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**Choose certainty.  
Add value.**

# Report On

EMC Evaluation of  
Globalstar USA LLC  
SPOTXB Satellite GPS Messenger

FCC Part 15 Subpart B  
ICES-003 Issue 6

**Report No. 72142584J**

**June 2019**



America

TÜV SÜD America Inc., 10040 Mesa Rim Road, San Diego, CA 92121  
Tel: (858) 678-1400. Website: [www.TUVamerica.com](http://www.TUVamerica.com)

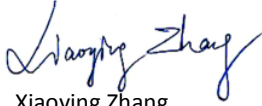
**REPORT ON** EMC Evaluation of the  
Globalstar USA LLC  
SPOTXB Satellite GPS Messenger


**TEST REPORT NUMBER** 72142584J

**TEST REPORT DATE** June 2019

**PREPARED FOR** Globalstar USA LLC  
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**DATED** June 18, 2019



America

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### Revision History

72142584J Globalstar USA LLC SPOTXB Satellite GPS Messenger					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
06/18/2019	-	Initial Release			Ferdinand Custodio



**CONTENTS**

<b>Section</b>	<b>Page No</b>
<b>1</b>	<b>REPORT SUMMARY..... 4</b>
1.1	Introduction ..... 5
1.2	Brief Summary of Results..... 6
1.3	Product Information ..... 7
1.4	Eut Test Configuration ..... 9
1.5	Deviations from the Standard..... 11
1.6	Modification Record ..... 11
1.7	Test Methodology..... 11
1.8	Test Facility Location..... 11
1.9	Test Facility Registration..... 11
<b>2</b>	<b>TEST DETAILS ..... 13</b>
2.1	Conducted Emissions..... 14
2.2	Radiated Emissions ..... 22
<b>3</b>	<b>TEST EQUIPMENT USED ..... 32</b>
3.1	Test Equipment Used..... 33
3.2	Measurement Uncertainty ..... 34
<b>4</b>	<b>DIAGRAM OF TEST SETUP ..... 36</b>
4.1	Test Setup Diagram..... 37
<b>5</b>	<b>ACCREDITATION, DISCLAIMERS AND COPYRIGHT ..... 40</b>
5.1	Accreditation, Disclaimers and Copyright..... 41



## **SECTION 1**

### **REPORT SUMMARY**

EMC Evaluation of the  
Globalstar USA LLC  
SPOTXB Satellite GPS Messenger



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Globalstar USA LLC SPOTXB Satellite GPS Messenger to the requirements of FCC Part 15 Subpart B and Innovation, Science and Economic Development Canada ICES-003.

Objective	To perform EMC Evaluation to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Globalstar USA LLC
Model Name	SPOTXB
Model Number(s)	SPOTXB
Serial Number(s)	0-1000025 (ESN)
Number of Samples Tested	1
Highest Frequency Generated or Used	2499.15 MHz
Test Specification/Issue/Date	<ul style="list-style-type: none"> <li>• FCC Part 15 Subpart B (October 1, 2018)</li> <li>• Spectrum Management and Telecommunications Interference-Causing Equipment Standard ICES-003 Information Technology Equipment (ITE) — Limits and methods of measurement (Issue 6 April 2017).</li> </ul>
Start of Test	January 10, 2019
Finish of Test	April 02, 2019
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	None



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart B with cross-reference to Innovation, Science and Economic Development Canada Interference-Causing Equipment Standard ICES-003 is shown below.

Part 15	ICES-003	Test Description	Result	Comments/Base Standard
§15.107	Clause 6.1	Conducted Emissions	Compliant	Class B requirement
§15.109	Clause 6.2	Radiated Emissions	Compliant	Class B requirement

### 1.3 PRODUCT INFORMATION

#### 1.3.1 Technical Description

The Equipment Under Test (EUT) is a Globalstar USA LLC SPOTXB Satellite GPS Messenger as shown in the photograph below. The EUT is designed to provide users with reliable 2-way messaging and tracking capabilities when beyond cellular services or when traditional means of communication are unavailable. The SPOTXB can be used to send and receive short text messages and emails, track trip routes, have 2-way communications with Search and Rescue personnel, and to navigate. It can also be linked to smart devices via Bluetooth Low Energy.



Equipment Under Test





### 1.3.2 Labelling Requirement for Innovation, Science and Economic Development Canada

The manufacturer, importer or supplier shall meet the labelling requirements set out in this section and in Notice 2014-DRS1003 for electronic labelling for every unit:

- (i) Prior to marketing in Canada, for ITE manufactured in Canada, and;
- (ii) Prior to importation into Canada, for imported ITE.

Each unit of an ITE model shall bear a label (see below) that represents the manufacturer's or the importer's SDoC with Innovation, Science and Economic Development Canada's ICES-003. This label shall be permanently affixed to the ITE or displayed electronically and its text must be clearly legible. If the dimensions of the device are too small or if it is not practical to place the label on the ITE and electronic labelling has not been implemented, the label shall be, upon agreement with Innovation, Science and Economic Development Canada, placed in a prominent location in the user manual supplied with the ITE. The user manual may be in an electronic format and must be readily available.

Innovation, Science and Economic Development Canada ICES-003 Compliance Label:

***CAN ICES-3 (B)/NMB-3(B)***

\* Insert either "A" or "B" but not both to identify the applicable Class of ITE.

### 1.3.3 Labelling Requirement for Part 15 (SDoC) Device

See FCC Publication Number: 784748 for details:

<https://apps.fcc.gov/oetcf/kdb/forms/FTSsearchResultPage.cfm?id=27980&switch=P>



**1.4 EUT TEST CONFIGURATION**

**1.4.1 Test Configuration Description**

Test Configuration	Description
Default	The EUT is powered by AC/DC Power Supply and work in unintentional mode.

**1.4.2 EUT Exercise Software**

Putty and Hex Dumper are used to set the transmitter to work in fixed channel. Once connected, corresponding programming commands were issued to set the EUT in continues transmission mode at particular channel.

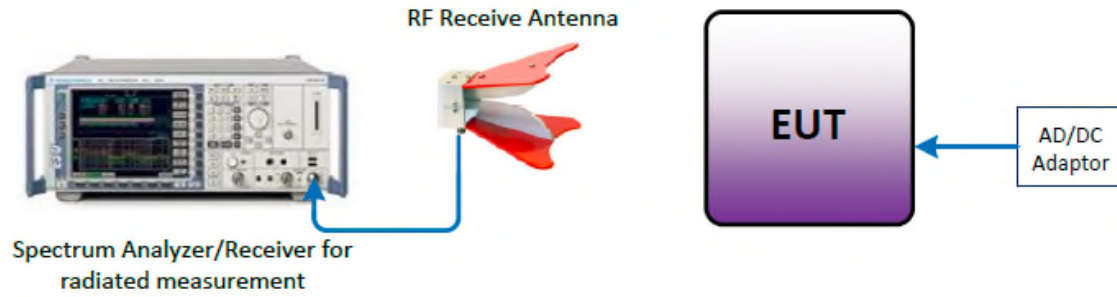
**1.4.3 Support Equipment and I/O cables**

Manufacturer	Equipment/Cable	Description
Borasen	AC/DC Adaptor*	M/N: BX-0502000 IP: 100-240 VAC,50/60 Hz 0.2A OP: 5 VDC 2.0A
GOOD-SHE TECH CO.,Ltd.	AC/DC Adaptor*	M/N: GS-50100B IP: 100-240 VAC,50/60 Hz 0.15A OP: 5 VDC 1.0A

\* AC/DC Adaptors are not sold together with the device and thus are not part of the device. They are used as support equipment only.

#### 1.4.4 Simplified Test Configuration Diagram

### 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: 0-1000025 (ESN)		
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.

For 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)

16936 Via Del Campo, 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 – Designation 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 §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.



**1.9.2 Innovation, Science and Economic Development Canada (IC) Registration No.: 3067A-1 & 22806-1**

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

**1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)**

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

**1.9.4 NCC (National Communications Commission - US0102)**

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

**1.9.5 VCCI – Registration No. A-0280 and A-0281**

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

**1.9.6 RRA – Identification No. US0102**

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

**1.9.7 OFCA – U.S. Identification No. US0102**

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.



## **SECTION 2**

### **TEST DETAILS**

EMC Evaluation of the  
Globalstar USA LLC  
SPOTXB Satellite GPS Messenger



## 2.1 CONDUCTED EMISSIONS

### 2.1.1 Specification Reference

Part 15 Subpart B §15.107(a)

### 2.1.2 Standard Applicable

Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

\*Decreases with the logarithm of the frequency.

### 2.1.3 Equipment Under Test and Modification State

Serial No: 0-1000025 (ESN)/Default and Simultaneous Test Configuration

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

January 11, 2019/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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	20.6 °C
Relative Humidity	46.6 %
ATM Pressure	99.4 kPa



**2.1.7 Additional Observations**

Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.1.8 for sample computation.

