FCC Test Report

FOR:

3SI Security Systems
Model Name: AT140720US

Product Description:
Asset Tracking and Alert Device

FCC ID: Q6KAT140720A

47 CFR Part 90

TEST REPORT #: EMC-3SISE-039-14001_RT_FCC_90_Rev1
DATE: 2015-1-28

Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Test Lab
LAB CODE 20020328-00

FCC listed:
A2LA Accredited

IC recognized #
3462B-1

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

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1 Assessment.

The following device was evaluated against the applicable criteria specified in FCC rules Parts 90 of Title 47 of the Code of Federal Regulations and no deviations were ascertained during the course of the tests performed.

Company	Description	Model #
3SI Security Systems	Asset tracking and alert devices	AT140720US

This report is reviewed by:

Date	Section	Name	Signature
2015-1-28	Compliance	Franz Engert (Manager Compliance)	Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Complience, email=franz.engert@cetecom.com Date: 2015.01.28 14:10:06 -08'00'

Responsible for the Report:

Date	Section	Name	Signature
2015-1-28	Compliance	James Donnellan (Senior EMC Test Engineer)	James Donnellan Digitally signed by James Donnellan DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com Date: 2015.01.28 13:22:58 -08'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC 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
Responsible Test Lab Manager:	Franz Engert.
Responsible Project Leader:	James Devasia.

2.2 Identification of the Client

Applicant's Name:	3SI Security Systems
Street Address:	2055 N Brown Road, Suite 225, Lawrenceville
City/Zip Code	GA 30043
Country	USA
Contact Person:	Waldemar Sierocinski
Phone No.	954-214-5398
Fax:	954-214-5398
e-mail:	Waldemar_Sierocinski@3sisecurity.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as above.
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name / Description:	Asset Tracking and Alert Device
Model Number:	AT140720US
FCC-ID :	Q6KAT140720A
IC Cert Number:	5043A-AT140720A
HW / SW Revision :	P2 / 12.1.18203
Product Description:	Asset Tracking and Alert Device equipped with 3G cellular radio module, beacon radio and GPS
Type(s) of Modulation:	no modulation, pulsed CW at 20% duty cycle, repetition rate 1 Hz
Frequency Range / number of channels:	1 channel, center at 219.6MHz, OBW: 6.25 KHz
Antenna info:	Internal, PCB trace loop antenna (around pcb perimeter)
Output Power:	ERP: -13.46 dBm
Other Radios	• 3G radio module GSM: 850/1900 & UMTS FDD: Band II/Band V • GPS 1575.42 MHz
Power supply	Battery Pack 3.7V DC;
operating temperature range	-20ºC to 60ºC
Prototype / Production unit	Prototype

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Notes	Cetecom ID
1	IMEI: 354676050448264	(P2)	12.1.18147	RT REVB # 7	-
2	IMEI 354676050452894	(P2)	12.1.18147	RT REVB #8	-

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Serial Number / PN
1	Battery	3.7 V Li-ion Battery Pack	52010555 T	3.7 V Li-ion Battery Pack

4 Subject Of Investigation

The objective of the evaluation documented in this report was to assess if the performance of the EUT meets the relevant requirements specified in FCC rules Part 90 of Title 47 of the Code of Federal Regulations.

This test report is to support a request for new equipment authorization under the
FCC ID: Q6KAT140720A
All testing was performed on the product samples referred to in Section 3 as EUT.

