FCC/IC Test Report

FOR:

3SI Security Systems
Model Name: AT140720US

Product Description:
Asset Tracking and Alert Device

FCC ID: Q6KAT140720A
IC ID: 5043A-AT140720A

47 CFR Part 95
RSS-210 Issue 8; RSS-Gen Issue 4

TEST REPORT #: EMC-3SISE-039-14001_RT_FCC_95_Rev1
DATE: 2015-1-28

Bluetooth Qualification Test Facility (BQTF)

FCC listed: A2LA Accredited

IC recognized # 3462B-1

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

TABLE OF CONTENTS

1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 95 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 210 Annex 4 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 14:09:50 -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 13:31:08 -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	

2.4 Date of Testing

2104-10-13 to 2014-12-20

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 216.475 MHz
Antenna info:	internal, PCB trace loop antenna (around pcb perimeter)
Output Power:	ERP: -8.2 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
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 below.

- 47 CFR 2: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communication Commission: Frequency allocations and radio treaty matters; general rules and regulations.
- 47 CFR 95: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communication Commission: Personal Radio Services.
- RSS-GEN, issue 4: General Requirements and Information for the Certification of Radio Apparatus
- RSS 210, issue 8: Spectrum Management and Telecommunications – Radio Standards Specification; License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

This test report is to support a request for new equipment authorization under the FCC-ID: Q6KAT140720A and IC-ID: 5043A-AT140720A

All testing was performed on the product samples referred to in Section 3 as EUT.

5 Summary of Measurement Results

Test Specification	Test Case	Temperature and Voltage Conditions	Leveraged Note 1	Pass	Fail	NA	NP	Result
FCC §95.639 & RSS-210 A4.3	RF Output Power	Nominal	■	☐	☐	☐	☐	Complies
§95.633(d) (3) RSS Gen Sect. 6.6	Occupied Bandwidth	Nominal	■	☐	☐	☐	☐	Complies
§95.635 (2) (i) RSS210 A4.3 Mask D (a)	Transmit Spectrum Mask	Nominal	■	☐	☐	☐	☐	Complies
FCC §95.629 (2) RSS-210 A5.3	Frequency Tolerance	Nominal & Extreme	■	☐	☐	☐	☐	Complies
§95.635 (2) (ii) RSS Gen 6.13	Radiated Spurious Emissions	Nominal	☐	■	☐	☐	☐	Complies
§95.635 (2) RSS210 A4.3 Mask D	Conducted Spurious Emissions	Nominal	☐	☐	☐	■	☐	Note 2

Note1. Results from previous certification testing of model # AT140704US as documented in Test Report #EMC-3SISE-038-14001-ATM_FCC_95_Rev1 are overtaken, based on the manufacturers Product Portion Equality Attestation which will be part of the FCC/IC filing exhibits.

Note 2: EUT contains an integral antenna.
Comment: NA = Not Applicable; NP = Not Performed

6 Measurements

6.1 Measurement Uncertainty

	Uncertainty in dB radiated <30MHz	Uncertainty in in dB radiated 30MHz - 1GHz	Uncertainty in dB radiated > 1GHz	Uncertainty in dB Conducted measurement
standard deviation k=1	2.48	1.94	2.16	0.64
95% confidence interval in dB	4.86	3.79	4.24	1.25
95% confidence interval in dB in delta to Result	+-2.5 dB	+-2.0 dB	+- 2.3dB	+-0.7dB

