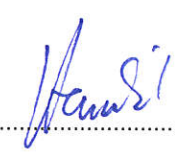
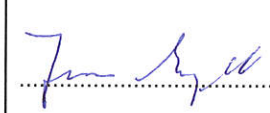


EMC TEST REPORT	
FCC 47 CFR Part 15B, ISED ICES-003 Issue 6	
Report Reference No	G0M-1807-7558-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 IC Testing Laboratory site: 3470A-2
Applicant	digades GmbH
Address	Äußere Weberstraße 20 02763 Zittau GERMANY
Test Specification	Full compliance test
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	VW RemoteStart
Model(s)	Remote Start Receiver - VWRSTR
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	HW 004
Software Version(s)	SW 0702
FCC-ID	QNFVWRSTR
IC	6869A-VWRSTR
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	2018-008-24	
Report:		
Compiled by	Matthias Handrik	
Tested by (+ signature) (Responsible for Test)	Matthias Handrik	
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt	
Date of Issue	2018-09-10	
Total number of pages	25	
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	2018-09-10	Initial Release	

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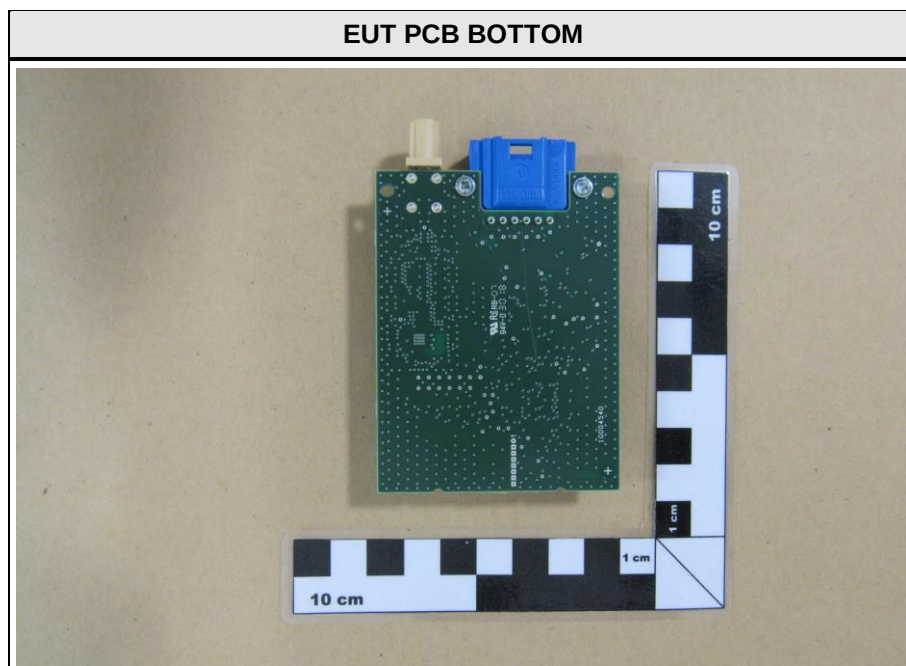
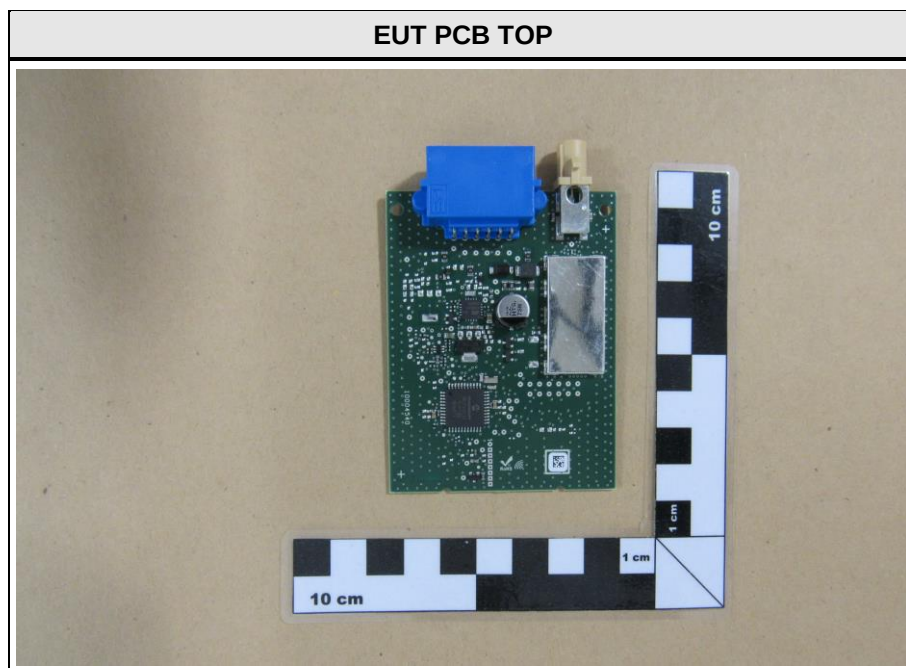
1 Equipment (Test Item) Under Test

Description	VW RemoteStart	
Model	Remote Start Receiver - VWRSTR	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	unspecified	
Hardware Version(s)	HW 004	
Software Version(s)	SW 0702	
FCC-ID	QNFVWRSTR	
IC	6869A-VWRSTR	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	919.5	
Supply Voltage	V _{NOM}	12 VDC (Vehicular use)
AC/DC-Adaptor	None	
Manufacturer	digades GmbH Äußere Weberstraße 20 02763 Zittau GERMANY	

