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## Report On

Application for Grant of Equipment Authorization of the  
Novatel Wireless Inc.  
Enabler HS 3001 CDMA2000 1xRTT Dual-Band Radio Module

FCC CFR 47 Part 2, Part 22 and Part 24: 2014  
RSS-132 issue 3: 2013 and RSS-133 issue 6: 2013

**Report No. SD72115463-0316**

**March 2016**



|                           |                                                                                                                                                                                 |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>REPORT ON</b>          | Limited Radio Testing of the<br>Novatel Wireless Inc.<br>Enabler HS 3001 CDMA2000 1xRTT Dual-Band Radio Module                                                                  |
| <b>TEST REPORT NUMBER</b> | SD72115463-0316                                                                                                                                                                 |
| <b>PREPARED FOR</b>       | Novatel Wireless Inc.<br>9645 Scranton Road, Suite 205<br>San Diego, CA 92121                                                                                                   |
| <b>CONTACT PERSON</b>     | Roman Olmos<br>Sr. Regulatory Engineer<br>(858) 812-3400<br>rolmos@nvtl.com                                                                                                     |
| <b>PREPARED BY</b>        | <br>Xiaoying Zhang<br><b>Name</b><br>Authorized Signatory<br>Title: EMC/Wireless Test Engineer |
| <b>APPROVED BY</b>        | <br>Chip Fleury<br><b>Name</b><br>Authorized Signatory<br>Title: West Coast EMC Manager       |
| <b>DATED</b>              | March 25, 2016                                                                                                                                                                  |



#### Revision History

| SD72115463-0316<br>Novatel Wireless Inc.<br>Enabler HS 3001 CDMA2000 1xRTT Dual-Band Radio Module |                 |              |        |                   |             |
|---------------------------------------------------------------------------------------------------|-----------------|--------------|--------|-------------------|-------------|
| DATE                                                                                              | OLD REVISION    | NEW REVISION | REASON | PAGES<br>AFFECTED | APPROVED BY |
| 03/25/2016                                                                                        | Initial Release |              |        |                   | Chip Fleury |
|                                                                                                   |                 |              |        |                   |             |
|                                                                                                   |                 |              |        |                   |             |
|                                                                                                   |                 |              |        |                   |             |



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## **SECTION 1**

### **REPORT SUMMARY**

Radio Testing of the  
Novatel Wireless Inc.  
Enabler HS 3001 CDMA2000 1xRTT Dual-Band Radio Module



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. Enabler HS 3001 CDMA2000 1xRTT Dual-Band Radio Module to the requirements of the following:

FCC CFR 47 Part 2, Part 22 and Part 24: 2014  
RSS-132 issue 3: 2013 and RSS-133 issue 6: 2013

|                               |                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective                     | To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.                                                                                                                                                                                                                                       |
| Applicant                     | Novatel Wireless Inc.                                                                                                                                                                                                                                                                                                                                                                       |
| Manufacturer                  | Enfora Inc.                                                                                                                                                                                                                                                                                                                                                                                 |
| Brand Name                    | Enabler HS 3001                                                                                                                                                                                                                                                                                                                                                                             |
| Model Number(s)               | CNN0301-10                                                                                                                                                                                                                                                                                                                                                                                  |
| FCC ID Number                 | MIVCNN0301                                                                                                                                                                                                                                                                                                                                                                                  |
| IC Number                     | 4106A-CNN0301                                                                                                                                                                                                                                                                                                                                                                               |
| Serial Number(s)              | IMEI: A1000013E98F81                                                                                                                                                                                                                                                                                                                                                                        |
| Number of Samples Tested      | 1                                                                                                                                                                                                                                                                                                                                                                                           |
| Test Specification/Issue/Date | <ul style="list-style-type: none"><li>• FCC CFR 47 Part 2, Part 22 and Part 24: 2014</li><li>• RSS-132 issue 3: 2013; (Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz)</li><li>• RSS-133 issue 6: 2013; (2 GHz Personal Communications Services)</li><li>• RSS-GEN issue 4 November 2014; (General Requirements for Compliance of Radio Apparatus)</li></ul> |
| Start of Test                 | March 17, 2016                                                                                                                                                                                                                                                                                                                                                                              |
| Finish of Test                | March 20, 2016                                                                                                                                                                                                                                                                                                                                                                              |
| Name of Engineer(s)           | Xiaoying Zhang                                                                                                                                                                                                                                                                                                                                                                              |
| Related Document(s)           | <ul style="list-style-type: none"><li>• 971168 D01 Power Meas License Digital Systems v02r02: October 17 2014; (Measurement guidance for certification of licensed digital transmitters)</li><li>• Test Report No. RFI-RPT-RP86318JD02A V4.0.</li></ul>                                                                                                                                     |



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, Part 22 and Part 24: 2014 and RSS-132 issue 3: 2013 and RSS-133 issue 6: 2013 standard is shown below.

| Section | FCC Part Sections(s)               | Industry Canada Sections      | Test Description                     | Result    |
|---------|------------------------------------|-------------------------------|--------------------------------------|-----------|
| -       | 2.1046                             | RSS-132: 5.4,<br>RSS-133: 6.4 | Transmitter Conducted Output Power   | N/T*      |
| -       | 2.1046,<br>22.913(a)(2)            | -                             | Effective Radiated Power             | N/T*      |
| -       | 2.1046,<br>24.232(c)               | RSS-132: 5.4<br>RSS-133: 6.4  | Equivalent Isotropic Radiated Power  | N/T*      |
| -       | 24.232(d)                          | RSS-132: 5.4,<br>RSS-133: 6.4 | Peak-Average Ratio                   | N/T*      |
| -       | -                                  | RSS-GEN 4.6.1                 | Occupied Bandwidth                   | N/T*      |
| 2.1     | 2.1049,<br>22.917(b),<br>24.238(b) | -                             | 26dB Bandwidth                       | Compliant |
| -       | 2.1051,<br>22.917(a),<br>24.238(a) | RSS-132: 5.5,<br>RSS-133: 6.5 | Band Edge                            | N/T*      |
| -       | 2.1051,<br>22.917(a),<br>24.238(a) | RSS-132: 5.5,<br>RSS-133: 6.5 | Conducted Spurious Emissions         | N/T*      |
| 2.2     | 2.1053,<br>22.917(a),<br>24.238(a) | RSS-132: 5.5,<br>RSS-133: 6.5 | Field Strength Of Spurious Radiation | Compliant |
| -       | 2.1055, 22.355,<br>24.235          | RSS-132: 5.3,<br>RSS-133: 6.3 | Frequency Stability                  | N/T*      |

Note \*: N/T: Not Test. Test Data for the case refers to testing report No. RFI-RPT-RP86318JD02A V4.0



### 1.3 PRODUCT INFORMATION

#### 1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Novatel Wireless Inc. CDMA2000 1xRTT Dual-Band Radio Module. The EUT does not support EV-DO.

