EMC TEST REPORT

FCC Title 47 CFR Part 15B, ISED ICES-003 Issue 7

Report Reference No	G0M-2205-1489-EF0215B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	A2LA - Registration number: 1983.01 (ISED) ISED wireless device testing laboratory: CN 3470A DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Testo SE & Co. KGaA
Address	Celsiusstr. 2 79822 Titisee-Neustadt Germany
Test Specification Standard(s)	Title 47 CFR Part 15 Subpart B ISED ICES-Gen Issue 1 ; Amendment 1 (February 2021) ISED ICES-003 Issue 7 ANSI C63.4:2014+A1:2017
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy and ATEX certification
Model(s)	testo 316-1-EX
Additional Model(s)	None
Brand Name(s)	testo
Hardware Version(s)	2.0
Software Version(s)	0.2.9
FCC-ID	WAF-TESTO316
IC	6127B-TESTO316
Test Result	**PASSED**

Possible test case verdicts:	
required by standard but not tested	N/T
not required by standard	N/R
required by standard but not appl. to test object	N/A
test object does meet the requirement	P(PASS)
test object does not meet the requirement	F(FAIL)
Testing:	
Date of receipt of test item	2022-06-24
Report:	
Compiled by	Manuel Engel
Tested by (+ signature)	Marko Neuner
Supervised by (+ signature)	Manuel Engel
Approved by (+ signature) (Test Lab Engineer)	Andreas Pflug
Date of Issue	2022-09-21
Total number of pages	55
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:	
-	

ADDITIONAL NOT TESTED MODEL(S)

Additional variants have been declared by the manufacturer. The listed models were not tested, evaluated or assessed in no way.		
Additional Model 1	Product Type Description	Battery powered detector for fluegas with LCD display
	Model Name	testo 316-1
	Brand Name (optional)	testo
	Hardware Version	3.0
	Software Version	0.2.9

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T_{NOM}	Nominal operating temperature
V_{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-09-21-	Initial Release	

REPORT INDEX

1 Equipment (Test Item) Under Test

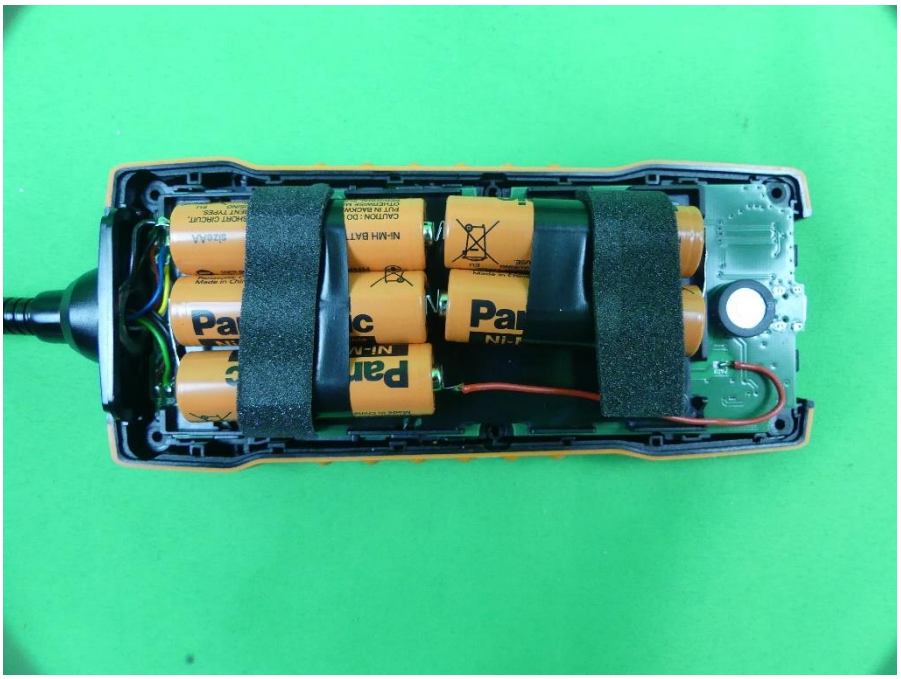
Description	Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy and ATEX certification		
Intended Use	Leak detection and measurement of methan concentrations		
Model	testo 316-1-EX		
Additional Model(s)	None		
Brand Name(s)	testo		
Hardware Version(s)	2.0		
Software Version(s)	0.2.9		
Number of tested samples	1		
Sample Identification	EUT	Sample-ID	Serial Number
	testo 316-1-EX	40293	Demo Unit 220663111
	AC/DC-adapter 1	40121	Unspecified
	AC/DC-adapter 2	40119	Unspecified
EUT Dimensions [cm]	54.5 x 6.5 x 3.5		
FCC-ID	WAF-TESTO316		
IC	6127B-TESTO316		
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	2480		
Protective Earth	None		
Radio Module	Type	Bluetooth Low Energy	
	Model	LSD4BT-S37B	
	Manufacturer	Lierda Science & Technology Group Co., Ltd.	
Supply Voltage	V_{NOM}	5.0 V DC during charging or 5 x 1.2 AA 6 V DC NIMH rechargeable battery	
AC/DC-Adaptor 1	Model	BI12T-050200-IU	
	Vendor	EGSTON	
	Input	100 – 240 VAC 60 Hz	
	Output	5.0 VDC / 2.0 A	
AC/DC-Adaptor 2	Model	ATM012T-W050VU	
	Vendor	TESTO (Elektrosil GmbH)	
	Input	100 – 240 VAC 60 Hz	
	Output	5.0 VDC / 2.0 A	
Manufacturer	Testo SE & Co. KGaA Celsiusstr. 2 79822 Titisee-Neustadt Germany		

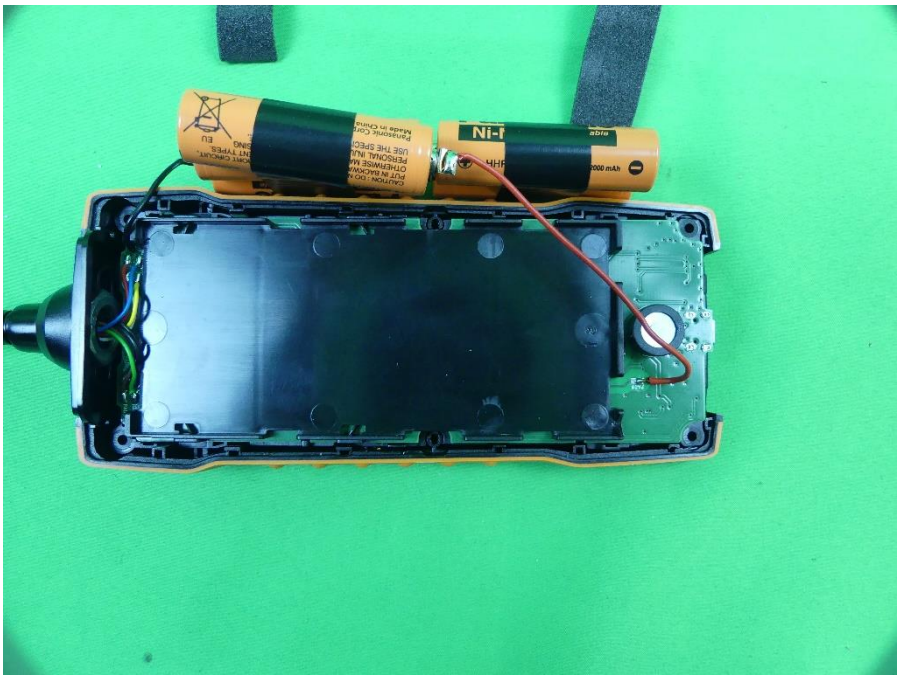
1.1 Equipment Ports

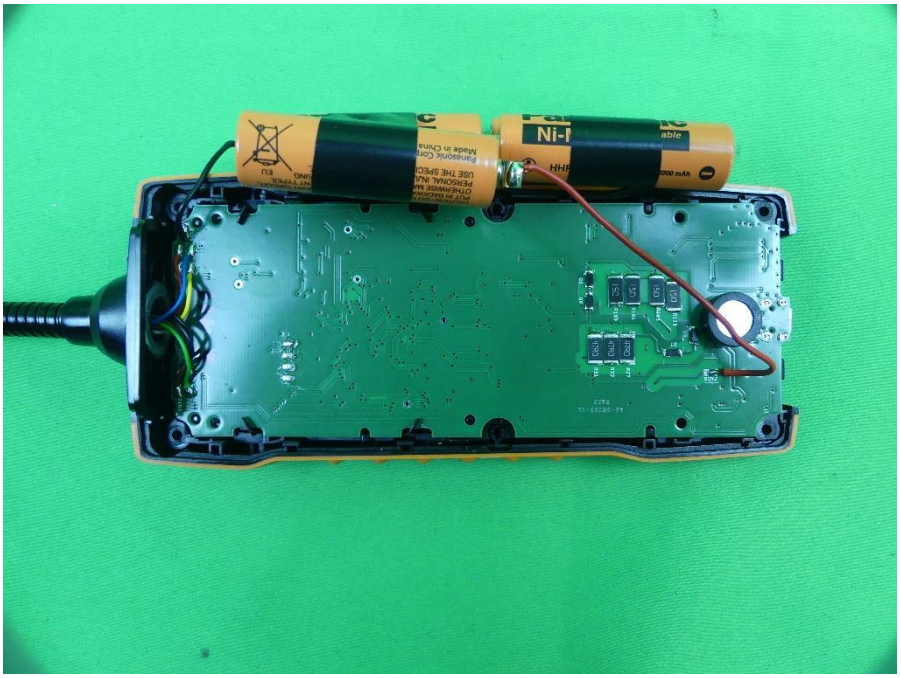
Name	Type	Attributes	Comment
MicroUSB	DC	Count: 1 Cable length [m]: 2.99 Direction: IN Service only: No Shielded: Yes	For charging of accumulator

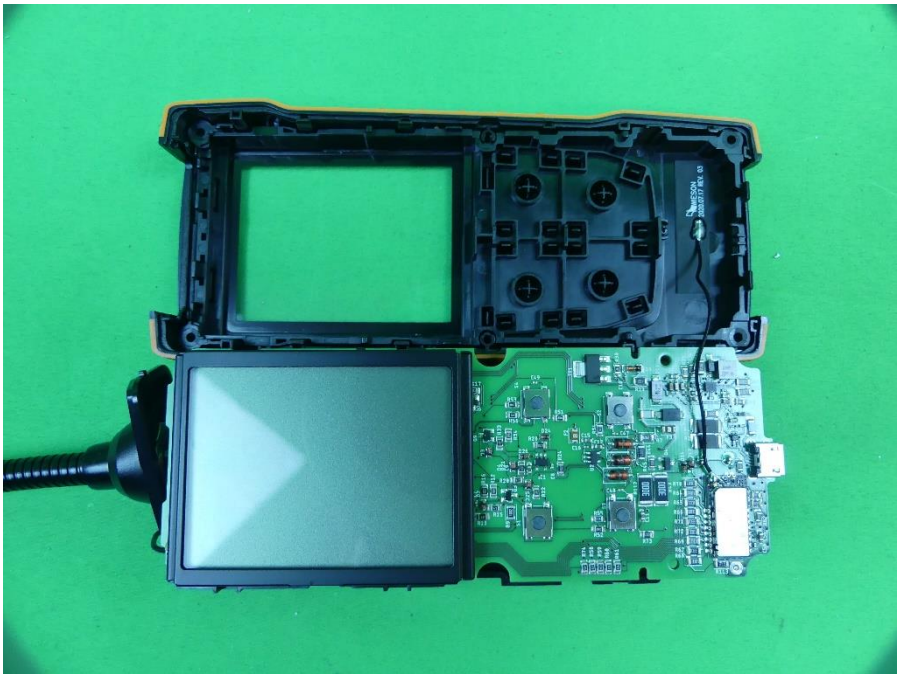
Description:	
AC	AC mains power input/output port
DC	DC power input/output port
BAT	DC power input port connected to external battery
IO	Input/Output port
TP	Telecommunication port
NE	Non-electrical port

