



**FCC CFR47 PART 22H & 24E
CERTIFICATION
TEST REPORT**

FOR

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

MODEL NUMBER: GT33000A

FCC ID: Q2UGT33000A

REPORT NUMBER: 05U3574-2

ISSUE DATE: AUGUST 14, 2005

Prepared for
**GEOTRAX PROTECTION LLC
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SCTTSDALE, AZ 85261**

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Revision History

Rev.	Issue Date	Revisions	Revised By
A	8/14/05	Initial Issue	Thu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GEOTRAX PROTECTION LLC
P O BOX 6021
SCOTTSDALE AZ 85261, U.S.A

EUT DESCRIPTION: GSM MULTI-BAND SELF-CONTAINED GPS TRACKIG DEVICE
WITH BEACON TECHNOLOGY

MODEL: GT33000A

SERIAL NUMBER: GT33000_050531_0001

DATE TESTED: JULY20-23, 2005

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22 H and 24 E	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:



THU CHAN
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 TIA/EIA 603A (2001), ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and FCC CFR 47 Part 22 and Part 24.

3. CROSS REFERENCE TO OTHER REPORTS ON THIS PRODUCT

Other FCC report applicable to this product, please refer to Enfora L.P. Report No. 3L0477RUS2, FCC ID: MIVGSM0108.

4. 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>.

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. 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%.

6. EQUIPMENT UNDER TEST

6.1. 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.

The radio utilizes a dual-folded mono-pole antenna, with a maximum gain of 0dBi.

Since the EUT used the same output powers as previously and the antenna with a maximum gain of 0dBi, thus all tests were performed only on radiated emissions.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power, ERP, and EIRP as follows:

824 to 849 MHz Authorized Band

Frequency Range (MHz)	Modulation	Conducted Output Power (dBm)	Conducted Output Power (mW)	ERP Output Power (dBm)	ERP Output Power (mW)
824.2 - 848.8	GSM	32.4	1737.80	30.30	1071.52

1850 - 1910 MHz Authorized Band

Frequency Range (MHz)	Modulation	Conducted Output Power (dBm)	Conducted Output Power (mW)	EIRP Output Power (dBm)	EIRP Output Power (mW)
1850.2 - 1909.8	GSM	29.8	954.99	29.70	933.25

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dual-folded mono-pole antenna, with a maximum gain of 0dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT is linked with CMU200 tester support equipment during testing.

6.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output powers were at 836.4MHz and 1909.8MHz.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Wireless Test Set	R & S	CMU200	1100.0008.02	NA
Horn Antenna	ETS	3117	29310	NA

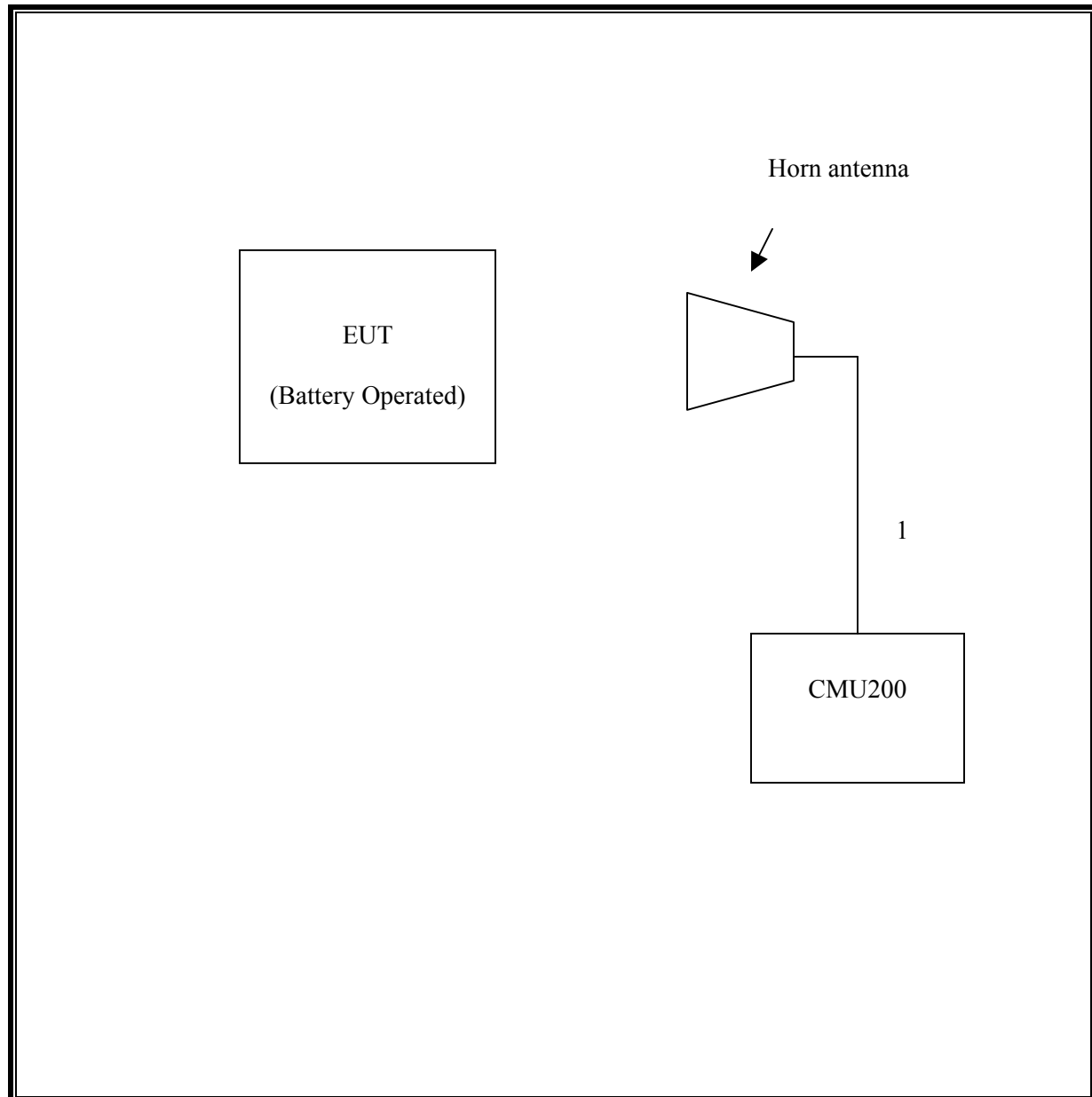
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	RF IN/OUT	1	SMA	Coax	1m	Connected to Horn

TEST SETUP

The EUT is installed as a stand-alone device during the tests. The Wireless Communication test set exercised the EUT.

