

EMC TEST REPORT	
Title 47 CFR Part 15B, ISED ICES-003 Issue 7	
Report Reference No	G0M-2111-1143-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, Reg.-No.: 96970
Applicant	Bridgestone Mobility Solutions B.V.
Address	Beethovenstraat 503 1083 HK Amsterdam Netherlands
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	Telematic Device with GSM+LTE+GNSS
Model(s)	L0640
Additional Model(s)	None
Brand Name(s)	webfleet LINK 640
Hardware Version(s)	48/2019
Software Version(s)	8.4
FCC-ID	2AGPAL0640
IC	20911-L0640
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	2021-12-13	
Report:		
Compiled by	Manuel Engel	
Tested by (+ signature) (Responsible for Test)	Manuel Engel	
Approved by (+ signature) (EMC Test Technician)	Matthias Handrik	
Date of Issue	2022-04-06	
Total number of pages	39	
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	2022-04-06	Initial Release	-

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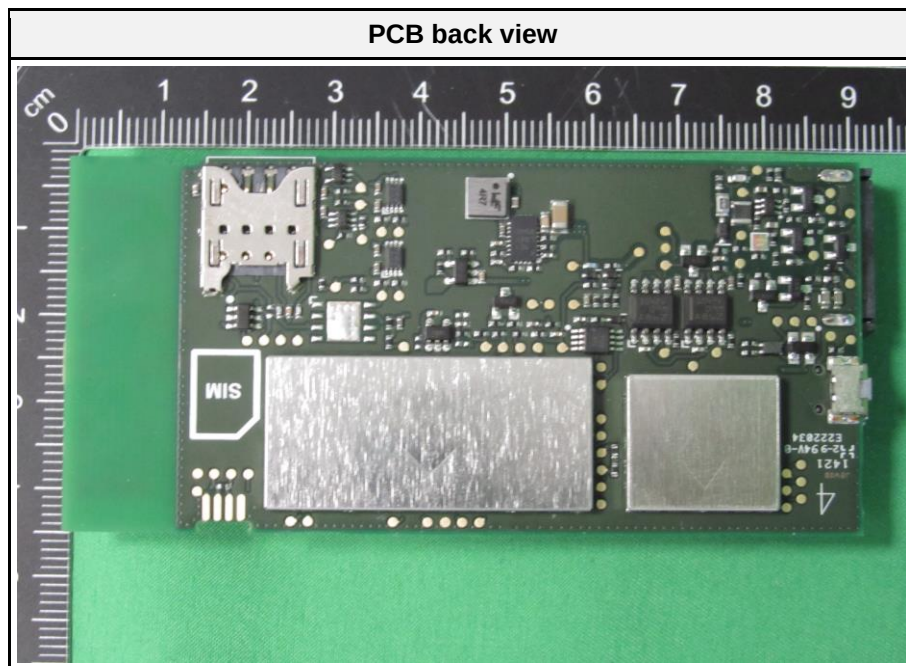
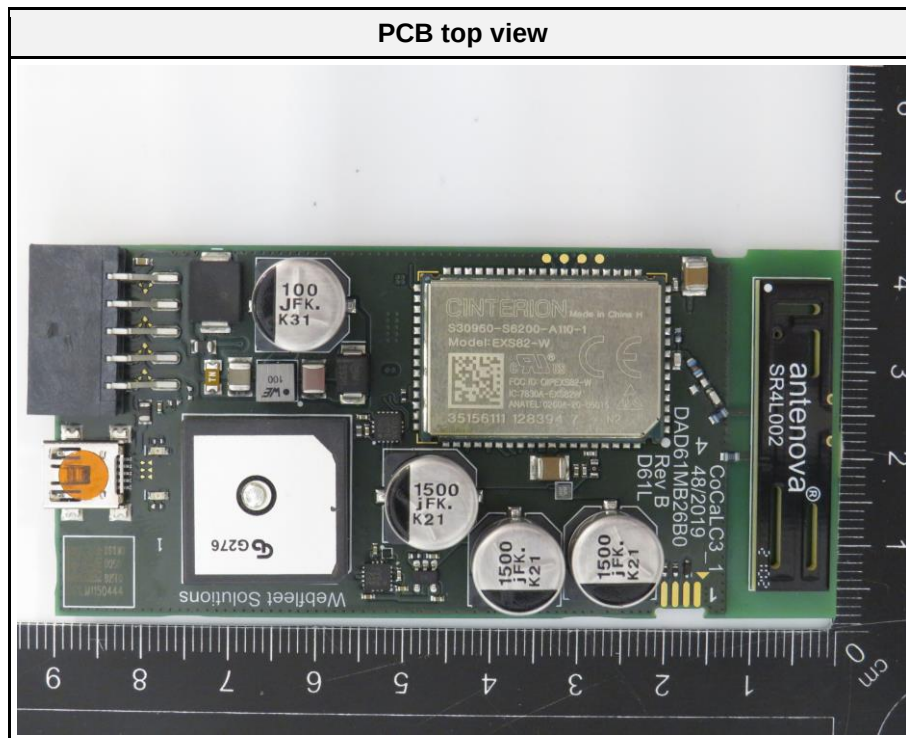
1 Equipment (Test Item) Under Test

Description	Telematic Device with GSM+LTE+GNSS	
Intended use	Telematic Device with GSM+LTE+GNSS for vehicle	
Model	L0640	
Additional Model(s)	None	
Brand Name(s)	webfleet LINK 640	
Serial Number(s)	WZ41611I00509	
Sample ID	37753	
Hardware Version(s)	48/2019	
Software Version(s)	8.4	
EUT Dimensions [cm]	9.7 x 6.3 x 2.2	
FCC-ID	2AGPAL0640	
IC	20911-L0640	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	2155	
Protective Earth	No	
Radio Module I	Type	Mobile communication
	Model	EXS82-W
	Manufacturer	Gemalto (Thales)
	FCC-ID	QIPEXS82-W
	IC	7830A-EXS82W
Radio II	Type	GNSS Chip
	Model	M-8030-KT
	Manufacturer	ublox
Supply Voltage	V _{NOM}	12/24 VDC
AC/DC-Adaptor	None	
Manufacturer	Bridgestone Mobility Solutions B.V. Beethovenstraat 503 1083 HK Amsterdam Netherlands	
Factory	Tech-Com (Shanghai) Computer Co.Ltd F1, No 68, Sanzhuang Road 201613 Shanghai PR China	

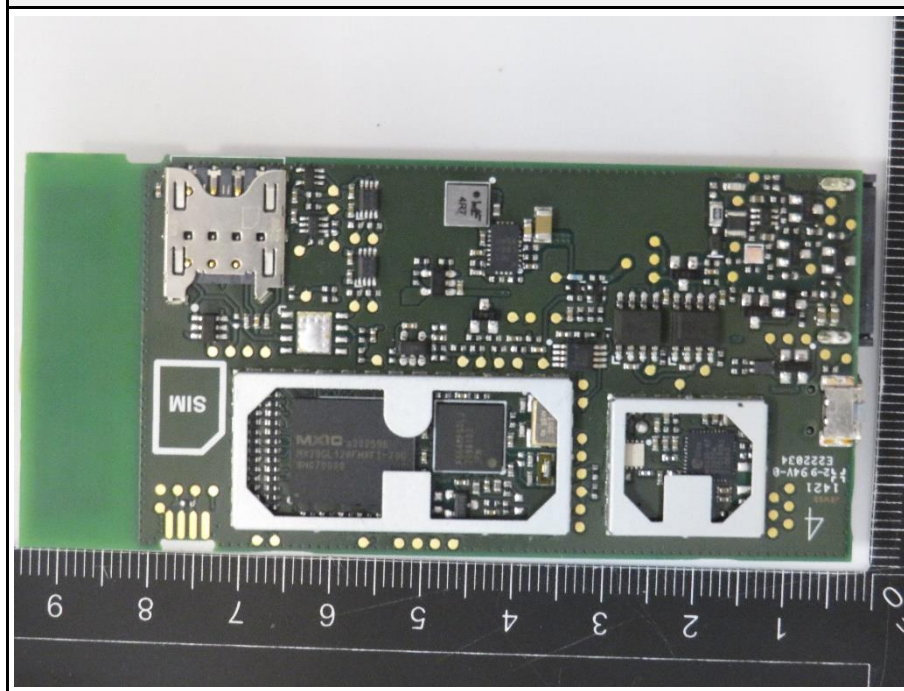
1.1 Equipment Ports

Name	Type	Attributes	Comment
Molex Micro-Fit Connector	IO, DC	Count: 1 Cable length [m]: 3 Direction: IO Service only: No Shielded: No	-10 pin port, dual raw -contains 2x HS CAN, power supply and ignition input
USB Mini	IO	Count: 1 Cable length [m]: - Direction: IO Service only: Yes Shielded: 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		