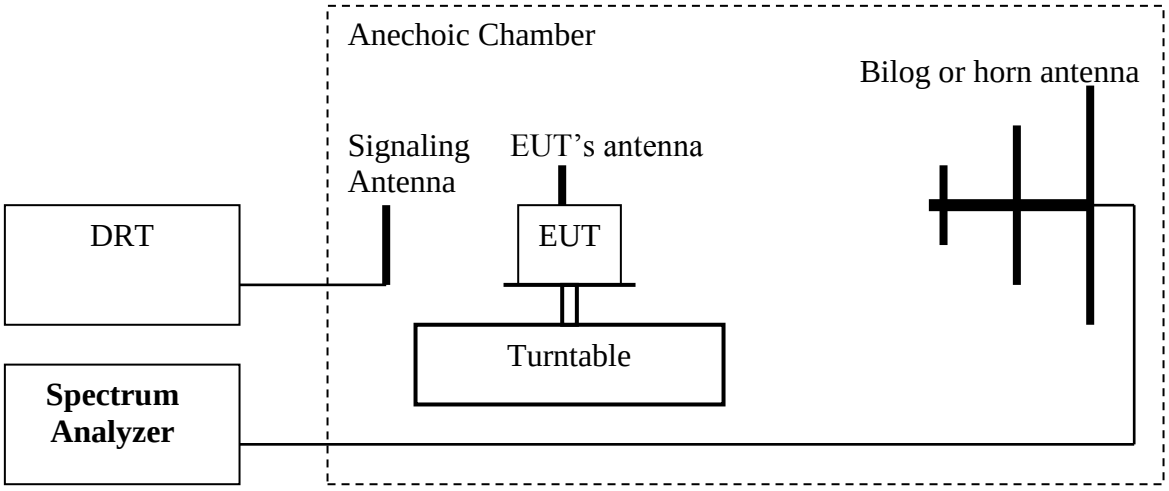
Nominal Environmental Conditions
Ambient Temperature: 20-25 °C
Relative humidity: 40-60%

Nominal Environmental Test Conditions
Test Temperature: 20-25°C (nominal);
Test Voltage: 3.7 VDC(nominal);

Deviating test conditions are indicated at individual test description where applicable.

6.2 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°. 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 channels.
   Spectrum analyzer settings: RBW=VBW=3MHz

6.3 RF Output Power

6.3.1 References:

FCC: Part 95.639, IC: RSS-210, A4.3

6.3.2 Limits

FCC: Part 95.639 (e): 100 mW (20 dBm)
RSS-210, A4.3: The peak output power shall not exceed 100 mW or 160 mW e.i.r.p.

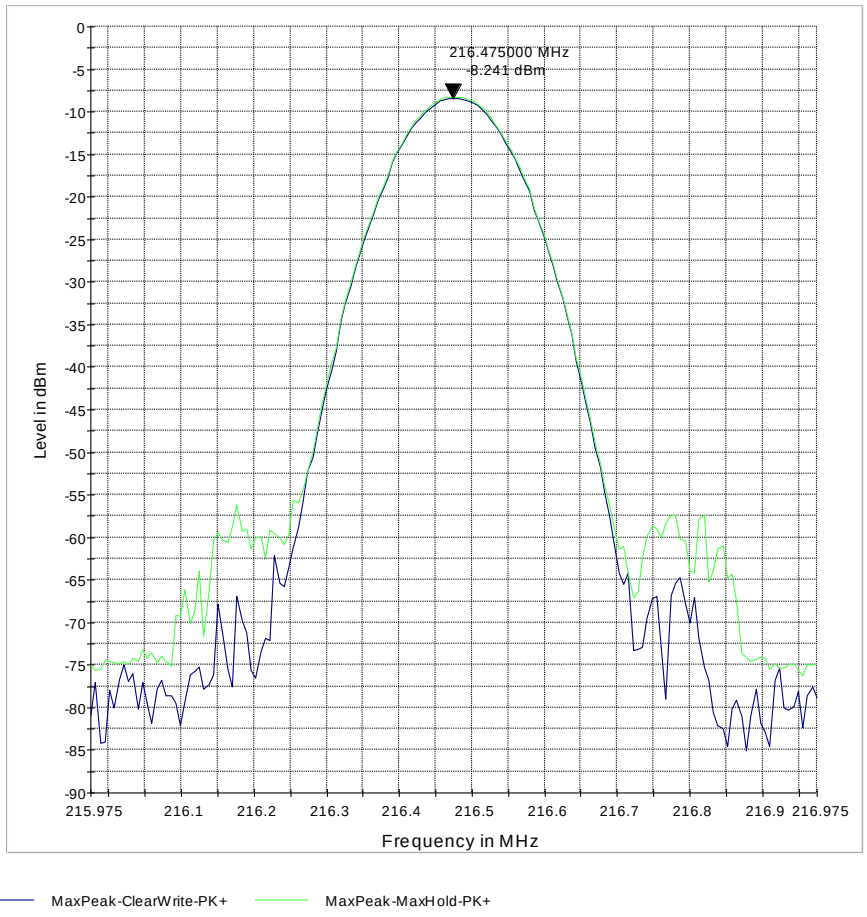
Test Conditions:
Tnom: 23.4 ^{o}C; Vnom: 3.7 V dc

6.3.3 Test Result:

Frequency (MHz)	Max Peak Output Power- Conducted (dBm)	Radiated ERP (dBm)
216.475	N/A	-8.2
Measurement Uncertainty: ±3dB		

6.3.4 Test Plot

ERP 216.475 MHz Beacon.



