

	EMC TEST REPORT				
FCC	FCC Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Report Reference No	G0M-2107-9897-EF0115B-V01				
Testing Laboratory	Eurofins Product Service GmbH				
Address	Storkower Str. 38c 15526 Reichenwalde Germany				
Accreditation	A2LA - Registration number: 1983.01 (ISED) ISED wireless device testing laboratory: CN 3470A DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, RegNo.: 96970				
Applicant	BIOTRONIK SE & Co. KG				
Address	Woermannkehre 1 12359 Berlin GERMANY				
Test Specification Standard(s)	Title 47 CFR Part 15 Subpart B ISED ICES-003 Issue 7 ANSI C63.4:2014+A1:2017				
Non-Standard Test Method	None				
Equipment under Test (EUT):					
Product Description	USB Cellular Adapter				
Model(s)	DataBridge				
Additional Model(s)	None				
Brand Name(s)	BIOTRONIK				
Hardware Version(s)	A.A				
Software Version(s)	1.0				
FCC-ID	QRI-DATABRIDGE				
IC	4708A-DATABRIDGE				
Test Result	PASSED				



Possible test case verdicts:					
required by standard but not tested		N/T			
not required by standard		N/R	N/R		
required by standard but not appl. to	o test object	N/A			
test object does meet the requireme	ent	P(PASS)			
test object does not meet the requir	ement	F(FAIL)			
Testing:					
Date of receipt of test item		2021-10-2	1		
Report:					
Compiled by	Ruslan Col	Ibasiuc			
Tested by (+ signature) (Responsible for Test)	Ruslan Col	Ibasiuc	Collegue		
Approved by (+ signature) (Test Lab Engineer)	Andreas P	Nug	A.R		
Date of Issue	2022-06-10	D			
Total number of pages	39				
General Remarks:					
the responsibility of the manufactor requirements detailed within this	ort reflect the rest cturer to ensure the s report.	ults for this partinat all production	cular model and serial number. It is		
Additional Comments:					



ABBREVIATIONS AND ACRONYMS

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



VERSION HISTORY

		Version History	
Version Issue Date Remarks Revised By			
01	2022-06-10	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	12
1.4	Support Equipment	19
1.5	Operational Modes	20
1.6	EUT Configuration	21
1.7	Sample emission level calculation	22
2	Result Summary	23
2.1	Test Conditions and Results - Radiated emissions acc. to ANSI C63.4	24
2.2	Test Conditions and Results - Conducted emissions acc. to ANSI C63.4	
3	Measurement Uncertainty	



1 Equipment (Test Item) Under Test

Description	USB Cellular Adap	ter	
Model	DataBridge		
Additional Model(s)	None		
Brand Name(s)	BIOTRONIK		
Serial Number(s)	#33 (Eurofins ID: 3	6101)	
Hardware Version(s)	A.A		
Software Version(s)	1.0		
FCC-ID	QRI-DATABRIDGE		
IC	4708A-DATABRID	GE	
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	2155		
Dimension	320 mm x 160 mm x 50 mm		
	Туре	LTE Module	
	Model	5131A-LE910C1-NA	
	Manufacturer	Telit	
Radio Module	HW Version	1.10	
	SW Version	M0F.210008	
	FCC-ID	RI7LE910C1NA	
	IC	5131A - RI7LE910C1NA	
Supply Voltage	V _{NOM}	5 VDC via USB	
Manufacturer	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY		
Factory	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY		



1.1 Equipment Ports

Name	Туре	Attributes		Comment
USB	DC;IO	Count: Cable length [m]: Direction: Service only: Shielded:	1 0.3 In No Yes	Port has a shield
Description:		1		I
AC A	AC mains power input/output port			
DC D	DC power input/output port			
BAT D	C power input	port connected to externation	al battery	
IO Ir	put/Output por	t		
TP T	Telecommunication port			
NE N	on-electrical po	ort		



