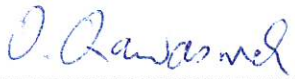


RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 902.0 MHz - 928.0 MHz band	
Report Reference No	G0M-2207-1565-TFC247DT-V02
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A 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 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 2, 2021-02
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
IC	N/A
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	
Approved by (+ signature) (Test Lab Engineer)	Radwan Jaafar	
Date of Issue	2023-04-04	
Total number of pages	105	
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-TFC247DT-V01 Replaced by: G0M-2207-1565-TFC247DT -V02 Reason: Correction of antenna gain (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

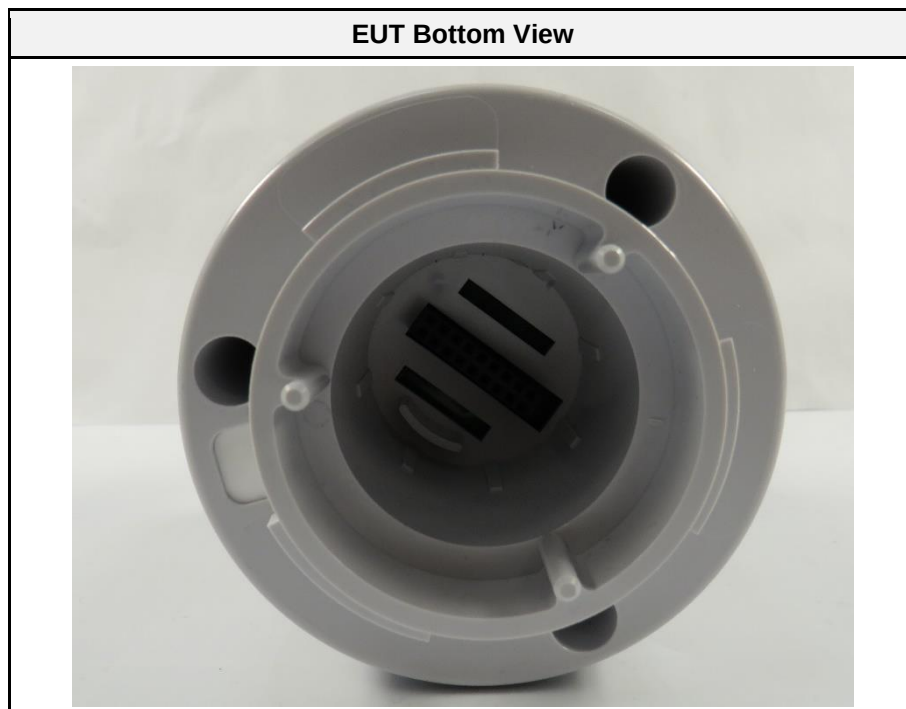
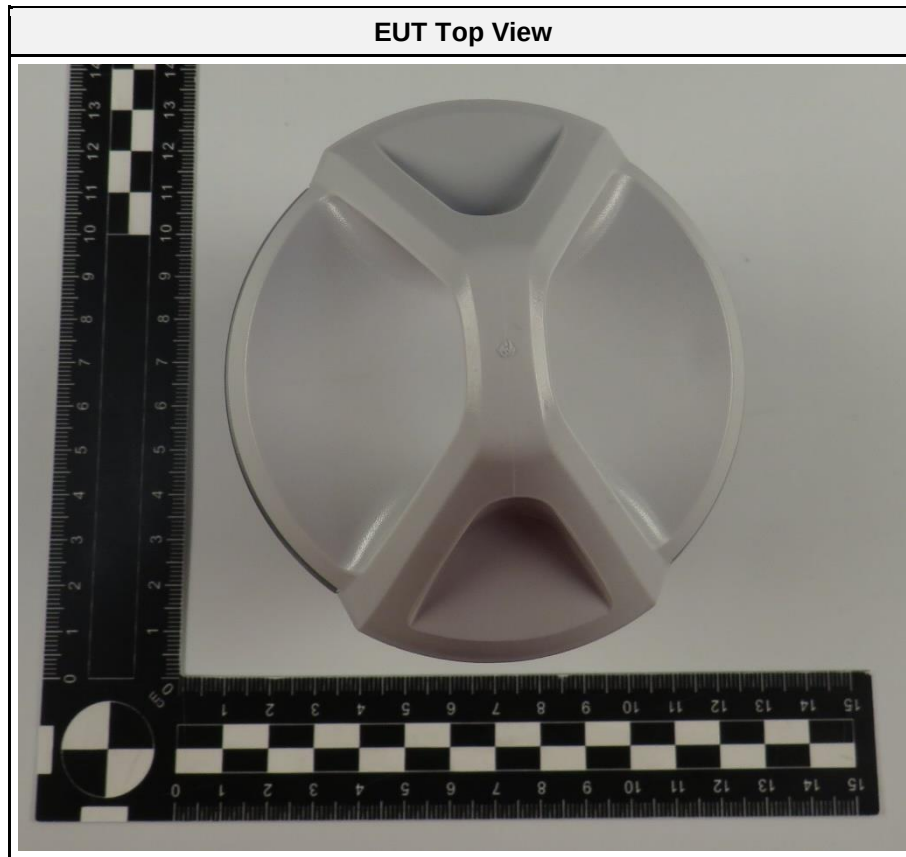
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1 Equipment (Test Item) Under Test

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 (Radiated) 41710 (Conducted)	
Hardware Version(s)	EU-F7a	
Software Version(s)	2.1.5	
FCC ID	2A9SW-LR01	
IC	N/A	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	902.0 MHz - 928.0 MHz	
Radio technology	LoRa	
Modulation	CSS	
Number of antenna ports	1	
Antenna	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



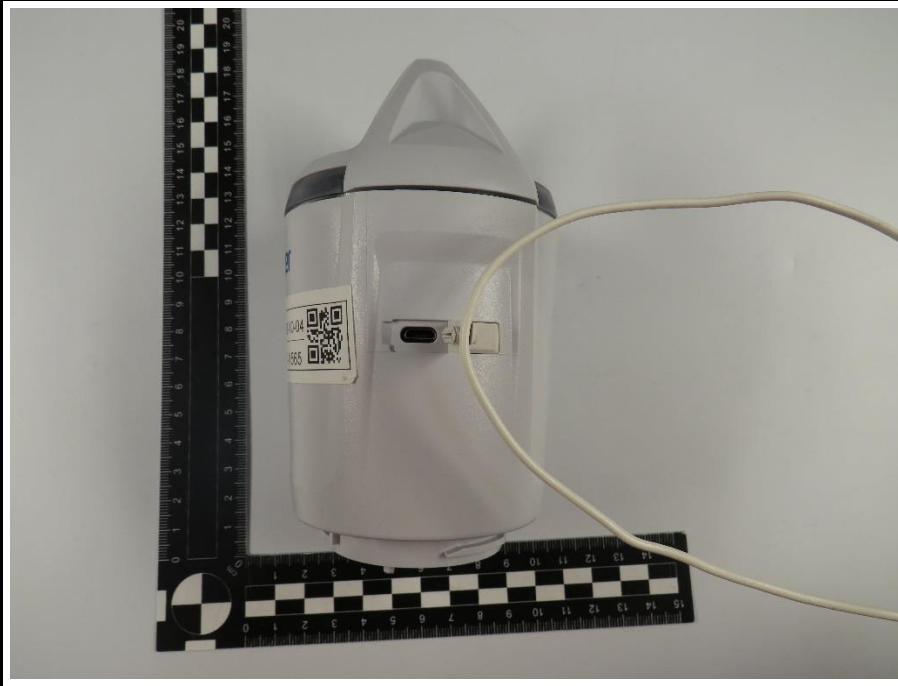
EUT Front View



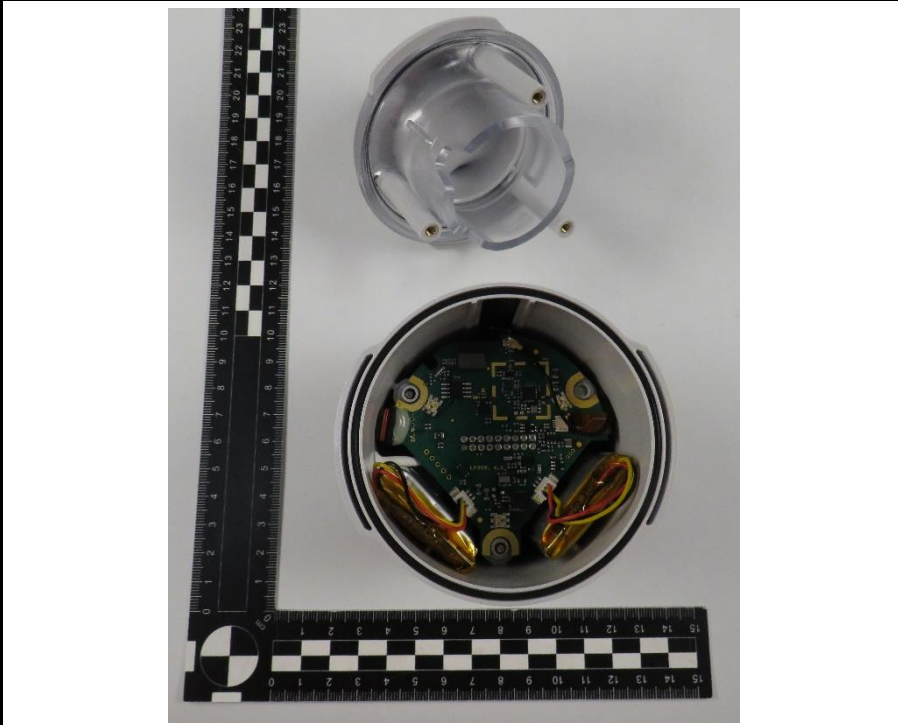
EUT Side View (with label)



EUT Side View (with USB Port)



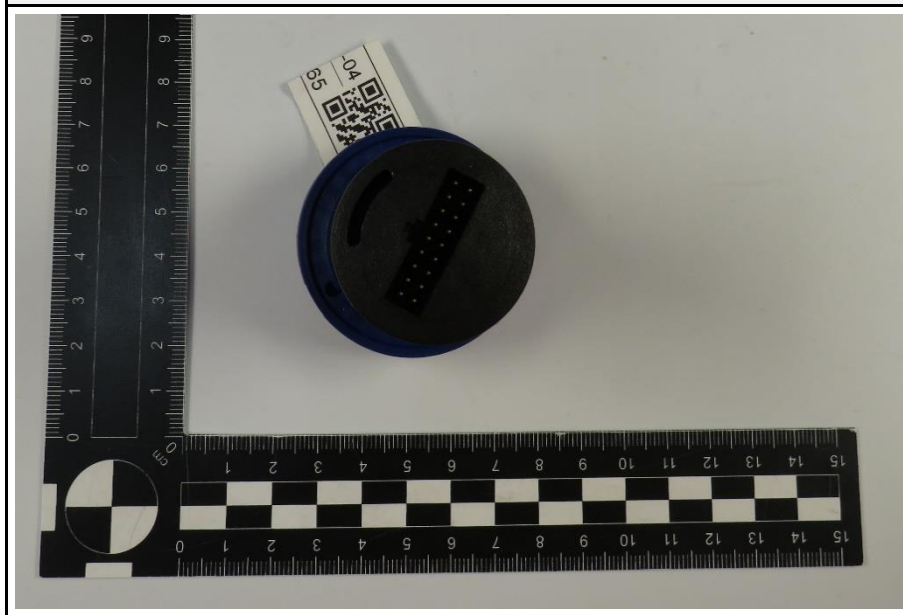
EUT opened



Gas detector Top View



Gas detector Bottom View



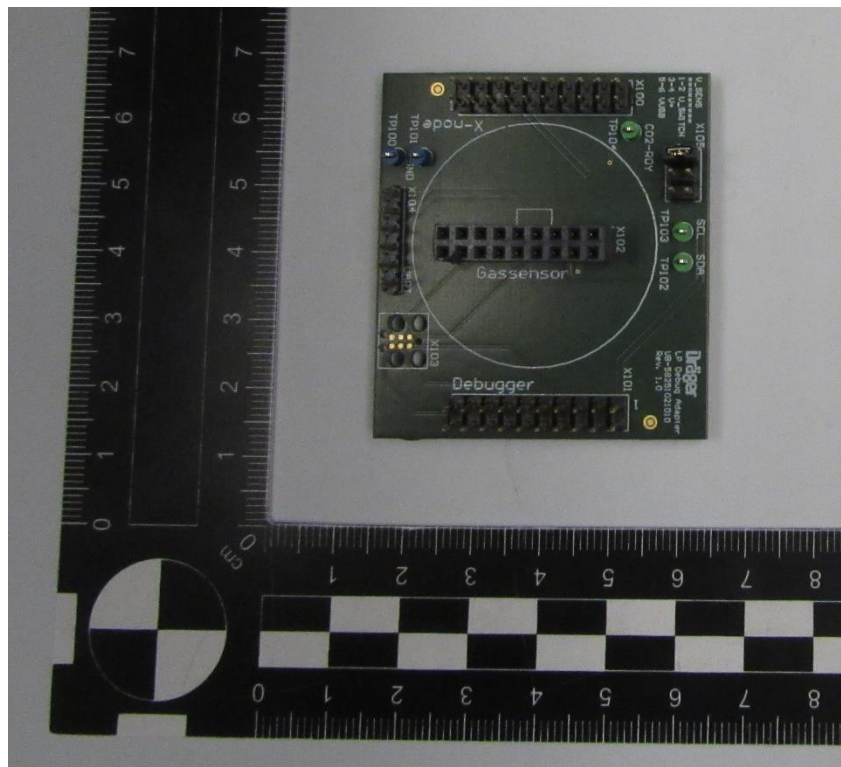
Flasher Top View



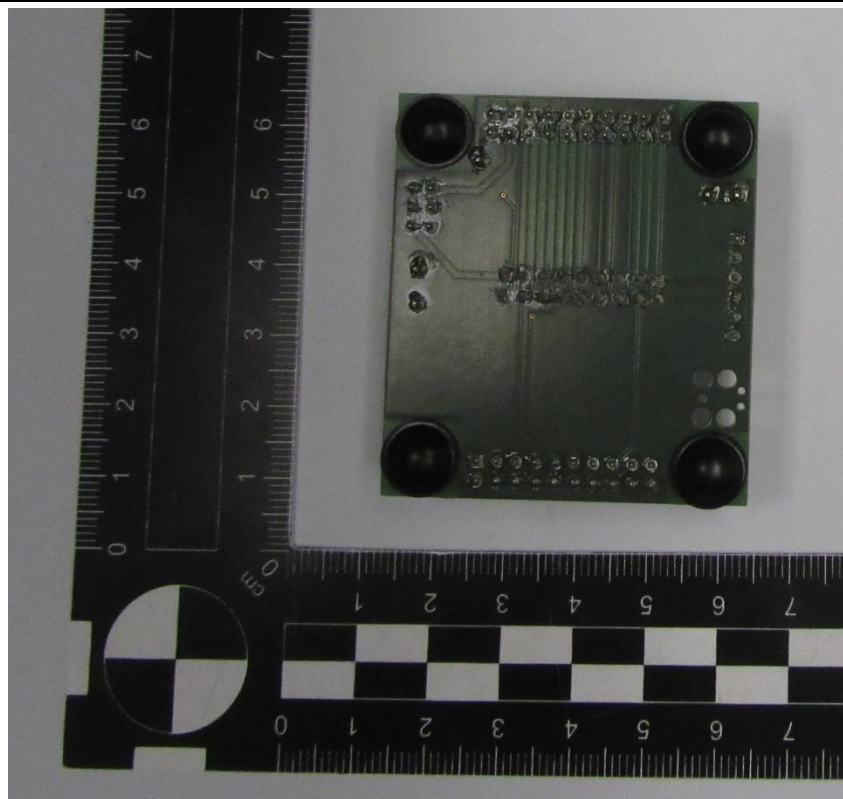
Flasher Bottom View



PCB for flashing Top View



PCB for flashing Bottom View



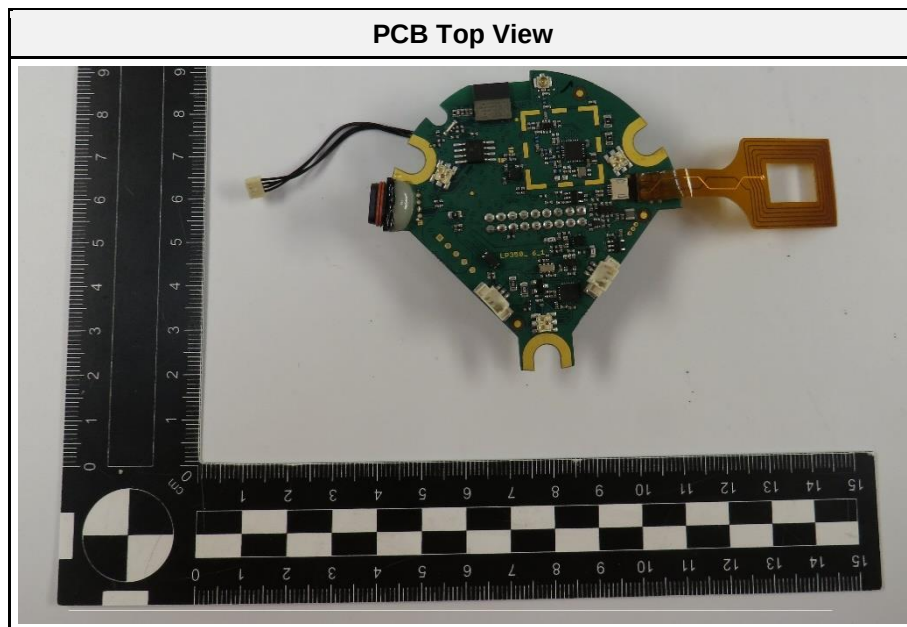
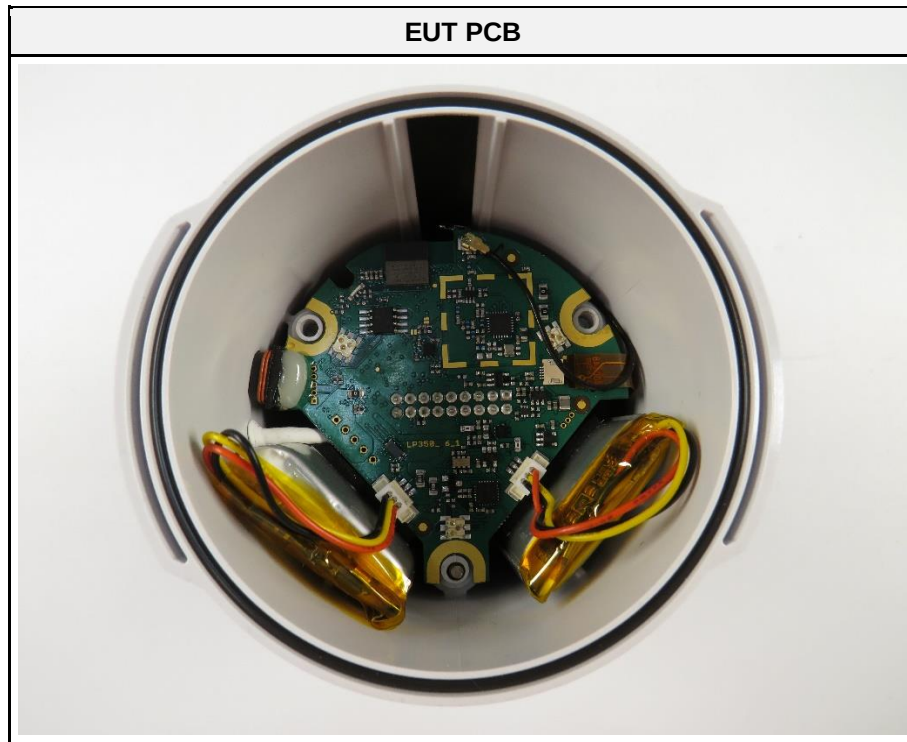
Sensor for Flashing



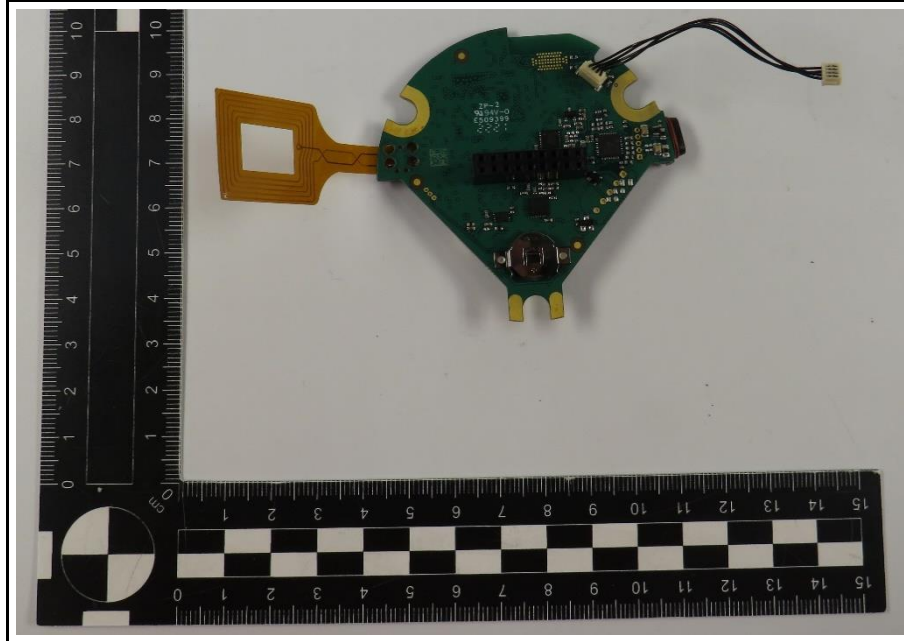
Flash equipment



1.2 Photos – Equipment Internal



PCB Bottom View



1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
CBL	USB Cable	-	-	-
AE	Notebook	Lenovo	Thinkpad	-
AE	Flasher	Segger	8110029006	For configuring Firmware to activate Hopping Mode
SFT	-	Putty	-	for configuring LoRa test modes
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.4 Test Modes

Mode	Description
Transmit Single	Mode = Transmit single frequency Modulation = CSS Frequency = 903.9 MHz, 905.3 MHz Spreading factor = 7 (software setting) Power Settings = 15 dBm (software setting) Bandwidth = 125 kHz, 250 kHz, 500 kHz (software setting) Duty cycle = 100 % (software setting)
Transmit Hopping	Mode = Transmit hopping mode Modulation = CSS Spreading factor = 7 (software setting) Power Settings = 15 dBm (software setting) Duty cycle = 100 % (software setting)
Receive	Mode = Receive Modulation = CSS Bandwidth = 125 kHz (software setting) Spreading factor = 7 (software setting) Frequency = 904.7 MHz
Comment:	

1.5 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	1	903.9
F2	Rx	2	904.7
F3	Tx	3	905.3

1.6 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 dB μ V. 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:

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

Net:

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

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.

Field strength limit:

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

$$\text{Field strength limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

Example only for radiated field strength:

Reading + AF	= Net Reading	:	Net reading	- Field strength limit	= Margin
+21.5 dB μ V	+ 26 dB/m	:	47.5 dB μ V/m	- 57.0 dB μ V/m	= -9.5

2 Result Summary

FCC 47 CFR Part 15C, ISCED RSS-247				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISCED RSS-Gen, Issue 5 (section 6.6)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISCED RSS-247, Issue 2 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	N/R	No requirement for hybrid systems
FCC § 15.247(b)(3) ISCED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.247(e) ISCED RSS-247, Issue 2 (section 5.2)	Power spectral density	ANSI C63.10-2013	PASS	
FCC § 15.247(a)(1) ISCED RSS-247 § 5.1 Issue 2	20 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(a)(1)(i) ISCED RSS-247, Issue 2 (section 5.1)	Number of hopping frequencies	ANSI C63.10-2013	N/R	No requirement for hybrid systems
FCC § 15.247(a)(1) ISCED RSS-247, Issue 2 (section 5.1)	Frequency hopping channel separation	ANSI C63.10-2013	PASS	
FCC § 15.247(a)(1)(i) ISCED RSS-247, Issue 2 (section 5.1)	Time of occupancy (Dwell time)	ANSI C63.10-2013	PASS	
FCC § 15.207 ISCED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISCED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISCED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209 ISCED RSS-Gen, Issue 5 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISCED RSS-247, Issue 2 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.10-2013	PASS	
Comment: The Decision Rule is applied on the basis of ETSI TR 102 273 and ETSI TR 100 028. These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. In all cases due consideration will be given to ILAC-G8:09/2019. Where a result is considered conditional in respect of its proximity to the limit line, the customer would be made aware of situation so that they can make an informed decision on how to proceed.				

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 - Occupied bandwidth

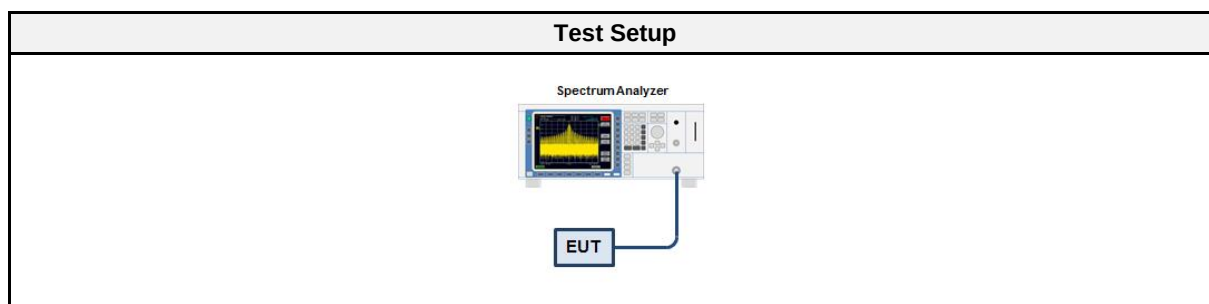
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 A2 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	$\pm 1.26 \%$
Test Sample ID	41711
Operator	Radwan Jaafar
Date	2022-11-11

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.1.5 Procedure

Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

3.1.6 Results

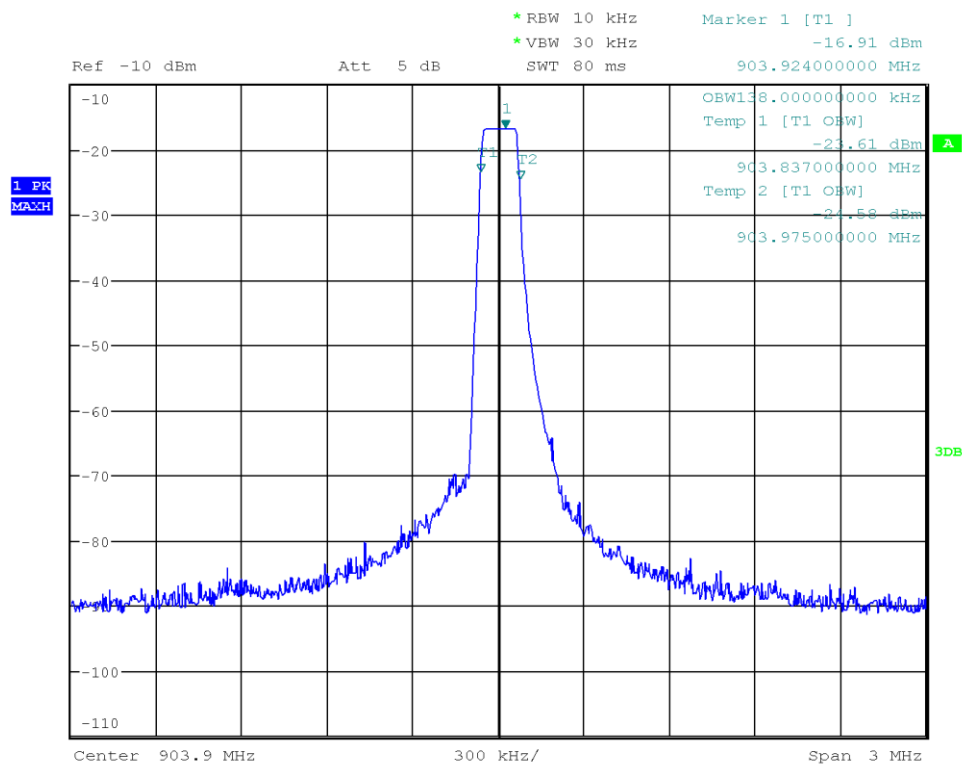
Test Results – 125 kHz		
Mode	Frequency [MHz]	Bandwidth [MHz]
Single	903.9	0.138
Single	905.3	0.141

Test Results – 250 kHz		
Mode	Frequency [MHz]	Bandwidth [MHz]
Single	903.9	0.267
Single	905.3	0.267

Test Results – 500 kHz		
Mode	Frequency [MHz]	Bandwidth [MHz]
Single	903.9	0.513
Single	905.3	0.516

