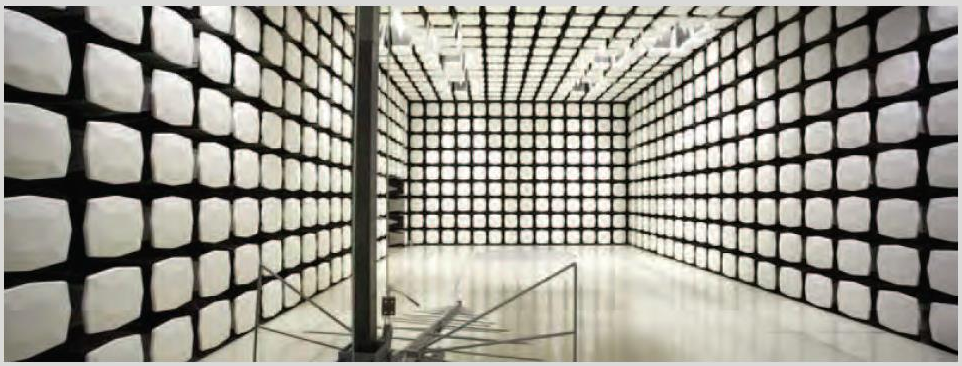
Medtronic, Inc.

Cobalt™ XT HF Quad CRT-D MRI SureScan™

FCC 15.247:2018

Report # MDTR0748



NVLAP LAB CODE: 200881-0

CERTIFICATE OF TEST

Last Date of Test: December 7, 2018
Medtronic, Inc.
Model: Cobalt™ XT HF Quad CRT-D MRI SureScan™

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2018	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Matt Nuernberg, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

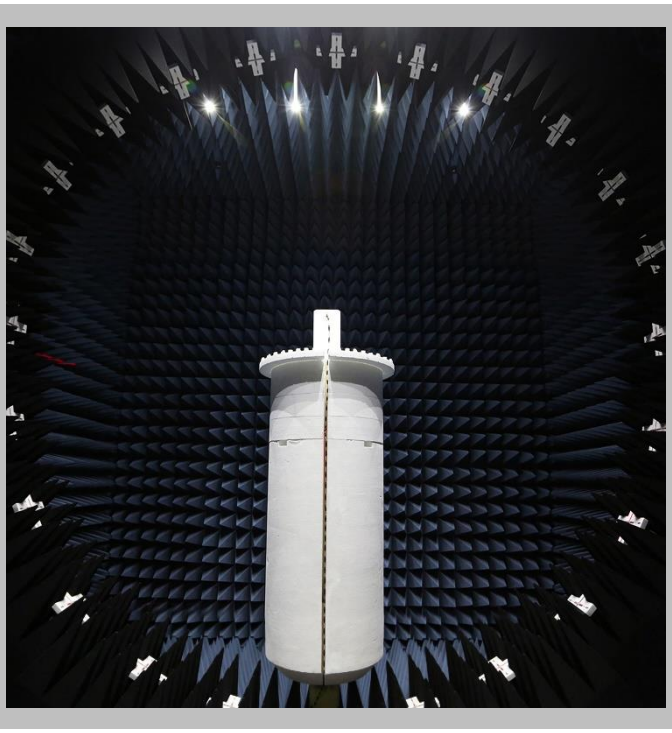
MIC – Recognized by MIC as a CAB for the acceptance of test data.

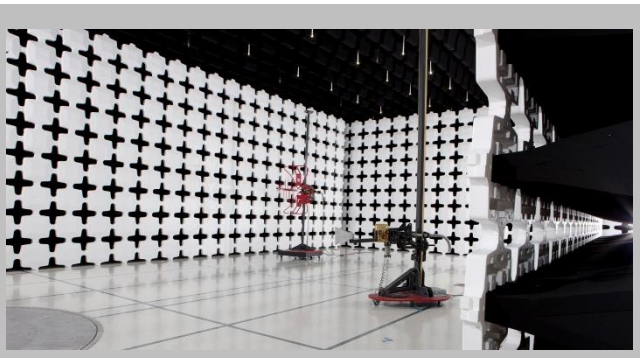
SCOPE

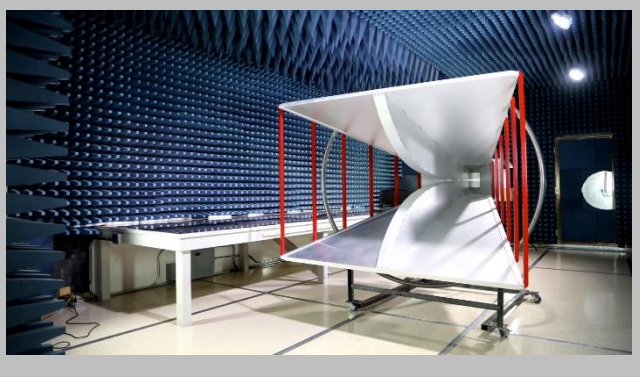
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

WTD.2016.12.19

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

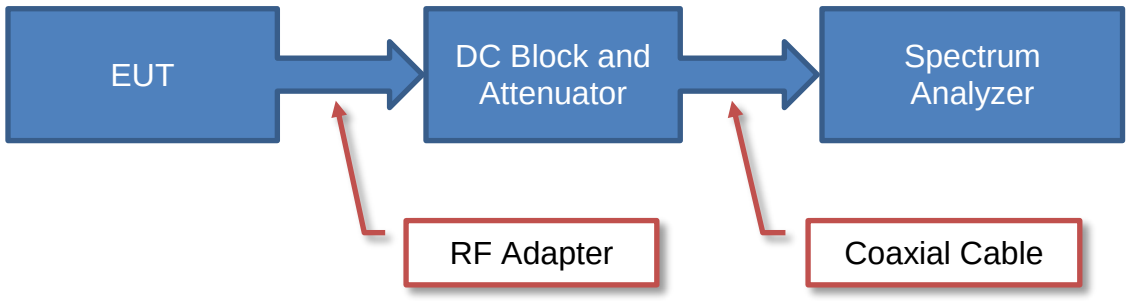
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

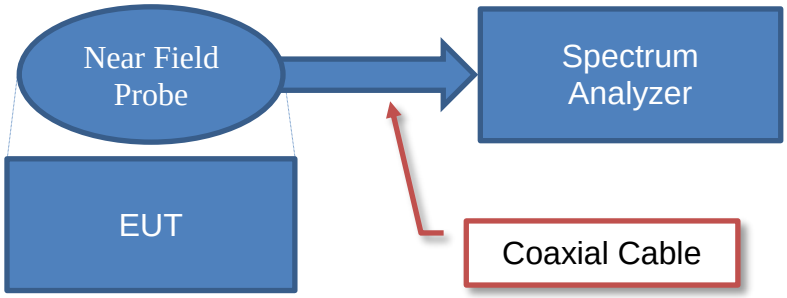
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

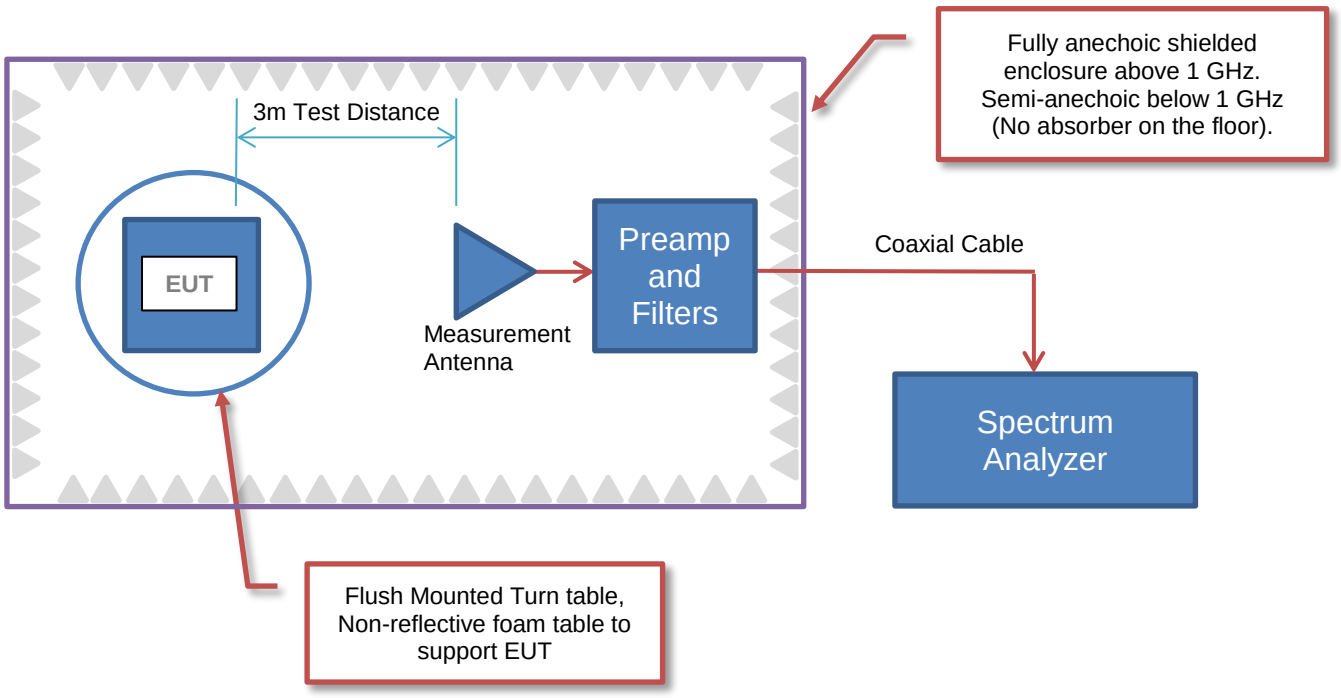
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Medtronic, Inc.
Address:	710 Medtronic Parkway
City, State, Zip:	Minneapolis, MN 55432
Test Requested By:	Jay Axmann
Model:	Cobalt™ XT HF Quad CRT-D MRI SureScan™
First Date of Test:	December 4, 2018
Last Date of Test:	December 7, 2018
Receipt Date of Samples:	December 4, 2018
Equipment Design Stage:	Production Equivalent
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The Cobalt™ and Crome™ family of implantable cardioverter defibrillator (ICD) and cardiac resynchronization therapy defibrillator (CRT-D) devices are based on a common circuit architecture. The models listed on the Product Similarity Statement page offer a mix of basic, standard, and premium features. All devices listed will include support for 1.5 T and 3.0 T MRI environments, and also include a 2.4 GHz ISM band Bluetooth Low Energy (BLE) radio module.

Client Provided Information:

The Cobalt™ XT HF Quad CRT-D MRI SureScan™ test sample has been setup in a test fixture for direct connect radio transmitter measurements. The test fixture includes an antenna impedance matching circuit that introduces a fixed 2.2 dB loss to the RF signal. To ensure that measured values are accurate with the actual transmitter output levels, a 2.2 dB correction factor is added to the following measurements and applicable datasheets:

- Output Power
- Equivalent Isotropic Radiated Power (EIRP)
- Power Spectral Density

All measurements that require an antenna gain value are to use the worst case measured antenna gain value of -31.86 dBi as measured at a 4 cm implant depth in a 3 g/L saline solution with measured conductivity of 5.260 mS/cm (± 10%) measured at 23°C (± 10%).