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop PC	Dell	Latitude E6420	-
AE	Power Supply	Dell	LA90PM130	-
SIM	Simulation Software	Biotronik	EXE Development Tool EDT	Global Version 3.6 Build 3863
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipmen	t		
CBL	Connecting Cable			
Comment:				



1.5 Operational Modes

Mode #	Description
	DataBridge is connected to communication tester (such as R&S CMW) in test mode at its highest LTE band (band 2), constantly transmitting at maximum power
1	LTE FDD B2 band channel 18700 (uplink) Mode: RMC TPC: Max Power Modulation: QPSK RB: 50 RB Start: Low
	At the same time, there should be constant transmission of data through the USB interface to a host device.
	Additional evaluation of the worst case at other bands (Band 4, 12) performed.
Comment:	



1.6 EUT Configuration

Configuration #	Description
1	Data bridge connected via USB port to the test laptop pc. Laptop PC connected with power supply, powered up at 120 V / 60 Hz Data bridge has a LTE connection with a communication tester.
2	Data bridge connected and powered on via USB port and an extension 5m USB cable to the test laptop pc. Laptop installed outside measurement chamber, and battery powered. Data bridge has a LTE connection with a communication tester.
Comment:	
Configuration 2	Device Under Test
Dell Notebook	USB Cable BIOTRONIK DataBridge))) (((R&S CMW500 Communication Tester



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 $(dB\mu V) + A.F. (dB/m) = Net field strength (dB\mu V/m)$

Net:

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

Limit:

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

Limit (dB μ V/m) = 20*log (μ 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 Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 3.2.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 3.2.1	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

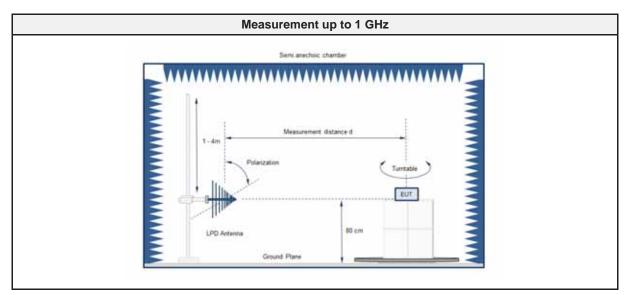


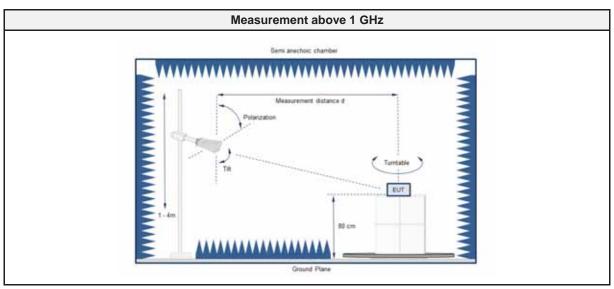
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

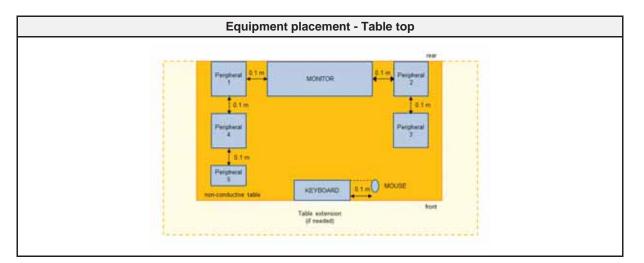
Test Information		
Reference	FCC 15.109, ICES-003, 6.2	
Reference method	ANSI C63.4:2014+A1:2017 Section 8	
Equipment class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	2155	
Measurement range	30 MHz to 12000 MHz	
Temperature [°C]	23±3	
Humidity [%]	43±3	
Operator	Ruslan Colbasiuc	
Date	2021-11-26	

