EMISSION TEST REPORT

Report Number: 3139198BOX-001

Project Number: 3139198

Testing performed on the

Ground Penetration Radars

Model: 52600, 5101

To

FCC Part 15 Subpart F – Ultra-Wideband Operation

For

Geophysical Survey Systems

Test Performed by:	Test Authorized by:
Intertek – ETL SEMKO	Geophysical Survey Systems
70 Codman Hill Road	12 Industrial Way
Boxborough, MA 01719	Salem, NH 03079

Prepared by: _____ Date: 12/13/07

Kouma Sinn, Sr. Project Engineer

Reviewed by: _____ Date: 12/13/07

Jeff Goulet, Engineering Team Leader, EMC

1.0 Job Description

1.1 Client Information:

This equipment under test (EUT) has been tested at the request of:

Company:	Geophysical Survey Systems 12 Industrial Way Salem, NH 03079
Contact:	Alan Schutz
Telephone:	(603) 893-1109
Fax:	(603) 889-3984
Email:	alan.s@geophysical.com

1.2 Equipment Under Test:

Equipment Type:	Ground Penetration Radars
Model Number(s):	52600, 5101
Serial number(s):	0191, 0015, respectively
Manufacturer:	Geophysical Survey Systems
EUT receive date:	November 15, 2007
EUT received condition:	Production units were received with no visible damage.
Test start date:	November 16, 2007 & December 7, 2007
Test end date:	December 7, 2007

1.3 Test Plan Reference: ANSI C63.4-2003

1.4 Test Configuration:

1.4.1 EUT Voltage Range:

The EUT powers from Survey Controller, SIR20.

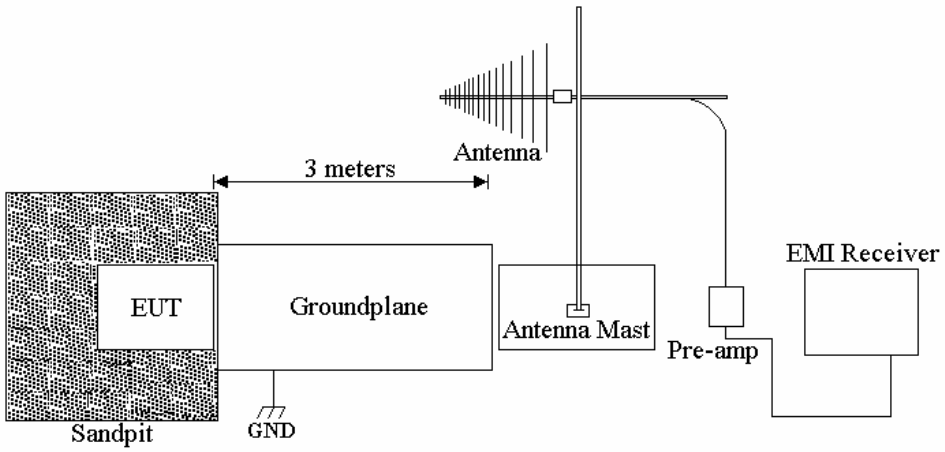
1.4.2 Cables:

Description	Shielding	Connector	Length (m)	Qty.
AC Mains	None	Plastic	2	1
AC Adapter	None	Plastic	2	1
Control	Braid	Metal	5	1
Antenna	Braid	Metal	1	1
Control	Braid	Metal	1	1
Survey Wheel	None	Plastic	1 – Coiled	1

1.4.3 Support Equipment:

Description	Manufacturer	Model	Serial No.
Survey Controller	GSSI	SIR-20 MF-20/1000	001
Power Supply	GSSI	08/4	350

1.4.4 Block Diagram:



1.5 Mode(s) of Operation:

The EUT was continuous transmitting and collecting data during testing.