#### 1.3.2 EUT General Description

|                    |                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| EUT Description    | CDMA2000 1xRTT Dual-Band Radio Module                                                                                             |
| Band Name          | Enabler HS 3001                                                                                                                   |
| Model Number(s)    | CNN0301-10                                                                                                                        |
| Rated Voltage      | 3.7VDC                                                                                                                            |
| Mode Verified      | CDMA2000 Cell Band and PCS Band                                                                                                   |
| Primary Unit (EUT) | <input checked="" type="checkbox"/> Production<br><input type="checkbox"/> Pre-Production<br><input type="checkbox"/> Engineering |

#### Internal Antennas Details

##### Antenna – CDMA

##### Antenna Gain:

- 850MHz Band:  
 Low Ch = -1.67 dBi  
 Mid Ch = -1.42 dBi  
 High Ch = -1.36 dBi
- 1900MHz Band:  
 Low Ch = -2.37 dBi  
 Mid Ch = -2.23 dBi  
 High Ch = -2.04 dBi

#### 1.3.3 Transmit Frequency Table

| Technology / Mode                   | Tx Frequency (MHz) | Emission Designator |
|-------------------------------------|--------------------|---------------------|
| CDMA2000 – 1xRTT<br>Cell Band (BC0) | 824-849            | 1M31F9W             |
| CDMA2000 – 1xRTT<br>PCS Band (BC1)  | 1850-1910          | 1M31F9W             |





#### 1.4 EUT TEST CONFIGURATION

##### 1.4.1 Test Configuration Description

| Test Configuration | Description                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|
| Default            | The module was tested together with a host with the antenna connector connected to call box and transmit at a max. power |

##### 1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester. There are no other test software used during verification.

##### 1.4.3 Support Equipment and I/O cables

| Manufacturer | Equipment/Cable                     | Description                                                          |
|--------------|-------------------------------------|----------------------------------------------------------------------|
| CUI INC      | Power Supply for the host equipment | Model: 3A-181WP05<br>IP: 100-240VAC, 50-60Hz, 0.6A<br>OP: 5VDC, 3.2A |

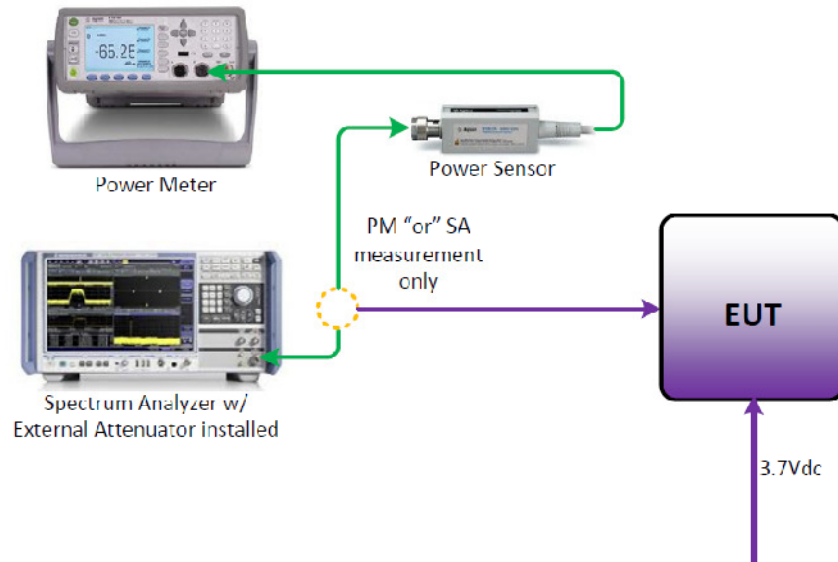
##### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report:

| Technology        | Band       |
|-------------------|------------|
| CDMA 2000 – 1xRTT | Cell (BC0) |
| CDMA 2000 – 1xRTT | PCS (BC1)  |

#### 1.4.5 Simplified Test Configuration Diagram

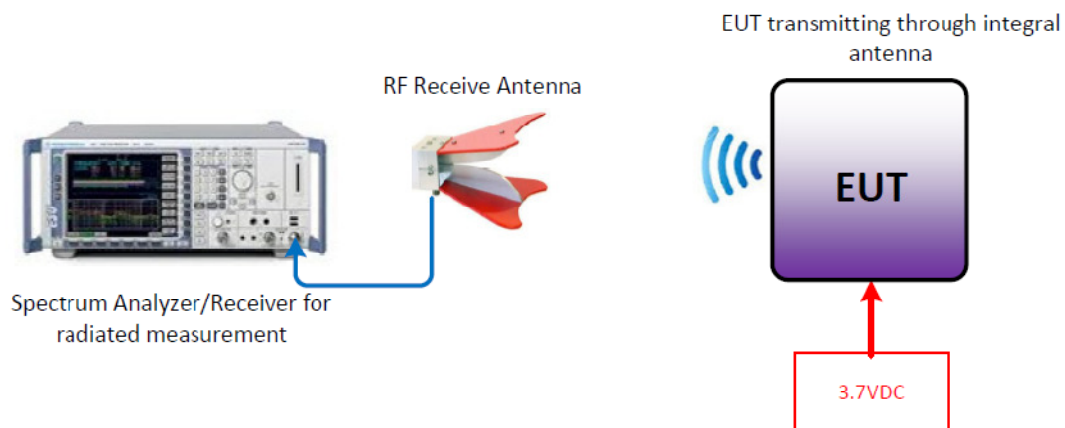
##### Conducted (Antenna Port) Test Configuration



**Not To Scale – Illustration Purpose Only**

Objects may not represent actual image of original equipment/s or set-up.

##### Radiated Test Configuration



**Not To Scale – Illustration Purpose Only**

Objects may not represent actual image of original equipment/s or set-up.



## 1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

## 1.6 MODIFICATION RECORD

| Description of Modification        | Modification Fitted By | Date Modification Fitted |
|------------------------------------|------------------------|--------------------------|
| Serial Number IMEI: A1000013E98F81 |                        |                          |
| N/A                                | —                      | —                        |

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

## 1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements by Substitution method were conducted according to ANSI/TIA/EIA-603-C-2004, August 17, 2004. Land Mobile FM or PM -Communications Equipment -Measurement and Performance Standards.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2014. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

## 1.8 TEST FACILITY LOCATION

### 1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

### 1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 678 1400 Fax: 858 546 0364.



## **1.9 TEST FACILITY REGISTRATION**

### **1.9.1 FCC – Registration No.: US1146**

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

### **1.9.2 Industry Canada (IC) Registration No.: 3067A**

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.



## 1.10 SAMPLE CALCULATIONS

### 1.10.1 CDMA Emission Designator

Emission Designator = 1M30F9W  
 F = Frequency Modulation  
 9= Composite Digital Info  
 W = Combination (Audio/Data)

### 1.10.2 Spurious Radiated Emission (below 1GHz)

|                                                       |                            |       |       |
|-------------------------------------------------------|----------------------------|-------|-------|
| Measuring equipment raw measurement (dBμV/m) @ 30 MHz |                            |       | 24.4  |
| Correction Factor (dB)                                | Asset# 1066 (cable)        | 0.3   | -12.6 |
|                                                       | Asset# 1172 (cable)        | 0.3   |       |
|                                                       | Asset# 1016 (preamplifier) | -30.7 |       |
|                                                       | Asset# 1175(cable)         | 0.3   |       |
|                                                       | Asset# 1002 (antenna)      | 17.2  |       |
| Reported QuasiPeak Final Measurement (dBμV/m) @ 30MHz |                            |       | 11.8  |

### 1.10.3 Spurious Radiated Emission – Substitution Method

Example = 84dBμV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBμV/m @ 1413 MHz (2<sup>nd</sup> Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBμV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$$\begin{aligned}
 P_{\text{EIRP}} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{\text{ERP}} &= P_{\text{EIRP}} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$



## **SECTION 2**

### **TEST DETAILS**

Radio Testing of the  
Novatel Wireless Inc.  
Enabler HS 3001 CDMA2000 1xRTT Dual-Band Radio Module



## **2.1 26DB BANDWIDTH**

### **2.1.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1049  
FCC 47 CFR Part 22, Clause 22.917(b)  
FCC 47 CFR Part 24, Clause 24.238(b)

### **2.1.2 Standard Applicable**

26dB 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 by at least 26 dB below the transmitter power.