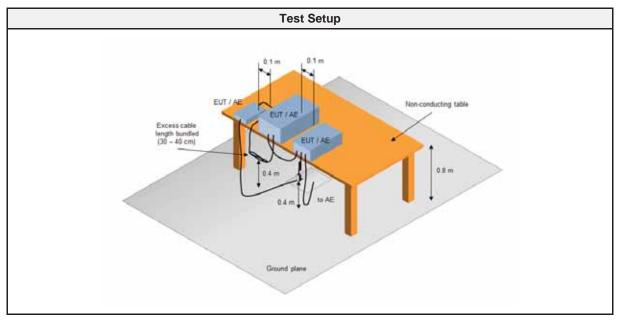
2.1.2 Setup











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	AC6	EF00910	2021-07	2024-07
EMI Test Receiver	R&S	ESU26	EF00887	2021-07	2022-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2019-10	2022-10
Horn Antenna	ETS-Lindgren	3117	EF00976	2019-03	2022-03
Functional radio communication tester	Rohde & Schwarz GmbH & Co. KG	CMW290	EF01367	2021-07	2022-07
Climatic Sensor	Embedded Data Systems, LLC.	9A00100000254 77E	EF01124	2021-03	2022-03



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.
- 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	

Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dBµV/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 Average	69.5 49.5

2.1.6 Results

Test Results			
Operational mode EUT Configuration Verdict Remark			
1 2 PASS See note 1			
Notes: 1 – Evaluation measurements were also performed at LTE band 4 and 12. However in the frequency range 80 to 1000 MHz, with minimal deference, band 2 was found as worst case. Below are represented the			

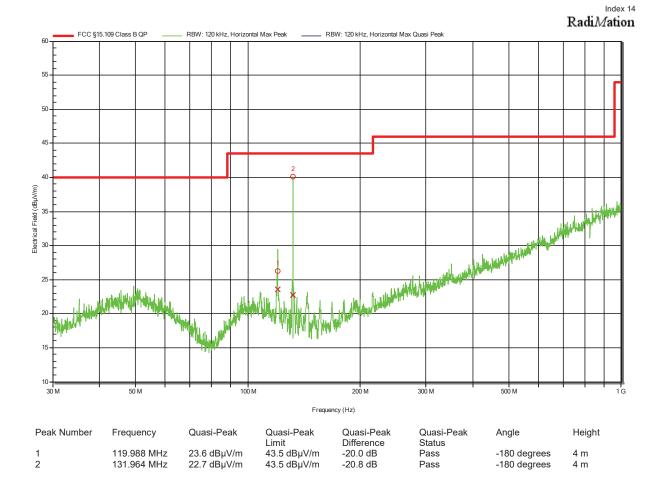
measurements for this band.



2.1.8 Records

Radiated emissions according to FCC part 15B

Project Number:	G0M-2107-9897
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	USB Cellular Adapter
Model:	DataBridge
Test Sample ID:	36101
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Colbasiuc
Test Date:	2021-11-26
Operating Conditions:	ambient temperature: 23 °Celsius power input: EUT 5 VDC via USB Laptop PC battery powered 11.1 V DC
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10m converted to 3m
Operational Mode &	Mode 1
EUT Configuration:	Configuration 2.
Note 1:	



