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Report On

Application for Grant of Equipment Authorization of the
DexCom Inc.

G5 Continuous Glucose Monitor System

FCC Part 15 Subpart C §15.247 (DTS)

RSS-247 Issue 1 May 2015

Report No. SC1410677B

March 2016



REPORT ON	Radio Testing of the DexCom Inc. Continuous Glucose Monitor System
TEST REPORT NUMBER	SC1410677B
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DATED	March 29, 2016



Revision History

SC1410677B DexCom Inc. G5 Continuous Glucose Monitor System					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
03/29/2016	Initial Release				Chip R. Fleury



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SECTION 1

REPORT SUMMARY

Radio Testing of the
DexCom Inc.
Continuous Glucose Monitor System



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the DexCom Inc. G5 Continuous Glucose Monitor System to the requirements of FCC Part 15 Subpart C §15.247 and RSS-247 Issue 1 May 2015.

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)	9438-06; MT22719-XX and 8260-01
FCC ID Number	G5 Mobile Transmitter: PH29715 and G5 Mobile Receiver: PH29496
IC Number	G5 Mobile Transmitter: 9290A-943806 and G5 Mobile Receiver: 9290A-22719
Serial Number(s)	Transmitter: 4003N3 with Receiver: SM42390155
Number of Samples Tested	2
Test Specification/Issue/Date	- FCC Part 15 Subpart C §15.247 (October 1, 2015). - RSS-247 Issue 1 May 2015 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices. - RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 4, November 2014). 558074 D01 DTS Meas Guidance v03r04, (January 07, 2016) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247. - ANSI C63.10-2013. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Start of Test	November 11, 2014
Finish of Test	November 12, 2014
Name of Engineer(s)	Kathy MacKenzie
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(4)	Peak Output Power	Compliant	
2.2	§15.207(a)	RSS-Gen 8.8	Conducted Emissions	Compliant	Receiver only, Transmitter is battery operated
2.3		RSS-Gen 6.6	99% Emission Bandwidth	Compliant	
2.4	§15.247(a)(2)	RSS-247 5.2(1)	Minimum 6 dB RF Bandwidth	Compliant	
2.7	§15.247(d)	RSS-247 5.5	Out-of-Band Emissions - Radiated	Compliant	
2.8	§15.247(d)	RSS-247 5.5	Band-edge Compliance and Immediate Restricted Band	Compliant	
2.8	§15.247(e)	RSS-247 5.2(2)	Power Spectral Density for Digitally Modulated Device	Compliant	



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a DexCom Inc. G5 Continuous Glucose Monitor System. The system consists of a sensor (a resistor sensor simulator is used for EMC testing), a primary battery powered transmitter that is physically connected to the sensor and a receiver that is powered by a rechargeable Li-ion battery. The receiver battery can be charged from a wall mount power supply/charger (5VDC/1 amp) or from a laptop PC. The G5 Mobile CGM System may also include an iPhone that has a Dexcom G5 Mobile iOS CGM App. In normal operation the G5 Mobile transmitter will exchange data with the G5 Mobile receiver and/or the iPhone once every 5 minutes over a Bluetooth Low Energy wireless link. The G5 Mobile Receiver and iPhone CGM App display (and record) glucose values and provide alerts and alarms.

1.3.2 Models Verified

Model Number	Type	
9438-06	G5 Mobile Transmitter	-
MT22719-xx	G5 Mobile Receiver	"xx" denotes the other variants of the EUT to internally distinguish between the colors. The only difference for the variants is that they have a different color overlay on the front. The color options are blue, pink or orange. The different color overlays do not have any effect on the RF characteristics of the variants of MT22719.
8260-01	G5 Mobile Receiver	The MT22719-xx and 8260-01 G5 Mobile Receivers have identical electronics BOM's and software. The main difference is that the MT22719-xx is built by Contract Manufacturers and then sent to Dexcom while the 8260-01 is built on-site at Dexcom



1.3.3 EUT General Description

EUT Description	Continuous Glucose Monitor System
Model Name	G5
Model Number(s)	9438-06; MT22719-XX and 8260-01
Rated Voltage	Transmitter: Two silver oxide primary coin cells connected in series, nominal supply voltage = 3.1 V Receiver: One rechargeable lithium ion cell, nominal supply voltage = 3.7 V
Mode Verified	Bluetooth Low Energy (BT LE)
Capability	Bluetooth Low Energy (BT LE) only
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
Antenna Type G5 Mobile Transmitter	antenna m2m Fusca A10192 2.4 GHz SMD
Antenna Gain	0.8dBi
Antenna Type G5 Mobile Receiver	Johanson Technology 2450AT18A100E 2.4GHz
Antenna Gain	0.5dBi

1.3.4 Maximum Peak Conducted Output Power - -G5 Mobile Transmitter

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
Bluetooth LE	2402-2480	-3.2	0.48

1.3.5 Maximum Peak Conducted Output Power - -G5 Mobile Receiver

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
Bluetooth LE	2402-2480	-9.1	0.12



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	SW10649 is used with the USB dongle to send configuration commands over the BLE wireless link to the G5 Mobile Transmitter. SW10182 is used to put the G5 Mobile Receiver in manufacturing mode. The manufacturing mode menu is then used to configure the G5 Mobile Receiver.

1.4.2 EUT Exercise Software

9438-06 G5 Mobile Transmitter:
 Software: SW10623 V1.0.13.11 and SW10624 V1.0.12.39
 MT22719 G5 Mobile Receiver:
 Software: SW10617 v4.0.1.026

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Dell	Laptop	Latitude E5440
	Software on Laptop	Connection Manager Software: SW10649 v1.20.0.23
	Software on Laptop	Global Receiver Communication tool SW10182 v6.0.0.12
Nordic Semiconductor	USB Dongle	PCA10000
	USB Cable	Part No: MT20655
	USB Power Charger	Part No: MT21255
	GEN4 Walkabout box	Part No: FX-90182; S/N CI0029

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per maximum conducted output power measurements:

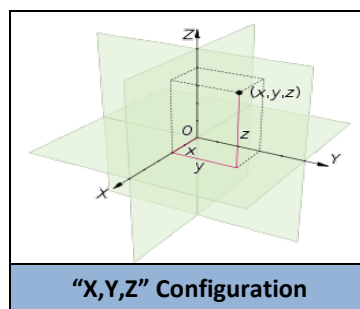
G5 Mobile Transmitter

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

G5 Mobile Receiver

Mode	Channel	Data Rate
Bluetooth LE	39 (High Channel)	1Mbps

Both of the EUT's are mobile devices. For radiated measurements X, Y and Z orientations were verified. Worst case position is "X" for both the Transmitter and the Receiver.



1.4.5 Simplified Test Configuration Diagram

Not required. EUT verified on a standalone 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 Transmitter: 4003N3 with Receiver: SM42390155		
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 C63.10-2014. 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)

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

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 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 Registration No.: 3067A

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



SECTION 2

TEST DETAILS

Radio Testing of the
DexCom Inc.
Continuous Glucose Monitor System



2.1 PEAK OUTPUT POWER

2.1.1 Specification Reference

Part 15 Subpart C §15.247(b)(3)

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: G5 Mobile Transmitter:4003N3; G5 Mobile Receiver SM42390155 / Default Test Configuration

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

November 11, 12, 2014/KAM

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	24.7-25.3°C
Relative Humidity	44.4-46.0%
ATM Pressure	99.2-99.3 kPa

2.1.7 Additional Observations

- This is a radiated test
- 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.
- Test methodology is per Clause 3.0 of KDB 558074 D01 (DTS Meas Guidance v03r04, January 7, 2016).
- Substitution method was used to determine final power measurement in dBm.

2.1.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ 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 (db μ V/m) @ 2400 MHz			53.5

2.1.9 Test Results

G5 Mobile Transmitter

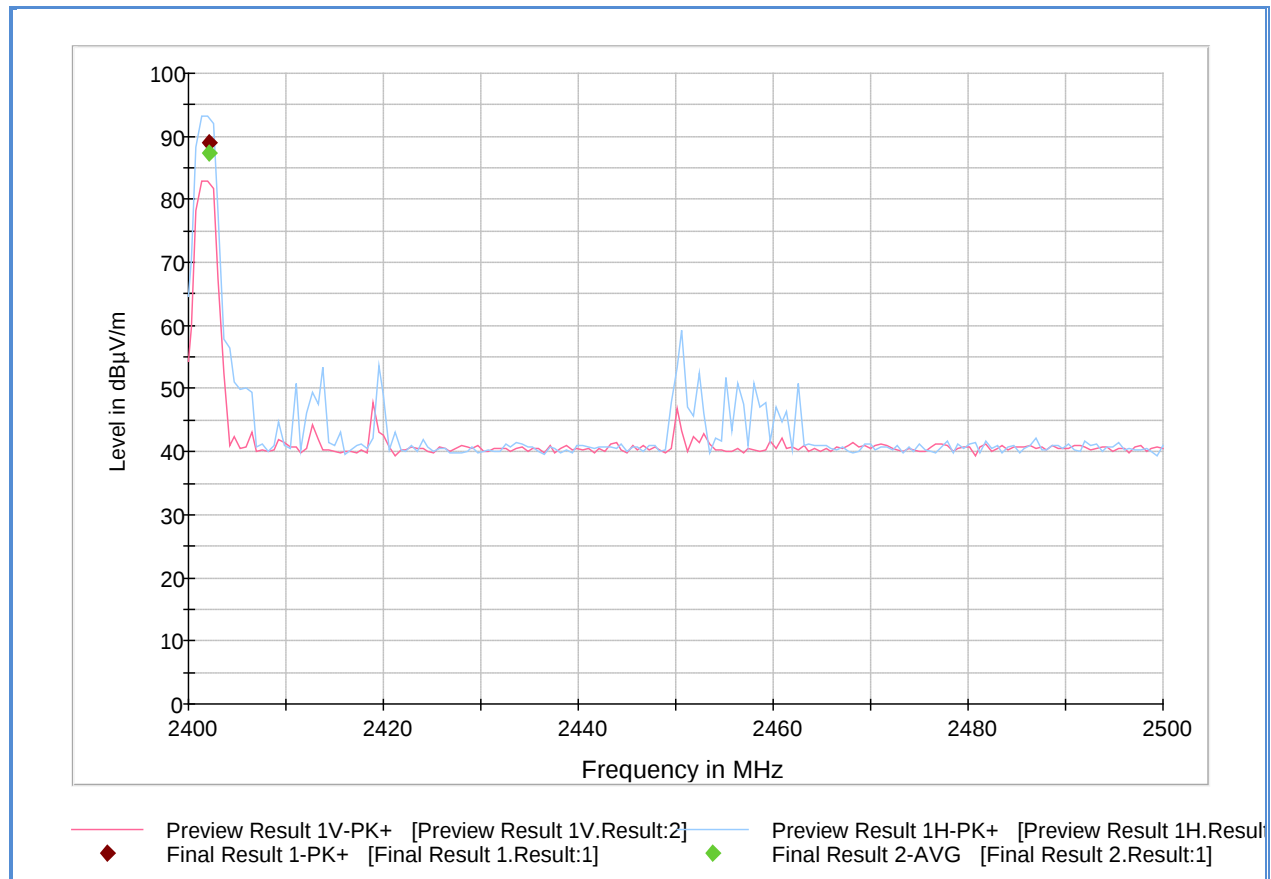
Bluetooth Low Energy (LE)	Channel	Modulation	Measured Average Power (dBm)
	37 (2402 MHz)	GFSK @ 1Mbps	-7.7
	17 (2440 MHz)		-3.2
	39 (2480 MHz)		-4.2

G5 Mobile Receiver

Bluetooth Low Energy (LE)	Channel	Modulation	Measured Average Power (dBm)
	37 (2402 MHz)	GFSK @ 1Mbps	-10.5
	17 (2440 MHz)		-13.3
	39 (2480 MHz)		-9.1

2.1.10 Peak Output Power Test Results-G5 Mobile Transmitter

Bluetooth LE. Low Channel 1Mbps



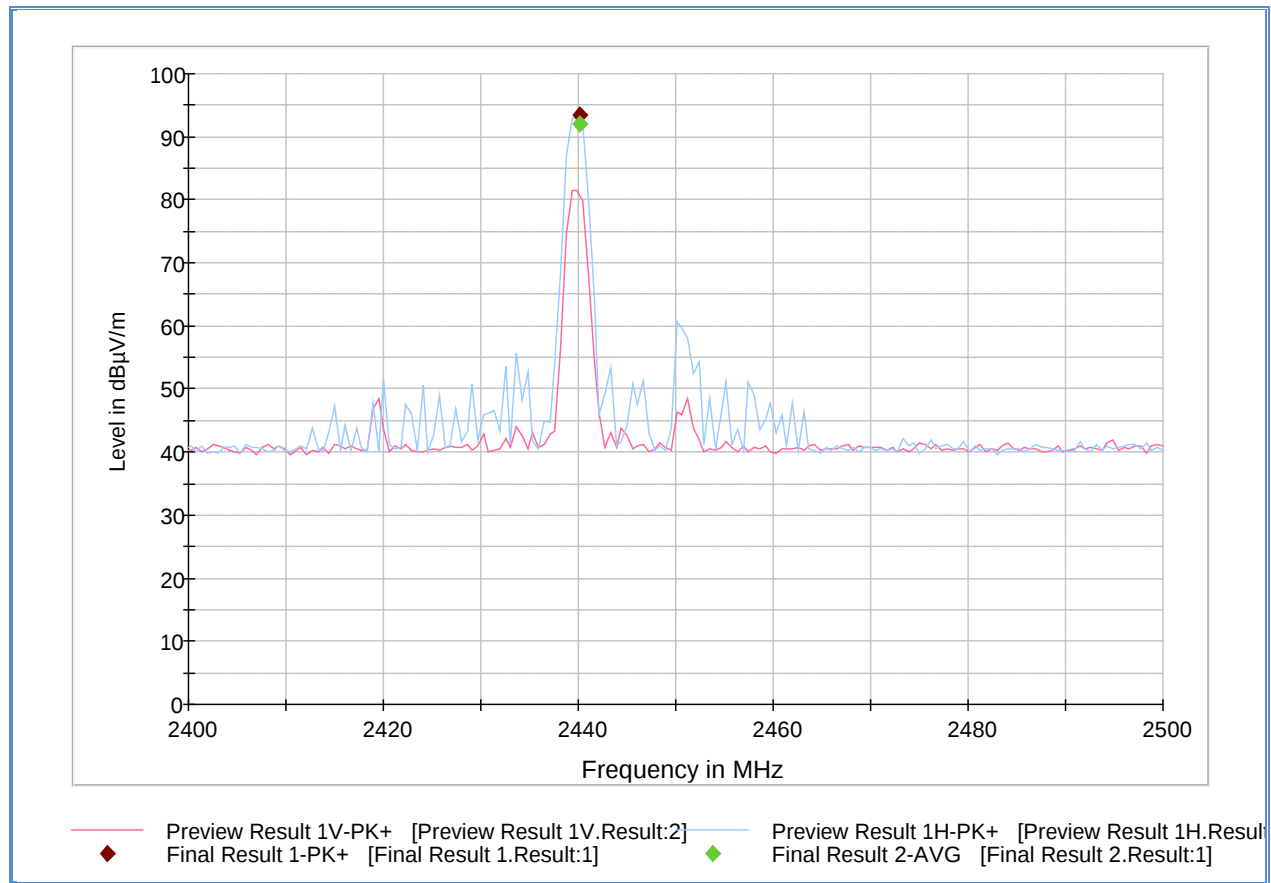
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2402.133333	87.4	1000.0	1000.000	103.7	H	321.0	-0.2

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
2402.133333	87.4	3.7	9.503	-13.5.0	-7.7	30	Compliant

Bluetooth LE. Mid Channel 1Mbps



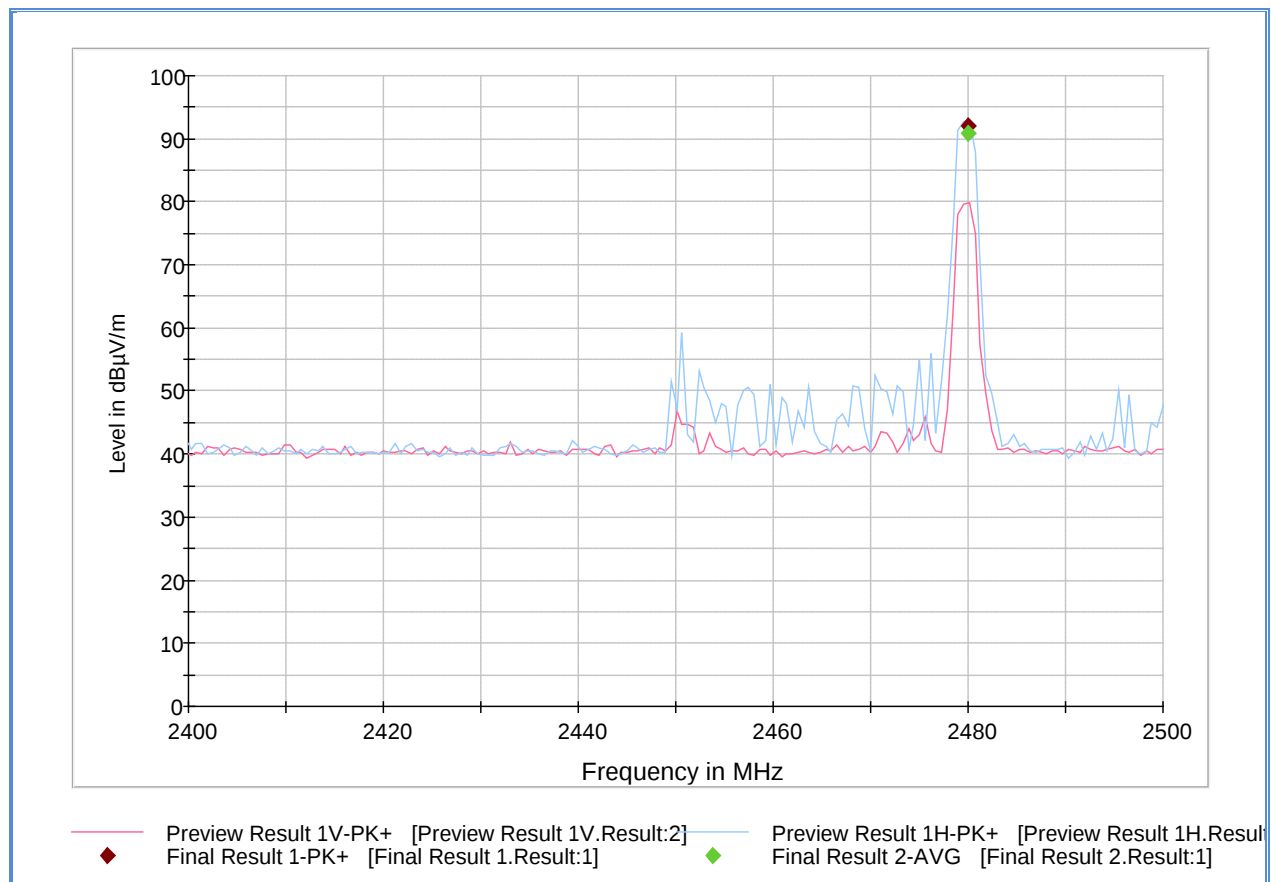
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2440.100000	92.0	1000.0	1000.000	99.7	H	301.0	0.0

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
2440.100000	92.0	3.7	9.503	-9.0	-3.2	30	Compliant

