EMC TEST REPORT

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6

Report Reference No	G0M-1908-8377-EF0215B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 ISED Testing Laboratory site: 3470A-3 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	BIOTRONIK SE & Co. KG
Address	Woermannkehre 1 12359 Berlin GERMANY
Test Specification Standard(s)	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014+A1:2017
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	CardioMessenger Smart / Telemonitoring System
Model(s)	CardioMessenger Smart 4G
Additional Model(s)	None
Brand Name(s)	BIOTRONIK
Hardware Version(s)	CardioMessenger Smart 4G mit LP best. LP1/Telex Smart 4G Rev Cx
Software Version(s)	ULP_HIGH_1_32_0, ULP_LOW_1_13_0, M0B.800004
FCC-ID	QRI-CMSMART4GWW
IC	4708A-CMSMART4GWW
Test Result	**PASSED**

Possible test case verdicts:	
required by standard but not tested	N/T
not required by standard	N/R
required by standard but not appl. to test object	N/A
test object does meet the requirement	P(PASS)
test object does not meet the requirement	F(FAIL)
Testing:	
Date of receipt of test item	2021-03-04
Report:	

Compiled by	Marco Belz	
Tested by (+ signature) (Responsible for Test)	Marco Belz	.....
Approved by (+ signature) (Test Technician)	Matthias Handrik	.....
Date of Issue	2021-05-31	
Total number of pages	57	

General Remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional Comments:

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T_{NOM}	Nominal operating temperature
V_{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-05-31	Initial Release	-

REPORT INDEX

1 Equipment (Test Item) Under Test

Description	CardioMessenger Smart / Telemonitoring System	
Model	CardioMessenger Smart 4G	
Additional Model(s)	None	
Brand Name(s)	BIOTRONIK	
Serial Number(s)	91630223	
Hardware Version(s)	CardioMessenger Smart 4G mit LP best. LP1/Telex Smart 4G Rev Cx	
Software Version(s)	ULP_HIGH_1_32_0, ULP_LOW_1_13_0, M0B.800004	
FCC-ID	QRI-CMSMART4GWW	
IC	4708A-CMSMART4GWW	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	2169.9, carrier signal mobile communication	
Radio Module 1	Type	Mobile Communication
	Model	ME910C1-WW
	Manufacturer	TELIT COMMUNICATIONS
	FCC-ID	RI7ME910C1WW
	IC	5131A-ME910C1WW
Radio Module 2	Type	Medical Implant Communication Service
	Model	Hermes 3
	Manufacturer	Biotronik/MSEI
Supply Voltage	V_{NOM}	3.7 V DC internal battery
AC/DC-Adaptor	Model	GTM96180-1107-2.0
	Vendor	GlobTek, Inc.
	Input	100 – 240 V 50/60 Hz
	Output	5 V DC
Manufacturer	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY	

1.1 Equipment Ports

Name	Type	Attributes		Comment
USB	DC;IO	Count: Direction: Service only:	1 In Yes	-

Description:	
AC	AC mains power input/output port
DC	DC power input/output port
BAT	DC power input port connected to external battery
IO	Input/Output port
TP	Telecommunication port
NE	Non-electrical port

1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Mains adapter	GlobTek, Inc.	GTM96180-1107-2.0	-
SIM	Signalling Station	RHODE&SCHWARZ	CMU200	EF00304
AE	Antenna	Delock	Stand Antenna	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Active Mobile Communication via GSM850 Channel 192, Uplink/Gamma 3 (33dBm); MICS Tx
2	Active Mobile Communication via GSM850 Channel 192, Uplink/Gamma 3 (33dBm); MICS Tx, Battery is charging
3	Active Mobile Communication via GSM1900 Channel 661, Uplink/Gamma 3 (30dBm); MICS Tx
4	Active Mobile Communication via GSM1900 Channel 661, Uplink/Gamma 3 (30dBm); MICS Tx, Battery is charging
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT Battery powered, Over the Air connection to GSM tester
2	AC/DC Adapter connected to EUT via USB connection, Over the Air connection to GSM tester
Comment:	

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyser in dBµV. Any external preamplifiers used are taken into account through internal analyser settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyser (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6				
Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
Emission				
FCC 15.109 ICES-003, 6.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 6.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	-
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

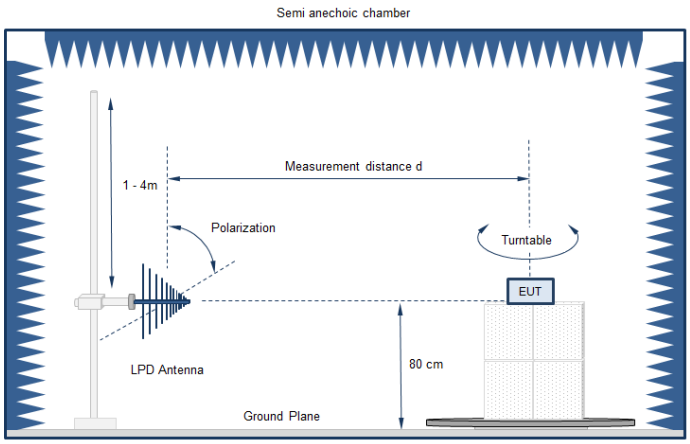
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

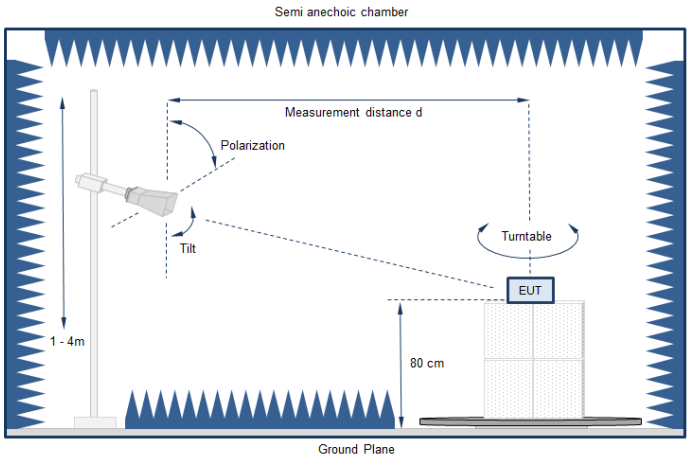
Test Information	
Reference	FCC 15.109, ICES-003, 6.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2169.9
Measurement range	30 MHz to 10849.5 MHz
Temperature [°C]	21 – 23
Humidity [%]	16 – 35
Operator	Marco Belz
Date	2021-03-09 - 2021-03-10

2.1.2 Setup

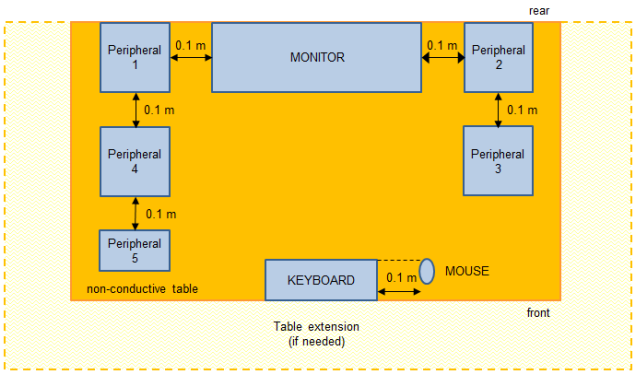
Measurement up to 1 GHz



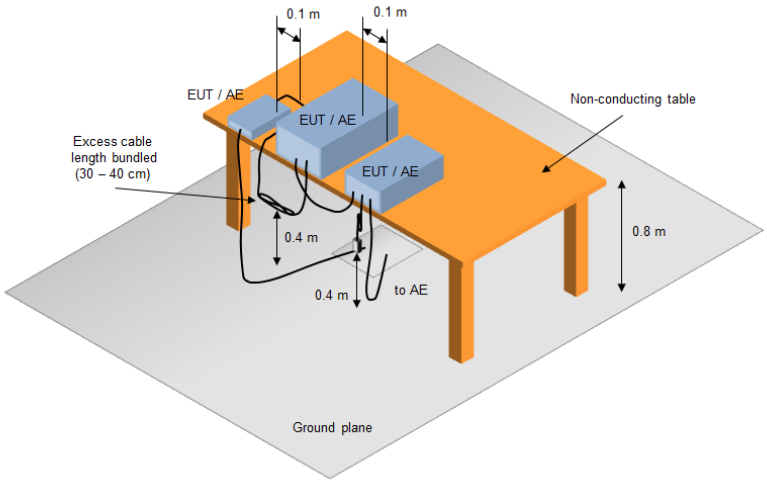
Measurement above 1 GHz



Equipment placement - Table top



Test Setup



2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Semi-Anechoic chamber	Frankonia GmbH	AC 6 (SAC10-3)	EF00899	2019-05	2022-05
EMI Test Receiver	Keysight	N9038A-526/WXP	EF01070	2020-06	2021-06
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESU26	EF00887	2020-07	2021-07
Biconical Antenna	R&S	HK 116	EF00030	2019-04	2022-04
LPD Antenna	R&S	HL 223	EF00187	2019-05	2022-05
Double-Ridged Guide Antenna	ETS-Lindgren USA	3117	EF00976	2019-03	2022-03
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2020-03	2021-03
Temperature/Humidity Sensor	Embedded Data Systems, LLC.	OW-ENV-THR	EF01124	2020-03	2021-03

2.1.4 Procedure

Exploratory measurement
1. The EUT was placed on a non-conductive table at a height of 0.8m. 2. The EUT and support equipment, if needed, were set up to simulate typical usage. 3. Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage. 4. The antenna was placed at a distance of 3 or 10 m. 5. The received signal was monitored at the measurement receiver. 6. This procedure has to be performed in both antenna polarizations, horizontal and vertical. 7. The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 2.1.2

Final measurement
1. The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver. 2. A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast. 3. The EUT and cable arrangement were based on the exploratory measurement results. 4. Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded. 5. The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dBµV/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak Average	74 54

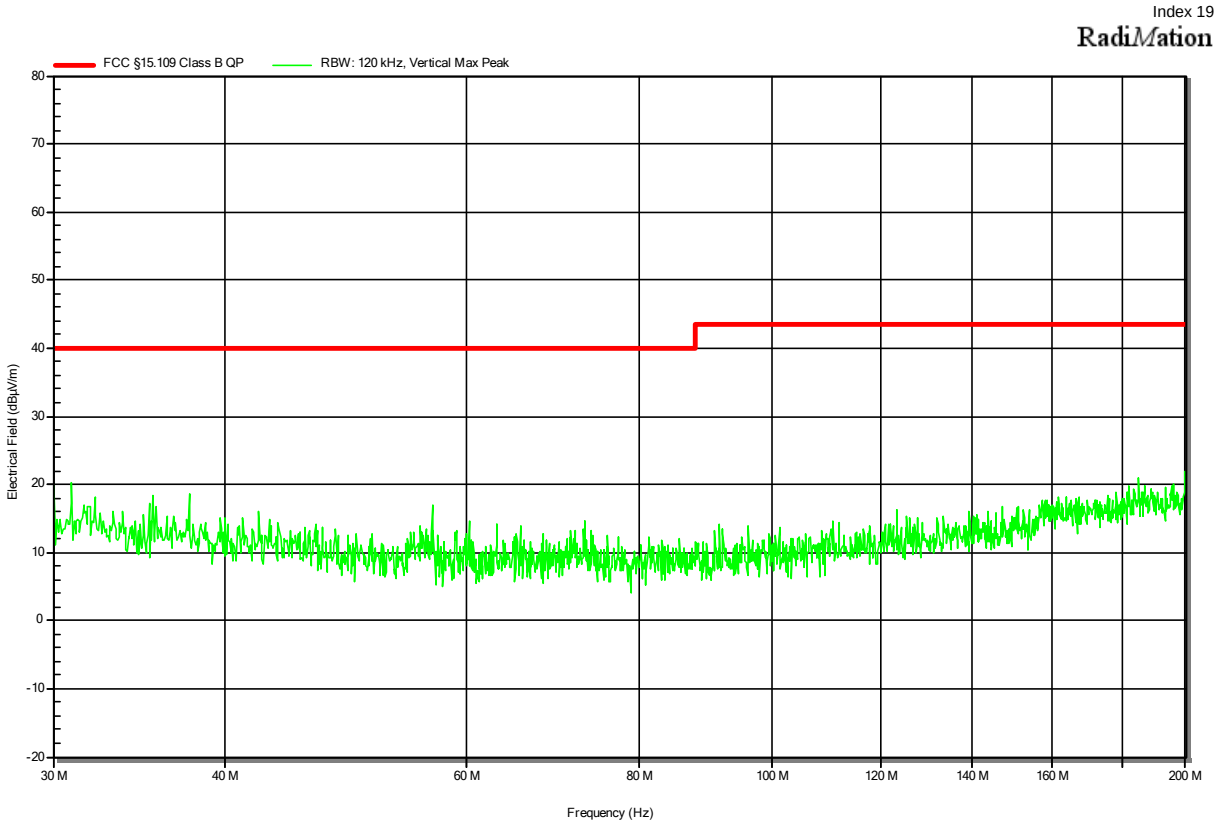
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-
2	2	PASS	-
3	1	PASS	-
4	2	PASS	-

