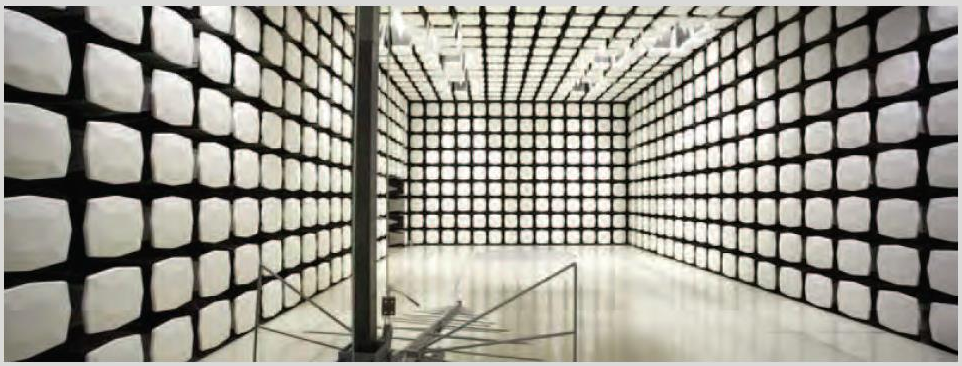
Boston Scientific Corporation

VALITUDE™

LP0002:2018

Inductive Radio

Report # BSTN0971



NVLAP LAB CODE: 200881-0

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CERTIFICATE OF TEST

Last Date of Test: February 3, 2014
Boston Scientific Corporation
EUT: VALITUDE™

Radio Equipment Testing

Standards

Specification	Method
LP0002 2018[1]	LP0002 2018[1]

Note 1: At the date of test, only LP0002 2011 was available. However, for this device, the technical requirements remain unchanged from the 2016 version to the current 2018 version. Therefore, the test lab determined that the original test data shows compliance with LP0002 2018.

Results

Method Clause	Test Description	Applied	Results	Comments
Appendix I, II.(II)	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
Appendix I, II.(III, IV)	Field Strength of Fundamental	Yes	Pass	
Appendix I, II.(III, IV)	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

On July 1, 2016, Northwest EMC was purchased by Element Materials Technology. All laboratory accreditations, designations, and recognitions were transferred from Northwest EMC to Element Materials Technology. No changes were made to the facilities, equipment, procedures, or personnel. This test report contains test data produced by Northwest EMC prior to the purchase on July 1, 2016, and by Element Materials Technology after that date. All the test data in this test report is accredited and maintains the same recognition as described herein.

Approved By:

Eric Brandon, Department Manager

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

REVISION HISTORY

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

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

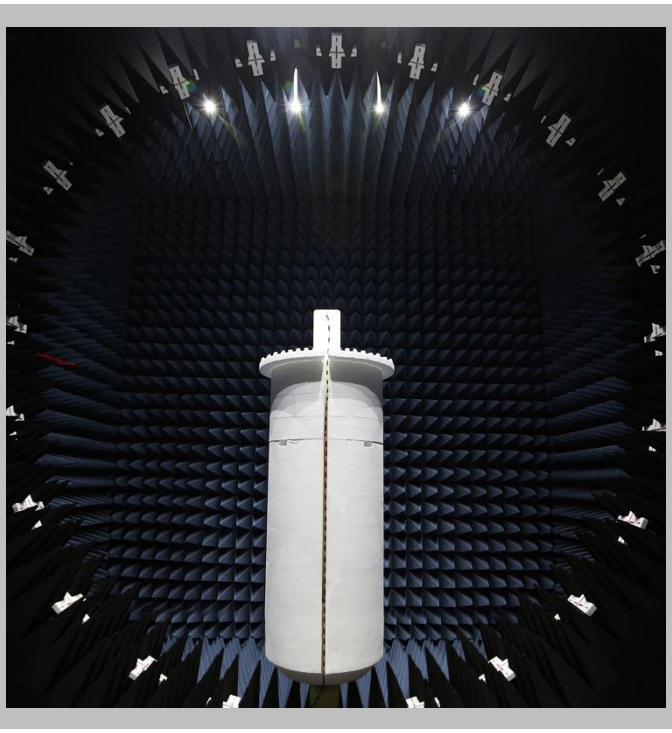
MIC – Recognized by MIC as a CAB for the acceptance of test data.

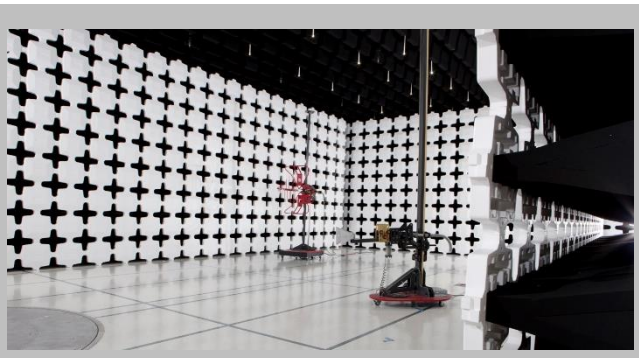
SCOPE

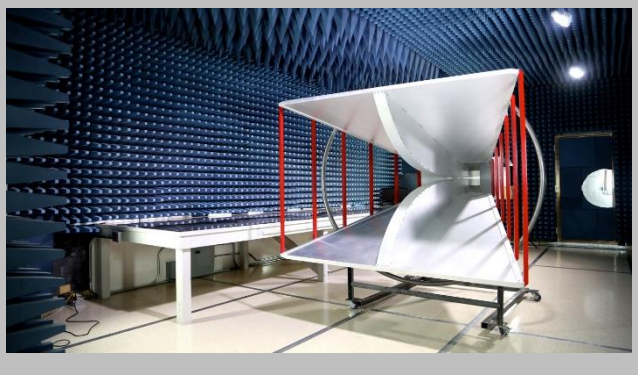
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

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







MEASUREMENT UNCERTAINTY

element
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.

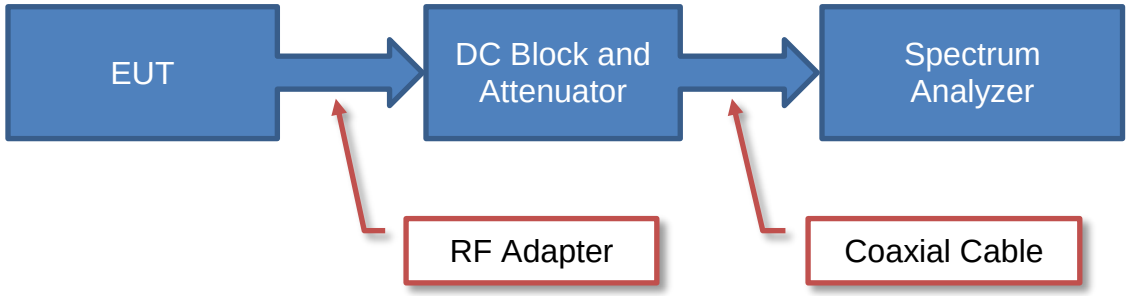
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

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

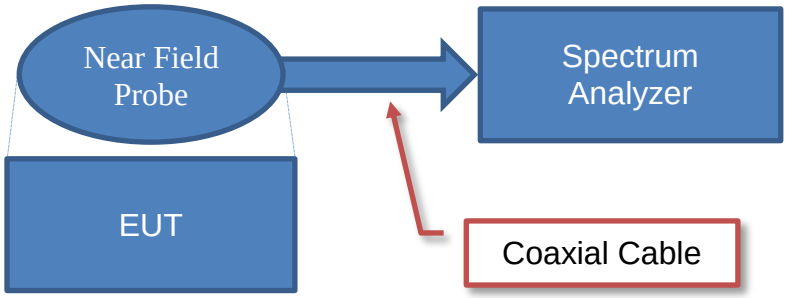
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field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

Test Setup Block Diagrams

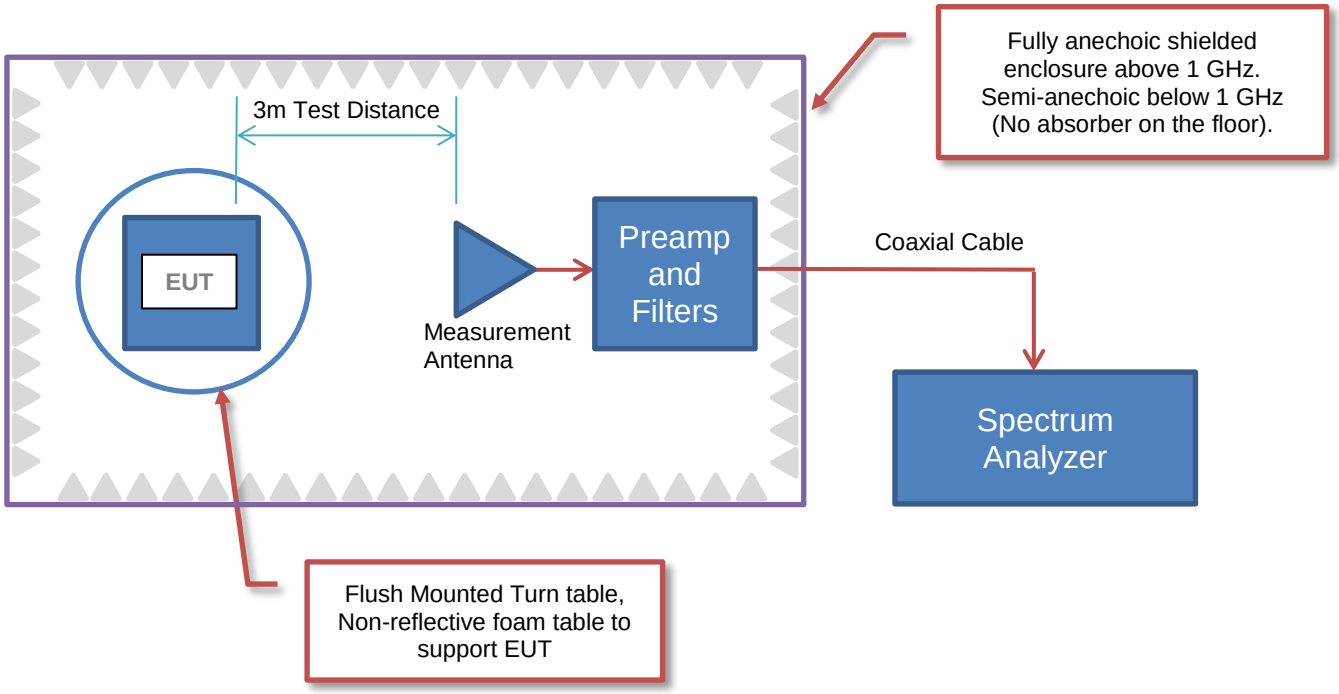
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Boston Scientific Corporation
Address:	4100 Hamline Avenue
City, State, Zip:	St. Paul, MN 55014
Test Requested By:	Jim Kippola
EUT:	VALITUDE™
First Date of Test:	February 3, 2014
Last Date of Test:	February 3, 2014
Receipt Date of Samples:	February 3, 2014
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The VALITUDE ™ is an implantable Pacemaker that transmits in the MICS band of 402-405 MHz and has backup communication using inductive communications at 57kHz.

