



Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268

fax: (480) 926-3598

<http://www.ComplianceTesting.com>

info@ComplianceTesting.com

Test Report

Prepared for: Leica Geosystems

Model: Jasset WWG

Description: Equipment Locator and Communications Hub

Serial Number: 000055

FCC ID: 2AFYJ-JASSET

To

FCC Part 15B
Class A

And

IC ICES-003 Issue 6 January 2016

Date of Issue: July 25, 2016

On the behalf of the applicant:

Leica Geosystems
600 S Country Club Rd
Tucson, AZ 85716

Attention of:

Graham Tooms, Senior Systems Engineer
Ph: (520)529-8729
E-Mail: Graham.Tooms@hexagonmining.com

Prepared By
Compliance Testing, LLC
1724 S. Nevada Way
Mesa, AZ 85204
(480) 926-3100 phone / (480) 926-3598 fax
www.compliancetesting.com
Project ID: p15a0021

Kenneth Lee
Project Test Engineer

This report may not be reproduced, except in full, without written permission from Compliance Testing.
All results contained herein relate only to the sample tested.

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	3/7/16	Kenneth Lee	Original Document
2.0	6/24/16	Kenneth Lee	Updated description, cable information and added reference plots for radiated emissions
3.0	7/15/16	Paul Hay	Added Radiated Emissions 1-15GHz plots and tabular data.
4.0	7/31/16	Diana Williams	Added FCC ID

Table of Contents

<u>Description</u>	<u>Page</u>
Standard Test Conditions and Engineering Practices	6
Test Summary	8
15.109 Radiated Emissions	9
Test Equipment Utilized	14

The applicant has been cautioned as to the following

FCC

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 the 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 party 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.

Industry Canada

Products subject to Industry Canada ICES-003 must be labeled in English and/or French (based on the intended market and any other applicable provincial or federal regulations) as follows:

CAN ICES-3 (A)/NMB-3(A)

ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

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

Test and Measurement Data

Subpart 2.1033(b)

All tests and measurement data shown were performed in accordance with FCC Rule Parts: 15.107, 15.109 (Unintentional Radiators).

All tests and measurement data shown are deemed satisfactory evidence of compliance with Industry Canada Interference-Causing Equipment Standard ICES-003.

Name of Test	FCC Section	ICES-003
A/C Powerline Conducted Emissions	15.107	Section 6
Radiated Emissions	15.109	Section 6

Standard Engineering Practices

Unless otherwise indicated, the procedures contained in ANSI C63.4-2009 were observed during testing.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurement.

Standard Test Conditions and Engineering Practices

Unless otherwise indicated in the specific measurement results, the ambient temperature was maintained within the range of 10° to 40°C (50° to 104°F) and the relative humidity levels were in the range of 10% to 90%.

Environmental Conditions	
Temperature (°C)	Humidity (%)
24.3	29.2

EUT Description

Model: Jasset WWG

Description: Equipment Locator and Communications Hub

Article Number: 834652

Firmware: N/A

Software: N/A

Serial Number: 000055

Additional Information:

The EUT was placed in an active mode using the manufacturer's software and instructions.

EUT Operation during Tests

The EUT was connected to a 24 VDC power supply and was placed in normal operation using the manufacturer supplied HTML



Accessories:

Qty	Description	Manufacturer	Model	S/N
2	Wifi antenna	RFI	CD2405	N/A
1	GPS antenna	Tallysman	33-3320-01-10	N/A
1	GPS antenna	Antcom	G3Ant-2ATNBI	N/A
1	GSM antenna	MobileMark	RM-WLF-DN-BLK	N/A

Cables:

Qty	Description	Length (M)	Shielding Y/N	Shielded Hood Y/N	Termination
4	Antenna cables	>3m	Y	Y	N/A
1	Multicore cable*	<3m	Y	N	Multiple*

* Serial 1 and 2 connect to loopback terminations.

* CAN and Cepio connected to loopback terminations.

