

## FCC Test Report (Part 15C)

### WPT

<b>Test Report no.:</b>	EMC_BO_002191 (v1.0)	<b>Date of issue:</b>	17-JAN-2019
<b>Number of pages:</b>	14	<b>Project support engineer:</b>	Ralf Lange, Frank Wittmann
<b>Test period:</b>	20.12.18-11.01.19		

<b>Applicant:</b>	Laird Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Germany, Mr. Michael Schmidt		
<b>Manufacturer:</b>	Laird Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Germany		
<b>EUT identification:</b>	Laird, WCH-193b		
<b>FCC ID:</b>	RK7193-00	<b>IC ID:</b>	4774A-19300

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	<b>FCC Designation number</b>	DE0017	<b>IC recognition no.:</b> 7847A-1
	<b>Laboratory manager:</b>	Jürgen Mitterer	

**Test result** The test result complies with the requirements made in the referred test documents.

<b>Approver:</b>	Ines Baufeld	<b>Technical review:</b>	Frank Wittmann
<b>Title:</b>	Laboratory Quality Manager	<b>Title:</b>	Senior EMC Test Engineer

**Signature:** 
**Signature:** 

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## 1. Summary for FCC Part 15C Test Report

Date of receipt	20-Dec-2018
Testing completed	11-Jan-2019
The customer's contact person	Mr. Michael Schmidt
Notes	none

### 1.1. EUT and Accessory Information

The EUT is an inductive wireless power transfer device (wireless charger) with load modulation operating at 111 kHz. The highest output power is available at 111 kHz. The EUT is tested with the highest duty cycle of 100%. Same current consumption was observed between 5% and 95% charging level of the mobile phone, so that measurement was done at around 50%.

Product	Type	SN	HW	MV	SW	DUT
Wireless charging unit	WCH-193b	000002B700AB	H03	-	0002	DAB181159E
Artificial load	WCH-Rec.	0005	3.4	-	-	DAB15133E
Power cable	-	-	-	-	-	DAB181161E
RF cable cellular	-	-	-	-	-	BOC190050E

### 1.2. Applied Standards

Standard / Rule Part	Version	Year
CFR 47, FCC Part 15C	-	Dec-2018
ANSI C63.10	-	Jun-2013
ISED RSS-Gen	Issue 5	Apr-2018
ISED RSS-216	Issue 2	Jan-2016

Deviations or clarifications to these standards are noted in the related test result under "test method and limit".

### 1.3. Summary of Test Results

Section	Section in CFR 47	Section in RSS-Gen	Section in RSS-216	Name of the test	Result
3 & 4	15.205, 15.209	8.9	6.2.2.2 (Type 1 WPT devices)	Radiated emissions	PASSED
-	15.207	-	6.2.2.1	AC powerline conducted emissions	NA
5	15.215 (c)	6.7	-	Occupied bandwidth	PASSED

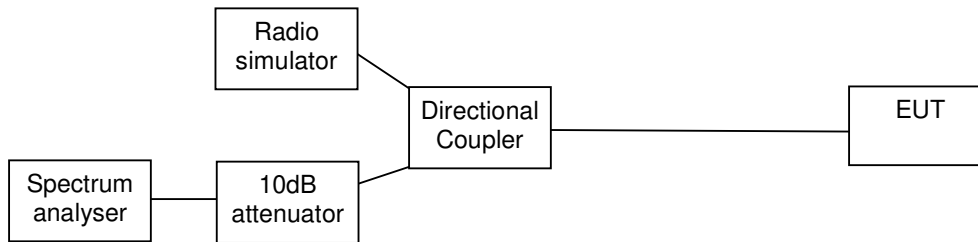
PASSED: The EUT complies with the essential requirements in the standard.  
 FAILED: The EUT does not comply with the essential requirements in the standard.  
 NP: The test was not performed.  
 NA: The test was not applicable.

