EMISSION TEST REPORT

Report Number: 3153005BOX-001d

Project Number: 3153005

Testing performed on the

Ground Penetration Radar

Model: 50400

To

FCC Part 15 Subpart F – Ultra-Wideband Operation

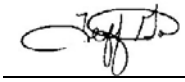
For

Geophysical Survey Systems, Inc.

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

Prepared by:  Date: 10/03/08

Kouma Sinn, Sr. Project Engineer

Reviewed by:  Date: 10/03/08

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, Inc. 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 Radar
Model Number(s):	50400
Serial number(s):	001
Manufacturer:	Geophysical Survey Systems, Inc.
EUT receive date:	May 22, 2008
EUT received condition:	Production unit was received with no visible damage
Test start date:	May 22, 2008
Test end date:	May 22, 2008

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, Model SIR20.

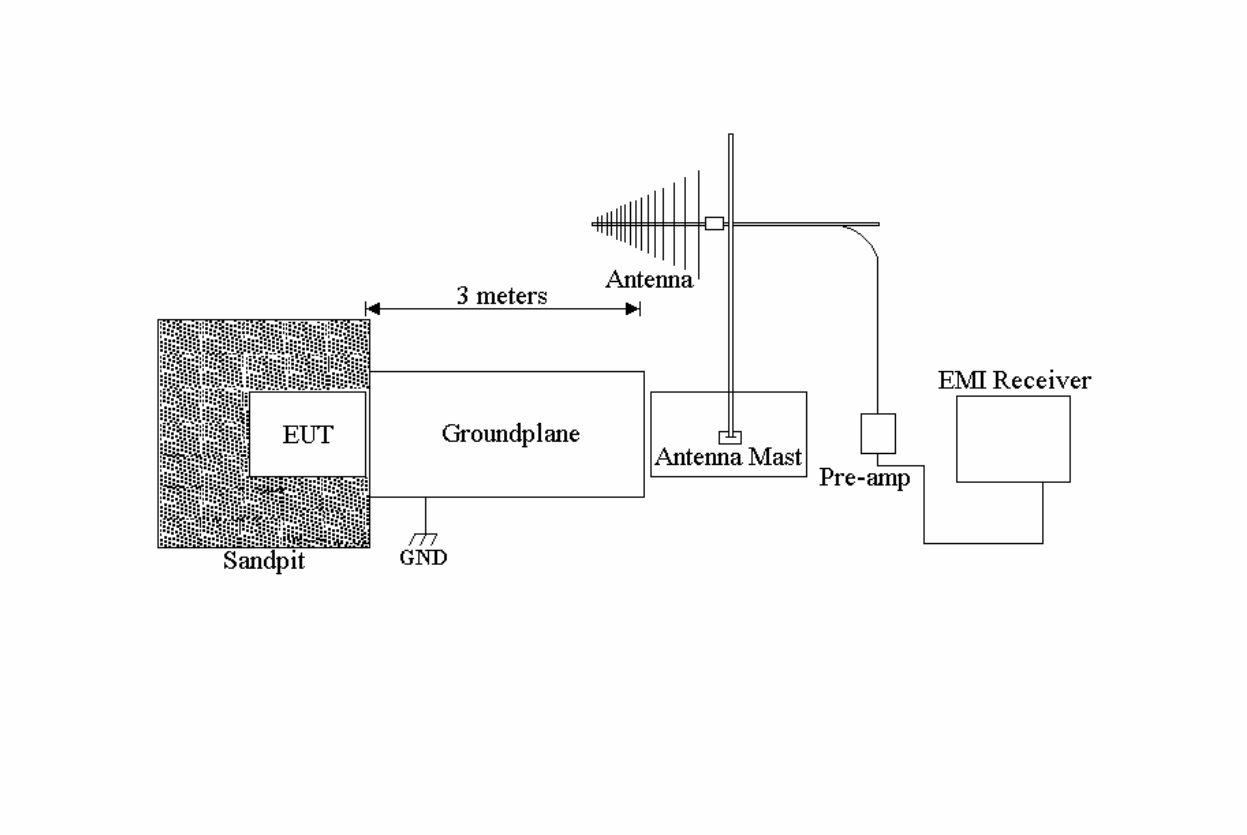
1.4.2 Cables:

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

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
10 dB Bandwidth	The UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. The fractional bandwidth shall be equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.	Pass
Line Conducted Emissions	Not Applicable	--

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

Date	Project No.	Project Handler	Page(s)	Item	Description of Change
5/30/08	3153005	Kouma Sinn	12, 13, 16, 17, 20, 21	Radiated Emissions Data	Changed data from 960MHz-10GHz from AVG to RMS
7/14/08	3153005	Kouma Sinn	Whole report	Model # change	Changed model # from 4105A to 42000
7/14/08	3153005		28	10 dB BW for Model 4105A	Changed the statement “The UWB Bandwidth >500MHz” to “The UWB Bandwidth is greater than 500MHz, therefore, fractional bandwidth calculation is not necessary”
10/02/08	3153005	Kouma Sinn	Whole Report	Separated report for each model #	The original report has three models in it. Need to separate report for each model for FCC certification.

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 (%):	39	Pressure (hPa):	986
Pretest Verification Performed:		Yes		Equipment under Test:		50400	
Test Engineer(s):	Kouma Sinn			EUT Serial Number:		001	

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	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	01/25/2009
2	ANTENNA	EMCO	3142	9711-1225	06/05/2008
3	Thermo/Hygro Meter	Fisher Scientific	11-661-13	51200654	08/17/2008
4	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL027	12/06/2008
5	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL028	12/06/2008
6	HORN ANTENNA	EMCO	3115	9610-4980	06/18/2008
7	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	03/27/2009

Software Utilized:

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

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail N/A	Comment
Around the EUT	Per Standard	Per Standard	Pass	None

Test Results:

Radiated Emissions From 30-960MHz

Company: GSSI
Model #: 50400
Serial #: 0 0 1
Engineers: Kouma Sinn
Project #: 3153005
Standard: FCC Part 15 Subpart F
Receiver: R&S ESCI (ROS002)
PreAmp: PRE9 03-27-09.txt
PreAmp Used? (Y or N): N

Location: 2
Date(s): 05/22/08
Limit Distance (m): 3
Test Distance (m): 3
Voltage/Frequency: DC Power

Antenna & Cables: N
Antenna: LOG4 06-05-08 V3.txt
Cable(s): CBL027 12-06-08.txt
Barometer: FIS005
Temp/Humidity/Pressure: 17C 39% 986mbar