Bluetooth LE. High Channel 1Mbps



Average Data

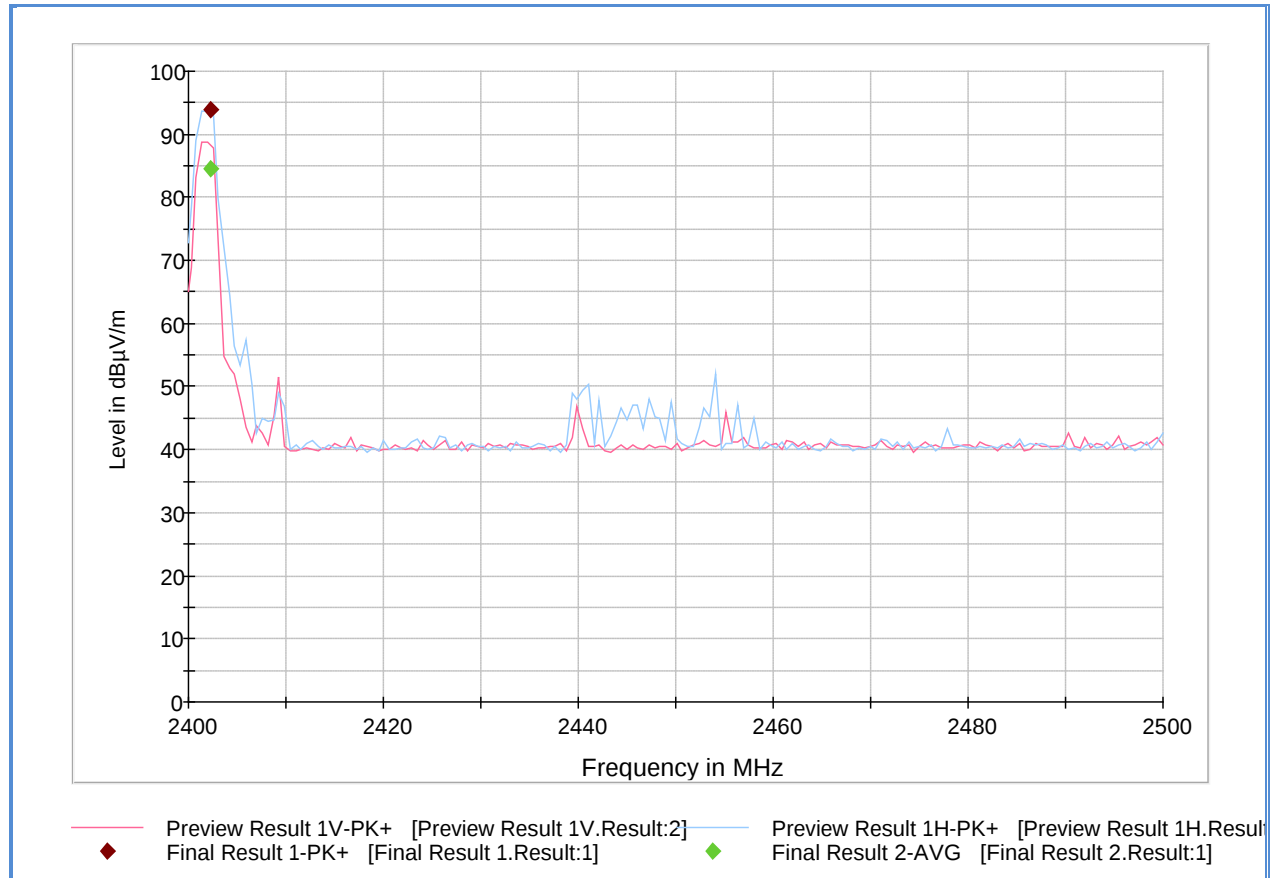
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2479.933333	90.8	1000.0	1000.000	99.7	H	305.0	0.1

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBμV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
2479.933333	90.8	3.8	9.503	-9.9	-4.2	30	Compliant

2.1.11 Peak Output Power Test Results-G5 Mobile Receiver

Bluetooth LE. Low Channel 1Mbps



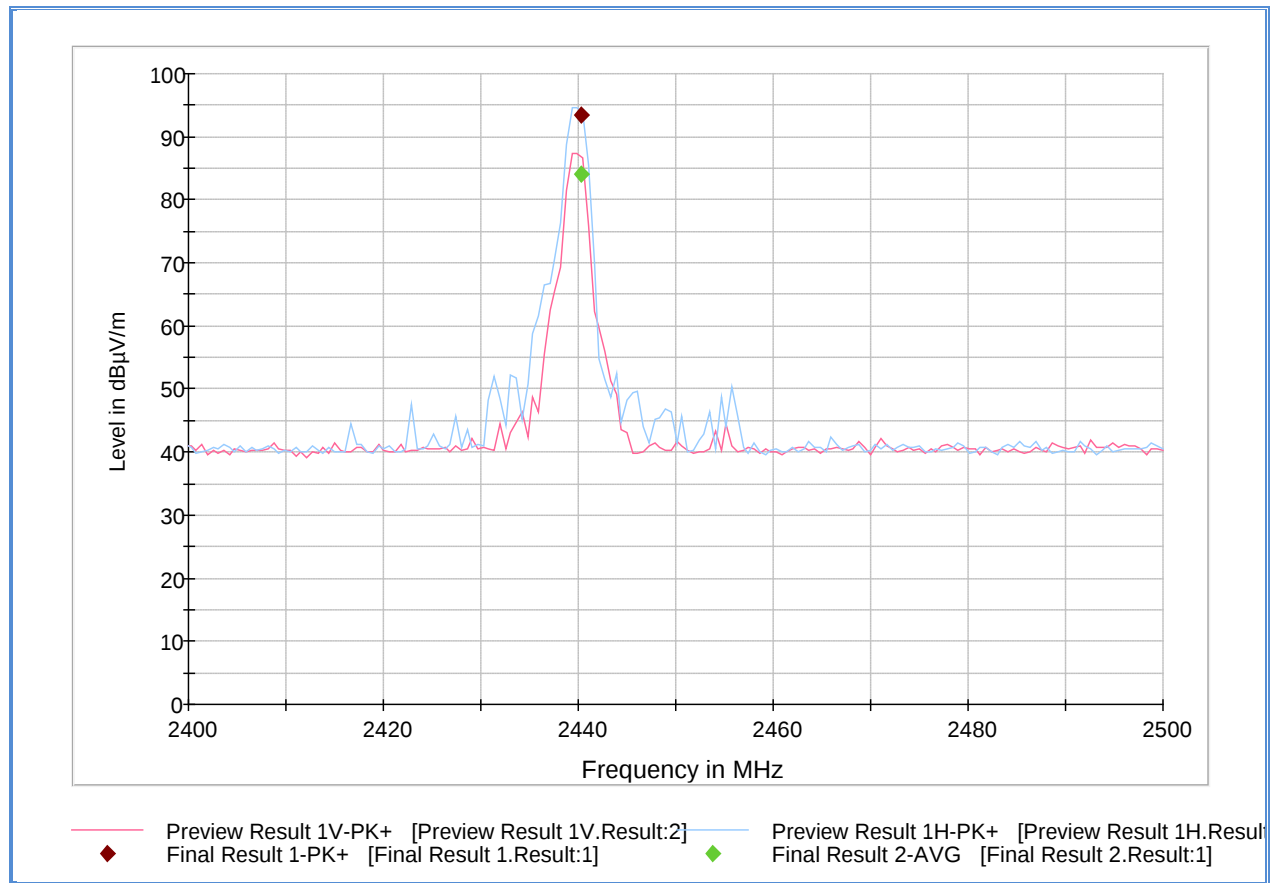
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2402.333333	84.4	1000.0	1000.000	102.7	H	42.0	-0.2

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
2402.333333	84.4	3.7	9.503	-16.3	-10.5	30	Compliant

Bluetooth LE. Mid Channel 1Mbps



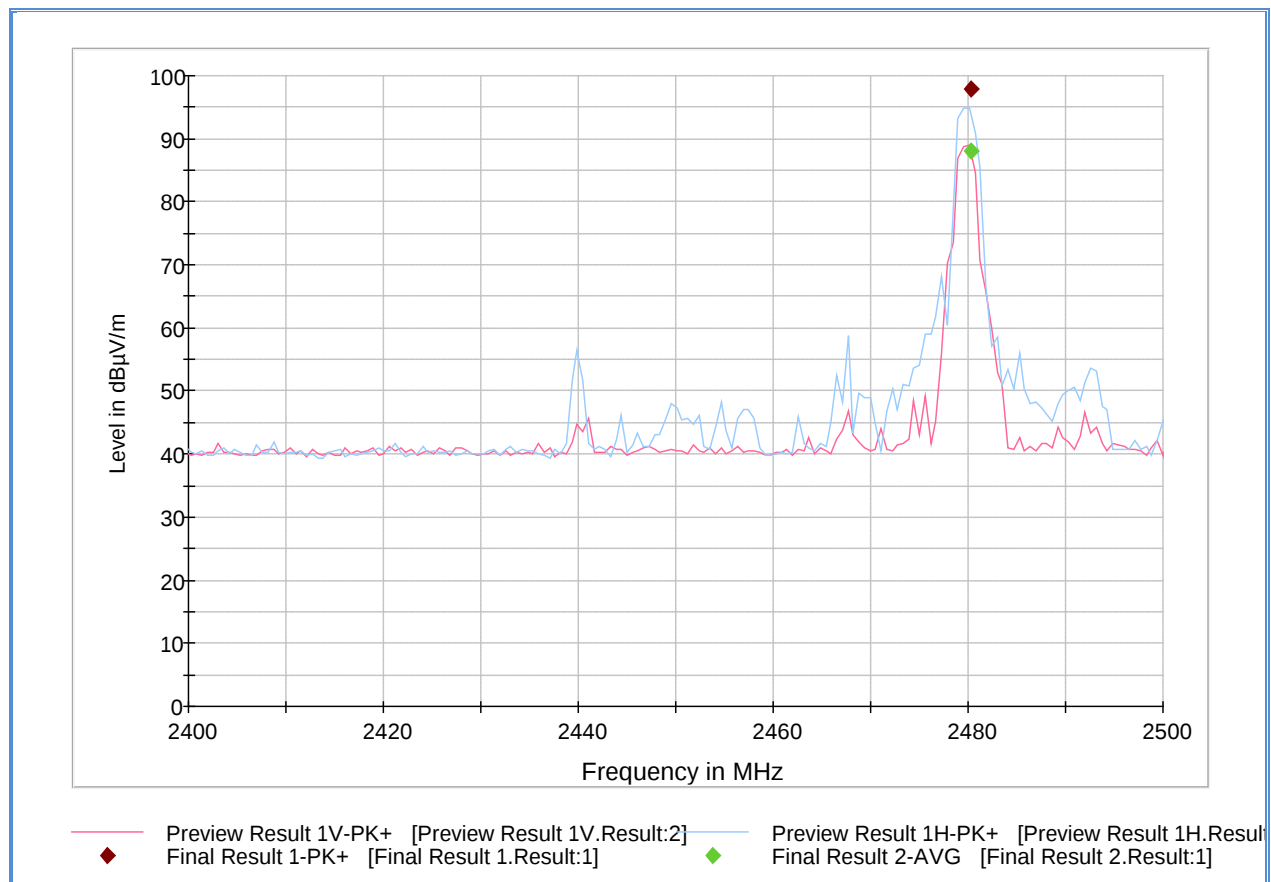
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2440.300000	84.0	1000.0	1000.000	130.7	H	46.0	0.0

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
2440.300000	84.0	3.7	9.503	-19.1	-13.3	30	Compliant

Bluetooth LE. High Channel 1Mbps



Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
2480.333333	88.1	1000.0	1000.000	207.5	H	266.0	0.1

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
2480.333333	88.1	3.8	9.503	-14.8	-9.1	30	Compliant



2.2 CONDUCTED EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart C §15.207(a)

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 μ H/50 ohms line impedance stabilization network (LISN).

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

*Decreases with the logarithm of the frequency.

2.2.3 Equipment Under Test and Modification State

Serial No: SM42390155 / Default Test Configuration

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

November 11, 2014/KAM

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	24.2 °C
Relative Humidity	44.8.%
ATM Pressure	99.0 kPa

2.2.7 Additional Observations

- The G-5 Mobile Receiver was verified in the Charging Mode
- The G-5 Mobile Transmitter is internal battery powered so it was not tested.
- 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 2.2.8 for sample computation.



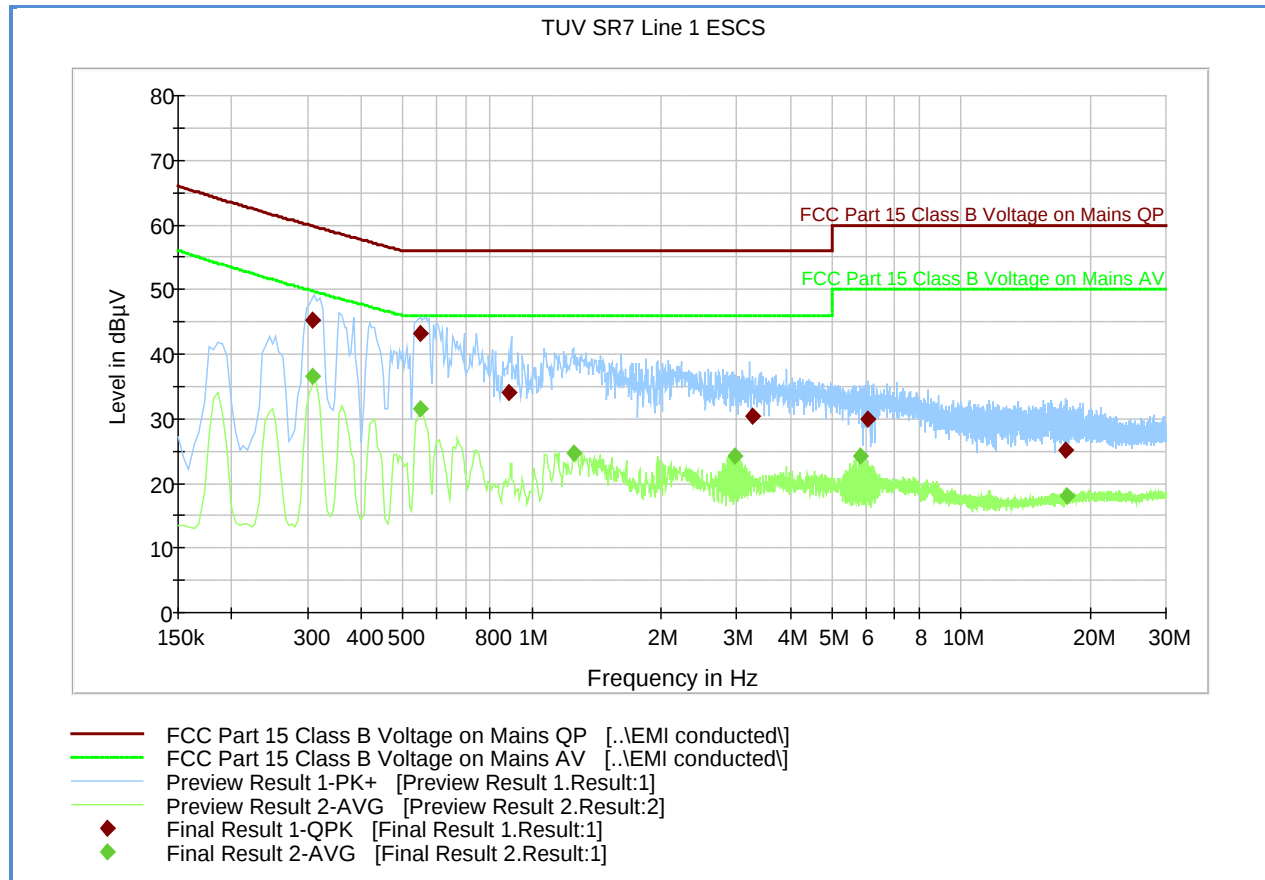
2.2.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (db μ 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# 7567 (LISN)	0.30	
Reported QuasiPeak Final Measurement (db μ V) @ 150kHz			26.2

2.2.9 Test Results

Compliant. See attached plots and tables.

2.2.10 FCC Conducted Emissions Line 1 – (Charging Mode)



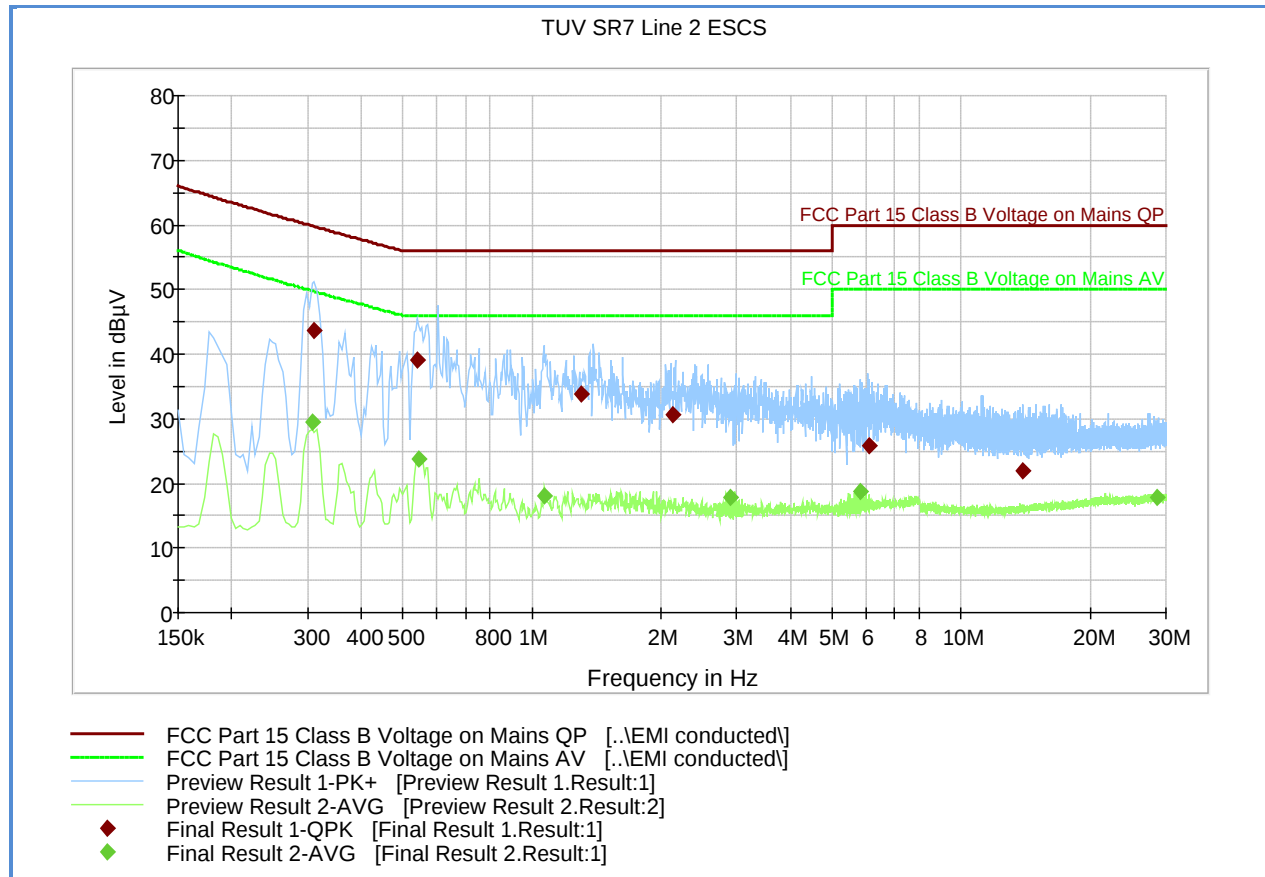
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.307500	45.2	1000.0	9.000	Off	L1	20.1	14.6	59.8
0.550500	43.2	1000.0	9.000	Off	L1	20.0	12.8	56.0
0.883500	34.0	1000.0	9.000	Off	L1	20.0	22.0	56.0
3.273000	30.4	1000.0	9.000	Off	L1	20.4	25.6	56.0
6.054000	29.9	1000.0	9.000	Off	L1	20.6	30.1	60.0
17.488500	25.1	1000.0	9.000	Off	L1	20.9	34.9	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.307500	36.5	1000.0	9.000	Off	L1	20.1	13.3	49.8
0.550500	31.5	1000.0	9.000	Off	L1	20.0	14.5	46.0
1.248000	24.6	1000.0	9.000	Off	L1	20.1	21.4	46.0
2.967000	24.3	1000.0	9.000	Off	L1	20.4	21.7	46.0
5.811000	24.3	1000.0	9.000	Off	L1	20.6	25.7	50.0
17.619000	18.1	1000.0	9.000	Off	L1	20.9	31.9	50.0

