
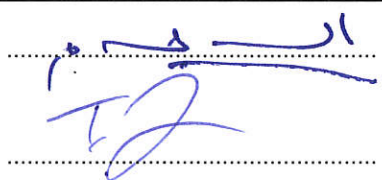



RADIO REPORT FCC 47 CFR Part 15F ISED Canada RSS-220 Ultra Wide Band Devices	
Report Reference No	G0M-1806-7488-TFC15FUW-V02
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 <p>A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2</p>
Applicant	Atlas Copco Industrial Technique AB
Address	Sickla Industriväg 19 10523 Stockholm Sweden
Test Specification	According to FCC/ISED rules
Standard	47 CFR Part 15F RSS-220, Issue 1 + A1, 2018-07
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Industrial Location Tethering - Positioning System
Model(s)	IL-R
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	1
Software Version(s)	1.0.1
FCC-ID	2AQ8P-ILR1
IC	24224-ILR1
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 - 23 °C	
Test Lab Humidity	32 – 38 %	
Date of receipt of test item	2018-08-15	
Report:		
Compiled by	Abdullah Al Jamal	
Tested by (+ signature) (Responsible for Test)	Abdullah Al Jamal	
	Toralf Jahn	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2019-03-04	
Total number of pages	72	
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:		
<p>The power settings of the module have been reduced by 8.5 dB (compared to the basic settings; via software settings).</p>		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2019-02-26	Initial Release	Abdullah Al Jamal, Toralf Jahn
02	2019-03-04	<p>Replaced document G0M-1806-7488-TFC15FUW-V01</p> <p>Replaced by G0M-1806-7488-TFC15FUW-V02</p> <p>Reason According to KDB 393764 D01 UWB v02 the types of devices are considered to be "hand held" under Section 15.519 for modular approval.</p>	Abdullah Al Jamal, Toralf Jahn

ABBREVIATIONS AND ACRONYMS

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

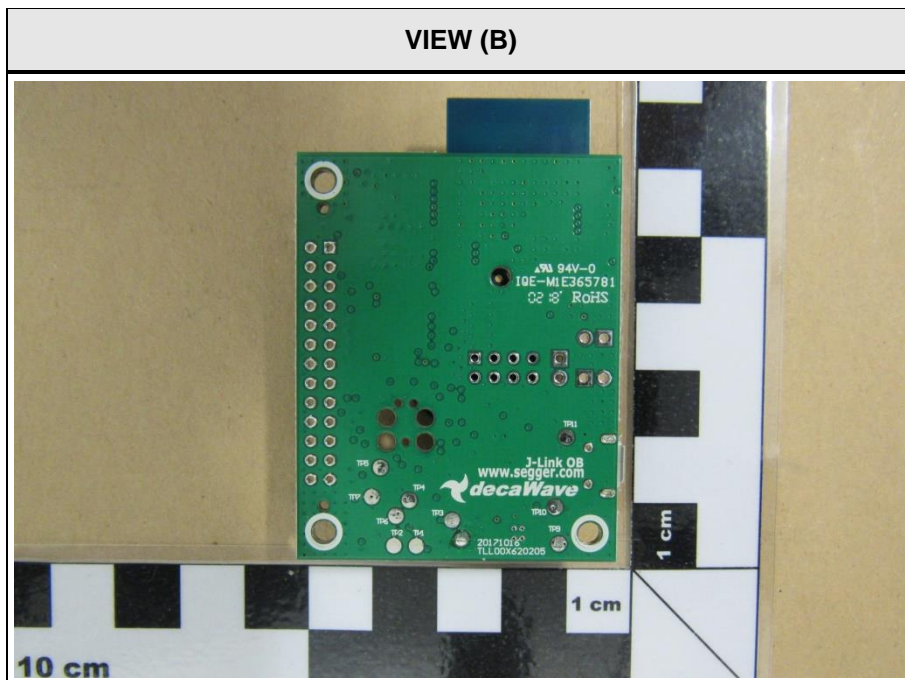
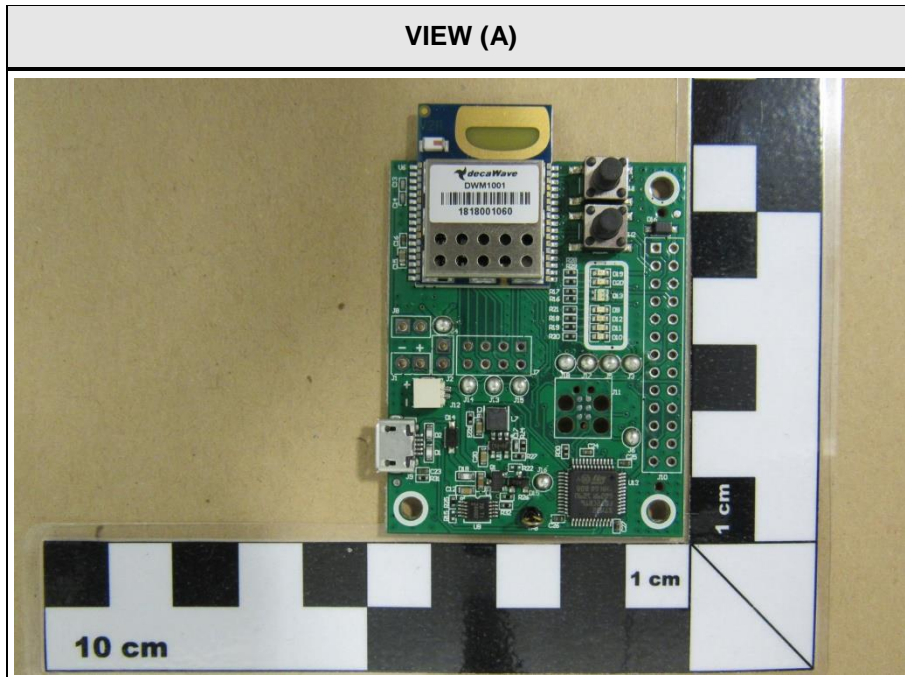
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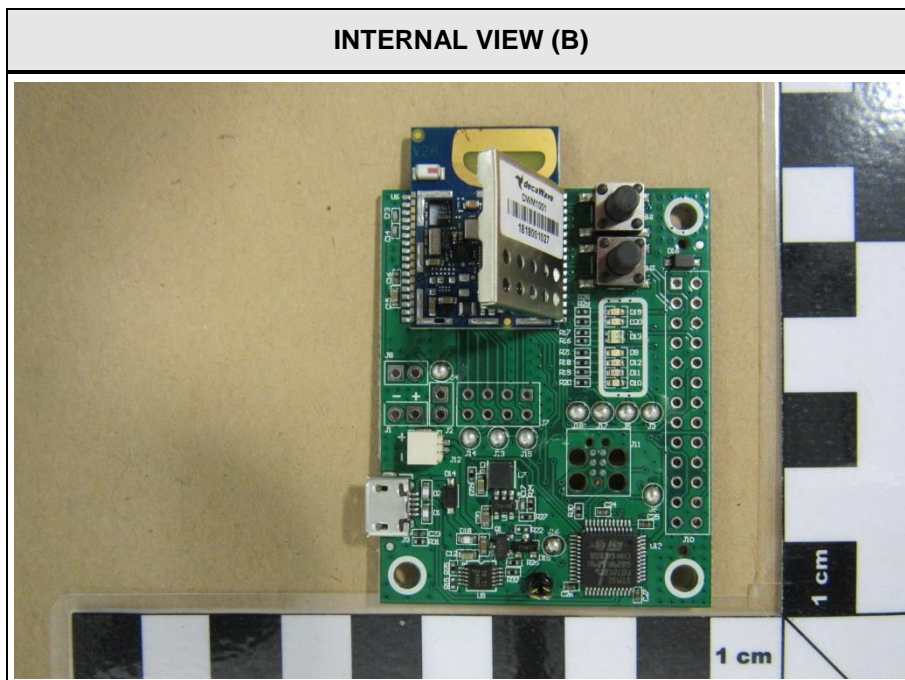
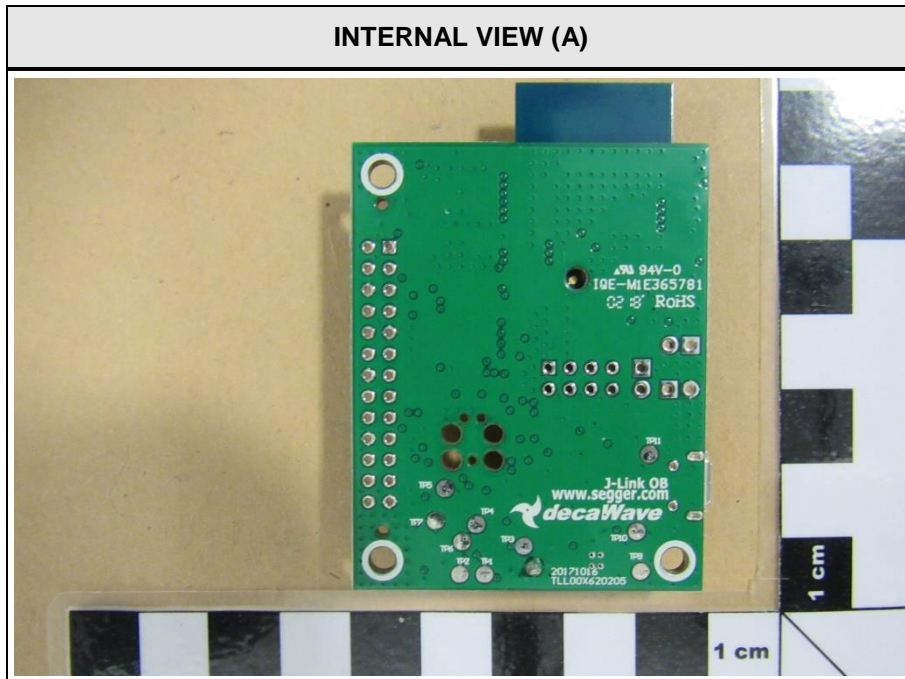
1 Equipment (Test Item) Under Test

Description	Industrial Location Tethering - Positioning System	
Model	IL-R	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	Not specified	
Hardware Version(s)	1	
Software Version(s)	1.0.1	
PMN	Industrial Location Radio Module (IL-R)	
HVIN	1	
FVIN	1	
HMN	N/A	
FCC-ID	2AQ8P-ILR1	
IC	24224-ILR1	
Equipment class	Hand held	
Equipment type	End Product	
Radio type	Transceiver	
Operating frequency range	3 - 6.8 GHz	
Radio technology	Ultra Wide-band	
Modulation	ASK	
Antenna	Type	Integrated antenna
	Model	UWB Channel 5 printed PCB antenna (6.5 GHz)
	Manufacturer	Decawave
	Gain	Not specified
Supply Voltage	V_{NOM}	3.3 VDC
Operating Temperature	T_{NOM}	25 °C
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A
Manufacturer	Atlas Copco Industrial Technique AB Sickla Industriväg 19 10523 Stockholm Sweden	

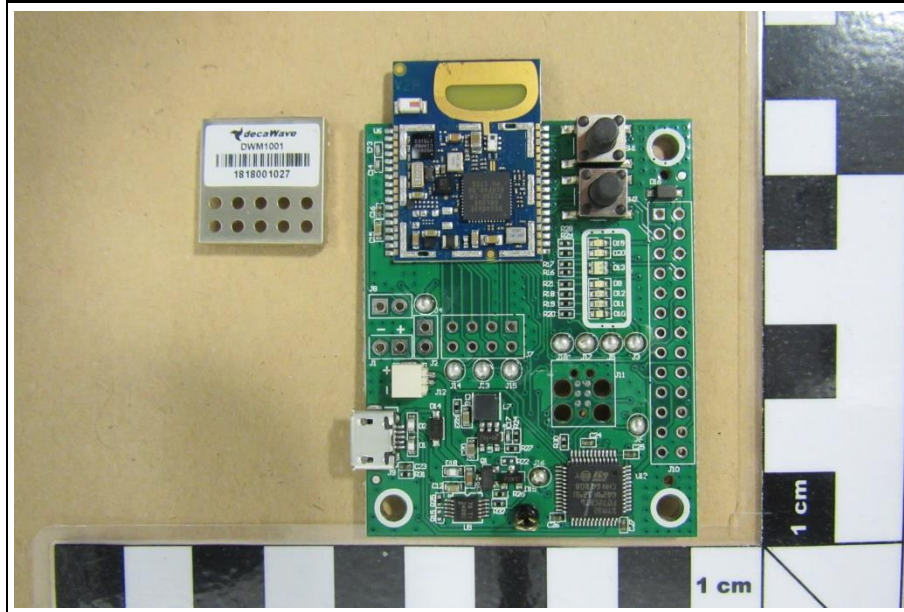
1.1 Photos – Equipment External



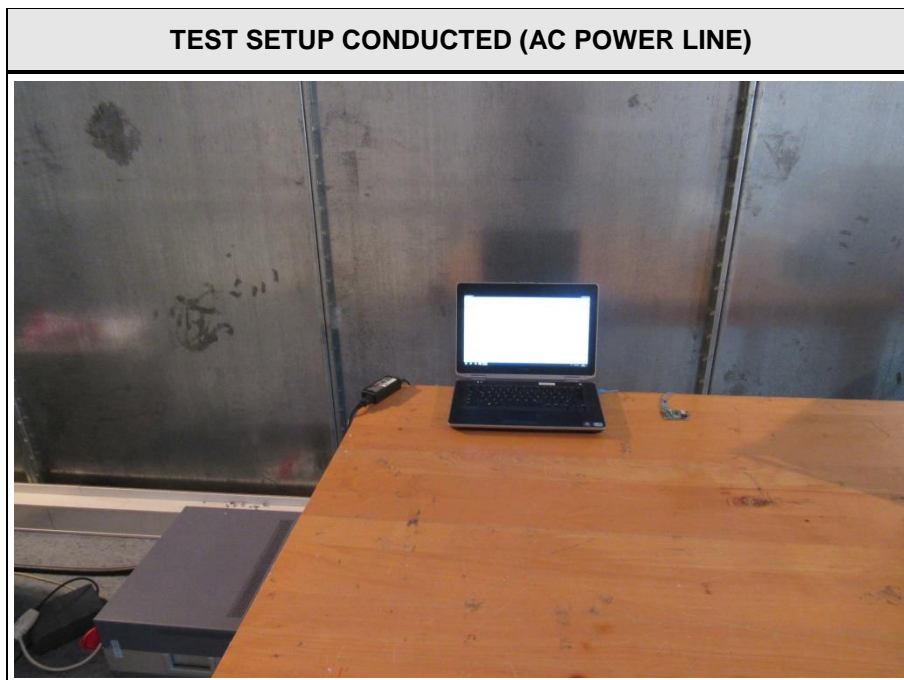
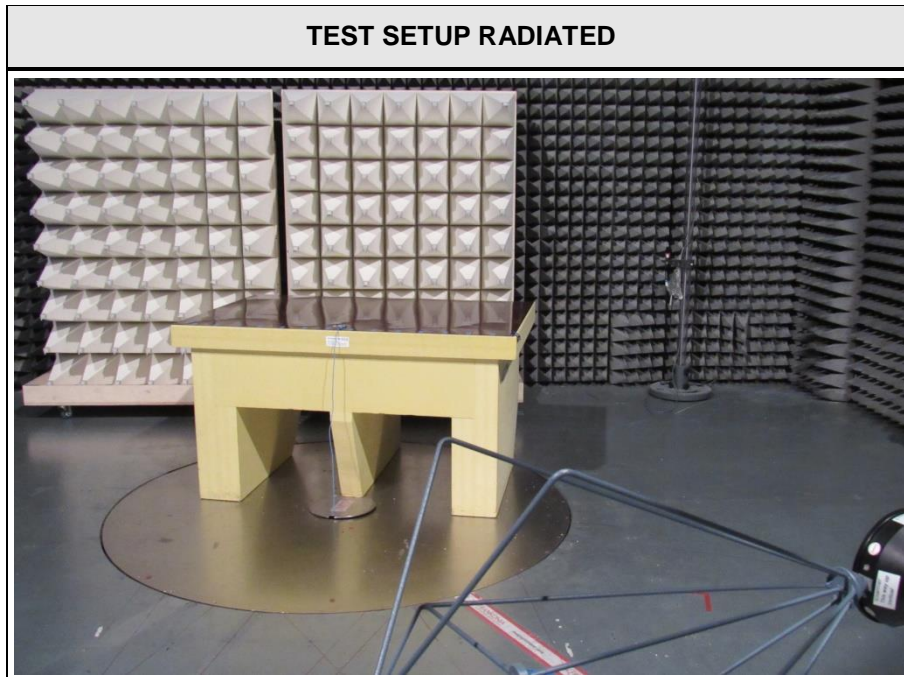
1.2 Photos – Equipment Internal



INTERNAL VIEW (D)



1.3 Photos – Test Setup



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE1	Laptop	Dell	Latitude E6430	S/N 4MX5TY1
AE2	Power Supply	Dell	LA65NS2-01	S/N 6TM1C
AE3	FT232RL FTDI USB to TTL Converter Adapter Modul 5V 3.3V	Not specified	Not specified	Not specified
AE4	Base Station	Atlas Copco Industrial Technique AB	IL-Base Station	Companion device
Description:				
AE1 – AE3	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment: None				

1.5 Test Modes

Mode	Description
Transmit	Mode = Transmit Modulation = BPM-BPSK Duty cycle = 100 %
Receive	Mode = Receive Modulation = BPM-BPSK
Communication	Normal communication link with a IL-Base Station
Comment: The power settings of the module have been reduced by 8.5 dB (compared to the basic settings; via software settings).	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	0	6489.6
F2	Rx	0	6489.6

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 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).

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:

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

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 dB μ V + 26 dB/m		= 47.5 dB μ V/m		47.5 dB μ V/m - 57.0 dB μ V/m		= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15F, ISED RSS-220				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISED RSS-220 3.1, RSS-Gen 6.7	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC 15.503(a), 15.519(b), ISED RSS-220 5.1a	UWB (-10 dB) Bandwidth	ANSI C63.10-2013	PASS	
FCC 15.519(e) ISED RSS-220 5.3.1g	Peak power	ANSI C63.10-2013	PASS	
FCC 15.519(a)(1) ISED RSS-220 5.3.1b	Cease of transmitter operation	ANSI C63.10-2013	PASS	
FCC 15.519(c)(d) ISED RSS-220 5.3.1c-e	Transmitter radiated emissions	ANSI C63.10-2013	PASS	
ISED RSS-220 3.1, ISED RSS-Gen 7.1	Receiver radiated spurious emissions	ANSI C63.10-2013	PASS	
FCC 15.207 ISED RSS-220 3.1, RSS-Gen 8.8	AC power line conducted emissions	ANSI C63.10-2013	PASS	
Comment: None				

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

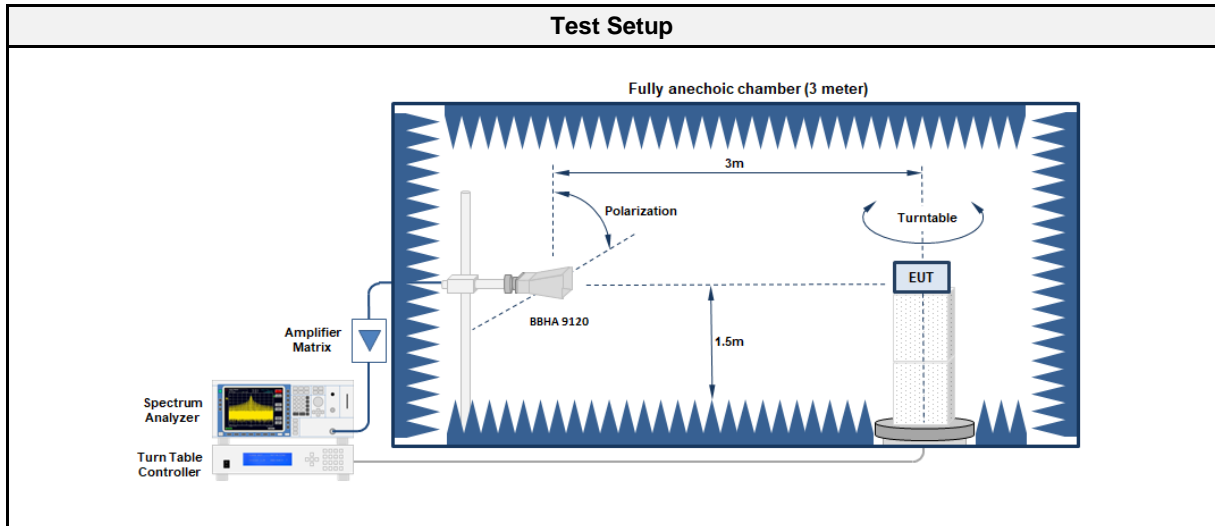
3.1.1 Information

Test Information	
Product Standard Reference	ISED RSS-220 3.1, RSS-Gen 6.7
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	± 1.3 %
Date	2018-09-28
Operator	Toralf Jahn

