



FCC Test Report

FOR:

3SI Security Systems
Model Name: AT140317US

FCC ID: Q6KAT140317A
IC ID: 5043A-AT140317A

47 CFR Part 90

47 CFR Part 95

RSS-119 Issue 11

TEST REPORT #: EMC-ETHEO-018-14001_FCC_90_95
DATE: 2014-05-10



FCC listed:
A2LA Accredited

IC recognized #
3462B-1

CETECOM Inc.

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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




Report #:	EMC-ETHEO-018-14001_FCC_90_95	FCC ID: Q6KAT140317A	
Date :	2014-06-23	IC ID: 5043A-AT140317A	

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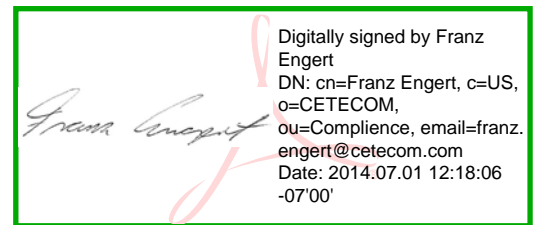
1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 90 and 95 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 119 Issue 11 and no deviations were ascertained during the course of the tests performed.

Company	Description	Model #
3SI Security Systems	Asset tracking and alert devices	AT140317US

This report is reviewed by:

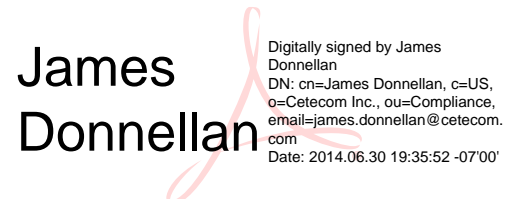
2014-06-23 Compliance Franz Engert
 (Manager Compliance)



Date	Section	Name	Signature
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Responsible for the Report:

2014-05-23 Compliance James Donnellan
 (Senior EMC Test Engineer)



Date	Section	Name	Signature
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The test results of this test report relate exclusively to the test item specified in Section 3. 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 the CETECOM Inc USA.

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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:	Deepak Kumar

2.2 Identification of the Client

Applicant's Name:	3SI Security Systems
Street Address:	486 Thomas Jones Way Exton,
City/Zip Code	PA 19341
Country	USA
Contact Person:	Brandon Cromer
Phone No.	610-280-2043
Fax:	
e-mail:	

2.3 Identification of the Manufacturer


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

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3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name / Model No:	Asset Recovery Device / AT140217US												
HW / SW Revision :	P2 / 12.0.14945												
FCC-ID / IC-ID:	Q6KAT140317A / 5043A-AT140317A												
Product Description:	Asset tracking and alert device												
Frequency Range / number of channels:	<table border="1"> <thead> <tr> <th>Radio</th> <th>Frequency</th> <th>Channel BW</th> <th>Antenna Gain dBi</th> </tr> </thead> <tbody> <tr> <td>Beacon</td> <td>216.475MHz</td> <td>50.00 KHz</td> <td>-36.4</td> </tr> <tr> <td>Beacon</td> <td>219.6MHz</td> <td>6.25 KHz</td> <td>-35.2</td> </tr> </tbody> </table> <p>Antenna Type. PCB trace loop antenna</p> <p>Other Radios</p> <p>1. Telit HE910-D: GSM Quad-Band WCDMA/UMTS: Bands I, II, IV,V,VIII , Internal Antenna FCC ID: RI7HE910 IC: 5131A-HE910 Antenna. PCB trace antenna, -2dBi gain</p> <p>2. GPS: CE Pre-Certified Module. Telit J-F2-C1C9</p>	Radio	Frequency	Channel BW	Antenna Gain dBi	Beacon	216.475MHz	50.00 KHz	-36.4	Beacon	219.6MHz	6.25 KHz	-35.2
Radio	Frequency	Channel BW	Antenna Gain dBi										
Beacon	216.475MHz	50.00 KHz	-36.4										
Beacon	219.6MHz	6.25 KHz	-35.2										
Type(s) of Modulation:	Beacon: No Modulation.												
Min. distance to other antenna (if appl):	Minimum distance between radio antennas: <20cm												
Output Powers:	219.6 MHz Beacon ERP -25.334 dBm 216.475 MHz Beacon ERP -26.573 dBm												
power supply	Battery Pack 3.7V DC;												
operating temperature range	-20°C to 60°C												
Prototype / Production unit	Prototype												


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3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Notes	Cetecom ID
1	IMEI: 351579051396552	(P2)	12.0.14945	SN 22	-
1	IMEI: 351579051431698	(P2)	12.0.14945	SN 18	-

3.3 Identification of Accessory equipment

AE #	Type	PN
1	3SI Battery	52010555

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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 FCC rules Part 90 and 95 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 119 Issue 10

This test report is to support a request for new equipment authorization under the FCC ID: Q6KAT140317A and IC ID: 5043A-AT140317A

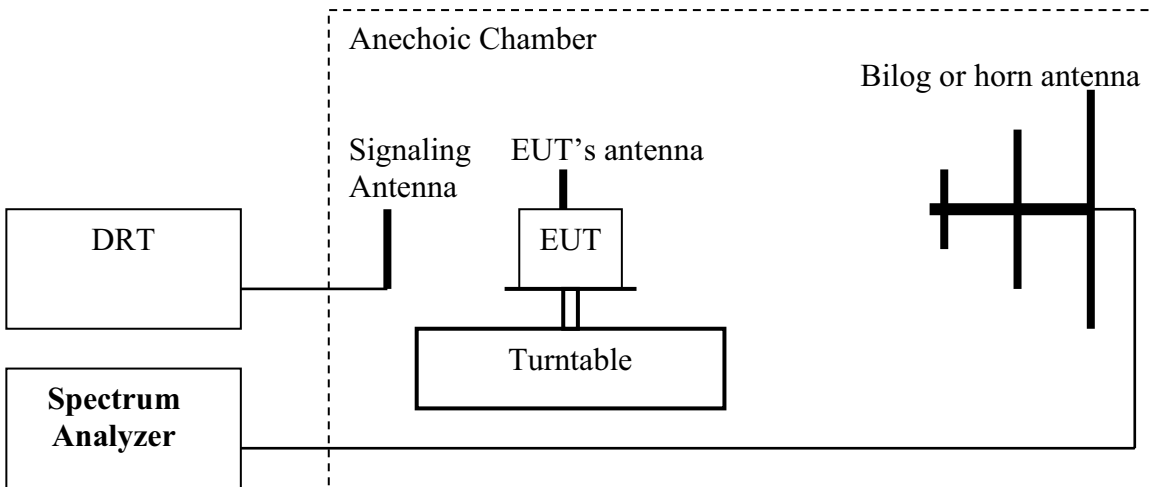
All testing was performed on the products referred to in Section 3 as EUT.

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5 Measurements

5.1 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°. 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

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5.2 Maximum Peak Output Power

5.2.1 References:

FCC: Part 90.205; 90.259

RSS 119: 5.4

FCC: Part 95.639

5.2.2 Limits

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

RSS 119: Less than 5 Watts.

FCC: Part 95.639 (e): 100 mW.

Test Conditions:

Tnom: 23.4 °C; Vnom

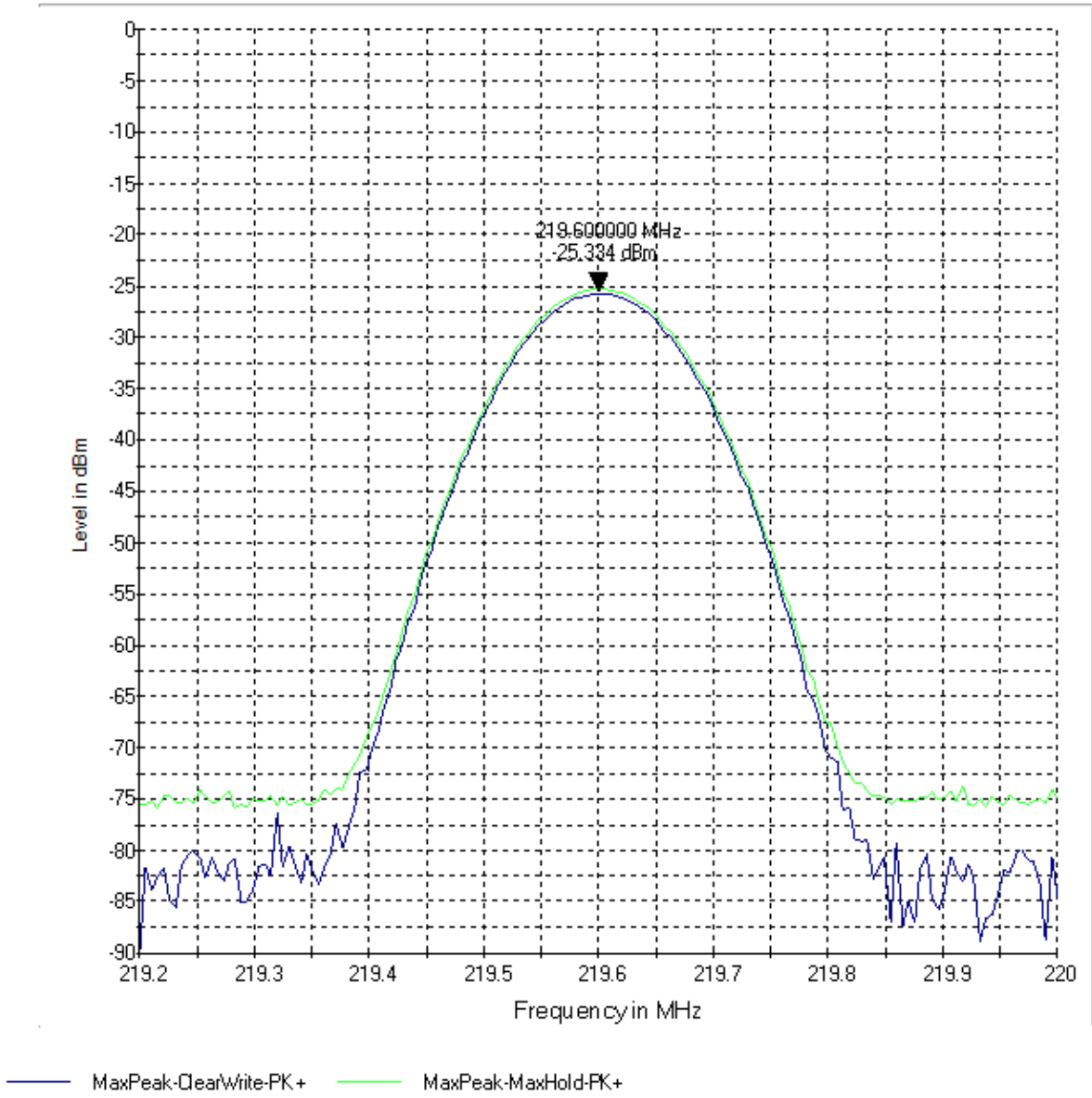
5.2.3 Test Result:

Frequency (MHz)	Max Peak Output Power- Conducted (dBm)	Radiated ERP (dBm)
219.6	N/A	-25.334
216.475	N/A	-26.573
Measurement Uncertainty: ±3dB		

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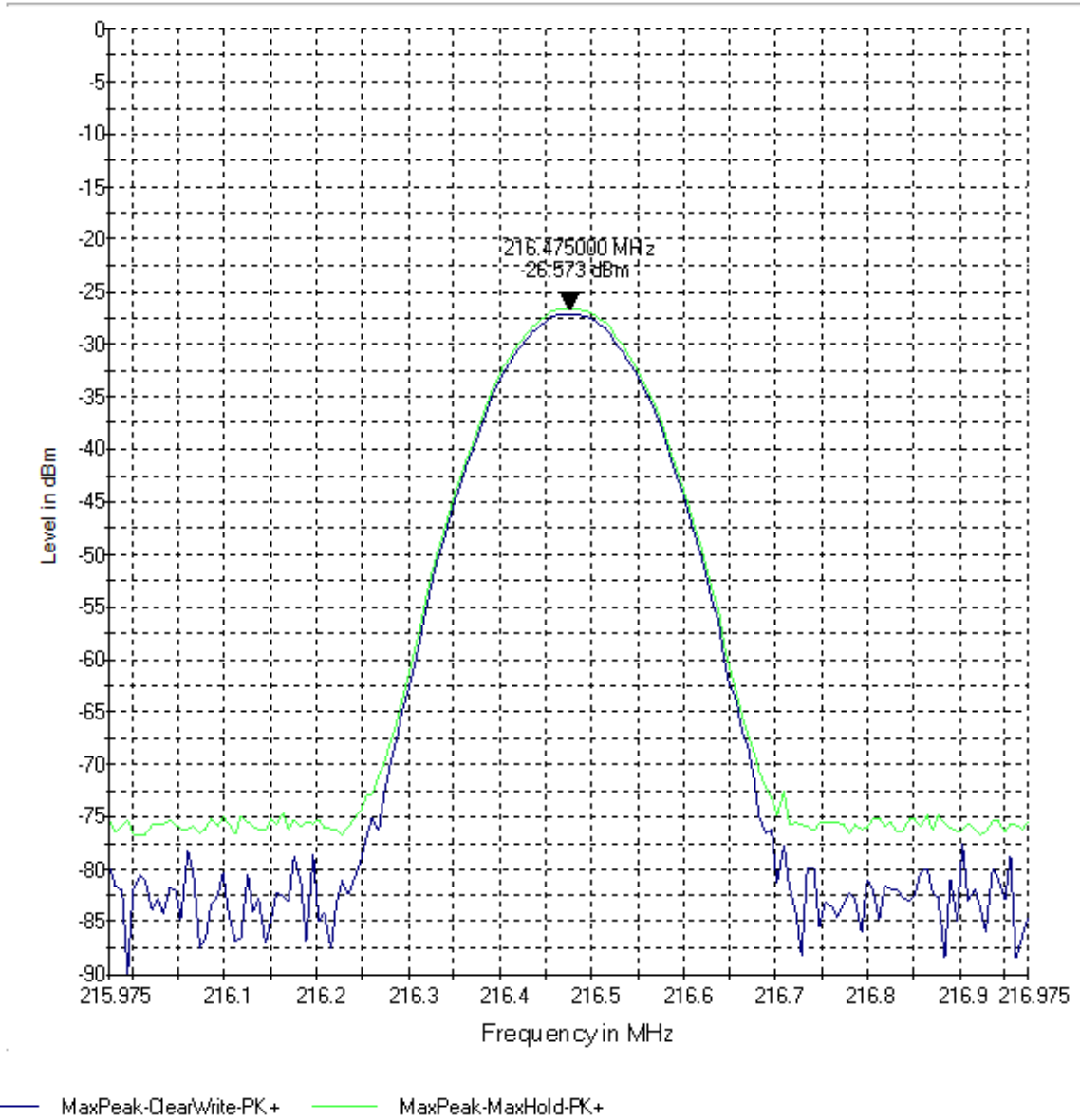
5.2.4 Test Plot


ERP 219.6 MHz Beacon.



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ERP 216.475 MHz Beacon.



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5.3 Occupied Bandwidth

5.3.1 References:

FCC: 2.1049, 90.209,90.259(8)

RSS 119: 5.5

5.3.2 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.

RSS 119: 5.5: Authorized Bandwidth: 11.25kHz.

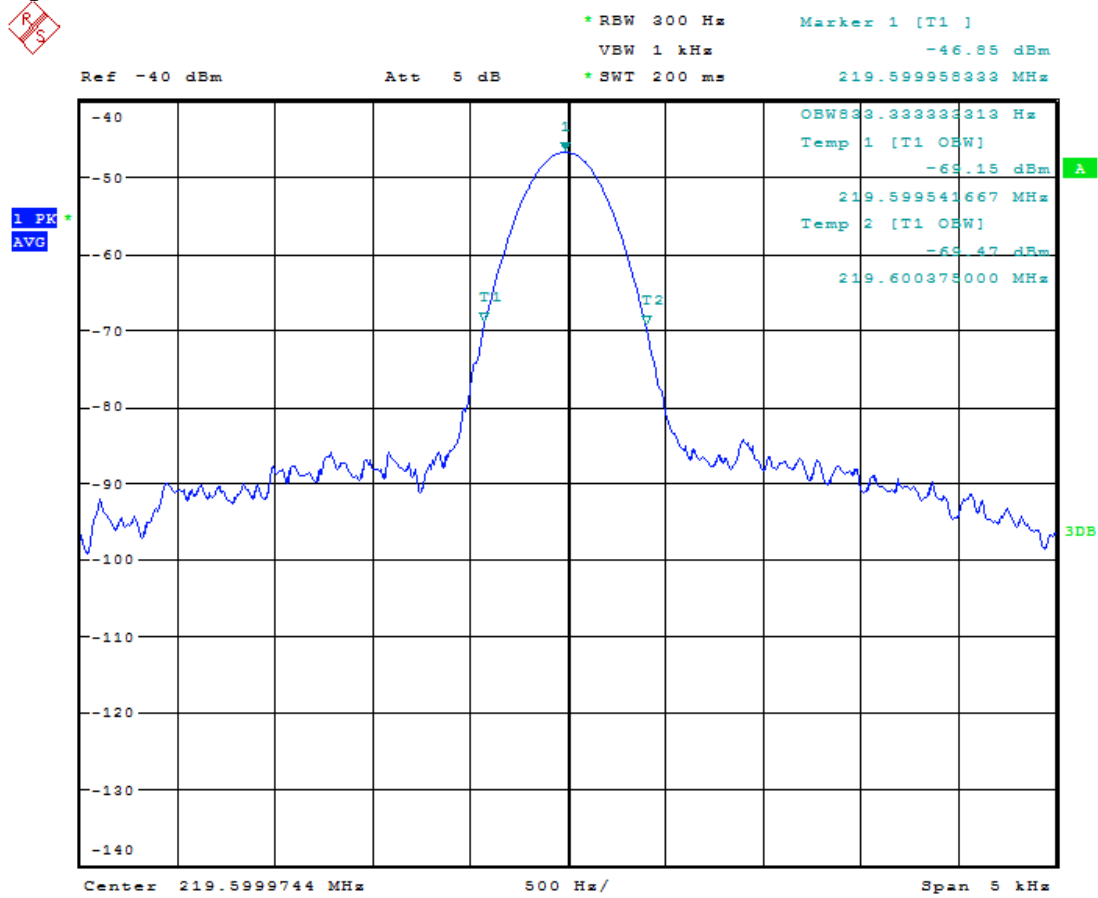
According to CFR 47 section 95.629 LPRS transmitter frequencies. (c) Extra band channels. (1) The following table indicates extra band frequencies. The channel bandwidth is 50 kHz.

