NORTHWEST EMC

Medtronic Inc.

Azure IPG

FCC 15.247:2016

Bluetooth Low Energy Radio

Report # MDTR0446 Rev.1

NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: March 28, 2016
Medtronic Inc.
Model: Azure IPG

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2016	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
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	Characterization of radio
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.2.2.4	Output 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	

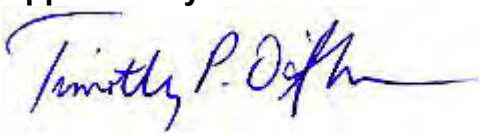
Deviations From Test Standards

Transmitter Radiated Power and spurious measurements were performed by two methods-

1. Conducted measurements taken at the antenna port performed per ANSI C63.10.

2. Radiated measurements using a human torso simulator and simulation tissue liquid solution with the electrical properties of muscle tissue at 2.44 GHz. Tests performed per the radiated methods in ANSI C63.10 for a radio operating in the 2.4 - 2.5 GHz range. A muscle tissue simulation solution defined in OET Bulletin 65 Supplement C at an implant depth of 2cm to reflect a worst case radiated field from a human torso.

Approved By:



Tim O'Shea, 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.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
01	"The 99.9% (approximate 26 dB) emission bandwidth (EBW) was also measured at the same time" was removed in the Test Description for Occupied Bandwidth.	6-7-16	12

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2015.2.19

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 Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

MSIP / 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:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

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.

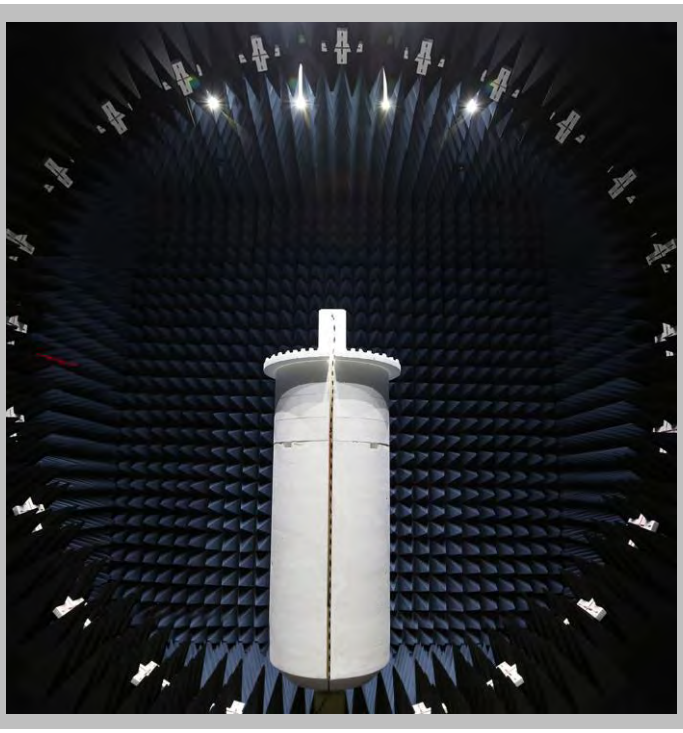
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

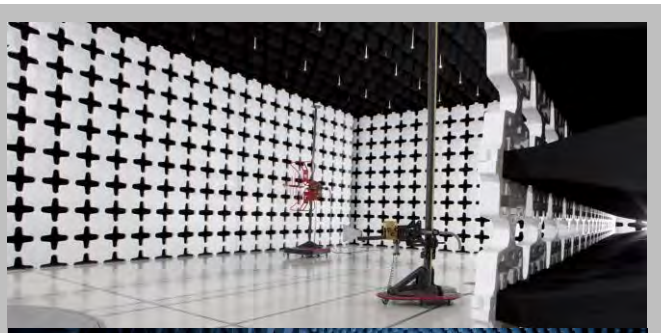
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

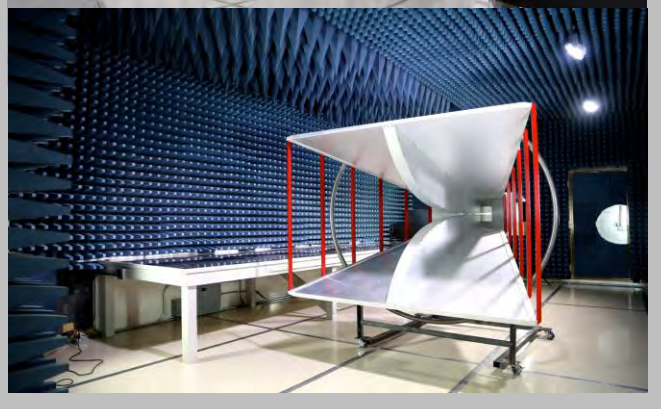
FACILITIES

REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 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 22975 NW Evergreen Pkwy 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
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	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







PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Medtronic Inc.
Address:	710 Medtronic Parkway
City, State, Zip:	Fridley, MN 55432
Test Requested By:	Jay Axmann
Model:	Azure IPG
First Date of Test:	February 17, 2016
Last Date of Test:	March 28, 2016
Receipt Date of Samples:	February 17, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The Azure IPG product family consists of the following models:
AZURE S SR MRI
AZURE S DR MRI
AZURE XT SR MRI
AZURE XT DR MRI

S-standard feature model
XT- enhanced feature model
SR-Single chamber IPG
DR-Dual chamber IPG
All models have an identical Bluetooth LE radio. Tests were performed on the Azure XT DR; results are representative of all models.

Azure is an Implantable Pulse Generator (IPG) medical device that includes a Bluetooth LE radio.

Radiated testing was performed with the EUT in a body torso simulator at a depth of 2 cm from the side wall, with the following simulant properties:

Simulated Muscle Tissue at 2.44 GHz

Measured Values:
Permittivity = 51.51
Conductivity = 2.05

Testing Objective:

To demonstrate compliance of the Bluetooth LE radio to FCC 15.247 requirements.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration MDTR0446- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Azure XT DR	Medtronic Inc.	W1DR01	RNB600111S

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Atrial Lead	Medtronic Inc.	5076-65CM	PJN3391150
Ventricular Lead	Medtronic Inc.	5076-65CM	PJN3624359

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	DELL	Latitude E6410	7KGKYN1
Laptop Power Adapter	DELL	LA90PE1-01	CN-0J62H3-71615-0BK-1CAA-A01
Bluetooth Test Instrument	Medtronic Inc.	M960127B001	15B0056
Near Field Probe	EMCO	7405-902	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	0.9m	No	AC Mains	Laptop Power Adapter
DC Power	No	1.8m	Yes	Laptop Power Adapter	Laptop
USB	Yes	1.8m	No	Laptop	Bluetooth Test Instrument
Coax	Yes	0.9m	No	Bluetooth Test Instrument	Near Field Probe

Configuration MDTR0446- 2

Software/Firmware Running during test	
Description	**Version**
MFG TIC	1.17
CRON	3.21

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Azure XT DR - INC 3.0 DVT Fixture	Medtronic Inc.	W1DR01	RNB308902M

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	DELL	Latitude E6410	7KGKYN1
Laptop Power Adapter	DELL	LA90PE1-01	CN-0J62H3-71615-0BK-1CAA-A01
Bluetooth Test Instrument	Medtronic Inc.	M960127B001	15B0056
Near Field Probe	EMCO	7405-902	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	0.9m	No	AC Mains	Laptop Power Adapter
DC Power	No	1.8m	Yes	Laptop Power Adapter	Laptop
USB	Yes	1.8m	No	Laptop	Bluetooth Test Instrument
Coax	Yes	0.9m	No	Bluetooth Test Instrument	Near Field Probe

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration MDTR0464- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Azure XT DR	Medtronic Inc.	W1DR01	RNB600111S

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Atrial Lead	Medtronic Inc.	5076-65CM	PJN3391150
Ventricular Lead	Medtronic Inc.	5076-65CM	PJN3624359

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2/17/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	2/24/2016	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	2/24/2016	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	2/24/2016	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	2/24/2016	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	2/24/2016	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	3/28/2016	Radiated Power (EIRP)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
8	3/28/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

NORTHWEST EMC

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.

OCCUPIED BANDWIDTH

XMit 2015.01.14

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.	Interval (mo)
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	0
Meter - Multimeter	Fluke	117/EFSP	MLR	5/27/2015	36
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	15

TEST DESCRIPTION

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth.

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

OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

EUT:	Azure IPG			**Work Order:**	MDTR0446
Serial Number:	RNB308902M			**Date:**	02/24/16
Customer:	Medtronic Inc.			**Temperature:**	22°C
Attendees:	Nick Blake			**Humidity:**	26%
Project:	None			**Barometric Pres.:**	986.1
Tested by:	Trevor Buls	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Tested per Medtronic test protocol.

