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# Report On

Application for Grant of Equipment Authorization of the  
Dexcom Inc.

G6 Continuous Glucose Monitoring System  
(G6 Receiver)

FCC Part 15 Subpart C §15.247 (DTS)  
RSS-247 Issue 2 February 2017

Report No. FB72126754-0417A

June 2017



**REPORT ON** Radio Testing of the  
Dexcom Inc.  
G6 Continuous Glucose Monitoring System (G6 Receiver)

**TEST REPORT NUMBER** FB72126754-0417A

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**DATED** June 20, 2017



### Revision History

FB72126754-0417A Dexcom Inc. G6 Continuous Glucose Monitoring System (G6 Receiver)					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
06/20/2017	Initial Release				Juan M. Gonzales

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## **SECTION 1**

### **REPORT SUMMARY**

Radio Testing of the  
Dexcom Inc.  
G6 Continuous Glucose Monitoring System  
(G6 Receiver)



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Dexcom Inc. G6 Continuous Glucose Monitoring System (G6 Receiver) to the requirements of FCC Part 15 Subpart C §15.247 and RSS-247 Issue 2 February 2017.

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.
Manufacturer	Dexcom Inc.
Model Number(s)	MT24078
FCC ID Number	PH29949
Serial Number(s)	PL71003355
Number of Samples Tested	1
Test Specification/Issue/Date	<ul style="list-style-type: none"><li>• FCC Part 15 Subpart C §15.247 (October 1, 2016).</li><li>• RSS-247 Issue 2 February 2017 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.</li><li>• RSS-Gen Issue 4 November 2014 - General Requirements for Compliance of Radio Apparatus.</li><li>• 558074 D01 DTS Meas Guidance v04, (April 05, 2017) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247</li><li>• ANSI C63.10-2013. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.</li></ul>
Start of Test	April 11, 2017
Finish of Test	April 17, 2017
Name of Engineer(s)	Alex Chang
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.247 with cross-reference to the corresponding IC RSS standard is shown below.

Section	§15.247 Spec Clause	RSS	Test Description	Result	Comments/Base Standard
2.1	§15.247(b)(3)	RSS-247 5.4(d)	Peak Output Power	Compliant	
2.2	§15.207(a)	RSS-Gen 8.8	Conducted Emissions	Compliant	
2.3		RSS-Gen 6.6	99% Emission Bandwidth	Compliant	
2.4	§15.247(a)(2)	RSS-247 5.2(a)	Minimum 6 dB RF Bandwidth	Compliant	
2.5	§15.247(d)	RSS-247 5.5	Out-of-Band Emissions - Radiated	Compliant	
2.6	§15.247(d)	RSS-247 5.5	Band-edge Compliance and Immediate Restricted Band	Compliant	
2.7	§15.247(d)	RSS-Gen 8.9 and 8.10	Spurious Radiated Emissions	N/A <sup>1</sup>	Clause 12.2.7 of KDB558074 D01 DTS Meas Guidance v04
2.8	§15.247(e)	RSS-247 5.2(b)	Power Spectral Density for Digitally Modulated Device	Compliant	

N/A Not performed. EUT is a battery powered device

N/A<sup>1</sup> Not performed. Test results from "Out-of-Band Emissions – Radiated" covers this requirement



## 1.3 PRODUCT INFORMATION

### 1.3.1 Technical Description

The Equipment Under Test (EUT) was a Dexcom Inc. G6 Continuous Glucose Monitoring System (G6 Receiver). The EUT is a small hand-held device that is part of the G6 Continuous Glucose Monitoring (CGM) System. The G6 Receiver communicates with a G6 Transmitter every 5 minutes over a Bluetooth Low Energy wireless link. The display screen on the G6 Receiver shows sensor glucose readings, trend graphs and trend arrows. The G6 Receiver also provides audible and vibratory alerts. The G6 Receiver contains a touch screen that is used to navigate menus and control the device. The G6 Receiver is powered by a rechargeable lithium-polymer battery; also it can be powered by an external power supply.



### 1.3.2 EUT General Description

EUT Description	G6 Continuous Glucose Monitoring System
Model Name	G6 Receiver
Model Number(s)	MT24078
Rated Voltage	5 VDC (internal lithium polymer rechargeable battery. Part number C60019 from Jhiih-Hong Technology manufacturer) 120VAC/60Hz (EUT can also be charged from an external power supply, model(s): MT23681/HDP05-MD05010U or MT23681/UE151204HKYC1-P)
Mode Verified	Bluetooth Low Energy (BT LE)
Capability	Bluetooth Low Energy (BT LE)
Primary Unit (EUT)	<input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
Antenna Type	RF Ceramic Chip antenna
Antenna Manufacturer	Johanson Technology
Antenna Model Number	2450AT18A100E
Antenna Dimensions	3.20mm x 1.60mm x 1.30mm
Antenna Gain	0.5 dBi (Peak) -0.5 dBi (Average)

### 1.3.3 Maximum Average Conducted Output Power

Mode	Frequency Range (MHz)	Average Output Power (dBm)	Average Output Power (mW)
Bluetooth LE	2402-2480	3.74	2.37

## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

Test Configuration	Description
Default	Test firmware loaded which allows the EUT to transmit at 100% duty cycle. A manual control on the EUT to set it transmit in Low, Mid and High channels for evaluation.

### 1.4.2 EUT Exercise Software

None. No special test software was used to exercise the EUT. A firmware "SW11269 v5.1.1.013" was loaded during evaluation.

### 1.4.3 Support Equipment and I/O cables

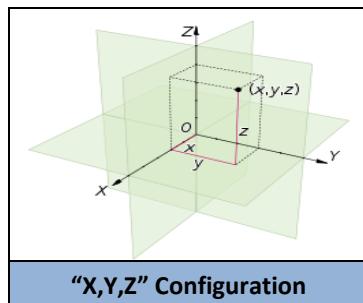
Manufacturer	Equipment/Cable	Description
—	—	—

### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per fundamental field strength measurements:

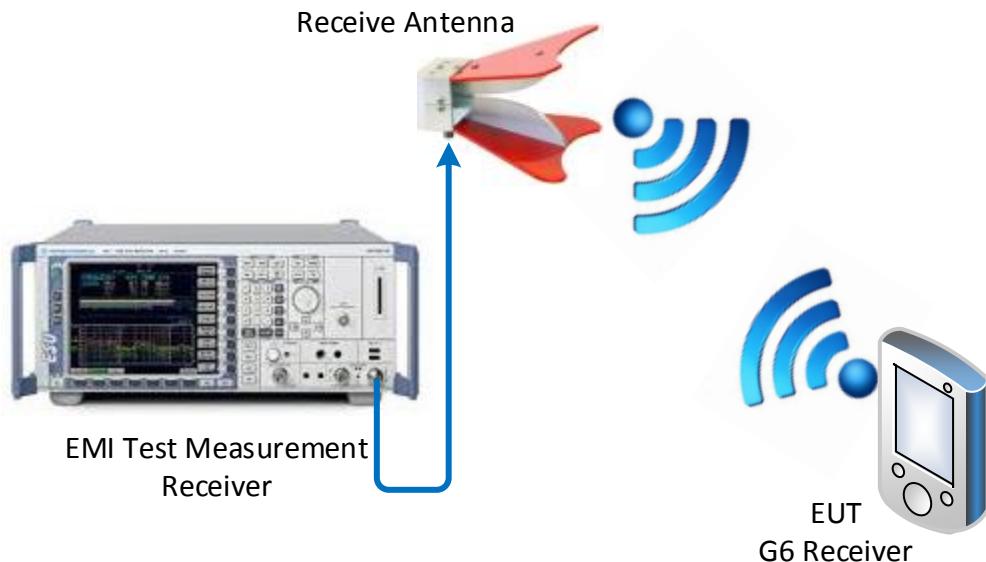
Mode	Channel	Data Rate
Bluetooth LE	High Channel	1Mbps

EUT is a portable device. For radiated measurements, all three axes were verified to determine worst case axis to be used during testing. "X" axis was verified to be the worst axis for radiated emissions.



#### 1.4.5 Simplified Test Configuration Diagram

#### Radiated Measurement Setup 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: PL71003355		
None	—	—

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 C63.10-2013. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

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)

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 – 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 §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.



**1.9.2 Innovation, Science and Economic Development Canada (ISED) Registration No.: 3067A**

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



## SECTION 2

### TEST DETAILS

Radio Testing of the  
Dexcom Inc.  
G6 Continuous Glucose Monitoring System  
(G6 Receiver)



## 2.1 PEAK OUTPUT POWER

### 2.1.1 Specification Reference

Part 15 Subpart C §15.247(b)(3) and RSS-247 5.4(d)

### 2.1.2 Standard Applicable

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

### 2.1.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 14, 2017 / AC

### 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	24.7 °C
Relative Humidity	36.6 %
ATM Pressure	99.1 kPa

### 2.1.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10<sup>th</sup> harmonic.
- Test Methodology is per Clause 3.0 of KDB558074 D01 DTS Meas Guidance v04.
- Calculate the EIRP from the radiated field strength in the far field using Equation (22) of ANSI C63.10-2013:

$$\text{EIRP} = E_{\text{Meas}} + 20\log(d_{\text{Meas}}) - 104.7$$



Where

- $E_{\text{IRP}}$  is the equivalent isotropically radiated power, in dBm  
 $E_{\text{Meas}}$  is the field strength of the emission at the measurement distance, in  $\text{dB}\mu\text{V}/\text{m}$   
 $d_{\text{Meas}}$  is the measurement distance, in m

- Calculate the conducted power from the EIRP using Equation (23) of ANSI C63.10-2013:

$$P_{\text{Cond}} = \text{EIRP} - G_{\text{EUT}}$$

Where

- $P_{\text{Cond}}$  is the measured power at feedpoint of the EUT antenna, in dBm  
 $E_{\text{IRP}}$  is the equivalent isotropically radiated power, in dBm  
 $G_{\text{EUT}}$  is the gain of the EUT radiating element (antenna), in dBi

- Measurement was done using EMC32 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 (Radiated Emission)

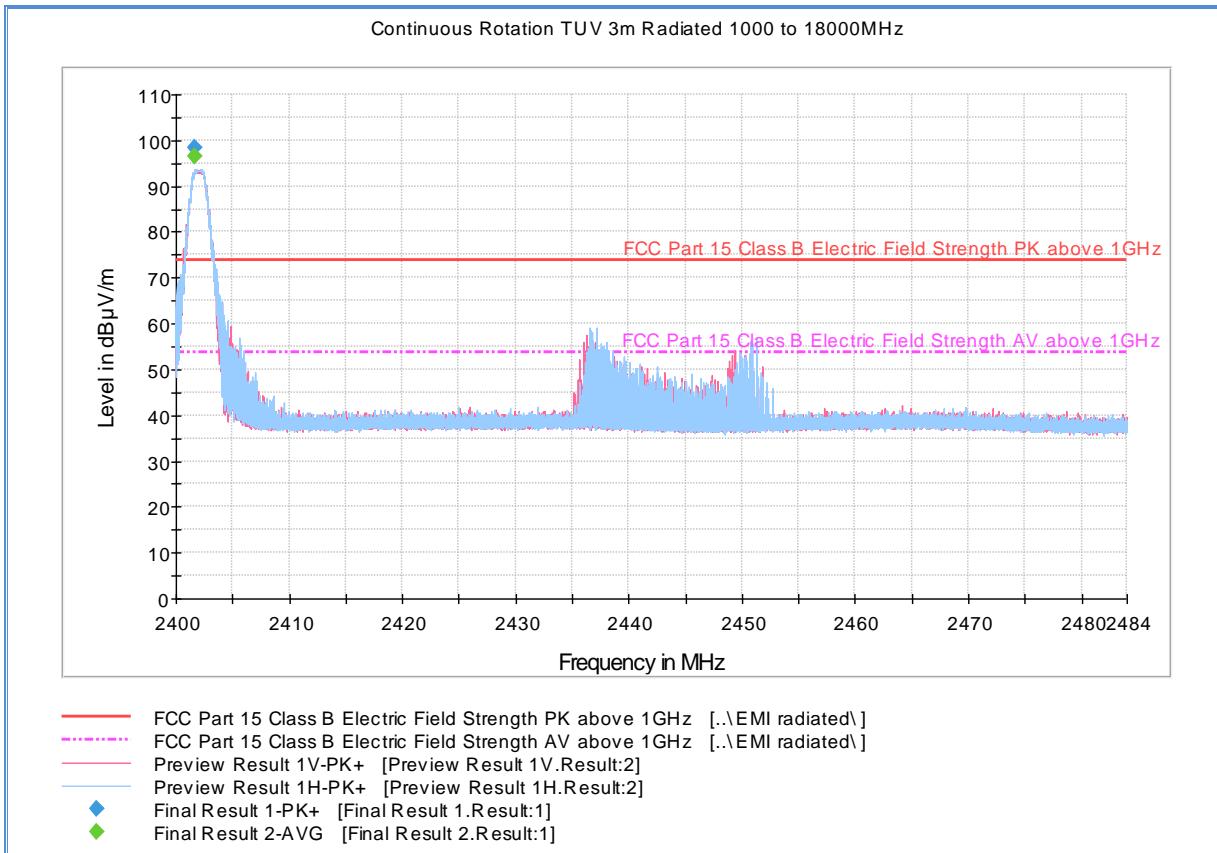
Measuring equipment raw measurement ( $\text{dB}\mu\text{V}$ ) @ 2400 MHz			53.9
Correction Factor (dB)	Asset# 1153 (cable)	3.4	-0.4
	Asset# 8628(preamplifier)	-36.5	
	Asset#7575 (antenna)	32.7	
Reported Max Peak Final Measurement ( $\text{dB}\mu\text{V}/\text{m}$ ) @ 2400 MHz			53.5

### 2.1.9 Test Results

Compliance. See attached plots and results.