#### 1.4. Measurement Uncertainties

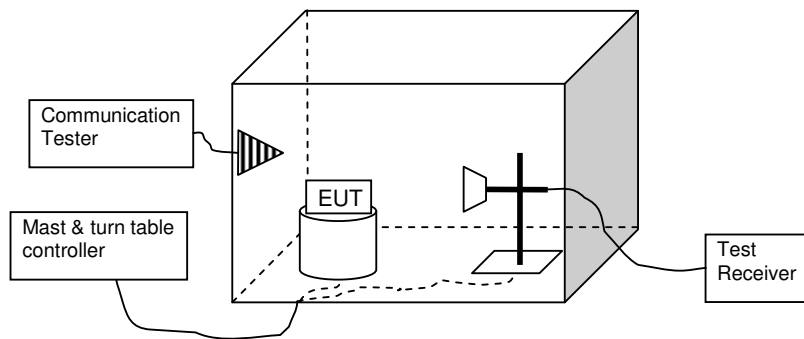
Parameter	Measurement Uncertainty
Radio Frequency	$\pm 3.6 \times 10^{-7}$
Total RF Power, conducted	$\pm 0.79$ dB
Emissions, conducted	$\pm 1.67$ dB
All emissions, radiated	$\pm 5.38$ dB
Temperature	$\pm 0.25$ °C
Humidity	$\pm 1.0$ %

## 2. Test setups

### 2.1. Conducted RF test setup



### 2.2. Radiated emissions test setup



### 3. Radiated emissions below 30 MHz

<b>EUT with DUT number</b>	DAB181159E
<b>Accessories with DUT numbers</b>	DAB181161E, BOC190050E, DAB15133E
<b>Operation Voltage [V] / [Hz]</b>	12 V / DC
<b>Result</b>	PASSED
<b>Remarks</b>	none
<b>Temp [°C] / Humidity [%RH]</b>	21.5 °C / 35.0 %
<b>Date of measurements</b>	20.12.2018
<b>Measured by</b>	Oliver Flecke
<b>Test system SW version</b>	V1.7.1

#### 3.1. Test method and limit

The measurement is made according to ANSI C63.10 and RSS-Gen as follows:

The measurement distance is 3m with a shielded loop antenna

The Limit has been adjusted with the distance correction factor according to 15.31(f)(2) (+40 dB for 30 m distance and +80 dB for 300 m distance)

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with measuring antenna at fixed height using 2-axis EUT position system, set on the turntable, which is rotated 360 degrees.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described:  $E [\mu V/m] = U_{RX} + A_{CF}$

Where  $U_{RX}$  is receiver reading and  $A_{CF}$  is total correction factor including cable loss, antenna factor and preamplifier gain ( $A_{CF} = L_{CABLES} + AF - G_{PREAMP}$ ).

FCC limits for radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [ $\mu V/m$ ]	Limit [dB $\mu V/m$ ]	Detector
0.009 - 0.09	10000 * 2400 / f[kHz]	128.5 - 93.8	AV
0.09 - 0.11			QP
0.11 - 0.19			AV
0.19 - 0.49			AV
0.490 - 1.705	100 * 24000 / f[kHz]	73.8 - 63.0	QP
1.705 - 30.0	100 * 30	69.5	QP

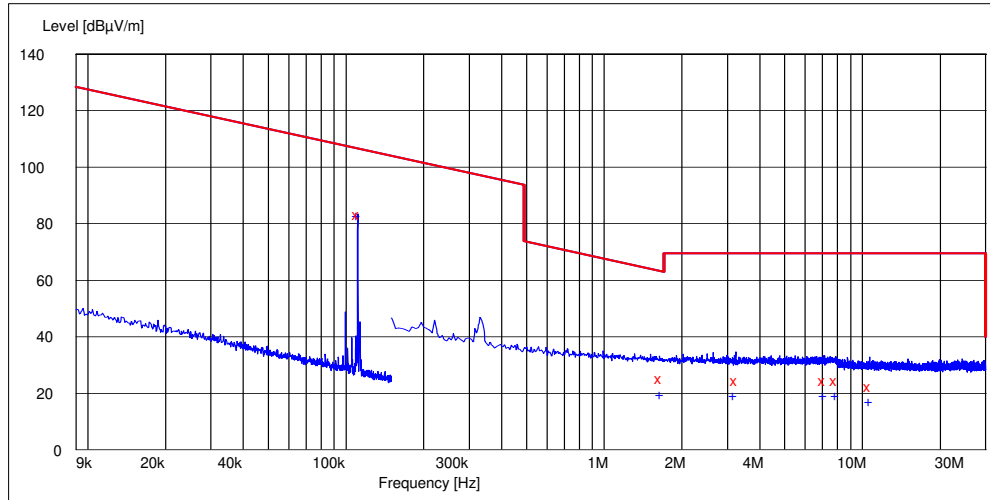
CISPR11 Induction cooking (group 2) limits (3 m measurement distance)