### **2.1.3 Equipment Under Test and Modification State**

Serial No: IMEI: A1000013E98F81 / Test Configuration Default

### **2.1.4 Date of Test/Initial of test personnel who performed the test**

March 17, 2016 / XYZ

### **2.1.5 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.1.6 Environmental Conditions/ Test Location**

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

|                     |         |
|---------------------|---------|
| Ambient Temperature | 26.0°C  |
| Relative Humidity   | 38.1%   |
| ATM Pressure        | 98.9kPa |

### **2.1.7 Additional Observations**

- This is a conducted test. 26dB bandwidth presented.
- The 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 V0202 Clause 4.1 using the ndB measurement function in the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be at least 3x RBW.
- Low, Mid and High channels for all bandwidths and modulations were verified. Only Mid channel plots presented as representative.

## 2.1.8 Test Results

| CDMA 2000 – SO 1 Voice |             |           |               |
|------------------------|-------------|-----------|---------------|
| Band                   | Channel     | Frequency | 26dB BW (MHz) |
| Cell (BC0)             | Bottom 1013 | 824.7     | 1.42          |
|                        | Middle 384  | 836.52    | 1.44          |
|                        | High 777    | 848.31    | 1.44          |

| CDMA 2000 – SO 55 Data |             |           |               |
|------------------------|-------------|-----------|---------------|
| Band                   | Channel     | Frequency | 26dB BW (MHz) |
| Cell (BC0)             | Bottom 1013 | 824.7     | 1.42          |
|                        | Middle 384  | 836.52    | 1.44          |
|                        | High 777    | 848.31    | 1.44          |

| CDMA 2000 – SO 1 Voice |            |           |               |
|------------------------|------------|-----------|---------------|
| Band                   | Channel    | Frequency | 26dB BW (MHz) |
| PCS (BC1)              | Bottom 25  | 1851.25   | 1.45          |
|                        | Middle 600 | 1880.00   | 1.48          |
|                        | High 1175  | 1908.75   | 1.46          |

| CDMA 2000 – SO 55 Data |            |           |               |
|------------------------|------------|-----------|---------------|
| Band                   | Channel    | Frequency | 26dB BW (MHz) |
| PCS (BC1)              | Bottom 25  | 1851.25   | 1.48          |
|                        | Middle 600 | 1880.00   | 1.47          |
|                        | High 1175  | 1908.75   | 1.45          |



## 2.1.9 Example Test Plots

### CDMA 2000 Cell BC0 – SO 1 Channel 1013



Date: 17 MAR 2016 15:37:10

### CDMA 2000 Cell BC0 – SO 55 Channel 1013



Date: 17 MAR 2016 15:36:27

### CDMA 2000 Cell BC0 – SO 1 Channel 384



Date: 17.MAR.2016 14:00:05

### CDMA 2000 Cell BC0 – SO 55 Channel 384



Date: 17.MAR.2016 13:49:05

### CDMA 2000 Cell BC0 – SO 1 Channel 777



Date: 17.MAR.2016 15:34:16

### CDMA 2000 Cell BC0 – SO 55 Channel 777



Date: 17.MAR.2016 15:35:23

### CDMA 2000 Cell BC1 – SO 1 Channel 25



Date: 17.MAR.2016 15:38:00

### CDMA 2000 Cell BC1 – SO 55 Channel 25



Date: 17.MAR.2016 15:38:38

### CDMA 2000 Cell BC1 – SO 1 Channel 600



Date: 17.MAR.2016 15:40:08

### CDMA 2000 Cell BC1 – SO 55 Channel 600



Date: 17.MAR.2016 15:39:17



### CDMA 2000 Cell BC1 – SO 1 Channel 1175



Date: 17.MAR.2016 15:40:54

### CDMA 2000 Cell BC1 – SO 55 Channel 1175



Date: 17.MAR.2016 15:41:49



## **2.2 FIELD STRENGTH OF SPURIOUS RADIATION**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1053  
FCC 47 CFR Part 22, Clause 22.917(a)  
FCC 47 CFR Part 24, Clause 24.238(a)  
RSS-132, Clause 5.5  
RSS-133, Clause 6.5

### **2.2.2 Standard Applicable**

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.

### **2.2.3 Equipment Under Test and Modification State**

Serial No: IMEI: A1000013E98F81 / Test Configuration B

### **2.2.4 Date of Test/Initial of test personnel who performed the test**

March 20, 2016 / XYZ

### **2.2.5 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.2.6 Environmental Conditions/ Test Location**

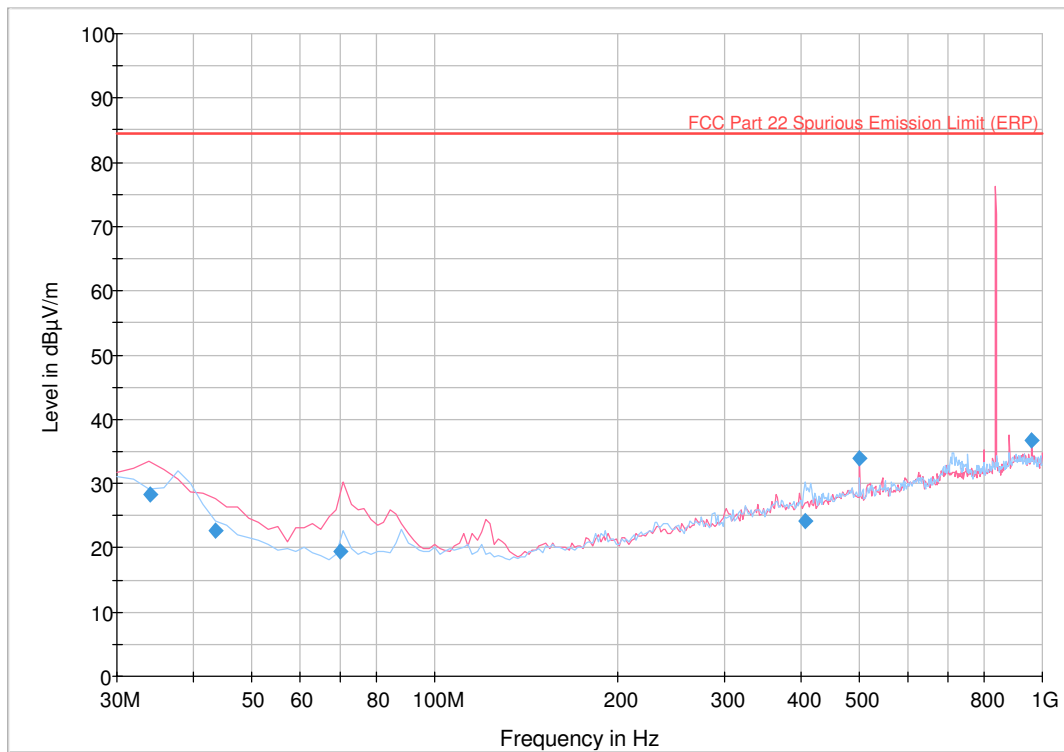
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

|                     |         |
|---------------------|---------|
| Ambient Temperature | 23.8°C  |
| Relative Humidity   | 45.2%   |
| ATM Pressure        | 99.5kPa |

