



Medtronic, Inc.

**Cobalt XT HF Quad CRT-D MRI SureScan
FCC 15.247:2022**

Report: MDTR1060.0, Issue Date: February 27, 2023



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CERTIFICATE OF TEST



Last Date of Test: December 22, 2022
Medtronic, Inc.
EUT: Cobalt XT HF Quad CRT-D MRI SureScan

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2022	ANSI C63.10:2013, FCC KDB 558074 v05r02:2019

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions	N/A	15.207	6.2	The EUT is a battery powered, implantable medical device so this testing does not apply.
Occupied Bandwidth (99%)	N/A	KDB 558074 -2.1	6.9.3	Not included for a C2PC related to adding a capacitor to the PCB near the antenna.
Spurious Radiated Emissions	Pass	15.247(d), KDB 558074 - 8.6, 8.7	6.5, 6.6, 11.12.1, 11.13.2	
Duty Cycle	Evaluated	KDB 558074 -6.0	11.6	No pass/fail criteria for duty cycle
DTS Bandwidth (6 dB)	Pass	15.247(a)(2), KDB 558074 -8.2	11.8.2	
Equivalent Isotropic Radiated Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	11.9.1.1	
Output Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	11.9.1.1	
Power Spectral Density	N/A	15.247(e), KDB 558074 -8.4	11.10.2	Not required for a C2PC related to adding a capacitor to the PCB near the antenna.
Band Edge Compliance	N/A	15.247(d), KDB 558074 -8.5	11.11	
Spurious Conducted Emissions	N/A	15.247(d), KDB 558074 -8.5	11.11	

Deviations From Test Standards

None

Approved By:

Cole Ghizzone, 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 - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

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

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FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



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 QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. 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	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 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)	3.2 dB	-3.2 dB

TEST SETUP BLOCK DIAGRAMS

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)	Factor			Distance Adjustment Factor	External Attenuation	Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain			
42.6	28.6	3.1	40.8	0.0	0.0	33.5

Conducted Emissions:

Measured Level (Amplitude)	Factor		External Attenuation	Adjusted Level
	Transducer Factor	Cable Factor		
26.7	0.3	0.1	20.0	47.1

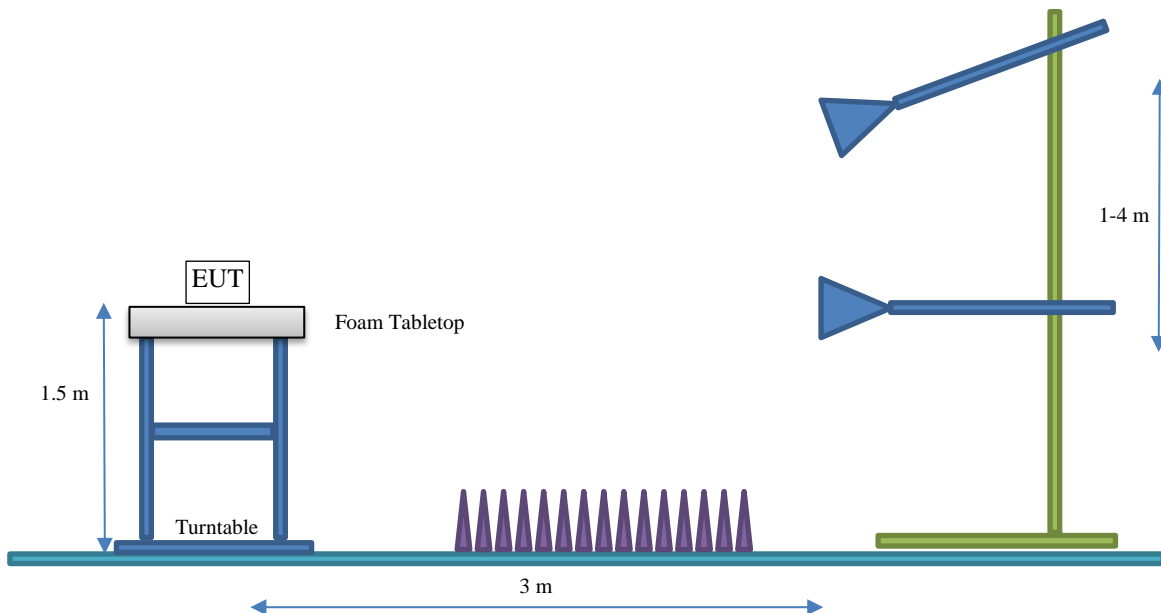
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION



Client and Equipment under Test (EUT) Information

Company Name:	Medtronic, Inc.
Address:	710 Medtronic Parkway NE
City, State, Zip:	Minneapolis, MN 55432
Test Requested By:	Taylor Dowden
EUT:	Cobalt XT HF Quad CRT-D MRI SureScan
First Date of Test:	December 20, 2022
Last Date of Test:	December 22, 2022
Receipt Date of Samples:	December 20, 2022
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 in Medtronic Product Similarity Statement Reference offer a mix of basic, standard and premium features. All devices listed will include support for 1.5T and 3.0T MRI environment. All models include a 2.4 GHz ISM band Bluetooth Low Energy (BLE) radio module.

Testing Objective:

Demonstrating criteria are met for a Class 2 Permissive Change (C2PC) to FCC Part 15.247 for the Cobalt XT HF Quad CRT-D MRI SureScan implantable cardiac device, FCC ID: LF5BLEIMPLANT4). This change involves the addition of an integrated (not discrete) DC blocking capacitor placed on the PCB trace between the RF antenna and the RF module. This capacitor is not part of the impedance matching network.

Medtronic Test Plan Reference:

D00893969 Cobalt/Crome Radio & EMC Design Verification Plan Revision A

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™	

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Monopole	Medtronic	2400-2485	-31.86

The EUT was tested using the power settings provided by the manufacturer which were based upon:

- ☒ Test software settings Test software/firmware installed on EUT: Baseline 7.1
☐ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting
BLE GFSK	DTS	0 or 37	2402	Default – Not Adjustable
		20 or 18	2442	Default – Not Adjustable
		39	2480	Default – Not Adjustable

CONFIGURATIONS



Configuration MDTR1060- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Cobalt XT HF Quad CRT-D MRI SureScan	Medtronic	DTPA2Q1	RTD603455S

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Tablet	Apple	iPad MYLD2LL/A	F9FFG3ENQ1GG

Configuration MDTR1060- 4

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Cobalt XT HF Quad CRT-D MRI SureScan	Medtronic	DTPA2Q1	RTD603483S

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Battery Module (2x AA)	None	None	None

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-12-20	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	2022-12-21	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.
3	2022-12-22	DTS Bandwidth (6 dB)	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	2022-12-22	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.
5	2022-12-22	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS

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 within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

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 $10 \cdot \log(1/dc)$.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2022-09-01	2024-09-01
Cable	Element	Double Ridge Guide Horn Cables	MNV	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2022-01-24	2023-01-24
Attenuator	Coaxicom	3910-20	AXY	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2022-06-10	2023-06-10
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2022-09-10	2023-09-10
Antenna - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Cable	Element	Standard Gain Cable	MNW	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2022-01-24	2023-01-24
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	L-3 Narda-Miteq	AMF-6F-12001800-30-10P	PAP	2022-01-24	2023-01-24
Antenna - Biconilog	Ametek	CBL 6141B	AYS	2021-03-09	2023-03-09
Cable	Element	Biconilog Cable	MNX	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2022-01-24	2023-01-24
Filter - Low Pass	Micro-Tronics	LPM50004	HGG	2022-09-10	2023-09-10
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2022-09-10	2023-09-10
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2022-09-10	2023-09-10

SPURIOUS RADIATED EMISSIONS

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26000 MHz

POWER INVESTIGATED

Battery - 3.2 VDC

CONFIGURATIONS INVESTIGATED

MDTR1060-2

MODES INVESTIGATED

Transmitting BLE Ch 0 and Ch 39 (2402, 2480 MHz), 1 Mbps, PN15 (pseudorandom noise)
Transmitting BLE Ch 0, Ch 20 and Ch 39 (2402, 2442, 2480 MHz), 1 Mbps, PN15 (pseudorandom noise)

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	43	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

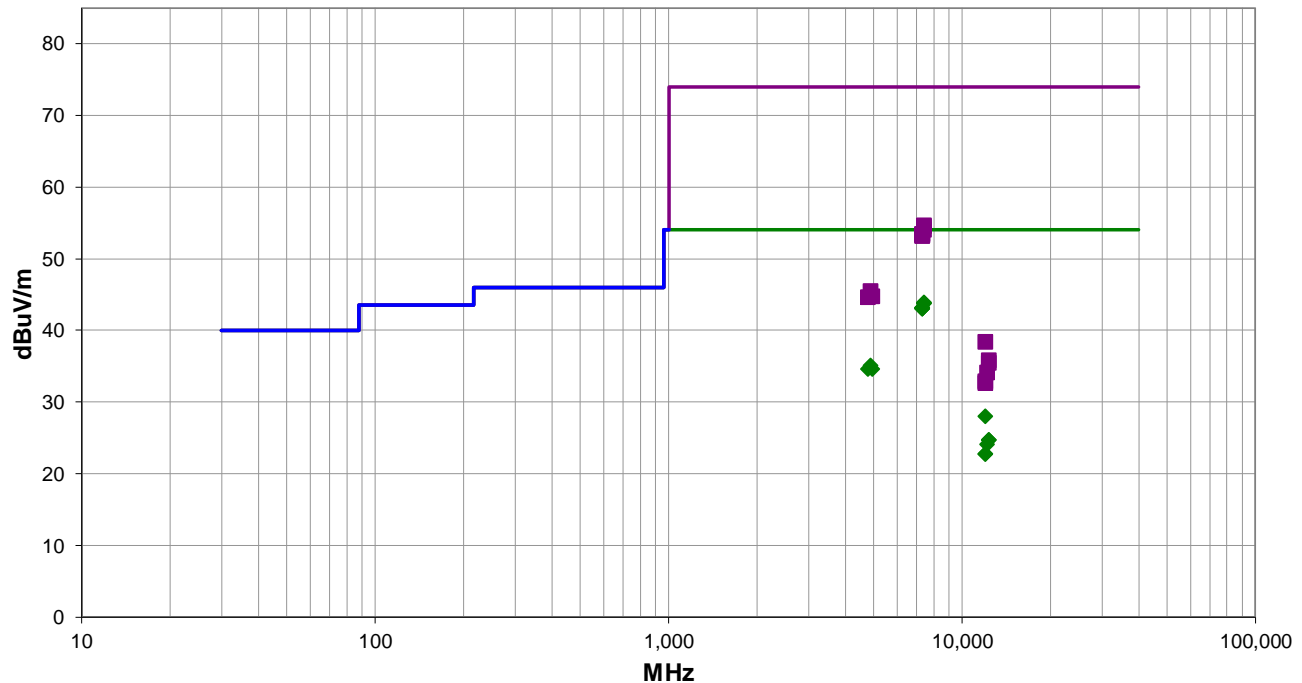
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D00893969 Rev A

EUT OPERATING MODES

Transmitting BLE Ch 0, Ch 20 and Ch 39 (2402, 2442, 2480 MHz), 1 Mbps, PN15 (pseudorandom noise)