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
Anechoic Chamber	Frankonia	AC3	EF00199	-	-
Spectrum Analyzer	R&S	FSU 26	EF01003	2018-07	2019-07
Antenna	R&S	BBHA 9120D	EF01153	2018-09	2019-09

3.1.5 Procedure

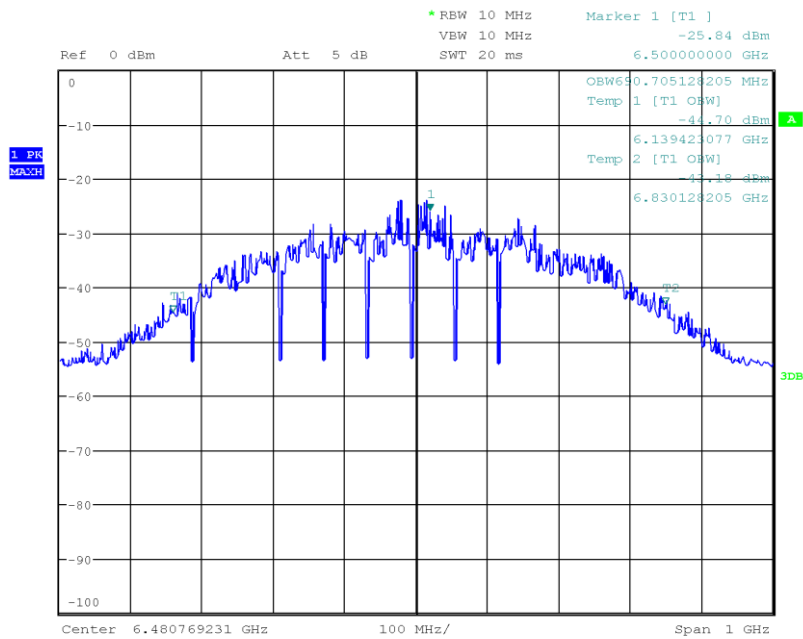
Test Procedure	
1.	EUT set to test mode
2.	The turntable and antenna height are set to the maximum emission level for the fundamental emission of the EUT
2.	Span set to at least twice the emission spectrum
3.	Resolution bandwidth set between 1 % to 5 % of OBW
4.	Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function

3.1.6 Results

Test Results	
Channel [MHz]	Bandwidth [MHz]
6489.6	690.7

Occupied Bandwidth

Project Number: G0M-1806-4788
 Applicant: RT-Systemtechnik GmbH
 Model Description: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Sample ID: 19860
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2018-09-28
 Operating Conditions: Tnom/Vnom
 Mode: UWB



Date: 28.SEP.2018 13:06:03

3.2 Test Conditions and Results - UWB (-10 dB) Bandwidth

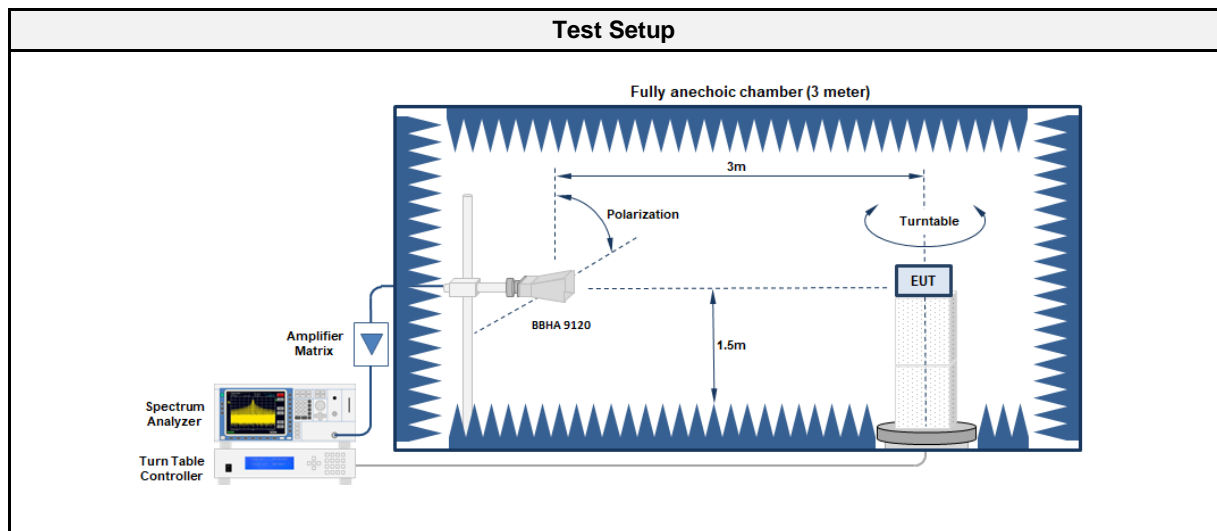
3.2.1 Information

Test Information	
Product Standard Reference	FCC Part 15.519 (a), ISED RSS-220 5.1 a
Measurement Method	ANSI C63.10 10.1
Measurement Uncertainty	± 1.3 %
Date	2018-09-18
Operator	Abdullah Al Jamal

3.2.2 Limits

Limits
UWB (-10 dB) bandwidth totally contained in the band 3.1 - 10.6 GHz

3.2.3 Setup



3.2.4 Equipment

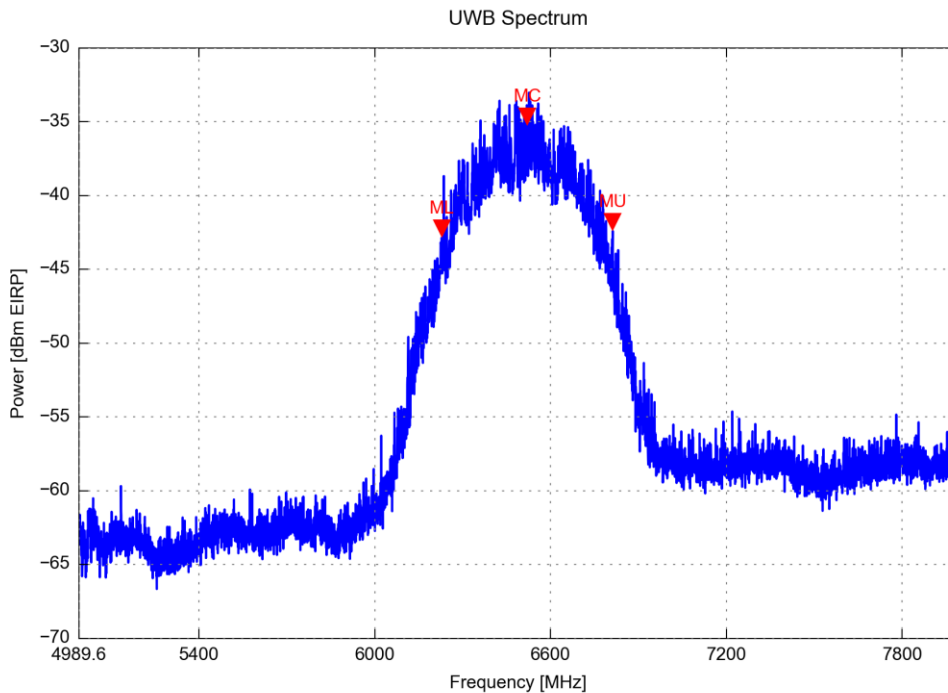
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC3	EF00199	-	-
Spectrum Analyzer	R&S	FSU 26	EF01003	2018-07	2019-07
Antenna	R&S	BBHA 9120D	EF01153	2018-09	2019-09

3.2.5 Procedure

Test Procedure	
1.	EUT set to test mode
2.	The turntable and antenna polarization are set to the maximum emission level for the fundamental emission of the EUT
3.	Span is set so that the complete fundamental emission spectrum is captured
3.	Resolution bandwidth set to 1 MHz and the VBW is set to 3 MHz with peak detector and max. hold
4.	The emission spectrum is corrected by the antenna gain cable loss, low-noise amplifier gain
5.	The maximum of the spectrum envelope is determined as reference
6.	The spectrum is searched from the left edge to the center of the spectrum in order to find the lower -10 dB frequency
7.	The spectrum is searched from the right edge to the center of the spectrum in order to find the upper -10 dB frequency
8.	From the lower and upper frequency the center frequency, the -10 dB bandwidth and the fractional bandwidth are calculated

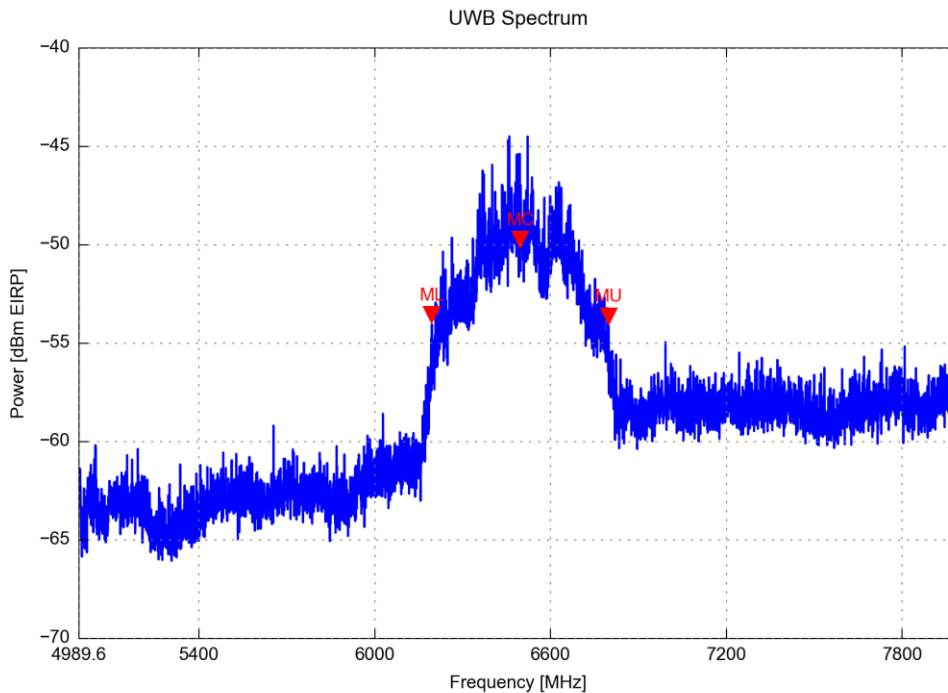
-10 dB Bandwidth (horizontal)

Project Number:	G0M-1806-7488
Applicant:	Atlas Copco Industrial Technique AB
Model Description:	Industrial Location Tethering - Positioning System
Model:	IL-R
Test Sample ID:	19860
Reference Standards:	FCC 15F, RSS-220
Reference Method:	ANSI C63.10:2013, Section 10.1
Operational Mode:	6489.6 GHz
Operating Conditions:	Tnom/Vnom
Operator:	Abdullah Al Jamal
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-09-18
Equipment class:	Indoor UWB systems (Indoor Communication Devices)
Center Frequency [MHz] (MC):	6520.500
Lower Frequency [MHz] (ML):	6228.600
Upper Frequency [MHz] (MU):	6812.400
-10 dB Bandwidth [MHz]:	583.800
Fractional Bandwidth [MHz]:	0.090
Bandwidth Verdict:	PASS



-10 dB Bandwidth (vertical)

Project Number:	G0M-1806-7488
Applicant:	Atlas Copco Industrial Technique AB
Model Description:	Industrial Location Tethering - Positioning System
Model:	IL-R
Test Sample ID:	19860
Reference Standards:	FCC 15F, RSS-220
Reference Method:	ANSI C63.10:2013, Section 10.1
Operational Mode:	6489.6 GHz
Operating Conditions:	Tnom/Vnom
Operator:	Abdullah Al Jamal
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-09-18
Equipment class:	Indoor UWB systems (Indoor Communication Devices)
Center Frequency [MHz] (MC):	6496.500
Lower Frequency [MHz] (ML):	6195.000
Upper Frequency [MHz] (MU):	6798.000
-10 dB Bandwidth [MHz]:	603.000
Fractional Bandwidth [MHz]:	0.093
Bandwidth Verdict:	PASS



3.3 Test Conditions and Results - Maximum Peak Power

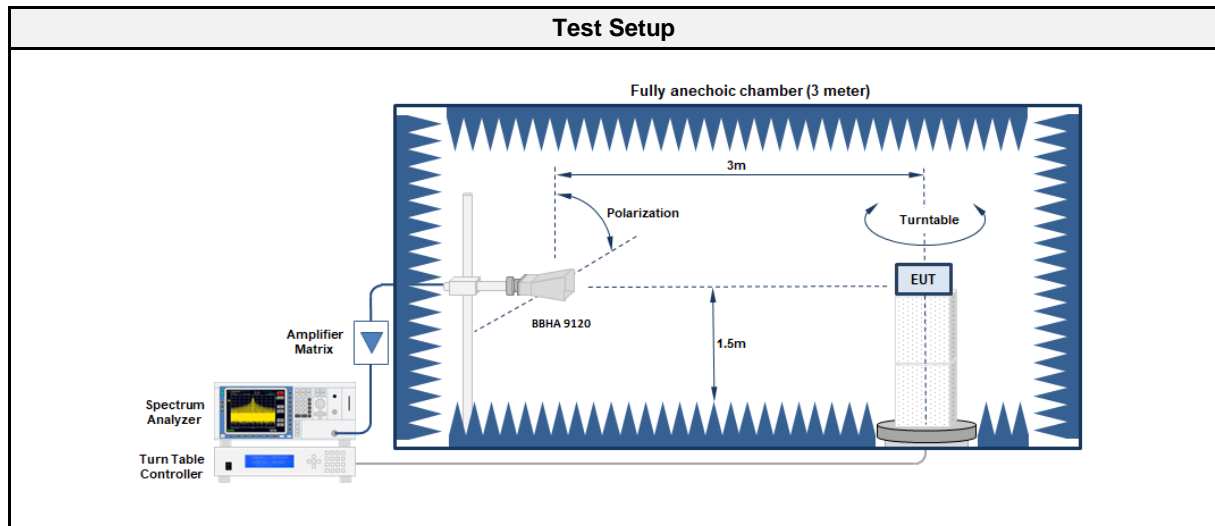
3.3.1 Information

Test Information	
Product Standard Reference	FCC Part 15.519 (e), ISED RSS-220 5.3.1 g
Date	2018-09-28
Operator	Toralf Jahn
Measurement Method	ANSI C63.10 10.3.5, 10.3.6, 10.3.9
Measurement Uncertainty	± 4.4 dB

3.3.2 Limits

Limits	
Bandwidth [MHz]	Power [dBm EIRP]
50	0

3.3.3 Setup



3.3.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2015.2.4

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC3	EF00199	-	-
Spectrum Analyzer	R&S	FSU 26	EF01003	2018-07	2019-07
Antenna	Schwarzbeck	BBHA 9120D	EF01153	2018-09	2019-09

3.3.5 Procedure

Test Procedure	
1.	EUT set to test mode
2.	The turntable and antenna polarization are set to the maximum emission level for the fundamental emission of the EUT
3.	Span is set so that the complete fundamental emission spectrum is captured
3.	Resolution bandwidth set to 50 MHz and the VBW is set to maximum with peak detector and max hold
4.	The emission spectrum is corrected by the antenna gain cable loss, low-noise amplifier gain and path loss
5.	The maximum of the spectrum envelope is determined and compared to the limit

3.3.6 Results

Test Results				
Channel [MHz]	Emission [MHz]	Power [dBm EIRP]	Limit [dBm EIRP]	Margin [dB]
6489.6 (horizontal)	6520.500	-10.8	0	-10.80
6489.6 (vertical)	6496.500	-22.1	0	-22.10

3.4 Test Conditions and Results - Cease of transmitter operation

3.4.1 Information

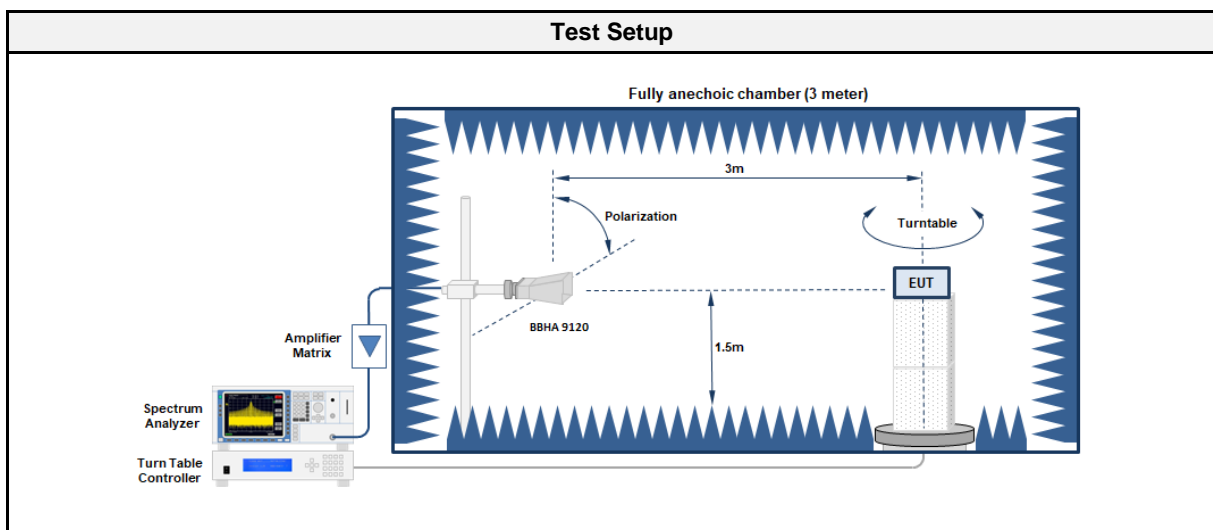
Test Information	
Product Standard Reference	FCC Part 15.519 (a)(1), ISED RSS-220 5.3.1 b
Date	2019-03-04
Operator	Abdullah Al Jamal

3.4.2 Limits

Limits - FCC
A UWB device shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

Limits - ISED
The device is to transmit only when it is sending information to an associated receiver. The device shall cease transmission of information within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB device at least every 10 seconds or the UWB device shall cease transmitting any information other than periodic signals used for the establishment or re-establishment of a communication link with an associated receiver.

