

TEST REPORT # EMCC-981261EIEB, 2019-09-02

- This Test Report supersedes Test Report #EMCC-981261EIE, 2019-08-29 -

EQUIPMENT UNDER TEST:

Trade Name: Charging Stand
Type/Model: 7052 20
Serial Number(s): 19D50446, 19D50450,
Application: Charging Stand
FCC ID: 2ATKA-HSTC705220
Manufacturer: BRAND GMBH & CO. KG
Address: Otto-Schott-Strasse 25
97877 Wertheim
GERMANY
Phone: +49 9342 808 1130
E-Mail: juergen.schraut@brand.de

RELEVANT STANDARD(S): 47 CFR §§ 18.305 / 18.307
KDB 680106

MEASUREMENT PROCEDURE: FCC/OST MP-5 (1986)

TEST REPORT PREPARED BY:

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Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

0 REVISION HISTORY

Project number	Issue date	Chapter	Description
981261EIE	2019-08-29	n.a.	Initial issue
981261EIEB	2019-09-02	n.a.	Correction of FCC ID

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance with the 47 CFR § 18.305 and §18.307 and KDB 680106 requirements applicable to ISM equipment.

1.2 Limits and Reservations

The test results in this report apply only to the particular equipment under test (EUT) as declared in this report. This test report shall not be reproduced except in full without the written permission of EMCCons DR. RAŠEK GmbH & Co. KG.

1.3 Test Laboratory

Test laboratory:	EMCCons DR. RAŠEK GmbH & Co. KG
Accreditation No.:	D-PL-12067-01-04
Address of Labs I, II, III and Head Office:	EMCCons DR. RAŠEK GmbH & Co. KG Boelwiese 8 91320 Ebermannstadt GERMANY
Address of Labs IV and V:	EMCCons DR. RAŠEK GmbH & Co. KG Stoernhofer Berg 15 91364 Unterleinleiter GERMANY
Phone:	+49 9194 7262-0
Fax:	+49 9194 7262-199
E-Mail:	info@emcc.de
Web:	www.emcc.de

1.4 Customer

Company name:	Brand GmbH & CO. KG
Street:	Otto-Schott-Strasse 25
City:	97877 Wertheim
Country:	GERMANY
Name:	Juergen Schraut
Phone:	+49 9342 808 1130
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E-Mail:	juergen.schraut@brand.de

1.5 Manufacturer

Company name:	BRAND GMBH & CO. KG
Street:	Otto-Schott-Strasse 25
City:	97877 Wertheim
Country:	GERMANY
Phone:	+49 9342 808 1130
E-Mail:	juergen.schraut@brand.de

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

1.6 Dates and Test Location

Date of Receipt of EUT: 2019-05-02
Test Date: 2019-05-13, 2019-07-01, 2019-08-02
Test Location: Lab IV

1.7 Ordering Information

Purchase Order: 1/45259685
Date: 2019-05-02
Vendor-Number: 27344

1.8 Climatic Conditions

Date	Temperature	Relative Humidity	Air Pressure	Lab	Customer attended tests
--	°C	%	hPa	--	--
2019-05-13	23	33	993	IV	No
2019-07-01	28	47	975	IV	No
2019-08-02	26	46	974	IV	No
2019-08-09	29	48	-	open field	No

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

The following data is based on customer's information.

Manufacturer:	BRAND GMBH & CO. KG
Type:	Charging Stand, 7052 20
Application:	Charging Stand
No of variants:	0
Serial No(s):	Charging Stand EUT #1: 19D50446 Charging Stand EUT #2: 19D50450
Firmware Version:	Bootloader, Version: 1.2 HST Firmware, Version 0.28
Hardware Version:	Charging Stand, Version 01.00
FCC ID:	2ATKA-HSTC705220
Equipment Class:	Wireless Power Transmission System (WPT)
Type of modulation:	AM, communication from dispenser to charging stand
Data rate(s):	n/a
QI Charging / operating frequency:	110 – 205 kHz
Highest internal Frequency:	205 kHz
Antenna:	Integral
Voltage:	5 V _{DC} via USB power supply
Remarks:	None

Ancillary unit:	Electronic Dispenser EUT #3: 19B22619 (to provoke charging mode)
Firmware Version:	HSe2 Firmware (Dispenser), Version: 01.00
Hardware Version:	Electronic Dispenser, Version 01.00

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

2.2 Intended Use

The following description was taken from the multi-lingual user manual 997886_V1 of Charging Stand:

The HandyStep® touch and the HandyStep® touch S are microprocessor-controlled, battery-powered hand dispensers operated by touchscreen.

BRAND precision dispenser tips (PD tips) with type coding are automatically recognized by the device according to their nominal volumes and allow quick volume selection. Compatible dispenser tips from other manufacturers can also be used after manually selecting the corresponding volume.

Inductive charging via the charging stand

The charging stand can charge inductively as soon as the power adapter is connected. Do not place any magnetic data media (e.g. credit cards) near the charging stand.

2.3 EUT Peripherals/Simulators

The EUT peripheral consists of a switching power supply with USB-C cable, Model No.: BI12T-050140-IU. The input of the power supply is AC 100 - 240 V at 50/60 Hz, the output is DC 5V, 1.4 A.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

2.4 Mode of operation during testing and test setup

The equipment under test (EUT) was operated during the tests under the following conditions.

Description of modes as taken from the multi-lingual user manual 997886_V1 of HandyStep®touch and charging stand.

