Report On

Application for Grant of Equipment Authorization of the
Globalstar USA LLC
SPOTXB Satellite GPS Messenger

FCC Part 15 Subpart C §15.247
IC RSS-247 Issue 2 February 2017

Report No. 72142941L **June 2019**

REPORT ON	EMC Evaluation of the Globalstar USA LLC SPOTXB Satellite GPS Messenger
TEST REPORT NUMBER	72142941L
TEST REPORT DATE	June 2019
PREPARED FOR	Globalstar USA LLC 1351 Holiday Square Blvd Covington, LA 70433
CONTACT PERSON	Jeffery Mendow Sr. Hardware Design Engineer jeff.mendow@globalstar.com (985) 335-1650
PREPARED BY	Xiaoying Zhang **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: Senior EMC Test Engineer/Wireless Team Lead
DATED	June 18, 2019

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

Revision History

72142941L Globalstar USA LLC SPOTXB Satellite GPS Messenger					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
06/18/19	-	Initial Release			Ferdinand S. Custodio

CONTENTS

SECTION 1

REPORT SUMMARY

Radio Testing of the
Globalstar USA LLC
SPOTXB Satellite GPS Messenger

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

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 C §15.247 and IC 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	Globalstar USA LLC
EUT	Satellite GPS Messenger
Model Name	SPOTXB
Model Number(s)	SPOTXB
FCC ID	L2V-SPOTXB
IC Number	3989A-SPOTXB
FCC Classification	Low Power Communications Device Transmitter (DTS)
Serial Number(s)	2955076, 2955062
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2018). • RSS-247–Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices (Issue 2, February 2017). • RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 5, Amendment 1, March 2019).
Start of Test	January 17, 2019
Finish of Test	April 03, 2019
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• KDB 558074 D01 (DTS Meas Guidance v05, August 24, 2018). Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules. • 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 and IC RSS-247 Issue 2 February 2017 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	-	RSS-Gen 6.7	99% Emission Bandwidth	Compliant	
2.3	§15.247(a)(2)	RSS-247 5.2(a)	Minimum 6 dB RF Bandwidth	Compliant	
2.4	§15.247(d)	RSS-247 5.5	Out-of-Band Emissions - Conducted	Compliant	
2.5	§15.247(d)	RSS-247 5.5	Band-edge Compliance of RF Conducted Emissions	Compliant	
2.6	§15.247(d)	RSS-247 5.5	Radiated Spurious Emissions	Compliant	
-	-	RSS-Gen 7.3/7.4	Receiver Spurious Emissions	N/A*	
2.8	§15.247(e)	RSS-247 5.2(b)	Power Spectral Density for Digitally Modulated Device	Compliant	

N/A Not required as per RSS-Gen 5.2. The EUT is not a stand-alone receiver.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) is a Globalstar USA LLC SPOTXB Satellite GPS Messenger. 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 & Rescue personnel, and to navigate. It can also be linked to smart devices via Bluetooth Low Energy. Only the BT Low Energy function of the EUT was verified in this test report.

1.3.2 EUT General Description

EUT Description	Satellite GPS Messenger
Model Name	SPOTXB
Model Number(s)	SPOTXB
Rated Voltage	3.1 VDC – 4.2 VDC Battery input; 4.4 VDC – 5.25 VDC USB input
Mode Verified	BT LE
Capability	Satellite Service, BT LE and GPS
Primary Unit (EUT)	☒ Production ☐ Pre-Production ☐ Engineering
Manufacturer Declared Temperature Range	-20°C to 60°C
Antenna Type	Integral Antenna
Antenna Model	-
Maximum Antenna Gain	Max. 1.7 dBi for BT LE

1.3.3 Maximum Conducted Output Power

Bluetooth Low Energy (LE)	Frequency Range (MHz)	Average Output Power (dBm)	Average Output Power (mW)	Peak Output Power (dBm)	Peak Output Power (mW)
	2402-2480	-1.22	0.755	1.65	1.462

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Antenna Conducted Port Single Channel Mode. EUT connects to a support Laptop via a Bluetooth serial converter PCB and USB Cable and is set to transmit in fixed channel using Putty.
B	Case/Cabinet Radiated Emission Single Channel Mode. EUT connects to a support Laptop via USB Cable and is set to transmit in fixed Bluetooth LE channel using Putty.
C	BT LE and Satellite Simultaneous Transmission. The EUT connects to a support Laptop via USB Cable and set to transmit BTLE and Satellite Signal simultaneously. The BTLE RF port and Satellite RF port are terminated by 50 Ωload.

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.

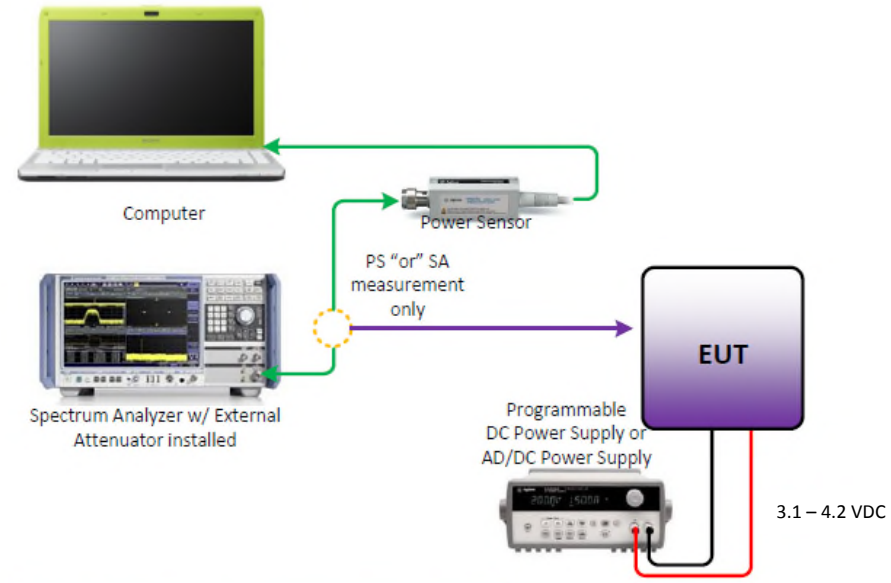
1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Acer	Laptop (ASPIREone)	S/N LUSAL0B137011532631601
Delta Electronics Inc.	Laptop AC Adapter (ADP-40TH)	S/N 592C60AYMSO26N
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
Sparkfun Electronics	Bluetooth Serial Converter PCB board	M/N: BOB-12731

* AC/DC Adaptor is not sold together with the device and thus are not part of the device. It was used as support equipment only.

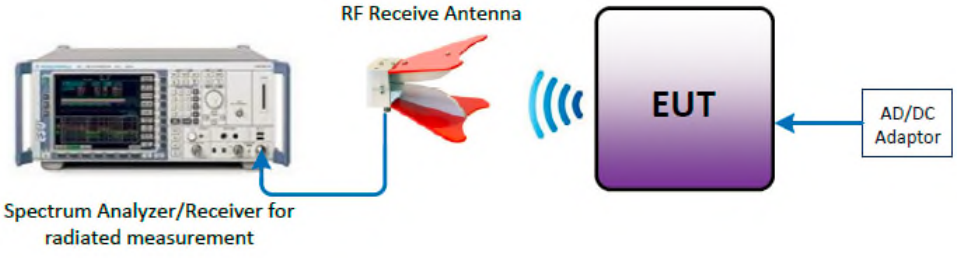
1.4.4 Simplified Test Configuration Diagram

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



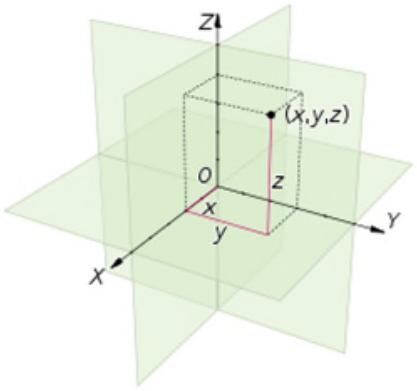
Not To Scale – Illustration Purpose Only
Objects may not represent actual image of original equipment/s or set-up.

1.4.5 Worst Case Configuration

Worst-case configuration used in this test report as per Radiated Spurious Emission:

Mode	Channel	Data Rate
Bluetooth LE	17 (Middle Channel)	1Mbps

For radiated measurements X, Y, and Z orientations were verified. The verification was determined "X" as worst case configuration.



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: 2955076 and 2955062		
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 C63.10-2013, 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 C63.10-2013. 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 (ISED) 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

Radio Testing of the
Globalstar USA LLC
SPOTXB Satellite GPS Messenger

2.1 PEAK OUTPUT POWER

2.1.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(b)(3)
RSS-247, Clause 5.4 (d)

2.1.2 Standard Applicable

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands, the maximum peak conducted output shall not exceed 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: 2955076 / Default Test Configuration

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

January 22, 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

Ambient Temperature	21.9°C
Relative Humidity	27.4%
ATM Pressure	99.7kPa

2.1.7 Additional Observations

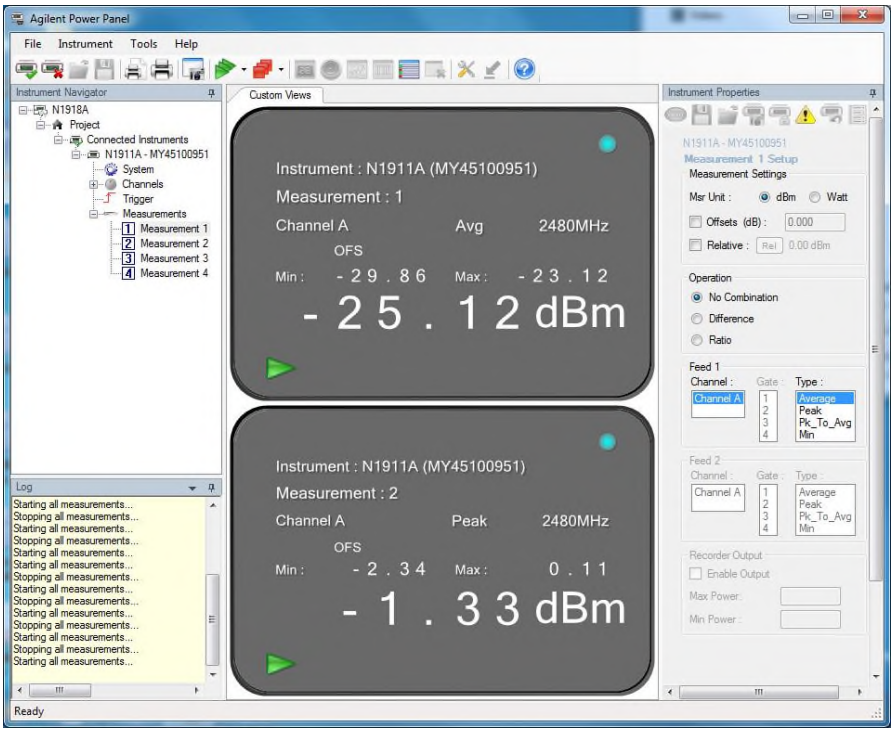
- This is a conducted test (Maximum conducted [average] output power) using direct connection to a power meter.
- The path loss was measured and entered as a level offset.
- The maximum power is set to 0 dBm and the data rate is 1 Mbps.
- Test methodology is per Clause 8.3.2.3 of KDB 558074 D01 (DTS Meas Guidance v05, August 24, 2018). All conditions under this Clause are satisfied.
- Both Peak and Average measurements were recorded.

