



**Boston Scientific Corporation**

**Bluetooth Telemetry Module**

**FCC 15.207:2017**

**FCC 15.247:2017**

**Bluetooth Low Energy Radio**

**Report # BSTN0717.4 Rev. 2, Issue Date: August 29, 2022**



NVLAP Lab Code: 200881-0

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# CERTIFICATE OF TEST



Last Date of Test: January 31, 2017  
Boston Scientific Corporation  
Model: Bluetooth Telemetry Module

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.207:2017	ANSI C63.10:2013
FCC 15.247:2017	KDB 558074

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	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	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

### Deviations From Test Standards

The original testing was completed using KDB 558074 D01 V3R5. This KDB is now V5R2. A gap analysis was performed to ensure the testing in the report remains compliant to the latest version of the KDB and the CFR. The most relevant change is the KDB was heavily modified to point to corresponding ANSI C63.10:2013 sections. These sections were followed during the original testing. The manufacturer attests that the device continues to be identical to the sample testing in this report.

### Approved By:

James Morris, 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



Revision Number	Description	Date	Page Number
01	Updated block diagram	2022-08-17	7-9
02	Comments included in CoT regarding gap analysis and results	2022-08-25	2
	Addressed in test description showing measurements show compliance.	2022-08-25	36-39

# ACCREDITATIONS AND AUTHORIZATIONS



## United States

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

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

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

## Canada

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

## European Union

**European Commission** – Validated by the European Commission 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://portlandcustomer.element.com/ts/scope/scope.htm>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

# FACILITIES



<b>California</b> Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>New York</b> Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	<b>Oregon</b> Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
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## NVLAP

NVLAP Lab Code: 200676-0 NVLAP Lab Code: 200881-0 NVLAP Lab Code: 200761-0 NVLAP Lab Code: 200630-0 NVLAP Lab Code: 201049-0 NVLAP Lab Code: 200629-0

## Innovation, Science and Economic Development Canada

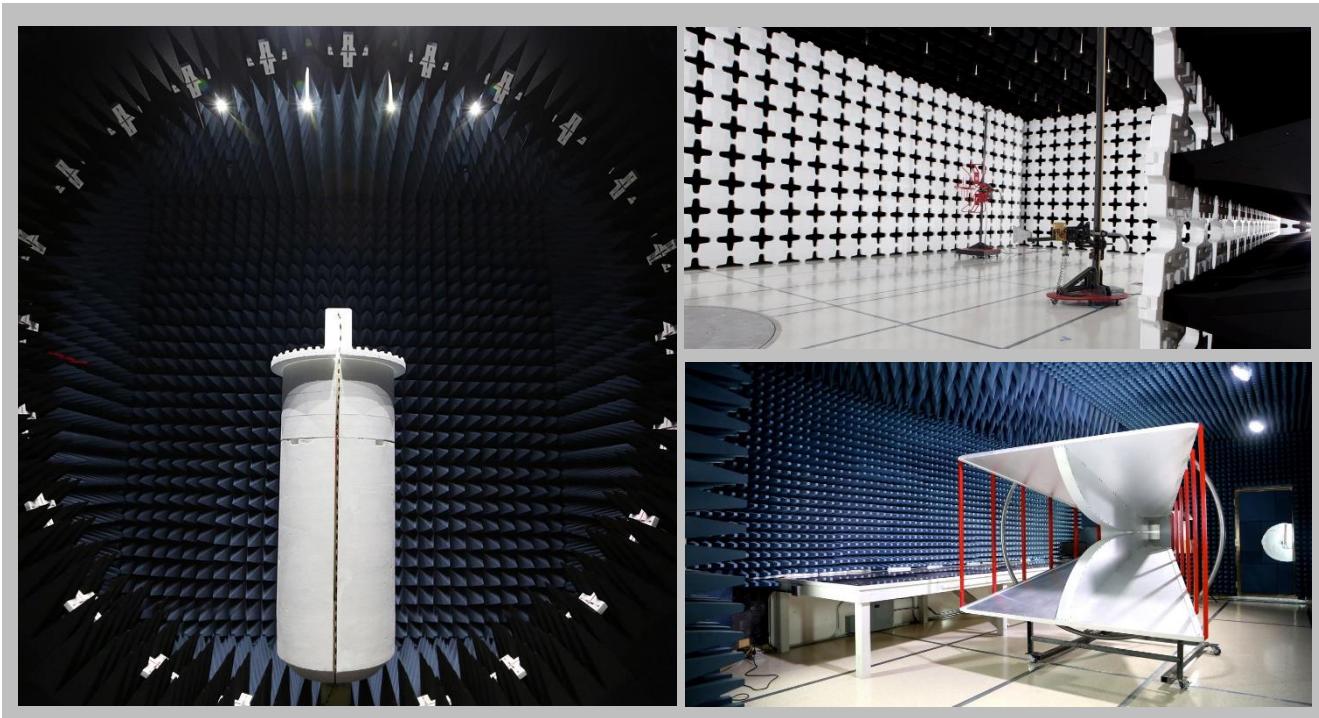
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
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## VCCI

A-0029	A-0109	N/A	A-0108	A-0201	A-0110
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## Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA

US0158	US0175	N/A	US0017	US0191	US0157
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# 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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

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

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

]

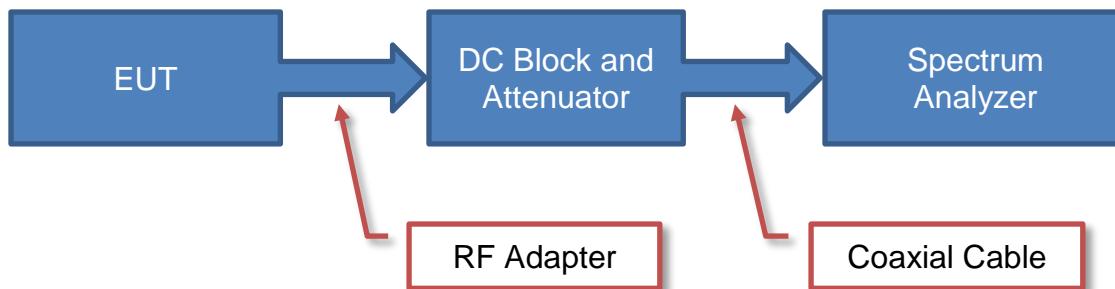
# TEST SETUP BLOCK DIAGRAMS

## 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.

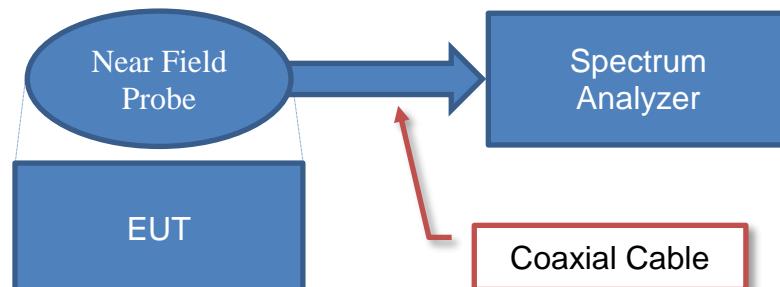
## Antenna Port Conducted Measurements



## Sample Calculation (logarithmic units)

$$\begin{array}{ccc} \text{Measured} & \text{Measured} & \text{Reference} \\ \text{Value} & = & \text{Level} \\ 71.2 & = & 42.6 \\ & & + \\ & & \text{Level} \\ & & \text{Offset} \\ & & 28.6 \end{array}$$

## Near Field Test Fixture Measurements

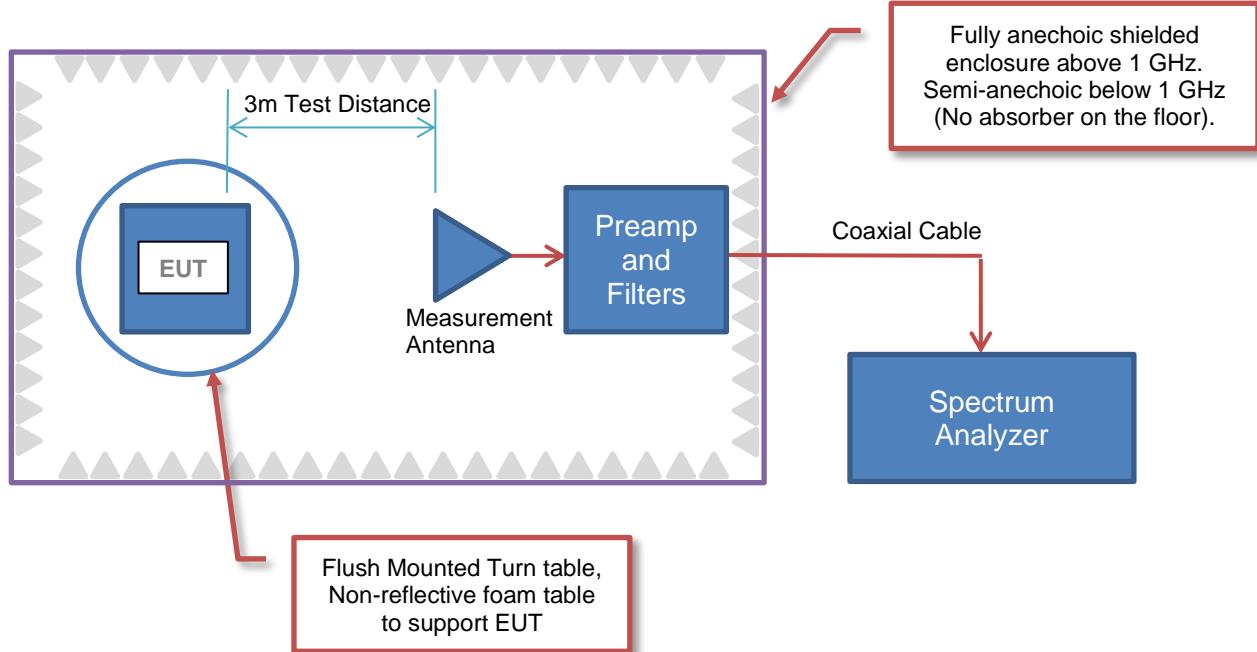


## Sample Calculation (logarithmic units)

$$\begin{array}{ccc} \text{Measured} & \text{Measured} & \text{Reference} \\ \text{Value} & = & \text{Level} \\ 71.2 & = & 42.6 \\ & & + \\ & & \text{Level} \\ & & \text{Offset} \\ & & 28.6 \end{array}$$

# TEST SETUP BLOCK DIAGRAMS

## Emissions Measurements



## Sample Calculation (logarithmic units)

### Radiated Emissions:

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

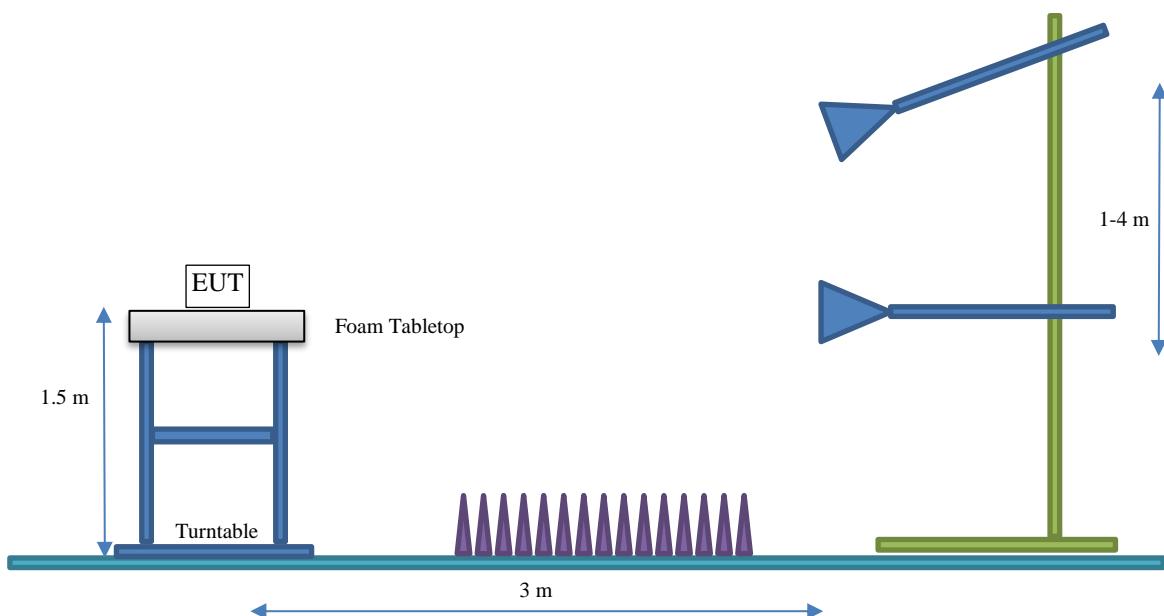
### Conducted Emissions:

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

# 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

<b>Company Name:</b>	Boston Scientific Corporation
<b>Address:</b>	4100 Hamline Avenue North
<b>City, State, Zip:</b>	St. Paul, MN 55112-5798
<b>Test Requested By:</b>	Pete Musto
<b>Model:</b>	Bluetooth Telemetry Module
<b>First Date of Test:</b>	January 24, 2017
<b>Last Date of Test:</b>	January 31, 2017
<b>Receipt Date of Samples:</b>	January 23, 2017
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
BLE Module that will be installed on the Telemetry Test Module (TTM)
<b>Testing Objective:</b>
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

# CONFIGURATIONS



2017-1-25

## Configuration BSTN0717- 7

EUT					
Description		Manufacturer		Model/Part Number	Serial Number
Bluetooth Telemetry Module		Boston Scientific Corporation		None	1

Peripherals in test setup boundary					
Description		Manufacturer		Model/Part Number	Serial Number
Laptop		Gateway		ZE7	LUWZM0D00120219DD97614
Laptop Adapter		Leader Electronics		IU40-11190-011S	APO04007002150069F8PP03
MuRata Dev Kit		MuRata		None	ZFKITU1374
Power Supply		GlobalTek Inc		GS-1923G2US	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Ethernet	No	2.0m	No	BLE Adapter	Unterminated
USB Cable RE	No	1.8m	Yes	BLE Adapter	Laptop
DC Cable	No	2.2m	No	Laptop	Laptop Adapter
USB Cable MuRata Dev Kit	No	1.9m	Yes	MuRata Dev Kit	AC Mains
DC Cable	No	2.0m	Yes	Power Supply	Bluetooth Telemetry Module

## Configuration BSTN0717- 8

EUT					
Description		Manufacturer		Model/Part Number	Serial Number
Bluetooth Telemetry Module		Boston Scientific Corporation		None	1

Peripherals in test setup boundary					
Description		Manufacturer		Model/Part Number	Serial Number
MuRata Dev Kit		MuRata		None	ZFKITU1374
Power Supply		GlobalTek Inc		GS-1923G2US	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Ethernet	No	2.0m	No	BLE Adapter	Network
USB Cable MuRata Dev Kit	No	1.9m	Yes	MuRata Dev Kit	AC Mains
DC Cable	No	2.0m	Yes	Power Supply	Bluetooth Telemetry Module

# CONFIGURATIONS



## Configuration BSTN0717- 11

EUT					
Description		Manufacturer		Model/Part Number	Serial Number
Bluetooth Telemetry Module		Boston Scientific Corporation		None	1

