



EMC - TEST REPORT

Type / Model Name : B6R-HAT (Handset unit)

Product Description : Handset unit for gas burning appliances (room heaters)

Applicant : Plättner Elektronik GmbH

Address : Lerchenbreite 8

38889 BLANKENBURG, GERMANY

Manufacturer : Mertik Maxitrol GmbH & Co.KG

Address : Warnstedter Str.3

06502 THALE, GERMANY

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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Test Report No. : T40604-02-01KJ	28. May 2019 Date of issue
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Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02



BNetzA-CAB-13/21-07

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (September 2018)

Part 15, Subpart B, Section 15.107	AC Line conducted emission <input type="checkbox"/> Class A device	<input type="checkbox"/> Class B device
Part 15, Subpart B, Section 15.109	Radiated emission, general requirements <input type="checkbox"/> Class A device	<input checked="" type="checkbox"/> Class B device

Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement

ICES-003, Issue 6 (April 2017); Section 6.1	AC Power Line Conducted Emission Limits <input type="checkbox"/> Class A device	<input type="checkbox"/> Class B device
ICES-003, Issue 6 (April 2017); Section 6.2	Radiated Emission Limits <input type="checkbox"/> Class A device	<input checked="" type="checkbox"/> Class B device

ANSI C63.4: 2014

Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

CISPR 16-4-2: 2011 + A1: 2014
EN 55016-4-2: 2011

Uncertainty in EMC measurement

2 SUMMARY

2.1 General remarks

None

2.2 Summary for all EMC tests

Type of test	Test result
Emission:	
A4 Conducted emission (AC mains power / DC power)	Not applicable ¹⁾
A5 Radiated emission (< 1 GHz)	Fulfilled
SER 3 Radiated emission (> 1 GHz)	Fulfilled

1) The test is not applicable, because the EuT is battery powered.

2.3 Final assessment

The equipment under test **fulfills** the EMC requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 08 November 2018

Testing concluded on : 14 November 2018

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Josef Knab
Radio Team

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT

Detailed photos see T40604-02-00KJ attachment B and T40604-02-00KJ attachment C.

3.2 Power supply system utilised

Power supply voltage, V_{nom} : 2x 1.5 V Battery powered

3.3 Highest internal frequency

Highest internal frequency : 918 MHz

3.4 Short description of the Equipment under Test (EUT)

The EuT is an electronic remote ignition and control system for gas appliances with pilot burners and ODS system. All tests were carried out with the test sample "B6R-RATV4PBD".

	Used test sample
Setup for testing	Radiated test sample
Operating frequency	918.0 MHz
Frequency range	902 MHz – 928 MHz
Test signals	cont. modulated & normal operation mode
Serial numer	Cont. CW unmod.: 3518724944 (with temporary SMA antenna connector) Cont. CW mod.: 3518724942 Normal operation mode: 3518724947
Firmware	1.111.x.x.x
Modulation	GFSK
Data rate	32000 bps (bps = bits per second)
Voltage range	2.8 V_{nom}
	2.3 V_{min}
	3.3 V_{max}
Temprature range	20 $^{\circ}C_{nom}$
	-20 $^{\circ}C_{min}$
	50 $^{\circ}C_{max}$

3.5 Variants of the EUT

Transmitter B6R-H (FOIL)					
B6R-H	Frequency		Handset		Color
A	US (918 MHz)	T5P	Thermostat (CSA only)		BD Black tactile
		TL3P	Thermostat, 2nd burner	(8-button)	WD White tactile
		TL20P	Thermostat, 2nd burner, 1 hour shut off (CSA only)	(8-button)	
		TV4P	Thermostat, Fan, Dimmer, 2nd burner	(10-button)	
		TV7P	Thermostat, Fan, ON/OFF light, 2nd burner	(10-button)	
		TV19P	Thermostat, Fan, Dimmer, 2nd burner, 1 hour shut off (CSA only)	(10-button)	
		TV21P	Therm., Fan w/o level "0", Dimmer (OFF in Pilot), 2nd burner	(10-button)	

3.6 EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

- receive mode / standby

3.7 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

Modifications during the EMC test: None

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Accreditation and Recognition of the test laboratory

Within the framework of the Mutual Recognition Agreement (MRA) between the European Community and the USA the EMC test laboratory listed above has been approved as a Conformity Assessment Body (CAB) designated by the EU member states through the conclusion of the MRA on the basis of Article 133 of the treaty

The site is accredited/registered by

- the German accreditation body DAkkS-Registration No.: D-PL-12030-01-01
- the Federal Communications Commission (FCC) Registration Number: 0013864798
- the German Federal Network Agency as Conformity assessment body (CAB) Registration No: BnetzA-CAB-13/21-07

4.3 Statement regarding the usage of logos in test reports

The accreditation and notification body logos displayed in this test report are only valid for standards listed in the accreditation or notification scope of CSA Group Bayern GmbH.

