Test report

according to ISO/IEC 17025:2017

FCC
(Federal Communications Commission)
Test Firm Registration Number: 768032
Designation Number DE0022

Electromagnetic compatibility

Intentional Radiators

Deutsche Akkreditierungsstelle
D-PL-17379-01-00
D-PL-17379-01-02
D-PL-17379-01-03

Bundesnetzagentur
BNetzA-CAB-18/21-19

TESTED IN GERMANY

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Test report no.: **20/04-0002**

Table of contents

1. Client information 3
2. Equipment under test (EUT) 3
3. Description of the Equipment under test and test conditions 4
4. Performed measurements and results 5
5. AC Mains conducted emissions 6
6. Radiated emission measurements 24
7. Fundamental Emission 55
8. Test equipment 57
9. Test Setups 59
10. Measurement uncertainthy 62
11. Photos setup 63
12. Conclusions 64
13. Photos of tested sample 65

Location of test facility:

STC Germany GmbH
Ohmstrasse 1
84160 Frontenhausen
Germany

1. Client information

Name:	V-Juice
Address:	Emil-Geis-Straße 33
Name of contact:	Tilman Roeder
Telephone:	+49 172 1083212
Fax:	-/-
E-mail:	E-Mail: tilman@v-juice.de

2. Equipment under test (EUT)

2.1 Identification of the EUT

Equipment:	Inductive Charger
Model:	1.0
Brand name:	V-Juice
Serial no.:	-/-
Manufacturer:	V-Juice
Country of origin:	Germany
Power rating:	5 V ⎓ ; min 0.8 A
Highest frequency generated or used in the device or on which the device operates or tunes:	205 kHz
Date Sample Received:	03.04.2020
Tests were performed:	29.05.2020 – 12.10.2020

2.2 Additional information about the EUT:

-/-

To duplicate parts of this test report needs the written confirmation of the test laboratory.

The test results relate only to the above mentioned test sample(s).

3. Description of the Equipment under test and test conditions

FCC-ID:	2AV3O-V-JUICE1
Cables:	-/-
Approx. Size (l x w x h):	(41.5 x 6.0 x 1.0) cm
Test conditions:	The “Inductive Charger - 1.0” (=equipment under test – EUT) had been tested, with a host AC-Adaptor and an input voltage of 120 V / 60 Hz in the following modes: 1. EUT active – Output: with artificial max. load 500mA; direct contacted 2. EUT active – Output: with artificial max. load 500mA; with distance (2mm) contacted 3. EUT active – Output: with normal load (Battery Pack); direct contacted 4. EUT active – Output: with normal load (Battery Pack); with distance (2mm) contacted The tested configuration represents (based on the product specification) with the tested operation modes the worst case.
Additional information:	-/-
Operating frequencies:	110 kHz – 205 kHz
Max. field strength of fundamental:	AV 68.18 dBµV/m @ 3m
Spurious Emissions: (radiated lowest margin to limit)	QP 38.6 dBµV/m (1.4 dB) @ 3m
Environmental conditions during tests:	Ambient temperature: 20 °C Relative humitity 42 % Atmospheric pressure 955 mbar
Antenna Transmitter:	Model: Type: ☒ External (coil) fixed ☐ Internal

4. Performed measurements and results

The complete list of measurements required in e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C is given below.

Standard:	**Test Method:**		**Test requirements:**			
			applicable:		**fulfilled:**	
			Yes	**No**	**Yes**	**No**
§ 15.207	ANSI 63.10 Section 6.2	AC Mains Conducted Emissions	☒	☐	☒	☐
§ 15.209	ANSI 63.10 Section 6.3 - 6.6	Radiated Emissions	☒	☐	☒	☐

All required / applicable tests according to the following standards were performed under Ref-No. 20/04-0002.

- e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C with test Method according to ANSI C63.10-2013
- e-CFR data is current as of August 12, 2020

Remark: -/-

5. AC Mains conducted emissions

Applied standards
-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.207 Conducted limits

Test site
Measurements of conducted emission from EUT was made in the shielded chamber (DC - 10GHz) located in the test facility.

Test equipment and test set up
Test equipment used for conducted measurements on Mains as given in clause Test equipment of this report.
Test setup used for conducted measurements on Mains as given in clause Test setups of this report.

Detector function selection and bandwidth
In conducted emissions measurement CISPR quasi-peak- and average-detector were used.
The bandwidth of the detector of instrument is 10 kHz over the frequency range of 150 kHz to 30 MHz.

Frequency range to be scanned
For conducted emission measurements, the spectrum in the range of 150 kHz to 30 MHz was investigated.

Test conditions and configuration of EUT
The EUT was configured and operated with conditions as mentioned under “Test conditions” in clause 3 of this report.

All modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation and for each ac power current-carrying conductor, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below. The corresponding configuration is shown in the “Photo(s) of test setup”.
The EUT was placed on a 80 cm high non metallic table. Measurements were performed on the AC terminals of the ancillary AC-Adaptor, on neutral (N)- and live (L1)-wire had been performed.

Requirements

Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average Limits [dBμV]
0.15 - 0.5	66 to 56 Note 1	56 to 46 Note 1
0.5 - 5.0	56	46
5.0 - 30.0	60	50
Note 1: The level decreases linearly with the logarithm of the frequency		

Measurement

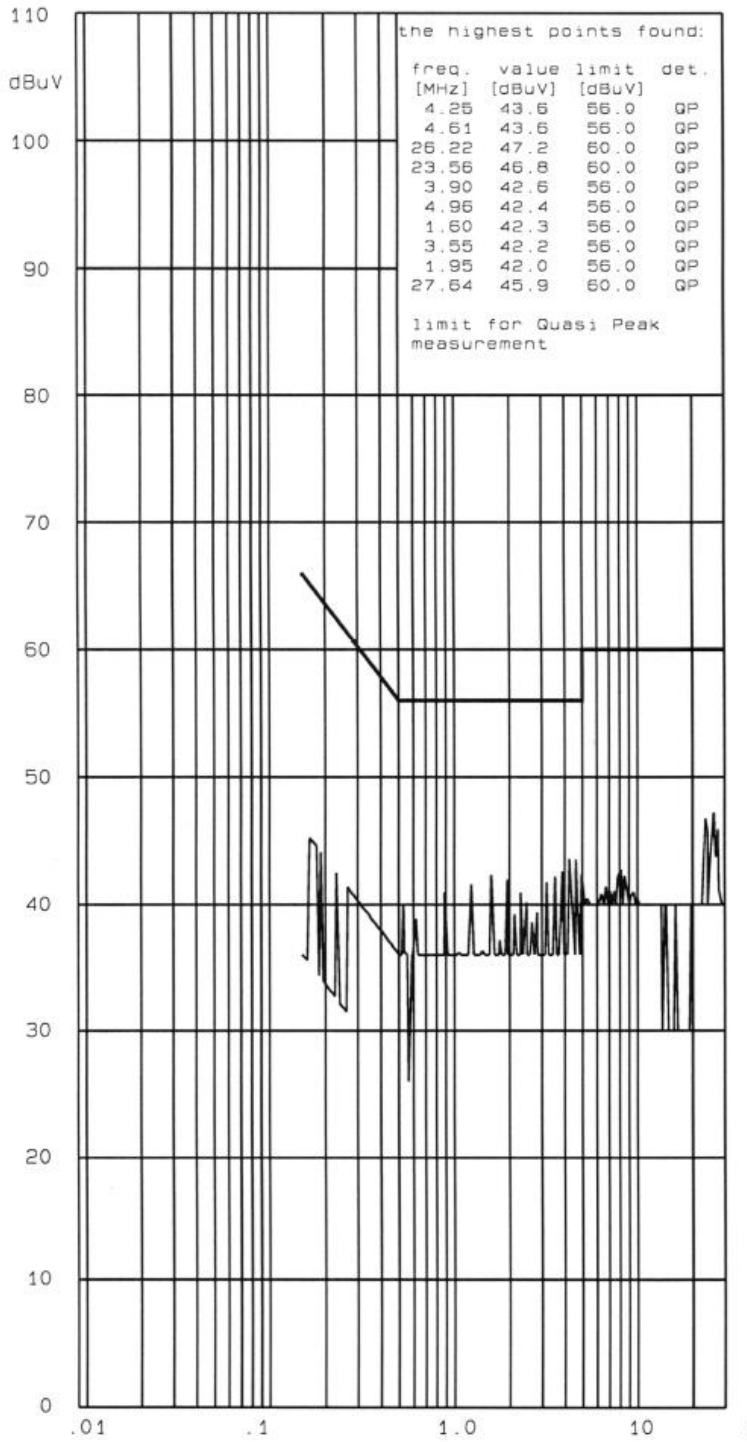
Measurement performed on 02.06.2020

I T 1 / 2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.25	43.6	56.0	QP
4.61	43.6	56.0	QP
26.22	47.2	60.0	QP
23.56	46.8	60.0	QP
3.90	42.6	56.0	QP
4.96	42.4	56.0	QP
1.60	42.3	56.0	QP
3.55	42.2	56.0	QP
1.95	42.0	56.0	QP
27.64	45.9	60.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
direct contacted
Tested on N

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

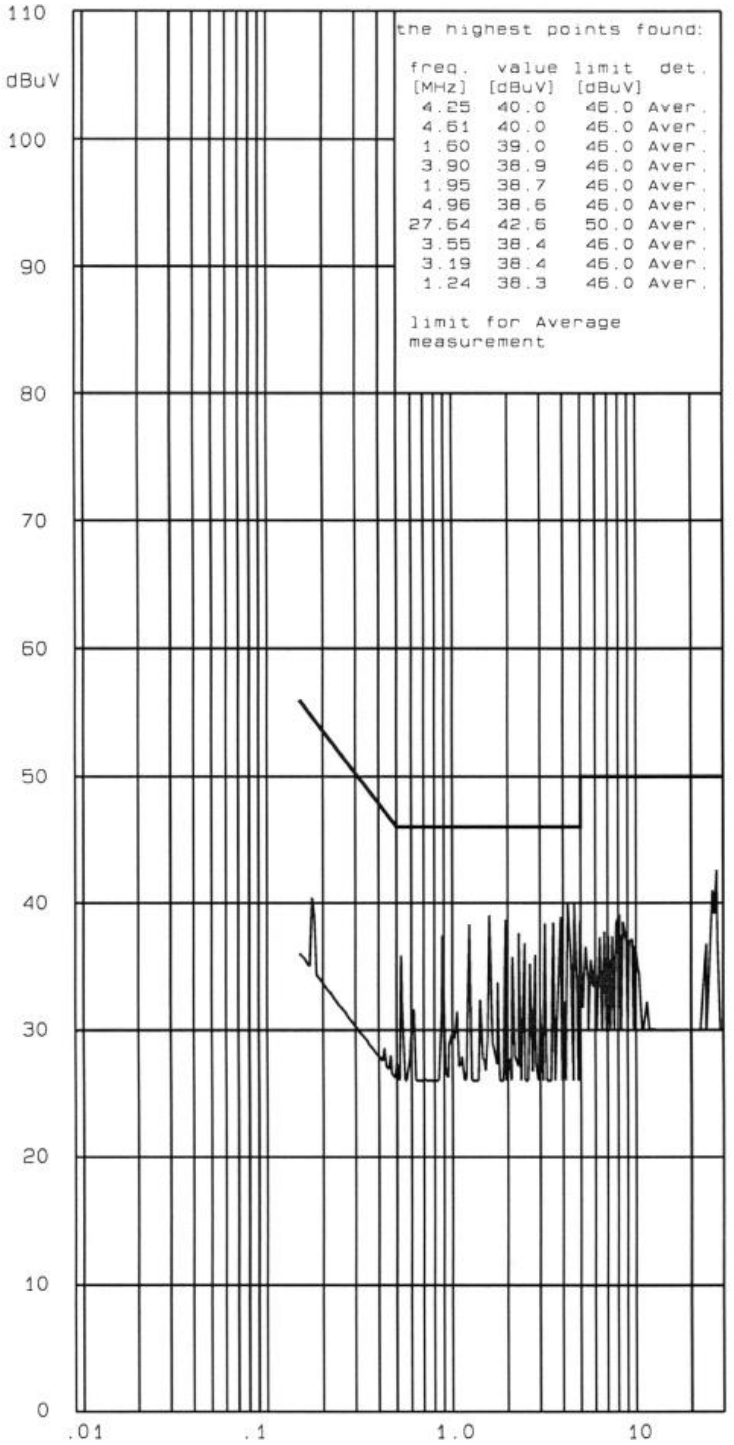
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.25	40.0	46.0	Aver.
4.61	40.0	46.0	Aver.
1.60	39.0	46.0	Aver.
3.90	38.9	46.0	Aver.
1.95	38.7	46.0	Aver.
4.96	38.6	46.0	Aver.
27.64	42.6	50.0	Aver.
3.55	38.4	46.0	Aver.
3.19	38.4	46.0	Aver.
1.24	38.3	46.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
direct contacted
Tested on N

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

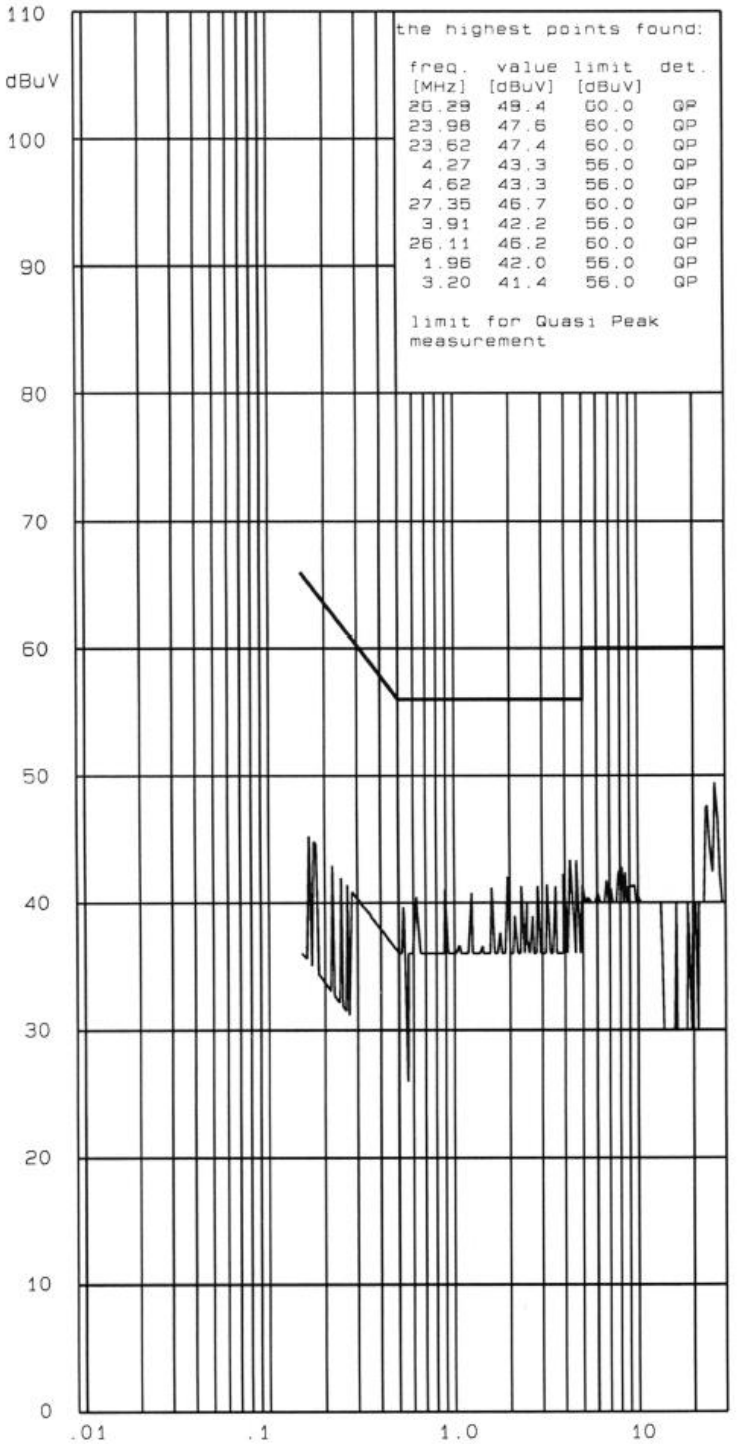
STC Germany GmbH

I T 1 / 2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
26.29	49.4	60.0	QP
23.98	47.6	60.0	QP
23.62	47.4	60.0	QP
4.27	43.3	56.0	QP
4.62	43.3	56.0	QP
27.35	46.7	60.0	QP
3.91	42.2	56.0	QP
26.11	46.2	60.0	QP
1.96	42.0	56.0	QP
3.20	41.4	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
direct contacted
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

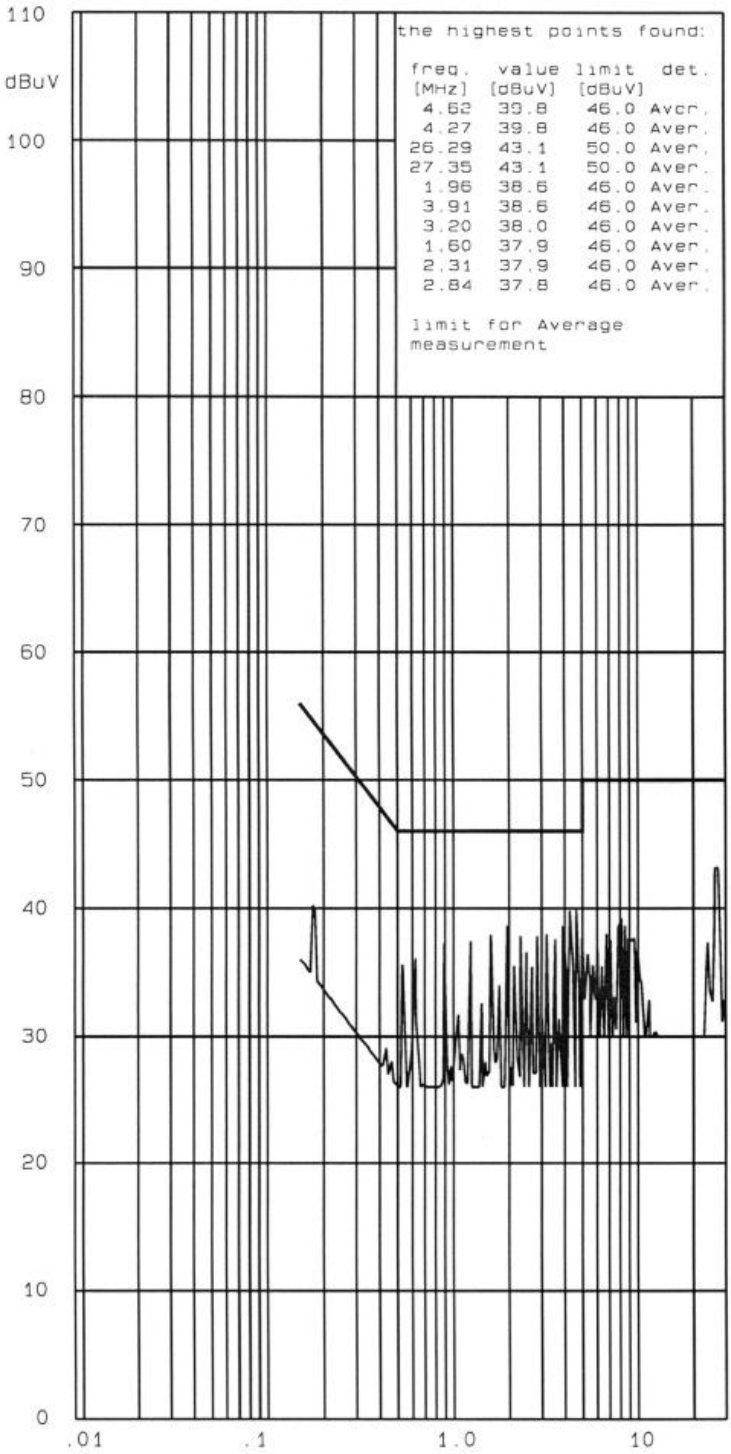
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.62	39.8	46.0	Aver.
4.27	39.8	46.0	Aver.
26.29	43.1	50.0	Aver.
27.35	43.1	50.0	Aver.
1.96	38.6	46.0	Aver.
3.91	38.6	46.0	Aver.
3.20	38.0	46.0	Aver.
1.60	37.9	46.0	Aver.
2.31	37.9	46.0	Aver.
2.84	37.8	46.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
direct contacted
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

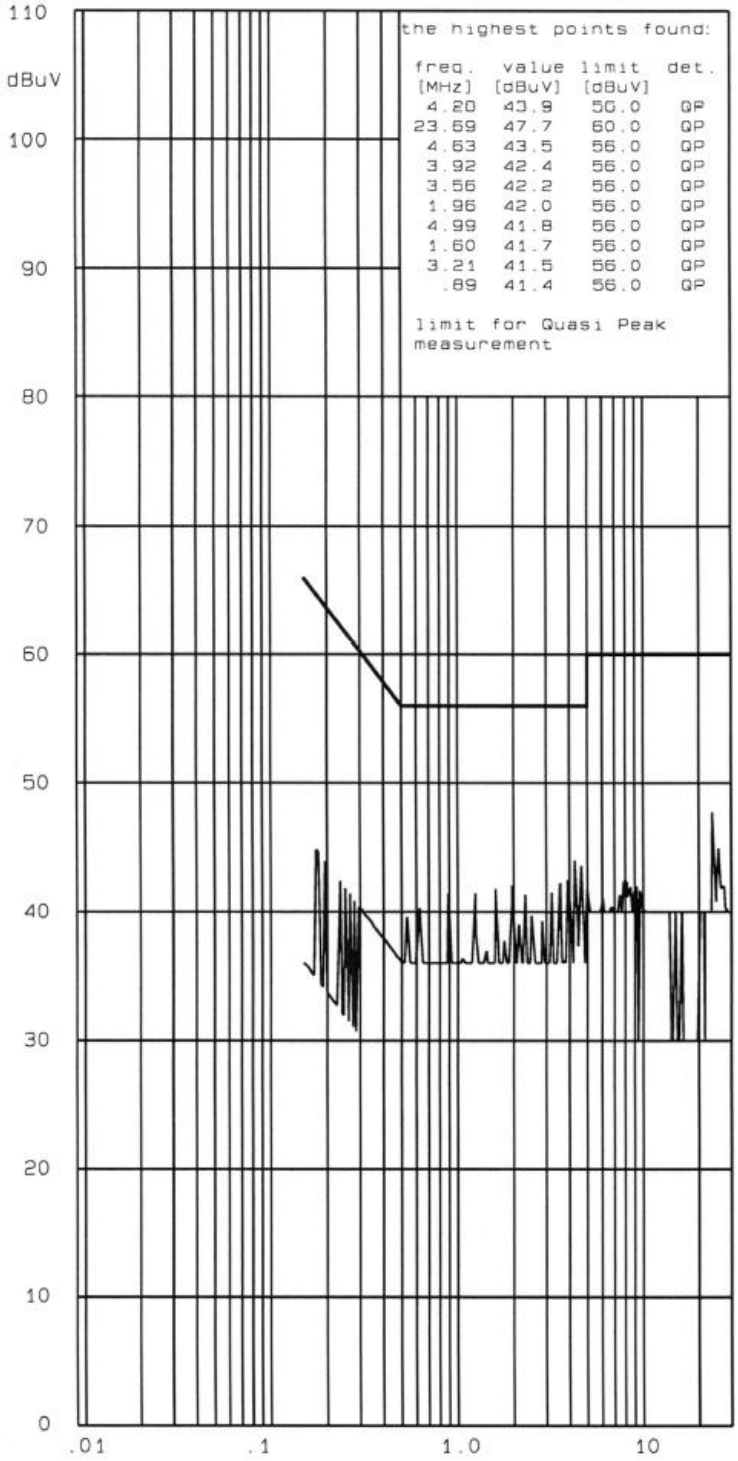
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.20	43.9	56.0	QP
23.69	47.7	60.0	QP
4.63	43.5	56.0	QP
3.92	42.4	56.0	QP
3.56	42.2	56.0	QP
1.96	42.0	56.0	QP
4.99	41.8	56.0	QP
1.60	41.7	56.0	QP
3.21	41.5	56.0	QP
.89	41.4	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
with distance contacted (2mm)
Tested on N

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass ☒ fail [ ]

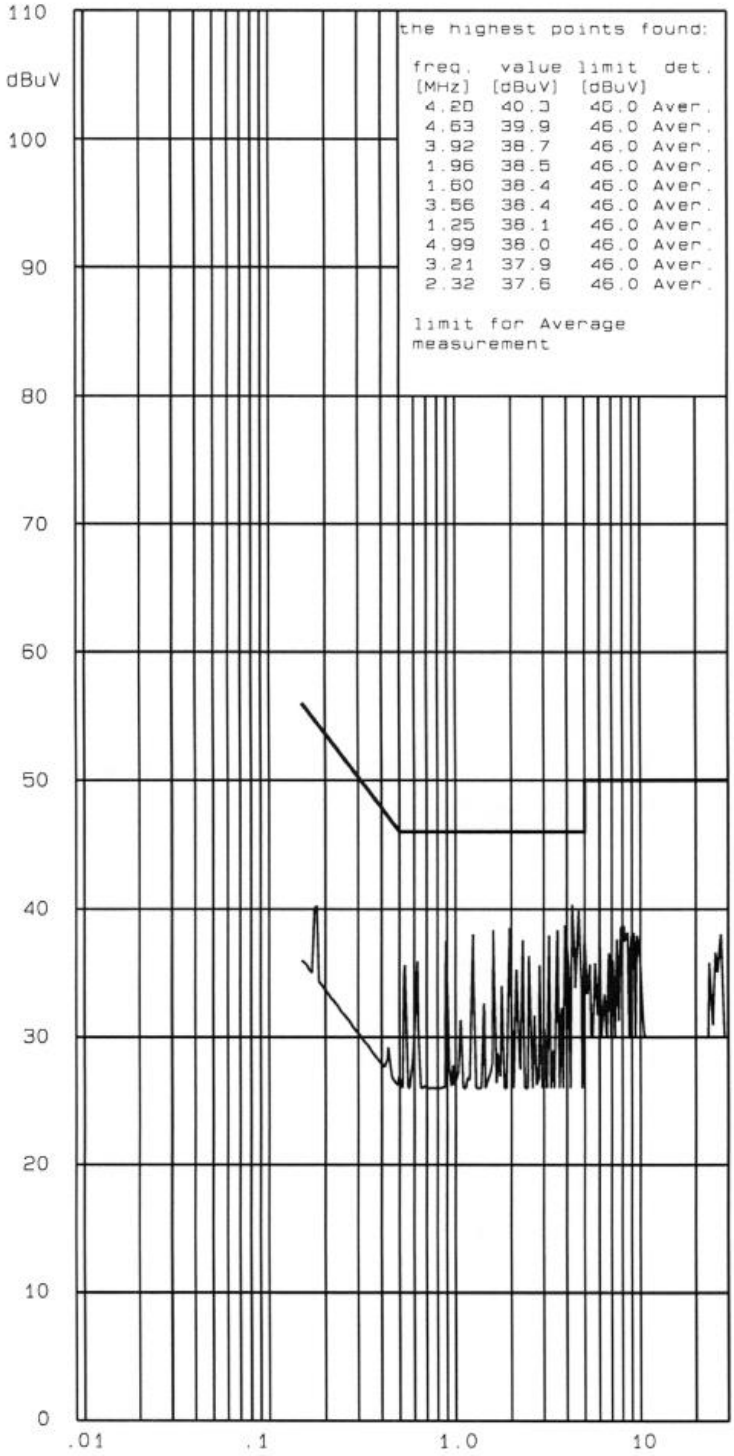
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz – 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.20	40.3	46.0	Aver.
4.63	39.9	46.0	Aver.
3.92	38.7	46.0	Aver.
1.96	38.5	46.0	Aver.
1.60	38.4	46.0	Aver.
3.56	38.4	46.0	Aver.
1.25	38.1	46.0	Aver.
4.99	38.0	46.0	Aver.
3.21	37.9	46.0	Aver.
2.32	37.6	46.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
with distance contacted (2mm)
Tested on N