3.4.3 Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC4	EF00199	-	-
Spectrum Analyzer	R&S	FSU 26	EF01003	2018-07	2019-07
Antenna	Schwarzbeck	BBHA 9120D	EF00019	2018-10	2020-10

3.4.5 Procedure

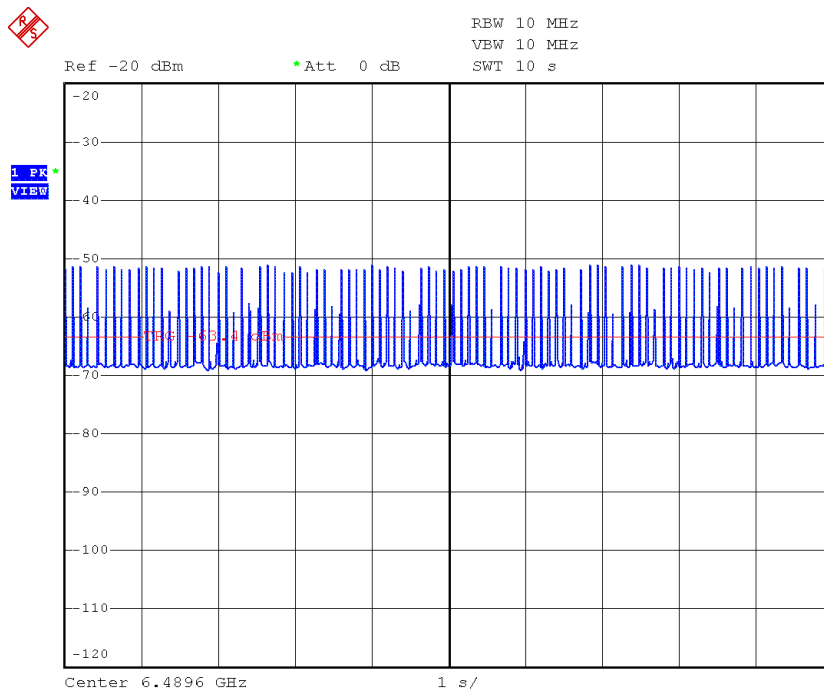
Test Procedure
<ol style="list-style-type: none"> 1. EUT set to normal operation 2. The emissions of the EUT are captured with a spectrum analyzer 3. The transmitter is stopped either by switching off the companion device or by releasing the manual switch 4. From the moment the transmitter is released the emission are recorded and a marker is set to the moment the transmitter has switched off 5. The marker time is recorded an compared to the limit

3.4.6 Results

Test Results			
Channel [MHz]	Transmission stop time [s]	Limit [s]	Margin [s]
6489.6	0.08	10	-09.92

Cease of transmitter operation

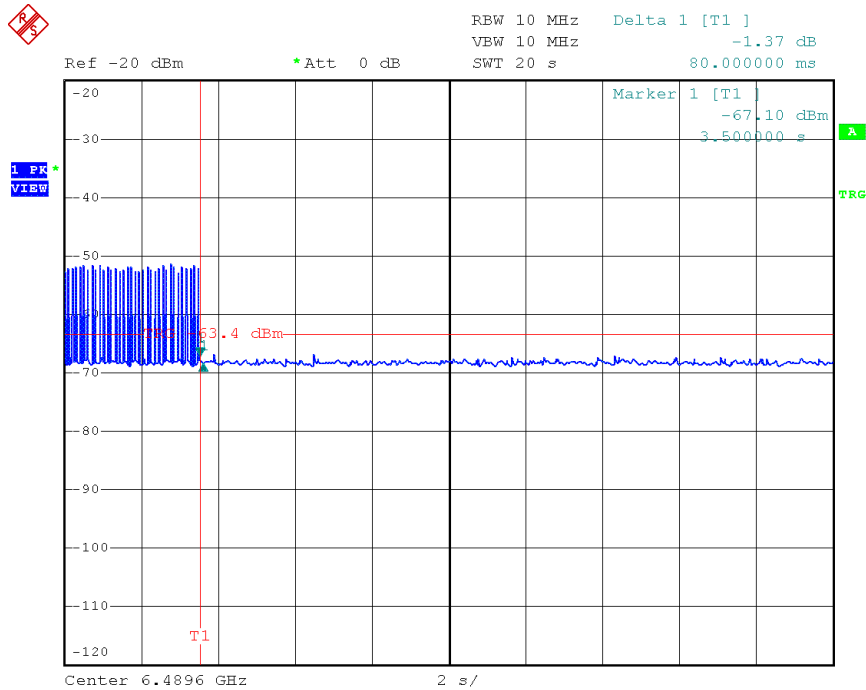
Project Number: G0M-1806-7488
 Applicant: Atlas Copco Industrial Technique AB
 Model Description: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Sample ID: 23190
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-03-04
 Operating Conditions: Tnom/Vnom
 Mode: Normal communication
 Note 1: Normal communication with companion device



Date: 4.MAR.2019 13:42:45

Cease of transmitter operation

Project Number: G0M-1806-7488
 Applicant: Atlas Copco Industrial Technique AB
 Model Description: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Sample ID: 23190
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-03-04
 Operating Conditions: Tnom/Vnom
 Mode: Normal communication
 Note 1: turn off the companion device after 3.5 seconds
 Note 2: The EUT stopt transmission after 80 ms



Date: 4.MAR.2019 14:49:30

3.5 Test Conditions and Results - Transmitter radiated emissions

3.5.1 Information

Test Information	
Product Standard Reference	FCC Part 15.519 (c)(d), ISED RSS-220 5.3.1 c-f
Measurement Method	ANSI C63.10 10.2, 10.3
Measurement Uncertainty	± 5.7 dB
Date	2018-09-17
Operator	Abdullah Al Jamal / Toralf Jahn

3.5.2 Limits

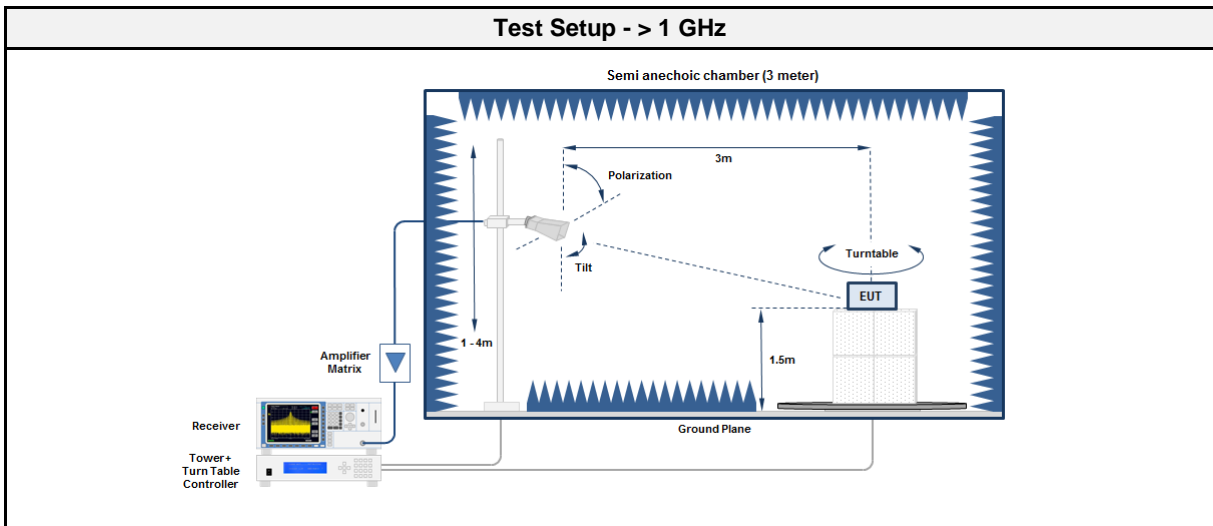
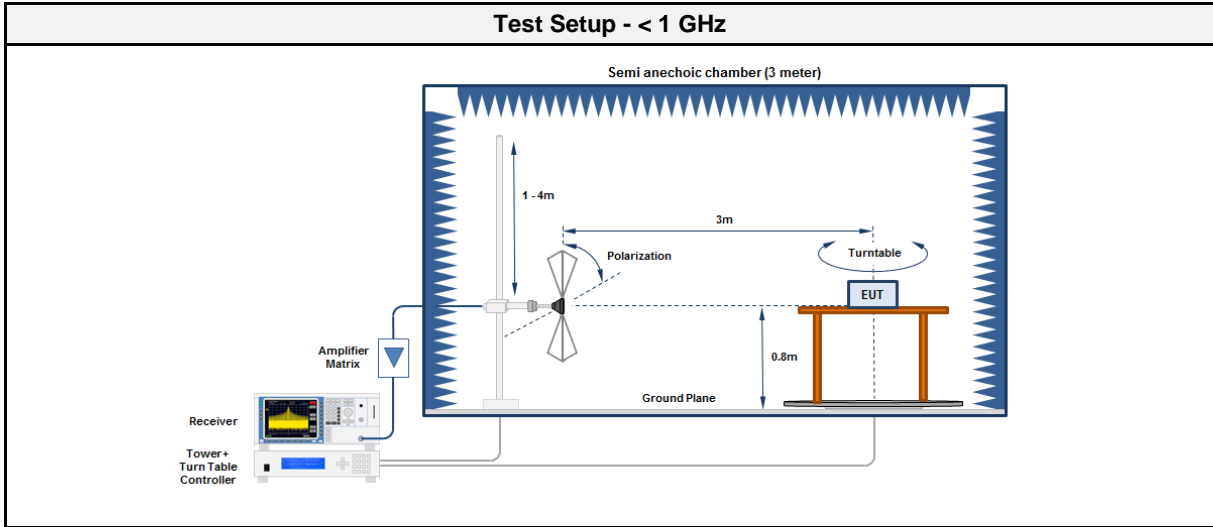
Limits - below 960 MHz			
Frequency [MHz]	Detector	Field strength [$\mu\text{V}/\text{m}$]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3

Limits - FCC - above 960 MHz					
Frequency [MHz]	Bandwidth	Detector	Power [dBm EIRP]	Field Strength [$\text{dB}\mu\text{V}/\text{m}@3\text{m}$]	Field Strength [$\text{dB}\mu\text{V}/\text{m}@1\text{m}$]
960-1610	1 MHz	RMS	-75.3	19.9	29.5
1610-1990	1 MHz	RMS	-63.3	31.9	41.5
1990-3100	1 MHz	RMS	-61.3	33.9	43.5
3100-10600	1 MHz	RMS	-41.3	53.9	63.5
> 10600	1 MHz	RMS	-61.3	33.9	43.5

Limits - ISED - above 960 MHz					
Frequency [MHz]	Bandwidth	Detector	Power [dBm EIRP]	Field Strength [$\text{dB}\mu\text{V}/\text{m}@3\text{m}$]	Field Strength [$\text{dB}\mu\text{V}/\text{m}@1\text{m}$]
960-1610	1 MHz	RMS	-75.3	19.9	29.5
1610-4750	1 MHz	RMS	-70.0	25.2	34.7
4750-10600	1 MHz	RMS	-41.3	53.9	63.5
> 10600	1 MHz	RMS	-61.3	33.9	43.5

Limits - GPS Band					
Frequency [MHz]	Bandwidth	Detector	Power [dBm EIRP]	Field Strength [$\text{dB}\mu\text{V}/\text{m}@3\text{m}$]	Field Strength [$\text{dB}\mu\text{V}/\text{m}@1\text{m}$]
1164-1240	1 kHz	RMS	-85.3	9.9	19.5
1559-1610	1 kHz	RMS	-85.3	9.9	19.5

3.5.3 Setup



3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00187	2016-05	2019-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF01153	2018-09	2019-09
Antenna	Amplifier Research	AT4560	EF00302	2018-04	2019-04
Antenna	Amplifier Research	ATH18G40	EF01152	2017-10	2018-10
Antenna	Amplifier Research	22240-25	EF00301	2016-11	2019-11

3.5.5 Procedure

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

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

3.5.6 Results

Test Results - 30 - 960 MHz						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
6489.6	30.763	39.65	pk	ver	40.00	-00.35
6489.6	36.959	33.43	pk	hor	40.00	-06.57
6489.6	42.321	37.16	pk	ver	40.00	-02.84
6489.6	183.199	35.22	pk	hor	43.50	-08.28
6489.6	186.507	35.98	pk	ver	43.50	-07.52

Test Results - 960 MHz - 40 GHz						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
6489.6	996.204	-77.80	RMS	ver	-75.30	-02.50
6489.6	1236.8	-80.90	RMS	hor	-75.30	-05.63
6489.6	1236.8	-80.90	RMS	ver	-75.30	-05.64
6489.6	1239.4	-87.70	RMS	hor	-75.30	-12.38
6489.6	1.2367	-87.50	RMS	ver	-75.30	-12.20
6489.6	1572	-88.80	RMS	hor	-75.30	-13.50
6489.6	1574.2	-88.6	RMS	ver	-75.30	-13.30
6489.6	6.4895	-50.4	RMS	ver	-41.30	-09.10
6489.6	6489.5	-60.6	RMS	ver	-41.3	-19.30
6489.6	6.5335	-49.9	RMS	hor	-41.30	-08.60

Test Results - GPS Band						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
6489.6	No significant emissions.					

3.6 Test Conditions and Results - Receiver radiated emissions

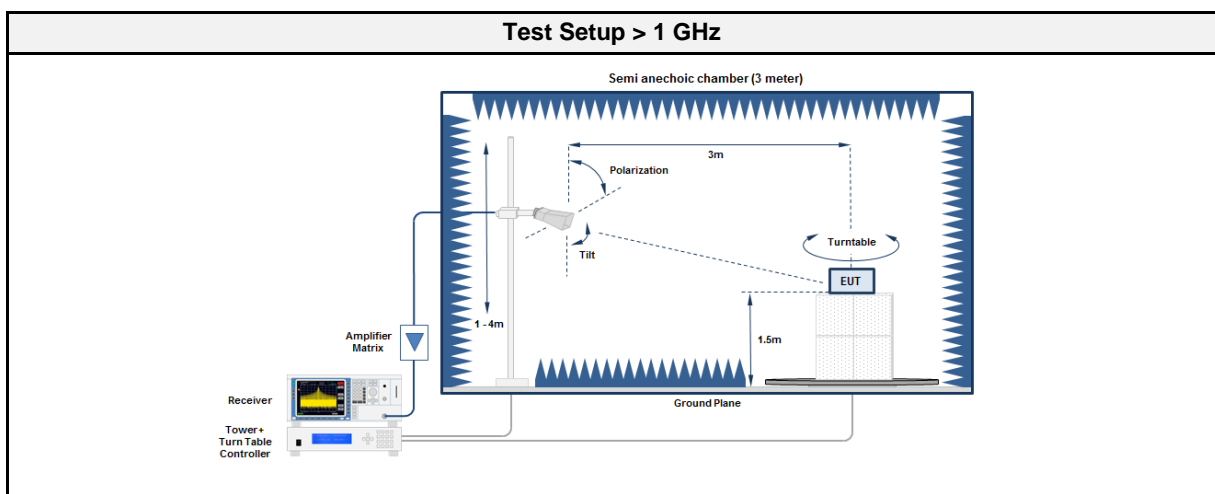
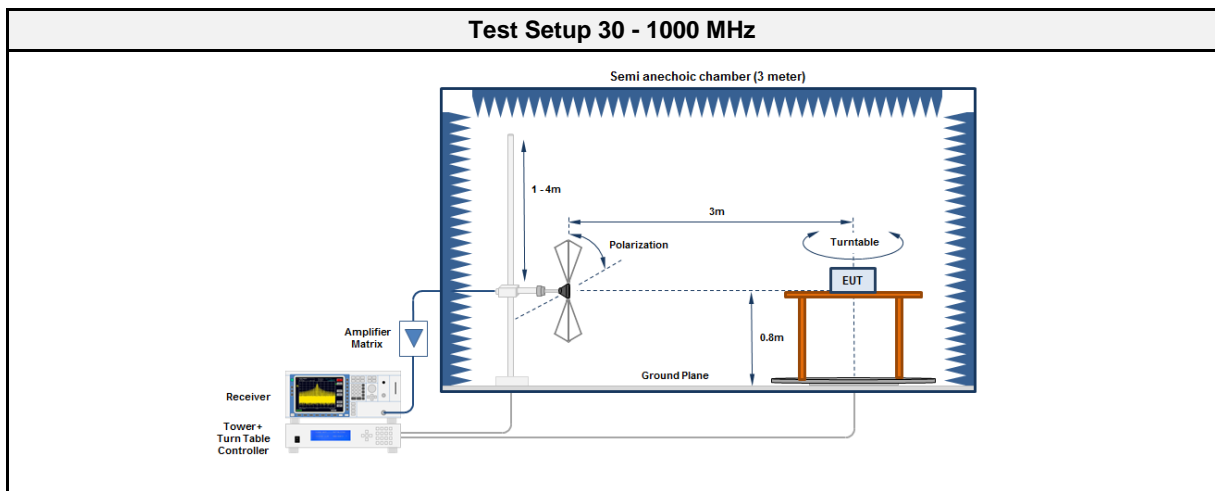
3.6.1 Information

Test Information	
Product Standard Reference	ISED RSS-220 3.1, RSS-Gen 7.3
Measurement Method	ANSI C63.10 6.5, 6.6
Operator	Toralf Jahn
Date	2018-09-28

3.6.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dB μ 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

3.6.3 Setup



3.6.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	R&S	VULB 9162	EF00978	2016-11	2019-11
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00212	2016-04	2019-04

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF00302	2018-04	2019-04
Antenna	Amplifier Research	ATH18G40	EF01152	2017-10	2018-10
Antenna	Amplifier Research	22240-25	EF00301	2016-11	2019-11

3.6.5 Procedure

Test Procedure 30 - 1000 MHz
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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

3.6.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dB μ V/m]	Det.	Pol.	Limit [dB μ V/m]	Margin [dB]
6489.6	30	31.67	pk	hor	40.00	-08.33
6489.6	3793	37.63	pk	ver	53.98	-16.35
6489.6	3904	38.75	pk	hor	53.98	-15.23
6489.6	7952	48.18	pk	ver	53.98	-05.80
6489.6	7976	47.79	pk	hor	53.98	-06.19
6489.6	10585	42.77	pk	ver	53.98	-11.21
6489.6	11367	41.52	pk	hor	53.98	-12.46
6489.6	14572	45.40	pk	ver	53.98	-08.58

3.7 Test Conditions and Results - AC powerline conducted emissions

3.7.1 Information

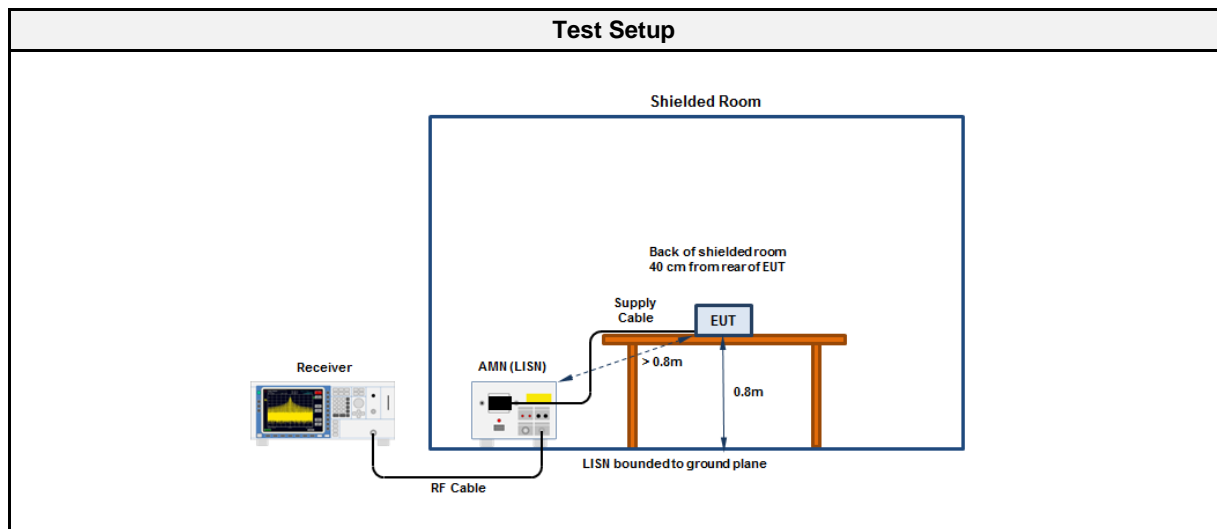
Test Information	
Reference	FCC 15.207; ISED RSS-220 3.1, RSS-Gen, Issue 5
Measurement Method	ANSI C63.10 6.2
Operator	Abdullah Al Jamal
Date	2018-09-04

3.7.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dB μ V]	Average [dB μ V]
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	2016.1.10

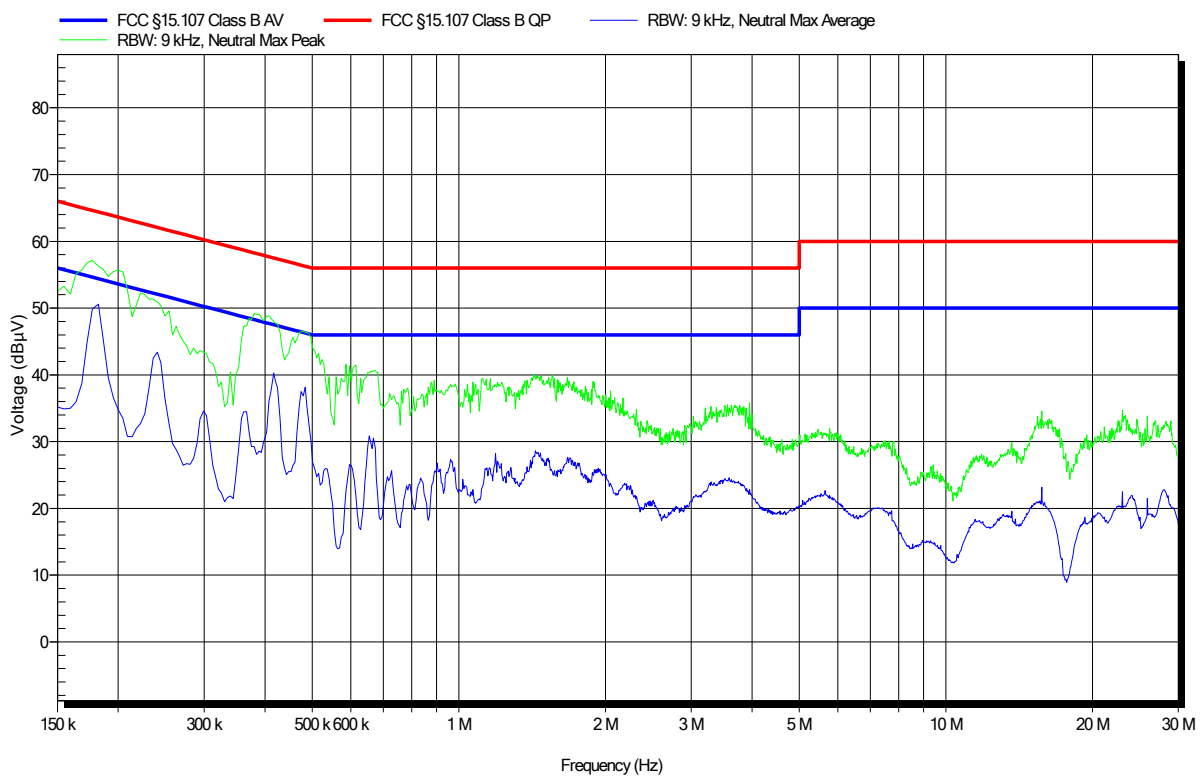
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESCS 30	EF00295	2018-07	2019-07
LISN	R&S	ESH2-Z5	EF00182	2017-01	2019-01

EMI voltage test in the ac-mains according to FCC Part C 15.207

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique AB
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.9°C, Vnom: 3.3 VDC
 LISN: ESH2-Z5 N
 Mode: UWB
 Test Date: 2018-09-04
 Note:

Index 2

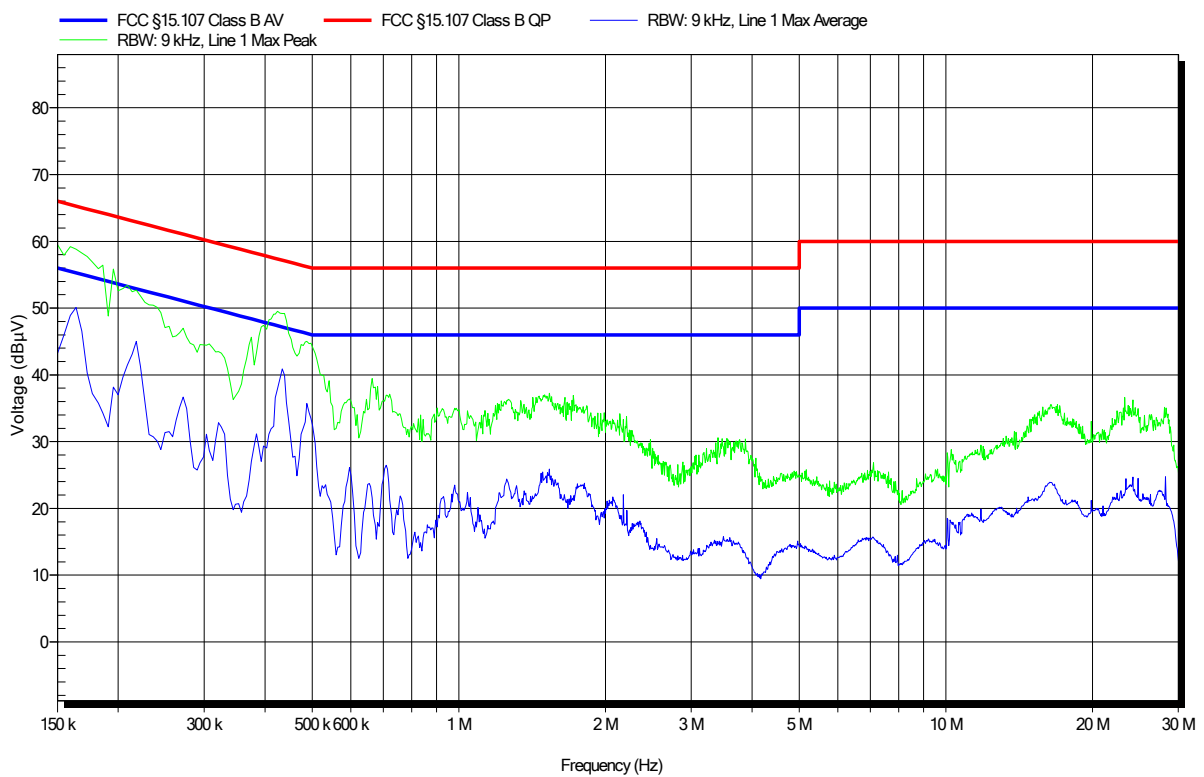


EMI voltage test in the ac-mains according to FCC Part C 15.207

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique AB
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.9°C, Vnom: 3.3 VDC
 LISN: ESH2-Z5 L
 Mode: UWB
 Test Date: 2018-09-04
 Note:

Index 3



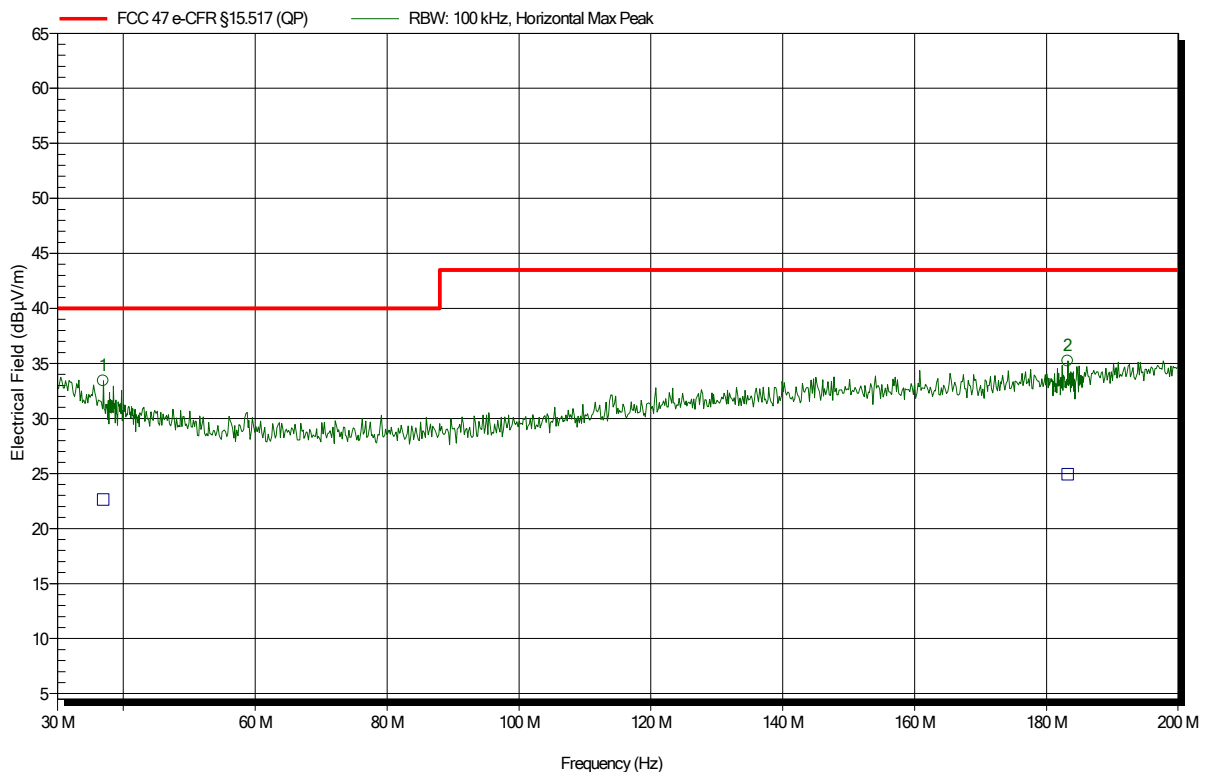
ANNEX A Transmitter radiated emissions

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 4



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Height
183.199 MHz	35.22 dBµV/m	43.5 dBµV/m	-8.28 dB	Pass	1.2 m
36.959 MHz	33.43 dBµV/m	40 dBµV/m	-6.57 dB	Pass	1.2 m

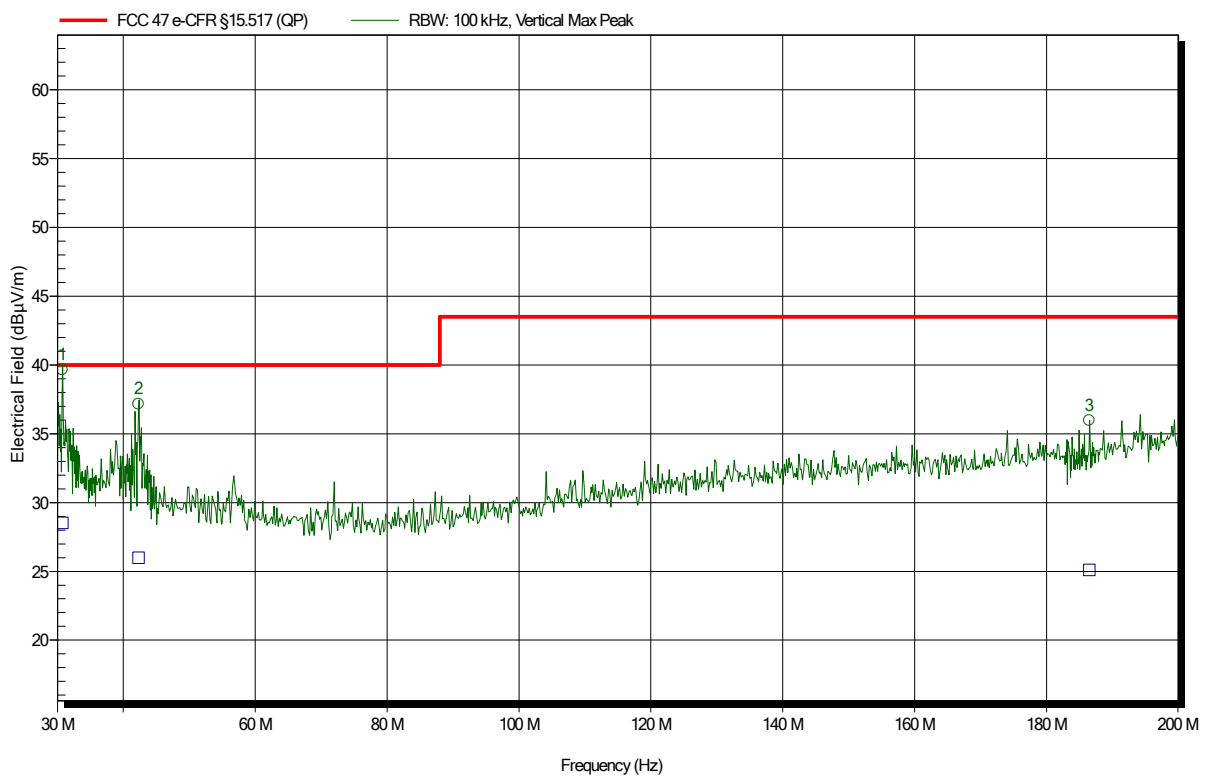
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Height
183.199 MHz	24.92 dBµV/m	43.5 dBµV/m	-18.58 dB	Pass	1.2 m
36.959 MHz	22.64 dBµV/m	40 dBµV/m	-17.36 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 5



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Height
186.507 MHz	35.98 dBµV/m	43.5 dBµV/m	-7.52 dB	Pass	1.2 m
30.763 MHz	39.65 dBµV/m	40 dBµV/m	-0.35 dB	Pass	1.2 m
42.321 MHz	37.16 dBµV/m	40 dBµV/m	-2.84 dB	Pass	1.2 m

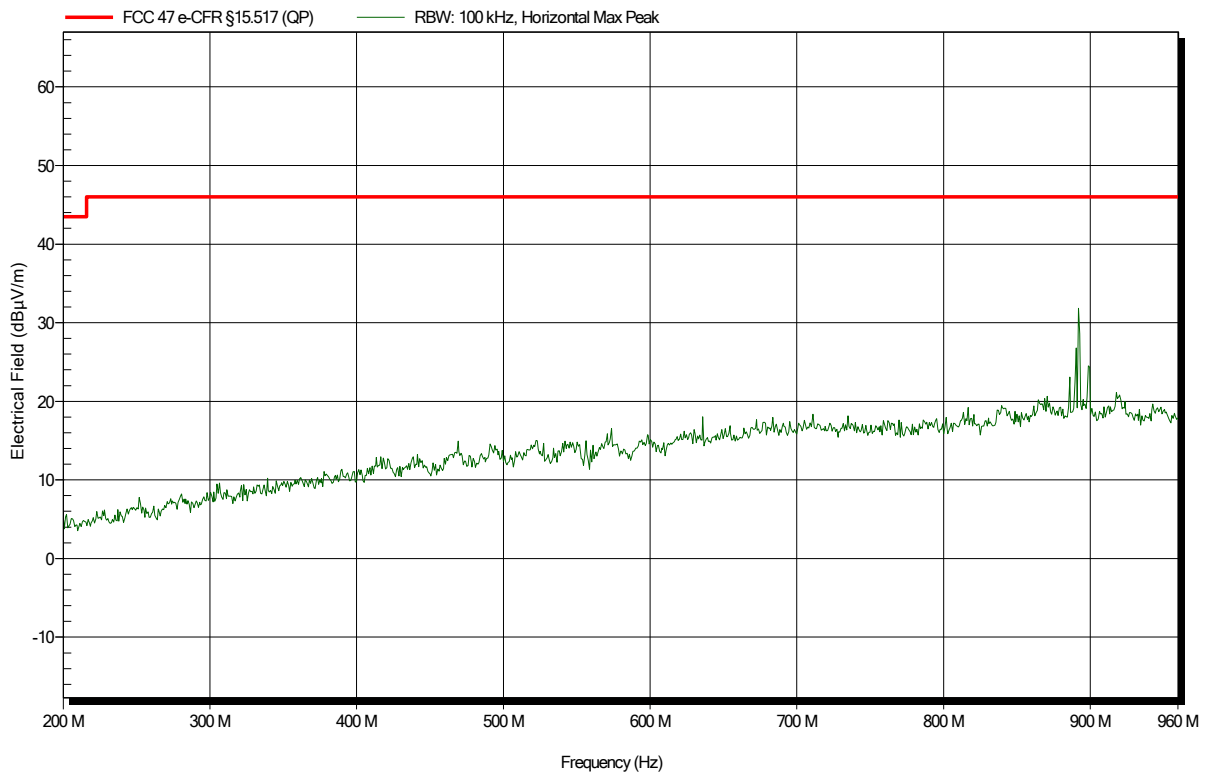
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Height
186.507 MHz	25.11 dBµV/m	43.5 dBµV/m	-18.39 dB	Pass	1.2 m
30.763 MHz	28.52 dBµV/m	40 dBµV/m	-11.48 dB	Pass	1.2 m
42.321 MHz	25.98 dBµV/m	40 dBµV/m	-14.02 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 7

