Medtronic MiniMed

REVISED TEST REPORT TO 102993-5

NGP BLE Pump
Model: M994838A001*
(*See Appendix A for Manufacturer Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.247
(DTS 2400-2483.5 MHz)

Report No.: 102993-5A

Date of issue: November 25, 2019

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.01

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Medtronic MiniMed
18000 Devonshire Street, SS-32
Northridge, CA 91325

Representative: Jonathan Tabalujan
Customer Reference Number: 4500134769

REPORT PREPARED BY:

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 102993

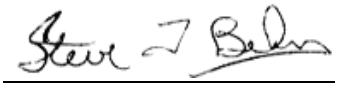
DATE OF EQUIPMENT RECEIPT: September 12, 2019
DATE(S) OF TESTING: September 12-15, 2019

Revision History

Original: Testing of the NGP BLE Pump Model: M994838A001 to FCC Part 15 Subpart C Section(s) 15.247 (DTS 2400-2483.5 MHz).
Revision A: To correct the Calculated (dBm) column in Section 15.247(b)(3)Power Output and Section 15.247(e) PSD.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Canyon Park Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.12

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Japan
Canyon Park, Bothell, WA	US0081	US1022	A-0136
Brea, CA	US0060	US1025	A-0136
Fremont, CA	US0082	US1023	A-0136
Mariposa, CA	US0103	US1024	A-0136

*CKC's list of NIST designated countries can be found at: https://standards.gov/cabs/designations.html

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	NA1
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	NA2

NA = Not Applicable
NA1 = Not applicable because the EUT has an integral antenna.
NA2 = Not applicable because the EUT is battery operated.

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
NGP BLE Pump	Medtronic MiniMed	M994838A001	NG2017888H

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	BLE
Operating Frequency Range:	2402-2480 MHz
Modulation Type(s):	GFSK
Maximum Duty Cycle:	Tested 100% as worst case
Number of TX Chains:	1
Antenna Type(s) and Gain:	Chip Antenna, -0.5 dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	1.5VDC Battery
Firmware / Software used for Test:	XTest-5.1A.1

FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

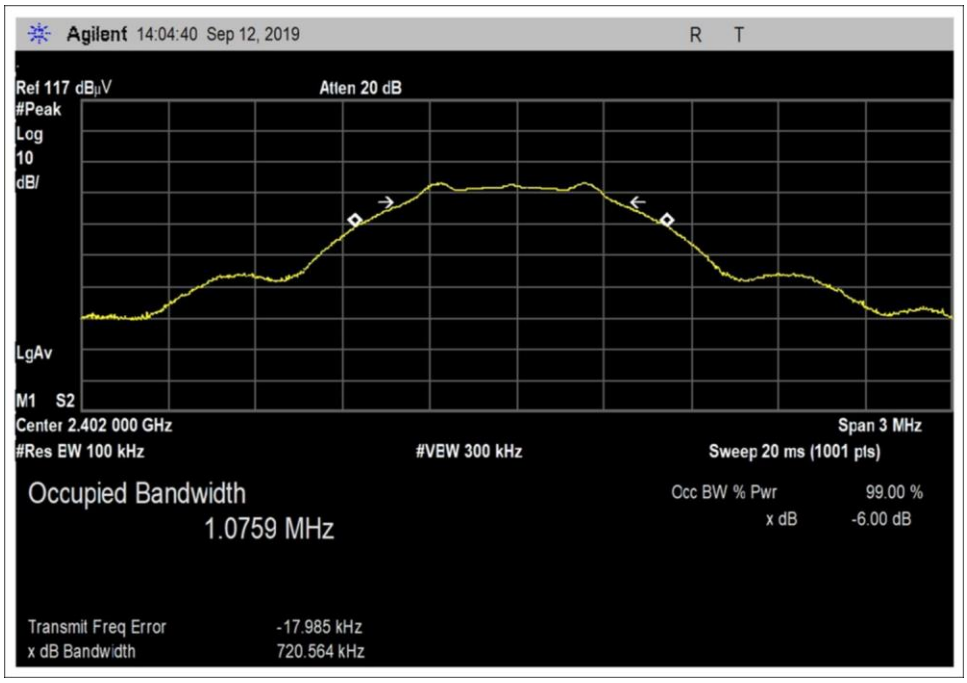
Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 558074 v05r02 2019	Test Date(s):	9/12/2019
Configuration:	1		
Test Setup:	Test Mode: Continuously Modulated 15.31(e) EUT is operating with fresh battery installed. The EUT is set 1.5 meters high on a Styrofoam table. X, Y and Z axis are investigated with the worst case reported.		

Environmental Conditions			
Temperature (ºC)	24	Relative Humidity (%):	40

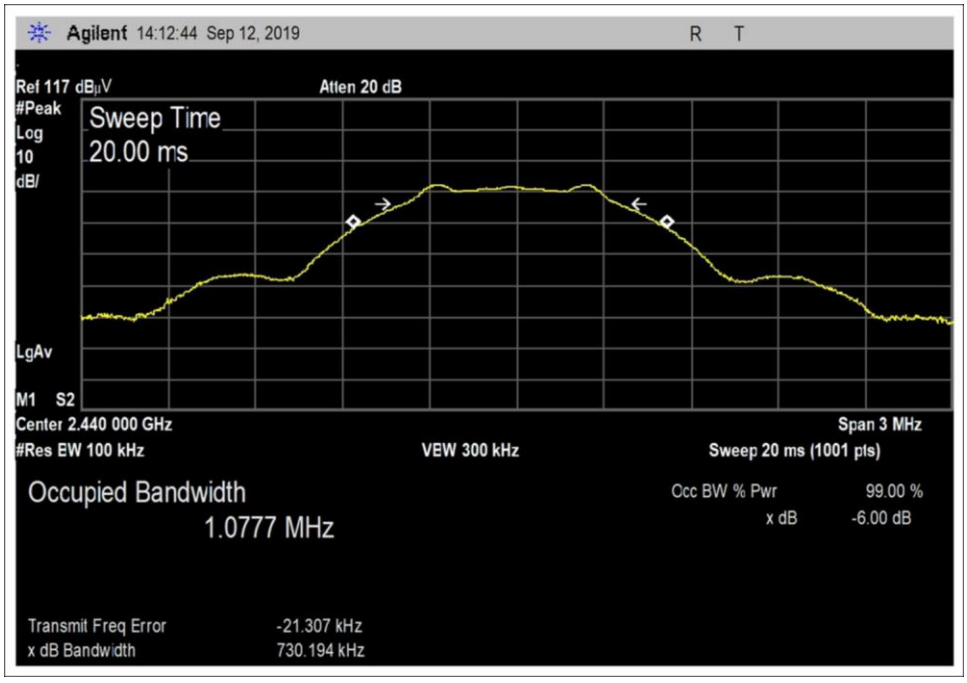
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01467	Horn Antenna	EMCO	3115	7/5/2019	7/5/2021
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
P06503	Cable	Astrolab	32026-29801-29801-36	3/13/2018	3/13/2020
P06515	Cable	Andrews	Heliax	6/29/2018	6/29/2020
P06540	Cable	Andrews	Heliax	8/23/2019	8/23/2021
03540	Preamp	HP	83017A	5/13/2019	5/13/2021