4.4 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 °C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 2011 + A1 / 2014 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.6 Measurement protocol for FCC

4.6.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011

ISED: DE0009

4.6.1.1 Test methodology

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4 procedures.

4.6.1.2 Justification

The Equipment under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.6.2 Details of test procedures

4.6.2.1 General standard information

The test methods used comply with ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

4.6.3 Conducted emission

4.6.3.1 Description of measurement

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω / 50 μ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.6.4 Radiated emission (electrical field 30 MHz - 1 GHz)

4.6.4.1 Description of measurement

Spurious emission from the EUT is measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 metre non-

conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area.

The antenna is positioned 3, 10 or 30 metres horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made with both horizontal and vertical antenna polarization planes and the EUT is rotated 360 degrees.

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver where the correction factors are stored. The FCC or CISPR limit is subtracted from this result in order to provide the limit margins listed in the measurement protocols.

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency	Reading level	+	Correction Factor*	=	Level	-	CISPR Limit	=
Delta								
(MHz)	(dB μ V)		(dB/m)		(dB μ V/m)		(dB)	
719.0	75.0	+	32.6	=	107.6	-	110.0	=
							-2.4	

*Correction Factor = Antenna Factor + Cable Attenuation = 30 dB/m + 2.6 dB = 32.6 dB/m

4.6.4.2 Measurement Procedure

The test setup is prepared with the EUT at the desired EUT-Antenna separation.

The turntable is rotated 360° until the test receiver displays the maximum level at the observed frequency.

The antenna height is then adjusted from 1 m to 4 m maximizing the measured value.

The turntable is re-adjusted to re-affirm the maximum emission value which is then recorded.

This procedure is repeated for all frequencies of interest.

4.6.5 Radiated emission (electrical field 1 GHz - 18 GHz)

4.6.5.1 Description of measurement

Radiated emission from the EUT are measured in the frequency range of 1 GHz to the maximum frequency as specified in 47 CFR Part 15 Subpart A section 15.33, using a tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 0.65 X 1.5 metre non-conducting table 80 centimetres above the ground plane. The turntable must be fully covered with the appropriate absorber (Type VHP-12).

Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4.

The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 3 metres horizontally from the EUT.

Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to a peak detector function and a resolution and video bandwidth of 1 MHz. All tests are performed at a test distance of 3 metres. Hand-held or body-worn devices are rotated around three orthogonal axes in order to determine the position, angle and configuration having the maximum emission. The cables and equipment are placed and moved within the range of their likely positioning to find the maximum emission. These conditions will then be used for the final measurements. The antenna height is then adjusted from 1 m to 4 m maximizing the measured value. The antenna is mounted to a boresight axis so the antenna centre always points to the EUT.

Other devices are placed according to their general purpose. The turntable is rotated 360° until the spectrum analyser displays the maximum level at the observed frequency. The antenna height is then adjusted from 1 m to 4 m maximizing the measured value. The turntable is re-adjusted to re-affirm the maximum emission value which is then recorded. This procedure is repeated for all frequencies of interest.

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When the EUT is larger than the beamwidth of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to demonstrate that emissions are under the limits at the specified test distance.

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emission

For test instruments and accessories used see section 6 Part A 4.

Legend for tables:

QP-L ... QuasiPeak reading including correction factor

AV-L ... Average reading including correction factor

D-Limit... Measured value to limit delta (margin)

5.1.1 Description of the test location

Test location: None

5.1.2 Photo documentation of the test setup

5.1.3 Test result

Remarks: The test is not applicable, because the EuT is battery powered

5.2 Radiated emission < 1 GHz (electric field)

For test instruments and accessories used see section 6 Part A 5.

