
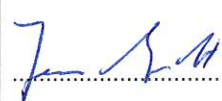


EMC TEST REPORT FCC 47 CFR Part 15B, ISED ICES-003 Issue 6	
Report Reference No	G0M-2002-8805-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 <p> DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970 </p>
Applicant	Laird Connectivity Inc
Address	50 South Main Street 44308 Akron, OH United States of America
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	915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
Model(s)	RG191+LTE Series
Additional Model(s)	None
Brand Name(s)	Laird Connectivity
Hardware Version(s)	v750.03.224
Software Version(s)	v93.9.5.1
FCC-ID	SQG-RG191NALTE
IC	3147A-RG191NALTE
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	2020-03-05	
Report:		
Compiled by	Stefan Dose	
Tested by (+ signature) (Responsible for Test)	Matthias Handrik	
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt	
Date of Issue	2020-09-10	
Total number of pages	43	
General Remarks:		
<p>The test results presented in this report relate only to the object tested.</p> <p>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.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
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	2020-09-10	Initial Release	-

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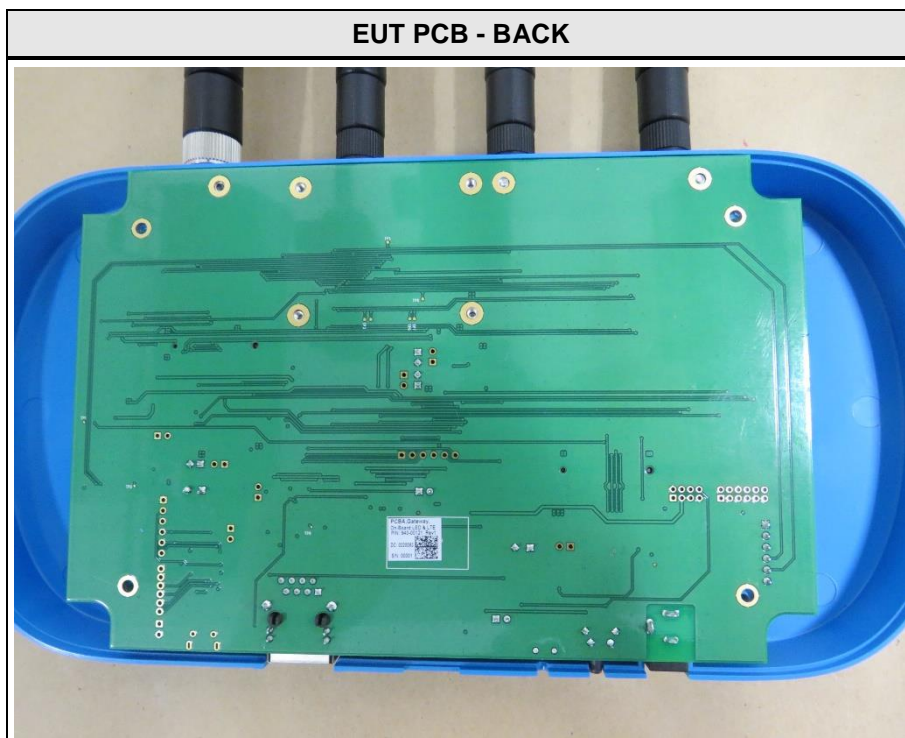
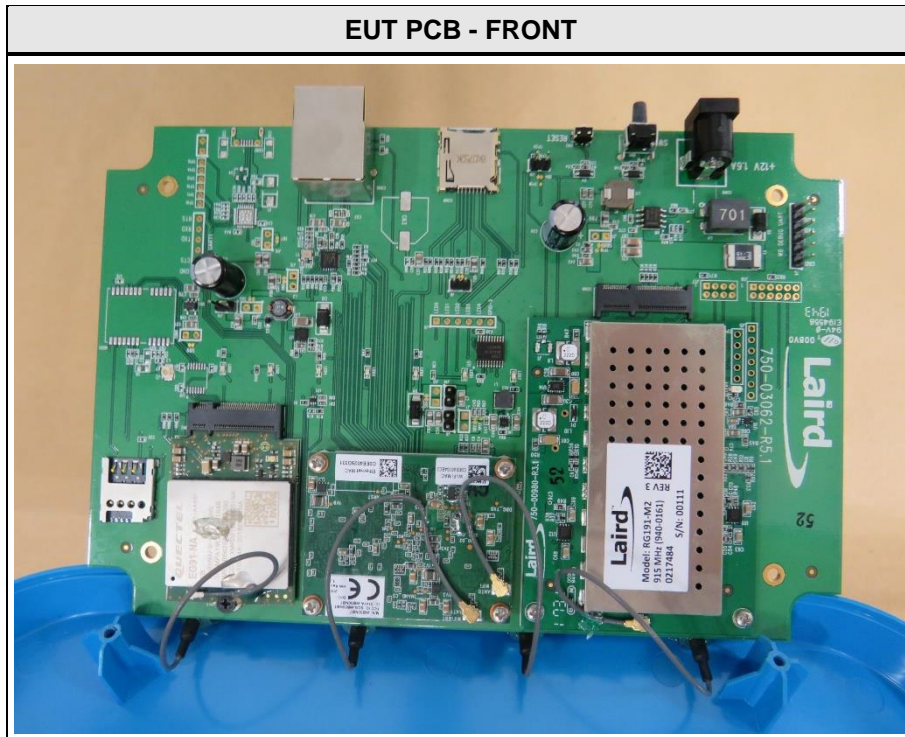
1 Equipment (Test Item) Under Test

Description	915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants	
Model	RG191+LTE Series	
Additional Model(s)	None	
Brand Name(s)	Laird Connectivity	
Serial Number(s)	unspecified	
Hardware Version(s)	v750.03.224	
Software Version(s)	v93.9.5.1	
FCC-ID	SQG-RG191NALTE	
IC	3147A-RG191NALTE	
Class	Class B	
Equipment type	Table top	
EUT Dimension [cm]	13.3 x 27.5 x 3.0	
Highest internal frequency [MHz]	2155 clock frequency (5825GHz WLAN)	
Radio Module 1	Type	WLAN module
	Model	WB50NBT
	Manufacturer	Laird
	FCC-ID	SQG-WB50NBT
	IC	3147A-WB50NBT
Radio Module 2	Type	Mobile communication module
	Model	EG91-NA
	Manufacturer	Quectel Wireless Solutions Co., Ltd
	FCC-ID	XMR201807EG91NA
	IC	10224A-2018EG91NA
Radio Module 3	Type	LoRa module
	Model	Unspecified
	Manufacturer	Unspecified
	FCC-ID	Unspecified
	IC	Unspecified
Supply Voltage	V_{NOM}	120 V / 60Hz (AC/DC adaptor)
AC/DC-Adaptor	Model	GST25U12-P1J
	Vendor	Meanwell
	Input	100 - 240 VAC, 50/60 Hz
	Output	12V DC
Manufacturer	Laird Connectivity Inc 50 South Main Street 44308 Akron, OH United States of America	

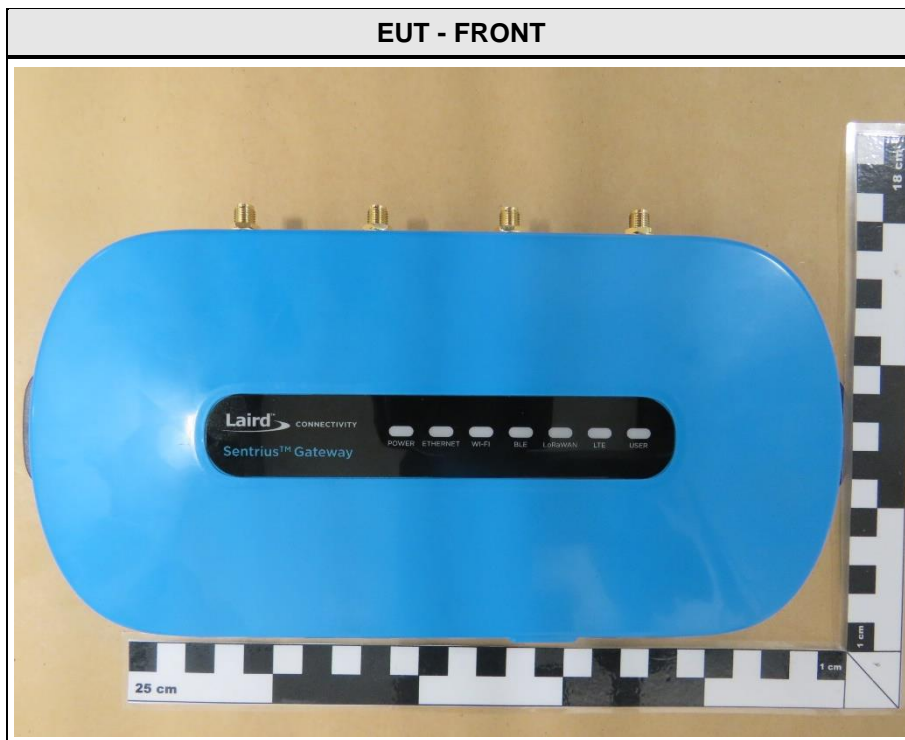
1.1 Equipment Ports

Name	Type	Attributes	Comment
Power	AC	Count: 1 Direction: In Service only: No	-
Ethernet	IO	Count: 1 Direction: IO Service only: No	shielded cable, CAT5e
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		