2.2.1 FCC Conducted Emissions Line 2 – (Charging Mode)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.312000	43.6	1000.0	9.000	Off	N	20.1	16.1	59.7
0.541500	39.1	1000.0	9.000	Off	N	20.0	16.9	56.0
1.302000	33.7	1000.0	9.000	Off	N	20.1	22.3	56.0
2.130000	30.7	1000.0	9.000	Off	N	20.2	25.3	56.0
6.121500	25.7	1000.0	9.000	Off	N	20.5	34.3	60.0
13.861500	22.0	1000.0	9.000	Off	N	20.6	38.0	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.307500	29.6	1000.0	9.000	Off	N	20.1	20.2	49.8
0.546000	23.9	1000.0	9.000	Off	N	20.0	22.2	46.0
1.068000	18.1	1000.0	9.000	Off	N	20.1	27.9	46.0
2.904000	17.9	1000.0	9.000	Off	N	20.4	28.1	46.0
5.806500	18.7	1000.0	9.000	Off	N	20.5	31.4	50.0
28.671000	17.8	1000.0	9.000	Off	N	20.8	32.2	50.0



2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen Clause 4.6.1

2.3.2 Standard Applicable

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 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 shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear 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. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: G5 Mobile Transmitter:4003N3; G5 Mobile Receiver SM42390155 / Default Test Configuration

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

November 13, 2014/KAM

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.6°C
Relative Humidity	44.9%
ATM Pressure	99.4 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)

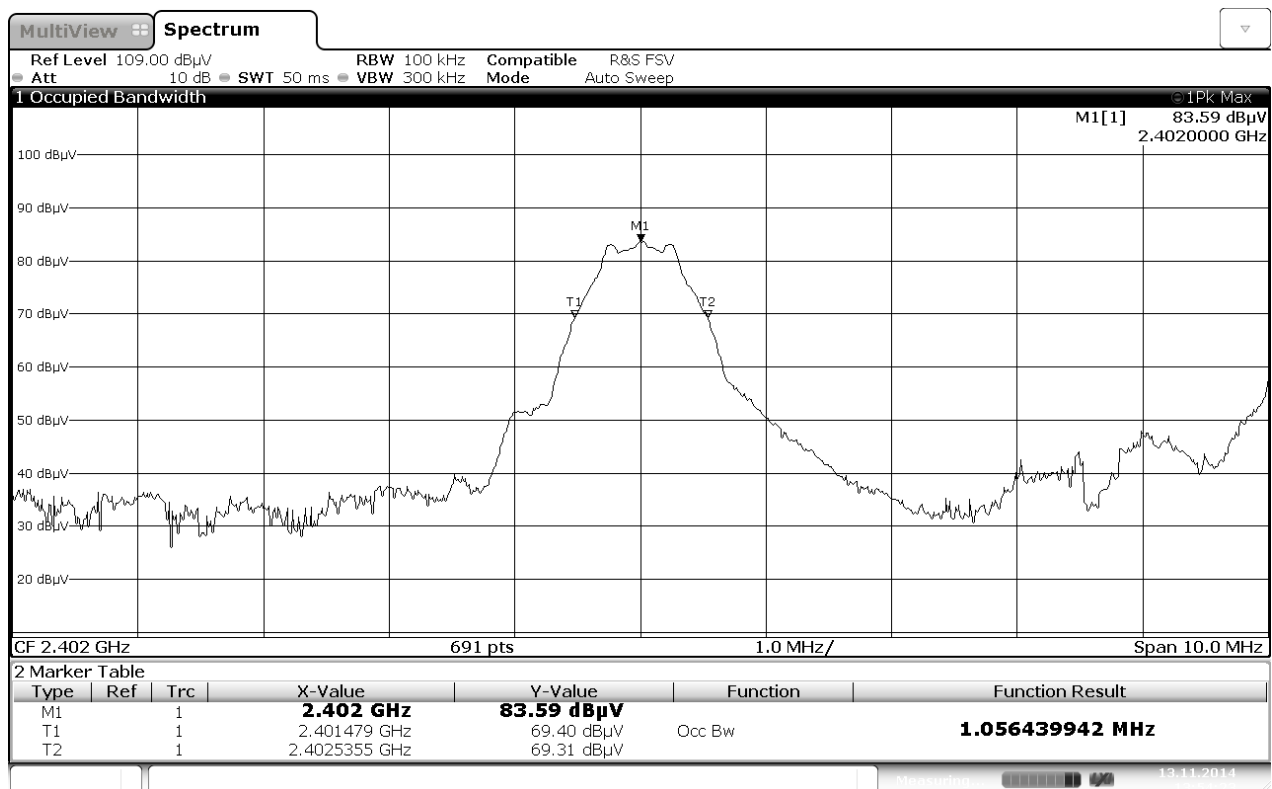
G-5 Mobile Transmitter

Mode	Channel	Measured 99% Bandwidth (MHz)
Bluetooth LE	37 (2402 MHz)	1.056
	17 (2440 MHz)	1.056
	39 (2480 MHz)	1.056

G-5 Mobile Receiver

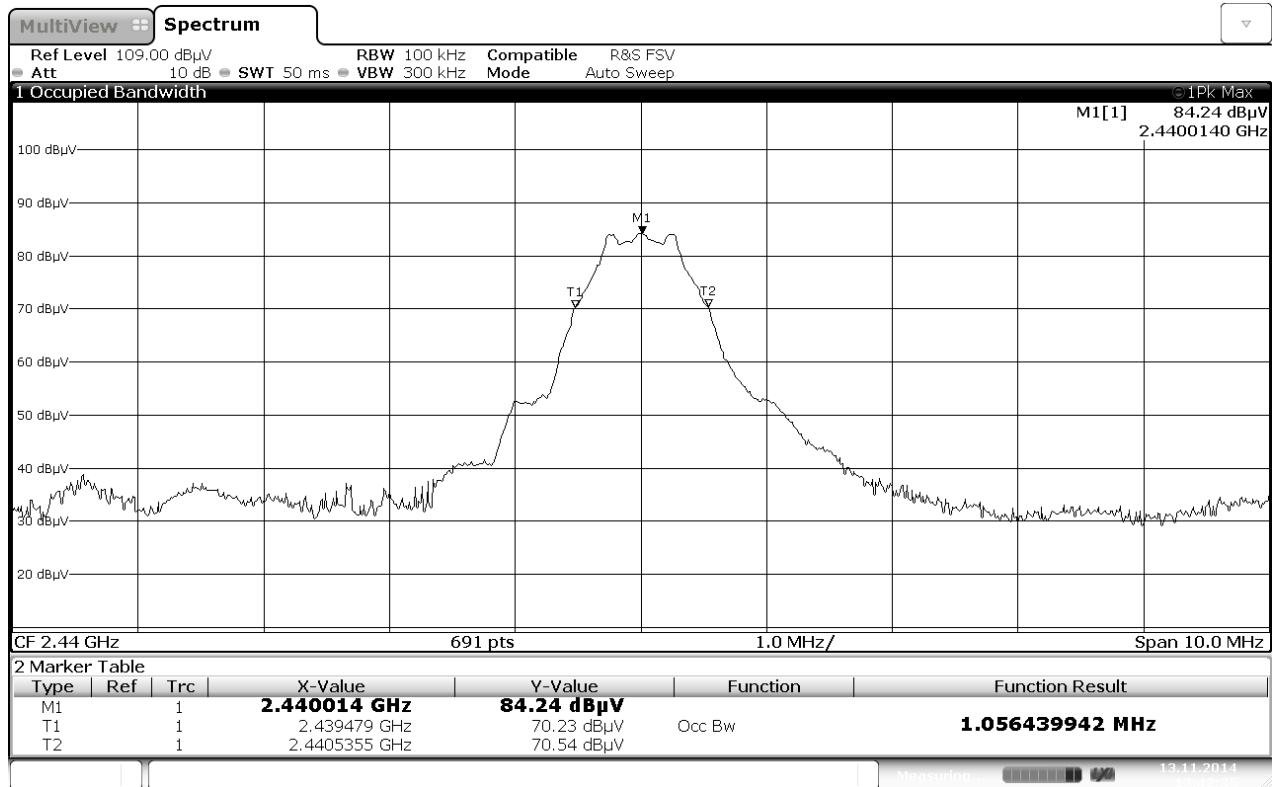
Mode	Channel	Measured 99% Bandwidth (MHz)
Bluetooth LE	37 (2402 MHz)	1.896
	17 (2440 MHz)	2.185
	39 (2480 MHz)	1.954

2.3.9 Test Results Plots-G5 Mobile Transmitter



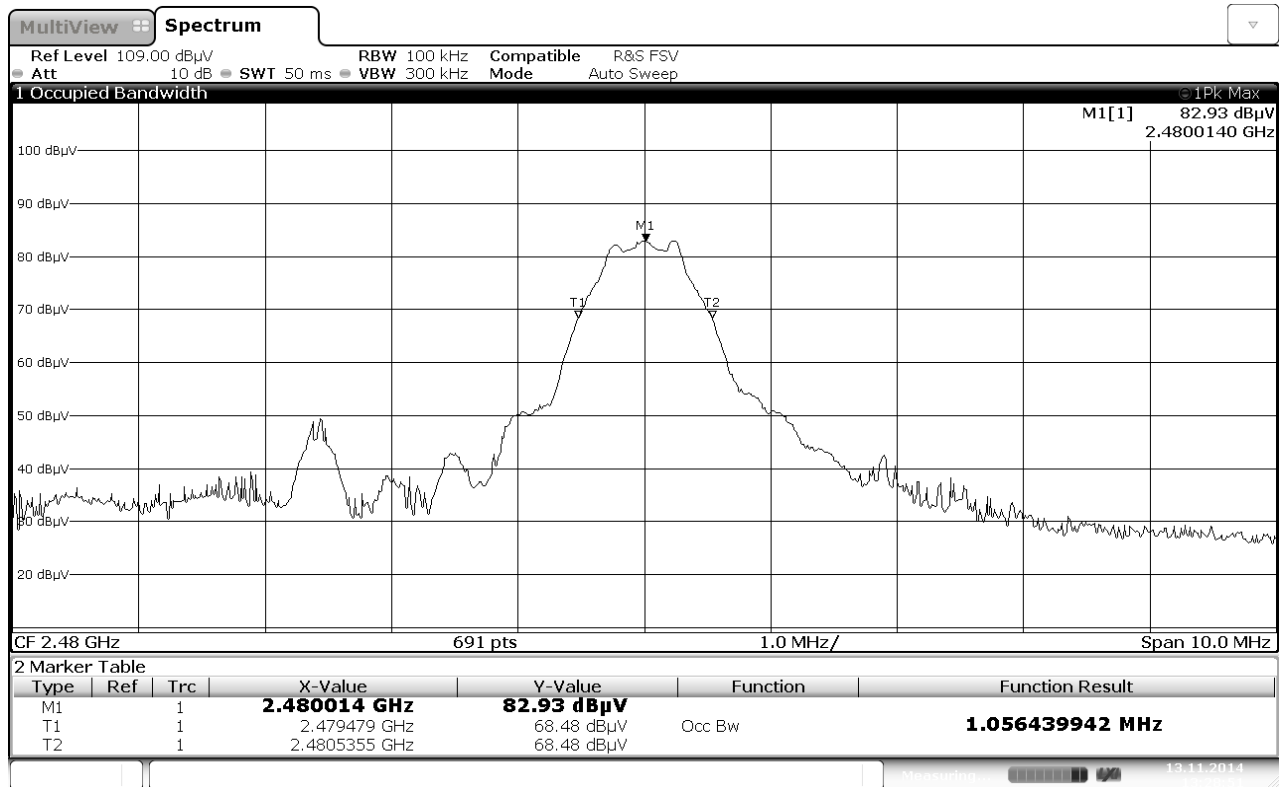
Date: 13 NOV 2014 13:54:23

Bluetooth LE Low Channel



Date: 13 NOV 2014 13:42:35

Bluetooth LE Mid Channel

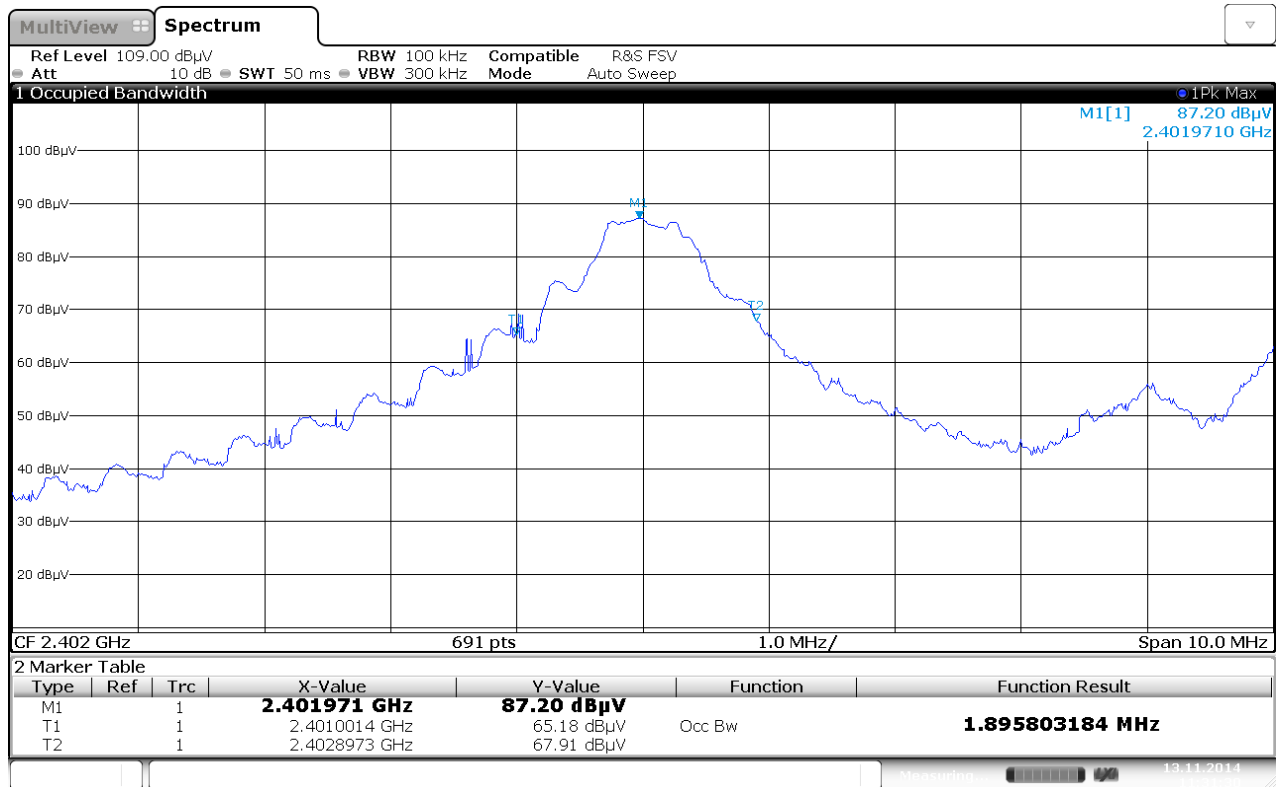


Date: 13 NOV 2014 13:28:51

Bluetooth LE High Channel

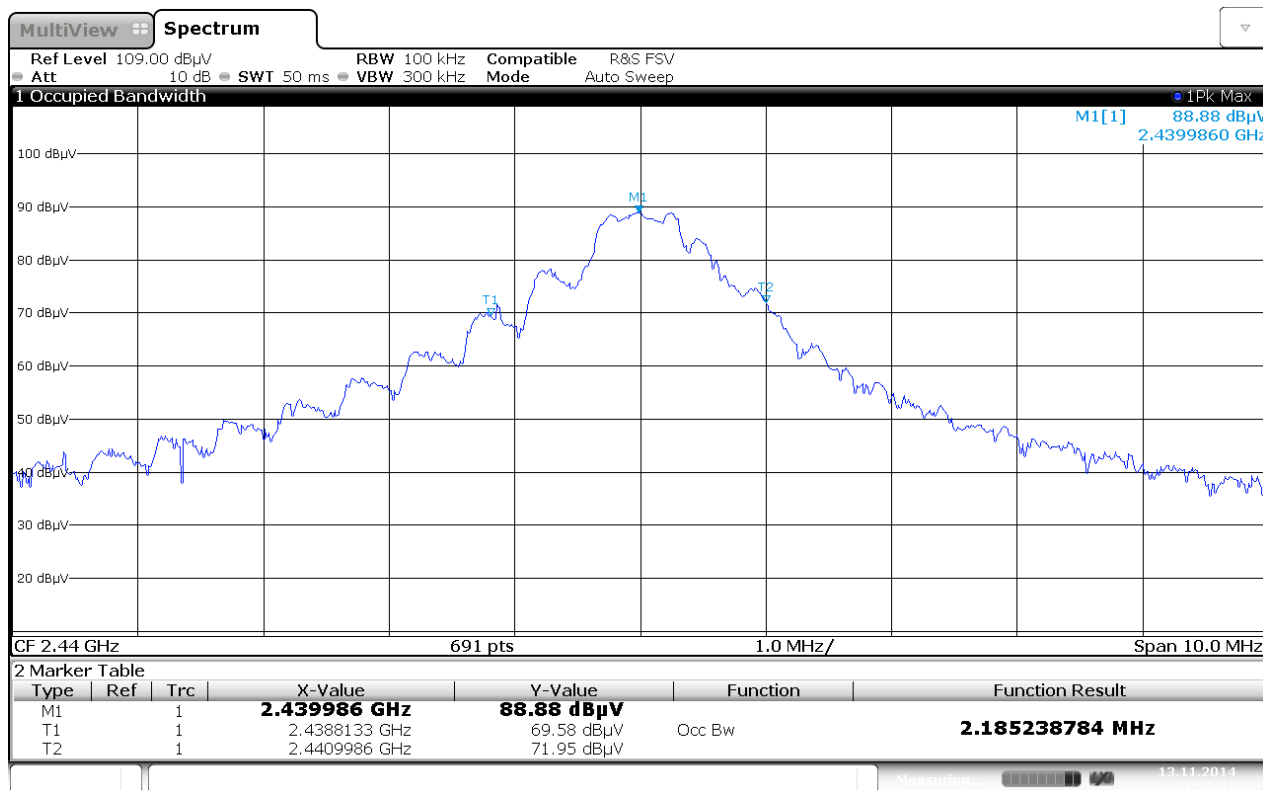


2.3.10 Test Results Plots-G5 Mobile Receiver



Date: 13 NOV 2014 11:31:30

Bluetooth LE Low Channel



Date: 13 NOV 2014 11:52:44

Bluetooth LE Mid Channel



Date: 13 NOV 2014 13:08:19

Bluetooth LE High Channel



2.4 MINIMUM 6 dB RF BANDWIDTH

2.4.1 Specification Reference

Part 15 Subpart C §15.247(a)(2)

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: G5 Mobile Transmitter:4003N3; G5 Mobile Receiver SM42390155 / Default Test Configuration

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

November 13, 2014/KAM

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.6°C
Relative Humidity	44.9%
ATM Pressure	99.4 kPa

2.4.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- RBW is set to 100 kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- The “n” dB down marker function of the spectrum analyzer was used for this test.
- For signal modulation where “n” dB down marker function is not practical, a peak measurement is performed while the trace is in max hold.



