



166 South Carter, Genoa City, WI 53128

Company:	Wilson Sporting Goods
Model Tested:	MSC1108
Report Number:	21656
DLS Project:	7913

## Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

### Subpart C – Intentional Radiators

#### Section 15.247

Operation within the bands 902 - 928 MHz,  
2400 - 2483.5 MHz, 5725 - 5875 MHz,  
and 24.0 - 24.25 GHz.

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name:	Wilson Football Tag FCC ID: 2AHBQWX1F3C8
Kind of Equipment:	Radio Transceiver with Accelerometers
Frequency Range:	2402-2480 MHz
Test Configuration:	DC powered transceiver module
Model Number(s):	MSC1108
Model(s) Tested:	MSC1108 (Rev D)
Serial Number(s):	RF Conducted SN: I1602159 Radiated SN: I1602162
Date of Tests:	January 25 <sup>th</sup> through 28 <sup>th</sup> , 2016
Test Conducted For:	Wilson Sporting Goods 8750 W Bryn Mawr Ave Chicago, IL 60631, USA

**NOTICE:** “This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government”. Please see the "Description of Test Sample" page listed inside of this report.

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## SIGNATURE PAGE

Tested By:

A handwritten signature in black ink that reads "Paul Leo". The signature is written in a cursive, flowing style.

Paul Leo  
Test Engineer

Reviewed By:

A handwritten signature in black ink that reads "William Stumpf". The signature is written in a cursive, flowing style.

William Stumpf  
OATS Manager

Approved By:

A handwritten signature in black ink that reads "Brian J. Mattson". The signature is written in a cursive, flowing style.

Brian Mattson  
General Manager



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United States Department of Commerce  
National Institute of Standards and Technology



**Certificate of Accreditation to ISO/IEC 17025:2005**

NVLAP LAB CODE: 100276-0

**D.L.S. Electronic Systems, Inc.**  
Wheeling, IL

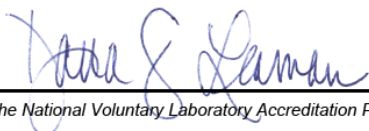
*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

**Electromagnetic Compatibility & Telecommunications**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2015-09-25 through 2016-09-30  
Effective Dates



  
For the National Voluntary Laboratory Accreditation Program

**ELECTROMAGNETIC  
COMPATIBILITY &  
TELECOMMUNICATIONS**

**NVLAP LAB CODE 100276-0**

**Emissions**

**Designation**

Off-site test location

**Description**

D.L.S. Electronics performs radiated emissions testing at an additional location, 166 South Carter Street, Genoa City, WI 53128.



166 South Carter, Genoa City, WI 53128

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## 1.0 Summary of Test Report

It was determined that the Wilson Sporting Goods Football Tag, model MSC1108, complies with the requirements of CFR 47 Part 15 Subpart C Section 15.247, and FCC KDB 558074 D01 DTS Meas Guidance v03r04.

### Subpart C Section 15.247 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
15.247(a)(2)	6dB Bandwidth	KDB 558074 (8.0)(8.2) and ANSI C63.10-2013 (11.8)(11.8.2)	1	Yes
15.247(b)(3)	Maximum Peak Conducted Output Power	KDB 558074 (9.1)(9.1.1) and ANSI C63.10-2013 (11.9.1)(11.9.1.1)	1	Yes
15.247(e)	Peak Power Spectral Density	KDB 558074 (10.0)(10.2) and ANSI C63.10-2013 (11.10)(11.10.2)	1	Yes
15.247(d)	RF Conducted Spurious Emissions	KDB 558074 (11.0)(11.1)(11.2)(11.3) & ANSI C63.10-2013 (11.11)(11.11.1)(11.11.2)(11.11.3)	1	Yes
15.247(d) 15.205 15.209	Radiated Emissions in Restricted Bands	KDB 558074 (12.0)(12.1) and ANSI C63.10-2013 (11.12)(11.12.1)	2	Yes
15.247(d) 15.209	Radiated Spurious Emissions	ANSI C63.14-2014 (8.0)	2	Yes
15.247(d)	Band-Edge Measurements – RF Conducted	KDB 558074 (11.0)(11.2)(11.3) and ANSI C63.10-2013 (11.11)(11.11.2)(11.11.3)	1	Yes
15.247(d) 15.205 15.209	Band-Edge Measurements - Radiated	KDB 558074 (12.0)(12.1) and ANSI C63.10-2013 (11.12)(11.12.1)	2	Yes
15.247	Duty Cycle	KDB 558074 (6.0)	3	N/A

Note 1: RF conducted measurement.