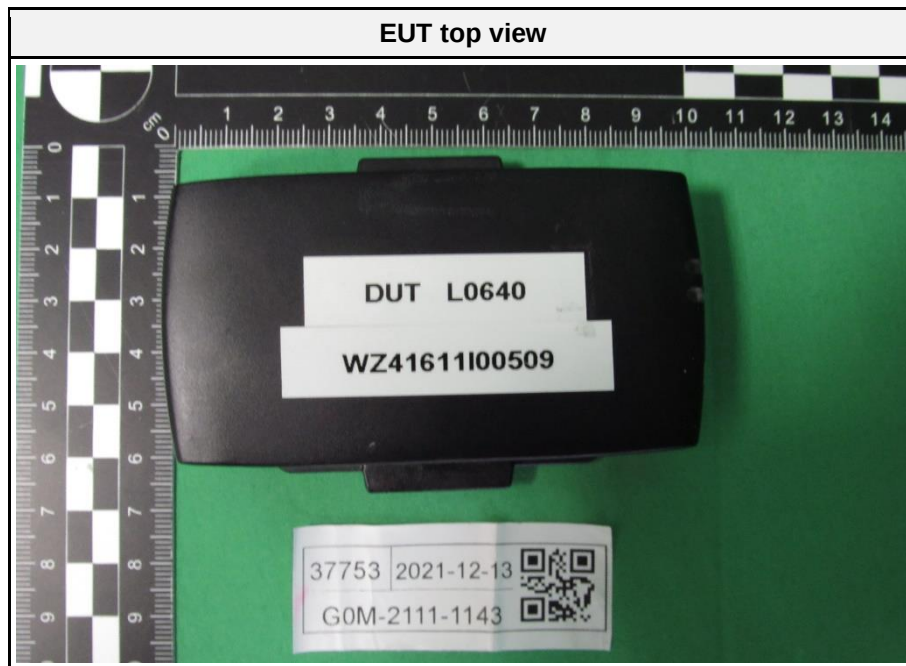
1.2 Equipment Photos - Internal



PCB back view without shielding



1.3 Equipment Photos - External



EUT front view



EUT back view



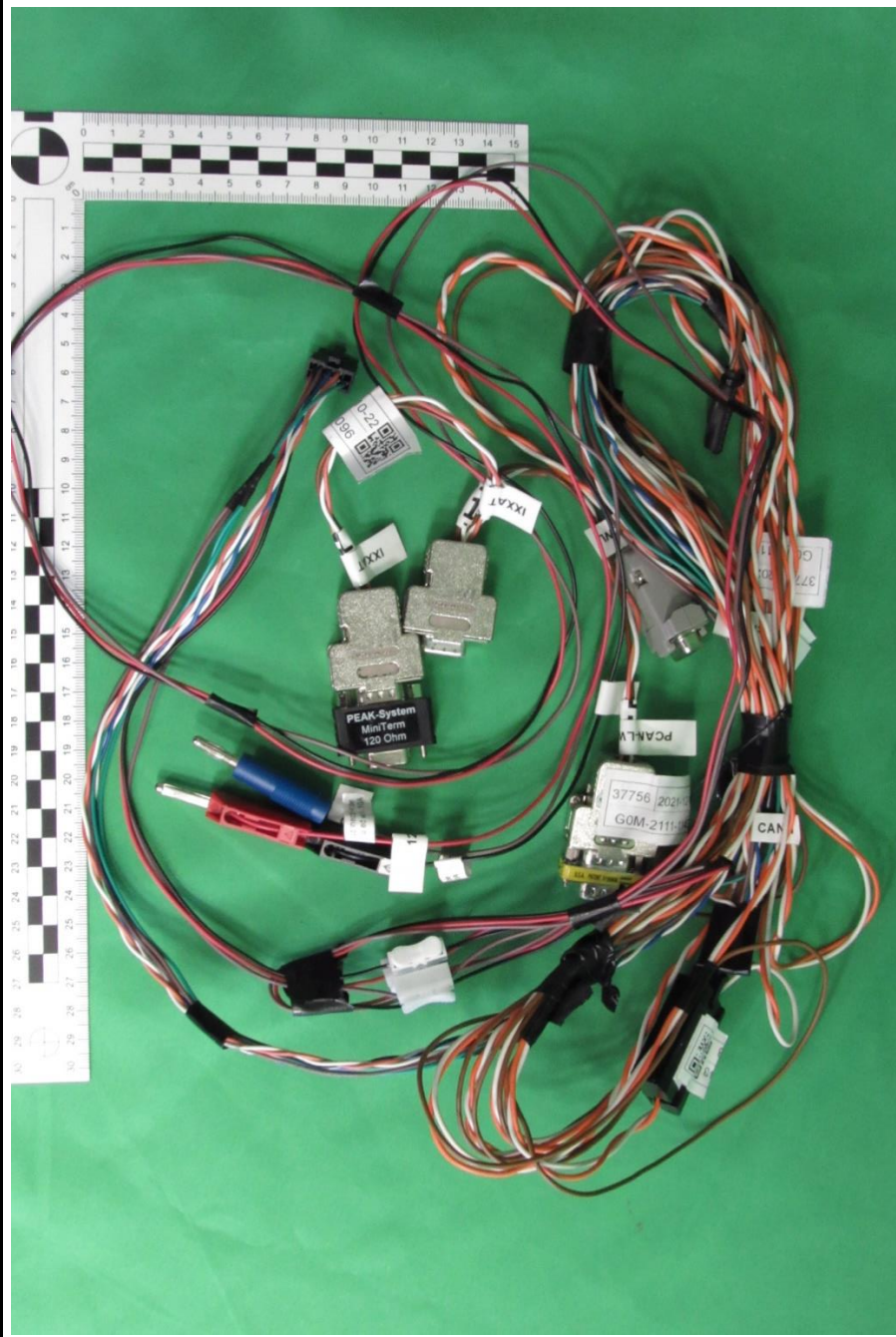
EUT right view



EUT left view



Harness with termination



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1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
CBL, EUT	Harness 3 m	unspecified	unspecified	Harness contains Power/Ignition/ 2 x HS CAN
AE	CAN Termination	Peak-System	MiniTerm 120 Ω	-
SIM	Radio communication tester	R&S	CMW290	Identifier EF01367
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Mobile communication connection to Radio Communication Tester. LTE FDD 4, channel 20325, TPC: Max power CAN listing. GPS receive local position.
2	Mobile communication connection to Radio Communication Tester. GSM 850; GPRS 2 slots; Gamma: 3. CAN listing. GPS receive local position.
Comment: Device support although LTE FDD 2,12, 13 and GSM 1900. The selection of band for final measurement was determined before with a spectrum analyzer. Report contains the worst case bands only.	

1.6 EUT Configuration

Configuration #	Description
1	EUT connected with harness, CAN line of harness terminated with 120 Ω EUT powered via 24 V DC. Test preparation via service port and software, modem on, GNSS on and CAN test mode activate.
2	EUT connected with harness, CAN line of harness terminated with 120 Ω EUT powered via 12 V DC. Test preparation via service port and software, modem on, GNSS on and CAN test mode activate.
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

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	N/R	Intended for vehicular use
Comment:				

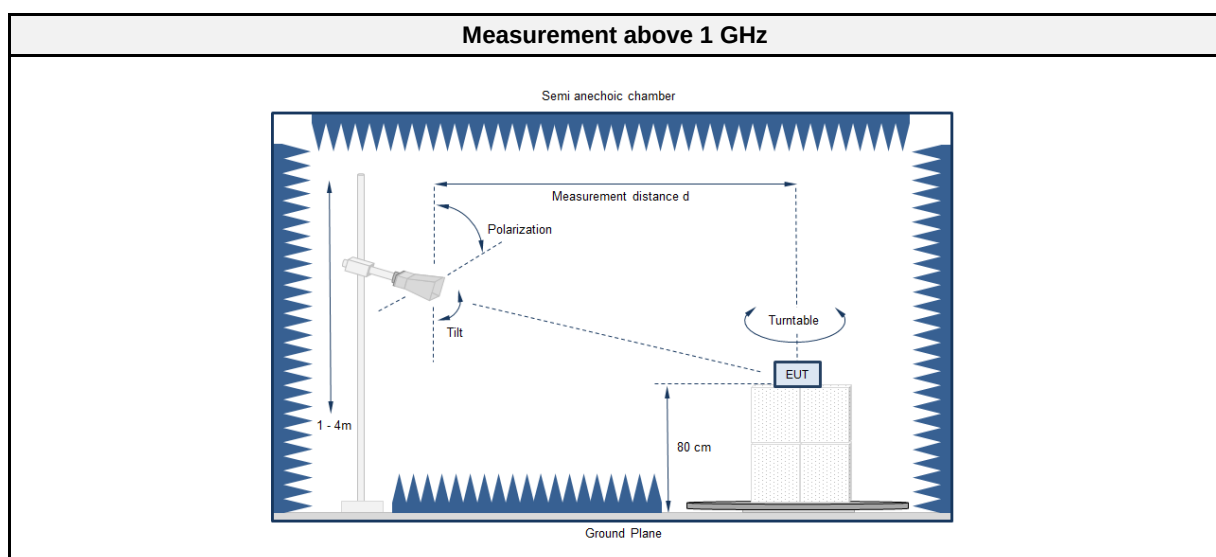
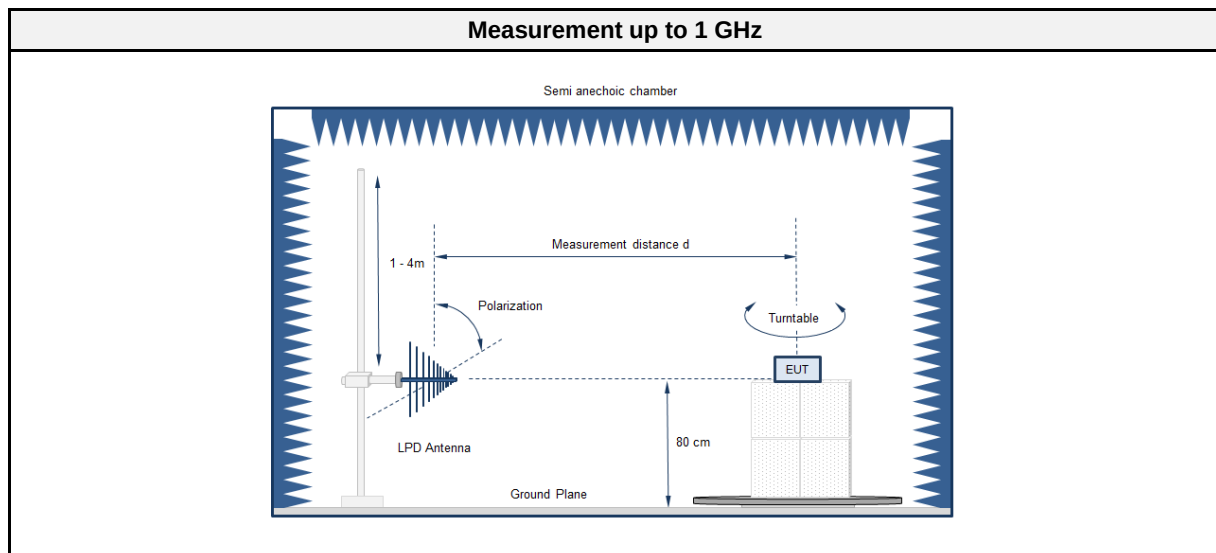
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

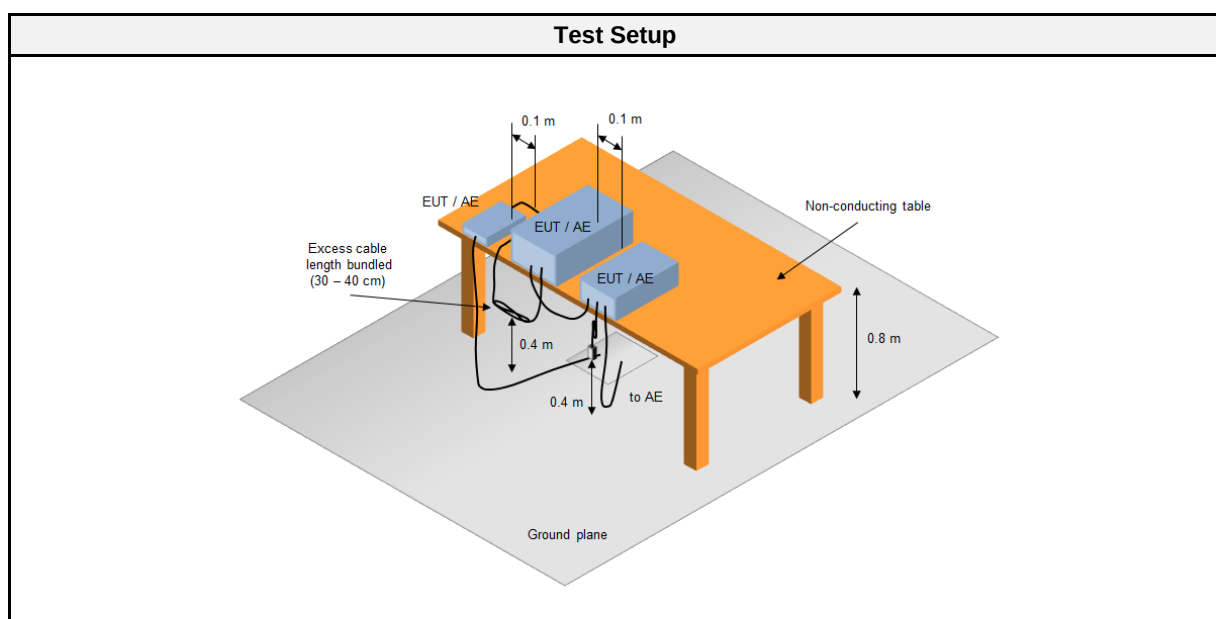
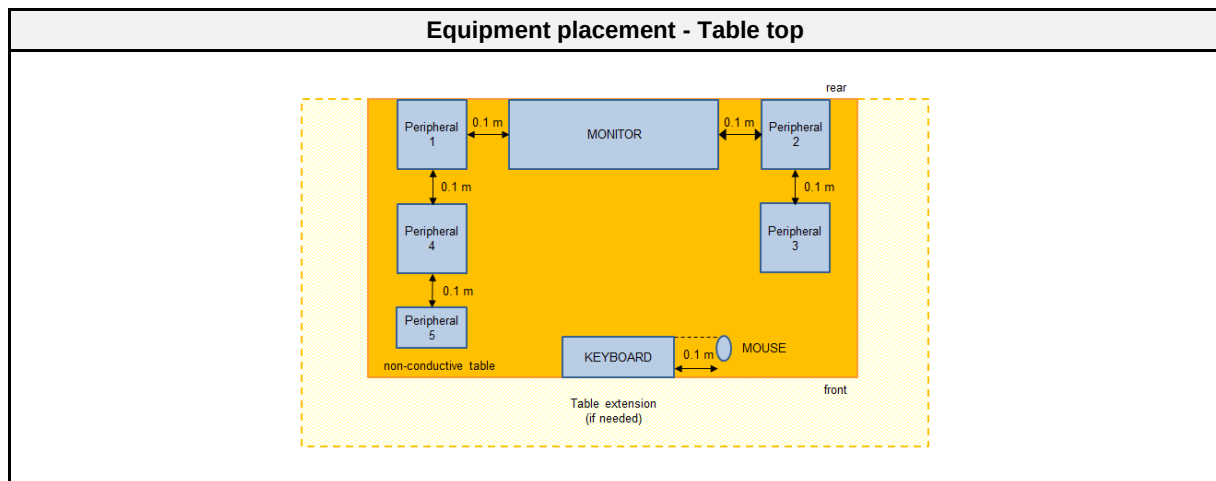
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 3.2.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2470
Measurement range	30 MHz to 11000 MHz
Temperature [°C]	23 ± 1
Humidity [%]	31 - 37
Operator	Manuel Engel
Date	2022-03-21 and 2022-03-22