5.3.3 Test Result:

Channel	Frequency (MHz)	99% Occupied Bandwidth	26 dB Emission Bandwidth
1	219.6	833.33Hz	900 Hz
1	216.475	480.76 Hz	540 Hz

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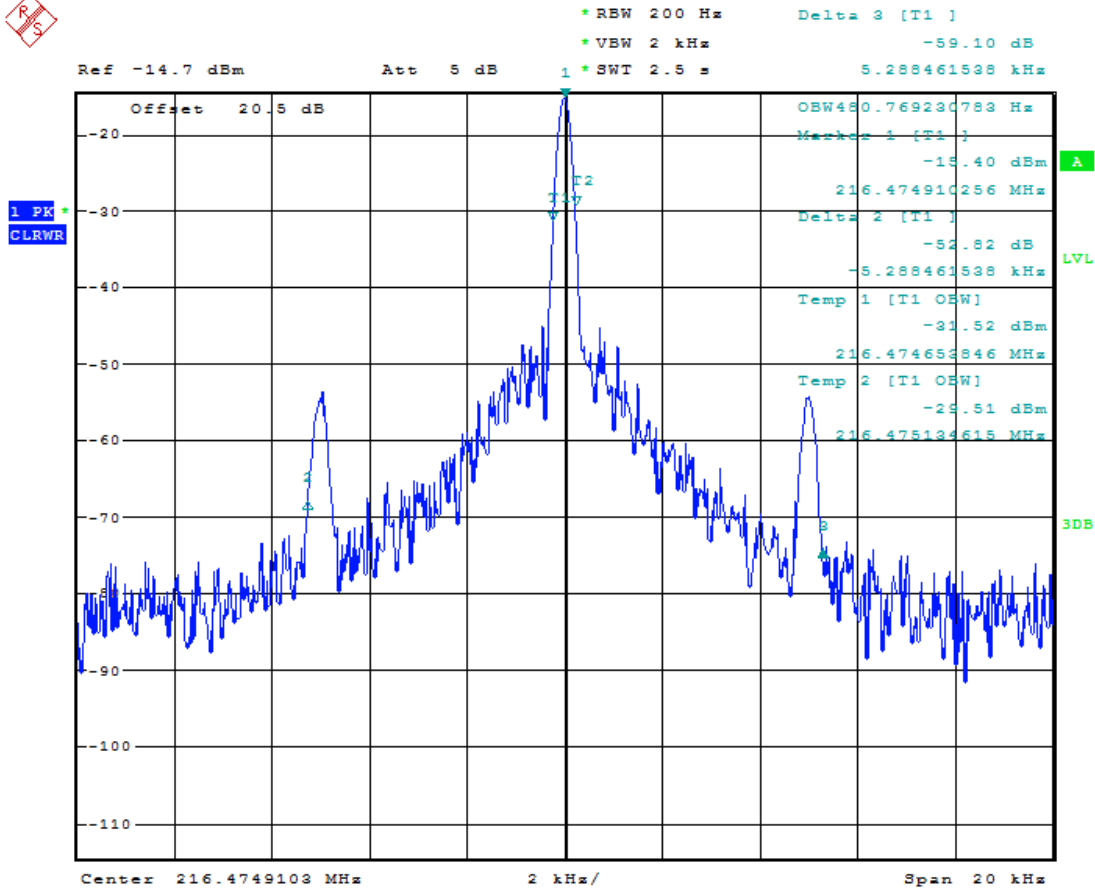
5.3.4 Test Data/plots: Occupied Bandwidth 219.6 MHz Beacon




Date: 13.MAY.2014 15:02:48

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Occupied Bandwidth 216.475 MHz Beacon



Date: 20.MAY.2014 15:29:25

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5.4 Modulation Characteristics

The manufacturer has intended that the signal has no modulation on 219.6 MHz Beacon.

5.5 Transmit Spectrum Mask

5.5.1 Transmit Spectrum Mask FCC Part 90

5.5.1.1 References:

FCC: 90.210, 90.379, ASTM 8.9.2

RSS 119: 5.5

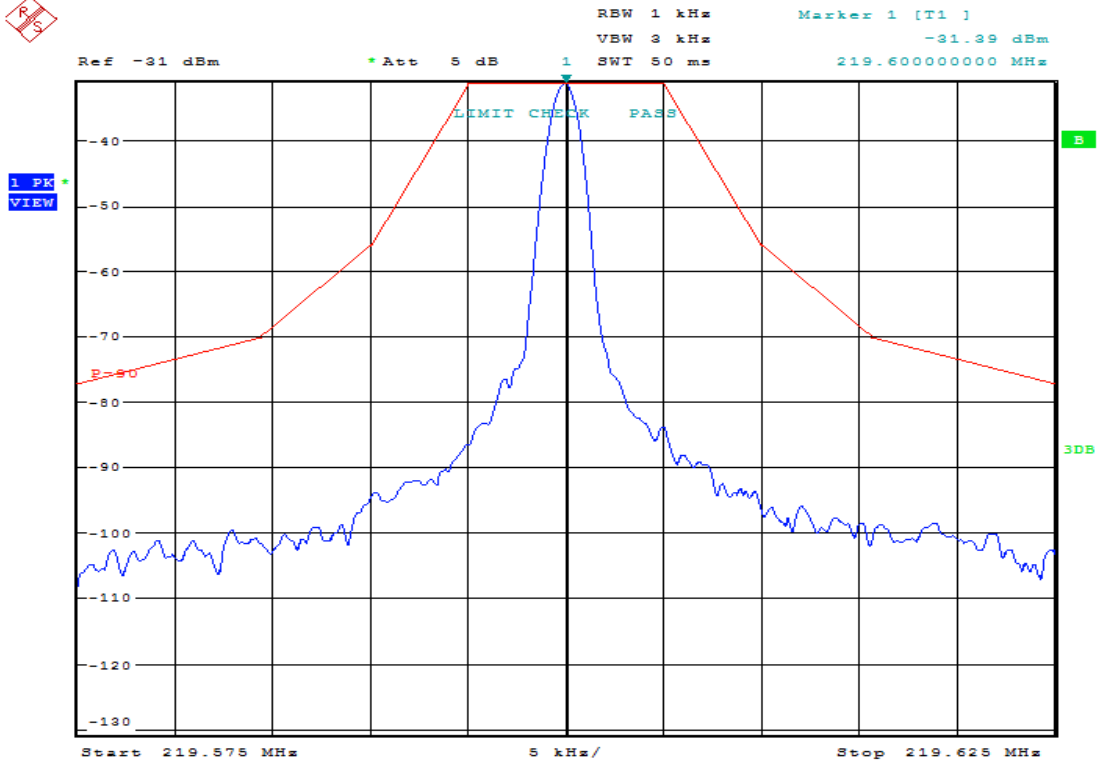
5.5.1.2 Limits:

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.

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5.5.1.3 Test Plot



Date: 16.MAY.2014 14:20:02

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5.5.2 Transmit Spectrum Mask IC RSS-119

5.5.2.1 Reference

RSS119 Section 5.8.8

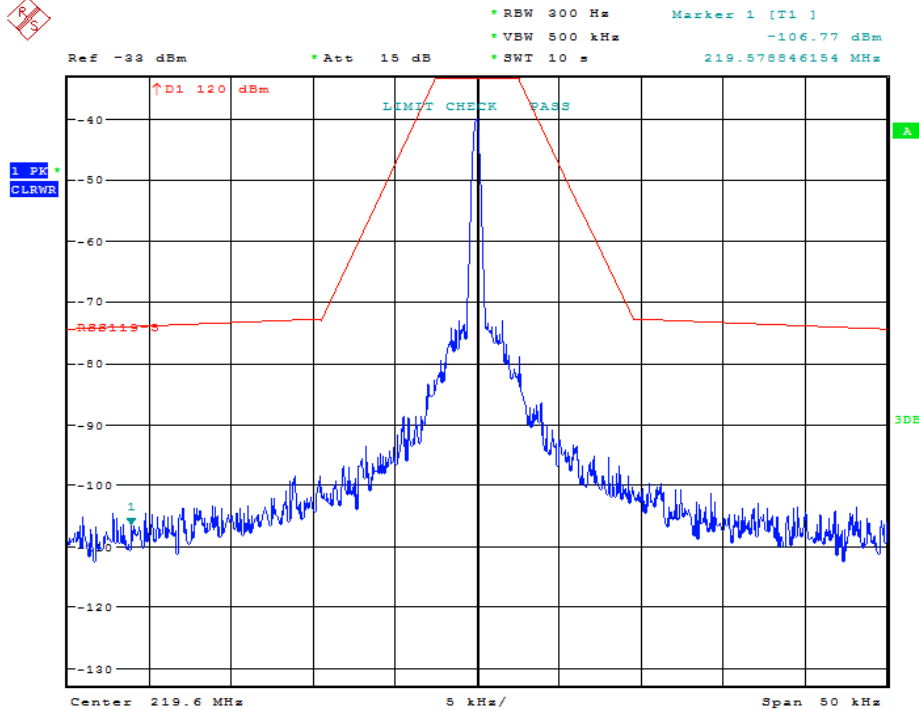
5.5.2.2 Limits:

According to RSS119 Section 5.8.8 for Emission Mask D for Transmitters not Equipped with an Audio Low-Pass Filter:


The power of any emission shall be attenuated below the transmitter output power P (dBw) as specified in Table 11.

