FCC Test Report (Part 1)

RF Exposure (EMF)

Test Report no.:	EMC_BO_002189 (v1.0)	**Date of Report:**	16-Jan-2019
Number of pages:	14	**Project support engineer:**	Ralf Lange, Frank Wittmann
Test period:	18.12.2018-07.01.2019		

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

Testing laboratory:	Laird Bochum GmbH, Meesmannstr.103, 44807 Bochum, Germany			
	Tel.:	+49 234 51668-0		
	e-mail:	Product.Validation.Bochum@lairdtech.com		
	FCC designation no.:	DE0017	IC recognition no.:	7847A-1
	Laboratory manager:	Jürgen Mitterer		

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

Approver:	Ines Baufeld	**Technical Review:**	Frank Wittmann
Title:	Laboratory Quality Manager	**Title:**	Senior EMC Test Engineer
Signature:		**Signature:**	

CONTENTS

1. Summary for FCC Part 1 EMF test report

Date of receipt	18-DEC-2018
Testing completed	07-JAN-2019
The customer's contact person	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. In case of AM radio frequency interference in the car, the main WPT operating frequency at 111 kHz can be switched to 112 or 113 kHz. The highest output power is available at 111 kHz. The EUT is tested with a commercial available mobile phone with 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 charger unit	WCH-193c	000002B70007	H03	--	0002	DAB18116E
Power cable	--	--	--	--	--	DAB18161E
RF cable cellular	--	--	--	--	--	DAB16106E
Mobile Phone	Galaxy S7	IMEI: 357810085825140	--	--	--	MPS7

1.2. Applied standards

Standard, Rule Part	Version	Year
CFR 47, FCC Part 2	-	Nov-2018
CFR 47, FCC Part 1	-	Nov-2018
KDB 680106 D01	v03	Apr-2018
ISED RSS-216	Issue 2	Jan-2016
ISED RSS-102	Issue 5	Mar-2015
SPR-002	Issue 1	Sep-2016
Safety Code 6	Issue 3	Mar-2015

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

1.3. Summary of test results

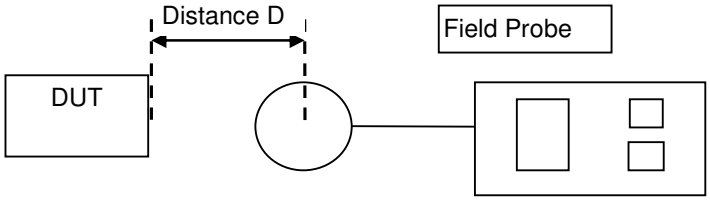
Section	Section in CFR 47	Section in RSS-102 / SC6	Name of the test	Result
3.2	1.1307(b), 1.1310	4 / 2.2.1	RF Exposure (H-field)	PASSED
3.3	1.1307(b), 1.1310	4 / 2.2.1	RF Exposure (E-field)	PASSED

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	Worst Case Uncertainty	Max. Uncertainty
H-field probe 100 cm^2	3.33 %	< 30 %
H-field probe 3 cm^2	4.17 %	
H-field level tester	12.60 %	
E-field probe + level tester	20 %	

2. EMF Test setup



3. RF Exposure (EMF)

EUT with DUT number	DAB181165E
Accessories with DUT numbers	MPS7, DAB18116E, DAB16106E
Operation Voltage [V] / [Hz]	12 / DC
Result	PASSED
Remarks	None
Temp [°C] / Humidity [%RH]	20 / 35.0
Date of measurements	18-Dec-2018 to 07-Jan-2019
Measured by	Ralf Lange

3.1. Test method and limit

The DUT is working on the operating frequency (111 kHz) with the highest output power (worst case).

Measurement was performed at all sides of the DUT in 5 cm steps between 10 and 20 cm and in 1 cm steps between 1 and 10 cm, if possible.

