

EMC TEST REPORT FCC 47 CFR Part 15B, ISED ICES-003 Issue 6	
Report Reference No	G0M-1909-8467-EF0115B-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 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	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Programming device
Model(s)	BIOWand
Additional Model(s)	None
Brand Name(s)	BIOTRONIK
Hardware Version(s)	B
Software Version(s)	BFW_FW_1_0_x
FCC-ID	QRI-BIOWAND
IC	-/-
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	2019-09-16	
Report:		
Compiled by	Stephan Liebich	
Tested by (+ signature) (Responsible for Test)	Stephan Liebich	  
	Stefan Dose	
	Matthias Handrik	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2020-01-07	
Total number of pages	40	
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	2020-01-07	Initial Release	

REPORT INDEX

1	Equipment (Test Item) Under Test.....	6
1.1	Equipment Ports.....	7
1.2	Equipment Photos - Internal.....	8
1.3	Equipment Photos - External.....	13
1.4	Support Equipment.....	19
1.5	Operational Modes.....	19
1.6	EUT Configuration.....	19
1.7	Sample emission level calculation.....	20
2	Result Summary.....	21
2.1	Test Conditions and Results - Radiated emissions acc. to ANSI C63.4.....	22
2.2	Test Conditions and Results - Conducted emissions acc. to ANSI C63.4.....	35

1 Equipment (Test Item) Under Test

Description	Programming device	
Model	BIOwand	
Additional Model(s)	None	
Brand Name(s)	BIOTRONIK	
Serial Number(s)	80300002 and 80300001	
Hardware Version(s)	B	
Software Version(s)	BFW_FW_1_0_x	
FCC-ID	QRI-BIOWAND	
IC	-/-	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	2500	
Radio Module	Type	Bluetooth Low Energy
	Model	Telit
	Manufacturer	BlueMod+S50/AP
	FCC-ID	RFR-S50
	IC	4957A-S50
Supply Voltage	V _{NOM}	120 V / 60 Hz
AC/DC-Adaptor	Model	FW8000M/12
	Vendor	FRIWO
	Input	100-240 V / 50-60 Hz
	Output	12 V DC
Manufacturer	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY	

1.1 Equipment Ports

Name	Type	Attributes	Comment
Power	AC	Count: 1 Direction: In Service only: No	-
PGH	IO	Count: 1 Direction: IO Service only: No	-
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		

1.2 Equipment Photos - Internal

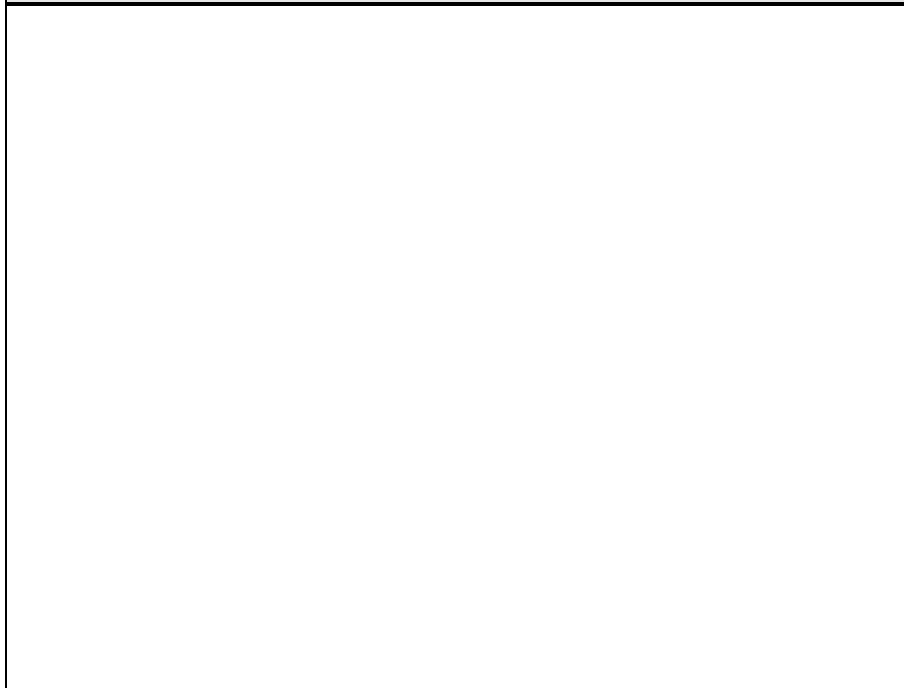
EUT PCB

EUT PCB FOCUS

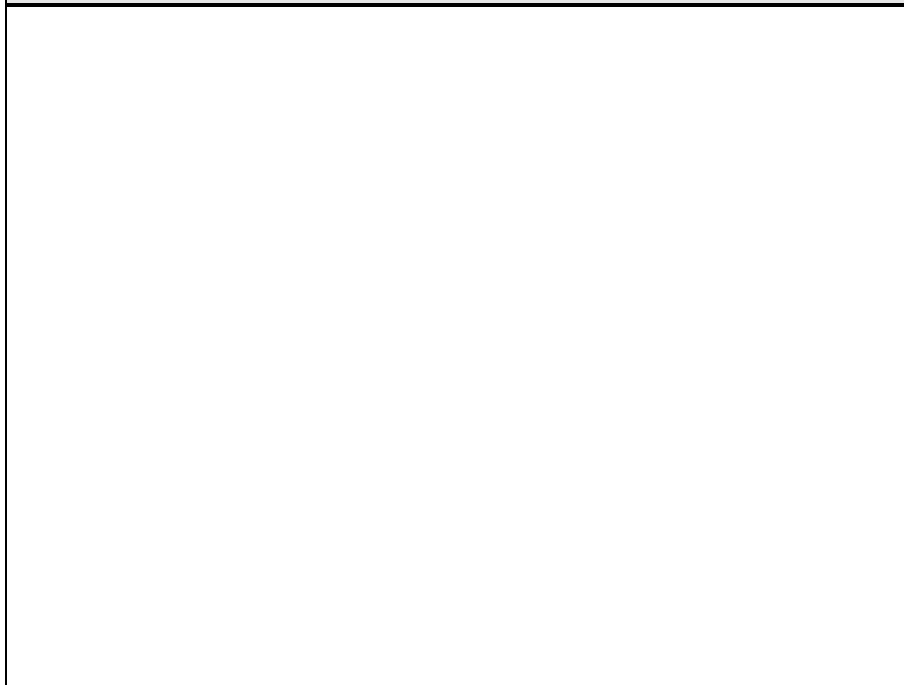
PGH BOTTOM SIDE

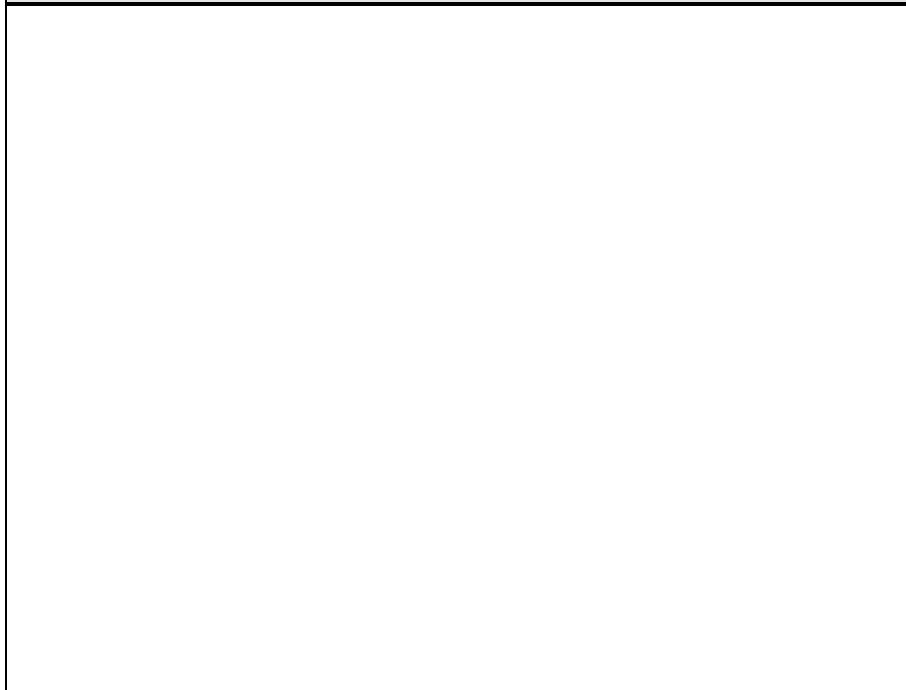
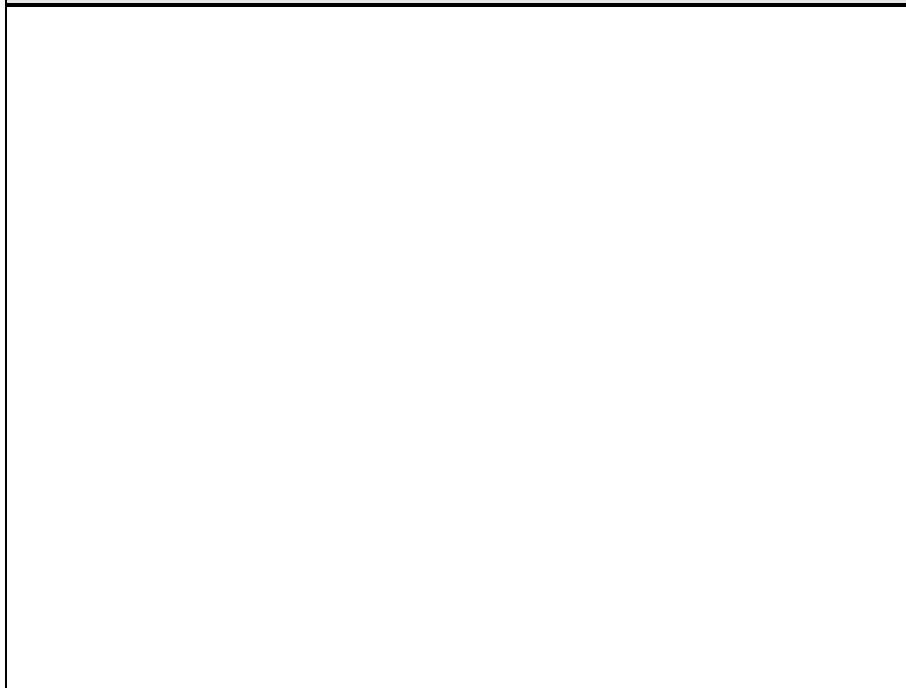
PGH TOP SIDE