DEVIATIONS FROM TEST STANDARD

None



Run #: 43

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #43

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7438.375	28.5	15.3	1.5	339.0	3.0	0.0	Horz	AV	0.0	43.8	54.0	-10.2	EUT Horz, Ch 39
7437.817	28.4	15.3	1.5	331.0	3.0	0.0	Vert	AV	0.0	43.7	54.0	-10.3	EUT On Side, Ch 39
7437.942	28.4	15.3	1.5	11.0	3.0	0.0	Vert	AV	0.0	43.7	54.0	-10.3	EUT On Side, Ch 39
7327.942	28.5	14.6	4.0	230.0	3.0	0.0	Horz	AV	0.0	43.1	54.0	-10.9	EUT Horz, Ch 20
7327.600	28.5	14.6	1.5	145.0	3.0	0.0	Vert	AV	0.0	43.1	54.0	-10.9	EUT On Side, Ch 20
7328.433	28.5	14.6	1.5	244.0	3.0	0.0	Horz	AV	0.0	43.1	54.0	-10.9	EUT Vert, Ch 20
7326.700	28.5	14.5	2.1	210.0	3.0	0.0	Horz	AV	0.0	43.0	54.0	-11.0	EUT On Side, Ch 20
7328.292	28.4	14.6	1.7	186.0	3.0	0.0	Vert	AV	0.0	43.0	54.0	-11.0	EUT Horz, Ch 20
7327.633	28.4	14.6	1.8	104.0	3.0	0.0	Vert	AV	0.0	43.0	54.0	-11.0	EUT Vert, Ch 20
4886.408	29.4	5.7	4.0	237.0	3.0	0.0	Horz	AV	0.0	35.1	54.0	-18.9	EUT Horz, Ch 20
7438.925	39.3	15.3	1.5	339.0	3.0	0.0	Horz	PK	0.0	54.6	74.0	-19.4	EUT Horz, Ch 39
7441.483	39.2	15.3	1.5	331.0	3.0	0.0	Vert	PK	0.0	54.5	74.0	-19.5	EUT On Side, Ch 39
4958.575	28.9	5.6	1.5	149.0	3.0	0.0	Vert	AV	0.0	34.5	54.0	-19.5	EUT On Side, Ch 39
4805.783	28.8	5.7	2.1	329.0	3.0	0.0	Vert	AV	0.0	34.5	54.0	-19.5	EUT On Side, Ch 0
7440.375	38.7	15.3	1.5	11.0	3.0	0.0	Vert	PK	0.0	54.0	74.0	-20.0	EUT On Side, Ch 39
7324.175	38.9	14.5	1.7	186.0	3.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	EUT Horz, Ch 20
7324.825	38.9	14.5	4.0	230.0	3.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	EUT On Side, Ch 20
7327.708	38.8	14.6	1.5	145.0	3.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	EUT On Side, Ch 20
7325.617	38.8	14.5	2.1	210.0	3.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	EUT Horz, Ch 20
7326.017	38.7	14.5	1.5	244.0	3.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	EUT Vert, Ch 20
7324.858	38.7	14.5	1.8	104.0	3.0	0.0	Vert	PK	0.0	53.2	74.0	-20.8	EUT Vert, Ch 20
12007.660	29.2	-1.3	1.5	261.0	3.0	0.0	Horz	AV	0.0	27.9	54.0	-26.1	EUT Horz, Ch 0
4884.600	39.7	5.7	4.0	237.0	3.0	0.0	Horz	PK	0.0	45.4	74.0	-28.6	EUT Horz, Ch 20
4961.792	39.1	5.6	1.5	149.0	3.0	0.0	Vert	PK	0.0	44.7	74.0	-29.3	EUT On Side, Ch 39
12397.630	24.8	-0.1	1.5	195.0	3.0	0.0	Horz	AV	0.0	24.7	54.0	-29.3	EUT Horz, Ch 39
12398.560	24.8	-0.1	1.5	15.0	3.0	0.0	Vert	AV	0.0	24.7	54.0	-29.3	EUT On Side, Ch 39
4805.208	38.9	5.7	2.1	329.0	3.0	0.0	Vert	PK	0.0	44.6	74.0	-29.4	EUT On Side, Ch 0
12208.030	24.1	-0.1	1.5	102.0	3.0	0.0	Horz	AV	0.0	24.0	54.0	-30.0	EUT Horz, Ch 20
12009.030	24.0	-1.3	1.5	157.0	3.0	0.0	Horz	AV	0.0	22.7	54.0	-31.3	EUT Horz, Ch 0
12012.340	24.0	-1.3	1.5	181.0	3.0	0.0	Vert	AV	0.0	22.7	54.0	-31.3	EUT On Side, Ch 0
12011.370	39.6	-1.3	1.5	261.0	3.0	0.0	Horz	PK	0.0	38.3	74.0	-35.7	EUT Horz, Ch 0
12398.360	35.9	-0.1	1.5	15.0	3.0	0.0	Vert	PK	0.0	35.8	74.0	-38.2	EUT On Side, Ch 39
12397.760	35.5	-0.1	1.5	195.0	3.0	0.0	Horz	PK	0.0	35.4	74.0	-38.6	EUT Horz, Ch 39
12209.160	34.2	-0.1	1.5	102.0	3.0	0.0	Horz	PK	0.0	34.1	74.0	-39.9	EUT Horz, Ch 20
12009.240	34.1	-1.3	1.5	157.0	3.0	0.0	Horz	PK	0.0	32.8	74.0	-41.2	EUT Horz, Ch 0
12010.340	33.9	-1.3	1.5	181.0	3.0	0.0	Vert	PK	0.0	32.6	74.0	-41.4	EUT On Side, Ch 0

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-21
Customer:	Medtronic, Inc.	Temperature:	21.4°C
Attendees:	Curt Pies	Relative Humidity:	17.6%
Customer Project:	None	Bar. Pressure (PMSL):	1033 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	52	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

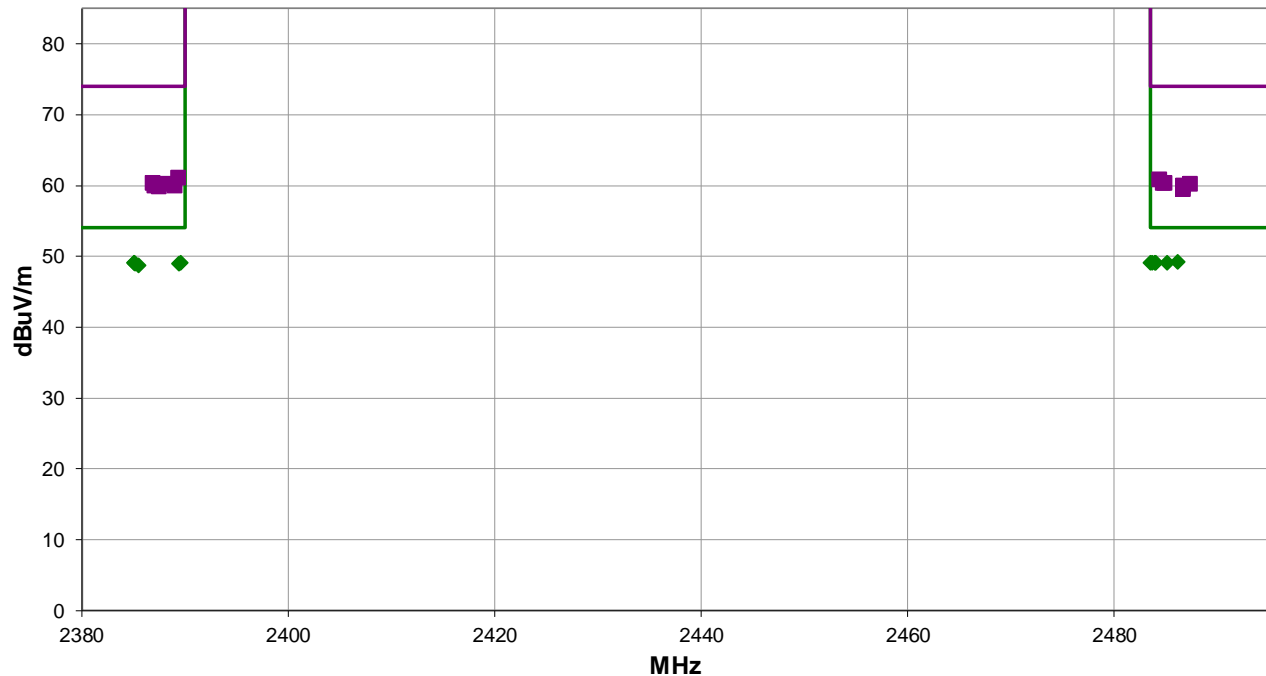
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D00893969 Rev A

EUT OPERATING MODES

Transmitting BLE Ch 0 and Ch 39 (2402, 2480 MHz), 1 Mbps, PN15 (pseudorandom noise)

DEVIATIONS FROM TEST STANDARD

None



Run #: 52

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #52

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2486.217	31.4	-2.2	1.5	335.0	3.0	20.0	Vert	AV	0.0	49.2	54.0	-4.8	EUT Horz, Ch 39
2485.142	31.3	-2.2	1.5	137.0	3.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	EUT On Side, Ch 39
2483.692	31.3	-2.2	2.93	55.0	3.0	20.0	Vert	AV	0.0	49.1	54.0	-4.9	EUT On Side, Ch 39
2483.542	31.3	-2.2	1.5	265.0	3.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	EUT Vert, Ch 39
2385.100	31.5	-2.4	1.5	273.0	3.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	EUT Vert, Ch 0
2484.075	31.2	-2.2	1.5	282.0	3.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT Horz, Ch 39
2483.950	31.2	-2.2	1.5	38.0	3.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	EUT Vert, Ch 39
2385.067	31.4	-2.4	1.5	253.0	3.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	EUT Vert, Ch 0
2389.583	31.3	-2.3	1.5	62.0	3.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT On Side, Ch 0
2385.142	31.3	-2.4	1.5	24.0	3.0	20.0	Horz	AV	0.0	48.9	54.0	-5.1	EUT Horz, Ch 0
2389.442	31.2	-2.3	2.33	112.0	3.0	20.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT On Side, Ch 0
2385.558	31.1	-2.4	1.5	48.0	3.0	20.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT Horz, Ch 0
2389.367	43.3	-2.3	1.5	24.0	3.0	20.0	Horz	PK	0.0	61.0	74.0	-13.0	EUT Horz, Ch 0
2484.425	43.0	-2.2	2.93	55.0	3.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	EUT On Side, Ch 39
2484.750	42.5	-2.2	1.5	335.0	3.0	20.0	Vert	PK	0.0	60.3	74.0	-13.7	EUT Horz, Ch 39
2484.892	42.5	-2.2	1.5	265.0	3.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	EUT Vert, Ch 39
2386.883	42.7	-2.4	1.5	273.0	3.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	EUT Vert, Ch 0
2487.392	42.4	-2.2	1.5	38.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT Vert, Ch 39
2388.242	42.5	-2.3	1.5	253.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT Vert, Ch 0
2388.983	42.3	-2.3	1.37	127.0	3.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT Horz, Ch 0
2387.017	42.4	-2.4	1.5	62.0	3.0	20.0	Horz	PK	0.0	60.0	74.0	-14.0	EUT On Side, Ch 0
2486.650	42.1	-2.2	1.5	282.0	3.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT Horz, Ch 39
2387.458	42.2	-2.4	2.33	112.0	3.0	20.0	Vert	PK	0.0	59.8	74.0	-14.2	EUT On Side, Ch 0
2486.700	41.7	-2.2	1.5	137.0	3.0	20.0	Horz	PK	0.0	59.5	74.0	-14.5	EUT On Side, Ch 39

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	28	Test Distance (m):	3	Ant. Height(s) (m):	1, 1.5, 2, 2.75, 3.75 (m)
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COMMENTS