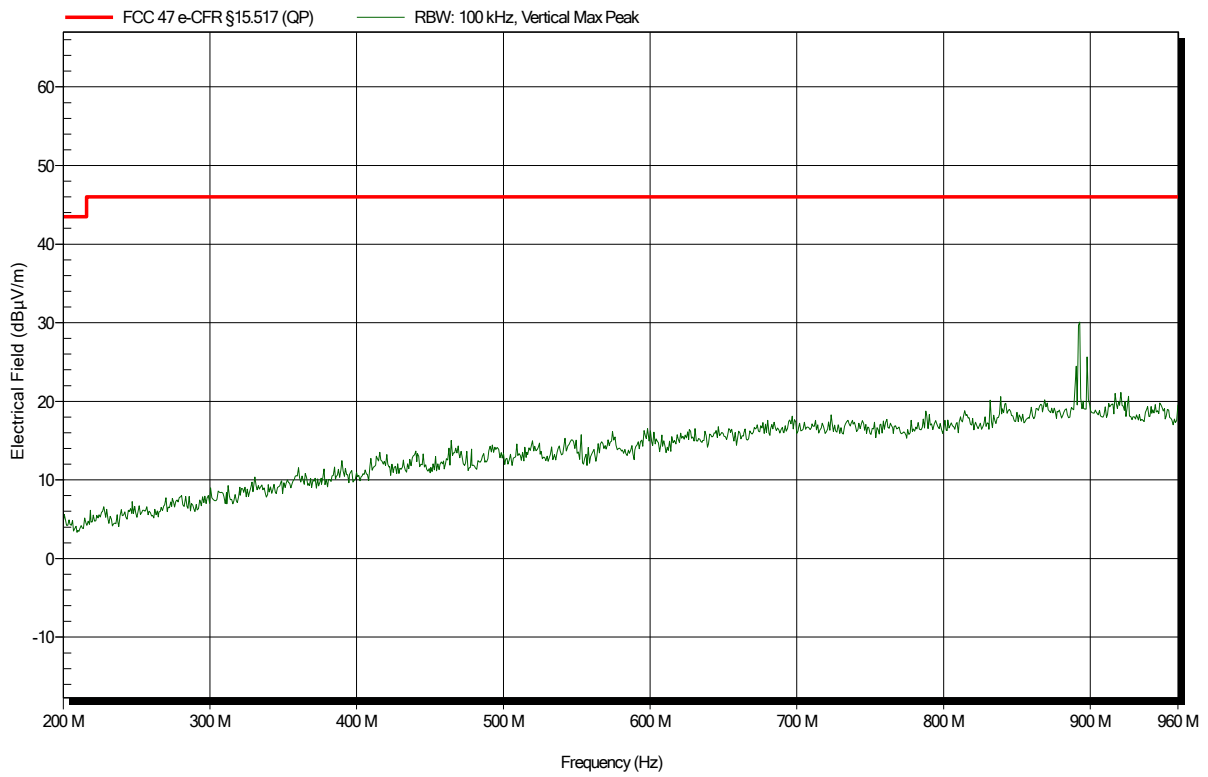


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 11

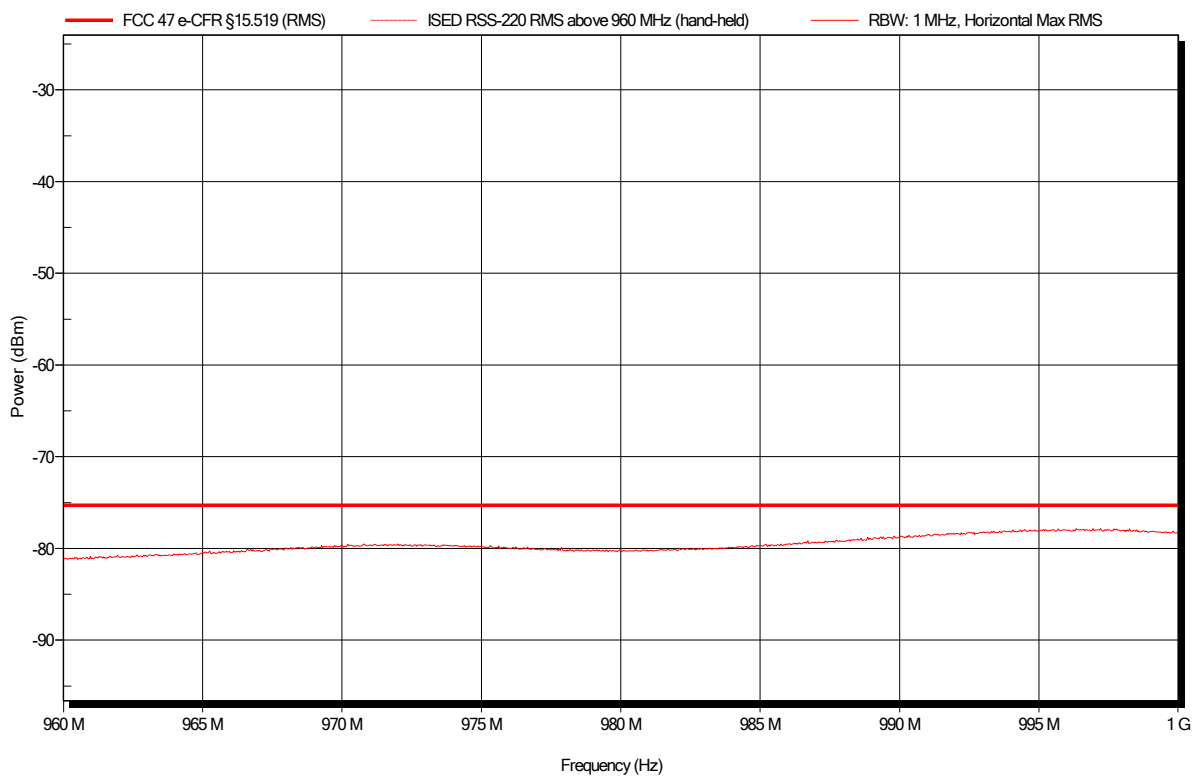


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 8

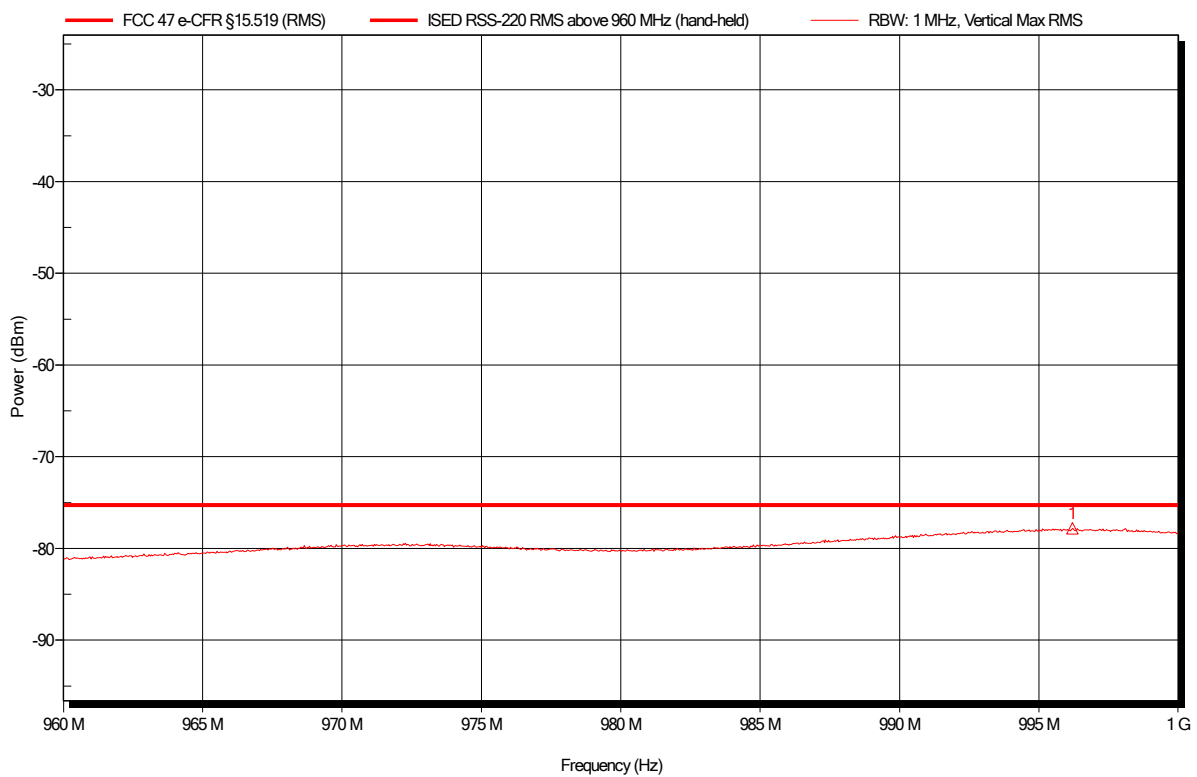


Spurious emissions according to FCC 15.119

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 12



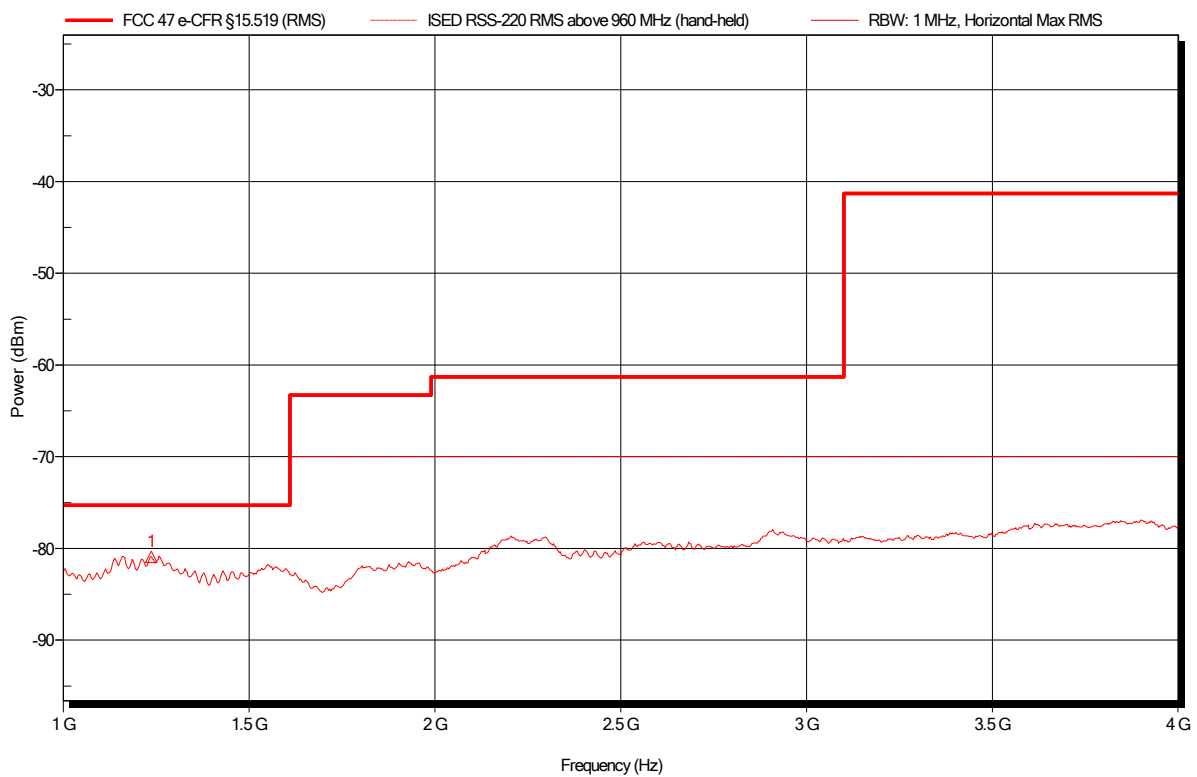
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
996.204 MHz	-77.8 dBm	-75.3 dBm	-2.5 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 13



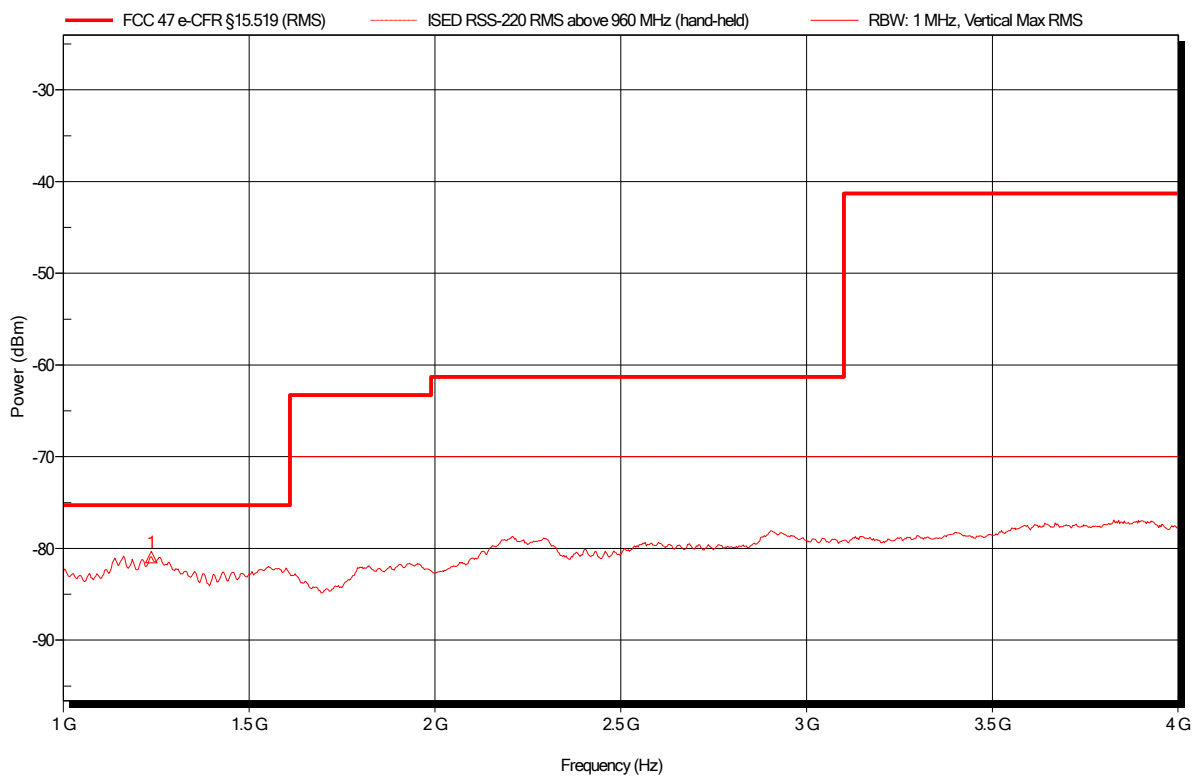
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
1.2368 GHz	-80.9 dBm	-75.3 dBm	-5.63 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.6°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-17
 Note:

Index 17



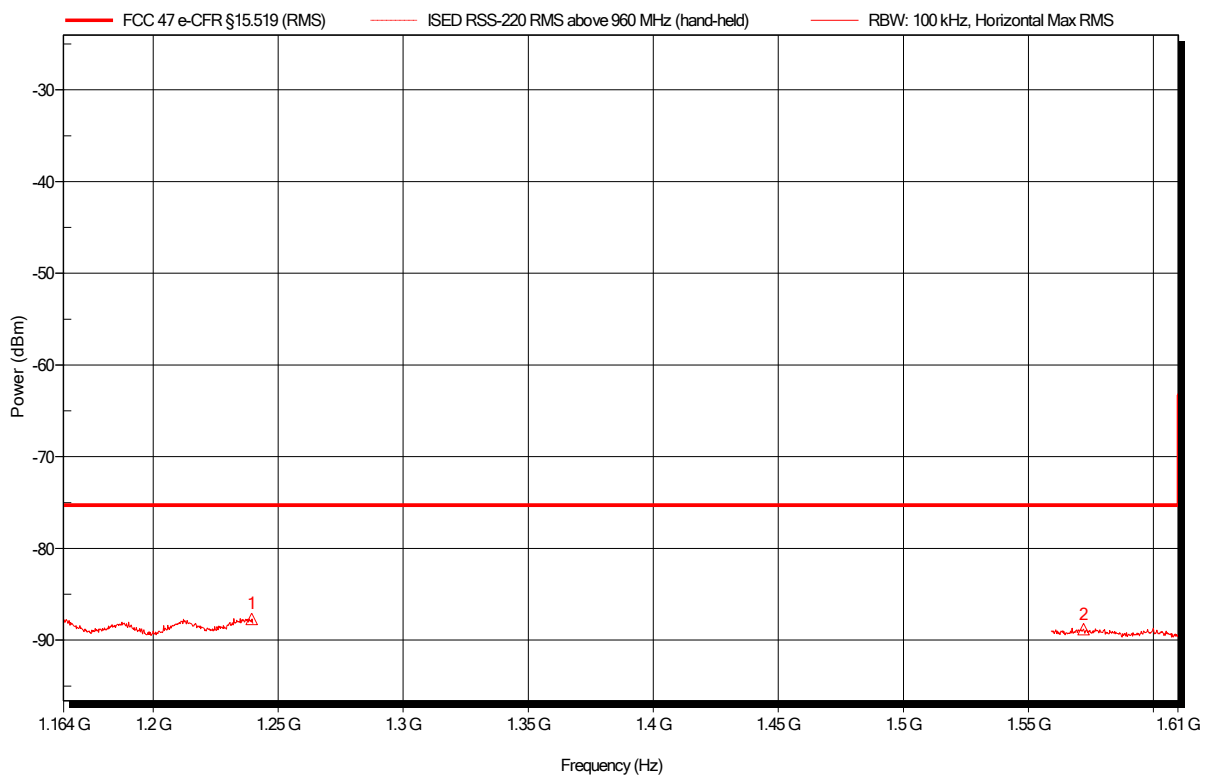
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
1.2368 GHz	-80.9 dBm	-75.3 dBm	-5.64 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-18
 Note:

Index 32



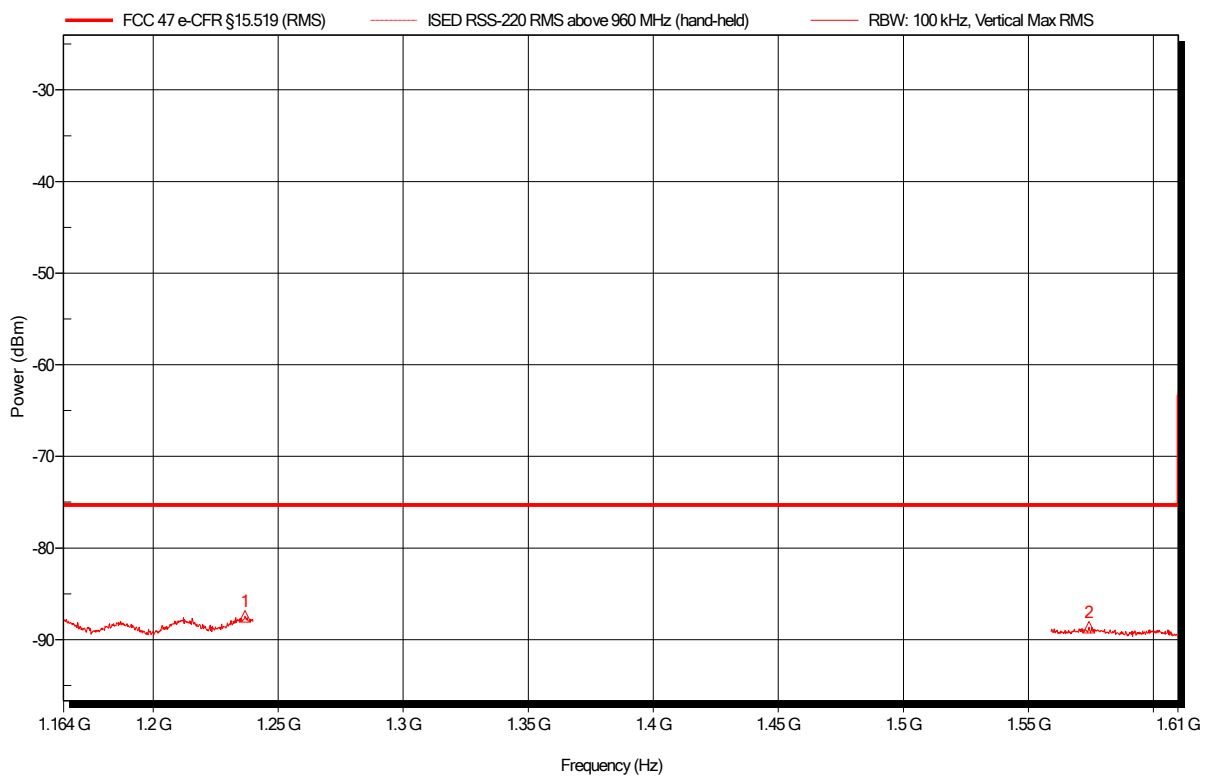
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
1.2394 GHz	-87.7 dBm	-75.3 dBm	-12.38 dB	Pass	1.2 m
1.572 GHz	-88.8 dBm	-75.3 dBm	-13.49 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-18
 Note:

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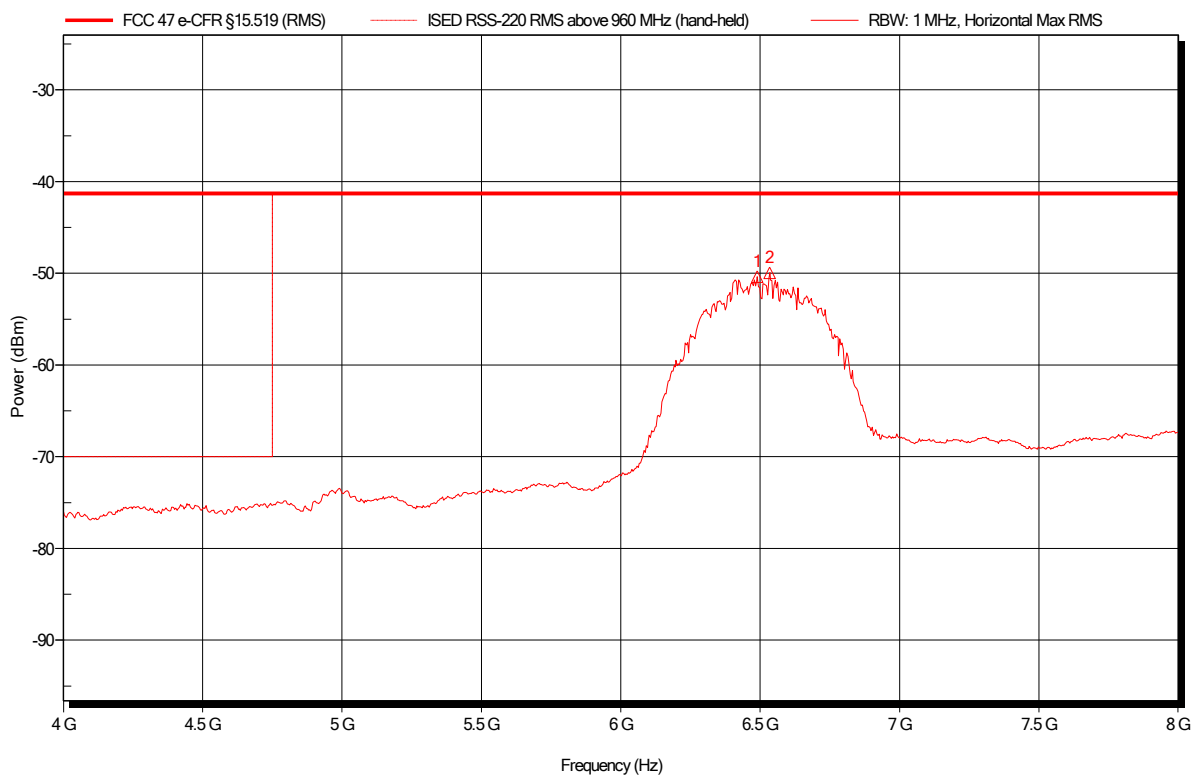
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
1.2367 GHz	-87.5 dBm	-75.3 dBm	-12.17 dB	Pass	1.2 m
1.5742 GHz	-88.6 dBm	-75.3 dBm	-13.35 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-18
 Note:

Index 33



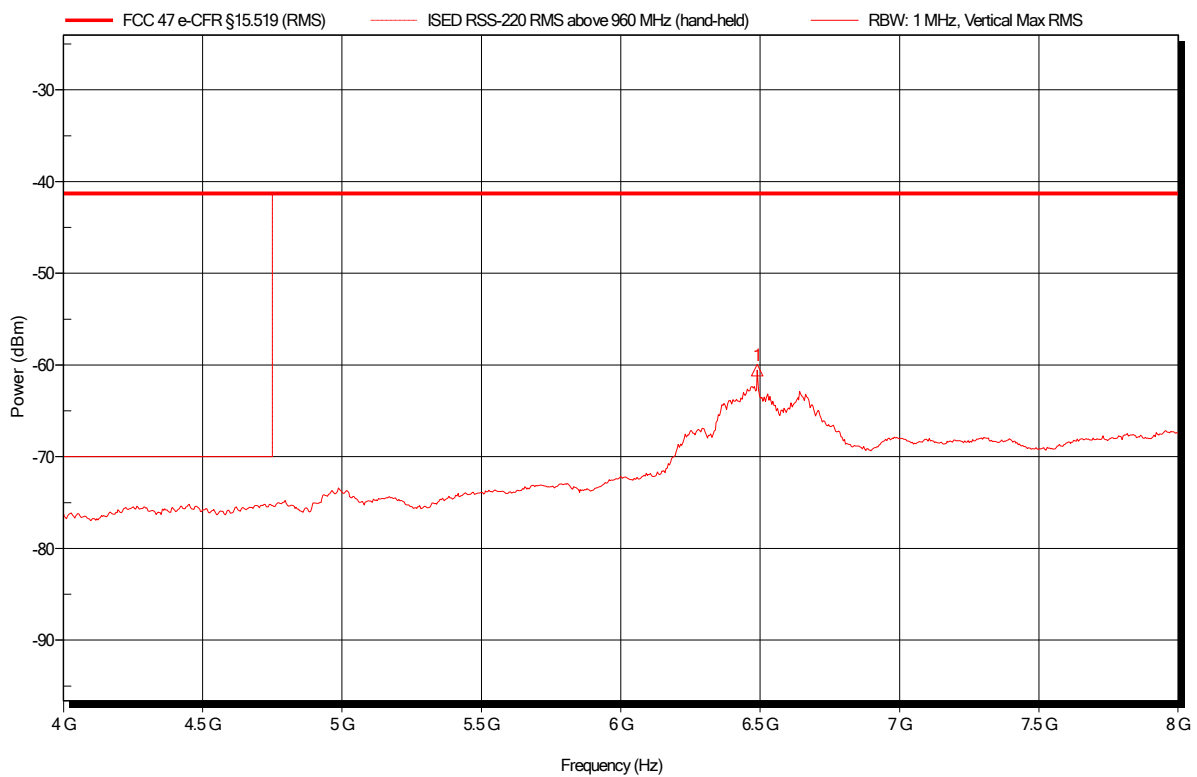
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
6.4895 GHz	-50.4 dBm	-41.3 dBm	-9.09 dB	Pass	1.2 m
6.5335 GHz	-49.9 dBm	-41.3 dBm	-8.63 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-18
 Note:

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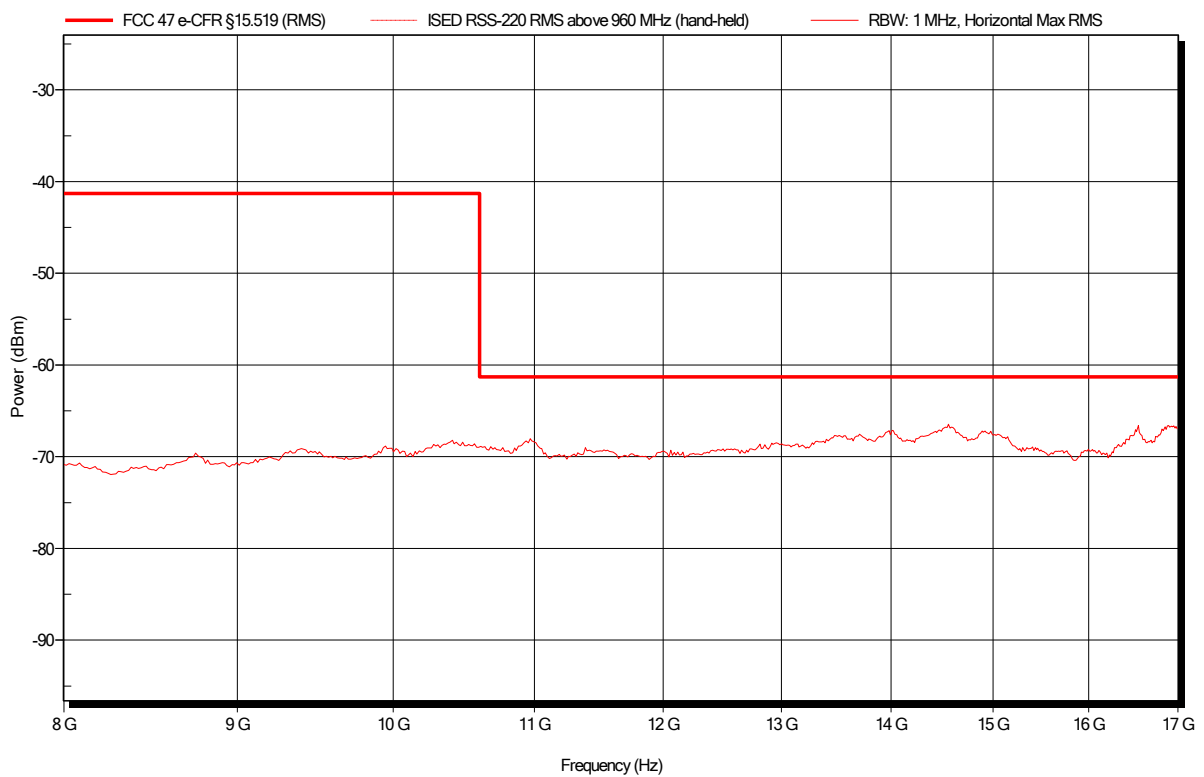
Frequency	RMS	RMS Limit	RMS Difference	RMS Status	Height
6.4895 GHz	-60.6 dBm	-41.3 dBm	-19.27 dB	Pass	1.2 m

Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; UWB, channel 5
 Test Date: 2019-02-26
 Note:

Index 46

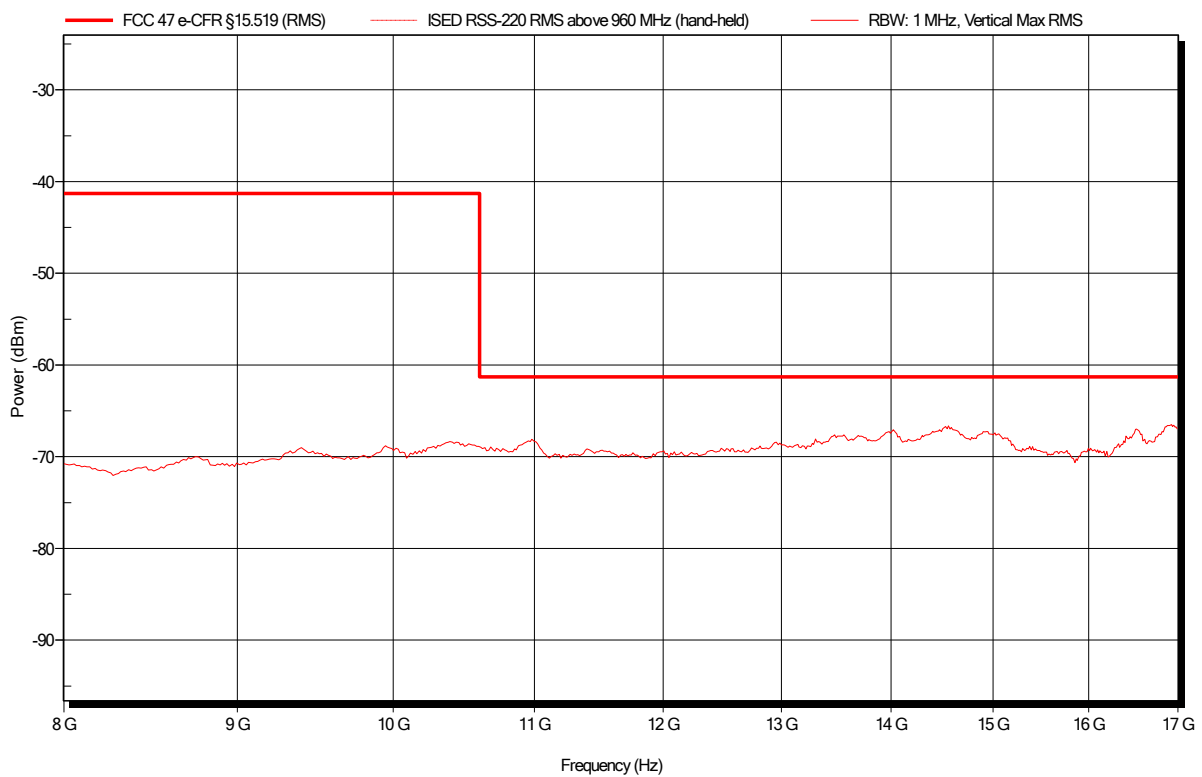


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; UWB, channel 5
 Test Date: 2019-02-26
 Note:

Index 47

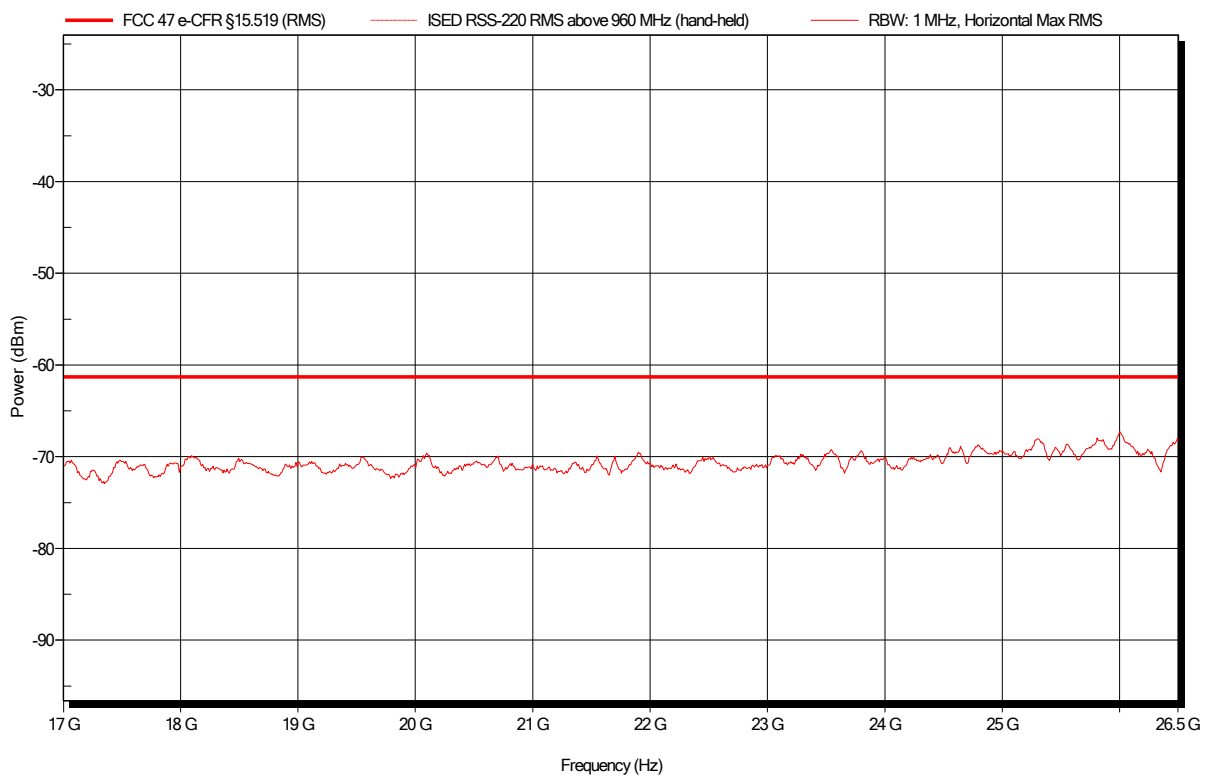


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Amplifier Research AT4560, Horizontal
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-28
 Note:

Index 41

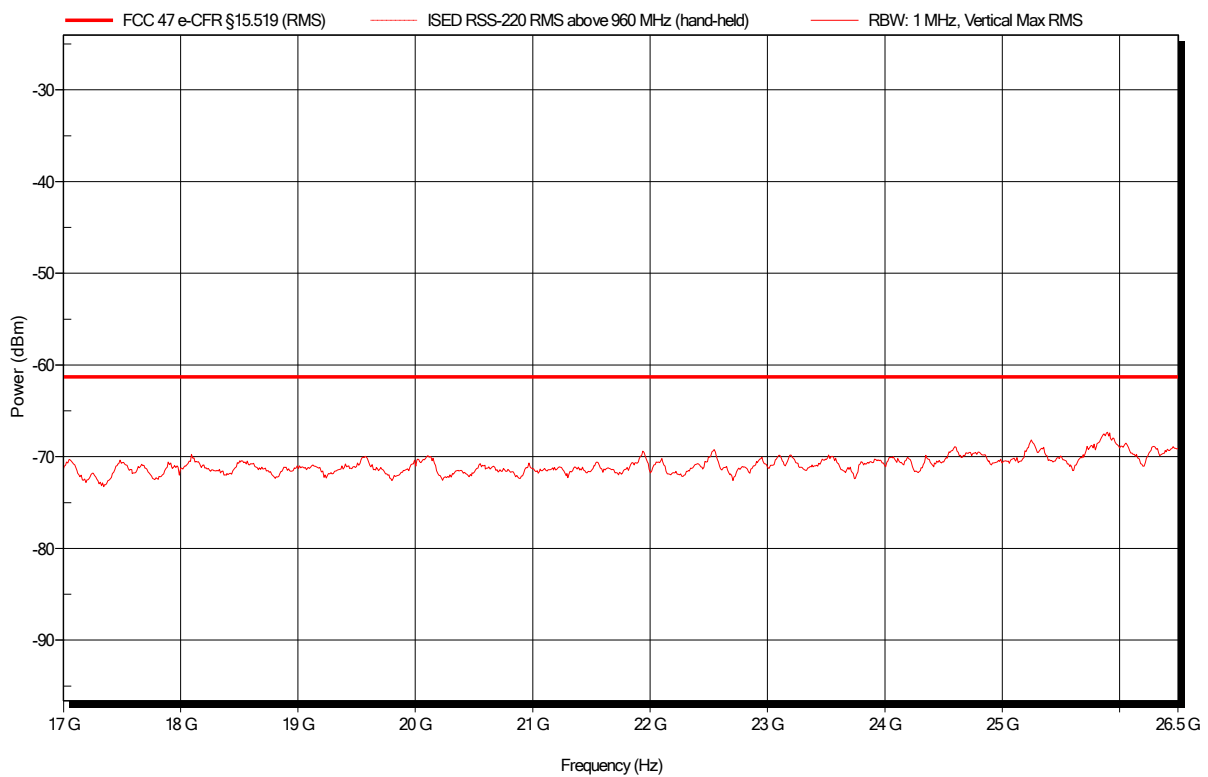


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Amplifier Research AT4560, Vertical
 Measurement distance: 1 m, converted to 3 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-28
 Note:

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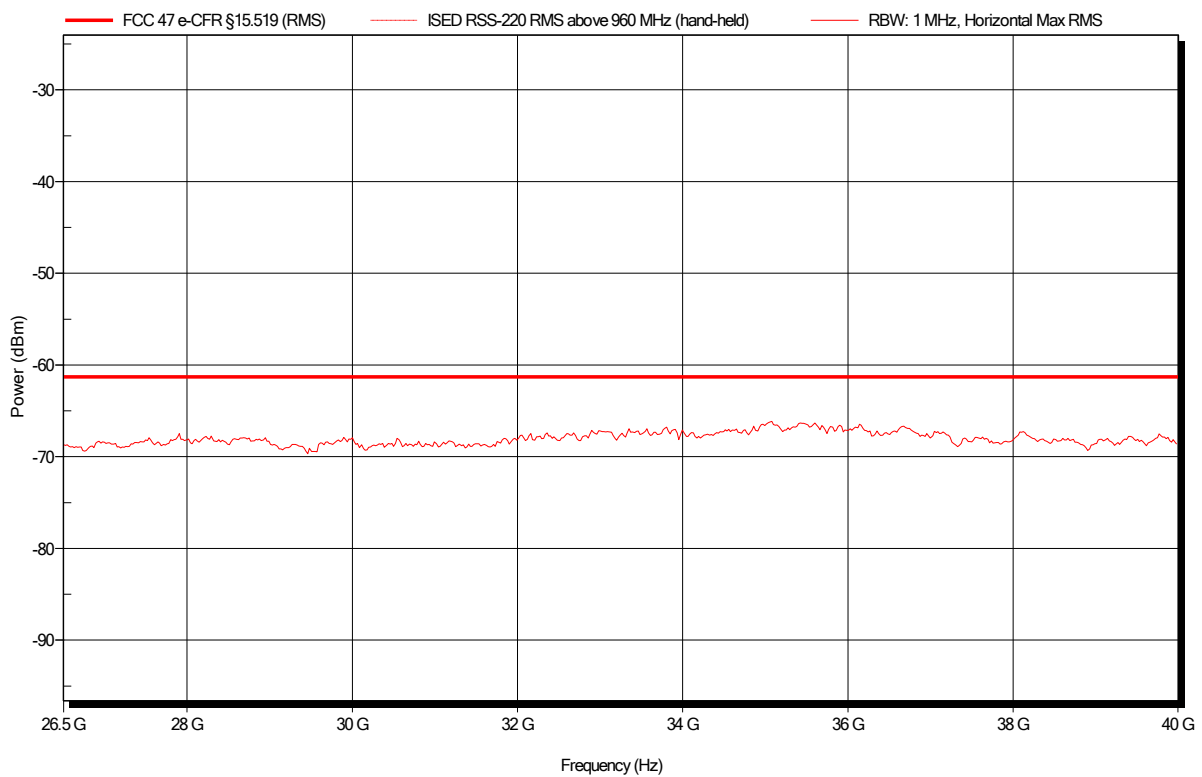


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Flann Microwave Ltd 22240-25+CBL26402075, Horizontal
 Measurement distance: 1 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-28
 Note:

Index 44

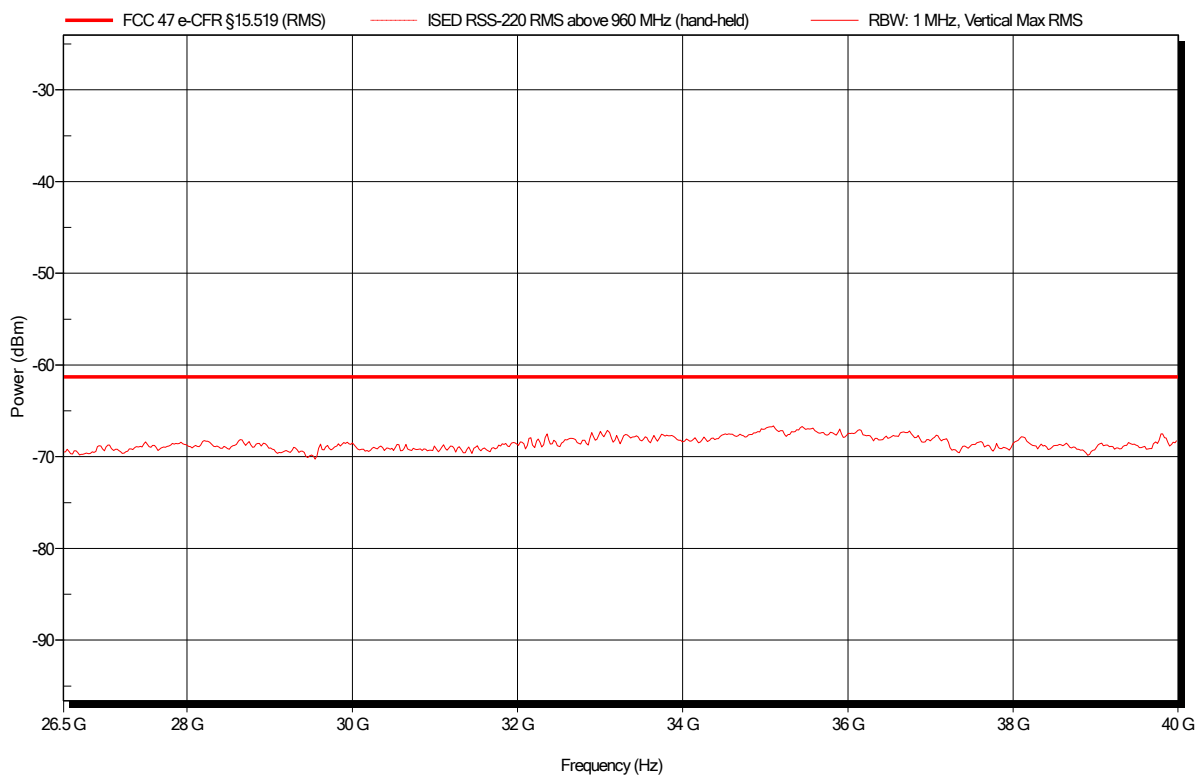


Spurious emissions according to FCC 15.519

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Flann Microwave Ltd 22240-25+CBL26402075, Vertical
 Measurement distance: 1 m
 Mode: TX; UWB, channel 5
 Test Date: 2018-09-28
 Note:

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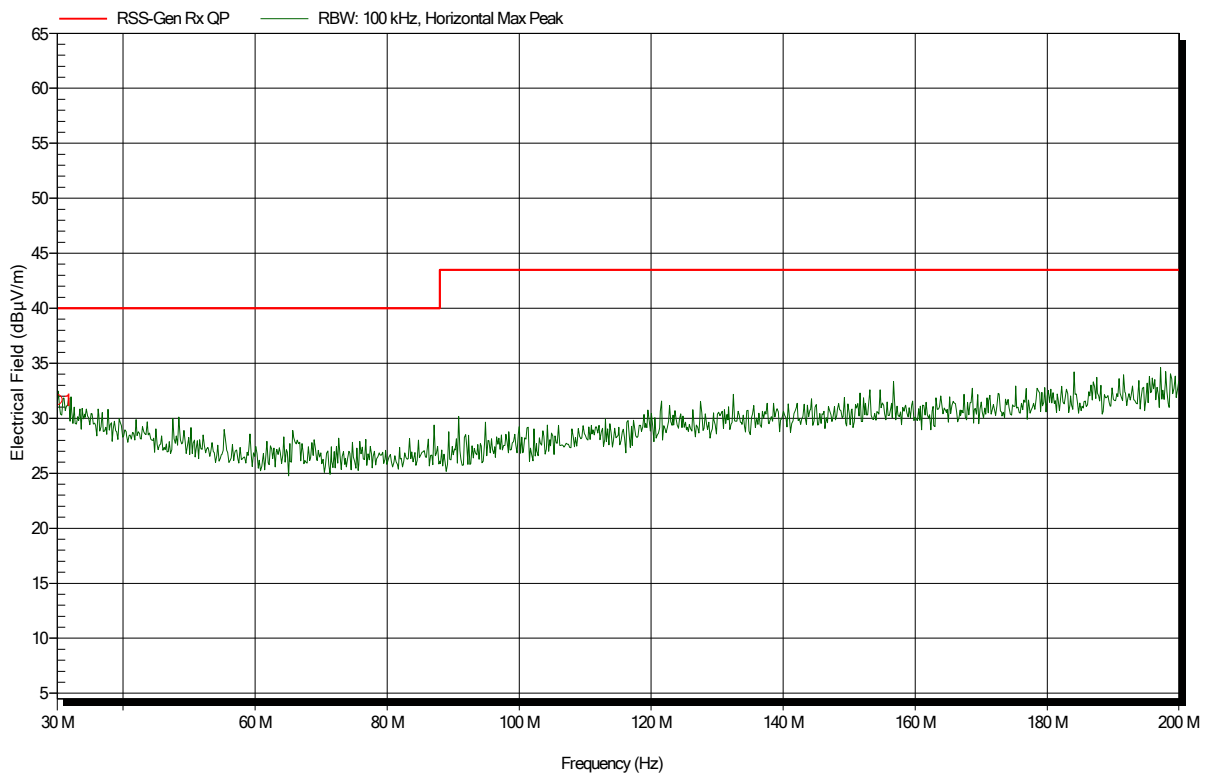
ANNEX B Receiver radiated emissions

