

Prüfbericht-Nr.: <i>Test report no.:</i>	60419662-001	Auftrags-Nr.: <i>Order no.:</i>	23870433 030	Seite 1 von 30 <i>Page 1 of 30</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	2267330	Auftragsdatum: <i>Order date:</i>	2020.09.29	
Auftraggeber: <i>Client:</i>	Accent Advanced Systems SLU			
Prüfgegenstand: <i>Test item:</i>	GPS tracker			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Mobiam			
Auftrags-Inhalt: <i>Order content:</i>	Accredited FCC verification. Partial testing.			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR Part 15.247 ANSI C63.10: 2013			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020.10.06			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002839106-006			
Prüfzeitraum: <i>Testing period:</i>	2020.10.06			
Ort der Prüfung: <i>Place of testing:</i>	Lund, Sweden			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Sweden			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>reviewed by:</i>	<input checked="" type="checkbox"/> 	genehmigt von: <i>authorized by:</i>	<input checked="" type="checkbox"/> 	
Datum: 2020.10.12 <i>Date:</i>	Signed by: Fariborz Abasi	Datum: 2020.10.12 <i>Date:</i>	Signed by: Per Isacson	
Stellung / Position:	Test Engineer	Stellung / Position:	Lab Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.</i></p>				

Revision History 60419662-00160419662-001

REVISION	DATE	REMARKS	AUTHOR
001	2020.10.12	First release	Fariborz Abasi

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)	NO	4.1	N/A	
15.209	Radiated Emissions (Intentional Radiators)	YES	4.2	PASS	
15.247 (d)	Out of Band Emissions	NO	4.3	N/A	
15.247 (d)	Band Edge Compliance (Authorized Band)	NO	4.4	N/A	
15.247 (d)	Band Edge Compliance (Restricted Band)	YES	4.5	PASS	
15.247 (a)(1)	20dB Bandwidth	NO	4.6	N/A	
15.247 (a)(1)	Carrier (Hopping Channel) Separation	NO	4.7	N/A	
15.247 (a)(1)	Number of Hopping Channels	NO	4.8	N/A	
15.247 (a)(1)	Time of Occupancy (Dwell Time)	NO	4.9	N/A	
15.247 (a)(2)	6dB Bandwidth	NO	4.10	N/A	
15.247 (b)	Peak Conducted Output Power	NO	4.11	N/A	
15.247 (e)	Power Spectral Density	NO	4.12	N/A	

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	4
1.1	Test Site.....	4
1.2	Client Information.....	4
2.	PRODUCT INFORMATION.....	5
2.1	General Description.....	5
2.2	Device Characteristics.....	5
2.3	Test Samples	5
2.4	Wireless Technologies and Bands Supported by the EUT.....	5
2.5	Antenna Information.....	6
2.6	Wireless Technology Details	6
2.7	Ancillary Equipment.....	6
2.8	EUT Diagrams.....	6
3.	TEST METHODS	7
3.1	Test Standards.....	7
3.2	Additional references.....	7
3.3	Limits	8
3.4	Description of Test Methods and Equipment Setup	9
3.5	EUT Configuration During Test.....	13
3.6	EUT Operation Modes.....	13
3.7	Deviations from the Test Standard	13
3.8	Environmental Conditions.....	14
4.	TEST RESULTS	15
4.1	Test Results – AC Power Line Conducted Emissions (Intentional Transmitter).....	15
4.2	Test Results – Radiated Emissions (Intentional Transmitter).....	16
4.3	Test Results – Out of Band Emissions	23
4.4	Test Results – Band Edge Compliance (Authorized Band).....	23
4.5	Test Results – Band Edge Compliance (Restricted Band).....	24
4.6	Test Results – 20dB Bandwidth.....	27
4.7	Test Results – Carrier (Hopping Channel) Separation	27
4.8	Test Results – Number of Hopping Channels.....	27
4.9	Test Results – Time of Occupancy (Dwell Time)	27
4.10	Test Results – 6dB Bandwidth.....	27
4.11	Test Results – Peak Conducted Output Power.....	27
4.12	Test Results – Power Spectral Density.....	27
5.	TEST EQUIPMENT STATUS.....	28
5.1	List of Hardware with Calibration Dates	28
5.2	Software / Firmware Versions.....	29
6.	MEASUREMENT UNCERTAINTY	30
6.1	Measurement Uncertainty for CTE	30
6.2	Measurement Uncertainty for Conducted Emissions	30
6.3	Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)	30
7.	PHOTOGRAPHS.....	30
7.1	Photographs of the EUT.....	30
7.2	Photographs of the Test Setup.....	30

1. GENERAL INFORMATION

1.1 Test Site

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

1.2 Client Information

Company Name:	Accent Systems
Address:	Terra Alta, 1-3 (Pol. Ind. Can Carner)
	08211 Castellar del Vallès (Barcelona)
	Spain
Contact Person:	Victor Bueno
Contact e-Mail / Telephone	vbueno@accent-systems.com

2. PRODUCT INFORMATION

2.1 General Description

Model name:	Mobiam
Manufacturer:	Accent Systems
Model number / Marketing name:	Mobiam
FCC ID:	2ABTTTRK230
Description:	Mobiam
Ancillary Equipment:	See section 2.7

2.2 Device Characteristics

Device Class for 47 CFR Part 15 B	Class B
Type of Power Supply	Li-Pol battery
Nominal Supply Voltage	3.7 V
Supply Voltage Range	3.4 - 4.2 V
Operating Temperature Range	-20 - 50 C
Operating Air Humidity Range	0 - 100 %
Highest Internal Frequency Source	2400 MHz

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A002839106-006	Default EUT with integrated antenna	Radiated Emissions