Legend for tables:

Level vert. QuasiPeak reading including correction factor for vertically polarised antenna
Level hor. QuasiPeak reading including correction factor for horizontally polarised antenna
Limit Limit referred to the appropriate standard
DLimit... Delta between limit and result (margin)
Noise Characteristic of disturbance (narrowband or broadband)

5.2.1 Description of the test location

Test location: OATS 1
Test distance: 3 m

5.2.2 Photo documentation of the test setup



5.2.3 Test result

Frequency range: 30 MHz - 1000 MHz

Min. limit margin >10 dB

The requirements are **FULFILLED**.**Remarks:** For detailed results, please see the following page(s).For description of the measurement see 4.6.4.

5.2.4 Test protocol

Radiation-Test

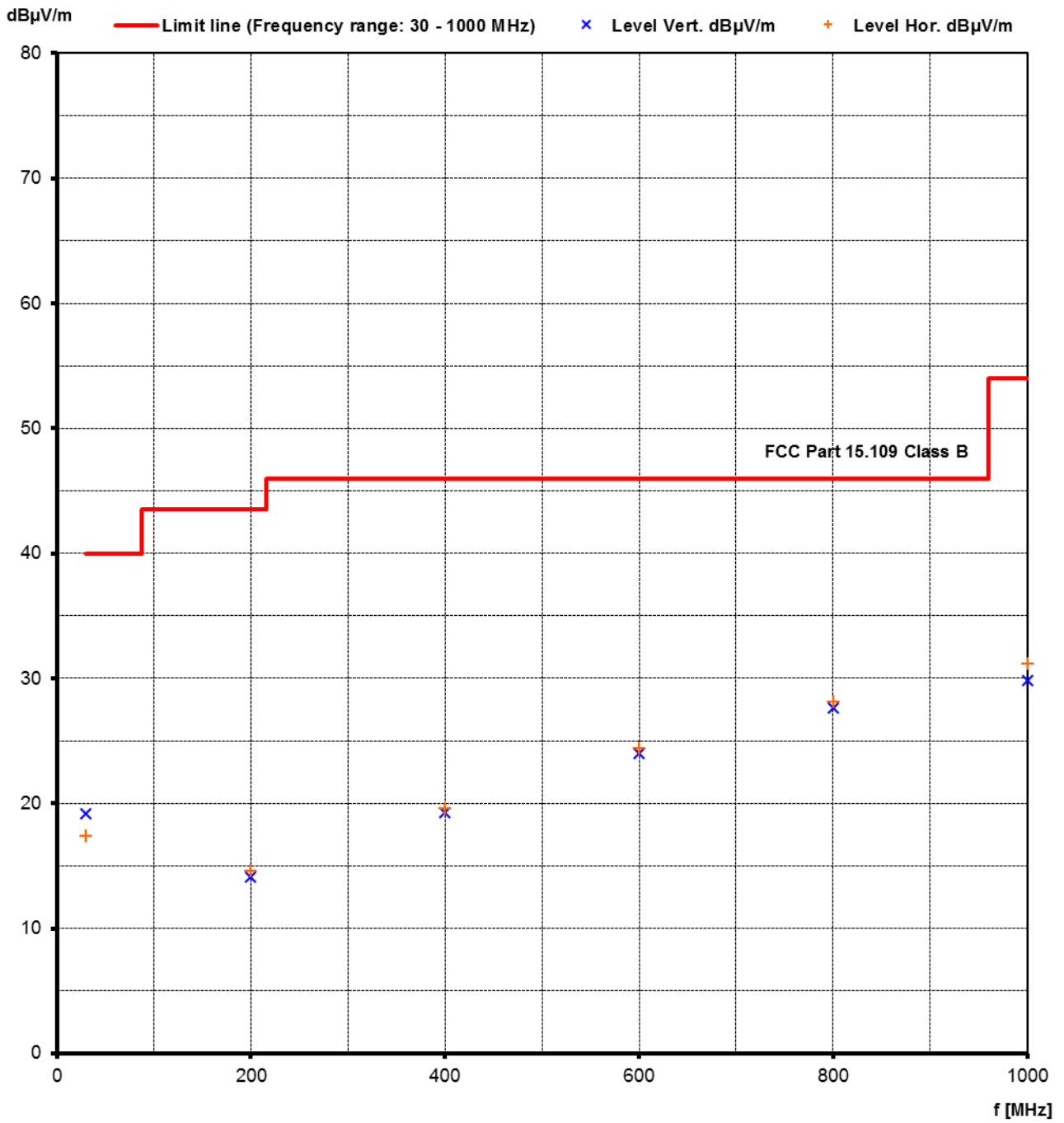
accd. FCC Part 15.109 Class B

Typ: B6R-R-HAT (Handset unit)	Test distance: 3 m
Manufacturer: Plättner Elektronik GmbH	Test receiver: ESVS30
Client: Plättner Elektronik GmbH	Antenna: VULB
Regulation: FCC Part 15.109 Class B	Test engineer: KJ
Order No.: T40604-02KJ	Date: 14.11.2018