2.1.8 Records

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	1 1
Note 1:	Table 0°, Antenna 1 m



Radiated emissions
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Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	1 1
Note 1:	Table 0°, Antenna 1 m

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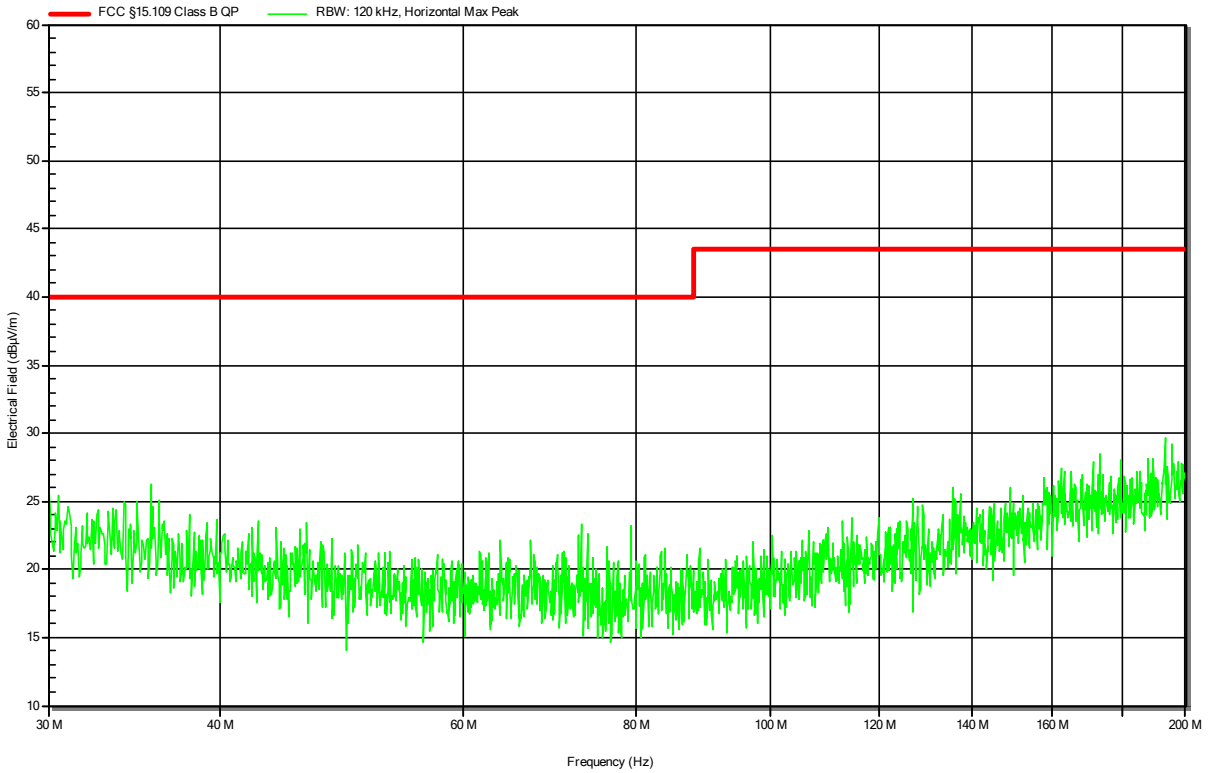
RadiMation



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Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	1 1
Note 1:	Table 110°, Antenna 1 m Peak 1 = MICS carrier Peak 2 = GSM850 carrier

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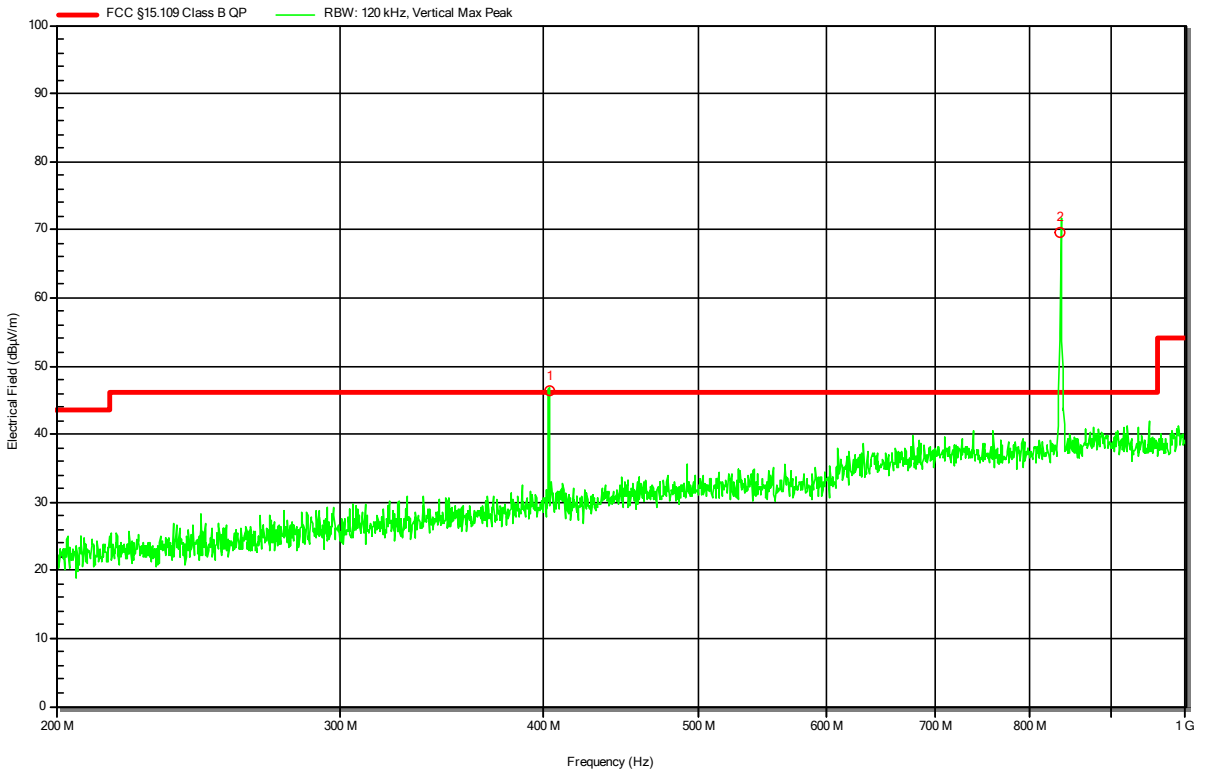

Peak Number	Frequency
1	403.663 MHz
2	837.006 MHz

Radiated emissions
according to FCC part 15B

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Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	1 1
Note 1:	Table -10°, Antenna 1 m Peak 1 = MICS carrier, Peak 2 = GSM850 carrier

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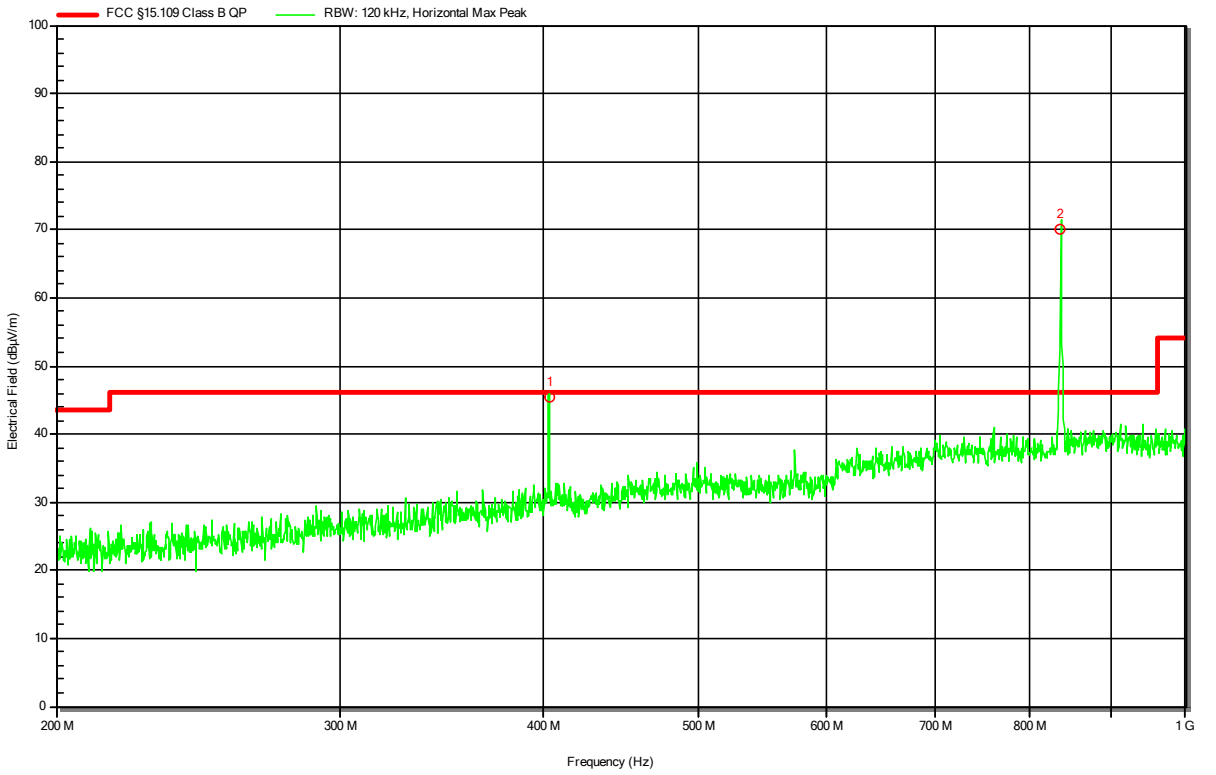
RadiMation



Peak Number	Frequency
1	403.663 MHz
2	836.986 MHz

Radiated emissions
according to FCC part 15B

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Model:	CardioMessenger Smart 4G
Test Sample ID:	33611
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	3 1
Note 1:	Table 0°, Antenna 1 m

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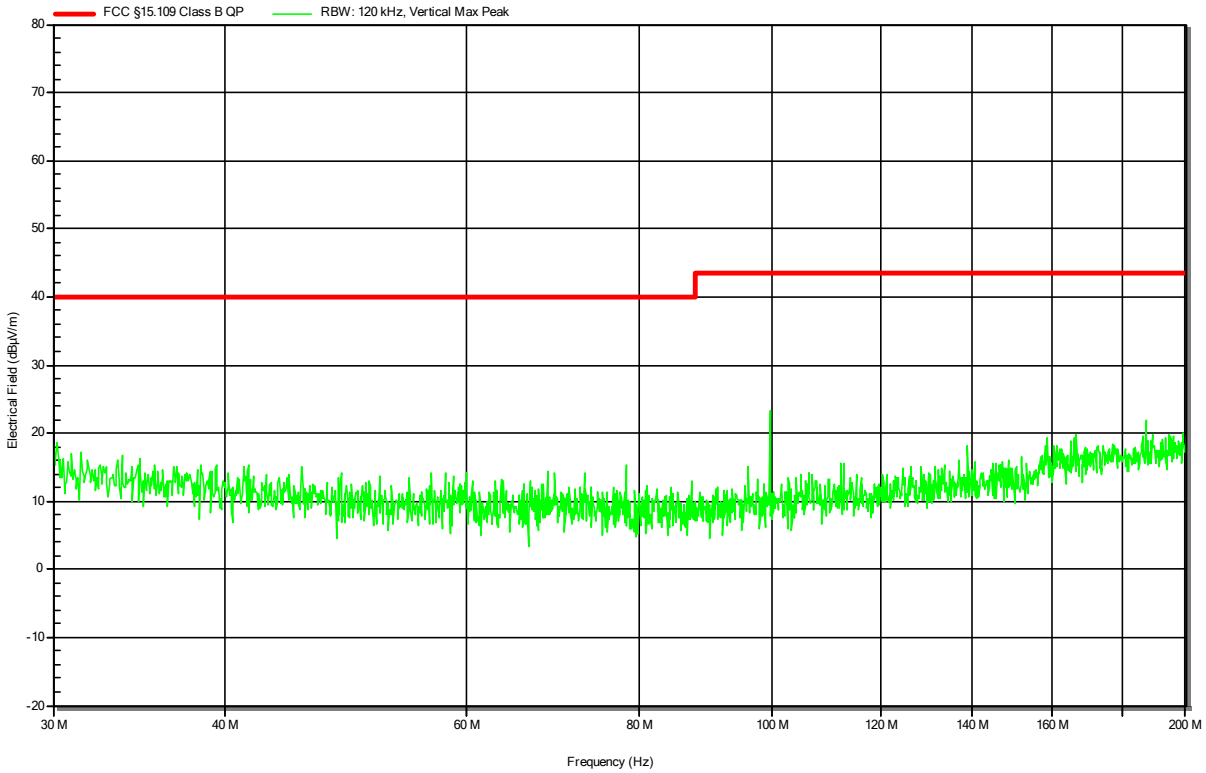
RadiMation



Radiated emissions
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Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	3 1
Note 1:	Table 0°, Antenna 1 m

