



## Test Report

Prepared for: Leica Geosystems (a Hexagon Mining Co)

Model: HxGN MineDiscover Core

Description: Industrial Mining Computer. Model 846947, 867856, 864519, 867482

Serial Number: GB0001, WB0001, WG0001, WU0001

FCC ID: 2AFYJ-CORE

To

FCC Part 15B  
Class A

And

IC ICES-003 Issue 6 (January 2016)

Date of Issue: October 23, 2018

On the behalf of the applicant: **Leica Geosystems (a Hexagon Mining Co)**  
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Project Test Engineer

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All results contained herein relate only to the sample tested.

### Test Report Revision History

| Revision | Date             | Revised By  | Reason for Revision                                   |
|----------|------------------|-------------|---|
| 1.0      | March 6, 2018    | Kenneth Lee | Original Document                                     |
| 2.0      | October 23, 2018 | Amanda Reed | Modified the additional information section on page 6 |
|          |                  |             |   |
|          |                  |             |   |

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**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 C63.4-2014 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 (%) |
| 19-26                    | 31-39        |

## EUT Description

**Model:** HxGN MineDiscover Core

**Article Numbers:** 846947 (GB0001) and 867482 (WU0001)

**Description:** Industrial Mining Computer. Model 846947, 867856, 864519, 867482

**Firmware:** N/A

**Software:** N/A

**Serial Numbers:** GB0001, WB0001, WG0001, WU0001

**Highest Clock Frequency:** 2.4 GHz Radio

**Additional Information:** Out of the 4 available devices, two of them contained all the available options; therefore the testing was performed on 2 of the devices. One device contains Wi-Fi and satellite modules and the other one contains Wi-Fi and 4G-LTE module. Because it was unknown which device would have the worst case results, both devices were fully tested and the worst case results are presented in this test report. When EUT is used in this report, it is referencing both devices tested.

## EUT Operation during Tests

The EUT was placed in a test mode using the manufacturer supplied HTML. The radios in the device were put into standby.

**Accessories:**

| Qty | Description        | Manufacturer       | Model                       | S/N                                   |
|-----|--------------------|--------------------|-----------------------------|---------------------------------------|
| 1   | Test Box           | Leica              | 866389 Avengers Test Box    | N/A                                   |
| 2   | Wireless Router    | NETGEAR            | R6020                       | 4Y8379BF030A6<br>and<br>4Y8379B7035BD |
| 3   | Antenna            | MobileMark         | OD6-2400M0D2-<br>BLK-SP-335 | N/A                                   |
| 2   | Antenna            | Antcom Corporation | G5Ant-53AT1                 | 291111 and<br>291110                  |
| 1   | Antenna            | RFI                | CD2405                      | N/A                                   |
| 1   | Antenna            | See Note 1         | See Note 1                  | N/A                                   |
| 1   | External UHF Radio | SATEL              | SATEL EASy-Proof            | 1643000018                            |

**Note 1:** No Information was printed on this antenna except frequency range. (750-1250 / 1650-2700 MHz)

**Cables:**

| Qty | Description          | Length (M) | Shielding Y/N | Shielded Hood Y/N | Termination     |
|-----|----------------------|------------|---------------|-------------------|-----------------|
| 6   | TNC to N Type Cable  | 5          | Y             | Y                 | EUT to Antenna  |
| 2   | TNC to TNC Cable     | 5          | Y             | Y                 | EUT to Antenna  |
| 2   | Ethernet to TNC      | 5          | Y             | Y                 | EUT to Routers  |
| 4   | Cables from Test Box | 5          | Y             | Y                 | Test Box to EUT |
| 1   | Cable from Test Box  | 2          | Y             | Y                 | Test Box to EUT |

**Modifications:** None

### Test Results Summary

| Specification | Test Name                         | Pass, Fail, N/A | Comments          |
|---------------|-----------------------------------|-----------------|-------------------|
| 15.107        | A/C Powerline Conducted Emissions | N/A             | EUT is DC Powered |
| 15.109        | Radiated Emissions                | Pass            |                   |