Note 2: Radiated emission measurement.

Note 3: Informational.



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## 2.0 Introduction

From January 25<sup>th</sup> to 28<sup>th</sup>, 2016, the Wilson Football Tag model MSC1108, as provided from Wilson Sporting Goods was tested to the requirements of CFR 47 Part 15 Subpart C Section 15.247 for limited modular approval. To meet these requirements, the procedures contained within this report were performed by personnel of D.L.S Electronic Systems, Inc.

## 3.0 Test Facilities

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

### Wisconsin Test Facility:

D.L.S. Electronic Systems, Inc.  
166 S. Carter Street  
Genoa City, Wisconsin 53128

### Wheeling Test Facility:

D.L.S. Electronic Systems, Inc.  
1250 Peterson Drive  
Wheeling, IL 60090

### FCC Registration #90531

## 4.0 Description of Test Sample

### Description:

The module reads acceleration data and transmits the data to a Smart Device, ie. Smart Phone.

### Type of Equipment / Frequency Range:

Portable / 2402-2480 MHz

### Physical Dimensions of Equipment Under Test:

43mm x 34mm x 10mm



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#### **4.0 Description of Test Sample (continued)**

##### **Power Source:**

3.0 VDC

##### **Internal Frequencies:**

16.0 MHz, 1.0 MHz, 32.768 kHz  
8 MHz (radio power supply)

##### **Transmit / Receive Frequencies Used For Test Purpose:**

Low channel: 2402 MHz, Middle channel: 2440 MHz, High channel: 2480 MHz  
40 Channels with 2 MHz Channel Bandwidth

##### **Type of Modulation(s) / Antenna Type:**

GFSK Modulation / PCB Trace Antenna

##### **Description of Circuit Board(s) / Part Number:**

PC Board / Module	MSC1108 Rev D
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## 5.0 Test Equipment

A list of the equipment used can be found in the table below. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

### (G1) 1-18 GHz and RF Conducted

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Date	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	6-25-15	6-25-16
Preamp	Ciao	CA118-4010	101	1GHz-18GHz	2-2-15	2-2-16
Filter- High-Pass	Q-Microwave	100462	1	4.2GHz-18GHz	5-27-15	5-27-16
Horn Antenna	EMCO	3115	9502-4451	1-18GHz	6-1-15	6-1-17
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A

### Radiated 30 – 1000 MHz (Site 2)

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Date	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	6-25-15	6-25-16
Preamplifier	Rohde & Schwarz	TS-PR10	032001/004	9 kHz – 1 GHz	12-3-15	12-3-16
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	10-1-14	10-1-16
Antenna	EMCO	3146	1205	200 MHz – 1 GHz	10-24-14	10-24-16
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A

### (Site 3) Additional if 18-26 GHz

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Date	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	6-25-15	6-25-16
Filter- High Pass	K&L	50140-11SH10-18000/T40000-K-K	438727	18-40GHz	3-6-14	3-6-16
Preamp	Miteq	AMF-8B-180265-40-10P-H/S	438727	18GHz-26GHz	6-29-15	6-29-16
Horn Antenna	EMCO	3116	2549	18 – 40GHz	9-2-14	9-2-16
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A





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## 6.0 Test Arrangements

### **Radiated Emissions Measurement Arrangement:**

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to FCC KDB 558074 D01 DTS Meas Guidance v03r04 and ANSI C63.10-2013, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up.

Unless otherwise noted, the bandwidth of the measuring receiver / analyzer used during testing is shown below.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

### **RF Conducted Emissions Measurement Arrangement:**

All RF conducted emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to FCC KDB 558074 D01 DTS Meas Guidance v03r04 and ANSI C63.10-2013, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up.

## 7.0 Test Conditions

### **Normal Test Conditions:**

#### **Temperature and Humidity:**

63°F at 26% RH unless otherwise noted on test data

#### **Supply Voltage:**

3.0 VDC

## 8.0 Modifications Made To EUT For Compliance

No modifications were needed for compliance.