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 (NSA)	Frankonia	AC6	EF00910	2021-07	2024-07
Anechoic chamber (SVSWR)	Frankonia	AC6	EF00899	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	2022-03	2025-03
3-phase Electronic Voltage Source	EM Test GmbH (Switzerland)	NetWave 30-400	EF01514	2021-06	2022-06
Climatic Sensor	Embedded Data Systems, LLC.	9A0010000025477E	EF01124	2021-03	2022-03

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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 10 or 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver.
2.	A broadband hybrid antenna was used for the frequency range 30 – 1000 MHz. Above 1 GHz the antenna was placed on an adjustable height antenna mast. In the range 1- 18 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.

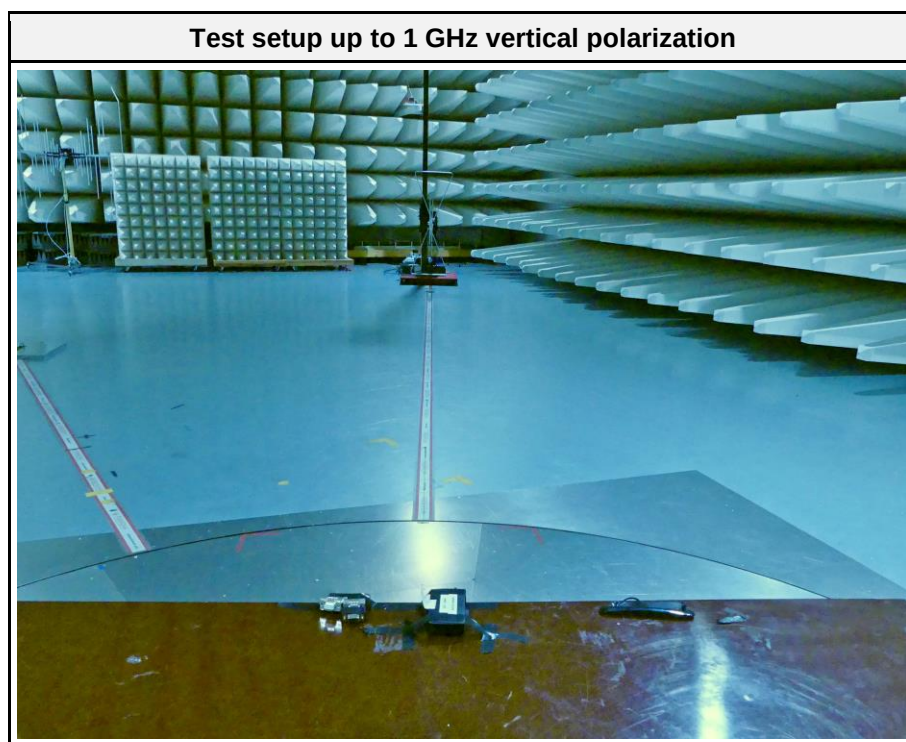
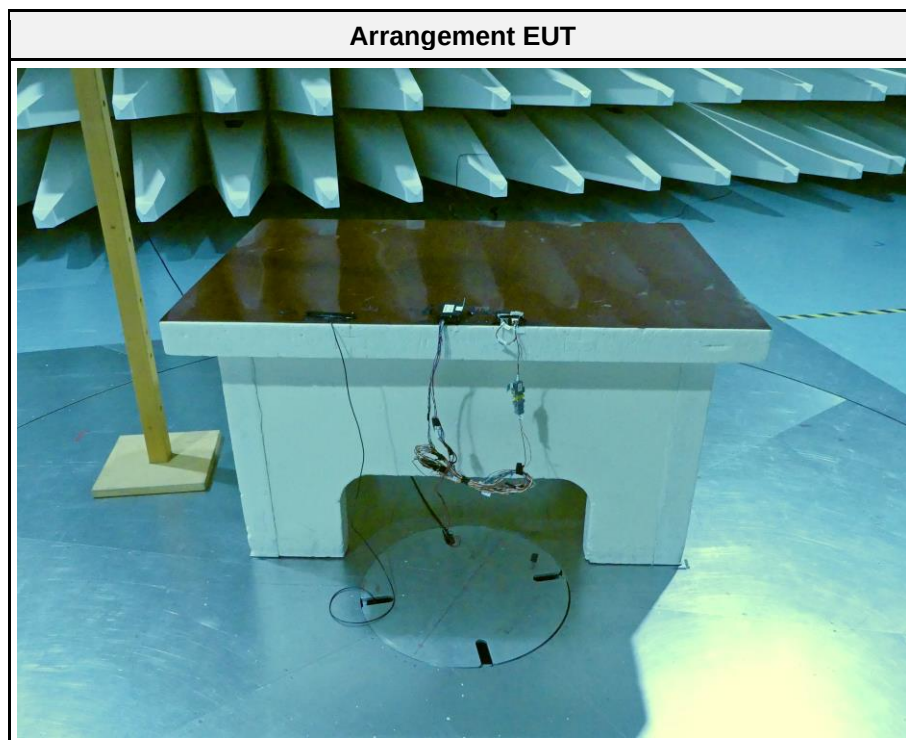
2.1.5 Limits

