Prüfbericht-Nr.: *Test report no.:*	**60437104-001**	**Auftrags-Nr.:** *Order no.*:	23870495 030	Seite 1 von 49 *Page 1 of 49*
Kunden-Referenz-Nr.: *Client reference no.:*	2312866	**Auftragsdatum:** *Order date:*	2021.01.27	
Auftraggeber: *Client:*	Appsens AS			
Prüfgegenstand: *Test item:*	Heart Monitoring Device			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	ECG247 Smart Sensor / FCC ID: 2AYZI-ECG247			
Auftrags-Inhalt: *Order content*:	Accredited testing according to FCC Part 15C			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 15.247 with parts 15.207 & 15.209 ANSI C63.10: 2013			

Wareneingangsdatum: *Date of sample receipt:*	2021.01.27
Prüfmuster-Nr.: *Test sample no:*	See section 2.3
Prüfzeitraum: *Testing period:*	2021.02.03 – 2021.02.15
Ort der Prüfung: *Place of testing:*	Lund, Sweden
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Sweden
Prüfergebnis*: *Test result*:*	Pass

überprüft von: reviewed by: **Datum: 2021.04.22** *Date:*	X Signed by: Niall Forrester	**genehmigt von:** authorized by: **Datum: 2021.04.22** *Date:*	X Signed by: Per Isacsson
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 History60437104-00160437104-001

REVISION	DATE	REMARKS	AUTHOR
001	2021.04.22	First release	Niall Forrester
Note: Latest revision report will replace all previous reports			
This report based on FCC Part 15.247 Template version 1.2			

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)	NO	4.1	N/A	No AC Power
15.209	Radiated Emissions (Intentional Radiators)	YES	4.2	PASS	
15.247 (d)	Antenna Conducted Emissions	NO	4.3	N/A.	Radiated testing performed
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.

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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:	**Appsens AS**
Address:	**Bergshaven 17**
	N-4790 Lillesand
	Norway
Contact Person:	**Elsiabeth Ramsdal**
Contact e-Mail / Telephone	**elisabeth@appsens.no** **+47 951 21 487**

2. PRODUCT INFORMATION

2.1 General Description

Model name:	ECG247 Smart Sensor
Manufacturer:	Appsens AS
Model number / Marketing name:	ECG247 Smart Sensor
FCC ID:	2AYZI-ECG247
Description:	Electrocardiographic long-term ambulatory recorder/analyser
Ancillary Equipment:	See section 2.7

2.2 Device Characteristics

Type of Power Supply	DC (Battery)
Nominal Supply Voltage	2.9 V DC
Supply Voltage Range	2.4V – 3.3V
Operating Temperature Range	-25 ºC – 70 ºC
Operating Air Humidity Range	0% - 90%
Highest Internal Frequency Source	2483.5 MHz

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A002994639-001	Standard Sample	Radiated Emissions
2	A002994639-003	Modified with RF connector and DC cables	Conducted Radio Tests

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
Bluetooth Low Energy	2.4GHz	2400 MHz – 2483.5 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
Bluetooth Low Energy	2.4GHz	1	inverted-F	-2.9

2.6 Wireless Technology Details

Technology	Band	Modulation Type(s)	No. of Channels	Channel Spacing	Adaptivity
Bluetooth Low Energy	2.4GHz	GFSK	39	2 MHz	N/A

2.7 Ancillary Equipment

None

2.8 EUT Diagrams

-

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)	Antenna Conducted 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)

Interpretation of the measurement results has been performed in accordance with ANSI C63.10 section 1.3

Compliance with the requirements has been based on the results of the measurements compared to the specified limits, not taking into account measurement instrumentation uncertainty.

Measurement Uncertainty figures are stated in section 6

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:

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

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)	Antenna Conducted Emissions	N/A
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	N/A
15.247 (a)(1)	Carrier (Hopping Channel) Separation	N/A
15.247 (a)(1)	Number of Hopping Channels	N/A
15.247 (a)(1)	Time of Occupancy (Dwell Time)	N/A
15.247 (a)(2)	6dB Bandwidth	CTE
15.247 (b)	Peak Conducted Output Power	CTE
15.247 (e)	Power Spectral Density	CTE

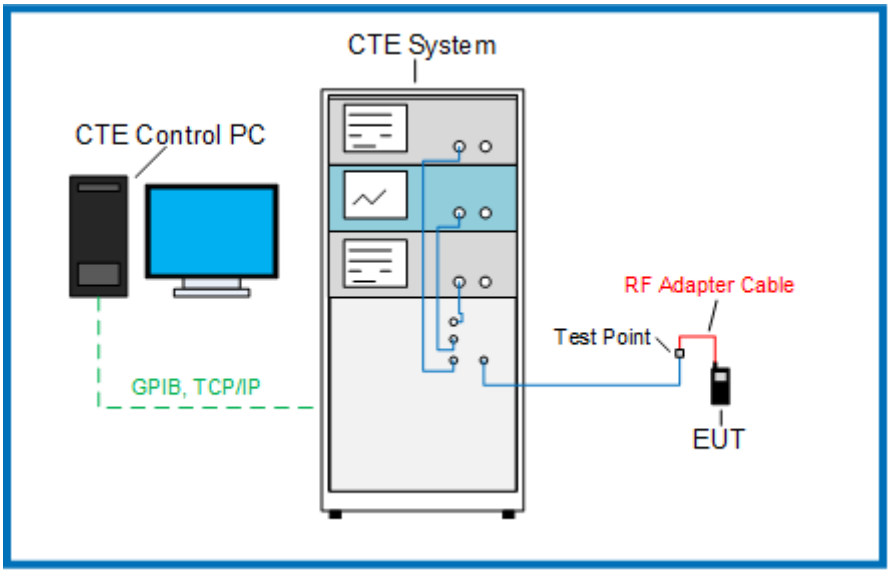
3.4.3 Test Equipment Setup – CTE System

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

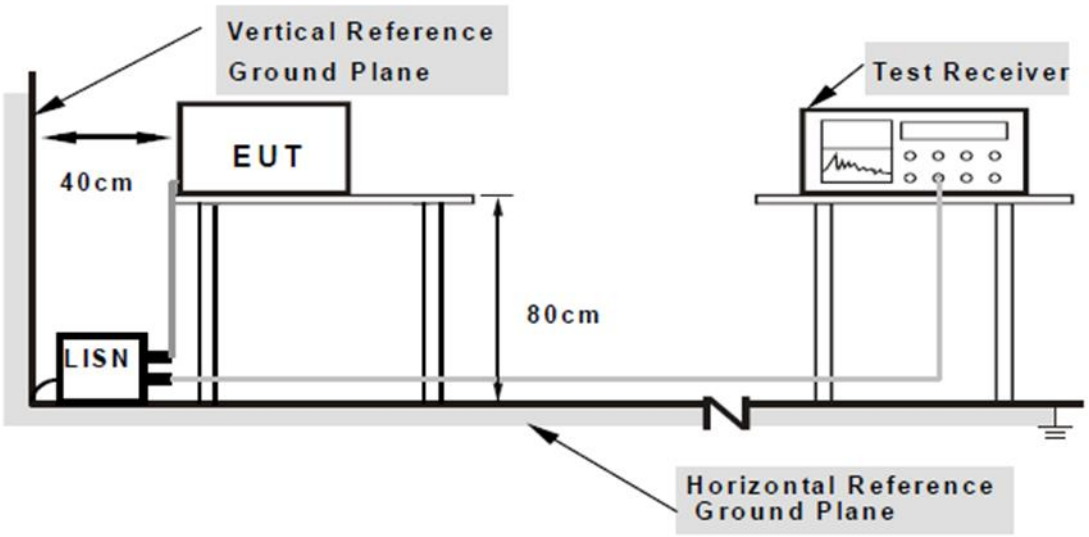


3.4.4 Test Equipment Setup – Conducted Emissions

- 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)

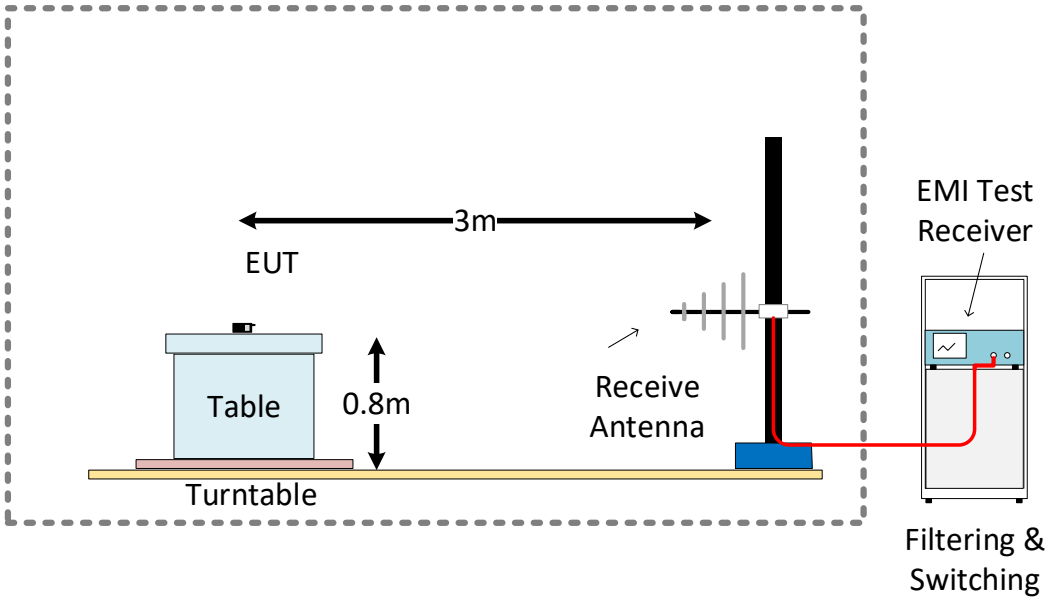
- For frequency range 30MHz-1GHz Log-Periodic Antenna was used. Antenna elevated from 100 cm from floor to 400 cm from floor, and was placed at 3 m from center of turntable in tilted position. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna 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.

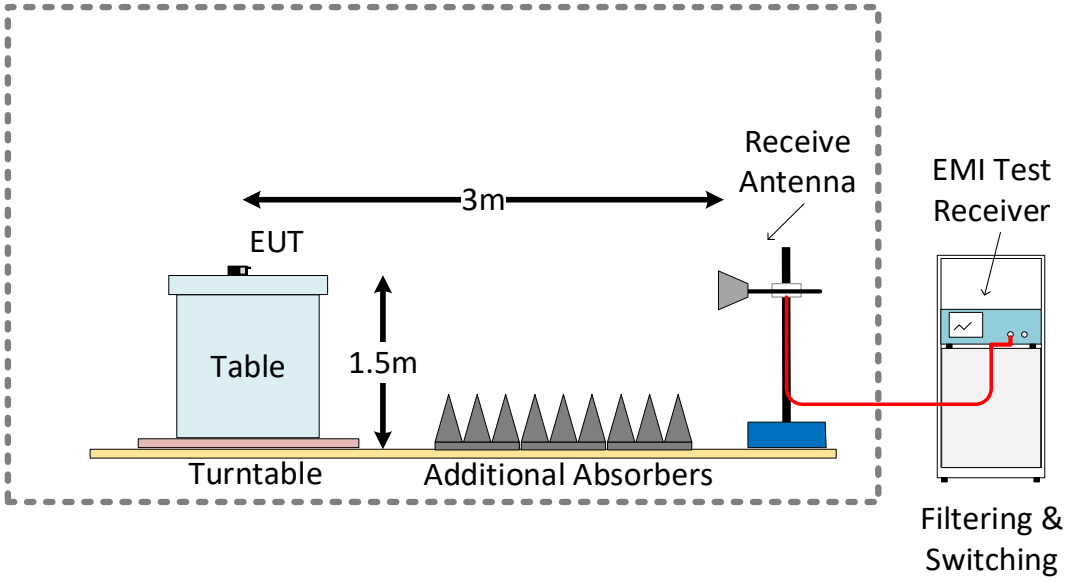
- For frequency range 18GHz-40GHz double horn Antenna was used. Antenna's height was adjusted to150 cm from floor, and 1 m distance to center of turntable. The equipment under test (EUT) was placed at the middle of the turntable on at 150 cm height from floor.

