

## **Certification Test Report**

**FCC ID: 2AAZL-GTCU-GS-001**

**FCC Rule Part: 15.247**

**ACS Report Number: 13-2133.W04.1A**

Manufacturer: Globe Tracker, Inc.  
Model: GTCU-GS-001

Test Begin Date: **September 19, 2013**  
Test End Date: **October 10, 2013**

Report Issue Date: October 28, 2013



FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER AT-1533

This report must not be used by the client to claim product certification, approval, or endorsement by ACLASS, ANSI, or any agency of the Federal Government.

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**Kirby Munroe**  
**Director, Wireless Certifications**  
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**This report contains 12 pages**

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## 1 GENERAL

### 1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations for a Class II Permissive Change for the specific test requirements described in this document.

The purpose of the Class II Permissive change is to add a new antenna/host to the Globe Tracker Model GTCU-GS-001.

### 1.2 Manufacturer Information

Globe Tracker, Inc.  
304 E Strawbridge Ave  
Melbourne, FL 32901

### 1.3 Product Description

The Globe Tracker model GTCU-GS-001 is an IEEE 802.11b low power Wi-Fi module. The model GTCU-GS-001 is integrated inside of the Globe Tracker communication unit (GTCU), which consists of the Globe Tracker communication module (GTCM) and the Globe Tracker antenna module (GTAM). The GTCU system also includes a 433 MHz transceiver and a Telit GSM module (FCC ID: RI7GE865, IC: 5131A-GE865). Only one of the transceivers can transmit at a given period of time.

#### Technical Details

Mode of Operation: WLAN 802.11 b  
Frequency Range: 2412 MHz – 2462 MHz  
Number of Channels: 11  
Channel Separation: 5 MHz  
Transmit Data Rates: 802.11b: 1, 2, 5.5, and 11Mb/s  
Antenna Type/Gain: Patch Antenna, 3.5 dBi

Model Number: GTCU-GS-001

Test Sample Serial Number(s): N/A

Test Sample Condition: The samples were in good conditions with no observable physical damages.

#### 1.4 Test Methodology and Considerations

The Globe Tracker model GTCU-GS-001 was evaluated for radiated emissions when integrated within the Globe Tracker GTCU-001 system. The Wi-Fi radio was investigated up to the 10th harmonic using the worst case data rate declared in the original certification test report. The configurations for the EUT during the assessment are provided below. Additional preliminary evaluations were performed for the module and host was set in three orthogonal orientations. The results reported in this document correspond to the worst case.

The unit was also evaluated for unintentional emissions in the new host/antenna configuration. The results are reported separately in a verification test report.

**Table 1.4-1: Wi-Fi Radio Configurations**

Mode of Operation	Frequency (MHz)	Channel	Data Rate (Mbps)
802.11b	2412	1	11
	2437	6	
	2462	11	

## 2 TEST FACILITIES

### 2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions, Inc.  
3998 FAU Blvd, Suite 310  
Boca Raton, Florida 33431  
Phone: (561) 961-5585  
Fax: (561) 961-5587  
[www.acstestlab.com](http://www.acstestlab.com)

FCC Test Firm Registration #: 475089

Industry Canada Lab Code: 4175C

### 2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by ANSI-ASQ National Accreditation Board under their ACCLASS program and has been issued certificate number AT-1533 in recognition of this accreditation. Unless otherwise specified, all test methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

## 2.3 Radiated & Conducted Emissions Test Site Description

### 2.3.1 Semi-Anechoic Chamber Test Site

The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with a continuous metallic loaded spring. An EMCO Model 1050 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:

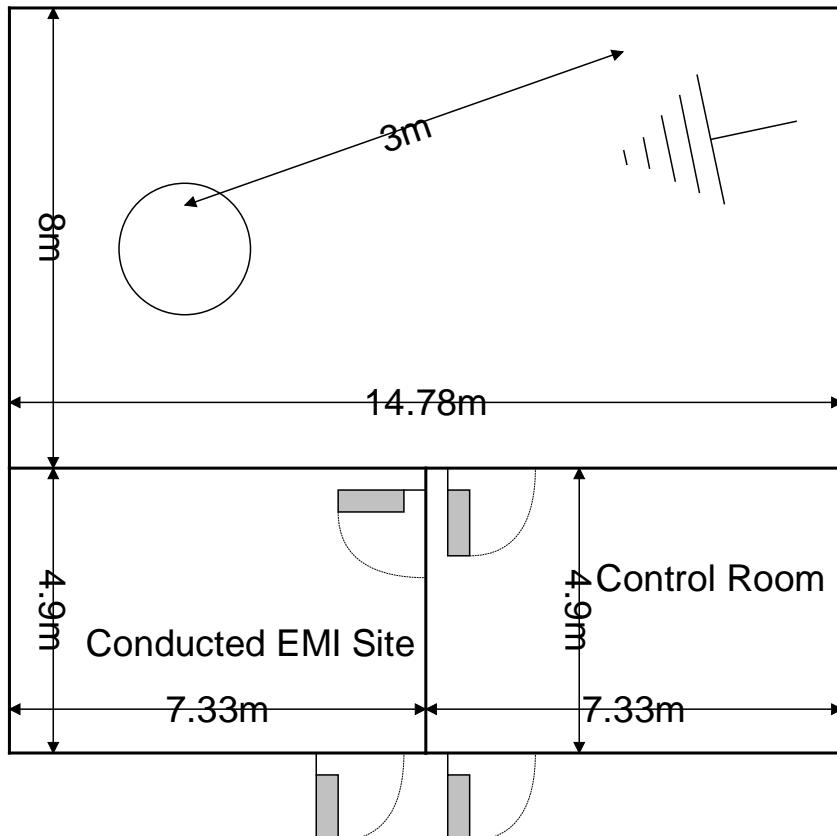


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

### 2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are  $7.3 \times 4.9 \times 3 \text{ m}^3$ . As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50  $\Omega$ /50  $\mu\text{H}$  and an EMCO Model 3825, which are installed as shown in Photograph 3. For 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

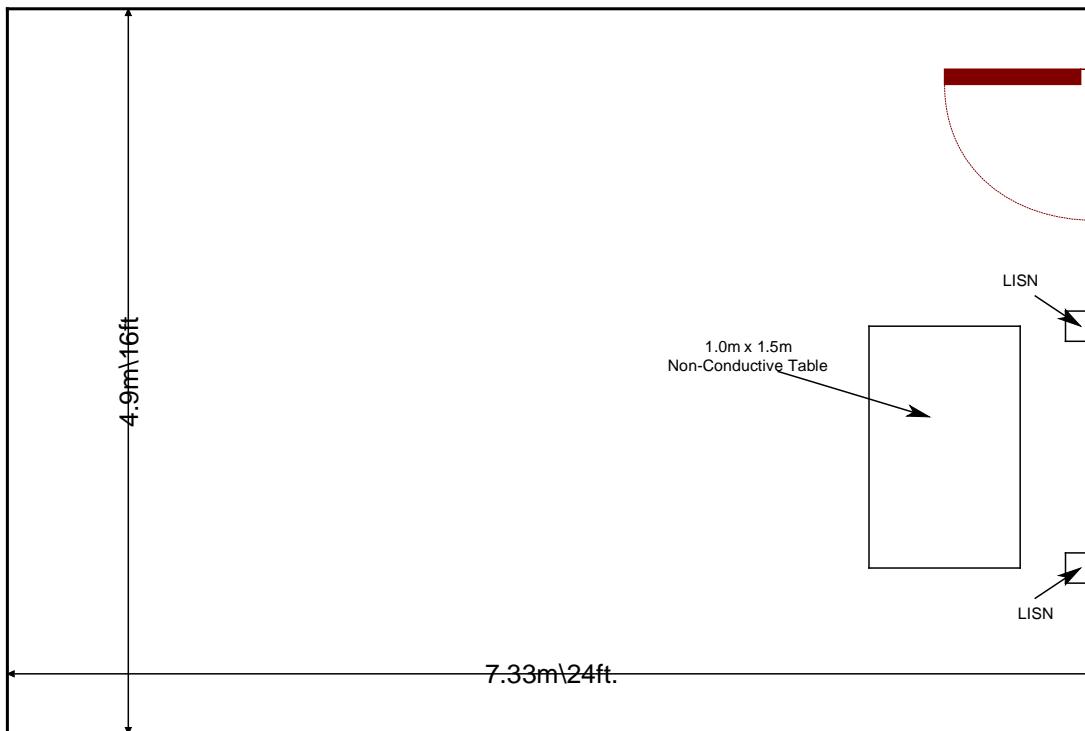


Figure 2.3.2-1: AC Mains Conducted EMI Site

## 3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ❖ ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 kHz to 40 GHz.
- ❖ ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2013.
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2013
- ❖ KDB Publication No. 558074 D01 DTS Meas Guidance v03r01 – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247, April 9, 2013.