### **2.2.7 Additional Observations**

- This is a radiated test using substitution method as per Unwanted Emissions: Radiated Spurious method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- Only the worst case configuration presented in this test report.
- Only noise floor measurements observed above 18GHz.
- Measurement was done using EMC32 V8.52 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

## 2.2.8 Test Results Below 1GHz\_Worst Case Configuration\_CDMA 2000 BC0\_Mid Channel (384)



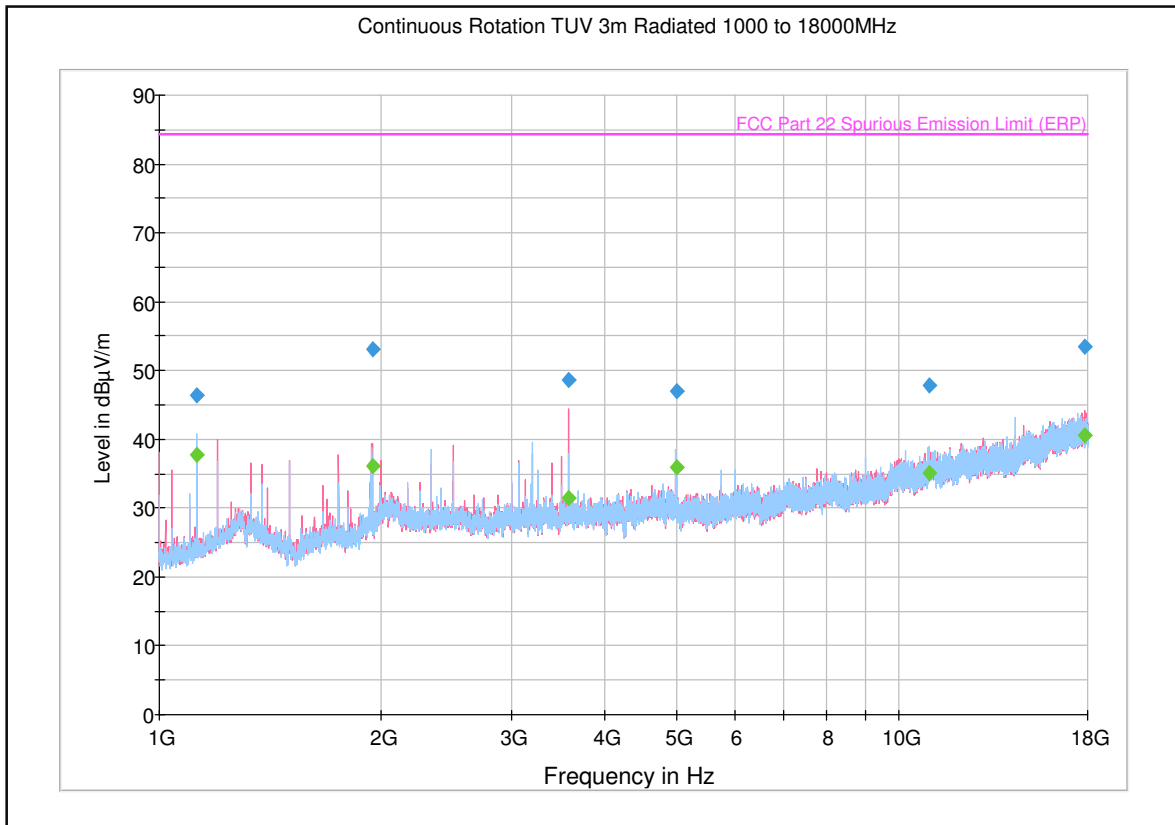
### Quasi Peak Data

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 34.087776       | 28.3               | 1000.0          | 120.000         | 100.0       | V            | 267.0         | -8.0       | 56.1        | 84.4           |
| 43.567214       | 22.6               | 1000.0          | 120.000         | 115.0       | V            | 297.0         | -12.4      | 61.7        | 84.4           |
| 70.061643       | 19.5               | 1000.0          | 120.000         | 140.0       | V            | 18.0          | -16.9      | 64.8        | 84.4           |
| 406.794228      | 24.3               | 1000.0          | 120.000         | 100.0       | H            | 94.0          | -4.0       | 60.1        | 84.4           |
| 500.020842      | 34.0               | 1000.0          | 120.000         | 100.0       | V            | 22.0          | -1.8       | 50.4        | 84.4           |
| 960.082244      | 36.7               | 1000.0          | 120.000         | 155.0       | V            | 196.0         | 6.2        | 47.6        | 84.4           |

**Test Notes:** Only worst case for CDMA200 BC0 presented for spurious emissions below 1GHz. The emission that is close to the limit is the carrier.



