Prüfbericht-Nr.: *Test report no.:*	**60434977-002**	**Auftrags-Nr.:** *Order no.*:	23870436 030	Seite 1 von 53 *Page 1 of 53*
Kunden-Referenz-Nr.: *Client reference no.:*	2285816	**Auftragsdatum:** *Order date:*	2020.09.20	
Auftraggeber: *Client:*	The Raymond Corporation			
Prüfgegenstand: *Test item:*	Display, Remote Receiver Unit (RRU)			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	08-1338021-01 Display / FCC ID: 2AYXJ-1338021			
Auftrags-Inhalt: *Order content*:	Accredited testing according to FCC 47 CFR Part 15			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 15.247 with parts 15.207 & 15.209 ANSI C63.10: 2013			

Wareneingangsdatum: *Date of sample receipt:*	2020.09.30
Prüfmuster-Nr.: *Test sample no:*	See section 2.3
Prüfzeitraum: *Testing period:*	2020.10.14 – 2020.11.12
Ort der Prüfung: *Place of testing:*	Lund, Sweden
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Sweden
Prüfergebnis*: *Test result*:*	Pass

überprüft von: reviewed by:	X Signed by: Niall Forrester	**genehmigt von:** authorized by:	X Signed by: Per Isacsson
Datum: 2021.09.09 *Date:*		**Datum: 2021.09.09** *Date:*	
Stellung / *Position:*	Senior Technical Expert	**Stellung** / *Position:*	Lab Manager

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:* — Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

V05

Revision History60434977-00260434977-002

REVISION	DATE	REMARKS	AUTHOR
001	2021.01.20	First release	Niall Forrester
002	2021.09.09	Added FCC ID	Niall Forrester
Note: Latest revision report will replace all previous reports			
This report based on FCC Part 15.247 Template version 1.1			

Summary of Test Results

FCC 47 CFR Rule Part	Test Description	Applicability	Report Section	RESULT	REMARKS
15.207	AC Power Line Conducted Emissions (Intentional Radiators)	YES	4.1	PASS	
15.209	Radiated Emissions (Intentional Radiators)	YES	4.2	PASS	
15.247 (d)	Out of Band Emissions	YES	4.3	PASS	
15.247 (d)	Band Edge Compliance (Authorized Band)	YES	4.4	PASS	
15.247 (d)	Band Edge Compliance (Restricted Band)	YES	4.5	PASS	
15.247 (a)(1)	20dB Bandwidth	NO	4.6	N/A	BLE is non-hopping
15.247 (a)(1)	Carrier (Hopping Channel) Separation	NO	4.7	N/A	BLE is non-hopping
15.247 (a)(1)	Number of Hopping Channels	NO	4.8	N/A	BLE is non-hopping
15.247 (a)(1)	Time of Occupancy (Dwell Time)	NO	4.9	N/A	BLE is non-hopping
15.247 (a)(2)	6dB Bandwidth	YES	4.10	PASS	
15.247 (b)	Peak Conducted Output Power	YES	4.11	PASS	
15.247 (e)	Power Spectral Density	YES	4.12	PASS	

Possible test case verdicts:

- Test case does not apply to the test object: N/A
- Test object complies with the requirement: PASS or COMPLIANT
- Test object does not meet the requirement: FAIL or NOT COMPLIANT
- Test case not performed on the test object: N.P.

Table of Contents

1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	**TÜV Rheinland Sweden AB**
Address:	**Mobilvägen 10**
	223 62 Lund
	Sweden
Swedac Registration Number: **FCC Test Firm Registration Number:** **ISED Test Site Registration Number:**	**10325** **517458** **24753**

1.2 Client Information

Company Name:	**The Raymond Corporation**
Address:	**22 S Canal St**
	Greene, NY 13778
Contact Person:	**Ben Grotton**
Contact e-Mail / Telephone	**(607) 656-2311 x2040**

2. PRODUCT INFORMATION

2.1 General Description

Model name:	Display
Manufacturer:	Scanfil
Model number / Marketing name:	08-1338021-01
FCC ID:	2AYXJ-1338021
Description:	Display, Remote Receiver Unit (RRU)
Ancillary Equipment:	See section 2.7

2.2 Device Characteristics

Type of Power Supply	DC
Nominal Supply Voltage	24V
Supply Voltage Range	21.6V – 26.4V
Operating Temperature Range	0ºC - 70 ºC
Operating Air Humidity Range	-
Highest Internal Frequency Source	2480 MHz

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A002921819-001	Sample with semi-rigid antenna and DTM mode	Conducted radio tests
2	A002921819-004	Standard Sample	Radiated emissions
3	A002921819-005	Standard Sample	Radiated emissions Conducted Emissions A/C

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
NFC	13.56 MHz	13.56 MHz	NO
BLE	2.4 GHz	2402 MHz - 2480 MHz	YES

*This statement refers only to this report. Other wireless technologies may be covered by other reports.

2.5 Antenna Information

Technology	Band	Number of Antennas	Antenna Type(s)	Gain
NFC	13.56 MHz	1	PCB Loop	2.00
BLE	2.4 GHz	1	PIFA	4.26

2.6 Wireless Technology Details

Technology	Band	Modulation Type(s)	No. of Channels	Channel Spacing	Adaptivity
NFC	13.56 MHz	ASK	1	-	N/A
BLE	2.4 GHz	GFSK	40	2 MHz	N/A

2.7 Ancillary Equipment

None

2.8 EUT Diagrams

N/A

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
FCC 47 CFR 15.247	-	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC 47 CFR 15.207	-	Conducted limits
FCC 47 CFR 15.209	-	Radiated emission limits; general requirements

3.2 Additional references

The following standards / references were also considered for the testing

Standard	Version	Description
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.3 Limits

FCC 47 CFR Rule Part	Test Description	Limit Reference (FCC 47 CFR Reference)
15.207	AC Power Line Conducted Emissions (Intentional Radiators)	15.207 (a)
15.209	Radiated Emissions (Intentional Radiators)	15.209 (a) *See Note 1
15.247 (d)	Out of Band Emissions	15.247 (d)
15.247 (d)	Band Edge Compliance (Authorized Band)	15.247 (d)
15.247 (d)	Band Edge Compliance (Restricted Band)	15.247 (d)
15.247 (a)(1)	20dB Bandwidth	15.247 (a)(1)
15.247 (a)(1)	Carrier (Hopping Channel) Separation	15.247 (a)(1)
15.247 (a)(1)	Number of Hopping Channels	15.247 (a)(1)
15.247 (a)(1)	Time of Occupancy (Dwell Time)	15.247 (a)(1)
15.247 (a)(2)	6dB Bandwidth	15.247 (a)(2)
15.247 (b)	Peak Conducted Output Power	15.247 (b)(1) [Hopping] 15.247 (b)(3) [Non-Hopping]
15.247 (e)	Power Spectral Density	15.247 (e)

Note 1

Radiated Emissions limits in the tables from 47 CFR sections 15.109 & 15.209 are presented in µV/m. Measurements on the test system are made in dBµV/m. To convert between these, the following adjustment is used:

$New\ Limit = 20\log\left(\frac{Original\ Limit}{10^6}\right)$+120

Example: from 15.209(a) the limit for 30MHz – 88MHz is 100µV/m at 3m. This gives:

$New\ Limit = 20\log\left(\frac{100}{10^6}\right)$+120 = 40dBµV/m at 3m

Additionally, in some cases testing has been performed at distances other than those specified in the tables. When this has occurred, the limits have been adjusted in accordance with the requirements in 47 CFR 15.31, using an extrapolation factor of 40dB/decade at frequencies below 30MHz and 20dB/decade at or above 30MHz

Example: from 15.209(a) the limit for 1.705MHz – 30MHz is 30µV/m (=29.54 dBµV/m) at 30m

$Limit@3m = Limit@30m + 40\log\left(\frac{30}{3}\right)$ = 29.54 +40.00 = 69.54 dBµV/m at 3m

Example: from 15.209(a) the limit for 1GHz – 18GHz is 500µV/m (=53.98 dBµV/m) at 3m

$Limit@1m = Limit@3m + 20\log\left(\frac{3}{1}\right)$ = 53.98 +9.54 = 63.52 dBµV/m at 1m

3.4 Description of Test Methods and Equipment Setup

3.4.1 General Description

Testing was performed in accordance with the various requirements of ANSI C63.4 and ANSI C63.10. Any deviations from the test methods are described in section 3.7

Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

3.4.2 Test Equipment Setup Used by Test Type

FCC 47 CFR Rule Part	Test Description	Test Equipment Used
15.207	AC Power Line Conducted Emissions (Intentional Radiators)	Conducted Emissions
15.209	Radiated Emissions (Intentional Radiators)	SAC5
15.247 (d)	Out of Band Emissions	CTE
15.247 (d)	Band Edge Compliance (Authorized band)	CTE
15.247 (d)	Band Edge Compliance (Restricted band)	SAC 5
15.247 (a)(1)	20dB Bandwidth	CTE
15.247 (a)(1)	Carrier (Hopping Channel) Separation	CTE
15.247 (a)(1)	Number of Hopping Channels	CTE
15.247 (a)(1)	Time of Occupancy (Dwell Time)	CTE
15.247 (a)(2)	6dB Bandwidth	CTE
15.247 (b)	Peak Conducted Output Power	CTE
15.247 (e)	Power Spectral Density	CTE

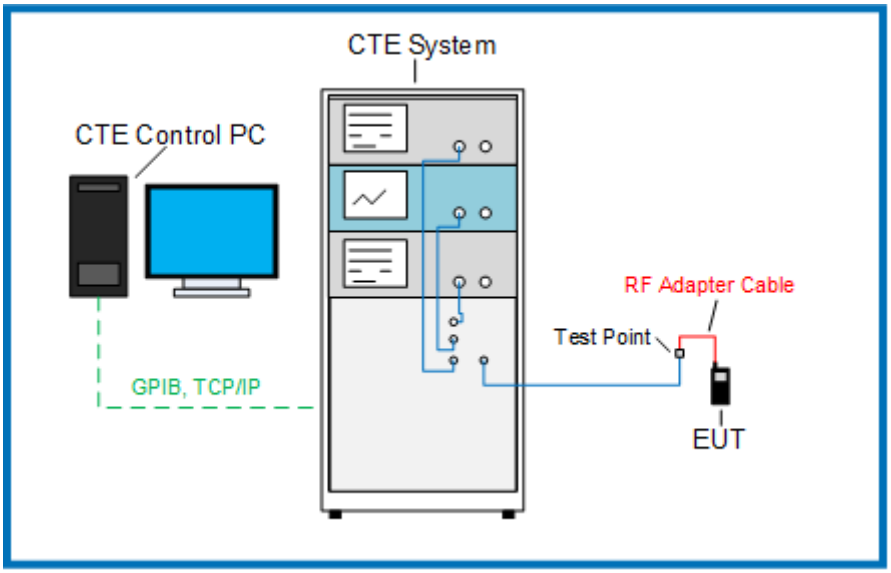
3.4.3 Test Equipment Setup – CTE System

The Comprehensive Test Environment (CTE) system consists of a number of instruments (see section 5.1.1) mounted in a rack together with automated relays and interconnecting hardware. The instruments and other equipment are controlled from a standard PC running software provided by the manufacturer. The RF output of the EUT is connected to the test system via a coaxial cable.

Tests are in the form of pre-defined scripts that can be loaded on the PC. The scripts, as well as the hardware setup, have been verified for conformance with the relevant test specifications.

Losses in the cables and interconnects have been measured using the system's own automated routines and are compensated for automatically. Any additional loss in RF adapter cables supplied together with the EUT can be compensated for using the known characteristics of that adapter.

CTE Block Diagram

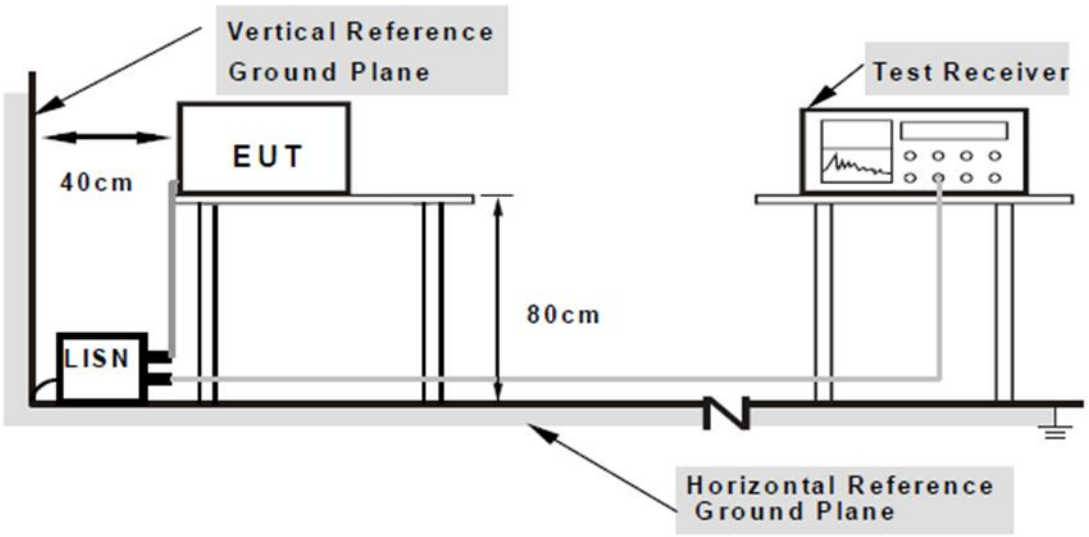


3.4.4 Test Equipment Setup – Conducted Emissions

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The LISNs provide 50Ω/ 50µH of coupling impedance for the measuring instrument.

- The lines of the power mains connected to the EUT were checked for maximum conducted interference.

- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10 dB under the prescribed limits could not be reported.



