PHOENIX TESTLAB

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Test Report

Report Number:

F212050E2

Equipment under Test (EUT):

Protective Glass Monitor D134 G3

Applicant:

TRUMPF Laser GmbH

Manufacturer:

TRUMPF Laser GmbH

ilac-MRA
DAkkS Deutsche Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

References

[1] **ANSI C63.10: 2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

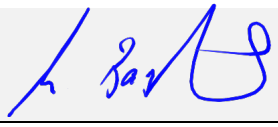
[2] **FCC CFR 47 Part 15** Radio Frequency Devices

[3] **RSS-210 Issue 10 (December 2019)**
Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

[4] **RSS-Gen Issue 5 (March 2019) Amendment 1**
General Requirements for Compliance of Radio Apparatus

Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.

Tested and written by:		Michael DINTER 21.01.2022
	Signature	
Reviewed and approved by:		Manuel BASTERT 21.01.2022
	Signature	

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents: Page

1 Identification

1.1 Applicant

Name:	TRUMPF Laser GmbH
Address:	Aichhalder Str. 39, 78713 Schramberg
Country:	Germany
Name for contact purposes:	Mr. Matthias FICHTER
Phone:	07422-515-0
eMail address:	info@trumpf-laser.com
Applicant represented during the test by the following person:	Mr. Jürgen FLAD

1.2 Manufacturer

Name:	TRUMPF Laser GmbH
Address:	Aichhalder Str. 39, 78713 Schramberg
Country:	Germany
Name for contact purposes:	Mr. Matthias FICHTER
Phone:	07422-515-0
eMail address:	info@trumpf-laser.com
Manufacturer represented during the test by the following person:	Mr. Jürgen FLAD

1.3 Test Laboratory

The tests were carried out by:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06 and D-PL-17186-01-05, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	RFID Reader for Intelligent optic for laser device
Model name: *	Protective Glass Monitor D134 G3
Model number: *	Not provided by the applicant
Order number: *	Not provided by the applicant
FCC ID: *	2AQUY-UDOP001
IC certification number: *	24193-UDOP001
PMN: *	UDOP001A
HVIN: *	Protective Glass Monitor D134 G3
FVIN: *	PFO_50xx

	EUT number		
	1	2	3
Serial number: *	Equi-No. 407096567*1	-	-
PCB identifier: *	-	-	-
Hardware version: *	-	-	-
Software version: *	PFO_50bj	-	-

* Declared by the applicant
*1 Equipment number of the laser unit part (no other number provided by the applicant)

1 EUT was used for the tests.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

General:

Power supply EUT: *	+/- 24V DC		
Supply voltage EUT: *	U_{nom} = 24V	U_{min} = 18V	U_{max} = 25,2V
Temperature range: *	+15 °C to +45 °C		
Lowest / highest internal frequency: *	500 kHz (SPI) / 600 MHz (Controller) / 13.56 MHz (RFID)		

RFID part:

Operating frequency: *	13.56 MHz
Number of channels: *	1
Type of modulation: *	Single subcarrier
Data rate: *	26 Kbps
Duty cycle: *	--
Antenna type: *	Antenna within the PCB
Antenna connector: *	PCB connection

* Declared by the applicant

Equipment used for testing	
RFID TAG *1	LXMS33HCNG-134

*1 Provided by the applicant
*2 Provided by the laboratory

Ancillary equipment	
Panel PC*1	10.4” Panelcomputer multitouch Product ID E741095
Simulation UNIT*1	Customized equipment
LASER optic*1	PFO 33 (KF023) M/N:2648058
AC adapter *1	Mean Well SP-200-24

*1 Provided by the applicant

1.6 Dates

Date of receipt of test sample:	19.10.2021
Start of test:	19.10.2021
End of test:	22.10.2021

2 Operational States

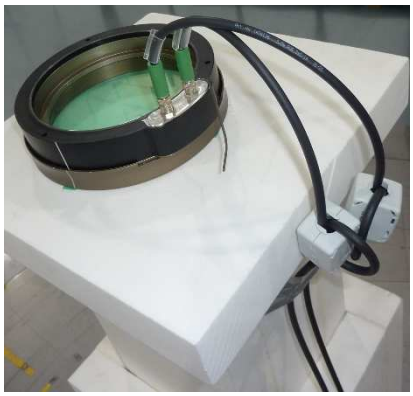
Description of function of the EUT:

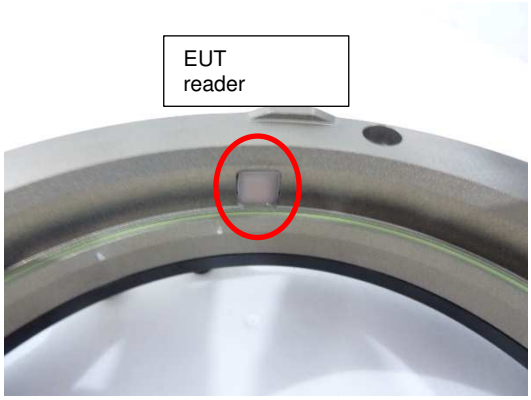
The EUT is an RFID reader which is part of a Laser optic to identify the right protect glass for each laser type and application.

