



RF Exposure Evaluation Report

FOR:

Manufacturer: 3SI Security Systems

Model Name: GT86000

Product Description: Asset Tracking and Alert Device

FCC ID: Q6KGT86000A

IC ID: 5043A-GT86000A

References:

1. FCC OET Bulletin 65 Supplement
2. FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091)
3. RSS-102- Radio Frequency Exposure Compliance of Radiocommunication Apparatus
Issue 4 March 2010, Ch, 2.5 and Ch. 4

1 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Manager:	Sajay Jose
Test Engineer:	Daniel Salinas

1.2 Identification of the Client

Applicant's Name:	3SI Security Systems
Street Address:	486 Thomas Jones Way
City/Zip Code	Exton, PA 19341
Country	USA
Contact Person:	Latha Ravi
Phone No.	478-718-5791
e-mail:	latha_ravi@3SISecurity.com

1.3 Identification of the Manufacturer

Same as client

2 Equipment under Test (EUT)

2.1 Specification of the Equipment under Test

Marketing Name:	ATM Tracker
Model No:	GT86000
Product Type:	Asset Tracking and Alert Device
FCC-ID:	Q6KGT86000A
IC-ID :	5043A-GT86000A
Supported frequency bands of operation:	GSM/GPRS: 850/900/1800/1900 MHz Beacon Transmitter: 219.6 MHz
Type(s) of Modulation:	GSM: GMSK Beacon: Pulsed Carrier signal with no modulation
Antenna Info:	GSM: Inverted F antenna Manufacturer stated antenna Gain: 1 – 3 dBi Beacon Radio: Magnetic Loop antenna Manufacturer stated antenna Gain: 1.2-3.3 dBi
Rated Operating Voltage Range(DC):	Internal Battery Operated 3.3V (Low) / 3.7V (Nominal) / 9V (Max)
Test Sample status:	Production
Co-located Transmitters/ Antennas?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Device Category:	<input type="checkbox"/> Fixed Installation <input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable
Exposure Category:	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

3 Assessment

This report serves as the Technical Information regarding RF Exposure evaluation of the below identified device according to the rules as stipulated in the documents listed under References above.

The device meets the RF exposure limits, or - for some of it's radio functions / bands - the conditions for exemption from routine evaluation as defined in the referenced FCC and IC rule parts.

Company	Description	Model #
3SI Security Systems	Asset Tracking and Alert Device	GT86000

2013-04-05 Compliance Daniel Salinas
(EMC Engineer)

Date	Section	Name	Signature
------	---------	------	-----------

4 **RF Exposure Evaluation Requirements**

4.1 **FCC:**

Calculations can be made to predict RF field strength and power density levels around typical RF sources using the general equations (3) and (4) on page 19 of the following FCC document:
“OET Bulletin 65, Edition 97-01 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Note:

1. This device is used only for fixed and mobile applications.

Additionally, according to § 2.1091:

The limit for <1.5 GHz mobile operations where no routine evaluation is required is: 1.5W ERP
The limit for >1.5 GHz mobile operations where no routine evaluation is required is: 3W ERP

4.2 **IC:**

RSS-102 Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 1.5 GHz and the maximum EIRP of the device is equal to or less than 2.5 W;
- at or above 1.5 GHz and the maximum EIRP of the device is equal to or less than 5 W.

RSS-102 4.2: RF Field strength limits for devices used by the General Public (Uncontrolled Environment):