3.4.5 Test Equipment Setup – SAC 5 (Radiated Emissions and Restricted Band Edge)

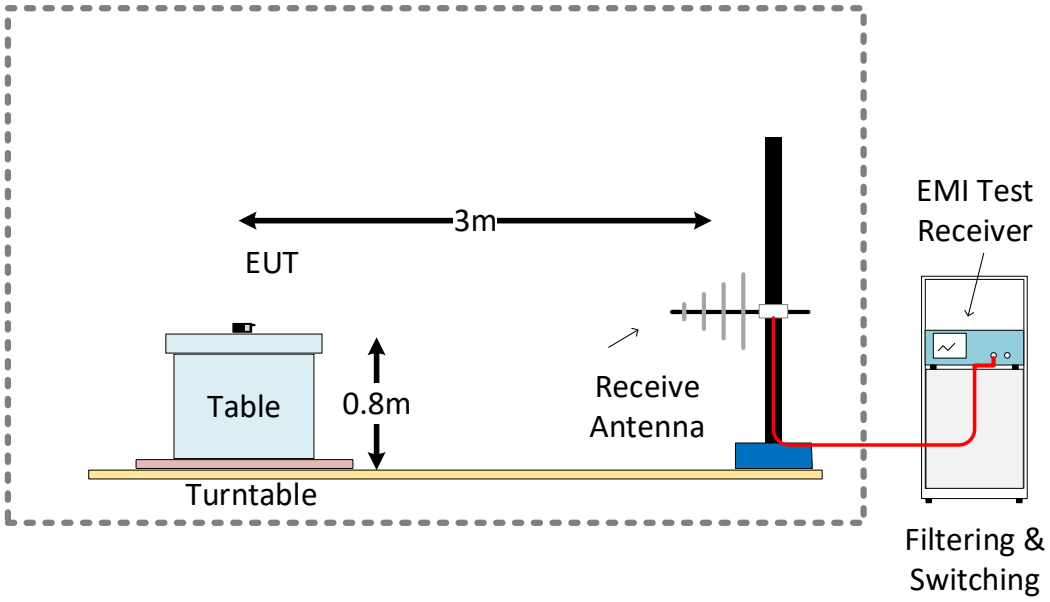
- For frequency range 30MHz-1GHz Log-Periodic Antenna was used. Antenna elevated from 100 cm from floor to 400 cm from floor, and was placed at 3 m from center of turntable in tilted position. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

- For frequency range 1GHz-18GHz horn Antenna was used. Antenna elevated from 100 cm from floor to 200 cm from floor, and was placed at 3 m from center of turntable. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

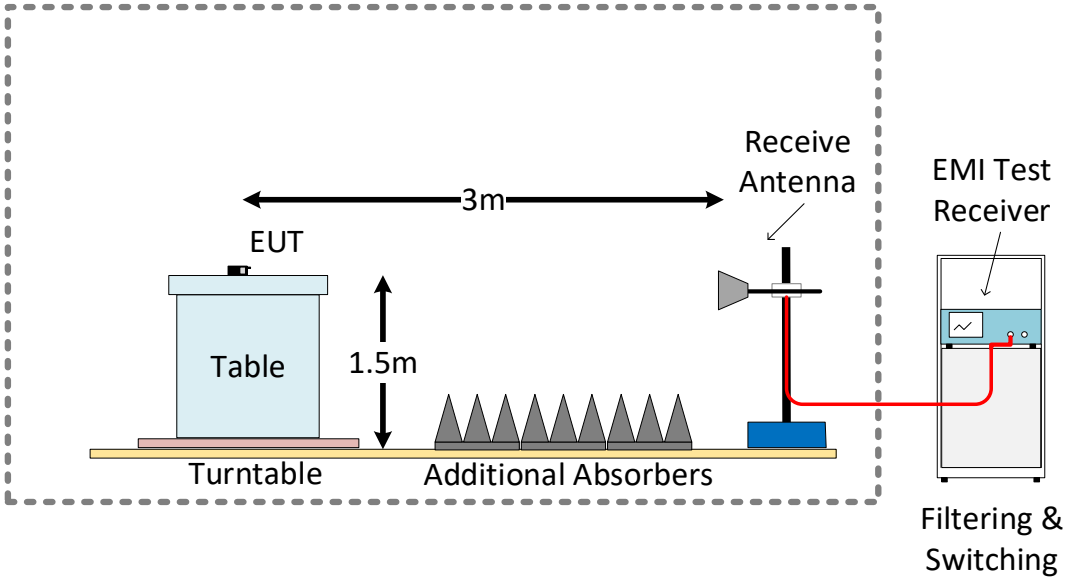
- For frequency range 18GHz-40GHz double horn Antenna was used. Antenna's height was adjusted to150 cm from floor, and 1 m distance to center of turntable. The equipment under test (EUT) was placed at the middle of the turntable on at 150 cm height from floor.

- For all frequency ranges the turntable was rotated 360˚ for obtaining the maximum emission.

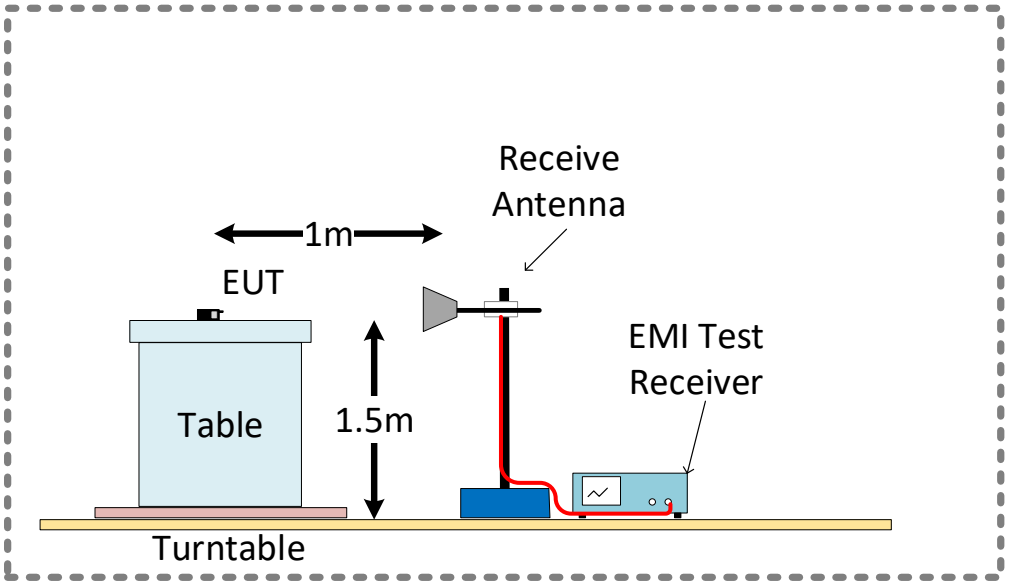
SAC 5 Test Setup Configuration 30MHz – 1GHz



SAC 5 Test Setup Configuration 1GHz – 18GHz



SAC 5 Test Setup Configuration 18GHz – 40GHz



3.5 EUT Configuration During Test

N/A

3.6 EUT Operation Modes

Operation mode	Description
1	Continuous Transmit – Device is set to transmit random data continuously
2	DTM – Device is controlled by the test equipment using Bluetooth Low Energy Direct Test Mode

3.7 Deviations from the Test Standard

None

3.8 Environmental Conditions

3.8.1 Environmental Conditions – CTE System

Environmental Conditions Log - CTE

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.11.12	10:35	20.5	37

3.8.2 Environmental Conditions – Conducted Emissions System

Environmental Conditions Log – Conducted Emissions

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.10.30	08:35	22.6	41

3.8.3 Environmental Conditions – SAC5 (Radiated Emissions)

Environmental Conditions Log – SAC5

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.10.14	08:28	18.5	51
2020.10.15	08:30	18.5	49
2020.10.19	07:37	19.1	46
2020.10.20	07:10	18.4	48

4. TEST RESULTS

4.1 Test Results – AC Power Line Conducted Emissions (Intentional Transmitter)

4.1.1 AC Power Line Conducted Emissions (Intentional) – Test Summary

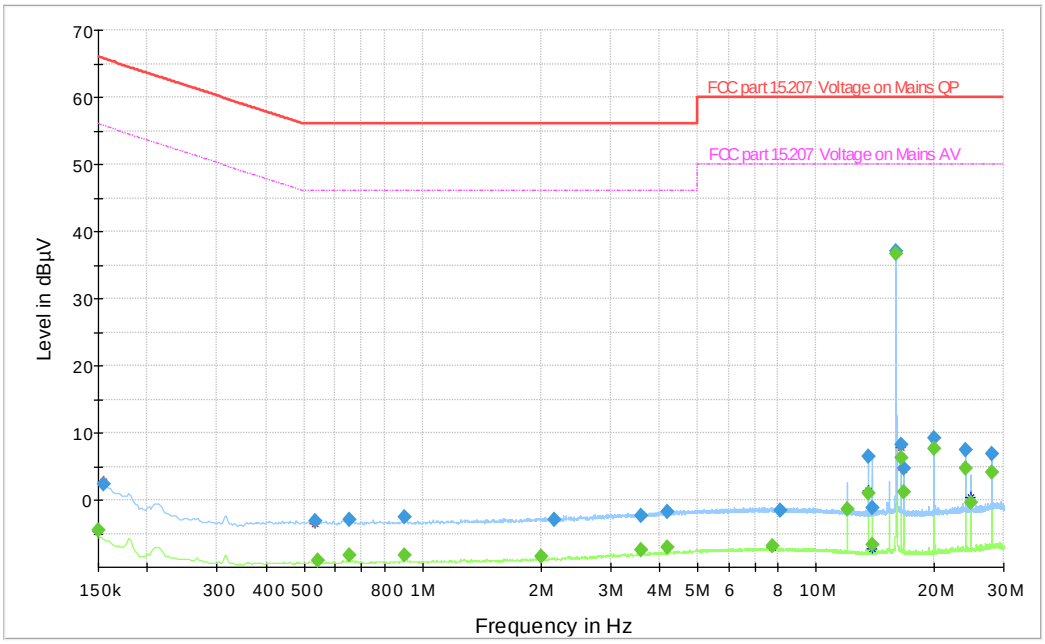
Test Specification	FCC 47 CFR 15.207 (Part 15 Subpart C)	
Test Engineer & Date	Sam Ebadeh	2020.10.30
EUT and Ancillary Equipment IDs	A002921819-005	None
EUT Operation Mode(s)	Bluetooth Low Energy – Mid channel 2440 MHz	
EUT Wireless Configuration(s)	2402 MHz – 2480 MHz	
EUT Hardware Configuration(s)	-	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Result*
AC Conducted Power Line Emissions – “N” Line	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	PASS
AC Conducted Power Line Emissions – “L1” Line	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	PASS

* For detailed measurements, see tables and graphs in sections below

4.1.2 AC Power Line Conducted Emissions (Intentional) – Test Details

Test	Conducted Emission	
Test mode condition	Bluetooth Low Energy, TX attached to Mid channel	
Sweep frequency	0,15 MHz – 30 MHz	
Standard	FCC part 15.207	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Sam Ebadeh	Date: 2020-10-30



Frequency (MHz)	QuasiPeak (dBuV/m)	CAverage (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
16.001250	---	36.67	50.00	13.33	1000.0	9.000	L1	ON	9.9
16.001250	37.03	---	60.00	22.97	1000.0	9.000	L1	ON	9.9
16.527750	---	6.27	50.00	43.73	1000.0	9.000	N	ON	10.0
20.001750	---	7.58	50.00	42.42	1000.0	9.000	L1	ON	10.0
24.002250	---	4.73	50.00	45.27	1000.0	9.000	L1	ON	10.0
28.000500	---	4.12	50.00	45.88	1000.0	9.000	N	ON	10.1

4.2 Test Results – Radiated Emissions (Intentional Transmitter)

4.2.1 Radiated Emissions (Intentional) – Test Summary

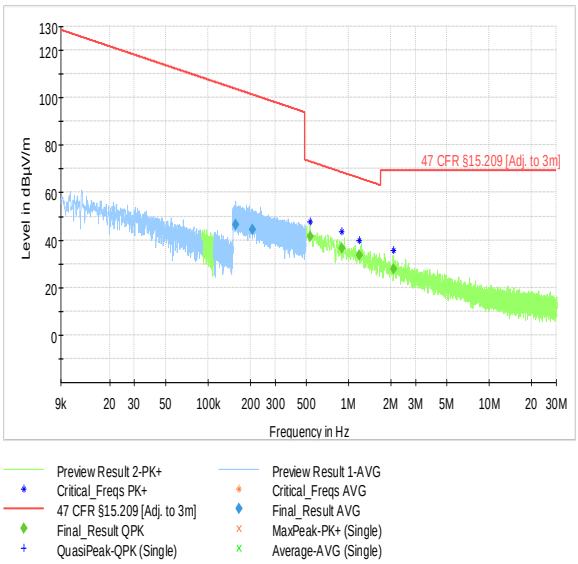
Test Specification	FCC 47 CFR 15.209 (Part 15 Subpart C)	
Test Engineer & Date	Sam Ebadeh Niall Forrester Simon Palmhager Joel Efraimsson	2020.10.14 – 2020.10.20
EUT and Ancillary Equipment IDs	A002921819-004 A002921819-005	24V DC Power supply
EUT Wireless Configuration(s)	Bluetooth Low Energy (2402 MHz – 2480 MHz)	
EUT Hardware Configuration(s)	-	
Overall Result	PASS	

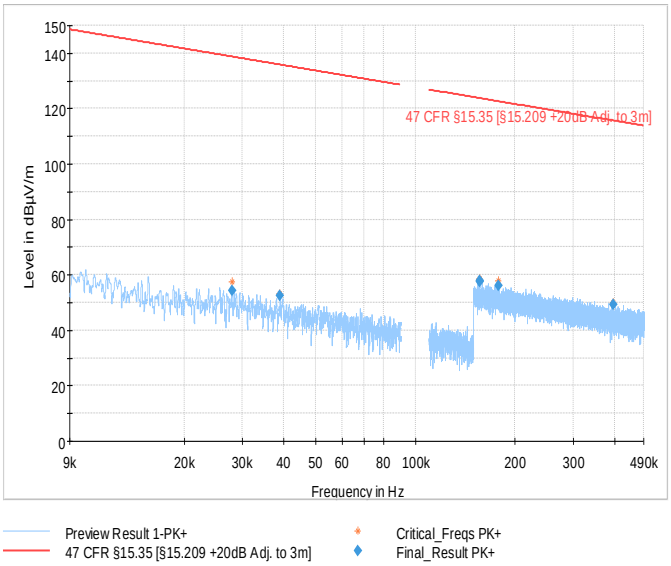
Test Parameter	Wireless Configuration	Frequency Range	Result
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	9 kHz – 30 MHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	30 MHz – 1 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	9 kHz – 30 MHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	30 MHz – 1 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	9 kHz – 30 MHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	30 MHz – 1 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	18 GHz – 40 GHz	PASS

4.2.2 Radiated Emissions (Intentional) – Test Details

Low Channel

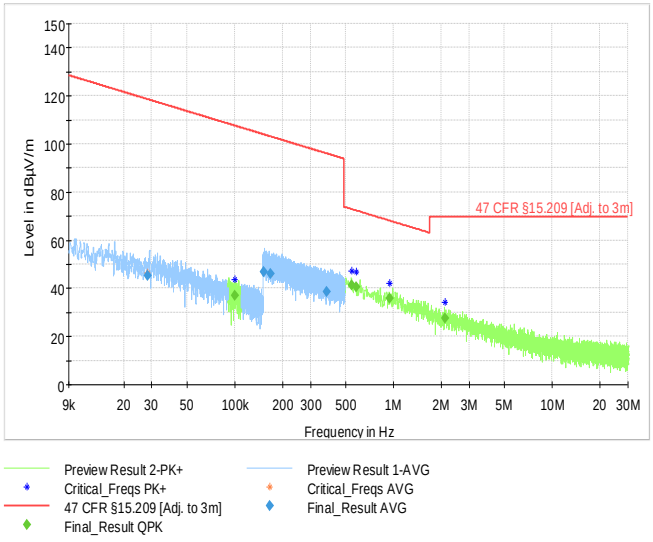
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Loop Antenna Parallel to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Simon Palmhager	Date: 2020-10-15
Chamber details	Chamber: SAC 5	

