PCTEST Engineering Laboratory, Inc.

6660-B Dobbin Road • Columbia, MD 21045 • U.S.A.
TEL (410) 290-6652 • FAX (410) 290-6654
http://www.pctestlab.com

CERTIFICATE OF COMPLIANCE
FCC Part 95 Certification

Medtronic, Inc.
7000 Central Ave.
Minneapolis, MN 55432-3576
U.S.A.
Attention: Mr. Len Twetan,
Senior Product Development Manager

Dates of Tests: Jan 26-27,2006
Test Report S/N: 0601090010
Test Site: PCTEST Lab, MD

FCC ID **LF5MICSW**

APPLICANT **Medtronic, Inc.**

Classification:	Licensed Non-Broadcast Transmitter
FCC Rule Part(s):	Part 95
Procedure(s):	FCC 95, RSS 243, EN 301 839-1
EUT Type:	Medtronic Cure Link Monitor
Trade Name(s):	*Medtronic*
Model(s):	*2490C, 2490W, 2490R*
Tx/Rx Frequency Range:	402.15 – 404.85 MHz
Max. RF Output Power:	23 µW
Frequency Tolerance:	16 ppm
Emission Designator:	135KF1D
Channel Capacity:	10

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

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MEASUREMENT REPORT

1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

General Information

Applicant Name:	**Medtronic, Inc.**
Address:	**7000 Central Ave.**
	Minneapolis, MN 55432-3576
Attention:	**Mr. Len Twetan,**
	Senior Product Development Manager

- **FCC ID:** **LF5MICSW**
- **Model(s):** **2490C, 2490W, 2490R**
- Quantity: Quantity production is planned
- Tx/Rx Freq. Range: 402.15 – 404.85 MHz
- Equipment Class: Licensed Non-Broadcast Transmitter
- Equipment Type: Medtronic Cure Link Monitor
- Emission Designator: 135KF1D
- Modulation: F1D
- Frequency Tolerance: 16 ppm
- Max. Power: 23 µW
- FCC Rule Part(s): §§§§ 95
- Dates of Tests: Jan. 26 – 27, 2006
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 0601090010

2.1 INTRODUCTION

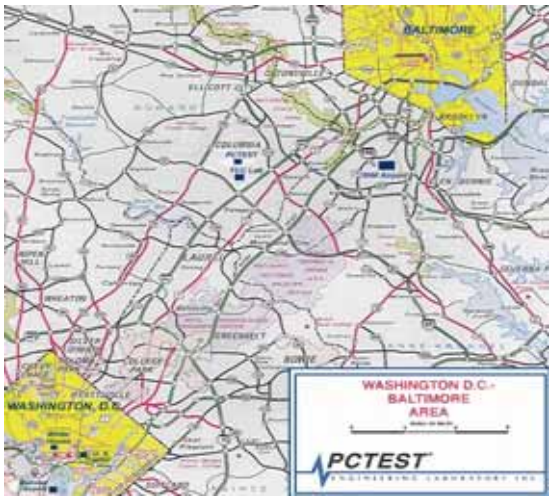


Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

These measurement tests were conducted at ***PCTEST Engineering Laboratory, Inc.*** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

Measurement Procedure

The radiated and spurious measurements were made outdoors at a 3-meter test range (see Figure2). The equipment under testing was placed on a wooden turntable, 3-meters from the receive antenna. The receive antenna height and turntable rotations was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This level was recorded.

For readings above 1 GHZ, the above procedure would be repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

3.1 INSERTS

Block Diagram(s) & Circuit Diagram(s)

The block diagram is shown in Attachment I, and the circuit diagram is shown in Attachment J.

N/A

Operating Instructions

The instruction manual is shown in Attachment K.

N/A

4.1 DESCRIPTION OF TESTS

4.2 Purpose

The tests conducted for this investigation was to determine the effect of minor adjustments in the matching parameters for the antenna. In this case the FCC requires measurements to determine the radiated fundamental and spurious levels. The results are used to determine if it's appropriate to file a Class II change request with the FCC or treat the changes as Class I not requiring a filing with the FCC.

4.3 Radiated Spurious and Harmonic Emissions

Radiated spurious and harmonic emissions above 1 GHz are measured on a 3-meter outdoor site. The EUT is placed on the turntable connected to a dummy load in normal operation using the intended power source. A receiving antenna located 3 meters from the turntable receives any signal radiated from the transmitter and its operating accessories. The antenna is varied from 1 to 4 meters and the polarization is varied (horizontal and vertical) to determine the worst-case emission level. To obtain actual radiated signal strength, a signal generator is adjusted in output until a reading identical to that obtained with the actual transmitter is obtained at the receiver. Signal level is read directly from the generator and recorded on the attached table.