Frequency range [MHz]	Limit [dB $\mu A/m$ ]	Limit [dB $\mu V/m$ ]	Detector
0.009 - 0.070	69.0	120.5	QP
0.070 - 0.1485	69 - 39	120.5 - 90.5	QP
0.1485 - 4.0	39 - 3	90.5 - 54.5	QP
4.0 - 30	3	54.5	QP

Conversion factor between dB $\mu A/m$  and dB $\mu V/m$  is 51.5 dB

### 3.2. Test results (FCC)

@111 kHz: Peak (< 150 kHz: RBW: 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak (< 150 kHz: RBW: 200 Hz, >150 kHz: RBW: 9 kHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Azimuth [Deg]	Polarisation	Result
0.111116	83.20	23.20	106.70	23.50	170.0	36.00	VERTICAL	PASSED
1.644476	25.40	23.00	63.30	37.90	170.0	161.00	VERTICAL	PASSED
3.242662	24.40	23.20	69.50	45.10	170.0	18.00	VERTICAL	PASSED
7.087348	24.70	23.40	69.50	44.80	170.0	274.00	VERTICAL	PASSED
7.876471	24.70	23.40	69.50	44.80	170.0	192.00	VERTICAL	PASSED
10.638052	22.50	23.40	69.50	47.00	170.0	143.00	VERTICAL	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted band of operation.

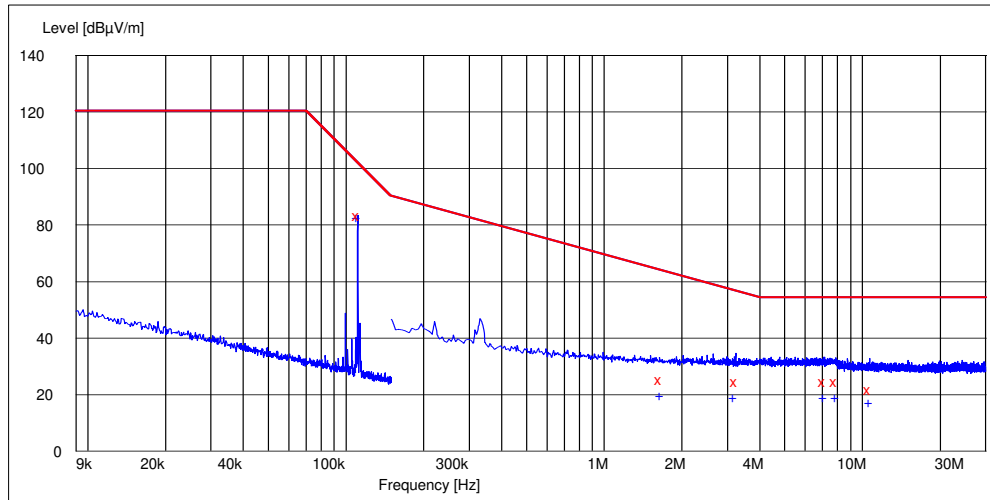
Average (< 150 kHz: RBW: 200Hz, > 150 kHz: RBW: 9 kHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Azimuth [Deg]	Polarisation	Result
0.111116	83.20	23.20	106.70	23.50	170.0	36.00	VERTICAL	PASSED
1.665976	20.10	23.00	63.20	43.10	170.0	142.00	VERTICAL	PASSED
3.197662	19.50	23.10	69.50	50.00	170.0	14.00	VERTICAL	PASSED
7.118848	19.50	23.40	69.50	50.00	170.0	290.00	VERTICAL	PASSED
7.924471	19.60	23.40	69.50	49.90	170.0	201.00	VERTICAL	PASSED
10.720052	17.40	23.40	69.50	52.10	170.0	128.00	VERTICAL	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted band of operation.

Test results (ISED)

@111 kHz: Peak (< 150 kHz: RBW: 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak (< 150 kHz: RBW: 200 Hz, >150 kHz: RBW: 9 kHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Azimuth [Deg]	Polarisation	Result
0.111116	83.30	23.20	102.10	18.80	170.0	36.00	VERTICAL	PASSED
1.644476	25.40	23.00	64.20	38.80	170.0	161.00	VERTICAL	PASSED
3.242662	24.80	23.20	56.80	32.00	170.0	18.00	VERTICAL	PASSED
7.087348	24.70	23.40	54.50	29.80	170.0	274.00	VERTICAL	PASSED
7.876471	24.70	23.40	54.50	29.80	170.0	192.00	VERTICAL	PASSED
10.638052	21.90	23.40	54.50	32.60	170.0	143.00	VERTICAL	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted band of operation.