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
Bluetooth classic	-	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
Bluetooth	2.4 GHz	1	PCB Inverted F antenna	5.3 dB
Cellular	698 – 798 MHz 824 – 960MHz 1710 – 2170 MHz 2300 – 2400 MHz 2500 – 2690 MHz	1	SMD	0.50 dBi 1.00 dBi 2.50 dBi 1.60 dBi 2.50 dBi

2.6 Wireless Technology Details

Not available

2.7 Ancillary Equipment

No Ancillary devices

2.8 EUT Diagrams

Not available

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 (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 $\mu\text{V}/\text{m}$. Measurements on the test system are made in $\text{dB}\mu\text{V}/\text{m}$. To convert between these, the following adjustment is used:

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

Example: from 15.209(a) the limit for 30MHz – 88MHz is $100\mu\text{V}/\text{m}$ at 3m. This gives:

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

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 $30\mu\text{V}/\text{m}$ (=29.54 $\text{dB}\mu\text{V}/\text{m}$) at 30m

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

Example: from 15.209(a) the limit for 1GHz – 18GHz is $500\mu\text{V}/\text{m}$ (=53.98 $\text{dB}\mu\text{V}/\text{m}$) at 3m

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

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)	N/A
15.209	Radiated Emissions (Intentional Radiators)	SAC5
15.247 (d)	Out of Band Emissions	N/A
15.247 (d)	Band Edge Compliance (Authorized band)	N/A
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	N/A
15.247 (b)	Peak Conducted Output Power	N/A
15.247 (e)	Power Spectral Density	N/A

3.4.3 Test Equipment Setup – CTE System

Test system has not been used in this verification activity

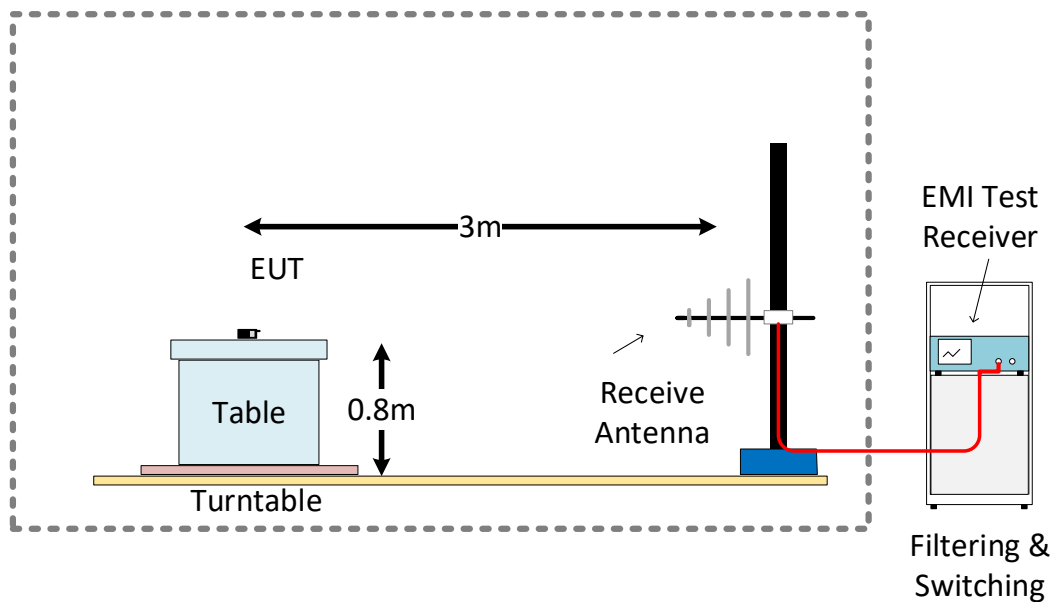
3.4.4 Test Equipment Setup – Conducted Emissions

Test system has not been used in this verification activity

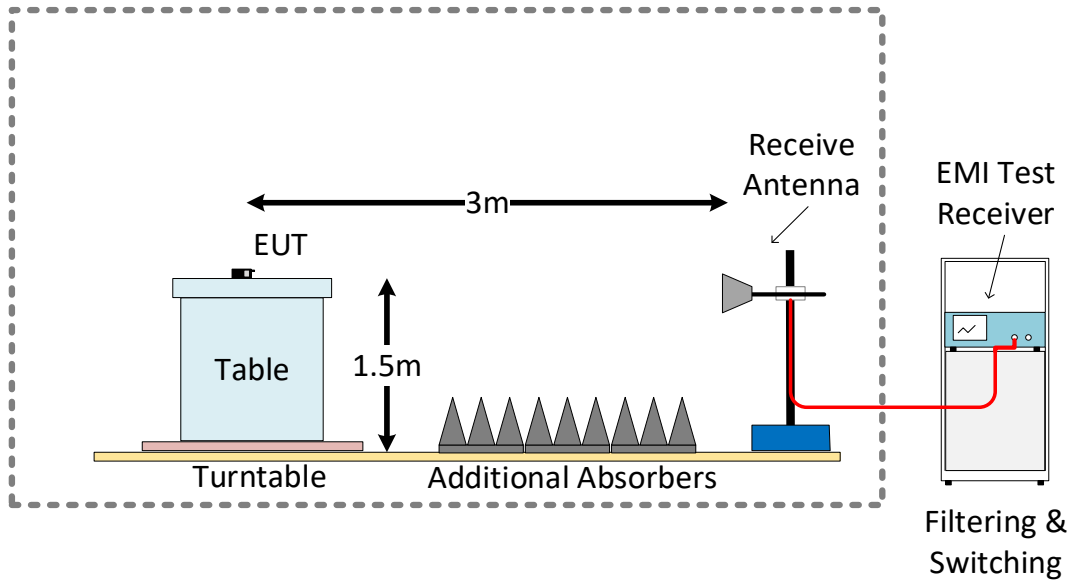
3.4.5 Test Equipment Setup – SAC 5 (Radiated Emissions and Restricted Band Edge)

- 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 to 150 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.