5.1 TEST DATA

5.2 Radiated Measurements

Field Strength of SPURIOUS Radiation -Low

Frequency (MHz)	Level (dBm)	AFCL (dB)	POL (H/V)	F/S (dBμV/m)	F/S (μV/m)	Power (W)	Margin (dB)
402.15	-50.100 (ref)		H			23 uW	
804.3	-99.200	31.45	H	39.25	91.72759	1.54E-09	6.75
1206.5	-124.000	32.1	H	15.1	5.688529	5.92E-12	38.9
1608.6	-124.600	34.5	H	16.9	6.99842	8.96E-12	37.1
2010.8	-135.000	36	H	8	2.511886	1.15E-12	46

Field Strength of SPURIOUS Radiation -Medium

Frequency (MHz)	Level (dBm)	AFCL (dB)	POL (H/V)	F/S (dBμV/m)	F/S (μV/m)	Power (W)	Margin (dB)
403.35	-50.000 (ref)		H			22 uW	
806.7	-99.900	31.5	H	38.6	85.1138	1.33E-09	7.4
1210.1	-124.200	32.2	H	15	5.623413	5.78E-12	39
1613.4	-122.400	34.6	H	19.2	9.120108	1.52E-11	34.8
2016.8	-135.000	36.1	H	8.1	2.540973	1.18E-12	45.9

Field Strength of SPURIOUS Radiation -High

Frequency (MHz)	Level (dBm)	AFCL (dB)	POL (H/V)	F/S (dBμV/m)	F/S (μV/m)	Power (W)	Margin (dB)
404.85	-50.200(ref)		H			23 uW	
809.70	-98.600	31.6	H	40	100	1.83E-09	-6
1214.60	-123.100	32.3	H	16.2	6.456542	7.63E-12	-37.8
1619.40	-123.600	34.7	H	18.1	8.035261	1.18E-11	-35.9
2024.30	-135.000	36.2	H	8.2	2.570396	1.21E-12	-45.8

6.1 POWER LINE EMISSIONS

SEE ATTACHMENT A

7.1 TEST EQUIPMENT

8.2 Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	08/15/06	3638A08713
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	04/17/06	2542A11898
Spectrum Analyzer/Tracking Gen.	HP 8591A (100Hz-1.8GHz)	08/10/06	3144A02458
Signal Generator*	HP 8640B (500Hz-1GHz)	06/03/06	2232A19558
Signal Generator*	HP 8640B (500Hz-1GHz)	06/03/06	1851A09816
Signal Generator*	Rohde & Schwarz (0.1-1000MHz)	09/11/06	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30-1000MHz)	04/12/06	0792-03271
Ailtech/Eaton Receiver	NM 37/57A (30-1000MHz)	03/11/06	0805-03334
Ailtech/Eaton Receiver	NM 17/27A (0.1-32MHz)	09/17/06	0608-03241
Quasi-Peak Adapter	HP 85650A	08/15/06	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/06	0194-04082
RG58 Coax Test Cable	No. 167		n/a
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP 8447D		1145A00470, 1937A03348
Broadband Amplifier	HP 8447F		2443A03784
Transient Limiter	HP 11947A (9kHz-200MHz)		2820A00300
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance		Design 1295, 1332, 0355
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set)		
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN	3816/2		1079
EMCO LISN	3816/2		1077
EMCO LISN	3725/2		2009
Microwave Preamplifier 40dB Gain	HP 83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Ailtech/Eaton Receiver	NM37/57A-SL		0792-03271
Spectrum Analyzer	HP 8594A	3051A00187	
Spectrum Analyzer (2)	HP 8591A		3034A01395, 3108A02053
Modulation Analyzer	HP 8901A		2432A03467
NTSC Pattern Generator	Leader 408		0377433

Noise Figure Meter	HP 8970B	3106A02189
Noise Figure Meter	Ailtech 7510	TE31700
Noise Generator	Ailtech 7010	1473
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)	80931
Digital Thermometer	Extech Instruments 421305	426966
Attenuator	HP 8495A (0-70dB) DC-4GHz	
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)	
Shielded Screen Room	RF Lindgren Model 26-2/2-0	6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81	R2437 (PCT278)
Enviromental Chamber	Associated Systems Model 1025 (Temperature/Humidity)	PCT285

* Calibration traceable to the National Institute of Standards and Technology (NIST).