RFI suppression parts:

* two dB safety margin for type approval recommended

Result: pass [X] fail [ ]

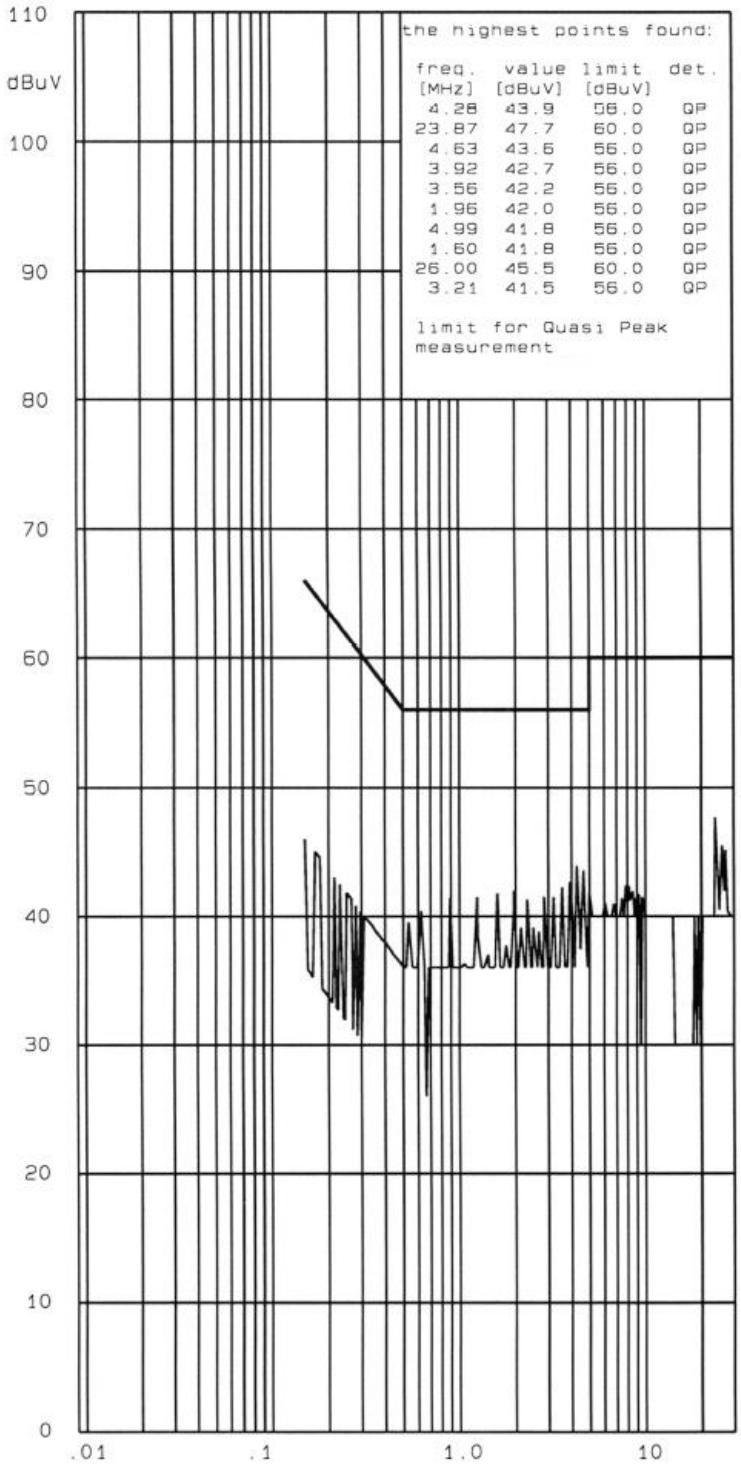
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	43.9	56.0	QP
23.87	47.7	60.0	QP
4.63	43.6	56.0	QP
3.92	42.7	56.0	QP
3.56	42.2	56.0	QP
1.96	42.0	56.0	QP
4.99	41.8	56.0	QP
1.60	41.8	56.0	QP
26.00	45.5	60.0	QP
3.21	41.5	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
with distance contacted (2mm)
Tested on L1

RFI suppression parts:

* two dB safety margin for type approval recommended

Result: pass ☒ fail [ ]

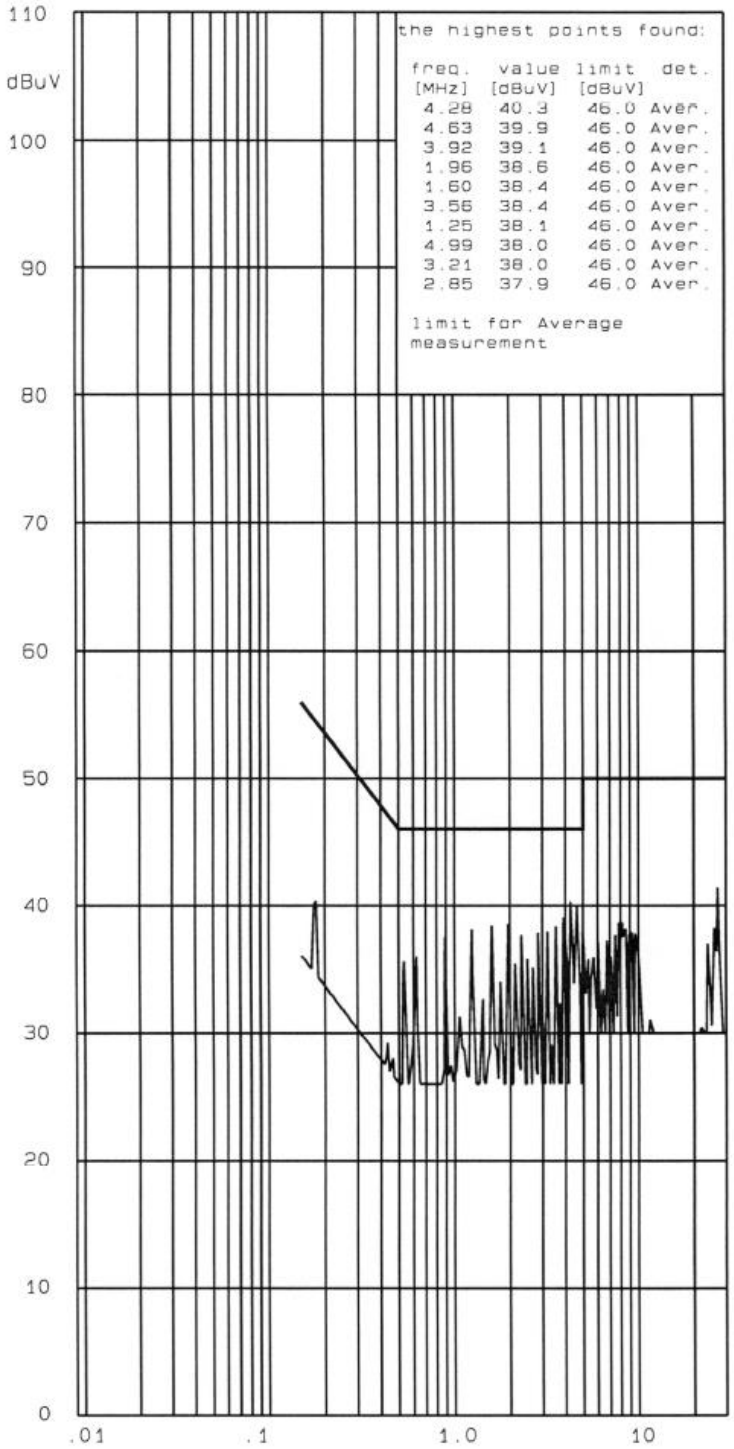
STC Germany GmbH

I T 1 / 2

Interference Voltage 150 KHz – 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	40.3	46.0	Aver.
4.63	39.9	46.0	Aver.
3.92	39.1	46.0	Aver.
1.96	38.6	46.0	Aver.
1.60	38.4	46.0	Aver.
3.56	38.4	46.0	Aver.
1.25	38.1	46.0	Aver.
4.99	38.0	46.0	Aver.
3.21	38.0	46.0	Aver.
2.85	37.9	46.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with artificial
max. load 500mA
with distance contacted (2mm)
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

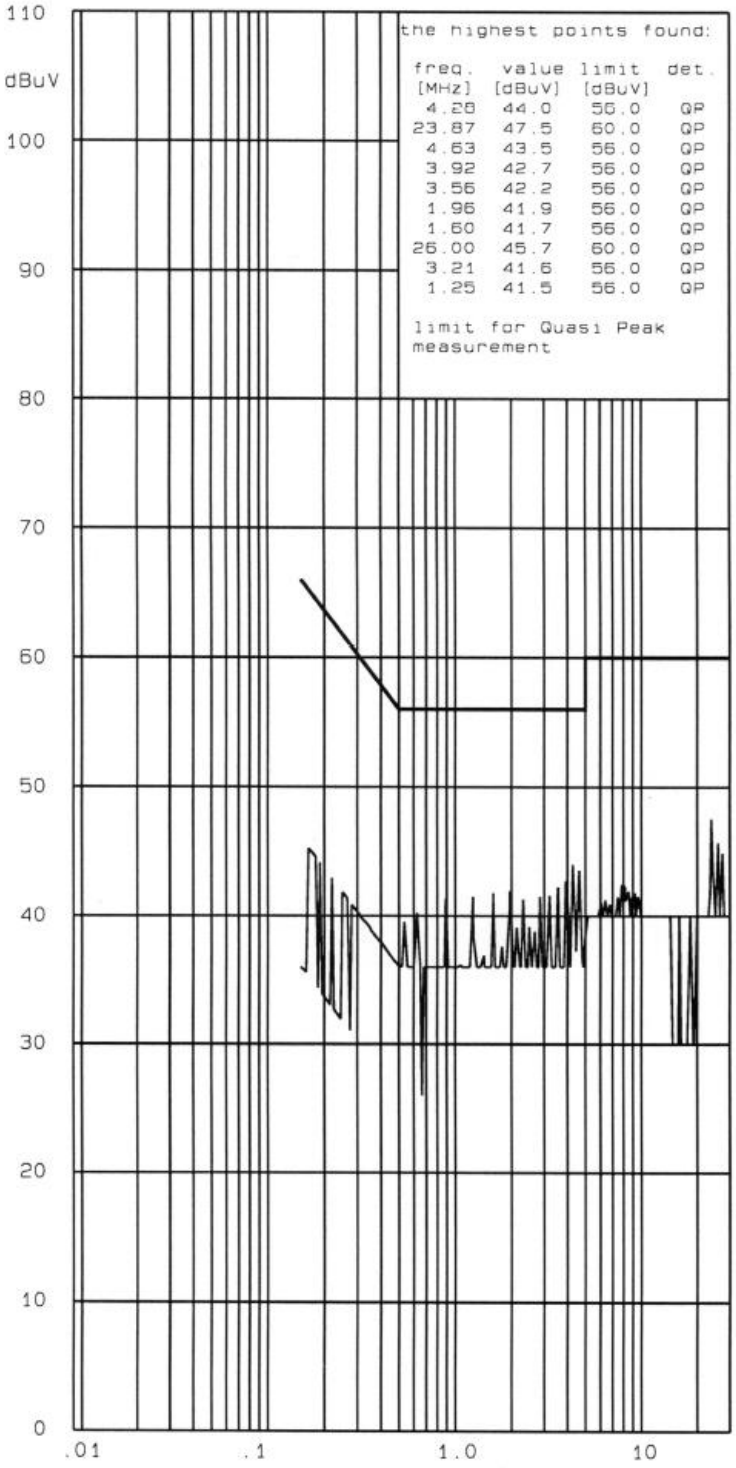
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	44.0	56.0	QP
23.87	47.5	60.0	QP
4.63	43.5	56.0	QP
3.92	42.7	56.0	QP
3.56	42.2	56.0	QP
1.96	41.9	56.0	QP
1.60	41.7	56.0	QP
26.00	45.7	60.0	QP
3.21	41.6	56.0	QP
1.25	41.5	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
direct contacted
Tested on N

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

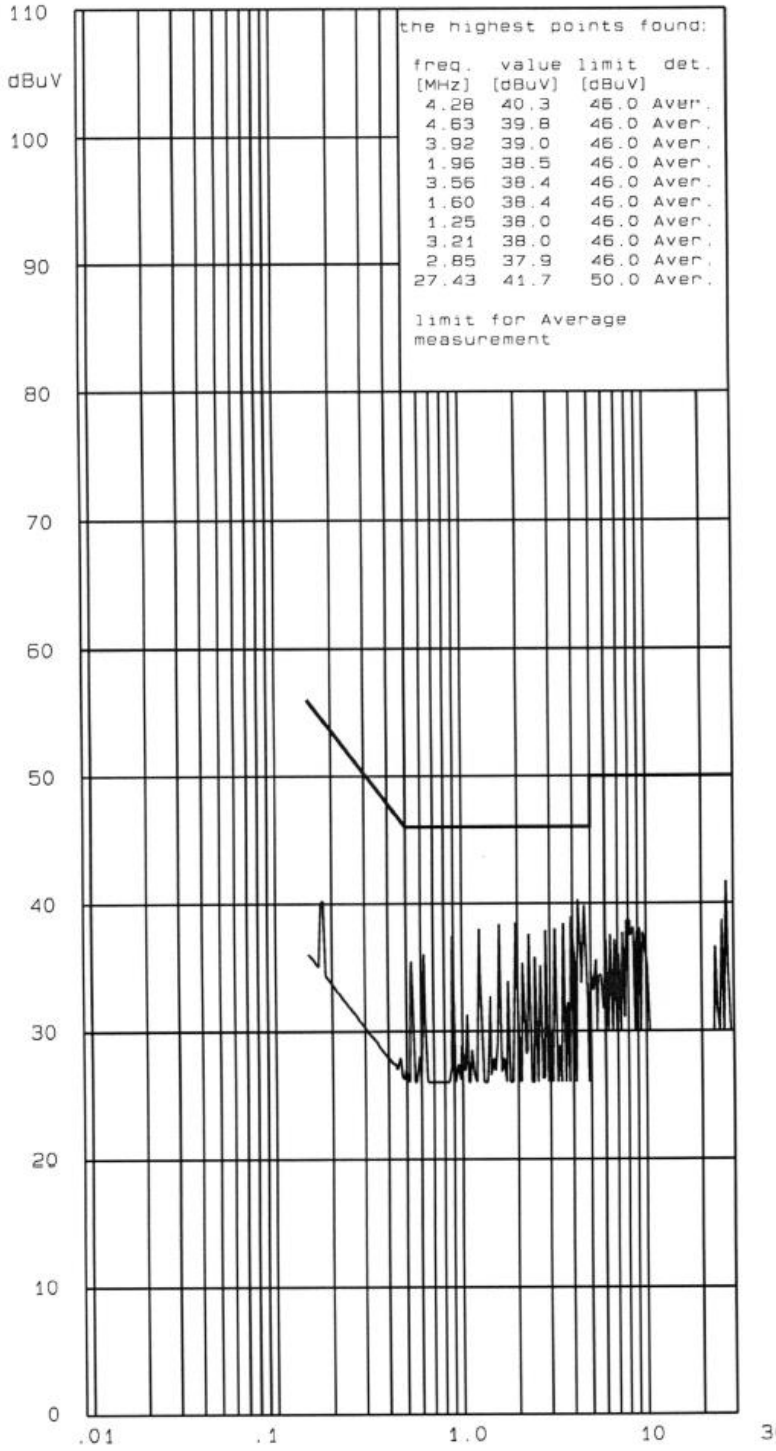
STC Germany GmbH

I T 1 / 2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	40.3	46.0	Aver.
4.63	39.8	46.0	Aver.
3.92	39.0	46.0	Aver.
1.96	38.5	46.0	Aver.
3.56	38.4	46.0	Aver.
1.60	38.4	46.0	Aver.
1.25	38.0	46.0	Aver.
3.21	38.0	46.0	Aver.
2.85	37.9	46.0	Aver.
27.43	41.7	50.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
direct contacted
Tested on N

RFI suppression parts:

* two dB safety margin for type approval recommended

Result: pass [X] fail [ ]

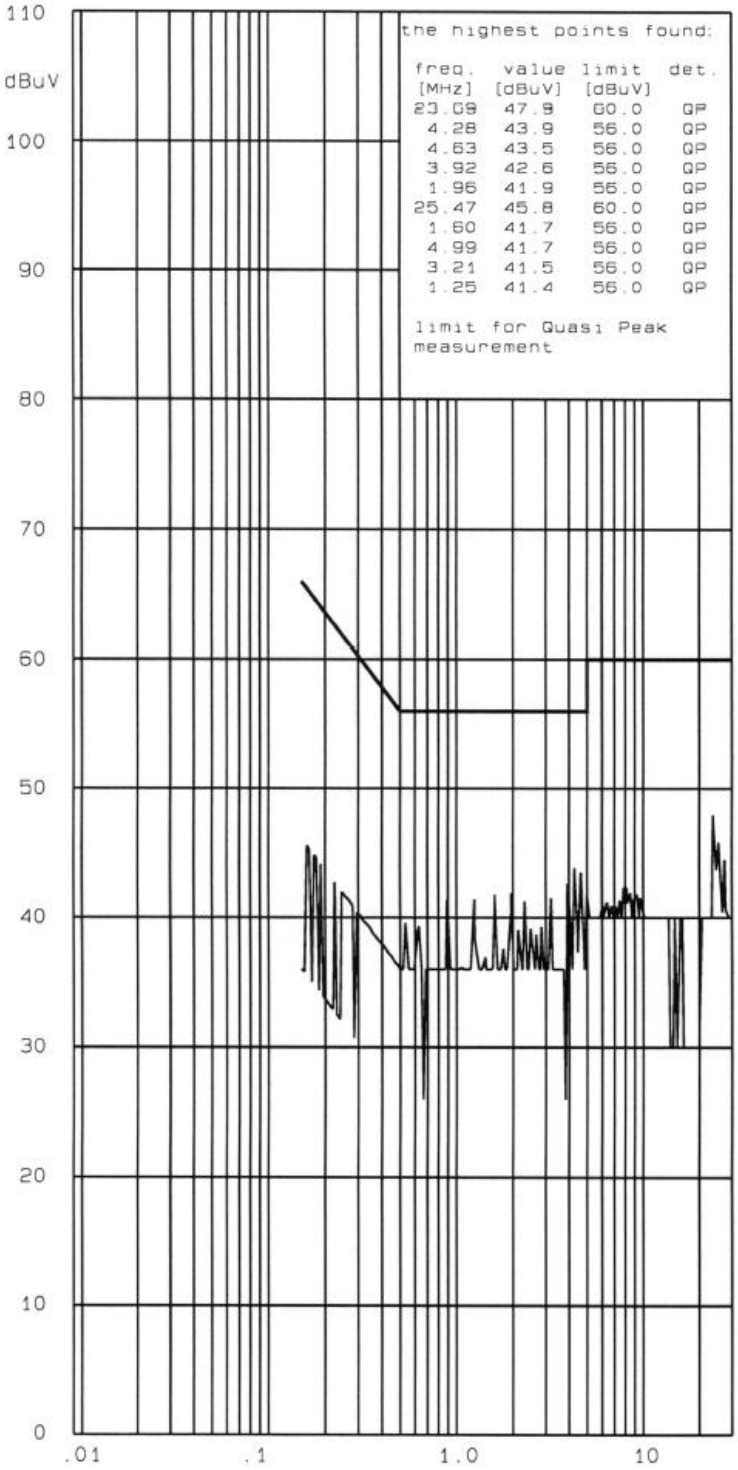
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
23.09	47.9	60.0	QP
4.28	43.9	56.0	QP
4.63	43.5	56.0	QP
3.92	42.6	56.0	QP
1.96	41.9	56.0	QP
25.47	45.8	60.0	QP
1.60	41.7	56.0	QP
4.99	41.7	56.0	QP
3.21	41.5	56.0	QP
1.25	41.4	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
direct contacted
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

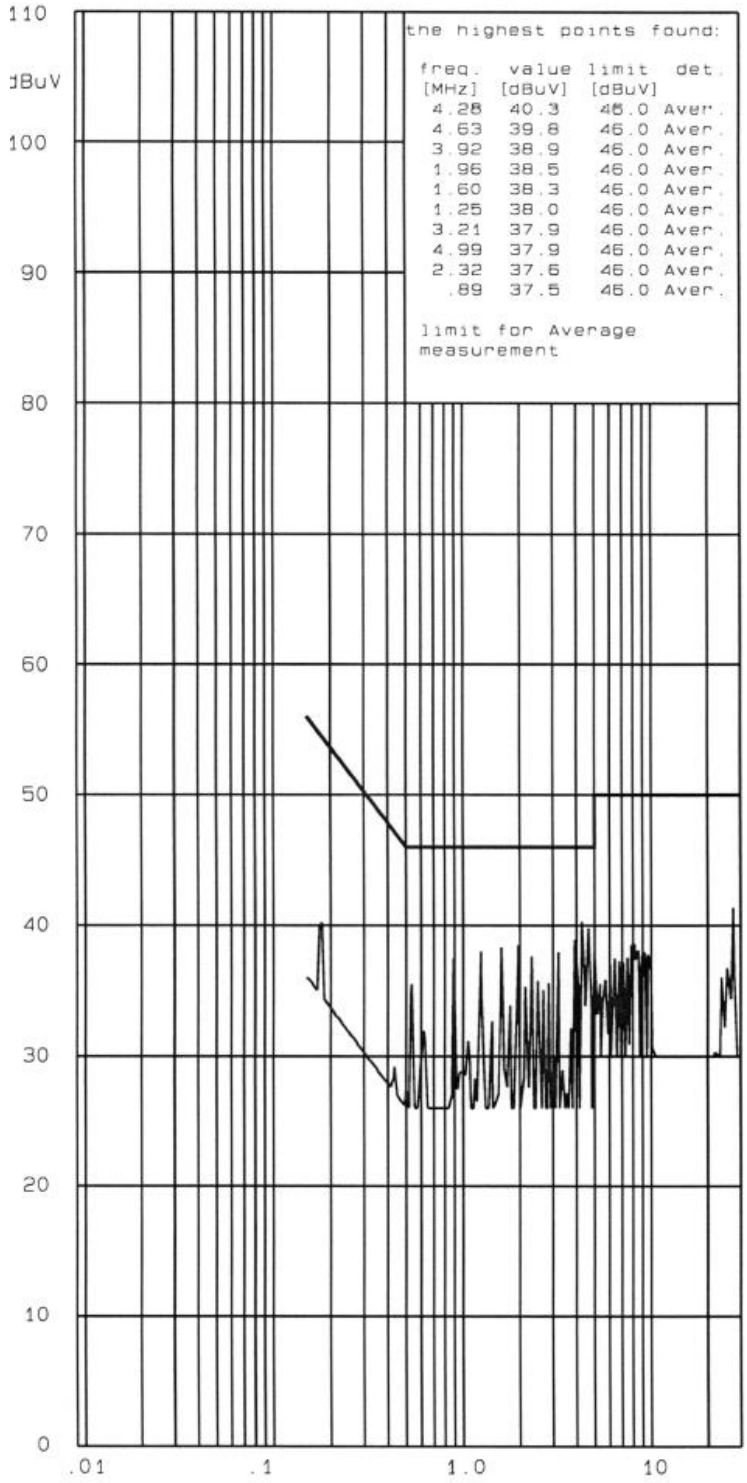
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	40.3	46.0	Aver.
4.63	39.8	46.0	Aver.
3.92	38.9	46.0	Aver.
1.96	38.5	46.0	Aver.
1.60	38.3	46.0	Aver.
1.25	38.0	46.0	Aver.
3.21	37.9	46.0	Aver.
4.99	37.9	46.0	Aver.
2.32	37.6	46.0	Aver.
.89	37.5	46.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
direct contacted
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