Occupied Bandwidth

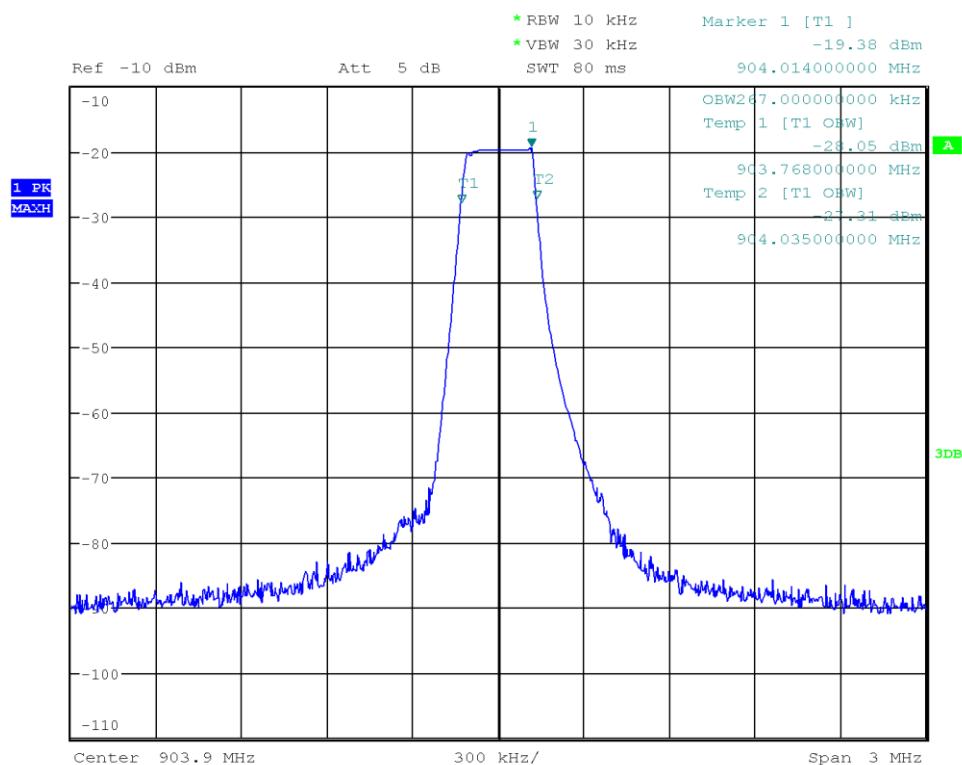
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Occupied Bandwidth [MHz]: 0.138



Date: 11.NOV.2022 13:30:47

Occupied Bandwidth

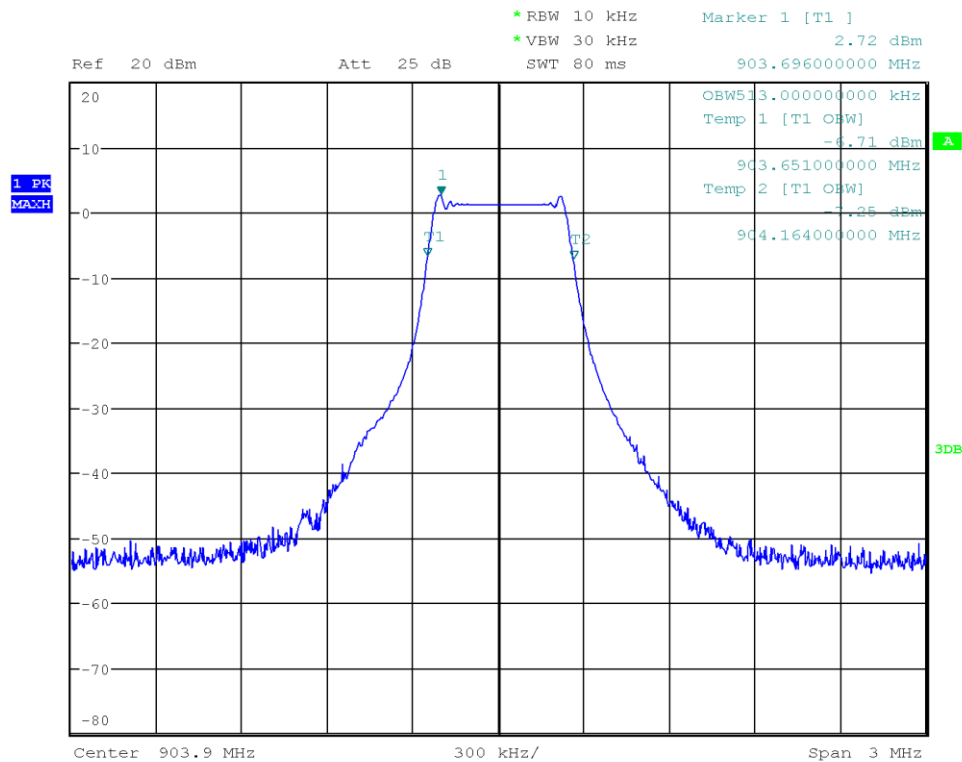
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Occupied Bandwidth [MHz]: 0.267



Date: 11.NOV.2022 13:33:45

Occupied Bandwidth

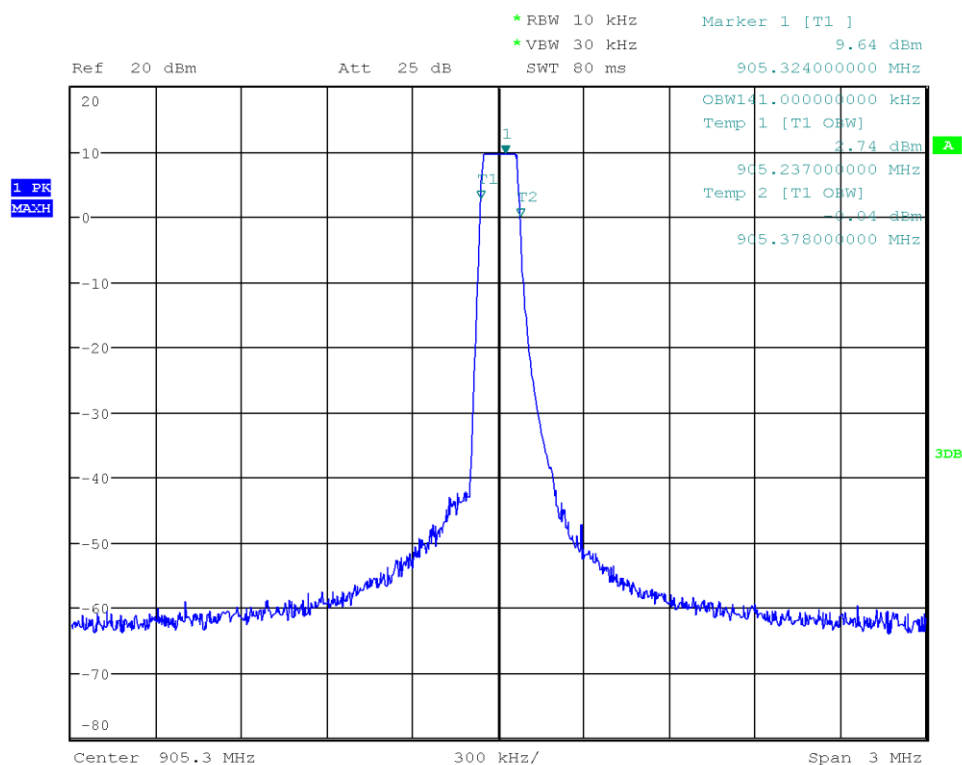
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Occupied Bandwidth [MHz]: 0.513



Date: 11.NOV.2022 14:49:28

Occupied Bandwidth

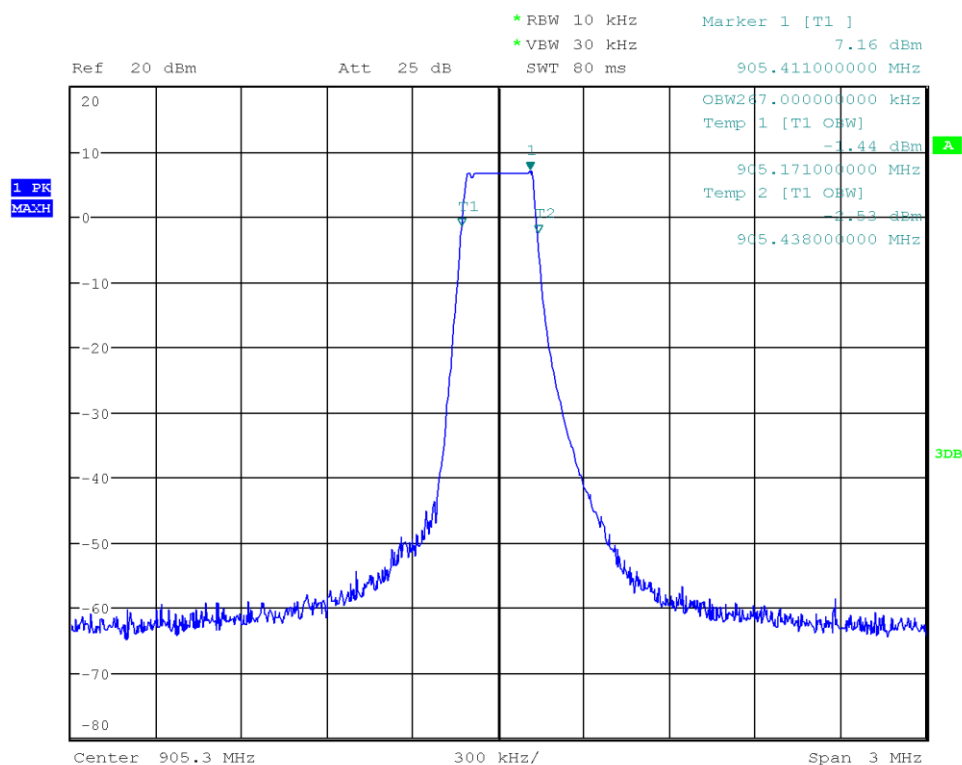
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Occupied Bandwidth [MHz]: 0.141



Date: 11.NOV.2022 14:52:13

Occupied Bandwidth

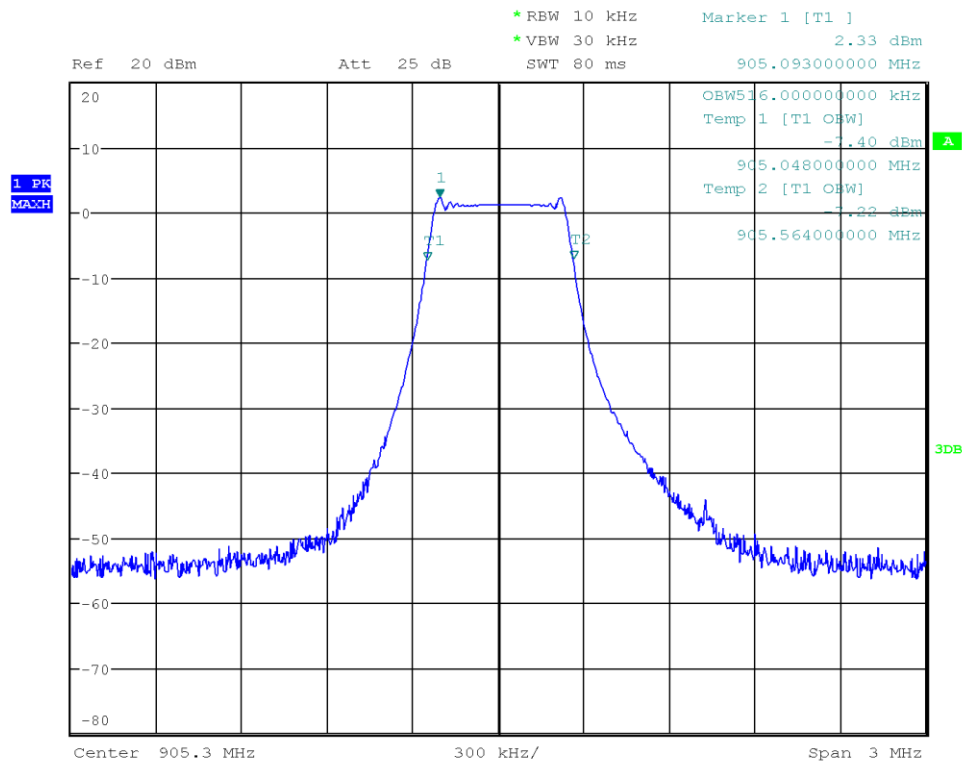
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Occupied Bandwidth [MHz]: 0.267



Date: 11.NOV.2022 15:14:33

Occupied Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Occupied Bandwidth [MHz]: 0.516



Date: 11.NOV.2022 15:16:37

3.2 Test Conditions and Results - Maximum peak conducted output power

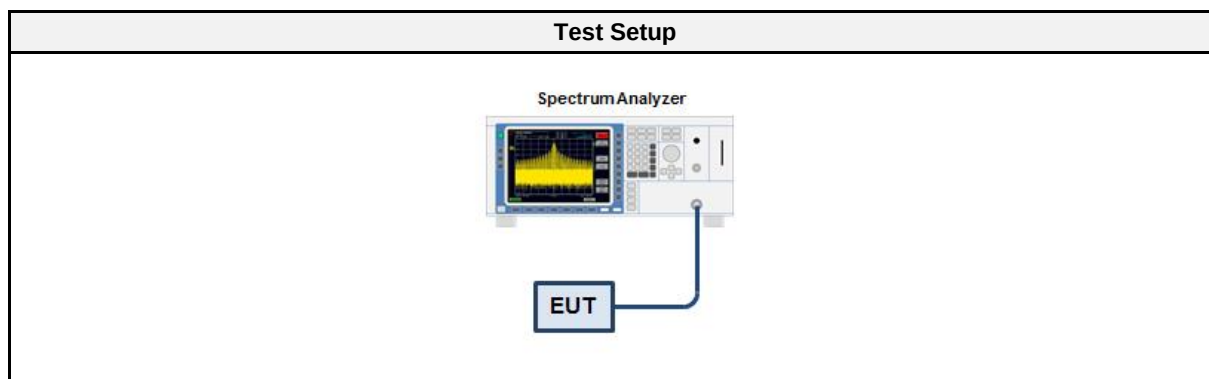
3.2.1 Information

Test Information	
Reference	FCC § 15.247(b); ISSED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Measurement Uncertainty	± 2.86 dB
Operator	Radwan Jaafar
Date	2022-11-11

3.2.2 Limits

Limits
1 W (30 dBm)
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.2.5 Procedure

Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set ≥ DTS bandwidth 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.2.6 Results

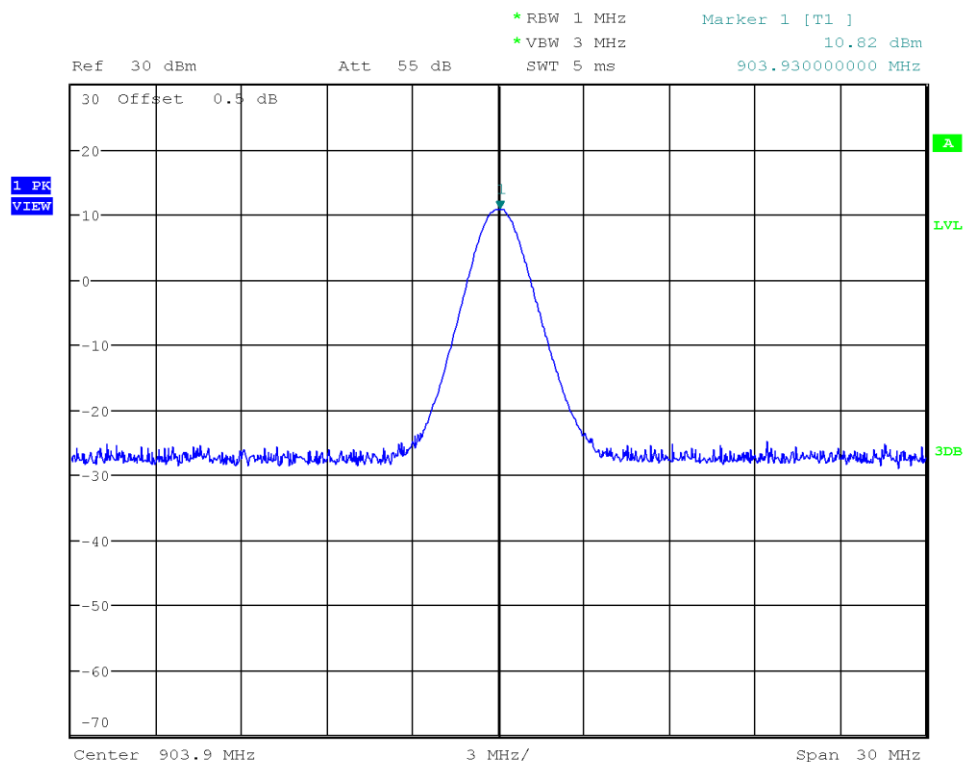
Test Results – 125 kHz				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
903.9	10.820	0.0121	1.0	PASS
905.3	10.574	0.0114	1.0	PASS

Test Results – 250 kHz				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
903.9	10.765	0.0119	1.0	PASS
905.3	10.579	0.0114	1.0	PASS

Test Results – 500 kHz				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
903.9	10.707	0.0118	1.0	PASS
905.3	10.579	0.0114	1.0	PASS

Peak Conducted Output Power

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Peak Power [dBm]: 10.820
 Peak Power [W]: 0.0121



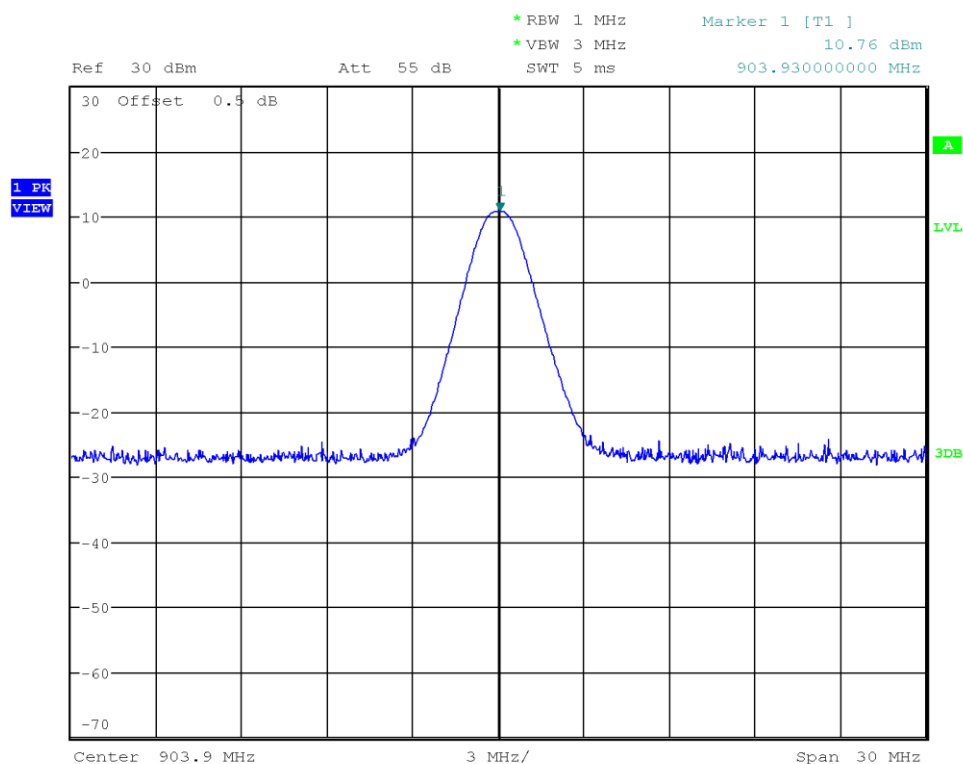
Date: 11.NOV.2022 14:07:15

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Conducted Output Power

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Peak Power [dBm]: 10.765
 Peak Power [W]: 0.0119



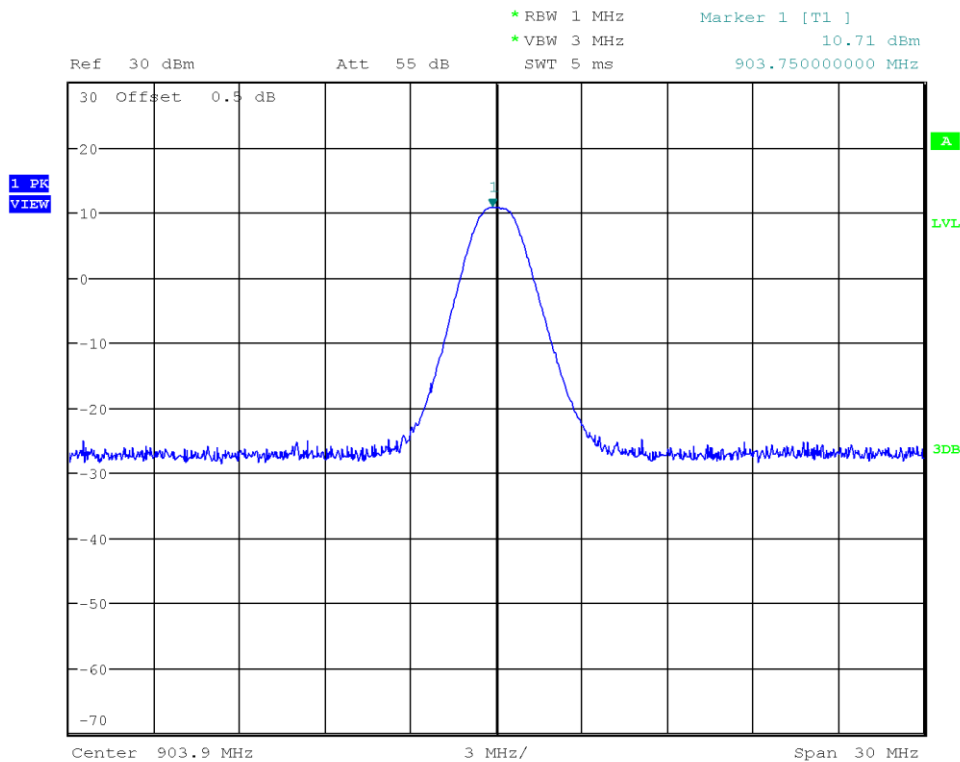
Date: 11.NOV.2022 14:25:26

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Conducted Output Power

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Peak Power [dBm]: 10.707
 Peak Power [W]: 0.0118



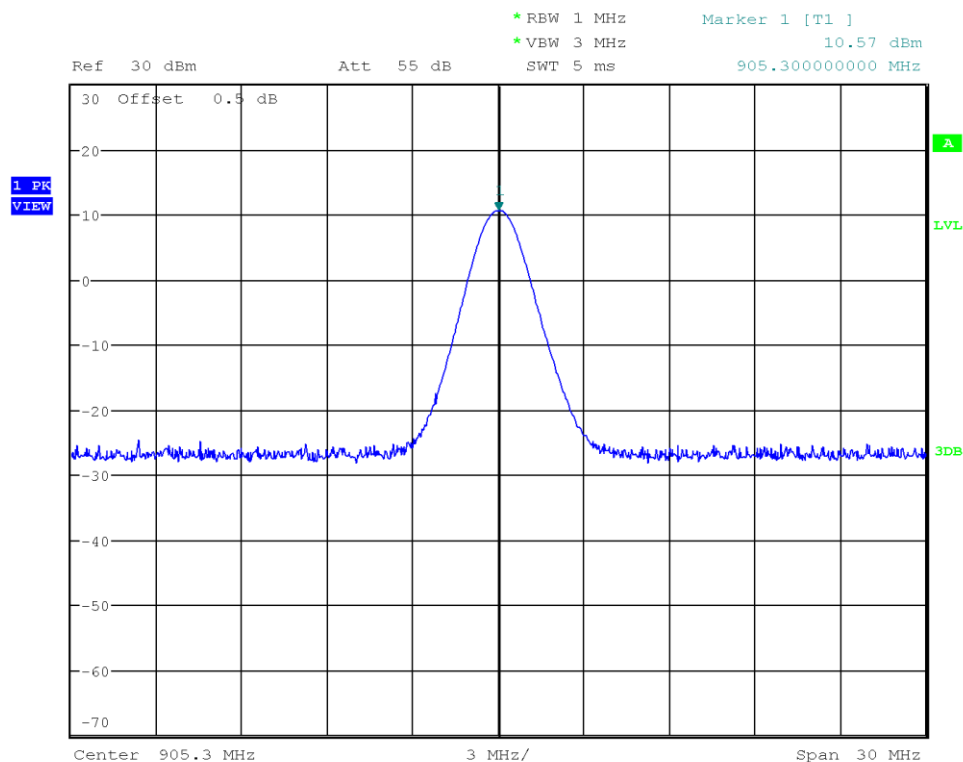
Date: 11.NOV.2022 14:32:19

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Conducted Output Power

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Peak Power [dBm]: 10.574
 Peak Power [W]: 0.0114



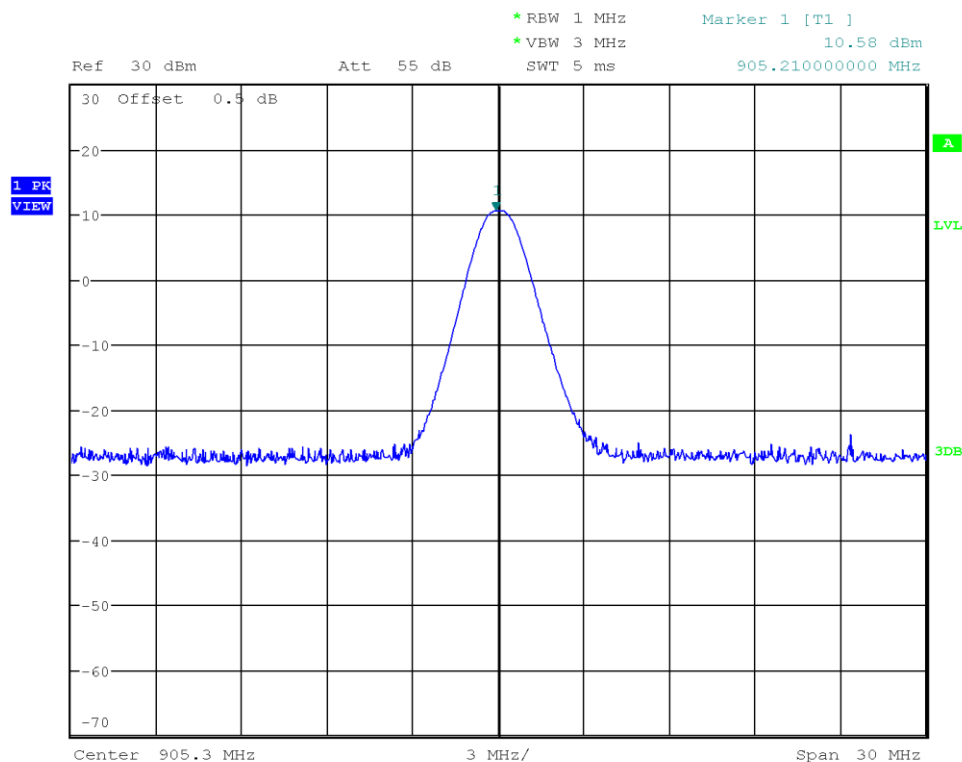
Date: 11.NOV.2022 14:53:12

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Conducted Output Power

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Peak Power [dBm]: 10.579
 Peak Power [W]: 0.0114



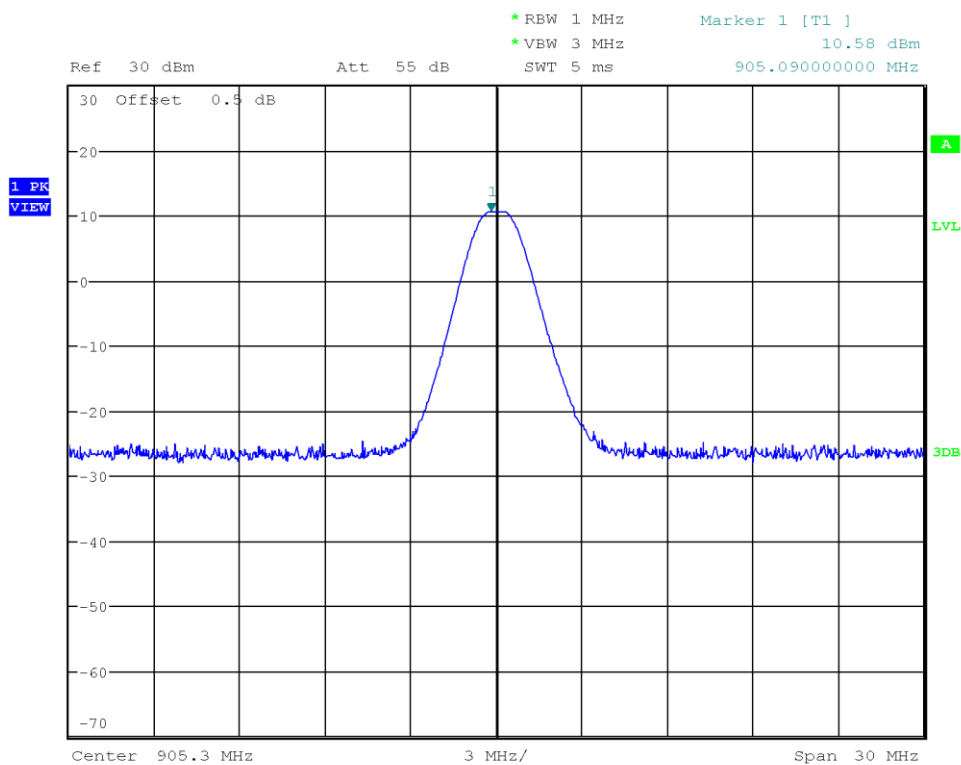
Date: 11.NOV.2022 15:05:37

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Conducted Output Power

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Peak Power [dBm]: 10.579
 Peak Power [W]: 0.0114