Client Justification:
All devices in these families incorporate the identical MedRadio design.

Testing Objective:
To demonstrate compliance of the inductive portion of the device to Taiwan specifications.

CONFIGURATIONS

Configuration BSTN0453- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Implant Inductive Radio	Boston Scientific Corporation	ACCOLADE / L331	417249

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
IS1 Lead, Model: 4063, SN: 305813	No	45cm	No	Implant Inductive Radio	Tissue Simulant
IS1 Lead, Model: 45, SN: 28782266	No	44cm	No	Implant Inductive Radio	Tissue Simulant
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration BSTN0453- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Implant Inductive Radio	Boston Scientific Corporation	ACCOLADE / L331	417250

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
IS1 Lead, Model: 4063, SN: 305813	No	45cm	No	Implant Inductive Radio	Tissue Simulant
IS1 Lead, Model: 45, SN: 28782266	No	44cm	No	Implant Inductive Radio	Tissue Simulant
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration BSTN0453- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Implant Inductive Radio	Boston Scientific Corporation	ACCOLADE / L331	417251

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
IS1 Lead, Model: 4063, SN: 305813	No	45cm	No	Implant Inductive Radio	Tissue Simulant
IS1 Lead, Model: 45, SN: 28782266	No	44cm	No	Implant Inductive Radio	Tissue Simulant
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2/3/2014	Field Strength of Fundamental	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	2/3/2014	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

FIELD STRENGTH OF FUNDAMENTAL

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 inductive at 57 kHz, all ones (CW).

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

BSTN0453 - 1
BSTN0453 - 2
BSTN0453 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

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
Antenna, Loop	ETS Lindgren	6502	AOB	2/20/2013	24 mo
MN04 Cables	ESM Cable Corp.	MN04 Horn Cables	MNE	4/10/2013	12 mo
Spectrum Analyzer	Agilent	E4440A	AFG	5/16/2012	24 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

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

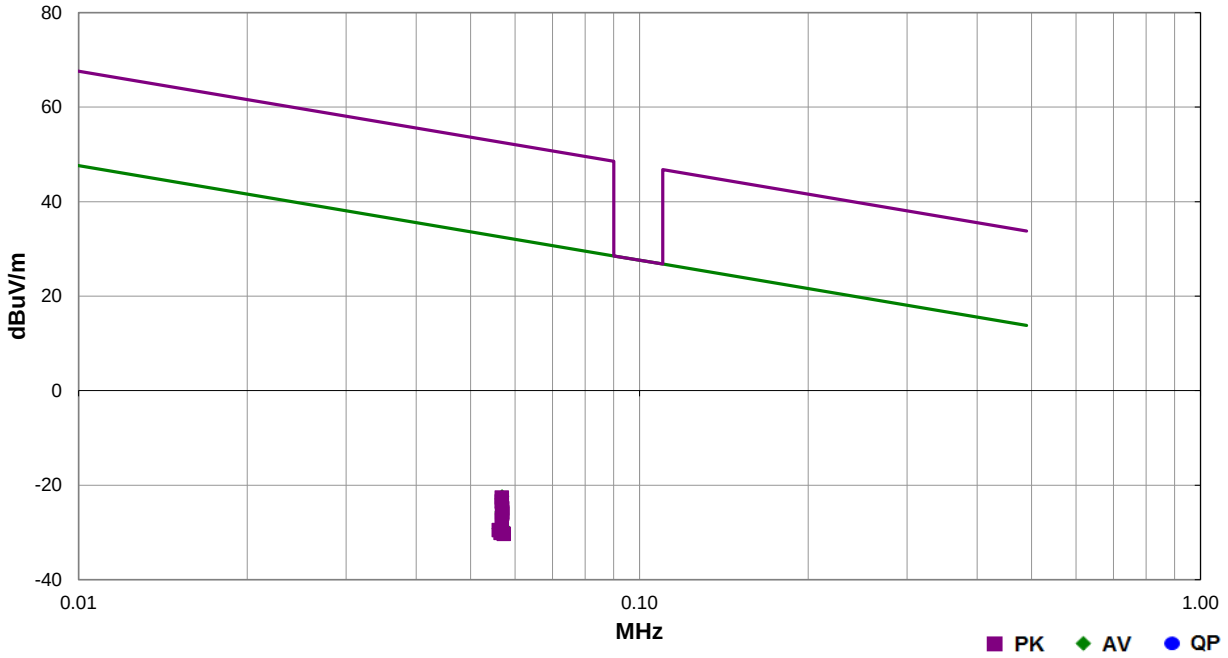
If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417249	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	1				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, all ones (CW).				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

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



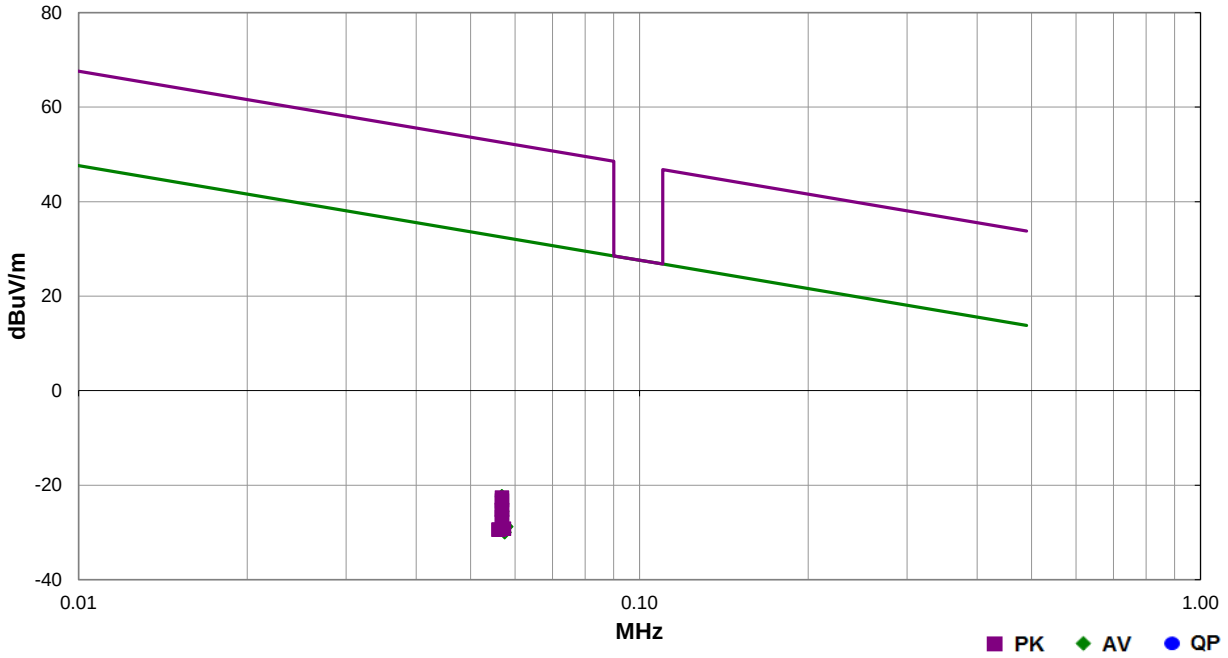
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.057	45.1	12.5	1.0	11.0	3.0	0.0	Par to EUT	AV	-80.0	-22.4	32.5	-54.9	EUT on Side
0.057	44.6	12.5	1.0	169.0	3.0	0.0	Par to EUT	AV	-80.0	-22.9	32.5	-55.4	EUT Vertical
0.057	42.6	12.5	1.0	96.0	3.0	0.0	Perp to GND	AV	-80.0	-24.9	32.5	-57.4	EUT on Side
0.057	41.9	12.5	1.0	58.0	3.0	0.0	Par to EUT	AV	-80.0	-25.6	32.5	-58.1	EUT Horizontal
0.057	41.8	12.5	1.0	40.0	3.0	0.0	Perp to GND	AV	-80.0	-25.7	32.5	-58.2	EUT Vertical
0.057	41.1	12.5	1.0	88.0	3.0	0.0	Par to GND	AV	-80.0	-26.4	32.5	-58.9	EUT Horizontal
0.057	38.5	12.5	1.0	58.0	3.0	0.0	Perp to GND	AV	-80.0	-29.0	32.4	-61.4	EUT Horizontal
0.057	38.4	12.5	1.0	354.0	3.0	0.0	Par to GND	AV	-80.0	-29.1	32.5	-61.6	EUT Vertical
0.056	38.3	12.5	1.0	312.0	3.0	0.0	Par to GND	AV	-80.0	-29.2	32.6	-61.8	EUT on Side
0.057	44.9	12.5	1.0	11.0	3.0	0.0	Par to EUT	PK	-80.0	-22.6	52.5	-75.1	EUT on Side
0.057	44.1	12.5	1.0	169.0	3.0	0.0	Par to EUT	PK	-80.0	-23.4	52.5	-75.9	EUT Vertical
0.057	42.6	12.5	1.0	96.0	3.0	0.0	Perp to GND	PK	-80.0	-24.9	52.5	-77.4	EUT on Side
0.057	41.8	12.5	1.0	40.0	3.0	0.0	Perp to GND	PK	-80.0	-25.7	52.5	-78.2	EUT Vertical
0.057	41.5	12.5	1.0	58.0	3.0	0.0	Par to EUT	PK	-80.0	-26.0	52.5	-78.5	EUT Horizontal
0.057	40.2	12.5	1.0	88.0	3.0	0.0	Par to GND	PK	-80.0	-27.3	52.5	-79.8	EUT Horizontal
0.056	38.0	12.5	1.0	312.0	3.0	0.0	Par to GND	PK	-80.0	-29.5	52.6	-82.1	EUT on Side
0.057	37.4	12.5	1.0	354.0	3.0	0.0	Par to GND	PK	-80.0	-30.1	52.5	-82.6	EUT Vertical
0.057	37.2	12.5	1.0	58.0	3.0	0.0	Perp to GND	PK	-80.0	-30.3	52.4	-82.7	EUT Horizontal