Operation Mode: standby / receive mode	
Remarks: The limits are met!	

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
30.00	6.3	6.0	12.9	11.4	19.2	17.4	40.0	-20.8
200.00	3.8	3.6	10.3	11.0	14.1	14.6	43.5	-28.9
400.00	0.4	1.0	18.9	18.6	19.3	19.6	46.0	-26.4
600.00	-0.3	0.3	24.3	24.1	24.0	24.4	46.0	-21.6
800.00	-0.1	1.0	27.7	27.2	27.6	28.2	46.0	-17.8
1000.00	-0.4	1.6	30.2	29.6	29.8	31.2	54.0	-22.8

Note: The correction factor includes cable loss and antenna factor. The measurement results are from distance of 3 m. In the frequency range 30 MHz to 1000 MHz no emission could be detected. This frequencies mention the noise level.

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5.3 Radiated emission > 1 GHz (electric field)

For test instruments and accessories used see section 6 Part **SER 3**.

5.3.1 Description of the test location

Test location: Anechoic chamber 1
 Test distance: 3 metres

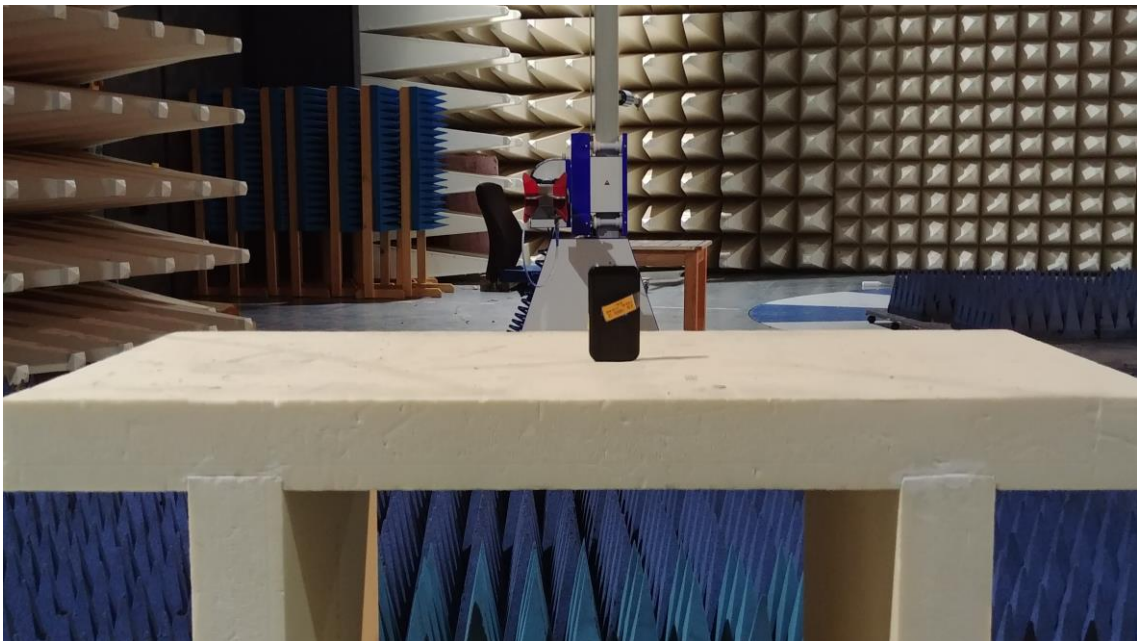
ETS Lindgren 3117:
 Dimension of the line tangent to the EUT according to CISPR 16-2-3:2010