## 2.2.9 Test Results Above 1GHz\_Worst Case Configuration\_CDMA 2000 BC0\_High Channel (777)



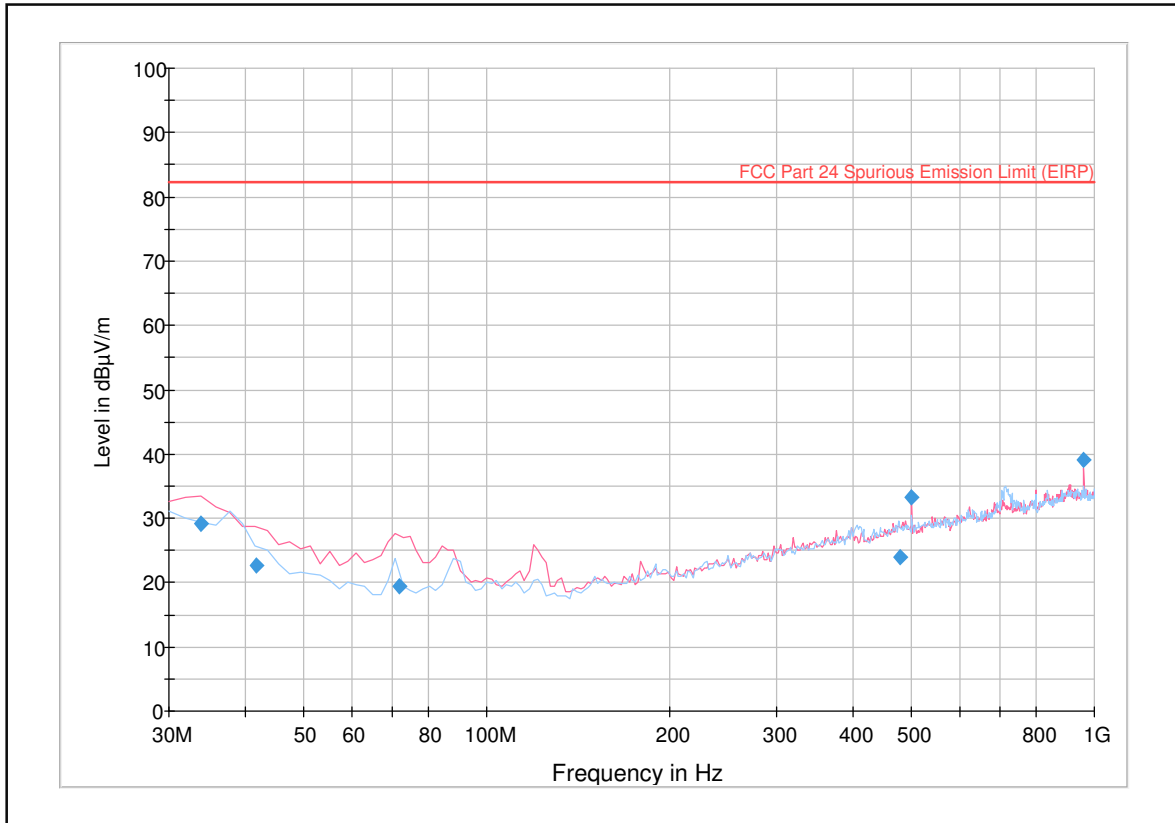
### Peak/Average Data

| Frequency (MHz) | MaxPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V/m) |
|-----------------|------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|
| 1124.866667     | 46.5                   | 1000.0          | 1000.000        | 116.7       | H            | 157.0         | -7.6       | 37.9        | 84.4                 |
| 1941.033333     | 53.1                   | 1000.0          | 1000.000        | 192.5       | V            | -20.0         | -1.1       | 31.3        | 84.4                 |
| 3573.433333     | 48.6                   | 1000.0          | 1000.000        | 183.5       | V            | 67.0          | 1.3        | 35.8        | 84.4                 |
| 5000.133333     | 47.1                   | 1000.0          | 1000.000        | 151.2       | H            | 16.0          | 3.3        | 37.3        | 84.4                 |
| 10980.666667    | 47.9                   | 1000.0          | 1000.000        | 229.4       | H            | 194.0         | 12.8       | 36.5        | 84.4                 |
| 17877.566667    | 53.5                   | 1000.0          | 1000.000        | 152.2       | V            | 10.0          | 20.4       | 30.9        | 84.4                 |

| Frequency (MHz) | Average (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V/m) |
|-----------------|------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|
| 1124.866667     | 37.8                   | 1000.0          | 1000.000        | 116.7       | H            | 157.0         | -7.6       | 46.6        | 84.4                 |
| 1941.033333     | 36.1                   | 1000.0          | 1000.000        | 192.5       | V            | -20.0         | -1.1       | 48.3        | 84.4                 |
| 3573.433333     | 31.5                   | 1000.0          | 1000.000        | 183.5       | V            | 67.0          | 1.3        | 52.9        | 84.4                 |
| 5000.133333     | 35.9                   | 1000.0          | 1000.000        | 151.2       | H            | 16.0          | 3.3        | 48.5        | 84.4                 |
| 10980.666667    | 35.1                   | 1000.0          | 1000.000        | 229.4       | H            | 194.0         | 12.8       | 49.3        | 84.4                 |
| 17877.566667    | 40.6                   | 1000.0          | 1000.000        | 152.2       | V            | 10.0          | 20.4       | 43.8        | 84.4                 |

**Test Notes:** Only worst case for CDMA200 BC0 presented for spurious emissions above 1GHz.

**Test Results Below 1GHz\_Worst Case Configuration\_CDMA 2000 BC1\_Mid Channel (600)**

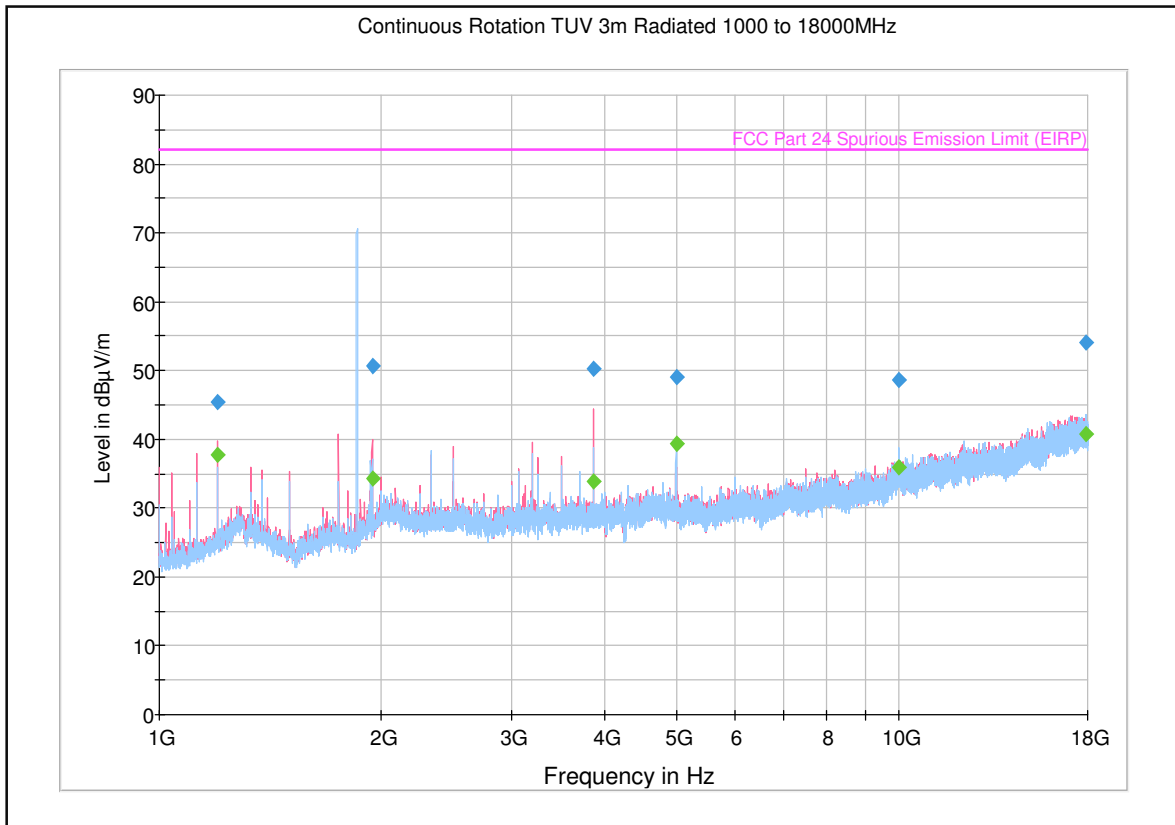


**Quasi Peak Data**

| Frequency (MHz) | QuasiPeak (dBμV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 33.927776       | 29.2               | 1000.0          | 120.000         | 100.0       | V            | 3.0           | -7.9       | 53.0        | 82.2           |
| 41.767214       | 22.8               | 1000.0          | 120.000         | 100.0       | V            | 333.0         | -11.8      | 59.5        | 82.2           |
| 71.861643       | 19.4               | 1000.0          | 120.000         | 100.0       | V            | 333.0         | -16.8      | 62.8        | 82.2           |
| 478.094188      | 23.9               | 1000.0          | 120.000         | 250.0       | H            | 141.0         | -1.7       | 58.3        | 82.2           |
| 499.980842      | 33.3               | 1000.0          | 120.000         | 100.0       | V            | 16.0          | -1.8       | 49.0        | 82.2           |
| 960.082244      | 39.2               | 1000.0          | 120.000         | 150.0       | V            | 161.0         | 6.2        | 43.1        | 82.2           |