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## 9.0 Additional Descriptions

The Wilson Football Tag is a Bluetooth Low-Energy device that is embedded inside a football. When paired to a smart device it reads and transmits acceleration data to that paired device.

## 10.0 Results

Measurements were performed in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r04 and ANSI C63.10-2013. Graphical and tabular data can be found in Appendix B at the end of this report.

## 11.0 Conclusion

The Wilson Football Tag model MSC1108, as provided from Wilson Sporting Goods, tested from January 25<sup>th</sup> to 28<sup>th</sup>, 2016 **meets** the requirements of CFR 47 Part 15 Subpart C Section 15.247.



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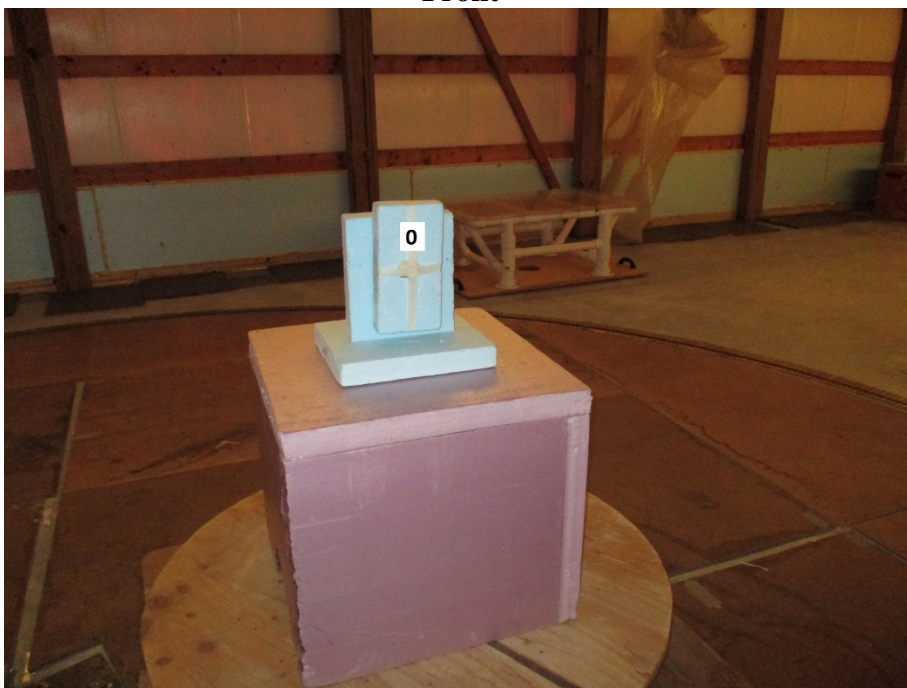
## Appendix A – Test Photos

### Photo Information and Test Setup:

Item0: Wilson Sporting Goods Football Tag Model: MSC1108  
Serial Numbers: Conducted - I1602159; Radiated - I1602162