Peripherals in test setup boundary					
Description		Manufacturer		Model/Part Number	Serial Number
Laptop		Gateway		ZE7	LUWZM0D00120219DD97614

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable RE	No	1.8m	Yes	BLE Adapter	Laptop

## Configuration BSTN0717- 12

EUT					
Description		Manufacturer		Model/Part Number	Serial Number
Bluetooth Telemetry Module		Boston Scientific Corporation		None	1

Remote Equipment Outside of Test Setup Boundary					
Description		Manufacturer		Model/Part Number	Serial Number
Laptop		Gateway		ZE7	LUWZM0D00120219DD97614
Laptop Adapter		Leader Electronics		IU40-11190-011S	APO04007002150069F8PP03

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Ethernet	No	2.0m	No	BLE Adapter	Unterminated
DC Cable	No	2.2m	No	Laptop	Laptop Adapter
USB Cable (Unterminated)	No	1.8m	Yes	BLE Adapter	Unterminated

# MODIFICATIONS



2017-1-25

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/24/2017	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
2	1/30/2017	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
3	1/31/2017	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
4	1/31/2017	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
5	1/31/2017	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
6	1/31/2017	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
7	1/31/2017	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element Material Technologies following the test.
8	1/31/2017	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# POWERLINE CONDUCTED EMISSIONS

## TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	1/29/2016	1/29/2017
Receiver	Rohde & Schwarz	ESR7	ARI	6/14/2016	6/14/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/21/2016	3/21/2017

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

## CONFIGURATIONS INVESTIGATED

BSTN0717-7  
BSTN0717-8

## MODES INVESTIGATED

USB Power laptop, Bluetooth radio in session with MuRata dev kit  
AC/DC Power, ethernet data connection, Bluetooth radio in session with MuRata dev kit

# POWERLINE CONDUCTED EMISSIONS

EUT:	Bluetooth Telemetry Module	Work Order:	BSTN0717
Serial Number:	1	Date:	01/24/2017
Customer:	Boston Scientific Corporation	Temperature:	22.9°C
Attendees:	Deek Farah	Relative Humidity:	25.5%
Customer Project:	None	Bar. Pressure:	1013 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	BSTN0717-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	8	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

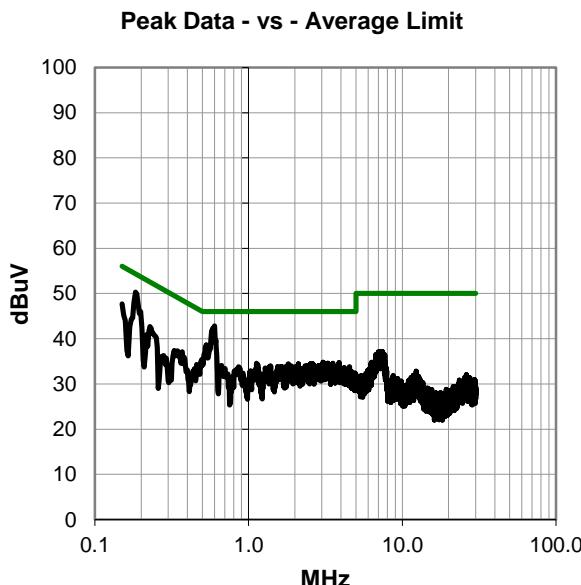
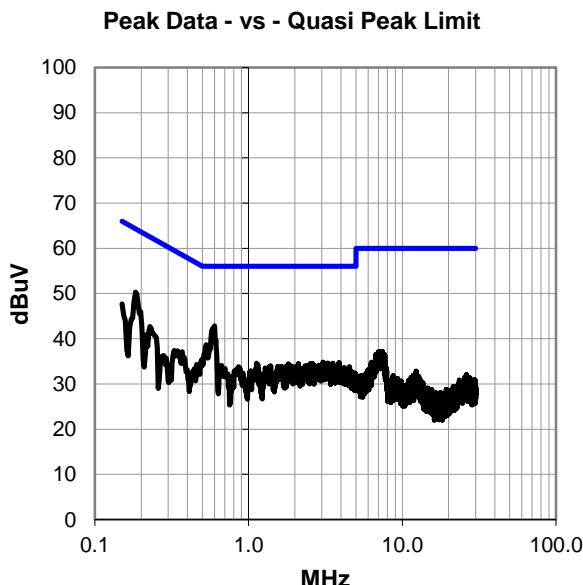
None

## EUT OPERATING MODES

USB Power laptop, Bluetooth radio in session with MuRata dev kit

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

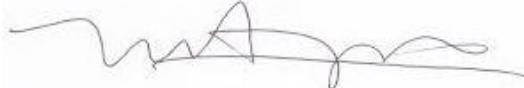
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
0.601	22.7	20.1	42.8	56.0	-13.2
0.184	29.9	20.4	50.3	64.3	-14.0
0.150	27.3	20.4	47.7	66.0	-18.3
0.228	22.4	20.3	42.7	62.5	-19.8
3.053	14.6	20.2	34.8	56.0	-21.2
3.877	14.4	20.3	34.7	56.0	-21.3
1.127	14.5	20.1	34.6	56.0	-21.4
3.280	14.4	20.2	34.6	56.0	-21.4
3.534	14.3	20.3	34.6	56.0	-21.4
2.541	14.3	20.2	34.5	56.0	-21.5
1.814	14.2	20.2	34.4	56.0	-21.6
2.109	14.2	20.2	34.4	56.0	-21.6
2.616	14.2	20.2	34.4	56.0	-21.6
0.665	14.0	20.1	34.1	56.0	-21.9
2.407	13.9	20.2	34.1	56.0	-21.9
2.870	13.9	20.2	34.1	56.0	-21.9
1.392	13.9	20.1	34.0	56.0	-22.0
1.892	13.8	20.2	34.0	56.0	-22.0
0.329	17.2	20.2	37.4	59.5	-22.1
1.545	13.7	20.2	33.9	56.0	-22.1
1.751	13.7	20.2	33.9	56.0	-22.1
0.859	13.7	20.1	33.8	56.0	-22.2
1.989	13.6	20.2	33.8	56.0	-22.2
3.642	13.5	20.3	33.8	56.0	-22.2
4.530	13.5	20.3	33.8	56.0	-22.2
1.724	13.4	20.2	33.6	56.0	-22.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
0.601	22.7	20.1	42.8	46.0	-3.2
0.184	29.9	20.4	50.3	54.3	-4.0
0.150	27.3	20.4	47.7	56.0	-8.3
0.228	22.4	20.3	42.7	52.5	-9.8
3.053	14.6	20.2	34.8	46.0	-11.2
3.877	14.4	20.3	34.7	46.0	-11.3
1.127	14.5	20.1	34.6	46.0	-11.4
3.280	14.4	20.2	34.6	46.0	-11.4
3.534	14.3	20.3	34.6	46.0	-11.4
2.541	14.3	20.2	34.5	46.0	-11.5
1.814	14.2	20.2	34.4	46.0	-11.6
2.109	14.2	20.2	34.4	46.0	-11.6
2.616	14.2	20.2	34.4	46.0	-11.6
0.665	14.0	20.1	34.1	46.0	-11.9
2.407	13.9	20.2	34.1	46.0	-11.9
2.870	13.9	20.2	34.1	46.0	-11.9
1.392	13.9	20.1	34.0	46.0	-12.0
1.892	13.8	20.2	34.0	46.0	-12.0
0.329	17.2	20.2	37.4	49.5	-12.1
1.545	13.7	20.2	33.9	46.0	-12.1
1.751	13.7	20.2	33.9	46.0	-12.1
0.859	13.7	20.1	33.8	46.0	-12.2
1.989	13.6	20.2	33.8	46.0	-12.2
3.642	13.5	20.3	33.8	46.0	-12.2
4.530	13.5	20.3	33.8	46.0	-12.2
1.724	13.4	20.2	33.6	46.0	-12.4

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Bluetooth Telemetry Module	Work Order:	BSTN0717
Serial Number:	1	Date:	01/24/2017
Customer:	Boston Scientific Corporation	Temperature:	22.9°C
Attendees:	Deek Farah	Relative Humidity:	25.5%
Customer Project:	None	Bar. Pressure:	1013 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	BSTN0717-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	9	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

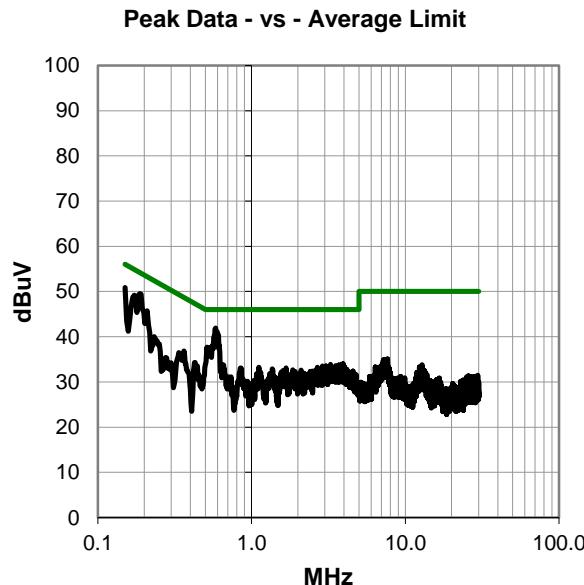
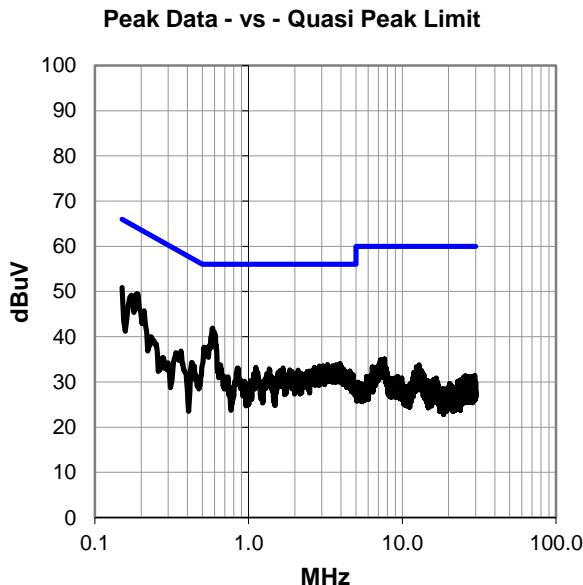
None

## EUT OPERATING MODES

USB Power laptop, Bluetooth radio in session with MuRata dev kit

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #9

Peak Data - vs - Quasi Peak Limit

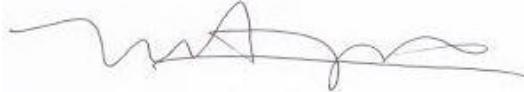
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
0.583	21.8	20.1	41.9	56.0	-14.1
0.187	29.1	20.4	49.5	64.2	-14.7
0.150	30.5	20.4	50.9	66.0	-15.1
0.172	28.8	20.4	49.2	64.8	-15.6
0.363	16.6	20.2	36.8	58.7	-21.9
3.929	13.7	20.3	34.0	56.0	-22.0
3.258	13.7	20.2	33.9	56.0	-22.1
3.843	13.5	20.3	33.8	56.0	-22.2
3.698	13.4	20.3	33.7	56.0	-22.3
0.232	19.7	20.3	40.0	62.4	-22.4
3.519	13.3	20.3	33.6	56.0	-22.4
2.900	13.3	20.2	33.5	56.0	-22.5
3.049	13.3	20.2	33.5	56.0	-22.5
2.926	13.2	20.2	33.4	56.0	-22.6
3.638	13.0	20.3	33.3	56.0	-22.7
1.116	13.1	20.1	33.2	56.0	-22.8
2.676	13.0	20.2	33.2	56.0	-22.8
2.959	13.0	20.2	33.2	56.0	-22.8
3.892	12.9	20.3	33.2	56.0	-22.8
0.848	13.0	20.1	33.1	56.0	-22.9
1.672	12.9	20.2	33.1	56.0	-22.9
2.873	12.9	20.2	33.1	56.0	-22.9
0.426	14.2	20.1	34.3	57.3	-23.0
1.366	12.8	20.1	32.9	56.0	-23.1
4.161	12.5	20.3	32.8	56.0	-23.2
1.855	12.5	20.2	32.7	56.0	-23.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
0.583	21.8	20.1	41.9	46.0	-4.1
0.187	29.1	20.4	49.5	54.2	-4.7
0.150	30.5	20.4	50.9	56.0	-5.1
0.172	28.8	20.4	49.2	54.8	-5.6
0.363	16.6	20.2	36.8	48.7	-11.9
3.929	13.7	20.3	34.0	46.0	-12.0
3.258	13.7	20.2	33.9	46.0	-12.1
3.843	13.5	20.3	33.8	46.0	-12.2
3.698	13.4	20.3	33.7	46.0	-12.3
0.232	19.7	20.3	40.0	52.4	-12.4
3.519	13.3	20.3	33.6	46.0	-12.4
2.900	13.3	20.2	33.5	46.0	-12.5
3.049	13.3	20.2	33.5	46.0	-12.5
2.926	13.2	20.2	33.4	46.0	-12.6
3.638	13.0	20.3	33.3	46.0	-12.7
1.116	13.1	20.1	33.2	46.0	-12.8
2.676	13.0	20.2	33.2	46.0	-12.8
2.959	13.0	20.2	33.2	46.0	-12.8
3.892	12.9	20.3	33.2	46.0	-12.8
0.848	13.0	20.1	33.1	46.0	-12.9
1.672	12.9	20.2	33.1	46.0	-12.9
2.873	12.9	20.2	33.1	46.0	-12.9
0.426	14.2	20.1	34.3	47.3	-13.0
1.366	12.8	20.1	32.9	46.0	-13.1
4.161	12.5	20.3	32.8	46.0	-13.2
1.855	12.5	20.2	32.7	46.0	-13.3

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Bluetooth Telemetry Module	Work Order:	BSTN0717
Serial Number:	1	Date:	01/24/2017
Customer:	Boston Scientific Corporation	Temperature:	22.9°C
Attendees:	Deek Farah	Relative Humidity:	25.5%
Customer Project:	None	Bar. Pressure:	1013 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	BSTN0717-8

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	16	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

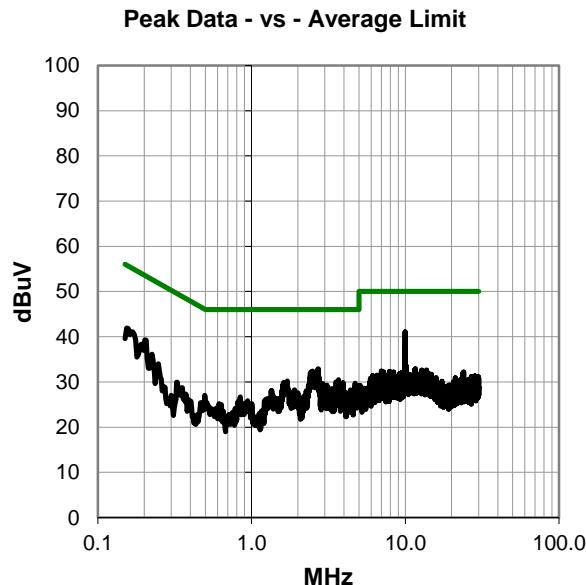
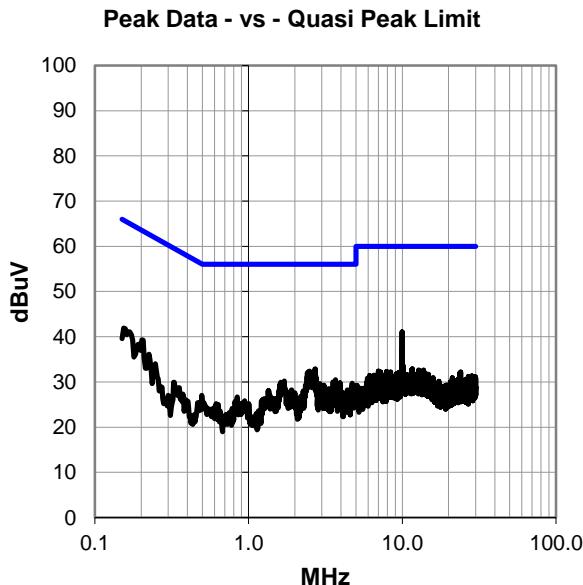
None