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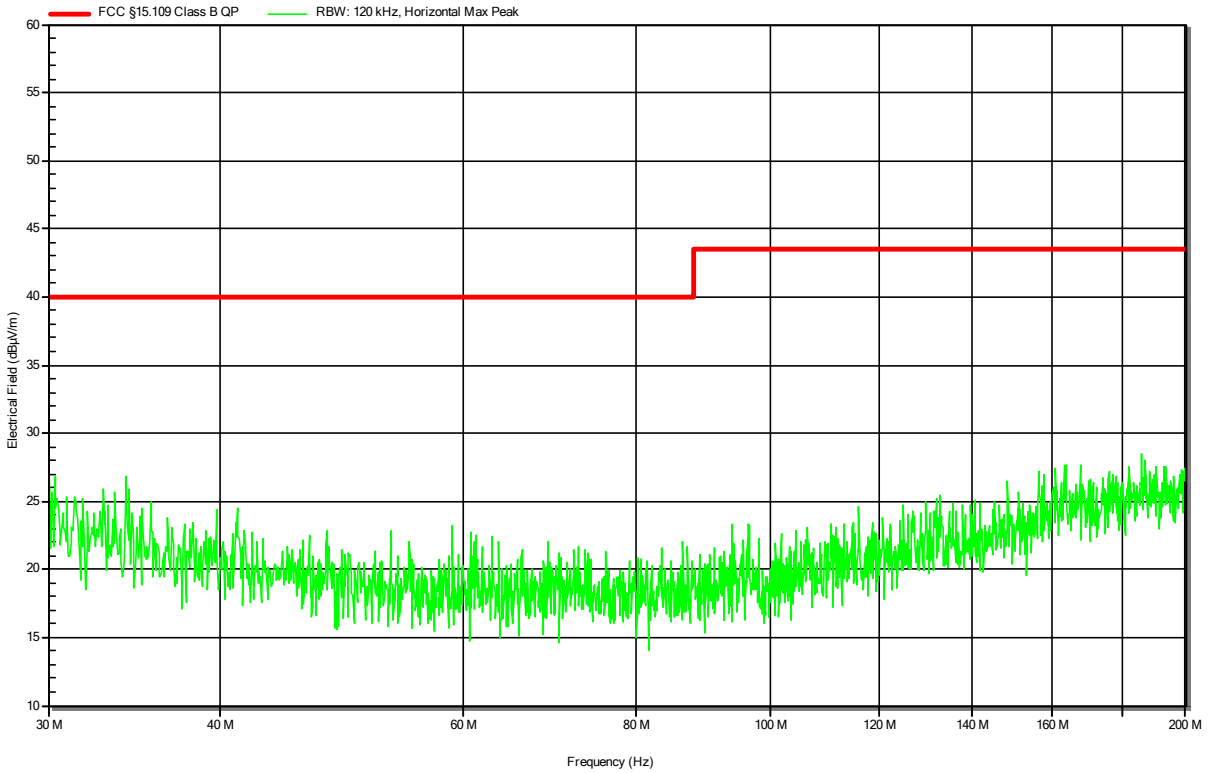
RadiMation



Radiated emissions
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Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	3 1
Note 1:	Table 90°, Antenna 1 m Peak = MICS carrier

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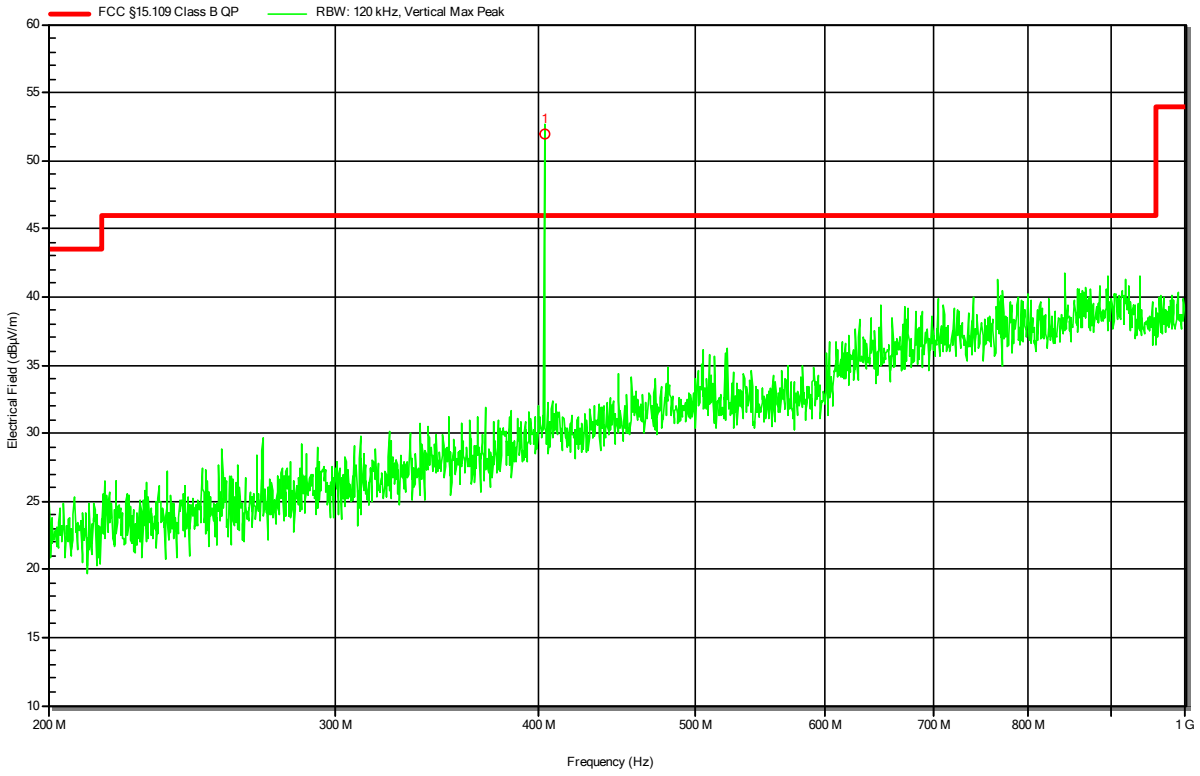

Peak Number	Frequency
1	403.663 MHz

Radiated emissions
according to FCC part 15B

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Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	3 1
Note 1:	Table -25°, Antenna 1 m Peak 1 = MICS carrier

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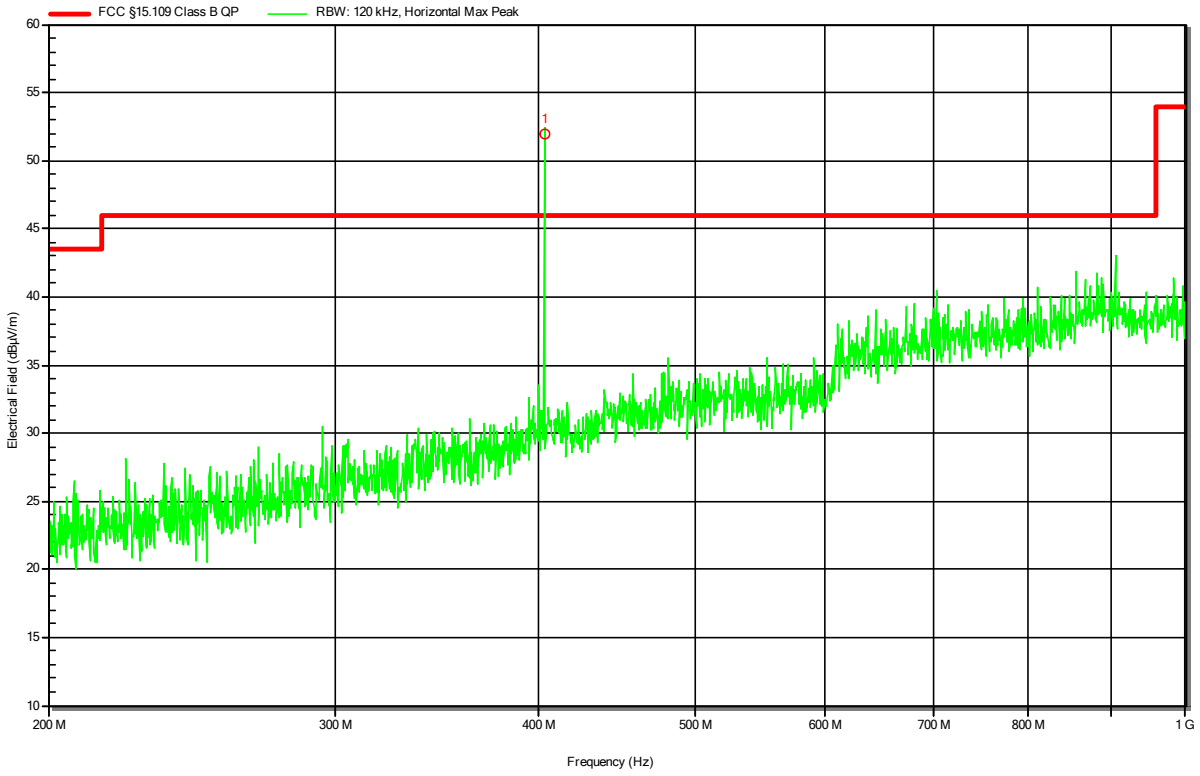

Peak Number	Frequency
1	403.663 MHz

Radiated emissions
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Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	2 2
Note 1:	

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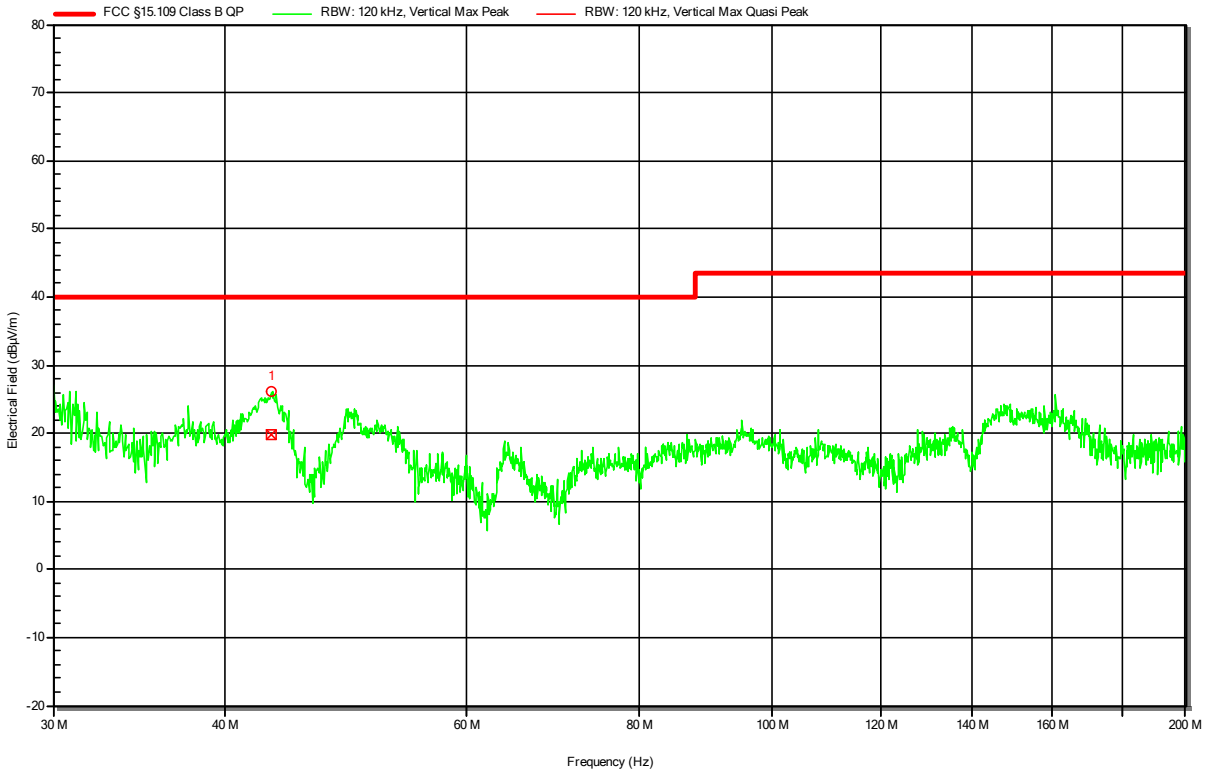

Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	43.301 MHz	19.85 dBµV/m	40 dBµV/m	-20.15 dB	Pass	60 degrees	1 m

Radiated emissions
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Measurement Distance:	3m
Operational Mode & EUT Configuration:	2 2
Note 1:	