2.1.8 Test Results

Bluetooth Low Energy (LE)	Channel	Modulation	Measured Average Power (dBm)	Measured Peak Power (dBm)
	37 (2402 MHz)	GFSK @ 1Mbps	-2.88	1.3
	17 (2440 MHz)		**-1.22**	**1.65**
	39 (2480 MHz)		-25.12*	-1.33

* The power of High Channel is low due to the EUT filter rolloff, and the upper channel is being rejected

2.1.9 Sample Test Display



Bluetooth LE Middle Channel 1Mbps

2.2 99% EMISSION BANDWIDTH

2.2.1 Specification Reference

RSS-Gen Clause 6.7

2.2.2 Standard Applicable

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and one below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall e reported for all equipment in additon to the specified bandwidth required in the applicable RSSs.

The following conditions shall be observed for measuring the occpied bandwidth:

- 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, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sample detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occpied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied / x dB and video bandwidth (VBW) shall be samller than three times the RBW value. Video averaging is not permitted.

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 occupied bandwidth (or the 99% emission bandwidth).

2.2.3 Equipment Under Test and Modification State

Serial No: 2955076 / Default Test Configuration

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

January 22, 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

Ambient Temperature	22.1°C
Relative Humidity	21.6%
ATM Pressure	99.9kPa

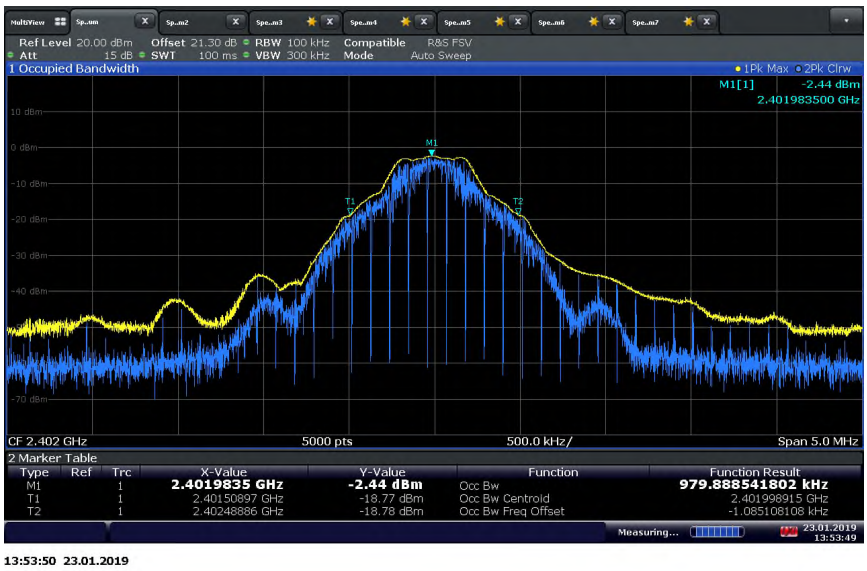
2.2.7 Additional Observations

- This is a conducted test.
- The path loss was measured and entered as a level offset.
- Span is wide enough to capture the channel transmission.
- RBW is 100kHz.
- VBW is 3 x RBW.
- Sweep is auto.
- Detector is peak.
- Trace mode is max hold.
- 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.

2.2.8 Test Results (For reporting purposes only)

Mode	Channel	Measured 99% Bandwidth (MHz)
Bluetooth LE	37 (2402 MHz)	0.9799
	17 (2440 MHz)	1.3012
	39 (2480 MHz)	2.5672

2.2.9 Test Results Plots

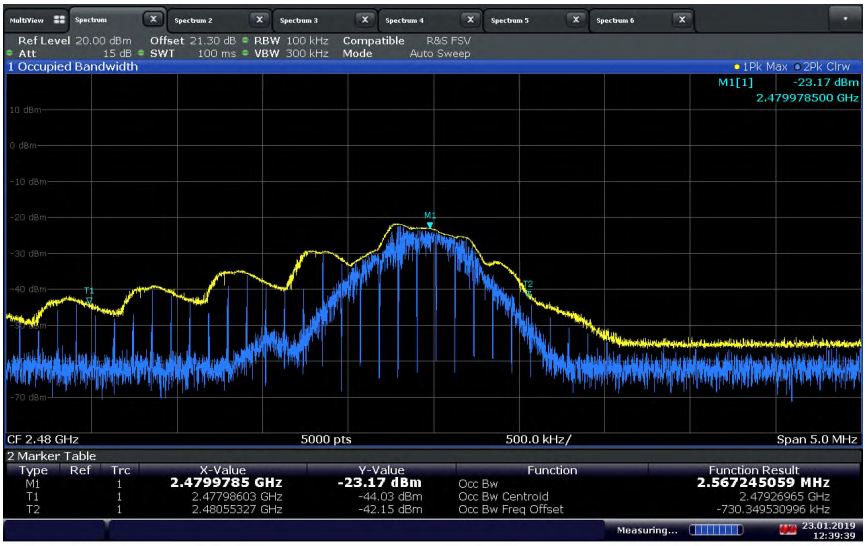


13:53:50 23.01.2019

Bluetooth LE Low Channel

13:48:35 23.01.2019

Bluetooth LE Middle Channel



12:39:39 23.01.2019

Bluetooth LE High Channel

2.3 MINIMUM 6 dB RF BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(a)(2)
RSS-247, Clause 5.2 (a)

2.3.2 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.

2.3.3 Equipment Under Test and Modification State

Serial No: 2955076 / Default Test Configuration

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

2.3.5 Date of Test/Initial of test personnel who performed the test

January 22, 2019/XYZ

2.3.6 Test Equipment Used

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

2.3.7 Environmental Conditions

Ambient Temperature	22.1°C
Relative Humidity	21.6%
ATM Pressure	99.9kPa

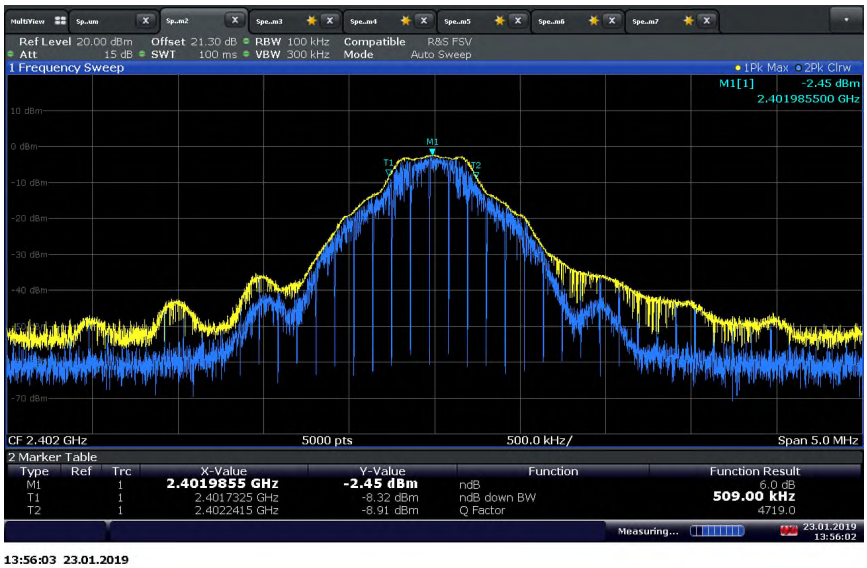
2.3.8 Additional Observations

- This is a conducted test.
- The path loss was measured and entered as a level offset.
- Span is wide enough to capture the channel transmission.
- RBW is set to 100 kHz.
- VBW is ≥3 x RBW.
- Sweep is auto.
- Detector is peak.
- Trace is maxhold.
- The “n” dB down marker function of the spectrum analyzer was used for this test.