**Test Notes:** Only worst case for CDMA200 BC1 presented for spurious emissions below 1GHz.

## 2.2.10 Test Results Above 1GHz\_Worst Case Configuration\_CDMA 2000 BC1\_Low Channel (25)



### Peak/Average Data

| Frequency (MHz) | MaxPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V/m) |
|-----------------|------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|
| 1199.866667     | 45.4                   | 1000.0          | 1000.000        | 192.5       | V            | 208.0         | -6.4       | 36.8        | 82.2                 |
| 1941.633333     | 50.7                   | 1000.0          | 1000.000        | 200.5       | V            | 250.0         | -1.1       | 31.6        | 82.2                 |
| 3862.433333     | 50.3                   | 1000.0          | 1000.000        | 165.6       | V            | 13.0          | 2.0        | 31.9        | 82.2                 |
| 4999.900000     | 49.0                   | 1000.0          | 1000.000        | 102.7       | H            | -16.0         | 3.3        | 33.3        | 82.2                 |
| 10000.000000    | 48.7                   | 1000.0          | 1000.000        | 200.5       | H            | 58.0          | 10.7       | 33.5        | 82.2                 |
| 17952.766667    | 54.1                   | 1000.0          | 1000.000        | 140.7       | H            | 10.0          | 20.5       | 28.1        | 82.2                 |

| Frequency (MHz) | Average (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V/m) |
|-----------------|------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|
| 1199.866667     | 37.7                   | 1000.0          | 1000.000        | 192.5       | V            | 208.0         | -6.4       | 44.5        | 82.2                 |
| 1941.633333     | 34.3                   | 1000.0          | 1000.000        | 200.5       | V            | 250.0         | -1.1       | 47.9        | 82.2                 |
| 3862.433333     | 33.9                   | 1000.0          | 1000.000        | 165.6       | V            | 13.0          | 2.0        | 48.3        | 82.2                 |
| 4999.900000     | 39.4                   | 1000.0          | 1000.000        | 102.7       | H            | -16.0         | 3.3        | 42.9        | 82.2                 |
| 10000.000000    | 36.0                   | 1000.0          | 1000.000        | 200.5       | H            | 58.0          | 10.7       | 46.2        | 82.2                 |
| 17952.766667    | 40.8                   | 1000.0          | 1000.000        | 140.7       | H            | 10.0          | 20.5       | 41.4        | 82.2                 |

**Test Notes:** Only worst case for CDMA200 BC0 presented for spurious emissions above 1GHz. The emission that is close to the limit is the carrier.



### **SECTION 3**

#### **TEST EQUIPMENT USED**



### 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| ID Number<br>(SDGE/SDR<br>B) | Test Equipment                                    | Type     | Serial Number           | Manufacturer    | Cal Date                     | Cal Due<br>Date |
|------------------------------|---------------------------------------------------|----------|-------------------------|-----------------|------------------------------|-----------------|
| Conducted Port Setup         |                                                   |          |                         |                 |                              |                 |
| 7582                         | Signal/Spectrum<br>Analyzer                       | FSW26    | 101614                  | Rhode & Schwarz | 10/05/15                     | 10/05/16        |
| 7608                         | Vector Signal<br>Generator                        | SMBV100A | 259021                  | Rhode & Schwarz | 07/29/15                     | 07/29/16        |
| 7562                         | Wideband Radio<br>Communication<br>Tester         | CMW 500  | 1201.0002k50<br>/103829 | Rhode & Schwarz | For signalling only          |                 |
| -                            | Power<br>Divider/Splitter                         | 1506A    | RR003                   | Weinschel       | Verified by 7608 and<br>7582 |                 |
| 8869                         | 20dB Attenuator                                   | 34-20-34 | BP8140                  | MCE/Weischel    | Verified by 7608 and<br>7582 |                 |
| Radiated Test Setup          |                                                   |          |                         |                 |                              |                 |
| 1033                         | Bilog Antenna                                     | 3142C    | 00044556                | EMCO            | 09/25/15                     | 09/25/16        |
| 7575                         | Double-ridged<br>waveguide horn<br>antenna        | 3117     | 00155511                | EMCO            | 04/27/15                     | 04/27/16        |
| 1151                         | Pre-amplifier                                     | TS-PR26  | 100026                  | Rhode & Schwarz | 05/03/15                     | 05/03/16        |
| 1016                         | Pre-amplifier                                     | PAM-0202 | 187                     | PAM             | 12/15/15                     | 12/15/16        |
| 1040                         | EMI Test Receiver                                 | ESIB40   | 100292                  | Rhode & Schwarz | 09/29/15                     | 09/29/16        |
| 7620                         | EMI Test Receiver                                 | ESU      | 100399                  | Rhode & Schwarz | 09/03/15                     | 09/03/16        |
| 7562                         | Wideband Radio<br>Communication<br>Tester         | CMW 500  | 1201.0002k50<br>/103829 | Rhode & Schwarz | For signalling only          |                 |
| Miscellaneous                |                                                   |          |                         |                 |                              |                 |
|                              | Test Software                                     | EMC32    | V8.53                   | Rhode & Schwarz | N/A                          |                 |
| 7560                         | Barometer/Temper<br>ature/Humidity<br>Transmitter | iBTHX-W  | 1240476                 | Omega           | 10/19/15                     | 10/19/16        |

### 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

#### 3.2.1 Radiated Emission Measurements (Below 1GHz)

| Contribution                    |                            | Probability Distribution Type | Probability Distribution $x_i$ | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---------------------------------|----------------------------|-------------------------------|--------------------------------|-------------------------------|--------------|
| 1                               | Receiver/Spectrum Analyzer | Rectangular                   | 0.45                           | 0.26                          | 0.07         |
| 2                               | Cables                     | Rectangular                   | 0.50                           | 0.29                          | 0.08         |
| 3                               | Preamp                     | Rectangular                   | 0.50                           | 0.29                          | 0.08         |
| 4                               | Antenna                    | Rectangular                   | 0.75                           | 0.43                          | 0.19         |
| 5                               | Site                       | Rectangular                   | 3.89                           | 2.25                          | 5.04         |
| 6                               | EUT Setup                  | Rectangular                   | 1.00                           | 0.58                          | 0.33         |
| Combined Uncertainty ( $u_c$ ): |                            |                               |                                |                               | 2.41         |
| Coverage Factor (k):            |                            |                               |                                |                               | 2            |
| Expanded Uncertainty:           |                            |                               |                                |                               | 4.82         |

#### 3.2.2 Radiated Emission Measurements (Above 1GHz)

| Contribution                    |                            | Probability Distribution Type | Probability Distribution $x_i$ | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---------------------------------|----------------------------|-------------------------------|--------------------------------|-------------------------------|--------------|
| 1                               | Receiver/Spectrum Analyzer | Rectangular                   | 0.57                           | 0.33                          | 0.11         |
| 2                               | Cables                     | Rectangular                   | 0.70                           | 0.40                          | 0.16         |
| 3                               | Preamp                     | Rectangular                   | 0.50                           | 0.29                          | 0.08         |
| 4                               | Antenna                    | Rectangular                   | 0.37                           | 0.21                          | 0.05         |
| 5                               | Site                       | Rectangular                   | 3.89                           | 2.25                          | 5.04         |
| 6                               | EUT Setup                  | Rectangular                   | 1.00                           | 0.58                          | 0.33         |
| Combined Uncertainty ( $u_c$ ): |                            |                               |                                |                               | 2.40         |
| Coverage Factor (k):            |                            |                               |                                |                               | 2            |
| Expanded Uncertainty:           |                            |                               |                                |                               | 4.81         |