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

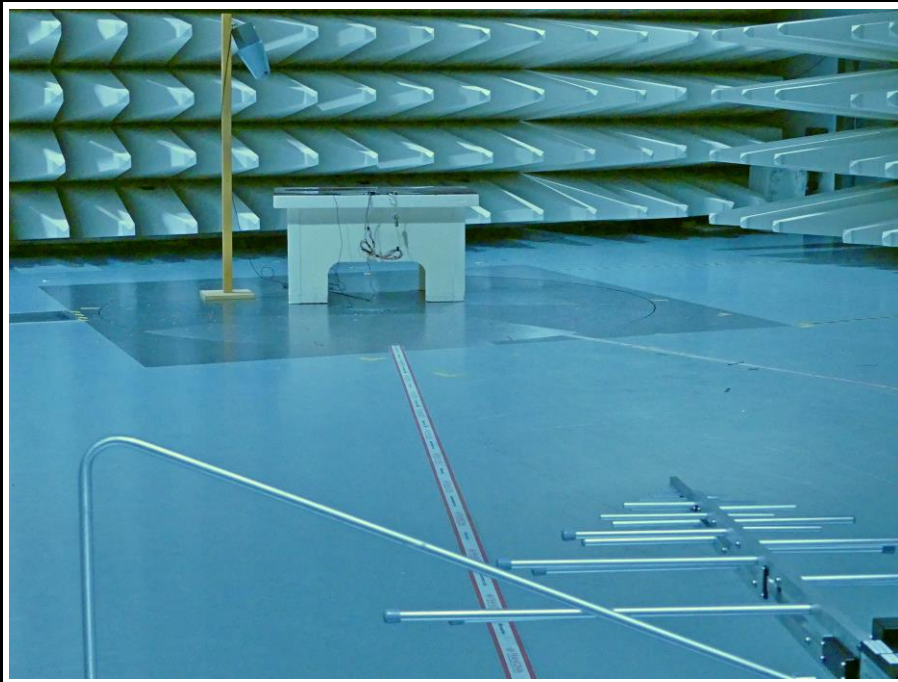
2.1.6 Results

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

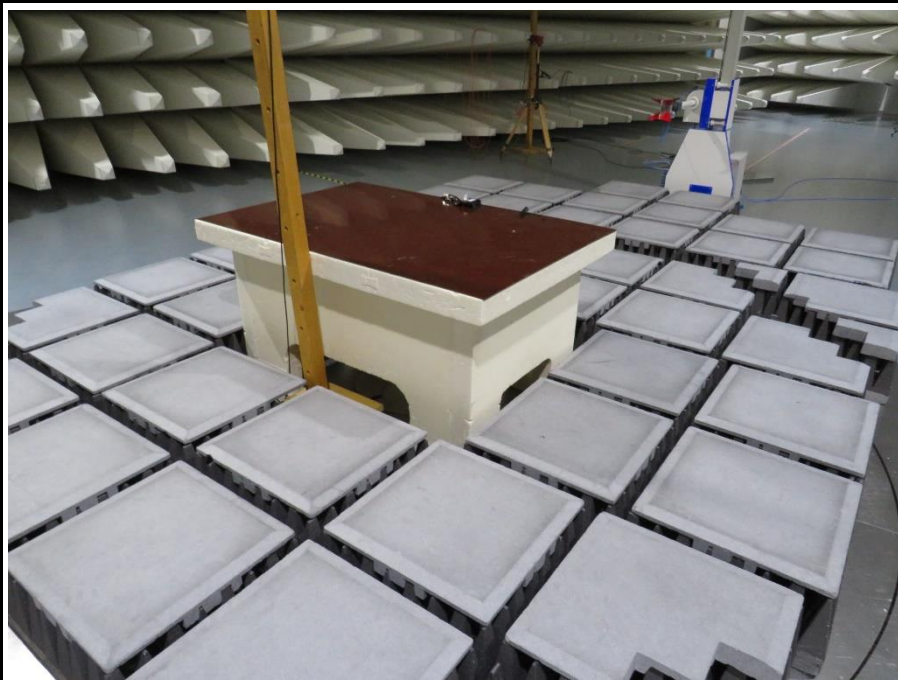
2.1.7 Setup Photos



Test setup up to 1 GHz horizontal polarization



Test setup up above 1 GHz vertical polarization



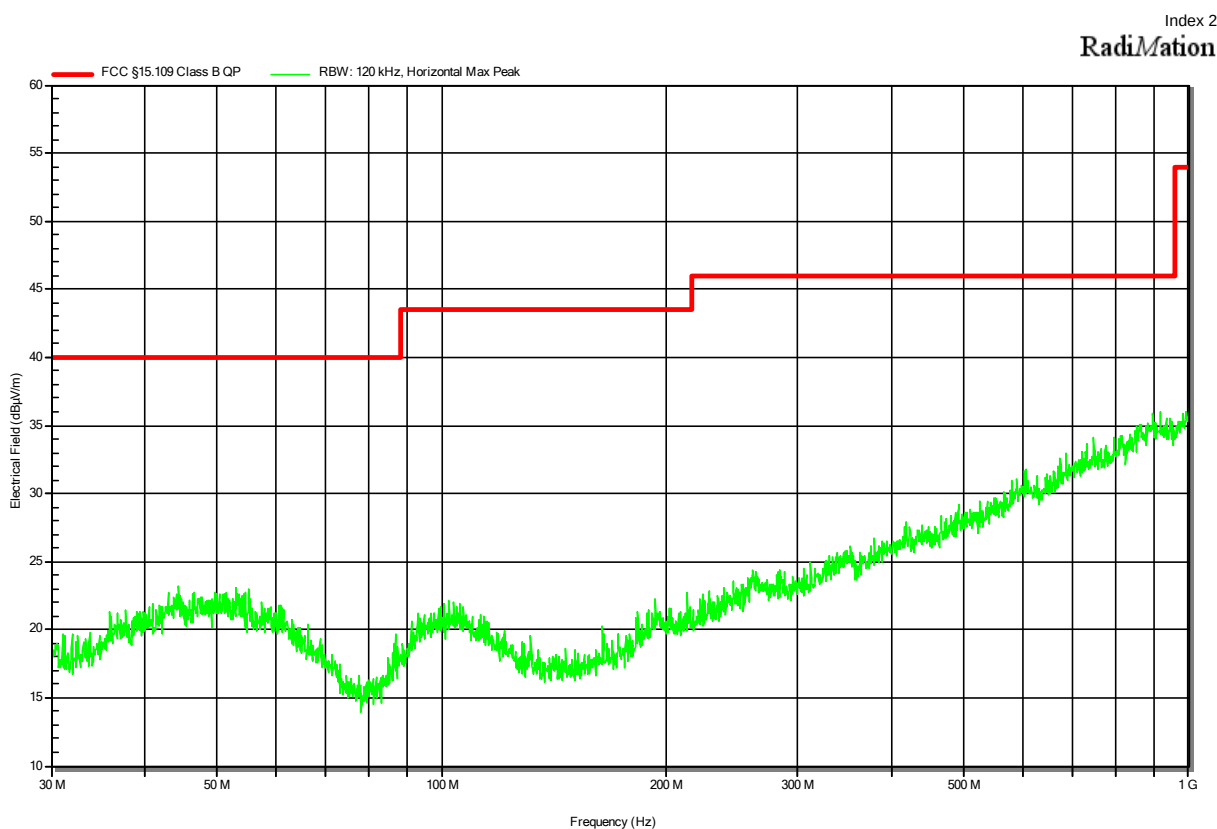
Test setup up above 1 GHz horizontal polarisation



2.1.8 Records

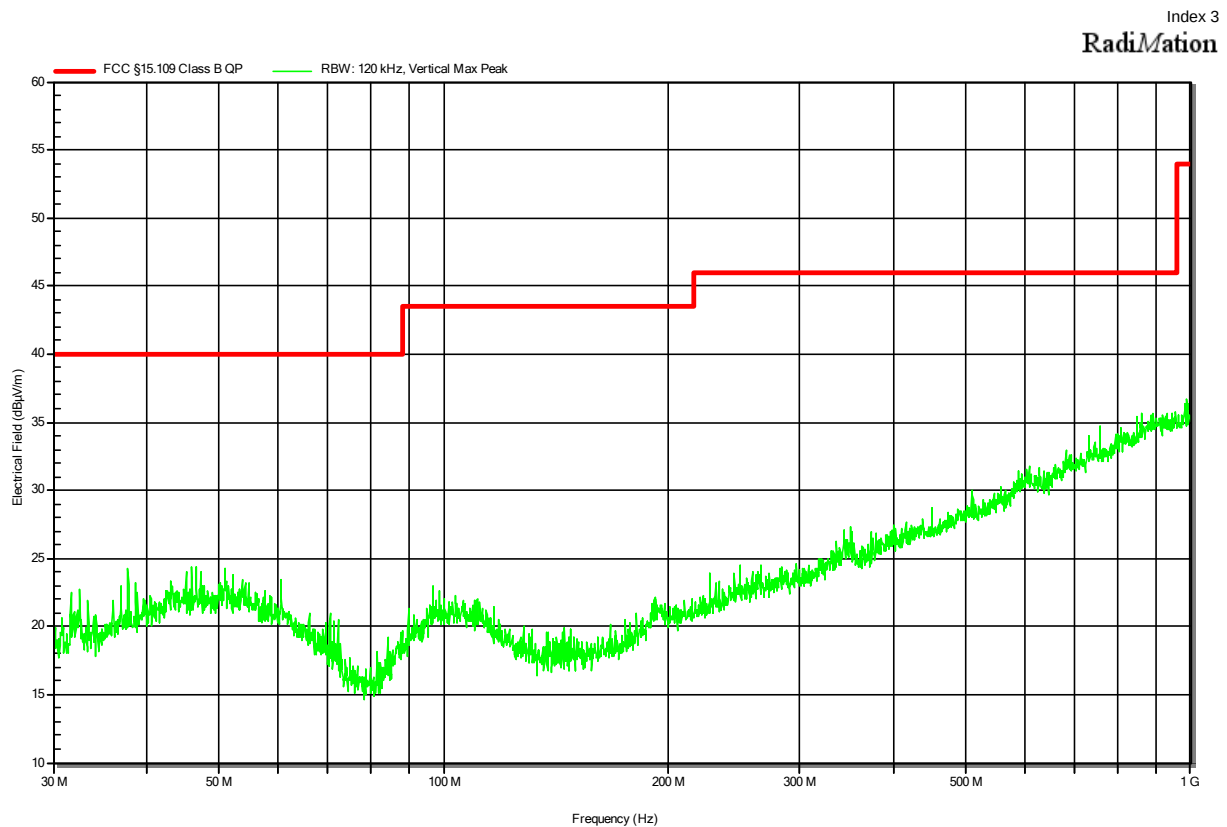
**Radiated emissions
according to FCC 15B**

Project Number: G0M-2111-1143
 Applicant: Bridgestone Mobility Solutions B.V.
 Model Description: Telematic Device with GSM+LTE+GNSS
 Model: L0640
 Test Sample ID: 37753
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-03-21
 Operating Conditions: ambient temperature: 22 °Celsius
 power input: 24 VDC
 Antenna: Schwarzbeck VULB 9162, Horizontal
 Measurement Distance: 10 m, converted to 3 m
 Operational Mode: Mode 1
 EUT Configuration: Configuration 1
 Note 1: Height 1 m, angle 0°



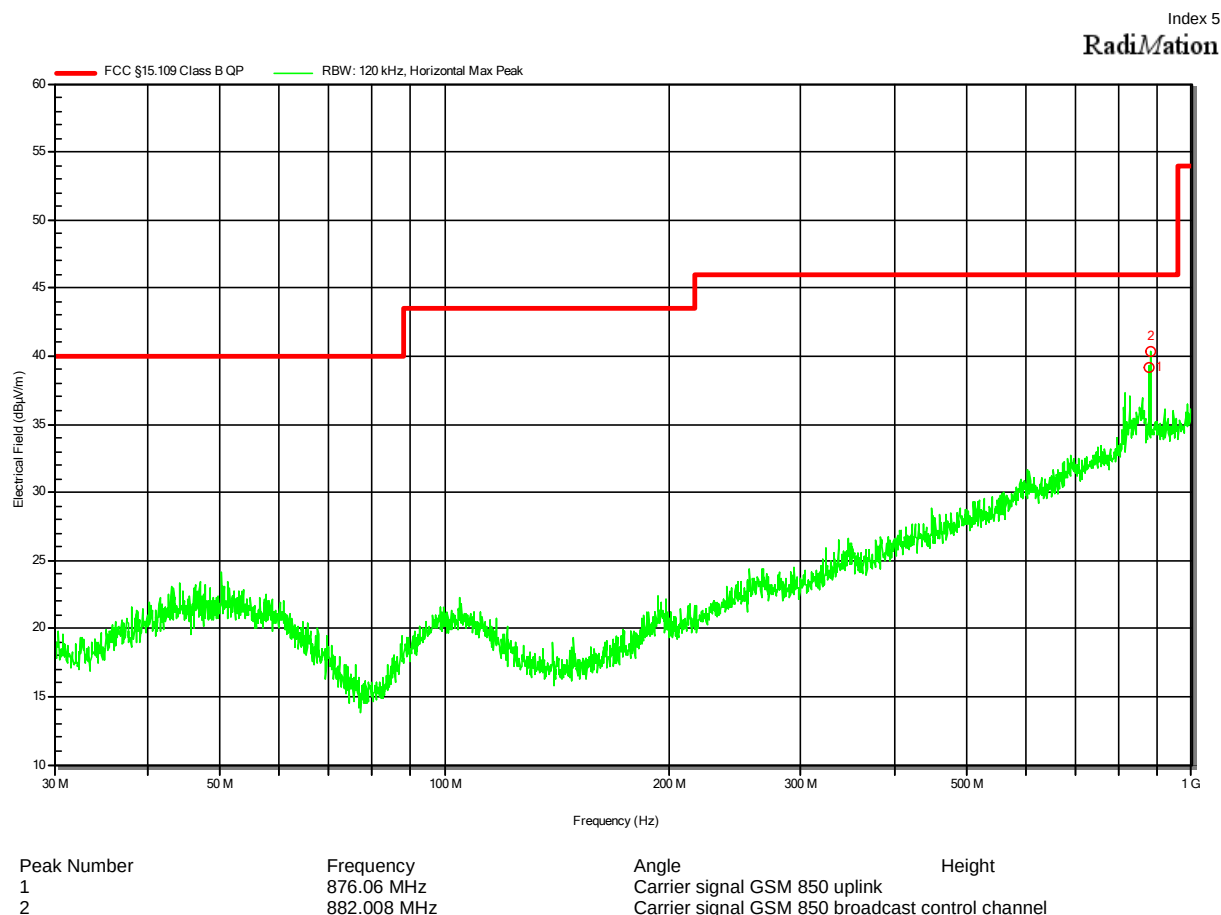
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power input: 24 VDC
Antenna: Schwarzbeck VULB 9162, Vertical
Measurement Distance: 10 m, converted to 3 m
Operational Mode: Mode 1
EUT Configuration: Configuration 1
Note 1: Height 1 m, angle 0°