1.6 Modifications Required For Compliance:

None

2.0 Test Summary:

TEST STANDARD	RESULTS	
FCC Part 15 Subpart F – Ultra-Wideband Operation		
SUB-TEST	**TEST PARAMETER**	**PASS/FAIL**
Radiated Emissions	Per Standard Specifications	Pass
Line Conducted Emissions	Not Applicable	--

Notes:

REVISION SUMMARY – The following changes have been made to this Report:

Date	Project No.	Project Handler	Page(s)	Item	**Description of Change**

3.0 Sample Calculations:

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

Level in μV/m = [10(32 dBμV/m)/20] = 39.8 μV/m

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(48.1\ dB\mu V / 20)}$ = 254 μV/m

4.0 Measurement Uncertainty:

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.
The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be:

±3.5 dB at 10m and ±3.8 dB at 3m

The expanded uncertainty (k = 2) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

±2.6 dB

The expanded uncertainty (k = 2) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

±3.2 for ISN and voltage probe measurements
±3.1 for current probe measurements

5.0 Site Description:

Test Site(s): 2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

Extended Site 2 For FCC Part 15 Subpart F – Ultra-Wideband Testing:

The test site used during testing was made in according with FCC Part 15F. The test site was constructed with a dimension of 9 ft x 9 ft x 48 inches deep. The whole area was filled with dry sand. The equipment under test (EUT) was placed directly on the sand while the receiving antenna was placed on the blacktop at a distance of 3m from the closest point of the EUT. A groundplane with a dimension of 8 ft x 12 ft was placed between the EUT and receiving antenna and connected to earth ground via a ground rod.

6.0 Testing Procedure

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

All support equipment was remotely located. The EUT was placed directly on the sand 3 meters away from the receiving antenna with groundplane in between.

Initial testing was performed to maximize the emissions. The system was rotated every 45° and cables were oriented to get the worst emissions, the antenna height was varied from 1 meter to 4 meters above the ground, and the antenna polarization was changed. The EUT azimuth of maximum emissions was recorded. The worst-case orientation will be used in the final testing.

Test Results: Pass

Test Standard: FCC Part 15 Subpart F – Ultra-Wideband Operation

Test: Radiated Emissions

Performance Criterion: Not Applicable

EUT Operating Voltage: Powered from survey controller.

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	17	Humidity (%):	33	Pressure (hPa):	1050
		10		34		1050
Pretest Verification Performed:	Yes		Equipment under Test:		52600, 5101	
Test Engineer(s):	Kouma Sinn		EUT Serial Number:		0191, 0015, respectively	

Maximum Test Disturbance Parameters: Emissions below specified limits

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	ANTENNA	EMCO	3142	9711-1223	02/06/2008
3	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL027	12/04/2007
4	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL028	12/04/2007
5	EMI Receiver Set W/RF Filter	Hewlett Packard	8542E	Littleton Asset # 145-092	02/16/2008
6	RF FILTER	Hewlett Packard	85420E	Littleton Asset # 145-092	02/16/2008
7	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	11/26/2008
8	HORN ANTENNA	EMCO	3115	9610-4980	06/18/2008
9	40GHz Cable	Megaphase	TM40-K1K1-197	7030801 001	05/23/2008
10	40 GHz Cable	Megaphase	TM40-K1K1-197	7030801 002	05/23/2008
11	PREAMPLFIER 1- 40 GHz	MITEQ	NSP4000-NF	507145	11/09/2008

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	2/07/05 Revision

Test Results:

Model: 52600

Radiated Emissions From 30MHz-960MHz

Company: Geophysical Survey Systems
Model #: 52600
Serial #: 191
Engineers: Kouma Sinn
Project #: 3139198
Standard: FCC Part 15 Subpart B Class B
Receiver: Little Receiver
PreAmp: PRE8 11-09-08.txt
Location: 2
Date(s): 11/16/07
Limit Distance (m): 3
Test Distance (m): 3
Antenna & Cables: N
Bands: N, LF, HF, SHF
Antenna: LOG2 02-06-08 V3.txt LOG2 02-06-08 H3.txt
Cable(s): CBL027 12-04-2007.txt CBL028 12-04-2007.txt
Barometer: BAR2
Temp/Humidity/Pressure: 17C 33% 1050mbar
PreAmp Used? (Y or N): N
Voltage/Frequency: Powered from SIR20
Frequency Range: 30-960MHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	42.700	18.6	10.7	0.8	0.0	0.0	30.1	40.0	-9.9	120/300 kHz
QP	V	115.200	5.1	7.3	1.2	0.0	0.0	13.7	43.5	-29.8	120/300 kHz
QP	V	133.200	12.0	6.7	1.3	0.0	0.0	20.0	43.5	-23.5	120/300 kHz
QP	V	181.500	9.5	9.0	1.6	0.0	0.0	20.0	43.5	-23.5	120/300 kHz
QP	V	201.000	2.9	10.5	1.7	0.0	0.0	15.0	43.5	-28.5	120/300 kHz
QP	V	242.000	4.8	12.3	1.8	0.0	0.0	19.0	46.0	-27.0	120/300 kHz
QP	V	261.900	9.1	12.9	1.9	0.0	0.0	23.9	46.0	-22.1	120/300 kHz
QP	V	280.000	12.1	13.4	2.0	0.0	0.0	27.5	46.0	-18.5	120/300 kHz
QP	V	299.000	12.5	14.2	2.0	0.0	0.0	28.7	46.0	-17.3	120/300 kHz
QP	V	334.000	6.7	14.7	2.1	0.0	0.0	23.5	46.0	-22.5	120/300 kHz
QP	V	369.000	4.8	15.3	2.3	0.0	0.0	22.3	46.0	-23.7	120/300 kHz
QP	V	398.500	11.2	15.8	2.3	0.0	0.0	29.3	46.0	-16.7	120/300 kHz
QP	V	608.000	2.4	19.9	2.9	0.0	0.0	25.3	46.0	-20.7	120/300 kHz
QP	V	665.000	4.1	20.1	3.1	0.0	0.0	27.3	46.0	-18.7	120/300 kHz
QP	V	758.000	2.1	21.2	3.3	0.0	0.0	26.5	46.0	-19.5	120/300 kHz
QP	V	825.000	2.3	21.9	3.4	0.0	0.0	27.6	46.0	-18.4	120/300 kHz

Test Results Continued:

Model: 52600

Radiated Emissions From 960MHz-10GHz

Company: Geophysical Survey Systems
Model #: 52600
Serial #: 191
Engineers: Kouma Sinn
Project #: 3139198
Standard: FCC Part 15 Subpart F
Receiver: ROS001
PreAmp: PRE8 11-09-08.txt
PreAmp Used? (Y or N): y

Location: 2
Date(s): 12/07/07
Limit Distance (m): 3
Test Distance (m): 1
Voltage/Frequency: Powered from SIR20

Antenna & Cables: lf
Antenna: HORN3 V1m 6-18-08.txt
Cable(s): MEG001.txt
Barometer: BAR2