PGH INNER BRACKET TOP SIDE



PGH INNER BRACKET BOTTOM SIDE



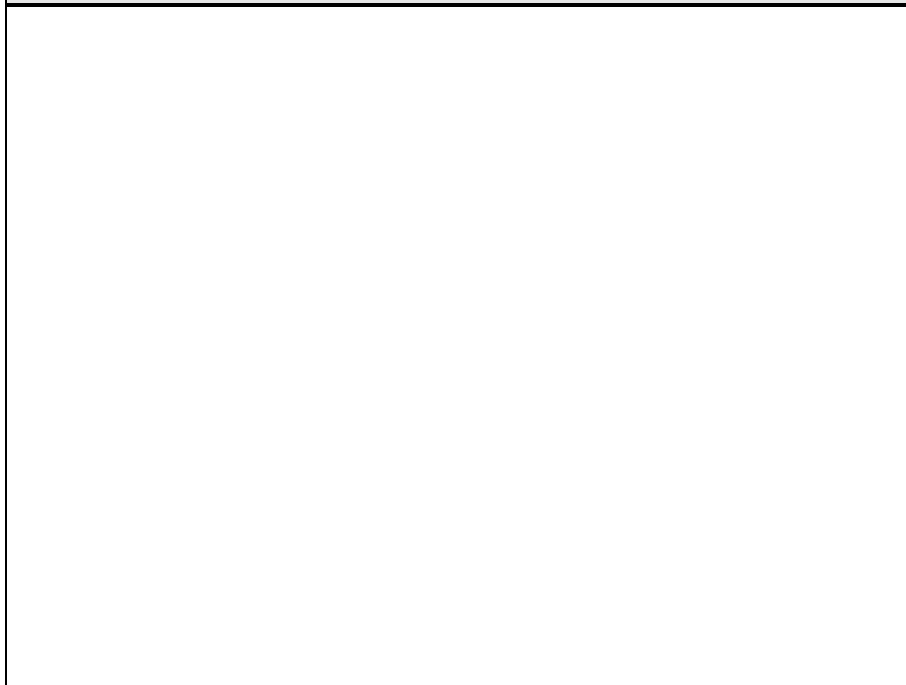
PGH WITHOUT INNER BRACKET TOP SIDE**PGH PCB RIGHT SIDE**

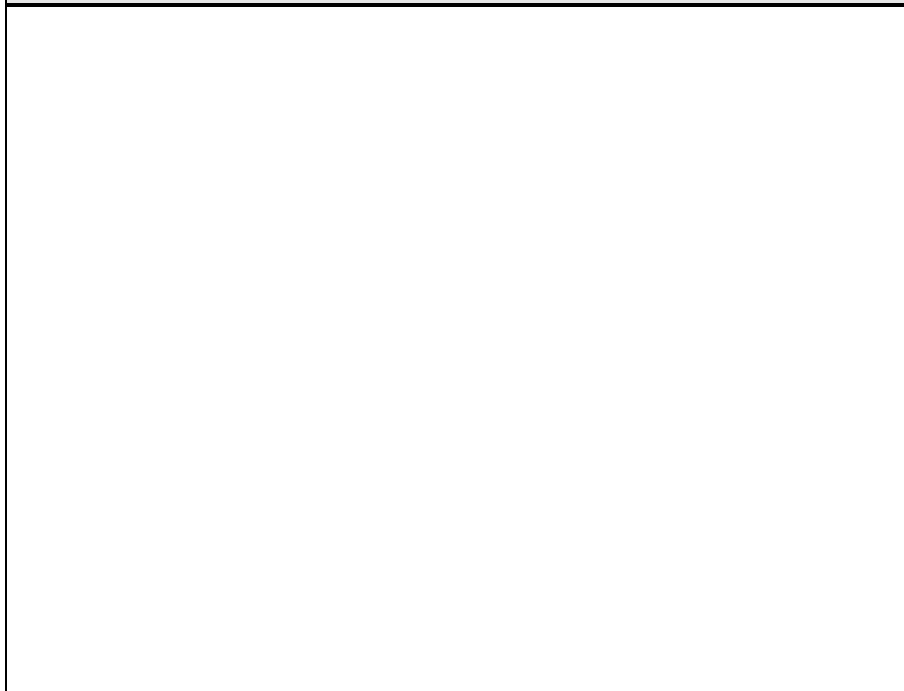
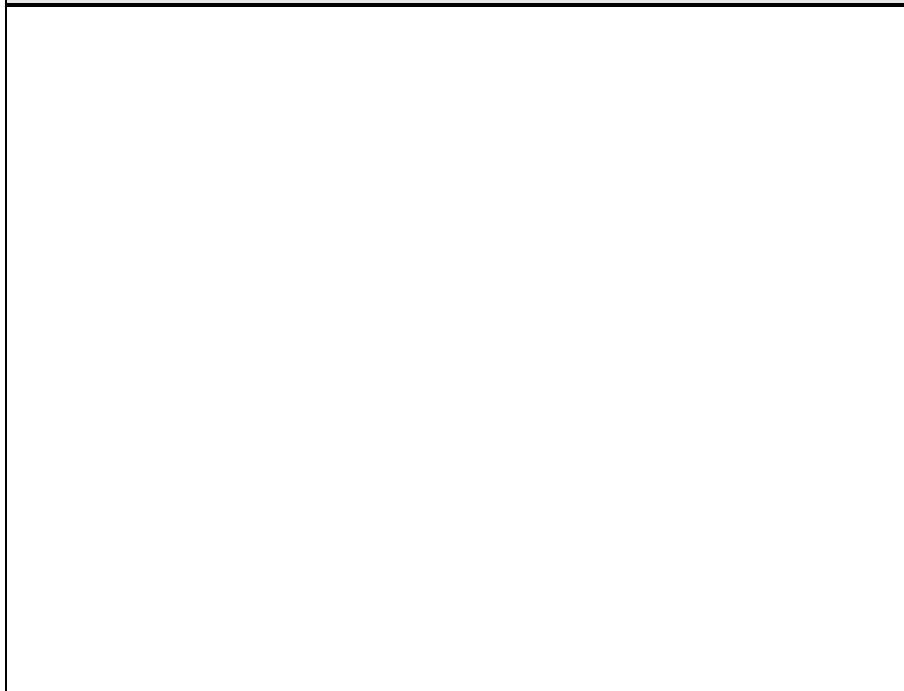
PGH PCB LEFT SIDE