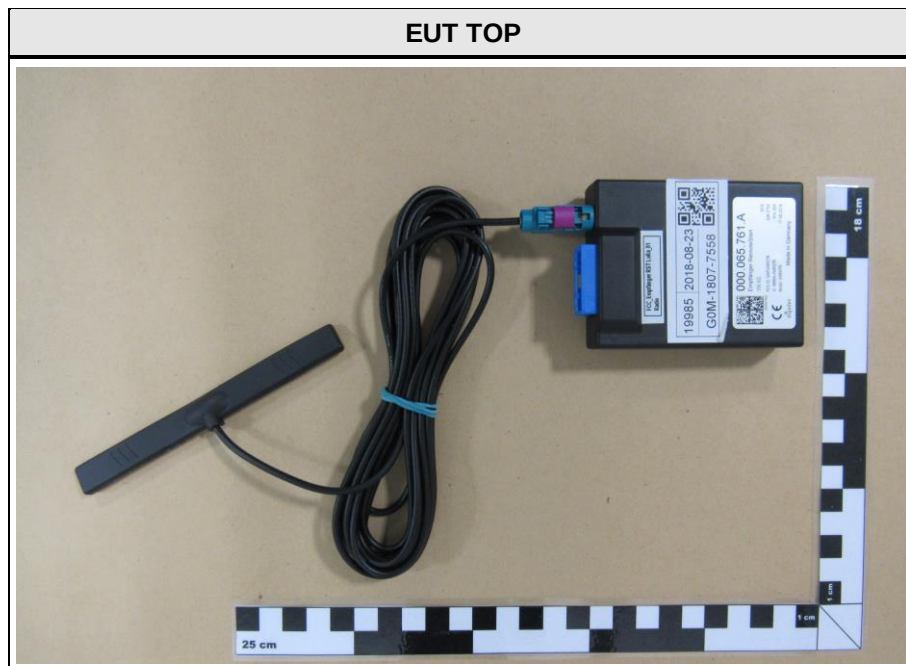
1.1 Equipment Ports

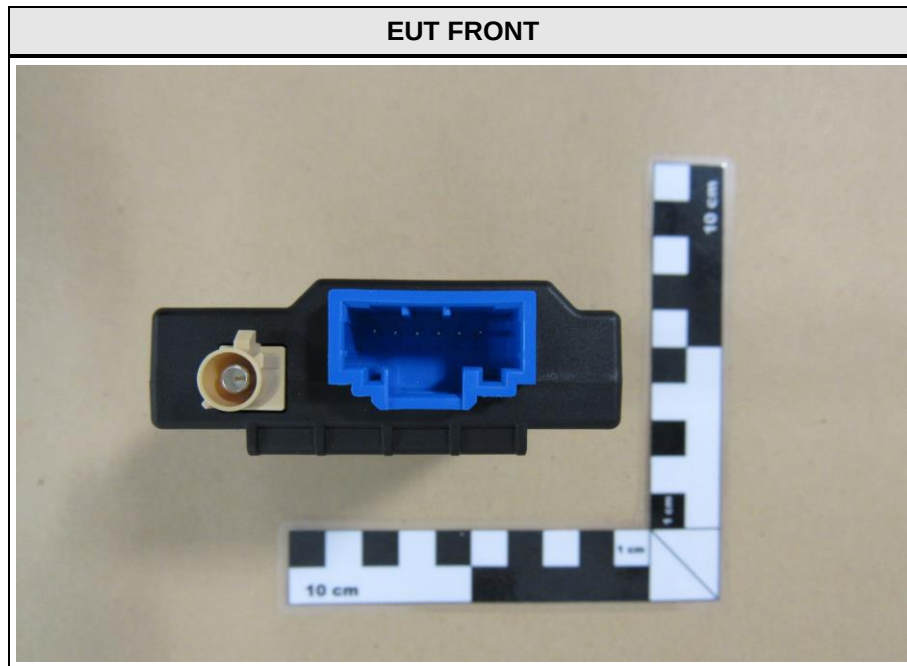
Name	Type	Attributes	Comment
Harness	DC;IO	Count: 1 Direction: In Service only: No	
Antenna	IO	Count: 1 Direction: In Service only: No	
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		

1.2 Equipment Photos - Internal



1.3 Equipment Photos - External





1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Remote control	digades		Companion device
AE	Laptop	Lenovo	T420	
AE	LIN LWL	Langer	LIN100	
AE	LIN LWL	digades	LIN Master	
AE	software	digdes	BCM simulator	
Description:				
AE	Auxillary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	EUT powered up. Active RF on 919.5 MHz communication between EUT and companion device.
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT powered via 12V DC battery. EUT is placed inside the measurement chamber. LIN LWL is connected from EUT to laptop. Laptop is placed outside the measurement chamber. Software visualized the LIN communication. Companion device is placed inside the measurement chamber (corner).
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 analyzer in dBμV. Any external preamplifiers used are taken into account through internal analyzer 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 analyzer. 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:

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

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 = 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	
FCC 15.107 ICES-003, 8, 6.2	AC power line conducted emissions	ANSI C63.4:2014	N/R	
Comment:				