Date: 11.NOV.2022 15:23:14

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

3.3 Test Conditions and Results - Power spectral density

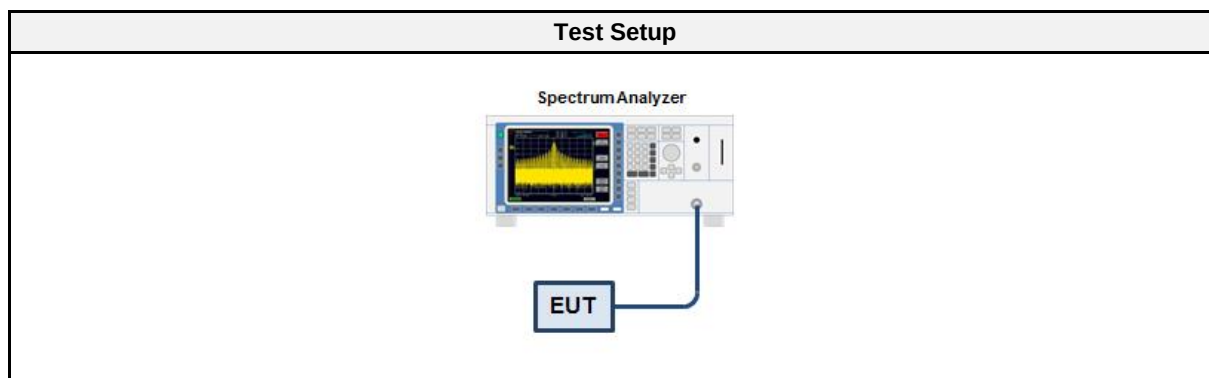
3.3.1 Information

Test Information	
Reference	FCC § 15.247(e); ISSED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Measurement Uncertainty	± 2.86 dB
Operator	Radwan Jaafar
Date	2022-11-11

3.3.2 Limits

Limits
8 dBm / 3 kHz

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.3.5 Procedure

Test Procedure
1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW $\geq$ RBW and the detector is set to peak with max hold 4. After the trace has stabilized a marker is set to the envelope maximum 5. If the power spectral density is above the limit the RBW is reduced (not lower than 3 kHz) and the measurement is repeated 6. If the EUT has more than one transmit chain the procedure is repeated for each transmit chain

3.3.6 Results

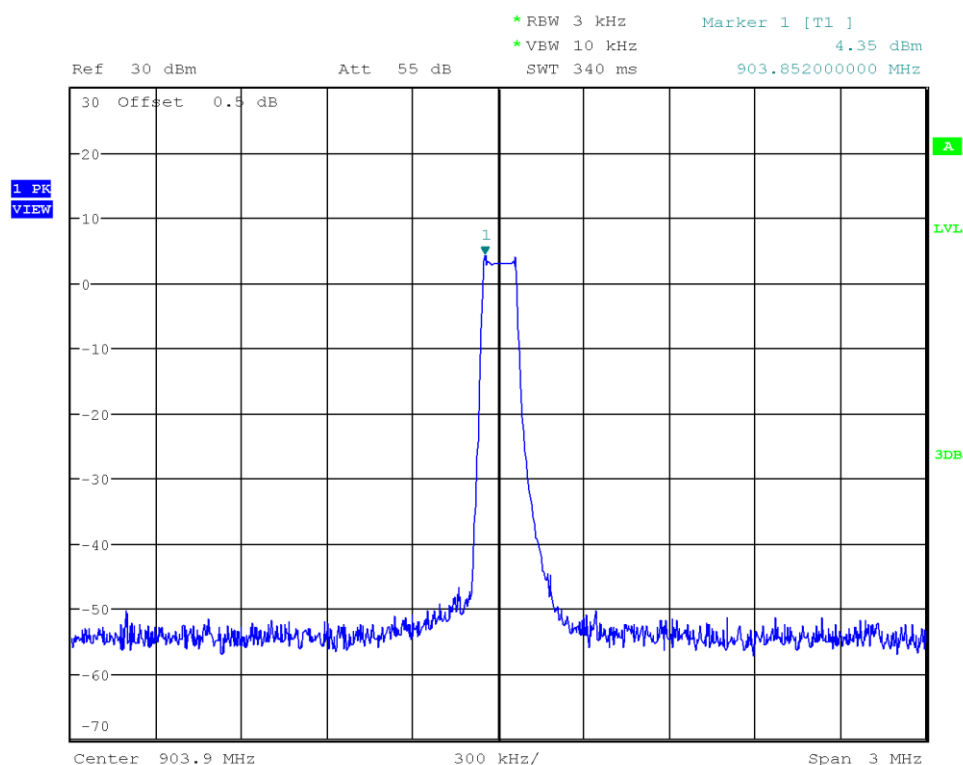
Test Results – 125 kHz			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
903.9	4.354	8.0	PASS
905.3	3.931	8.0	PASS
RBW = 3 kHz			

Test Results – 250 kHz			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
903.9	7.815	8.0	PASS
905.3	7.606	8.0	PASS
RBW = 10 kHz			

Test Results – 500 kHz			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
903.9	3.164	8.0	PASS
905.3	2.788	8.0	PASS
RBW = 10 kHz			

Peak Power Spectral Density

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Peak Frequency [MHz]: 903.852
 Spectral Density [dBm/RBW]: 4.354
 Resolution Bandwidth [kHz]: 3 kHz



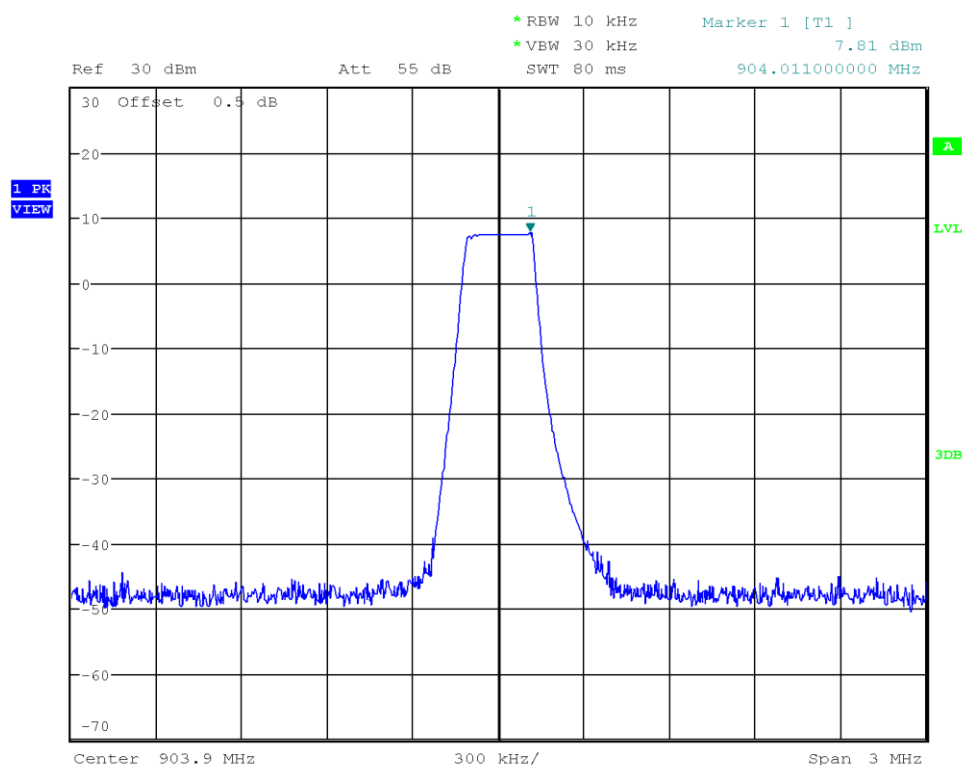
Date: 11.NOV.2022 14:09:34

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Power Spectral Density

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Peak Frequency [MHz]: 904.011
 Spectral Density [dBm/RBW]: 7.815
 Resolution Bandwidth [kHz]: 10 kHz



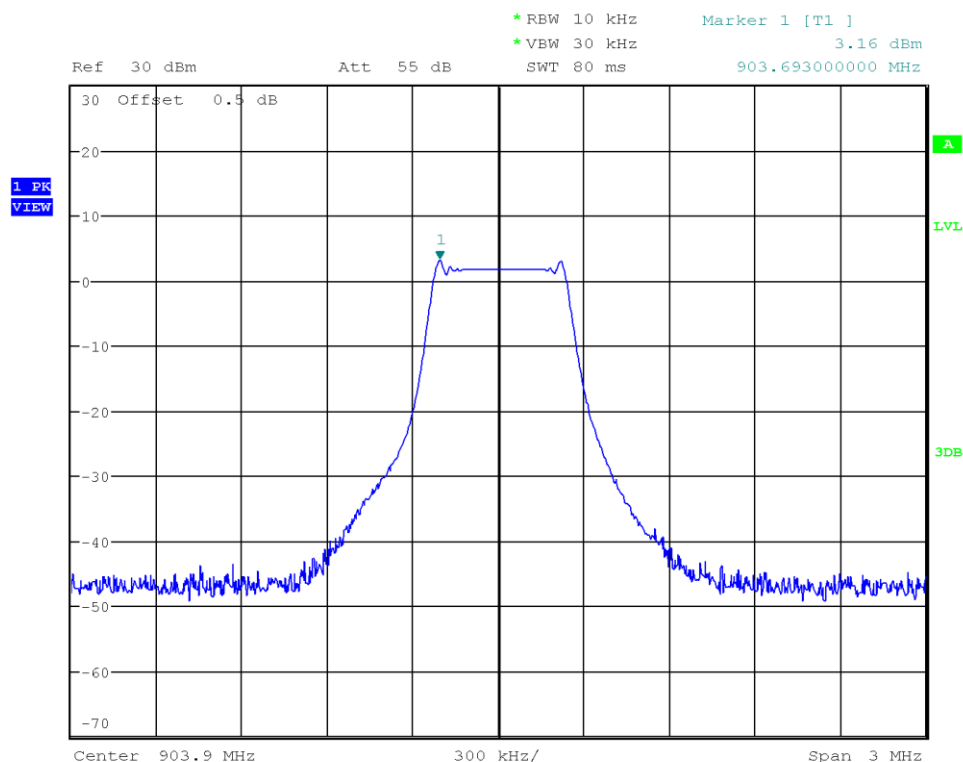
Date: 11.NOV.2022 14:28:02

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Power Spectral Density

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Peak Frequency [MHz]: 903.693
 Spectral Density [dBm/RBW]: 3.164
 Resolution Bandwidth [kHz]: 10 kHz



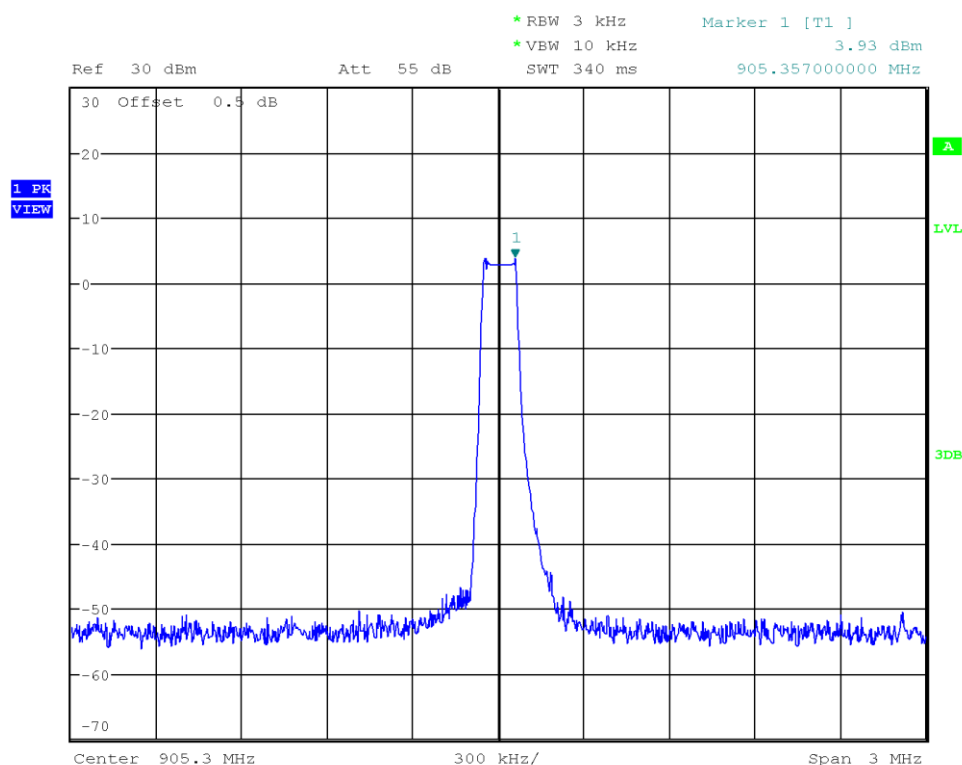
Date: 11.NOV.2022 14:30:44

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Power Spectral Density

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Peak Frequency [MHz]: 905.357
 Spectral Density [dBm/RBW]: 3.931
 Resolution Bandwidth [kHz]: 3 kHz



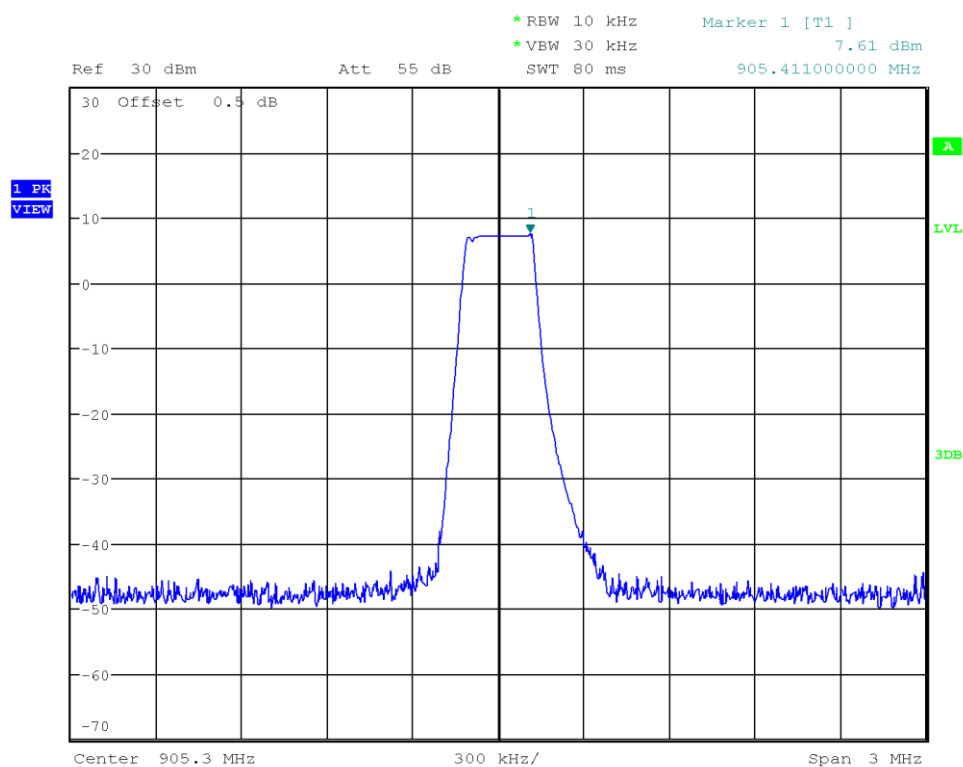
Date: 11.NOV.2022 14:55:58

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Power Spectral Density

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Peak Frequency [MHz]: 905.411
 Spectral Density [dBm/RBW]: 7.606
 Resolution Bandwidth [kHz]: 10 kHz



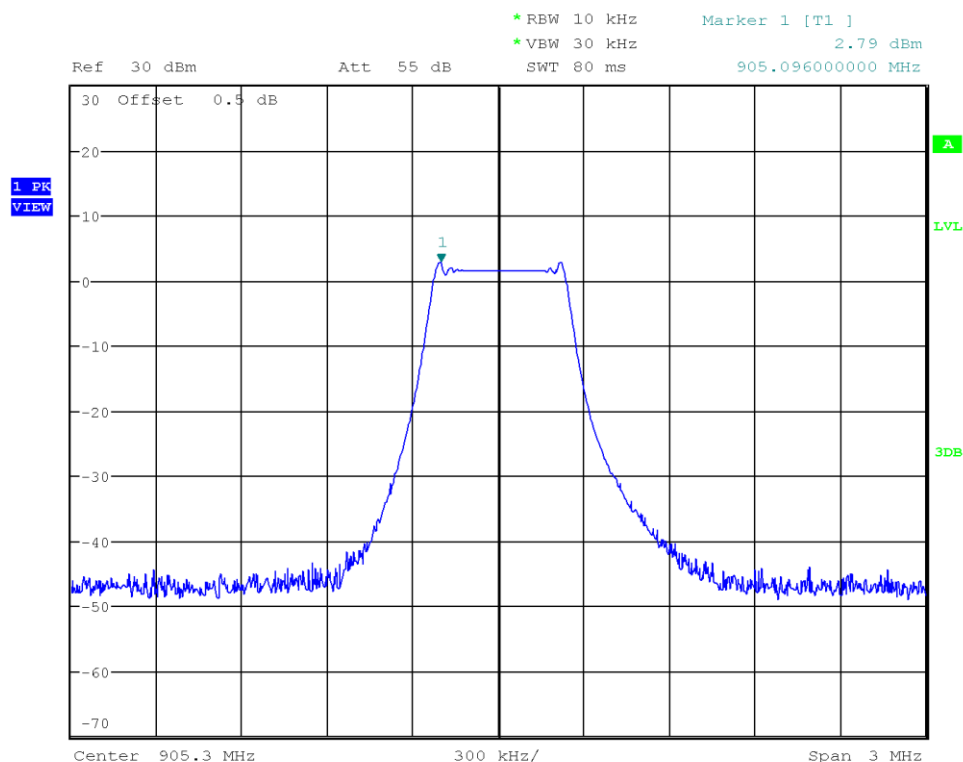
Date: 11.NOV.2022 15:12:56

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Peak Power Spectral Density

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Peak Frequency [MHz]: 905.096
 Spectral Density [dBm/RBW]: 2.788
 Resolution Bandwidth [kHz]: 10 kHz



Date: 11.NOV.2022 15:18:25

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

3.4 Test Conditions and Results - 20 dB bandwidth

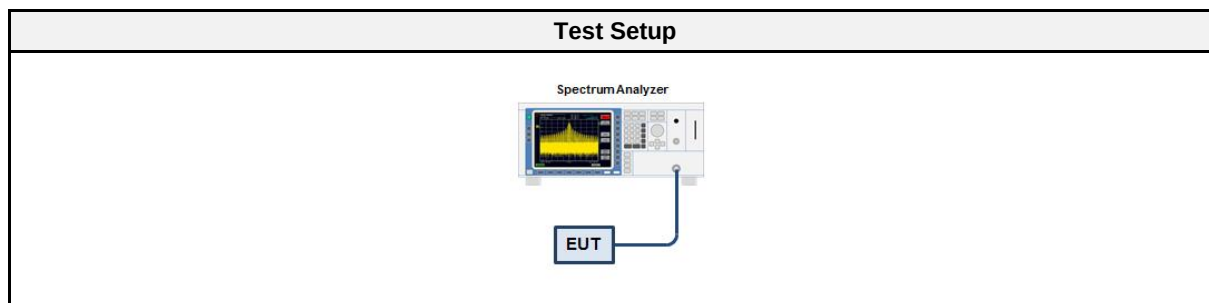
3.4.1 Information

Test Information	
Reference	FCC 15.247(a)(1) / ISED RSS-247 5.1
Measurement Method	ANSI C63.10 6.9.2
Measurement Uncertainty	$\pm 1.26 \%$
Test Sample ID	41710
Operator	Odai Qawasmeh
Date	2022-12-12

3.4.2 Limits

Limits	
Number of hopping channels ≥ 50 (N/A for Hybrid systems) Time of occupancy ≤ 0.4 s within 20 s	20 dB BW < 250 kHz
Number of hopping channels ≥ 25 (N/A for Hybrid systems) Time of occupancy ≤ 0.4 s within 10 s	250 kHz $\leq$ 20 dB BW < 500 kHz

3.4.3 Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.4.5 Procedure

Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -20 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -20 dB to the right of the peak 7. 20dB Bandwidth is determined by marker frequency separation

3.4.6 Results

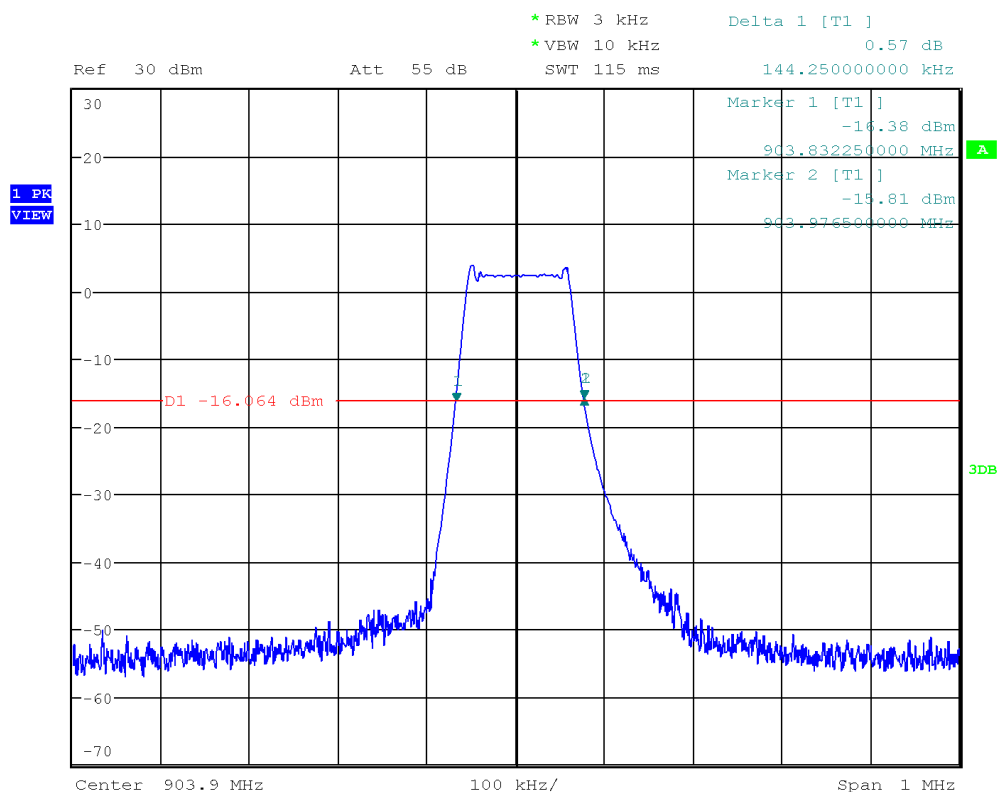
Test Results – 125 kHz		
Mode	Frequency [MHz]	Bandwidth [kHz]
Single	903.9	144
Single	905.3	144

Test Results – 250 kHz		
Mode	Frequency [MHz]	Bandwidth [kHz]
Single	903.9	304
Single	905.3	304

Test Results – 500 kHz		
Mode	Frequency [MHz]	Bandwidth [kHz]
Single	903.9	565
Single	905.3	567

20 dB Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.2
 Operational Mode: LoRa CSS, single, Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Note: 125 kHz Bandwidth
 Lower Frequency [MHz]: 903.832
 Upper Frequency [MHz]: 903.976
 20 dB Bandwidth [kHz]: 144



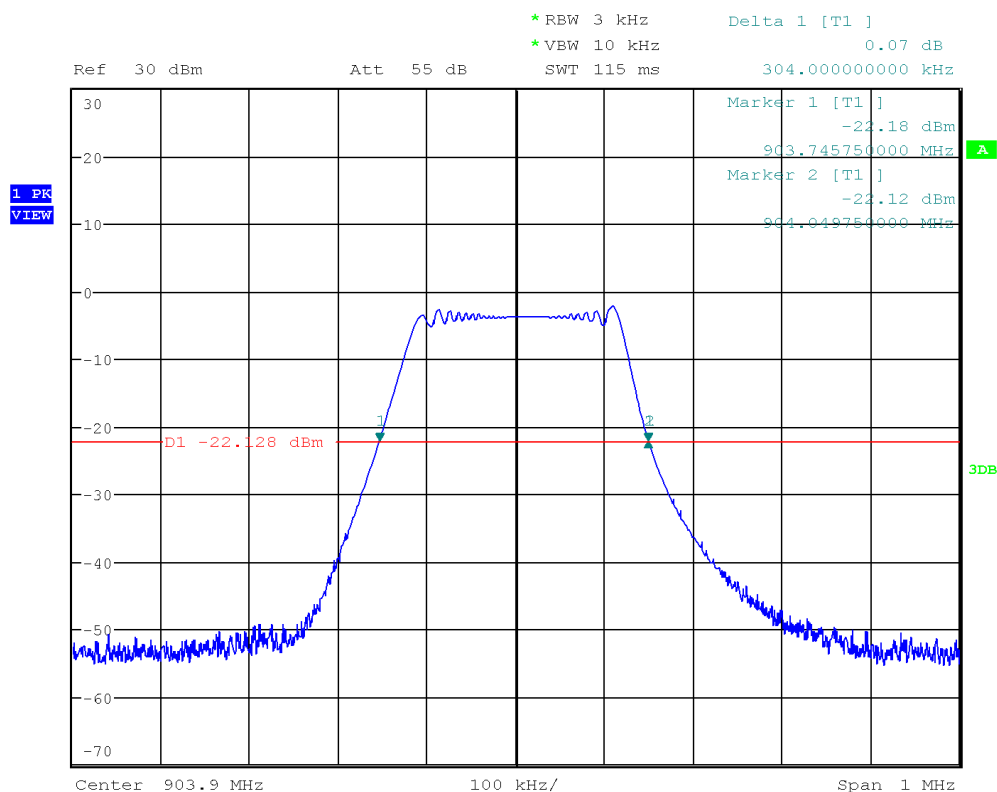
Date: 12.DEC.2022 13:32:17

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

20 dB Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.2
 Operational Mode: LoRa CSS, single, Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Note: 250 kHz Bandwidth
 Lower Frequency [MHz]: 903.746
 Upper Frequency [MHz]: 904.050
 20 dB Bandwidth [kHz]: 304



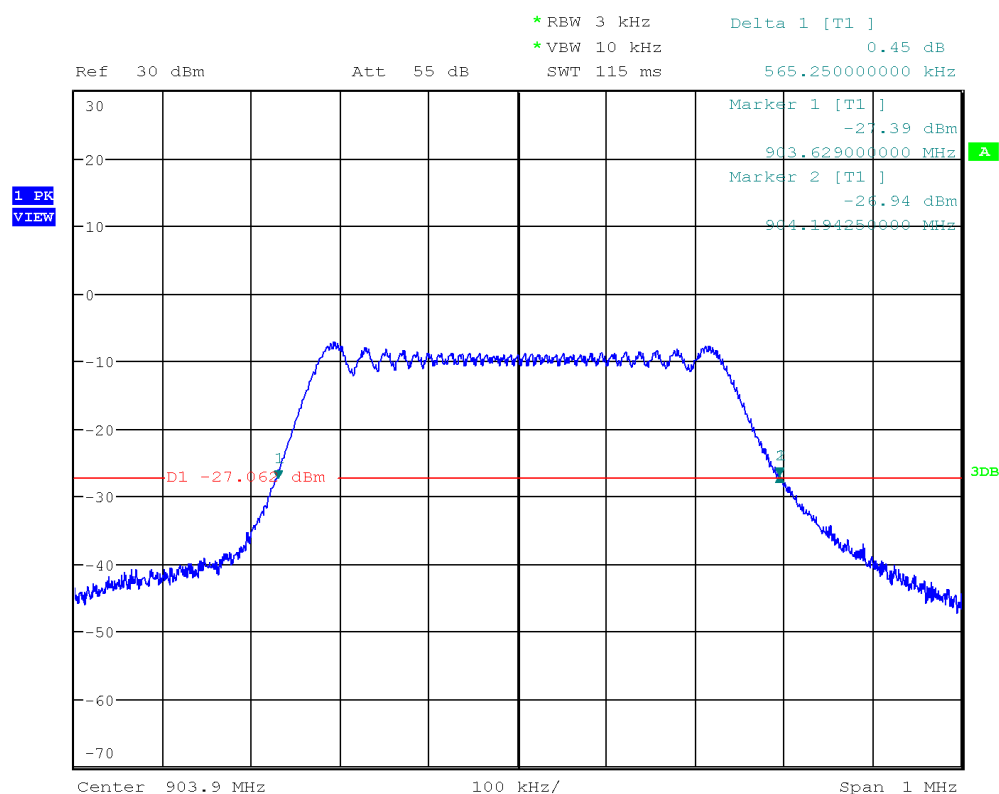
Date: 12.DEC.2022 13:34:12

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

20 dB Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.2
 Operational Mode: LoRa CSS, single, Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Note: 500 kHz Bandwidth
 Lower Frequency [MHz]: 903.629
 Upper Frequency [MHz]: 904.194
 20 dB Bandwidth [kHz]: 565