Using the charging stand

The charging stand requires the power adapter and the USB cable of the HandyStep®touch or the HandyStep®touch S.

Charging stand indicators

- Charging stand light is blue: the battery is charging.
- Charging stand light is off: the battery is charged or there is no device in the charging stand.
- Charging stand lights up intermittently: the battery cannot charge. Place the device in the charging station again.

The following mode was used for all tests:

the electronic dispenser (EUT#3) is placed in the charging stand, the charging stand light is blue and the battery of the electronic dispenser is being charged.

2.5 Modifications required for compliance

None.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

3 TEST RESULTS SUMMARY

Summary of test results for the following EUT:

Manufacturer: BRAND GMBH & CO. KG
Type: 7052 20
Serial No.: EUT #1: 19D50446
EUT #2: 19D50450
Electronic dispenser: EUT #3: 19B22619

Requirement	47 CFR Section	Report Section	Tested EUT	Result
AC Power Line Conducted Emissions 150 kHz - 30 MHz	§ 18.307	4.1	19D50450 19B22619	Compliant
Radiated Emissions 9 kHz – 30 MHz	§ 18.305	4.2.4	19D50446 19B22619	Compliant
Maximum Permissible Exposure (MPE)	N.A.	4.3	19D50446 19B22619	Compliant

N.A. – not applicable.

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedures described in ANSI C63.10-2013 and all applicable Public Notices received prior to the date of testing. All requirements were found to be within the limits outlined in this report.

The test results in this report apply only to the particular equipment under test (EUT) as declared in this report.

Test Personnel: Wolfgang Kiss

Issuance Date: 2019-09-02

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4 DETAILED TEST RESULTS

4.1 AC Power Line Conducted Emissions

Test Requirement: 47 CFR, Part § 18.307
Test Procedure: MP-5 (1986)

4.1.1 Regulation

47 CFR § 18.307 Conduction limits

For the following equipment, when designed to be connected to the public utility (AC) power line the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following tables. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal using a 50 μ H/50 ohms line impedance stabilization network (LISN).

(b) All other part 18 consumer devices:

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(d) If testing with a quasi-peak detector demonstrates that the equipment complies with the average limits specified in the appropriate table in this section, additional testing to demonstrate compliance using an average detector is not required.

4.1.2 Test Procedures

Testing is performed acc. to MP-5 (1986).

Tabletop and their ancillary devices are placed on a nonconducting table with nominal dimension of 1.0 m by 1.5 m, height 0.8 m above the ground plane. The EUT is centered laterally (left to right facing the tabletop) on the tabletop and its rear is flush with the rear of the table. Accessories or peripherals that are part of a system tested on a tabletop are being placed in a test arrangement on one or both sides of the host with a 10 cm separation between the nearest points of the cabinets.

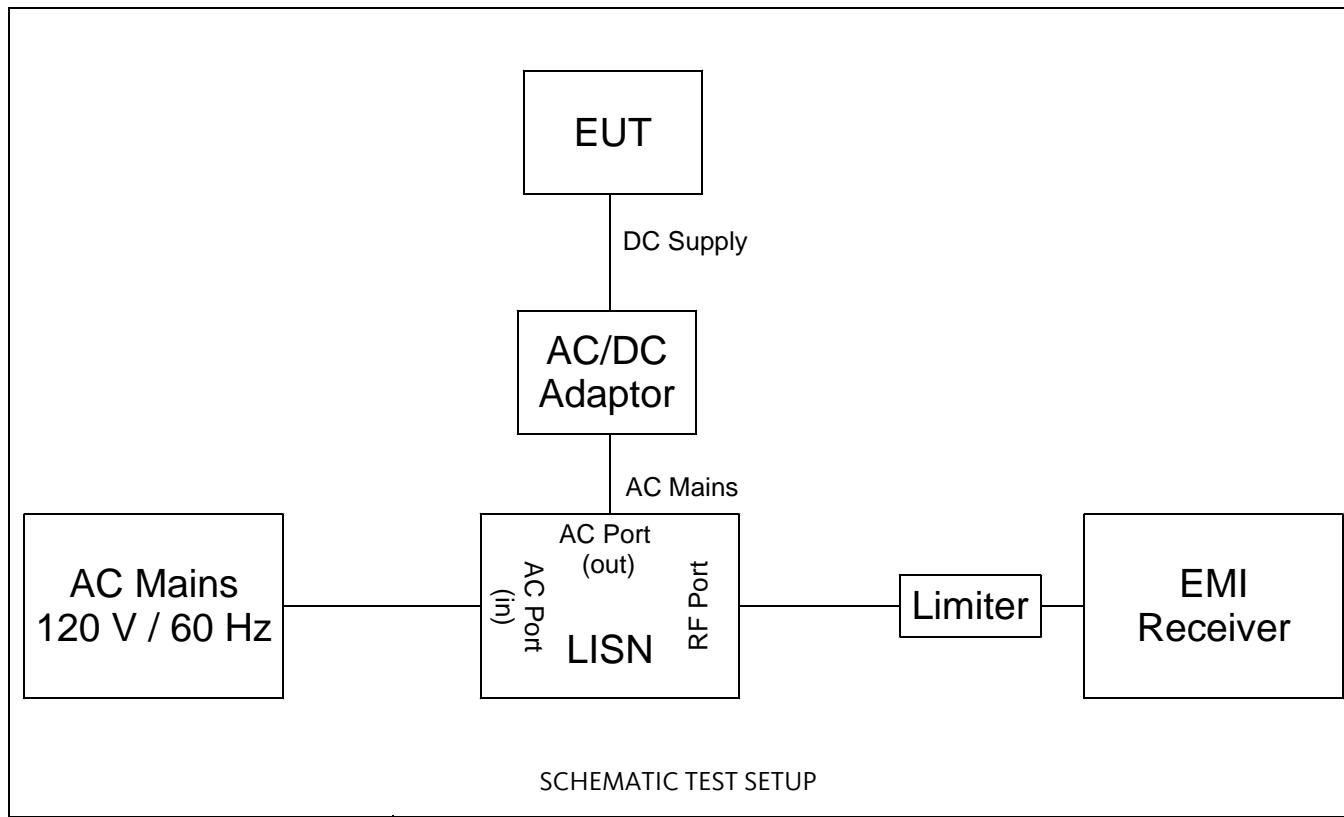
Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center forming a bundle 30 cm to 40 cm long.