2.4.8 Test Results

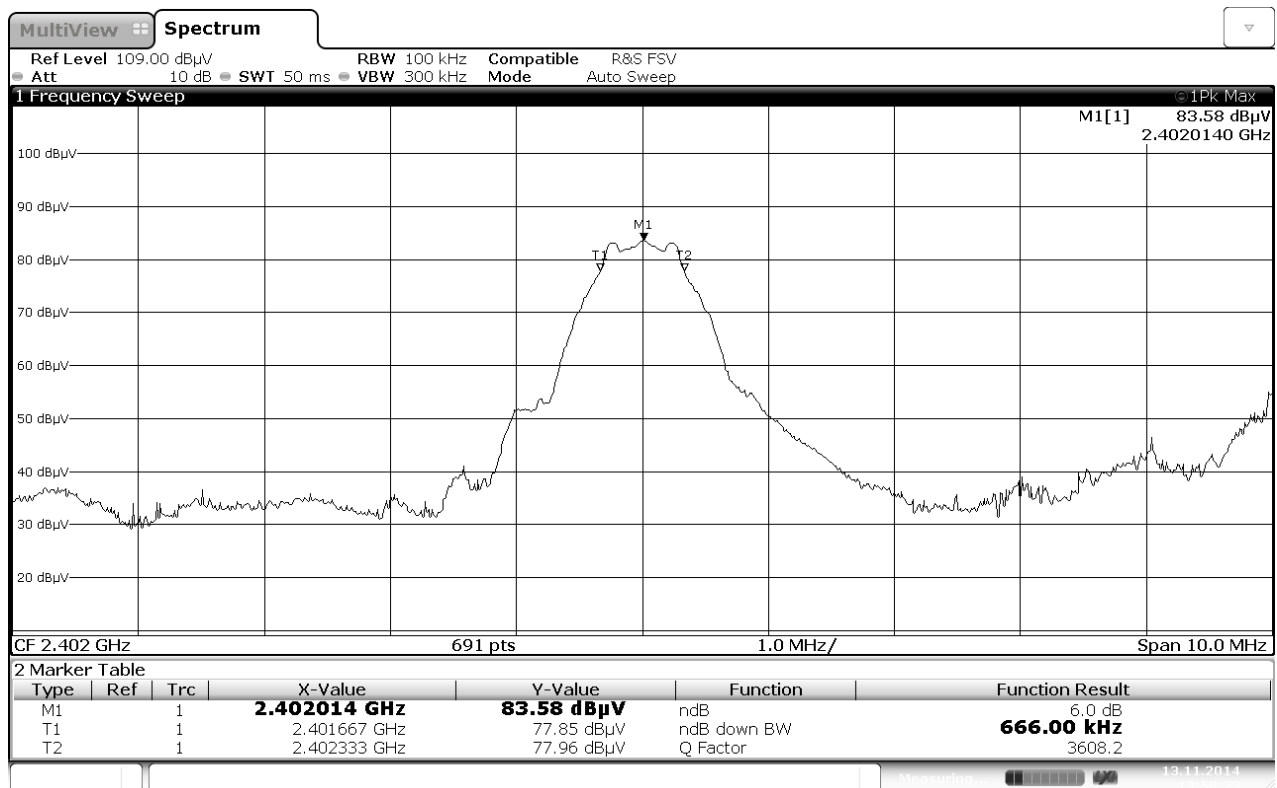
G-5 Mobile Transmitter

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
Bluetooth LE	37 (2402 MHz)	0.666	0.500	Complies
	17 (2440 MHz)	0.695	0.500	Complies
	39 (2480 MHz)	0.680	0.500	Complies

G-5 Mobile Receiver

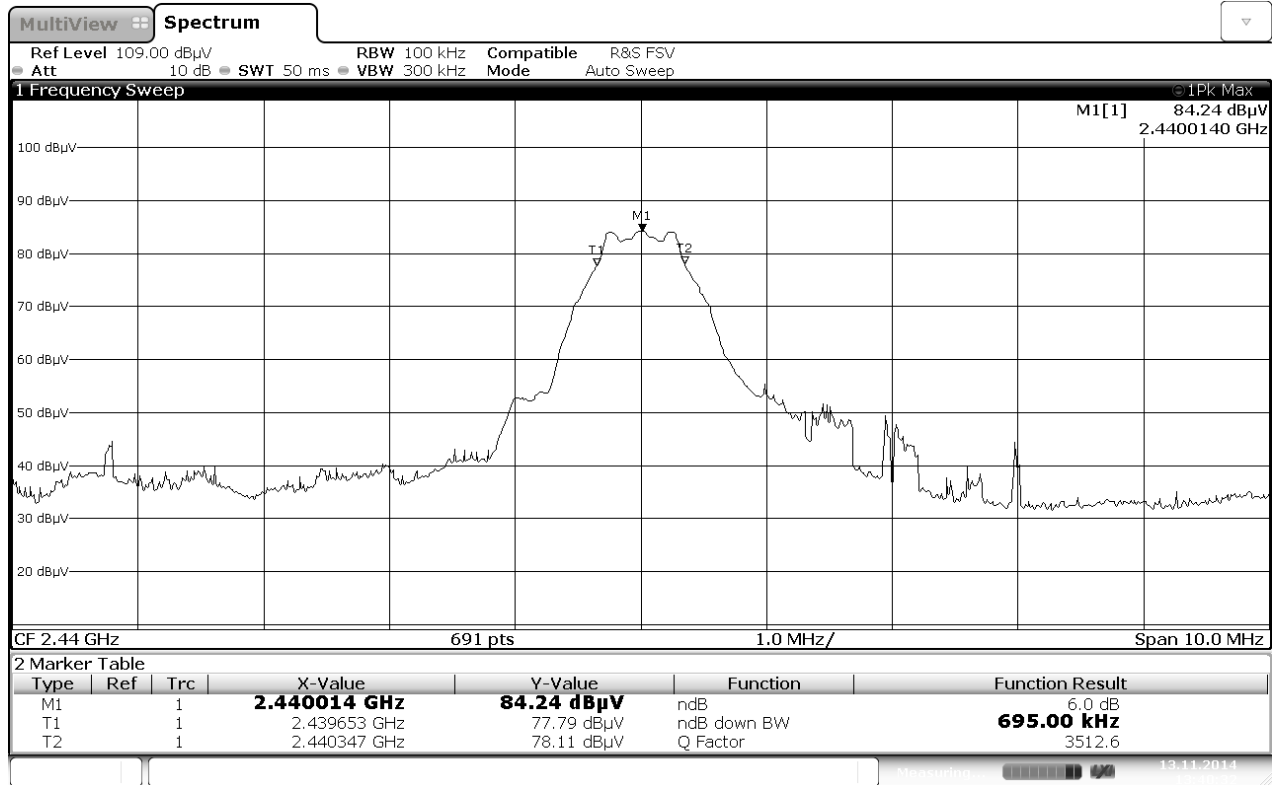
Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
Bluetooth LE	37 (2402 MHz)	0.796	0.500	Complies
	17 (2440 MHz)	0.738	0.500	Complies
	39 (2480 MHz)	0.680	0.500	Complies

2.4.9 Test Results Plots- G-5 Mobile Transmitter



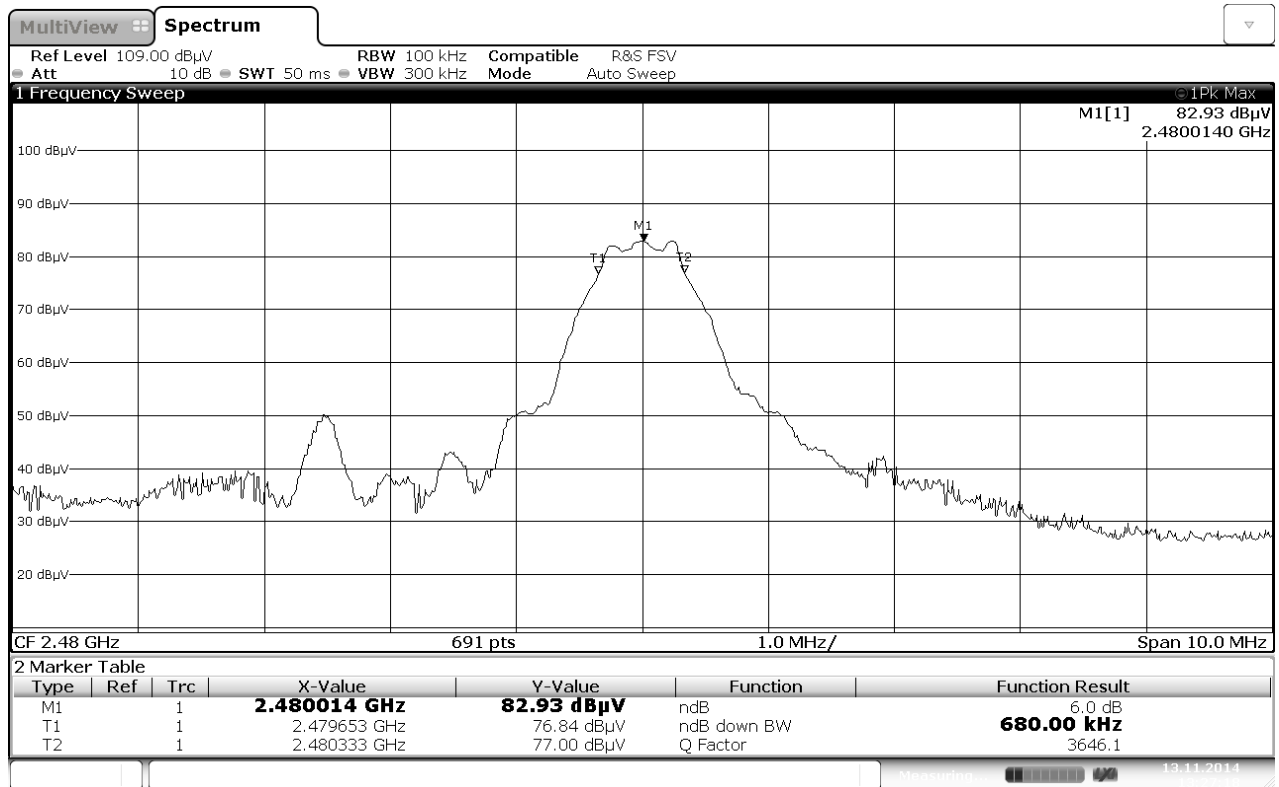
Date: 13 NOV 2014 13:58:22

Bluetooth LE Low Channel



Date: 13 NOV 2014 13:40:32

Bluetooth LE Mid Channel

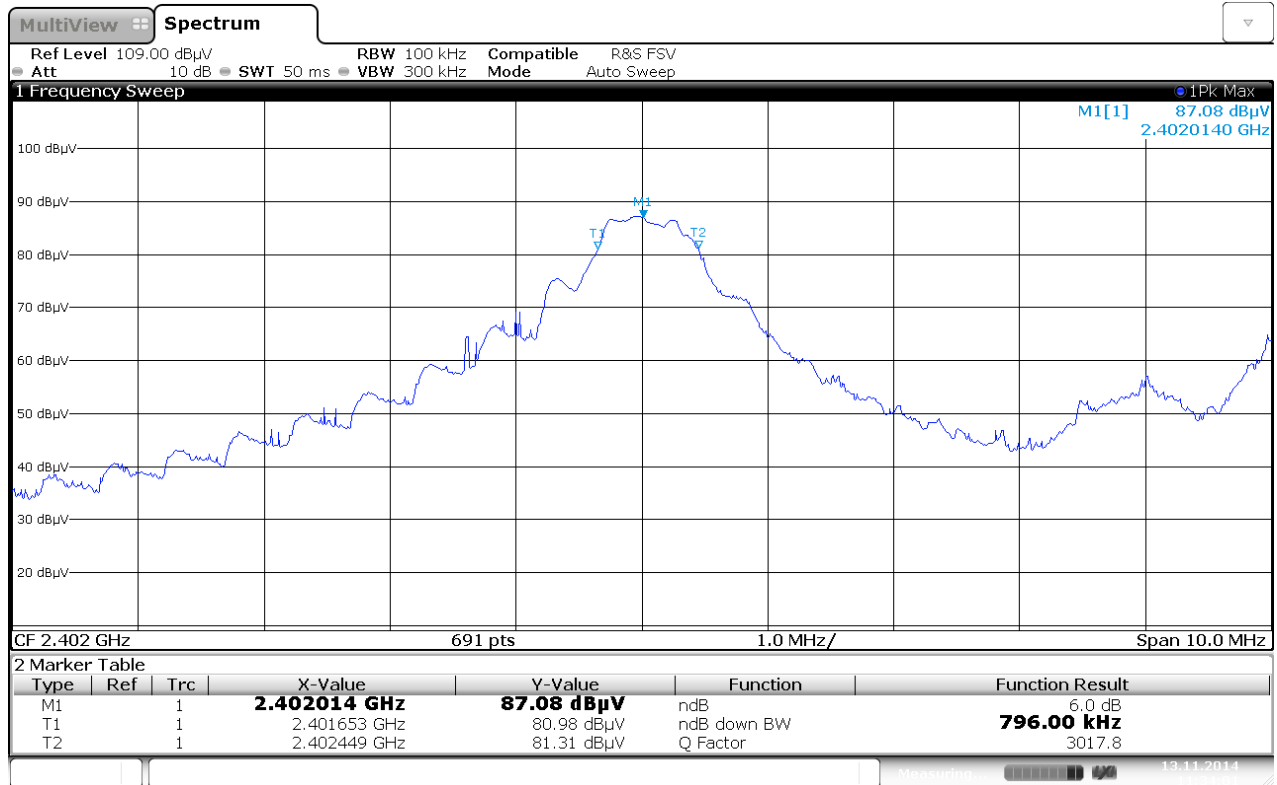


Date: 13 NOV 2014 13:27:18

Bluetooth LE High Channel

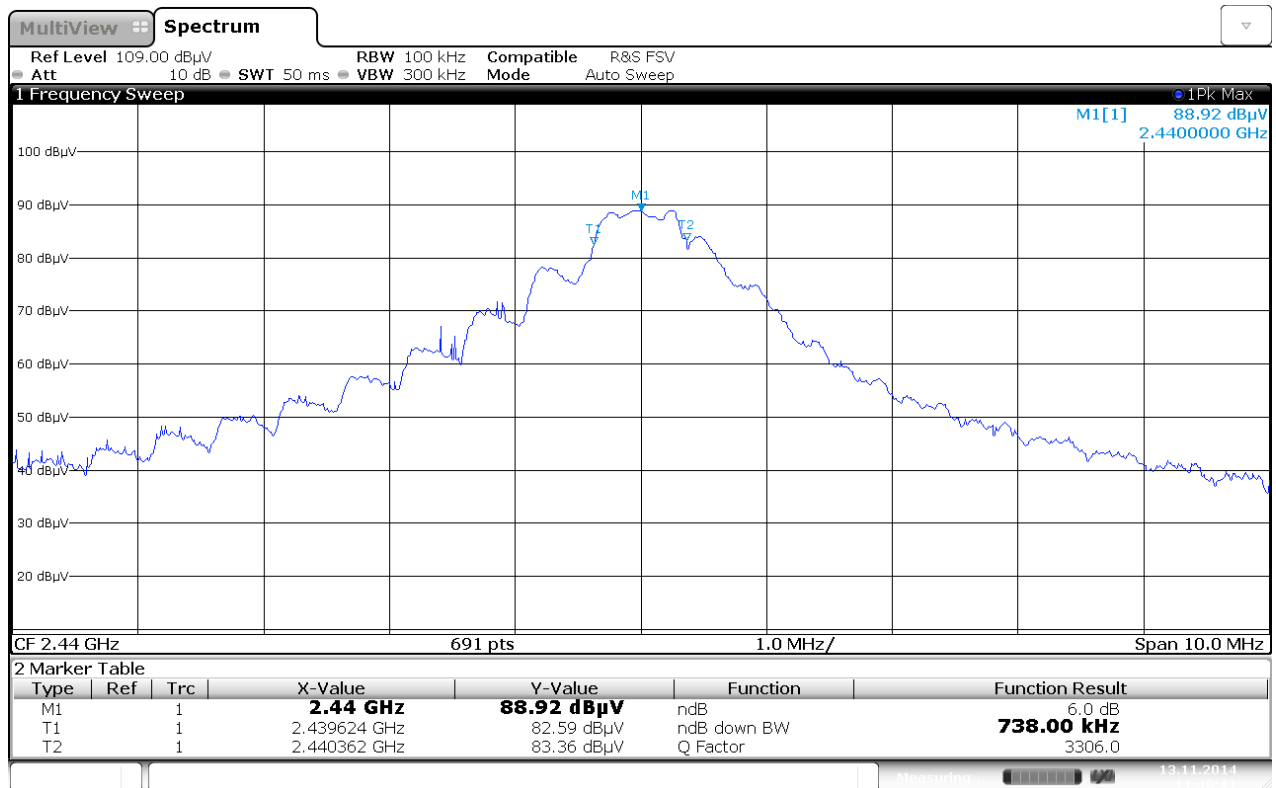


2.4.10 Test Results Plots- G-5 Mobile Receiver



Date: 13 NOV 2014 11:34:01

Bluetooth LE Low Channel



Date: 13 NOV 2014 11:48:41

Bluetooth LE Mid Channel



Date: 13 NOV 2014 13:09:54

Bluetooth LE High Channel



2.5 **OUT-OF-BAND EMISSIONS - CONDUCTED**

2.5.1 **Specification Reference**

Part 15 Subpart C §15.247(d)

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**

Not performed. Since the EUT does not have a conducted port, the test results from section 2.7 apply



2.6 **BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS**

2.6.1 **Specification Reference**

Part 15 Subpart C §15.247(d)

2.6.2 **Standard Applicable**

See previous test.

2.6.3 **Equipment Under Test and Modification State**

Not performed. All band edge measurements were performed using radiated measurements. Test results are presented in Section 2.8 of this test report



2.7 SPURIOUS RADIATED EMISSIONS

2.7.1 Specification Reference

Part 15 Subpart C §15.247(d)

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

Serial No: G5 Mobile Transmitter:4003N3; G5 Mobile Receiver SM42390155 / Default Test Configuration

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

November 11-12, 2014/KAM

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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.7-25.3°C
Relative Humidity	44.4-46.0%
ATM Pressure	99.2-99.3 kPa

2.7.7 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 considered worst case configuration presented for radiated emissions below 1GHz. There are no significant differences in emissions between all modes below 1GHz.



- 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.

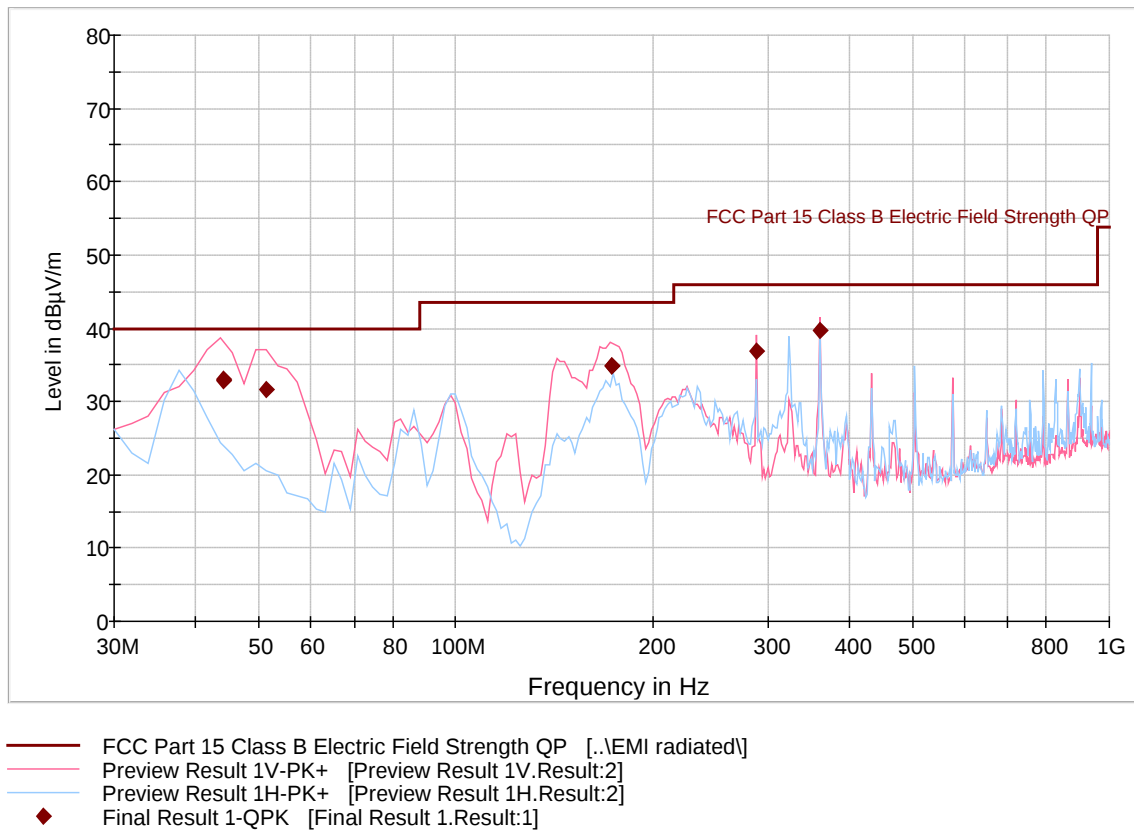
2.7.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ 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 QuasiPeak Final Measurement (db μ V/m) @ 30MHz			11.8

2.7.9 Test Results

See attached plots.