## EUT OPERATING MODES

AC/DC Power, ethernet data connection, Bluetooth radio in session with MuRata dev kit

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #16

Peak Data - vs - Quasi Peak Limit

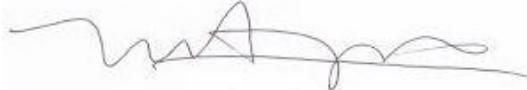
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
9.992	20.4	20.7	41.1	60.0	-18.9
10.010	16.9	20.7	37.6	60.0	-22.4
9.954	16.8	20.7	37.5	60.0	-22.5
2.713	12.7	20.2	32.9	56.0	-23.1
2.489	12.2	20.2	32.4	56.0	-23.6
0.154	21.5	20.4	41.9	65.8	-23.9
0.202	19.0	20.3	39.3	63.5	-24.2
9.962	14.4	20.7	35.1	60.0	-24.9
3.687	10.2	20.3	30.5	56.0	-25.5
1.706	10.0	20.2	30.2	56.0	-25.8
3.549	9.7	20.3	30.0	56.0	-26.0
3.929	9.5	20.3	29.8	56.0	-26.2
4.713	9.4	20.3	29.7	56.0	-26.3
2.903	9.4	20.2	29.6	56.0	-26.4
10.096	12.9	20.7	33.6	60.0	-26.4
0.225	15.8	20.3	36.1	62.6	-26.5
3.101	9.1	20.2	29.3	56.0	-26.7
3.832	8.8	20.3	29.1	56.0	-26.9
4.765	8.6	20.4	29.0	56.0	-27.0
11.633	12.2	20.7	32.9	60.0	-27.1
11.529	12.0	20.7	32.7	60.0	-27.3
12.771	11.7	20.9	32.6	60.0	-27.4
13.730	11.7	20.9	32.6	60.0	-27.4
3.317	8.3	20.2	28.5	56.0	-27.5
6.981	12.0	20.4	32.4	60.0	-27.6
7.936	11.7	20.6	32.3	60.0	-27.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
9.992	20.4	20.7	41.1	50.0	-8.9
10.010	16.9	20.7	37.6	50.0	-12.4
9.954	16.8	20.7	37.5	50.0	-12.5
2.713	12.7	20.2	32.9	46.0	-13.1
2.489	12.2	20.2	32.4	46.0	-13.6
0.154	21.5	20.4	41.9	55.8	-13.9
0.202	19.0	20.3	39.3	53.5	-14.2
9.962	14.4	20.7	35.1	50.0	-14.9
3.687	10.2	20.3	30.5	46.0	-15.5
1.706	10.0	20.2	30.2	46.0	-15.8
3.549	9.7	20.3	30.0	46.0	-16.0
3.929	9.5	20.3	29.8	46.0	-16.2
4.713	9.4	20.3	29.7	46.0	-16.3
2.903	9.4	20.2	29.6	46.0	-16.4
10.096	12.9	20.7	33.6	50.0	-16.4
0.225	15.8	20.3	36.1	52.6	-16.5
3.101	9.1	20.2	29.3	46.0	-16.7
3.832	8.8	20.3	29.1	46.0	-16.9
4.765	8.6	20.4	29.0	46.0	-17.0
11.633	12.2	20.7	32.9	50.0	-17.1
11.529	12.0	20.7	32.7	50.0	-17.3
12.771	11.7	20.9	32.6	50.0	-17.4
13.730	11.7	20.9	32.6	50.0	-17.4
3.317	8.3	20.2	28.5	46.0	-17.5
6.981	12.0	20.4	32.4	50.0	-17.6
7.936	11.7	20.6	32.3	50.0	-17.7

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Bluetooth Telemetry Module	Work Order:	BSTN0717
Serial Number:	1	Date:	01/24/2017
Customer:	Boston Scientific Corporation	Temperature:	22.9°C
Attendees:	Deek Farah	Relative Humidity:	25.5%
Customer Project:	None	Bar. Pressure:	1013 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	BSTN0717-8

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	15	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

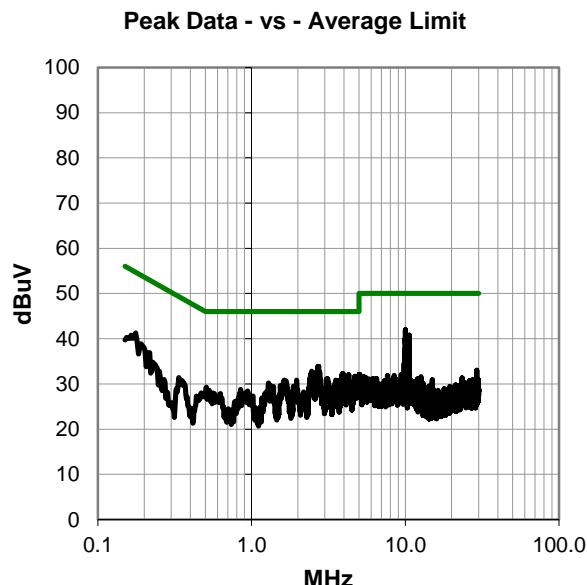
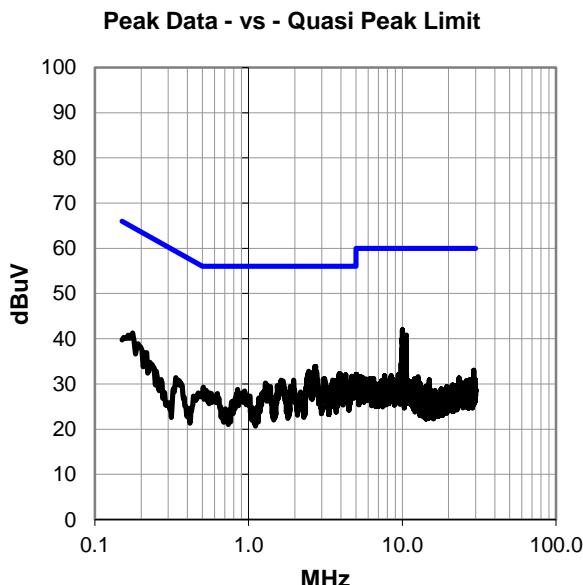
None

## EUT OPERATING MODES

AC/DC Power, ethernet data connection, Bluetooth radio in session with MuRata dev kit

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #15

Peak Data - vs - Quasi Peak Limit

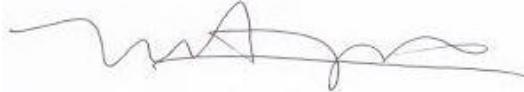
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
10.007	21.3	20.7	42.0	60.0	-18.0
10.626	20.1	20.7	40.8	60.0	-19.2
2.724	13.7	20.2	33.9	56.0	-22.1
10.059	17.2	20.7	37.9	60.0	-22.1
9.962	17.1	20.7	37.8	60.0	-22.2
2.463	12.6	20.2	32.8	56.0	-23.2
0.176	20.9	20.4	41.3	64.7	-23.4
3.914	12.0	20.3	32.3	56.0	-23.7
10.037	15.6	20.7	36.3	60.0	-23.7
4.989	11.7	20.4	32.1	56.0	-23.9
4.295	11.7	20.3	32.0	56.0	-24.0
4.702	11.4	20.3	31.7	56.0	-24.3
4.910	10.9	20.4	31.3	56.0	-24.7
3.832	10.9	20.3	31.2	56.0	-24.8
3.060	10.9	20.2	31.1	56.0	-24.9
2.799	10.8	20.2	31.0	56.0	-25.0
1.631	10.6	20.2	30.8	56.0	-25.2
1.963	10.6	20.2	30.8	56.0	-25.2
3.530	10.5	20.3	30.8	56.0	-25.2
9.936	14.0	20.6	34.6	60.0	-25.4
9.820	13.9	20.6	34.5	60.0	-25.5
1.288	10.1	20.1	30.2	56.0	-25.8
4.127	9.6	20.3	29.9	56.0	-26.1
3.683	9.5	20.3	29.8	56.0	-26.2
0.213	16.6	20.3	36.9	63.1	-26.2
1.321	9.6	20.1	29.7	56.0	-26.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (l)	Spec. Limit (l)	Margin (dB)
10.007	21.3	20.7	42.0	50.0	-8.0
10.626	20.1	20.7	40.8	50.0	-9.2
2.724	13.7	20.2	33.9	46.0	-12.1
10.059	17.2	20.7	37.9	50.0	-12.1
9.962	17.1	20.7	37.8	50.0	-12.2
2.463	12.6	20.2	32.8	46.0	-13.2
0.176	20.9	20.4	41.3	54.7	-13.4
3.914	12.0	20.3	32.3	46.0	-13.7
10.037	15.6	20.7	36.3	50.0	-13.7
4.989	11.7	20.4	32.1	46.0	-13.9
4.295	11.7	20.3	32.0	46.0	-14.0
4.702	11.4	20.3	31.7	46.0	-14.3
4.910	10.9	20.4	31.3	46.0	-14.7
3.832	10.9	20.3	31.2	46.0	-14.8
3.060	10.9	20.2	31.1	46.0	-14.9
2.799	10.8	20.2	31.0	46.0	-15.0
1.631	10.6	20.2	30.8	46.0	-15.2
1.963	10.6	20.2	30.8	46.0	-15.2
3.530	10.5	20.3	30.8	46.0	-15.2
9.936	14.0	20.6	34.6	50.0	-15.4
9.820	13.9	20.6	34.5	50.0	-15.5
1.288	10.1	20.1	30.2	46.0	-15.8
4.127	9.6	20.3	29.9	46.0	-16.1
3.683	9.5	20.3	29.8	46.0	-16.2
0.213	16.6	20.3	36.9	53.1	-16.2
1.321	9.6	20.1	29.7	46.0	-16.3

## CONCLUSION

Pass



Tested By

# DUTY CYCLE

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	8/12/2014	8/12/2017
Cable	ESM Cable Corp.	TTBJ141 KMMK-72	MNU	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

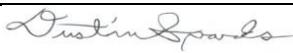
There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

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.

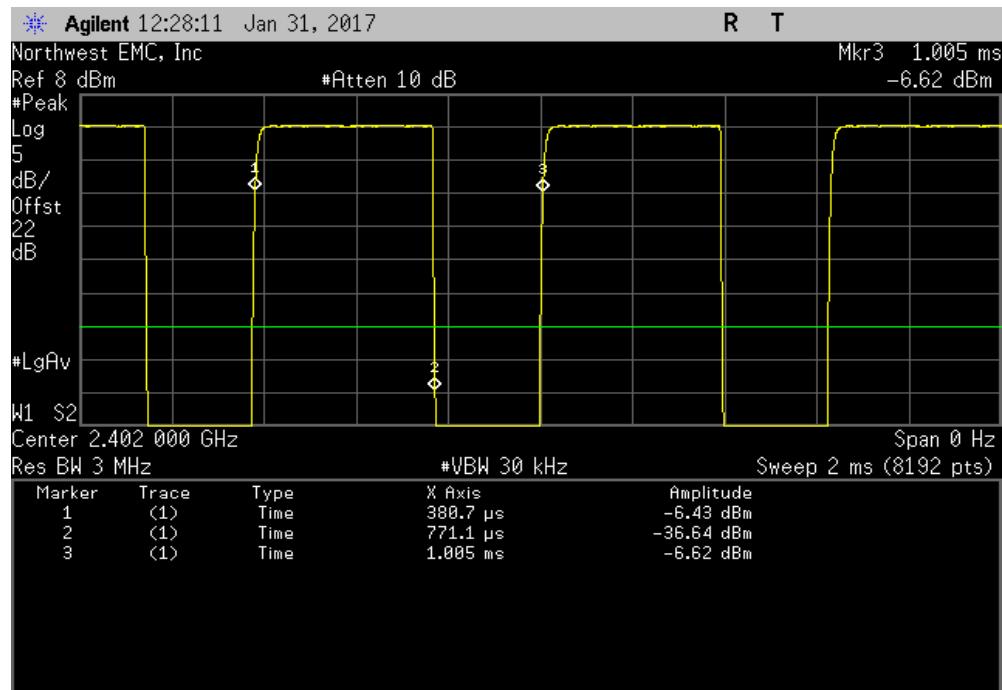
If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

# DUTY CYCLE

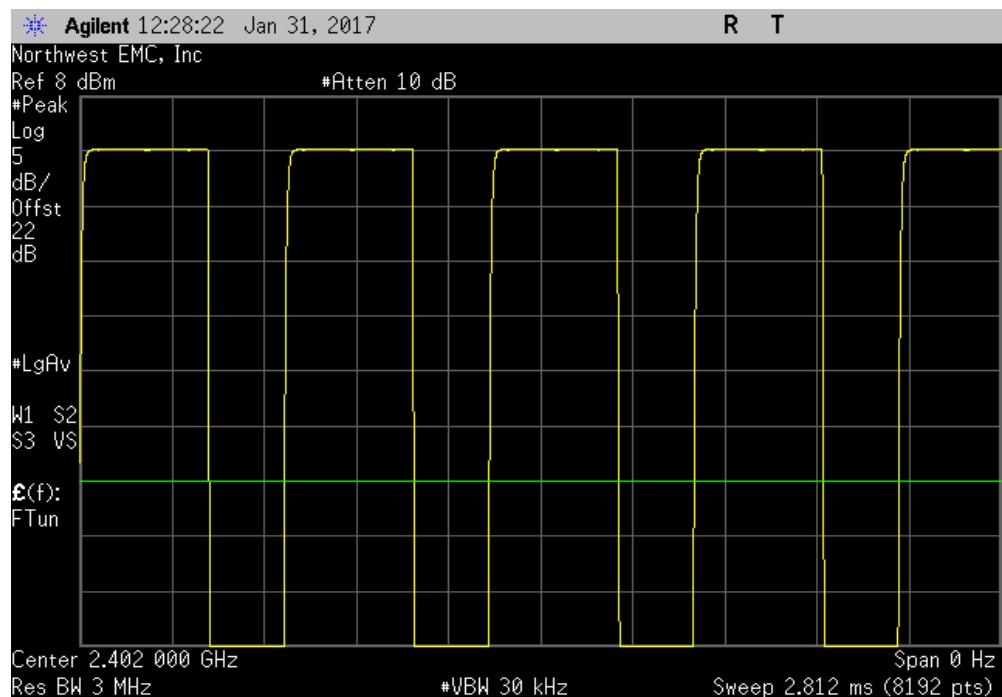
EUT:	Bluetooth Telemetry Module		Work Order:	BSTM0717	
Serial Number:	1		Date:	01/31/17	
Customer:	Boston Scientific Corporation		Temperature:	23.2 °C	
Attendees:	Deek Farah		Humidity:	24.6% RH	
Project:	None		Barometric Pres.:	1010 mbar	
Tested by:	Dustin Sparks	Power:	5VDC	Job Site:	MN08
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2017		ANSI C63.10:2013			
COMMENTS					
EUT powered by USB connection to laptop					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	11	 Signature			
		Pulse Width	Period	Number of Pulses	Value (%)
BLE/GFSK Low Channel, 2402 MHz		390.4 us	624.8 us	1	62.5
BLE/GFSK Low Channel, 2402 MHz		N/A	N/A	5	N/A
BLE/GFSK Mid Channel, 2442 MHz		390.9 us	625.1 us	1	62.5
BLE/GFSK Mid Channel, 2442 MHz		N/A	N/A	5	N/A
BLE/GFSK High Channel, 2480 MHz		390.6 us	624.8 us	1	62.5
BLE/GFSK High Channel, 2480 MHz		N/A	N/A	5	N/A