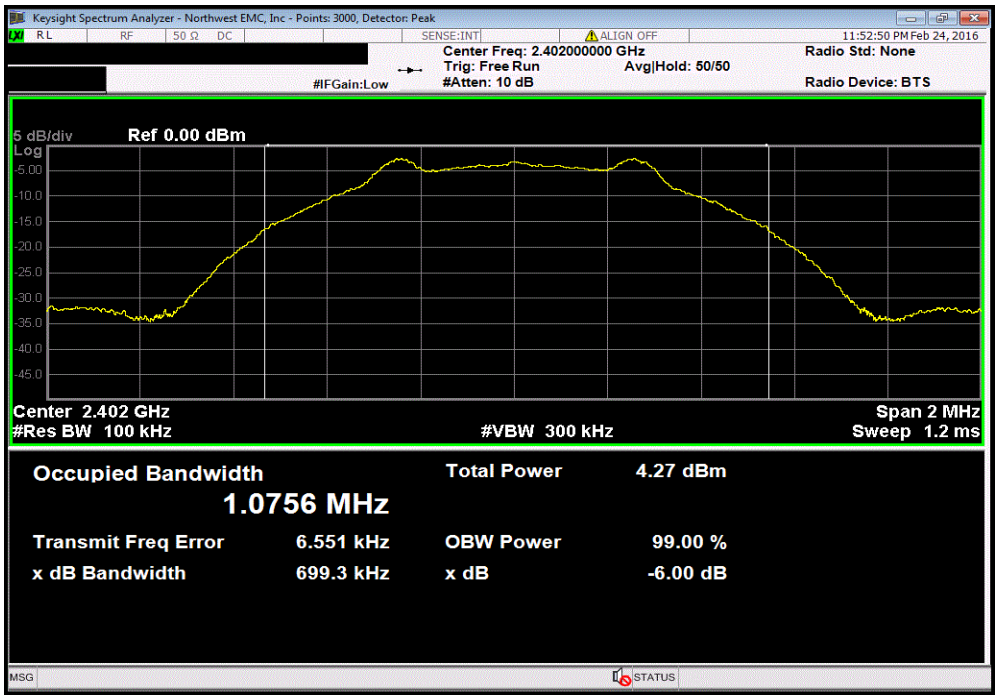
DEVIATIONS FROM TEST STANDARD

None

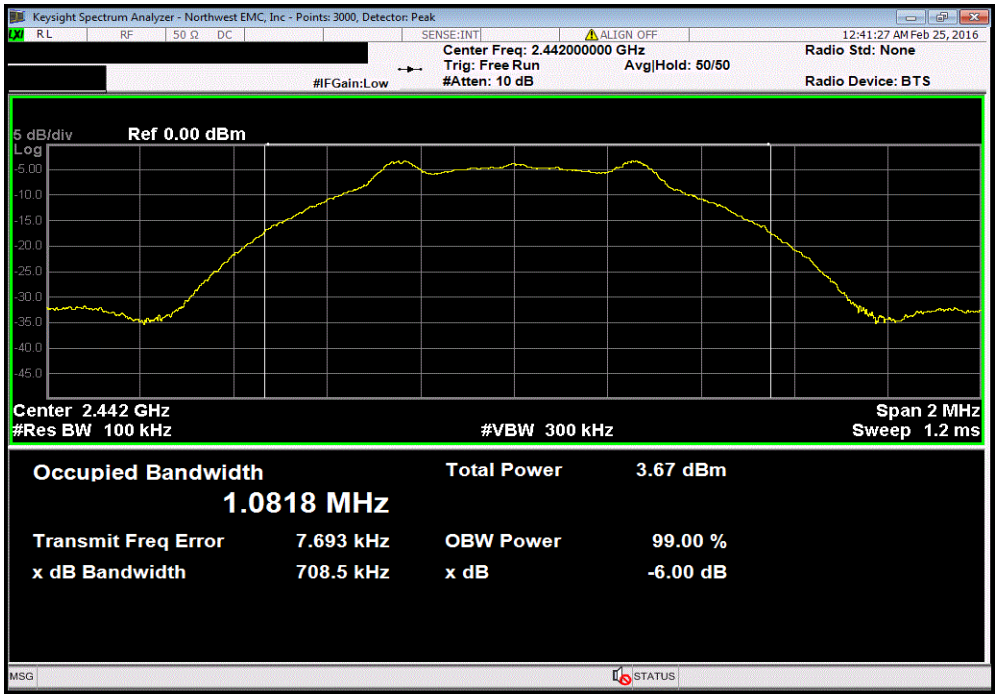
Configuration #	2	Signature Trevor Buls

	Value	Limit (≥)	Result
Low Channel, 2402 MHz	699.315 kHz	500 kHz	Pass
Mid Channel, 2442 MHz	708.53 kHz	500 kHz	Pass
High Channel, 2480 MHz	720.451 kHz	500 kHz	Pass

Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				699.315 kHz	500 kHz	Pass



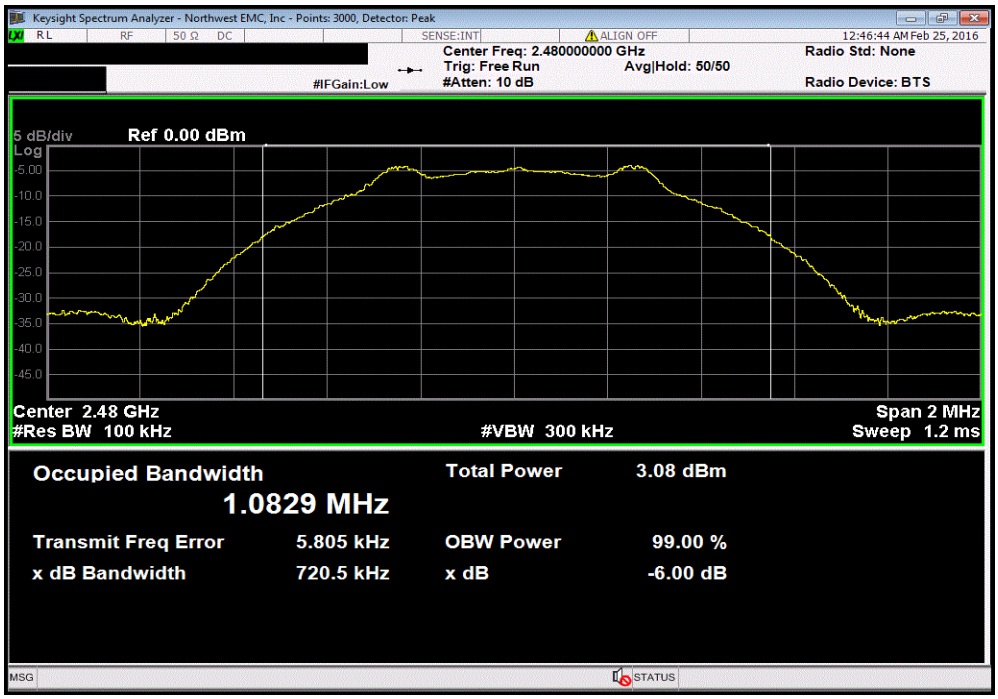
Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				708.53 kHz	500 kHz	Pass



OCCUPIED BANDWIDTH

XMit 2015.01.14

High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				720.451 kHz	500 kHz	Pass



OUTPUT POWER

XMit 2015.01.14

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.	Interval (mo)
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	0
Meter - Multimeter	Fluke	117/EFSP	MLR	5/27/2015	36
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	15

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. 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 reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Prior to measuring peak transmit power the DTS bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method found in ANSI C63.10:2013 Section 11.10.2 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio..

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

NORTHWEST EMC

XMit 2015.01.14

EUT:	Azure IPG			**Work Order:**	MDTR0446
Serial Number:	RNB308902M			**Date:**	02/24/16
Customer:	Medtronic Inc.			**Temperature:**	22°C
Attendees:	Nick Blake			**Humidity:**	26%
Project:	None			**Barometric Pres.:**	986.1
Tested by:	Trevor Buls	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Tested per Medtronic test protocol.

DEVIATIONS FROM TEST STANDARD

None

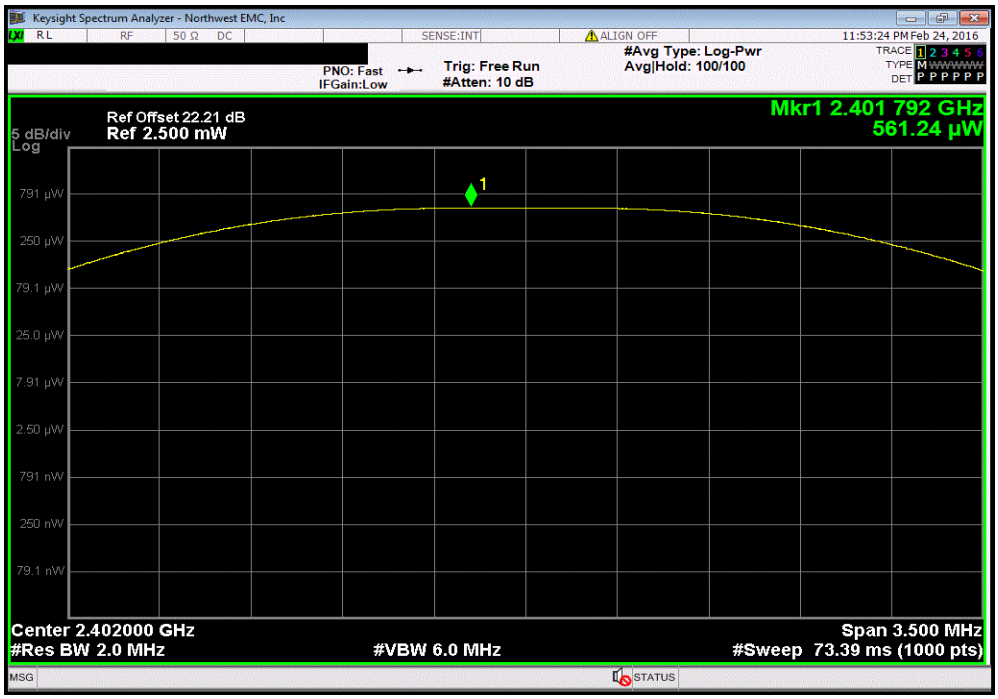
Configuration #	2	Signature	Trevor Buls

	Value	Limit (<)	Result
Low Channel, 2402 MHz	561.24 uW	1 W	Pass
Mid Channel, 2442 MHz	472.47 uW	1 W	Pass
High Channel, 2480 MHz	426.76 uW	1 W	Pass