**2.1.8 Sample Computation (Conducted Emission – Quasi Peak)**

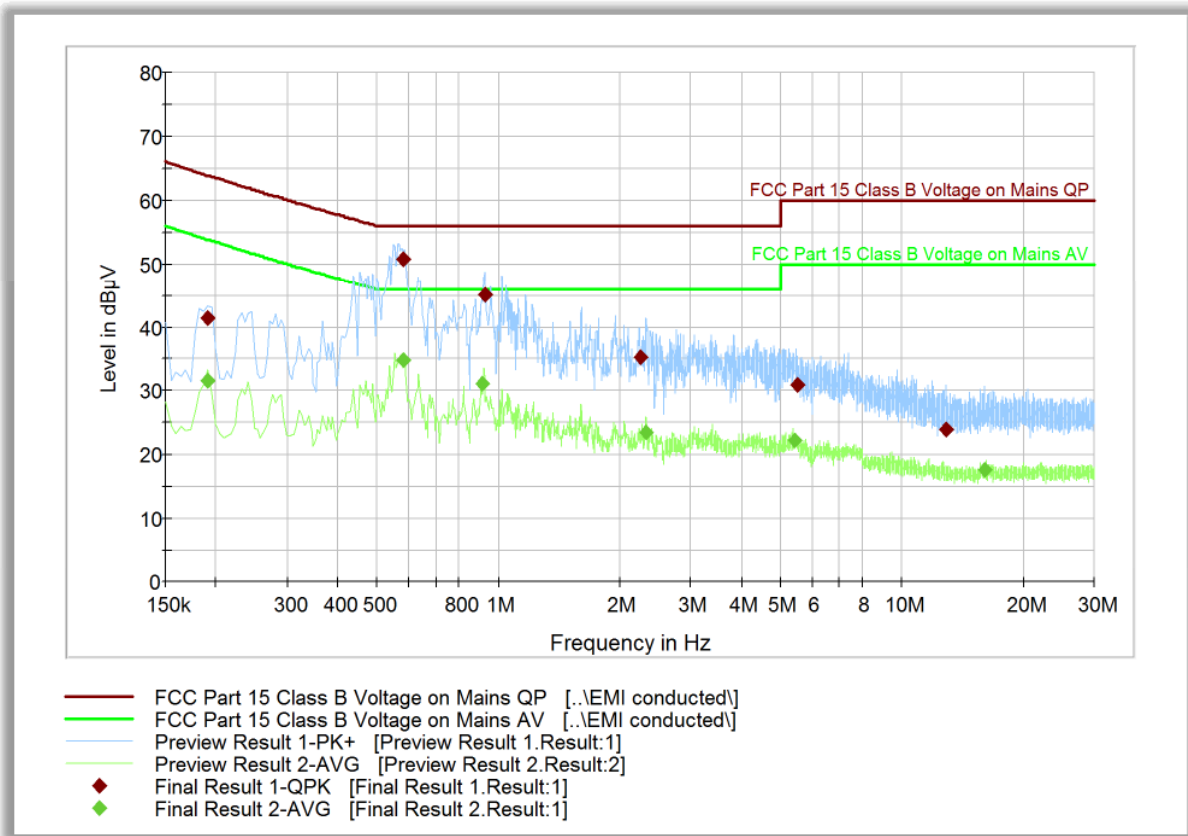
Measuring equipment raw measurement (db $\mu$ V) @ 150kHz		5.5
Correction Factor (dB)	Asset# 8822(20 dB attenuator)	19.9
	Asset# 1177 (cable)	0.15
	Asset# 1176 (cable)	0.35
	Asset# 7567(LISN)	0.30
<b>Reported QuasiPeak Final Measurement (db<math>\mu</math>V) @ 150kHz</b>		<b>26.2</b>

**2.1.9 Test Results**

**Compliant.** See attached plots and tables.



2.1.1 FCC Class B 120V 60Hz (Line 1 – Hot) with AC/DC Adaptor BX-0502000



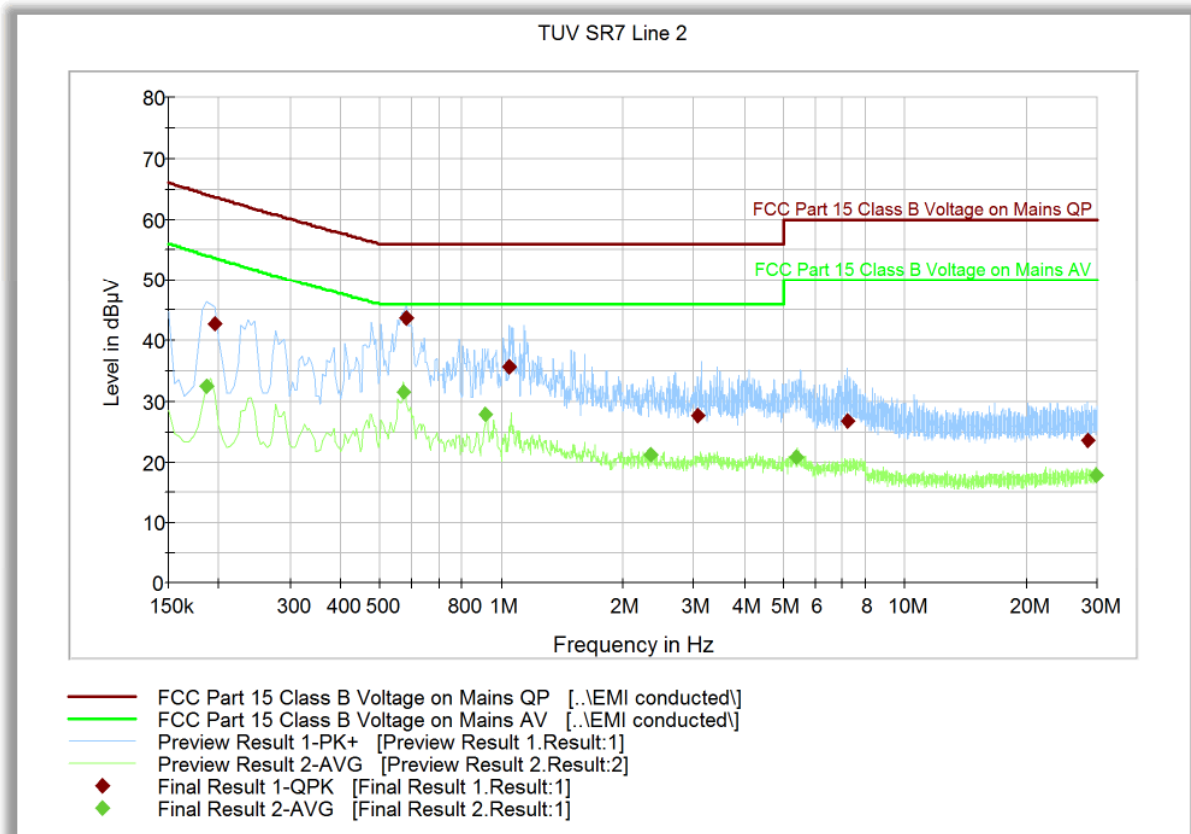
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.190500	41.5	1000.0	9.000	Off	L1	20.2	22.4	63.9
0.582000	50.8	1000.0	9.000	Off	L1	20.2	5.2	56.0
0.924000	45.2	1000.0	9.000	Off	L1	20.2	10.8	56.0
2.242500	35.2	1000.0	9.000	Off	L1	20.5	20.8	56.0
5.518500	30.9	1000.0	9.000	Off	L1	20.5	29.1	60.0
12.822000	24.0	1000.0	9.000	Off	L1	20.7	36.0	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.190500	31.6	1000.0	9.000	Off	L1	20.2	22.3	53.9
0.582000	34.9	1000.0	9.000	Off	L1	20.2	11.1	46.0
0.915000	31.2	1000.0	9.000	Off	L1	20.2	14.8	46.0
2.319000	23.5	1000.0	9.000	Off	L1	20.5	22.5	46.0
5.419500	22.3	1000.0	9.000	Off	L1	20.5	27.7	50.0
16.102500	17.6	1000.0	9.000	Off	L1	20.7	32.4	50.0