### 2.1.10 Low Channel Fundamental Field Strength Measurement



#### Average Data

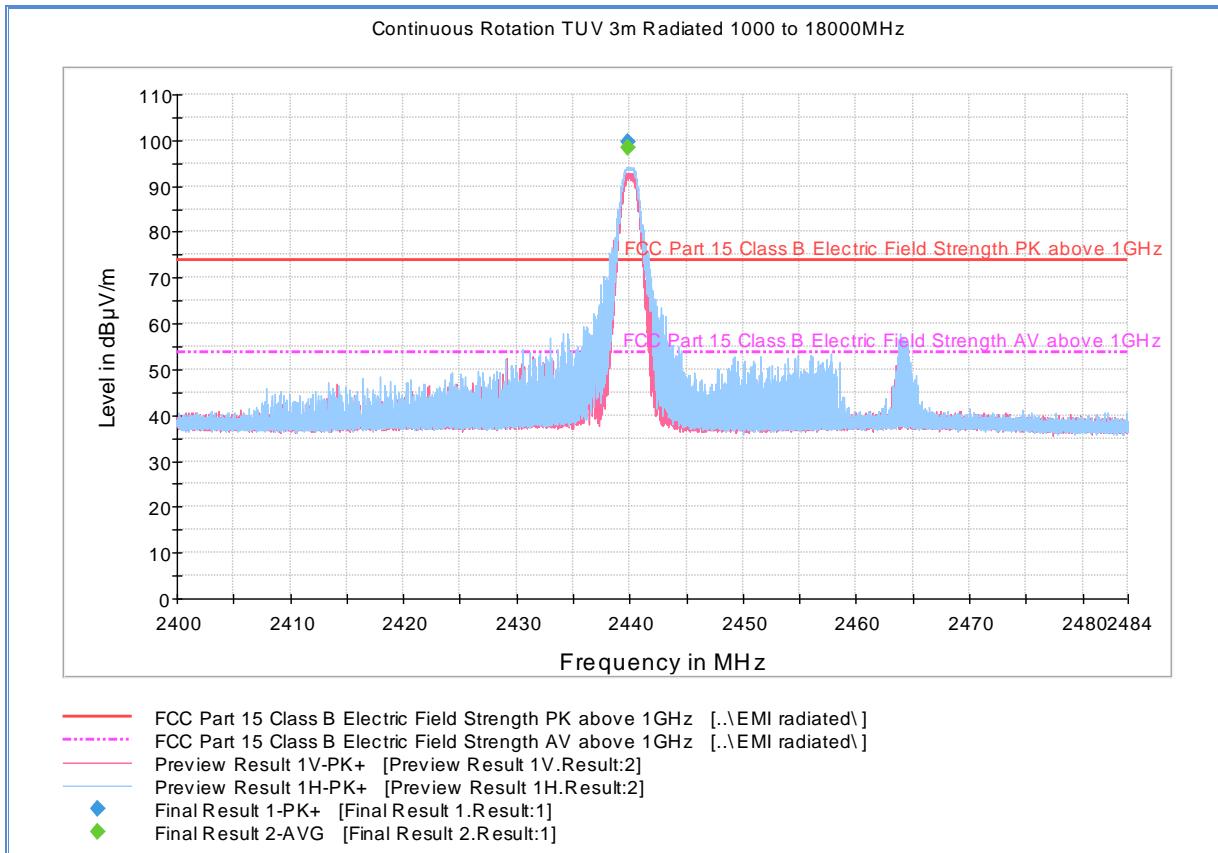
Frequency (MHz)	MaxAverage (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2401.704400	96.5	1000.0	1000.000	102.8	H	140.0	-1.0

$$\text{Therefore EIRP} = 96.5 + 20\log(3) - 104.7 \\ = 1.34 \text{ dBm}$$

$$P_{\text{Cond}} = \text{EIRP} - G_{\text{EUT}} \\ = 1.34 \text{ dBm} - (-0.5) \text{ dBi} \\ = 1.84 \text{ dBm. Complies with } 30 \text{ dBm limit.}$$



### 2.1.11 Mid Channel Fundamental Field Strength Measurement



#### Average Data

Frequency (MHz)	MaxAverage (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2439.834000	98.2	1000.0	1000.000	102.7	H	147.0	-0.8

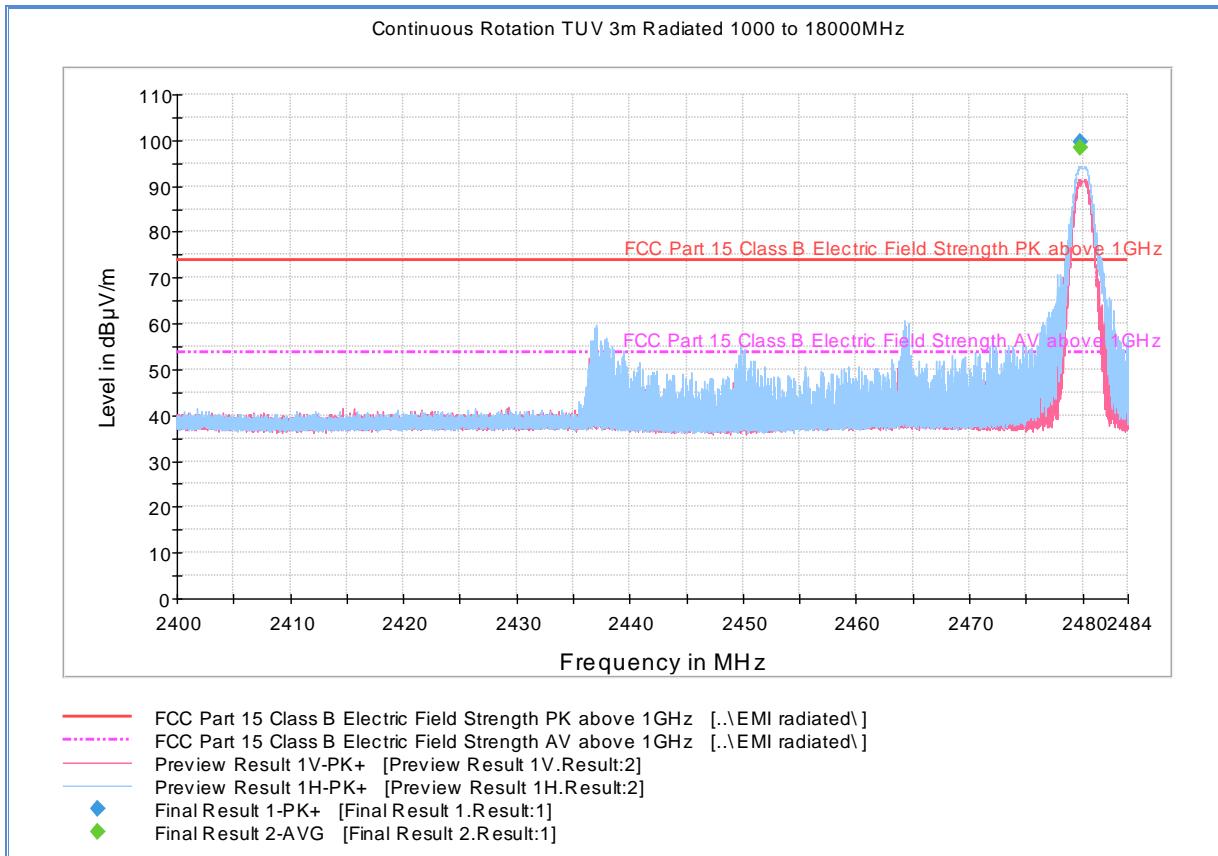
$$\text{Therefore EIRP} = 98.2 + 20\log(3) - 104.7 \\ = 3.04 \text{ dBm}$$

$$P_{\text{Cond}} = \text{EIRP} - G_{\text{EUT}} \\ = 3.04 \text{ dBm} - (-0.5) \text{ dBi} \\ = 3.54 \text{ dBm. Complies with } 30 \text{ dBm limit.}$$



### 2.1.12 High Channel Fundamental Field Strength Measurement

America



#### Average Data

Frequency (MHz)	MaxAverage (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2479.851600	98.4	1000.0	1000.000	102.7	H	165.0	-0.7

$$\text{Therefore EIRP} = 98.4 + 20\log(3) - 104.7 \\ = 3.24 \text{ dBm}$$

$$P_{\text{Cond}} = \text{EIRP} - G_{\text{EUT}} \\ = 3.24 \text{ dBm} - (-0.5) \text{ dBi} \\ = 3.74 \text{ dBm. Complies with } 30 \text{ dBm limit.}$$



## 2.2 CONDUCTED EMISSIONS

### 2.2.1 Specification Reference

Part 15 Subpart C §15.207(a) and RSS-Gen 8.8

### 2.2.2 Standard Applicable

An intentional radiator 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 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	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.

### 2.2.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 11, 2017 / AC

### 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	24.4 °C
Relative Humidity	35.7 %
ATM Pressure	99.1 kPa

### 2.2.7 Additional Observations

- EUT was tested with two external power supplies, model(s): MT23681 / HDP05-MD05010U or MT23681 / UE151204HKYC1-P.
- 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 (Conducted Emission – Quasi Peak)

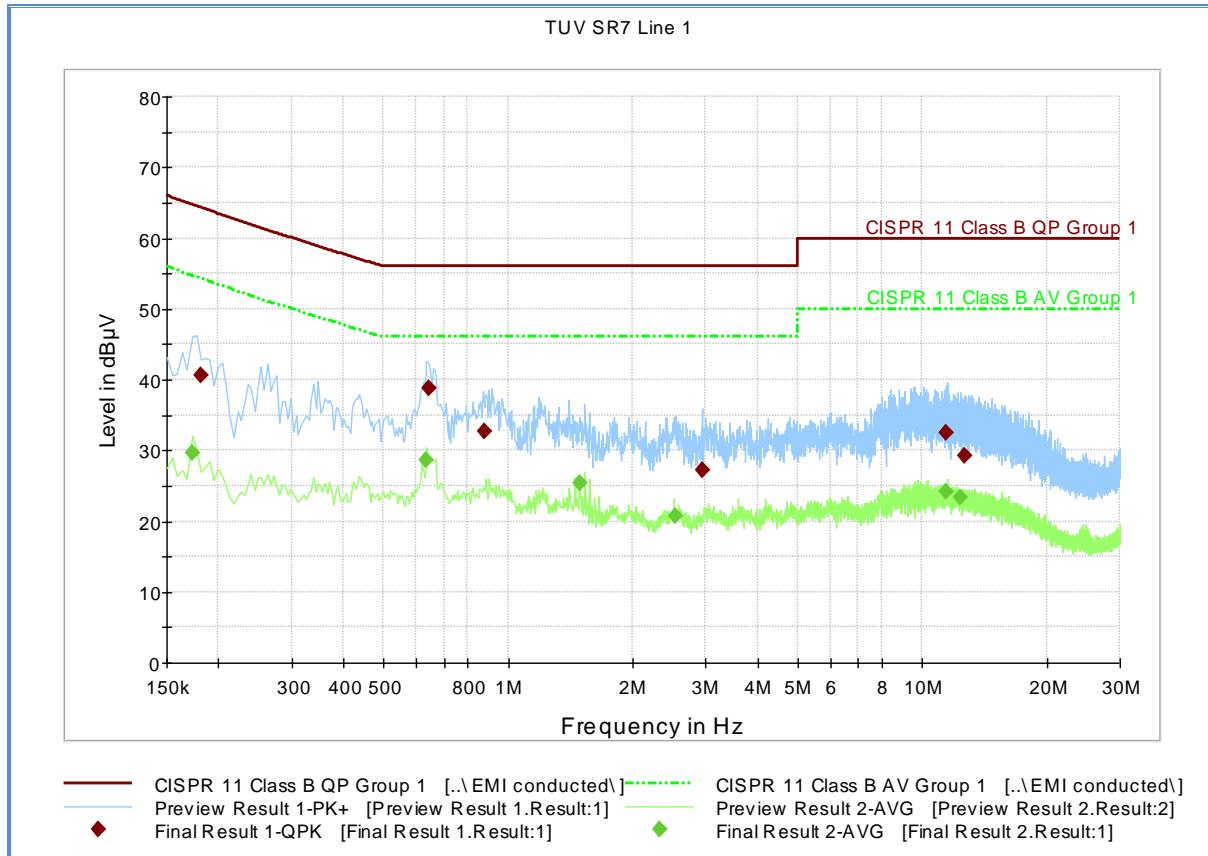
Measuring equipment raw measurement (dB $\mu$ V) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported Quasi Peak Final Measurement (dB $\mu$ V) @ 150kHz			26.2

### 2.2.9 Test Results

Compliant. See attached plots and tables.



**2.2.10 120VAC/60Hz, Line 1 (G6 Receiver with an external power supply, model: MT23681/HDP05-MD05010U)**



Note: FCC and CISPR 11 Class B limits are identical

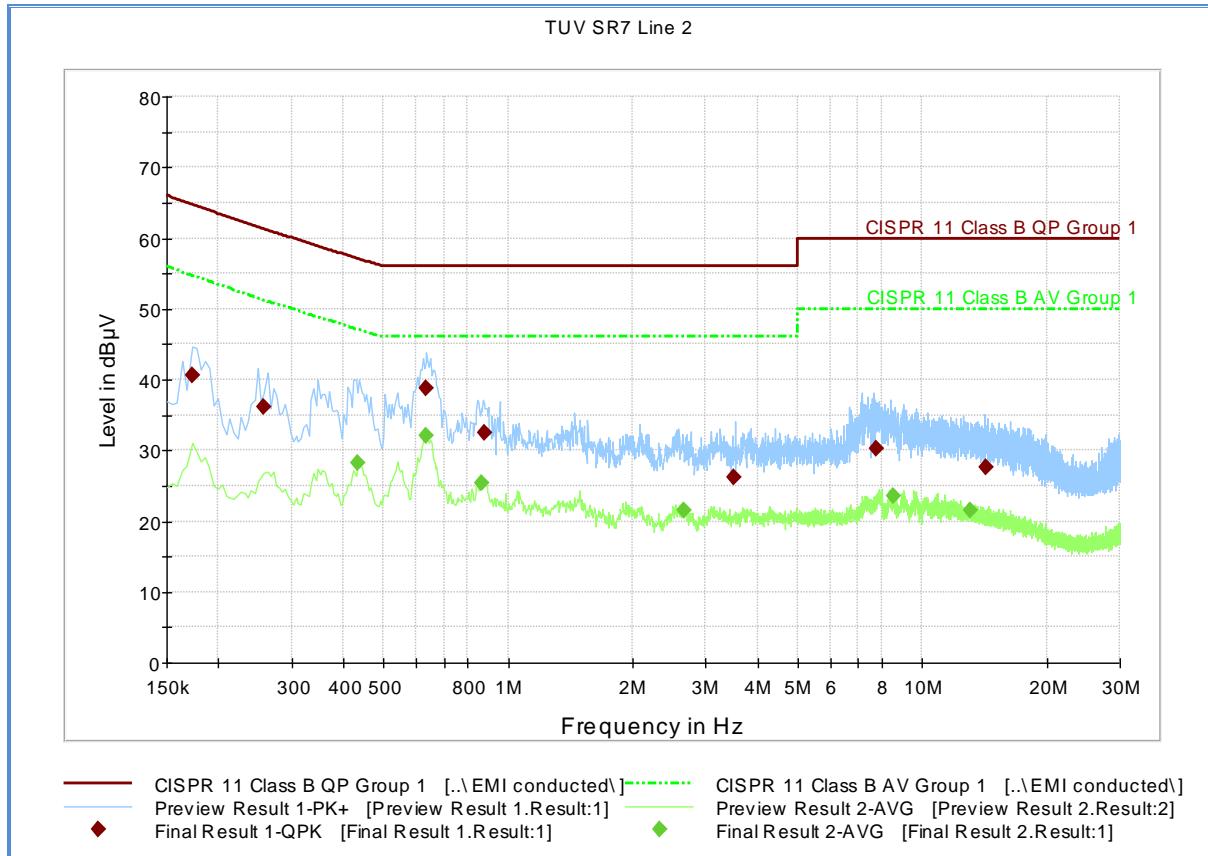
**Quasi Peak**

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.181500	40.7	1000.0	9.000	Off	L1	19.9	23.6	64.3
0.645000	38.8	1000.0	9.000	Off	L1	19.9	17.2	56.0
0.874500	32.7	1000.0	9.000	Off	L1	20.0	23.3	56.0
2.940000	27.2	1000.0	9.000	Off	L1	20.3	28.8	56.0
11.445000	32.5	1000.0	9.000	Off	L1	20.4	27.5	60.0
12.696000	29.2	1000.0	9.000	Off	L1	20.5	30.8	60.0

**Average**

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.172500	29.6	1000.0	9.000	Off	L1	19.9	25.1	54.7
0.636000	28.6	1000.0	9.000	Off	L1	19.9	17.4	46.0
1.486500	25.3	1000.0	9.000	Off	L1	20.0	20.7	46.0
2.530500	20.7	1000.0	9.000	Off	L1	20.3	25.3	46.0
11.436000	24.1	1000.0	9.000	Off	L1	20.4	25.9	50.0
12.399000	23.4	1000.0	9.000	Off	L1	20.5	26.6	50.0