Testing Objective:

To demonstrate compliance of the Bluetooth Low Energy (BLE) radio to FCC 15.247 requirements.

This document describes product design similarities for the Cobalt™ and Crome™ ICD and CRT-D families. Radio and EMC test results from the worst-case configuration are applicable to all models indicated below.

The Cobalt and Crome family of Implantable Cardioverter Defibrillators (ICD) and Cardiac Resynchronization Therapy Defibrillator (CRT-D) models share the same internal system architecture. Different feature and therapy options between the models are enabled and disabled through firmware factory settings. These feature sets have no effect on the product's radio or electromagnetic compatibility (EMC) compliance, and once configured cannot be altered. Among the models listed there are 8 different connector types used each with a common Bluetooth Low Energy (BLE) antenna type; each having a slightly different physical orientation due to the different connector sizes.
For Radio and EMC test purposes, the Cobalt XT HF Quad CRT-D MRI SureScan model that uses the QP_DF-1 connector is considered the worst-case configuration. Test results from this device represent the worst-case radio and EMC performance since it has the most complex feature set, allows for the most number of leads to be connected, and has the highest antenna gain. Radio and EMC results from the Cobalt XT HF Quad CRT-D MRI SureScan model with the QP_DF-1 are applicable to all Cobalt™ and Crome™ ICD and CRT-D models listed here

MODEL NAME	CONNECTOR Type (Number of Leads)
Cobalt™ XT VR MRI SureScan™	VR_DF-1 (3)
Cobalt™ VR MRI SureScan™	
Crome™ VR MRI SureScan™	
Cobalt™ XT VR MRI SureScan™	VR_DF4 (1)
Cobalt™ VR MRI SureScan™	
Crome™ VR MRI SureScan™	
Cobalt™ XT DR MRI SureScan™	DR_DF4 (2)
Cobalt™ DR MRI SureScan™	
Crome™ DR MRI SureScan™	
Cobalt™ XT DR MRI SureScan™	DR_DF-1 (4)
Cobalt™ DR MRI SureScan™	
Crome™ DR MRI SureScan™	
Cobalt™ XT HF CRT-D MRI SureScan™	CRT_DF4 (2)
Cobalt™ HF CRT-D MRI SureScan™	
Crome™ HF CRT-D MRI SureScan™	
Cobalt™ XT HF CRT-D MRI SureScan™	CRT_DF-1 (5)
Cobalt™ HF CRT-D MRI SureScan™	
Crome™ HF CRT-D MRI SureScan™	
Cobalt™ XT HF Quad CRT-D MRI SureScan™	QP_DF4 (3)
Cobalt™ HF Quad CRT-D MRI SureScan™	
Crome™ HF Quad CRT-D MRI SureScan™	
Cobalt™ XT HF Quad CRT-D MRI SureScan™	QP_DF-1 (5)
Cobalt™ HF Quad CRT-D MRI SureScan™	
Crome™ HF Quad CRT-D MRI SureScan™	

CONFIGURATIONS

Configuration MDTR0748- 3

Software/Firmware Running during test	
Description	**Version**
Implantable FW	Release Baseline 6.1
Universal LabVIEW Programmer	v8.0.0
BLE Radio Utility No Sleep	1.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Cobalt XT HF Quad CRT-D MRI SureScan (Hybrid)	Medtronic Inc.	DTPA1D1	RTF412201M

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Lambda Electronics	LL-902-OV	D13847

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
TTI Telemetry Module	Medtronic Inc.	TTI Programmer	TLM000001R
TTI Programming Head	Medtronic Inc.	2067L	INR028410R
Power Supply (Laptop)	Dell Inc.	DA130PE1-00	CN-0WRHKW-48661-56M-FTIT-A03
USB to Ethernet Adapter	Linksys	USB300M	CU906P301143

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
BNC Power Cable	No	0.5m	No	DC Power Supply	Implant Hybrid Board
AC Power Cable	No	1.2m	No	AC Mains	DC Power Supply
AC Power Cable (TTI Telemetry Module)	No	1.8m	No	AC Mains	TTI Telemetry Module
Programming Head Cable	Yes	3.0m	No	TTI Telemetry Module	TTI Programming Head
AC Cable (Laptop)	No	1.0m	No	AC Mains	Power Supply (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	Power Supply (Laptop)	Laptop
Ethernet Cable	No	>3.0m	No	TTI Telemetry Module	USB to Ethernet Adapter
USB Cable (USB to Ethernet Adapter)	Yes	0.15m	No	USB to Ethernet Adapter	Laptop

CONFIGURATIONS

Configuration MDTR0748- 8

Software/Firmware Running during test	
Description	**Version**
Implantable FW	Release Baseline 6.1
Universal LabVIEW Programmer	v8.0.0
BLE Radio Utility No Sleep	1.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Cobalt XT HF Quad CRT-D MRI SureScan	Medtronic Inc.	DTPA1D1	RTB600168S

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Lead (RV, SVC, HVB)	Medrontic Inc.	6947	TDG643645V
Lead (LV)	Medtronic Inc.	4398	QUB504894V
Lead (ATR)	Medtronic Inc.	5076	PJN7033634
Cylindrical Tank	Medtronic Inc.	387379A T01R	N/A
DC Power Supply	Lambda Electronics	LL-902-OV	D13847

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
TTI Telemetry Module	Medtronic Inc.	TTI Programmer	TLM000001R
TTI Programming Head	Medtronic Inc.	2067L	INR028410R
Power Supply (Laptop)	Dell Inc.	DA130PE1-00	CN-0WRHKW-48661-56M-FTIT-A03
USB to Ethernet Adapter	Linksys	USB300M	CU906P301143

CONFIGURATIONS

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
BNC Power Cable	No	0.5m	No	DC Power Supply	Implant Hybrid Board
AC Power Cable	No	1.2m	No	AC Mains	DC Power Supply
AC Power Cable (TTI Telemetry Module)	No	1.8m	No	AC Mains	TTI Telemetry Module
Programming Head Cable	Yes	3.0m	No	TTI Telemetry Module	TTI Programming Head
AC Cable (Laptop)	No	1.0m	No	AC Mains	Power Supply (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	Power Supply (Laptop)	Laptop
Ethernet Cable	No	>3.0m	No	TTI Telemetry Module	USB to Ethernet Adapter
USB Cable (USB to Ethernet Adapter)	Yes	0.15m	No	USB to Ethernet Adapter	Laptop
Lead (RV, SVC, HVB)	No	0.65 m	No	Cobalt	Terminated (Saline)
Lead (LV)	No	0.78 m	No	Cobalt	Terminated (Saline)
Lead (ATR)	No	0.58 m	No	Cobalt	Terminated (Saline)

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	12/5/2018	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	12/7/2018	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	12/7/2018	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	12/7/2018	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	12/7/2018	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	12/7/2018	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	12/7/2018	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) were measured for each of the EUT operating modes. The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

The EUT operates at 100% Duty Cycle during test to facilitate radio measurements. During actual radio operation, the radio worst case Duty Cycle is approximately 43.8% based on the Bluetooth Low Energy protocol specified in version 4.1 of the BT SIG standard.

OCCUPIED BANDWIDTH

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	27-Feb-18	27-Feb-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was set to the channels and modes listed in the datasheet.

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

OCCUPIED BANDWIDTH

element

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Cobalt™ XT HF Quad CRT-D MRI SureScan™			**Work Order:**	MDTR0748
Serial Number:	RTF412201M			**Date:**	7-Dec-18
Customer:	Medtronic, Inc.			**Temperature:**	22.8 °C
Attendees:	Nick Blake			**Humidity:**	20.7% RH
Project:	None			**Barometric Pres.:**	1033 mbar
Tested by:	Dustin Sparks	**Power:**	2.9VDC	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

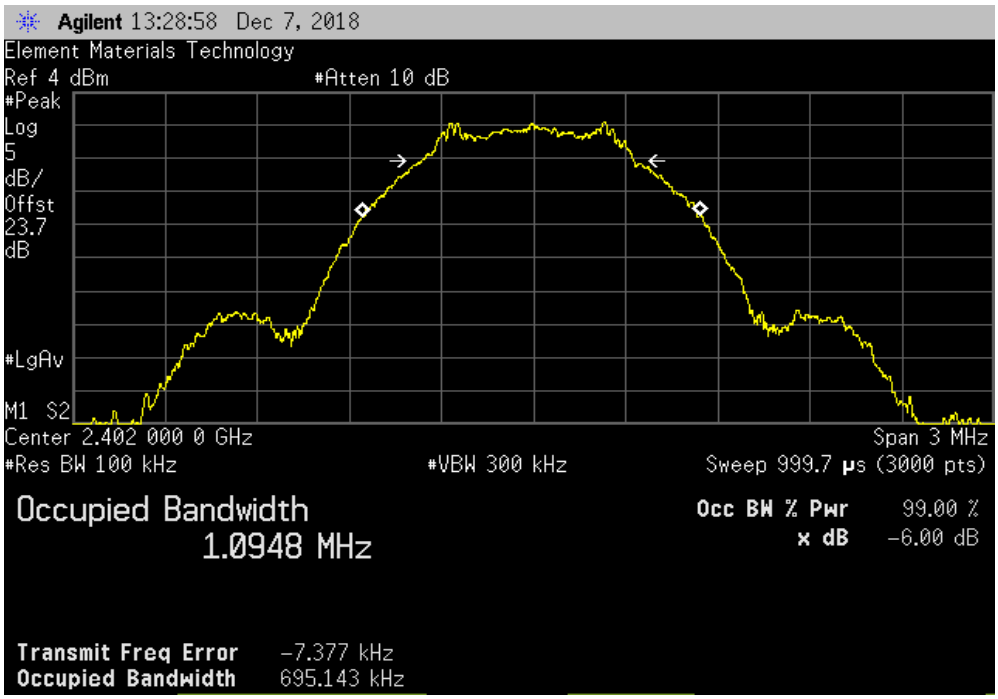
Configuration #	3	Signature Dustin Sparks

	Value	Limit (≥)	Result
BLE/GFSK Low Channel, 2402 MHz	695.143 kHz	500 kHz	Pass
BLE/GFSK Mid Channel, 2442 MHz	705.347 kHz	500 kHz	Pass
BLE/GFSK High Channel, 2480 MHz	704.531 kHz	500 kHz	Pass