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2402	1	GFSK	720.56	≥500	Pass
2440	1	GFSK	730.19	≥500	Pass
2480	1	GFSK	730.68	≥500	Pass

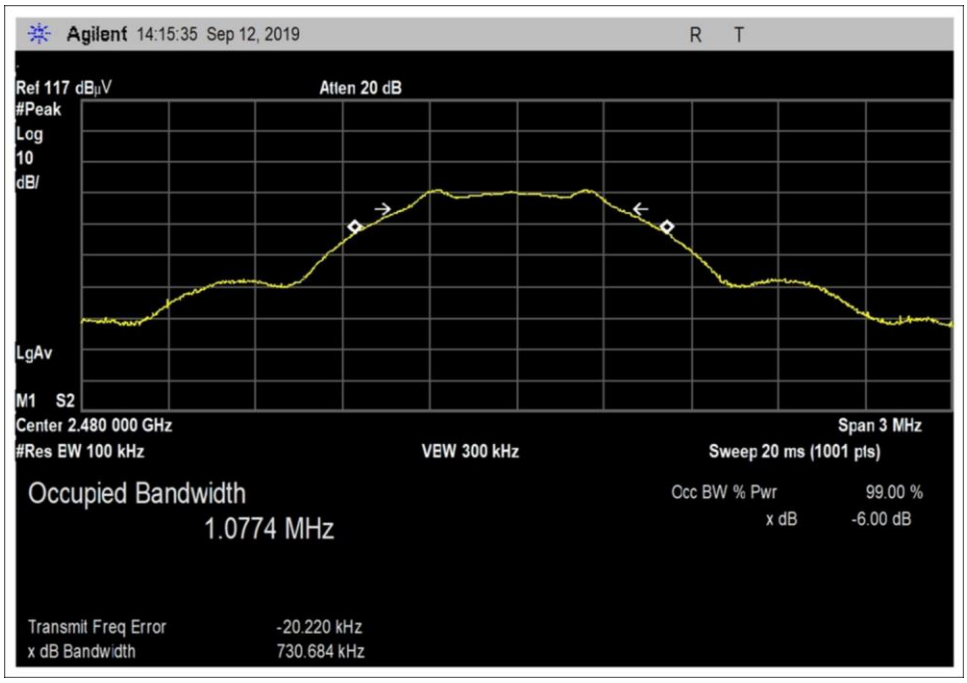
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)

15.247(b)(3) Output Power

Test Data Summary - Radiated Measurement						
Measurement Option: RBW > DTS Bandwidth						
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Field Strength (dBuV/m @3m)**	**Calculated (dBm)**	**Limit (dBm)**	**Results**
2402	GFSK	Chip / -0.5dBi	90.8	-3.92	≤30	Pass
2440	GFSK	Chip / -0.5dBi	90.3	-4.42	≤30	Pass
2480	GFSK	Chip / -0.5dBi	90.4	-4.32	≤30	Pass

For fixed point-to-point antennas, the limit is calculated in accordance with 15.247(c)(1): $Limit = 30 - Roundup\left(\frac{G-6}{3}\right)$

For directional beamforming antennas, the limit is calculated in accordance with 15.247(c)(2) and KDB 662911.

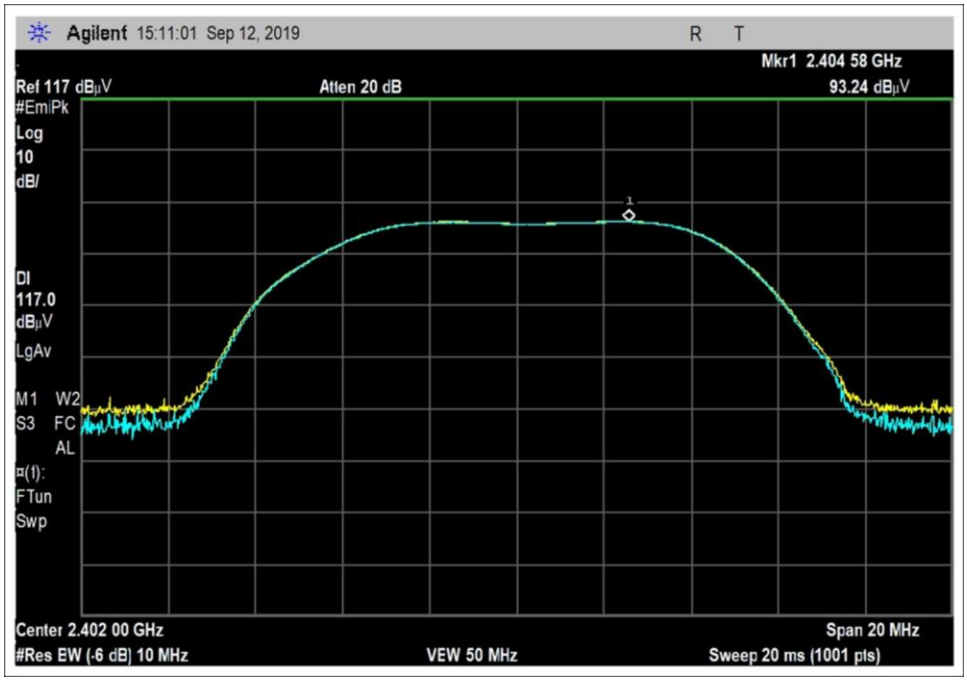
Conducted RF output power calculated in accordance with ANSI C63.10.