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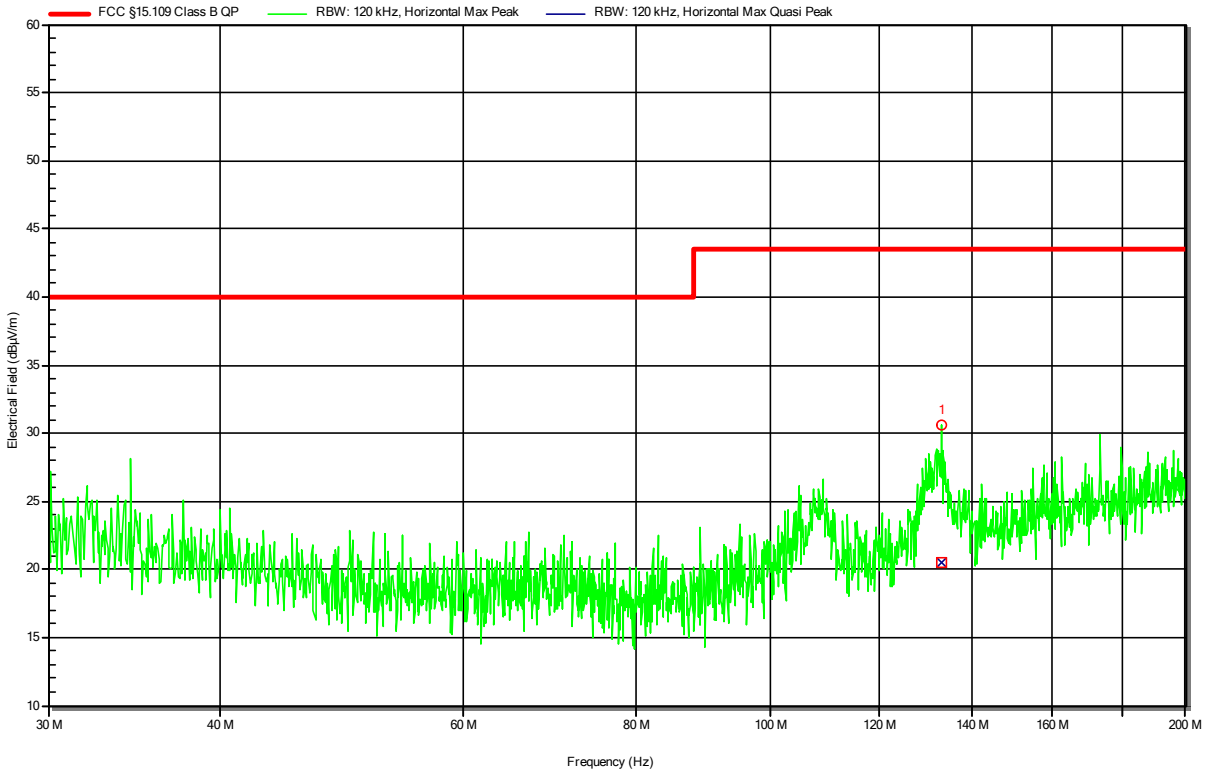
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	133.105 MHz	20.52 dBµV/m	43.52 dBµV/m	-23 dB	Pass	180 degrees	2 m

Radiated emissions
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Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	2 2
Note 1:	Table 110°, Antenna 1 m Peak 1 = MICS carrier, Peak 2 = GSM850 carrier

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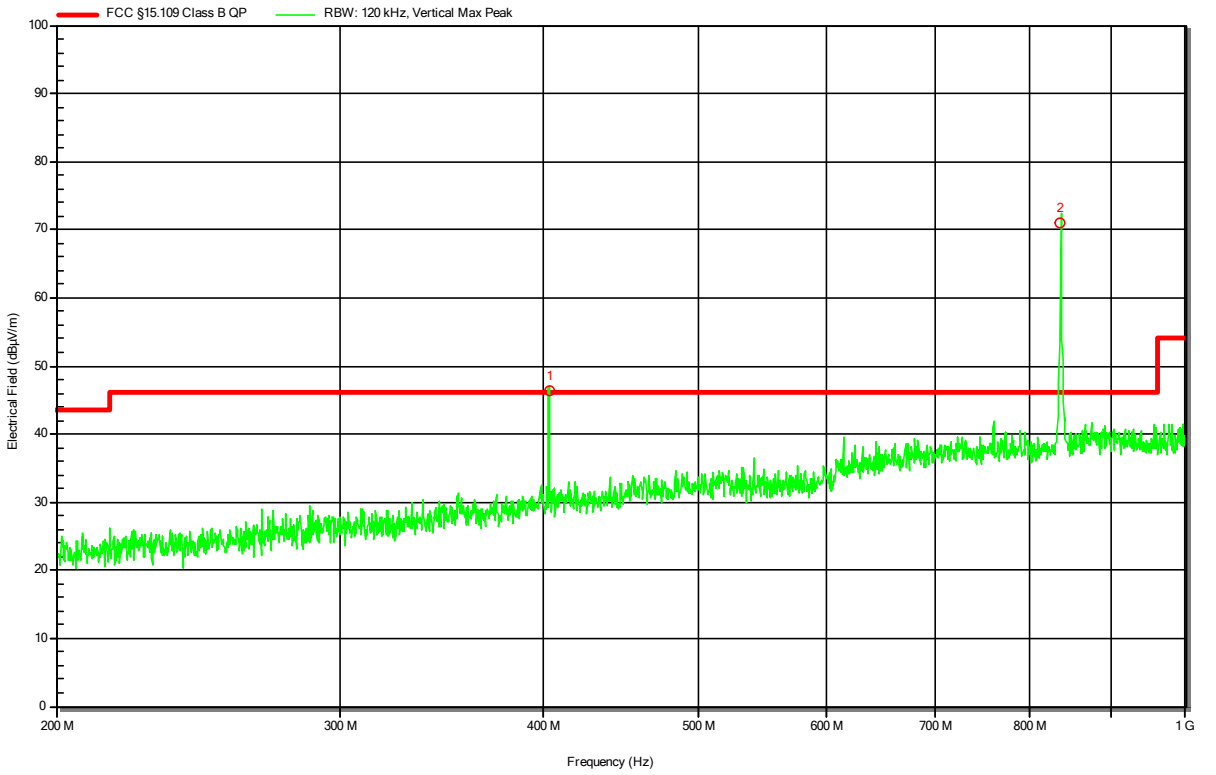
RadiMation



Peak Number	Frequency
1	403.663 MHz
2	836.986 MHz

Radiated emissions
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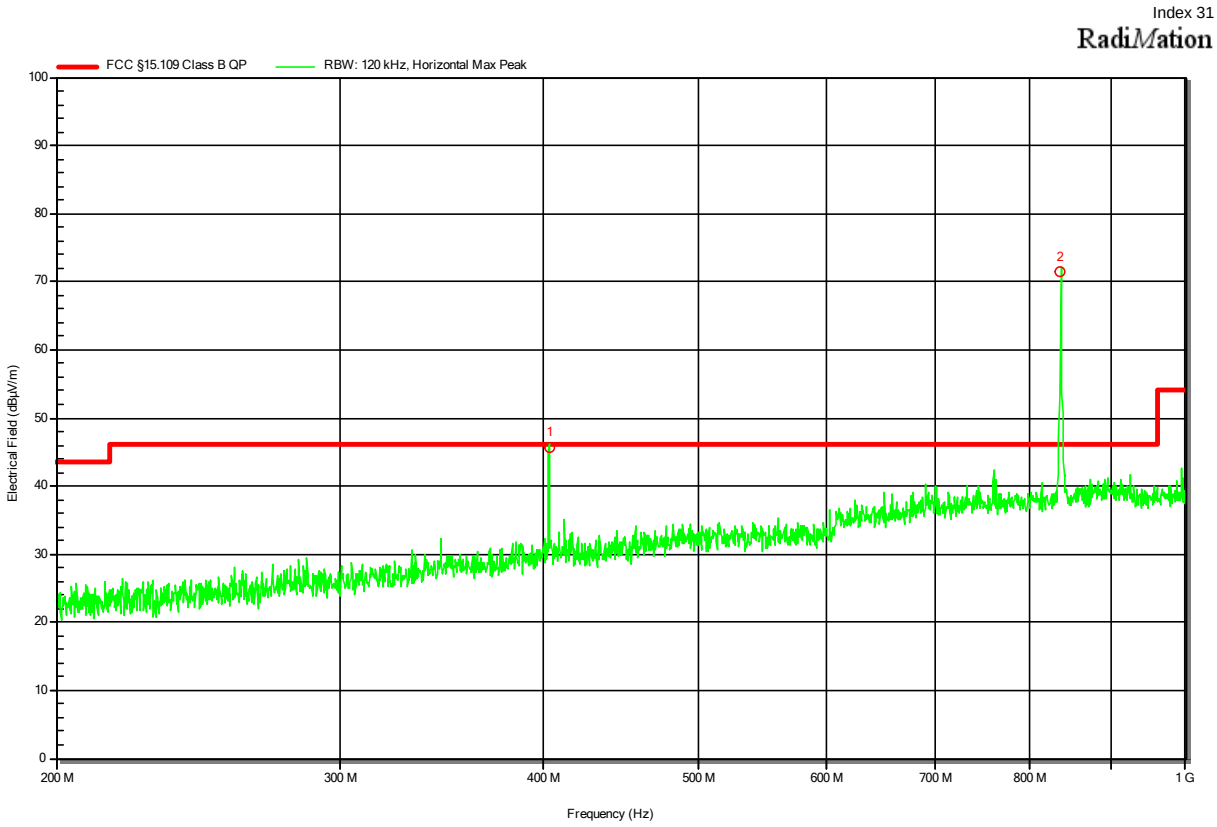
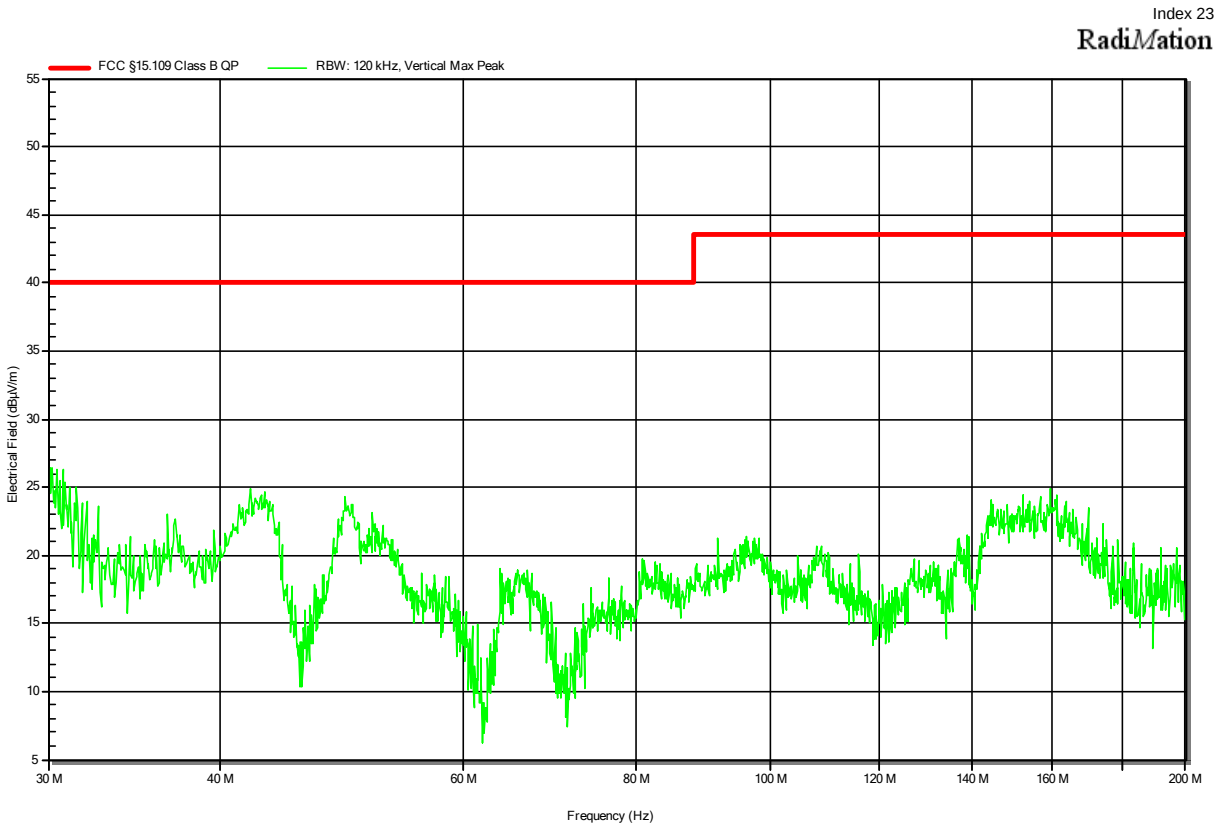
Operational Mode & EUT Configuration:	2 2
Note 1:	Table -10°, Antenna 1 m Peak 1 = MICS carrier, Peak 2 = GSM850 carrier