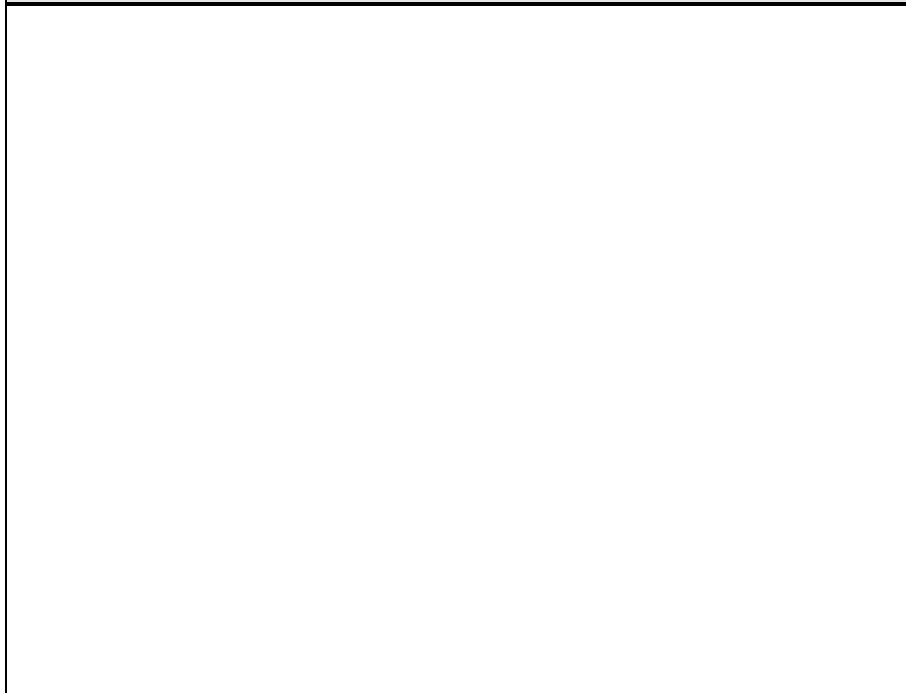
1.3 Equipment Photos - External

EUT TOP SIDE

EUT BOTTOM SIDE

EUT CONNECTOR SIDE**EUT TOP RIGHT SIDE**

EUT BOTTOM LEFT SIDE**PGH TOP SIDE**

PGH BOTTOM SIDE**EUT TOP RIGHT SIDE**

PGH CONNECTOR**AC/DC-ADAPTER LEFT SIDE**

AC/DC-ADAPTER BACK SIDE**AC/DC-ADAPTER LABEL**

1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	PC Laptop	Dell	Latitude 7490	Monitoring equipment
SIM	Implant	BIOTRONIK SE & Co KG	Lumax	Companion device for coil telemetry
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Bluetooth 5 Low Energy 2.4 GHz Tx + COIL Tx (EUT receives information via PGH (COIL) and sends these data via Bluetooth Low Energy to a receiver)
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT powered up and powered via AC/DC-Adapter with 120 V / 60 Hz external power supply. PGH is connected with EUT and scans the Implant. EUT is paired to Laptop via Bluetooth Low Energy.
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:

$$\text{Reading on Analyser (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

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:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

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, 8, 6.1	Radiated emissions	ANSI C63.4:2014	PASS	1
FCC 15.107 ICES-003, 8, 6.2	AC power line conducted emissions	ANSI C63.4:2014	PASS	1
Comment: 1 → The test data of the worst-case conditions were recorded and shown on the next pages.				

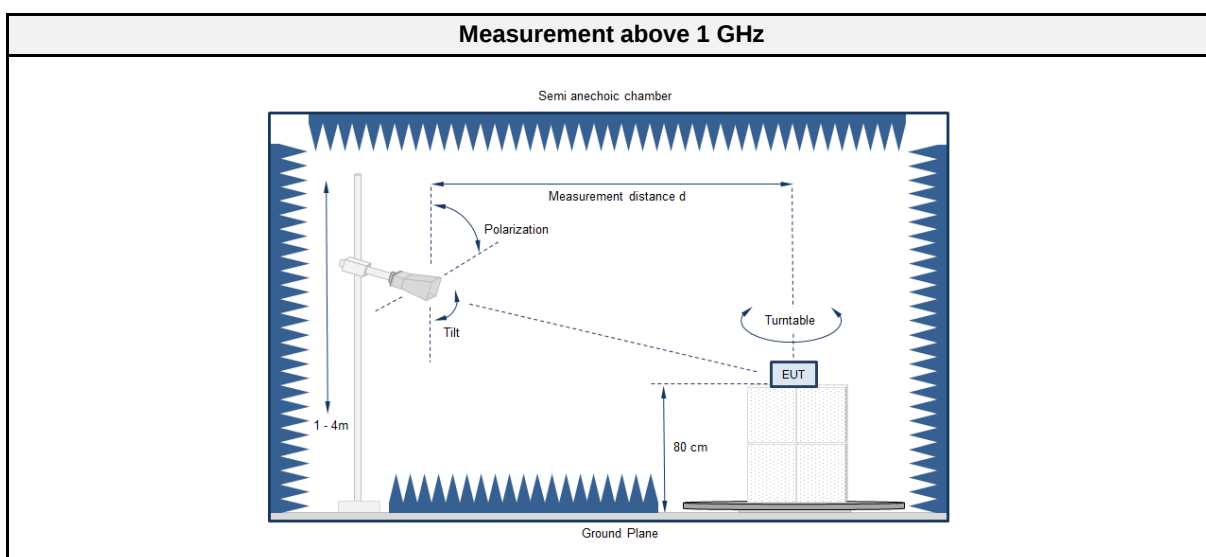
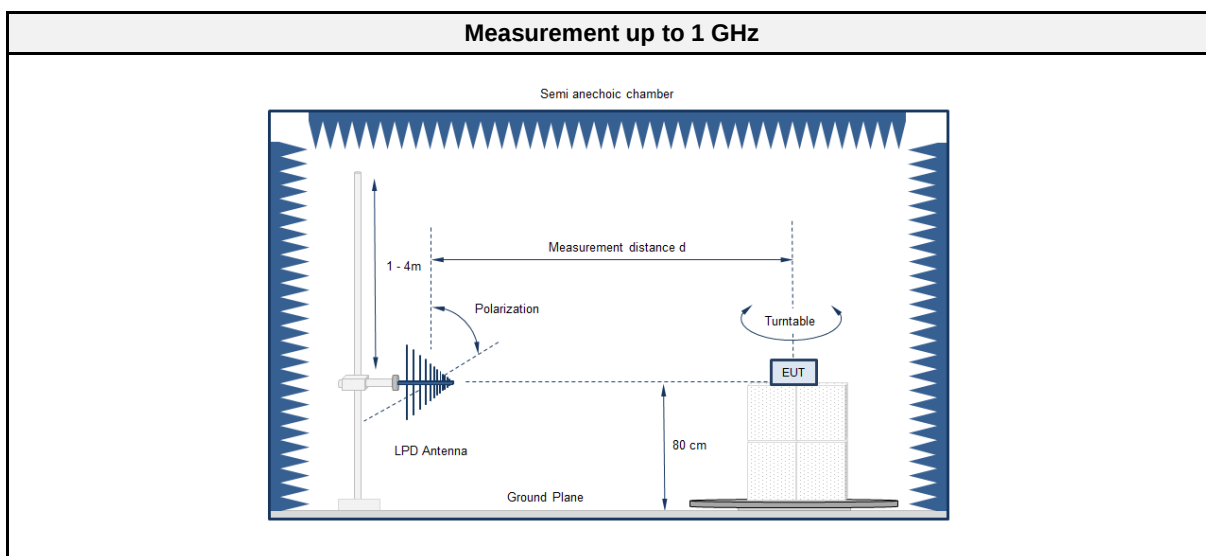
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

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

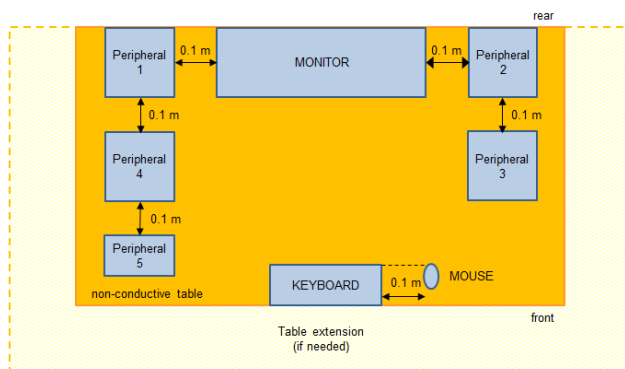
2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 8, 6.1
Reference method	ANSI C63.4:2014 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2500
Measurement range	30 MHz to 12500 MHz
Temperature [°C]	21
Humidity [%]	46
Operator	Stephan Liebich
Date	2019-09-17

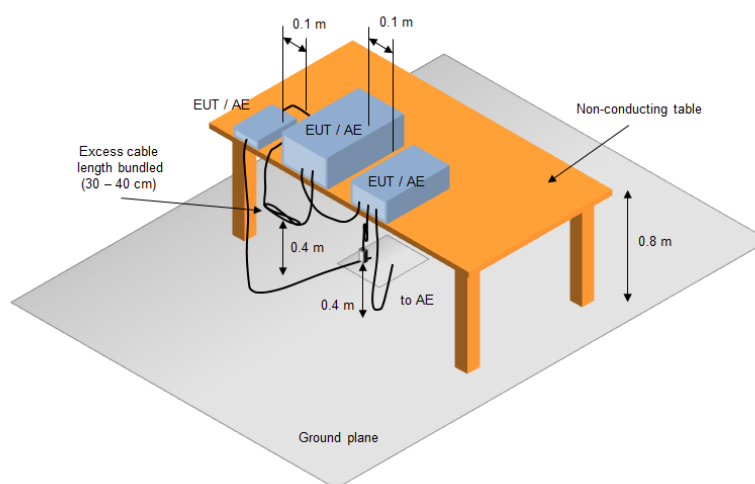
2.1.2 Setup



Equipment placement - Table top



Test Setup



2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00062	2018-07	2021-07
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESU8	EF00379	2019-07	2020-07
Biconical Antenna	R&S	HK 116	EF00030	2019-04	2022-04
LPD Antenna	R&S	HL 223	EF00187	2019-05	2022-05
Horn Antenna	ETS-Lindgren	3117	EF01256	2019-09	2020-09