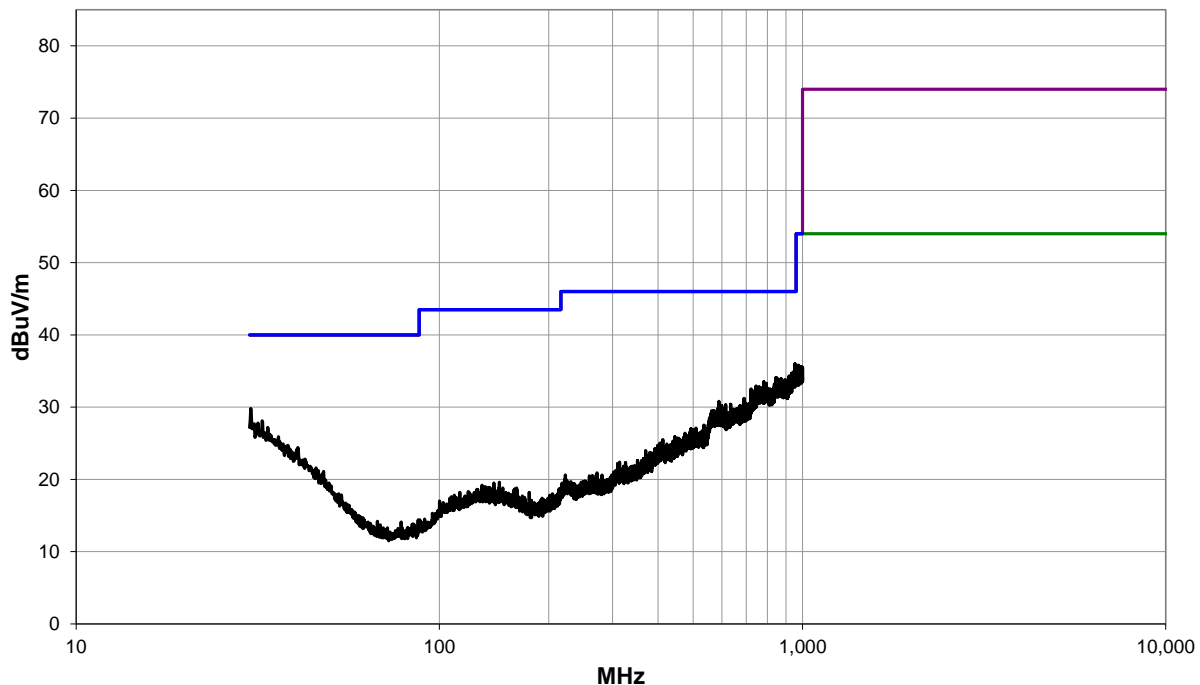
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 0 (2402 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 28

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	29	Test Distance (m):	3	Ant. Height(s) (m):	1, 1.5, 2, 2.75, 3.75 (m)
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COMMENTS

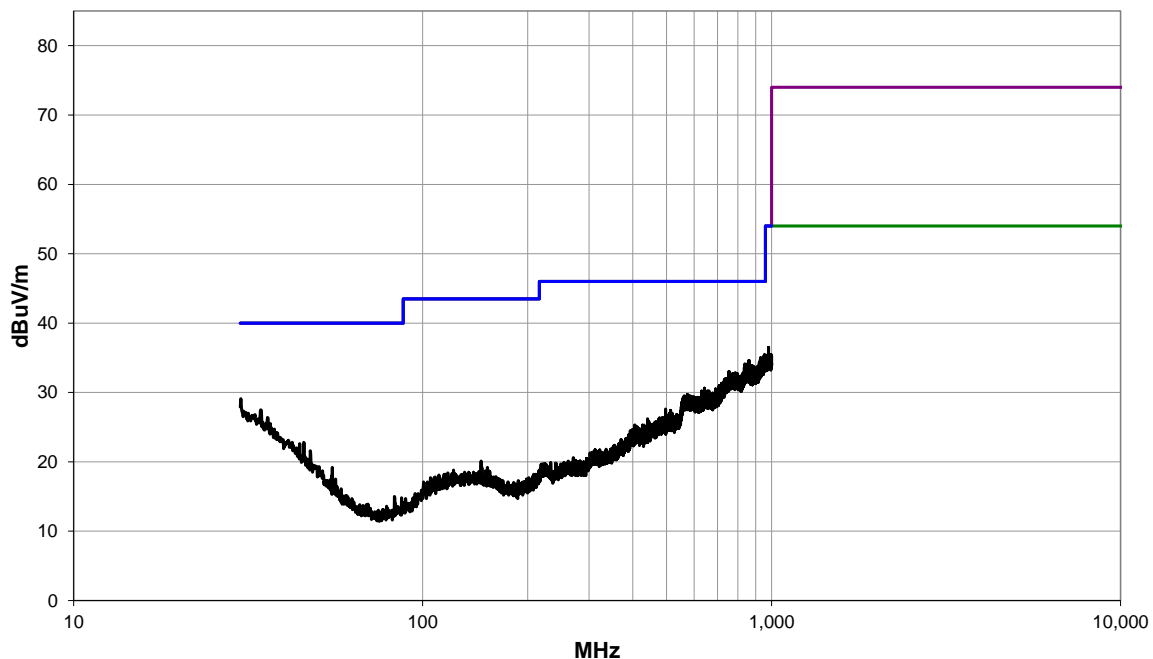
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 20 (2442 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 29

PK AV QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	30	Test Distance (m):	3	Ant. Height(s) (m):	1, 1.5, 2, 2.75, 3.75 (m)
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COMMENTS

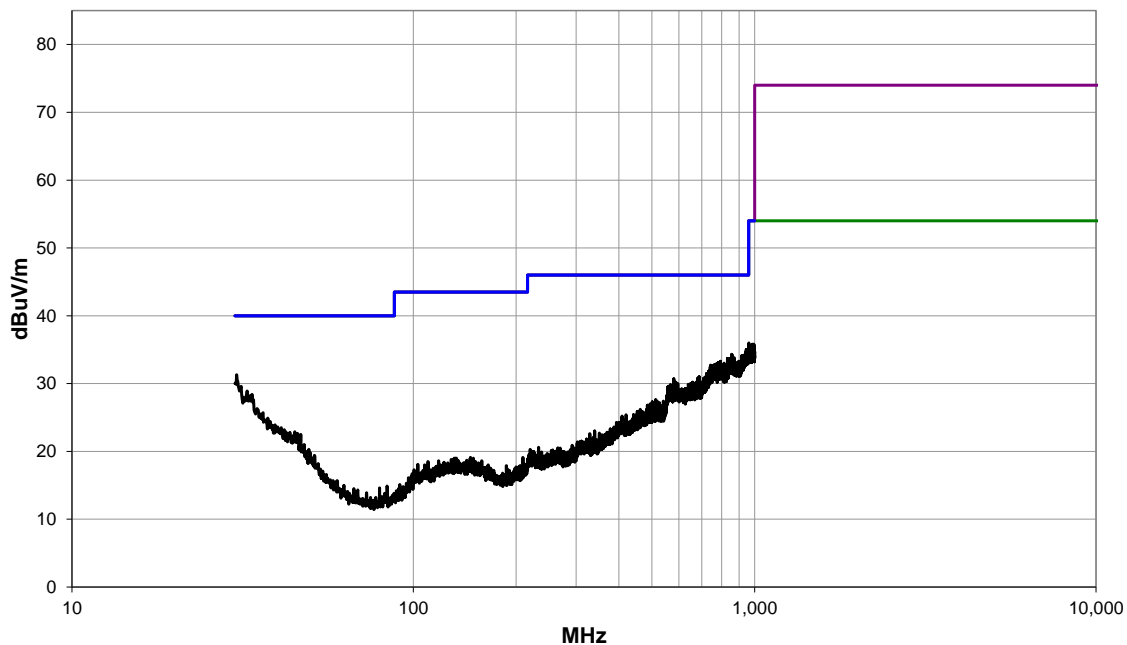
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 30

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	31	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

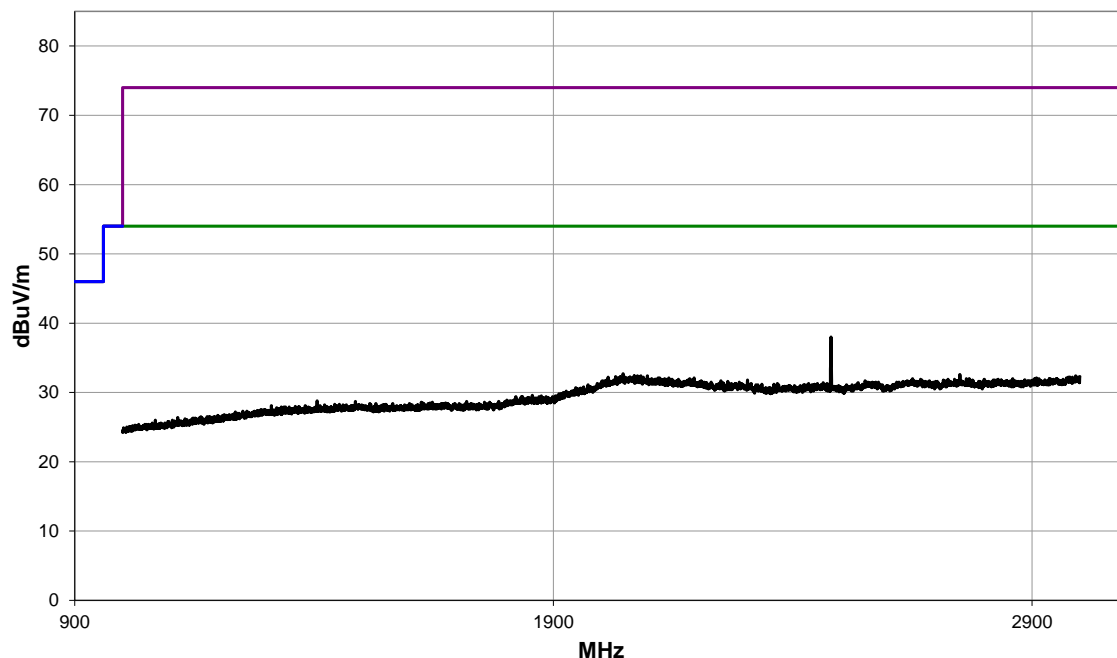
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 31

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	32	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

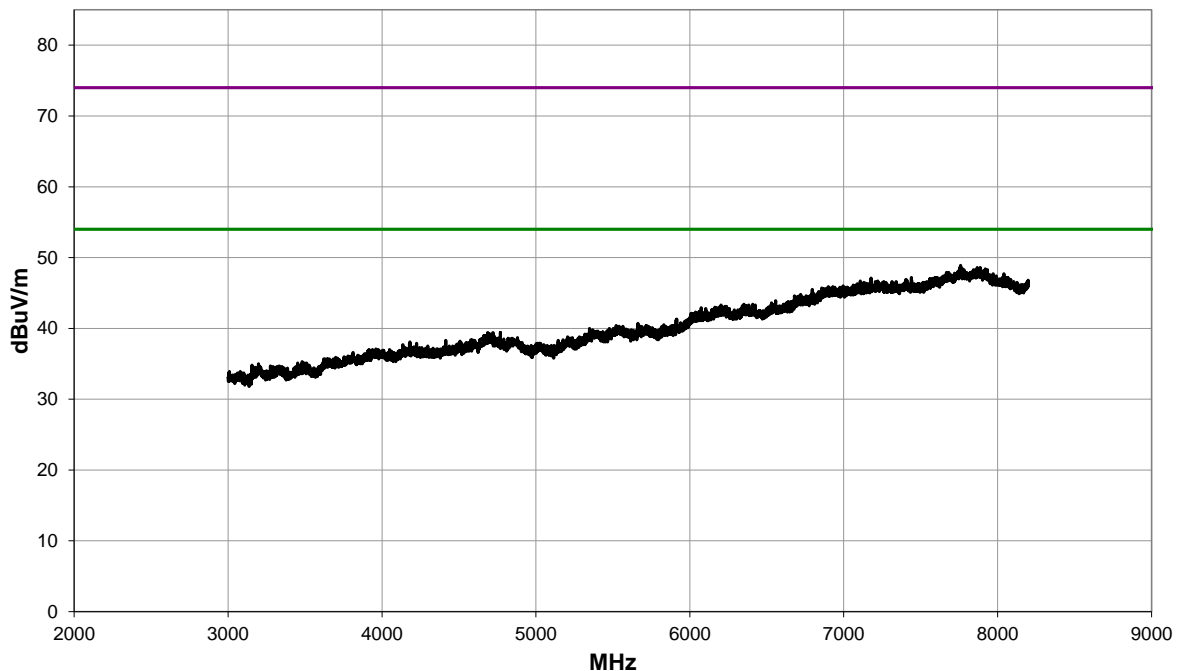
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 32