Peak Number	Frequency
1	403.645 MHz
2	836.976 MHz

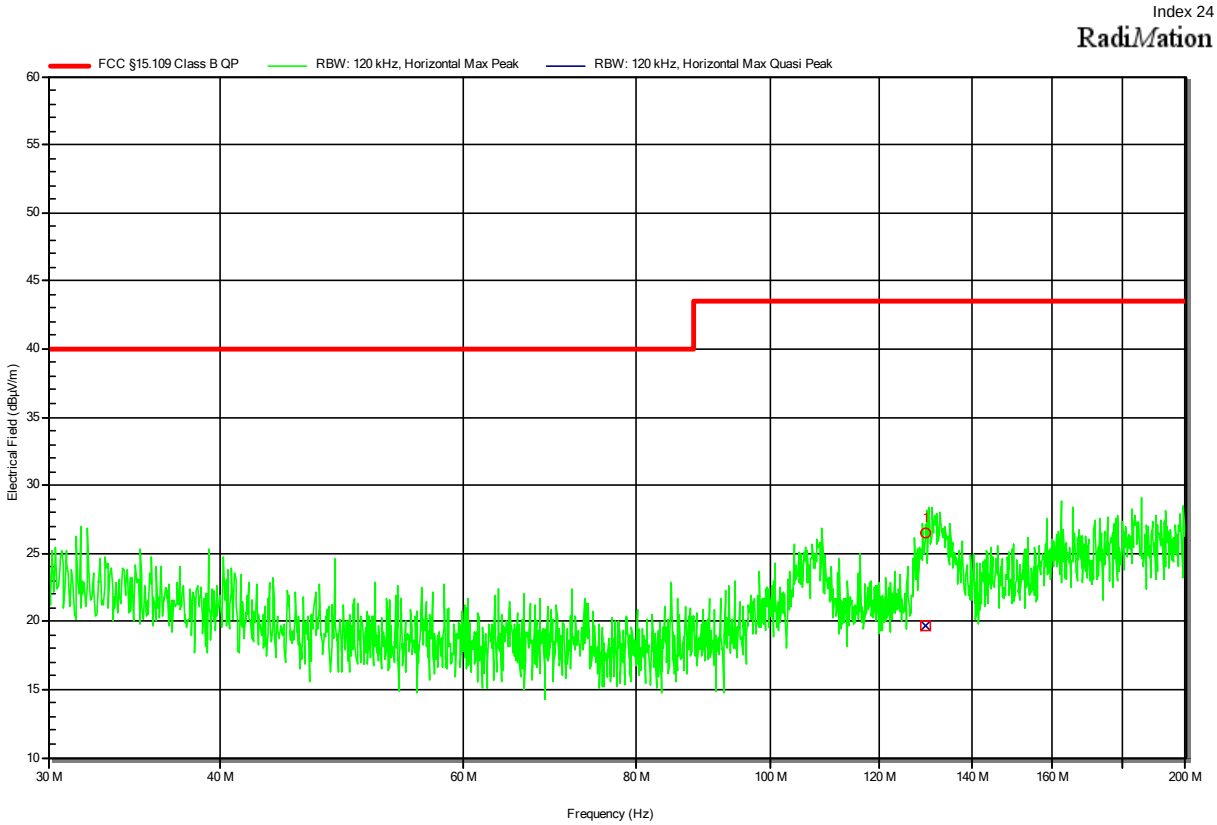
Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	4 2
Note 1:	Table 60°, Antenna 1 m



Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	4 2
Note 1:	



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	129.742 MHz	19.68 dBµV/m	43.52 dBµV/m	-23.84 dB	Pass	180 degrees	2 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	4 2
Note 1:	Table 90°, Antenna 1 m Peak 1 = MICS carrier

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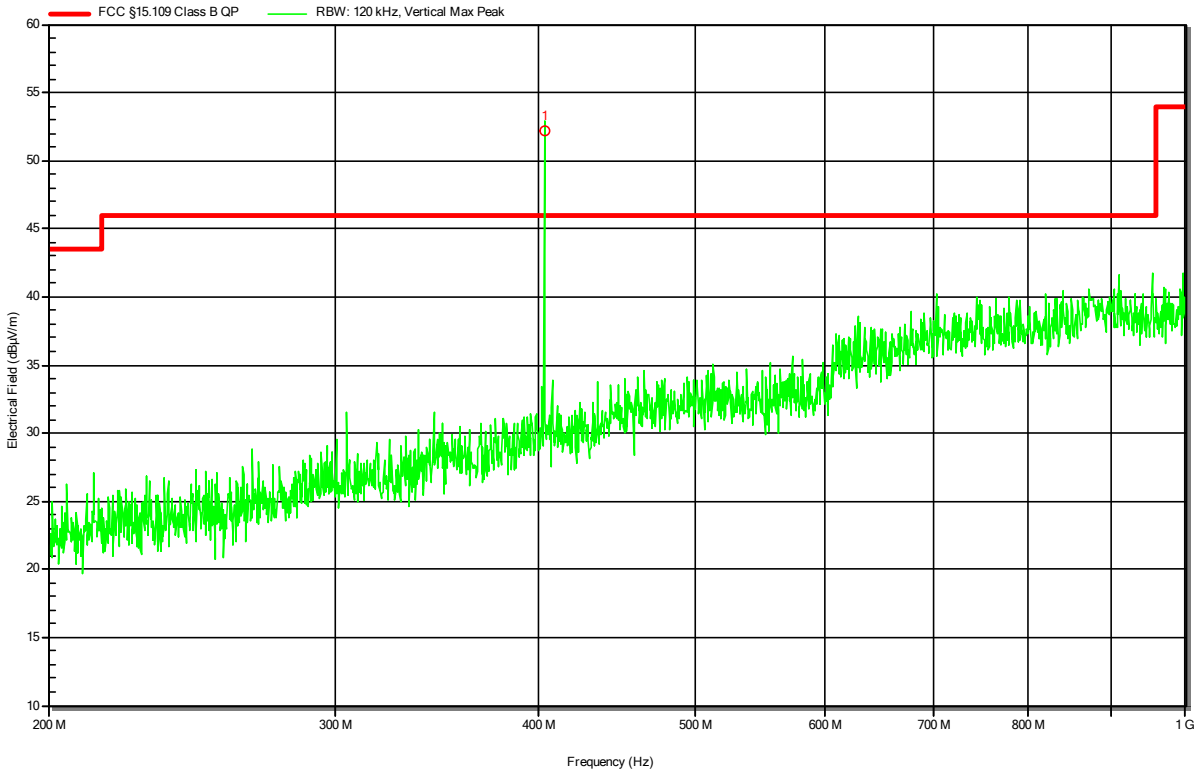
RadiMation



Peak Number	Frequency
1	403.663 MHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-09
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	4 2
Note 1:	Table - 25°, Antenna 1m Peak 1 = MICS carrier

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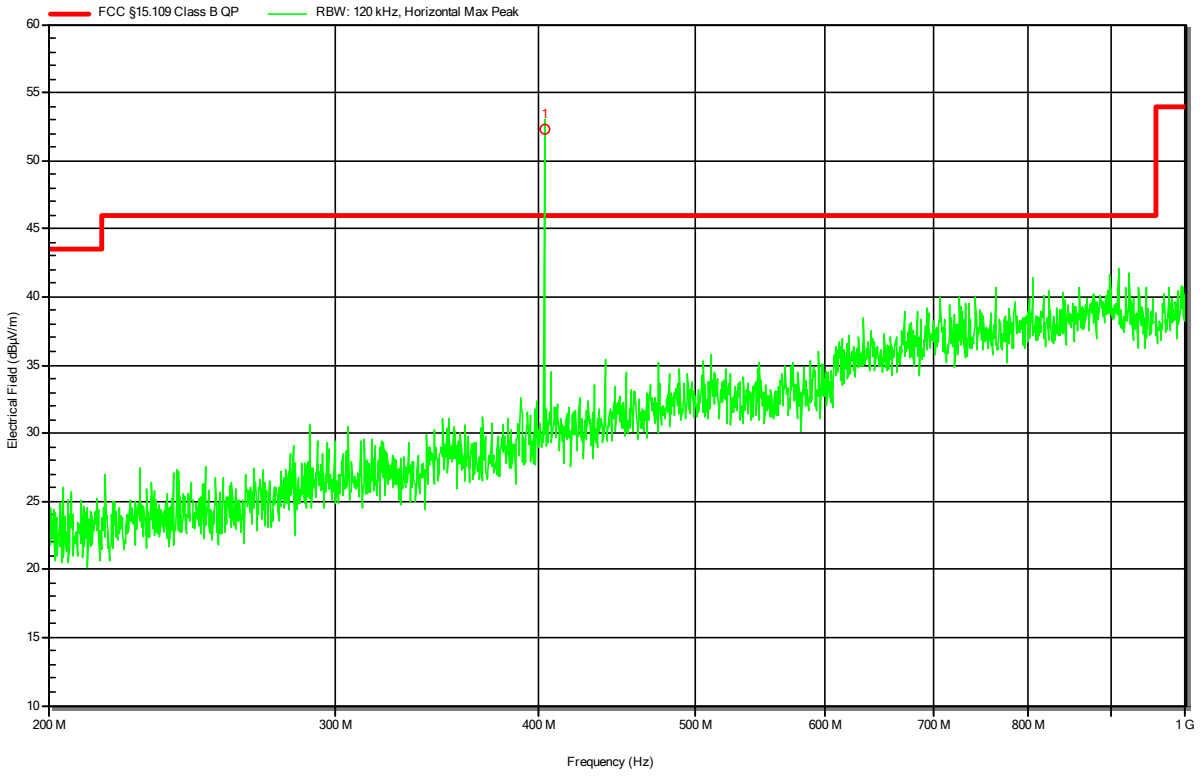
RadiMation



Peak Number	Frequency
1	403.663 MHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	1 1
Note 1:	Table 0°, Antenna 1 m Peak = 2nd Harmonic GSM850

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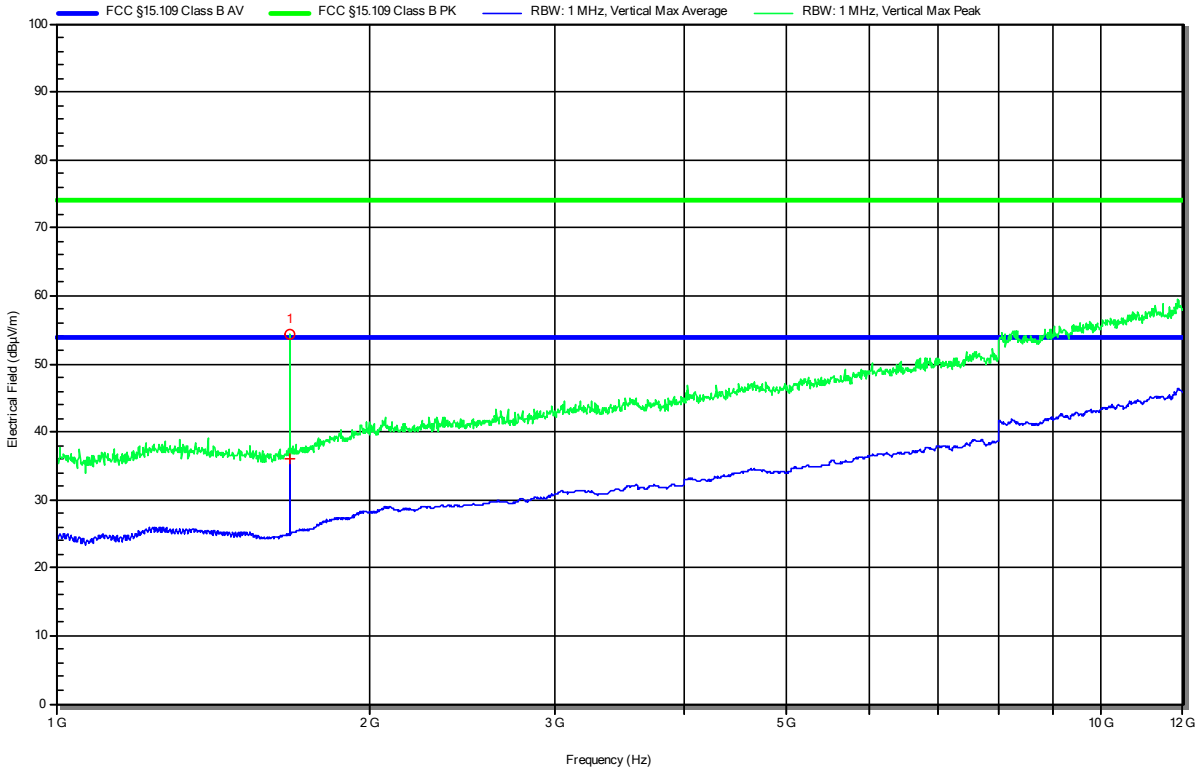
RadiMation



Peak Number	Frequency
1	1.674 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	1 1
Note 1:	Table 0°, Antenna 1 m Peak = 2nd Harmonic GSM850