# DUTY CYCLE

BLE/GFSK Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
390.4 us	624.8 us	1	62.5	N/A	N/A

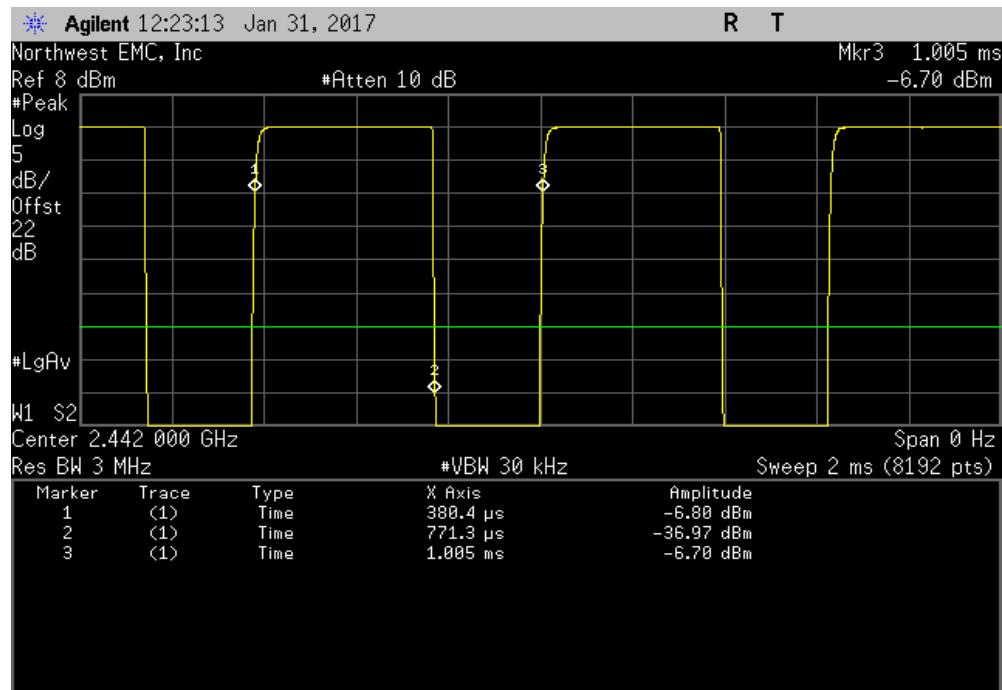


BLE/GFSK Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

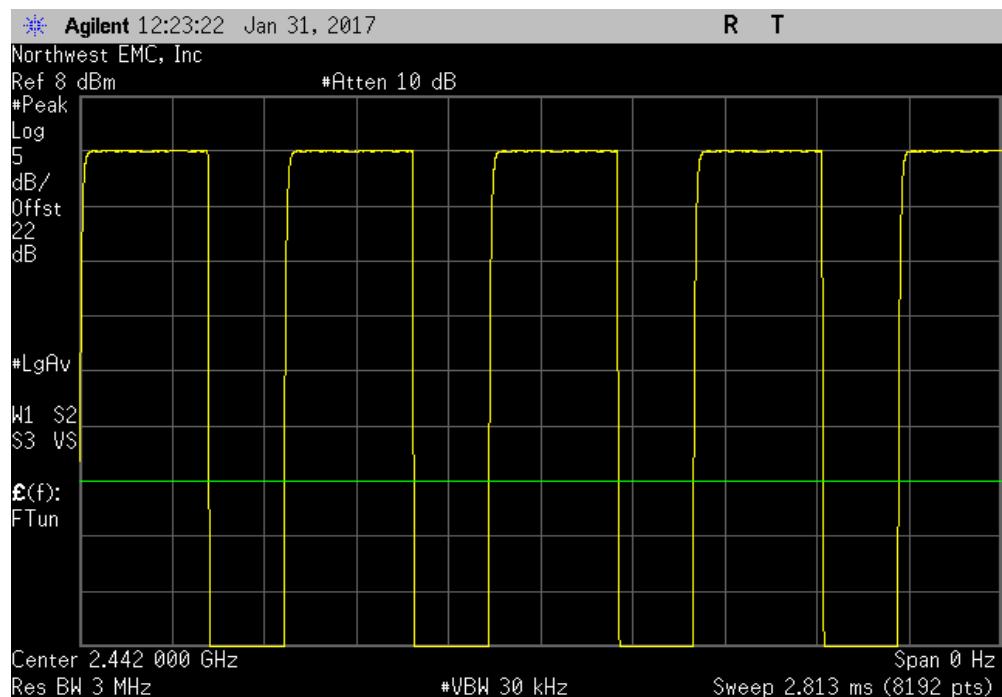


# DUTY CYCLE

BLE/GFSK Mid Channel, 2442 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
390.9 us	625.1 us	1	62.5	N/A	N/A

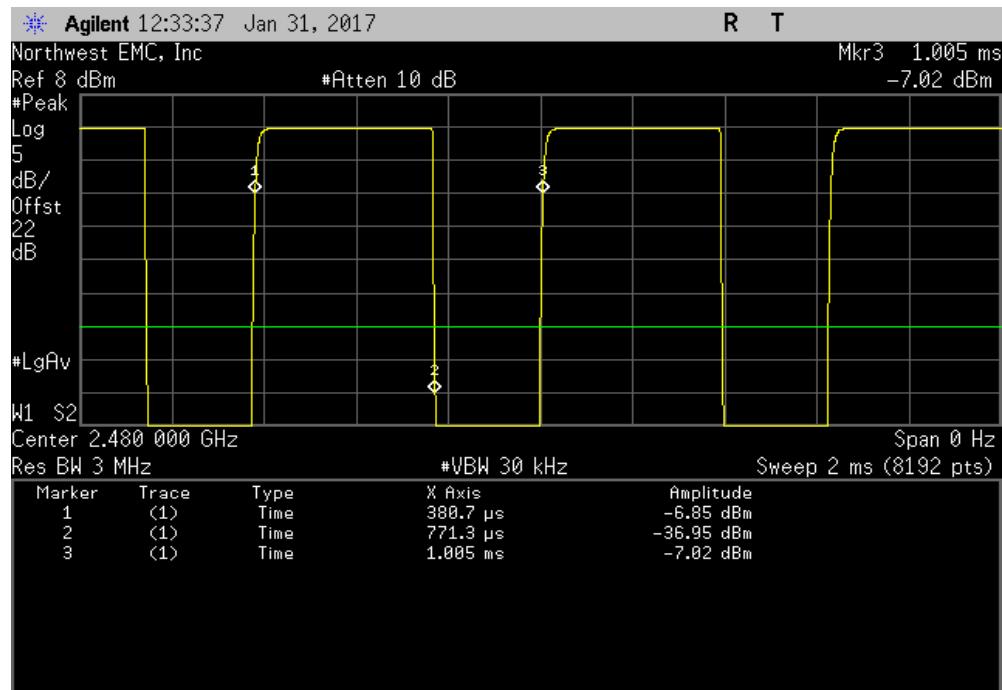


BLE/GFSK Mid Channel, 2442 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

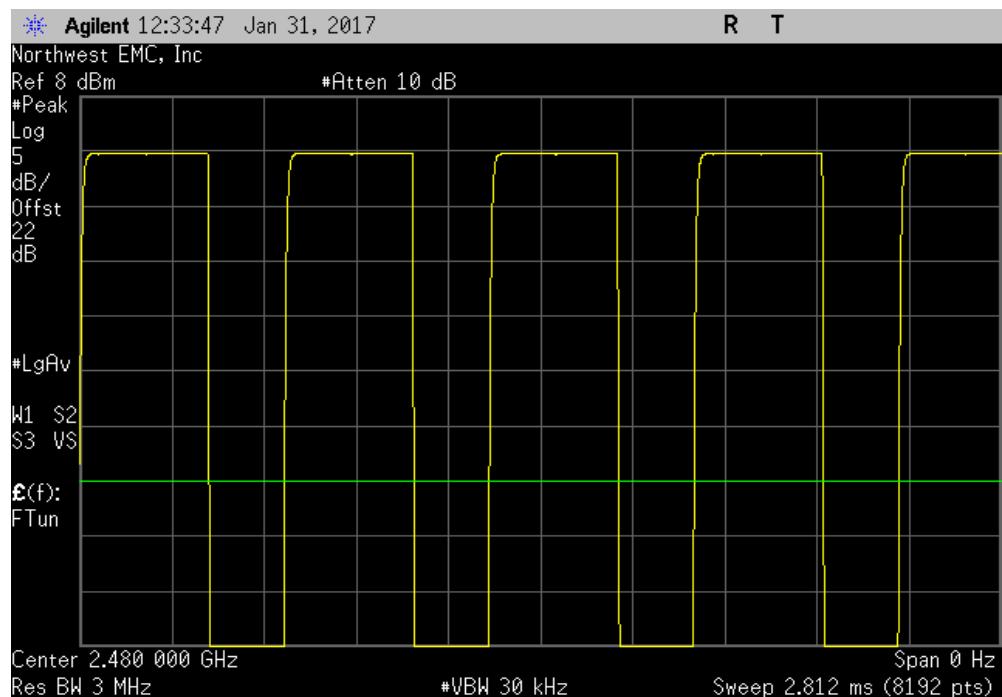


# DUTY CYCLE

BLE/GFSK High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
390.6 us	624.8 us	1	62.5	N/A	N/A



BLE/GFSK High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# OCCUPIED BANDWIDTH

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	8/12/2014	8/12/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

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

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

## OCCUPIED BANDWIDTH

**NORTHWEST  
EMC**

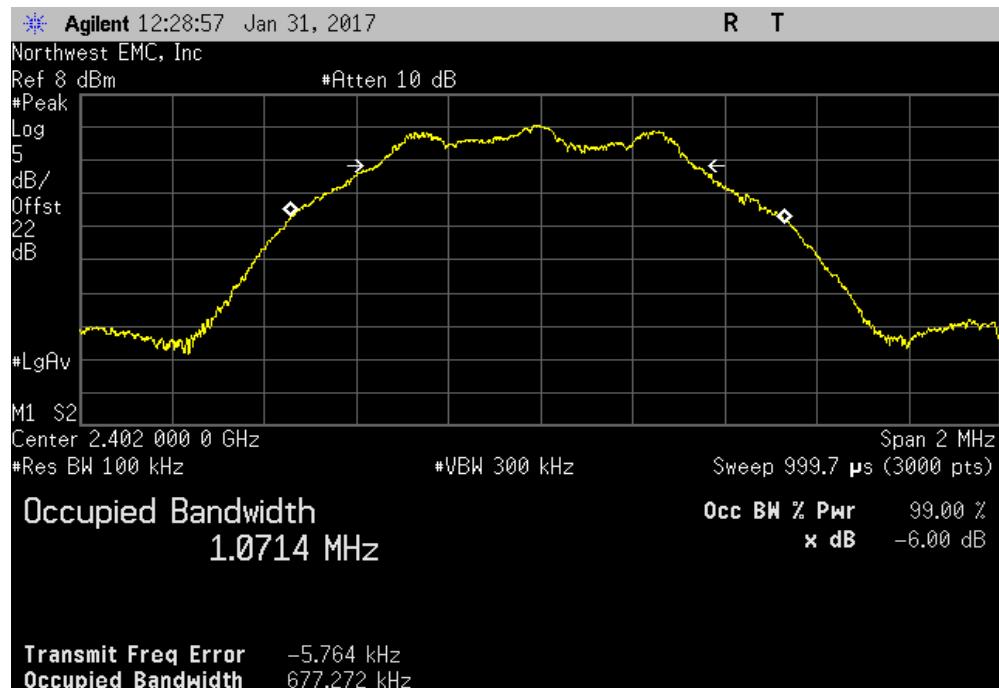
XMit 2016.12.19

NweTx 2016.09.14.2

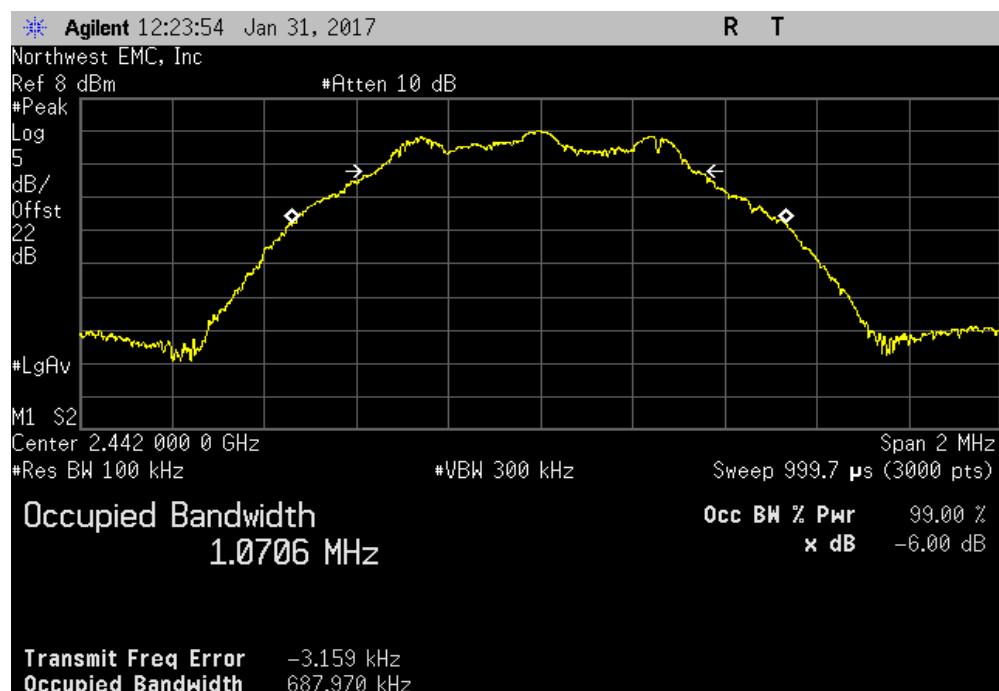
EUT: Bluetooth Telemetry Module		Work Order: BSTN0717
Serial Number: 1		Date: 01/31/17
Customer: Boston Scientific Corporation		Temperature: 23.2 °C
Attendees: Deek Farah		Humidity: 24.6% RH
Project: None		Barometric Pres.: 1010 mbar
Tested by: Dustin Sparks	Power: 5VDC	Job Site: MN08
TEST SPECIFICATIONS		
Test Method		
FCC 15.247:2017		ANSI C63.10:2013
COMMENTS		
EUT powered by USB connection to laptop		
DEVIATIONS FROM TEST STANDARD		
None		
Configuration #	11	 Signature
		Limit Value (ε) Result
BLE/GFSK Low Channel, 2402 MHz		677.272 kHz 500 kHz Pass
BLE/GFSK Mid Channel, 2442 MHz		687.97 kHz 500 kHz Pass
BLE/GFSK High Channel, 2480 MHz		699.98 kHz 500 kHz Pass

