FCC TEST REPORT **Co-Location**	
Report Reference No	G0M-2207-1565-TFCCOLOC-V02
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Dräger MSI GmbH
Address	Rohrstraße 32 58093 Hagen Germany
Test Specification	47 CFR Part 15.247
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Wireless gas detection transmitter
Model(s)	X-node 1
Additional Model(s)	None
Brand Name(s)	X-node 1
Hardware Version(s)	EU-F7a
Software Version(s)	2.1.5
FCC ID	2A9SW-LR01
Test Result	**PASSED**

Possible test case verdicts:	
Required by standard but not tested	N/T
Not required by standard	N/R
Not applicable to EUT	N/A
Test object does meet the requirement	P(PASS)
Test object does not meet the requirement	F(FAIL)
Testing:	
Test Lab Temperature	20 °C - 30 °C
Test Lab Humidity	25 % - 55 %
Date of receipt of test item	2022-10-04
Report:	

Compiled by	Odai Qawasmeh	
Tested by (+ signature) (Responsible for Test)	Odai Qawasmeh	O. Qawasmeh
Approved by (+ signature) (Test Lab Engineer)	Radwan Jaafar	
Date of Issue	2023-04-04	
Total number of pages	38	

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:

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2023-03-01	Initial Release	O. Qawasmeh
02	2023-04-04	Replaced document: G0M-2207-1565-TFCCOLOC-V01 Replaced by: G0M-2207-1565-TFCCOLOC -V02 Reason: Correction of antenna gain for LoRa (1.2 dBi to 1.6 dBi)	

ABBREVIATIONS AND ACRONYMS

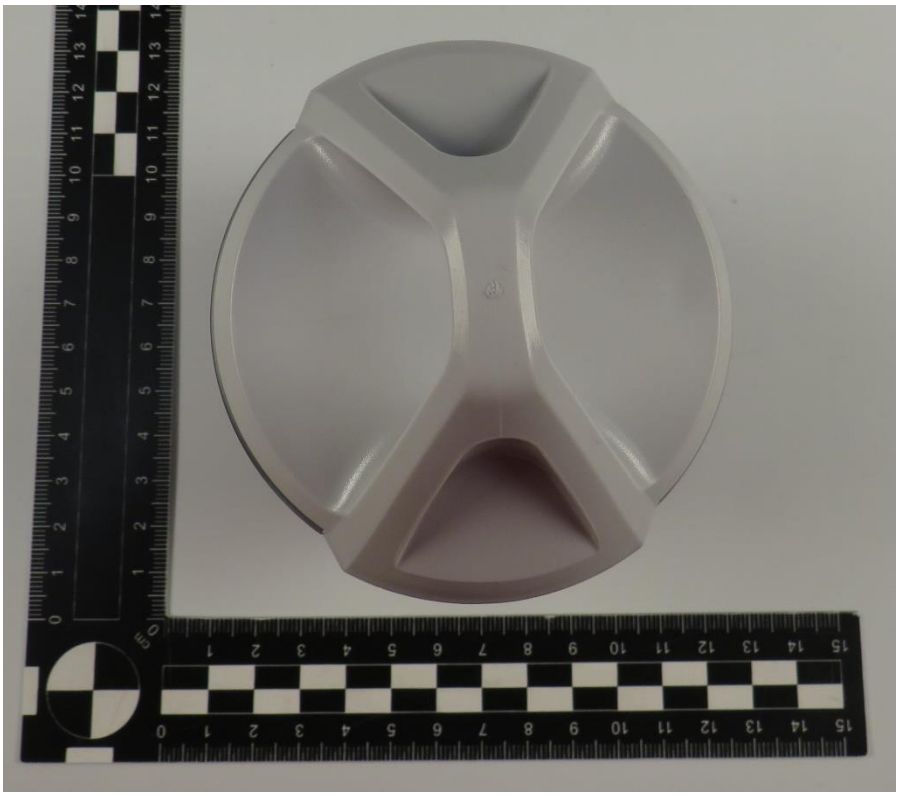
Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

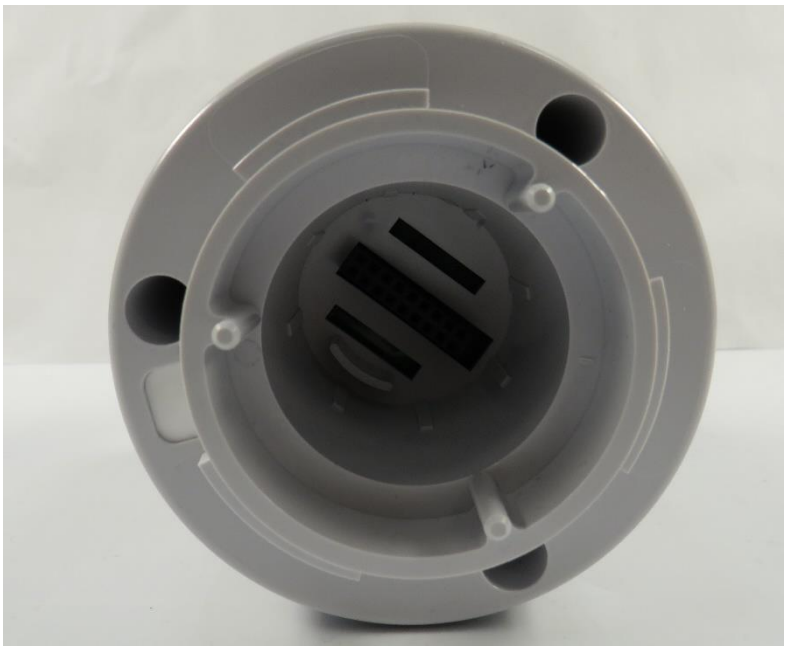
REPORT INDEX

1 Equipment (Test Item) Under Test

Description	Wireless gas detection transmitter	
Model	X-node 1	
Additional Model(s)	None	
Brand Name(s)	X-node 1	
Serial Number(s)	Prototype	
Test Sample Id(s)	41711	
Hardware Version(s)	EU-F7a	
Software Version(s)	2.1.5	
FCC ID	2A9SW-LR01	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	902 – 928 MHz 2400 – 2483.5 MHz	
Radio technologies	LoRa, Bluetooth Low Energy	
Modulation	CSS, GFSK	
Number of modules	1	
Radio Module	Type	Bluetooth module
	Model	ISP1807
	Manufacturer	Insight SIP
	HW Version	LR
	SW Version	1.6
	FCC ID	2AAQS-ISP1807
Antenna 1 (BLE)	Type	Integrated
	Model	ISP1807
	Manufacturer	Insight SIP
	Gain	0.6 dBi
Antenna 2 (LoRa)	Type	Integrated
	Model	105262
	Manufacturer	Molex
	Gain	1.6 dBi
Supply Voltage	V_{NOM}	3.7 VDC (battery, rechargeable via USB)
Operating Temperature	T_{NOM}	20 °C
AC/DC-Adaptor	None	
Manufacturer	Dräger MSI GmbH Rohrstraße 32 58093 Hagen Germany	