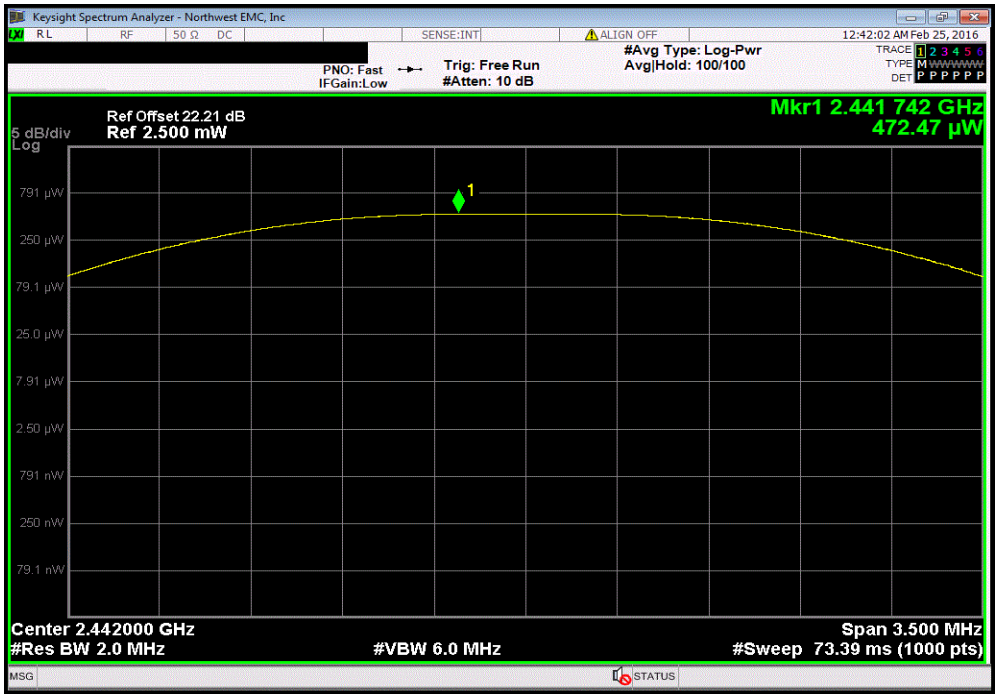
OUTPUT POWER

XMit 2015.01.14

Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				561.24 uW	1 W	Pass



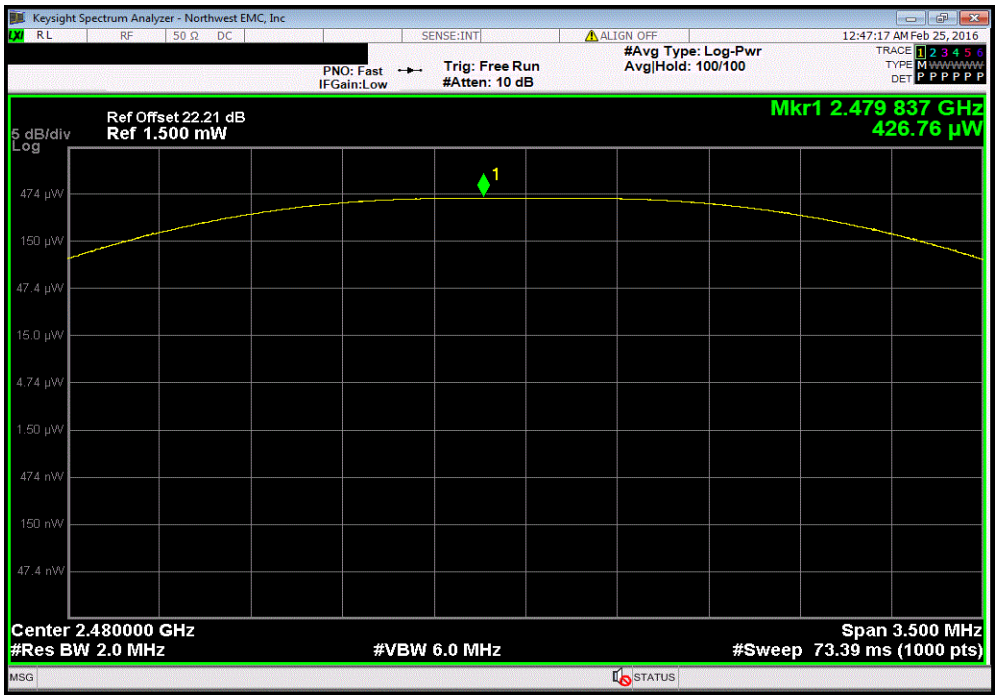
Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				472.47 uW	1 W	Pass



OUTPUT POWER

XMit 2015.01.14

High Channel, 2480 MHz						
				Value	Limit (<)	Result
				426.76 uW	1 W	Pass



RADIATED POWER (EIRP)

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

MDTR0464 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	2400 MHz	Stop Frequency	2483.5 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 (mo)
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12

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

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. A field strength measurement was made of the fundamental with the carrier fully maximized for its highest radiated power.

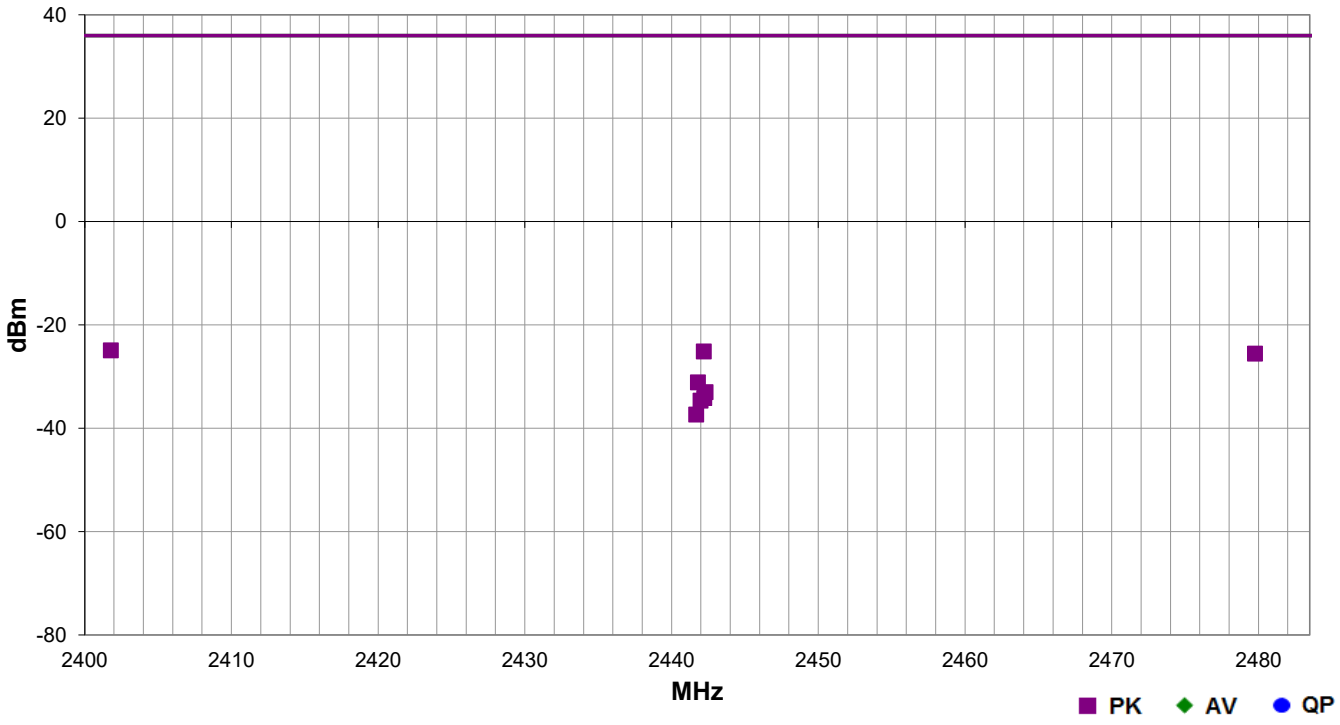
The final data was converted from field strength to a radiated power value using equations found in ANSI C63.10:2013 Annex G.2