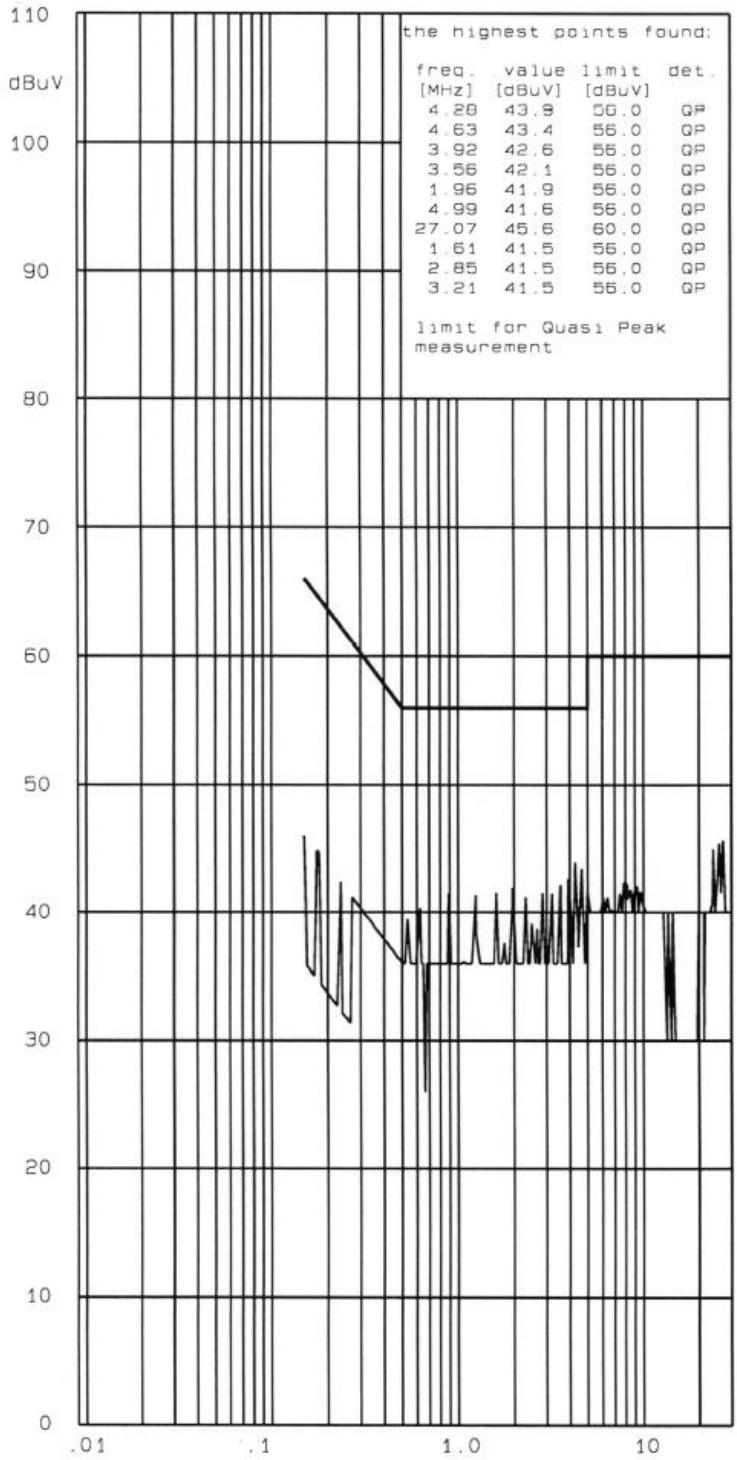
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	43.9	56.0	QP
4.63	43.4	56.0	QP
3.92	42.6	56.0	QP
3.56	42.1	56.0	QP
1.96	41.9	56.0	QP
4.99	41.6	56.0	QP
27.07	45.6	60.0	QP
1.61	41.5	56.0	QP
2.85	41.5	56.0	QP
3.21	41.5	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
with distance contacted (2mm)
Tested on N

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

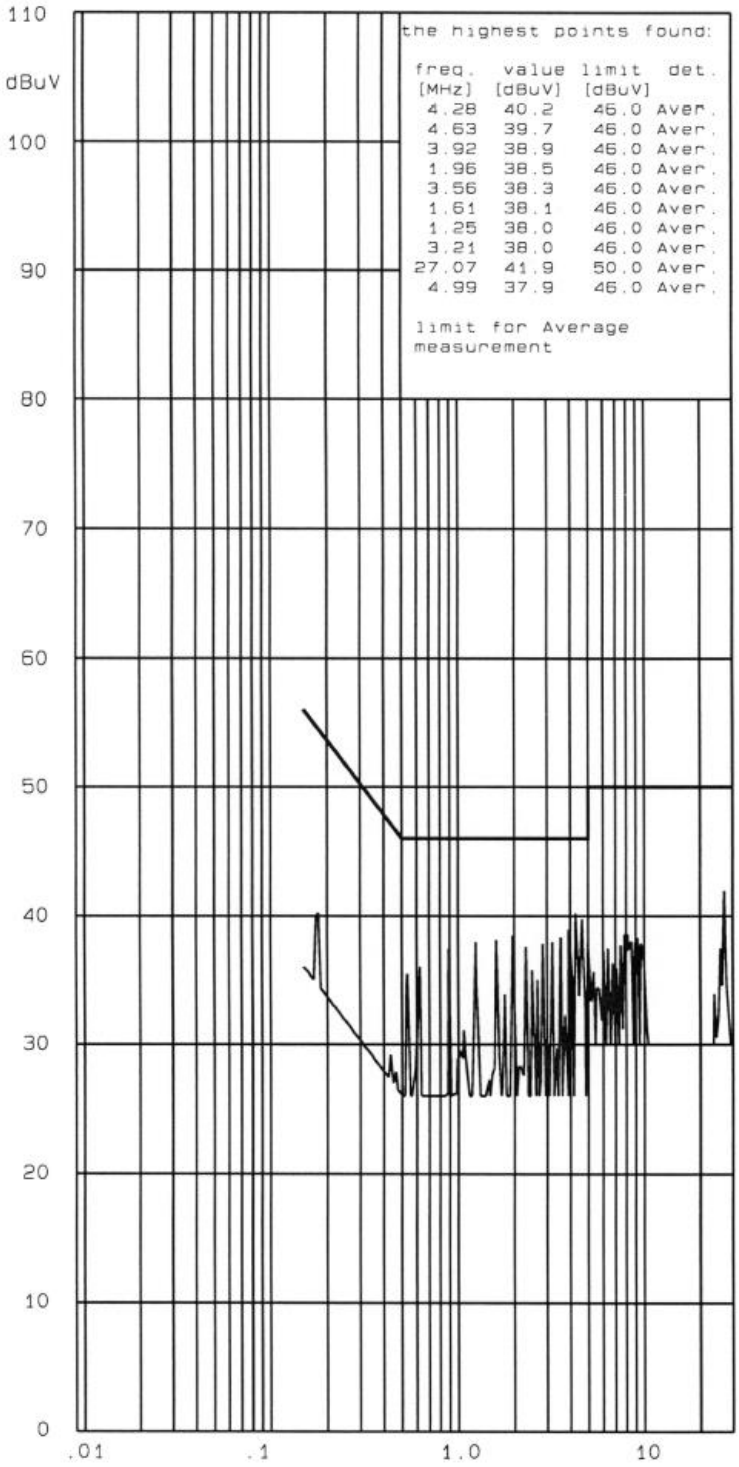
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.28	40.2	46.0	Aver.
4.63	39.7	46.0	Aver.
3.92	38.9	46.0	Aver.
1.96	38.5	46.0	Aver.
3.56	38.3	46.0	Aver.
1.61	38.1	46.0	Aver.
1.25	38.0	46.0	Aver.
3.21	38.0	46.0	Aver.
27.07	41.9	50.0	Aver.
4.99	37.9	46.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
with distance contacted (2mm)
Tested on N

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

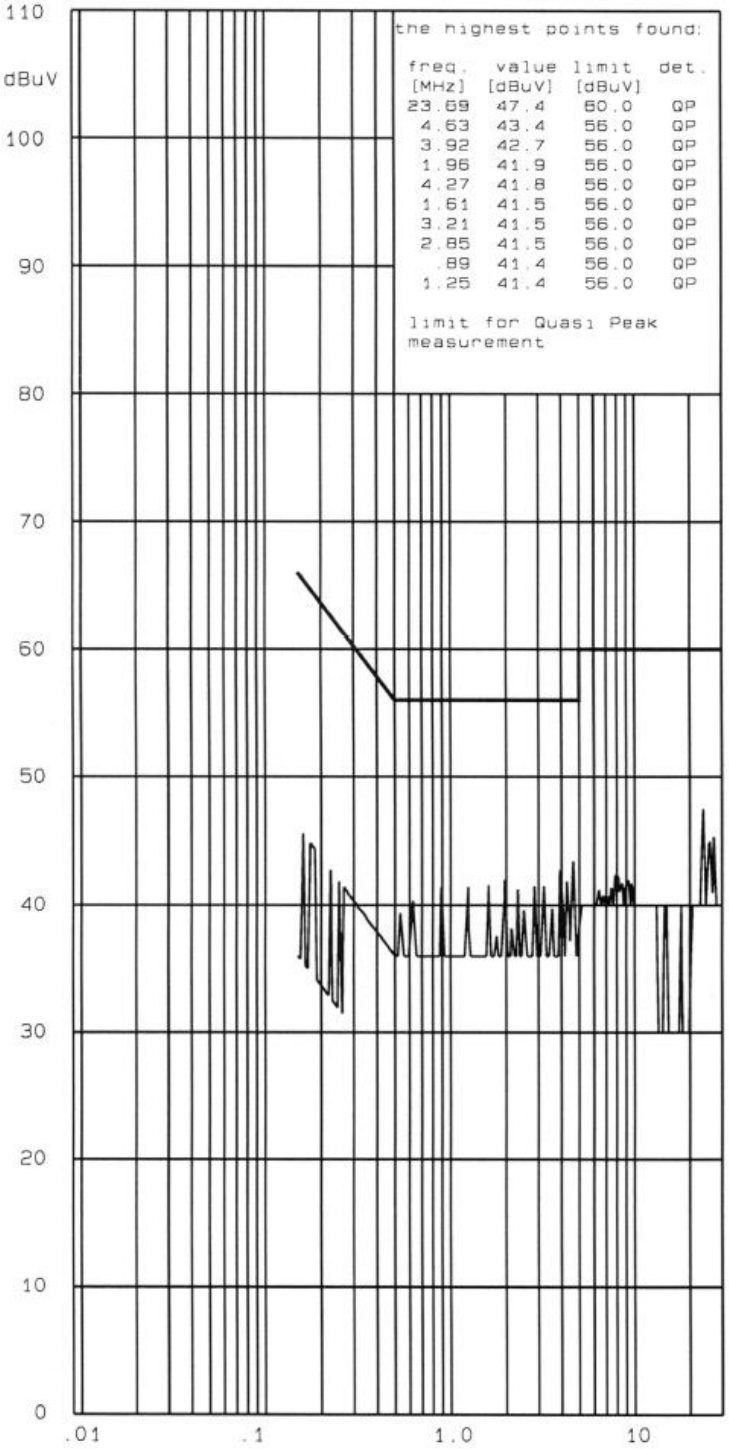
STC Germany GmbH

IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
23.69	47.4	60.0	QP
4.63	43.4	56.0	QP
3.92	42.7	56.0	QP
1.96	41.9	56.0	QP
4.27	41.8	56.0	QP
1.61	41.5	56.0	QP
3.21	41.5	56.0	QP
2.85	41.5	56.0	QP
.89	41.4	56.0	QP
1.25	41.4	56.0	QP

limit for Quasi Peak measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: Bl

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
with distance contacted (2mm)
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

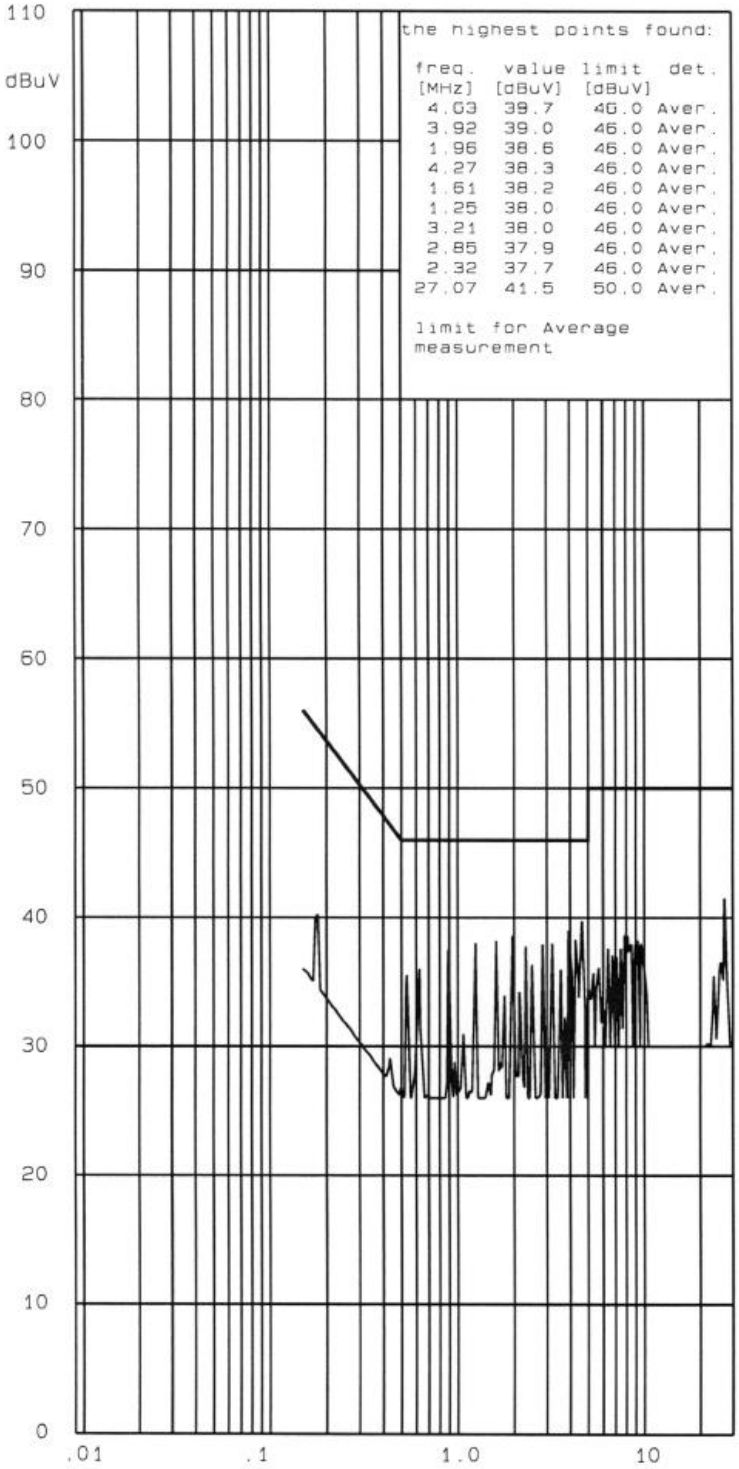
STC Germany GmbH

I T 1 / 2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RSS-Gen

Cabin 1



the highest points found:

freq. [MHz]	value [dBuV]	limit [dBuV]	det.
4.03	39.7	46.0	Aver.
3.92	39.0	46.0	Aver.
1.96	38.6	46.0	Aver.
4.27	38.3	46.0	Aver.
1.61	38.2	46.0	Aver.
1.25	38.0	46.0	Aver.
3.21	38.0	46.0	Aver.
2.85	37.9	46.0	Aver.
2.32	37.7	46.0	Aver.
27.07	41.5	50.0	Aver.

limit for Average measurement

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 2 Jun 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

USB-Adaptor
Input voltage: 120V/60Hz

Operating mode:

Output: with normal load
(Battery pack)
with distance contacted (2mm)
Tested on L1

RFI suppression parts:

* two dB safety margin for
type approval recommended

Result: pass [X] fail [ ]

STC Germany GmbH

The six highest emissions for each port (L/N)/detector are as following:

Frequency [MHz] (1)	Reading of test receiver [dBµV] (2)	Detector (3)	Port (4)	loss of cable between LISN and test receiver [dB] (5)	LISN correction [dB] (6)	AC power line conducted emission [dBµV] (7)	Limit [dBµV] (8)	Result (9)
4.28	43.9	QP	N	0.20	0.10	44.2	56.0	Pass
4.63	43.8	QP	N	0.20	0.10	44.1	56.0	Pass
4.25	43.5	QP	N	0.20	0.10	43.8	56.0	Pass
4.61	43.5	QP	N	0.20	0.10	43.8	56.0	Pass
3.92	42.5	QP	N	0.20	0.10	42.8	56.0	Pass
3.56	42.0	QP	N	0.20	0.10	42.3	56.0	Pass
4.28	40.2	AV	N	0.20	0.10	40.5	46.0	Pass
4.25	39.9	AV	N	0.20	0.10	40.2	46.0	Pass
4.61	39.9	AV	N	0.20	0.10	40.2	46.0	Pass
4.63	39.8	AV	N	0.20	0.10	40.1	46.0	Pass
1.60	38.8	AV	N	0.10	0.10	39.2	46.0	Pass
3.92	38.9	AV	N	0.20	0.10	39.2	46.0	Pass
26.29	48.6	QP	L1	0.20	0.80	49.6	60.0	Pass
4.28	43.8	QP	L1	0.20	0.10	44.1	56.0	Pass
23.69	47.2	QP	L1	0.30	0.60	48.1	60.0	Pass
23.87	47.0	QP	L1	0.30	0.60	47.9	60.0	Pass
23.98	46.9	QP	L1	0.30	0.60	47.8	60.0	Pass
4.63	43.5	QP	L1	0.20	0.10	43.8	56.0	Pass
4.28	40.2	AV	L1	0.20	0.10	40.5	46.0	Pass
4.63	39.8	AV	L1	0.20	0.10	40.1	46.0	Pass
4.62	39.7	AV	L1	0.20	0.10	40.0	46.0	Pass
4.27	39.7	AV	L1	0.20	0.10	40.0	46.0	Pass
26.29	42.3	AV	L1	0.20	0.80	43.3	50.0	Pass
3.92	39.0	AV	L1	0.20	0.10	39.3	46.0	Pass

(1) = test frequency
(2) = Reading of test receiver in dBµV without correction factors
(3) = used detector
(4) = tested port Phase (live, L1) or Neutral (N)
(5) = loss of cable between LISN and test receiver in dB
(6) = correction factor of LISN in dB
(7) = Reading of test receiver [dBµV] (2) + loss of cable between Line impedance stabilisation network (LISN) and test receiver (dB) (5) + LISN correction [dB] (6)
(8) = relevant limit in dBµV
(9) = comparison between Limit [dBµV] (7) / (8) and AC power line conducted emission [dBµV]

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Conducted Emission**.

6. Radiated emission measurements

Test site
Measurement of radiated emissions from EUT was made in the semi-anechoic chamber SAC3 (DC to 40 GHz) located in the test facility.

Test equipment and test set up
Test equipment used for radiated measurements as given in clause Test equipment of this report.
Test setup used for radiated measurements as given in clause Test Setups of this report.

Detector function selection and bandwidth
In radiated emissions measurement, an EMI test receiver with CISPR detectors was used.

Frequency range	Resolution Bandwidth
9KHz – 150kHz (Quasi Peak & Average* Detector)	200Hz
150KHz – 30MHz (Quasi Peak & Average* Detector)	9kHz
30MHz – 1GHz (Quasi Peak Detector)	120kHz
Above 1GHz (Peak & Average Detector)	1MHz

*Average Detector only in specified frequency range.

Antennas
Measurements were made using a calibrated loop antenna in the range 9 kHz – 30 MHz, as well as a calibrated bilog antenna in the range of 30 to 1000 MHz to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization in a SAC .
The horizontal distance between the receiving antenna and the EUT was 3 meters.

Frequency range to be scanned
For radiated emissions measurements, the spectrum in the range of 9kHz MHz to 1 GHz was investigated as the highest used frequency in the EUT is 205 kHz.

Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned under “Test conditions” in clause 3.

During test the EUT was operated as specified in the technical intstruction of the EUT. For frequencies below 1000 MHz the EUT was placed on a 80 cm non metallic table placed on the turntable. The EUT was rotated and the antenna height was varied between 1 m to 4 m to find the maximum RF energy generated from EUT. The procedure according to ANSI C63.10:2013 is used and all modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below.

Remarks:
-Correction factor included antenna factor and cable attenuation.

Applied standards
-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits

Requirements

acc. e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits

Frequency MHz	Limits [µV/m] Quasi-peak	Limits [dBµV/m] Quasi-peak	Limits [µV/m] Average	Limits [dBµV/m] Average	Test distance [m]
0.009 – 0.090	-/-	-/-	2400/F (kHz)	48.5 – 28.5	300
0.090 - 0.110	2400/F (kHz)	28.5 – 26.8	-/-	-/-	300
0.110 – 0.490	-/-	-/-	2400/F (kHz)	26.8 – 13.8	300
0.490 - 1.705	24000/F (kHz)	33.8 – 23.0	-/-	-/-	30
1.705 - 30.0	30	29.5	-/-	-/-	30

Frequency MHz	Limits [µV/m] Quasi-peak	Limits [dBµV/m] Quasi-peak	Limits [µV/m] Average	Limits [dBµV/m] Average	Test distance [m]
30 - 88	100	40	-/-	-/-	3
88 - 216	150	43.5	-/-	-/-	3
216 - 960	200	46	-/-	-/-	3
960 - 1000	500	54	-/-	-/-	3
Above 1000	-/-	-/-	500	54	3

Measurements

The Measurement was performed on: 29.05.2020

Result 9 kHz – 30 MHz

In the frequency range 9 kHz – 30 MHz the EUT had been scanned in a distance of 3 m and the Limit were corrected to the test distance of 3 m using a factor with 40 dB/decade acc. to § 15.31 (f)(2).

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Product: Battery Charger

Sample: 02

Date: 29.05.2020

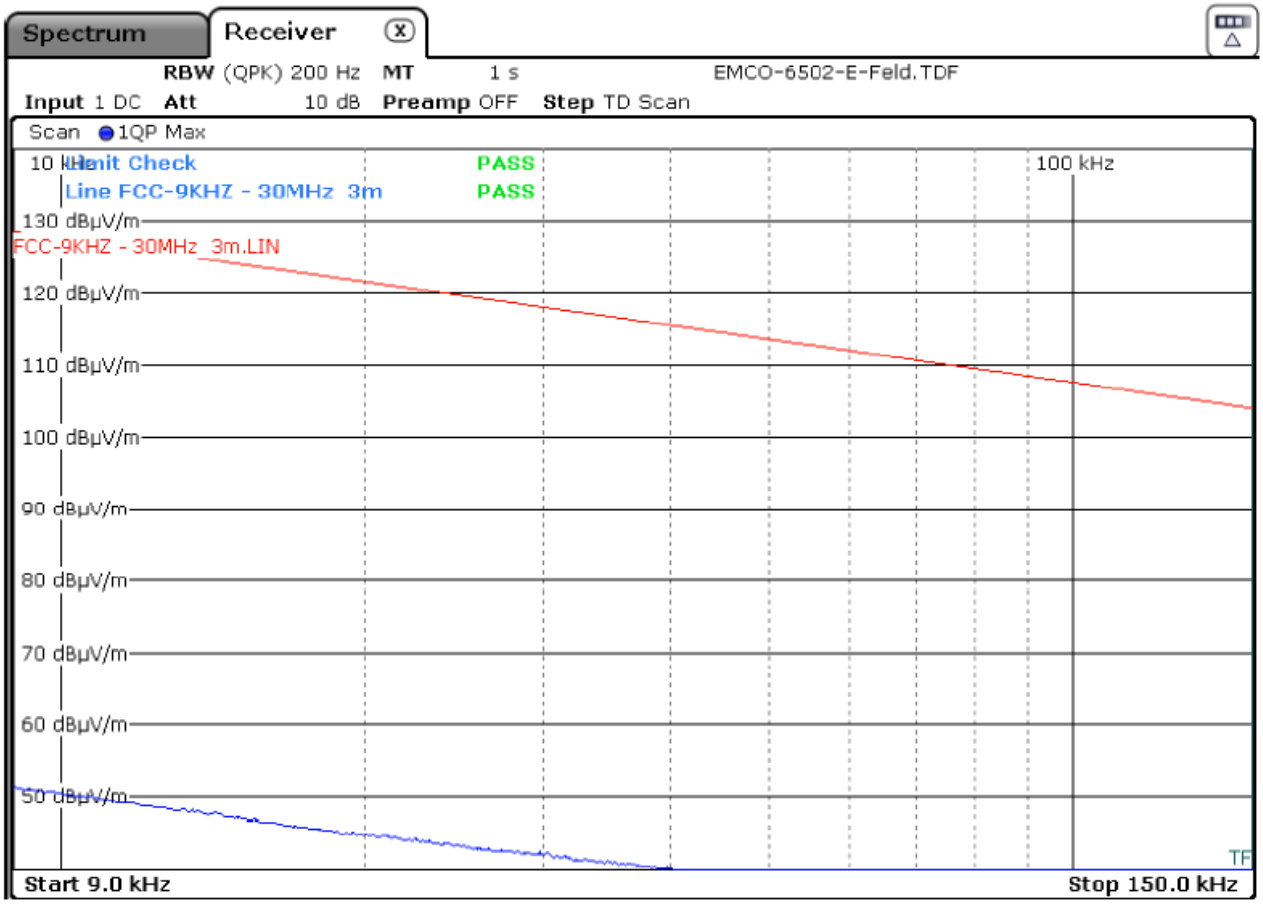
Operator: BI

Remarks:

Result: pass ☒ fail ☐

Operation mode: Output: with artificial max. load 500mA; direct contacted

Position X (9kHz - 150kHz)



Position: X									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
9kHz-150kHz	-/-	>20	-/-	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

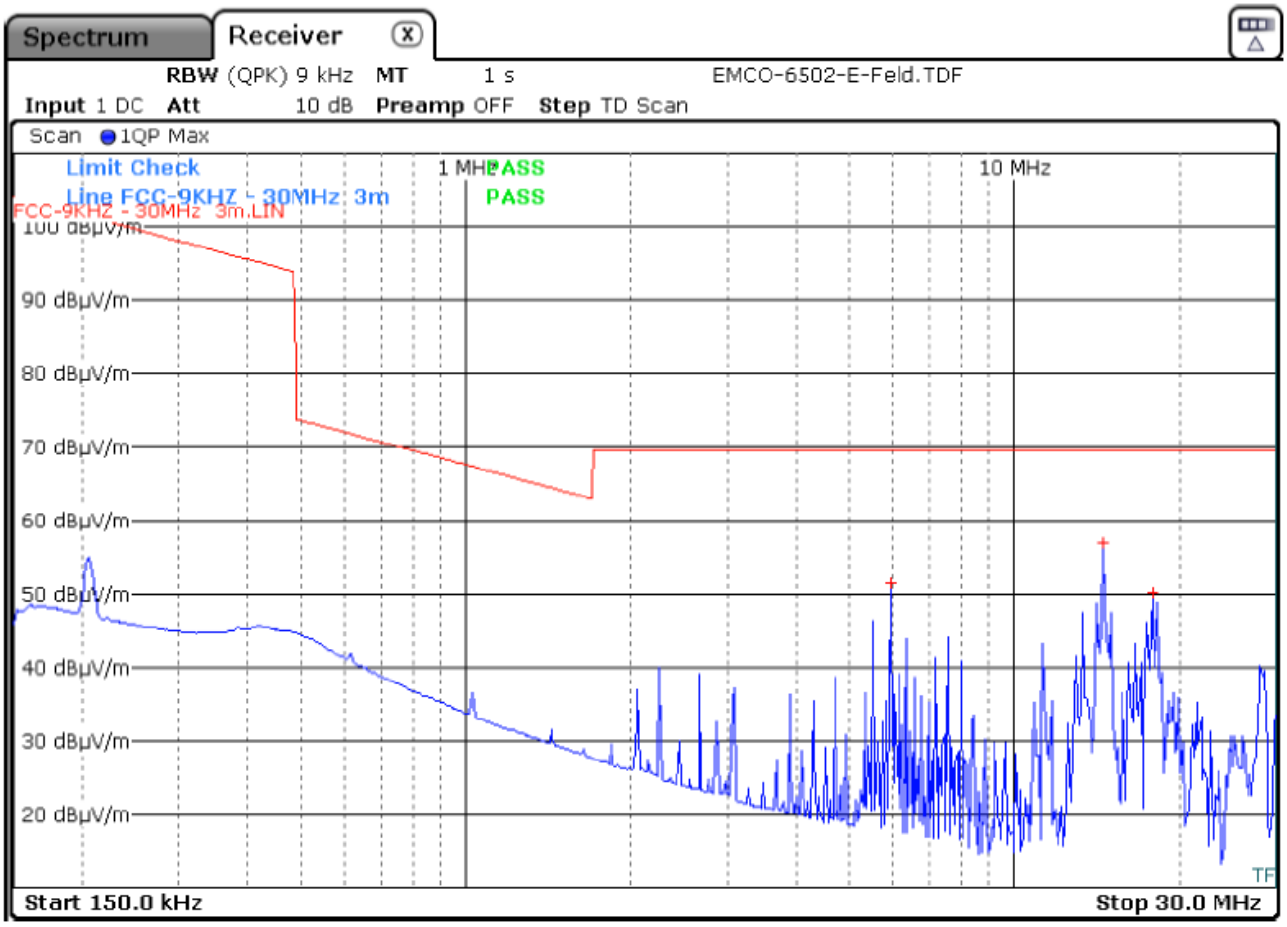
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; direct contacted

