FCC/IC Test Report

FOR:

3SI Security Systems

Model Name: GT86000
Product Description: Asset tracking and Alert Device

FCC ID: Q6KGT86000A
IC ID: 5043A-GT86000A

47 CFR Part 2, 22, 24

RSS-132 Issue 3

RSS-133 Issue 6

TEST REPORT #: EMC_3SISE-025-13001_WWAN
DATE: 2013-04-18

FCC: Accredited

IC recognized # 3462B-1

***CETECOM* Inc.**
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Table of Contents

1 Assessment

The following device was tested against the applicable criteria specified in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 132 and RSS 133 and no deviations were ascertained during the course of the tests performed.

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

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2013-04-18	Compliance	Sajay Jose (Test Lab Manager)	

Responsible for the Report:

Date	Section	Name	Signature
2013-04-18	Compliance	Daniel Salinas (EMC Engineer)	

The test results of this test report relate exclusively to the test item specified in Section3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 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

2.2 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

2.3 Identification of the Manufacturer

Same as client.

2.4 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:
Ambient Temperature: 20-25^{o}C
Relative humidity: 40-60%

2.5 Dates of Testing:

Aug 27, 2012 - Feb 25, 2013

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Model No:	GT86000
Product Description:	Asset tracking and Alert Device
Hardware Version :	1.0.0
Software Version :	10.05
FCC-ID:	Q6KGT86000A
IC-ID :	5043A-GT86000A
Supported frequency bands of operation:	GSM/GPRS: 850/900/1800/1900 MHz
Frequency range of test:	GSM 850: 824.2-848.8MHz PCS 1900: 1850.2-1909.8MHz
Type(s) of Modulation:	GSM: GMSK
Number of channels:	GSM850: 125 PCS 1900: 300
Antenna Info:	Inverted F antenna Manufacturer stated antenna Gain: 1 – 3 dBi
Other radios in the device:	Beacon Transmitter: 219.6 MHz GPS Receiver: 1575.42 MHz
Rated Operating Voltage Range(DC):	3.3V (Low) / 3.7V (Nominal) / 9V (Max)
Rated Operating Temperature Range:	0°C to +60°C
Test Sample status:	Production

3.2 Identification of the Equipment under Test (EUT)

EUT #	IMEI	HW Version	SW Version
1	35259904355180803	1.0.0	10.0.5

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model
1	GPS Antenna	ACC	M827B-S

4 Subject of Investigation

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in the following test standards:

- 47 CFR Part 2: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission Frequency allocations and radio treaty matters; general rules and regulations.
- 47 CFR Part 22: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 22- Public mobile services
- 47 CFR Part 24: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 24- Personal communication services
- RSS 132- Issue 3: Spectrum management and telecommunication policy- Radio Standards Specifications Cellular telephones operating in the bands 824-849MHz and 869-894MHz
- RSS 133- Issue 6: Spectrum management and telecommunication policy- Radio Standards Specifications- 2GHz personal communication services

This test report is to support a request for new equipment authorization under the FCC ID: Q6KGT86000A and IC ID: 5043A-GT86000A.

Model GT86000 incorporates the same WWAN portion (Telit GE865-QUAD module radio, antenna and associated circuitry) as in a variant model- GT83000, from 3SI Security Systems. Based on a related product portion equality declaration from the manufacturer, only Radiated Spurious Emissions testing, in mid channel of operation , is performed; and reference made to the module/ variant test reports to prove compliance of this model against all the above specified requirements.

5 Summary of Measurement Results

850MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS132 4.4	RF Output Power	Nominal	GSM 850	☐	☐	☐	■	Complies*
§2.1055 §22.355 RSS132 4.3	Frequency Stability	Nominal	GSM 850	☐	☐	☐	■	Complies*
§2.1049 §22.917(b) RSS132 4.2	Occupied Bandwidth	Nominal	GSM 850	☐	☐	☐	■	Complies*
§2.1051 §22.917 RSS132 4.5	Band Edge Compliance	Nominal	GSM 850	☐	☐	☐	■	Complies*
§2.1051 §22.917 RSS132 4.5	Conducted Spurious Emissions	Nominal	GSM 850	☐	☐	☐	■	Complies*
§2.1053 §22.917 RSS132 4.5	Radiated Spurious Emissions	Nominal	GSM 850	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.