The following states were defined as the operating conditions:

The EUT is part of LASER optic and always supplied by the main unit which is supplied by 120 V AC 60 Hz. During all test the EUT is reading a TAG of a protection glass.

The EUT was set up as follows:





The radiated emission measurement is divided into three stages:
1. A preliminary measurement inside a semi anechoic chamber with 3 m distance.
2. A final measurement inside a semi anechoic chamber with 3 m distance for frequencies above 30 MHz.
3. A final measurement on an outdoor test site without reflecting groundplane and 3 m distance for frequencies below 30 MHz.

3 Additional Information

The EUT was not labeled as required by FCC / IC.

4 Overview

Application	Frequency range in MHz	FCC 47 CFR Part 15 section [2]	RSS-Gen, Issue 5 [4] and RSS-210, Issue 10 [3]	Tested EUT	Status
Conducted emissions on supply line	0.15 – 30	15.207 (a)	8.8 [4]	1	Passed
Radiated emissions	0.500 – 6000 **	15.205 (a) 15.209 (a)	8.9 and 8.10 [4] 7.1 and 7.3 [3]	1	Passed
99 % bandwidth	13.56	-	6.7 [4]	1	Passed
Antenna requirement	-	15.203 [2]	6.8 [4]	1	Passed *

*: Integrated antenna only, requirement fulfilled.

**: As declared by the applicant the highest radio clock frequency is 13.56 MHz.
In this case the radiated emission measurement was carried out up to 6 GHz.

5 Results

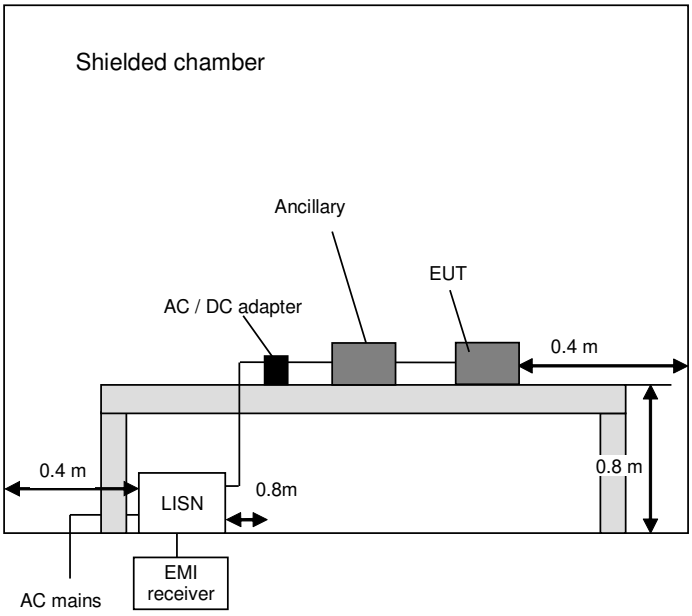
5.1 Conducted emissions on AC power supply lines

5.1.1 Test method

The test is carried out in a shielded chamber. Table-top devices are set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices are placed directly on the ground plane. In case of DC powered equipment, which is not exclusively powered by a battery, it is connected to the LISN via a suitable AC/DC adaptor. The setup of the equipment under test is in accordance to [1].

The frequency range 150 kHz to 30 MHz is measured with an EMI receiver set to MAX hold mode with Peak and Average detectors and a resolution bandwidth of 9 kHz. A scan is carried out on the phase and neutral line of the AC mains network. If emissions less than 10 dB below the appropriable limit are detected, these emissions are measured with an Average and Quasi-Peak detector on all lines.

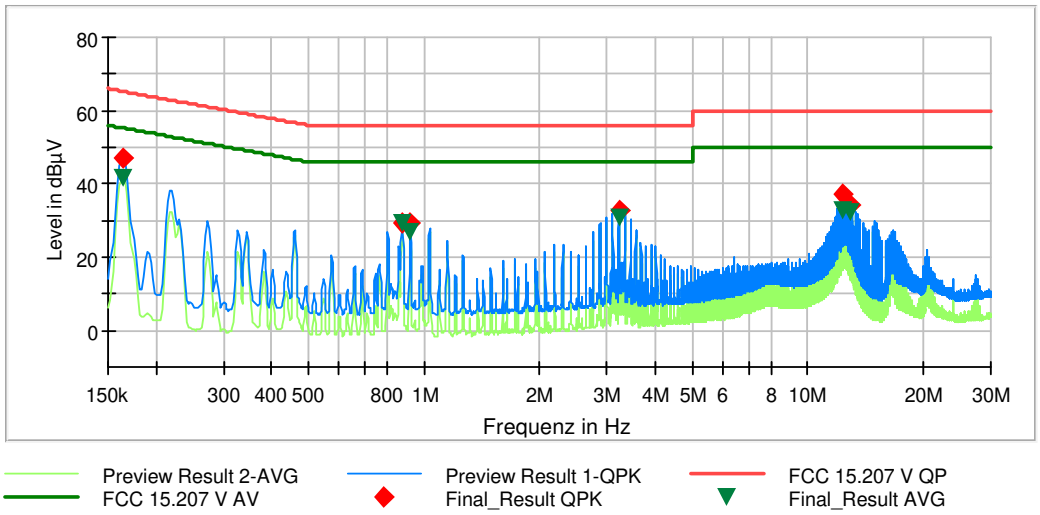
Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