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	33	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

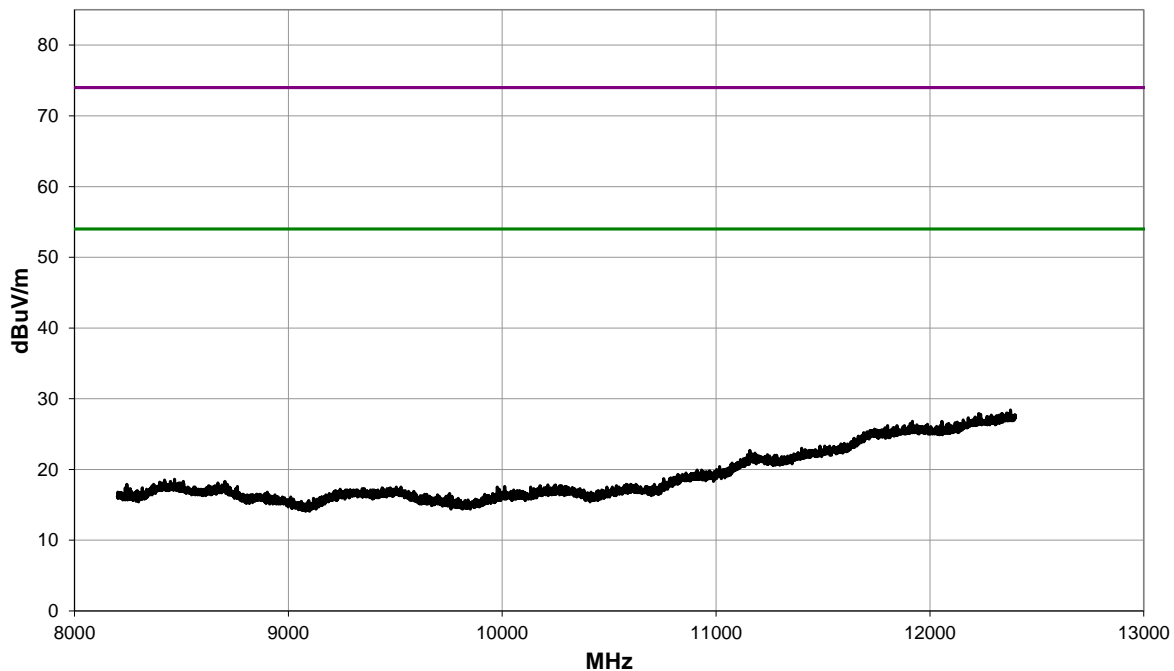
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 33

PK AV QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	34	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

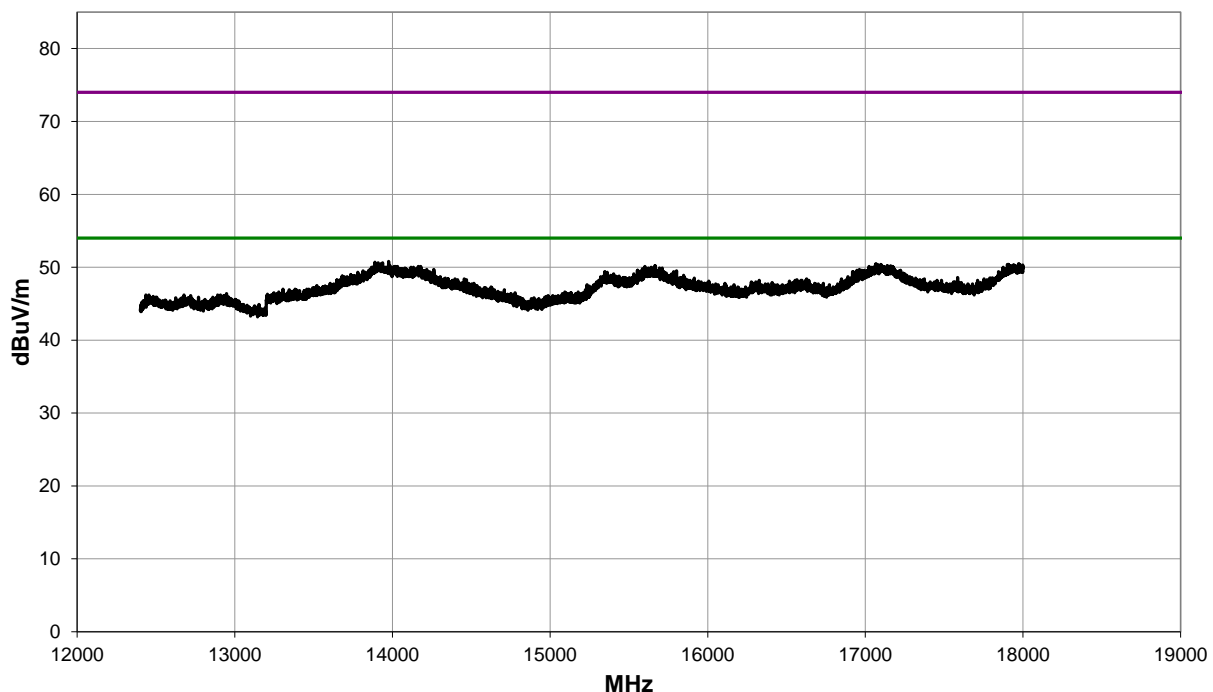
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 34

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	35	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

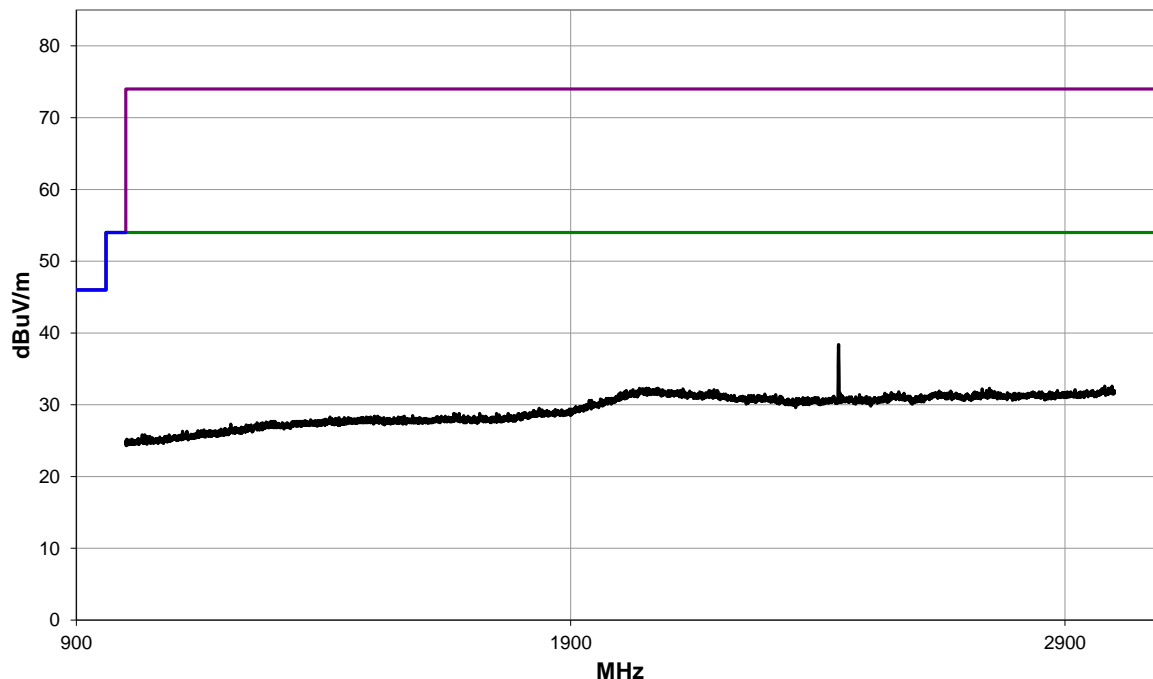
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 20 (2442 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 35

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	36	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

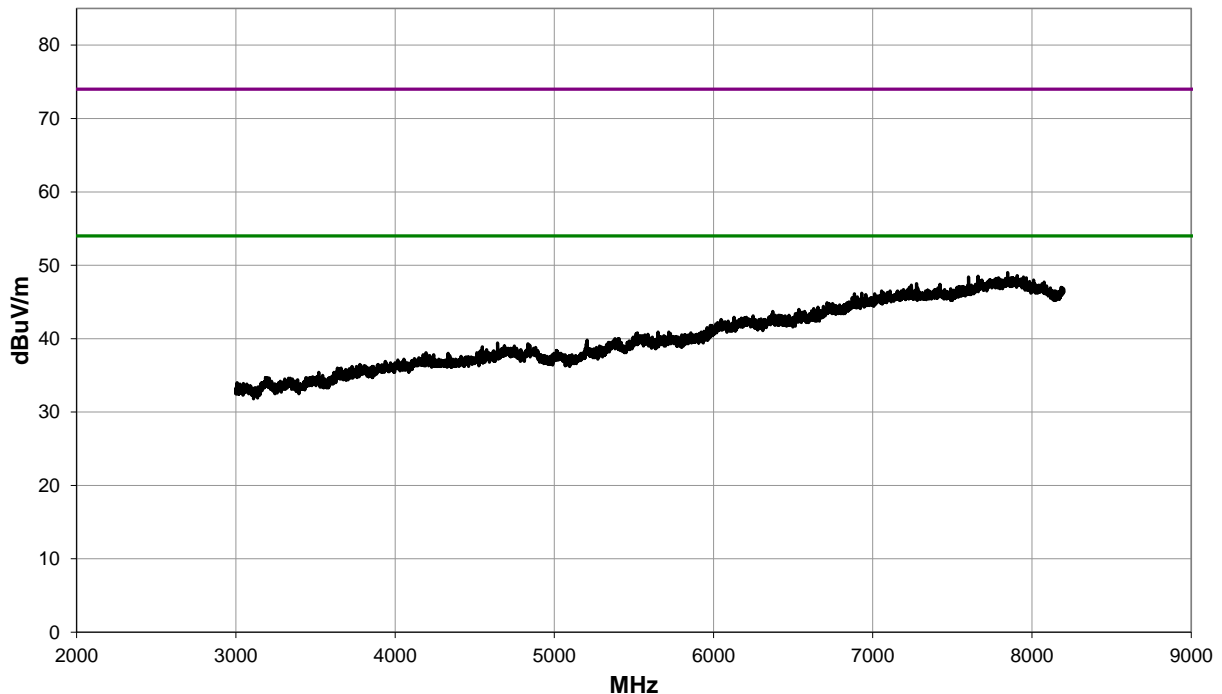
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 20 (2442 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 36

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	37	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