#### 3.2.3 Conducted Antenna Port Measurement

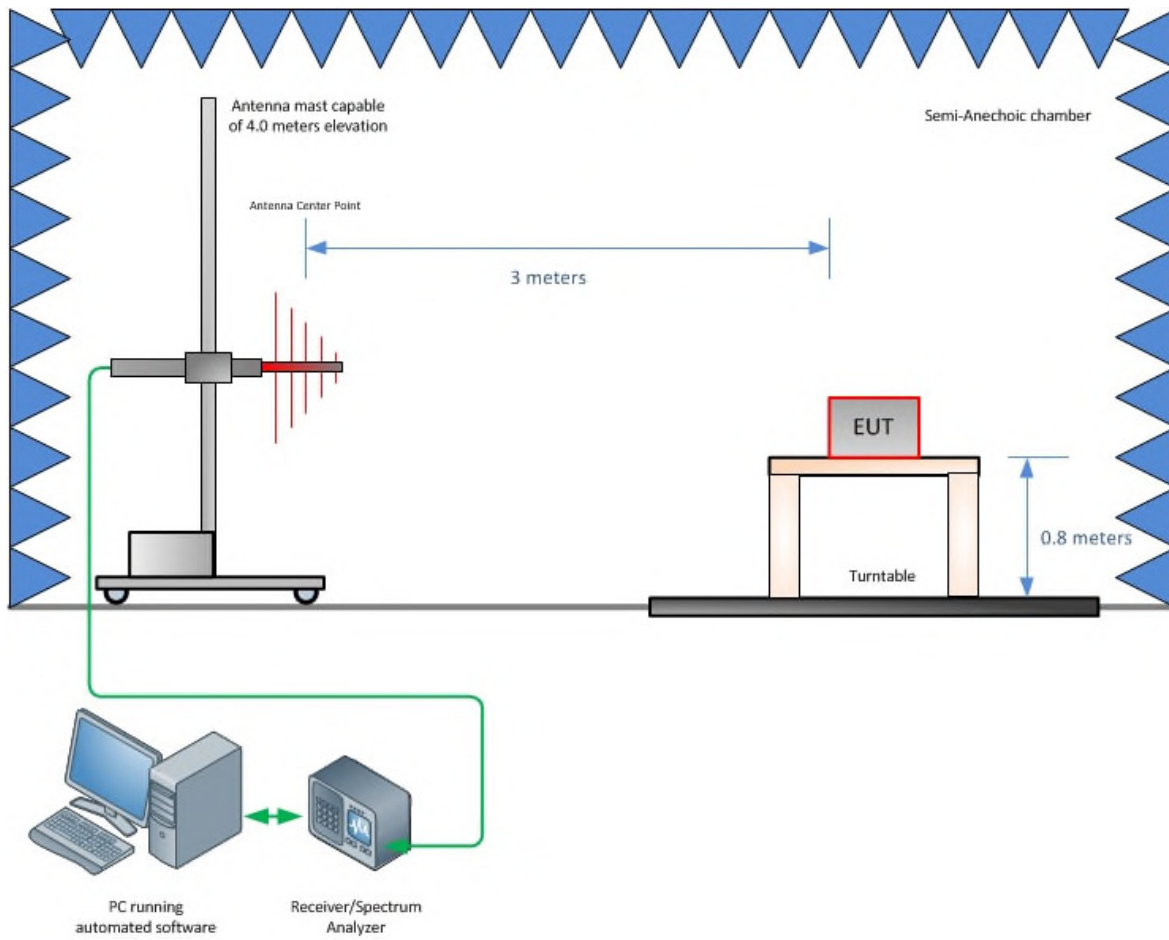
| Contribution                    |                            | Probability Distribution Type | Probability Distribution $x_i$ | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---------------------------------|----------------------------|-------------------------------|--------------------------------|-------------------------------|--------------|
| 1                               | Receiver/Spectrum Analyzer | Rectangular                   | 0.57                           | 0.33                          | 0.11         |
| 2                               | Cables                     | Rectangular                   | 0.50                           | 0.29                          | 0.08         |
| 3                               | EUT Setup                  | Rectangular                   | 1.00                           | 0.58                          | 0.33         |
| Combined Uncertainty ( $u_c$ ): |                            |                               |                                |                               | 0.72         |
| Coverage Factor (k):            |                            |                               |                                |                               | 2            |
| Expanded Uncertainty:           |                            |                               |                                |                               | 1.45         |