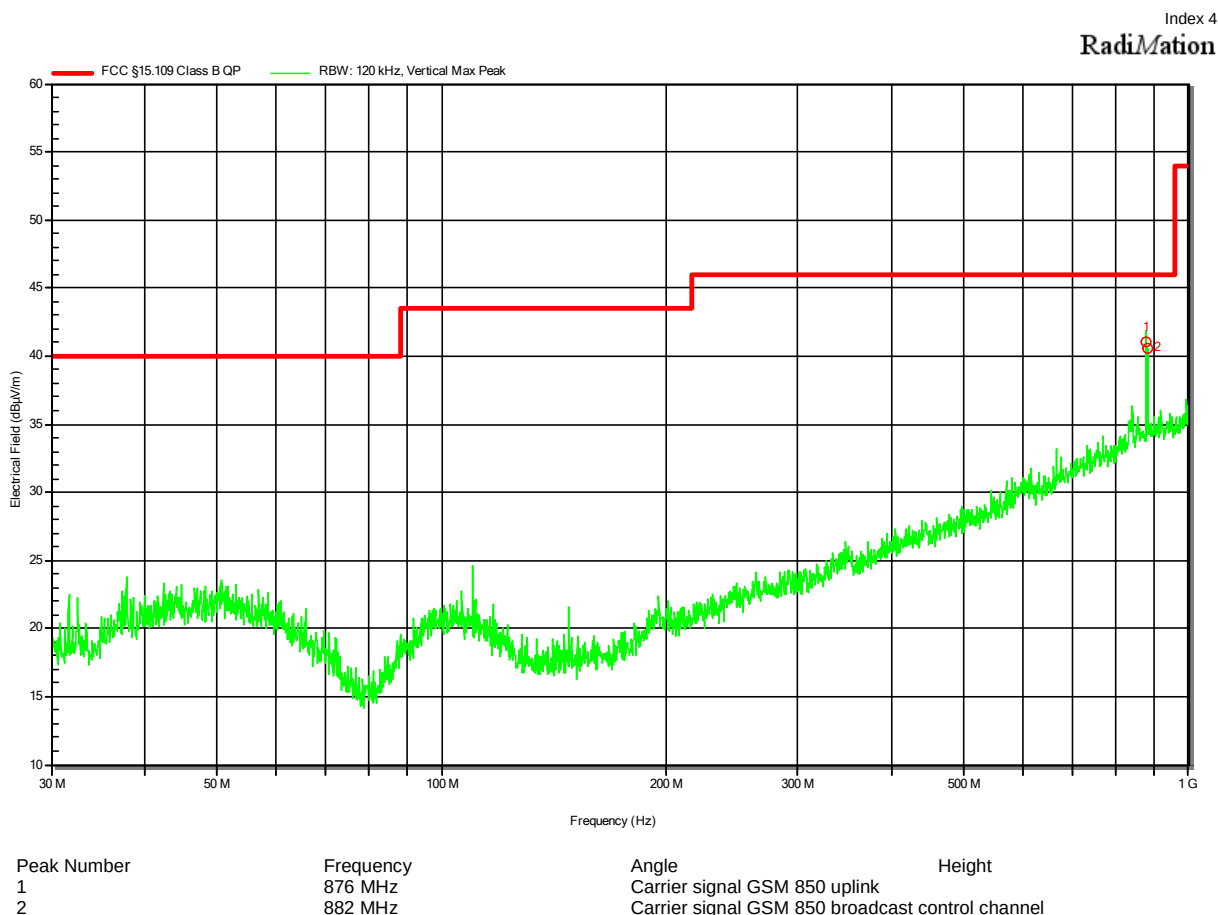
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Operator: Mr. Engel
Test Date: 2022-03-21
Operating Conditions: ambient temperature: 23 °Celsius
power input: 24 VDC
Antenna: Schwarzbeck VULB 9162, Horizontal
Measurement Distance: 10 m, converted to 3 m
Operational Mode: Mode 2
EUT Configuration: Configuration 1
Note 1: Height 1 m, angle 0°



Radiated emissions according to FCC 15B

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Test Site: Eurofins Product Service GmbH
Operator: Mr. Engel
Test Date: 2022-03-21
Operating Conditions: ambient temperature: 22 °Celsius
power input: 24 VDC
Antenna: Schwarzbeck VULB 9162, Vertical
Measurement Distance: 10 m, converted to 3 m
Operational Mode: Mode 2
EUT Configuration: Configuration 1
Note 1: Height 1 m, angle 0°

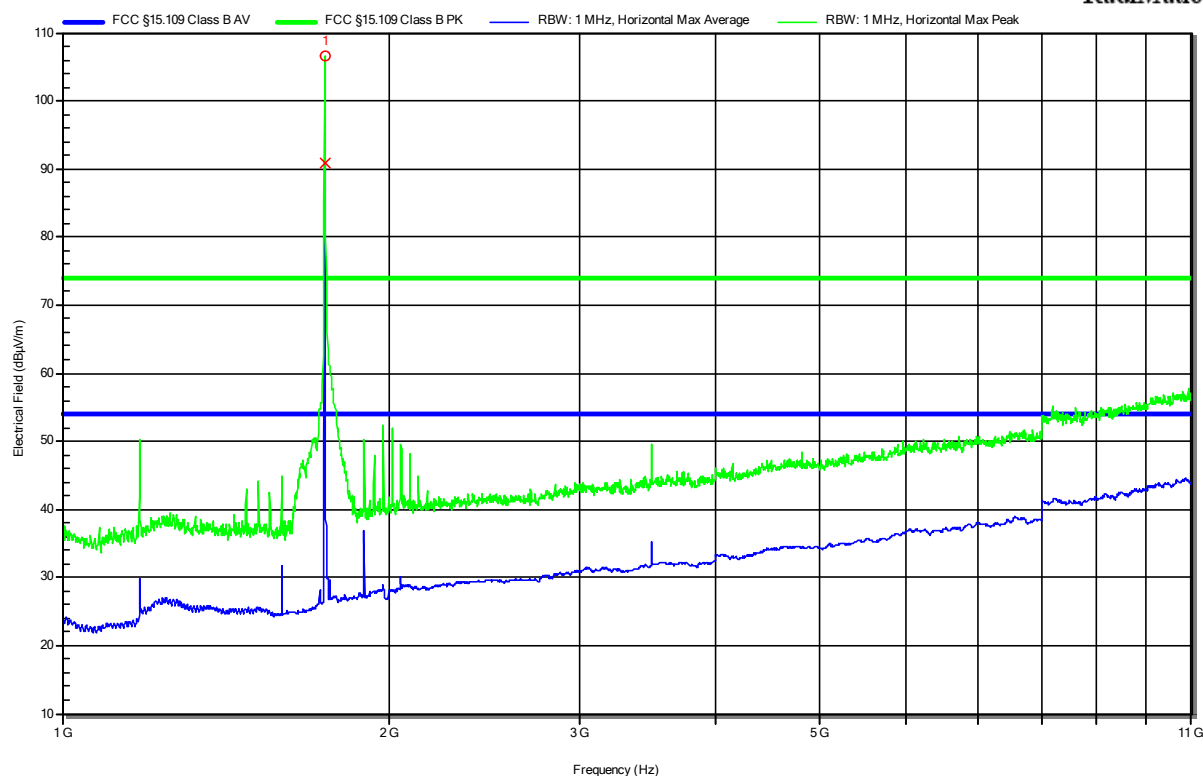


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 Test Sample ID: 37753
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-03-22
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 24 VDC
 Antenna: ETS-Lindgren 3117, Horizontal
 Measurement Distance: 3 m
 Operational Mode: Mode 1
 EUT Configuration: Configuration 1
 Note 1: Height 1 m, angle 0°

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Radiation



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.747 GHz	106.6 dBμV/m	74 dBμV/m	32.7 dB	Carrier signal LTE uplink		
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.747 GHz	90.8 dBμV/m	54 dBμV/m	36.8 dB	Carrier signal LTE uplink		

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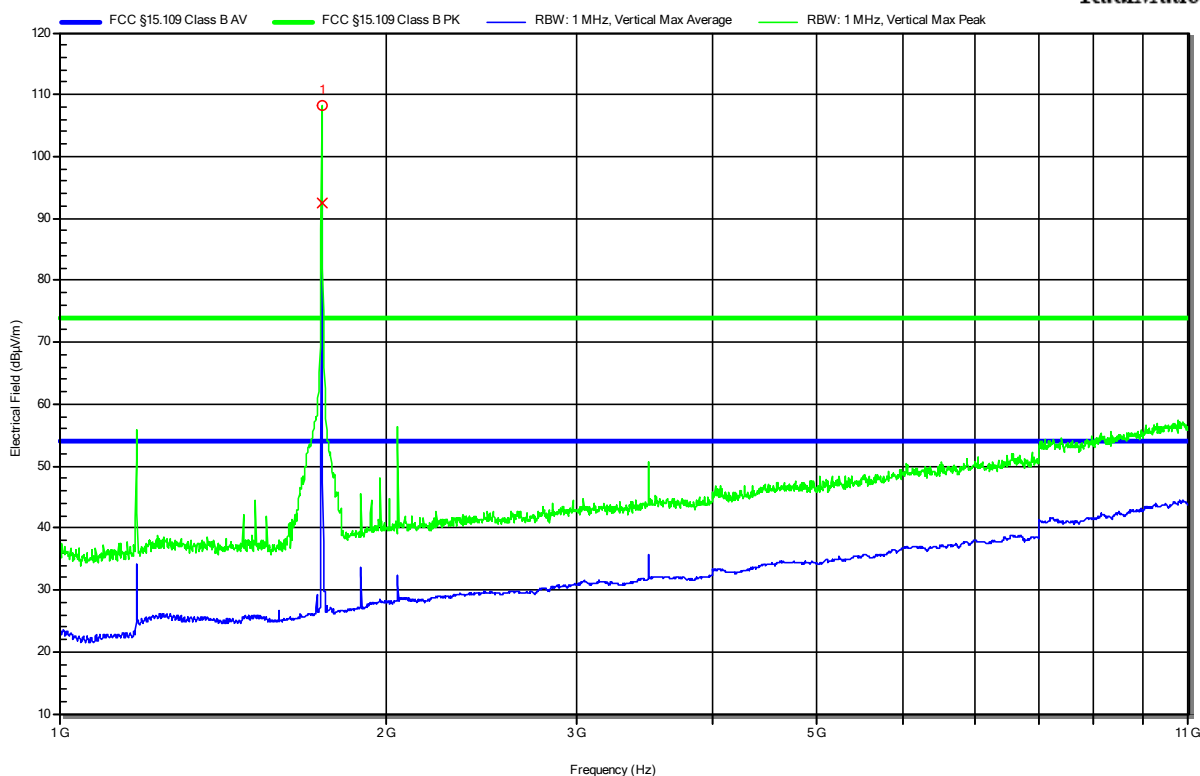
Eurofins Product Service GmbH
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Operating Conditions: ambient temperature: 23 °Celsius
power input: 24 VDC
Antenna: ETS-Lindgren 3117, Vertical
Measurement Distance: 3 m
Operational Mode: Mode 1
EUT Configuration: Configuration 1
Note 1: Height 1 m, angle 0°

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Radiation



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.747 GHz	108.3 dBμV/m	74 dBμV/m	34.4 dB	Carrier signal LTE uplink		
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.747 GHz	92.5 dBμV/m	54 dBμV/m	38.5 dB	Carrier signal LTE uplink		