* Compliance data referenced from module test report #RFI/RPT2/RP74296JD03B issued by RFI Global LTD.on 2010-09-20 and variant test report # EMC_3SISE-020-12001_WWAN issued by CETECOM Inc. on 2013-04-04 and as available on FCC database under FCC ID: Q6KGT83000A.

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1900MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS133 6.4	RF Output Power	Nominal	GSM 1900	☐	☐	☐	■	Complies*
§2.1055 §24.235 RSS133 6.3	Frequency Stability	Nominal	GSM 1900	☐	☐	☐	■	Complies*
§2.1049 §24.238(b) RSS133 6.2	Occupied Bandwidth	Nominal	GSM 1900	☐	☐	☐	■	Complies*
§2.1051 §24.238 RSS133 6.5	Band Edge Compliance	Nominal	GSM 1900	☐	☐	☐	■	Complies*
§2.1051 §24.238 RSS133 6.5	Conducted Spurious Emissions	Nominal	GSM 1900	☐	☐	☐	■	Complies*
§2.1053 §24.238 RSS133 6.5	Radiated Spurious Emissions	Nominal	GSM 1900	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.

* Compliance data referenced from module test report #RFI/RPT2/RP74296JD03B issued by RFI Global LTD.on 2010-09-20 and variant test report # EMC_3SISE-020-12001_WWAN issued by CETECOM Inc. on 2013-04-04 and as available on FCC database under FCC ID: Q6KGT83000A.

6 Measurements

6.1 Spurious Emissions Radiated

6.1.1 References

FCC: CFR Part 2.1053, CFR Part 22.917, CFR Part 24.238
IC: RSS-Gen Section 4.9; RSS 132 Section 5.5; RSS 133 Section 6.5

6.1.2 Measurement requirements:

6.1.2.1 FCC 2.1053: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

6.1.2.2 RSS-Gen 4.9: Transmitter unwanted spurious emissions

The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements.
The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

6.1.3 Limits:

(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.
For all power levels +30dBm to 0dBm, this becomes a constant specification of -13dBm.

6.1.3.1 FCC 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.1.3.2 FCC 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.
(b) Measurement procedure. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution

bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.1.3.3 RSS-132 Section 5.5

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified inSection 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

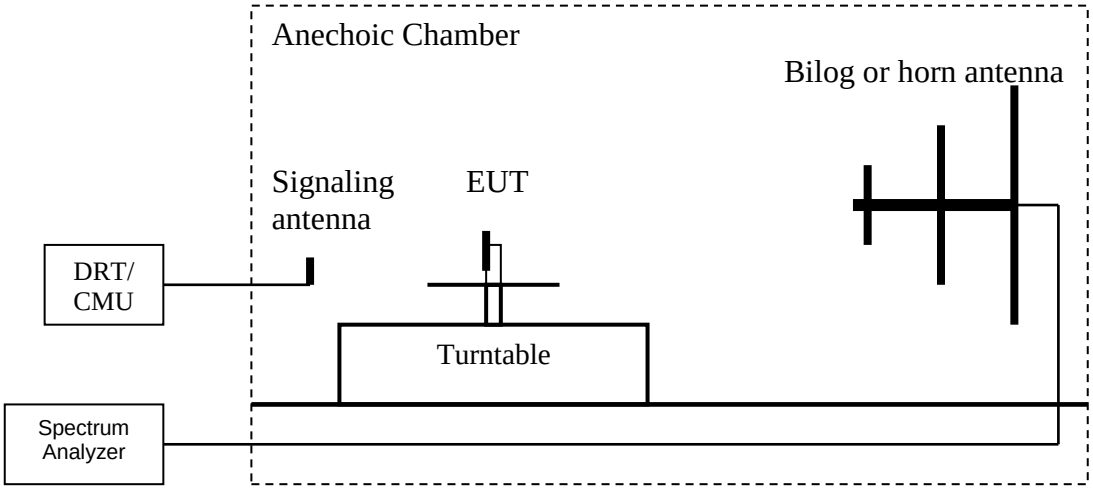
6.1.3.4 RSS-133 Section 6.5.1

i. In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).

ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

6.1.4 Radiated out of band measurement procedure:

Ref: TIA-603C 2004- 2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital RadioCommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (**LVL**) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally 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 level of spurious emissions using the following equation: **Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation: **Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
    (N**ote:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

6.1.5 Sample Calculations for Radiated Measurements

6.1.5.1 Power Measurements using Substitution Procedure:

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure. The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

EIRP (dBm)= Signal Generator setting (dBm)- Cable Loss (dB)+ Antenna Gain (dBi)
Eg:

Frequency (MHz)	Measured SA (dBµV)	Signal Generator setting (dBm)	Antenna Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	EIRP (dBm)
1000	95.5	24.5	6.5	0	3.5	27.5

6.1.6 Measurement Survey:

The site is constructed in accordance with ANSI C63.4 requirements and is recognized by the FCC to be in compliance for a 3m site. The spectrum is scanned from 30MHz to the 10th harmonic of the highest frequency generated by the EUT.
Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands.
It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 & PCS-1900 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

Radiated emission measurements were performed in Circuit Switched GMSK mode of operation.

All measurements are done for horizontal and vertical measurement antenna polarization; and on three orientations of the EUT. Plots showing the worst case is included in this report.

Unless mentioned otherwise, the peaks exceeding the limit line in the plots are from the transmit carrier.

6.1.7 Test Conditions:

Tnom: 25^{o}C; Vnom: 9 V

6.1.8 Test Verdict:

Pass.

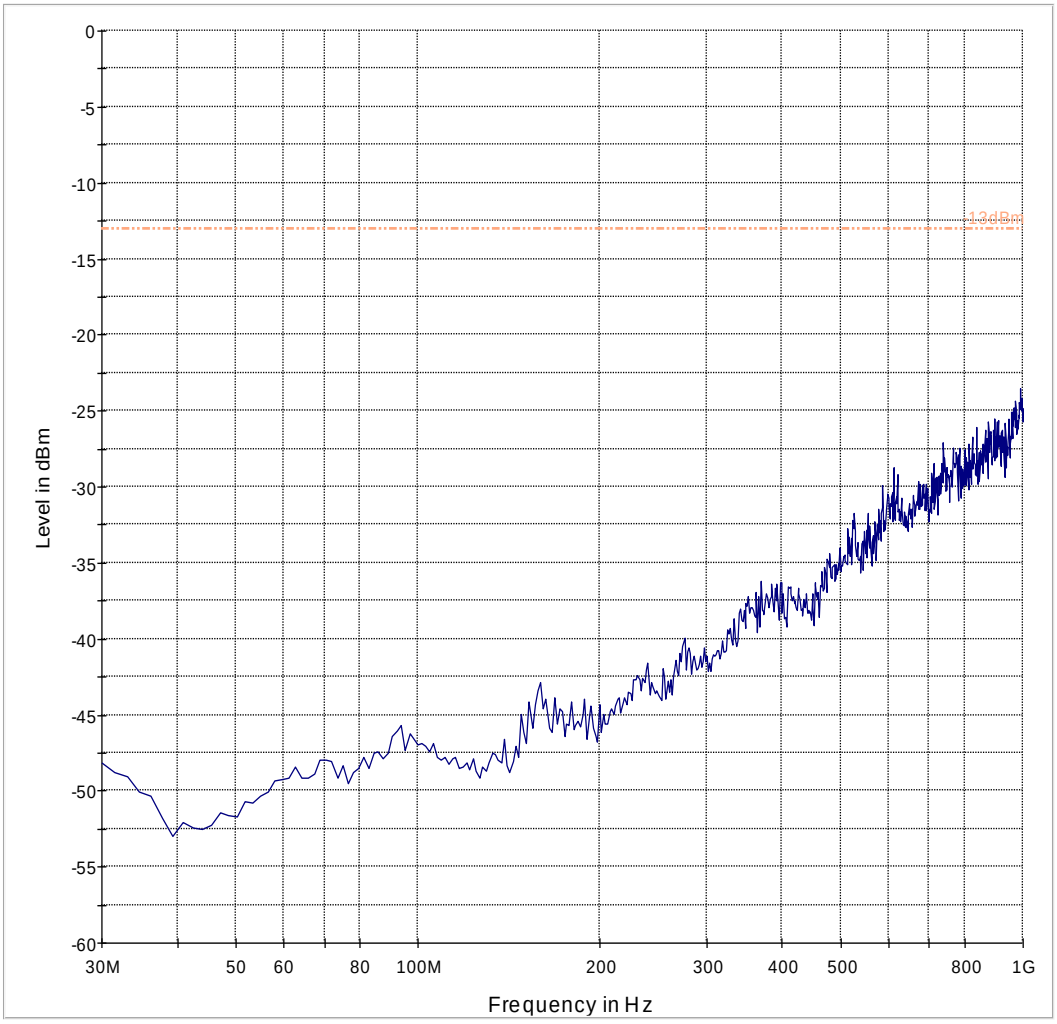
6.1.9 Test Results:

6.1.9.1 Test Results Transmitter Spurious Emissions:

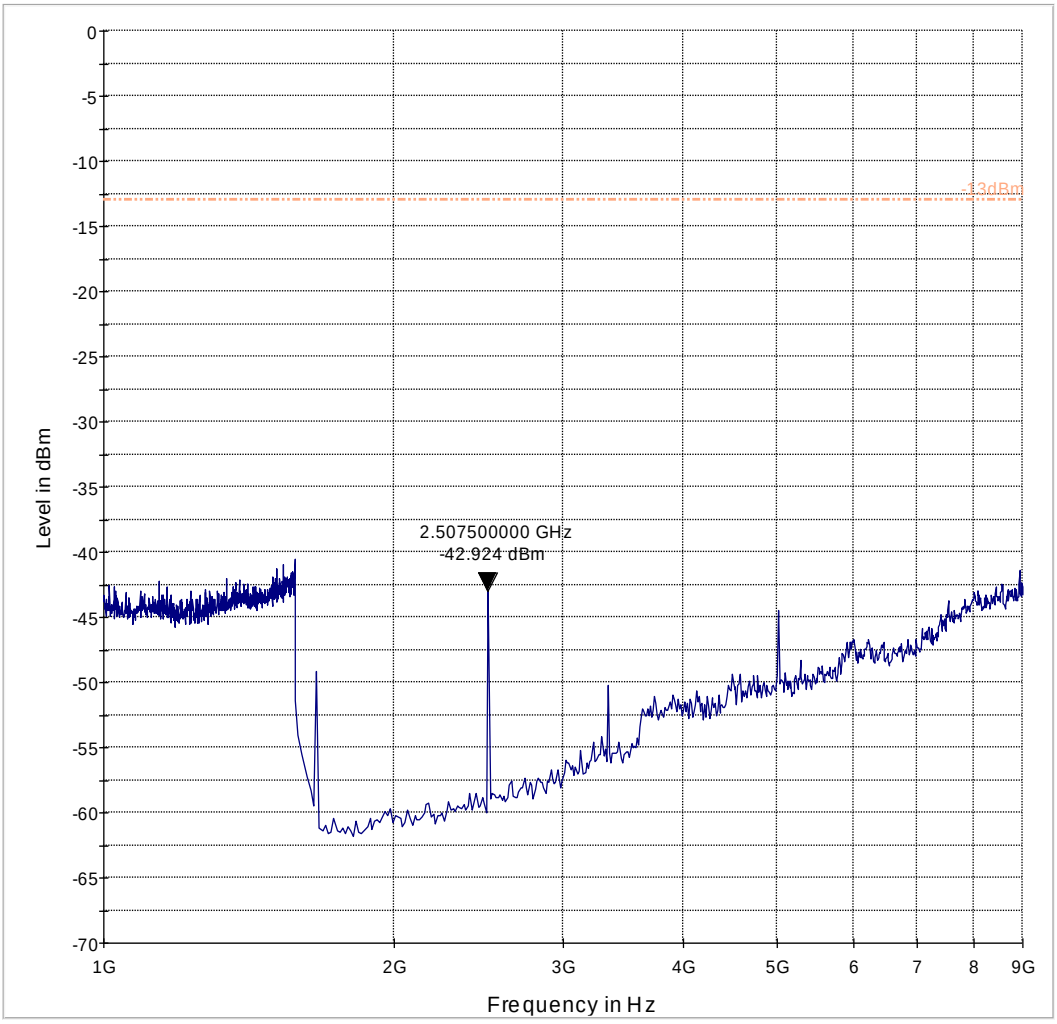
	GSM 850 MHz		PCS 1900 MHz	
Harmonic	**Freq. (MHz)**	**Level (dBm)**	**Freq. (MHz)**	**Level (dBm)**
2	**1673.2**	-49	**3760**	-45
3	**2509.8**	-42.9	**5640**	NF
4	**3346.4**	-50	**7520**	NF
5	**4183**	NF	**9400**	NF
6	**5019.6**	-44.6	**11280**	NF
7	**5856.2**	NF	**13160**	NF
8	**6692.8**	NF	**15040**	NF
9	**7529.4**	NF	**16920**	NF
10	**8366**	NF	**18800**	NF
NF = Noise Floor Measurement Uncertainty: ±3dB				