2.3.9 Test Results

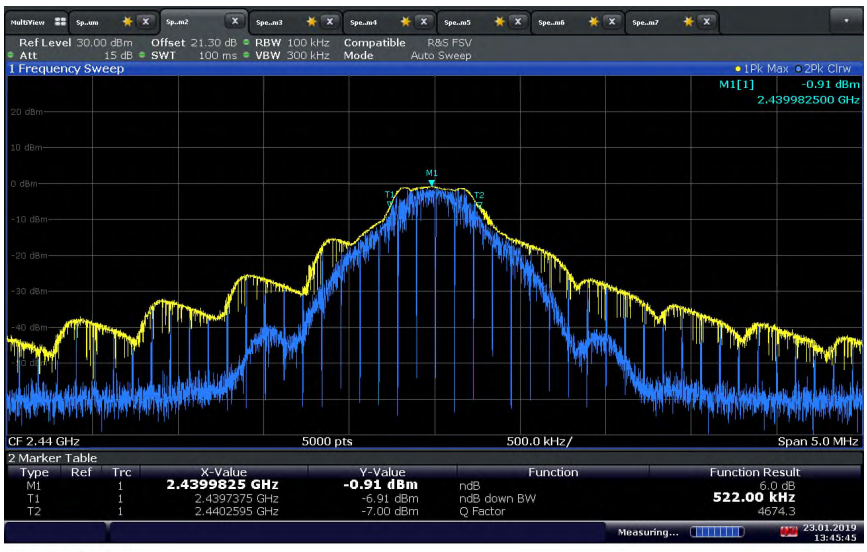
Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
Bluetooth LE	37 (2402 MHz)	0.509	0.500	Complies
	17 (2440 MHz)	0.522	0.500	Complies
	39 (2480 MHz)	0.564	0.500	Complies

2.3.10 Test Results Plots



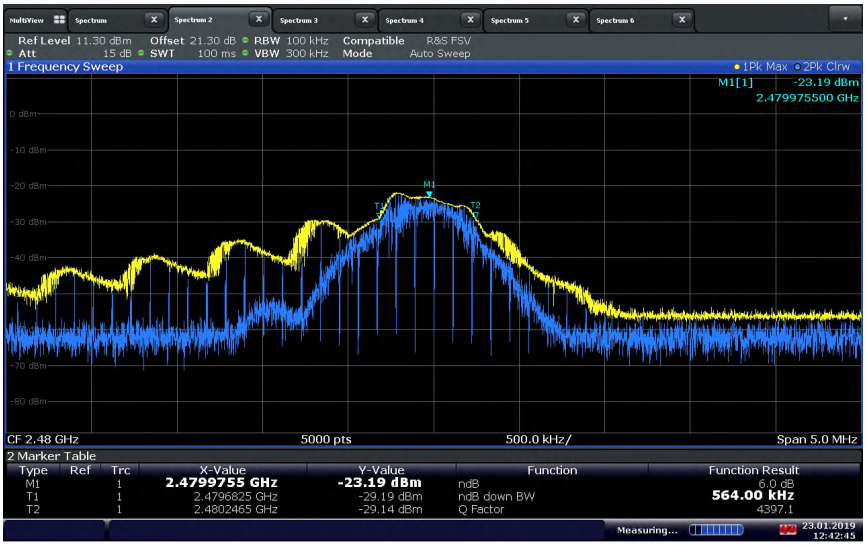
13:56:03 23.01.2019

Bluetooth LE Low Channel



13:45:45 23.01.2019

Bluetooth LE Middle Channel



Bluetooth LE High Channel

2.4 OUT-OF-BAND EMISSIONS - CONDUCTED

2.4.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
RSS-247, Clause 5.5

2.4.2 Standard Applicable

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)).

2.4.3 Equipment Under Test and Modification State

Serial No: 2955076 / Default Test Configuration

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

January 22, 2019/XYZ

2.4.5 Test Equipment Used

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

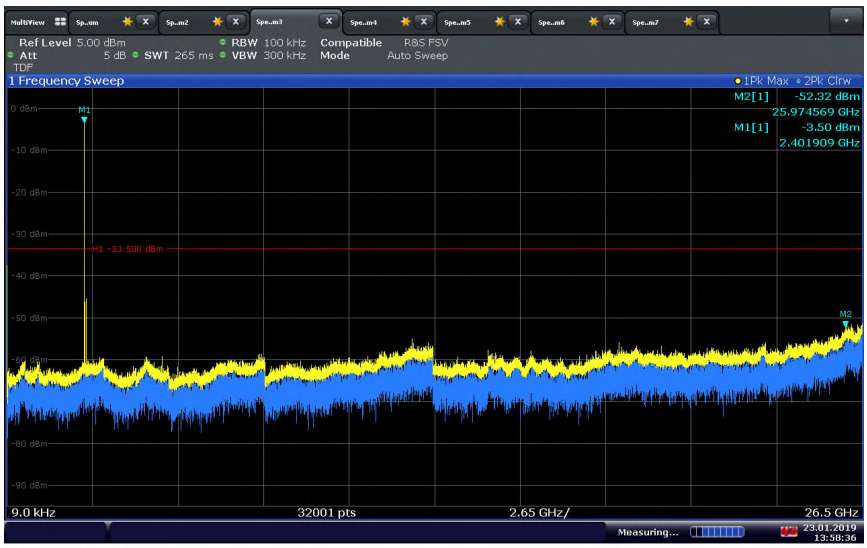
2.4.6 Environmental Conditions

Ambient Temperature	22.1°C
Relative Humidity	21.6%
ATM Pressure	99.9kPa

2.4.7 Additional Observations

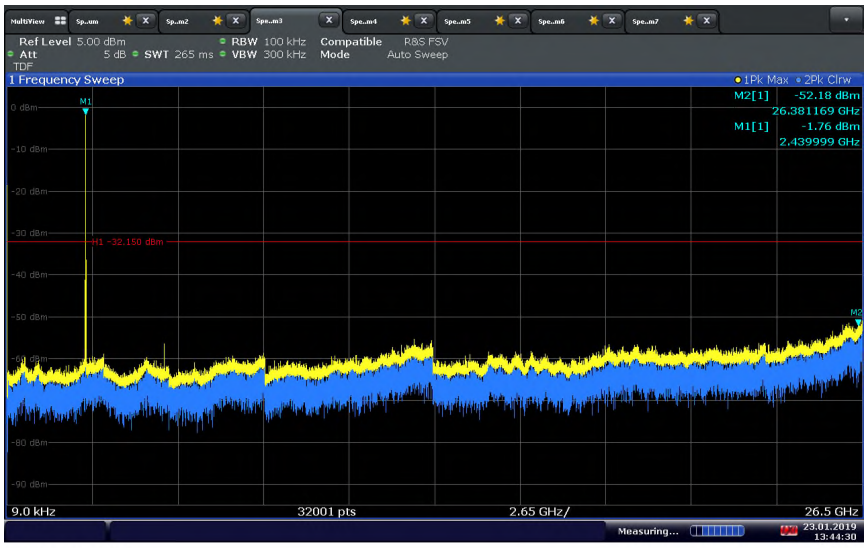
- This is a conducted test.
- TDF (Transducer Factor) was used to compensate for the external attenuator and cable used.
- RBW is 100kHz.VBW is 3 x RBW.
- Sweep is auto. Detector is peak. Trace is max hold.
- Initial scan was performed to determine the highest level of the desired power within the band. Limit (display line) was drawn 30dB below this level.
- Spectrum was searched from 9 kHz up to 26.5GHz.

2.4.8 Test Results Plots



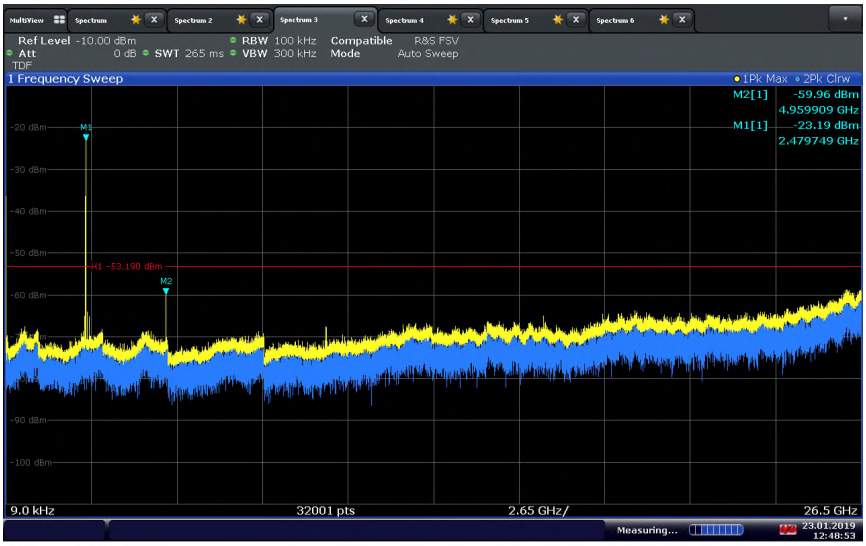
13:58:37 23.01.2019

Bluetooth LE Low Channel



13:44:30 23.01.2019

Bluetooth LE Middle Channel



Bluetooth LE High Channel

2.5 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.5.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
FCC 47 CFR Part 15, Clause 15.205
RSS-247, Clause 5.5

2.5.2 Standard Applicable

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: 2955076 / Default Test Configuration