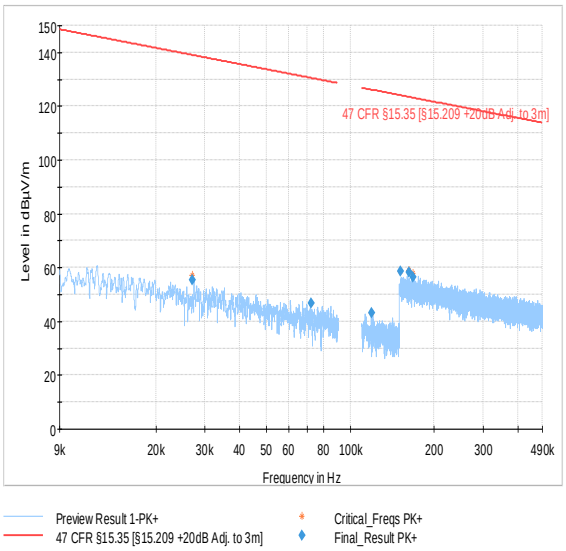




Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.157412	46.55	---	---	103.66	57.11	1000.0	9.000	100.0	H	-41.0
0.206506	44.25	---	---	101.31	57.05	1000.0	9.000	100.0	H	-1.0
0.534840	---	41.63	---	73.04	31.41	1000.0	9.000	100.0	H	64.0
0.900519	---	36.48	---	68.51	32.04	1000.0	9.000	100.0	H	-14.0
1.190364	---	33.71	---	66.09	32.38	1000.0	9.000	100.0	H	192.0
2.091978	---	27.88	---	69.54	41.66	1000.0	9.000	100.0	H	191.0
0.027848	---	---	54.15	138.71	84.56	1000.0	0.200	100.0	H	306.0
0.038785	---	---	52.56	135.83	83.27	1000.0	0.200	100.0	H	75.0
0.156309	---	---	57.78	123.73	65.94	1000.0	9.000	100.0	H	165.0
0.156377	---	---	57.61	123.72	66.12	1000.0	9.000	100.0	H	45.0
0.178270	---	---	56.18	122.58	66.40	1000.0	9.000	100.0	H	75.0
0.397083	---	---	49.39	115.63	66.23	1000.0	9.000	100.0	H	139.0

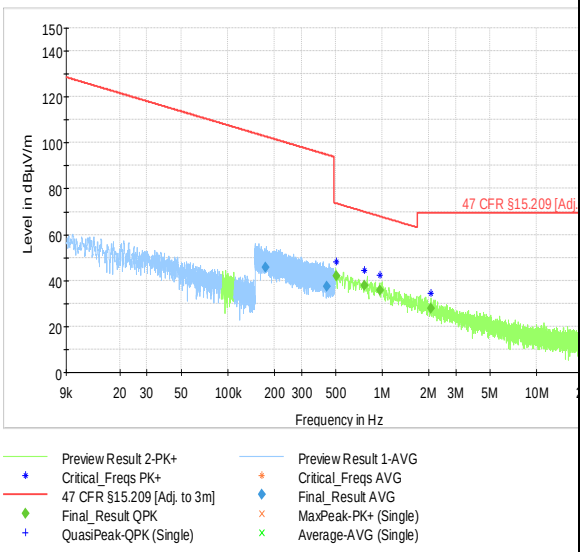
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Loop Antenna Perpendicular to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-004	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Sam Ebadeh	Date: 2020-10-19
Chamber details	Chamber: SAC 5	

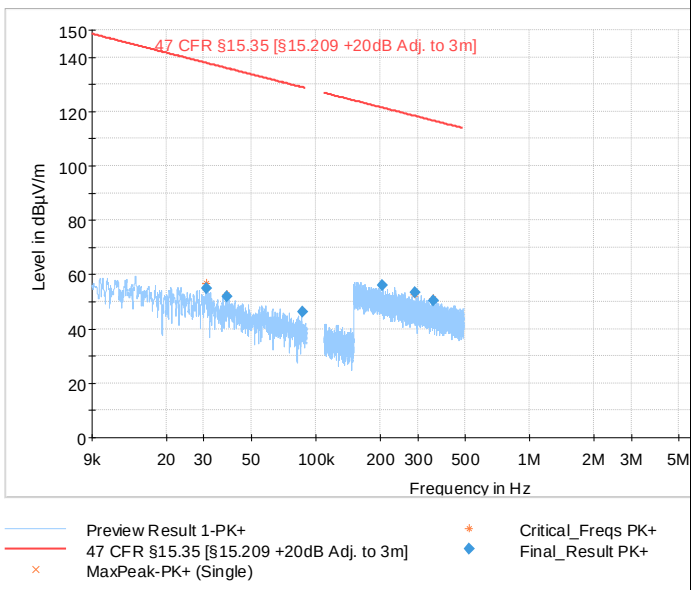




Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.151583	46.86	---	---	103.99	57.13	1000.0	9.000	100.0	H	-26.0
0.168929	45.89	---	---	103.05	57.16	1000.0	9.000	100.0	H	216.0
0.544388	---	41.32	---	72.89	31.56	1000.0	9.000	100.0	H	101.0
0.585376	---	40.53	---	72.26	31.72	1000.0	9.000	100.0	H	225.0
0.948776	---	35.89	---	68.06	32.17	1000.0	9.000	100.0	H	-1.0
2.115421	---	27.57	---	69.54	41.97	1000.0	9.000	100.0	H	11.0
0.026945	---	---	55.51	139.00	83.49	1000.0	0.200	100.0	H	279.0
0.072088	---	---	46.91	130.45	83.54	1000.0	0.200	100.0	H	214.0
0.119009	---	---	43.15	126.09	82.95	1000.0	0.200	100.0	H	88.0
0.151779	---	---	58.57	123.98	65.41	1000.0	9.000	100.0	H	315.0
0.162341	---	---	58.17	123.40	65.22	1000.0	9.000	100.0	H	291.0
0.167423	---	---	56.45	123.13	66.68	1000.0	9.000	100.0	H	202.0

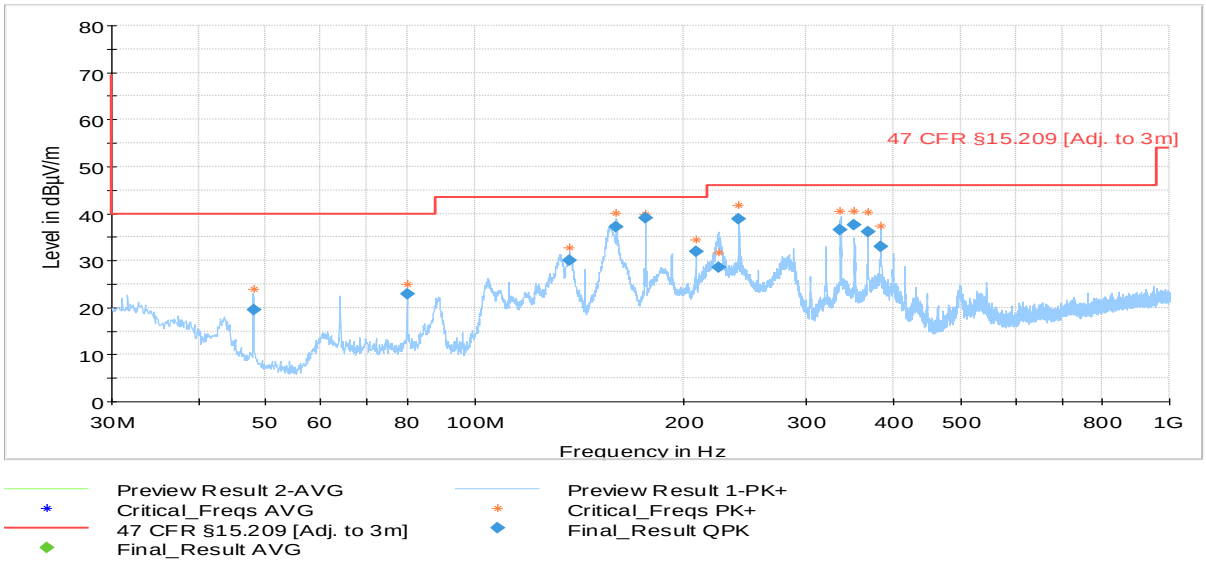
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-004	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Sam Ebadeh	Date: 2020-10-19
Chamber details	Chamber: SAC 5	





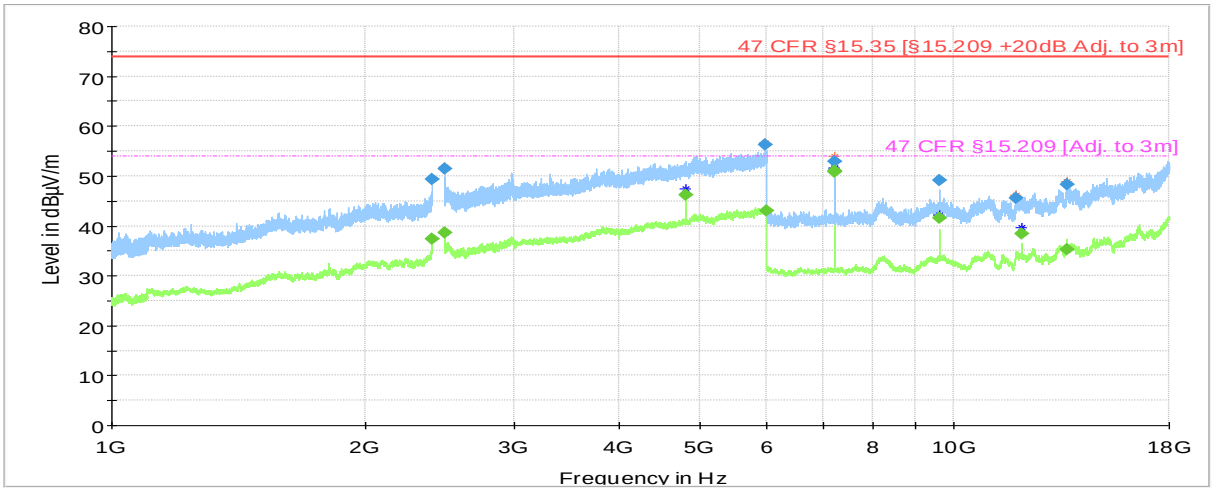
Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.176360	45.51	---	---	102.68	57.16	1000.0	9.000	100.0	H	49.0
0.437810	37.33	---	---	94.78	57.45	1000.0	9.000	100.0	H	126.0
0.507071	---	41.98	---	73.50	31.52	1000.0	9.000	100.0	H	45.0
0.766501	---	37.92	---	69.91	31.99	1000.0	9.000	100.0	H	225.0
0.968384	---	35.92	---	67.88	31.97	1000.0	9.000	100.0	H	-41.0
2.073328	---	27.76	---	69.54	41.78	1000.0	9.000	100.0	H	315.0
0.031016	---	---	54.76	137.77	83.01	1000.0	0.200	100.0	H	45.0
0.038617	---	---	51.91	135.87	83.96	1000.0	0.200	100.0	H	133.0
0.086477	---	---	46.10	128.87	82.76	1000.0	0.200	100.0	H	153.0
0.205322	---	---	56.07	121.36	65.28	1000.0	9.000	100.0	H	229.0
0.291855	---	---	53.39	118.30	64.91	1000.0	9.000	100.0	H	-2.0
0.357259	---	---	50.37	116.55	66.18	1000.0	9.000	100.0	H	229.0

Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-14
Chamber details	Chamber: SAC 5	



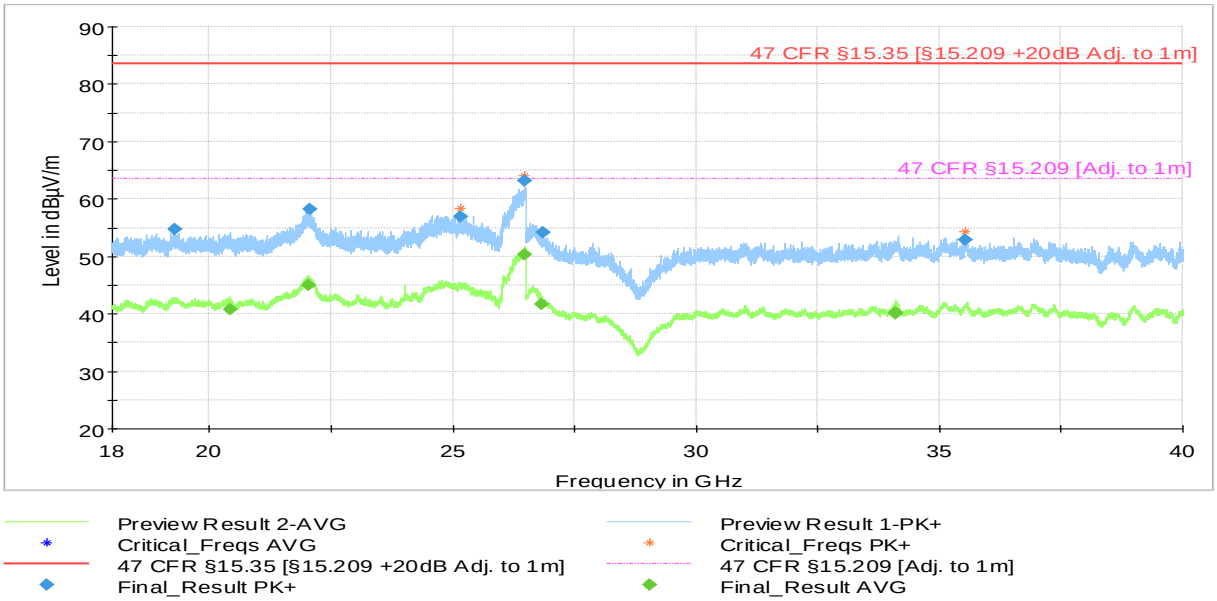
Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
159.984560	37.18	43.52	6.34	1000.0	120.000	383.0	H	292.0
175.981520	39.08	43.52	4.44	1000.0	120.000	125.0	V	-4.0
240.020120	38.87	46.02	7.15	1000.0	120.000	100.0	V	116.0
335.840760	36.48	46.02	9.54	1000.0	120.000	125.0	H	112.0
352.065200	37.62	46.02	8.40	1000.0	120.000	225.0	V	-3.0
368.059720	36.21	46.02	9.81	1000.0	120.000	254.0	V	116.0

Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-15
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.524500	---	38.57	53.98	15.41	1000.0	1000.000	175.0	H	22.0
4804.131000	---	46.19	53.98	7.79	1000.0	1000.000	206.0	H	162.0
5980.506000	---	43.02	53.98	10.96	1000.0	1000.000	102.0	H	267.0
7206.089000*	---	50.73	53.98	3.25	1000.0	1000.000	125.0	V	129.0
7206.098000*	---	51.10	53.98	2.88	1000.0	1000.000	125.0	V	130.0
9608.225000	---	41.58	53.98	12.40	1000.0	1000.000	171.0	V	72.0

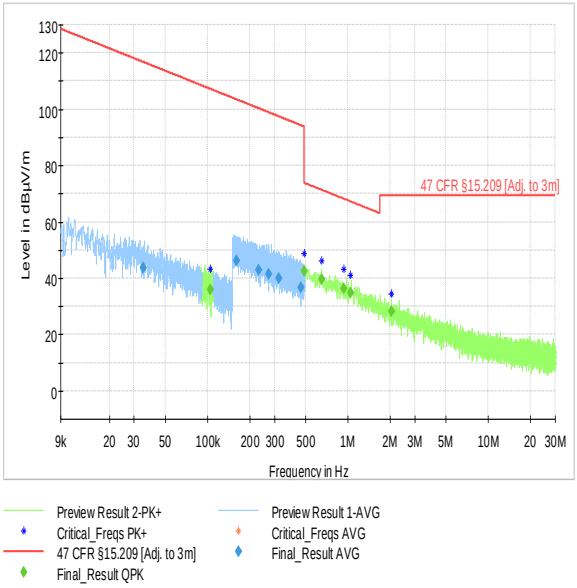
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-20
Chamber details	Chamber: SAC 5	

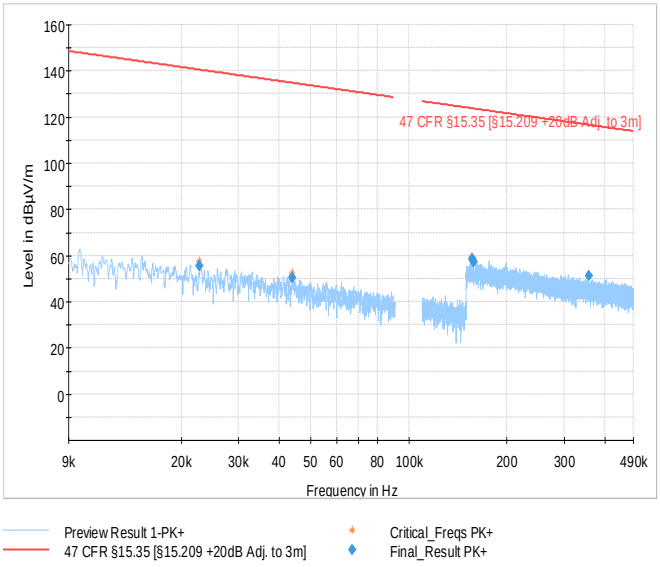


Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
19291.030000	54.69	---	83.52	28.84	1000.0	1000.000	155.0	H	292.0
20426.411000	---	40.76	63.52	22.76	1000.0	1000.000	155.0	V	172.0
22020.092000	---	44.99	63.52	18.53	1000.0	1000.000	155.0	H	-8.0
22074.158000	58.19	---	83.52	25.33	1000.0	1000.000	155.0	H	326.0
25151.070000	56.90	---	83.52	26.62	1000.0	1000.000	155.0	H	102.0
26475.686000	---	50.40	63.52	13.12	1000.0	1000.000	155.0	V	142.0
26479.579000	63.15	---	83.52	20.37	1000.0	1000.000	155.0	V	192.0
26836.430000	---	41.64	63.52	21.88	1000.0	1000.000	155.0	V	172.0
26849.040000	54.20	---	83.52	29.32	1000.0	1000.000	155.0	H	-8.0
34110.165000	---	40.20	63.52	23.32	1000.0	1000.000	155.0	V	292.0
34112.791000	---	40.06	63.52	23.46	1000.0	1000.000	155.0	V	292.0
35528.932000	52.83	---	83.52	30.69	1000.0	1000.000	155.0	H	202.0

Mid Channel

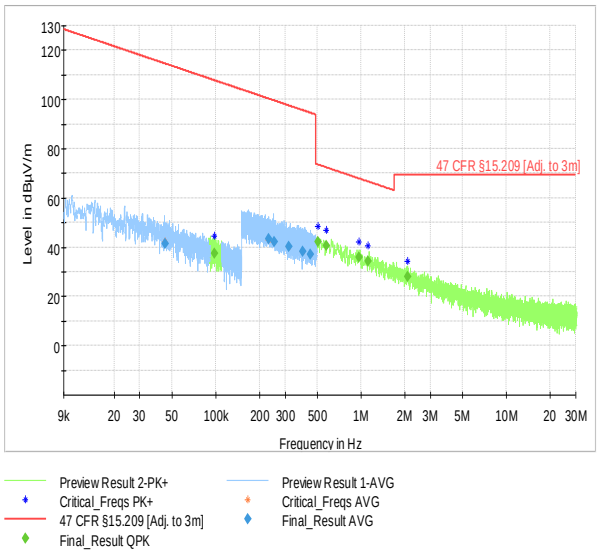
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Loop Antenna Parallel to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Simon Palmhager	Date: 2020-10-15
Chamber details	Chamber: SAC 5	

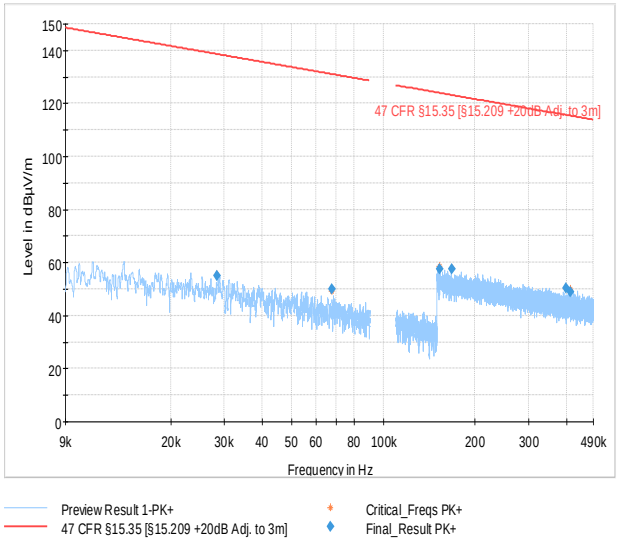




Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.160681	46.37	---	---	103.49	57.11	1000.0	9.000	100.0	H	225.0
0.490692	---	42.38	---	73.79	31.41	1000.0	9.000	100.0	H	-41.0
0.651118	---	39.74	---	71.33	31.60	1000.0	9.000	100.0	H	257.0
0.933490	---	36.23	---	68.20	31.98	1000.0	9.000	100.0	H	282.0
1.044424	---	34.99	---	67.23	32.24	1000.0	9.000	100.0	H	217.0
2.038366	---	28.06	---	69.54	41.49	1000.0	9.000	100.0	H	127.0
0.022697	---	---	55.55	140.49	84.94	1000.0	0.200	100.0	H	255.0
0.043742	---	---	50.41	134.79	84.37	1000.0	0.200	100.0	H	225.0
0.156158	---	---	58.72	123.73	65.01	1000.0	9.000	100.0	H	100.0
0.156954	---	---	57.76	123.69	65.93	1000.0	9.000	100.0	H	135.0
0.158176	---	---	57.32	123.62	66.30	1000.0	9.000	100.0	H	-15.0
0.357439	---	---	51.16	116.54	65.38	1000.0	9.000	100.0	H	45.0

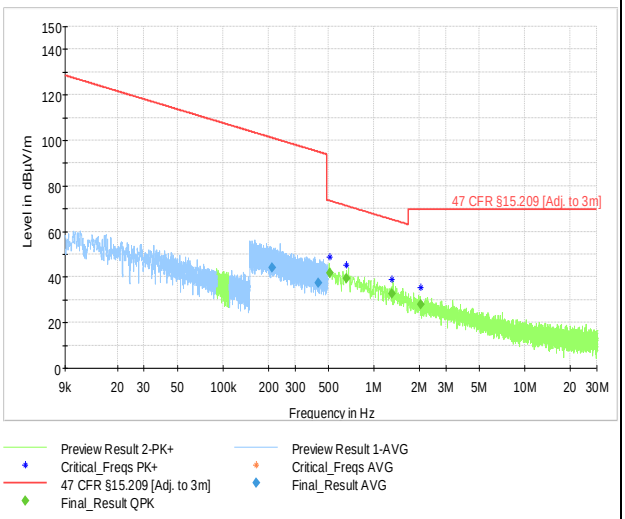
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Simon Palmhager	Date: 2020-10-19
Chamber details	Chamber: SAC 5	

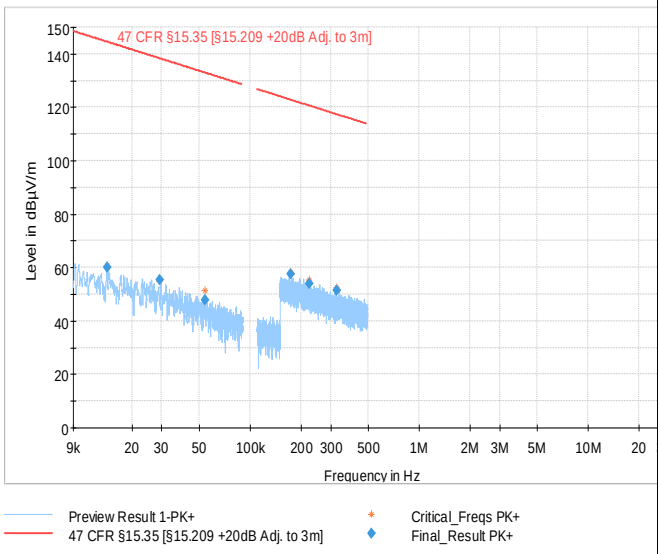




Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.230938	43.20	---	---	100.33	57.14	1000.0	9.000	100.0	H	37.0
0.505447	---	42.07	---	73.53	31.46	1000.0	9.000	100.0	H	45.0
0.579542	---	40.68	---	72.34	31.66	1000.0	9.000	100.0	H	166.0
0.970789	---	35.72	---	67.86	32.14	1000.0	9.000	100.0	H	154.0
1.119574	---	34.25	---	66.62	32.37	1000.0	9.000	100.0	H	11.0
2.079949	---	27.87	---	69.54	41.67	1000.0	9.000	100.0	H	135.0
0.028316	---	---	54.96	138.56	83.60	1000.0	0.200	100.0	H	165.0
0.067629	---	---	49.82	131.00	81.18	1000.0	0.200	100.0	H	22.0
0.152976	---	---	57.68	123.91	66.24	1000.0	9.000	100.0	H	22.0
0.168217	---	---	57.42	123.09	65.66	1000.0	9.000	100.0	H	34.0
0.398992	---	---	50.43	115.59	65.15	1000.0	9.000	100.0	H	225.0
0.411455	---	---	48.90	115.32	66.42	1000.0	9.000	100.0	H	-45.0

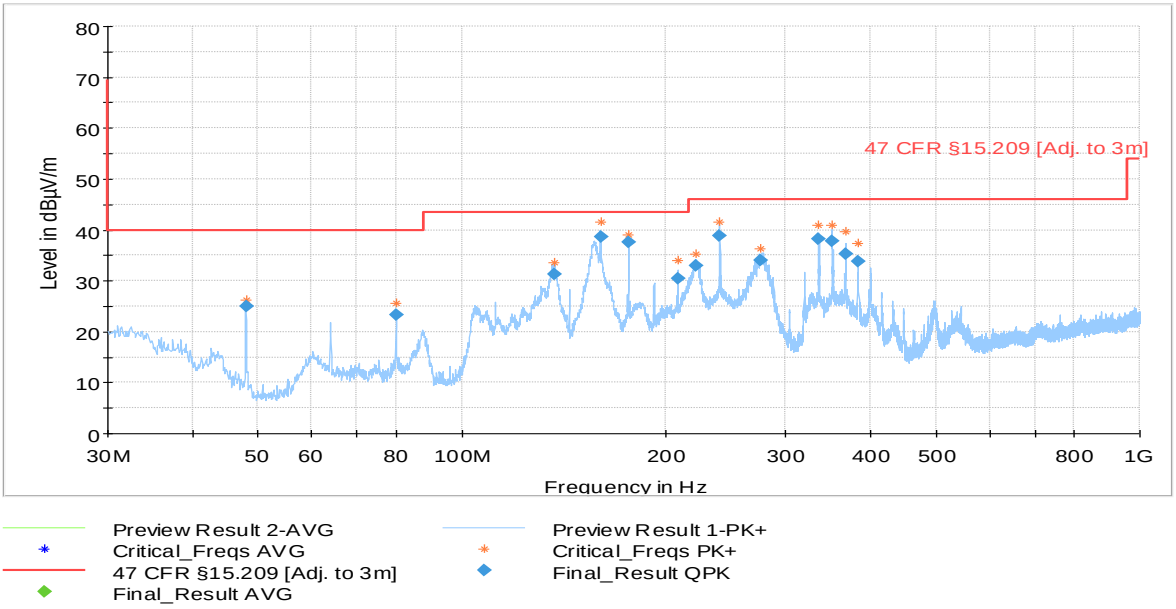
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Sam Ebadeh	Date: 2020-10-19
Chamber details	Chamber: SAC 5	