## OCCUPIED BANDWIDTH

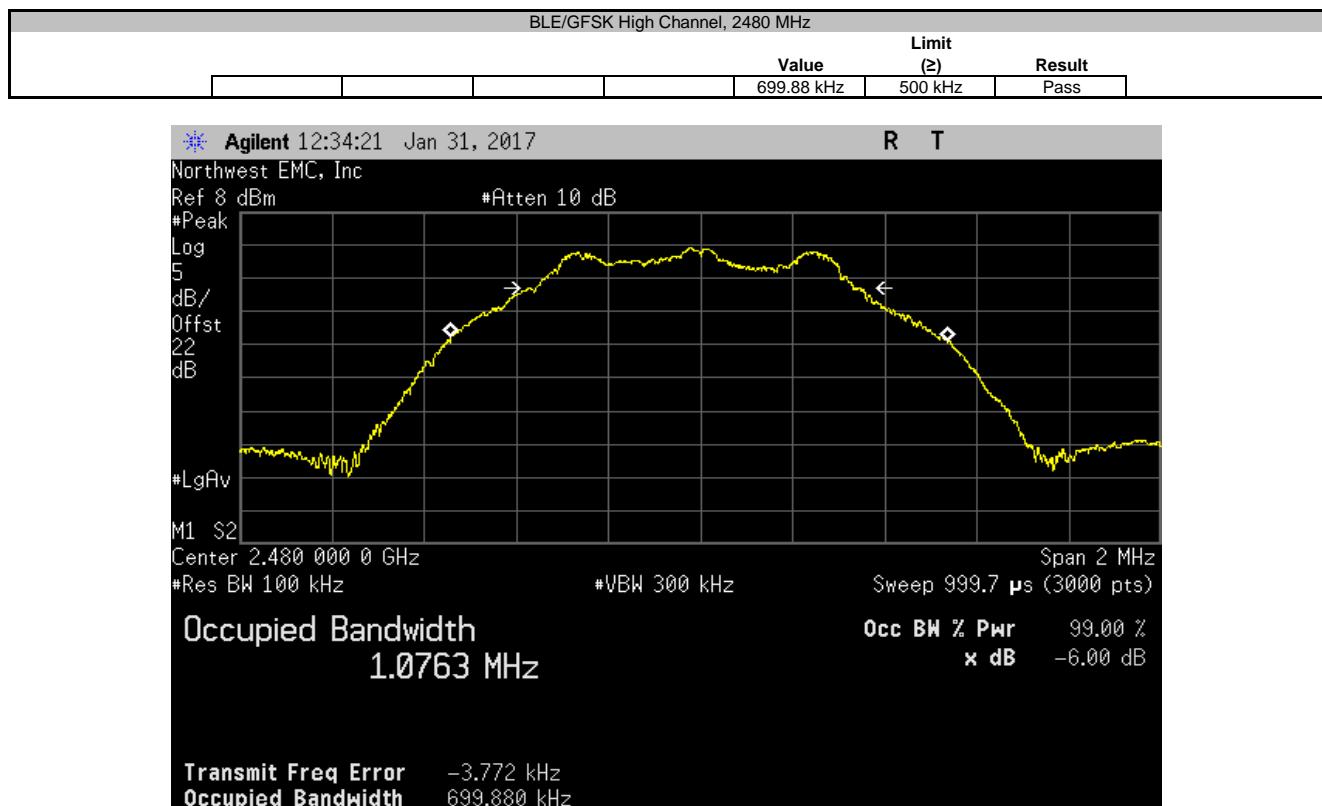
BLE/GFSK Low Channel, 2402 MHz				Limit	Result
	Value	Limit ( $\geq$ )			
	677.272 kHz	500 kHz		Pass	



BLE/GFSK Mid Channel, 2442 MHz						
			Limit			
			Value	( $\geq$ )	Result	
			687.97 kHz	500 kHz	Pass	



# OCCUPIED BANDWIDTH



# OUTPUT POWER

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	8/12/2014	8/12/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## 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.

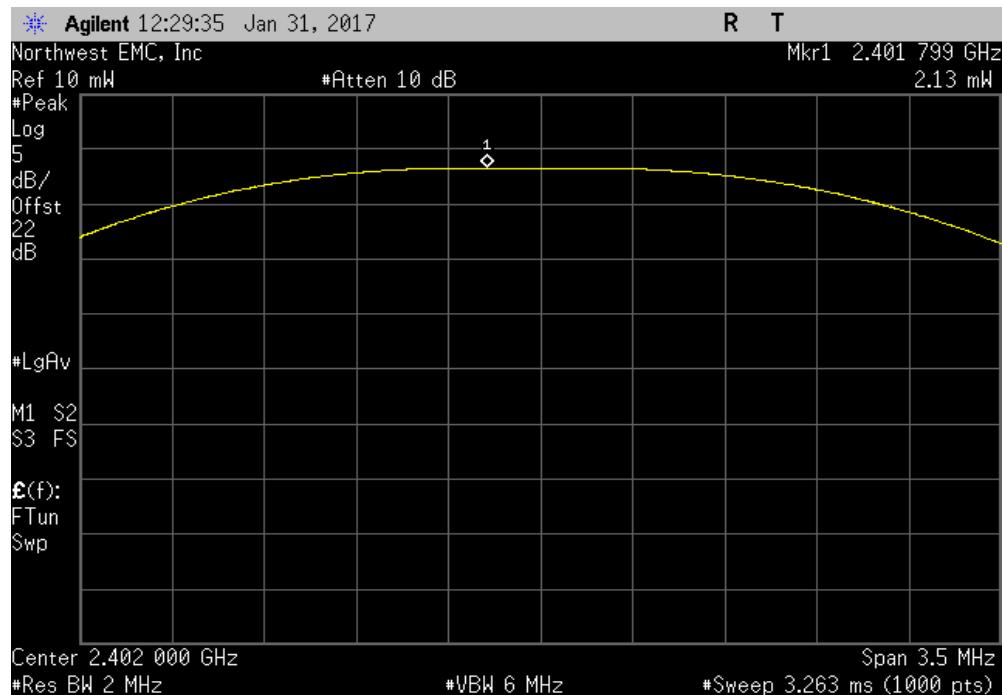
**De Facto EIRP Limit:** The EUT meets the de facto EIRP limit of +36 dBm.

# OUTPUT POWER

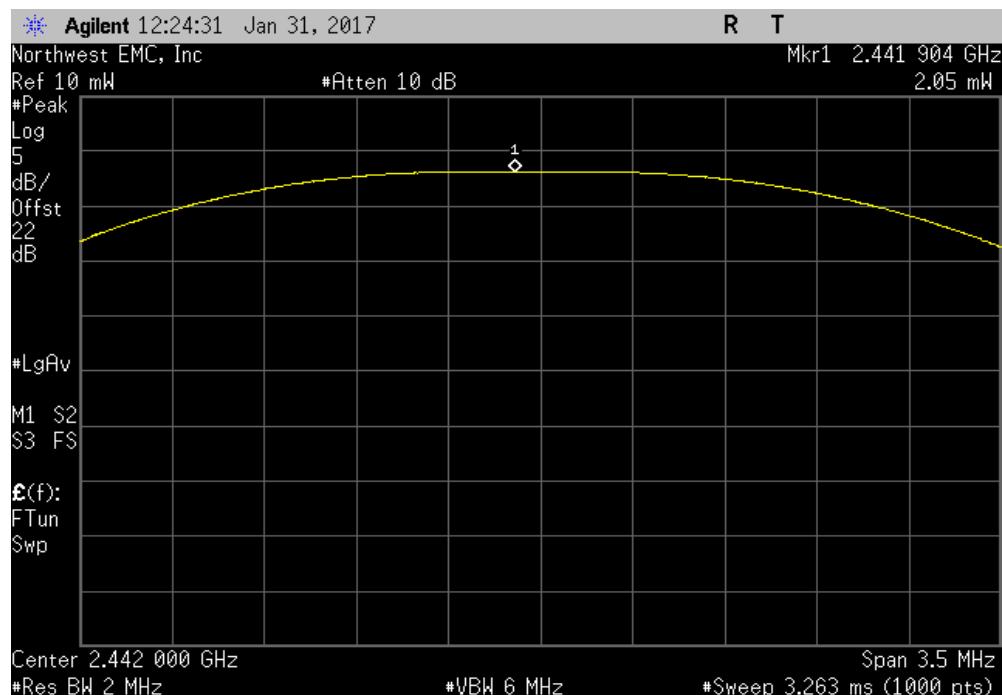
EUT:	Bluetooth Telemetry Module		Work Order:	BSTN0717	
Serial Number:	1		Date:	01/31/17	
Customer:	Boston Scientific Corporation		Temperature:	23.1 °C	
Attendees:	Deek Farah		Humidity:	24.5% RH	
Project:	None		Barometric Pres.:	1010 mbar	
Tested by:	Dustin Sparks	Power:	5VDC	Job Site:	MN08
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2017		ANSI C63.10:2013			
COMMENTS					
EUT powered by USB connection to laptop					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	11	Signature			
			Value	Limit (-)	Result
			2.127 mW	1 W	Pass
			2.049 mW	1 W	Pass
			1.952 mW	1 W	Pass
BLE/GFSK Low Channel, 2402 MHz					
BLE/GFSK Mid Channel, 2442 MHz					
BLE/GFSK High Channel, 2480 MHz					

# OUTPUT POWER

BLE/GFSK Low Channel, 2402 MHz		
	Value	Limit (<)
	2.127 mW	1 W

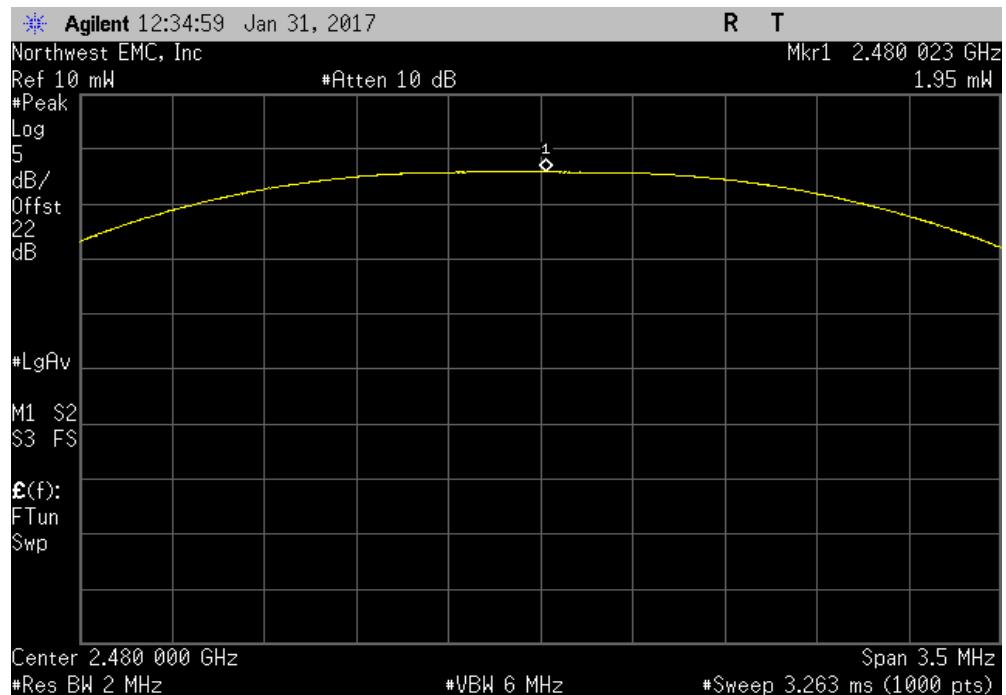


BLE/GFSK Mid Channel, 2442 MHz		
	Value	Limit (<)
	2.049 mW	1 W



# OUTPUT POWER

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



# POWER SPECTRAL DENSITY

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	8/12/2014	8/12/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

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

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

*The analyzer was set to the maximum available number of points (8192). The span of 10 MHz divided by the number of points allows for one point per 1.2 kHz of spectrum. This exceeds the requirement to find the highest power spectral density in 3 kHz spectrum*