2.1.2 FCC Class B 120V 60Hz (Line 2 – Neutral) with AC/DC Adaptor BX-0502000



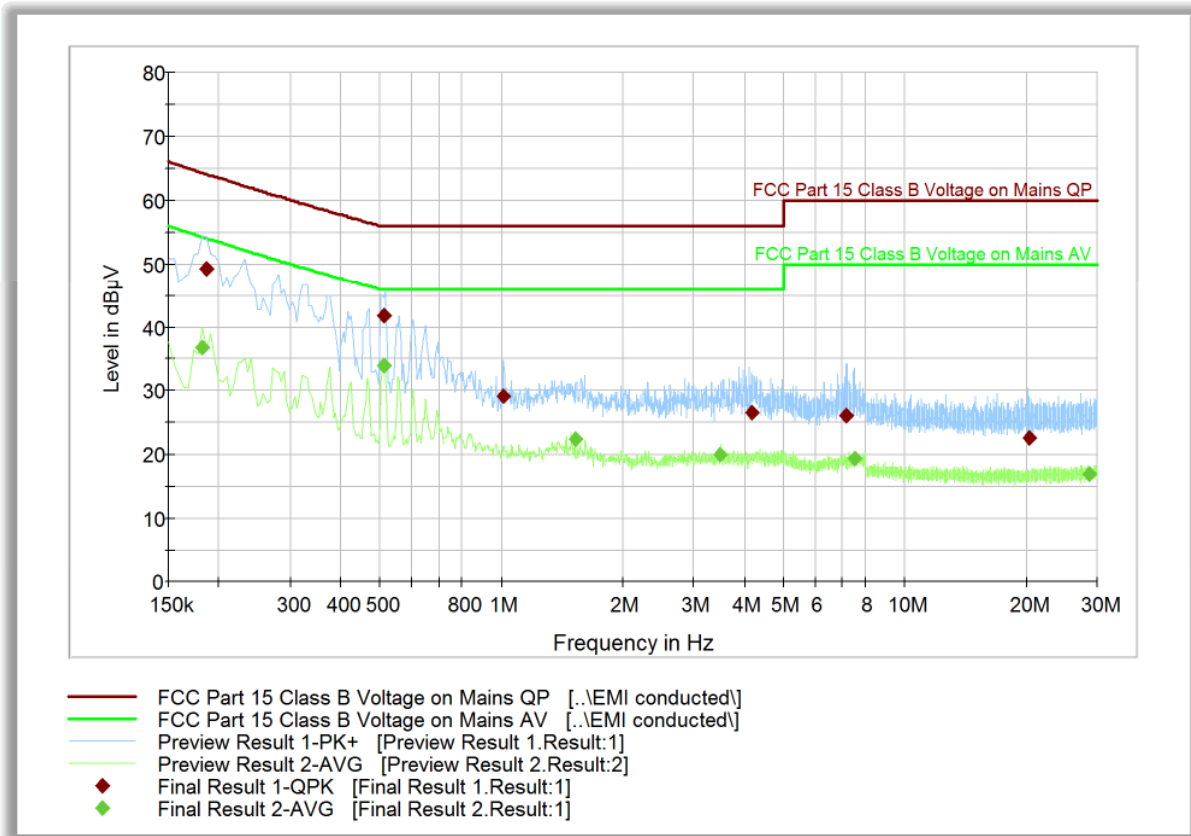
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.195000	42.7	1000.0	9.000	Off	N	20.2	20.9	63.7
0.582000	43.7	1000.0	9.000	Off	N	20.2	12.3	56.0
1.045500	35.7	1000.0	9.000	Off	N	20.3	20.3	56.0
3.061500	27.6	1000.0	9.000	Off	N	20.5	28.4	56.0
7.224000	26.6	1000.0	9.000	Off	N	20.5	33.4	60.0
28.405500	23.6	1000.0	9.000	Off	N	20.8	36.4	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.186000	32.5	1000.0	9.000	Off	N	20.2	21.5	54.1
0.573000	31.6	1000.0	9.000	Off	N	20.2	14.4	46.0
0.915000	27.8	1000.0	9.000	Off	N	20.2	18.2	46.0
2.337000	21.2	1000.0	9.000	Off	N	20.4	24.8	46.0
5.392500	20.9	1000.0	9.000	Off	N	20.5	29.1	50.0
29.863500	17.8	1000.0	9.000	Off	N	20.8	32.2	50.0

2.1.3 FCC Class B 120V 60Hz (Line 1 – Hot) with AC/DC Adaptor GS-50100B



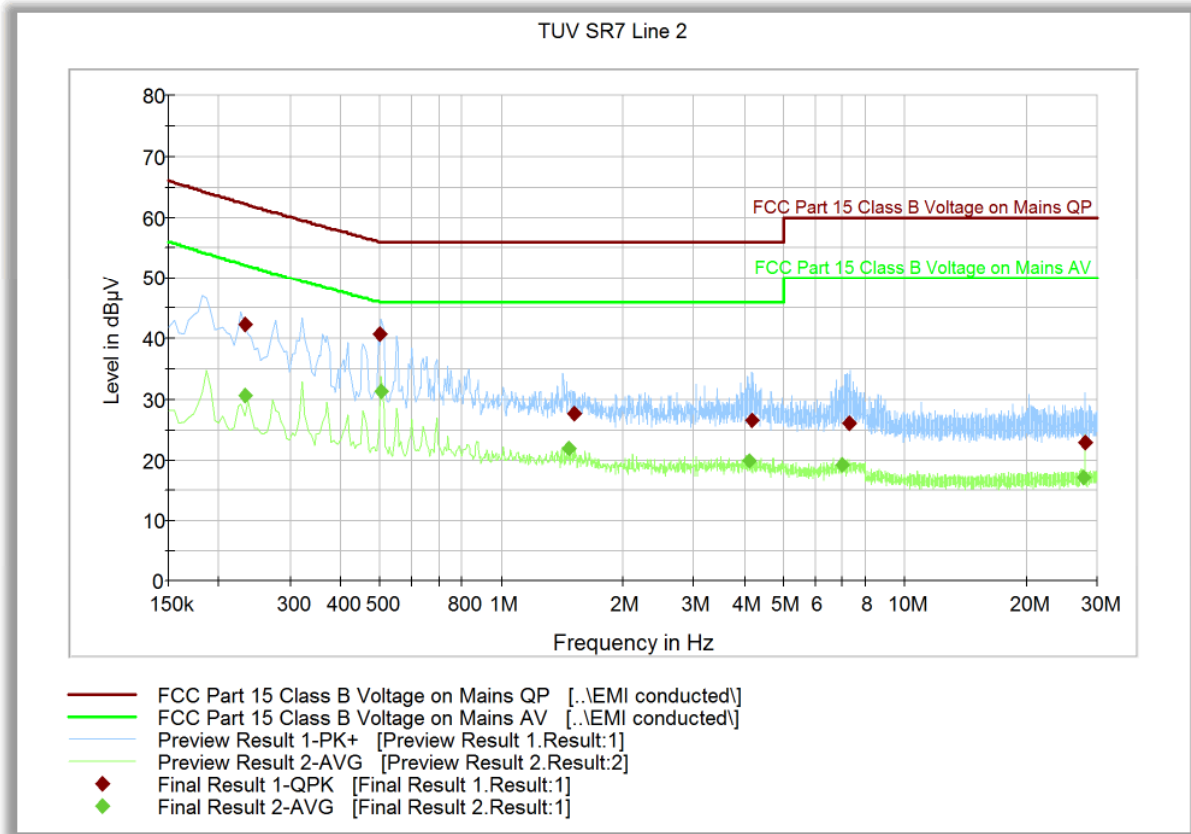
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.186000	49.2	1000.0	9.000	Off	L1	20.2	14.9	64.1
0.510000	41.9	1000.0	9.000	Off	L1	20.1	14.1	56.0
1.009500	29.3	1000.0	9.000	Off	L1	20.2	26.7	56.0
4.191000	26.6	1000.0	9.000	Off	L1	20.5	29.4	56.0
7.161000	26.3	1000.0	9.000	Off	L1	20.5	33.7	60.0
20.323500	22.7	1000.0	9.000	Off	L1	20.8	37.3	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.181500	36.9	1000.0	9.000	Off	L1	20.2	17.4	54.3
0.510000	34.0	1000.0	9.000	Off	L1	20.1	12.0	46.0
1.531500	22.6	1000.0	9.000	Off	L1	20.2	23.4	46.0
3.475500	20.1	1000.0	9.000	Off	L1	20.5	25.9	46.0
7.530000	19.4	1000.0	9.000	Off	L1	20.5	30.6	50.0
28.707000	17.1	1000.0	9.000	Off	L1	20.8	32.9	50.0

2.1.4 FCC Class B 120V 60Hz (Line 2 – Neutral) with AC/DC Adaptor GS-50100B



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.231000	42.2	1000.0	9.000	Off	N	20.2	20.1	62.2
0.501000	40.6	1000.0	9.000	Off	N	20.1	15.4	56.0
1.513500	27.6	1000.0	9.000	Off	N	20.2	28.4	56.0
4.191000	26.5	1000.0	9.000	Off	N	20.5	29.5	56.0
7.246500	26.0	1000.0	9.000	Off	N	20.5	34.0	60.0
27.937500	22.9	1000.0	9.000	Off	N	20.8	37.1	60.0

