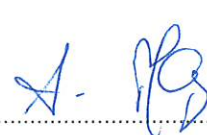


EMC TEST REPORT FCC 47 CFR Part 15B, ISED ICES-003 Issue 6	
Report Reference No	G0M-2007-9170-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkks - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkks - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	SKAN Deutschland GmbH
Address	Nickrischer Straße 2 02827 Görlitz/Hagenwerder GERMANY
Test Specification Standard(s)	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014+A1:2017
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Network Extender resp. Repeater/ part of the product portfolio wireless glove tester
Model(s)	Network Extender wirelessGlovTester evolution 2
Additional Model(s)	None
Brand Name(s)	SKAN NE wGT evo2
Hardware Version(s)	SKAN partID 1308593 Version C
Software Version(s)	main processor 2.27; radiomodule ZigBee 2661700; performance test application 0.9.13
FCC-ID	2AXZXSKANWGTXX2
IC	26652-SKANNE02
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	2020-10-23	
Report:		
Compiled by	Matthias Handrik	
Tested by (+ signature) (Responsible for Test)	Matthias Handrik	
Approved by (+ signature) (Test Lab Engineer)	Andreas Pflug	
Date of Issue	2020-11-25	
Total number of pages	35	
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:		

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	2020-11-25	Initial Release	

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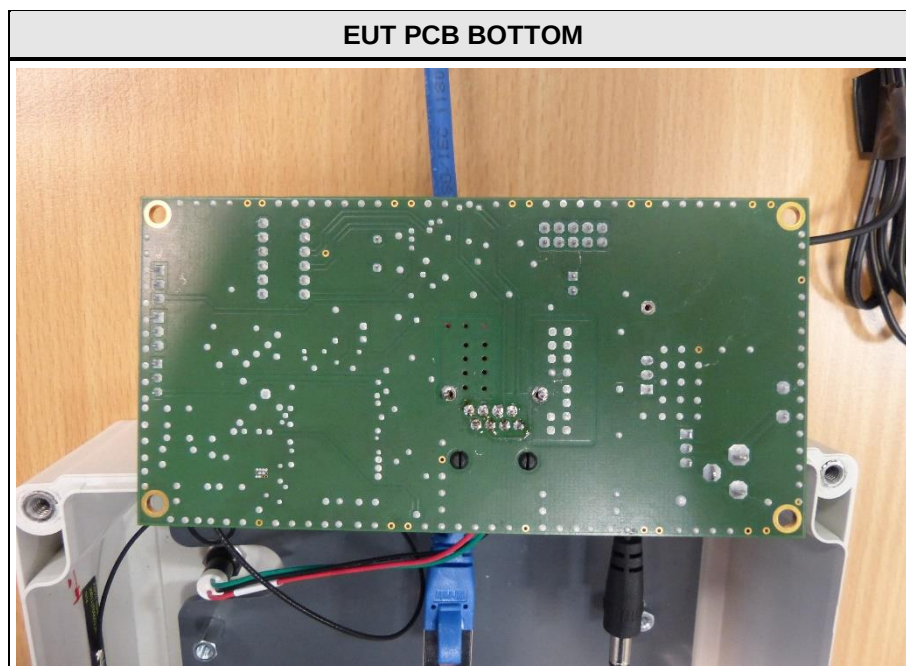
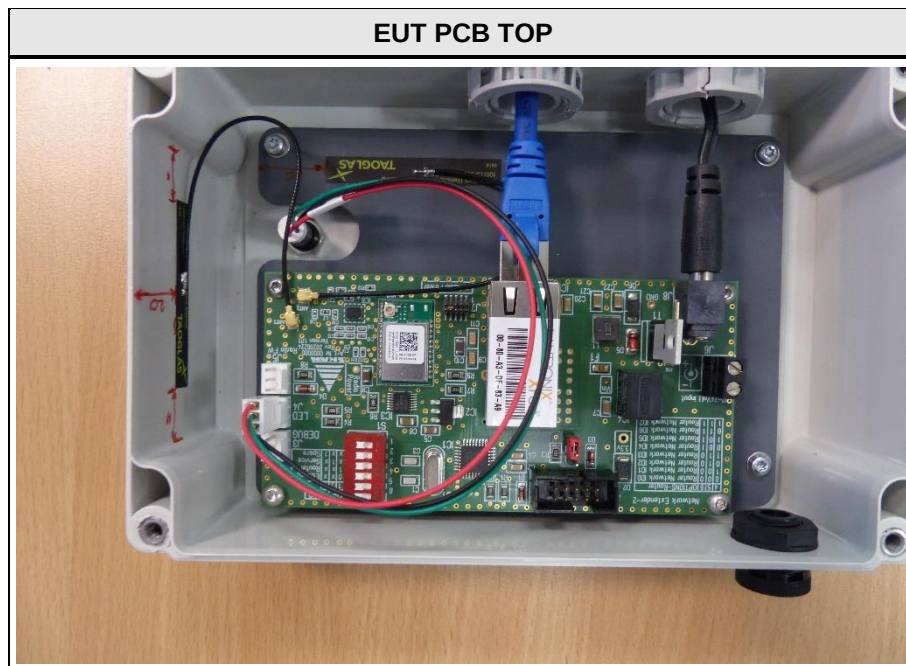
1 Equipment (Test Item) Under Test

Description	Network Extender resp. Repeater/ part of the product portfolio wireless glove tester	
Model	Network Extender wirelessGlovTester evolution 2	
Additional Model(s)	None	
Brand Name(s)	SKAN NE wGT evo2	
Serial Number(s)	Unspecified	
Hardware Version(s)	SKAN partID 1308593 Version C	
Software Version(s)	main processor 2.27; radiomodule ZigBee 2661700; performance test application 0.9.13	
FCC-ID	2AXZXSKANWGTX2	
IC	26652-SKANNE02	
Class	Class B	
Equipment type	Table top	
EUT dimension [cm]	22 x 12 x 6.2	
Highest internal frequency [MHz]	3.6864 MCU; 48 radiomodule; 2400 ZigBee	
Radio Module	Type	ZigBee module
	Model	deRFsamR21E-23S20
	Manufacturer	Dresden electronic ingenieurtechnik gmbh
	FCC-ID	XVV-23SXX
	IC	n.a.
Supply Voltage	V _{NOM}	24 VDC
AC/DC-Adaptor	Model	GE24I24-P1J
	Vendor	MEAN WELL
	Input	100-240 VAC
	Output	24 VDC / 1A
Manufacturer	SKAN Deutschland GmbH Nickrischer Straße 2 02827 Görlitz/Hagenwerder GERMANY	

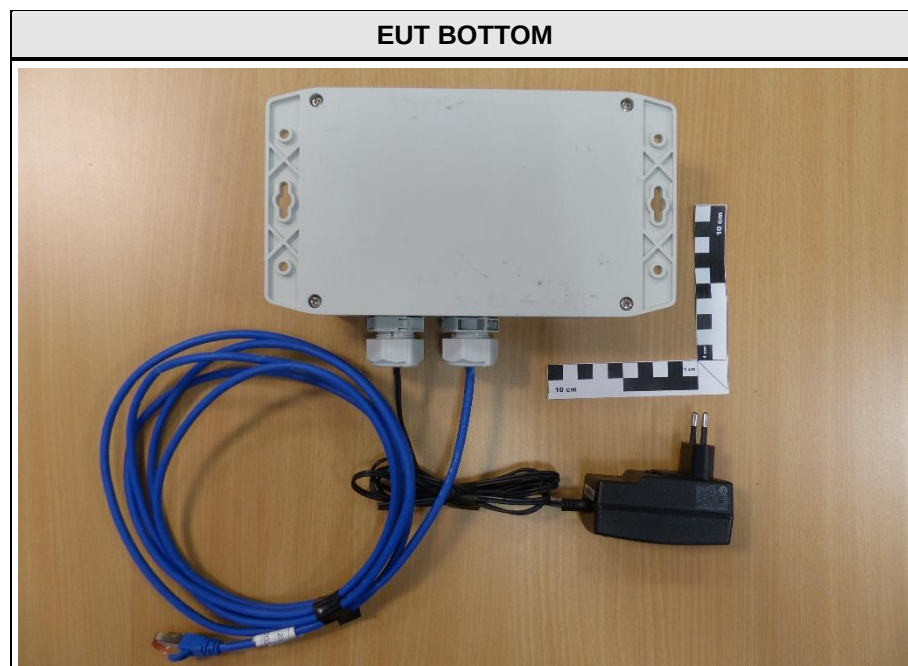
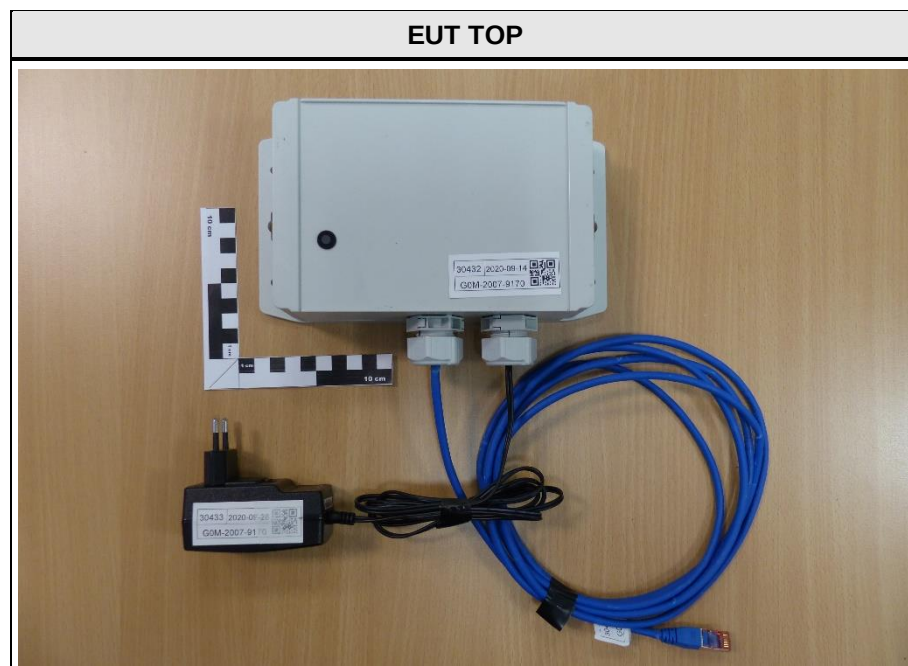
1.1 Equipment Ports

