



# FCC Test Report

**FOR:**

**Manufacturer: System Planning Corporation**

**Model #: VERSA 203133-01**

**FCC ID: XDY-VERSA-01**

**47 CFR Part 2, 25**

**TEST REPORT #: EMC\_SYSTE\_004\_11001\_SAT**  
**DATE: 2013-03-22**



FCC:  
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](mailto:info@cetecomusa.com) • <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

## Table of Contents

<b>1</b>	<b>Assessment .....</b>	<b>3</b>
<b>2</b>	<b>Administrative Data.....</b>	<b>4</b>
2.1	Identification of the Testing Laboratory Issuing the Test Report .....	4
2.2	Identification of the Client .....	4
2.3	Identification of the Manufacturer .....	4
<b>3</b>	<b>Equipment under Test (EUT) .....</b>	<b>5</b>
3.1	Specification of the Equipment under Test .....	5
3.2	Identification of the Equipment Under Test (EUT) .....	5
<b>4</b>	<b>Subject of Investigation .....</b>	<b>6</b>
<b>5</b>	<b>Summary of Measurement Results.....</b>	<b>7</b>
5.1	Dates of Testing: .....	7
<b>6</b>	<b>Measurements.....</b>	<b>8</b>
6.1	RF Power Output.....	8
6.1.1	<i>References .....</i>	8
6.1.2	<i>Limits: .....</i>	8
6.2	Radiated Output Power Measurement procedure.....	9
6.3	RF Power Output.....	10
6.3.1	<i>Test Results: .....</i>	10
6.3.2	<i>Test Verdict: .....</i>	10
6.4	Spurious Emissions Radiated.....	11
6.4.1	<i>References .....</i>	11
6.4.2	<i>Measurement requirements:.....</i>	11
6.4.3	<i>Limits: .....</i>	11
6.4.4	<i>Radiated out of band measurement procedure: .....</i>	12
6.4.5	<i>Sample Calculations for Radiated Measurements .....</i>	13
6.4.6	<i>Measurement Survey:.....</i>	13
6.4.7	<i>Test Conditions: .....</i>	13
6.4.8	<i>Measurement Verdict .....</i>	13
6.4.9	<i>Measurement Results: .....</i>	14
<b>7</b>	<b>Test Equipment and Ancillaries used for tests .....</b>	<b>16</b>
<b>8</b>	<b>Test Setup Diagrams .....</b>	<b>17</b>
<b>9</b>	<b>Revision History .....</b>	<b>18</b>

## **1 Assessment**

**The following device was tested against the applicable criteria specified in FCC rules Parts 2 and 25 of Title 47 of the Code of Federal Regulations**  
**No deviations were ascertained during the course of the tests performed.**

<b>Company</b>	<b>Description</b>	<b>Model #</b>
System Planning Corporation	Local Control for remote installations.	VERSA 203133-01

### **Responsible for Testing Laboratory:**

2013-03-22	Compliance	Sajay Jose (Test Lab Manager)
Date	Section	Name

### **Responsible for the Report:**

2013-03-22	Compliance	Tunji Yusuf (EMC Engineer)
Date	Section	Name

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 CETECOM Inc. USA.

## **2 Administrative Data**

### **2.1 Identification of the Testing Laboratory Issuing the Test Report**

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

### **2.2 Identification of the Client**

<b>Client:</b>	System Planning Corporation
<b>Street Address:</b>	3601 Wilson Blvd, Suite 500
<b>City/Zip Code</b>	Arlington VA 22201
<b>Country</b>	USA
<b>Contact Person:</b>	Ronald Martin
<b>Phone No.</b>	703-351-8203
<b>e-mail:</b>	martin@sysplan.com

### **2.3 Identification of the Manufacturer**

Same as Client.