SETUP DIAGRAM FOR TESTS



7. 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
Modulation Analyzer	HP	8901B	3438A05272	9/23/05
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-44	646456	8/17/05
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29310	9/12/05
Communication Tester	R & S	CMU 200	838114/032	12/17/05
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

8. LIMITS AND RESULTS

8.1. 99 % BANDWIDTH

LIMIT

N/A, Reporting purpose only

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

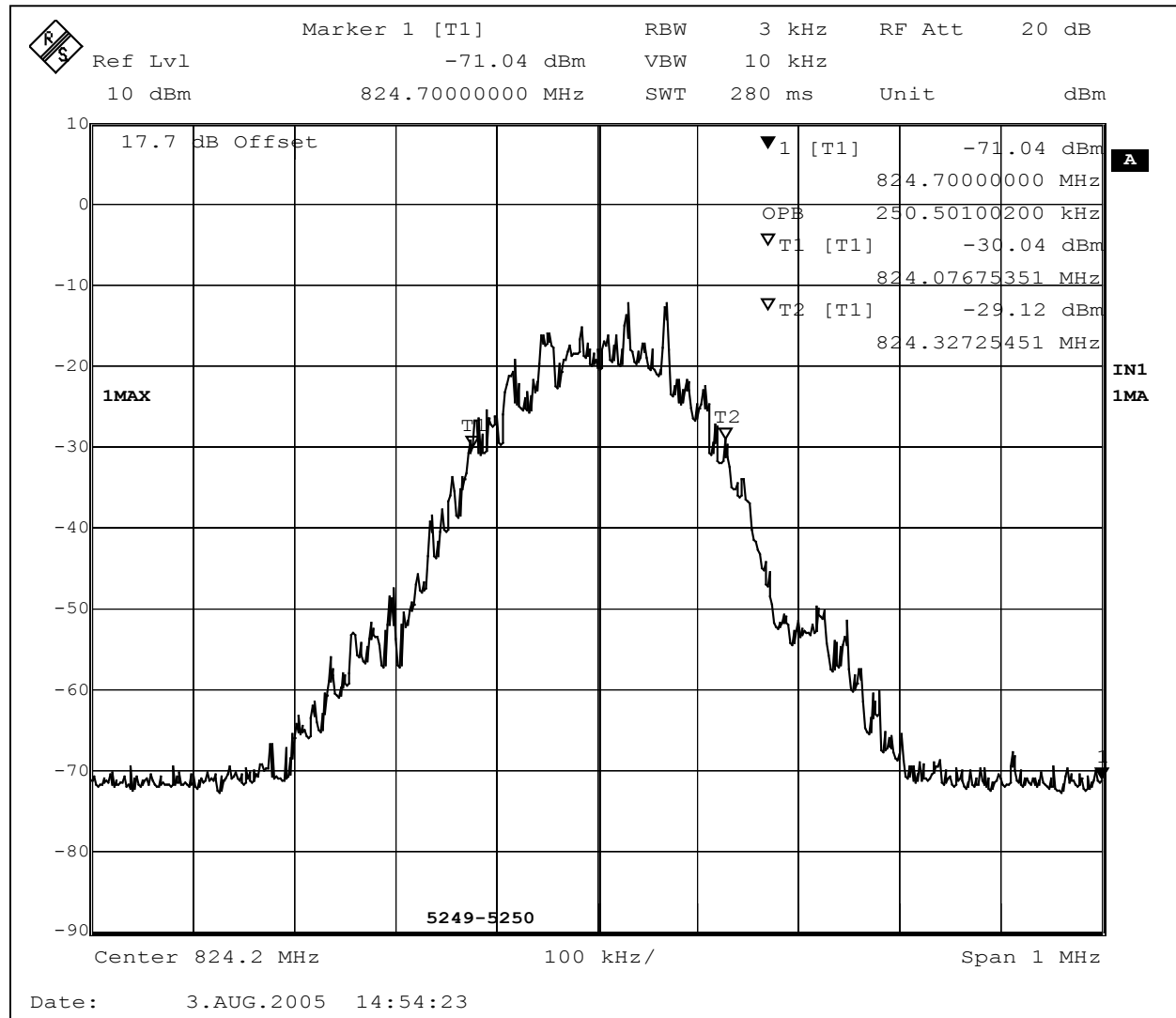
RESULTS

No non-compliance noted:

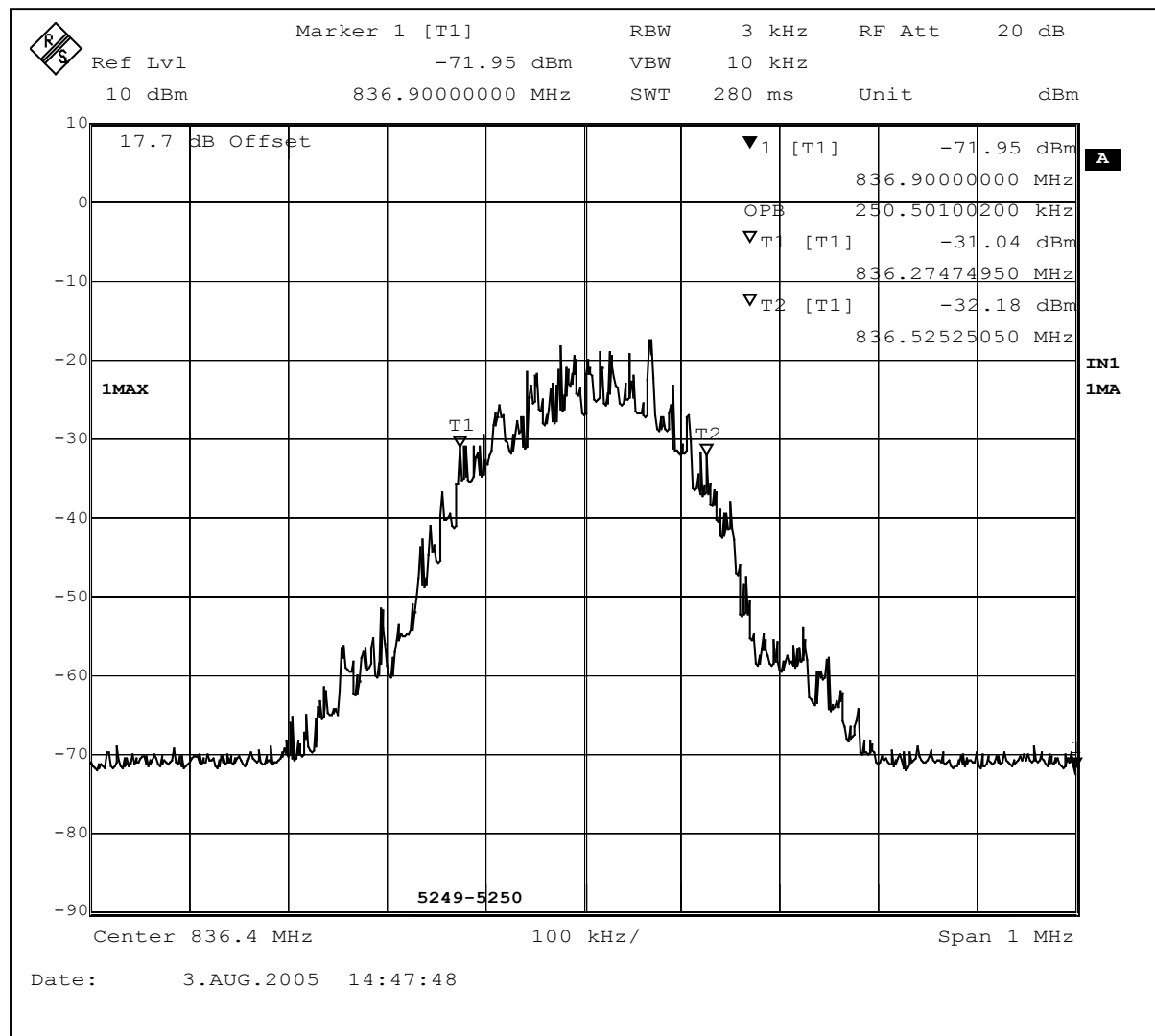
Channel	Frequency (MHz)	99% BW (KHz)
Low	824.20	250.5010
Middle	836.50	250.5010
High	848.80	250.5010