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 1.3

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 [dB μ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak	74
	Average	54

Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak	69.5
	Average	49.5

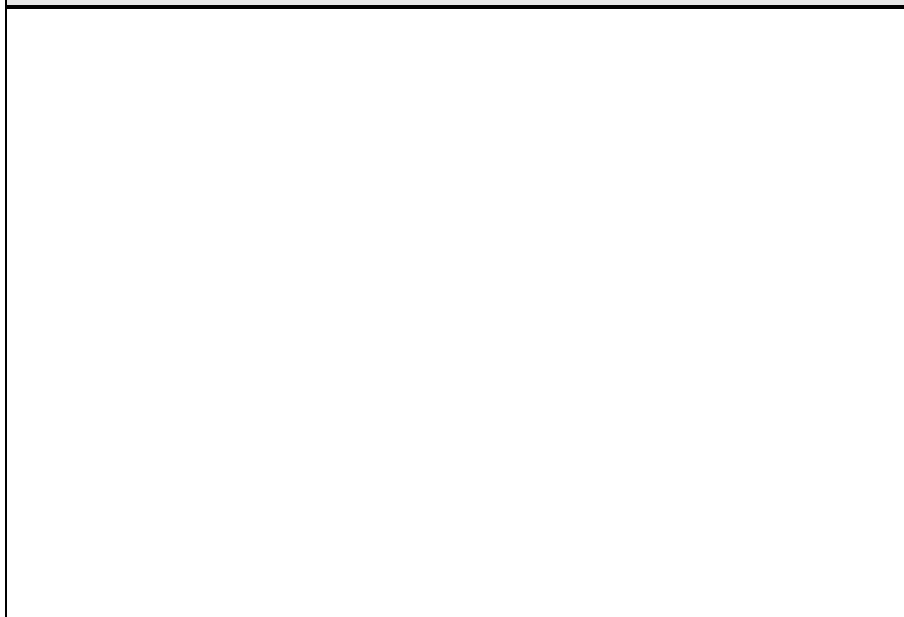
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-
Comment: 1 → The test data of the worst-case conditions were recorded and shown on the next pages.			

2.1.7 Setup Photos

TEST SETUP: RADIATED EMISSION < 200 MHz

TEST SETUP: RADIATED EMISSION < 1 GHz

TEST SETUP: RADIATED EMISSION > 1 GHz**TEST SETUP FOCUS: RADIATED EMISSION**

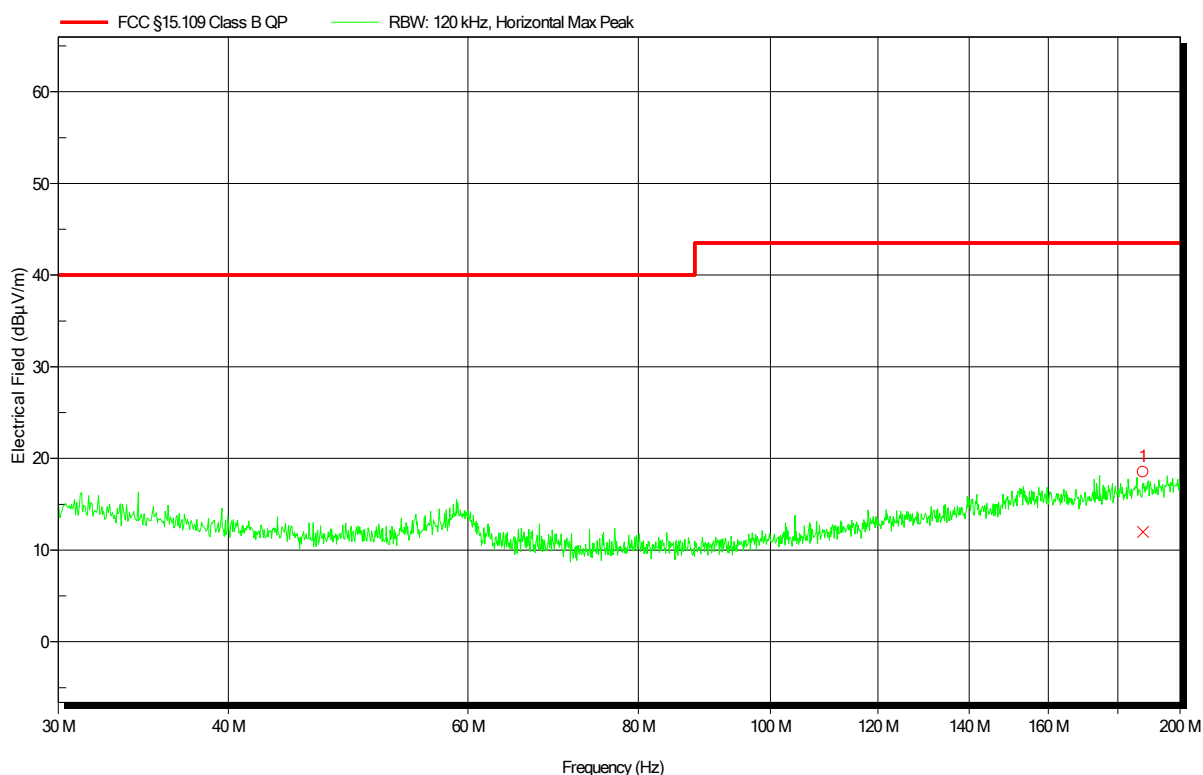
2.1.8 Records

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Programming device
 Model: BLOWand
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-09-17
 Note:

Index 48



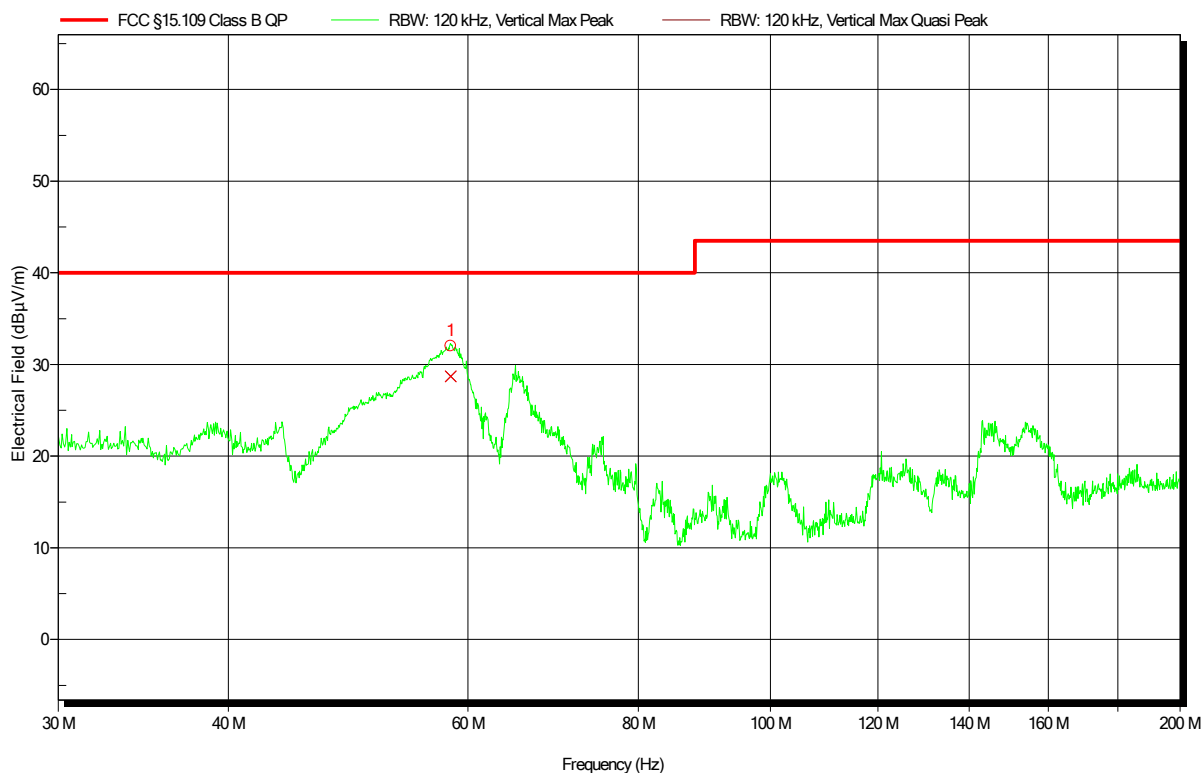
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	187.86 MHz	11.97 dBμV/m	43.52 dBμV/m	-31.55 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Programming device
Model: BLOWand
Test Site: Eurofins Product Service GmbH
Operator: Mr. Liebich
Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
Antenna: Rohde & Schwarz HK 116, Vertical
Measurement distance: 3m
Mode: 1
Test Date: 2019-09-17
Note:

Index 47



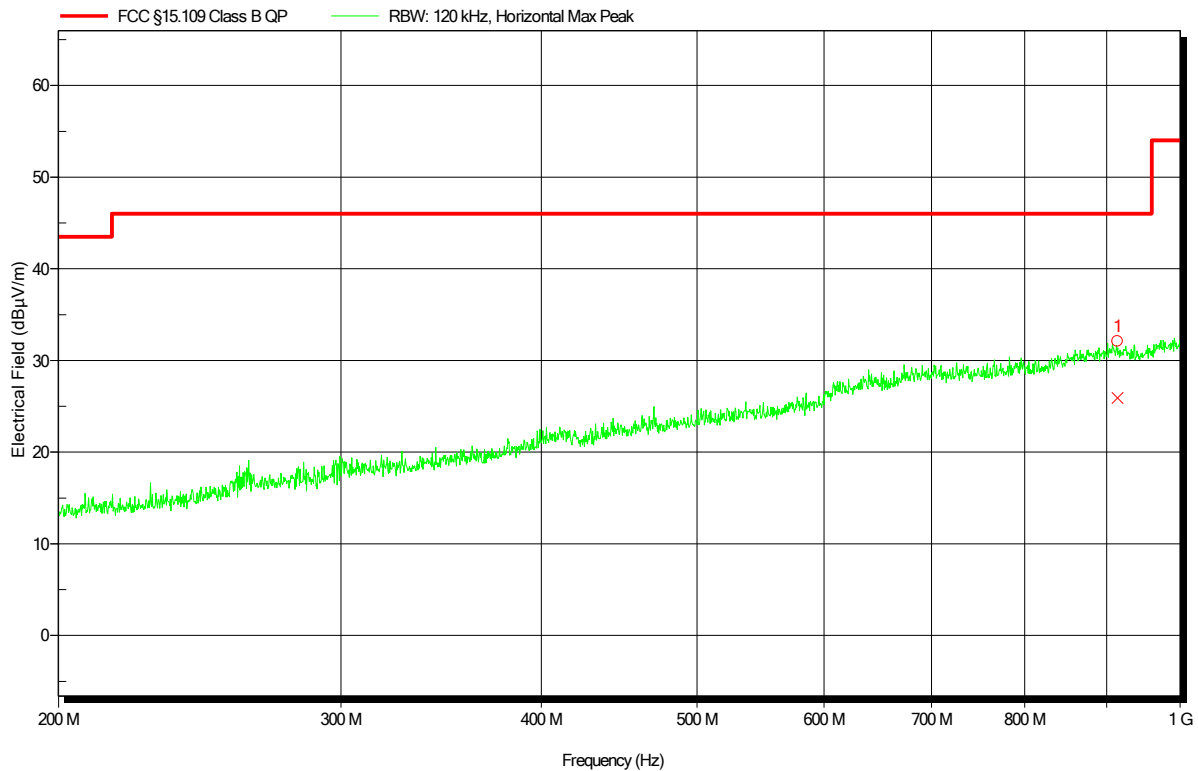
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	58.26 MHz	28.69 dBµV/m	40 dBµV/m	-11.31 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Programming device
Model: BLOWand
Test Site: Eurofins Product Service GmbH
Operator: Mr. Liebich
Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3m
Mode: 1
Test Date: 2019-09-17
Note:

Index 49



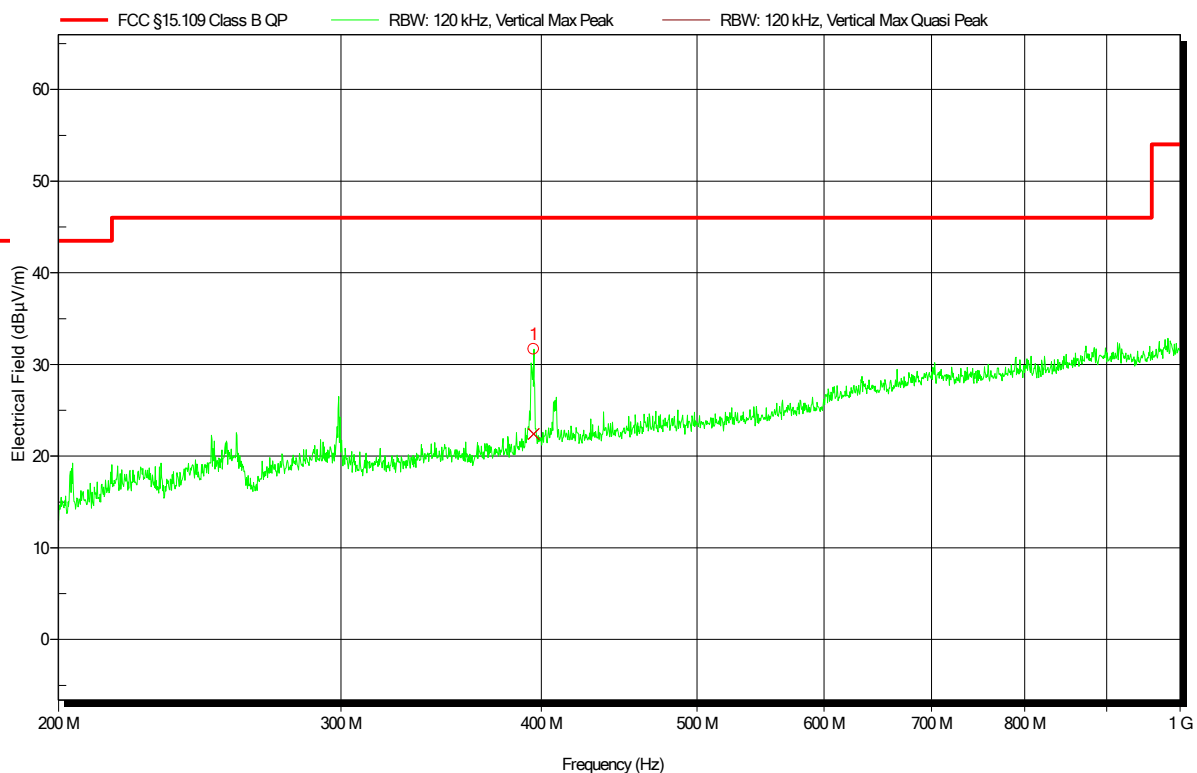
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	914.18 MHz	25.92 dBµV/m	46.02 dBµV/m	-20.1 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Programming device
Model: BLOWand
Test Site: Eurofins Product Service GmbH
Operator: Mr. Liebich
Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3m
Mode: 1
Test Date: 2019-09-17
Note:

Index 50



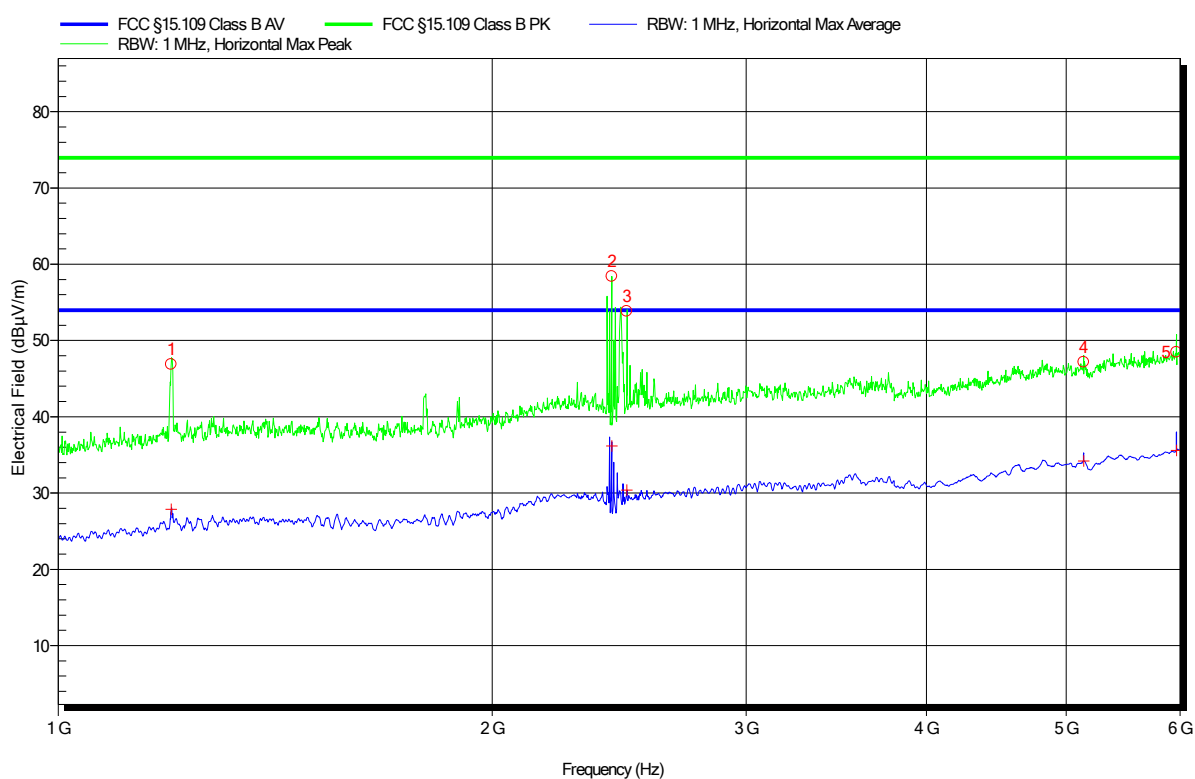
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	395.606 MHz	22.42 dBµV/m	46.02 dBµV/m	-23.6 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Programming device
 Model: BIOwand
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
 Antenna: Schwarzbek BBHA 9120D, Horizontal
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-09-17