#### **SECTION 4**

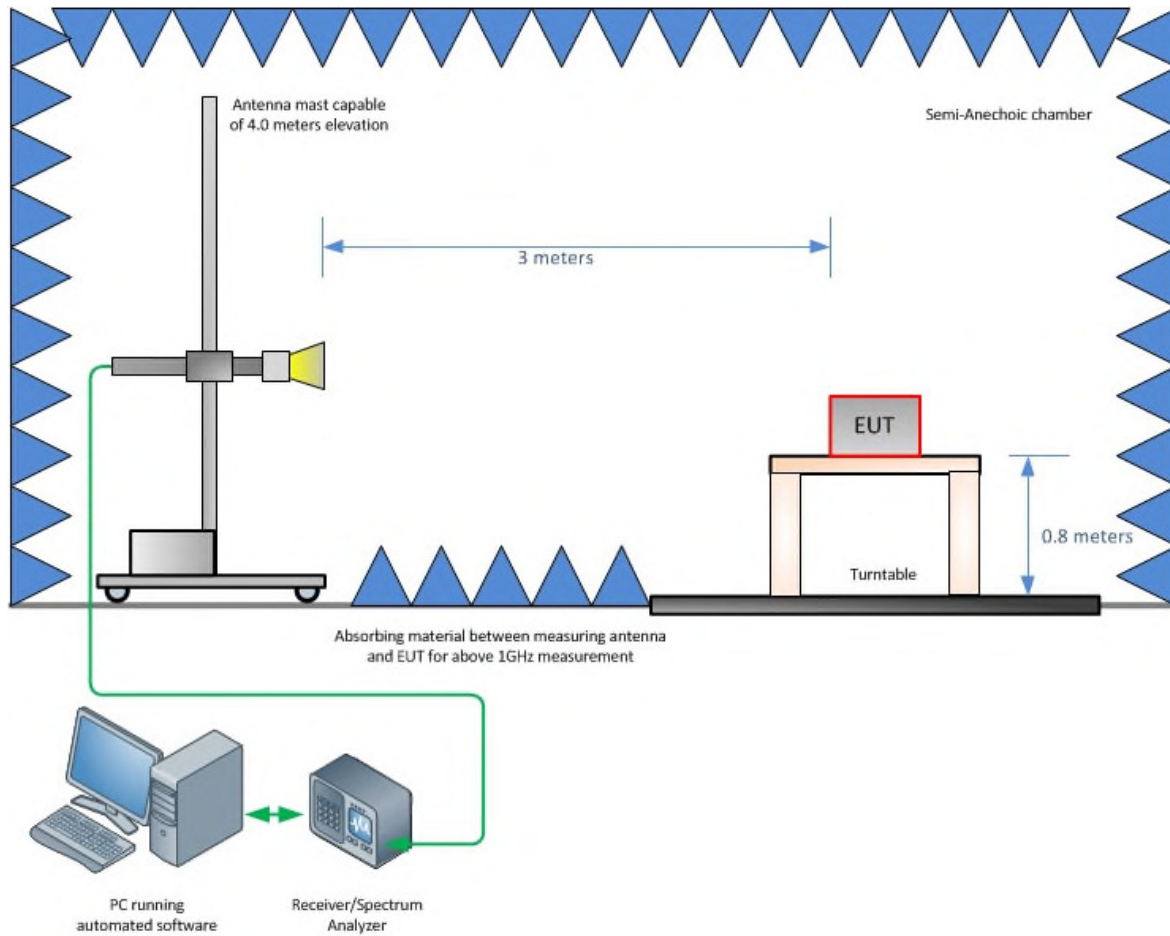
#### **DIAGRAM OF TEST SETUP**

#### 4.1 TEST SETUP DIAGRAM

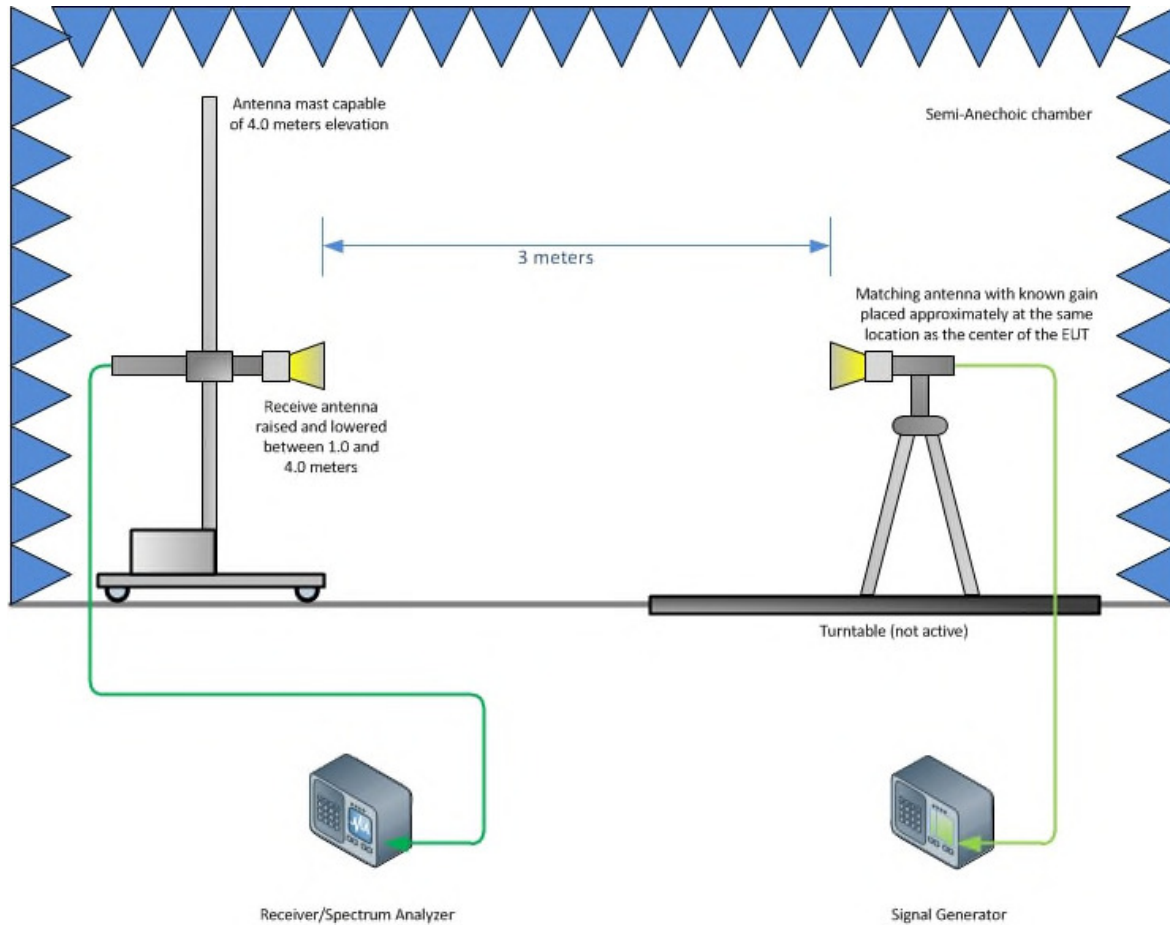


**Radiated Emission Test Setup (Below 1GHz)**

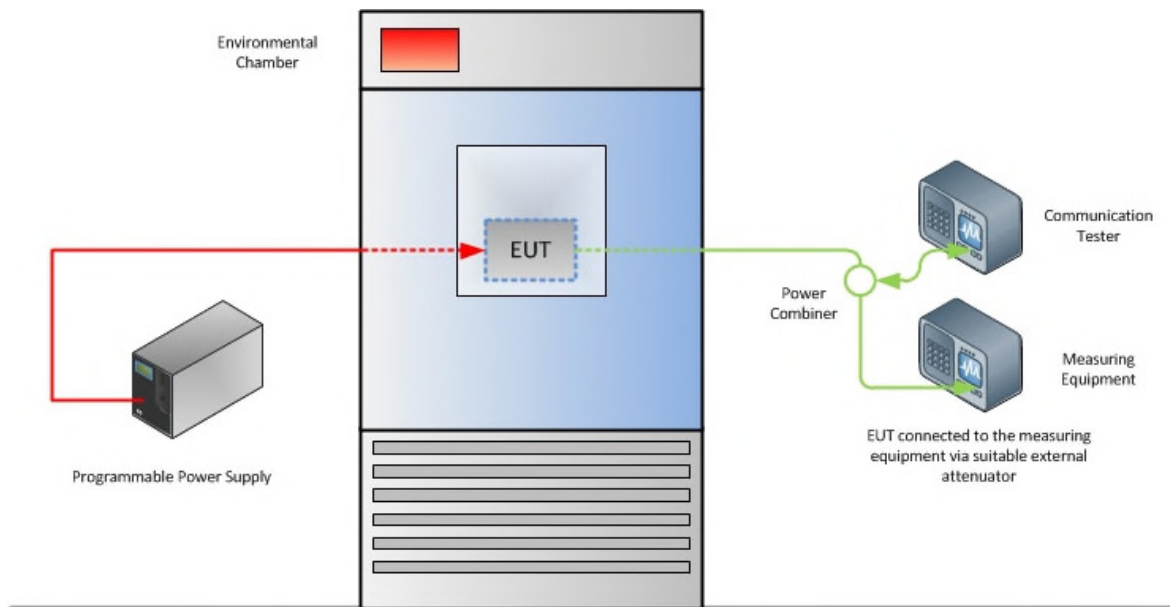




**Radiated Emission Test Setup (Above 1GHz)**



**Substitution Test Method (Above 1GHz)**



**Frequency Stability Test Configuration**



## **SECTION 5**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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