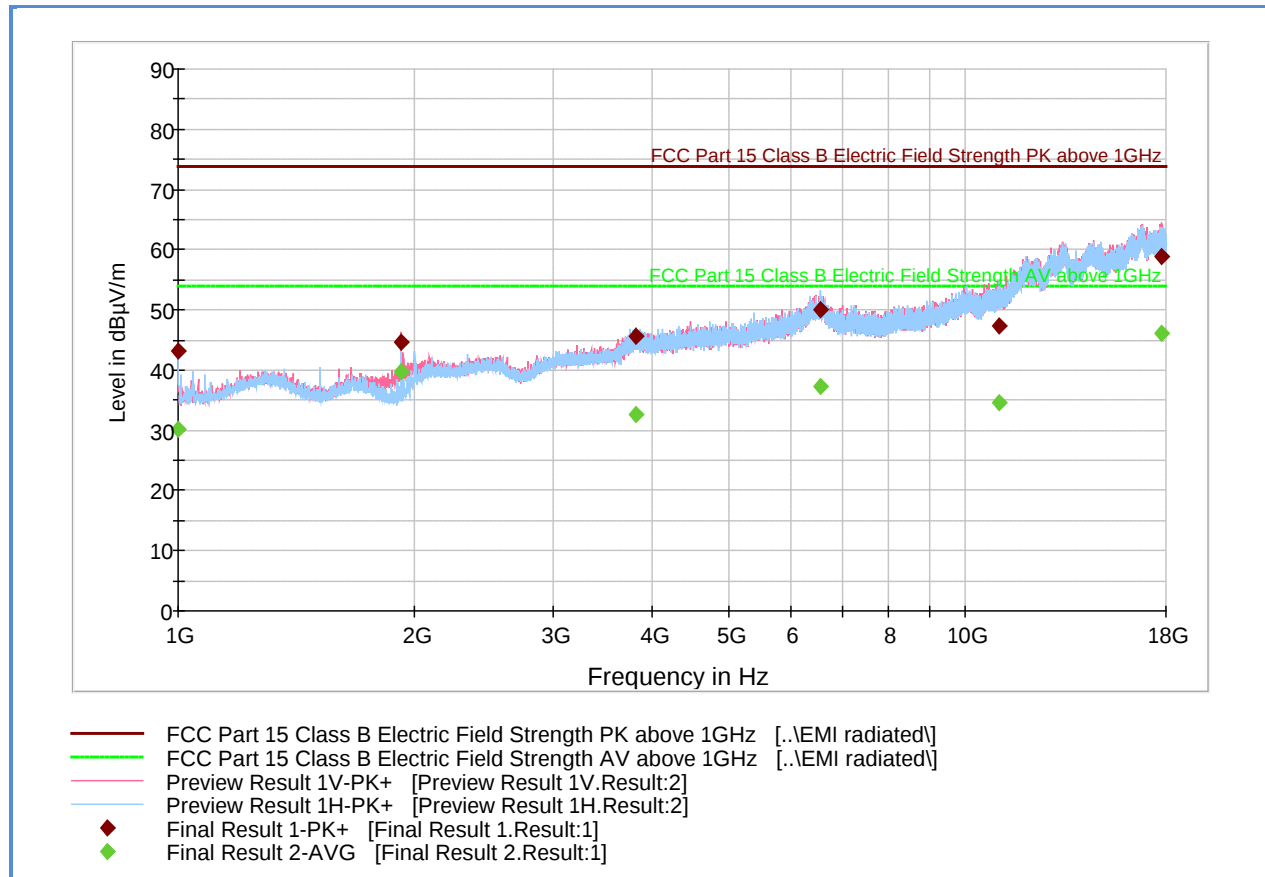
2.7.10 Test Results Below 1GHz (Receive Mode)



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)
44.007214	32.9	1000.0	120.000	100.0	V	229.0	-17.1	7.1	40.0
44.143327	33.1	1000.0	120.000	100.0	V	118.0	-17.1	6.9	40.0
51.358878	31.7	1000.0	120.000	100.0	V	115.0	-19.2	8.3	40.0
172.903808	34.8	1000.0	120.000	100.0	V	-15.0	-17.2	8.7	43.5
173.407695	34.9	1000.0	120.000	100.0	V	-8.0	-17.2	8.6	43.5
288.017074	36.9	1000.0	120.000	183.0	V	10.0	-12.1	9.1	46.0
359.980922	39.6	1000.0	120.000	140.0	V	50.0	-9.2	6.4	46.0

2.7.11 Test Results Above 1GHz (Receive Mode)



Peak Data

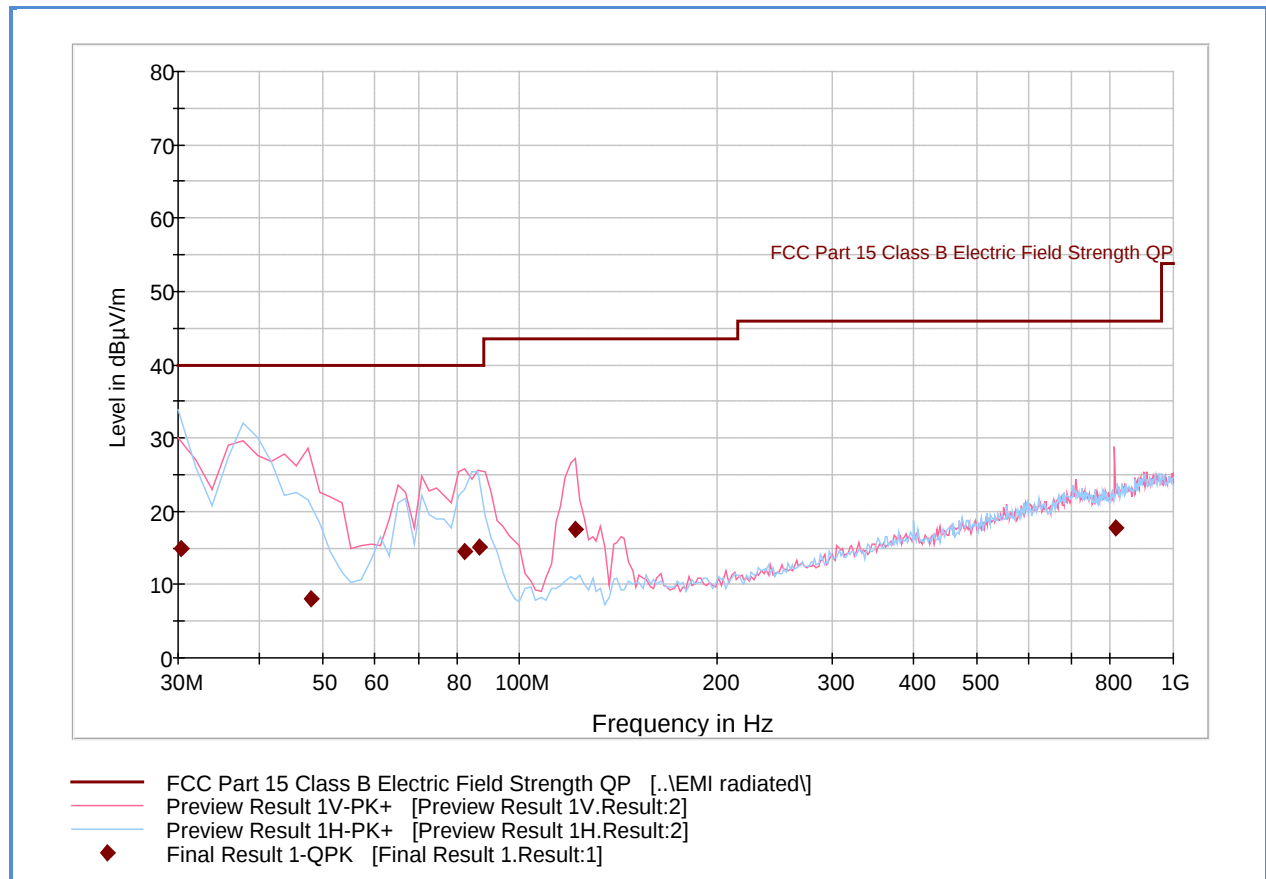
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	43.3	1000.0	1000.000	247.3	H	149.0	-7.0	30.6	73.9
1919.900000	44.5	1000.0	1000.000	378.1	V	12.0	-1.4	29.4	73.9
3823.333333	45.6	1000.0	1000.000	403.1	H	331.0	6.0	28.3	73.9
6549.933333	49.9	1000.0	1000.000	319.2	H	340.0	12.8	24.0	73.9
11070.600000	47.3	1000.0	1000.000	146.7	H	108.0	16.7	26.6	73.9
17770.533333	59.0	1000.0	1000.000	255.3	V	185.0	25.8	14.9	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)
1000.000000	30.1	1000.0	1000.000	247.3	H	149.0	-7.0	23.8	53.9
1919.900000	39.7	1000.0	1000.000	378.1	V	12.0	-1.4	14.2	53.9
3823.333333	32.7	1000.0	1000.000	403.1	H	331.0	6.0	21.2	53.9
6549.933333	37.3	1000.0	1000.000	319.2	H	340.0	12.8	16.6	53.9
11070.600000	34.7	1000.0	1000.000	146.7	H	108.0	16.7	19.2	53.9
17770.533333	46.1	1000.0	1000.000	255.3	V	185.0	25.8	7.8	53.9

Test Notes: No significant emissions observed above 18GHz.

2.7.12 Test Results Below 1GHz (Bluetooth LE) (G-5 Mobile Transmitter)

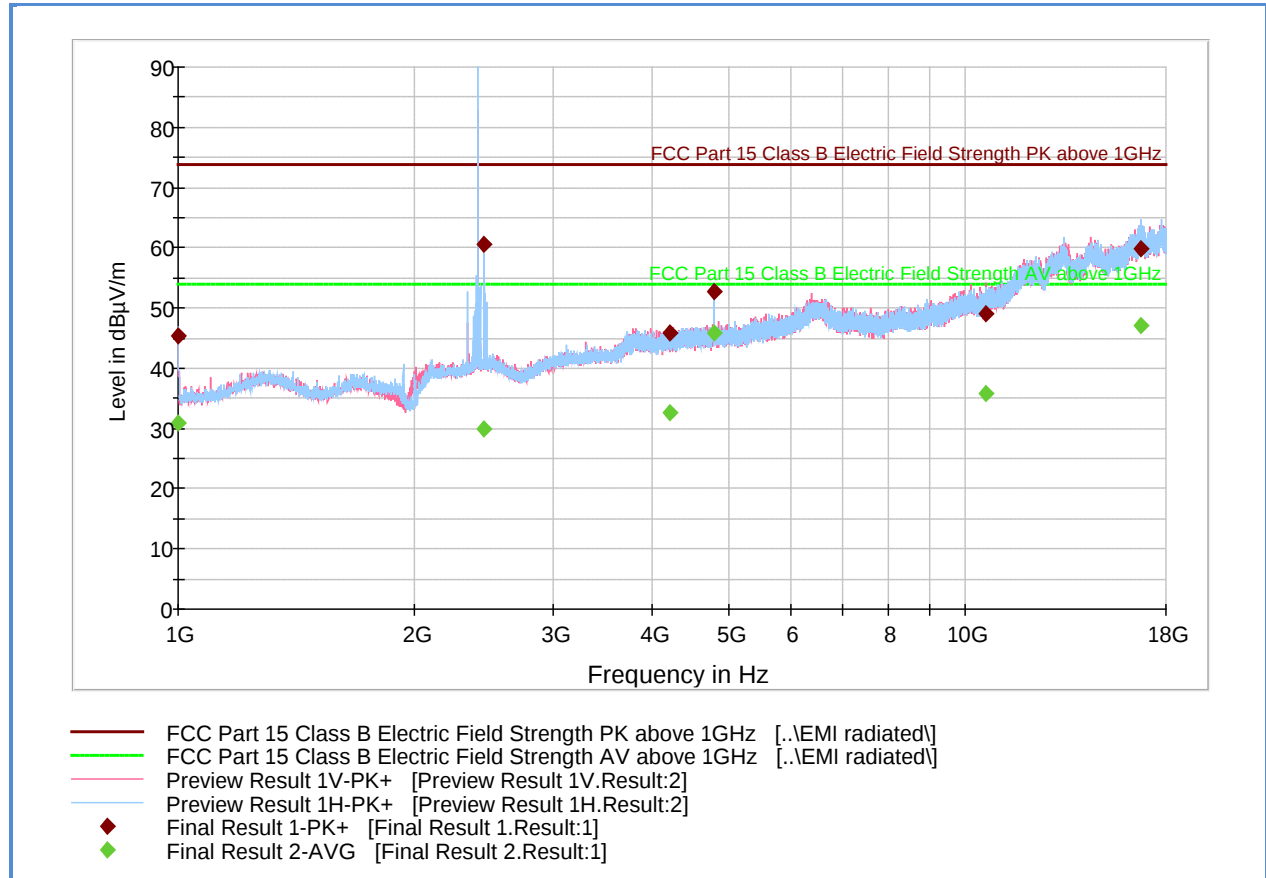


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.360000	15.0	1000.0	120.000	105.0	H	342.0	-10.8	25.0	40.0
48.014990	8.0	1000.0	120.000	105.0	V	264.0	-18.3	32.0	40.0
82.444970	14.4	1000.0	120.000	160.0	V	311.0	-20.9	25.6	40.0
86.732745	15.1	1000.0	120.000	109.0	V	-11.0	-20.5	24.9	40.0
121.466613	17.5	1000.0	120.000	100.0	V	227.0	-19.6	26.0	43.5
815.066774	17.8	1000.0	120.000	150.0	V	312.0	0.4	28.2	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.13 Test Results Above 1GHz (Bluetooth LE Low Channel) (G-5 Mobile Transmitter)



Peak Data

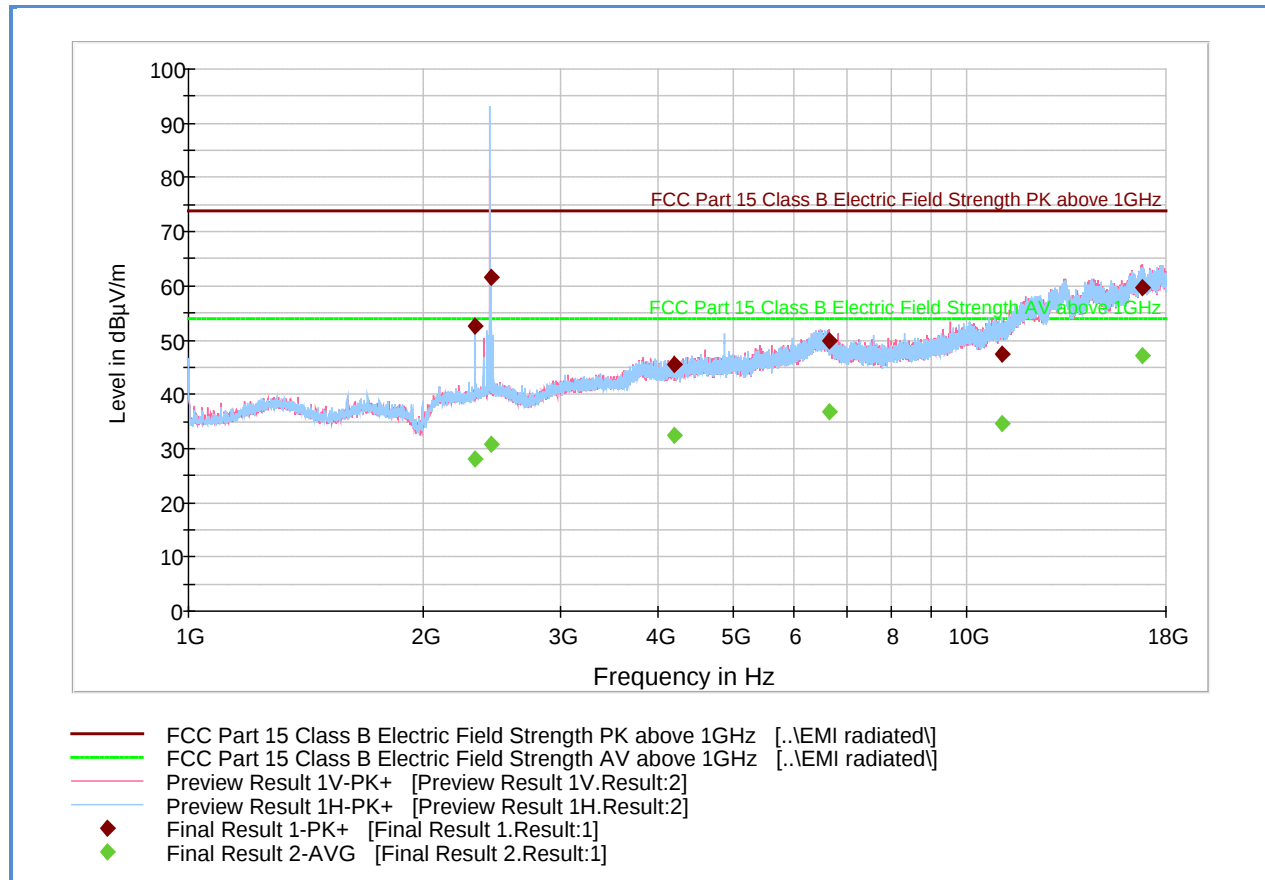
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	45.4	1000.0	1000.000	201.3	H	77.0	-7.0	28.5	73.9
2450.866667	60.7	1000.0	1000.000	123.7	H	271.0	0.1	13.2	73.9
4219.066667	45.8	1000.0	1000.000	201.3	H	20.0	6.2	28.1	73.9
4803.833333	52.7	1000.0	1000.000	99.7	H	317.0	6.8	21.2	73.9
10647.166667	49.0	1000.0	1000.000	188.5	V	278.0	15.5	24.9	73.9
16758.233333	59.7	1000.0	1000.000	102.8	H	246.0	25.9	14.2	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)
1000.400000	30.8	1000.0	1000.000	201.3	H	77.0	-7.0	23.1	53.9
2450.866667	30.0	1000.0	1000.000	123.7	H	271.0	0.1	23.9	53.9
4219.066667	32.5	1000.0	1000.000	201.3	H	20.0	6.2	21.4	53.9
4803.833333	45.9	1000.0	1000.000	99.7	H	317.0	6.8	8.0	53.9
10647.166667	35.9	1000.0	1000.000	188.5	V	278.0	15.5	18.0	53.9
16758.233333	47.0	1000.0	1000.000	102.8	H	246.0	25.9	6.9	53.9

Test Notes: No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.7.14 Test Results Above 1GHz (Bluetooth LE Mid Channel) (G-5 Mobile Transmitter)