### **3    Equipment under Test (EUT)**

#### **3.1    Specification of the Equipment under Test**

<b>Model No./Name:</b>	VERSA 203133-01
<b>Product Description:</b>	Local Control for remote installations.
<b>Hardware Version :</b>	203133 -05
<b>Software Version:</b>	7.45.1 (SV08)
<b>FCC ID:</b>	XDY-VERSA-01
<b>Integrated Module Info:</b>	Modular Satellite Transmitter STX2 (FCC ID: L2V-STX2-1)
<b>Supported Frequency Band of Operation:</b>	1610-1625 MHz
<b>No. of Channels:</b>	4 transmit frequencies: 1611.25, 1613.75, 1616.26 and 1618.25 MHz
<b>Type(s) of Modulation:</b>	BPSK
<b>Other Radios included in the device:</b>	Sierra Wireless Q2687 : GSM/GPRS/EGPRS: 850/900/1800/1900 MHz  DTS/Zigbee: 2.405-2.480 GHz  GPS: Rx only 1575 MHz
<b>Antenna Info:</b>	Internal Monopole Printed Trace Antenna  Model: Spectrum Controls PA25-1615-025SA  Manufacturer reported peak gain: 3 dBi
<b>Rated Operating Voltage (V DC):</b>	3.6
<b>Rated Operating Temperature Range:</b>	-40°C ~ +85°C
<b>Test Sample Status:</b>	Pre-Production

#### **3.2    Identification of the Equipment Under Test (EUT)**

<b>EUT #</b>	<b>Serial Number/IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
<b>1</b>	35242104127809608	203133 -05	7.45.1 (SV08)

#### **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 25: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 22- Satellite Communications

This test report is to support a request for new equipment authorization under the FCC ID: XDY-VERSA-01. All testing was performed on the products referred to in Section 3 as EUT.

The EUT incorporates a pre-certified STX2 module from GlobalStar (FCC ID: L2V-STX2-1). Since the EUT is leveraging the module's FCC ID, this test report only covers the radiated test portion of the above listed FCC rule parts.

For conducted test results, reference is made to the results from the module's pre-certification and as documented in test report number #05-0141 issued by U.S. Technologies, Inc. dated July 12, 2005 and as published on the module's FCC filing.

## 5 Summary of Measurement Results

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §25.204 (a) RSS-170 5.3	RF Output Power	Nominal		■	□	□	□	Complies
§2.1055 §25.202 (d) RSS-170 5.2	Frequency Stability	Nominal		□	□	□	■	Complies*
§2.1049 §25.202 (f) RSS-170 5.4	Emissions Limitations	Nominal		□	□	□	■	Complies*
§2.1051 §25.202 (f) §25.213 RSS-170 5.4	Conducted Spurious Emissions	Nominal		□	□	□	■	Complies*
§2.1053 §25.202 (f) RSS-170 5.4	Radiated Spurious Emissions	Nominal		■	□	□	□	Complies
§25.216 (c,f)	Protection of Radio Navigation Satellite Service	Nominal		□	□	□	■	Complies*

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

1. Line Conducted Emissions not applicable since device is Vehicular DC powered.
2. \* Refer to module conducted test report under FCC ID: L2V-STX2-1. Test Report# 05-0141 issued by U.S. Technologies, Inc. dated July 12, 2005.

### 5.1 Dates of Testing:

Feb 7, Mar 7 2012.

## **6 Measurements**

### **6.1 RF Power Output**

#### **6.1.1 References**

FCC: CFR Part 2.1046, CFR Part 25.204 (a)

#### **6.1.2 Limits:**

##### **6.1.2.1 FCC 25.204 (a) Power Limits**

(a) In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:

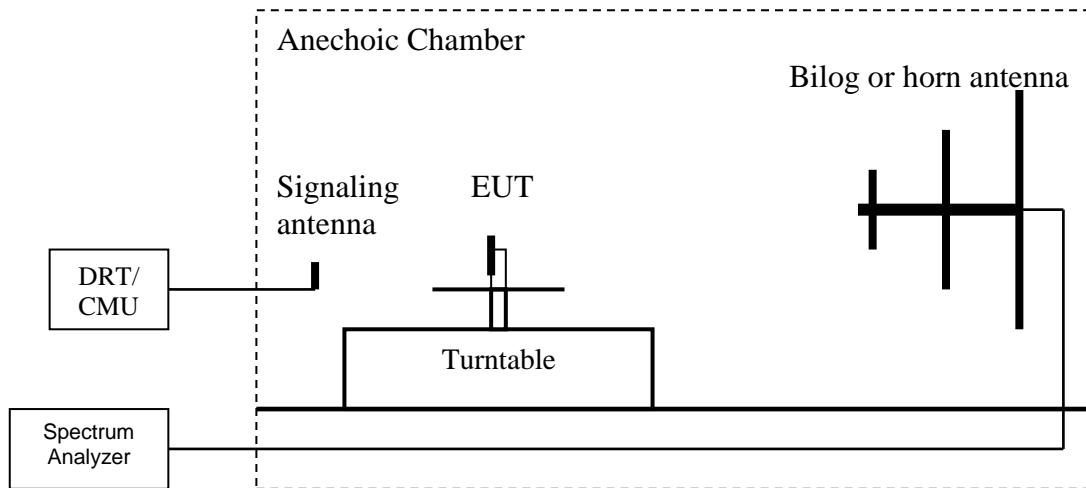
+40 dBW in any 4 kHz band for  $\Theta \leq 0^\circ$

$+40 + 3\Theta$  dBW in any 4 kHz band for  $0^\circ < \Theta \leq 5^\circ$

where  $\Theta$  is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

## 6.2 Radiated Output Power 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 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:  

$$\text{ERP (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$
8. Determine the EIRP using the following equation:  

$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.14 \text{ (dB)}$$
9. Measurements are to be performed with the EUT set to the low and high channel of each frequency band.
10. Measurement settings: RBW=VBW=1MHz  
**(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.)

Measurement Uncertainty (Radiated):  $\pm 3.0$  dB

### **6.3 RF Power Output**

Module has a stated maximum output power of +22 dBm

#### **6.3.1 Test Results:**

<b>Frequency (MHz)</b>	<b>Output Power</b>	
	<b>Module Conducted Power (dBm)</b>	<b>Measured Radiated Power (dBm)</b>
<b>1611.25</b>	21.43	20.70
<b>1618.25</b>	20.22	19.29

#### **6.3.2 Test Verdict:**

Pass.

## **6.4 Spurious Emissions Radiated**

### **6.4.1 References**

FCC: CFR Part 2.1053, CFR Part 25.202 (f)

### **6.4.2 Measurement requirements:**

#### **6.4.2.1 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.

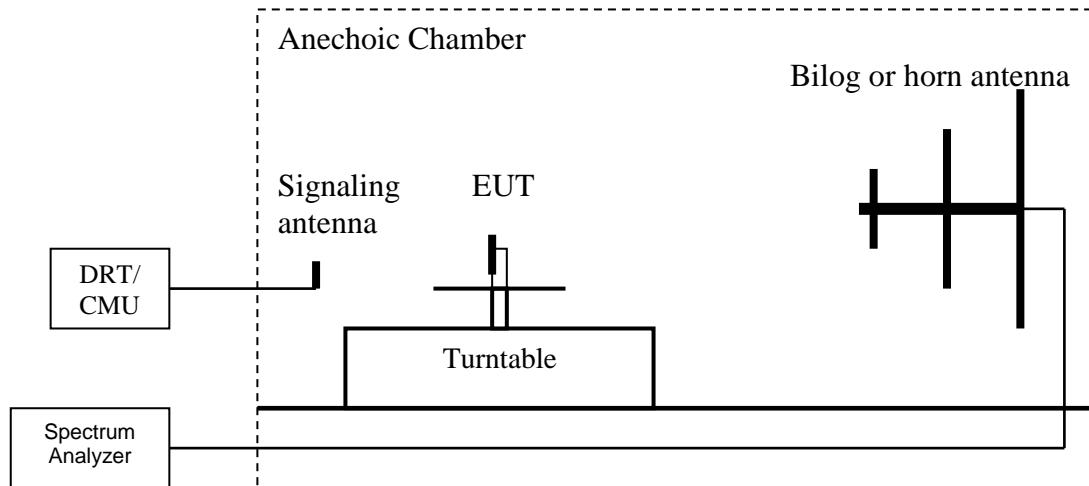
### **6.4.3 Limits:**

#### **6.4.3.1 FCC 25.202 (f)**

*Emission limitations.* Except for SDARS terrestrial repeaters, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section.