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

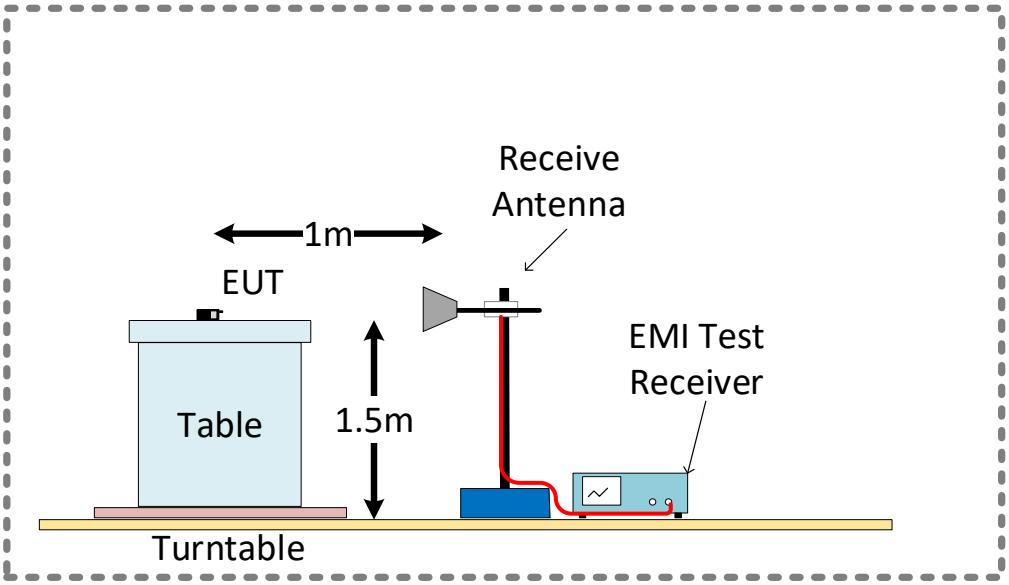
SAC 5 Test Setup Configuration 30MHz – 1GHz



SAC 5 Test Setup Configuration 1GHz – 18GHz



SAC 5 Test Setup Configuration 18GHz – 40GHz



3.5 EUT Configuration During Test

Radiated Emissions

For radiated emissions testing, the device was operated from the battery and set to continuous transit mode on an appropriate channel. See test setup photographs for more detail.

Conducted RF

For all conducted RF testing, the device was operated from a DC power supply to simulate the various battery levels. The device was modified with an RF connector in place of the Bluetooth antenna to allow for conducted RF measurements. Modifications to the device allowed for a USB-TTL adapter to be connected for DTM control.

3.6 EUT Operation Modes

Operation mode	Description
Continuous Tx	The device was set to transmit a continuous modulated signal with the appropriate frequency
DTM	The device was set to Bluetooth LE Direct Test Mode and was controlled by the test equipment

3.7 Deviations from the Test Standard

None

3.8 Environmental Conditions

3.8.1 Environmental Conditions – CTE System

Date	Time	Temperature (°C)	Relative Humidity (%)
2021.02.05	07:47	20.9	15

3.8.2 Environmental Conditions – SAC5 (Radiated Emissions)

Date	Time	Temperature (°C)	Relative Humidity (%)
2021.02.03	07:57	18.4	29
2021.02.09	08:32	18.2	22
2021.02.10	08:47	18.3	22
2021.02.11	08:02	18.4	22
2021.02.12	07:44	18.4	22
2021.02.15	07:55	18.5	24

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

This requirement is not applicable as the device cannot be connected to AC Mains (no AC connection or charging connection)

4.2 Test Results – Radiated Emissions (Intentional Transmitter)

4.2.1 Radiated Emissions (Intentional) – Test Summary

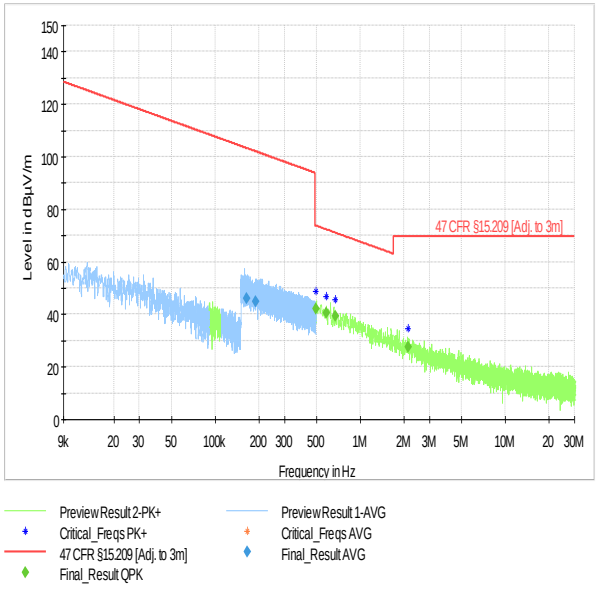
Test Specification	FCC 47 CFR 15.209 (Part 15 Subpart C)	
Test Engineer & Date	Niall Forrester	2021.02.03 – 2021.02.15
EUT and Ancillary Equipment IDs	A002994639-001	-
EUT Operation Mode(s)	Continuous Tx	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M	
EUT Hardware Configuration(s)	-	
Overall Result	PASS	

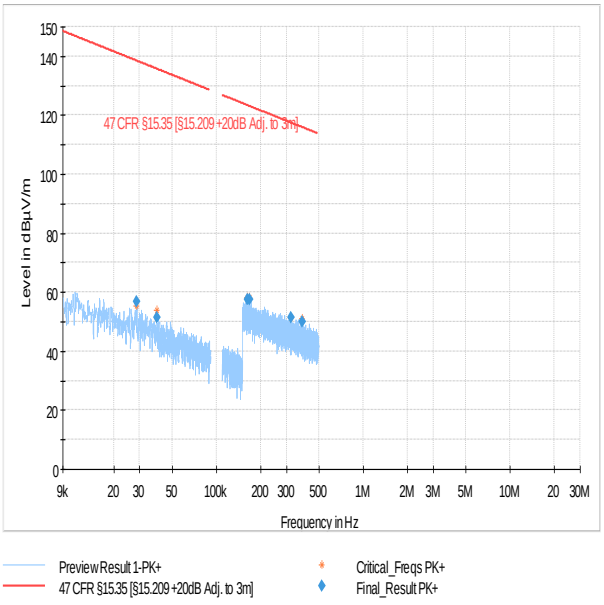
Test Parameter	Wireless Configuration	Frequency Range	Result
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	9 kHz – 30 MHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	30 MHz – 1 GHz	PASS
Radiated Emissions	Bluetooth Low Energy 1M Low Channel (GFSK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

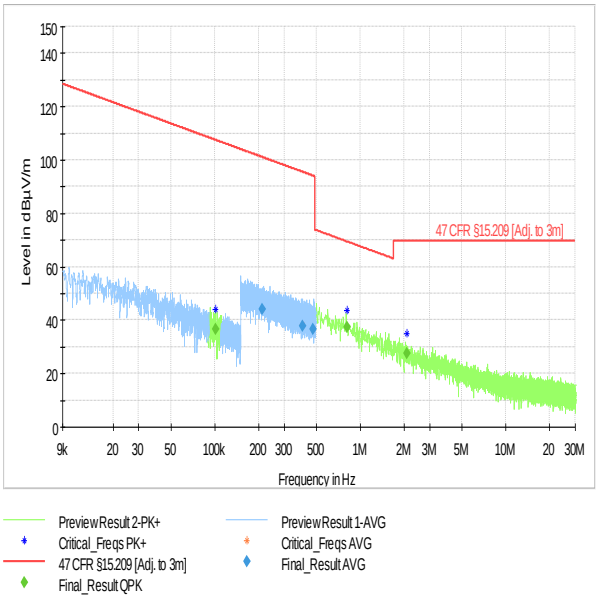
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Loop Antenna Parallel to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-12
Chamber details	Chamber: SAC 5	

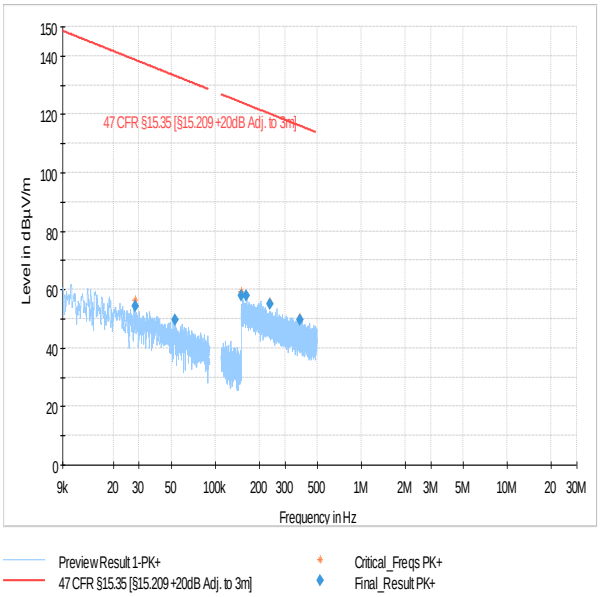




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.165231	46.10	---	---	103.24	57.14	1000.0	9.000	100.0	H	101.0
0.189878	44.79	---	---	102.04	57.24	1000.0	9.000	100.0	H	135.0
0.493791	---	42.10	---	73.73	31.63	1000.0	9.000	100.0	H	25.0
0.583852	---	40.62	---	72.28	31.66	1000.0	9.000	100.0	H	135.0
0.673697	---	39.22	---	71.04	31.81	1000.0	9.000	100.0	H	-1.0
2.126519	---	27.43	---	69.54	42.11	1000.0	9.000	100.0	H	315.0
0.028662	---	---	56.94	138.46	81.52	1000.0	0.200	100.0	H	22.0
0.039304	---	---	51.29	135.72	84.42	1000.0	0.200	100.0	H	135.0
0.162451	---	---	57.65	123.39	65.74	1000.0	9.000	100.0	H	225.0
0.168881	---	---	57.54	123.05	65.52	1000.0	9.000	100.0	H	-12.0
0.321539	---	---	51.29	117.46	66.17	1000.0	9.000	100.0	H	135.0
0.384152	---	---	49.98	115.91	65.94	1000.0	9.000	100.0	H	135.0

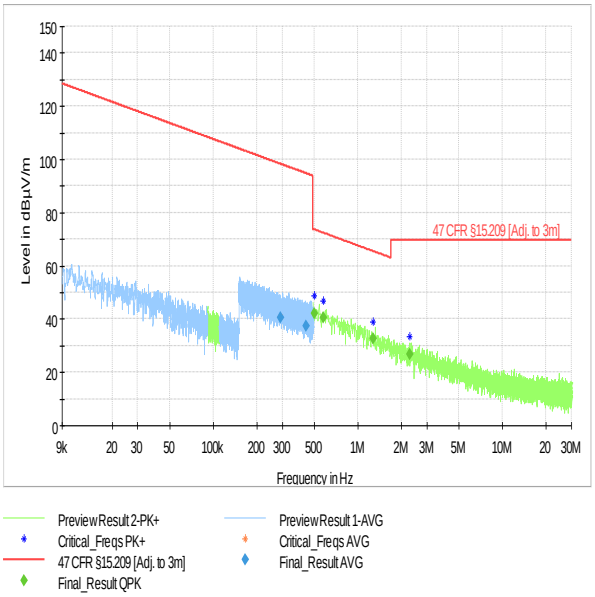
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Loop Antenna Perpendicular to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-12
Chamber details	Chamber: SAC 5	

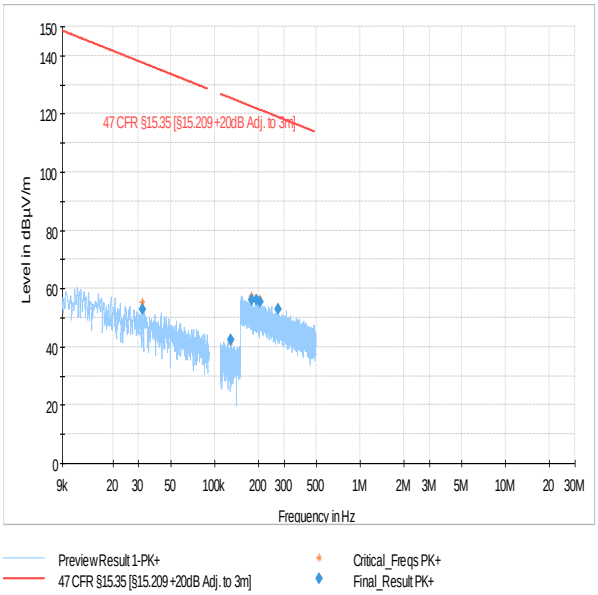




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.100804	---	36.72	---	107.54	70.81	1000.0	0.200	100.0	H	64.0
0.211579	43.94	---	---	101.10	57.15	1000.0	9.000	100.0	H	135.0
0.402465	37.99	---	---	95.51	57.52	1000.0	9.000	100.0	H	179.0
0.473367	36.69	---	---	94.10	57.41	1000.0	9.000	100.0	H	295.0
0.810988	---	37.25	---	69.42	32.17	1000.0	9.000	100.0	H	45.0
2.083132	---	27.68	---	69.54	41.86	1000.0	9.000	100.0	H	269.0
0.028201	---	---	54.36	138.60	84.24	1000.0	0.200	100.0	H	63.0
0.052986	---	---	49.55	133.12	83.57	1000.0	0.200	100.0	H	34.0
0.151085	---	---	57.75	124.02	66.27	1000.0	9.000	100.0	H	-2.0
0.162255	---	---	58.01	123.40	65.39	1000.0	9.000	100.0	H	80.0
0.236268	---	---	55.04	120.14	65.10	1000.0	9.000	100.0	H	99.0
0.380042	---	---	49.55	116.01	66.46	1000.0	9.000	100.0	H	218.0