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417250	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	2				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, all ones (CW).				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

Run #	7	**Test Distance (m)**	3	**Antenna Height(s)**	1m	**Results**	Pass



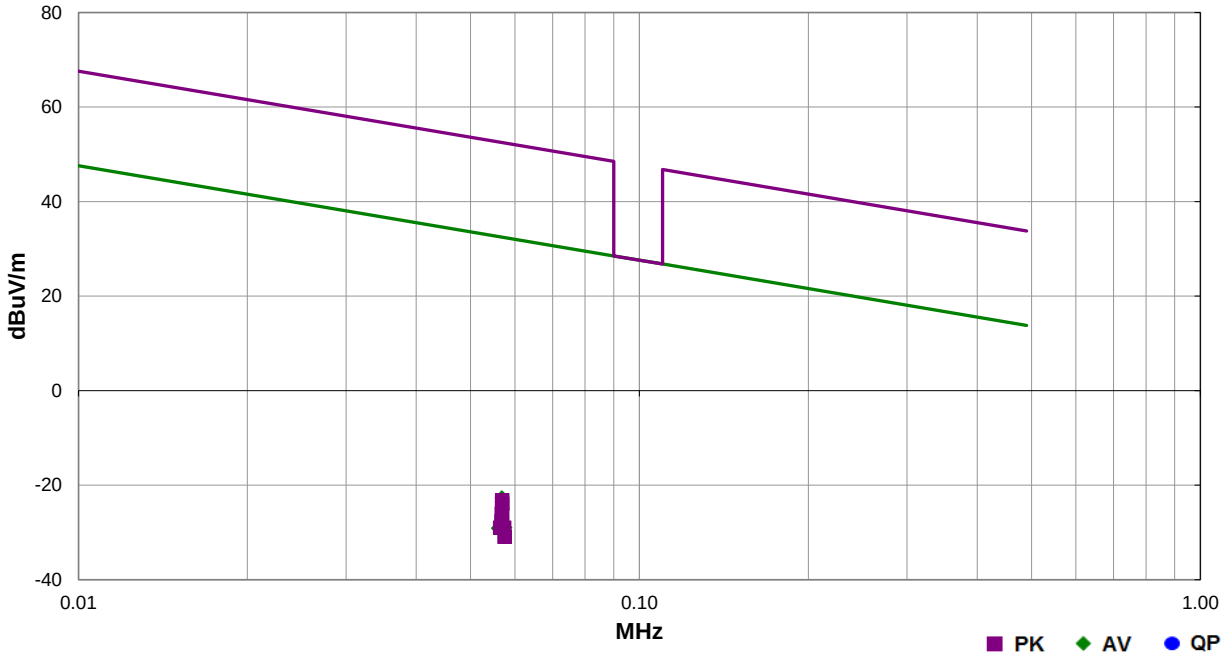
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.057	45.2	12.5	1.0	196.0	3.0	0.0	Par to EUT	AV	-80.0	-22.3	32.5	-54.8	EUT on Side
0.057	45.0	12.5	1.0	4.0	3.0	0.0	Par to EUT	AV	-80.0	-22.5	32.5	-55.0	EUT Vertical
0.057	42.8	12.5	1.0	265.0	3.0	0.0	Perp to GND	AV	-80.0	-24.7	32.5	-57.2	EUT on Side
0.057	42.6	12.5	1.0	86.0	3.0	0.0	Perp to GND	AV	-80.0	-24.9	32.5	-57.4	EUT Vertical
0.057	41.9	12.5	1.0	160.0	3.0	0.0	Par to GND	AV	-80.0	-25.6	32.5	-58.1	EUT Horizontal
0.057	41.0	12.5	1.0	2.0	3.0	0.0	Par to EUT	AV	-80.0	-26.5	32.5	-59.0	EUT Horizontal
0.057	38.9	12.5	1.0	341.0	3.0	0.0	Perp to GND	AV	-80.0	-28.6	32.4	-61.0	EUT Horizontal
0.058	38.7	12.5	1.0	202.0	3.0	0.0	Par to GND	AV	-80.0	-28.8	32.3	-61.1	EUT Vertical
0.058	37.5	12.5	1.0	54.0	3.0	0.0	Par to GND	AV	-80.0	-30.0	32.4	-62.4	EUT on Side
0.057	44.9	12.5	1.0	4.0	3.0	0.0	Par to EUT	PK	-80.0	-22.6	52.5	-75.1	EUT Vertical
0.057	44.3	12.5	1.0	196.0	3.0	0.0	Par to EUT	PK	-80.0	-23.2	52.5	-75.7	EUT on Side
0.057	42.3	12.5	1.0	86.0	3.0	0.0	Perp to GND	PK	-80.0	-25.2	52.5	-77.7	EUT Vertical
0.057	42.3	12.5	1.0	265.0	3.0	0.0	Perp to GND	PK	-80.0	-25.2	52.5	-77.7	EUT on Side
0.057	40.8	12.5	1.0	160.0	3.0	0.0	Par to GND	PK	-80.0	-26.7	52.5	-79.2	EUT Horizontal
0.057	39.7	12.5	1.0	2.0	3.0	0.0	Par to EUT	PK	-80.0	-27.8	52.5	-80.3	EUT Horizontal
0.057	38.3	12.5	1.0	202.0	3.0	0.0	Par to GND	PK	-80.0	-29.2	52.4	-81.6	EUT Vertical
0.056	38.1	12.5	1.0	341.0	3.0	0.0	Perp to GND	PK	-80.0	-29.4	52.6	-82.0	EUT Horizontal
0.056	38.1	12.5	1.0	54.0	3.0	0.0	Par to GND	PK	-80.0	-29.4	52.6	-82.0	EUT on Side

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417251	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	3				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, all ones (CW).				
Deviations:	None				
Comments:	None				

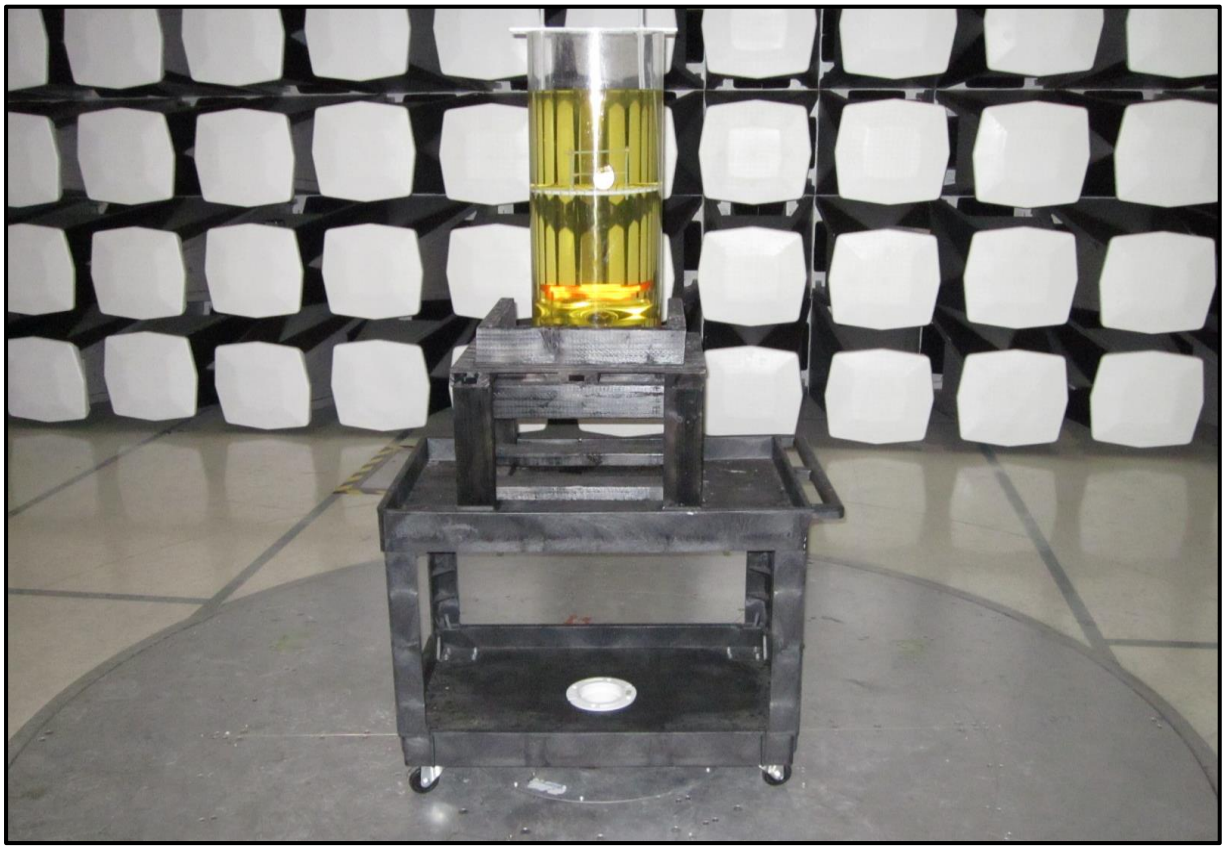
Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