The EUT's AC mains or the EUT's AC/DC adaptor is connected to a LISN. Ancillaries having an AC mains connector are connected to a separate LISN.

The measurement receiver is connected to the 50 Ω RF port of the LISN.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.1.3 Test Setup



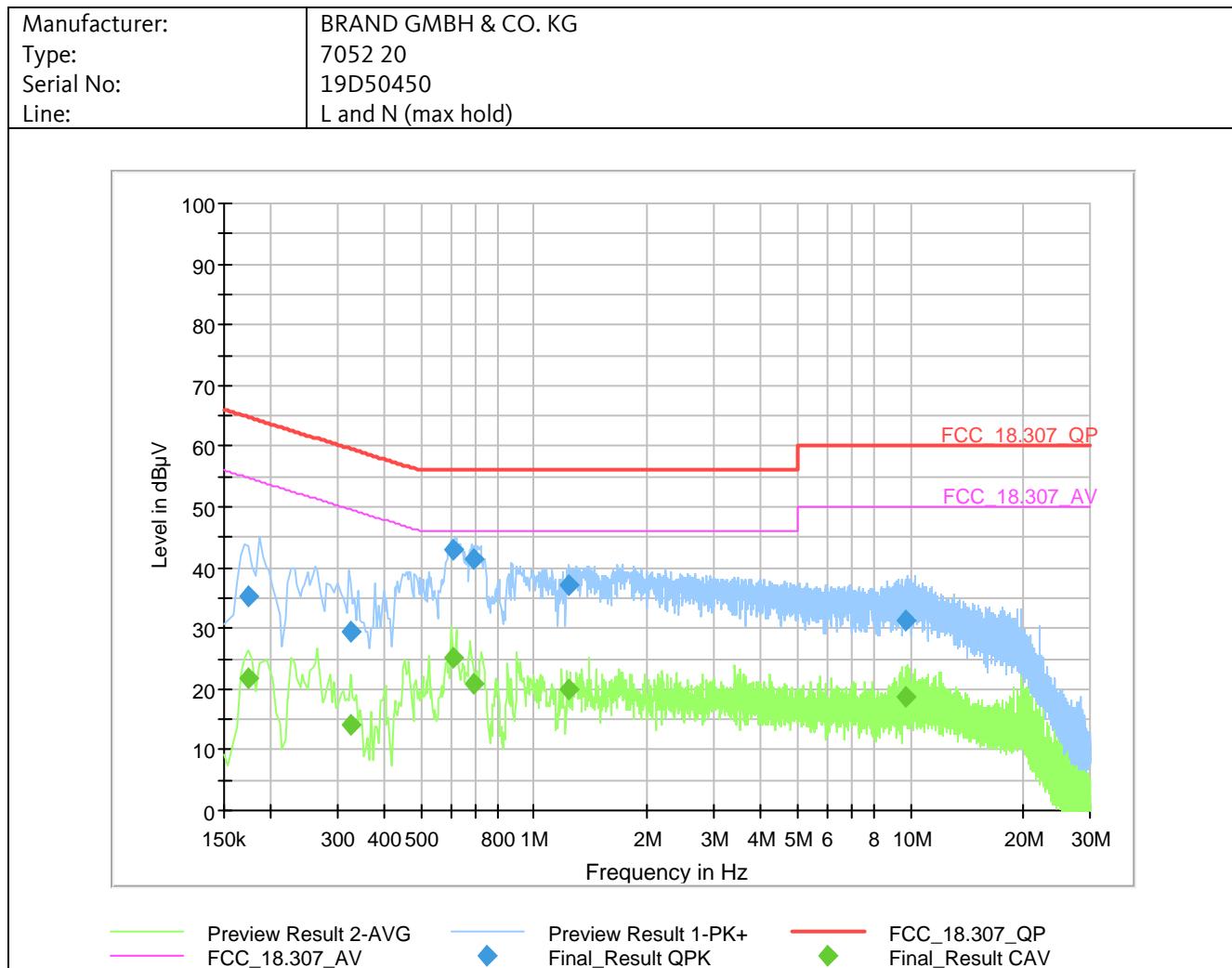
SCHEMATIC TEST SETUP

Requirement: 47 CFR, § 18.307 Procedure: MP-5 (1986) Power Source: #1 Receiver: #516 LISN: #1901 TEST EQUIPMENT USED: Refer to chapter 5 of this document. 1, 516, 1890, 1901, 2721, 3184, 4026, 4717, 5392, 5551	 <p>A photograph showing the physical test setup. On the left, a grey power source unit sits on a table. A black power cord connects it to a grey 'LISN' box mounted on a wooden wall. The LISN box has two red knobs and a digital display. A black cable runs from the LISN box to a white 'EMI Receiver' unit on the right. The 'EMCC DR. RAŠEK' logo is visible on the wooden wall.</p>
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Photo of Setup