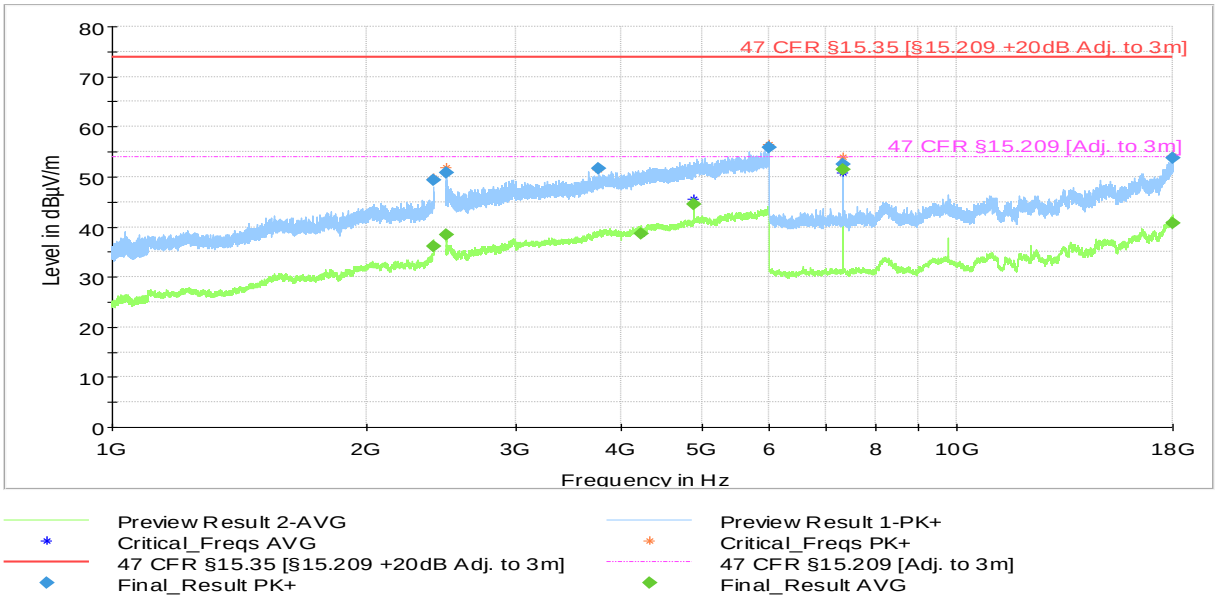
Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.211659	43.99	---	---	101.09	57.10	1000.0	9.000	100.0	H	64.0
0.429792	37.45	---	---	94.94	57.49	1000.0	9.000	100.0	H	225.0
0.511088	---	41.90	---	73.43	31.54	1000.0	9.000	100.0	H	88.0
0.654807	---	39.47	---	71.28	31.82	1000.0	9.000	100.0	H	24.0
1.316228	---	32.53	---	65.22	32.69	1000.0	9.000	100.0	H	256.0
2.044590	---	27.88	---	69.54	41.66	1000.0	9.000	100.0	H	-45.0
0.014254	---	---	60.01	144.53	84.51	1000.0	0.200	100.0	H	293.0
0.029248	---	---	55.41	138.28	82.87	1000.0	0.200	100.0	H	23.0
0.054170	---	---	47.83	132.93	85.10	1000.0	0.200	100.0	H	191.0
0.173332	---	---	57.50	122.83	65.32	1000.0	9.000	100.0	H	139.0
0.223983	---	---	54.13	120.60	66.47	1000.0	9.000	100.0	H	135.0
0.325160	---	---	51.50	117.36	65.86	1000.0	9.000	100.0	H	177.0

Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-14
Chamber details	Chamber: SAC 5	



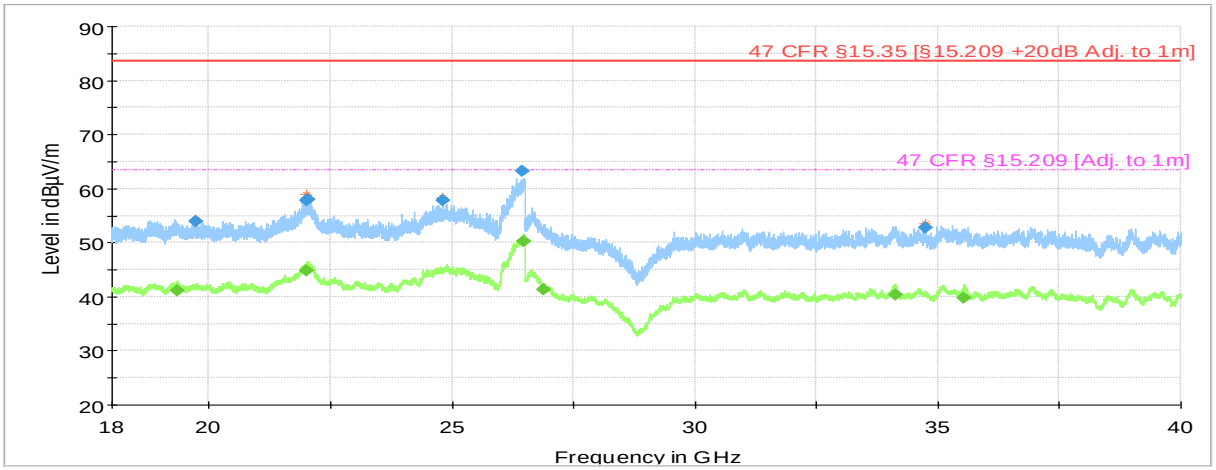
Frequency (MHz)	QuasiPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
160.040000	38.74	---	43.52	4.78	1000.0	120.000	283.0	H	296.0
176.036480	37.56	---	43.52	5.96	1000.0	120.000	100.0	V	248.0
240.005240	38.85	---	46.02	7.17	1000.0	120.000	100.0	V	116.0
336.040640	38.27	---	46.02	7.75	1000.0	120.000	100.0	H	296.0
351.938960	37.80	---	46.02	8.22	1000.0	120.000	207.0	V	9.0
367.846240	35.22	---	46.02	10.80	1000.0	120.000	225.0	V	130.0

Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Joel Efraimsson	Date: 2020-10-14
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2399.936500	---	36.11	53.98	17.87	1000.0	1000.000	102.0	V	234.0
2483.512248	---	38.50	53.98	15.48	1000.0	1000.000	100.0	H	267.0
4223.916000	---	38.57	53.98	15.41	1000.0	1000.000	102.0	V	324.0
4880.076000	---	44.51	53.98	9.47	1000.0	1000.000	125.0	V	87.0
7320.092000*	---	51.48	53.98	2.50	1000.0	1000.000	109.0	V	129.0
17999.288120	---	40.83	53.98	13.15	1000.0	1000.000	185.0	H	-18.0

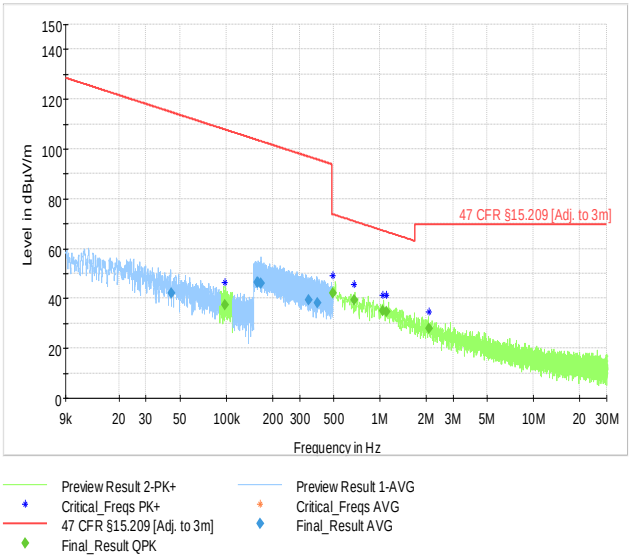
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-20
Chamber details	Chamber: SAC 5	

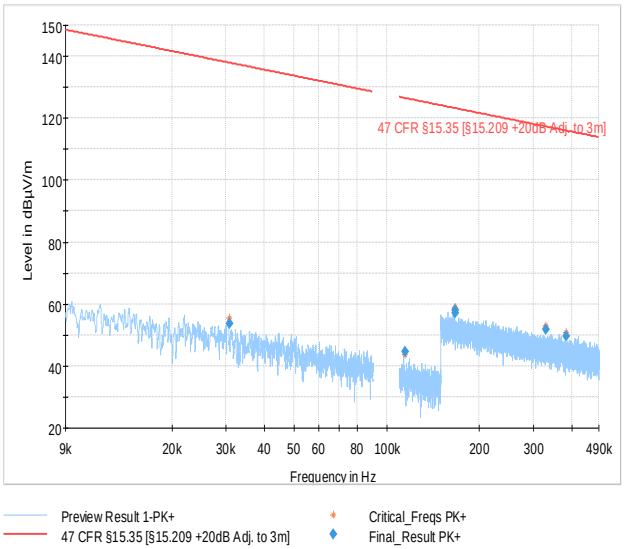


Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
19348.402000	---	41.12	63.52	22.40	1000.0	1000.000	155.0	V	306.0
19722.373000	53.91	---	83.52	29.62	1000.0	1000.000	155.0	V	96.0
21992.399000	---	44.73	63.52	18.79	1000.0	1000.000	155.0	V	112.0
22016.434000	57.77	---	83.52	25.76	1000.0	1000.000	155.0	H	252.0
22022.499000	58.02	---	83.52	25.51	1000.0	1000.000	155.0	H	262.0
24820.876000	57.74	---	83.52	25.78	1000.0	1000.000	155.0	V	306.0
26455.988000	63.26	---	83.52	20.26	1000.0	1000.000	155.0	V	322.0
26468.490000	---	50.29	63.52	13.23	1000.0	1000.000	155.0	V	52.0
26873.580000	---	41.26	63.52	22.26	1000.0	1000.000	155.0	V	22.0
34124.408000	---	40.36	63.52	23.16	1000.0	1000.000	155.0	V	68.0
34741.856000	52.72	---	83.52	30.81	1000.0	1000.000	155.0	H	38.0
35528.388000	---	39.82	63.52	23.70	1000.0	1000.000	155.0	H	8.0

High Channel

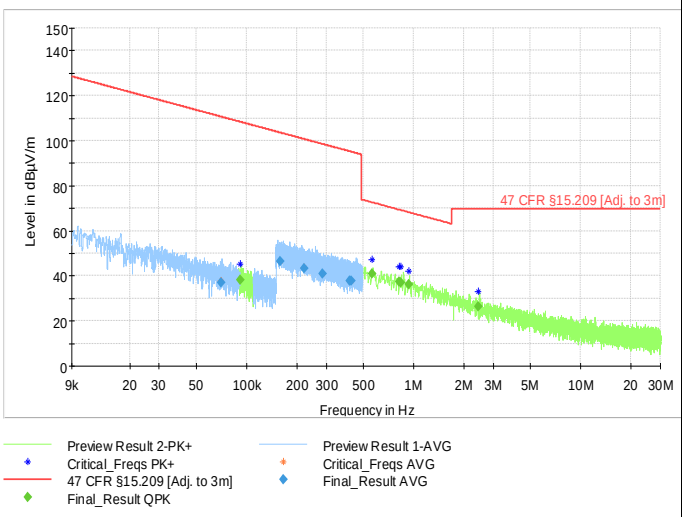
Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Loop Antenna Parallel to axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Simon Palmhager	Date: 2020-10-15
Chamber details	Chamber: SAC 5	

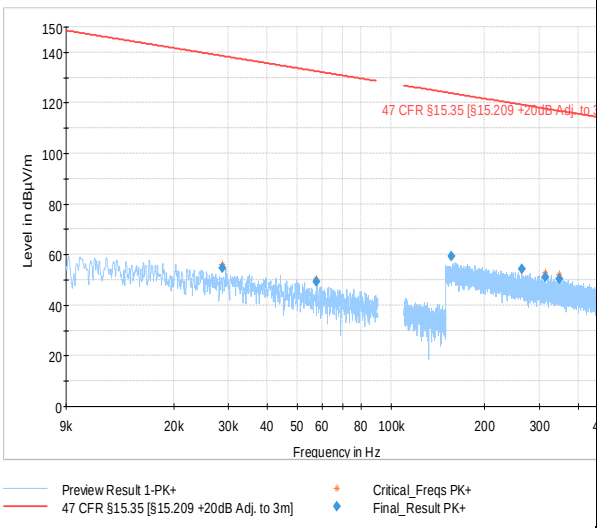




Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.160907	46.41	---	---	103.47	57.06	1000.0	9.000	100.0	H	135.0
0.493643	---	42.21	---	73.74	31.52	1000.0	9.000	100.0	H	127.0
0.677772	---	39.29	---	70.98	31.69	1000.0	9.000	100.0	H	225.0
1.039896	---	35.19	---	67.26	32.07	1000.0	9.000	100.0	H	45.0
1.105624	---	34.52	---	66.73	32.21	1000.0	9.000	100.0	H	191.0
2.082310	---	27.82	---	69.54	41.72	1000.0	9.000	100.0	H	38.0
0.030710	---	---	53.60	137.86	84.26	1000.0	0.200	100.0	H	202.0
0.114452	---	---	44.57	126.43	81.86	1000.0	0.200	100.0	H	45.0
0.166538	---	---	57.13	123.17	66.04	1000.0	9.000	100.0	H	176.0
0.166827	---	---	58.06	123.16	65.10	1000.0	9.000	100.0	H	315.0
0.329634	---	---	51.73	117.24	65.51	1000.0	9.000	100.0	H	304.0
0.384344	---	---	49.76	115.91	66.15	1000.0	9.000	100.0	H	202.0

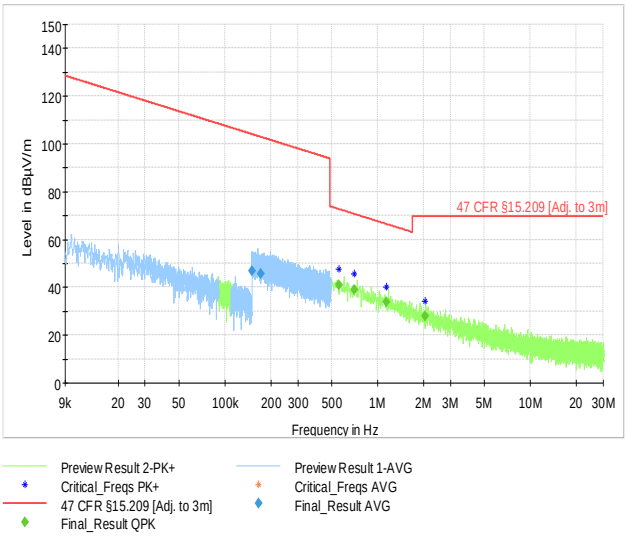
Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Loop Antenna Perpendicular to axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Simon Palmhager	Date: 2020-10-15
Chamber details	Chamber: SAC 5	

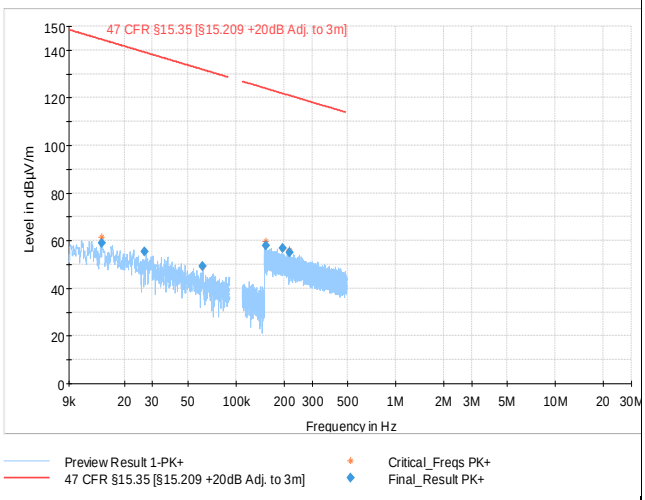




Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.159251	46.40	---	---	103.56	57.16	1000.0	9.000	100.0	H	127.0
0.564681	---	40.86	---	72.57	31.71	1000.0	9.000	100.0	H	45.0
0.824950	---	37.34	---	69.28	31.94	1000.0	9.000	100.0	H	296.0
0.837757	---	36.99	---	69.14	32.15	1000.0	9.000	100.0	H	11.0
0.935806	---	36.13	---	68.18	32.05	1000.0	9.000	100.0	H	282.0
2.449912	---	26.24	---	69.54	43.30	1000.0	9.000	100.0	H	282.0
0.028683	---	---	54.69	138.45	83.76	1000.0	0.200	100.0	H	135.0
0.057412	---	---	49.46	132.42	82.97	1000.0	0.200	100.0	H	45.0
0.156151	---	---	59.33	123.73	64.41	1000.0	9.000	100.0	H	139.0
0.264012	---	---	54.42	119.17	64.75	1000.0	9.000	100.0	H	315.0
0.314051	---	---	51.23	117.66	66.43	1000.0	9.000	100.0	H	268.0
0.347108	---	---	50.46	116.80	66.34	1000.0	9.000	100.0	H	135.0