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

Based on the module's stated output power of 22 dBm, this translates to 35 dB.

**6.4.4 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:  

$$\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:  

$$\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$
10. Measurements are to be performed with the EUT set to the low and high channel of each frequency band.  
 (Note: 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.)

## **6.4.5 Sample Calculations for Radiated Measurements**

### **6.4.5.1 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-

$$\text{EIRP (dBm)} = \text{Signal Generator setting (dBm)} - \text{Cable Loss (dB)} + \text{Antenna Gain (dBi)}$$

Example:

Frequency (MHz)	Measured SA (dB $\mu$ V)	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

## **6.4.6 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 10<sup>th</sup> harmonic of the highest frequency generated by the EUT.

Radiated emissions measurements were made only at the upper and lower carrier frequencies of the band of operation.

For radiated measurements, all data in this report shows the worst case emissions data between H/V antenna polarizations and for all 3 orthogonal orientations of the EUT.

Measurement Uncertainty= +/- 3.0 dB.

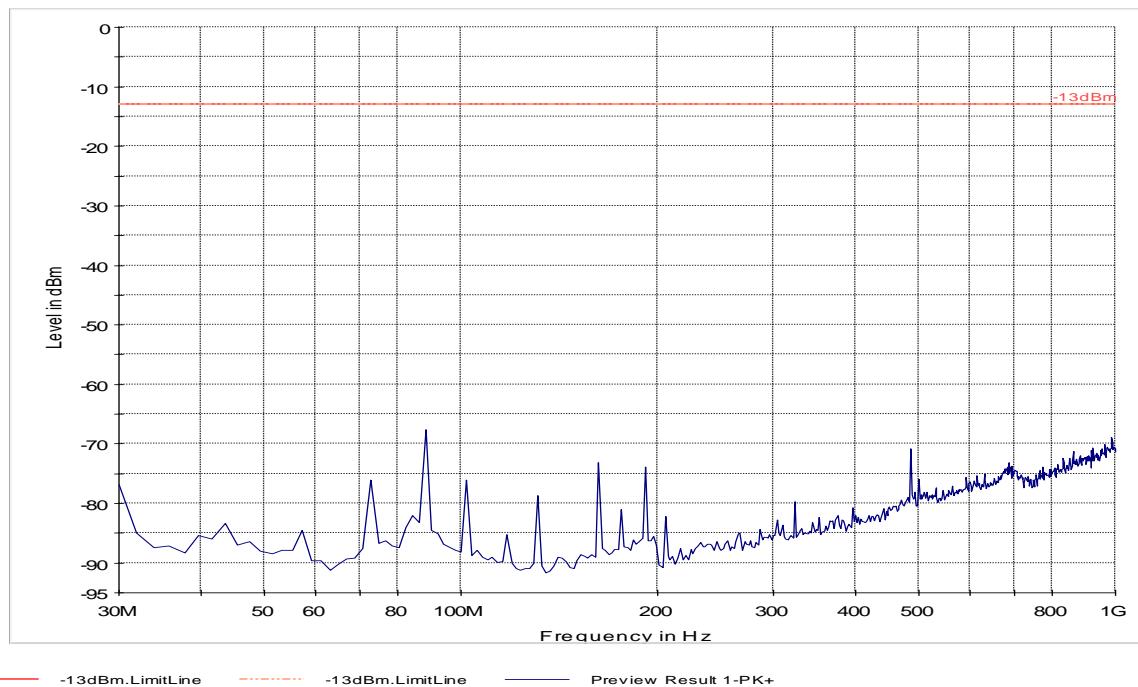
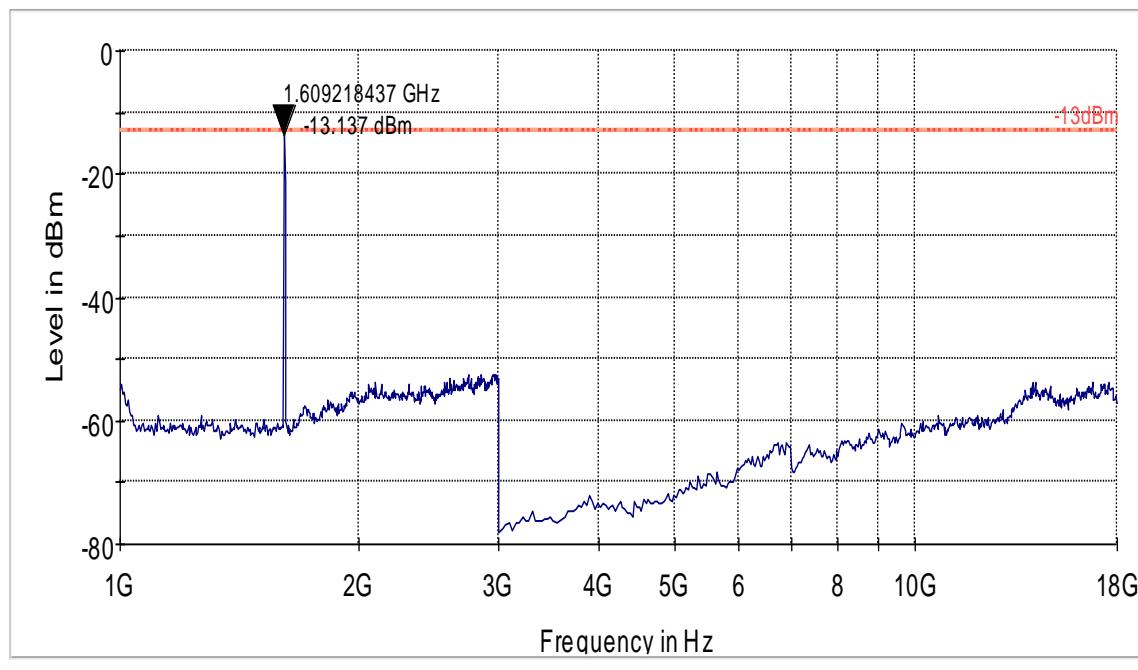
### **6.4.7 Test Conditions:**