**2.2.11 120VAC/60Hz, Line 2 (G6 Receiver with an external power supply, model: MT23681/HDP05-MD05010U)**



Note: FCC and CISPR 11 Class B limits are identical

**Quasi Peak**

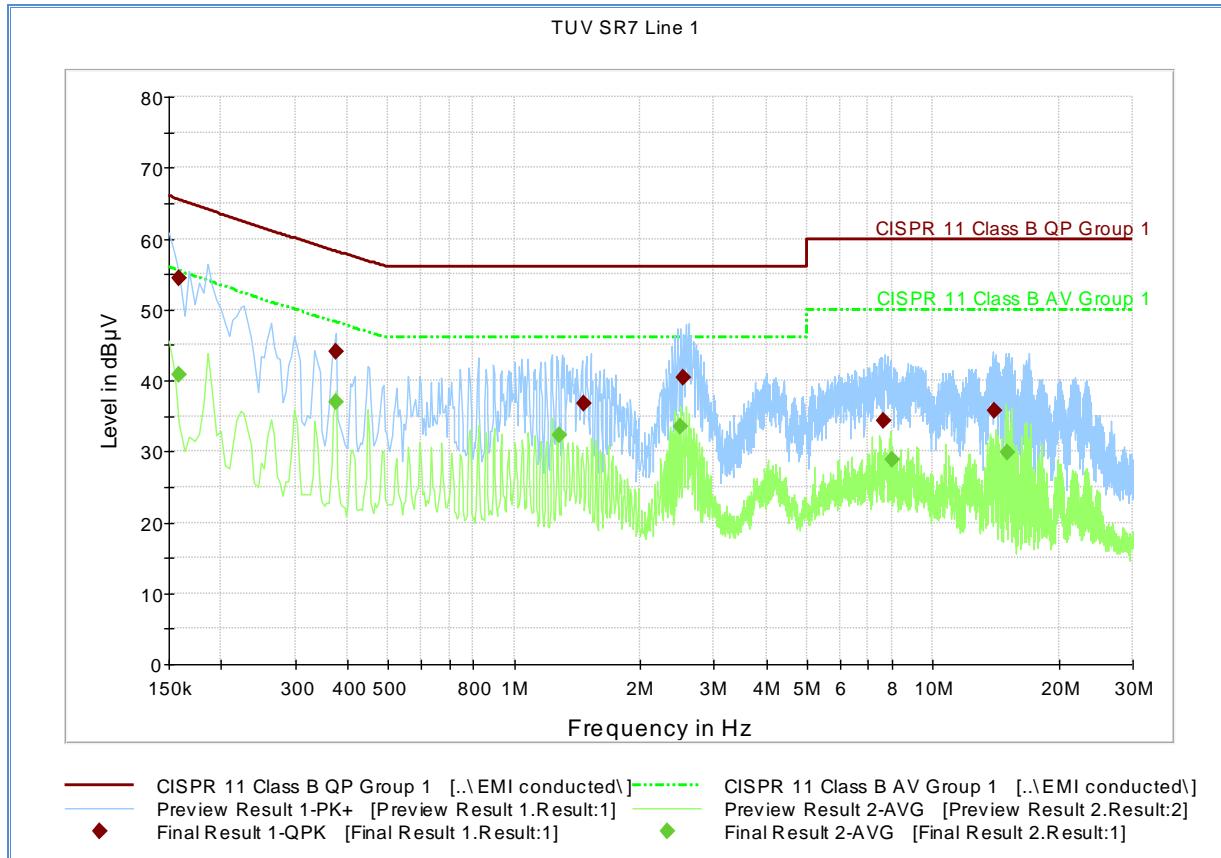
Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dB $\mu$ V)
0.172500	40.7	1000.0	9.000	Off	L2	19.9	24.1	64.8
0.258000	36.1	1000.0	9.000	Off	L2	19.8	25.2	61.3
0.636000	38.7	1000.0	9.000	Off	L2	19.9	17.3	56.0
0.879000	32.5	1000.0	9.000	Off	L2	20.0	23.5	56.0
3.520500	26.1	1000.0	9.000	Off	L2	20.3	29.9	56.0
7.719000	30.3	1000.0	9.000	Off	L2	20.4	29.7	60.0

**Average**

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dB $\mu$ V)
0.433500	28.2	1000.0	9.000	Off	L2	19.9	18.8	47.1
0.636000	32.1	1000.0	9.000	Off	L2	19.9	13.9	46.0
0.865500	25.5	1000.0	9.000	Off	L2	20.0	20.5	46.0
2.661000	21.5	1000.0	9.000	Off	L2	20.3	24.5	46.0
8.511000	23.6	1000.0	9.000	Off	L2	20.4	26.4	50.0
13.096500	21.5	1000.0	9.000	Off	L2	20.5	28.5	50.0



**2.2.12 120VAC/60Hz, Line 1 (G6 Receiver with an external power supply, model: MT23681/UE151204HKYC1-P)**



**Quasi Peak**

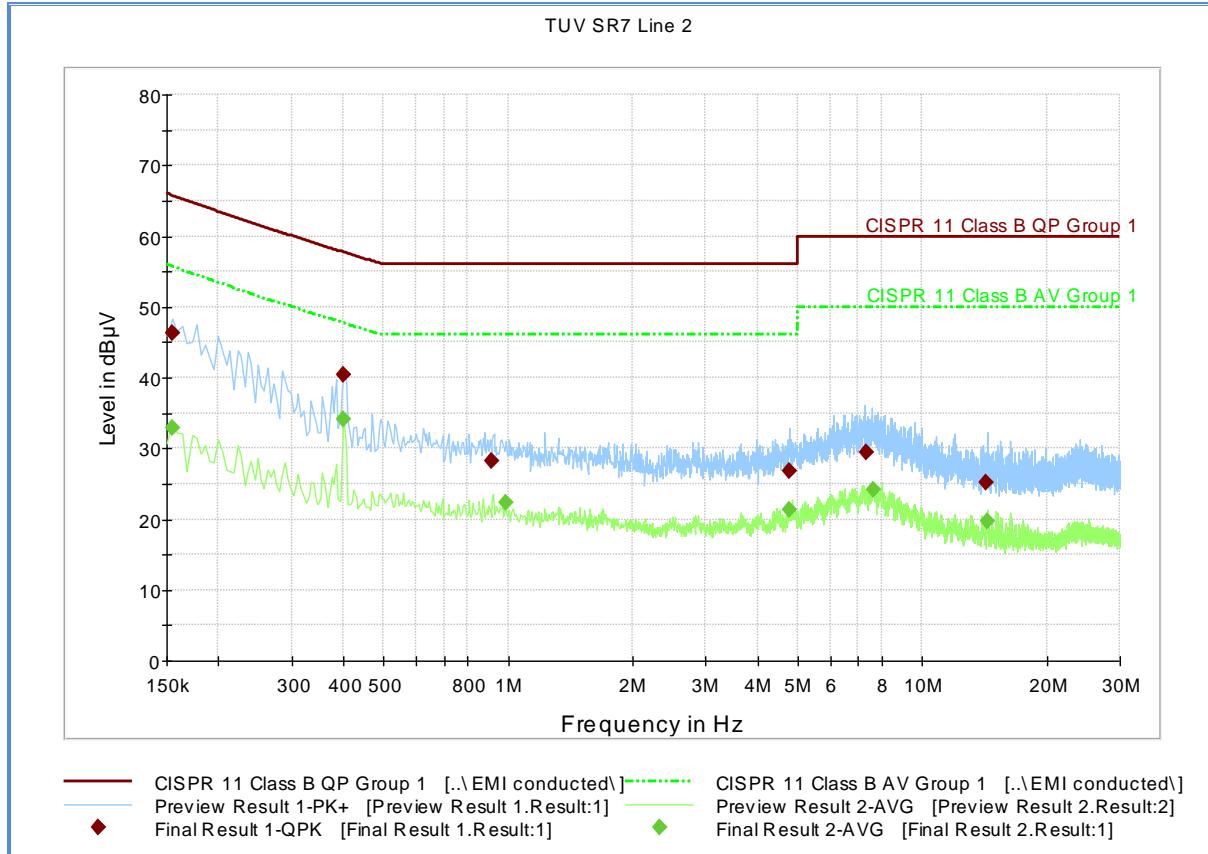
Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dB $\mu$ V)
0.159000	54.4	1000.0	9.000	Off	L1	19.9	11.1	65.5
0.375000	44.1	1000.0	9.000	Off	L1	19.9	14.1	58.2
1.468500	36.8	1000.0	9.000	Off	L1	20.0	19.2	56.0
2.535000	40.4	1000.0	9.000	Off	L1	20.3	15.6	56.0
7.606500	34.4	1000.0	9.000	Off	L1	20.3	25.6	60.0
14.010000	35.8	1000.0	9.000	Off	L1	20.5	24.2	60.0

**Average**

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dB $\mu$ V)
0.159000	40.7	1000.0	9.000	Off	L1	19.9	14.7	55.5
0.375000	37.0	1000.0	9.000	Off	L1	19.9	11.2	48.2
1.284000	32.3	1000.0	9.000	Off	L1	20.0	13.7	46.0
2.503500	33.4	1000.0	9.000	Off	L1	20.3	12.6	46.0
7.962000	28.9	1000.0	9.000	Off	L1	20.3	21.1	50.0
15.054000	29.9	1000.0	9.000	Off	L1	20.5	20.1	50.0



**2.2.13 120VAC/60Hz, Line 2 (G6 Receiver with an external power supply, model: MT23681/UE151204HKYC1-P)**



Note: FCC and CISPR 11 Class B limits are identical

**Quasi Peak**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dB $\mu$ V)
0.154500	46.2	1000.0	9.000	Off	L2	19.9	19.5	65.7
0.402000	40.4	1000.0	9.000	Off	L2	20.0	17.3	57.7
0.915000	28.2	1000.0	9.000	Off	L2	20.0	27.8	56.0
4.776000	26.8	1000.0	9.000	Off	L2	20.3	29.2	56.0
7.309500	29.3	1000.0	9.000	Off	L2	20.3	30.7	60.0
14.293500	25.2	1000.0	9.000	Off	L2	20.5	34.8	60.0

**Average**

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dB $\mu$ V)
0.154500	32.8	1000.0	9.000	Off	L2	19.9	22.9	55.7
0.402000	34.0	1000.0	9.000	Off	L2	20.0	13.7	47.7
0.987000	22.4	1000.0	9.000	Off	L2	19.9	23.6	46.0
4.780500	21.4	1000.0	9.000	Off	L2	20.3	24.6	46.0
7.647000	24.1	1000.0	9.000	Off	L2	20.4	25.9	50.0
14.334000	19.7	1000.0	9.000	Off	L2	20.5	30.3	50.0



## 2.3 99% EMISSION BANDWIDTH

### 2.3.1 Specification Reference

RSS-Gen Clause 6.6

### 2.3.2 Standard Applicable

The emission bandwidth ( $x$  dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated  $x$  dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

- 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% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

Note: Video averaging is not permitted.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.

### 2.3.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 17, 2017 / AC

### 2.3.5 Test Equipment Used

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



### 2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature      24.7 °C  
Relative Humidity      36.6.%  
ATM Pressure      99.1 kPa

### 2.3.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

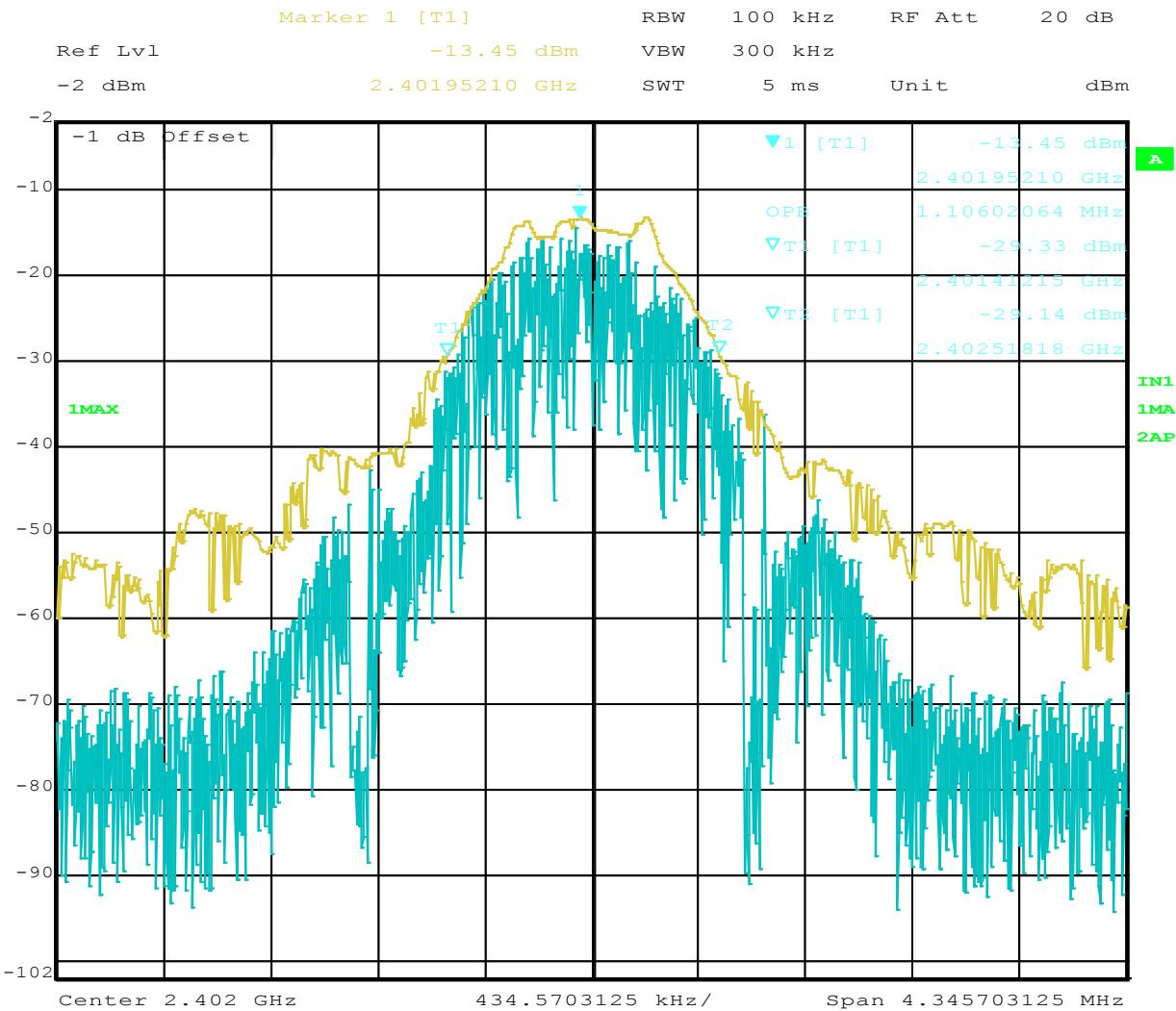
### 2.3.8 Test Results (For reporting purposes only)

Mode	Channel	Measured 99% Bandwidth (MHz)
Bluetooth LE	2402 MHz	1.106
	2440 MHz	1.393
	2480 MHz	1.167