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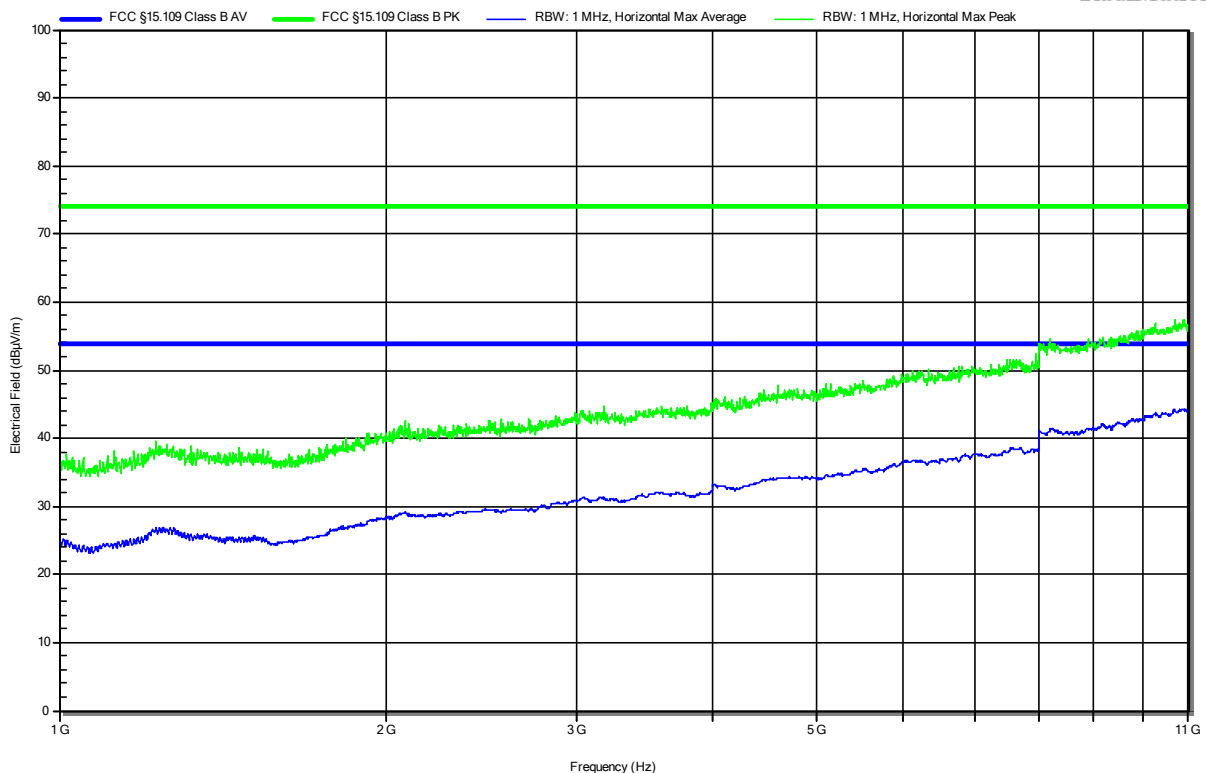
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 Model: L0640
 Test Sample ID: 3 m
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-03-22
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 24 VDC
 Antenna: ETS-Lindgren 3117, Horizontal
 Measurement Distance: 3 m
 Operational Mode: Mode 2
 EUT Configuration: Configuration 1
 Note 1: Height 1 m, angle 0°

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RadiMation

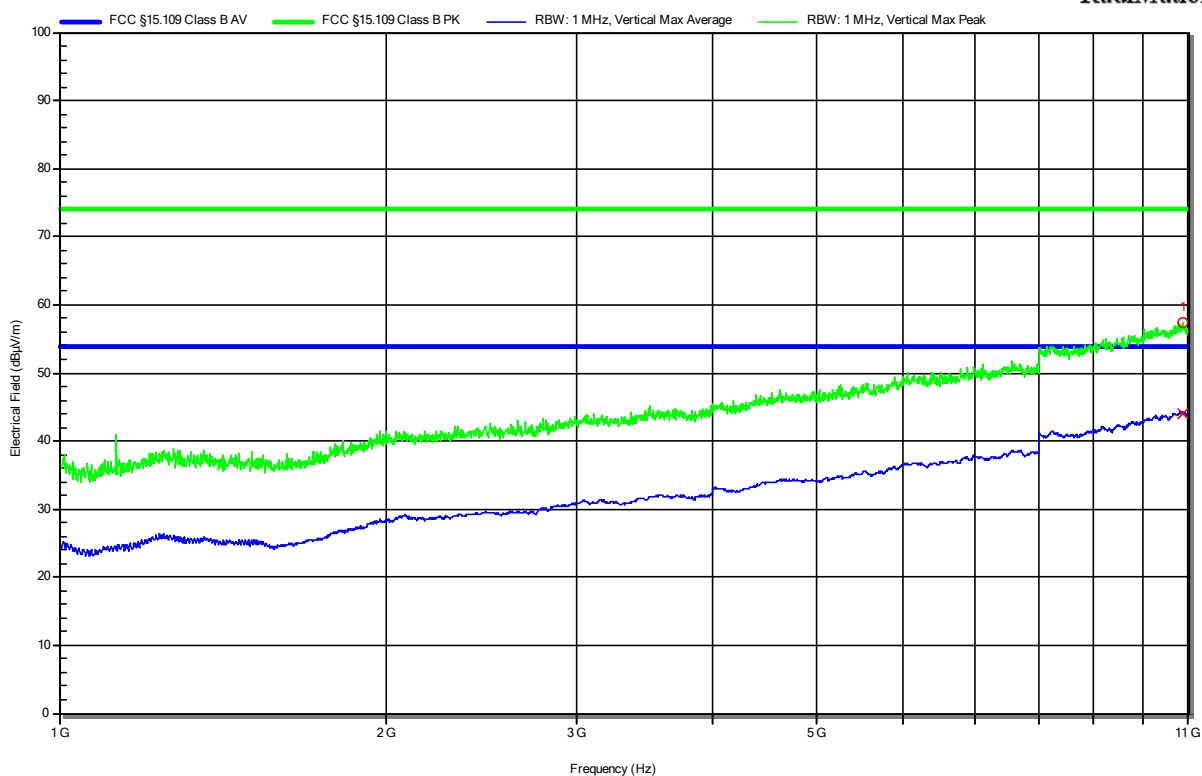


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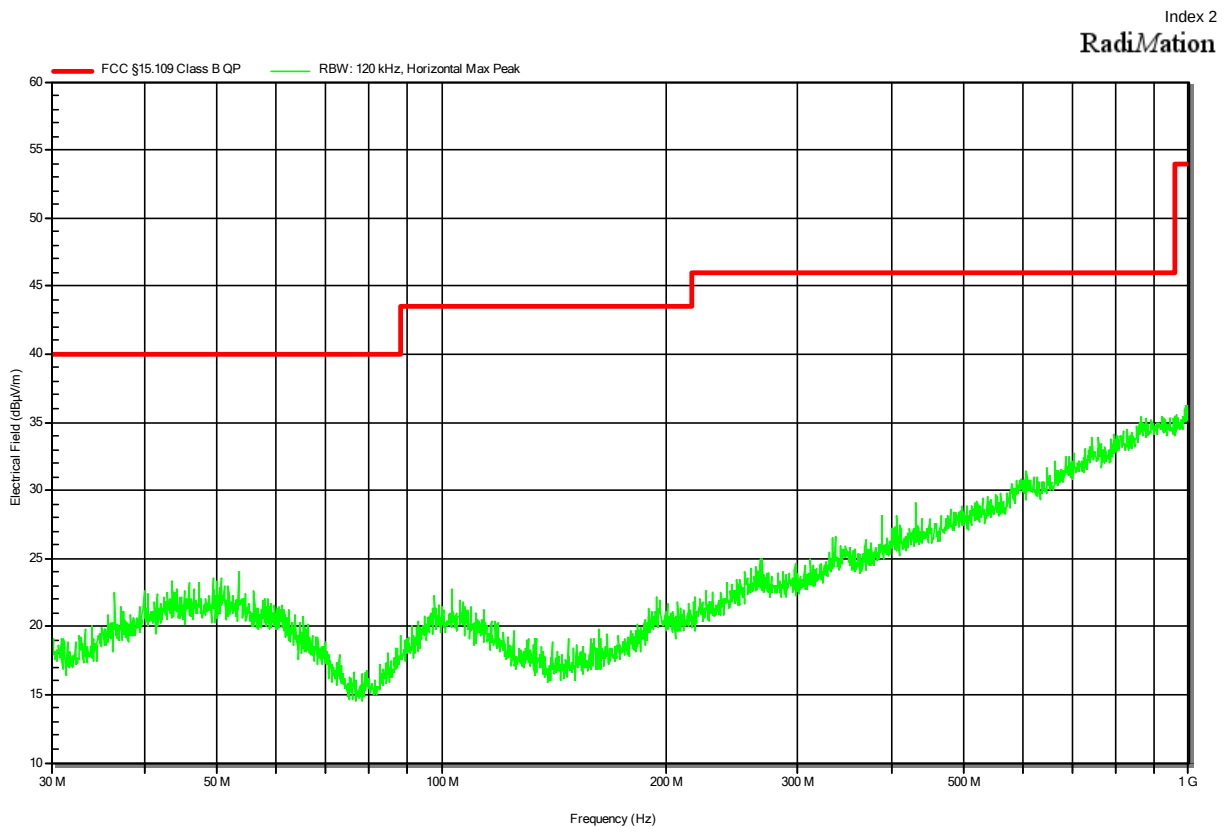
RadiMation



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	10.88 GHz	57.4 dBµV/m	74 dBµV/m	-16.6 dB	Pass	0 degrees	1 m
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	10.88 GHz	44 dBµV/m	54 dBµV/m	-10.0 dB	Pass	0 degrees	1 m

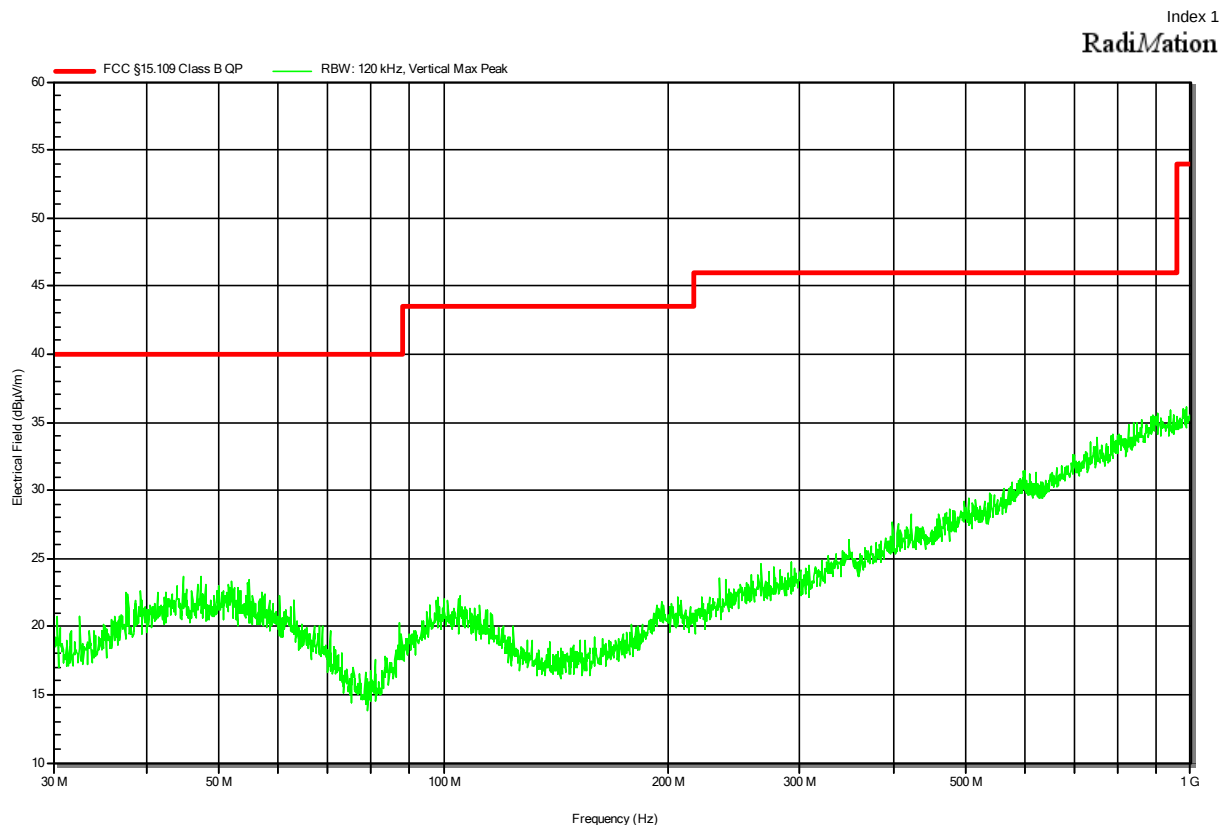
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 Model: L0640
 Test Sample ID: 37753
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-03-21
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 12 VDC
 Antenna: Schwarzbeck VULB 9162, Horizontal
 Measurement Distance: 10 m, converted to 3 m
 Operational Mode: Mode 1
 EUT Configuration: Configuration 2
 Note 1: Height 1 m, angle 0°