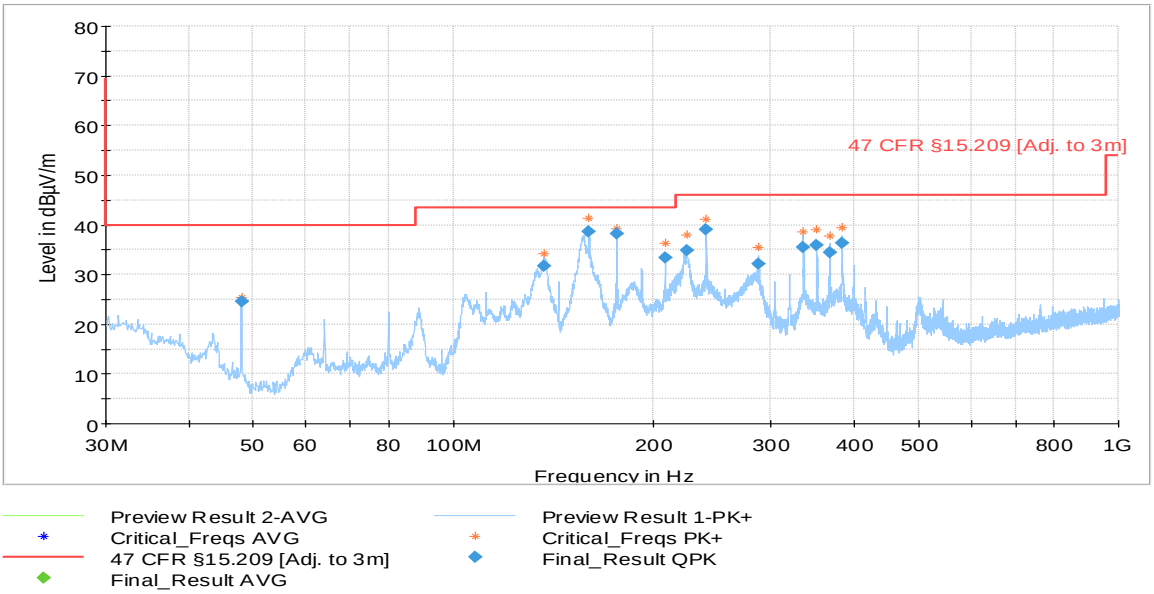
Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-19
Chamber details	Chamber: SAC 5	





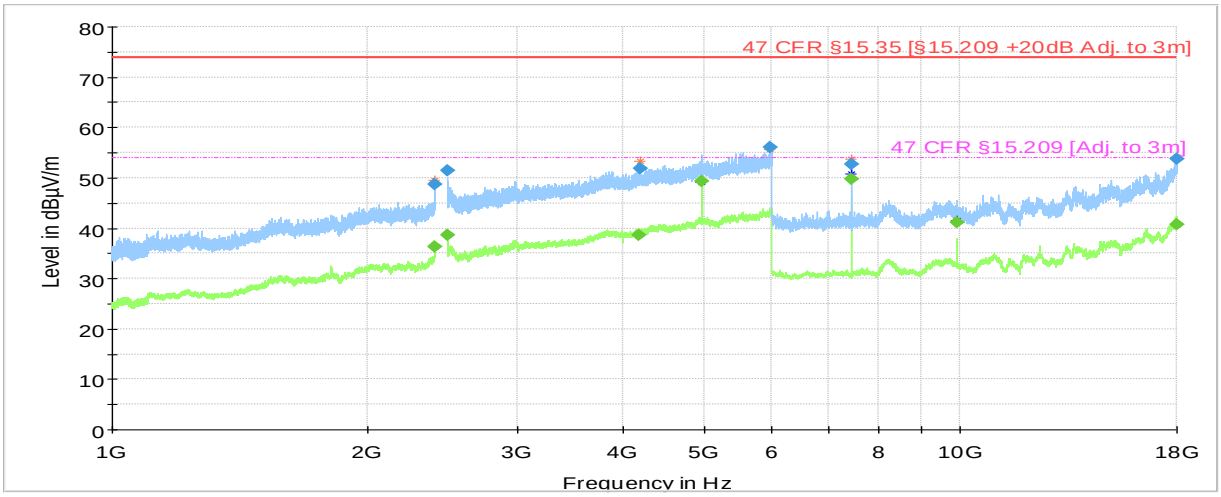
Frequency (MHz)	Average (dBuV/m)	QuasiPeak (dBuV/m)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.150501	46.72	---	---	104.05	57.34	1000.0	9.000	100.0	H	-26.0
0.172797	45.62	---	---	102.85	57.23	1000.0	9.000	100.0	H	135.0
0.560926	---	40.97	---	72.63	31.65	1000.0	9.000	100.0	H	45.0
0.699950	---	38.86	---	70.70	31.84	1000.0	9.000	100.0	H	128.0
1.143059	---	34.05	---	66.44	32.40	1000.0	9.000	100.0	H	281.0
2.048921	---	27.81	---	69.54	41.74	1000.0	9.000	100.0	H	179.0
0.014496	---	---	58.95	144.38	85.43	1000.0	0.200	100.0	H	23.0
0.026695	---	---	55.40	139.08	83.68	1000.0	0.200	100.0	H	243.0
0.061462	---	---	49.30	131.83	82.54	1000.0	0.200	100.0	H	22.0
0.154793	---	---	57.89	123.81	65.92	1000.0	9.000	100.0	H	153.0
0.196833	---	---	56.69	121.72	65.04	1000.0	9.000	100.0	H	190.0
0.217298	---	---	55.07	120.86	65.79	1000.0	9.000	100.0	H	165.0

Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-14
Chamber details	Chamber: SAC 5	



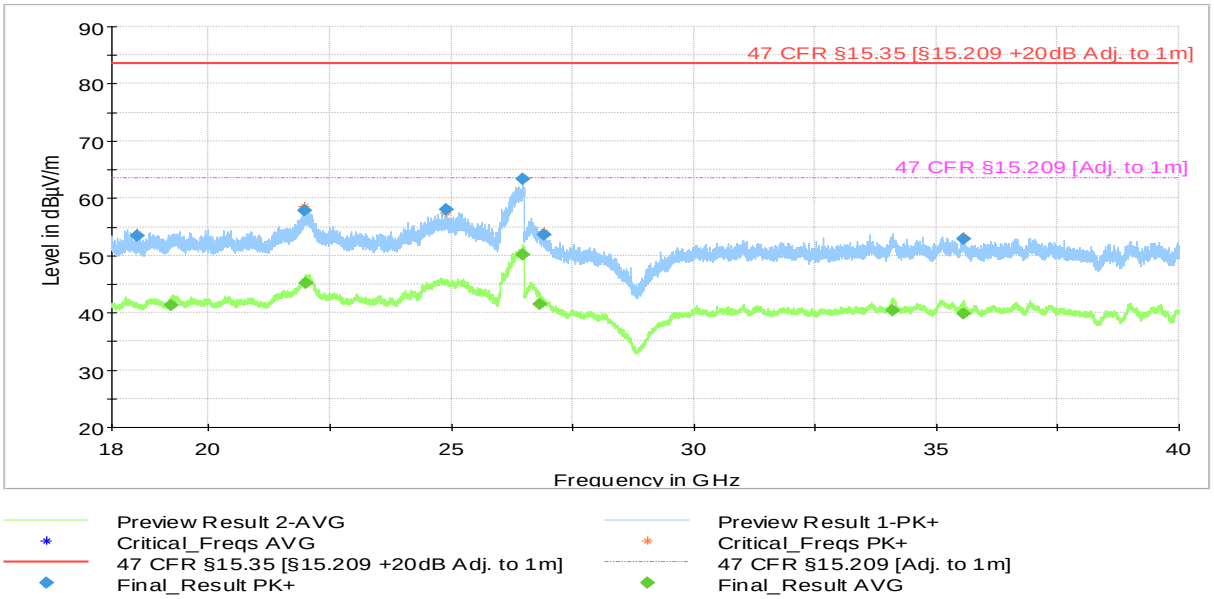
Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
159.969400	38.61	43.52	4.91	1000.0	120.000	204.0	H	292.0
175.981280	38.27	43.52	5.25	1000.0	120.000	100.0	V	9.0
207.977240	33.36	43.52	10.17	1000.0	120.000	100.0	V	158.0
240.032360	39.00	46.02	7.02	1000.0	120.000	100.0	V	158.0
352.053280	35.82	46.02	10.20	1000.0	120.000	183.0	V	-3.0
384.067960	36.39	46.02	9.63	1000.0	120.000	225.0	V	130.0

Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Joel Efraimsson	Date: 2020-10-14
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.516500	---	38.67	53.98	15.31	1000.0	1000.000	125.0	V	206.0
4183.384000	---	38.64	53.98	15.34	1000.0	1000.000	185.0	H	335.0
4960.120000*	---	49.36	53.98	4.61	1000.0	1000.000	100.0	V	87.0
7440.085000*	---	49.84	53.98	4.14	1000.0	1000.000	109.0	V	116.0
9920.118000	---	41.18	53.98	12.80	1000.0	1000.000	210.0	H	86.0
17988.964000	---	40.75	53.98	13.23	1000.0	1000.000	100.0	H	220.0

Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-20
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
18512.524000	53.39	---	83.52	30.13	1000.0	1000.000	155.0	H	56.0
19238.930000	---	41.34	63.52	22.19	1000.0	1000.000	155.0	V	188.0
21983.790000	57.77	---	83.52	25.75	1000.0	1000.000	155.0	H	292.0
21999.940000	---	45.08	63.52	18.44	1000.0	1000.000	155.0	V	322.0
24906.815000	57.96	---	83.52	25.56	1000.0	1000.000	155.0	H	132.0
26471.223000	---	50.22	63.52	13.30	1000.0	1000.000	155.0	V	6.0
26475.730000	63.40	---	83.52	20.12	1000.0	1000.000	155.0	V	52.0
26835.531000	---	41.55	63.52	21.97	1000.0	1000.000	155.0	V	-8.0
26909.280000	53.59	---	83.52	29.93	1000.0	1000.000	155.0	V	112.0
34103.764000	---	40.38	63.52	23.14	1000.0	1000.000	155.0	V	8.0
35552.992000	---	39.80	63.52	23.72	1000.0	1000.000	155.0	H	202.0
35554.512000	52.86	---	83.52	30.66	1000.0	1000.000	155.0	V	338.0

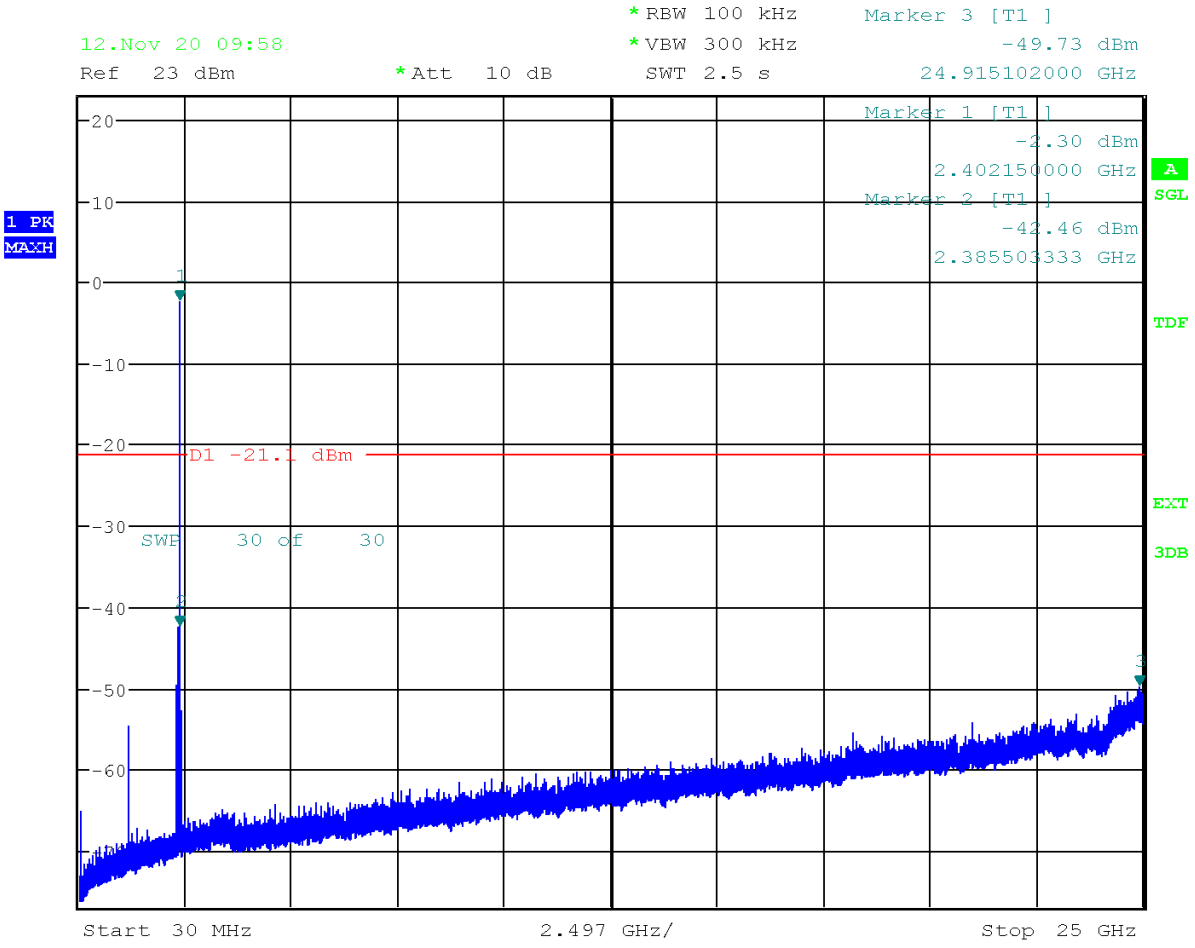
4.3 Test Results – Out of Band Emissions