6.4 Occupied Bandwidth

6.4.1 References:

FCC: 95.629
RSS-GEN, 6.6

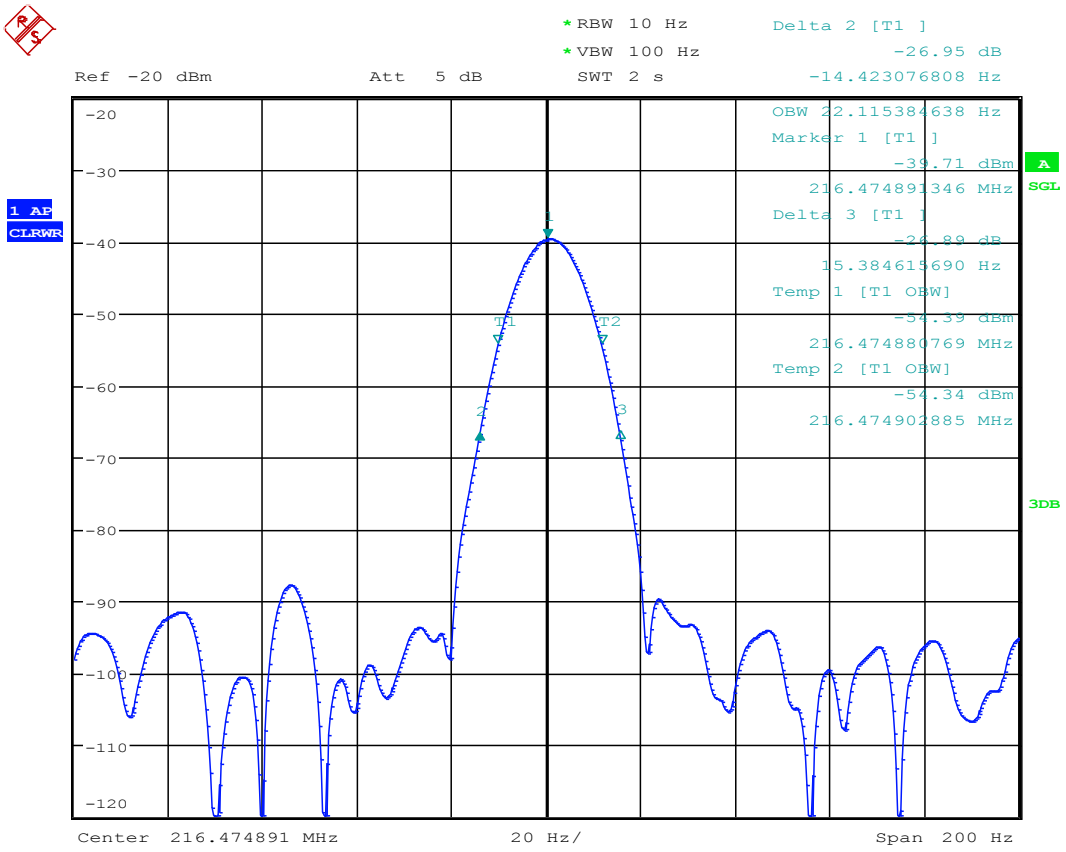
6.4.2 Limits:

FCC part 95.629 LPRS transmitter frequencies. (c) Extra band channels. (1) The following table indicates extra band frequencies. The channel bandwidth is 50 kHz.

6.4.3 Test Result:

Channel	Frequency (MHz)	99% Occupied Bandwidth	26 dB Emission Bandwidth
1	216.475	22.1 Hz	29.8 Hz

Occupied Bandwidth 216.475 MHz Beacon



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6.5 Modulation Characteristics

The manufacturer has indicated that the signal has no modulation.