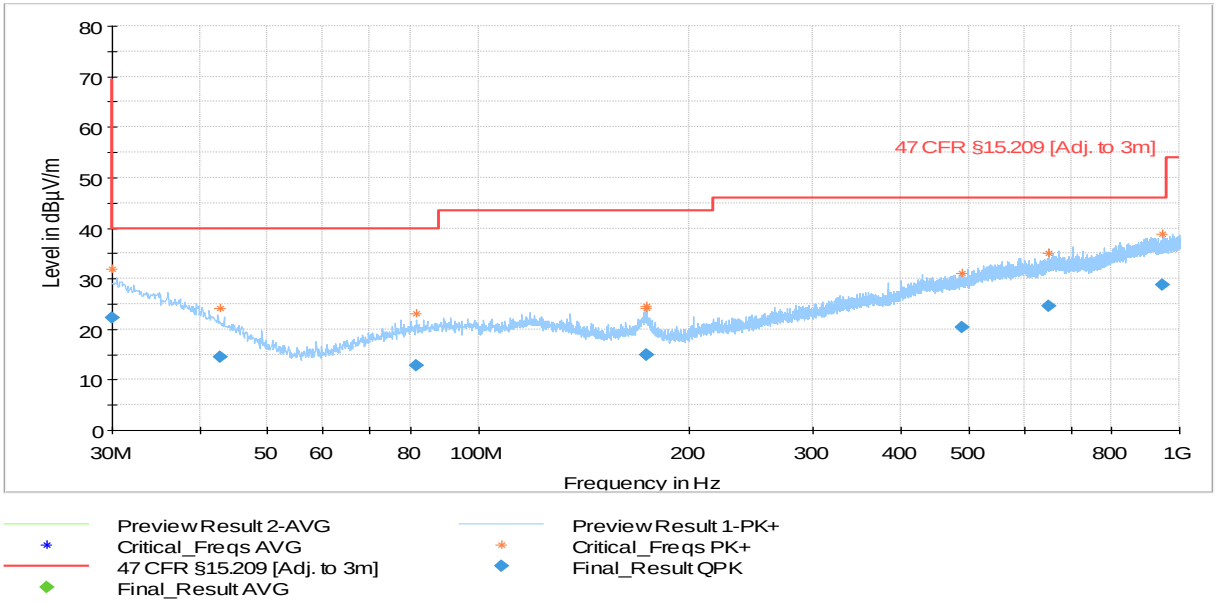
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Joel Efraimsson	Date: 2021-02-11
Chamber details	Chamber: SAC 5	





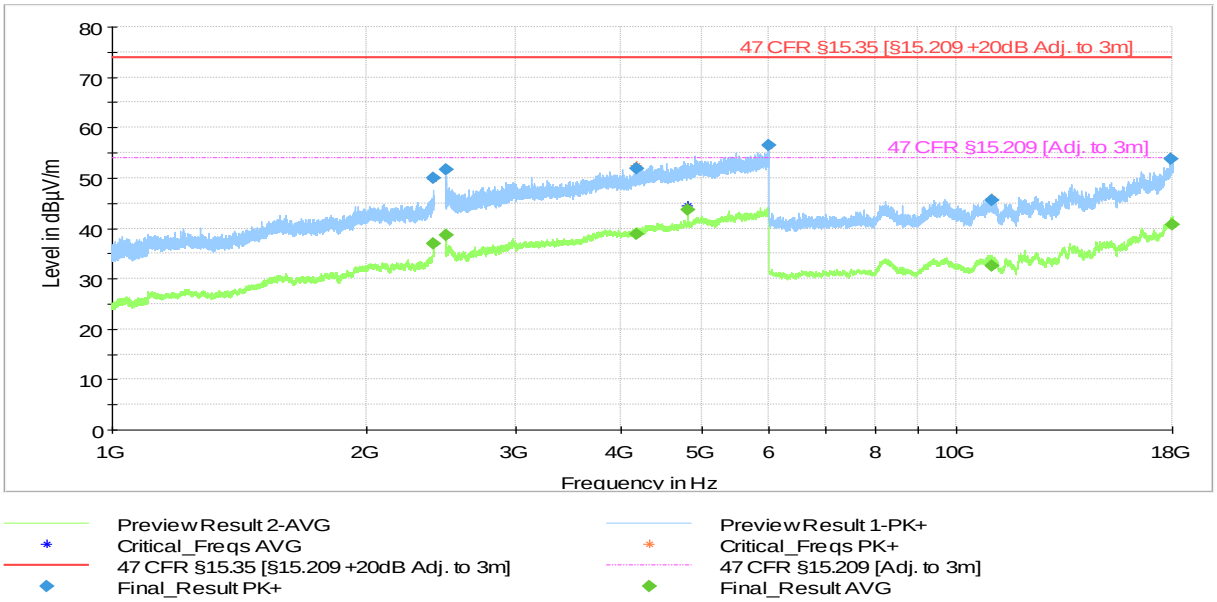
Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.292773	40.73	---	---	98.27	57.54	1000.0	9.000	100.0	H	115.0
0.439021	37.30	---	---	94.76	57.46	1000.0	9.000	100.0	H	64.0
0.501521	---	42.19	---	73.60	31.41	1000.0	9.000	100.0	H	225.0
0.574633	---	40.72	---	72.42	31.70	1000.0	9.000	100.0	H	244.0
1.281082	---	32.87	---	65.45	32.58	1000.0	9.000	100.0	H	-26.0
2.277402	---	26.92	---	69.54	42.62	1000.0	9.000	100.0	H	45.0
0.031754	---	---	52.74	137.57	84.83	1000.0	0.200	100.0	H	202.0
0.128431	---	---	42.34	125.43	83.09	1000.0	0.200	100.0	H	178.0
0.178826	---	---	56.07	122.56	66.49	1000.0	9.000	100.0	H	135.0
0.194175	---	---	56.07	121.84	65.77	1000.0	9.000	100.0	H	112.0
0.206023	---	---	55.39	121.33	65.93	1000.0	9.000	100.0	H	315.0
0.271432	---	---	53.04	118.93	65.90	1000.0	9.000	100.0	H	178.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-09
Chamber details	Chamber: SAC 5	



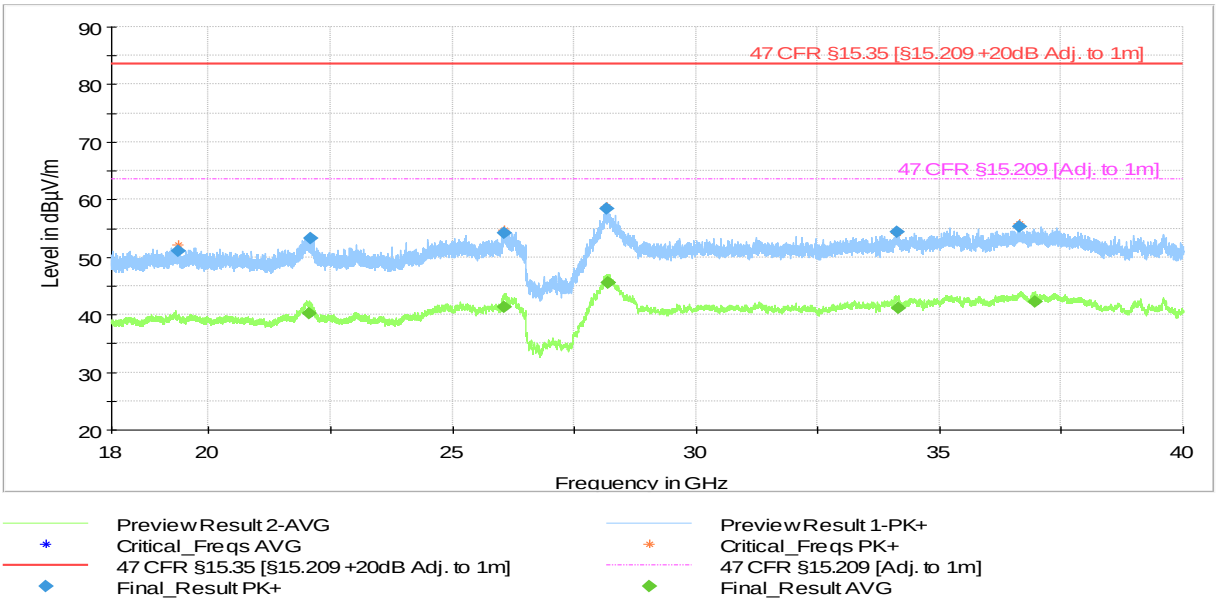
Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.009874	22.23	---	40.00	17.77	1000.0	120.000	333.0	H	279.0
42.720560	14.44	---	40.00	25.56	1000.0	120.000	333.0	V	221.0
81.555240	12.83	---	40.00	27.17	1000.0	120.000	370.0	V	22.0
173.401560	14.88	---	43.52	28.64	1000.0	120.000	171.0	H	64.0
173.426840	14.81	---	43.52	28.71	1000.0	120.000	183.0	H	109.0
488.536640	20.38	---	46.02	25.64	1000.0	120.000	304.0	V	292.0
650.624840	24.58	---	46.02	21.44	1000.0	120.000	125.0	H	289.0
946.425280	28.85	---	46.02	17.17	1000.0	120.000	100.0	H	134.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-03
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2399.907000	---	37.02	53.98	16.96	1000.0	1000.000	175.0	H	72.0
2399.989000	50.03	---	73.98	23.94	1000.0	1000.000	175.0	V	234.0
2483.511227	---	38.57	53.98	15.41	1000.0	1000.000	102.0	V	290.0
2483.531097	51.59	---	73.98	22.39	1000.0	1000.000	169.0	H	296.0
4180.798000	51.92	---	73.98	22.06	1000.0	1000.000	113.0	V	155.0
4183.516000	---	38.75	53.98	15.23	1000.0	1000.000	102.0	H	68.0
4803.689000	---	43.69	53.98	10.28	1000.0	1000.000	100.0	H	-18.0
5981.306000	56.55	---	73.98	17.42	1000.0	1000.000	100.0	H	54.0
10989.633000	---	32.55	53.98	21.43	1000.0	1000.000	100.0	H	338.0
10993.498000	45.48	---	73.98	28.50	1000.0	1000.000	175.0	H	39.0
17958.213000	53.70	---	73.98	20.28	1000.0	1000.000	196.0	H	-5.0
17981.066000	---	40.74	53.98	13.24	1000.0	1000.000	100.0	H	265.0

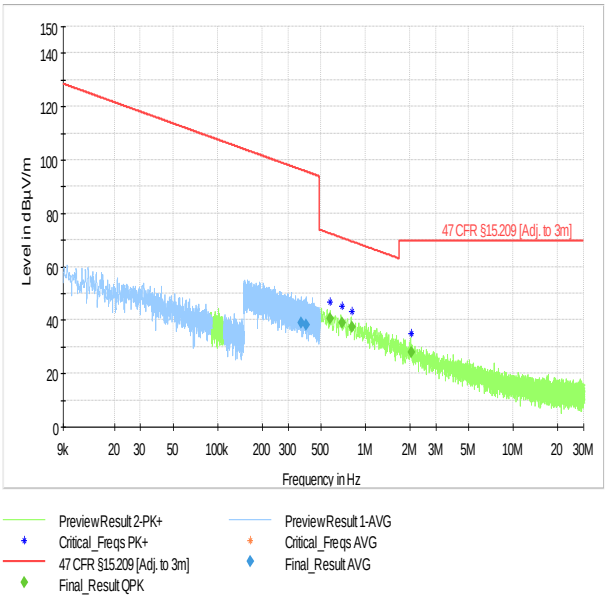
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-15
Chamber details	Chamber: SAC 5	