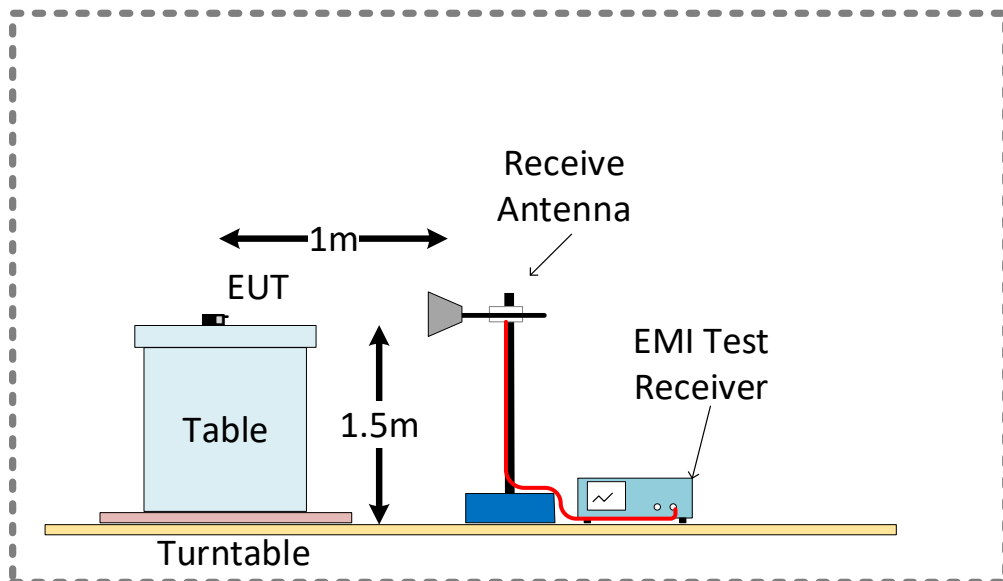
SAC 5 Test Setup Configuration 30MHz – 1GHz



SAC 5 Test Setup Configuration 1GHz – 18GHz



SAC 5 Test Setup Configuration 18GHz – 40GHz



3.5 EUT Configuration During Test

Hardware Setup	Description
1	Default. EUT stand alone

3.6 EUT Operation Modes

Operation mode	Description
#1	Bluetooth Low Energy TX mode

3.7 Deviations from the Test Standard

No deviations

3.8 Environmental Conditions

3.8.1 Environmental Conditions – CTE System

Test system has not been used in this verification activity

3.8.2 Environmental Conditions – Conducted Emissions System

Test system has not been used in this verification activity

3.8.3 Environmental Conditions – SAC5 (Radiated Emissions)

Environmental Conditions Log – SAC5

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.10.06	7:30	18.8	60

4. TEST RESULTS

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

Requirement is not applicable.

4.2 Test Results – Radiated Emissions (Intentional Transmitter)

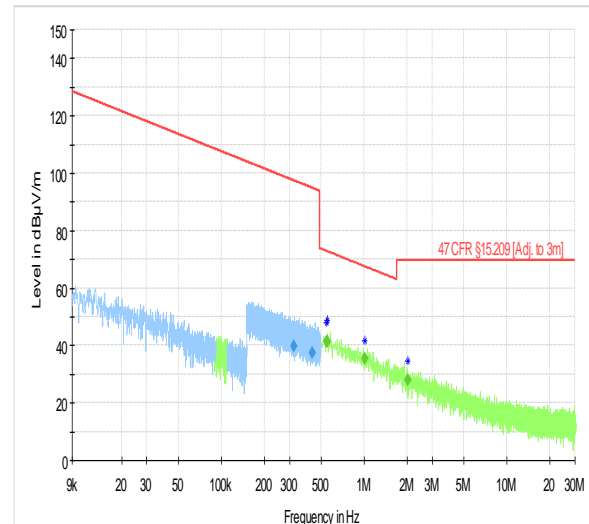
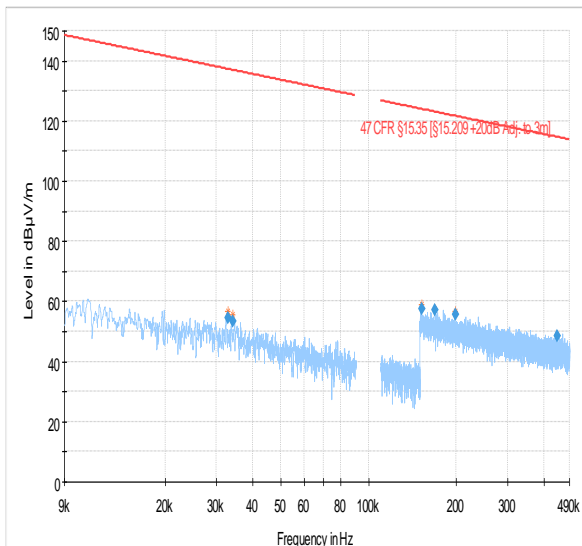
4.2.1 Radiated Emissions (Intentional) – Test Summary

Test Specification	FCC 47 CFR 15.209 (Part 15 Subpart C)		
Test Engineer & Date	Simon Palmhager Joel Efraimsson	2020.10.06	
EUT and Ancillary Equipment IDs	A002839106-006	None	
EUT Operation Mode(s)	Traffic mode		
EUT Wireless Configuration(s)	#1: Bluetooth Low Energy TX Mid (Channel 19, 2440 MHz)		
EUT Hardware Configuration(s)	Default		
Overall Result	Pass		
Test Parameter	Wireless Configuration	Frequency Range	Result
Radiated Emissions	#1	9 kHz – 30 MHz	Pass
		30 MHz – 1 GHz	Pass
		1 GHz – 18 GHz	Pass
		18 GHz – 40 GHz	Pass