T<sub>nom</sub>: 20°C; V<sub>nom</sub>: 3.6 V

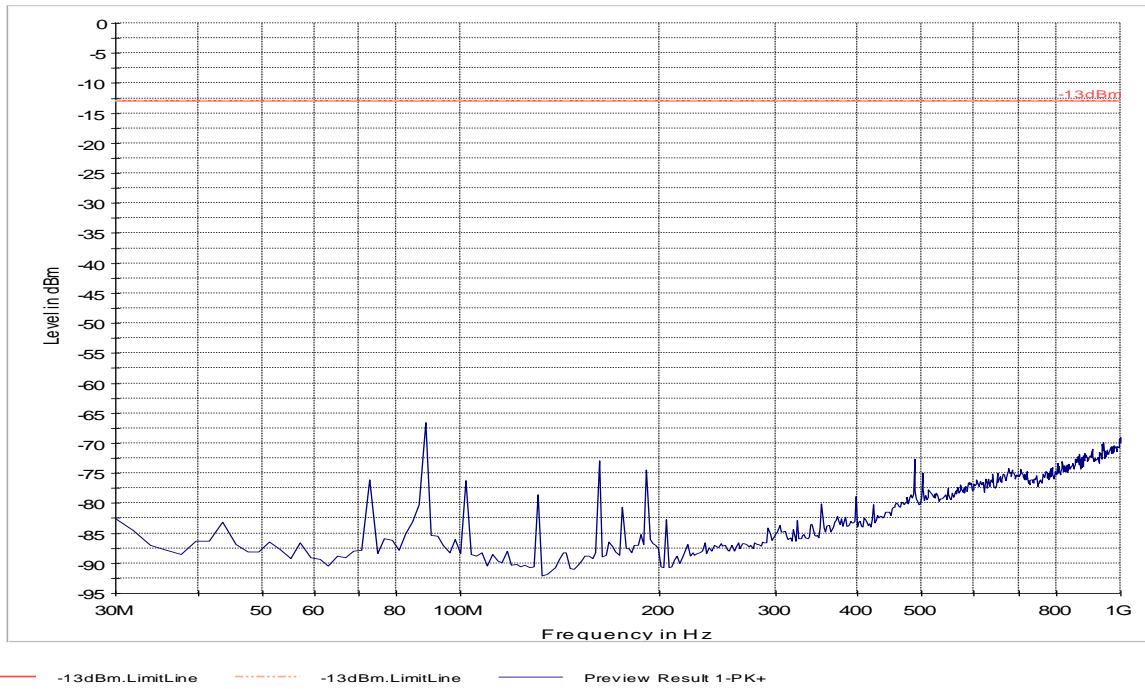
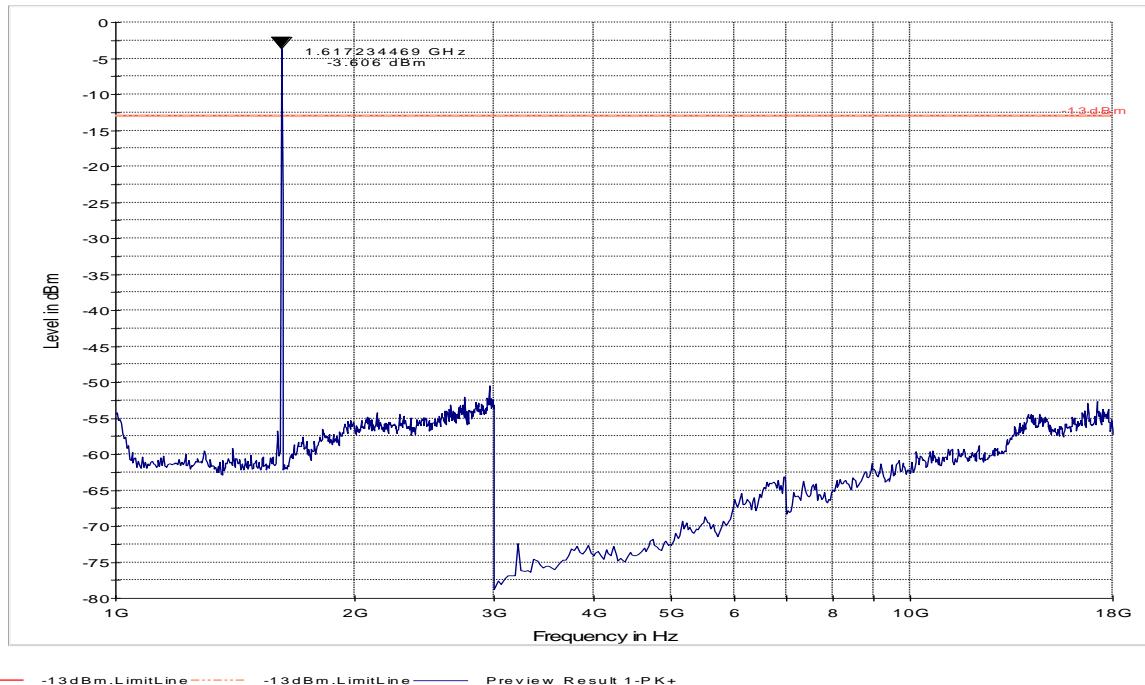
### **6.4.8 Measurement Verdict**

Pass.

Since there are no spurious emissions >35 dBc, the EUT passes this requirement.