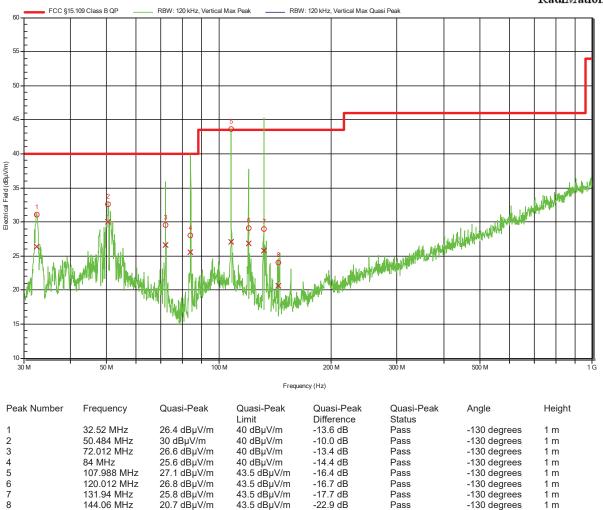


Radiated emissions according to FCC part 15B

Project Number:	G0M-2107-9897
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	USB Cellular Adapter
Model:	DataBridge
Test Sample ID:	36101
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Colbasiuc
Test Date:	2021-11-26
Operating Conditions:	ambient temperature: 23 °Celsius power input: EUT 5 VDC via USB Laptop PC battery powered 11.1 V DC
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10m converted to 3m
Operational Mode &	Mode 1
EUT Configuration:	Configuration 2

Note 1:

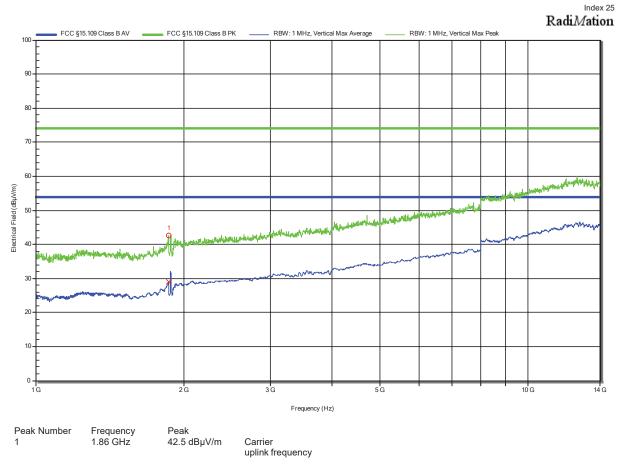
Index 15 RadiMation





Radiated emissions according to FCC part 15B

G0M-2107-9897
BIOTRONIK SE & Co. KG
USB Cellular Adapter
DataBridge
36101
Eurofins Product Service GmbH
Mr. Colbasiuc
2021-11-26
ambient temperature: 23 °Celsius power input: EUT 5 VDC via USB Laptop PC battery powered 11.1 V DC
ETS-Lindgren 3117, Vertical
3m
Mode 1 Configuration 2 Table position:95°/ Antenna high: 1m For the measurement was used an notch filter

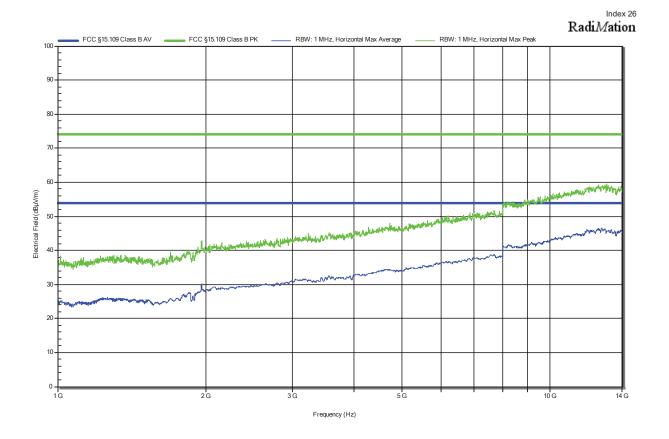


Peak Number Frequency 1 1.86 GHz Average 29.1 dBµV/m



Radiated emissions according to FCC part 15B

Project Number:	G0M-2107-9897
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	USB Cellular Adapter
Model:	DataBridge
Test Sample ID:	36101
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Colbasiuc
Test Date:	2021-11-26
Operating Conditions:	ambient temperature: 23 °Celsius power input: EUT 5 VDC via USB Laptop PC battery powered 11.1 V DC
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode &	Mode 1
EUT Configuration:	Configuration 2
Note 1:	Table position:60°/ Antenna high: 1m
	For the measurement was used a notch filter