Note: The \ominus 3dB min values were given by the antenna manufacturer

Frequenz GHz	\ominus 3dB min	Measurement distance	w min
1	88	3 m	5.79 m
2	67	3 m	3.97 m
4	69	3 m	4.12 m
6	53	3 m	2.99 m
10	40	3 m	2.18 m
18	36	3 m	1.95 m

Frequenz GHz	\ominus 3dB min	Measurement distance	w min
18	18.0	1 m	0.32 m
20	17.0	1 m	0.30 m
25	14.5	1 m	0.25 m
30	13.0	1 m	0.23 m
35	13.0	1 m	0.23 m
40	17.0	1 m	0.30 m

5.3.2 Photo documentation of the test setup



5.3.3 Test result

Frequency range: 1 GHz to 12 GHz

Min. limit margin >5 dB

The requirements are **FULFILLED**.**Remarks:** For detailed results, please see the following page(s).For description of the measurement see 4.6.5.

5.3.4 Test protocol

Radiation-Test

accd. FCC Part 15.109 Class B

Typ: B6R-R-HAT (Handset unit)

Test distance: 3 m

Manufacturer: Plättner Elektronik GmbH

Test receiver: ESW

Client: Plättner Elektronik GmbH

Antenna: EMCO 3117

Regulation: FCC Part 15.109 Class B

Test engineer: KJ

Order No.: T40604-02KJ

Date: 08.11.2018

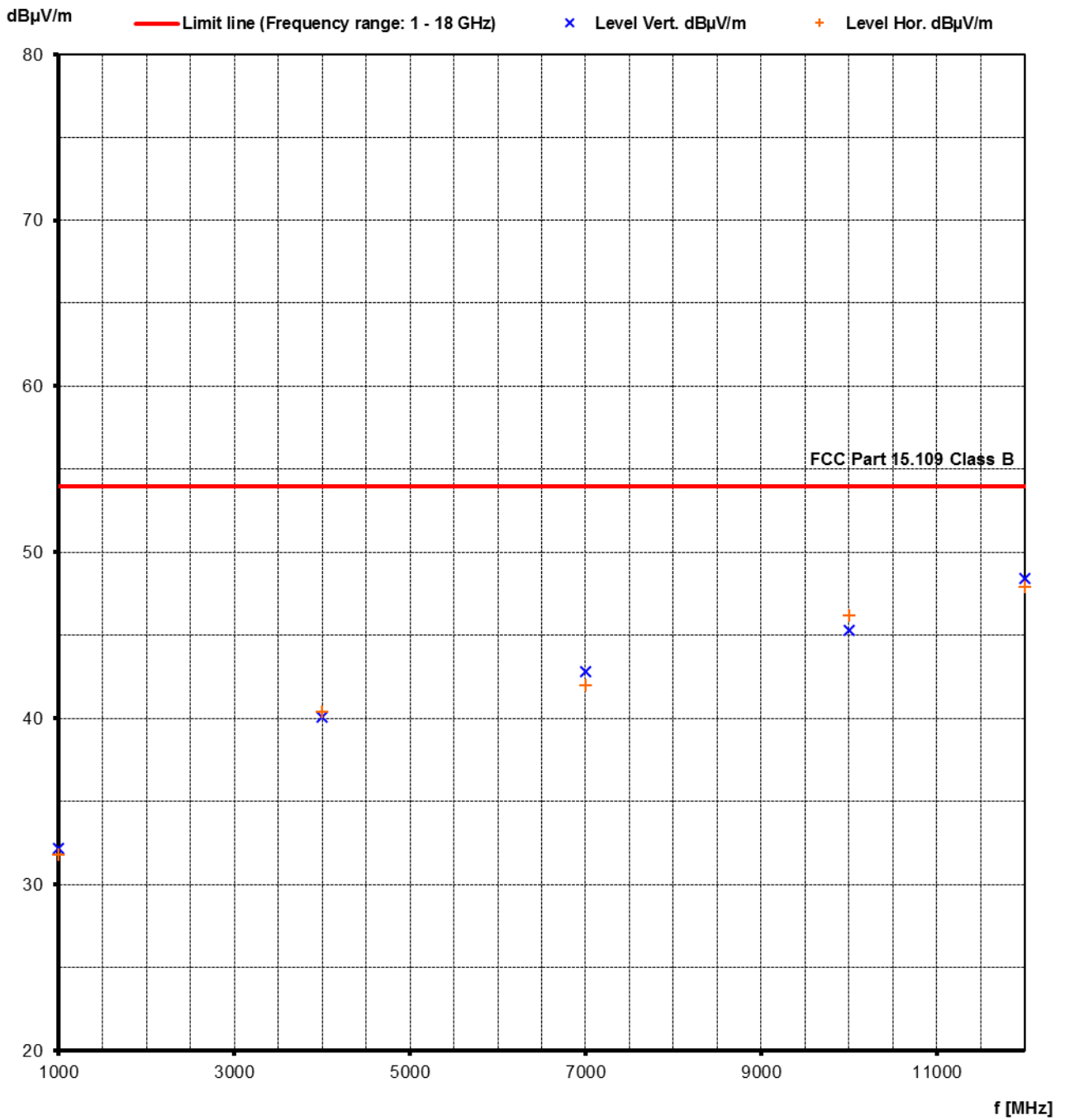
Operation Mode: standby / receive mode

Remarks: The measured PK values are below the AV limits!

Frequency (MHz)	PK Reading Vert. (dBµV)	PK Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	AV Limit (dBµV/m)	Dlimit (dB)
1000.00	44.5	44.1	-12.3	-12.3	32.2	31.8	54.0	-21.8
4000.00	45.7	46.0	-5.6	-5.6	40.1	40.4	54.0	-13.6
7000.00	45.0	44.2	-2.2	-2.2	42.8	42.0	54.0	-11.2
10000.00	44.5	45.4	0.8	0.8	45.3	46.2	54.0	-7.8
12000.00	44.9	44.4	3.5	3.5	48.4	47.9	54.0	-5.6

Note: The correction factor includes cable loss and antenna factor. The measurement results are from distance of 3 m. In the frequency range 1 GHz to 12 GHz no emission could be detected. This frequencies mention the noise level.

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6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
SER 2	ESVS 30	02-02/03-05-006	06/06/2019	06/06/2018		
	VULB 9168	02-02/24-05-005	18/04/2019	18/04/2018		
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	ESW26	02-02/03-17-002	08/12/2018	08/12/2017		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	3117	02-02/24-05-009	08/05/2019	08/05/2018		