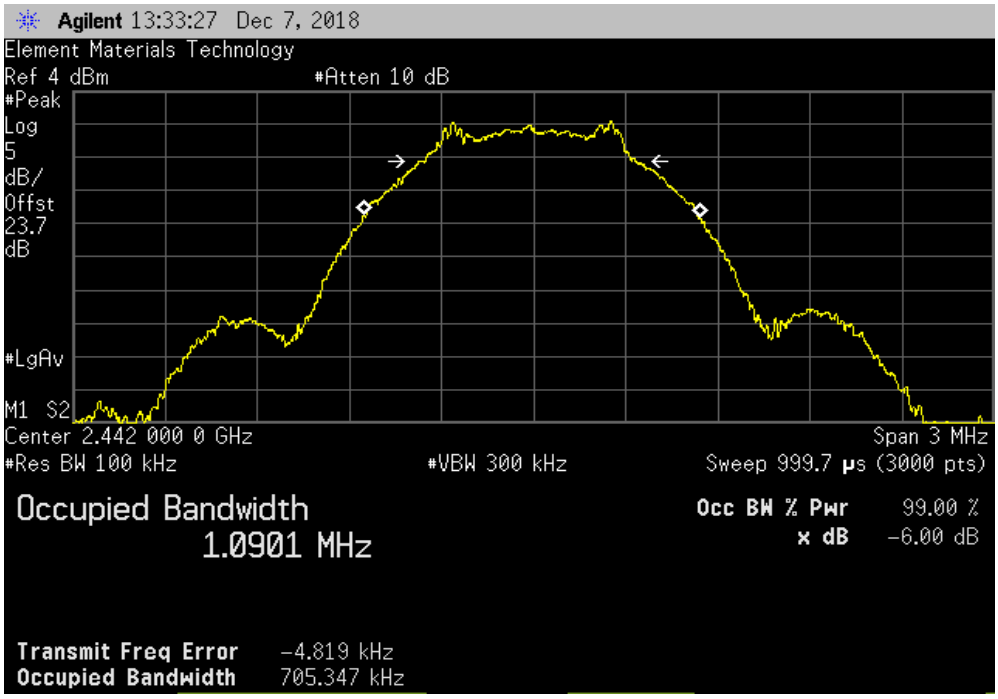
OCCUPIED BANDWIDTH

TbtTx 2018.09.13 XMit 2017.12.13

BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				695.143 kHz	500 kHz	Pass

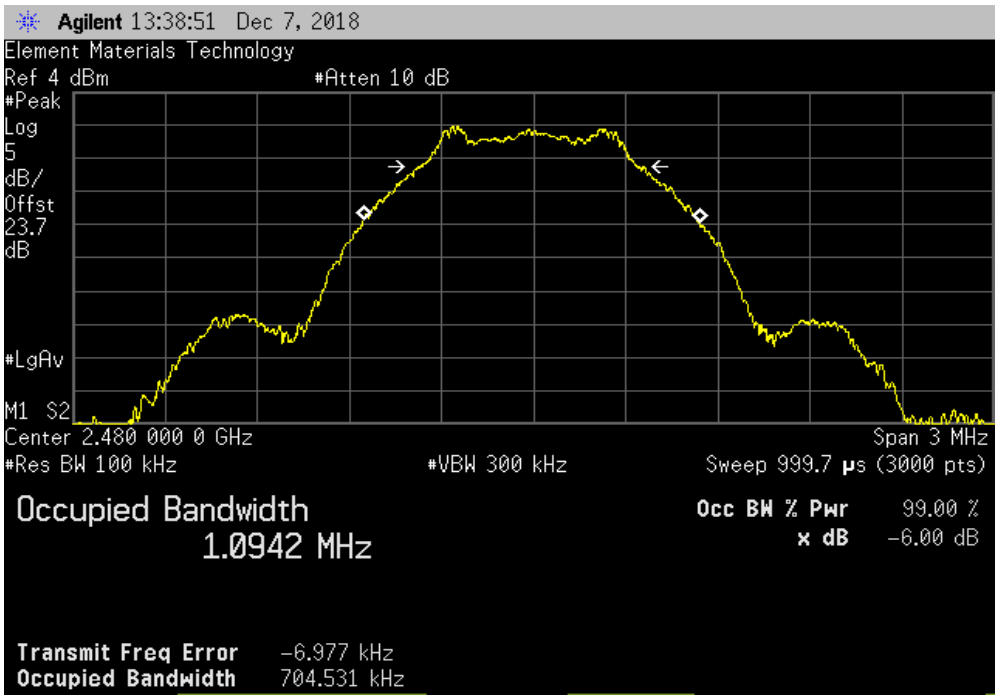


BLE/GFSK Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				705.347 kHz	500 kHz	Pass



OCCUPIED BANDWIDTH

BLE/GFSK High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				704.531 kHz	500 kHz	Pass



OUTPUT POWER

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	27-Feb-18	27-Feb-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

OUTPUT POWER

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	**Cobalt™ XT HF Quad CRT-D MRI SureScan™**			**Work Order:**	**MDTR0748**
Serial Number:	**RTF412201M**			**Date:**	**7-Dec-18**
Customer:	**Medtronic, Inc.**			**Temperature:**	**22.8 °C**
Attendees:	**Nick Blake**			**Humidity:**	**20.7% RH**
Project:	**None**			**Barometric Pres.:**	**1033 mbar**
Tested by:	**Dustin Sparks**	**Power:**	**2.9VDC**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	**ANSI C63.10:2013**

COMMENTS

2.2 dB added to the reference level offset on the spectrum analyzer to account for path loss in the hybrid test fixture.

DEVIATIONS FROM TEST STANDARD

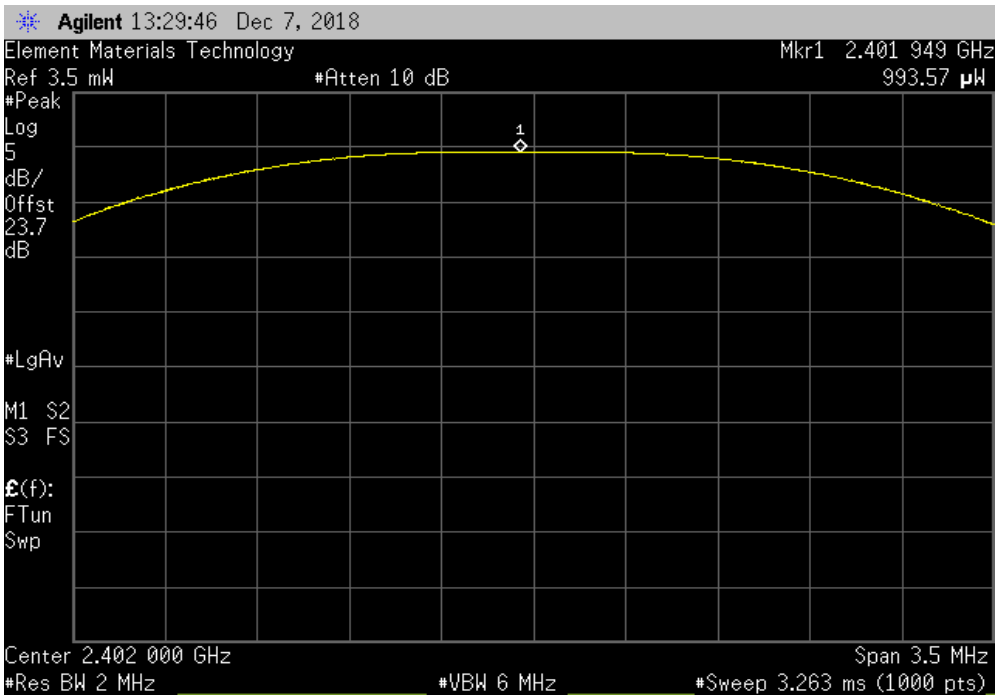
None

Configuration #	**3**	*Signature* Dustin Sparks

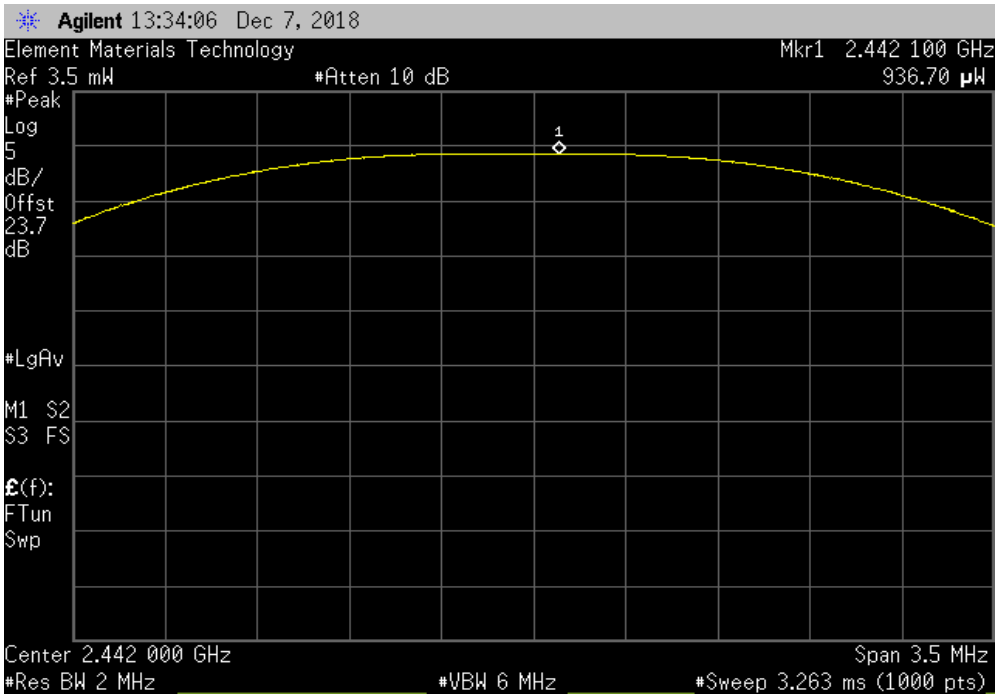
	Value	**Limit (<)**	**Result**
BLE/GFSK Low Channel, 2402 MHz	993.573 uW	1 W	Pass
BLE/GFSK Mid Channel, 2442 MHz	936.699 uW	1 W	Pass
BLE/GFSK High Channel, 2480 MHz	856.643 uW	1 W	Pass

OUTPUT POWER

BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				993.573 uW	1 W	Pass

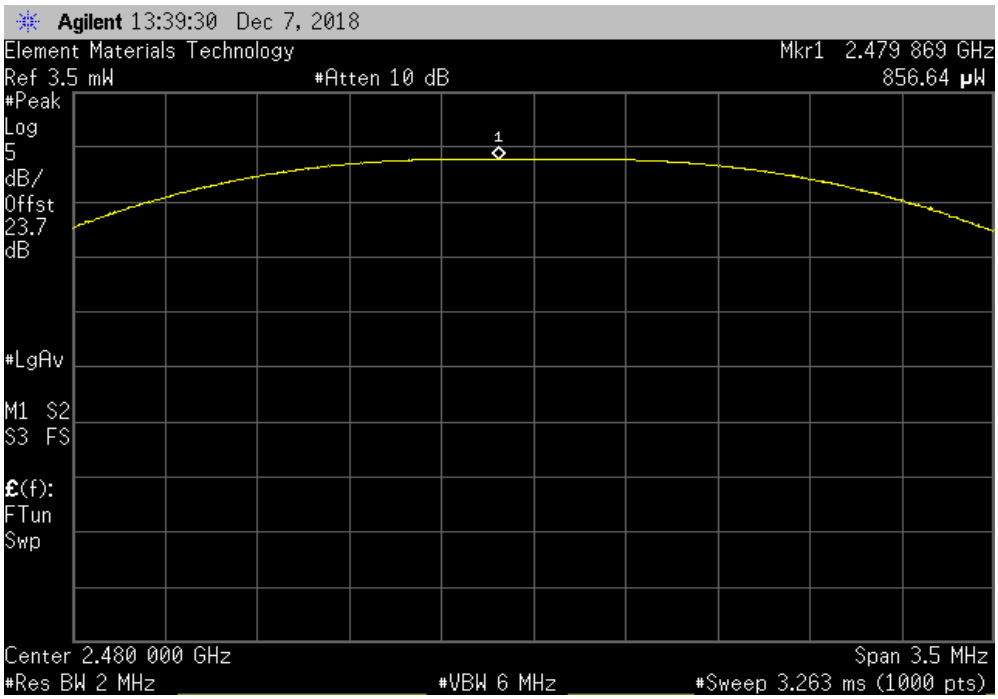


BLE/GFSK Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				936.699 uW	1 W	Pass



OUTPUT POWER

BLE/GFSK High Channel, 2480 MHz						
				Value	Limit (<)	Result
				856.643 uW	1 W	Pass



EQUIVALENT ISOTROPIC RADIATED POWER

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	27-Feb-18	27-Feb-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio. The antenna gain of the EUT was added to the conducted output power to derive the EIRP values.