RADIATED POWER (EIRP)

Work Order:	MDTR0464	**Date:**	03/28/16		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	MN05	**Humidity:**	26.3% RH		
Serial Number:	RNB600111S	**Barometric Pres.:**	1021 mbar	**Tested by:**	Dustin Sparks
EUT:	Azure XT DR				
Configuration:	1				
Customer:	Medtronic Inc.				
Attendees:	Nick Blake, Jay Axmann				
EUT Power:	Battery				
Operating Mode:	Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz)				
Deviations:	None				
Comments:	2cm spacing between EUT and wall of tissue simulant tank				

Test Specifications	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

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



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	2401.783	1.0	328.0	Horz	PK	3.24E-06	-24.9	36.0	-60.9	Low ch, EUT horz
	2442.192	1.0	340.9	Horz	PK	3.08E-06	-25.1	36.0	-61.1	Mid ch, EUT horz
	2479.758	1.0	355.9	Horz	PK	2.79E-06	-25.5	36.0	-61.5	High ch, EUT horz
	2441.800	1.0	2.0	Horz	PK	7.73E-07	-31.1	36.0	-67.1	Mid ch, EUT on side
	2442.317	1.0	9.0	Horz	PK	5.00E-07	-33.0	36.0	-69.0	Mid ch, EUT vert
	2442.225	1.0	339.0	Vert	PK	3.88E-07	-34.1	36.0	-70.1	Mid ch, EUT on side
	2441.967	1.0	7.0	Vert	PK	3.45E-07	-34.6	36.0	-70.6	Mid ch, EUT vert
	2441.683	4.0	260.0	Vert	PK	1.85E-07	-37.3	36.0	-73.3	Mid ch, EUT horz

POWER SPECTRAL DENSITY

XMit 2015.01.14

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.	Interval (mo)
Meter - Multimeter	Fluke	117/EFSP	MLR	5/27/2015	36
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	0
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	15

TEST DESCRIPTION

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

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

POWER SPECTRAL DENSITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	Azure IPG			**Work Order:**	MDTR0446
Serial Number:	RNB308902M			**Date:**	02/24/16
Customer:	Medtronic Inc.			**Temperature:**	22°C
Attendees:	Nick Blake			**Humidity:**	26%
Project:	None			**Barometric Pres.:**	986.1
Tested by:	Trevor Buls	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Tested per Medtronic test protocol.

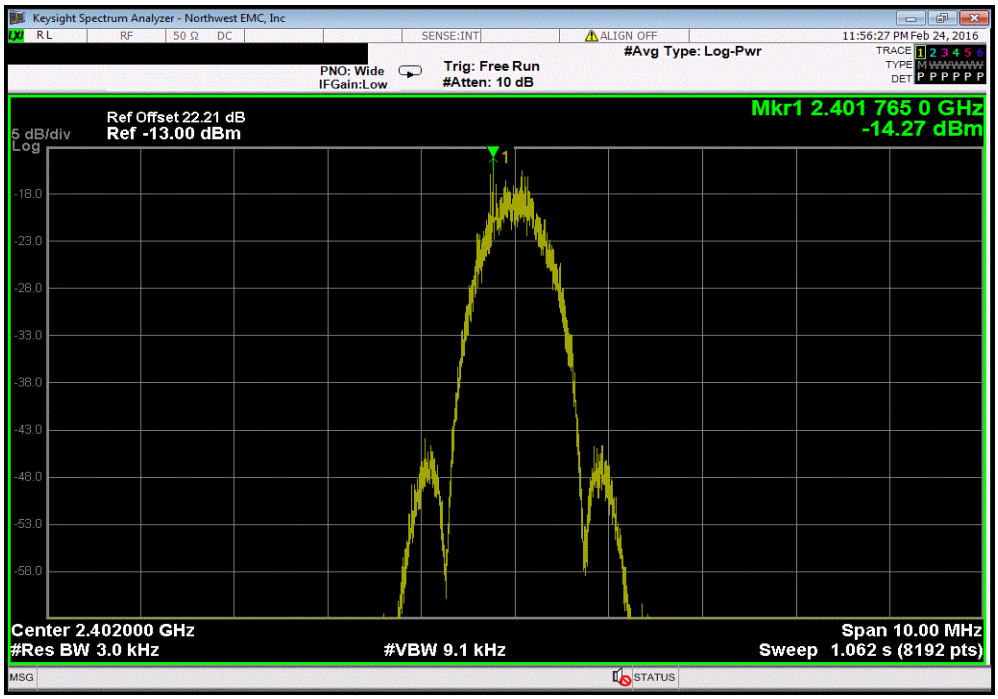
DEVIATIONS FROM TEST STANDARD

None

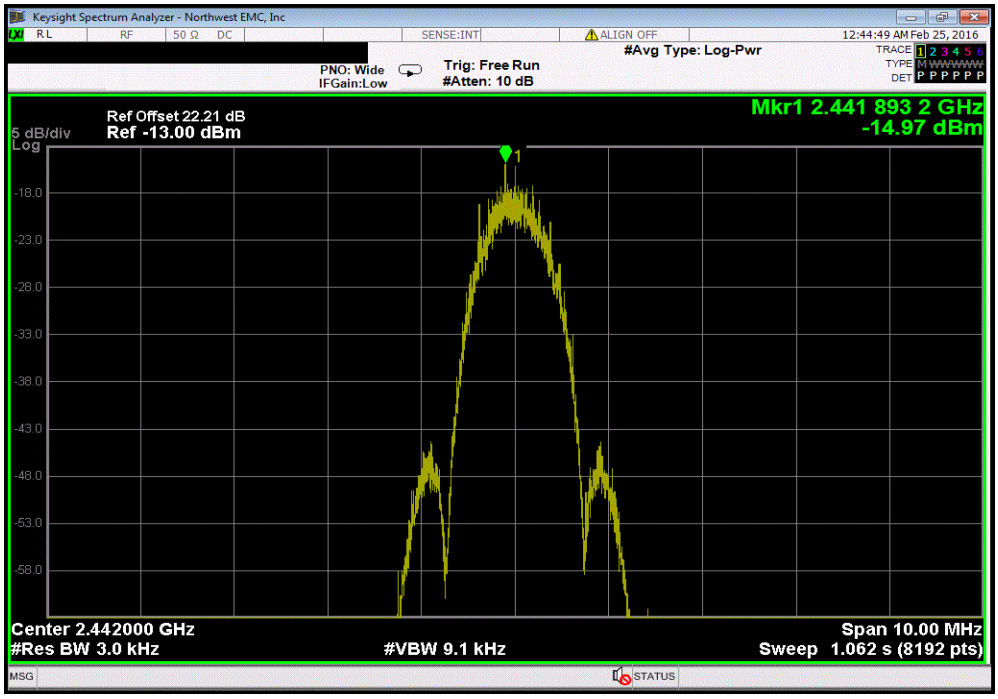
Configuration #	2	Signature Trevor Buls

	Value dBm/3kHz	Limit < dBm/3kHz	Results
Low Channel, 2402 MHz	-14.271	8	Pass
Mid Channel, 2442 MHz	-14.967	8	Pass
High Channel, 2480 MHz	-14.414	8	Pass

Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.271	8	Pass



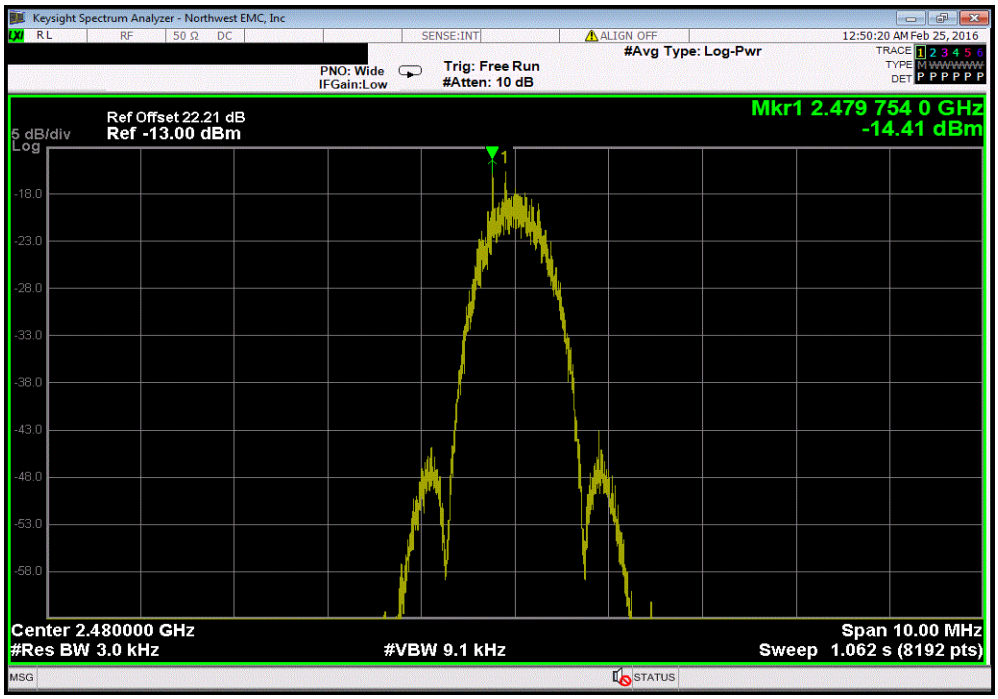
Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.967	8	Pass



POWER SPECTRAL DENSITY

XMit 2015.01.14

High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.414	8	Pass



BAND EDGE COMPLIANCE

NORTHWEST EMC

XMit 2015.01.14

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.	Interval (mo)
Meter - Multimeter	Fluke	117/EFSP	MLR	5/27/2015	36
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	0
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	15

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. 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

NORTHWEST EMC

XMit 2015.01.14

EUT:	Azure IPG			Work Order:	MDTR0446
Serial Number:	RNB308902M			Date:	02/24/16
Customer:	Medtronic Inc.			Temperature:	22°C
Attendees:	Nick Blake			Humidity:	26%
Project:	None			Barometric Pres.:	986.1
Tested by:	Trevor Buls	Power:	Battery	Job Site:	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Tested per Medtronic test protocol.