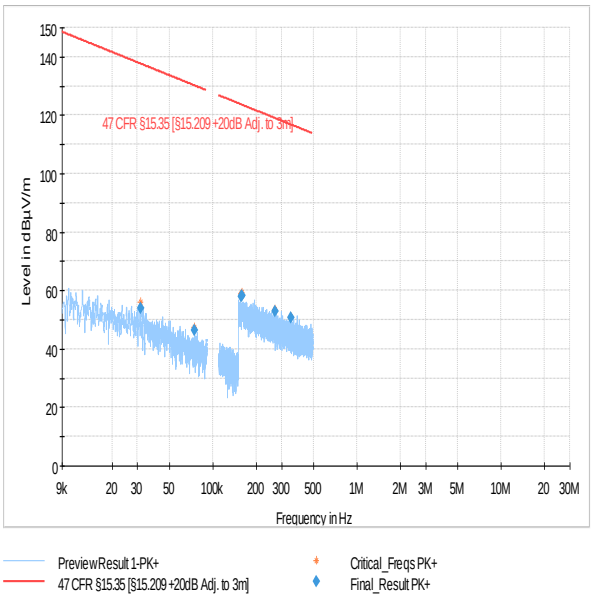


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
19358.995000	51.08	---	83.52	32.45	1000.0	1000.000	155.0	V	128.0
22050.100000	---	40.19	63.52	23.33	1000.0	1000.000	155.0	V	22.0
22099.945000	53.30	---	83.52	30.22	1000.0	1000.000	155.0	H	102.0
26059.363000	54.23	---	83.52	29.29	1000.0	1000.000	155.0	V	345.0
26069.876000	---	41.24	63.52	22.28	1000.0	1000.000	155.0	V	232.0
28168.899000	58.46	---	83.52	25.07	1000.0	1000.000	155.0	V	338.0
28192.576000	---	45.56	63.52	17.96	1000.0	1000.000	155.0	V	22.0
28192.837000	---	45.56	63.52	17.96	1000.0	1000.000	155.0	V	38.0
34141.328000	54.40	---	83.52	29.12	1000.0	1000.000	155.0	V	282.0
34149.336000	---	41.04	63.52	22.48	1000.0	1000.000	155.0	H	172.0
36639.204000	55.33	---	83.52	28.19	1000.0	1000.000	155.0	H	142.0
36956.288000	---	42.25	63.52	21.27	1000.0	1000.000	155.0	H	202.0

Mid Channel

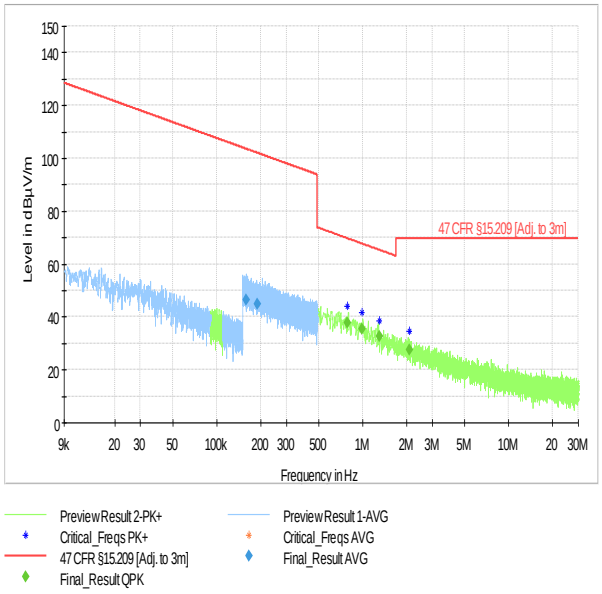
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Loop Antenna Parallel to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-12
Chamber details	Chamber: SAC 5	

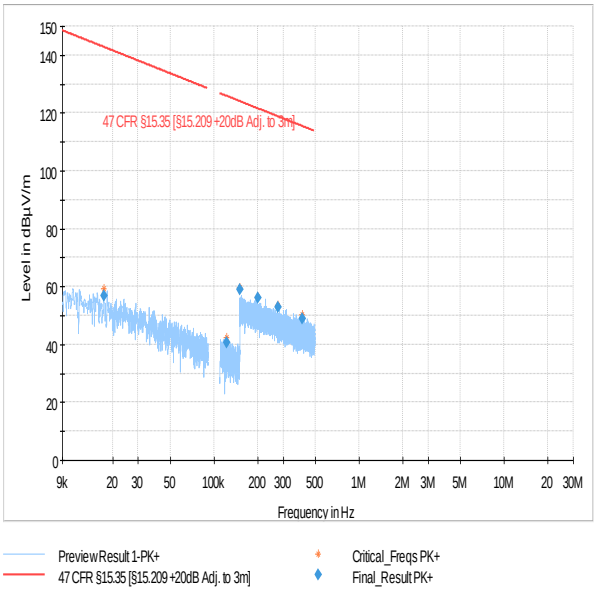




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.366657	38.88	---	---	96.32	57.44	1000.0	9.000	100.0	H	135.0
0.397067	38.13	---	---	95.63	57.49	1000.0	9.000	100.0	H	-41.0
0.578161	---	40.64	---	72.36	31.72	1000.0	9.000	100.0	H	45.0
0.693209	---	38.89	---	70.79	31.89	1000.0	9.000	100.0	H	49.0
0.810232	---	37.35	---	69.43	32.08	1000.0	9.000	100.0	H	225.0
2.041631	---	27.89	---	69.54	41.65	1000.0	9.000	100.0	H	179.0
0.031657	---	---	53.83	137.60	83.77	1000.0	0.200	100.0	H	153.0
0.074423	---	---	46.27	130.17	83.90	1000.0	0.200	100.0	H	283.0
0.156685	---	---	57.88	123.70	65.82	1000.0	9.000	100.0	H	45.0
0.159107	---	---	58.38	123.57	65.19	1000.0	9.000	100.0	H	-15.0
0.269505	---	---	52.88	118.99	66.11	1000.0	9.000	100.0	H	304.0
0.349554	---	---	50.82	116.73	65.91	1000.0	9.000	100.0	H	202.0

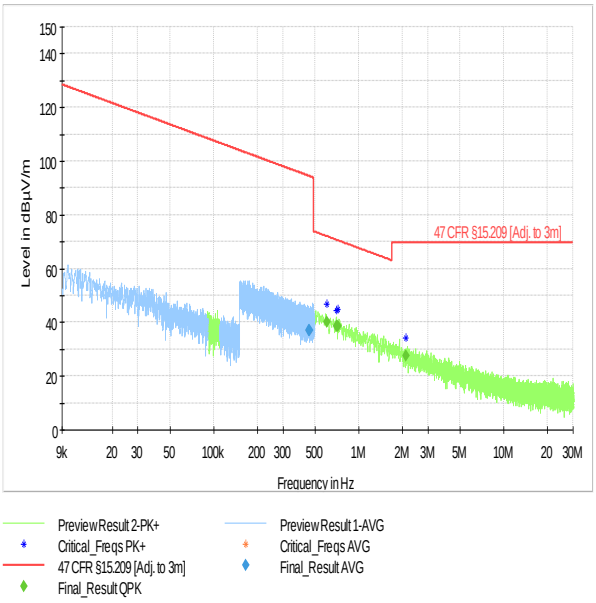
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Loop Antenna Perpendicular to Axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-12
Chamber details	Chamber: SAC 5	

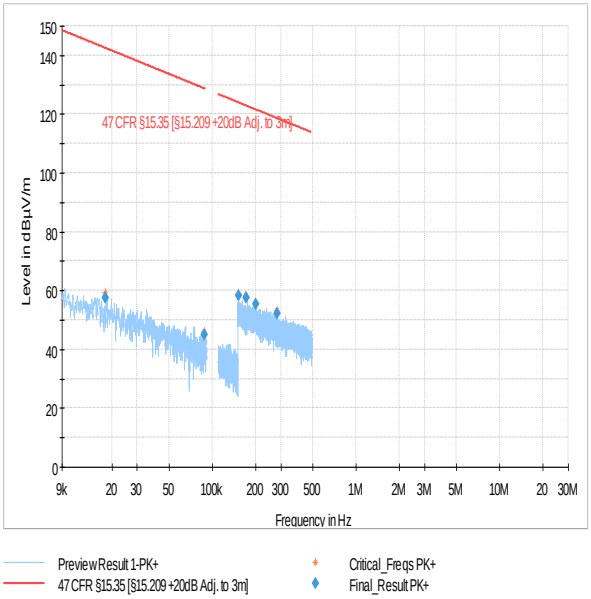




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.159390	46.27	---	---	103.56	57.29	1000.0	9.000	100.0	H	135.0
0.190850	44.82	---	---	101.99	57.17	1000.0	9.000	100.0	H	179.0
0.781747	---	37.64	---	69.74	32.11	1000.0	9.000	100.0	H	100.0
0.993574	---	35.34	---	67.66	32.32	1000.0	9.000	100.0	H	126.0
1.306499	---	32.49	---	65.28	32.79	1000.0	9.000	100.0	H	315.0
2.079658	---	27.62	---	69.54	41.92	1000.0	9.000	100.0	H	308.0
0.017450	---	---	56.92	142.77	85.85	1000.0	0.200	100.0	H	225.0
0.122164	---	---	40.62	125.87	85.25	1000.0	0.200	100.0	H	268.0
0.151213	---	---	58.96	124.01	65.05	1000.0	9.000	100.0	H	63.0
0.201502	---	---	56.14	121.52	65.38	1000.0	9.000	100.0	H	49.0
0.274715	---	---	52.71	118.83	66.11	1000.0	9.000	100.0	H	-15.0
0.403469	---	---	49.01	115.49	66.47	1000.0	9.000	100.0	H	135.0

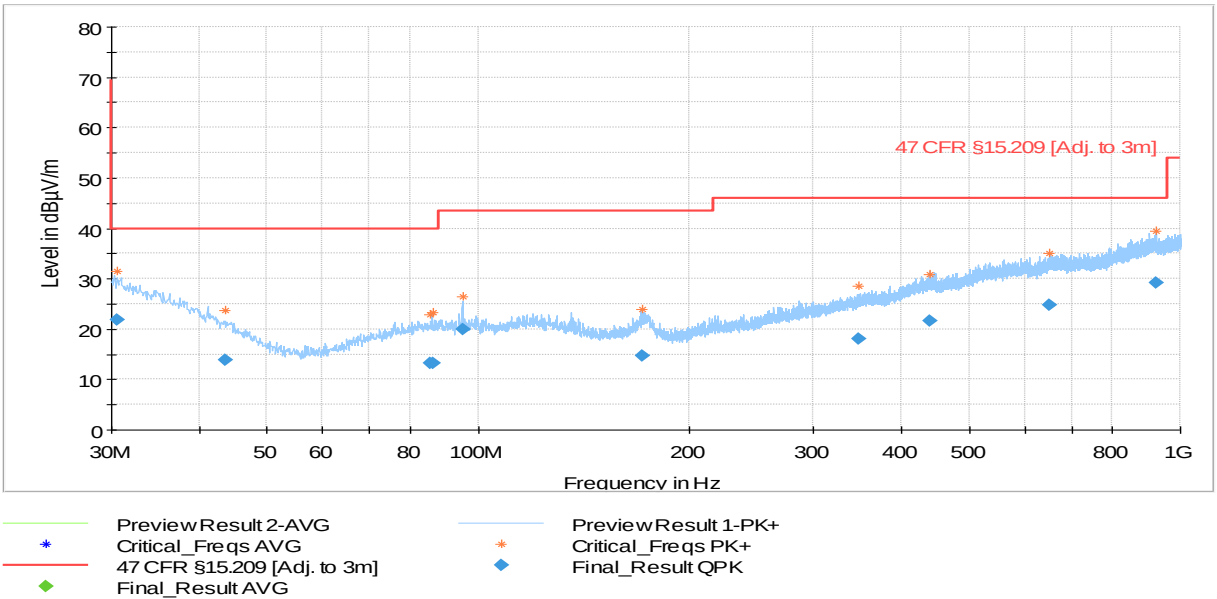
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Joel Efraimsson	Date: 2021-02-11
Chamber details	Chamber: SAC 5	