Channel	Frequency (MHz)	99% BW (KHz)
Low	1850.20	244.4889
Middle	1880.00	246.4929
High	1909.80	244.4889

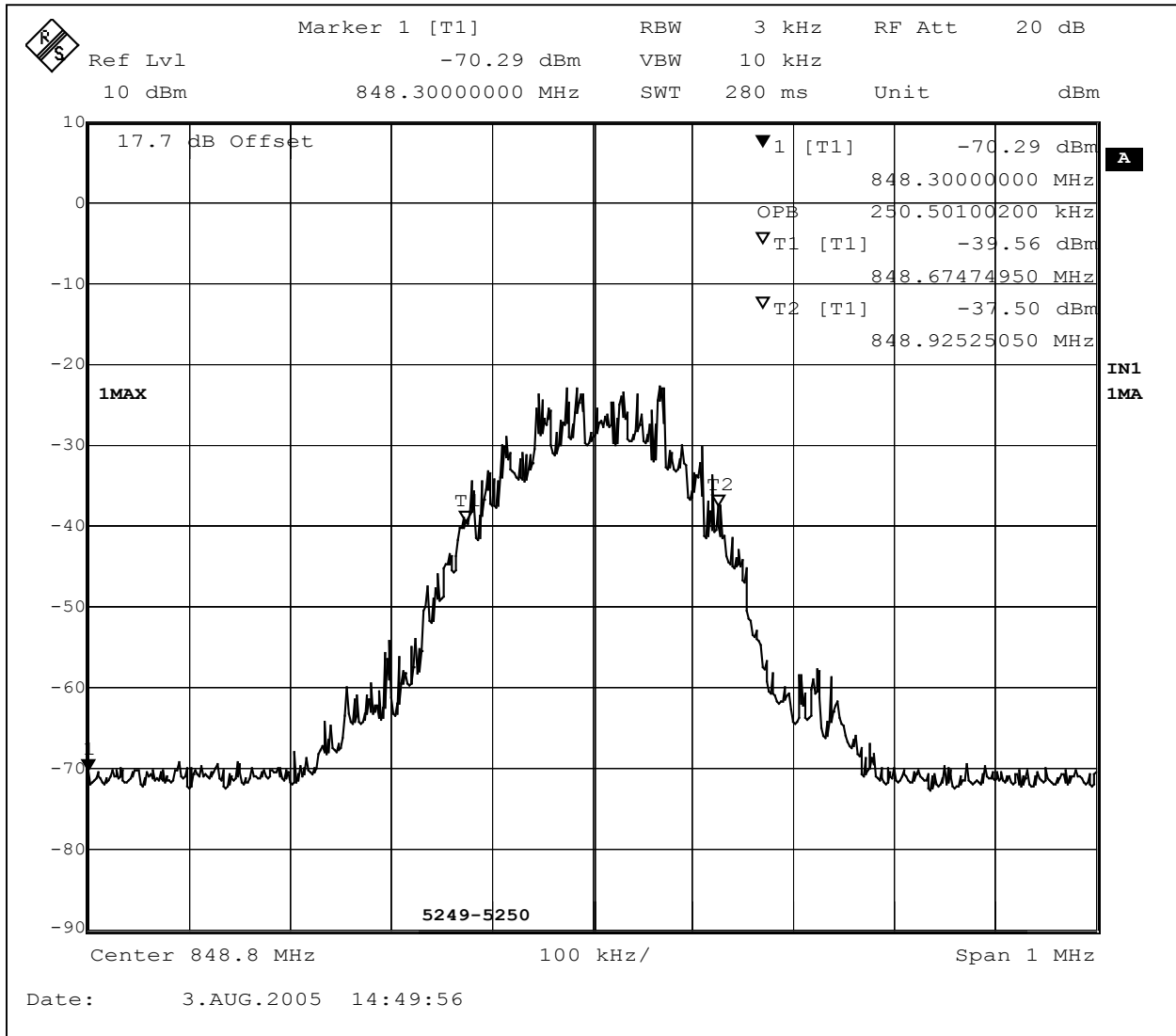
800MHz GSM - Low Channel 99% Bandwidth:



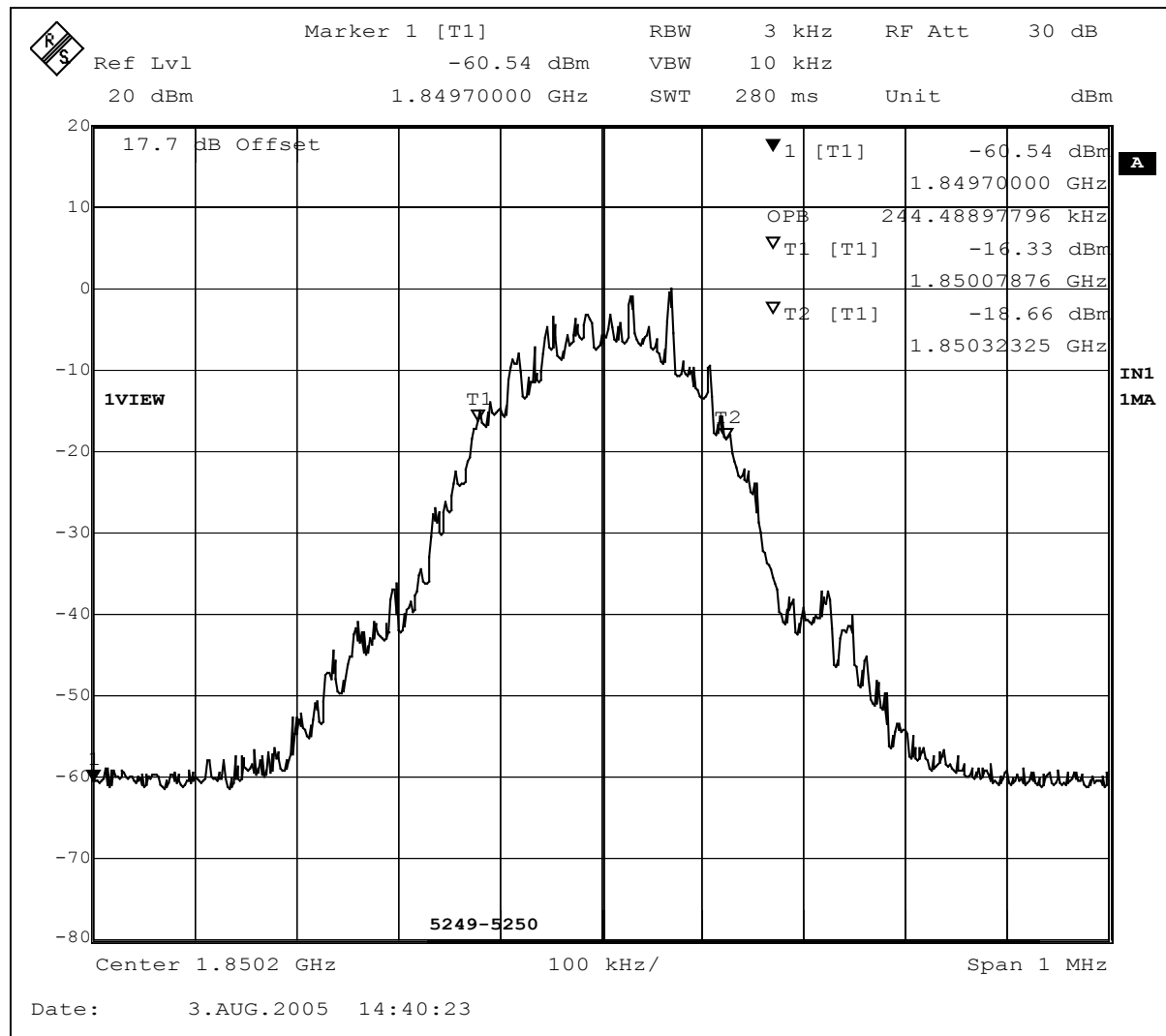
800MHz GSM - Mid Channel 99% Bandwidth:



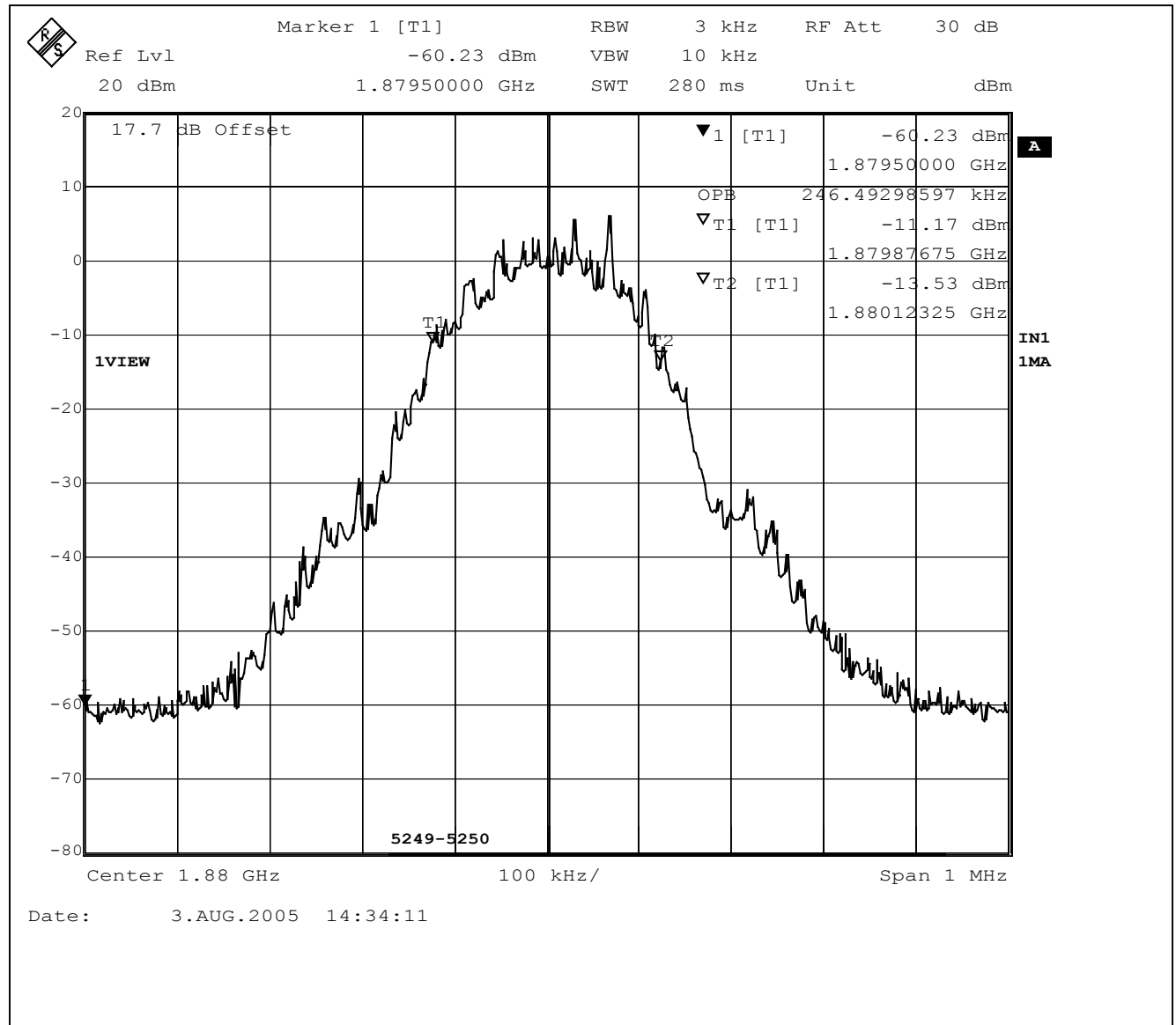
800MHz GSM - High Channel 99% Bandwidth:



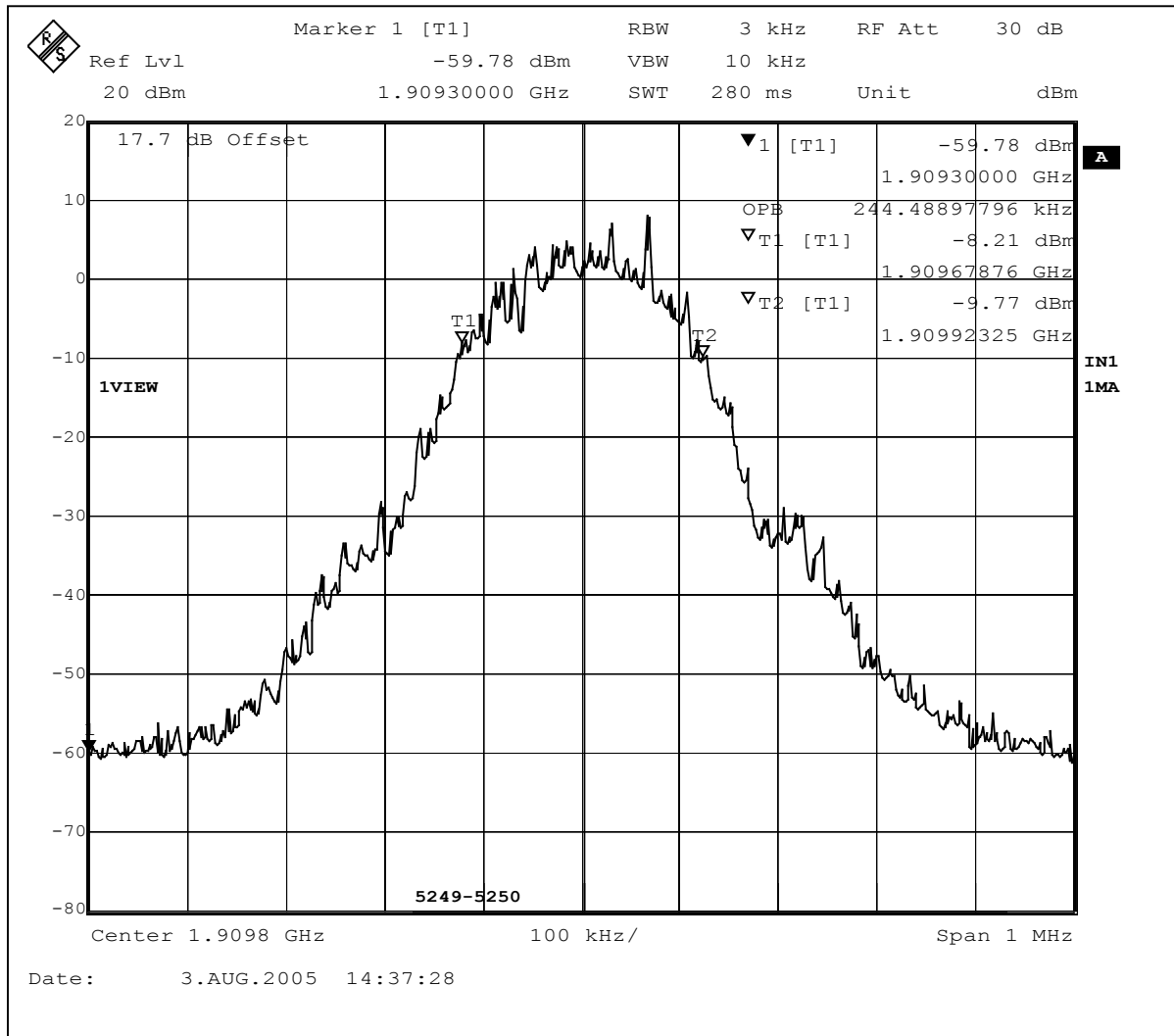
1900MHz GSM - Low Channel 99% Bandwidth:



1900MHz GSM - Mid Channel 99% Bandwidth:



1900MHz GSM - Hi Channel 99% Bandwidth



8.2. RF POWER OUTPUT

LIMIT

22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.2.17

RESULTS

No non-compliance noted.

824 to 849 MHz Authorized Band

Frequency (MHz)	Modulation	Conducted Peak Output Power (dBm)	Radiated ERP (dBm)
824.2	GSM	32.40	30.10
836.4	GSM	32.40	30.30
848.8	GSM	32.40	30.20

GSM1900, 1850 - 1910 MHz Authorized Band

Frequency (MHz)	Modulation	Conducted Peak Output Power (dBm)	Radiated EIRP (dBm)
1850.2	GSM	29.80	29.30
1880	GSM	29.80	29.20
1909.8	GSM	29.80	29.70

GSM850 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
Low Ch										
824.20	101.4	V	28.4	0.8	0.0	-2.1	25.5	38.5	-13.0	
824.20	106.6	H	33.0	0.8	0.0	-2.1	30.1	38.5	-8.4	
Mid Ch										
836.40	100.2	V	27.4	0.8	0.0	-2.1	24.4	38.5	-14.1	
836.40	106.9	H	33.2	0.8	0.0	-2.1	30.3	38.5	-8.2	
High Ch										
848.60	101.7	V	29.0	0.8	0.0	-2.1	26.0	38.5	-12.5	
848.60	106.8	H	33.1	0.8	0.0	-2.1	30.2	38.5	-8.3	

GSM1900 Output Power (EIRP)

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
1.850	92.5	V	19.0	0.5	4.6	2.5	23.1	33.0	-9.9	
1.850	98.4	H	25.2	0.5	4.6	2.5	29.3	33.0	-3.7	
Mid Ch										
1.880	93.7	V	20.4	0.5	4.7	2.6	24.6	33.0	-8.4	
1.880	98.0	H	25.0	0.5	4.7	2.6	29.2	33.0	-3.8	
High Ch										
1.910	92.0	V	22.1	0.5	4.7	2.6	26.3	33.0	-6.7	
1.910	98.7	H	25.5	0.5	4.7	2.6	29.7	33.0	-3.3	

8.3. FIELD STRENGTH OF SPURIOUS RADIATION

LIMIT

§22.917 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

§24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.12 & FCC 22.917 (b)
ANSI / TIA / EIA 603 Clause 3.2.12 & FCC 24.238 (b)

RESULTS

No non-compliance noted.

