




<b>RF-EXPOSURE REPORT</b> <b>FCC 47 CFR Part 2.1093</b> <b>ISED RSS-102</b> <b>RF-Exposure evaluation of portable equipment</b>	
<b>Report Reference No</b>	G0M-2103-9714-TFC093PE-V02
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<b>Address</b>	Storkower Str. 38c 15526 Reichenwalde Germany
<b>Accreditation</b>	 <p>A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 ISED Testing Laboratory site: 3470A-2</p>
<b>Applicant</b>	Medela AG
<b>Address</b>	Lättichstr. 4b 6340 Baar SWITZERLAND
<b>Test Specification</b>	According to FCC/ISED rules
<b>Standard</b>	FCC 47 CFR 2.1093 ISED RSS-102 Issue 5
<b>Non-Standard Test Method</b>	None
<b>Equipment under Test (EUT):</b>	
<b>Product Description</b>	Invia Ease
<b>Model(s)</b>	101042297
<b>Additional Model(s)</b>	None
<b>Brand Name(s)</b>	None
<b>Hardware Version(s)</b>	None
<b>Software Version(s)</b>	None
<b>FCC ID</b>	2ATCR608283 Host - 2ATCR608284 Module
<b>IC</b>	-
<b>Test Result</b>	<b>PASSED</b>

<b>Possible test case verdicts:</b>		
required by standard but not tested	N/T	
not required by standard	N/R	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
<b>Testing:</b>		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2021-07-30	
<b>Report:</b>		
Compiled by	Charline Graf	
Tested by (+ signature) (Responsible for Test)	Charline Graf	
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	
Date of Issue	2021-08-24	
Total number of pages	17	
<b>General Remarks:</b>		
<p>The test results presented in this report relate only to the object tested.</p> <p>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.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
<b>Additional Comments:</b>		

## VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-08-09	Initial Release	
02	2021-08-24	Replaced document: G0M-2103-9714-TFC093PE-V01 Replaced by: G0M-2103-9714-TFC093PE-V02  Reason: Result Summary verdict corrected Addition of concurrent sources	C.Graf

**ABBREVIATIONS AND ACRONYMS**

Acronyms	
Acronym	Description
EIRP	Equivalent Isotropic Radiated Power
ERP	Effective Radiated Power
EUT	Equipment Under Test
LPE	Low Power Exclusion

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## 1 Equipment (Test Item) Under Test

Description	Invia Ease
Model	101042297
Additional Model(s)	None
Brand Name(s)	None
Serial Number(s)	00000002008
Hardware Version(s)	None
Software Version(s)	None
PMN	-
HVIN	-
FVIN	-
HMN	-
FCC ID	2ATCR608283 Host - 2ATCR608284 Module
IC	-
Equipment type	End Product
Environment	General public
Use case	Body worn

### 1.1 Reference Documents

Document Type	Document No.	Issued by	Date
Test Report FCC CFR 47 Part15 RSS-Gen Issue 5	F181014E7	Phoenix Testlab	2018-09-08

### 1.2 Standalone radiation sources

Standalone radiation sources					
Mode	Operating Frequency [MHz]	Maximum conducted power [dBm]	Maximum radiated power [dBm EIRP]	Maximum duty cycle [%]	Antenna distance to body [mm]
Bluetooth LE	2402	7.9	11.0	94.5	5.0
	2440	7.9	9.9	94.5	5.0
	2480	7.6	9.0	94.5	5.0
Comment:					

Standalone radiation sources				
Mode	Operating Frequency [MHz]	Maximum electric field strength [V/m]	Maximum magnetic field strength [A/m]	Measurement distance [m]
RFID 13.56 MHz	13.56	7.34	0.0195	0.005
Comment:				

### 1.3 Concurrent Sources

	RFID	Bluetooth LE
RFID	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Bluetooth LE	<input checked="" type="checkbox"/>	<input type="checkbox"/>



## 2 Result Summary

Standalone sources - FCC KDB 447498				
Product Standard Reference	Requirement	Reference Method	Mode	Verdict
KDB 447498	SAR Test Exclusion	KDB 447498 4.3.1	Bluetooth LE	PASS
47 CFR 2.1091	Maximum permissible exposure	FCC KDB 447498	RFID 13.56 MHz	PASS
Comment:				

FCC MPE Evaluation - Multi-transmitter sources					
Product Standard Reference	Requirement	Reference Method	Mode	Distance [m]	Verdict
47 CFR 2.1091	Maximum permissible exposure	FCC KDB 447498	RFID 13.56 MHz + Bluetooth LE	0.005	PASS
Comment:					

### 3 RF-Exposure classification

RF-Exposure Categories	
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.
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.

RF-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.