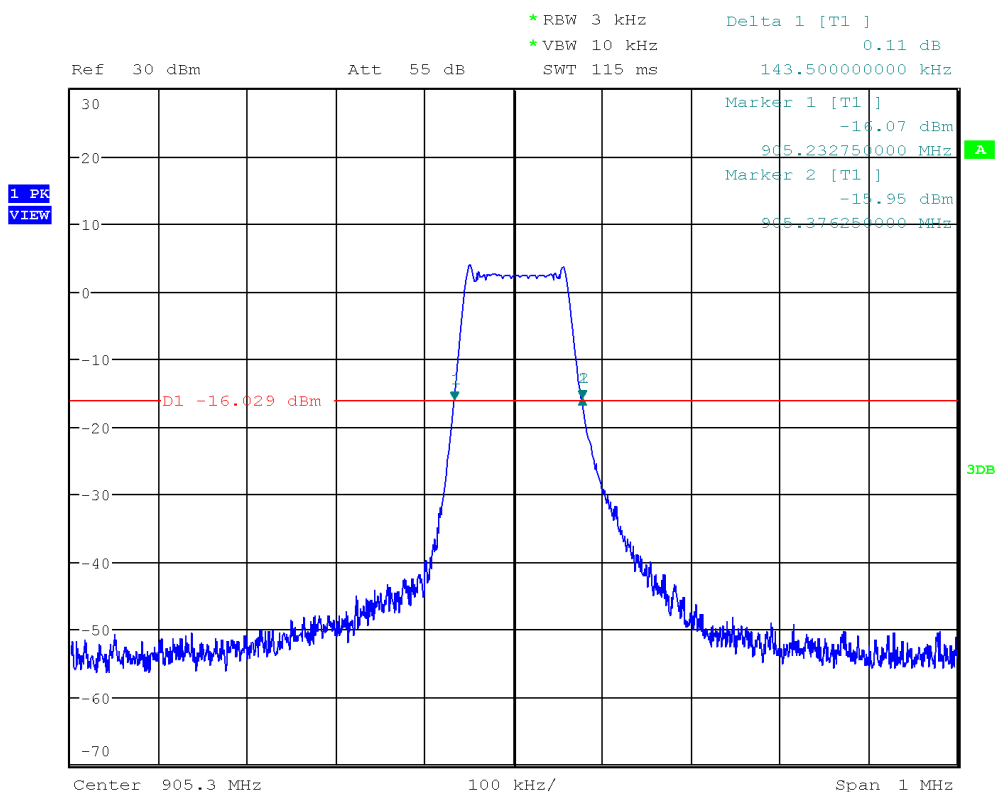
Date: 12.DEC.2022 13:35:10

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

20 dB Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.2
 Operational Mode: LoRa CSS, single, Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Note: 125 kHz Bandwidth
 Lower Frequency [MHz]: 905.233
 Upper Frequency [MHz]: 905.376
 20 dB Bandwidth [kHz]: 144



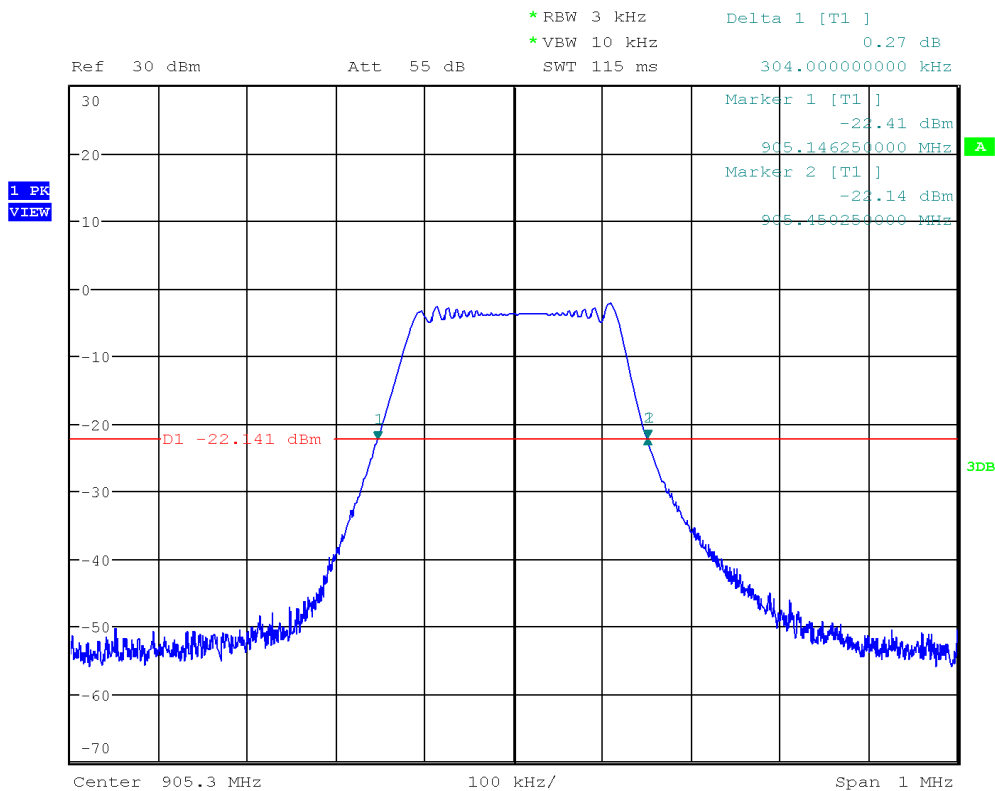
Date: 12.DEC.2022 13:38:59

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

20 dB Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.2
 Operational Mode: LoRa CSS, single, Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Note: 250 kHz Bandwidth
 Lower Frequency [MHz]: 905.146
 Upper Frequency [MHz]: 905.450
 20 dB Bandwidth [kHz]: 304



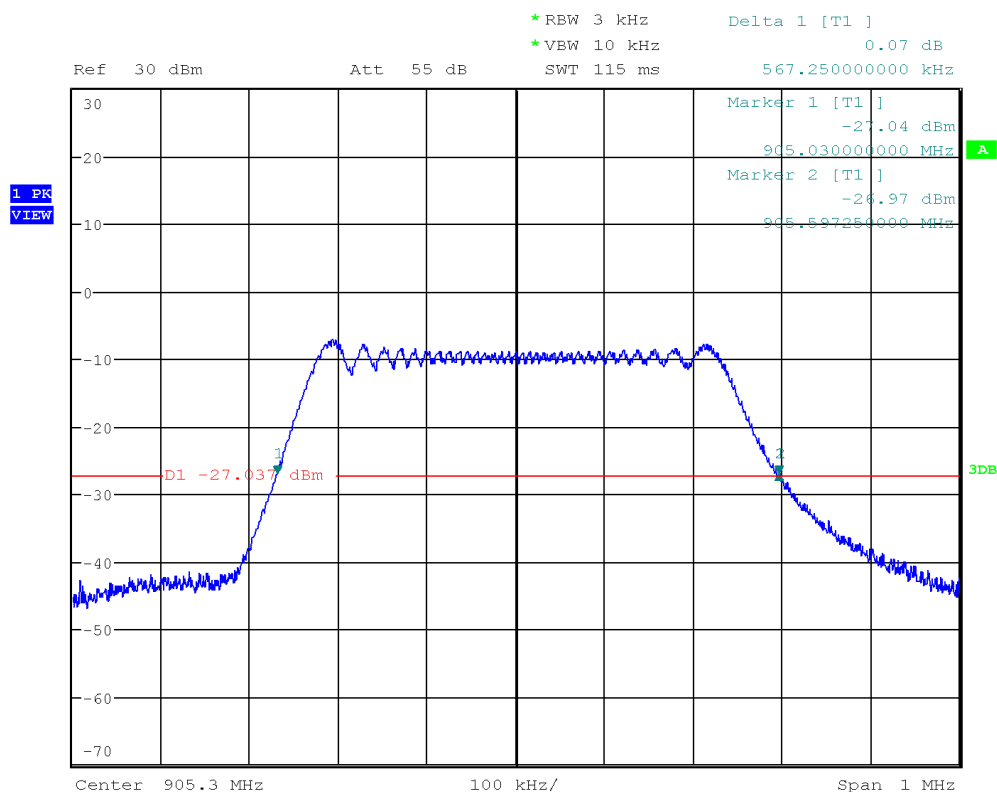
Date: 12.DEC.2022 13:40:07

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

20 dB Bandwidth

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.2
 Operational Mode: LoRa CSS, single, Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Note: 500 kHz Bandwidth
 Lower Frequency [MHz]: 905.030
 Upper Frequency [MHz]: 905.597
 20 dB Bandwidth [kHz]: 567



Date: 12.DEC.2022 13:41:46

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

3.5 Test Conditions and Results - Frequency hopping channel separation

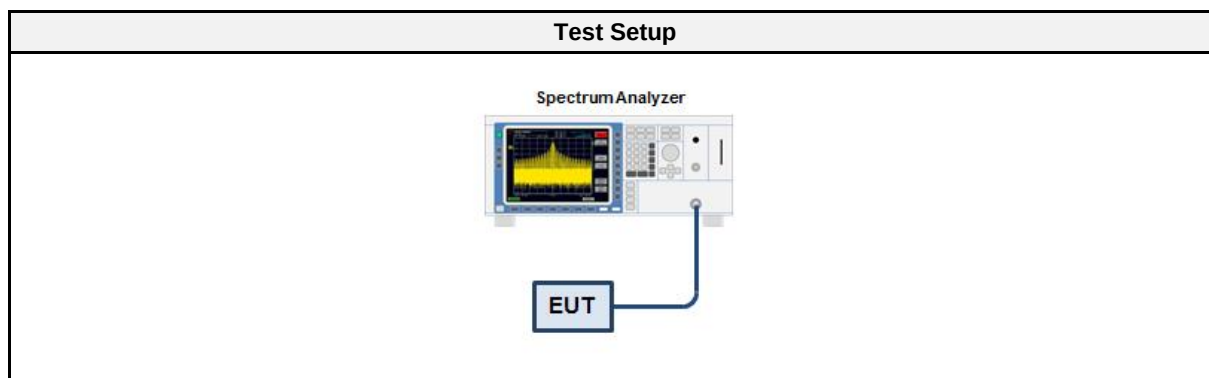
3.5.1 Information

Test Information	
Reference	FCC § 15.247(a)(1); ISSED RSS-247, Issue 2 (section 5.1)
Measurement Method	ANSI C63.10 7.8.4
Measurement Uncertainty	± 3.14 %
Operator	Odai Qawasmeh
Date	2022-12-12

3.5.2 Limits

Limit
≥ 25 kHz or 20 dB bandwidth, whichever is greater

3.5.3 Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.5.5 Procedure

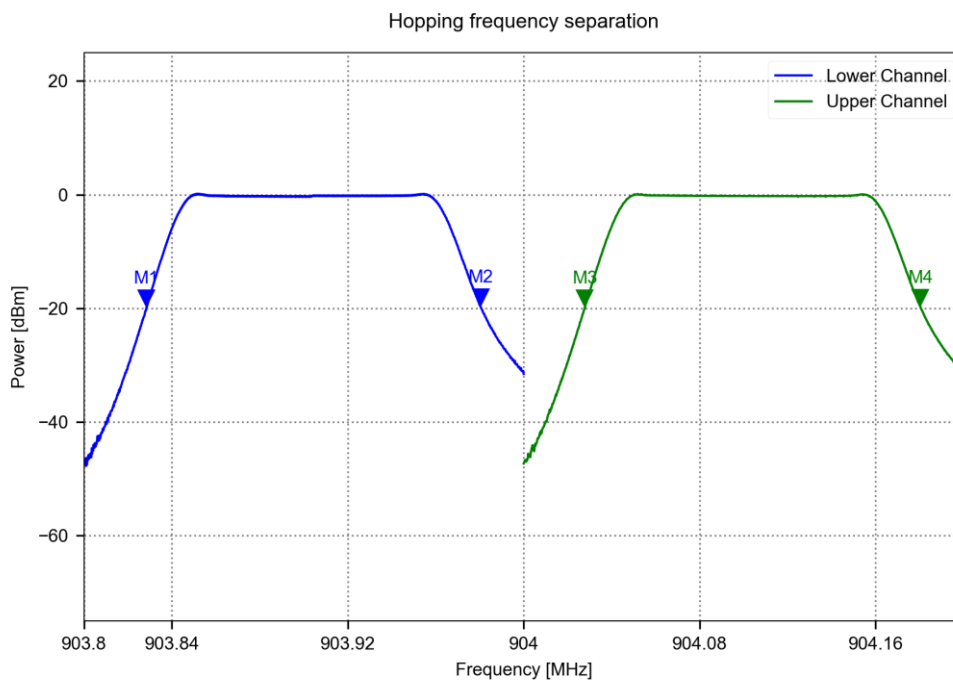
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to measurement frequency range 3. Detector set to peak and max hold 4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra 5. The two adjacent channel peaks are marked 6. Channel separation is determined from frequency separation of markers

3.5.6 Results

Test Results		
Channel separation [kHz]	Limit [kHz]	Verdict
200	≥ 144	PASS

Hopping frequency separation

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-node 1
Test Sample ID:	41710
Reference Standards:	FCC 15.247(a)(1)
Reference Method:	ANSI C63.10:2013 7.8.2
Operational Mode:	other, Lora CSS, Channels: 903.9 + 904.1 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Odai Qawasmeh
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-12-12
Note:	125 kHz Bandwidth
Lower Frequency (M1) [MHz]:	903.828
Upper Frequency (M2) [MHz]:	903.980
Lower Frequency (M3) [MHz]:	904.028
Upper Frequency (M4) [MHz]:	904.180
Lower center Frequency [MHz]:	903.904
Upper center Frequency [MHz]:	904.104
Hopping Frequency Separation [MHz]:	0.200



3.6 Test Conditions and Results - Time of occupancy (Dwell time)

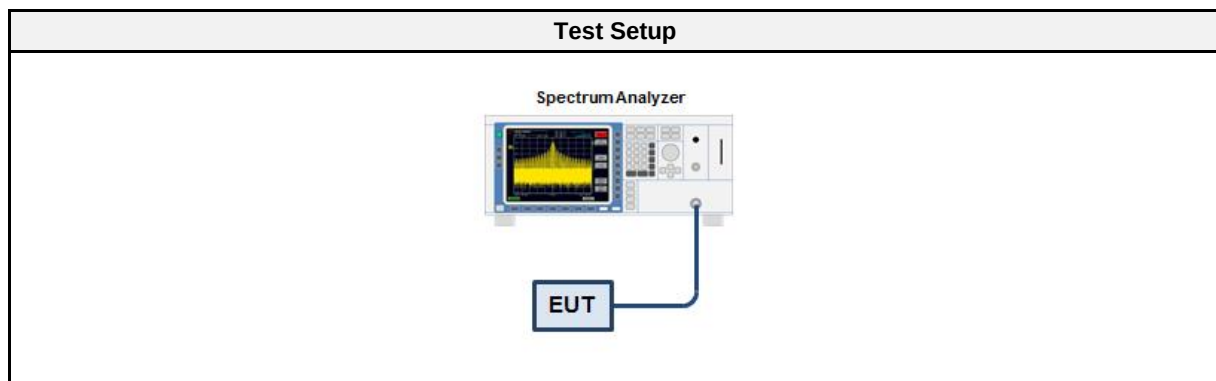
3.6.1 Information

Test Information	
Reference	FCC § 15.247(a)(1)(i); ISSED RSS-247, Issue 2 (section 5.1)
Measurement Method	ANSI C63.10 7.8.2
Measurement Uncertainty	± 78.53 %
Operator	Odai Qawasmeh
Date	2022-12-12

3.6.2 Limits

Limits	
Condition	Limit
20 dB BW < 250 kHz Number of hopping channels ≥ 50 (N/A for Hybrid systems)	Time of occupancy ≤ 0.4 s within 20 s
250 kHz ≤ 20 dB BW < 500 kHz Number of hopping channels ≥ 25 (N/A for Hybrid systems)	Time of occupancy ≤ 0.4 s within 10 s

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.6.5 Procedure

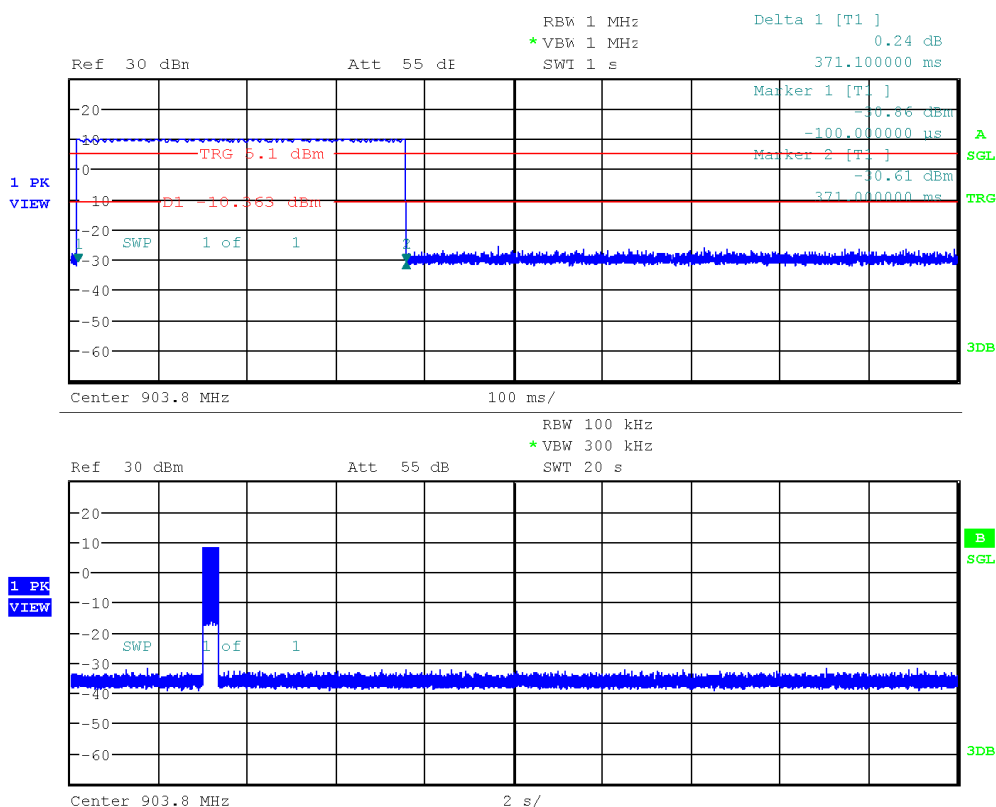
Test Procedure	
1. EUT set to test hopping mode (Communication tester is used if needed) 2. Analyzer span is set to zero span 3. Detector set to peak and max hold 4. RBW is set to 100 kHz and VBW to 300 kHz 5. The sweep time is set to capture one single dwell time 6. Trigger is set to video trigger 7. A marker is set to the start and end positions of the burst 8. The dwell time is determined from the marker difference 9. Another sweep is initiated without trigger and sweep time set to the observation time 10. The number of hops is counted 11. The total time of occupancy is calculated from the dwell time per hop multiplied by the number of hops	

3.6.6 Results

Test Results					
Observation Period [s]	Number of Hops	Dwell time per Hop [s]	Time of occupancy [s]	Limit [s]	Verdict
20	1	0.371	0.371	0.4	Pass

Time of occupancy

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Method: ANSI C63.10:2013 7.8.4
 Operational Mode: LoRa 125kHz, Hopping mode
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Dwell Time per Hop [ms]: 371.100
 Number of Hops: 1
 Time of occupancy [s]: 0.371



Date: 12.DEC.2022 17:36:35

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

3.7 Test Conditions and Results - AC powerline conducted emissions

3.7.1 Information

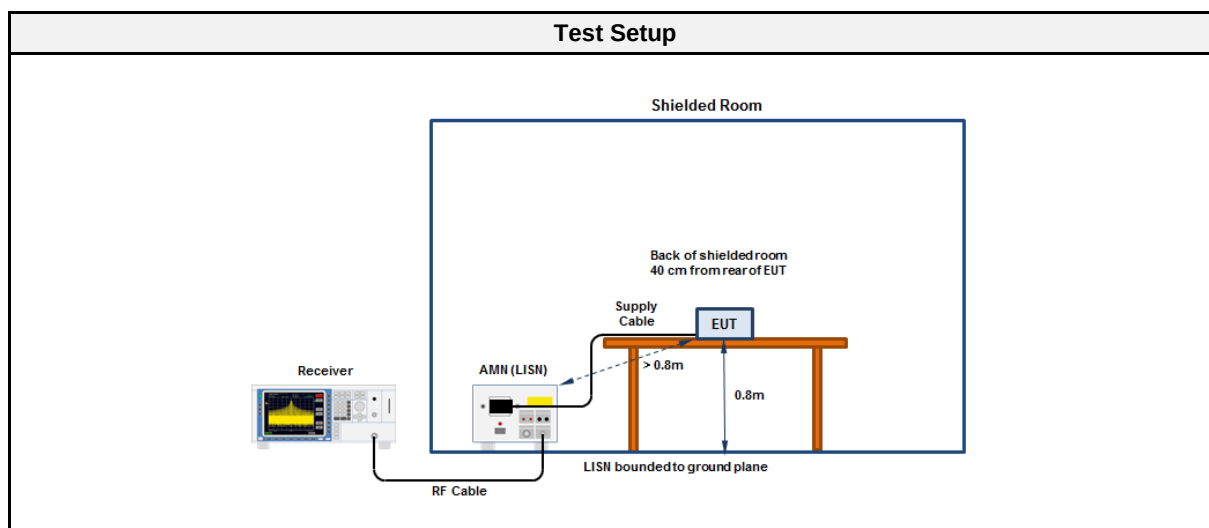
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Odai Qawasmeh
Date	2022-11-11

3.7.2 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

3.7.3 Setup

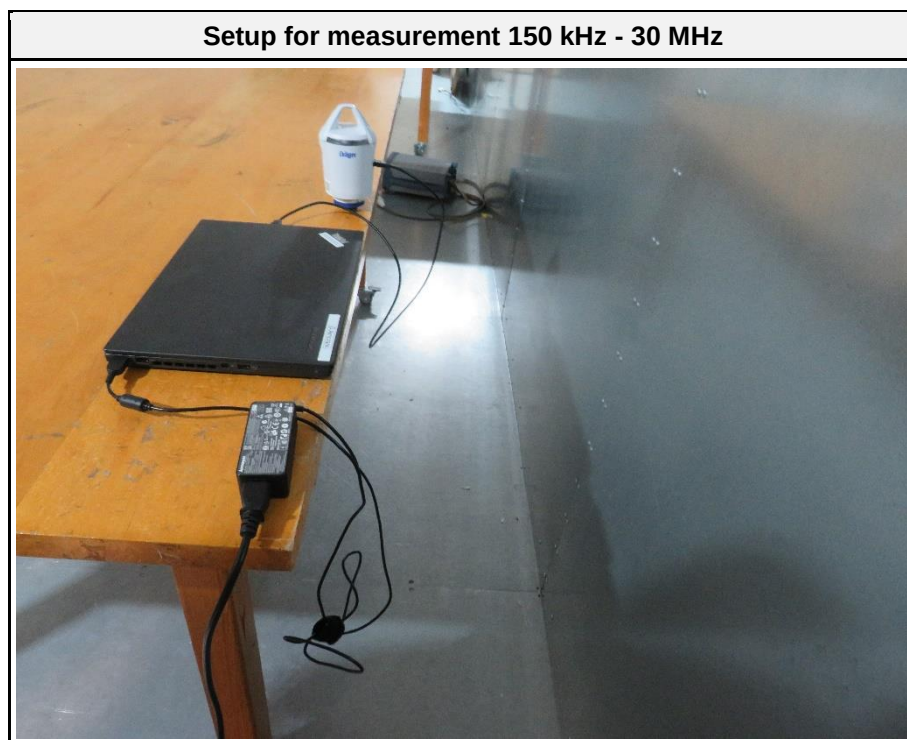
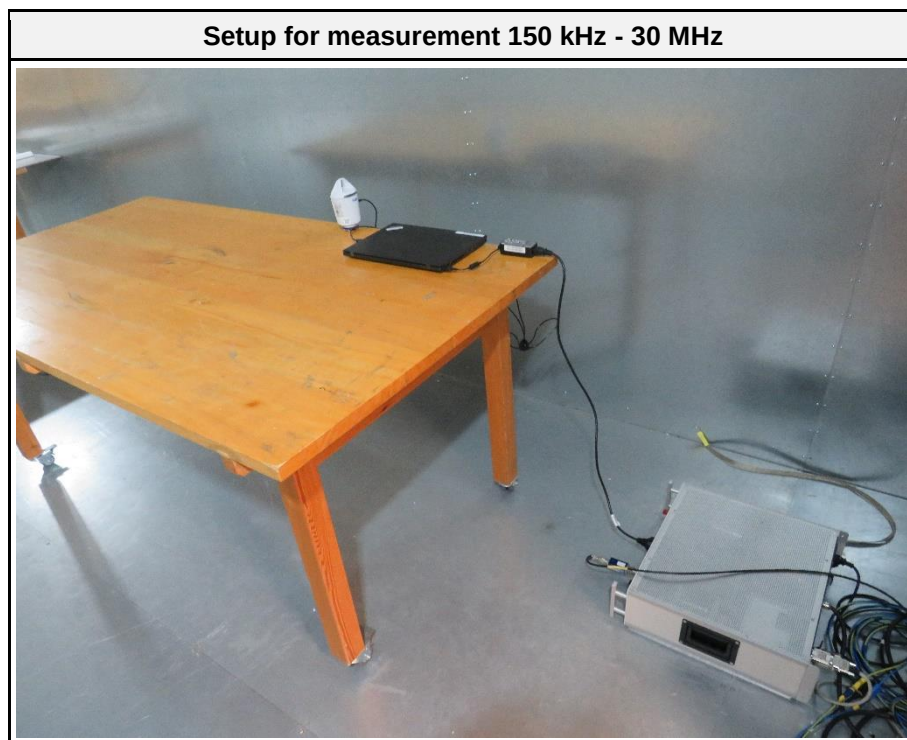


3.7.4 Equipment

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

3.7.5 Setup Photos

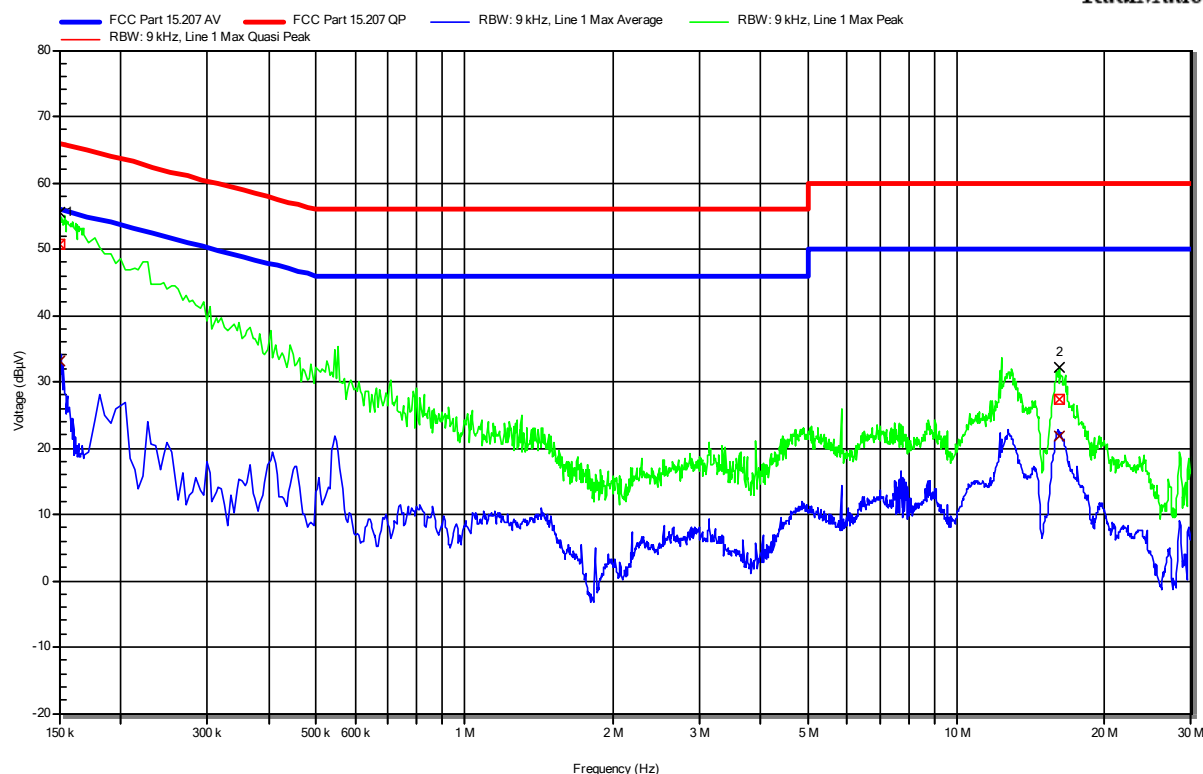


Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-247

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: SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power,
 EUT Configuration: Spreading factor 7
 US/CANADA
 Applied to Port: 120 VAC / 60 Hz
 Note 1:

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Radiation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	50.83 dBμV	66 dBμV	-15.17 dB	Pass	Line 1
2	16.184 MHz	27.34 dBμV	60 dBμV	-32.66 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	33.05 dBμV	56 dBμV	-22.95 dB	Pass	Line 1
2	16.184 MHz	21.86 dBμV	50 dBμV	-28.14 dB	Pass	Line 1

