FCC CFR47 PART 90 REQUIREMENT
CERTIFICATION
TEST REPORT

FOR

GSM MULTI-BAND SELF-CONTAINED GPS TRACKING DEVICE WITH BEACON TECHNOLOGY

MODEL NUMBER: GT33000A

FCC ID: Q2UGT33000A

REPORT NUMBER: 05U3574-1

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Prepared for
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Prepared by
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Revision History

Rev.	Issue Date	Revisions	Revised By
A	8/11/05	Initial Issue	Thu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GEOTRAX PROTECTION LLC.
PO BOX 6021
SCOTTSDALE, AZ 85261

EUT DESCRIPTION: GSM Multi-Band Self-contained GPS Tracking Device
With Beacon Technology

MODEL: GT33000A

SERIAL NUMBER: GT33000_050531_0001

DATE TESTED: JULY 20-23, 2005

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 90	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By: Tested By:

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EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 90, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM multi-band self-contained GPS device with beacon technology.

The device is manufactured by Geotrax Protection LLC.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follow:

RF Beacon 219.56 - 219.64 MHz Band

Frequency Range (MHz)	Modulation	Conducted Output Power (dBm)	Conducted Output Power (mW)
219.6	Beacon	13.63	23.07

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The device uses a Loop antenna with a maximum gain of 0dBi for the RF Beacon transmitter.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

N/A.

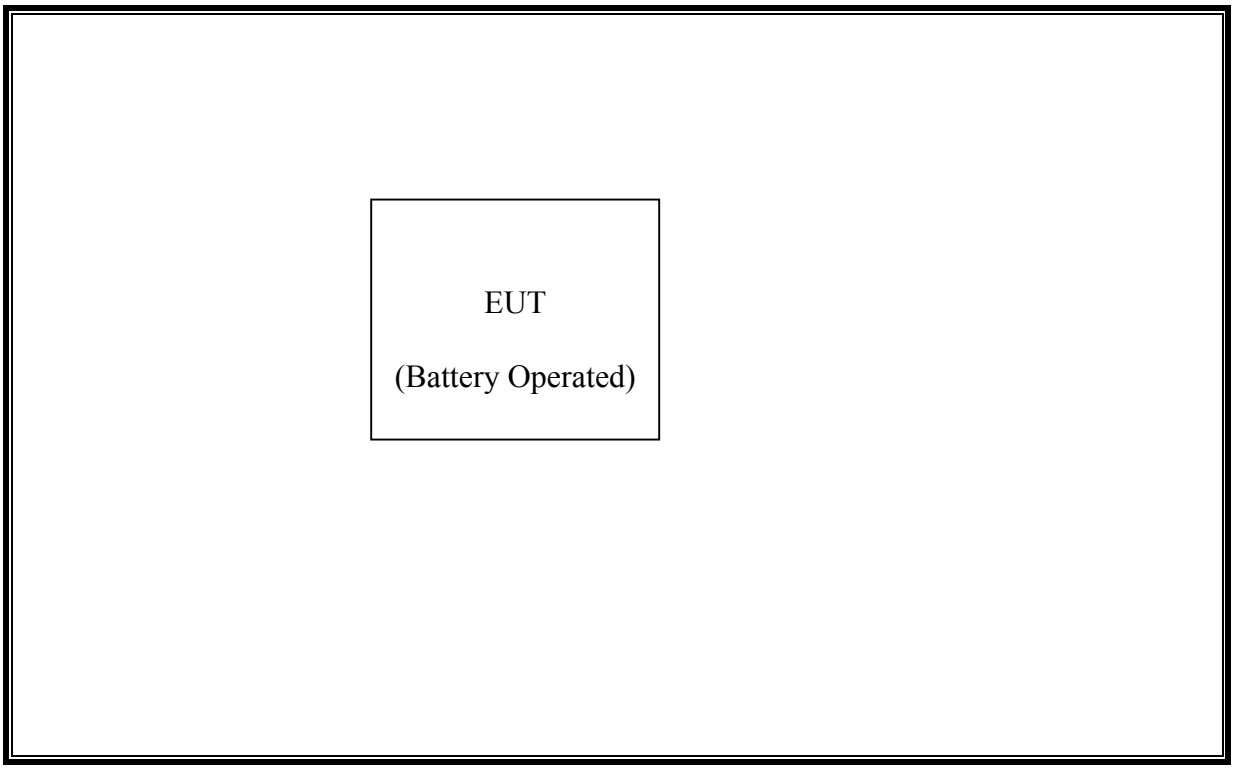
I/O CABLES

N/A.

