAL INFORMATION

1.1 Product Description

None

1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the following tests.

Test Summary					
Test Description	Paragraph Number	Summary of Results			Pass/Fail
		Low Channel	Mid Channel	High Channel	
Radiated Fundamental Field Strength	15.249(a)	93.82 dB μ V/m pk 90.8 dB μ V/m av	92.98 dB μ V/m pk 91.6 dB μ V/m av	94.51 dB μ V/m pk* 91.1 dB μ V/m av	Pass
Radiated Spurious Emissions (30 MHz to 10 GHz)	15.249(a)/ 15.209(a)	-0.86 dB @ 1806 MHz	-0.79 dB @ 1830 MHz	-0.96 dB @ 1849 MHz	Pass
Receiver Spurious Emissions	15.109(a)	No emissions detected	No emissions detected	No emissions detected	Pass

(*) Quasi Peak results indicate level at 93.7 dB μ V/m.

Testing was performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983.

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 678 1400
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Test Setup Photos Exhibit

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Test Setup Photos Exhibit

**3.0 RECEIVER SPURIOUS EMISSIONS EQUIPMENT/DATA
RADIATED EMISSIONS EQUIPMENT/DATA
RADIATED SPURIOUS EMISSIONS EQUIPMENT/DATA**

**Test Conditions: RECEIVER SPURIOUS EMISSIONS: FCC Part 15.109(a)
RADIATED EMISSIONS: FCC Part 15.209(a)
RADIATED SPURIOUS EMISSIONS: FCC Part 15.249(a)**

The following measurements were performed at the San Diego Testing Facility:

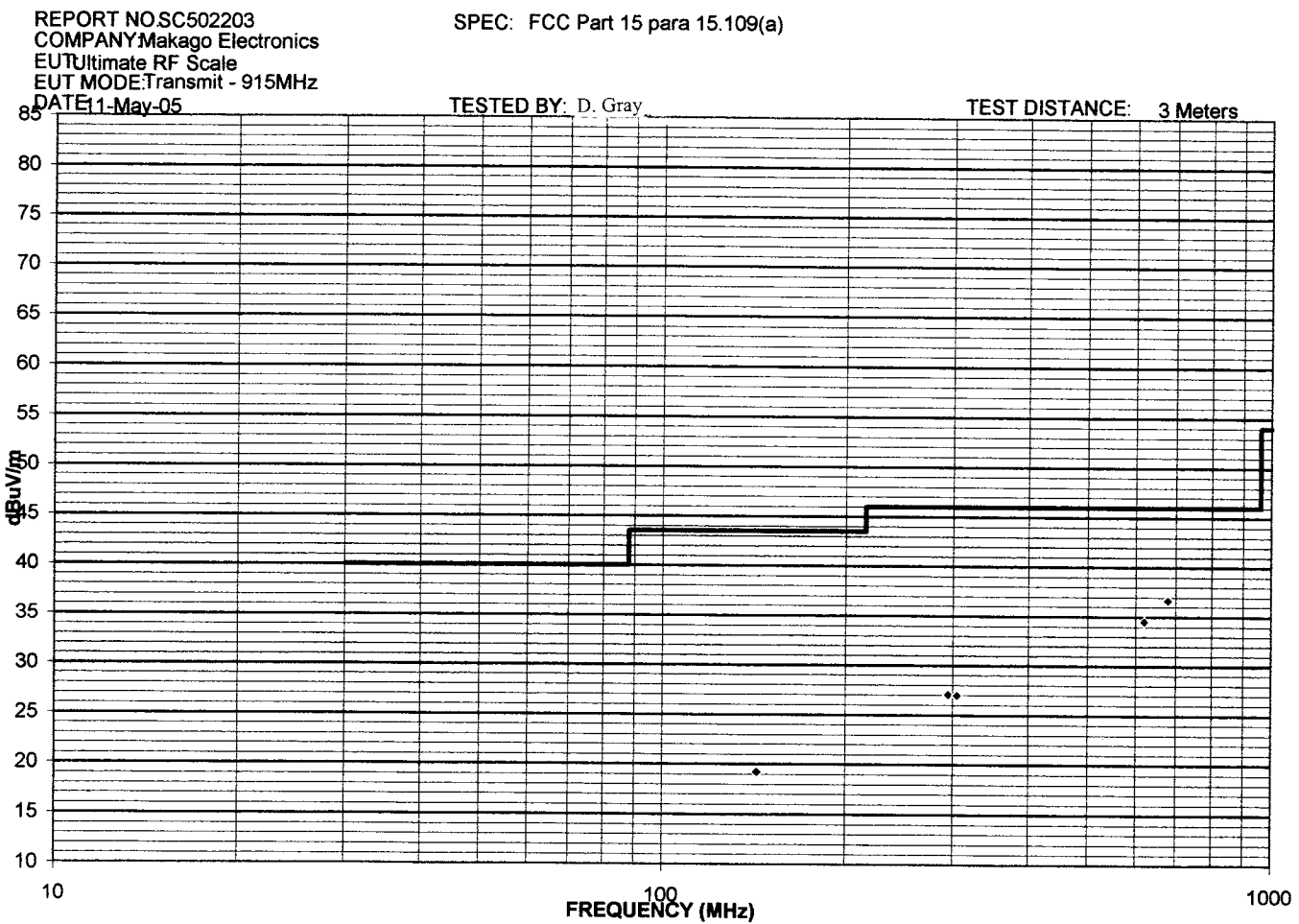
☐ - Test not applicable

- - Roof (Small Open Area Test Site)
- - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
E4440A	7500	Spectrum Analyzer	Hewlett Packard	MY43362168	12/04
8566B	744	Spectrum Analyzer	Hewlett Packard	2618A02913	02/05
AMF-5D-010180-35-10P	719	Preamplifier	Miteq	549460	VBU*
FF6548-2	877	2000 MHz High Pass Filter	Sage	005	VBU*
FF6549-1	783	900 MHz High Pass Filter	Sage	008	VBU*
3115	251	Double Ridge Guide Antenna	EMCO	2495	VBU*
3146	244	Log Periodic Dipole Antenna	EMCO	1063	07/04

Remarks: One year calibration cycle for all test equipment and sites. (*) Verified Before Use.



Page 7 of 8
Rev.No 1.0

4.0 ATTESTATION STATEMENT

GENERAL REMARKS:

EUT's transmit and receive is on the same frequency. Results indicated are for both modes.

SUMMARY:

All tests were performed per CFR 47, Part(s) 15.109(a), 15.209(a), and 15.249(a)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part(s) 15.109(a), 15.209(a), and 15.249(a)

Testing Start Date: 11 May 2005

Testing End Date: 11 May 2005

- TÜV AMERICA, INC. -

Responsible Engineer:



David Gray
(EMC Engineer)

Mittler Bros. Ultimate RF Scale
Testing the SMA vs. Reverse SMA Antenna Connector

July 5, 2005

Summary

These test show that changing from SMA connector to reverse SMA connector will (if anything) very slightly reduce the output power.

Test Setup

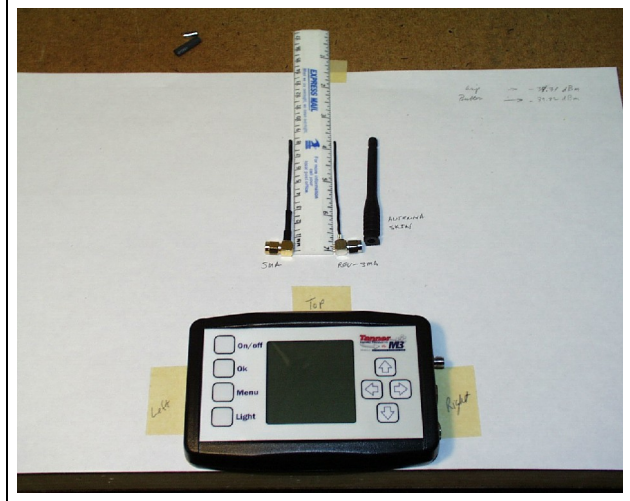
The normal SMA connector is shown on the left. The reverse SMA connector is shown on the right. The two antennas wires are the same length, 3.25".