Average (< 150 kHz: RBW: 200Hz, > 150 kHz: RBW: 9 kHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Azimuth [Deg]	Polarisation	Result
0.111116	83.20	23.20	102.10	18.90	170.0	36.00	VERTICAL	PASSED
1.665976	20.10	23.00	64.10	44.00	170.0	142.00	VERTICAL	PASSED
3.197662	19.50	23.10	56.90	37.40	170.0	14.00	VERTICAL	PASSED
7.118848	19.40	23.40	54.50	35.10	170.0	290.00	VERTICAL	PASSED
7.924471	19.60	23.40	54.50	34.90	170.0	201.00	VERTICAL	PASSED
10.720052	17.50	23.40	54.50	37.00	170.0	127.00	VERTICAL	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted band of operation.



## 4. Radiated emissions above 30 MHz

<b>EUT with DUT number</b>	DAB181159E
<b>Accessories with DUT numbers</b>	DAB181161E, BOC190050E, DAB15133E
<b>Operation Voltage [V] / [Hz]</b>	12 V / DC
<b>Result</b>	PASSED
<b>Remarks</b>	none
<b>Temp [°C] / Humidity [%RH]</b>	21.5 °C / 35.0 %
<b>Date of measurements</b>	21.12.2018
<b>Measured by</b>	Oliver Flecke
<b>Test system SW version</b>	V1.7.1

### 4.1. Test method and limit

The measurement is made according to ANSI C63.10 and RSS-Gen as follows:

The Preliminary Measurement and the Final Measurement is performed in 3 m distance by rotating the turntable of 360 degrees and moving the antenna height between 1-4 m.

The Preliminary Measurement is performed with floor absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed without floor absorbers, if the Preliminary Measurement results are closer than 20 dB to the permissible limit.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The EUT is placed on a nonconductive plate in the center of the turntable.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

$$E [\mu V/m] = U_{RX} + A_{CF}$$

Where  $U_{RX}$  is receiver reading and  $A_{CF}$  is total correction factor including cable loss, antenna factor and preamplifier gain ( $A_{CF} = L_{CABLES} + AF - G_{PREAMP}$ ).

FCC limits for radiated emissions measurements (3 m measurement distance)

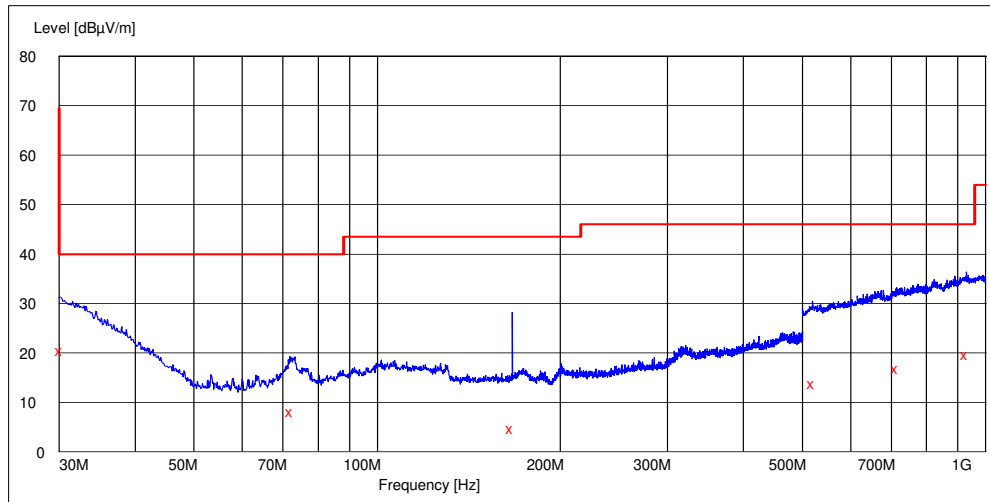
Frequency range [MHz]	Limit [ $\mu V/m$ ]	Limit [dB $\mu V/m$ ]	Detector
30 – 88	100	40	QP
88 – 216	150	43.5	QP
216 – 960	200	46	QP
960 – 1000	500	54	QP

CISPR11 Class B group 2 limits (3 m measurement distance)