EQUIVALENT ISOTROPIC RADIATED POWER

element

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	**Cobalt™ XT HF Quad CRT-D MRI SureScan™**			**Work Order:**	**MDTR0748**
Serial Number:	**RTF412201M**			**Date:**	**7-Dec-18**
Customer:	**Medtronic, Inc.**			**Temperature:**	**22.8 °C**
Attendees:	**Nick Blake**			**Humidity:**	**20.7% RH**
Project:	**None**			**Barometric Pres.:**	**1033 mbar**
Tested by:	**Dustin Sparks**	**Power:**	**2.9VDC**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	**ANSI C63.10:2013**

COMMENTS

2.2 dB added to the reference level offset on the spectrum analyzer to account for path loss in the hybrid test fixture.

DEVIATIONS FROM TEST STANDARD

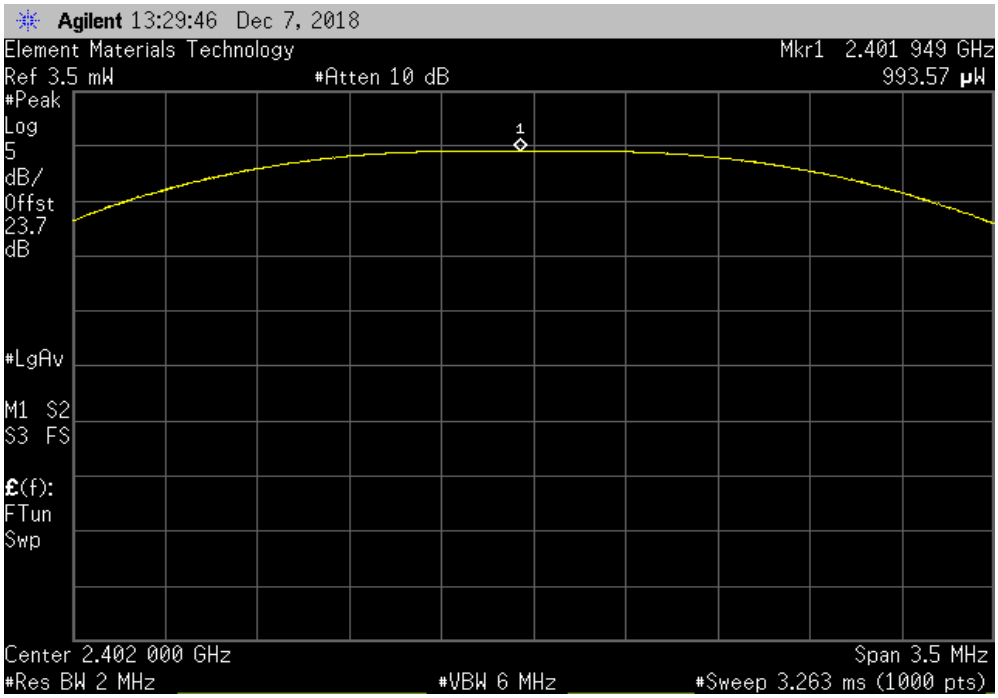
None

Configuration #	**3**	*Signature* Dustin Sparks

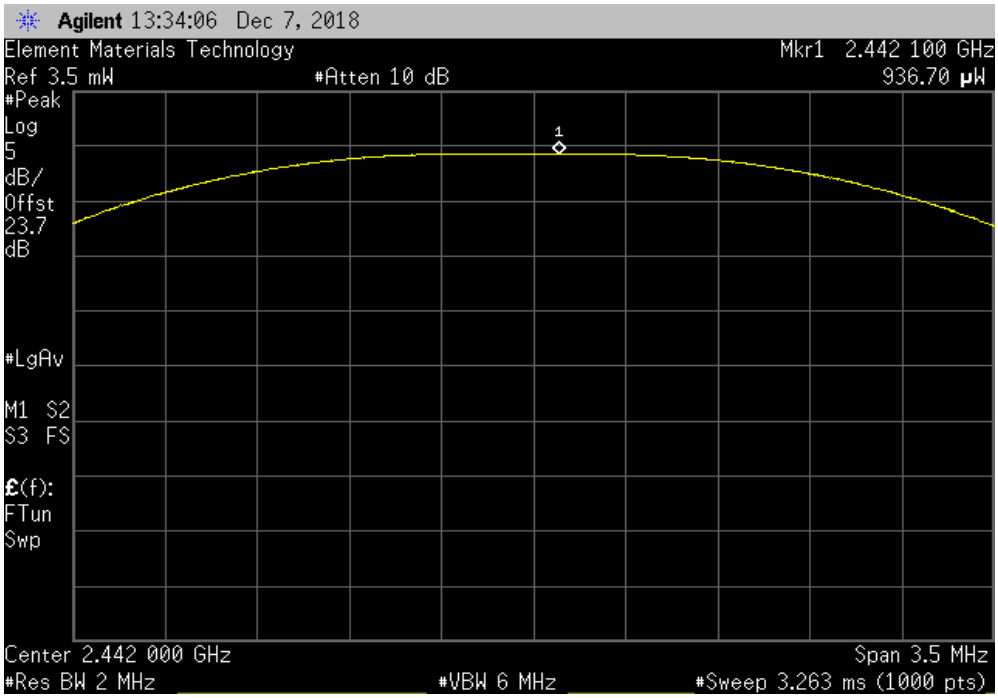
	Value (uW)	Value (dBm)	Antenna Gain (dBi)	Value (dBm EIRP)	Limit (<)	Result
BLE/GFSK Low Channel, 2402 MHz	993.573	-0.03	-31.86	-31.89	36 dBm	Pass
BLE/GFSK Mid Channel, 2442 MHz	936.699	-0.28	-31.86	-32.14	36 dBm	Pass
BLE/GFSK High Channel, 2480 MHz	856.643	-0.67	-31.86	-32.53	36 dBm	Pass

EQUIVALENT ISOTROPIC RADIATED POWER

BLE/GFSK Low Channel, 2402 MHz						
	Value (uW)	Value (dBm)	Antenna Gain (dBi)	Value (dBm EIRP)	Limit (<)	Result
	993.573	-0.03	-31.86	-31.89	36 dBm	Pass



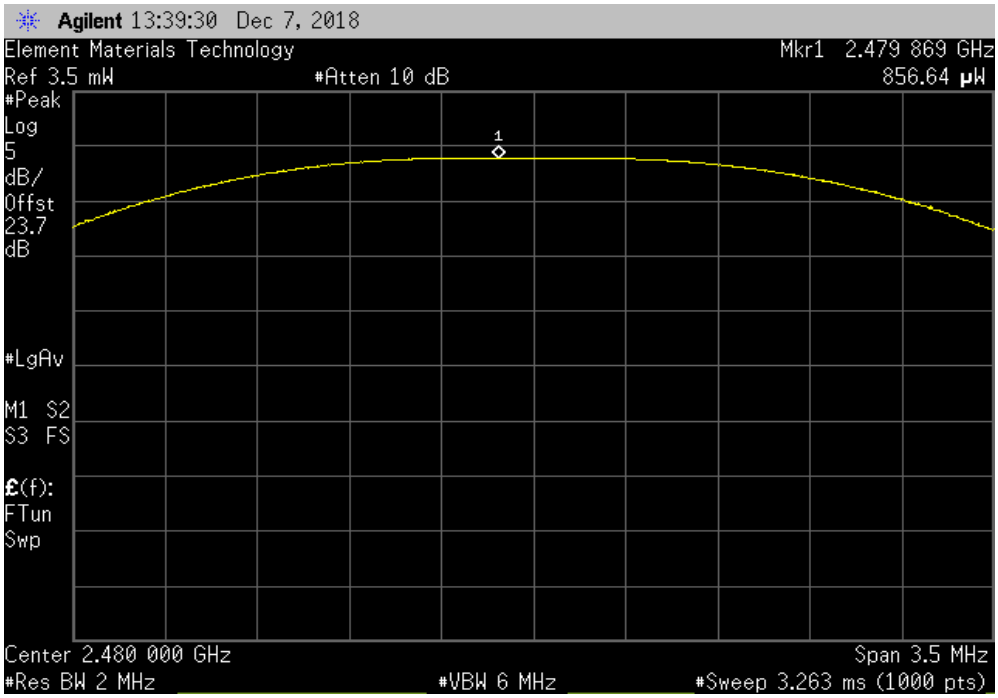
BLE/GFSK Mid Channel, 2442 MHz						
	Value (uW)	Value (dBm)	Antenna Gain (dBi)	Value (dBm EIRP)	Limit (<)	Result
	936.699	-0.28	-31.86	-32.14	36 dBm	Pass



EQUIVALENT ISOTROPIC RADIATED POWER

TbtTx 2018.09.13 XMit 2017.12.13

BLE/GFSK High Channel, 2480 MHz						
	Value (uW)	Value (dBm)	Antenna Gain (dBi)	Value (dBm EIRP)	Limit (<)	Result
	856.643	-0.67	-31.86	-32.53	36 dBm	Pass



POWER SPECTRAL DENSITY

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	27-Feb-18	27-Feb-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

element

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Cobalt™ XT HF Quad CRT-D MRI SureScan™			Work Order:	MDTR0748
Serial Number:	RTF412201M			Date:	7-Dec-18
Customer:	Medtronic, Inc.			Temperature:	22.9 °C
Attendees:	Nick Blake			Humidity:	20.7% RH
Project:	None			Barometric Pres.:	1033 mbar
Tested by:	Dustin Sparks	Power:	2.9VDC	Job Site:	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

2.2 dB added to the reference level offset on the spectrum analyzer to account for path loss in the hybrid test fixture.