#### 4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

**Table 4-1: Test Equipment**

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
523	Agilent	E7405	Spectrum Analyzers	MY45103293	1/8/2013	1/8/2015
524	Chase	CBL6111	Antennas	1138	1/7/2013	1/7/2015
2006	EMCO	3115	Antennas	2573	4/24/2013	4/24/2015
2008	COM-Power	AH-826	Antennas	81009	NCR	NCR
2011	Hewlett-Packard	HP 8447D	Amplifiers	2443A03952	12/31/2012	12/31/2013
2037	ACS Boca	Chamber EMI Cable Set	Cable Set	2037	1/1/2013	1/1/2014
2044	QMI	N/A	Cables	2044	12/31/2012	12/31/2013
2070	Mini Circuits	VHF-8400+	Filter	2070	12/31/2012	12/31/2013
2072	Mini Circuits	VHF-3100+	Filter	30737	12/31/2012	12/31/2013
2076	Hewlett Packard	HP5061-5458	Cables	2076	12/29/2012	12/29/2013
2086	Merrimac	FAN-6-10K	Attenuators	23148-83-1	12/29/2012	12/29/2013
2089	Agilent Technologies, Inc.	83017A	Amplifiers	3123A00214	12/20/2012	12/20/2013
2095	ETS Lindgren	TILE4! - Version 4.2.A	Software	85242	NCR	NCR