Bands: N, LF, HF, SHF
HORN3 H1m 6-18-08.txt
MEG002.txt

Temp/Humidity/Pressure: 10C 34% 1050mbar

Frequency Range: 960MHz-10GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor + GND Factor(dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	GND +DF Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	
RMS	V	960.000	30.4	28.0	3.5	20.6	14.2	27.2	29.9	-2.7	1M/3MHz	
RMS	V	982.725	29.6	28.0	3.6	20.6	14.2	26.5	29.9	-3.4	1M/3MHz	
RMS	V	1000.000	29.2	24.3	3.6	20.6	14.2	22.4	29.9	-7.5	1M/3MHz	
RMS	V	1023.847	0.0	24.4	3.7	20.6	14.2	-6.7	29.9	-36.6	1M/3MHz	
RMS	V	1084.440	28.3	24.6	3.8	20.6	14.2	21.9	29.9	-8.0	1M/3MHz	
RMS	V	1105.000	27.6	24.7	3.8	20.6	14.2	21.3	29.9	-8.6	1M/3MHz	
RMS	V	1224.480	26.7	25.1	4.0	20.6	14.2	21.0	29.9	-8.9	1M/3MHz	
RMS	V	1161.282	25.7	24.9	3.9	20.6	14.2	19.6	29.9	-10.3	1M/3MHz	
RMS	V	1244.600	24.4	25.2	4.1	20.6	14.2	18.9	29.9	-11.0	1M/3MHz	
RMS	V	1303.000	25.3	25.4	4.2	20.7	14.2	20.0	29.9	-9.9	1M/3MHz	
RMS	V	1397.000	26.1	25.7	4.4	20.7	14.2	21.3	29.9	-8.6	1M/3MHz	
RMS	V	1482.680	25.8	26.0	4.5	20.7	14.2	21.5	29.9	-8.4	1M/3MHz	
RMS	V	1554.500	25.9	26.3	4.6	20.7	14.2	22.0	29.9	-7.9	1M/3MHz	
RMS	V	1665.000	24.6	26.8	4.8	20.8	14.2	21.2	41.9	-20.7	1M/3MHz	
RMS	V	1786.100	23.1	27.4	5.0	20.8	14.2	20.5	41.9	-21.4	1M/3MHz	
RMS	V	1885.570	21.5	27.8	5.2	20.8	14.2	19.5	41.9	-22.4	1M/3MHz	
RMS	V	2061.500	20.8	28.4	5.4	20.9	14.2	19.6	43.9	-24.3	1M/3MHz	
RMS	V	2678.356	19.4	29.8	6.3	21.1	14.2	20.2	43.9	-23.7	1M/3MHz	NF
RMS	V	3919.800	21.3	33.0	7.8	21.7	14.2	26.2	53.9	-27.7	1M/3MHz	NF
RMS	V	5000.000	21.0	35.0	9.0	22.6	14.2	28.2	53.9	-25.7	1M/3MHz	NF
RMS	V	5501.000	23.0	36.1	9.5	22.7	14.2	31.7	53.9	-22.2	1M/3MHz	NF
RMS	V	5881.763	23.7	35.9	9.9	22.8	14.2	32.6	53.9	-21.3	1M/3MHz	NF
RMS	V	6679.300	25.8	36.0	10.7	22.1	14.2	36.2	53.9	-17.7	1M/3MHz	NF
RMS	V	7468.937	22.1	37.8	11.4	21.2	14.2	36.0	53.9	-17.9	1M/3MHz	NF
RMS	V	8274.549	22.3	38.0	12.1	20.1	14.2	38.1	53.9	-15.8	1M/3MHz	NF
RMS	V	9000.000	21.3	38.9	12.8	19.6	14.2	39.2	53.9	-14.7	1M/3MHz	NF
RMS	V	10000.000	20.4	40.6	13.6	18.8	14.2	41.6	53.9	-12.3	1M/3MHz	NF
1164-1240MHz and 1559-1610MHz ResBW = 1kHz, VidBW = 3MHz												
RMS	V	1169.360	3.0	24.9	3.9	20.6	14.2	-2.9	19.9	-22.8	1/3MHz	
RMS	V	1241.759	2.8	25.2	4.1	20.6	14.2	-2.8	19.9	-22.7	1/3MHz	
RMS	V	1303.430	3.3	25.4	4.2	20.7	14.2	-2.0	19.9	-21.9	1/3MHz	
RMS	V	1329.350	5.6	25.5	4.2	20.7	14.2	0.4	19.9	-19.5	1/3MHz	
RMS	V	1364.200	5.6	25.6	4.3	20.7	14.2	0.6	19.9	-19.3	1/3MHz	
RMS	V	1437.400	3.7	25.9	4.4	20.7	14.2	-0.9	19.9	-20.8	1/3MHz	
RMS	V	1508.100	4.3	26.1	4.6	20.7	14.2	0.1	19.9	-19.8	1/3MHz	
RMS	V	1579.000	4.1	26.4	4.7	20.7	14.2	0.3	19.9	-19.6	1/3MHz	
RMS	V	1610.000	1.5	26.6	4.7	20.7	14.2	-2.1	19.9	-22.0	1/3MHz	

Test Results Continued:

Model: 52600

Highest Radiated Emissions Above 960MHz

Company:	Geophysical Survey Systems		Antenna & Cables:	lf	Bands: N, LF, HF, SHF
Model #:	52600		Antenna:	HORN3 V1m 6-18-08.txt	HORN3 H1m 6-18-08.txt
Serial #:	191		Cable(s):	MEG001.txt	MEG002.txt
Engineers:	Kouma Sinn	Location: 2	Barometer:	BAR2	
Project #:	3139198	Date(s): 12/07/07			
Standard:	FCC Part 15 Subpart F		Temp/Humidity/Pressure:	10C	34% 1050mbar
Receiver:	ROS001	Limit Distance (m): 3			
PreAmp:	PRE8 11-09-08.txt	Test Distance (m): 1			