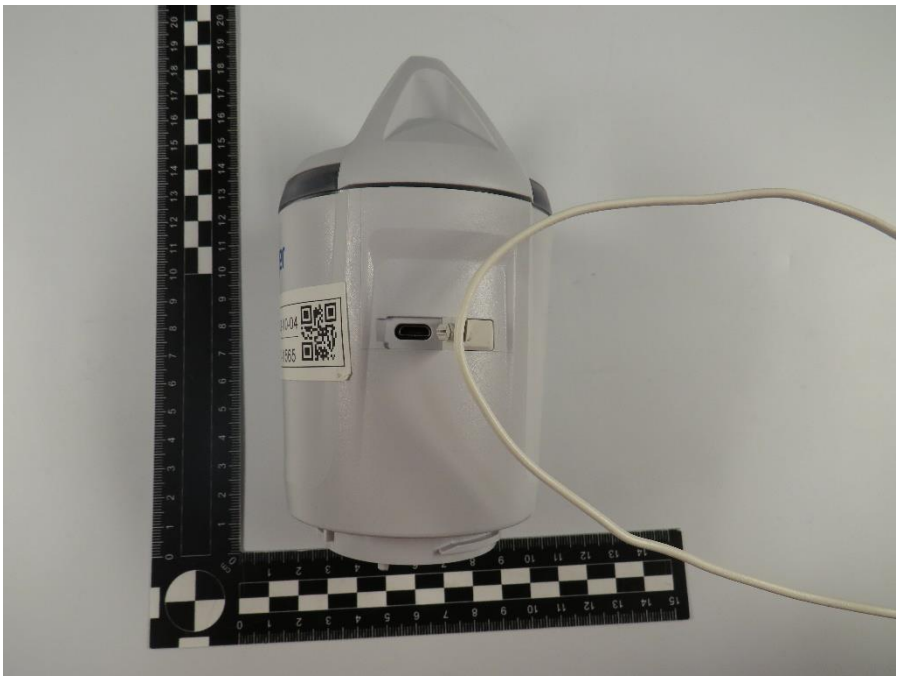
1.1 Photos – Equipment External

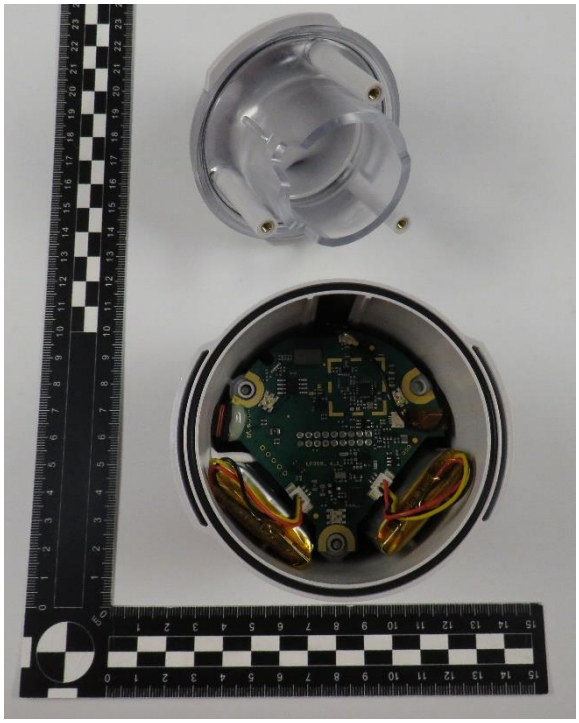
EUT Top View


EUT Bottom View


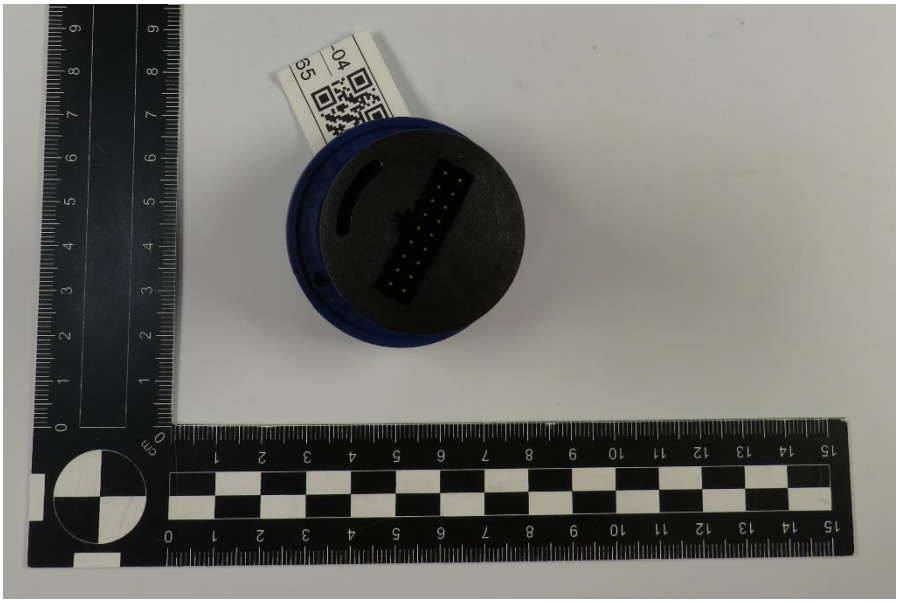
EUT Front View


EUT Side View (with label)


EUT Side View (with USB Port)


