





<b>FCC TEST REPORT</b>	
<b>Co-Location</b>	
<b>Report Reference No</b>	G0M-2009-9279-TFCCOLOC-V01
<b>Testing Laboratory</b>	Eurofins Product Service GmbH
<b>Address</b>	Storkower Str. 38c 15526 Reichenwalde Germany
<b>Accreditation</b>	    <p>                     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                 </p>
<b>Applicant</b>	Dräger Safety AG & Co. KGaA
<b>Address</b>	Revalstraße 1 23560 Lübeck GERMANY
<b>Test Specification</b>	47 CFR Part 15.247
<b>Non-Standard Test Method</b>	None
<b>Equipment under Test (EUT):</b>	
<b>Product Description</b>	Fixed Gas Detector
<b>Model(s)</b>	Polytron 6100 EC WL
<b>Additional Model(s)</b>	None
<b>Brand Name(s)</b>	None
<b>Hardware Version(s)</b>	RC002
<b>Software Version(s)</b>	Transmitter: P6100 V1.5.7, Centro FW v02.00.08, Bootloader V2.5.0, SW Telit BLT V3.12.002
<b>FCC ID</b>	X6O-RC002
<b>IC</b>	5895F-RC002
<b>Test Result</b>	<b>PASSED</b>

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	2021-10-04	
Report:		
Compiled by	Odai Qawasmeh	
Tested by (+ signature) (Responsible for Test)	Odai Qawasmeh	
Approved by (+ signature) (Test Lab Engineer)	Wilfried Treffke	
Date of Issue	2022-12-12	
Total number of pages	34	
General Remarks:		
<p>The test results presented in this report relate only to the object tested.</p> <p>The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
Additional Comments:		

Additional Variants (not tested and not evaluated variants)		
Not-tested Variant	Description	
1	Product Type Description	Polytron Repeater ISA100
	Model name	Polytron Repeater ISA
	Brand name	-
	Hardware Version	RC002
	Software Version	Polytron Repeater V1.5.7, Centro FW v02.00.08, Bootloader V2.5.0, SW Telit BLT V3.12.002
	HVIN	RC002
	PMN	Polytron Repeater ISA
<p>Comment: This named additional variant above has not been tested. This additional variant of the series has been declared by the manufacturer. The test report explicitly states that this variant was neither tested nor assessed nor evaluated.</p>		

Additional Antennas (not tested and not evaluated variants)		
Not-tested Antenna	Description	
1	Type	External
	Model	1399.17.0232
	Manufacturer	Huber+Suhner
	Gain	2 dBi (declared by customer)
2	Type	External
	Model	F9915KW
	Manufacturer	Yokogawa
	Gain	2 dBi (declared by customer)
<p>Comment: Those named additional antennas above have not been tested. Those additional antennas of the series have been declared by the manufacturer. The test report explicitly states that those antennas were neither tested nor assessed nor evaluated.</p>		

## VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-12-12	Initial Release	

**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 <sub>NOM</sub>	Nominal supply voltage

**REPORT INDEX**

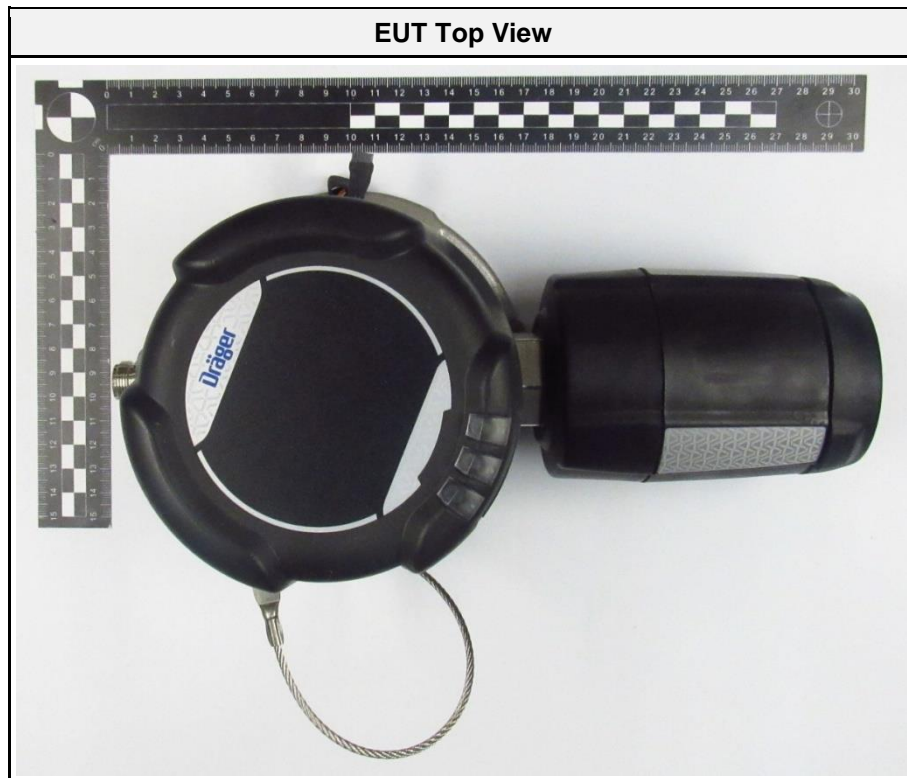
<b>1</b>	<b>Equipment (Test Item) Under Test.....</b>	<b>7</b>
1.1	Photos – Equipment External.....	8
1.2	Photos – Equipment Internal.....	13
1.3	Photos – Test Setup.....	15
1.4	Support Equipment.....	18
1.5	Test Modes.....	19
1.6	Test Frequencies.....	20
1.7	Sample emission level calculation.....	21
<b>2</b>	<b>Result Summary.....</b>	<b>22</b>
<b>3</b>	<b>Test Conditions and Results.....</b>	<b>23</b>
3.1	Test Conditions and Results – AC powerline conducted emissions.....	23
3.2	Test Conditions and Results - Transmitter radiated emissions.....	27
ANNEX A	Transmitter spurious emissions.....	30

## 1 Equipment (Test Item) Under Test

Description	Fixed Gas Detector	
Model	Polytron 6100 EC WL	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	2060092	
Test Sample Id(s)	36490	
Hardware Version(s)	RC002	
Software Version(s)	Transmitter: P6100 V1.5.7, Centro FW v02.00.08, Bootloader V2.5.0, SW Telit BLT V3.12.002	
PMN	Polytron 6100 EC WL	
HVIN	RC002	
FVIN	N/A	
HMN	N/A	
FCC ID	X6O-RC002	
IC	5895F-RC002	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency band	2400 – 2480 MHz	
Radio technologies	IEEE 802.15.4, Bluetooth LE 4.2	
Modulation	GFSK, O-QPSK	
Number of modules	1	
Radio Module (Zigbee)	Type	Zigbee Radio Module
	Model	CW24-012
	Manufacturer	Centro LLC
	HW Version	2
	SW Version	V1.5.02c
	FCC ID	2ANDP-CW24-012
	IC	23069-CW24012
Radio Module (Bluetooth)	Type	Bluetooth Module
	Model	BlueMod + S42 ATEX
	Manufacturer	Telit Communication
	HW Version	BE890D2SY3ATAI1
	SW Version	3.012.0002
	FCC ID	RFRMS42
	IC	4957A-MS42
Antenna (Zigbee)	Type	External
	Model	1399.17.0237
	Manufacturer	Huber+Suhner
	Gain	2 dBi
Antenna (Bluetooth)	Type	Integrated ceramic chip antenna
	Model	Not specified
	Manufacturer	Not specified
	Gain	2 dBi
Supply Voltage 1	V <sub>NOM</sub>	24 VDC
Supply Voltage 2	V <sub>NOM</sub>	14.4 VDC (Battery)
Operating Temperature	T <sub>NOM</sub>	20 °C
Manufacturer	Dräger Safety AG & Co. KGaA Revalstraße 1 23560 Lübeck GERMANY	