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.1.4 Detailed Test Data



Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.1740	35.4	---	64.8	29.4	1000	9.0	N
0.1740	---	21.8	54.8	33.0	1000	9.0	N
0.3255	---	14.0	49.6	35.6	1000	9.0	N
0.3255	29.6	---	59.6	30.0	1000	9.0	N
0.6095	---	25.3	46.0	20.7	1000	9.0	L1
0.6095	42.8	---	56.0	13.2	1000	9.0	L1
0.6935	41.5	---	56.0	14.5	1000	9.0	L1
0.6935	---	20.7	46.0	25.3	1000	9.0	L1
1.2375	---	20.0	46.0	26.0	1000	9.0	L1
1.2375	37.2	---	56.0	18.8	1000	9.0	L1
9.7255	---	18.7	50.0	31.3	1000	9.0	L1
9.7255	31.3	---	60.0	28.7	1000	9.0	L1

Worst case results listed, only.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.1.5 Test Result

Manufacturer: BRAND GMBH & CO. KG
Type: 7052 20
Serial No.: 19D50450
Test date: 2019-05-13
Test Personnel: Wolfgang Kiss

The EUT meets the requirements of this section.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.2 Radiated Emissions

Test Requirement: 47 CFR, Part § 18.305
Test Procedure: MP-5 (1986)

4.2.1 Regulation

47CFR § 18.305 Field strength limits

(a) ISM equipment operating on a frequency specified in §18.301 is permitted unlimited radiated energy in the band specified for that frequency.
(b) The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (μ V/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 $25 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
	Any non-ISM frequency	Below 500* 500 or more	15 $15 \times \text{SQRT}(\text{power}/500)$	300 ¹ 300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 ⁽²⁾	1,600 ⁽²⁾
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	$2,400/F(\text{kHz})$ $2,400/F(\text{kHz}) \times \text{SQRT}(\text{power}/500)$	300 ³ 300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	$24,000/F(\text{kHz})$ 15	30 30
Induction cooking ranges	Below 90 kHz On or above 90 kHz	Any Any	1,500 300	⁴ 30 ⁴ 30

* Applicable requirement

¹Field strength may not exceed 10 μ V/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

²Reduced to the greatest extent possible.

³Field strength may not exceed 10 μ V/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

⁴Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

Notes

- The tighter limit shall apply at the boundary between two frequency ranges.
- Testing for compliance with these limits may be made at closer distances, provided a sufficient number of measurements are taken to plot the radiation pattern, to determine the major lobes of radiation, and to determine the

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

expected field strength level at 30, 300, or 1600 meters. Alternatively, if measurements are made at only one closer fixed distance, then the permissible field strength limits shall be adjusted using 1/d as an attenuation factor.

47CFR § 18.309 Frequency range of measurements

(a) For field strength measurements:

Frequency band in which device operates (MHz)	Range of frequency measurements	
	Lowest frequency	Highest frequency
Below 1.705	Lowest frequency generated in the device, but not lower than 9 kHz	30 MHz
1.705 to 30	Lowest frequency generated in the device, but not lower than 9 kHz	400 MHz
30 to 500	Lowest frequency generated in the device or 25 MHz, whichever is lower	Tenth harmonic or 1000 MHz, whichever is higher
500 to 1000	Lowest frequency generated in the device or 25 MHz, whichever is lower	Tenth harmonic
Above 1000	... do	Tenth harmonic or highest detectable emission.

4.2.2 Test Site Correlation for H Field Measurement in Semi-Anechoic Chamber (SAC)

The measurement was performed at an open field site and in the semi-anechoic room (SAC) at a test distance of 10 m. A calibrated loop antenna was positioned with its plane vertical at the test distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the field generating loop antenna. The center of the calibrated loop antenna was 2 m above the ground.

The EUT was placed on a styrofoam support at a height of 80 cm.

Freq ¹ MHz	Detector	Distance m	FSAC dB μ V/m	Fopen dB μ V/m
0.13	AV	10	51.8	-
0.12	AV	10	-	49.2

These measurements were used to evaluate a correction of the open field measurement to the semi-anechoic room measurement, measurement results from the SAC are worst case measurements. Detailed test results are listed under chapter Detailed Test Data.

¹ The EUT aligns the charging frequency automatically, hence the measured frequencies are slightly different

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.2.3 Calculation of Field Strength Limits

E.g. radiated emissions field strength limits for the frequency band 9 kHz - 30 MHz:

15 μ V/m at 300 meters

Using the equation:

$$E_{dB\mu V/m} = 20 \log (E_{\mu V/m})$$

where

$E_{dB\mu V/m}$ = Field Strength in logarithmic units (in $dB\mu V/m$)

$E_{\mu V/m}$ = Field Strength in linear units (in $\mu V/m$)

A field strength limit of 15 μ V/m corresponds with 23.5 $dB\mu V/m$.

Distance correction (limit)

Remark: The preferred method is the correction of the measured field strength (refer to 4.2.3) instead of limit correction. Only one correction method shall be applied to a particular measurement.