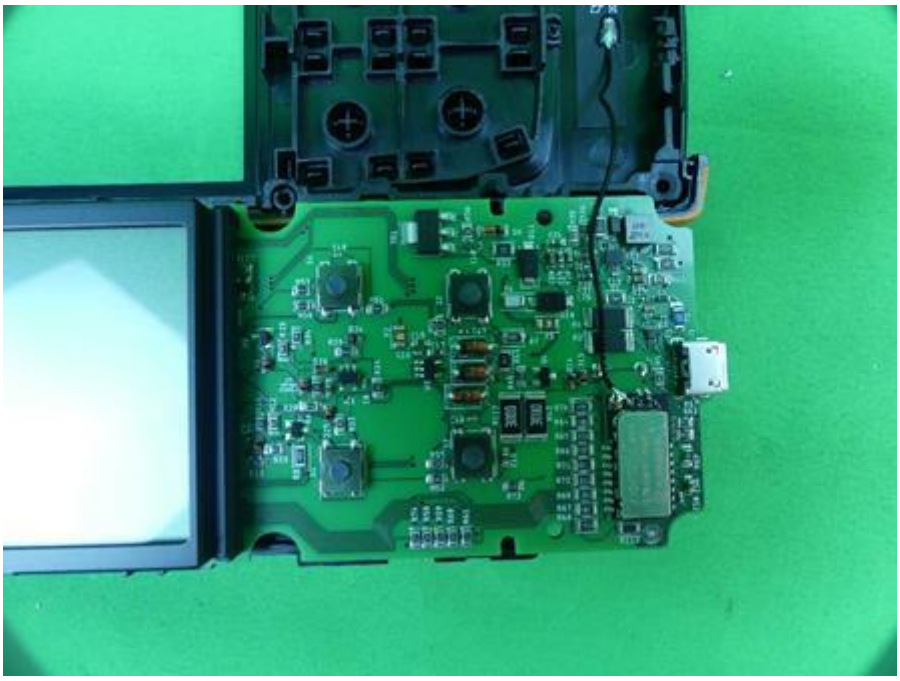
1.2 Equipment Photos - Internal

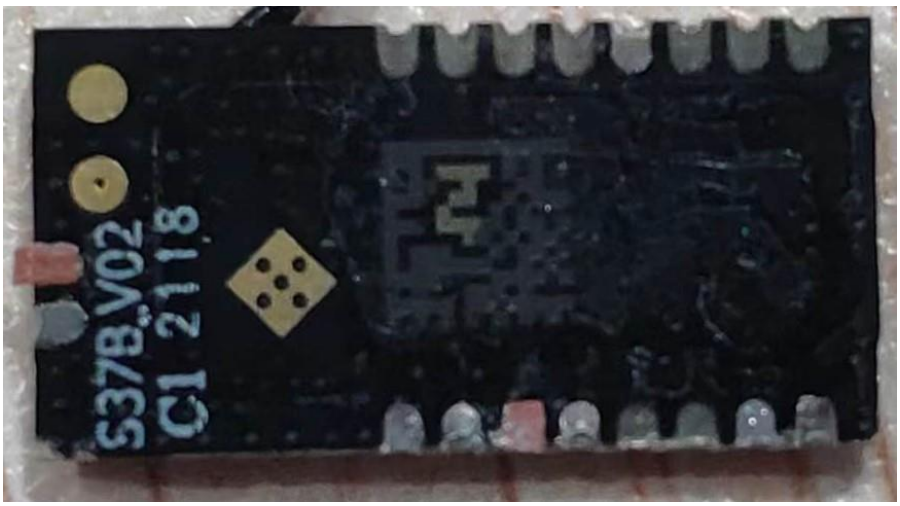
EUT accumulators


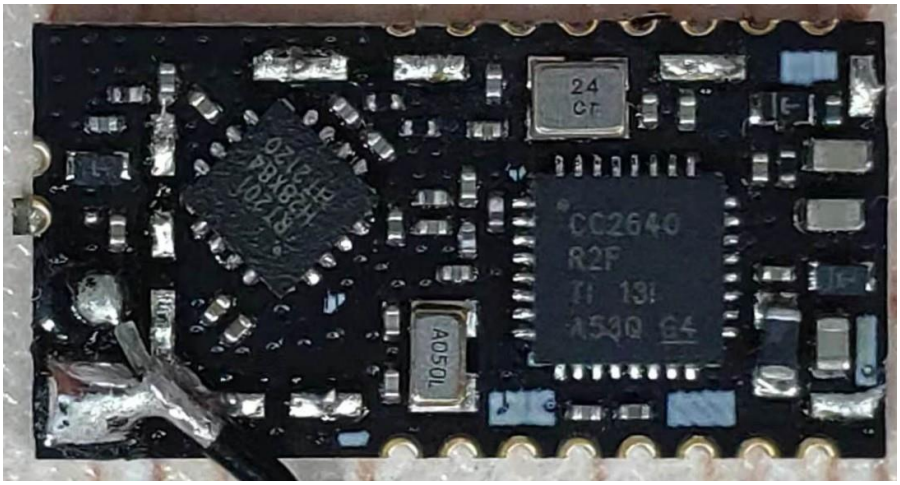
EUT cover accu to PCB


EUT PCB rear side


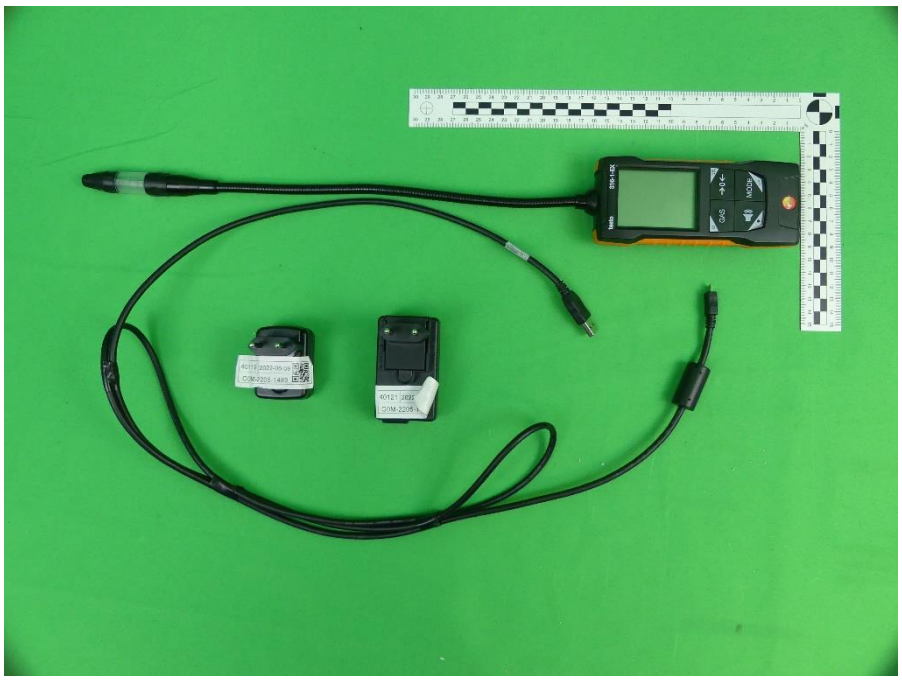
EUT PCB front side


EUT PCB detailed view


S37 back_Detail


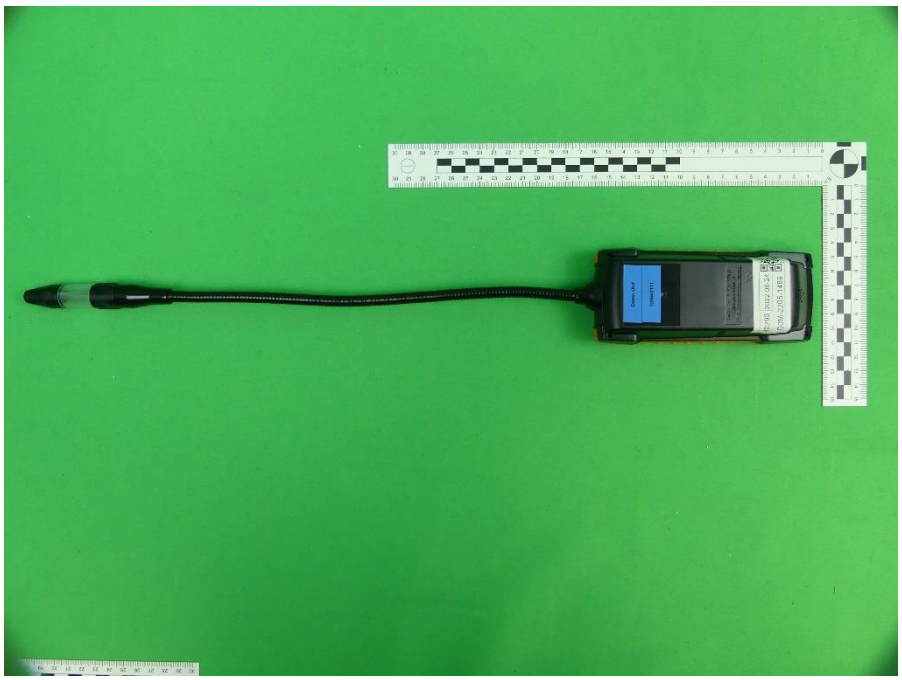
S37 Front_Detail


1.3 Equipment Photos - External

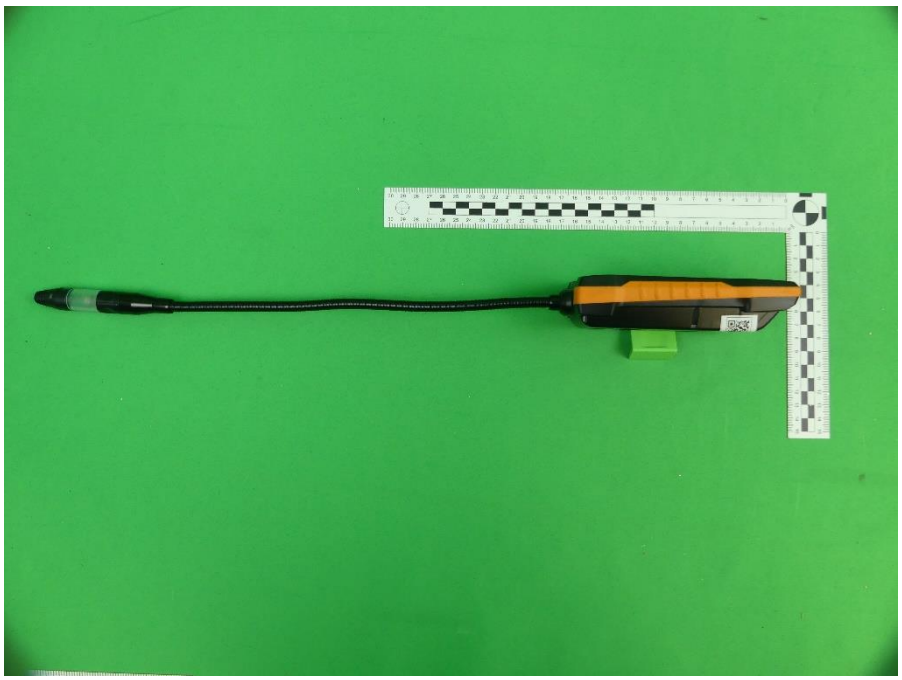
EUT sample kit


EUT front side

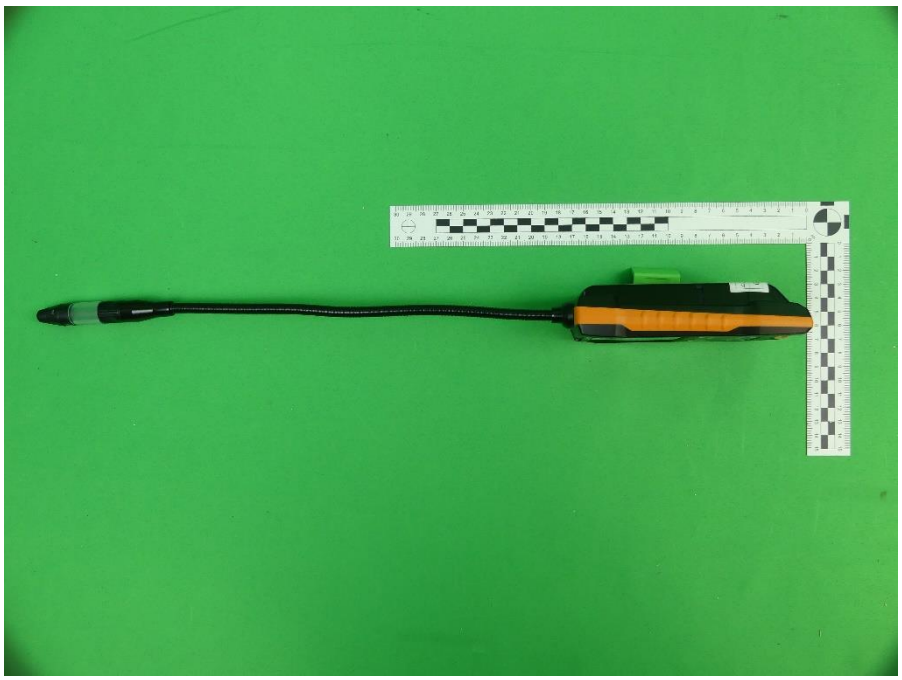

EUT rear side



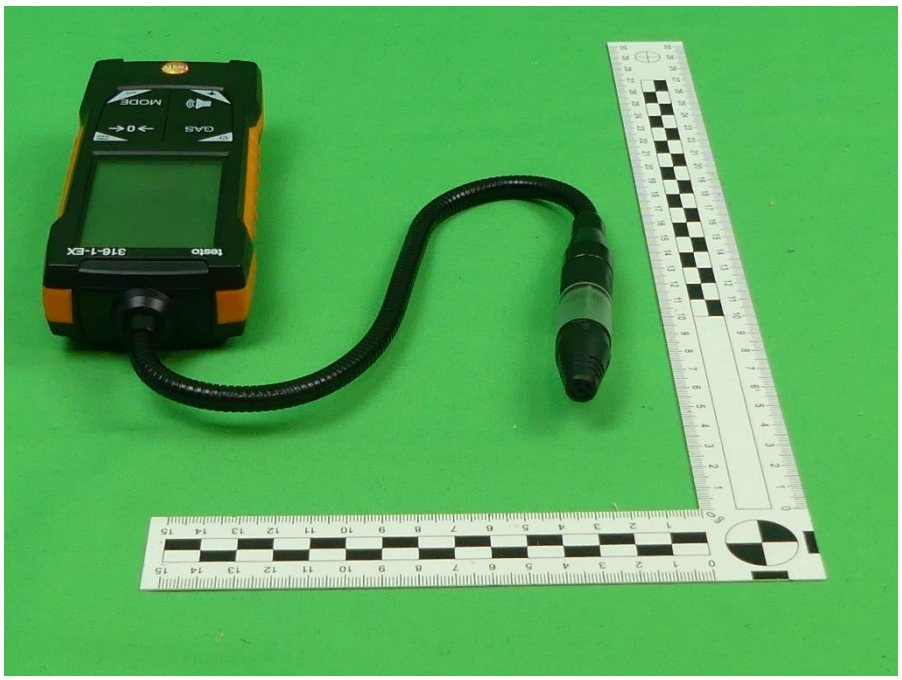
EUT left side

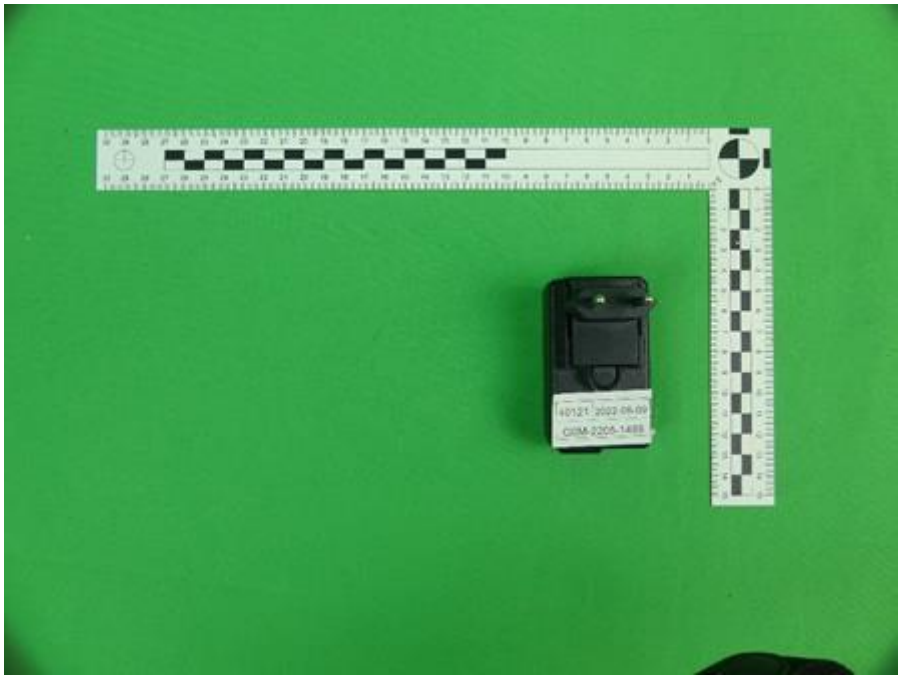


EUT right side

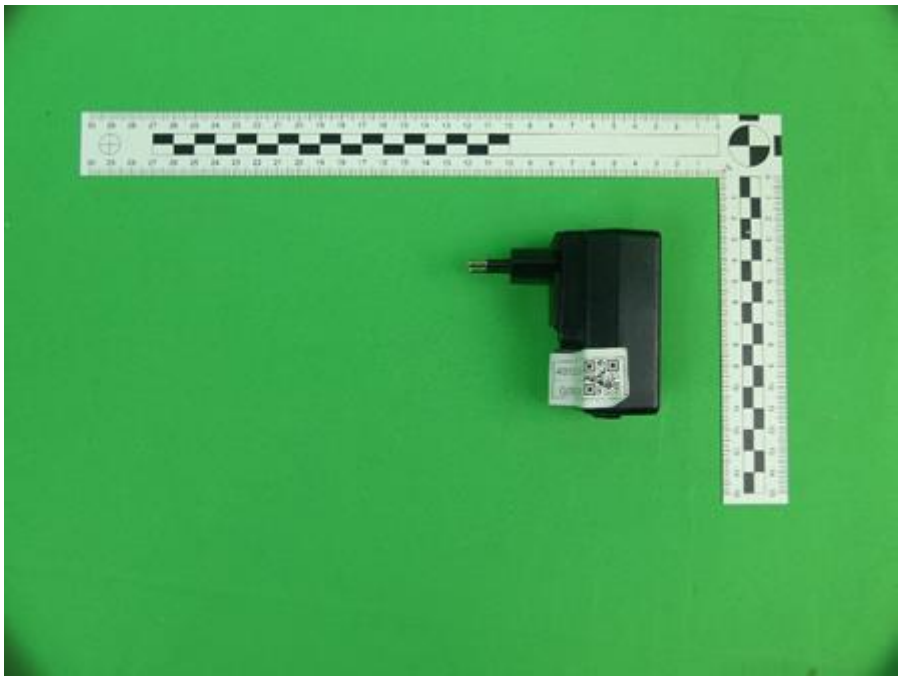


EUT bottom side

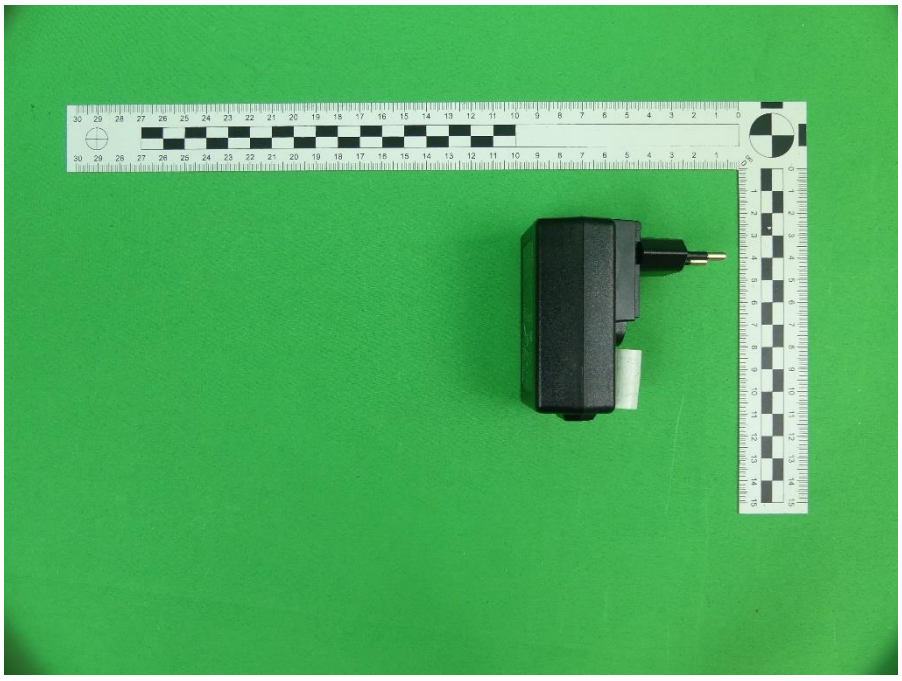
EUT top side


AC/DC adapter EUT 2 bottom side


AC/DC adapter EUT 2 left side



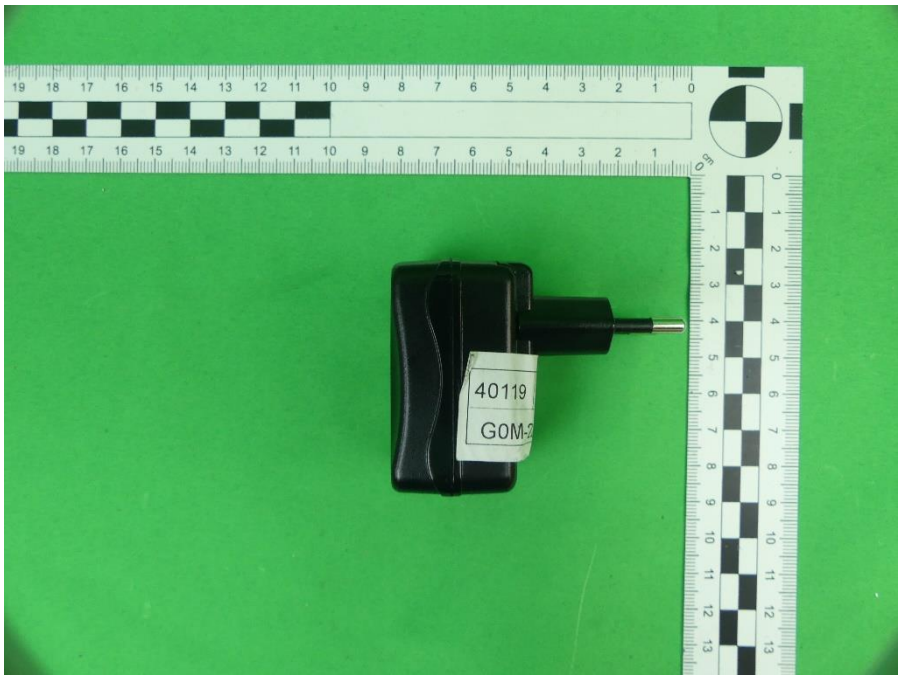
AC/DC adapter EUT 2 right side

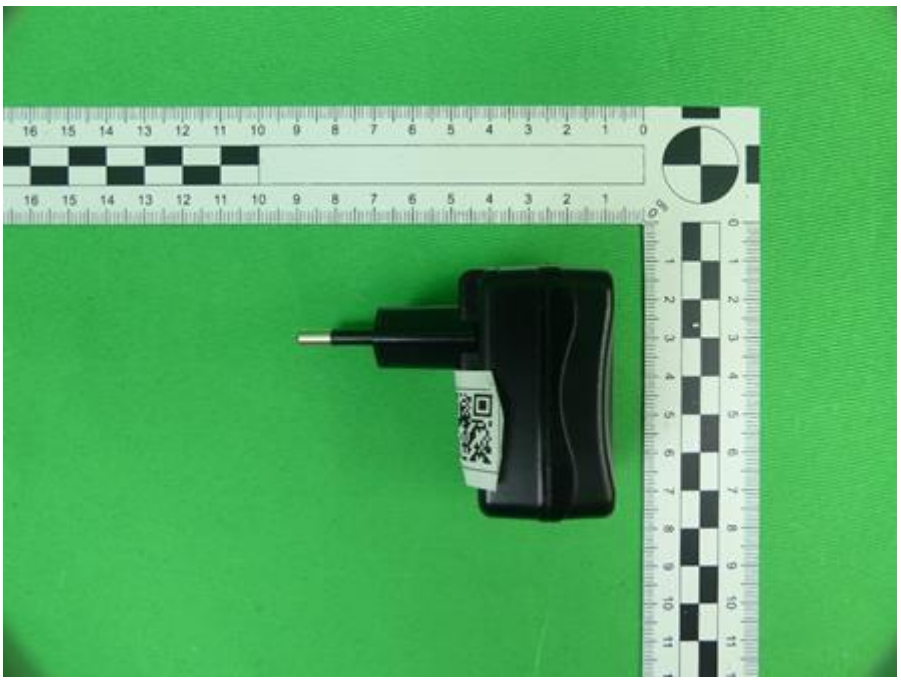


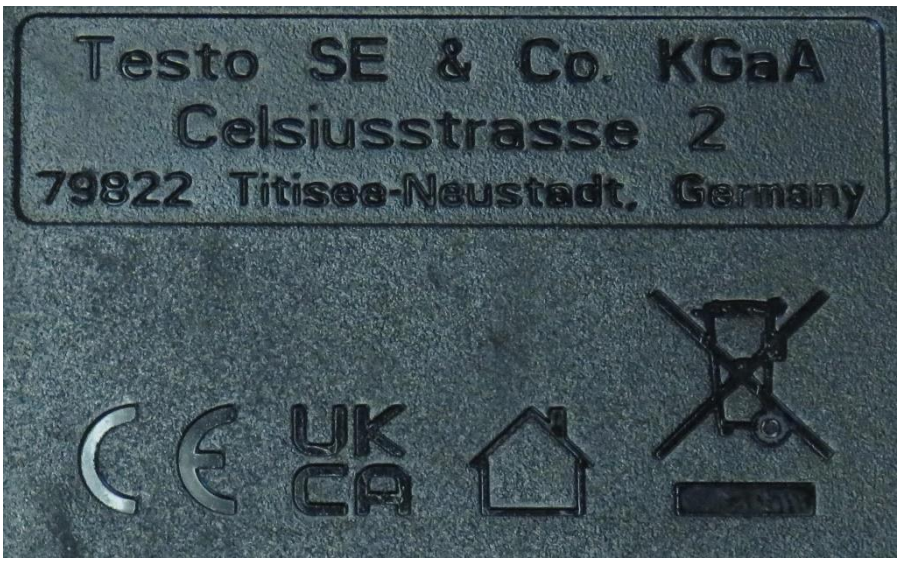
AC/DC adapter EUT 2 top side

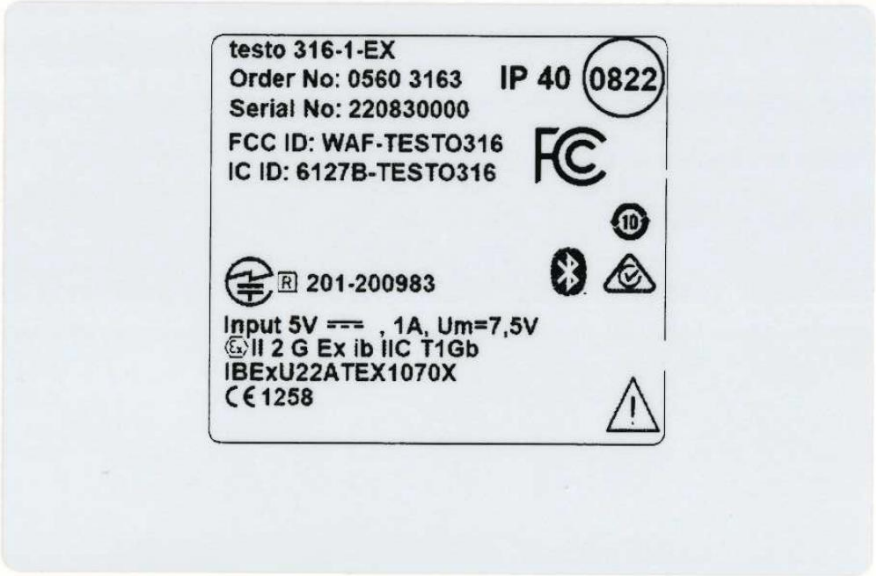

AC/DC adapter EUT 3 bottom side


AC/DC adapter EUT 3 top side


AC/DC adapter EUT 3 right side


AC/DC adapter EUT 3 left side


EUT Label


EUT Label draft


1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Mobile handset	Motorola	Moto G4 Plus (XT1642)	Maintaining connection to EUT
AE	Companion Android-Application	Testo	testo Smart v15.4.0.62224	Continuously reading data from EUT
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Charging of internal accumulator NiMH.
2	EUT is measuring continuously each second the gas concentration and transmitting the results to the companion Android-application for display via BTLE
Comment: Charging of internal accumulator NiMH does not work if device is switch on.	

1.6 EUT Configuration

Configuration #	Description