6.6 Transmit Spectrum Mask

6.6.1 References:

RSS 210 Annex 4 Mask D
(a) At least 30 dB; for emissions 25 kHz to 35 kHz removed from the channel center frequency; and
(b) At least 55 + 10 log 10(P) dB or to Table 2 limits, whichever is less stringent; for emissions more than 35 kHz removed from the channel center frequency.

FCC 95.635 (2) (ii) Emissions for LPRS transmitters operating on extra band channels (50 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:
(i) Emissions 25 kHz to 35 kHz from the channel center frequency: at least 30 dB; and
(ii) Emissions more than 35 kHz away from the channel center frequency: at least 43 + 10log(carrier power in watts) dB.

6.6.2 Measurement Settings

For emissions measurement 25 kHz to 35 kHz from center frequency:

RBW=500 Hz for measurements
VBW=RBW or 3x RBW
Span= 100 kHz or sufficient to capture the entire frequency range to be investigated

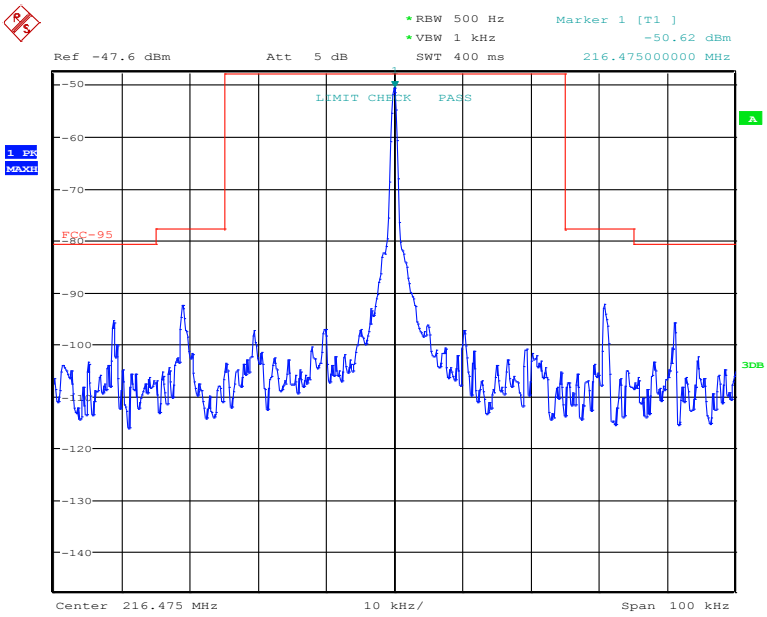
For emissions measurement more than 35 kHz away from the channel center frequency:

RBW=100 kHz for measurements < 1GHz
RBW=1MHz for measurements > 1GHz
VBW=RBW or 3x RBW
Span= Entire range of measuring antenna or in segment
Detector: Peak- Max Hold
Peak- Max Hold
Sweep time: Auto.

6.6.3 Test Conditions

Tnom: 23°C
Vnom: 3.7 V dc

6.6.3.1 Test Plot: 216.475 Beacon per FCC 95 Mask



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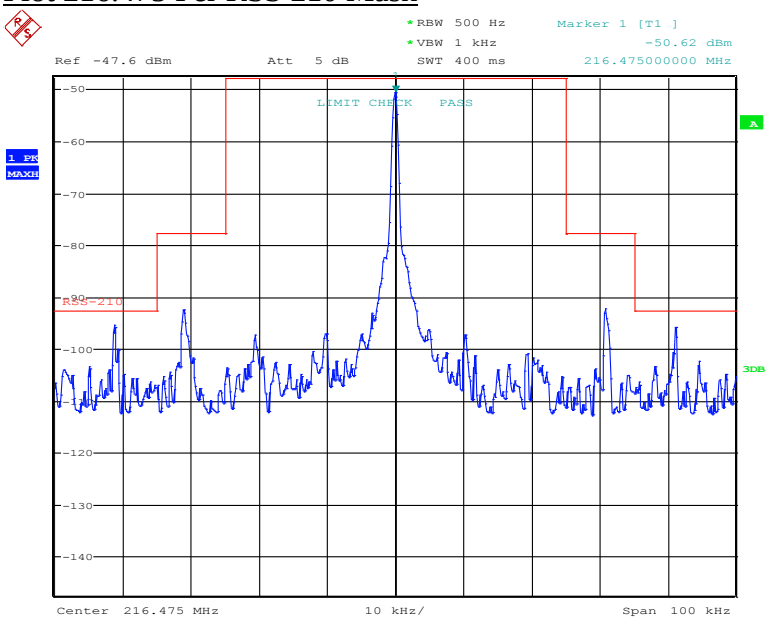
6.6.3.2 Plot 216.475 Per RSS 210 Mask