Peak Data

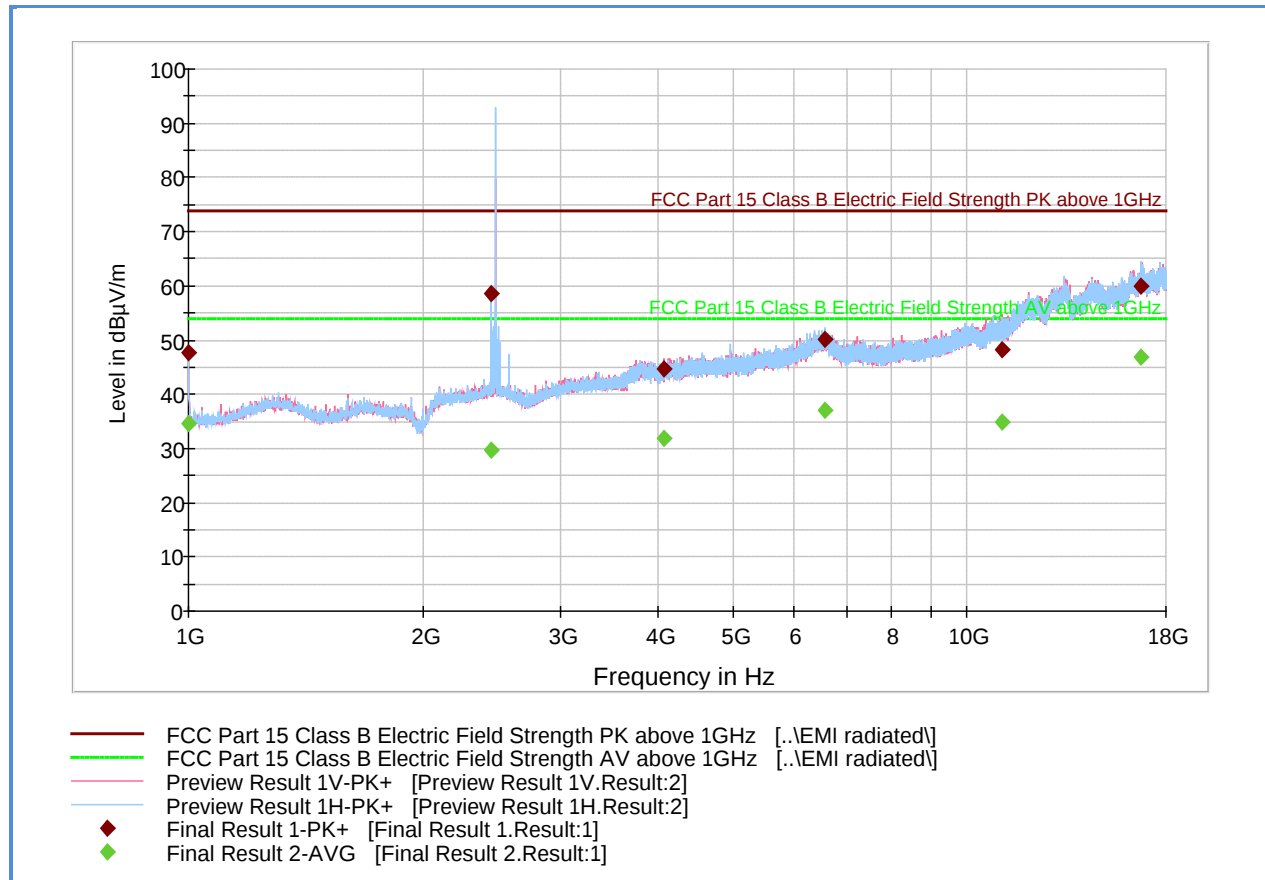
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2334.333333	52.5	1000.0	1000.000	311.2	H	241.0	-0.4	21.4	73.9
2450.900000	61.5	1000.0	1000.000	100.7	H	301.0	0.1	12.4	73.9
4210.000000	45.5	1000.0	1000.000	345.1	V	309.0	6.2	28.4	73.9
6639.500000	49.7	1000.0	1000.000	382.0	V	164.0	12.6	24.2	73.9
11082.333333	47.5	1000.0	1000.000	103.7	H	234.0	16.6	26.4	73.9
16759.400000	59.8	1000.0	1000.000	302.2	V	293.0	25.9	14.1	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)
2334.333333	28.0	1000.0	1000.000	311.2	H	241.0	-0.4	25.9	53.9
2450.900000	30.9	1000.0	1000.000	100.7	H	301.0	0.1	23.0	53.9
4210.000000	32.4	1000.0	1000.000	345.1	V	309.0	6.2	21.5	53.9
6639.500000	36.8	1000.0	1000.000	382.0	V	164.0	12.6	17.1	53.9
11082.333333	34.7	1000.0	1000.000	103.7	H	234.0	16.6	19.2	53.9
16759.400000	47.0	1000.0	1000.000	302.2	V	293.0	25.9	6.9	53.9

Test Notes: No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.7.15 Test Results Above 1GHz (Bluetooth LE High Channel) (G-5 Mobile Transmitter)



Peak Data

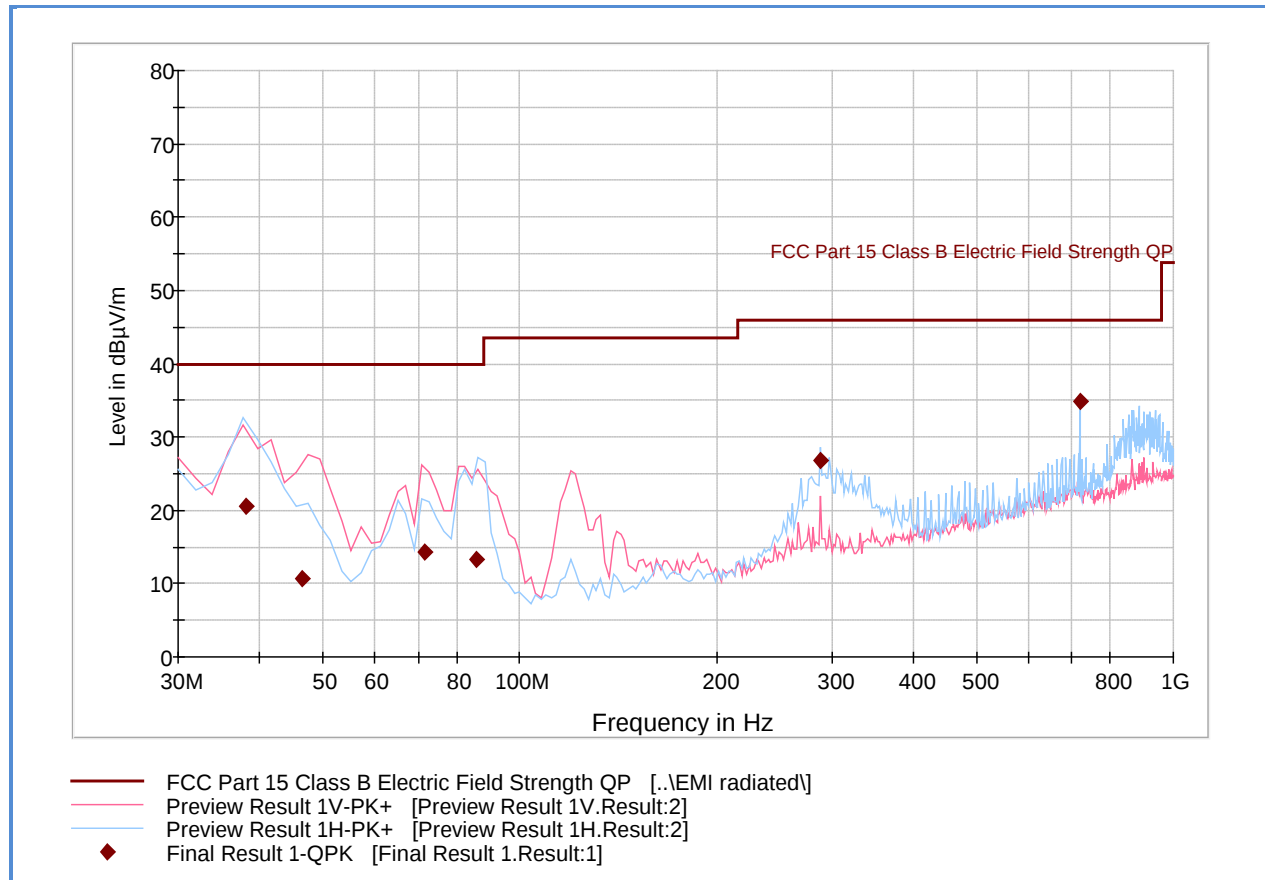
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	47.7	1000.0	1000.000	165.6	H	20.0	-7.0	26.2	73.9
2450.866667	58.5	1000.0	1000.000	103.7	H	308.0	0.1	15.4	73.9
4074.566667	44.8	1000.0	1000.000	163.6	V	20.0	6.1	29.1	73.9
6558.100000	50.0	1000.0	1000.000	242.4	H	-9.0	12.8	23.9	73.9
11069.100000	48.3	1000.0	1000.000	402.7	V	119.0	16.7	25.6	73.9
16713.233333	59.9	1000.0	1000.000	125.7	H	73.0	25.9	14.0	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)
1000.000000	34.6	1000.0	1000.000	165.6	H	20.0	-7.0	19.3	53.9
2450.866667	29.7	1000.0	1000.000	103.7	H	308.0	0.1	24.2	53.9
4074.566667	31.8	1000.0	1000.000	163.6	V	20.0	6.1	22.1	53.9
6558.100000	37.1	1000.0	1000.000	242.4	H	-9.0	12.8	16.8	53.9
11069.100000	34.9	1000.0	1000.000	402.7	V	119.0	16.7	19.0	53.9
16713.233333	46.7	1000.0	1000.000	125.7	H	73.0	25.9	7.2	53.9

Test Notes: No significant emissions observed above 6GHz. Measurements above 6GHz are noise floor figures.

2.7.16 Test Results Below 1GHz (Bluetooth LE) (G-5 Mobile Receiver)

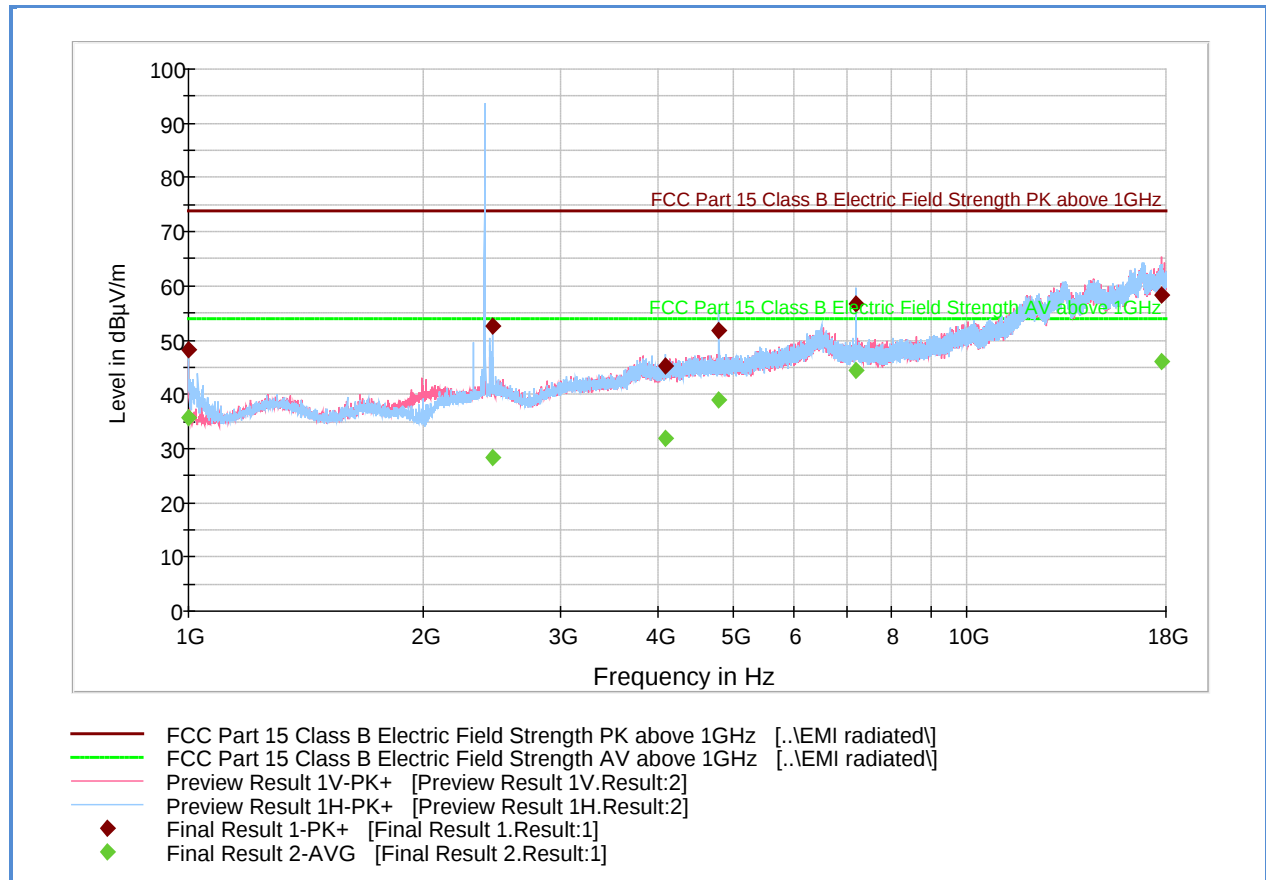


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.095551	20.5	1000.0	120.000	350.0	H	10.0	-14.8	19.5	40.0
46.534990	10.7	1000.0	120.000	100.0	V	15.0	-17.9	29.3	40.0
71.621643	14.4	1000.0	120.000	200.0	V	186.0	-21.4	25.6	40.0
85.652745	13.3	1000.0	120.000	200.0	H	0.0	-20.7	26.7	40.0
288.017074	26.8	1000.0	120.000	100.0	H	52.0	-12.1	19.2	46.0
720.000160	34.9	1000.0	120.000	105.0	H	60.0	-0.8	11.1	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.17 Test Results Above 1GHz (Bluetooth LE Low Channel) (G-5 Mobile Receiver)



Peak Data

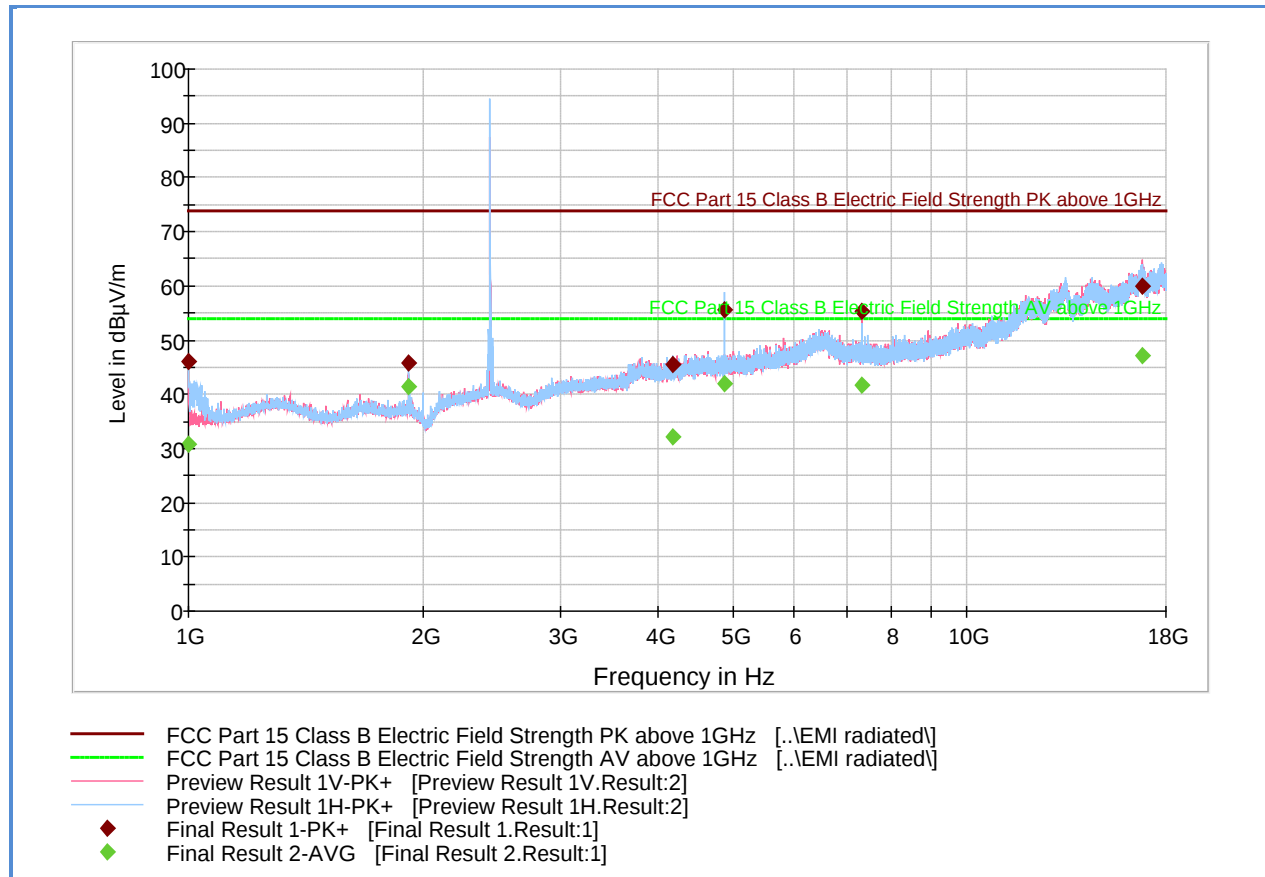
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	48.3	1000.0	1000.000	265.3	H	267.0	-7.0	25.6	73.9
2453.866667	52.6	1000.0	1000.000	123.7	H	267.0	0.1	21.3	73.9
4093.100000	45.1	1000.0	1000.000	302.2	H	320.0	6.2	28.8	73.9
4804.433333	51.7	1000.0	1000.000	103.7	H	44.0	6.8	22.2	73.9
7206.500000	56.8	1000.0	1000.000	208.5	H	342.0	11.3	17.1	73.9
17745.766667	58.4	1000.0	1000.000	406.7	V	253.0	25.8	15.5	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)
1000.000000	35.7	1000.0	1000.000	265.3	H	267.0	-7.0	18.2	53.9
2453.866667	28.5	1000.0	1000.000	123.7	H	267.0	0.1	25.4	53.9
4093.100000	31.9	1000.0	1000.000	302.2	H	320.0	6.2	22.0	53.9
4804.433333	39.0	1000.0	1000.000	103.7	H	44.0	6.8	14.9	53.9
7206.500000	44.3	1000.0	1000.000	208.5	H	342.0	11.3	9.6	53.9
17745.766667	46.0	1000.0	1000.000	406.7	V	253.0	25.8	7.9	53.9

Test Notes: No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.7.18 Test Results Above 1GHz (Bluetooth LE Mid Channel) (G-5 Mobile Receiver)



Peak Data

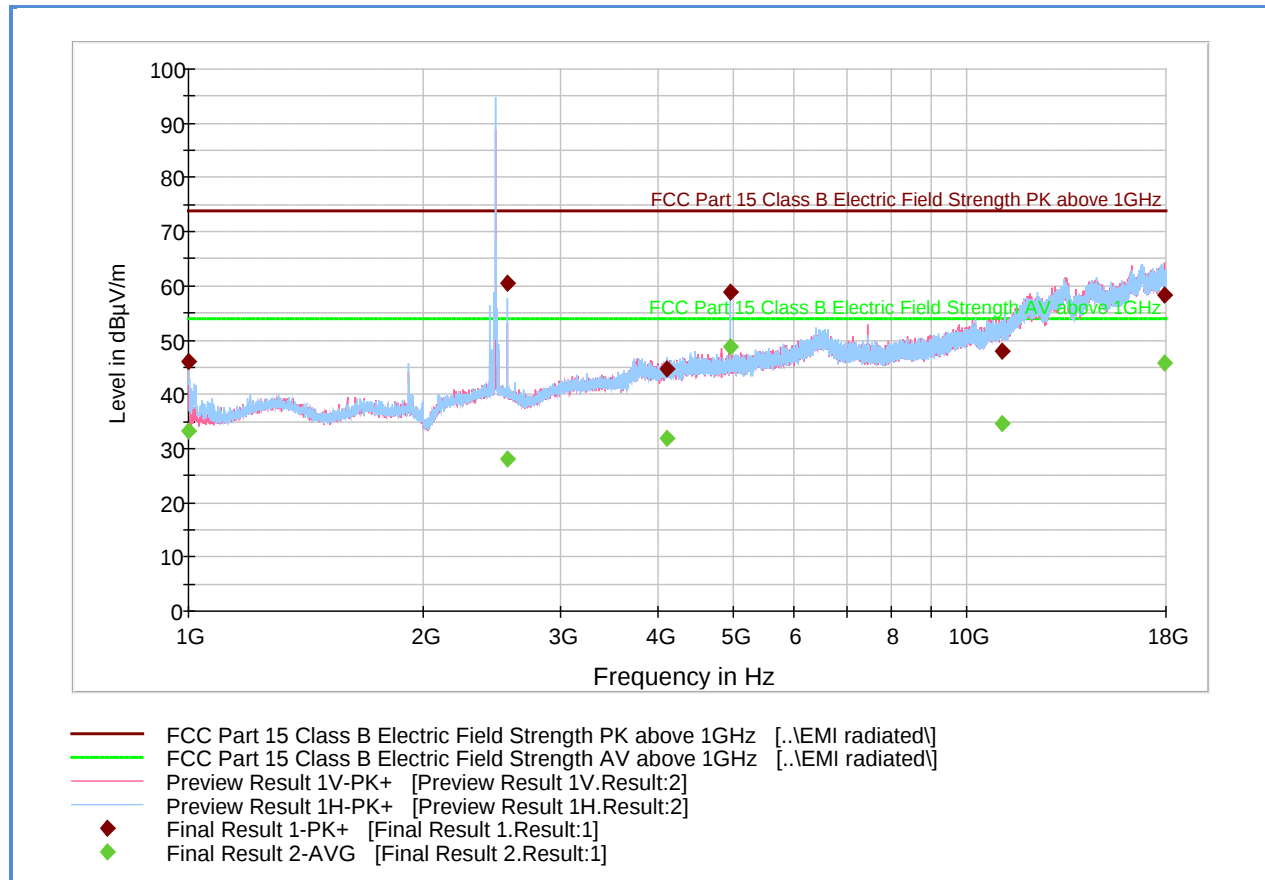
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.500000	46.0	1000.0	1000.000	287.2	H	182.0	-7.0	27.9	73.9
1919.900000	45.8	1000.0	1000.000	267.3	H	1.0	-1.4	28.1	73.9
4179.766667	45.5	1000.0	1000.000	301.6	H	265.0	6.2	28.4	73.9
4879.366667	55.6	1000.0	1000.000	172.6	H	46.0	7.1	18.3	73.9
7319.300000	55.2	1000.0	1000.000	268.3	V	288.0	11.1	18.7	73.9
16794.533333	60.0	1000.0	1000.000	391.1	V	75.0	25.9	13.9	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)
1000.500000	30.7	1000.0	1000.000	287.2	H	182.0	-7.0	23.2	53.9
1919.900000	41.3	1000.0	1000.000	267.3	H	1.0	-1.4	12.6	53.9
4179.766667	32.3	1000.0	1000.000	301.6	H	265.0	6.2	21.6	53.9
4879.366667	41.9	1000.0	1000.000	172.6	H	46.0	7.1	12.0	53.9
7319.300000	41.6	1000.0	1000.000	268.3	V	288.0	11.1	12.3	53.9
16794.533333	47.1	1000.0	1000.000	391.1	V	75.0	25.9	6.8	53.9