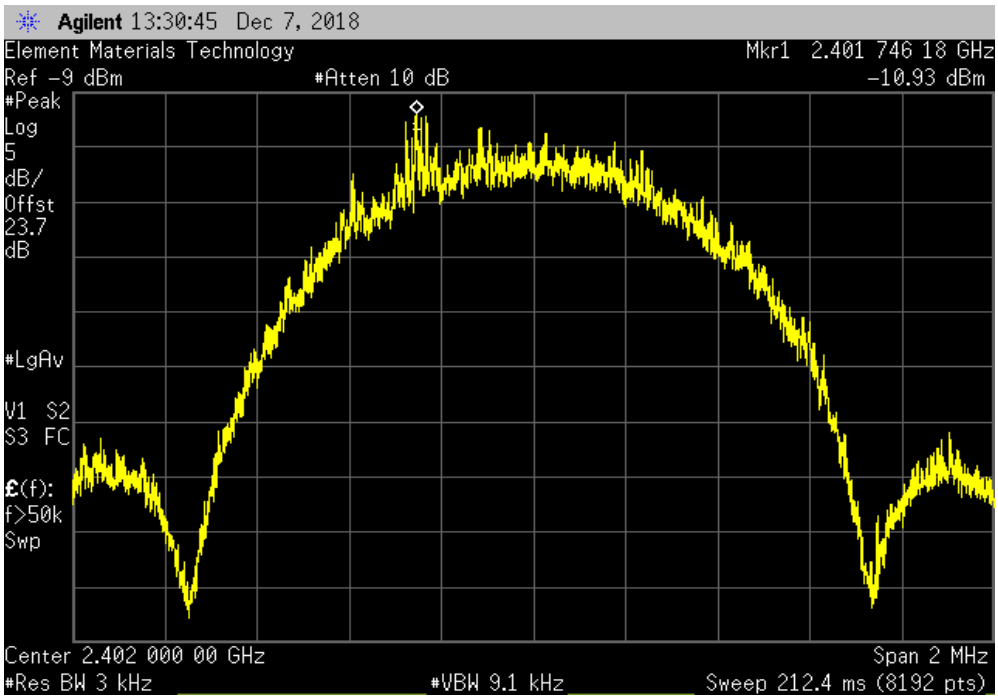
DEVIATIONS FROM TEST STANDARD

None

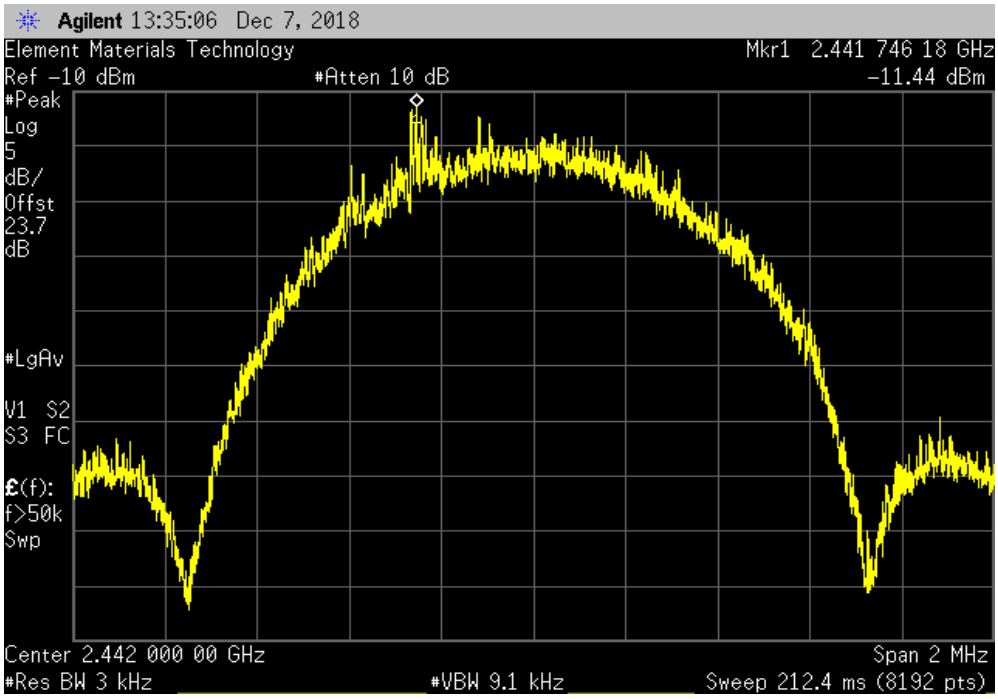
Configuration #	3	Signature Dustin Sparks

	Value dBm/3kHz	Limit < dBm/3kHz	Results
BLE/GFSK Low Channel, 2402 MHz	-10.934	8	Pass
BLE/GFSK Mid Channel, 2442 MHz	-11.445	8	Pass
BLE/GFSK High Channel, 2480 MHz	-12.198	8	Pass

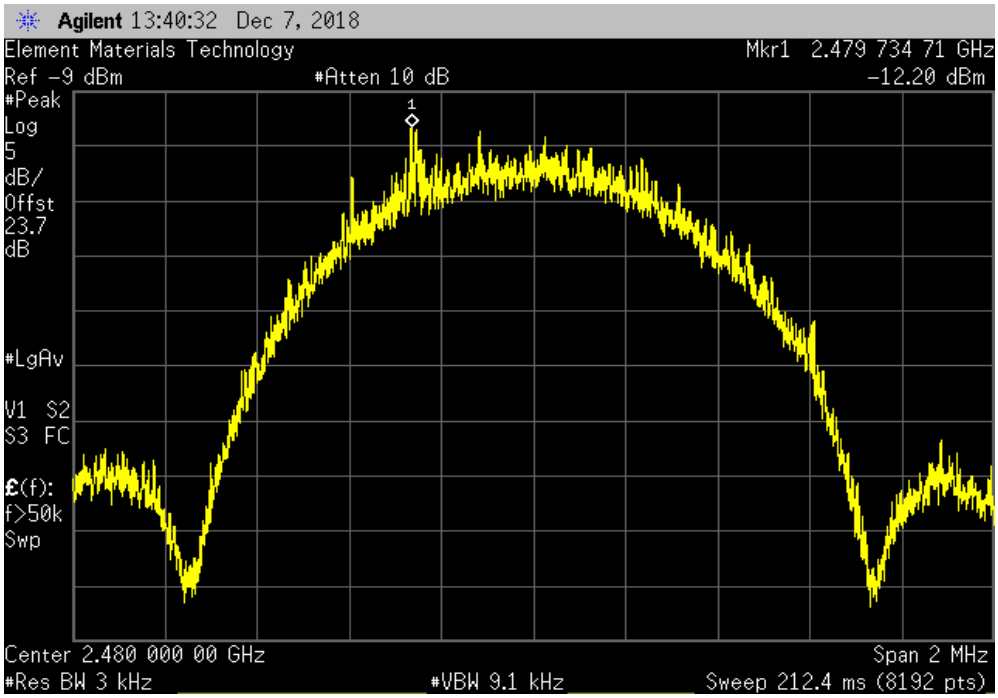
BLE/GFSK Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-10.934	8	Pass



BLE/GFSK Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-11.445	8	Pass



BLE/GFSK High Channel, 2480 MHz							
					Value dBm/3kHz	Limit < dBm/3kHz	Results
					-12.198	8	Pass



BAND EDGE COMPLIANCE

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	27-Feb-18	27-Feb-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Cobalt™ XT HF Quad CRT-D MRI SureScan™			Work Order:	MDTR0748
Serial Number:	RTF412201M			Date:	7-Dec-18
Customer:	Medtronic, Inc.			Temperature:	22.8 °C
Attendees:	Nick Blake			Humidity:	20.6% RH
Project:	None			Barometric Pres.:	1033 mbar
Tested by:	Dustin Sparks	Power:	2.9VDC	Job Site:	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

2.2 dB added to the reference level offset on the spectrum analyzer to account for path loss in the hybrid test fixture.

DEVIATIONS FROM TEST STANDARD

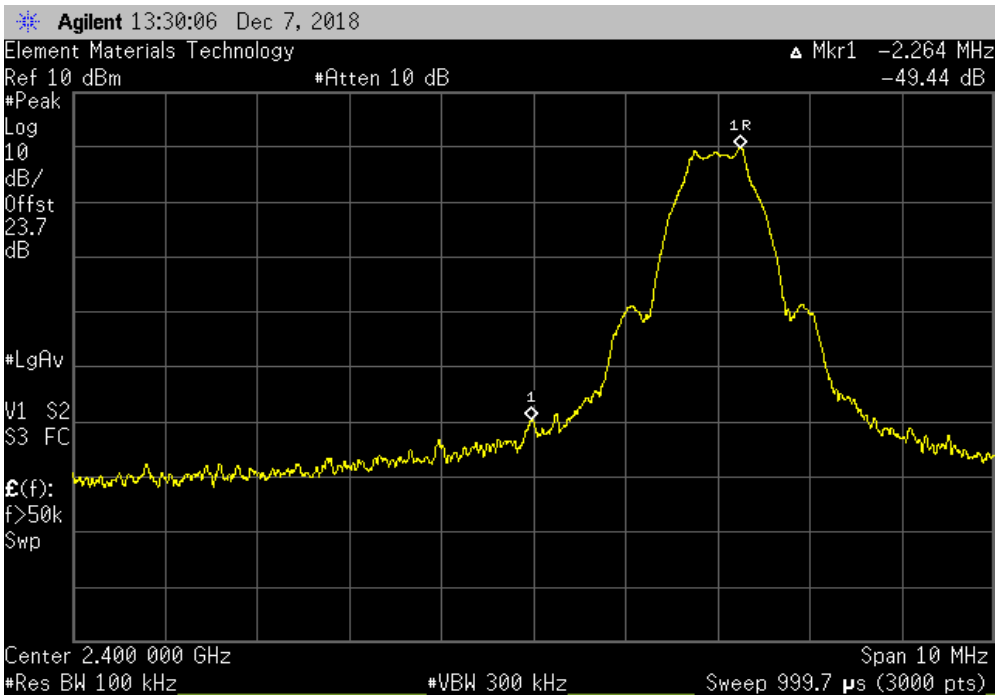
None

Configuration #	3	Signature Dustin Sparks

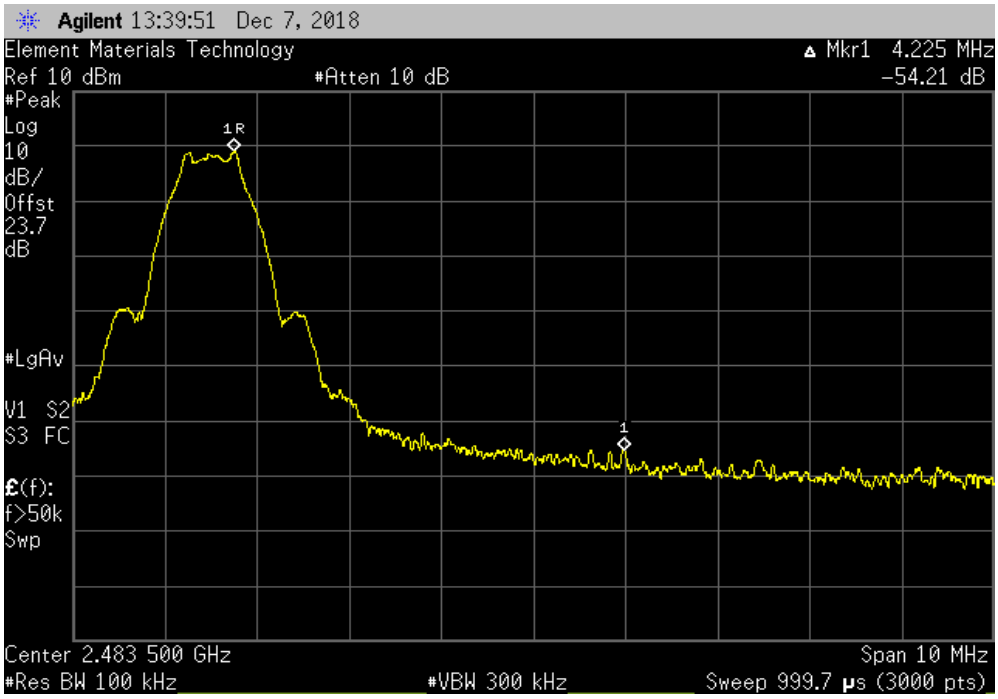
	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	-49.44	-20	Pass
BLE/GFSK High Channel, 2480 MHz	-54.21	-20	Pass

BAND EDGE COMPLIANCE

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-49.44	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.21	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	5-Jul-18	5-Jul-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

element

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	**Cobalt™ XT HF Quad CRT-D MRI SureScan™**			**Work Order:**	**MDTR0748**
Serial Number:	**RTF412201M**			**Date:**	**7-Dec-18**
Customer:	**Medtronic, Inc.**			**Temperature:**	**22.9 °C**
Attendees:	**Nick Blake**			**Humidity:**	**20.6% RH**
Project:	**None**			**Barometric Pres.:**	**1032 mbar**
Tested by:	**Dustin Sparks**	**Power:**	**2.9VDC**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	**ANSI C63.10:2013**

COMMENTS

2.2 dB added to the reference level offset on the spectrum analyzer to account for path loss in the hybrid test fixture.