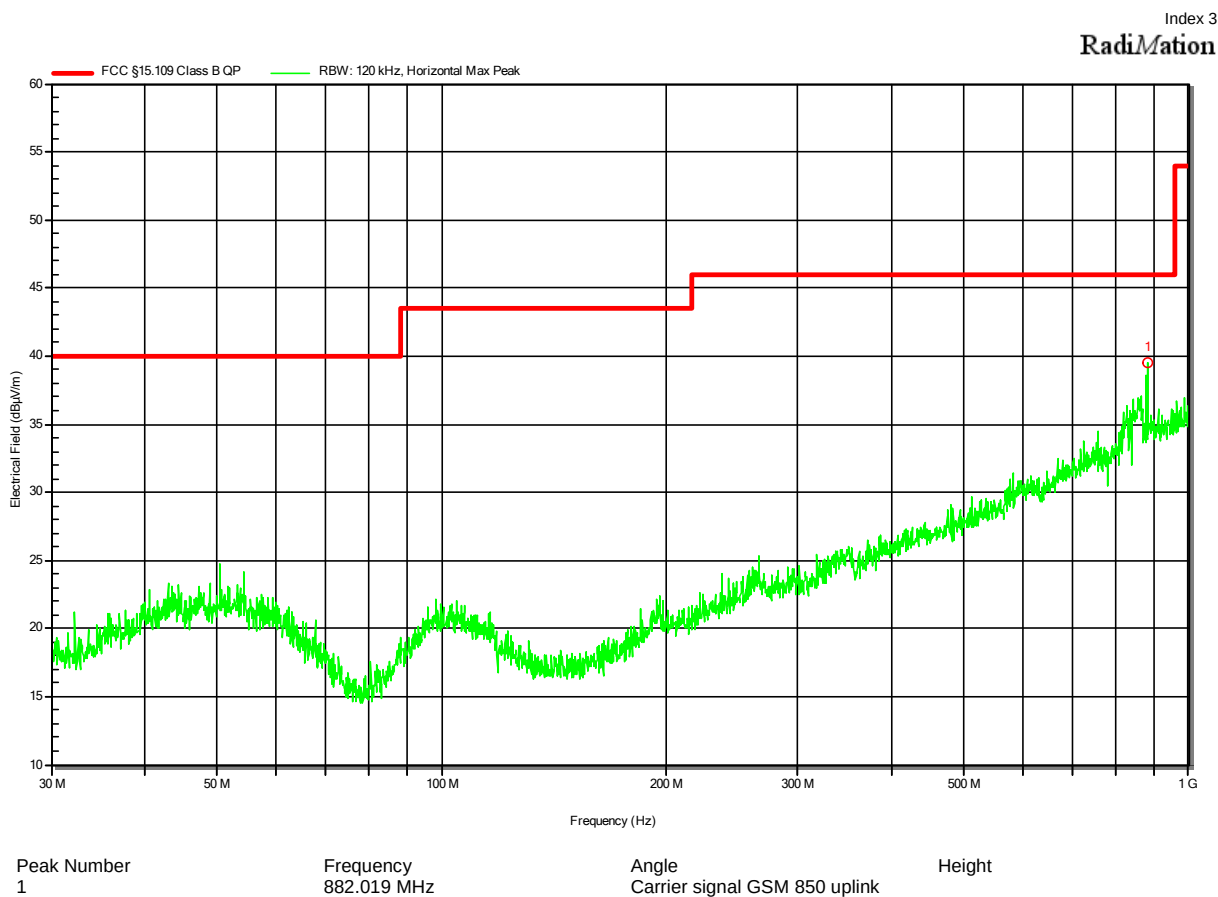
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EUT Configuration: Configuration 2
Note 1: Height 1 m, angle 0°

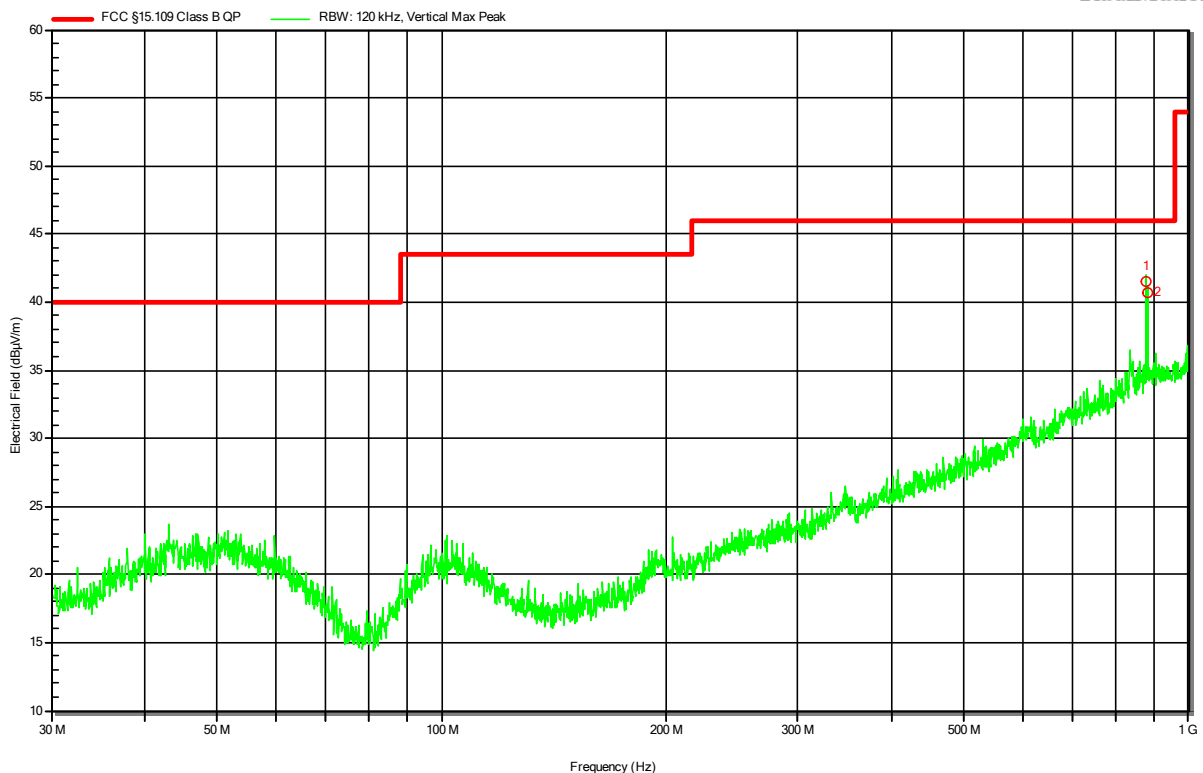


Radiated emissions according to FCC 15B

Project Number: G0M-2111-1143
Applicant: Bridgestone Mobility Solutions B.V.
Model Description: Telematic Device with GSM+LTE+GNSS
Model: L0640
Test Sample ID: 37753
Test Site: Eurofins Product Service GmbH
Operator: Mr. Engel
Test Date: 2022-03-21
Operating Conditions: ambient temperature: 23 °Celsius
power input: 12 VDC
Antenna: Schwarzbeck VULB 9162, Vertical
Measurement Distance: 10 m, converted to 3 m
Operational Mode: Mode 2
EUT Configuration: Configuration 2
Note 1: Height 1 m, angle 0°

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Radiation



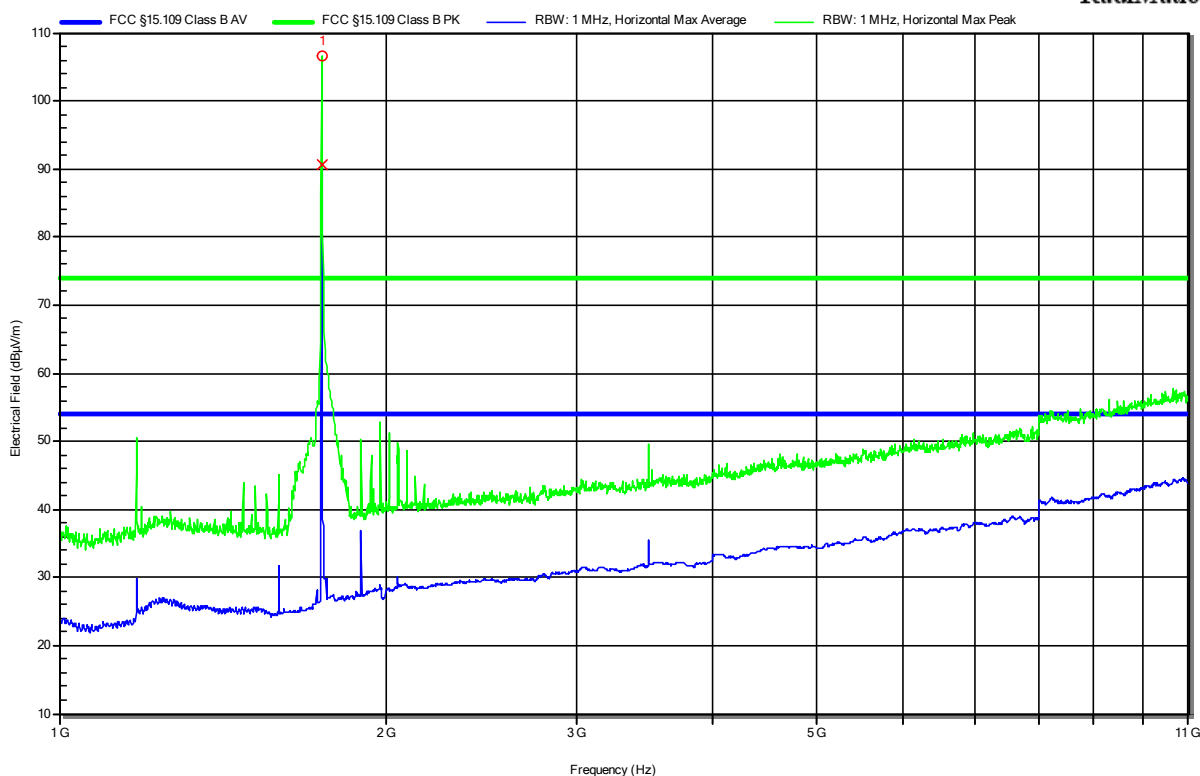
Peak Number	Frequency	Angle	Height
1	876 MHz	Carrier signal GSM 850 broadcast control channel	
2	882 MHz	Carrier signal GSM 850 uplink	

Radiated emissions according to FCC 15B

Project Number: G0M-2111-1143
Applicant: Bridgestone Mobility Solutions B.V.
Model Description: Telematic Device with GSM+LTE+GNSS
Model: L0640
Test Sample ID: 37753
Test Site: Eurofins Product Service GmbH
Operator: Mr. Engel
Test Date: 2022-03-22
Operating Conditions: ambient temperature: 23 °Celsius
power input: 12 VDC
Antenna: ETS-Lindgren 3117, Horizontal
Measurement Distance: 3 m
Operational Mode: Mode 1
EUT Configuration: Configuration 2
Note 1: Height 1 m, angle 0°