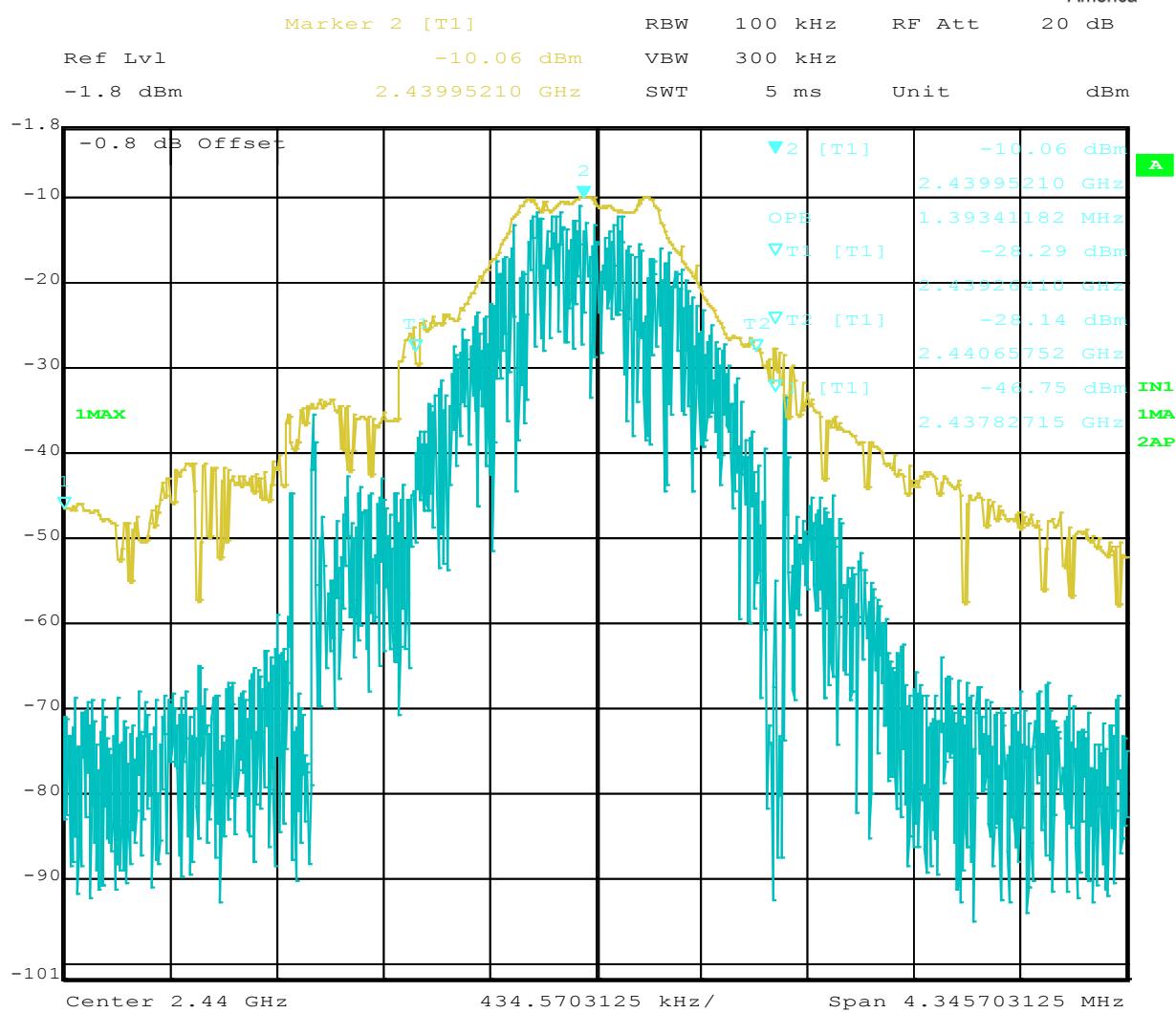
### 2.3.9 Test Results Plots

America



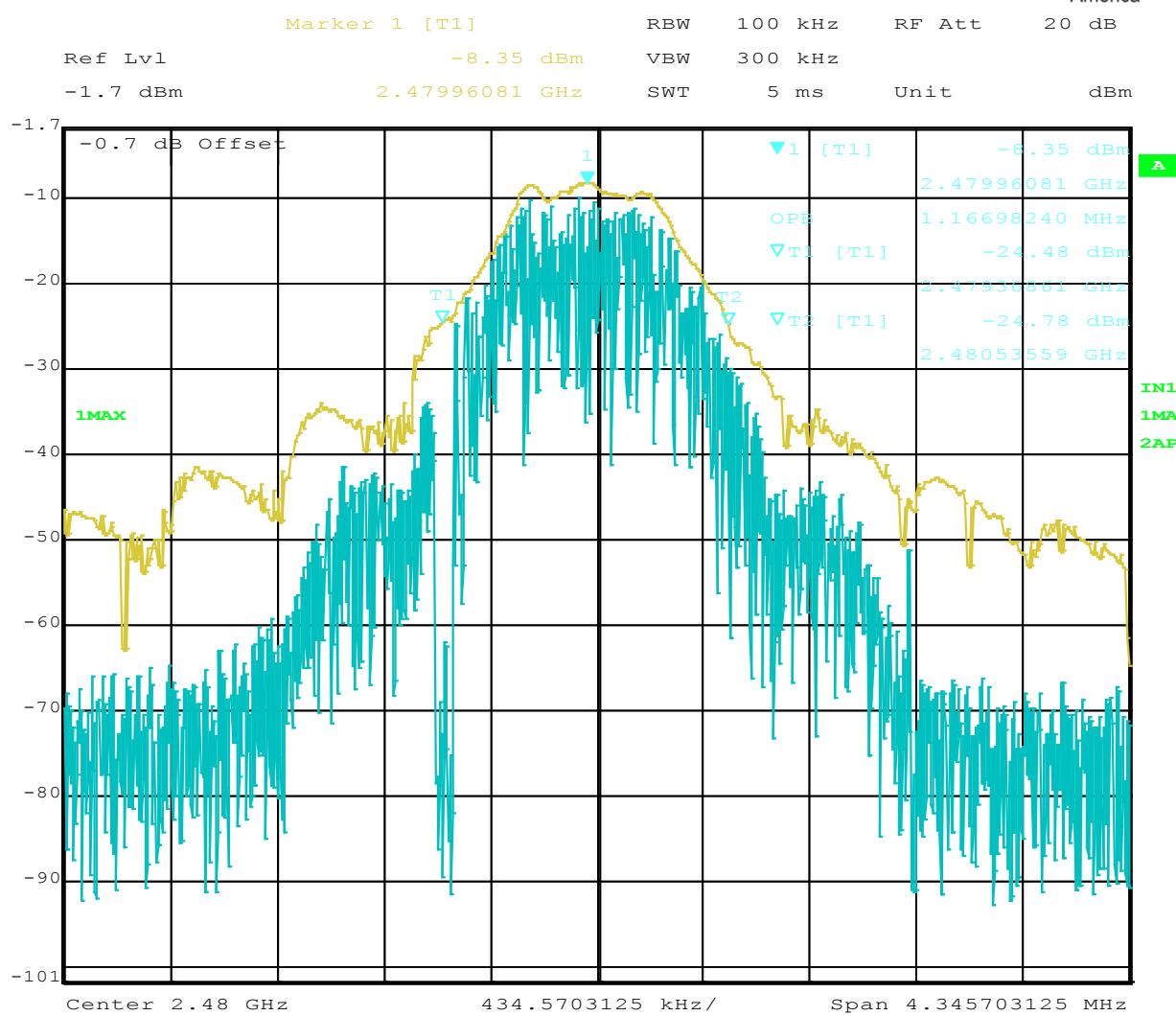
Date: 17.APR.2017 08:51:02

Bluetooth LE Low Channel



Date: 17.APR.2017 08:33:26

### Bluetooth LE Mid Channel



Date: 17.APR.2017 08:43:23

### Bluetooth LE High Channel



## 2.4 MINIMUM 6 dB RF BANDWIDTH

### 2.4.1 Specification Reference

Part 15 Subpart C §15.247(a)(2) and RSS-247 5.2(a)

### 2.4.2 Standard Applicable

(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 2.4.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 17, 2017 / AC

### 2.4.5 Test Equipment Used

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

### 2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.7 °C
Relative Humidity	36.6.%
ATM Pressure	99.1 kPa

### 2.4.7 Additional Observations

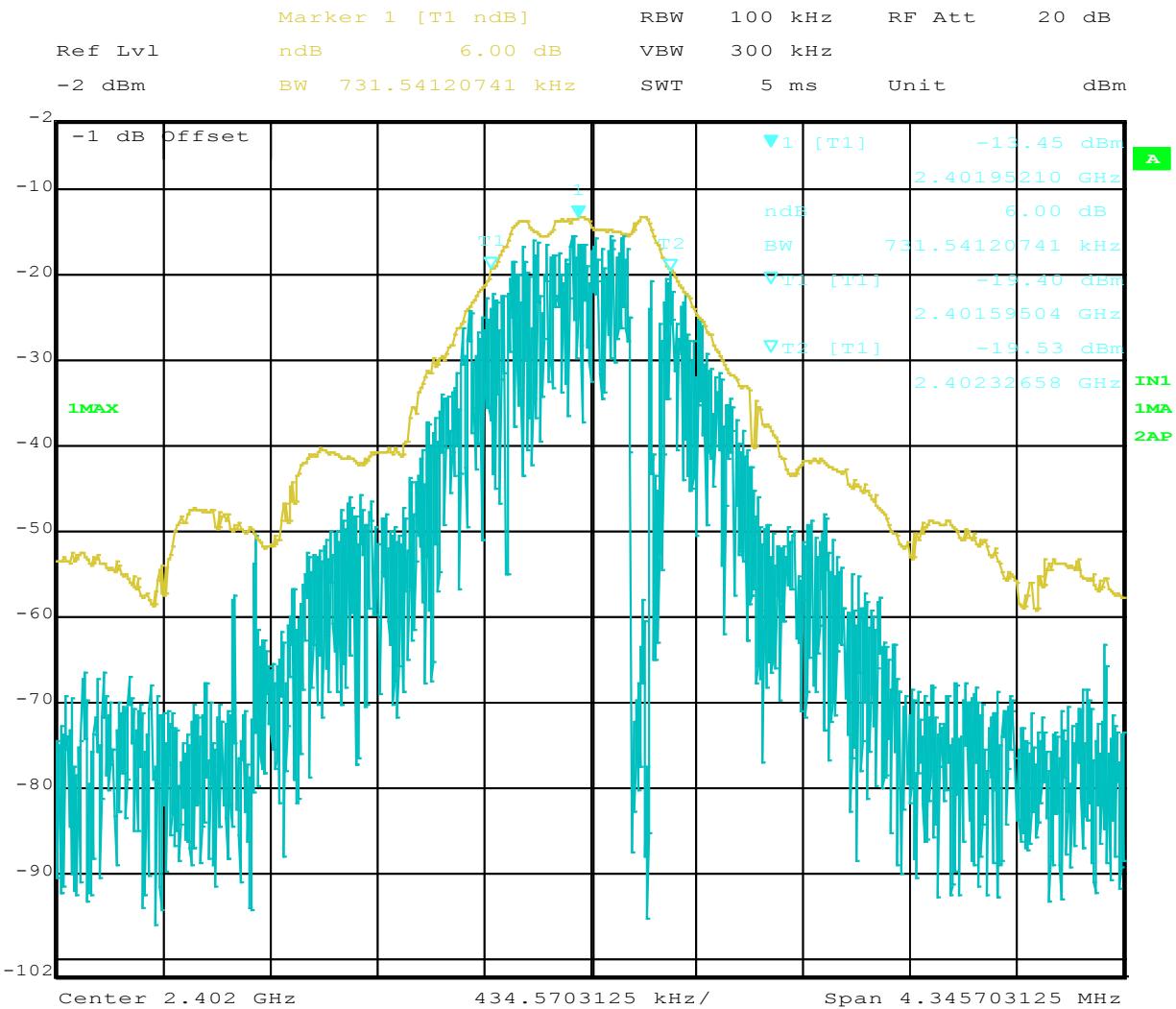
- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- RBW was set to 100 kHz while VBW is ≥3X RBW.
- Sweep is auto while Detector used is peak.
- The “n” dB down marker function of the spectrum analyzer was used for this test.

### 2.4.8 Test Results

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
Bluetooth LE	2402 MHz	0.731	0.500	Complies
	2426 MHz	0.731	0.500	Complies
	2480 MHz	0.705	0.500	Complies

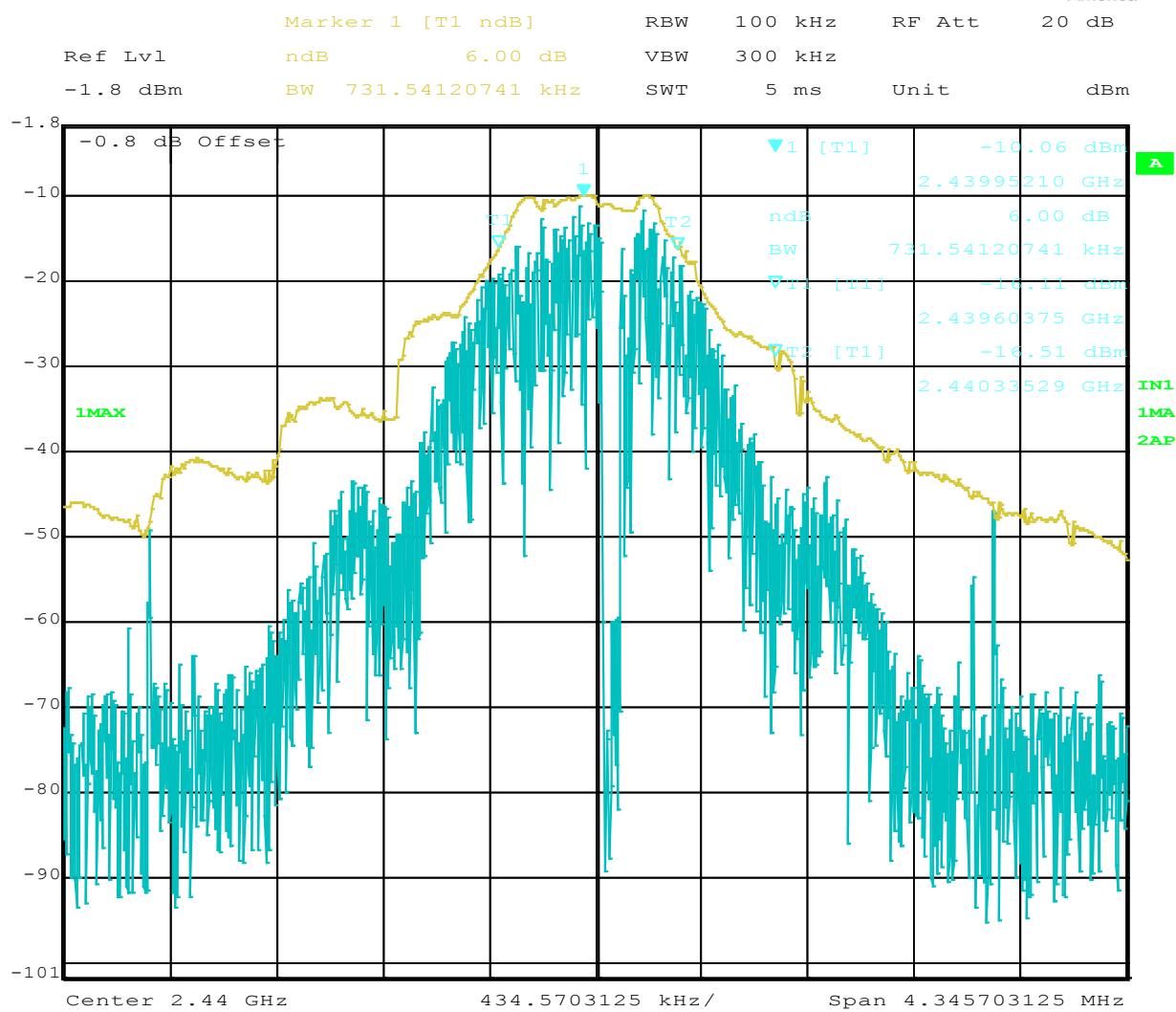


## 2.4.9 Test Results Plots



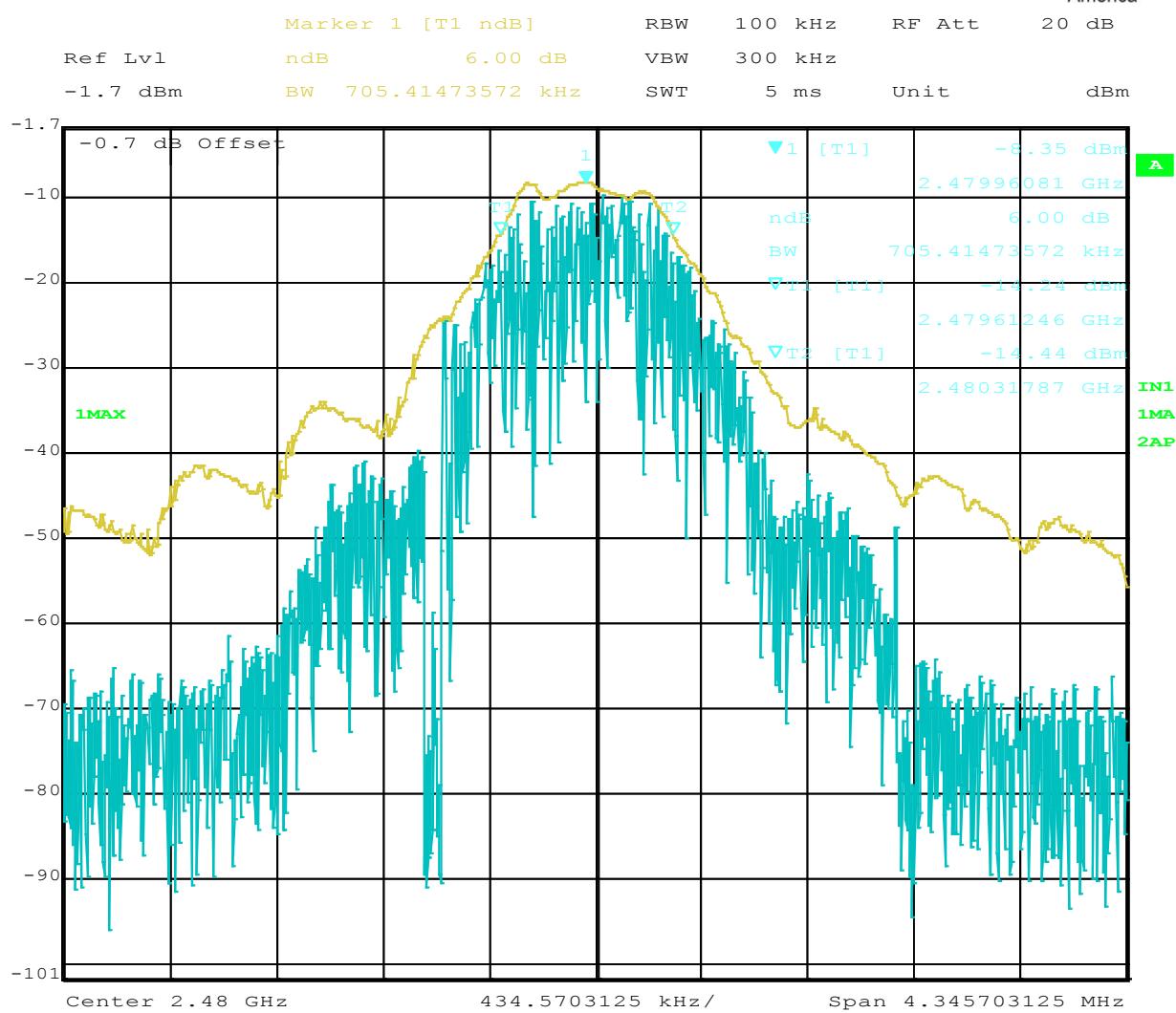
Date: 17.APR.2017 08:51:48

### Bluetooth LE Low Channel



Date: 17.APR.2017 08:34:44

### Bluetooth LE Mid Channel



Date: 17.APR.2017 08:44:19

### Bluetooth LE High Channel



## 2.5 OUT-OF-BAND EMISSIONS - RADIATED

### 2.5.1 Specification Reference

Part 15 Subpart C §15.247(d) and RSS-247 5.5

### 2.5.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 2.5.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 14, 2017 / AC

