



Test Report

Prepared for: MICRORISC s.r.o.

Model: TR-5xDx

Description: Smart RF Transceiver

FCC ID: R24-TR-5XDX

To

FCC Part 15.249

Date of Issue: August 1, 2014

On the behalf of the applicant: MICRORISC s.r.o.
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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	April 25, 2014	Greg Corbin	Original Document
2.0	June 11, 2014	Amanda Reed	Added FCC ID to report
3.0	July 17, 2014	Amanda Reed	Updated FCC ID
4.0	July 30, 2014	Greg Corbin	Added statement to bottom of tables on page 12 for clarification



Table of Contents

<u>Description</u>	<u>Page</u>
Standard Test Conditions Engineering Practices	6
Test Results Summary	8
Fundamental Field Strength	9
Radiated Spurious Emissions.....	11
Test Equipment Utilized.....	14



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The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A



The applicant has been cautioned as to the following

15.21: Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator the responsible part may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.



Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI C63.10-2009 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (°C)	Humidity (%)	Pressure (mbar)
24.3 – 26.4	23.3 – 29.6	964.5 – 969.4

EUT Description

Model: TR-5xDx

Description: Smart RF Transceiver

Firmware: OS 3.04 (build # 0646)

Additional Information:

This test report is to support modular certification of the TR-5xDx smart rf transceiver for FCC CFR part 15.249.

The TR-5xDx RF transceiver is a battery powered module operating in the 902 – 928 MHz frequency band.

The antenna is a stripline antenna etched into the pcb.

EUT Operation during Tests

The manufacturer provided 3 modules programmed with test software that was specifically written for testing to perform repeated broadcast with LED indication. The test software was titled: FCC_STATUS_BROADCAST, version 2.01.

Each module was setup to operate on one of the low, mid, high frequencies at the maximum transmitting power.

A battery pack supplied by the manufacturer was used to power the module.

A 20 cm extension cable was provided to separate the transmitter module and battery pack.

EUT, extension cable and battery pack





Accessories:

Qty	Desc	Mfg	Model	S/N
1	Battery pack	MICRORISC	DK-EVAL-04	Version 1.02

Cables:

Qty	Desc	Length	Shielding Y/N	Shielded Hood Y/N	Ferrite Y/N
1	Extension cable	20 cm	N	N	N

Modifications: None

15.203: Antenna Requirement:

- ☒ The antenna is permanently attached to the EUT
- ☐ The antenna uses a unique coupling
- ☐ The EUT must be professionally installed
- ☐ The antenna requirement does not apply



Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.249(a)	Fundamental Field Strength	Pass	
15.249(d)	Out of Band Spurious Emissions	Pass	



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Fundamental Field Strength

Name of Test:

Fundamental Field Strength

Engineer: Greg Corbin

Test Equipment Utilized:

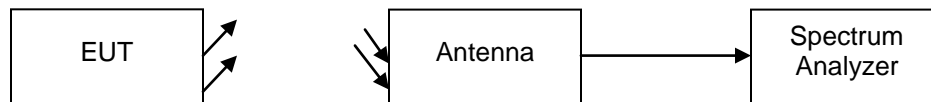
i00349, i00379

Test Date: 4/24/2014

Test Procedure

The EUT was tested in a semi-anechoic chamber at a distance of 3 meters from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Fundamental Field Strength.

Test Setup



Spectrum Analyzer Settings

Detector Settings	RBW	VBW	Span
Quasi – Peak	120 kHz	300 kHz	As Necessary

Sample Calculations:

Correction Factors include Antenna, cable insertion loss and pre-amplifier gain.

Measured Level includes correction factors that were entered into the spectrum analyzer before recording test data.



Fundamental Field Strength

Tuned Frequency (MHz)	Quasi-Peak Measured Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
903.9	92.1	94.0	Pass
916.4	92.4	94.0	Pass
926.1	92.7	94.0	Pass

No other emissions were detectable. All emissions were more than -20 dBc.



Radiated Spurious Emissions

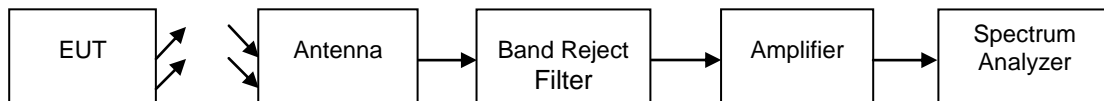
Name of Test: Radiated Spurious Emissions
Test Equipment Utilized: i00271, i00364, i00379

Engineer: Greg Corbin
Test Date: 4/24/2014

Test Procedure

The EUT was tested in a semi-anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the limits for Radiated Spurious Emissions. The antenna, band reject filter, amplifier and cable correction factors were input into the spectrum analyzer before recording data. The spectrum for each tuned frequency was examined to the 10th harmonic.