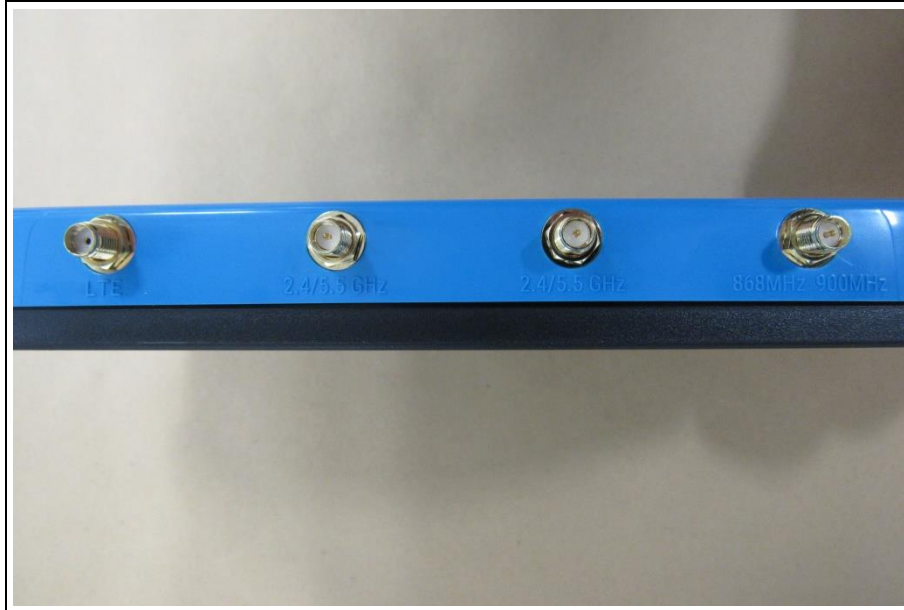
1.2 Equipment Photos - Internal



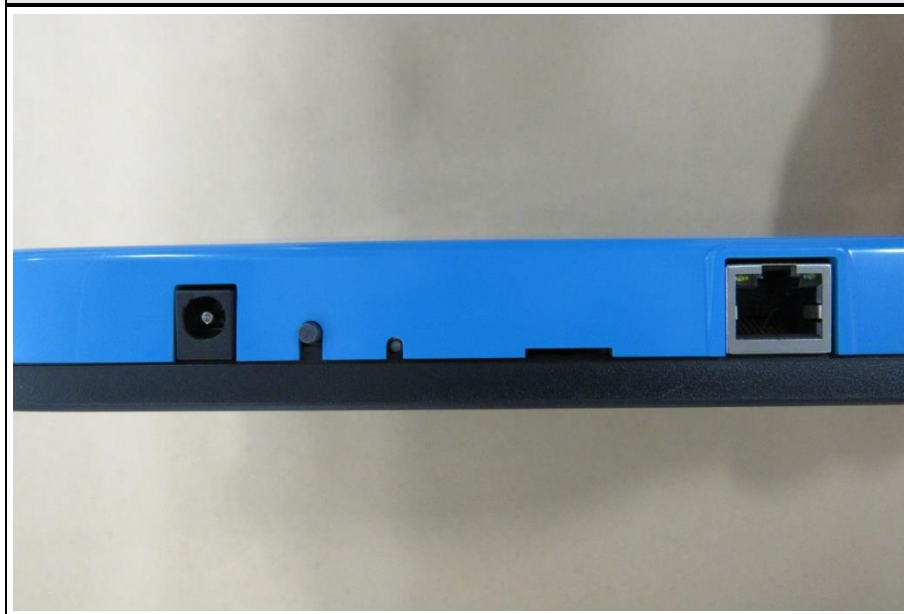
1.3 Equipment Photos - External



EUT ANTENNA CONNECTORS



EUT DC AND ETHERNET CONNECTOR



LTE ANTENNA



LoRa ANTENNA



WiFi ANTENNAS



EUT Label



EUT AC/DC adapter



EUT AC/DC adapter



EUT AC/DC adapter Label



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
SIM	Radio communication tester	R&S	CMW500	-
AE	Laptop	Lenovo	T440	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	WLAN continuous transmission in TX test mode on 2462 MHz. LORA continuous transmission in TX test mode 923.3 MHz LTE connection (Band 2) to Radio Communication tester.
2	WLAN continuous transmission in TX test mode on 5785 MHz. LORA continuous transmission in TX test mode 923 MHz LTE connection (Band 2) to Radio Communication tester.
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT is powered up via ac/dc-adapter and connected via Ethernet-cable to Notebook. LTE, LoRa and WLAN are activated by software and the CPU load is set to almost 100%.
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, 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:				

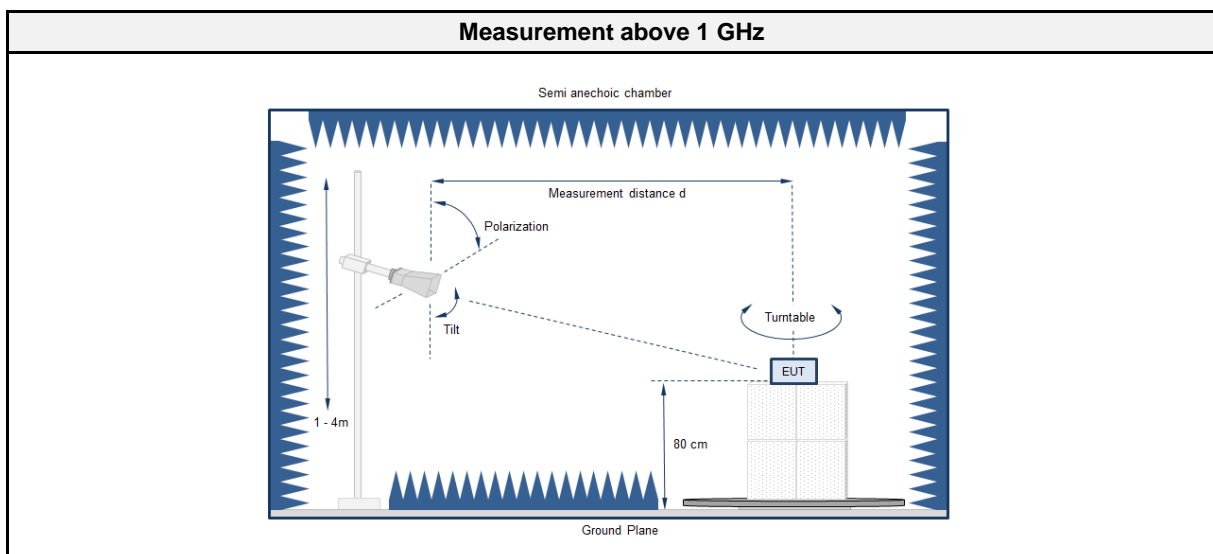
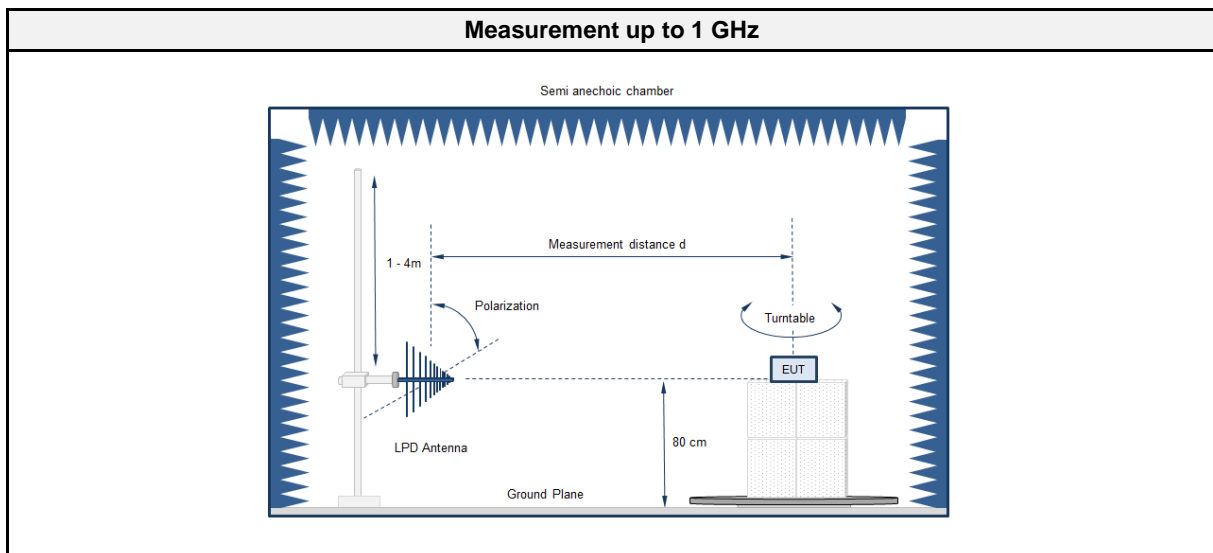
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

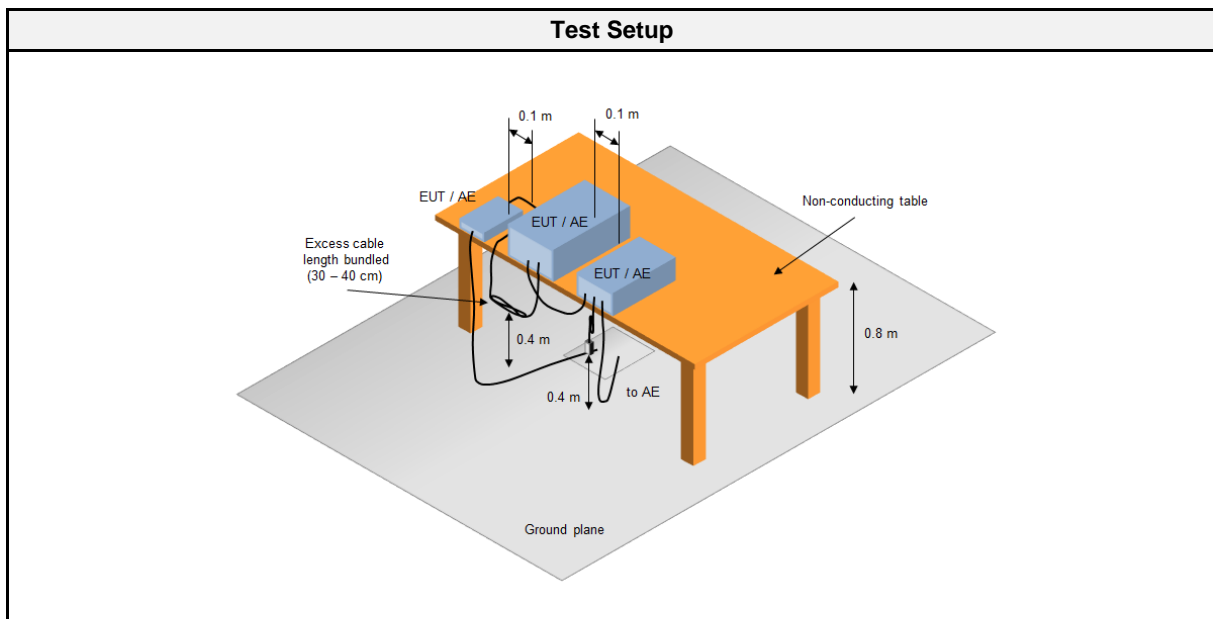
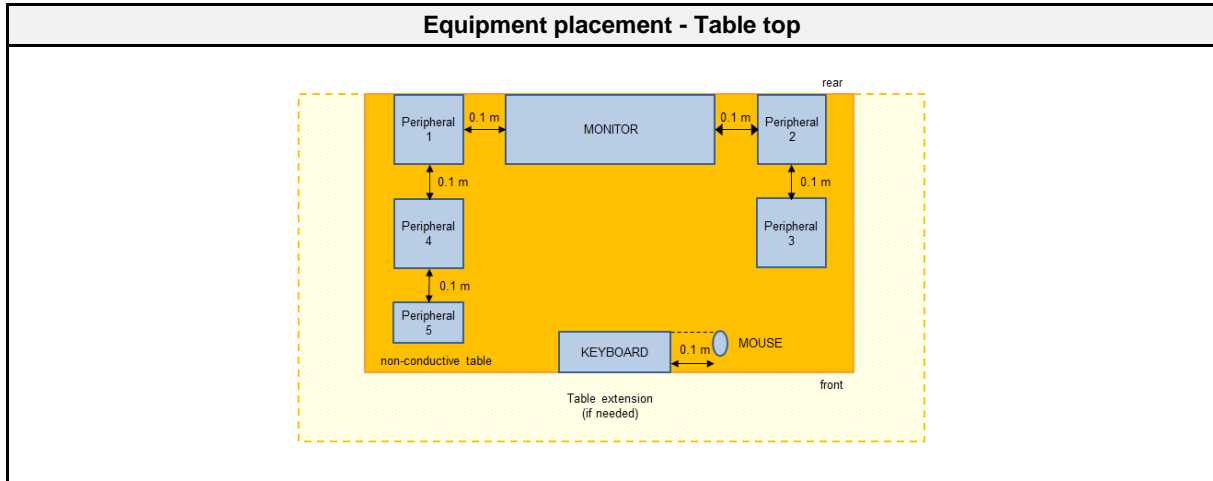
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

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]	5825
Measurement range	30 MHz to 30000 MHz
Temperature [°C]	22 ±3
Humidity [%]	51 ±6
Operator	Stefan Dose
Date	2020-07-24 – 2020-08-25

2.1.2 Setup





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.08

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00062	2018-07	2021-07
EMI Test Receiver	Keysight	N9038A-526/WXP	EF01070	2020-06	2021-06
Biconical Antenna	R&S	HK 116	EF00030	2019-04	2022-04
LPD Antenna	R&S	HL 223	EF00187	2019-05	2022-05
Horn Antenna	Schwarzbeck	BBHA9120D	EF00018	2019-10	2022-10
Common Mode Absorption Device	TESEQ GmbH	CMAD 20B	EF01428	2020-07	2021-07
CDN	AMETEK	ST08A	EF00411	2019-07	2021-07
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2020-03	2021-03

2.1.4 Procedure

Exploratory measurement
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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.