In case of testing being performed in a distance other than specified, the limit may be adjusted by a Distance Extrapolation Factor DF of 20 dB per decade, which is calculated by the following equation:

$$DF = 20 \log (D_{test}/D_{specification})$$

where

DF = Distance Extrapolation Factor (in dB)

D_{test} = Distance, where measurement was performed (in m)

$D_{specification}$ = Distance acc. to specification (in m)

Example:

Assume a limit specified in 300 m and a measurement performed at 10 m giving a Distance Extrapolation Factor (acc. to 47 CFR Part §18.305) of $DF = 20 \log (10 / 300) = -29.5$.

Assuming a measured field strength level of 48.8 $dB\mu V/m$ is obtained in a distance of 10 m. The Distance Factor of -29.5 dB is added to the limit, which is specified with 23.5 $dB\mu V/m$, giving a corrected limit of 53 $dB\mu V/m$.

The margin is therefore $53 dB\mu V/m - 48.8 dB\mu V/m = 4.2 dB$.

The 48.8 $dB\mu V/m$ value can be mathematically converted to its corresponding level in $\mu V/m$.

$$FS = 48.8 - 29.5 = 19.3 [dB\mu V/m]$$

$$\text{Level in } \mu V/m = \text{Common Antilogarithm } (19.3/20) = 9.2$$

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.2.4 Radiated Emissions 9 kHz – 30 MHz

4.2.4.1 Test Procedure Semi-Anechoic Chamber

Measurement was performed in a FCC listed semi-anechoic room at a test distance of 10 m. A calibrated loop antenna was positioned with its plane vertical at the test distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. For certain applications, the loop antenna may also need to be positioned horizontally at the specified distance from the EUT. Instead of changing the loop antenna polarization to horizontal the EUT antenna was rotated by 90 degrees. I.e. tests performed for 2 EUT antenna polarizations. The center of the loop antenna was 2 m above the ground.

The EUT was tested on a 0.8 meter high tabletop.

The EUT is connected to its associated peripherals, with any excess I/O cabling bundled to approximately 1 meter.

Measurement initially performed as a pre-scan in the full frequency range in order to find worst case emissions.

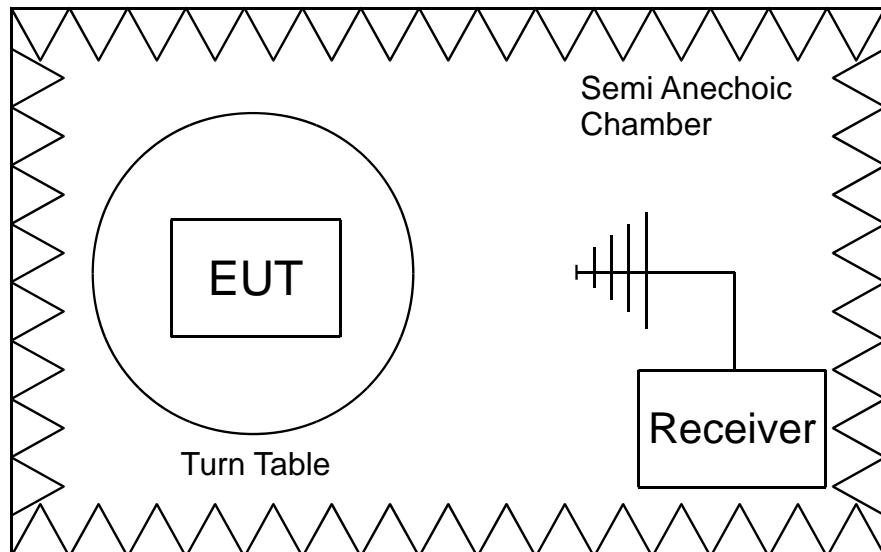
Worst case emissions are listed under chapter: Detailed Test Data.

According to 47CFR § 18.305 (see chapter 4.2.1) the field strength limit at a test distance of 10 m is 53 dB μ V/m².

Radiated Emissions Test Characteristics	
Frequency range	9 kHz - 30 MHz
Test distance	10 m
Test instrumentation resolution bandwidth	200 Hz (9 kHz – 150 kHz) 10 kHz (150 kHz – 30 MHz)
Receive antenna height	2 m
Receive antenna polarization	Vertical/Horizontal
Measurement location	Semi Anechoic Chamber (SAC)

² The limit applies to a non-ISM frequency with RF power generated by the equipment below 500 W which results in a field strength limit of 15 μ V/m at a test distance of 300 m. For a detailed calculation see chapter 4.2.3.

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4.2.4.2 Test Setup Semi-Anechoic Chamber