4.2.2 Radiated Emissions (Intentional) – Test Details

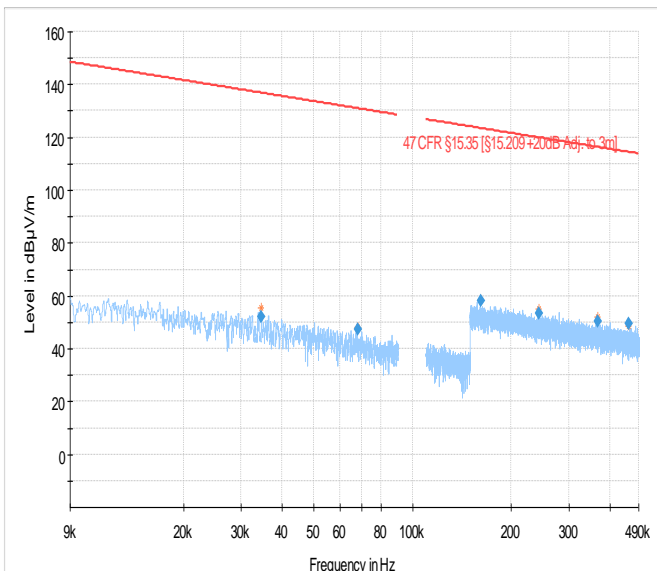
4.2.2.1 9 kHz – 30 MHz

Test mode condition	Bluetooth TX Mid (Channel 19, 2440 MHz)	
Antenna orientation	Loop Antenna Parallel to Axis	
Sweep frequency	9 kHz – 30 MHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Joel Efraimsson	Date: 2020.10.06
Chamber details	Chamber: SAC 5	

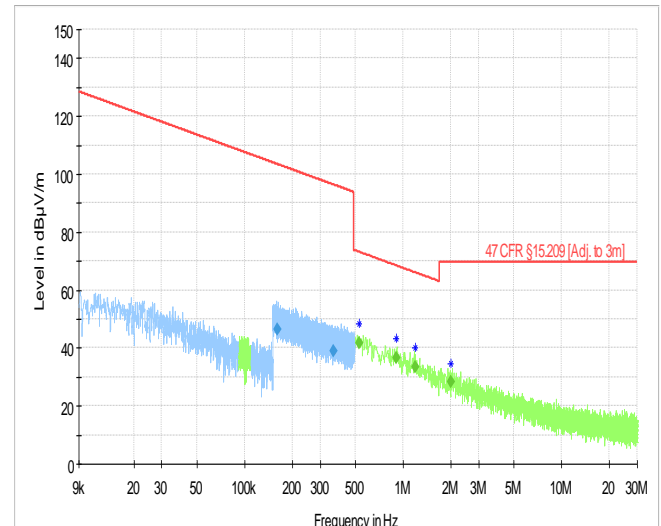


Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.032773	---	---	54.63	137.29	82.66	1000	0.2	100	H	-45
0.034124	---	---	53.45	136.94	83.49	1000	0.2	100	H	-41
0.151797	---	---	57.48	123.98	66.5	1000	9	100	H	243
0.168785	---	---	57.11	123.06	65.95	1000	9	100	H	279
0.198488	---	---	55.64	121.65	66.01	1000	9	100	H	304
0.445313	---	---	48.68	114.63	65.95	1000	9	100	H	45
0.323356	39.85	---	---	97.41	57.56	1000	9	100	H	225
0.433389	37.46	---	---	94.87	57.41	1000	9	100	H	269
0.543753	---	41.43	---	72.9	31.46	1000	9	100	H	-25
0.551745	---	41.2	---	72.77	31.56	1000	9	100	H	225
1.014301	---	35.58	---	67.48	31.9	1000	9	100	H	-45
2.030527	---	28.08	---	69.54	41.47	1000	9	100	H	139

Test mode condition	Bluetooth TX Mid (Channel 19, 2440 MHz)	
Antenna orientation	Loop Antenna Parallel to floor	
Sweep frequency	9 kHz – 30 MHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020.10.06
Chamber details	Chamber: SAC 5	



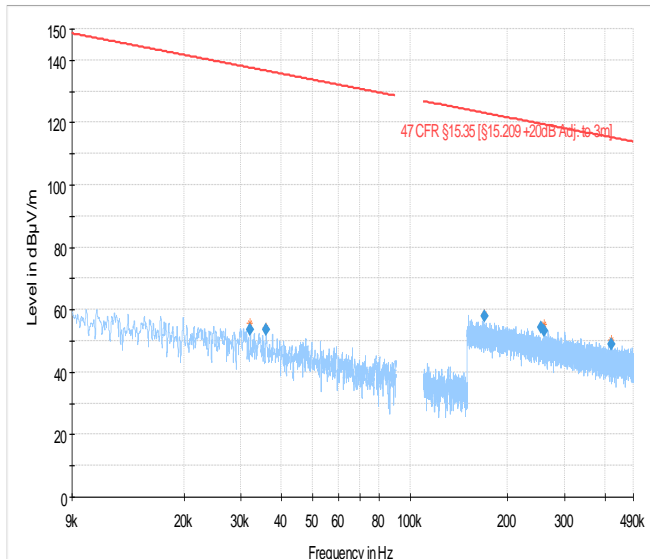
— PreviewResult 1-PK+ * Critical_Freqs PK+
— 47 CFR §15.35 [§15.209+20dB Adj. to 3m] ♦ Final_Result PK+