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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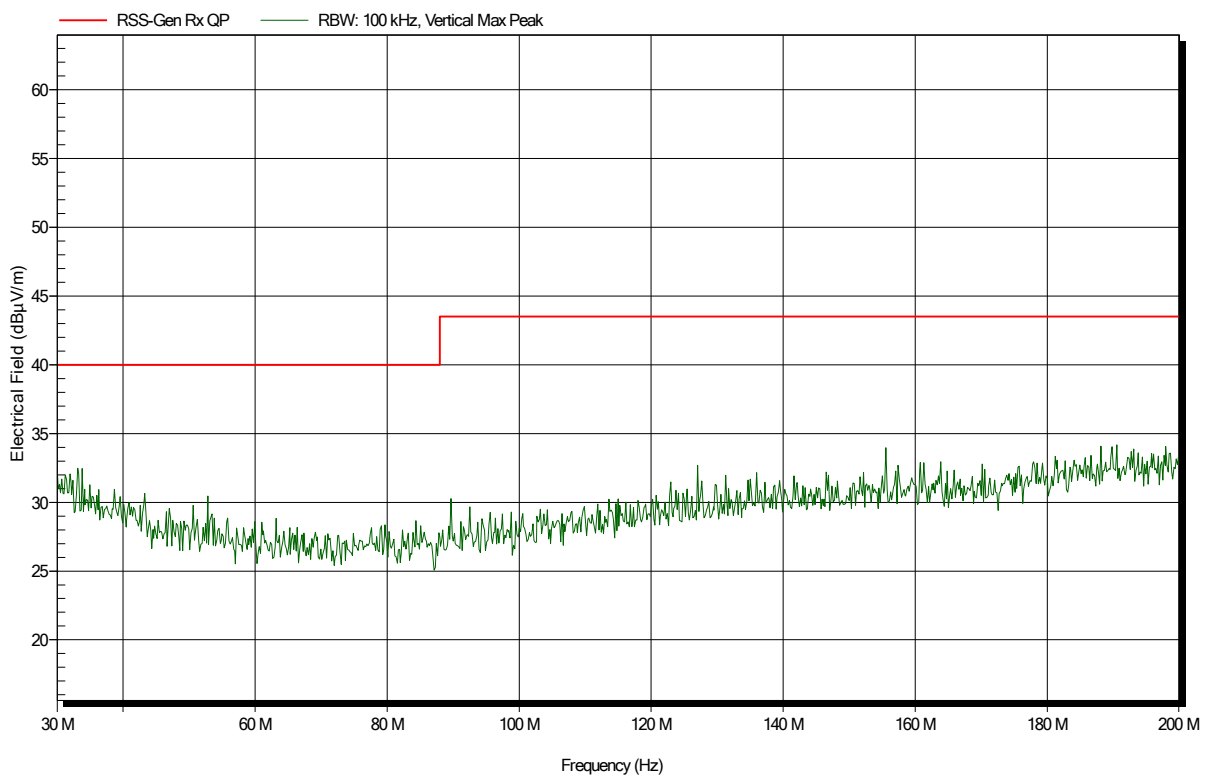
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
30 MHz	31.67 dBµV/m	40 dBµV/m	-8.33 dB	Pass	-1 Degree	1.2 m

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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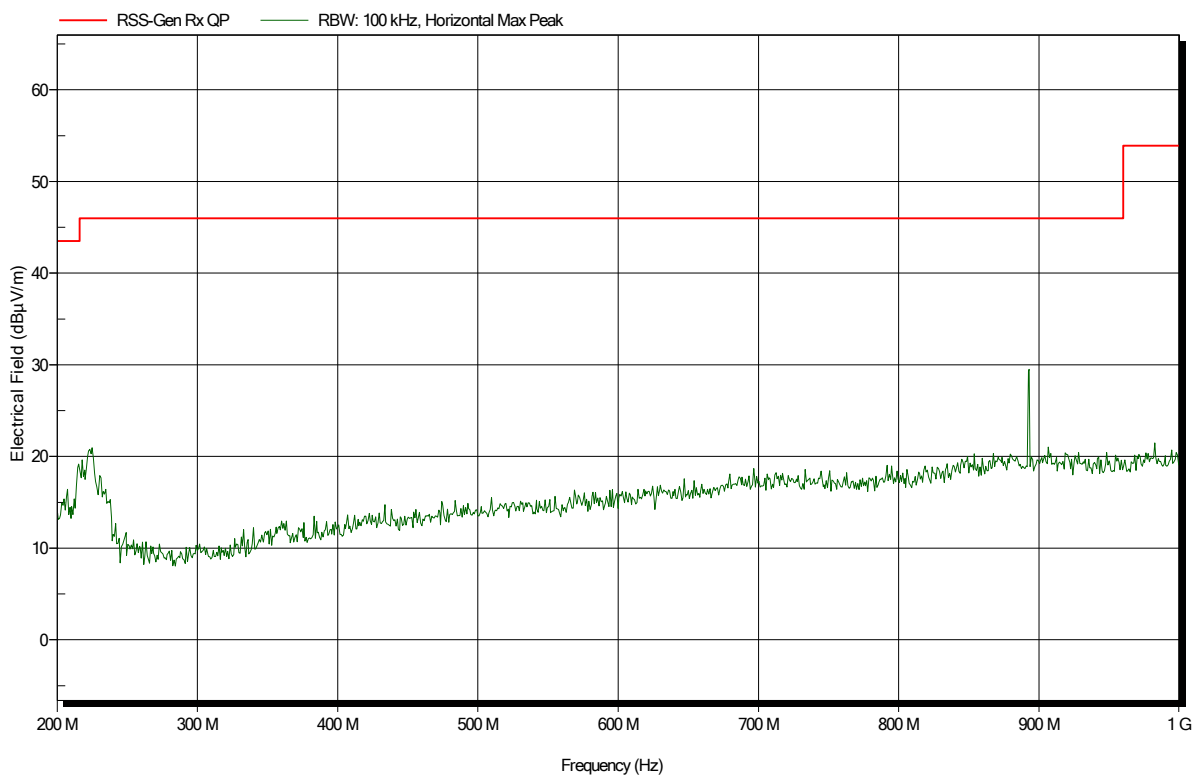


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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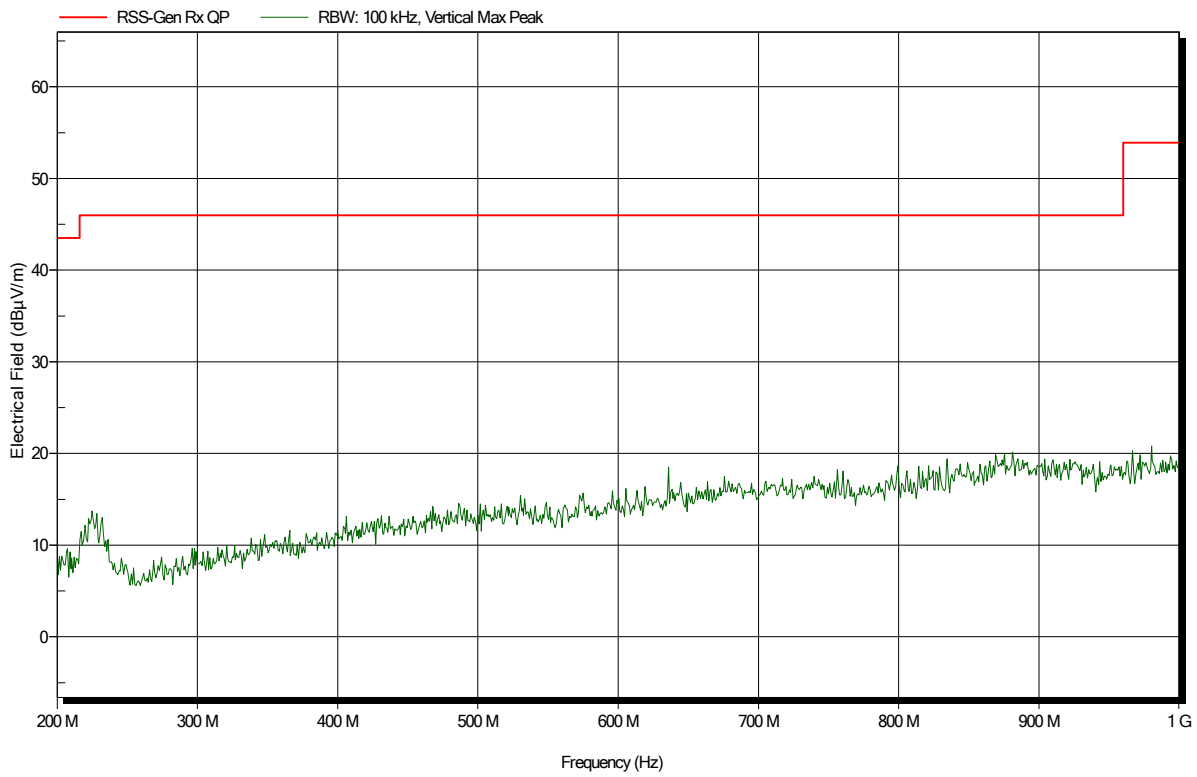


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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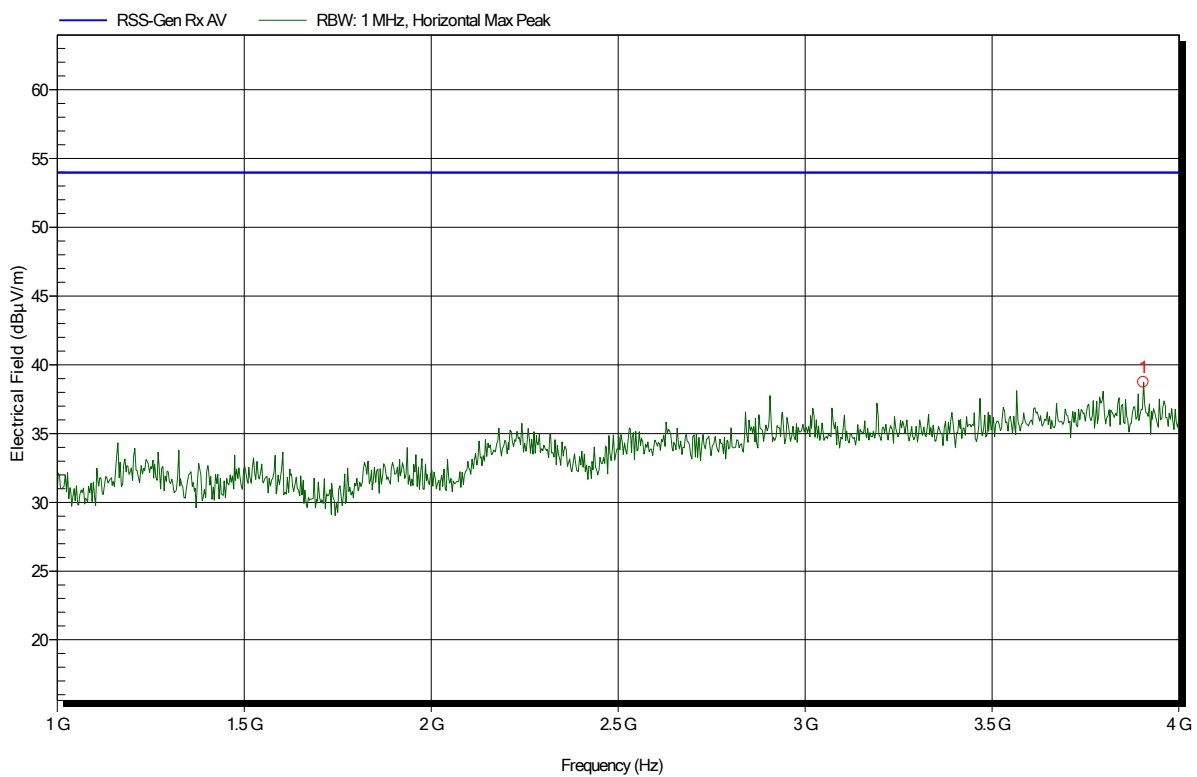