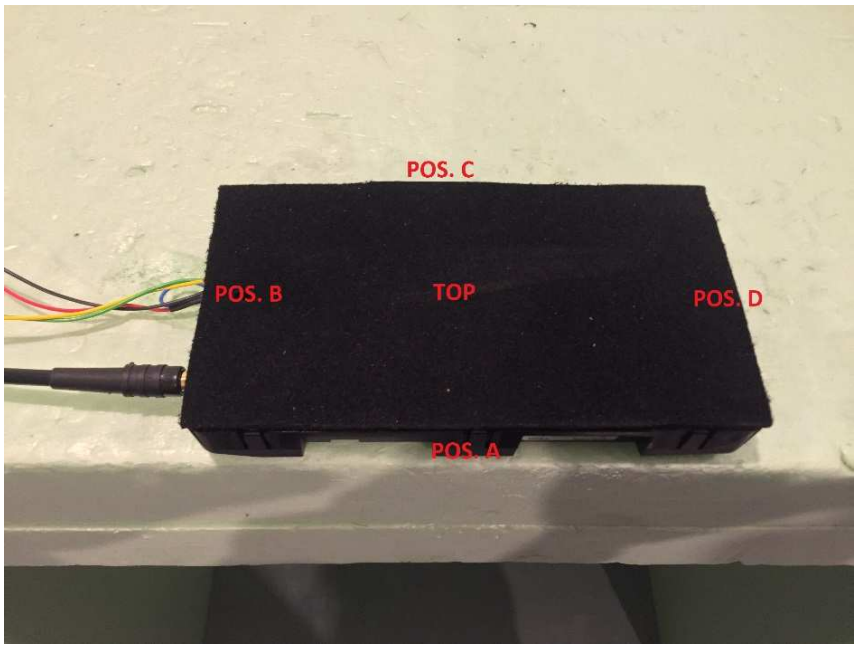
The mobile phone was placed in the center of the charging area of each coil (left, middle, right), one after another.

Minimum distance between the primary coil in the DUT and the secondary coil in the mobile phone (best coupling).

Different probes were used for E- an H-field measurement.

The highest emission level was recorded.

Side definition for positioning of E- and H-field probe



FCC limits for maximum permissible exposure

Frequency range [MHz]	Electric Field Strength Limit [V/m]	Magnetic Field Strength Limit [A/m]	Power Density [mW/cm²]	Average Time [minutes]
(B) Limits for General Population / Uncontrolled Exposures				
0.3 – 1.34	**614**	**1.63**	**100**	**30**
1.34 – 30	824 / $f_{[MHz]}$	2.19 / $f_{[MHz]}$	180 / $f_{[MHz]}^2$	30
30 – 300	27.5	0.073	0.2	30
300 – 1500			$f_{[MHz]}$ / 1500	30
1500 – 100000			1.0	30

Note1: According to DUT operating frequency and installation definition, the limit in bold letters (300 kHz) was applied.

ISED limits for maximum permissible exposure

Frequency range [MHz]	Electric Field Strength Limit [V/m]	Magnetic Field Strength Limit [A/m]	Power Density [W/m²]	Average Time [minutes]
RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
0.003 – 10	**83**	**90**	**-**	**Instantaneous**
0.1 – 10	**-**	**0.73 / $f_{[MHz]}$**	**-**	**6**
1.1 – 10	87 / $f_{[MHz]}^{0.5}$	-	-	6
10 – 20	27.46	0.0728	-2	6
20 – 48	58.07 / $f_{[MHz]}^{0.25}$	0.1540 / $f_{[MHz]}^{0.25}$	8.944 / $f_{[MHz]}^{0.5}$	6
48 – 300	22.06	0.05852	1.291	6
300 – 6000	3.142 $f_{[MHz]}^{0.3417}$	0.008335 $f_{[MHz]}^{0.3417}$	0.02619 $f_{[MHz]}^{0.6834}$	6
6000 – 15000	61.4	0.163	10	6
15000 – 150000	61.4	0.163	10	616000 / $f_{[MHz]}^{1.2}$
150000 – 300000	0.158 $f_{[MHz]}^{0.5}$	4.21×10^{-4} $f_{[MHz]}^{0.5}$	6.67×10^{-5} $f_{[MHz]}$	616000 / $f_{[MHz]}^{1.2}$

Note: According to DUT operating frequency and installation definition, the limit in bold letters was applied.

3.2. Test results H-field (FCC, ISED)

3.2.1 H-field (left coil)

Detector: RMS, Mode: 320 µT, Range: normal, Low Cut: 10 Hz

Distance [cm]	Level Pos A [A/m]	Level Pos B [A/m]	Level Pos C [A/m]	Level Pos D [A/m]	Level Top [A/m]	Level Buttom [A/m]	FCC Limit [A/m]	ISED Limit [A/m]	Result
20	-	-	-	-	0.24	-	1.63	90 / 6.58	PASSED
15	0.23	0.24	0.29	0.27	-	-	1.63	90 / 6.58	PASSED
10	0.23	0.24	0.33	0.31	0.41	0.38	1.63	90 / 6.58	PASSED
9	0.29	0.29	0.41	0.37	0.50	0.41	1.63	90 / 6.58	PASSED
8	0.37	0.35	0.53	0.46	0.62	0.46	1.63	90 / 6.58	PASSED
7	0.48	0.44	0.70	0.57	0.80	0.53	1.63	90 / 6.58	PASSED
6	0.62	0.54	0.94	0.71	0.96	0.62	1.63	90 / 6.58	PASSED
5	0.86	0.69	1.15	0.84	1.43	0.74	1.63	90 / 6.58	PASSED
4.2	NP	NP	NP	NP	**1.63**	NP	1.63	90 / 6.58	PASSED
4	1.15	0.90	**1.63**	1.08	NP	0.90	1.63	90 / 6.58	PASSED
3.1	**1.63**	NP	NP	NP	NP	NP	1.63	90 / 6.58	PASSED
3	NP	1.17	NP	1.43	NP	1.11	1.63	90 / 6.58	PASSED
2.6	NP	NP	NP	**1.63**	NP	NP	1.63	90 / 6.58	PASSED
2.1	NP	**1.63**	NP	NP	NP	NP	1.63	90 / 6.58	PASSED
2	NP	NP	NP	NP	NP	1.36	1.63	90 / 6.58	PASSED
1.6	NP	NP	NP	NP	NP	1.46	1.63	90 / 6.58	PASSED

Note1: Measurement values were transformed from µT to A/m, where 1 A/m = 1.256 µT

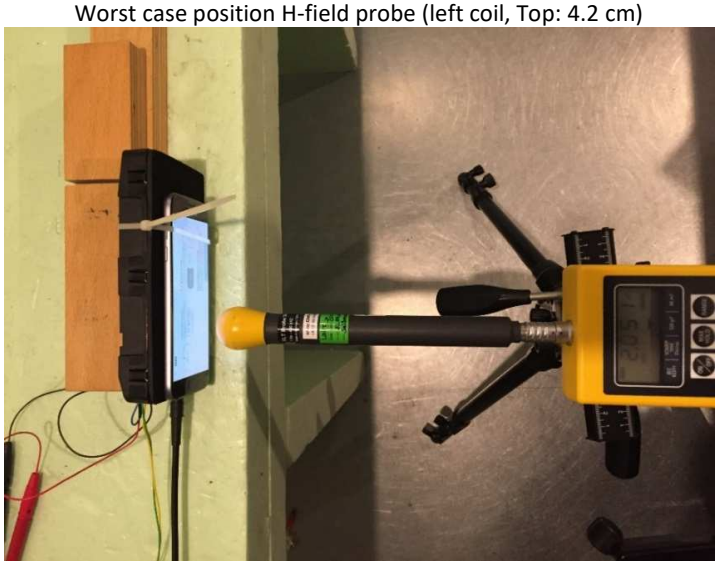
Note2: Measurements for distances ≥ 6 cm were performed with 100 cm^2 H-field probe

Note3: Measurements for distances < 6 cm were performed with 3 cm^2 H-field probe

Note4: Result declaration relates only to the columns with measured values within each row

Note5: NP = Not Performed

Worst case position H-field probe (left coil, Top: 4.2 cm)



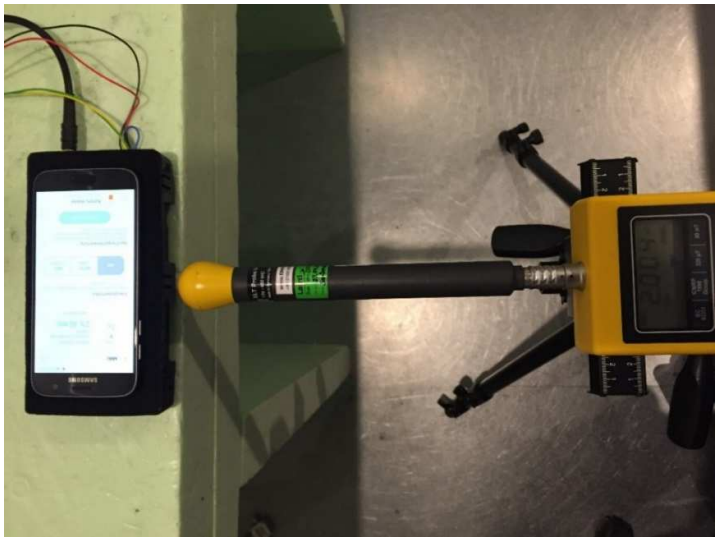
3.2.2 H-field (mid coil)

Detector: RMS, Mode: 320 µT, Range: normal, Low Cut: 10 Hz

Distance [cm]	Level Pos A [A/m]	Level Pos B [A/m]	Level Pos C [A/m]	Level Pos D [A/m]	Level Top [A/m]	Level Buttom [A/m]	FCC Limit [A/m]	ISED Limit [A/m]	Result
20	-	-	-	-	0.28	-	1.63	90 / 6.58	PASSED
15	0.28	0.28	0.29	0.28	-	-	1.63	90 / 6.58	PASSED
10	0.29	0.28	0.30	0.29	0.36	0.29	1.63	90 / 6.58	PASSED
9	0.32	0.30	0.32	0.29	0.38	0.30	1.63	90 / 6.58	PASSED
8	0.33	0.31	0.33	0.29	0.43	0.31	1.63	90 / 6.58	PASSED
7	0.38	0.32	0.37	0.30	0.52	0.33	1.63	90 / 6.58	PASSED
6	0.45	0.34	0.41	0.31	0.63	0.33	1.63	90 / 6.58	PASSED
5	0.61	0.37	0.53	0.33	0.80	0.35	1.63	90 / 6.58	PASSED
4	0.92	0.45	0.72	0.37	1.07	0.39	1.63	90 / 6.58	PASSED
3	1.42	0.55	1.07	0.44	1.44	0.45	1.63	90 / 6.58	PASSED
2.8	**1.63**	NP	**1.63**	NP	NP	NP	1.63	90 / 6.58	PASSED
2.5	NP	NP	NP	NP	**1.63**	NP	1.63	90 / 6.58	PASSED
2	NP	0.74	NP	0.55	NP	0.53	1.63	90 / 6.58	PASSED
1.6	NP	0.80	NP	0.61	NP	0.56	1.63	90 / 6.58	PASSED

Note1: Measurement values were transformed from µT to A/m, where 1 A/m = 1.256 µT
Note2: Measurements for distances ≥ 6 cm were performed with 100 cm^2 H-field probe
Note3: Measurements for distances < 6 cm were performed with 3 cm^2 H-field probe
Note4: Result declaration relates only to the columns with measured values within each row
Note5: NP = Not Performed

Worst case position H-field probe (mid coil, pos A + C, 2.8 cm)



3.2.3 H-field (right coil)

Detector: RMS, Mode: 320 µT, Range: normal, Low Cut: 10 Hz

Distance [cm]	Level Pos A [A/m]	Level Pos B [A/m]	Level Pos C [A/m]	Level Pos D [A/m]	Level Top [A/m]	Level Buttom [A/m]	FCC Limit [A/m]	ISED Limit [A/m]	Result
20	-	-	-	-	0.29	-	1.63	90 / 6.58	PASSED
15	0.29	0.29	0.30	0.28	-	-	1.63	90 / 6.58	PASSED
10	0.31	0.33	0.33	0.29	0.33	0.33	1.63	90 / 6.58	PASSED
9	0.33	0.35	0.37	0.30	0.42	0.34	1.63	90 / 6.58	PASSED
8	0.33	0.38	0.40	0.33	0.49	0.37	1.63	90 / 6.58	PASSED
7	0.37	0.41	0.45	0.33	0.57	0.41	1.63	90 / 6.58	PASSED
6	0.42	0.47	0.53	0.35	0.65	0.48	1.63	90 / 6.58	PASSED
5	0.51	0.57	0.68	0.39	0.77	0.57	1.63	90 / 6.58	PASSED
4	0.65	0.71	0.88	0.46	0.88	0.72	1.63	90 / 6.58	PASSED
3	0.92	0.94	1.25	0.57	0.96	0.96	1.63	90 / 6.58	PASSED
2.5	NP	NP	**1.63**	NP	NP	NP	1.63	90 / 6.58	PASSED
2	1.28	1.27	NP	0.78	0.97	1.23	1.63	90 / 6.58	PASSED
1.6	**1.63**	1.45	NP	0.96	1.02	1.36	1.63	90 / 6.58	PASSED

Note1: Measurement values were transformed from µT to A/m, where 1 A/m = 1.256 µT
Note2: Measurements for distances ≥ 6 cm were performed with 100 cm^2 H-field probe
Note3: Measurements for distances < 6 cm were performed with 3 cm^2 H-field probe
Note4: Result declaration relates only to the columns with measured values within each row
Note5: NP = Not Performed

Worst case position H-field probe (right coil, pos C, 2.5 cm)

3.3. Test results E-field (FCC, ISED)

3.3.1 E-field (left coil)

Detector: AVRG, Mode: V/m

Distance [cm]	Level Pos A [V/m]	Level Pos B [V/m]	Level Pos C [V/m]	Level Pos D [V/m]	Level Top [V/m]	Level Bottom [V/m]	FCC Limit [V/m]	ISED Limit [V/m]	Result
10	0.27	0.37	0.80	0.27	0.64	0.28	614	83	PASSED
9	0.31	0.38	0.86	0.31	0.73	0.28	614	83	PASSED
8	0.32	0.46	1.06	0.32	0.99	0.32	614	83	PASSED
7	0.35	0.49	1.32	0.43	1.04	0.34	614	83	PASSED
6	0.49	0.61	1.60	0.47	1.33	0.37	614	83	PASSED
5	0.55	0.84	1.97	0.49	1.65	0.41	614	83	PASSED
4	0.85	1.10	**2.68**	0.52	NP	0.49	614	83	PASSED

Note1: Measurements for distances 10, 9, 8, 7, 6, 5 and 4 cm were done with the E-field probe
Note2: Result declaration relates only to the columns with measured values within each row
Note3: NP = Not Performed

Worst case position E-field probe (left coil, pos C, 4 cm)

3.3.2 E-field (mid coil)

Detector: AVRG, Mode: V/m

Distance [cm]	Level Pos A [V/m]	Level Pos B [V/m]	Level Pos C [V/m]	Level Pos D [V/m]	Level Top [V/m]	Level Bottom [V/m]	FCC Limit [V/m]	ISED Limit [V/m]	Result
10	0.27	0.27	0.53	0.28	0.49	0.27	614	83	PASSED
9	0.28	0.27	0.65	0.36	0.57	0.27	614	83	PASSED
8	0.35	0.36	0.80	0.37	0.66	0.30	614	83	PASSED
7	0.37	0.37	1.06	0.37	0.80	0.31	614	83	PASSED
6	0.46	0.42	1.44	0.48	0.93	0.33	614	83	PASSED
5	0.49	0.46	2.01	0.49	1.11	0.38	614	83	PASSED
4	0.61	0.57	**2.99**	**0.51**	NP	0.44	614	83	PASSED

Note1: Measurements for distances 10, 9, 8, 7, 6, 5 and 4 cm were done with the E-field probe
Note2: Result declaration relates only to the columns with measured values within each row
Note3: NP = Not Performed

Worst case position E-field probe (mid coil, pos C, 4 cm)

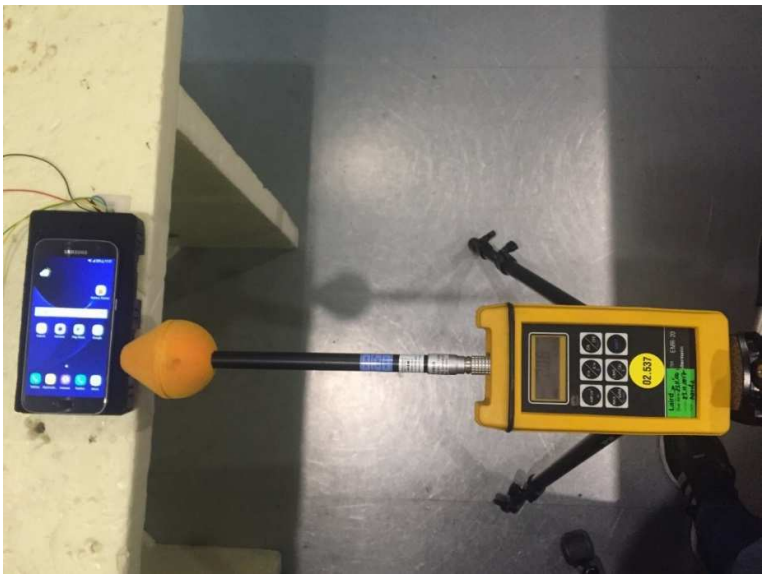
3.3.3 E-field (right coil)

Detector: AVRG, Mode: V/m

Distance [cm]	Level Pos A [V/m]	Level Pos B [V/m]	Level Pos C [V/m]	Level Pos D [V/m]	Level Top [V/m]	Level Bottom [V/m]	FCC Limit [V/m]	ISED Limit [V/m]	Result
10	0.41	0.28	0.56	0.29	0.54	0.28	614	83	PASSED
9	0.42	0.29	0.73	0.36	0.62	0.31	614	83	PASSED
8	0.43	0.36	0.88	0.49	0.72	0.33	614	83	PASSED
7	0.50	0.37	1.16	0.51	0.83	0.38	614	83	PASSED
6	0.62	0.38	1.39	0.54	1.10	0.43	614	83	PASSED
5	0.64	0.47	1.72	0.65	1.26	0.48	614	83	PASSED
4	0.76	0.60	**2.06**	0.88	NP	0.53	614	83	PASSED

Note1: Measurements for distances 10, 9, 8, 7, 6, 5 and 4 cm were done with the E-field probe
Note2: Result declaration relates only to the columns with measured values within each row
Note3: NP = Not Performed

Worst case position E-field probe (right coil, pos C, 4 cm)



4. Test Equipment

Equipment	Manufacturer	Type	Serial No.	Actual Calibration	Next Calibration
Exposure Level Tester	Narda Safety Test Solutions GmbH	ELT-400	N-0385	07.12.2017	07.12.2020
H-field Probe 3 cm^2	Narda Safety Test Solutions GmbH	2300/90.20	C-0150	23.04.2018	23.04.2021
H-Field Probe 100 cm^2	Narda Safety Test Solutions GmbH	Probe	M-0823	07.12.2017	07.12.2020
Field Analyzer	Wandel & Goltermann	EMR20	P-0030	23.11.2017	23.11.2020
Isotropic Electric Field Probe	Wandel & Goltermann	Type 8	M-0082	23.11.2017	23.11.2020