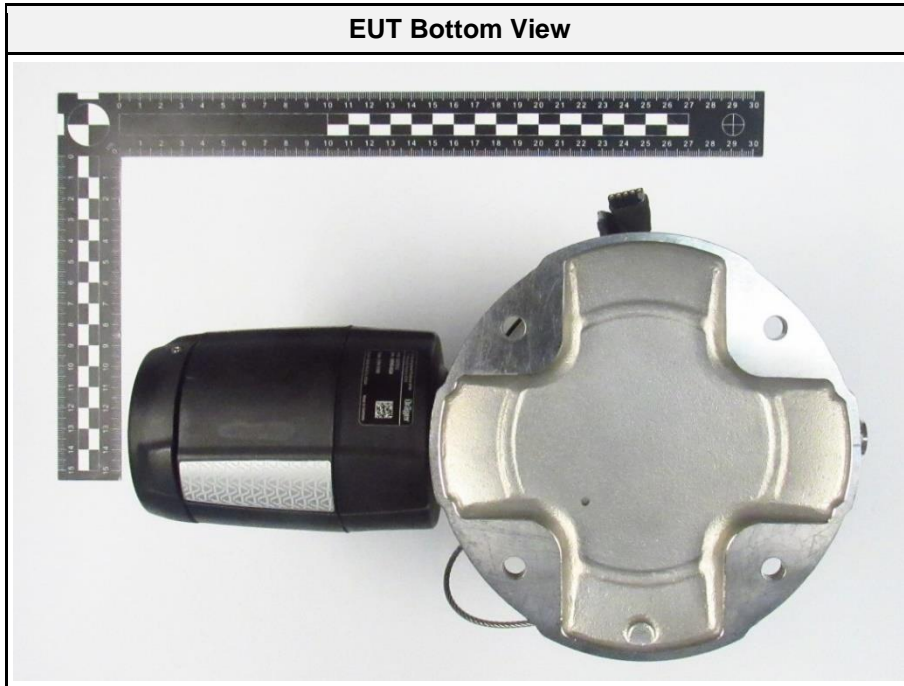
Test Report No.: G0M-2009-9279-TFCCOLOC-V01

1.1 Photos – Equipment External

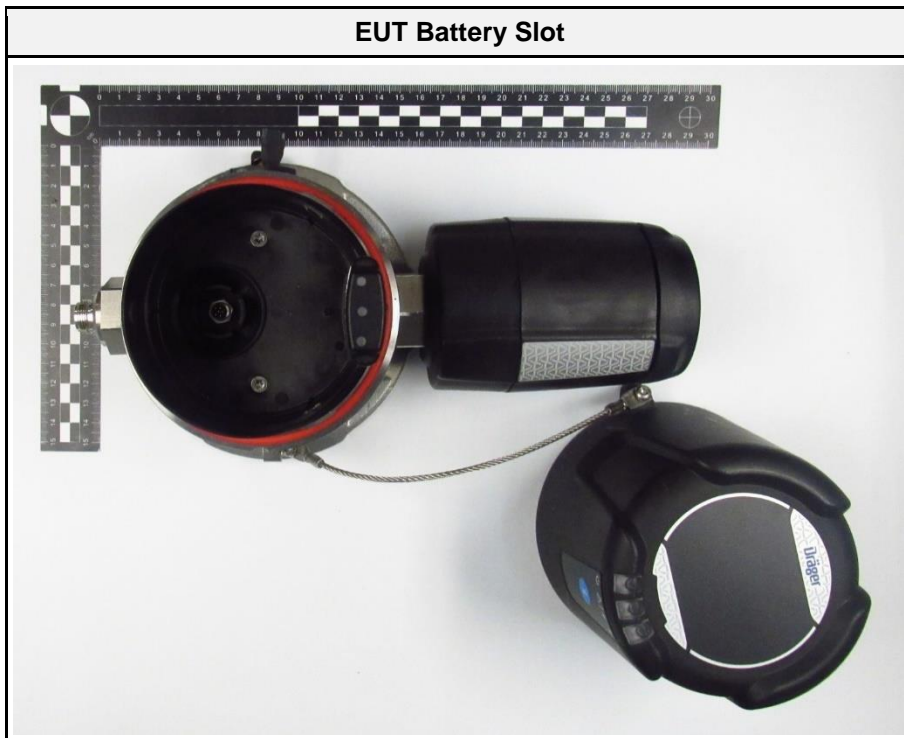


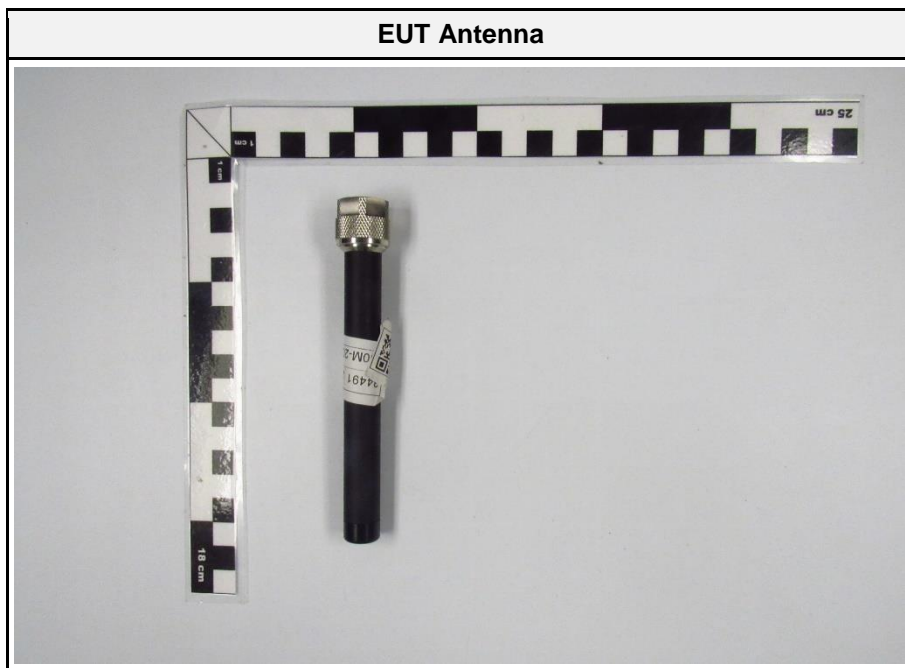
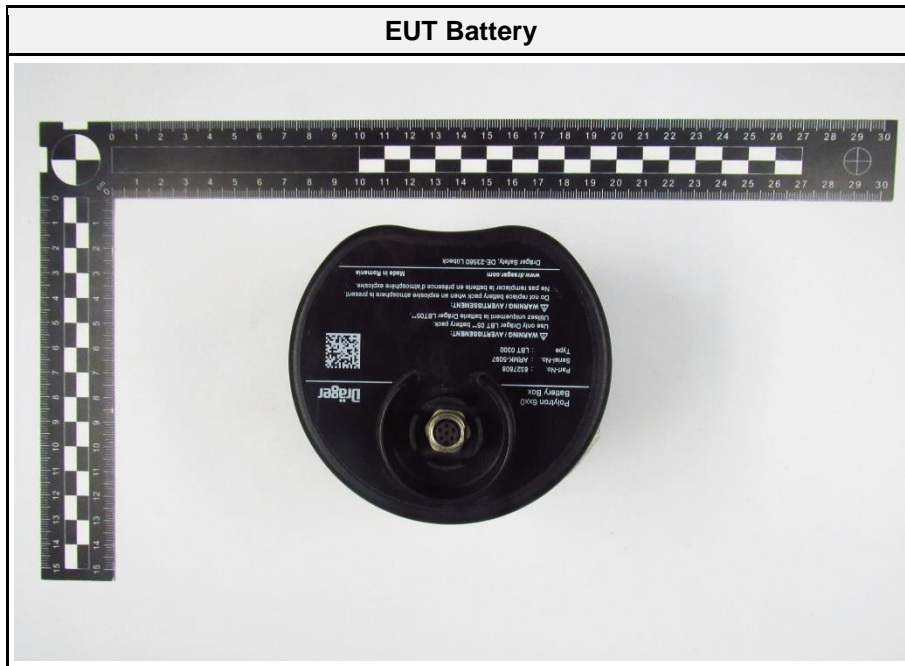