Displacement frequency, f_d (kHz)	Minimum Attenuation (dB)	Resolution Bandwidth (Hz)
$5.625 < f_d \leq 12.5$	$7.27 (f_d - 2.88)$	Specified in Section 4.2.2
$F_d > 12.5$	whichever is the lesser attenuation: 70 or $50 + 10 \log_{10} (p)$	Specified in Section 4.2.2

5.5.2.3 Test Plot: 219.6 MHz Beacon RSS-119



Date: 14.MAY.2014 13:39:27

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5.5.3 Transmit Spectrum Mask FCC Part 95

5.5.3.1 References:

FCC 95.635 (c)

5.5.3.2 Limits:

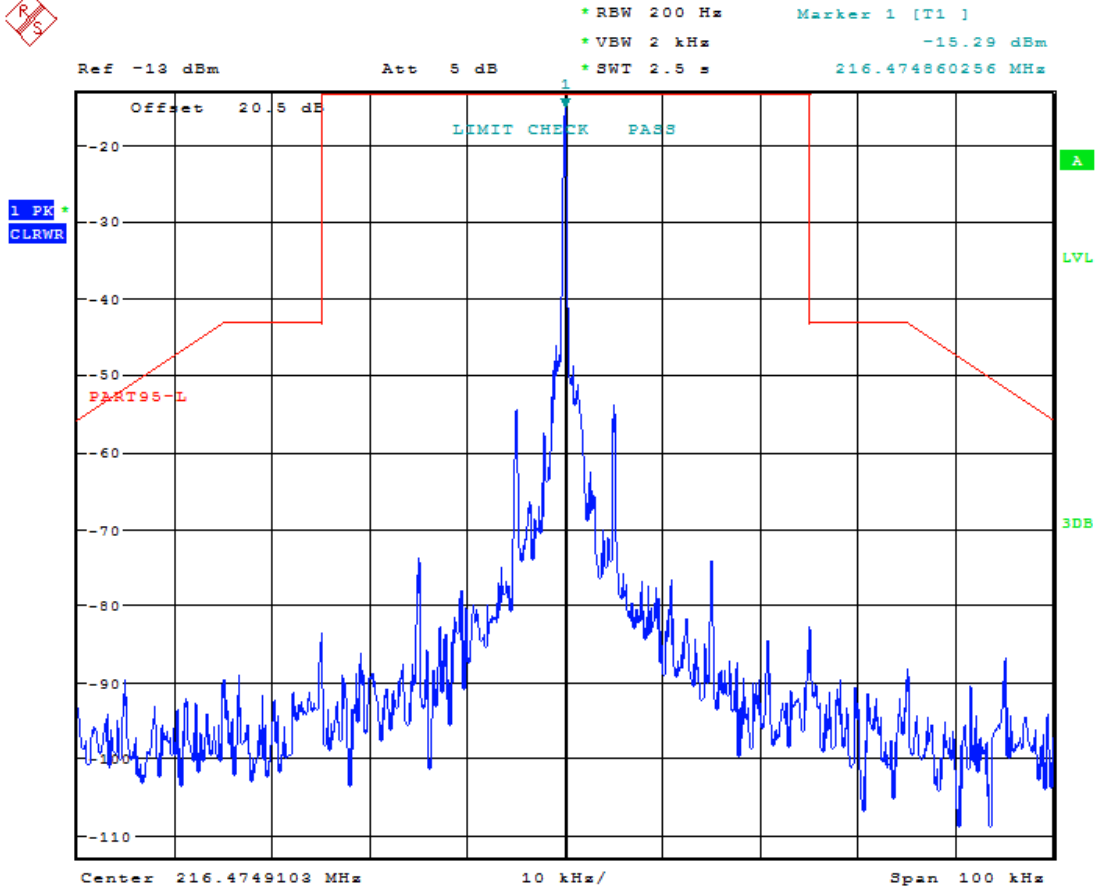
According to FCC 95.635 LPRS As specified in paragraph (c).

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 $43 + 10\log(\text{carrier power in watts})$ dB.

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5.5.3.3 Test Plot: 216.475 Beacon:



Date: 20.MAY.2014 14:57:13

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5.6 Frequency Tolerance

5.6.1 219.6 MHz Beacon

5.6.2 References:

FCC: 2.1055, 90.213


RSS 119: 5.3

5.6.3 Limits:

+/- 1 ppm

5.6.4 Results:

Temperature °C	Frequency (MHz)	Frequency Error (MHz)	Frequency Error (ppm)
60	219.5998573	0.0001427	0.649817851
55	219.5998662	0.0001338	0.609289617
50	219.5998726	0.0001274	0.58014572
40	219.5998744	0.0001256	0.571948998
30	219.599886	0.000114	0.519125683
20	219.5999191	8.09E-05	0.368397086
10	219.5999463	5.37E-05	0.244535519
0	219.6000016	-1.6E-06	-0.007285975
-10	219.6000737	-7.37E-05	-0.3356102
-20	219.6001154	-0.0001154	-0.525500911
-25	219.6001458	-0.0001458	-0.663934426

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5.6.5 216.475 MHz Beacon

5.6.6 References:

FCC: 95.629

5.6.7 Limits:

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

5.6.8 Results:

Expected Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Error (ppm)
Temperature			
60	216.4748592	0.0001408	0.650421527
55	216.4748669	0.0001331	0.614851599
50	216.4748702	0.0001298	0.599607345
40	216.4748669	0.0001331	0.614851599
30	216.4748878	0.0001122	0.518304654
20	216.4749183	8.17E-05	0.377410786
10	216.4749423	5.77E-05	0.266543481
0	216.4750064	-6.4E-06	-0.029564615
-10	216.4750753	-7.53E-05	-0.347846172
-20	216.4750988	-9.875E-05	-0.456172768
-25	216.4751178	-0.0001178	-0.544173692

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5.7 Transmitter Spurious Emissions- Radiated