Bands: N, LF, HF, SHF
LOG4 06-05-08 H3.txt
CBL028 12-06-08.txt
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	30.000	13.4	17.1	0.6	0.0	0.0	31.2	40.0	-8.9	120/300 kHz
QP	V	47.860	20.6	9.3	0.7	0.0	0.0	30.6	40.0	-9.4	120/300 kHz
QP	V	57.840	23.4	9.1	0.8	0.0	0.0	33.3	40.0	-6.7	120/300 kHz
QP	V	63.000	20.9	8.7	0.8	0.0	0.0	30.4	40.0	-9.6	120/300 kHz
QP	V	74.000	21.9	7.5	0.9	0.0	0.0	30.3	40.0	-9.7	120/300 kHz
QP	V	85.000	23.1	7.7	1.0	0.0	0.0	31.8	40.0	-8.2	120/300 kHz
QP	V	95.000	22.9	8.1	1.0	0.0	0.0	32.0	43.5	-11.5	120/300 kHz
QP	V	99.938	24.0	8.2	1.1	0.0	0.0	33.2	43.5	-10.3	120/300 kHz
QP	V	105.134	26.4	8.1	1.1	0.0	0.0	35.6	43.5	-7.9	120/300 kHz
QP	V	108.640	24.9	8.1	1.1	0.0	0.0	34.2	43.5	-9.3	120/300 kHz
QP	V	125.000	26.8	6.8	1.2	0.0	0.0	34.7	43.5	-8.8	120/300 kHz
QP	V	138.000	27.3	7.1	1.2	0.0	0.0	35.6	43.5	-7.9	120/300 kHz
QP	V	153.000	28.3	8.3	1.3	0.0	0.0	38.0	43.5	-5.5	120/300 kHz
QP	V	160.000	27.0	8.5	1.4	0.0	0.0	36.8	43.5	-6.7	120/300 kHz
QP	V	177.000	25.3	8.8	1.4	0.0	0.0	35.5	43.5	-8.0	120/300 kHz
QP	V	207.900	19.3	11.1	1.6	0.0	0.0	32.0	43.5	-11.5	120/300 kHz
QP	V	227.000	14.1	12.2	1.6	0.0	0.0	27.9	46.0	-18.1	120/300 kHz
QP	V	237.622	16.6	12.4	1.7	0.0	0.0	30.7	46.0	-15.3	120/300 kHz
QP	V	262.000	14.7	12.9	1.8	0.0	0.0	29.4	46.0	-16.6	120/300 kHz
QP	V	277.000	13.7	13.2	1.8	0.0	0.0	28.6	46.0	-17.4	120/300 kHz
QP	V	291.000	14.6	13.4	1.9	0.0	0.0	29.9	46.0	-16.1	120/300 kHz
QP	V	305.000	7.9	13.8	1.9	0.0	0.0	23.7	46.0	-22.3	120/300 kHz
QP	V	323.000	15.0	14.5	2.0	0.0	0.0	31.5	46.0	-14.5	120/300 kHz
QP	V	341.000	10.3	15.0	2.0	0.0	0.0	27.4	46.0	-18.6	120/300 kHz
QP	V	355.000	13.4	15.3	2.1	0.0	0.0	30.8	46.0	-15.2	120/300 kHz
QP	V	373.000	8.6	15.5	2.2	0.0	0.0	26.2	46.0	-19.8	120/300 kHz
QP	V	385.000	8.2	15.4	2.2	0.0	0.0	25.8	46.0	-20.2	120/300 kHz
QP	V	400.000	3.4	15.3	2.3	0.0	0.0	21.0	46.0	-25.0	120/300 kHz
QP	V	414.000	8.6	15.8	2.3	0.0	0.0	26.7	46.0	-19.3	120/300 kHz
QP	V	459.000	7.8	17.4	2.4	0.0	0.0	27.7	46.0	-18.3	120/300 kHz
QP	V	545.000	3.0	19.5	2.7	0.0	0.0	25.2	46.0	-20.8	120/300 kHz
QP	V	590.000	1.7	19.0	2.8	0.0	0.0	23.5	46.0	-22.5	120/300 kHz
QP	V	660.000	5.0	20.1	3.0	0.0	0.0	28.1	46.0	-17.9	120/300 kHz
QP	V	741.000	3.6	21.0	3.1	0.0	0.0	27.8	46.0	-18.2	120/300 kHz
QP	V	826.000	-0.7	22.2	3.3	0.0	0.0	24.8	46.0	-21.2	120/300 kHz
QP	V	905.000	-0.1	23.5	3.5	0.0	0.0	26.9	46.0	-19.1	120/300 kHz
QP	V	960.000	0.2	23.5	3.6	0.0	0.0	27.3	46.0	-18.7	120/300 kHz
QP	V	975.000	-0.1	23.5	3.7	0.0	0.0	27.1	54.0	-26.9	120/300 kHz
QP	V	986.000	0.5	23.8	3.7	0.0	0.0	28.0	54.0	-26.0	120/300 kHz
QP	V	1000.000	-1.1	24.1	3.7	0.0	0.0	26.7	54.0	-27.3	120/300 kHz

Test Results Continued:

Radiated Emissions From 960MHz-10GHz

Company: GSSI
Model #: 50400
Serial #: 0 0 1
Engineers: Kouma Sinn
Project #: 3153005
Standard: FCC Part 15 Subpart F
Receiver: R&S ESCI (ROS001)
PreAmp: PRE9 03-27-09.txt
PreAmp Used? (Y or N): Y

Location: 2
Date(s): 05/22/08
Limit Distance (m): 3
Test Distance (m): 1
Voltage/Frequency: DC Power