EUT Bottom View



EUT Battery Slot

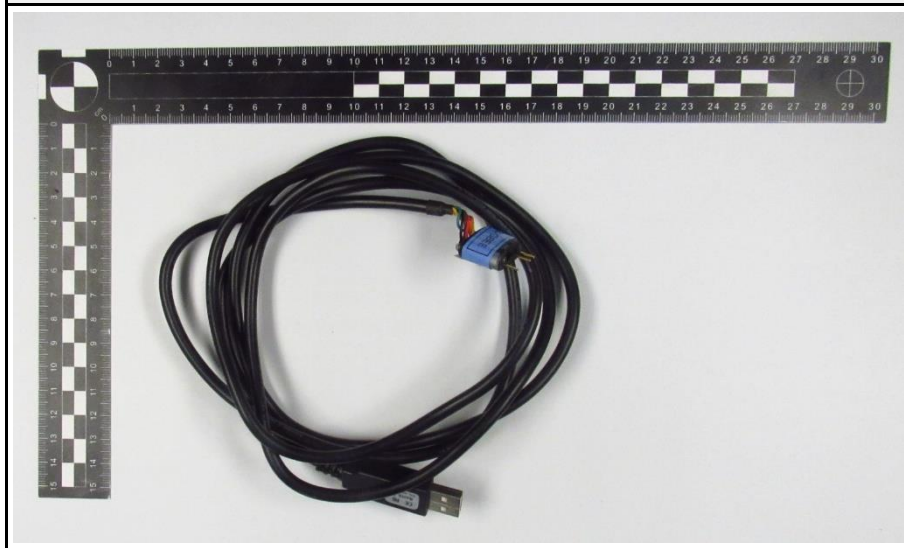




**USB Cable for BT Mode**



**USB Cable for Zigbee Mode**



**EUT with auxiliary equipment (Zigbee)**

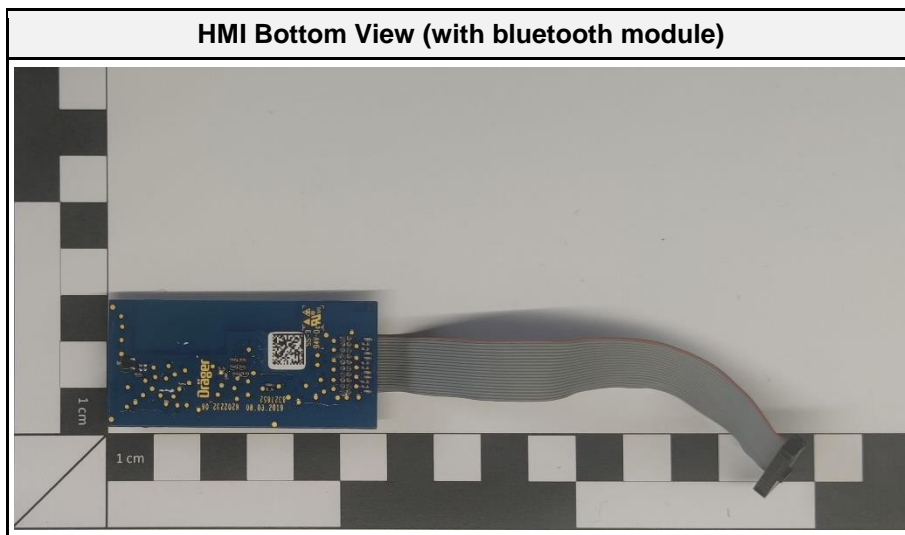
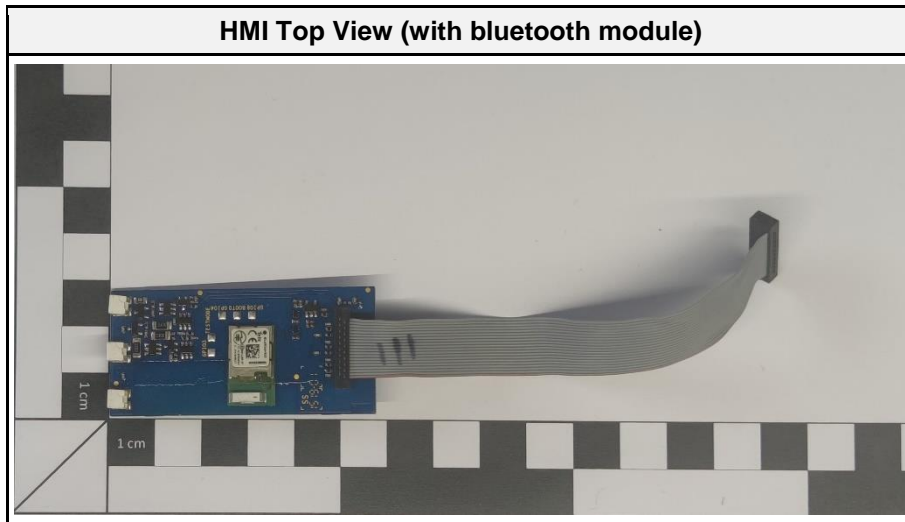


**EUT with auxiliary equipment (Bluetooth)**

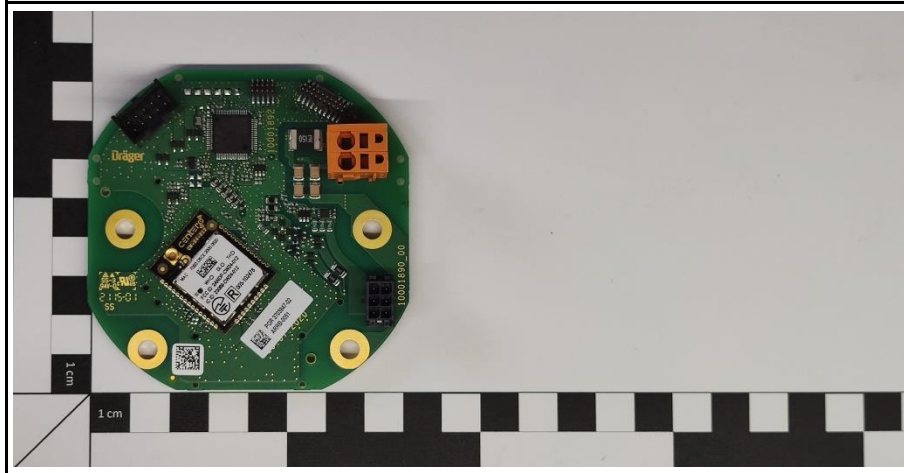




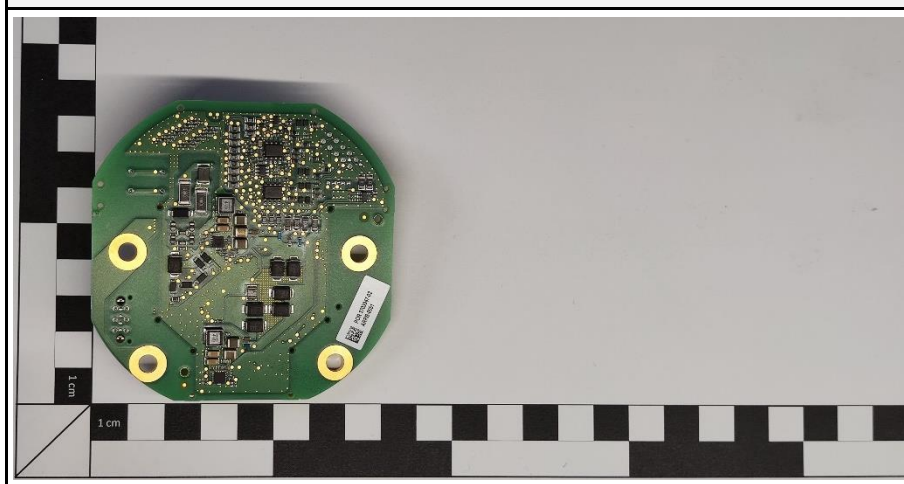
1.2 Photos – Equipment Internal



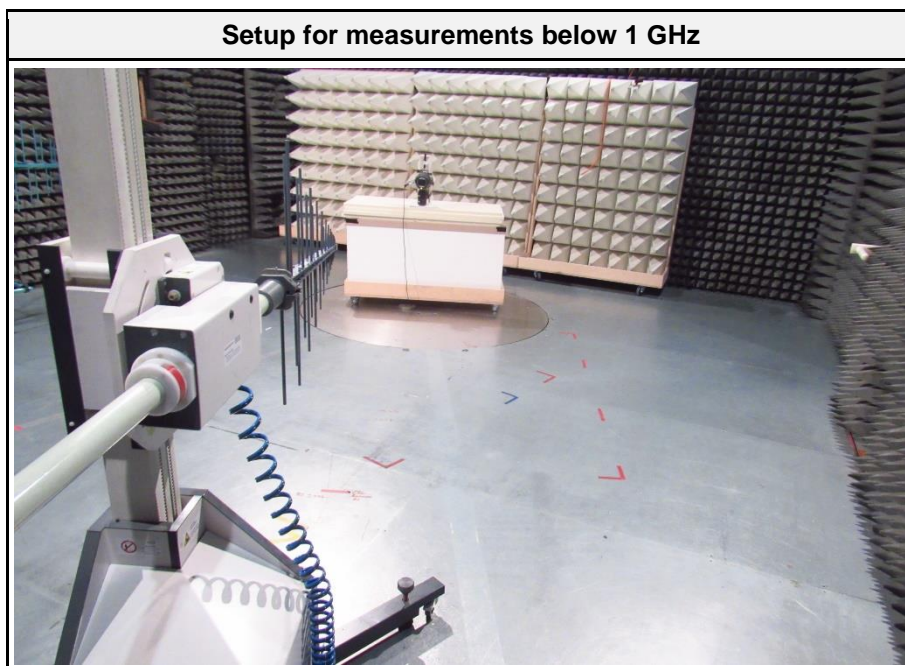
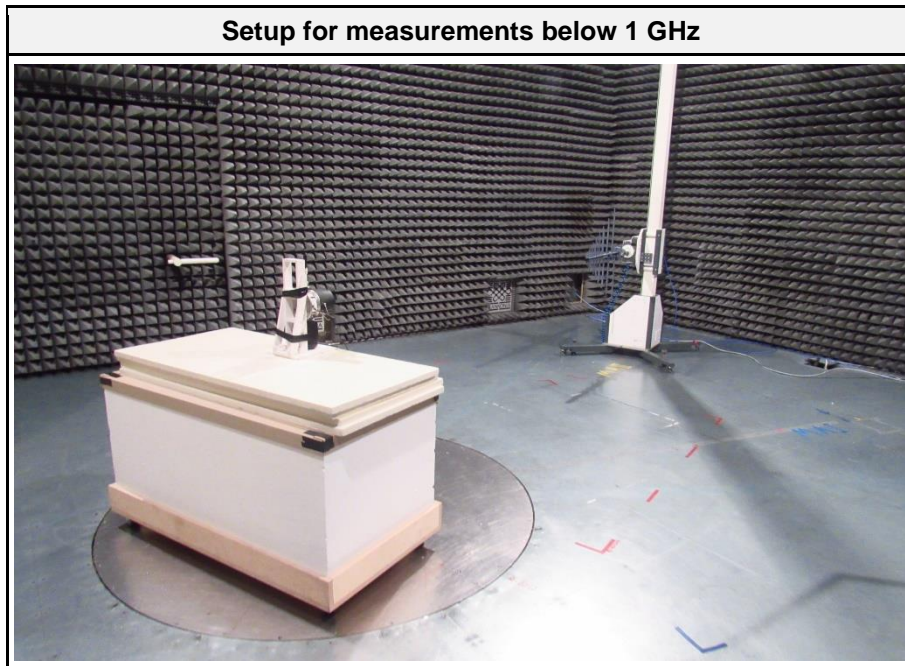
**SWEETII Top (main board with ISA100)**