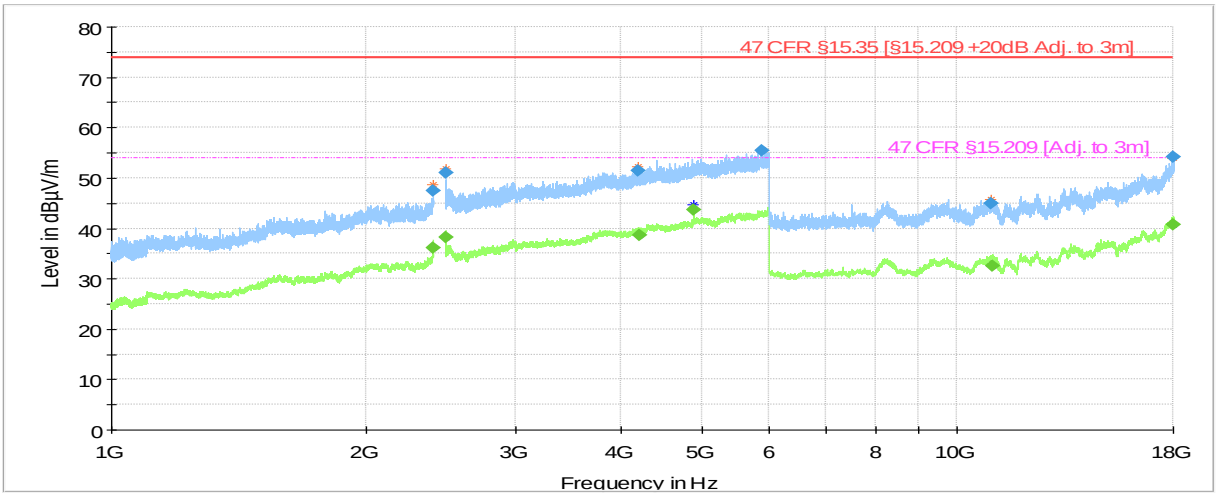
Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.452790	37.10	---	---	94.49	57.39	1000.0	9.000	100.0	H	225.0
0.458700	37.01	---	---	94.37	57.36	1000.0	9.000	100.0	H	49.0
0.604663	---	40.19	---	71.97	31.78	1000.0	9.000	100.0	H	154.0
0.705947	---	38.69	---	70.63	31.94	1000.0	9.000	100.0	H	45.0
0.722272	---	38.63	---	70.43	31.80	1000.0	9.000	100.0	H	225.0
2.110724	---	27.57	---	69.54	41.97	1000.0	9.000	100.0	H	225.0
0.018054	---	---	57.56	142.47	84.92	1000.0	0.200	100.0	H	139.0
0.088076	---	---	45.13	128.71	83.58	1000.0	0.200	100.0	H	191.0
0.151809	---	---	58.43	123.98	65.55	1000.0	9.000	100.0	H	153.0
0.171738	---	---	57.58	122.91	65.33	1000.0	9.000	100.0	H	45.0
0.200719	---	---	55.47	121.55	66.08	1000.0	9.000	100.0	H	280.0
0.281328	---	---	52.29	118.62	66.33	1000.0	9.000	100.0	H	139.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-03
Chamber details	Chamber: SAC 5	



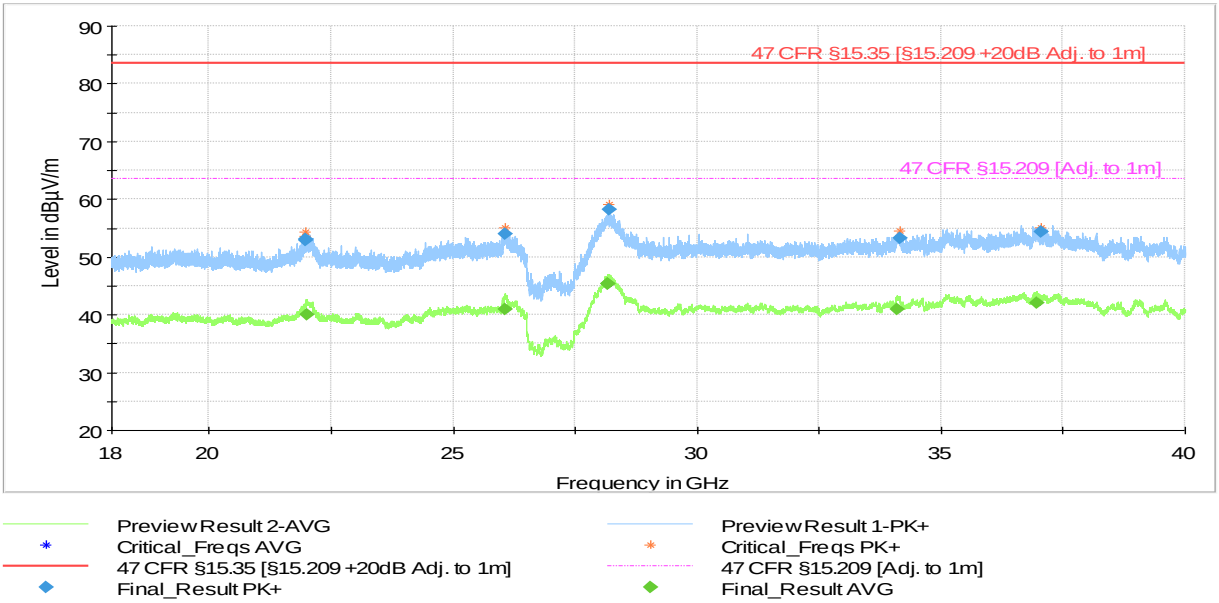
Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.630026	21.92	---	40.00	18.09	1000.0	120.000	108.0	H	26.0
43.568000	13.86	---	40.00	26.14	1000.0	120.000	183.0	V	296.0
85.498000	13.27	---	40.00	26.73	1000.0	120.000	325.0	H	162.0
86.078000	13.33	---	40.00	26.67	1000.0	120.000	325.0	V	40.0
94.898640	20.02	---	43.52	23.51	1000.0	120.000	170.0	V	-22.0
170.966680	14.64	---	43.52	28.89	1000.0	120.000	354.0	H	162.0
348.129880	18.04	---	46.02	27.99	1000.0	120.000	325.0	H	8.0
439.637800	21.54	---	46.02	24.48	1000.0	120.000	225.0	H	176.0
651.768640	24.84	---	46.02	21.18	1000.0	120.000	125.0	V	130.0
924.235240	29.29	---	46.02	16.73	1000.0	120.000	204.0	H	19.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-03
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2399.464500	47.45	---	73.98	26.53	1000.0	1000.000	127.0	H	110.0
2399.931500	---	36.20	53.98	17.78	1000.0	1000.000	100.0	H	112.0
2483.617500	50.93	---	73.98	23.05	1000.0	1000.000	175.0	V	158.0
2483.702000	---	38.14	53.98	15.84	1000.0	1000.000	175.0	V	206.0
4194.420000	51.52	---	73.98	22.46	1000.0	1000.000	100.0	H	248.0
4208.554000	---	38.73	53.98	15.25	1000.0	1000.000	169.0	H	65.0
4879.788000	---	43.73	53.98	10.25	1000.0	1000.000	102.0	H	162.0
5868.040000	55.34	---	73.98	18.64	1000.0	1000.000	175.0	H	158.0
10963.906000	44.85	---	73.98	29.13	1000.0	1000.000	196.0	H	248.0
10987.537000	---	32.57	53.98	21.41	1000.0	1000.000	125.0	V	232.0
17983.240000	54.18	---	73.98	19.80	1000.0	1000.000	206.0	V	22.0
17986.728000	---	40.70	53.98	13.28	1000.0	1000.000	125.0	H	220.0

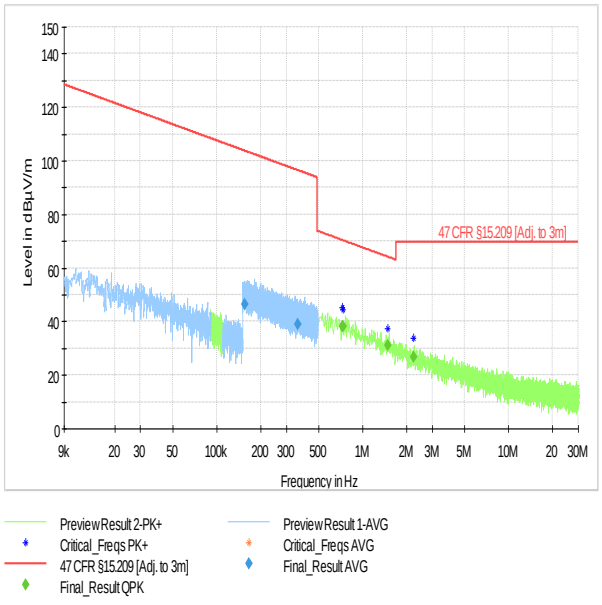
Test mode condition	Bluetooth Low Energy 1M, Mid channel (2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-15
Chamber details	Chamber: SAC 5	

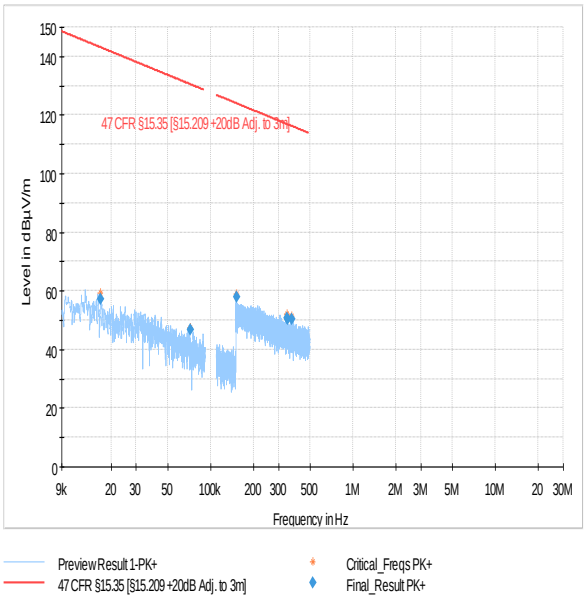


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
21976.844000	53.04	---	83.52	30.48	1000.0	1000.000	155.0	V	158.0
21976.996000	52.95	---	83.52	30.58	1000.0	1000.000	155.0	V	146.0
21990.332000	---	40.05	63.52	23.47	1000.0	1000.000	155.0	V	52.0
26058.194000	---	40.94	63.52	22.58	1000.0	1000.000	155.0	H	278.0
26073.011000	53.93	---	83.52	29.59	1000.0	1000.000	155.0	V	352.0
28157.968000	---	45.35	63.52	18.17	1000.0	1000.000	155.0	V	38.0
28158.238000	---	45.37	63.52	18.15	1000.0	1000.000	155.0	V	42.0
28197.556000	58.22	---	83.52	25.31	1000.0	1000.000	155.0	V	232.0
34088.733000	---	40.86	63.52	22.66	1000.0	1000.000	155.0	H	128.0
34153.850000	53.27	---	83.52	30.25	1000.0	1000.000	155.0	V	98.0
36958.545000	---	42.01	63.52	21.51	1000.0	1000.000	155.0	V	52.0
37060.980000	54.44	---	83.52	29.08	1000.0	1000.000	155.0	H	22.0

High Channel

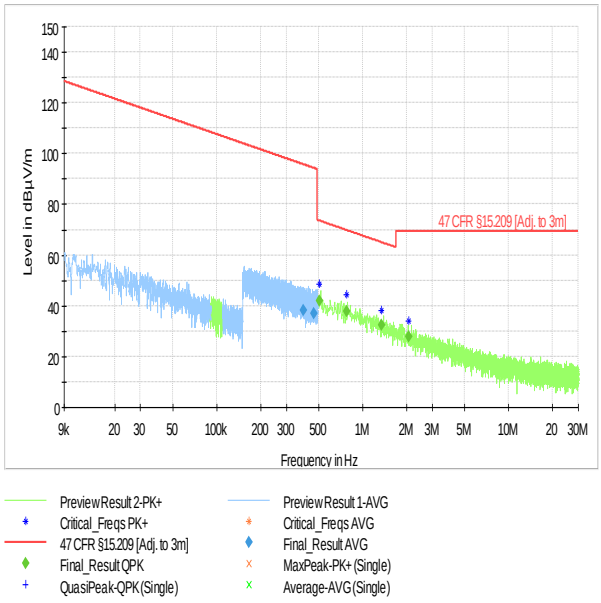
Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Loop Antenna Parallel to axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-12
Chamber details	Chamber: SAC 5	

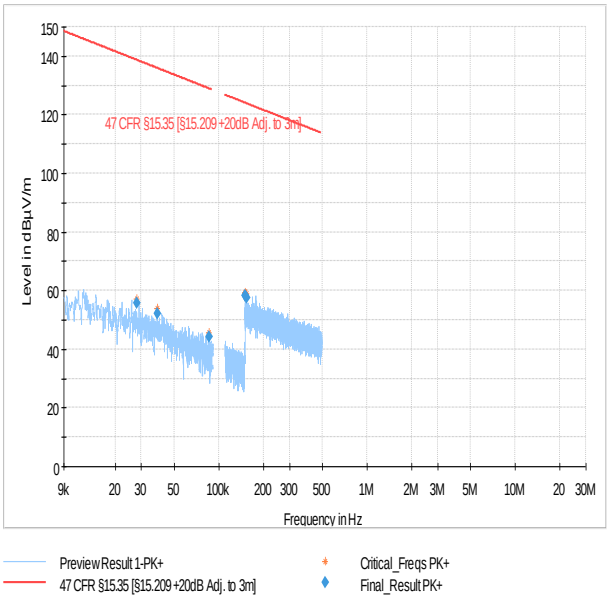




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.155547	46.50	---	---	103.77	57.27	1000.0	9.000	100.0	H	229.0
0.360985	38.91	---	---	96.45	57.54	1000.0	9.000	100.0	H	-45.0
0.727347	---	38.27	---	70.37	32.10	1000.0	9.000	100.0	H	114.0
0.738536	---	38.14	---	70.24	32.09	1000.0	9.000	100.0	H	25.0
1.484288	---	31.08	---	64.17	33.10	1000.0	9.000	100.0	H	295.0
2.231606	---	26.87	---	69.54	42.67	1000.0	9.000	100.0	H	-1.0
0.016775	---	---	57.26	143.11	85.85	1000.0	0.200	100.0	H	-2.0
0.072115	---	---	46.72	130.44	83.73	1000.0	0.200	100.0	H	-3.0
0.152102	---	---	57.89	123.96	66.07	1000.0	9.000	100.0	H	88.0
0.344615	---	---	50.84	116.86	66.01	1000.0	9.000	100.0	H	-45.0
0.347762	---	---	50.49	116.78	66.29	1000.0	9.000	100.0	H	225.0
0.372021	---	---	50.18	116.19	66.01	1000.0	9.000	100.0	H	135.0