$$P(W) = \frac{(E \cdot d)^2}{30\ G}$$

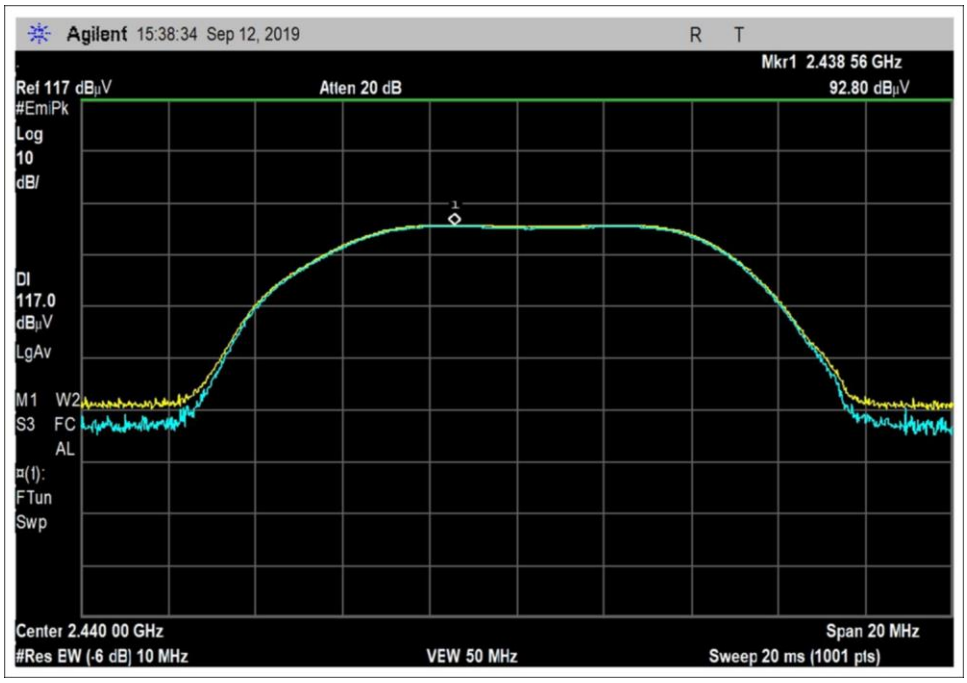
Or equivalently, in logarithmic form:

$$P(dBm) = E(dBuV/m) + 20LOG(d) - G\ - 104.77$$

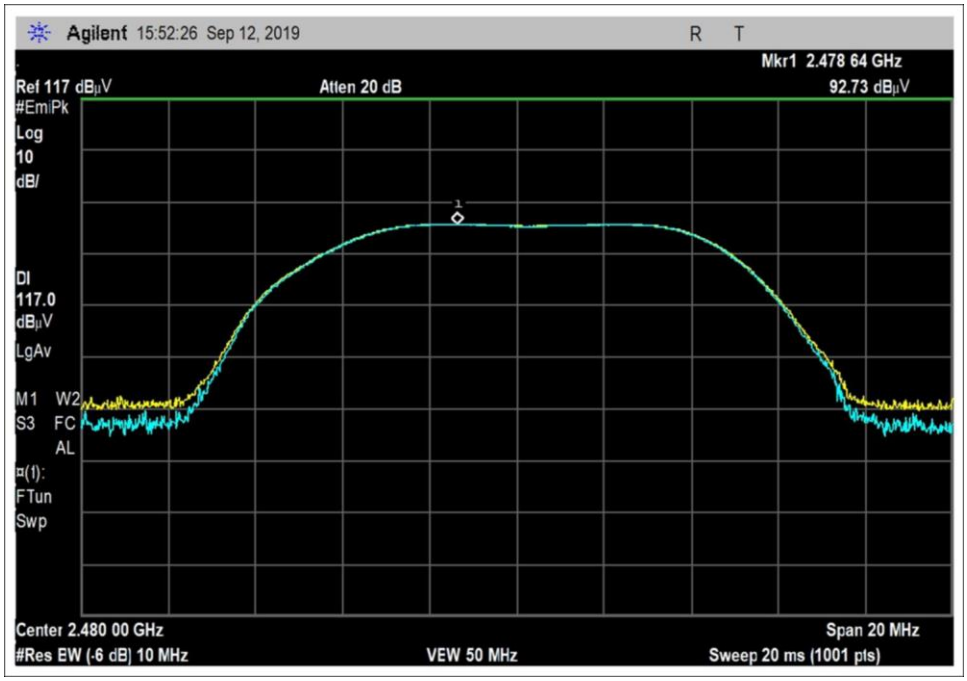
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362		
Customer:	**Medtronic MiniMed**		
Specification:	**15.247(b) Power Output (2400-2483.5 MHz DTS)**		
Work Order #:	**102993**	Date:	9/12/2019
Test Type:	**Maximized Emissions**	Time:	15:47:47
Tested By:	Matthew Harrison	Sequence#:	1
Software:	EMITest 5.03.12		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

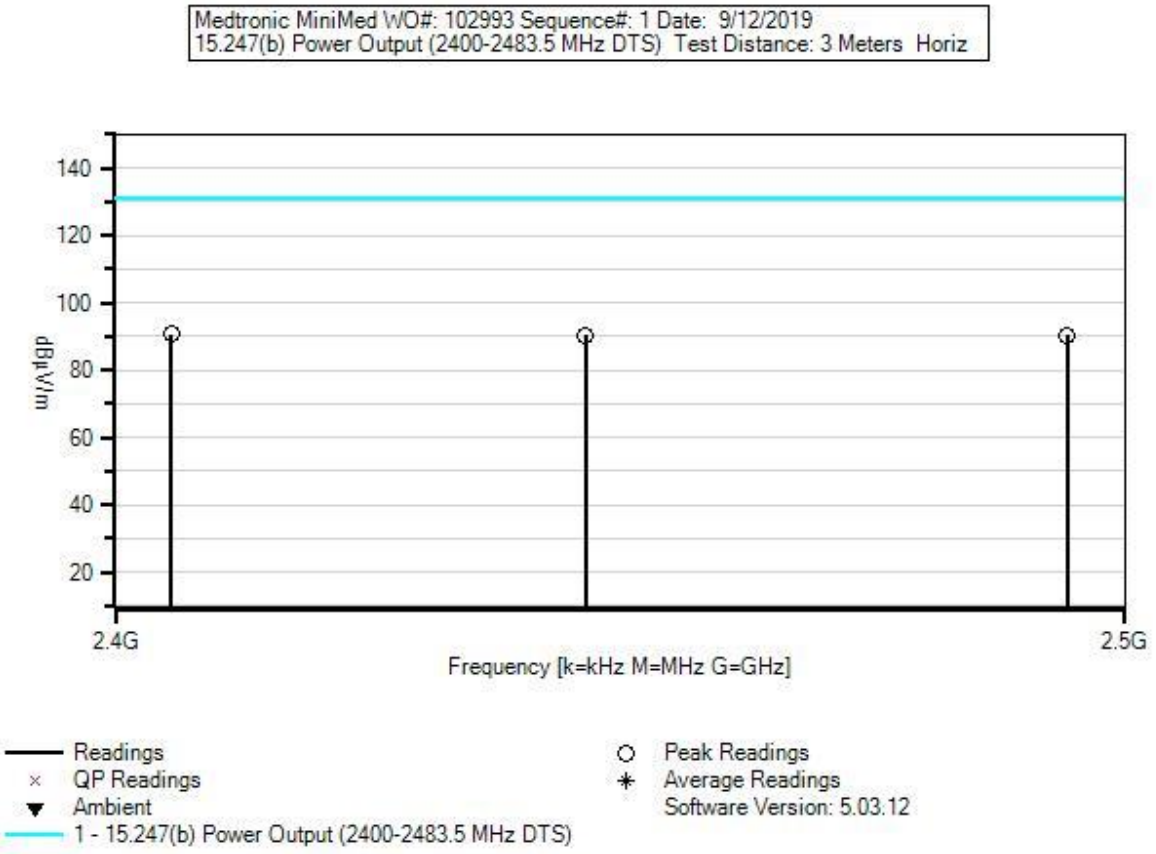
Test Conditions / Notes:

Frequency Range: 2402-2480MHz
Power setting: 0dBm
Test Setup: Continuously Transmitting 2402, 2440, 2480 MHz

Temperature (ºC): 25
Relative Humidity (%): 38

Test Location: Bothell Lab C
Test Method: ANSI C63.10 (2013), KDB 558074 v05r02 2019

Setup: EUT is operating with fresh battery installed. Low, Mid, and High channels investigated. X, Y, and Z EUT axes investigated as well as horizontal and vertical measurement antenna polarities investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Cal Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T3	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020
T4	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T5	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T6	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2404.580M	93.2	-34.3 +0.6	+27.7 +0.0	+1.0	+2.6	+0.0 100	90.8	131.2 X-Axis	-40.4	Horiz 180
2	2478.640M	92.7	-34.2 +0.6	+27.6 +0.0	+1.0	+2.7	+0.0 100	90.4	131.2 X-Axis	-40.8	Horiz 191
3	2438.560M	92.8	-34.3 +0.6	+27.6 +0.0	+1.0	+2.6	+0.0 100	90.3	131.2 X-Axis	-40.9	Horiz 190

Test Setup Photo(s)

X Axis

Y Axis

Z Axis

15.247(e) Power Spectral Density

Test Data Summary - Radiated Measurement						
Measurement Method: PKPSD						
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Field Strength (dBuV/m @3m)**	**Calculated (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
2402	GFSK	Chip / -0.5dBi	78.4	-16.32	≤8	Pass
2440	GFSK	Chip / -0.5dBi	78.3	-16.42	≤8	Pass
2480	GFSK	Chip / -0.5dBi	78.1	-16.62	≤8	Pass

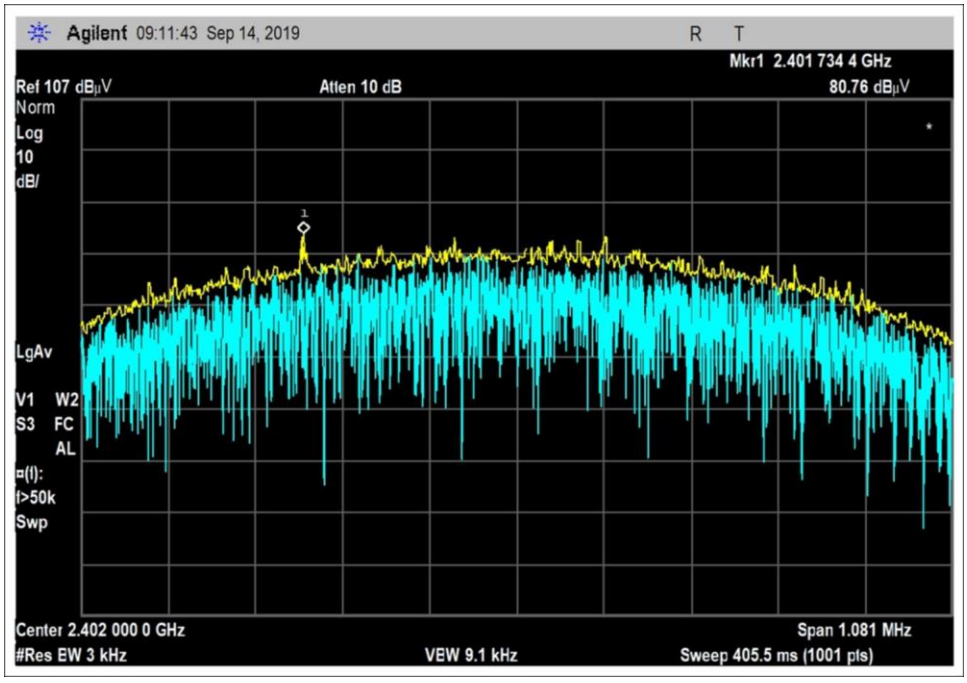
Conducted RF output power calculated in accordance with ANSI C63.10.

$$P(W) = \frac{(E \cdot d)^2}{30\ G}$$

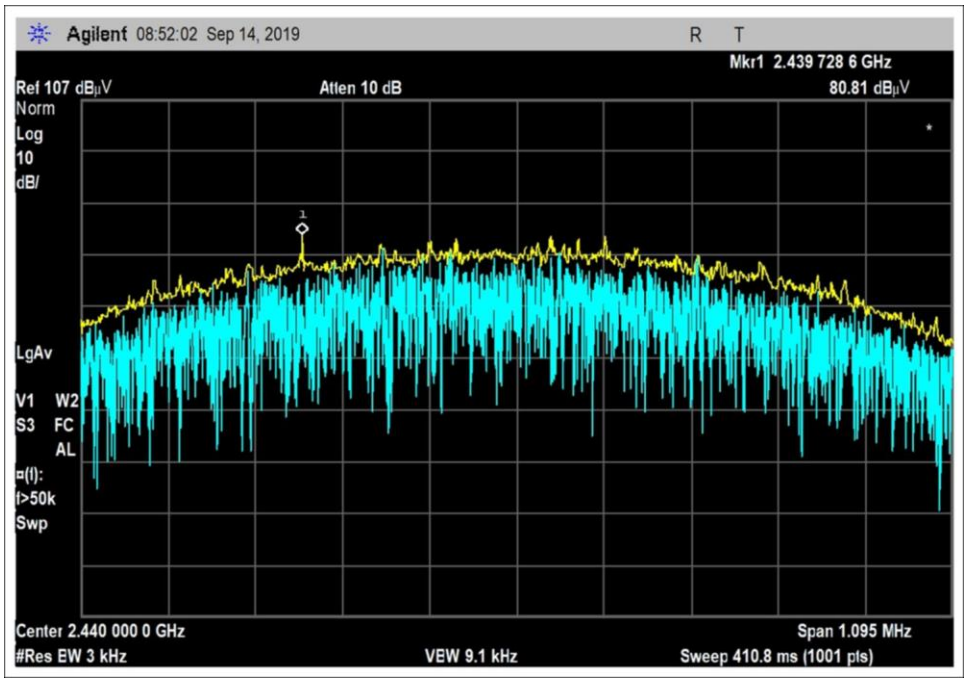
Or equivalently, in logarithmic form:

$$P(dBm) = E(dBuV/m) + 20LOG(d) - G\ - 104.77$$

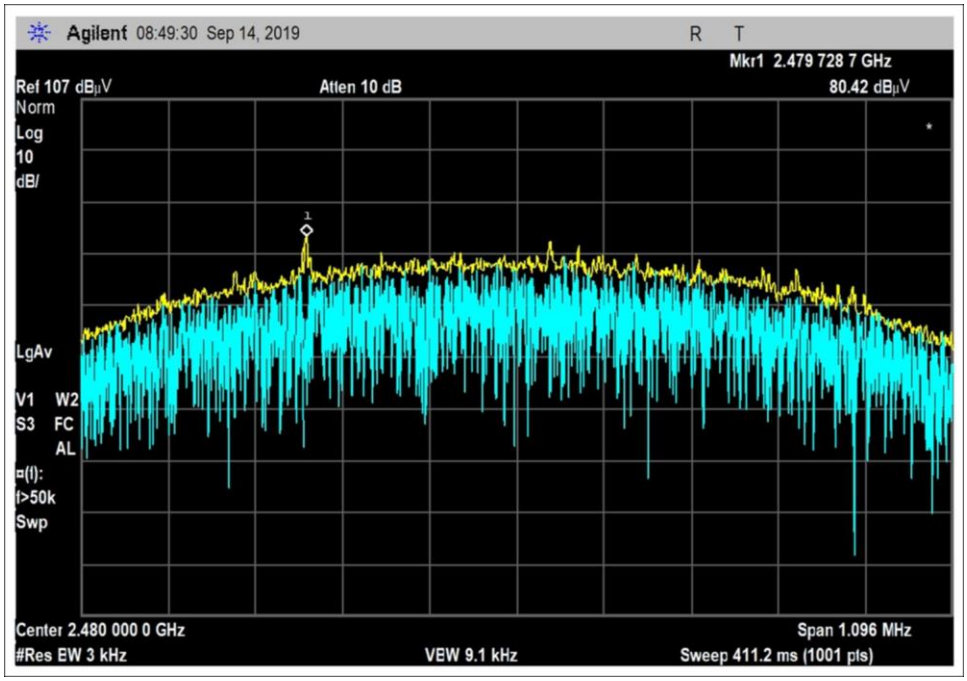
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location:	CKC Labs • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362		
Customer:	**Medtronic MiniMed**		
Specification:	**15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)**		
Work Order #:	**102993**	Date:	9/14/2019
Test Type:	**Maximized Emissions**	Time:	09:07:13
Tested By:	Matthew Harrison	Sequence#:	3
Software:	EMITest 5.03.12		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

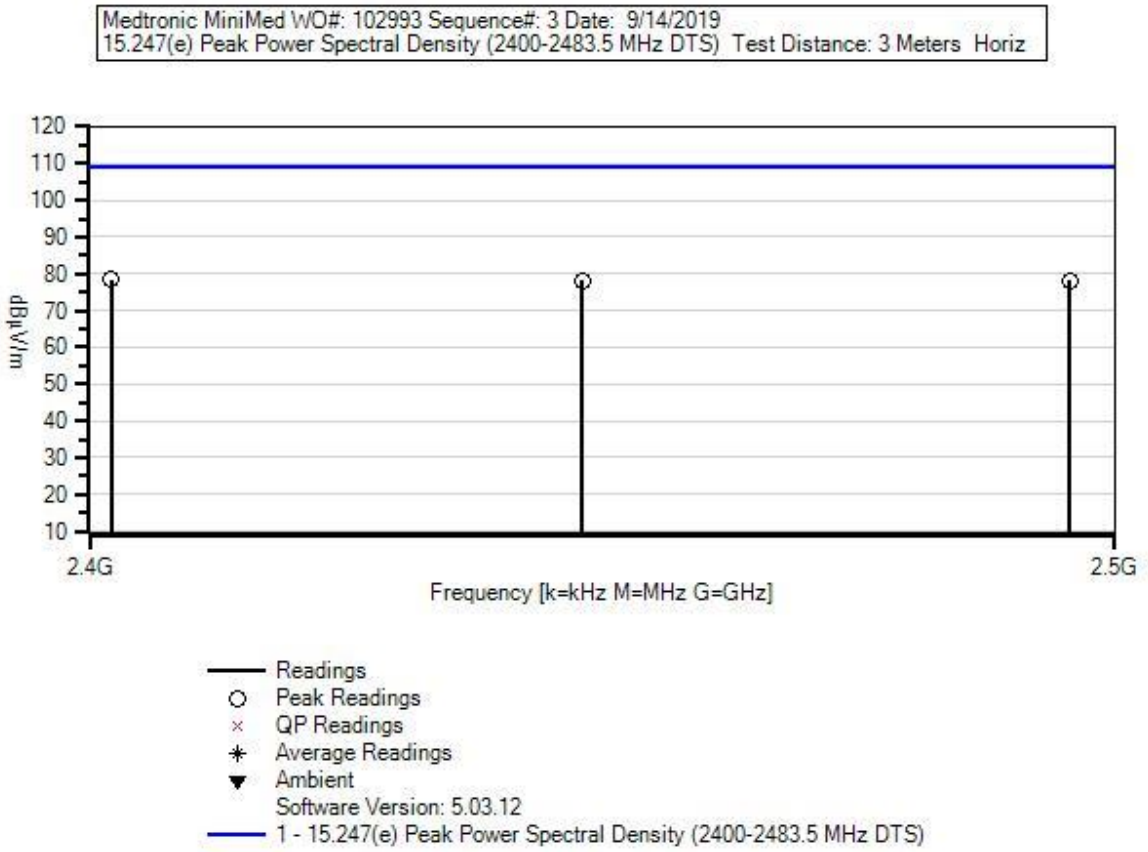
Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2390-2483.5MHz
Power setting: 0dBm
Test Setup: Continuously Transmitting 2402, 2480 MHz

Test Location: Bothell Lab C3
Temperature (ºC): 22
Relative Humidity (%): 39
Test Method: ANSI C63.10 (2013), KDB 558074 v05r02 2019

Setup: EUT is operating with fresh battery installed. Low, Mid, and High channels investigated. X, Y, and Z EUT axes investigated as well as horizontal and vertical measurement antenna polarities investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Cal Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T3	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020
T4	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T5	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2401.734M	80.8	-34.3 +0.6	+27.7	+1.0	+2.6	+0.0	78.4	109.2	-30.8	Horiz
2	2439.729M	80.8	-34.3 +0.6	+27.6	+1.0	+2.6	+0.0	78.3	109.2	-30.9	Horiz
3	2479.729M	80.4	-34.2 +0.6	+27.6	+1.0	+2.7	+0.0	78.1	109.2	-31.1	Horiz

Test Setup Photo(s)

X Axis

Y Axis

Z Axis

15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Labs • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362		
Customer:	**Medtronic MiniMed**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**102993**	Date:	9/15/2019
Test Type:	**Maximized Emissions**	Time:	12:20:32
Tested By:	Matthew Harrison	Sequence#:	4
Software:	EMITest 5.03.12		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