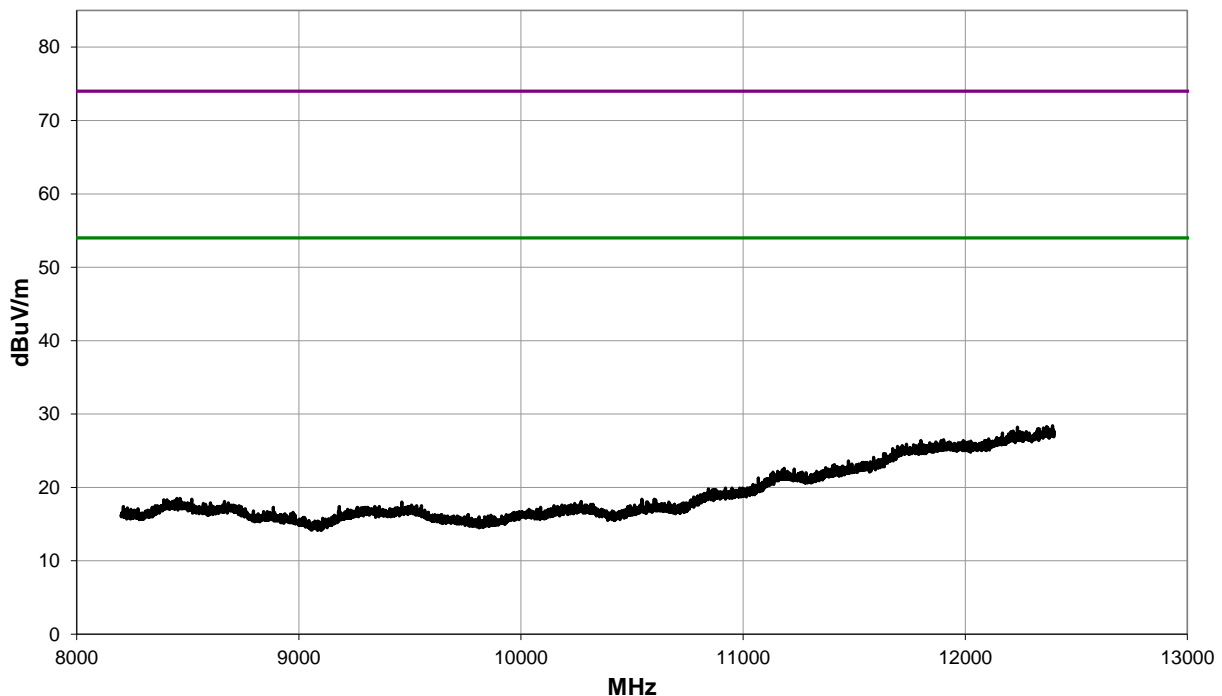
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 20 (2442 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 37

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	38	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

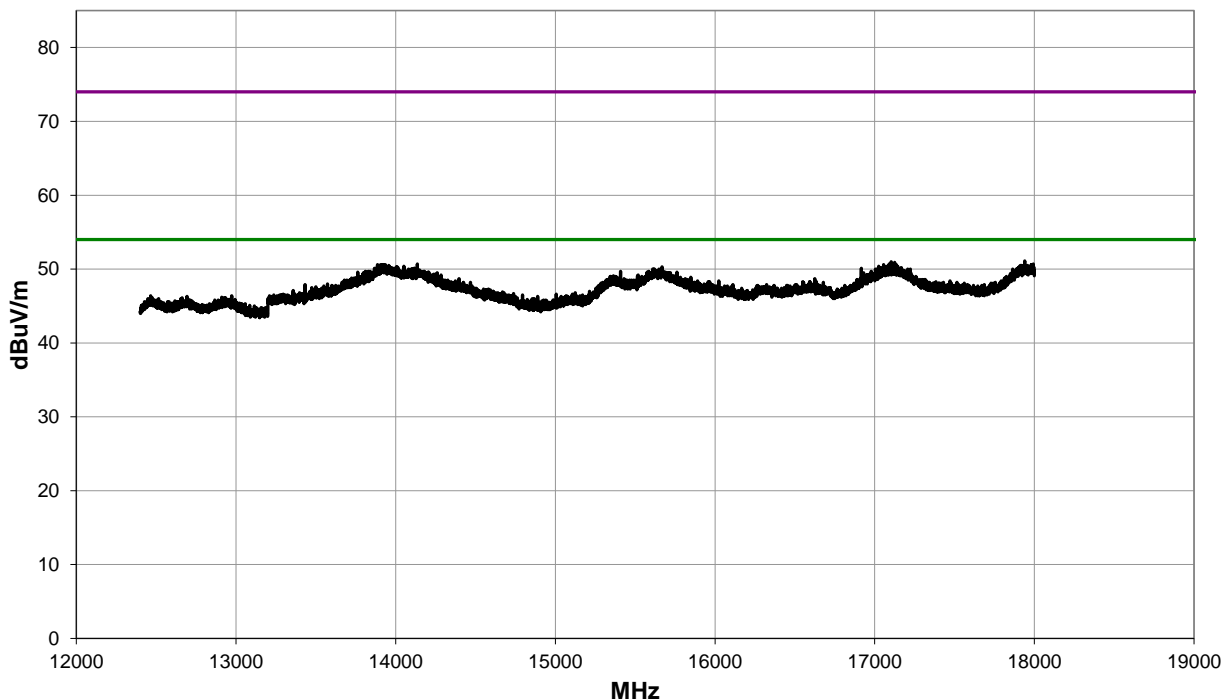
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 20 (2442 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 38

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	39	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

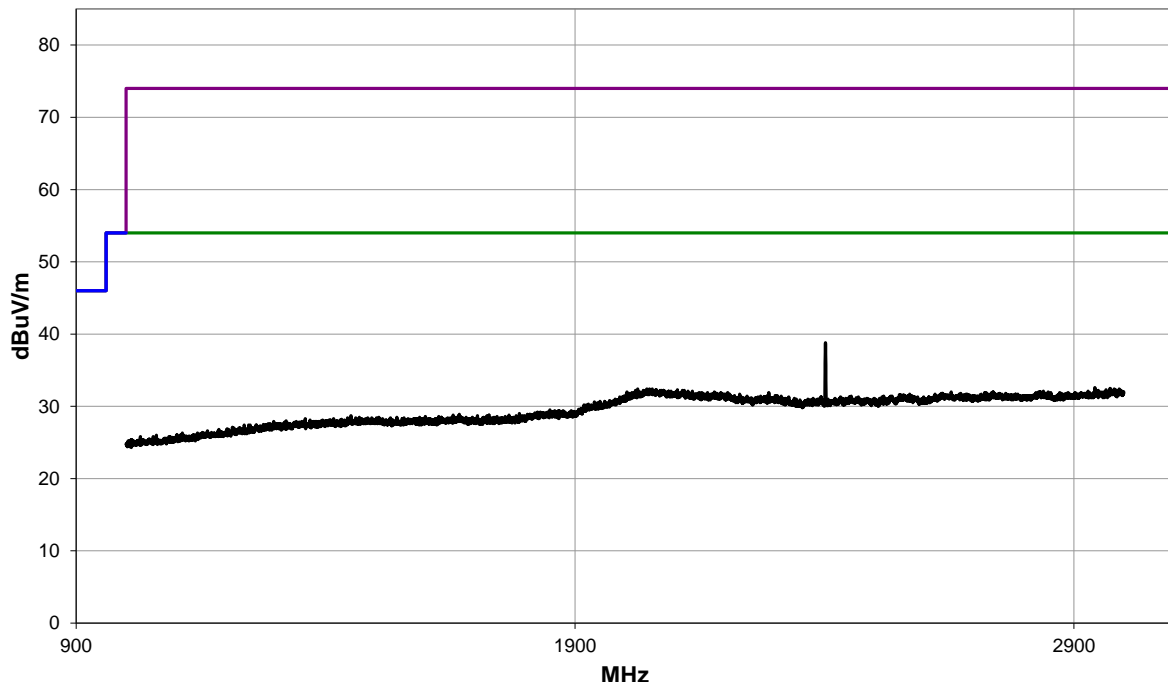
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 0 (2402 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 39

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	40	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

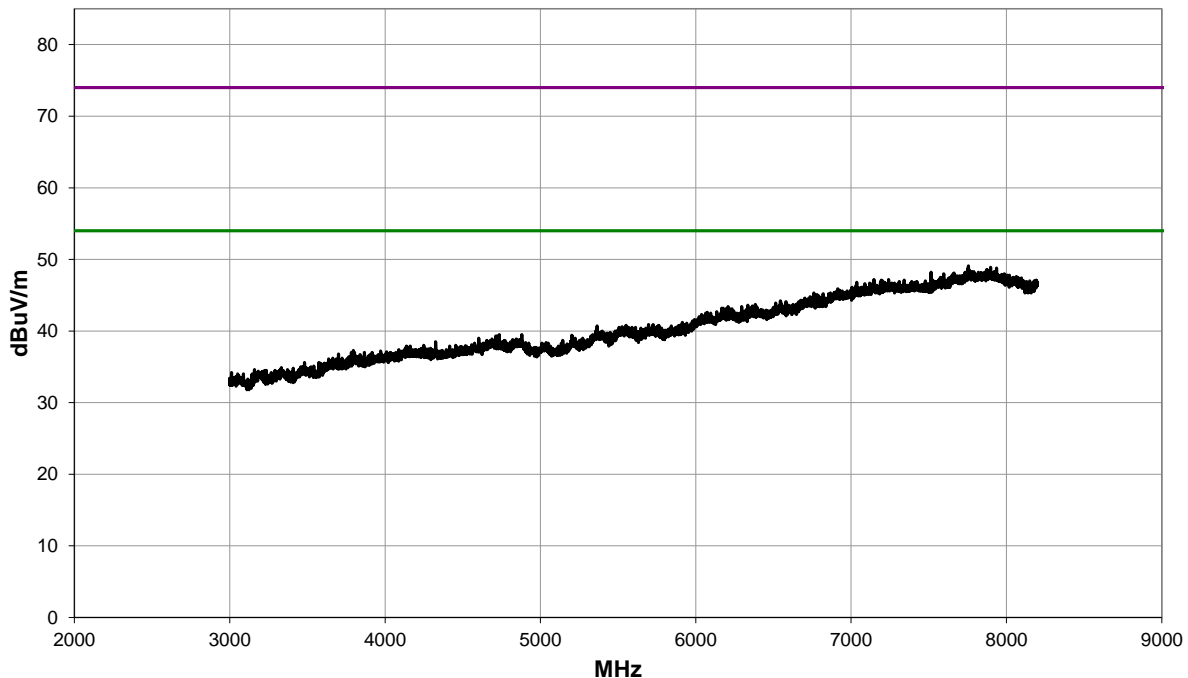
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 0 (2402 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 40

PK AV QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	41	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 0 (2402 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 41

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	42	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

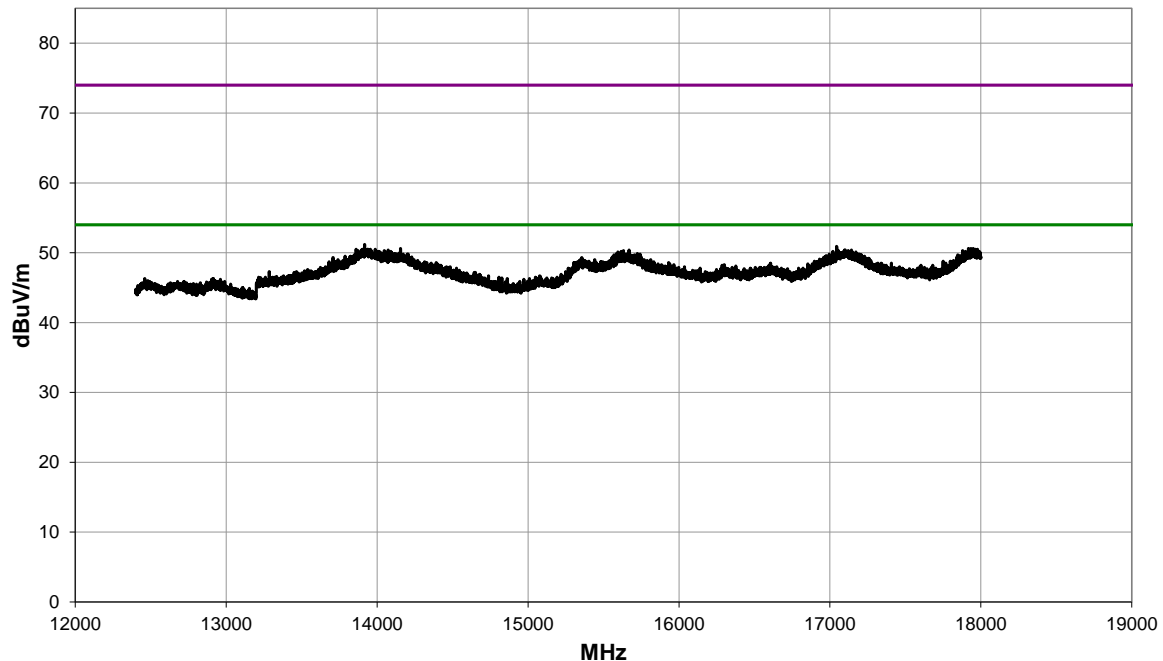
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 0 (2402 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 42