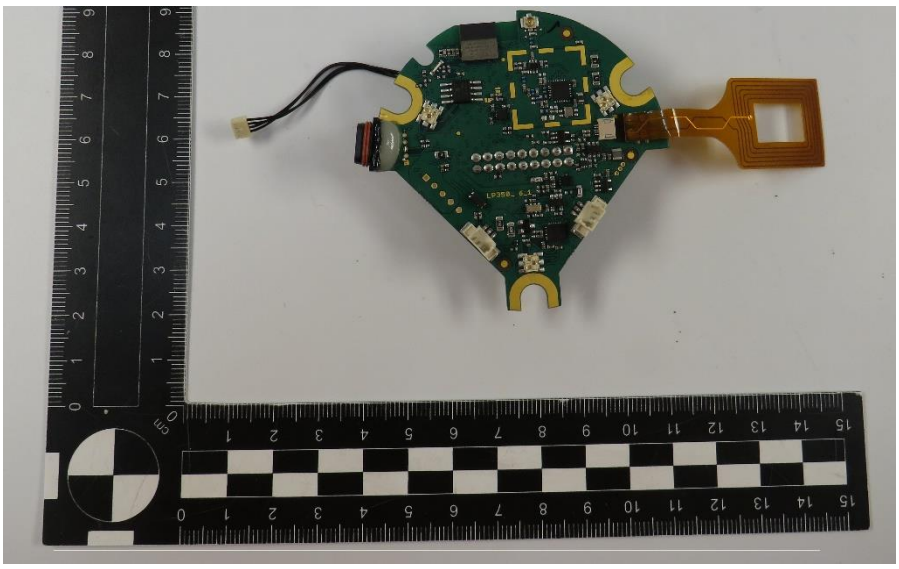
EUT opened


Gas detector Top View

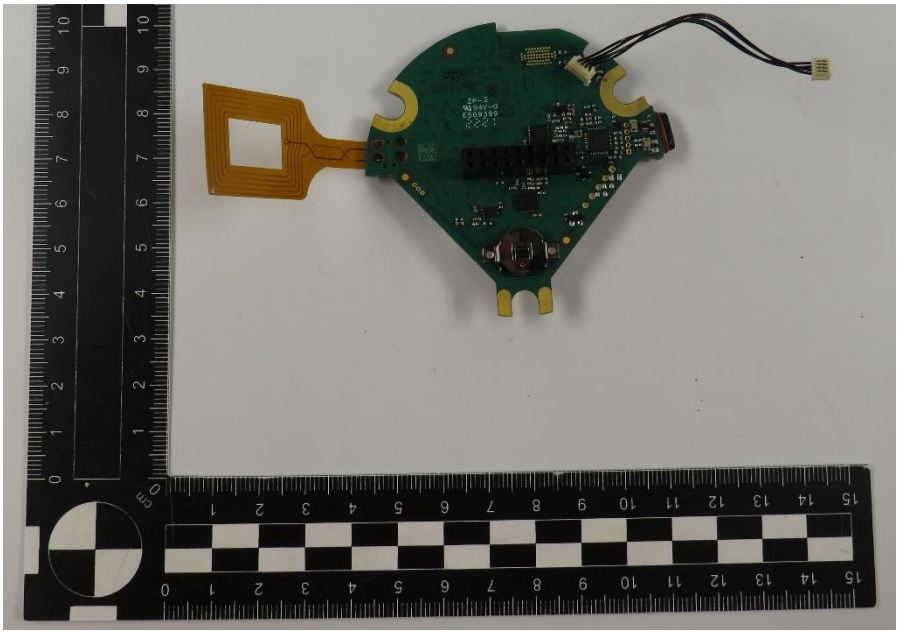

Gas detector Bottom View


1.2 Photos – Equipment Internal

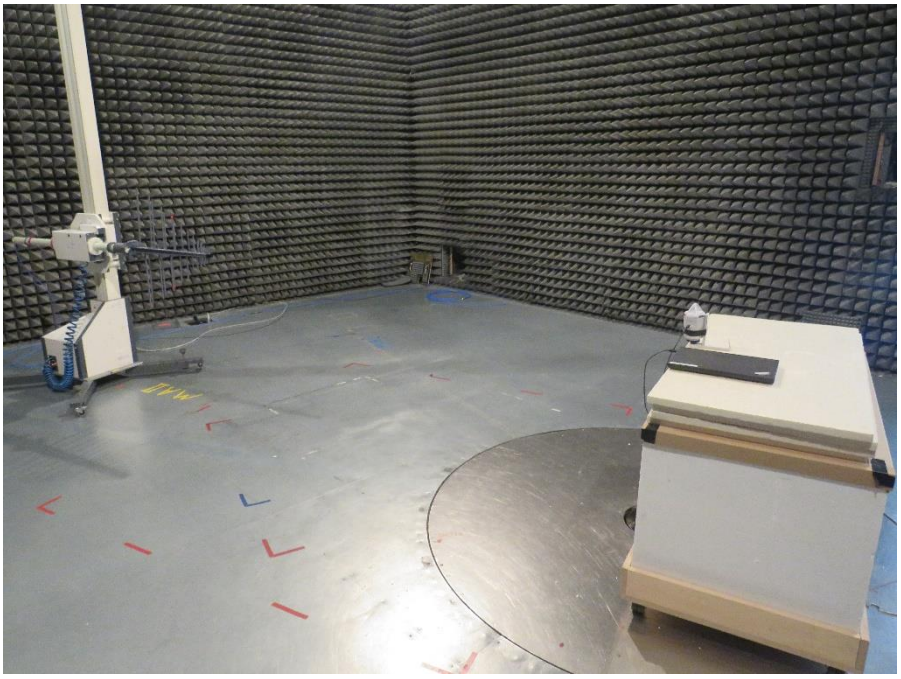
EUT PCB

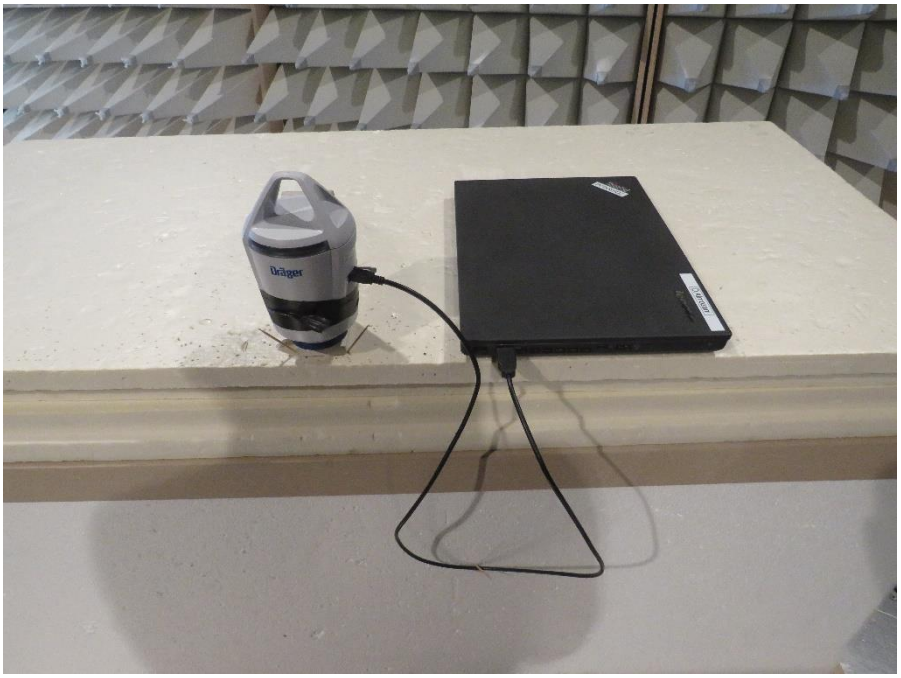

PCB Top View


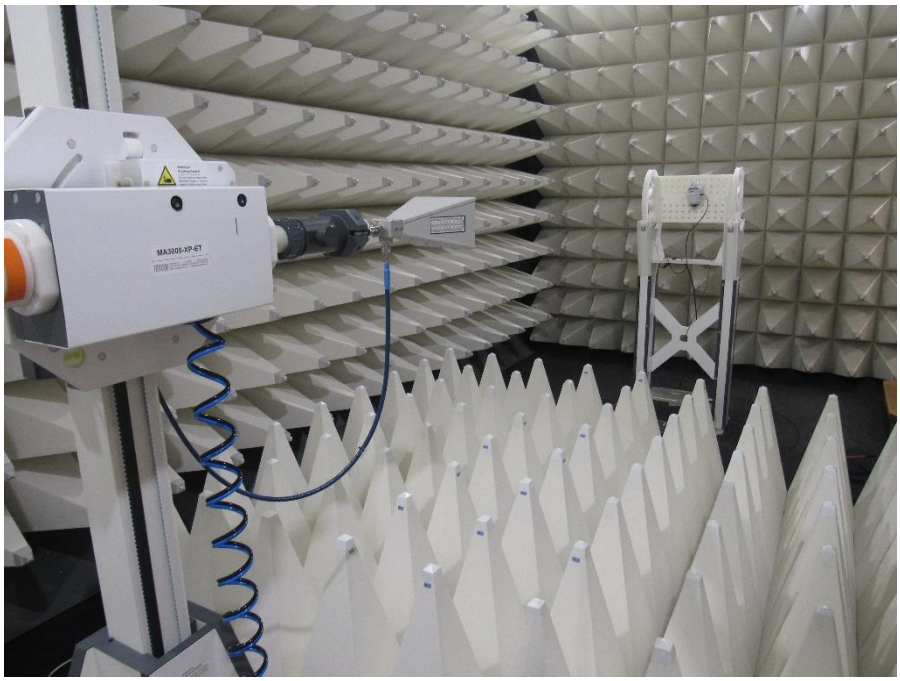
PCB Bottom View

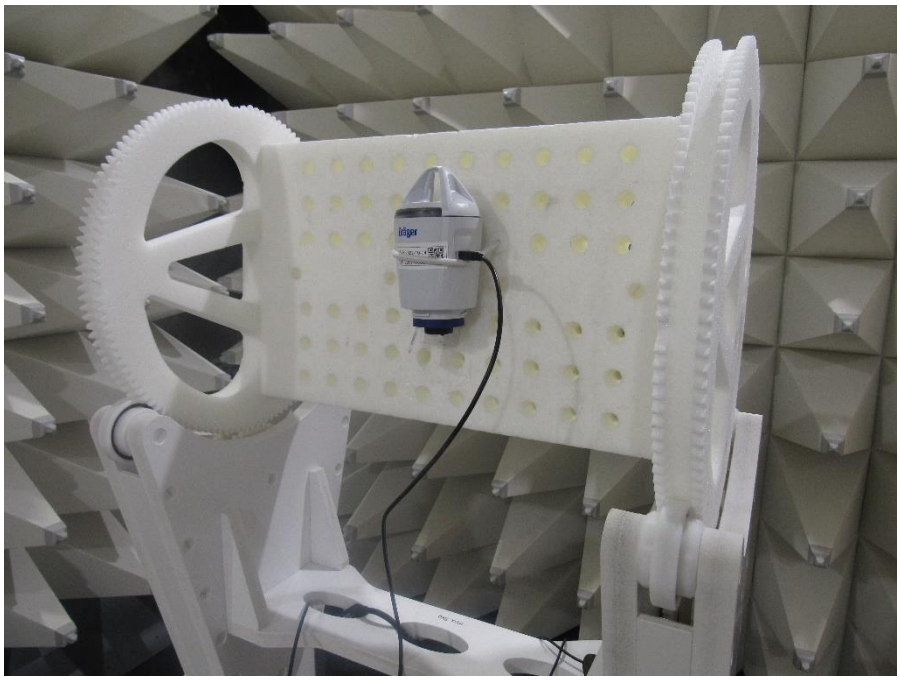


1.3 Photos – Test Setup

Setup for measurements below 1 GHz


EUT Test Setup


Setup for measurements above 1 GHz


EUT Test Setup


1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
CBL	USB Cable	-	-	-
AE	Notebook	Lenovo	Thinkpad	-
SFT	-	Putty	-	for configuring LoRa test modes
SFT	-	Nordic	nRF Connect Desktop	for activating direct testmode
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.5 Test Modes

Mode	Description
BT	Mode = Transmit Modulation = GFSK Spreading = None Packet Length = 239 Bytes Packet Type = PRBS9 Data rate = 2 Mbit/s Duty cycle = 81%
LoRa	Mode = Transmit Modulation = CSS Frequency = 903.9 MHz, 905.3 MHz Spreading factor = 7 Power Settings = 15 dBm Bandwidth = 125 kHz, 250 kHz, 500 kHz Duty cycle = 100 %
Comment: Worst case for Bluetooth was found in module test report number DRTFCC2002-0049 issued by DT&C Co., Ltd. on 2020-02-24. Worst case for LoRa was determined by pre-tests and investigating of the highest output power.	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	1	903.9
F2	Tx	2	905.3
F3	Tx	39	2480
Comment: F1 and F2 were tested in conjunction with F3.			

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:

Reading on Analyzer (dBµV) + A.F. (dB/m) = Net field strength (dBµV/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:

Limit (dBµV/m) = 20*log (µV/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 15C				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
FCC § 15.247(d) FCC § 15.209	Transmitter radiated spurious emissions	KDB 558074 D01 KDB 789033 D02 KDB 996369 D04 ANSI C63.10 12.7	PASS	
FCC § 15.207	AC power line conducted emissions	ANSI C63.10-2013	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

3 Test Conditions and Results

3.1 Test Conditions and Results - AC powerline conducted emissions

3.1.1 Information

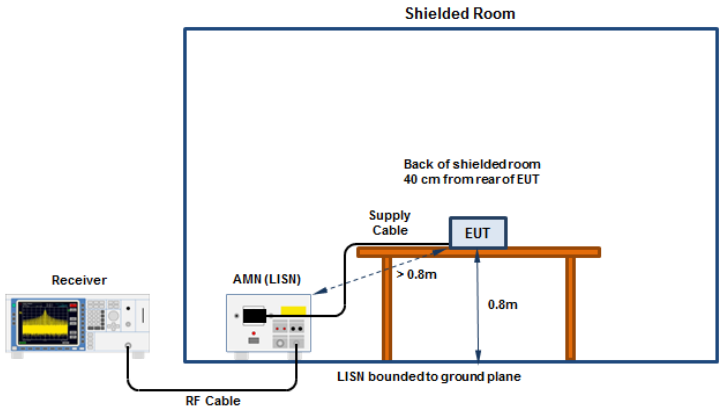
Test Information	
Reference	FCC § 15.207
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Odai Qawasmeh
Date	2022-11-11

3.1.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBµV]	Average [dBµV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50
* Limit decreases linearly with the logarithm of the frequency		

3.1.3 Setup

Test Setup



3.1.4 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
EMI Test Receiver	R&S	ESR7	EF00943	2022-07	2023-07
Pulse Limiter	R&S	ESH3-Z2	EF01222	2021-07	2023-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2021-07	2023-07

3.1.5 Setup Photos

Setup for measurement 150 kHz - 30 MHz


Setup for measurement 150 kHz - 30 MHz


Conducted emissions at the mains power port according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-11-11
Operating Conditions:	ambient temperature: 24 °Celsius power input: 3.7 VDC (Battery)
LISN:	Schwarzbeck NSLK 8127 RC L1
Operational Mode:	BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes
EUT Configuration:	SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Applied to Port:	120 VAC / 60 Hz
Note 1:	

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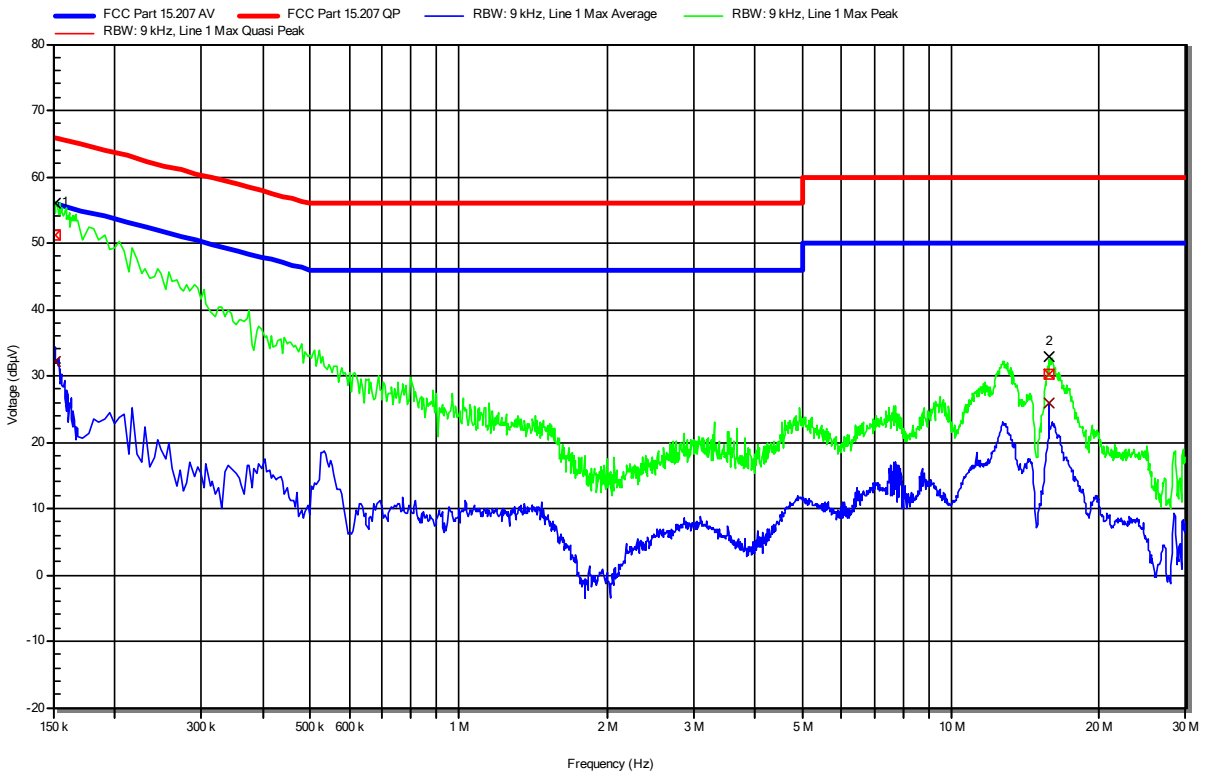
RadiMation

