




<b>EMC TEST REPORT</b> <b>FCC 47 CFR Part 15B, ISED ICES-003 Issue 6</b>	
<b>Report Reference No</b>	G0M-1808-7604-EF0115B-V01
<b>Testing Laboratory</b>	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 <p>A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 ISED Testing Laboratory site: 3470A-2</p>
<b>Applicant</b>	Dräger Safety AG & Co. KGaA
Address	Revalstraße 1 23560 Lübeck GERMANY
<b>Test Specification</b>	
Standard	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014
Non-Standard Test Method	None
<b>Equipment under Test (EUT):</b>	
Product Description	Handheld gas measurement tool
Model(s)	X-act 7000
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	8610820
Software Version(s)	v0.0.1102
FCC-ID	X6O-RF001
IC	5895F-RF001
<b>Test Result</b>	<b>PASSED</b>

<b>Possible test case verdicts:</b>		
required by standard but not tested	N/T	
not required by standard	N/R	
required by standard but not appl. to test object	N/A	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
<b>Testing:</b>		
Date of receipt of test item	2018-12-21	
<b>Report:</b>		
Compiled by	Stefan Dose	
Tested by (+ signature) (Responsible for Test)	Stefan Dose	  .....
	Jens Marquardt	
Approved by (+ signature) (Head of Lab)	Christian Weber	 .....
Date of Issue	2019-03-27	
Total number of pages	25	
<b>General Remarks:</b>		
<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>		
<b>Additional Comments:</b>		

**ABBREVIATIONS AND ACRONYMS**

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T <sub>NOM</sub>	Nominal operating temperature
V <sub>NOM</sub>	Nominal supply voltage

**VERSION HISTORY**

Version History			
Version	Issue Date	Remarks	Revised By
01	2019-03-27	Initial Release	

**REPORT INDEX**

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## 1 Equipment (Test Item) Under Test

Description	Handheld gas measurement tool	
Model	X-act 7000	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	LRLH-0017	
Hardware Version(s)	8610800	
Software Version(s)	v0.0.1102	
FCC-ID	X6O-RF001	
IC	5895F-RF001	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	90	
Radio Module	Type	RFID module
	Model	unspecified
	Manufacturer	unspecified
Supply Voltage	V <sub>NOM</sub>	7.5 VDC (5x 1.5V AA-battery)
Manufacturer	Plexus Deutschland GmbH Bratustrasse 7 Darmstadt Design Center 64293 Darmstadt GERMANY	

**1.1 Equipment Ports**

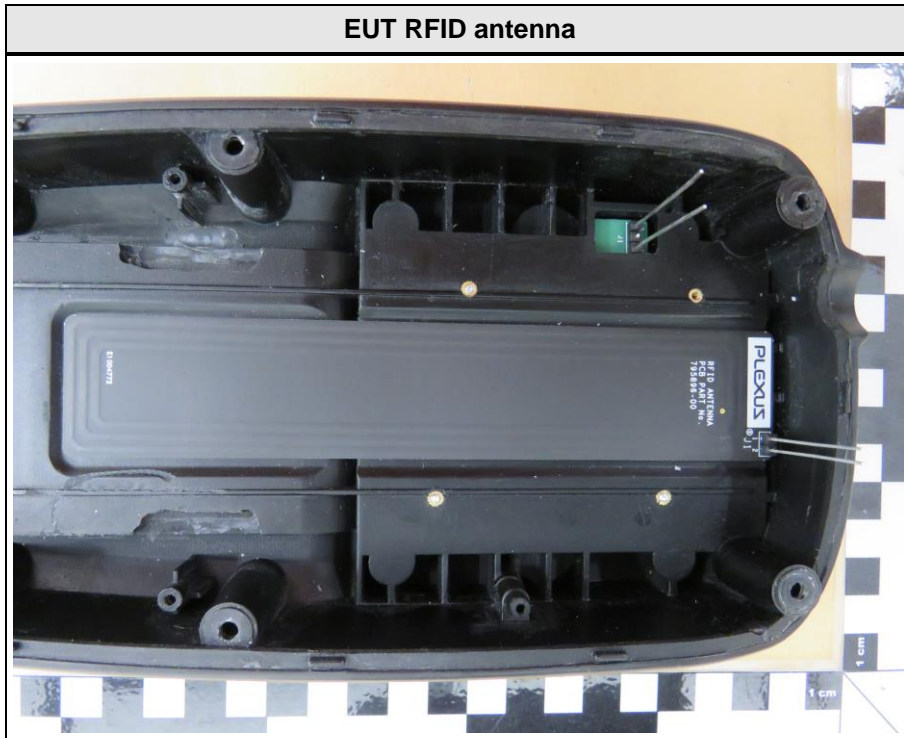
Name	Type	Attributes	Comment
USB	IO	Count: 1 Direction: IO Service only: Yes	housing did not contain a cover for this port while testing, customer declares: in future there will be a cover secured by screw
IRDA	NE	Count: 1 Direction: IO Service only: No	-
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		