TEST SETUP

The EUT was tested stand alone.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	MY43360112	3/28/2006
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-44	646456	8/17/05
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29310	9/12/05
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	29800	6/10/06
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	3/3/06
RF Filter Section	HP	85420E	3705A00256	3/29/06
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/06
Signal Generator, 10 MHz ~ 20 GHz	HP	83732B	US34490599	7/7/06
Tuned Dipole Antenna 400~1000 MHz	ETS	3121CDB4	1620	5/7/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	9/12/05

7. LIMITS AND RESULTS

7.1. OUTPUT POWER MEASUREMENT

LIMIT

According to section 90.205 & 90.259 – the output power shall not exceed 2 W ERP @ 3 km service area radius.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.2.17.

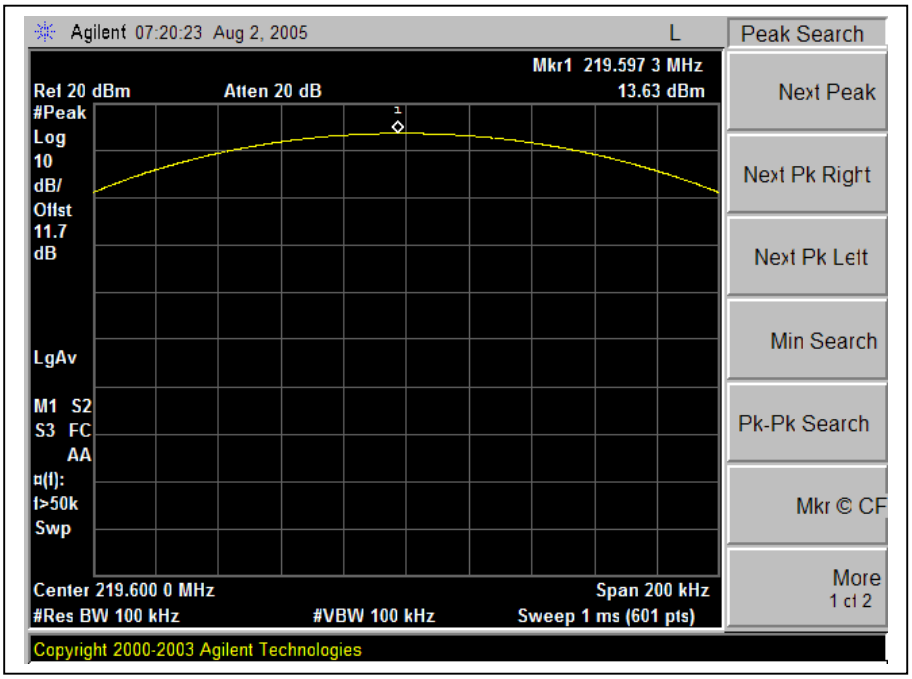
RESULTS

No non-compliance noted.

Radiated Output Power - ERP

f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
X pos										
219.60	74.6	H	-20.2	1.0	2.2	0.0	-21.2	33.0	-54.2	
219.60	67.0	V	-31.0	1.0	2.2	0.0	-32.0	33.0	-65.0	
Y pos										
219.60	69.0	V	-25.2	1.0	2.2	0.0	-26.2	33.0	-59.2	
219.60	70.2	H	-25.0	1.0	2.2	0.0	-26.0	33.0	-59.0	
Z pos										
219.60	68.0	H	-27.2	1.0	2.2	0.0	-28.2	33.0	-61.2	
219.60	66.5	V	-28.7	1.0	2.2	0.0	-29.7	33.0	-62.7	

Conducted Output Power - Peak



7.2. EMISSION BANDWIDTH

LIMIT

According to CFR 47 section 90.209, the authorized bandwidth for emission type of AP0 unit is 6.25 KHz.