5.7.1 219.6 MHz Beacon

5.7.1.1 References

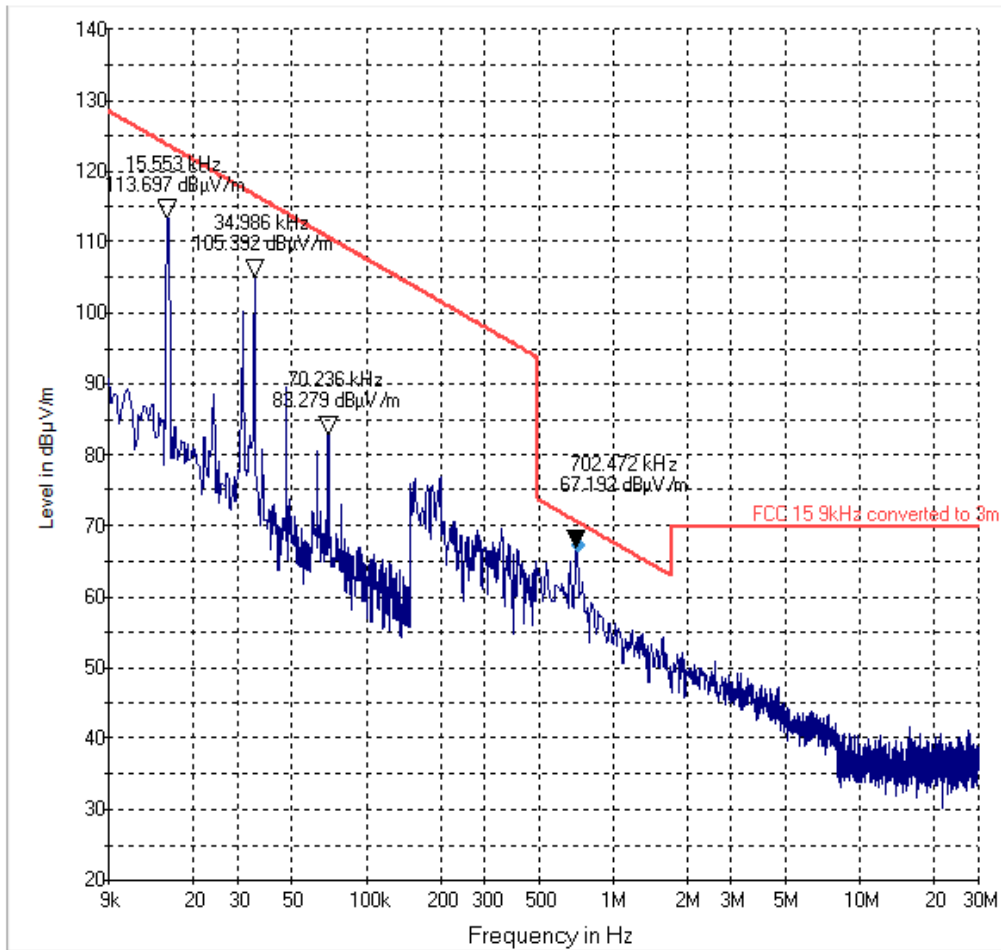
FCC: CFR Part 2.1053, 90.215

RSS 119: 5.8

5.7.1.2 Test Result:

Horizontal and Vertical Polarizations, Worst case for all channels

5.7.1.2.1 Test Results 9 KHz – 30 MHz

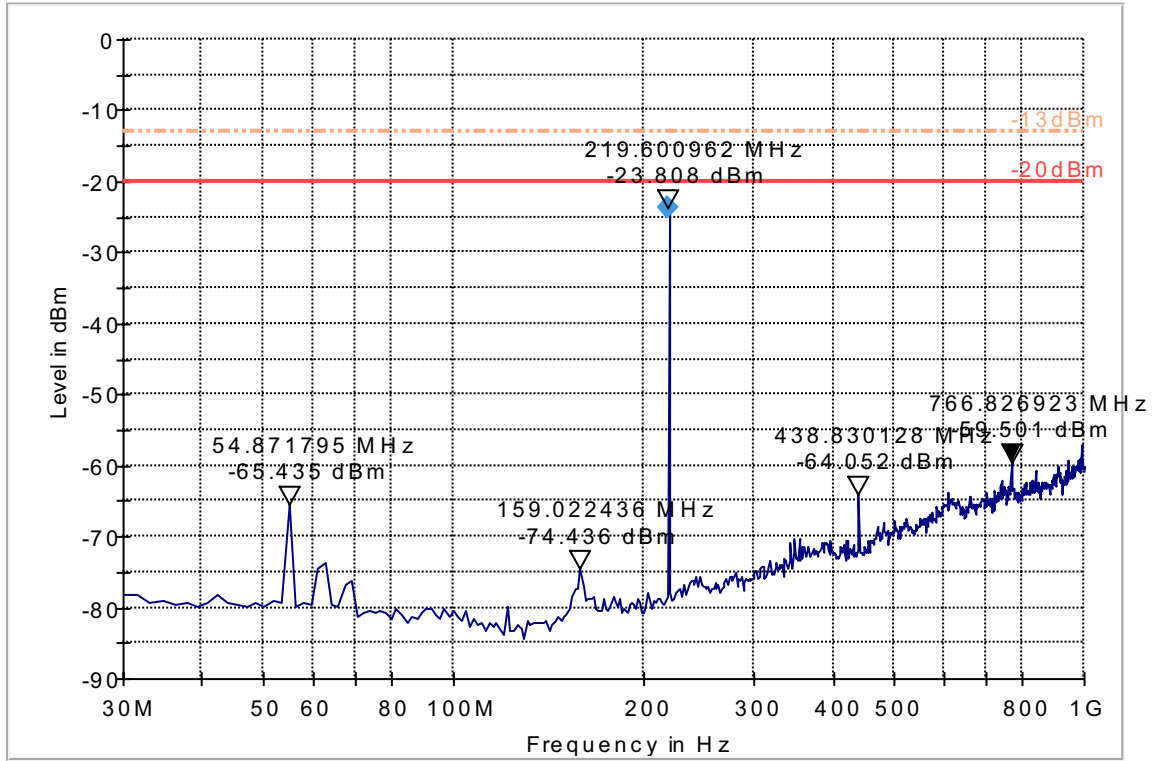


— FCC 15 9kHz converted to 3m — Preview Result 1-PK+ ◆ Final Result 1-PK+

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5.7.1.2.2 Test Result 30 MHz - 1 GHz:

FCC 90 30-1000MHz



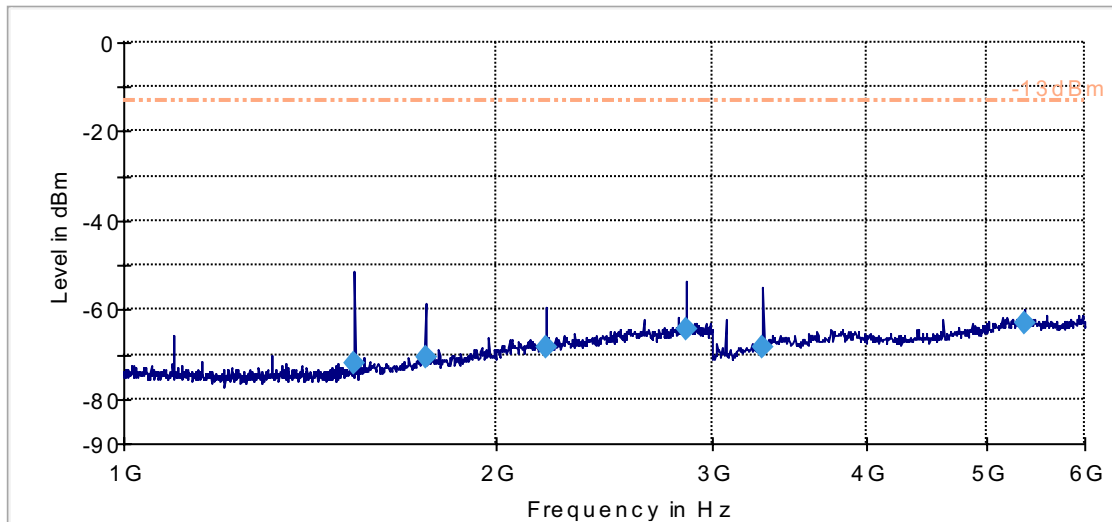
— -20dBm - - - - -13dBm.LimitLine — Preview Result 1-PK+ ◆ Final Result 1-P

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5.7.1.2.3 Test Result 1 GHz – 6 GHz:

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1537.910256	-72.2	20.0	100.000	120.0	H	13.0	-75.8	52.2	-20.0
1755.519231	-70.8	20.0	100.000	126.0	H	22.0	-74.1	50.8	-20.0
2197.144231	-68.5	20.0	100.000	126.0	V	75.0	-71.8	48.5	-20.0
2857.019230	-64.4	20.0	100.000	126.0	H	202.0	-69.2	44.4	-20.0
3293.240385	-68.6	20.0	100.000	126.0	H	0.0	-94.4	48.6	-20.0
5365.136218	-63.0	20.0	100.000	101.0	H	22.0	-89.2	43.0	-20.0