Test Setup



Analyzer Settings

Detector Settings	RBW	VBW	Span
Peak	1 MHz	3 MHz	As Necessary
Average	1 MHz	3 MHz	As Necessary

Sample Calculations:

Correction Factors include antenna, band reject filter, amplifier and cable correction factors.

Measured Level includes correction factors that were input to the spectrum analyzer before recording test data



Radiated Spurious Emissions

Tuned Frequency (MHz)	Emission Frequency (MHz)	Peak Measured Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
903.9	1807	41.2	74.0	-32.8
903.9	2711	37.7	74.0	-36.3
903.9	3615	35.7	74.0	-38.3

Tuned Frequency (MHz)	Emission Frequency (MHz)	Avg. Measured Level (dBuV/m)	Avg. Limit (dBuV/m)	Margin (dB)
903.9	1807	39.8	54.0	-14.2
903.9	2711	35.1	54.0	-18.9
903.9	3615	32.0	54.0	-22.0

Tuned Frequency (MHz)	Emission Frequency (MHz)	Peak Measured Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
916.4	1832	42.2	74.0	-31.8
916.4	2749	37.2	74.0	-36.8
916.4	3665	36.1	74.0	-37.9

Tuned Frequency (MHz)	Emission Frequency (MHz)	Avg. Measured Level (dBuV/m)	Avg. Limit (dBuV/m)	Margin (dB)
916.4	1832	40.3	54.0	-13.7
916.4	2749	31.3	54.0	-22.7
916.4	3665	34.8	54.0	-19.2

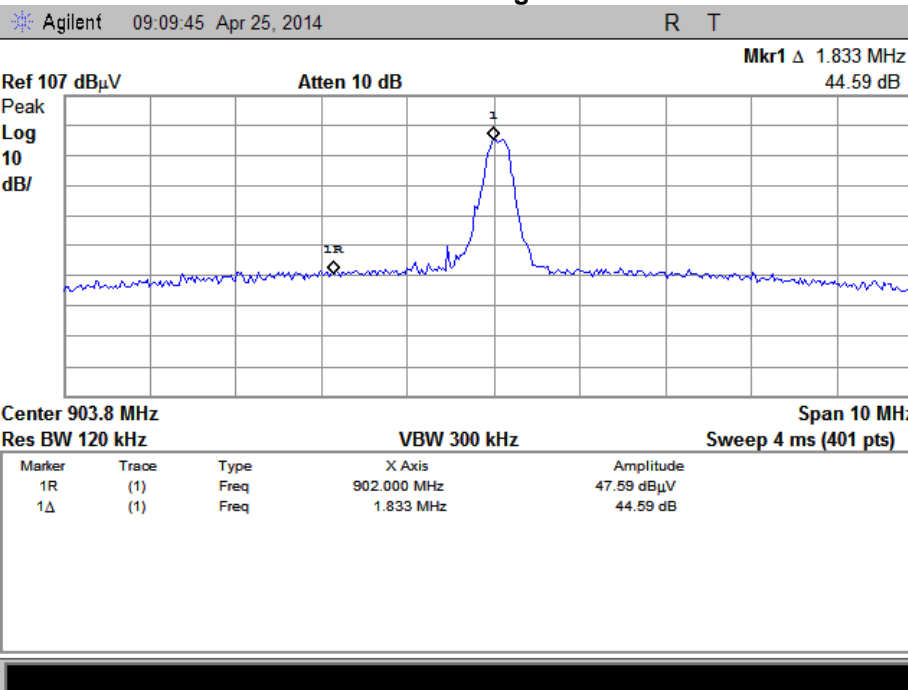
Tuned Frequency (MHz)	Emission Frequency (MHz)	Peak Measured Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
926.1	1852	41.5	74.0	-32.5
926.1	2778	39.9	74.0	-34.1
926.1	3704	37.1	74.0	-36.9

Tuned Frequency (MHz)	Emission Frequency (MHz)	Avg. Measured Level (dBuV/m)	Avg. Limit (dBuV/m)	Margin (dB)
926.1	1852	39.6	54.0	-14.4
926.1	2778	37.8	54.0	-16.2
926.1	3704	34.1	54.0	-19.9