1	EUT is charging and supplied from AC/DC adapter 1 (EGSTON)
2	EUT is charging and supplied from AC/DC adapter 2 (TESTO)
3	EUT is operating and supplied from internal accumulator NiMH
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:

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

Net:

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

Limit:

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

Limit (dBµV/m) = 20*log (µV/m)

Margin:

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

Example only:

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

2 Result Summary

Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
Emission				
FCC 15.109 ICES-003, 3.2.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 3.2.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	-
Comment:				

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

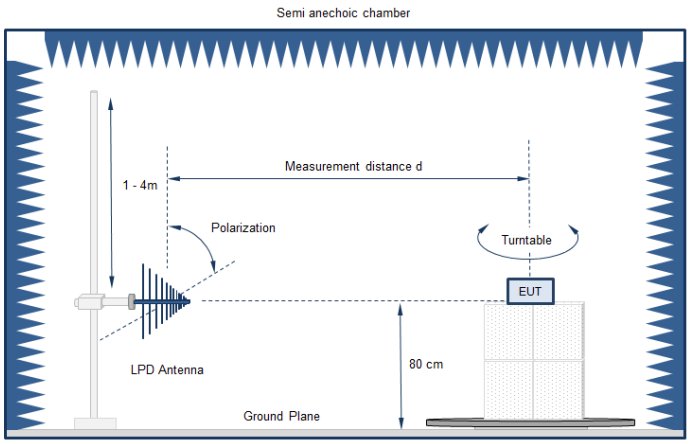
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

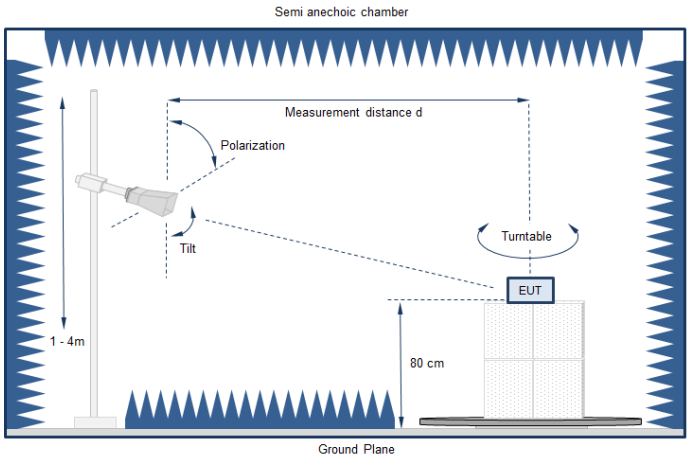
Test Information	
Reference	FCC 15.109, ICES-003, 3.2.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Portable
Highest internal frequency [MHz]	2480
Measurement range	30 MHz to 13000 MHz
Temperature [°C]	22±3
Humidity [%]	55±3
Operator	Marko Neuner
Date	2022-06-30 to 2022-07-01

2.1.2 Setup

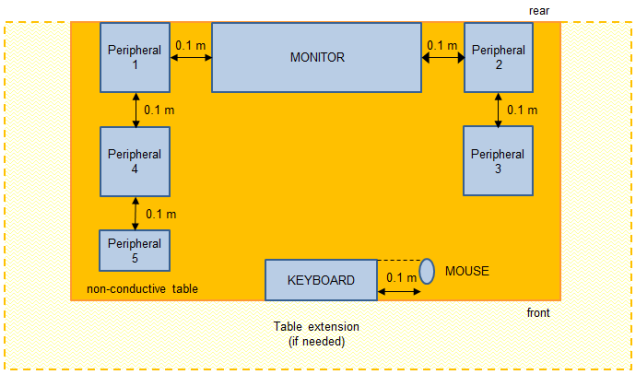
Measurement up to 1 GHz



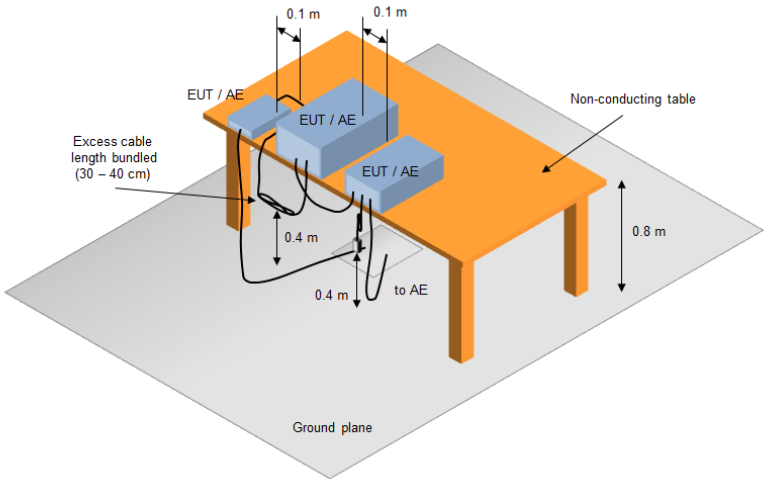
Measurement above 1 GHz



Equipment placement - Table top



Test Setup



2.1.3 Equipment

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

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC6	EF00910	2021-07	2024-07
Anechoic chamber (SVSWR)	Frankonia	AC6	EF00899	2021-07	2024-07
EMI Test Receiver	R&S	ESU26	EF00887	2021-07	2022-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2019-10	2022-10
Horn Antenna	ETS-Lindgren	3117	EF00976	2022-03	2025-03