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-20
Customer:	Medtronic, Inc.	Temperature:	21.3°C
Attendees:	Taylor Dowden	Relative Humidity:	18.3%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	50	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

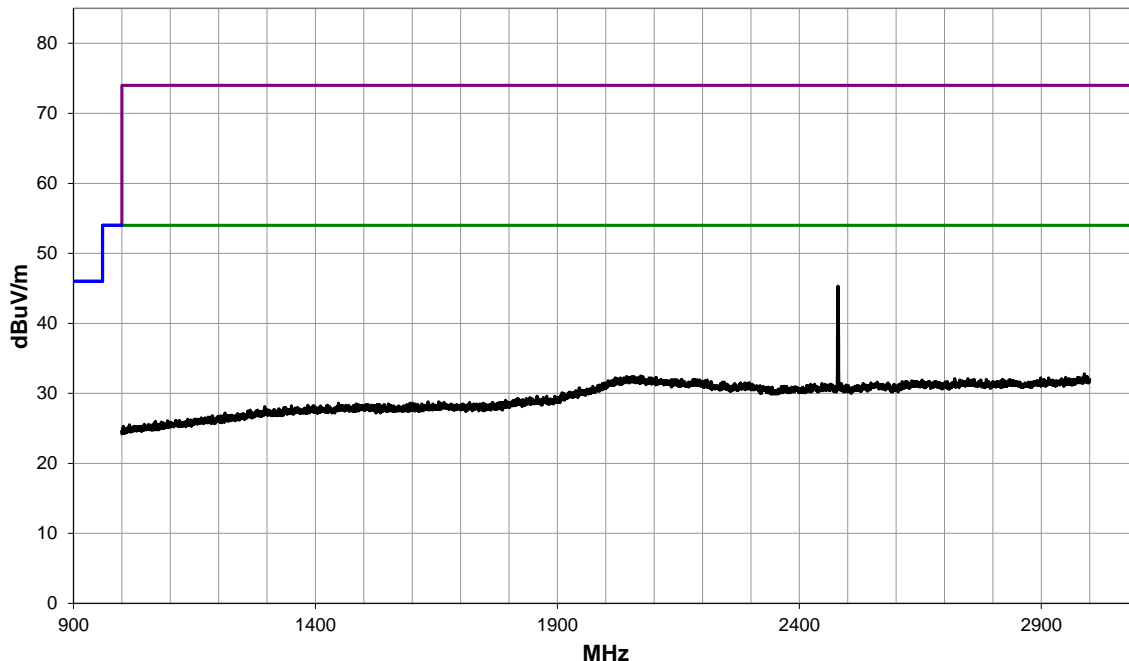
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m ($\pm 10\%$) at 23°C ($\pm 10\%$) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 50

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-21
Customer:	Medtronic, Inc.	Temperature:	21.4°C
Attendees:	Curt Pies	Relative Humidity:	17.6%
Customer Project:	None	Bar. Pressure (PMSL):	1033 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	53	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

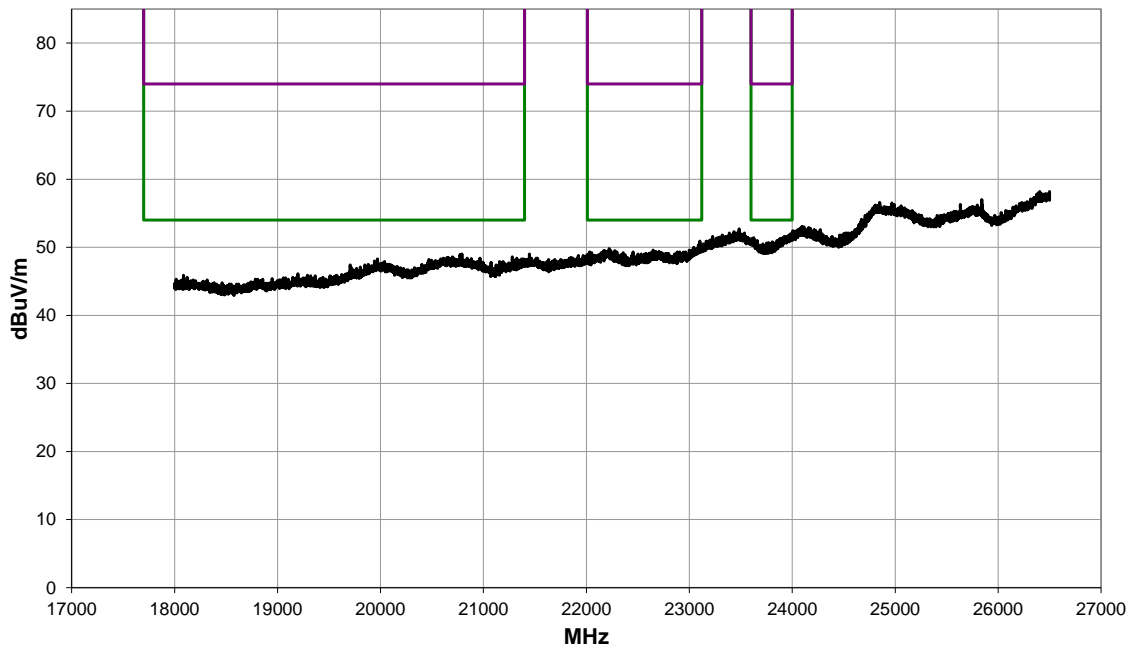
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 0 (2402 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 53

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-21
Customer:	Medtronic, Inc.	Temperature:	21.4°C
Attendees:	Curt Pies	Relative Humidity:	17.6%
Customer Project:	None	Bar. Pressure (PMSL):	1033 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	54	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

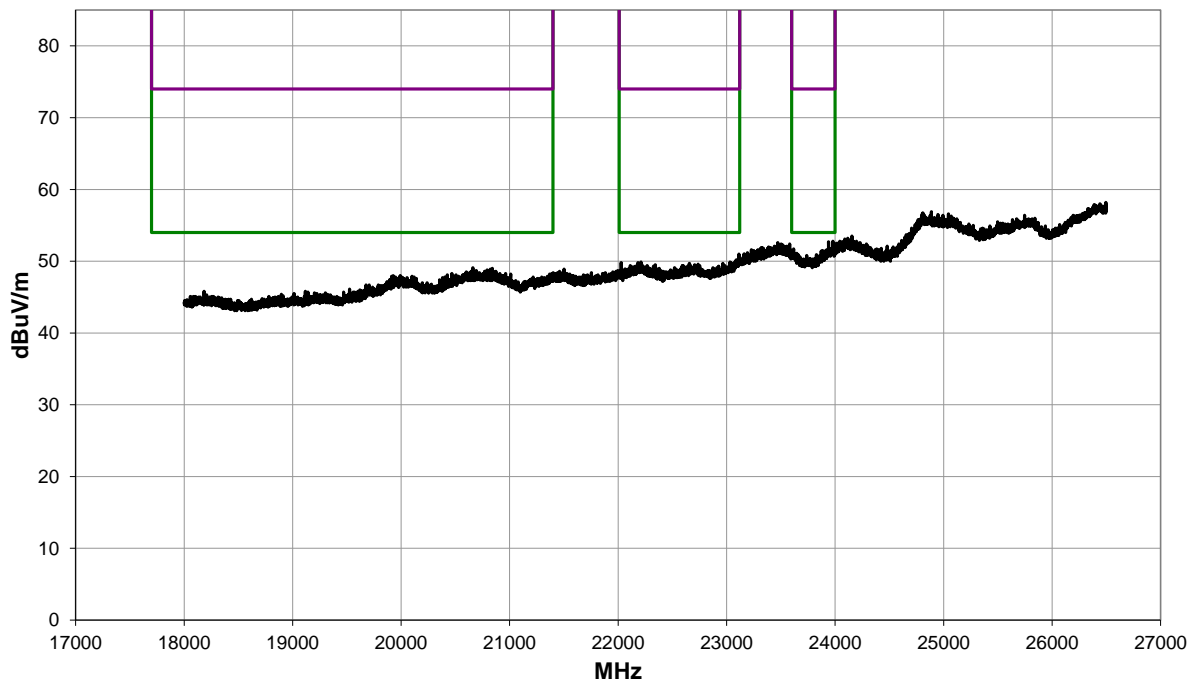
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 20 (2442 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 54

■ PK ◆ AV ● QP

FOR REFERENCE ONLY

SPURIOUS RADIATED EMISSIONS

EUT:	Cobalt XT HF Quad CRT-D MRI SureScan	Work Order:	MDTR1060
Serial Number:	RTD603455S	Date:	2022-12-21
Customer:	Medtronic, Inc.	Temperature:	21.4°C
Attendees:	Curt Pies	Relative Humidity:	17.6%
Customer Project:	None	Bar. Pressure (PMSL):	1033 mb
Tested By:	Marcelo Aguayo	Job Site:	MN09
Power:	Battery - 3.2 VDC	Configuration:	MDTR1060-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	55	Test Distance (m):	3	Ant. Height(s) (m):	1.25 (m)
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COMMENTS

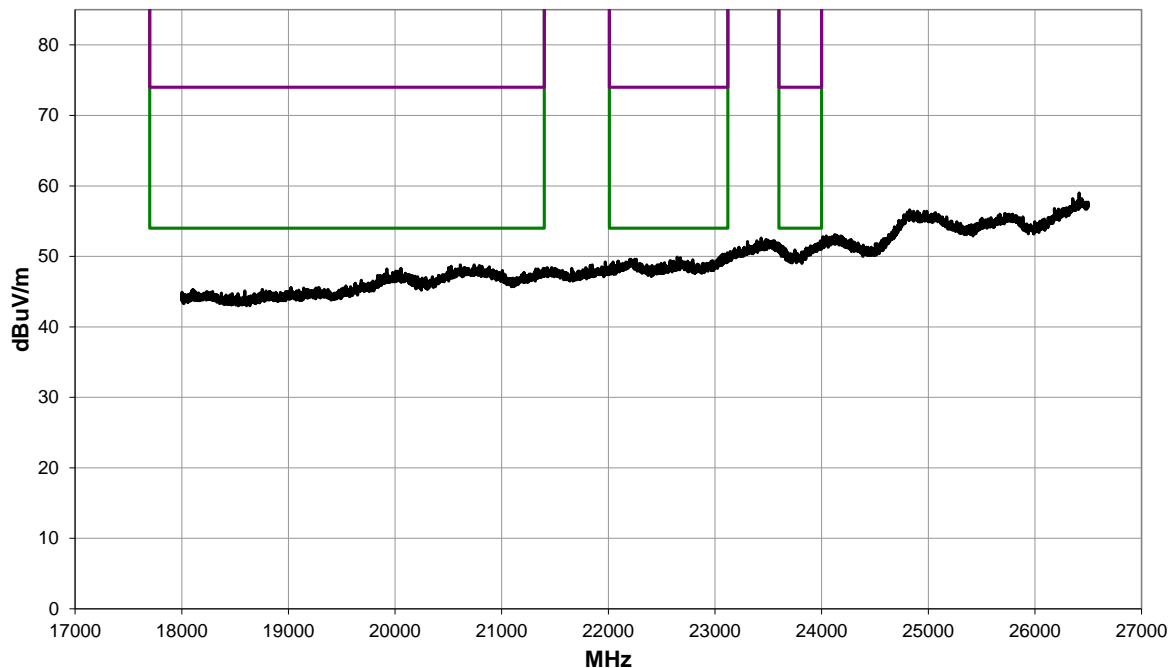
The implant is 1.5m from the ground plane. Simulated implant depth of 4 cm. Customer provided saline solution: Conductivity – 1.9 S/m (±10%) at 23°C (±10%) at 2.4GHz (Approximately equal to 3 g/L Total Dissolved Solids), referenced from Test Plan D0089396

EUT OPERATING MODES

Transmitting BLE Ch 39 (2480 MHz), PN15. Modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 55

PK AV QP

FOR REFERENCE ONLY

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.