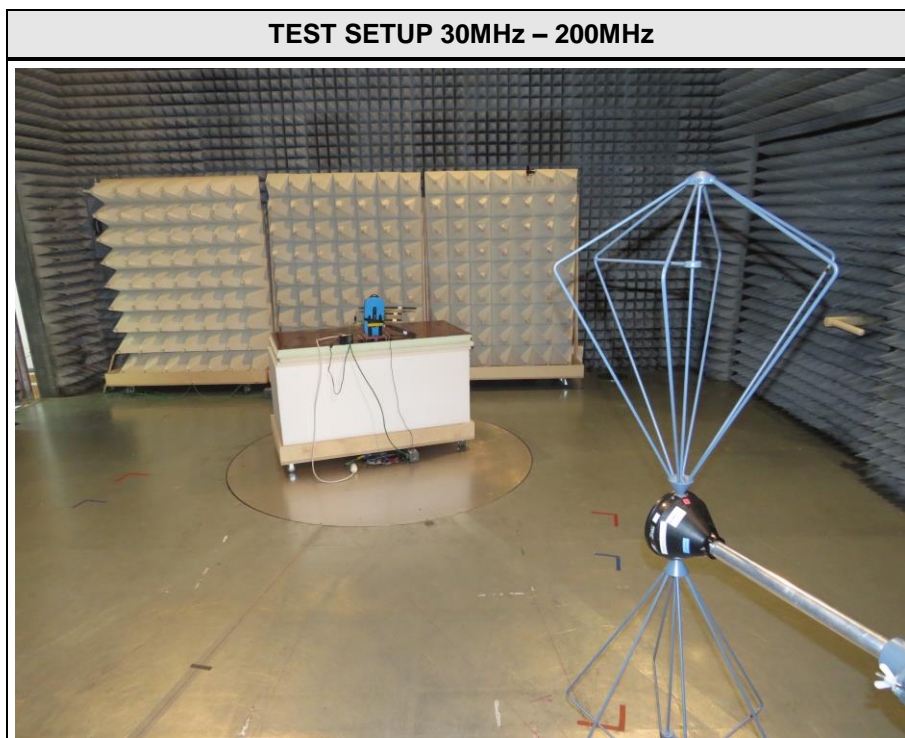
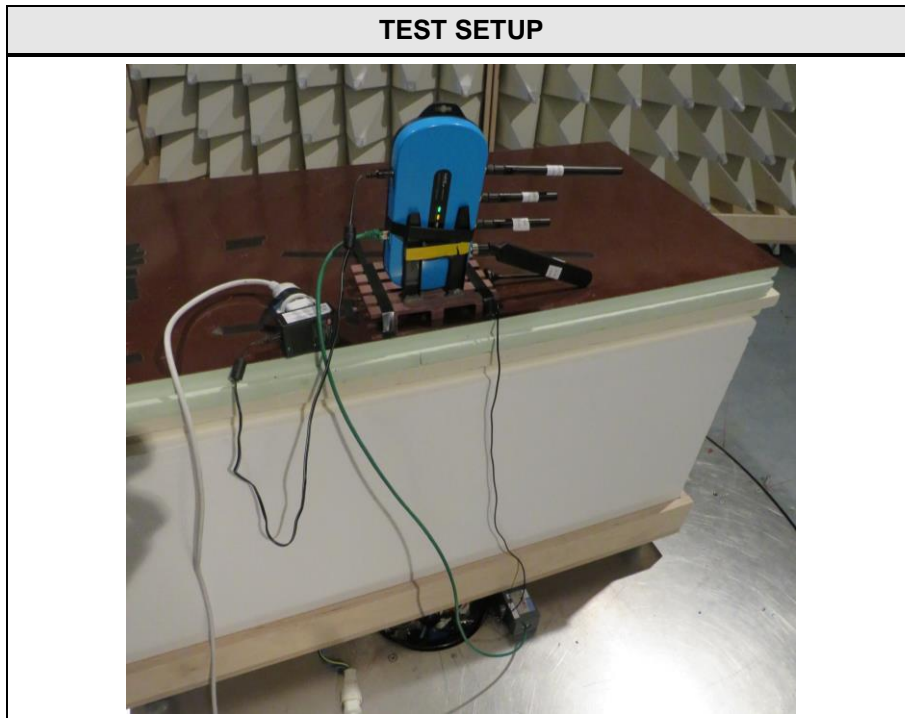
2.1.5 Limits

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

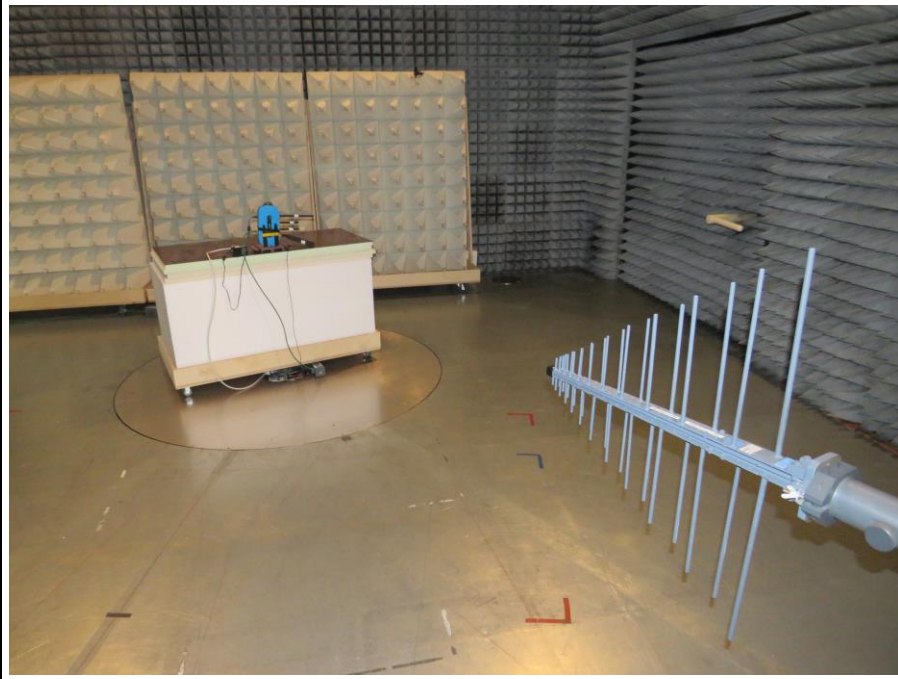
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	1
2	1	PASS	1
Comment: 1 Measurement was performed from 30-30000MHz. Above 17GHz no significant emissions were observed, records up to 17GHz are documented in this test report.			