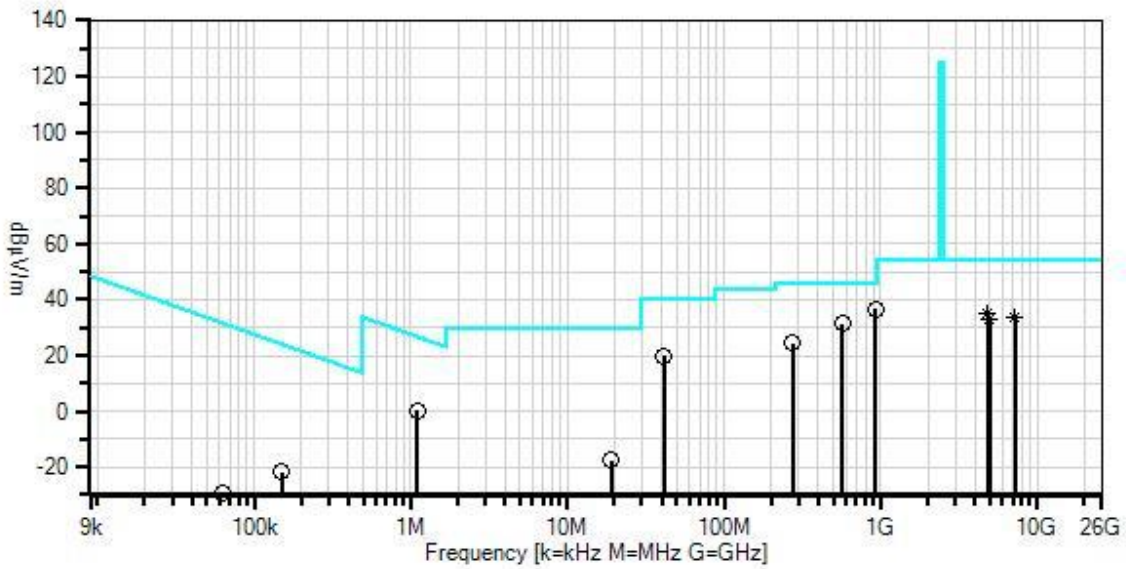
Test Conditions / Notes:

Frequency Range: 9kHz-25GHz
Power setting: 0dBm
Test Setup: Continuously Transmitting 2402, 2440, 2480 MHz

Test Location: Bothell Lab C3
Temperature (ºC): 22
Relative Humidity (%): 39
Test Method: ANSI C63.10 (2013), KDB 558074 v05r02 2019

Setup: EUT is operating with fresh battery installed. Low, Mid, and High channels investigated. X, Y, and Z EUT axes investigated as well as horizontal and vertical measurement antenna polarities investigated, worst case reported.

Medtronic MiniMed WO#: 102993 Sequence#: 4 Date: 9/15/2019
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Para, Perp & Gnd Para



Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.12

Test Equipment:

ID	Asset #	Description	Model	Cal Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T3	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020
T4	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T5	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
	AN02763-69	Waveguide	Multiple	4/23/2018	4/23/2020
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	10/16/2018	10/16/2020
T6	AN00052	Loop Antenna	6502	5/7/2018	5/7/2020
T7	AN02307	Preamp	8447D	1/15/2018	1/15/2020
T8	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T9	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T10	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T11	ANP05360	Cable	RG214	1/31/2018	1/31/2020
	ANP06678	Cable	32026-29801-29801-144	3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

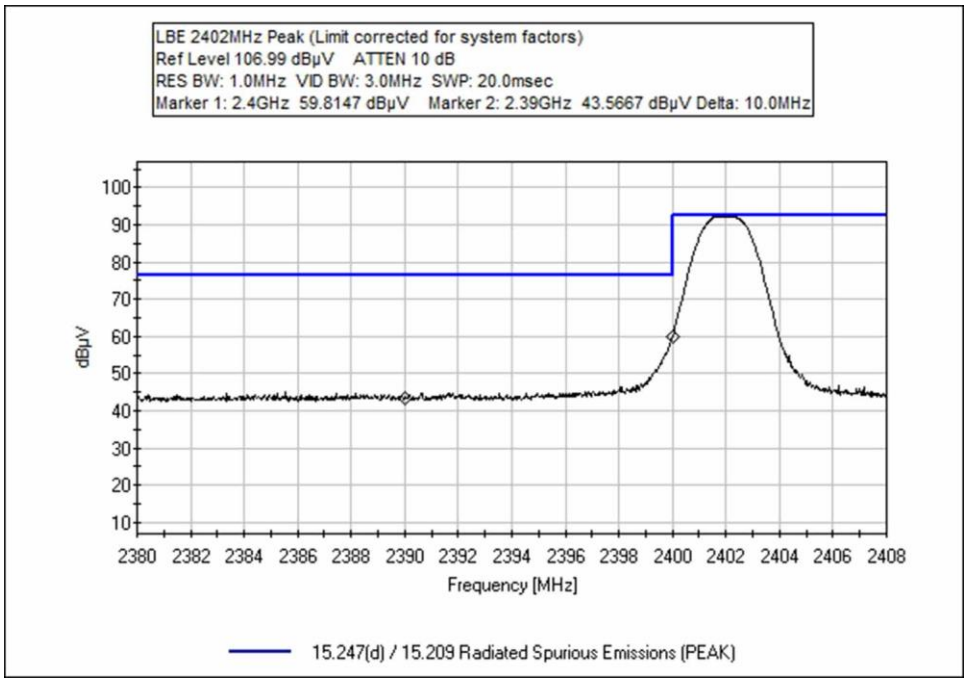
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	924.300M	30.0	+0.0 +0.4 +5.8	+0.0 +0.0 +1.5	+0.0 -27.3 +2.0	+0.0 +24.1	+0.0	36.5	46.0	-9.5	Para, 158
2	570.300M	30.8	+0.0 +0.3 +5.8	+0.0 +0.0 +1.1	+0.0 -28.2 +1.4	+0.0 +20.2	+0.0	31.4	46.0	-14.6	Para, 158
3	4804.255M Ave	29.6	-33.6 +0.9 +0.0	+32.4 +0.0 +0.0	+1.5 +0.0 +0.0	+4.1 +0.0	+0.0	34.9	54.0	-19.1	Horiz
^	4804.255M	41.1	-33.6 +0.9 +0.0	+32.4 +0.0 +0.0	+1.5 +0.0 +0.0	+4.1 +0.0	+0.0	46.4	54.0	-7.6	Horiz
5	7206.000M Ave	23.5	-34.5 +1.1 +0.0	+36.5 +0.0 +0.0	+2.1 +0.0 +0.0	+5.3 +0.0	+0.0	34.0	54.0	-20.0	Horiz
^	7206.000M	39.2	-34.5 +1.1 +0.0	+36.5 +0.0 +0.0	+2.1 +0.0 +0.0	+5.3 +0.0	+0.0	49.7	54.0	-4.3	Horiz
7	41.600M	29.8	+0.0 +0.1 +5.8	+0.0 +0.0 +0.3	+0.0 -27.9 +0.3	+0.0 +11.4	+0.0 35	19.8	40.0	-20.2	Para, 158