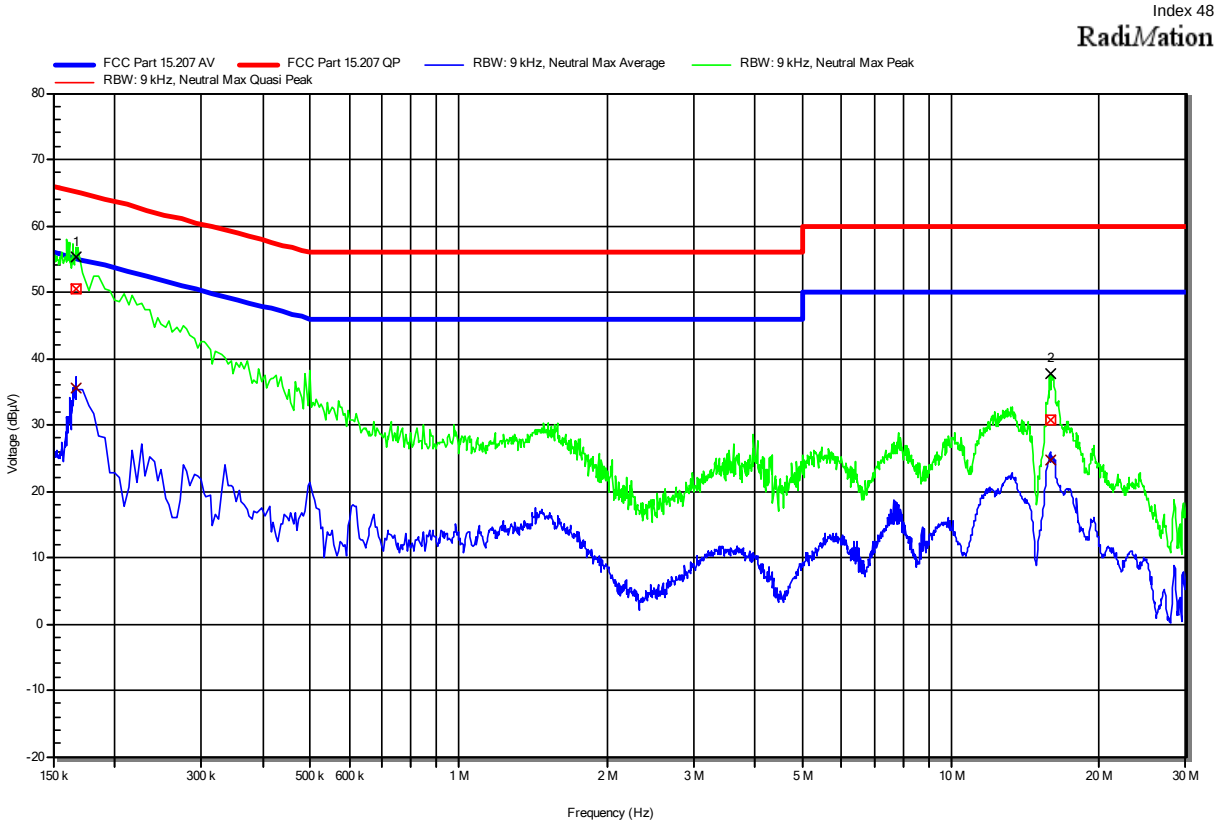


Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	152.25 kHz	51.11 dBµV	65.88 dBµV	-14.76 dB	Pass	Line 1
2	15.851 MHz	30.28 dBµV	60 dBµV	-29.72 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	152.25 kHz	32.13 dBµV	55.88 dBµV	-23.75 dB	Pass	Line 1
2	15.851 MHz	25.8 dBµV	50 dBµV	-24.2 dB	Pass	Line 1

Conducted emissions at the mains power port according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-11-11
Operating Conditions:	ambient temperature: 24 °Celsius power input: 3.7 VDC (Battery)
LISN:	Schwarzbeck NSLK 8127
Operational Mode:	BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes
EUT Configuration:	SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Applied to Port:	120 VAC / 60 Hz
Note 1:	



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	167.55 kHz	50.47 dBµV	65.08 dBµV	-14.61 dB	Pass	Neutral
2	15.954 MHz	30.76 dBµV	60 dBµV	-29.24 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	167.55 kHz	35.55 dBµV	55.08 dBµV	-19.53 dB	Pass	Neutral
2	15.954 MHz	24.63 dBµV	50 dBµV	-25.37 dB	Pass	Neutral

Conducted emissions at the mains power port according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-11-11
Operating Conditions:	ambient temperature: 24 °Celsius power input: 3.7 VDC (Battery)
LISN:	Schwarzbeck NSLK 8127 RC L1
Operational Mode:	BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes
EUT Configuration:	SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Applied to Port:	120 VAC / 60 Hz
Note 1:	

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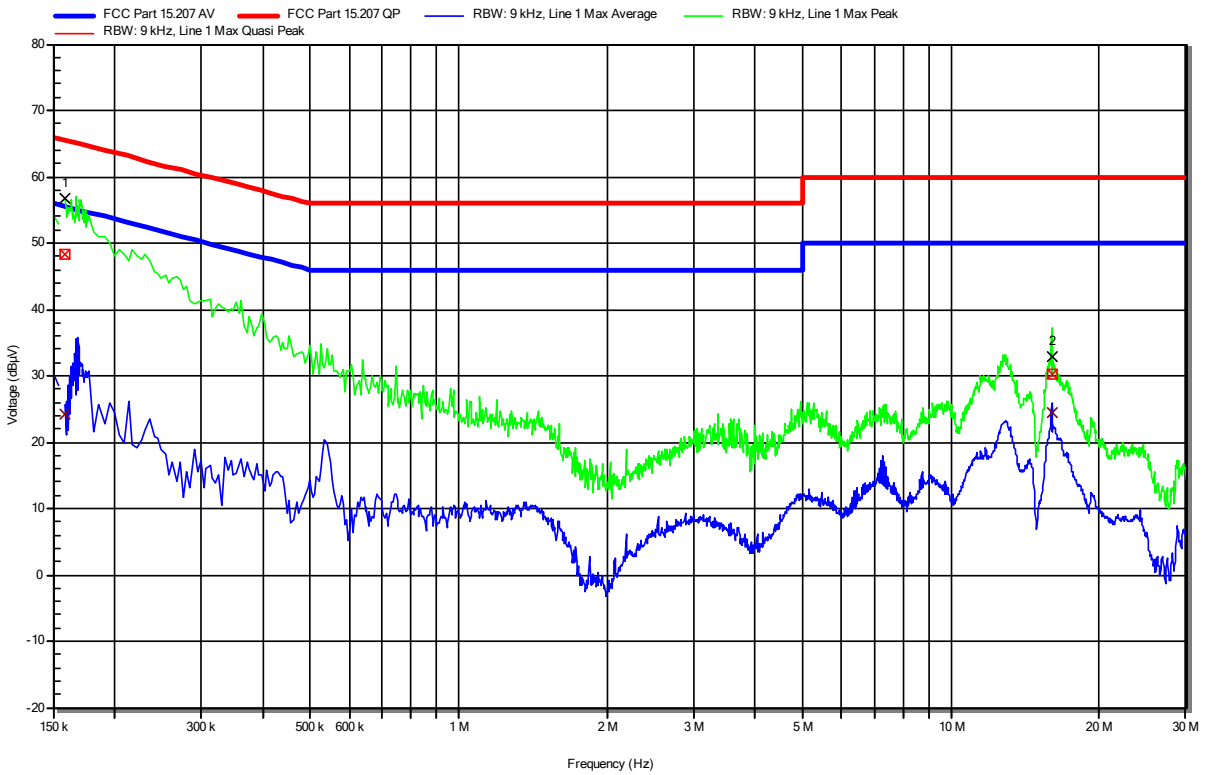
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	159 kHz	48.36 dBµV	65.52 dBµV	-17.16 dB	Pass	Line 1
2	16.008 MHz	30.32 dBµV	60 dBµV	-29.68 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	159 kHz	24.14 dBµV	55.52 dBµV	-31.37 dB	Pass	Line 1
2	16.008 MHz	24.53 dBµV	50 dBµV	-25.47 dB	Pass	Line 1

Conducted emissions at the mains power port according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-11-11
Operating Conditions:	ambient temperature: 24 °Celsius power input: 3.7 VDC (Battery)
LISN:	Schwarzbeck NSLK 8127
Operational Mode:	BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes
EUT Configuration:	SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Applied to Port:	120 VAC / 60 Hz
Note 1:	

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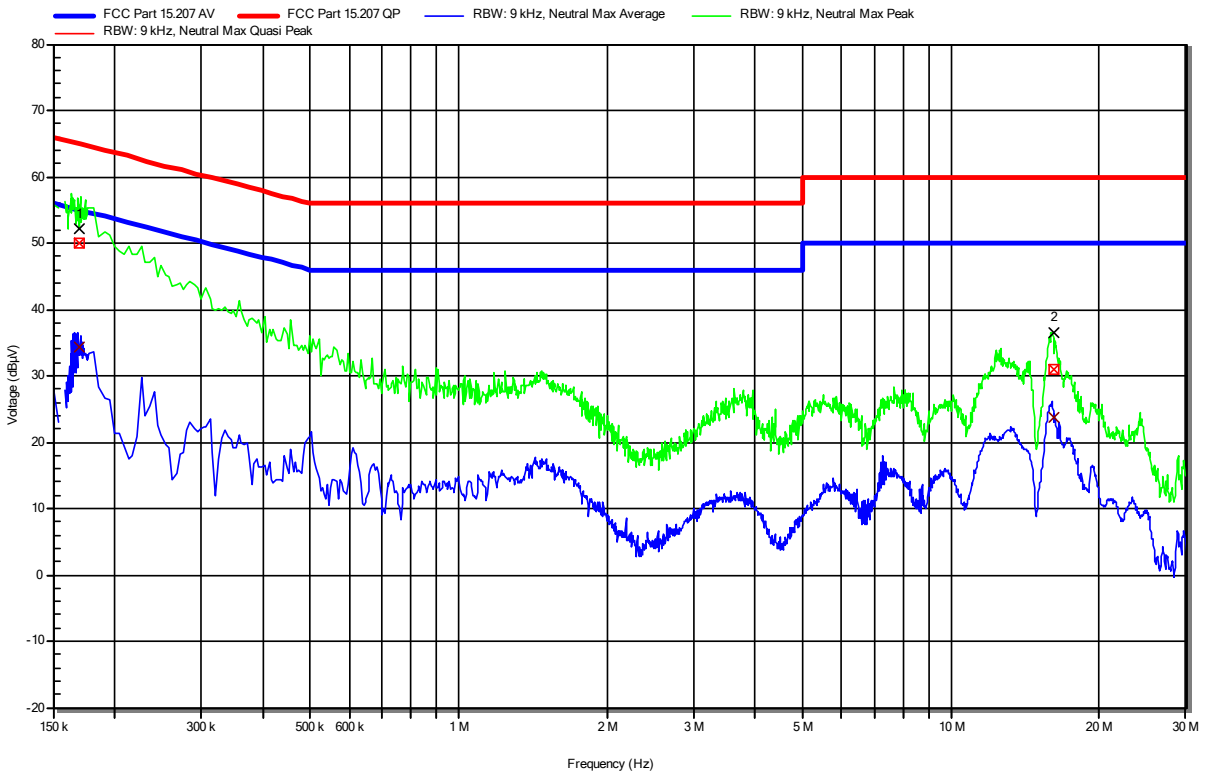
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	169.8 kHz	50.04 dBµV	64.97 dBµV	-14.93 dB	Pass	Neutral
2	16.148 MHz	30.93 dBµV	60 dBµV	-29.07 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	169.8 kHz	34.37 dBµV	54.97 dBµV	-20.6 dB	Pass	Neutral
2	16.148 MHz	23.77 dBµV	50 dBµV	-26.23 dB	Pass	Neutral