The reverse SMA connector's antenna wire will be tested with and without the rubber antenna skin shown far right.

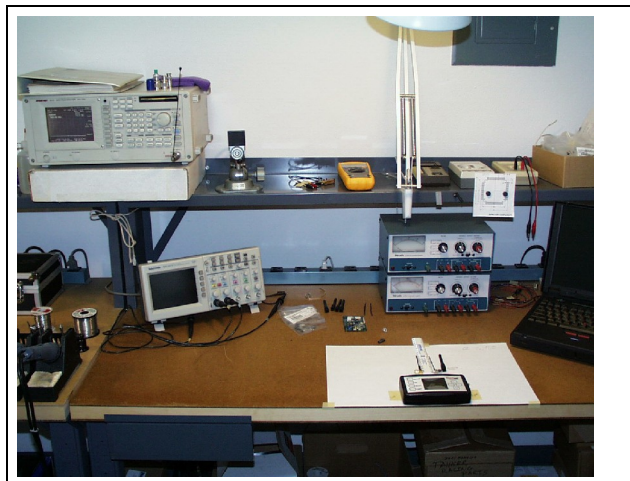


One Ultimate RF Scale's display box will be used to test both antenna connectors.

The masking tape marks the position of the display box on the test bench.



The test bench with the display box and spectrum analyzer.

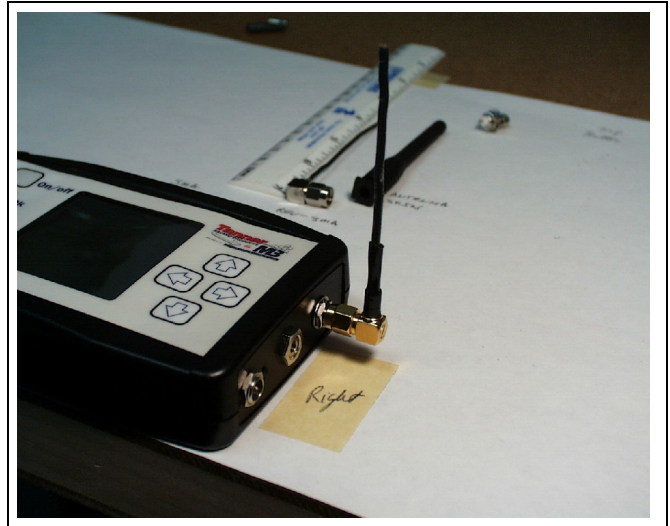


Mittler Bros. Ultimate RF Scale
Testing the SMA vs. Reverse SMA Antenna Connector

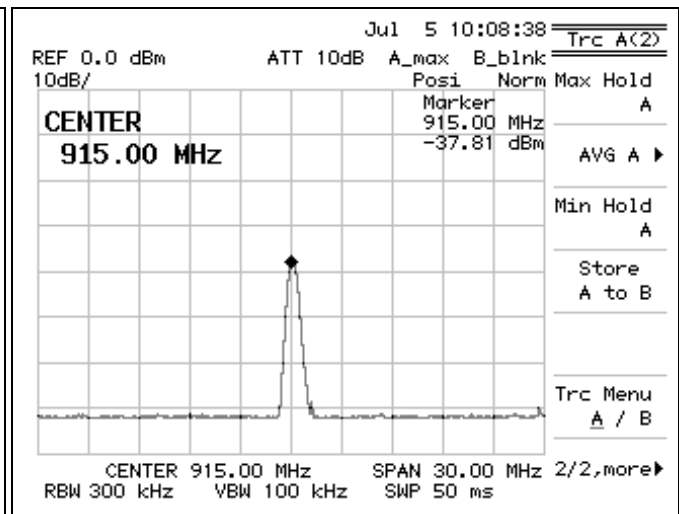
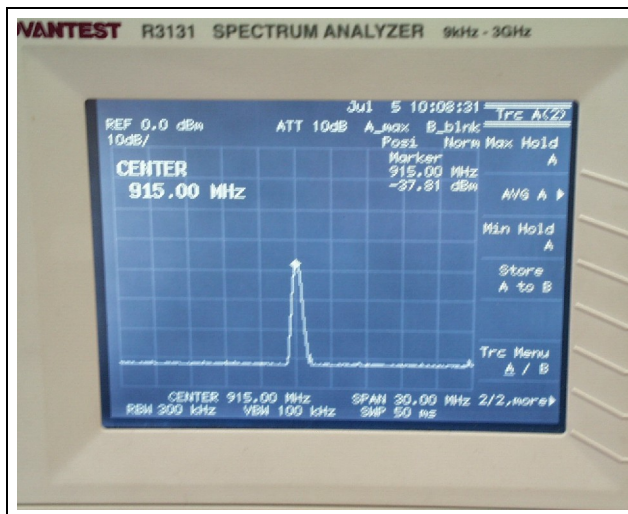
July 5, 2005