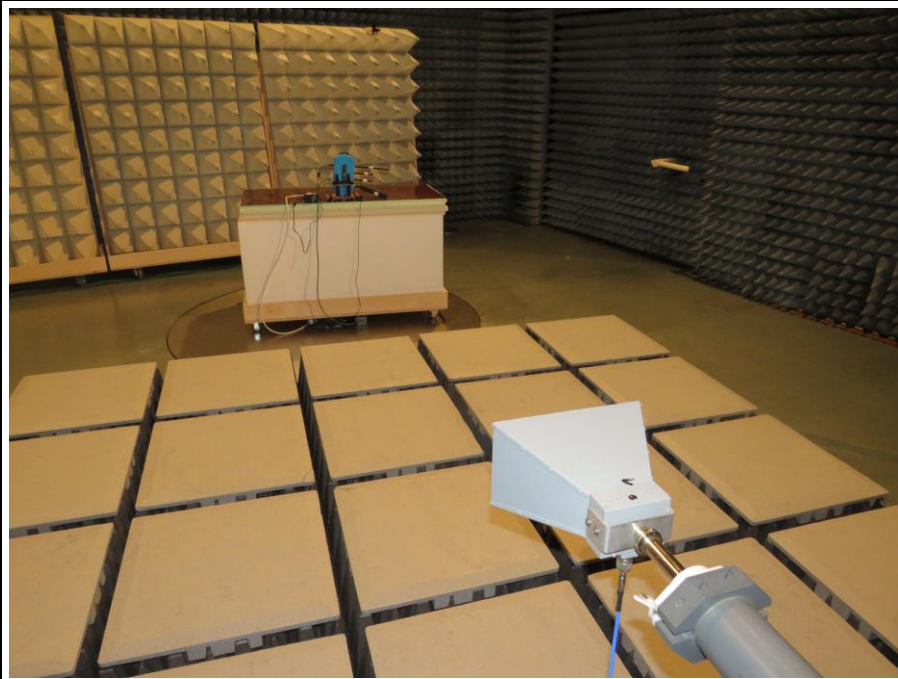
2.1.7 Setup Photos



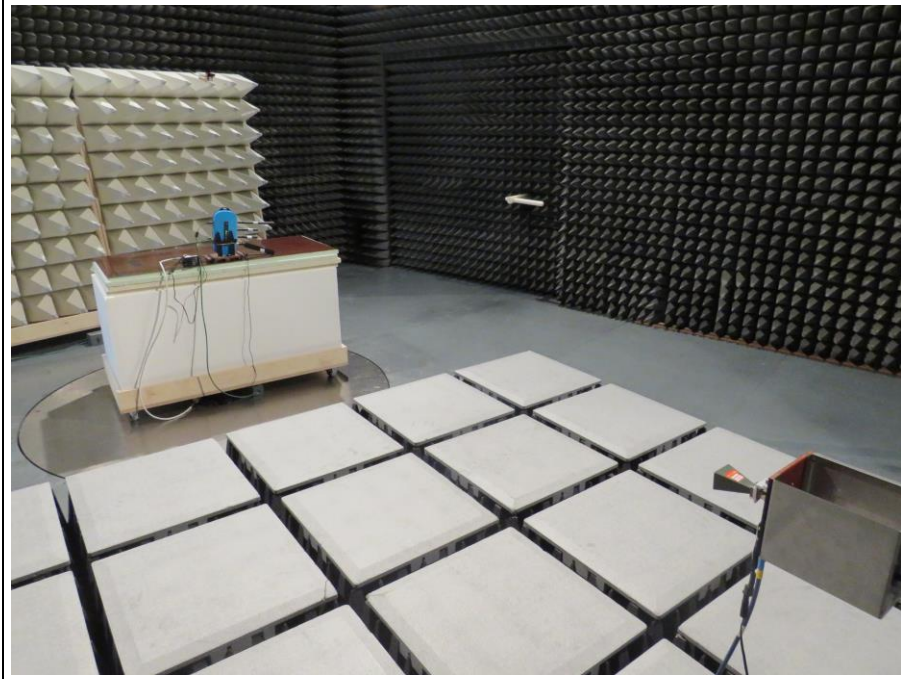
TEST SETUP 200MHz – 1GHz



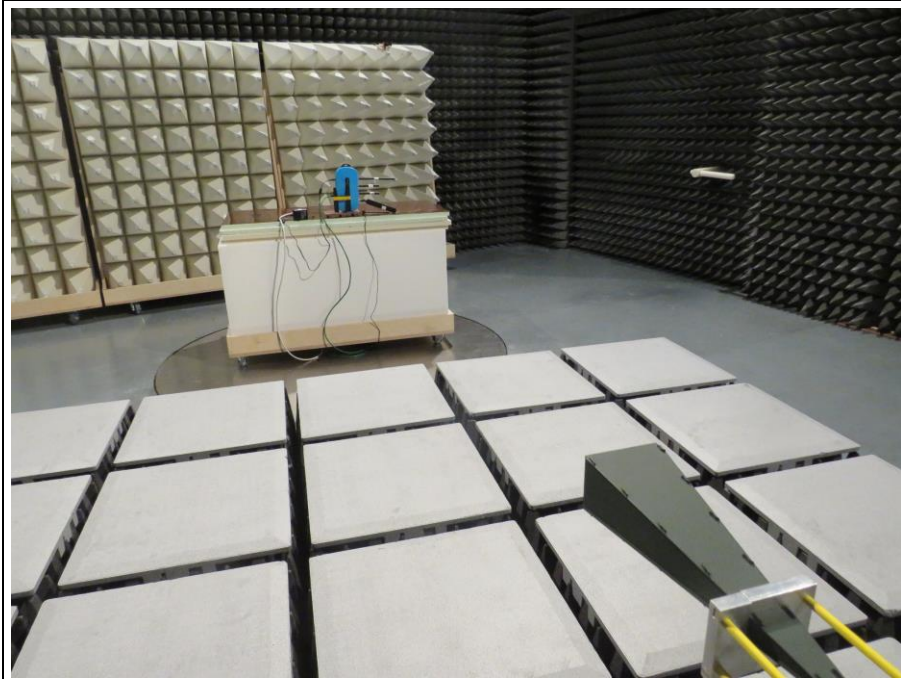
TEST SETUP 1GHz – 17GHz



TEST SETUP 17GHz – 26.5GHz



TEST SETUP 26.5GHz – 30GHz



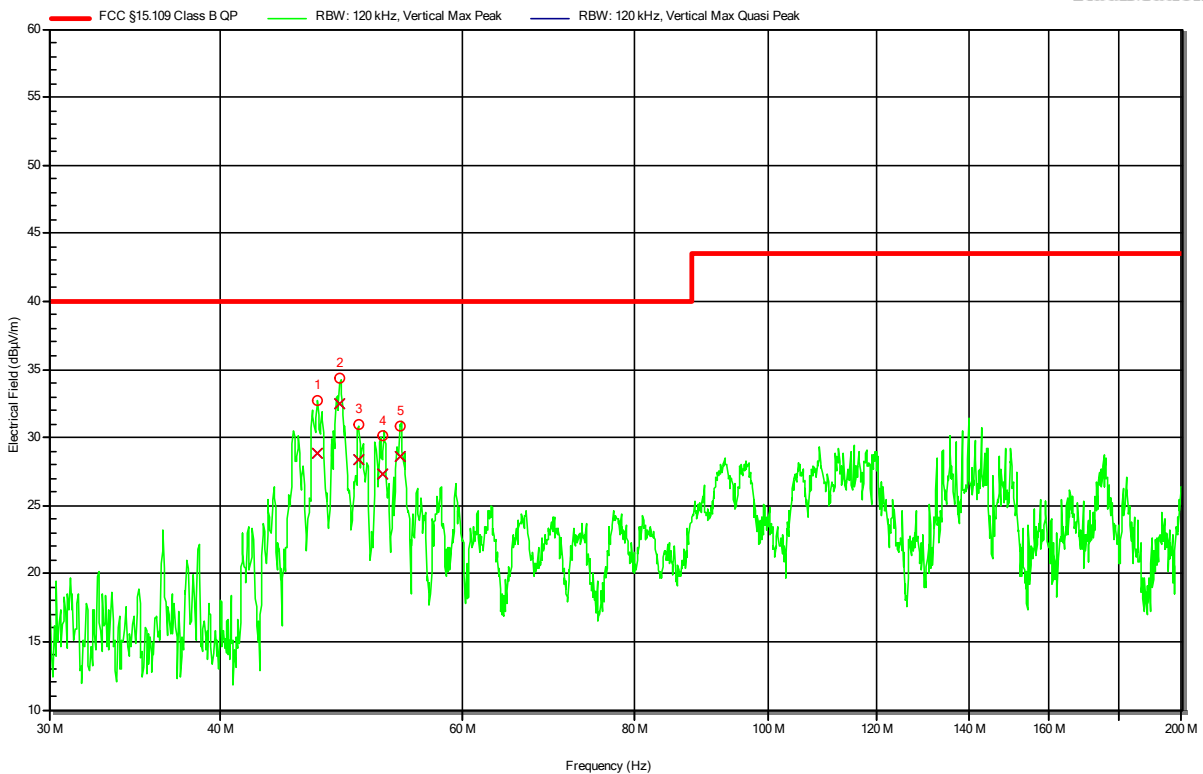
2.1.8 Records

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 22°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement Distance: 3m
 Mode: 1
 Note 1:

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RadiMation



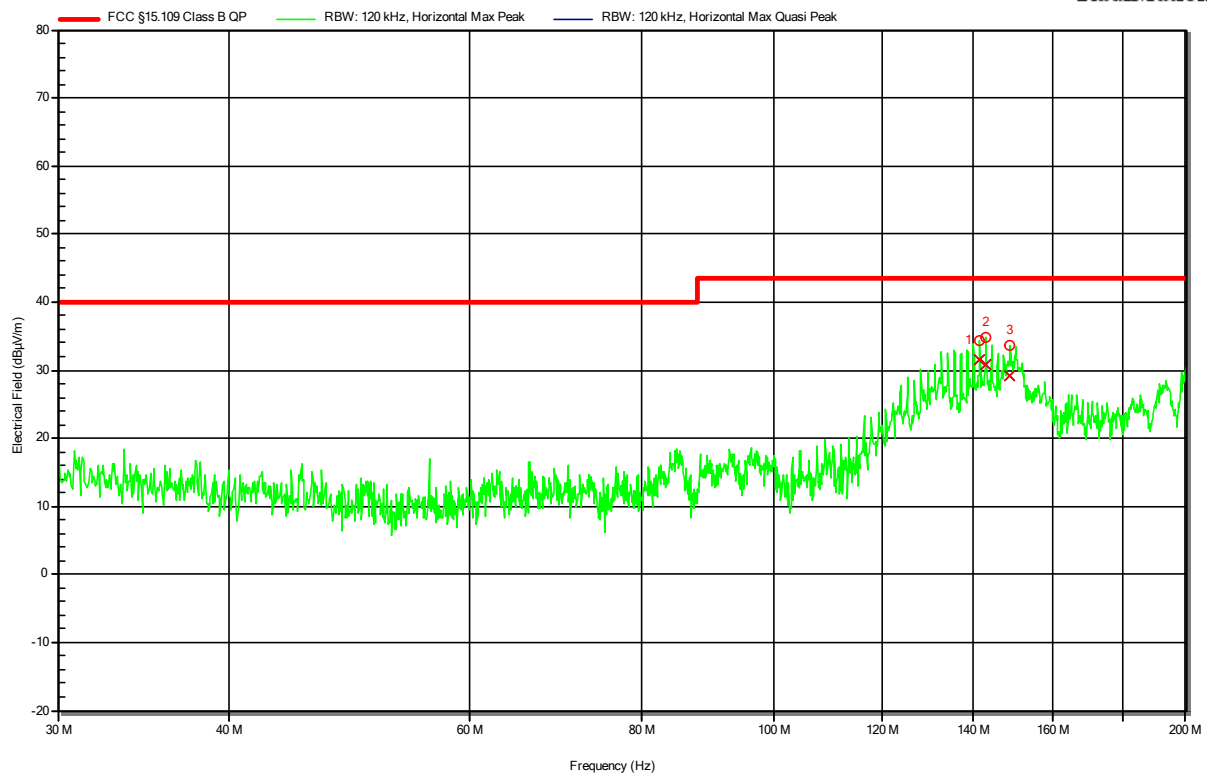
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	47.054 MHz	28.8 dBµV/m	40 dBµV/m	-11.2 dB	Pass	0 degrees	1 m
2	48.856 MHz	32.45 dBµV/m	40 dBµV/m	-7.55 dB	Pass	0 degrees	1 m
3	50.357 MHz	28.32 dBµV/m	40 dBµV/m	-11.68 dB	Pass	0 degrees	1 m
4	52.519 MHz	27.32 dBµV/m	40 dBµV/m	-12.68 dB	Pass	0 degrees	1 m
5	54.02 MHz	28.58 dBµV/m	40 dBµV/m	-11.42 dB	Pass	0 degrees	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement Distance: 3m
 Mode: 1
 Note 1:

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RadiMation



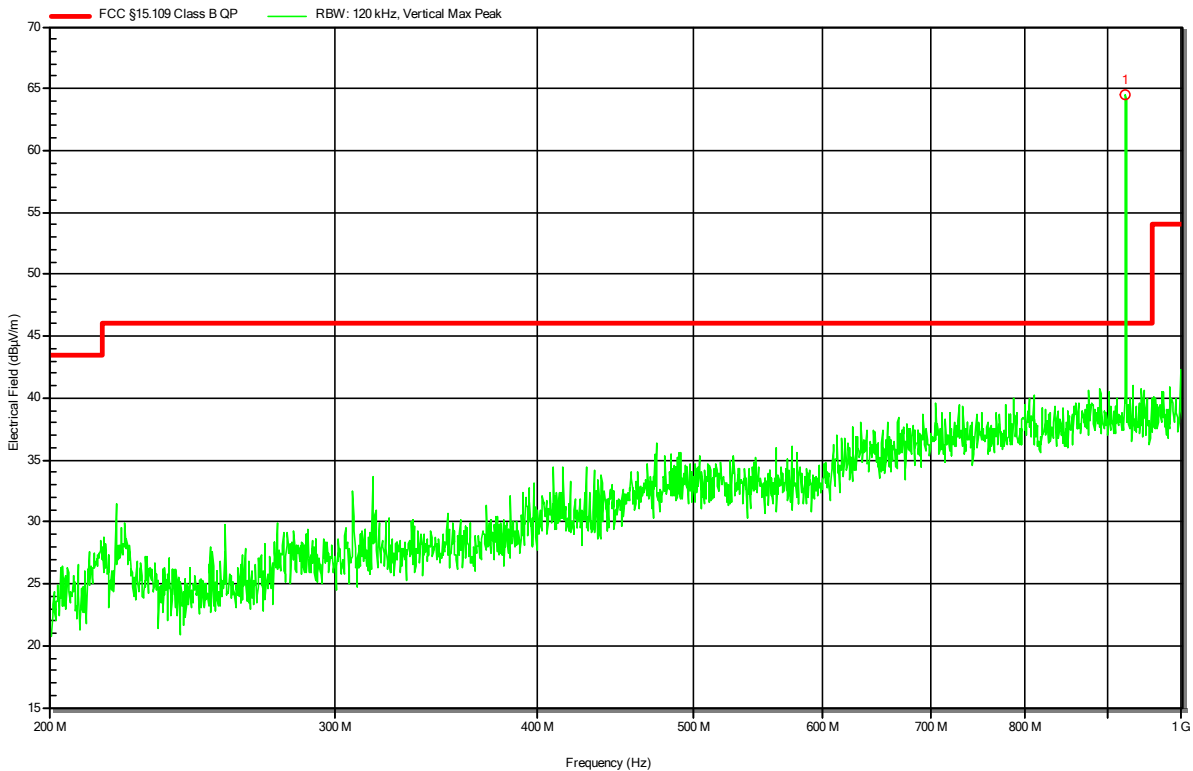
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	141.392 MHz	31.62 dBµV/m	43.52 dBµV/m	-11.91 dB	Pass	0 degrees	1 m
2	142.833 MHz	30.76 dBµV/m	43.52 dBµV/m	-12.76 dB	Pass	0 degrees	1 m
3	148.718 MHz	29.12 dBµV/m	43.52 dBµV/m	-14.4 dB	Pass	0 degrees	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement Distance: 3m
 Mode: 1
 Note 1:

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RadiMation



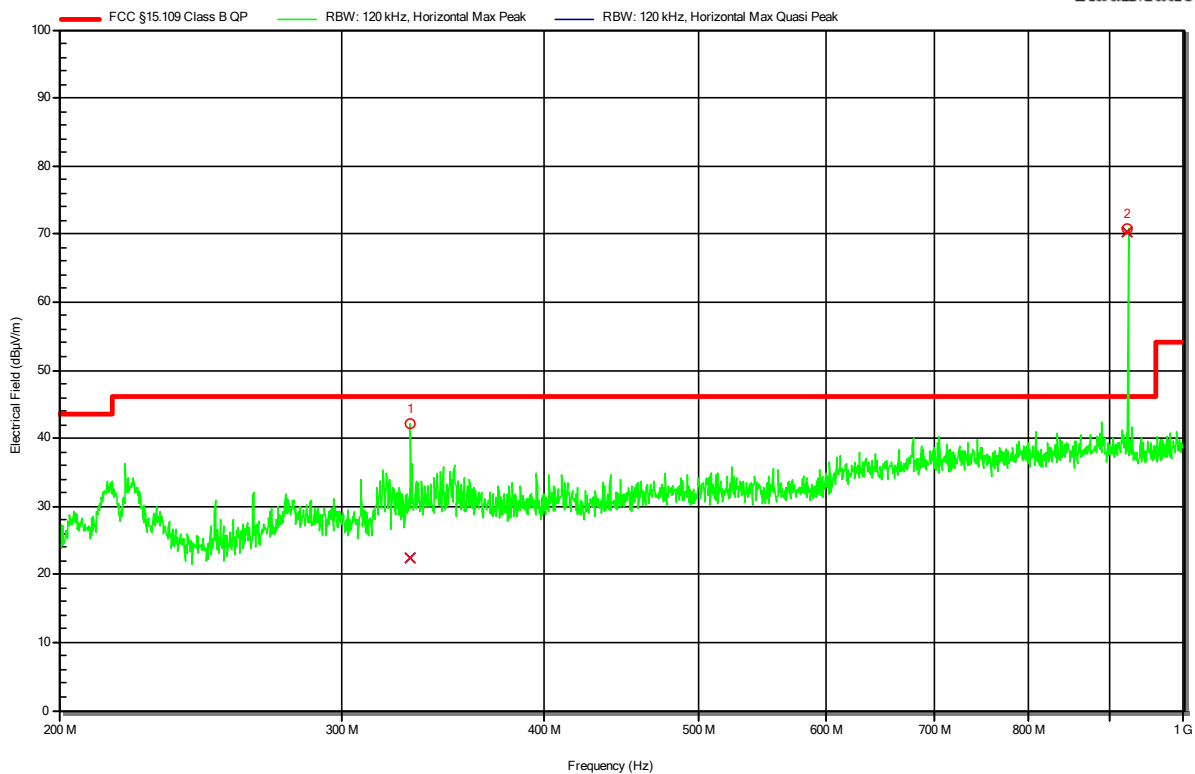
Peak Number	Frequency	Carrier
1	923.266 MHz	LoRa Carrier

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement Distance: 3m
 Mode: 1
 Note 1:

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RadiMation



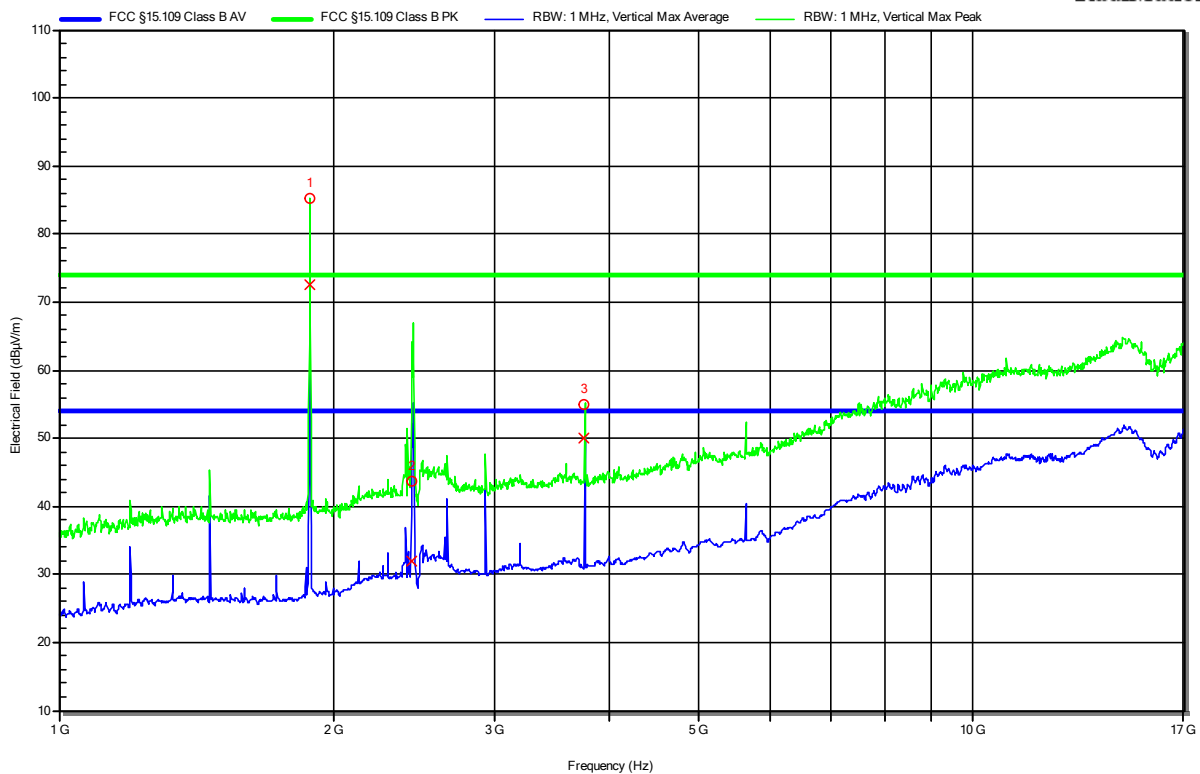
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	330.712 MHz	22.42 dBµV/m	46.02 dBµV/m	-23.6 dB	Pass	0 degrees	1 m
2	923.266 MHz				LoRa Carrier		

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 21°C
 power input: 120V 60Hz
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement Distance: 3m
 Mode: 1
 Note 1:

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RadiMation



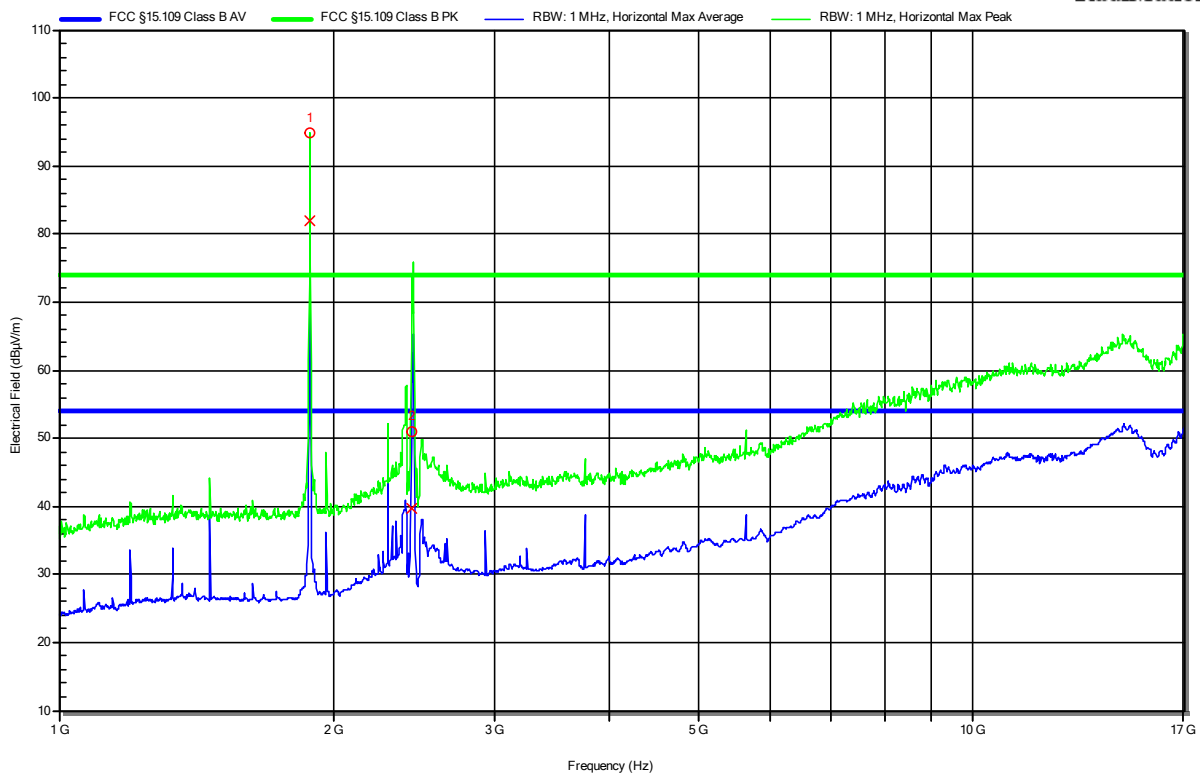
Peak Number	Frequency	
1	1.88 GHz	LTE Carrier
2	2.437 GHz	WLAN Carrier
3	3.76 GHz	2 nd harmonic of LTE Carrier

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
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 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 22°C
 power input: 120V 60Hz
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement Distance: 3m
 Mode: 1
 Note 1:

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RadiMation



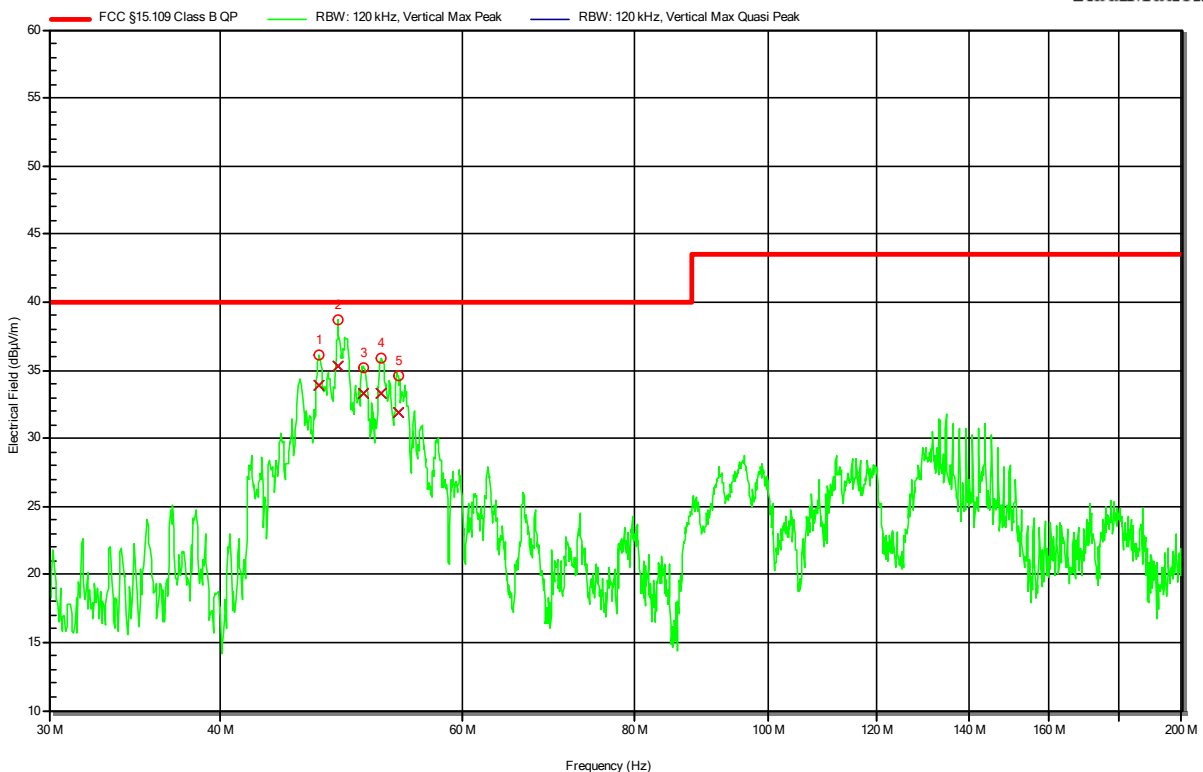
Peak Number	Frequency	
1	1.88 GHz	LTE Carrier
2	2.437 GHz	WLAN Carrier

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 24°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement Distance: 3m
 Mode: 2
 Note 1:

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RadiMation



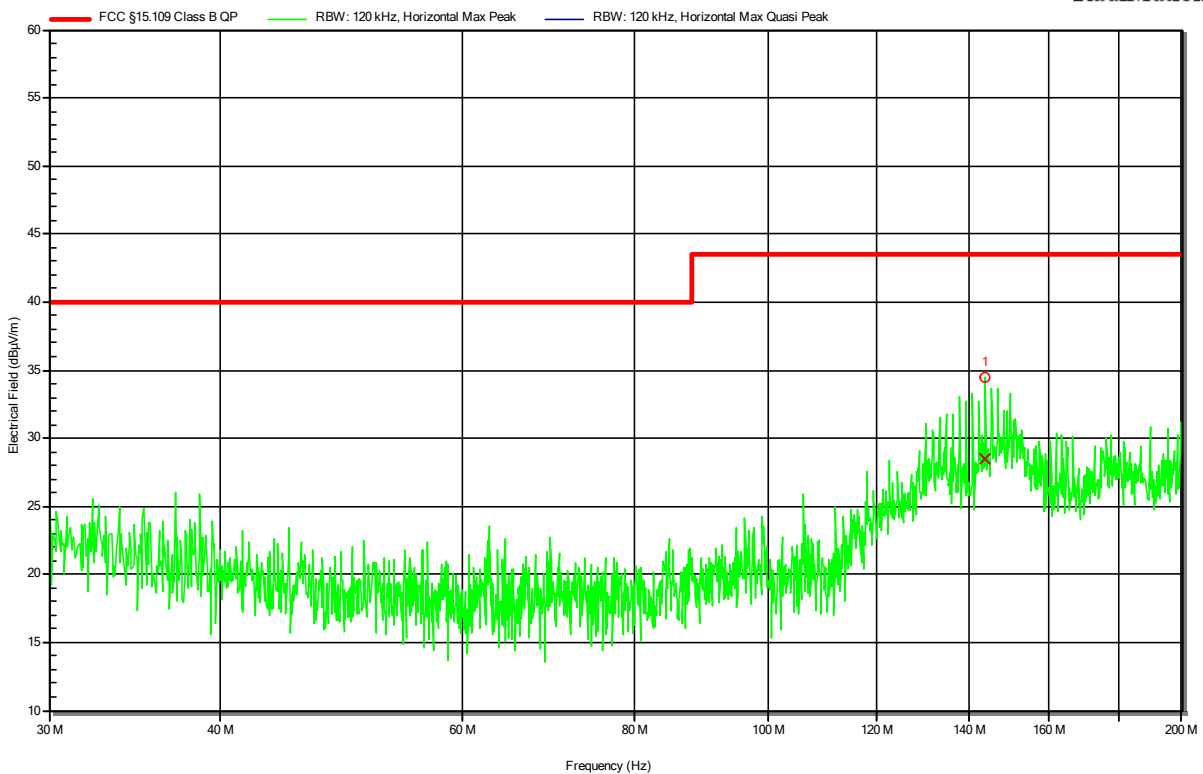
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	47.162 MHz	33.9 dBµV/m	40 dBµV/m	-6.1 dB	Pass	0 degrees	1 m
2	48.662 MHz	35.27 dBµV/m	40 dBµV/m	-4.73 dB	Pass	0 degrees	1 m
3	50.822 MHz	33.31 dBµV/m	40 dBµV/m	-6.69 dB	Pass	0 degrees	1 m
4	52.383 MHz	33.32 dBµV/m	40 dBµV/m	-6.68 dB	Pass	0 degrees	1 m
5	53.823 MHz	31.93 dBµV/m	40 dBµV/m	-8.07 dB	Pass	0 degrees	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 24°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement Distance: 3m
 Mode: 2
 Note 1:

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RadiMation



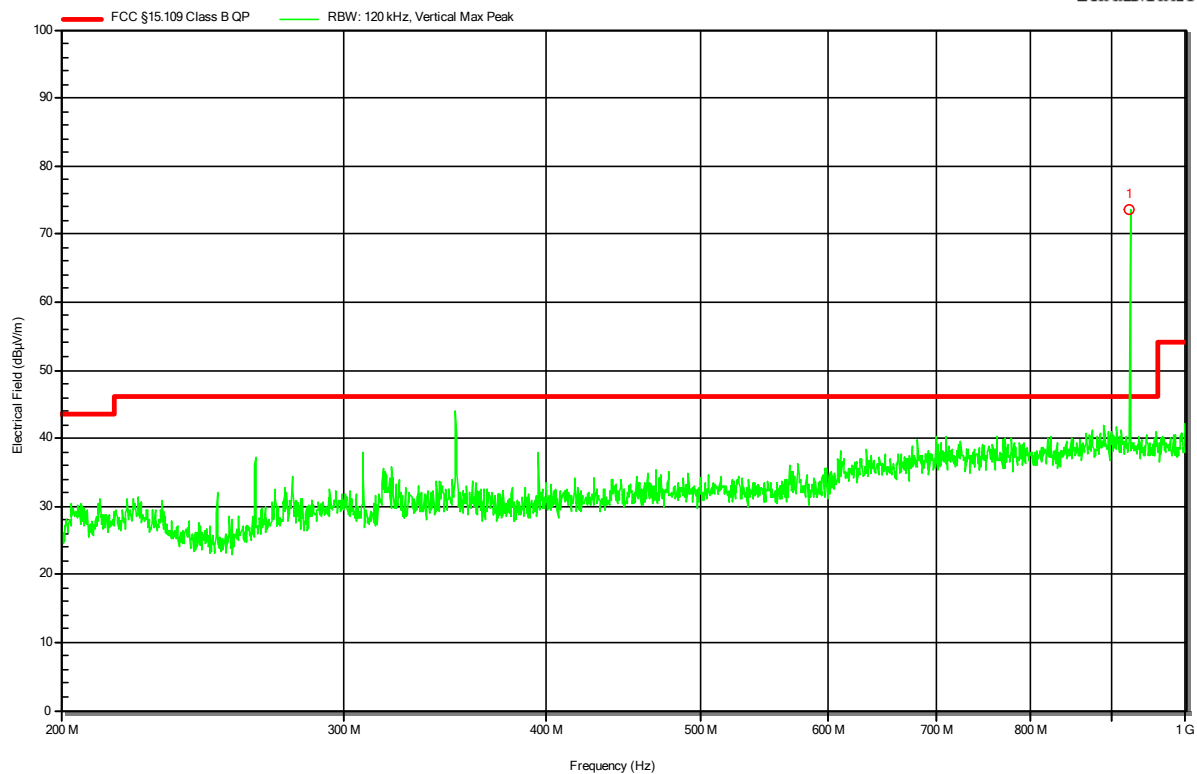
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	143.914 MHz	28.47 dBµV/m	43.52 dBµV/m	-15.06 dB	Pass	0 degrees	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 24°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement Distance: 3m
 Mode: 2
 Note 1:

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RadiMation



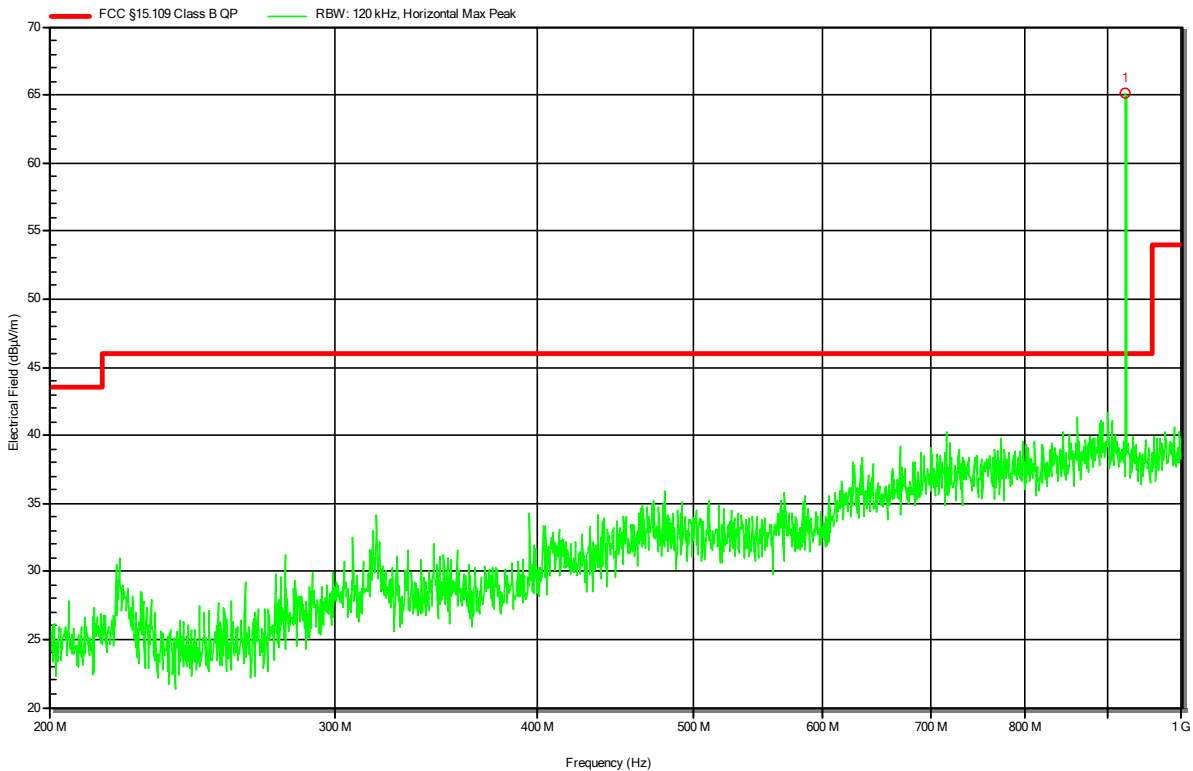
Peak Number	Frequency	
1	923.266 MHz	LoRa Carrier