Name	Type	Attributes	Comment
Power	AC	Count: 1 Direction: In Max. cable length [m]: 1.5 Shielded: No Service only: No	-
Ethernet	IO	Count: 1 Direction: IO Max. cable length [m]: unspecified Shielded: Yes Service only: No	SSTP Cat 6 Shield connected on both sides
RS232	IO	Count: 1 Direction: IO Max. cable length [m]: unspecified Shielded: No Service only: Yes	-
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		

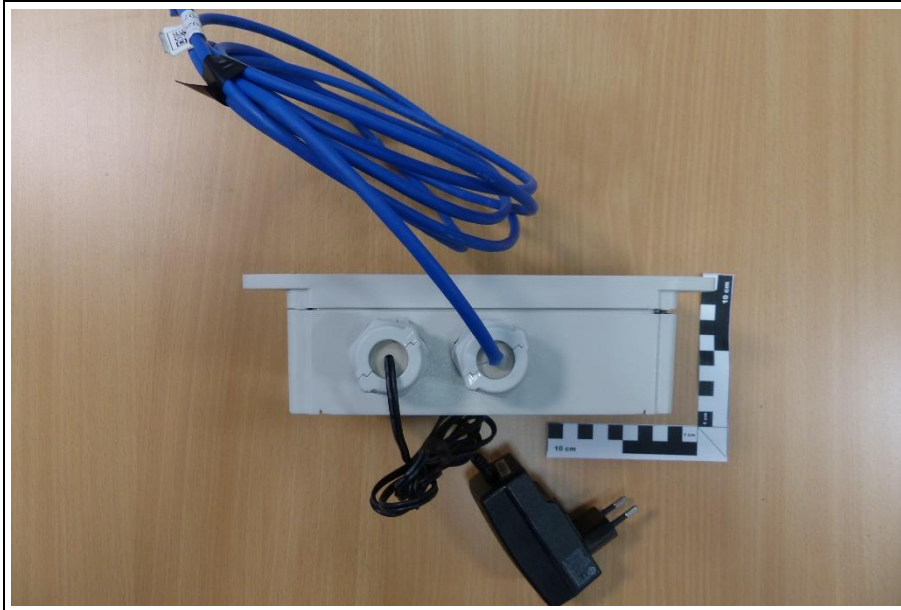
1.2 Equipment Photos - Internal



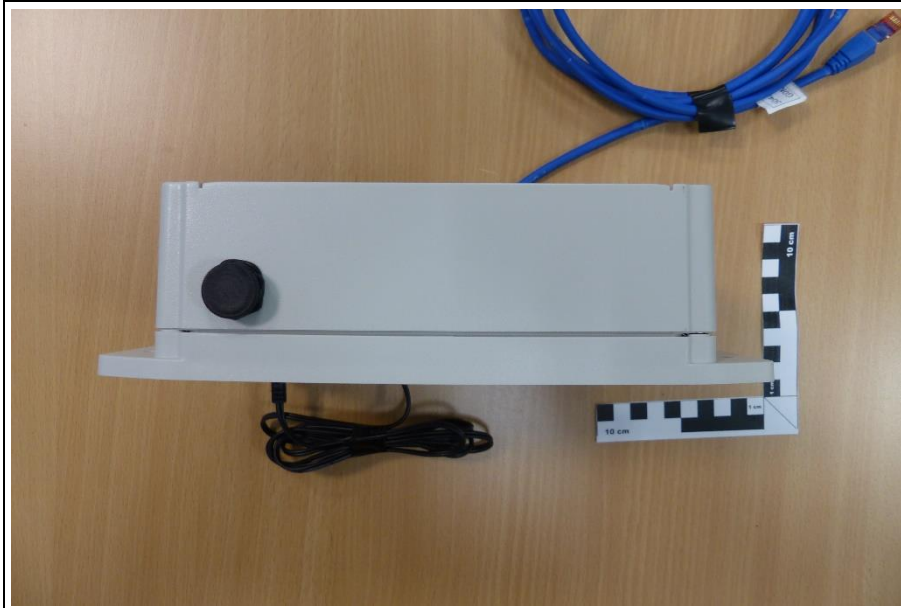
1.3 Equipment Photos - External



EUT BACK



EUT FRONT



EUT RIGHT



EUT LEFT



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	lenovo	ThinkPad T450	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	ZigBee functionality, operates in TX test-mode. TX test-mode: Ch.: 11; TX power: 13; PRBS mode. “ping” test for Ethernet connection.
2	ZigBee stand by.
Comment: After exploratory testing in accordance with ANSI 63.4:2014 chapter 7.3.3 and 8.3.1 is mode 1 is worst case.	

1.6 EUT Configuration

Configuration #	Description
1	EUT assembled with AC/DC adaptor and Ethernet cable. Laptop controlled the EUT via terminal program.
Comment:	

1.7 Sample emission level calculation

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

Reading:

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

A.F.:

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

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

Net:

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

Limit:

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

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

Margin:

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

Example only:

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

2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 6.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 6.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	-
Comment:				