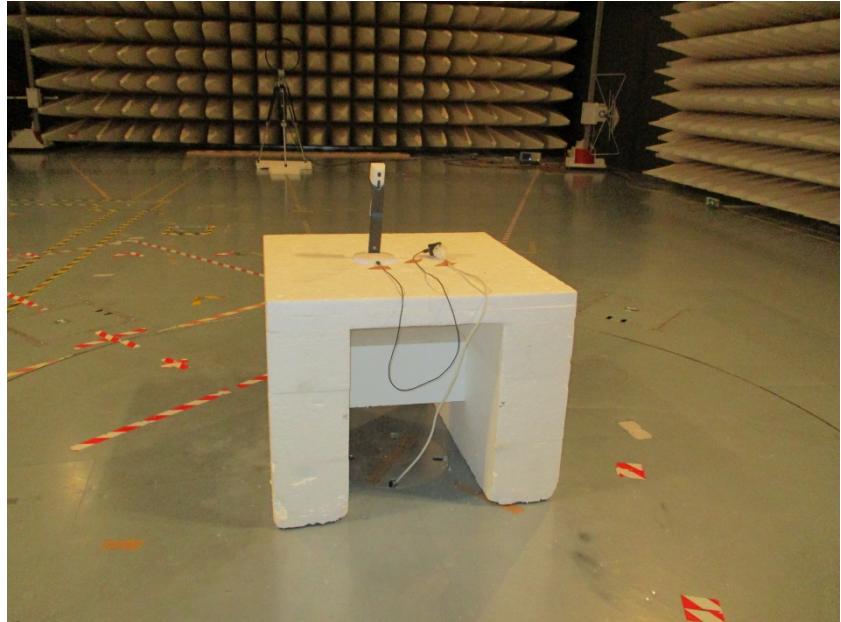
SCHEMATIC TEST SETUP

Requirement: 47 CFR, § 18.307
Procedure: FCC/OST MP-5

Receiver: #3846
Antenna: #374

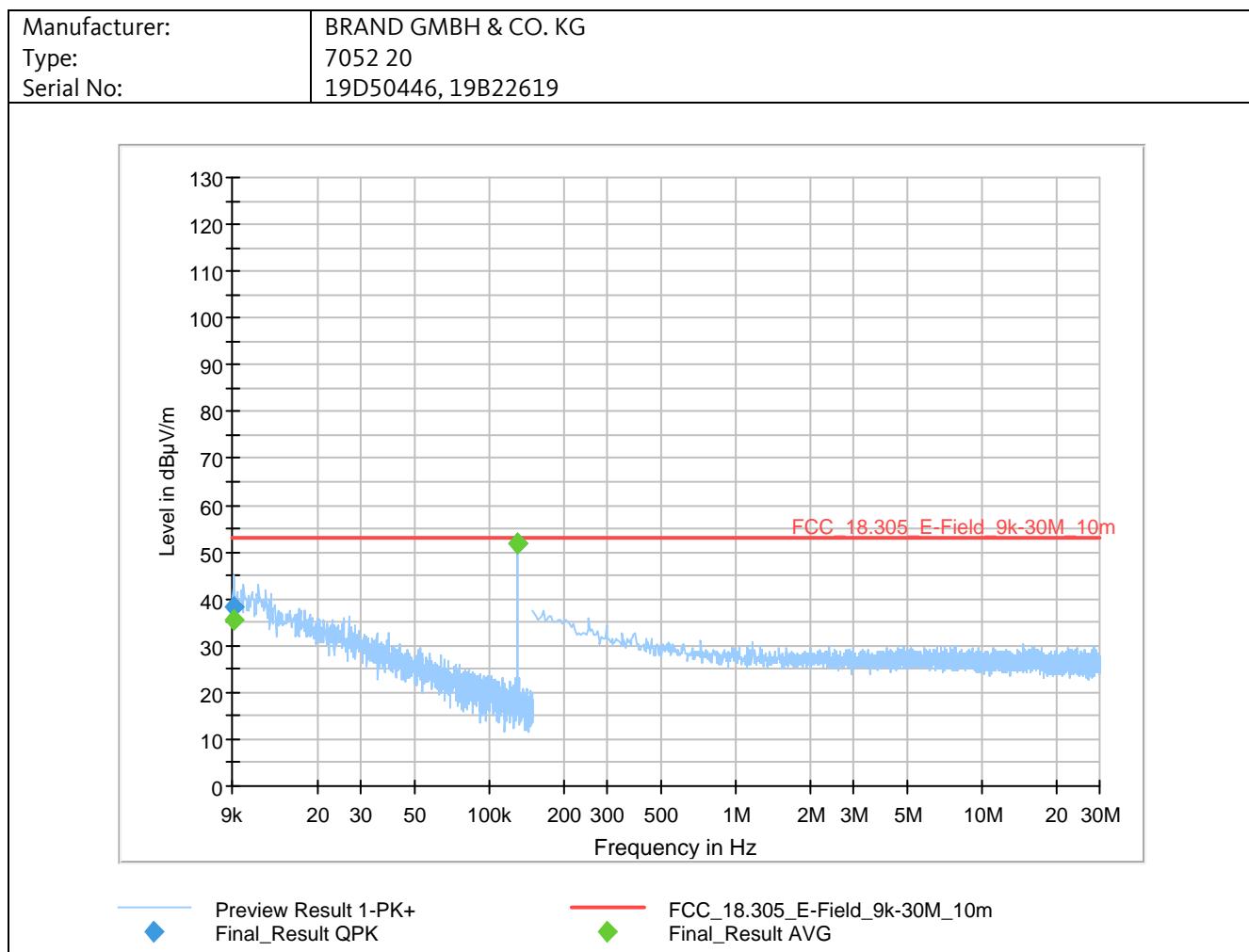
Test distance: 10 m

TEST EQUIPMENT USED:
Refer to chapter 5 of this document.
1, 374, 1292, 1416, 1889, 3846,
4075, 4717, 5392



Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.2.4.3 Detailed Test Data Semi-Anechoic Chamber



Final Result:

Frequency MHz	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Meas. Dist m	Dist. Corr. dB	Ant. Corr. dB
0.01	35.4	53	17.6	0.2	10	-29.5	20
0.13	51.8	53-	1.2	0.2	10	-29.5	20

All tests performed at 10 m distance. The table above contains worst-case emissions, only. For further details refer to the pre-scan test plot above.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.2.4.4 Test Result Semi-Anechoic Chamber

Manufacturer: BRAND GMBH & CO. KG
Type: 7052 20
Serial No.: 19D50446, 19B22619
Test date: 2019-08-02
Test Personnel: Wolfgang Kiss

The EUT meets the requirements of this section.