TEST PROCEDURE

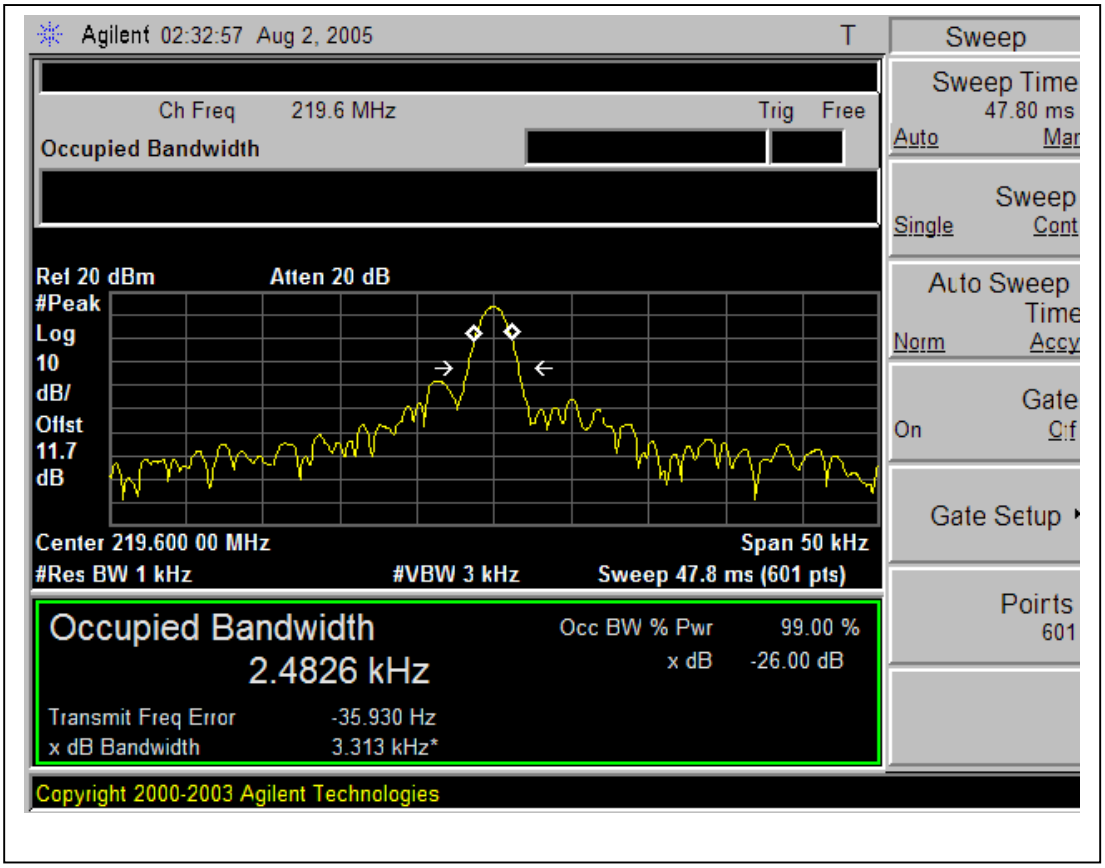
ANSI / TIA / EIA 603 Clause 2.4.10

RESULTS

No non-compliance noted.

Channel	Frequency (MHz)	26 dB BW (KHz)
Middle	219.6	2.4826

26dB BANDWIDTH



7.3. FIELD STRENGTH OF SPURIOUS EMISSION

LIMIT

According to CFR 47 section 90.210(c), the power of each unwanted emission shall be less than Transmitted Power as specified below:
1). On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in KHz) of more than 5 KHz, but not more than 10KHz: At least 83 log (f_d /5) dB.
2). On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in KHz) by more than 10 KHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2 /11) dB or 50dB, which is the lesser attenuation;
3). At least 43+10 $\log_{10}$(TP) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