Antenna & Cables: LF Bands: N, LF, HF, SHF
Antenna: HORN3 V1m 3-03-09.txt HORN3 H1m 3-03-09.txt
Cable(s): CBL027 12-06-08.txt CBL028 12-06-08.txt
Barometer: FIS005
Temp/Humidity/Pressure: 17C 39% 986mbar
Frequency Range: 960MHz-10GHz

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	
RMS	V	960.000	40.0	24.0	3.6	29.1	9.5	28.9	29.9	-1.0	1/3MHz	
RMS	V	969.531	40.0	24.0	3.7	29.1	9.5	29.1	29.9	-0.8	1/3MHz	
RMS	V	981.563	40.3	24.1	3.7	29.1	9.5	29.5	29.9	-0.4	1/3MHz	
RMS	V	989.900	39.9	24.1	3.7	29.1	9.5	29.1	29.9	-0.8	1/3MHz	
RMS	V	996.000	40.6	24.2	3.7	29.1	9.5	29.8	29.9	-0.1	1/3MHz	
RMS	V	1000.000	40.2	24.2	3.7	29.1	9.5	29.5	29.9	-0.4	1/3MHz	
RMS	V	1017.034	39.2	24.3	3.8	29.1	9.5	28.6	29.9	-1.3	1/3MHz	
RMS	V	1038.076	37.9	24.3	3.8	29.1	9.5	27.4	29.9	-2.5	1/3MHz	
RMS	V	1058.116	37.1	24.4	3.8	29.1	9.5	26.7	29.9	-3.2	1/3MHz	
RMS	V	1182.365	32.2	24.8	4.1	29.1	9.5	22.4	29.9	-7.5	1/3MHz	
RMS	V	1279.550	33.0	25.2	4.3	29.1	9.5	23.8	29.9	-6.1	1/3MHz	
RMS	V	1357.710	31.4	25.4	4.4	29.1	9.5	22.6	29.9	-7.3	1/3MHz	
RMS	V	2000.000	26.0	28.0	5.6	29.2	9.5	20.9	43.9	-23.0	1/3MHz	NF
RMS	V	3000.000	26.0	30.5	7.1	29.2	9.5	24.8	43.9	-19.1	1/3MHz	NF
RMS	V	5000.000	25.0	34.7	9.9	29.3	9.5	30.7	53.9	-23.2	1/3MHz	NF
RMS	V	5460.000	23.0	35.7	10.2	29.1	9.5	30.3	53.9	-23.6	1/3MHz	NF
RMS	V	7364.000	25.0	37.4	13.7	28.4	9.5	38.3	53.9	-15.6	1/3MHz	NF
RMS	V	10000.000	24.0	40.6	15.7	27.3	9.5	43.4	53.9	-10.5	1/3MHz	NF

Test Results Continued:

1164-1240MHz, 1559-1610MHz

Company:	GSSI		Antenna & Cables:	LF	Bands: N, LF, HF, SHF
Model #:	50400		Antenna:	HORN3 V1m 3-03-09.txt	HORN3 H1m 3-03-09.txt
Serial #:	0 0 1		Cable(s):	CBL027 12-06-08.txt	CBL028 12-06-08.txt
Engineers:	Kouma Sinn	Location: 2	Barometer:	FIS005	
Project #:	3153005	Date(s): 05/22/08			
Standard:	FCC Part 15 Subpart F		Temp/Humidity/Pressure:	17C	39% 986mbar
Receiver:	R&S ESCI (ROS001)	Limit Distance (m): 3			
PreAmp:	PRE9 03-27-09.txt	Test Distance (m): 1			
PreAmp Used? (Y or N):	Y	Voltage/Frequency: DC Power	Frequency Range:	1164-1240MHz, 1559-1610MHz	