Frequency range [MHz]	Limit [ $\mu V/m$ ]	Limit [dB $\mu V/m$ ]	Detector
30 – 80.872	100	40	QP
80.872 – 81.848	1000	60	QP
81.848 – 134.786	100	40	QP
134.786 – 136.414	1000	60	QP
136.414 – 230	100	40	QP
230 - 1000	500	47	QP

## 4.2. Test results (FCC)

Peak (< 300 MHz: RBW: 300 kHz, > 300 MHz: RBW 1 MHz)



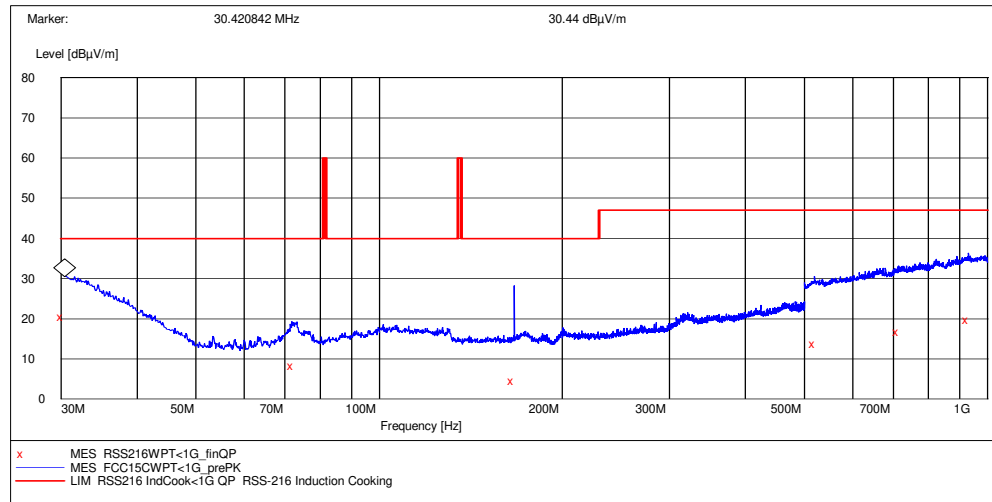
QuasiPeak (RBW: 1 MHz)

Frequency [MHz]	Level [dBμV/m]	Transducer [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Azimuth [Deg]	Polarisation	Result
30.150000	20.50	-8.30	40.00	19.50	176.0	38.00	VERTICAL	PASSED
72.053607	8.20	-25.60	40.00	31.80	401.0	274.00	VERTICAL	PASSED
166.283467	4.60	-31.60	43.50	38.90	276.0	58.00	VERTICAL	PASSED
519.439078	13.80	-22.50	46.00	32.20	323.0	142.00	VERTICAL	PASSED
713.877856	16.80	-19.50	46.00	29.20	126.0	184.00	VERTICAL	PASSED
929.108717	19.80	-16.30	46.00	26.20	173.0	10.00	VERTICAL	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted band of operation.

### 4.3. Test results (ISED)

Peak (< 300 MHz: RBW: 300 kHz, > 300 MHz: RBW 1 MHz)



QuasiPeak (RBW: 1 MHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Azimuth [Deg]	Polarisation	Result
30.150000	20.60	-8.30	40.00	19.40	176.0	38.00	VERTICAL	PASSED
72.053607	8.20	-25.60	40.00	31.80	401.0	274.00	VERTICAL	PASSED
166.283467	4.60	-31.60	40.00	35.40	276.0	58.00	VERTICAL	PASSED
519.439078	13.80	-22.50	47.00	33.20	323.0	142.00	VERTICAL	PASSED
713.877856	16.70	-19.50	47.00	30.30	126.0	184.00	VERTICAL	PASSED
929.108717	19.80	-16.30	47.00	27.20	173.0	10.00	VERTICAL	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted band of operation.