	WHJS 1000-10EE	02-02/50-05-070				
	18N-20	02-02/50-17-003				
	NMS111-GL200SC01-NMS11	02-02/50-17-012				
	BAM 4.5-P	02-02/50-17-024				
	NCD	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	02-02/50-18-016				

7 Detailed measurement uncertainty

7.1 Overview

Measurement instrumentation uncertainty shall be taken into account when determining compliance or non-compliance with a disturbance limit.

The measurement instrumentation uncertainty for a test laboratory shall be evaluated. The standard uncertainty $u(x_i)$ in decibels and the sensitivity coefficient c_i shall be evaluated for the estimate x_i of each quantity. The combined standard uncertainty $u_c(y)$ of the estimate y of the measurand shall be calculated as

$$u_c(y) = \sqrt{\sum_i c_i^2 u^2(x_i)}$$

The expanded measurement instrumentation uncertainty U_{lab} for a test laboratory shall be calculated as $U_{lab} = 2 u_c(y)$

$$U_{lab} = 2 u_c(y)$$

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} in the table below, then:

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} in the table below, then:

- compliance is deemed to occur if no measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.
- non-compliance is deemed to occur if any measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

7.2 Definitions and symbols

X_i	Input quantity
x_i	estimate of X_i
$u(x_i)$	standard uncertainty of x_i
c_i	sensitivity coefficient
$u_c(y)$	(combined) standard uncertainty of y
Y	result of a measurement, (the estimate of the measured), corrected for all recognised significant systematic effects
U	expanded uncertainty of y

7.3 Measurement uncertainty

Measurement	U_{lab} [dB]
Conducted disturbance	+ 3.29 / - 3.29
Radiated disturbance (electric field)	
- 10 m test distance	+ 3.86 / - 3.91
- 3 m test distance	+ 4.14 / - 4.78
- Frequency range: 30 MHz – 300 MHz	
Radiated disturbance (electric field)	
- 10 m test distance	+ 4.11 / - 4.11
- 3 m test distance	+ 4.13 / - 4.14
- Frequency range: 300 MHz – 1000 MHz	
Radiated disturbance (electric field)	
- 3 m test distance	+ 2.89 / -2.89
- Frequency range: 1 GHz – 30 GHz	