* Ethernet connected to a test PC via a shielded CAT5 cable

Modifications: None

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.107	A/C Powerline Conducted Emissions	N/A	EUT does not connect to the AC Mains
15.109	Radiated Emissions	Pass	

15.109 Radiated Emissions

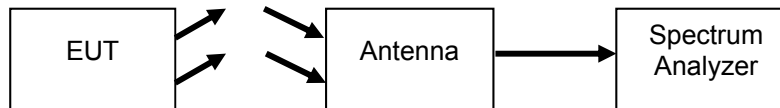
Engineer: Kenneth Lee

Test Date: 2/16/16

Test Procedure

The EUT was tested in a semi-anechoic chamber with the turntable set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antennas in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the signal levels were maximized. All emissions from 30 MHz to 1 GHz were examined.

Test Setup



Settings

RBW = 120 KHz

VBW = 300 KHz

Detector – Quasi Peak

Sample Calculations

Corrected Value = Measured Value + Correction factor

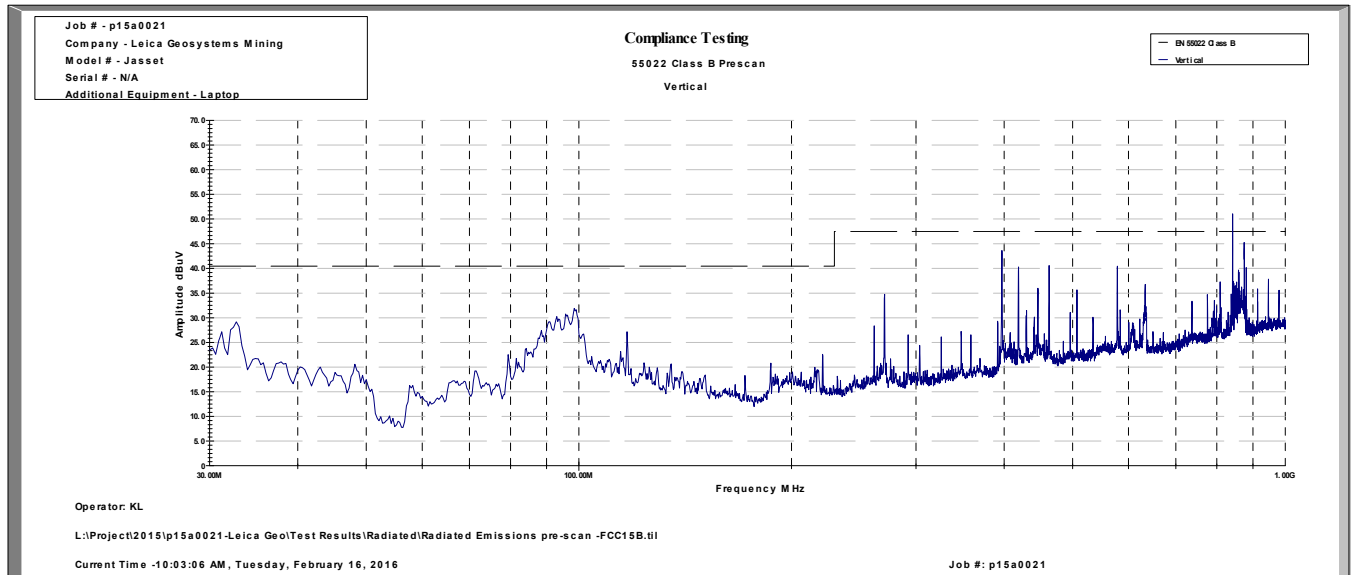
Correction factor = ACF + Cable loss

Radiated Emissions

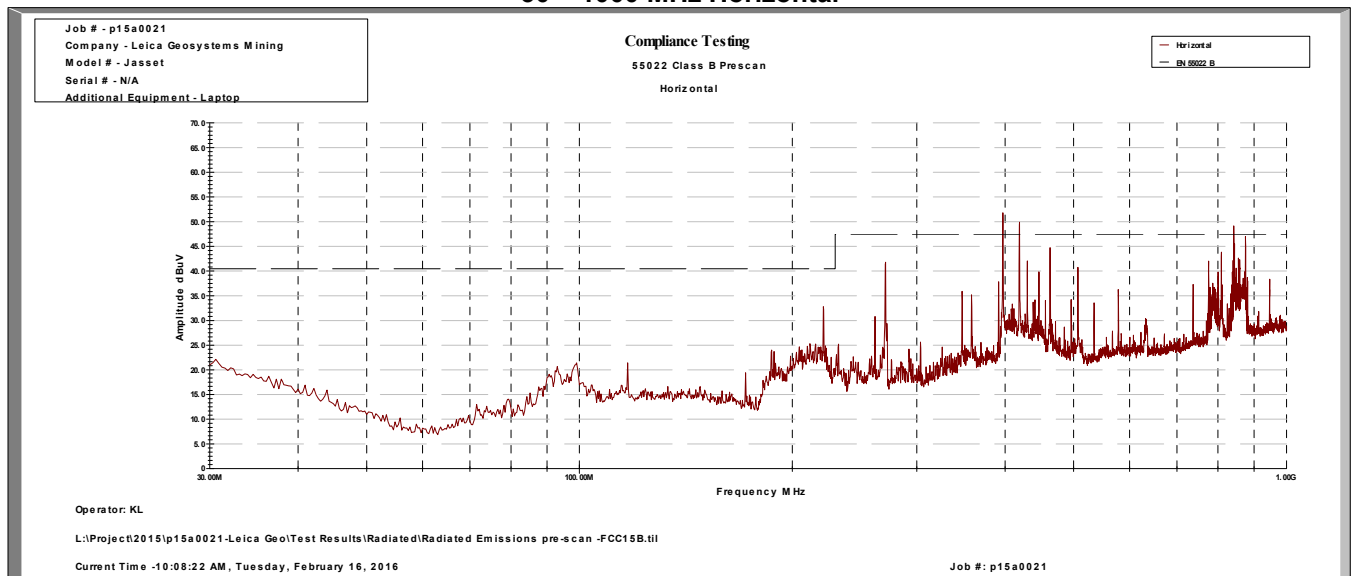
Emission Frequency (MHz)	Measured Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Antenna Polarity (V/H)	Turntable Position (deg)	Detector (QP,PK,Avg)
395.99	52.57	56.9	-4.33	100	H	138	QP
410.672	48.81	56.9	-8.09	100	H	150	QP
824.991	40.79	56.9	-16.11	100	H	135	QP
395.995	45.82	56.9	-11.08	111	V	190	QP
835.971	36.95	56.9	-19.95	100	V	137	QP
857.973	38.5	56.9	-18.4	100	H	139	QP



30 – 1000 MHz Vertical



30 – 1000 MHz Horizontal



Note: These plots are used for reference only, the data shown is not maximized.