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6.7 Frequency Tolerance

6.7.1 References:
FCC: 95.629

6.7.2 Limits:
LPRS transmitters operating on extra band channels must be maintained within a frequency stability of 50 parts per Million.

6.7.3 Results:

Expected Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Error (ppm)
Temperature			
50	216.4749199	8.0128E-05	-0.370148978
40	216.4749038	9.6154E-05	-0.444180621
30	216.4749215	7.8526E-05	-0.362748585
20	216.4749471	5.2885E-05	-0.244300728
10	216.4749631	3.6859E-05	-0.170269084
0	216.4750064	-6.41E-06	0.02961081
-10	216.4750577	-5.7692E-05	0.266506525
-20	216.4750721	-7.2115E-05	0.333133156
-25	216.4750994	-9.9359E-05	0.458986026
-30	216.4751074	-0.000107372	0.496001848

Temp 21 C and Voltage at +/- 15% of Mfg rated voltage Per RSS 210

Temperature / Voltage	Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)
nominal T and V	216.4749343	6.57055E-05	-0.303524656
nominal T and low V 3.15	216.4749322	6.7815E-05	-0.313269431
nominal T and low V 4.25	216.4749358	6.4166E-05	-0.296412981

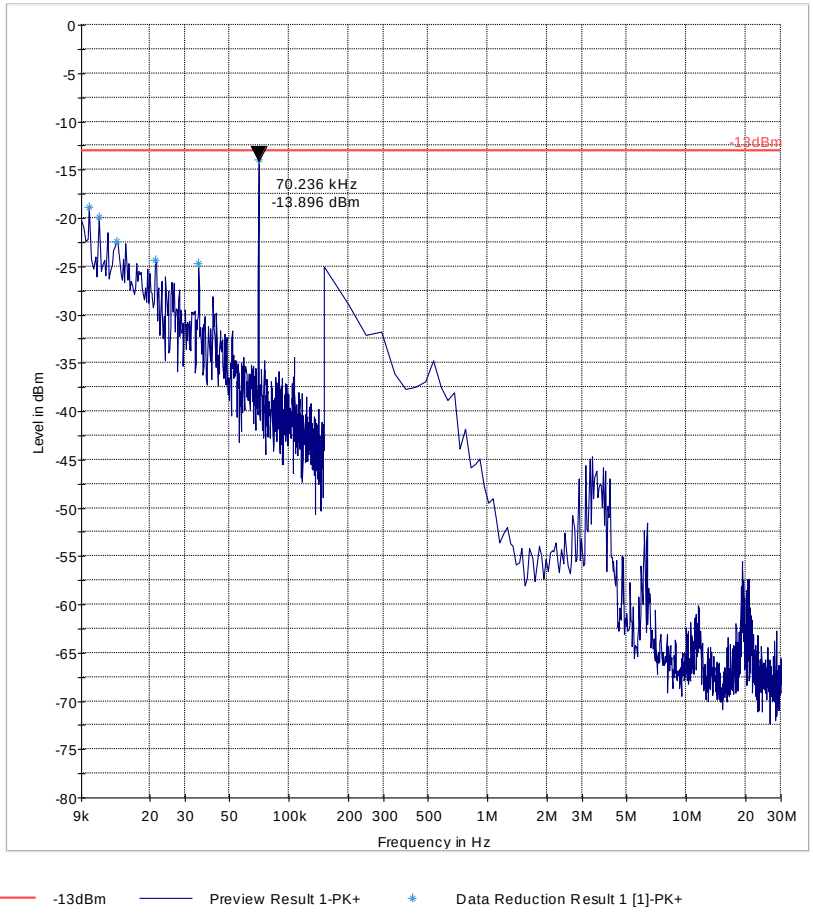
6.8 Transmitter Spurious Emissions- Radiated