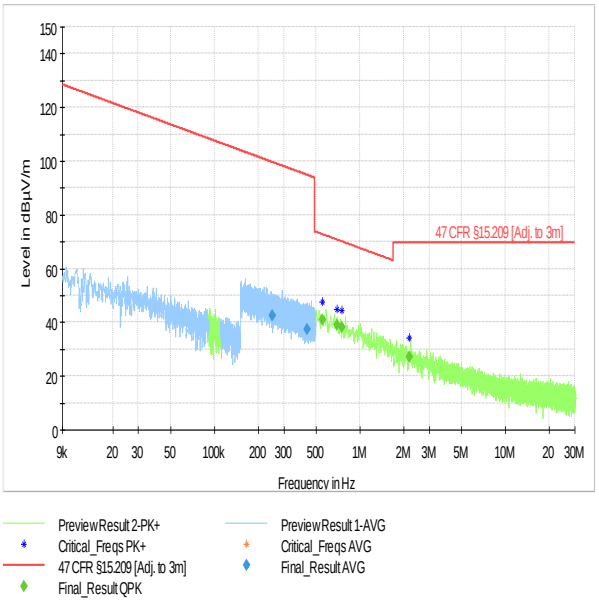
Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Loop Antenna Perpendicular to axis	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-12
Chamber details	Chamber: SAC 5	

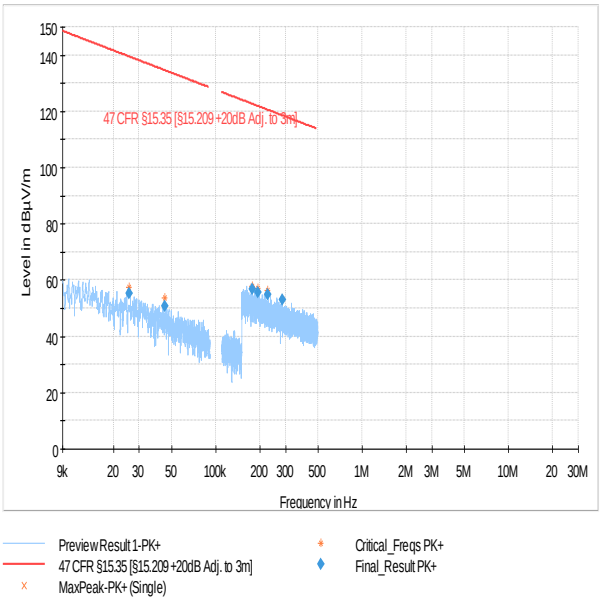




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.391048	38.25	---	---	95.76	57.51	1000.0	9.000	100.0	H	64.0
0.463345	36.89	---	---	94.29	57.39	1000.0	9.000	100.0	H	-26.0
0.506036	---	41.94	---	73.52	31.58	1000.0	9.000	100.0	H	154.0
0.774515	---	37.74	---	69.82	32.09	1000.0	9.000	100.0	H	76.0
1.345488	---	32.29	---	65.03	32.74	1000.0	9.000	100.0	H	36.0
2.057392	---	27.84	---	69.54	41.70	1000.0	9.000	100.0	H	225.0
0.027982	---	---	55.67	138.67	82.99	1000.0	0.200	100.0	H	315.0
0.038532	---	---	52.03	135.89	83.86	1000.0	0.200	100.0	H	315.0
0.085994	---	---	44.35	128.92	84.57	1000.0	0.200	100.0	H	12.0
0.150782	---	---	58.22	124.04	65.82	1000.0	9.000	100.0	H	135.0
0.151236	---	---	58.13	124.01	65.88	1000.0	9.000	100.0	H	135.0
0.153952	---	---	57.63	123.86	66.23	1000.0	9.000	100.0	H	63.0

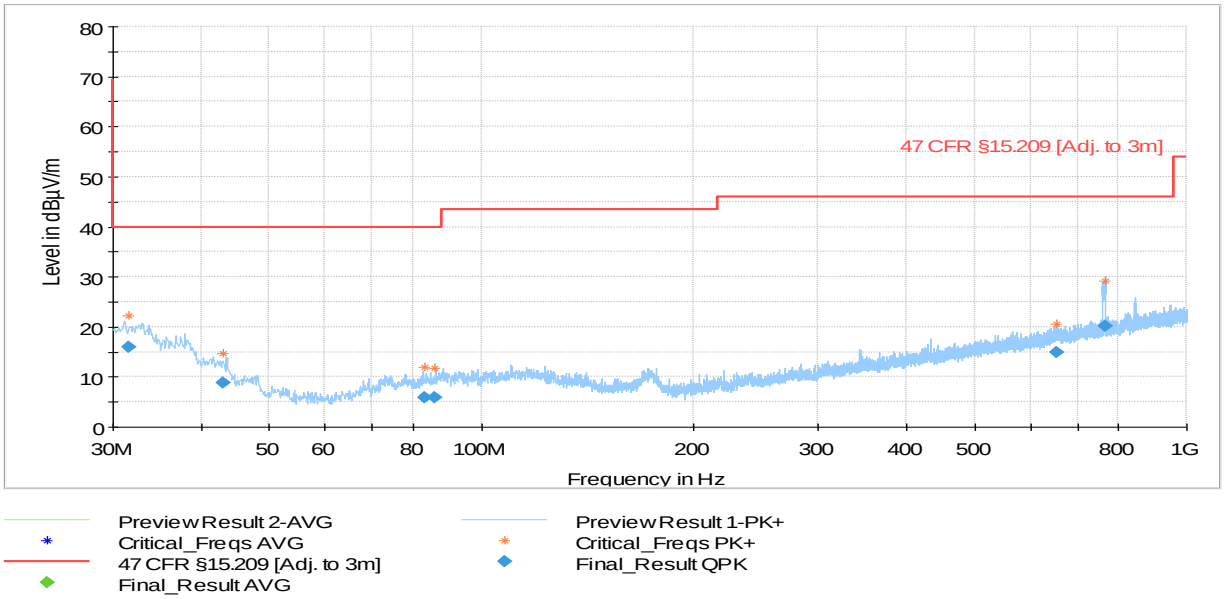
Test mode condition	Bluetooth Low Energy 1M, High channel (2480 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz-30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Joel Efraimsson	Date: 2021-02-11
Chamber details	Chamber: SAC 5	





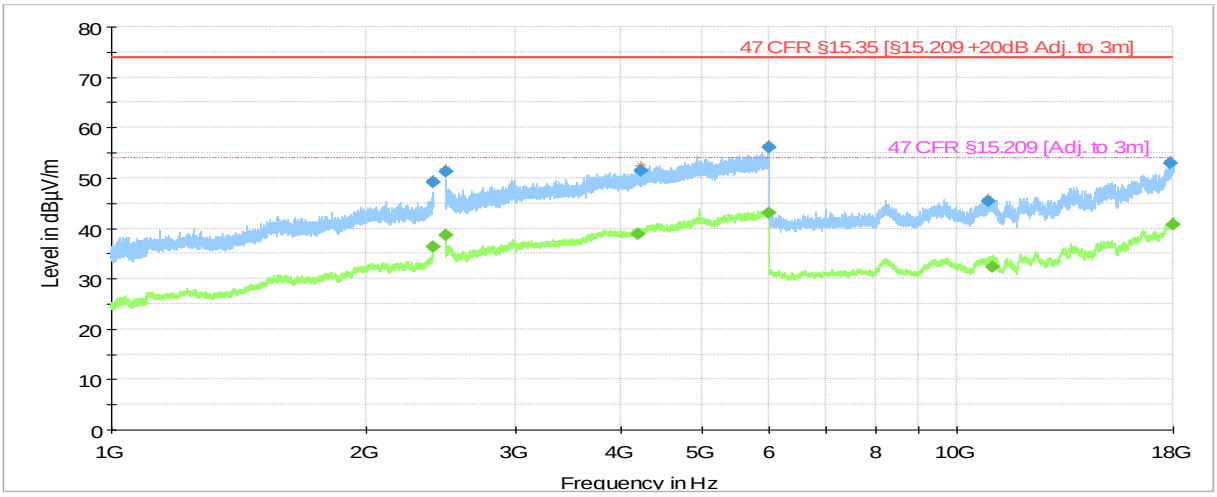
Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.248634	42.33	---	---	99.69	57.36	1000.0	9.000	100.0	H	167.0
0.433924	37.55	---	---	94.86	57.31	1000.0	9.000	100.0	H	-45.0
0.554525	---	41.13	---	72.73	31.60	1000.0	9.000	100.0	H	102.0
0.695014	---	38.96	---	70.76	31.80	1000.0	9.000	100.0	H	167.0
0.753578	---	38.18	---	70.06	31.88	1000.0	9.000	100.0	H	139.0
2.197034	---	27.29	---	69.54	42.26	1000.0	9.000	100.0	H	-1.0
0.025623	---	---	55.45	139.43	83.98	1000.0	0.200	100.0	H	268.0
0.045083	---	---	50.93	134.52	83.59	1000.0	0.200	100.0	H	225.0
0.177484	---	---	56.72	122.62	65.91	1000.0	9.000	100.0	H	-13.0
0.193852	---	---	55.79	121.86	66.07	1000.0	9.000	100.0	H	45.0
0.226540	---	---	54.96	120.50	65.54	1000.0	9.000	100.0	H	49.0
0.284205	---	---	53.01	118.53	65.52	1000.0	9.000	100.0	H	-45.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Joel Efraimsson	Date: 2021-02-10
Chamber details	Chamber: SAC 5	



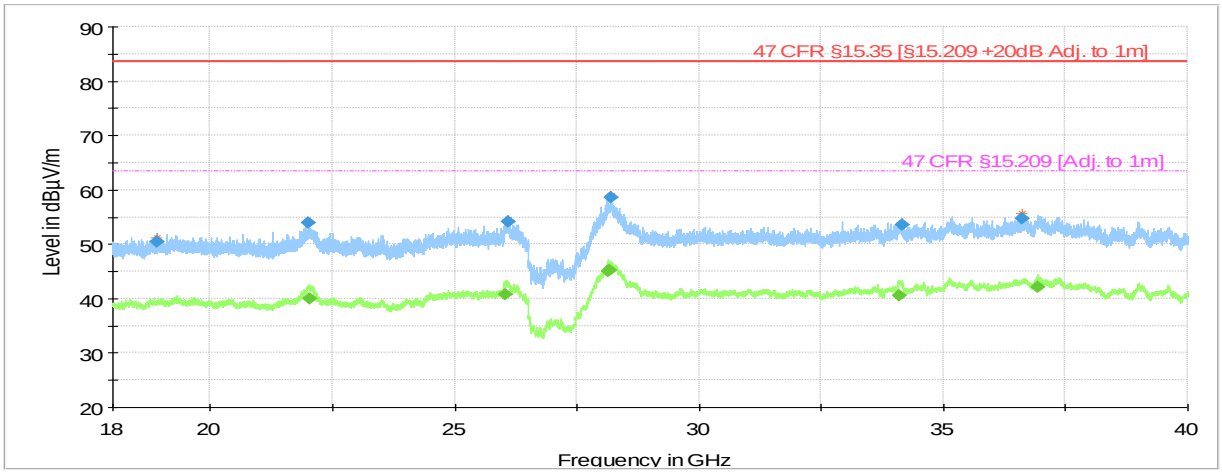
Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
31.535640	15.92	---	40.00	24.08	1000.0	120.000	125.0	H	292.0
43.036880	8.82	---	40.00	31.18	1000.0	120.000	325.0	H	289.0
83.056240	5.95	---	40.00	34.05	1000.0	120.000	333.0	V	248.0
85.754960	5.88	---	40.00	34.12	1000.0	120.000	125.0	H	322.0
654.680960	14.87	---	46.02	31.16	1000.0	120.000	100.0	V	199.0
765.912840	20.13	---	46.02	25.89	1000.0	120.000	100.0	V	162.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-03
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2399.967500	---	36.31	53.98	17.67	1000.0	1000.000	125.0	V	162.0
2399.969000	49.21	---	73.98	24.77	1000.0	1000.000	125.0	H	26.0
2483.556500	51.32	---	73.98	22.66	1000.0	1000.000	170.0	V	112.0
2483.569000	---	38.64	53.98	15.33	1000.0	1000.000	198.0	H	178.0
4189.954000	---	38.84	53.98	15.14	1000.0	1000.000	120.0	V	335.0
4224.317000	51.50	---	73.98	22.48	1000.0	1000.000	201.0	V	292.0
5981.227000	---	42.99	53.98	10.99	1000.0	1000.000	125.0	V	-22.0
5982.198000	56.08	---	73.98	17.90	1000.0	1000.000	136.0	V	54.0
10894.487000	45.27	---	73.98	28.71	1000.0	1000.000	175.0	V	112.0
11005.475000	---	32.42	53.98	21.56	1000.0	1000.000	125.0	H	86.0
17893.995000	52.99	---	73.98	20.99	1000.0	1000.000	210.0	H	116.0
17984.899000	---	40.72	53.98	13.25	1000.0	1000.000	100.0	V	68.0