5 Test Summary

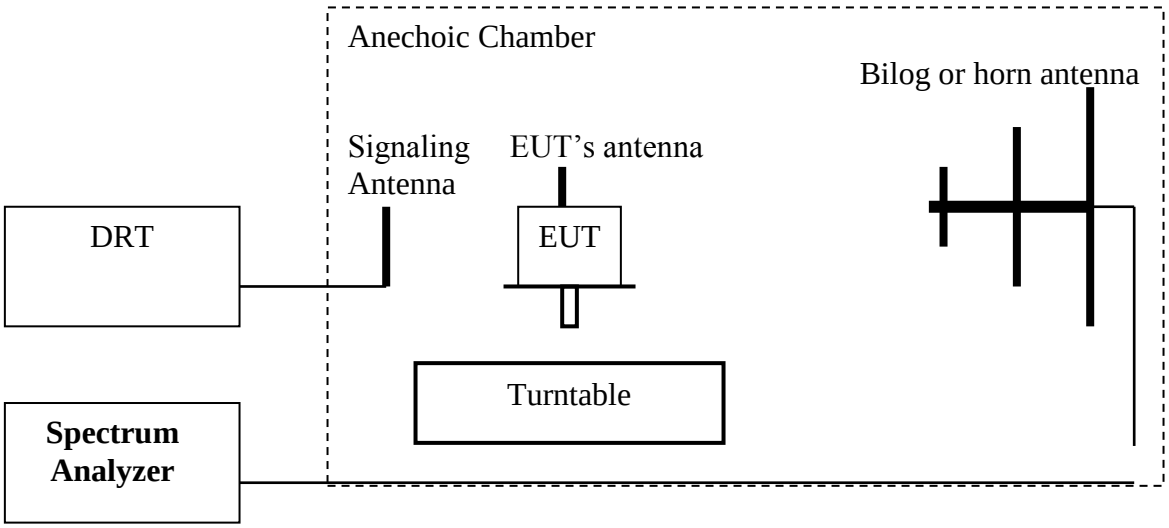
Test Specification	Test Case	Temperature and Voltage Conditions	Leveraged Pass Note 1	Pass	Fail	NA	NP	Result
FCC CFR 90.259(a)	RF Output Power	Nominal	■	☐	☐	☐	☐	Complies
FCC: 2.1049, 90.209, 90.259(8)	Occupied Bandwidth	Nominal	■	☐	☐	☐	☐	Complies
FCC: 90.210 (c)	Transmit Spectrum Mask	Nominal	■	☐	☐	☐	☐	Complies
FCC: 2.1055, 90.213	Frequency Stability	Nominal & Extreme	■	☐	☐	☐	☐	Complies
FCC: CFR Part 2.1053, 90.215	Radiated Spurious Emissions	Nominal	☐	■	☐	☐	☐	Complies
§2.1047	Modulation Characteristics	Nominal	☐	☐	☐	■	☐	-

Note1. Results from previous certification testing of model # AT140704US as documented in Test Report #EMC-3SISE-038-14001-ATM_FCC_90 are overtaken, based on the manufacturers Product Portion Equality Attestation which will be part of the FCC/IC filing exhibits.

6 Measurements

6.1 Radiated Measurement Procedure

Ref: TIA-603C 2004 -2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a vertical orientation.
2. Configure 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°. Find the peak level
5. With EUT in peak Level position from step 4, adjust the antenna height to get peak power level in dBm (LVL).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 channels.
   Spectrum analyzer settings: RBW=VBW=3MHz