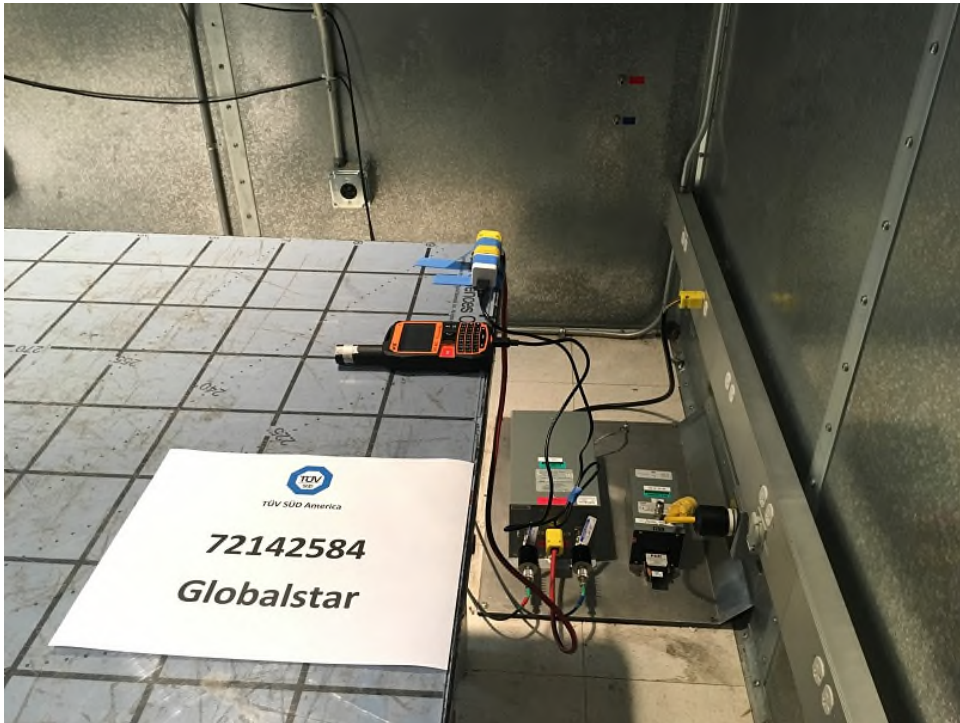
Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.231000	30.6	1000.0	9.000	Off	N	20.2	21.6	52.2
0.505500	31.4	1000.0	9.000	Off	N	20.1	14.6	46.0
1.473000	21.9	1000.0	9.000	Off	N	20.2	24.1	46.0
4.096500	20.0	1000.0	9.000	Off	N	20.5	26.0	46.0
6.999000	19.1	1000.0	9.000	Off	N	20.5	30.9	50.0
27.757500	17.1	1000.0	9.000	Off	N	20.8	32.9	50.0

2.1.5 Test Setup Photo - AC/DC Adaptor BX-0502000



**2.1.6 Test Setup Photo - AC/DC Adaptor GS-50100B**





## 2.2 RADIATED EMISSIONS

### 2.2.1 Specification Reference

Part 15 Subpart B §15.109(a)

### 2.2.2 Standard Applicable

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field Strength (microvolts/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

### 2.2.3 Equipment Under Test and Modification State

Serial No: 0-1000025 (ESN) /Default Test Configurations

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

January 10, 11 and 24, February 26, and April 02, 2019/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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	20.6 - 22.2 °C
Relative Humidity	28.7 - 52.5 %
ATM Pressure	99.3 - 99.5 kPa

### 2.2.7 Additional Observations

- The spectrum was searched from 30MHz to 18GHz.
- Verification was performed at 3 meters.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.2.8 for sample computation.



**2.2.8 Sample Computation (Radiated Emission)**

Measuring equipment raw measurement (db $\mu$ V) @ 30 MHz		24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3
	Asset# 1172 (cable)	0.3
	Asset# 1016 (preamplifier)	-30.7
	Asset# 1175(cable)	0.3
	Asset# 1033 (antenna)	17.2
<b>Reported QuasiPeak Final Measurement (db<math>\mu</math>V/m) @ 30MHz</b>		<b>11.8</b>

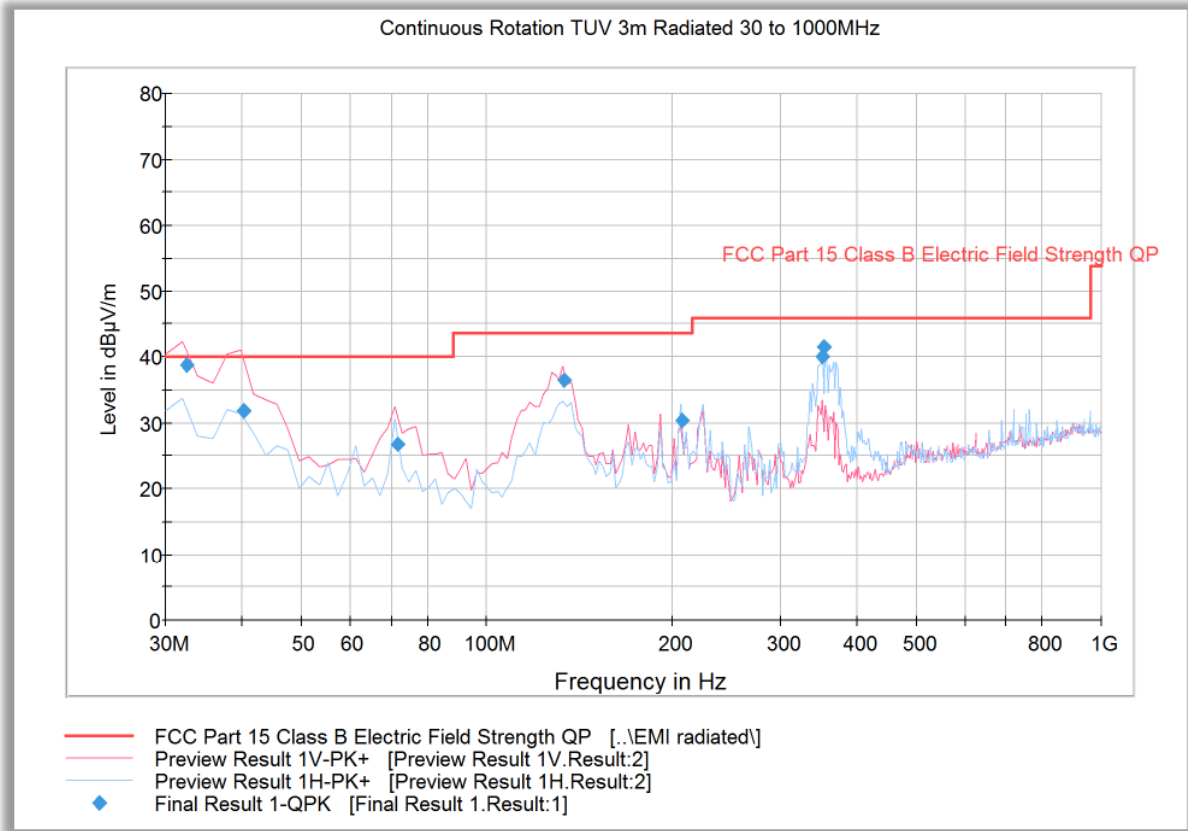
**2.2.9 Test Results**

See attached plots.





2.2.9.1 Below 1GHz Radiated Emission Test with AC/DC Adaptor BX-0502000



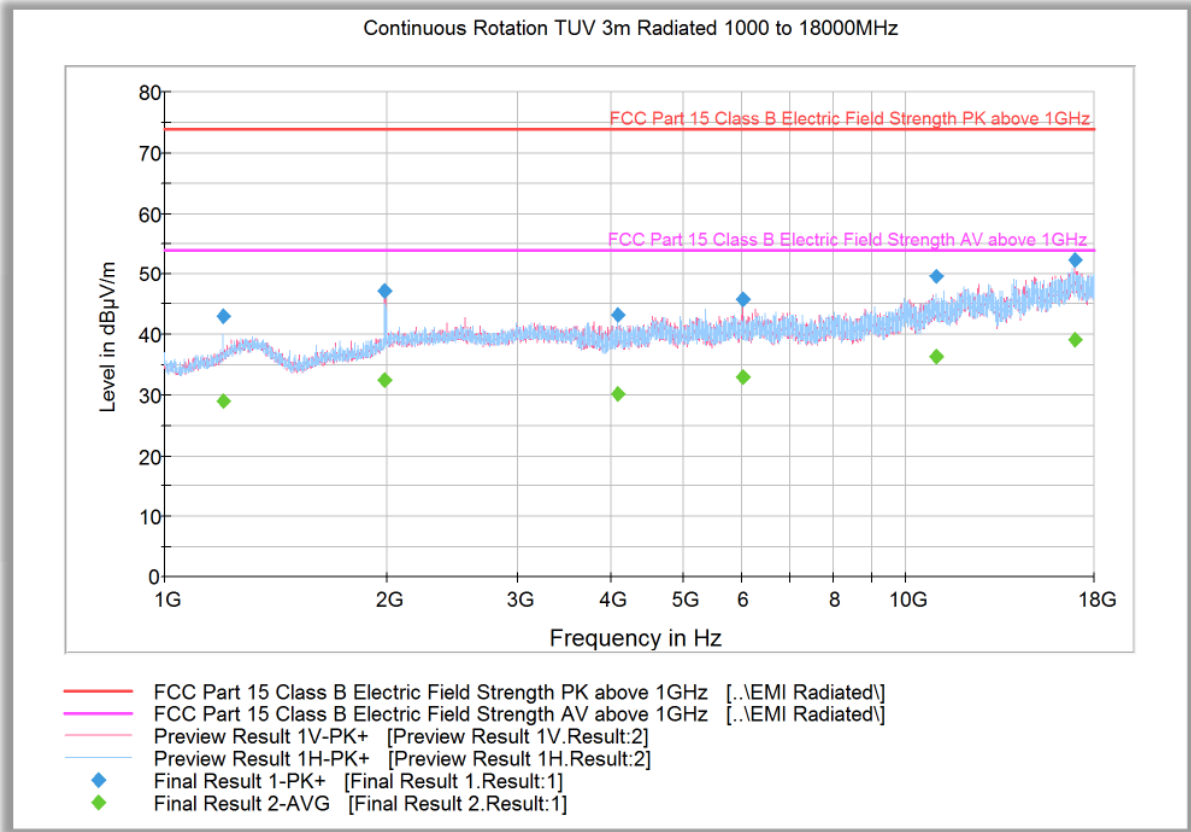
Quasi-Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.440000	38.7	1000.0	120.000	100.0	V	133.0	-8.8	1.3	40.0
40.047214	31.8	1000.0	120.000	114.0	V	-15.0	-12.0	8.2	40.0
71.381643	26.7	1000.0	120.000	100.0	V	134.0	-17.0	13.3	40.0
133.506052	36.5	1000.0	120.000	100.0	V	246.0	-14.2	7.0	43.5
208.013788	30.4	1000.0	120.000	145.0	H	122.0	-10.1	13.1	43.5
350.837595	40.1	1000.0	120.000	100.0	H	312.0	-4.7	5.9	46.0
353.829259	41.5	1000.0	120.000	100.0	H	322.0	-4.7	4.5	46.0