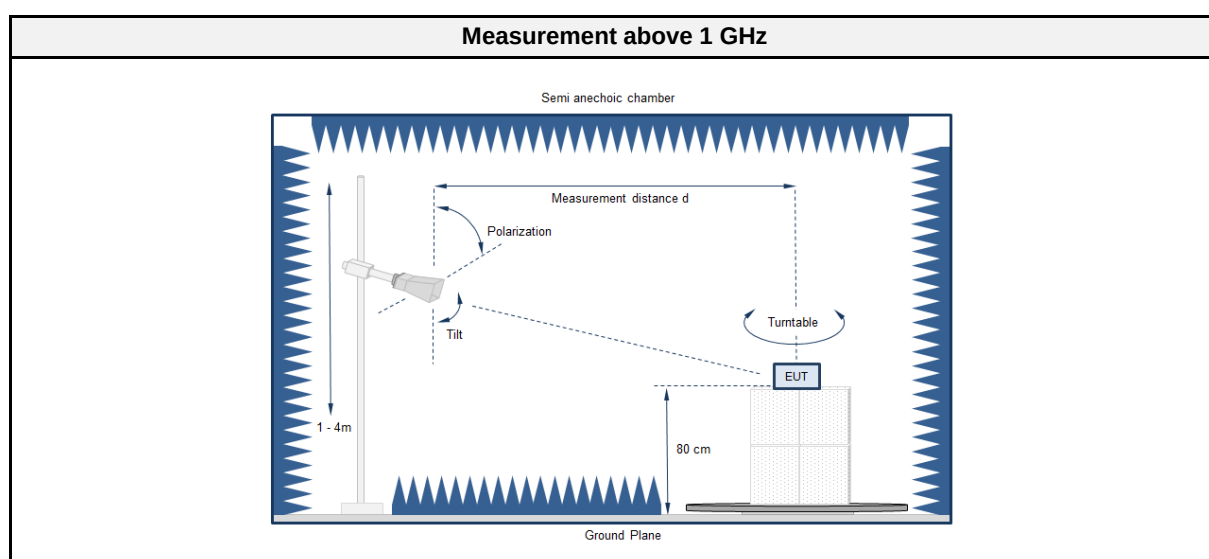
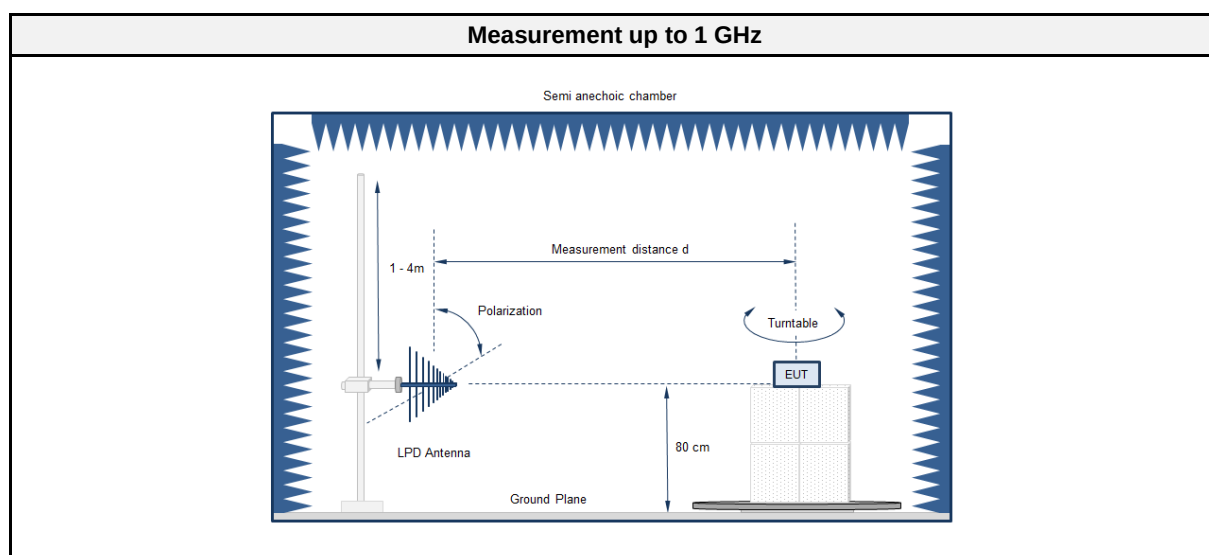
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