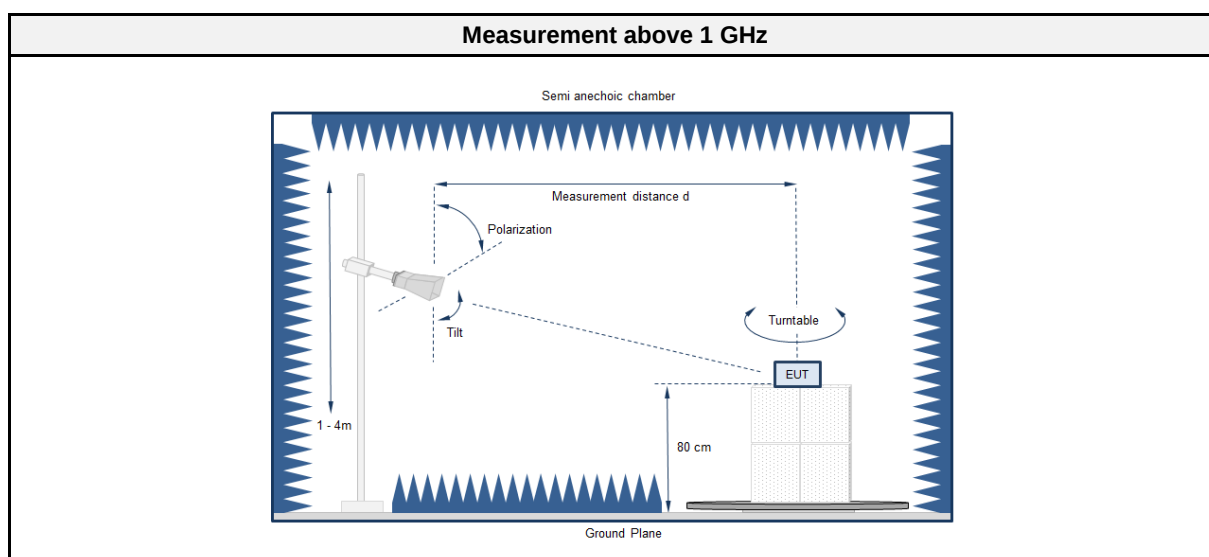
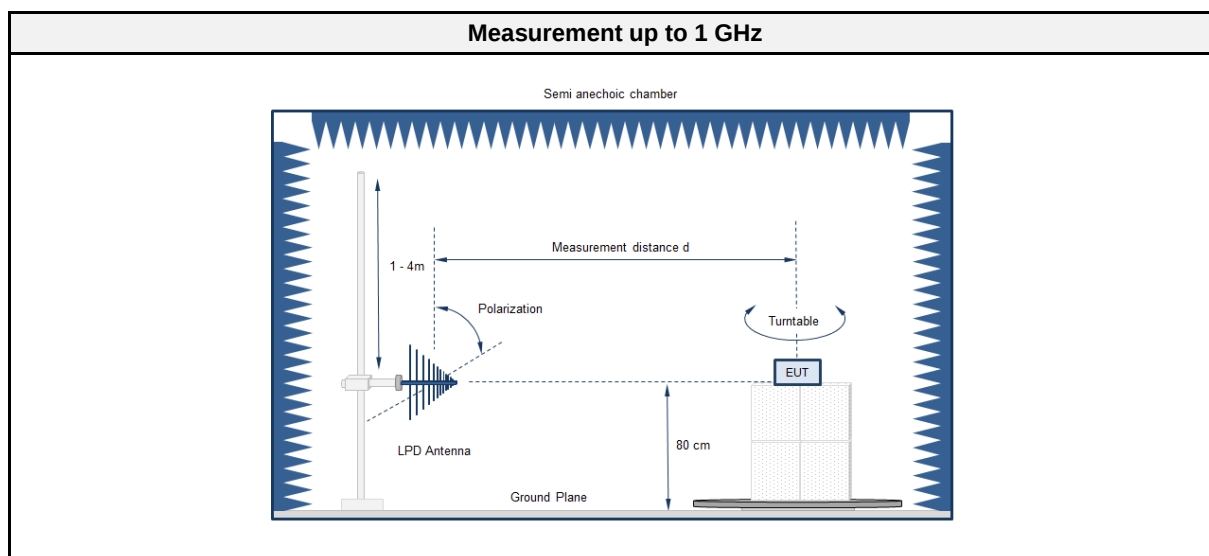
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

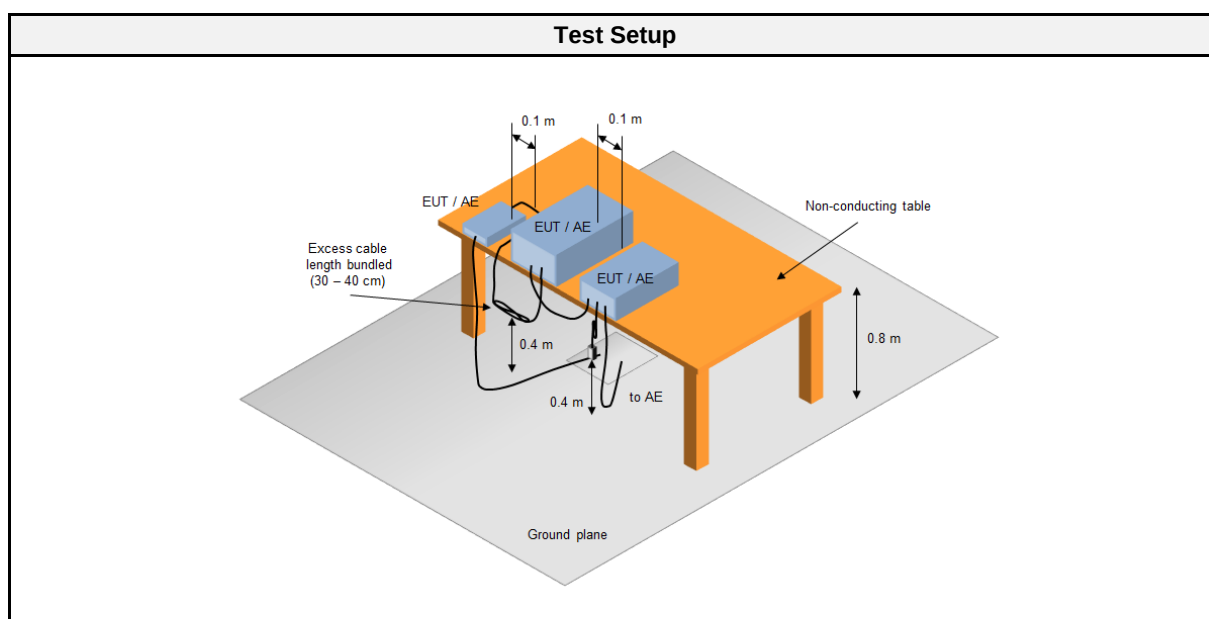
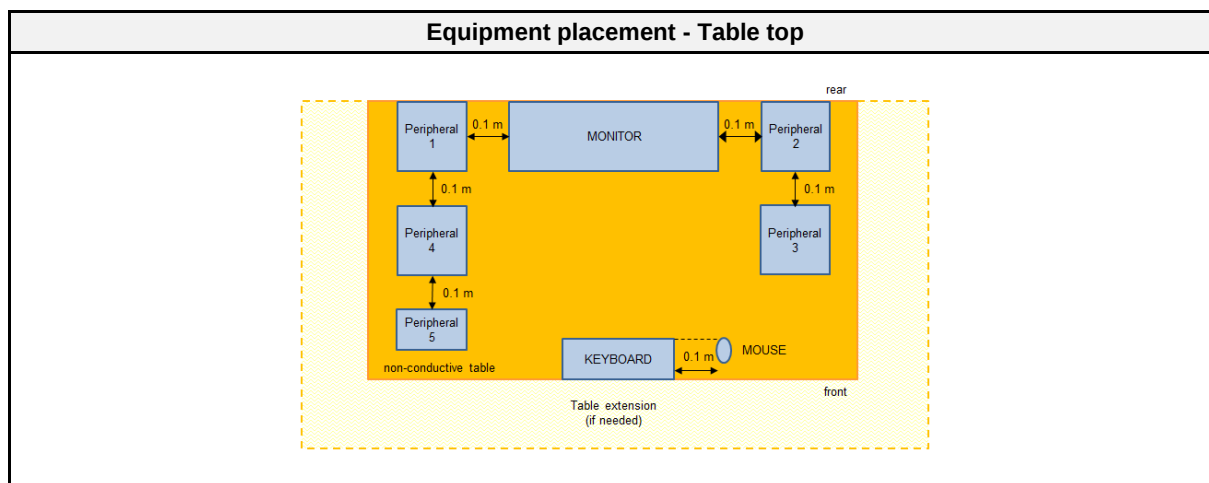
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 6.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2400
Measurement range	30 MHz to 13000 MHz
Temperature [°C]	20 ±3
Humidity [%]	49 ±3
Operator	Matthias Handrik
Date	2020-10-30

2.1.2 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	Frankonia	AC1	EF00062	2018-07	2021-07
EMI Test Receiver	Keysight	N9038A-526/WXP	EF01070	2020-06	2021-06
Biconical Antenna	R&S	HK 116	EF00030	2019-04	2022-04
LPD Antenna	R&S	HL 223	EF00187	2019-05	2022-05
Horn Antenna	Schwarzbeck	BBHA9120D	EF00018	2019-10	2022-10
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2020-03	2021-03

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.