Test Notes:



2.2.9.2 Above 1GHz Radiated Emission Test with AC/DC Adaptor BX-0502000



Peak Data

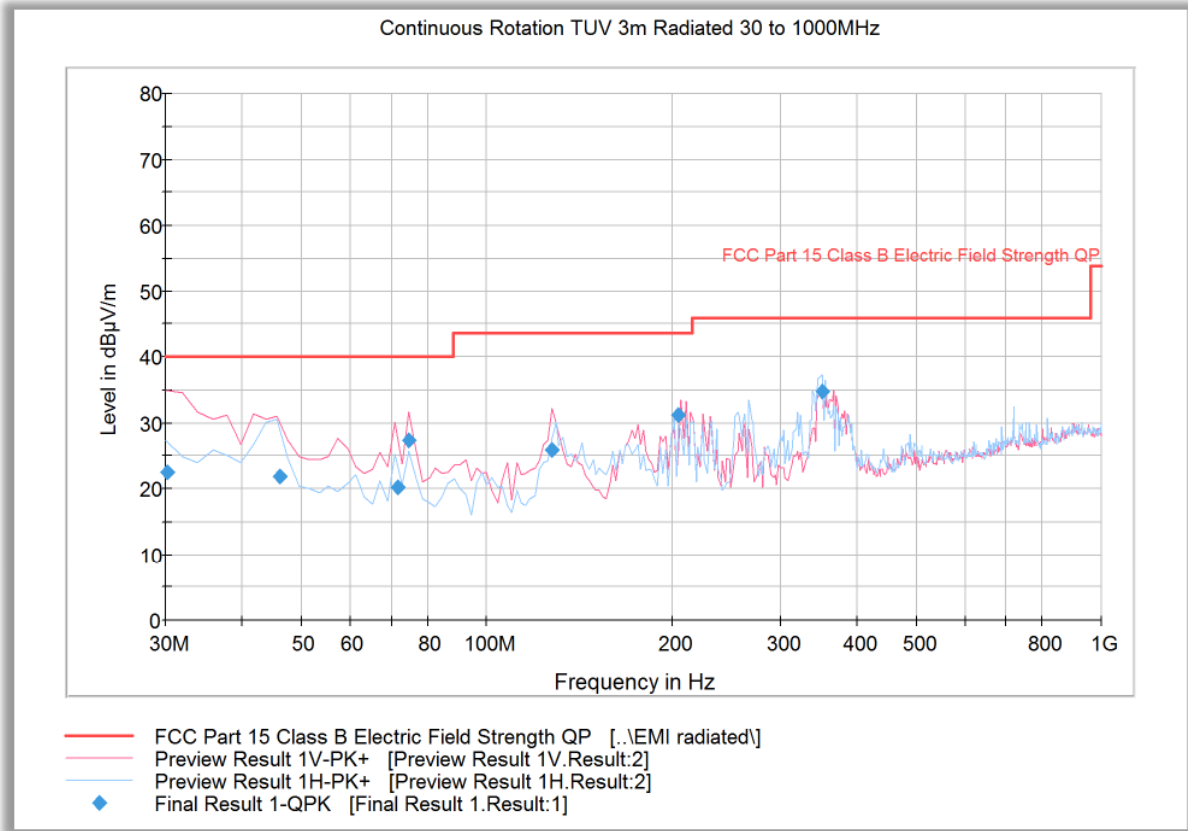
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.266667	43.0	1000.0	1000.000	101.7	H	31.0	-6.5	30.9	73.9
1981.266667	47.2	1000.0	1000.000	305.2	V	104.0	-2.3	26.7	73.9
4087.400000	43.3	1000.0	1000.000	119.8	H	170.0	2.5	30.6	73.9
6034.266667	45.7	1000.0	1000.000	151.2	V	248.0	5.6	28.2	73.9
10985.433333	49.5	1000.0	1000.000	226.4	H	164.0	11.5	24.4	73.9
16911.433333	52.3	1000.0	1000.000	290.3	V	27.0	17.9	21.6	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.266667	29.1	1000.0	1000.000	101.7	H	31.0	-6.5	24.8	53.9
1981.266667	32.4	1000.0	1000.000	305.2	V	104.0	-2.3	21.5	53.9
4087.400000	30.2	1000.0	1000.000	119.8	H	170.0	2.5	23.7	53.9
6034.266667	32.9	1000.0	1000.000	151.2	V	248.0	5.6	21.0	53.9
10985.433333	36.3	1000.0	1000.000	226.4	H	164.0	11.5	17.6	53.9
16911.433333	39.0	1000.0	1000.000	290.3	V	27.0	17.9	14.9	53.9

Test Notes:

**2.2.9.3 Below 1GHz Radiated Emission Test with AC/DC Adaptor GS-50100B**



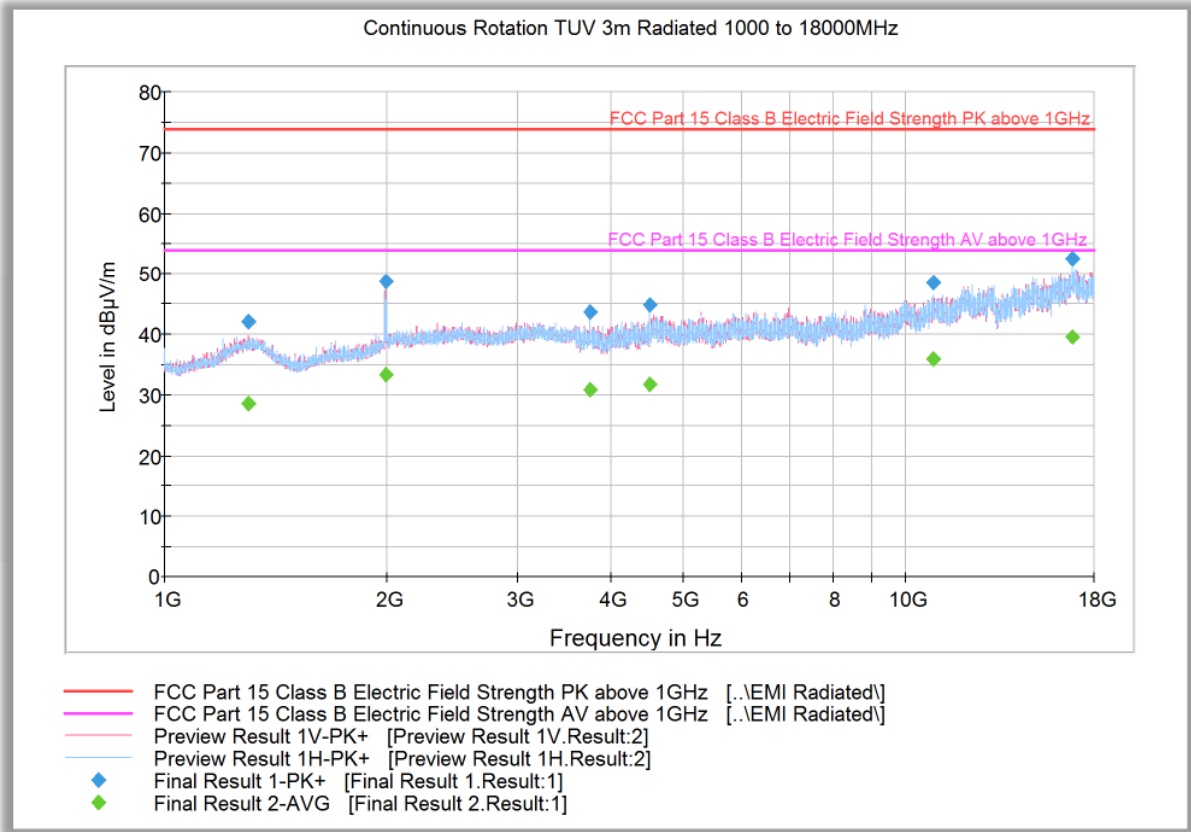
**Quasi-Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.120000	22.5	1000.0	120.000	150.0	V	199.0	-7.8	17.5	40.0
45.991102	21.9	1000.0	120.000	100.0	V	312.0	-13.8	18.1	40.0
71.421643	20.2	1000.0	120.000	300.0	V	18.0	-17.0	19.8	40.0
74.549419	27.5	1000.0	120.000	100.0	V	80.0	-17.2	12.5	40.0
127.394389	26.0	1000.0	120.000	100.0	V	345.0	-14.3	17.5	43.5
205.013788	31.1	1000.0	120.000	100.0	V	120.0	-10.1	12.4	43.5
350.957595	34.7	1000.0	120.000	100.0	H	154.0	-4.7	11.3	46.0