2.1.4 Procedure

Exploratory measurement
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 2.1.2

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

2.1.5 Limits

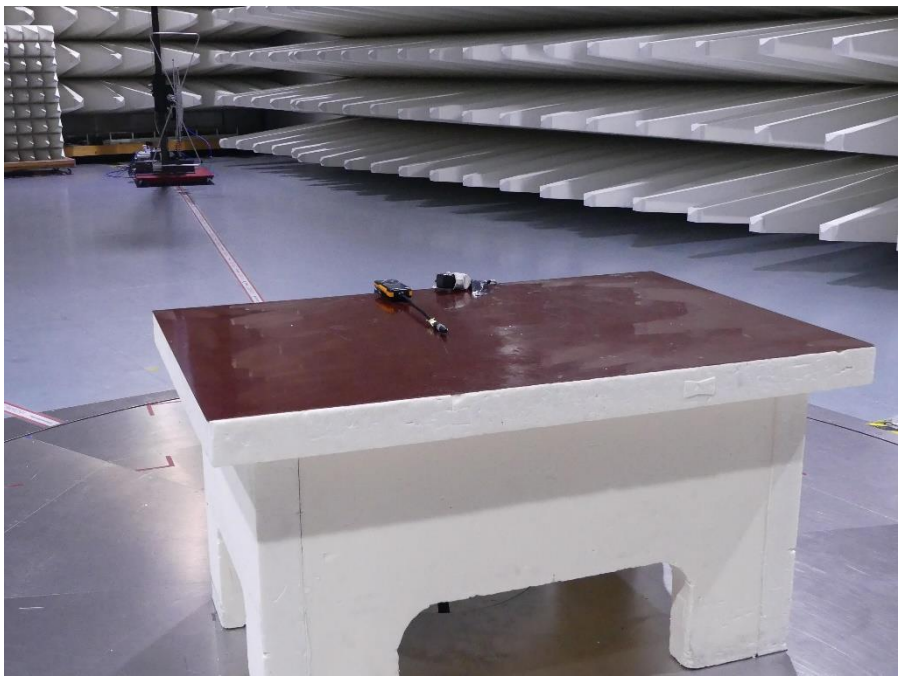
Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dBµV/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak Average	74 54

2.1.6 Results

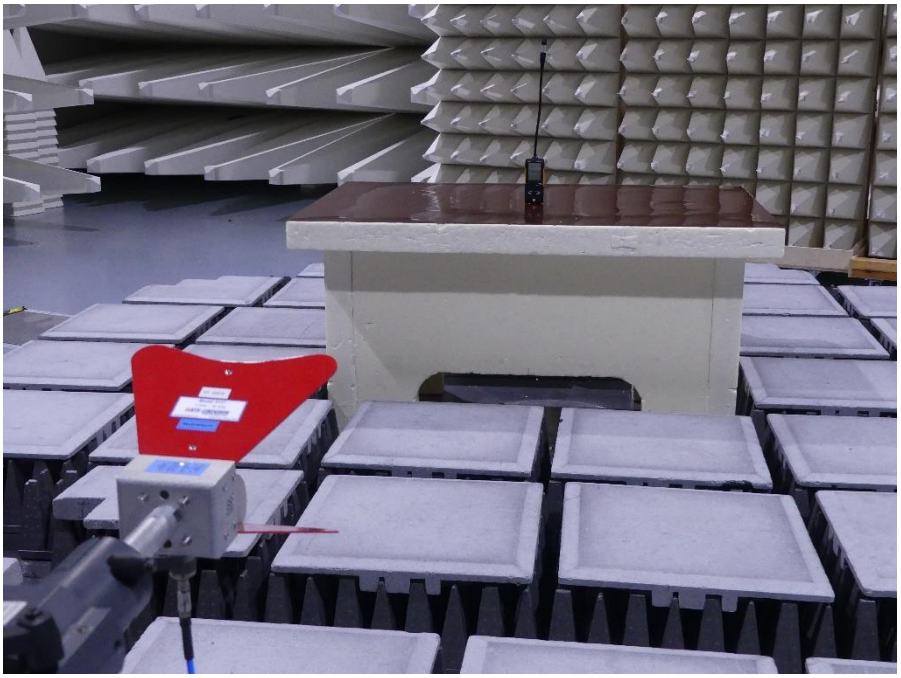
Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-
1	2	PASS	-
2	3	PASS	-

2.1.7 Setup Photos

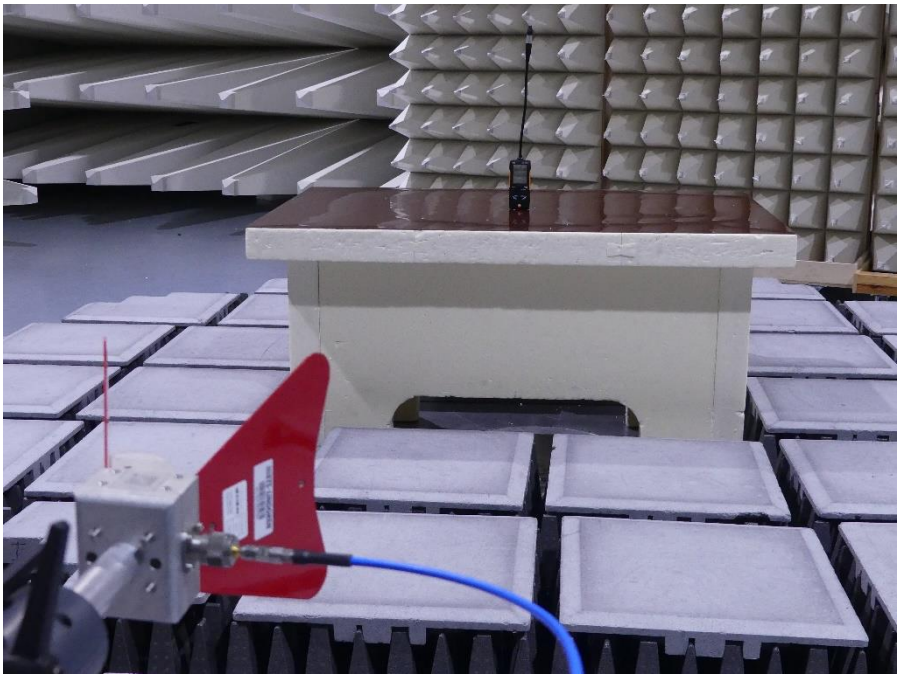
Setup 30 to 1000 MHz horizontal, charging mode (TESTO)

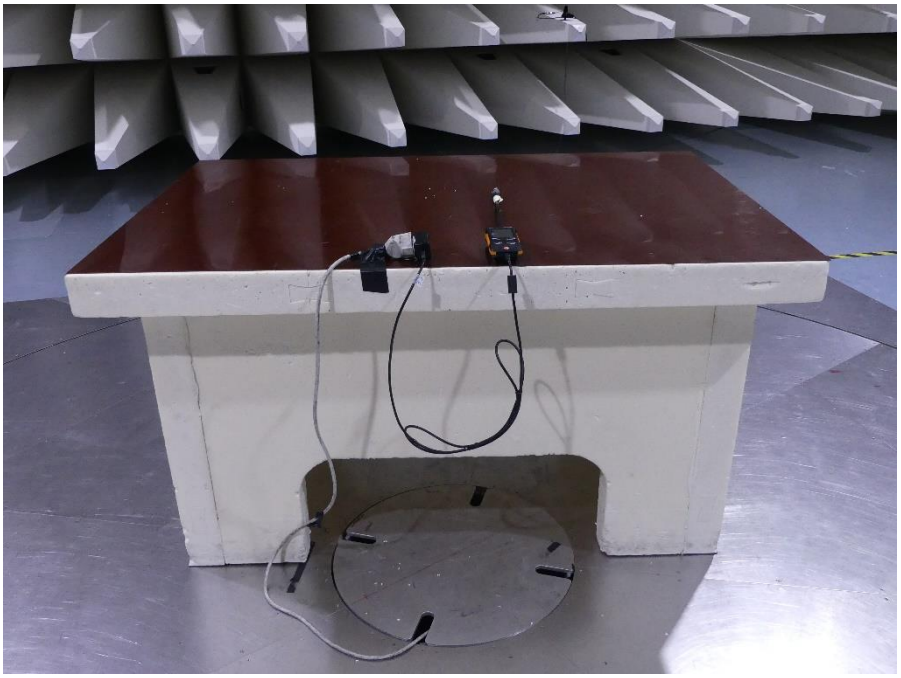

Setup 30 to 1000 MHz vertical, charging mode (TESTO)


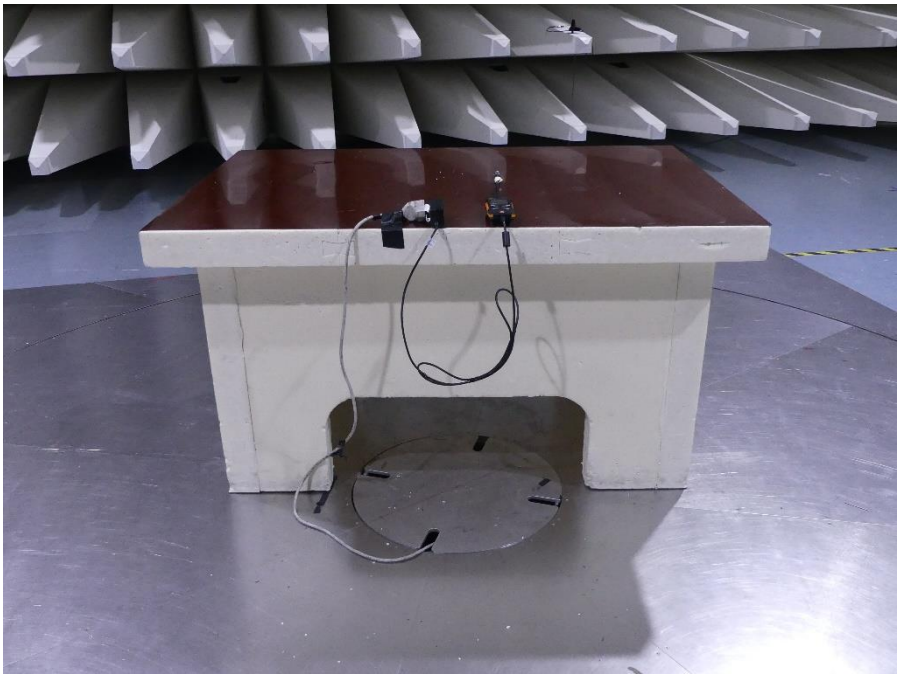
Setup 1000 to 13000 MHz horizontal, accumulator mode



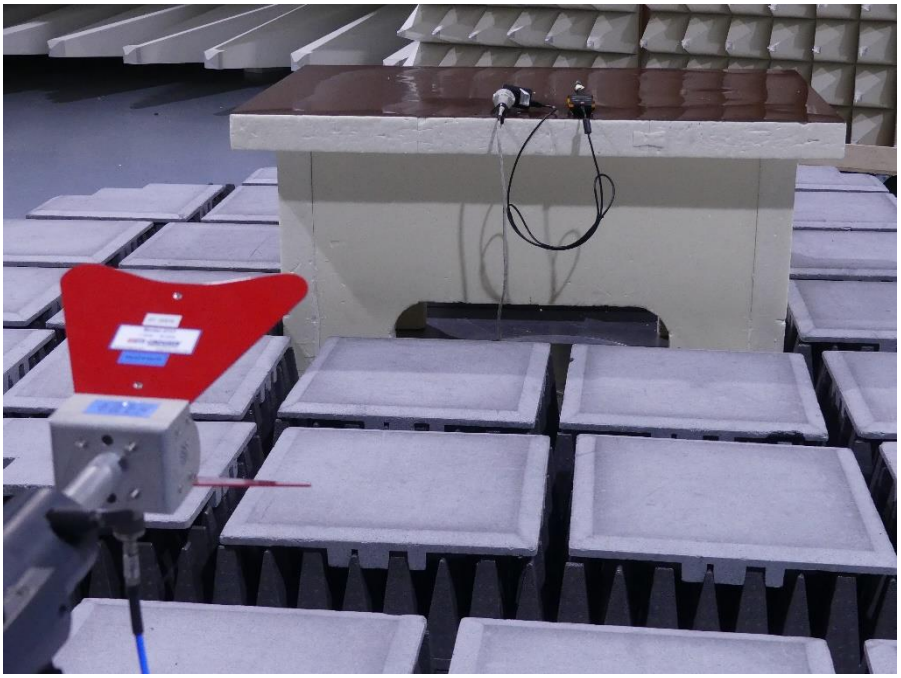
Setup 1000 to 13000 MHz vertical, accumulator mode



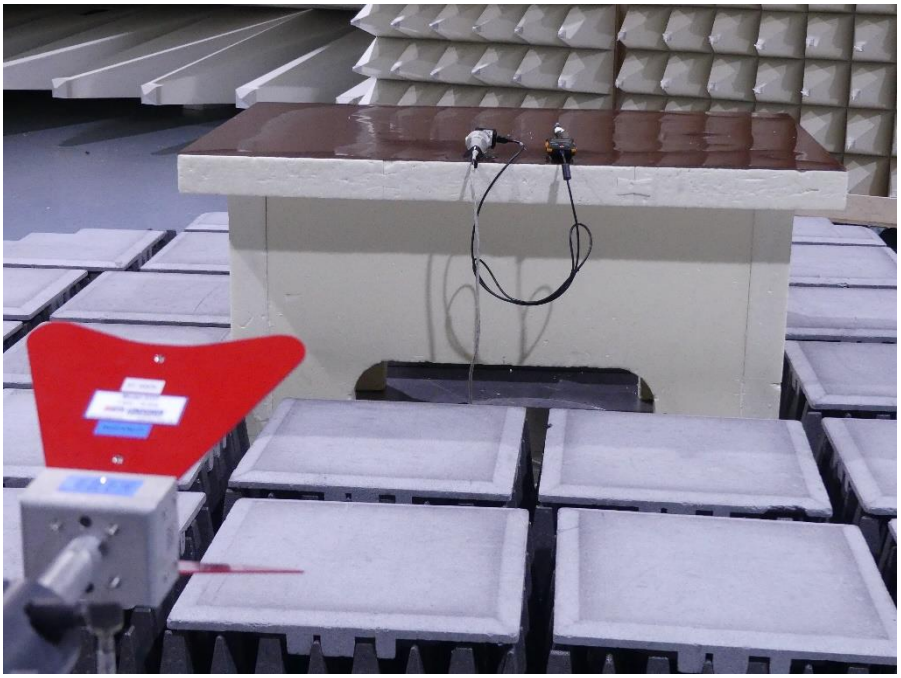
Test setup charging , 30-1000 MHz (EGSTON)


Test setup charging 3, 30-1000 MHz (EGSTON)