### Radiated Emissions Below 1 GHz

#### Front



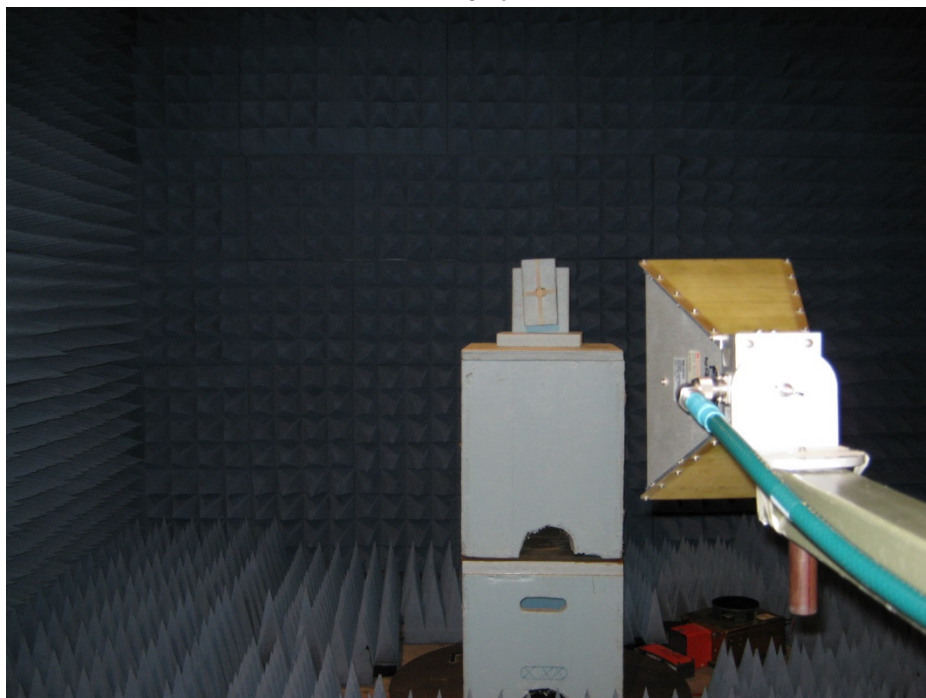
#### Back



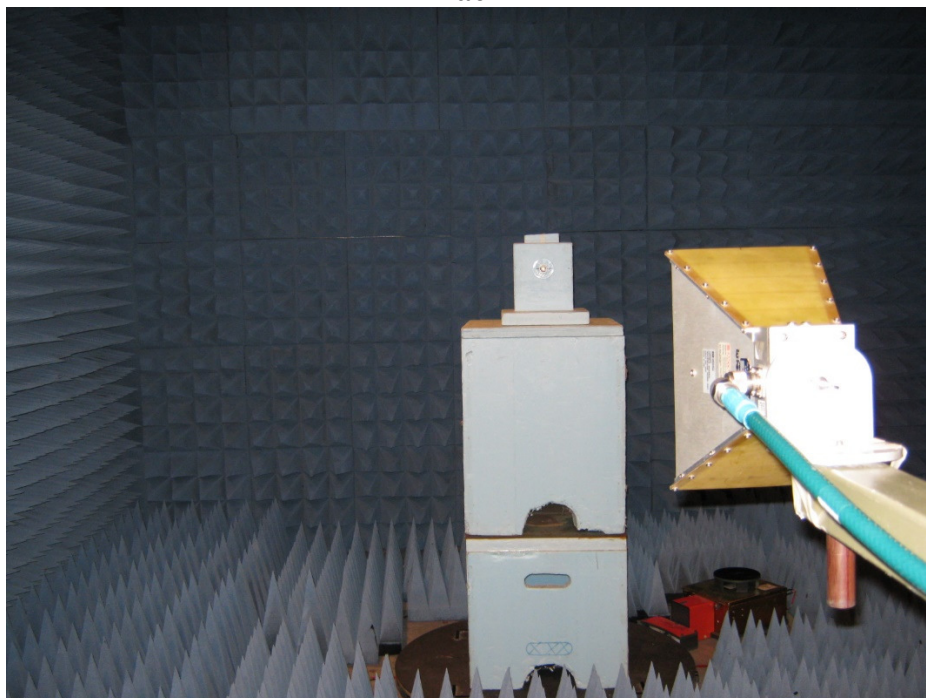
## Appendix A

### Radiated Emissions Above 1 GHz

**Front**



**Back**







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## Appendix A

### RF Conducted





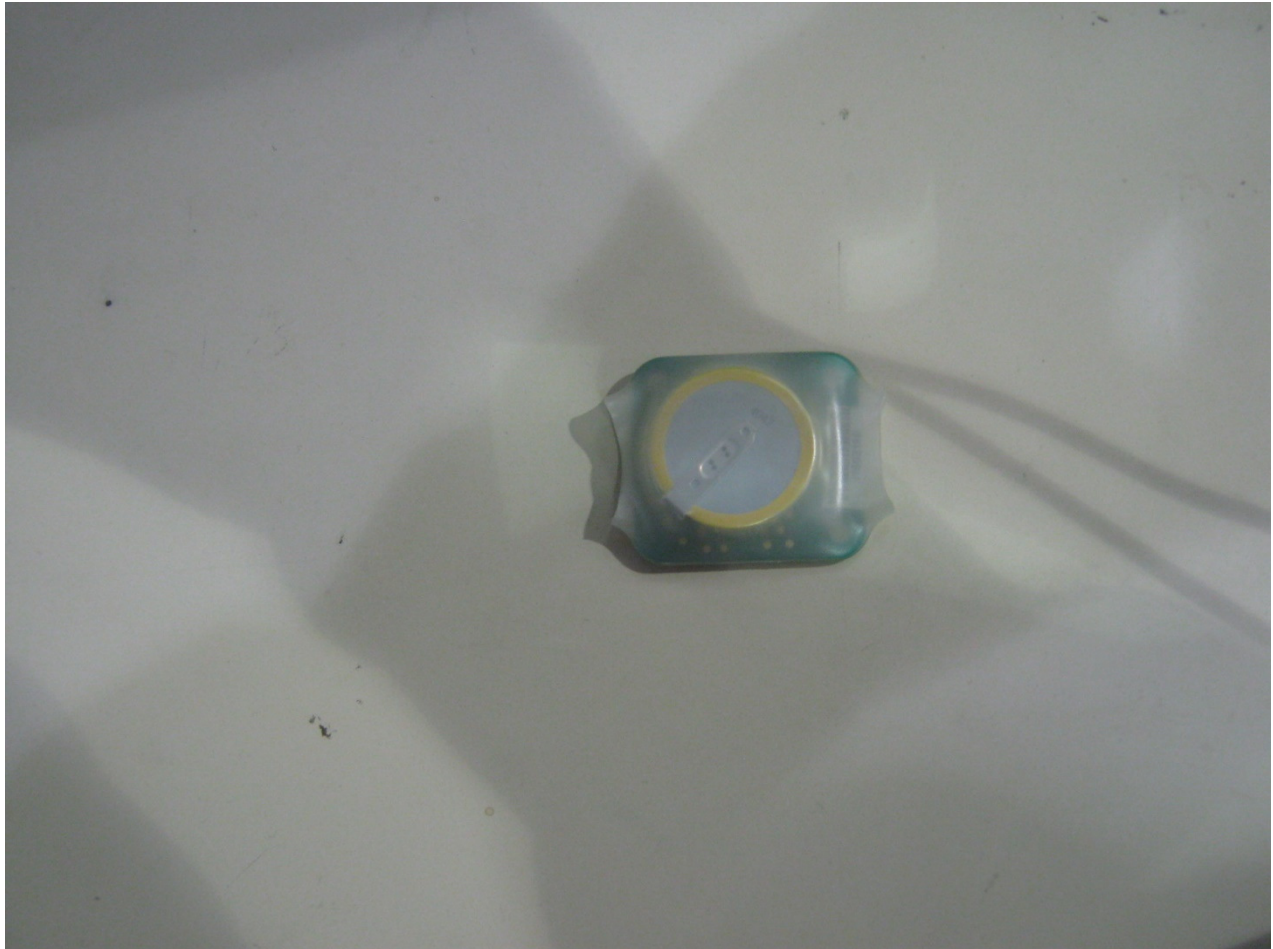
166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
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## Appendix A

### EUT in shrink wrap housing





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## **Appendix B – Measurement Data**

### **B1.0 6dB Emission Bandwidth**

#### **Rule Part:**

FCC Part 15.247(a)(2)

#### **Test Procedure:**

558074 D01 DTS Meas Guidance v03r04 Sections 8.0 and 8.2  
ANSI C63.10-2013 Sections 11.8 and 11.8.2

#### **Limit:**

6 dB bandwidth shall be at least 500 kHz

#### **Results:**

Compliant  
Minimum 6 dB bandwidth: **709.41 kHz**

#### **Notes:**

The EUT was set to transmit at its maximum power and maximum duty cycle (83%).  
The EUT was tested at the low, middle, and high channels of operation.