Index 52



Peak Number	Frequency	Peak	Angle	Height
1	1.198 GHz	46.89 dBµV/m	0 Degree	2,5 m
2	2.421 GHz	58.42 dBµV/m	0 Degree	2,5 m
3	2.48 GHz	53.85 dBµV/m	0 Degree	2,5 m
4	5.143 GHz	47.17 dBµV/m	0 Degree	2,5 m
5	5.964 GHz	48.49 dBµV/m	0 Degree	2,5 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.198 GHz	27.89 dBµV/m	53.98 dBµV/m	-26.09 dB	Pass	0 Degree	2,5 m
2	2.421 GHz	36.2 dBµV/m	53.98 dBµV/m	-17.78 dB	Pass	0 Degree	2,5 m
3	2.48 GHz	30.4 dBµV/m	53.98 dBµV/m	-23.58 dB	Pass	0 Degree	2,5 m
4	5.143 GHz	34.22 dBµV/m	53.98 dBµV/m	-19.76 dB	Pass	0 Degree	2,5 m
5	5.964 GHz	35.59 dBµV/m	53.98 dBµV/m	-18.39 dB	Pass	0 Degree	2,5 m

Test Report No.: G0M-1909-8467-EF0115B-V01

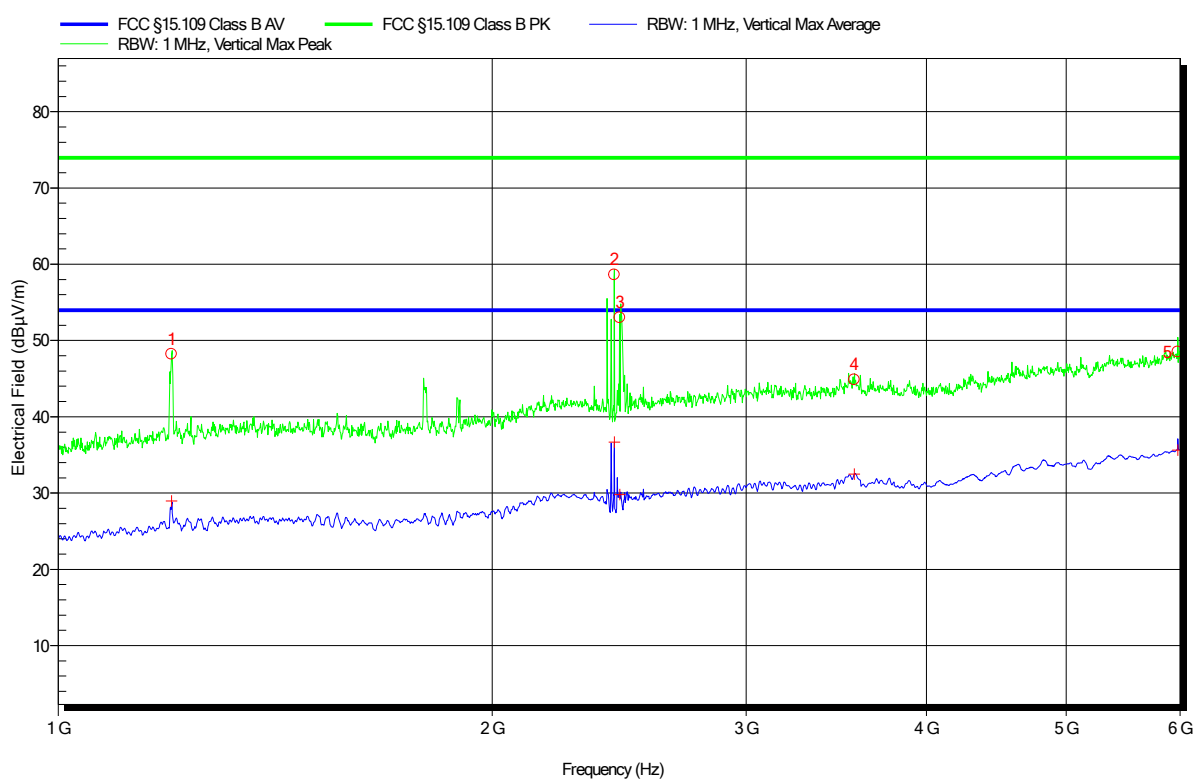
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Programming device
 Model: BIOwand
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-09-17

Index 51



Peak Number	Frequency	Peak	Angle	Height
1	1.199 GHz	48.23 dBµV/m	0 Degree	2,5 m
2	2.431 GHz	58.61 dBµV/m	0 Degree	2,5 m
3	2.451 GHz	53.01 dBµV/m	0 Degree	2,5 m
4	3.566 GHz	44.84 dBµV/m	0 Degree	2,5 m
5	5.978 GHz	48.52 dBµV/m	0 Degree	2,5 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.199 GHz	28.97 dBµV/m	53.98 dBµV/m	-25.01 dB	Pass	0 Degree	2,5 m
2	2.431 GHz	36.67 dBµV/m	53.98 dBµV/m	-17.31 dB	Pass	0 Degree	2,5 m
3	2.451 GHz	29.81 dBµV/m	53.98 dBµV/m	-24.17 dB	Pass	0 Degree	2,5 m
4	3.566 GHz	32.48 dBµV/m	53.98 dBµV/m	-21.5 dB	Pass	0 Degree	2,5 m
5	5.978 GHz	35.65 dBµV/m	53.98 dBµV/m	-18.33 dB	Pass	0 Degree	2,5 m

Test Report No.: G0M-1909-8467-EF0115B-V01

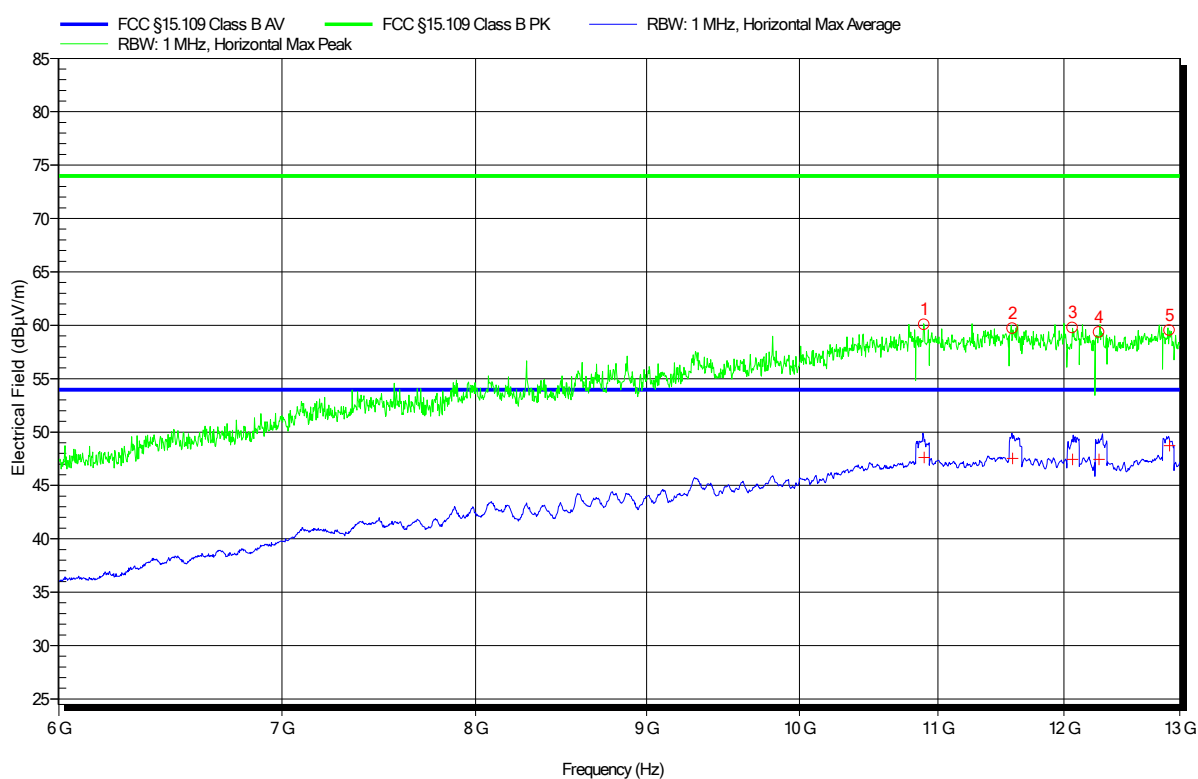
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated emissions according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Programming device
Model: BIOwand
Test Site: Eurofins Product Service GmbH
Operator: Mr. Liebich
Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3m
Mode: 1
Test Date: 2019-09-17