Maximum Peak Output Power

6.1.1 References:

FCC: Part 90.205; 90.259

6.1.2 Limits

FCC CFR 90.259(a): 2W, Class C

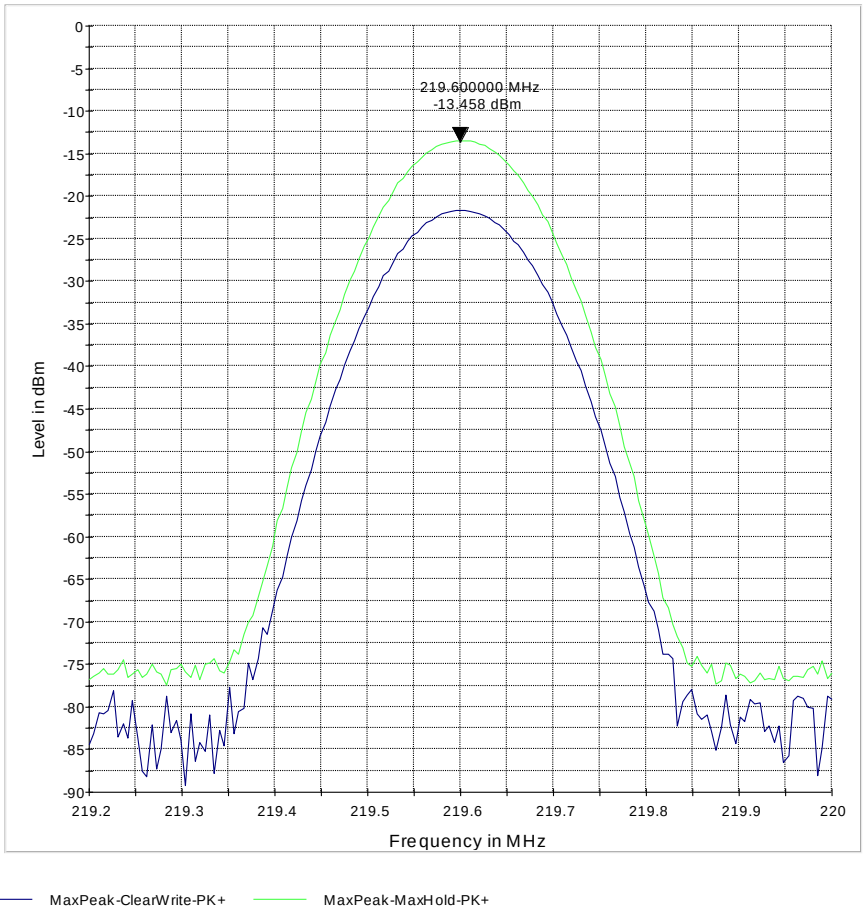
Test Conditions:
Tnom: 22.3 ^{o}C; Vnom

6.1.3 Test Result:

Frequency (MHz)	Max Peak Output Power- Conducted (dBm)	Radiated ERP (dBm)
219.6	N/A	-13.46
Measurement Uncertainty: ±3dB		

6.1.4 Test Plot

ERP 219.6 MHz Beacon.



6.2 Occupied Bandwidth

6.2.1 References:

FCC: 2.1049, 90.209, 90.259(8)

6.2.2 Limits:

According to CFR 47 section 90.209, operations using equipment designed to operate with a 6.25 kHz channel bandwidth, the authorized bandwidth is 6 kHz.

According to CFR 47 section 90.259(8), assignable 6.25 kHz channels will occur in increment of 6.25kHz from 217.00625 MHz to 219.99375MHz.

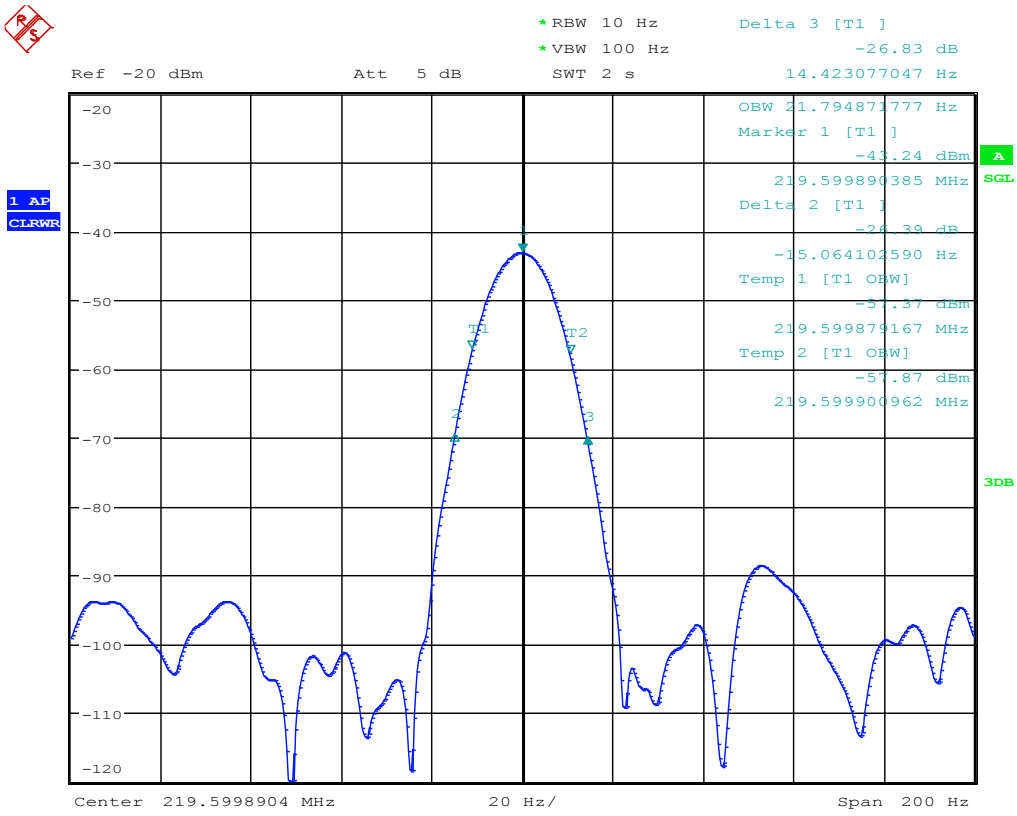
6.2.3 Measurement Method.