6.8.1 216.475 MHz Beacon

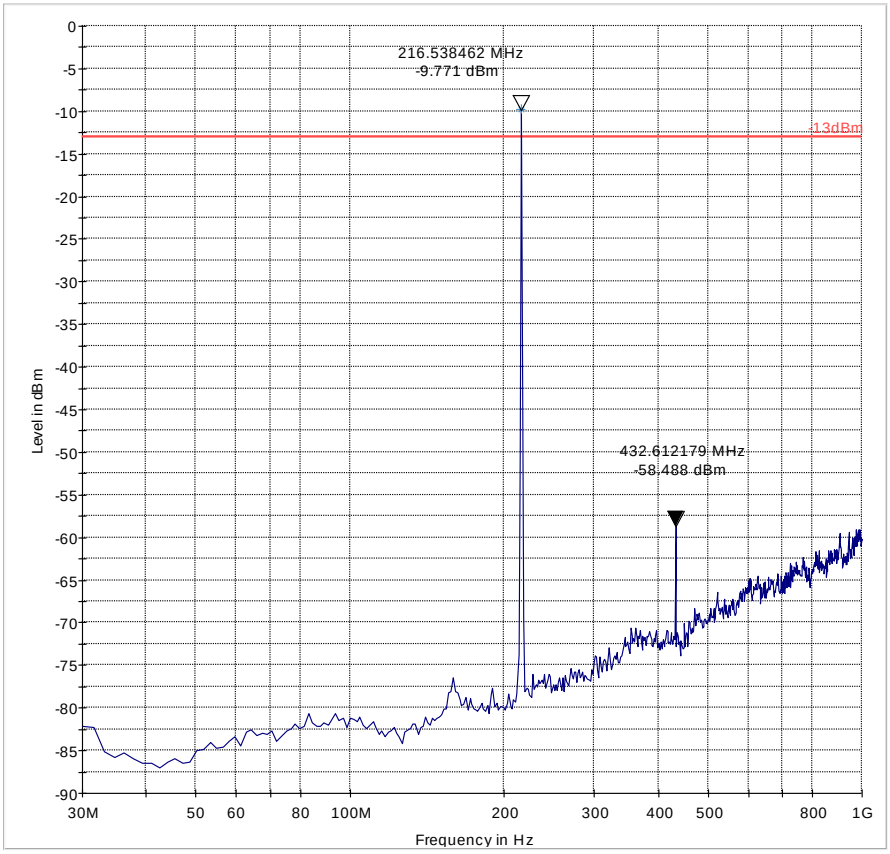
6.8.1.1 References
FCC: CFR Part 95

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

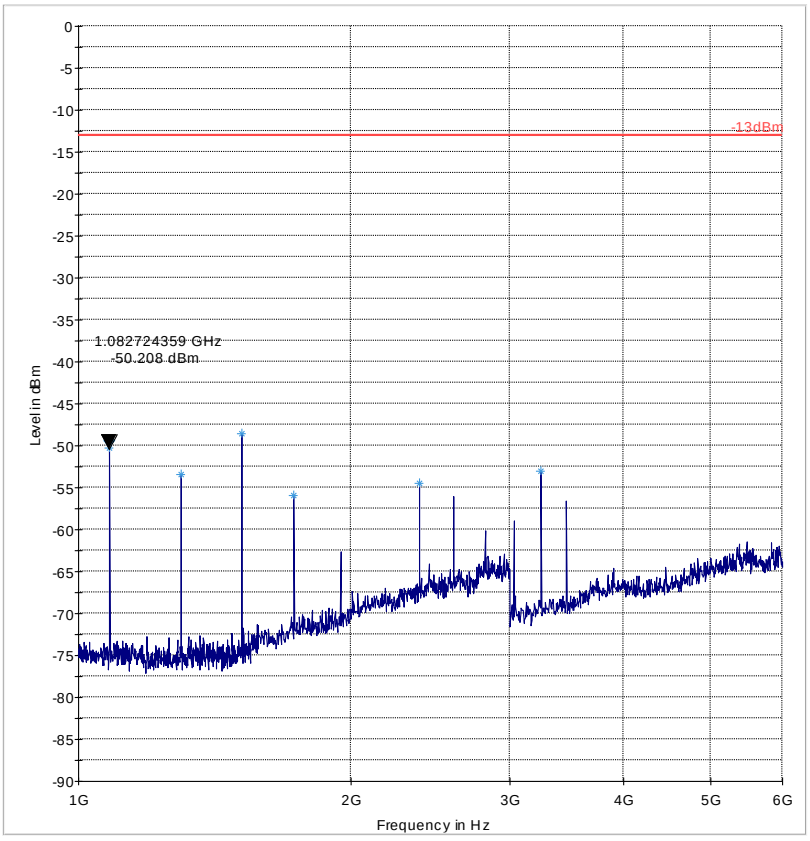