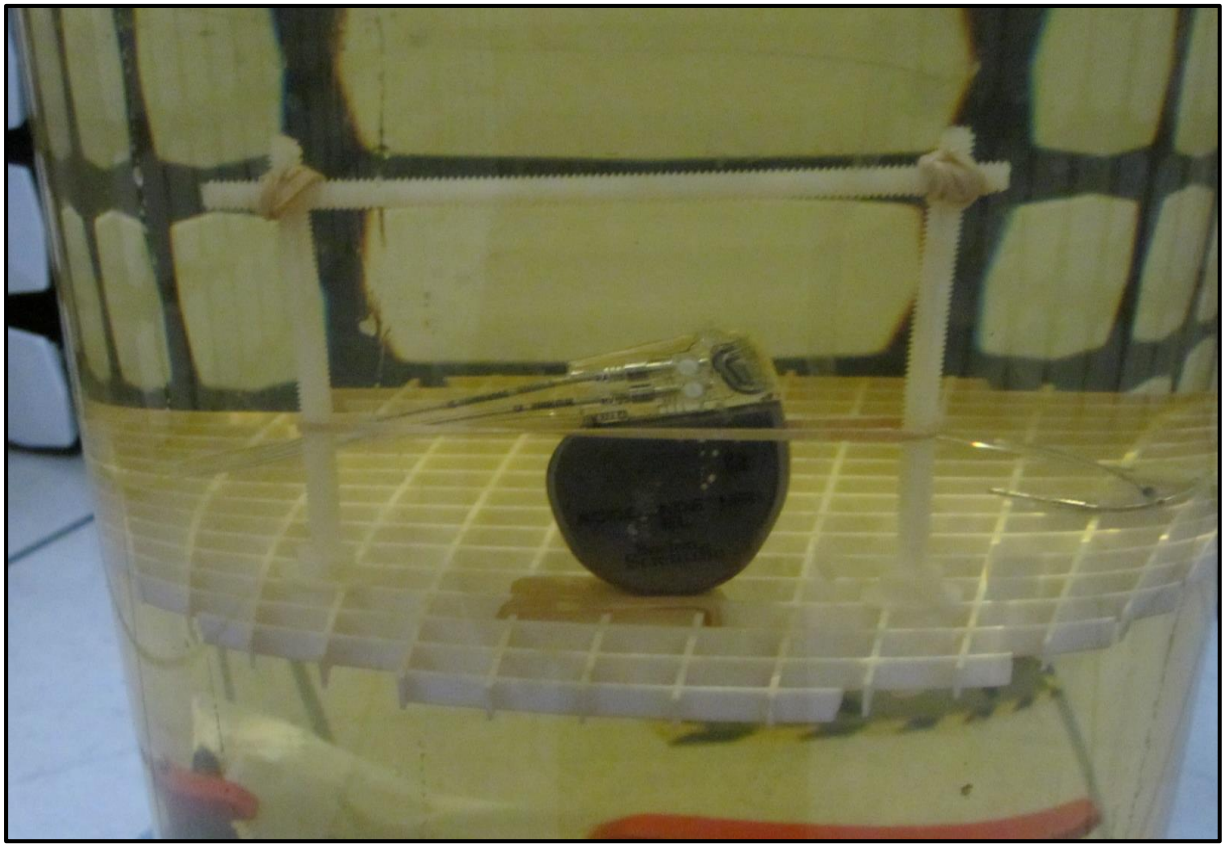
Run #	11	**Test Distance (m)**	3	**Antenna Height(s)**	1m	**Results**	Pass



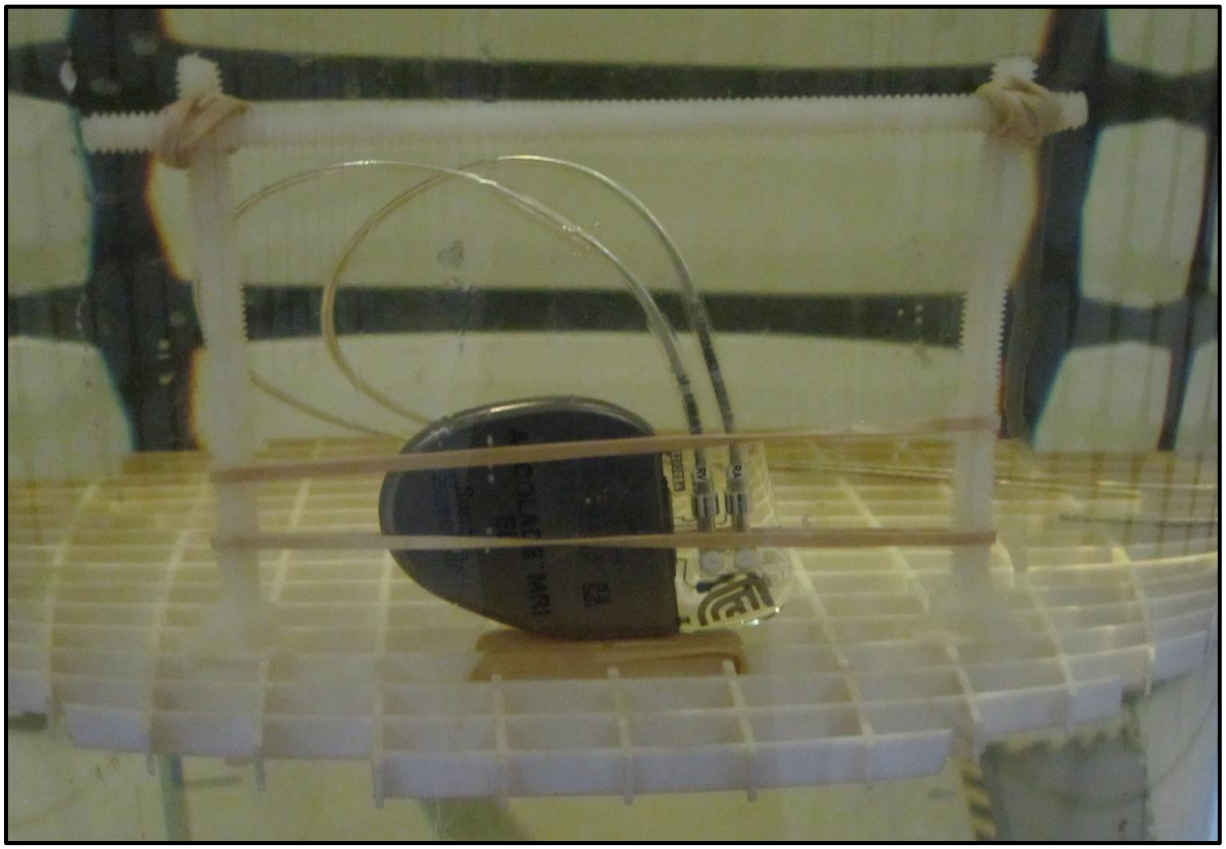
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.057	44.9	12.5	1.0	1.0	3.0	0.0	Par to EUT	AV	-80.0	-22.6	32.5	-55.1	EUT on Side
0.057	43.9	12.5	1.0	183.0	3.0	0.0	Par to EUT	AV	-80.0	-23.6	32.5	-56.1	EUT Vertical
0.057	42.4	12.5	1.0	287.0	3.0	0.0	Perp to GND	AV	-80.0	-25.1	32.5	-57.6	EUT Vertical
0.057	42.1	12.5	1.0	86.0	3.0	0.0	Perp to GND	AV	-80.0	-25.4	32.5	-57.9	EUT on Side
0.057	41.5	12.5	1.0	86.0	3.0	0.0	Perp to GND	PK	-80.0	-26.0	32.5	-58.5	EUT on Side
0.057	41.1	12.5	1.0	329.0	3.0	0.0	Par to EUT	AV	-80.0	-26.4	32.5	-58.9	EUT Horizontal
0.057	40.1	12.5	1.0	269.0	3.0	0.0	Par to GND	AV	-80.0	-27.4	32.5	-59.9	EUT Horizontal
0.058	38.5	12.5	1.0	104.0	3.0	0.0	Perp to GND	AV	-80.0	-29.0	32.4	-61.4	EUT Horizontal
0.057	38.5	12.5	1.0	325.0	3.0	0.0	Par to GND	PK	-80.0	-29.0	32.5	-61.5	EUT on Side
0.056	38.4	12.5	1.0	112.0	3.0	0.0	Par to GND	AV	-80.0	-29.1	32.6	-61.7	EUT Vertical
0.057	38.2	12.5	1.0	325.0	3.0	0.0	Par to GND	AV	-80.0	-29.3	32.5	-61.8	EUT on Side
0.057	44.3	12.5	1.0	1.0	3.0	0.0	Par to EUT	PK	-80.0	-23.2	52.5	-75.7	EUT on Side
0.057	43.6	12.5	1.0	183.0	3.0	0.0	Par to EUT	PK	-80.0	-23.9	52.5	-76.4	EUT Vertical
0.057	41.5	12.5	1.0	287.0	3.0	0.0	Perp to GND	PK	-80.0	-26.0	52.5	-78.5	EUT Vertical
0.057	40.0	12.5	1.0	329.0	3.0	0.0	Par to EUT	PK	-80.0	-27.5	52.5	-80.0	EUT Horizontal
0.057	39.5	12.5	1.0	269.0	3.0	0.0	Par to GND	PK	-80.0	-28.0	52.5	-80.5	EUT Horizontal
0.056	38.5	12.5	1.0	112.0	3.0	0.0	Par to GND	PK	-80.0	-29.0	52.6	-81.6	EUT Vertical
0.057	36.6	12.5	1.0	104.0	3.0	0.0	Perp to GND	PK	-80.0	-30.9	52.4	-83.3	EUT Horizontal

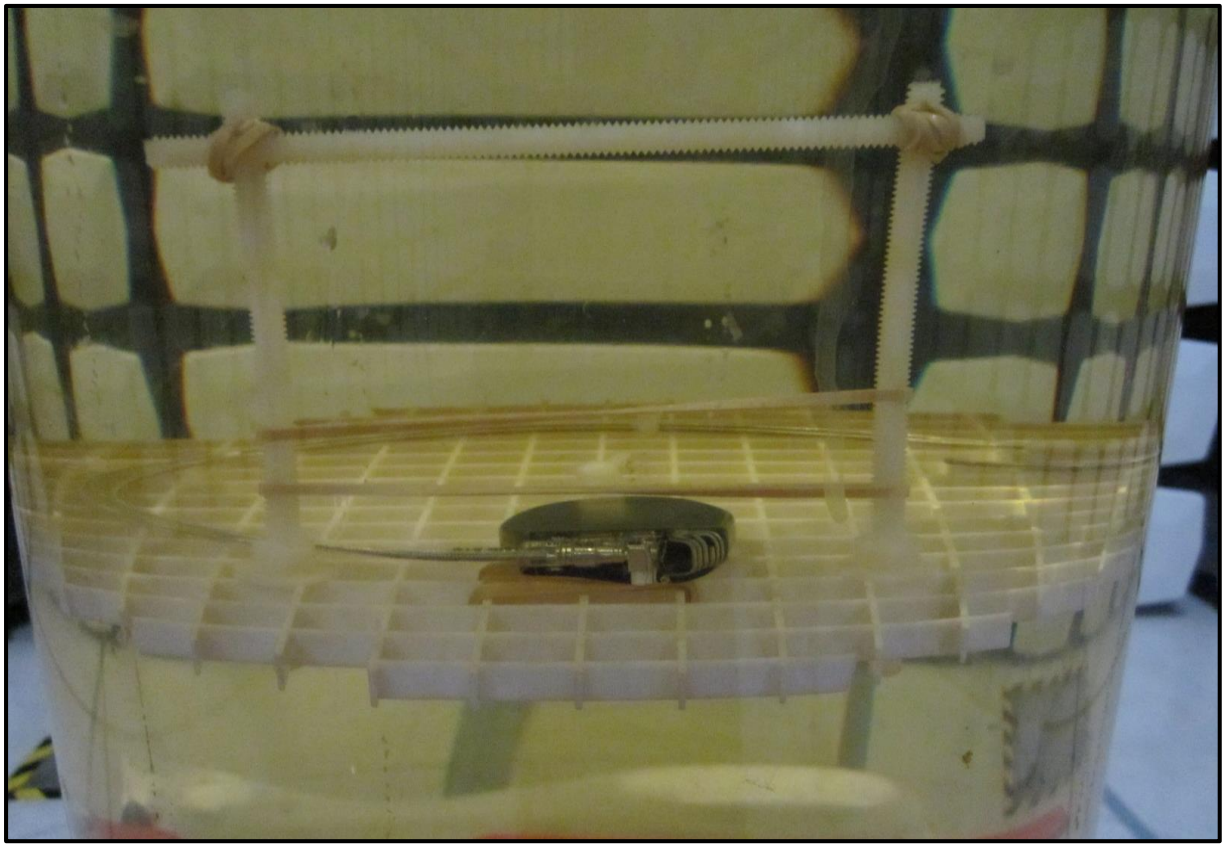
FIELD STRENGTH OF FUNDAMENTAL





FIELD STRENGTH OF FUNDAMENTAL





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 inductive at 57 kHz, Pseudorandom.