**Test Notes:**



2.2.9.4 Above 1GHz Radiated Emission Test with AC/DC Adaptor GS-50100B



Peak Data

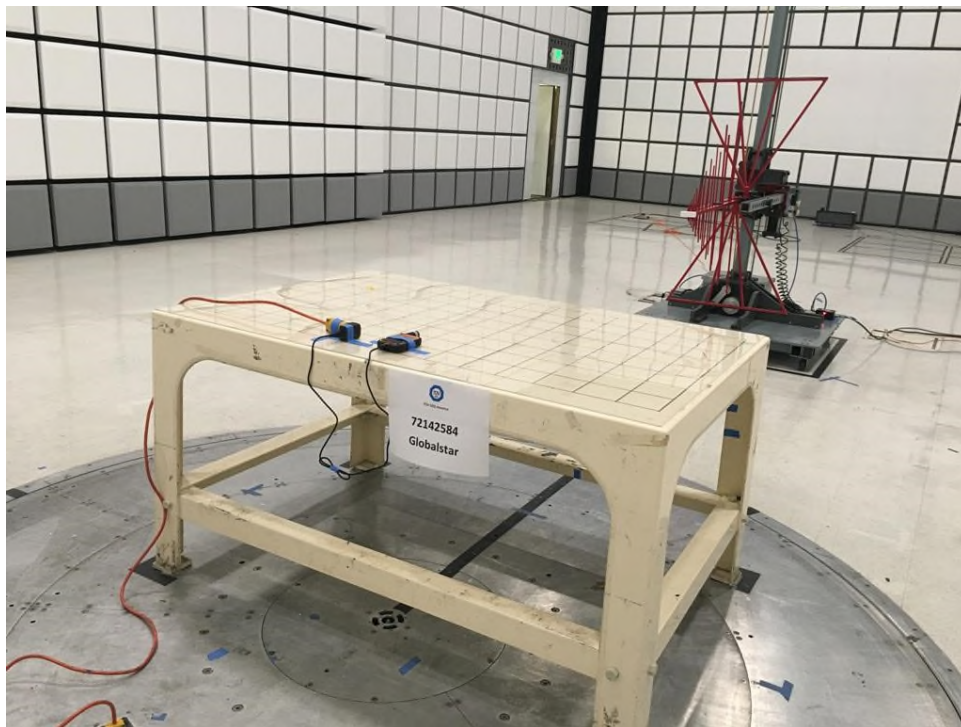
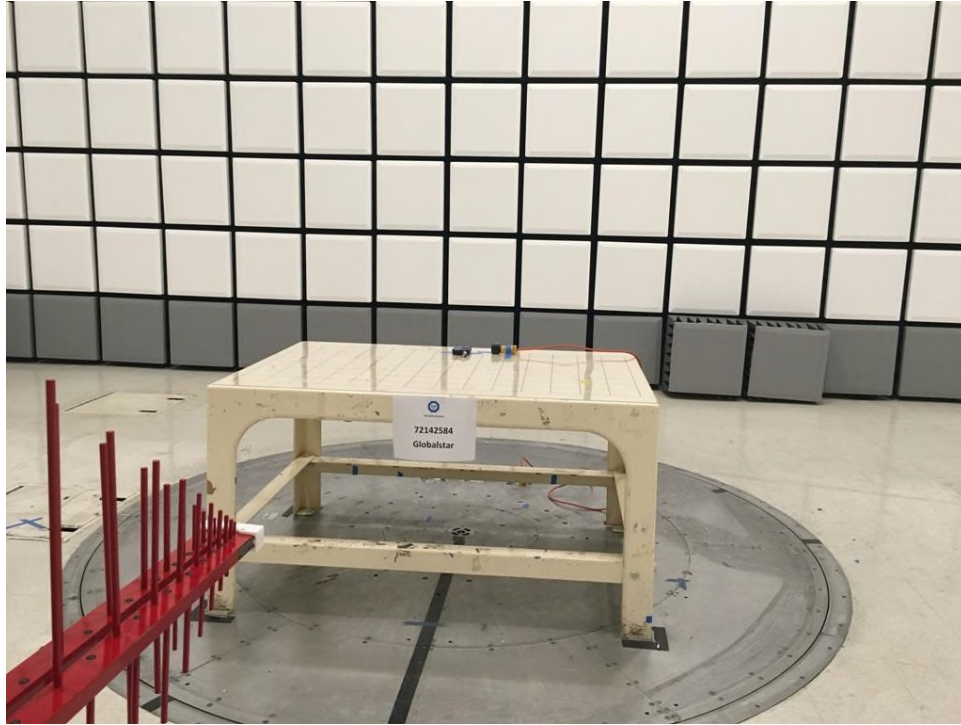
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1296.800000	41.9	1000.0	1000.000	212.4	V	226.0	-5.3	32.0	73.9
1988.066667	48.6	1000.0	1000.000	400.0	V	150.0	-2.3	25.3	73.9
3745.866667	43.7	1000.0	1000.000	378.1	H	0.0	1.8	30.2	73.9
4517.866667	44.9	1000.0	1000.000	252.5	H	318.0	3.4	29.0	73.9
10916.700000	48.6	1000.0	1000.000	294.2	H	-6.0	11.5	25.3	73.9
16780.333333	52.6	1000.0	1000.000	395.0	H	131.0	17.8	21.3	73.9

Average Data

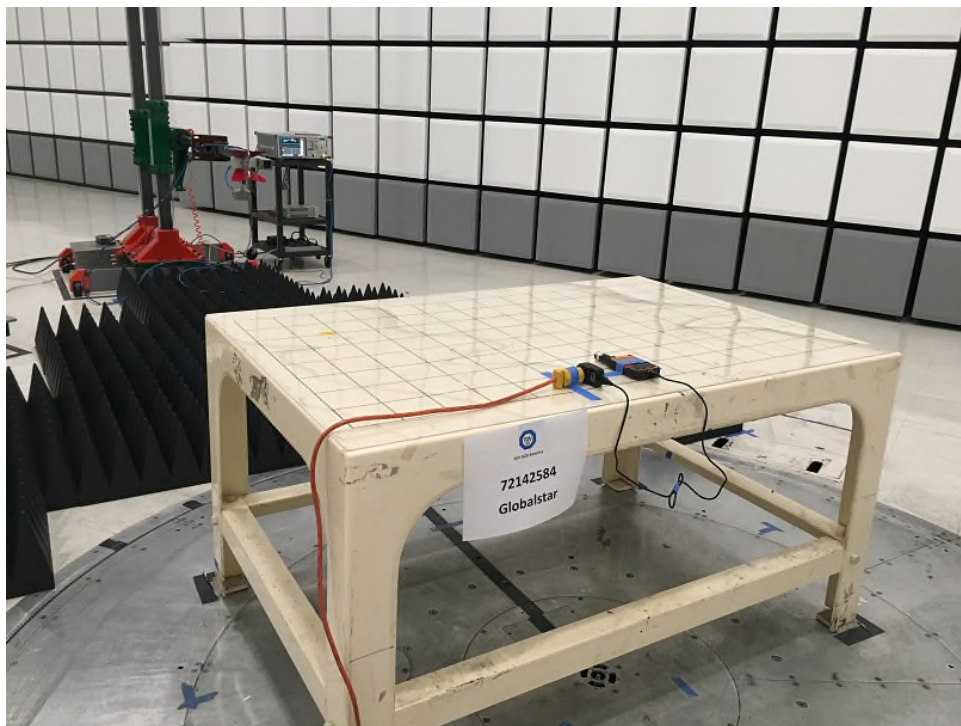
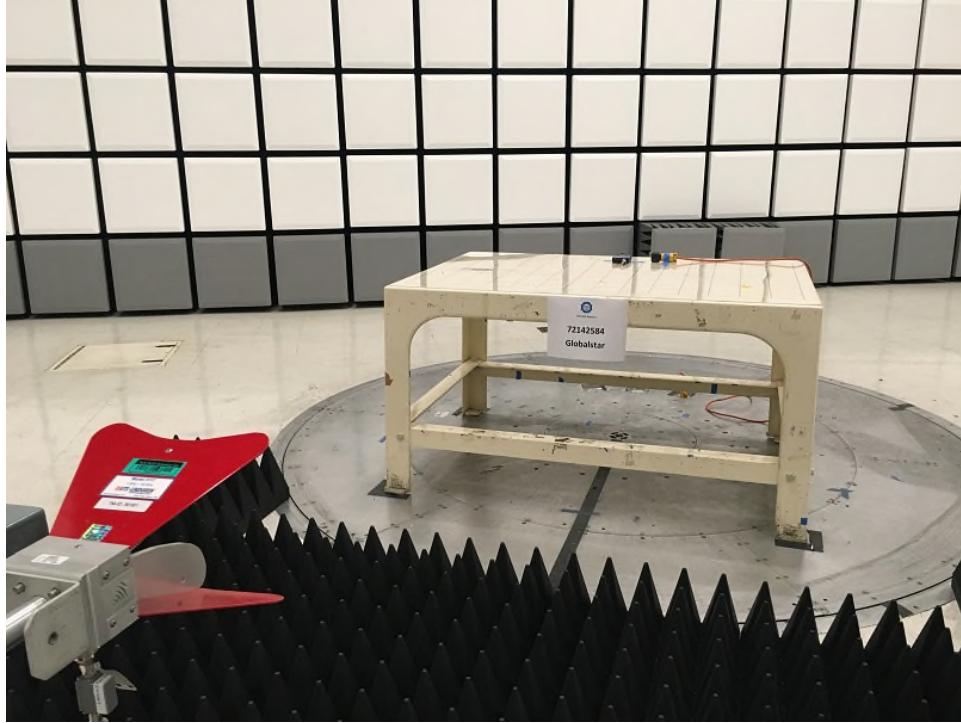
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1296.800000	28.6	1000.0	1000.000	212.4	V	226.0	-5.3	25.3	53.9
1988.066667	33.4	1000.0	1000.000	400.0	V	150.0	-2.3	20.5	53.9
3745.866667	30.8	1000.0	1000.000	378.1	H	0.0	1.8	23.1	53.9
4517.866667	31.8	1000.0	1000.000	252.5	H	318.0	3.4	22.1	53.9
10916.700000	35.8	1000.0	1000.000	294.2	H	-6.0	11.5	18.1	53.9
16780.333333	39.6	1000.0	1000.000	395.0	H	131.0	17.8	14.3	53.9