FCC 90 1-6 GHz



----- -13dBm.LimitLine ——— Preview Result 1-PK+ ◆ Final Result 1-PK+

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5.7.2 216.475 MHz Beacon

5.7.2.1 References

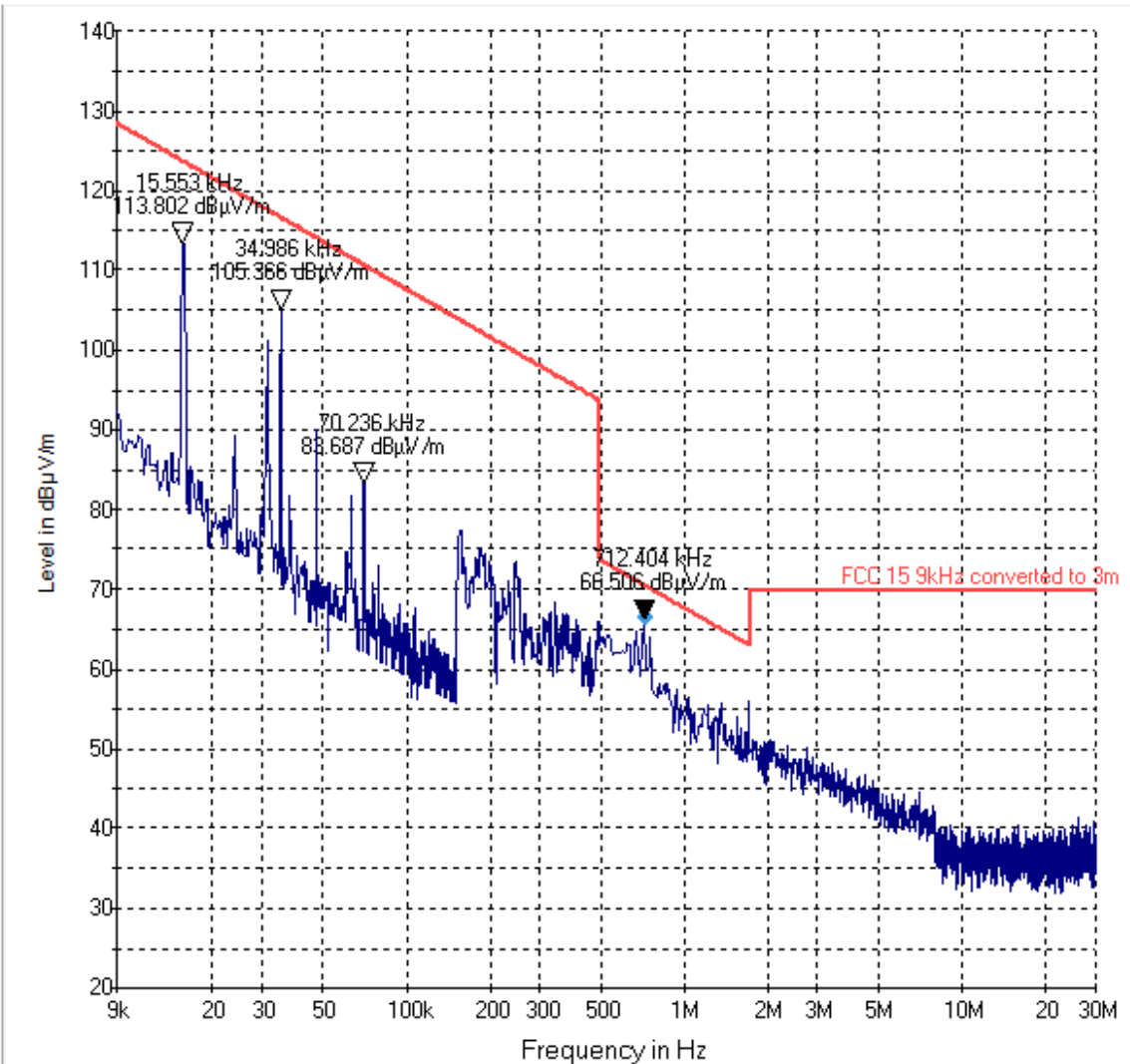
FCC: CFR Part 95

RSS 119:

5.7.2.2 Test Result:

Horizontal and Vertical Polarizations, Worst case for all channels

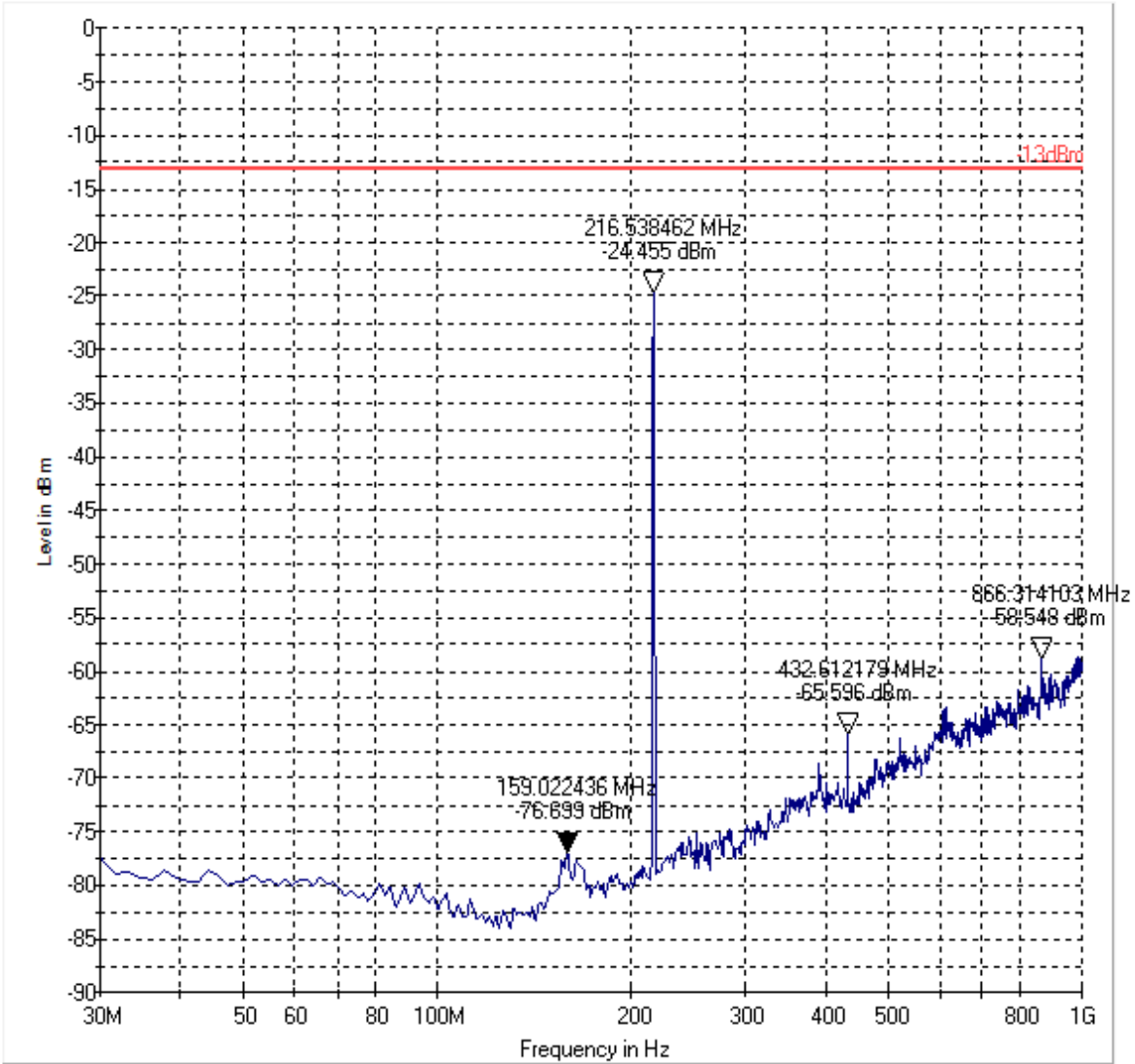
5.7.2.2.1 Test Results 9KHz – 30 MHz



— FCC 15 9kHz converted to 3m — Preview Result 1-PK+ ◆ Final Result 1-PK+

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5.7.2.2.2 Test Result 30 MHz - 1 GHz:

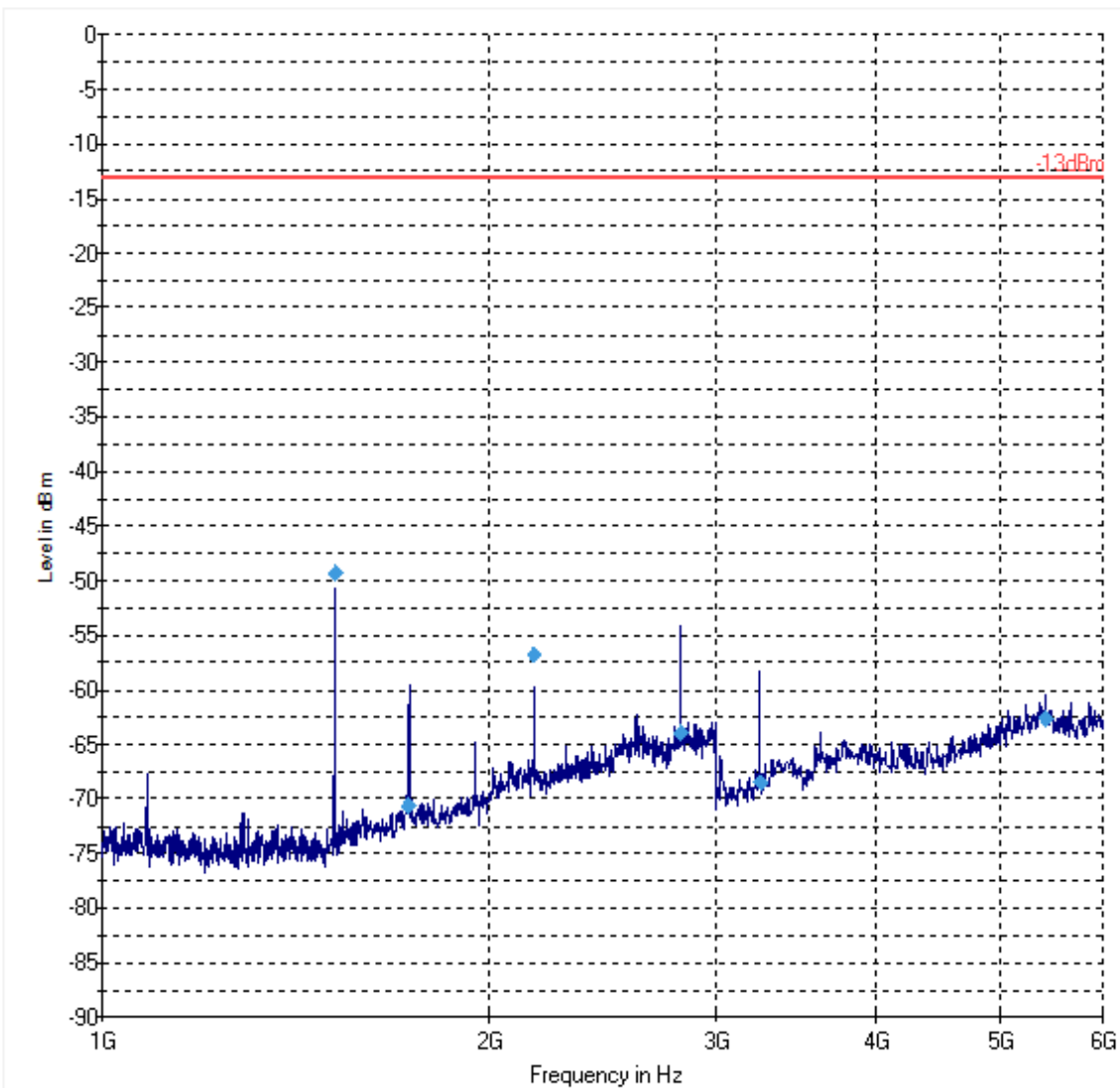


— -13dBm — Preview Result 1-PK+

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5.7.2.2.3 Test Result 1 GHz – 6 GHz:

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1515.365385	-49.3	20.0	100.000	100.0	H	22.0	-76.0	36.3	-13.0
1729.729167	-70.6	20.0	100.000	125.0	H	268.0	-74.4	57.6	-13.0
2164.754808	-56.8	20.0	100.000	101.0	H	248.0	-72.0	43.8	-13.0
2815.386218	-63.9	20.0	100.000	101.0	V	94.0	-69.4	50.9	-13.0
3245.538462	-68.5	20.0	100.000	119.0	H	13.0	-95.3	55.5	-13.0
5413.788461	-62.6	20.0	100.000	101.0	V	1.0	-89.2	49.6	-13.0



— -13dBm — Preview Result 1-PK+ ◆ Final Result 1-PK+

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5.8 Receiver Spurious Emissions

5.8.1 References

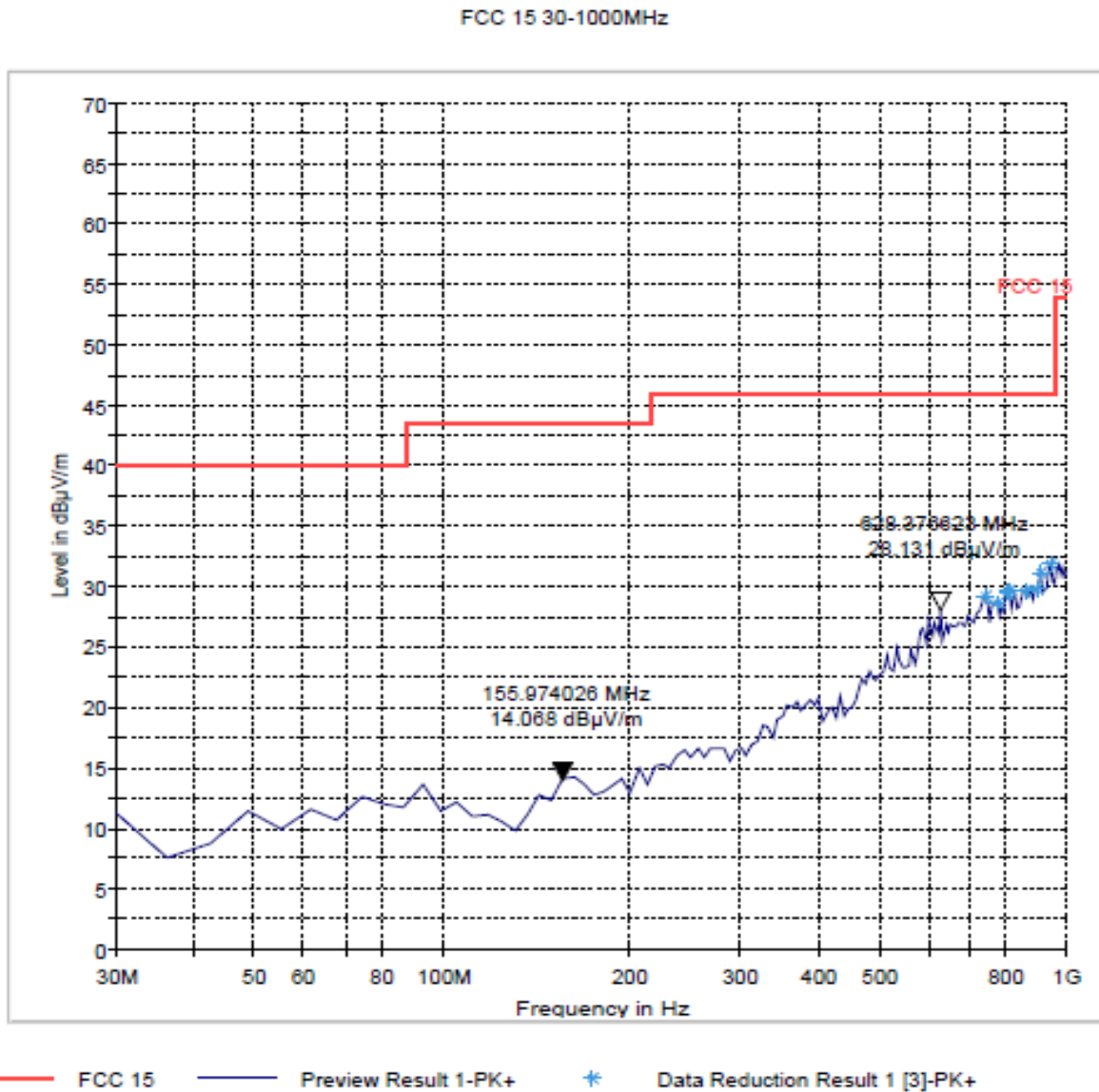
FCC: CFR Part 2.1053, 90.215

RSS 119: 5.8

5.8.2 Test Result:

Horizontal and Vertical Polarizations, Worst case for all channels

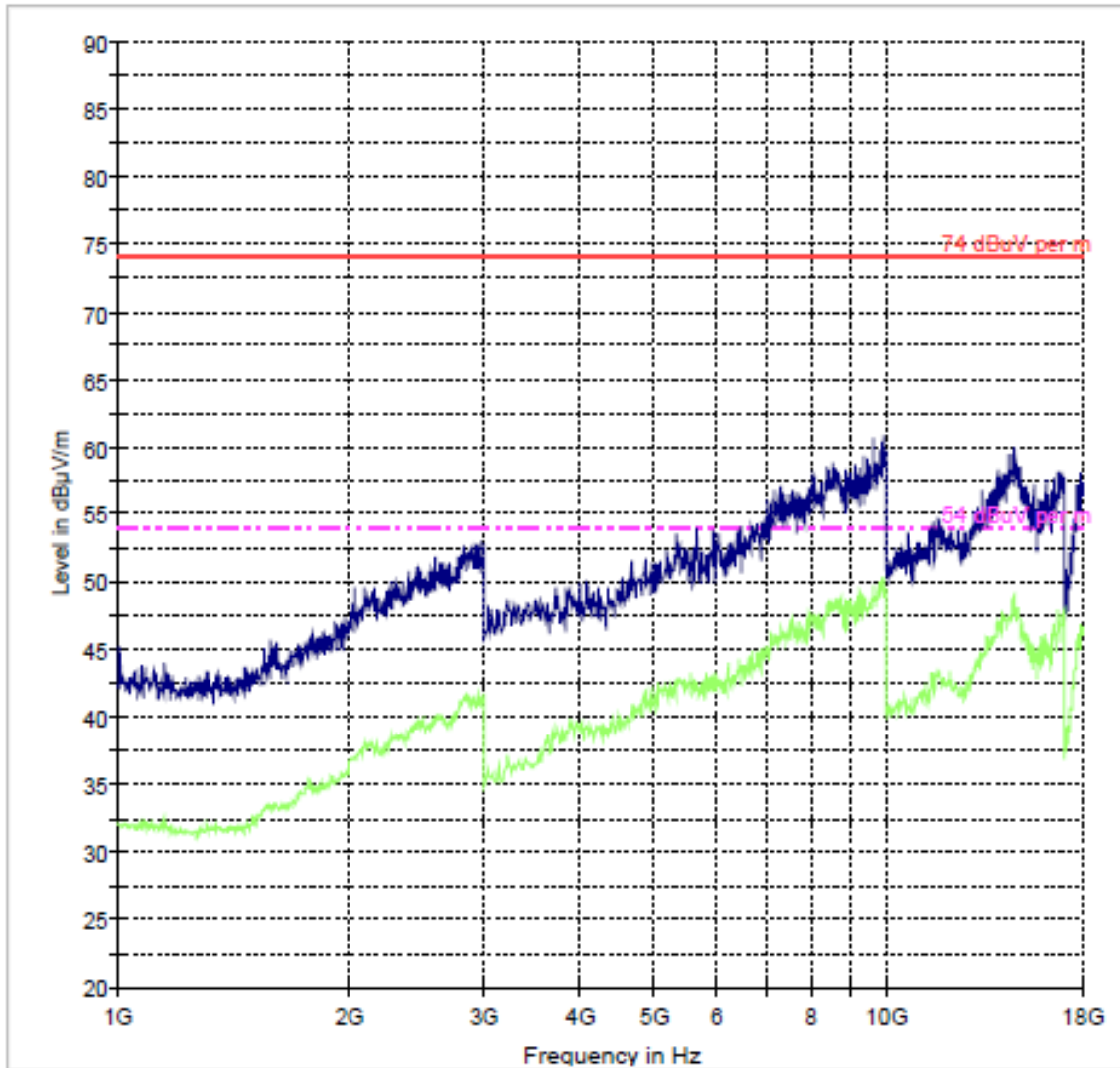
Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations



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Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.