3.2 Test Conditions and Results - Transmitter radiated emissions

3.2.1 Information

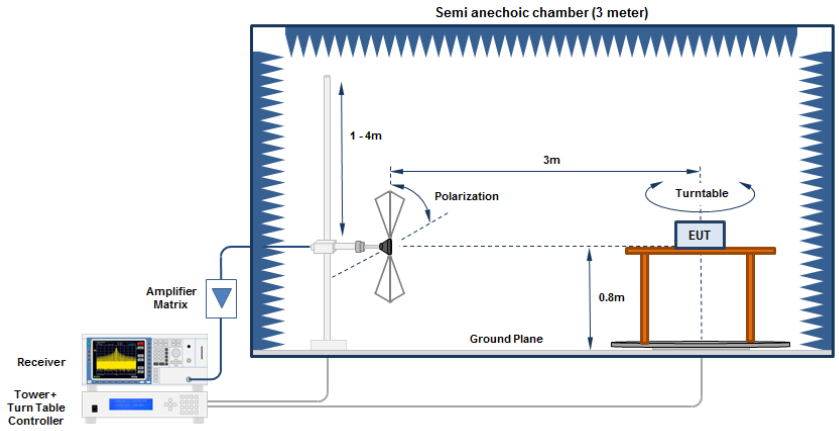
Test Information	
Reference	FCC § 15.247(d) FCC § 15.209
Measurement Method	KDB 558074 D01, KDB 789033 D02, KDB 996369 D04, ANSI C63.10 12.7
Measurement Uncertainty	± 5.95 dB
Operator	Odai Qawasmeh
Date	2022-11-03

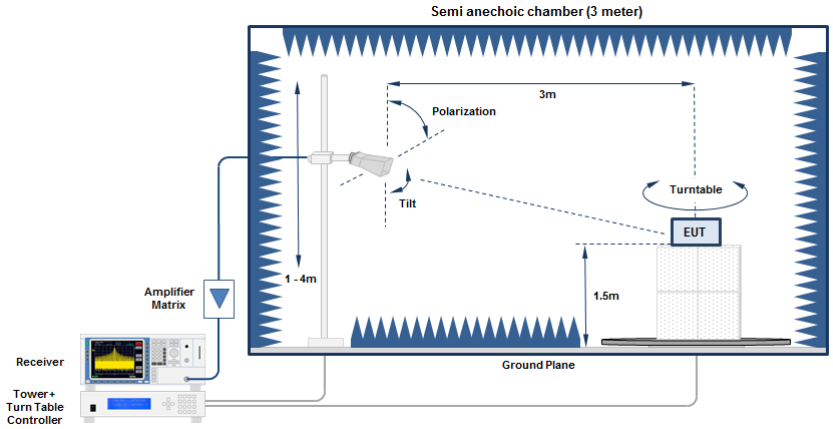
3.2.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.2.3 Setup

Test Setup 30 - 1000 MHz



Test Setup > 1 GHz


3.2.4 Equipment

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2023-01
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2022-06	2025-06

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC2	EF01616	2022-10	2023-10
Spectrum analyzer	R&S	FSW43	EF00896	2022-08	2023-08
Antenna	Schwarzbeck	BBHA 9120D	EF01678	2021-03	2024-03
Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2024-03
Antenna	Amplifier Research	AT4560	EF00302	2021-06	2023-06

3.2.5 Procedure

Test Procedure 30 - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

3.2.6 Results

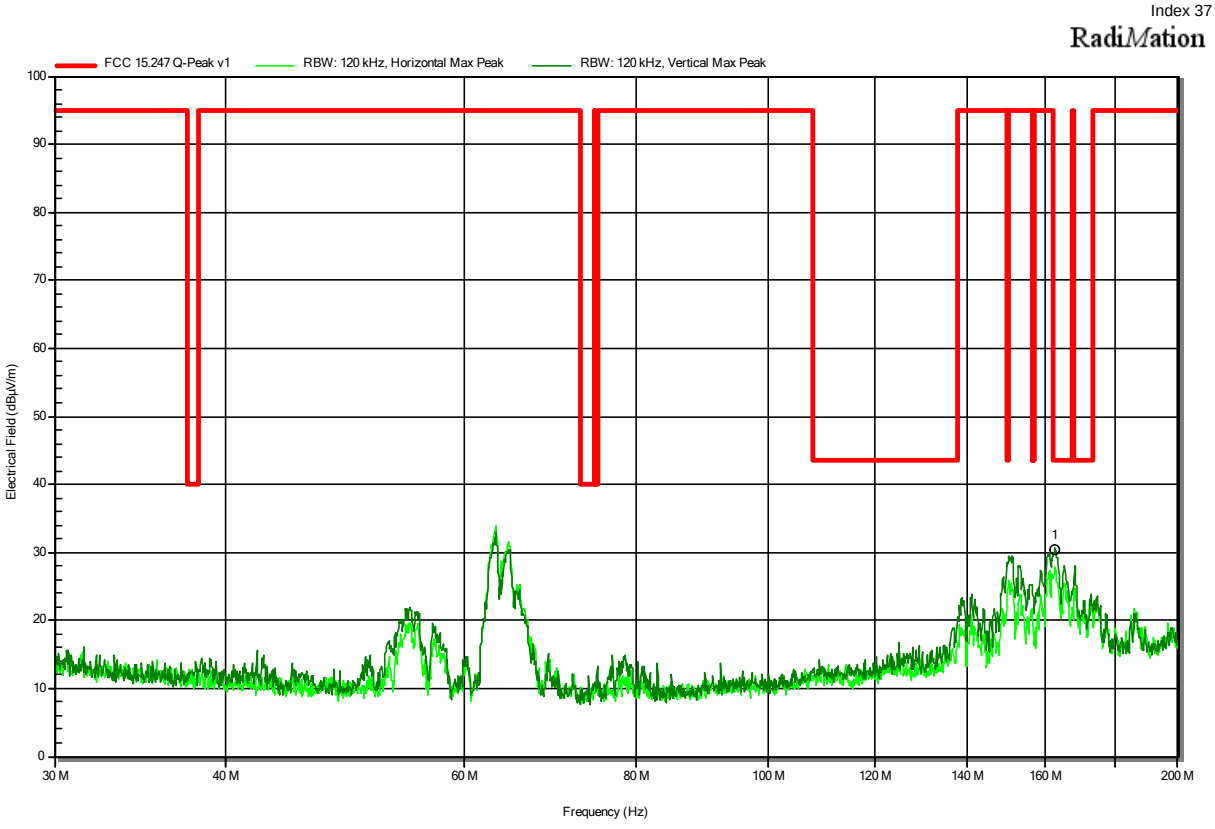
Test Results – LoRa + BT						
Frequency [MHz]	Emission [MHz]	Level [dBµV/m]	Detector	Pol.	Limit [dBµV/m]	Margin [dB]
903.9 + 2480	162.2728	30.30	pk	ver	43.50	-13.22
903.9 + 2480	978.6286	41.70	pk	ver	54.00	-12.25
903.9 + 2480	2712	52.09	pk	hor	74.00	-21.91
903.9 + 2480	2712	50.03	avg	hor	54.00	-03.97
903.9 + 2480	4959	45.45	pk	ver	74.00	-28.55
903.9 + 2480	4959	37.46	avg	ver	54.00	-16.54
903.9 + 2480	7439	56.80	pk	hor	74.00	-17.20
903.9 + 2480	7439	51.37	avg	hor	54.00	-02.63
903.9 + 2480	8135	48.15	pk	ver	74.00	-25.85
903.9 + 2480	8135	45.92	avg	ver	54.00	-08.08
903.9 + 2480	9039	42.72	pk	ver	74.00	-31.28
903.9 + 2480	9039	40.86	avg	ver	54.00	-13.14
903.9 + 2480	12398	45.49	pk	hor	74.00	-28.51
903.9 + 2480	12398	39.16	avg	hor	54.00	-14.84
903.9 + 2480	18197	47.91	pk	ver	74.00	-26.09
903.9 + 2480	18197	35.93	avg	ver	54.00	-18.07

Test Results – LoRa + BT						
Frequency [MHz]	Emission [MHz]	Level [dBµV/m]	Detector	Pol.	Limit [dBµV/m]	Margin [dB]
905.3 + 2480	162.2728	32.00	pk	ver	43.50	-11.49
905.3 + 2480	986.824	42.00	pk	ver	54.00	-12.01
905.3 + 2480	2716	52.68	pk	hor	74.00	-21.32
905.3 + 2480	2716	50.83	avg	hor	54.00	-03.17
905.3 + 2480	7439	56.87	pk	hor	74.00	-17.13
905.3 + 2480	7439	51.04	avg	hor	54.00	-02.96
905.3 + 2480	8148	47.88	pk	ver	74.00	-26.12
905.3 + 2480	8148	46.04	avg	ver	54.00	-07.96
905.3 + 2480	9053	42.19	pk	ver	74.00	-31.81
905.3 + 2480	9053	40.17	avg	ver	54.00	-13.83
905.3 + 2480	12402	46.67	pk	hor	74.00	-27.33
905.3 + 2480	12402	38.74	avg	hor	54.00	-15.26
905.3 + 2480	18285	47.45	pk	ver	74.00	-26.55
905.3 + 2480	18285	36.13	avg	ver	54.00	-17.87