5.1.2 Test results

Ambient temperature:	23 °C
Relative humidity:	41 %

Date:	22.10.2021
Tested by:	M.DINTER



Frequency in MHz	QuasiPeak in dB(µV)	Average in dB(µV)	Limit in dB(µV)	Margin in dB	Meas. Time in ms	Bandwidth in kHz	Line	PE	Corr. in dB
0.163500	---	41.78	55.28	13.51	15000.0	9.000	L1	GND	9.8
0.163500	47.19	---	65.28	18.10	15000.0	9.000	N	GND	9.8
0.879000	---	29.16	46.00	16.84	15000.0	9.000	L1	GND	9.8
0.879000	29.56	---	56.00	26.44	15000.0	9.000	L1	GND	9.8
0.919500	---	27.11	46.00	18.89	15000.0	9.000	L1	GND	9.8
0.919500	29.50	---	56.00	26.50	15000.0	9.000	L1	GND	9.8
3.219000	33.00	---	56.00	23.00	15000.0	9.000	L1	GND	10.3
3.219000	---	30.69	46.00	15.31	15000.0	9.000	L1	GND	10.3
12.300000	37.33	---	60.00	22.67	15000.0	9.000	L1	GND	10.6
12.300000	---	32.70	50.00	17.30	15000.0	9.000	L1	GND	10.6
12.900750	---	32.32	50.00	17.68	15000.0	9.000	L1	GND	10.6
12.900750	34.42	---	60.00	25.58	15000.0	9.000	N	GND	10.6

Measurement uncertainty ±2.76 dB

Test result: Passed

Test equipment (please refer to chapter 6 for details)
1 - 8

5.2 Radiated emissions

5.2.1 Test method

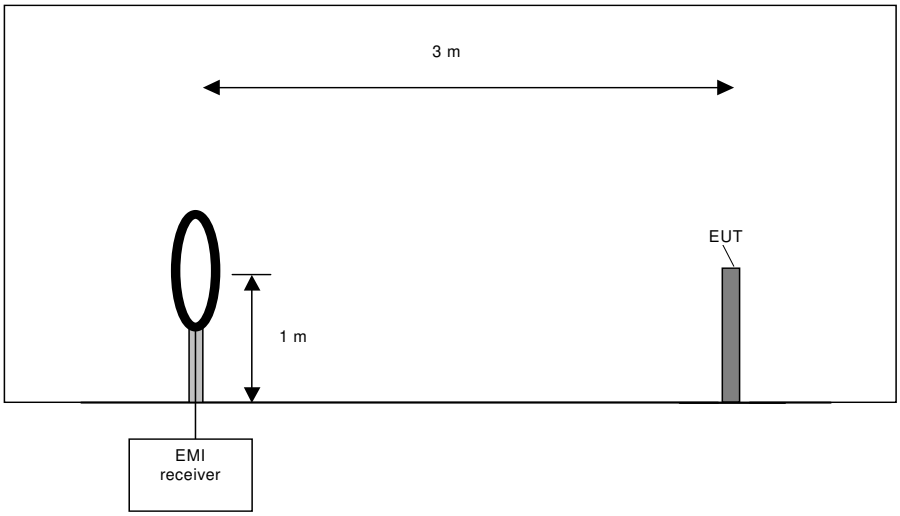
Preliminary measurement 9 kHz to 30 MHz

In the first stage a preliminary measurement is performed in an anechoic chamber with a measuring distance of 3 meters. Table-top devices are set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices are placed directly on the turntable / ground plane. The setup of the equipment under test is in accordance to [1].

The frequency range 9 kHz to 30 MHz is monitored with an EMI receiver while the system and its cables are manipulated to find out the configuration with the maximum emission levels if applicable. The EMI receiver is set to MAX hold mode. The EUT and the measuring antenna are rotated around their vertical axis to find the maximum emission levels.

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Procedure preliminary measurement:

Pre-scans are performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.
The following procedure is used:

1) Monitor the frequency range with the measuring antenna facing the EUT and an EUT / turntable azimuth of 0 °.
2) Manipulate the system cables to produce the maximum levels of emissions.
3) Rotate the EUT by 360 ° to maximize the detected signals.
4) Measure the frequencies of the highest detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency values.
5) If the EUT is portable or ceiling mounted, repeat steps 1 to 4 with other orientations (x,y,z) of the EUT.
6) Rotate the measuring antenna and repeat steps 1 to 5.