## POWER SPECTRAL DENSITY

**NORTHWEST  
EMC**  
XMit 2016.12.19

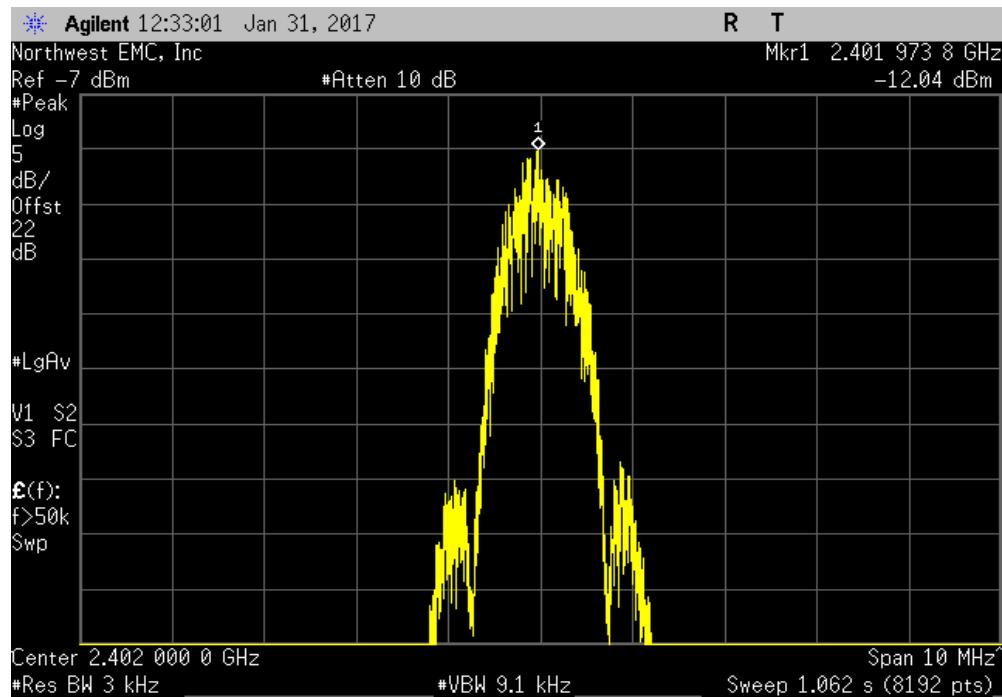
XMit 2016.12.19

NweTx 2016.09.14.2

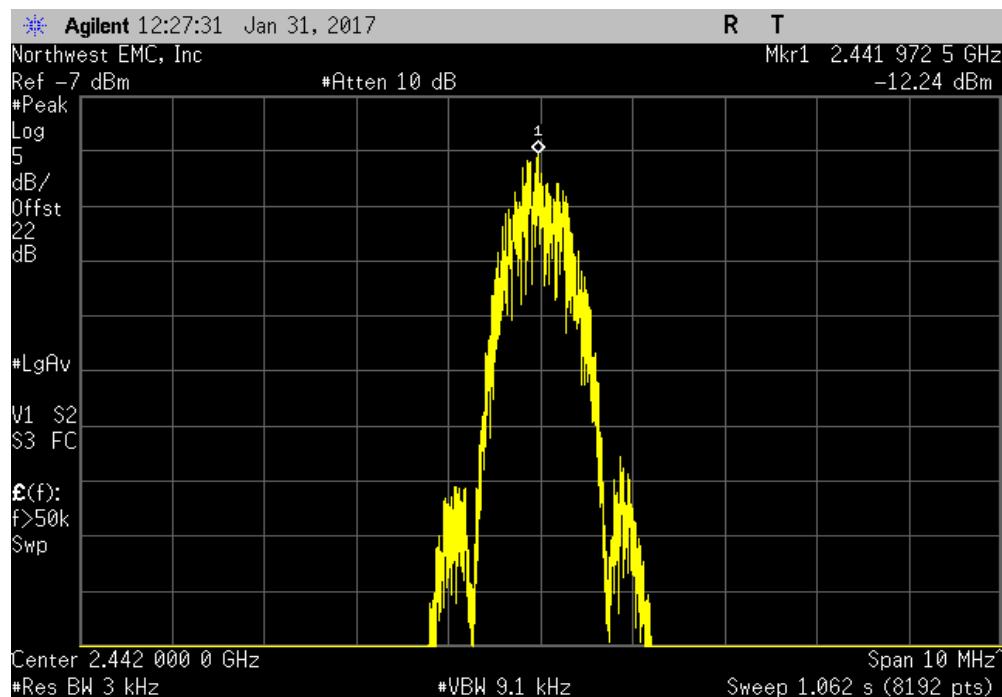
EUT: Bluetooth Telemetry Module		Work Order: BSTN0717		
Serial Number: 1		Date: 01/31/17		
Customer: Boston Scientific Corporation		Temperature: 23.1 °C		
Attendees: Deek Farah		Humidity: 24.8% RH		
Project: None		Barometric Pres.: 1010 mbar		
Tested by: Dustin Sparks	Power: 5VDC	Job Site: MN08		
TEST SPECIFICATIONS				
FCC 15.247:2017		Test Method		
		ANSI C63.10:2013		
COMMENTS				
EUT powered by USB connection to laptop				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	11			
Signature				
		Value	Limit	
		dBm/3kHz	< dBm/3kHz	Results
BLE/GFSK Low Channel, 2402 MHz		-12.042	8	Pass
BLE/GFSK Mid Channel, 2442 MHz		-12.245	8	Pass
BLE/GFSK High Channel, 2492 MHz		10.497	0	Pass

# POWER SPECTRAL DENSITY

BLE/GFSK Low Channel, 2402 MHz				Value	Limit	
				dBm/3kHz	< dBm/3kHz	Results
				-12.042	8	Pass

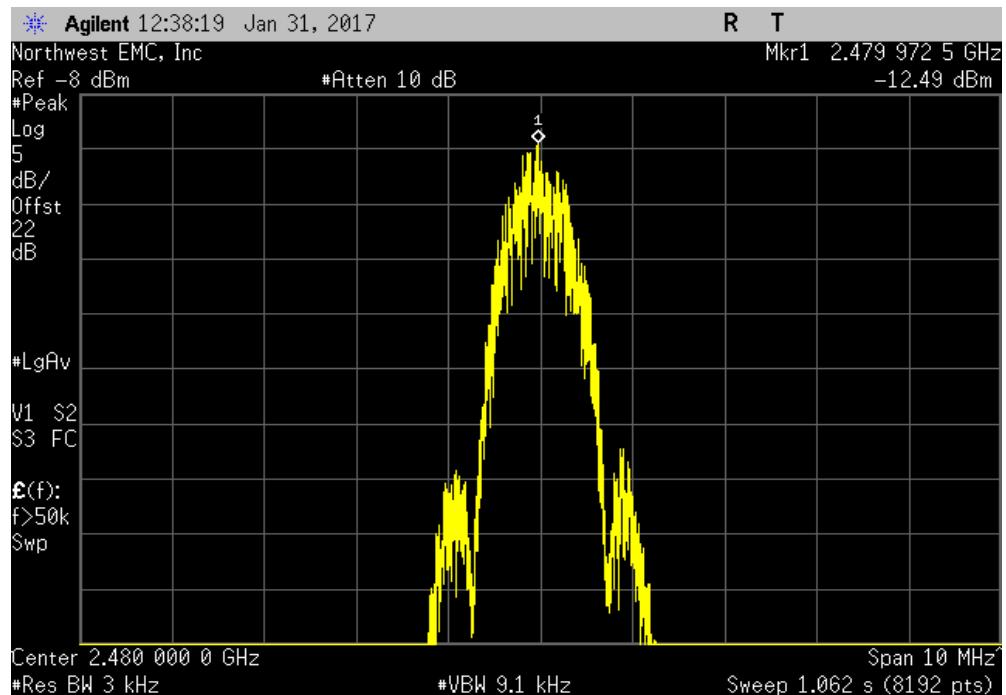


BLE/GFSK Mid Channel, 2442 MHz				Value	Limit	
				dBm/3kHz	< dBm/3kHz	Results
				-12.245	8	Pass



# POWER SPECTRAL DENSITY

BLE/GFSK High Channel, 2480 MHz			
	Value dBm/3kHz	Limit < dBm/3kHz	Results
	-12.487	8	Pass



# BAND EDGE COMPLIANCE

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	8/12/2014	8/12/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

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

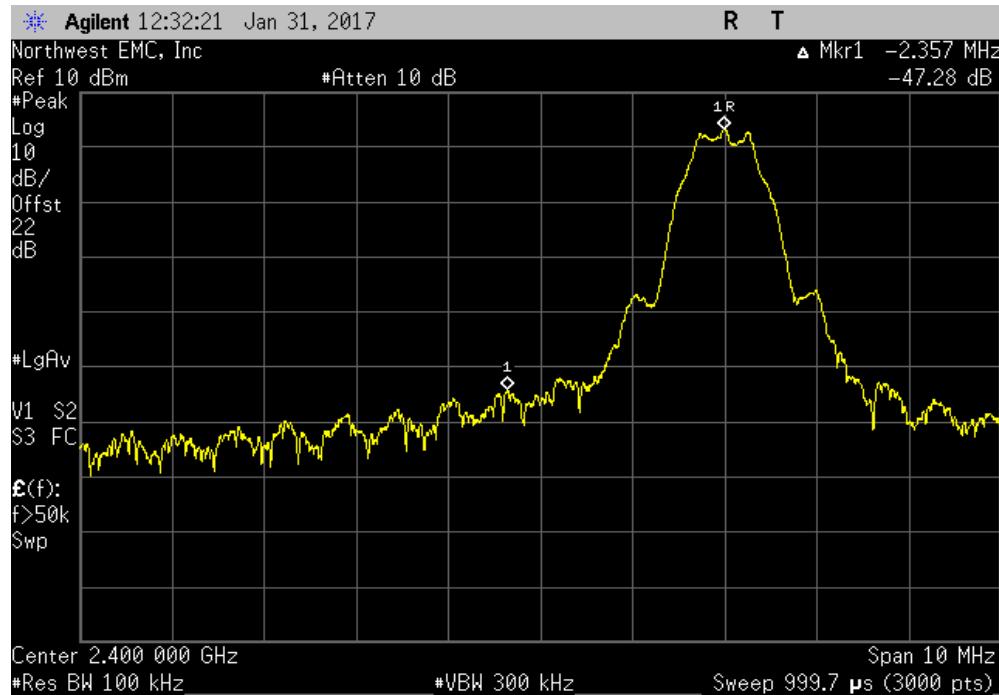
The spectrum was scanned below the lower band edge and above the higher band edge.

# BAND EDGE COMPLIANCE

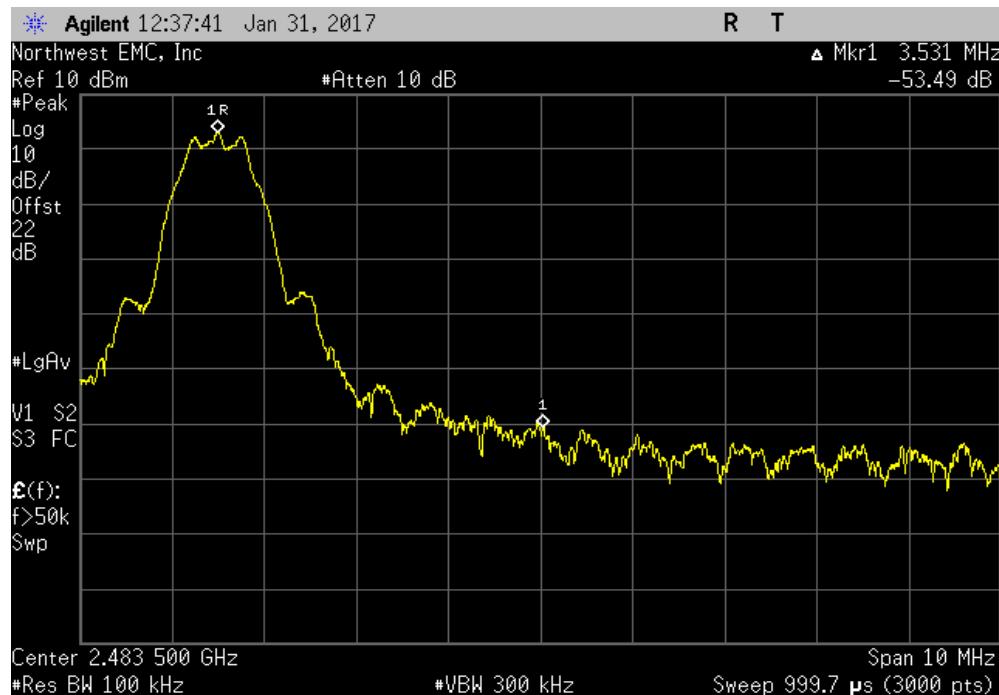
EUT:	Bluetooth Telemetry Module		Work Order:	BSTM0717	
Serial Number:	1		Date:	01/31/17	
Customer:	Boston Scientific Corporation		Temperature:	23.3 °C	
Attendees:	Deek Farah		Humidity:	25% RH	
Project:	None		Barometric Pres.:	1010 mbar	
Tested by:	Dustin Sparks	Power:	5VDC	Job Site:	MN08
TEST SPECIFICATIONS			Test Method		
FCC 15.247:2017			ANSI C63.10:2013		
COMMENTS					
EUT powered by USB connection to laptop					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	11	Signature			
			Value (dBc)	Limit ≤ (dBc)	Result
			-47.28	-20	Pass
			-53.49	-20	Pass
BLE/GFSK Low Channel, 2402 MHz					
BLE/GFSK High Channel, 2480 MHz					

# BAND EDGE COMPLIANCE

BLE/GFSK Low Channel, 2402 MHz			
	Value (dBc)	Limit $\leq$ (dBc)	Result
	-47.28	-20	Pass



BLE/GFSK High Channel, 2480 MHz			
	Value (dBc)	Limit $\leq$ (dBc)	Result
	-53.49	-20	Pass



# SPURIOUS CONDUCTED 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.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	8/12/2014	8/12/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

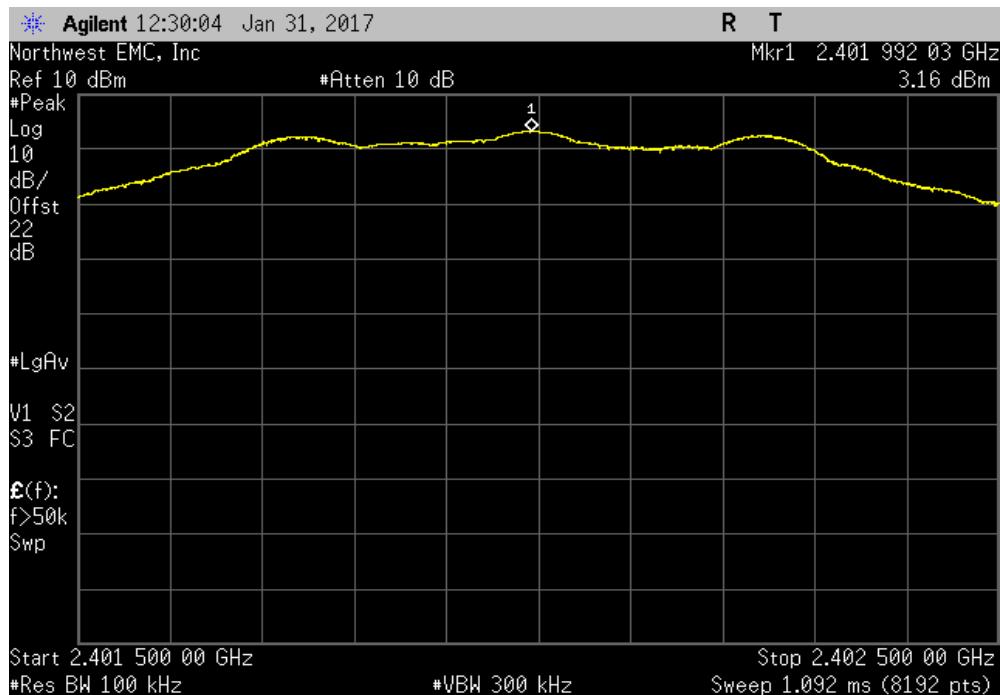
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each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