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

January 23, 2019/XYZ

2.5.5 Test Equipment Used

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

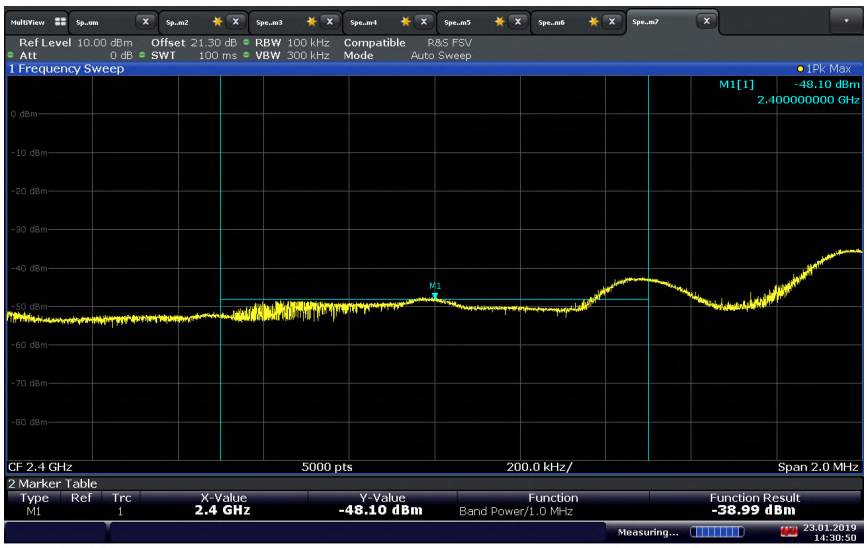
2.5.6 Environmental Conditions

Ambient Temperature	22.1°C
Relative Humidity	21.6%
ATM Pressure	99.9kPa

2.5.7 Additional Observations

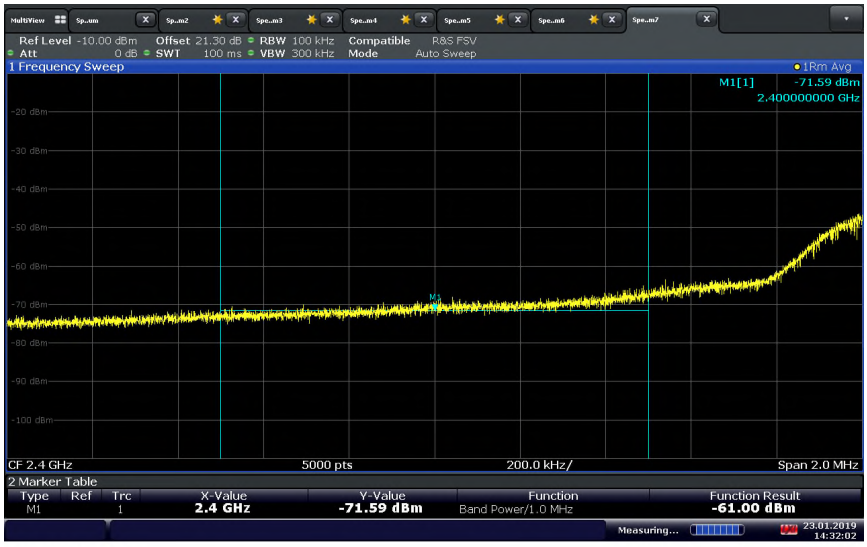
- Setup is identical to “Out-of-Band Emissions – Conducted” test (previous test).
- The path loss was measured and entered as a level offset
- Test methodology is per Clause 8.7.3 of KDB 558074 D01 (DTS Meas Guidance v05, August 24, 2018) which refer to C63.10 Section 11.13.3.2 Peak detection and 11.13.3.3 trace averaging with continuous EUT transmission at full power.
- The highest level of the desired power in the 100 kHz bandwidth within the band were tested , Limits are 30dBc from the highest level of the desired power within the band.

2.5.8 Test Results



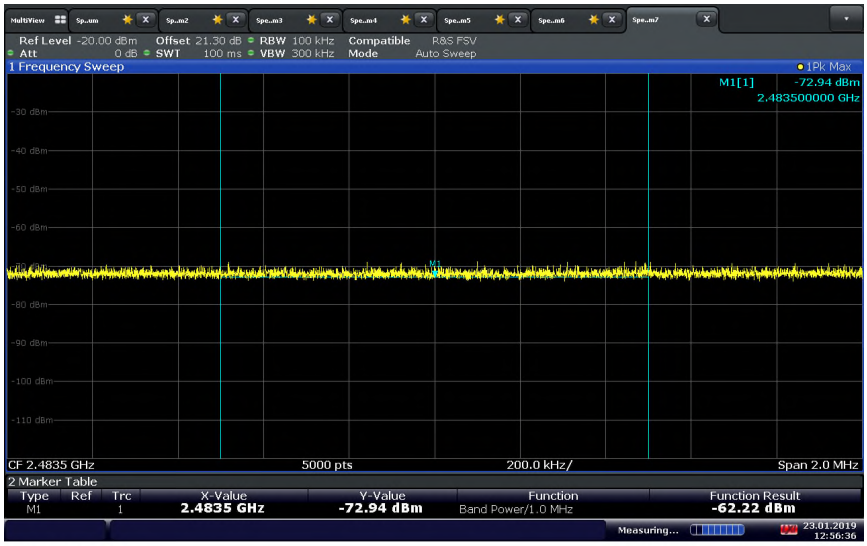
14:30:51 23.01.2019

Bluetooth LE Low Band Edge 2400MHz (Peak Measurement) @ Ch 2402 MHz
(For reference only. not in the restricted band)



14:32:03 23.01.2019

Bluetooth LE Low Channel (2402 MHz). Limit is -33.5 dBm. Margin is -27.5 dB.
(The highest level of the desired power in the 100 kHz bandwidth within the band is -3.5 dBm)



Bluetooth LE Upper Band Edge 2483.5MHz (Peak Measurement) @ Ch 2480 MHz
Limit is -53.19 dBm. Margin is -9.03 dB
(The highest level of the desired power in the 100 kHz bandwidth within the band is -23.19 dBm)

Upper band edge calculation (2483.5 MHz):

- 2483.5 MHz (in the restricted bands)
- Use the following formula as per Section 12.7.2 (d)(2) in C63.10: 2013:

E (dBµV/m) = EIRP (dBm) + 95.23
= (-62.22 dBm + 1.7 dBi antenna gain) + 95.23
= 34.71 dBµV/m @ 3 meters (Complies with 54 dBµV/m Average limit. Average testing is not needed)

2.6 RADIATED SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
RSS-247, Clause 5.5

2.6.2 Standard Applicable

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: 2955076 and 2955062 / Default Test Configuration

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

February 11, 26, and April 03, 2019/XYZ

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	20.6 - 22.1 °C
Relative Humidity	46.6 - 46.7 %
ATM Pressure	99.1 - 99.4 kPa

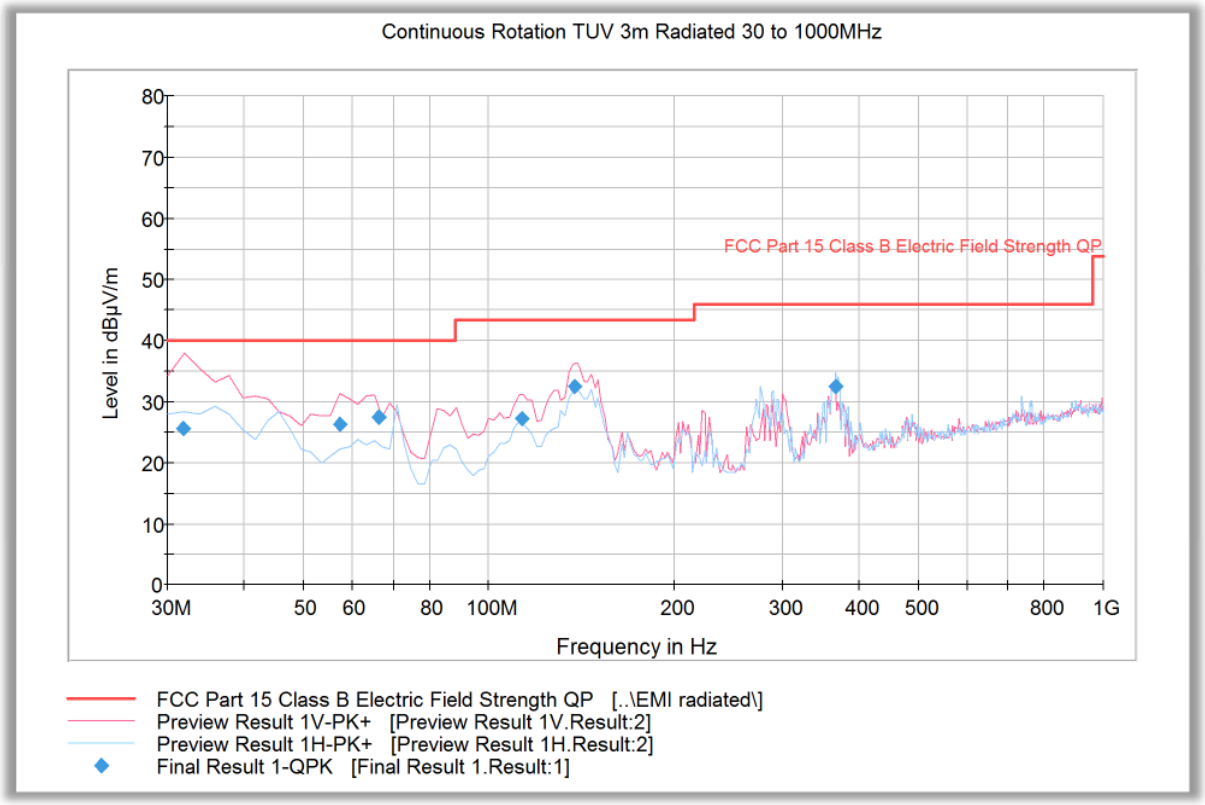
2.6.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic.
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Only the worst case BLE (Middle Channel) presented for below 1GHz. There are no significant differences in emissions between all channels.
- Only noise floor measurements observed above 18GHz.
- 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 2.7.8 for sample computation.