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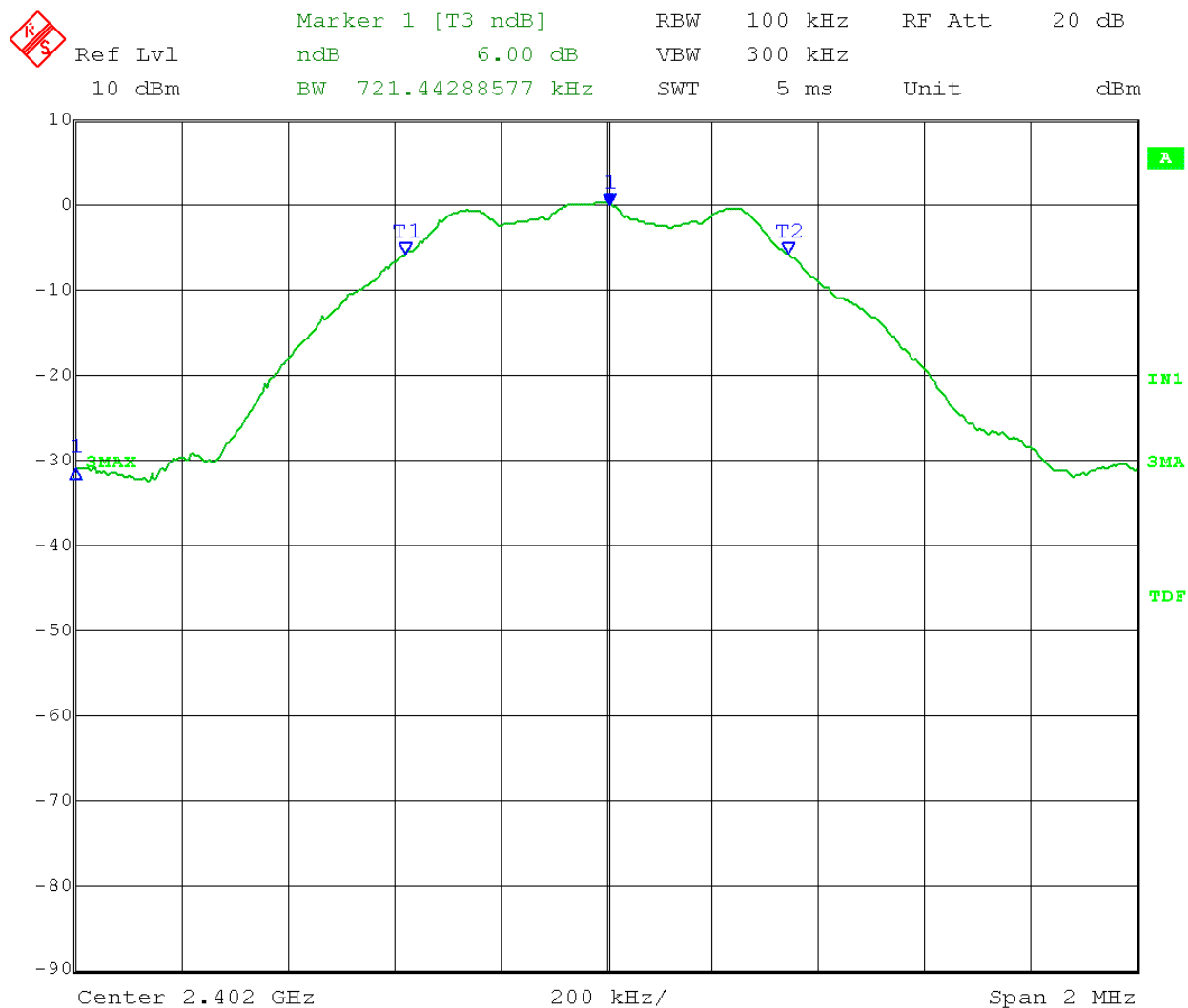
Company:  
Model Tested:  
Report Number:  
DLS Project:

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Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: 6db Bandwidth - Conducted – 15.247 (a)(2)  
Operator: Paul L