Test Report No.: G0M-2207-1565-TFC247DT-V02

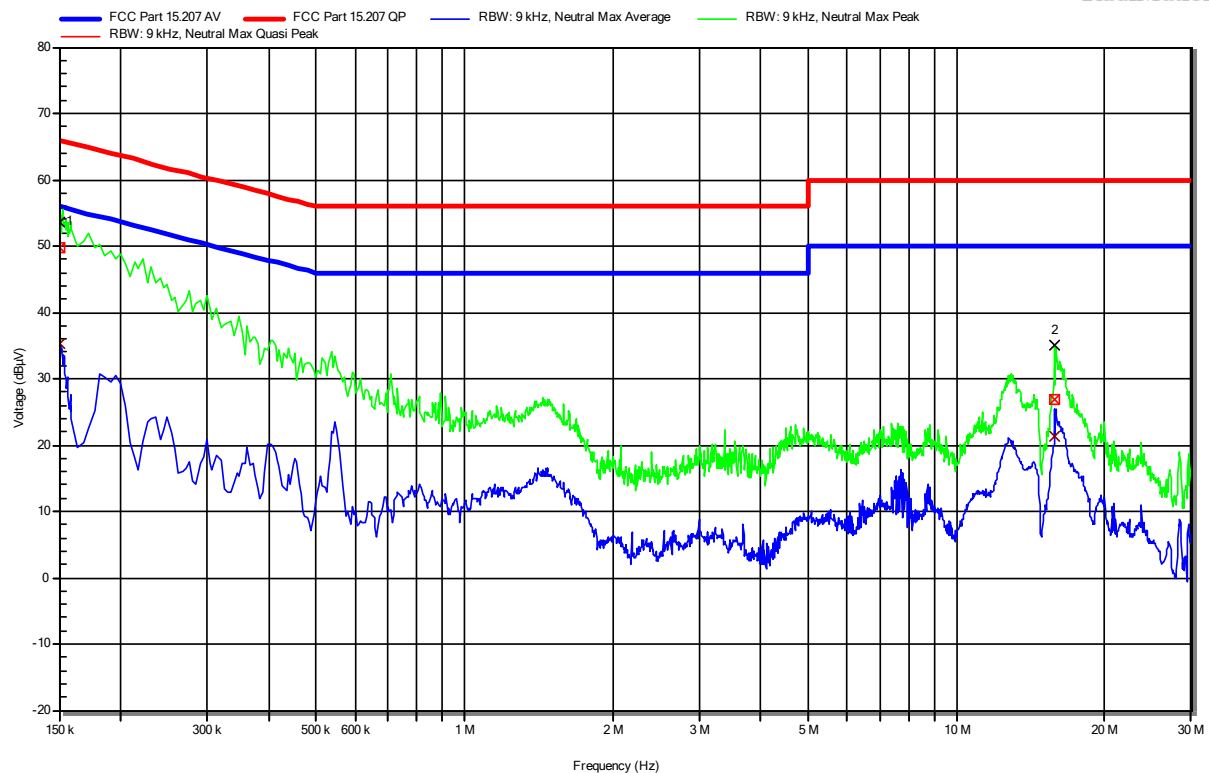
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-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: SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power,
 EUT Configuration: 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	150 kHz	49.73 dBμV	66 dBμV	-16.27 dB	Pass	Neutral
2	15.869 MHz	26.92 dBμV	60 dBμV	-33.08 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	35.34 dBμV	56 dBμV	-20.66 dB	Pass	Neutral
2	15.869 MHz	21.35 dBμV	50 dBμV	-28.65 dB	Pass	Neutral

Test Report No.: G0M-2207-1565-TFC247DT-V02

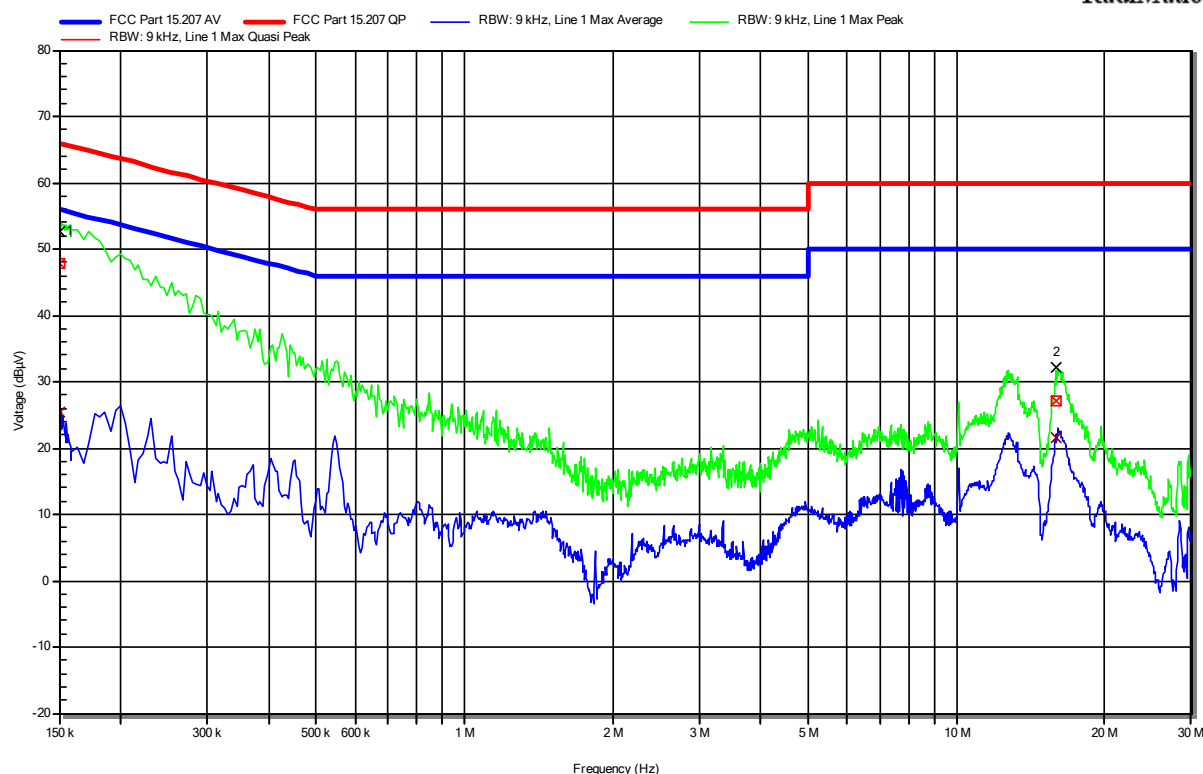
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-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: SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power,
 EUT Configuration: Spreading factor 7
 US/CANADA
 Applied to Port: 120 VAC / 60 Hz
 Note 1:

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Radiation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	47.87 dBμV	66 dBμV	-18.13 dB	Pass	Line 1
2	15.986 MHz	27.02 dBμV	60 dBμV	-32.98 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	25.46 dBμV	56 dBμV	-30.54 dB	Pass	Line 1
2	15.986 MHz	21.61 dBμV	50 dBμV	-28.39 dB	Pass	Line 1

Test Report No.: G0M-2207-1565-TFC247DT-V02

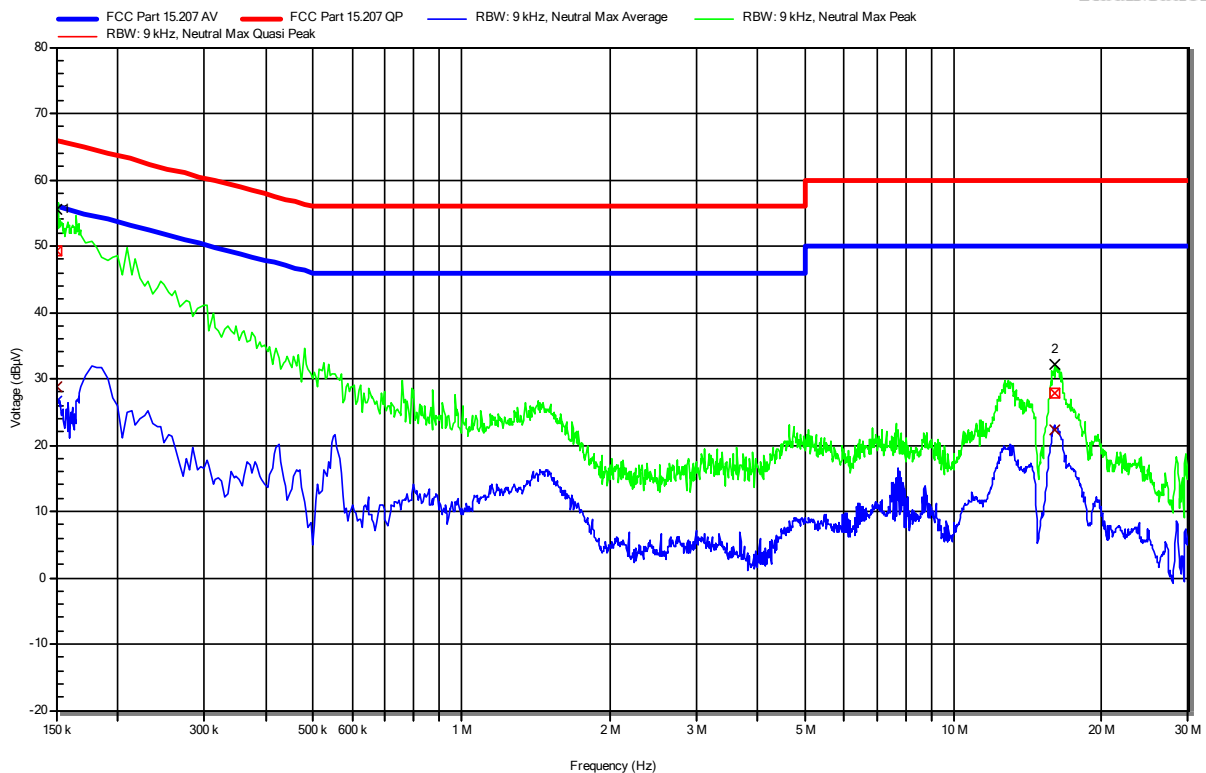
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-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: SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power,
 EUT Configuration: Spreading factor 7
 US/CANADA
 Applied to Port: 120 VAC / 60 Hz
 Note 1:

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Radiation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150.45 kHz	49.27 dBμV	65.98 dBμV	-16.71 dB	Pass	Neutral
2	16.022 MHz	27.71 dBμV	60 dBμV	-32.29 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150.45 kHz	28.79 dBμV	55.98 dBμV	-27.18 dB	Pass	Neutral
2	16.022 MHz	22.31 dBμV	50 dBμV	-27.69 dB	Pass	Neutral

Test Report No.: G0M-2207-1565-TFC247DT-V02

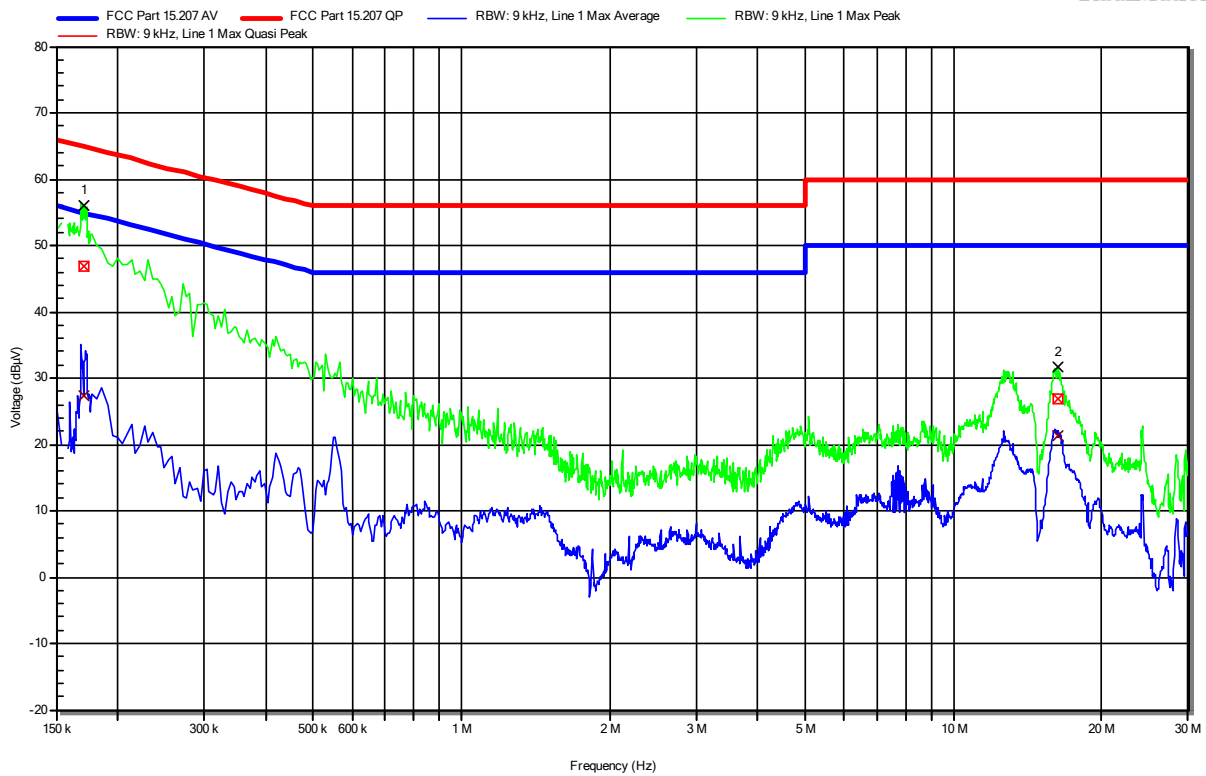
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-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: SRD, Lora, 904.7 MHz
 EUT Configuration: 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	170.7 kHz	46.95 dBμV	64.93 dBμV	-17.98 dB	Pass	Line 1
2	16.242 MHz	26.85 dBμV	60 dBμV	-33.15 dB	Pass	Line 1
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	170.7 kHz	27.23 dBμV	54.93 dBμV	-27.69 dB	Pass	Line 1
2	16.242 MHz	21.41 dBμV	50 dBμV	-28.59 dB	Pass	Line 1

Test Report No.: G0M-2207-1565-TFC247DT-V02

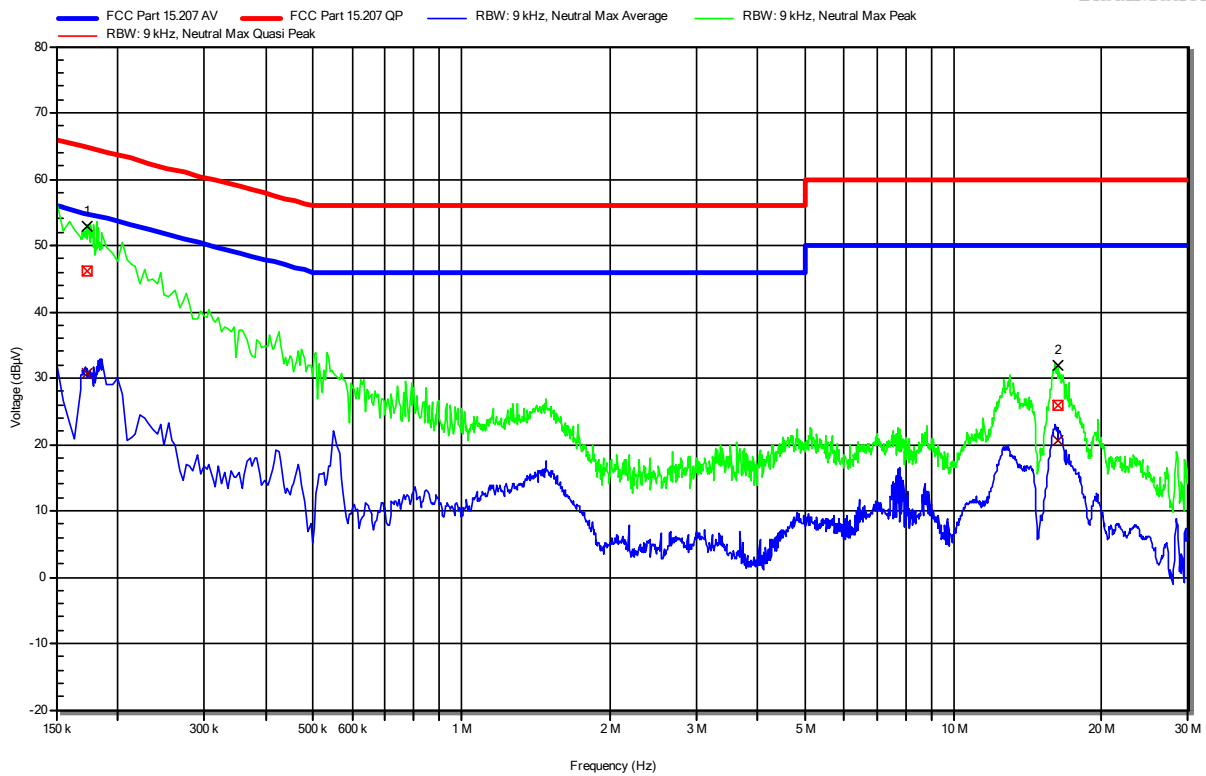
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-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: SRD, Lora, 904.7 MHz
 EUT Configuration: 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	172.95 kHz	46.25 dBμV	64.82 dBμV	-18.57 dB	Pass	Neutral
2	16.247 MHz	25.91 dBμV	60 dBμV	-34.09 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	172.95 kHz	30.78 dBμV	54.82 dBμV	-24.04 dB	Pass	Neutral
2	16.247 MHz	20.54 dBμV	50 dBμV	-29.46 dB	Pass	Neutral

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

3.8 Test Conditions and Results - Band-edge compliance

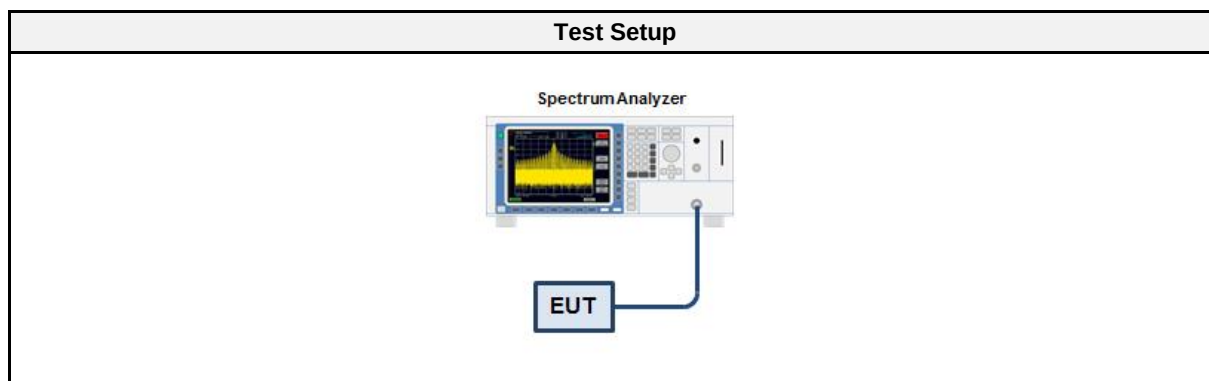
3.8.1 Information

Test Information	
Reference	FCC § 15.247(d); ISSED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 11.13
Operator	Radwan Jaafar + Odai Qawasmeh
Date	2022-11-11 + 2022-12-13

3.8.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.8.3 Setup



3.8.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.8.5 Procedure

Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge attenuation is determined from level difference

3.8.6 Results

Test Results – 125 kHz				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
Single	903.9	-42.734	-20	PASS
Single	905.3	-42.749	-20	PASS

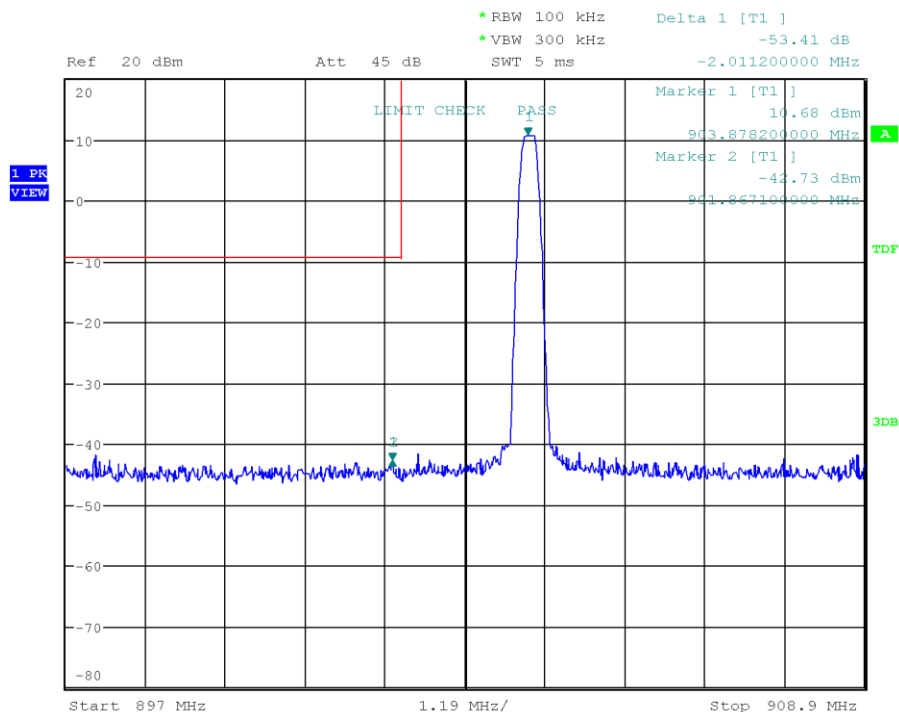
Test Results – 250 kHz				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
Single	903.9	-42.112	-20	PASS
Single	905.3	-41.953	-20	PASS

Test Results – 500 kHz				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
Single	903.9	-37.583	-20	PASS
Single	905.3	-41.153	-20	PASS

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
Hopping	903.9	-41.087	-20	PASS
Hopping	905.3	-40.714	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: single frequency, Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Band-edge: Lower
 In-band Frequency [MHz]: 903.878
 Max. in-band Level [dBm/100 kHz]: 10.678
 Out-of-band Frequency [MHz]: 901.867
 Max. out-of-band Level [dBm/100 kHz]: -42.734
 Attenuation [dB]: -53.41



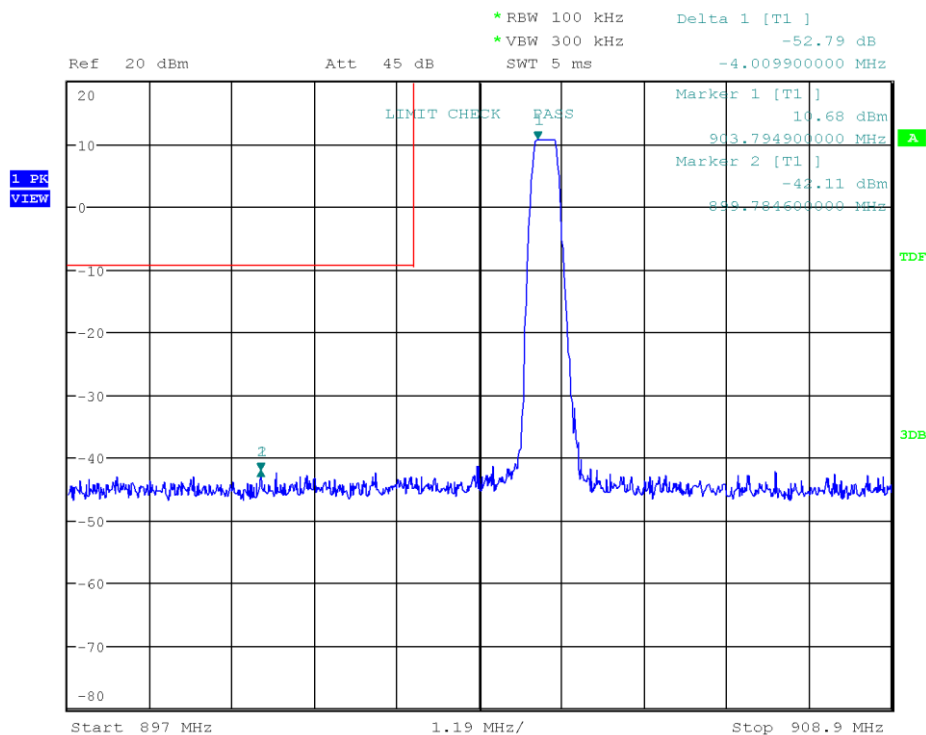
Date: 11.NOV.2022 14:14:59

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: single frequency, Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Band-edge: Lower
 In-band Frequency [MHz]: 903.795
 Max. in-band Level [dBm/100 kHz]: 10.677
 Out-of-band Frequency [MHz]: 899.785
 Max. out-of-band Level [dBm/100 kHz]: -42.112
 Attenuation [dB]: -52.79



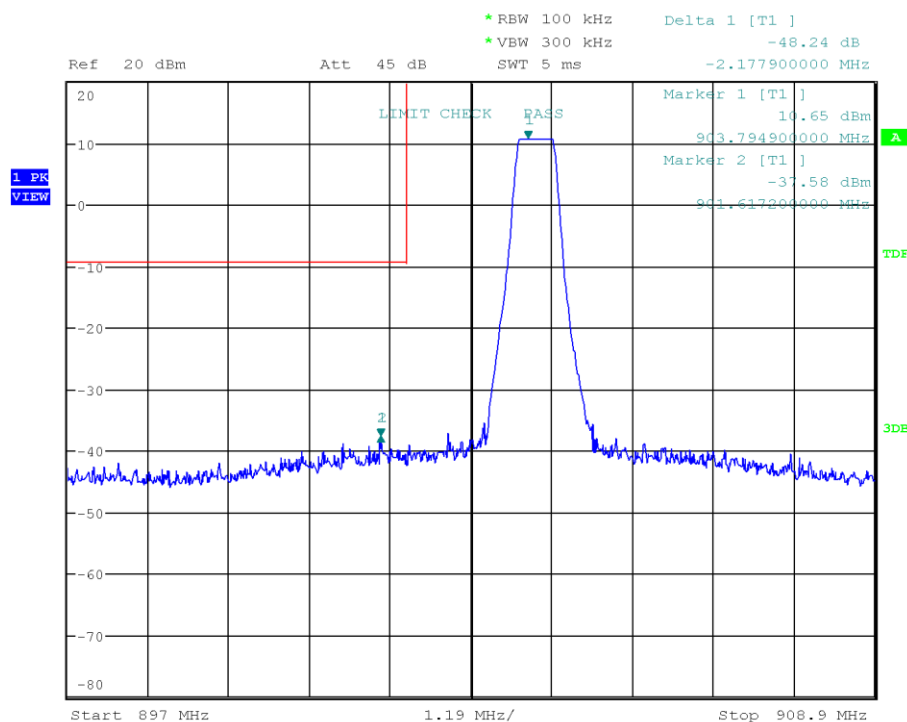
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Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2207-1565
Applicant:	Dräger MSI GmbH
Model Description:	Wireless gas detection transmitter
Model:	X-node 1
Test Sample ID:	41710
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.10
Operational Mode:	single frequency, Channel: 903.9 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Radwan Jaafar
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-11-11
Note:	Modulated, CBW 500 KHz
Band-edge	Lower
In-band Frequency [MHz]:	903.795
Max. in-band Level [dBm/100 kHz]:	10.654
Out-of-band Frequency [MHz]:	901.617
Max. out-of-band Level [dBm/100 kHz]:	-37.583
Attenuation [dB]:	-48.24



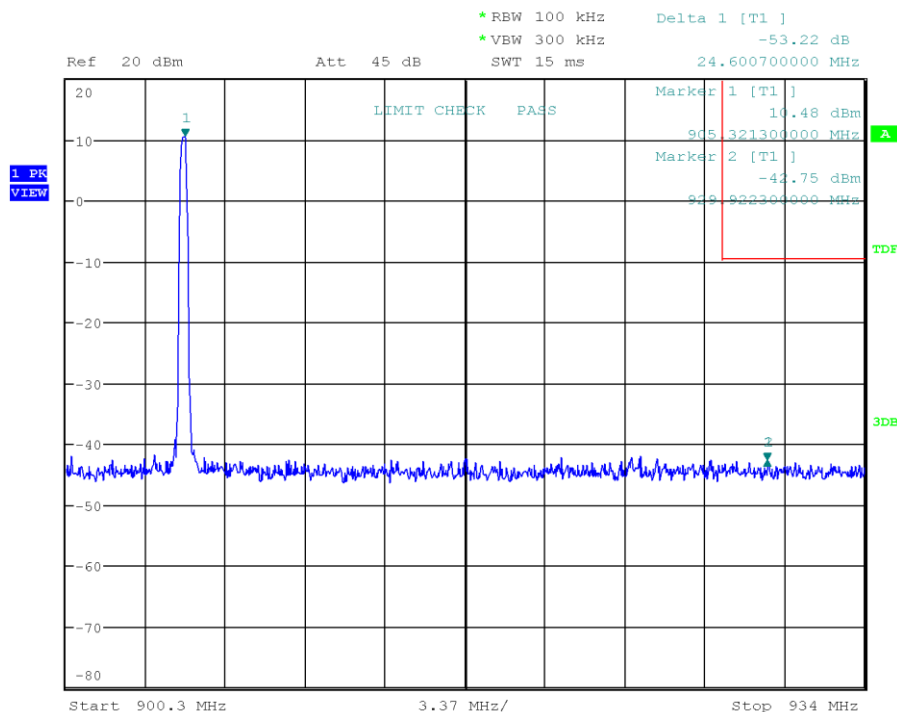
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Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: single frequency, Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Band-edge: Upper
 In-band Frequency [MHz]: 905.321
 Max. in-band Level [dBm/100 kHz]: 10.475
 Out-of-band Frequency [MHz]: 929.922
 Max. out-of-band Level [dBm/100 kHz]: -42.749
 Attenuation [dB]: -53.22