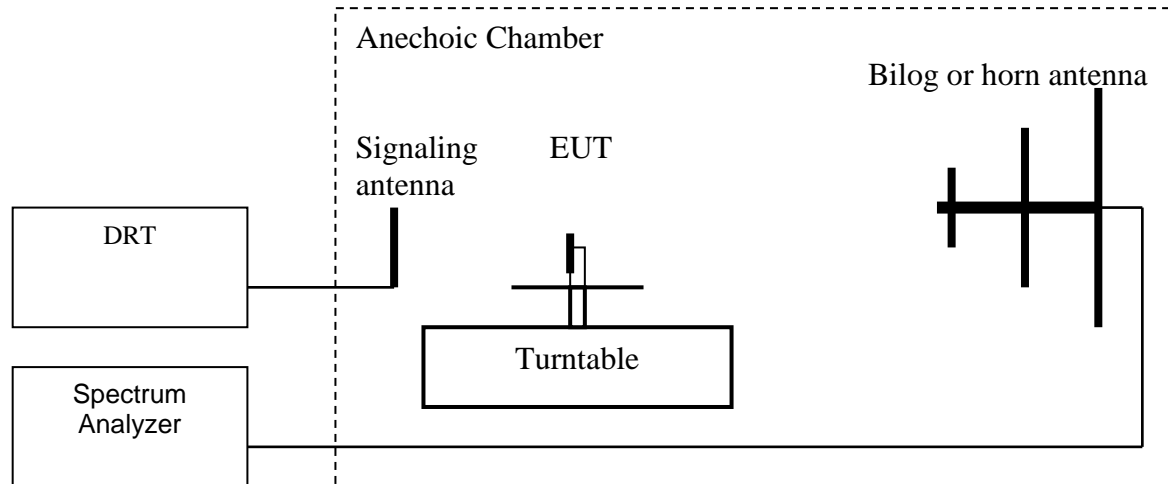
Power density

300MHz- 1500 MHz= f/150 W/m²

1500 MHz- 1500000 MHz= 10 W/m²

5 Measurement procedure:

5.1 Radiated power measurement- ERP/EIRP-

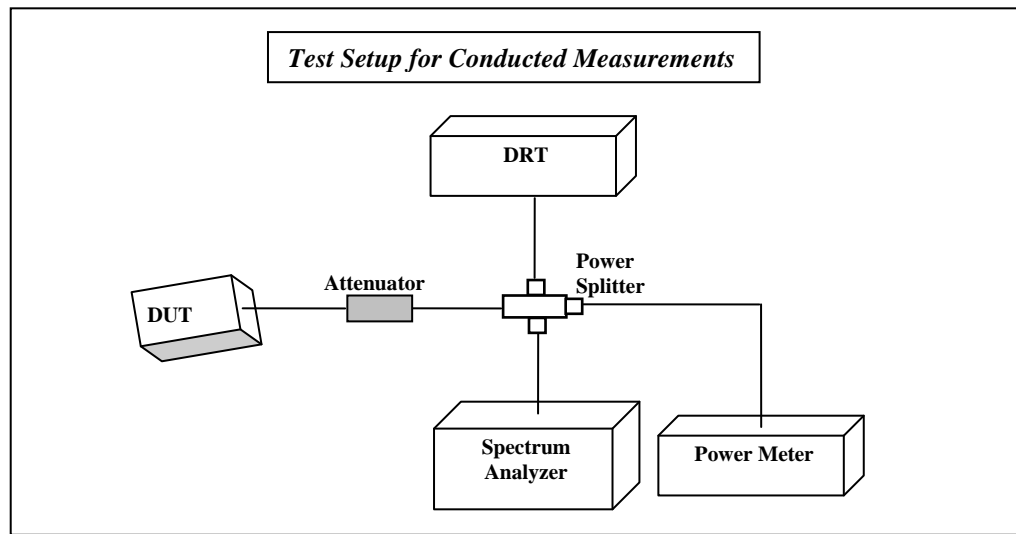


1. Connect the equipment as shown in the above diagram with the EUT's antenna in center of the turn table.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS**). **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the ERP using the following equation:
ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
EIRP (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

Measurement uncertainty: +/-3.0 dB

(**Note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)

5.2 Radiated power Calculation- ERP/EIRP-



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to connect the EUT at the required channel (OR) alternatively use the EUT to set to transmit at a specific mode.
3. Measure conducted power using the power meter or the Spectrum Analyzer.
4. ERP/EIRP is calculated by adding the antenna gain to the measured conducted power.

EIRP= Measured conducted power+ Antenna Gain (dBi)

(Antenna gain based on measurement or data from the antenna manufacturer.)