SMA Connector

The SMA connector attached to display box.



The spectrum analyzer is set to maximum hold. The relative signal strength is -37.81 dBm, shown in both a picture of the spectrum analyzer and a screen print.

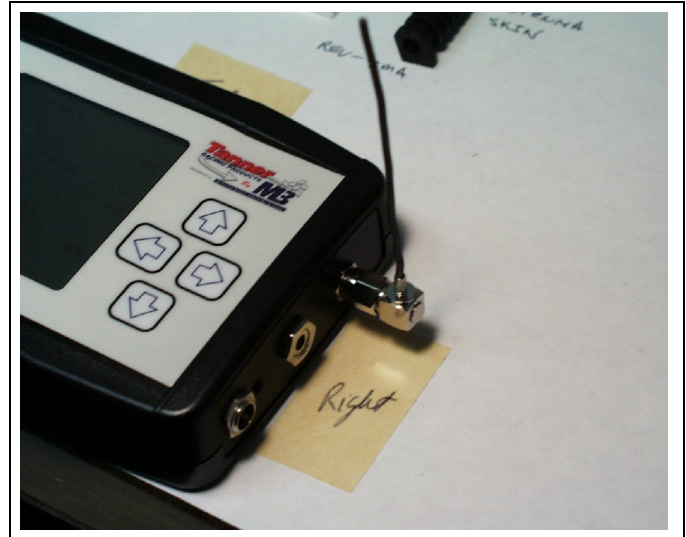


Mittler Bros. Ultimate RF Scale
Testing the SMA vs. Reverse SMA Antenna Connector

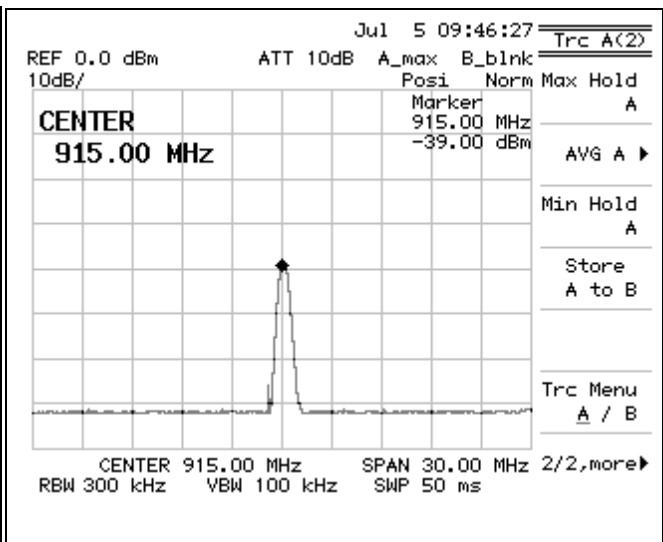
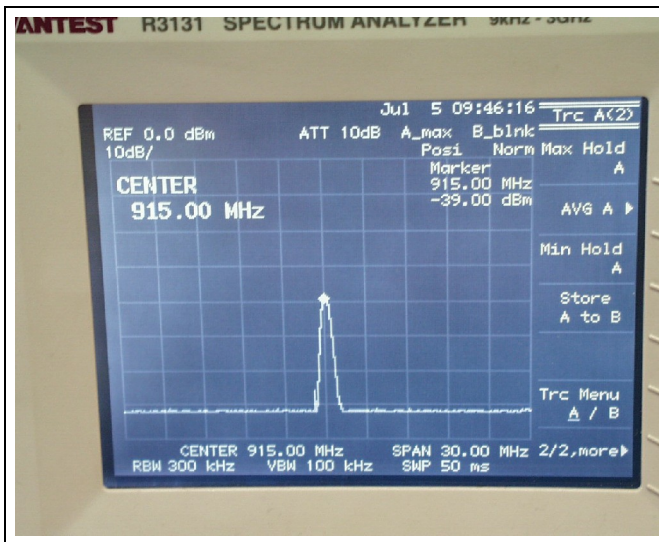
July 5, 2005