GSM850 Band (ERP), 30-1000MHz:

07/24/05 30 - 1000MHz Substitution Measurement										
Compliance Certification Services, Morgan Hill 5m Chamber Site										
Test Engr:Chin Pang										
Project #:05U3574-2										
Company:Geotrax										
EUT Descrip.:RF Beacon, GSM Transceiver 850/1800/1900 GPS Receiver, 1 Omni Antenna, Battery Operated										
EUT M/N:GT33000A										
Test Target:Part 22/24										
Mode Oper:TX										
Test Equipment:										
Bilog Antenna			Cable		Pre-amplifier 8447D		Limit			
5m Chamber Sunol Bilo			5m Chamber Cable		T5 8447D		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
204.00	44.0	H	-63.1	1.8	4.9	2.7	-62.2	-13.0	-49.2	
224.00	45.0	H	-65.0	1.9	5.9	3.7	-63.2	-13.0	-50.2	
435.00	45.8	H	-58.4	2.5	6.1	3.9	-57.0	-13.0	-44.0	
905.00	43.2	H	-54.3	3.6	6.8	4.6	-53.4	-13.0	-40.4	
61.50	43.6	V	-72.1	1.1	-2.1	-4.3	-77.5	-13.0	-64.5	
204.00	36.3	V	-72.4	1.8	4.9	2.7	-71.4	-13.0	-58.4	
224.00	37.0	V	-73.0	1.9	5.9	3.7	-71.2	-13.0	-58.2	
471.00	37.3	V	-66.3	2.6	6.1	4.0	-64.9	-13.0	-51.9	

GSM850 Spurious & Harmonic (ERP) above 1GHz:

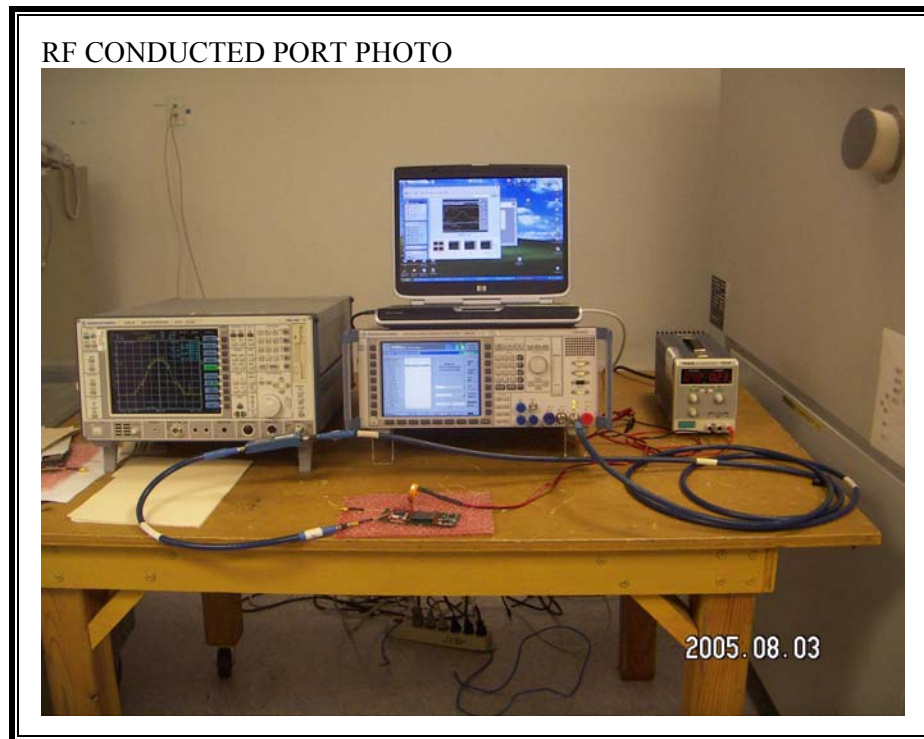
07/23/05 High Frequency Substitution Measurement											
Compliance Certification Services, Morgan Hill 5m Chamber Site											
Test Engr: Chin Pang											
Project #: 05U3574-2											
Company: Geotrax											
EUT Descrip.: RF Beacon, GSM Transceiver 850/1800/1900, GPS Receiver, 1 Onmi antenna, Battery Operated											
EUT M/N: GT33000A											
Test Target: FCC Part 22											
Mode Oper: TX											
Test Equipment:											
EMCO Horn 1-18GHz T60; S/N: 2238 @3m			Horn > 18GHz			Limit FCC 22			☒ High Pass Filter		
Hi Frequency Cables ☐ (2 ft) ☒ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☒ (12 ft)						Pre-amplifier 1-26GHz T63 Miteq 646456			Pre-amplifier 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	
Low Ch, 824.2MHz											
1.648	60.2	H	-46.0	1.6	7.9	5.7	-41.9	-13.0	-28.9		
2.473	65.6	H	-39.0	1.9	9.8	7.6	-33.3	-13.0	-20.3		
3.297	64.8	H	-36.6	2.3	9.7	7.6	-31.3	-13.0	-18.3		
4.121	50.8	H	-47.7	2.6	9.8	7.7	-42.6	-13.0	-29.6		
5.769	67.5	H	-26.8	3.3	11.3	9.1	-21.0	-13.0	-8.0		
6.994	56.0	H	-36.0	3.6	11.7	9.5	-30.0	-13.0	-17.0		
2.473	55.7	V	-49.1	1.9	9.8	7.6	-43.4	-13.0	-30.4		
4.121	49.5	V	-49.4	2.6	9.8	7.7	-44.3	-13.0	-31.3		
4.945	50.0	V	-48.0	3.0	11.1	9.0	-41.9	-13.0	-28.9		
5.769	65.3	V	-30.0	3.3	11.3	9.1	-24.2	-13.0	-11.2		
6.994	56.4	V	-36.2	3.6	11.7	9.5	-30.3	-13.0	-17.3		
Mid Ch, 836.4MHz											
1.672	65.6	H	-40.5	1.6	7.9	5.8	-36.4	-13.0	-23.4		
2.509	66.9	H	-37.5	1.9	9.8	7.6	-31.8	-13.0	-18.8		
3.346	70.0	H	-31.2	2.3	9.7	7.6	-26.0	-13.0	-13.0		
4.172	55.6	H	-42.9	2.6	9.9	7.8	-37.7	-13.0	-24.7		
5.018	54.0	H	-41.6	3.0	11.2	9.1	-35.6	-13.0	-22.6		
5.854	72.0	H	-22.3	3.3	11.4	9.2	-16.4	-13.0	-3.4		
6.691	54.0	H	-38.7	3.5	11.6	9.5	-32.7	-13.0	-19.7		
1.672	57.0	V	-49.9	1.6	7.9	5.8	-45.7	-13.0	-32.7		
2.509	56.7	V	-47.9	1.9	9.8	7.6	-42.2	-13.0	-29.2		
3.346	57.3	V	-44.0	2.3	9.7	7.6	-38.8	-13.0	-25.8		
5.854	65.4	V	-29.9	3.3	11.4	9.2	-24.0	-13.0	-11.0		
6.691	51.5	V	-41.9	3.5	11.6	9.5	-35.9	-13.0	-22.9		
High Ch, 848.8MHz											
1.697	64.4	H	-41.7	1.6	8.0	5.8	-37.4	-13.0	-24.4		
2.545	67.5	H	-36.8	2.0	9.8	7.6	-31.1	-13.0	-18.1		
3.394	67.4	H	-33.7	2.3	9.7	7.6	-28.4	-13.0	-15.4		
4.243	54.2	H	-44.2	2.7	10.0	7.9	-39.0	-13.0	-26.0		
5.092	52.1	H	-43.3	3.0	11.2	9.0	-37.4	-13.0	-24.4		
5.940	71.0	H	-23.3	3.4	11.5	9.3	-17.3	-13.0	-4.3		
6.789	54.3	H	-38.2	3.6	11.7	9.5	-32.2	-13.0	-19.2		
2.545	59.2	V	-45.3	2.0	9.8	7.6	-39.6	-13.0	-26.6		
3.394	59.5	V	-41.7	2.3	9.7	7.6	-36.4	-13.0	-23.4		
4.243	53.8	V	-44.9	2.7	10.0	7.9	-39.7	-13.0	-26.7		
5.092	50.7	V	-45.7	3.0	11.2	9.0	-39.8	-13.0	-26.8		
5.940	67.8	V	-27.5	3.4	11.5	9.3	-21.5	-13.0	-8.5		
6.789	55.4	V	-37.7	3.6	11.7	9.5	-31.8	-13.0	-18.8		
Note: No other emissions were detected above the system noise floor.											