## 1.2 Equipment Photos - Internal

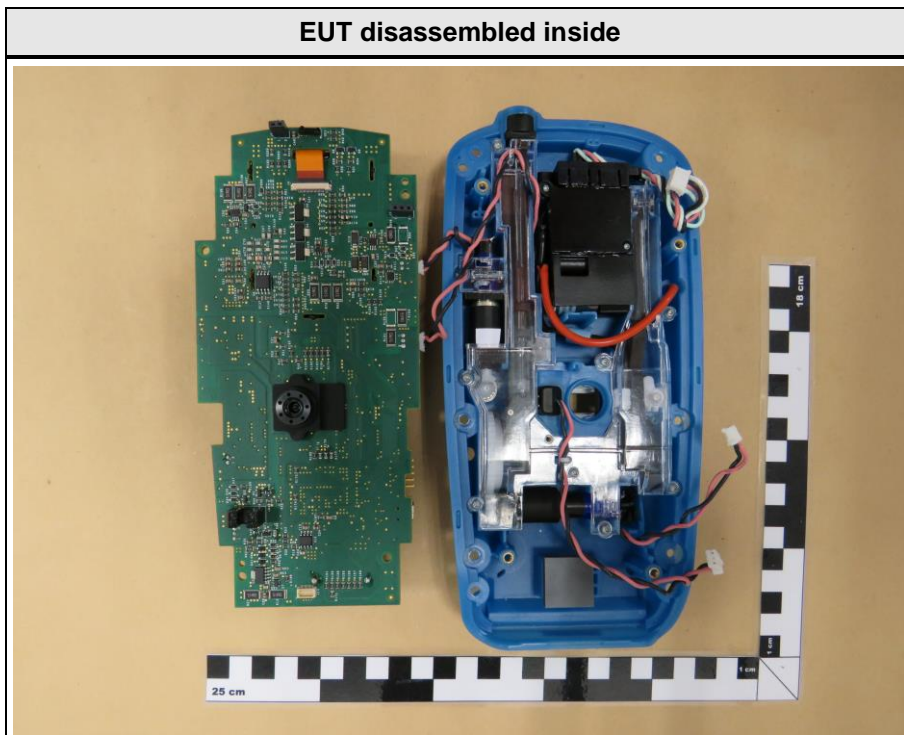




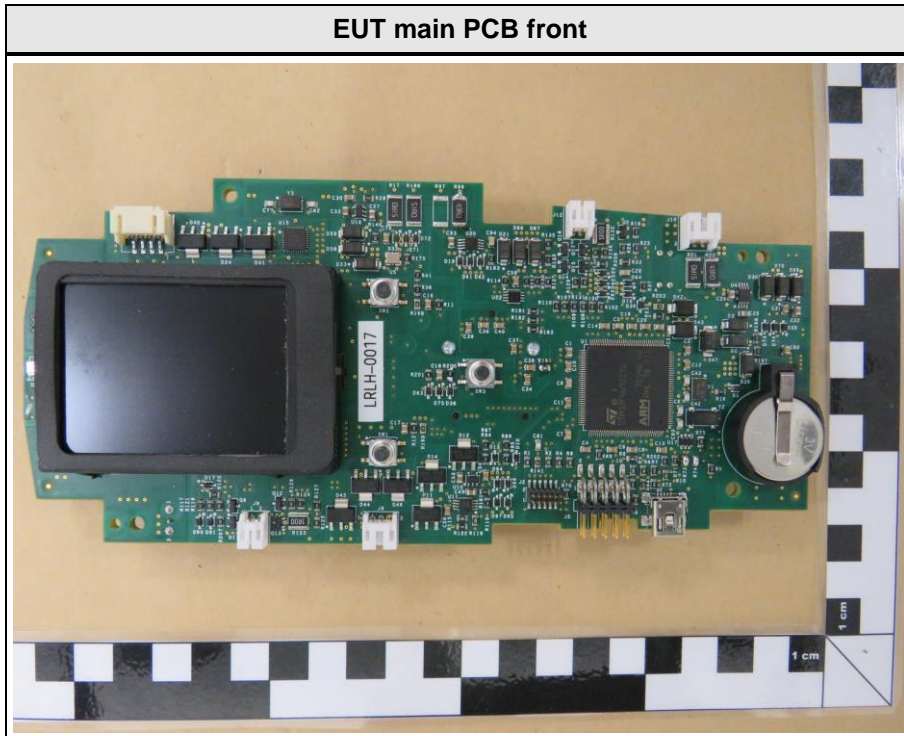
EUT RFID antenna



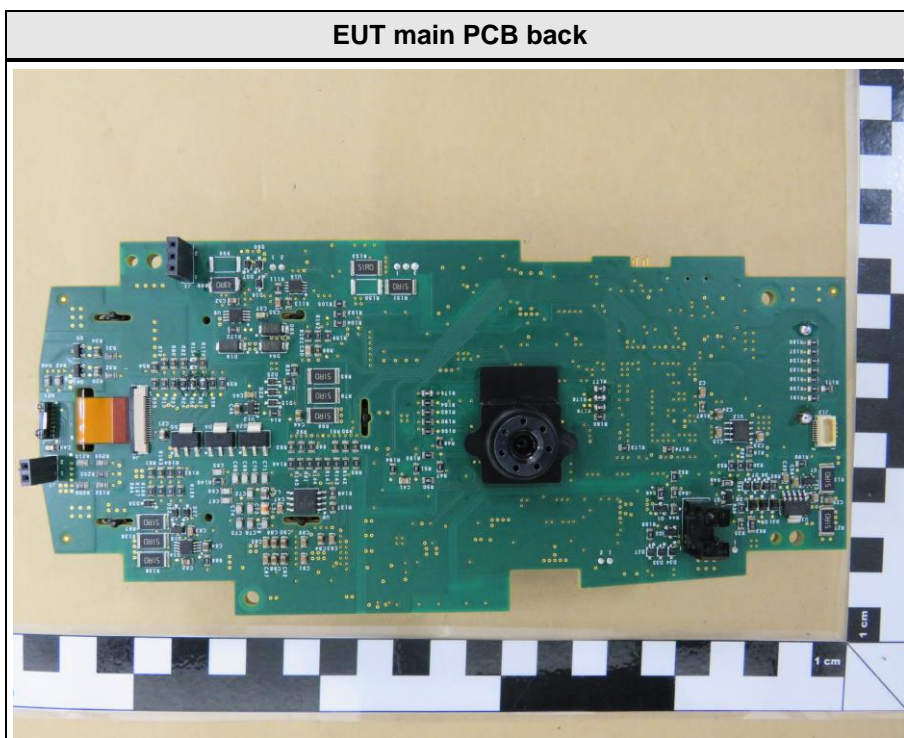
EUT disassembled inside



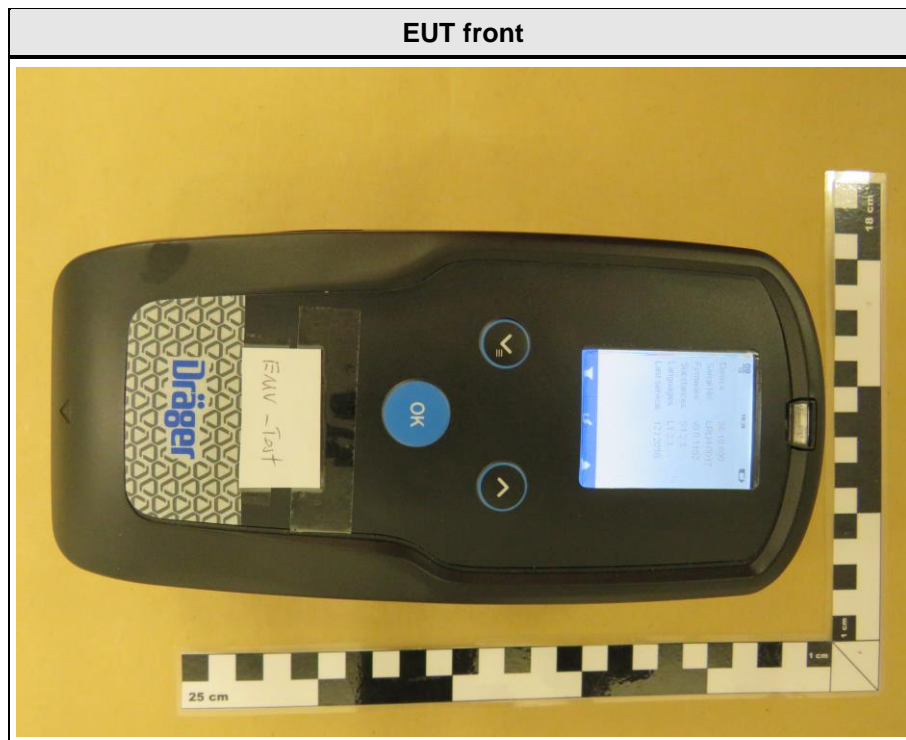
EUT main PCB front



EUT main PCB back

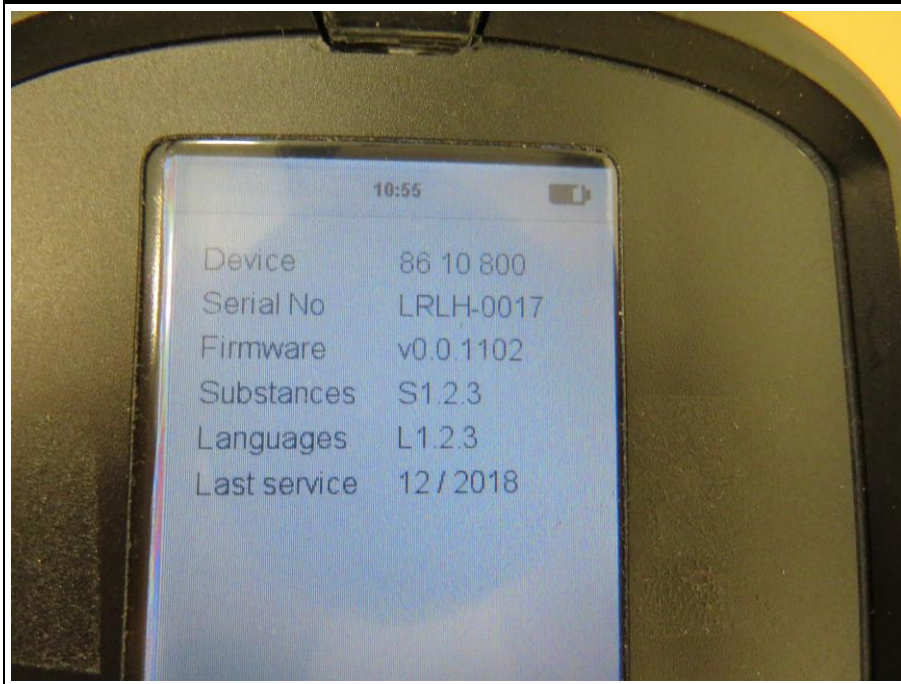


### 1.3 Equipment Photos - External





**EUT display with device info**



**EUT USB port without cover**



#### 1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	external airpump with coupler	Dräger MSI	X-am pump	type: GEP 0200
AE	1.5V AA battery	Duracell	Plus Power	5 pieces
AE	micro tubes	Dräger Safety AG	-	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

### 1.5 Operational Modes

Mode #	Description
1	EUT performs a gas measurement.
Comment:	

## 1.6 EUT Configuration

Configuration #	Description
1	EUT is powered up via internal batteries. The external air pump is connected to the EUT via coupler. A Dräger Micro-Tube (substance specific chemical gas sensor) is put into the EUT. The air pump is pumping air inside the EUT, which performs a gas measurement with the standard chip inside.
Comment:	

### 1.7 Sample emission level calculation

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

Reading:

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

A.F.:

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

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

Net:

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

Limit:

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

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

Margin:

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

Example only:

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



## 2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 8, 6.1	Radiated emissions	ANSI C63.4:2014	PASS	-
FCC 15.107 ICES-003, 8, 6.2	AC power line conducted emissions	ANSI C63.4:2014	N/R	-
Comment:				