### 15.109 Radiated Emissions

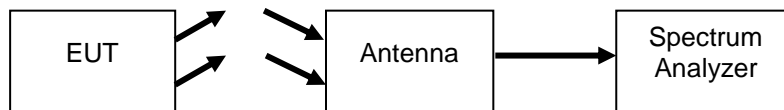
**Engineer:** Kenneth Lee

**Test Date:** 3/3/2018

#### 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 15 GHz were examined.

#### Test Setup



#### Settings below 1 GHz

RBW = 120 KHz

VBW = 300 KHz

Detector – Quasi Peak

#### Settings above 1 GHz

RBW = 1 MHz

VBW = 3 MHz

Detector – Peak

#### Sample Calculations

Corrected Value = Measured Value + Correction factor

Correction factor = ACF + Cable loss

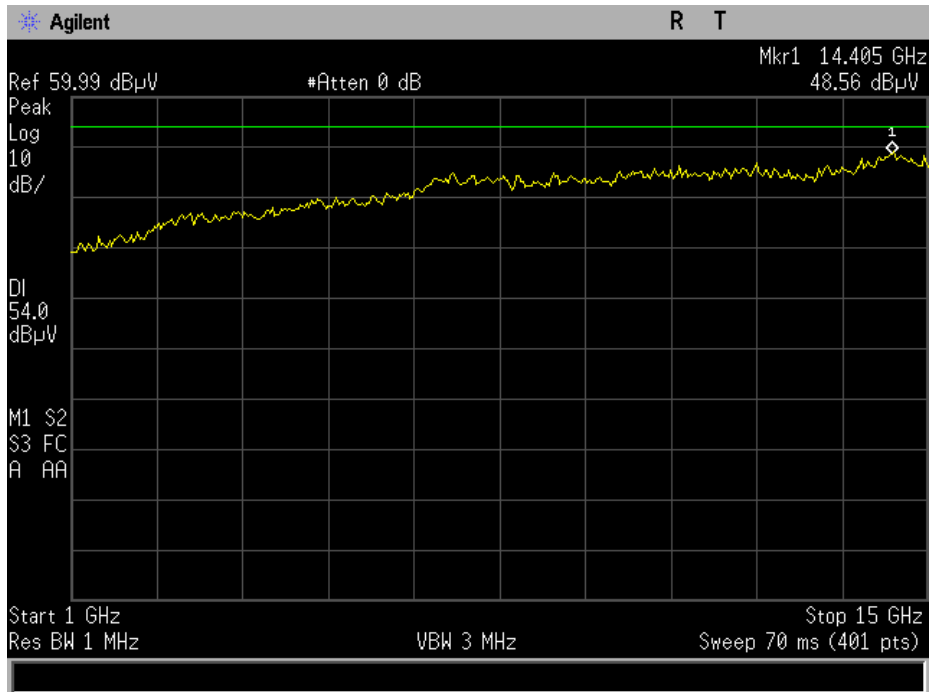
#### Radiated Emissions

| 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) |
|--------------------------|-------------------------|----------------|-------------|---------------------|------------------------|--------------------------|----------------------|
| 469.4665                 | 47.047                  | 56.9           | -9.853      | 175                 | H                      | 214                      | PK                   |
| 471.953                  | 45.466                  | 56.9           | -11.434     | 175                 | H                      | 214                      | PK                   |
| 474.796                  | 46.227                  | 56.9           | -10.673     | 175                 | H                      | 214                      | PK                   |
| 586.823                  | 46.091                  | 56.9           | -10.809     | 325                 | H                      | 199                      | PK                   |
| 590.139                  | 47.126                  | 56.9           | -9.774      | 250                 | H                      | 323                      | PK                   |
| 592.863                  | 46.387                  | 56.9           | -10.513     | 325                 | H                      | 171                      | PK                   |