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.

DTS BANDWIDTH



XMIT 2022.02.07.0

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
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Attenuator	S.M. Electronics	SA26B-20	RFW	2022-02-08	2023-02-08
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

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 DTS bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

DTS BANDWIDTH



TstTx 2022.06.03.0 XMI 2022.02.07.0

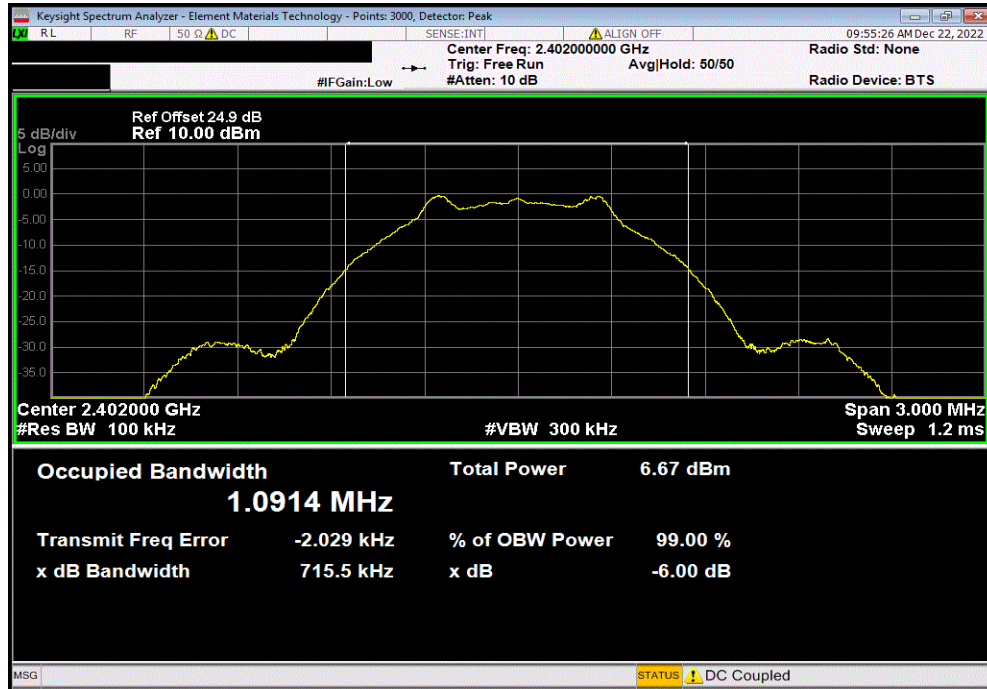
EUT: Cobalt XT HF Quad CRT-D MRI SureScan		Work Order: MDTR1060	
Serial Number: RTD603483S		Date: 22-Dec-22	
Customer: Medtronic, Inc.		Temperature: 21.4 °C	
Attendees: Curt Pies		Humidity: 14.8% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Christopher Heintzelman		Power: Battery - 3.2 VDC	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, 20 dB attenuator, DC block, and a 3.5dB loss from the device to the SMA output to account for the Impedance Match Board (this value declared by the customer)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Christopher Heintzelman</i>	
		Value	Limit (±) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		715.513 kHz	500 kHz Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		705.372 kHz	500 kHz Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		713.935 kHz	500 kHz Pass

DTS BANDWIDTH

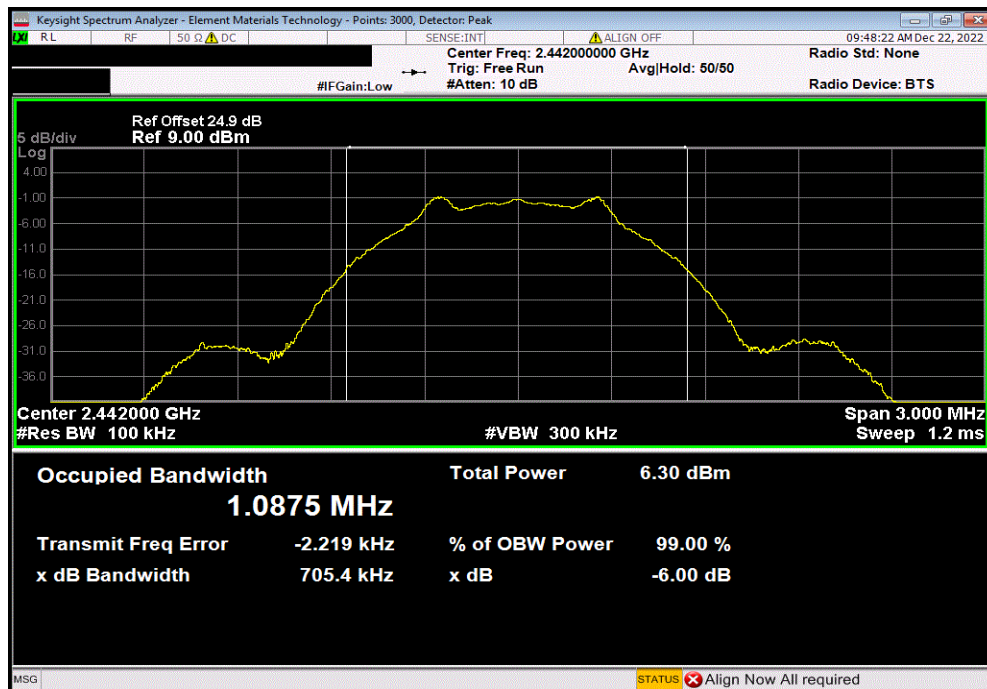


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				715.513 kHz	500 kHz	Pass



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				705.372 kHz	500 kHz	Pass

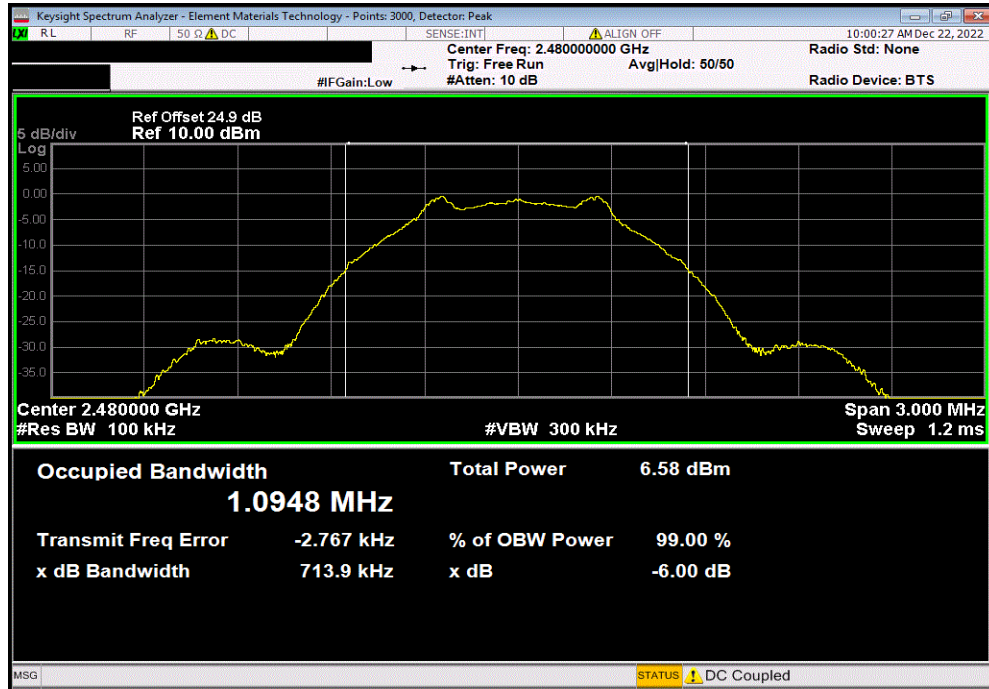


DTS BANDWIDTH



TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
Value				Limit	Result	
				(≥)		
			713.935 kHz	500 kHz	Pass	



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMIT 2022.02.07.0

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
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Attenuator	S.M. Electronics	SA26B-20	RFW	2022-02-08	2023-02-08
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

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.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TstTx 2022.06.03.0 XMI 2022.02.07.0

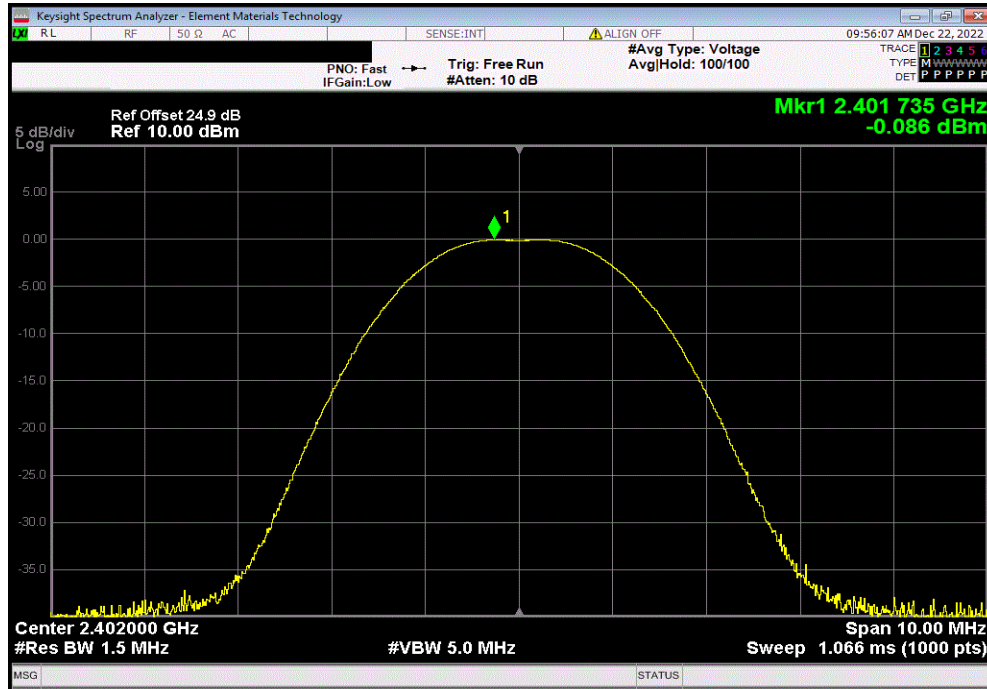
EUT: Cobalt XT HF Quad CRT-D MRI SureScan		Work Order: MDTR1060	
Serial Number: RTD603483S		Date: 22-Dec-22	
Customer: Medtronic, Inc.		Temperature: 21.4 °C	
Attendees: Curt Pies		Humidity: 14.9% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Christopher Heintzelman	Power: Battery - 3.2 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, 20 dB attenuator, DC block, and a 3.5dB loss from the device to the SMA output to account for the Impedance Match Board (this value declared by the customer)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Christopher Heintzelman</i>	
		Out Pwr (dBm)	Antenna Gain (dBi)
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		-0.086	-31.86
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		-0.354	-31.86
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-0.17	-31.86
		EIRP (dBm)	EIRP Limit (dBm)
		-31.946	36
		-32.214	36
		-32.03	36
			Result
			Pass
			Pass
			Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