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

BSTN0453 - 1
BSTN0453 - 2
BSTN0453 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	1000 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
Antenna, Bilog	Teseq	CBL 6141B	AYD	12/17/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	5/20/2013	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	5/20/2013	12 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 mo
Antenna, Loop	ETS Lindgren	6502	AOB	2/20/2013	24 mo
MN04 Cables	ESM Cable Corp.	MN04 Horn Cables	MNE	4/10/2013	12 mo
Spectrum Analyzer	Agilent	E4440A	AFG	5/16/2012	24 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

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

For measurements below 30 MHz, as outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

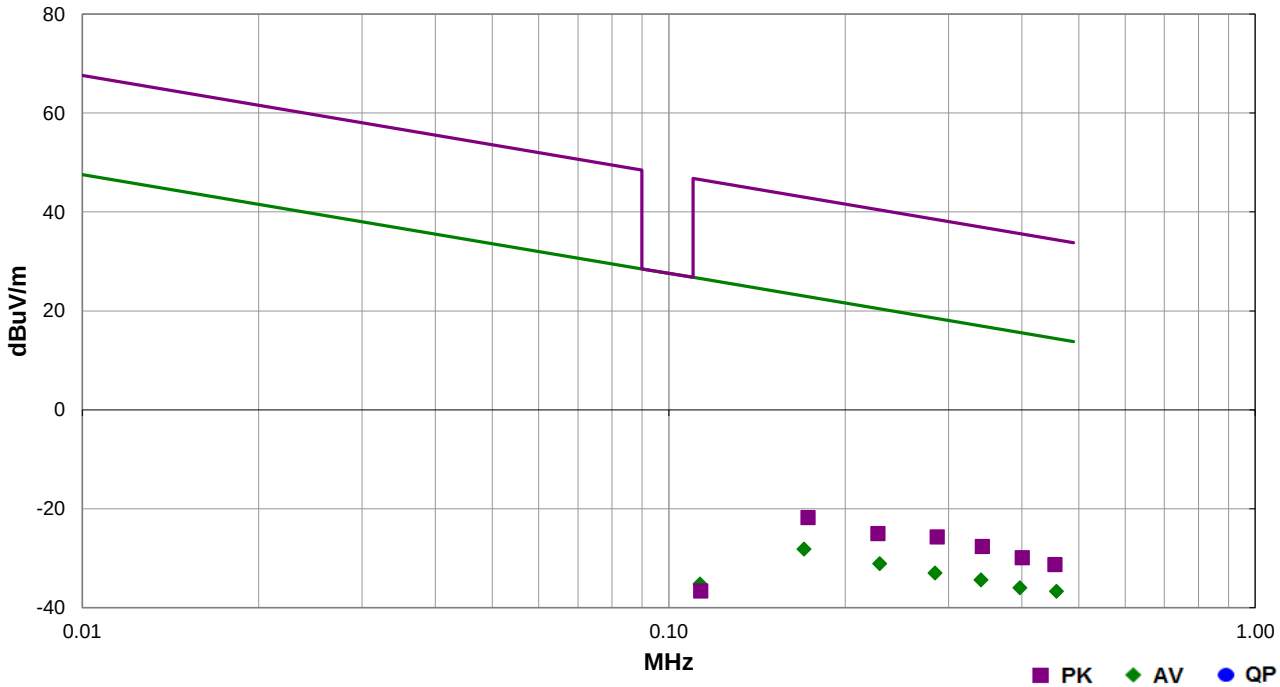
If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

SPURIOUS RADIATED EMISSIONS

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417249	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	1				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, Pseudorandom.				
Deviations:	None				
Comments:	EUT on Side				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

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



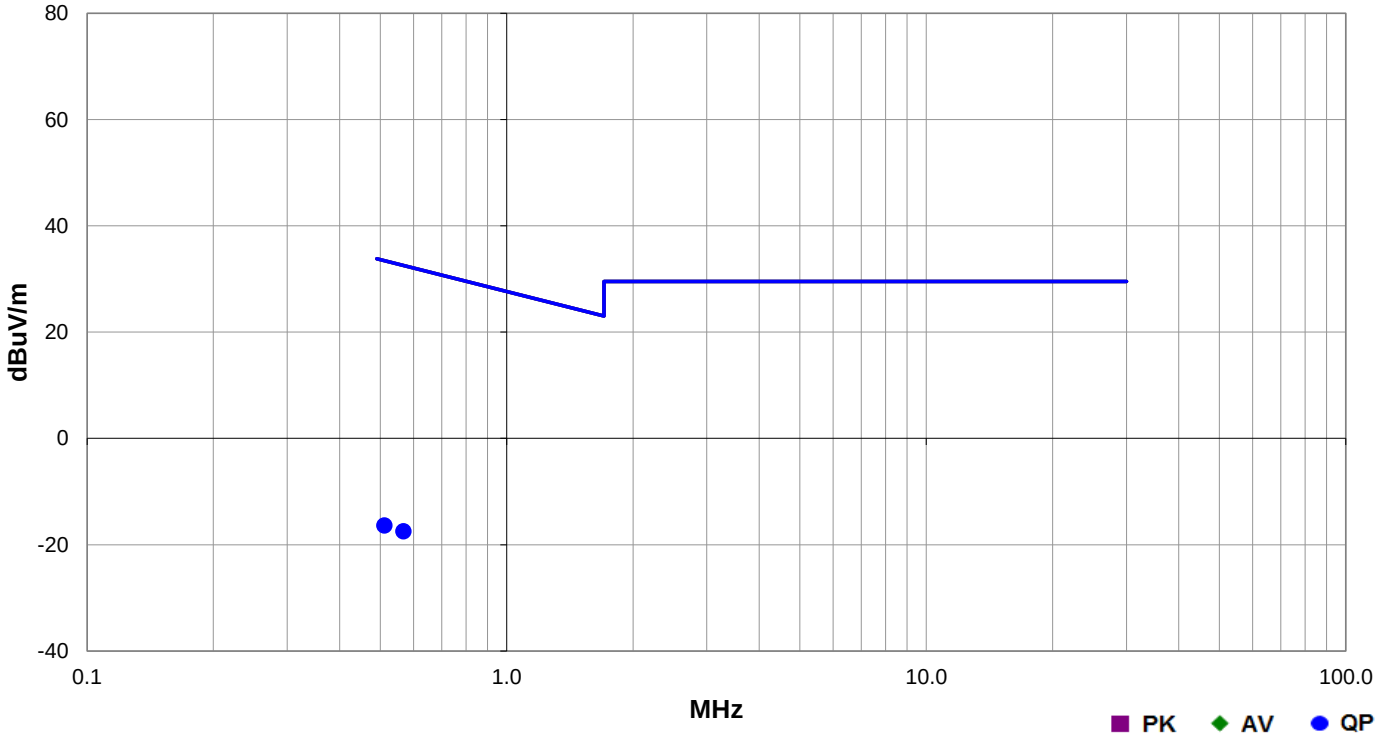
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
0.458	31.6	11.7	1.0	270.0	3.0	0.0	Par to EUT	AV	-80.0	-36.7	14.4	-51.1
0.170	40.2	11.6	1.0	33.0	3.0	0.0	Par to EUT	AV	-80.0	-28.2	23.0	-51.2
0.341	34.0	11.6	1.0	96.0	3.0	0.0	Par to EUT	AV	-80.0	-34.4	17.0	-51.4
0.229	37.3	11.6	1.0	22.0	3.0	0.0	Par to EUT	AV	-80.0	-31.1	20.4	-51.5
0.284	35.4	11.6	1.0	177.0	3.0	0.0	Par to EUT	AV	-80.0	-33.0	18.5	-51.5
0.397	32.4	11.6	1.0	219.0	3.0	0.0	Par to EUT	AV	-80.0	-36.0	15.6	-51.6
0.113	33.1	11.7	1.0	110.0	3.0	0.0	Par to EUT	AV	-80.0	-35.2	26.6	-61.8
0.287	42.7	11.6	1.0	177.0	3.0	0.0	Par to EUT	PK	-80.0	-25.7	38.5	-64.2
0.343	40.8	11.6	1.0	96.0	3.0	0.0	Par to EUT	PK	-80.0	-27.6	36.9	-64.5
0.173	46.6	11.6	1.0	33.0	3.0	0.0	Par to EUT	PK	-80.0	-21.8	42.9	-64.6
0.401	38.5	11.6	1.0	219.0	3.0	0.0	Par to EUT	PK	-80.0	-29.9	35.6	-65.5
0.227	43.4	11.6	1.0	22.0	3.0	0.0	Par to EUT	PK	-80.0	-25.0	40.5	-65.5
0.455	37.0	11.7	1.0	270.0	3.0	0.0	Par to EUT	PK	-80.0	-31.3	34.4	-65.7
0.113	31.7	11.7	1.0	110.0	3.0	0.0	Par to EUT	PK	-80.0	-36.6	46.5	-83.2