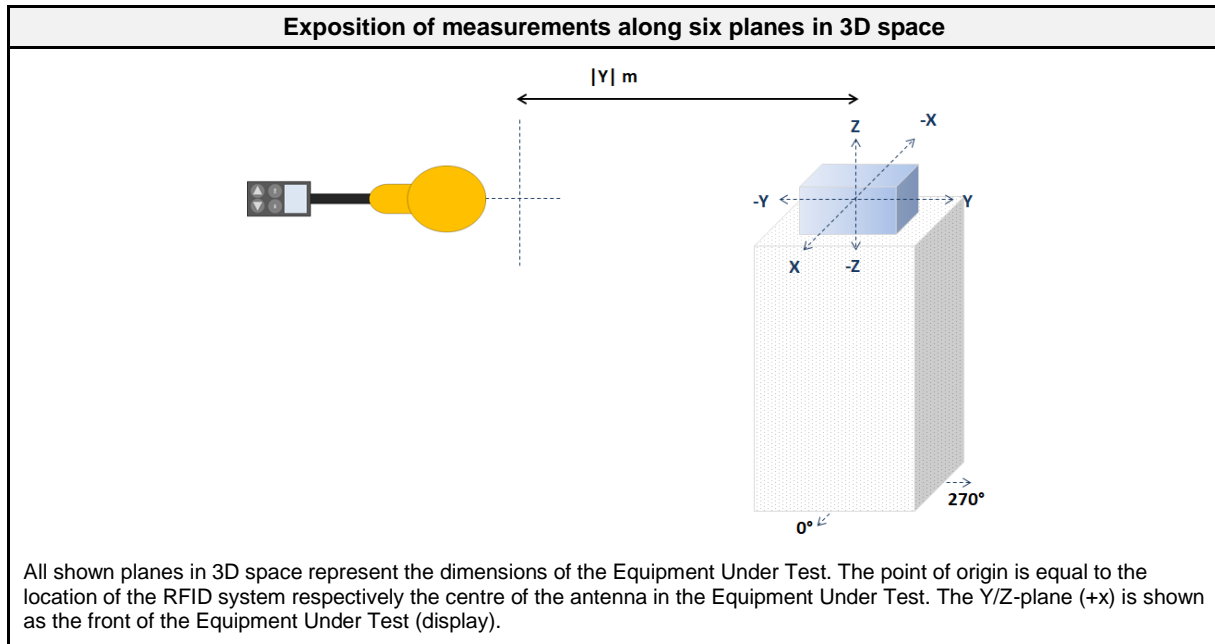
## 4 Radiated Field Measurement

### 4.1 Test Conditions and Results – Electric and magnetic field strength

#### 4.1.1 Information

Test Information	
Measurement Method	Radiated only
Operator	Charline Graf
Date	2021-08-09

#### 4.1.2 Setup



#### 4.1.3 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC2	EF00196	-	-
Broadband Field Meter NBM-550	Narda Safety Test Solutions	2401/01B	EF00998	2020-11	2021-11
Magnetic field probe HF3061	Narda Safety Test Solutions	2402/05B	EF00999	2020-11	2021-11

#### 4.1.4 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>1. EUT transmitter is activated in test mode under normal conditions.</li> <li>2. The perimeter of the EUT is scanned with an electric and magnetic field probe at a fixed distance.</li> <li>3. The electric and magnetic field strength is measured.</li> <li>4. The maximum field strength values are recorded.</li> </ol>

## 4.1.5 Results

Test Results			
Measurement position	Distance x or y or z [m]	Max. electric field strength [V/m]	Max. magnetic field strength [A/m]
X,Y,Z plane	0.005	7.34	0.0195

## 5 RF-Exposure limits and exclusion thresholds

### 5.1 SAR limits

SAR Limits		
Type	Occupational SAR values [W / kg]	General population SAR values [W / kg]
Whole-body SAR averaging mass = entire body	0.4	0.08
Partial-body Localized Head, Neck and Trunk SAR averaging mass = 1g	8.0	1.6
Hands, Wrists, Feet and Ankles Localized Limbs SAR averaging mass = 10g	20.0	4

FCC Limits – General Population / Uncontrolled Exposure				
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [W/m <sup>2</sup> ]	Averaging time [min]
0.3 – 1.34	614	1.63	1000	30
1.34 – 30	824/f	2.19/f	1800/f <sup>2</sup>	30
30 – 300	27.5	0.073	2	30
300 – 1500	-	-	f/150	30
1500 – 100000	-	-	10.0	30

FCC Limits – Occupational / Controlled Exposure				
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [W/m <sup>2</sup> ]	Averaging time [min]
0.3 – 3.0	614	1.63	1000	6
3.0 – 30	1842/f	4.89/f	9000/f <sup>2</sup>	6
30 – 300	61.4	0.163	10.0	6
300 – 1500	-	-	f/30	6
1500 – 100000	-	-	50	6

\* = Plane wave equivalent power density; f in MHz

#### Assessment procedure

The evaluation is performed at a separation distance of 0.5 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.

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.

### 5.2 SAR standalone test exclusion threshold

SAR test exclusion power acc. to FCC KDB 447498 D01 – Standalone operation
<p>Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.</p> <p>The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander</p>

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

- a) For 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm

$$\frac{\text{max. power of channel [mW]}}{\text{min. test separation distance [mm]}} \cdot \sqrt{f[\text{GHz}]} \leq \begin{cases} 3.0 & 1g \text{ SAR} \\ 7.5 & 10g \text{ SAR} \end{cases}$$

- b) For 100 MHz to 6 GHz and test separation distances  $> 50$  mm

- 1) For 100 to 1500 MHz

$$\left\{ \text{Power allowed at numeric threshold for 50 mm in step a} + (\text{test separation distance} - 50\text{mm}) \cdot \frac{f(\text{MHz})}{150} \right\}, \text{mW}$$

- 2) for  $> 1500$  MHz and  $\leq 6$  GHz

$$\left\{ \text{Power allowed at numeric threshold for 50 mm in step a} + (\text{test separation distance} - 50\text{mm}) \cdot 10 \right\}, \text{mW}$$

- c) for frequencies below 100 MHz:

- 1) test separation distances  $> 50$  mm and  $< 200$  mm:

the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by

$$\left( 1 + \log \left( \frac{100}{f(\text{MHz})} \right) \right)$$

- 2) test separation distances  $\leq 50$  mm:

the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by  $\frac{1}{2}$

### 5.3 SAR concurrent test exclusion threshold

<b>SAR test exclusion acc. to ISED RSS-102 + FCC KDB 447498 D01 – Concurrent operation</b>
<p>When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.</p> <p>For the test exclusion to apply, the maximum output power, duty factor, and other applicable parameters used in the standalone SAR tests, must be the same or more conservative than those required for simultaneous transmission.</p> <p>When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:</p> <ol style="list-style-type: none"> <li>1) <math display="block">\frac{\text{max.power of channel,including tune-up tolerance,mW}}{\text{min.test separation distance,mm}} \cdot \frac{\sqrt{f(\text{GHz})}}{x}</math>, for test separation distances <math>\leq 50</math> mm                      where <math>x = 7.5</math> for 1-g SAR and <math>x = 18.75</math> for 10-g SAR</li> <li>2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is <math>&gt; 50</math> mm</li> </ol>

## 6 RF-Exposure Evaluation

Evaluation procedure acc. to FCC KDB 447498
<p><u>Standalone operational modes</u></p> <ol style="list-style-type: none"> <li>1) For each standalone operational mode the associated frequencies, conducted output power values, duty cycles and antenna separation distances to the human body are specified</li> <li>2) From the conducted power and the duty cycle the source-based time averaged conducted output power is calculated</li> <li>3) The transmission frequency, average power and separation distance is used to determine the SAR test exclusion power threshold value acc. to FCC KDB 447498 D01</li> <li>4) If the time averaged output power of the transmission mode is lower than the SAR test exclusion power threshold value, the mode qualifies for SAR test exclusion and no further SAR evaluation is needed</li> </ol> <p><u>Concurrent operational modes</u></p> <ol style="list-style-type: none"> <li>1) For each operational mode that participates in the concurrent operational mode, the estimated SAR is calculated from the source-based time average conducted output power and the separation distance to the human body for each transmission frequency of the operation mode</li> <li>2) The maximum estimated SAR value for each operational mode is determined</li> <li>3) The sum of SAR values of the maximum estimated SAR values for each operational mode is calculated</li> <li>4) If the sum of SAR values is below the corresponding SAR limit, the concurrent operational mode qualifies for SAR test exclusion and no further evaluation is needed</li> </ol>



## 7 Single Source Evaluation Results - FCC

Results – Standalone Operational Modes							
Mode	Frequency [MHz]	Power [mW]	Duty Cycle	Average Power [mW]	Distance [mm]	Power Limit [mW]	Verdict
Bluetooth LE 1Mbit/s	2402	6.17	0.94	5.83	5.0	10	PASS
	2440	6.17	0.94	5.83	5.0	10	PASS
	2480	5.75	0.94	5.44	5.0	10	PASS
Comment:							

Results - RFID 13.56 MHz	
Evaluation distance [m]	0.005
<b>Transmission Mode</b>	
Transmission Frequency (f) [MHz]	13.56
<b>Electric field strength</b>	
Compliance field strength limit [V/m]	60.77
Measured field strength [V/m]	7.34
Field strength ratio	0.12
<b>Magnetic field strength</b>	
Compliance field strength limit [A/m]	0.16
Measured field strength [A/m]	0.02
Field strength ratio	0.125
<b>Compliance</b>	
Verdict	PASS
Comment:	

Evaluation result – RFID 13.56 MHz + Bluetooth LE	
<b>Transmission modes</b>	
Evaluation distance [m]	0.005
Number of concurrent modes	2
<b>Transmission mode 1</b>	
Transmission mode	RFID
Radiation type	Magnetic Field
Evaluation frequency (f) [MHz]	13.56
Maximum average radiated value	0.02 A/m
Compliance limit	0.16 A/m
Limit ratio	0.125
<b>Transmission mode 2</b>	
Transmission mode	Bluetooth LE
Radiation type	Power
Evaluation frequency [MHz]	2440
Maximum average radiated value	5.83 mW
Compliance limit	10.0 mW
Limit ratio	0.583
<b>Concurrent compliance</b>	
Maximum sum of limit ratios	0.708
<b>Verdict</b>	<b>PASS</b>
The multi-transmitter mode complies with the rf-exposure restrictions	
Comment:	

== = END OF TEST REPORT == =