Position X (150kHz – 30MHz)



Position: X									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	57,01	-12,49	69,50	pass					
6,0	51,52	-17,98	69,50	pass					
17,9	50,31	-19,19	69,50	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

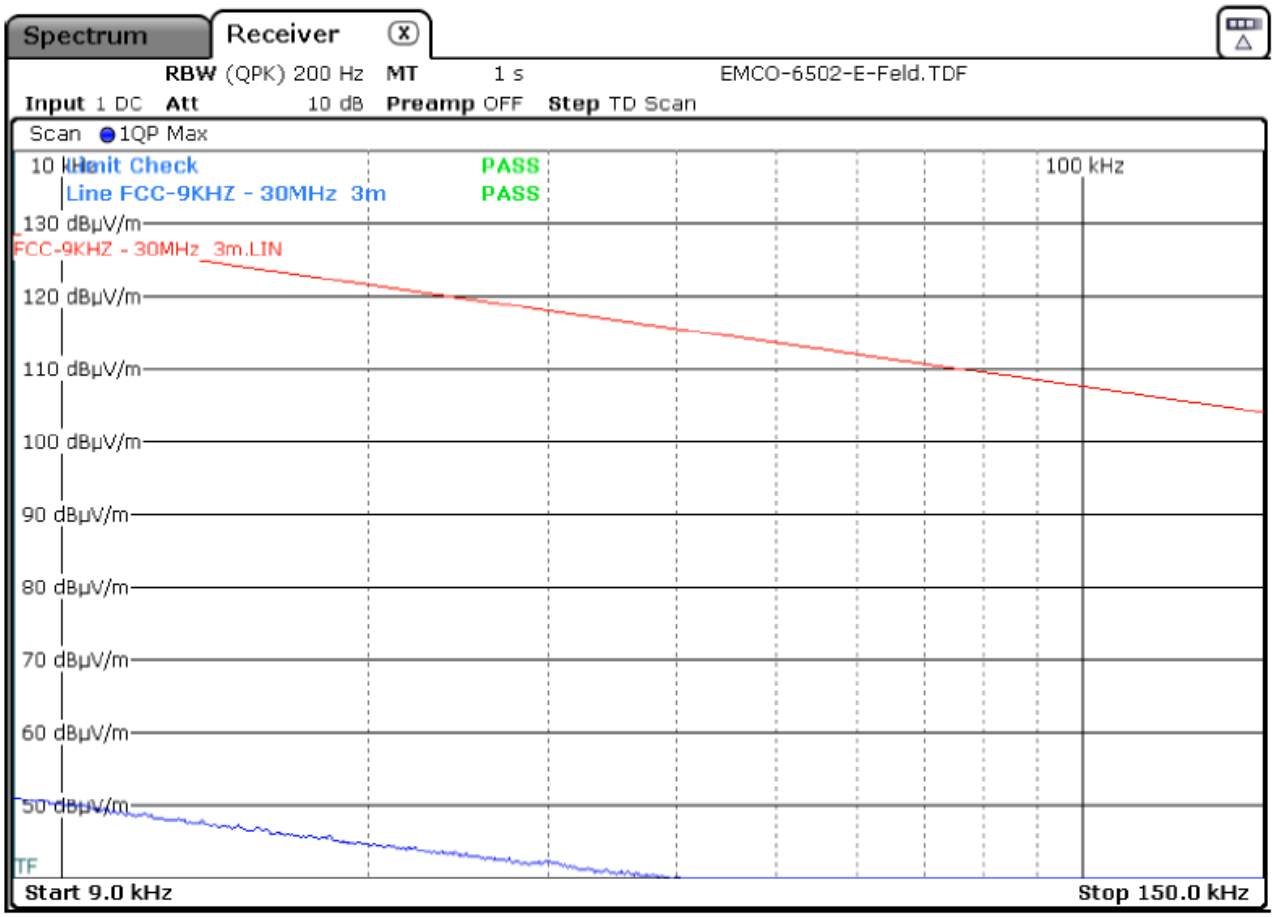
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; direct contacted

Position Y (9kHz - 150kHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

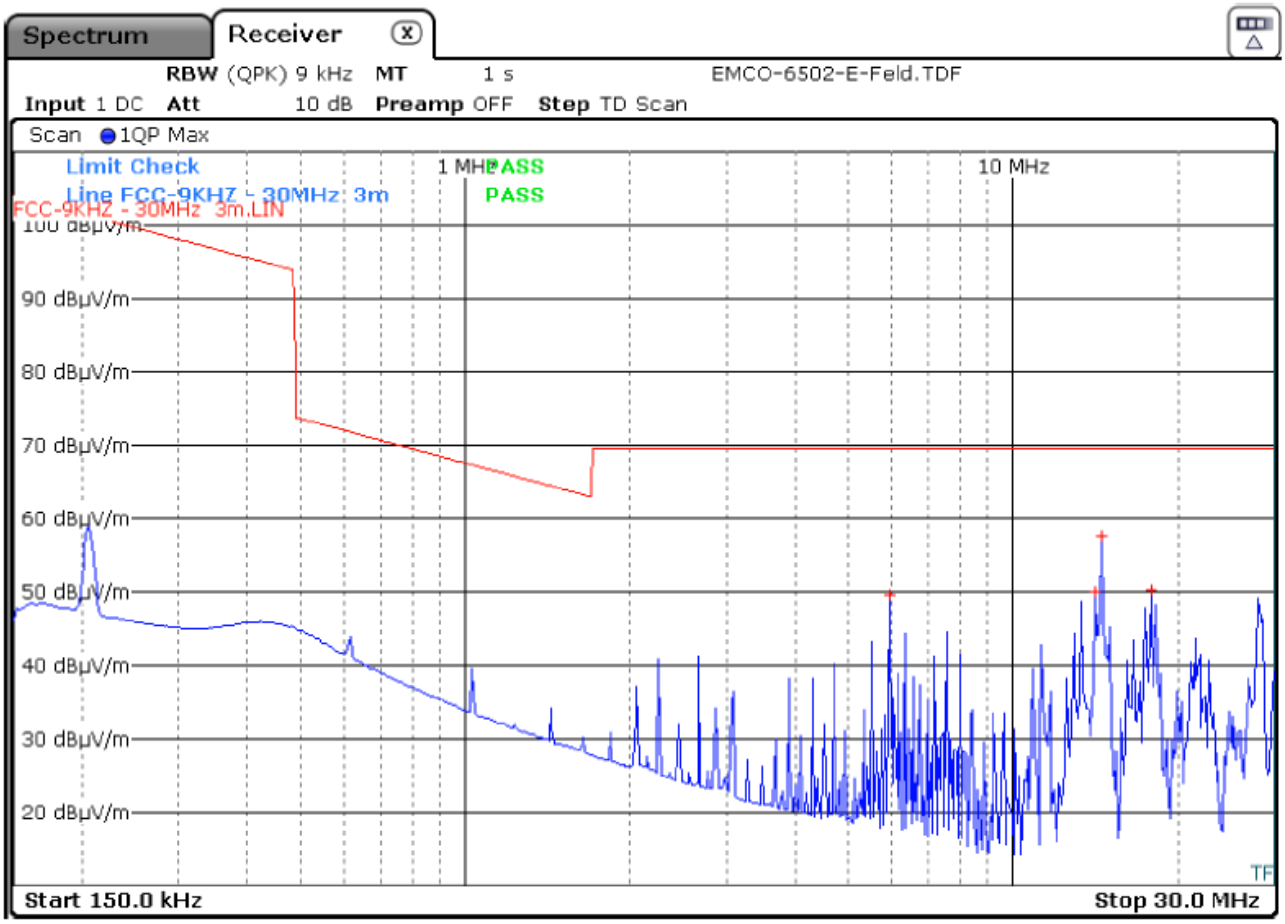
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; direct contacted

Position Y (150kHz – 30MHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	57,55	-11,95	69,50	pass					
17,9	50,16	-19,34	69,50	pass					
14,2	49,91	-19,59	69,50	pass					
6,0	49,62	-19,88	69,50	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

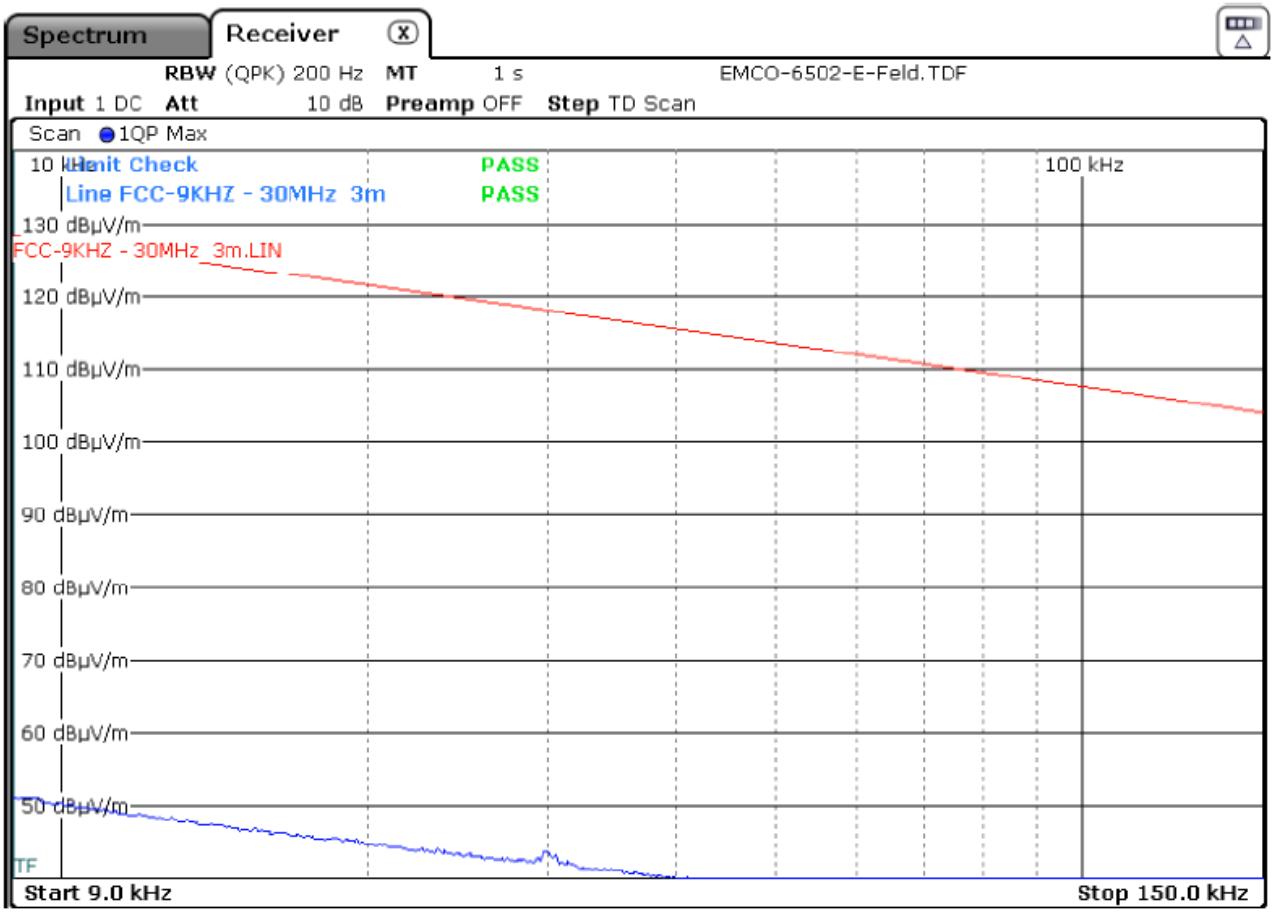
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; direct contacted

Position Z (9kHz - 150kHz)



Position: Z									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
9kHz-150kHz	-/-	>20	-/-	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

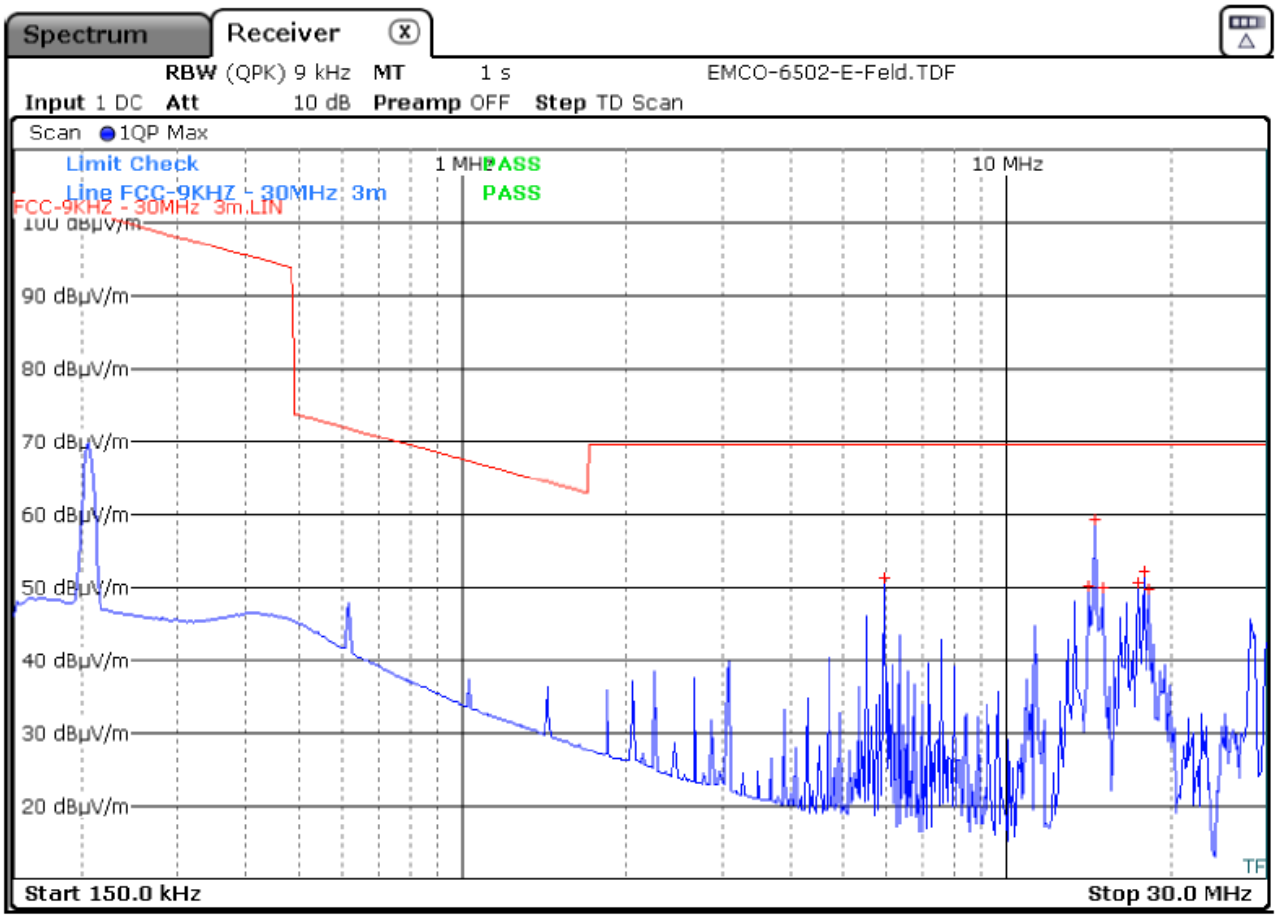
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; direct contacted

Position Z (150kHz – 30MHz)



Position: Z									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	59,39	-10,11	69,50	pass					
17,9	52,28	-17,22	69,50	pass					
6,0	51,30	-18,20	69,50	pass					
17,5	50,64	-18,86	69,50	pass					
14,2	50,19	-19,31	69,50	pass					
15,0	50,02	-19,48	69,50	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

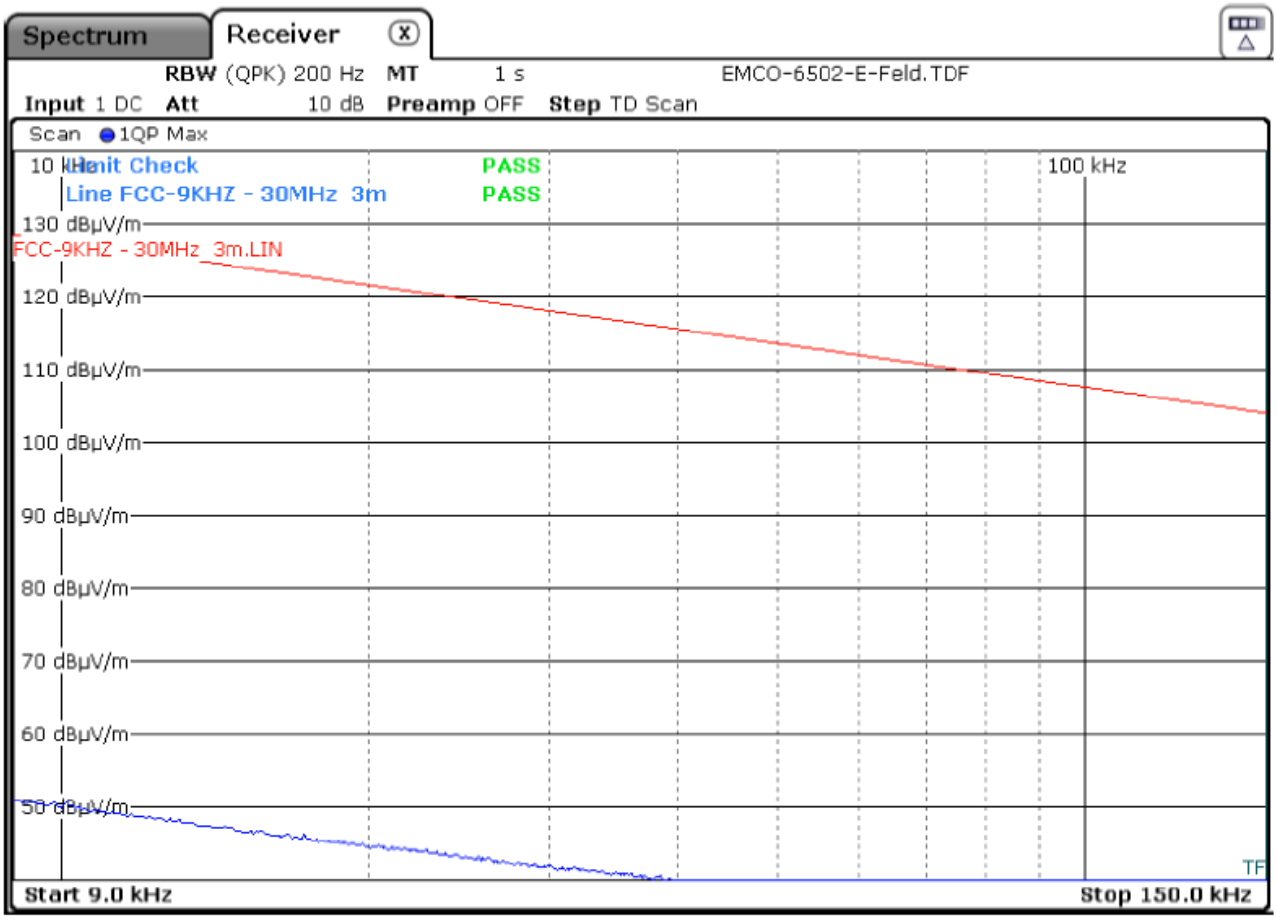
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; with distance (2mm) contacted

Position X (9kHz - 150kHz)



Position: X									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

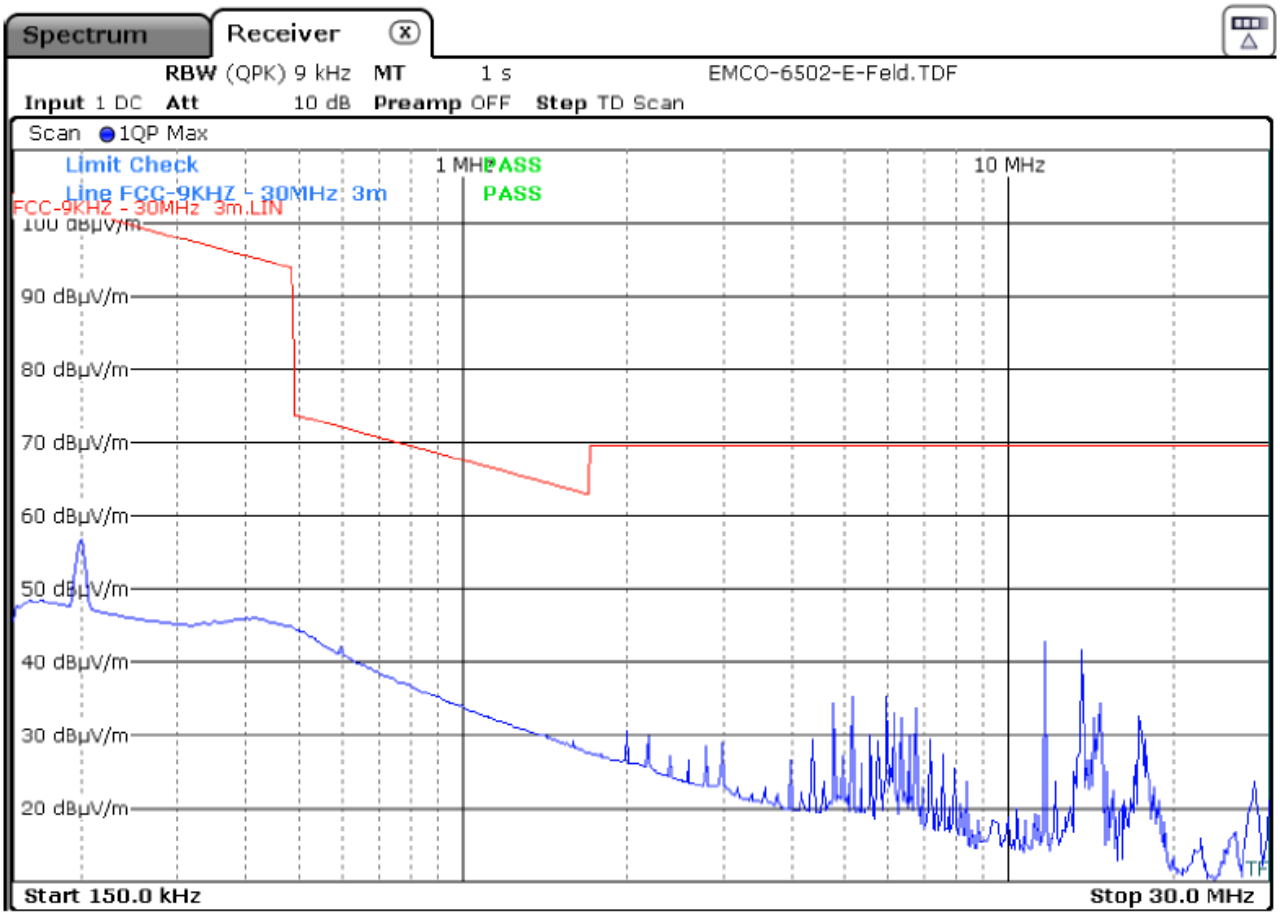
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; with distance (2mm) contacted

Position X (150kHz – 30MHz)



Position: X									
Detector QP									
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
150kHz-30MHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

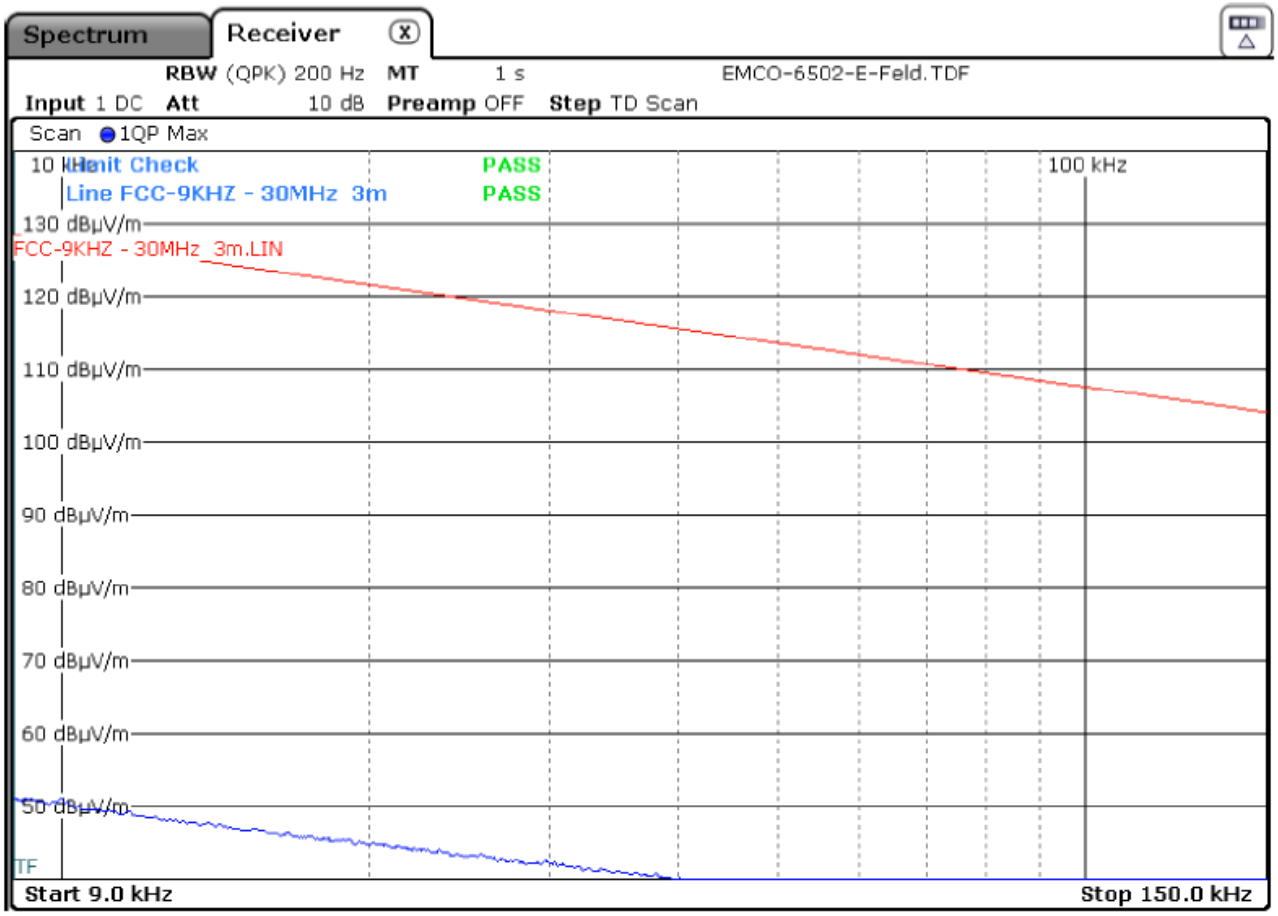
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; with distance (2mm) contacted