Index 53



Peak Number	Frequency	Peak	Angle	Height
1	10.896 GHz	60.05 dBµV/m	0 Degree	2,5 m
2	11.581 GHz	59.7 dBµV/m	0 Degree	2,5 m
3	12.07 GHz	59.74 dBµV/m	0 Degree	2,5 m
4	12.292 GHz	59.34 dBµV/m	0 Degree	2,5 m
5	12.904 GHz	59.51 dBµV/m	0 Degree	2,5 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	10.896 GHz	47.62 dBµV/m	53.98 dBµV/m	-6.36 dB	Pass	0 Degree	2,5 m
2	11.581 GHz	47.54 dBµV/m	53.98 dBµV/m	-6.44 dB	Pass	0 Degree	2,5 m
3	12.07 GHz	47.43 dBµV/m	53.98 dBµV/m	-6.55 dB	Pass	0 Degree	2,5 m
4	12.292 GHz	47.43 dBµV/m	53.98 dBµV/m	-6.55 dB	Pass	0 Degree	2,5 m
5	12.904 GHz	48.72 dBµV/m	53.98 dBµV/m	-5.26 dB	Pass	0 Degree	2,5 m

Test Report No.: G0M-1909-8467-EF0115B-V01

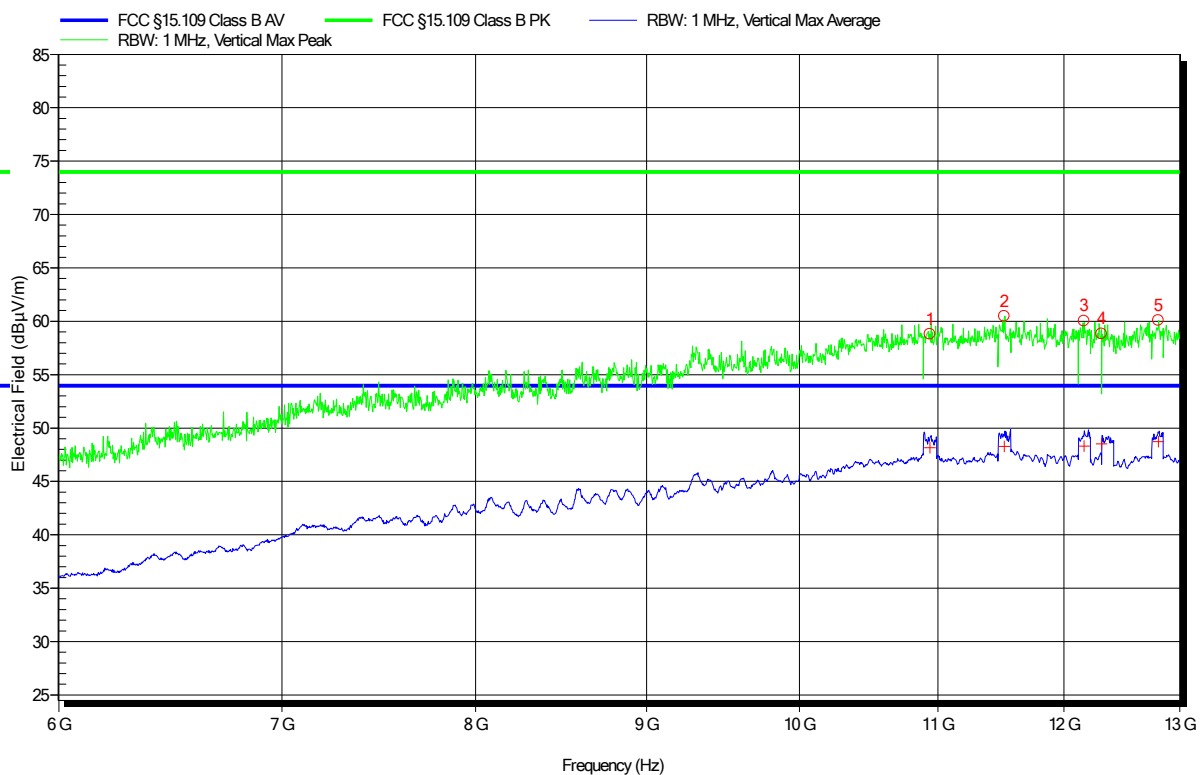
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated emissions according to FCC Part 15b, ICES-003

Project number: GOM-1909-8467

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Programming device
 Model: BIOwand
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-09-17

Index 54



Peak Number	Frequency	Peak	Angle	Height
1	10.94 GHz	58.8 dBµV/m	0 Degree	2,5 m
2	11.516 GHz	60.46 dBµV/m	0 Degree	2,5 m
3	12.165 GHz	60.04 dBµV/m	0 Degree	2,5 m
4	12.316 GHz	58.82 dBµV/m	0 Degree	2,5 m
5	12.807 GHz	60.08 dBµV/m	0 Degree	2,5 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	10.94 GHz	48.16 dBµV/m	53.98 dBµV/m	-5.82 dB	Pass	0 Degree	2,5 m
2	11.516 GHz	48.27 dBµV/m	53.98 dBµV/m	-5.71 dB	Pass	0 Degree	2,5 m
3	12.165 GHz	48.3 dBµV/m	53.98 dBµV/m	-5.68 dB	Pass	0 Degree	2,5 m
4	12.316 GHz	48.51 dBµV/m	53.98 dBµV/m	-5.47 dB	Pass	0 Degree	2,5 m
5	12.807 GHz	48.73 dBµV/m	53.98 dBµV/m	-5.25 dB	Pass	0 Degree	2,5 m

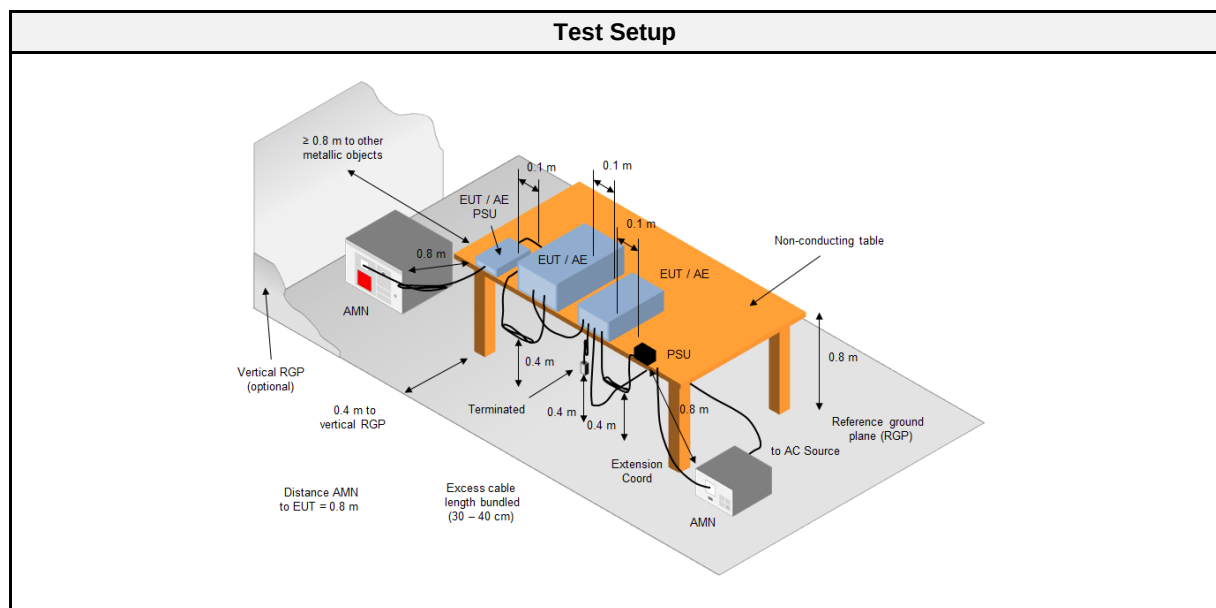
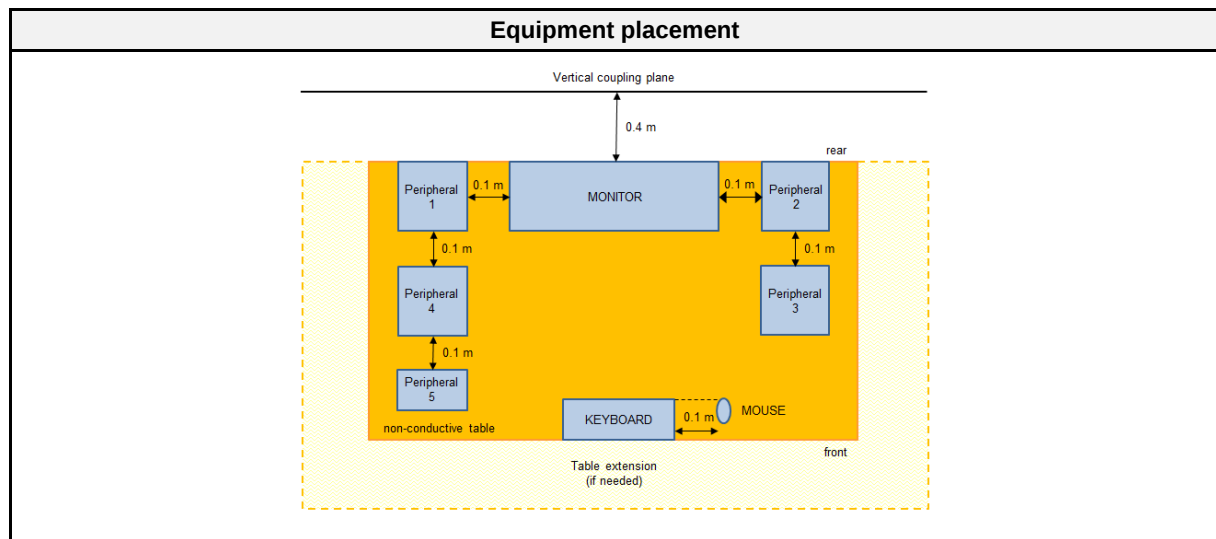
Test Report No.: GOM-1909-8467-EF0115B-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