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	
1164-1240MHz. Peak readings met RMS limits. Did not take RMS reading												
PK	V	1164.000	0.3	24.8	4.0	29.1	9.5	-9.5	19.9	-29.4	1/30kHz	
PK	V	1172.833	7.5	24.8	4.1	29.1	9.5	-2.3	19.9	-22.2	1/30kHz	
PK	V	1185.470	7.9	24.8	4.1	29.1	9.5	-1.8	19.9	-21.7	1/30kHz	
PK	V	1202.837	7.7	24.9	4.1	29.1	9.5	-1.9	19.9	-21.8	1/30kHz	
PK	V	1229.000	8.2	25.0	4.2	29.1	9.5	-1.3	19.9	-21.2	1/30kHz	
PK	V	1240.000	5.8	25.0	4.2	29.1	9.5	-3.6	19.9	-23.5	1/30kHz	
1559-1610MHz. Peak readings met RMS limits. Did not take RMS reading												
PK	V	1559.000	4.0	26.1	4.8	29.1	9.5	-3.7	19.9	-23.6	1/30kHz	NF
PK	V	1586.000	3.2	26.3	4.9	29.1	9.5	-4.3	19.9	-24.2	1/30kHz	NF
PK	V	1598.450	4.2	26.3	4.9	29.1	9.5	-3.3	19.9	-23.2	1/30kHz	NF
PK	V	1610.000	1.1	26.4	4.9	29.1	9.5	-6.3	19.9	-26.2	1/30kHz	NF

Test Results Continued:

Highest Emissions Above 960MHz

Company:	GSSI			Antenna & Cables:	LF Bands: N, LF, HF, SHF
Model #:	50400			Antenna:	HORN3 V1m 3-03-09.txt HORN3 H1m 3-03-09.txt
Serial #:	0 0 1			Cable(s):	CBL027 12-06-08.txt CBL028 12-06-08.txt
Engineers:	Kouma Sinn		Location: 2	Barometer:	FIS005
Project #:	3153005	Date(s):	05/22/08		
Standard:	FCC Part 15 Subpart F			Temp/Humidity/Pressure:	17C 39% 986mbar
Receiver:	R&S ESCI (ROS001)		Limit Distance (m): 3		
PreAmp:	PRE9 03-27-09.txt		Test Distance (m): 1		
PreAmp Used? (Y or N):	Y		Voltage/Frequency: DC Power		Frequency Range: 1014.013MHz

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
PK	V	1014.013	60.8	24.2	3.7	29.1	9.5	50.2	70.8	-20.6	3/3MHz

The highest radiated emission occurs, f_M, above 960MHz, there is a limit on the peak level of the emissions contained within a 50MHz bandwidth centered on f_M. That limit is 0 dBm EIRP which is 95 dBuV/m in field strength. The resolution bandwidth of 3MHz was used so, the new limit is 95.2-20*LOG(3MHz/50MHz) = 95.2-24.437 = 70.763 dBuV/m.

Setup Photo

Test Results: Pass

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

Test: 10 dB Bandwidth

Performance Criterion: Not Applicable

EUT Operating Voltage: Powered from survey controller

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	17	Humidity (%):	39	Pressure (hPa):	986
Pretest Verification Performed:	Yes		Equipment under Test:		50400	
Test Engineer(s):	Kouma Sinn		EUT Serial Number:		001	

Maximum Test Disturbance Parameters: The UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. The fractional bandwidth shall be equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	01/25/2009
2	ANTENNA	EMCO	3142	9711-1225	06/05/2008
3	Thermo/Hygro Meter	Fisher Scientific	11-661-13	51200654	08/17/2008
4	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL027	12/06/2008
5	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL028	12/06/2008

Software Utilized:

None

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail N/A	Comment
Highest Peak	Per Standard	Per Standard	Pass	None

Test Results:

10dB Bandwidth

f_l = 35.45MHz
f_h = 213.1MHz
$f_c = (f_h + f_l)/2$
f_c = (213.1MHz + 35.45MHz)/2
f_c = 124.275MHz

Fractional Bandwidth = $2(f_h - f_l)/(f_h + f_l)$
Fractional Bandwidth = 2(213.1MHz – 35.45MHz)/(213.1MHz + 35.45MHz)
Fractional Bandwidth = 355.3/248.55MHz
Fractional Bandwidth = 1.4295