RF Exposure Evaluation

EUT Name: Charging Cradle

EUT Model: NM001938

CFR 47 Part 2.1091

Prepared for:

Dosime, Inc.
3000 Executive Pkwy #222
San Ramon, CA 94583

Prepared by:

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Statement of Compliance

Manufacturer:	Dosime, Inc. 3000 Executive Pkwy #222 San Ramon, CA 94583
Name of Equipment:	Charging Cradle
Model No.	NM001938
Type of Equipment:	Intentional Radiator

Guidance Documents:

OET Bulletin 65
FCC Part 1.1310
KDB 680106

Evaluation Methods:

OET Bulletin 65
KDB 447498
KDB 680106

The RF exposure test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the RF exposure requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in this report.

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Josie Sabado	May 31, 2017	David Spencer	May 31, 2017
Test Engineer	Date	Laboratory Signatory	Date

Test Cert. # 31331.02

1 Equipment Under Test

EUT Specifications	
Manufacturer	Dosime, Inc.
Model	NM001938
Serial Number	00000412
Product Description	Wireless charging cradle
Classification	Mobile: used greater than 20 cm from a user
Environment	Uncontrolled
Radios	1. Wi-Fi 802.11 b/g/n 2. Bluetooth LE 3. Wireless power charging
Test Dates	May 18, 2017
Accessory Equipment	Dosimeter: S/N 000019876; Used to enable wireless power transfer.

2 Maximum Permissible Exposure

2.1 Test Methodology

In this report, we try to prove the safety of radiation harmfulness to the human body for our product. FCC part 2.1091 and OET Bulletin 65 is followed. Maximum power transfer efficiency is assumed as worst case for this assessment.

For wireless power charging a KDB inquiry was submitted as required by KDB 680106.

2.2 Power Density Calculation

Power density is calculated and compared to the MPE power density limits in FCC part 1.1310.

Power density is calculated as

$$S = \frac{EIRP}{4\pi R^2}$$

Where S = power density in mW/cm^2
EIRP = Effective Isotropically Radiated Power
R = distance to the center of radiation of the antenna in cm

2.3 E-Field and H-Field Measurements

An alternative to calculating the power density is to measure the E-Field and H-Field. A broadband E-field and H-field probe is used to measure the field around the EUT when it is transmitting at maximum power. Each side of the EUT is measured to find the worst case emissions. Measurements are performed on a non-conducting table in a fully anechoic chamber.

The measured E- and H-fields are compared to the MPE limits in FCC part 1.1310.

2.3.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
E-Field Probe	Narda	EF0391	D-1443	05/01/2107	05/01/2020
H-Field Probe	Narda	HF3061	D-0589	04/21/2017	04/21/2020
Meter	Narda	NBM-520	D-1561	05/01/2017	05/01/2020

3 MPE Evaluation

3.1 Stand-Alone MPE Evaluation

3.1.1 Power Density Calculation

Wi-Fi and Bluetooth power density is calculated using the maximum EIRP of each radio. Wi-Fi power is taken from the module data sheet. Wi-Fi antenna gain is taken from the antenna data sheet. Bluetooth power and gain is declared by the manufacturer.

Radio	Frequency Range (MHz)	Max. Conducted Power (dBm)	Max. Peak Gain (dBi)	Max. EIRP		Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	Verdict
				dBm	W			
Wi-Fi	2412 - 2462	18.3	4.4	22.7	0.186	0.037	1.64	Pass
Bluetooth	2402 - 2480	0	-10.05	-10.05	0.0001	0.00002	1.65	Pass

3.1.2 E-Field and H-Field Measurements

Wireless power charging is measured using an E-field and H-field probe. A Dosimeter is placed in the charging cradle (EUT) to enable transmission. Measurements were made while the Dosimeter is placed in the cradle, left in the cradle for at least 30 seconds, and removed from the cradle. A 20 cm separation distance is used between the EUT and the field probe.