**NCR=No Calibration Required**

## 5 SUPPORT EQUIPMENT

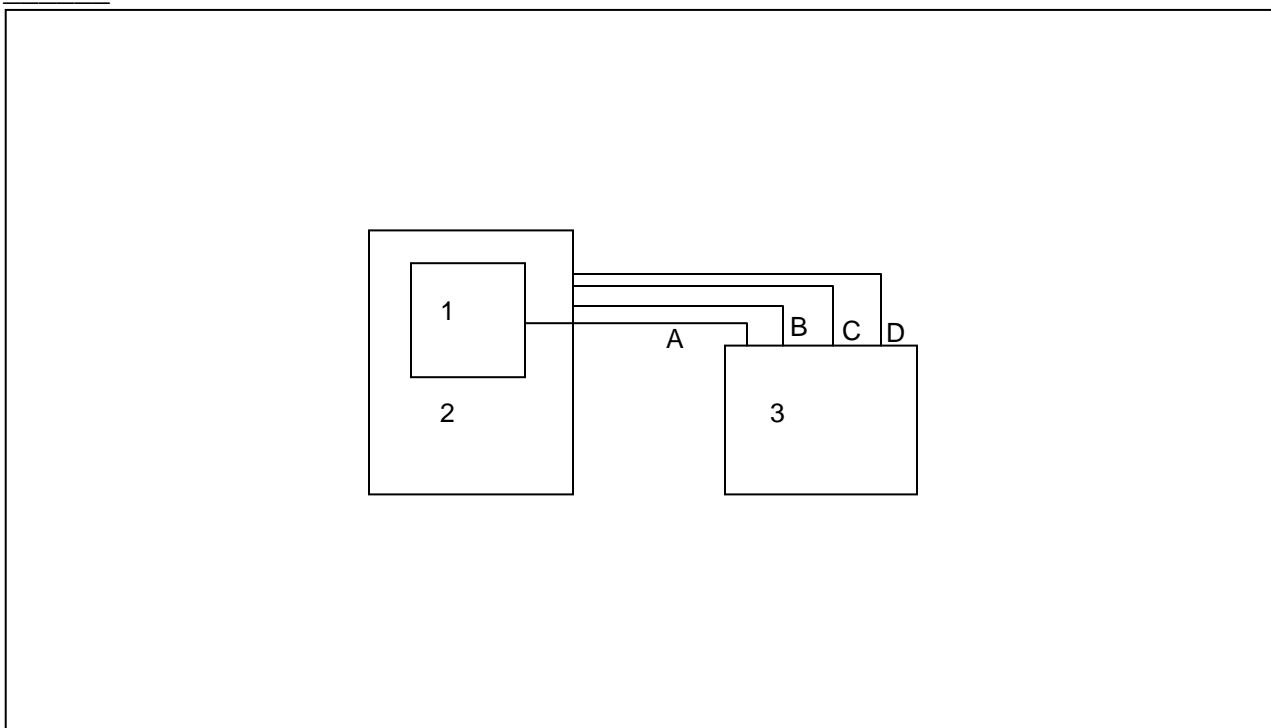
Table 5-1: EUT and Support Equipment

Item #	Type Device	Manufacturer / Grantee	Model/Part #	Serial #
1	Wi-Fi Module	Globe Tracker, Inc.	GTCU-GS-001	N/A
2	Communications Module of GTCU system (GTCM)	Globe Tracker, Inc.	GTCM-001	FLC323000136
3	Antenna Module of GTCU System (GTAM)	Globe Tracker, Inc.	GTAM-001	JCE-4

Table 5-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	Coaxial	0.3 m	Yes	GTAM To GTCM
B	Coaxial	0.3 m	Yes	GTAM To GTCM
C	Coaxial	0.3 m	Yes	GTAM To GTCM
D	Coaxial	0.3 m	Yes	GTAM To GTCM

## 6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



## 7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

### 7.1 Antenna Requirement – FCC: Section 15.203

The Globe Traker Model GTCU-GS-001 uses a Patch antenna located within the GTAM component of the GTCU system via SMB connectors.

### 7.2 Radiated Spurious Emissions - FCC Section 15.205

#### 7.2.1.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30 MHz to 26 GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 30 Hz over a 5 second sweep.

#### 7.2.1.2 Measurement Results

Radiated band-edge and spurious emissions found in the band of 30MHz to 26 GHz are reported in the tables below.

**Table 7.2.1-1: Radiated Spurious Emissions Tabulated Data – 802.11b**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
<b>Low Channel 2412 MHz</b>										
2390	59.32	44.88	H	-8.65	50.67	36.23	74.0	54.0	23.3	17.8
2390	59.79	44.60	V	-8.65	51.14	35.95	74.0	54.0	22.9	18.0
4824	46.51	33.63	H	-0.83	45.68	32.80	74.0	54.0	28.3	21.2
4824	46.28	34.56	V	-0.83	45.45	33.73	74.0	54.0	28.5	20.3
<b>Middle Channel 2437 MHz</b>										
4874	53.08	40.51	H	-0.68	52.40	39.83	74.0	54.0	21.6	14.2
4874	46.55	33.93	V	-0.68	45.87	33.25	74.0	54.0	28.1	20.8
<b>High Channel 2462 MHz</b>										
2483.5	59.97	44.79	H	-8.26	51.71	36.53	74.0	54.0	22.3	17.5
2483.5	60.80	44.52	V	-8.26	52.54	36.26	74.0	54.0	21.5	17.7
4924	45.60	33.35	H	-0.53	45.07	32.82	74.0	54.0	28.9	21.2
4924	44.94	32.60	V	-0.53	44.41	32.07	74.0	54.0	29.6	21.9

**Note: All the emissions above 4.92 GHz were attenuated below the limits and the noise floor of the measurement equipment.**

**7.2.1.3 Sample Calculation:**

$$R_C = R_U + CF_T$$

Where:

CF <sub>T</sub>	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R <sub>U</sub>	=	Uncorrected Reading
R <sub>C</sub>	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

**Example Calculation: Peak**

Corrected Level: 59.32 + (-8.65) = 50.67 dB $\mu$ V/m

Margin: 74 dB $\mu$ V/m - 50.67 dB $\mu$ V/m = 23.3 dB

**Example Calculation: Average**

Corrected Level: 44.88 + (-8.65) = 36.23 dB $\mu$ V/m

Margin: 54 dB $\mu$ V/m - 36.23 dB $\mu$ V/m = 17.8 dB

**8 CONCLUSION**

In the opinion of ACS, Inc., the GTCU-GS-001 manufactured by Globe Tracker, Inc. meets the requirements of FCC Part 15 subpart C for the test procedures documented in the test report.

**END REPORT**