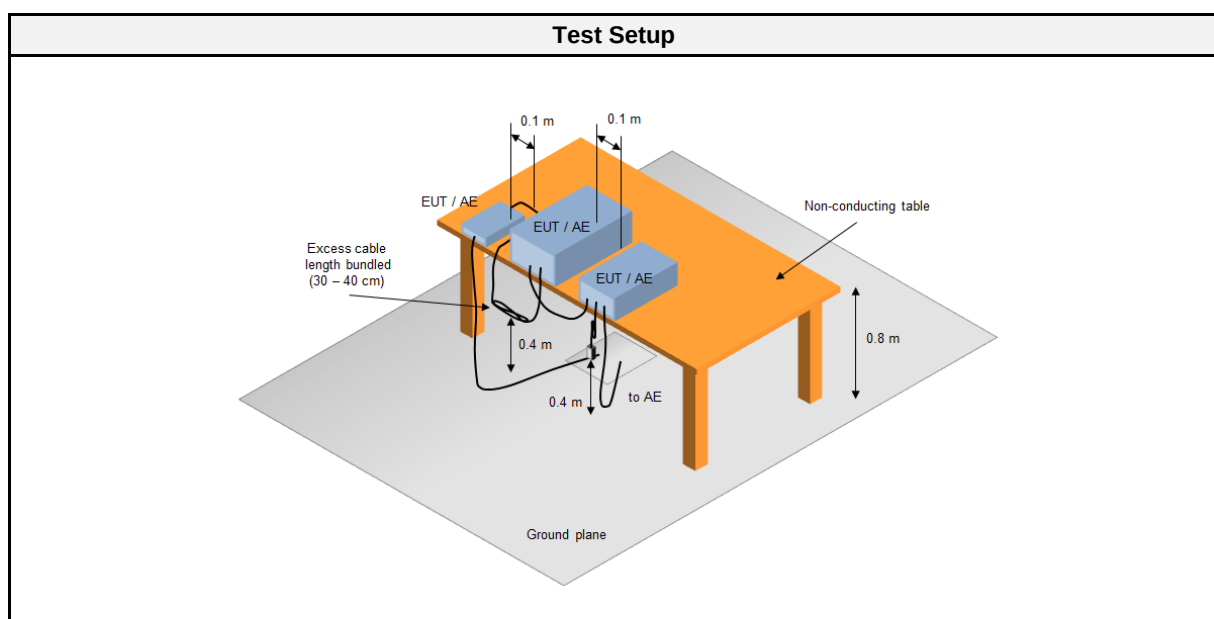
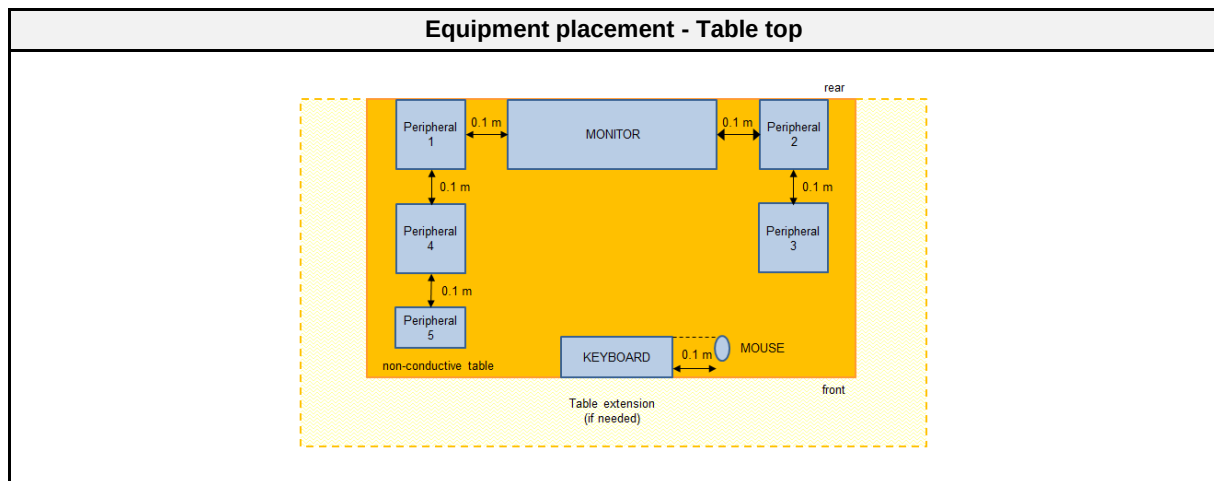
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 8, 6.1
Reference method	ANSI C63.4:2014 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	919.5
Measurement range	30 MHz to 5 GHz
Temperature [°C]	24 C°
Humidity [%]	56 %
Operator	Matthias Handrik
Date	2018-08-24

2.1.2 Setup





2.1.3 Equipment

Test Equipment					
Manufacturer	Description	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00200	functional test	functional test
Keysight	EMI Test Receiver	N9038A-526/WXP	EF01070	2017-08	2018-08
R&S	Biconical Antenna	HK116	EF00203	2018-06	2020-06
R&S	LPD Antenna	HL 223	EF00187	2016-05	2019-05
Schwarzbeck	Horn Antenna	BBHA 9120D (1-18GHz)	EF00018	2016-09	2019-09

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

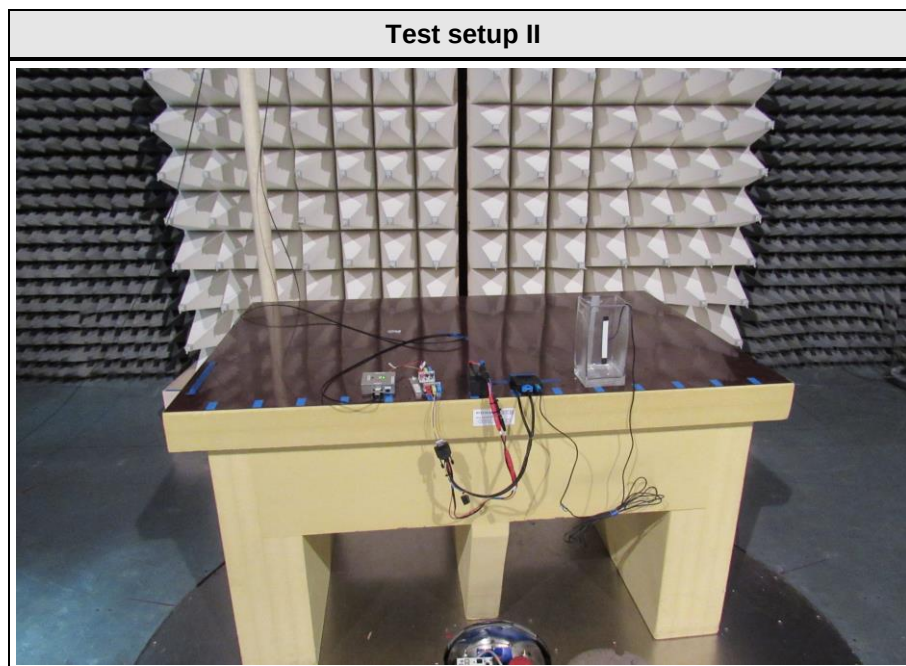
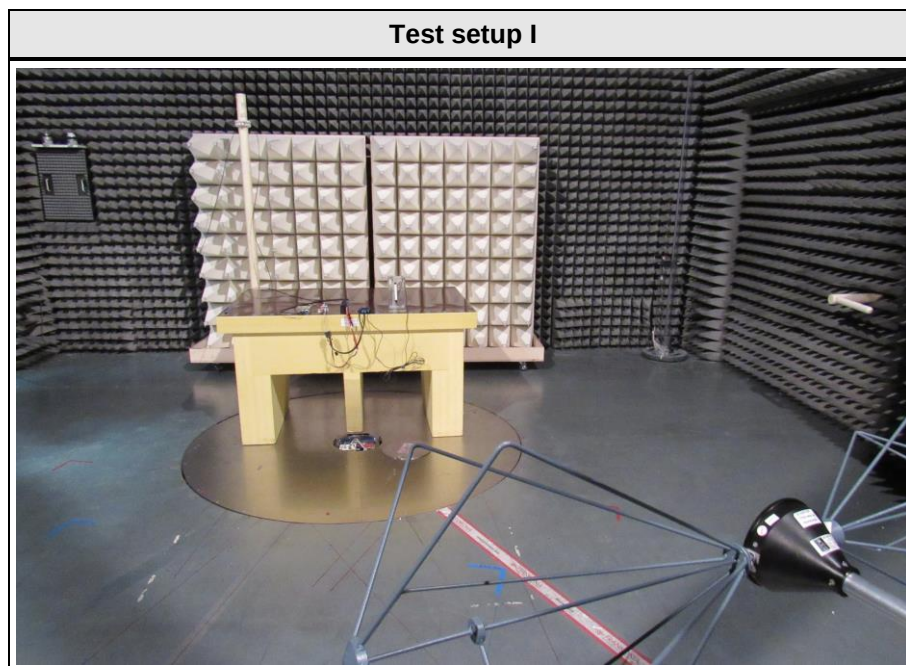
Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak	74
	Average	54