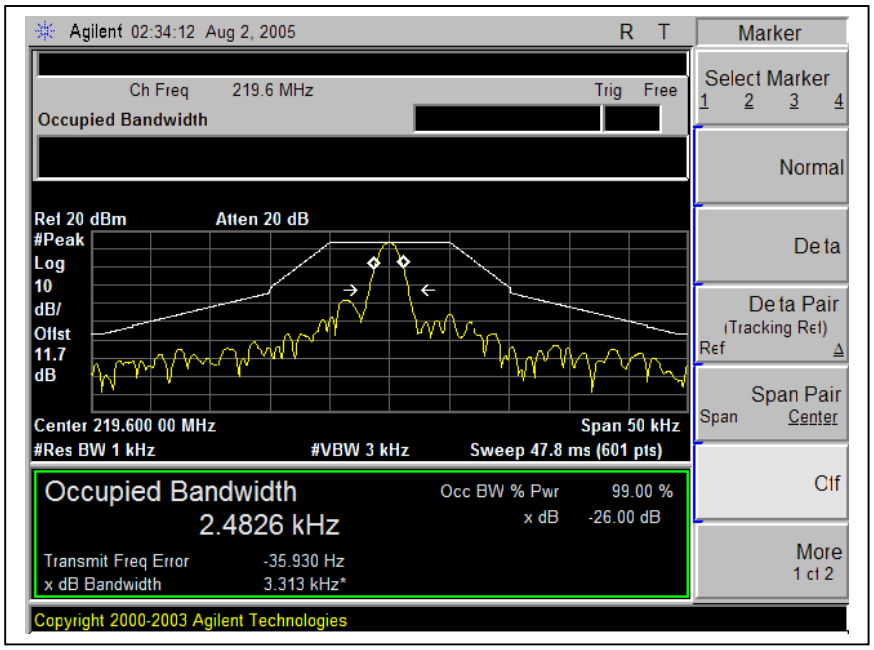
TEST PROCEDURE

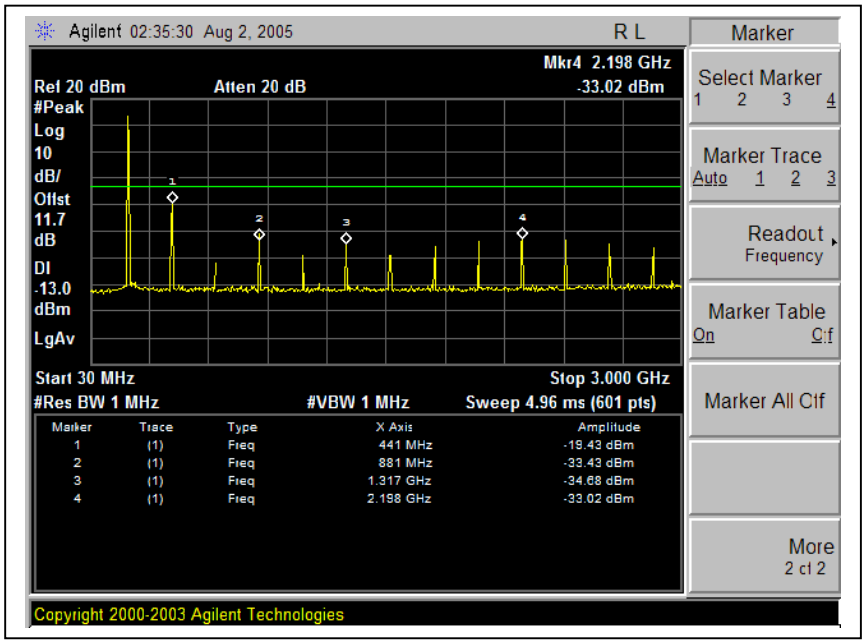
ANSI / TIA / EIA 603 Clause 3.2.12

RESULTS

No non-compliance noted.

Mid Channel, Emission Masks & Out-OF-Band:





30-1000MHz SPURIOUS EMISSIONS

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 05U3574-1
Report #: 050801C1
Date& Time: 08/01/05
Test Engr: Chin Pang

Company: GEOTRAX
EUT Description: Self-contained radio beacon device
Test Configuration : EUT stand alone
Type of Test: FCC Part 90
Mode of Operation: Transmitting @ 219.6MHz

Freq. (MHz)	SA Reading (dBuV)	SG Setting (dBm)	Ant Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	ERP Result (dBm)	Limit (dBm)	Margin (dBm)	Pol (H/V)
Transmitting Mode @ Worst Position:									
Spurious & Harmonics up to 1 GHz:									
Mid Channel:									
439.20	50.00	-30.20	0.00	0.00	0.80	-31.00	-13.00	-18.00	3mH
658.80	40.00	-38.00	0.00	0.00	0.80	-38.80	-13.00	-25.80	3mH
878.40	40.50	-38.50	0.00	0.00	1.00	-39.50	-13.00	-26.50	3mH
439.20	45.40	-33.60	0.00	0.00	0.80	-34.40	-13.00	-21.40	3mV
658.80	42.00	-36.80	0.00	0.00	0.80	-37.60	-13.00	-24.60	3mV
878.40	38.00	-39.30	0.00	0.00	1.00	-40.30	-13.00	-27.30	3mV