# SPURIOUS CONDUCTED EMISSIONS

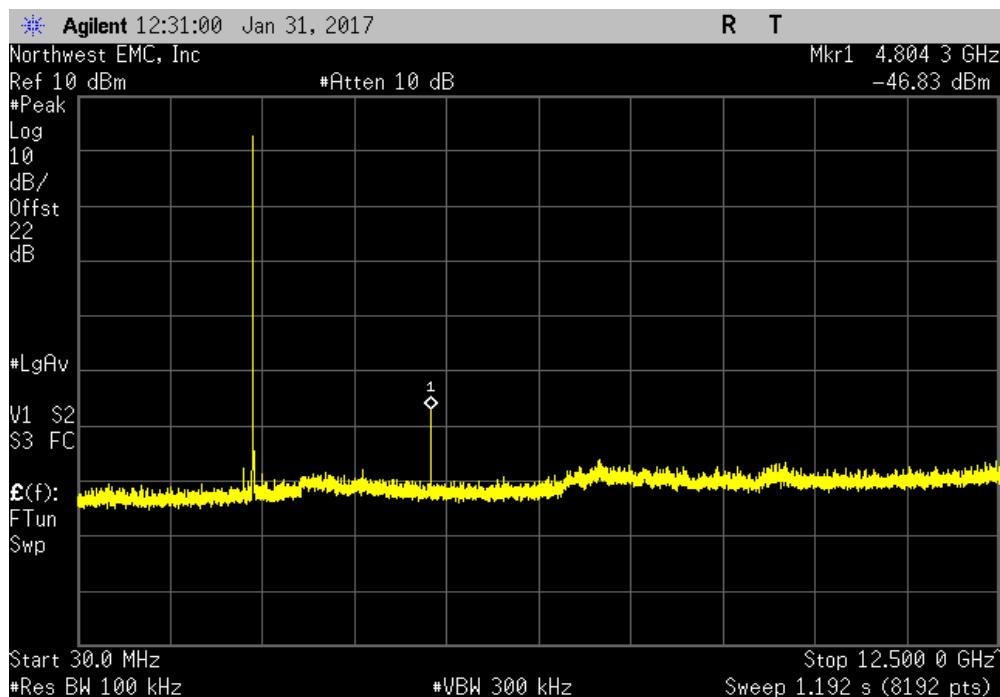
EUT:	Bluetooth Telemetry Module		Work Order:	BSTN0717	
Serial Number:	1		Date:	01/31/17	
Customer:	Boston Scientific Corporation		Temperature:	23.2 °C	
Attendees:	Deek Farah		Humidity:	24.6% RH	
Project:	None		Barometric Pres.:	1010 mbar	
Tested by:	Dustin Sparks	Power:	5VDC	Job Site:	MN08
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2017		ANSI C63.10:2013			
COMMENTS					
EUT powered by USB connection to laptop					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	11	Signature			
		Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz		Fundamental	N/A	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz		30 MHz - 12.5 GHz	-49.99	-20	Pass
BLE/GFSK Low Channel, 2402 MHz		12.5 GHz - 25 GHz	-55.59	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz		Fundamental	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz		30 MHz - 12.5 GHz	-53.76	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz		12.5 GHz - 25 GHz	-53.57	-20	Pass
BLE/GFSK High Channel, 2480 MHz		Fundamental	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz		30 MHz - 12.5 GHz	-51.95	-20	Pass
BLE/GFSK High Channel, 2480 MHz		12.5 GHz - 25 GHz	-55.37	-20	Pass

# SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
Fundamental	N/A	N/A			N/A

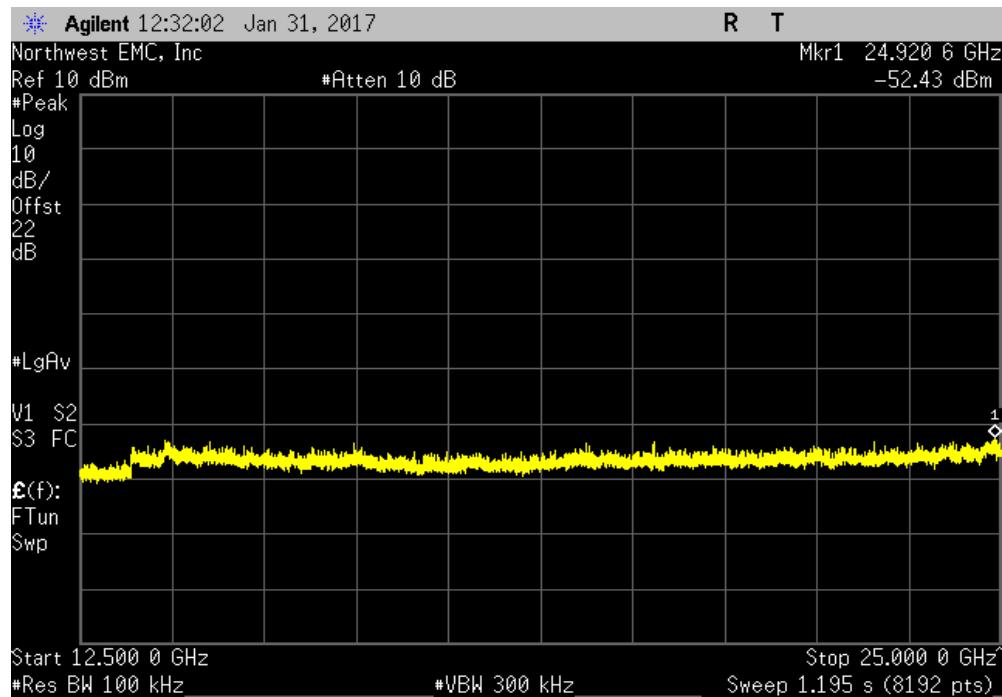


BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
30 MHz - 12.5 GHz	-49.99	-20			Pass

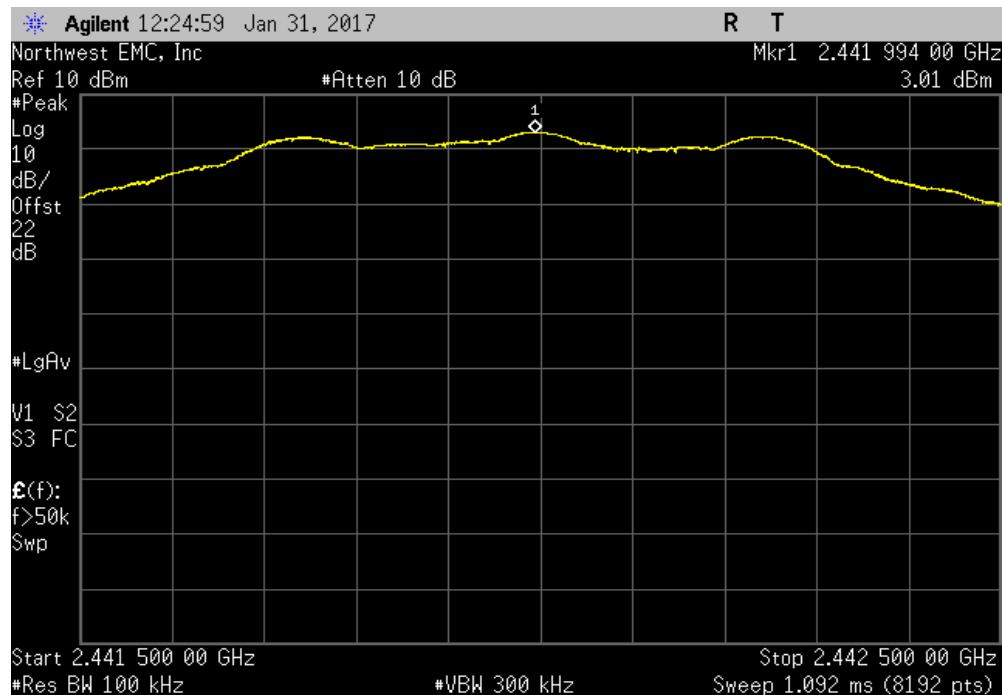


# SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Low Channel, 2402 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-55.59	-20	Pass

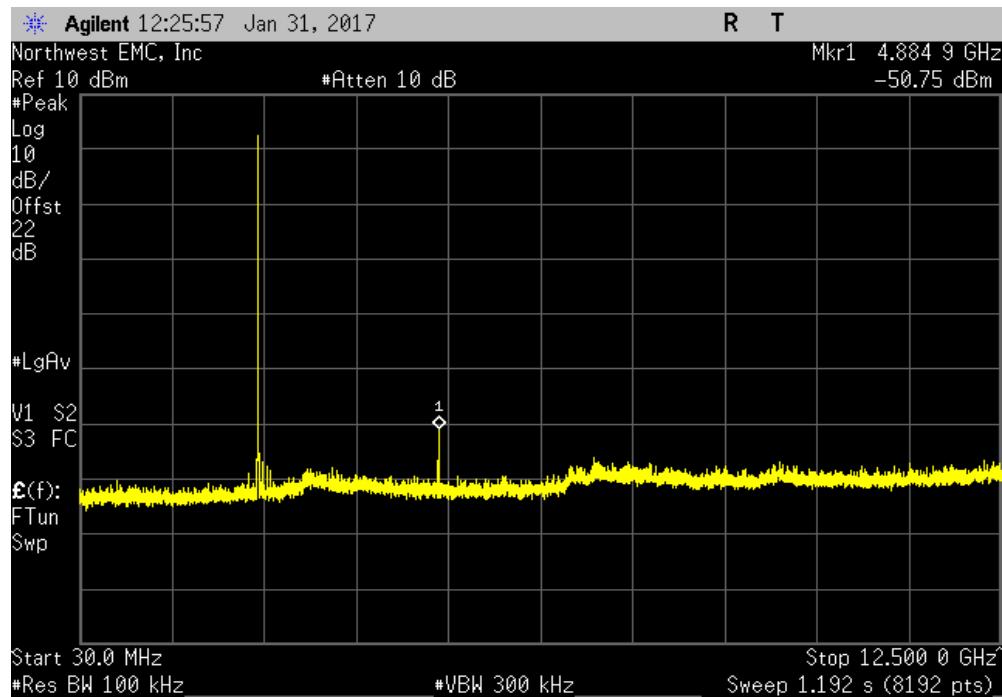


BLE/GFSK Mid Channel, 2442 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
Fundamental	N/A	N/A	N/A

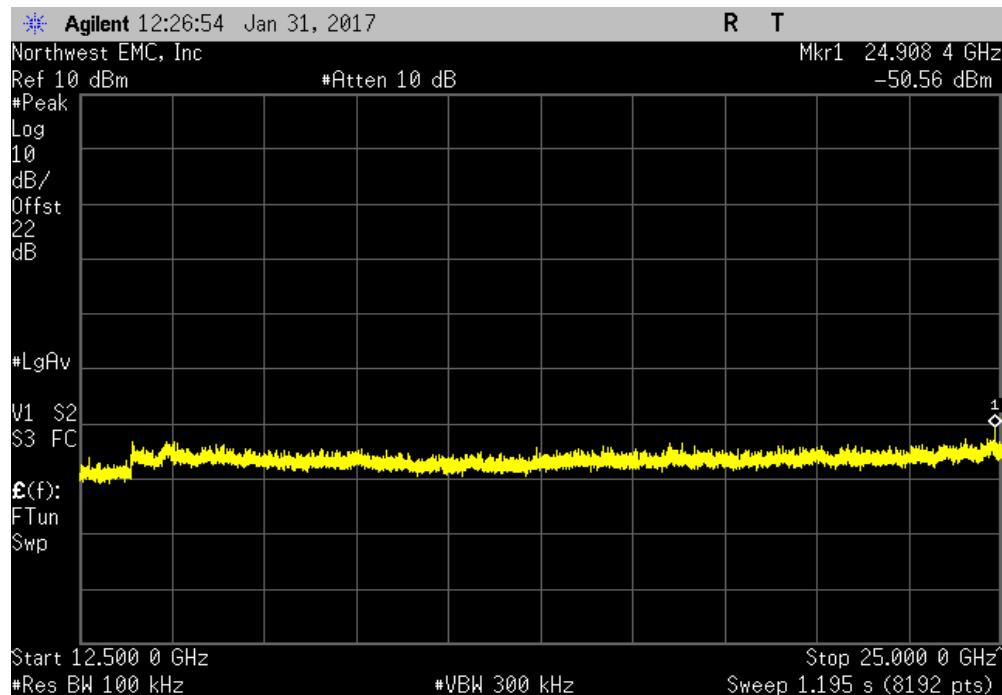


# SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range		Max Value (dBc)	Limit $\leq$ (dBc)	Result
30 MHz - 12.5 GHz		-53.76	-20	Pass

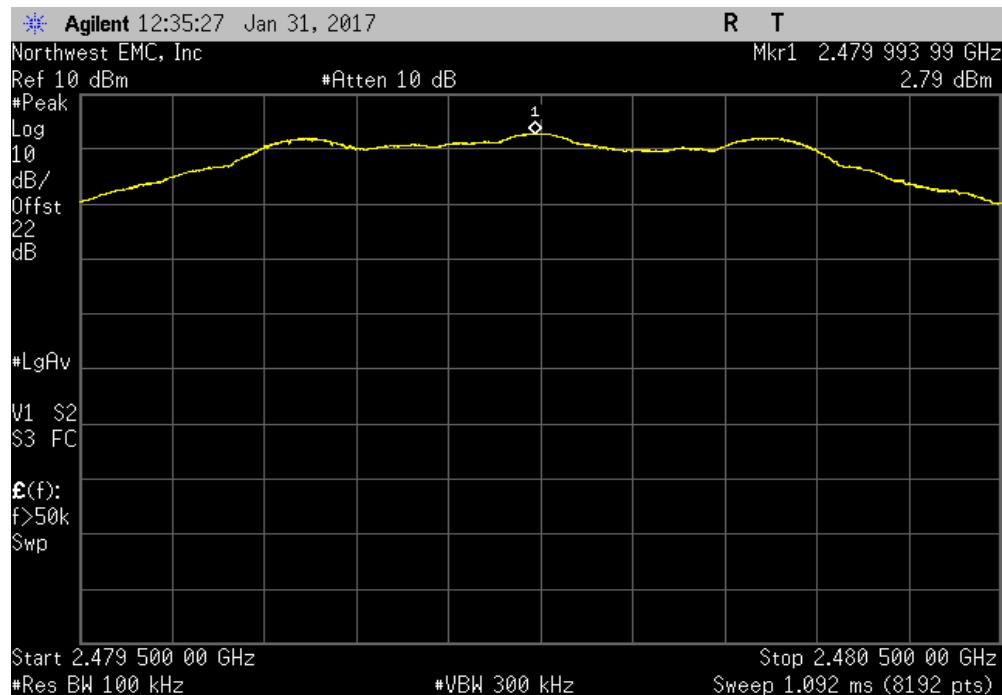


BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range		Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz		-53.57	-20	Pass

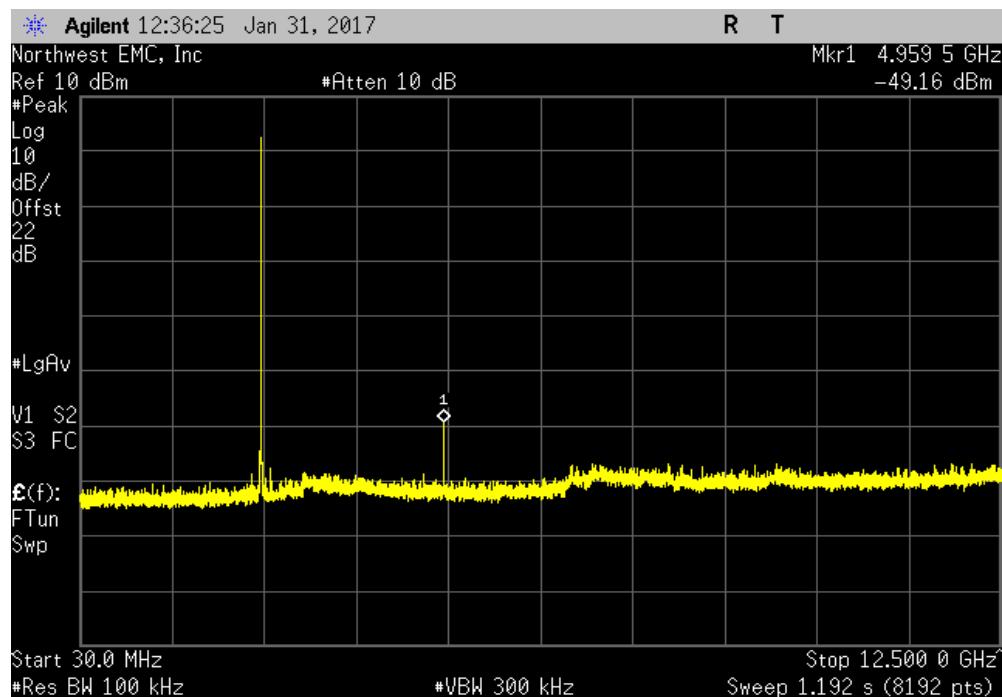


# SPURIOUS CONDUCTED EMISSIONS

Frequency Range		Max Value (dBc)	Limit $\leq$ (dBc)	Result
Fundamental		N/A	N/A	N/A