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Radiation



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.747 GHz	106.6 dBμV/m	74 dBμV/m	32.7 dB	Carrier signal LTE uplink		
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.747 GHz	90.7 dBμV/m	54 dBμV/m	36.7 dB	Carrier signal LTE uplink		

Test Report No.: G0M-2111-1143-EF0115B-V01

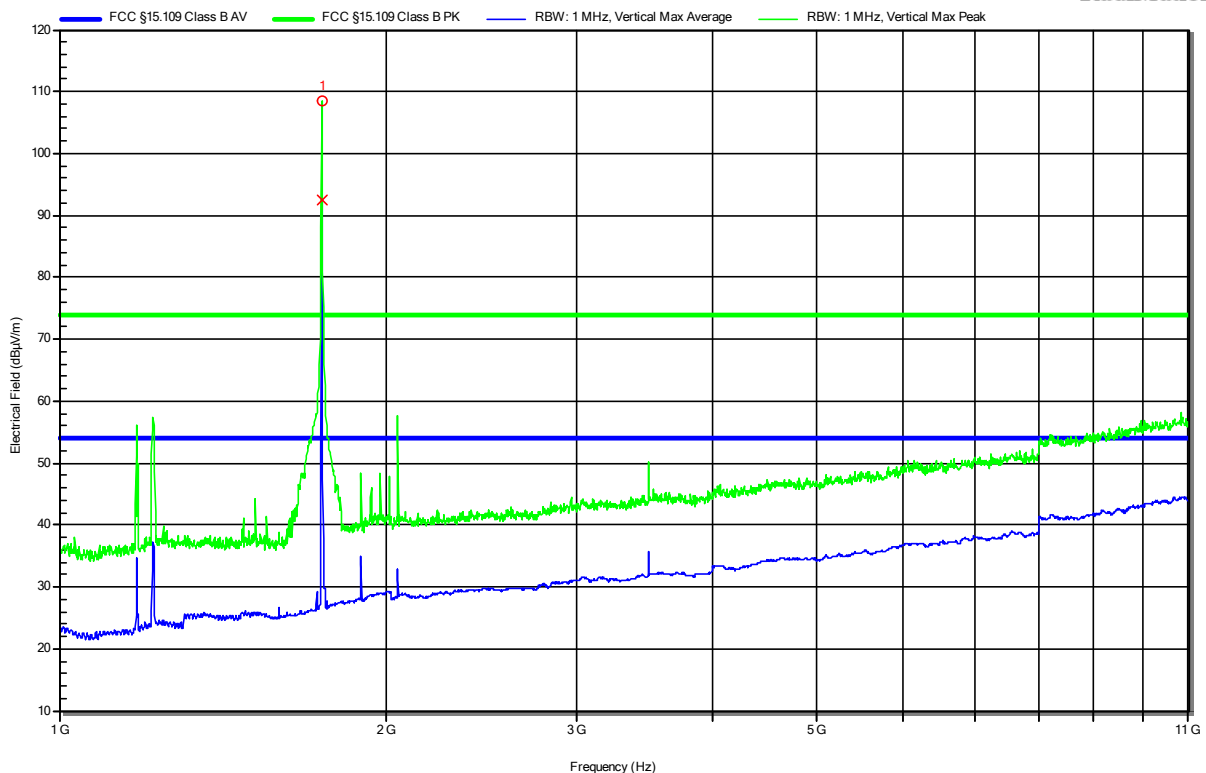
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated emissions according to FCC 15B

Project Number: G0M-2111-1143
 Applicant: Bridgestone Mobility Solutions B.V.
 Model Description: Telematic Device with GSM+LTE+GNSS
 Model: L0640
 Test Sample ID: 37753
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-03-22
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 12 VDC
 Antenna: ETS-Lindgren 3117, Vertical
 Measurement Distance: 3 m
 Operational Mode: Mode 1
 EUT Configuration: Configuration 2
 Note 1: Height 1 m, angle 0°

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Radiation



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.747 GHz	108.4 dBμV/m	74 dBμV/m	34.4 dB	Carrier signal LTE uplink		
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.747 GHz	92.6 dBμV/m	54 dBμV/m	38.6 dB	Carrier signal LTE uplink		

Test Report No.: G0M-2111-1143-EF0115B-V01

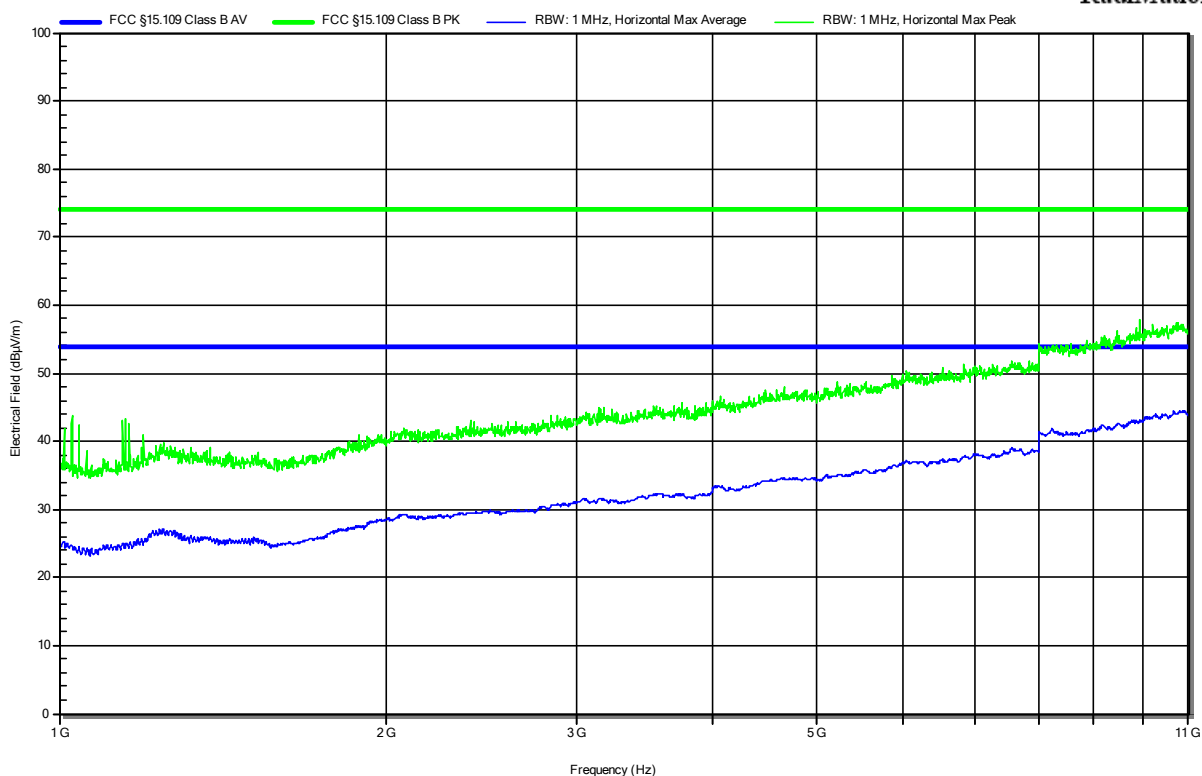
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated emissions according to FCC 15B

Project Number: G0M-2111-1143
Applicant: Bridgestone Mobility Solutions B.V.
Model Description: Telematic Device with GSM+LTE+GNSS
Model: L0640
Test Sample ID: 37753
Test Site: Eurofins Product Service GmbH
Operator: Mr. Engel
Test Date: 2022-03-22
Operating Conditions: ambient temperature: 23 °Celsius
power input: 12 VDC
Antenna: ETS-Lindgren 3117, Horizontal
Measurement Distance: 3 m
Operational Mode: Mode 2
EUT Configuration: Configuration 2
Note 1: Height 1 m, angle 0°

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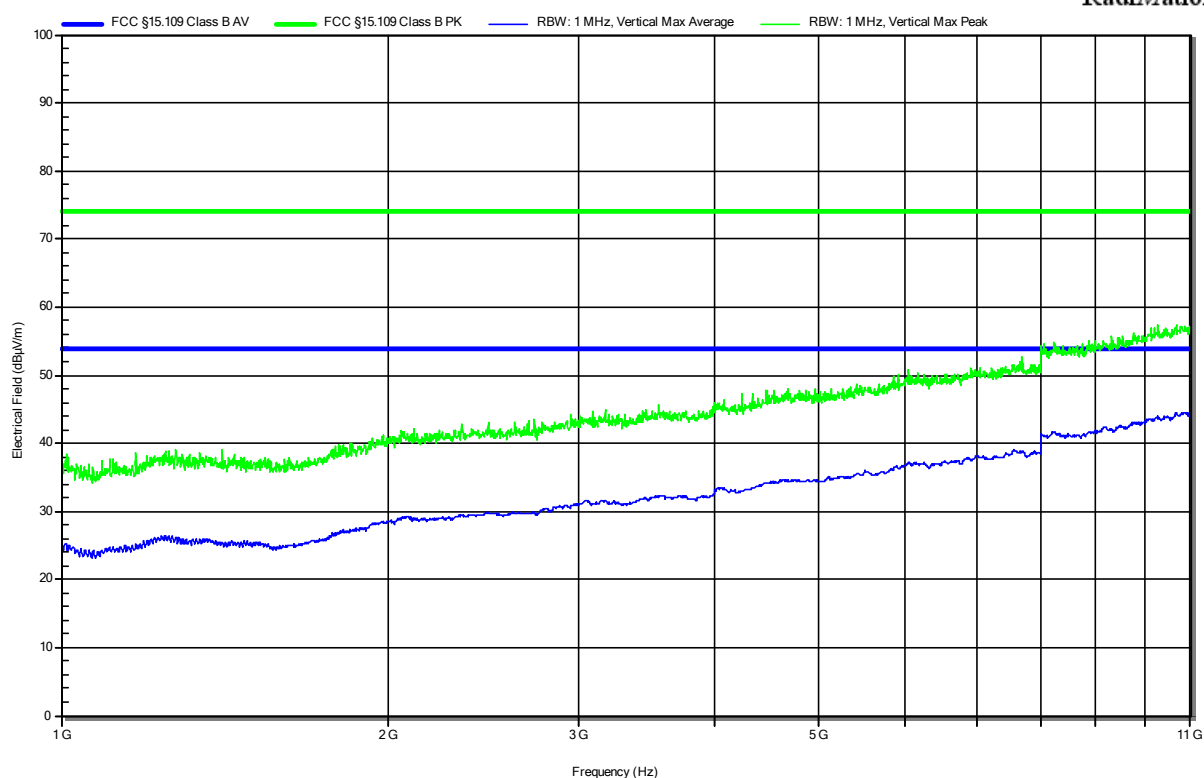


Radiated emissions according to FCC 15B

Project Number: G0M-2111-1143
Applicant: Bridgestone Mobility Solutions B.V.
Model Description: Telematic Device with GSM+LTE+GNSS
Model: L0640
Test Sample ID: 37753
Test Site: Eurofins Product Service GmbH
Operator: Mr. Engel
Test Date: 2022-03-22
Operating Conditions: ambient temperature: 23 °Celsius
power input: 12 VDC
Antenna: ETS-Lindgren 3117, Vertical
Measurement Distance: 3 m
Operational Mode: Mode 2
EUT Configuration: Configuration 2
Note 1: Height 1 m, angle 0°

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Radiation



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	30 MHz to 1 GHz @ 10 m, 6.25 dB 1 GHz to 6 GHz @ 3 m, 4.86 dB 6 GHz to 18 GHz @ 3 m, max. 5.39 dB