The beacon was set to 100% duty cycle and max power setting.
Analyzer setting as depicted in the plot.

6.2.4 Test Result:

Channel	Frequency (MHz)	99% Occupied Bandwidth in Hz	26 dB Emission Bandwidth in Hz
1	219.6	21.8	29.4 Hz

6.2.5 Test Data/plots:
Occupied Bandwidth 219.6 MHz Beacon



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6.3 Modulation Characteristics

In 100% duty cycle mode there is no modulation apparent on the 219.6 MHz Beacon.

6.4 Transmit Spectrum Mask

6.4.1 Transmit Spectrum Mask FCC Part 90

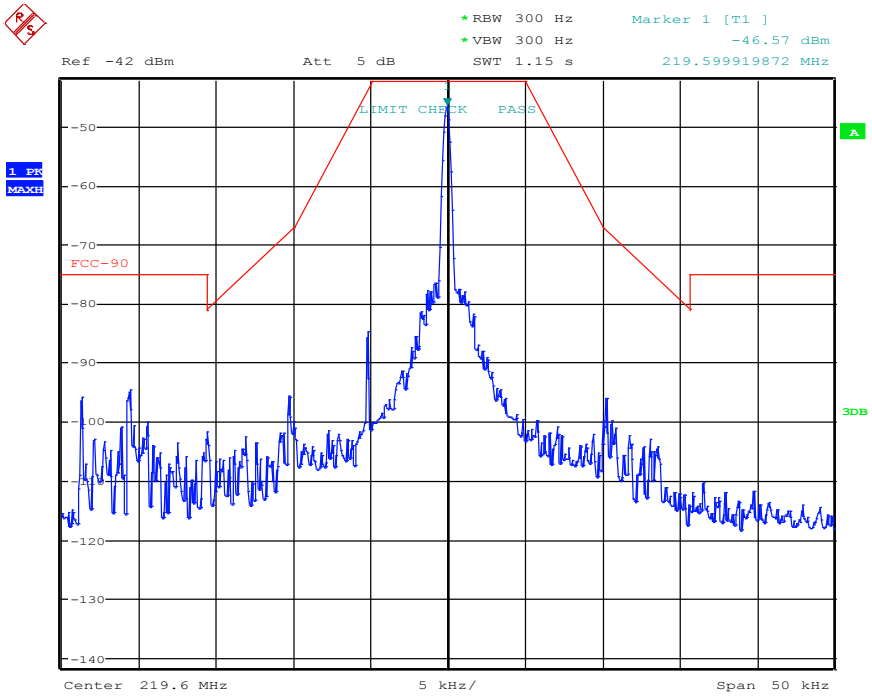
6.4.1.1 References:
FCC: 90.210,

6.4.1.2 Limits:
According to CFR 47 section 90.210c, 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 10KHz, 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 percent.

6.4.1.3 Test Plot

219.6 MHz Beacon with 100% duty cycle setting.



low

Date: 4.NOV.2014 16:20:22

6.5 Frequency Tolerance

6.5.1 219.6 MHz Beacon

6.5.2 References:
FCC: 2.1055, 90.213

6.5.3 Limits:
+/- 1 ppm

6.5.4 Results:

219.6 (MHz) Beacon	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Error (ppm)
Nominal Battery	219.5999281	7.1876E-05	-0.327304189
3.15 V	219.5999323	6.7688E-05	-0.308233151
4.25 V	219.599943	5.6987E-05	-0.259503643