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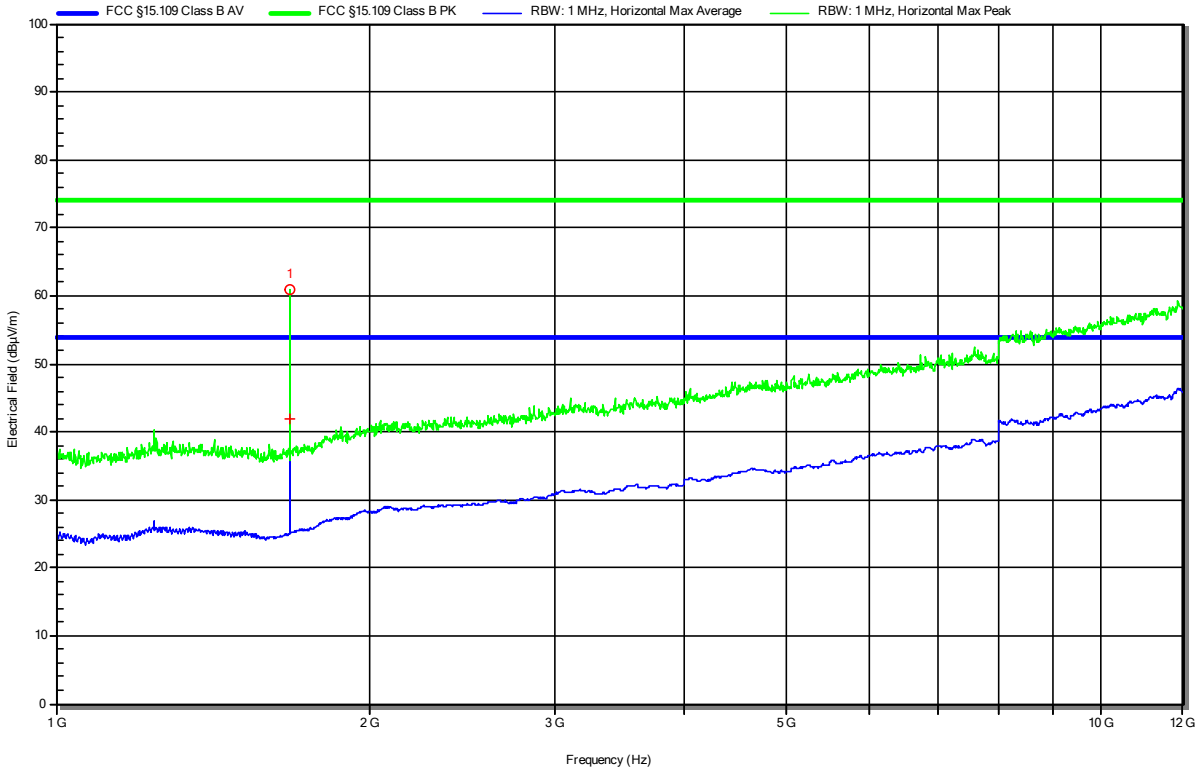
RadiMation



Peak Number	Frequency
1	1.674 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	2 2
Note 1:	Table 0°, Antenna 1m Peak = 2nd Harmonic GSM850

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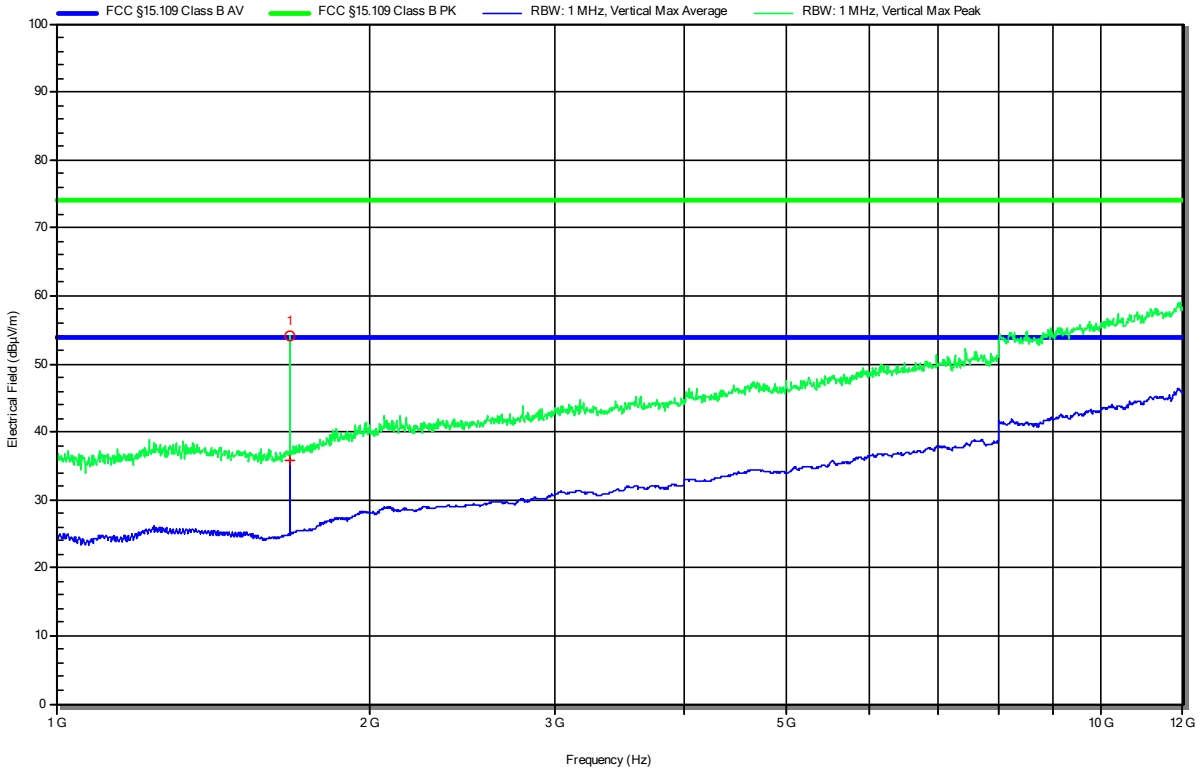
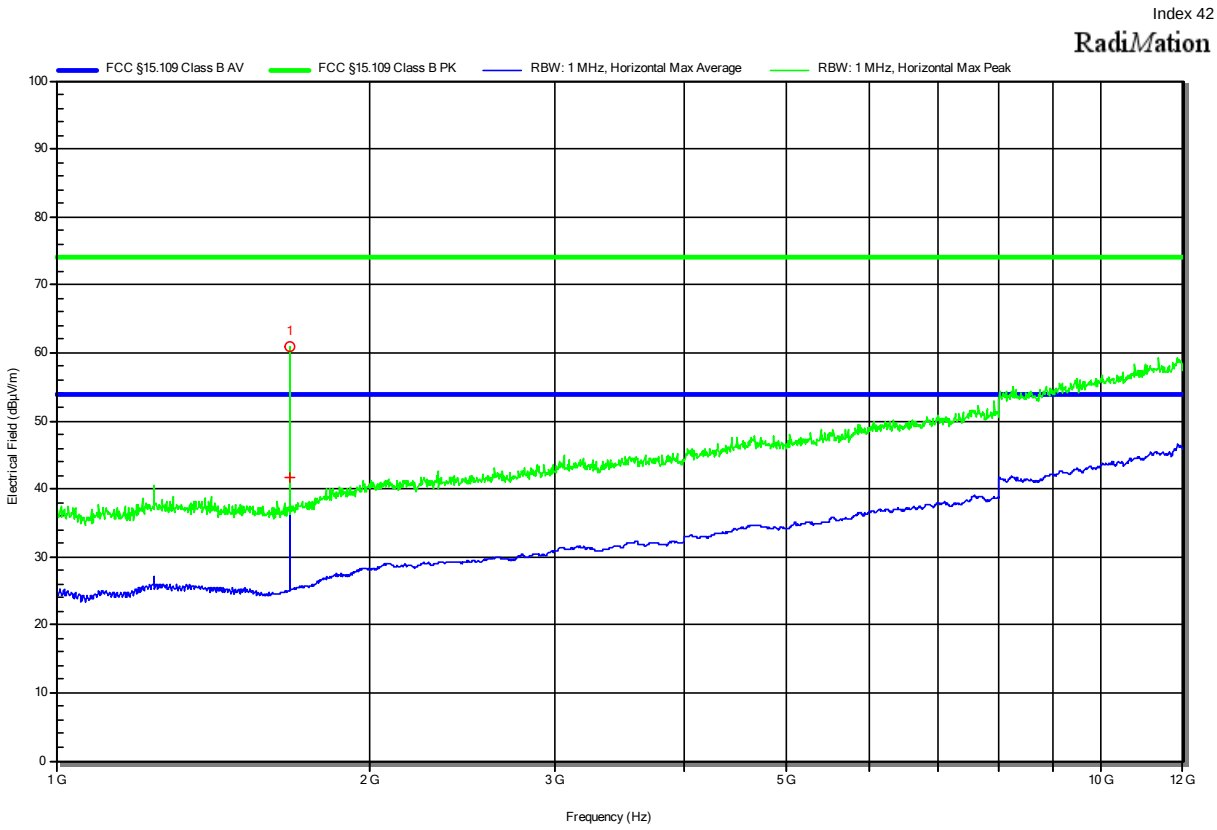
RadiMation



Peak Number	Frequency
1	1.674 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	2 2
Note 1:	Table 0°, Antenna 1 m Peak = 2nd Harmonic GSM850



Peak Number	Frequency
1	1.674 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	3 1
Note 1:	Table 0°, Antenna 1 m Peaks = GSM1900 1st; 2nd Harmonics

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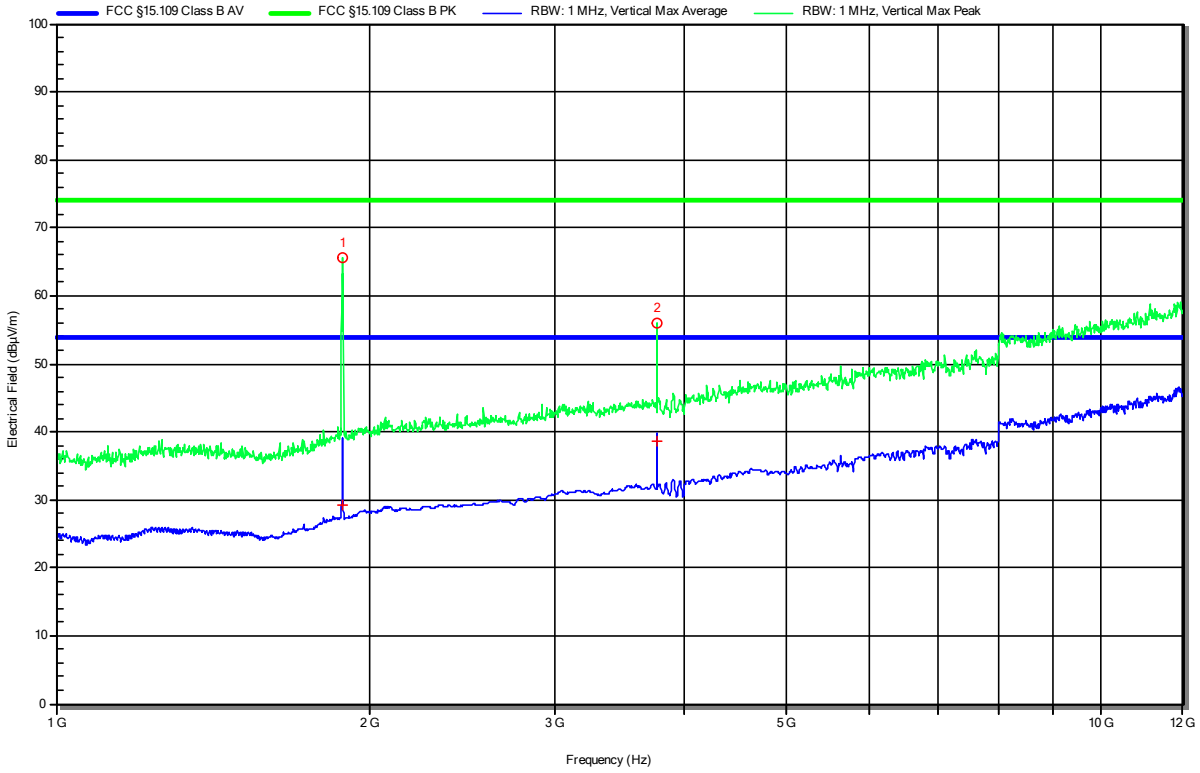
RadiMation



Peak Number	Frequency
1	1.879 GHz
2	3.76 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 3.7 V DC via internal battery
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	3 1
Note 1:	Table 0°, Antenna 1 m Peaks = GSM1900 1st; 2nd Harmonics

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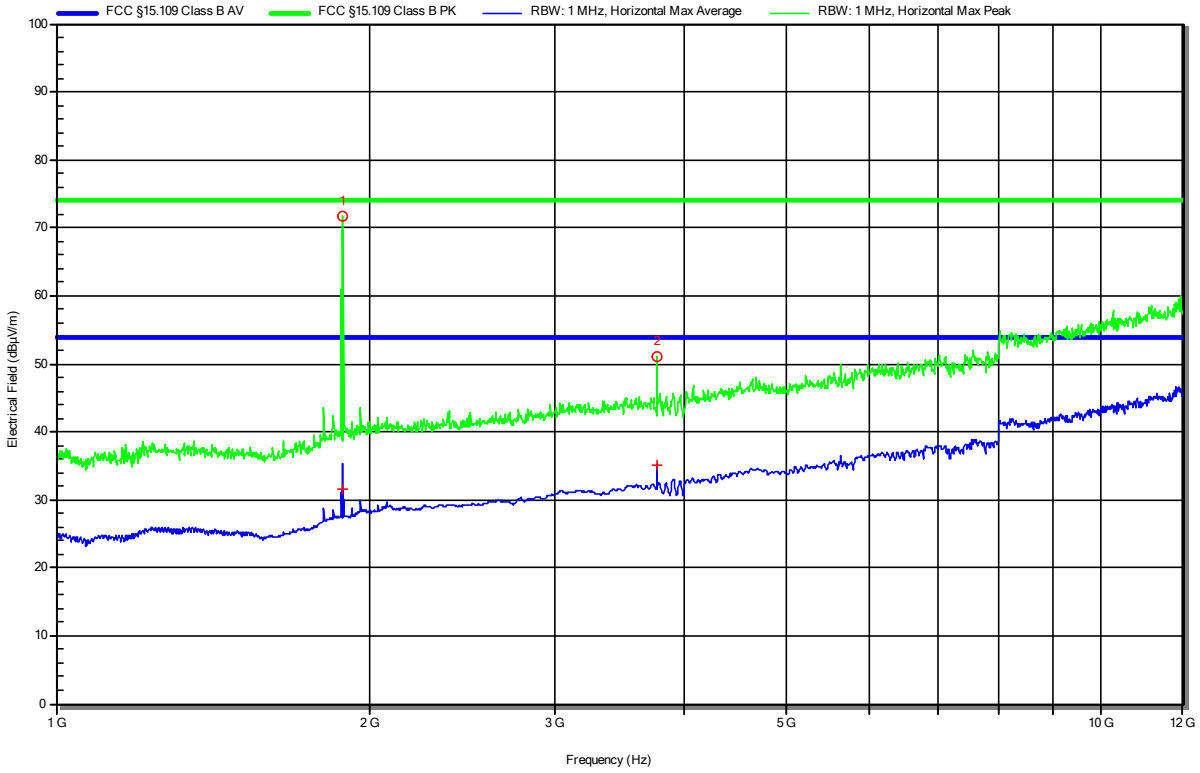
RadiMation