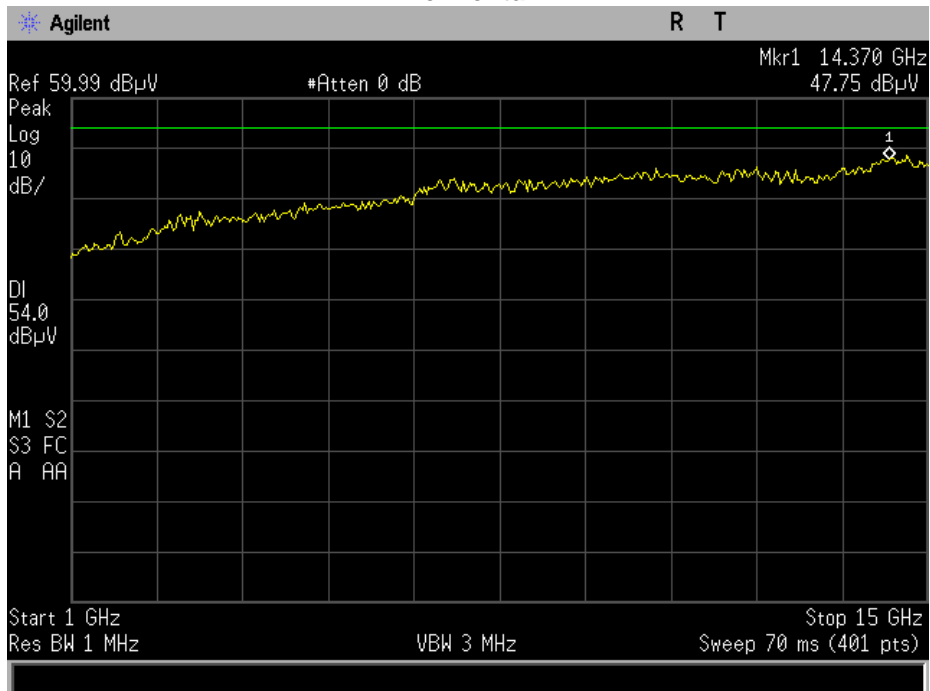


### Radiated Emissions 1-15GHz

#### Vertical

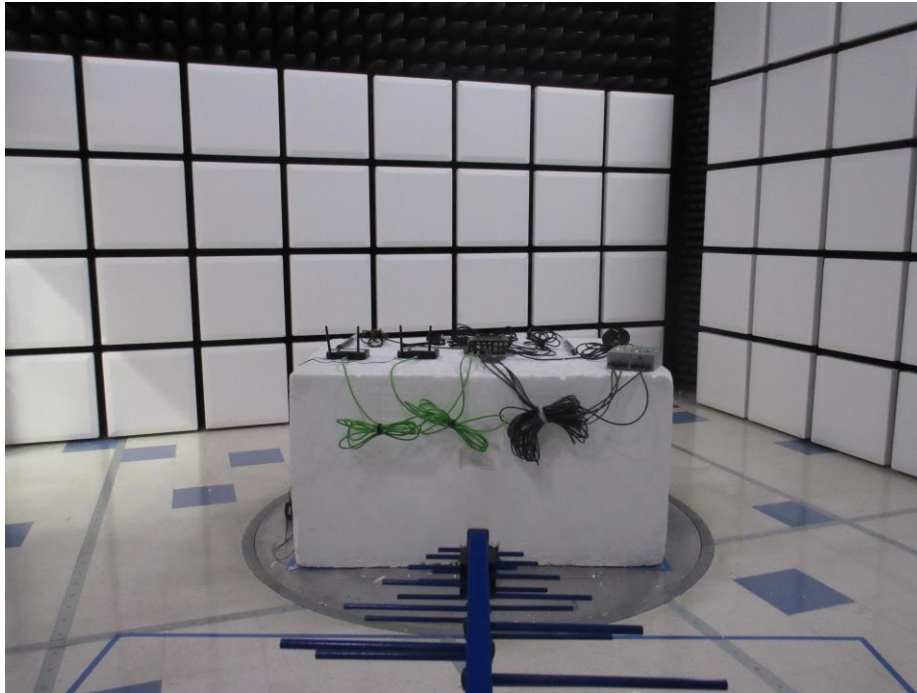


#### Horizontal



**Radiated Emissions Test Setup Photos – 30-1000 MHz**

**Front**

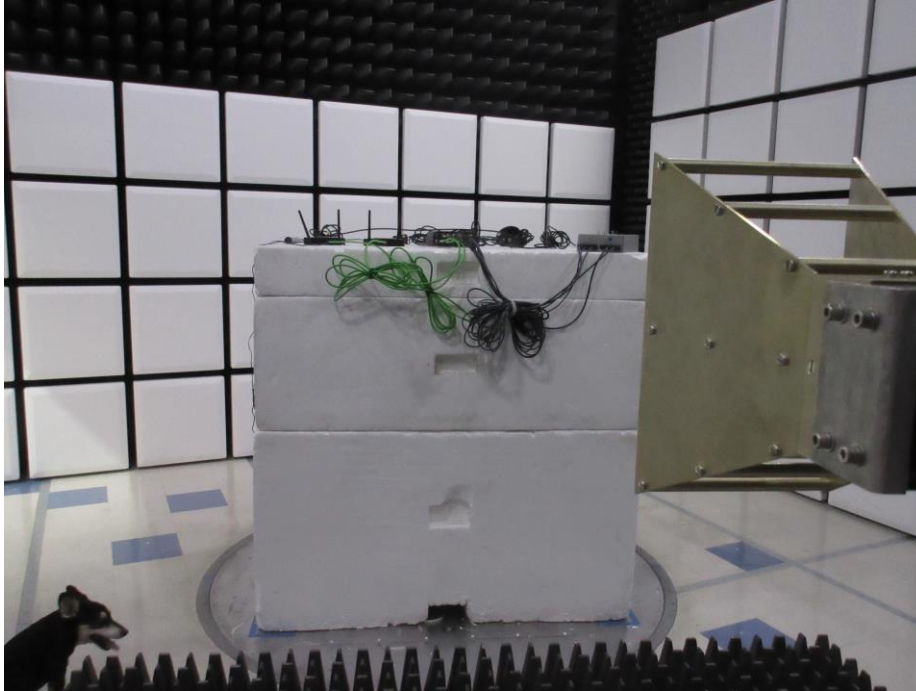


**Rear**



**Radiated Emissions Test Setup Photos – 1-15 GHz**

**Front**



**Rear**



**Test Equipment Utilized**

| Description                           | Manufacturer | Model #                       | CT Asset # | Last Cal Date | Cal Due Date |
|---------------------------------------|--------------|-------------------------------|------------|---------------|--------------|
| Horn Antenna                          | ARA          | DRG-118/A                     | i00271     | 6/16/16       | 6/16/18      |
| Humidity / Temp Meter                 | Newport      | IBTHX-W-5                     | i00282     | 6/9/17        | 6/9/18       |
| Bi-Log Antenna                        | Schaffner    | CBL 6111D                     | i00349     | 8/3/16        | 8/3/18       |
| EMI Analyzer                          | Agilent      | E7405A                        | i00379     | 2/13/18       | 2/13/19      |
| 3 Meter Semi-Anechoic Chamber         | Panashield   | 3 Meter Semi-Anechoic Chamber | i00428     | 8/15/16       | 8/15/19      |
| Preamplifier for 1-18GHz horn antenna | Miteq        | AFS44 00101 400<br>23-10P-44  | i00509     | N/A           | N/A          |

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