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4.2.4.5 Test Procedure Open Field Side

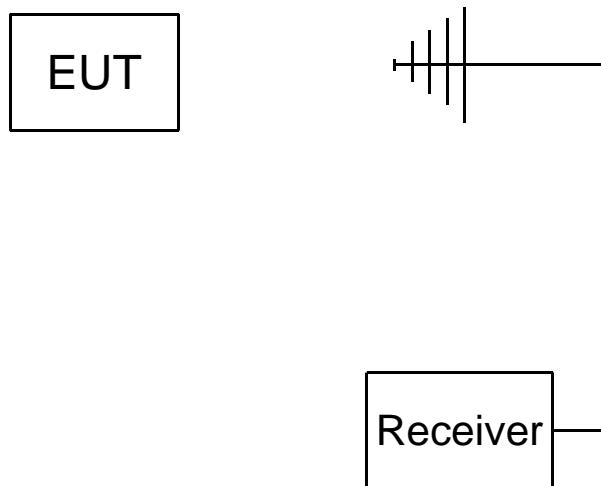
A comparison measurement was done at an open field site following ANSI C63.10-2013 without a conductive metal ground plane. The measurement distance and antenna height was taken from MP-5 (1986).

The measurement was performed at an open field site at a test distance of 10 m.

A calibrated loop antenna was positioned with its plane vertical at the test distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about EUT. The center of the calibrated loop antenna was 2 m above the ground.

The EUT was placed on a styrofoam support at a height similar to the EUT position in the SAC.

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4.2.4.6 Test Setup Open Field Site

SCHEMATIC TEST SETUP

<p>Requirement: 47 CFR, § 18.307 Procedure: FCC/OST MP-5 (without ground plane)</p> <p>Receiver: #303 Antenna: #374</p> <p>Test distance: 10 m</p> <p>TEST EQUIPMENT USED: Refer to chapter 5 of this document. 303, 374, 4529, 6344</p>	 <p>Photo of Setup</p>
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Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.2.4.7 Detailed Test Data Open Field Site

Final Result:

Frequency MHz	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Meas. Dist m	Dist. Corr. dB	Ant. Corr. dB
0.12	49.2	53	3.8	0.2	10	-29.5	20

4.2.4.8 Test Result Open Field Site

Manufacturer: BRAND GMBH & CO. KG
Type: 7052 20
Serial No.: 19D50446, 19B22619
Test date: 2019-08-09
Test Personnel: Wolfgang Kiss

The EUT meets the requirements of this section.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.3 Maximum Permissible Exposure (MPE)

Test Requirement: KDB680106

4.3.1 Test procedure

The electrical and magnetic field strength was measured at a distance of 15 cm from the EUT.

A pre-scan was performed around the complete EUT to identify the positions of maximum electric and magnetic field strength for the specified distance.

The magnetic field was measured in μ T by means of an Exposure Level Tester set to max hold over a period of 6 minutes.

The maximum field strength was measured with an E-Field Probe set to peak measurement and storing all measured values in a file over a period of 6 minutes. The maximum measured value was used as final result.

Reference levels electric, magnetic and electromagnetic fields (unperturbed rms values) as per 47 cfr 1.1310 Table 1, Limits for Maximum Exposure (MPE):

(B) Limits for General Population/Uncontrolled Exposure

Frequency range (MHz)	E-field strength (V/m)	Magnetic field strength (A/m)
0.3-1.34	614	1.63
1.34-30	824/f	2.19 / f
30-300	27.5	0.073
300-1,500		
1,500-100,000		

Notes:

f = frequency in MHz

According to KDB680106 3c) Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.3.2 Test setup H-Field



The field probe area is 3 cm².

SCHEMATIC TEST SETUP OF MAGNETIC FIELD STRENGTH MEASUREMENT

Test distance: 15 cm

EUT: EUT #1: 19D50446
 EUT #3: 19B22619

TEST EQUIPMENT USED:
Refer to chapter 5 of this document.
1, 1890, 4717, 6690, 6692