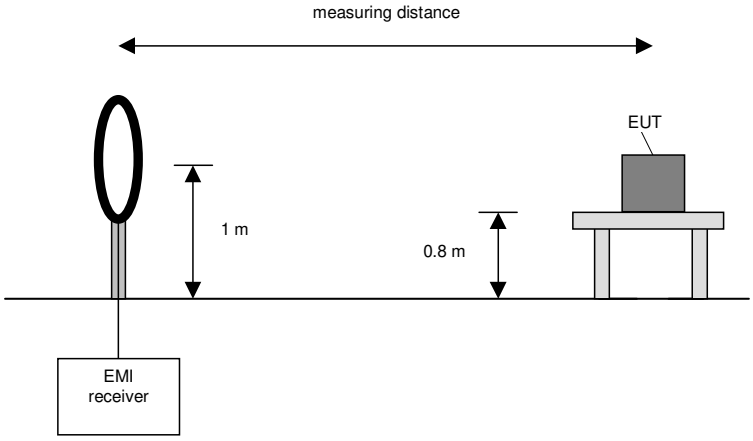
Final measurement 9 kHz to 30 MHz

In the second stage a final measurement is performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m or 30 m. In the case where larger measuring distances are required the results are extrapolated based on the values measured on the closer distances according to section 15.31 (f) (2) [2]. The final measurement is performed with an EMI receiver set to Quasi-Peak detector, except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an Average detector is used according section 15.209 (d) [2].

At the frequencies, which were detected during the preliminary measurements, the final measurement is performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum level value is found.

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Procedure final measurement:

The following procedure is used:

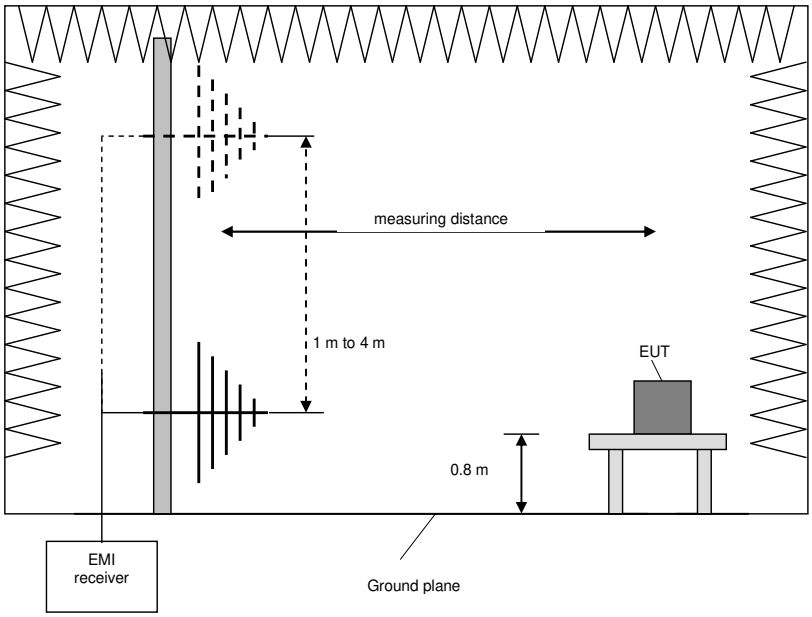
1) Monitor the selected frequencies from the preliminary measurement with the measuring antenna facing the EUT and an EUT azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals.
3) Rotate the measuring antenna and repeat steps 1 to 2 until the maximum value is found and note it.
4) If the EUT is portable or ceiling mounted, repeat steps 1 to 3 with other orientations (x,y,z) of the EUT.

Preliminary and final measurement 30 MHz to 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with a metal ground plane in a 3 m distance.
During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver is set to the following values:

Test	Frequency range	Resolution bandwidth
Preliminary measurement	30 MHz to 1 GHz	100 kHz
Frequency peak search	+ / - 1 MHz	10 kHz
Final measurement	30 MHz to 1 GHz	120 kHz



Procedure preliminary measurement:

The following procedure is used:

1) Set the measuring antenna to 1 m height.
2) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
3) Rotate the EUT by 360° to maximize the detected signals.
4) Repeat steps 2 to 3 with the vertical polarisation of the measuring antenna.
5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