Test Notes: No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.7.19 Test Results Above 1GHz (Bluetooth LE High Channel) (G-5 Mobile Receiver)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	46.2	1000.0	1000.000	275.3	H	16.0	-7.0	27.7	73.9
2570.433333	60.5	1000.0	1000.000	114.7	H	270.0	-0.1	13.4	73.9
4118.166667	44.7	1000.0	1000.000	378.1	H	329.0	6.2	29.2	73.9
4959.833333	58.9	1000.0	1000.000	207.5	H	269.0	7.4	15.0	73.9
11092.200000	48.0	1000.0	1000.000	356.1	V	121.0	16.6	25.9	73.9
17920.133333	58.4	1000.0	1000.000	322.2	V	4.0	25.3	15.5	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)
1000.000000	33.2	1000.0	1000.000	275.3	H	16.0	-7.0	20.7	53.9
2570.433333	28.0	1000.0	1000.000	114.7	H	270.0	-0.1	25.9	53.9
4118.166667	32.0	1000.0	1000.000	378.1	H	329.0	6.2	21.9	53.9
4959.833333	48.8	1000.0	1000.000	207.5	H	269.0	7.4	5.1	53.9
11092.200000	34.7	1000.0	1000.000	356.1	V	121.0	16.6	19.2	53.9
17920.133333	45.7	1000.0	1000.000	322.2	V	4.0	25.3	8.2	53.9

Test Notes: No significant emissions observed above 6GHz. Measurements above 6GHz are noise floor figures.



2.8 RADIATED BAND EDGE MEASUREMENTS AND IMMEDIATE RESTRICTED BANDS

2.8.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.8.2 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)).

2.8.3 Equipment Under Test and Modification State

Serial No: G5 Mobile Transmitter:4003N3; G5 Mobile Receiver SM42390155 / Default Test Configuration

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

November 12, 2014/KAM

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	25.3°C
Relative Humidity	46.0%
ATM Pressure	99.2 kPa

2.8.7 Additional Observations

- This is a radiated test. The spectrum was searched from 2310MHz to 2390MHz for lower immediate restricted band and 2483.5MHz to 2500MHz for the upper immediate restricted band.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.



- 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 2.8.8 for sample computation.

2.8.8 Sample Computation (Radiated Emission)

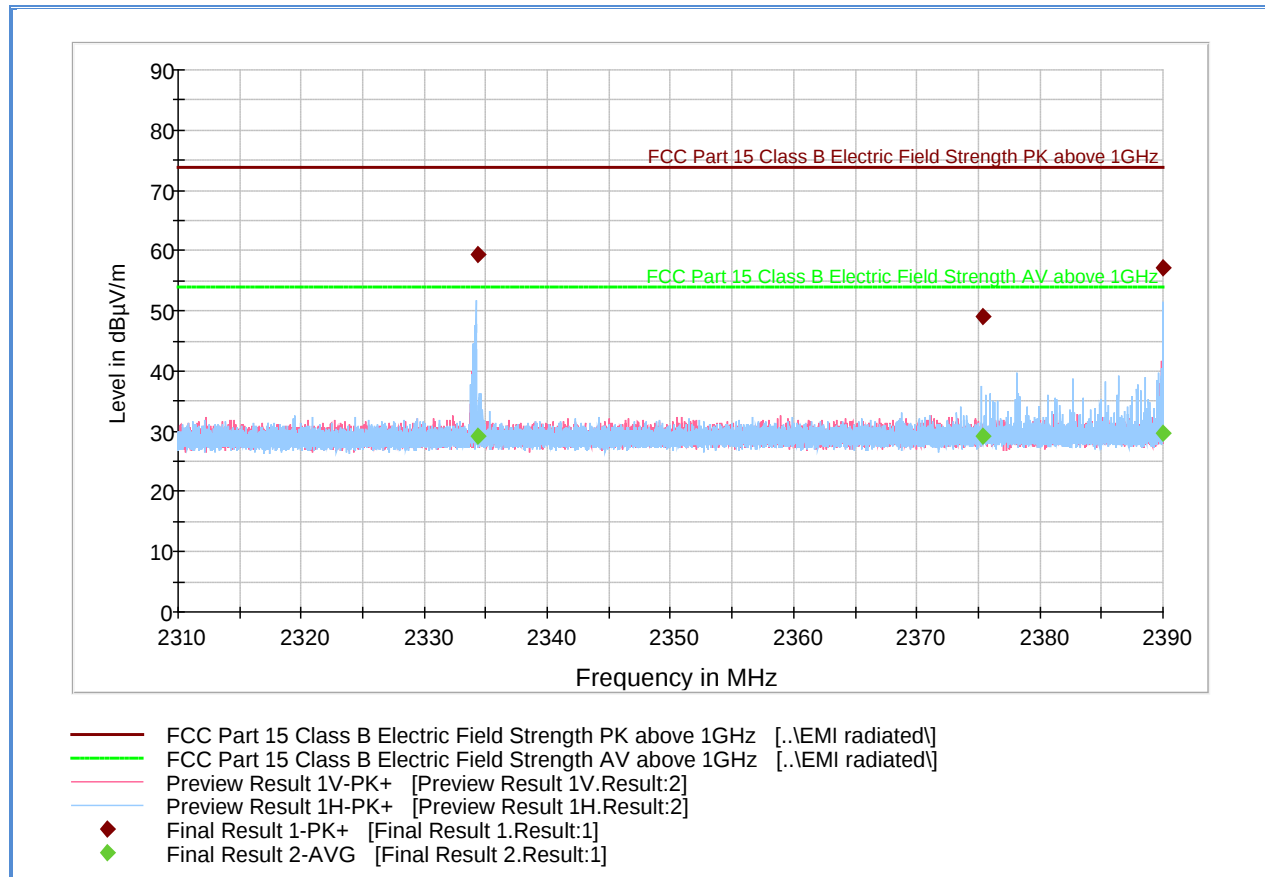
Measuring equipment raw measurement (db μ V) @ 2400 MHz			53.9
Correction Factor (dB)	Asset# 1153 (cable)	3.4	-0.4
	Asset# 8628(preamplifier)	-36.5	
	Asset#7575 (antenna)	32.7	
Reported Max Peak Final Measurement (dbμV/m) @ 2400 MHz			53.5

2.8.9 Test Results

See attached plots.

2.8.10 Test Results Restricted Band 2310MHz to 2490MHz (Bluetooth LE Low Channel)

G-5 Mobile Transmitter



Peak Data

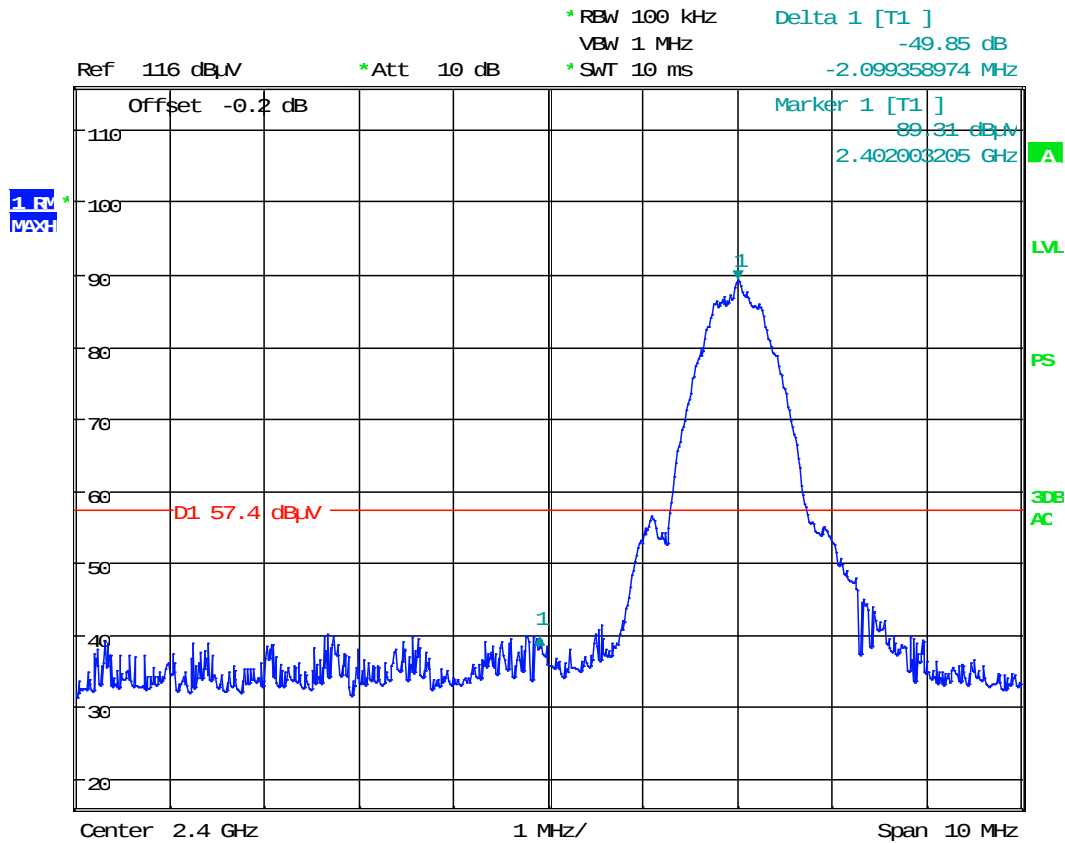
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2334.370667	59.4	1000.0	1000.000	102.8	H	272.0	-0.4	14.5	73.9
2375.397333	49.1	1000.0	1000.000	101.7	H	272.0	-0.3	24.8	73.9
2390.000000	57.1	1000.0	1000.000	103.7	H	302.0	-0.2	16.8	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)
2334.370667	29.3	1000.0	1000.000	102.8	H	272.0	-0.4	24.6	53.9
2375.397333	29.1	1000.0	1000.000	101.7	H	272.0	-0.3	24.8	53.9
2390.000000	29.6	1000.0	1000.000	103.7	H	302.0	-0.2	24.3	53.9

2.8.11 Test Results Band Edge 2400MHz using 100kHz RBW (Bluetooth LE Low Channel)

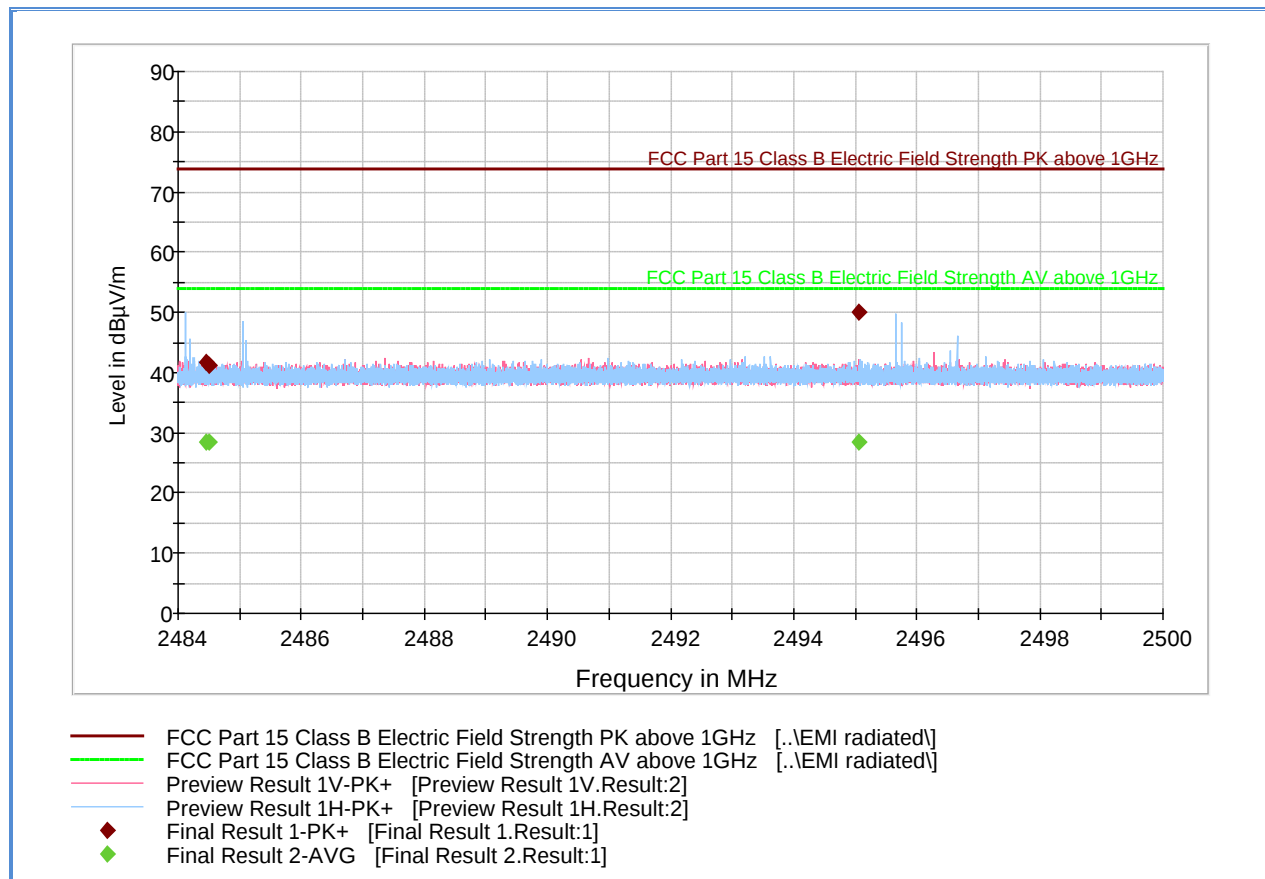
G-5 Mobile Transmitter



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2.8.12 Test Results Restricted Band 2483.5MHz to 2500MHz (Bluetooth LE High Channel)

G-5 Mobile Transmitter



Peak Data

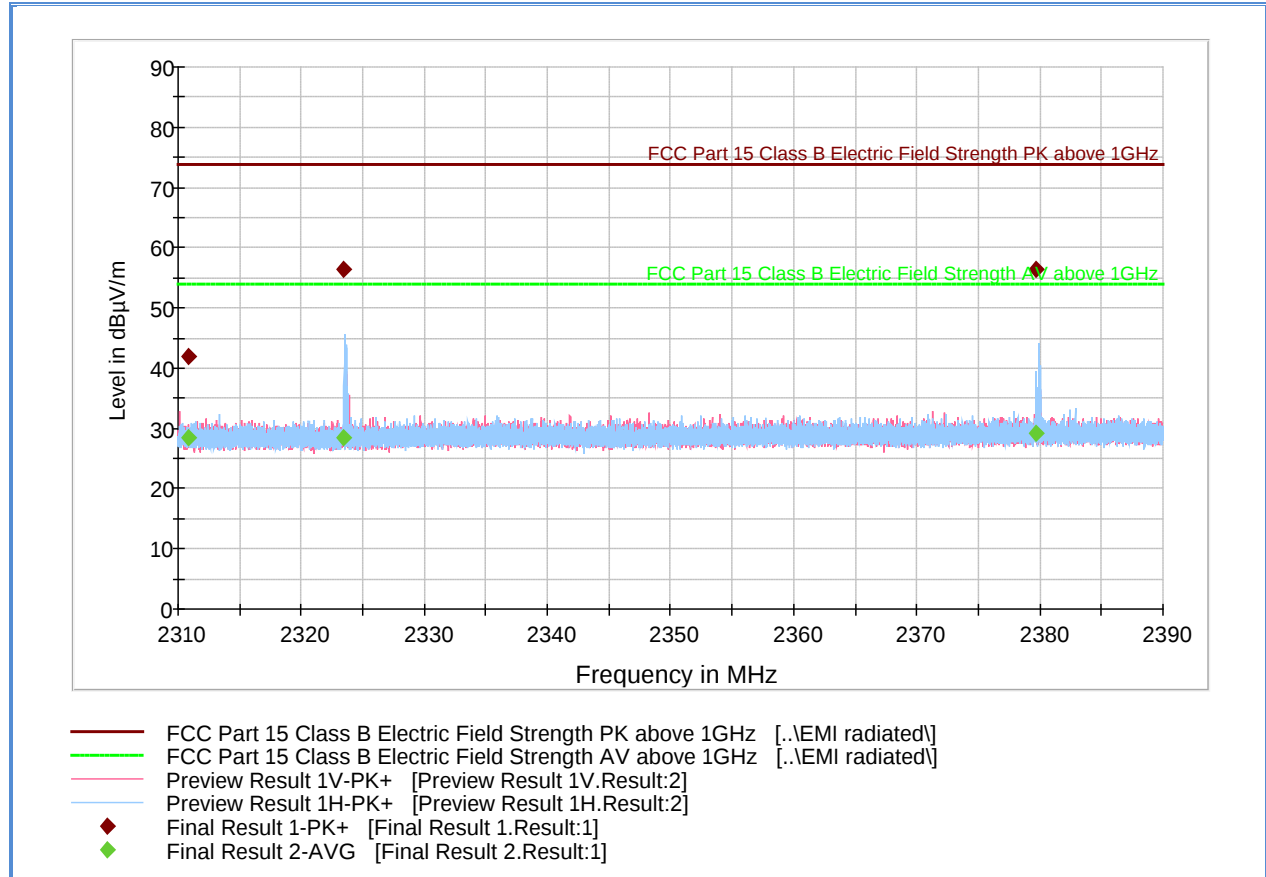
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2484.454000	41.6	1000.0	1000.000	170.6	H	46.0	0.2	32.3	73.9
2484.514667	41.3	1000.0	1000.000	102.7	H	39.0	0.2	32.6	73.9
2495.054000	50.1	1000.0	1000.000	124.7	H	45.0	0.2	23.8	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)
2484.454000	28.4	1000.0	1000.000	170.6	H	46.0	0.2	25.5	53.9
2484.514667	28.4	1000.0	1000.000	102.7	H	39.0	0.2	25.5	53.9
2495.054000	28.6	1000.0	1000.000	124.7	H	45.0	0.2	25.3	53.9