Temperature ºC	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)
50	219.5999148	8.52E-05	-0.387978142
40	219.5999048	9.52E-05	-0.433515483
30	219.5999115	8.852E-05	-0.403096539
20	219.5999498	5.02E-05	-0.22859745
10	219.5999617	3.828E-05	-0.17431694
0	219.6000096	-9.6E-06	0.043715847
-10	219.6000526	-5.26E-05	0.239526412
-20	219.6000718	-7.176E-05	0.326775956

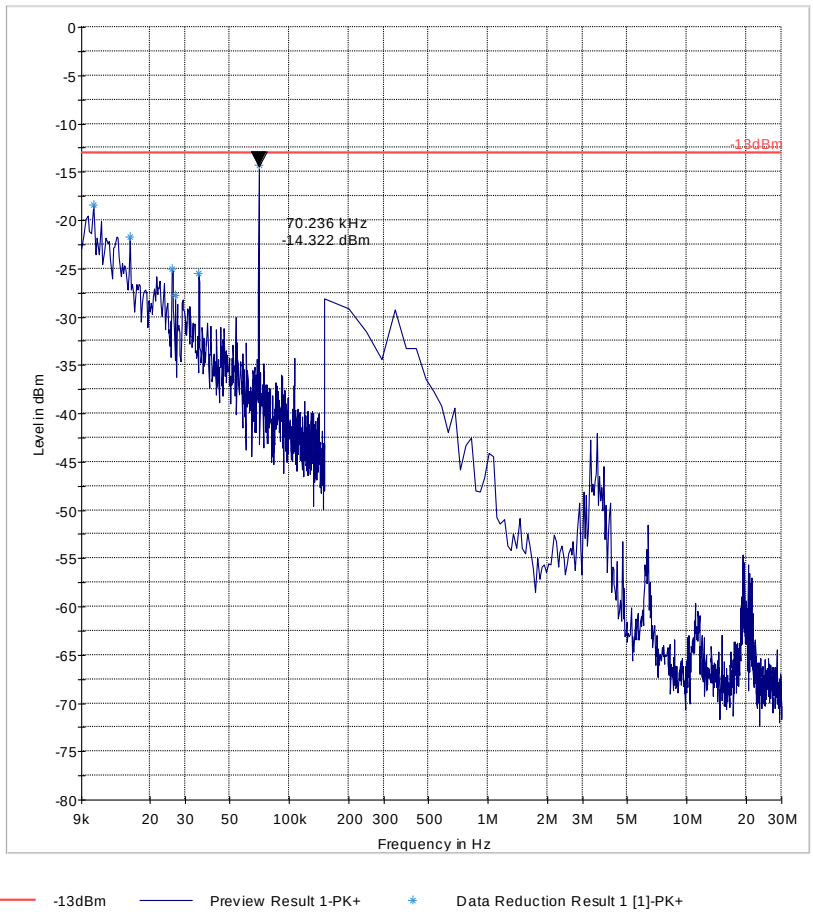
6.6 Transmitter Spurious Emissions- Radiated

6.6.1 219.6 MHz Beacon

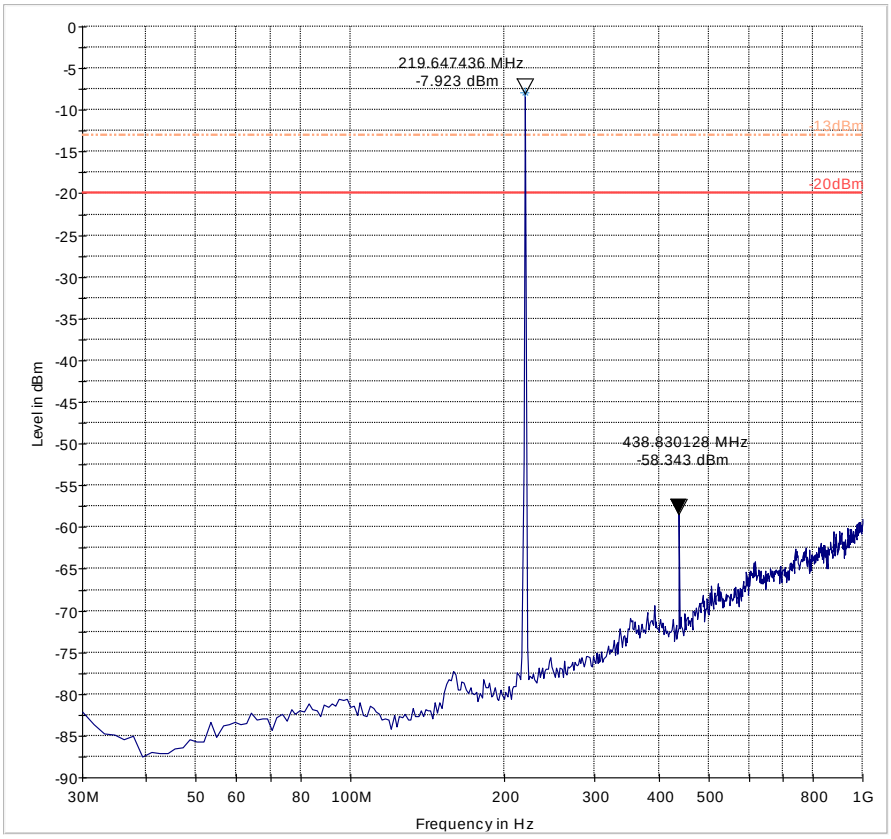
6.6.1.1 References
FCC: CFR Part 2.1053, 90.215