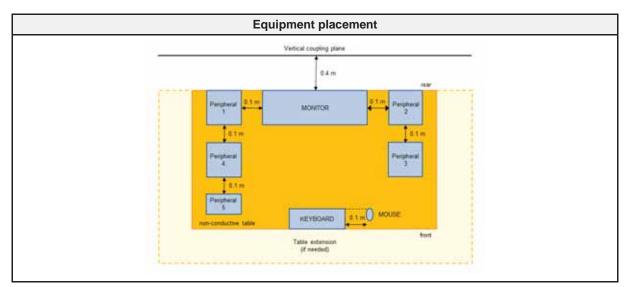


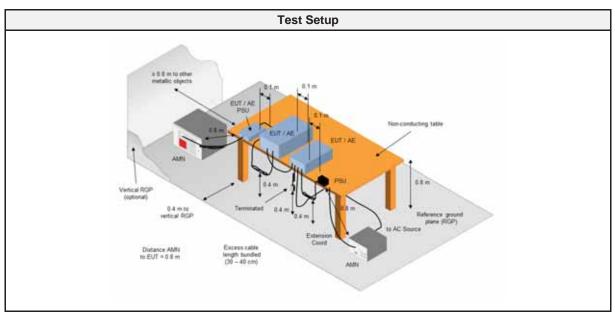
2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

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]	24	
Humidity [%]	33	
Operator	Ruslan Colbasiuc	
Date	2021-11-16	

2.2.2 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	2021-07	2022-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2021-07	2022-07
EMI Test Receiver	R&S	ESR 7	EF00943	2021-08	2022-08
Wideband radio communication tester	Rohde & Schwarz Vertriebs GmbH	CMW500	EF00677	2021-02	2022-02
AC & DC Power Supply	Chroma ATE Inc.	61604	EF01380	2021-07	2022-07
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2021-03	2022-03

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	1	1	PASS	See note 1
Notes.					
The results below are for LTE Band B2. Investigation measurement were performed also for B4 and B12, however was found that with minimal differences, LTE B2 is worst case.					

2.2.7 Setup Photos

Conducted Emission Test Setup
extracted - see exhibit - TSup Photos



2.2.8 Records

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

Project Number:	G0M-2107-9897
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	USB Cellular Adapter
Model:	DataBridge
Test Sample ID:	36101
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Colbasiuc
Test Date:	2021-11-16
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 VAC, 60 Hz (AC/DC-adapter Laptop)
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode:	Mode 1.
EUT Configuration:	1
Applied to Port:	AC port laptop PC power supply
Note 1:	

Radi*M*ation FCC §15.107 Class B AV RBW: 9 kHz, Neutral Max Quasi Peak FCC §15.107 Class B QP ____ RBW: 9 kHz, Neutral Max Average ____ RBW: 9 kHz, Neutral Max Peak _ 80 70 60 50 Voltage (dBµV) 40 NHWAN ШI 30 PHI PPT PM 20 WWWWW 10 0 - 10 300 k 500 k 600 k 1 M 3 M 5 M 20 M 150 k 2 M 10 M 30 M Frequency (Hz) Peak Number Frequency Quasi-Peak Quasi-Peak Limit Quasi-Peak Quasi-Peak Status LISN Difference 1 150 kHz 53.33 dBµV 66 dBµV -12.67 dB Pass Neutral 32.25 dBµV 27.01 dBµV 36.66 dBµV 514.5 kHz 56 dBµV -23.75 dB Pass Neutral 2 3 4 5 6 7 56 dBµV 56 dBµV -28.99 dB -19.34 dB 550.5 kHz Pass Neutral Neutral 609 kHz Pass 22.32 dBµV 56 dBµV -33.68 dB 690 kHz Pass Neutral 734.1 kHz 37.85 dBµV 56 dBµV -18.15 dB Pass Neutral 411 kHz 38.99 dBµV 57.63 dBµV -18.64 dB Pass Neutral Average LISN Peak Number Frequency Average Average Limit Average Status Difference