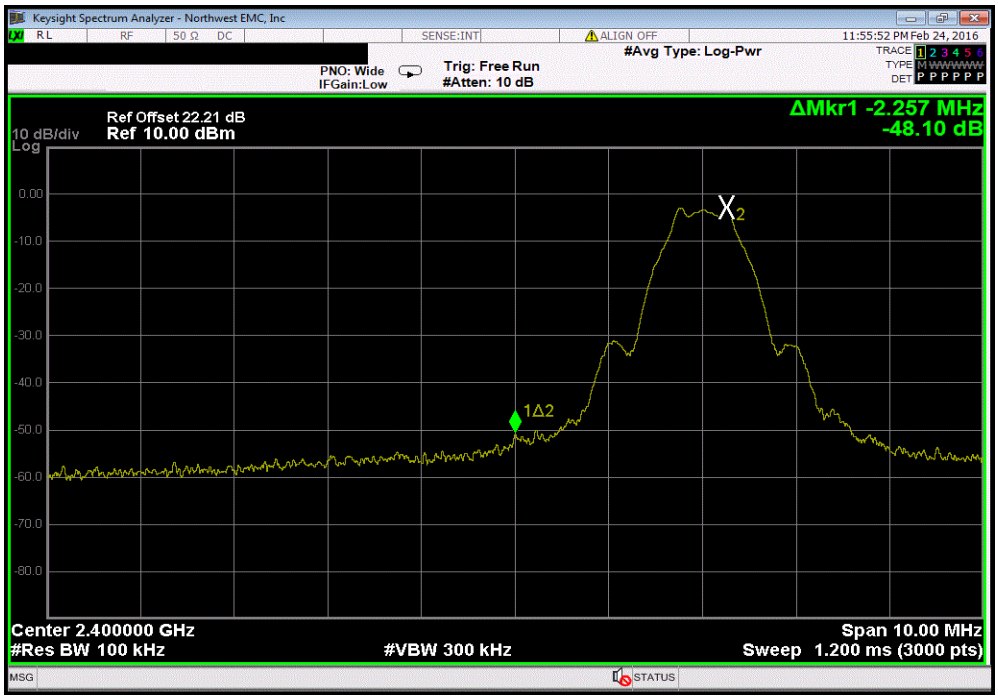
DEVIATIONS FROM TEST STANDARD

None

Configuration #	2	Signature Trevor Buls

	Value (dBc)	Limit ≤ (dBc)	Result
Low Channel, 2402 MHz	-48.1	-20	Pass
High Channel, 2480 MHz	-51.53	-20	Pass

Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-48.1	-20	Pass



High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.53	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

XMit 2015.01.14

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.	Interval (mo)
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	0
Meter - Multimeter	Fluke	117/EFSP	MLR	5/27/2015	36
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	15

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. 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

NORTHWEST EMC

XMit 2015.01.14

EUT:	Azure IPG			**Work Order:**	MDTR0446
Serial Number:	RNB308902M			**Date:**	02/24/16
Customer:	Medtronic Inc.			**Temperature:**	22°C
Attendees:	Nick Blake			**Humidity:**	26%
Project:	None			**Barometric Pres.:**	986.1
Tested by:	Trevor Buls	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2016	ANSI C63.10:2013

COMMENTS

Tested per Medtronic test protocol.

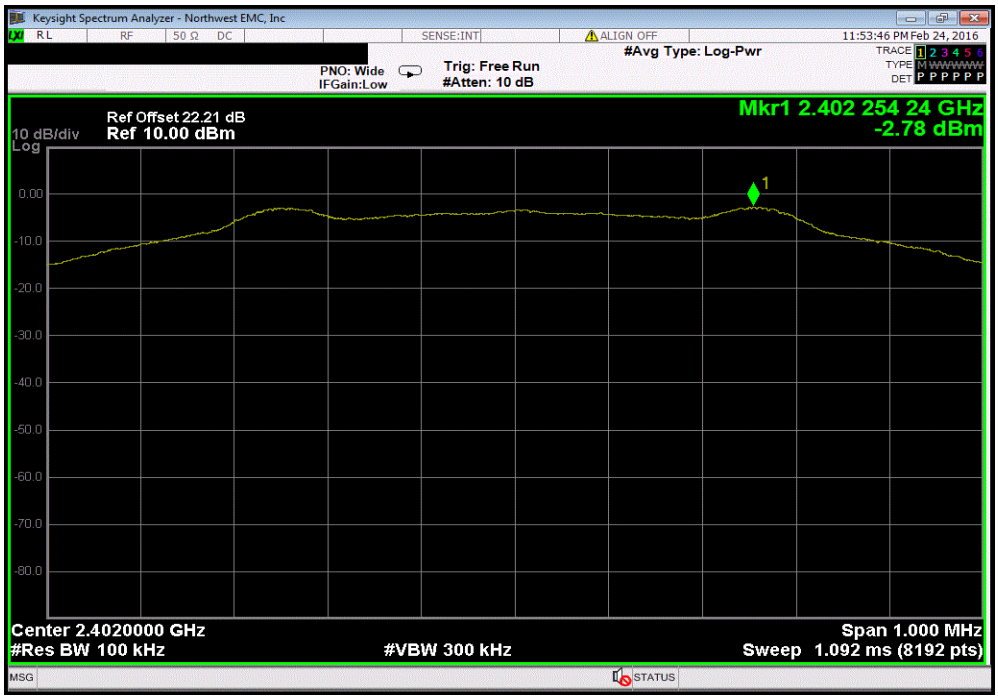
DEVIATIONS FROM TEST STANDARD

None

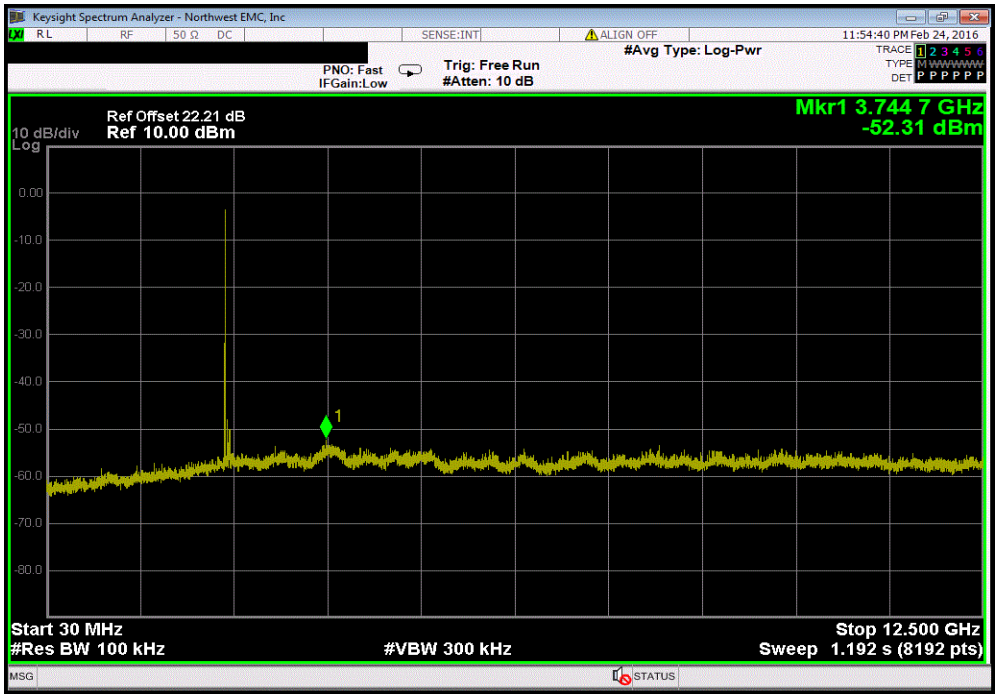
Configuration #	2	Signature	Trevor Buls

	Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
Low Channel, 2402 MHz	Fundamental	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-49.53	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-48.44	-20	Pass
Mid Channel, 2442 MHz	Fundamental	N/A	N/A	N/A
Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-49.61	-20	Pass
Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-47.99	-20	Pass
High Channel, 2480 MHz	Fundamental	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	-48.45	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	-46.21	-20	Pass