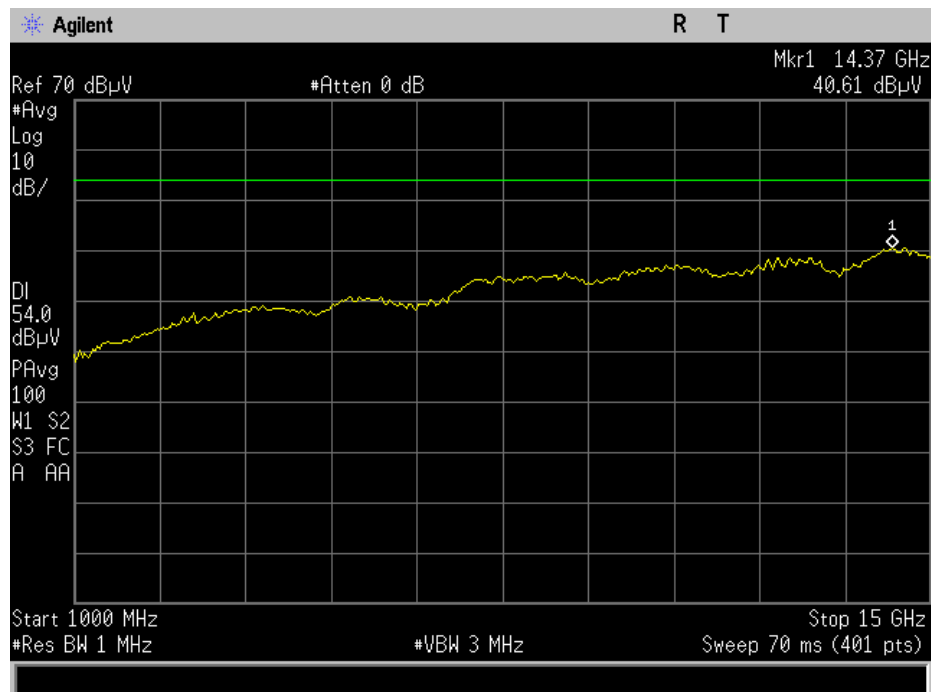


Radiated Emissions Test Results
1 – 15 GHz

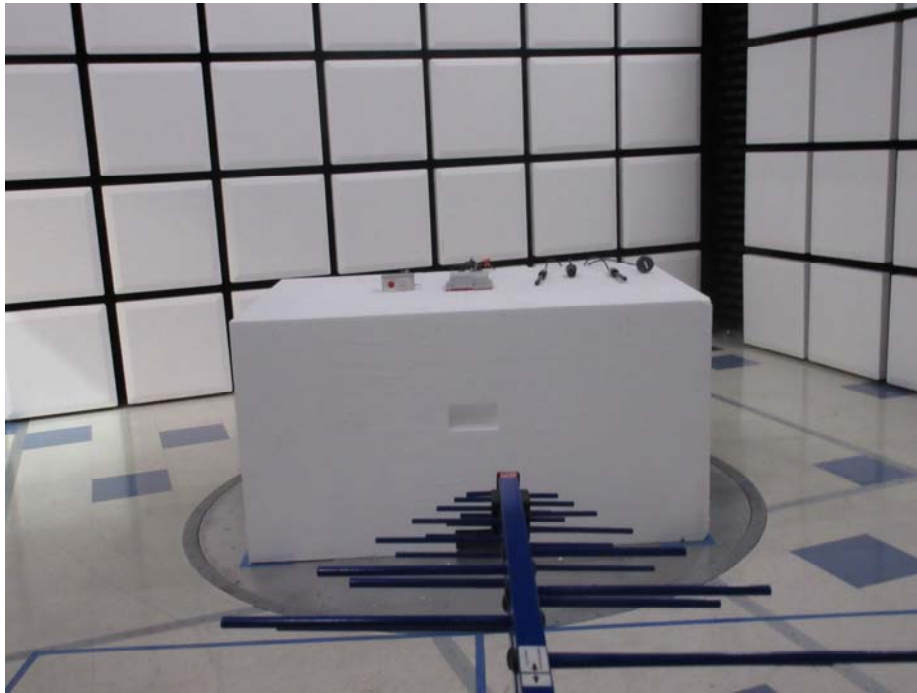
Frequency Range (GHz)	Emission Frequency (GHz)	Measured Level (dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)
1 – 15	14.37	40.61	Ave	54.0	-13.39

Note: For the Frequency ranges of 1 – 15 GHz, the correction factors for Antenna and cable were input to spectrum analyzer as reference level offsets before recording measurements.