PreAmp Used? (Y or N): y Voltage/Frequency: Powered from SIR20 Frequency Range: 960MHz-10GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor + GND Factor(dB)

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	GND+DF Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
RMS	V	961.820	35.0	28.0	3.5	20.6	14.2	31.8	70.8	-39.0	3/3MHz
PK	V	961.820	50.7	28.0	3.5	20.6	14.2	47.5	70.8	-23.3	3/3MHz

Test Results Continued:

Model: 5101

Radiated Emissions From 30-960MHz											
Company:	Geophysical Survey Systems						Antenna & Cables:	N	Bands: N, LF, HF, SHF		
Model #:	5101						Antenna:	LOG2 02-06-08 V3.txt	LOG2 02-06-08 H3.txt		
Serial #:	0015						Cable(s):	MEG001.txt	MEG002.txt		
Engineers:	Kouma Sinn			Location:	2		Barometer:	BAR2			
Project #:	3139198	Date(s):	12/07/07								
Standard:	FCC Part 15 Subpart B Class B						Temp/Humidity/Pressure:	6C	38%	1050mbar	
Receiver:	Littleton Reciever		Limit Distance (m):	3							
PreAmp:	PRE8 11-09-08.txt		Test Distance (m):	3							
PreAmp Used? (Y or N):	N	Voltage/Frequency:	Powered from SIR20			Frequency Range:	30-960MHz				
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)											
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW											

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	43.000	25.4	10.7	0.7	0.0	0.0	36.7	40.0	-3.3	120/300 kHz
QP	V	117.000	15.5	7.1	1.1	0.0	0.0	23.8	43.5	-19.7	120/300 kHz
QP	V	129.000	15.8	6.5	1.2	0.0	0.0	23.5	43.5	-20.0	120/300 kHz
QP	V	138.000	16.7	6.9	1.2	0.0	0.0	24.8	43.5	-18.7	120/300 kHz
QP	V	155.000	12.3	8.6	1.3	0.0	0.0	22.2	43.5	-21.3	120/300 kHz
QP	V	169.000	6.3	8.7	1.4	0.0	0.0	16.4	43.5	-27.1	120/300 kHz
QP	V	182.000	12.0	9.0	1.4	0.0	0.0	22.5	43.5	-21.0	120/300 kHz
QP	V	195.000	10.6	10.2	1.5	0.0	0.0	22.3	43.5	-21.2	120/300 kHz
QP	V	209.000	11.9	10.9	1.6	0.0	0.0	24.4	43.5	-19.1	120/300 kHz
QP	V	223.000	15.0	11.7	1.6	0.0	0.0	28.3	46.0	-17.7	120/300 kHz
QP	V	230.000	14.8	12.0	1.6	0.0	0.0	28.4	46.0	-17.6	120/300 kHz
QP	V	240.000	14.0	12.3	1.7	0.0	0.0	27.9	46.0	-18.1	120/300 kHz
QP	V	269.000	13.7	13.1	1.8	0.0	0.0	28.6	46.0	-17.4	120/300 kHz
QP	V	303.000	12.6	14.2	1.9	0.0	0.0	28.7	46.0	-17.3	120/300 kHz
QP	V	346.000	11.2	15.0	2.0	0.0	0.0	28.2	46.0	-17.8	120/300 kHz
QP	V	384.000	8.1	15.5	2.2	0.0	0.0	25.7	46.0	-20.3	120/300 kHz
QP	V	426.000	8.2	16.5	2.3	0.0	0.0	27.0	46.0	-19.0	120/300 kHz
QP	V	465.000	7.2	18.1	2.4	0.0	0.0	27.6	46.0	-18.4	120/300 kHz
QP	V	483.000	3.8	18.9	2.4	0.0	0.0	25.1	46.0	-20.9	120/300 kHz
QP	V	533.000	1.6	19.0	2.6	0.0	0.0	23.2	46.0	-22.8	120/300 kHz
QP	V	591.000	3.6	19.6	2.7	0.0	0.0	26.0	46.0	-20.0	120/300 kHz
QP	V	609.500	0.9	19.9	2.8	0.0	0.0	23.6	46.0	-22.4	120/300 kHz
QP	V	665.000	4.8	20.1	2.9	0.0	0.0	27.8	46.0	-18.2	120/300 kHz
QP	V	734.000	0.8	20.9	3.1	0.0	0.0	24.8	46.0	-21.2	120/300 kHz
QP	V	767.000	2.1	21.3	3.1	0.0	0.0	26.6	46.0	-19.4	120/300 kHz
QP	V	778.000	2.0	21.5	3.2	0.0	0.0	26.7	46.0	-19.3	120/300 kHz
QP	V	391.000	10.4	15.6	2.2	0.0	0.0	28.2	46.0	-17.8	120/300 kHz
QP	V	816.000	0.4	21.8	3.2	0.0	0.0	25.4	46.0	-20.6	120/300 kHz
QP	V	846.000	0.5	22.7	3.3	0.0	0.0	26.5	46.0	-19.5	120/300 kHz
QP	V	906.000	-1.6	23.4	3.4	0.0	0.0	25.3	46.0	-20.7	120/300 kHz
QP	V	946.000	-4.4	23.7	3.5	0.0	0.0	22.7	46.0	-23.3	120/300 kHz
QP	V	960.000	-3.2	23.7	3.5	0.0	0.0	24.1	46.0	-21.9	120/300 kHz