♦ PreviewResult 2-PK+ — PreviewResult 1-AVG
* Critical_Freqs PK+ * Critical_Freqs AVG
— 47 CFR §15.209 [Adj. to 3m] ♦ Final_Result AVG
♦ Final_Result QPK

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)
0.034452	---	---	52.03	136.86	84.83	1000.0	0.200	100.0	H	216.0
0.068223	---	---	47.37	130.93	83.56	1000.0	0.200	100.0	H	225.0
0.161313	---	---	58.18	123.45	65.27	1000.0	9.000	100.0	H	257.0
0.243192	---	---	53.48	119.89	66.41	1000.0	9.000	100.0	H	214.0
0.368127	---	---	50.53	116.28	65.76	1000.0	9.000	100.0	H	23.0
0.457589	---	---	49.29	114.40	65.10	1000.0	9.000	100.0	H	49.0
0.160867	46.32	---	---	103.48	57.15	1000.0	9.000	100.0	H	315.0
0.361887	39.00	---	---	96.43	57.43	1000.0	9.000	100.0	H	218.0
0.527119	---	41.68	---	73.17	31.48	1000.0	9.000	100.0	H	45.0
0.906314	---	36.51	---	68.46	31.95	1000.0	9.000	100.0	H	315.0
1.197897	---	33.52	---	66.04	32.52	1000.0	9.000	100.0	H	135.0
2.007605	---	28.28	---	69.54	41.26	1000.0	9.000	100.0	H	45.0

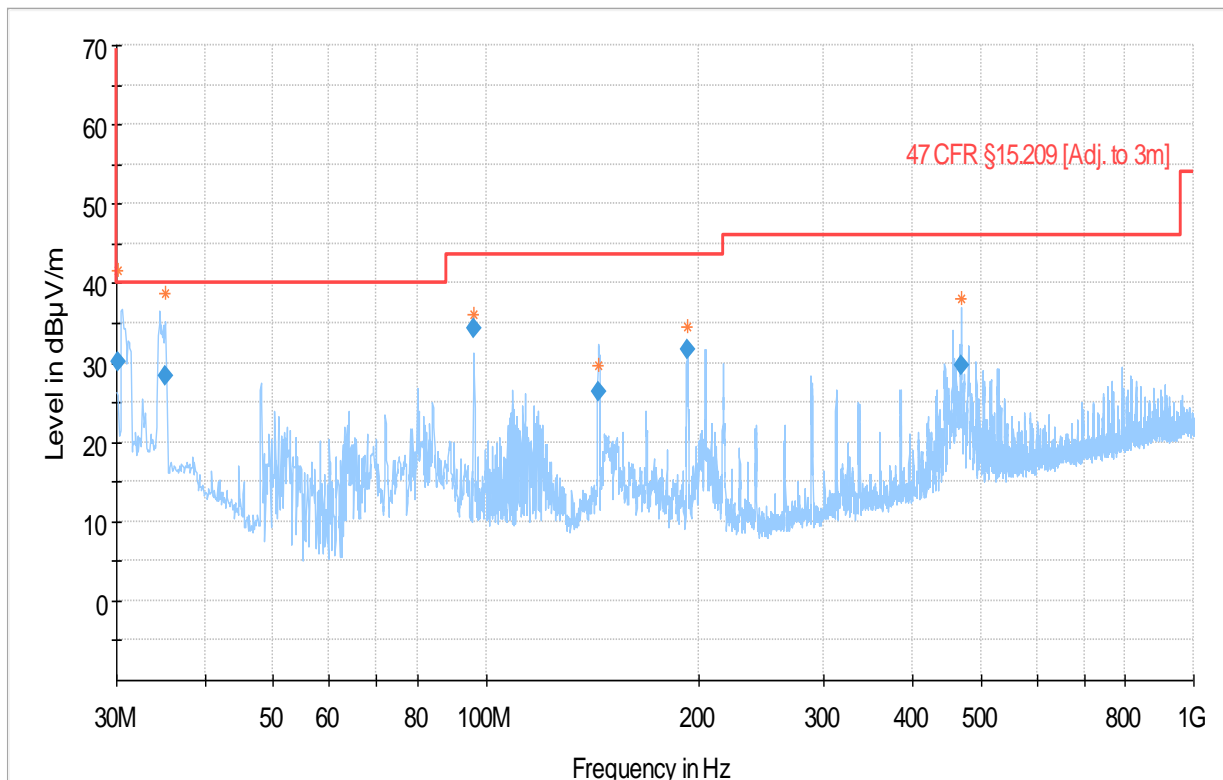
Test mode condition	Bluetooth TX Mid (Channel 19, 2440 MHz)	
Antenna orientation	Loop Antenna Perpendicular to axis	
Sweep frequency	9 kHz – 30 MHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020.10.06
Chamber details	Chamber: SAC 5	



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)
0.031871	---	---	53.60	137.54	83.94	1000.0	0.200	100.0	H	225.0
0.035791	---	---	53.62	136.53	82.91	1000.0	0.200	100.0	H	-15.0
0.170049	---	---	57.84	122.99	65.16	1000.0	9.000	100.0	H	100.0
0.253152	---	---	54.24	119.54	65.30	1000.0	9.000	100.0	H	215.0
0.259625	---	---	53.26	119.32	66.06	1000.0	9.000	100.0	H	-2.0
0.419590	---	---	48.75	115.15	66.40	1000.0	9.000	100.0	H	225.0
0.212918	44.09	---	---	101.04	56.95	1000.0	9.000	100.0	H	11.0
0.411986	37.81	---	---	95.31	57.49	1000.0	9.000	100.0	H	166.0
0.736983	---	38.45	---	70.26	31.80	1000.0	9.000	100.0	H	-14.0
0.843545	---	37.18	---	69.08	31.90	1000.0	9.000	100.0	H	102.0
1.053022	---	34.99	---	67.16	32.17	1000.0	9.000	100.0	H	37.0
2.420572	---	26.39	---	69.54	43.15	1000.0	9.000	100.0	H	0.0