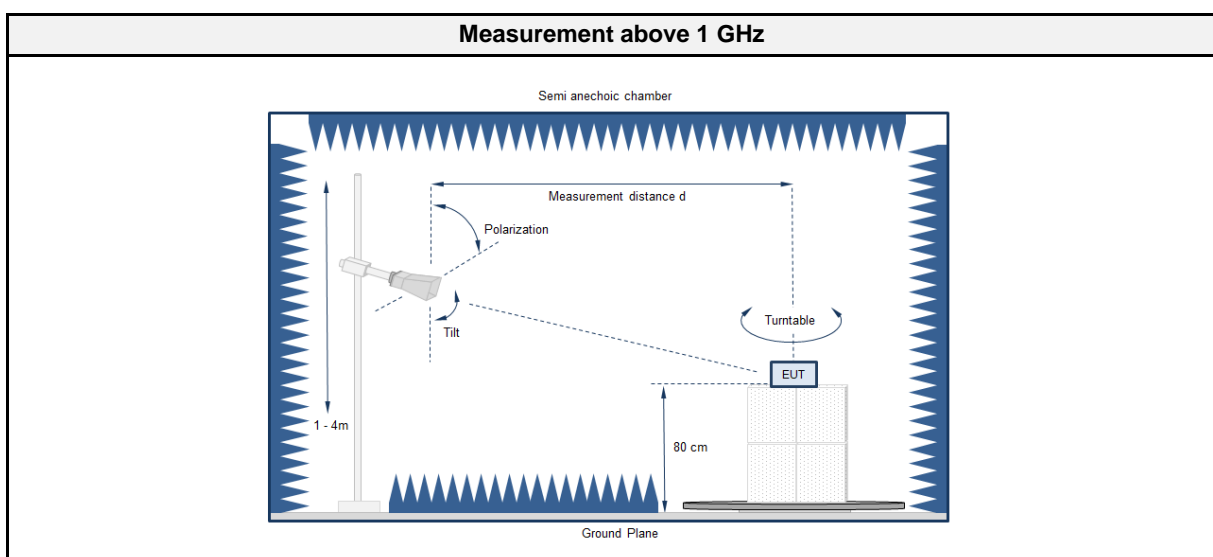
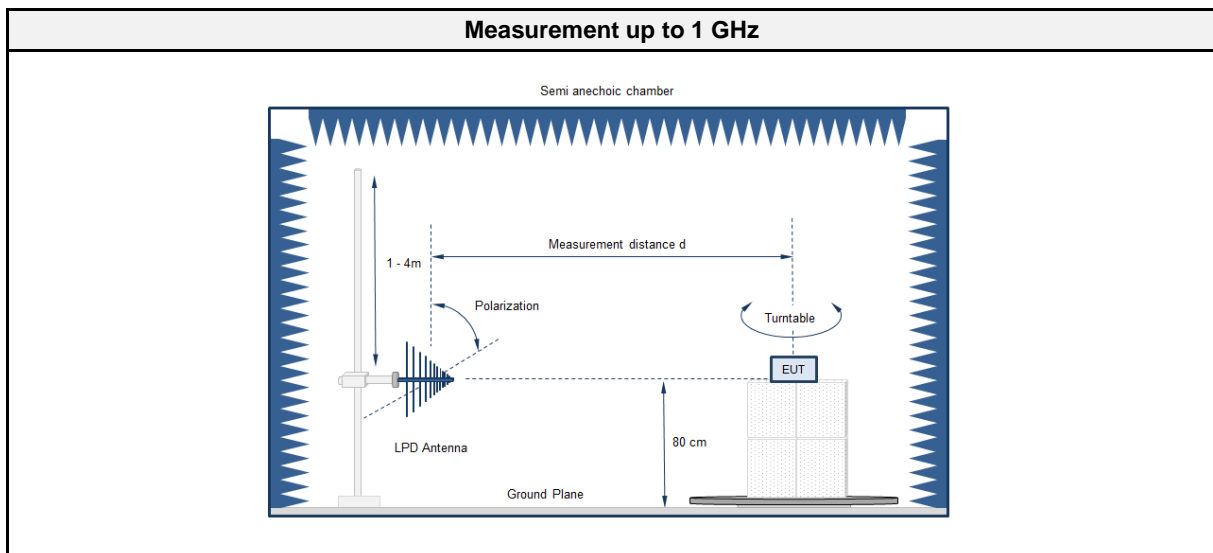
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