ABOVE 1GHZ HARMONIC SPURIOUS EMISSIONS

08/01/05 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr:Chin Pang
Project #:05U3574-1
Company:Geotrax Protection LLC
EUT Descrip.:GSM Multi-Band Self-Contained GPS Tracking Device with Beacon Technology
EUT M/N:GT33000A
Test Target:FCC Part 90
Mode Oper:TX, 219.6MHz

Test Equipment:

EMCO Horn 1-18GHz: T60; S/N: 2238 @3m
Horn > 18GHz:
Limit: ERP
☐ High Pass Filter

Hi Frequency Cables: ☐ (2 ft) ☑ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Pre-amplifer 1-26GHz: T63 Miteq 646456
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
1.098	55.4	V	-54.7	1.4	6.8	4.6	-51.5	-13.0	-38.5	
1.317	54.8	V	-54.4	1.5	7.2	5.1	-50.8	-13.0	-37.8	
1.537	53.0	V	-55.4	1.6	7.7	5.5	-51.4	-13.0	-38.4	
1.976	58.5	V	-48.2	1.7	8.5	6.4	-43.5	-13.0	-30.5	
2.165	56.1	V	-50.2	1.8	9.1	6.9	-45.1	-13.0	-32.1	
1.317	58.2	H	-50.4	1.5	7.2	5.1	-46.7	-13.0	-33.7	
1.537	58.0	H	-49.7	1.6	7.7	5.5	-45.7	-13.0	-32.7	
1.756	62.0	H	-44.8	1.6	8.1	5.9	-40.5	-13.0	-27.5	
1.976	64.3	H	-41.7	1.7	8.5	6.4	-37.0	-13.0	-24.0	
2.196	64.7	H	-41.4	1.8	9.2	7.0	-36.2	-13.0	-23.2	

7.4. FREQUENCY STABILITY MEASUREMENT

LIMIT

a). According to CFR 47 section 1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30°C to +50°C centigrade.
b). According to CFR 47 section 1055(d)(2), for hand carried battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
c). According to CFR 47 section 90.213, the unit must be maintained within a frequency tolerance of 0.0001%.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

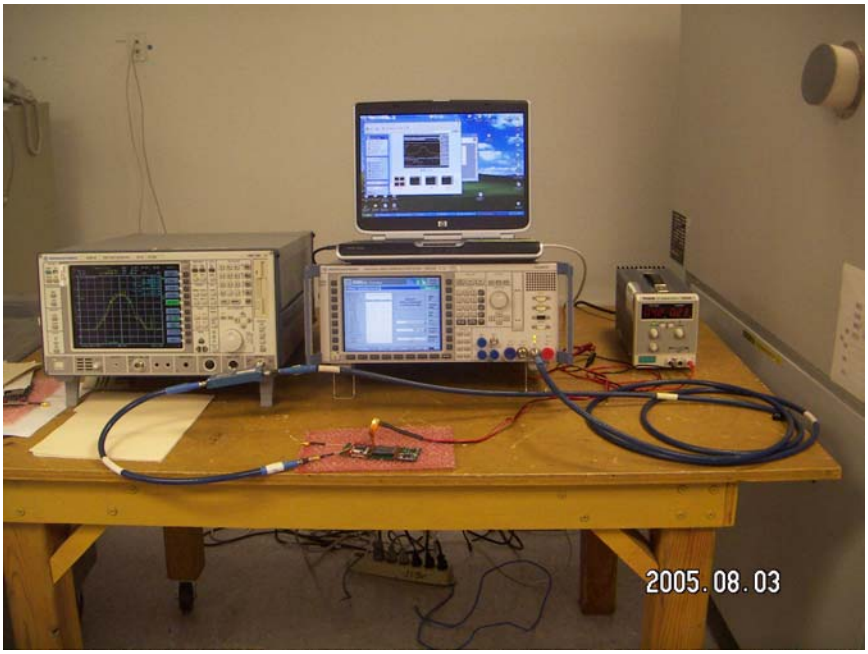
No non-compliance noted.