4.2.2.2 30 MHz – 1 GHz

Test mode condition	Bluetooth TX Mid (Channel 19, 2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz - 1 GHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020.10.06
Chamber details	Chamber: SAC 5	

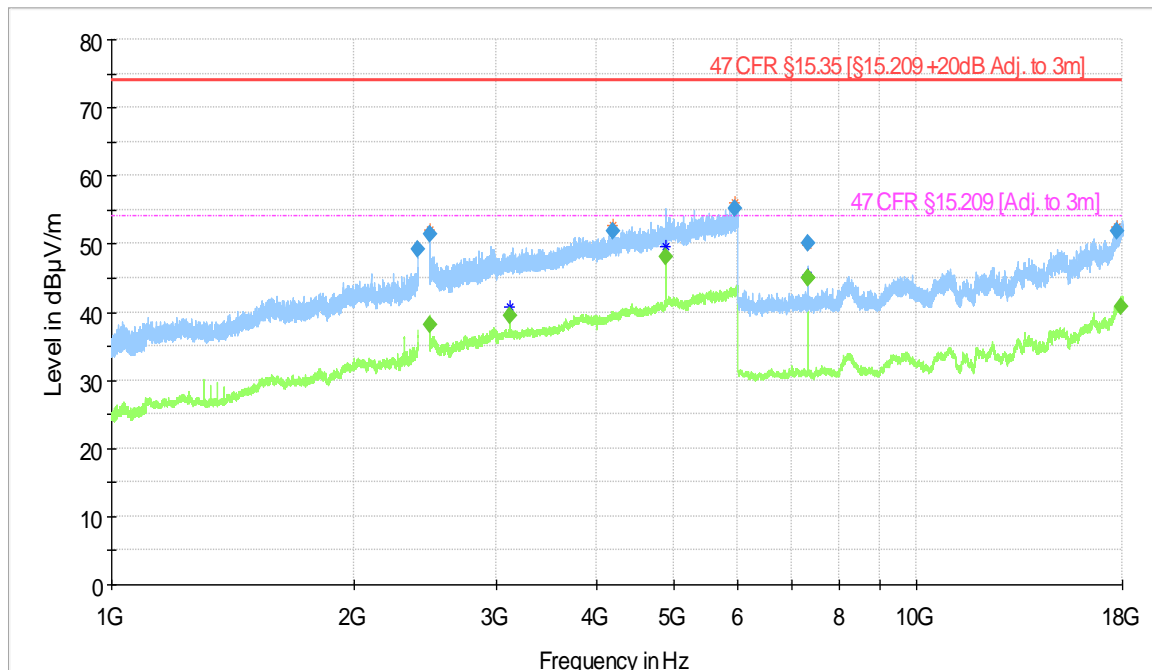


- PreviewResult 2-AVG
- * Critical_Freqs AVG
- 47 CFR §15.209 [Adj. to 3m]
- ◆ Final_Result AVG
- + QuasiPeak-QPK(Single)
- PreviewResult 1-PK+
- * Critical_Freqs PK+
- ◆ Final_Result QPK
- × MaxPeak-PK+(Single)
- × Average-AVG(Single)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.107444	30.13	40.00	9.87	1000.0	120.000	100.0	V	221.0
35.097080	28.39	40.00	11.61	1000.0	120.000	204.0	H	40.0
95.997520	34.31	43.52	9.22	1000.0	120.000	100.0	V	22.0
143.994760	26.33	43.52	17.19	1000.0	120.000	100.0	V	16.0
191.977960	31.63	43.52	11.89	1000.0	120.000	100.0	V	-22.0
468.604160	29.57	46.02	16.45	1000.0	120.000	125.0	H	112.0

4.2.2.3 1 GHz – 18 GHz

Test mode condition	Bluetooth TX Mid (Channel 19, 2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz - 18 GHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020.10.06
Chamber details	Chamber: SAC 5	