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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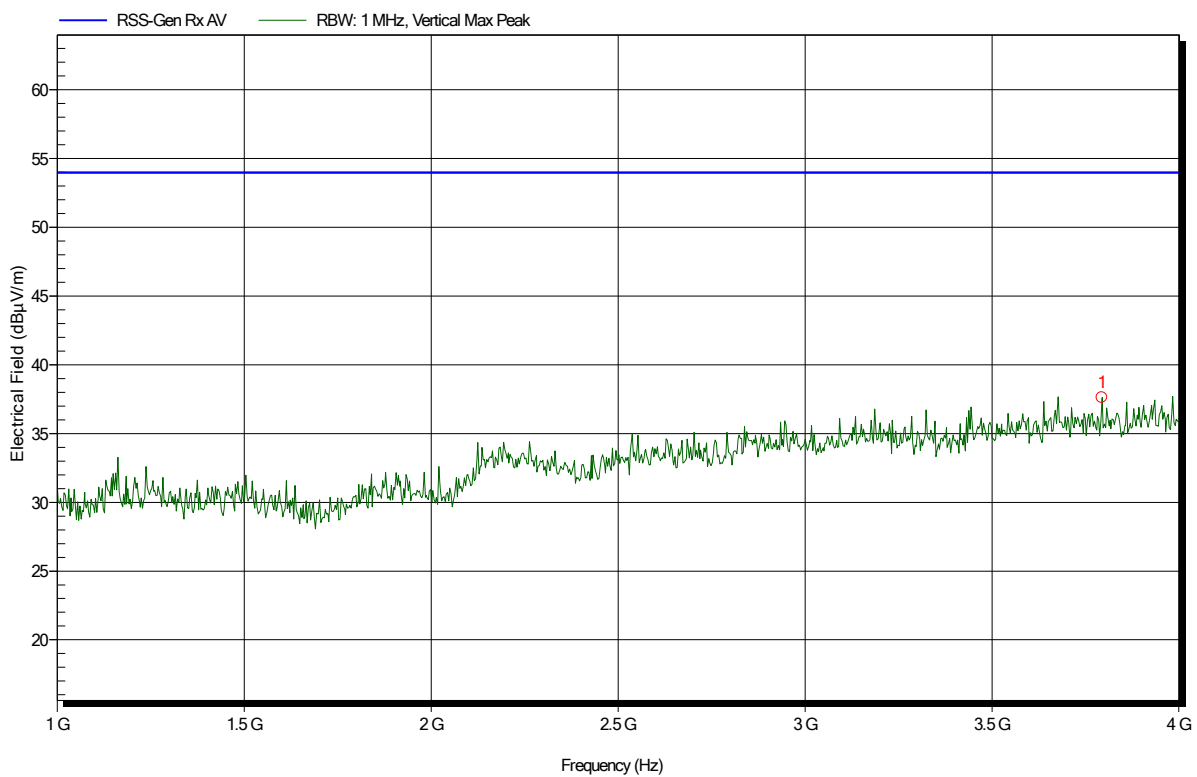
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
3.904 GHz	38.75 dBµV/m	53.98 dBµV/m	-15.23 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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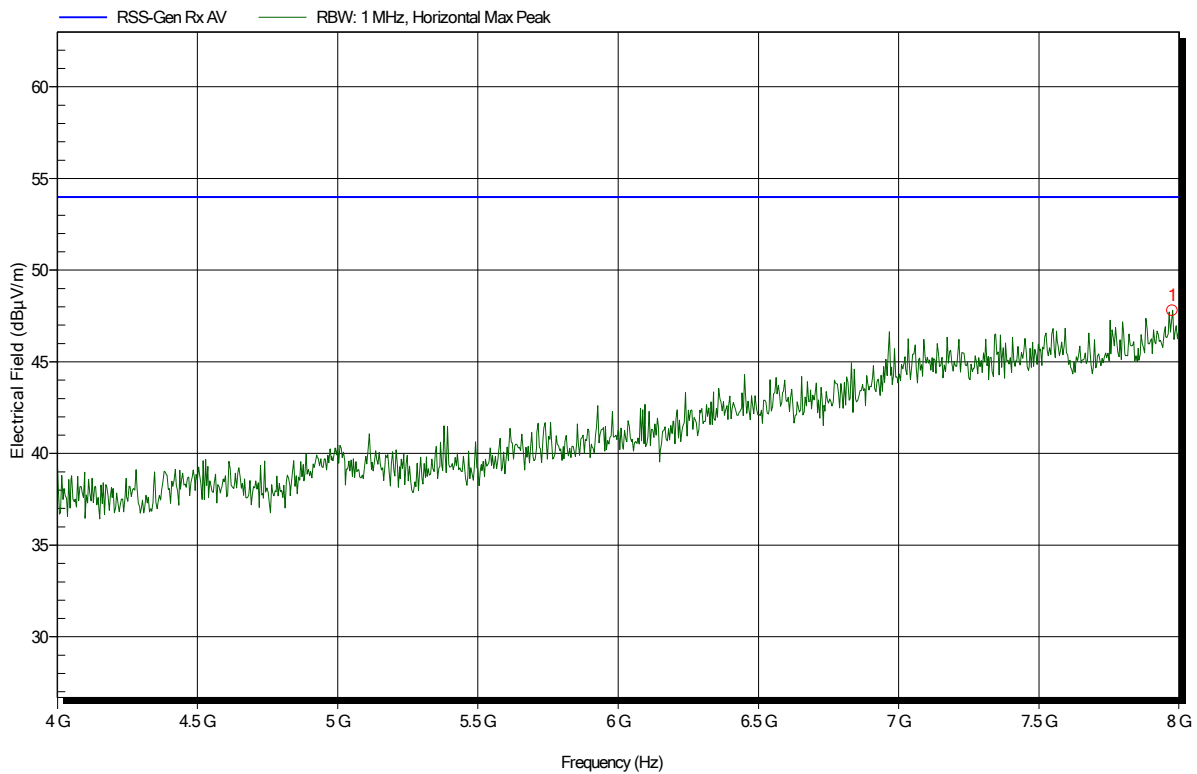
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
3.793 GHz	37.63 dBµV/m	53.98 dBµV/m	-16.35 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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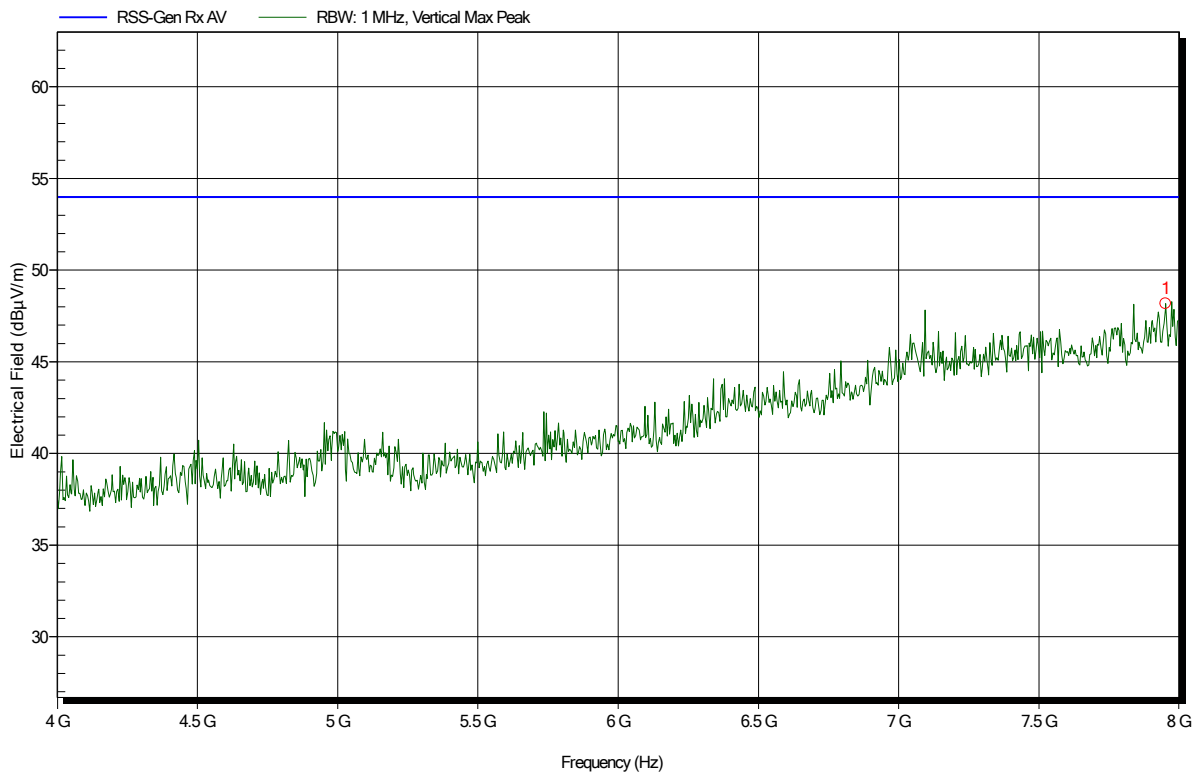
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.976 GHz	47.79 dBµV/m	53.98 dBµV/m	-6.19 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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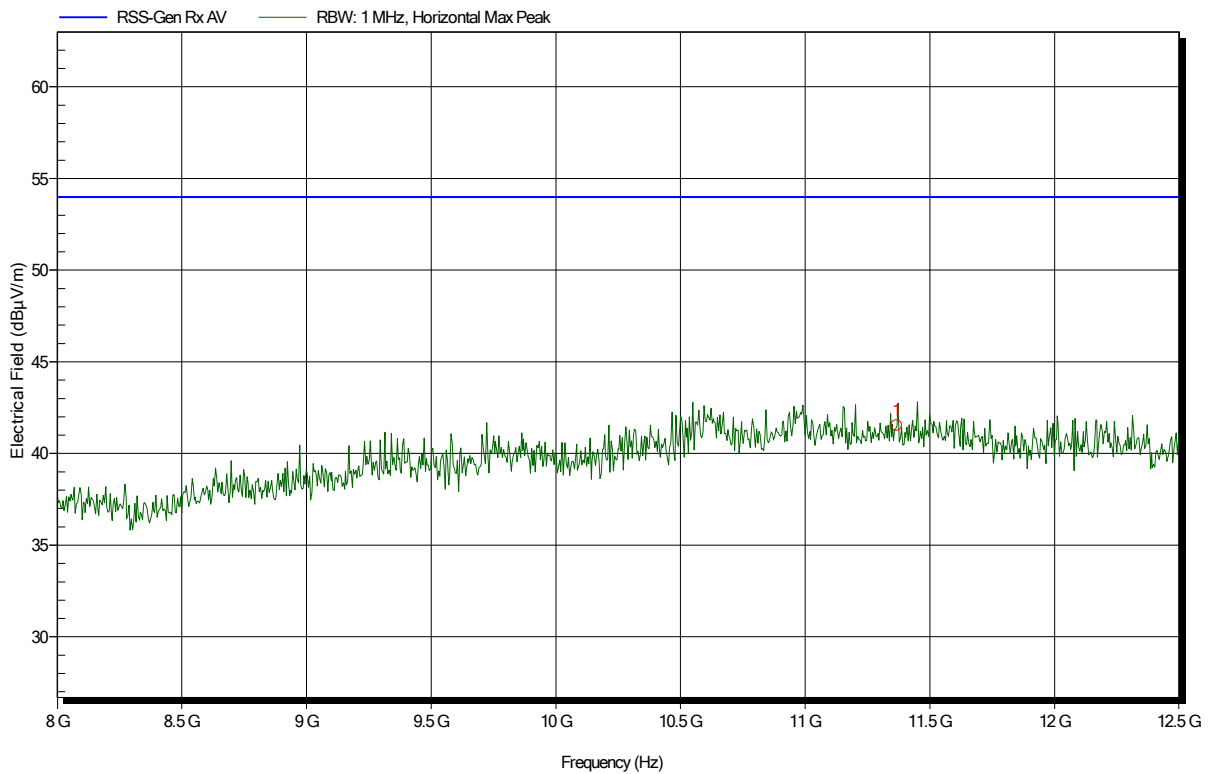
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.952 GHz	48.18 dBµV/m	53.98 dBµV/m	-5.8 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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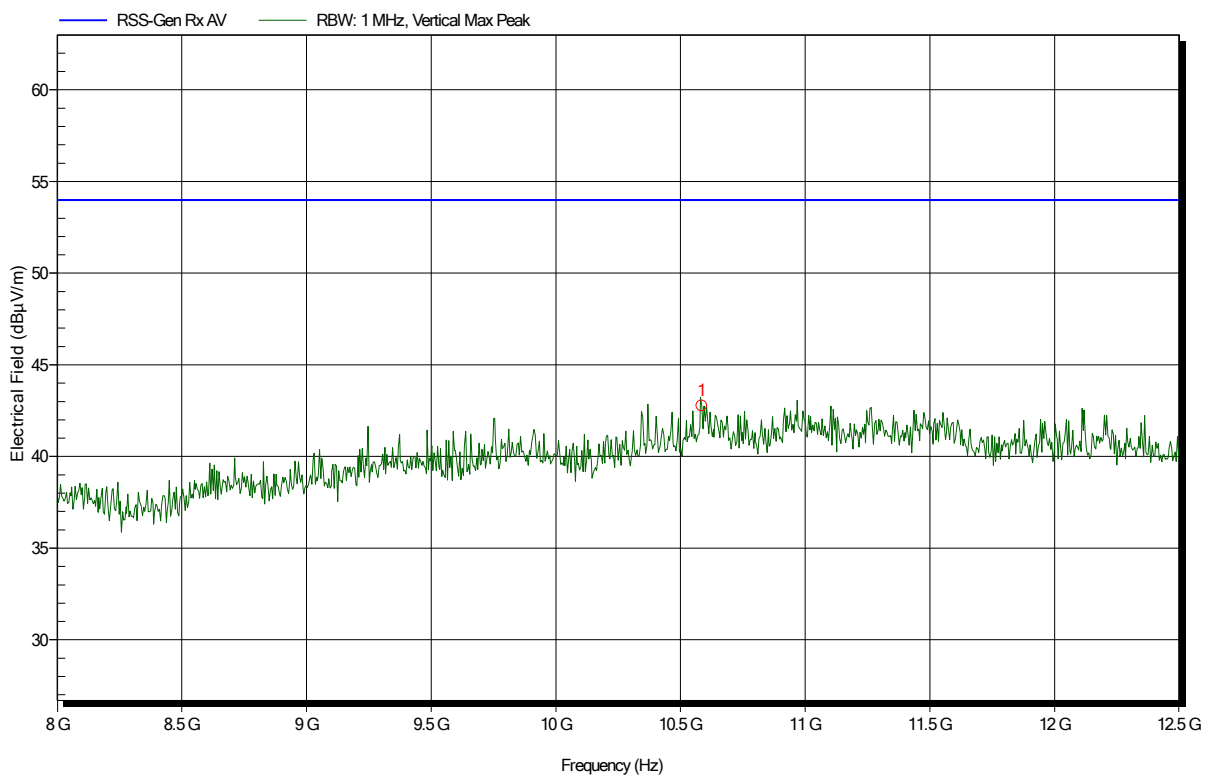
Frequency	Peak	Peak Limit	Peak Difference	Status
11.367 GHz	41.52 dBµV/m	53.98 dBµV/m	-12.46 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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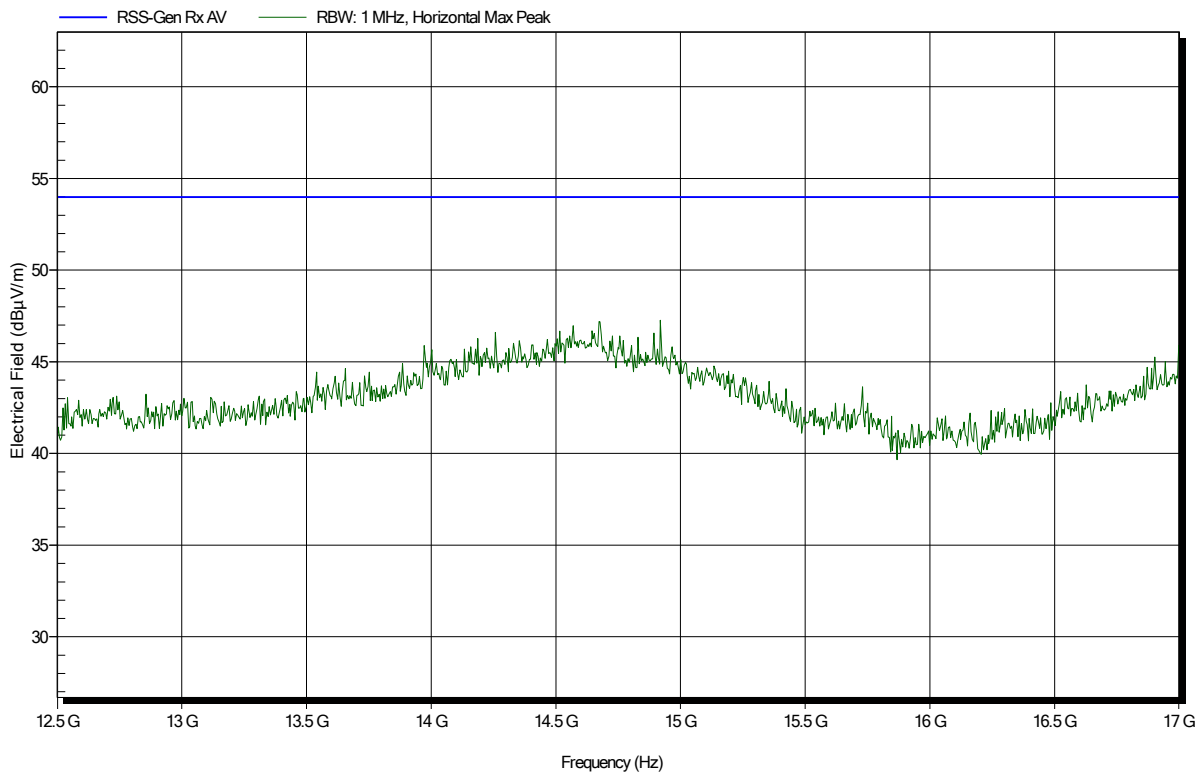
Frequency	Peak	Peak Limit	Peak Difference	Status
10.585 GHz	42.77 dBµV/m	53.98 dBµV/m	-11.21 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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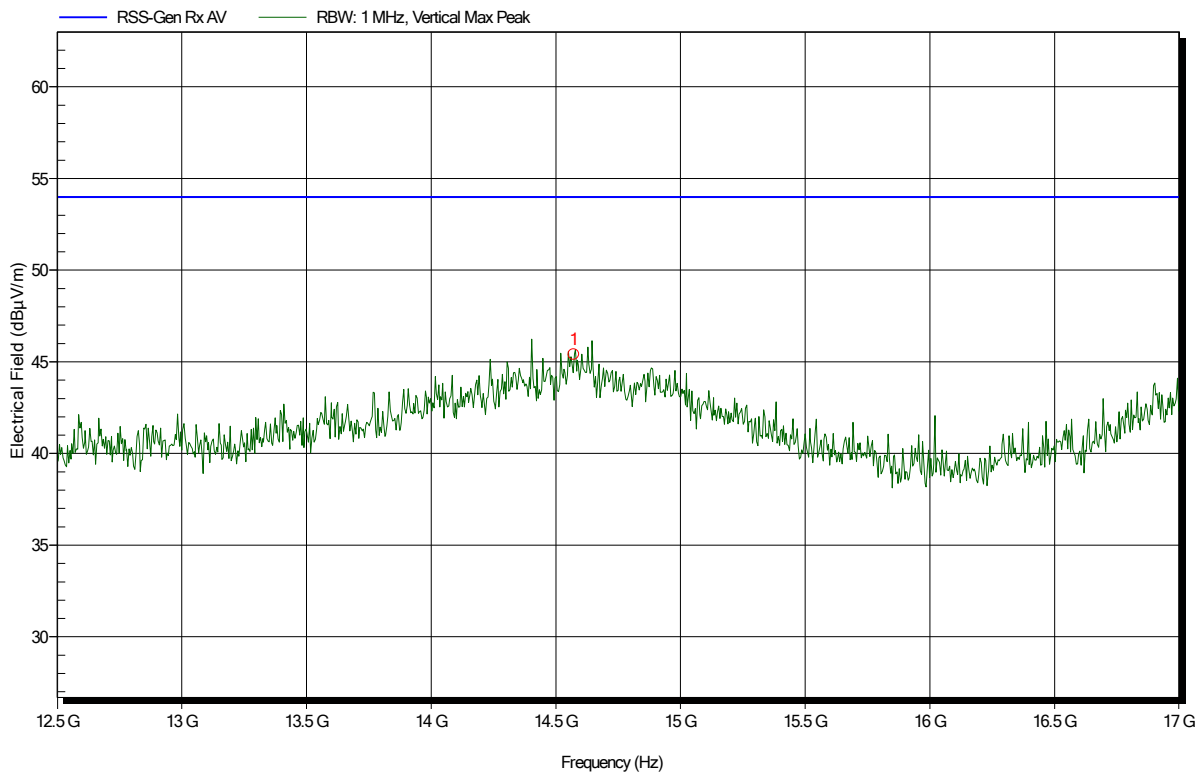


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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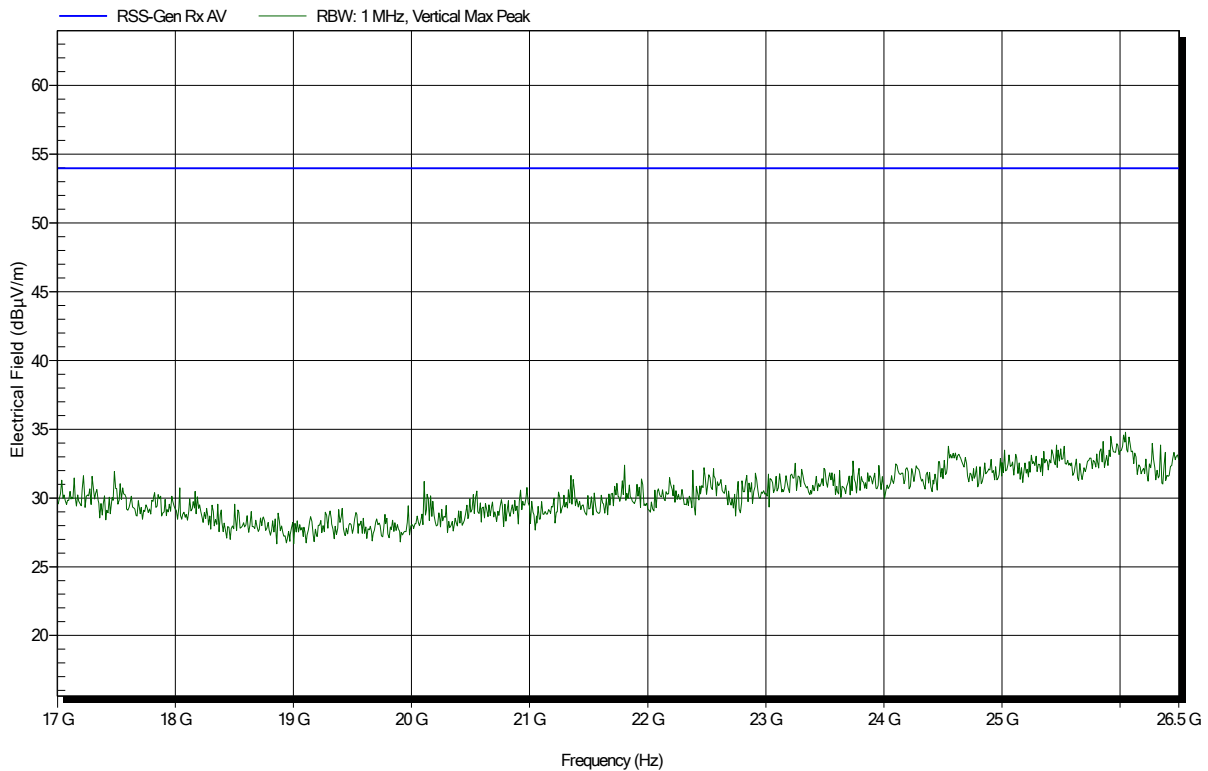
Frequency	Peak	Peak Limit	Peak Difference	Status
14.572 GHz	45.4 dBµV/m	53.98 dBµV/m	-8.58 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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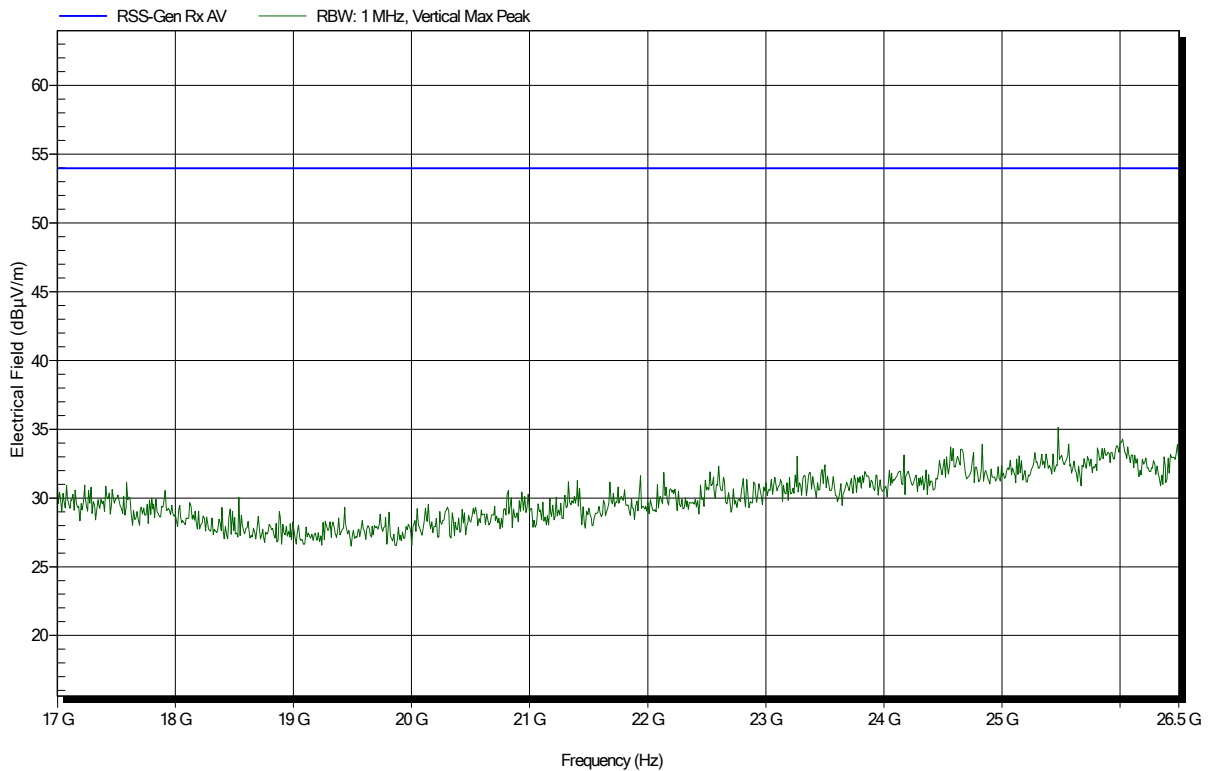


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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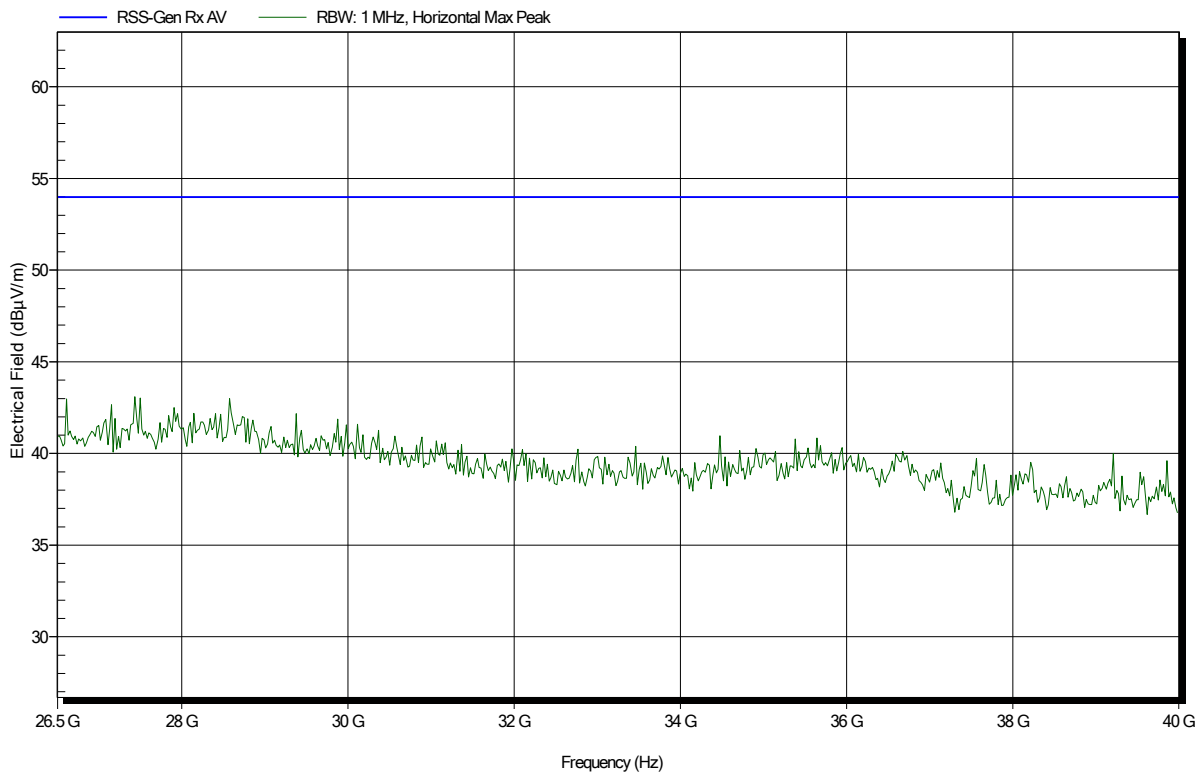


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Flann Microwave Ltd 22240-25+CBL26402075, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1806-7488

Applicant: Atlas Copco Industrial Technique A
 EUT Name: Industrial Location Tethering - Positioning System
 Model: IL-R
 Test Site: Eurofins Product Service GmbH
 Operator: Toralf Jahn
 Test Conditions: Tnom: 23.7°C, Vnom:
 Antenna: Flann Microwave Ltd 22240-25+CBL26402075, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; Rx UWB, channel 5
 Test Date: 2018-09-28
 Note:

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