## 5. Occupied bandwidth

<b>EUT with DUT number</b>	DAB181159E
<b>Accessories with DUT numbers</b>	DAB181161E, BOC190050E, DAB15133E
<b>Operation Voltage [V] / [Hz]</b>	12 V / DC
<b>Result</b>	PASSED
<b>Remarks</b>	none
<b>Temp [°C] / Humidity [%RH]</b>	21.6 °C / 40.5 %
<b>Date of measurements</b>	11.01.2019
<b>Measured by</b>	Bhushan Pawar
<b>Test system SW version</b>	V1.3

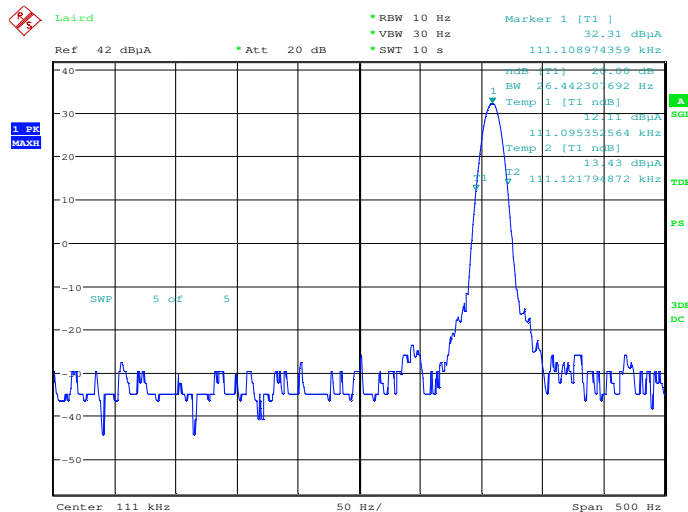
### 5.1. Test method and limit

The measurement is made according to FCC 15.215(c) and RSS-Gen.

Limits for 20 dB / 99 % bandwidth measurements

Limit [MHz]
N/A

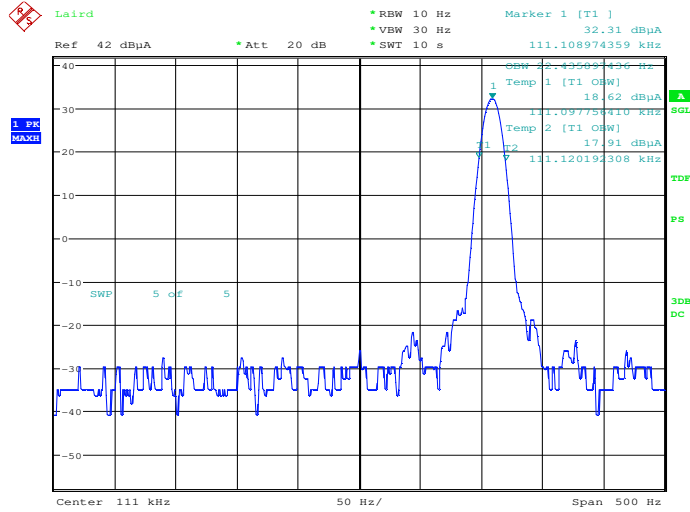
### 5.2. Test results (FCC)



20dB Bandwidth / 0.111MHz / WPT\_111kHz\_unmodulated  
Date: 11.JAN.2019 09:14:33

frequency [kHz]	20 dB bandwidth [Hz]	Result
111.108	26.442	PASSED

### 5.3. Test results (ISED)



99% Bandwidth / 0.111MHz / WPT\_111kHz\_unmodulated  
Date: 11.JAN.2019 09:13:34

frequency [kHz]	99 % bandwidth [Hz]	Result
111.108	22.435	PASSED

## 6. Test Equipment

### 6.1. Radiated Emission

Equipment	Manufacturer	Type	SERIAL-NO.	Actual Calibration	Next Calibration
Antenna	Schwarzbeck Mess-Elektronik	FMZB_1519	1519-056	14.07.2017	14.07.2020
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	827769/010	15.08.2017	15.08.2019
Power Supply	Hewlett Packard - Agilent	E3632A	KR75303301	17.05.2018	17.05.2020
Temp. / Humidity Logger	Lufft	Opus 10	13262	11.01.2017	11.01.2020
Antenna	ROHDE & SCHWARZ	HL562	100191	26.10.2018	26.10.2021
Antenna	Schwarzbeck	BBHA-9120-D	01617	18.08.2016	18.08.2019

### 6.2. Conducted Radio

Equipment	Manufacturer	Type	SERIAL-NO.	Actual Calibration	Next Calibration
Climatic Chamber	Vötsch	VT4002	521/85094	09.10.2018	09.10.2019
EMI Test Receiver	ROHDE & SCHWARZ	ESU26	100077	16.08.2017	16.08.2019
Power Supply	Hewlett Packard - Agilent	E3632A	MY40011318	23.05.2018	23.05.2020

# End of Report