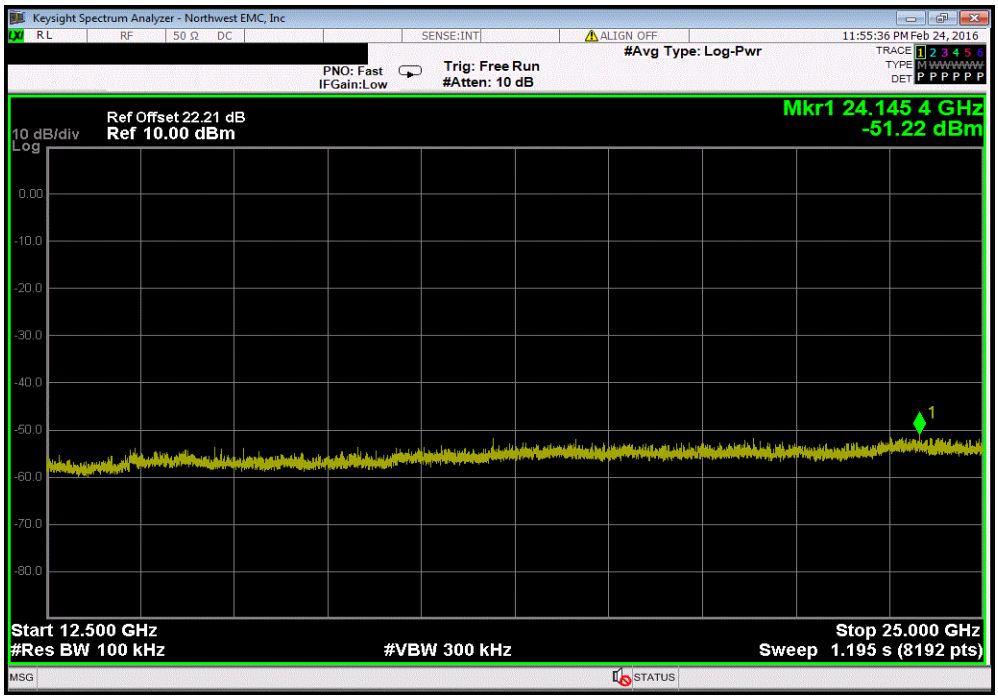
Low Channel, 2402 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



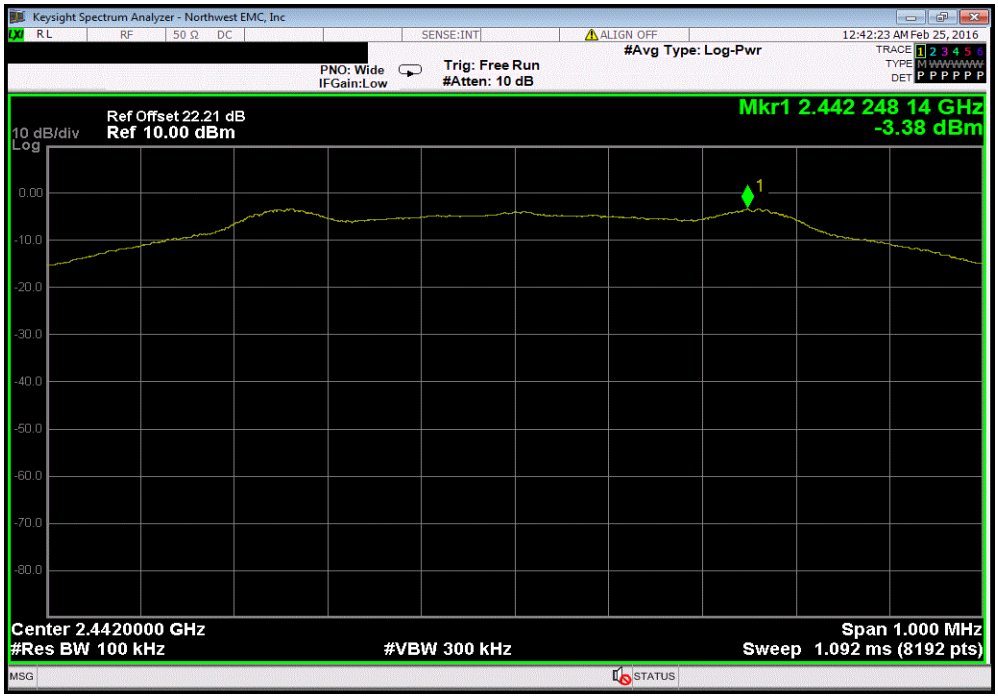
Low Channel, 2402 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz		-49.53	-20	Pass



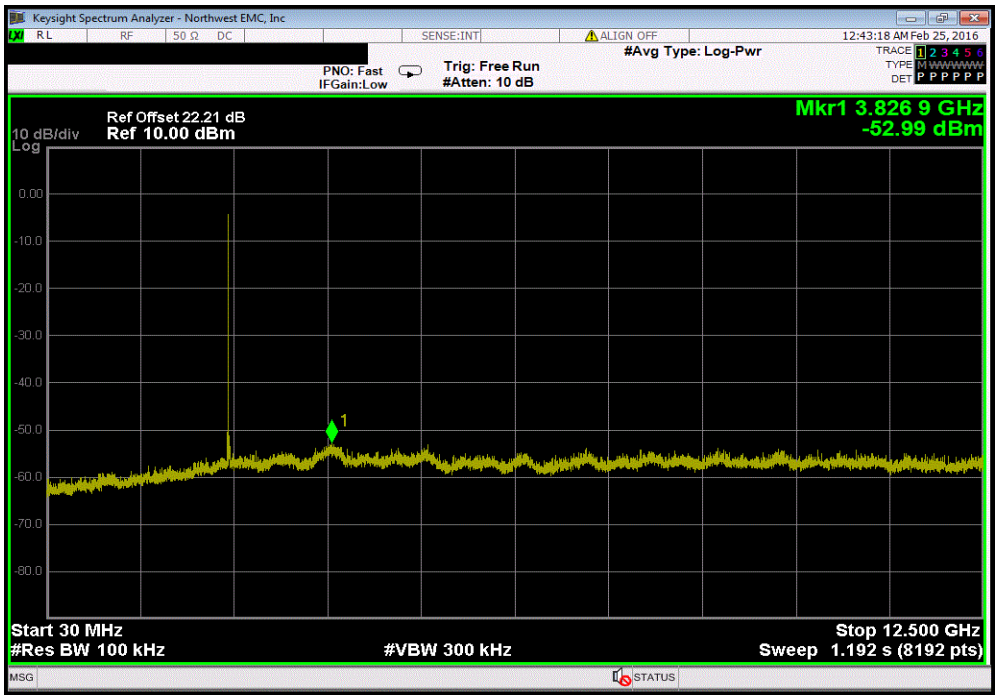
Low Channel, 2402 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-48.44	-20	Pass



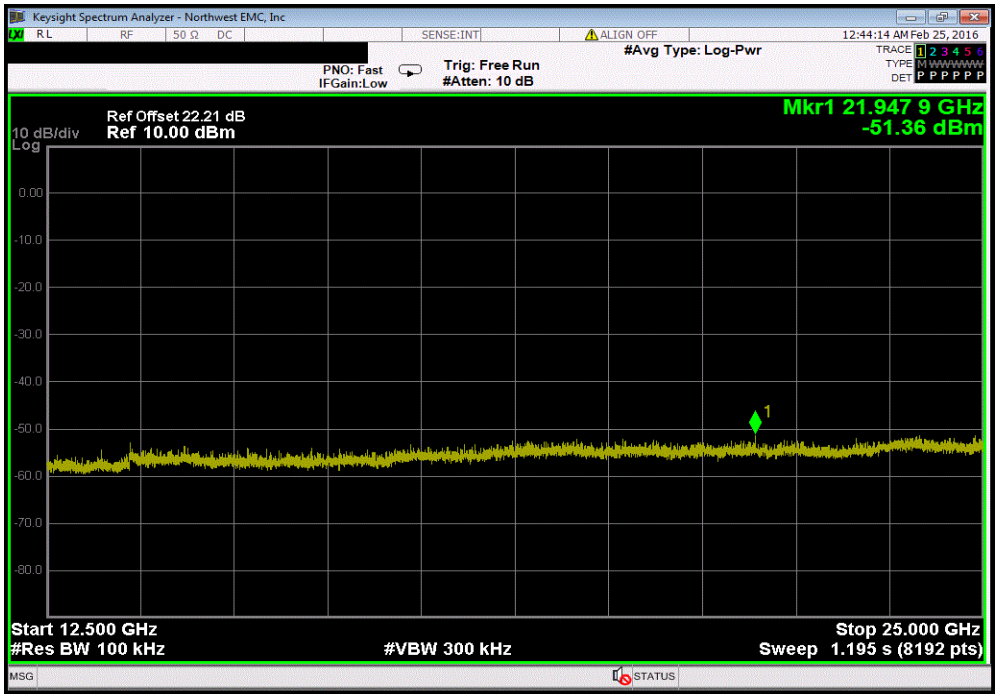
Mid Channel, 2442 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