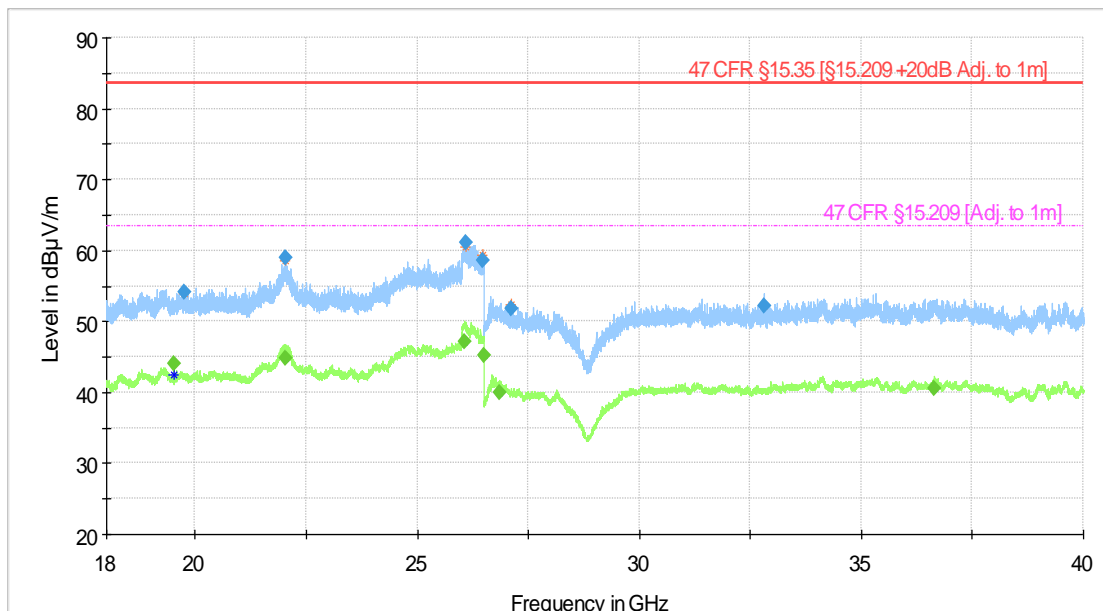


- PreviewResult 2-AVG
- PreviewResult 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- 47 CFR §15.35 [§15.209 +20dB Adj. to 3m]
- 47 CFR §15.209 [Adj. to 3m]
- ◆ Final_Result PK+
- ◆ Final_Result AVG
- × MaxPeak-PK+ (Single)
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2483.654	---	38.19	53.98	15.79	1000	1000	175	V	158
3125.199	---	39.46	53.98	14.52	1000	1000	139	H	26
4880.153	---	48.08	53.98	5.9	1000	1000	102	H	-18
7320.291	---	44.89	53.98	9.09	1000	1000	169	V	296
7320.347	---	45.01	53.98	8.97	1000	1000	169	V	296
17957.998	---	40.88	53.98	13.1	1000	1000	206	H	252

4.2.2.4 18 GHz – 40 GHz

Test mode condition	Bluetooth TX Mid (Channel 19, 2440 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz - 40 GHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Joel Efraimsson	Date: 2020.10.06
Chamber details	Chamber: SAC 5	



- Preview Result 2-AVG
- Preview Result 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- 47 CFR §15.35 [§15.209+20dB Adj. to 1m]
- 47 CFR §15.209 [Adj. to 1m]
- ◆ Final_Result PK+
- ◆ Final_Result AVG
- × MaxPeak-PK+ (Single)
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	PoI	Azimuth (deg)
19520.78	---	44.06	63.52	19.46	1000	1000	155	H	326
22019.093	---	44.77	63.52	18.75	1000	1000	155	H	338
26073.394	---	47.05	63.52	16.47	1000	1000	155	H	338
26093.479	61.13	---	83.52	22.4	1000	1000	155	H	42
26497.633	---	45.2	63.52	18.32	1000	1000	155	V	128
36652.924	---	40.56	63.52	22.96	1000	1000	155	H	8

4.3 Test Results – Out of Band Emissions

Requirement is not applicable

4.4 Test Results – Band Edge Compliance (Authorized Band)

Requirement is not applicable

4.5 Test Results – Band Edge Compliance (Restricted Band)

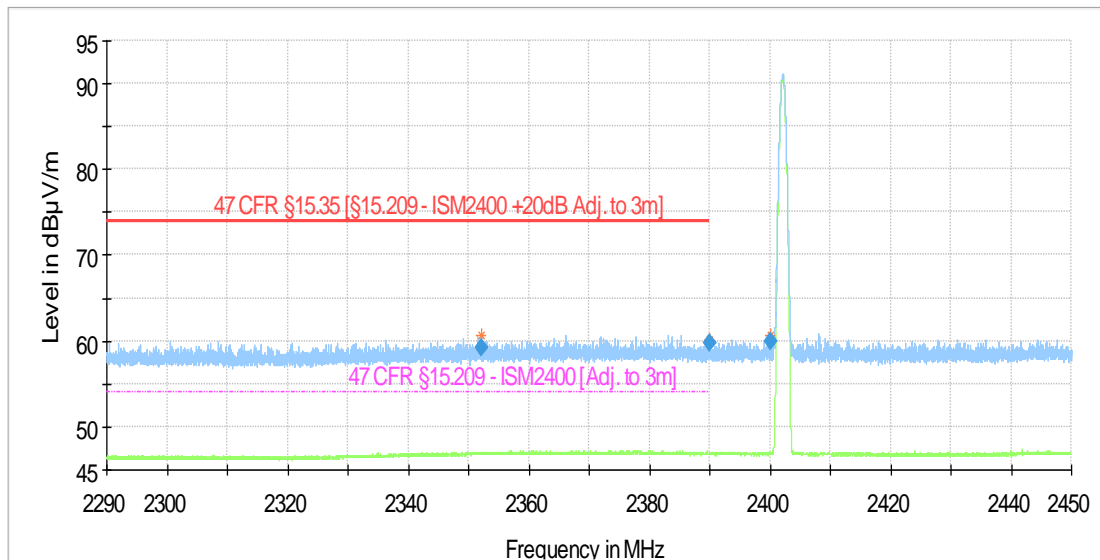
4.5.1 Band Edge Compliance (Restricted Band) – Test Summary

Test Specification	47 CFR 15.209 & 15.247 (d)	
Test Engineer & Date	Simon Palmhager	2020.10.06
EUT and Ancillary Equipment IDs	A002839106-006	None
EUT Operation Mode(s)	Traffic mode	
EUT Wireless Configuration(s)	#1: Bluetooth Low Energy TX Low (Channel 0, 2402 MHz) #2: Bluetooth Low Energy TX High (Channel 39, 2480 MHz)	
EUT Hardware Configuration(s)	Default	
Overall Result	Pass	
Test Parameter	Wireless Configuration	Result*
Emissions at Band Edge (Rest. Band – Low Edge)	#1	Pass
Emissions at Band Edge (Rest. Band – High Edge)	#2	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 – Bluetooth Low Energy

Test mode condition	Bluetooth TX Low (Channel 0, 2402 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz - 18 GHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020.10.06
Chamber details	Chamber: SAC 5	