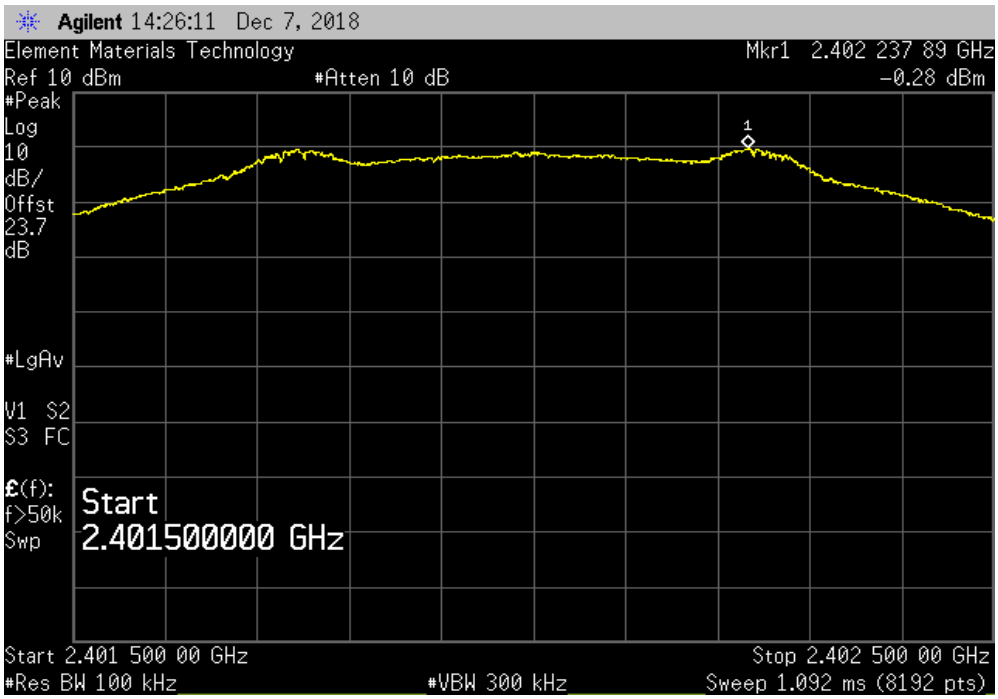
DEVIATIONS FROM TEST STANDARD

None

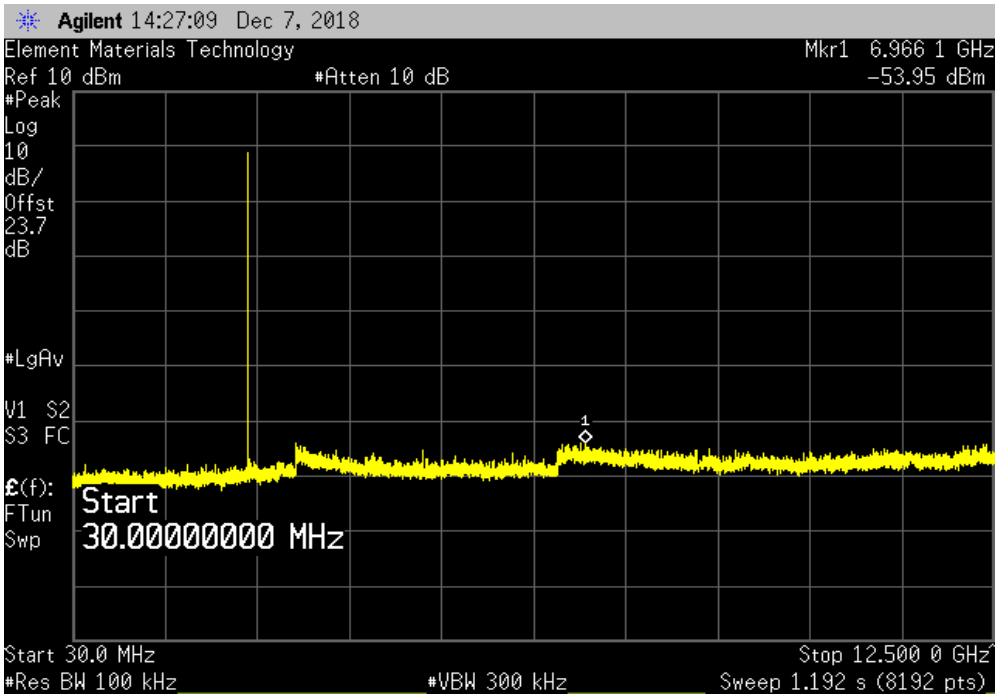
Configuration #	**3**	*Signature* Dustin Sparks

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	Fundamental	2402.24	N/A	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz	30 MHz - 12.5 GHz	6966.1	-53.67	-20	Pass
BLE/GFSK Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24919.1	-47.27	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	Fundamental	2442.24	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	6756	-52.84	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24940.5	-46.58	-20	Pass
BLE/GFSK High Channel, 2480 MHz	Fundamental	2479.74	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	30 MHz - 12.5 GHz	6774.2	-52.71	-20	Pass
BLE/GFSK High Channel, 2480 MHz	12.5 GHz - 25 GHz	24989.3	-46.99	-20	Pass

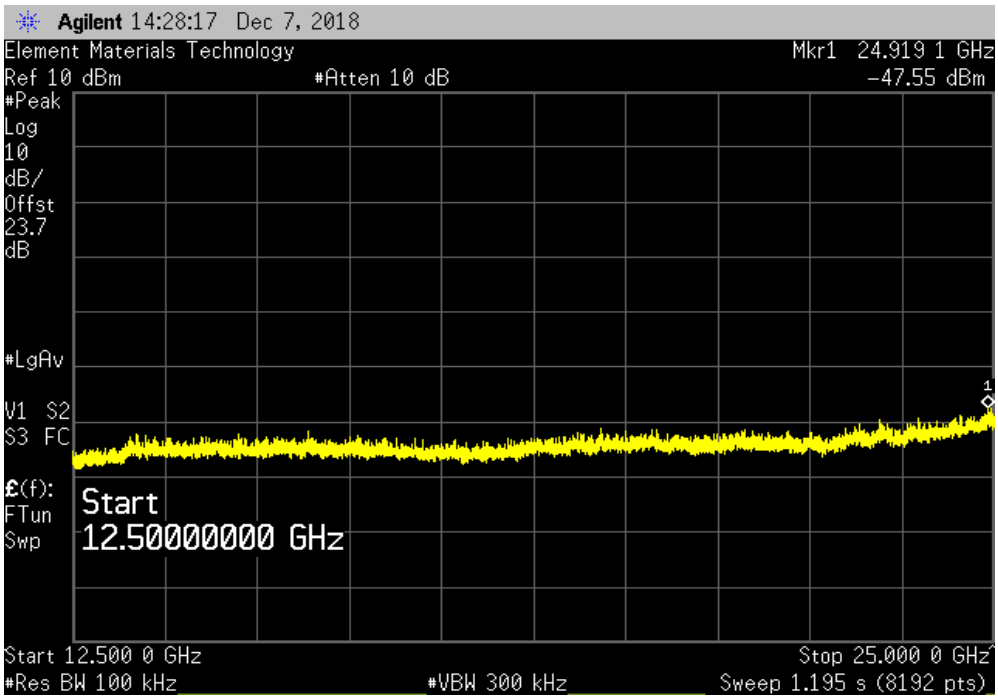
BLE/GFSK Low Channel, 2402 MHz						
	Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental		2402.24	N/A	N/A	N/A



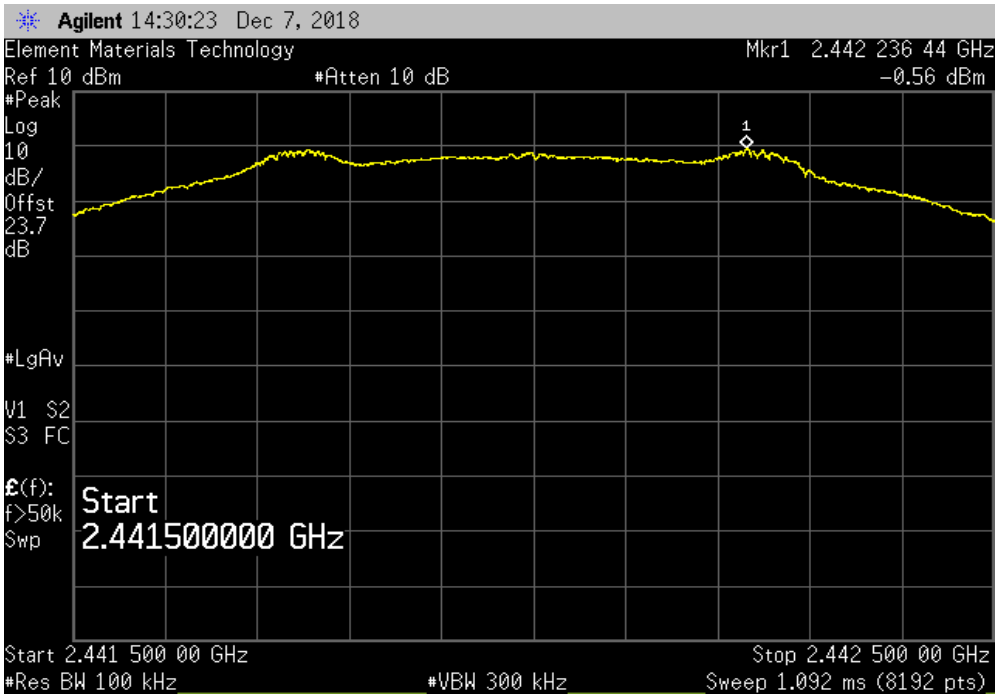
BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6966.1	-53.67	-20	Pass