Reference Frequency: CW Mid Channel 219.599995MHz @ 25°C Limit: to stay ± 1 ppm = 219.600 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
4.00	50	219.599966	0.13	± 1
4.00	40	219.599992	0.01	± 1
4.00	30	219.600003	-0.04	± 1
4.00	***25***	***219.599995***	0.00	**± 1**
4.00	20	219.600002	-0.03	± 1
4.00	10	219.600000	-0.02	± 1
4.00	0	219.600014	-0.09	± 1
4.00	-10	219.600071	-0.35	± 1
3.70	-20	219.600095	-0.46	± 1
4.00	-30	219.600090	-0.43	± 1
3.00 (end point)	25	219.599991	0.02	± 1
3.4	25	219.599995	0.00	± 1
4.6	25	219.599995	0.00	± 1

8. SETUP PHOTOS

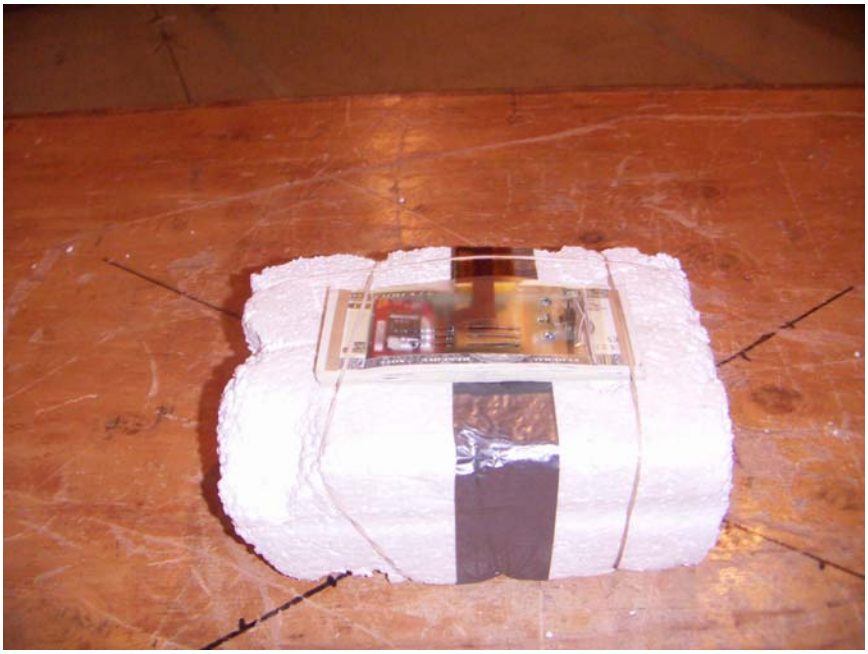
MEASUREMENT SETUP FOR RF CONDUCTED

RF CONDUCTED

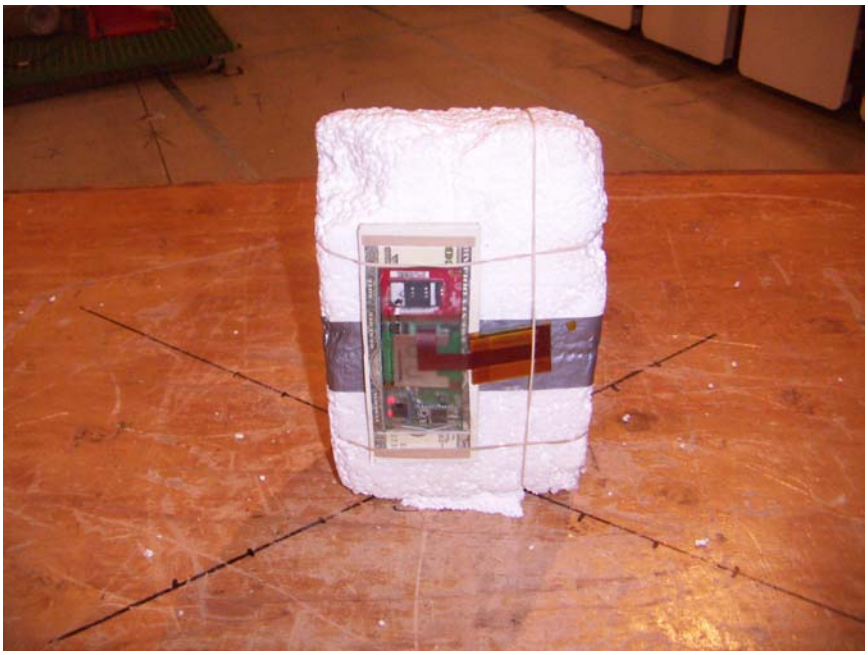


RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO



Y-AXIS FRONT PHOTO



Z-AXIS PHOTO

MEASUREMENT SETUP FOR FREQUENCY STABILITY