4.3.1 Out of Band Emissions – Test Summary

Test Specification	47 CFR 15.247 (d)	
Test Engineer & Date	Niall Forrester	2020.11.12
EUT and Ancillary Equipment IDs	A002921819-001	
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M/2M (See below for details)	
EUT Hardware Configuration(s)	Power from lab power supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Tx Pwr (dBm)	Measured Lvl (dBm)	Limit (dBm)	Result
Spurious Emissions (30 MHz – 25 GHz)	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	-1.08	-42.46	-21.08	PASS
Spurious Emissions (30 MHz – 25 GHz)	Bluetooth Low Energy 2M Low Channel (GFSK 2402 MHz)	-1.08	-50.19	-21.08	PASS
Spurious Emissions (30 MHz – 25 GHz)	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	-1.73	-50.44	-21.73	PASS
Spurious Emissions (30 MHz – 25 GHz)	Bluetooth Low Energy 2M Mid Channel (GFSK 2440 MHz)	-1.68	-49.91	-21.68	PASS
Spurious Emissions (30 MHz – 25 GHz)	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	-2.43	-44.03	-22.43	PASS
Spurious Emissions (30 MHz – 25 GHz)	Bluetooth Low Energy 2M High Channel (GFSK 2480 MHz)	-2.47	-43.30	-22.47	PASS

4.3.2 Out of Band Emissions – Test Details (Worst Case Plot)



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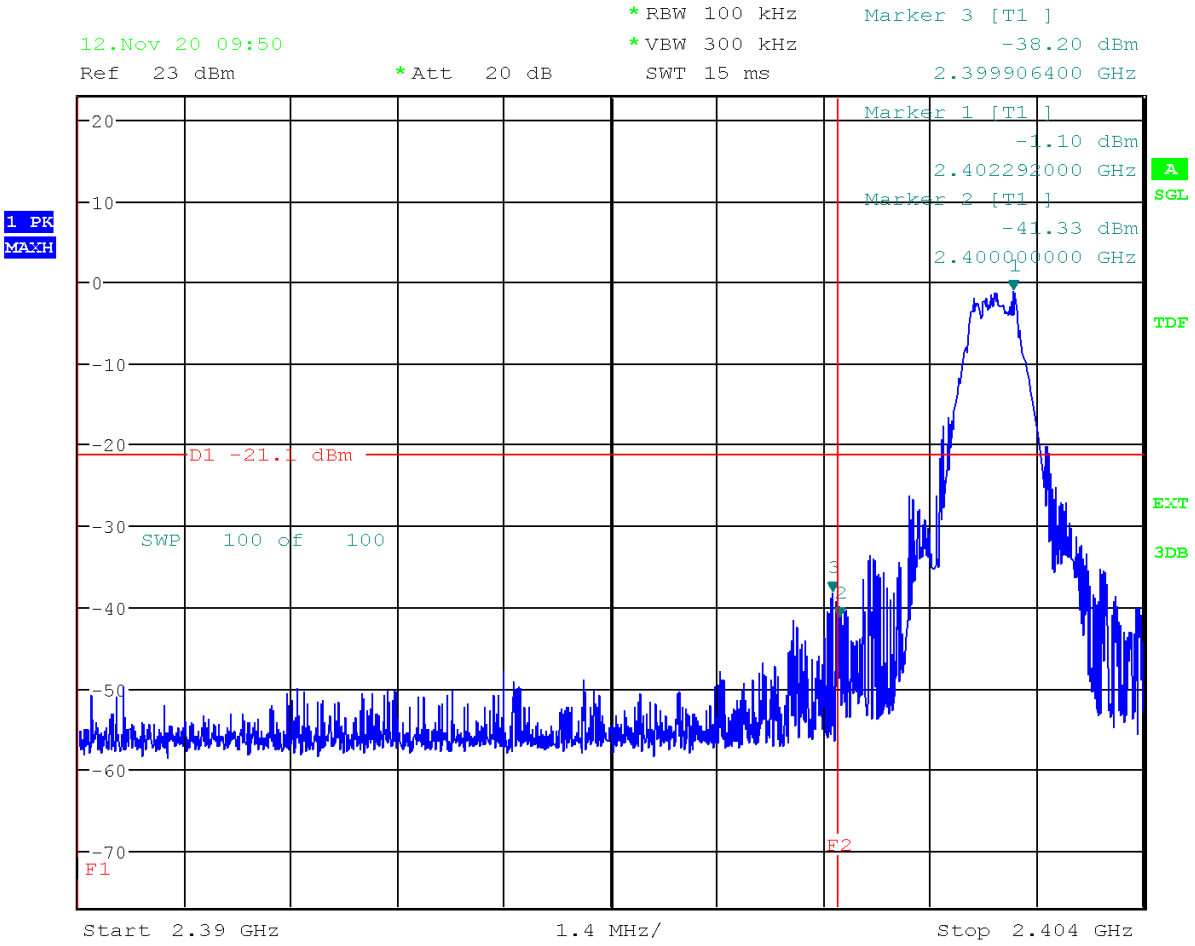
4.4 Test Results – Band Edge Compliance (Authorized Band)

4.4.1 Band Edge Compliance (Authorized Band) – Test Summary

Test Specification	47 CFR 15.247 (d)	
Test Engineer & Date	Niall Forrester	2020.11.12
EUT and Ancillary Equipment IDs	A002921819-001	
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M/2M (See below for details)	
EUT Hardware Configuration(s)	Power from lab power supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Measured Level (dBm)	Limit (dBm)	Result
Emissions at Band Edge (Auth. Band – Low Edge)	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	-38.20	-21.10	PASS
Emissions at Band Edge (Auth. Band – Low Edge)	Bluetooth Low Energy 2M Low Channel (GFSK 2402 MHz)	-38.75	-21.23	PASS
Emissions at Band Edge (Auth. Band – High Edge)	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	-50.70	-22.46	PASS
Emissions at Band Edge (Auth. Band – High Edge)	Bluetooth Low Energy 2M High Channel (GFSK 2480 MHz)	-52.66	-22.62	PASS

4.4.2 Band Edge Compliance (Authorized Band) – Test Details (Worst Case Plot)



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4.5 Test Results – Band Edge Compliance (Restricted Band)

4.5.1 Band Edge Compliance (Restricted Band) – Test Summary

Test Specification	47 CFR 15.209 & 15.247 (d)	
Test Engineer & Date	Niall Forrester	2020-10-15
EUT and Ancillary Equipment IDs	A002921819-005	24V DC power supply
EUT Operation Mode(s)	Continuous Transmit	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M (Low and High channels)	
EUT Hardware Configuration(s)	Power from lab power supply	
Overall Result	PASS	

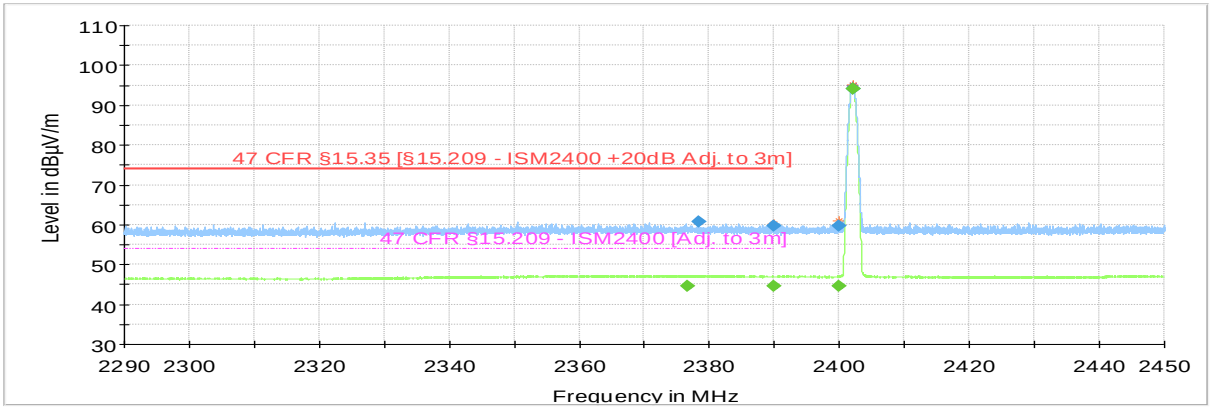
Test Parameter	Wireless Configuration	Result*
Emissions at Band Edge (Rest. Band – Low Edge)	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	PASS
Emissions at Band Edge (Rest. Band – High Edge)	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	PASS

* For detailed measurements, see tables and graphs in sections below

4.5.2 Band Edge Compliance (Restricted Band) – Test Details

Restricted Band – Low Edge

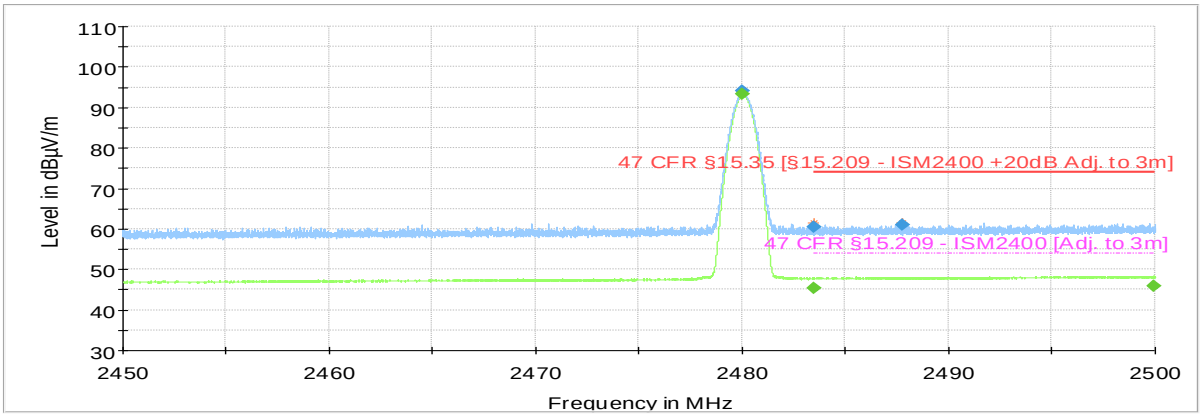
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-15
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2376.576000	---	44.71	53.98	9.27	1000.0	1000.000	100.0	V	304.0
2378.464000	60.69	---	73.98	13.29	1000.0	1000.000	121.0	H	299.0
2390.000000	---	44.56	53.98	9.42	1000.0	1000.000	100.0	V	0.0
2390.000000	59.66	---	73.98	14.32	1000.0	1000.000	100.0	H	30.0
2400.000000	59.71	---	---	---	1000.0	1000.000	170.0	H	43.0
2400.000000	---	44.67	---	---	1000.0	1000.000	203.0	V	117.0
2402.032000	---	93.97	---	---	1000.0	1000.000	145.0	H	93.0
2402.032000	94.02	---	---	---	1000.0	1000.000	145.0	H	93.0

Restricted Band – High Edge

Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002921819-005	
Ancillary Equipment	24V DC from power supply	
Test Engineer	Niall Forrester	Date: 2020-10-15
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2480.015000	---	93.42	---	---	1000.0	1000.000	121.0	H	68.0
2480.015000	94.02	---	---	---	1000.0	1000.000	123.0	H	69.0
2483.500000	---	45.43	53.98	8.55	1000.0	1000.000	121.0	H	145.0
2483.500000	60.58	---	73.98	13.39	1000.0	1000.000	171.0	H	269.0
2487.730000	61.04	---	73.98	12.94	1000.0	1000.000	145.0	H	263.0
2499.965000	---	45.87	53.98	8.11	1000.0	1000.000	145.0	V	92.0

4.6 Test Results – 20dB Bandwidth

4.6.1 20dB Bandwidth – Test Summary

Requirement is not applicable as the device is non-hopping

4.7 Test Results – Carrier (Hopping Channel) Separation

4.7.1 Carrier (Hopping Channel) Separation – Test Summary

Requirement is not applicable as the device is non-hopping

4.8 Test Results – Number of Hopping Channels

4.8.1 Number of Hopping Channels – Test Summary

Requirement is not applicable as the device is non-hopping

4.9 Test Results – Time of Occupancy (Dwell Time)

4.9.1 Time of Occupancy (Dwell Time) – Test Summary

Requirement is not applicable as the device is non-hopping

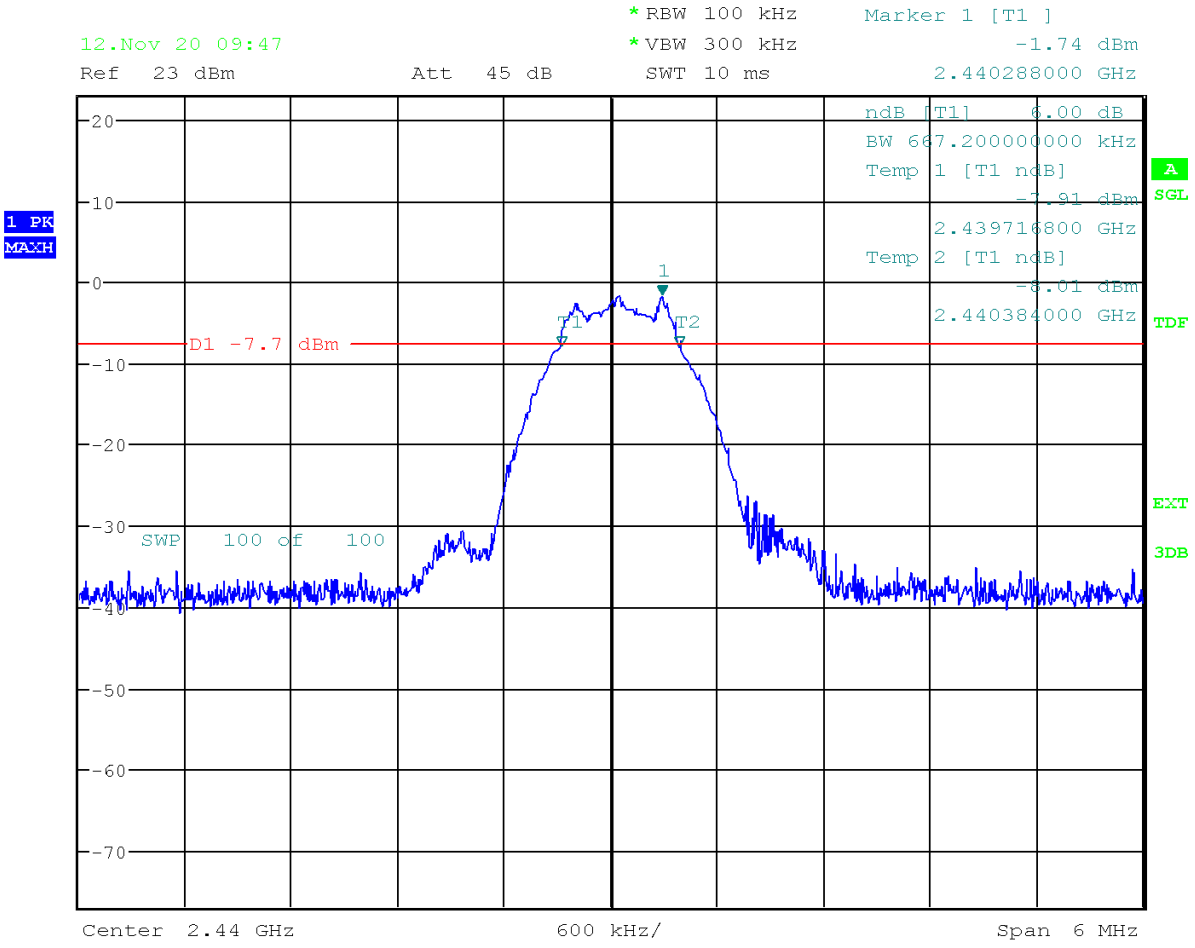
4.10 Test Results – 6dB Bandwidth

4.10.1 6dB Bandwidth – Test Summary

Test Specification	47 CFR 15.247 (a)(2)	
Test Engineer & Date	Niall Forrester	2020.11.12
EUT and Ancillary Equipment IDs	A002921819-001	
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M/2M (See below for details)	
EUT Hardware Configuration(s)	Power from lab power supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Measured Level (kHz)	Limit Min (kHz)	Result
6dB Bandwidth	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	681.60	500	PASS
6dB Bandwidth	Bluetooth Low Energy 2M Low Channel (GFSK 2402 MHz)	686.40	500	PASS
6dB Bandwidth	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	686.40	500	PASS
6dB Bandwidth	Bluetooth Low Energy 2M Mid Channel (GFSK 2440 MHz)	667.20	500	PASS
6dB Bandwidth	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	691.20	500	PASS
6dB Bandwidth	Bluetooth Low Energy 2M High Channel (GFSK 2480 MHz)	676.80	500	PASS