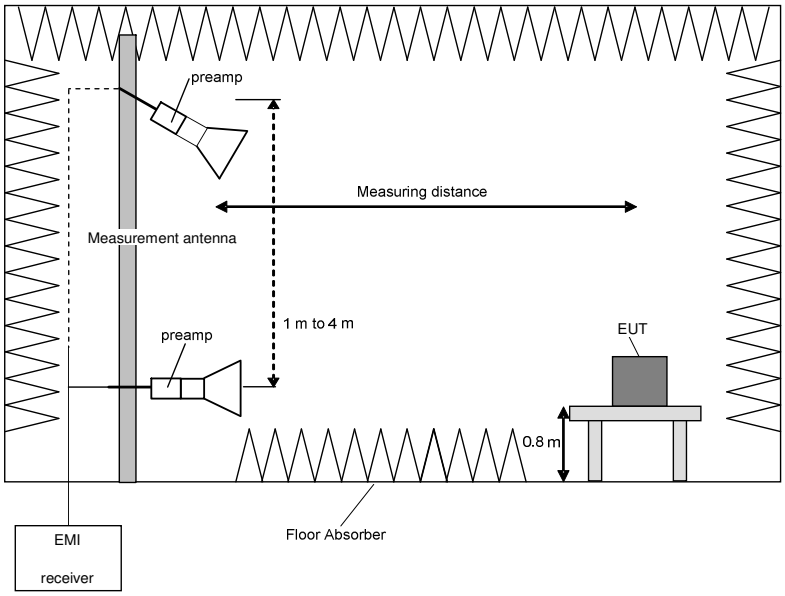
1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
2) The software determines the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x,y,z) for the final test.
4) The worst-case measuring antenna height is found via varying the height by +/- 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
5) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

Preliminary and final measurement > 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with floor absorbers between EUT and measuring antenna. The measuring distance is 3 m.
During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions. While changing the height, the measuring antenna gets tilted so that it is always aiming at the EUT.

The resolution bandwidth of the EMI Receiver is set to the following values:

Test	Frequency range	Resolution bandwidth
Preliminary measurement	1 - 40 GHz	1 MHz
Frequency peak search	+ / - 10 MHz	100 kHz
Final measurement	1 - 40 GHz	1 MHz



Procedure preliminary measurement:

The following procedure is used:

1) Set the measuring antenna to 1 m height.
2) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
3) Rotate the EUT by 360° to maximize the detected signals.
4) Repeat steps 2 to 3 with the vertical polarisation of the measuring antenna.
5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

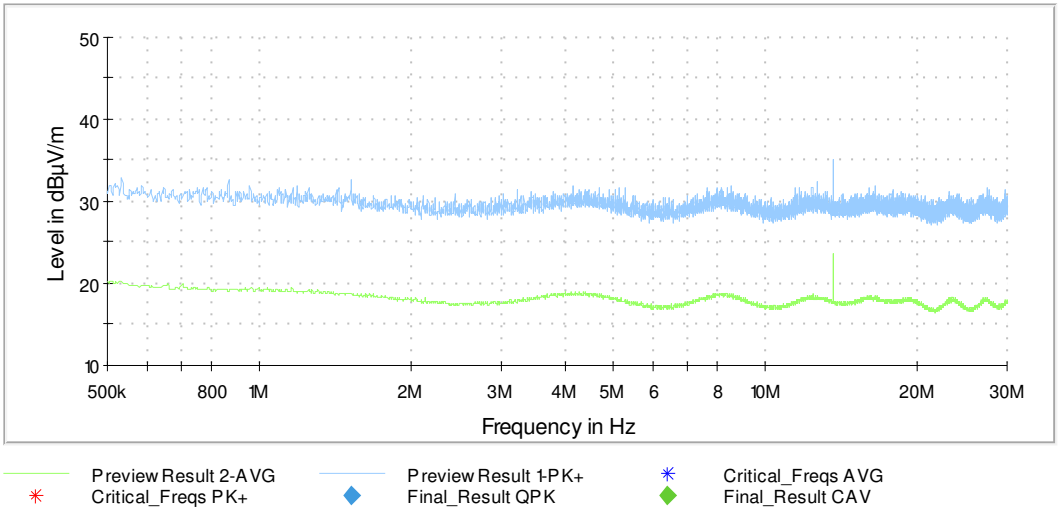
The following procedure is used:

1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
2) The software determines the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x,y,z) for the final test.
4) The worst-case measuring antenna height is found via varying the height by +/- 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
5) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

5.2.2 Test results preliminary measurement 500 kHz to 30 MHz

Ambient temperature:	22 °C
Relative humidity:	39 %

Date:	19.10.2021
Tested by:	M.DINTER



Only the fundamental of the transmitter was found.

The following emission was found according to [2] and [3] (fundamental of transmitter): / 13.56 MHz.

The following emissions were found according to [2] and [3]:

Frequency in MHz
13.56

Remark: No further emissions caused by the equipment under test were found.

5.2.3 Test results final measurement 9 kHz to 30 MHz

Ambient temperature:	-°C
Relative humidity:	- %

Date:	-
Tested by:	-

The results of the standard subsequent measurement on the outdoor test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 30 m measuring distance.