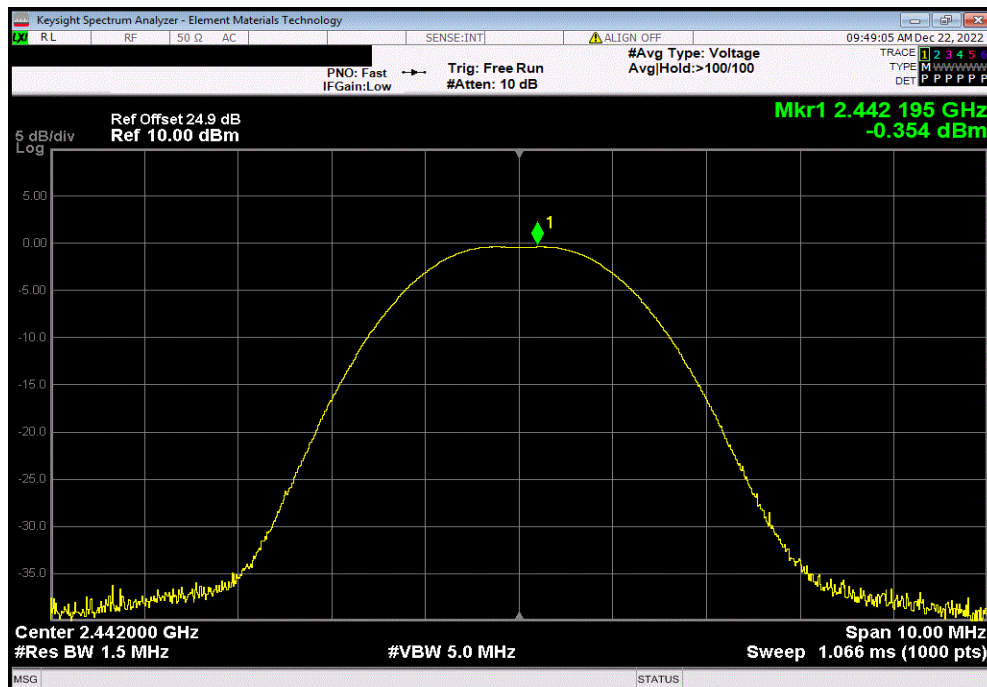


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-0.086	-31.86	-31.946	36	Pass		



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-0.354	-31.86	-32.214	36	Pass		

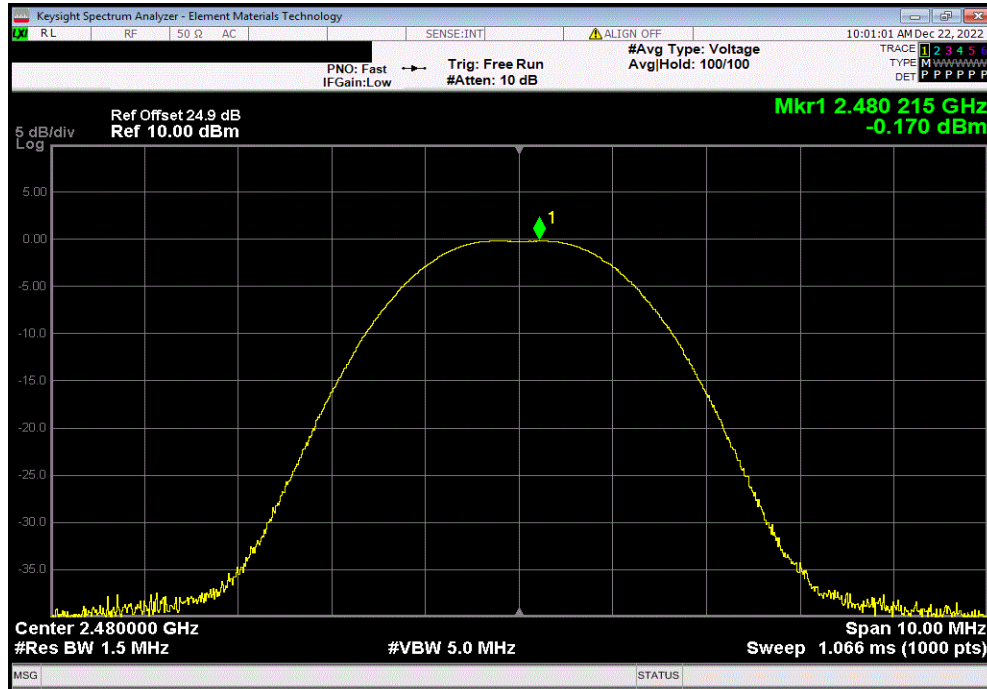


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
-0.17	-31.86	-32.03	36	Pass	



OUTPUT POWER



XMI 2022.02.07.0

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
Attenuator	S.M. Electronics	SA26B-20	RFW	2022-02-08	2023-02-08
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24

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



TstTx 2022.06.03.0 XMI 2022.02.07.0

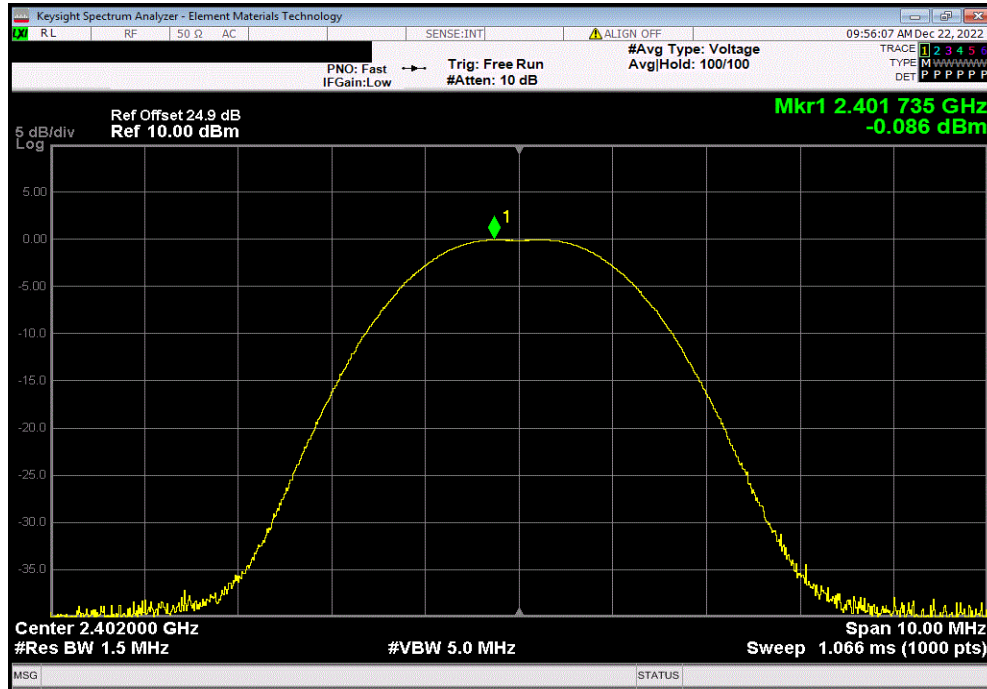
EUT: Cobalt XT HF Quad CRT-D MRI SureScan		Work Order: MDTR1060	
Serial Number: RTD603483S		Date: 22-Dec-22	
Customer: Medtronic, Inc.		Temperature: 21.3 °C	
Attendees: Curt Pies		Humidity: 14.3% RH	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Christopher Heintzelman	Power: Battery - 3.2 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, 20 dB attenuator, DC block, and a 3.5dB loss from the device to the SMA output to account for the Impedance Match Board (this value declared by the customer)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Christopher Heintzelman</i>	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		-0.086	30 Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		-0.354	30 Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-0.17	30 Pass

OUTPUT POWER

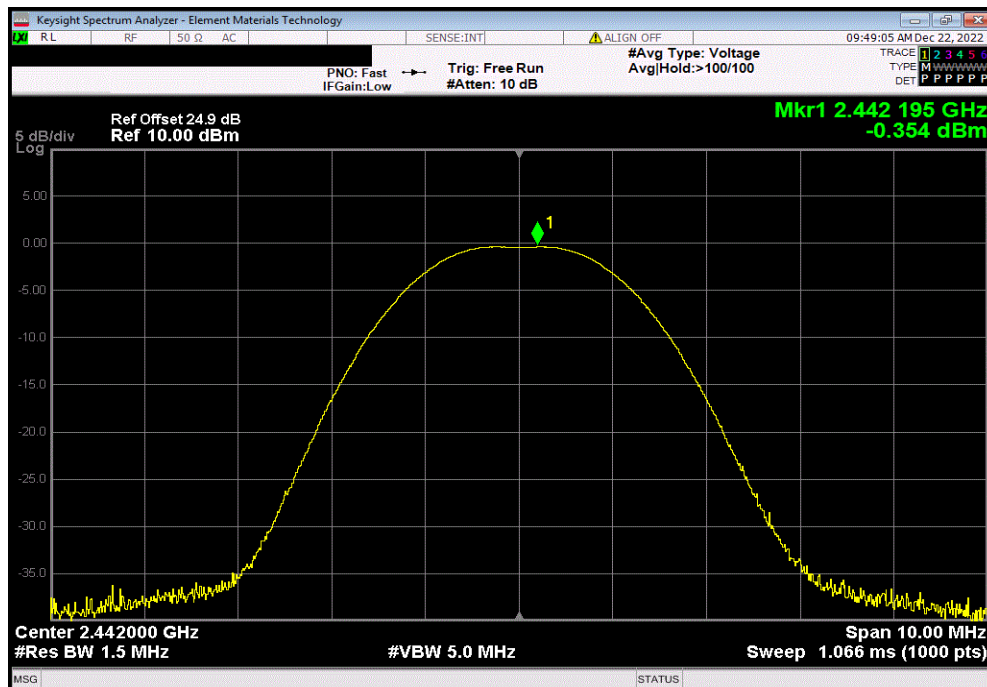


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-0.086	30	Pass



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-0.354	30	Pass

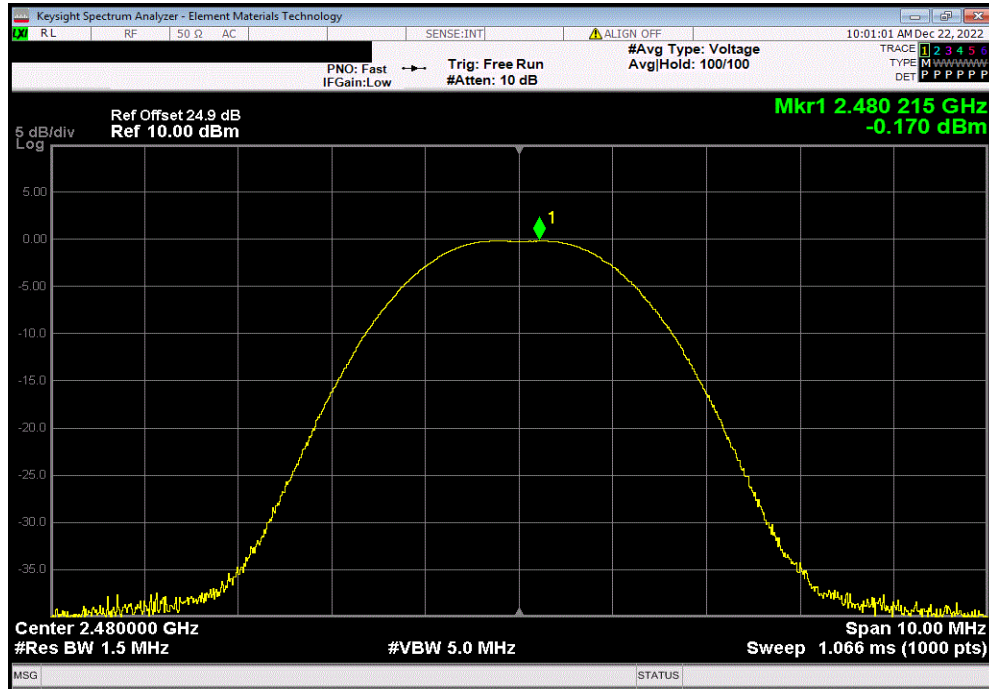


OUTPUT POWER



TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-0.17	30	Pass



End of Test Report