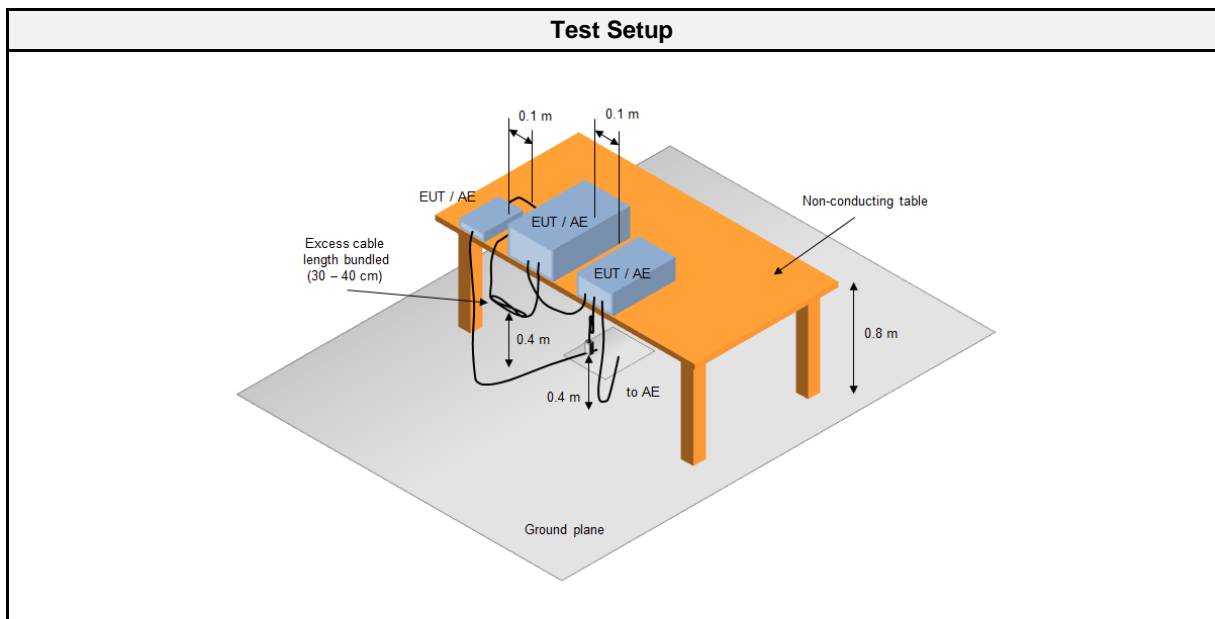
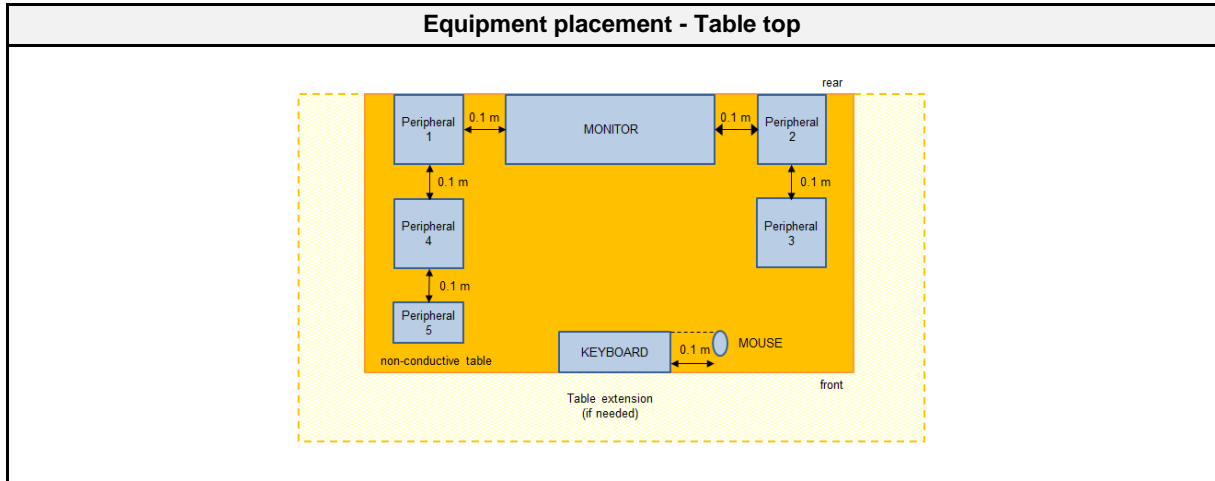
## 2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

### 2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 8, 6.1
Reference method	ANSI C63.4:2014 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	90
Measurement range	30 MHz to 1 GHz
Temperature [°C]	23
Humidity [%]	26
Operator	Stefan Dose supervised by Jens Marquardt
Date	2019-02-04

### 2.1.2 Setup





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00062	2018-07	2021-07
EMI Test Receiver	Keysight	N9038A-526/WXP	EF01070	2018-08	2019-08
Biconical Antenna	R&S	HK 116	EF00203	2018-06	2020-06
LPD Antenna	R&S	HL 223	EF00187	2016-05	2019-05

2.1.4 Procedure

<b>Exploratory measurement</b>	
1.	The EUT was placed on a non-conductive table at a height of 0.8m.
2.	The EUT and support equipment, if needed, were set up to simulate typical usage.
3.	Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
4.	The antenna was placed at a distance of 3 or 10 m.
5.	The received signal was monitored at the measurement receiver.
6.	This procedure has to be performed in both antenna polarizations, horizontal and vertical.
7.	The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3

<b>Final measurement</b>	
1.	The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver.
2.	A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast.
3.	The EUT and cable arrangement were based on the exploratory measurement results.
4.	Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
5.	The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