### 2.5.5 Test Equipment Used

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

### 2.5.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.7 °C
Relative Humidity	36.6 %
ATM Pressure	99.1 kPa

### 2.5.7 Additional Observations

- This is a radiated test.
- Data presented is per§15.209(a) and §15.205(c). Test results are considered worst case compared to the 30dBc limit.
- It was verified however that all emissions measured complies with the 30dBc limit.
- Measurement was done using EMC32 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 2.5.8 for sample computation.



America

## 2.5.8 Sample Computation (Radiated Emission)

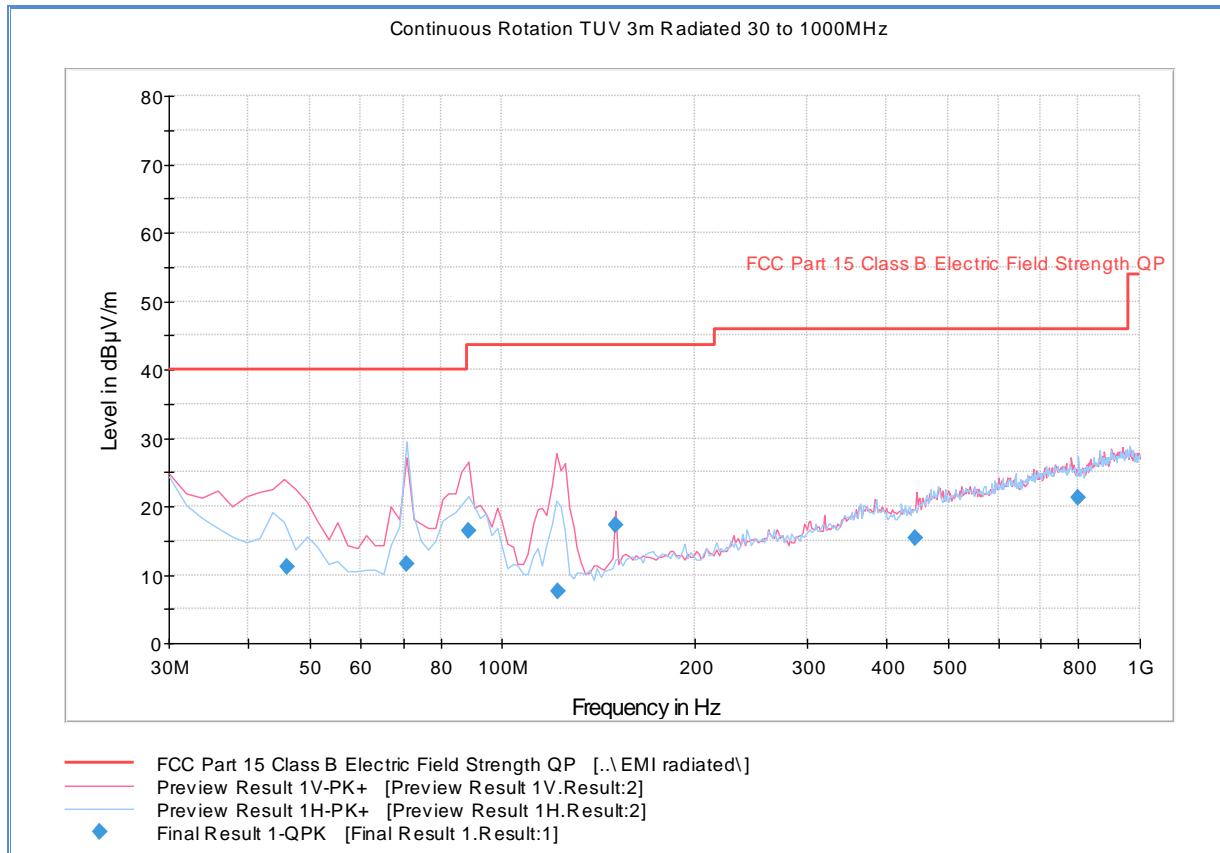
Measuring equipment raw measurement (dB $\mu$ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
	Reported Quasi Peak Final Measurement (dB $\mu$ V/m) @ 30MHz	11.8	

## 2.5.9 Test Results

Compliance. See attached plots and results.



### 2.5.10 Test Results Below 1GHz (Worst Case Channel – High Channel)

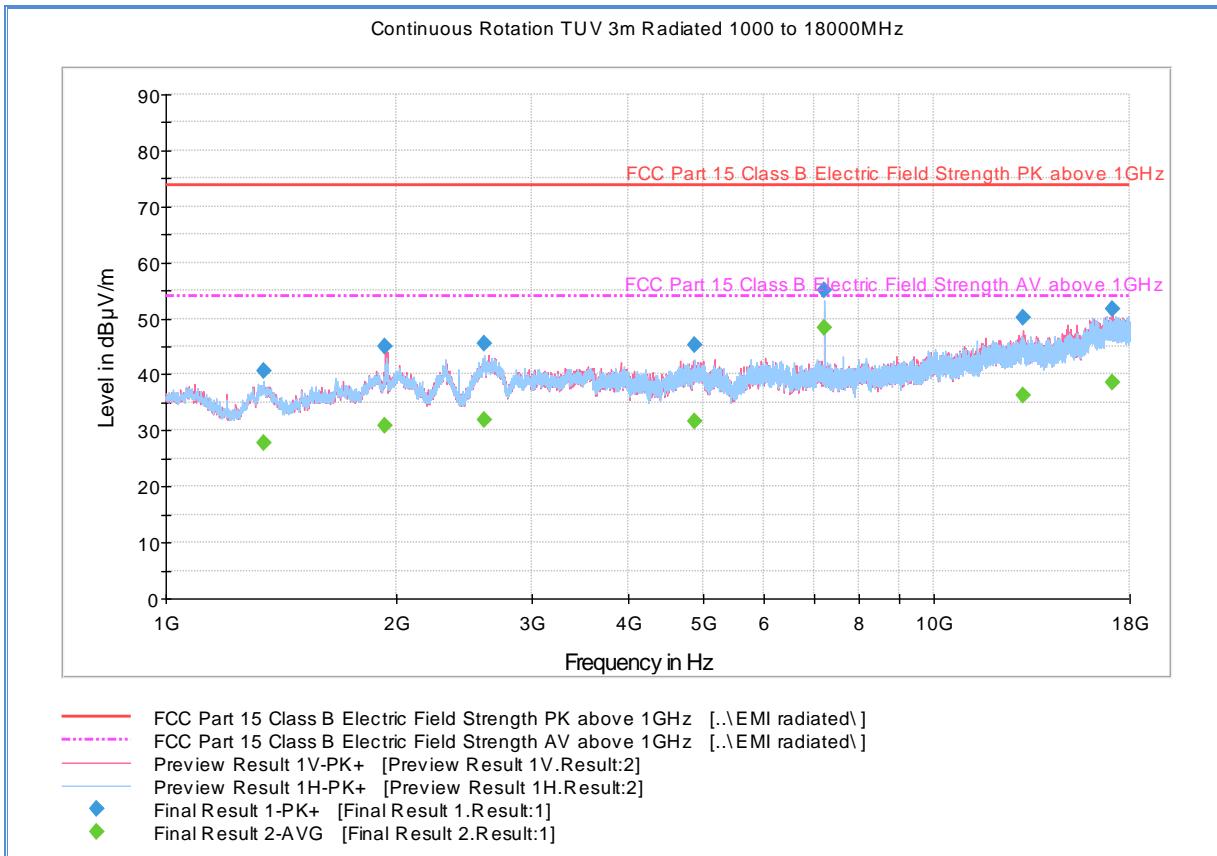


#### Quasi Peak Data

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)
45.911102	11.1	1000.0	120.000	139.0	V	15.0	-14.7	28.9	40.0
70.821643	11.6	1000.0	120.000	400.0	H	15.0	-17.7	28.4	40.0
88.476633	16.4	1000.0	120.000	300.0	V	-15.0	-17.0	27.1	43.5
122.442725	7.6	1000.0	120.000	200.0	V	342.0	-16.7	35.9	43.5
150.321042	17.2	1000.0	120.000	100.0	V	312.0	-14.3	26.3	43.5
443.711984	15.3	1000.0	120.000	190.0	V	354.0	-4.1	30.7	46.0
799.299559	21.2	1000.0	120.000	140.0	H	25.0	3.4	24.8	46.0



### 2.5.11 Test Results Above 1GHz (Low Channel)



#### Peak 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)
1339.966667	40.7	1000.0	1000.000	231.3	H	256.0	-5.2	33.2	73.9
1932.600000	45.1	1000.0	1000.000	346.1	V	187.0	-2.2	28.8	73.9
2595.000000	45.4	1000.0	1000.000	332.1	H	245.0	-0.7	28.5	73.9
4872.433333	45.2	1000.0	1000.000	399.8	H	220.0	3.6	28.7	73.9
7206.500000	55.1	1000.0	1000.000	272.3	H	48.0	6.6	18.8	73.9
13054.533333	50.2	1000.0	1000.000	112.7	V	31.0	14.3	23.7	73.9
17088.433333	51.8	1000.0	1000.000	192.5	V	222.0	19.6	22.1	73.9

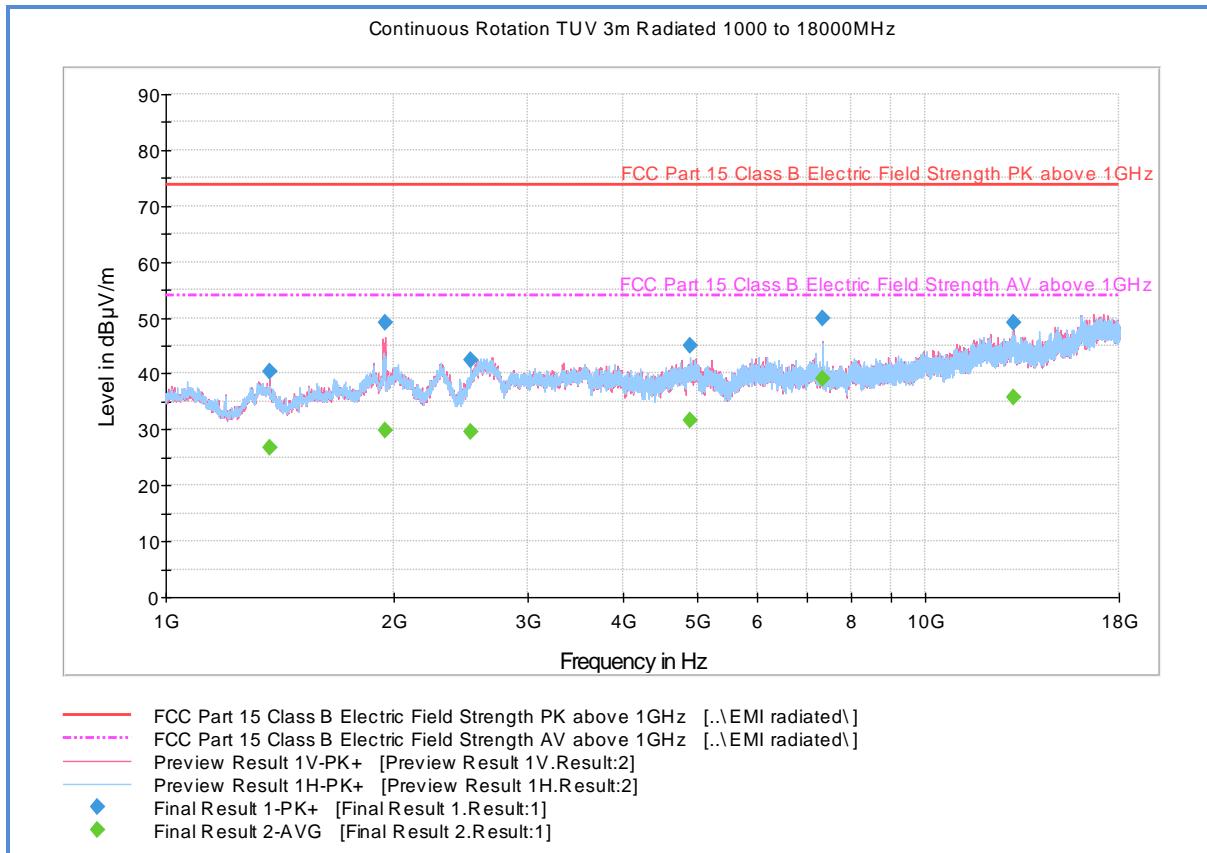
#### Average Data

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)
1339.966667	27.7	1000.0	1000.000	231.3	H	256.0	-5.2	26.2	53.9
1932.600000	30.9	1000.0	1000.000	346.1	V	187.0	-2.2	23.0	53.9
2595.000000	31.8	1000.0	1000.000	332.1	H	245.0	-0.7	22.1	53.9
4872.433333	31.6	1000.0	1000.000	399.8	H	220.0	3.6	22.3	53.9
7206.500000	48.3	1000.0	1000.000	272.3	H	48.0	6.6	5.6	53.9
13054.533333	36.3	1000.0	1000.000	112.7	V	31.0	14.3	17.6	53.9
17088.433333	38.7	1000.0	1000.000	192.5	V	222.0	19.6	15.2	53.9

**Test Notes:** Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.



## 2.5.12 Test Results Above 1GHz (Mid Channel)



### Peak 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)
1369.866667	40.3	1000.0	1000.000	180.5	V	97.0	-5.5	33.6	73.9
1943.500000	49.1	1000.0	1000.000	399.8	V	-20.0	-2.2	24.8	73.9
2521.733333	42.4	1000.0	1000.000	250.3	H	27.0	-0.6	31.5	73.9
4906.433333	44.9	1000.0	1000.000	301.6	H	52.0	3.7	29.0	73.9
7321.000000	49.9	1000.0	1000.000	218.4	V	25.0	6.7	24.0	73.9
13066.266667	49.1	1000.0	1000.000	124.7	V	87.0	14.3	24.8	73.9