ANNEX A Transmitter spurious emissions LoRa + BT

Radiated Spurious Emissions according to 47 CFR Part 15.247

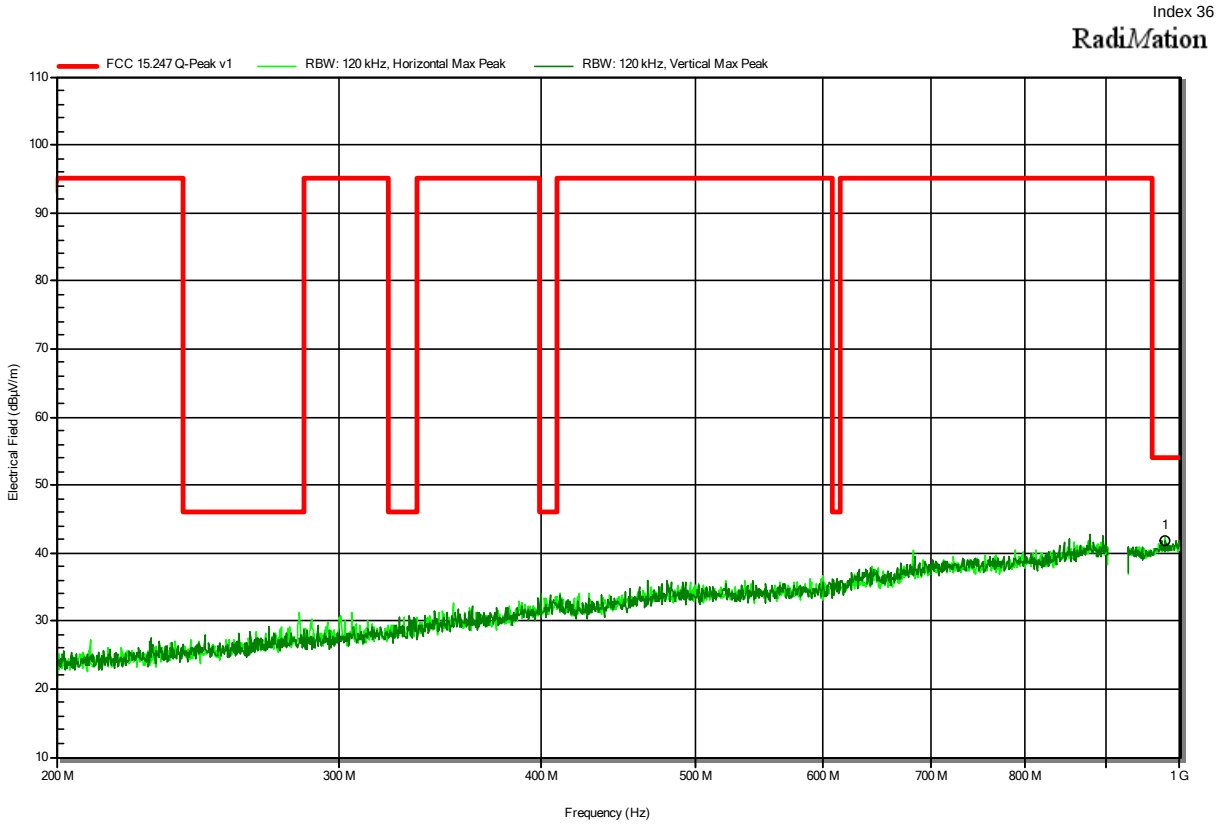
Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
162.2728 MHz	30.3 dBµV/m	43.5 dBµV/m	-13.22 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
978.6286 MHz	41.7 dBµV/m	54 dBµV/m	-12.25 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-03
Note:	

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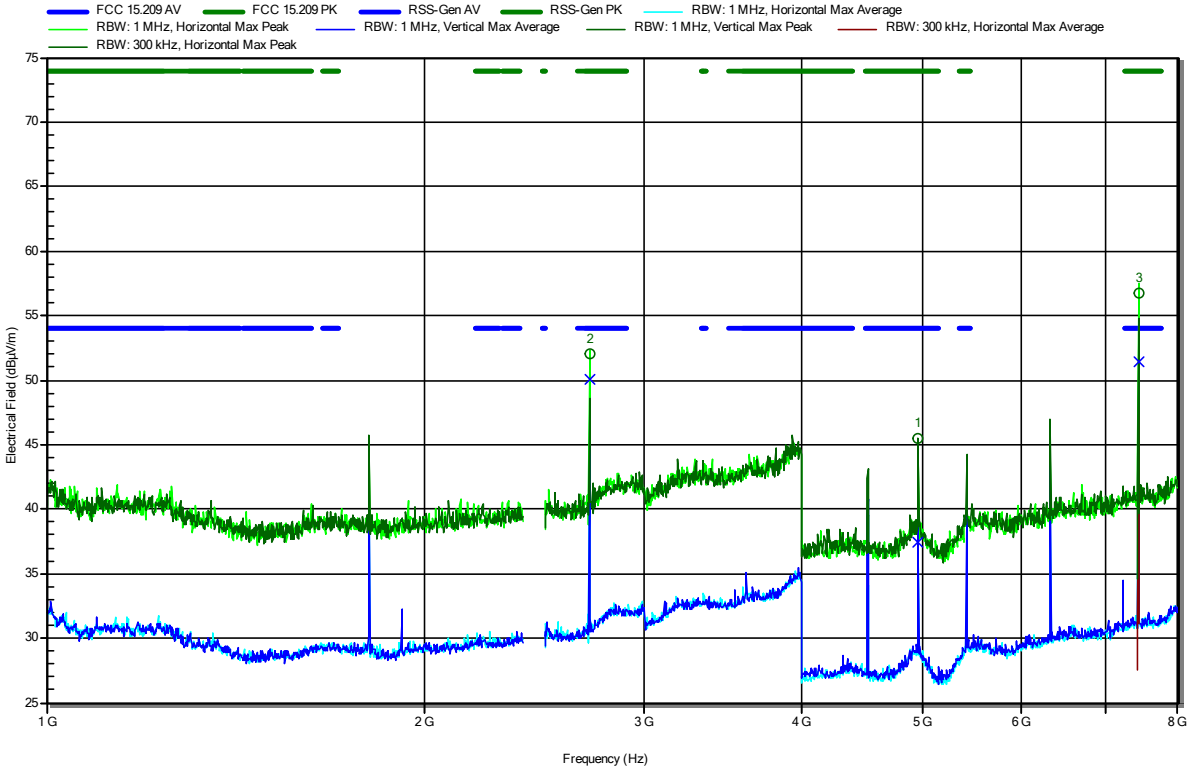
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.712 GHz	52.09 dBµV/m	74 dBµV/m	-21.91 dB	Pass	Horizontal
4.959 GHz	45.45 dBµV/m	74 dBµV/m	-28.55 dB	Pass	Vertical
7.439 GHz	56.8 dBµV/m	74 dBµV/m	-17.2 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.712 GHz	50.03 dBµV/m	54 dBµV/m	-3.97 dB	Pass	Horizontal
4.959 GHz	37.46 dBµV/m	54 dBµV/m	-16.54 dB	Pass	Vertical
7.439 GHz	51.37 dBµV/m	54 dBµV/m	-2.63 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-03
Note:	

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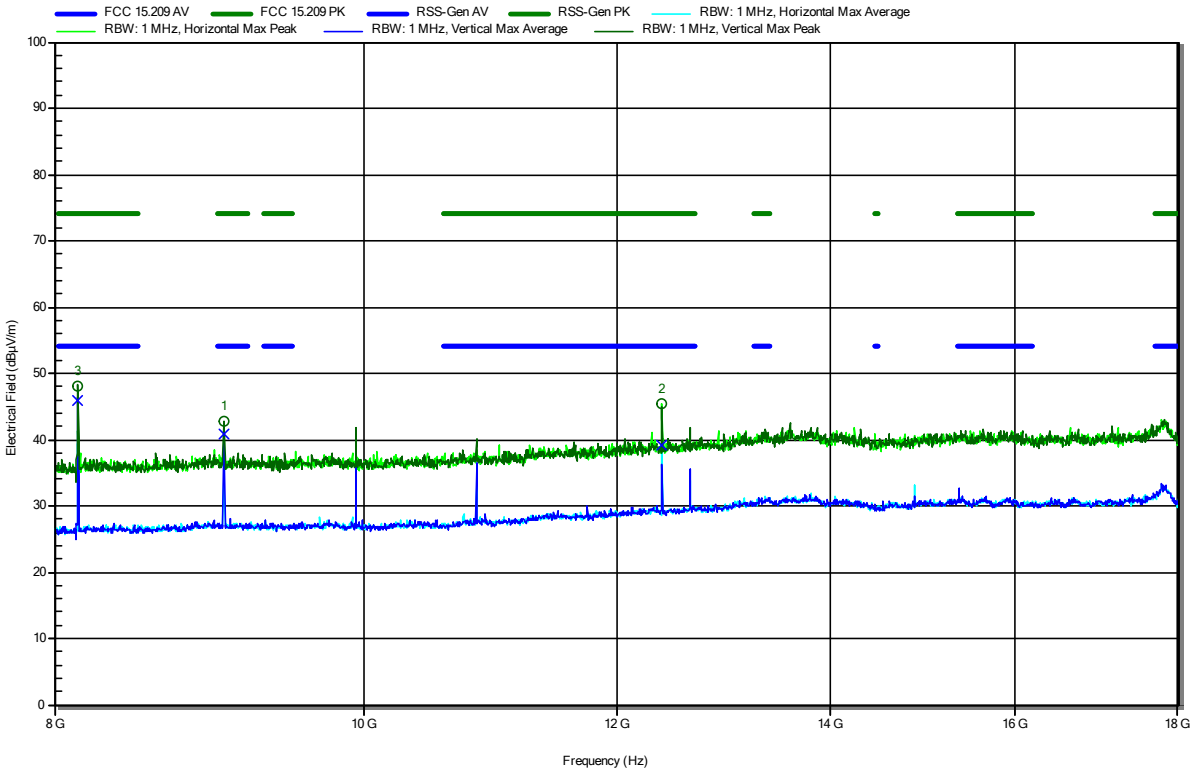
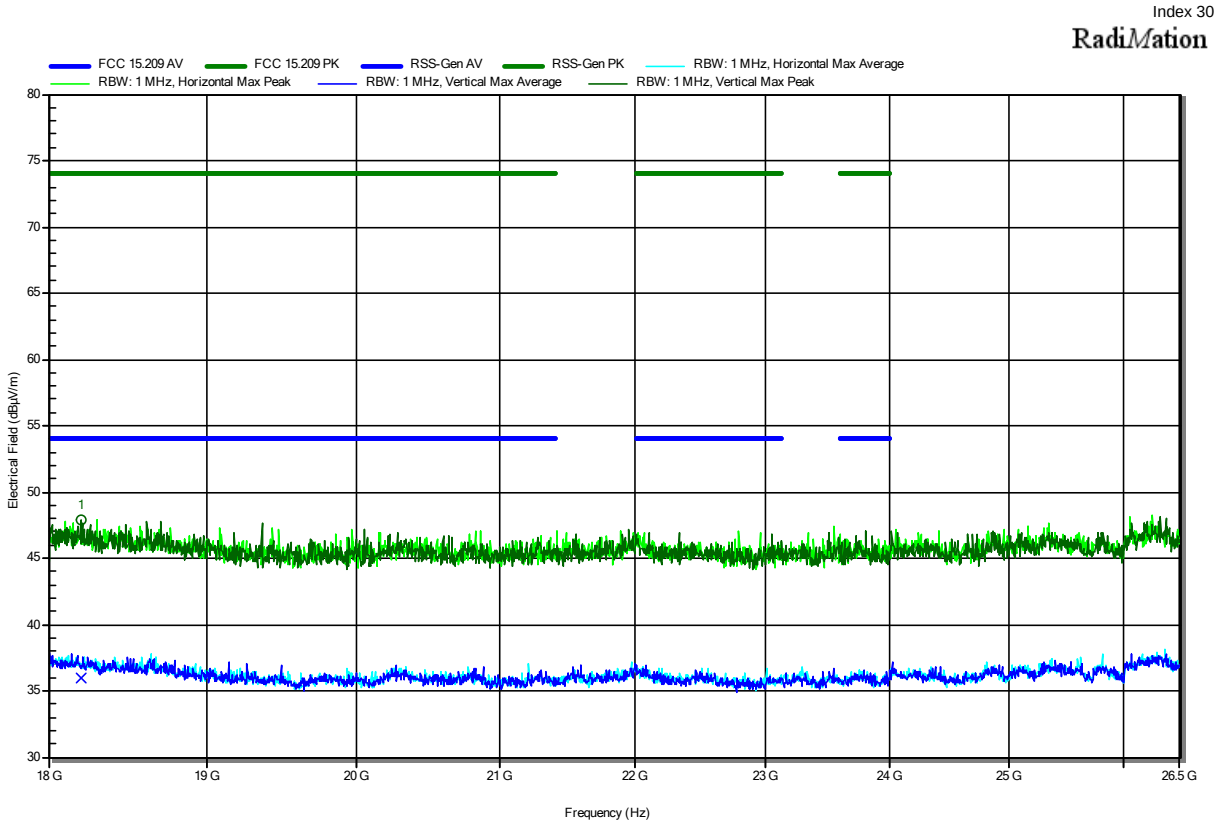