ERP= EIRP- 2.14

5.3 Measurement Equipment information:

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2011	2 Years
EMI Receiver/Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2011	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Loop Antenna	6512	EMCO	00049838	Aug 2011	3 years
Biconilog Antenna	3141	EMCO	0005-1186	Apr 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035114	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Apr 2012	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Aug 2011	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
Power Smart Sensor	R&S	NRP-Z81	100161	May 2011	2 Years

5.4 Measurement Summary:

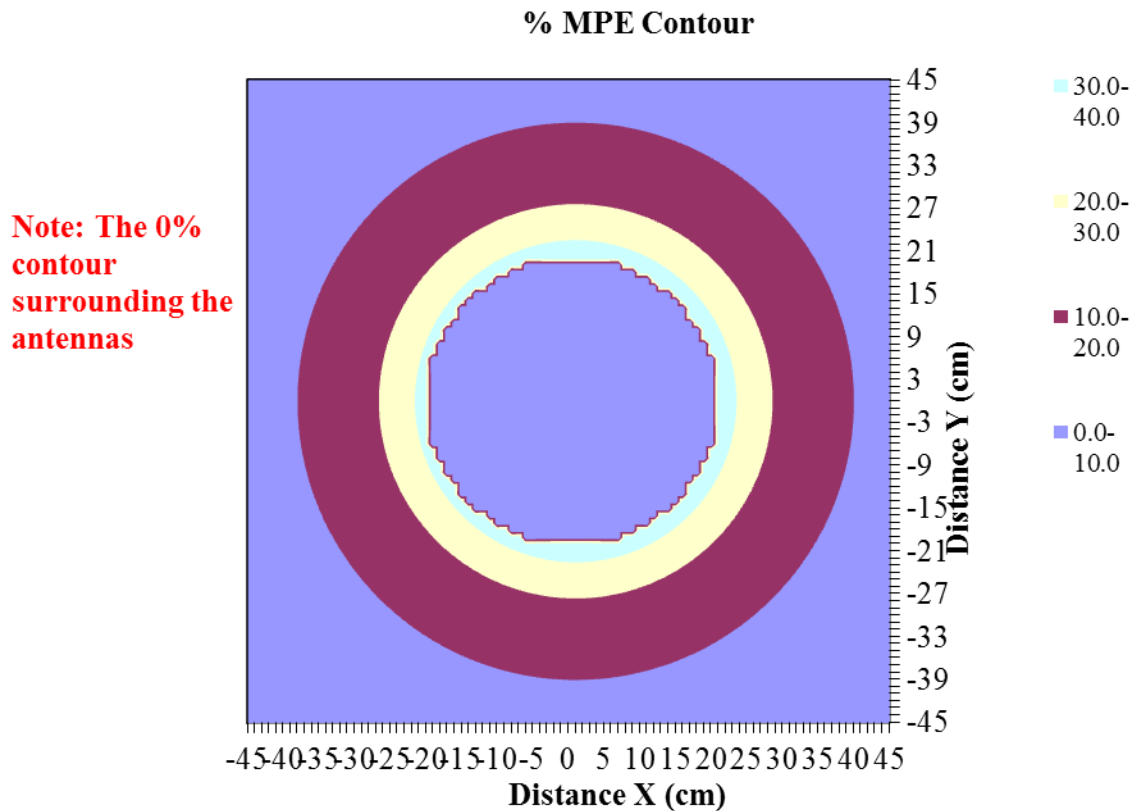
Band of operation	Peak Radiated Power-EIRP		Limits (IC) (where no routine evaluation is required)	Peak Radiated Power ERP		Limits (FCC) (where no routine evaluation is required)
	MHz	dBm	mW	dBm	mW	mW
GSM/GPRS 824.2-848.8	33.34	2157.7	2500	31.2	1318.2	1500
GSM/GPRS 1850.2-1909.8	30.3	1071.5	5000	28.16	654.6	3000
VHF 219.6	-31.6	0.0007	2500	-33.74	0.0004	1500

Since the Peak ERP <3W (FCC) and Peak EIRP <5W (IC), this device is exempt from Routine evaluation.