2.6.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbµV) @ 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**

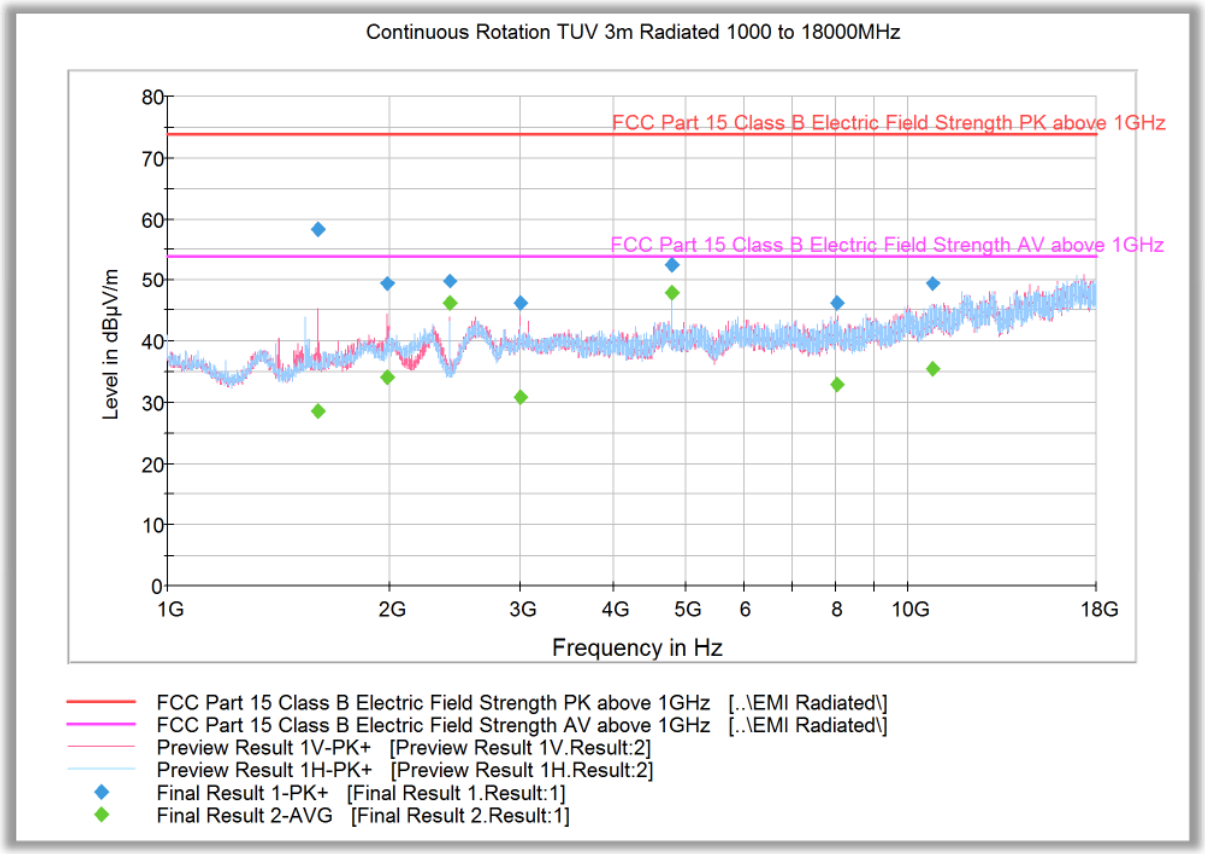
2.6.9 Worst case Test Results for Below 1GHz – Middle Channel



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)
31.800000	25.7	1000.0	120.000	100.0	V	12.0	-8.5	14.3	40.0
57.054429	26.3	1000.0	120.000	116.0	V	-5.0	-16.1	13.7	40.0
66.029980	27.5	1000.0	120.000	144.0	V	144.0	-16.6	12.5	40.0
113.187174	27.4	1000.0	120.000	100.0	V	310.0	-14.2	16.1	43.5
138.097715	32.4	1000.0	120.000	100.0	V	-14.0	-14.0	11.1	43.5
366.372585	32.6	1000.0	120.000	225.0	H	105.0	-4.4	13.4	46.0

2.6.10 Test Results for Above 1GHz - Low Channel



Peak Data

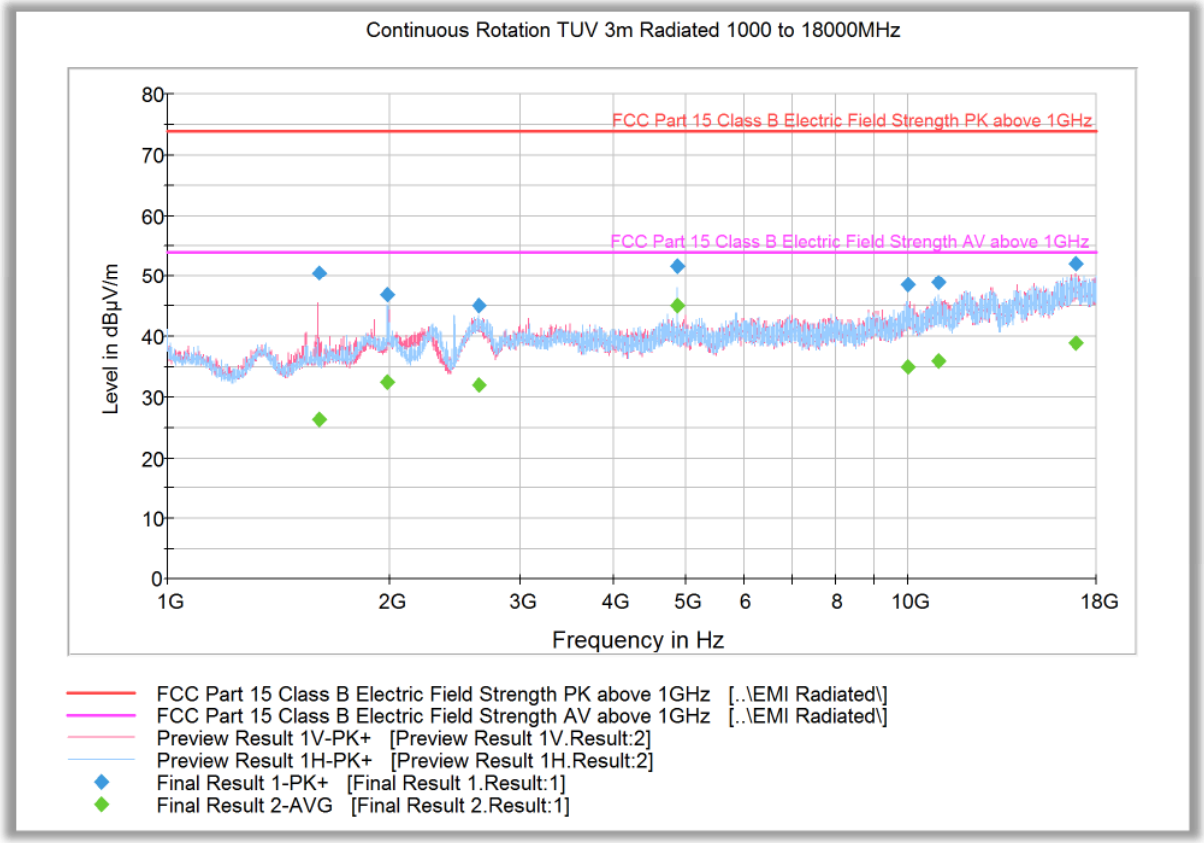
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1592.566667	58.2	1000.0	1000.000	250.5	V	204.0	-5.8	15.7	73.9
1981.466667	49.4	1000.0	1000.000	194.5	V	-1.0	-2.3	24.5	73.9
2402.166667	49.7	1000.0	1000.000	314.2	V	304.0	-1.2	24.2	73.9
2997.333333	46.2	1000.0	1000.000	165.6	V	212.0	0.8	27.7	73.9
4804.066667	52.5	1000.0	1000.000	291.3	V	13.0	3.5	21.4	73.9
8039.000000	46.3	1000.0	1000.000	169.6	V	176.0	6.7	27.6	73.9
10827.83333	49.4	1000.0	1000.000	152.2	V	148.0	11.5	24.5	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)
1592.566667	28.5	1000.0	1000.000	250.5	V	204.0	-5.8	25.4	53.9
1981.466667	34.1	1000.0	1000.000	194.5	V	-1.0	-2.3	19.8	53.9
2402.166667	46.1	1000.0	1000.000	314.2	V	304.0	-1.2	7.8	53.9
2997.333333	30.9	1000.0	1000.000	165.6	V	212.0	0.8	23.0	53.9
4804.066667	47.8	1000.0	1000.000	291.3	V	13.0	3.5	6.1	53.9
8039.000000	32.9	1000.0	1000.000	169.6	V	176.0	6.7	21.0	53.9
10827.83333	35.5	1000.0	1000.000	152.2	V	148.0	11.5	18.4	53.9

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

2.6.11 Test Results for Above 1GHz - Middle Channel



Peak Data

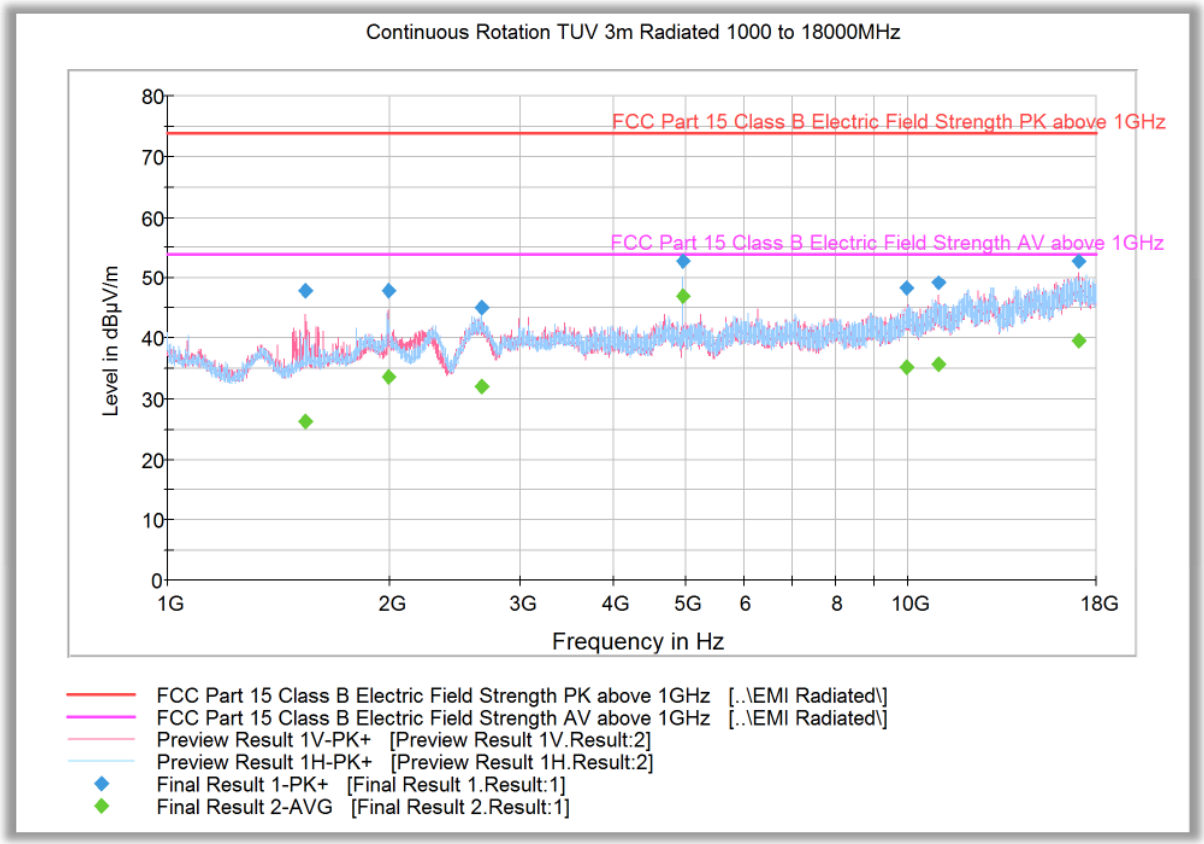
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1598.066667	50.5	1000.0	1000.000	208.5	V	77.0	-5.8	23.4	73.9
1981.266667	46.8	1000.0	1000.000	103.7	H	27.0	-2.3	27.1	73.9
2627.466667	45.1	1000.0	1000.000	333.1	H	115.0	-0.4	28.8	73.9
4879.766667	51.6	1000.0	1000.000	111.7	H	4.0	3.5	22.3	73.9
10009.00000	48.5	1000.0	1000.000	213.4	V	224.0	9.5	25.4	73.9
10998.26666	49.0	1000.0	1000.000	308.2	H	17.0	11.5	24.9	73.9
16895.23333	52.1	1000.0	1000.000	344.1	V	13.0	17.9	21.8	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)
1598.066667	26.3	1000.0	1000.000	208.5	V	77.0	-5.8	27.6	53.9
1981.266667	32.4	1000.0	1000.000	103.7	H	27.0	-2.3	21.5	53.9
2627.466667	32.0	1000.0	1000.000	333.1	H	115.0	-0.4	21.9	53.9
4879.766667	45.1	1000.0	1000.000	111.7	H	4.0	3.5	8.8	53.9
10009.00000	35.0	1000.0	1000.000	213.4	V	224.0	9.5	18.9	53.9
10998.26666	36.0	1000.0	1000.000	308.2	H	17.0	11.5	17.9	53.9
16895.23333	38.9	1000.0	1000.000	344.1	V	13.0	17.9	15.0	53.9

