

RF Exposure Report

Test Report Number STA-22121361-LCG-FCC-IC-MPE

FCC ID ZKP-ZOLLALS0001
IC ID 9702A-ZOLLALS0001

Applicant ZOLL Medical Corporation
Applicant Address 269 Mill Road, Chelmsford, MA 01824-4105
Product Name Zenix Monitor/Defibrillator
Model Number Zenix
Date of Receipt 08/10/2023
Date of Test 08/24/2023 – 08/29/2023
Report Issue Date 03/27/2024
Test Standards 47 CFR §1.1307(b), 47 CFR §1.1310
 RSS-102 Issue 6 Dec 2023
Test Result **PASS**



Issued by:

Vista Compliance Laboratories

1261 Puerta Del Sol, San Clemente, CA 92673 USA

www.vista-compliance.com



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REVISION HISTORY

Report Number	Version	Description	Issued Date
STA-22121361-LCG-FCC-IC-MPE	01	Initial report	03/27/2024

TABLE OF CONTENTS

1	GENERAL INFORMATION.....	4
1.1	Applicant	4
1.2	Product information	4
1.3	Test standard and method.....	5
2	TEST SITE INFORMATION.....	5
3	FCC RF EXPOSURE EVALUATION.....	6
3.1	Limits for Maximum Permissible Exposure (MPE)	6
3.2	MPE Calculation Formula	6
3.3	Classification	6
3.4	Antenna Gain	6
3.5	FCC RF Exposure Evaluation Results	7
4	ISED RF EXPOSURE EVALUATION	8
4.1	Limits for Maximum Permissible Exposure (MPE)	8
4.2	MPE Calculation Formula	9
4.3	Classification	9
4.4	Antenna Gain	9
4.5	ISED RF Exposure Evaluation Results	10

1 General Information

1.1 Applicant

Applicant	ZOLL Medical Corporation
Applicant Address	269 Mill Road, Chelmsford, MA 01824-4105
Manufacturer	ZOLL Medical Corporation
Manufacturer Address	269 Mill Road, Chelmsford, MA 01824-4105

1.2 Product information

Product Name	Zenix Monitor/Defibrillator
Model Number	Zenix
Family Models	N/A
Serial Number	ST22E00204
Frequency Band	BT BDR/EDR: 2402-2480MHz BT BLE: 2402-2480MHz WLAN: 2.4GHz/5GHz 11a/b/g/n/ac
Type of modulation	BT BDR/EDR: GFSK, $\pi/4$ DQPSK, 8DPSK BLE: GFSK 802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM) 802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Equipment Class	DSS, DTS, U-NII
Antenna Information	2.4/5GHz Flexible Antenna (Model: 1461530100, Brand: molex) Antenna Peak Gain: 2.4G WLAN/BT: 3.0 dBi, 5G WLAN: 4.5 dBi
Clock Frequencies	N/A
Input Power	15Vdc, 8.0A (DC rating for EMS version) 120-240VAC, 50-60Hz, 160VA (AC rating for Hospital version)
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Additional Info	ZOLL Zenix has two different hardware versions, the Hospital version, and EMS version. The difference is Hospital version has direct connection to AC power mains; the EMS version has DC connector, which can be connected to a external AC/DC power supply for recharging. This difference is not RF related, therefore there is no impact on RF performance. The EUT used for testing is EMS version.

1.3 Test standard and method

Test standard	47 CFR §1.1307(b), 47 CFR §1.1310 RSS-102 Issue 6 Dec 2023
Test method	47 CFR §1.1307(b), 47 CFR §1.1310 RSS-102 Issue 6 Dec 2023

2 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

3 FCC RF Exposure Evaluation

3.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

f = Frequency in MHz; *Plane-wave equivalent power density

3.2 MPE Calculation Formula

Equation: $S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

Where, S = Power Density

P = Power Input to Antenna

G = Antenna Gain

R = distance to the center of radiated antenna in cm

3.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as Mobile Device.

3.4 Antenna Gain

Please see section 1.2 product information for antenna gain details.

3.5 FCC RF Exposure Evaluation Results

Band (MHz)	Max Output Power (dBm)	Antenna Gain (dBi)	Separation distance (cm)	Power Density (mW/ cm ²)	MPE Limit (mW/ cm ²)
BT LE	1.94	3	20	0.00062	1
BT BDR/EDR	1.43	3	20	0.00055	1
WLAN 2.4G	24.77	4.5	20	0.1682	1
WLAN 5G	13.76	4.5	20	0.0133	1

The above results show that the device complies with the FCC MPE requirement.

4 ISED RF Exposure Evaluation

4.1 Limits for Maximum Permissible Exposure (MPE)

Per RSS-102 issue 5, section 2.5.2 as reproduced below:

2.5.2 Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- Below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- At or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $22.48/f^{0.5}W$ (adjusted for tune-up tolerance), where f is in MHz;
- At or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} W$ (adjusted for tune-up tolerance), where f is in MHz;
- At or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Frequency Range (MHz)	Electric Field Strength (V/m rms)	Magnetic Field Strength (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
Limits For General Population / Uncontrolled Exposure				
0.003-10 ²¹	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/ $f^{1.2}$
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

4.2 MPE Calculation Formula

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

4.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as Mobile Device.

4.4 Antenna Gain

Please see section 1.2 product information for antenna gain details.

4.5 ISED RF Exposure Evaluation Results

Band (MHz)	Max Output Power (dBm)	Antenna Gain (dBi)	Separation distance (cm)	Power Density (W/ m ²)	MPE Limit (W/ m ²)
BT LE	1.94	3	20	0.0062	5.35
BT BDR/EDR	1.43	3	20	0.0055	5.35
WLAN 2.4G	24.77	4.5	20	1.682	5.37
WLAN 5G	13.76	4.5	20	0.133	9.01

The above results show that the device complies with the ISED MPE requirement.

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