Position Y (9kHz - 150kHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

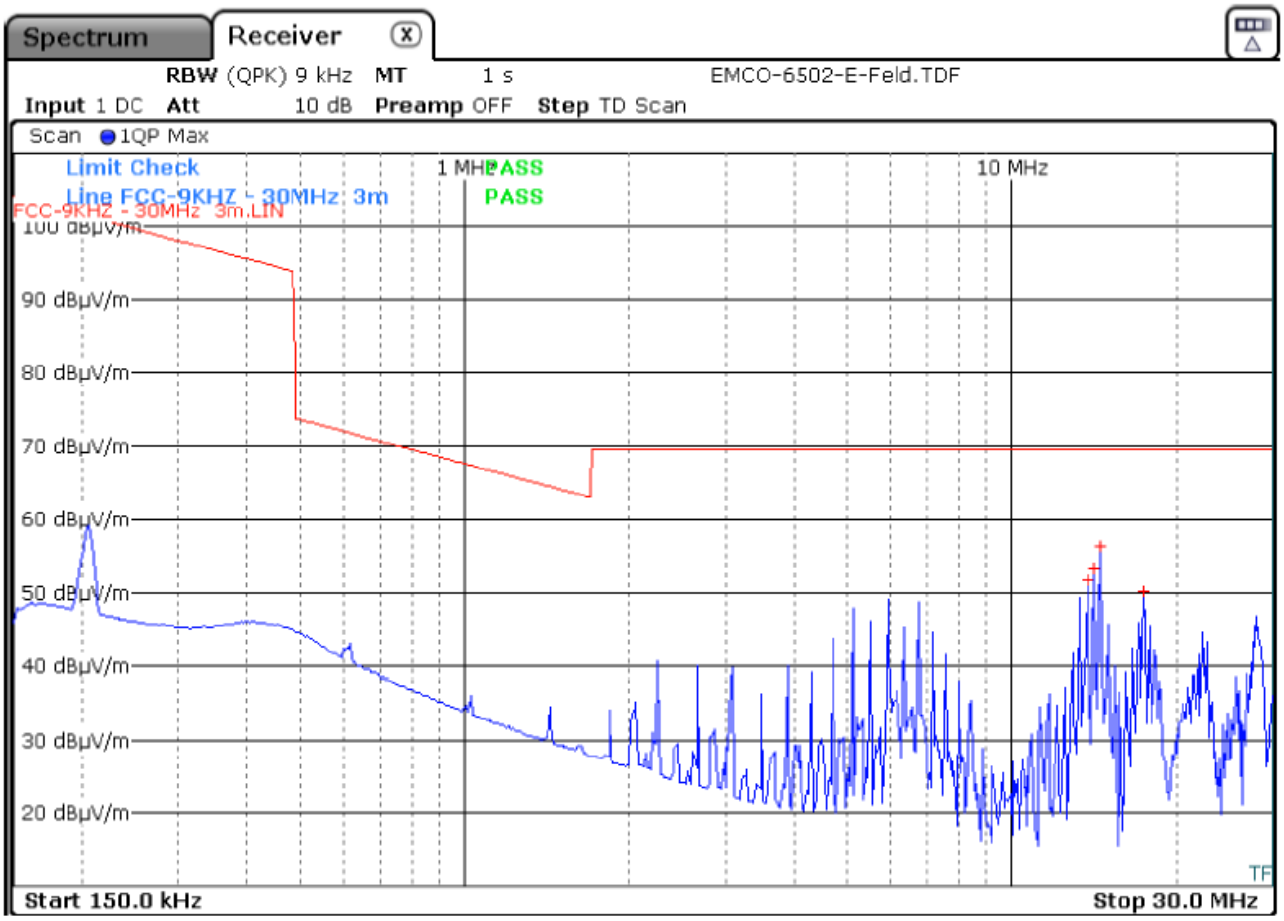
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; with distance (2mm) contacted

Position Y (150kHz – 30MHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	56,24	-13,26	69,50	pass					
14,2	53,23	-16,27	69,50	pass					
13,8	51,76	-17,74	69,50	pass					
17,5	50,16	-19,34	69,50	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

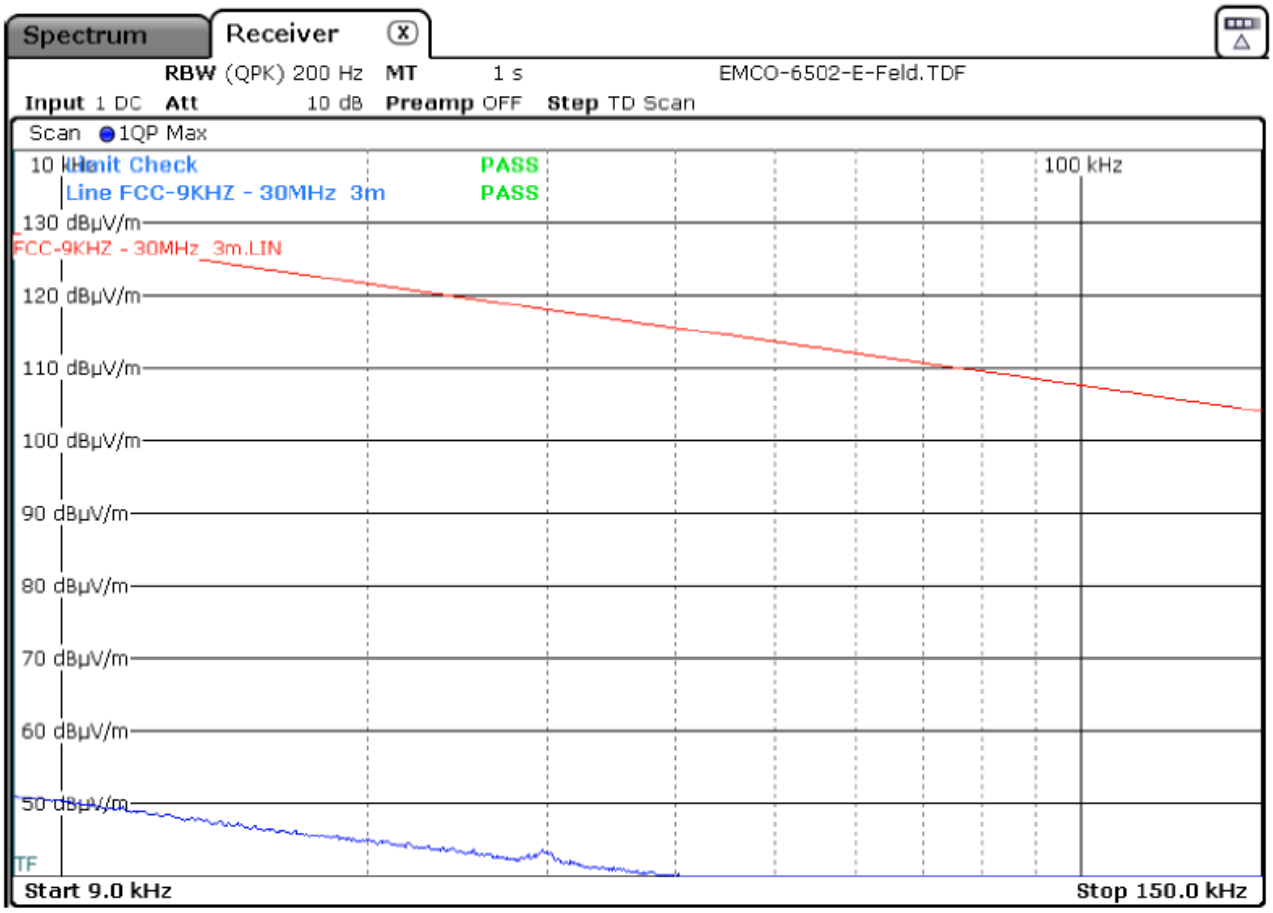
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; with distance (2mm) contacted

Position Z (9kHz - 150kHz)



Position: Z									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
9kHz-150kHz	-/-	>20	-/-	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

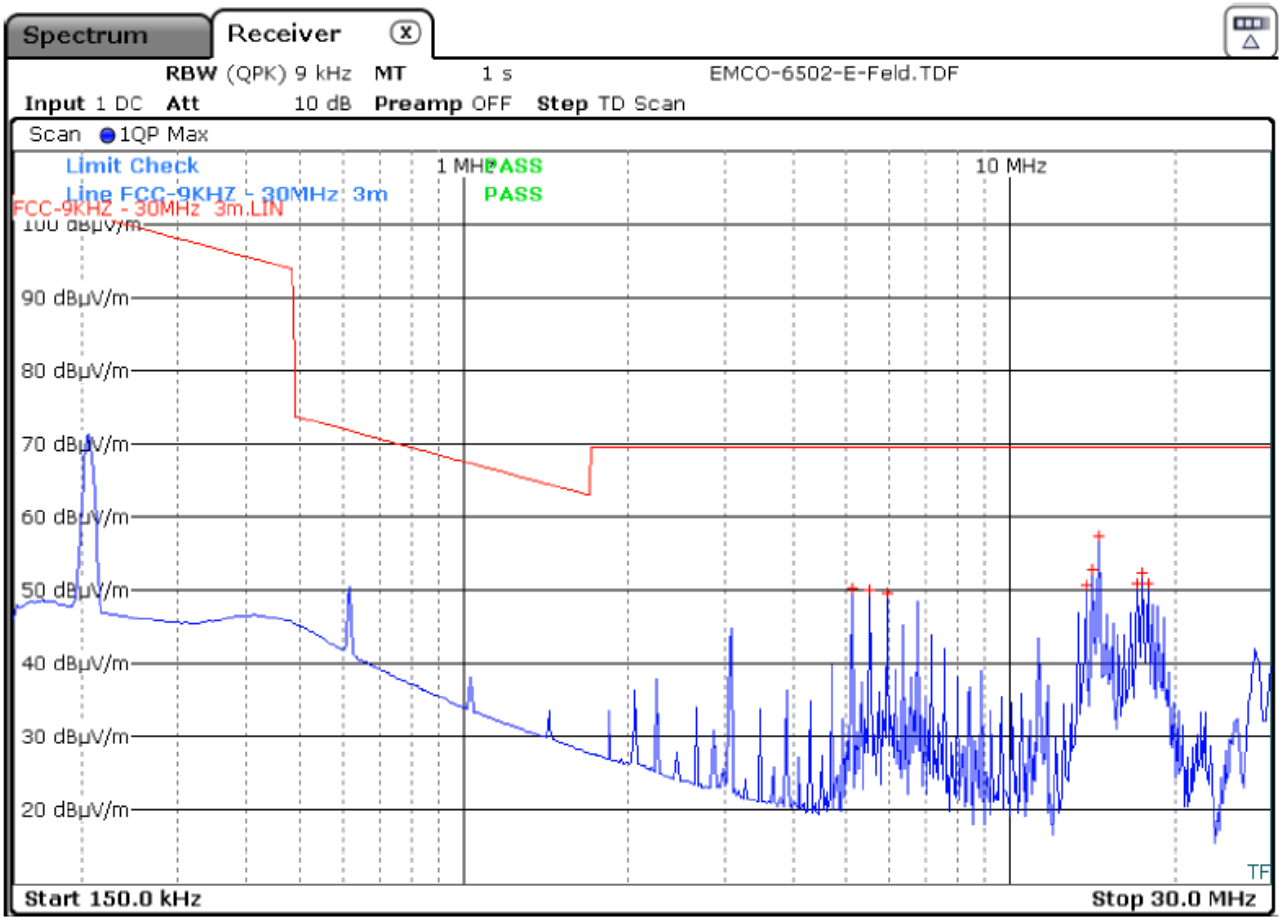
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with artificial max. load 500mA; with distance (2mm) contacted

Position Z (150kHz – 30MHz)



Position: Z									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	59,39	-10,11	69,50	pass					
17,9	52,28	-17,22	69,50	pass					
6,0	51,30	-18,20	69,50	pass					
17,5	50,64	-18,86	69,50	pass					
14,2	50,19	-19,31	69,50	pass					
15,0	50,02	-19,48	69,50	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

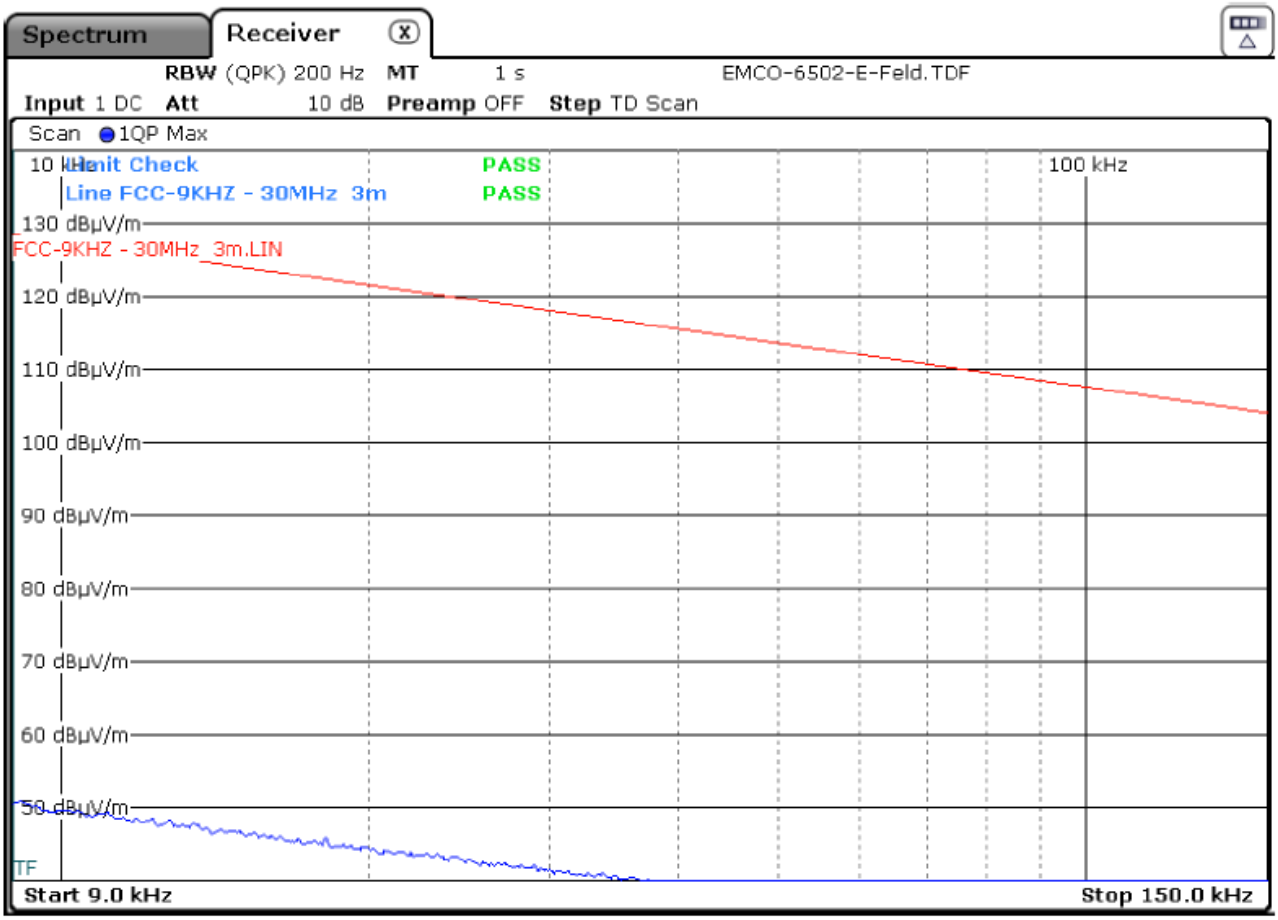
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); direct contacted

Position X (9kHz - 150kHz)



Position: X									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

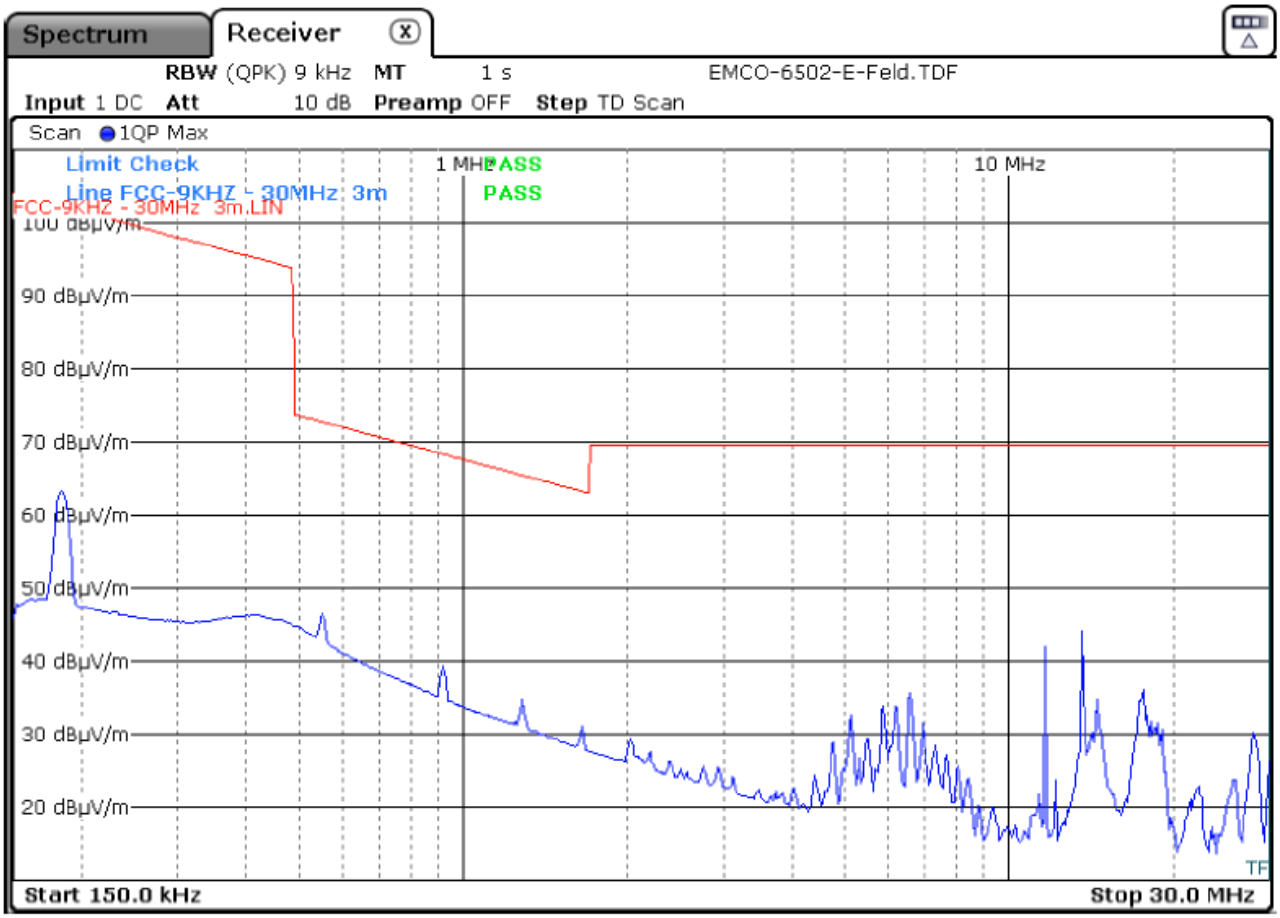
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); direct contacted

Position X (150kHz – 30MHz)



Position: X									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
150kHz-30MHz	-/-	>20	-/-	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

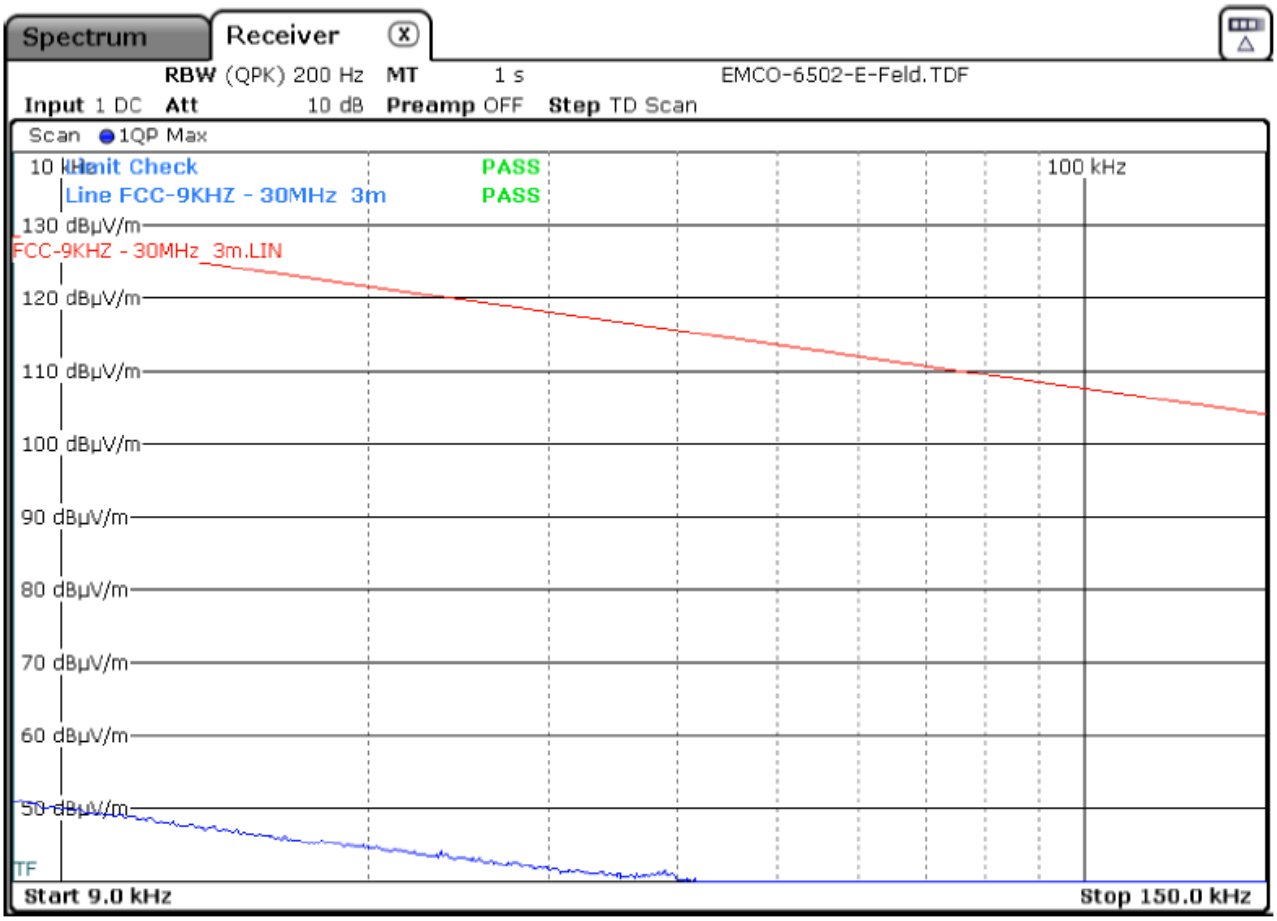
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); direct contacted

Position Y (9kHz - 150kHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
9kHz-150kHz	-/-	>20	-/-	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

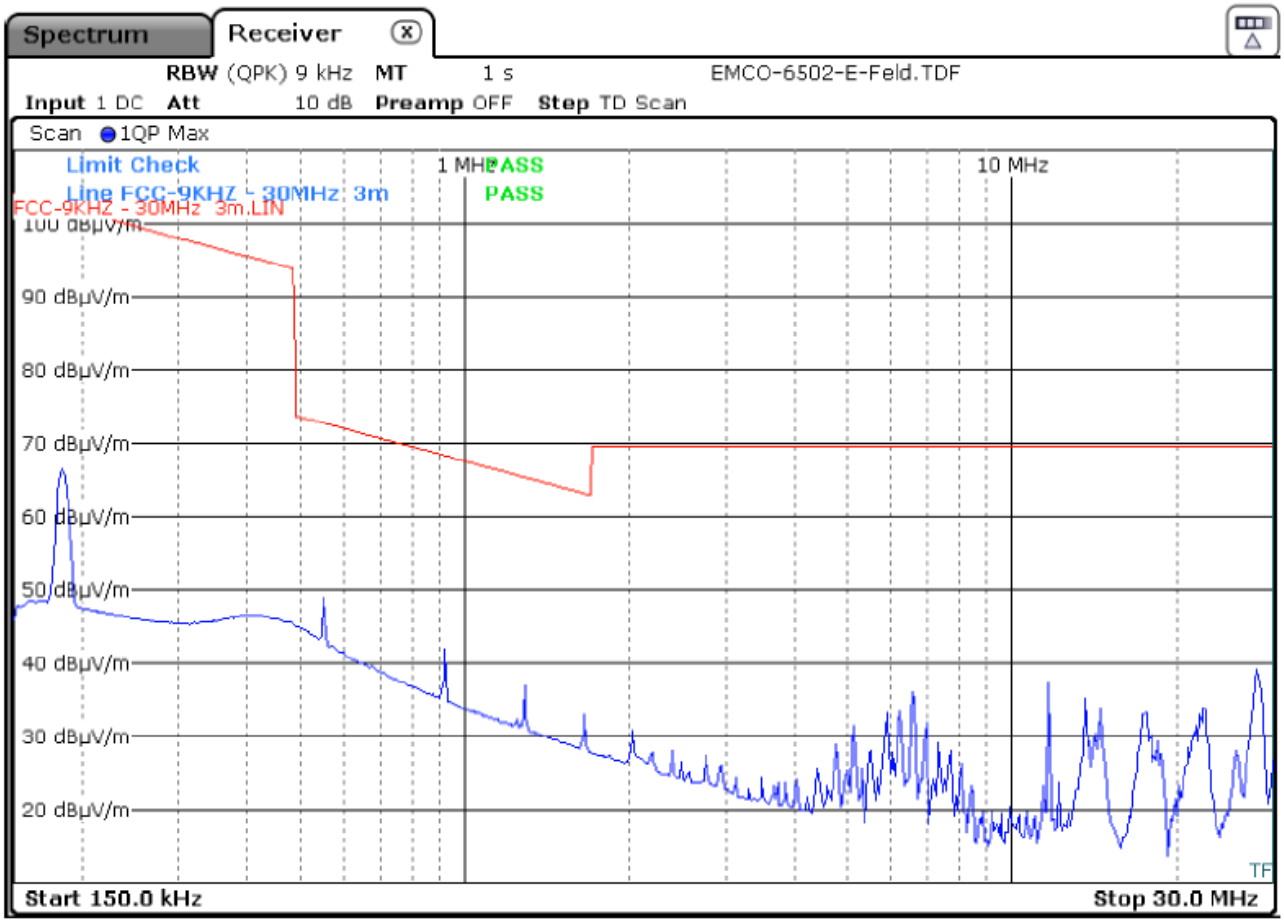
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); direct contacted