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	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Simon Palmhager	Date: 2021-02-15
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
18910.343000	50.53	---	83.52	32.99	1000.0	1000.000	155.0	V	56.0
22009.741000	53.99	---	83.52	29.53	1000.0	1000.000	155.0	V	112.0
22033.044000	---	39.99	63.52	23.54	1000.0	1000.000	155.0	V	22.0
26039.892000	---	40.77	63.52	22.75	1000.0	1000.000	155.0	H	112.0
26082.515000	54.08	---	83.52	29.45	1000.0	1000.000	155.0	V	112.0
28146.377000	---	45.09	63.52	18.43	1000.0	1000.000	155.0	V	308.0
28154.697000	---	45.13	63.52	18.39	1000.0	1000.000	155.0	V	308.0
28186.221000	58.52	---	83.52	25.00	1000.0	1000.000	155.0	V	188.0
34084.818000	---	40.58	63.52	22.94	1000.0	1000.000	155.0	V	38.0
34148.841000	53.64	---	83.52	29.88	1000.0	1000.000	155.0	V	322.0
36603.939000	54.67	---	83.52	28.85	1000.0	1000.000	155.0	H	38.0
36922.488000	---	42.14	63.52	21.38	1000.0	1000.000	155.0	V	12.0

4.3 Test Results – Antenna Conducted Emissions

4.3.1 Antenna Conducted Emissions – Test Summary

Emissions measurements have been performed as radiated test (see section 4.2)

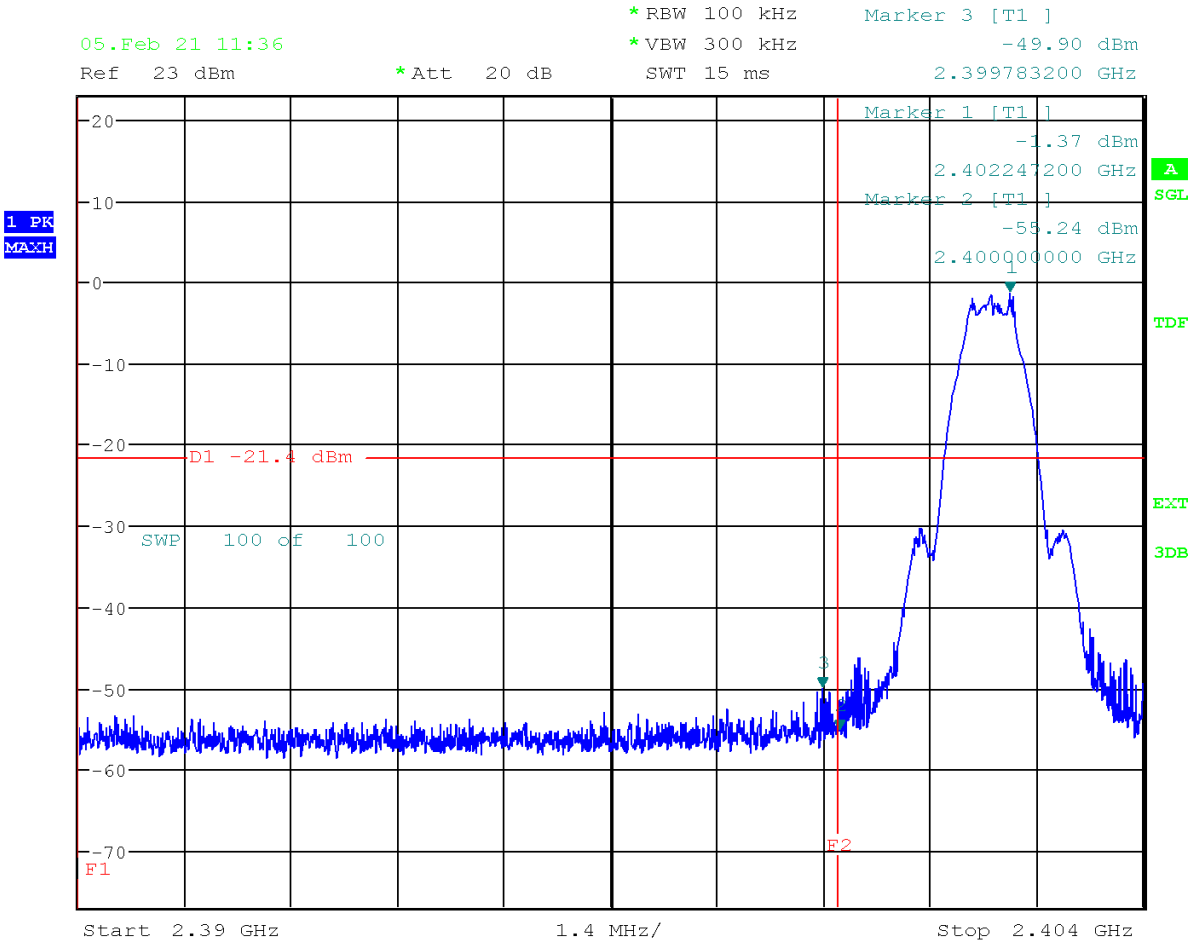
4.4 Test Results – Band Edge Compliance (Authorized Band)

4.4.1 Band Edge Compliance (Authorized Band) – Test Summary

Test Specification	47 CFR 15.247 (d)	
Test Engineer & Date	Niall Forrester	2021.02.05
EUT and Ancillary Equipment IDs	A002994639-003	-
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M	
EUT Hardware Configuration(s)	DC 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)	-49.90	-21.37	PASS
Emissions at Band Edge (Auth. Band – High Edge)	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	-52.40	-20.41	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	2021.02.03
EUT and Ancillary Equipment IDs	A002994639-001	-
EUT Operation Mode(s)	Continuous Tx	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M	
EUT Hardware Configuration(s)	-	
Overall Result	PASS	

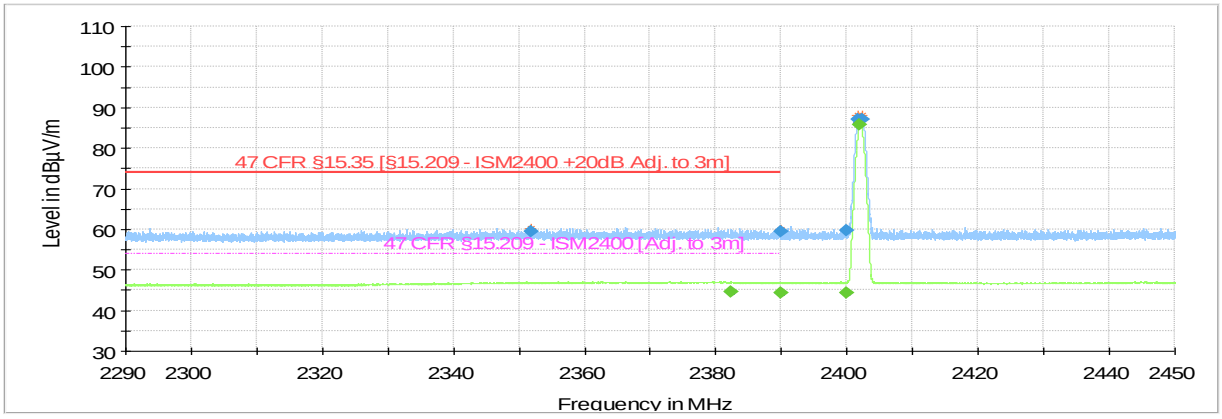
Test Parameter	Wireless Configuration	Result*
Emissions at Band Edge (Rest. Band – Low Edge)	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	PASS
Emissions at Band Edge (Rest. Band – High Edge)	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	PASS

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

4.5.2 Band Edge Compliance (Restricted Band) – Test Details

Restricted Band – Low Edge

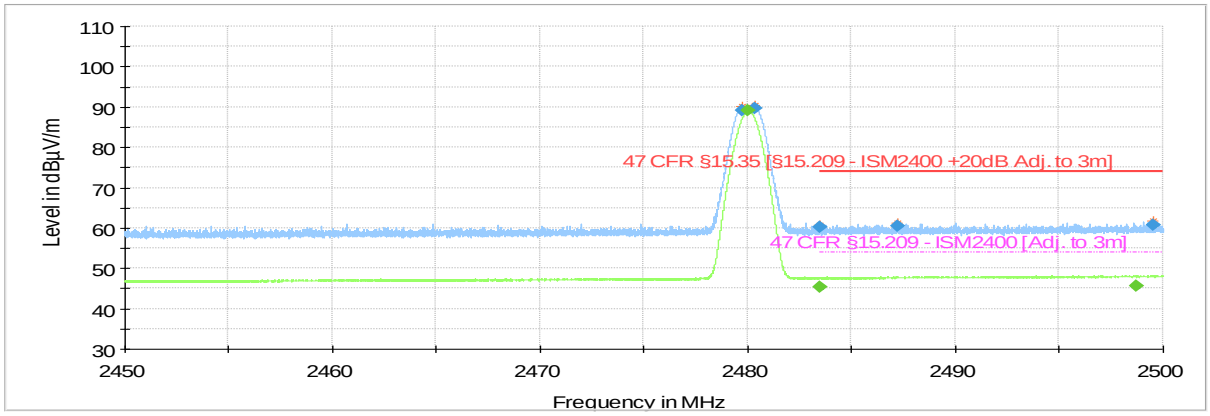
Test mode condition	Bluetooth Low Energy 1M, Low channel (2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-03
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2351.728000	59.55	---	73.98	14.43	1000.0	1000.000	210.0	V	180.0
2382.256000	---	44.52	53.98	9.46	1000.0	1000.000	102.0	V	103.0
2390.000000	---	44.39	53.98	9.59	1000.0	1000.000	183.0	V	328.0
2390.000000	59.47	---	73.98	14.51	1000.0	1000.000	146.0	V	55.0
2400.000000	59.77	---	---	---	1000.0	1000.000	134.0	V	56.0
2400.000000	---	44.41	---	---	1000.0	1000.000	156.0	V	103.0
2401.760000	87.08	---	---	---	1000.0	1000.000	145.0	H	4.0
2402.000000	---	85.64	---	---	1000.0	1000.000	169.0	H	68.0
2402.272000	87.03	---	---	---	1000.0	1000.000	145.0	H	4.0

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 Upper Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002994639-001	
Ancillary Equipment	-	
Test Engineer	Niall Forrester	Date: 2021-02-03
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2479.705000	89.16	---	---	---	1000.0	1000.000	121.0	H	56.0
2480.030000	---	89.28	---	---	1000.0	1000.000	192.0	H	0.0
2480.330000	89.64	---	---	---	1000.0	1000.000	122.0	H	58.0
2483.500000	---	45.25	53.98	8.73	1000.0	1000.000	210.0	H	355.0
2483.500000	60.14	---	73.98	13.84	1000.0	1000.000	121.0	H	81.0
2487.200000	60.54	---	73.98	13.44	1000.0	1000.000	210.0	H	233.0
2498.725000	---	45.68	53.98	8.30	1000.0	1000.000	210.0	H	4.0
2499.545000	60.67	---	73.98	13.31	1000.0	1000.000	210.0	V	193.0