6.8.1.2.1 Test Results 9KHz – 30 MHz



6.8.1.2.2 Test Result 30 MHz - 1 GHz:



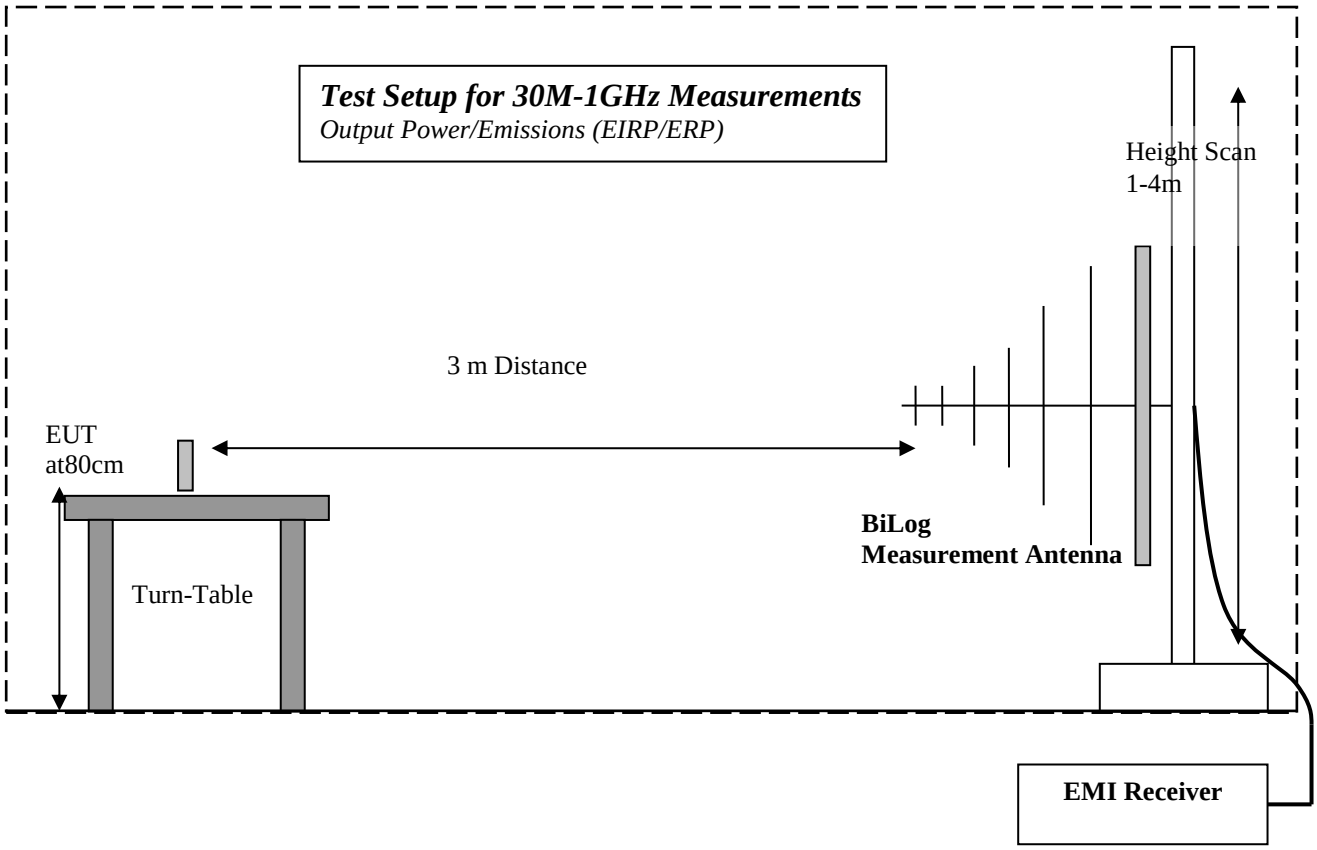
6.8.1.2.3 Test Result 1 GHz – 6 GHz:

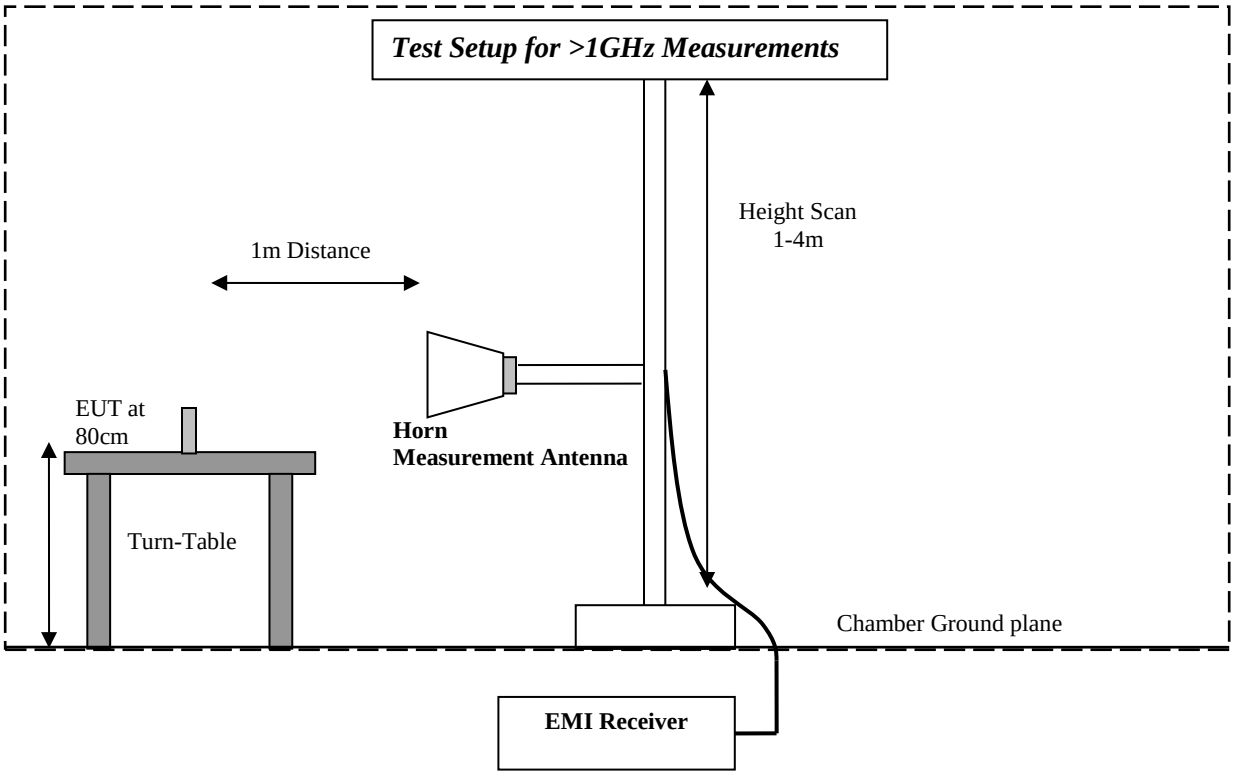


7 Test Equipment

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

8 BLOCK DIAGRAMS




Test Setup for >1GHz Measurements
Height Scan
1-4m
1m Distance
EUT at
80cm
Horn
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver

9 Revision History

Date	Report Name	Changes to report	Report prepared by
2015-1-19	EMC_3SISE-039-14001_RT _FCC_95	Official Release	James Donnellan
2015-1-28	EMC_3SISE-039-14001_RT _FCC_95_Rev1	Updated Summary Table	James Donnellan