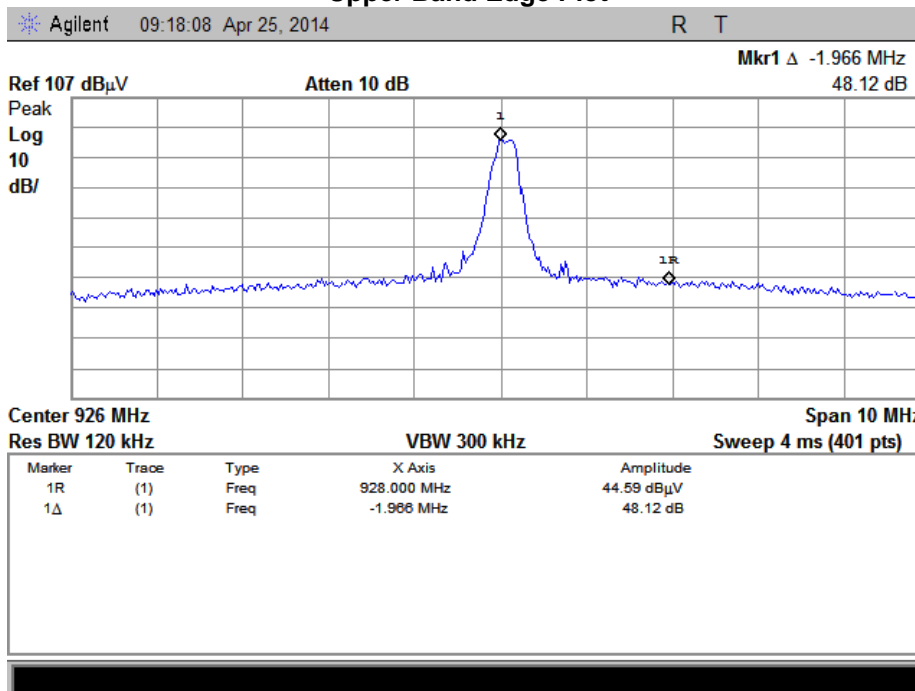
No other emissions were detectable. All emissions were more than -20 dBc.



Lower Band Edge Plot



Upper Band Edge Plot





Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna, Amplified	ARA	DRG-118/A	i00271	4/19/12	4/19/14 **
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	3/24/14	3/24/15
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	10/8/13	10/8/15
Tunable Notch Filter	Eagle	TNF-240MFMF	i00364	Verified on: 3/24/2014	
EMI Analyzer	Agilent	E7405A	i00379	1/14/14	1/14/15
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	11/26/13	11/26/15

**30-day lab extension at lab manager's discretion

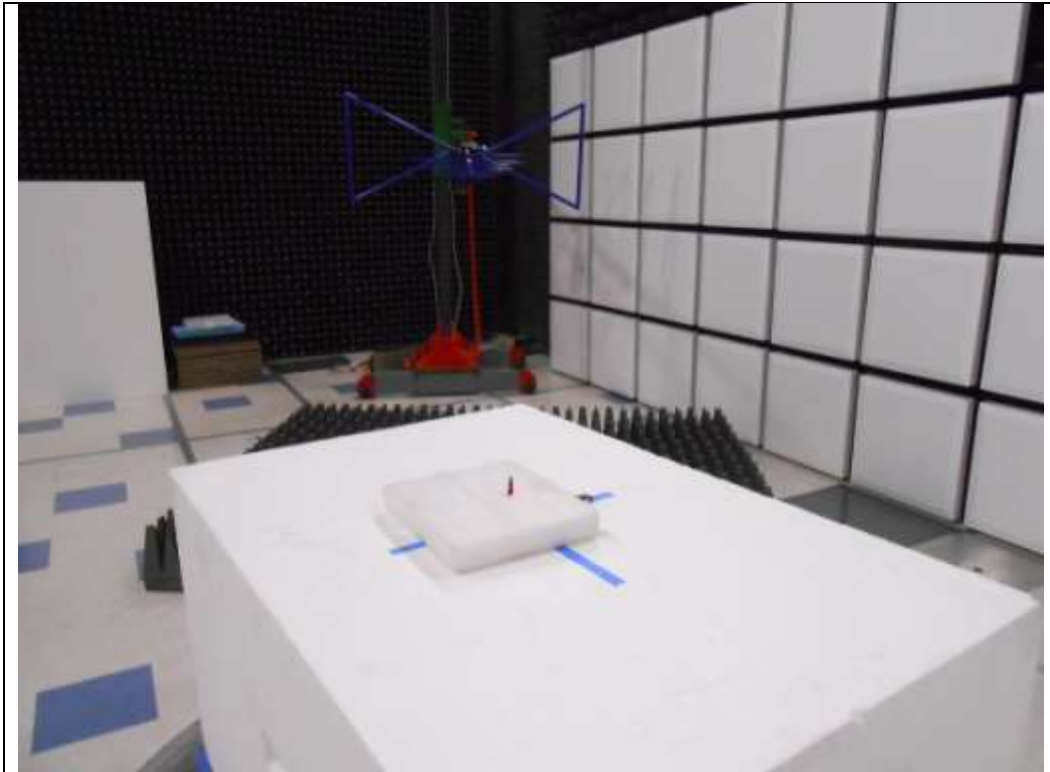
In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT



Test Setup Photos
FCC ID: R24-TR-5XDX

RF Radiated #1



RF Radiated #2