2.8.13 Test Results Restricted Band 2310MHz to 2490MHz (Bluetooth LE Low Channel)

G-5 Mobile Receiver



Peak Data

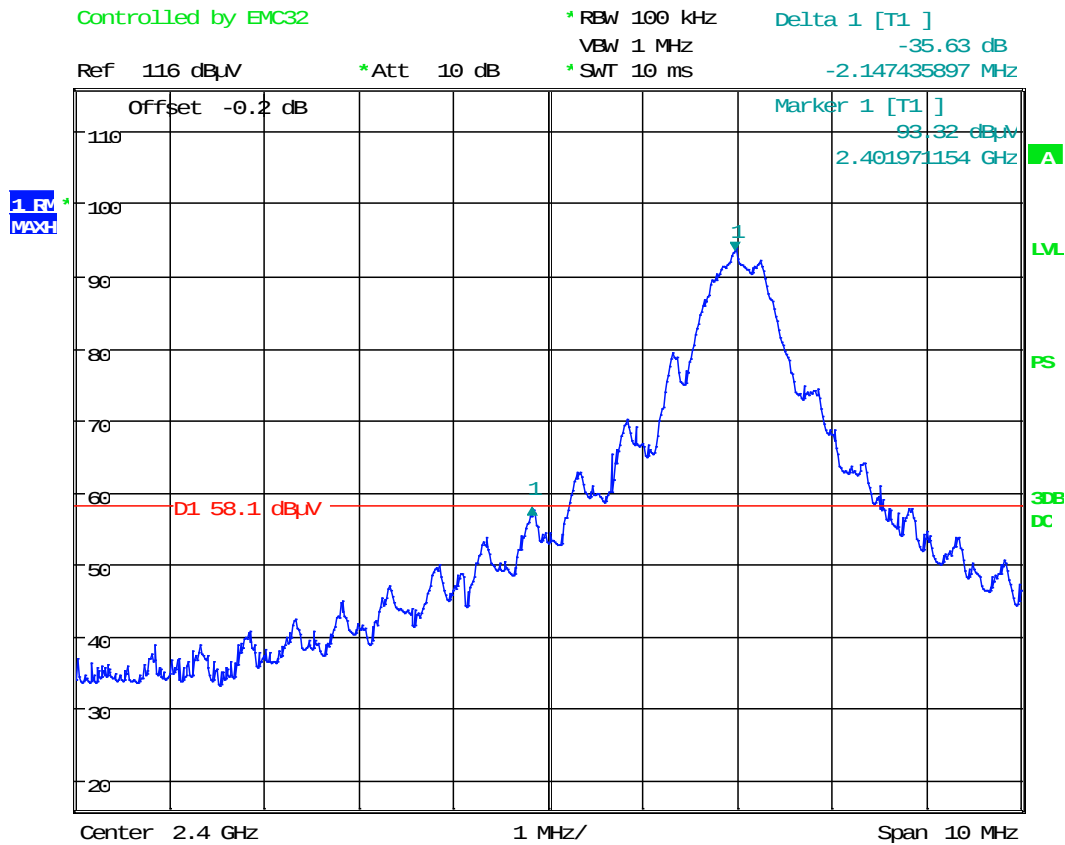
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2310.800000	41.8	1000.0	1000.000	312.2	V	314.0	-0.5	32.1	73.9
2323.384000	56.3	1000.0	1000.000	103.7	H	37.0	-0.5	17.6	73.9
2379.682667	56.3	1000.0	1000.000	102.7	H	36.0	-0.3	17.6	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2310.800000	28.4	1000.0	1000.000	312.2	V	314.0	-0.5	25.5	53.9
2323.384000	28.5	1000.0	1000.000	103.7	H	37.0	-0.5	25.4	53.9
2379.682667	29.2	1000.0	1000.000	102.7	H	36.0	-0.3	24.7	53.9

2.8.14 Test Results Band Edge 2400MHz using 100kHz RBW (Bluetooth LE Low Channel)

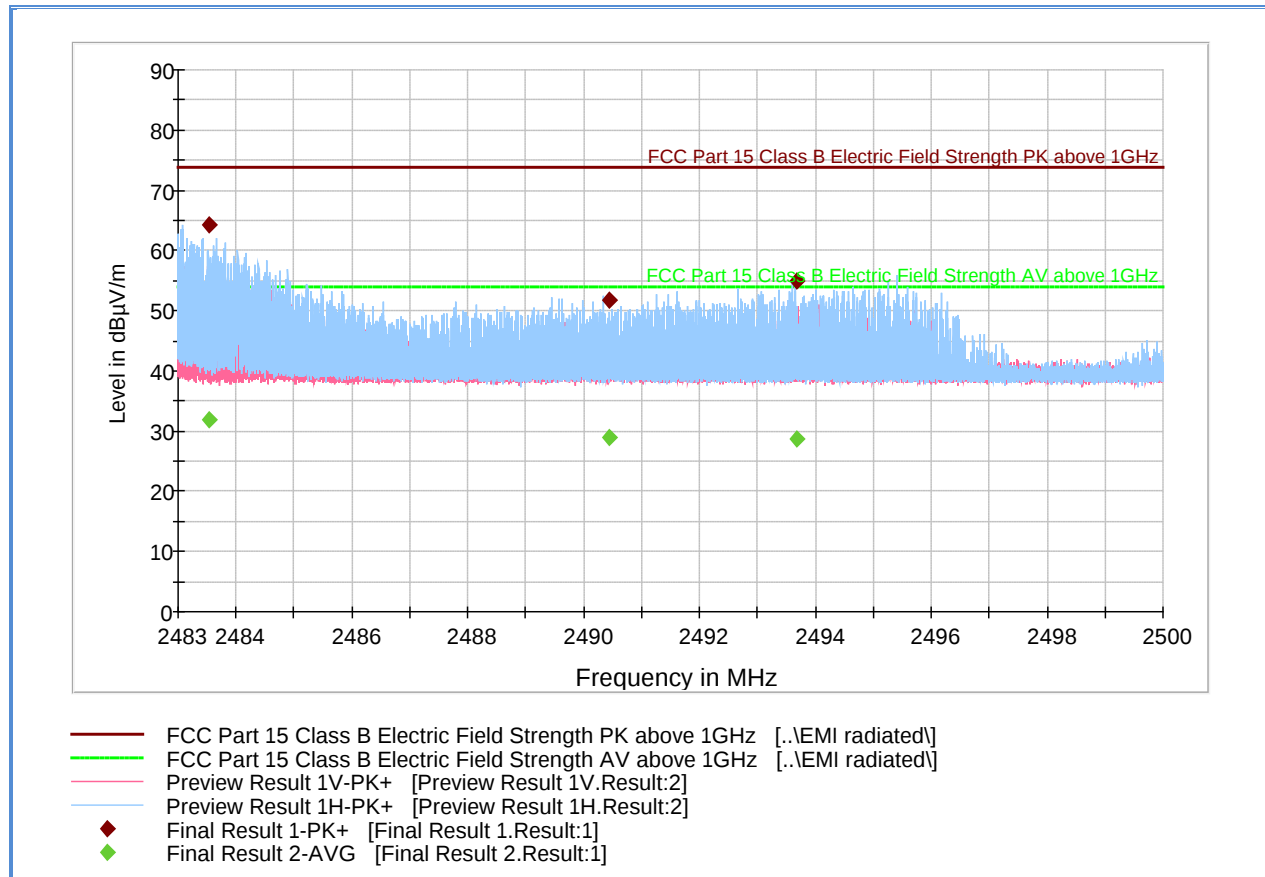
G-5 Mobile Receiver



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2.8.15 Test Results Restricted Band 2483.5MHz to 2500MHz (Bluetooth LE High Channel)

G-5 Mobile Receiver



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2483.542667	64.3	1000.0	1000.000	122.7	H	262.0	0.1	9.6	73.9
2490.444667	51.7	1000.0	1000.000	122.7	H	266.0	0.2	22.3	73.9
2493.672000	54.9	1000.0	1000.000	122.7	H	262.0	0.2	19.0	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)
2483.542667	32.0	1000.0	1000.000	122.7	H	262.0	0.1	21.9	53.9
2490.444667	28.9	1000.0	1000.000	122.7	H	266.0	0.2	25.0	53.9
2493.672000	28.8	1000.0	1000.000	122.7	H	262.0	0.2	25.1	53.9



2.9 **POWER SPECTRAL DENSITY**

2.9.1 **Specification Reference**

Part 15 Subpart C §15.247(e)

2.9.2 **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.

2.9.3 **Equipment Under Test and Modification State**

Serial No: 4003N3 / Default Test Configuration

2.9.4 **Date of Test/Initial of test personnel who performed the test**

Not Performed. EUT complies with the requirement since the measured total power (peak conducted output power or maximum conducted output power) complies with the PSD limit, therefore the actual measurement of PSD is not required (per Section 10.1 of KDB 558074 D01 DTS Meas Guidance v03r04, (January 07, 2016)) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.



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 Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	04/05/14	04/05/15
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	07/01/14	07/01/15
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	01/30/14	01/30/15
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	01/30/14	01/30/15
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/30/14	01/30/16
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	01/30/14	01/30/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	04/03/14	04/03/15
1150	Horn antenna	3160-09	012054-004	ETS	04/26/13	04/26/15
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	05/02/13	05/02/15
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	02/28/14	02/28/16
8760	Pre-amplifier	ZKL-2	1001	Mini-Circuits	09/04/14	09/04/15
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	04/03/14	04/03/15
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	09/04/14	09/04/15
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/29/14	08/29/15
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/14	03/17/15
1016	Pre-amplifier	PAM-0202	187	PAM	05/05/14	05/05/15
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	01/20/14	01/20/15
Miscellaneous						
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/30/14	01/30/15
	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 Emission Measurements (Below 1GHz)

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

3.2.3 Radiated Emission Measurements (Above 1GHz)

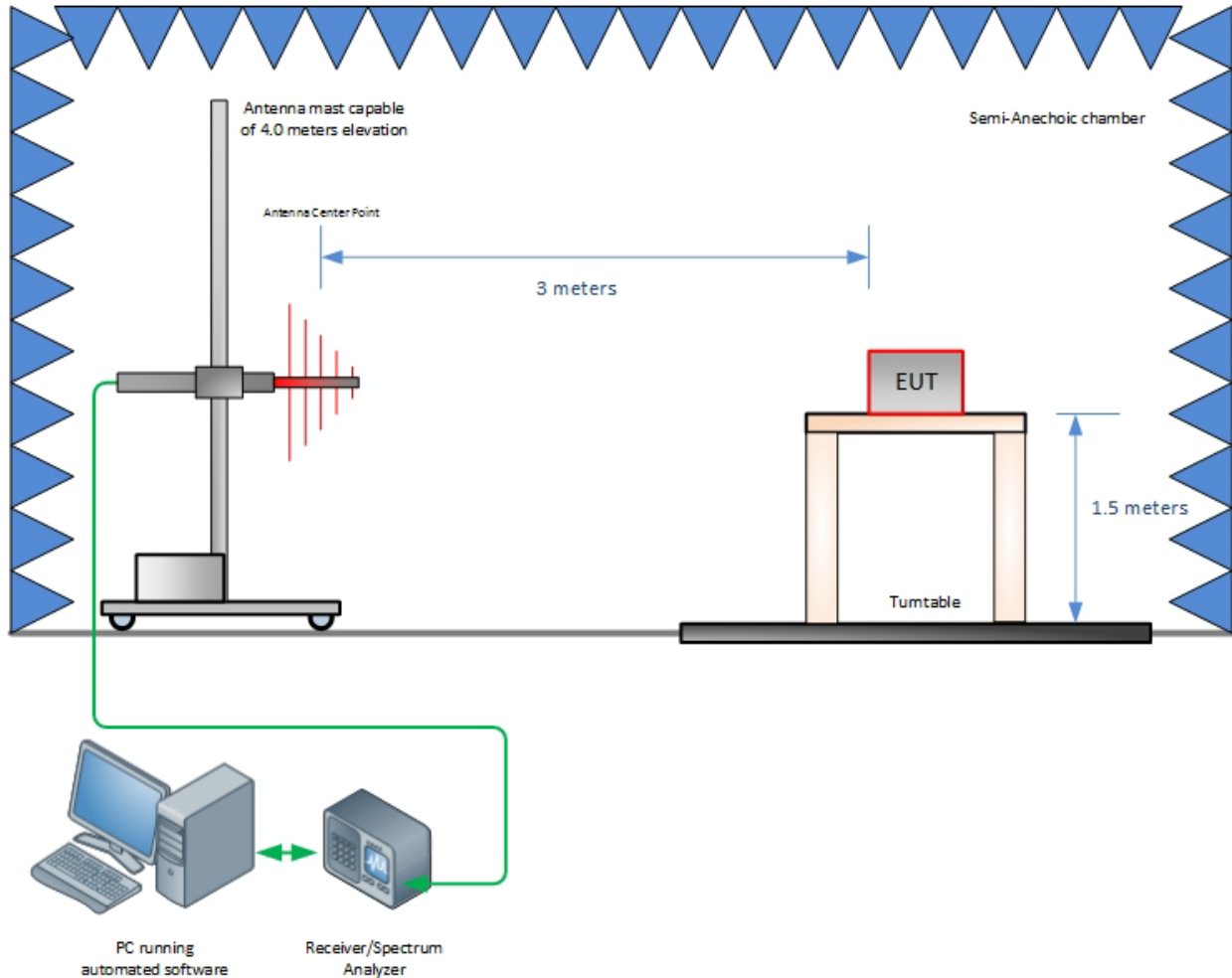
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89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



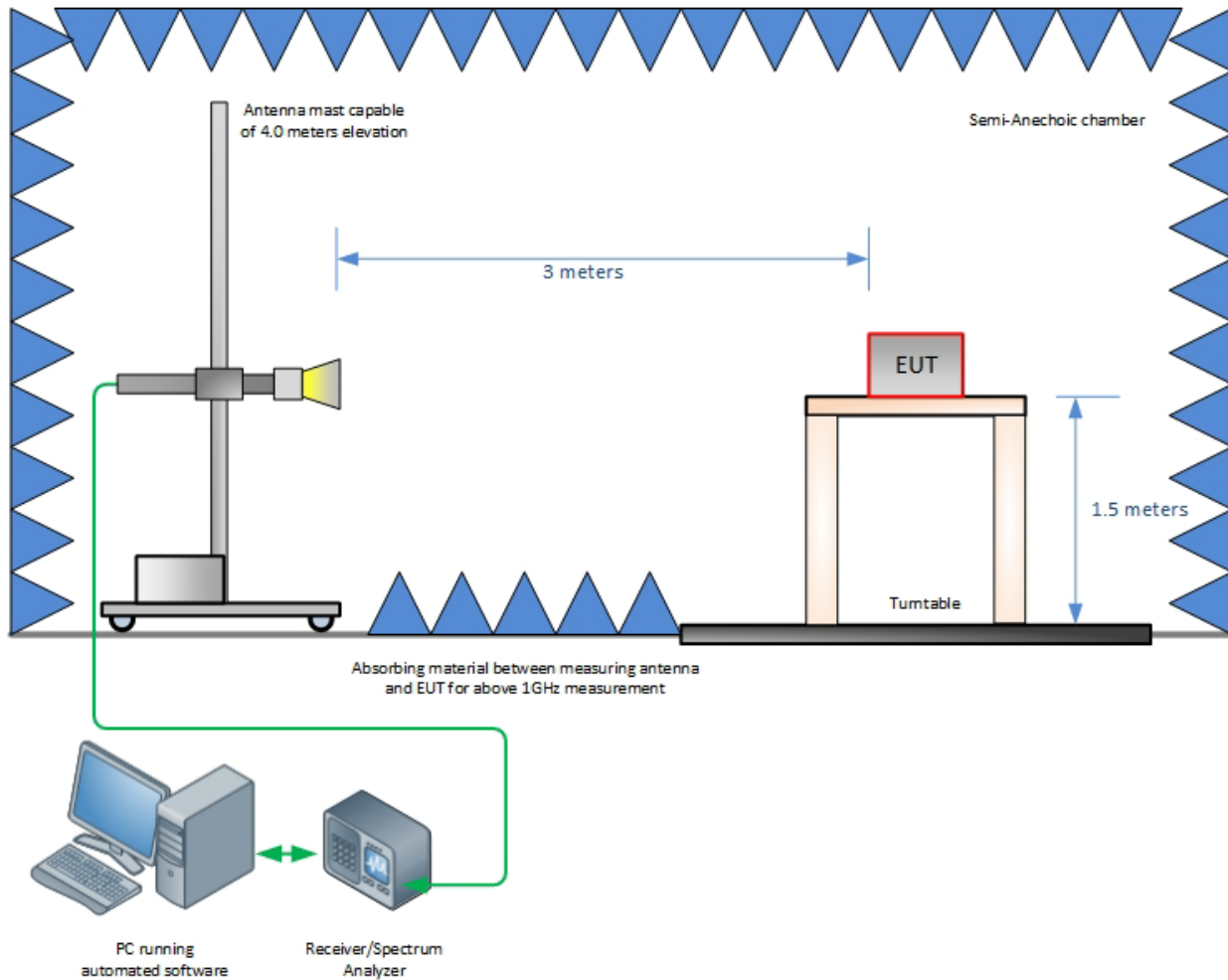
SECTION 4

DIAGRAM OF TEST SETUP

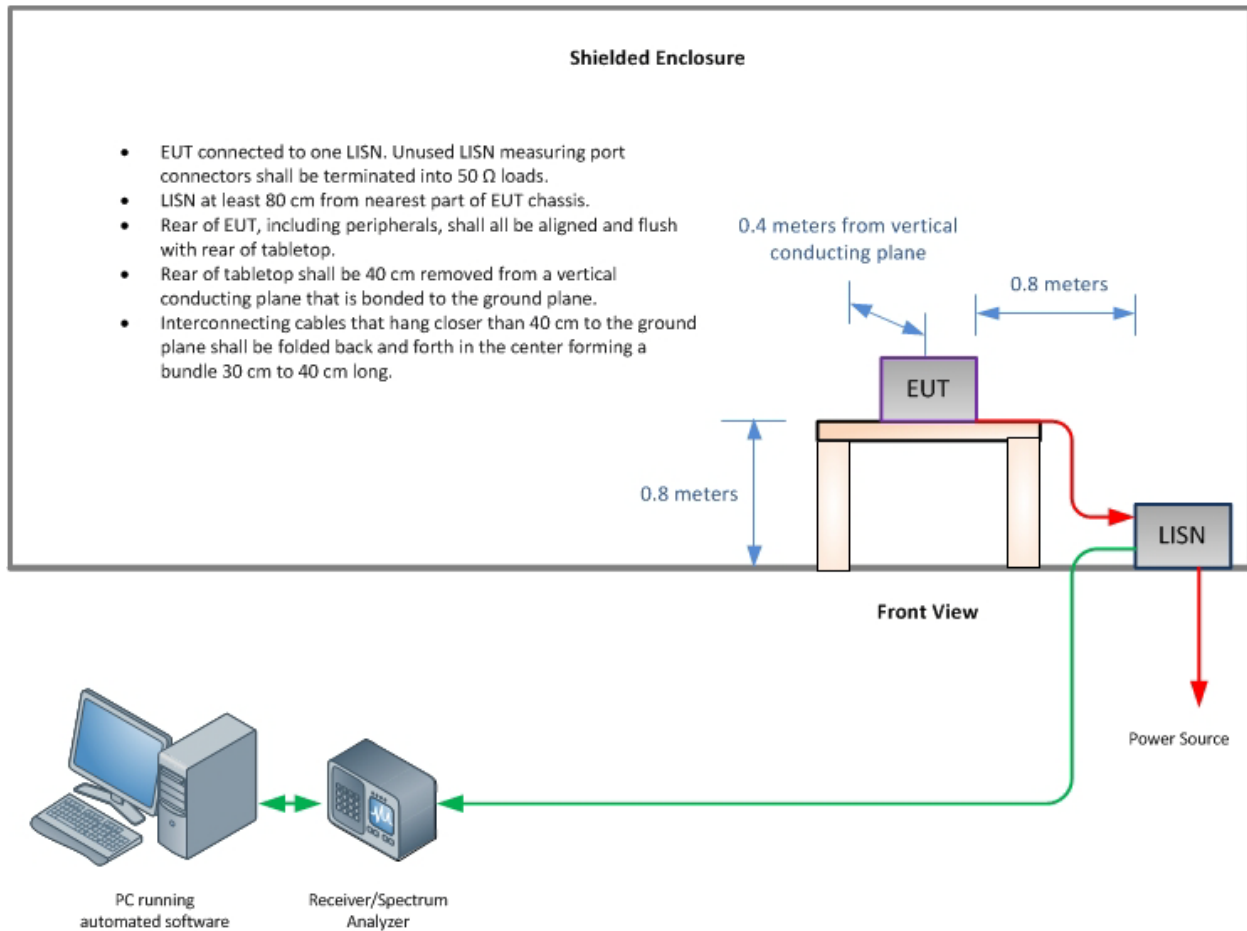
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)





SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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