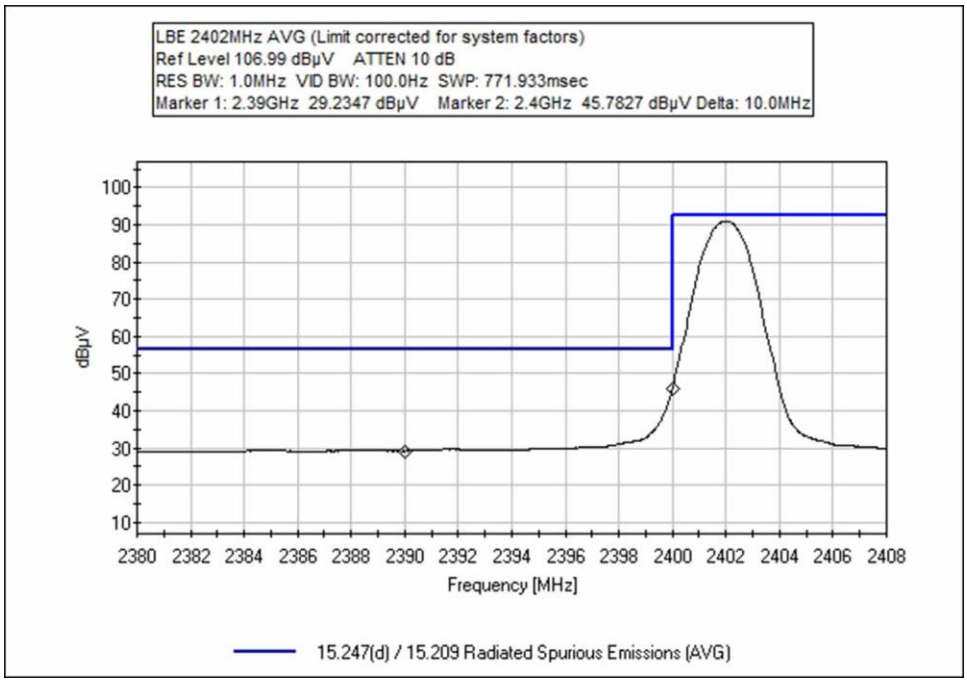
8	4960.390M Ave	27.4	-33.6 +0.9 +0.0	+32.6 +0.0 +0.0	+1.6 +0.0 +0.0	+4.2 +0.0	+0.0	33.1	54.0	-20.9	Horiz
^	4960.390M	40.4	-33.6 +0.9 +0.0	+32.6 +0.0 +0.0	+1.6 +0.0 +0.0	+4.2 +0.0	+0.0	46.1	54.0	-7.9	Horiz
10	4880.550M Ave	27.4	-33.6 +0.9 +0.0	+32.5 +0.0 +0.0	+1.6 +0.0 +0.0	+4.2 +0.0	+0.0	33.0	54.0	-21.0	Horiz
^	4880.550M	40.6	-33.6 +0.9 +0.0	+32.5 +0.0 +0.0	+1.6 +0.0 +0.0	+4.2 +0.0	+0.0	46.2	54.0	-7.8	Horiz
12	276.400M	30.9	+0.0 +0.2 +5.8	+0.0 +0.0 +0.8	+0.0 -27.0 +1.0	+0.0 +12.7	+0.0 88	24.4	46.0	-21.6	Para, 158
13	1.105M	30.2	+0.0 +0.0 +0.0	+0.0 +9.9 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0 256	0.1	26.8	-26.7	Para, 158
14	150.000k	48.5	+0.0 +0.0 +0.0	+0.0 +9.7 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	-80.0 207	-21.8	24.1	-45.9	Para, 158
15	19.194M	14.0	+0.0 +0.1 +0.0	+0.0 +8.2 +0.0	+0.0 +0.0 +0.0	+0.2 +0.0	-40.0 335	-17.5	29.5	-47.0	Para, 158
16	62.542k	41.3	+0.0 +0.0 +0.0	+0.0 +9.7 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	-80.0 7	-29.0	31.7	-60.7	Para, 158