Comment: Low Channel – Ch.37 2.402 GHz

6 dB Bandwidth = 721.44kHz



Date: 25.JAN.2016 09:28:17





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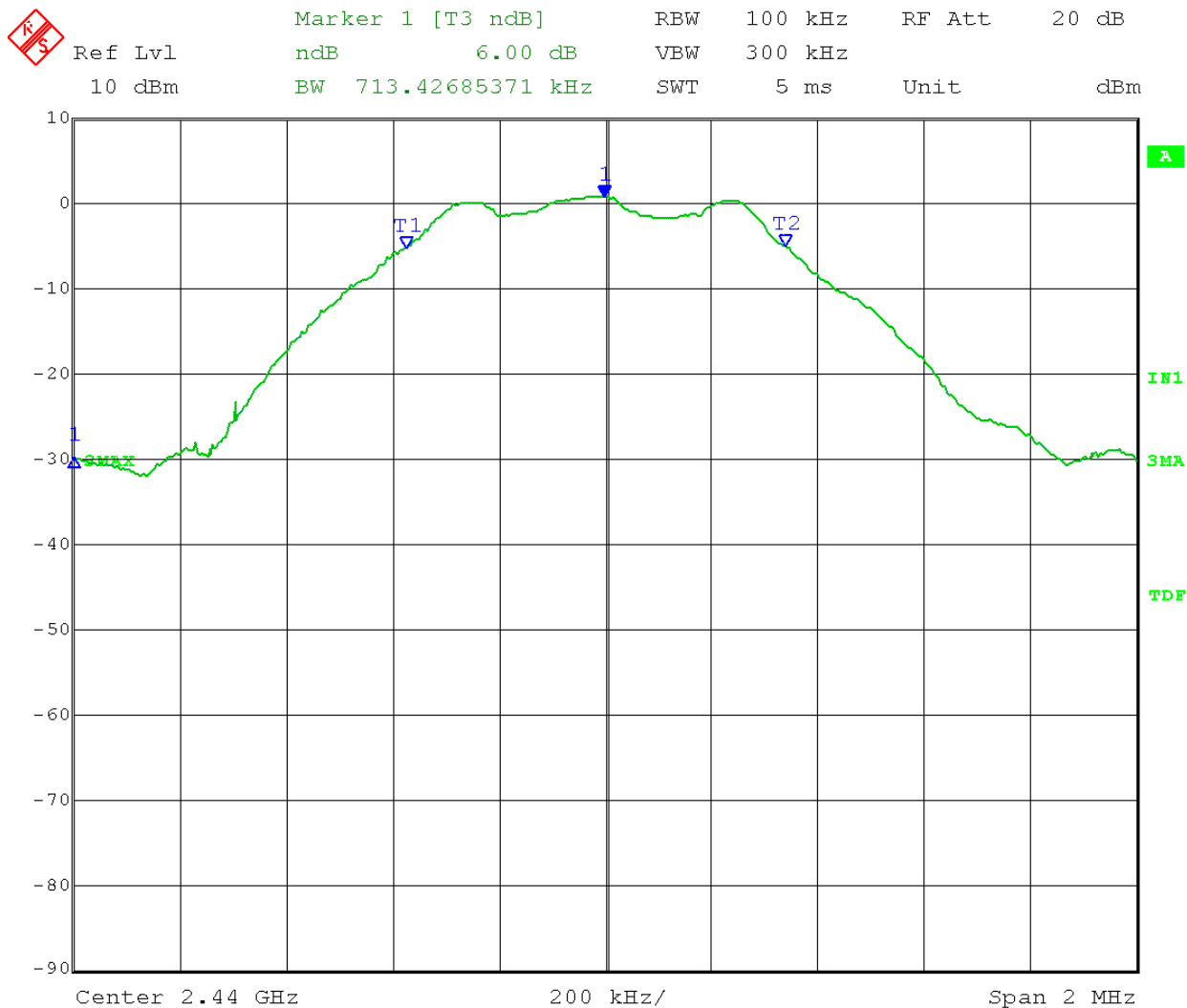
Company:  
Model Tested:  
Report Number:  
DLS Project:

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7913

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: 6db Bandwidth - Conducted – 15.247 (a)(2)  
Operator: Paul L