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	

2.1.7 Setup Photos



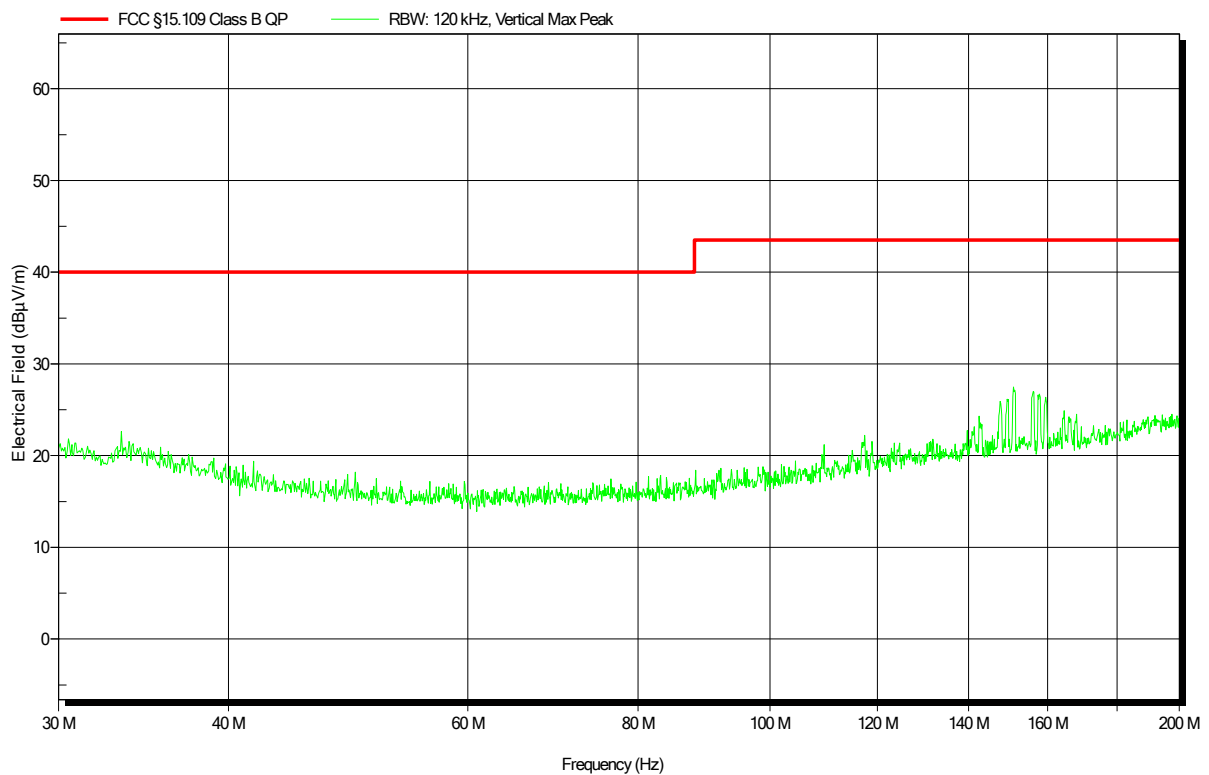
2.1.8 Records

Radiated emissions under normal conditions according to FCC Part 15b

Project number: G0M-1807-7558

Applicant: digades GmbH
 EUT Name: Remote Start VW "Empfänger"
 Model: Empfänger RemoteStart VW-VWRSTR
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 24°C, Unom: 12 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: mode# 1
 Test Date: 2018-08-24
 Note:

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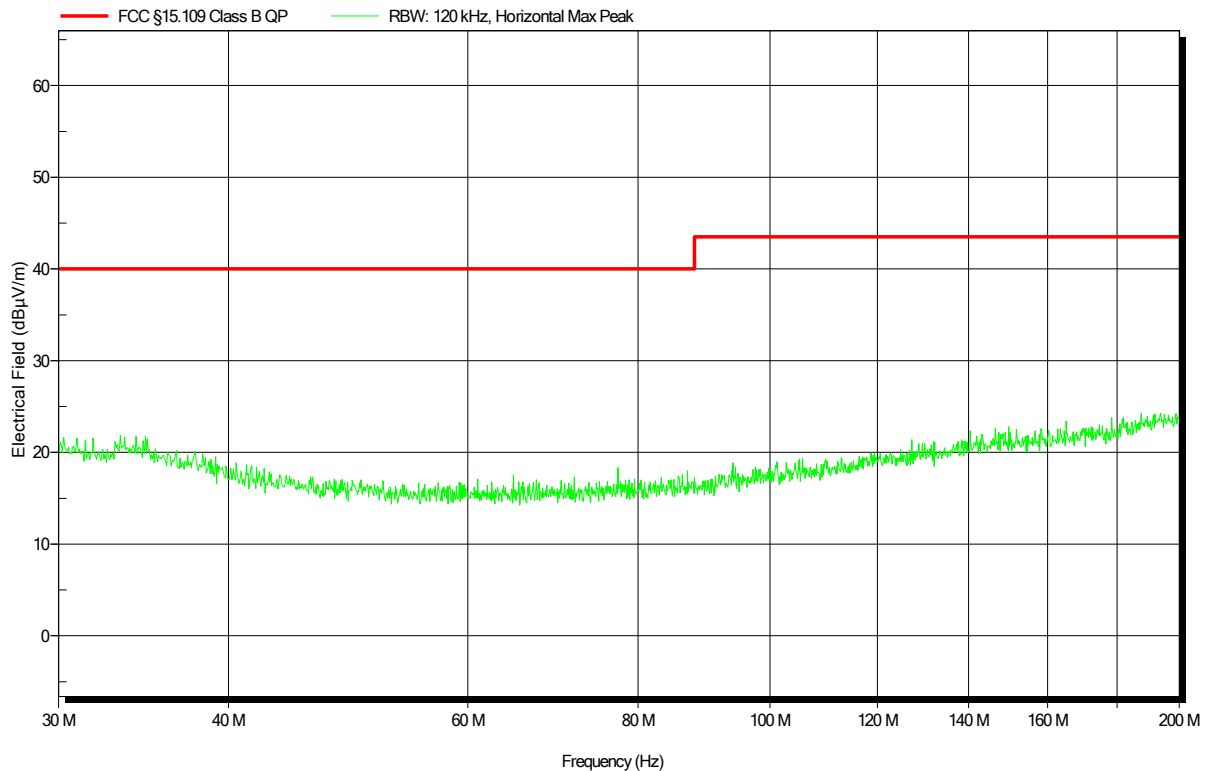


Radiated emissions under normal conditions according to FCC Part 15b

Project number: G0M-1807-7558

Applicant: digades GmbH
EUT Name: Remote Start VW "Empfänger"
Model: Empfänger RemoteStart VW-VWRSTR
Test Site: Eurofins Product Service GmbH
Operator: Mr. Handrik
Test Conditions: Tnom: 24°C, Unom: 12 VDC
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3m
Mode: mode# 1
Test Date: 2018-08-24
Note:

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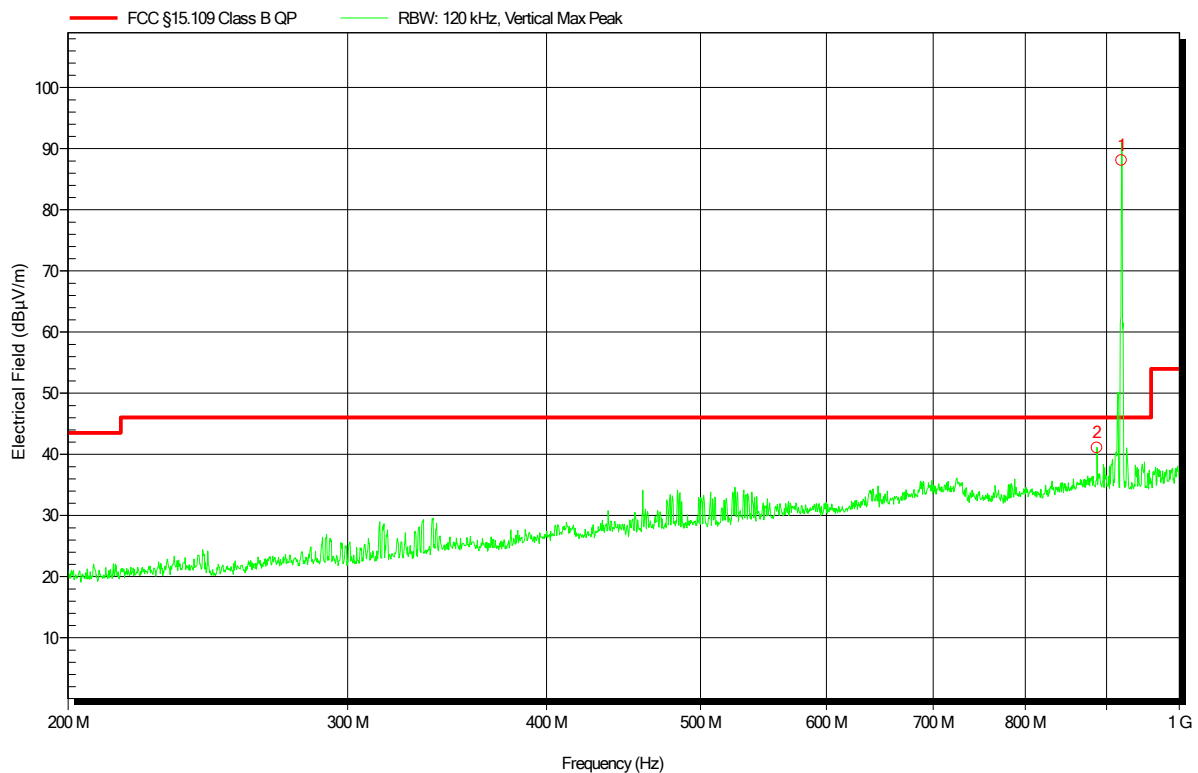


Radiated emissions under normal conditions according to FCC Part 15b

Project number: G0M-1807-7558

Applicant: digades GmbH
 EUT Name: Remote Start VW "Empfänger"
 Model: Empfänger RemoteStart VW-VWRSTR
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 24°C, Unom: 12 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: mode# 1
 Test Date: 2018-08-24
 Note:

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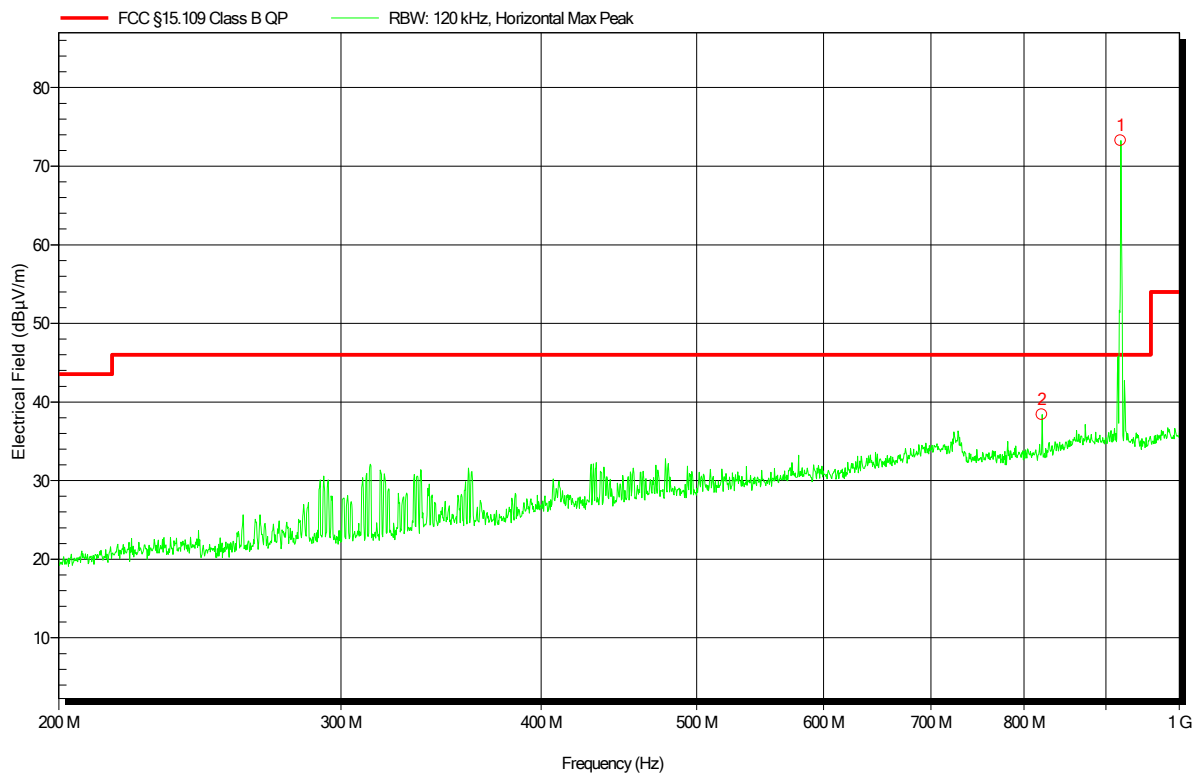
Peak Number	Frequency	Angle	Height
1	919.82 MHz	carrier	

Radiated emissions under normal conditions according to FCC Part 15b

Project number: G0M-1807-7558

Applicant: digades GmbH
EUT Name: Remote Start VW "Empfänger"
Model: Empfänger RemoteStart VW-VWRSTR
Test Site: Eurofins Product Service GmbH
Operator: Mr. Handrik
Test Conditions: Tnom: 24°C, Unom: 12 VDC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3m
Mode: mode# 1
Test Date: 2018-08-24
Note:

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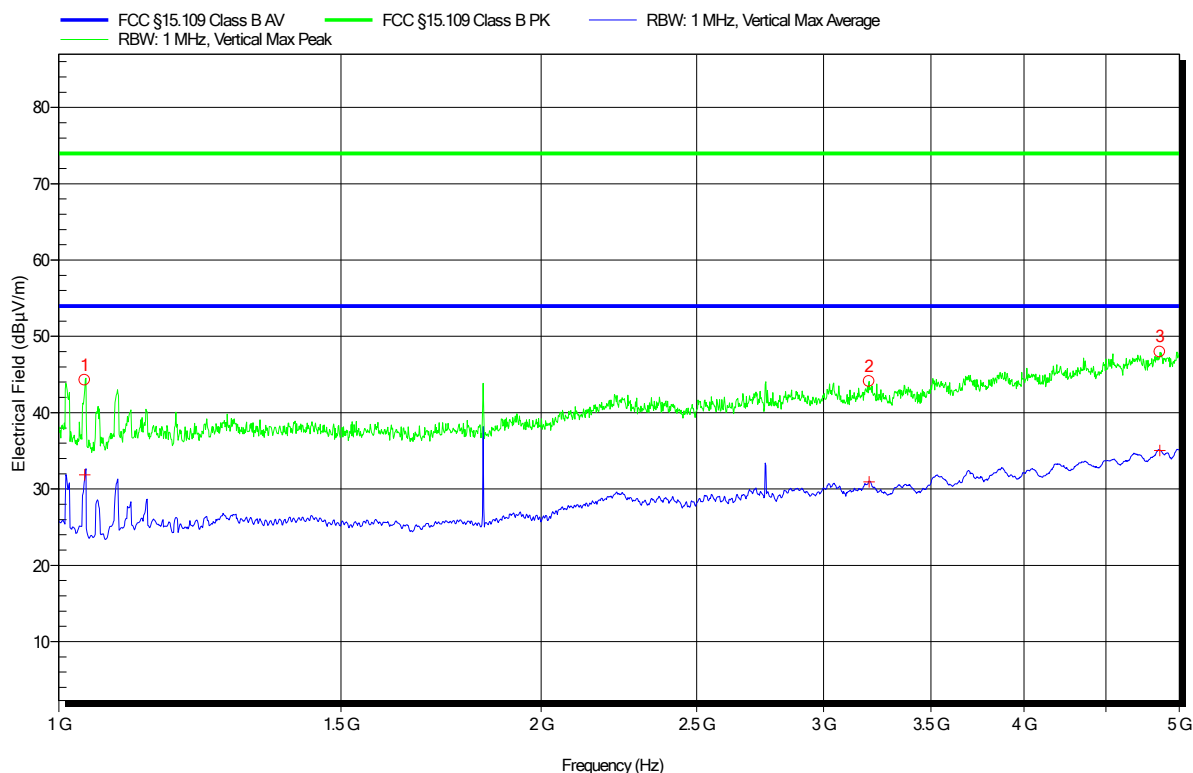
Peak Number	Frequency	Carrier
1	919.1 MHz	carrier