Test Results Continued:

Model: 5101

Radiated Emissions From 960MHz-10GHz

Company: Geophysical Survey Systems
Model #: 5101
Serial #: 0015
Engineers: Kouma Sinn
Project #: 3139198
Standard: FCC Part 15 Subpart F
Receiver: ROS001
PreAmp: PRE8 11-09-08.txt
PreAmp Used? (Y or N): y

Location: 2
Date(s): 12/07/07
Limit Distance (m): 3
Test Distance (m): 1
Voltage/Frequency: Powered from SIR20

Antenna & Cables: lf
Antenna: HORN3 V1m 6-18-08.txt
Cable(s): MEG001.txt
Barometer: BAR2
Temp/Humidity/Pressure: 10C 34% 1050mbar

Bands: N, LF, HF, SHF
HORN3 H1m 6-18-08.txt
MEG002.txt

Frequency Range: 960MHz-10GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor + GND Factor(dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	GND & DF Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	
RMS	V	960.000	31.3	28.0	3.5	20.6	14.2	28.0	29.9	-1.9	1/3MHz	
RMS	V	968.417	30.1	28.0	3.6	20.6	14.2	26.9	29.9	-3.0	1/3MHz	
RMS	V	980.000	30.5	28.0	3.6	20.6	14.2	27.3	29.9	-2.6	1/3MHz	
RMS	V	991.000	29.8	28.0	3.6	20.6	14.2	26.7	29.9	-3.2	1/3MHz	
RMS	V	1000.000	30.3	24.3	3.6	20.6	14.2	23.5	29.9	-6.4	1/3MHz	
RMS	V	1123.246	29.4	24.7	3.9	20.6	14.2	23.2	29.9	-6.7	1/3MHz	
RMS	V	1142.028	29.7	24.8	3.9	20.6	14.2	23.6	29.9	-6.3	1/3MHz	
RMS	V	1272.545	27.3	25.3	4.1	20.6	14.2	21.9	29.9	-8.0	1/3MHz	
RMS	V	1377.770	26.4	25.7	4.3	20.7	14.2	21.5	29.9	-8.4	1/3MHz	
RMS	V	1434.869	25.1	25.9	4.4	20.7	14.2	20.5	29.9	-9.4	1/3MHz	
RMS	V	1745.000	22.3	27.2	4.9	20.8	14.2	19.5	41.9	-22.4	1/3MHz	NF
RMS	V	2678.356	21.0	29.8	6.3	21.1	14.2	21.8	43.9	-22.1	1/3MHz	NF
RMS	V	3919.800	21.3	33.0	7.8	21.7	14.2	26.2	53.9	-27.7	1/3MHz	NF
RMS	V	5000.000	21.0	35.0	9.0	22.6	14.2	28.2	53.9	-25.7	1/3MHz	NF
RMS	V	5501.000	23.0	36.1	9.5	22.7	14.2	31.7	53.9	-22.2	1/3MHz	NF
RMS	V	5881.763	23.7	35.9	9.9	22.8	14.2	32.6	53.9	-21.3	1/3MHz	NF
RMS	V	6679.300	25.8	36.0	10.7	22.1	14.2	36.2	53.9	-17.7	1/3MHz	NF
RMS	V	7468.937	22.1	37.8	11.4	21.2	14.2	36.0	53.9	-17.9	1/3MHz	NF
RMS	V	8274.549	22.3	38.0	12.1	20.1	14.2	38.1	53.9	-15.8	1/3MHz	NF