FCC 15 1-18GHz



- 74 dBuV per m
- Preview Result 1-PK+
- - - 54 dBuV per m
- Preview Result 2-AVG

Test Date: 5/1/2014 3:30:41

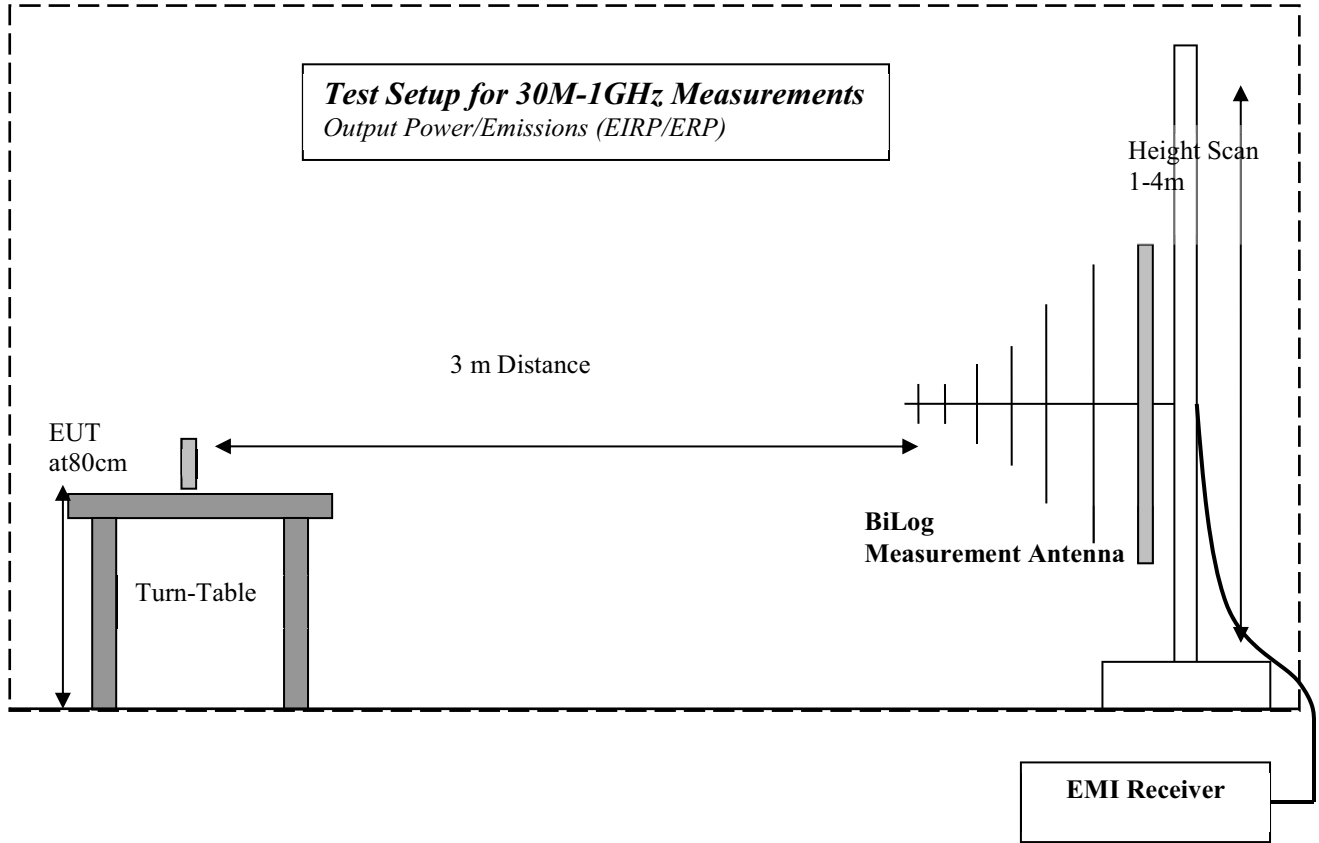
Test Engineer: SMoon

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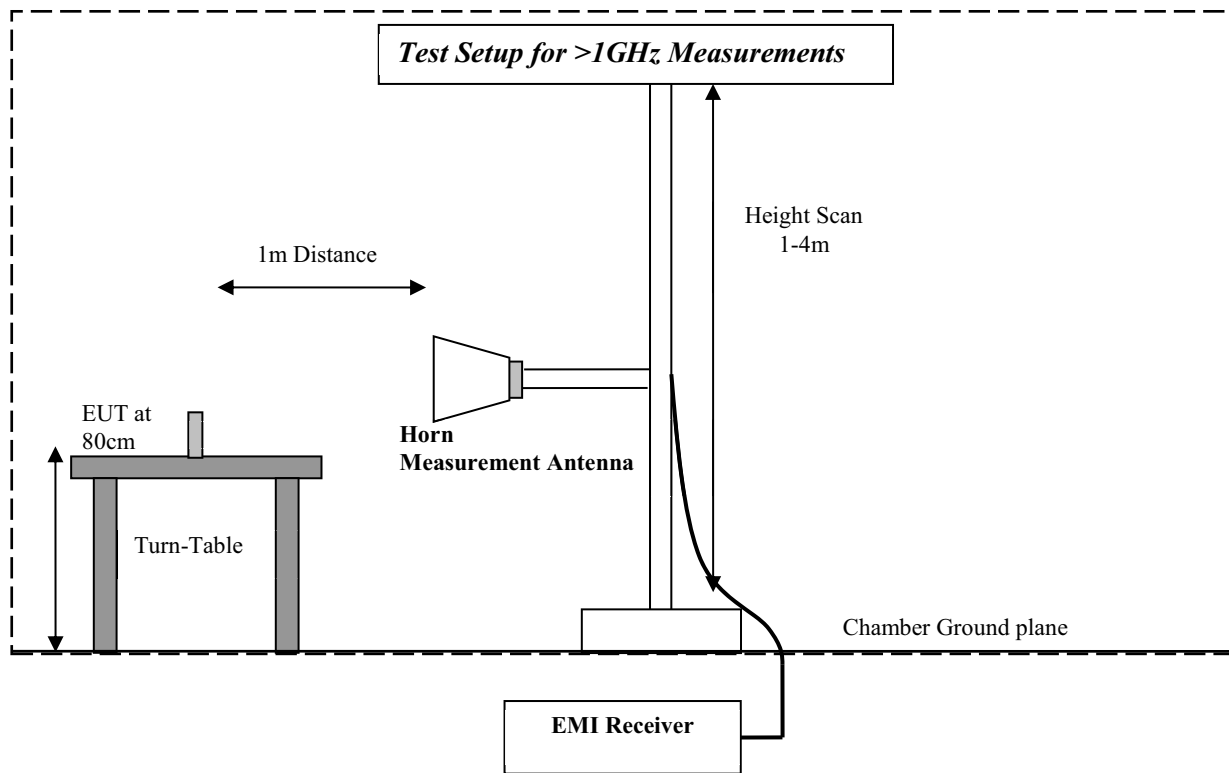
Item Name	Manu- facturer	Equipment Type	Model	Serial #	Calibration Cycle	Last Calibration Date
Binconlog Antenna 3141	EMCO	Binconilog Antenna	3141	0005-1186	3 years	4/5/2012
Digital Radio Comm. Tester CMU 200# 4	R&S	Digital Radio Comm. Tester	CMU 200# 4	110229	2 Years	6/15/2013
Digital Radio Comm. Tester CMU 200 #1	R&S	Digital Radio Comm. Tester	CMU 200 #1	101821	2 Years	6/17/2013
Digital Radio Comm. Tester CMU 200 #2	R&S	Digital Radio Comm. Tester	CMU 200 #2	109879	2 Years	6/15/2013
Digital Radio Comm. Tester CMU 200 #3	R&S	Digital Radio Comm. Tester	CMU 200 #3	110759	2 Years	6/15/2013
ESU Receiver	R&S	EMI Receiver	ESU40	100251	2 Years	9/13/2013
Horn Antenna 3115	EMCO	Horn Antenna	3115	35114	3 years	3/6/2012
Horn Antenna 3116	EMCO	Horn Antenna	3116	70497	3 years	3/2/2012
LISN ESH3-Z5	R&S	LISN	ESH3-Z5	836679/003	2 Years	6/18/2013
LISN ESH3-Z6	R&S	LISN	ESH3-Z6	836154/011	2 Years	6/16/2013
LISN FCC-LISN-50-25- 2-08	FCC	LISN	FCC-LISN- 50-25-2-08	70497	2 Years	7/12/2012
Log Periodic Antenna 3149	ETS Lindgren	Log Periodic Antenna	3149	1186	3 years	8/23/2011
Loop Antenna 6512	ETS Lindgren	Loop Antenna	6512	49838	3 years	8/1/2011
Thermometer Humidity TM325	Dickson	Thermometer Humidity	TM325	5285354	2 Years	4/15/2013
FSU 26	R&S	Spectrum Analyzer	FSU 26	100189	2 Years	6/1/2013
SMP04	R&S	Signal Generator	SMP04	100151	2 Years	6/17/2013


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6 BLOCK DIAGRAMS



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Date :	2014-06-23	IC ID: 5043A-AT140317A	

7 Revision History

Date	Report Name	Changes to report	Report prepared by
2014-6-23	EMC_3SISE_003_10001_FCC90	First official version	James Donnellan