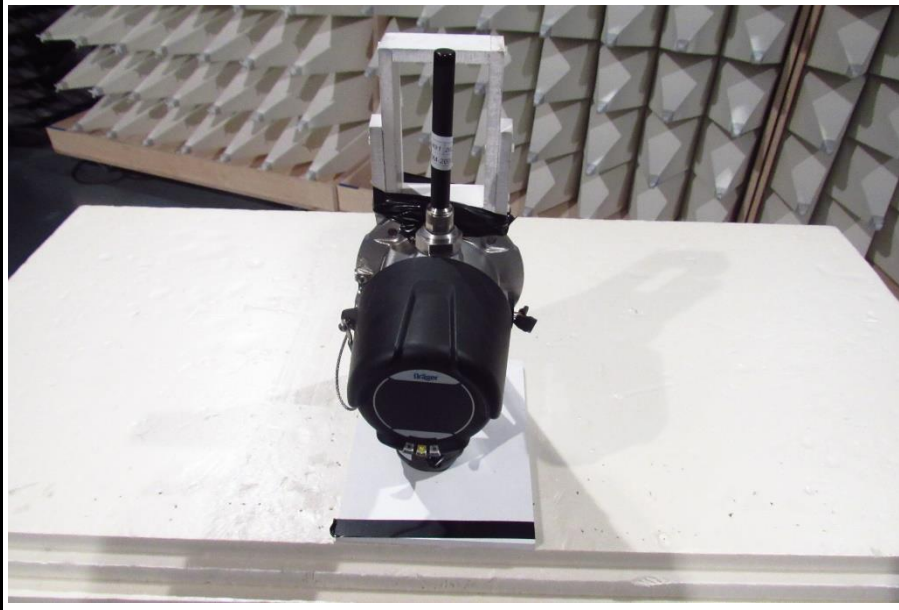
**SWEETII Bottom (main board with ISA100)**



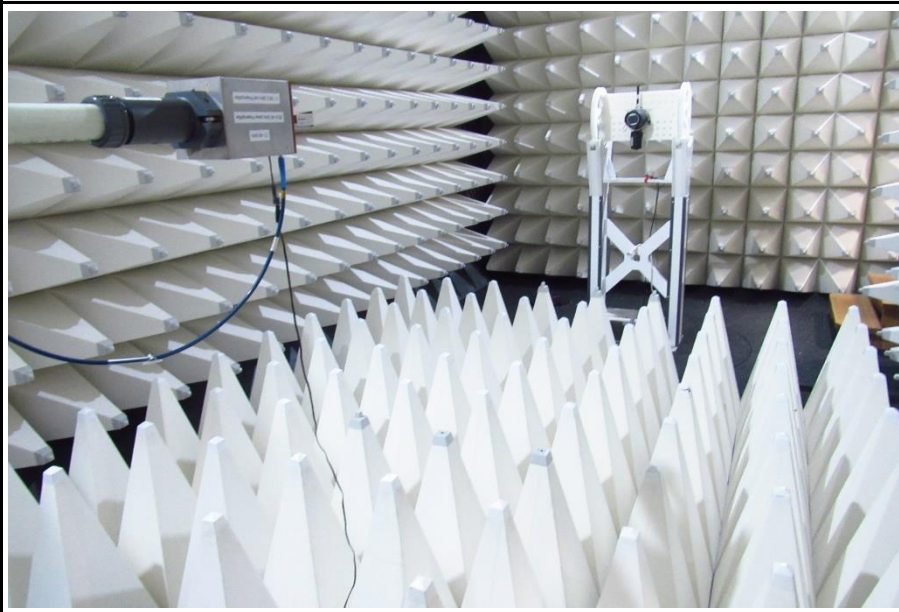
### 1.3 Photos – Test Setup



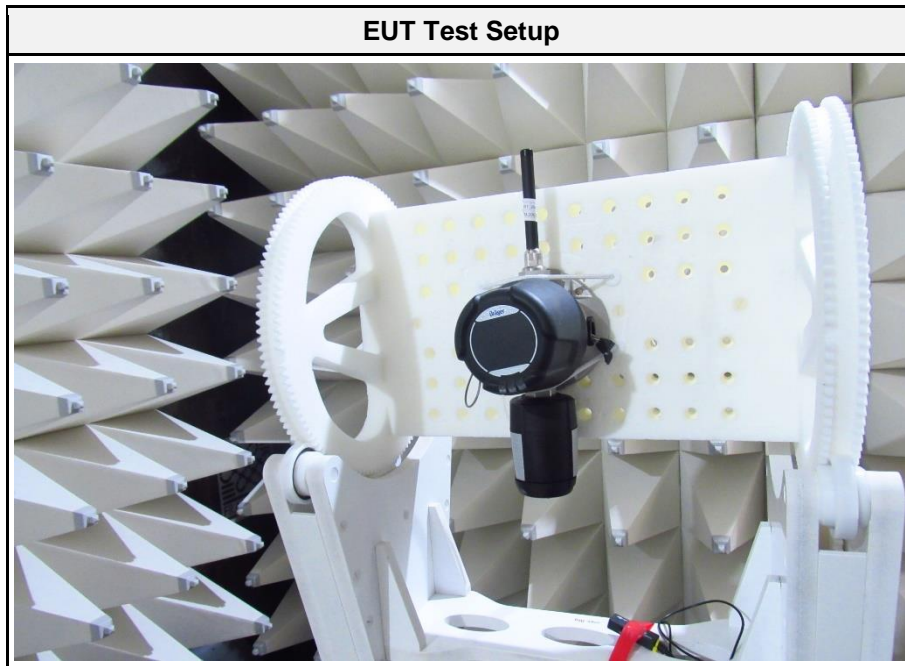
**EUT Test Setup**



**Setup for measurements above 1 GHz**







#### 1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Notebook	Dell	-	-
CBL	USB cable	-	-	for configuring test modes
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

## 1.5 Test Modes

Mode	Description
IEEE 802.15.4	Mode = Transmit Modulation = QPSK Channel 11 (2405 MHz) Bandwidth = 5 MHz Power setting = 10 Data rate = 250 kbps
BT-LE	Mode = Transmit Modulation = GFSK Channel = 0 (2402 MHz) Data rate = 1 Mbps Duty Cycle = 64% Spreading = None
Receive	Mode = Receive
<p><b>Comment 1:</b> Worst case for BT-LE was found in module test report number 1-2078/16-01-05-A issued by CETECOM ICT Services on 2016-09-07.</p> <p><b>Comment 2:</b> Worst case for IEEE 802.15.4 was found in module test report number 17-0343 issued by US Tech on 2017-11-10.</p> <p><b>Comment 3:</b> Packet Length, Packet Type and Power could not be adjusted for BT-LE with provided software tool.</p>	

## 1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	11	2405
F2	Tx	0	2402

### 1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

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

Net:

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

Limit:

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

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

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	=	Net Reading	:	Net reading - FCC limit	=	Margin
+21.5 dBµV + 26 dB/m		= 47.5 dBµV/m		47.5 dBµV/m - 57.0 dBµV/m		= -9.5 dB

## 2 Result Summary

FCC 47 CFR Part 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	
47 CFR 15.207	AC power line conducted emissions	ANSI C63.4-2014	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