4.10.2 6dB Bandwidth – Test Details (Worst Case Plot)



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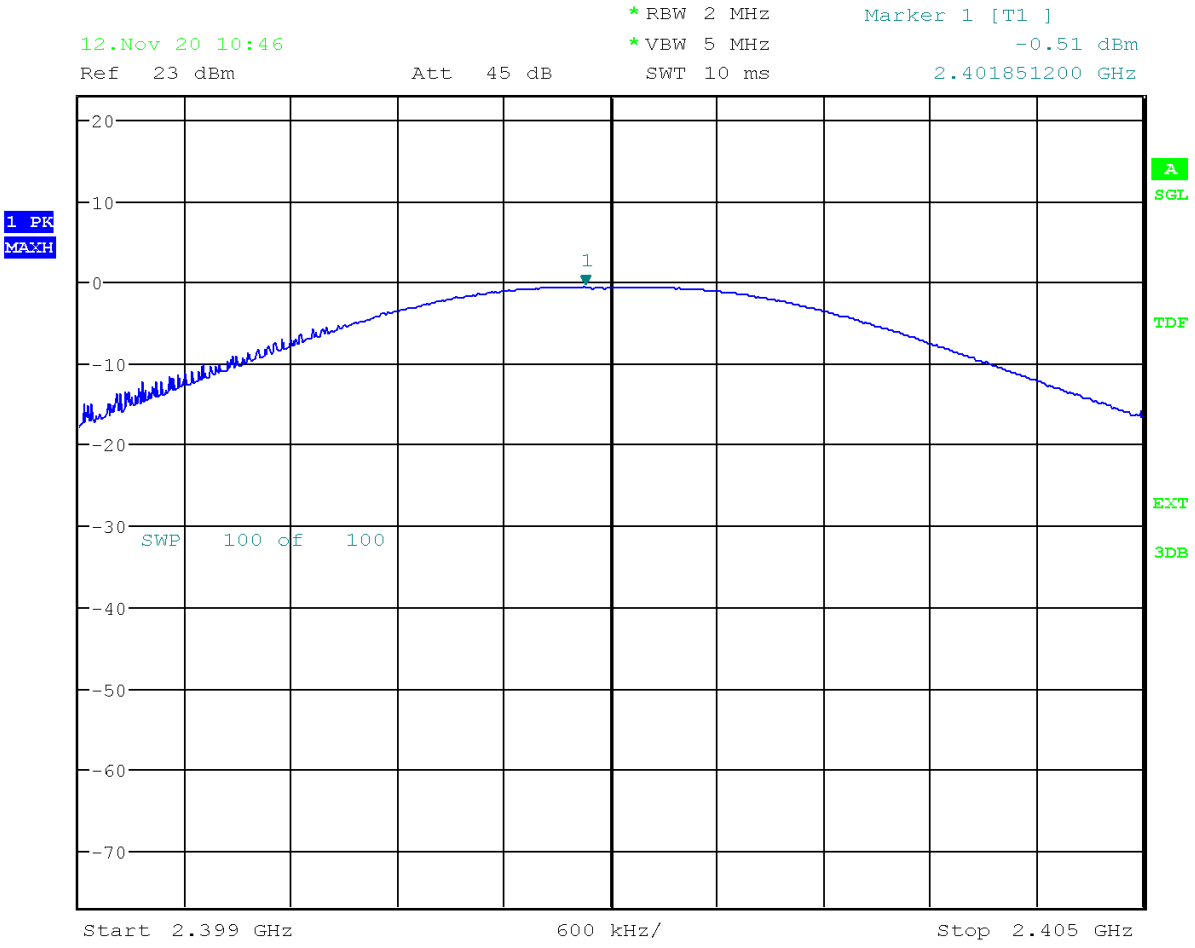
4.11 Test Results – Peak Conducted Output Power

4.11.1 Peak Conducted Output Power – Test Summary

Test Specification	47 CFR 15.247(b)	
Test Engineer & Date	Niall Forrester	2020.11.12
EUT and Ancillary Equipment IDs	A002921819-001	
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M/2M (See below for details)	
EUT Hardware Configuration(s)	Power from lab power supply	
Overall Result	PASS	

Test Parameter	**Wireless Configuration**	**Measured Level (dBm)**			**Limit (dBm)**	**Result**
		Low 21.6V	**Nom 24.0V**	**High 26.4V**		
Peak Conducted Output Power	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	-0.54	-0.61	-0.58	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 2M Low Channel (GFSK 2402 MHz)	-0.51	-0.59	-0.52	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	-1.16	-1.22	-1.12	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 2M Mid Channel (GFSK 2440 MHz)	-1.18	-1.21	-1.11	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	-1.67	-1.87	-1.74	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 2M High Channel (GFSK 2480 MHz)	-1.81	-1.89	-1.83	30	PASS

4.11.2 Peak Conducted Output Power – Test Details (Worst Case Plot)



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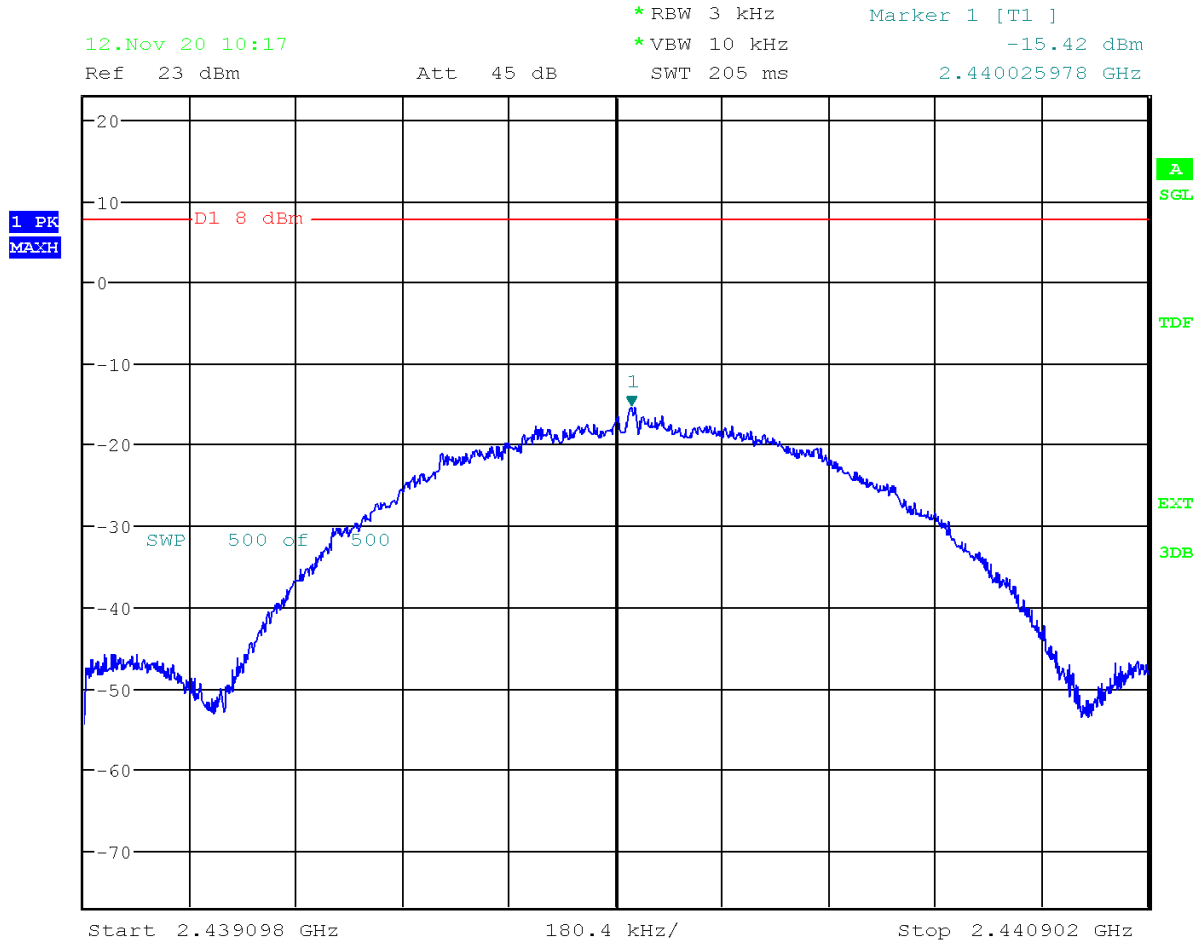
4.12 Test Results – Power Spectral Density

4.12.1 Power Spectral Density – Test Summary

Test Specification	47 CFR 15.247(e)	
Test Engineer & Date	Niall Forrester	2020.11.12
EUT and Ancillary Equipment IDs	A002921819-001	
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M/2M (See below for details)	
EUT Hardware Configuration(s)	Power from lab power supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Measured (dBm/3kHz)	Low Limit (dBm/3kHz)	High Limit (dBm/3kHz)	Result
Power Density	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	-13.43	-30	8	PASS
Power Density	Bluetooth Low Energy 2M Low Channel (GFSK 2402 MHz)	-13.71	-30	8	PASS
Power Density	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	-15.10	-30	8	PASS
Power Density	Bluetooth Low Energy 2M Mid Channel (GFSK 2440 MHz)	-15.42	-30	8	PASS
Power Density	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	-15.11	-30	8	PASS
Power Density	Bluetooth Low Energy 2M High Channel (GFSK 2480 MHz)	-15.25	-30	8	PASS

4.12.2 Power Spectral Density – Test Details



Date: 12.NOV.2020 10:17:44

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – CTE System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Comprehensive Testing Environment	TÜV Rheinland LGA Products	HWE 6000	00139	N/A	N/A
Bluetooth Signaling Unit	Rohde & Schwarz	CMW500	163750 2711468	16.07.2020	16.07.2021
Spectrum Analyzer	Rohde & Schwarz	FSU26	100308 2704108	14.07.2020	14.07.2021
Vector Signal Generator	Rohde & Schwarz	SMU200A	101584 2704111	04.08.2020	04.08.2021
Power Supply	Keithley	2303	1198722 2717714	24.07.2020	24.07.2021
Multimeter	Keithley	2700	1035251 2704115	09.07.2020	09.07.2021
Average Power Sensor	Rohde & Schwarz	NRP-Z31	102145 2704104	17.07.2020	17.07.2021
Temperature Chamber	Vötsch	VT4002	58566081940010 2717693	N/A	N/A
Temp. & Humidity Logger	Lufft	Opus 20	113.0118.0802.033 2771025	31.07.2020	31.07.2022

5.1.2 Hardware List – Conducted Emissions System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Two-Line V-network	Rohde & Schwarz	ENV216	101090 2704076	2020.07.16	2021.07.16
Test Receiver 9KHz to 3.5 GHz	Rohde & Schwarz	ESR3	101674 2704016	2020.07.17	2021.07.17

5.1.3 Hardware List – SAC5 System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
EMI Test Receiver	Rohde & Schwarz	ESW44	101760 2881044	2020.07.17	2021.07.17
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988 2823181	2019.07.23	2021.07.23
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678 2823164	2019.07.15	2021.07.15
Control Device	Maturo	NCD	NCD/393/2372.01	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	2020.08.04	2021.08.04
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 1	101333 2761265	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 2	101335 2761266	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330 2761262	2020.08.04	2021.08.04
Humidity Temperature Probe	Lufft	OPUS 20	1236.0118.0802.033 2771042	2020.07.31	2022.07.31

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
Comprehensive Testing Environment (CTE)	CTE – TMF CTE – WLAN	V47.5 V41.5
Conducted Emissions System	EMC 32	V10.60.10
SAC 5	EMC 32	V10.60.10

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for CTE

Parameter	Uncertainty (Coverage Factor k=2)
Maximum Output Power (15.247b)	±0.51 dB
6dB / 20dB Channel Bandwidth & 99% Occupied bandwidth (15.247a)	<5%
Carrier Frequency Separation (15.247a)	N/A
Number of Hopping Channels (15.247a)	N/A
Time of Occupancy – Dwell Time (15.247a)	N/A
Band Edge Compliance of Conducted Emissions (15.247a)	±1.04 dB
Conducted Spurious Emissions (15.247d)	±2.98 dB
Power Spectral Density (15.247e)	±0.51 dB

6.2 Measurement Uncertainty for Conducted Emissions

Parameter	Uncertainty (Coverage Factor k=2)
Conducted emissions with LISN 150KHz to 30 MHz	2.98 dB

6.3 Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)

Parameter	Uncertainty (Coverage Factor k=2)
Field Strength 10 Hz -9 kHz	3.38 dB
Field Strength 9 kHz -30 MHz	3.38 dB
Field Strength 30 MHz -1000 MHz	3.38 dB
Field Strength 1 GHz -18 GHz	4.88 dB
Field Strength 18 GHz - 40 GHz	5.14 dB

7. PHOTOGRAPHS

See Appendix 1