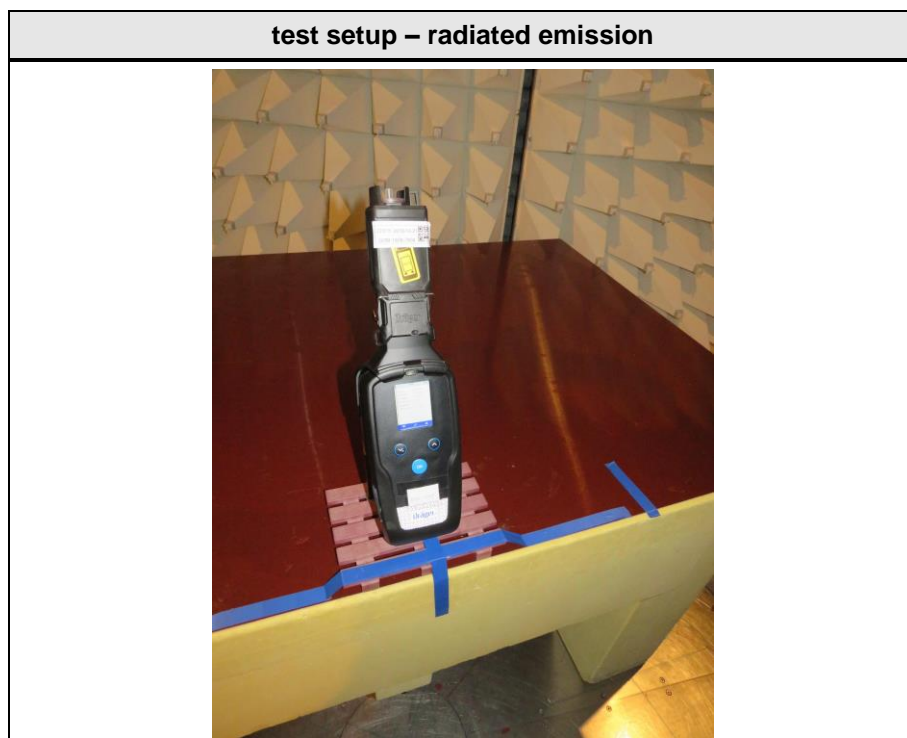
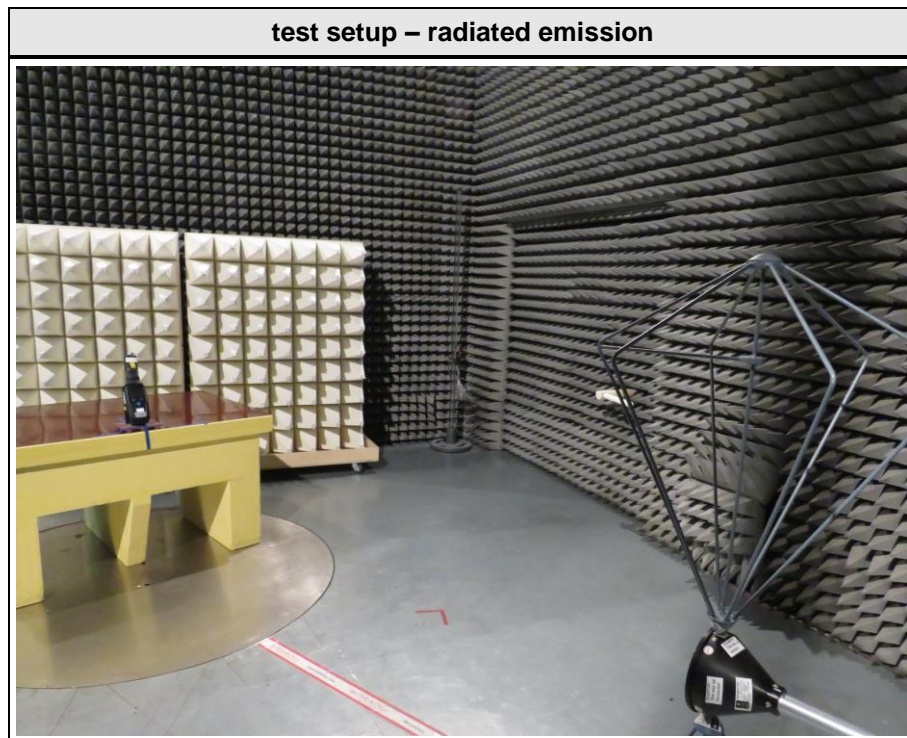
<b>Class B @ 3 m</b>		
Frequency [MHz]	Detector	Limit [dB $\mu$ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak Average	74 54

<b>Class A @ 10 m</b>		
Frequency [MHz]	Detector	Limit [dB $\mu$ V/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak Average	69.5 49.5

2.1.6 Results

<b>Test Results</b>			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-

2.1.7 Setup Photos



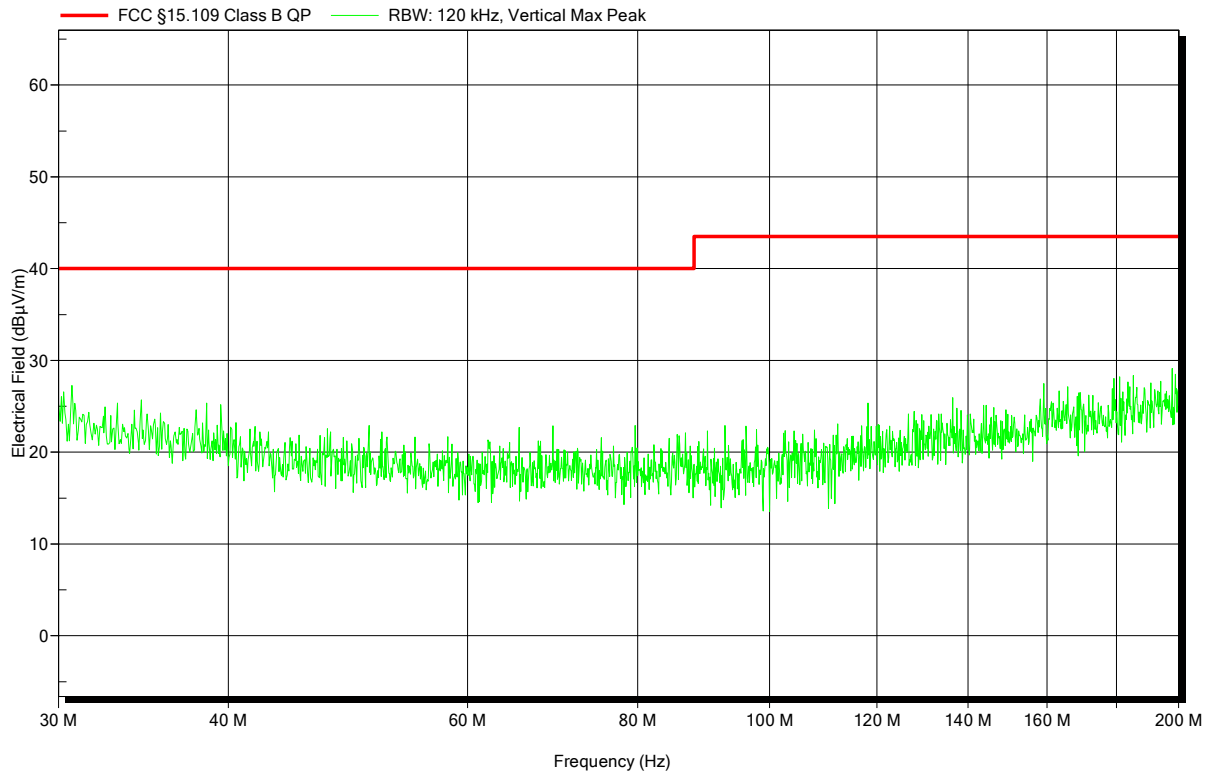
2.1.8 Records

**Radiated emissions under normal conditions according to FCC Part 15b**

Project number: G0M-1808-7604

Applicant:	Dräger Safety AG & Co. KGaA
EUT Name:	handheld gas measurement tool
Model:	X-act 7000
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Dose
Test Conditions:	Tnom: 23°C, Unom: 7.5 VDC (battery)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	1
Test Date:	2019-02-04