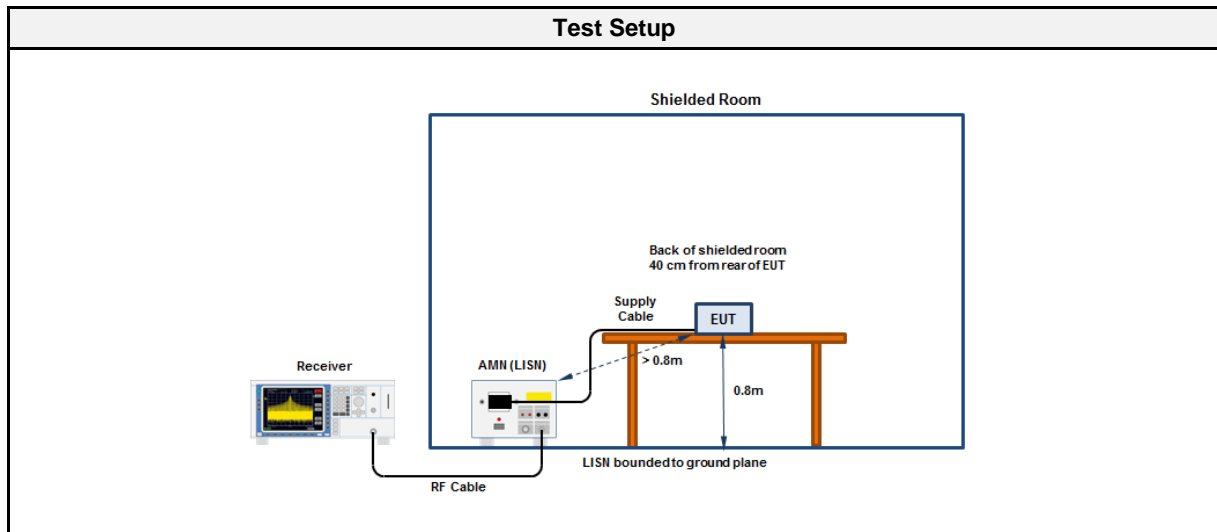
Test Information	
Reference	FCC § 15.207
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Odai Qawasmeh
Date	2022-06-27

##### 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

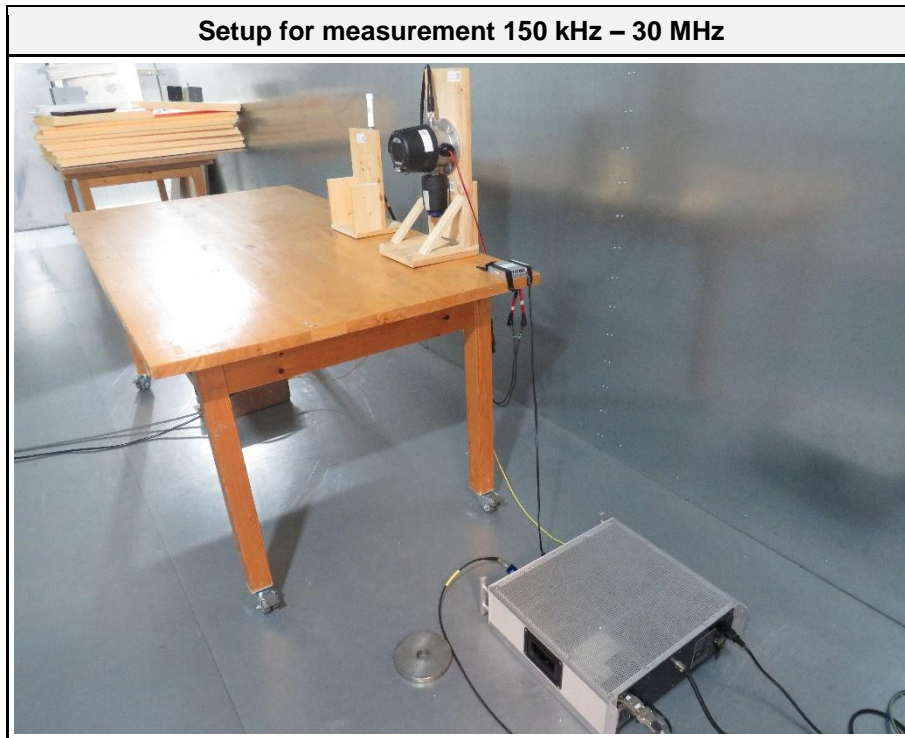


##### 3.1.4 Equipment

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	2021-08	2022-08
Pulse Limiter	R&S	ESH3-Z2	EF01222	2021-07	2022-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2021-07	2022-07

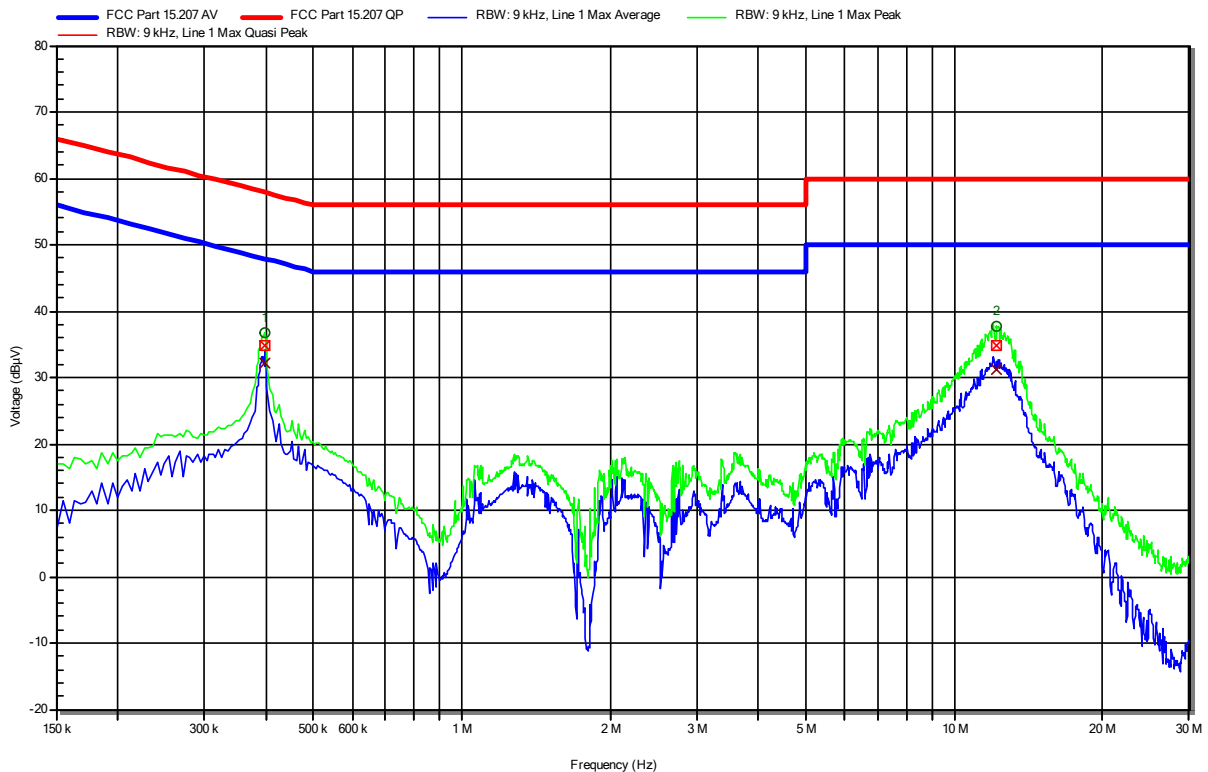
3.1.5 Setup Photos





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

Project Number: G0M-2009-9279  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40294  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Neuner  
 Test Date: 2022-06-27  
 Operating Conditions: ambient temperature: 24.6 °Celsius  
 LISN: Schwarzbeck NSLK 8127  
 Operational Mode: IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 EUT Configuration: BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Applied to Port: 120 VAC, 60Hz  
 Note 1:



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	397.05 kHz	34.71 dBµV	57.91 dBµV	-23.21 dB	Pass	Line 1
2	12.201 MHz	34.75 dBµV	60 dBµV	-25.25 dB	Pass	Line 1