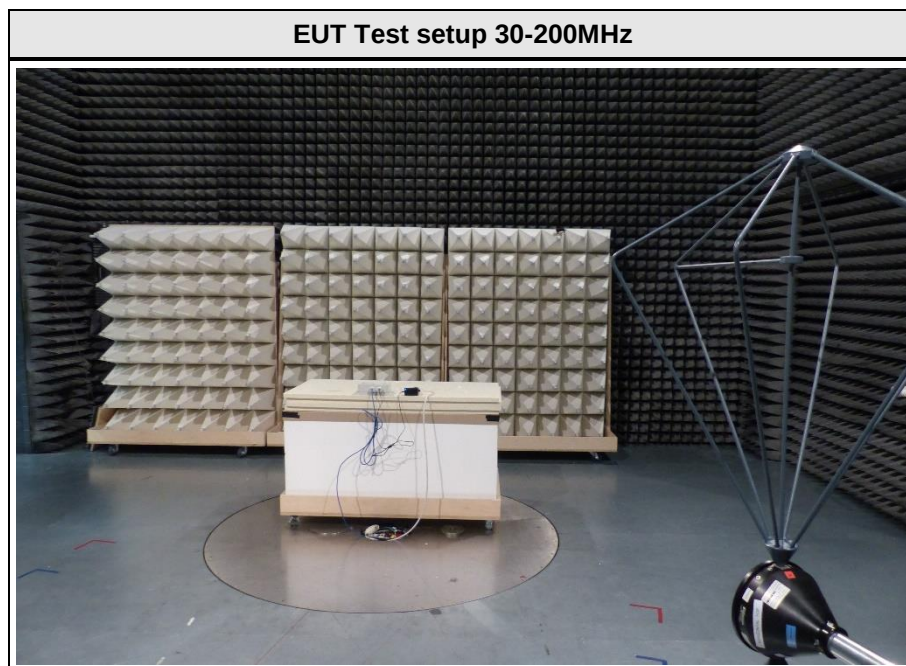
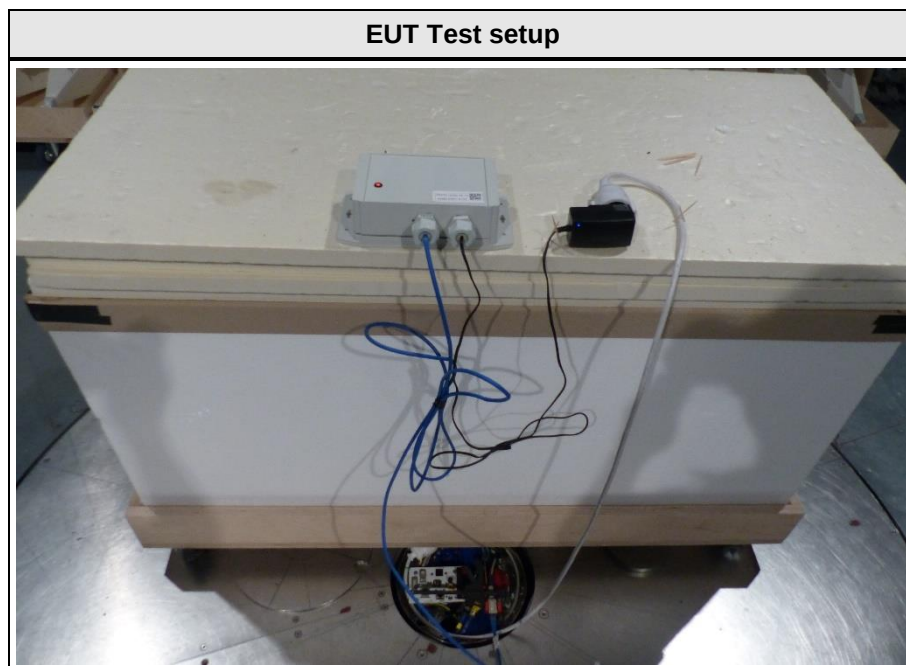
2.1.5 Limits

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	74
	Average	54

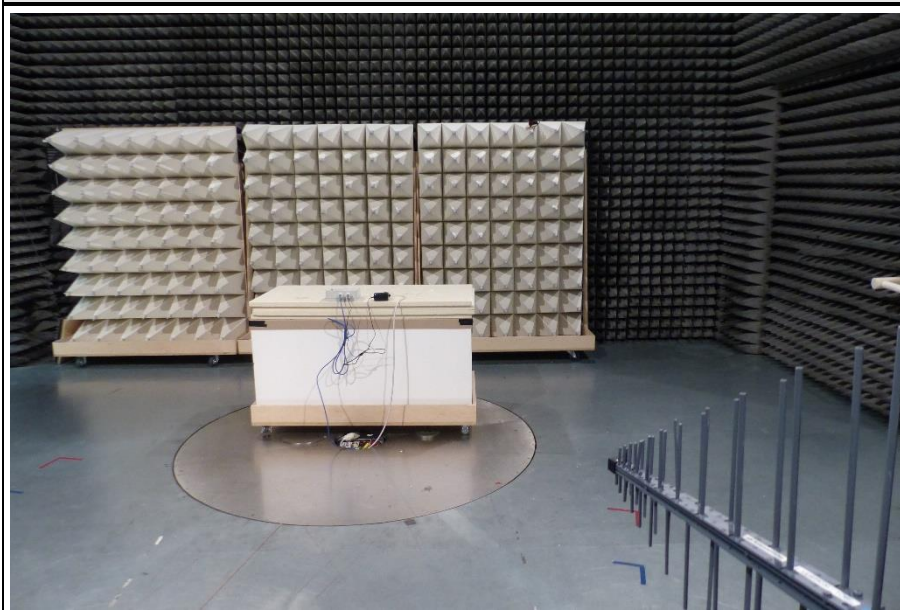
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	1
Comment:			
1	Ethernet shield was connected to measurement chamber ground		