The worst-case position was found in Z position

Results 9kHz - 30 MHz										
Frequency in MHz	Reading in dB(µV)	Result* in dB(µV/m)	Result* in dB(µA/m)	Limit acc. 15.209 in dB(µV/m)	Limit acc. RSS-Gen Table 6 in dB(µA/m)	Margin** in dB	Detector	Antenna factor in dB/m	Measuring Distance in m	Distance correction factor*** in dB
13.560000[*1]	15.1	-4 @ 30m	-55.5 @ 30m	29.5	-22.0	33.5	QP	20.9	3	40.0

Measurement uncertainty: 4.36 dB

* Result @ norm dist. = Reading + Antenna factor - Distance correction factor;
Result [dBµA/m] = Result [dBµV/m] - 20*log(377 Ω)
** Margin = Limit [dBµ{V|A}/m] - Result @ norm dist.
*** 40dB/decade according Part §15.31 (f) (2)

Remark[*1]: Because the noise level at the outdoor test site is higher than the wanted radio signal no measurement was carried out there.
Therefore, the final result value was taken from the preliminary measurement.

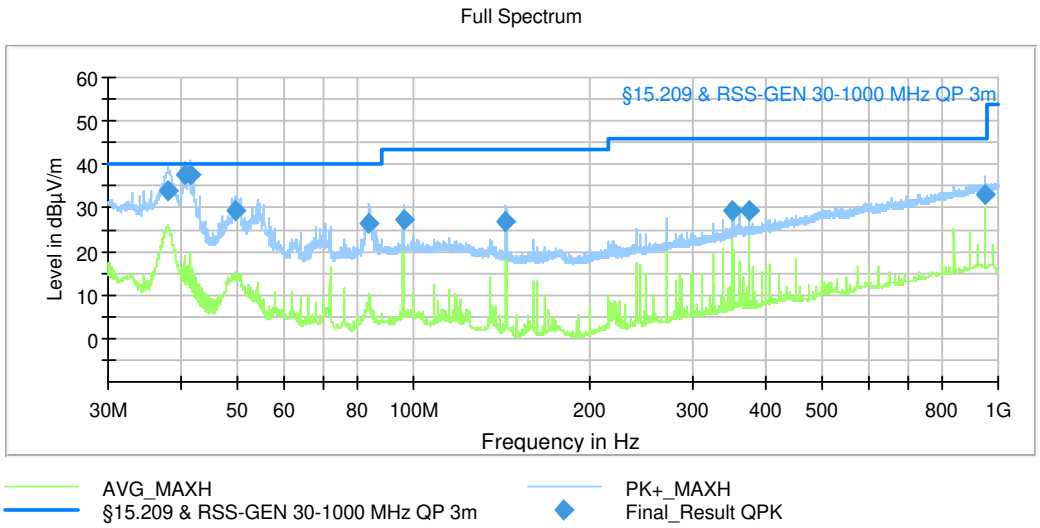
Test result: Passed

Test equipment (please refer to chapter 6 for details)
9 – 16 : Preliminary measurement
9, 17 – 18 : Final measurement

5.2.4 Test results final measurement 30 MHz to 1 GHz

Ambient temperature:	22 °C
Relative humidity:	39 %

Date:	19.10.2021
Tested by:	M.DINTER



The results of the standard subsequent measurement in a semi anechoic chamber are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Frequency in MHz	QuasiPeak in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in kHz	Height in cm	Pol	Azimuth in deg	Corr. in dB
37.980	33.8	40.0	6.2	1000	120.000	100.0	V	237	21.3
40.490	37.8	40.0	2.3	1000	120.000	100.0	V	137	19.8
41.490	37.7	40.0	2.3	1000	120.000	110.0	V	26	19.1
49.490	29.5	40.0	10.5	1000	120.000	100.0	V	202	14.2
83.980	26.5	40.0	13.5	1000	120.000	145.0	V	275	16.9
96.000	27.3	43.5	16.2	1000	120.000	110.0	V	270	17.1
143.990	26.8	43.5	16.7	1000	120.000	114.0	V	202	15.7
350.000	29.5	46.0	16.5	1000	120.000	129.0	V	208	20.7
374.990	29.5	46.0	16.5	1000	120.000	100.0	V	203	21.3
949.200	33.2	46.0	12.9	1000	120.000	100.0	V	160	30.2

Measurement uncertainty ±5.12 dB

Test result: Passed

The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + 6 dB attenuator (dB) + antenna factor (dB)

Therefore. the reading can be calculated as follows:
Reading (dBµV/m) = result QuasiPeak (dBµV/m) - Corr. (dB)