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

2.6.12 Test Results for Above 1GHz - High Channel



Peak Data

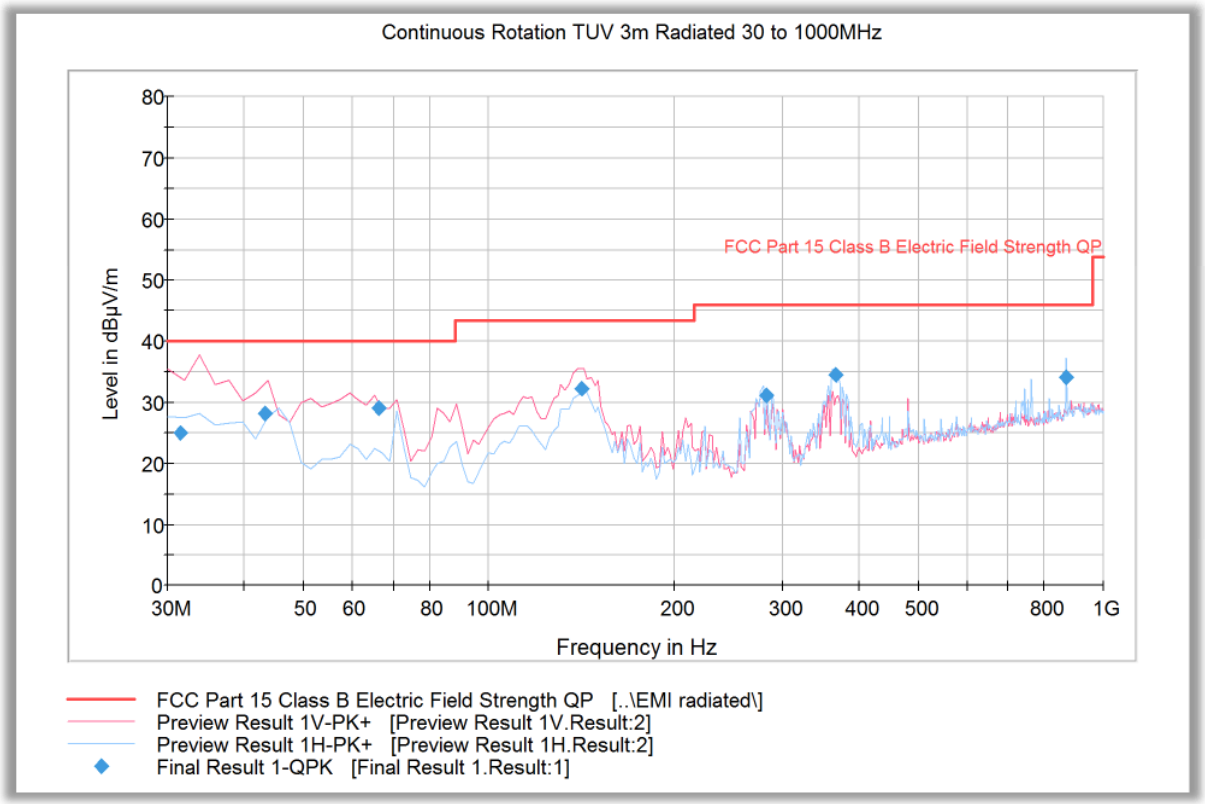
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1534.333333	47.7	1000.0	1000.000	208.5	V	276.0	-6.0	26.2	73.9
1989.966667	47.8	1000.0	1000.000	270.3	V	188.0	-2.3	26.1	73.9
2655.266667	45.1	1000.0	1000.000	270.3	H	115.0	-0.2	28.8	73.9
4959.666667	52.9	1000.0	1000.000	315.2	H	225.0	3.5	21.0	73.9
9964.100000	48.1	1000.0	1000.000	152.7	V	137.0	9.4	25.8	73.9
11005.06666	49.1	1000.0	1000.000	251.4	V	253.0	11.5	24.8	73.9
17024.90000	52.8	1000.0	1000.000	295.3	V	293.0	17.6	21.1	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)
1534.333333	26.4	1000.0	1000.000	208.5	V	276.0	-6.0	27.5	53.9
1989.966667	33.7	1000.0	1000.000	270.3	V	188.0	-2.3	20.2	53.9
2655.266667	32.0	1000.0	1000.000	270.3	H	115.0	-0.2	21.9	53.9
4959.666667	46.8	1000.0	1000.000	315.2	H	225.0	3.5	7.1	53.9
9964.100000	35.3	1000.0	1000.000	152.7	V	137.0	9.4	18.6	53.9
11005.06666	35.8	1000.0	1000.000	251.4	V	253.0	11.5	18.1	53.9
17024.90000	39.5	1000.0	1000.000	295.3	V	293.0	17.6	14.4	53.9

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

2.6.12.1 Below 1GHz Radiated Emission Test - BTLE and Satellite Simutaneous Transmission

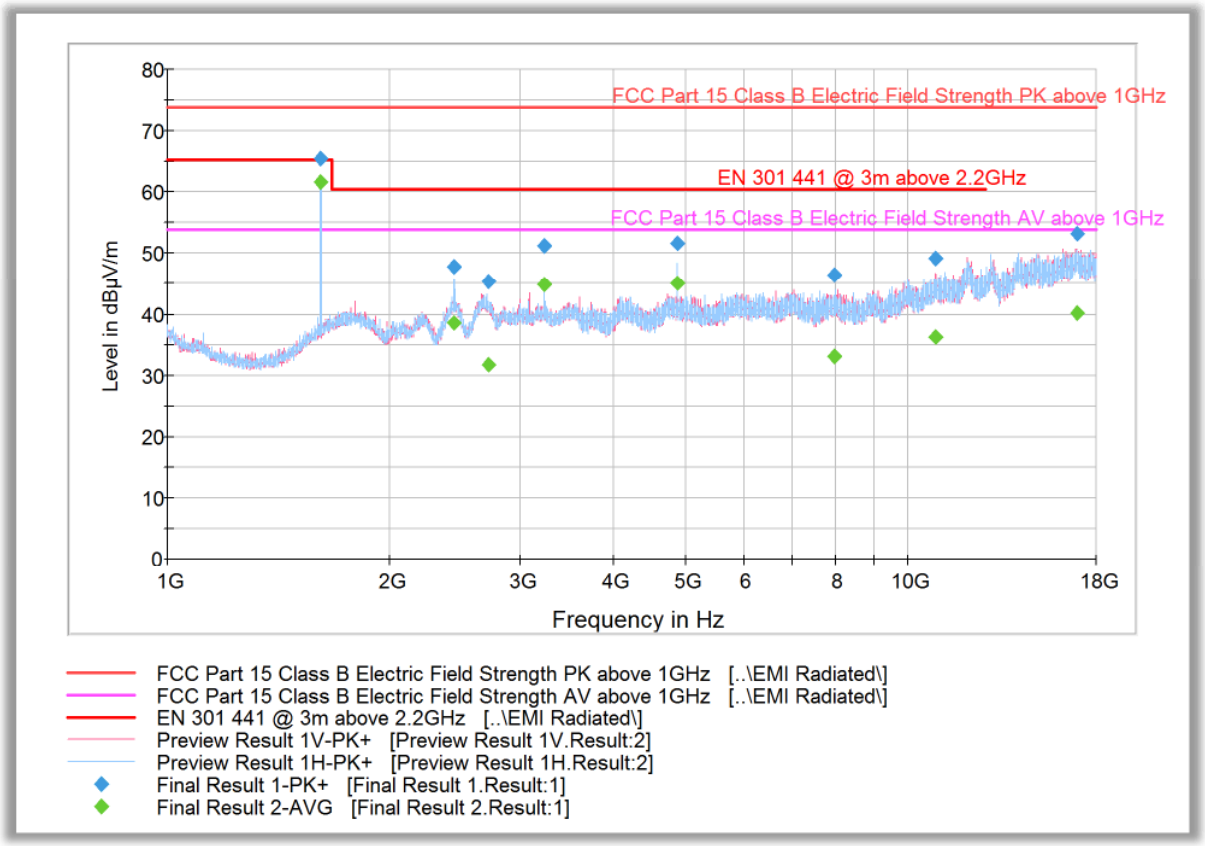


Quasi-Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
31.367776	25.0	1000.0	120.000	128.0	V	88.0	-8.3	15.0	40.0
43.207214	28.2	1000.0	120.000	115.0	V	136.0	-12.9	11.8	40.0
66.029980	29.2	1000.0	120.000	100.0	V	166.0	-16.6	10.8	40.0
141.097715	32.4	1000.0	120.000	100.0	V	325.0	-13.9	11.1	43.5
282.105411	31.1	1000.0	120.000	100.0	H	126.0	-8.1	14.9	46.0
366.052585	34.6	1000.0	120.000	217.0	H	103.0	-4.4	11.4	46.0
868.559519	34.1	1000.0	120.000	100.0	H	-14.0	4.6	11.9	46.0