SPURIOUS RADIATED EMISSIONS

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417249	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	1				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, Pseudorandom.				
Deviations:	None				
Comments:	EUT on Side				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

Run #	4	**Test Distance (m)**	1	**Antenna Height(s)**	1.5m	**Results**	Pass



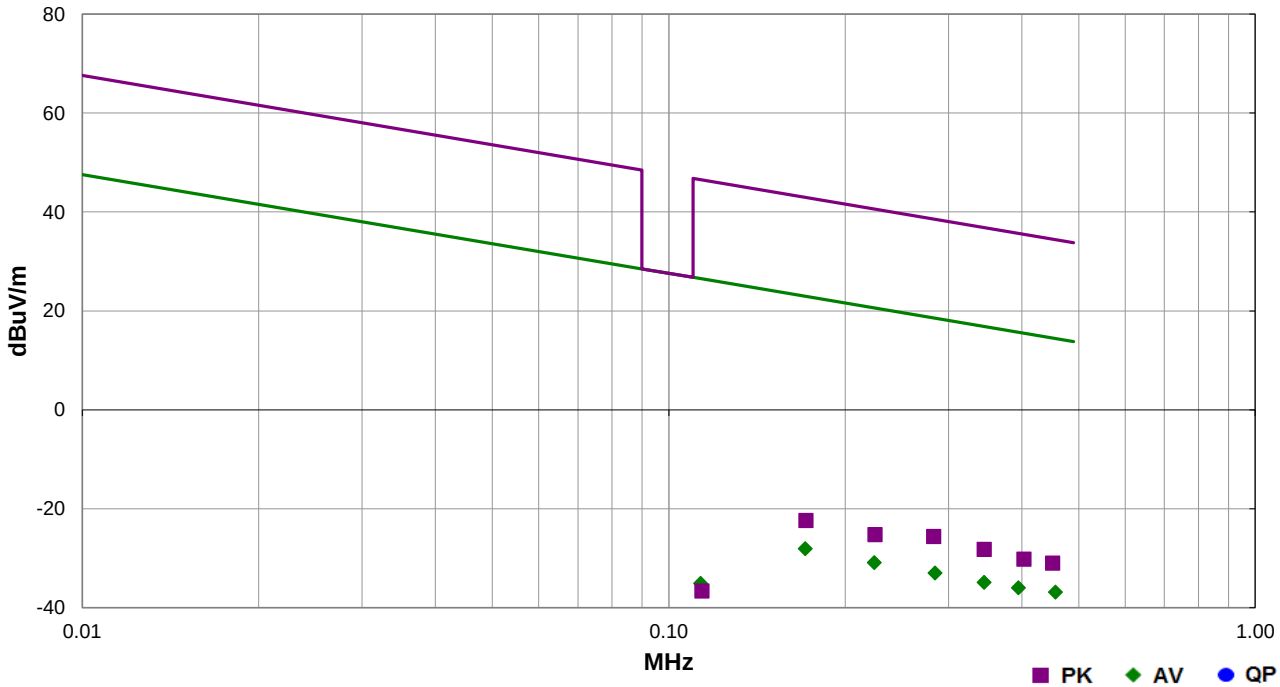
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
0.511	30.9	11.8	1.5	44.0	1.0	0.0	Par to EUT	QP	-59.1	-16.4	33.4	-49.8
0.567	29.8	11.8	1.5	358.0	1.0	0.0	Par to EUT	QP	-59.1	-17.5	32.5	-50.0

SPURIOUS RADIATED EMISSIONS

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417250	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	2				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, Pseudorandom.				
Deviations:	None				
Comments:	EUT on Side				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

Run #	8	**Test Distance (m)**	3	**Antenna Height(s)**	1m	**Results**	Pass



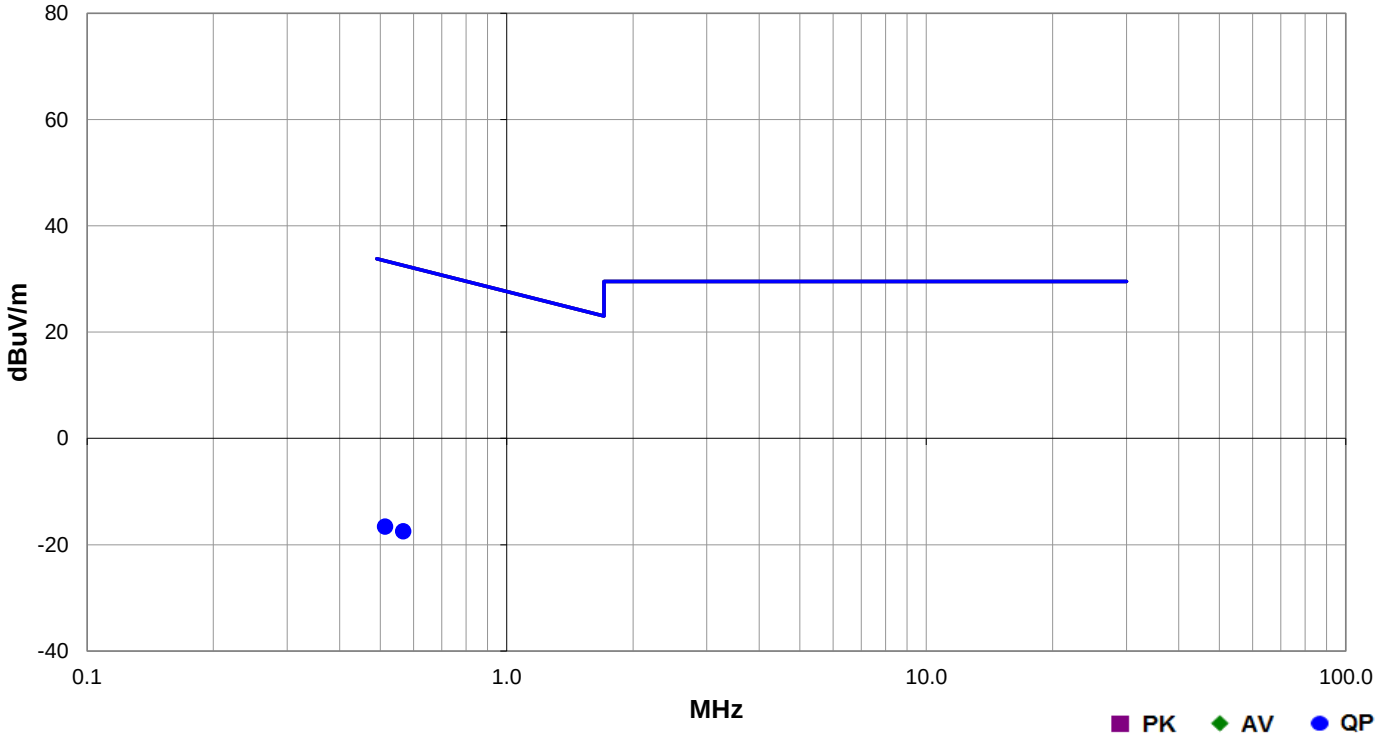
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
0.171	40.3	11.6	1.0	38.0	3.0	0.0	Par to EUT	AV	-80.0	-28.1	23.0	-51.0
0.457	31.4	11.7	1.0	110.0	3.0	0.0	Par to EUT	AV	-80.0	-36.9	14.4	-51.3
0.224	37.5	11.6	1.0	80.0	3.0	0.0	Par to EUT	AV	-80.0	-30.9	20.6	-51.5
0.285	35.4	11.6	1.0	157.0	3.0	0.0	Par to EUT	AV	-80.0	-33.0	18.5	-51.5
0.395	32.4	11.6	1.0	37.0	3.0	0.0	Par to EUT	AV	-80.0	-36.0	15.7	-51.7
0.345	33.5	11.6	1.0	155.0	3.0	0.0	Par to EUT	AV	-80.0	-34.9	16.9	-51.8
0.113	33.2	11.7	1.0	0.0	3.0	0.0	Par to EUT	AV	-80.0	-35.1	26.5	-61.6
0.283	42.8	11.6	1.0	157.0	3.0	0.0	Par to EUT	PK	-80.0	-25.6	38.6	-64.2
0.345	40.2	11.6	1.0	155.0	3.0	0.0	Par to EUT	PK	-80.0	-28.2	36.9	-65.1
0.171	46.0	11.6	1.0	38.0	3.0	0.0	Par to EUT	PK	-80.0	-22.4	42.9	-65.3
0.451	37.3	11.7	1.0	110.0	3.0	0.0	Par to EUT	PK	-80.0	-31.0	34.5	-65.5
0.403	38.2	11.6	1.0	37.0	3.0	0.0	Par to EUT	PK	-80.0	-30.2	35.5	-65.7
0.225	43.2	11.6	1.0	80.0	3.0	0.0	Par to EUT	PK	-80.0	-25.2	40.6	-65.8
0.114	31.7	11.7	1.0	0.0	3.0	0.0	Par to EUT	PK	-80.0	-36.6	46.5	-83.1

SPURIOUS RADIATED EMISSIONS

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417250	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	2				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, Pseudorandom.				
Deviations:	None				
Comments:	EUT on Side				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