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 24°C
 power input: 120V 60Hz
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement Distance: 3m
 Mode: 2
 Note 1:

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RadiMation



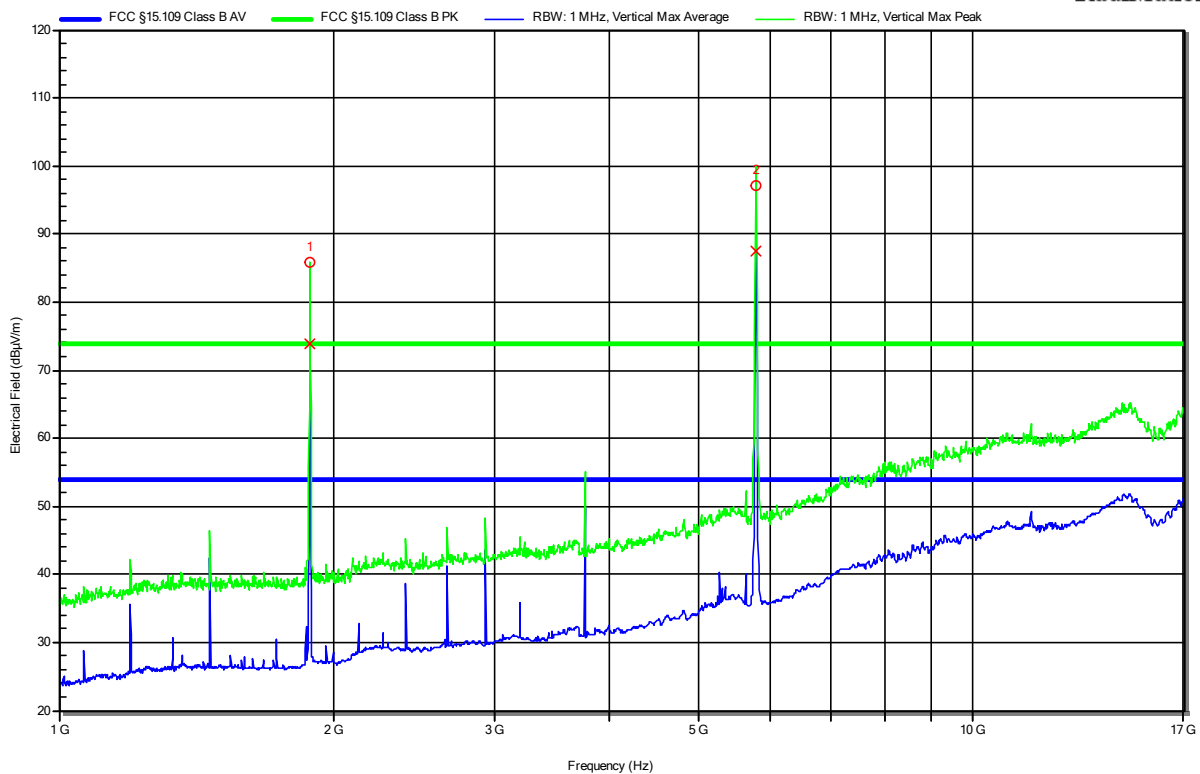
Peak Number	Frequency	
1	923.266 MHz	LoRa Carrier

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 23°C
 power input: 120V 60Hz
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement Distance: 3m
 Mode: 2
 Note 1:

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RadiMation



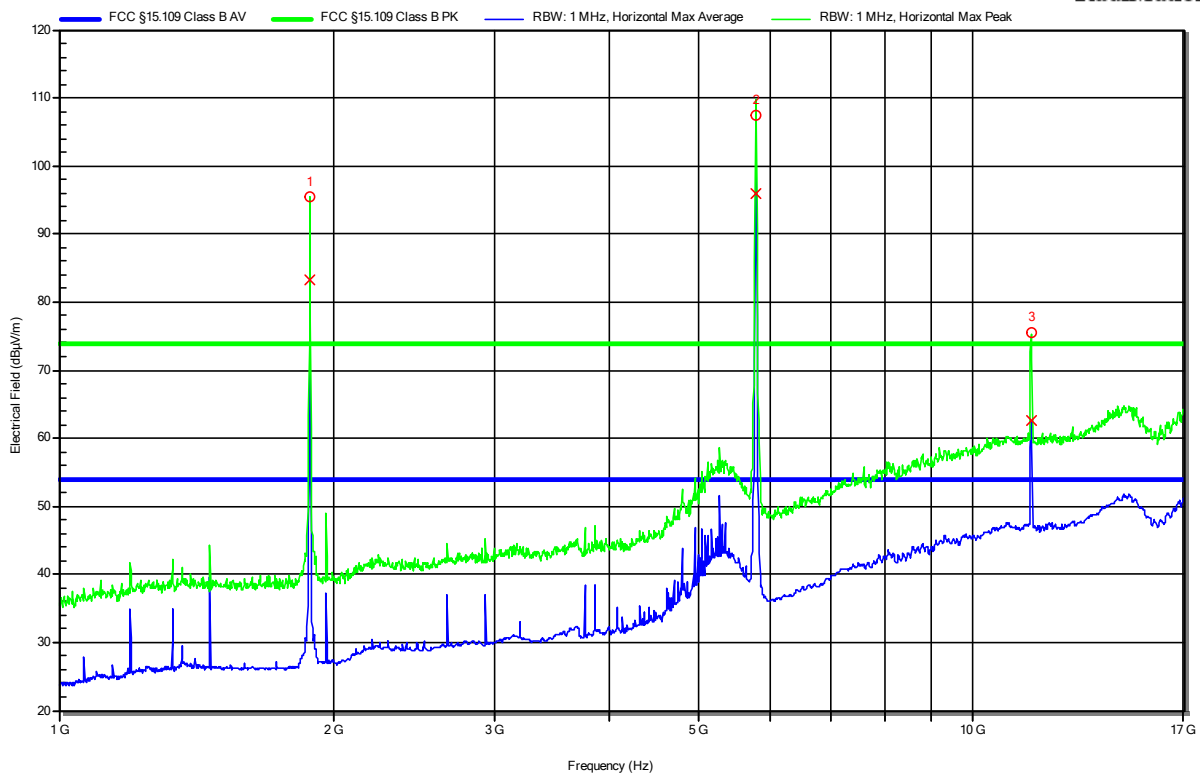
Peak Number	Frequency	
1	1.88 GHz	LTE Carrier
2	5.785 GHz	WLAN Carrier

Radiated emissions according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-25
 Operating Conditions: ambient temperature: 23°C
 power input: 120V 60Hz
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement Distance: 3m
 Mode: 2
 Note 1:

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RadiMation



Peak Number	Frequency	Carrier
1	1.88 GHz	LTE Carrier
2	5.785 GHz	WLAN Carrier
3	11.571 GHz	2 nd harmonic of WLAN Carrier

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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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

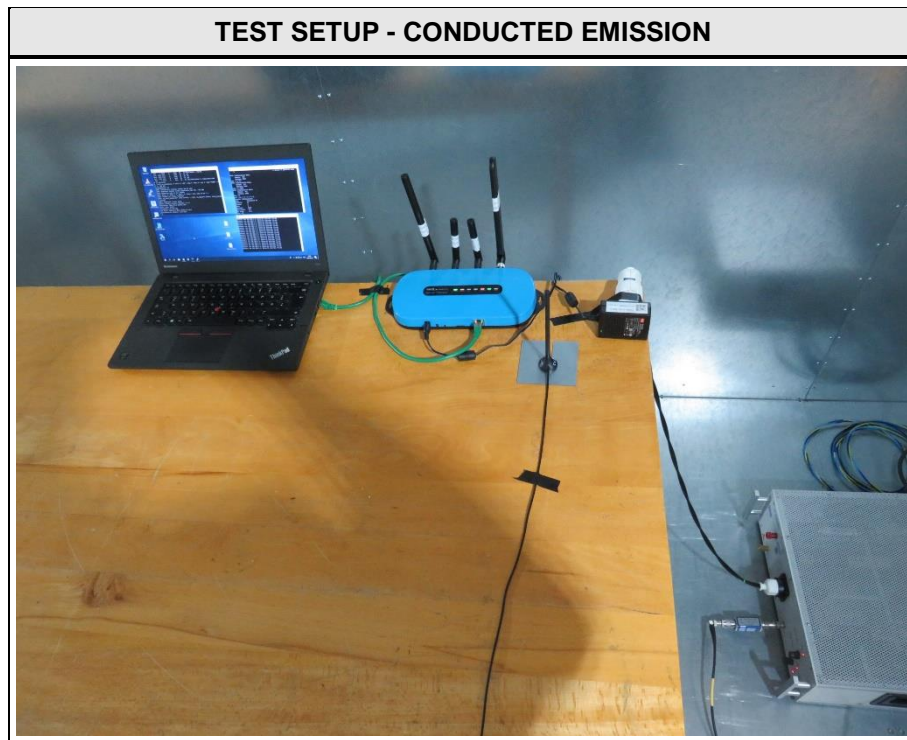
Class B		
Frequency [MHz]	Quasi-peak Limit [dB μ V]	Average Limit [dB μ V]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50

* 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	-
Power	AMN	2	1	PASS	-

2.2.7 Setup Photos



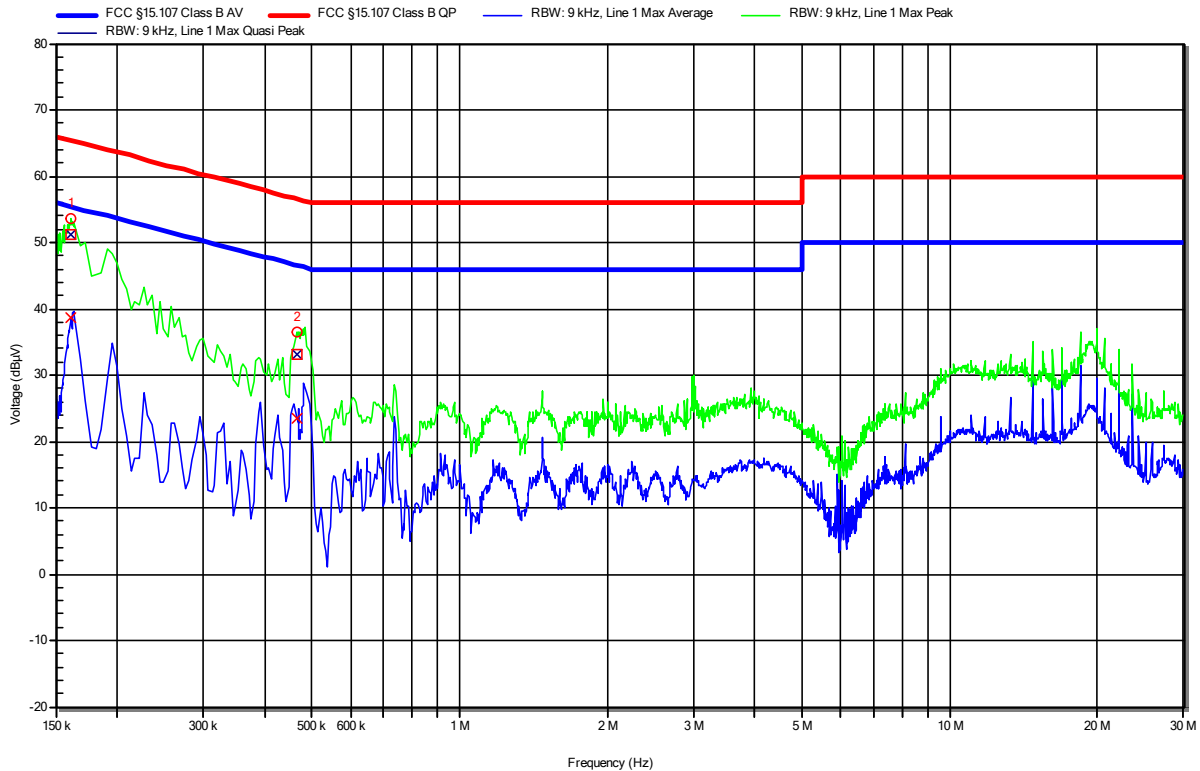
2.2.8 Records

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

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-26
 Operating Conditions: ambient temperature: 22°C
 power input: 120V 60Hz
 LISN: Schwarzbeck NSLK 8127 RC L
 Mode: 1
 Applied to Port: AC mains
 Note 1:

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RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	161.25 kHz	51.14 dBµV	65.4 dBµV	-14.26 dB	Pass	Line 1
2	465 kHz	33.14 dBµV	56.6 dBµV	-23.47 dB	Pass	Line 1
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	161.25 kHz	38.69 dBµV	55.4 dBµV	-16.71 dB	Pass	Line 1
2	465 kHz	23.42 dBµV	46.6 dBµV	-23.18 dB	Pass	Line 1

Test Report No.: G0M-2002-8805-EF0115B-V01

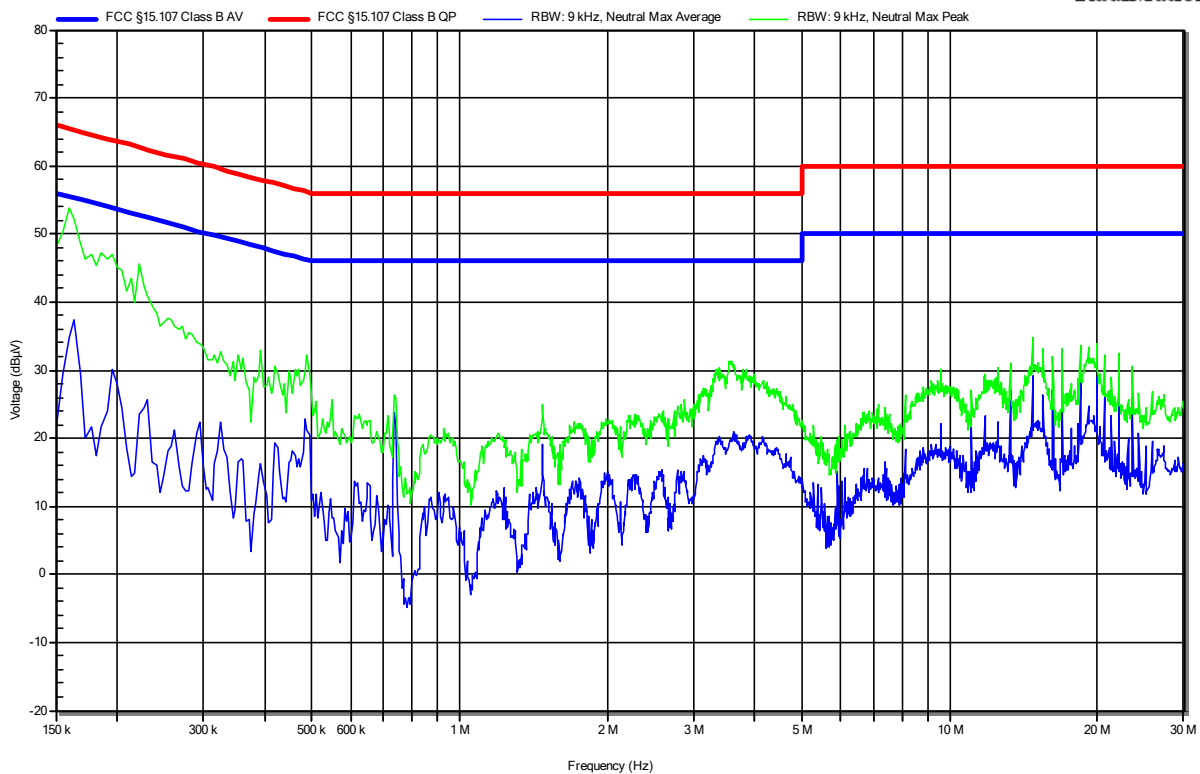
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-26
 Operating Conditions: ambient temperature: 22°C
 power input: 120V 60Hz
 LISN: Schwarzbeck NSLK 8127 RC N
 Mode: 1
 Applied to Port: AC mains
 Note 1:

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RadiMation

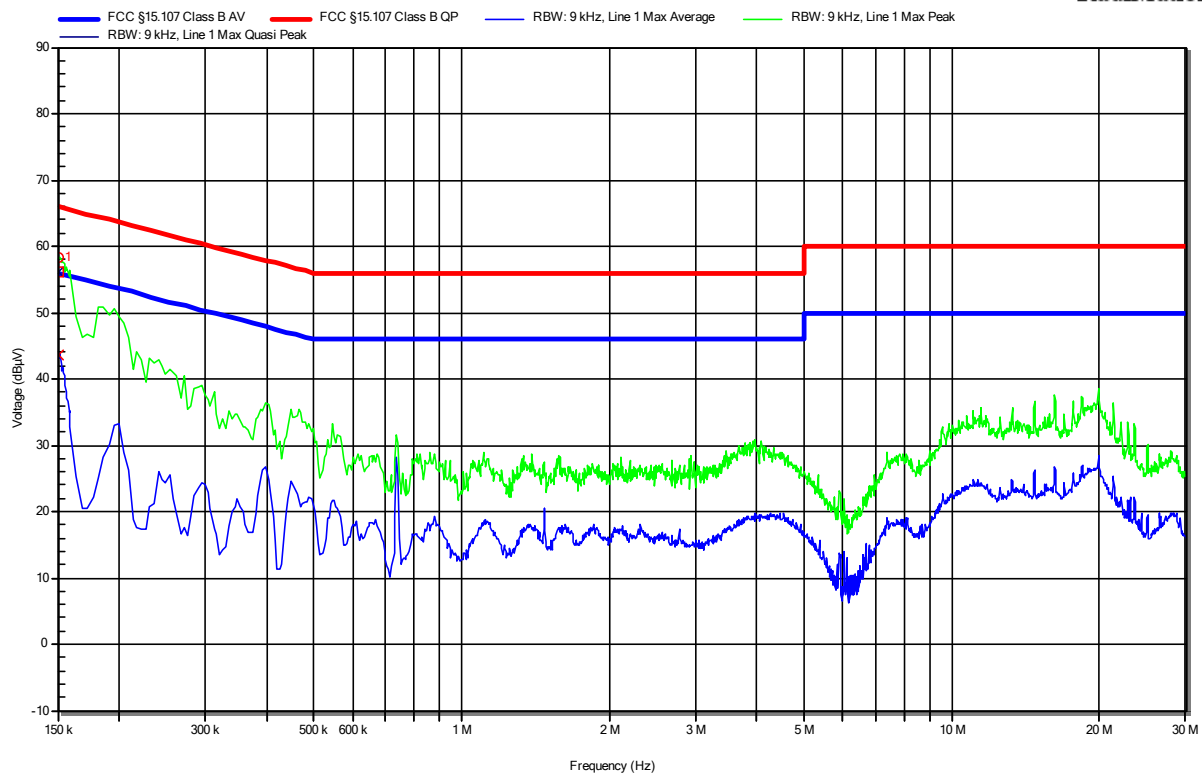


Conducted emissions at the mains power port according to FCC part 15B

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-26
 Operating Conditions: ambient temperature: 22°C
 power input: 120V 60Hz
 LISN: Schwarzbeck NSLK 8127 RC L
 Mode: 2
 Applied to Port: AC mains
 Note 1:

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RadiMation



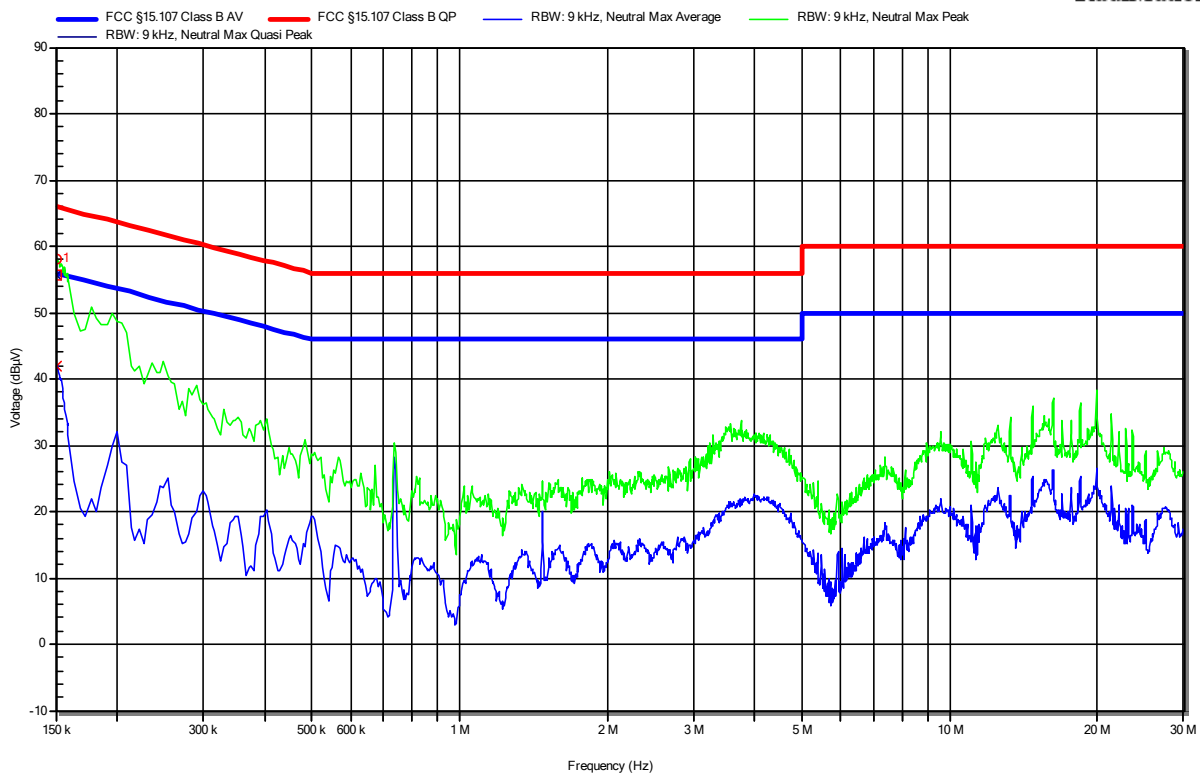
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	56.03 dBµV	66 dBµV	-9.97 dB	Pass	Line 1
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	43.73 dBµV	56 dBµV	-12.27 dB	Pass	Line 1

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

Project Number: G0M-2002-8805
 Applicant: m2m Germany GmbH
 Model Description: 915MHz LoRaWAN Gateway incl Wi-Fi, Ethernet & LTE - Indoor and IP67 variants
 Model: RG191+LTE Series
 Test Sample ID: 30741
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Dose
 Test Date: 2020-08-26
 Operating Conditions: ambient temperature: 22°C
 power input: 120V 60Hz
 LISN: Schwarzbeck NSLK 8127 RC N
 Mode: 2
 Applied to Port: AC mains
 Note 1:

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RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	55.61 dBµV	66 dBµV	-10.39 dB	Pass	Neutral
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	41.87 dBµV	56 dBµV	-14.13 dB	Pass	Neutral