RF Exposure Report

Report No.:	FCC_ RF_SL20090102-MED-064R1_MPE Rev1.0
FCC ID:	LF58667
Test Model:	8667-20/8667-40
Series Model:	8667 series
Received Date:	12/04/2020
Test Date:	12/11/2020-12/16/2020
Issued Date:	03/11/2021
Applicant:	Medtronic, Inc.
Address:	710 Medtronic Parkway N.E., Minneapolis, MN 55432
Manufacturer:	Medtronic, Inc.
Address:	710 Medtronic Parkway N.E., Minneapolis, MN 55432
Issued By:	Bureau Veritas Consumer Products Services, Inc.
Lab Address:	775 Montague Expressway, Milpitas, CA 95035
Test Location (1):	775 Montague Expressway, Milpitas, CA 95035
FCC Registration / Designation Number:	540430

ACCREDITED
TESTING CERT # 2742-01

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
FCC_ RF_SL20090102-MED-064R1_MPE	Orignal Release	03/11/2021
FCC_ RF_SL20090102-MED-064R1_MPE Rev1.0	Revised test procedure at para 3.2 added SAR exemption requirements	09/28/2022

1 Technical Declaration of Conformity

Product:	Programmable Infusion Pump (ULP-AMI)
Brand:	Medtronic
Test Model:	8667-20/8667-40
Series Model:	8667 series
Sample Status:	Engineering sample
Applicant:	Medtronic, Inc.
Test Date:	12/11/2020-12/16/2020
Standards:	FCC Part 2 (Section 2.1093) FCC Part 1 (Section 1.1310) KDB 680106 D01 RF Exposure Wireless Charging App v03

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** 03/11/2021

Ellen Chu / Test Engineer

Approved by : _____ , **Date:** 03/11/2021

Deon Dai / Engineer Reviewer

2 General Information

2.1 General Description of EUT

Product	Programmable Infusion Pump (ULP-AMI)
Brand	Medtronic
Test Model	8667-20/8667-40
Status of EUT	Engineering sample
Operating Frequency	175 kHz

3 RF Exposure

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 Occupational / Controlled Exposure				
0.3-3.0	614	1.63	(100)*	6
3.0-30	1824/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1	6
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
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

Note: 1. f = Frequency in MHz; *Plane-wave equivalent power density

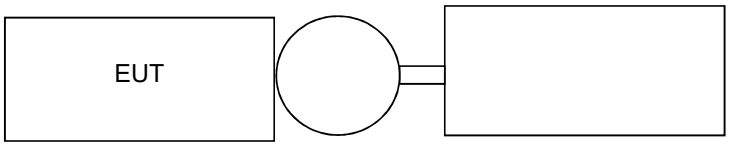
2. For the applicant limit, see FCC 1.1310

3.2 Test Procedure

E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 0 cm measured from the edge of the device.

In this project, body drape is use to maintain the recharger over the implanted devices and position and drape arrangement varies per therapy. A separation of about 5 cm is expected from implant to charger. However, the measurements were made 0 cm from the EUT to show wrost case results.

3.3 Test Setup

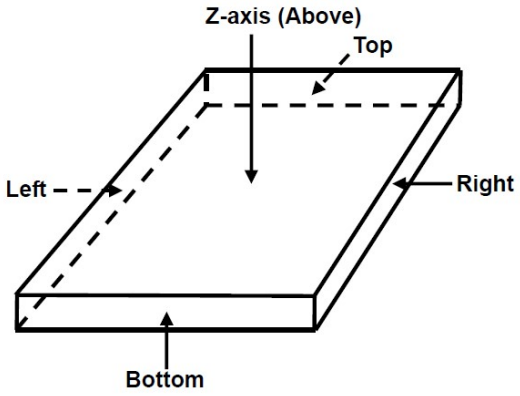


Field Probe

3.4 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Field strength meter WAVECONTROL	SMP2	19SN0981	Feb. 11, 2020	Feb. 11, 2022
WP400 Field Probe WAVECONTROL	WP400	19WP100500	Feb. 11, 2020	Feb. 11, 2022
WPH60 Field Probe WAVECONTROL	WPH60	19WP100400	Feb. 11, 2020	Feb. 11, 2022
Electric Field Probe ETS-Lindgren	HI-6005	156327	Feb. 11, 2020	Feb. 11, 2022

3.5 Test position description



3.6 Result of Maximum Permissible Exposure

H-field measurement result:

Frequency (KHz)	H-Field measurements [A/m]						Max [A/m]	Limit [A/m]	Result
	Top	Bottom	Left	Right	Front	Rear			
175	0.08	0.10	0.10	0.14	0.14	0.14	0.14	1.63	Pass

E-field measurement result:

Frequency (KHz)	E-Field measurements [V/m]						Max [V/m]	Limit [V/m]	Result
	Top	Bottom	Left	Right	Front	Rear			
175	1.38	1.40	1.28	2.11	2.80	9.72	9.72	614	Pass

3.7 EIRP

Frequency Band (KHz)	Max EIRP (dBm)	EIRP mw
175	-17.7	0.0169

From test report FCC_IC_RF_SL20090102-MED-064R1 Rev_1.0 Measured EIRP= -17.7dBm

3.8 SAR exemption limits

As per para 3.3.4 KDB 447498 D04 Interim General RF Exposure Guidance v01

For medical implants devices the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation

The following information was provided by Meditronic

Final Resistor at antenna coil 13.5 Ohms

Max current at the Loop antenna connector 1.3mA.

Power = 0.0228mW

Note: The above values were provided by client via email attached on page 10

3.9 Conclusion

This device meets exemptions limits for SAR evaluation and hence the device is exempt for SAR evaluation

4 Picture of Test Arrangements

From:	Yang, Zhe
To:	Suresh KONDAPALLI; G, G; Shane Hao
Cc:	Shane Hao; James MA; Sarbjit SHELOPAL
Subject:	RE: [EXTERNAL] SL21011803-MED-004 / CS34736 / CS34737 Test Report findings
Date:	Monday, July 25, 2022 4:18:29 PM
Attachments:	image002.png image003.png image004.png

Be careful with this message: it is coming from an external sender
Do not open attachments nor click on links, unless you are sure that the content is safe

Hi Suresh,

Please see below as we discussed.

Antenna Power RUDE calculation (SAME FOR BOTH 8667 and 97800) same antenna and bridge config.

Telemetry Uplink Circuit Description:

The telemetry uplink circuit (anitfc_pmic) contains a delay circuit (ant_ping_delay) that sets the NFET gate drive pulse width of the TX. The pulse width controls the ping amplitude (ANT) that results.

Essentially, the antenna is an external inductor. An external capacitor is chosen to give a resonant frequency of 176KHz (assuming **L=579uH, C=1.414nF**):

$$\omega = \frac{1}{\sqrt{LC}}$$

A rising edge on TXD initiates a telemetry uplink "ping". This occurs when the NFET device in the TX turns on and pulls node ANT low. Since the inductor current can not change instantaneously, it begins increasing relatively slowly, and continues until the NFET turns fully off. At this point, the circuit resonates at 176KHz, and decays at a rate determined by the Q of the resonant circuit. The is dependent upon the series resistance of the inductor:

$$Q = \frac{\omega L}{R}$$

where **R=13.5Ω**.

so current is 1.3mA at antenna connector.

Power if P=RIsquare= 0.0228mW

Zhe

--- END ---