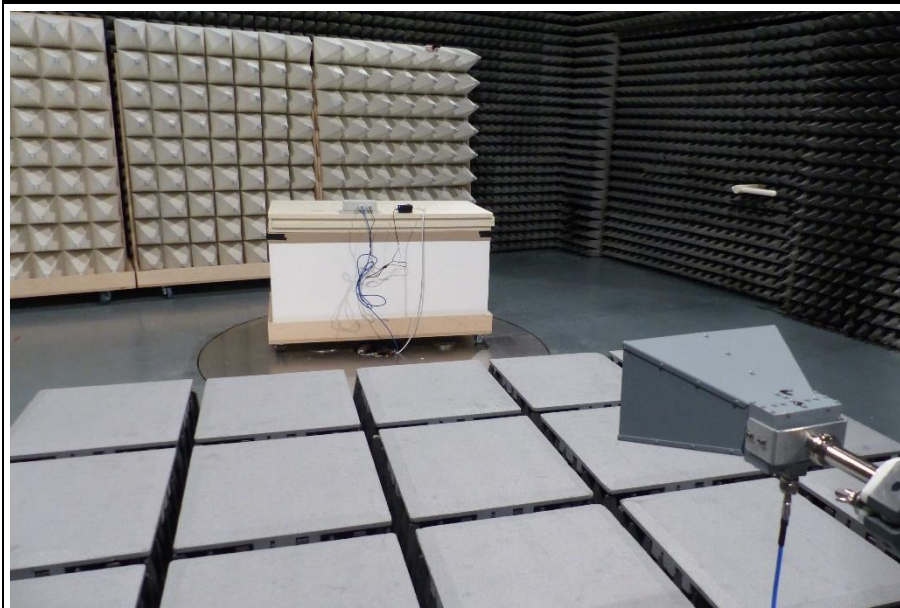
2.1.7 Setup Photos



EUT Test setup 200-1000MHz



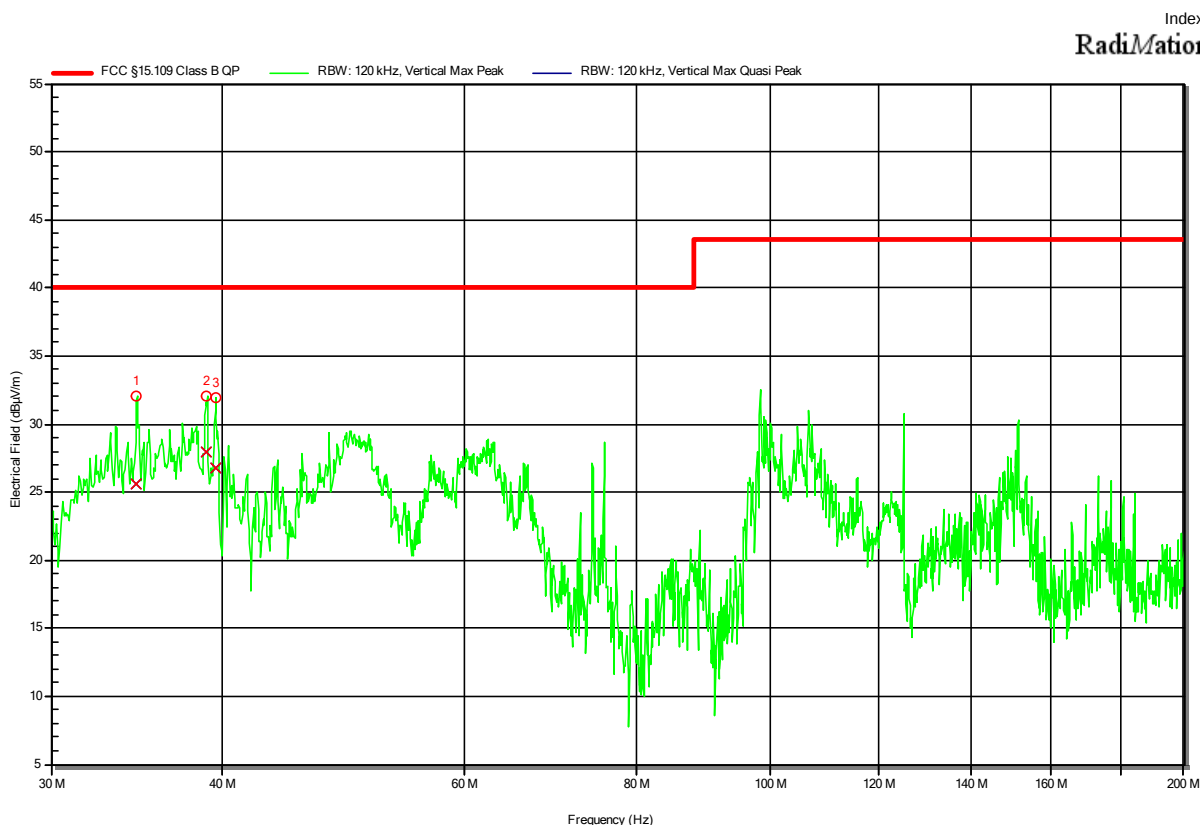
EUT Test setup 1-13GHz



2.1.8 Records

Radiated emissions according to FCC part 15B

Project Number: G0M-2007-9170
 Applicant: SKAN Deutschland GmbH
 Model Description: Network Extender wirelessGlovTester evolution 2
 Model: SKAN NE wGT evo2
 Test Sample ID: 30432
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Date: 2020-10-30
 Operating Conditions: ambient temperature: 19 °C
 power input: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement Distance: 3m
 Operational Mode & EUT Configuration: Mode 1
 Configuration 1
 Note 1:



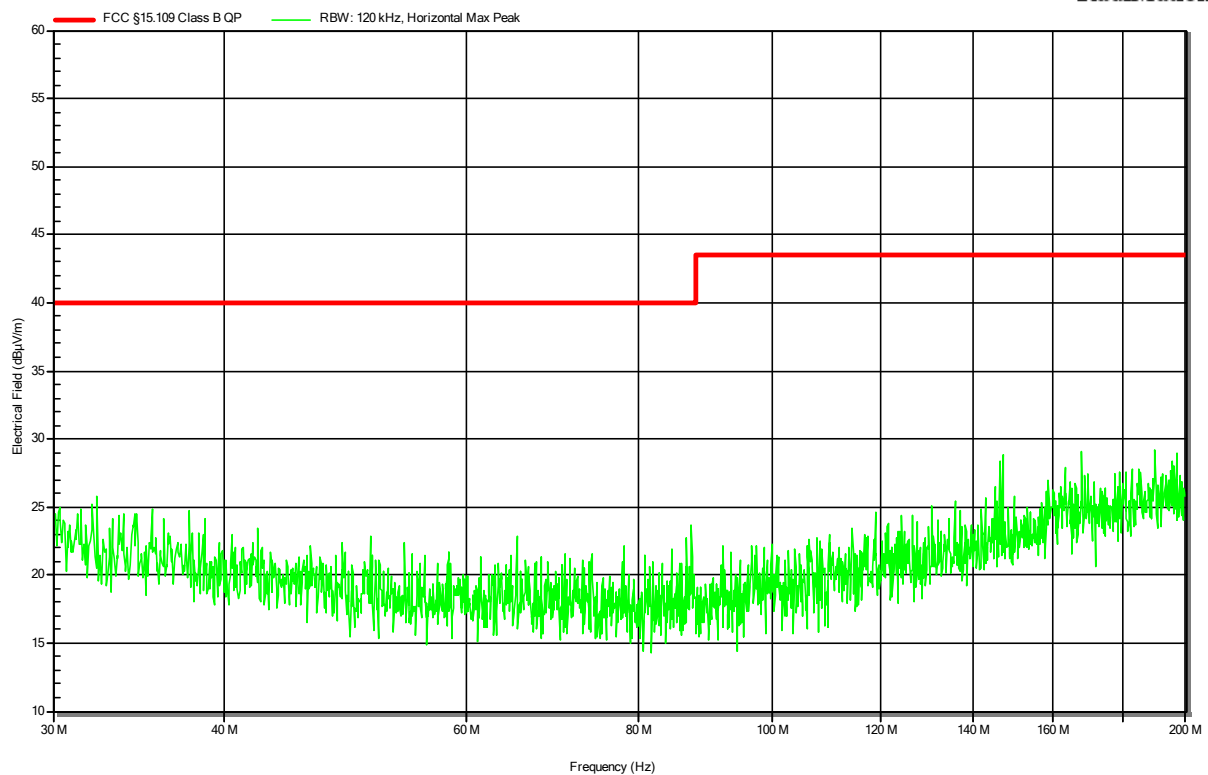
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	34.648 MHz	25.64 dBµV/m	40 dBµV/m	-14.36 dB	Pass	-80 degrees	1 m
2	38.953 MHz	27.94 dBµV/m	40 dBµV/m	-12.06 dB	Pass	-80 degrees	1 m
3	39.512 MHz	26.81 dBµV/m	40 dBµV/m	-13.19 dB	Pass	-80 degrees	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2007-9170
 Applicant: SKAN Deutschland GmbH
 Model Description: Network Extender wirelessGlovTester evolution 2
 Model: SKAN NE wGT evo2
 Test Sample ID: 30432
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Date: 2020-10-30
 Operating Conditions: ambient temperature: 19 °C
 power input: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement Distance: 3m
 Operational Mode & EUT Configuration: Mode 1
 Configuration 1
 Note 1:

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RadiMation

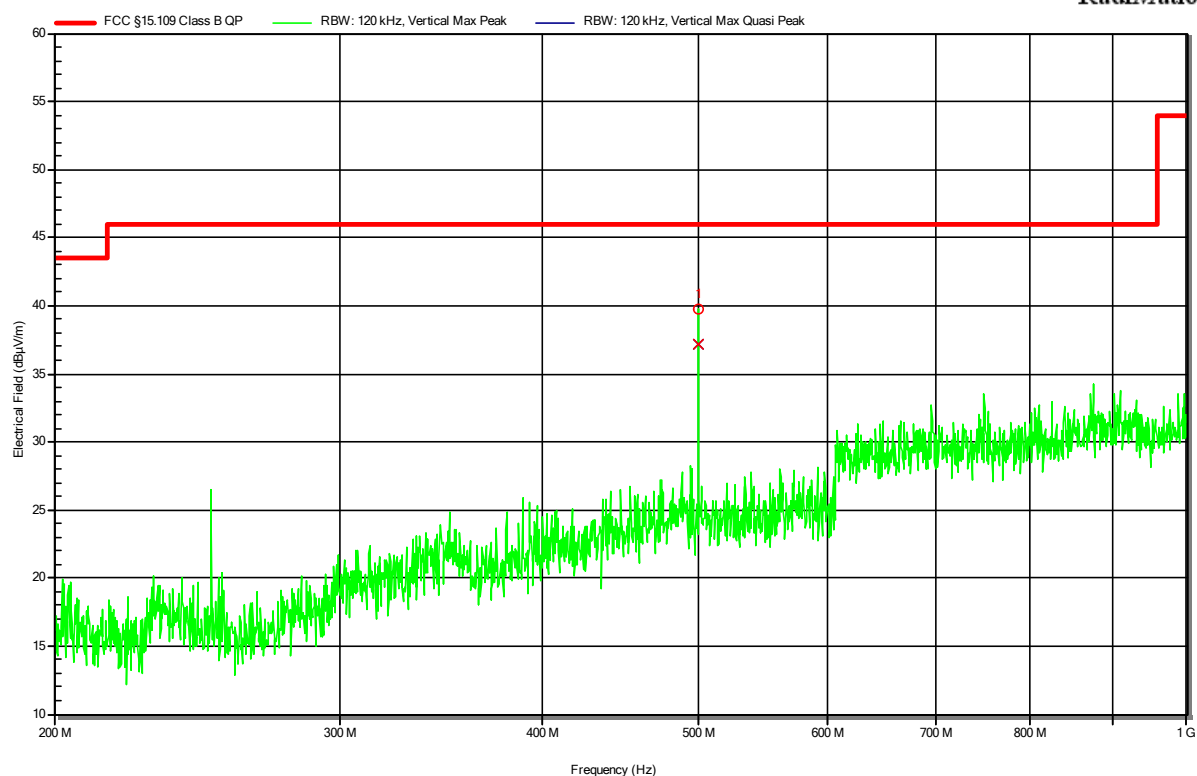


Radiated emissions according to FCC part 15B

Project Number: G0M-2007-9170
 Applicant: SKAN Deutschland GmbH
 Model Description: Network Extender wirelessGlovTester evolution 2
 Model: SKAN NE wGT evo2
 Test Sample ID: 30432
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Date: 2020-10-30
 Operating Conditions: ambient temperature: 19 °C
 power input: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement Distance: 3m
 Operational Mode & EUT Configuration: Mode 1
 Configuration 1
 Note 1:

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RadiMation



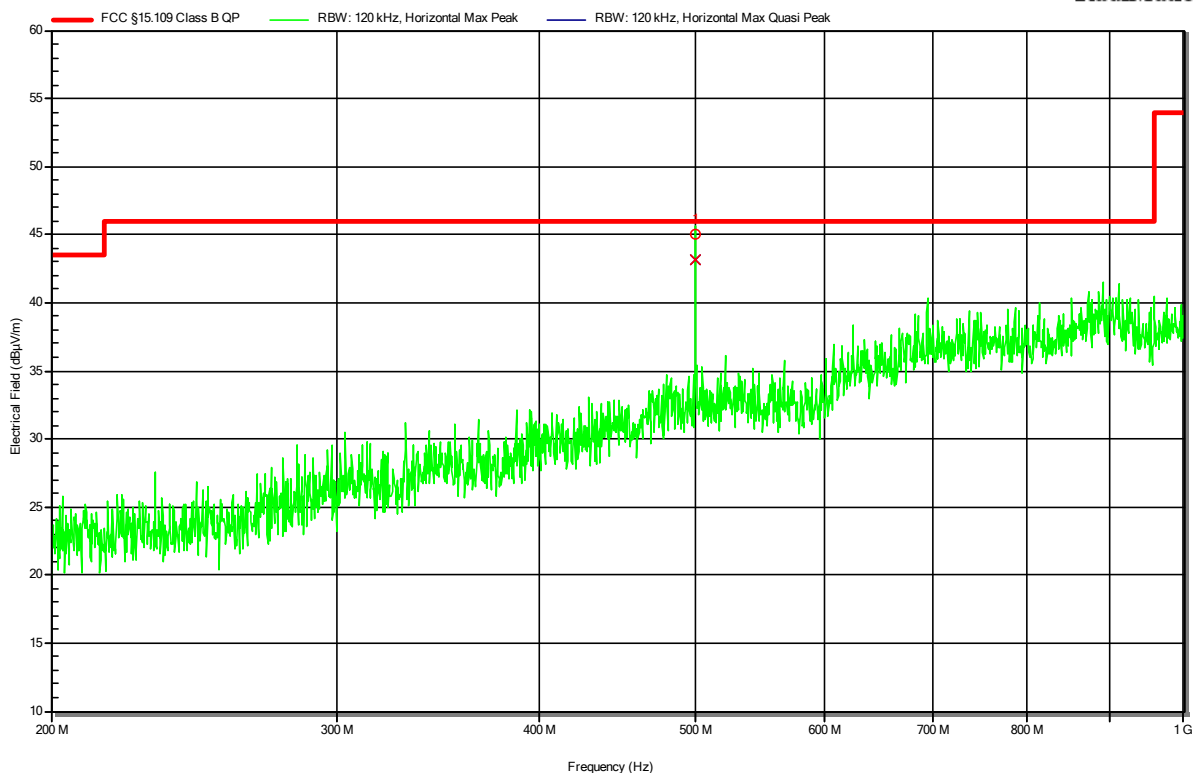
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	500 MHz	37.15 dBμV/m	46.02 dBμV/m	-8.87 dB	Pass	22 degrees	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2007-9170
Applicant: SKAN Deutschland GmbH
Model Description: Network Extender wirelessGlovTester evolution 2
Model: SKAN NE wGT evo2
Test Sample ID: 30432
Test Site: Eurofins Product Service GmbH
Operator: Mr. Handrik
Test Date: 2020-10-30
Operating Conditions: ambient temperature: 19 °C
power input: 120V AC (AC/DC adaptor)
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement Distance: 3m
Operational Mode & EUT Configuration: Mode 1
Configuration 1
Note 1:

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RadiMation



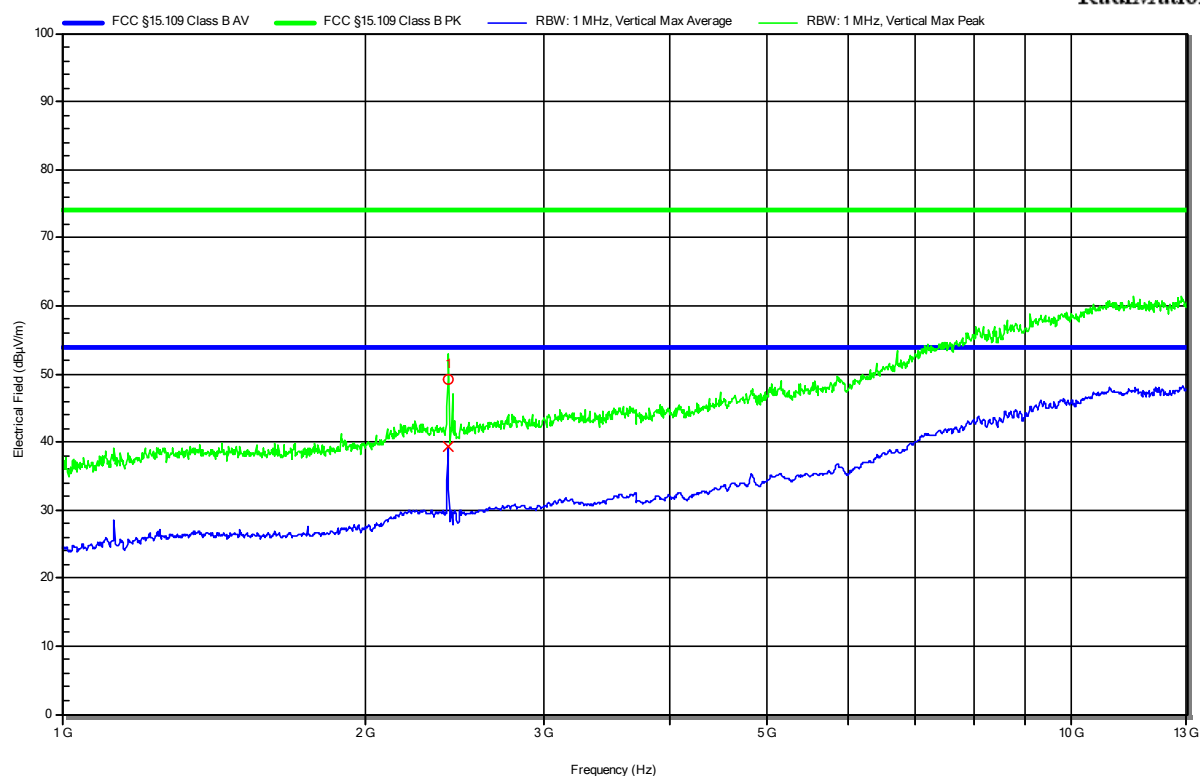
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	500 MHz	43.15 dBμV/m	46.02 dBμV/m	-2.87 dB	Pass	0 degrees	2.1 m

**Radiated emissions
according to FCC part 15B**

Project Number: G0M-2007-9170
 Applicant: SKAN Deutschland GmbH
 Model Description: Network Extender wirelessGlovTester evolution 2
 Model: SKAN NE wGT evo2
 Test Sample ID: 30432
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Date: 2020-10-30
 Operating Conditions: ambient temperature: 19 °C
 power input: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement Distance: 3m
 Operational Mode & EUT Configuration: Mode 1
 Configuration 1
 Note 1:

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RadiMation



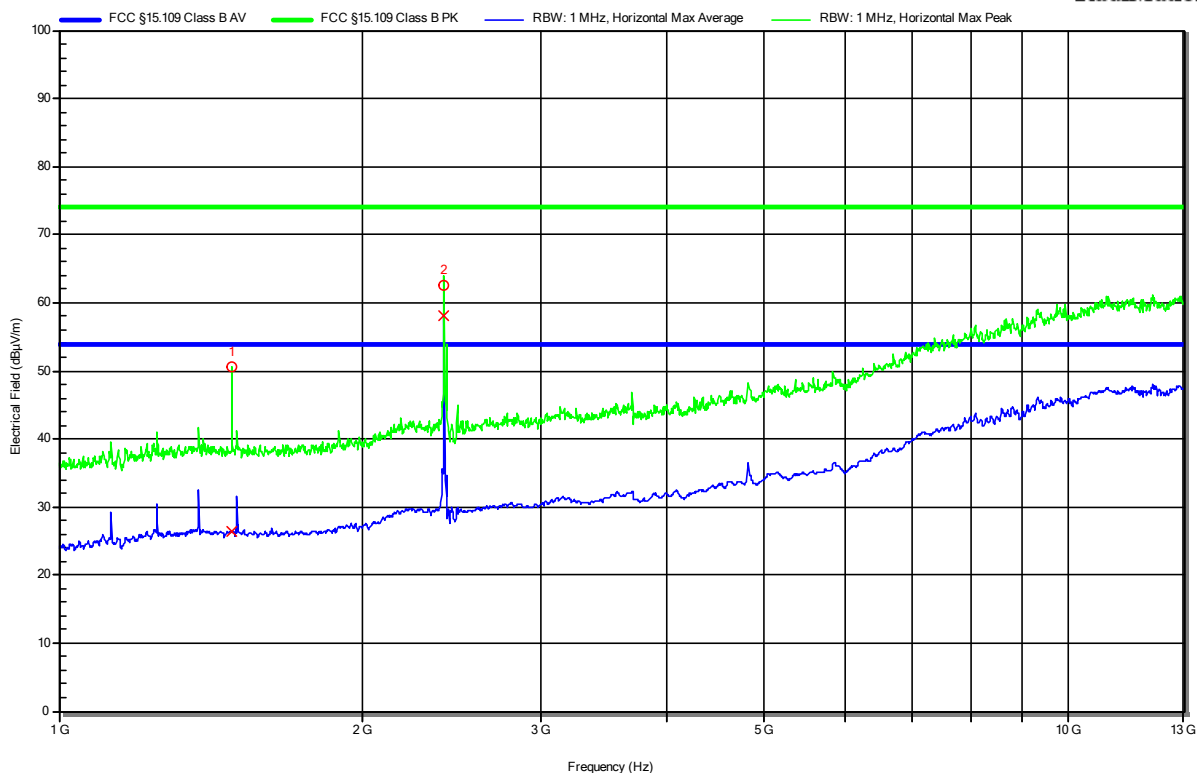
Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.41 GHz	ZigBee carrier					

Radiated emissions according to FCC part 15B

Project Number: G0M-2007-9170
Applicant: SKAN Deutschland GmbH
Model Description: Network Extender wirelessGlovTester evolution 2
Model: SKAN NE wGT evo2
Test Sample ID: 30432
Test Site: Eurofins Product Service GmbH
Operator: Mr. Handrik
Test Date: 2020-10-30
Operating Conditions: ambient temperature: 19 °C
power input: 120V AC (AC/DC adaptor)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement Distance: 3m
Operational Mode & EUT Configuration: Mode 1
Configuration 1
Note 1:

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RadiMation



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.482 GHz	50.56 dBμV/m	73.98 dBμV/m	-23.42 dB	Pass	0 degrees	1 m
2	2.405 GHz	ZigBee carrier					

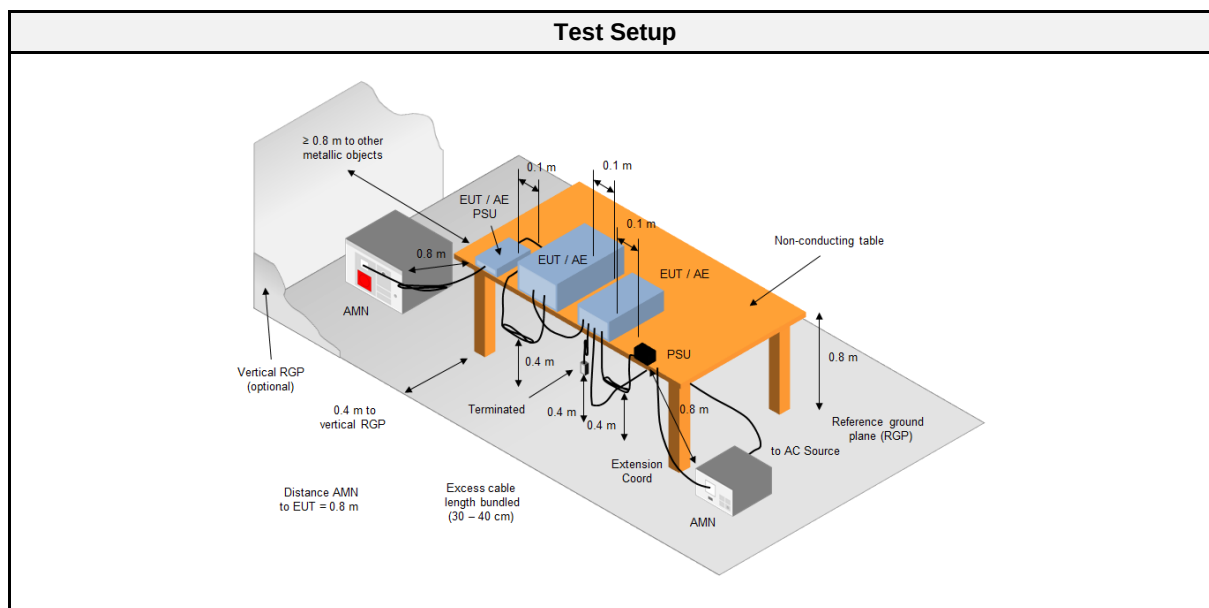
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.482 GHz	26.43 dBμV/m	53.98 dBμV/m	-27.55 dB	Pass	0 degrees	1 m
2	2.405 GHz	ZigBee carrier					

Test Report No.: G0M-2007-9170-EF0115B-V01

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

2.2.1 Information

2.2.2 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	2020-07	2021-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2020-07	2021-07
EMI Test Receiver	R&S	ESR 7	EF00943	2020-07	2021-07
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2020-03	2021-03