### Average Data

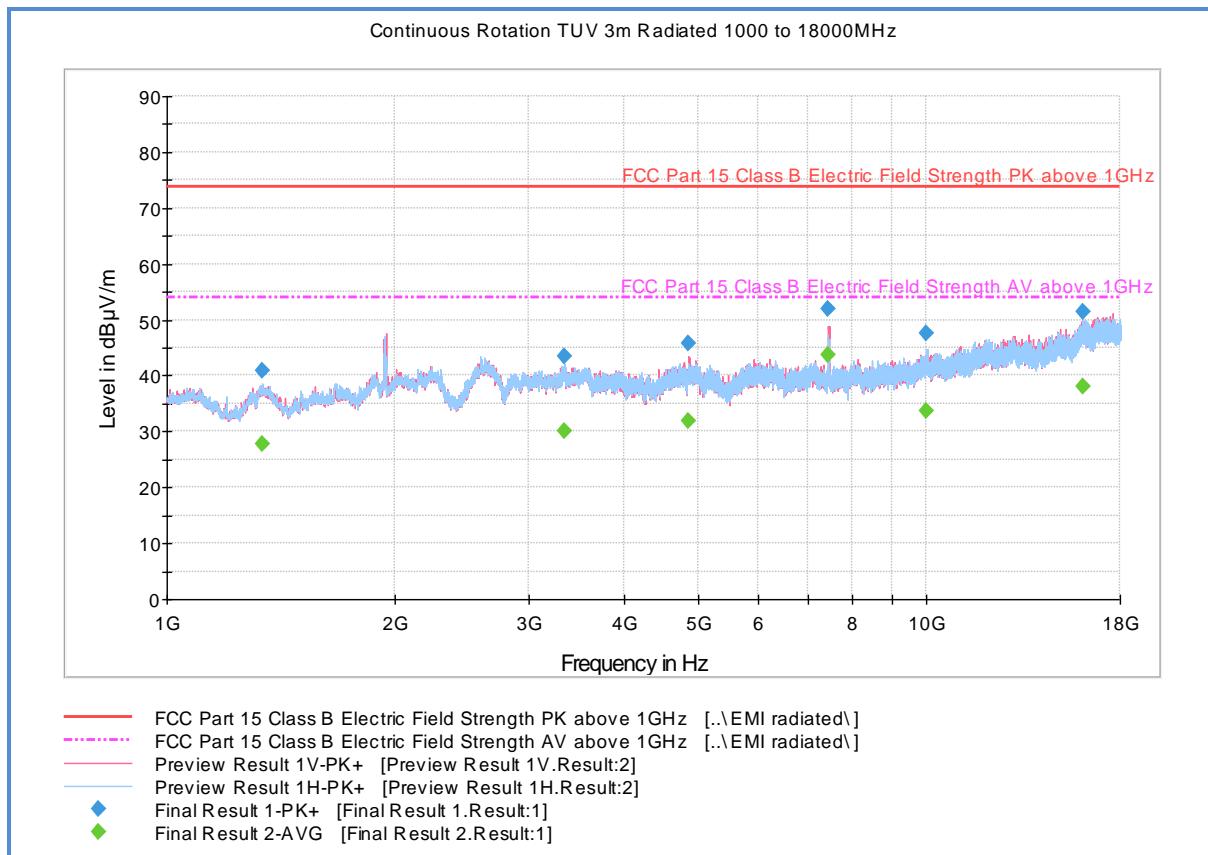
Frequency (MHz)	Average (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)
1369.866667	26.7	1000.0	1000.000	180.5	V	97.0	-5.5	27.2	53.9
1943.500000	29.8	1000.0	1000.000	399.8	V	-20.0	-2.2	24.1	53.9
2521.733333	29.4	1000.0	1000.000	250.3	H	27.0	-0.6	24.5	53.9
4906.433333	31.6	1000.0	1000.000	301.6	H	52.0	3.7	22.3	53.9
7321.000000	39.0	1000.0	1000.000	218.4	V	25.0	6.7	14.9	53.9
13066.266667	35.8	1000.0	1000.000	124.7	V	87.0	14.3	18.1	53.9

**Test Notes:** Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.



### 2.5.13 Test Results Above 1GHz (High Channel)

America



#### Peak Data

Frequency (MHz)	MaxPeak ( $\text{dB}\mu\text{V}/\text{m}$ )	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit ( $\text{dB}\mu\text{V}/\text{m}$ )
1337.533333	40.9	1000.0	1000.000	323.2	V	24.0	-5.2	33.0	73.9
3335.600000	43.4	1000.0	1000.000	254.3	V	288.0	1.0	30.5	73.9
4859.533333	45.6	1000.0	1000.000	399.8	V	20.0	3.6	28.3	73.9
7439.400000	51.8	1000.0	1000.000	187.5	V	116.0	6.6	22.1	73.9
9994.533333	47.7	1000.0	1000.000	399.9	H	127.0	10.1	26.2	73.9
16086.200000	51.3	1000.0	1000.000	161.6	V	86.0	18.6	22.6	73.9

#### Average Data

Frequency (MHz)	Average ( $\text{dB}\mu\text{V}/\text{m}$ )	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit ( $\text{dB}\mu\text{V}/\text{m}$ )
1337.533333	27.7	1000.0	1000.000	323.2	V	24.0	-5.2	26.2	53.9
3335.600000	30.0	1000.0	1000.000	254.3	V	288.0	1.0	23.9	53.9
4859.533333	31.9	1000.0	1000.000	399.8	V	20.0	3.6	22.0	53.9
7439.400000	43.7	1000.0	1000.000	187.5	V	116.0	6.6	10.2	53.9
9994.533333	33.7	1000.0	1000.000	399.9	H	127.0	10.1	20.2	53.9
16086.200000	38.1	1000.0	1000.000	161.6	V	86.0	18.6	15.8	53.9

**Test Notes:** Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.



## 2.6 BAND-EDGE COMPLIANCE AND IMMEDIATE RESTRICTED BAND

### 2.6.1 Specification Reference

Part 15 Subpart C §15.247(d) and RSS-247 5.5

### 2.6.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 2.6.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 17, 2017 / AC

### 2.6.5 Test Equipment Used

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

### 2.6.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.7 °C
Relative Humidity	36.6 %
ATM Pressure	99.1 kPa

### 2.6.7 Additional Observations

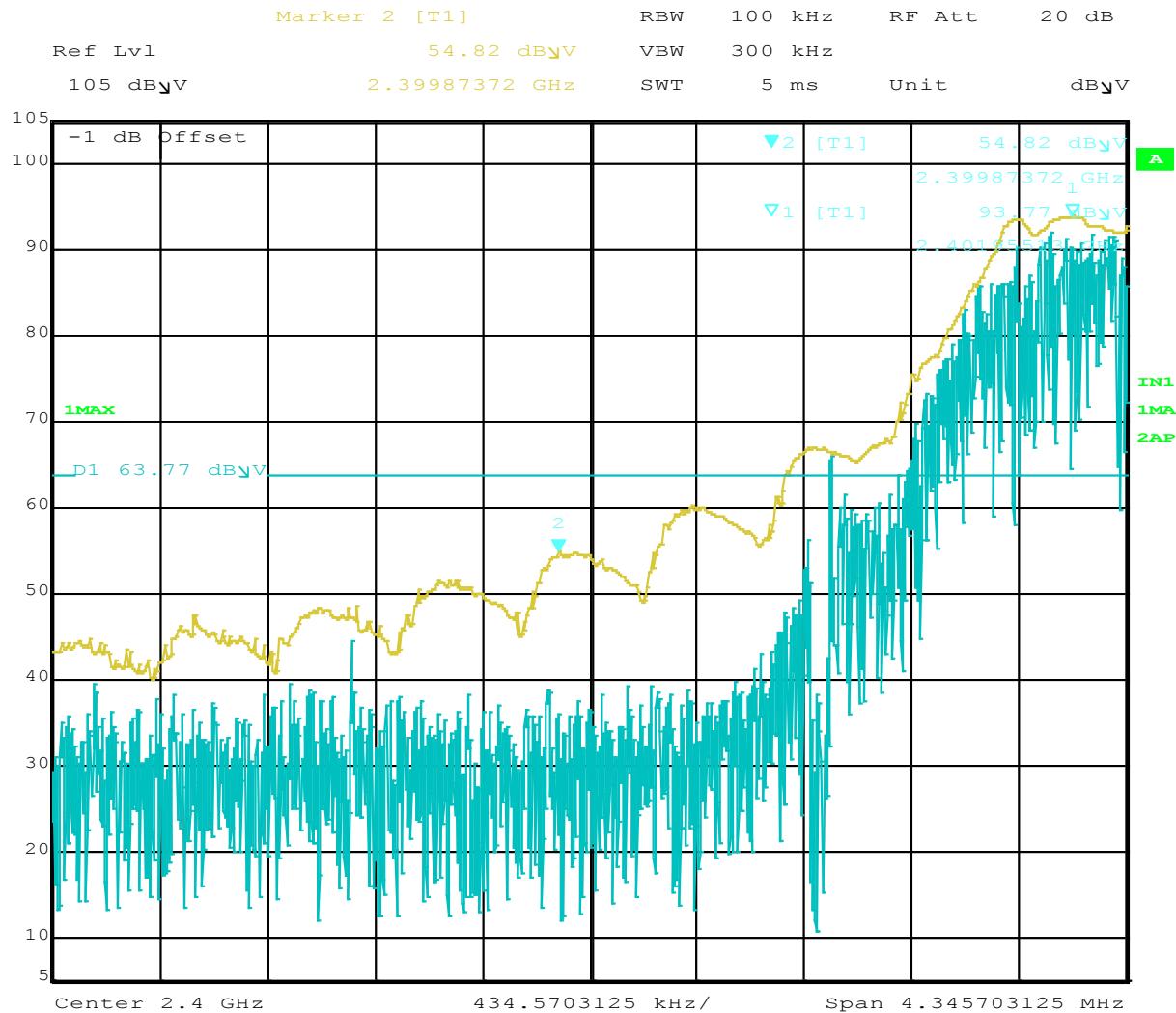
- This is a radiated test.
- Verification performed to show compliance with immediate restricted band adjacent to 2.4GHz band.
- Lower and Upper band edges were also verified in this test since spurious emissions verification performed under Section 2.5 of this test report were done using a 2.4GHz notch filter.
- All measurement performed using Peak and Average detector at 100% duty cycle.
- Lower band edge, even not in restricted band was verified using §15.205(c) test methodology. The results however was also assessed against the 30dBc limit as required by §15.247(d).



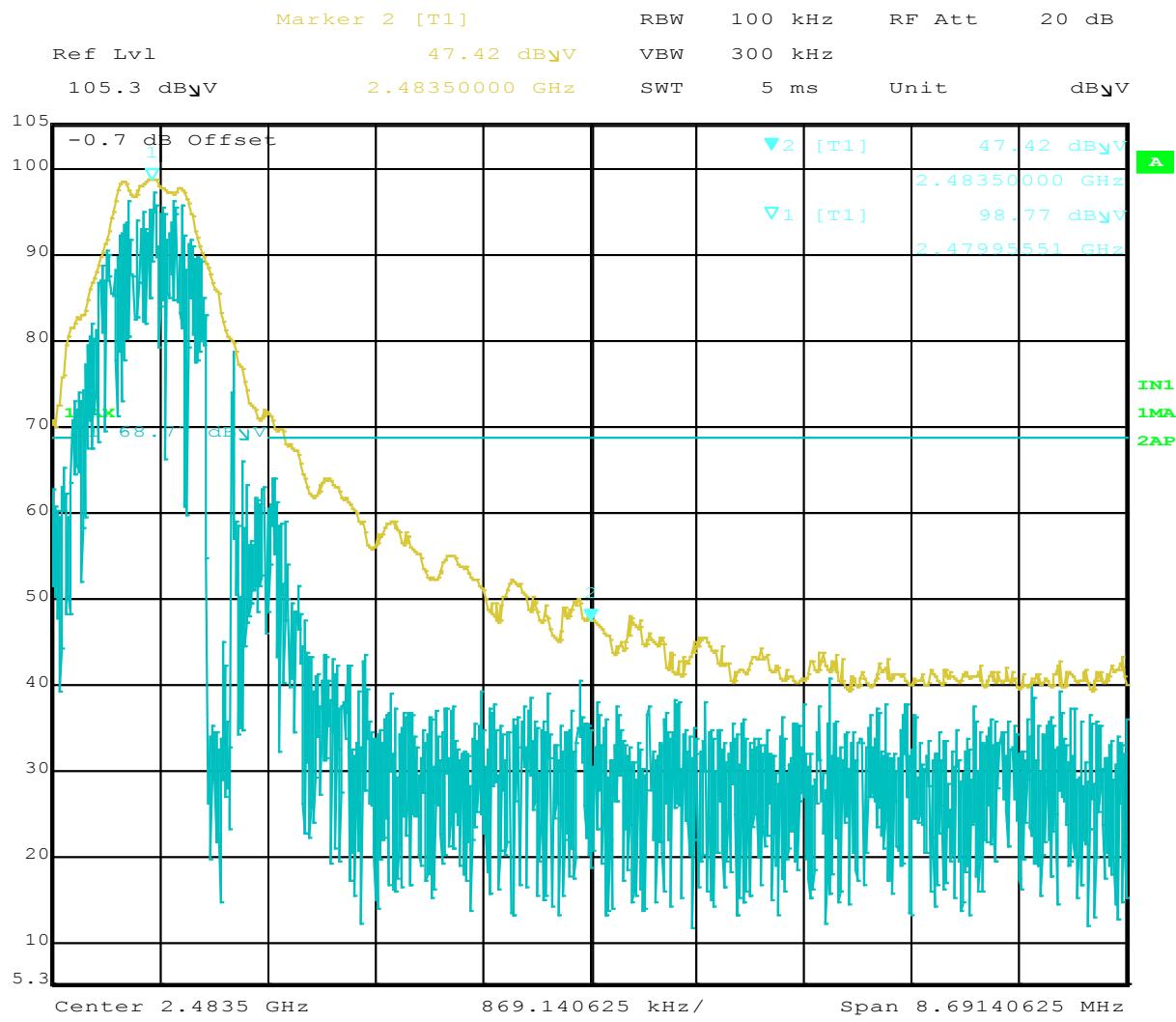
## 2.6.8 Test Results

Complies. See attached plots.