2.2.1 Information

Test Information	
Reference	FCC 15.107, ICES-003, 8, 6.2
Reference method	ANSI C63.4:2014 Section 12
Measurement range	150 kHz to 30 MHz
Equipment class	Class B
Equipment type	Table top
Temperature [°C]	22 – 23
Humidity [%]	41 – 44
Operator	Stefan Dose supervised by Matthias Handrik
Date	2019-09-17

2.2.2 Setup



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH3-Z5	EF00036	2019-07	2021-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2019-07	2020-07
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESCS 30	EF00295	2019-07	2020-07
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2019-05	2020-05

2.2.4 Procedure

Exploratory measurement
- 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) - The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN. - 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). - The LISN measurement port was connected to a measurement receiver - I/O cables were bundled not longer than 0.4 m - Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor - To maximize the emissions the cable positions were manipulated - The worst configuration of EUT and cables is shown on a test setup picture at item 1.3

Final measurement
- 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) - The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN. - 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). - The LISN measurement port was connected to a measurement receiver - The EUT and cable arrangement were based on the exploratory measurement results - 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
Power	AMN	1	1	PASS	1
Comment: 1 → The test data of the worst-case conditions were recorded and shown on the next pages.					

2.2.7 Setup Photos

TEST SETUP: CONDUCTED EMISSION

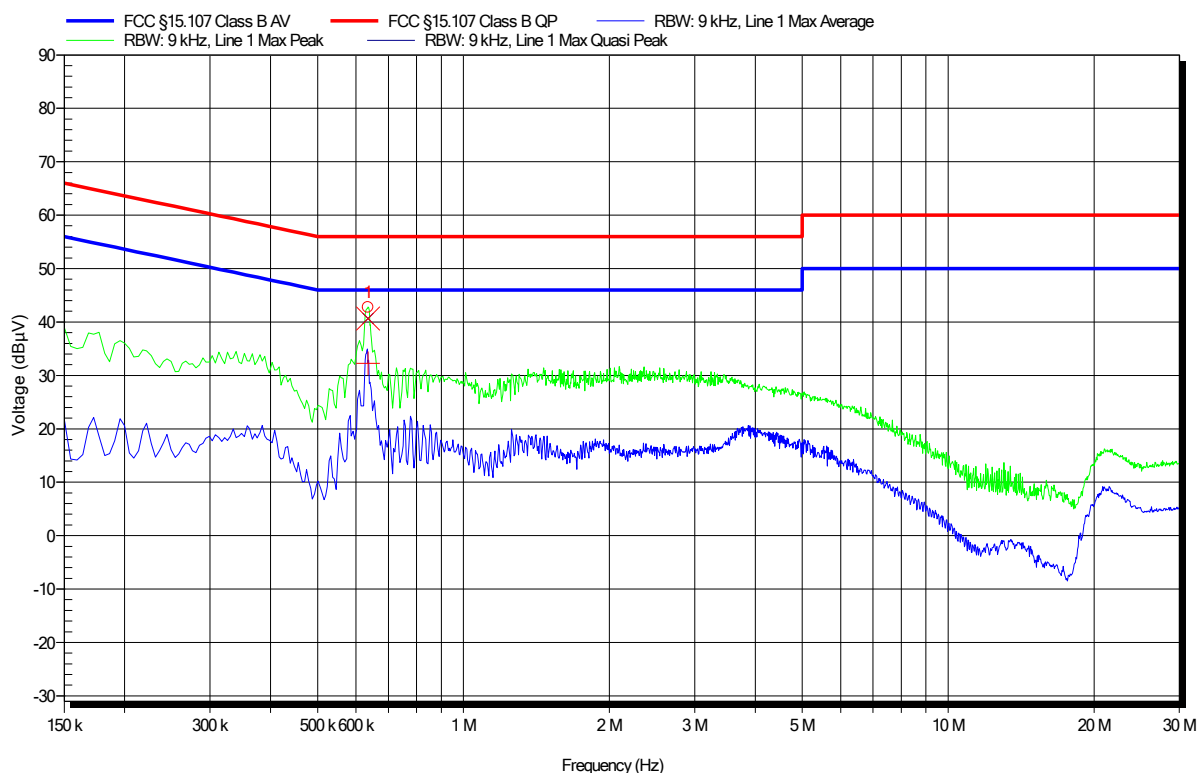
2.2.8 Records

EMI voltage test in the ac-mains according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Programming device
 Model: BLOWand
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Dose
 Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz
 LISN: ESH3-Z5 (L)
 Mode: 1
 Test Date: 2019-09-17

Index 55



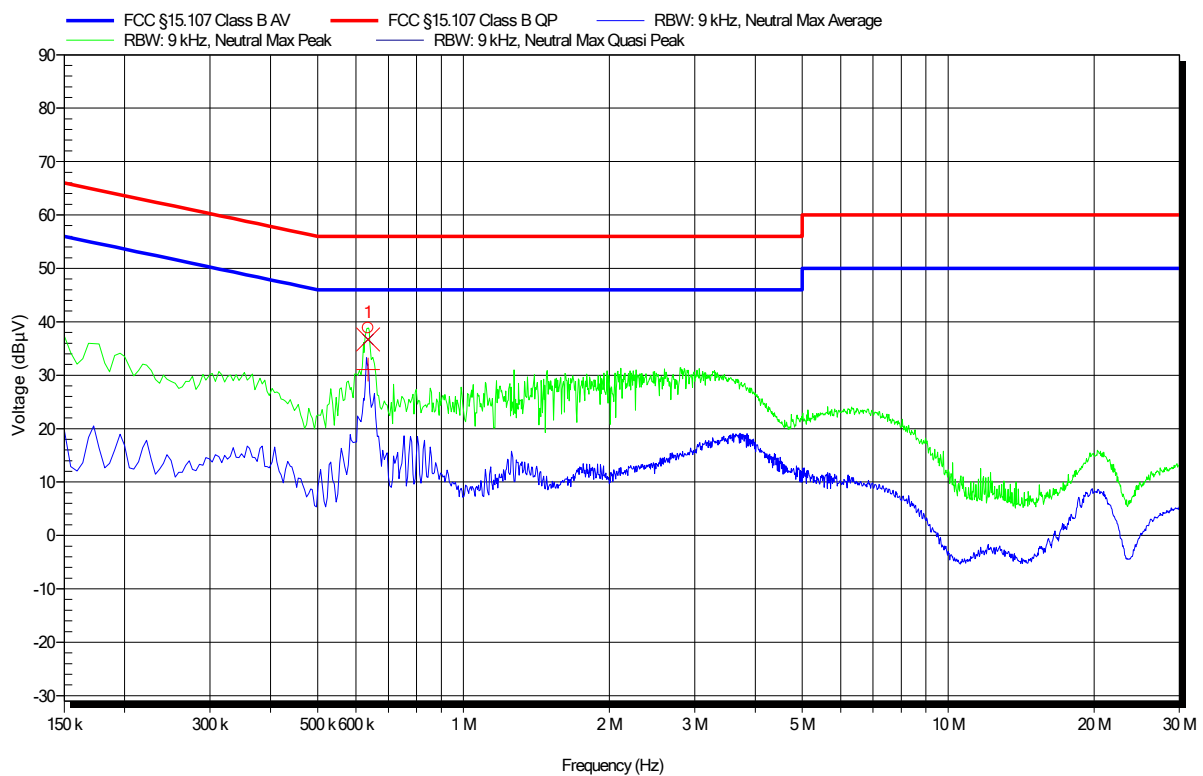
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	635.1 kHz	40.63 dBμV	56 dBμV	-15.37 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	635.1 kHz	32.25 dBμV	46 dBμV	-13.75 dB	Pass

EMI voltage test in the ac-mains according to FCC Part 15b, ICES-003

Project number: G0M-1909-8467

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Programming device
Model: BIOwand
Test Site: Eurofins Product Service GmbH
Operator: Mr. Dose
Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz
LISN: ESH3-Z5 (N)
Mode: 1
Test Date: 2019-09-17

Index 56



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	635.1 kHz	36.71 dBμV	56 dBμV	-19.29 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	635.1 kHz	31.04 dBμV	46 dBμV	-14.96 dB	Pass