Test setup charging, 1000-13000 MHz (TESTO)



Test setup charging , 1000-13000 MHz (EGSTON)

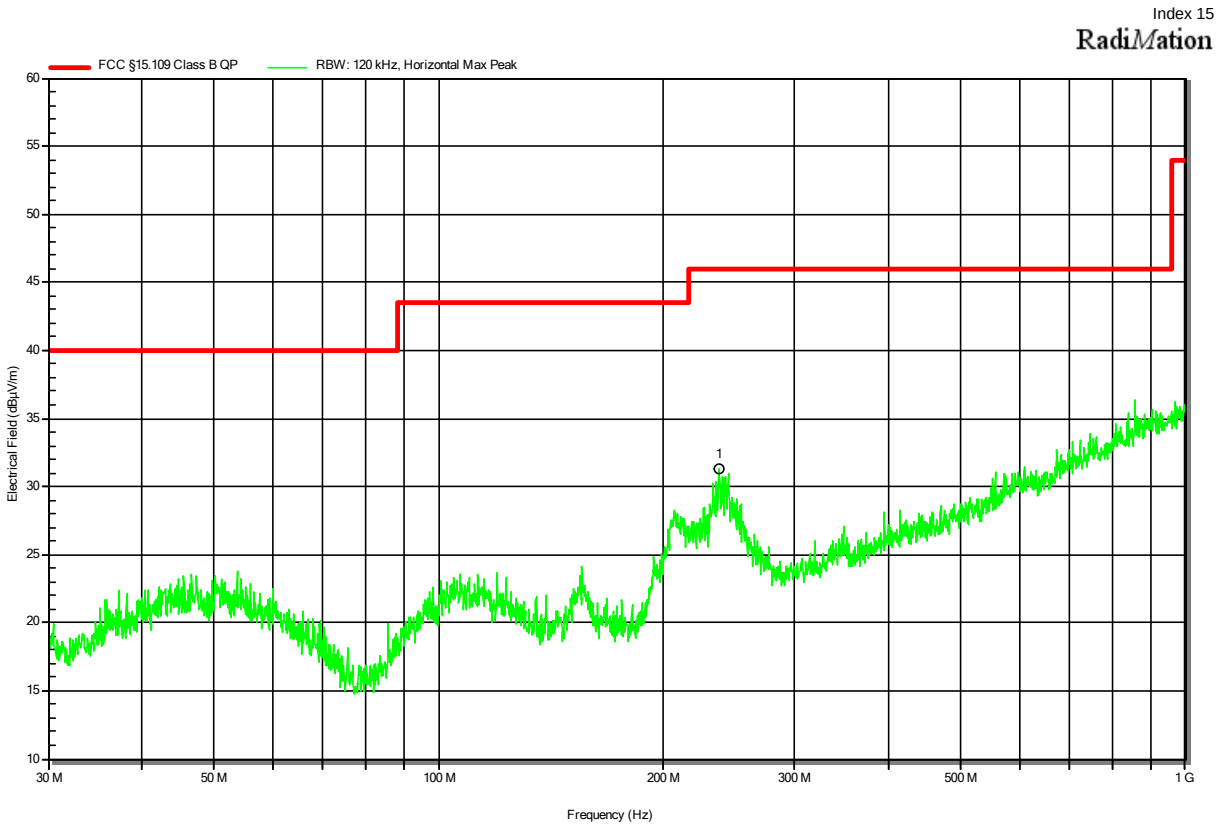


Test setup accumulator and Bluetooth, 1000-13000 MHz

2.1.8 Records

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10 m, converted to 3 m
Operational Mode:	1
EUT Configuration:	1
Note 1:	



Peak Number	Frequency	Angle	Height
1	237.12 MHz	90 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10 m, converted to 3 m
Operational Mode:	1
EUT Configuration:	1
Note 1:	

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RadiMation

Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	37.206 MHz	29.5 dBµV/m	40 dBµV/m	-10.5 dB	Pass	82 degrees	1 m
2	121.8 MHz	32.8 dBµV/m	43.5 dBµV/m	-10.8 dB	Pass	82 degrees	1 m
3	130.92 MHz	31.4 dBµV/m	43.5 dBµV/m	-12.2 dB	Pass	82 degrees	1 m
4	206.88 MHz	32.4 dBµV/m	43.5 dBµV/m	-11.2 dB	Pass	82 degrees	1 m
5	229.14 MHz	32.1 dBµV/m	46 dBµV/m	-13.9 dB	Pass	82 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-07-01
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode:	1
EUT Configuration:	1
Note 1:	

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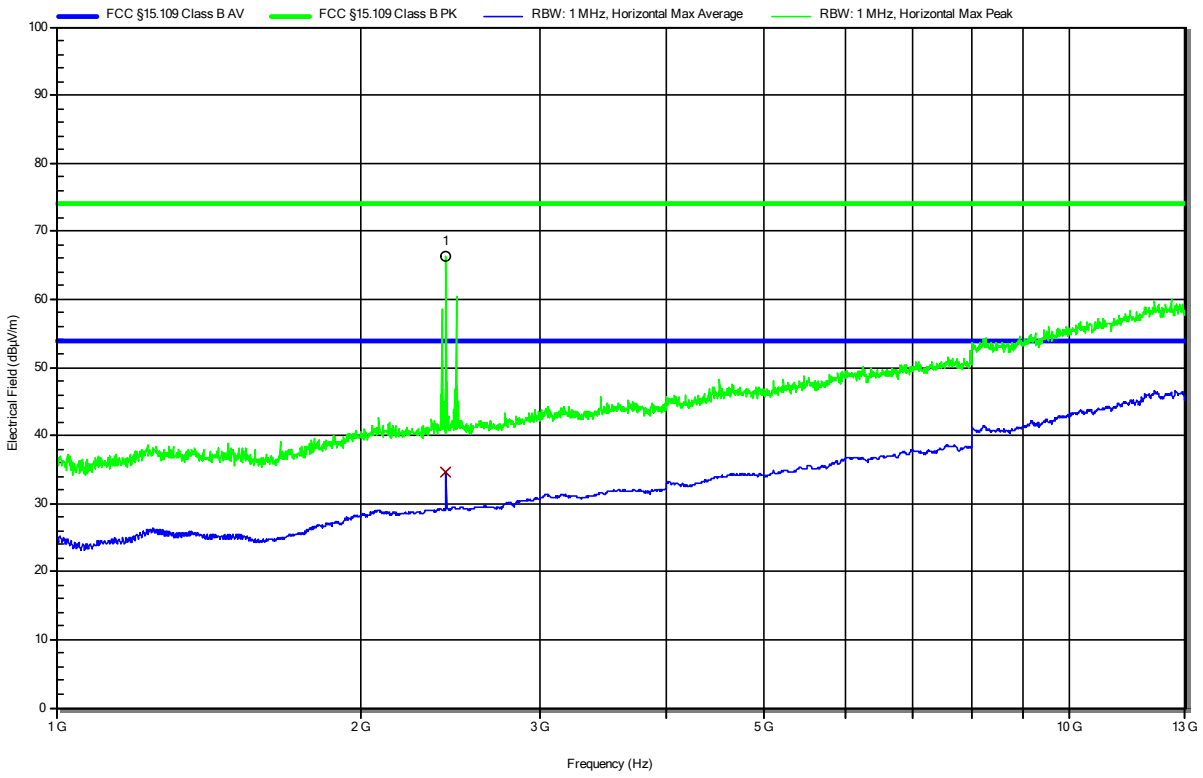
RadiMation

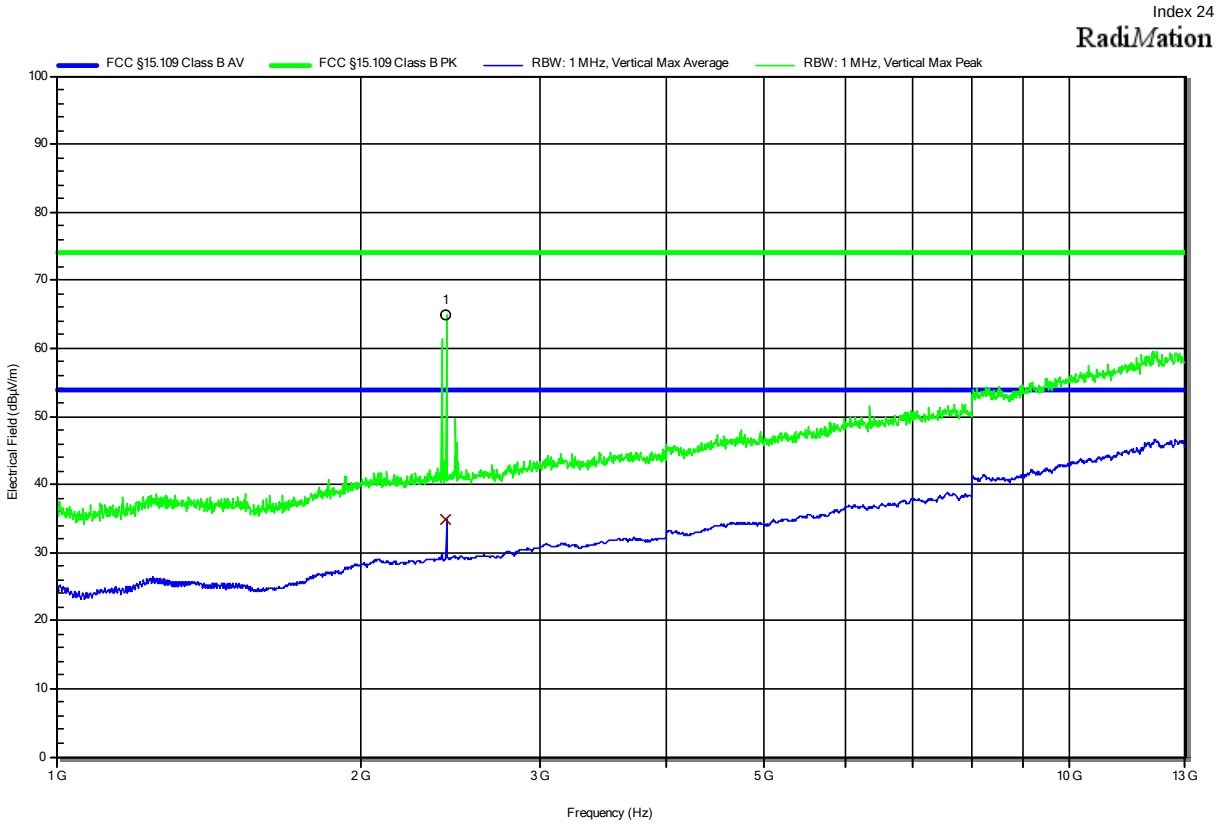


Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.426 GHz	Bluetooth LE				0 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.426 GHz	Bluetooth LE				0 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-07-01
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3m
Operational Mode:	1
EUT Configuration:	1
Note 1:	

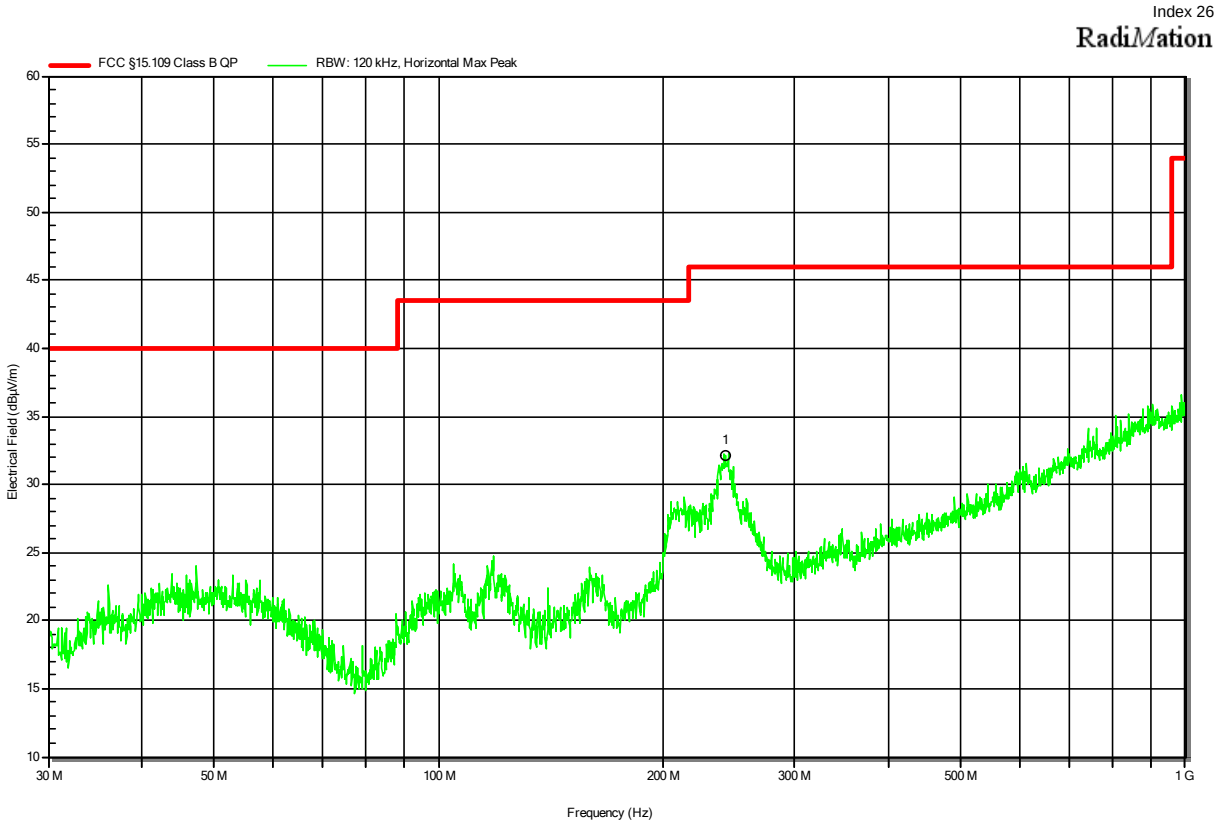


Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.426 GHz	Bluetooth LE				0 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.426 GHz	Bluetooth LE				0 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-07-01
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10 m, converted to 3 m
Operational Mode:	1
EUT Configuration:	2
Note 1:	



Peak Number	Frequency	Angle	Height
1	241.98 MHz	-83 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10 m, converted to 3 m
Operational Mode:	1
EUT Configuration:	2
Note 1:	