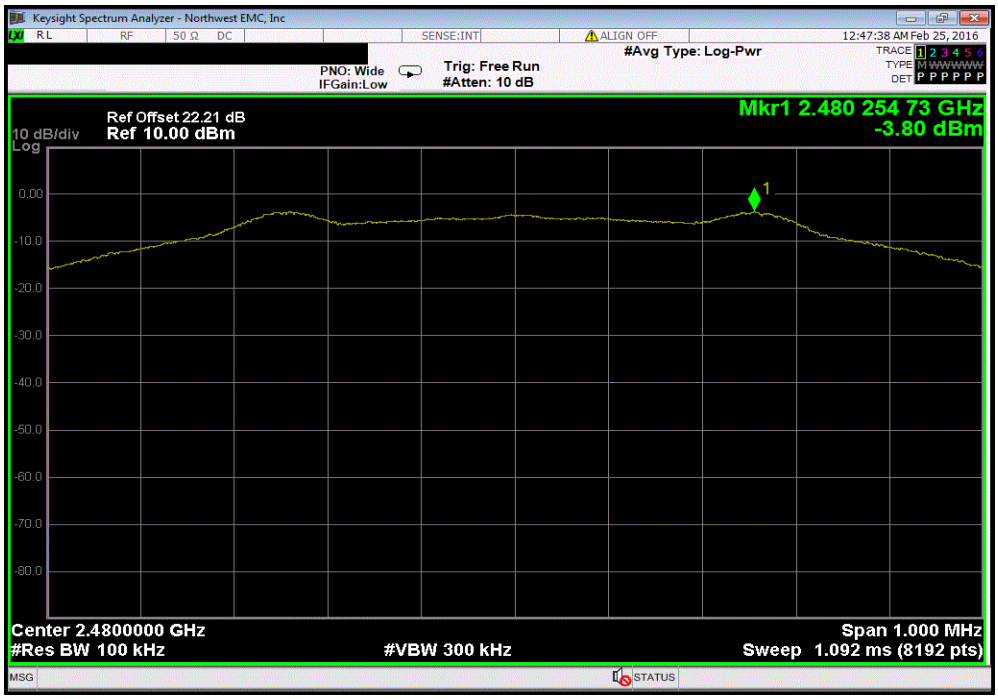
Mid Channel, 2442 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz		-49.61	-20	Pass



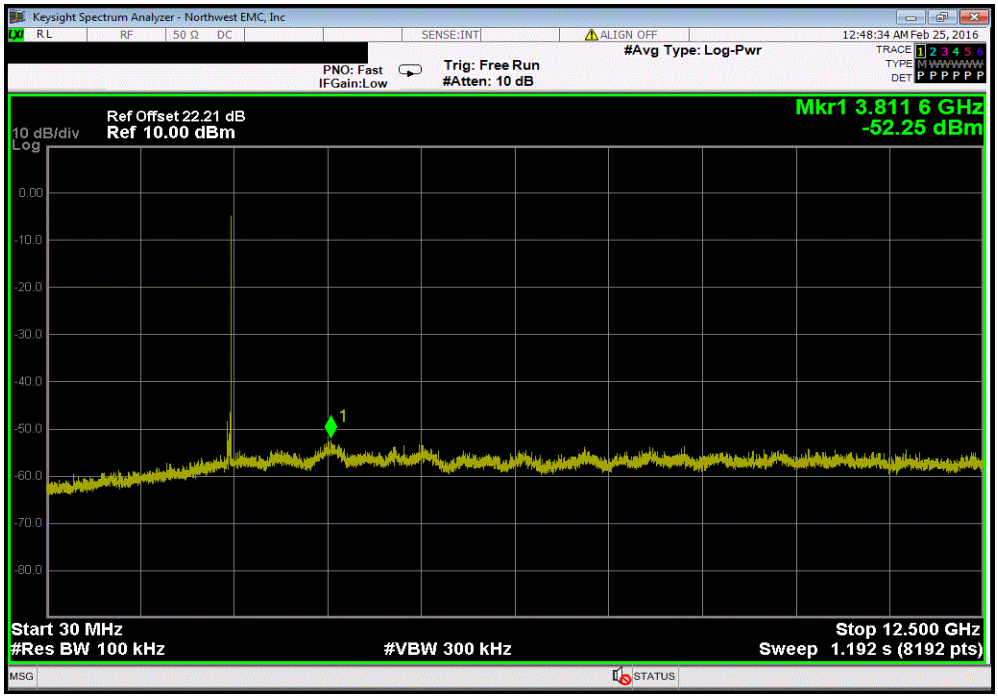
Mid Channel, 2442 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-47.99	-20	Pass



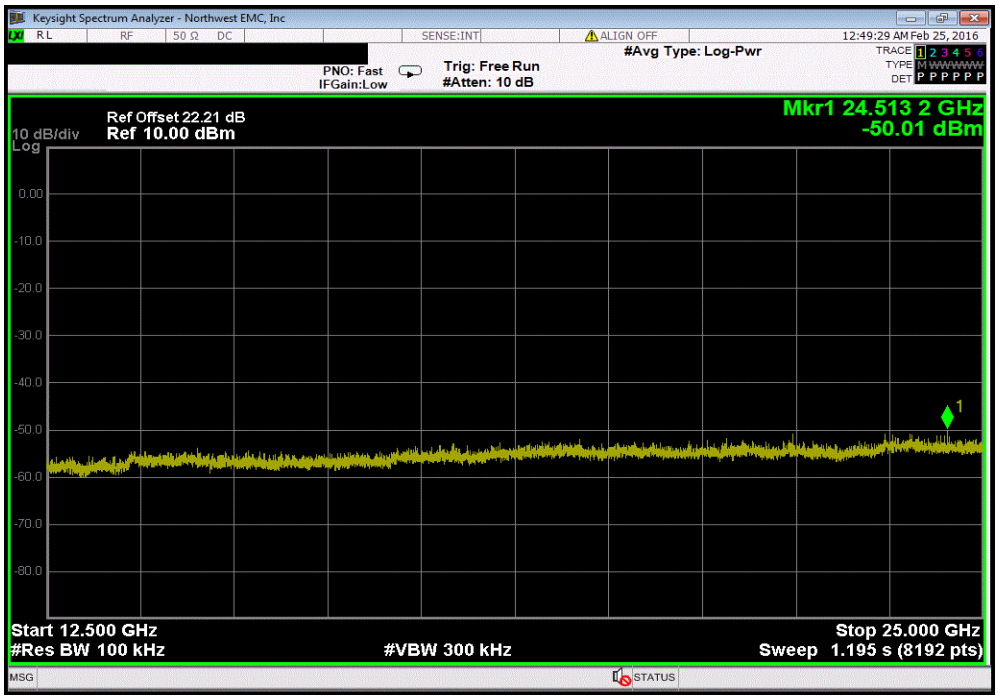
High Channel, 2480 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



High Channel, 2480 MHz					
Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz			-48.45	-20	Pass



High Channel, 2480 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-46.21	-20	Pass



SPURIOUS RADIATED EMISSIONS

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

MDTR0464 - 1

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 (mo)
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	10/21/2015	12
Filter - High Pass	Micro-Tronics	HPM50111	LFN	10/21/2015	12
Attenuator	Fairview Microwave	SA18E-20	TWZ	10/21/2015	12
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	9/18/2015	12
Cable	Northwest EMC	18-26GHz Standard Gain Horn Cable	MNP	9/18/2015	12
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	3/1/2016	12
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12/7/2015	12
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/1/2016	12
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12

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

TEST DESCRIPTION

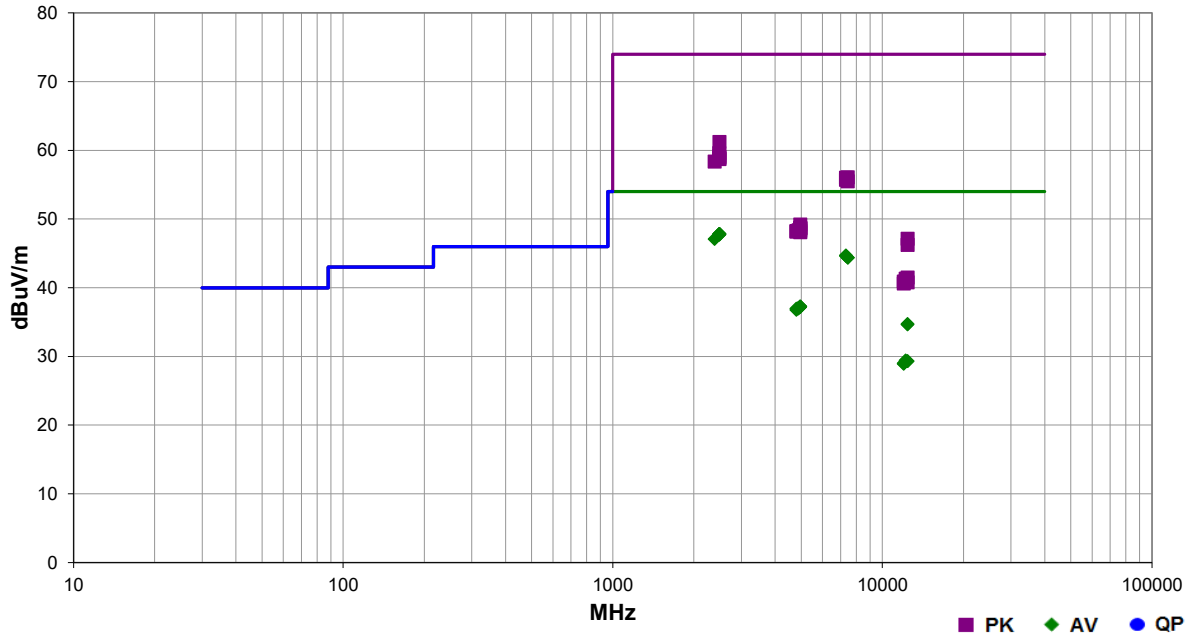
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

