

RF-EXPOSURE REPORT FCC 47 CFR Part 2.1091 ISED RSS-102 RF-Exposure evaluation of mobile equipment	
Report Reference No.	G0M-1801-7169-TFC091ME-V02
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Accreditation	<div style="display: flex; justify-content: center; align-items: center;">   </div> <p style="text-align: center;">FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2</p>
Applicant's name	Dräger Safety AG & Co. KGaA
Address.....	Revalstraße 1 23560 Lübeck GERMANY
Test specification:	
Standard	47 CFR 2.1091 KDB 447498 D01 v06:2015-10-23 RSS-102, Issue 5:2015-03 SPR-002 Issue 1:2016-09
Equipment under test (EUT):	
Product description	Inductive Charger
Model No.	Induktive Power Unit
Additional Model(s)	None
Brand Name(s)	Dräger
Hardware version	8325825
Firmware / Software version	8325897
	FCC-ID: X6O-IC001 IC: 5895F-IC001
Test result	Passed

Possible test case verdicts:

- neither assessed nor tested: N/N
- required by standard but not appl. to test object.....: N/A
- required by standard but not tested.....: N/T
- not required by standard for the test object: N/R
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Test Lab Temperature: 20 – 23 °C

Test Lab Humidity: 32 – 38 %

Date of receipt of test item:

Date (s) of assessment: 2019-01-29

Compiled by: Toralf Jahn

 Assessed by (+ signature): Toralf Jahn
 (Responsible for Assessment)



 Approved by (+ signature): Christian Weber
 (Head of Lab)



Date of issue: 2019-02-13

Total number of pages: 14

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2019-01-29	Initial Release	
02	2019-02-13	Replaced document: G0M-1801-7169-TFC091ME-V01 Replaced by: G0M-1801-7169-TFC091ME-V02 Reason: FCC-ID and IC corrected.	T. Jahn

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1 Equipment (Test item) Description

Description	Inductive Charger
Model	Induktive Power Unit
Additional Model(s)	None
Brand Name(s)	Dräger
Serial number	None
Hardware version	8325825
Software / Firmware version	8325897
PMN	None
HVIN	Induktive Power Unit
FVIN	None
HMN	None
FCC-ID	X6O-IC001
IC	5895F-IC001
Equipment type	End product

1.1 Radiation Sources

Mode #	Description	
Wireless Power Tx	Frequency range [MHz]	0.07 – 0.142
	Channel spacing	None
	Modulations	None
Communication	Frequency range [MHz]	2.0
	Channel spacing	None
	Modulations	ASK

Comment: It is not possible to measure the standalone modes separately.

Multi-transmitter Modes

	Wireless Power Tx	Communication
	N/A	Yes
Communication	Yes	N/A

1.2 Test Equipment Used

Field Strength Measurement					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC 2	EF00198	-	-
Exposure Level Tester	Narda Safety Test Solutions S.r.l.	ELT-400	EF00605	2018-02	2019-04
Magnetic field probe 100 cm ²	Narda Safety Test Solutions S.r.l.	2300/90.10	EF00606	2018-02	2019-04
EM Radiation Monitor	Narda Safety Test Solutions	EMR-02	EF00058	2018-08	2019-08
Broadband Field Meter NBM-550	Narda Safety Test Solutions	2401/01B	EF00998	2018-08	2019-08
Magnetic field probe HF3061	Narda Safety Test Solutions	2402/05B	EF00999	2018-08	2019-08

2 Result Summary

FCC 47 CFR Part 2.1091, IC RSS-102			
Product Specific Standard Section	Requirement	Result	Remarks
47 CFR 2.1091	Maximum permissible exposure @ 20cm below limit	PASS	
RSS-102	Maximum permissible exposure @ 20cm below limit	PASS	
Remarks:			

3 Radiated Field Measurement

3.1 Test Conditions and Results – Electric and magnetic field strength

ELECTRIC AND MAGNETIC FIELD STRENGTH					
Test frequency range		Tested frequencies			
		F _{MID}			
EUT test mode		RFID			
Measurement method		radiated only			
Test procedure					
1. EUT transmitter is activated in test mode under normal conditions 2. The perimeter of the EUT is scanned with an electric and magnetic field probe at a fixed distance 3. The electric and magnetic field strength is measured 4. The maximum field strength values are recorded					
Test results					
Channel	Frequency [MHz]	Mode	Distance [m]	Max. electric field strength [V/m]	Max. magnetic field strength [A/m]
F _{MID}	0.1 + 2.0	1 charger standby	0.2	1	0.1
F _{MID}	0.1 + 2.0	1 charger charging	0.2	7	0.3
F _{MID}	0.1 + 2.0	10 chargers standby	0.2	2	0.1
F _{MID}	0.1 + 2.0	10 chargers charging	0.2	7	0.3
Comments:					

4 RF-Exposure Classifications

Device Types	
Fixed	A fixed device is defined as a device physically secured at one fixed location and cannot be easily re-located.
Mobile	A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. (47 CFR 2.1091)
Portable	A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. (47 CFR 2.1093)
Exposure Categories	
Occupational / Controlled	Limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
General population / uncontrolled	Exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

5 Evaluation

5.1 MPE Evaluation Conditions – 47 CFR 2.1091 / RSS-102

MPE EVALUATION ACC. TO 47 CFR 2.1091 / ISED RSS-102				VERDICT: PASS
Assessment according to reference	Reference Method			
	KDB 447498 D01 / RSS-102 & Safety Code 6			
Device type	mobile			
Exposure category	General public			
ISED Limits – Occupational / Controlled Exposure				
Frequency range [MHz]	Electric field strength [V/m]	Magnetic field strength [A/m]	Power density [W/m ²]	Averaging time [min]
0.003-10*	170	180	-	Instantaneous*
0.1-10	-	1.6 / f	-	6**
1.29-10	193 / $f^{0.5}$	-	-	6**
10-20	61.4	0.163	-10	6
20-48	129.8 / $f^{0.25}$	0.3444 / $f^{0.25}$	44.72 / $f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 $f^{0.25}$	0.04138 $f^{0.25}$	0.6455 $f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000 / $f^{1.2}$
150000-300000	0.354 $f^{0.5}$	9.40 x 10 ⁻⁴ $f^{0.5}$	3.33 x 10 ⁻⁴ f	616000 / $f^{1.2}$
ISED Limits – General Population / Uncontrolled Exposure				
Frequency range [MHz]	Electric field strength [V/m]	Magnetic field strength [A/m]	Power density [W/m ²]	Averaging time [min]
0.003-10*	83	90	-	Instantaneous*
0.1-10	-	0.73 / f	-	6**
1.1-10	87 / $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07 / $f^{0.25}$	0.1540 / $f^{0.25}$	8.944 / $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000 / $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000 / $f^{1.2}$
* = Based on nerve stimulation				
** = Bases on specific absorption rate				

FCC Limits – Occupational / Controlled Exposure				
Frequency range [MHz]	Electric field strength [V/m]	Magnetic field strength [A/m]	Power density [mW/cm ²]	Averaging time [min]
0.3 – 3.0	614	1.63	(100)*	6
3.0 - 30	1842 / f	4.89 / f	(900 / f ²)*	6
30 - 300	61.4	0.163	1.0	6
300 - 1500	N/A	N/A	f / 300	6
1500 - 100000	N/A	N/A	5.0	6
FCC Limits – General Population / Uncontrolled Exposure				
Frequency range [MHz]	Electric field strength [V/m]	Magnetic field strength [A/m]	Power density [mW/cm ²]	Averaging time [min]
0.3 – 1.34	614	1.63	(100)*	30
1.34 - 30	842 / f	2.19 / f	(180 / f ²)*	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	N/A	N/A	f / 1500	30
1500 - 100000	N/A	N/A	1.0	30
* = Plane wave equivalent power density; f in MHz				
Assessment procedure				
<p>The evaluation is performed at a separation distance of 20 cm. The reference levels are taken from 47 CFR 1.1310 for FCC and RSS-102 for ISED according to the exposure category declared by customer.</p> <p>For each radio and frequency band the worst case transmission mode with the highest output power is activated and the surrounding area around the EUT is scanned using an electric and a magnetic field probe at the distance given in the test report. The maximum electric and magnetic field strength values measured are compared to the corresponding reference levels. If both measured field strength values are below the reference levels the EUT has passed the RF-Exposure requirements.</p>				

5.2 Transmitter Evaluation – 47 CFR 2.1091 / RSS-102 / SRP-002

Assessment results – Wireless Power Tx	
Transmission mode	
Operating mode frequency range [MHz]	0.1
Assessment frequency (f) [MHz]	0.1
Compliance separation distance to EUT [m]	0.2
Electric Field	
Measured max. electric field strength [V/m]	7
Reference level [V/m]	83 (ISED) / 614 (FCC)
Verdict	Pass
Magnetic Field	
Measured max. magnetic field strength [A/m]	0.3
Reference level [A/m]	7.3 (ISED) / 1.63 (FCC)
Verdict	Pass
Verdict	
The field strength level of the EUT are below the RF-Exposure reference level at the given compliance separation distance!	
Comments: *Worst case RF-exposure limits with respect to ISED and FCC requirements.	

Assessment results – Communication	
Transmission mode	
Operating mode frequency range [MHz]	2
Assessment frequency (f) [MHz]	2
Compliance separation distance to EUT [m]	0.2
Electric Field	
Measured max. electric field strength [V/m]	7
Reference level [V/m]	61.5 (ISED) / 421 (FCC)
Verdict	Pass
Magnetic Field	
Measured max. magnetic field strength [A/m]	0.3
Reference level [A/m]	0.365 (ISED) / 16.3 (FCC)
Verdict	Pass
Verdict	
The field strength level of the EUT are below the RF-Exposure reference level at the given compliance separation distance!	
Comments: *Worst case RF-exposure limits with respect to ISED and FCC requirements.	

Assessment results – Wireless Power Tx + Communication	
Worst RF-Exposure Ratios	
Wireless Power Tx	0.034
Communication	0.686
Sum of Ratios	0.710
Verdict	Pass
Verdict	
The combined field strength level of the EUT are below the RF-Exposure reference level at the given compliance separation distance!	
Comments: *Worst case RF-exposure limits with respect to ISED and FCC requirements.	