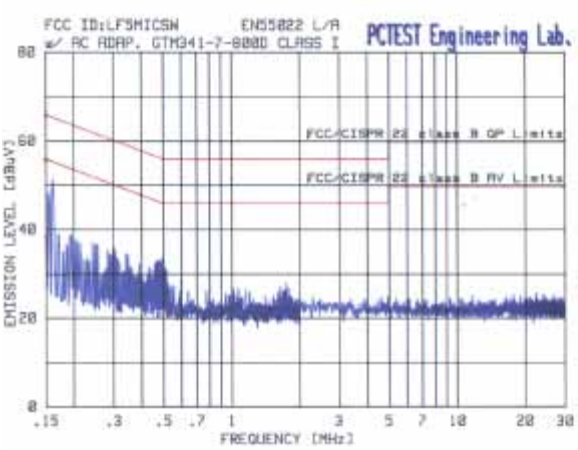
8.1 SAMPLE CALCULATIONS

The power for channel 05 (403.35 MHz) was measured at a 3 meter distance on our OATS. The turn table and antenna mast were adjusted to obtain the highest reading on a receiver spectrum analyzer with RBW and VBW set at 3MHz each. A dipole antenna driven by a signal generator was substituted in place of the EUT and adjusted to match the –50.1 dBm receiver spectrum analyzer reading. (The dipole antenna used during the substitution has a gain of 2.14 dBi at 403.35 MHz.) The power at the antenna terminals of the substituted dipole was –18.87 dBm. This value was corrected by adding the 2.14 dBi gain of the substituted dipole to yield – 16.73 dBm for EIRP.

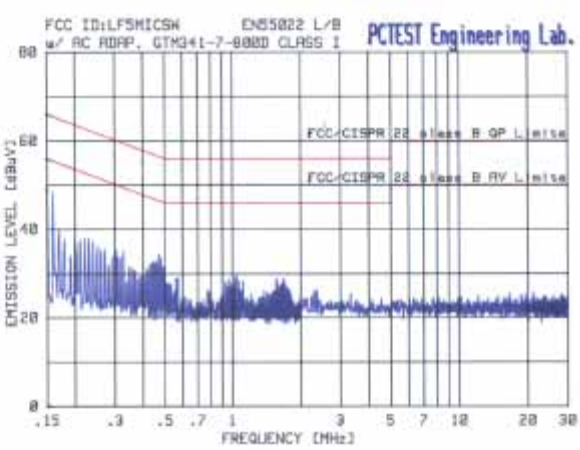
9.1 CONCLUSION

The data collected shows that the modified **Medtronic Cure Link Monitor FCC ID: LF5MICSW** continues to comply with all the requirements of Parts 2 and 95 of the FCC rules, RSS 243, and EN 301 829-2.

Attachment A



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Limit [dBuV]	Margin [dB]	Average [dBuV]	Limit [dBuV]	Margin [dB]
1	.158	39.25	65.98	-26.73	27.95	55.68	-27.71
2	.474	32.59	56.44	-23.45	22.91	46.27	-23.36
3	.461	32.30	56.67	-24.29	22.87	46.48	-23.61
4	.474	32.22	56.44	-24.22	22.86	46.57	-23.71
5	.467	32.10	56.56	-24.38	22.93	46.11	-23.18
6	.447	31.33	56.94	-25.61	22.08	46.76	-23.88
7	.438	31.15	57.08	-25.93	22.87	46.09	-24.82
8	.278	37.49	60.87	-23.38	23.36	50.58	-27.22
9	.284	35.75	60.70	-24.95	23.27	50.11	-26.84
10	.331	33.16	59.43	-26.27	23.15	49.42	-26.27



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Limit [dBuV]	Margin [dB]	Average [dBuV]	Limit [dBuV]	Margin [dB]
1	.158	42.33	65.98	-23.65	28.40	56.00	-27.60
2	.158	40.13	65.98	-25.79	28.35	56.00	-27.65
3	.458	32.61	56.87	-24.26	22.94	46.41	-23.47
4	.462	33.40	56.66	-23.26	22.97	46.49	-23.52
5	.442	31.47	57.03	-25.56	22.96	47.07	-24.11
6	.421	31.15	57.43	-26.28	22.85	47.24	-24.39
7	.482	33.15	56.31	-23.16	22.87	46.09	-23.22
8	.315	33.10	59.83	-26.73	23.11	49.77	-26.66
9	.475	32.98	56.43	-23.45	22.94	46.28	-23.34
10	.210	39.46	63.21	-23.75	24.17	52.84	-28.67

Attachement B