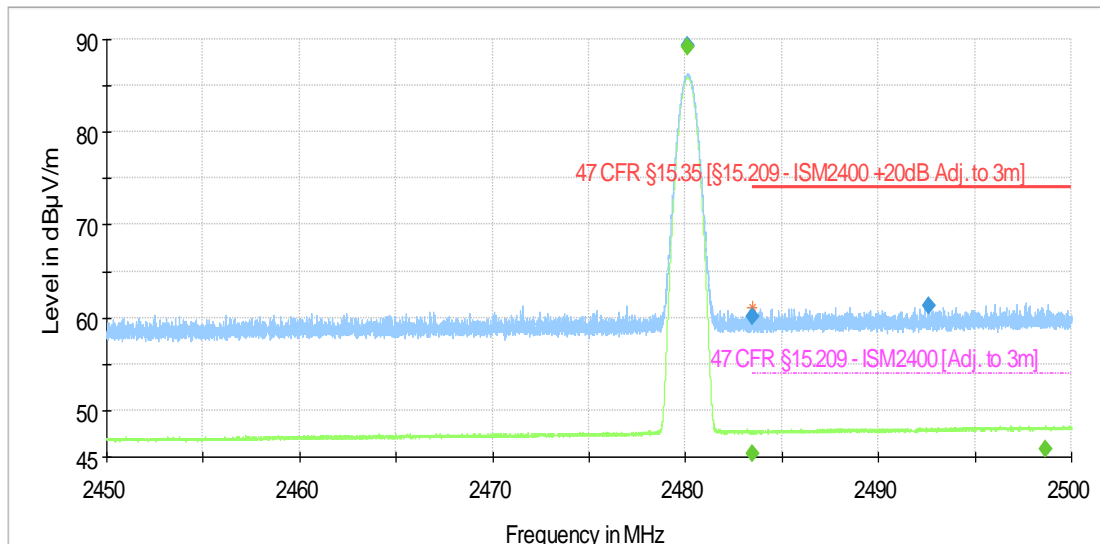


- Preview Result 2-AVG
- Preview Result 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- 47 CFR §15.35 [§15.209 - ISM2400 +20dB Adj. to 3m]
- 47 CFR §15.209 - ISM2400 [Adj. to 3m]
- ◆ Final_Result PK+
- ◆ Final_Result AVG
- × MaxPeak-PK+ (Single)
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2352.080000	59.18	---	73.98	14.80	1000.0	1000.000	210.0	H	68.0
2377.632000	---	44.66	53.98	9.32	1000.0	1000.000	205.0	H	115.0
2390.000000	59.76	---	73.98	14.22	1000.0	1000.000	100.0	H	142.0
2390.000000	---	44.52	53.98	9.46	1000.0	1000.000	112.0	H	131.0
2400.000000	59.99	---	---	---	1000.0	1000.000	102.0	H	93.0
2400.000000	---	44.67	---	---	1000.0	1000.000	145.0	H	129.0

Restricted Band – High Edge – Bluetooth Low Energy

Test mode condition	Bluetooth TX High (Channel 39, 2480 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz - 18 GHz	
Standard	FCC part 15.247	
EUT	A002839106-006	
Ancillary Equipment	None	
Test Engineer	Simon Palmhager	Date: 2020.10.06
Chamber details	Chamber: SAC 5	



- Preview Result 2-AVG
- Preview Result 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- 47 CFR §15.35 [§15.209 - ISM2400 +20dB Adj. to 3m]
- 47 CFR §15.209 - ISM2400 [Adj. to 3m]
- ◆ Final_Result PK+
- ◆ Final_Result AVG
- × MaxPeak-PK+ (Single)
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	PoI	Azimuth (deg)
2480.100000	89.30	---	---	---	1000.0	1000.000	180.0	H	141.0
2480.100000	---	89.14	---	---	1000.0	1000.000	203.0	H	144.0
2483.500000	60.06	---	73.98	13.92	1000.0	1000.000	210.0	V	31.0
2483.500000	---	45.37	53.98	8.61	1000.0	1000.000	210.0	H	146.0
2492.640000	61.24	---	73.98	12.74	1000.0	1000.000	112.0	V	4.0
2498.670000	---	45.77	53.98	8.21	1000.0	1000.000	101.0	V	265.0

4.6 Test Results – 20dB Bandwidth

Requirement is not applicable

4.7 Test Results – Carrier (Hopping Channel) Separation

Requirement is not applicable

4.8 Test Results – Number of Hopping Channels

Requirement is not applicable

4.9 Test Results – Time of Occupancy (Dwell Time)

Requirement is not applicable

4.10 Test Results – 6dB Bandwidth

Requirement is not applicable

4.11 Test Results – Peak Conducted Output Power

Requirement is not applicable

4.12 Test Results – Power Spectral Density

Requirement is not applicable

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – CTE System

Test system has not been used in this verification activity

5.1.2 Hardware List – Conducted Emissions System

Test system has not been used in this verification activity

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
Horn Antenna	ETS Lindgren	UG-596A/U	20898 2814839	2020.07.27	2022.07.27
Horn Antenna - 40 GHz	ETS Lindgren	UG-600A/U	20623 2814834	2020.07.27	2022.07.27
Loop Antenna	EMCO	6502	9206-2775 2759035	2020.07.16	2021.07.16
Control Device	Maturo	NCD	NCD/393/2372.01	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	2019.11.11	2020.11.11
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension	101333 2761265	2019.11.11	2020.11.11
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension	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

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
SAC 5	EMC 32	V10.50.40

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for CTE

Test system has not been used in this verification activity

6.2 Measurement Uncertainty for Conducted Emissions

Test system has not been used in this verification activity

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

7.1 Photographs of the EUT

See "60419662-001_FCC_Part_15-247_Appendix"

7.2 Photographs of the Test Setup

See "60419662-001_FCC_Part_15-247_Appendix"

< End of report >