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Test Report:	86438TRFWL
Applicant:	Accurate Locators 1383 2nd Ave Gold Hill, Oregon 97525
Apparatus:	Zond Ground Penetrating Radar
FCC ID:	VNU2GHZANT
In Accordance With:	FCC Part 15 Subpart F Ultra-Wideband Operation
Tested By:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Authorized By:	 Roman Kuleba, Wireless Specialist
Date:	October 1, 2007
Total Number of Pages:	16

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart F. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed: Zond Ground Penetrating Radar

Specification: FCC Part 15 Subpart F

Compliance Status: Complies

Exclusions: None

Non-compliances: None

Report Release History: Original Release

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TABLE OF CONTENTS

Report Summary	2
Section 1 : Equipment Under Test.....	4
1.1 Product Identification	4
1.2 Samples Submitted for Assessment.....	4
1.3 Theory of Operation	4
1.4 Technical Specifications of the EUT	5
1.5 Block Diagram of the EUT.....	5
Section 2 : Test Conditions.....	6
2.1 Specifications	6
2.2 Deviations From Laboratory Test Procedures	6
2.3 Test Environment	6
2.4 Test Equipment.....	6
2.5 Measurement Uncertainty.....	6
Section 3 : Observations	7
3.1 Modifications Performed During Assessment	7
3.2 Record Of Technical Judgements	7
3.3 EUT Parameters Affecting Compliance	7
3.4 Test Deleted.....	7
3.5 Additional Observations	7
Section 4 : Results Summary	8
4.1 FCC Part 15 Subpart F : Test Results	9
Appendix A : Test Results.....	10
Clause 15.509(a) UWB Bandwidth	10
Clause 15.509(d) Radiated Emissions	11
Clause 15.509(e) Additional Radiated Emissions.....	13
Clause 15.509(f) Emissions of f_m above 1GHz	14
Appendix B : Setup Photographs	15
Appendix C : Block Diagram of Test Setups.....	16

Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

Zond GPR with 2GHz antenna

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
3	2 GHz antenna	None
5	Rechargable battery	None
7	20m Antenna cable	None
10	Dell XPS (P/N: GJ198A00)	(01)07899029301310
11	Radar Zond 12e GPR	8004

The first samples were received on: May 10, 2007

1.3 Theory of Operation

The EUT is a ground penetrating radar system with interchangeable antennas. The antennas are tuned to different frequencies of operation. Testing was completed with the 2GHz antenna. The GPR is used for imaging of objects in the ground.