RMS	V	9000.000	21.3	38.9	12.8	19.6	14.2	39.2	53.9	-14.7	1/3MHz	NF
RMS	V	10000.000	20.4	40.6	13.6	18.8	14.2	41.6	53.9	-12.3	1/3MHz	NF
1164-1240MHz ResBW=1kHz, VidBW = 3MHz												
RMS	V	1165.218	3.6	24.9	3.9	20.6	14.2	-2.4	19.9	-22.3	1k/3M	
RMS	V	1170.244	10.2	24.9	3.9	20.6	14.2	4.3	19.9	-15.6	1k/3M	
RMS	V	1181.367	5.1	25.0	4.0	20.6	14.2	-0.8	19.9	-20.7	1k/3M	
RMS	V	1202.533	4.0	25.0	4.0	20.6	14.2	-1.8	19.9	-21.7	1k/3M	
RMS	V	1219.896	3.4	25.1	4.0	20.6	14.2	-2.3	19.9	-22.2	1k/3M	
RMS	V	1233.298	4.0	25.1	4.1	20.6	14.2	-1.6	19.9	-21.5	1k/3M	
RMS	V	1240.000	3.8	25.2	4.1	20.6	14.2	-1.8	19.9	-21.7	1k/3M	
1559-1610MHz ResBW=1kHz, VidBW = 3MHz												
RMS	V	1559.000	-3.6	26.4	4.6	20.7	14.2	-7.5	19.9	-27.4	1k/3M	
RMS	V	1575.557	5.0	26.4	4.7	20.7	14.2	1.1	19.9	-18.8	1k/3M	
RMS	V	1585.000	-0.5	26.5	4.7	20.7	14.2	-4.3	19.9	-24.2	1k/3M	
RMS	V	1602.436	-1.1	26.6	4.7	20.7	14.2	-4.7	19.9	-24.6	1k/3M	
RMS	V	1610.000	-2.2	26.6	4.7	20.7	14.2	-5.8	19.9	-25.7	1k/3M	

Test Results Continued:

Model: 5101

Highest Radiated Emissions Above 960MHz

Company:	Geophysical Survey Systems		Antenna & Cables:	lf	Bands: N, LF, HF, SHF
Model #:	5101		Antenna:	HORN3 V1m 6-18-08.txt	HORN3 H1m 6-18-08.txt
Serial #:	0015		Cable(s):	MEG001.txt	MEG002.txt
Engineers:	Kouma Sinn	Location: 2	Barometer:	BAR2	
Project #:	3139198	Date(s): 12/07/07			
Standard:	FCC Part 15 Subpart F		Temp/Humidity/Pressure:	10C	34% 1050mbar
Receiver:	ROS001	Limit Distance (m): 3			
PreAmp:	PRE8 11-09-08.txt	Test Distance (m): 1			

PreAmp Used? (Y or N): y Voltage/Frequency: Powered from SIR20 Frequency Range: 960MHz-10GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor + GND Factor(dB)

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	GND & DF Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
RMS	V	963.968	34.9	28.0	3.6	20.6	14.2	31.7	70.8	-39.1	3/3MHz
PK	V	963.968	50.3	28.0	3.6	20.6	14.2	47.1	70.8	-23.7	3/3MHz

Model 52600 Setup Photo 1

Model 52600 Setup Photo 2

Model 5101 Setup Photo 1

Model 5101 Setup Photo 2