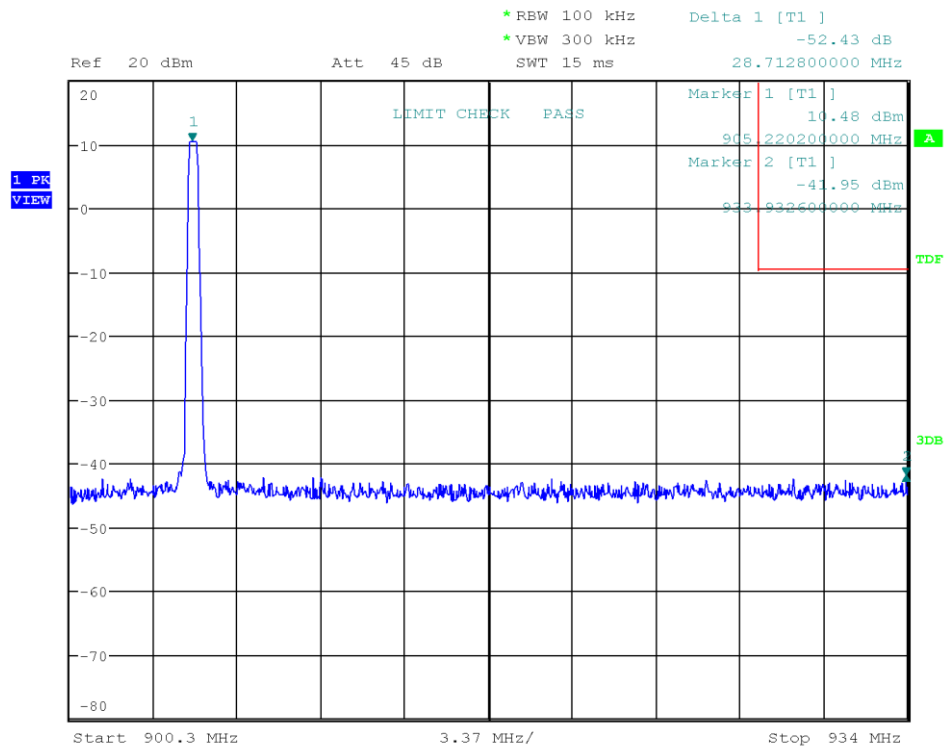
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Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: single frequency, Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Band-edge: Upper
 In-band Frequency [MHz]: 905.22
 Max. in-band Level [dBm/100 kHz]: 10.477
 Out-of-band Frequency [MHz]: 933.933
 Max. out-of-band Level [dBm/100 kHz]: -41.953
 Attenuation [dB]: -52.43



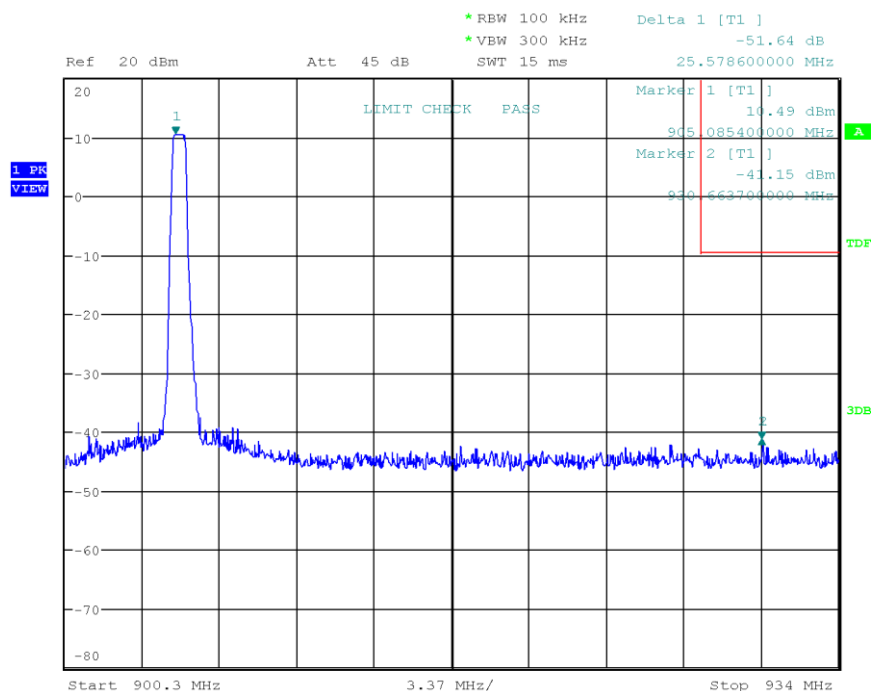
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Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: single frequency, Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Band-edge: Upper
 In-band Frequency [MHz]: 905.085
 Max. in-band Level [dBm/100 kHz]: 10.487
 Out-of-band Frequency [MHz]: 930.664
 Max. out-of-band Level [dBm/100 kHz]: -41.153
 Attenuation [dB]: -51.64



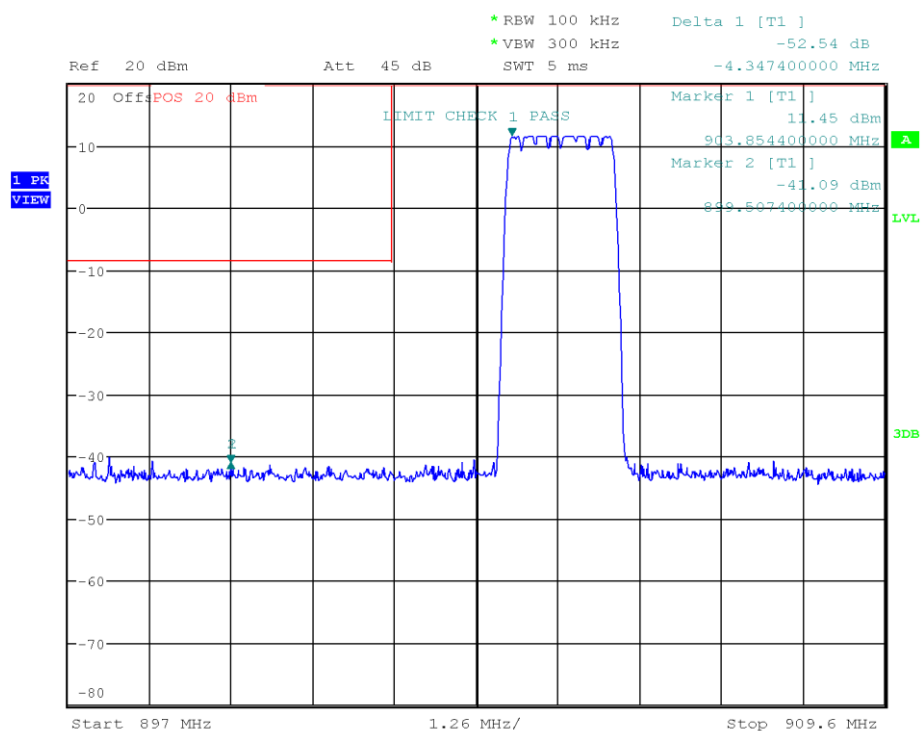
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Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: hopping mode, Channel: 904.6 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Band-edge: Lower
 In-band Frequency [MHz]: 903.854
 Max. in-band Level [dBm/100 kHz]: 11.451
 Out-of-band Frequency [MHz]: 899.507
 Max. out-of-band Level [dBm/100 kHz]: -41.087
 Attenuation [dB]: -52.54



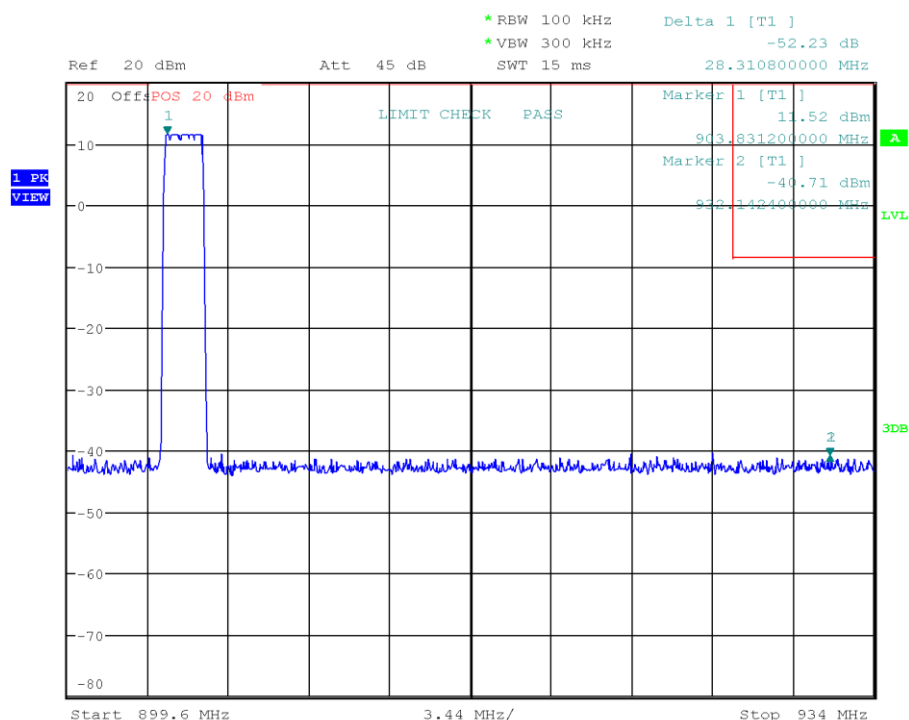
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Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.10
 Operational Mode: hopping mode, Channel: 904.6 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Odai Qawasmeh
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-12-12
 Band-edge: Upper
 In-band Frequency [MHz]: 903.831
 Max. in-band Level [dBm/100 kHz]: 11.515
 Out-of-band Frequency [MHz]: 932.142
 Max. out-of-band Level [dBm/100 kHz]: -40.715
 Attenuation [dB]: -52.23



Date: 12.DEC.2022 12:57:03

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

3.9 Test Conditions and Results - Conducted spurious emissions

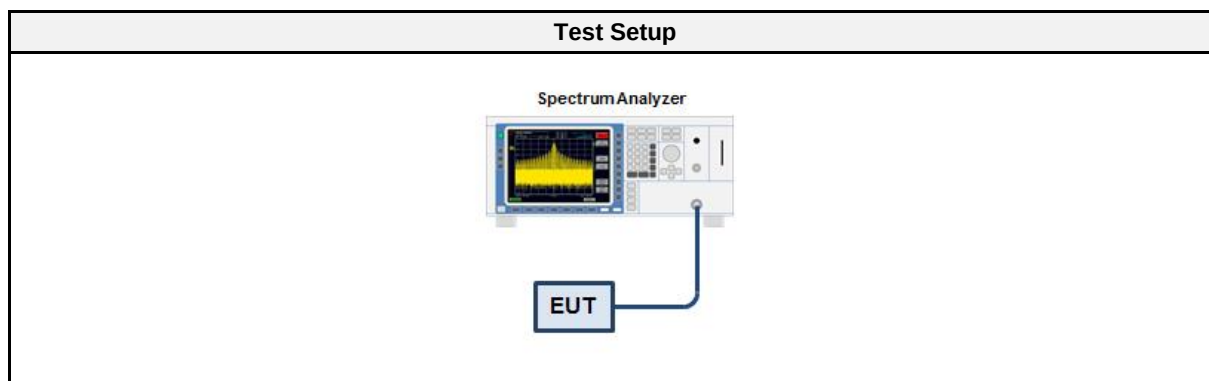
3.9.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Operator	Radwan Jaafar
Date	2022-11-11

3.9.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.9.3 Setup



3.9.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01003	2022-07	2023-07
Cable	Gigalane	CAABR	EF00779	2022-02	2023-02

3.9.5 Procedure

Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels outside frequency band

3.9.6 Results

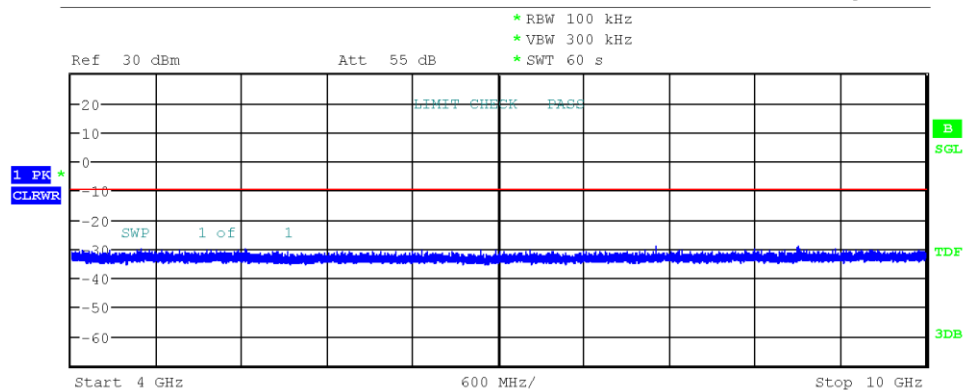
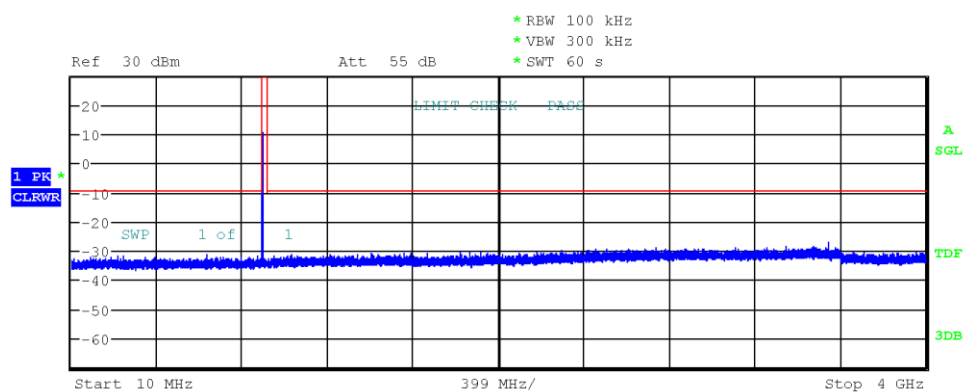
Test Results – 125 kHz		
Mode	Channel [MHz]	Verdict
Transmit	903.9	PASS
Transmit	905.3	PASS

Test Results – 250 kHz		
Mode	Channel [MHz]	Verdict
Transmit	903.9	PASS
Transmit	905.3	PASS

Test Results – 500 kHz		
Mode	Channel [MHz]	Verdict
Transmit	903.9	PASS
Transmit	905.3	PASS

Conducted Spurious Emissions

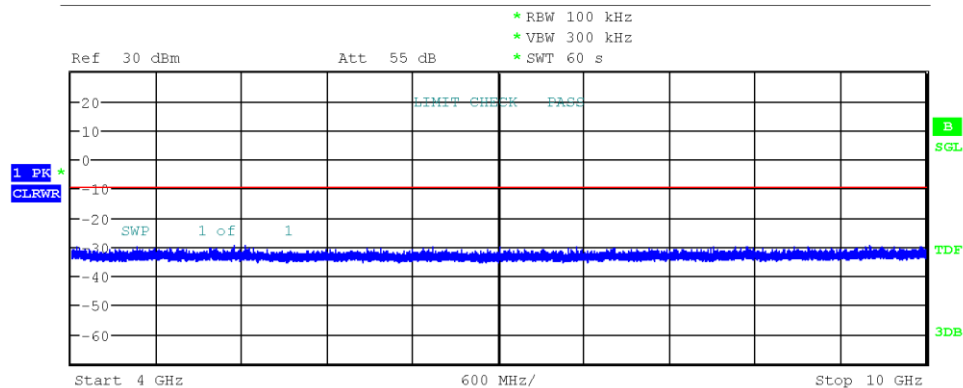
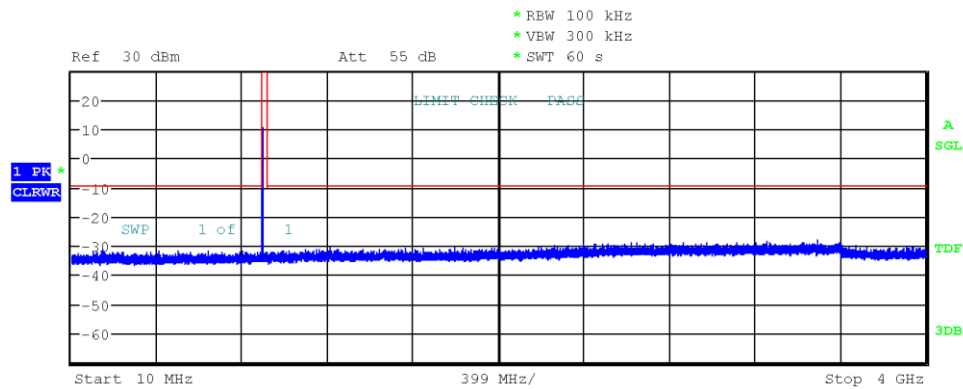
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Max. in-band Frequency [MHz]: 903.9
 Max. in-band Level [dBm/100 kHz]: 10.7
 Out-of-band Limit [dBm/100 kHz]: -9.3



Date: 11.NOV.2022 14:13:29

Conducted Spurious Emissions

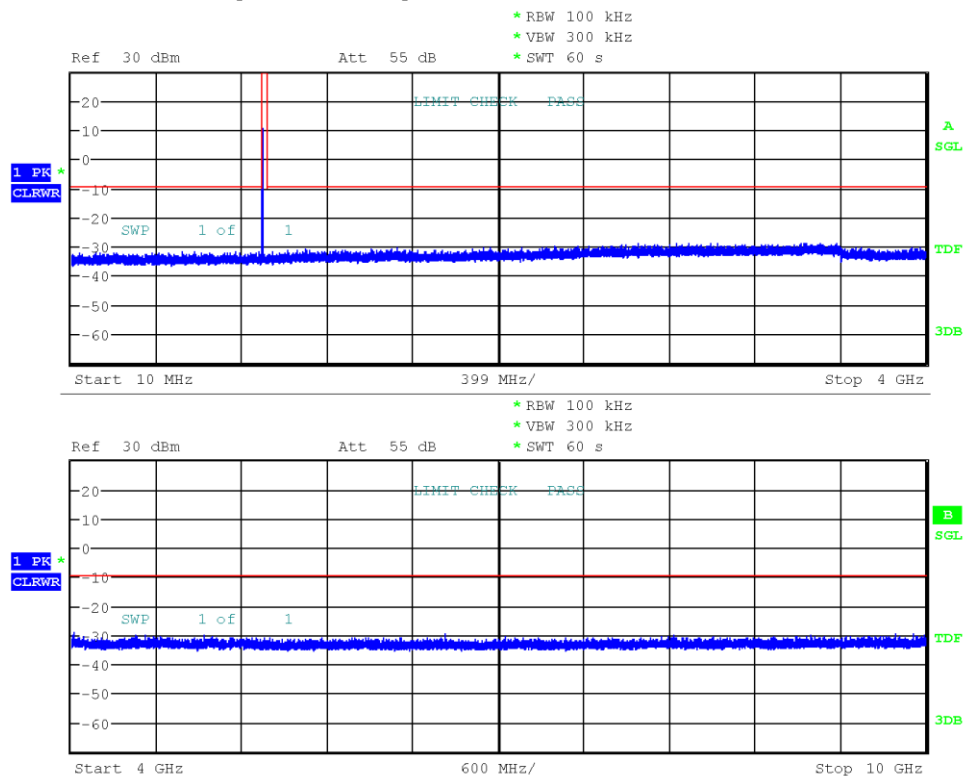
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Max. in-band Frequency [MHz]: 903.9
 Max. in-band Level [dBm/100 kHz]: 10.7
 Out-of-band Limit [dBm/100 kHz]: -9.3



Date: 11.NOV.2022 14:24:23

Conducted Spurious Emissions

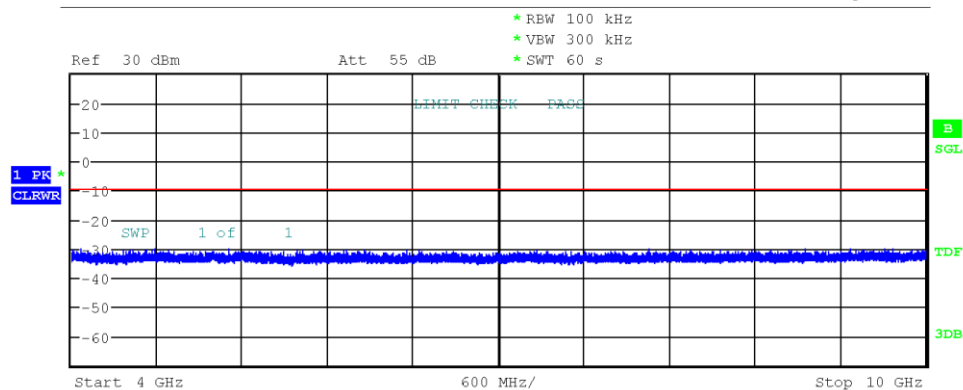
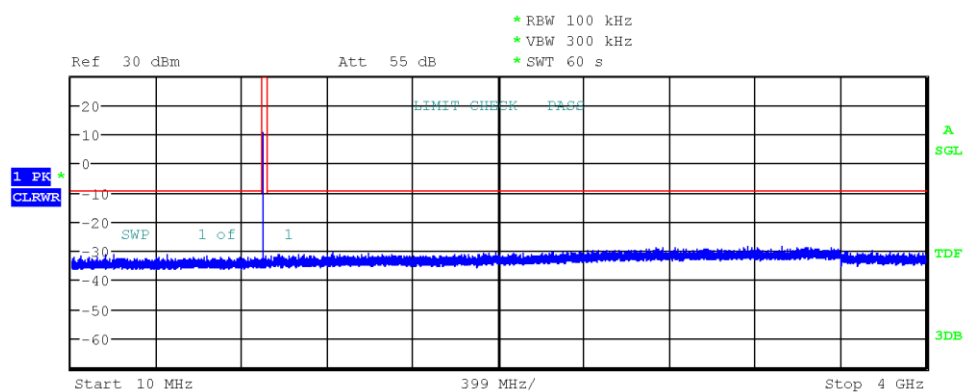
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 903.9 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Max. in-band Frequency [MHz]: 903.7
 Max. in-band Level [dBm/100 kHz]: 10.6
 Out-of-band Limit [dBm/100 kHz]: -9.4



Date: 11.NOV.2022 14:35:18

Conducted Spurious Emissions

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 125 KHz
 Max. in-band Frequency [MHz]: 905.3
 Max. in-band Level [dBm/100 kHz]: 10.5
 Out-of-band Limit [dBm/100 kHz]: -9.5



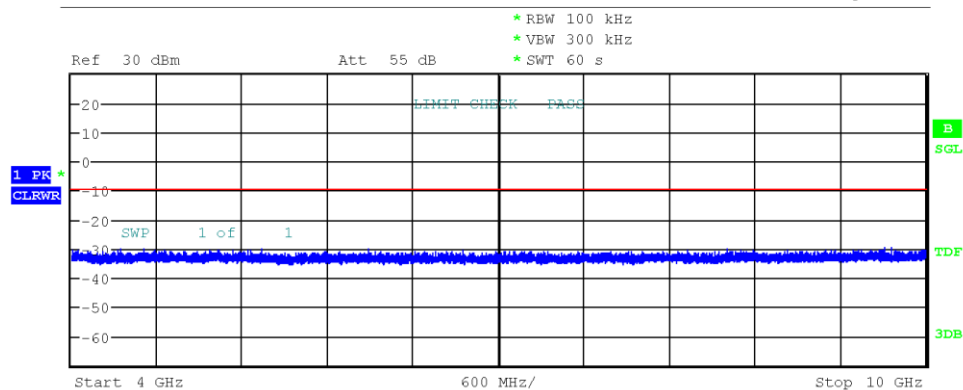
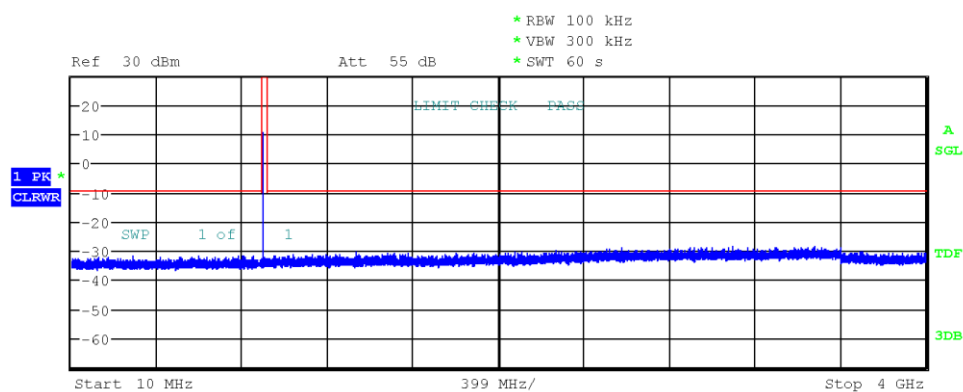
Date: 11.NOV.2022 15:00:09

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Conducted Spurious Emissions

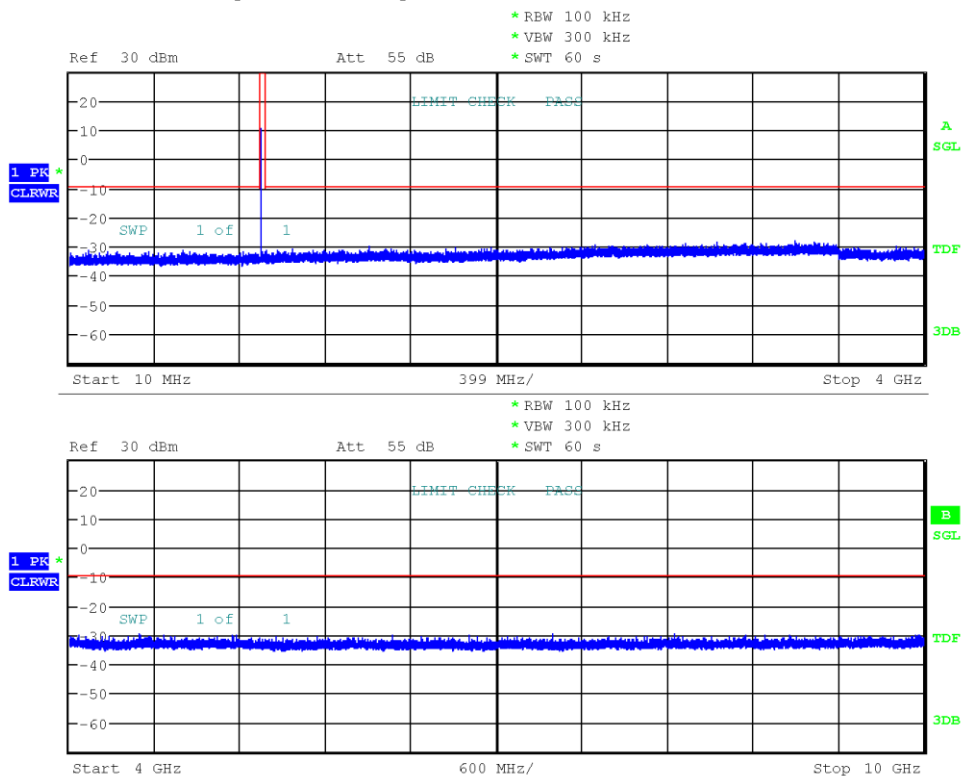
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 250 KHz
 Max. in-band Frequency [MHz]: 905.4
 Max. in-band Level [dBm/100 kHz]: 10.5
 Out-of-band Limit [dBm/100 kHz]: -9.5



Date: 11.NOV.2022 15:08:48

Conducted Spurious Emissions

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: Lora (Chirp Spread Spectrum), Channel: 905.3 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Radwan Jaafar
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-11-11
 Note: Modulated, CBW 500 KHz
 Max. in-band Frequency [MHz]: 905.1
 Max. in-band Level [dBm/100 kHz]: 10.5
 Out-of-band Limit [dBm/100 kHz]: -9.5



Date: 11.NOV.2022 15:22:17

3.10 Test Conditions and Results - Transmitter radiated emissions

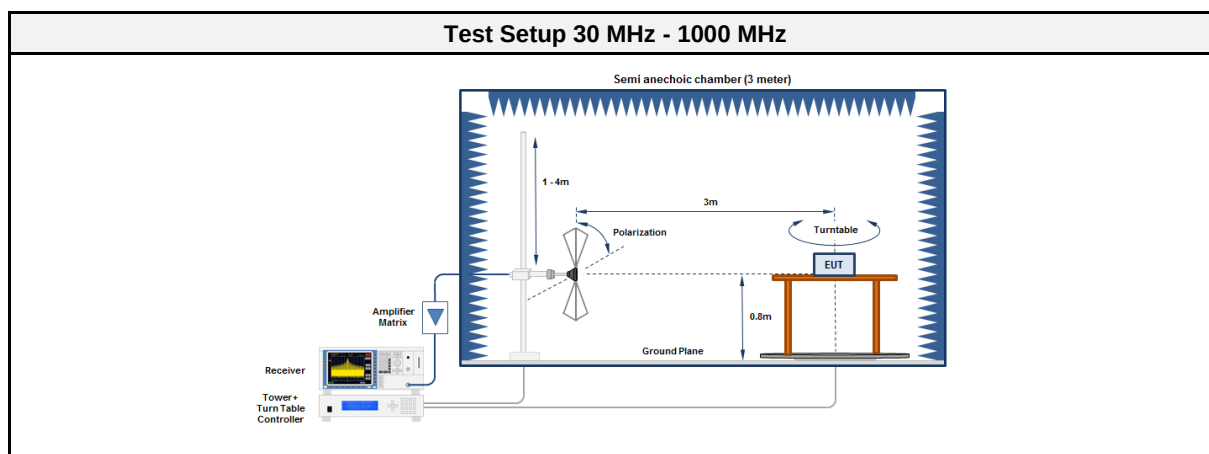
3.10.1 Information

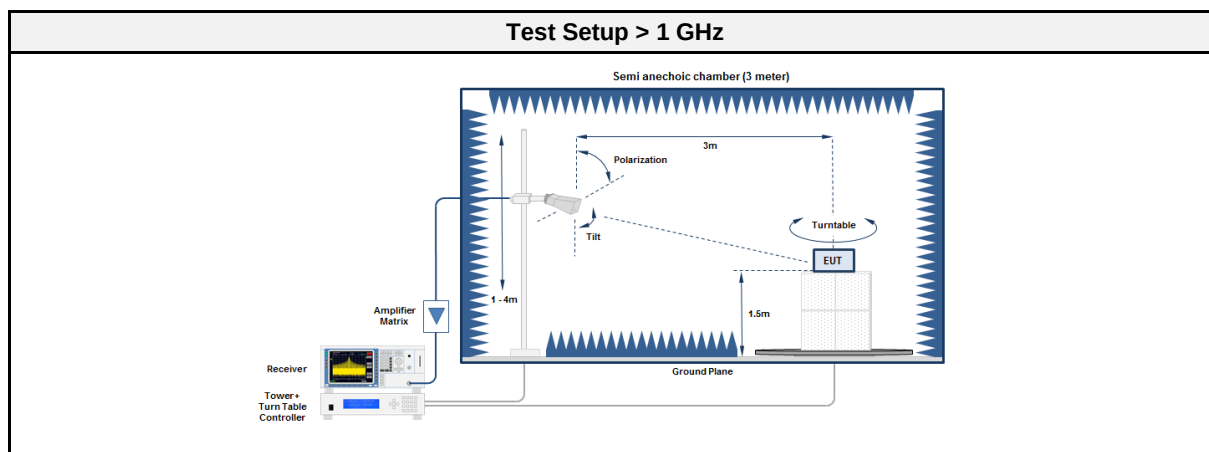
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISSED RSS-Gen, Issue 5 A2 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Odai Qawasmeh
Date	2022-11-02