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
8.135 GHz	48.15 dBµV/m	74 dBµV/m	-25.85 dB	Pass	Vertical
9.039 GHz	42.72 dBµV/m	74 dBµV/m	-31.28 dB	Pass	Vertical
12.398 GHz	45.49 dBµV/m	74 dBµV/m	-28.51 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
8.135 GHz	45.92 dBµV/m	54 dBµV/m	-8.08 dB	Pass	Vertical
9.039 GHz	40.86 dBµV/m	54 dBµV/m	-13.14 dB	Pass	Vertical
12.398 GHz	39.16 dBµV/m	54 dBµV/m	-14.84 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-03
Note:	

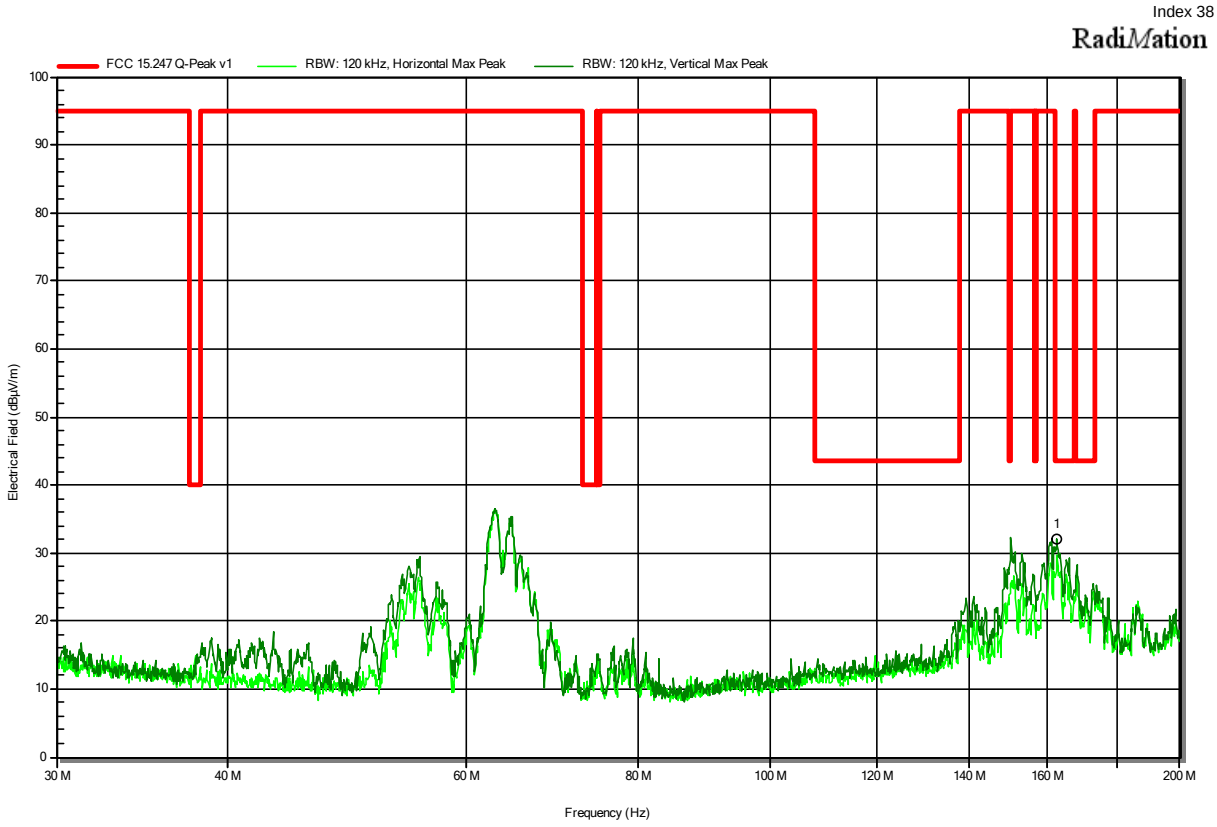


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
18.197 GHz	47.91 dBµV/m	74 dBµV/m	-26.09 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
18.197 GHz	35.93 dBµV/m	54 dBµV/m	-18.07 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247

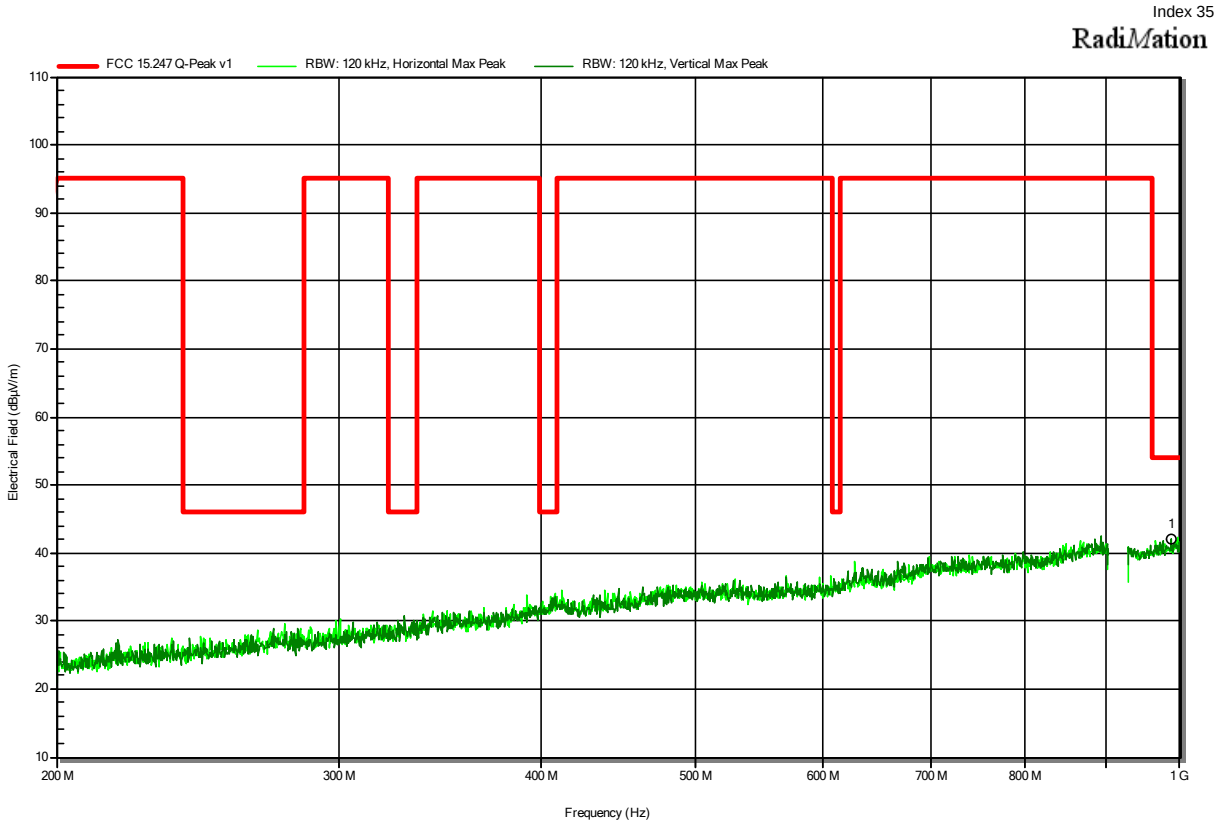
Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
162.2728 MHz	32 dBµV/m	43.5 dBµV/m	-11.49 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247