Reverse SMA Connector

The reverse SMA connector is used to connect the antenna wire without the rubber antenna skin.



The spectrum analyzer is set to maximum hold. The relative signal strength is -39.00 dBm, shown on the left in a picture of the spectrum analyzer and on the right in a screen print.



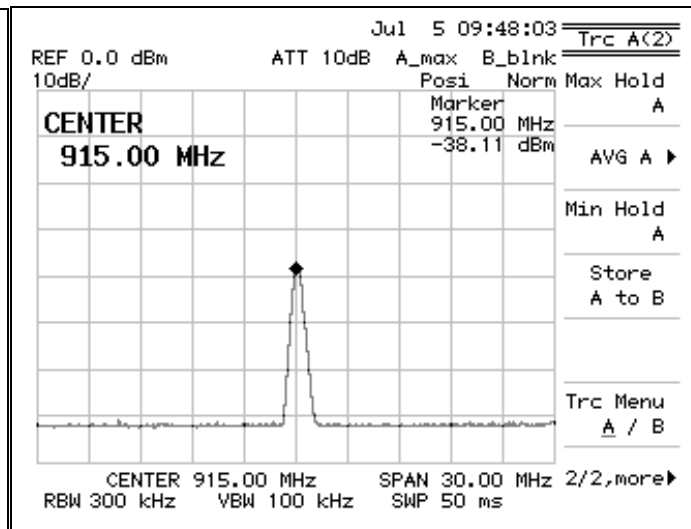
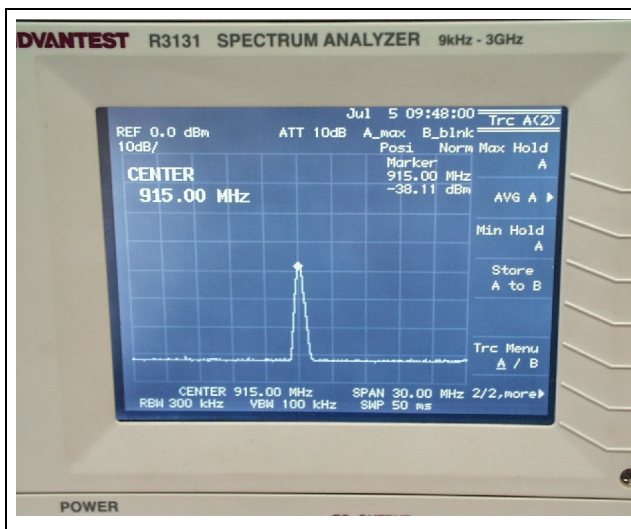
Mittler Bros. Ultimate RF Scale
Testing the SMA vs. Reverse SMA Antenna Connector

July 5, 2005

The reverse SMA connector is used to connect the antenna wire with the rubber antenna skin.



The spectrum analyzer is set to maximum hold. The relative signal strength is -38.11 dBm, shown on the left in a picture of the spectrum analyzer and on the right in a screen print.



Mittler Bros. Ultimate RF Scale
Testing the SMA vs. Reverse SMA Antenna Connector

July 5, 2005

Table of SMA vs. Reverse SMA

Connector	Spectrum Analyzer	Reverse SAM relative to SMA
SMA	-37.81 dBm	
Reverse SMA without rubber antenna skin	-39.00 dBm	-1.19 dBm
Reverse SMA with rubber antenna skin	-38.11 dBm	-0.30 dBm

Conclusion

The original FCC testing done with the SMA connector. These test show that changing from SMA connector to reverse SMA connector with or without the rubber antenna skin will (if anything) very slightly reduce the output power.