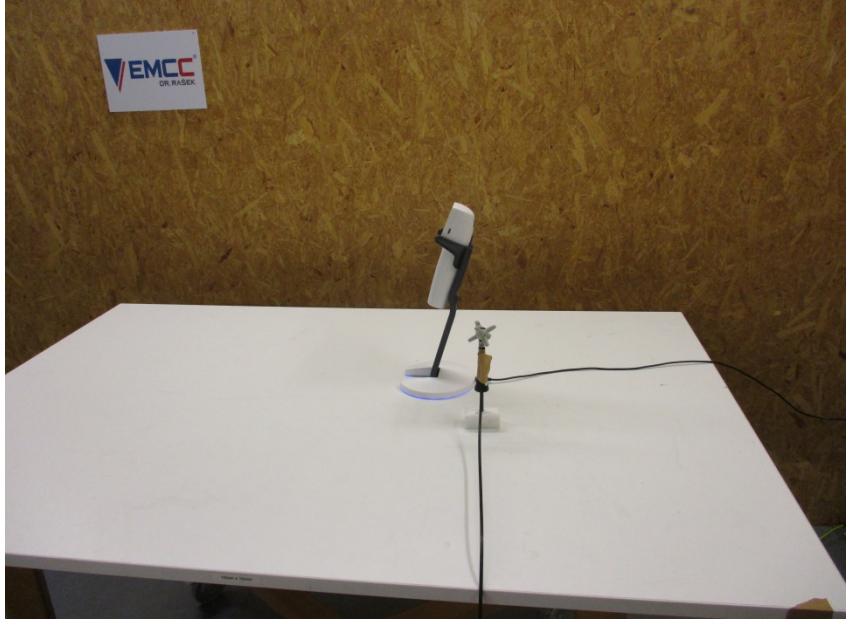


Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.3.3 Test setup E-Field



SCHEMATIC TEST SETUP OF ELECTRICAL FIELD STRENGTH MEASUREMENT

Test distance: 15 cm	
EUT:	EUT #1: 19D50446 EUT #3: 19B22619
TEST EQUIPMENT USED: Refer to chapter 5 of this document. 1, 1890, 4026, 4616, 4717	

 Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

4.3.4 Test results

EUT	Qi / operating frequency range kHz	Max E-field strength ³ V/m	MPE limit at 300 kHz V/m
EUT #1: 19D50446 EUT #3: 19B22619	110 - 205	3.6 (peak)	614

EUT	Qi / operating frequency range kHz	Max B-field strength ³ µT	Magnetic field strength A/m	MPE limit at 300 kHz A/m
EUT #1: 19D50446 EUT #3: 19B22619	110 - 205	0.41 (rms)	0.328	1.63

All measured field strengths are below the MPE limit.

In addition according to customer documentation the following applies, referred to KDB680106 5 b):

1. The power transfer frequency is 110 – 205 kHz
2. The maximum output power from each primary coil is less than 3.5 Watts.
3. The transfer system includes only single primary and secondary coils.
4. The client device is placed directly in contact with the transmitter, the distance is less than 5 mm.
5. Mobile exposure conditions only.
6. All measured H-field strengths are less than 50 % of the MPE limit.

³ Measurement time 360 sec

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

5 TEST INSTRUMENTS

EMCC ID #	Instrument	Manufacturer	Type	Last Calibration	Calibration valid until
1	60-Hz-Converter	AEG	DAMK4/DAG K4	n/a	n/a
303	EMI/RFI Test Receiver	Rohde & Schwarz	ESS	2019-06	2020-12
374	Loop Antenna	Rohde & Schwarz	HFH 2-Z2	2018-11	2021-02
516	EMI Test Receiver	Rohde & Schwarz	ESIB40	2019-04	2020-04
1292	Multi Device Controller	Frankonia	FC02	n/a	n/a
1416	Isolation Transformer	Daitron	J91097-11	n/a	n/a
1889	SR-ULL-01, Semi-Anechoic Chamber (SAC)	EMCC/FRANK.	SAC-10	n/a	n/a
1890	SR-ULL-05, Absorber-Lined Shielded Chamber	EMCC / SIEM / FRANK	SC2-ULL	n/a	n/a
1901	V-LISN 50 ohms//(50 uH + 5 ohms)	Rohde & Schwarz	ESH2-Z5	2018-11	2019-11
2721	Digital Multimeter	Agilent	U1241A	2019-07	2021-07
3184	Pulse Limiter	MTS	MTA-IMP-136	2019-07	2021-07
3846	EMI Test Receiver	Rohde & Schwarz	ESU8	2019-02	2020-02
4026	Notebook	Dell	Latitude E6430	n/a	n/a
4075	Workstation	Dell	Optiplex 7010	n/a	n/a
4529	Thermohygrometer	TFA	30.501	2018-01	2020-01
4616	Isotropic E-Field Probe	Narda / PMM	EP-601	2018-01	2020-01
4717	Web-Thermo-Hygrobarograph	Wiesemann & Theis GmbH WUT	57613 Web-T/Rh/P	2018-01	2020-01
5392	EMC Measurement Software V10.28.00 and V10.35.02	Rohde & Schwarz	EMC32	n/a	n/a
5551	BNC cable	EMCC	BNC003m0	n/a	n/a
6344	Power Supply	Preen	AFV-P-600A	n/a	n/a
6690	Exposure Level Tester ELT-400	Narda	ELT-400	2019-03	2021-03
6692	Field Probe 3cm	Narda	3 cm2	2019-04	2021-04

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

6 MEASUREMENT UNCERTAINTY

Measurement	Measurement Uncertainty
Conducted Emissions, AC mains (150 kHz – 30 MHz)	±3.5 dB
Radiated Emissions, H field (9 kHz – 30 MHz)	±3.0 dB
B-field (10 Hz – 400 kHz)	± 1.6 dB
E-field	± 2 dB
Distances	± 1.0 cm

The reported uncertainty values are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of 95%.

The given values have been calculated on the basis of the following documents:

CISPR 16-4-2:2011+A1:2014, Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty.

JCGM 100:2008, Evaluation of measurement data - Guide to the expression of uncertainty in measurement.

Test on BRAND GMBH & CO. KG 7052 20 to 47 CFR §§ 18.305 / 18.307 and KDB 680106

7 LIST OF ANNEXES

The following annexes are separated parts from this test report.

Description	Pages
Annex 1: Photographs of test setup	4
Annex 2: External photographs of equipment under test	7
Annex 3: Internal photographs of equipment under test	2
Annex 4: Photographs of ancillary equipment	2