Radiated Emissions 1-15 GHz

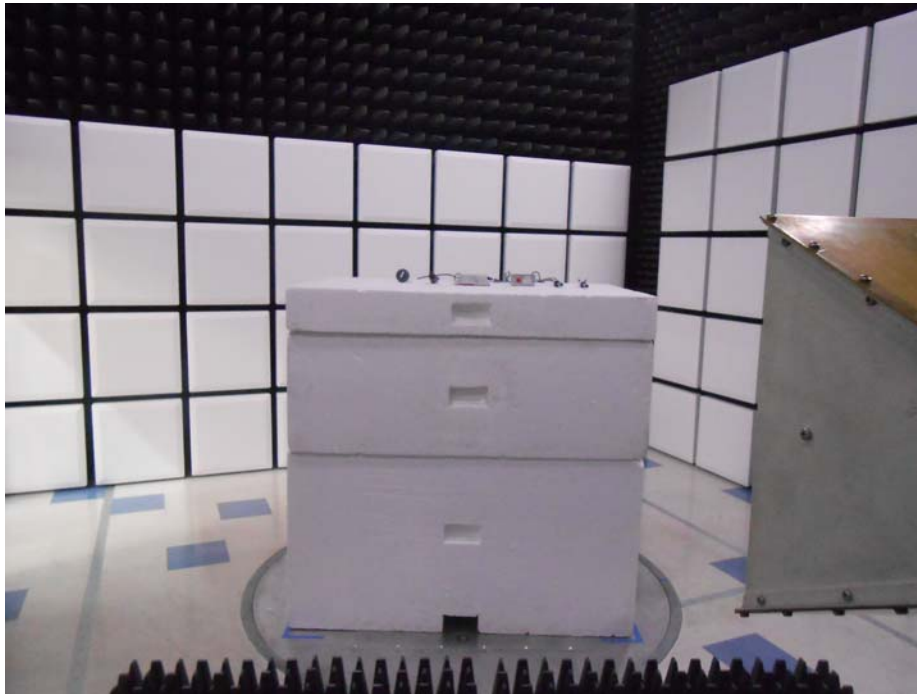


Radiated Emissions Test Setup Photos

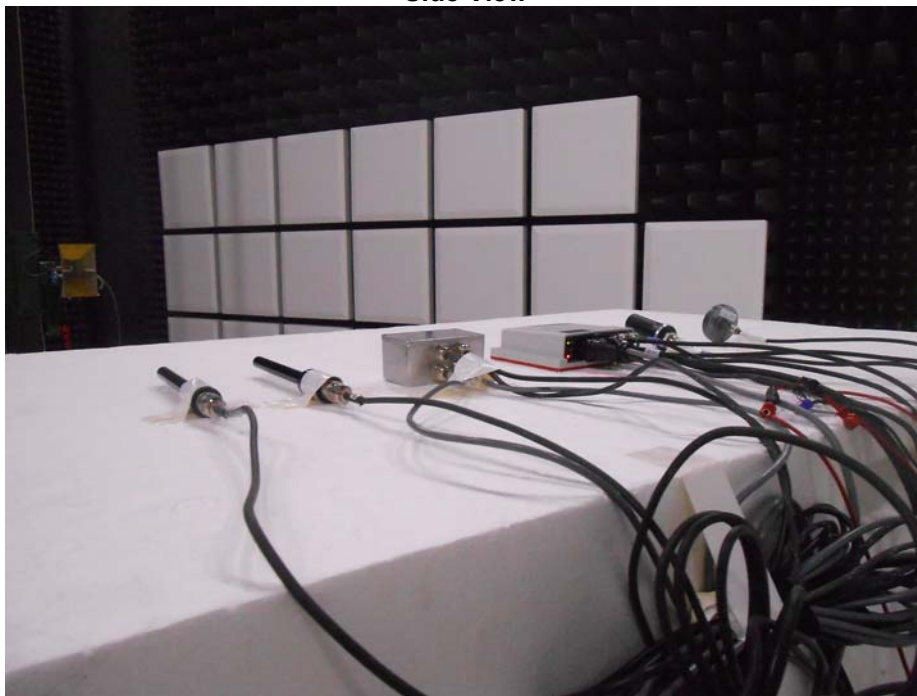


Radiated Emissions 1-15GHz Test Setup Photos

Front View



Side View



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	EMCO	3115	i00103	1/20/15	1/20/17
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	4/1/15	4/1/16
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	10/19/15	10/19/17
EMI Analyzer	Agilent	E7405A	i00379	2/11/16	2/11/17
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/27/14	7/27/16

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