Radiated emissions under normal conditions according to FCC Part 15b

Project number: G0M-1807-7558

Applicant: digades GmbH
 EUT Name: Remote Start VW "Empfänger"
 Model: Empfänger RemoteStart VW-VWRSTR
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 24°C, Unom: 12 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: mode# 1
 Test Date: 2018-08-24
 Note:

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Peak Number	Frequency	Peak	Angle	Height
1	1.039 GHz	44.28 dBμV/m	0 Degree	1 m
2	3.203 GHz	44.08 dBμV/m	0 Degree	1 m
3	4.861 GHz	47.96 dBμV/m	0 Degree	1 m

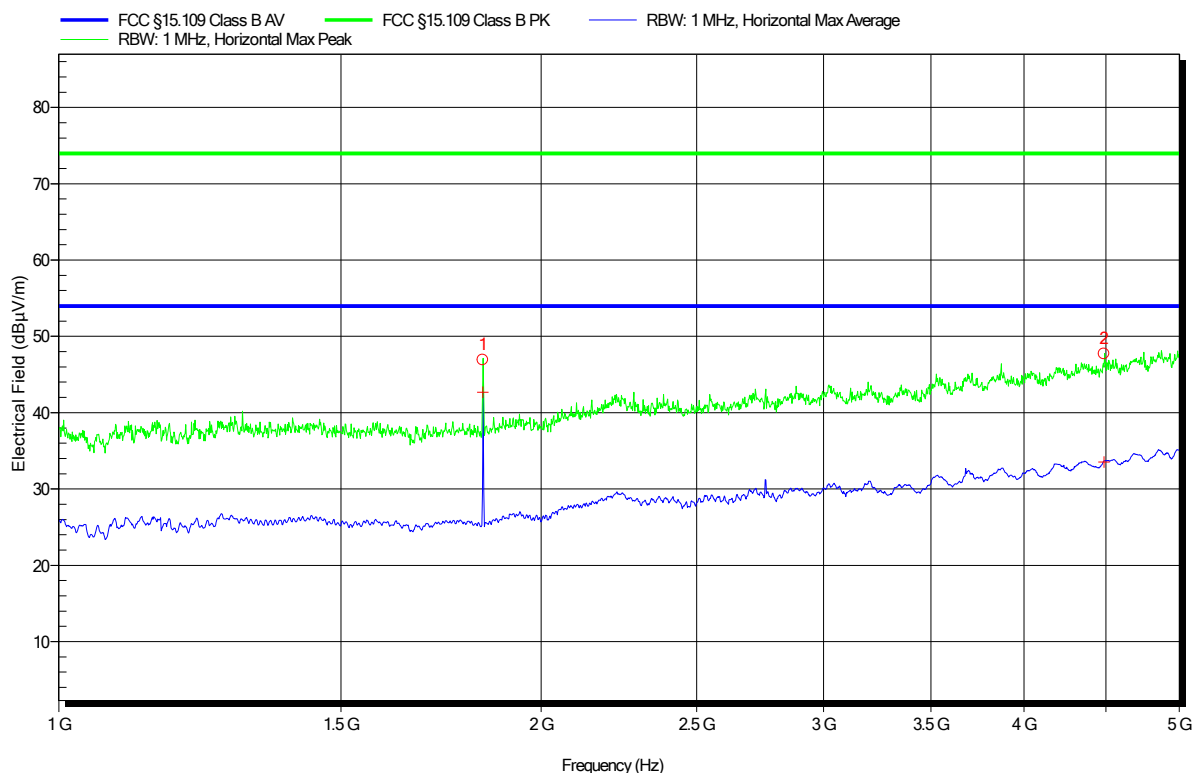
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.039 GHz	31.85 dBμV/m	53.98 dBμV/m	-22.13 dB	Pass	0 Degree	1 m
2	3.203 GHz	30.94 dBμV/m	53.98 dBμV/m	-23.03 dB	Pass	0 Degree	1 m
3	4.861 GHz	35.03 dBμV/m	53.98 dBμV/m	-18.95 dB	Pass	0 Degree	1 m

Radiated emissions under normal conditions according to FCC Part 15b

Project number: G0M-1807-7558

Applicant: digades GmbH
EUT Name: Remote Start VW "Empfänger"
Model: Empfänger RemoteStart VW-VWRSTR
Test Site: Eurofins Product Service GmbH
Operator: Mr. Handrik
Test Conditions: Tnom: 24°C, Unom: 12 VDC
Antenna: Schwarzbek BBHA 9120D, Horizontal
Measurement distance: 3m
Mode: mode# 1
Test Date: 2018-08-24
Note: 150m; 32°

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Peak Number	Frequency	Peak	Angle	Height
1	1.839 GHz	2 nd harmonic		
2	4.488 GHz	47.73 dBμV/m	32 Degree	1.50 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.839 GHz	2 nd harmonic					
2	4.488 GHz	33.54 dBμV/m	53.98 dBμV/m	-20.44 dB	Pass	32 Degree	1.50 m