6.1.9.2 Plots:

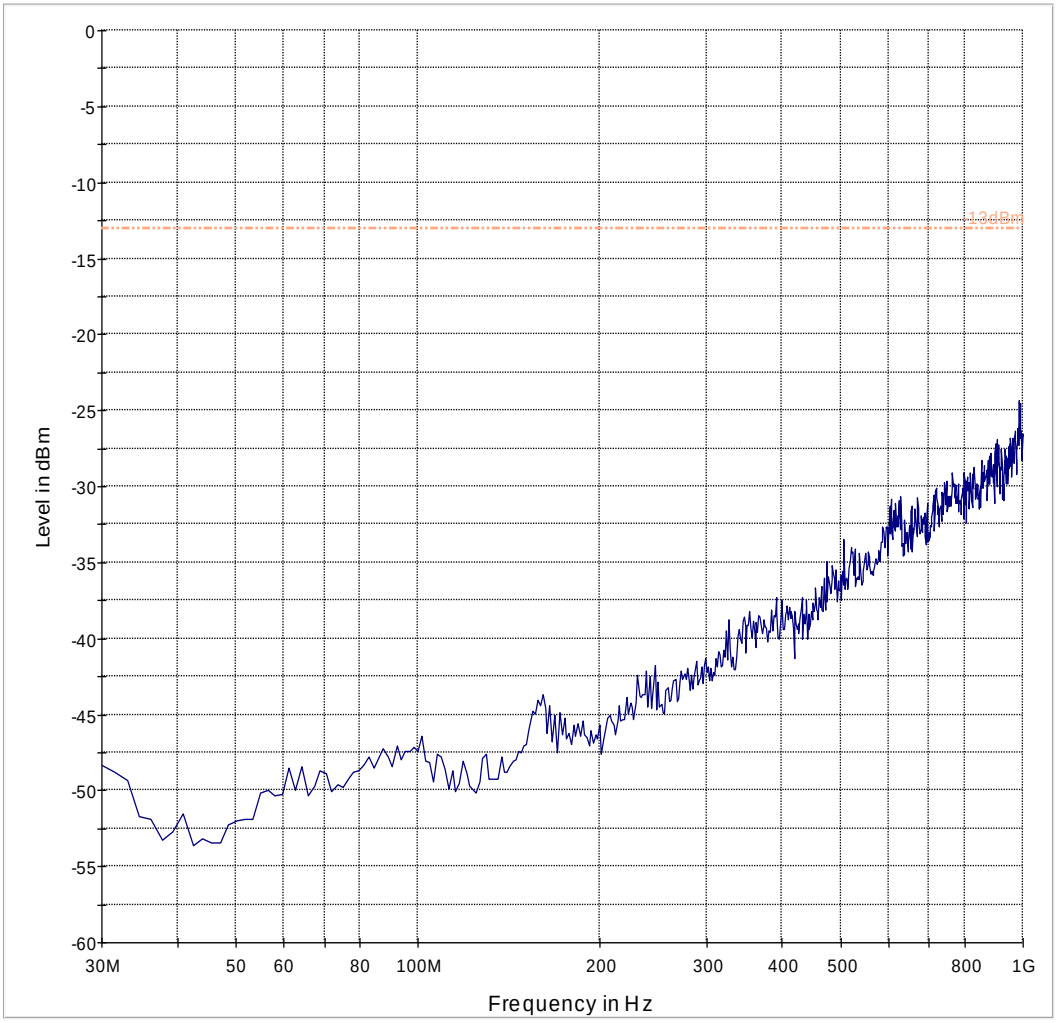
Radiated Spurious Emissions (GSM-850) Tx: Mid Channel
Test results 30M-1GHz