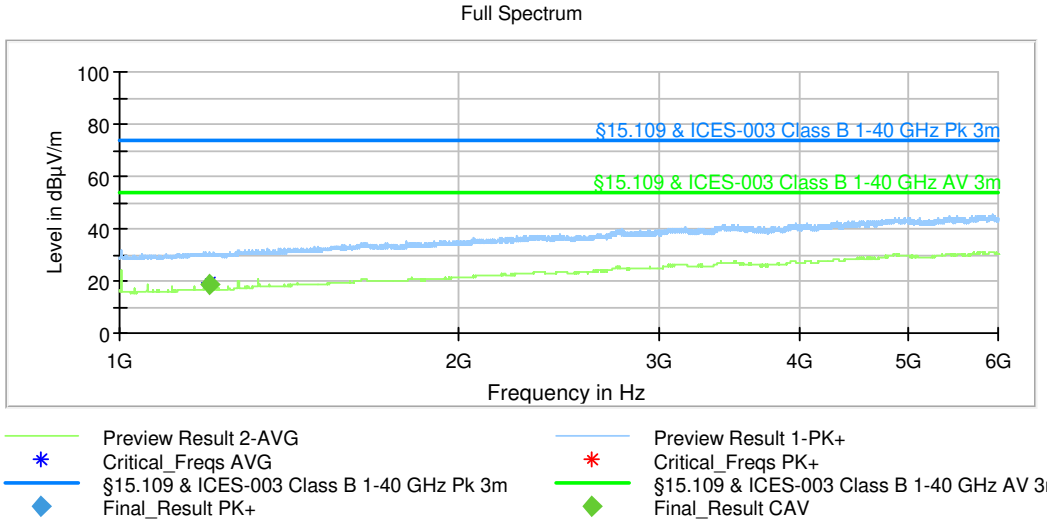
Test equipment (please refer to chapter 6 for details)
10 - 16, 19 - 20

5.2.5 Test results final measurement above 1 GHz

Ambient temperature:	22 °C
Relative humidity:	39 %

Date:	19.10.2021
Tested by:	M.DINTER

The results of the standard subsequent measurement above 1 GHz in a semi-anechoic chamber are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.



Frequency in MHz	MaxPeak in dB(µV/m)	Average in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in MHz	Height in cm	Pol	Azimuth in deg	Corr. in dB
1199.950	---	19.0	54.0	35.0	100	1000.000	244.0	V	5	-9.1

Measurement uncertainty ±5.14 dB

Test result: Passed

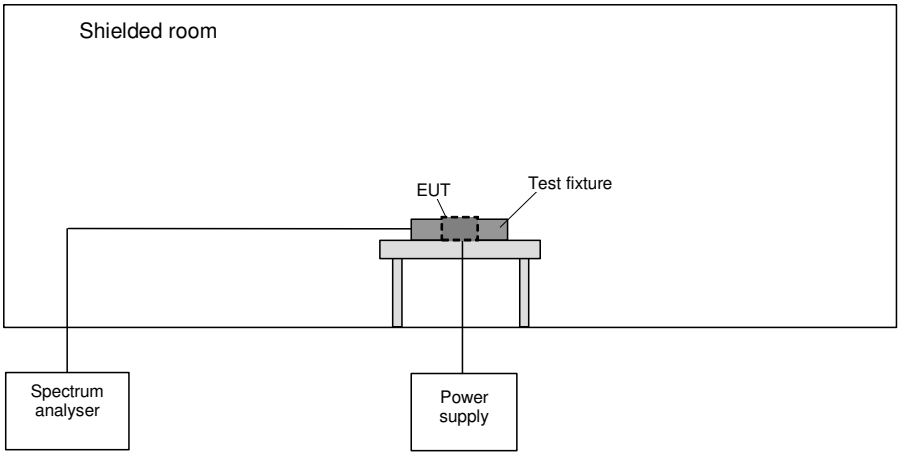
The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + preamplifier (dB) + antenna factor (dB)

Therefore. the reading can be calculated as follows:
Reading (dBµV/m) = result Peak or Average (dBµV/m) - Corr. (dB)

Test equipment (please refer to chapter 6 for details)
10 - 16, 21 - 22

5.3 99 % bandwidth

5.3.1 Test method



The following procedure is used for the occupied bandwidth measurement according to [1]:

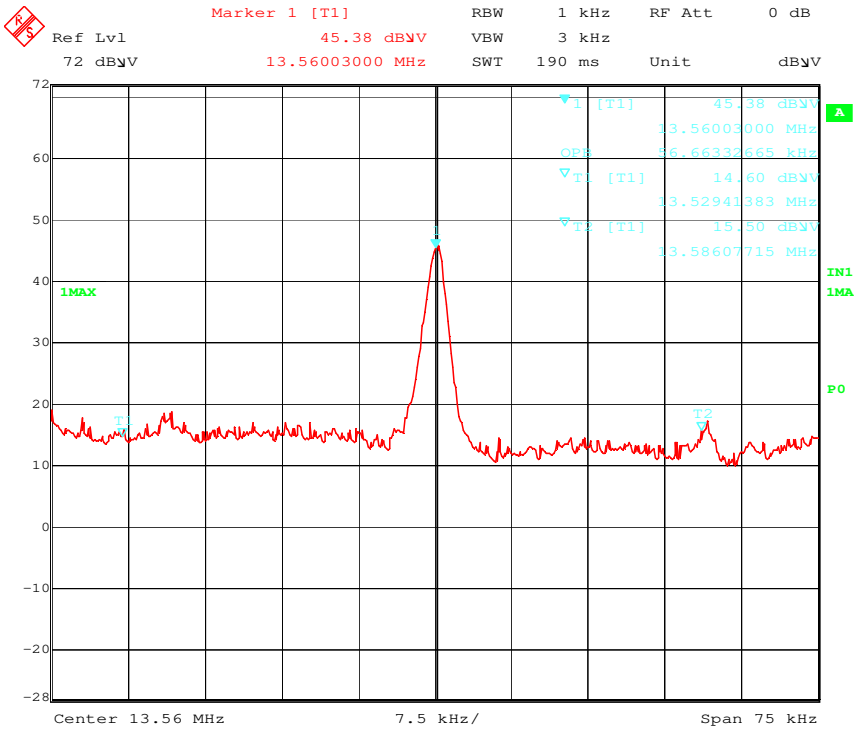
The occupied bandwidth is the frequency bandwidth such that. below its lower and above its upper frequency limits. the mean powers are each equal to 0.5% of the total mean power of the given emission.
The following procedure is used for measuring the 99% power bandwidth:

1) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
2) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW. and VBW shall be approximately three times the RBW. unless otherwise specified by the applicable requirement.
3) Set the reference level of the instrument as required. keeping the signal from exceeding the maximum input mixer level for linear operation. In general. the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
4) Step 1) through step 3) might require iteration to adjust within the specified range.

5.3.2 Test results

Ambient temperature:	23 °C
Relative humidity:	31 %

Date:	10.11.2021
Tested by:	M.Dinter



F_L	F_U	BW (F_U - F_L)
13.52941383 MHz	13.58607715 MHz	56.66332 kHz

Measurement uncertainty < $1*10^{-7}$

Test result: Passed

Test equipment (please refer to chapter 6 for details)
18, 23 - 24

6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	LISN	NSLK8128RC	Rohde & Schwarz	0412	483186	Calibration not necessary	
2	Shielded chamber M155	SK3	Albatross Projects		482786	Calibration not necessary	
3	Software	EMC32	Rohde & Schwarz	100619	483182	Calibration not necessary	
4	EMI Testreceiver	ESR7	Rohde & Schwarz	101939	482558	18.02.2020	02.2022
5	Coupling / Decoupling network	ETH S B	PHOENIX TESTLAB	-	480449	Calibration not necessary	
6	Software	Software	Spitzenberger & Spies	Siehe Textzusatz	480114	Calibration not necessary	
7	EMC test system	EMC D 30000 / PAS	Spitzenberger & Spies	A4507 00/1 1110	481301	Calibration not necessary	
8	Contol unit	SyCore 1k4	Spitzenberger & Spies	A4507 12/0 1110	481302	21.09.2020	09.2022
9	loop antenna	HFH2-Z2	Rohde & Schwarz	100417	481912	25.02.2021	02.2022
10	Software	EMC32	Rohde & Schwarz	100970	482972	Calibration not necessary	
11	RF Switch Matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
12	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
13	Antennasupport	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
14	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
15	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
16	EMI Testreceiver	ESW44	Rohde & Schwarz	101828	482979	14.11.2019	11.2021
17	Outdoor test site	-	PHOENIX TESTLAB GmbH	-	480293	Calibration not necessary	
18	EMI Testreceiver	ESI 40	Rohde & Schwarz	100064/040	480355	25.02.2021	02.2022
19	Attenuator 6 dB	WA2-6	Weinschel	8254	410119	Calibration not necessary	
20	Ultralog Antenna	HL562E	Rohde & Schwarz	101079	482978	18.03.2021	03.2024
21	Low Noise Amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	18.02.2020	02.2022
22	Log.-Per. antenna	HL050	Rohde & Schwarz	100908	482977	13.08.2019	08.2022
23	Dynamic temperature chamber	MK 240	WTB Binder Labortechnik GmbH	05-79022	480462	10.12.2020	12.2021
24	Lopp antenna	Loop antenna 22.5cm	PHOENIX TESTLAB GmbH	-	410085	Calibration not necessary	

7 Test site Verification

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Shielded chamber M155	482784	9 kHz – 30 MHz	GND-Plane	ANSI C63.4-2014	25.09.2020	24.09.2022
OATS Outdoor	480293	9 kHz – 30 MHz	-	ANSI C63.4-2014	-	-
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA/RSM	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	03.03.2021	02.03.2023
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	25.02.2021	24.02.2023

8 Report History

Report Number	Date	Comment
F212050E2	21.01.2022	Initial Test Report
-	-	-
-	-	-

9 List of Annexes

Annex A	Test Setup Photos	6 pages
Annex B	EUT External Photos	5 pages
Annex C	EUT Internal Photos	1 pages