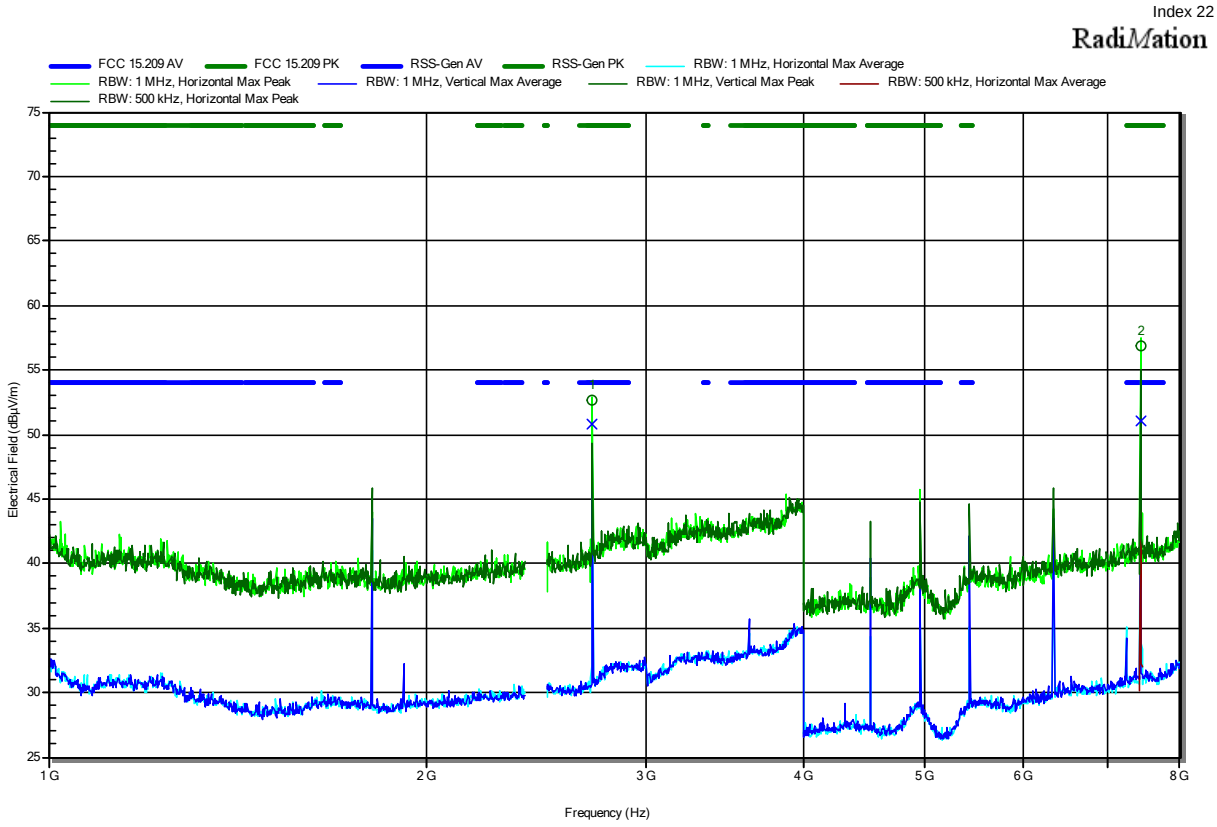
Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
986.824 MHz	42 dBµV/m	54 dBµV/m	-12.01 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-03
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.716 GHz	52.68 dBµV/m	74 dBµV/m	-21.32 dB	Pass	Horizontal
7.439 GHz	56.87 dBµV/m	74 dBµV/m	-17.13 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.716 GHz	50.83 dBµV/m	54 dBµV/m	-3.17 dB	Pass	Horizontal
7.439 GHz	51.04 dBµV/m	54 dBµV/m	-2.96 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-03
Note:	

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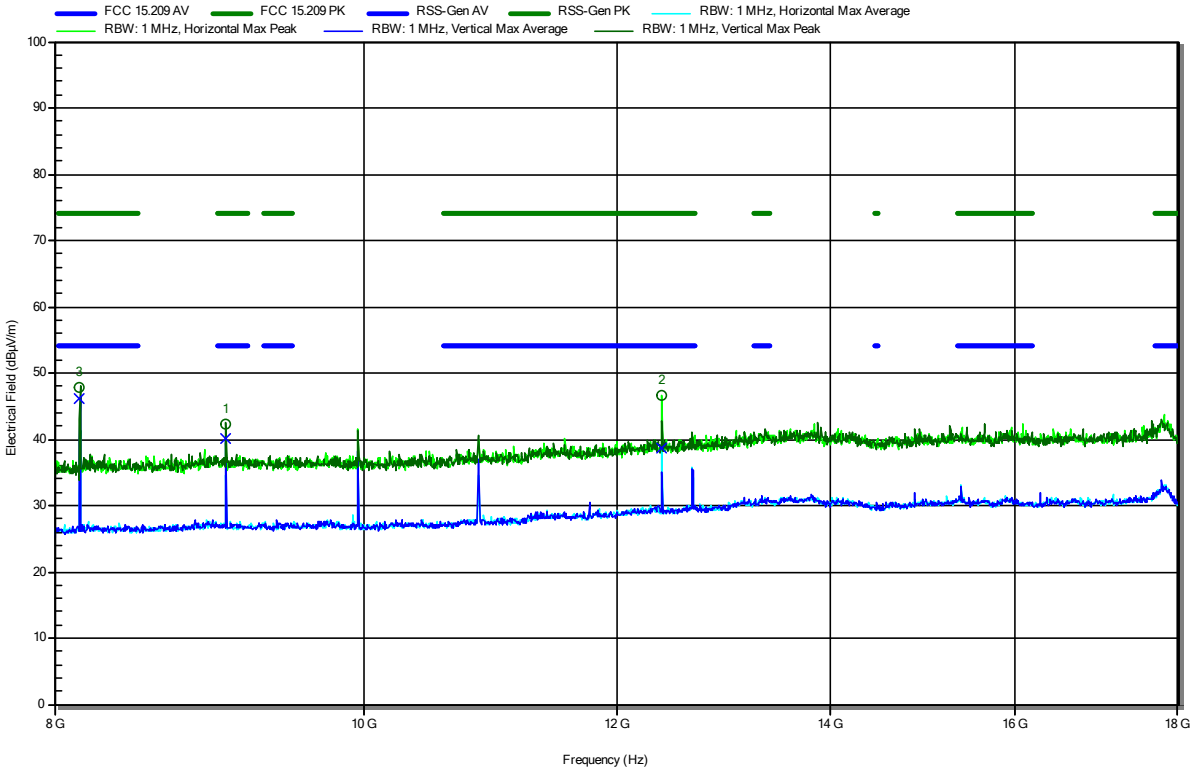
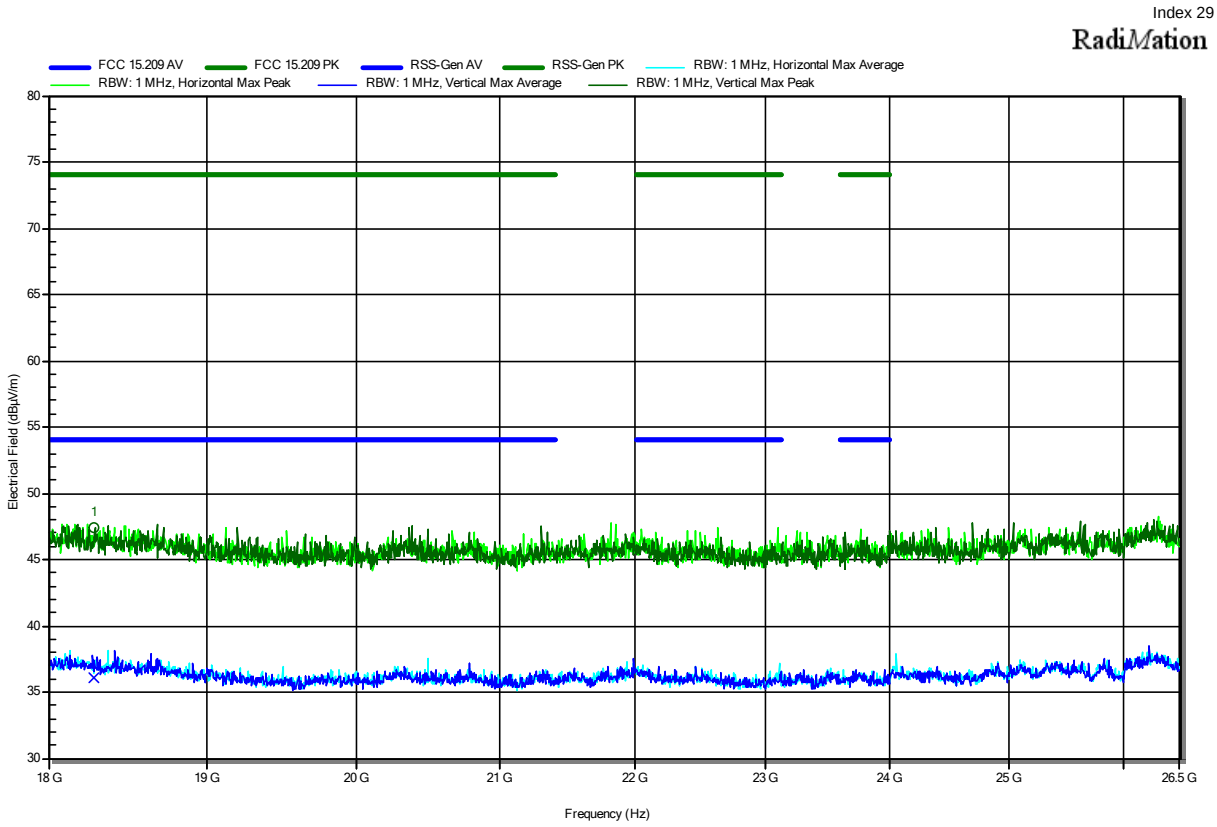


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
8.148 GHz	47.88 dBµV/m	74 dBµV/m	-26.12 dB	Pass	Vertical
9.053 GHz	42.19 dBµV/m	74 dBµV/m	-31.81 dB	Pass	Vertical
12.402 GHz	46.67 dBµV/m	74 dBµV/m	-27.33 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
8.148 GHz	46.04 dBµV/m	54 dBµV/m	-7.96 dB	Pass	Vertical
9.053 GHz	40.17 dBµV/m	54 dBµV/m	-13.83 dB	Pass	Vertical
12.402 GHz	38.74 dBµV/m	54 dBµV/m	-15.26 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-Node 1
Test Sample ID:	41711
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BT-LE, 2480 MHz, 2 Mbit/s, PRBS9, 239 Bytes SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7 US/CANADA
Test Date:	2022-11-03
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
18.285 GHz	47.45 dBµV/m	74 dBµV/m	-26.55 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
18.285 GHz	36.13 dBµV/m	54 dBµV/m	-17.87 dB	Pass	Vertical

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