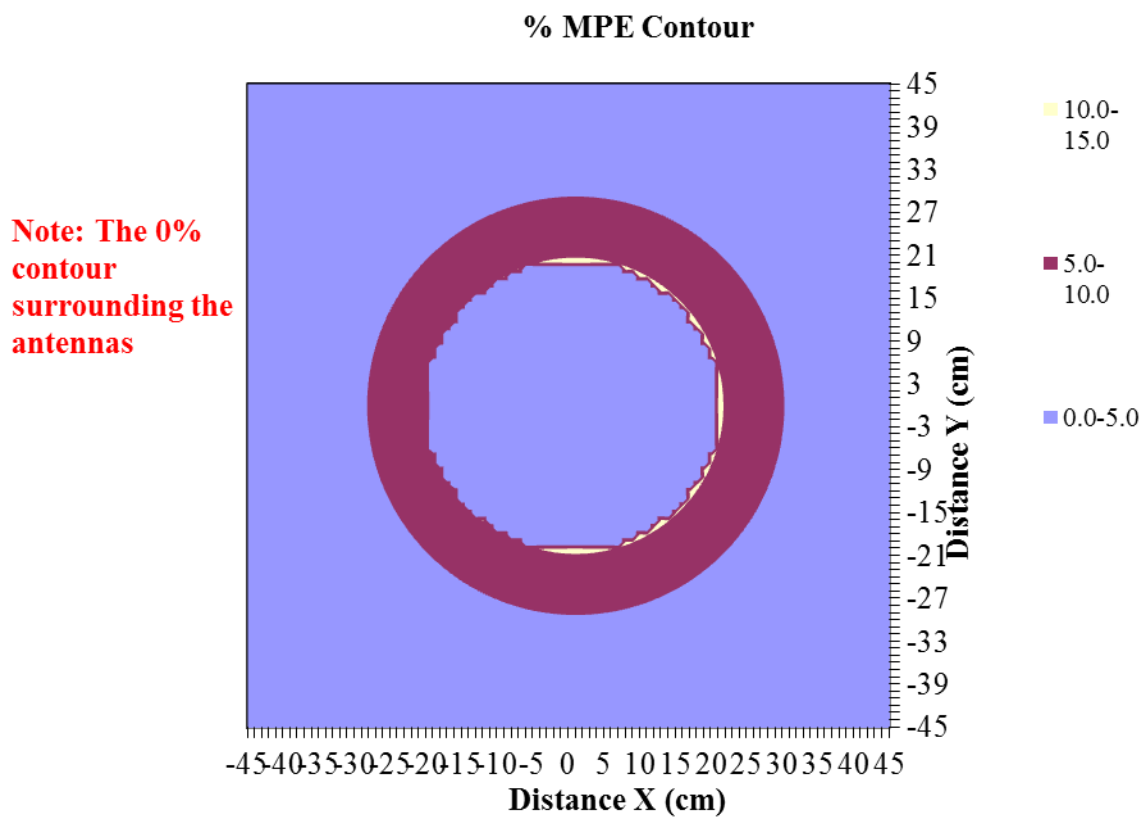
Prediction for Simultaneous Transmission

The MPE limit was made using a separation distance of 1 cm to represent the worse case.
Output power listed below is for 50% duty cycle in GSM mode.

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		219.6	848.8
MPE Limit	mW/cm ²		0.20	0.57
Max % MPE	%	37.9	0.0	37.9
Power	(W)	1.079	0.000	1.079
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	1.08	0.000	1.079
X	(cm)		0.0	1.0
Y	(cm)		0.0	0.0



Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		219.6	1880
MPE Limit	mW/cm ²		0.20	1.00
Max % MPE	%	10.7	0.0	10.7
Power	(W)	0.536	0.000	0.536
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	0.54	0.000	0.536
X	(cm)		0.0	1.0
Y	(cm)		0.0	0.0



Verdict: Since the max MPE is <100%, the device is compliant in simultaneous transmission mode for the Beacon Transmitter and GSM 850/1900 MHz bands of operation.