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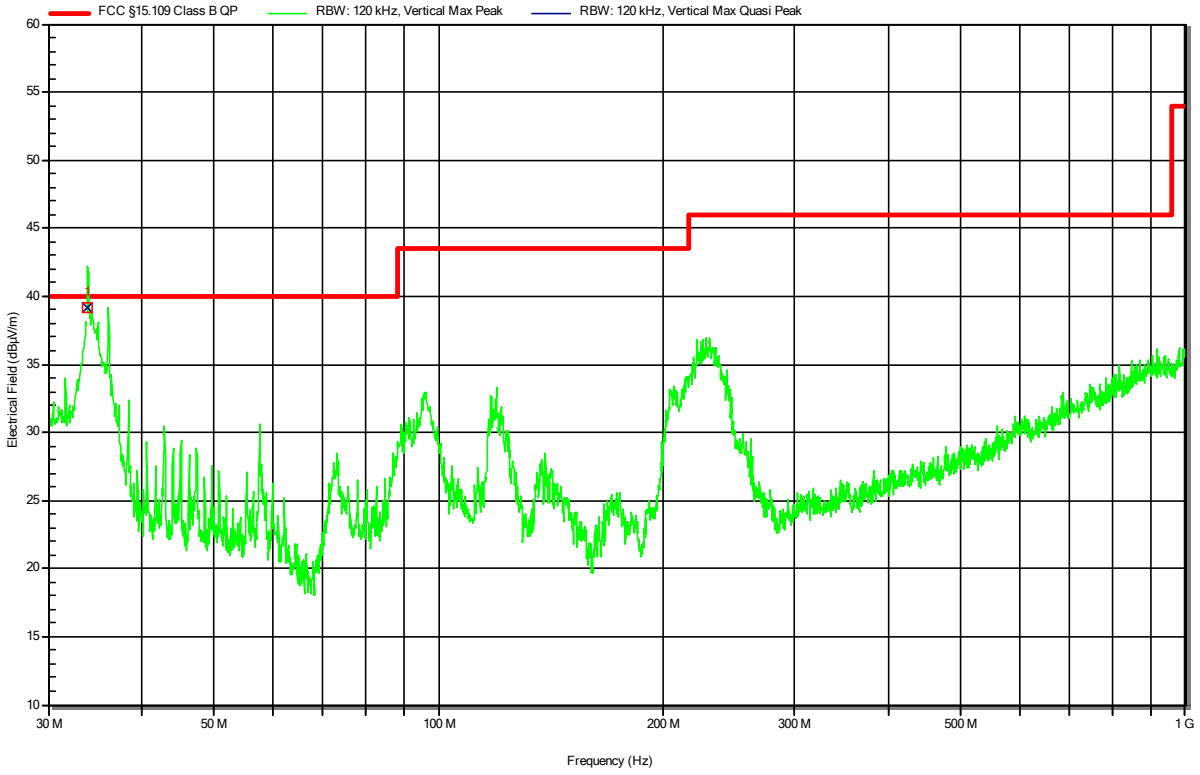
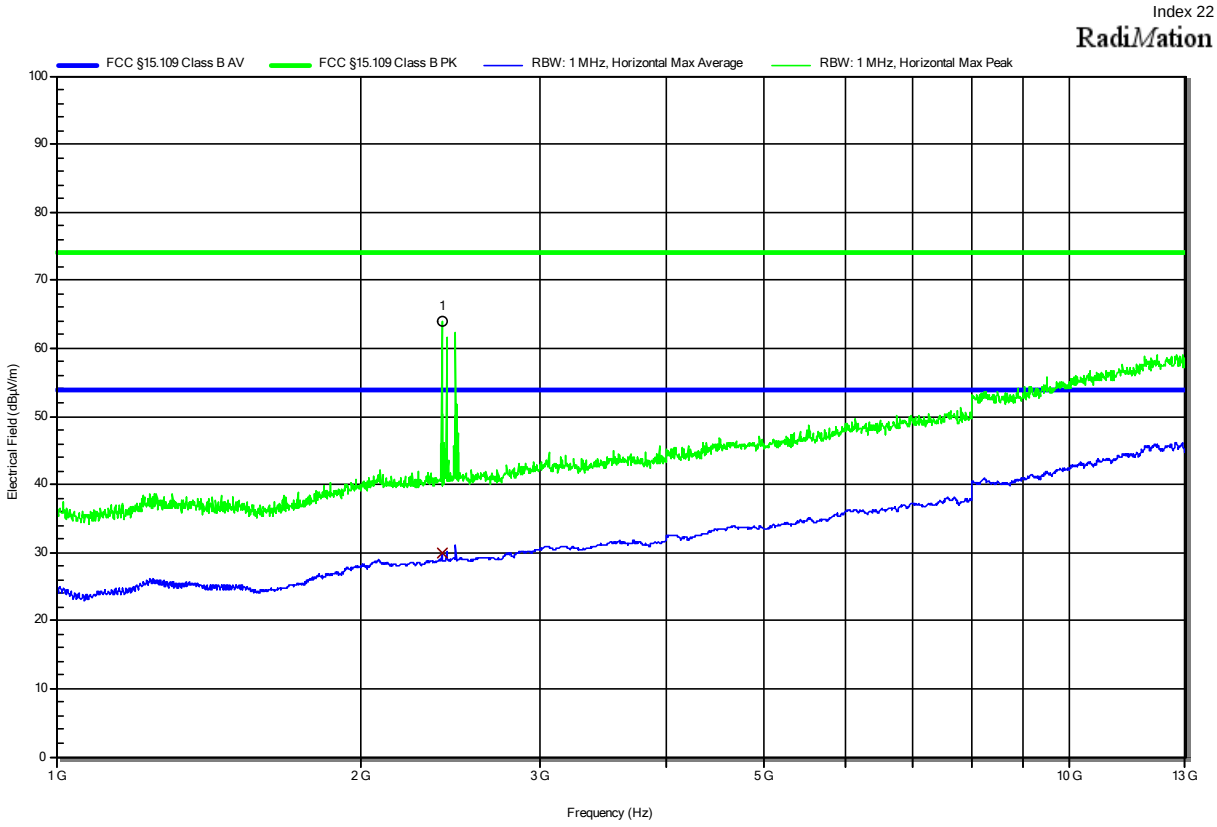
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	33.864 MHz	39.1 dBµV/m	40 dBµV/m	-0.9 dB	Pass	-120 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode:	1
EUT Configuration:	2
Note 1:	



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.401 GHz	Bluetooth LE				0 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.401 GHz	Bluetooth LE				0 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: AC/DC Adapter 120V AC 60Hz
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3 m
Operational Mode:	1
EUT Configuration:	2
Note 1:	

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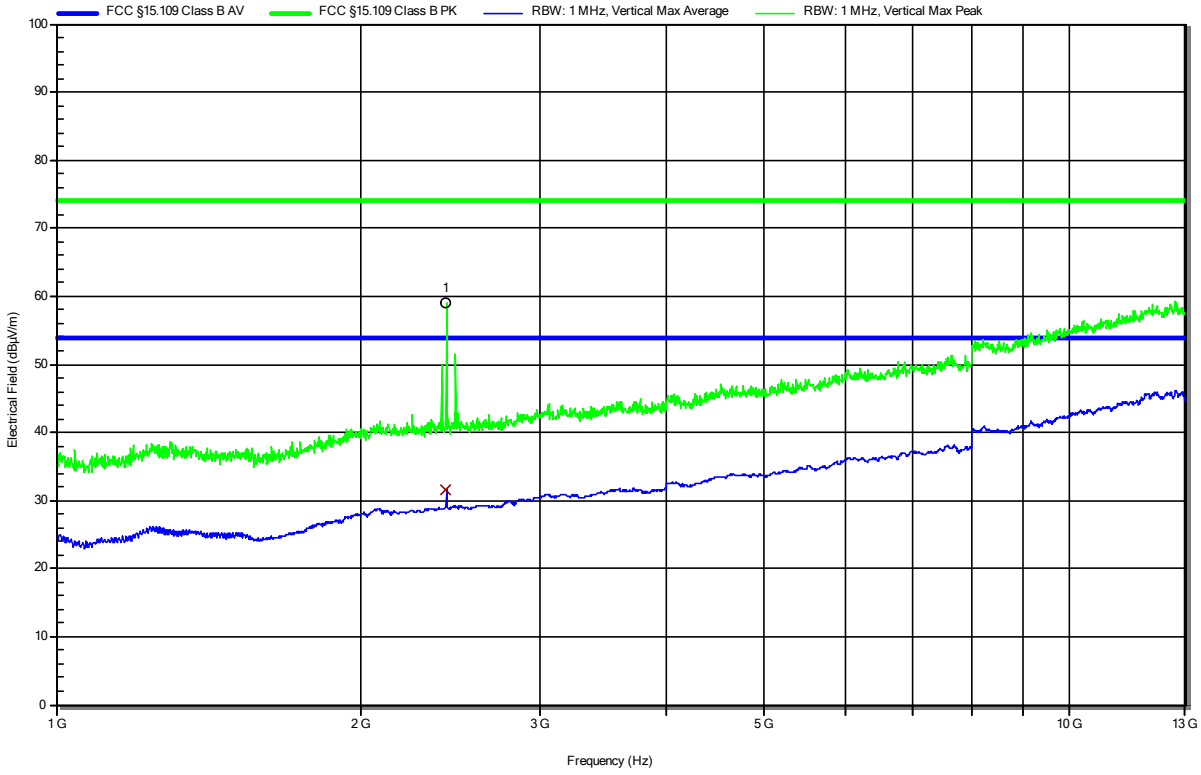
RadiMation

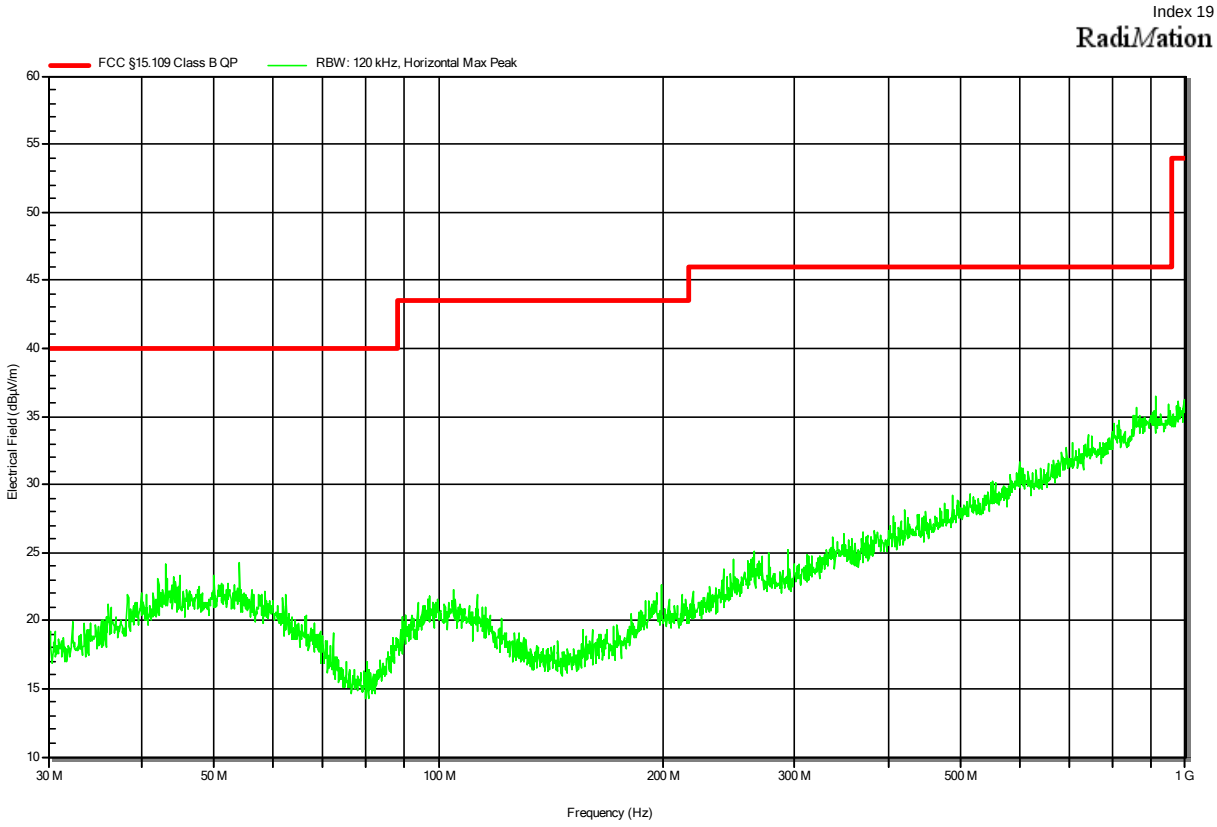


Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.427 GHz	Bluetooth LE				0 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.427 GHz	Bluetooth LE				0 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: accumulator
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10 m, converted to 3 m
Operational Mode:	2
EUT Configuration:	3
Note 1:	



Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: accumulator
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10 m, converted to 3 m
Operational Mode:	2
EUT Configuration:	3
Note 1:	

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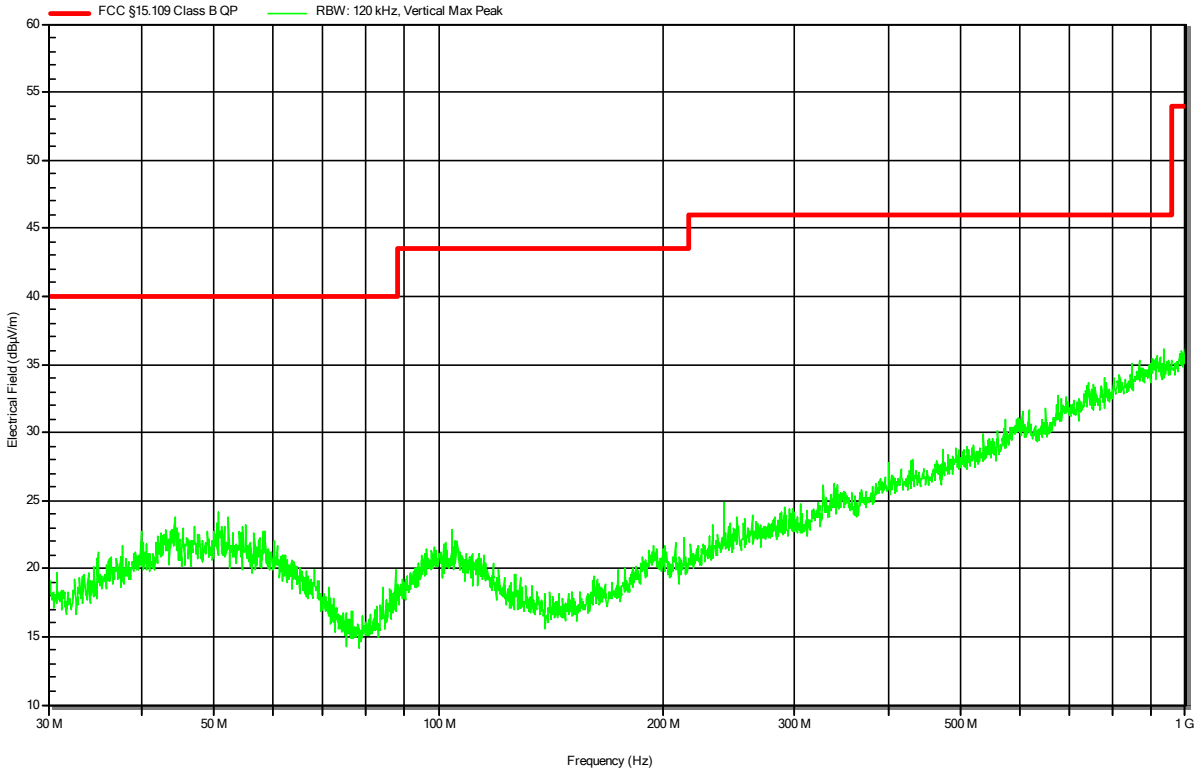
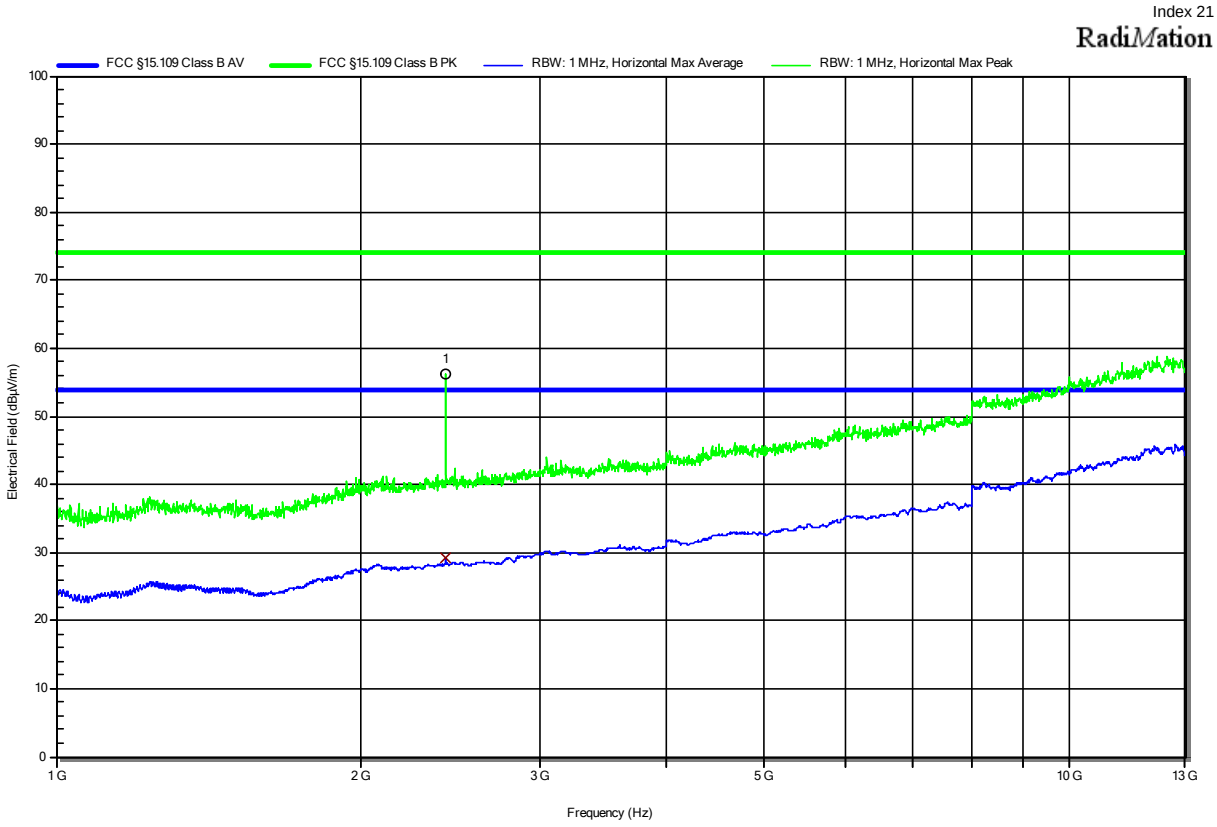
RadiMation



Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: accumulator
Antenna:	ETS-Lindgren 3117, Horizontal
Measurement Distance:	3m
Operational Mode:	2
EUT Configuration:	3
Note 1:	

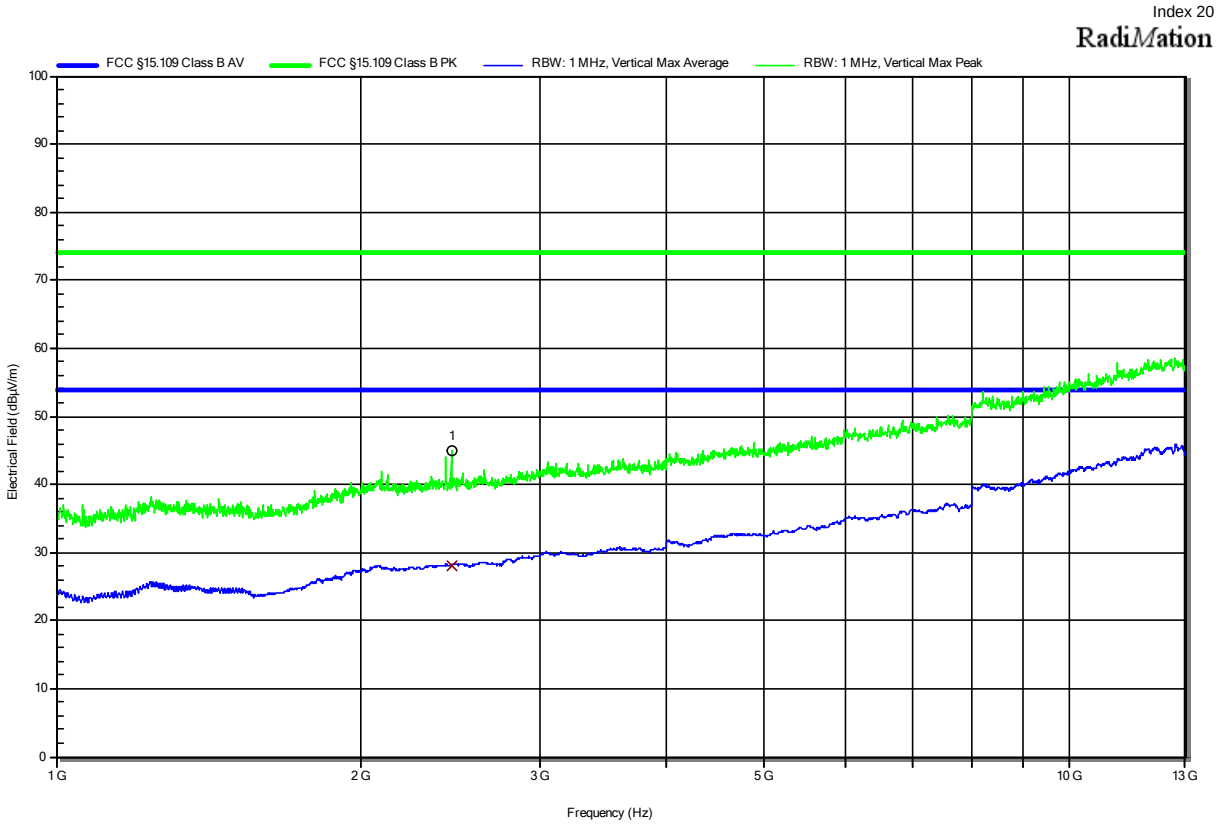


Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.423 GHz	Bluetooth LE				-33 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.423 GHz	Bluetooth LE				-33 degrees	1 m

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX / Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy, changeable sensor head and ATEX certification
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Neuner
Test Date:	2022-06-30
Operating Conditions:	ambient temperature: 22 °Celsius power input: accumulator
Antenna:	ETS-Lindgren 3117, Vertical
Measurement Distance:	3m
Operational Mode:	2
EUT Configuration:	3
Note 1:	



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.454 GHz	Bluetooth LE				-33 degrees	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.454 GHz	Bluetooth LE				-33 degrees	1 m

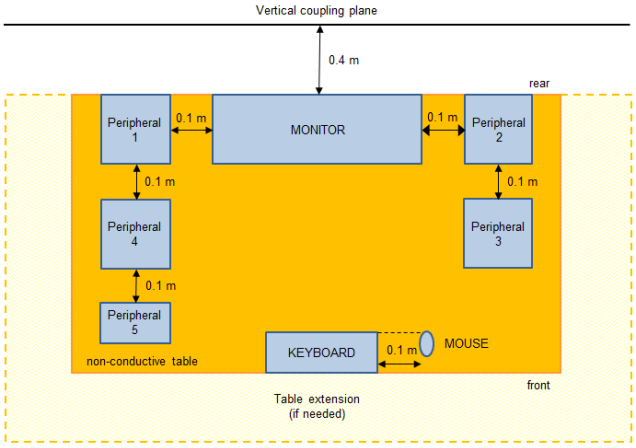
2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

2.2.1 Information

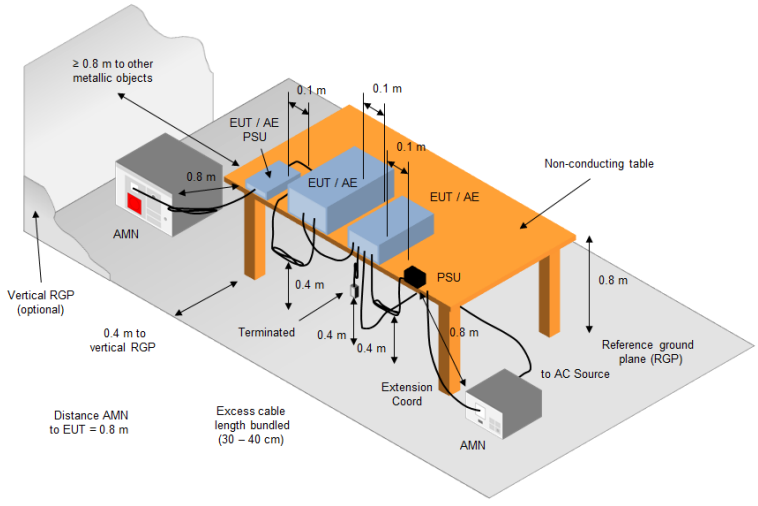
Test Information	
Reference	FCC 15.107, ICES-003, 3.2.1
Reference method	ANSI C63.4:2014+A1:2017 Section 12
Measurement range	150 kHz to 30 MHz
Equipment class	Class B
Equipment type	Table top
Temperature [°C]	25 ± 2
Humidity [%]	42 ± 3
Operator	Manuel Engel
Date	2022-06-28

2.2.2 Setup

Equipment placement



Test Setup



2.2.3 Equipment

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

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8127	EF01592	2021-07	2022-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2021-07	2022-07
EMI Test Receiver	R&S	ESR 7	EF00943	2021-08	2022-08
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2022-04	2023-04

2.2.4 Procedure

Exploratory measurement
1. The EUT was placed on a non-conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. I/O cables were bundled not longer than 0.4 m
6. Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor
7. To maximize the emissions the cable positions were manipulated
8. The worst configuration of EUT and cables is shown on a test setup picture at item 2.2.2

Final measurement
1. The EUT was placed on a non-conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. The EUT and cable arrangement were based on the exploratory measurement results
6. The test data of the worst-case conditions were recorded and shown on the next pages

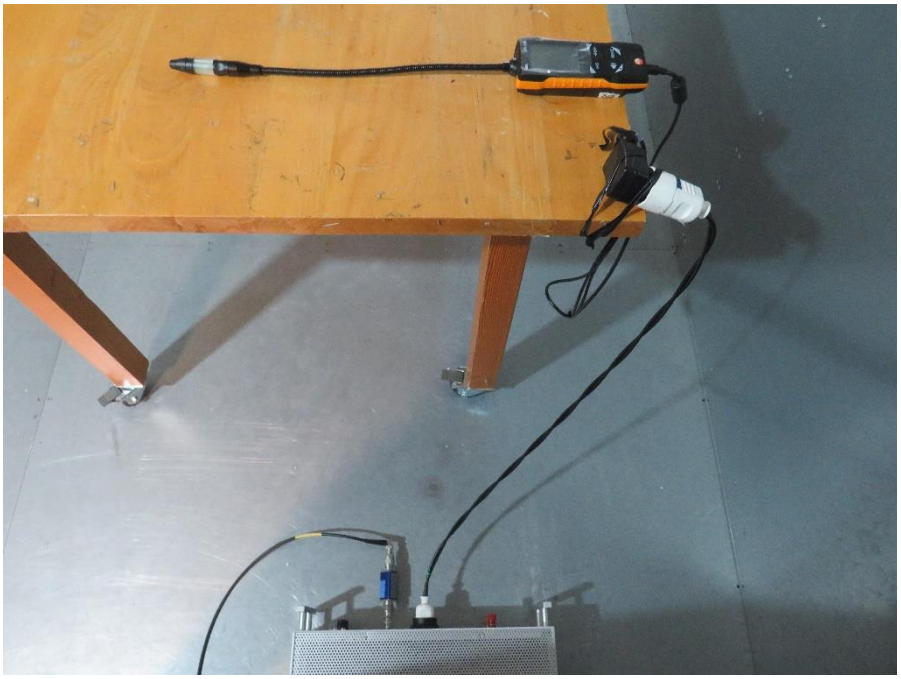
2.2.5 Limits

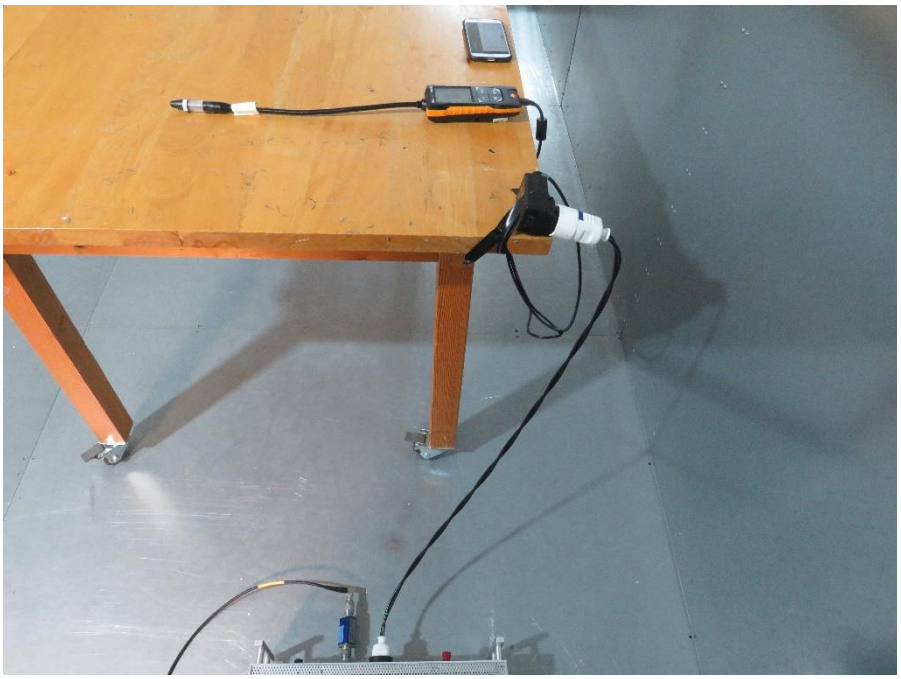
Class B		
Frequency [MHz]	Quasi-peak Limit [dBµV]	Average Limit [dBµV]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50
* Decreases with the logarithm of the frequency		

2.2.6 Results

AC power line conducted emissions					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
Power	AMN	1	1	PASS	-
		1	2	PASS	-