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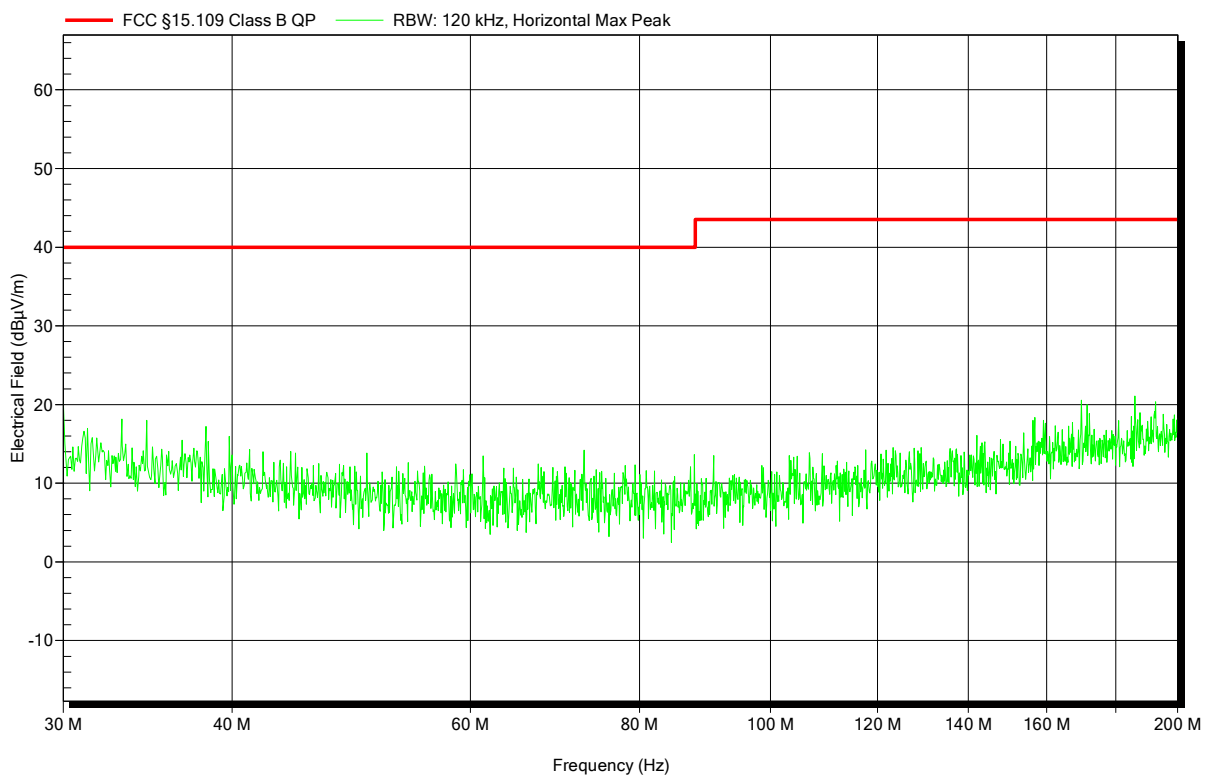


**Radiated emissions under normal conditions according to FCC Part 15b**

Project number: G0M-1808-7604

Applicant: Dräger Safety AG & Co. KGaA  
 EUT Name: handheld gas measurement tool  
 Model: X-act 7000  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Dose  
 Test Conditions: Tnom: 23°C, Unom: 7.5 VDC (battery)  
 Antenna: Rohde & Schwarz HK 116, Horizontal  
 Measurement distance: 3m  
 Mode: 1  
 Test Date: 2019-02-04