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

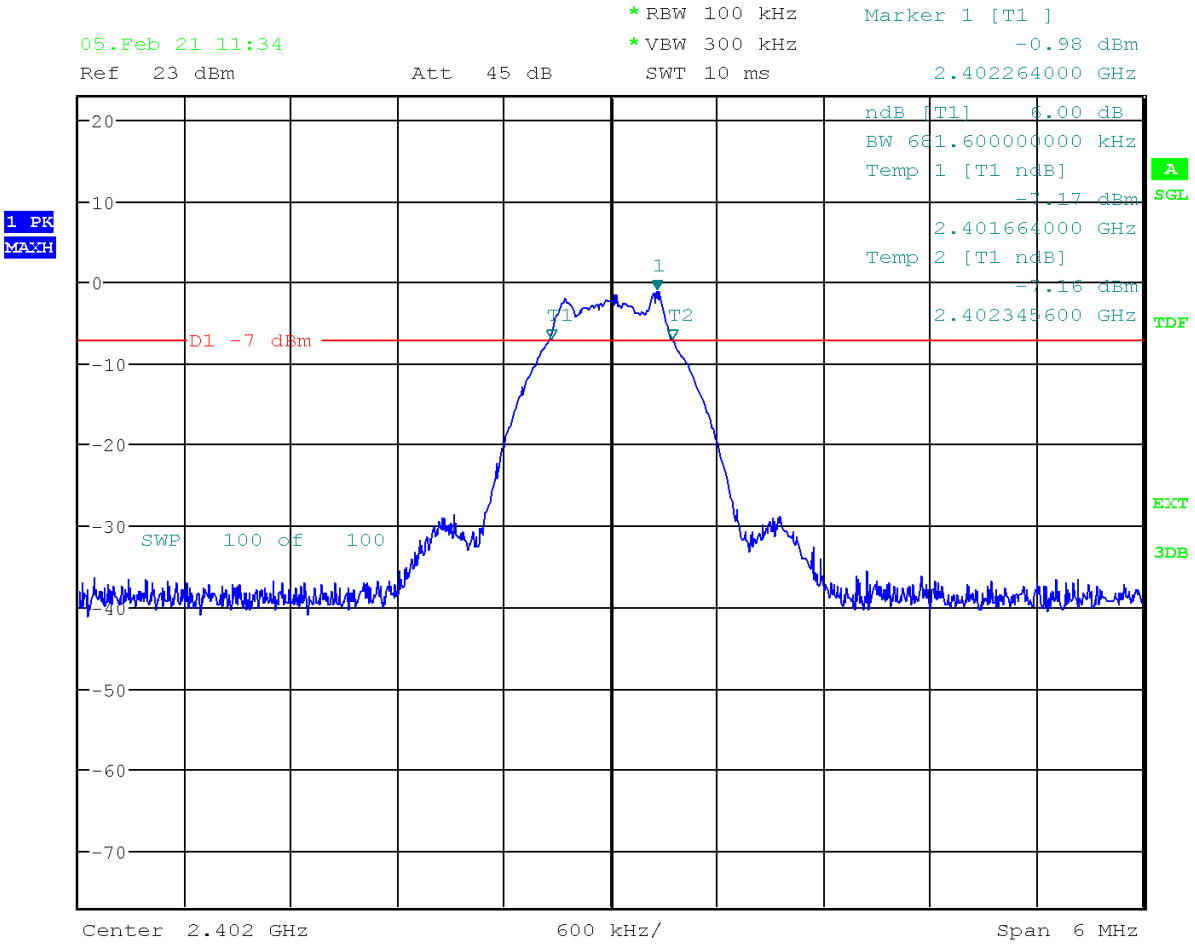
4.10 Test Results – 6dB Bandwidth

4.10.1 6dB Bandwidth – Test Summary

Test Specification	47 CFR 15.247 (a)(2)	
Test Engineer & Date	Niall Forrester	2021.02.05
EUT and Ancillary Equipment IDs	A002994639-003	-
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M	
EUT Hardware Configuration(s)	DC Power from lab power supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Measured Level (kHz)	Limit (kHz)	Result
6dB Bandwidth	Bluetooth Low Energy 1M Low Channel (GFSK 2402	681.60	500	PASS
6dB Bandwidth	Bluetooth Low Energy 1M Mid Channel (GFSK 2440	691.20	500	PASS
6dB Bandwidth	Bluetooth Low Energy 1M High Channel (GFSK 2480	696.00	500	PASS

4.10.2 6dB Bandwidth – Test Details



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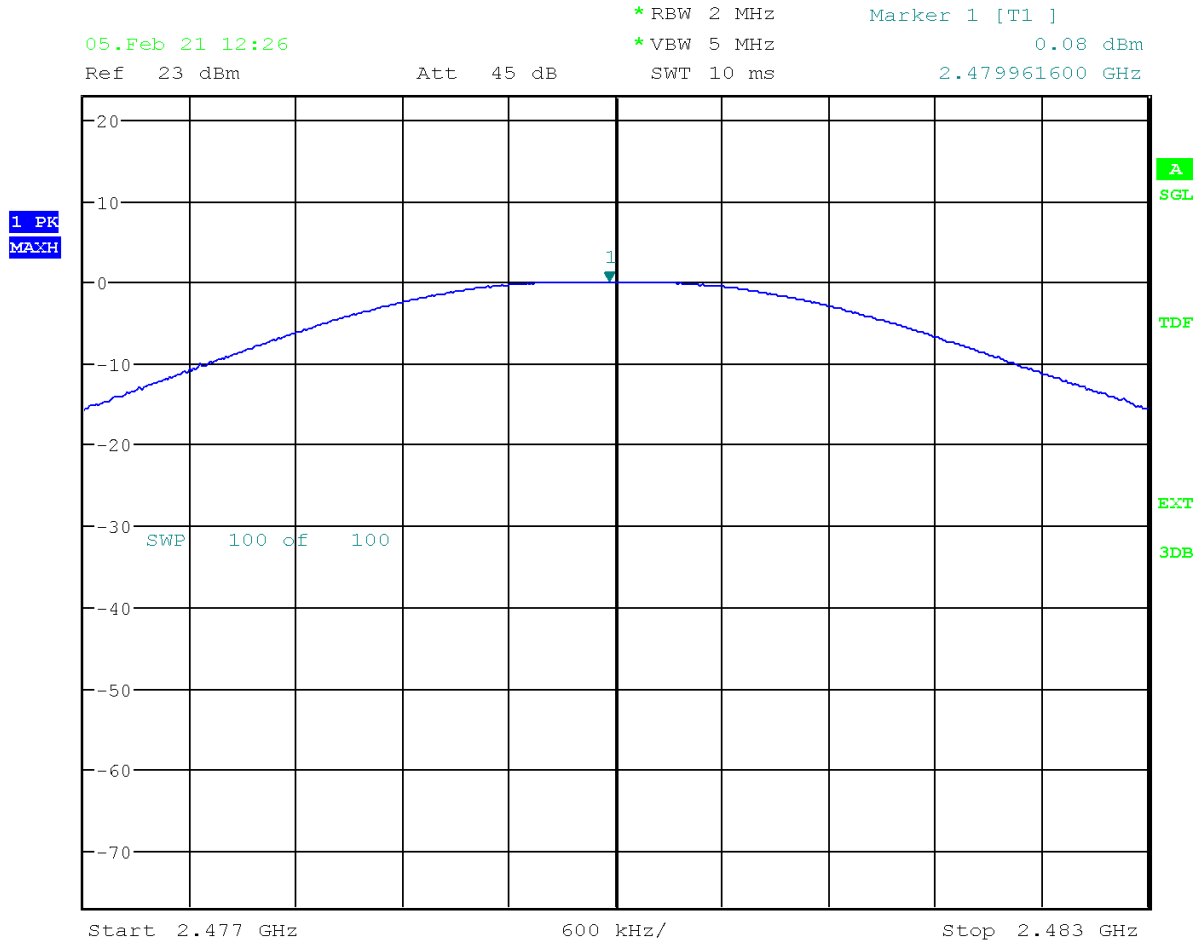
4.11 Test Results – Peak Conducted Output Power

4.11.1 Peak Conducted Output Power – Test Summary

Test Specification	47 CFR 15.247(b)	
Test Engineer & Date	Niall Forrester	2021.02.05
EUT and Ancillary Equipment IDs	A002994639-003	-
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M	
EUT Hardware Configuration(s)	DC Power from lab power supply	
Overall Result	PASS	

Test Parameter	**Wireless Configuration**	**Measured Level (dBm)**			**Limit (dBm)**	**Result**
		Low 2.40V	**Nom 2.90V**	**High 3.30V**		
Peak Conducted Output Power	Bluetooth Low Energy 1M Low Channel (GFSK 2402 MHz)	-0.51	-0.50	-0.42	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 1M Mid Channel (GFSK 2440 MHz)	-0.46	-0.50	-0.52	30	PASS
Peak Conducted Output Power	Bluetooth Low Energy 1M High Channel (GFSK 2480 MHz)	0.05	0.07	0.08	30	PASS

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



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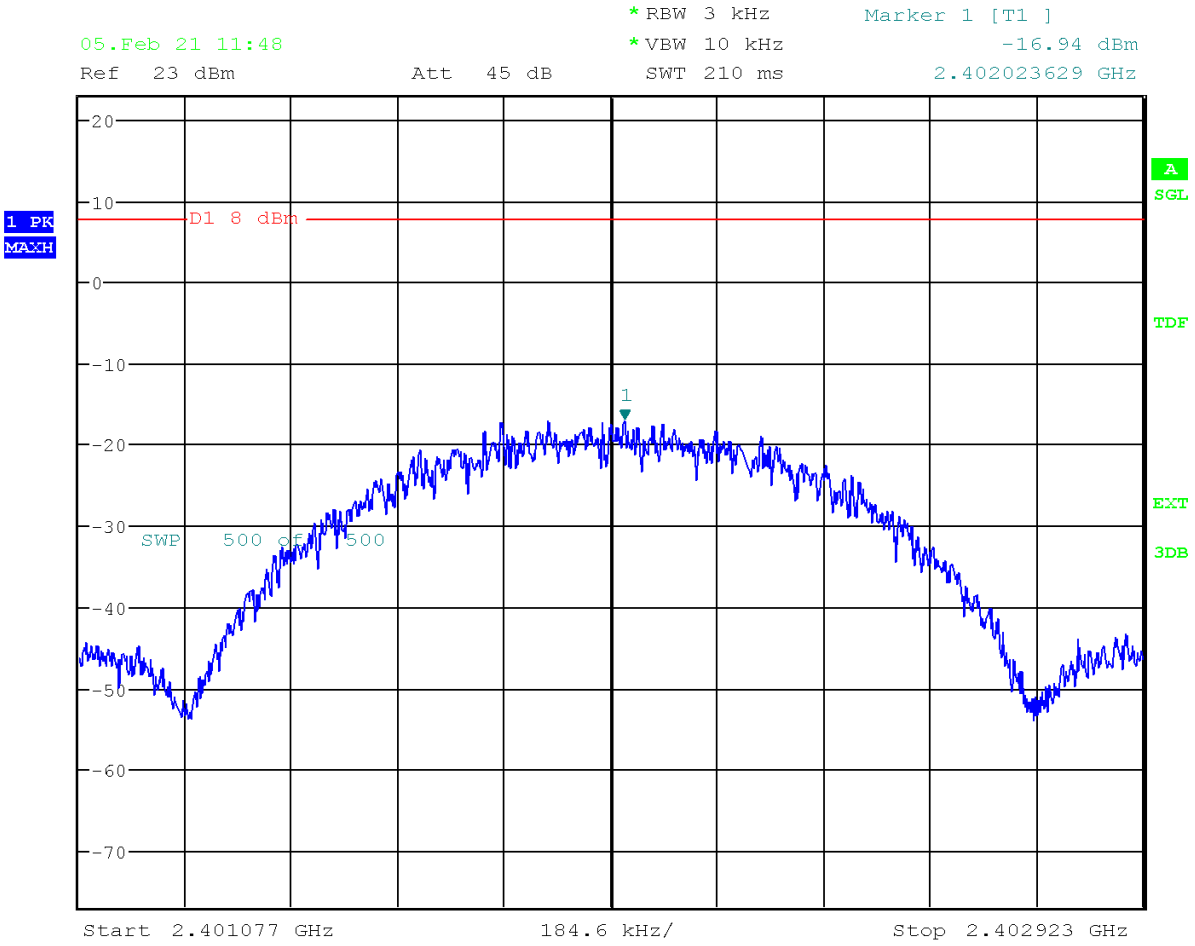
4.12 Test Results – Power Spectral Density

4.12.1 Power Spectral Density – Test Summary

Test Specification	47 CFR 15.247(e)	
Test Engineer & Date	Niall Forrester	2021.02.05
EUT and Ancillary Equipment IDs	A002994639-003	-
EUT Operation Mode(s)	DTM	
EUT Wireless Configuration(s)	Bluetooth Low Energy 1M	
EUT Hardware Configuration(s)	DC 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	-16.94	-30	8	PASS
Power Density	Bluetooth Low Energy 1M Mid Channel (GFSK 2440	-16.79	-30	8	PASS
Power Density	Bluetooth Low Energy 1M High Channel (GFSK 2480	-16.38	-30	8	PASS

4.12.2 Power Spectral Density – Test Details



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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 – 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
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 for photographs