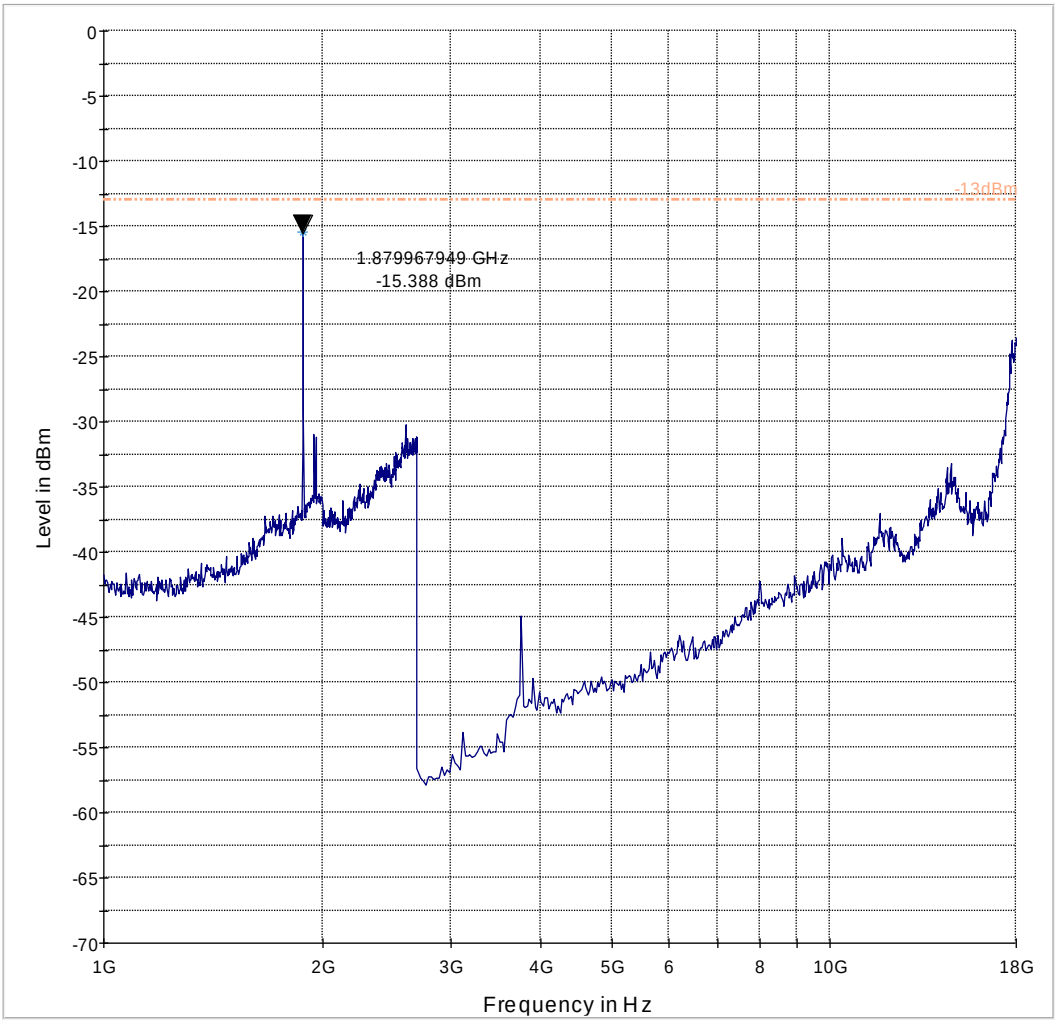
Test results 1GHz-9GHz



Radiated Spurious Emissions (GSM-1900) Tx: Mid Channel
Test results 30M-1GHz



Test results 1GHz-18GHz

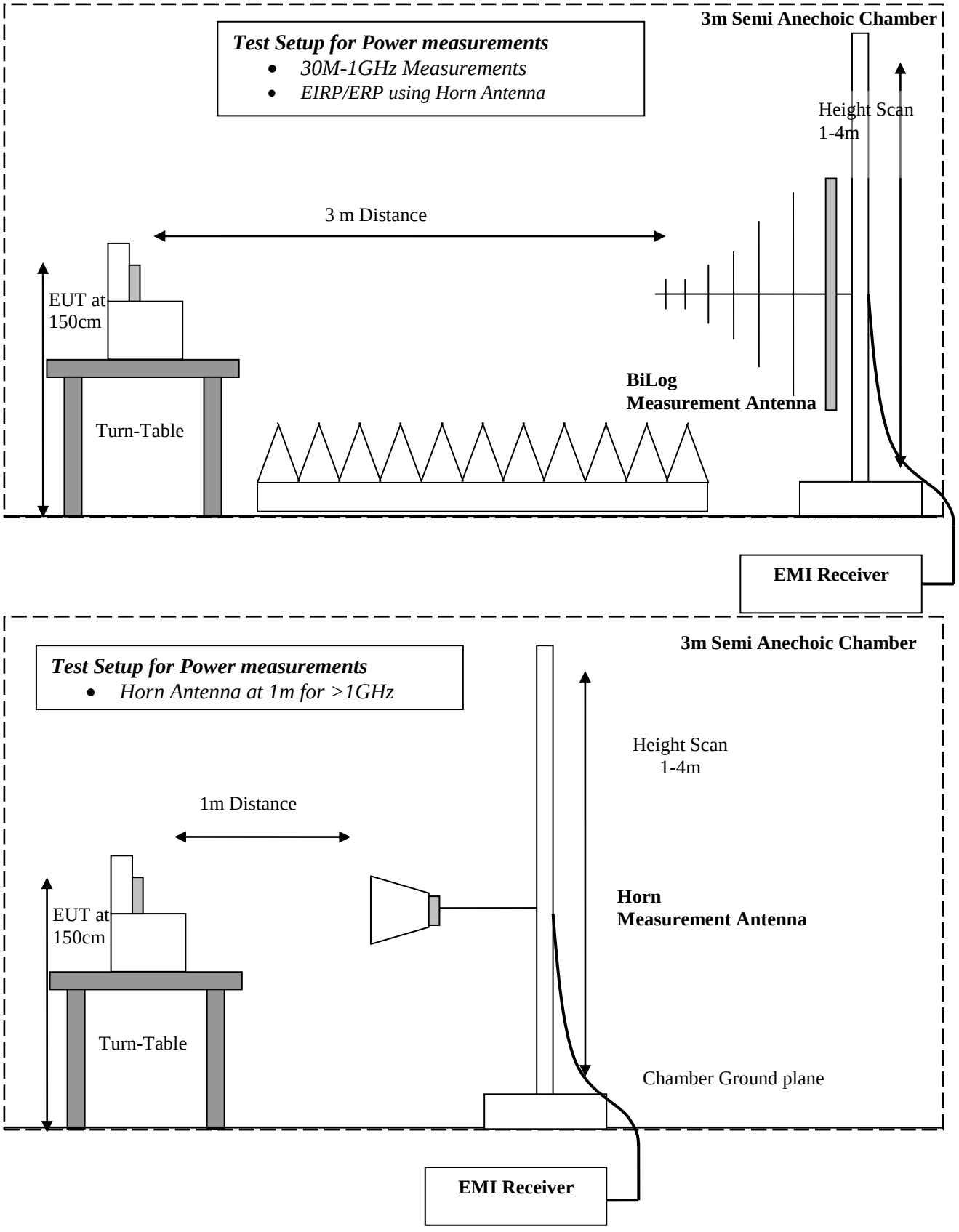


No emissions to report >18GHz.

7 Test Equipment and Ancillaries used for tests

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2011	2 Years
Radio Communication Tester	CMU 200	Rohde & Schwarz	109879	May 2011	2 Years
Radio Communication Tester	CMU 200	Rohde & Schwarz	110759	May 2011	2 Years
EMI Receiver/Analyzer	ESU 40	Rohde & Schwarz	100251	Aug 2012	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Loop Antenna	6512	EMCO	00049838	Apr 2012	3 years
Biconilog Antenna	3141	EMCO	0005-1186	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035114	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	
6GHz High Pass Filter	HPM50106	Microtronics	001	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
LISN	50-25-2-08	FCC	08014	Jan 2012	1 year
Power Smart Sensor	R&S	NRP-Z81	100161	May 2011	2 Years
DC Power Supply	6655A	Hewlett Packard	3403A-00487	n/a	n/a
Multimeter	MM200	Klein	N/A	Apr 2011	2 Years
Temp Hum Logger	TM320	Dickson	03280063	Feb 2012	1 Year
Temp Hum Logger	TM325	Dickson	5285354	Feb 2012	1 Year

8 Block Diagrams



9 Revision History

Date	Report Name	Changes to report	Report prepared by
2013-04-18	EMC_3SISE-025-13001_WWAN	First Version	Daniel Salinas