**6.4.9 Measurement Results:****Radiated Spurious Emissions : Low Channel****Test results 30M-1GHz****Test results 1GHz-18GHz**

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

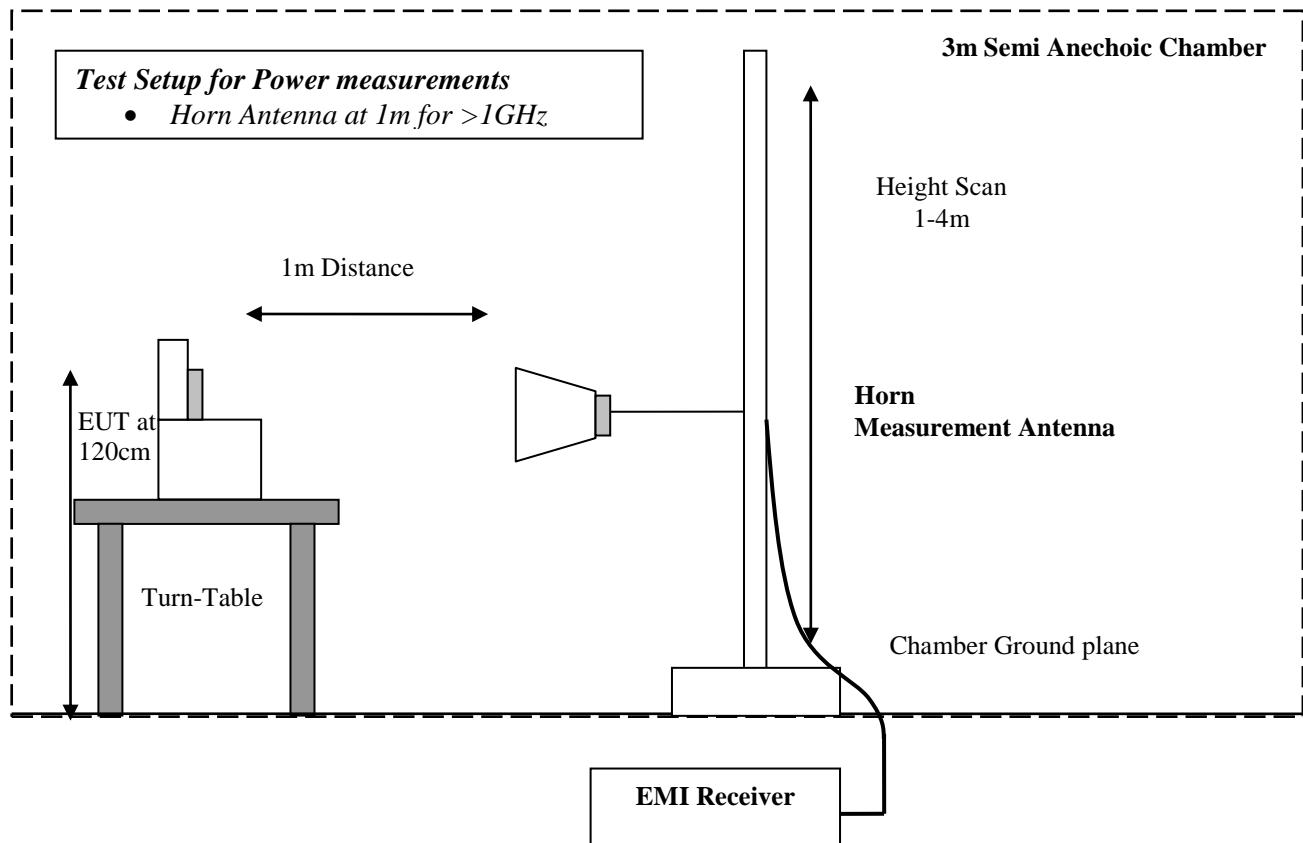
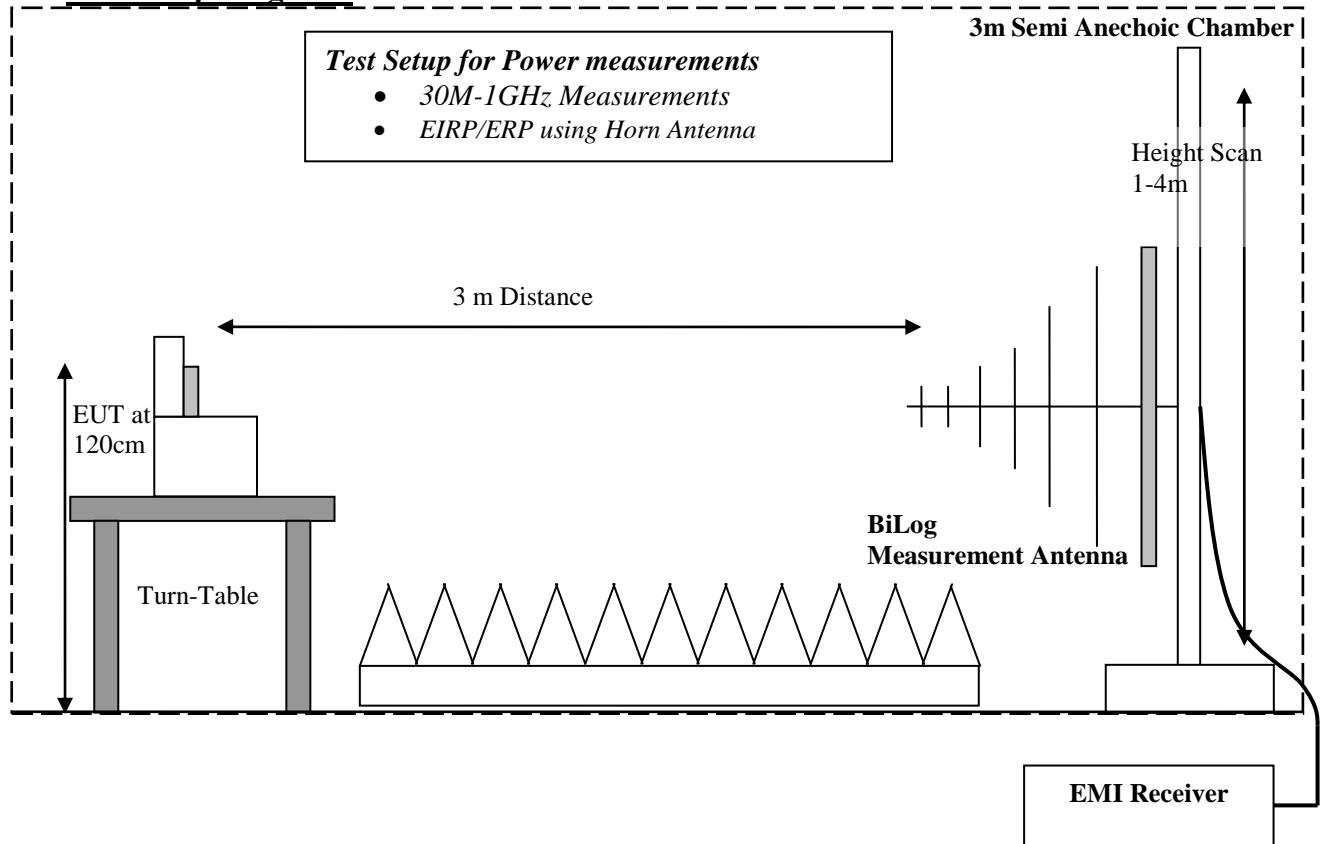
**Radiated Spurious Emissions : High Channel****Test results 30M-1GHz****Test results 1GHz-18GHz**

## **7 Test Equipment and Ancillaries used for tests**

Test equipment calibration status at the time of testing shown below.

<b>Instrument/Ancillary</b>	<b>Model</b>	<b>Manufacturer</b>	<b>Serial No.</b>	<b>Cal Date</b>	<b>Cal Interval</b>
EMI Receiver/Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2011	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Biconilog Antenna	3141	EMCO	0005-1186	June 2009	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Jan 2009	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035114	Mar 2009	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	
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

## 8 Test Setup Diagrams



## **9 Revision History**

<b>Date</b>	<b>Report Name</b>	<b>Changes to report</b>	<b>Report prepared by</b>
2013-03-22	EMC_SYSTE_004_11001_SAT	First Version	T Yusuf