Position Y (150kHz – 30MHz)



Position: Y									
Detector QP									
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
150kHz-30MHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

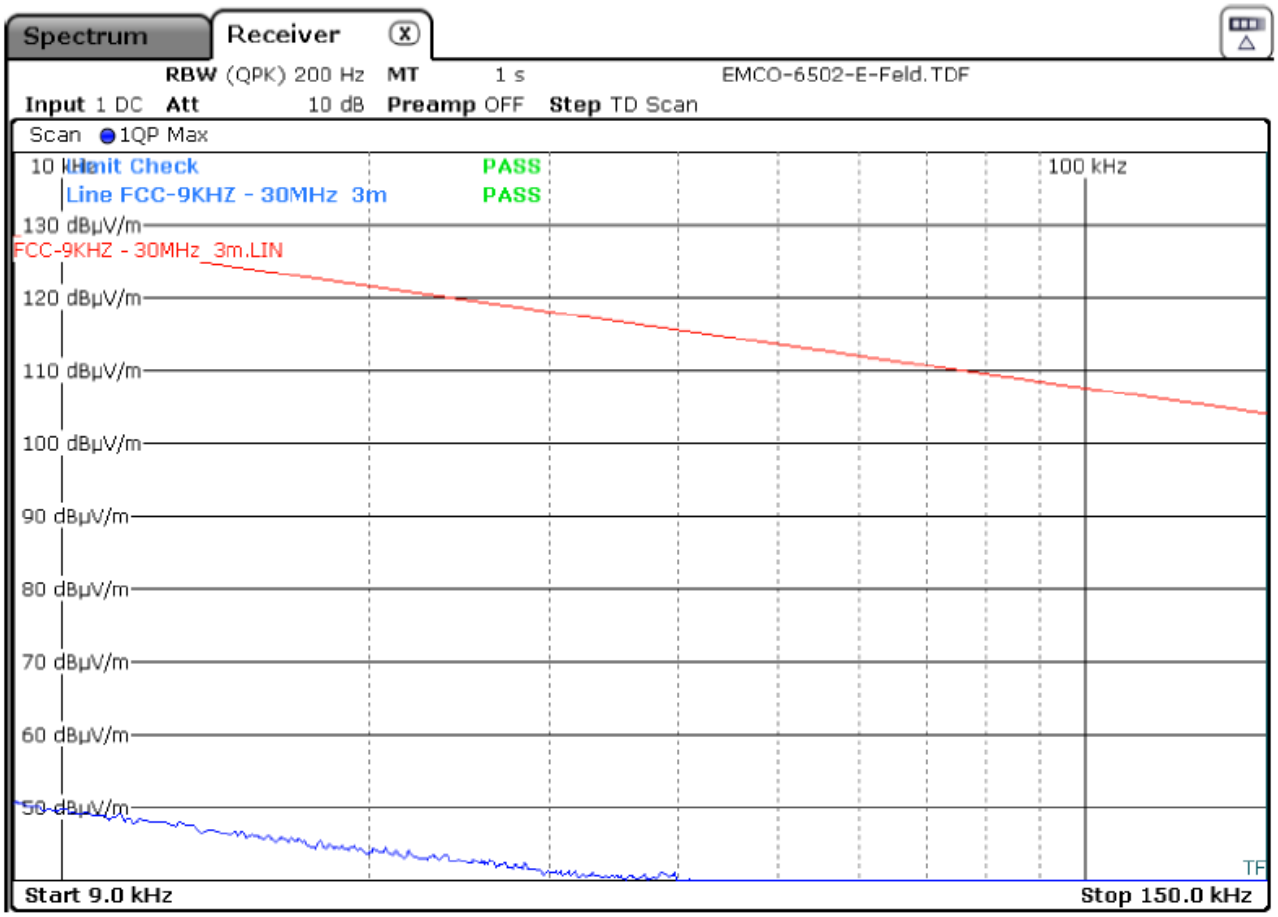
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); direct contacted

Position Z (9kHz - 150kHz)



Position: Z									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

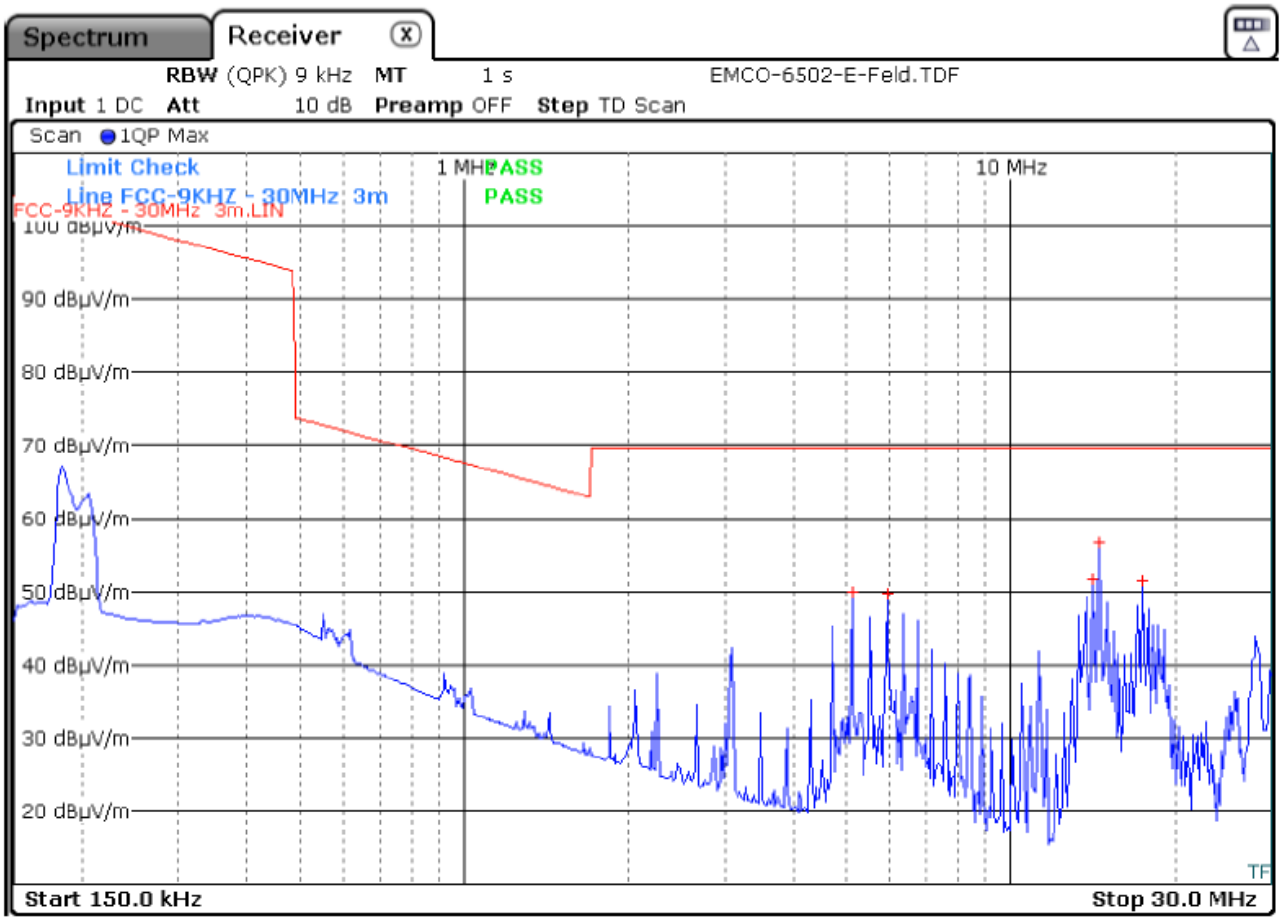
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); direct contacted

Position Z (150kHz – 30MHz)



Position: Z									
Detector QP									
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
14,6	56,84	-12,66	69,50	**pass**					
14,2	51,76	-17,74	69,50	**pass**					
17,5	51,58	-17,92	69,50	**pass**					
5,1	50,08	-19,42	69,50	**pass**					
6,0	49,86	-19,64	69,50	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

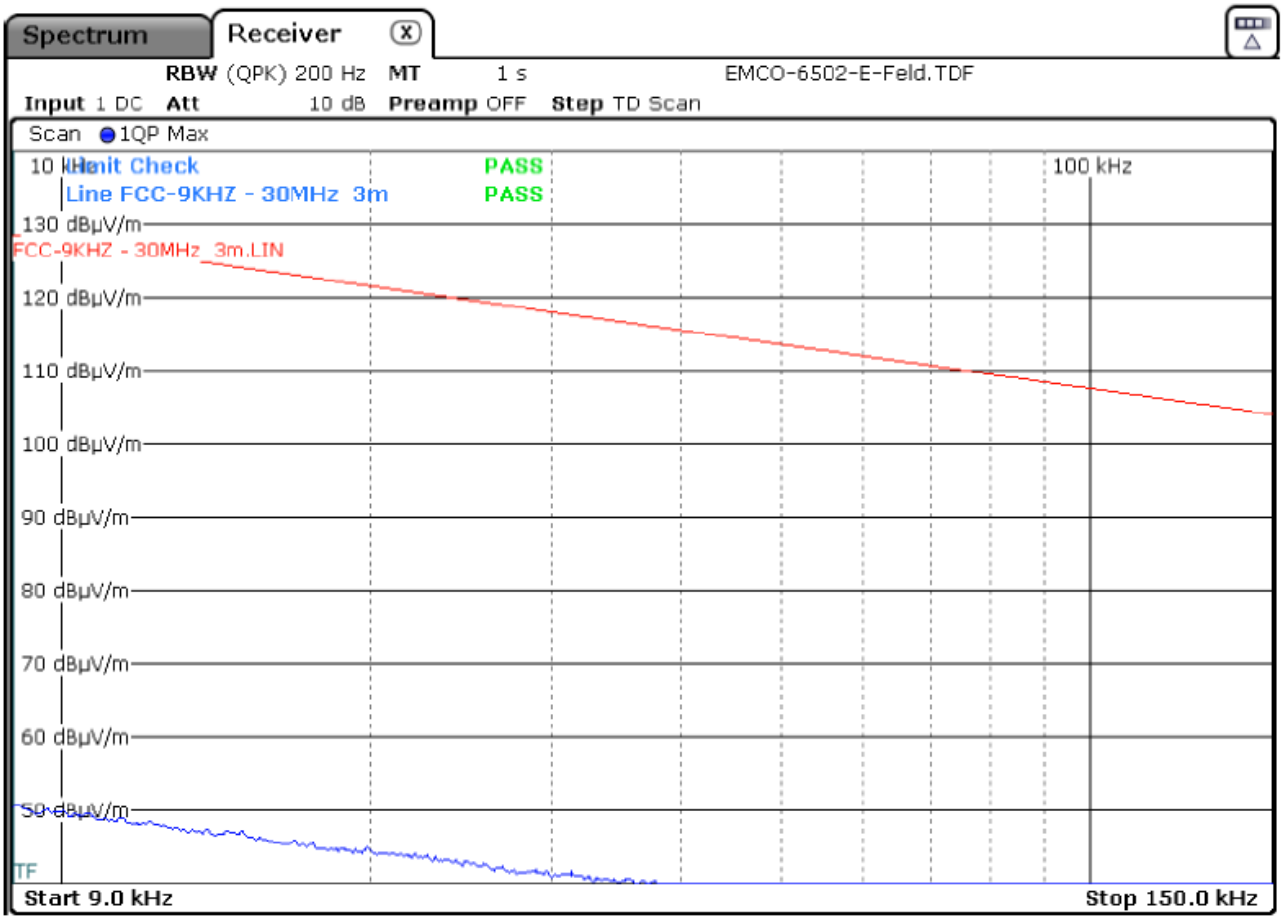
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); with distance (2mm) contacted

Position X (9kHz - 150kHz)



Position: X									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

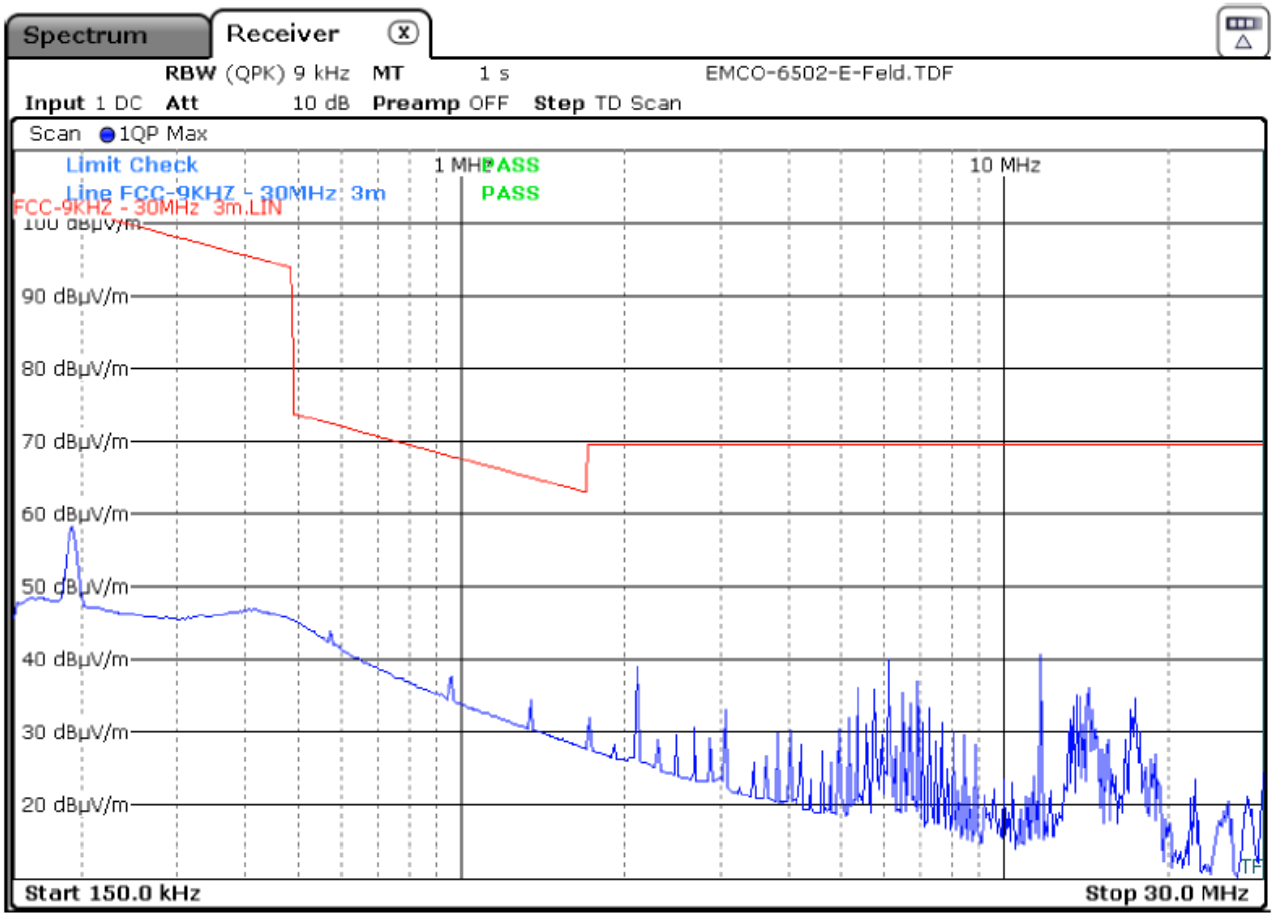
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); with distance (2mm) contacted

Position X (150kHz – 30MHz)



Position: X									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
150kHz-30MHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

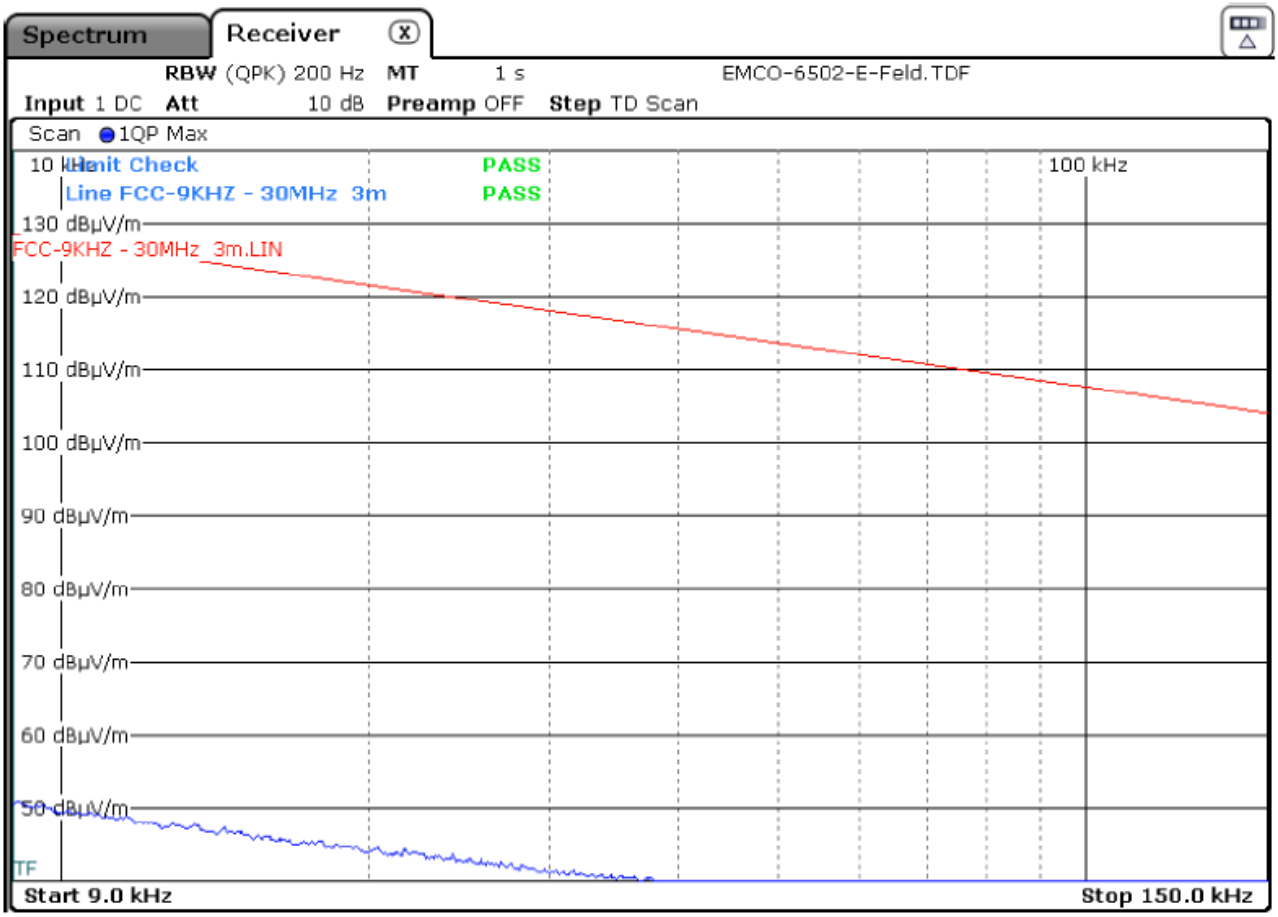
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); with distance (2mm) contacted

Position Y (9kHz - 150kHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
9kHz-150kHz	-/-	>20	-/-	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

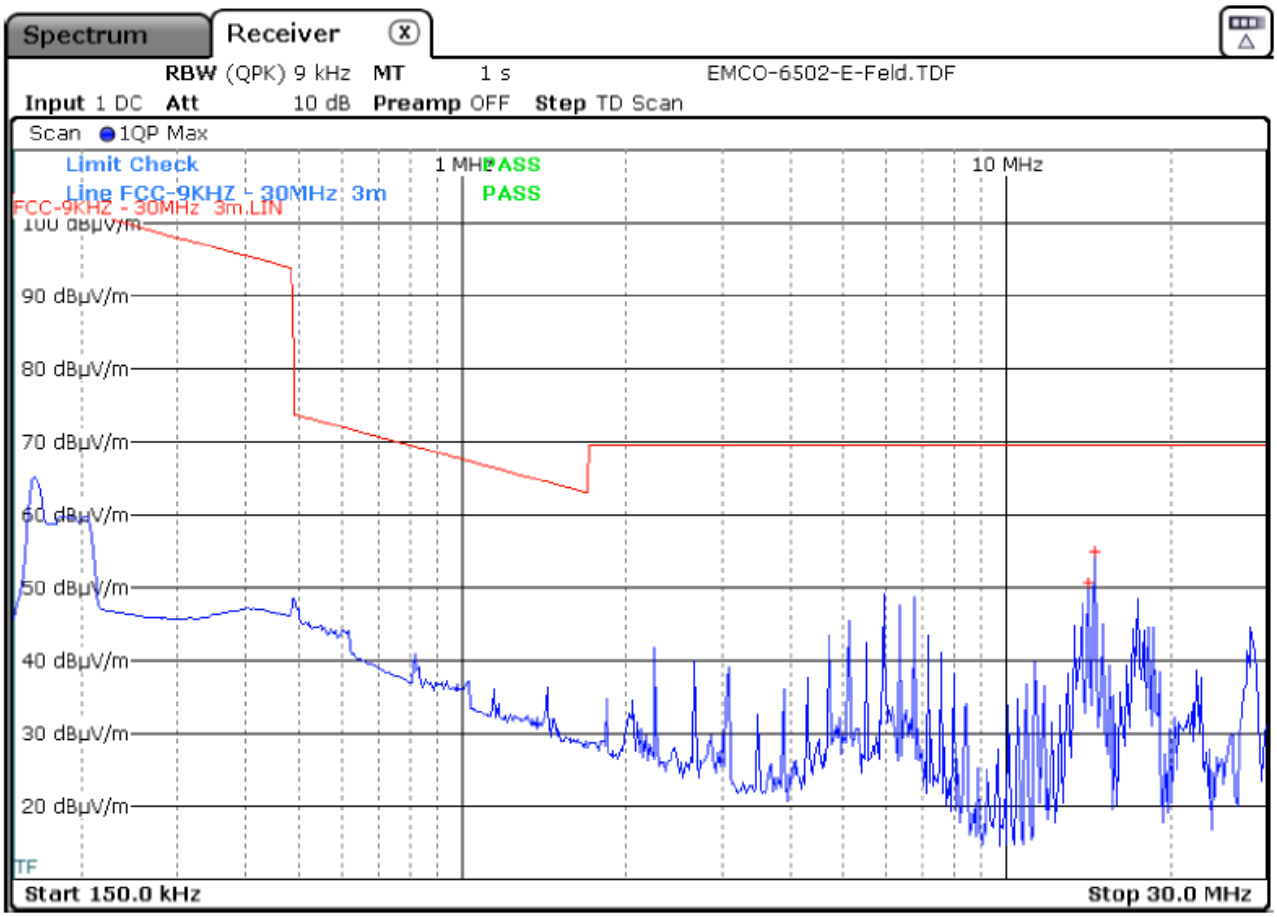
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); with distance (2mm) contacted

Position Y (150kHz – 30MHz)



Position: Y									
		Detector QP							
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	55,08	-14,42	69,50	pass					
14,2	50,57	-18,93	69,50	pass					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

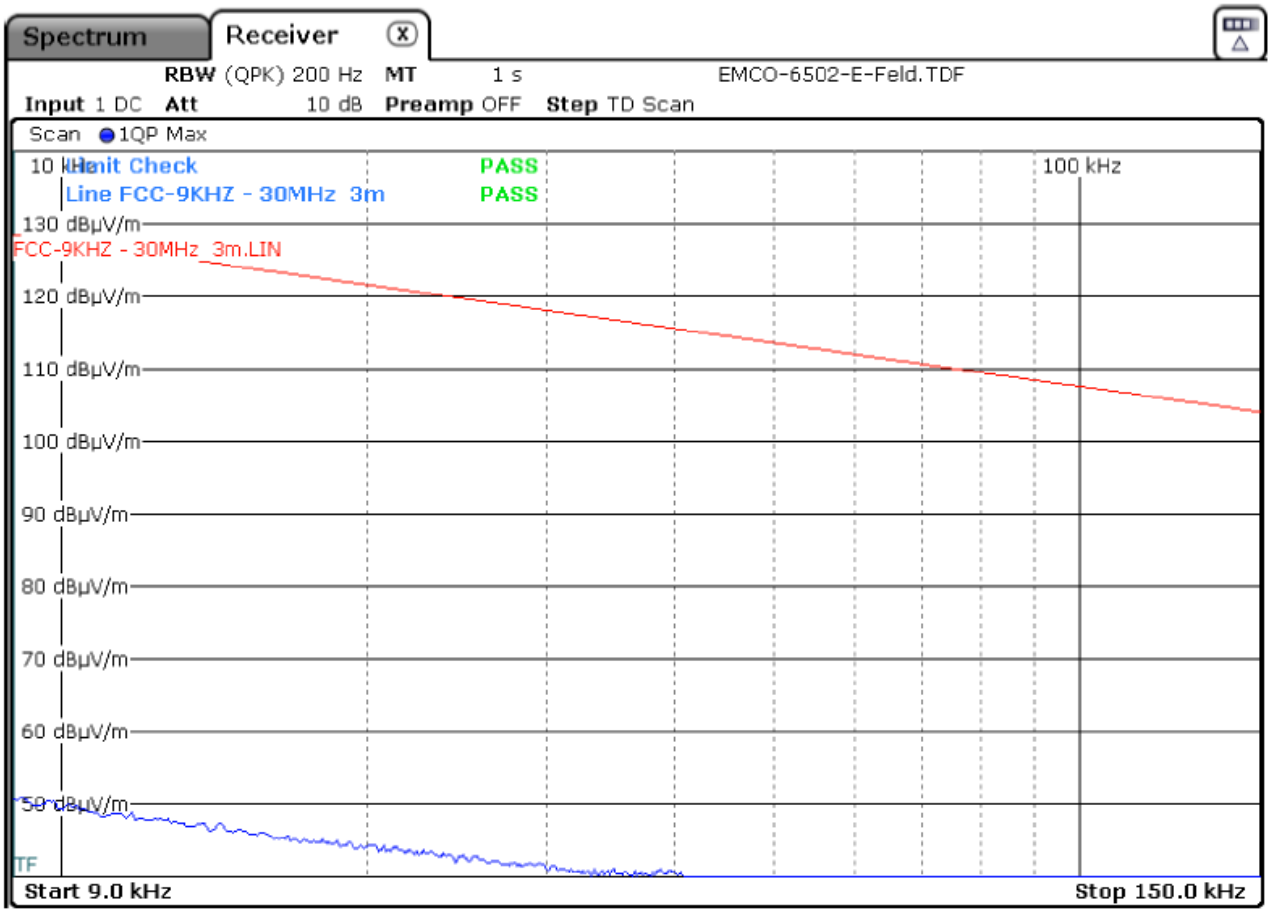
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

Operation mode: Output: with normal load (Battery Pack); with distance (2mm) contacted

Position Z (9kHz - 150kHz)



Position: Z									
		Detector QP							
Frequ. [MHz]	**Level [dBµV/m]**	**Margin to Limit [dB]**	**Limit [dBµV/m]**	**Result**					
9kHz-150kHz	-/-	>20	-/-	**pass**					

TESTED IN GERMANY

IT 3/4

Interference radiation (9kHz – 30MHz)

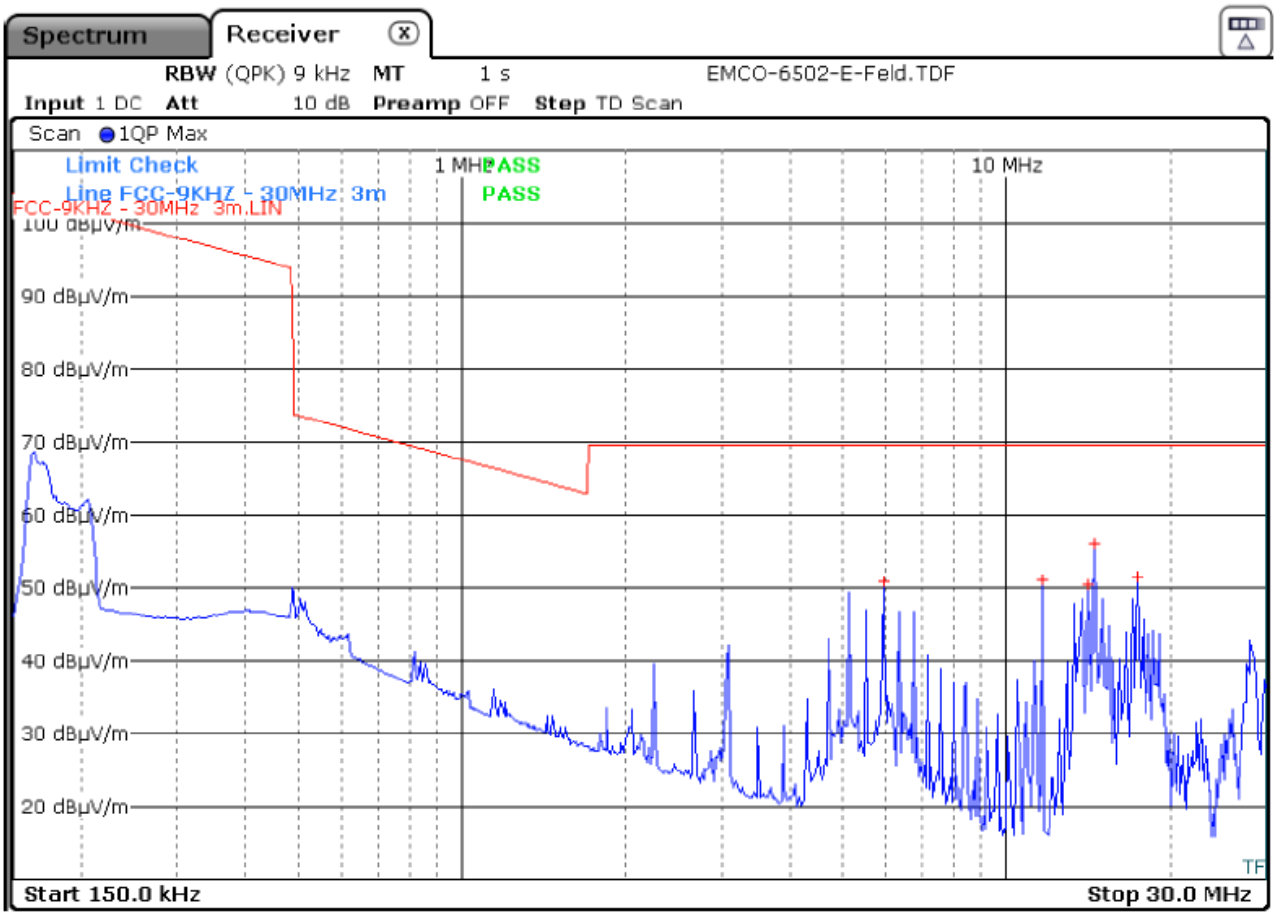
acc.FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/04-0002

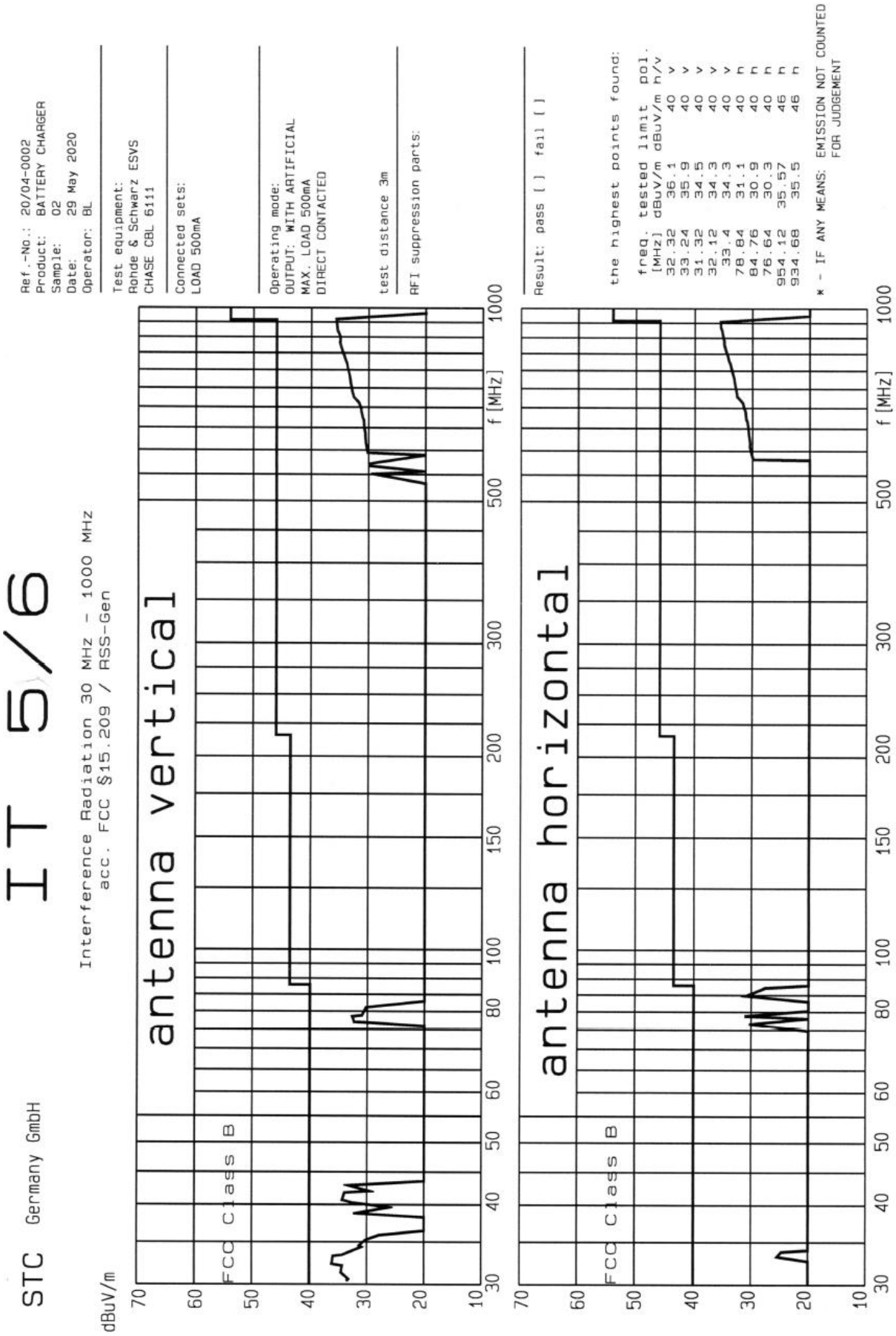
Operation mode: Output: with normal load (Battery Pack); with distance (2mm) contacted

Position Z (150kHz – 30MHz)



Position: Z									
Detector QP									
Frequ. [MHz]	Level [dBµV/m]	Margin to Limit [dB]	Limit [dBµV/m]	Result					
14,6	56,08	-13,42	69,50	pass					
17,5	51,59	-17,91	69,50	pass					
11,6	51,15	-18,35	69,50	pass					
6,0	50,95	-18,55	69,50	pass					
14,2	50,35	-19,15	69,50	pass					

Result 30 MHz – 1000 MHz



STC Germany GmbH

IT 5/6

Interference Radiation 30 MHz - 1000 MHz
acc. FCC §15.209 / RSS-Gen

Ref.-No.: 20/04-0002
Product: BATTERY CHARGER
Sample: 02
Date: 29 May 2020
Operator: BL

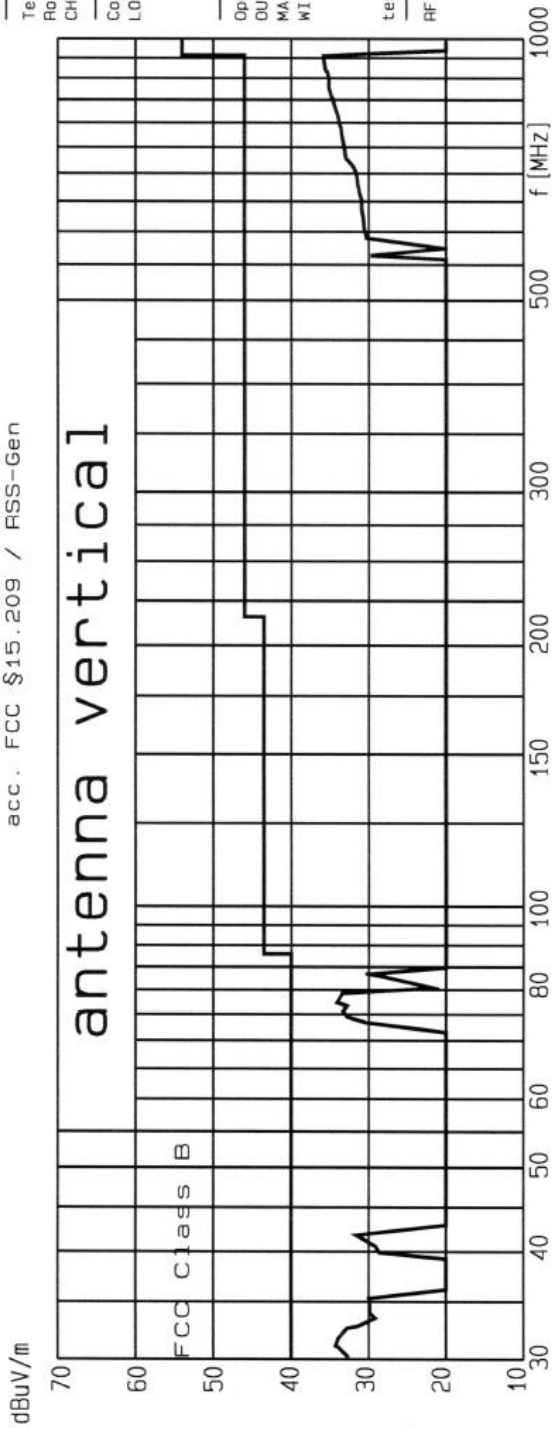
Test equipment:
Rohde & Schwarz ESVS
CHASE CBL 6111

Connected sets:
LOAD 500mA

Operating mode:
OUTPUT: WITH ARTIFICIAL
MAX. LOAD 500mA
WITH DISTANCE (2mm) CONTACTED

test distance 3m

RFI suppression parts:

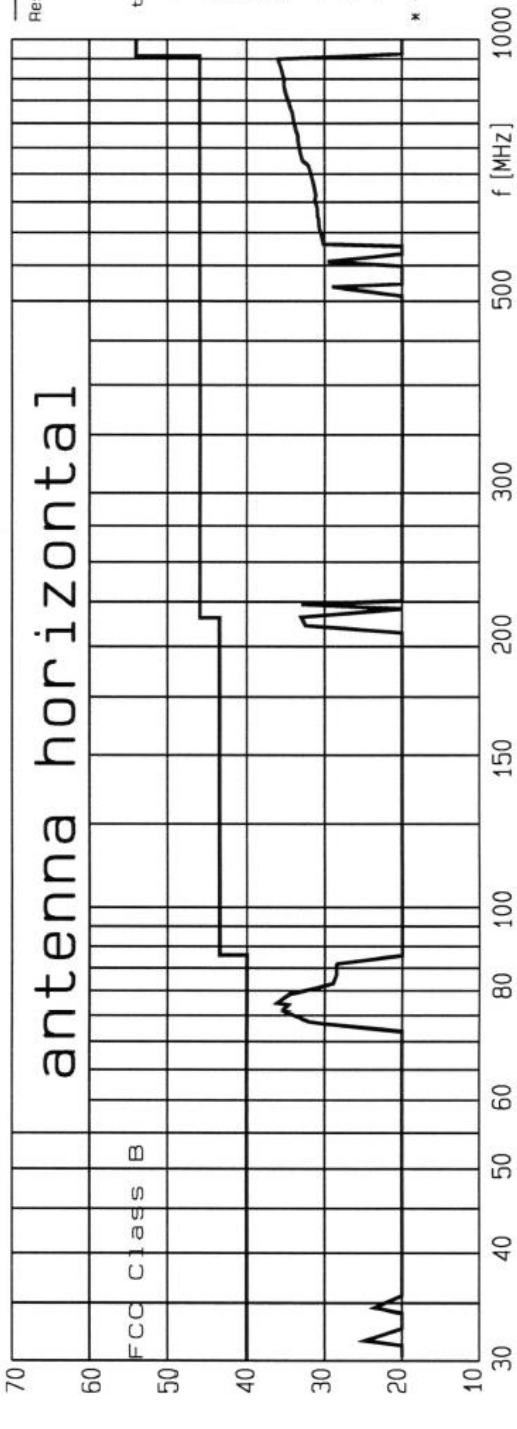


Result: pass [X] fail [ ]

the highest points found:

freq. [MHz]	tested dBuV/m	limit dBuV/m	pol. h/v
31.08	34.3	40	v
77.36	34.1	40	v
31.68	34	40	v
30.96	33.9	40	v
79.24	33.4	40	v
77.4	36.1	40	h
75.92	35.4	40	h
77.04	34.7	40	h
79.28	34.5	40	h
73.68	32.1	40	h

* - IF ANY MEANS: EMISSION NOT COUNTED FOR JUDGEMENT



STC Germany GmbH

IT 5/6

Interference Radiation 30 MHz - 1000 MHz
acc. FCC §15.209 / RSS-Gen

Ref.-No.: 20/04-0002
Product: BATTERY CHARGER
Sample: 02
Date: 29 May 2020
Operator: BL

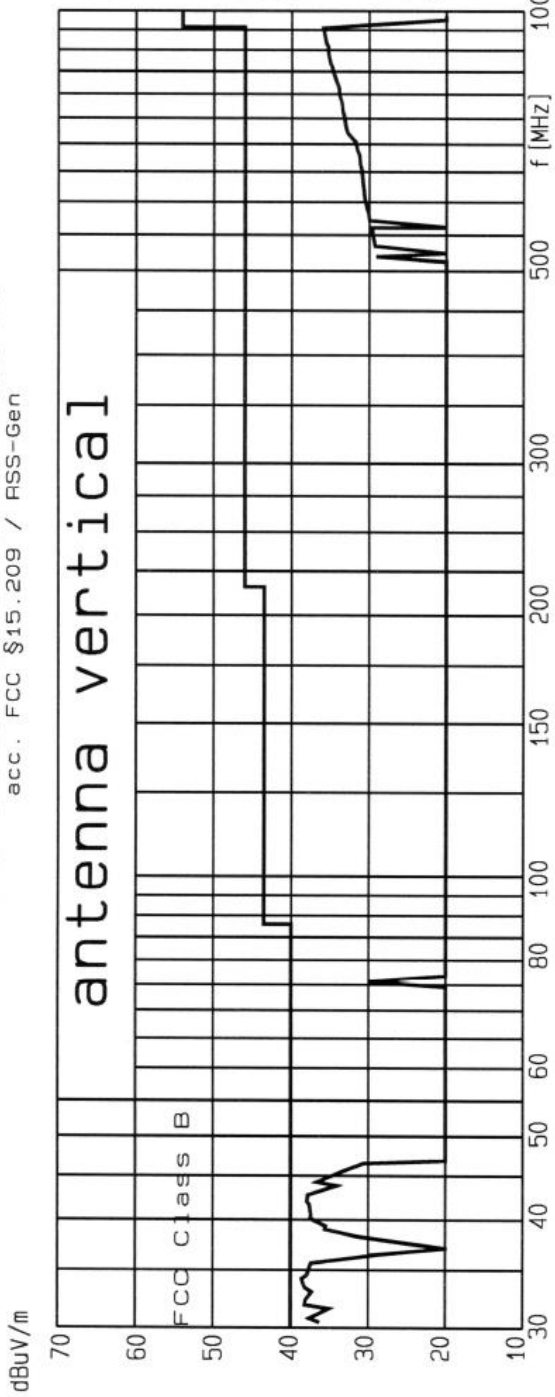
Test equipment:
Rohde & Schwarz ESVS
CHASE CBL 6111

Connected sets:

Operating mode:
OUTPUT: WITH NORMAL LOAD
BATTERY PACK
DIRECT CONTACTED

test distance 3m

AFI suppression parts:

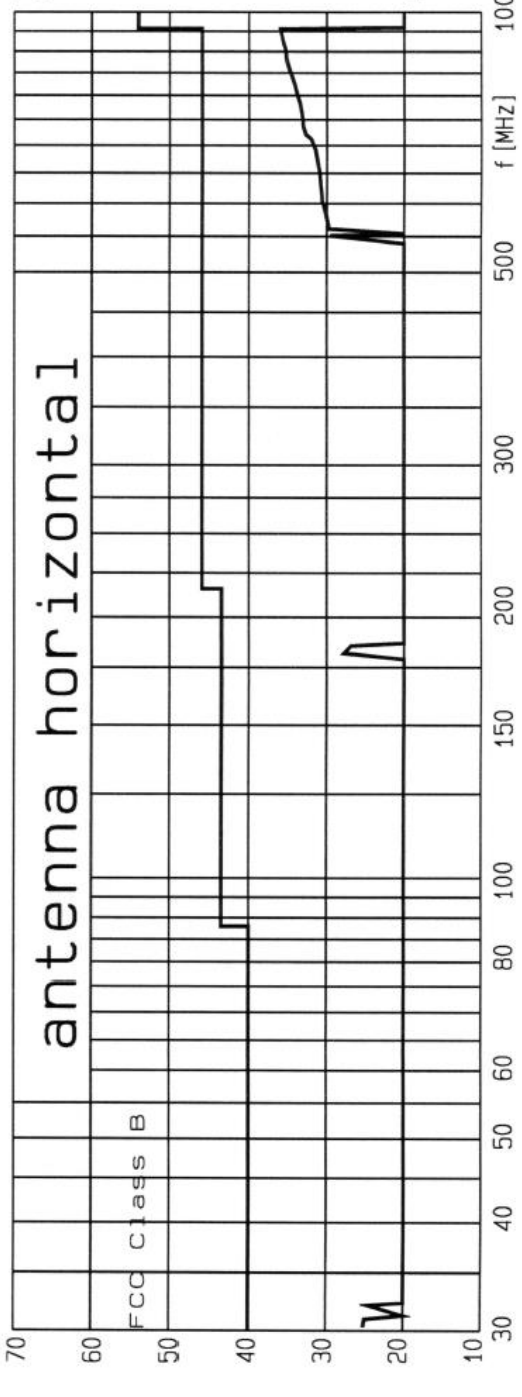


Result: pass [X] fail [ ]

the highest points found:

freq. [MHz]	tested dBuV/m	limit dBuV/m	pol. h/v
34.16	38.6	40	v
31.88	38.2	40	v
33.4	38.2	40	v
32.28	38.1	40	v
34.52	37.9	40	v
956	35.96	46	h
944.52	35.86	46	h
928.76	35.67	46	h
904.68	35.29	46	h
889.8	35.21	46	h

* - IF ANY MEANS: EMISSION NOT COUNTED FOR JUDGEMENT



STC Germany GmbH

IT 5/6

Interference Radiation 30 MHz - 1000 MHz
acc. FCC §15.209 / RSS-Gen

Ref.-No.: 20/04-0002
Product: BATTERY CHARGER
Sample: 02
Date: 29 May 2020
Operator: BL

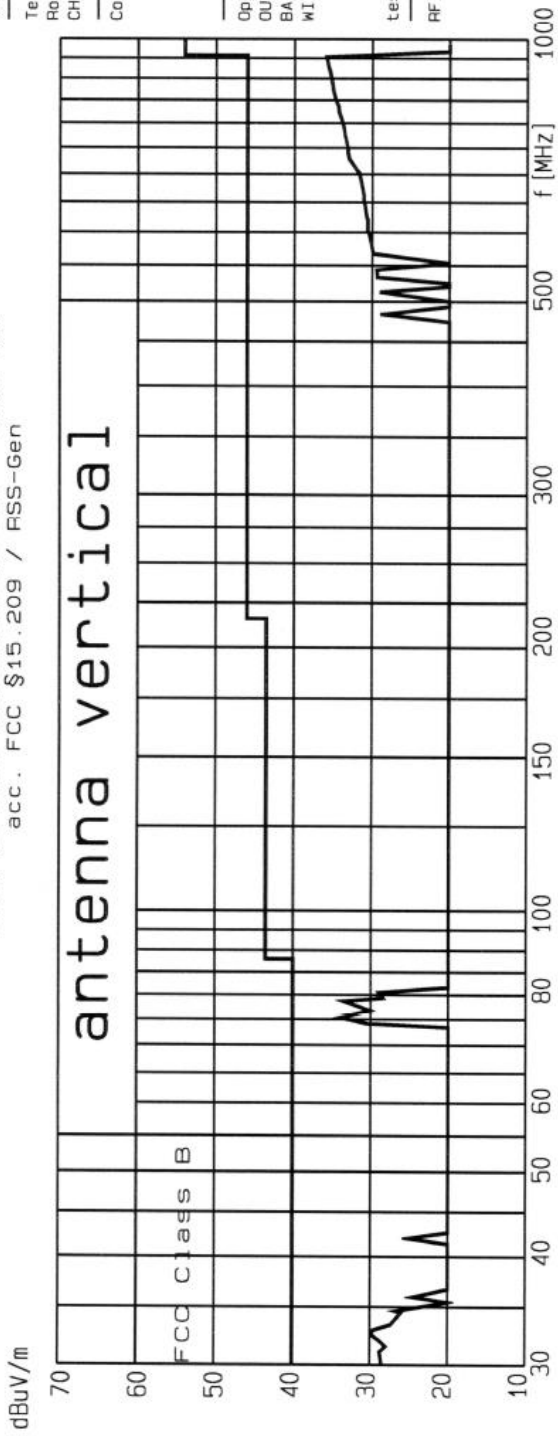
Test equipment:
Rohde & Schwarz ESVS
CHASE CBL 6111

Connected sets:

Operating mode:
OUTPUT: WITH NORMAL LOAD
BATTERY PACK
WITH DISTANCE (2mm) CONTACTED

test distance 3m

RFI suppression parts:

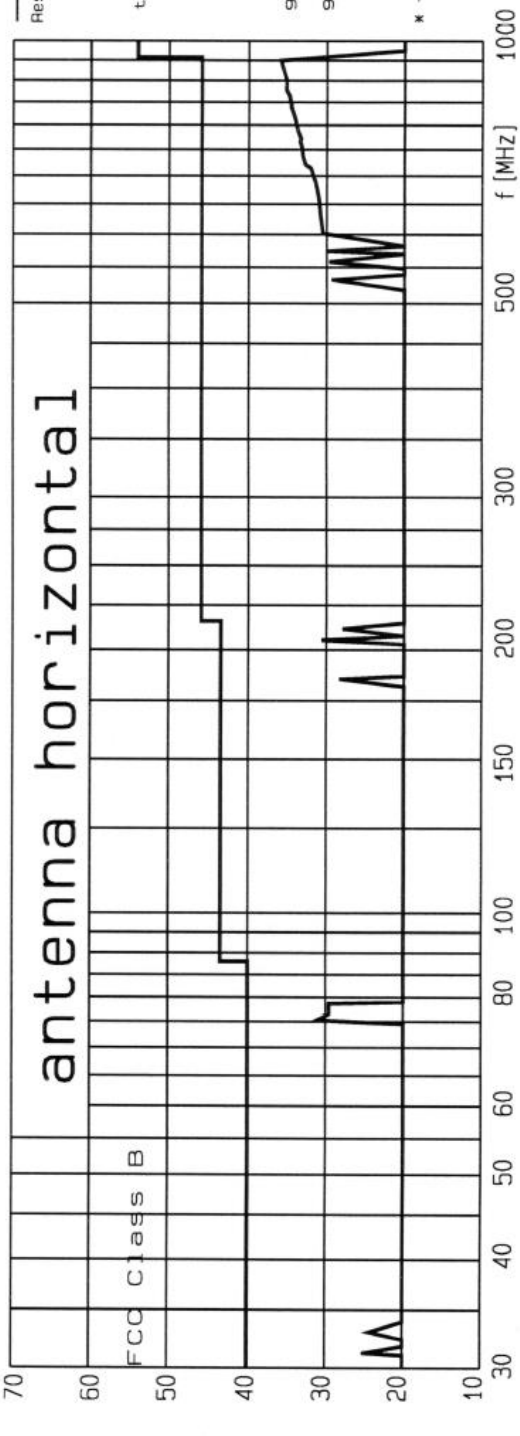


Result: pass [X] fail [ ]

the highest points found:

freq. [MHz]	tested dBuV/m	limit dBuV/m	pol. h/v
75.24	33.9	40	v
78.6	33.5	40	v
74.08	30.4	40	v
76.68	30.1	40	v
953.08	35.89	46	v
75.24	31.1	40	h
949.12	35.92	46	h
947.2	35.89	46	h
76.44	29.56	40	h
78.68	29.55	40	h

* - IF ANY MEANS: EMISSION NOT COUNTED FOR JUDGEMENT



The six highest emissions for each polarization (H/V) in the frequency range 30 MHz – 1000 MHz are as following:

Frequency [MHz] (1)	Detector (2)	Antenna polarization (3)	Radiated emission [dBµV/m] (4)	Radiated emission [µV/m] (5)	Limit [dBµV/m] (3 m) (6)	Limit [µV/m] (3 m) (7)	Result (8)
34.16	QP	V	38.6	85.11	40.0	100	Pass
31.88	QP	V	38.2	81.28	40.0	100	Pass
33.40	QP	V	38.2	81.28	40.0	100	Pass
32.28	QP	V	38.1	80.35	40.0	100	Pass
34.52	QP	V	37.9	78.52	40.0	100	Pass
32.32	QP	V	36.1	63.83	40.0	100	Pass
77.40	QP	H	36.1	63.83	40.0	100	Pass
75.92	QP	H	35.4	58.88	40.0	100	Pass
77.04	QP	H	34.7	54.32	40.0	100	Pass
79.28	QP	H	34.5	53.09	40.0	100	Pass
73.68	QP	H	32.1	40.27	40.0	100	Pass
75.24	QP	H	31.1	35.89	40.0	100	Pass

(1) = test frequency
(2) = used detector - quasi peak (QP), peak (PK), average (AV)
(3) = polarization of the test antenna (Horizontal/Vertical)
(4) = Reading of test receiver + coversaion factor
(5) = 10 ^ ((Radiated emission [dBµV/m] (4))/20)
(6) = relevant limit in dBµV/m
(7) = relevant limit in µV/m
(8) = comparison between Limit [dBµV/m] (6) and Radiated emission [dBµV/m] (4)

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Radiated Emissions**.

7. Fundamental Emission

Test site
Measurement of fundamental emissions from EUT was made in the semi-anechoic chamber SAC3 (DC to 40 GHz) located in the test facility.

Applied standards
-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits

Requirements
Acc. e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits.
Limits listed in clause 6 of this report.

Test equipment and test set up
Test equipment used for fundamental emission measurements as given in clause Test equipment of this report.
Test setup used for fundamental emission measurements as given in clause Test Setups of this report.

Detector function selection and bandwidth
Frequency range of fundamental emission 110 – 205 kHz
An EMI test receiver with Average detector was used.

Frequency range	Resolution Bandwidth
110 kHz – 150 kHz (Average Detector)	200Hz
150 kHz – 205 kHz (Average Detector)	9kHz

Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned under “Test conditions” in clause 3.

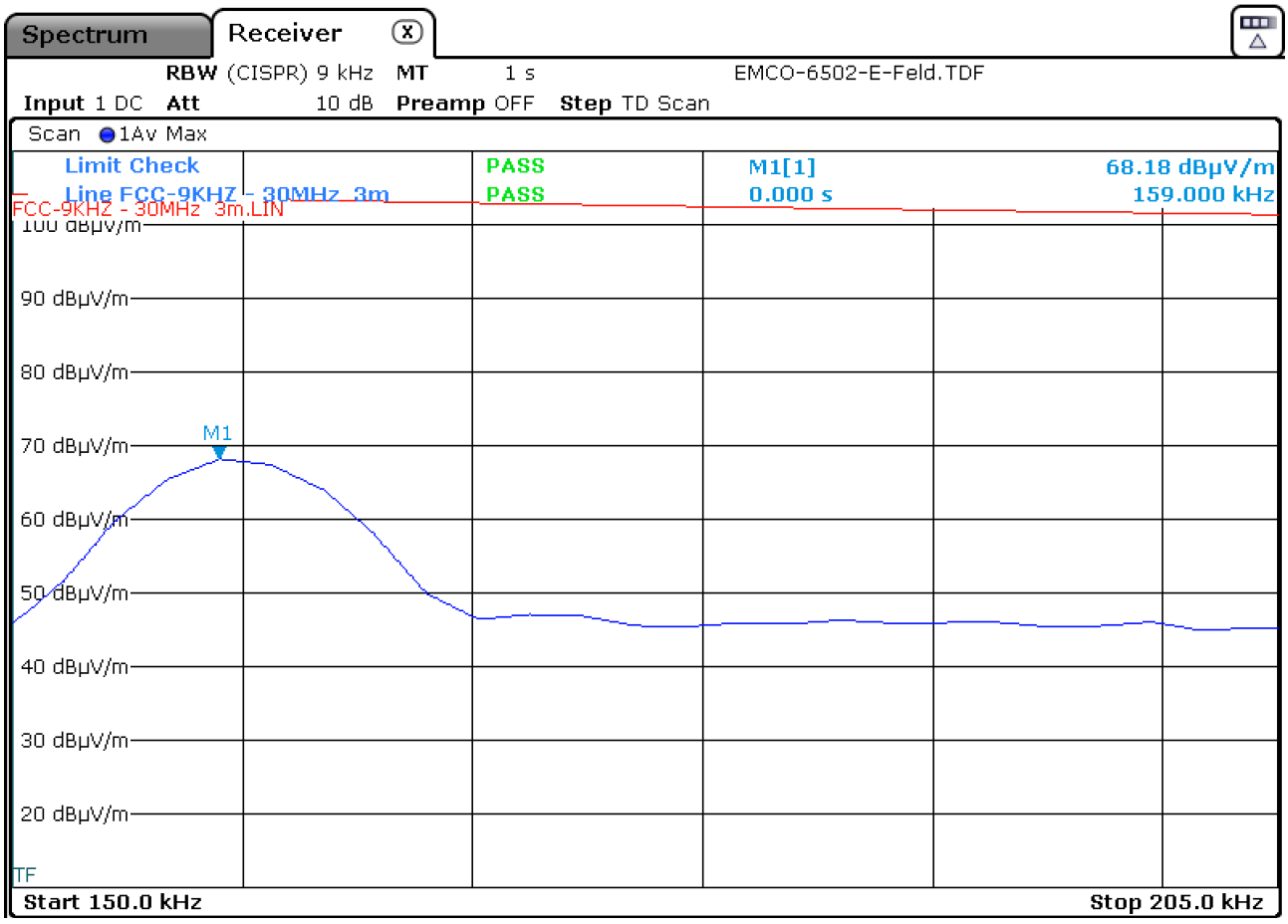
During test the EUT was operated as specified in the technical intstruction of the EUT. The EUT was placed on a 80 cm non metallic table placed on the turntable. The measurement was carried out with all three axis (x, y and z) of the loop antenna, to find the maximum RF energy generated from EUT. The procedure according to ANSI C63.10:2013 is used and all modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation, cable manipulation are performed within the range of likely configurations.

Measurement

As worst cases the mode No. 2. (EUT active – Output: with artificial max. load 500mA; with distance (2mm) contacted mode) and antenna postion “z“ was found and documented in this report

Measurement was performed on 12.10.2020

Highest Fundamental Emission



Frequency [kHz]	Radiated emission [dBµV/m]	Radiated emission [µV/m]	Limit [dBµV/m] (3 m)	Limit [µV/m] (3 m)	Margin [dB]	Result
159.00	**68.18**	**2564.5**	**103.59**	**151182**	**35.41**	**Pass**

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Fundamental Emission**.

8. Test equipment

Test equipment used for Conducted Mains emissions:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Test-Receiver	Rohde & Schwarz	ESHS30	10571	842053/008	2019 – Mar.	3 years
Software	PKM	PKM U5/6	-/-	V1.01.03	-/-	-/-
Line impedance stabilisation network (LISN)	Rohde & Schwarz	ESH2-Z5	10139	879675/028	2019 – Jan.	3 years
Shielded room	Siemens	(6,2 x 4,7 x 3,3) m (l x w x h) DC – 10 GHz	10113	1	-/-	-/-

Test equipment used for radiated Measurements:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ESR7	11676	101694	2018-March	3 years
Test-Receiver	Rohde & Schwarz	ESVS30	10572	833825/010	2020-April	3 years
Antenna 9 kHz – 30 MHz	EMCO	6502	10546	2018	2017-Nov.	3 years
Antenna 30 MHz – 1 GHz	Chase	CBL6111C	10022	1064	2019-Dec.	3 years
Cable	el-spec GmbH	FlexCore-SMA11-SMA11-8000-ARM	11625	-/-	2017-Dec.	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI-ANECHOIC-CHAMBER"	11609	004/16	2019-March	3 years

Test equipment used for Fundamental Emission:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ESR7	11676	101694	2018-March	3 years
Antenna 9 kHz – 30 MHz	EMCO	6502	10546	2018	2017-Nov.	3 years
Cable	el-spec GmbH	FlexCore-SMA11-SMA11-8000-ARM	11625	-/-	2017-Dec.	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI-ANECHOIC-CHAMBER"	11609	004/16	2019-March	3 years

All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of conducted emissions was made with instruments conforming to American National Standard Specification, ANSI C63.4-2014.

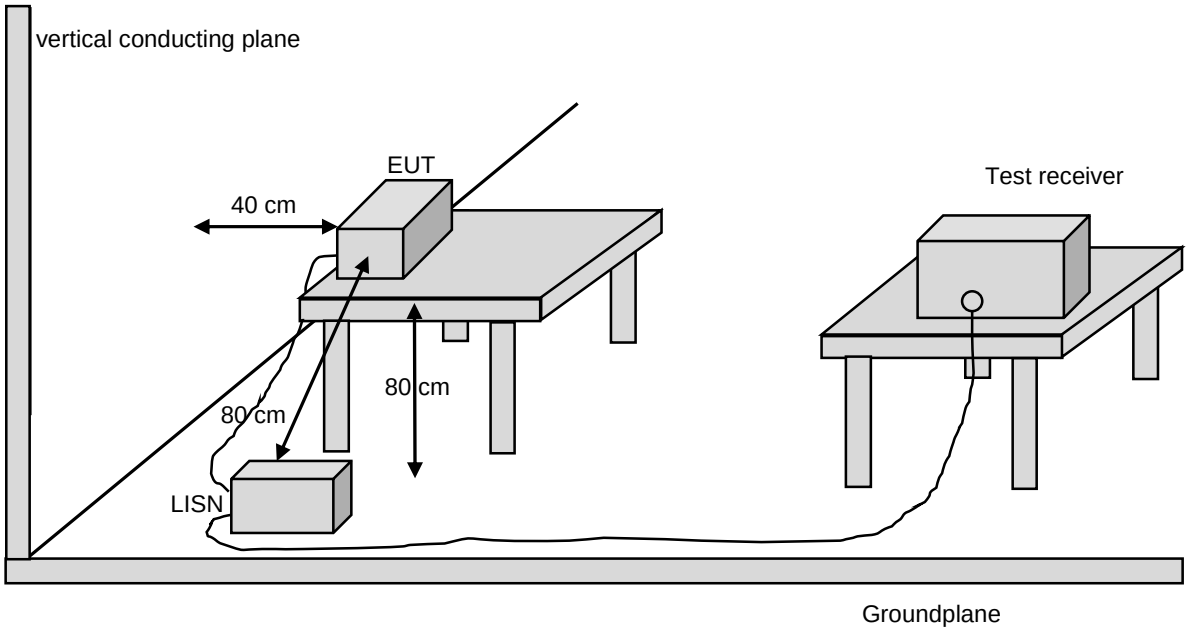
Test equipment to support EUT functions:

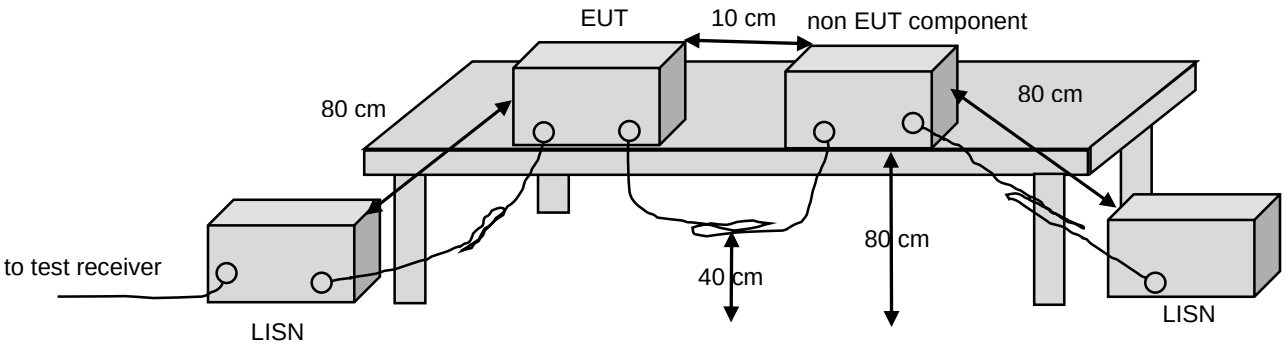
Kind of equipment	**Manufacturer**	**Type**	**Ident no.**
AC-Adaptor[1]	Qualcomm	GA-QC810	-/-
USB cable[1]	-/-	USB Typ A – Micro USB	-/-
USB Detector[1]	Keweisi	Voltage and Ampere meter	-/-
Artificial load[2]	TDK	EA02W122T	-/-
Battery Pack[1]	ZENS	ZEPPO4B	-/-

[1] Ancillary equipment, property of Test Laboratory
[2] Ancillary equipment, provided by applicant

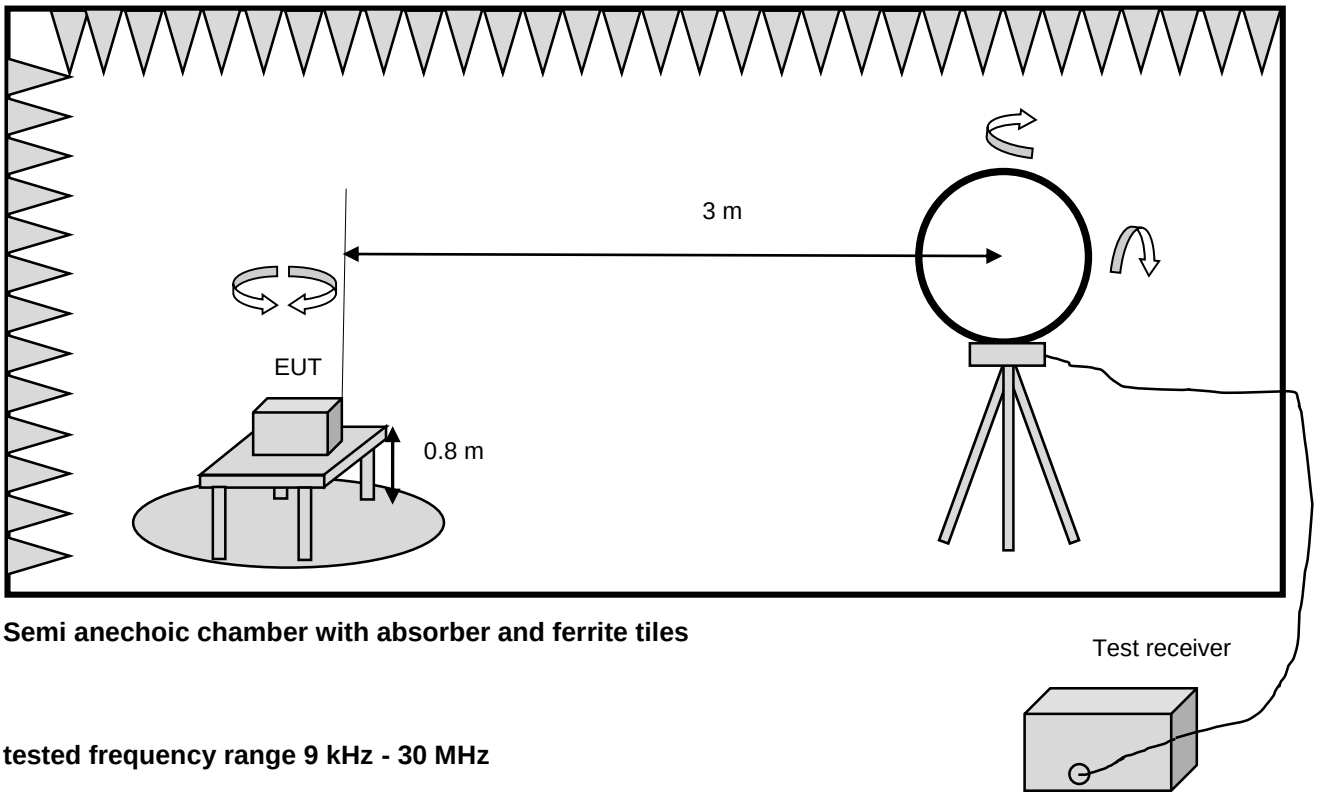
9. Test Setups

Block diagram Conducted Mains emissions





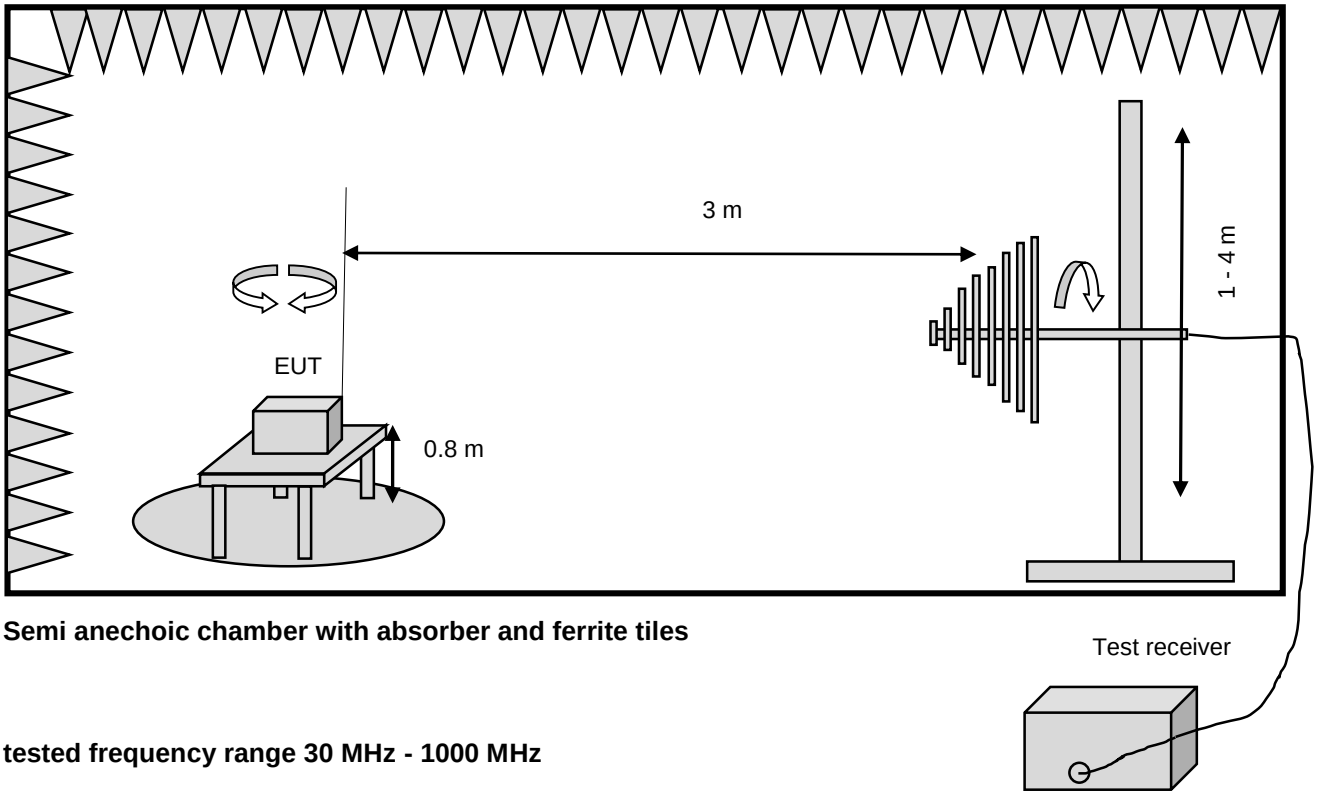
Block diagram Radiated emissions



Semi anechoic chamber with absorber and ferrite tiles

tested frequency range 9 kHz - 30 MHz

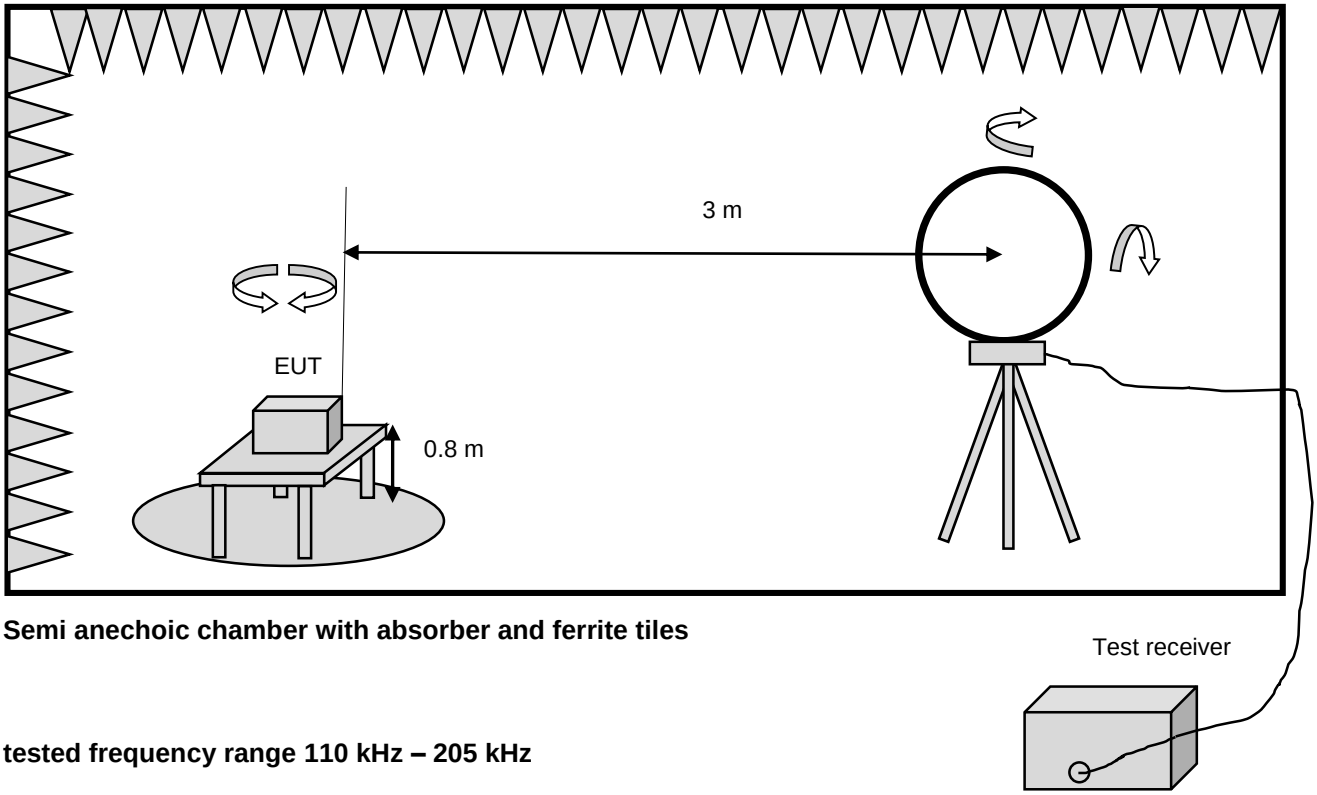
Block diagram Radiated emissions



Semi anechoic chamber with absorber and ferrite tiles

tested frequency range 30 MHz - 1000 MHz

Block diagram Fundamental emission



Semi anechoic chamber with absorber and ferrite tiles

tested frequency range 110 kHz – 205 kHz

10. Measurement uncertainthy

according to *CISPR 16-4-2 Edition 2.0 2011-06*

Measurement	**calculated uncertainty U_{lab}**	**Specified CISPR uncertainty according CISPR 16-4-2 Edition 2.0 2011-06, table 1 U_{CISPR}**
Conducted disturbance at mains port using AMN 9 kHz – 150 kHz	3.6 dB	3.8 dB
Conducted disturbance at mains port using AMN 150 kHz – 30 MHz	3.2 dB	3.4 dB
Magn. fieldstrength 9kHz - 30MHz	3.4 dB	-/-
Radiated disturbance (electric field strength in the SAC) 30 MHz to 1 000 MHz	4.7 dB	6.3 dB
Radiated disturbance (electric field strength in the SAC) 1 GHz to 26.5 GHz	4.1 dB	-/-

Measurement	**calculated uncertainty U_{lab}**	**Maximum measurement uncertainty**
Channel Bandwidth	1.17 %	±5 %
RF output power, conducted	±1.36 dB	±1.5 dB
Power Spectral Density, conducted	±1.99 dB	±3 dB
Unwanted Emissions, conducted	±1.71 dB	±3 dB
All emissions, radiated	±4.8 dB	±6 dB
Temperature	±0.72 °C	±3 °C
Supply voltages	±0.76 % (DC up to 40V) ±1.74 % (AC 50Hz up to 400V)	±3 %
Time	±0.012 %	±5 %

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % (k = 2).

11. Photos setup

Refer to “0002-fcc-photos test setup.pdf” file

12. Conclusions

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant §15.207 Conducted Limits, §15.209 Radiated emission limits; general requirements.

Following specific modifications and/or special attributes are necessary to pass the above mentioned requirements:

none

12.10.2020	M. Beindl, Laboratory Engineer	
Erstellt am/*prepared on*	**(Name/***name* / **Stellung/***position***)**	**(Unterschrift/***signature***)**
12.10.2020	A. Tropmann, Head of Laboratory	
Freigabe am/released *on*	**(Name/***name* / **Stellung/***position***)**	**(Unterschrift/***signature***)**

13. Photos of tested sample

Refer to “0002-fcc-ext-photos.pdf” file

End of test report