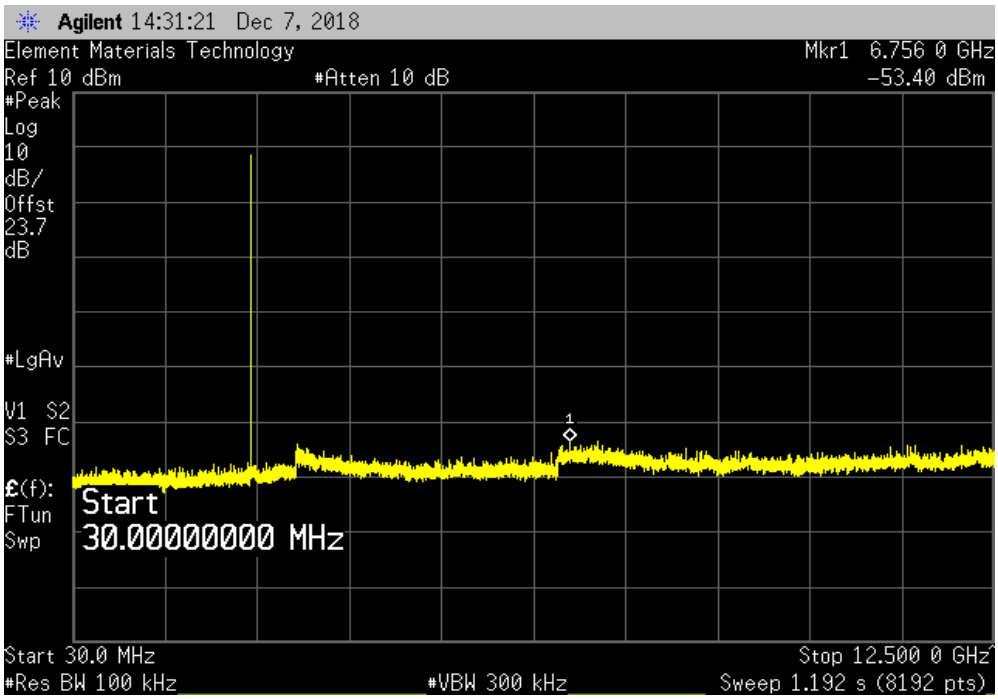
BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24919.1	-47.27	-20	Pass



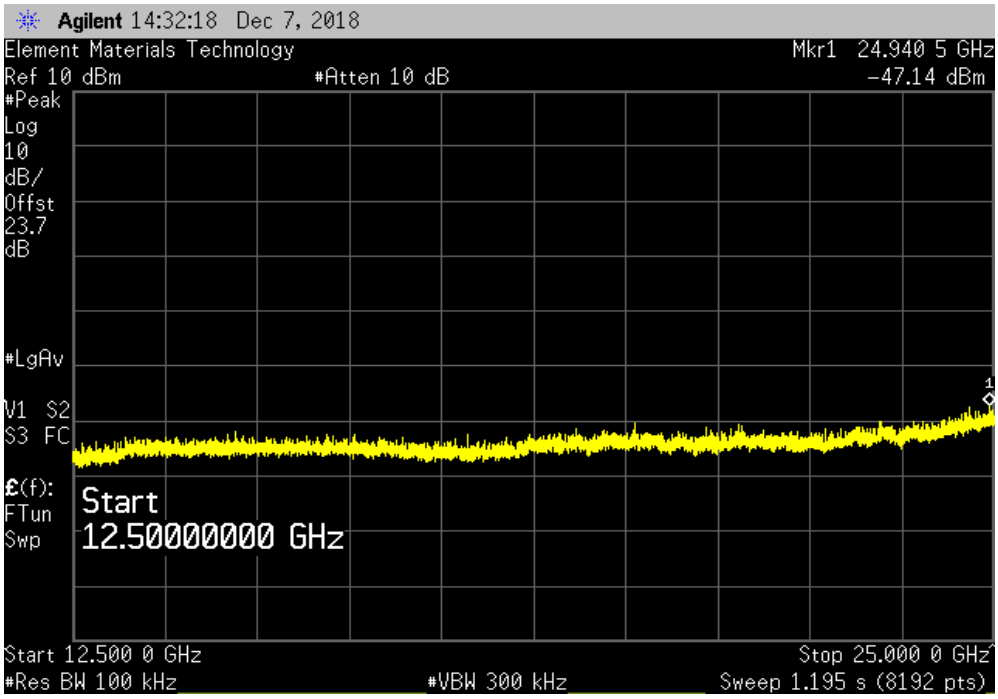
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2442.24	N/A	N/A	N/A



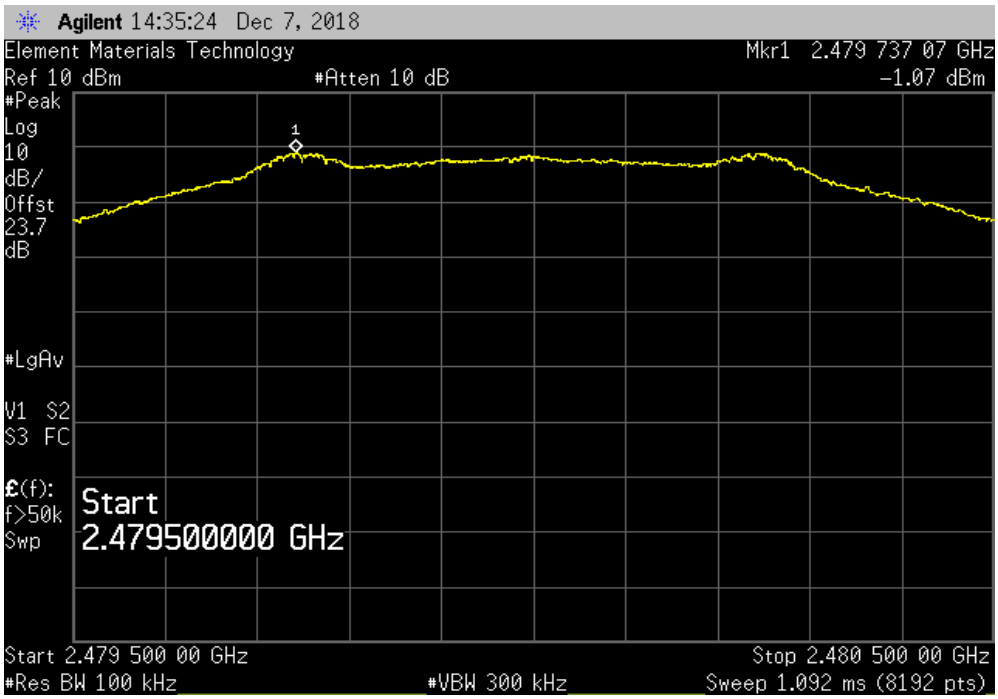
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz	6756	-52.84	-20	Pass



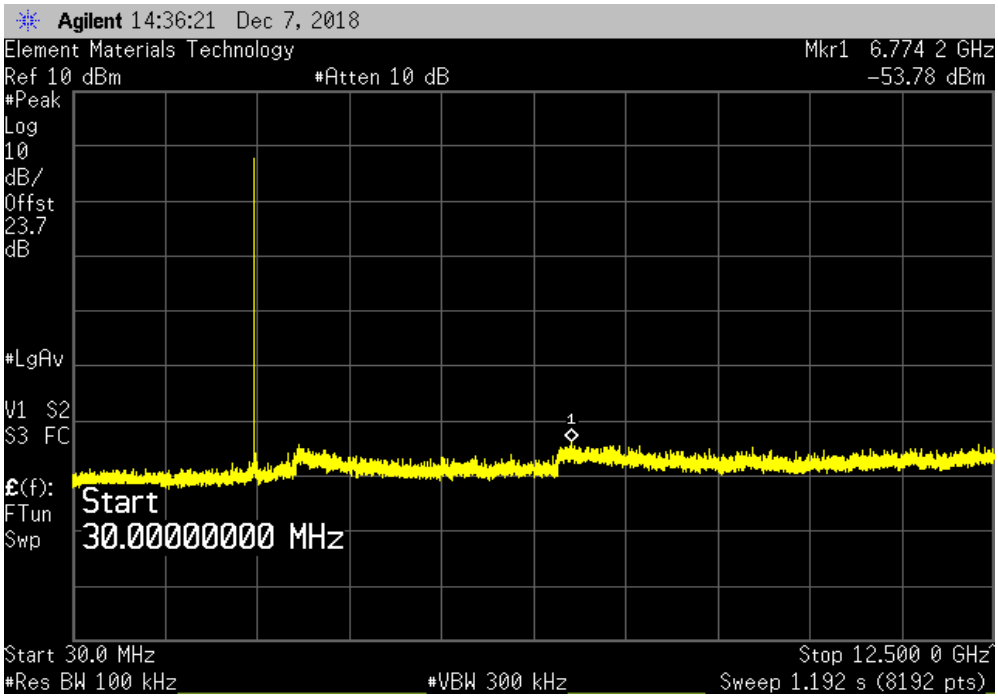
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz	24940.5	-46.58	-20	Pass



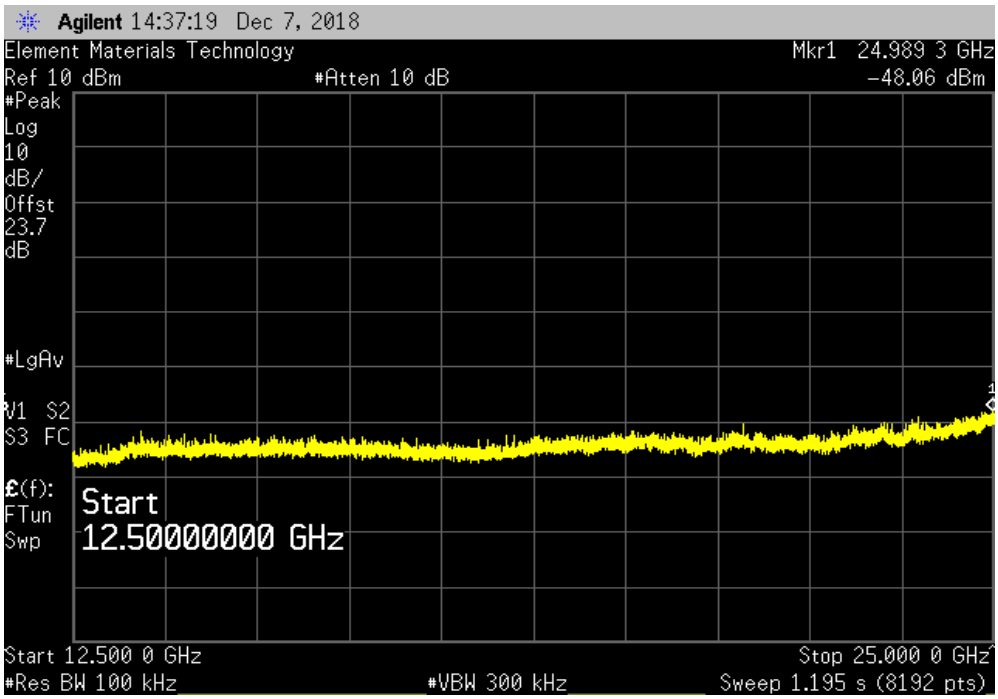
BLE/GFSK High Channel, 2480 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2479.74	N/A	N/A	N/A



BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6774.2	-52.71	-20	Pass



BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24989.3	-46.99	-20	Pass



SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2018.07.27

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz)

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

MDTR0748 - 8

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - High Pass	Micro-Tronics	HPM50111	LFN	24-Sep-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	24-Sep-2018	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	24-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	13-Sep-2018	12 mo
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	13-Feb-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	13-Feb-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	13-Feb-2018	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	24-Sep-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	27-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2-Nov-2018	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	2-Nov-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	27-Apr-2018	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2018.07.27