3.10.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
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

3.10.3 Setup





3.10.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

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

3.10.5 Procedure

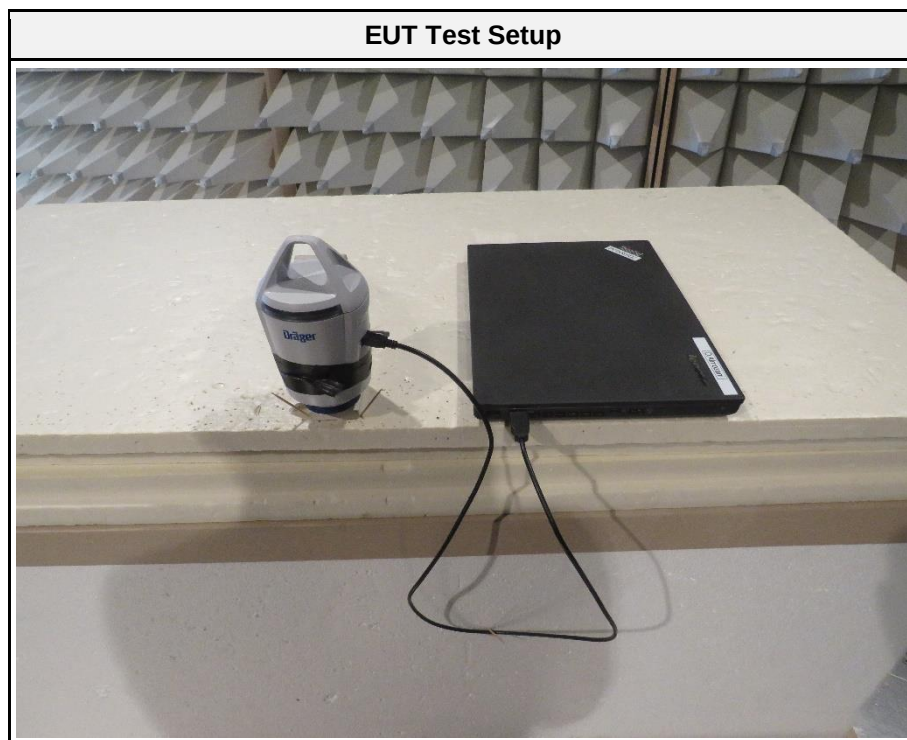
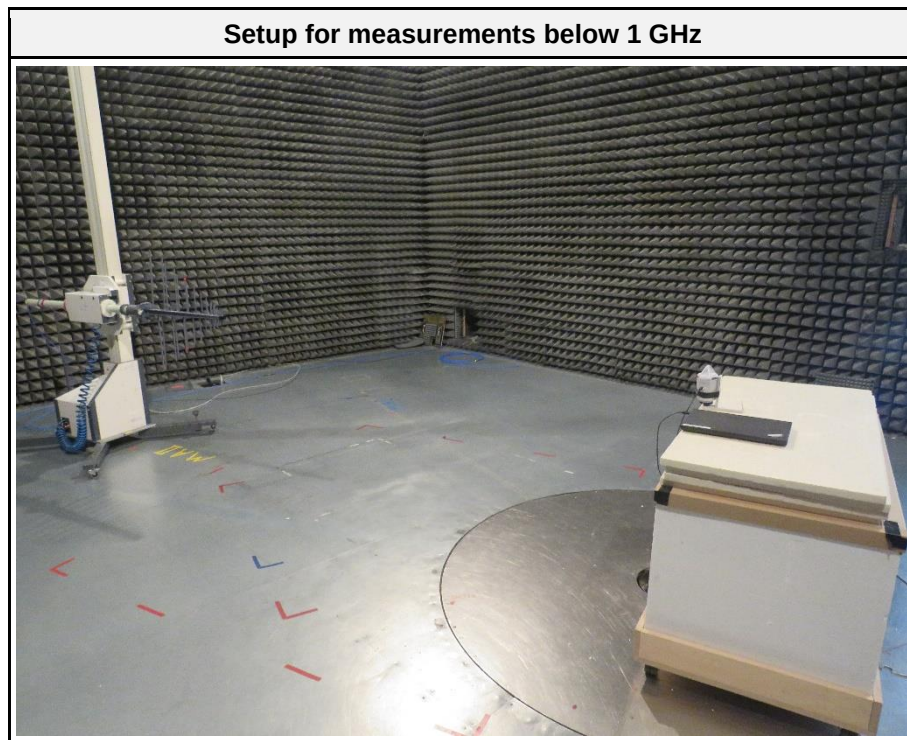
Test Procedure 30 MHz - 1000 MHz	
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m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

3.10.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
903.9	171.9458	17.90	pk	hor	43.50	-25.59
903.9	986.4028	40.60	pk	hor	54.00	-13.45
903.9	2711.7	50.67	pk	hor	74.00	-23.33
903.9	2711.7	50.17	avg	hor	54.00	-03.83
903.9	8135	42.30	pk	hor	74.00	-31.70
903.9	8135	39.63	avg	hor	54.00	-14.37
903.9	9039	43.74	pk	ver	74.00	-30.26
903.9	9039	40.50	avg	ver	54.00	-13.50
905.3	172.1838	18.10	pk	ver	43.50	-25.43
905.3	979.7104	42.00	pk	ver	54.00	-12.02
905.3	2716	48.18	pk	ver	74.00	-25.82
905.3	2716	47.09	avg	ver	54.00	-06.91
905.3	8147	46.11	pk	ver	74.00	-27.89
905.3	8147	44.44	avg	ver	54.00	-09.56
905.3	9053	39.91	pk	ver	74.00	-34.09
905.3	9053	34.83	avg	ver	54.00	-19.17

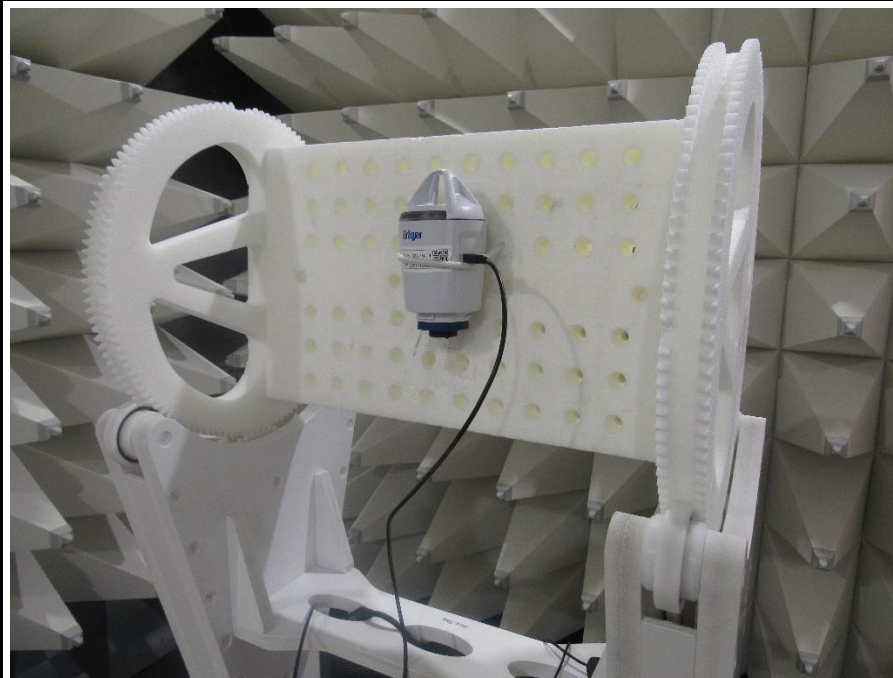
3.10.7 Setup Photos



Setup for measurements above 1 GHz



EUT Test Setup



3.11 Test Conditions and Results - Receiver radiated emissions

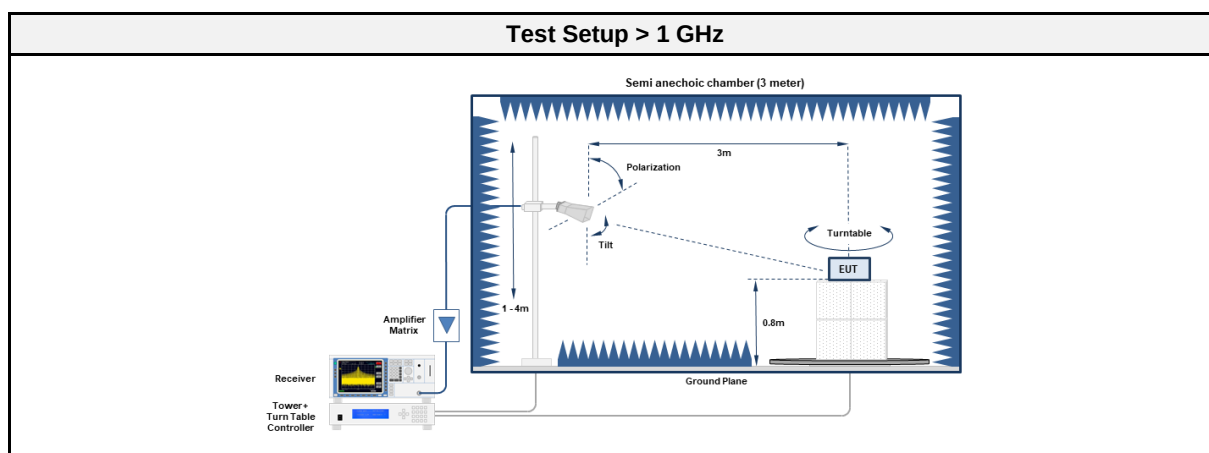
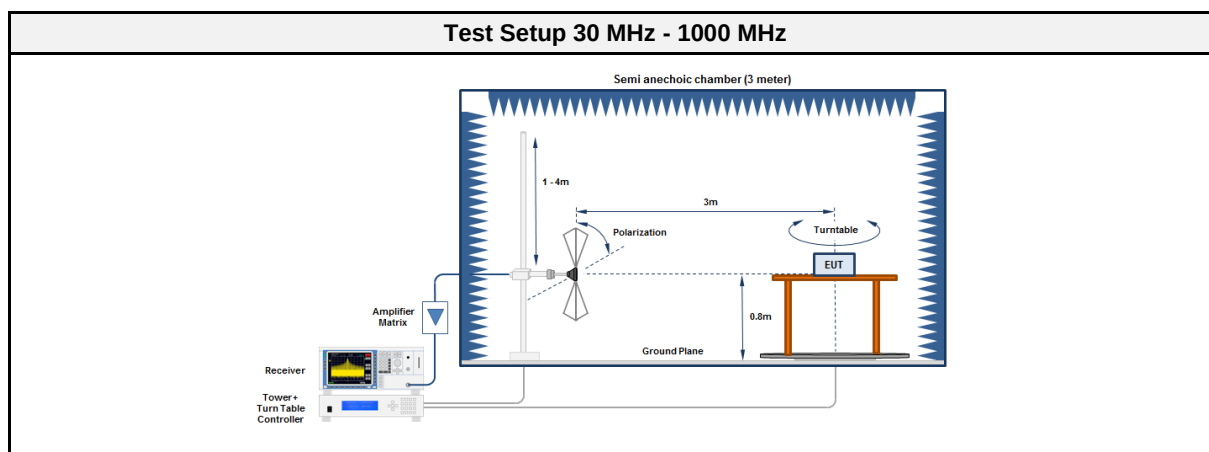
3.11.1 Information

Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.4-2014 8.1-8.3
Operator	Odai Qawasmeh
Date	2022-11-02

3.11.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	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

3.11.3 Setup



3.11.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

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	AC1	EF01011	2022-06	2025-06
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2023-01
Antenna	Schwarzbeck	BBHA 9120D	EF01561	2021-11	2024-11

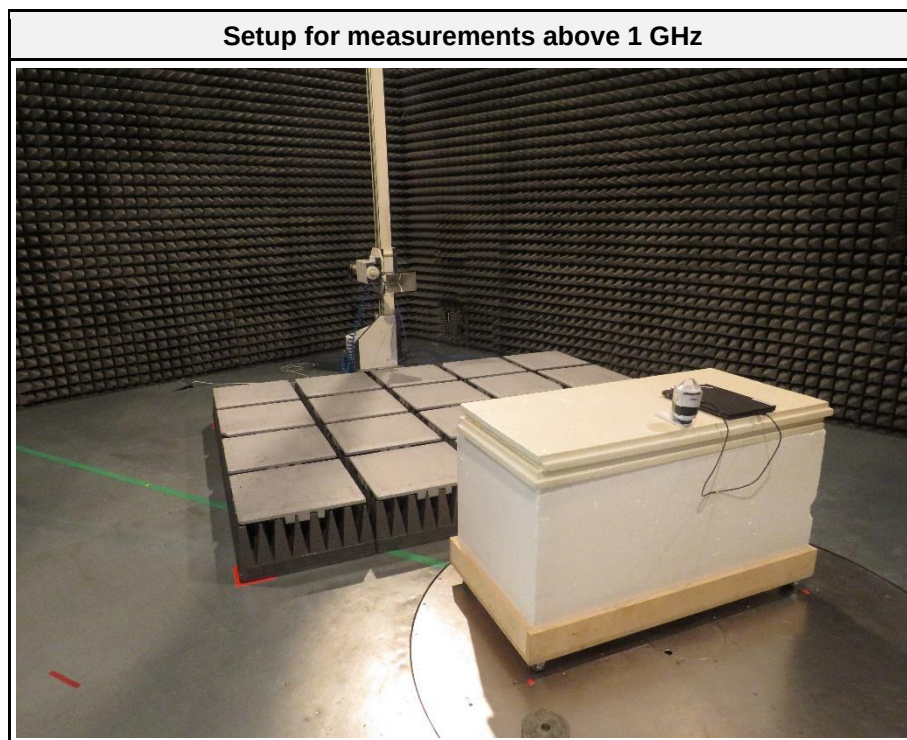
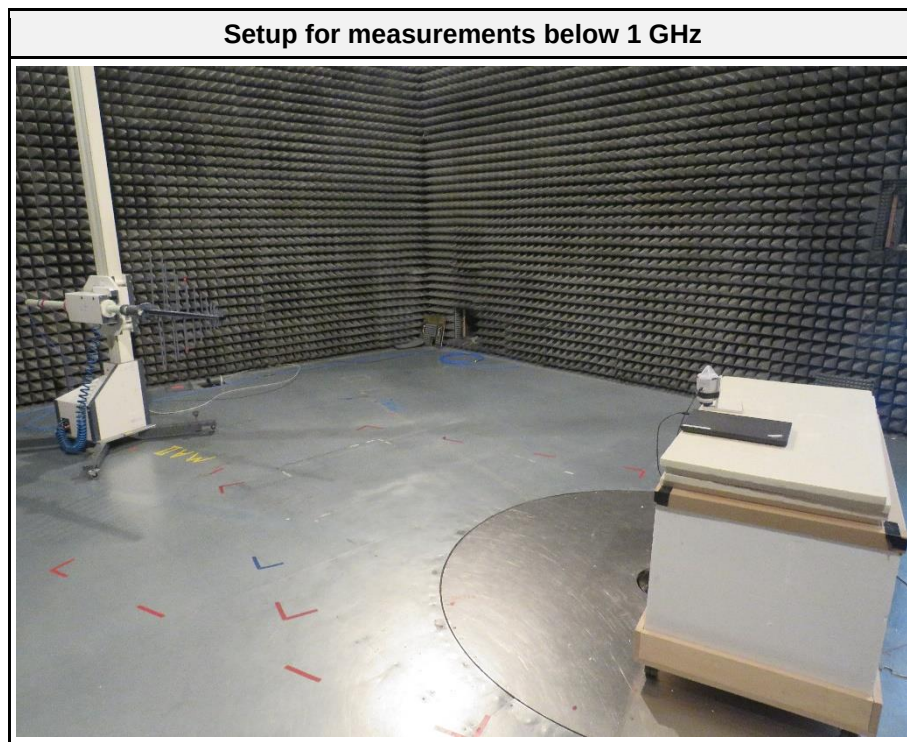
3.11.5 Procedure

Test Procedure
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT is 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

3.11.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
904.7	150.0073	25.10	pk	ver	43.50	-18.41
904.7	910.42	30.30	pk	ver	46.00	-15.66
904.7	6416	50.39	pk	ver	74.00	-23.61
904.7	6416	37.14	avg	ver	53.98	-16.84
904.7	17823	48.11	pk	hor	74.00	-25.89
904.7	17823	37.56	avg	hor	53.98	-16.42

3.11.7 Setup Photos



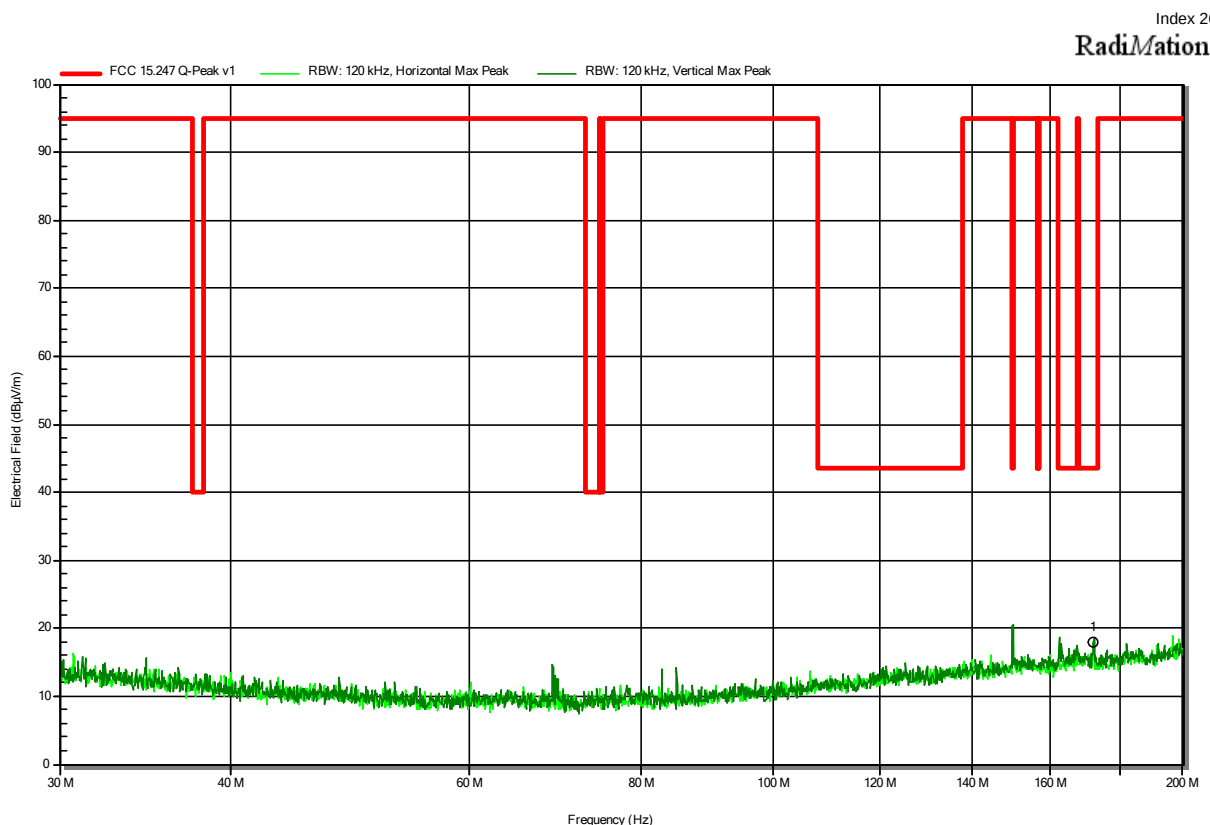
EUT Test Setup



ANNEX A Transmitter spurious emissions

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

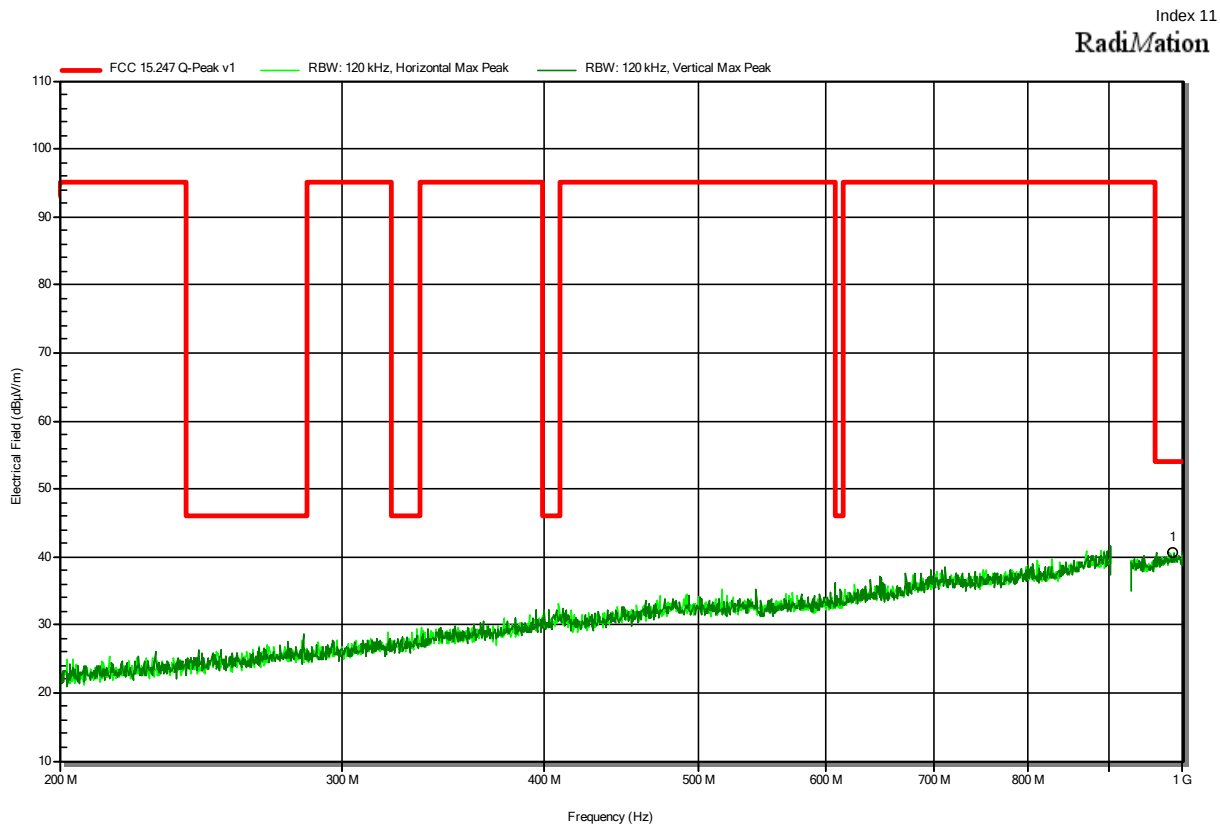
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-Node 1
 Test Sample ID: 41711
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 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
171.9458 MHz	17.9 dBμV/m	43.5 dBμV/m	-25.59 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-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; SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7
 US/CANADA
 Test Date: 2022-11-02
 Note:



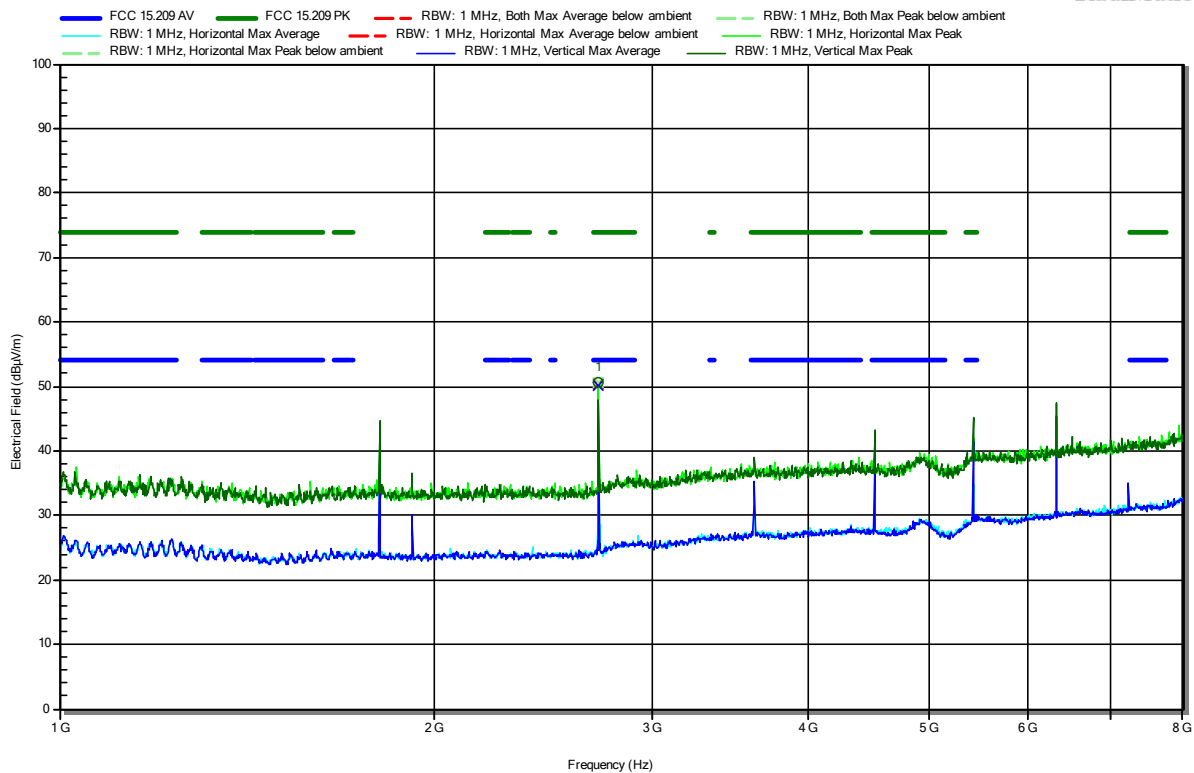
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
986.4028 MHz	40.6 dBµV/m	54 dBµV/m	-13.45 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-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; 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 2.7117 GHz	Peak 50.67 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -23.33 dB	Peak Status Pass	Polarization Horizontal
Frequency 2.7117 GHz	Average 50.17 dBµV/m	Average Limit 54 dBµV/m	Average Difference -3.83 dB	Average Status Pass	Polarization Horizontal

Test Report No.: G0M-2207-1565-TFC247DT-V02

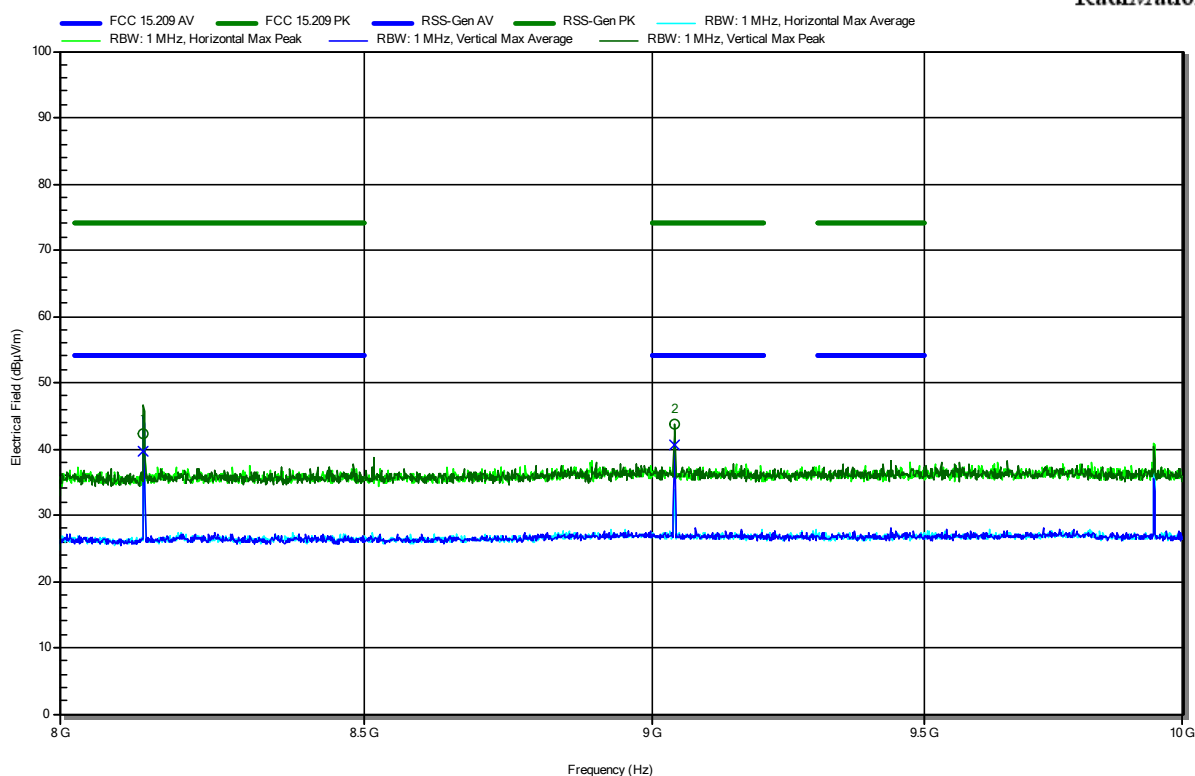
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-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; SRD, Lora, 903.9 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7
 US/CANADA
 Test Date: 2022-11-02
 Note:

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
8.135 GHz	42.3 dBµV/m	74 dBµV/m	-31.7 dB	Pass	Horizontal
9.039 GHz	43.74 dBµV/m	74 dBµV/m	-30.26 dB	Pass	Vertical

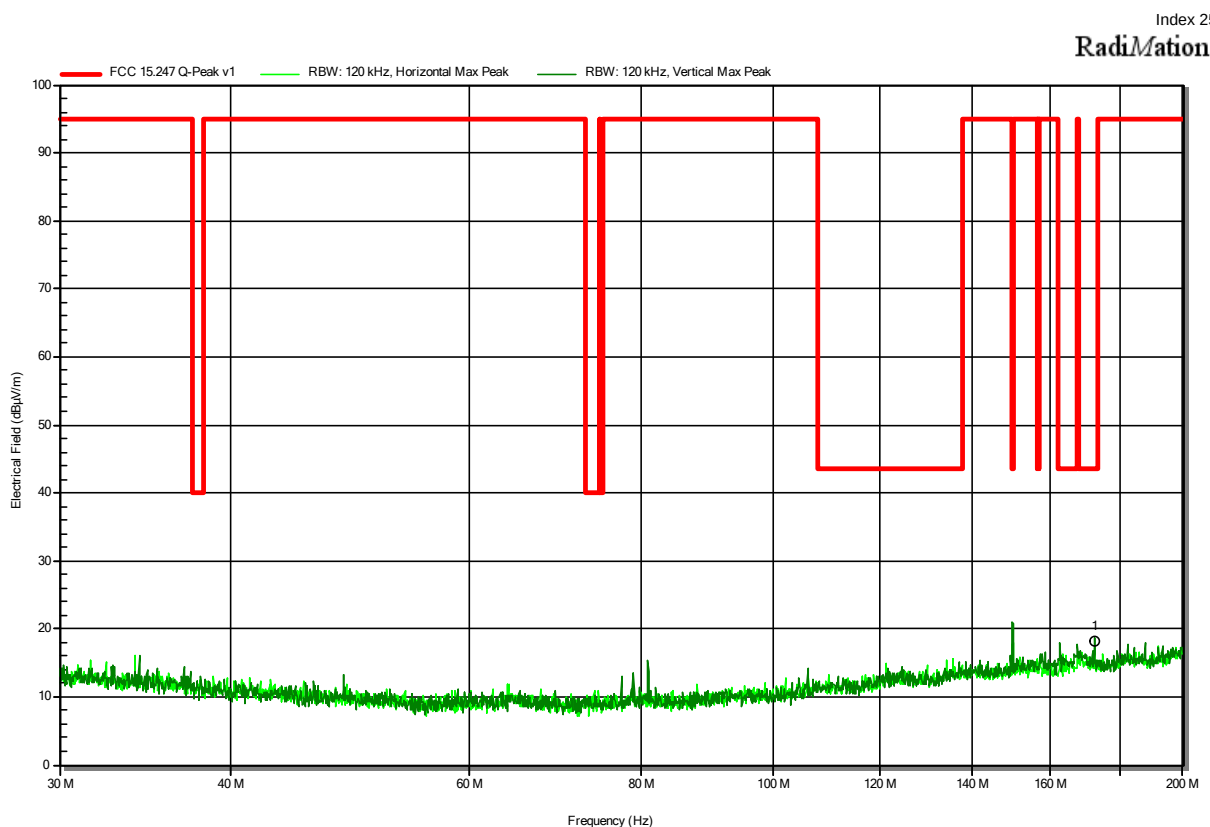
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
8.135 GHz	39.63 dBµV/m	54 dBµV/m	-14.37 dB	Pass	Horizontal
9.039 GHz	40.5 dBµV/m	54 dBµV/m	-13.5 dB	Pass	Vertical

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

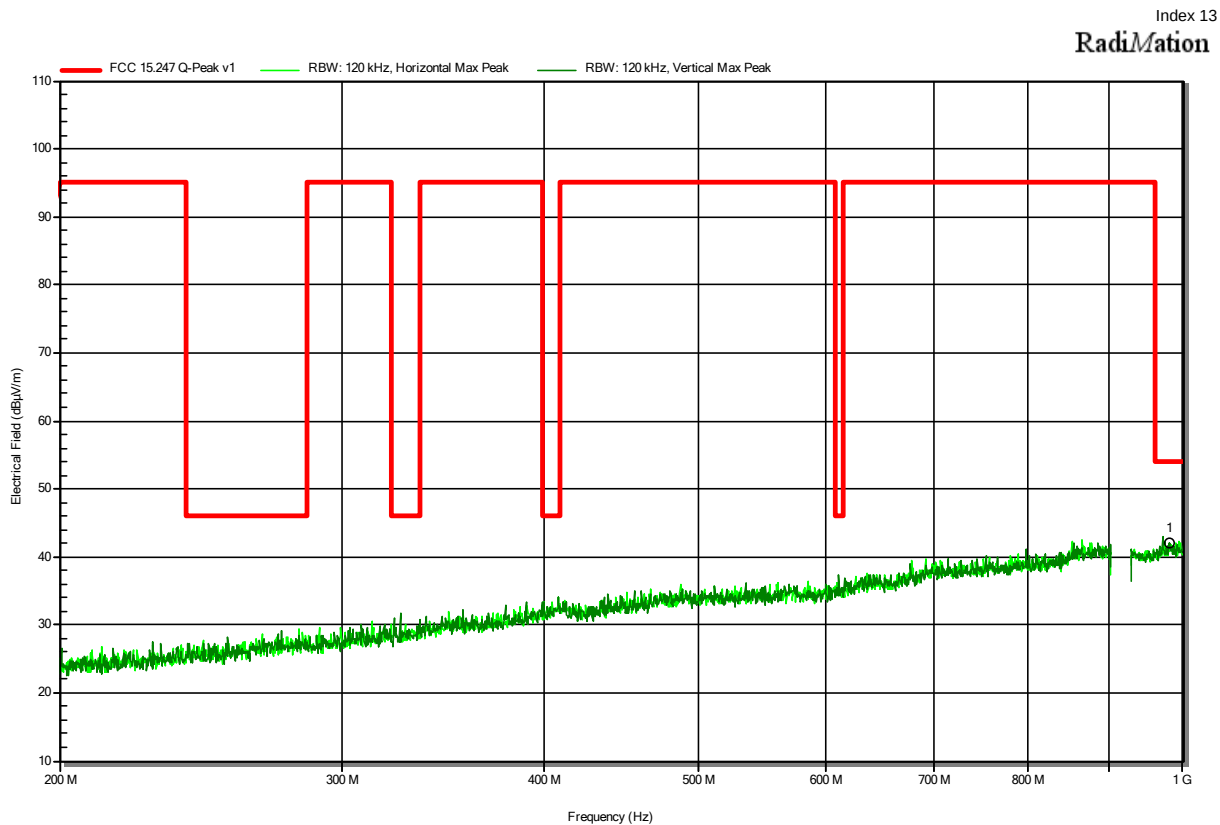
Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-Node 1
 Test Sample ID: 41711
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.7 VDC (Battery)
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; 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
172.1838 MHz	18.1 dBμV/m	43.5 dBμV/m	-25.43 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-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; SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7
 US/CANADA
 Test Date: 2022-11-02
 Note:



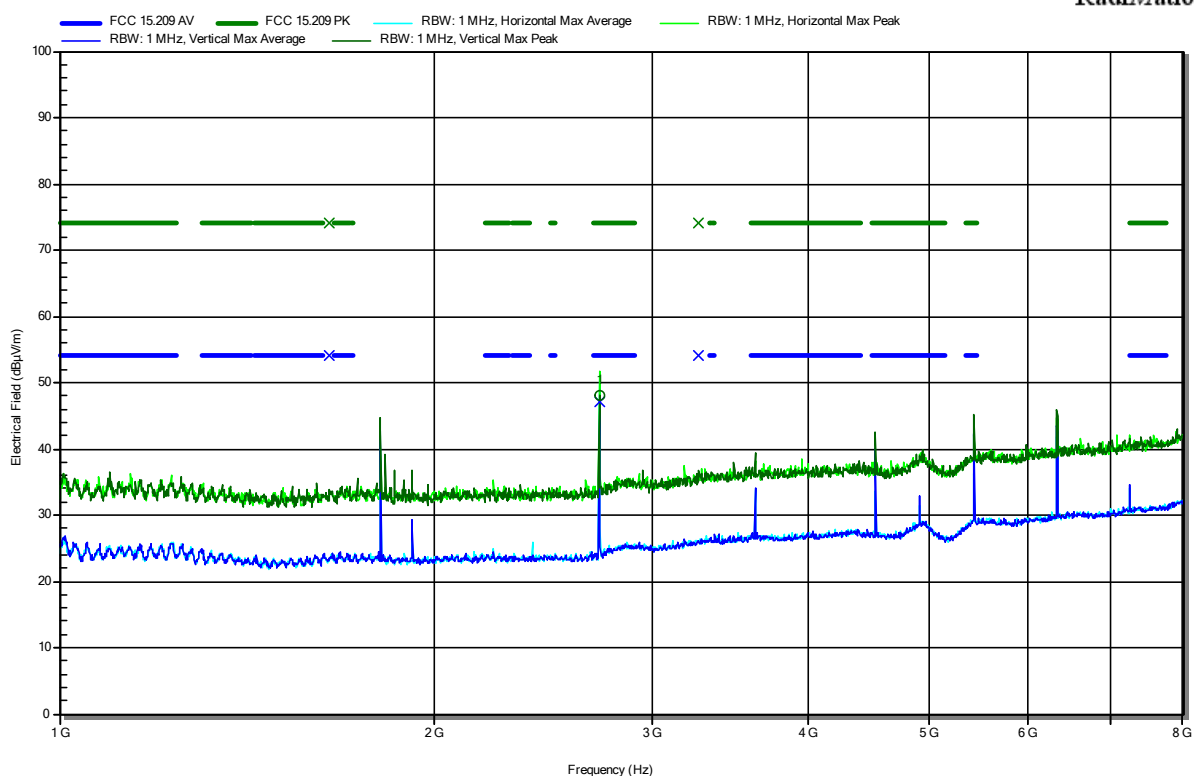
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
979.7104 MHz	42 dBµV/m	54 dBµV/m	-12.02 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-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; SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7
 US/CANADA
 Test Date: 2022-11-02
 Note:

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RadiMation



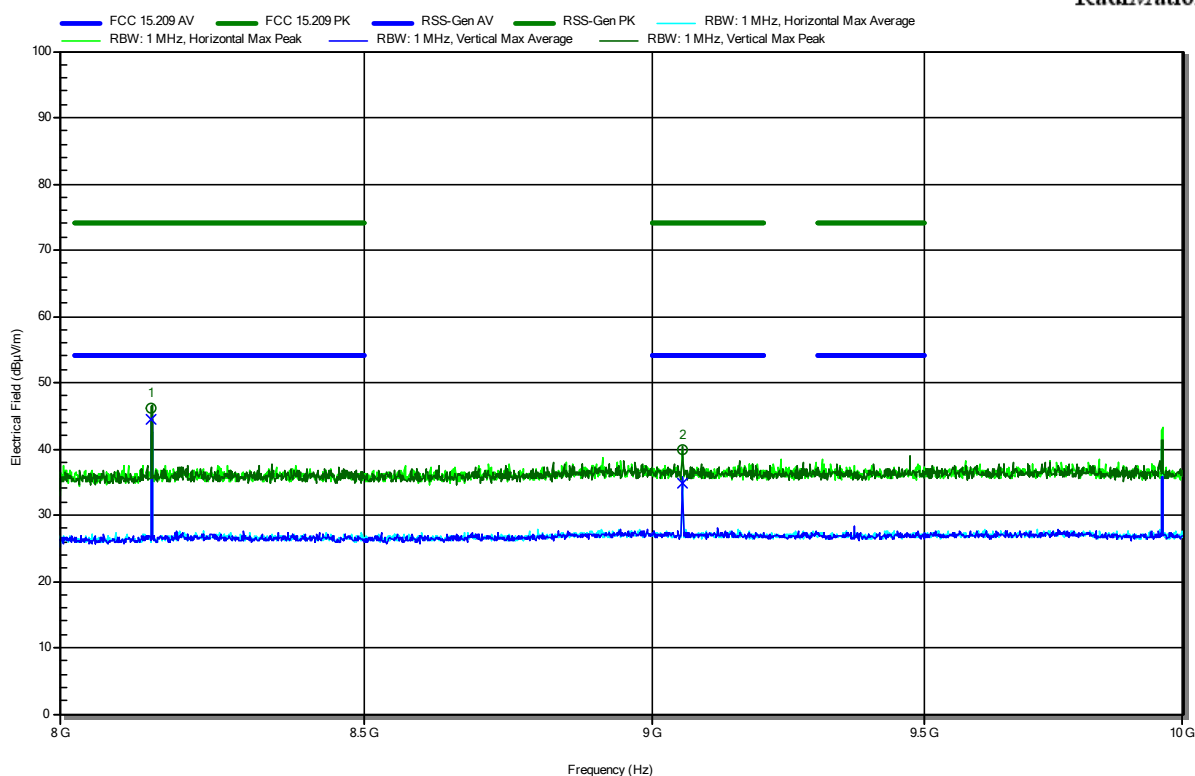
Frequency 2.716 GHz	Peak 48.18 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -25.82 dB	Peak Status Pass	Polarization Vertical
Frequency 2.716 GHz	Average 47.09 dBµV/m	Average Limit 54 dBµV/m	Average Difference -06.91 dB	Average Status Pass	Polarization Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-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; SRD, Lora, 905.3 MHz, 125 kHz Bandwidth, 15 dBm Output Power, Spreading factor 7
 US/CANADA
 Test Date: 2022-11-02
 Note:

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
8.147 GHz	46.11 dBµV/m	74 dBµV/m	-27.89 dB	Pass	Vertical
9.053 GHz	39.91 dBµV/m	74 dBµV/m	-34.09 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
8.147 GHz	44.44 dBµV/m	54 dBµV/m	-9.56 dB	Pass	Vertical
9.053 GHz	34.83 dBµV/m	54 dBµV/m	-19.17 dB	Pass	Vertical

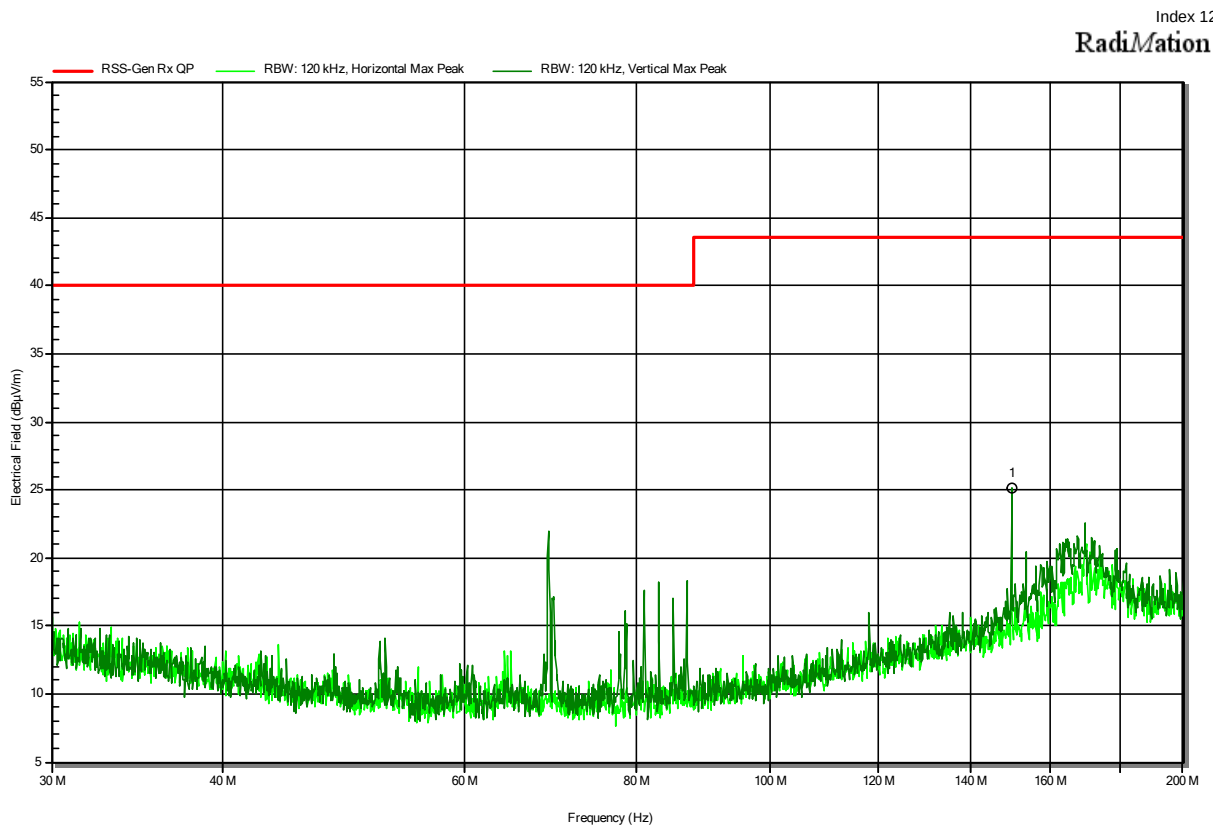
Test Report No.: G0M-2207-1565-TFC247DT-V02

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

ANNEX B Receiver spurious emissions

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 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: Rx; SRD, Lora, 904.7 MHz
 US/CANADA
 Test Date: 2022-11-10
 Note:



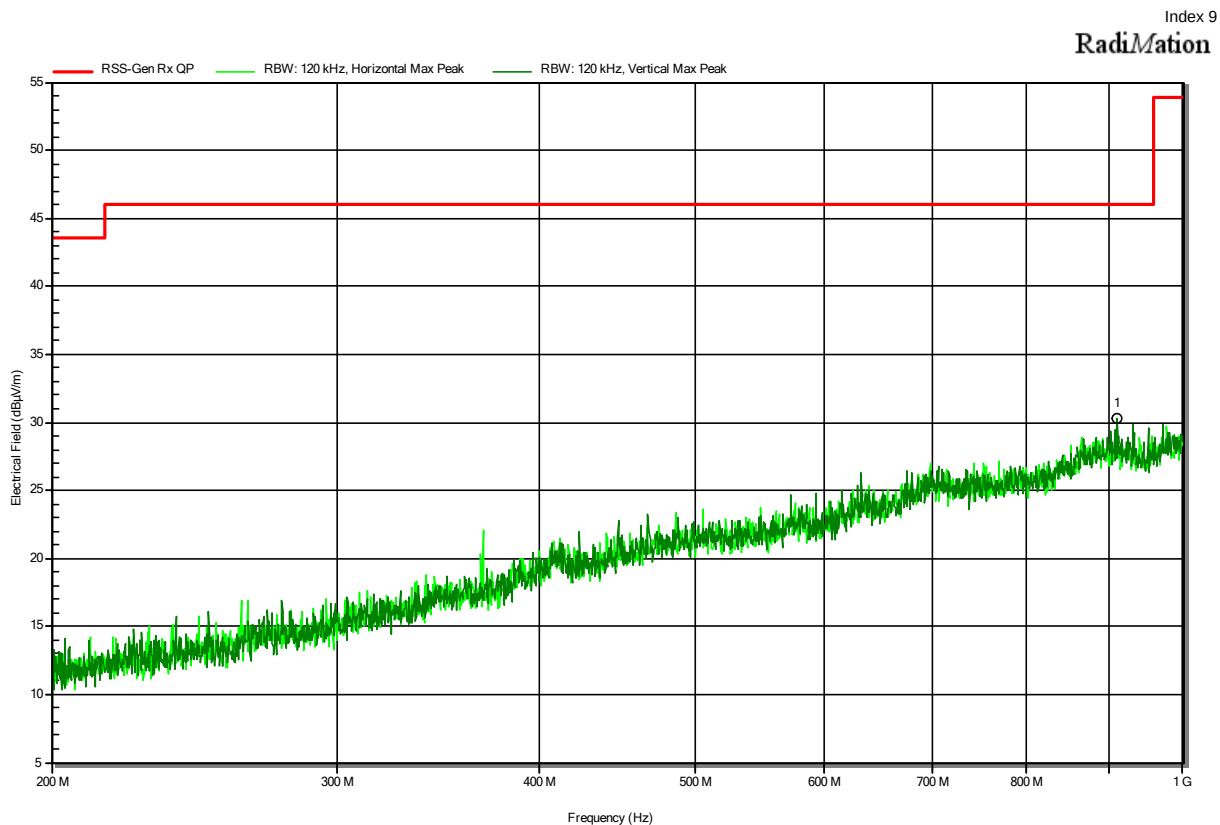
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
150.0073 MHz	25.1 dBµV/m	43.5 dBµV/m	-18.41 dB	Pass	Vertical

Test Report No.: G0M-2207-1565-TFC247DT-V02

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

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 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: Rx; SRD, Lora, 904.7 MHz
 US/CANADA
 Test Date: 2022-11-02
 Note:



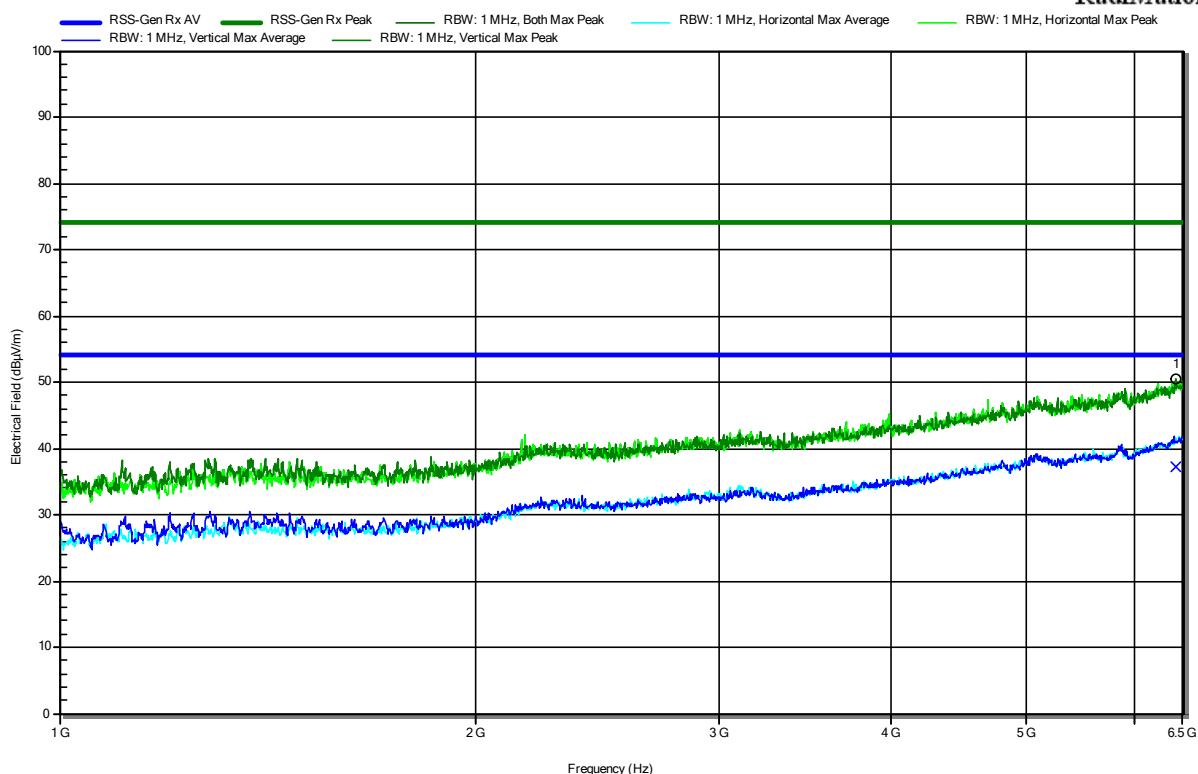
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
910.42 MHz	30.3 dBμV/m	46 dBμV/m	-15.66 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 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: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Rx; SRD, Lora, 904.7 MHz
 US/CANADA
 Test Date: 2022-11-10
 Note:

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RadiMation



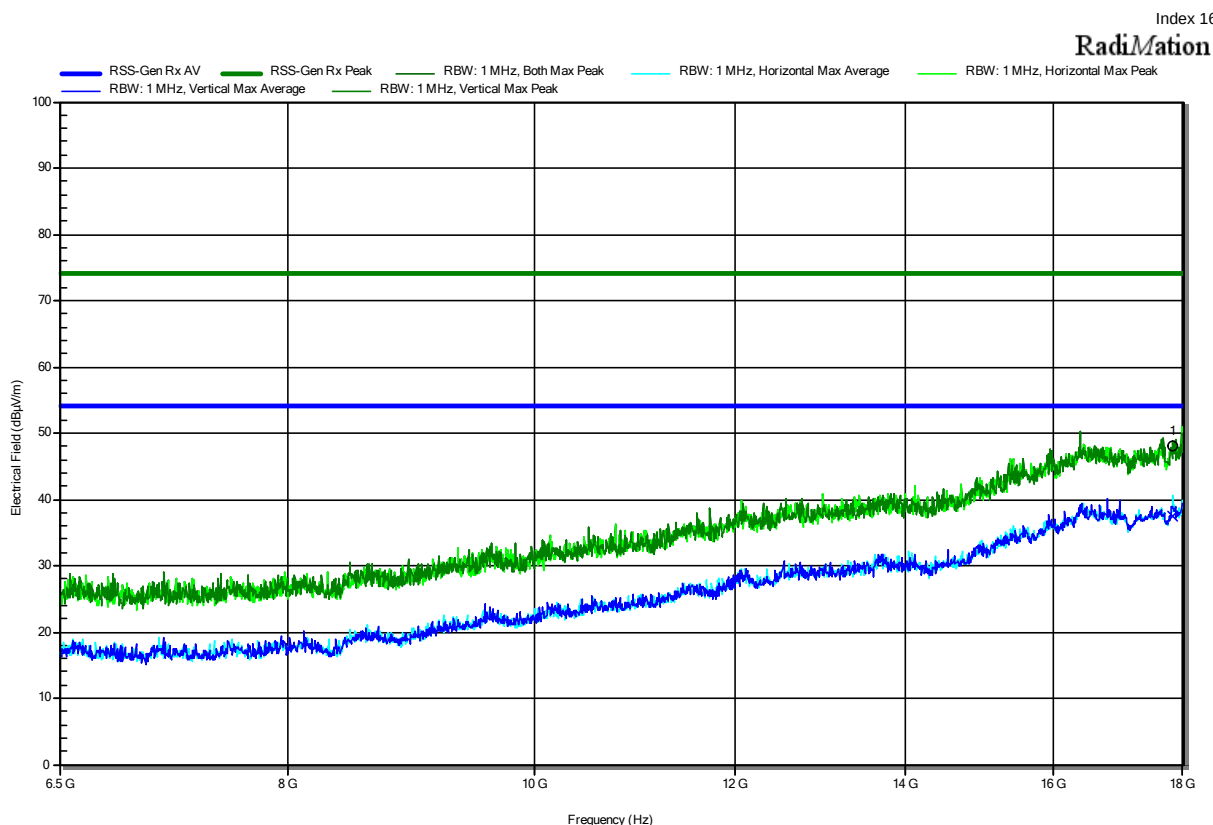
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
6.416 GHz	50.39 dBμV/m	74 dBμV/m	-23.61 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
6.416 GHz	37.14 dBμV/m	53.98 dBμV/m	-16.84 dB	Pass	Vertical

Test Report No.: G0M-2207-1565-TFC247DT-V02

Eurofins Product Service GmbH
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Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2207-1565
 Applicant: Dräger MSI GmbH
 Model Description: Wireless gas detection transmitter
 Model: X-node 1
 Test Sample ID: 41710
 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: Schwarzbeck HWRD 650
 Measurement distance: 3 m
 Mode: Rx; SRD, Lora, 904.7 MHz
 US/CANADA
 Test Date: 2022-11-10
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
17.823 GHz	48.11 dBµV/m	74 dBµV/m	-25.89 dB	Pass	Horizontal
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
17.823 GHz	37.56 dBµV/m	53.98 dBµV/m	-16.42 dB	Pass	Horizontal

== = END OF TEST REPORT == =

Test Report No.: G0M-2207-1565-TFC247DT-V02

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