Run #	9	**Test Distance (m)**	1	**Antenna Height(s)**	1.5m	**Results**	Pass



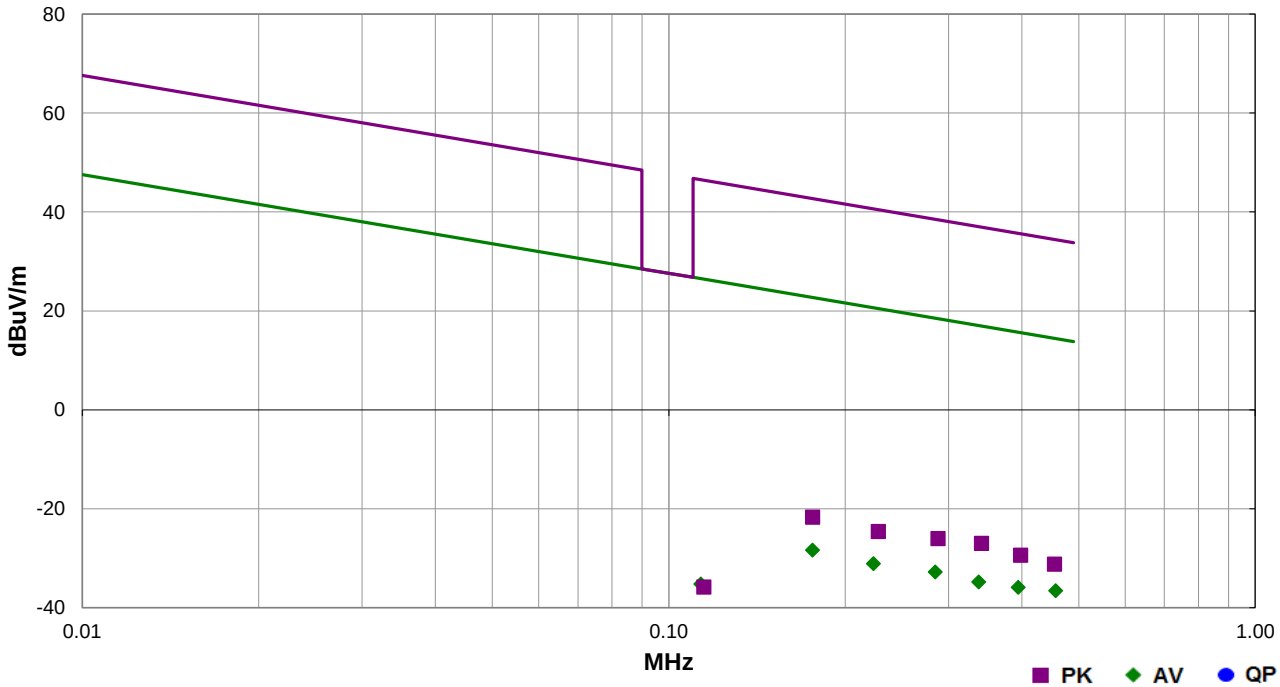
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
0.513	30.7	11.8	1.5	197.0	1.0	0.0	Par to EUT	QP	-59.1	-16.6	33.4	-50.0
0.567	29.8	11.8	1.5	304.0	1.0	0.0	Par to EUT	QP	-59.1	-17.5	32.5	-50.0

SPURIOUS RADIATED EMISSIONS

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417251	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	3				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, Pseudorandom.				
Deviations:	None				
Comments:	EUT on Side				

Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1m	**Results**	Pass



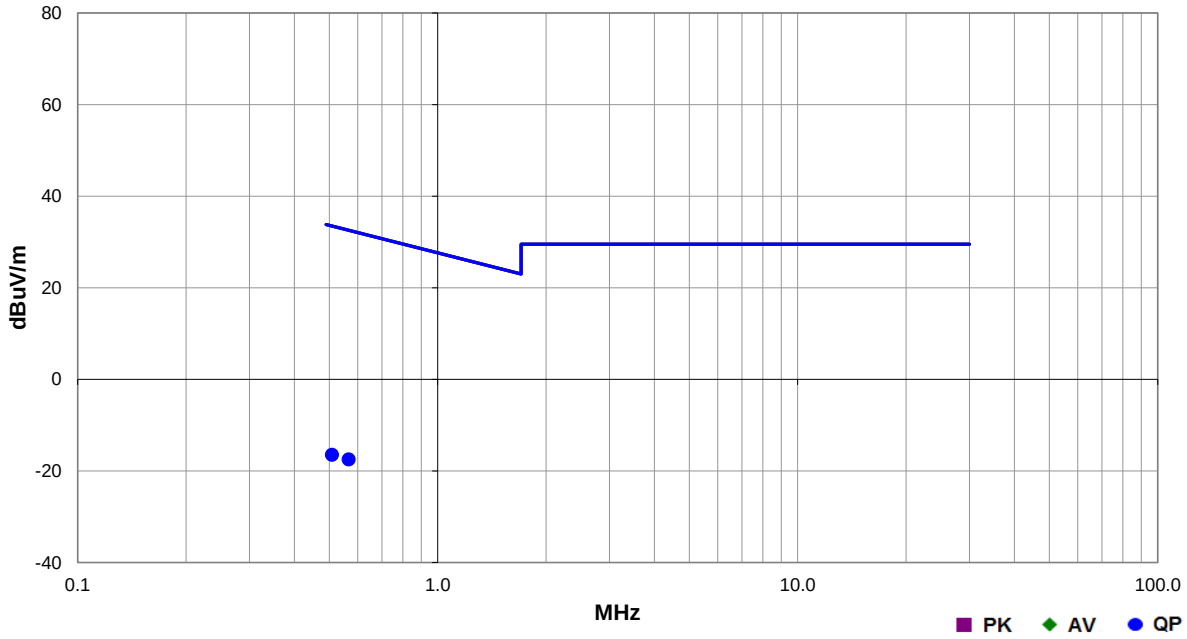
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
0.457	31.7	11.7	1.0	118.0	3.0	0.0	Par to EUT	AV	-80.0	-36.6	14.4	-51.0
0.176	40.0	11.6	1.0	290.0	3.0	0.0	Par to EUT	AV	-80.0	-28.4	22.7	-51.1
0.285	35.6	11.6	1.0	283.0	3.0	0.0	Par to EUT	AV	-80.0	-32.8	18.5	-51.3
0.394	32.5	11.6	1.0	309.0	3.0	0.0	Par to EUT	AV	-80.0	-35.9	15.7	-51.6
0.223	37.3	11.6	1.0	79.0	3.0	0.0	Par to EUT	AV	-80.0	-31.1	20.6	-51.7
0.338	33.6	11.6	1.0	188.0	3.0	0.0	Par to EUT	AV	-80.0	-34.8	17.0	-51.8
0.113	33.1	11.7	1.0	49.0	3.0	0.0	Par to EUT	AV	-80.0	-35.2	26.5	-61.7
0.341	41.4	11.6	1.0	188.0	3.0	0.0	Par to EUT	PK	-80.0	-27.0	36.9	-63.9
0.176	46.7	11.6	1.0	290.0	3.0	0.0	Par to EUT	PK	-80.0	-21.7	42.7	-64.4
0.288	42.4	11.6	1.0	283.0	3.0	0.0	Par to EUT	PK	-80.0	-26.0	38.4	-64.4
0.398	39.0	11.6	1.0	309.0	3.0	0.0	Par to EUT	PK	-80.0	-29.4	35.6	-65.0
0.228	43.8	11.6	1.0	79.0	3.0	0.0	Par to EUT	PK	-80.0	-24.6	40.5	-65.1
0.455	37.1	11.7	1.0	118.0	3.0	0.0	Par to EUT	PK	-80.0	-31.2	34.4	-65.6
0.115	32.5	11.7	1.0	49.0	3.0	0.0	Par to EUT	PK	-80.0	-35.8	46.4	-82.2

SPURIOUS RADIATED EMISSIONS

Work Order:	BSTN0453	**Date:**	02/03/14	Trevor Buls	
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN04	**Humidity:**	8.9% RH		
Serial Number:	417251	**Barometric Pres.:**	1024.4 mbar	**Tested by:**	Trevor Buls
EUT:	L331				
Configuration:	3				
Customer:	Boston Scientific Corporation				
Attendees:	Daniel Landherr				
EUT Power:	Battery				
Operating Mode:	Transmitting inductive at 57 kHz, Pseudorandom.				
Deviations:	None				
Comments:	EUT on Side				

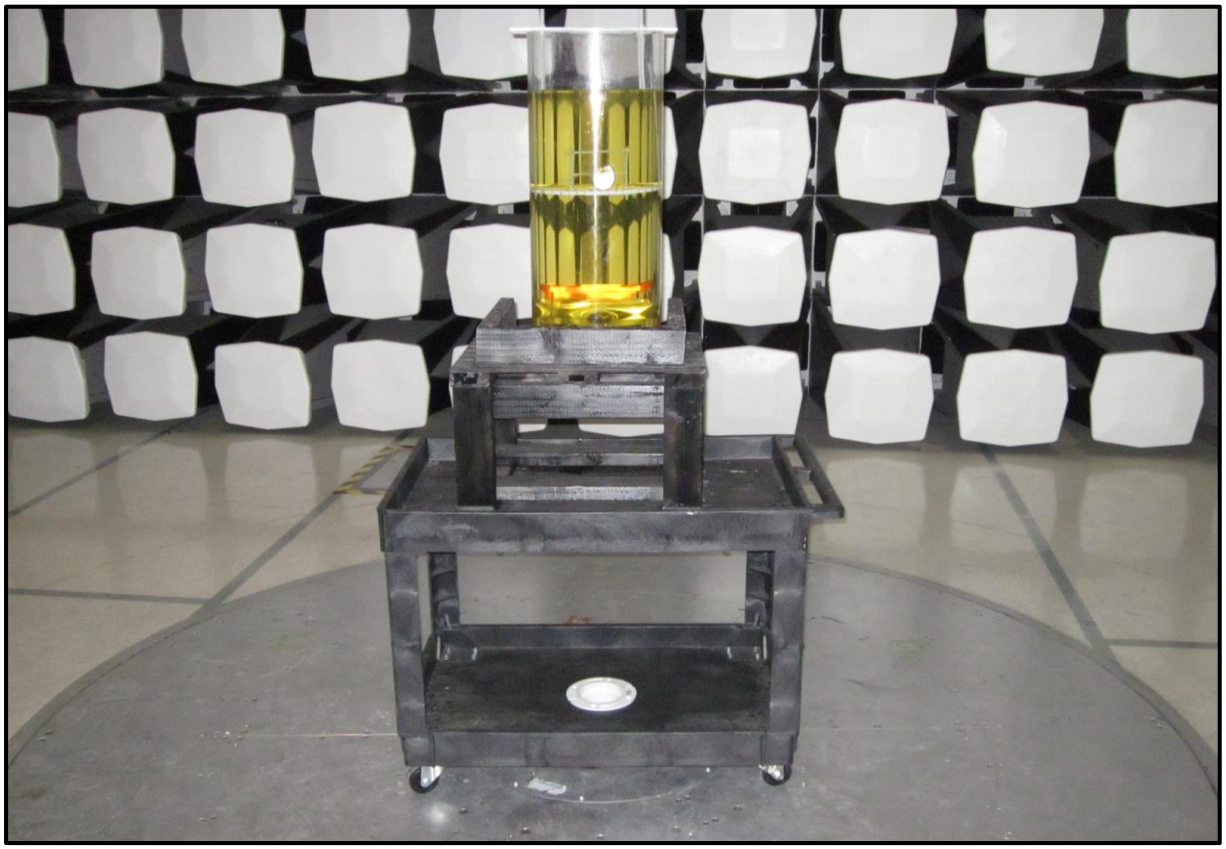
Test Specifications	**Test Method**
LP0002 June 2011	LP0002 June 2011