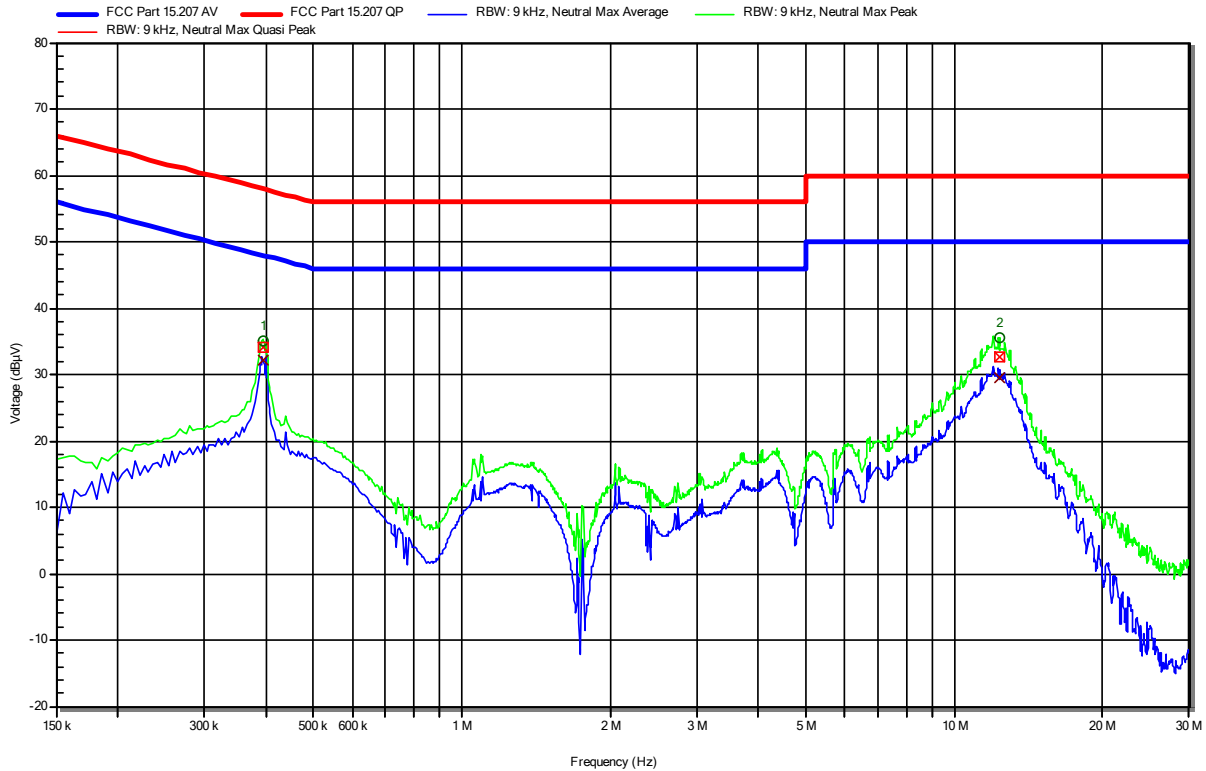
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	397.05 kHz	32.26 dBµV	47.91 dBµV	-15.66 dB	Pass	Line 1
2	12.201 MHz	31.22 dBµV	50 dBµV	-18.78 dB	Pass	Line 1

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

Project Number: G0M-2009-9279  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40294  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Neuner  
 Test Date: 2022-06-27  
 Operating Conditions: ambient temperature: 24.6 °Celsius  
 LISN: Schwarzbeck NSLK 8127  
 Operational Mode: IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 EUT Configuration: BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Applied to Port: 120 VAC, 60Hz  
 Note 1:

Index 43

**RadiMation**



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	393.9 kHz	34.21 dBµV	57.98 dBµV	-23.77 dB	Pass	Neutral
2	12.332 MHz	32.75 dBµV	60 dBµV	-27.25 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	393.9 kHz	32.09 dBµV	47.98 dBµV	-15.89 dB	Pass	Neutral
2	12.332 MHz	29.46 dBµV	50 dBµV	-20.54 dB	Pass	Neutral

### 3.2 Test Conditions and Results - Transmitter radiated emissions

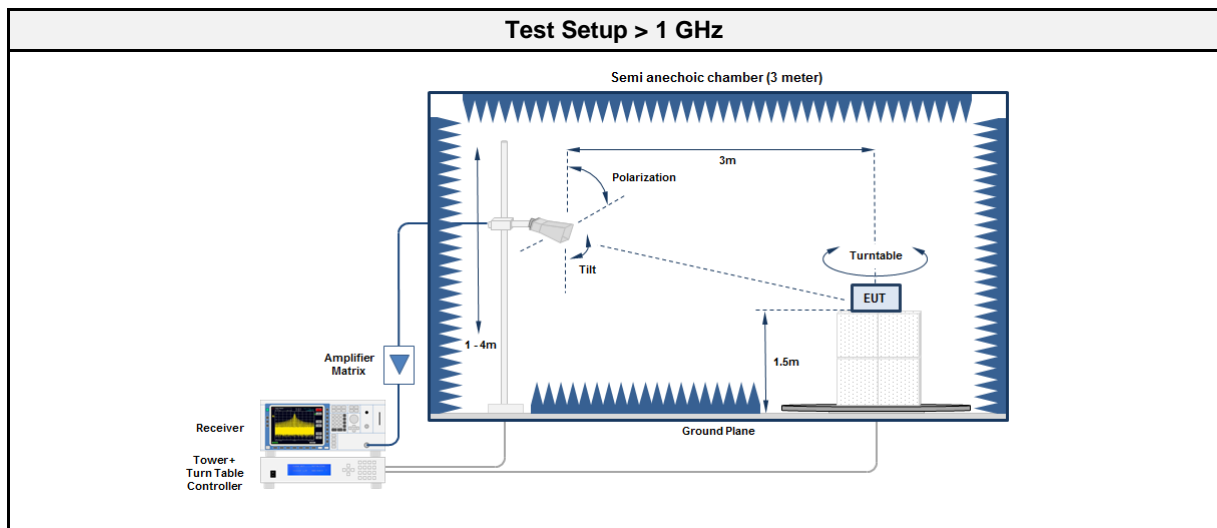
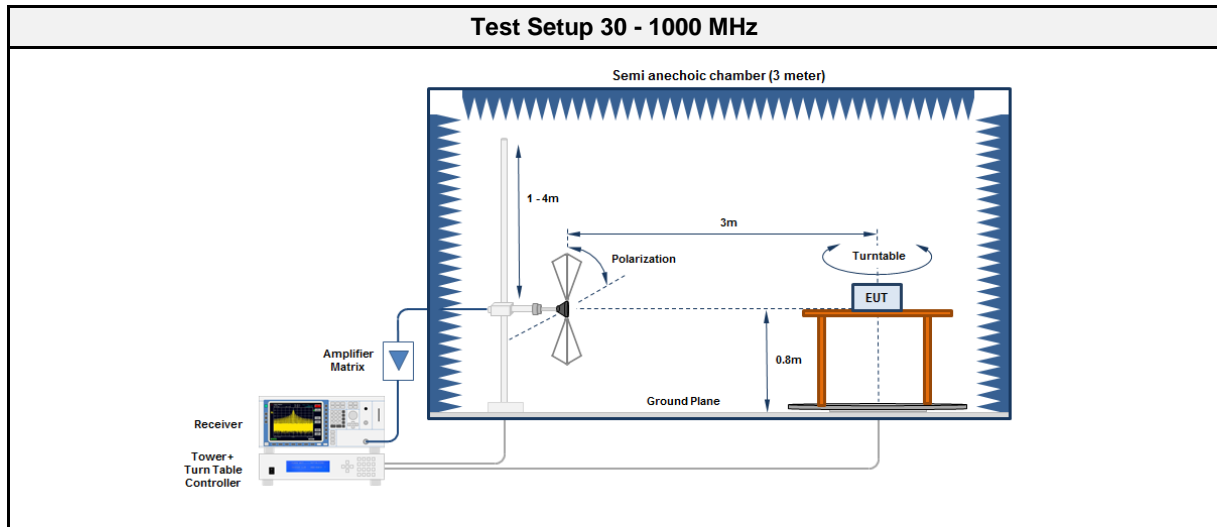
#### 3.2.1 Information

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	2022-06-29

#### 3.2.2 Limits

Limits - Restricted frequency bands and below 1 GHz			
Frequency [MHz]	Detector	Field strength [ $\mu\text{V}/\text{m}$ ]	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



## 3.2.4 Equipment

Test Equipment 30 - 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	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL223	EF00187	2022-06	2025-06

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC 2	EF01616	2021-09	2022-09
Spectrum analyzer	R&S	FSU43	EF01631	2021-07	2022-07
Horn antenna	Schwarzbeck	BBHA 9120B	EF01678	2021-03	2024-03
Horn Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2024-03
Antenna	Amplifier Research	AT4560	EF00302	2021-06	2023-06

3.2.5 Procedure

<b>Test Procedure 30 - 1000 MHz</b>	
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

<b>Test Procedure &gt; 1 GHz</b>	
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

<b>Test Results – IEEE 802.15.4 + BT-LE</b>						
Frequency [MHz]	Emission [MHz]	Level [dBµV/m]	Detector	Pol.	Limit [dBµV/m]	Margin [dB]
2405 + 2402	4810.9	52.36	pk	ver	74.00	-21.64
2405 + 2402	4810.9	46.60	avg	ver	54.00	-07.40
2405 + 2402	18403	48.34	pk	ver	74.00	-25.66
2405 + 2402	18403	36.35	avg	ver	54.00	-17.65