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

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

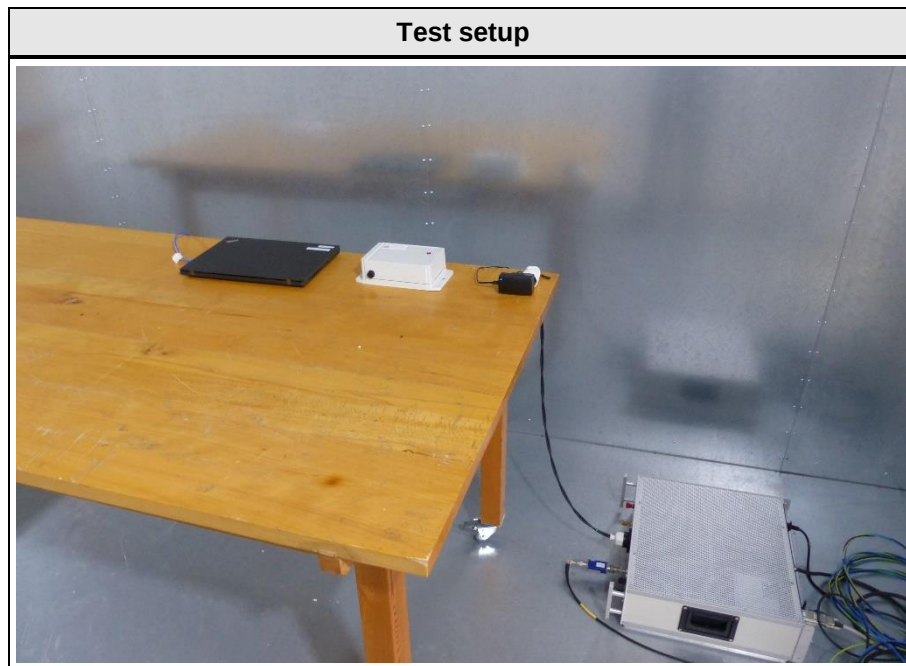
2.2.5 Limits

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	-

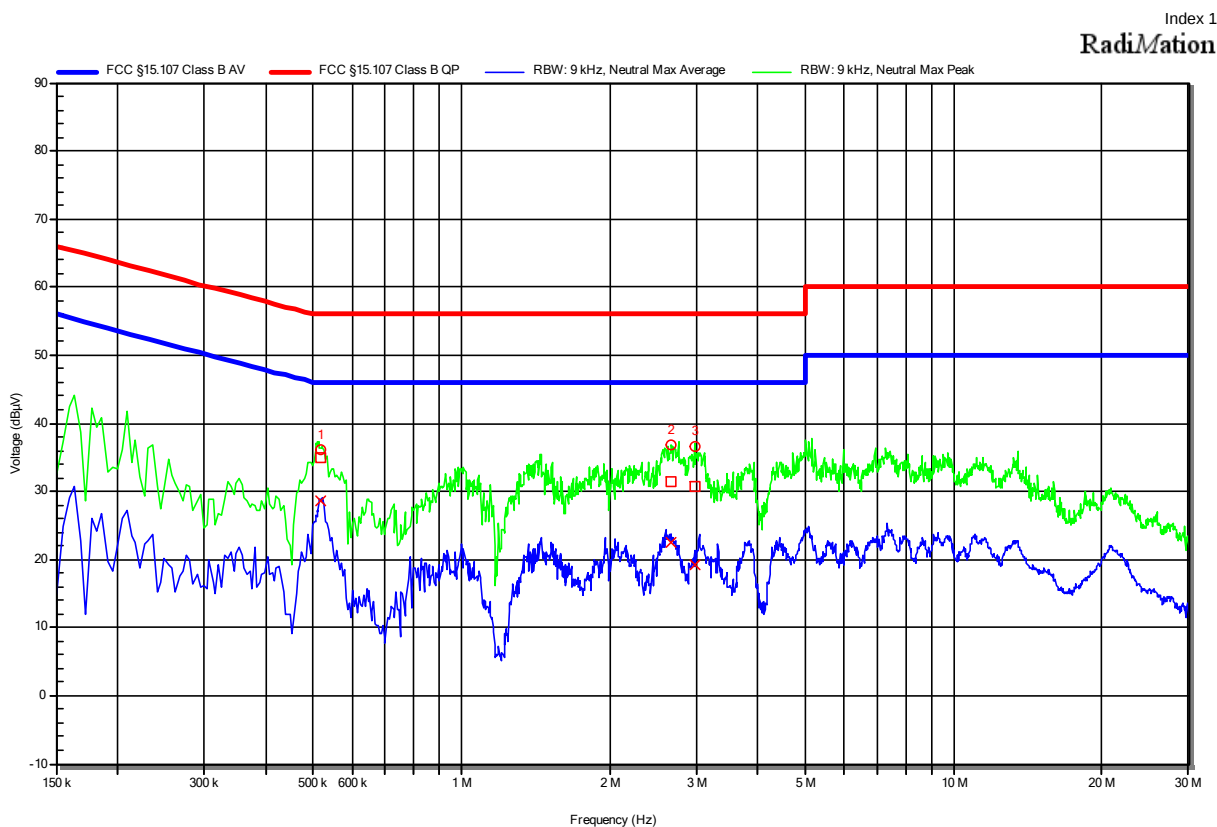
2.2.7 Setup Photos



2.2.8 Records

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

Project Number: G0M-2007-9170
 Applicant: SKAN Deutschland GmbH
 Model Description: Network Extender wirelessGlovTester evolution 2
 Model: SKAN NE wGT evo2
 Test Sample ID: 30432
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Date: 2020-10-28
 Operating Conditions: ambient temperature: 23 °C
 power input: 120V AC (AC/DC adaptor)
 LISN: Schwarzbeck NSLK 8127 RC, N
 Operational Mode & EUT Configuration: Mode 1
 Configuration 1
 Applied to Port: AC-mains
 Note 1:

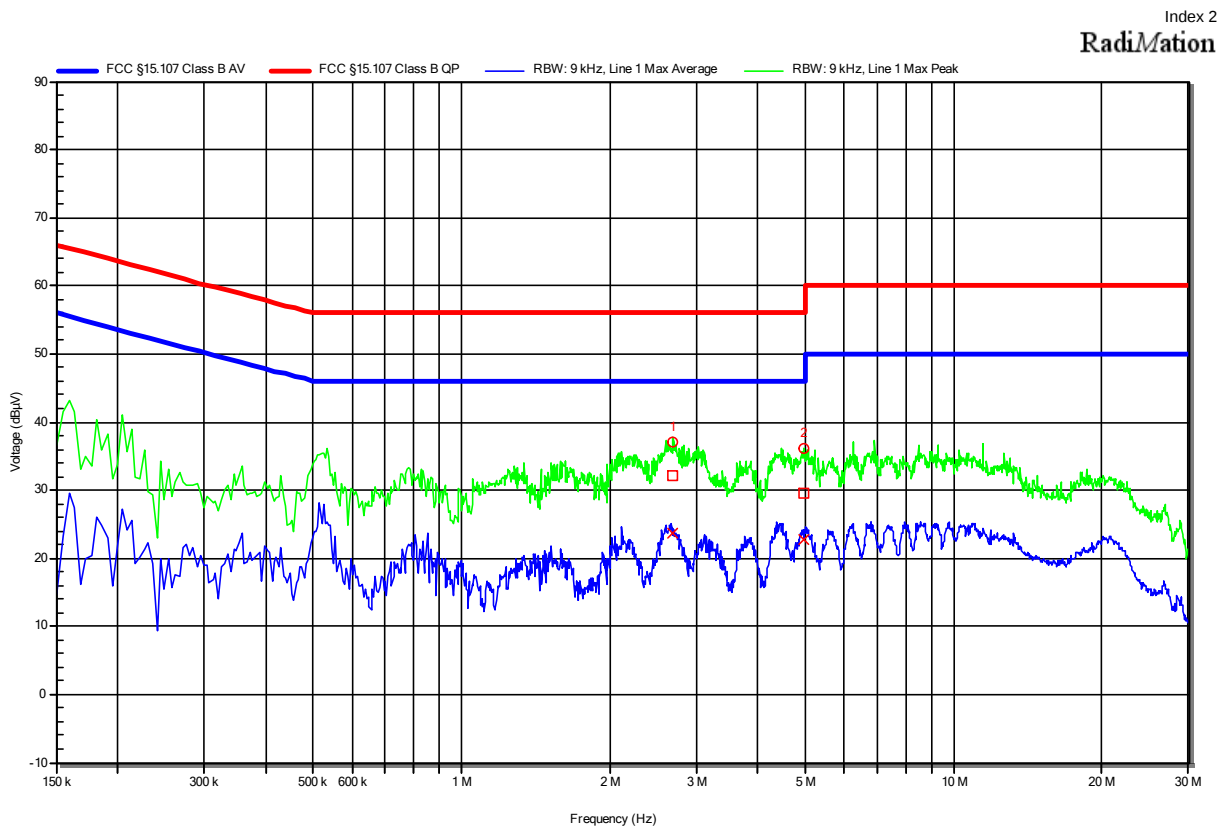


Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	517.65 kHz	34.92 dB μ V	56 dB μ V	-21.08 dB	Pass	Neutral
2	2.675 MHz	31.34 dB μ V	56 dB μ V	-24.66 dB	Pass	Neutral
3	2.99 MHz	30.79 dB μ V	56 dB μ V	-25.21 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	517.65 kHz	28.52 dB μ V	46 dB μ V	-17.48 dB	Pass	Neutral
2	2.675 MHz	22.55 dB μ V	46 dB μ V	-23.45 dB	Pass	Neutral
3	2.99 MHz	19.18 dB μ V	46 dB μ V	-26.82 dB	Pass	Neutral

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

Project Number: G0M-2007-9170
 Applicant: SKAN Deutschland GmbH
 Model Description: Network Extender wirelessGlovTester evolution 2
 Model: SKAN NE wGT evo2
 Test Sample ID: 30432
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Date: 2020-10-28
 Operating Conditions: ambient temperature: 23 °C
 power input: 120V AC (AC/DC adaptor)
 LISN: Schwarzbeck NSLK 8127 RC, L1
 Operational Mode & EUT Configuration: Mode 1
 Configuration 1
 Applied to Port: AC mains
 Note 1:



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	2.693 MHz	32.14 dBµV	56 dBµV	-23.86 dB	Pass	Line 1
2	4.943 MHz	29.55 dBµV	56 dBµV	-26.45 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	2.693 MHz	23.74 dBµV	46 dBµV	-22.26 dB	Pass	Line 1
2	4.943 MHz	22.68 dBµV	46 dBµV	-23.32 dB	Pass	Line 1