Peak Number	Frequency
1	1.879 GHz
2	3.76 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3m
Operational Mode & EUT Configuration:	4 2
Note 1:	Table 0°, Antenna 1 m Peaks = GSM1900 1st; 2nd Harmonics

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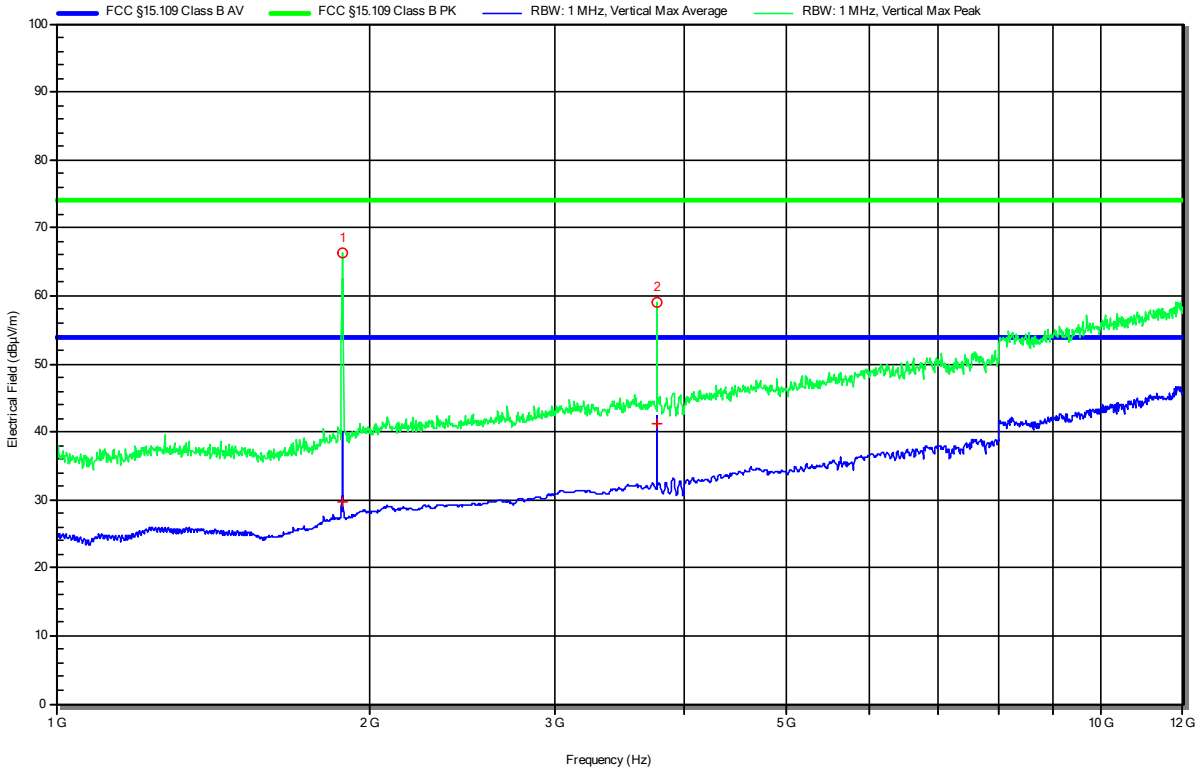
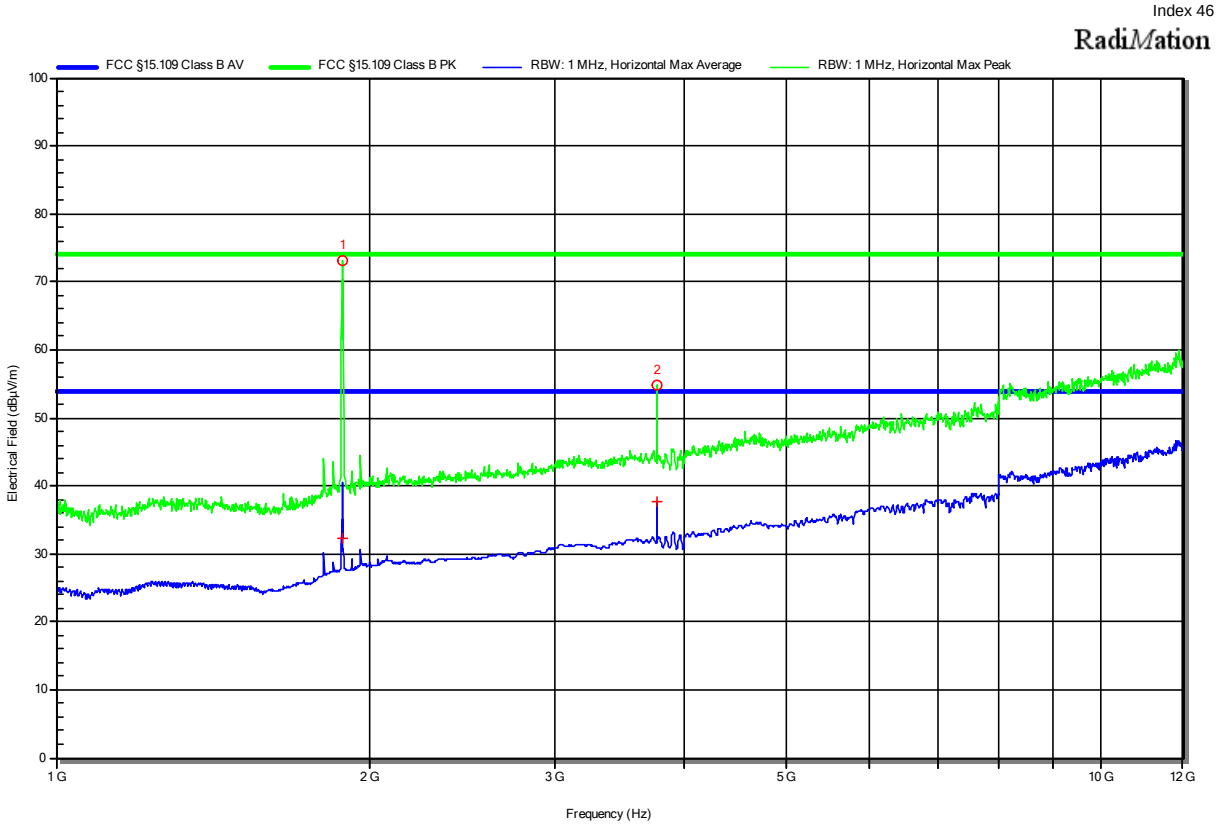
RadiMation



Peak Number	Frequency
1	1.879 GHz
2	3.76 GHz

Radiated emissions
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode & EUT Configuration:	4 2
Note 1:	Table 0°, Antenna 1 m Peaks = GSM1900 1st; 2nd Harmonics



Peak Number	Frequency
1	1.879 GHz
2	3.76 GHz

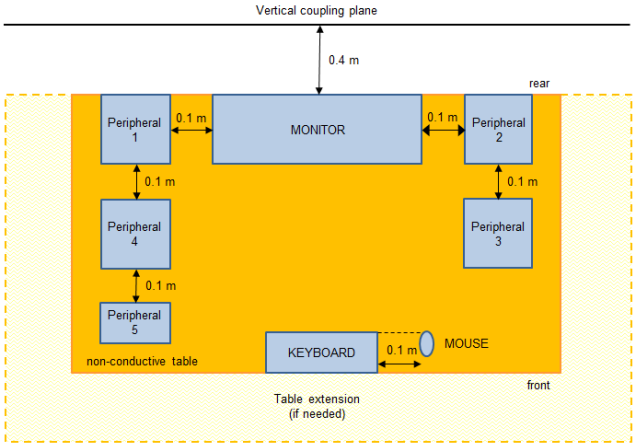
2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

2.2.1 Information

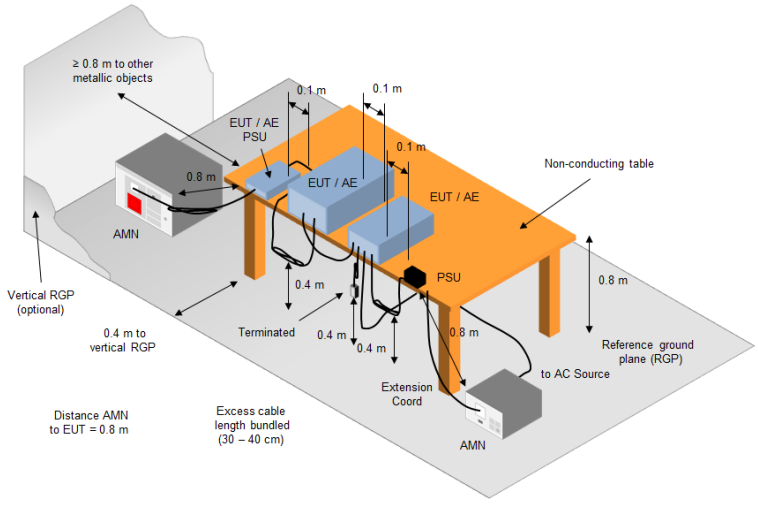
Test Information	
Reference	FCC 15.107, ICES-003, 6.1
Reference method	ANSI C63.4:2014+A1:2017 Section 12
Measurement range	150 kHz to 30 MHz
Equipment class	Class B
Equipment type	Table top
Temperature [°C]	21 – 22
Humidity [%]	18 – 20
Operator	Marco Belz
Date	2021-03-10

2.2.2 Setup

Equipment placement



Test Setup



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8127	EF01592	2020-07	2021-07
AMN	R&S	ESH3-Z5	EF00036	2019-07	2021-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2020-07	2021-07
EMI Test Receiver	R&S	ESR 7	EF00943	2020-07	2021-07
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2020-03	2021-03

2.2.4 Procedure

Exploratory measurement
1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. I/O cables were bundled not longer than 0.4 m
6. Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor
7. To maximize the emissions the cable positions were manipulated
8. The worst configuration of EUT and cables is shown on a test setup picture at item 2.2.2

Final measurement
1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. The EUT and cable arrangement were based on the exploratory measurement results
6. The test data of the worst-case conditions were recorded and shown on the next pages

2.2.5 Limits

Class B		
Frequency [MHz]	Quasi-peak Limit [dBµV]	Average Limit [dBµV]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50
* Decreases with the logarithm of the frequency		

2.2.6 Results

AC power line conducted emissions					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
USB	AMN	2	2	PASS	-
USB	AMN	4	2	PASS	-

Conducted emissions at the mains power port
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369 (Charger)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode & EUT Configuration:	2 2
Applied to Port:	USB via AC/DC Adapter
Note 1:	