SPURIOUS RADIATED EMISSIONS

Work Order:	MDTR0464	**Date:**	03/28/16		
Project:	None	**Temperature:**	22.4 °C		
Job Site:	MN05	**Humidity:**	27% RH		
Serial Number:	RNB600111S	**Barometric Pres.:**	1022 mbar	**Tested by:**	Dustin Sparks
EUT:	Azure XT DR				
Configuration:	1				
Customer:	Medtronic Inc.				
Attendees:	Nick Blake, Jay Axmann				
EUT Power:	Battery				
Operating Mode:	Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz)				
Deviations:	None				
Comments:	2cm spacing between EUT and wall of tissue simulant tank				

Test Specifications	**Test Method**
FCC 15.247:2016	ANSI C63.10:2013

Run #	16	**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
2487.600	31.2	-3.4	1.0	304.0	3.0	20.0	Vert	AV	0.0	47.8	54.0	-6.2	High ch, EUT vert
2487.250	31.2	-3.4	1.0	160.1	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	High ch, EUT horz
2486.883	31.2	-3.4	3.2	108.0	3.0	20.0	Vert	AV	0.0	47.8	54.0	-6.2	High ch, EUT horz
2485.867	31.2	-3.4	2.8	101.1	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	High ch, EUT on side
2487.642	31.1	-3.4	1.2	185.1	3.0	20.0	Vert	AV	0.0	47.7	54.0	-6.3	High ch, EUT on side
2487.150	31.1	-3.4	1.0	281.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	High ch, EUT vert
2388.508	30.8	-3.7	1.0	218.0	3.0	20.0	Vert	AV	0.0	47.1	54.0	-6.9	Low ch, EUT vert
7324.742	31.4	13.3	1.0	46.0	3.0	0.0	Horz	AV	0.0	44.7	54.0	-9.3	Mid ch, EUT horz
7327.750	31.3	13.3	1.0	96.0	3.0	0.0	Vert	AV	0.0	44.6	54.0	-9.4	Mid ch, EUT horz
7442.500	30.9	13.5	1.0	122.0	3.0	0.0	Vert	AV	0.0	44.4	54.0	-9.6	High ch, EUT horz
7442.017	30.9	13.5	3.0	23.1	3.0	0.0	Horz	AV	0.0	44.4	54.0	-9.6	High ch, EUT horz
2486.108	44.6	-3.4	1.0	160.1	3.0	20.0	Horz	PK	0.0	61.2	74.0	-12.8	High ch, EUT horz
2483.633	43.0	-3.4	1.0	281.0	3.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	High ch, EUT vert
2484.175	42.6	-3.4	3.2	108.0	3.0	20.0	Vert	PK	0.0	59.2	74.0	-14.8	High ch, EUT horz
2485.583	42.4	-3.4	1.2	185.1	3.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	High ch, EUT on side
2484.692	42.2	-3.4	2.8	101.1	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	High ch, EUT on side
2487.542	42.1	-3.4	1.0	304.0	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	High ch, EUT vert
2387.608	42.1	-3.7	1.0	218.0	3.0	20.0	Vert	PK	0.0	58.4	74.0	-15.6	Low ch, EUT vert
4962.433	31.7	5.6	1.6	358.9	3.0	0.0	Horz	AV	0.0	37.3	54.0	-16.7	High ch, EUT horz
4962.467	31.6	5.6	1.2	344.9	3.0	0.0	Vert	AV	0.0	37.2	54.0	-16.8	High ch, EUT horz
4962.242	31.6	5.6	1.4	325.9	3.0	0.0	Vert	AV	0.0	37.2	54.0	-16.8	High ch, EUT vert
4962.217	31.6	5.6	1.0	279.0	3.0	0.0	Vert	AV	0.0	37.2	54.0	-16.8	High ch, EUT on side

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
4962.142	31.6	5.6	1.0	339.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	High ch, EUT on side
4961.850	31.6	5.6	1.0	99.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	High ch, EUT vert
4885.933	31.7	5.4	1.9	134.1	3.0	0.0	Horz	AV	0.0	37.1	54.0	-16.9	Mid ch, EUT horz
4884.867	31.6	5.4	1.6	325.9	3.0	0.0	Vert	AV	0.0	37.0	54.0	-17.0	Mid ch, EUT horz
4801.867	31.8	5.2	1.0	91.1	3.0	0.0	Horz	AV	0.0	37.0	54.0	-17.0	Low ch, EUT horz
4801.967	31.6	5.2	1.0	271.0	3.0	0.0	Vert	AV	0.0	36.8	54.0	-17.2	Low ch, EUT horz
7440.625	42.6	13.5	1.0	122.0	3.0	0.0	Vert	PK	0.0	56.1	74.0	-17.9	High ch, EUT horz
7327.400	42.7	13.3	1.0	46.0	3.0	0.0	Horz	PK	0.0	56.0	74.0	-18.0	Mid ch, EUT horz
7324.175	42.4	13.3	1.0	96.0	3.0	0.0	Vert	PK	0.0	55.7	74.0	-18.3	Mid ch, EUT horz
7441.833	42.0	13.5	3.0	23.1	3.0	0.0	Horz	PK	0.0	55.5	74.0	-18.5	High ch, EUT horz
12401.530	29.2	5.5	1.0	130.1	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	High ch, EUT horz
12402.000	29.1	5.5	1.0	41.1	3.0	0.0	Horz	AV	0.0	34.6	54.0	-19.4	High ch, EUT horz
12207.600	30.1	-0.7	1.0	312.9	3.0	0.0	Vert	AV	0.0	29.4	54.0	-24.6	Mid ch, EUT horz
12207.730	30.0	-0.7	1.0	191.1	3.0	0.0	Horz	AV	0.0	29.3	54.0	-24.7	Mid ch, EUT horz
12399.410	29.3	0.0	1.0	0.0	3.0	0.0	Vert	AV	0.0	29.3	54.0	-24.7	High ch, EUT horz
12397.720	29.3	0.0	1.0	247.9	3.0	0.0	Horz	AV	0.0	29.3	54.0	-24.7	High ch, EUT horz
4962.283	43.6	5.6	1.0	99.0	3.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	High ch, EUT vert
12008.780	30.4	-1.4	1.0	224.1	3.0	0.0	Vert	AV	0.0	29.0	54.0	-25.0	Low ch, EUT horz
12008.040	30.3	-1.4	1.0	336.0	3.0	0.0	Horz	AV	0.0	28.9	54.0	-25.1	Low ch, EUT horz
4960.675	43.1	5.6	1.0	339.0	3.0	0.0	Horz	PK	0.0	48.7	74.0	-25.3	High ch, EUT on side
4957.925	43.1	5.6	1.2	344.9	3.0	0.0	Vert	PK	0.0	48.7	74.0	-25.3	High ch, EUT horz
4961.258	43.0	5.6	1.0	279.0	3.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	High ch, EUT on side
4885.925	43.0	5.4	1.9	134.1	3.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	Mid ch, EUT horz
4962.358	42.7	5.6	1.4	325.9	3.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	High ch, EUT vert
4883.708	42.9	5.4	1.6	325.9	3.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	Mid ch, EUT horz
4802.292	43.1	5.2	1.0	271.0	3.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	Low ch, EUT horz
4803.392	43.0	5.2	1.0	91.1	3.0	0.0	Horz	PK	0.0	48.2	74.0	-25.8	Low ch, EUT horz
4958.150	42.5	5.6	1.6	358.9	3.0	0.0	Horz	PK	0.0	48.1	74.0	-25.9	High ch, EUT horz
12401.750	41.6	5.5	1.0	130.1	3.0	0.0	Vert	PK	0.0	47.1	74.0	-26.9	High ch, EUT horz
12400.770	40.7	5.5	1.0	41.1	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	High ch, EUT horz
12398.840	41.5	0.0	1.0	247.9	3.0	0.0	Horz	PK	0.0	41.5	74.0	-32.5	High ch, EUT horz
12208.030	42.0	-0.7	1.0	191.1	3.0	0.0	Horz	PK	0.0	41.3	74.0	-32.7	Mid ch, EUT horz
12209.930	41.7	-0.7	1.0	312.9	3.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	Mid ch, EUT horz
12007.600	42.3	-1.4	1.0	336.0	3.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	Low ch, EUT horz
12398.980	40.8	0.0	1.0	0.0	3.0	0.0	Vert	PK	0.0	40.8	74.0	-33.2	High ch, EUT horz
12012.000	42.0	-1.4	1.0	224.1	3.0	0.0	Vert	PK	0.0	40.6	74.0	-33.4	Low ch, EUT horz