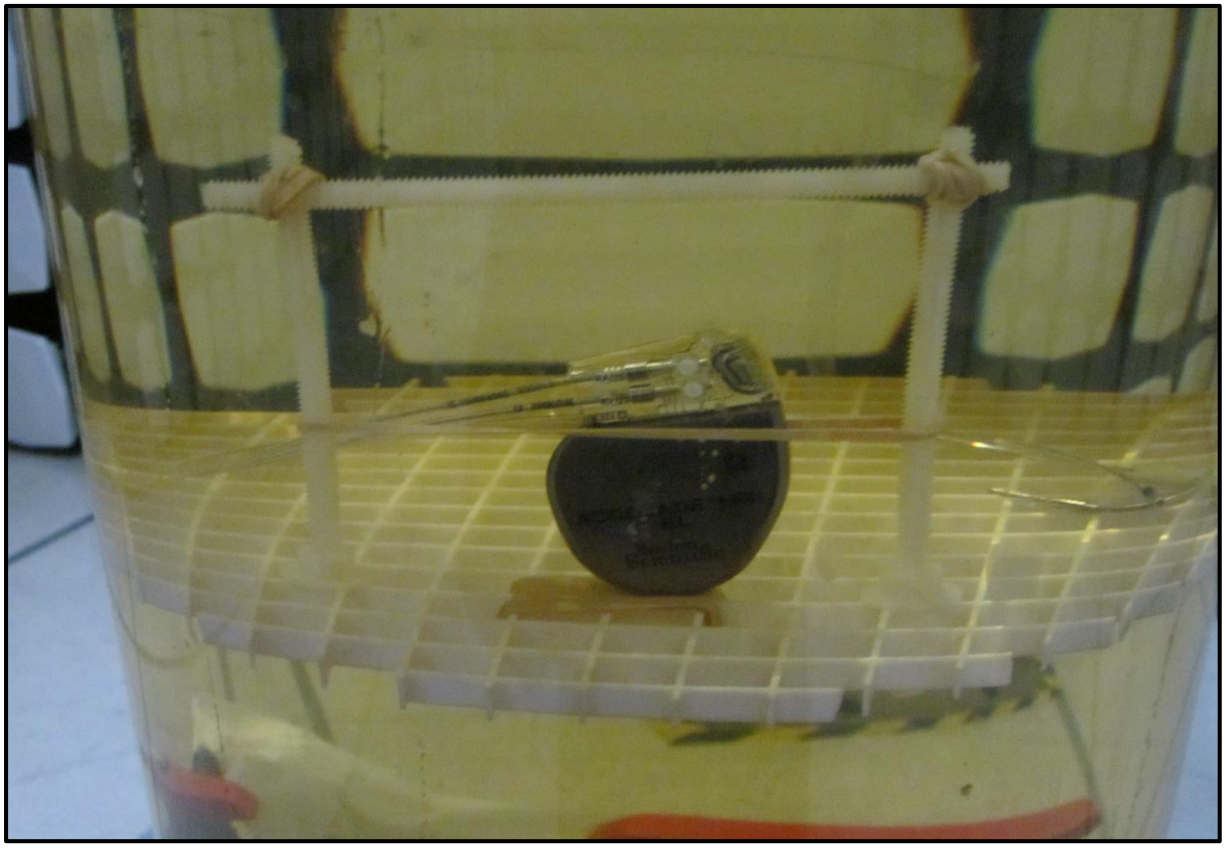
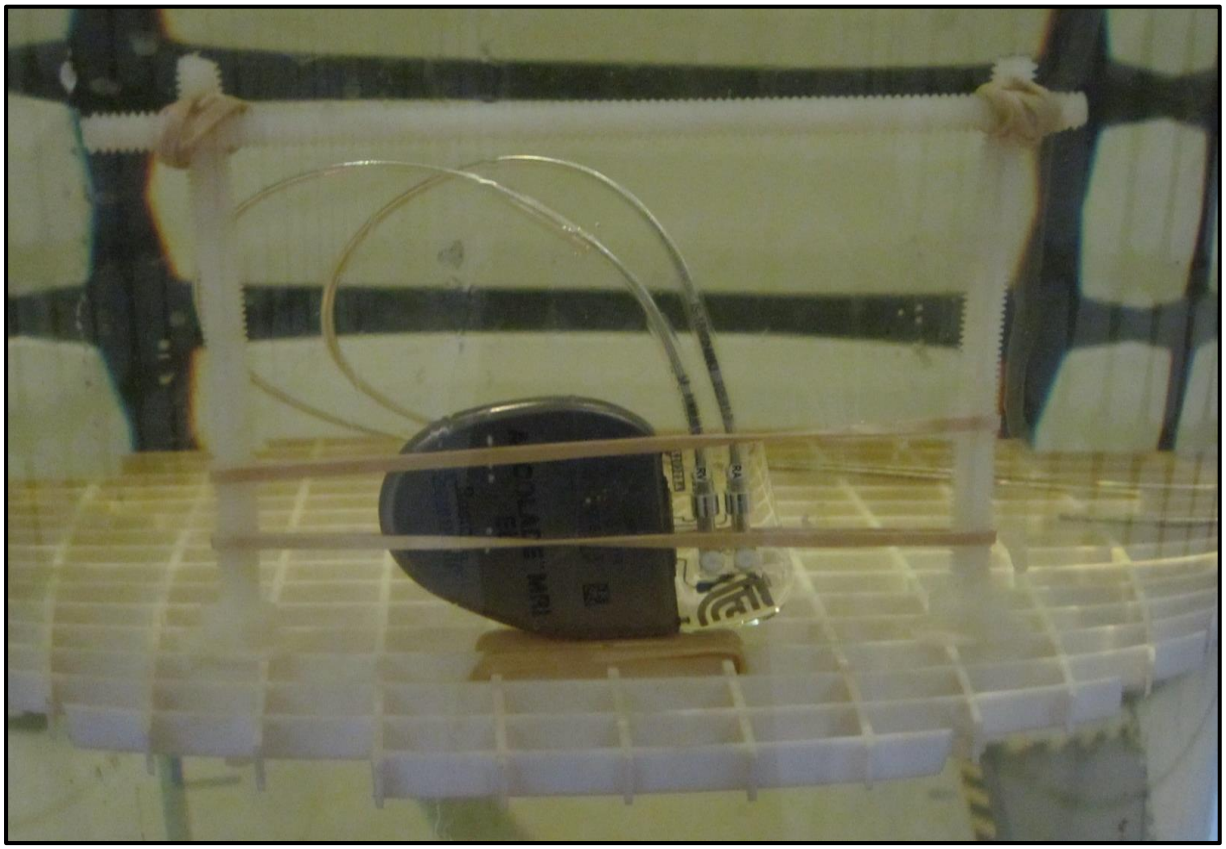
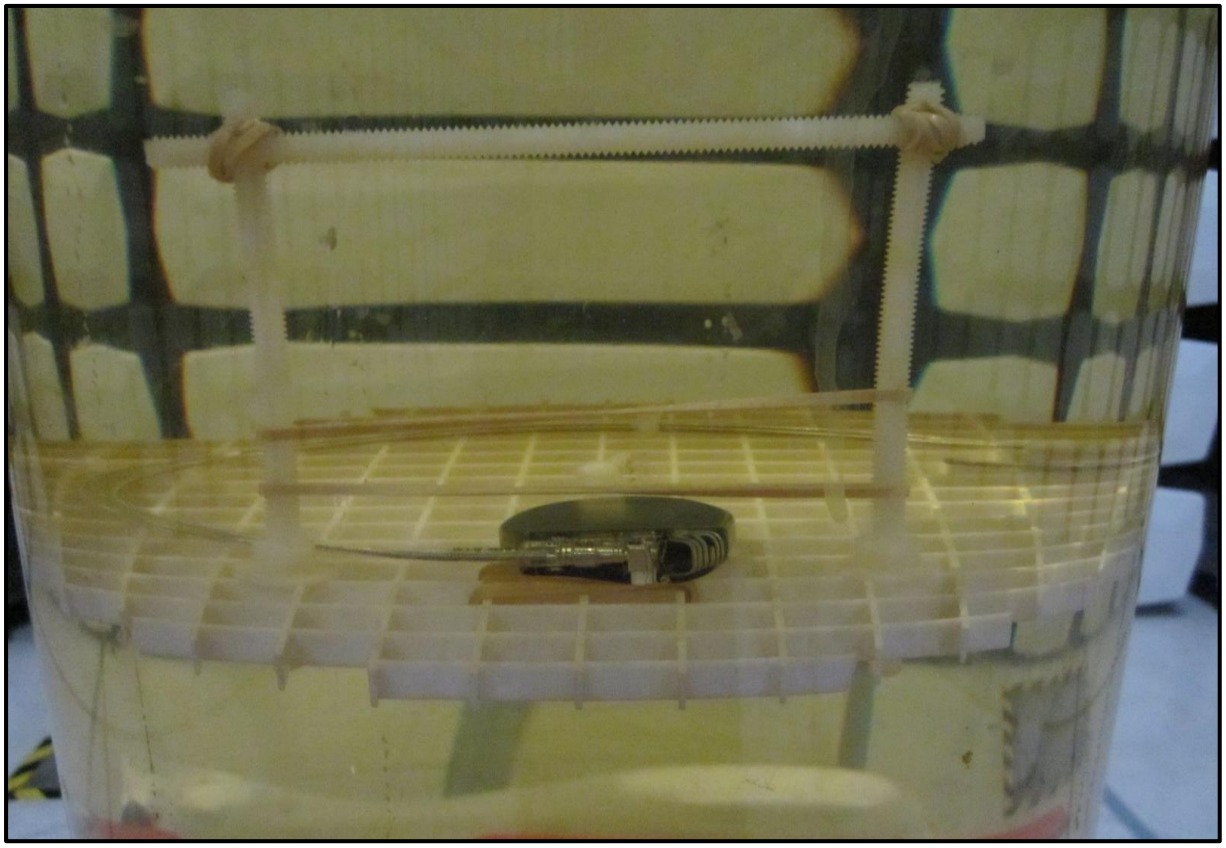
Run #	13	**Test Distance (m)**	1	**Antenna Height(s)**	1.5m	**Results**	Pass



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
0.508	30.8	11.8	1.5	115.0	1.0	0.0	Par to EUT	QP	-59.1	-16.5	33.5	-50.0	
0.566	29.8	11.8	1.5	48.0	1.0	0.0	Par to EUT	QP	-59.1	-17.5	32.6	-50.0	

SPURIOUS RADIATED EMISSIONS





SPURIOUS RADIATED EMISSIONS