GSM1900 Spurious & Harmonic (EIRP)

07/22/05 High Frequency Substitution Measurement											
Compliance Certification Services, Morgan Hill 5m Chamber Site											
Test Engr:Chin Pang											
Project #:05U3574-2											
Company:Geotrax											
EUT Descrip.:GSM Multi-Band Self Contained GPS Tracking Device with Beacon Technology											
EUT M/N:GT33000A											
Test Target:FCC Part 24											
Mode Oper:TX											
Test Equipment:											
EMCO Horn 1-18GHz T73; S/N: 6717 @3m Horn > 18GHz Limit EIRP ☒ High Pass Filter											
Hi Frequency Cables ☐ (2 ft) ☒ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☒ (12 ft) Pre-amplifier 1-26GHz T63 Miteq 646456 Pre-amplifier 26-40GHz											
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch, 1850.2											
3.700	67.0	H	-33.4	2.4	10.1	8.0	-25.8	-13.0	-12.8		
5.550	68.2	H	-26.2	3.2	10.9	8.8	-18.5	-13.0	-5.5		
7.400	62.4	H	-28.6	3.7	11.7	9.5	-20.6	-13.0	-7.6		
9.251	53.0	H	-37.3	4.2	12.2	10.0	-29.3	-13.0	-16.3		
11.101	50.0	H	-38.7	4.7	13.3	11.2	-30.1	-13.0	-17.1		
3.700	63.5	V	-37.0	2.4	10.1	8.0	-29.4	-13.0	-16.4		
5.550	61.0	V	-34.4	3.2	10.9	8.8	-26.7	-13.0	-13.7		
7.400	66.5	V	-25.3	3.7	11.7	9.5	-17.3	-13.0	-4.3		
9.251	53.6	V	-36.7	4.2	12.2	10.0	-28.7	-13.0	-15.7		
11.101	52.4	V	-36.9	4.7	13.3	11.2	-28.3	-13.0	-15.3		
12.951	54.6	V	-33.7	5.2	13.6	11.4	-25.3	-13.0	-12.3		
Mid Ch, 1880											
3.760	66.3	H	-34.0	2.5	10.2	8.0	-26.3	-13.0	-13.3		
5.640	64.2	H	-30.1	3.3	11.1	8.9	-22.3	-13.0	-9.3		
7.520	63.5	H	-27.1	3.7	11.6	9.5	-19.3	-13.0	-6.3		
9.400	55.4	H	-34.8	4.2	12.3	10.1	-26.8	-13.0	-13.8		
11.279	56.0	H	-32.6	4.8	13.3	11.1	-24.1	-13.0	-11.1		
13.160	55.3	H	-32.0	5.2	13.5	11.4	-23.6	-13.0	-10.6		
3.760	62.1	V	-38.3	2.5	10.2	8.0	-30.6	-13.0	-17.6		
5.640	61.6	V	-33.7	3.3	11.1	8.9	-25.9	-13.0	-12.9		
7.520	67.0	V	-24.4	3.7	11.6	9.5	-16.6	-13.0	-3.6		
9.400	55.0	V	-35.2	4.2	12.3	10.1	-27.2	-13.0	-14.2		
11.279	63.4	V	-25.8	4.8	13.3	11.1	-17.3	-13.0	-4.3		
13.160	54.0	V	-34.1	5.2	13.5	11.4	-25.7	-13.0	-12.7		
High Ch, 1909.8											
3.820	66.6	H	-33.5	2.5	10.2	8.0	-25.8	-13.0	-12.8		
5.729	63.6	H	-30.7	3.3	11.2	9.0	-22.8	-13.0	-9.8		
7.639	60.4	H	-29.9	3.8	11.5	9.4	-22.1	-13.0	-9.1		
9.549	55.0	H	-35.1	4.3	12.4	10.2	-27.0	-13.0	-14.0		
11.459	55.6	H	-32.9	4.8	13.2	11.1	-24.5	-13.0	-11.5		
13.369	55.7	H	-31.4	5.2	13.4	11.2	-23.2	-13.0	-10.2		
3.820	65.5	V	-34.7	2.5	10.2	8.0	-27.0	-13.0	-14.0		
5.729	61.3	V	-34.0	3.3	11.2	9.0	-26.1	-13.0	-13.1		
7.639	66.7	V	-24.4	3.8	11.5	9.4	-16.6	-13.0	-3.6		
9.549	56.3	V	-33.8	4.3	12.4	10.2	-25.7	-13.0	-12.7		
11.459	54.5	V	-34.6	4.8	13.2	11.1	-26.2	-13.0	-13.2		
13.369	58.5	V	-29.4	5.2	13.4	11.2	-21.2	-13.0	-8.2		
Note: No other emissions were detected above the system noise floor.											