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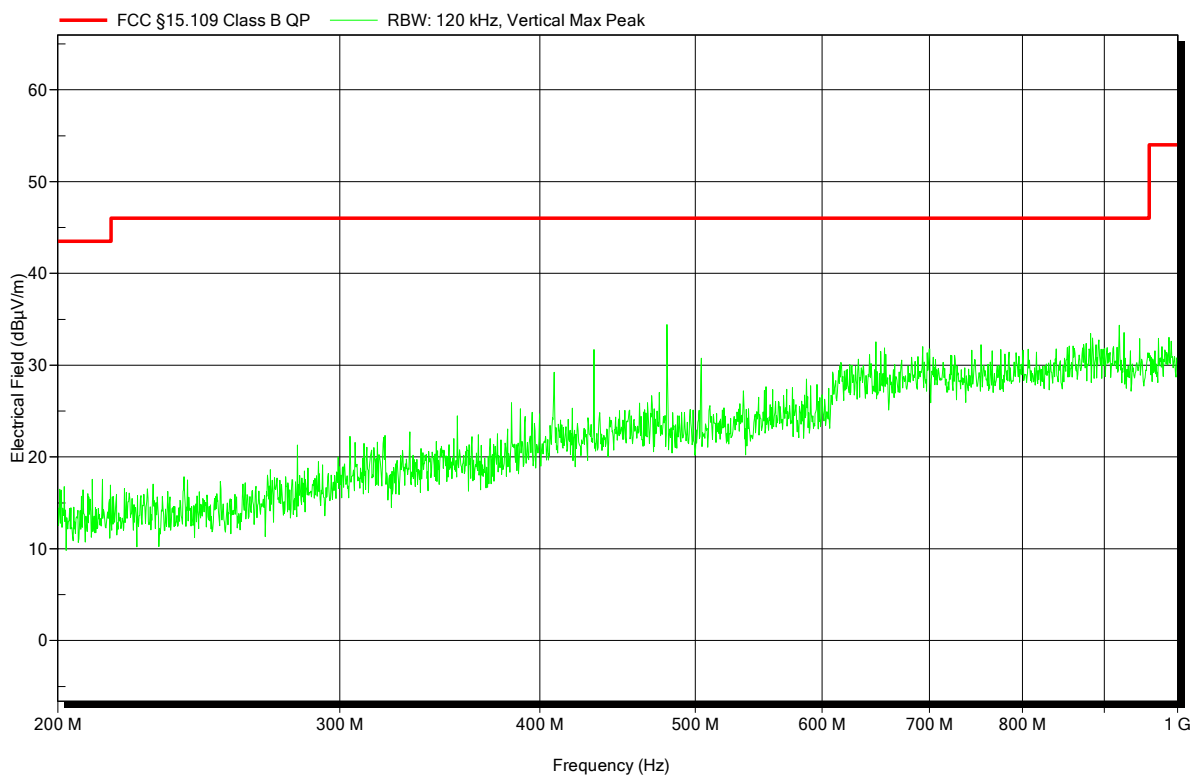


**Radiated emissions under normal conditions according to FCC Part 15b**

Project number: G0M-1808-7604

Applicant: Dräger Safety AG & Co. KGaA  
 EUT Name: handheld gas measurement tool  
 Model: X-act 7000  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Dose  
 Test Conditions: Tnom: 23°C, Unom: 7.5 VDC (battery)  
 Antenna: Rohde & Schwarz HL 223, Vertical  
 Measurement distance: 3m  
 Mode: 1  
 Test Date: 2019-02-04

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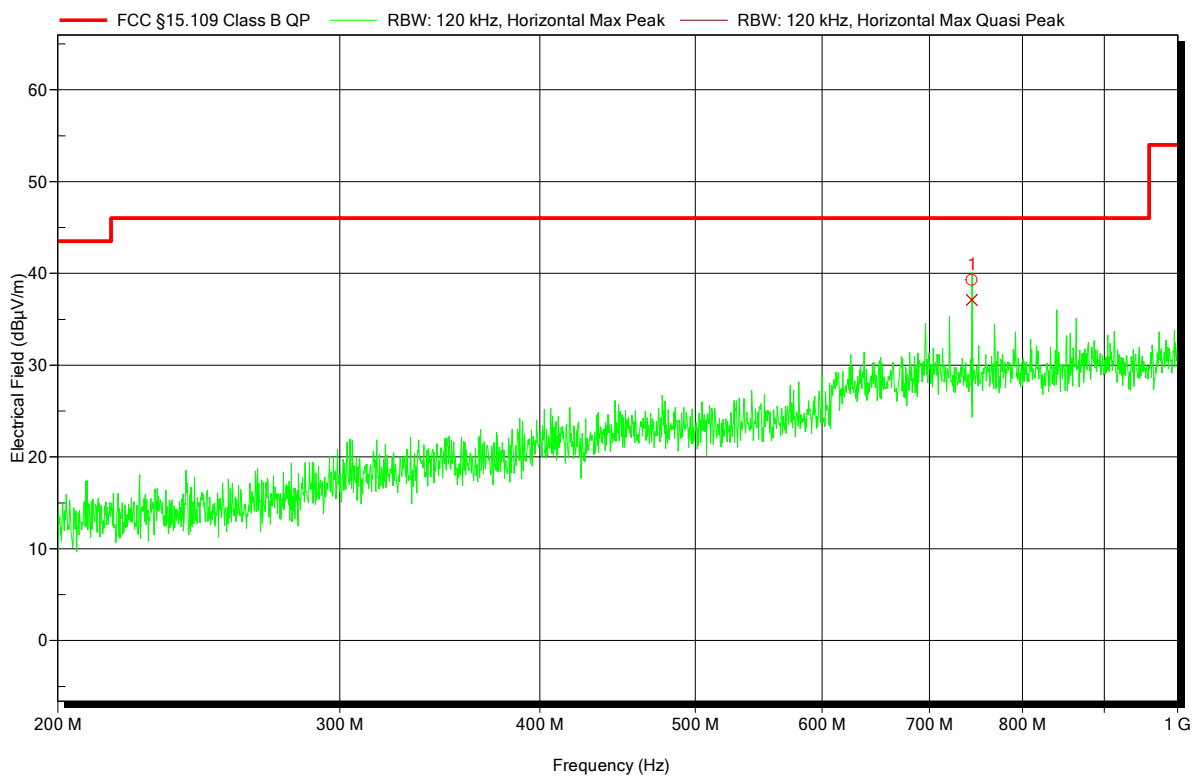


**Radiated emissions under normal conditions according to FCC Part 15b**

Project number: G0M-1808-7604

Applicant: Dräger Safety AG & Co. KGaA  
 EUT Name: handheld gas measurement tool  
 Model: X-act 7000  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Dose  
 Test Conditions: Tnom: 23°C, Unom: 7.5 VDC (battery)  
 Antenna: Rohde & Schwarz HL 223, Horizontal  
 Measurement distance: 3m  
 Mode: 1  
 Test Date: 2019-02-04

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Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	743.993 MHz	37.13 dBµV/m	46.02 dBµV/m	-8.89 dB	Pass	180 Degree	1 m