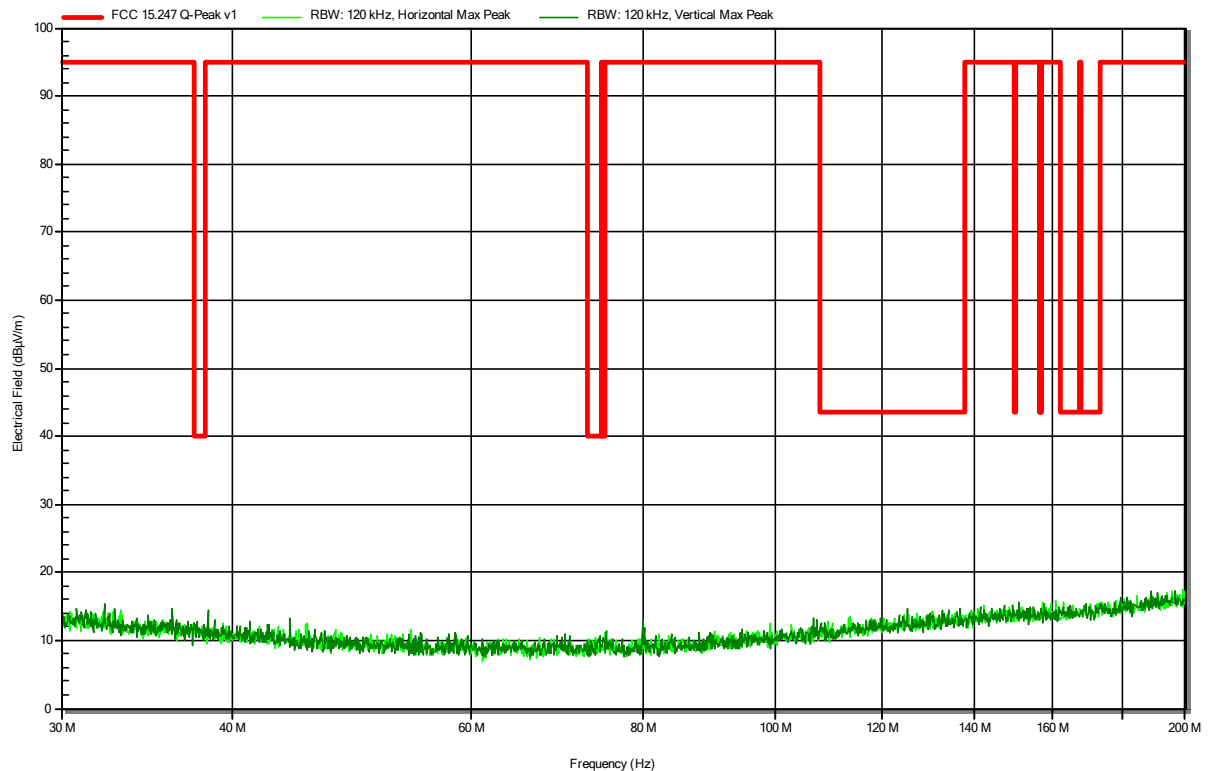
## ANNEX A Transmitter spurious emissions

### Radiated Spurious Emissions according to FCC 15.247

Project Number: G0M-2009-9278  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40425  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Voigt  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 24 °Celsius, Vnom:  
 Antenna: Rohde & Schwarz HK 116  
 Measurement distance: 3 m  
 Mode: Tx; IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Test Date: 2022-06-30  
 Note:

Index 19

RadiMation

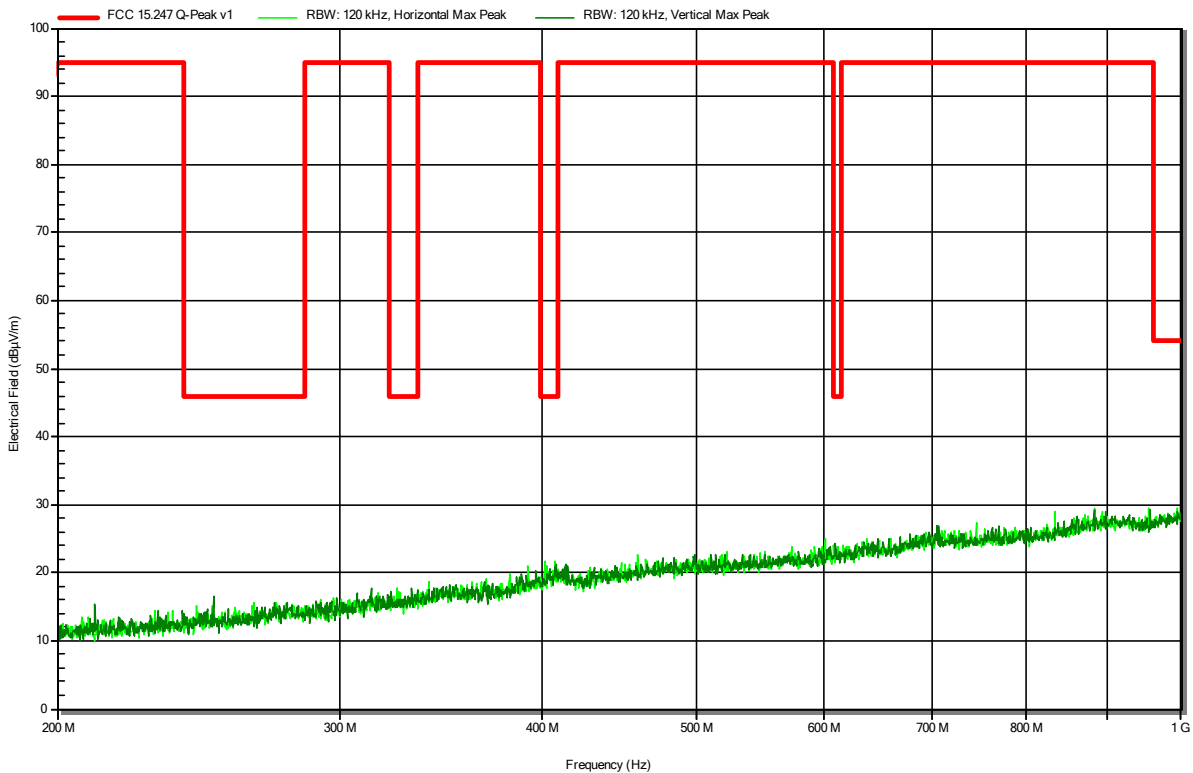


### Radiated Spurious Emissions according to FCC 15.247

Project Number: G0M-2009-9278  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40425  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Voigt  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 24 °Celsius, Vnom:  
 Antenna: Rohde & Schwarz HL 223  
 Measurement distance: 3 m  
 Mode: Tx; IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Test Date: 2022-06-30  
 Note:

Index 18

**RadiMation**

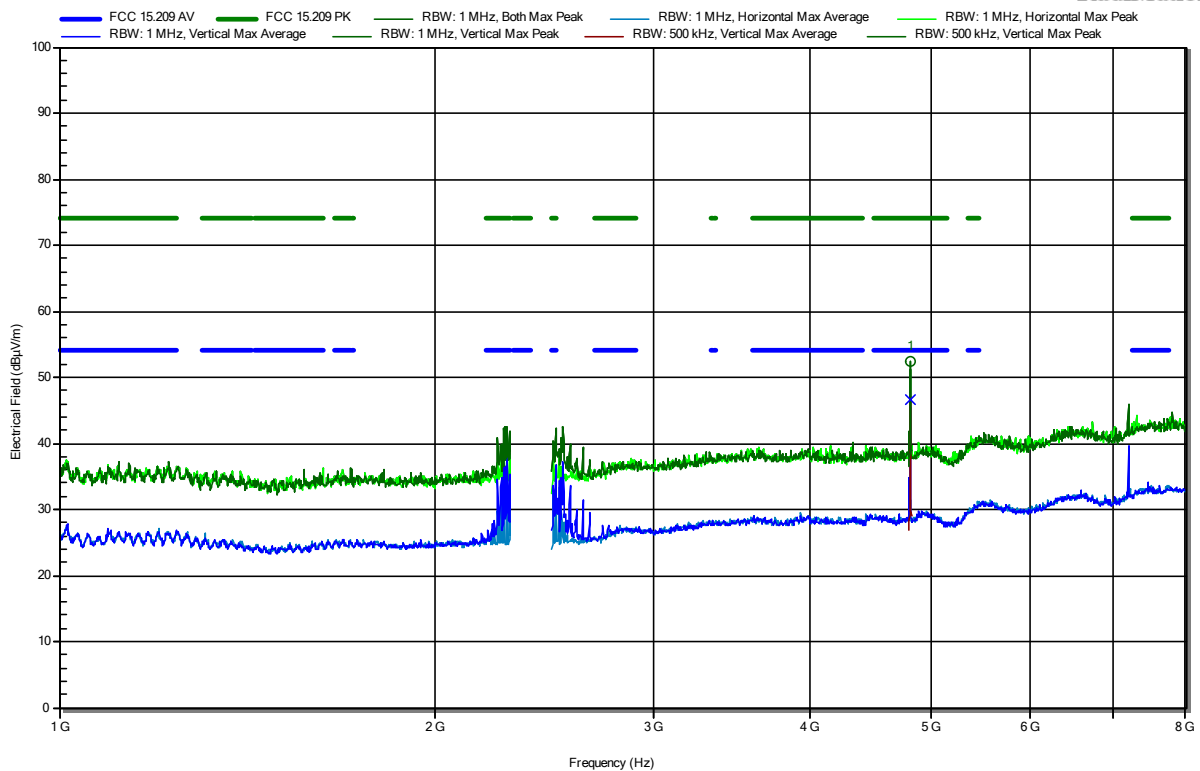


### Radiated Spurious Emissions according to FCC 15.247

Project Number: G0M-2009-9278  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40425  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Qawasmeh  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 24 °Celsius, Vnom:  
 Antenna: Schwarzbeck BBHA 9120B  
 Measurement distance: 3 m  
 Mode: Tx; IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Test Date: 2022-06-29  
 Note:

Index 15

RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.8109 GHz	52.36 dBµV/m	74 dBµV/m	-21.64 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.8109 GHz	46.6 dBµV/m	54 dBµV/m	-7.4 dB	Pass	Vertical

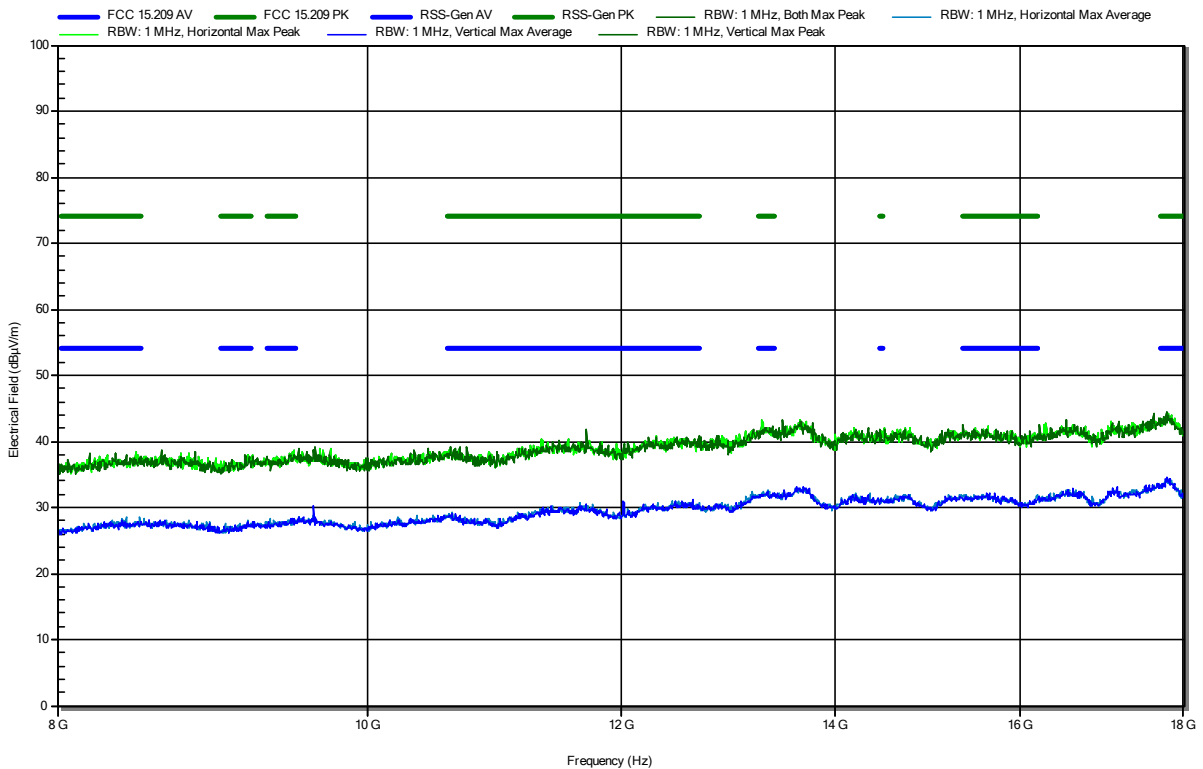


### Radiated Spurious Emissions according to FCC 15.247

Project Number: G0M-2009-9278  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40425  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Qawasmeh  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 24 °Celsius, Vnom:  
 Antenna: Schwarzbeck HWRD 650  
 Measurement distance: 3 m  
 Mode: Tx; IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Test Date: 2022-06-29  
 Note:

Index 16

**RadiMation**

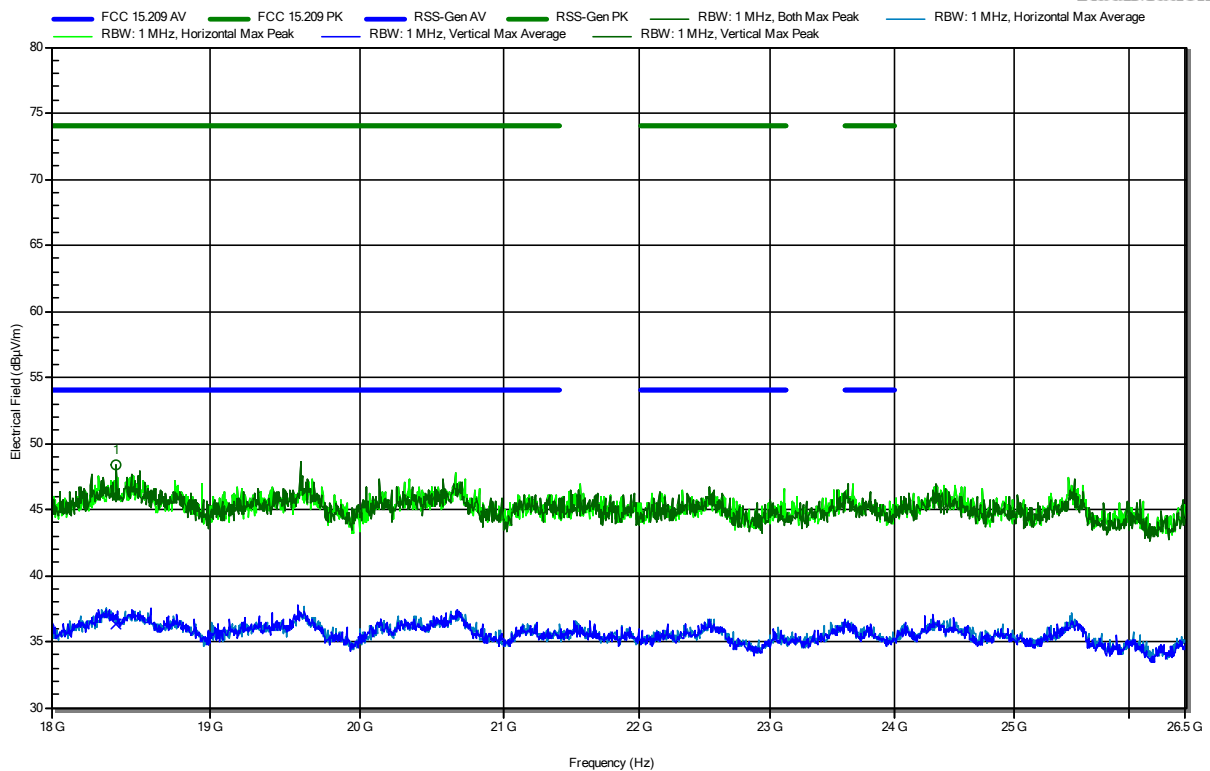


### Radiated Spurious Emissions according to FCC 15.247

Project Number: G0M-2009-9278  
 Applicant: Dräger Safety AG & Co. KGaA  
 Model Description: Fixed Gas Detector  
 Model: Polytron 6100 EC WL  
 Test Sample ID: 40425  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Qawasmeh  
 Measurement software: RadiMation, version 2020.1.8  
 Test Conditions: Tnom: 24 °Celsius, Vnom:  
 Antenna: Amplifier Research AT4560  
 Measurement distance: 3 m  
 Mode: Tx; IEEE 802.15.4, 10 dBm Output Power, 2405 MHz  
 BT-LE, 1 Mbps, 2402 MHz, PRBS9  
 Test Date: 2022-06-29  
 Note:

Index 17

**RadiMation**



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
18.403 GHz	48.34 dBµV/m	74 dBµV/m	-25.66 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
18.403 GHz	36.35 dBµV/m	54 dBµV/m	-17.65 dB	Pass	Vertical

=== END OF TEST REPORT ===

Test Report No.: G0M-2009-9279-TFCCOLOC-V01

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