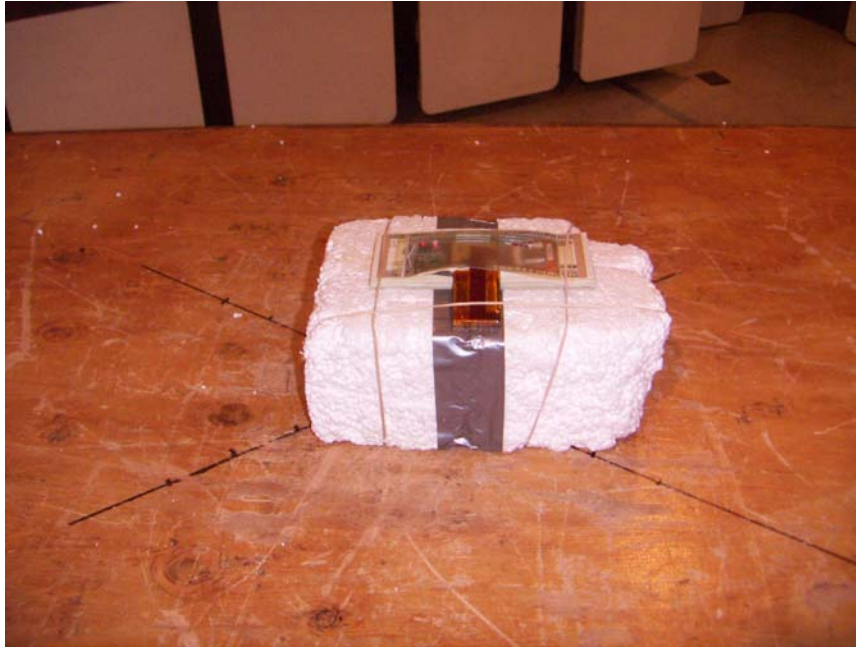
9. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

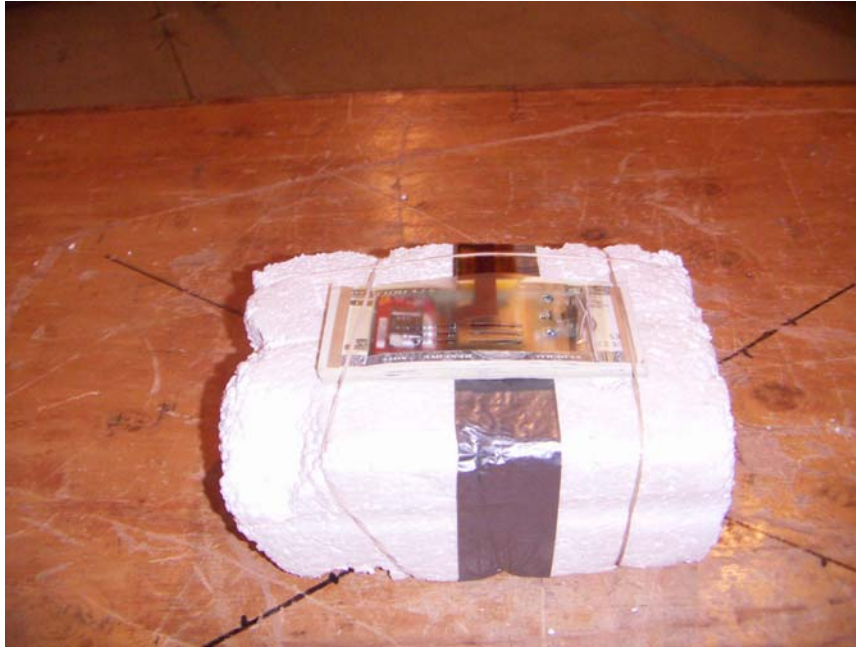


RADIATED RF MEASUREMENT SETUP FOR MOBILE CONFIGURATION

RADIATED FRONT PHOTO

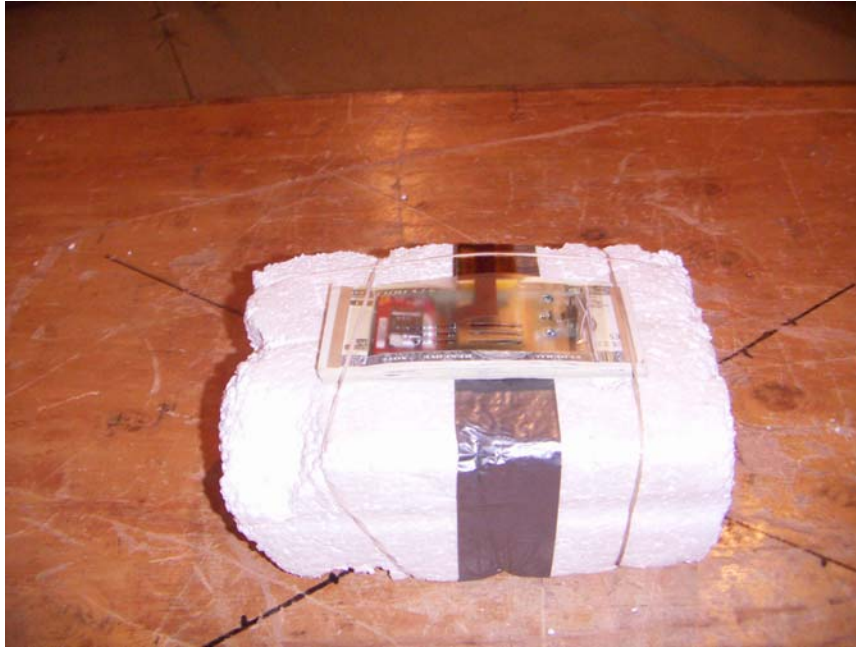


RADIATED BACK PHOTO

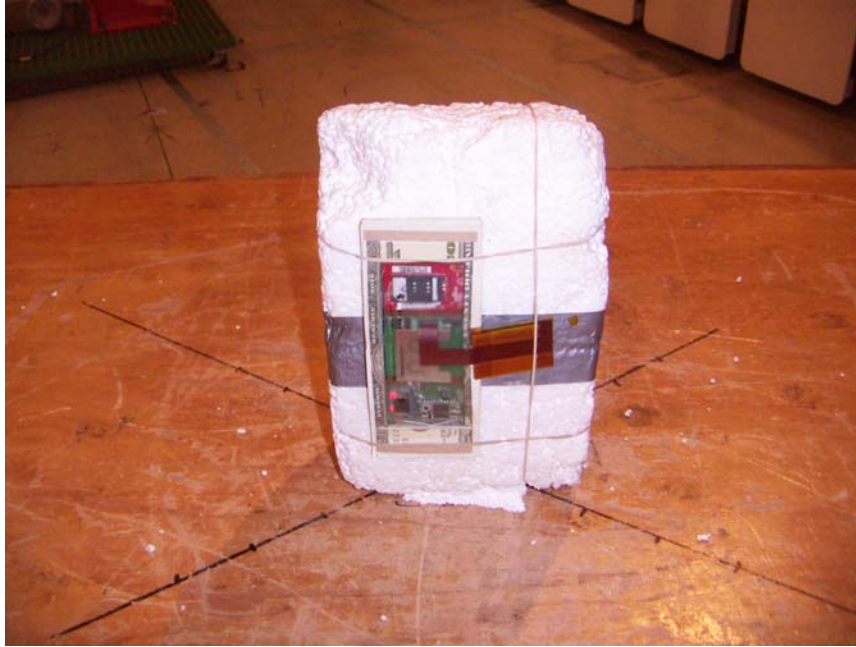


RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO



Y-AXIS FRONT PHOTO



Z-AXIS PHOTO



END OF REPORT