6.6.1.2 Test Result:
Horizontal and Vertical Polarizations, Worst case for all channels

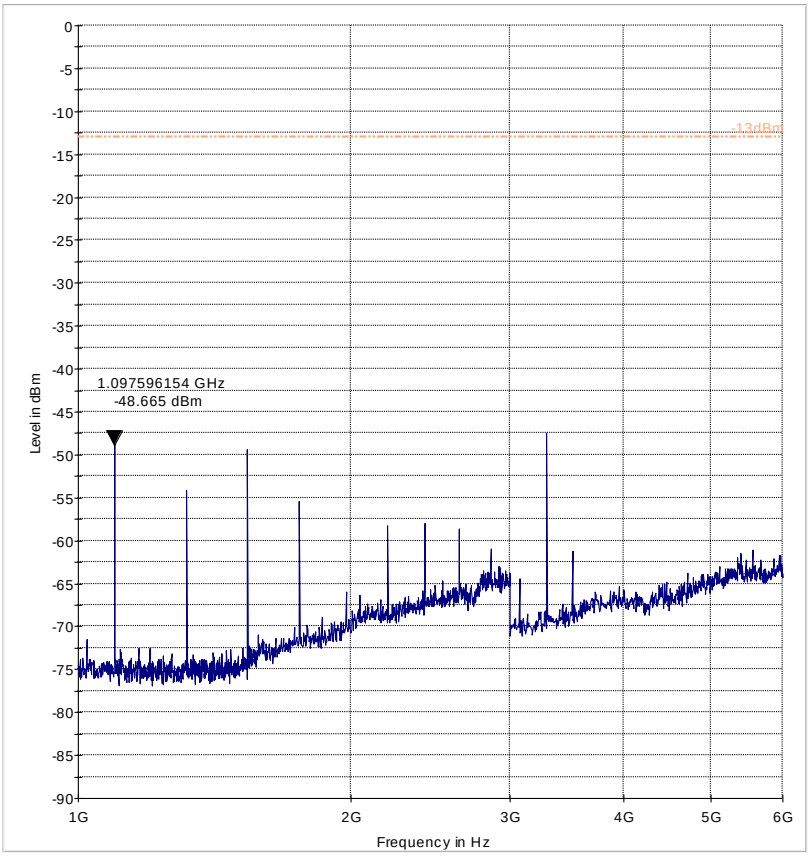
6.6.1.2.1 Test Results 9 KHz – 30 MHz



6.6.1.2.2 Test Result 30 MHz - 1 GHz:



6.6.1.2.3 Test Result 1 GHz – 6 GHz:



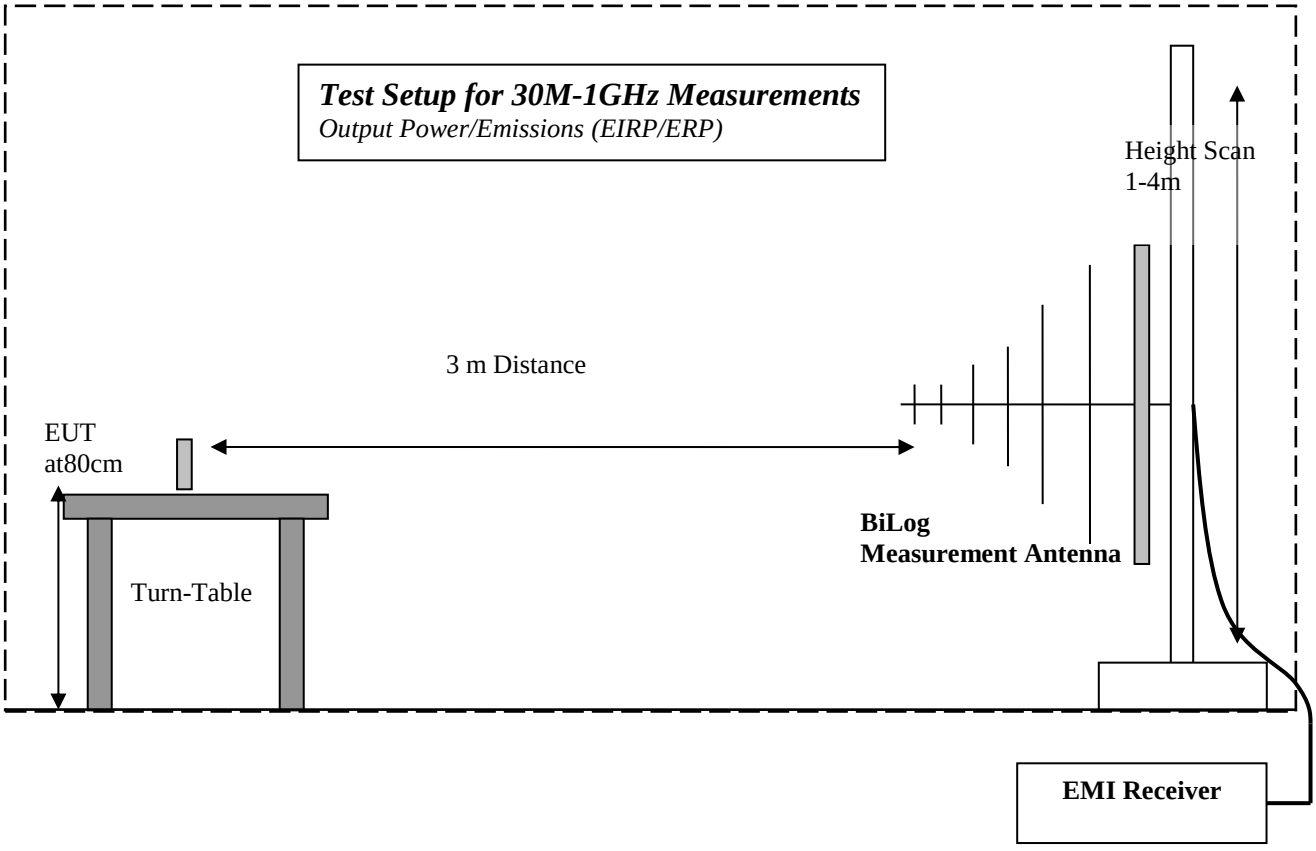
7 Equipment List

No.	Equipment Name	Manufacturer	Type/model	Serial No.	Cal Date	Cal Interval
3m Semi- Anechoic Chamber:						
	Turn table	EMCO	2075	N/A	N/A	N/A
	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
	Antenna Mast	EMCO	2075	N/A	N/A	N/A
	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
	EMI Receiver/Analyzer	Rohde&Schwarz	ESU 40	100251	Sep 2013	2 Year
	1500MHz HP Filter	Filtek	HP12/1700	14c48	N/A	N/A
	2800 MHZ HP Filter	Filtek	HP12/2800	14C47	N/A	N/A
	Pre-Amplifier	Miteq	JS40010260	340125	N/A	N/A
	Binconilog Antenna	EMCO	3141	0005-1186	Apr 2012	3 Years
	Horn Antenna	EMCO	3115	35114	Mar 2012	3 Years
Ancillary equipment						
	Spectrum Analyzer	Rohde&Schwarz	FSU	200256	Jun 2013	2 Years
	Multimeter	Klein Tools	MM200	CET-0002	Oct 2013	1 Years
	Vector Signal Generator	Rohde&Schwarz	SMU200A	101935	Feb 2013	2 Years
	Signal Generator	Rohde&Schwarz	SMP04	100151	Jun 2013	2 Years
	Thermometer Humidity	Dickson	SM320	09309168	Jul 2014	1 Year
	Temperature Chamber	Test Equity	115	150384	N/A	N/A
	DC Power Supply	HP	E3610A	KR83023316	N/A	N/A