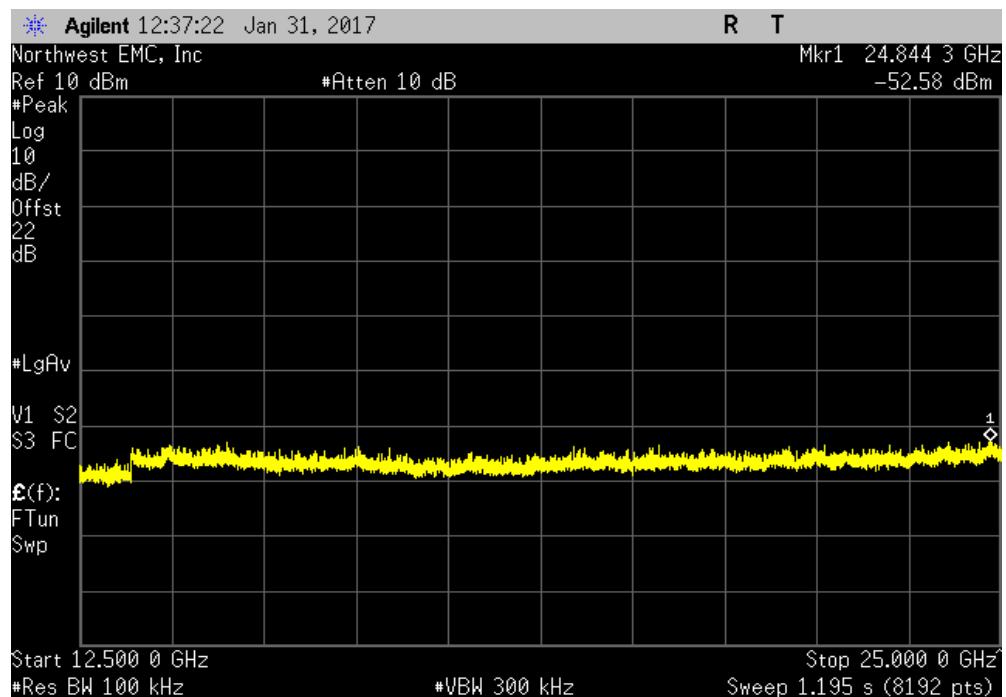


Frequency Range		Max Value (dBc)	Limit $\leq$ (dBc)	Result
30 MHz - 12.5 GHz		-51.95	-20	Pass



# SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK High Channel, 2480 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-55.37	-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) modulated

## POWER SETTINGS INVESTIGATED

5VDC

## CONFIGURATIONS INVESTIGATED

BSTN0717 - 12

## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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## 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
Attenuator	Fairview Microwave	SA18E-20	TWZ	9/23/2016	12 mo
Cable	Northwest EMC	18-26GHz Standard Gain Horn Cable	MNP	9/15/2016	12 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	7/29/2016	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/1/2016	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/1/2016	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	LFN	9/23/2016	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	9/22/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	3/1/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/1/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/1/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	9/15/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/23/2016	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/6/2017	12 mo

## MEASUREMENT BANDWIDTHS

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

# SPURIOUS RADIATED EMISSIONS

## TEST DESCRIPTION

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

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

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

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

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

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

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

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

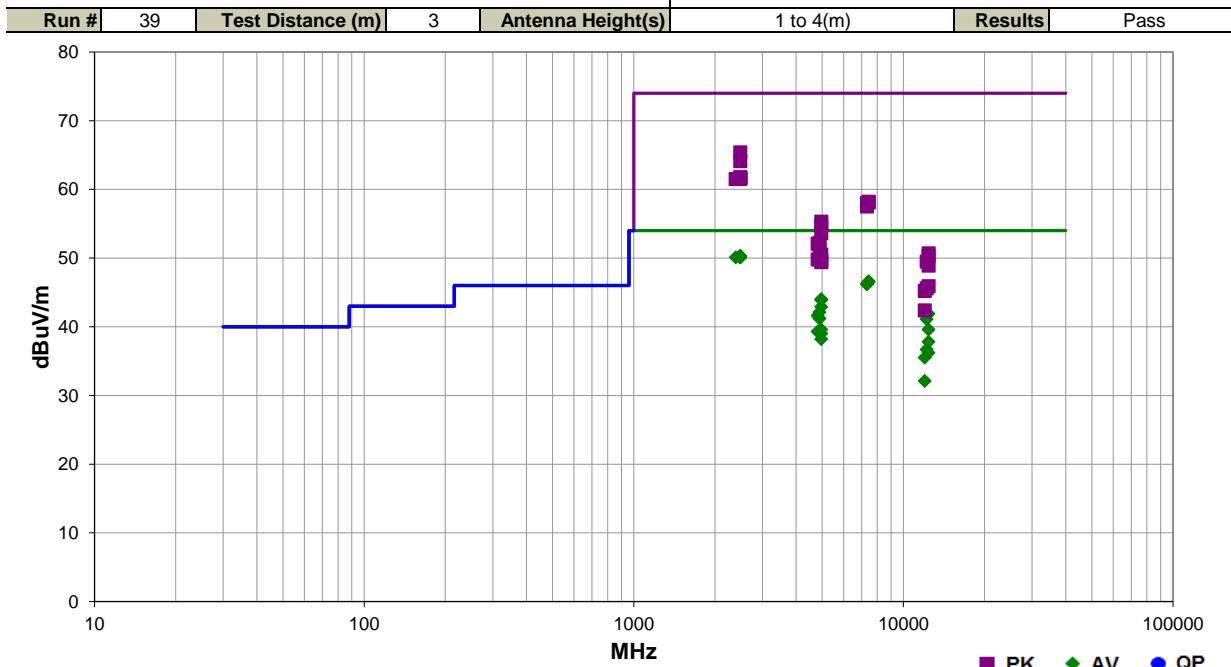
# SPURIOUS RADIATED EMISSIONS

NORTHWEST  
EMC

PSA-ESCI 2016.12.19  
EmiR5 2016.08.26

Work Order:	BSTN0717	Date:	01/30/17	
Project:	None	Temperature:	23.1 °C	
Job Site:	MN05	Humidity:	17.8% RH	
Serial Number:	1	Barometric Pres.:	1010 mbar	
EUT:	Bluetooth Telemetry Module	Tested by:	Dustin Sparks	
Configuration:	12			
Customer:	Boston Scientific Corporation			
Attendees:	Deek Farah			
EUT Power:	5VDC			
Operating Mode:	Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz) modulated			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 15.247:2017	ANSI C63.10:2013



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
2483.658	32.9	-2.6	1.0	342.0	3.0	20.0	Vert	AV	0.0	50.3	54.0	-3.7	High ch, EUT horz
2483.533	32.9	-2.6	1.0	8.1	3.0	20.0	Horz	AV	0.0	50.3	54.0	-3.7	High ch, EUT vert
2487.967	32.8	-2.6	1.4	55.1	3.0	20.0	Horz	AV	0.0	50.2	54.0	-3.8	High ch, EUT on side
2483.967	32.7	-2.6	1.0	61.0	3.0	20.0	Vert	AV	0.0	50.1	54.0	-3.9	High ch, EUT on side
2485.275	32.7	-2.6	1.0	97.0	3.0	20.0	Horz	AV	0.0	50.1	54.0	-3.9	High ch, EUT horz
2484.017	32.7	-2.6	1.0	100.0	3.0	20.0	Vert	AV	0.0	50.1	54.0	-3.9	High ch, EUT vert
2389.208	32.5	-2.4	1.6	300.9	3.0	20.0	Vert	AV	0.0	50.1	54.0	-3.9	Low ch, EUT horz
7437.792	31.3	15.3	1.0	151.0	3.0	0.0	Horz	AV	0.0	46.6	54.0	-7.4	High ch, EUT on side
7438.908	31.2	15.3	1.1	88.1	3.0	0.0	Vert	AV	0.0	46.5	54.0	-7.5	High ch, EUT horz
7326.275	31.1	15.1	1.0	146.0	3.0	0.0	Vert	AV	0.0	46.2	54.0	-7.8	Mid ch, EUT horz
7326.483	31.1	15.1	1.0	308.9	3.0	0.0	Horz	AV	0.0	46.2	54.0	-7.8	Mid ch, EUT on side
2483.583	48.0	-2.6	1.0	342.0	3.0	20.0	Vert	PK	0.0	65.4	74.0	-8.6	High ch, EUT horz
2484.300	46.7	-2.6	1.0	8.1	3.0	20.0	Horz	PK	0.0	64.1	74.0	-9.9	High ch, EUT vert
4959.858	37.3	6.7	2.1	197.0	3.0	0.0	Horz	AV	0.0	44.0	54.0	-10.0	High ch, EUT on side
4959.983	37.2	6.7	2.2	16.1	3.0	0.0	Horz	AV	0.0	43.9	54.0	-10.1	High ch, EUT vert
4959.767	36.2	6.7	1.0	81.0	3.0	0.0	Vert	AV	0.0	42.9	54.0	-11.1	High ch, EUT horz
4884.008	35.5	6.6	1.9	154.0	3.0	0.0	Horz	AV	0.0	42.1	54.0	-11.9	Mid ch, EUT on side
12398.790	41.2	0.7	1.7	41.1	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	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
2483.842	44.4	-2.6	1.0	97.0	3.0	20.0	Horz	PK	0.0	61.8	74.0	-12.2	High ch, EUT horz
2487.783	44.3	-2.6	1.0	100.0	3.0	20.0	Vert	PK	0.0	61.7	74.0	-12.3	High ch, EUT vert
4803.842	34.9	6.7	1.0	322.0	3.0	0.0	Horz	AV	0.0	41.6	54.0	-12.4	Low ch, EUT on side
2484.733	44.2	-2.6	1.0	61.0	3.0	20.0	Vert	PK	0.0	61.6	74.0	-12.4	High ch, EUT on side
2483.742	44.1	-2.6	1.4	55.1	3.0	20.0	Horz	PK	0.0	61.5	74.0	-12.5	High ch, EUT on side
2388.267	43.9	-2.4	1.6	300.9	3.0	20.0	Vert	PK	0.0	61.5	74.0	-12.5	Low ch, EUT horz
4883.825	34.6	6.6	1.0	297.9	3.0	0.0	Vert	AV	0.0	41.2	54.0	-12.8	Mid ch, EUT horz
12208.780	41.6	-0.5	1.7	42.0	3.0	0.0	Horz	AV	0.0	41.1	54.0	-12.9	Mid ch, EUT on side
4959.983	32.9	6.7	1.3	180.0	3.0	0.0	Horz	AV	0.0	39.6	54.0	-14.4	High ch, EUT horz
12401.210	33.4	6.2	1.6	35.0	3.0	0.0	Horz	AV	0.0	39.6	54.0	-14.4	High ch, EUT on side
4803.958	32.6	6.7	1.0	109.1	3.0	0.0	Vert	AV	0.0	39.3	54.0	-14.7	Low ch, EUT horz
4959.817	32.3	6.7	1.0	102.1	3.0	0.0	Vert	AV	0.0	39.0	54.0	-15.0	High ch, EUT vert
4960.067	31.5	6.7	1.0	340.0	3.0	0.0	Vert	AV	0.0	38.2	54.0	-15.8	High ch, EUT on side
7438.883	42.9	15.3	1.1	88.1	3.0	0.0	Vert	PK	0.0	58.2	74.0	-15.8	High ch, EUT horz
7438.700	42.8	15.3	1.0	151.0	3.0	0.0	Horz	PK	0.0	58.1	74.0	-15.9	High ch, EUT on side
7328.217	42.9	15.1	1.0	146.0	3.0	0.0	Vert	PK	0.0	58.0	74.0	-16.0	Mid ch, EUT horz
12401.060	31.6	6.2	4.0	353.0	3.0	0.0	Vert	AV	0.0	37.8	54.0	-16.2	High ch, EUT horz
7323.750	42.3	15.2	1.0	308.9	3.0	0.0	Horz	PK	0.0	57.5	74.0	-16.5	Mid ch, EUT on side
12208.860	37.2	-0.5	3.2	178.1	3.0	0.0	Vert	AV	0.0	36.7	54.0	-17.3	Mid ch, EUT horz
12398.800	35.5	0.7	1.7	0.0	3.0	0.0	Vert	AV	0.0	36.2	54.0	-17.8	High ch, EUT horz
12008.870	36.6	-1.1	1.6	318.9	3.0	0.0	Horz	AV	0.0	35.5	54.0	-18.5	Low ch, EUT on side
4960.042	48.6	6.7	2.1	197.0	3.0	0.0	Horz	PK	0.0	55.3	74.0	-18.7	High ch, EUT on side
4960.033	48.1	6.7	2.2	16.1	3.0	0.0	Horz	PK	0.0	54.8	74.0	-19.2	High ch, EUT vert
4959.900	46.9	6.7	1.0	81.0	3.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	High ch, EUT horz
4883.492	45.6	6.6	1.9	154.0	3.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	Mid ch, EUT on side
4804.183	45.4	6.7	1.0	322.0	3.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	Low ch, EUT on side
12008.730	33.2	-1.1	3.9	343.9	3.0	0.0	Vert	AV	0.0	32.1	54.0	-21.9	Low ch, EUT horz
4884.200	44.8	6.6	1.0	297.9	3.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	Mid ch, EUT horz
12399.980	50.0	0.7	1.7	41.1	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	High ch, EUT on side
4959.300	43.8	6.7	1.3	180.0	3.0	0.0	Horz	PK	0.0	50.5	74.0	-23.5	High ch, EUT horz
12401.210	44.1	6.2	1.6	35.0	3.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	High ch, EUT on side
4803.508	43.1	6.7	1.0	109.1	3.0	0.0	Vert	PK	0.0	49.8	74.0	-24.2	Low ch, EUT horz
4959.133	42.9	6.7	1.0	102.1	3.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	High ch, EUT vert
12210.210	50.0	-0.5	1.7	42.0	3.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	Mid ch, EUT on side
4961.617	42.7	6.7	1.0	340.0	3.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	High ch, EUT on side
12400.000	42.7	6.2	4.0	353.0	3.0	0.0	Vert	PK	0.0	48.9	74.0	-25.1	High ch, EUT horz
12399.890	45.2	0.7	1.7	0.0	3.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	High ch, EUT horz
12210.860	46.1	-0.5	3.2	178.1	3.0	0.0	Vert	PK	0.0	45.6	74.0	-28.4	Mid ch, EUT horz
12011.180	46.3	-1.1	1.6	318.9	3.0	0.0	Horz	PK	0.0	45.2	74.0	-28.8	Low ch, EUT on side
12008.980	43.5	-1.1	3.9	343.9	3.0	0.0	Vert	PK	0.0	42.4	74.0	-31.6	Low ch, EUT horz