Test Notes:

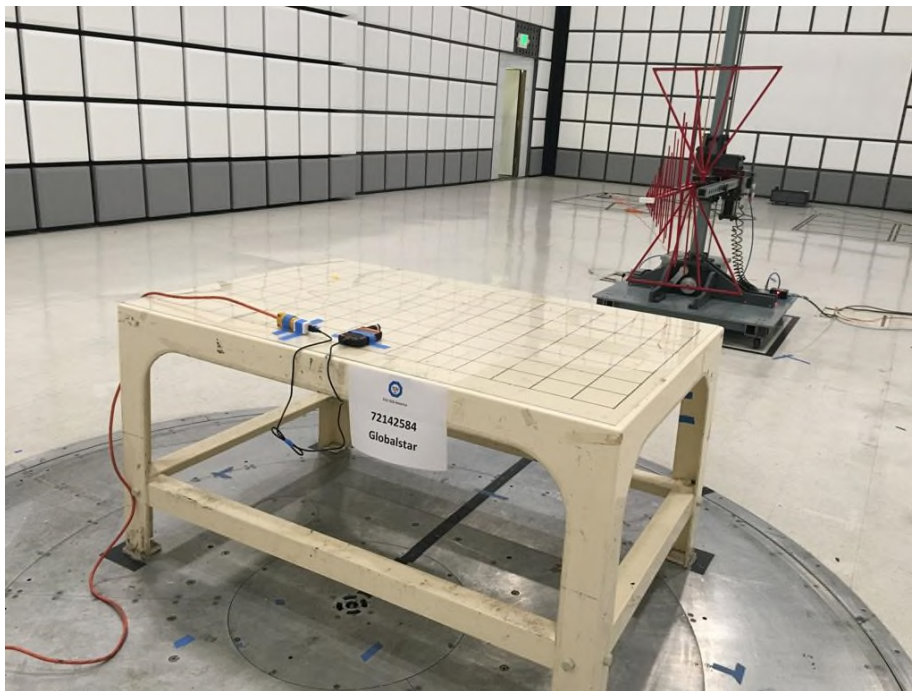
**2.2.10 Test Setup Photo (Below 1GHz) with AC/DC Adaptor BX-0502000**



**2.2.11 Test Setup Photo (Above 1GHz ) with AC/DC Adaptor BX-0502000**



**2.2.1 Test Setup Photo (Below 1GHz) with AC/DC Adaptor GS-50100B**



**2.2.2 Test Setup Photo (Above 1GHz ) with AC/DC Adaptor GS-50100B**







### SECTION 3

#### TEST EQUIPMENT USED



### 3.1 TEST EQUIPMENT USED

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

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
<b>Conducted Emissions</b>						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	09/19/18	09/19/19
7567	LISN	FCC-LISN-50-25-2	120304	Fischer Custom Comm.	12/14/17	12/14/19
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7608 and 7582	
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7608 and 7582	
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
<b>Radiated Emission</b>						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/20/17	11/20/19
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/16/18	06/16/20
1193	Pre-amplifier	PAM-0202	185	A.H. Systems, Inc.	04/11/18	04/11/19
8921	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7608 and 7582	
8923	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7608 and 7582	
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/15/18	10/15/19
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/13/18	07/13/19
8628	Pre-amplifier	QLI-01182835-JO	8986002	Quinstar	03/07/19	03/07/20
<b>Miscellaneous</b>						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/18/18	07/18/19
7554	Barometer/Temperature/Humidity Transmitter	iBTHX-W	0400706	Omega	05/25/18	05/25/19
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

### 3.2 MEASUREMENT UNCERTAINTY

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

#### 3.2.1 Conducted Measurements

	Input Quantity (Contribution) $X_i$	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	LISN-receiver attenuation	0.10 dB	Normal, k=2	2.000	0.05	0.00
3	LISN voltage division factor	0.30 dB	Normal, k=2	2.000	0.15	0.02
4	Receiver sinewave accuracy	0.36 dB	Normal, k=2	2.000	0.18	0.03
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
8	AMN VDF frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
9	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
10	LISN impedance	2.65 dB	Triangular	2.449	1.08	1.17
11	Effect of mains disturbance	0.00 dB			0.00	0.00
12	Effect of the environment					
Combined standard uncertainty				Normal	1.66 dB	
Expanded uncertainty				Normal, k=2	3.31 dB	

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

	Input Quantity (Contribution) $X_i$	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.76 dB	Triangular	2.449	1.54	2.36
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
Combined standard uncertainty				Normal	2.95 dB	
Expanded uncertainty				Normal, k=2	5.90 dB	

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

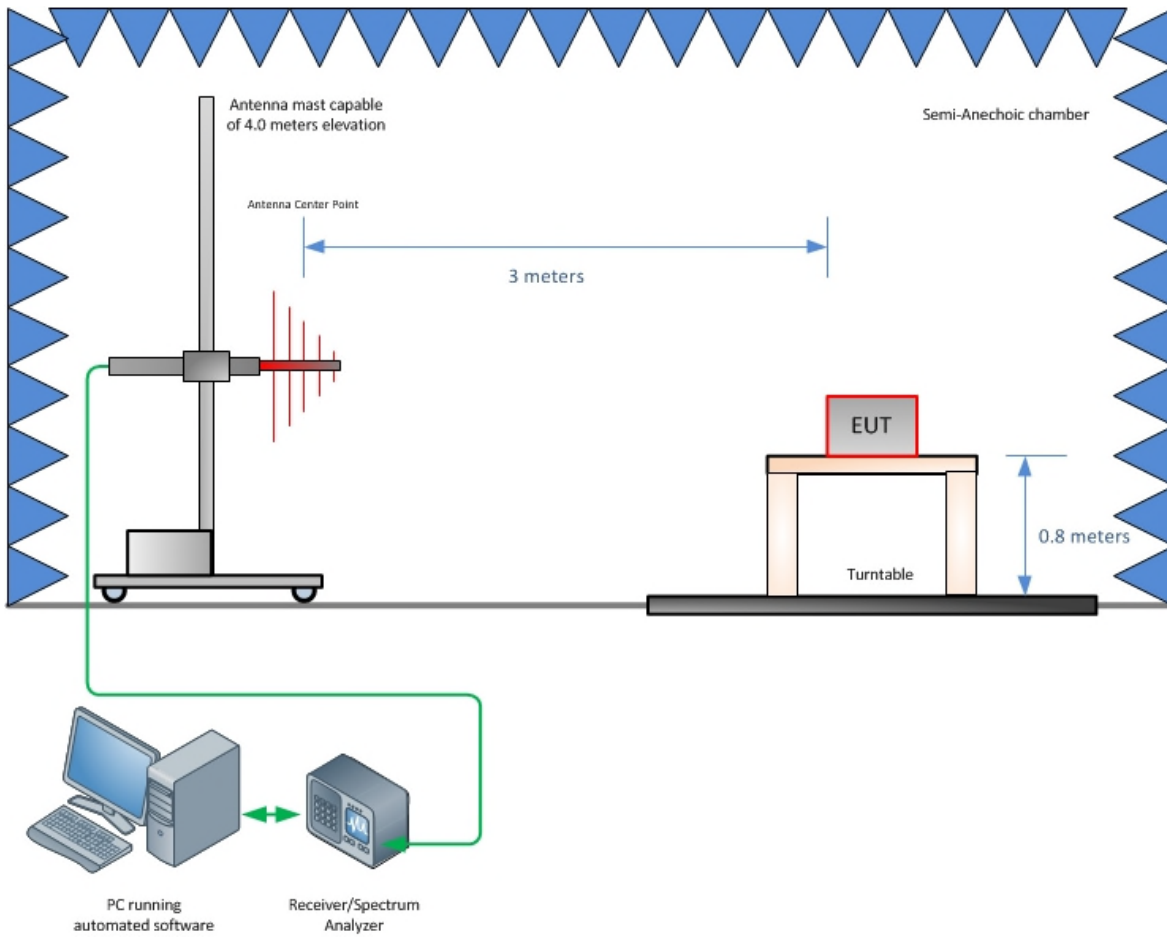
	Input Quantity (Contribution) $X_i$	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$								
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01								
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01								
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14								
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05								
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75								
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75								
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08								
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45								
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03								
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00								
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24								
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33								
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27								
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00								
15	Site imperfections	3.25 dB	Triangular	2.449	1.33	1.76								
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03								
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20								
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00								
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00								
20	Effect of ambient noise on OATS	0.00 dB				0.00								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Combined standard uncertainty</td> <td style="width: 15%;">Normal</td> <td style="width: 10%;">2.85</td> <td style="width: 15%;">dB</td> </tr> <tr> <td>Expanded uncertainty</td> <td>Normal, k=2</td> <td>5.70</td> <td>dB</td> </tr> </table>							Combined standard uncertainty	Normal	2.85	dB	Expanded uncertainty	Normal, k=2	5.70	dB
Combined standard uncertainty	Normal	2.85	dB											
Expanded uncertainty	Normal, k=2	5.70	dB											