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

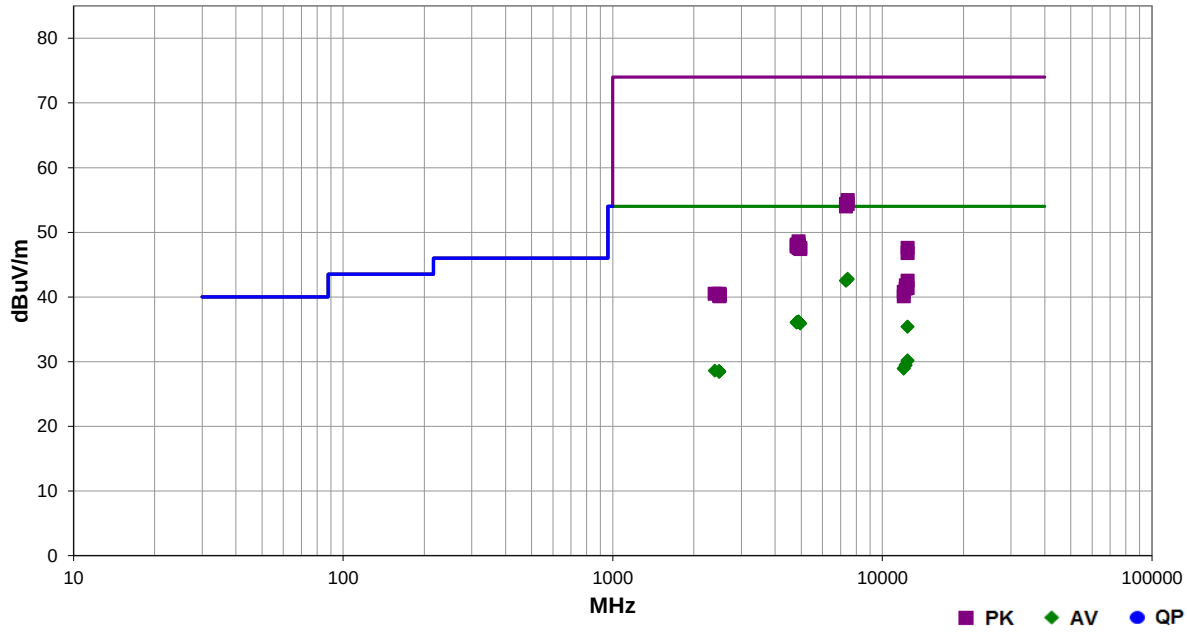
SPURIOUS RADIATED EMISSIONS

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	MDTR0748	**Date:**	5-Dec-2018		
Project:	None	**Temperature:**	21.8 °C		
Job Site:	MN05	**Humidity:**	22.9% RH		
Serial Number:	RTB600168S	**Barometric Pres.:**	1019 mbar	**Tested by:**	Dustin Sparks
EUT:	Cobalt™ XT HF Quad CRT-D MRI SureScan™				
Configuration:	8				
Customer:	Medtronic, Inc.				
Attendees:	Nick Blake				
EUT Power:	Battery				
Operating Mode:	Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz)				
Deviations:	None				
Comments:	PN15 modulation, 4cm depth in 3g/L saline				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	37	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7438.575	31.1	11.7	3.8	185.0	3.0	0.0	Horz	AV	0.0	42.8	54.0	-11.2	High ch, EUT vertical
7441.600	31.0	11.7	1.0	164.9	3.0	0.0	Vert	AV	0.0	42.7	54.0	-11.3	High ch, EUT vertical
7323.583	31.1	11.4	1.8	77.0	3.0	0.0	Horz	AV	0.0	42.5	54.0	-11.5	Mid ch, EUT vertical
7324.467	31.1	11.4	2.8	231.0	3.0	0.0	Vert	AV	0.0	42.5	54.0	-11.5	Mid ch, EUT vertical
4884.283	32.1	4.1	1.0	174.9	3.0	0.0	Horz	AV	0.0	36.2	54.0	-17.8	Mid ch, EUT vertical
4884.175	32.1	4.1	1.0	245.0	3.0	0.0	Vert	AV	0.0	36.2	54.0	-17.8	Mid ch, EUT vertical
4883.100	32.0	4.1	1.0	343.9	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	Mid ch, EUT on side
4882.075	32.0	4.1	1.0	0.0	3.0	0.0	Vert	AV	0.0	36.1	54.0	-17.9	Mid ch, EUT on side
4883.317	32.0	4.1	1.0	55.0	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	Mid ch, EUT horizontal
4883.125	32.0	4.1	1.0	253.9	3.0	0.0	Vert	AV	0.0	36.1	54.0	-17.9	Mid ch, EUT horizontal
4804.450	32.2	3.9	1.0	34.9	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	Low ch, EUT vertical
4804.400	32.1	3.9	1.9	134.0	3.0	0.0	Vert	AV	0.0	36.0	54.0	-18.0	Low ch, EUT vertical
4957.892	31.6	4.3	1.0	182.9	3.0	0.0	Horz	AV	0.0	35.9	54.0	-18.1	High ch, EUT vertical
4957.925	31.6	4.3	1.0	228.9	3.0	0.0	Vert	AV	0.0	35.9	54.0	-18.1	High ch, EUT vertical
12401.900	29.2	6.2	1.0	314.0	3.0	0.0	Horz	AV	0.0	35.4	54.0	-18.6	High ch, EUT vertical
12400.080	29.2	6.2	1.0	329.0	3.0	0.0	Vert	AV	0.0	35.4	54.0	-18.6	High ch, EUT vertical
7440.200	43.3	11.7	3.8	185.0	3.0	0.0	Horz	PK	0.0	55.0	74.0	-19.0	High ch, EUT vertical
7327.817	42.9	11.5	1.8	77.0	3.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	Mid ch, EUT vertical

Freq	Amplitude	Factor	Antenna Height	Azimuth	Test Distance	External Attenuation	Polarity/ Transducer Type	Detector	Distance Adjustment	Adjusted	Spec. Limit	Compared to Spec.	
7440.925	42.7	11.7	1.0	164.9	3.0	0.0	Vert	PK	0.0	54.4	74.0	-19.6	High ch, EUT vertical
7325.558	42.6	11.4	2.8	231.0	3.0	0.0	Vert	PK	0.0	54.0	74.0	-20.0	Mid ch, EUT vertical
12399.350	29.3	0.9	1.0	213.0	3.0	0.0	Vert	AV	0.0	30.2	54.0	-23.8	High ch, EUT vertical
12397.770	29.2	0.9	1.0	5.9	3.0	0.0	Horz	AV	0.0	30.1	54.0	-23.9	High ch, EUT vertical
12208.030	29.8	-0.3	1.0	60.9	3.0	0.0	Vert	AV	0.0	29.5	54.0	-24.5	Mid ch, EUT vertical
12207.860	29.7	-0.3	2.8	48.9	3.0	0.0	Horz	AV	0.0	29.4	54.0	-24.6	Mid ch, EUT vertical
12010.000	29.8	-0.9	1.0	210.9	3.0	0.0	Horz	AV	0.0	28.9	54.0	-25.1	Low ch, EUT vertical
12009.470	29.8	-0.9	1.0	286.9	3.0	0.0	Vert	AV	0.0	28.9	54.0	-25.1	Low ch, EUT vertical
4884.933	44.5	4.1	1.0	0.0	3.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	Mid ch, EUT on side
2389.925	32.5	-3.9	1.0	108.0	3.0	0.0	Horz	AV	0.0	28.6	54.0	-25.4	Low ch, EUT vertical
2484.100	32.6	-4.1	1.0	293.0	3.0	0.0	Horz	AV	0.0	28.5	54.0	-25.5	High ch, EUT vertical
2486.200	32.6	-4.1	1.0	92.9	3.0	0.0	Vert	AV	0.0	28.5	54.0	-25.5	High ch, EUT vertical
2484.117	32.6	-4.1	1.4	193.9	3.0	0.0	Horz	AV	0.0	28.5	54.0	-25.5	High ch, EUT on side
2483.525	32.6	-4.1	1.0	24.9	3.0	0.0	Horz	AV	0.0	28.5	54.0	-25.5	High ch, EUT horizontal
2483.600	32.5	-4.1	1.0	253.9	3.0	0.0	Vert	AV	0.0	28.4	54.0	-25.6	High ch, EUT on side
2484.475	32.5	-4.1	1.0	306.0	3.0	0.0	Vert	AV	0.0	28.4	54.0	-25.6	High ch, EUT horizontal
4883.158	44.0	4.1	1.0	55.0	3.0	0.0	Horz	PK	0.0	48.1	74.0	-25.9	Mid ch, EUT horizontal
4882.150	44.0	4.1	1.0	253.9	3.0	0.0	Vert	PK	0.0	48.1	74.0	-25.9	Mid ch, EUT horizontal
4806.125	44.2	3.9	1.0	34.9	3.0	0.0	Horz	PK	0.0	48.1	74.0	-25.9	Low ch, EUT vertical
4885.767	43.9	4.1	1.0	245.0	3.0	0.0	Vert	PK	0.0	48.0	74.0	-26.0	Mid ch, EUT vertical
4803.575	43.9	3.9	1.9	134.0	3.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Low ch, EUT vertical
4883.550	43.6	4.1	1.0	174.9	3.0	0.0	Horz	PK	0.0	47.7	74.0	-26.3	Mid ch, EUT vertical
4883.692	43.5	4.1	1.0	343.9	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	Mid ch, EUT on side
4959.517	43.3	4.3	1.0	182.9	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	High ch, EUT vertical
12401.100	41.4	6.2	1.0	329.0	3.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	High ch, EUT vertical
4958.967	43.1	4.3	1.0	228.9	3.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	High ch, EUT vertical
12400.850	40.6	6.2	1.0	314.0	3.0	0.0	Horz	PK	0.0	46.8	74.0	-27.2	High ch, EUT vertical
12399.150	41.6	0.9	1.0	213.0	3.0	0.0	Vert	PK	0.0	42.5	74.0	-31.5	High ch, EUT vertical
12211.580	42.0	-0.2	2.8	48.9	3.0	0.0	Horz	PK	0.0	41.8	74.0	-32.2	Mid ch, EUT vertical
12397.800	40.5	0.9	1.0	5.9	3.0	0.0	Horz	PK	0.0	41.4	74.0	-32.6	High ch, EUT vertical
12210.020	41.5	-0.2	1.0	60.9	3.0	0.0	Vert	PK	0.0	41.3	74.0	-32.7	Mid ch, EUT vertical
12010.690	41.7	-0.9	1.0	210.9	3.0	0.0	Horz	PK	0.0	40.8	74.0	-33.2	Low ch, EUT vertical
2484.625	44.6	-4.1	1.0	306.0	3.0	0.0	Vert	PK	0.0	40.5	74.0	-33.5	High ch, EUT horizontal
2388.108	44.4	-3.9	1.0	108.0	3.0	0.0	Horz	PK	0.0	40.5	74.0	-33.5	Low ch, EUT vertical
2487.925	44.5	-4.1	1.0	24.9	3.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	High ch, EUT horizontal
2483.550	44.4	-4.1	1.0	293.0	3.0	0.0	Horz	PK	0.0	40.3	74.0	-33.7	High ch, EUT vertical
2486.367	44.4	-4.1	1.0	92.9	3.0	0.0	Vert	PK	0.0	40.3	74.0	-33.7	High ch, EUT vertical
2485.908	44.3	-4.1	1.4	193.9	3.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	High ch, EUT on side
12011.880	41.0	-0.9	1.0	286.9	3.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9	Low ch, EUT vertical
2485.817	44.2	-4.1	1.0	253.9	3.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9	High ch, EUT on side