## 2.6.9 Test Results (Lower and Upper Band Edges)



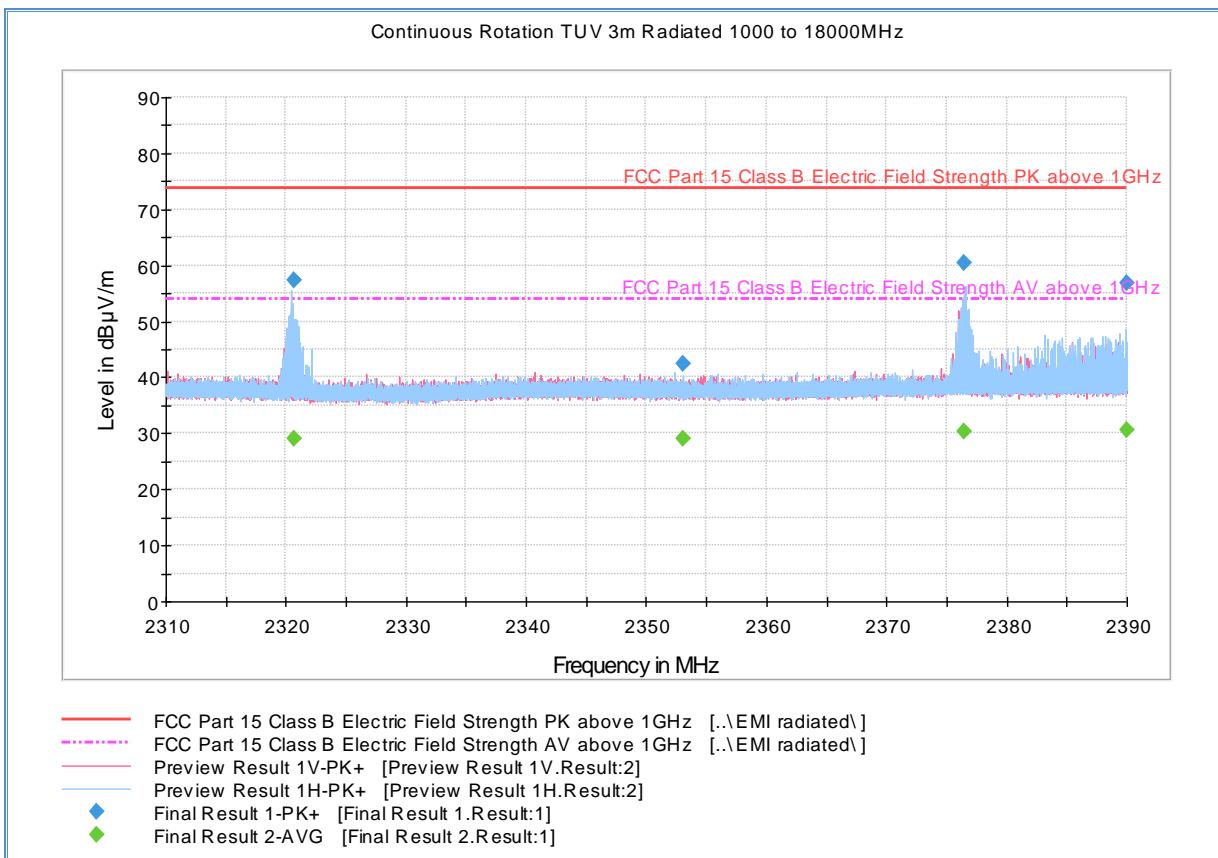
**Lower Bandage**



Date: 17.APR.2017 08:46:36

### Upper Bandage

### 2.6.10 Test Results (Lower Immediate Restricted Band (2310MHz to 2390MHz))



#### Peak Data

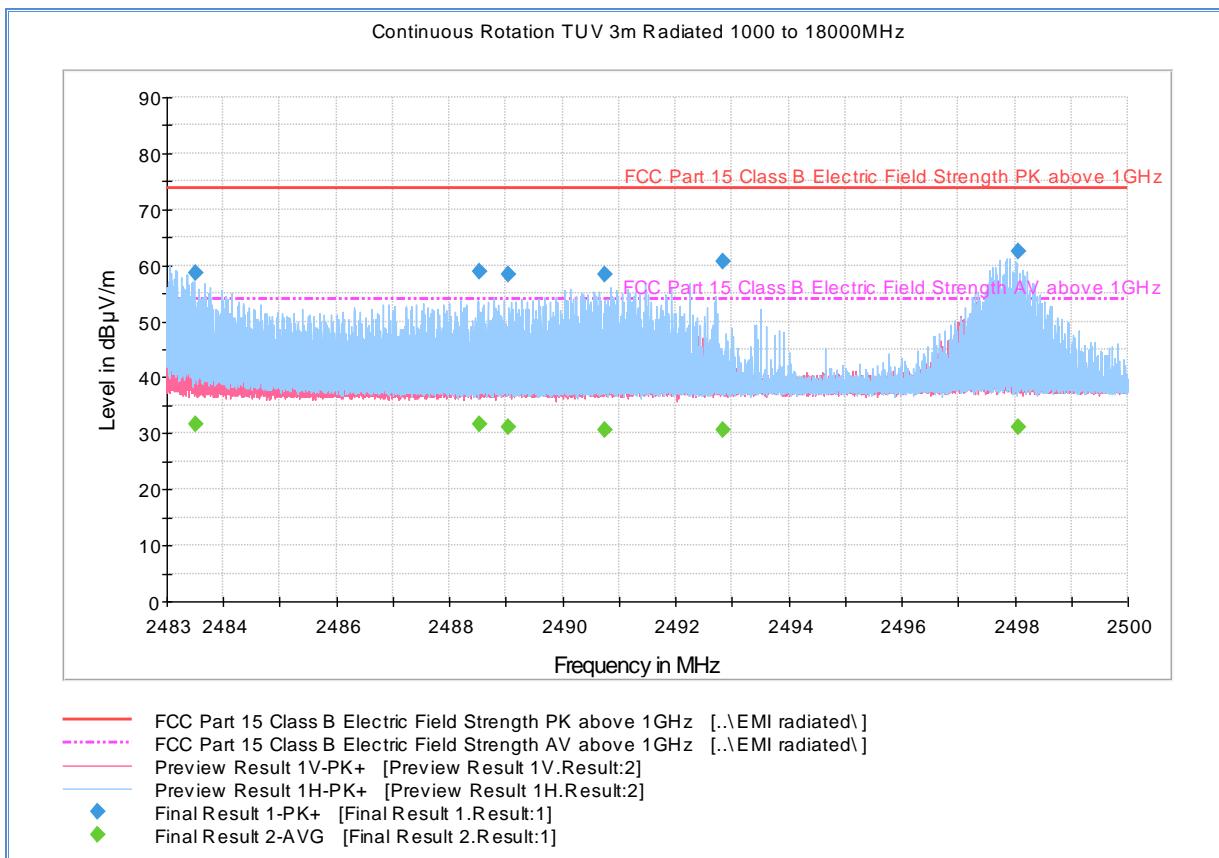
Frequency (MHz)	MaxPeak ( $\text{dB}\mu\text{V}/\text{m}$ )	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit ( $\text{dB}\mu\text{V}/\text{m}$ )
2320.642667	57.3	1000.0	1000.000	119.7	H	325.0	-1.3	16.6	73.9
2353.096000	42.5	1000.0	1000.000	146.7	H	188.0	-1.1	31.4	73.9
2376.426667	60.5	1000.0	1000.000	111.7	H	141.0	-1.0	13.4	73.9
2390.000000	56.7	1000.0	1000.000	110.7	H	141.0	-1.0	17.2	73.9

#### Average Data

Frequency (MHz)	Average ( $\text{dB}\mu\text{V}/\text{m}$ )	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit ( $\text{dB}\mu\text{V}/\text{m}$ )
2320.642667	29.1	1000.0	1000.000	119.7	H	325.0	-1.3	24.8	53.9
2353.096000	29.2	1000.0	1000.000	146.7	H	188.0	-1.1	24.7	53.9
2376.426667	30.3	1000.0	1000.000	111.7	H	141.0	-1.0	23.6	53.9
2390.000000	30.5	1000.0	1000.000	110.7	H	141.0	-1.0	23.4	53.9



### 2.6.11 Test Results (Upper Immediate Restricted Band (2483.5MHz to 2500MHz))



#### Peak 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)
2483.500000	58.8	1000.0	1000.000	102.7	H	164.0	-0.6	15.1	73.9
2488.538433	58.9	1000.0	1000.000	103.7	H	165.0	-0.6	15.0	73.9
2489.038433	58.4	1000.0	1000.000	106.7	H	160.0	-0.6	15.5	73.9
2490.738333	58.3	1000.0	1000.000	101.7	H	138.0	-0.6	15.6	73.9
2492.842333	60.7	1000.0	1000.000	104.7	H	165.0	-0.5	13.2	73.9
2498.057433	62.5	1000.0	1000.000	105.7	H	176.0	-0.5	11.4	73.9

#### Average Data

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)
2483.500000	31.5	1000.0	1000.000	102.7	H	164.0	-0.6	22.4	53.9
2488.538433	31.6	1000.0	1000.000	103.7	H	165.0	-0.6	22.3	53.9
2489.038433	31.1	1000.0	1000.000	106.7	H	160.0	-0.6	22.8	53.9
2490.738333	30.5	1000.0	1000.000	101.7	H	138.0	-0.6	23.4	53.9
2492.842333	30.6	1000.0	1000.000	104.7	H	165.0	-0.5	23.3	53.9
2498.057433	31.2	1000.0	1000.000	105.7	H	176.0	-0.5	22.7	53.9



## 2.7 SPURIOUS RADIATED EMISSIONS

### 2.7.1 Specification Reference

Part 15 Subpart C §15.247(d) and RSS-Gen 8.9 and 8.10

### 2.7.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 2.7.3 Equipment Under Test and Modification State

Not performed. The EUT is deemed to comply with this requirement (Clause 12.2.7 of KDB558074 D01 DTS Meas Guidance v04) by virtue of Section 2.5 test results.



## 2.8 POWER SPECTRAL DENSITY

### 2.8.1 Specification Reference

Part 15 Subpart C §15.247(e) and RSS-247 5.2(2)

### 2.8.2 Standard Applicable

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 2.8.3 Equipment Under Test and Modification State

Serial No: PL71003355 / Default Test Configuration

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

April 17, 2017 / AC

### 2.8.5 Test Equipment Used

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

### 2.8.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.2 °C
Relative Humidity	40.9 %
ATM Pressure	99.5 kPa

### 2.8.7 Additional Observations

- This is a radiated test. Test performed at the same time fundamental field strength were measured (Section 2.1 of this test report).
- Test Methodology is per Clause 3.0 and 10.2 of KDB558074 D01 DTS Meas Guidance v04.
- The 8dBm PSD limit was first converted to field strength utilizing the same formula used in Section 2.1 of this test report.

$$\begin{aligned}E_{\text{Limit}} &= \text{EIRP} - 20\log(d_{\text{Meas}}) + 104.7 \\&= 8 \text{ dBm} - 20\log(3 \text{ meters}) + 104.7 \\&= 103.16 \text{ dB}\mu\text{V/m} @ 3 \text{ meters.}\end{aligned}$$

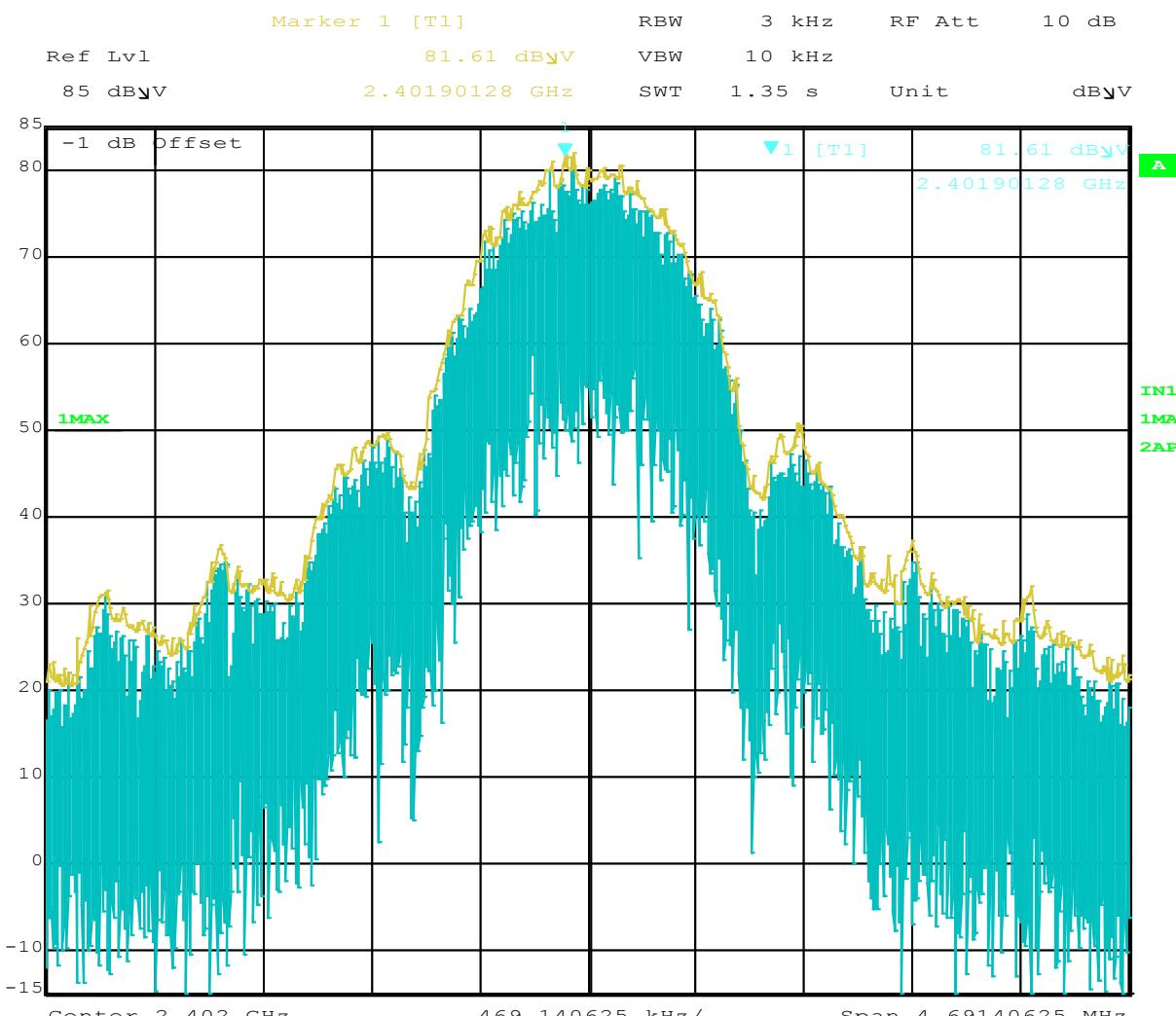
- Since the 8dBm PSD limit is not an EIRP limit, the antenna gain of the EUT will be deducted from the measurement plots and will be verified against the 103.16 dB $\mu$ V/m calculated limit.



## 2.8.8 Test Results Summary

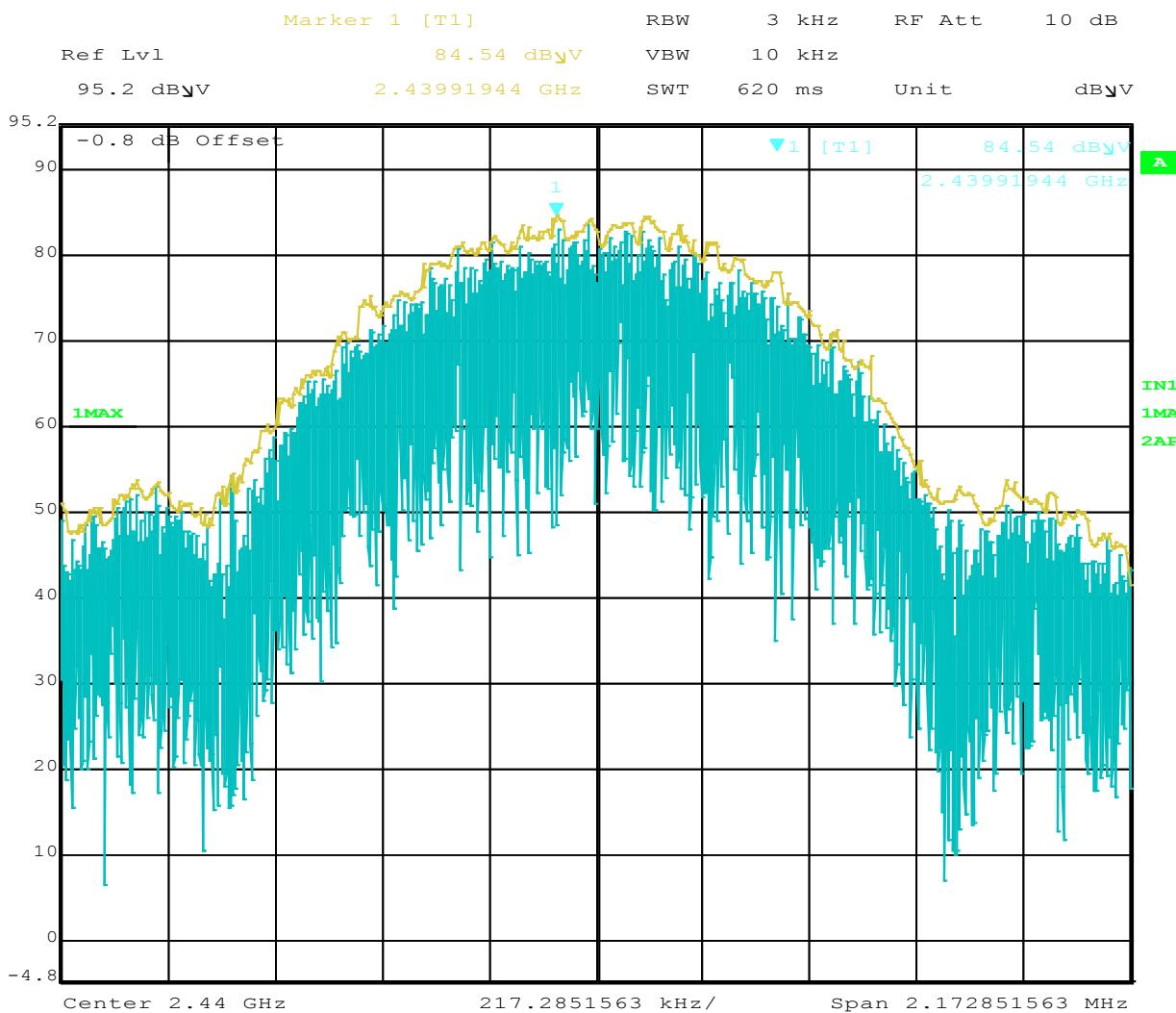
Channel	Marker Reading using 3 kHz RBW (dB $\mu$ V/m)	Calculated PSD: Marker Reading – Antenna Gain (dB $\mu$ V/m)	Calculated PSD Limit (dB $\mu$ V/m)	Margin (dB)	Compliance
2402 MHz	81.61	82.11	103.16	21.05	Complies
2440 MHz	84.54	85.04		18.12	Complies
2480 MHz	86.71	87.21		15.95	Complies