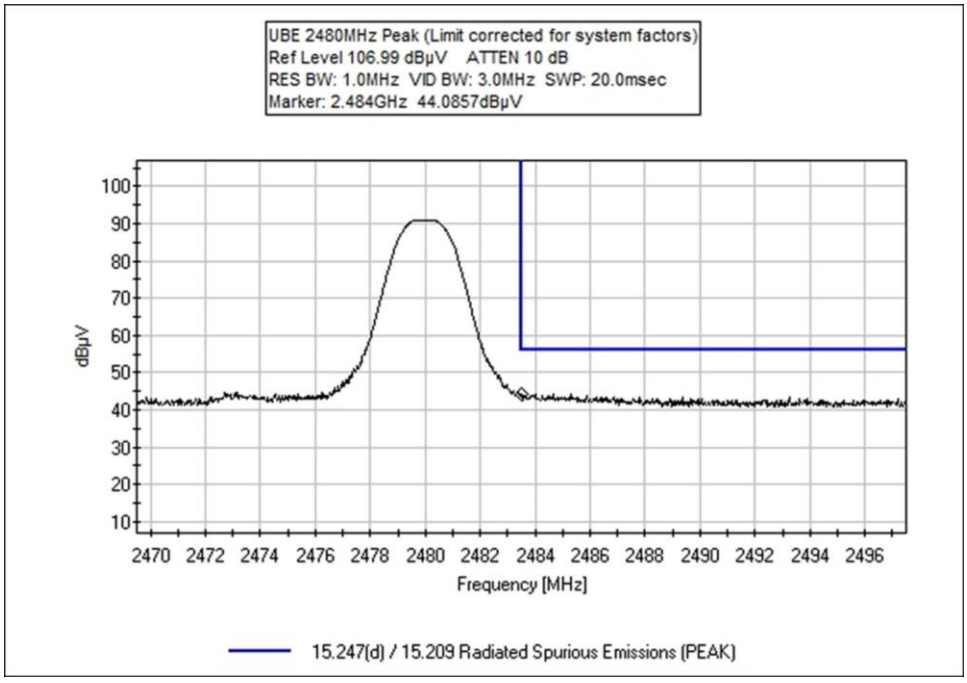
Band Edge

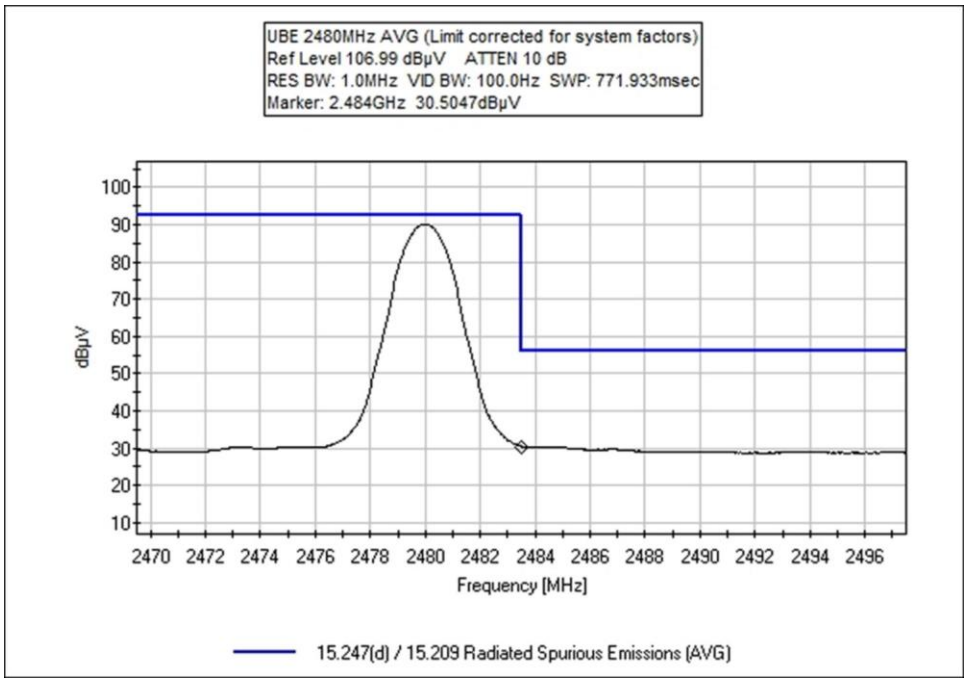
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	GFSK	Chip	26.8	<54	Pass
2400.0	GFSK	Chip	43.5	<70.2	Pass
2483.5	GFSK	Chip	28.2	<54	Pass

Band Edge Plots




LBE 2402MHz AVG (Limit corrected for system factors)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 771.933msec
Marker 1: 2.39GHz 29.2347 dBµV Marker 2: 2.4GHz 45.7827 dBµV Delta: 10.0MHz
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions (AVG)


UBE 2480MHz Peak (Limit corrected for system factors)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 44.0857dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions (PEAK)


UBE 2480MHz AVG (Limit corrected for system factors)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 771.933msec
Marker: 2.484GHz 30.5047dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2470 2472 2474 2476 2478 2480 2482 2484 2486 2488 2490 2492 2494 2496
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions (AVG)

Test Setup / Conditions / Data

Test Location:	CKC Labs • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362		
Customer:	**Medtronic MiniMed**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions (AVG)**		
Work Order #:	**102993**	Date:	9/14/2019
Test Type:	**Maximized Emissions**	Time:	08:34:47
Tested By:	Matthew Harrison	Sequence#:	2
Software:	EMITest 5.03.12		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2390-2483.5MHz
Power setting: 0dBm
Test Setup: Continuously Transmitting 2402, 2480 MHz

Test Location: Bothell Lab C3 Temperature (ºC): 22
Relative Humidity (%): 39
Test Method: ANSI C63.10 (2013), KDB 558074 v05r02 2019

Setup: EUT is operating with fresh battery installed. Low, Mid, and High channels investigated. X, Y, and Z EUT axes investigated as well as horizontal and vertical measurement antenna polarities investigated, worst case reported.

Test Equipment:

ID	Asset #	Description	Model	Cal Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T3	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020
T4	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T5	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T6	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2400.000M	45.9	-34.3	+27.7	+1.0	+2.6	+0.0	43.5	54.0	-10.5	Horiz
	Ave		+0.6	+0.0							
^	2400.000M	59.8	-34.3	+27.7	+1.0	+2.6	+0.0	57.4	74.0	-16.6	Horiz
			+0.6	+0.0							
3	2483.500M	30.5	-34.2	+27.6	+1.0	+2.7	+0.0	28.2	54.0	-25.8	Horiz
	Ave		+0.6	+0.0							
^	2483.500M	44.1	-34.2	+27.6	+1.0	+2.7	+0.0	41.8	54.0	-12.2	Horiz
			+0.6	+0.0							
5	2390.000M	29.2	-34.3	+27.7	+1.0	+2.6	+0.0	26.8	54.0	-27.2	Horiz
	Ave		+0.6	+0.0							
^	2390.000M	43.6	-34.3	+27.7	+1.0	+2.6	+0.0	41.2	74.0	-32.8	Horiz
			+0.6	+0.0							
7	2655.000M	27.8	-34.2	+28.1	+1.1	+2.6	+0.0	26.1	54.0	-27.9	Horiz
	Ave		+0.7	+0.0							
^	2655.000M	41.4	-34.2	+28.1	+1.1	+2.6	+0.0	39.7	54.0	-14.3	Horiz
			+0.7	+0.0							

Test Setup Photo(s)

Below 1GHz

Above 1GHz

Above 1GHz

X Axis

Y Axis

Z Axis

Appendix A: Manufacturer Declaration

The following device/model has been tested by CKC Laboratories: **NGP BLE Pump/M994838A001**

The manufacturer declares the **M994838A001** represents the hardware of the NGP BLE Platform which may include a variety of different brand names and model numbers that offer different therapies. Users will be able to upgrade their pump to a more comprehensive model via a firmware update. This update will enable the user to access more therapy options without having to purchase a different pump. The firmware updates will not impact RF, EMC and Safety characteristics.

The manufacturer declares that the following additional models are identical electrically or any differences between them do not affect their RF and EMC characteristics, and therefore meets the level of testing equivalent to the tested models.

NGP BLE Pump	***Brand Name***	***Configuration***
M994838A001	*MiniMed 700*	*MMT-1800*
		MMT-1801
		MMT-1805
	MiniMed 720G	*MMT-1809*
		MMT-1810
		MMT-1817
		MMT-1818
	MiniMed 740G	*MMT-1811*
		MMT-1812
	MiniMed 770G	*MMT-1880*
		MMT-1881
		MMT-1882
	MiniMed 780G	*MMT-1884*
		MMT-1885
		MMT-1886
		MMT-1887

Note: The products identified in the table above have the same hardware but different software and firmware that provide various therapy delivery options. The insulin pumps are offered in different configurations to meet regional needs for the display of blood glucose values. The display of blood glucose values is a functionality of device software and is not related to hardware. The software and firmware do not affect product radio or electromagnetic compatibility performance or compliance. Hardware documentation such as schematics, block diagram, printed circuit board and component layouts are identical between these insulin pumps. Additional configuration identifiers (e.g., K) may be added to the base configuration number for inventory management purposes and intended to only represent different keypad overlay color.

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.