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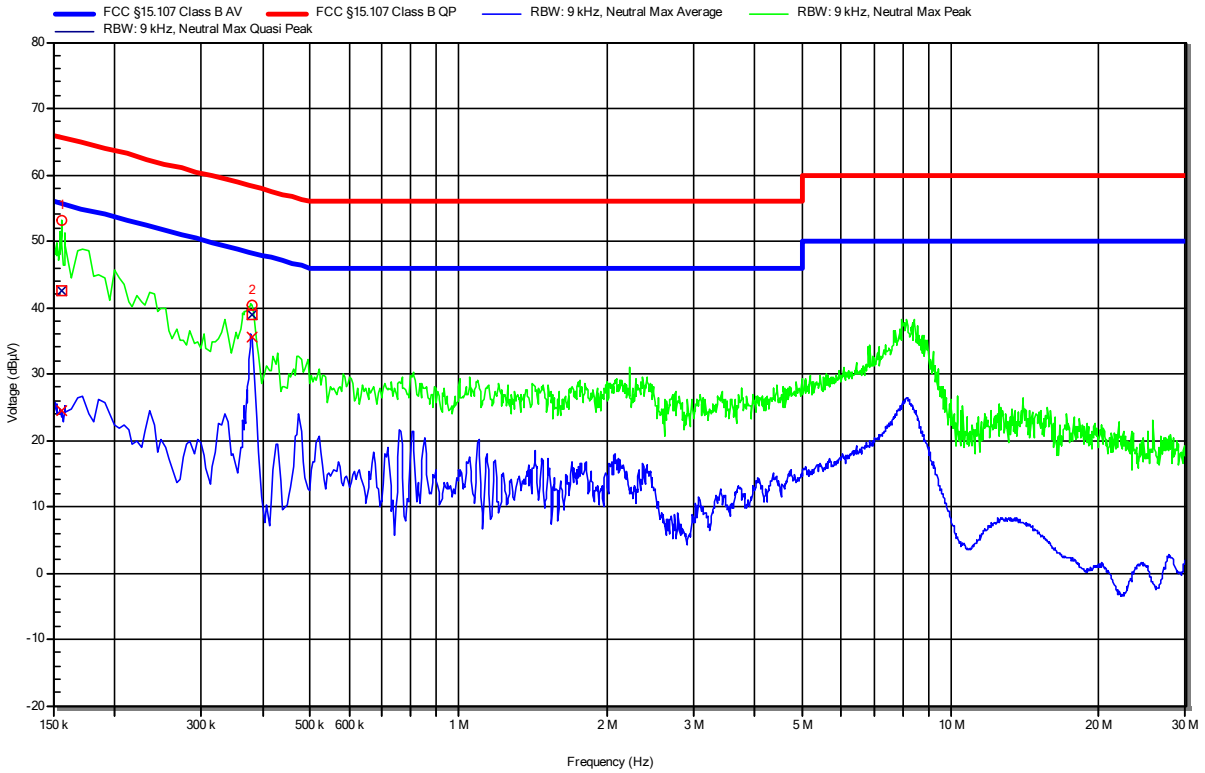
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	156.3 kHz	42.45 dBµV	65.66 dBµV	-23.21 dB	Pass	Neutral
2	379.5 kHz	38.85 dBµV	58.29 dBµV	-19.44 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	156.3 kHz	24.43 dBµV	55.66 dBµV	-31.23 dB	Pass	Neutral
2	379.5 kHz	35.59 dBµV	48.29 dBµV	-12.7 dB	Pass	Neutral

Conducted emissions at the mains power port
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369 (Charger)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode & EUT Configuration:	2 2
Applied to Port:	USB via AC/DC Adapter
Note 1:	

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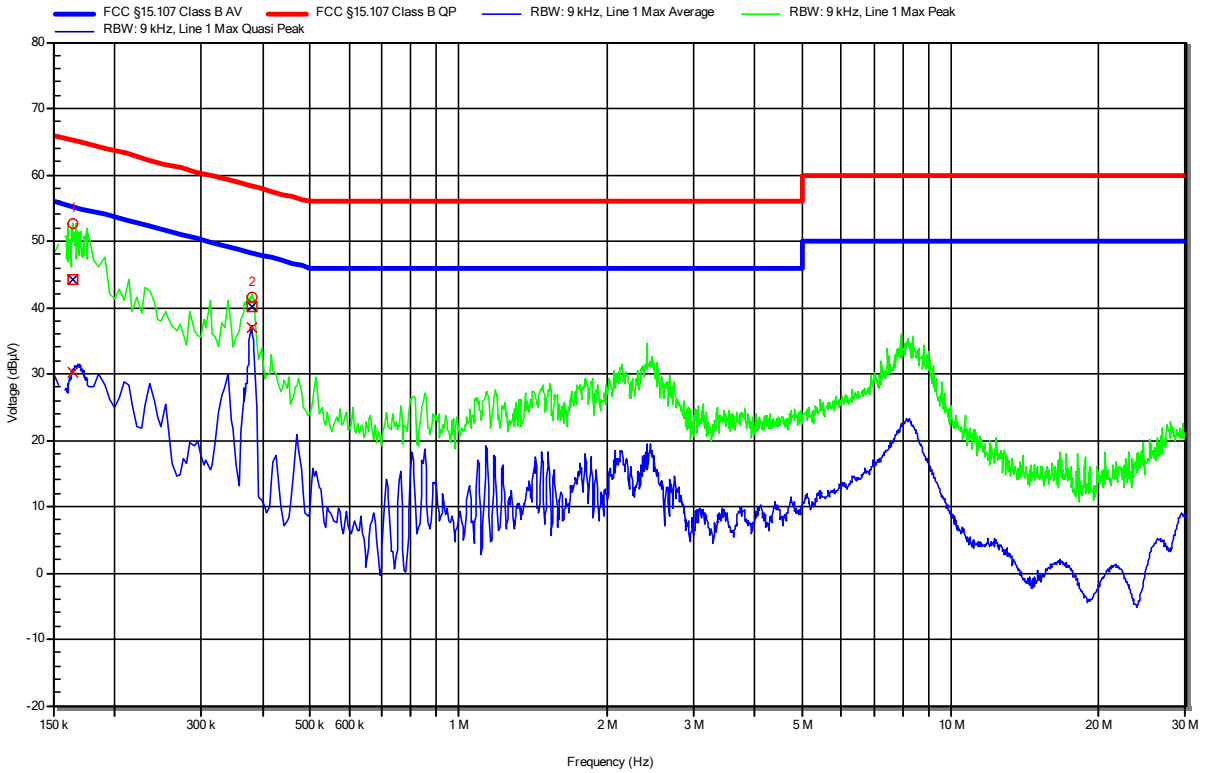
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	164.4 kHz	44.31 dBµV	65.24 dBµV	-20.92 dB	Pass	Line 1
2	379.95 kHz	40.01 dBµV	58.28 dBµV	-18.27 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	164.4 kHz	30.34 dBµV	55.24 dBµV	-24.9 dB	Pass	Line 1
2	379.95 kHz	37.1 dBµV	48.28 dBµV	-11.18 dB	Pass	Line 1

Conducted emissions at the mains power port
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369 (Charger)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode & EUT Configuration:	4 2
Applied to Port:	USB via AC/DC Adapter
Note 1:	

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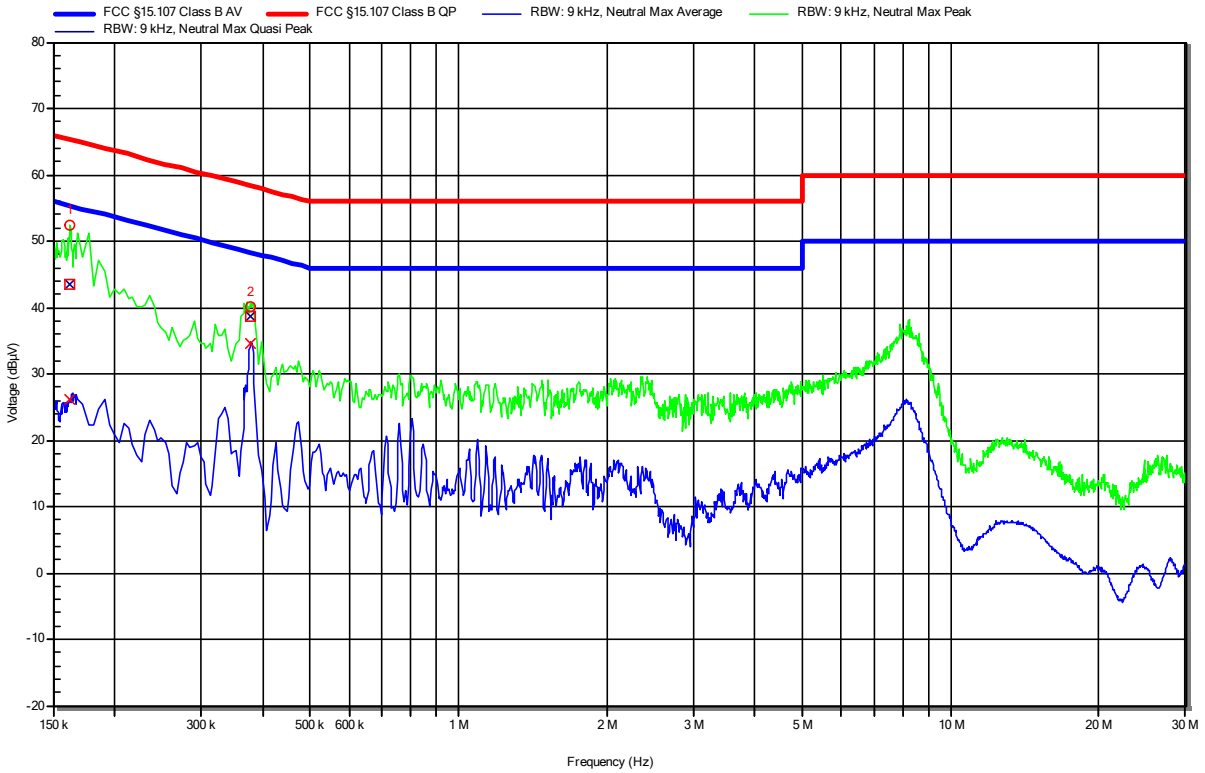
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	162.15 kHz	43.39 dBµV	65.35 dBµV	-21.96 dB	Pass	Neutral
2	377.7 kHz	38.76 dBµV	58.33 dBµV	-19.57 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	162.15 kHz	26.18 dBµV	55.35 dBµV	-29.17 dB	Pass	Neutral
2	377.7 kHz	34.53 dBµV	48.33 dBµV	-13.8 dB	Pass	Neutral

Conducted emissions at the mains power port
according to FCC part 15B

Project Number:	G0M-1908-8377
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	CardioMessenger Smart / Telemonitorig System
Model:	CardioMessenger Smart 4G
Test Sample ID:	33611 + 26369 (Charger)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Belz
Test Date:	2021-03-10
Operating Conditions:	ambient temperature: 22 °Celsius power input: 120 V / 60 Hz via external AC/DC Adapter
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode & EUT Configuration:	4 2
Applied to Port:	USB via AC/DC Adapter
Note 1:	

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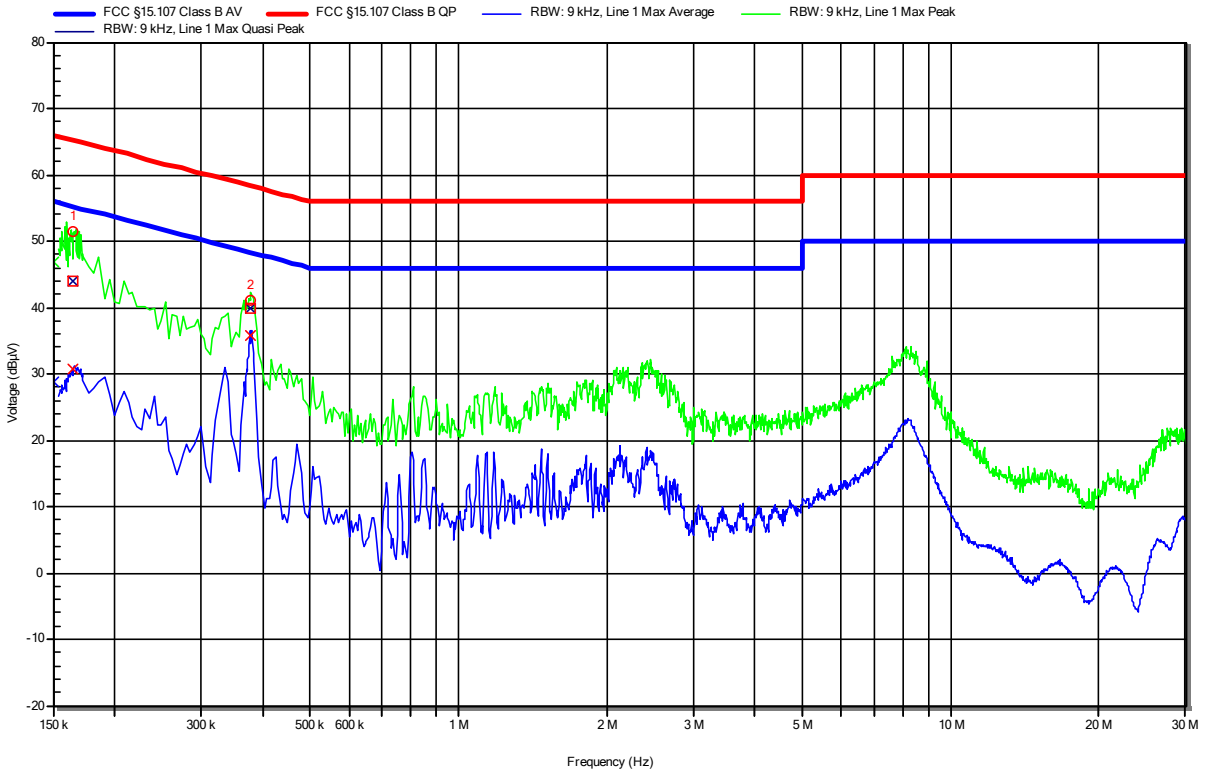
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	165.3 kHz	43.96 dBµV	65.19 dBµV	-21.24 dB	Pass	Line 1
2	378.15 kHz	39.97 dBµV	58.32 dBµV	-18.35 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	165.3 kHz	30.65 dBµV	55.19 dBµV	-24.55 dB	Pass	Line 1
2	378.15 kHz	35.77 dBµV	48.32 dBµV	-12.55 dB	Pass	Line 1