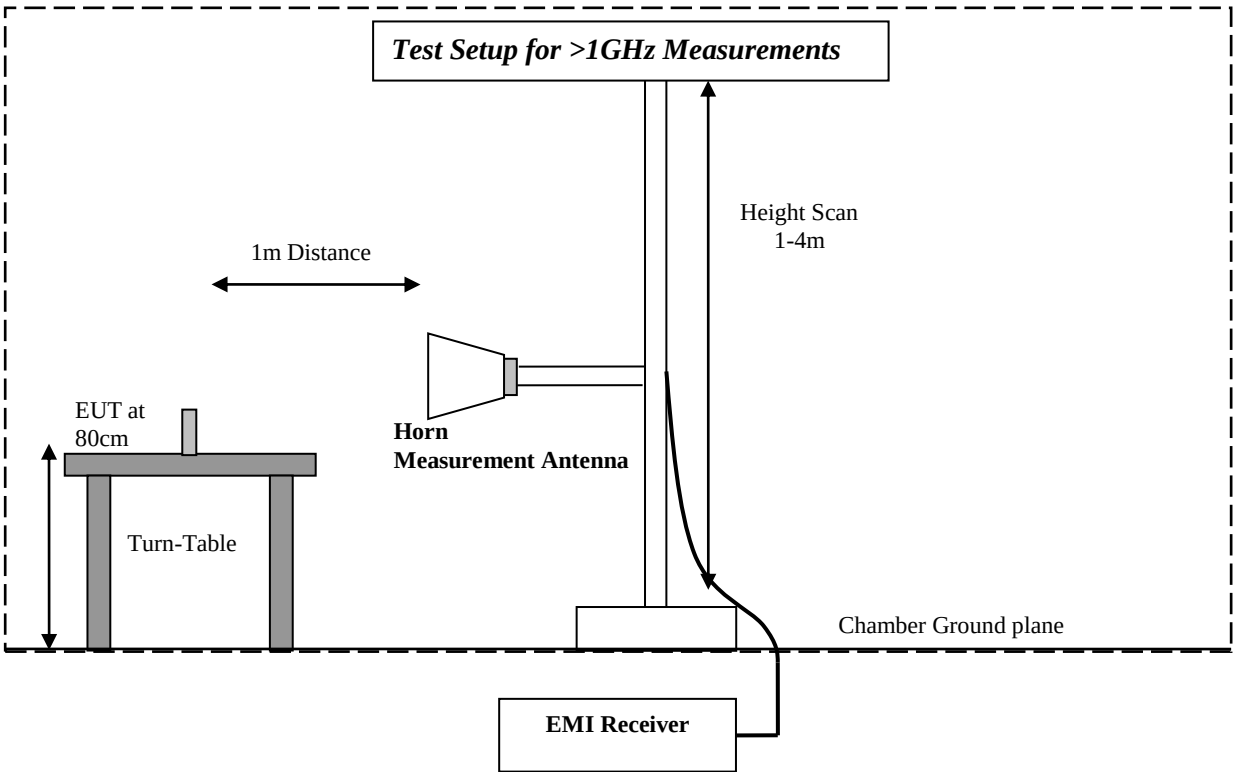
Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.
Calibration due dates, unless defined specifically, falls on the last day of the month.Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use

8 Block Diagrams

30M-1GHz Measurements Setup.



1GHz – 18 GHz Measurements Setup



9 Revision History

Date	Report Name	Changes to report	Report prepared by
2015-1-20	EMC-3SISE-039-14001_RT_FCC_90	First official version	James Donnellan
2015-1-28	EMC-3SISE-039-14001_RT_FCC_90_Rev1	Updated Summary table.	James Donnellan