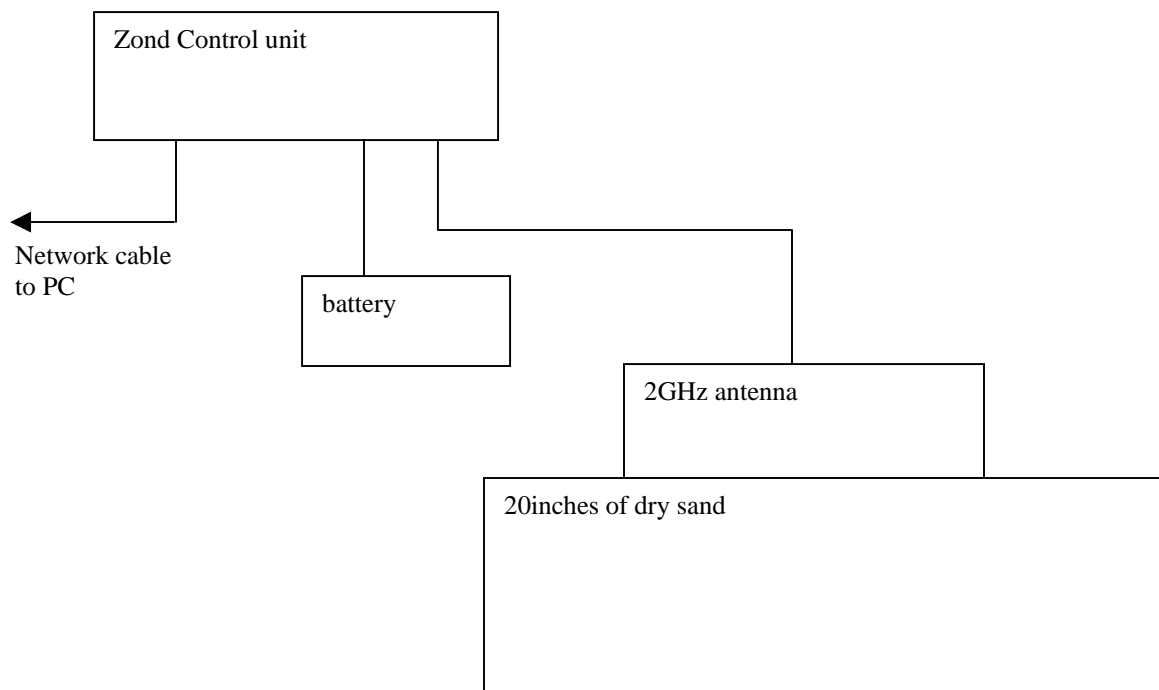
1.4 Technical Specifications of the EUT

Transmitter Frequency: $f_c = 897.175\text{MHz}$

10dB Bandwidth: 1.2425GHz

Power Source: 12VDC Battery

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart F, Ultra-Wideband Operation

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	Mar 19/08
Receiver	Rohde & Schwarz	ESVS-30	FA001445	July 26/08
Spectrum Analyzer	Hewlett-Packard	8564E	FA001367	May 09/08
Bilog	Schaffner	CBL6112B	FA001504	July 23/08
Horn Antenna #3	EMCO	3115	FA001452	May 09/08
1- 26.5 GHz Amplifier	Hewlett-Packard	HP 8449	FA001761	Aug. 10/08

COU – Calibrate on Use

NCR – No Calibration Required

2.5 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95% and can be found in Nemko Canada document MU-003.

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart F : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart F : Test Results

Part 15	Test Description	Required	Result
15.501	Scope	—	—
15.503	Definitions	—	—
15.505	Cross reference	—	—
15.507	Marketing of UWB equipment	—	—
15.509	Technical requirements for ground penetrating radars and wall imaging systems	—	—
15.509(a)	Operating frequency	Y	PASS
15.509(b)	Type of device	Y	PASS
15.509(c)	Hand held devices	N	
15.509(d)	Radiated emissions	Y	PASS
15.509(e)	Additional radiated emissions limits	Y	PASS
15.509(f)	Emissions of f_m above 960MHz	Y	PASS
15.510	Technical requirements for through-wall imaging systems	N	
15.511	Technical requirements for surveillance systems	N	
15.513	Technical requirements for medical imaging systems	N	
15.515	Technical requirements for vehicular radar systems	N	
15.517	Technical requirements for indoor UWB systems	N	
15.519	Technical requirements for hand held UWB systems	N	
15.523	Measurement procedures	NOTED	NOTED
15.525	Coordination requirements		

Notes:

Appendix A : Test Results

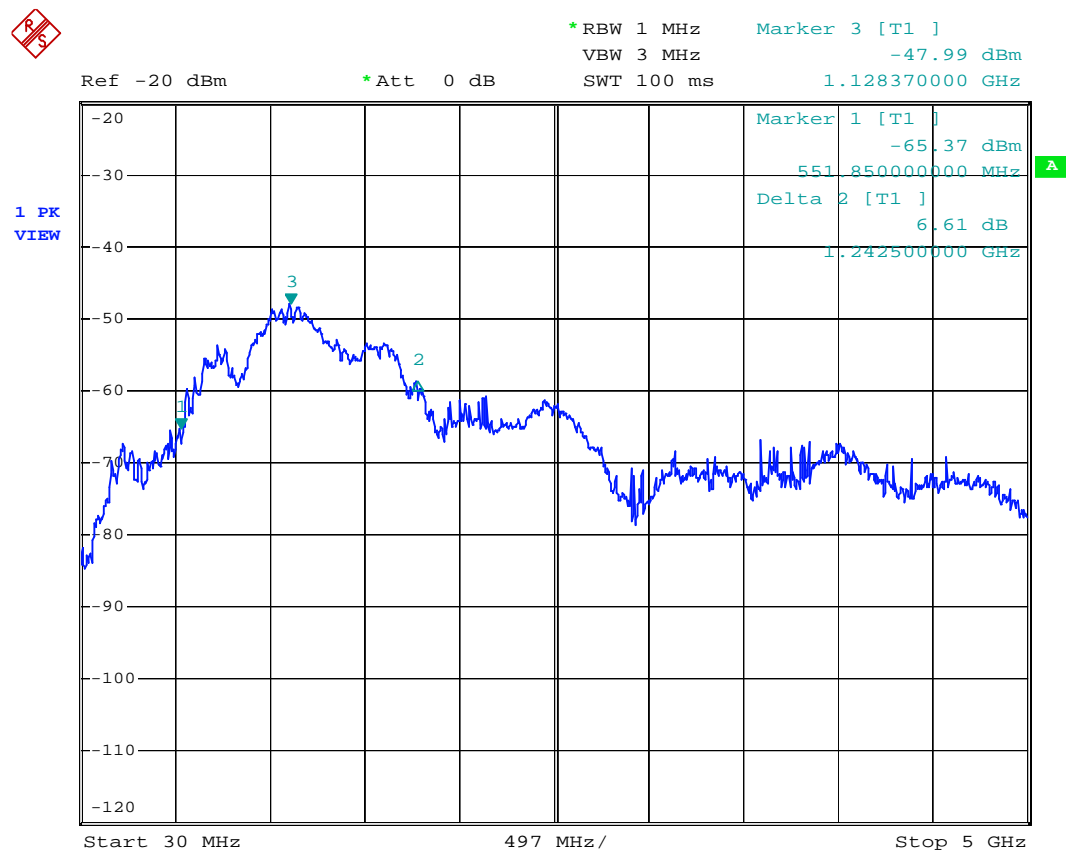
Clause 15.509(a) UWB Bandwidth

The UWB bandwidth of an imaging system operating under the provisions of this section must be below 10.6 GHz.

Test Conditions:

Sample Number:	3, 11	Temperature:	22
Date:	September 20, 2007	Humidity:	45
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Almonte

Test Results: See Attached Plots.



10dB Bandwidth

Date: 20.SEP.2007 11:45:13

Clause 15.509(d) Radiated Emissions

The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in Section 15.209. The radiated emissions above 960MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
960-1610	-65.3
1610-1990	-53.3
1990-3100	-51.3
3100-10600	-41.3
Above 10600	-51.3

Test Conditions:

Sample Number:	3, 11	Temperature:	25
Date:	July 27, 2007	Humidity:	48
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Almonte

Test Results:

See Attached Table for Results

Additional Observations:

The Spectrum was searched from 30MHz to the 10.6GHz.

Measurement equipment setup was 120kHz Quasi-peak detector for measurements below 1GHz and 1MHz RBW/VBW peak detector above 1GHz.

All Measurements were performed at 3 meters with the EUT set on 20inches of dry sand.

	Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBuV)	Ant. Factor (dB)	Amp. Gain (dB)	Cable Loss (dB)	Field Str. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	389.4015	BL	V	10.5	15.7	N/A	2.9	29.1	46.0	16.9
2	389.4015	BL	H	13.0	16.2	N/A	2.9	32.0	46.0	14.0
3	468.5758	BL	V	11.4	17.3	N/A	3.0	31.7	46.0	14.3
4	468.5758	BL	H	11.4	17.7	N/A	3.0	32.1	46.0	13.9
5	454.0350	BL	V	11.5	16.9	N/A	3.0	31.4	46.0	14.6
6	454.0350	BL	H	10.6	17.2	N/A	3.0	30.8	46.0	15.2
7	135.0629	BL	V	9.0	13.2	N/A	1.7	23.9	43.5	19.6
9	236.7299	BL	V	9.2	12.0	N/A	2.4	23.6	46.0	22.4
10	236.7299	BL	H	12.3	11.8	N/A	2.4	26.5	46.0	19.5
11	356.5716	BL	V	10.6	15.1	N/A	2.9	28.6	46.0	17.4
12	356.5716	BL	H	13.7	15.6	N/A	2.9	32.2	46.0	13.8

Clause 15.509(e) Additional Radiated Emissions

In addition to the radiated emission limits specified in the table in paragraph (d) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	-75.3
1559-1610	-75.3

Test Conditions:

Sample Number:	3, 11	Temperature:	25
Date:	July 27, 2007	Humidity:	48
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Almonte

Test Results:

See Attached Table for Results

Additional Observations:

Measurements were performed using a Peak detector with a 1kHz RBW/VBW.

All Measurements were performed at 3 meters with the EUT set on 20inches of dry sand.

	Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBuV)	Ant. Factor (dB)	Amp. Gain (dB)	Cable Loss (dB)	Field Str. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1185.6700	Horn3	V	20.5	24.7	38.0	5.3	12.5	19.9	7.4

Clause 15.509(f) Emissions of f_m above 1GHz

For UWB devices where the frequency at which the highest radiated emission occurs, f_m , is above 960MHz, there is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on f_m . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in Section 15.521

Test Conditions:

Sample Number:	3, 11	Temperature:	25
Date:	July 27, 2007	Humidity:	48
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Almonte

Test Results:

All emissions above 1GHz were below the field strength requirements of 15.509(d). This would imply compliance with the 0dBm EIRP limit within 50MHz as the correction between 1MHz and 50MHz RBW would be 17dB, which is higher than the limits of 15.509(d).

Appendix B : Setup Photographs

Spurious Emissions Setup:



Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions