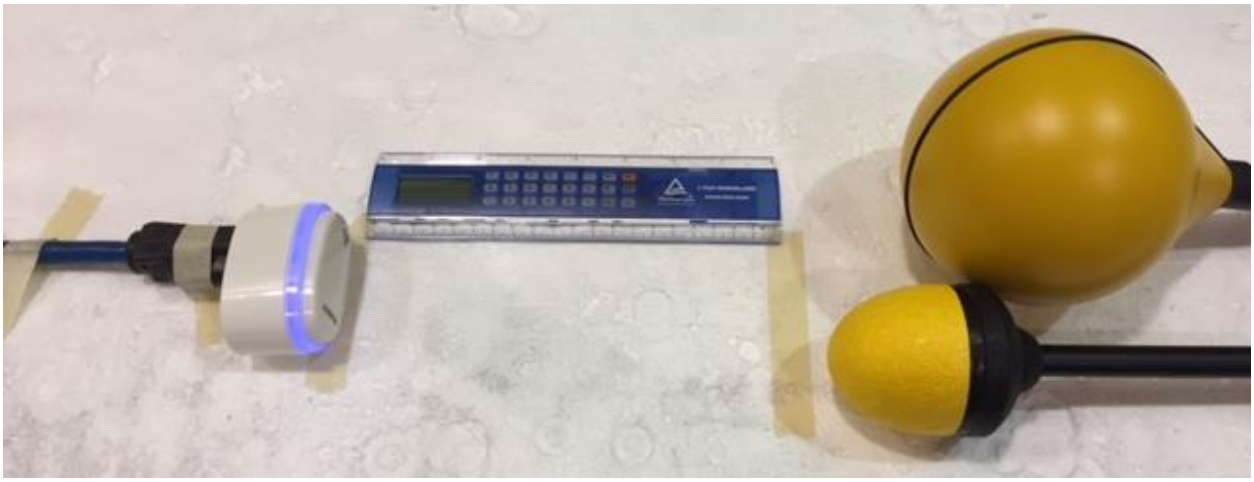
The following E-field and H-field values are the max peak measured.

Frequency (MHz)	Maximum E-field (V/m)						MPE Limit (V/m)	Result
	Top side	Top Edge	Left Edge	Bottom Edge	Right Edge	Bottom Side		
6.78	2.16	1.92	1.71	1.70	1.80	1.48	121.5	Pass

Frequency (MHz)	Maximum H-field (A/m)						MPE Limit (A/m)	Result
	Top side	Top Edge	Left Edge	Bottom Edge	Right Edge	Bottom Side		
6.78	.0595	.0440	.0651	.0563	.0658	.0583	0.323	Pass

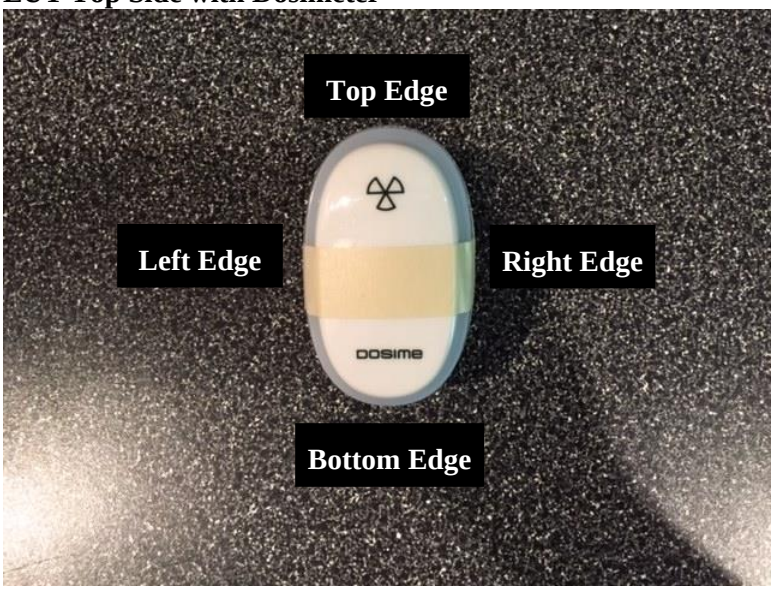
Test Setup Photos

Complete Setup



20 cm Measurement Distance

EUT Top Side with Dosimeter



EUT Bottom Side

3.2 Simultaneous Transmission Evaluation

FCC KDB 447498 section 7.2 is used for simultaneous transmission analysis. MPE evaluation for simultaneous transmission is excluded if the sum of MPE ratios is less than 1.0.

3.2.1 Wireless Charging E-Field

Radio	Worst Case MPE Value	MPE Limit	MPE Ratio
Wi-Fi	0.037 mW/cm^2	1.64	0.02
Bluetooth LE	0.00002 mW/cm^2	1.65	0.00
Wireless Charging	2.16 V/m	121.5 V/m	0.02
		Sum of Ratios	0.04
		Verdict	Pass

3.2.2 Wireless Charging H-Field

Radio	Worst Case MPE Value	MPE Limit	MPE Ratio
Wi-Fi	0.037 mW/cm^2	1.64	0.02
Bluetooth LE	0.00002 mW/cm^2	1.65	0.00
Wireless Charging	0.0658 A/m	0.323 A/m	0.20
		Sum of Ratios	0.22
		Verdict	Pass

4 Revision History

Revision Number	Date	Reason for Change	Author
0	April 20, 2017	Original Report	J. Sabado
1	May 31, 2017	Update model number. Include Wi-Fi and Bluetooth and update evaluation.	J. Sabado