## 2.8.9 Test Results Plots



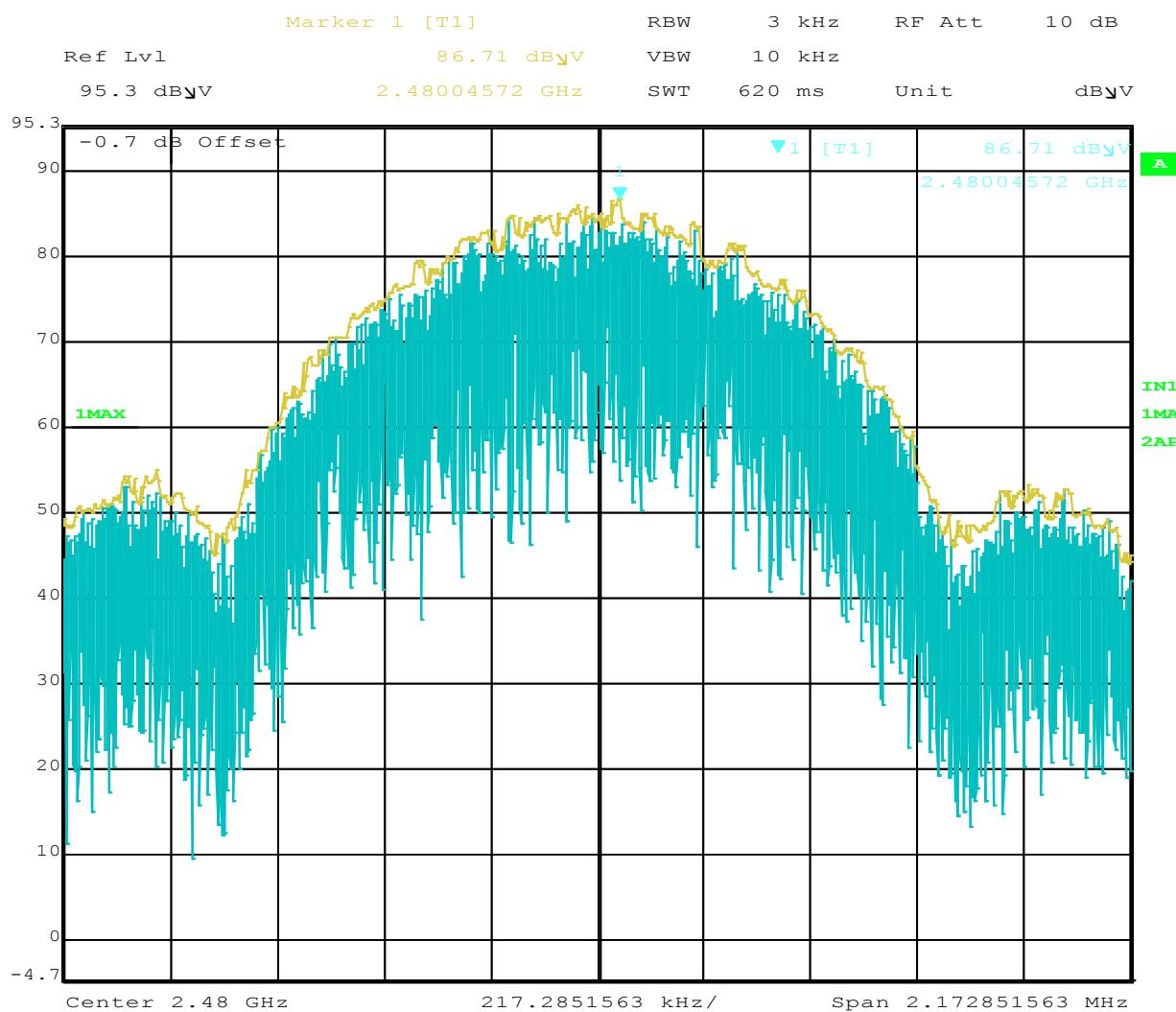
Date: 17.APR.2017 08:19:37

Bluetooth LE Low Channel



Date: 17.APR.2017 08:37:00

**Bluetooth LE Mid Channel**



Date: 17.APR.2017 08:40:57

**Bluetooth LE High Channel**



## **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>						
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	11/05/16	11/05/17
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	03/08/17	03/08/18
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	03/08/17	03/08/18
<b>Radiated Test Setup</b>						
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/07/16	10/07/17
1016	Pre-amplifier	PAM-0202	187	PAM	02/09/17	02/09/18
1033	Bilog Antenna	3142C	00044556	EMCO	10/11/16	10/11/18
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	02/09/17	02/09/18
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	09/09/16	09/09/17
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	05/12/16	05/12/17
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 7620	
<b>Miscellaneous</b>						
7619	Barometer/Temperature/Humidity Transmitter	iBTHX-W	15250268	Omega	12/21/16	12/21/17
	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

Contribution		Probability Distribution Type	Probability Distribution $x_i$	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
		Combined Uncertainty ( $u_c$ ):		0.80	
		Coverage Factor (k):		2	
		Expanded Uncertainty:		1.59	

#### 3.2.2 Radiated 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	3.52	1.44	2.07
6	EUT Setup	Rectangular	1.00	0.58	0.33
		Combined Uncertainty ( $u_c$ ):		1.68	
		Coverage Factor (k):		2	
		Expanded Uncertainty:		3.36	

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

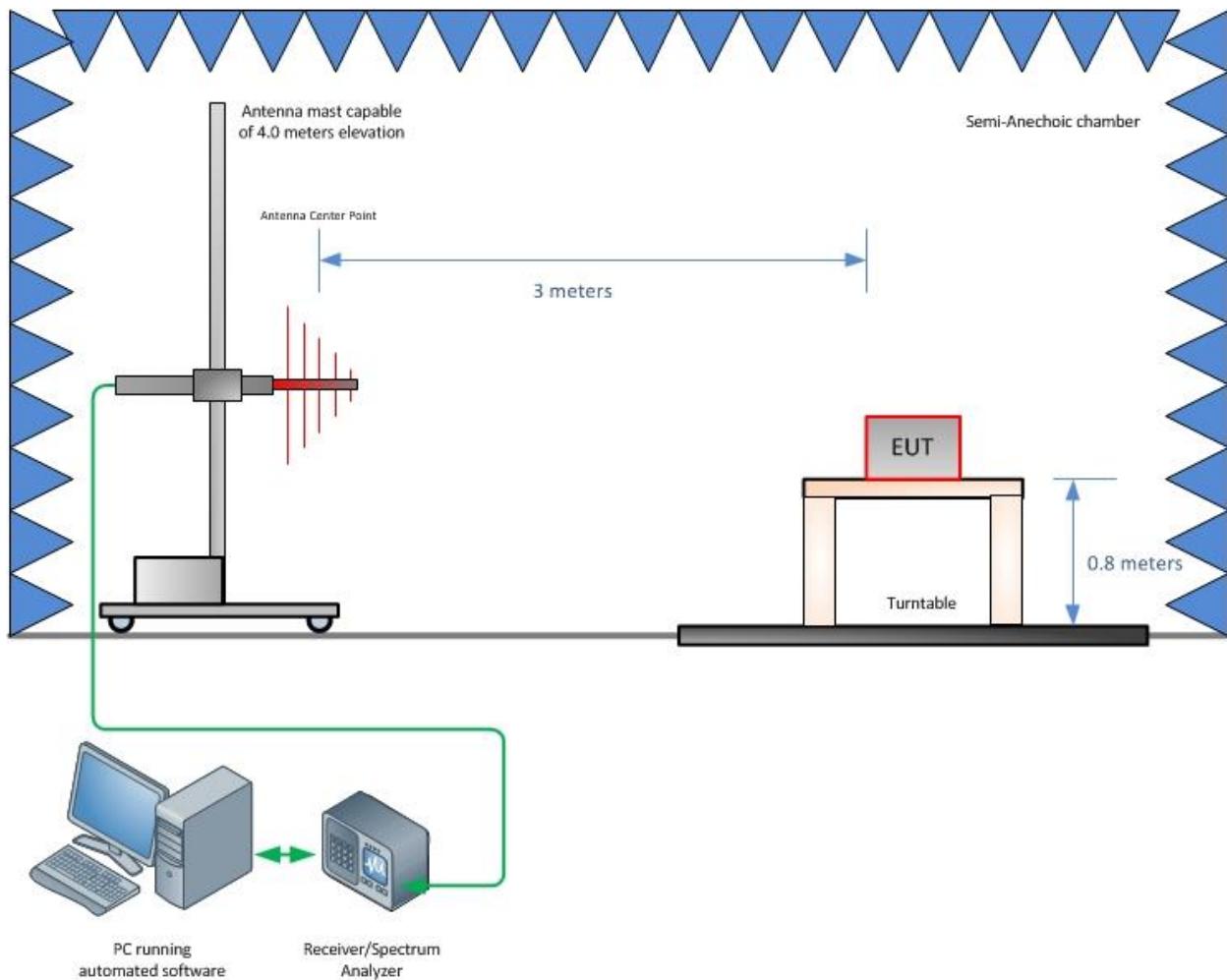
Contribution		Probability Distribution Type	Probability Distribution $x_i$	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.00	1.22	1.50
6	EUT Setup	Rectangular	1.00	0.58	0.33
		Combined Uncertainty ( $u_c$ ):		1.49	
		Coverage Factor (k):		2	
		Expanded Uncertainty:		2.99	

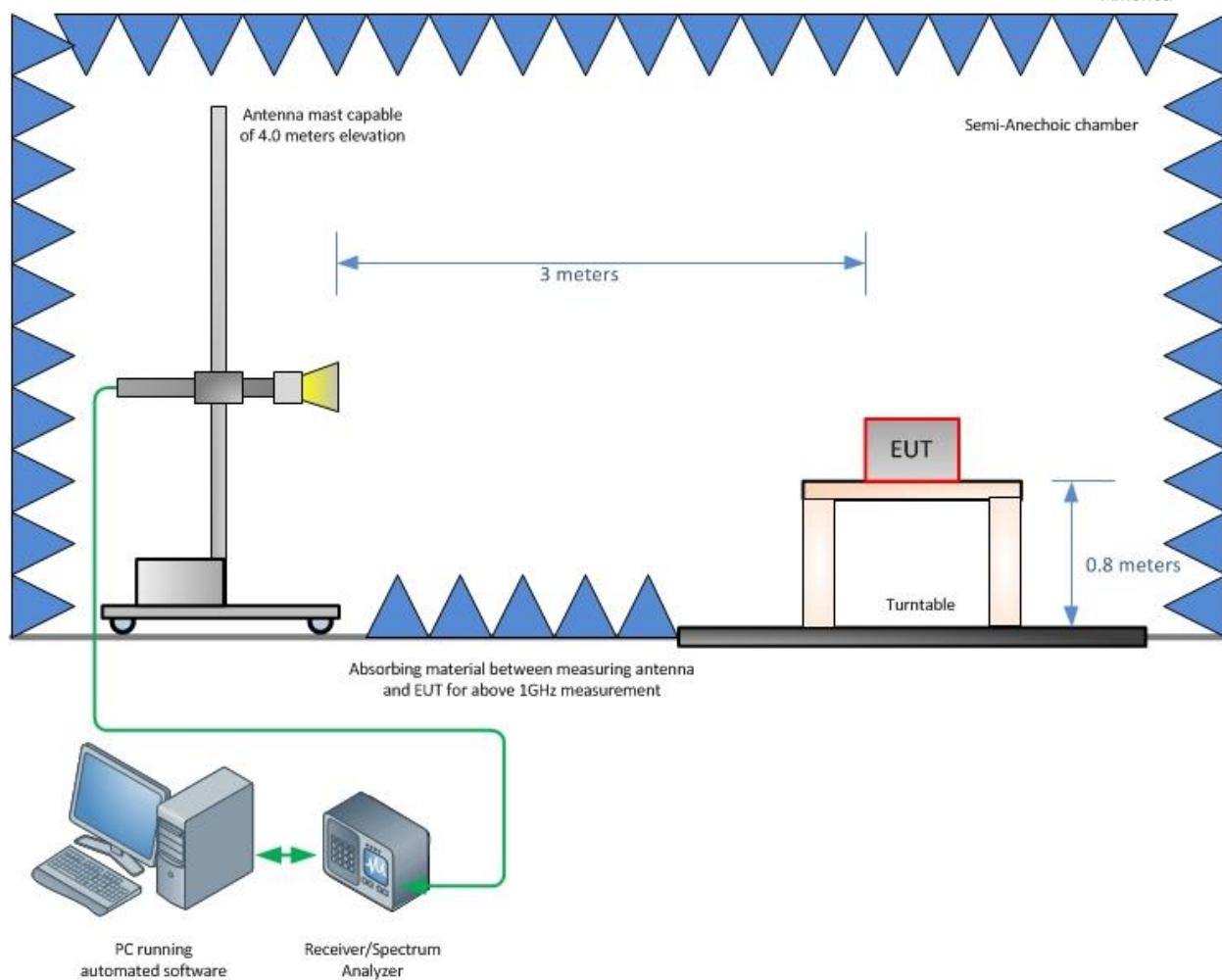


## SECTION 4

### DIAGRAM OF TEST SETUP

#### 4.1 TEST SETUP DIAGRAM

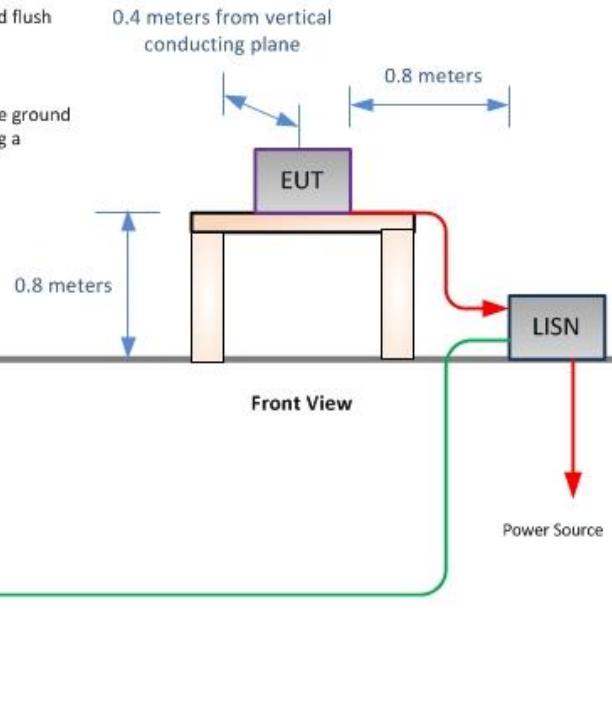




**Radiated Emission Test Setup (Above 1GHz)**

#### Shielded Enclosure

- EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated into  $50 \Omega$  loads.
- LISN at least 80 cm from nearest part of EUT chassis.
- Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.



#### Conducted Emission Test Setup



## **SECTION 5**

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



## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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