Test Notes:

2.6.12.2 Above 1GHz Radiated Emission Test - BTLE and Satellite Simutaneous Transmission



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1611.266667	65.6	1000.0	1000.000	295.2	H	343.0	-5.7	Satellite Fundamental Carrier	
2439.900000	47.9	1000.0	1000.000	174.6	H	-19.0	-0.7	26.1	73.9
2717.533333	45.2	1000.0	1000.000	151.6	V	251.0	-0.1	28.7	73.9
3222.700000	51.3	1000.0	1000.000	135.7	H	314.0	1.1	22.6	73.9
4879.800000	51.8	1000.0	1000.000	152.2	H	249.0	3.7	22.1	73.9
7946.733333	46.5	1000.0	1000.000	116.7	V	87.0	6.9	27.4	73.9
10927.800000	49.2	1000.0	1000.000	200.5	V	112.0	11.9	24.7	73.9
16954.633333	53.2	1000.0	1000.000	151.6	V	39.0	17.9	20.7	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)
1611.266667	61.7	1000.0	1000.000	295.2	H	343.0	-5.7	Satellite Fundamental Carrier	
2439.900000	38.6	1000.0	1000.000	174.6	H	-19.0	-0.7	15.3	53.9
2717.533333	31.7	1000.0	1000.000	151.6	V	251.0	-0.1	22.2	53.9
3222.700000	44.9	1000.0	1000.000	135.7	H	314.0	1.1	9.0	53.9
4879.800000	45.1	1000.0	1000.000	152.2	H	249.0	3.7	8.8	53.9
7946.733333	33.0	1000.0	1000.000	116.7	V	87.0	6.9	20.9	53.9
10927.800000	36.2	1000.0	1000.000	200.5	V	112.0	11.9	17.7	53.9
16954.633333	40.1	1000.0	1000.000	151.6	V	39.0	17.9	13.8	53.9

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

2.7 POWER SPECTRAL DENSITY

2.7.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(e)
RSS-247, Clause 5.2(b)

2.7.2 Standard Applicable

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.

2.7.3 Equipment Under Test and Modification State

Serial No: 2955076 / Default Test Configuration

2.7.4 Date of Test/Initial of test personnel who performed the test

January 22, 2019/XYZ

2.7.5 Test Equipment Used

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

2.7.6 Environmental Conditions

Ambient Temperature	22.1°C
Relative Humidity	21.6%
ATM Pressure	99.9kPa

2.7.7 Additional Observations

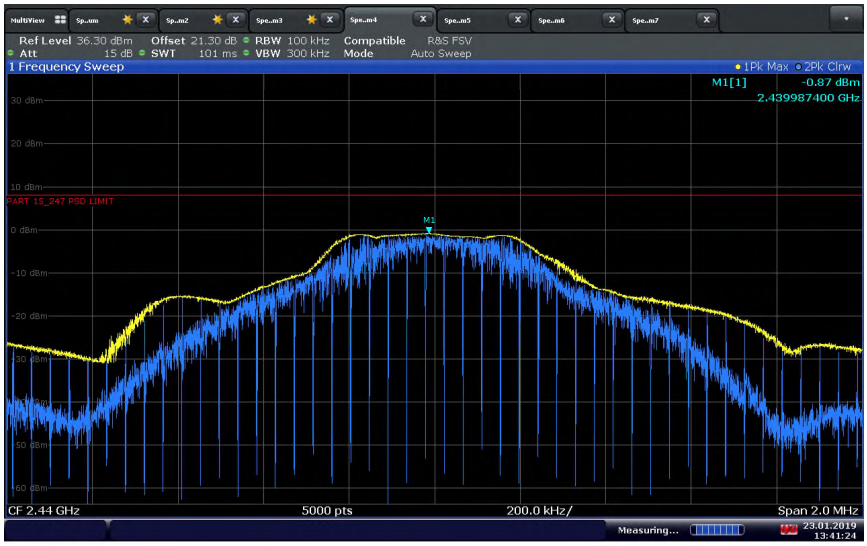
- This is a conducted test.
- Test procedure is per Section 8.4 of KDB 558074 D01 (DTS Meas Guidance v05, August 24, 2018).
- The path loss for was measured and entered as a level offset
- Set span to at least 1.5 times the OBW
- Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz
- VBW ≥ 3 x RBW
- Detector is peak.
- Trace is max hold.
- Sweep time is Auto.
- EUT complies with 100 kHz RBW.

2.7.8 Test Results Summary

Mode	Channel	Data Rates (Mbps)	Marker Reading using 100 kHz RBW (dBm)	PSD Limit (dBm)	Margin (dB)	Compliance
Bluetooth LE	37 (2402 MHz)	GFSK @ 1Mbps	-2.44	8	-1044	Complies
	17 (2440 MHz)	GFSK @ 1Mbps	-0.87	8	-8.87	Complies
	39 (2480 MHz)	GFSK @ 1Mbps	-22.07	8	-30.07	Complies

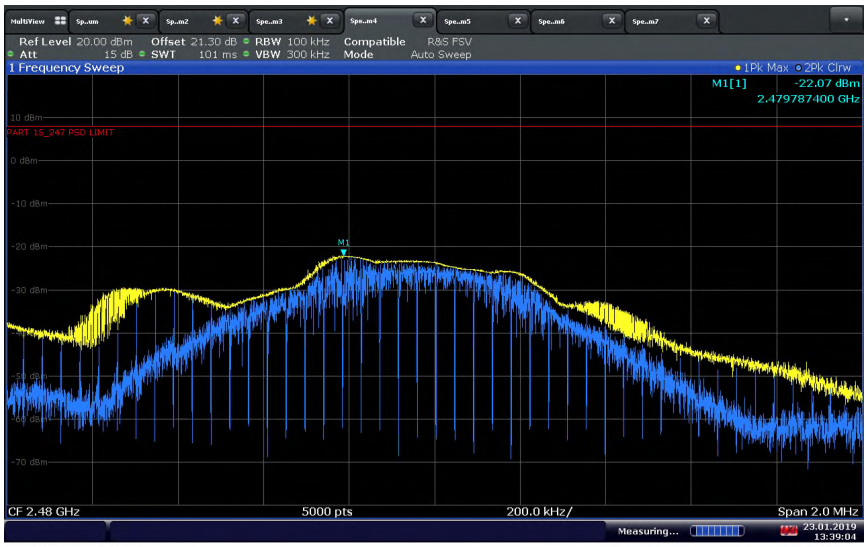
2.7.9 Test Results Plots

Bluetooth LE Low Channel



13:41:25 23.01.2019

Bluetooth LE Middle Channel



13:39:05 23.01.2019

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
Conducted Port Setup						
7662	P-Series Power Meter	N1911A	MY45100951	Agilent	06/15/18	06/15/19
7661	50MHz-18GHz Wideband Power Sensor	N1921A	MY45241383	Agilent	06/15/18	06/15/19
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
8705	3dB Attenuator	HAT-3+	-	Mini Circuit	Verified by 7608 and 7582	
8710	10dB Attenuator	HAT-10+	-	Mini Circuit	Verified by 7608 and 7582	
Radiated Emission						
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
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 1049	
Miscellaneous						
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	

3.1 MEASUREMENT UNCERTAINTY

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

3.1.1 Conducted Antenna Port Measurement

	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	Cable attenuation	1.00 dB	Normal, k=2	2.000	0.50	0.25
3	Receiver sinewave accuracy	0.08 dB	Normal, k=2	2.000	0.04	0.00
4	Receiver pulse amplitude	0.00 dB	Rectangular	1.732	0.00	0.00
5	Receiver pulse repetition rate	0.00 dB	Rectangular	1.732	0.00	0.00
6	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
7	Frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
8	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
	Combined standard uncertainty		Normal	0.52 dB		
	Expanded uncertainty		Normal, k=2	**1.03 dB**		

3.1.2 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**		

3.1.3 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
	Combined standard uncertainty		Normal	2.85 dB		
	Expanded uncertainty		Normal, k=2	**5.70 dB**		