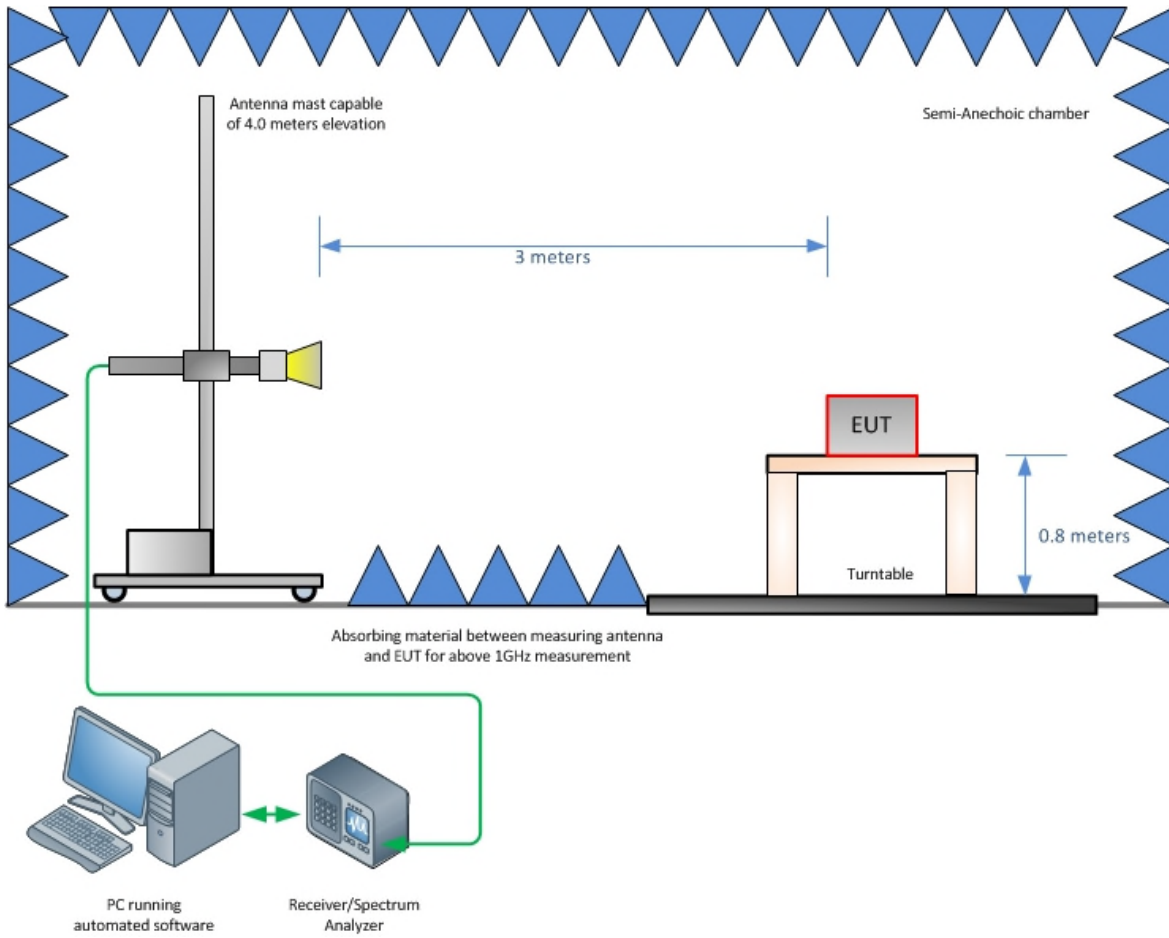
## SECTION 4

### DIAGRAM OF TEST SETUP

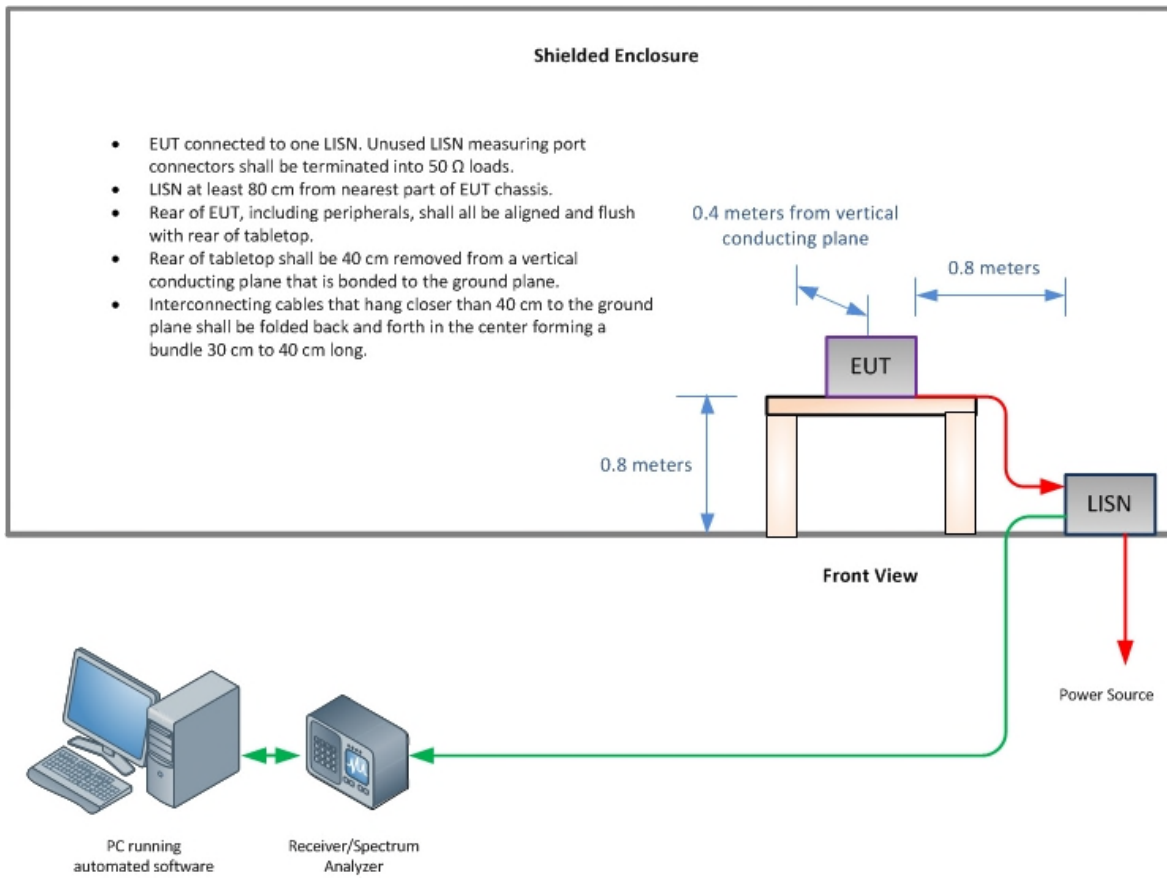
#### 4.1 TEST SETUP DIAGRAM



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



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







## SECTION 5

### ACCREDITATION, DISCLAIMERS AND COPYRIGHT



## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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