2.2.7 Setup Photos

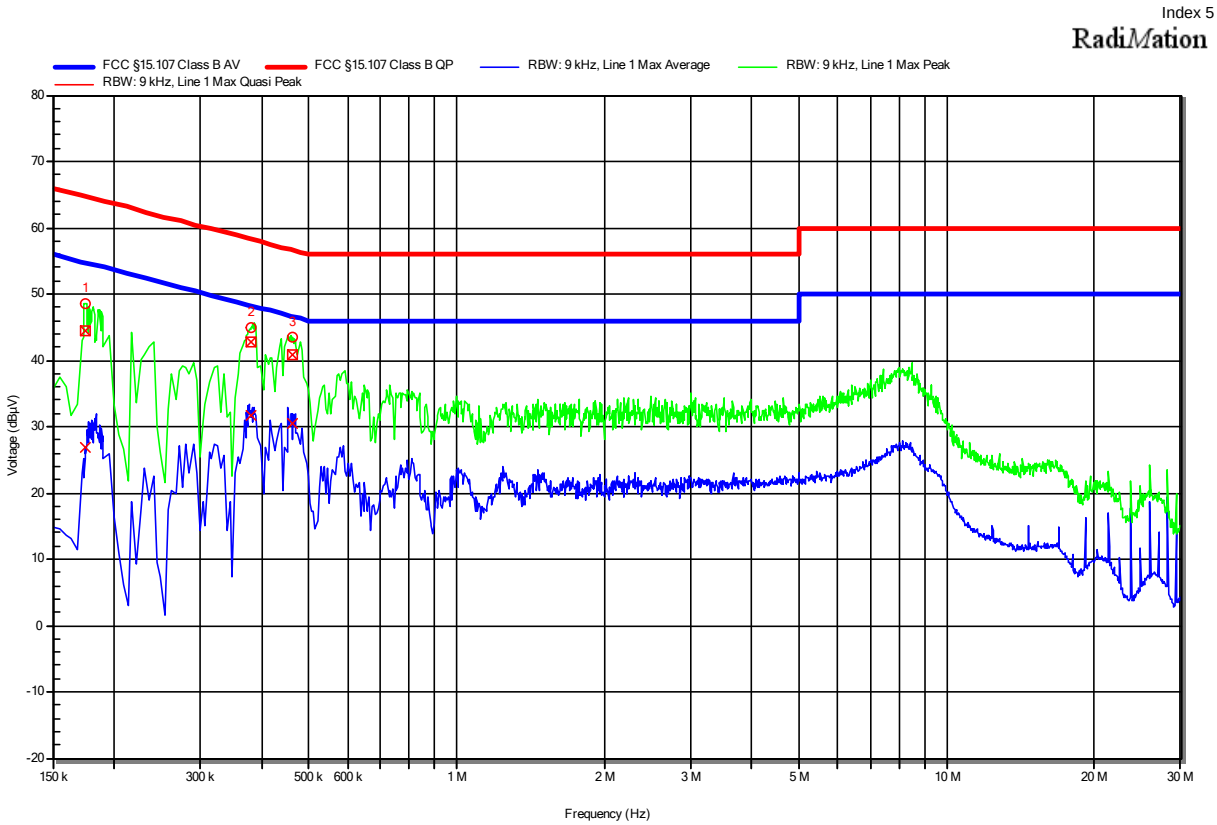
Setup EUT with AC/DC adapter (EGSTON)


Setup EUT with AC/DC adapter (TESTO)


2.2.8 Records

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

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX/ Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy and ATEX certification / Order No.0560 3163
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Engel
Test Date:	2022-06-28
Operating Conditions:	ambient temperature: 23 °Celsius power input: 120 V 60 Hz
LISN:	Schwarzbeck NSLK 8127 RC L1
Operational Mode:	Mode 1
EUT Configuration:	Configuration 1
Applied to Port:	AC Mains



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	174.75 kHz	44.55 dBµV	64.73 dBµV	-20.18 dB	Pass	Line 1
2	382.2 kHz	42.86 dBµV	58.23 dBµV	-15.37 dB	Pass	Line 1
3	461.85 kHz	40.8 dBµV	56.66 dBµV	-15.86 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	174.75 kHz	26.81 dBµV	54.73 dBµV	-27.92 dB	Pass	Line 1
2	382.2 kHz	31.76 dBµV	48.23 dBµV	-16.47 dB	Pass	Line 1
3	461.85 kHz	30.55 dBµV	46.66 dBµV	-16.11 dB	Pass	Line 1

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

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX/ Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy and ATEX certification / Order No.0560 3163
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Engel
Test Date:	2022-06-28
Operating Conditions:	ambient temperature: 23 °Celsius power input: 120 V 60 Hz
LISN:	Schwarzbeck NSLK 8127 N
Operational Mode:	Mode 1
EUT Configuration:	Configuration 1
Applied to Port:	AC Mains

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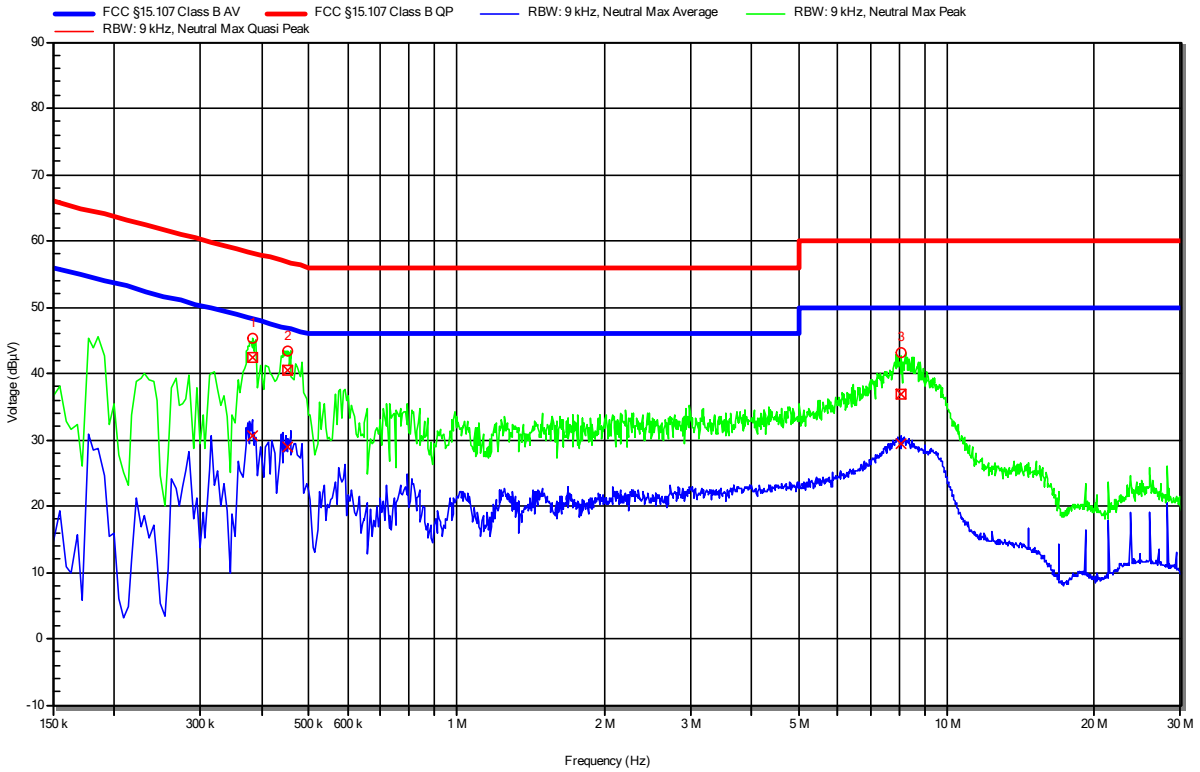
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	384 kHz	42.36 dBµV	58.19 dBµV	-15.83 dB	Pass	Neutral
2	453.3 kHz	40.43 dBµV	56.81 dBµV	-16.39 dB	Pass	Neutral
3	8.079 MHz	36.79 dBµV	60 dBµV	-23.21 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	384 kHz	30.5 dBµV	48.19 dBµV	-17.7 dB	Pass	Neutral
2	453.3 kHz	28.96 dBµV	46.81 dBµV	-17.86 dB	Pass	Neutral
3	8.079 MHz	29.34 dBµV	50 dBµV	-20.66 dB	Pass	Neutral

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

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX/ Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy and ATEX certification / Order No.0560 3163
Model:	testo 316-1-EX
Test Sample ID:	40293
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Engel
Test Date:	2022-06-28
Operating Conditions:	ambient temperature: 23 °Celsius power input: 120 V 60 Hz
LISN:	Schwarzbeck NSLK 8127 RC L1
Operational Mode:	Mode 1
EUT Configuration:	Configuration 2
Applied to Port:	AC Mains

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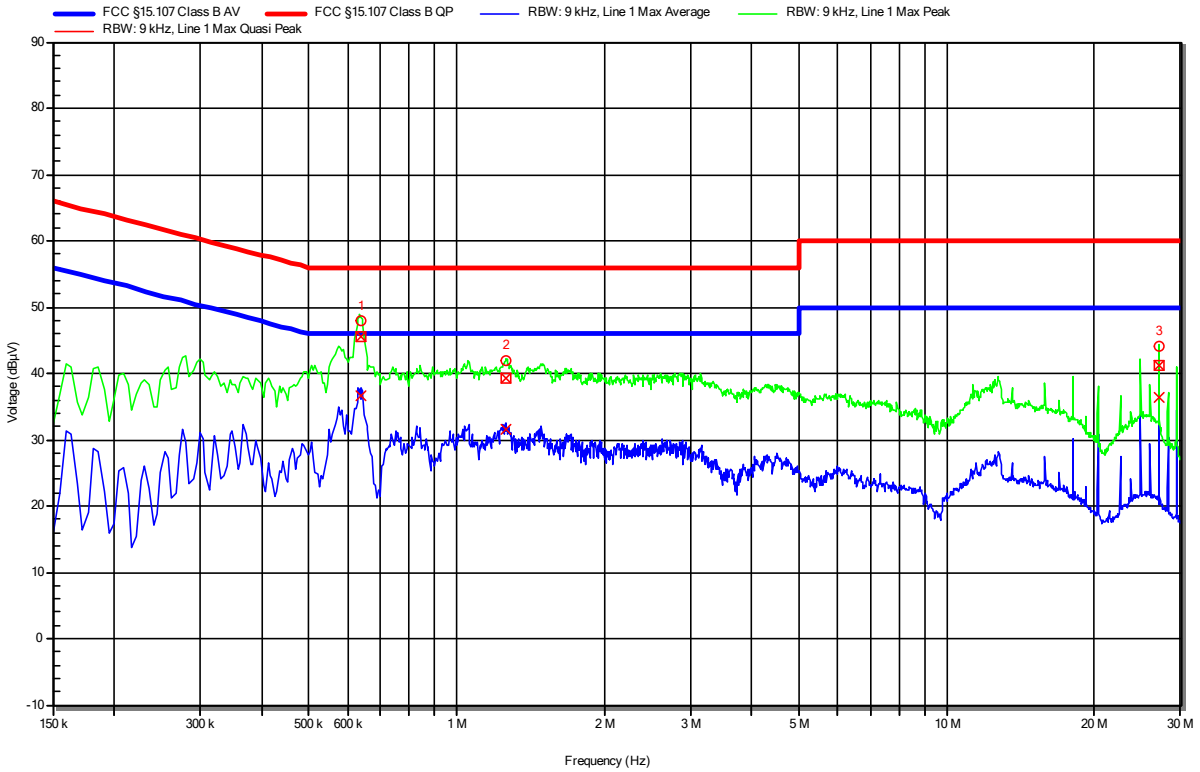
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	636 kHz	45.61 dBµV	56 dBµV	-10.39 dB	Pass	Line 1
2	1.257 MHz	39.34 dBµV	56 dBµV	-16.66 dB	Pass	Line 1
3	27.105 MHz	41.29 dBµV	60 dBµV	-18.71 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	636 kHz	36.71 dBµV	46 dBµV	-9.29 dB	Pass	Line 1
2	1.257 MHz	31.66 dBµV	46 dBµV	-14.34 dB	Pass	Line 1
3	27.105 MHz	36.31 dBµV	50 dBµV	-13.69 dB	Pass	Line 1

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

Project Number:	G0M-2205-1489
Applicant:	Testo SE & Co. KGaA
Model Description:	testo 316-1-EX/ Rechargeable battery powered (NiMH) detector for fluegas with LCD display, Bluetooth® Low Energy and ATEX certification / Order No.0560 3163
Model:	testo 316-1-EX
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Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Engel
Test Date:	2022-06-28
Operating Conditions:	ambient temperature: 23 °Celsius power input: 120 V 60 Hz
LISN:	Schwarzbeck NSLK 8127 N
Operational Mode:	Mode 1
EUT Configuration:	Configuration 2
Applied to Port:	AC Mains

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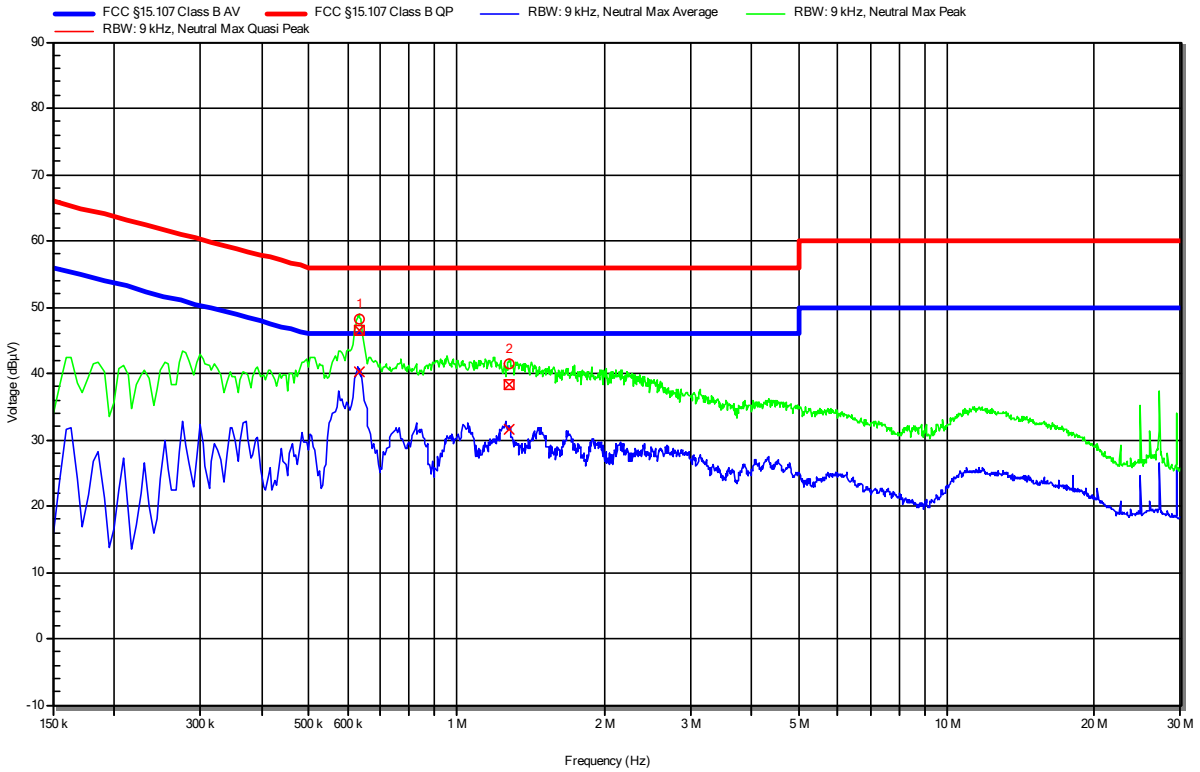
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	631.5 kHz	46.4 dBµV	56 dBµV	-9.6 dB	Pass	Neutral
2	1.279 MHz	38.19 dBµV	56 dBµV	-17.81 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	631.5 kHz	40.26 dBµV	46 dBµV	-5.74 dB	Pass	Neutral
2	1.279 MHz	31.54 dBµV	46 dBµV	-14.46 dB	Pass	Neutral

3 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Conducted emissions at the mains power port	150kHz to 30MHz, 3.35dB

Test Name	Measurement Uncertainty
Radiated Emission	30 MHz to 1 GHz @ 10 m, 6.25 dB 1 GHz to 6 GHz @ 3 m, 4.86 dB 6 GHz to 18 GHz @ 3 m, max. 5.39 dB