> Test Report No.: G0M-2107-9897-EF0115B-V01 Eurofins Product Service GmbH

> Storkower Str. 38c, D-15526 Reichenwalde, Germany

Index 2



Product Service

1	150 kHz	30.72 dBµV	56 dBµV	-25.28 dB	Pass	Neutral
2	514.5 kHz	15.98 dBµV	46 dBµV	-30.02 dB	Pass	Neutral
3	550.5 kHz	17.42 dBµV	46 dBµV	-28.58 dB	Pass	Neutral
4	609 kHz	11.65 dBµV	46 dBµV	-34.35 dB	Pass	Neutral
5	690 kHz	18.58 dBµV	46 dBµV	-27.42 dB	Pass	Neutral
6	734.1 kHz	15.13 dBµV	46 dBµV	-30.87 dB	Pass	Neutral
7	411 kHz	27.46 dBµV	47.63 dBµV	-20.17 dB	Pass	Neutral



Product Service

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

Project Number:	G0M-2107-9897
Applicant:	BIOTRONIK SE & Co. KG
Model Description:	USB Cellular Adapter
Model:	DataBridge
Test Sample ID:	36101
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Colbasiuc
Test Date:	2021-11-16
Operating Conditions:	ambient temperature: 24 °Celsius
	power input: 120 VAC, 60 Hz (AC/DC-adapter Laptop)
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode:	Mode 1.
EUT Configuration:	1
Applied to Port:	AC port laptop PC power supply
Note 1:	

Radi*M*ation FCC §15.107 Class B QP FCC §15.107 Class B AV - RBW: 9 kHz, Line 1 Max Average RBW: 9 kHz, Line 1 Max Peak 80 70 60 50 M 40 6 W Voltage (dBµV) € 30 20 10 0 - 10 -20-1 M 300 k 500 k 600 k 150 k 2 M 3 M 5 M 10 M 20 M 30 M Frequency (Hz) Peak Number Frequency Quasi-Peak Quasi-Peak Limit Quasi-Peak Quasi-Peak Status LISN Difference -12.67 dB 66 dBμV 56 dBμV 57.01 dBμV 53.33 dBμV 26.74 dBμV Line 1 150 kHz Pass 1 1.746 MHz -29.26 dB 2 3 4 Pass Line 1 442.95 kHz 41.02 dBµV -15.98 dB Pass Line 1 3.928 MHz 16.15 dBµV 56 dBµV -39.85 dB Pass Line 1 5 21.168 MHz 32.7 dBµV 60 dBµV -27.3 dB Pass Line 1 32.36 dBµV -27.64 dB 6 25.873 MHz 60 dBµV Pass Line 1

Test Report No.: G0M-2107-9897-EF0115B-V01

Index 3



Product Service

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	31.12 dBµV	56 dBµV	-24.88 dB	Pass	Line 1
2	1.746 MHz	11.21 dBµV	46 dBµV	-34.79 dB	Pass	Line 1
3	442.95 kHz	33.65 dBµV	47.01 dBµV	-13.35 dB	Pass	Line 1
4	3.928 MHz	13.97 dBµV	46 dBµV	-32.03 dB	Pass	Line 1
5	21.168 MHz	32.12 dBµV	50 dBµV	-17.88 dB	Pass	Line 1
6	25.873 MHz	32.05 dBµV	50 dBµV	-17.95 dB	Pass	Line 1



3 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty		
Radiated Emission	30MHz to 1GHz @ 10m, 6.25 dB 1GHz to 18GHz @3m, 4.86 dB		
Conducted emissions at the mains power port	150kHz to 30MHz, 3.35dB		