

St. Jude Medical RF Exposure Exhibit

SCOPE OF WORK

EMC TESTING – Merlin™ 2 PCS, Model Tested: MER3700

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RF Exposure Exhibit (mobile devices)

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Model Tested: MER3700

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to

47CFR 2.1091
RSS-102 Issue 5

for

St. Jude Medical

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Report No. 104663935MPK-013	
Equipment Under Test:	Merlin™ 2 PCS
Trade Name:	St. Jude Medical
Model(s) Tested:	MER3700
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1.0 RF Exposure Summary

Test	Reference FCC	Reference Industry Canada	Result
Radio frequency Radiation Exposure Evaluation	47 CFR§2.1091	RSS-102 Issue 5	Complies

2.0 RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 are followed.

2.1 FCC Limits

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

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)
(A)Limits For Occupational / Control Exposures				
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	...	...	F/300	6
1500 - 100,000	...	...	5	6
(B)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 density

2.2 Industry Canada Limits

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range	Electric Field	Magnetic Field	Power Density	Reference Period
(MHz)	(V/m rms)	(A/m rms)	(W/m ²)	(minutes)
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}
Note: f is frequency in MHz. * Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

3.0 Test Results (Mobile Configuration)

3.1 Classification

Radio is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user’s manual.

3.2 EIRP calculations

The Merlin™ 2 PCS, Model: MER3700 consists of: 0.032768 MHz, 13.56 MHz, and Bluetooth (2402-2480 MHz) Radios. The Radios does not simultaneously transmit.

3.3 Maximum RF Power

Merlin™ 2 PCS, Model: MER3700:

Frequency Range	Peak Field Strength (FS)	EIRP	EIRP	notes
(MHz)	(dBμV/m)	(dBm)	(mW)	
0.032768 (Inductive)	-	-	-	RF Exposure is address in SPR-002, Report # 104663935MPK-014
13.56 (NFC)	53.68	-31.09*	0.0008	10m FS measurement was taken from Report # 104663935MPK-001
2402-2480 (BLE)	-	16.59	45.604	RF Power is 11.56 dBm & Antenna Gain is 5.03 dBi Antenna Gain & Conducted power measurements were taken from Report# 170524-01.TR05 under FCC ID PD99260NG

*EIRP is calculated as dBm = dBuV/m + 20*Log (Measured Distance)-104.77

3.4 RF Exposure Calculation

3.4.1 RF Exposure calculation for RFID, Bluetooth & Telemetry, Merlin™ 2 PCS, Model: MER3700:

Frequency Range (MHz)	EIRP ¹ (dBm)	EIRP ¹ (mW)	Power Density (mW/cm ²) @20 cm	FCC Limit (mW/cm ²)
13.56	-31.09	0.0008	0.00000	0.98
2402-2480	16.59	45.6037	0.00908	1.00

Frequency Range (MHz)	EIRP ¹ (dBm)	EIRP ¹ (mW)	Power Density (W/m ²) @20 cm	RSS Limit (W/m ²)
13.56	-31.09	0.0008	0.00000	2.00
2402-2480	16.59	45.6037	0.09077	5.35

Note: Radios does not simultaneously transmit.

Power Density Calculation

The Power Density can be calculated using the formula

$$S = \text{EIRP} / 4\pi D^2$$

Where: S is Power Density in mW/cm²
D is the distance from the antenna in cm.

4.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0/ G104663935	AS	KV	June 11, 2021	Original document
1.1/ G104663935	AS	KV	November 03, 2021	Updated section 3 with radios used with non-simultaneous transmission.
1.2/ G104663935	AS	OM	July 01, 2022	Updated Customer name and contact information. Fix IC and FCC ID Typos. Updated Antenna Gain information.