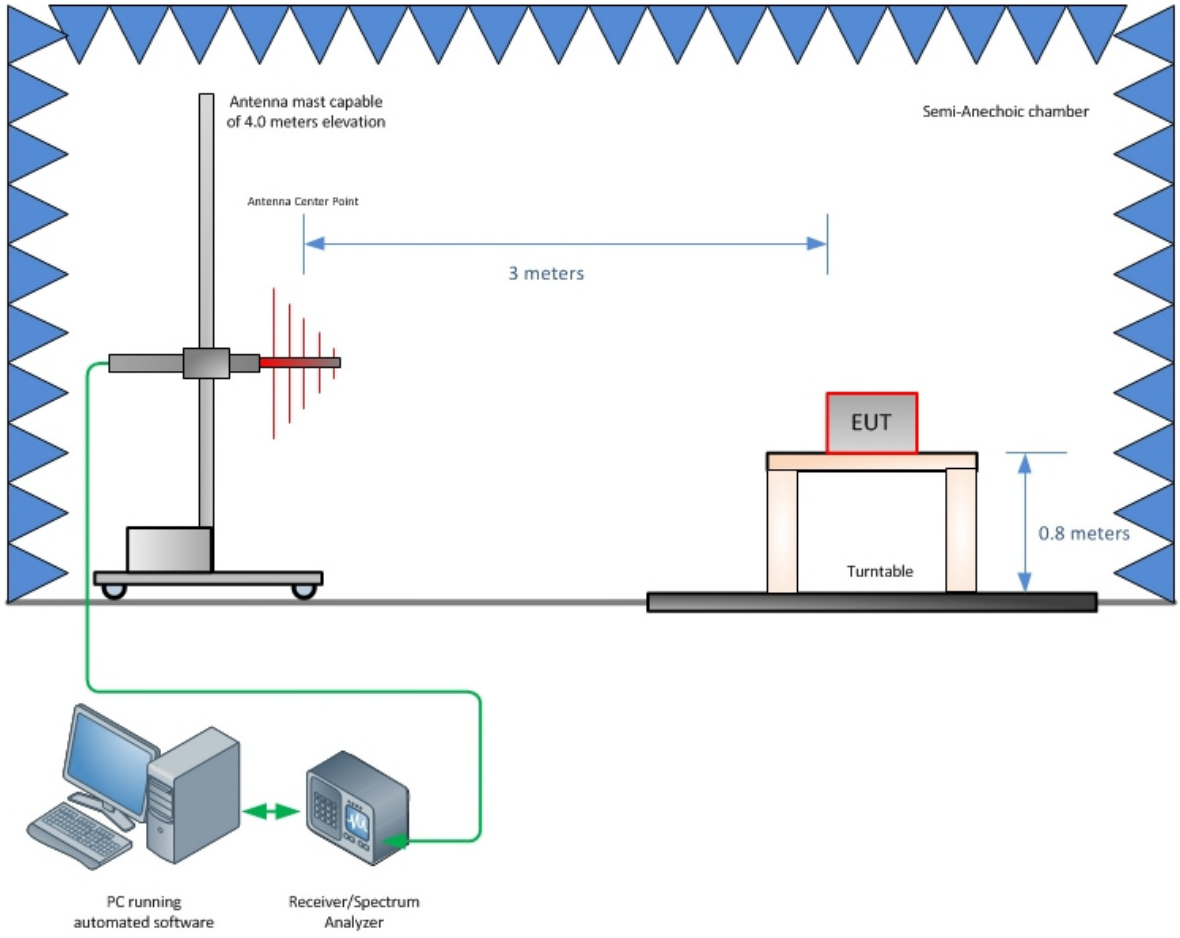
3.1.4 Conducted Measurements

	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**		

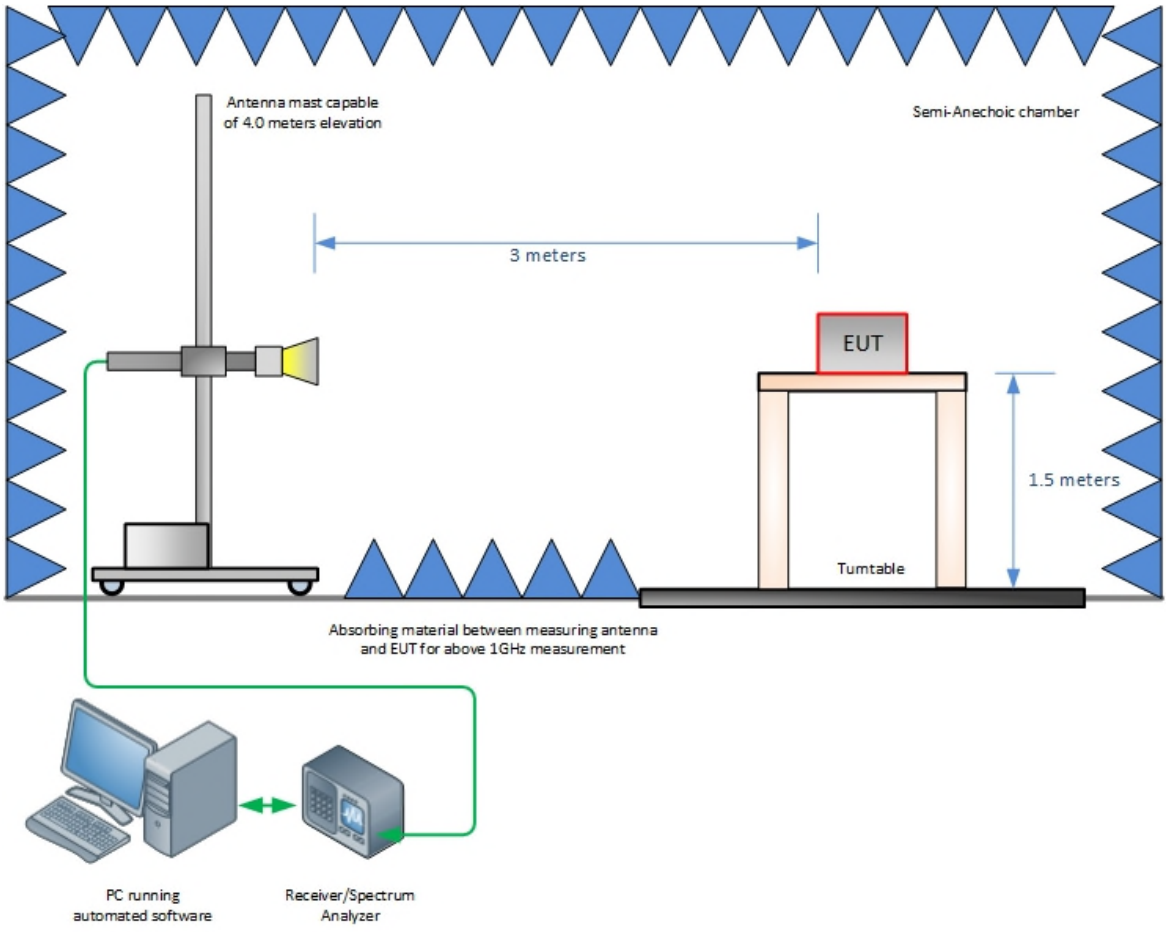
SECTION 4

DIAGRAM OF TEST SETUP

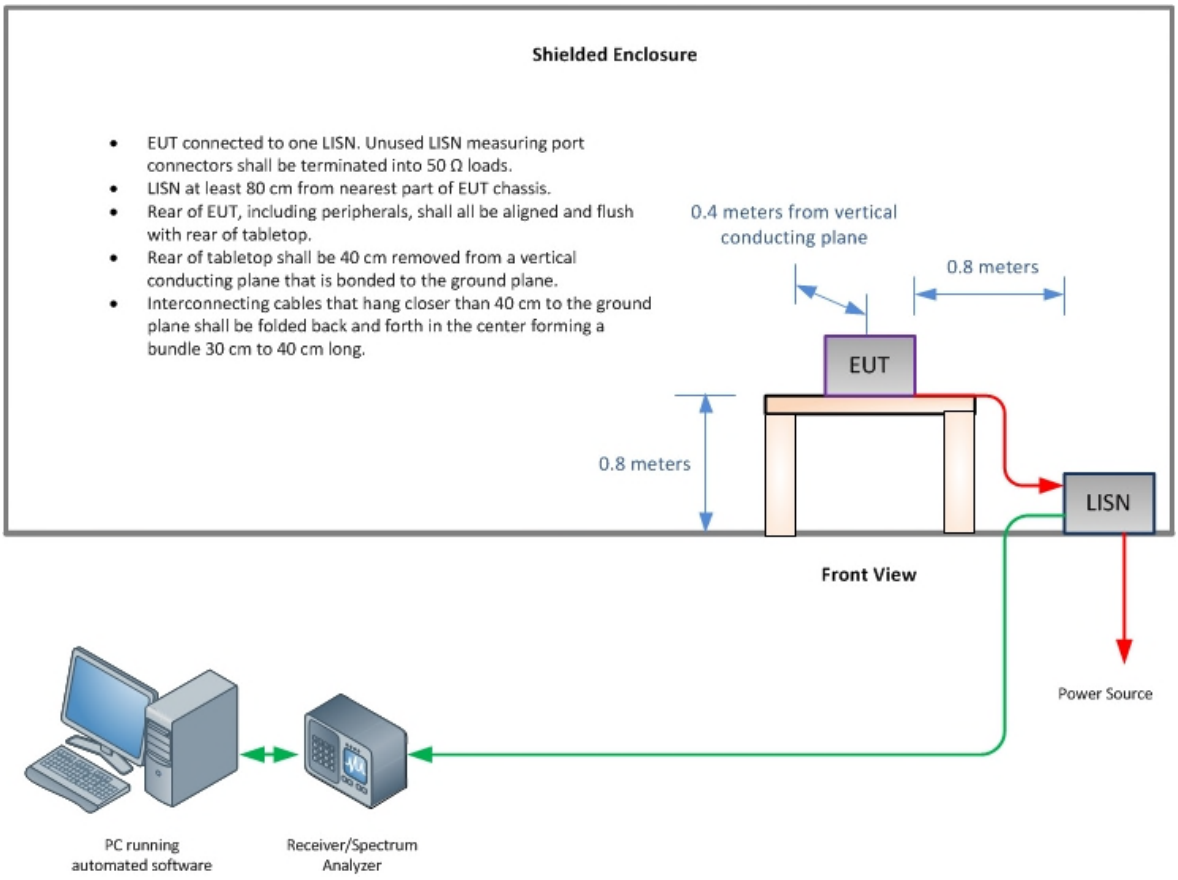
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Conducted Emission Test Setup

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and TÜV SÜD America, Inc., extracts from the test report shall not be reproduced, except in full without TÜV SÜD America, Inc.'s written approval.

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal government.

TÜV SÜD America, Inc. and its professional staff hold government
and professional organization certifications for
AAMI, ACIL, AEA, ANSI, IEEE, A2LA, NIST and VCCI.

A2LA Cert. No. 2955.13

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364