Comment: Mid Channel – Ch.17 2.440 GHz

6 dB Bandwidth = 713.42kHz



Date: 25.JAN.2016 09:35:10



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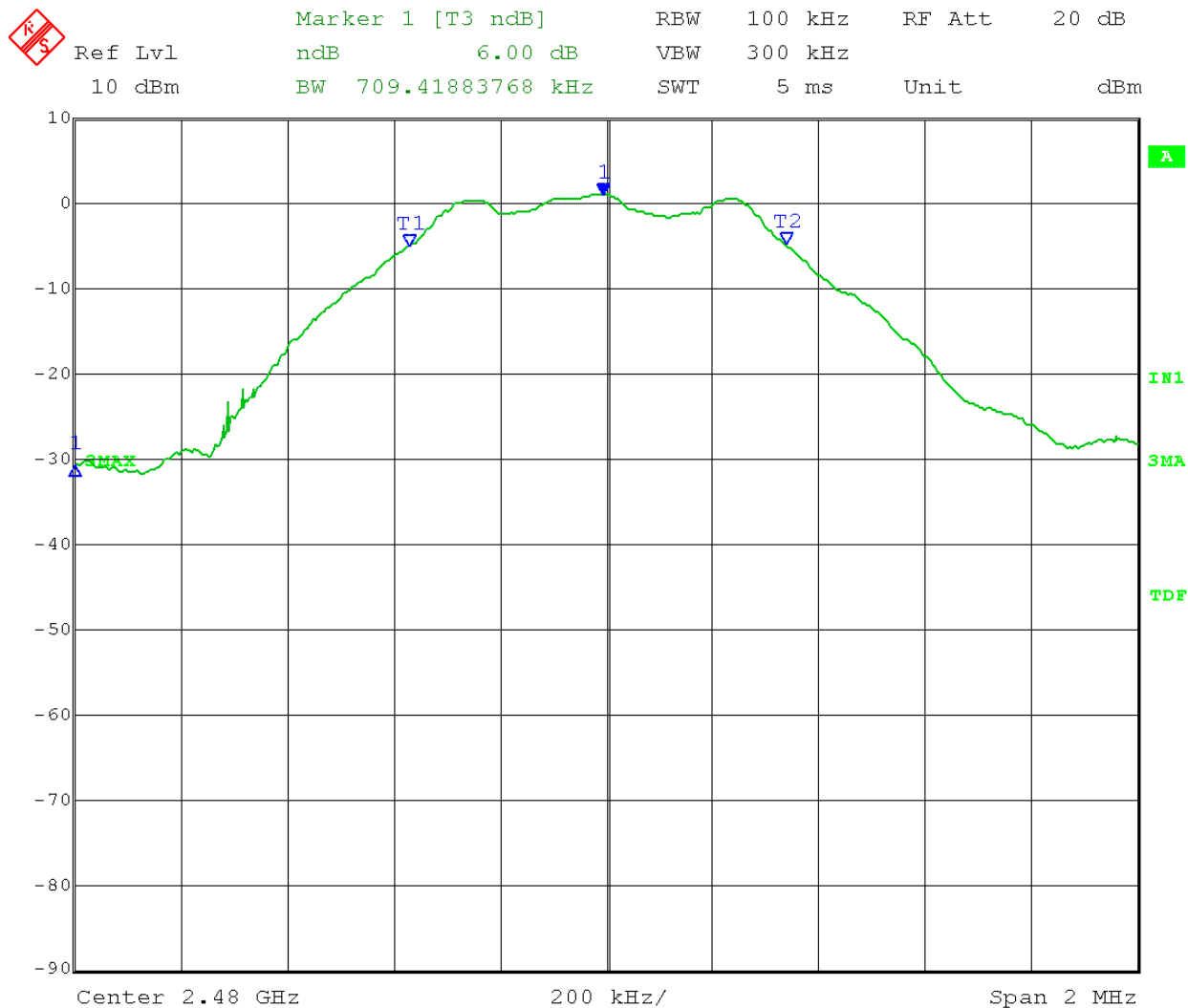
Company:  
Model Tested:  
Report Number:  
DLS Project:

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7913

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: 6db Bandwidth - Conducted – 15.247 (a)(2)  
Operator: Paul L

Comment: High Channel – Ch.39 2.480 GHz

6 dB Bandwidth = 709.41khz



Date: 25.JAN.2016 09:38:49



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Company:  
Model Tested:  
Report Number:  
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## **Appendix B**

### **B2.0 Maximum Peak Conducted Output Power**

#### **Rule Part:**

FCC Part 15.247(b)(3)

#### **Test Procedure:**

558074 D01 DTS Meas Guidance v03r04 Sections 9.1 and 9.1.1  
ANSI C63.10-2013 Sections 11.9.1 and 11.9.1.1

#### **Limit:**

The maximum peak conducted output power limit is 1 watt (30 dBm).

#### **Results:**

Compliant

#### **Notes:**

This was an RF conducted measurement. The EUT was connected to the measuring equipment through the external antenna connector. Cable loss and attenuation was accounted for in the transducer factors set in the analyzer.  
The EUT was set to transmit continuously at its maximum power level at the low, middle and high channels of the operating band.  
Output Power Option 1 was used for this test. Peak Output power was measured with a spectrum analyzer.



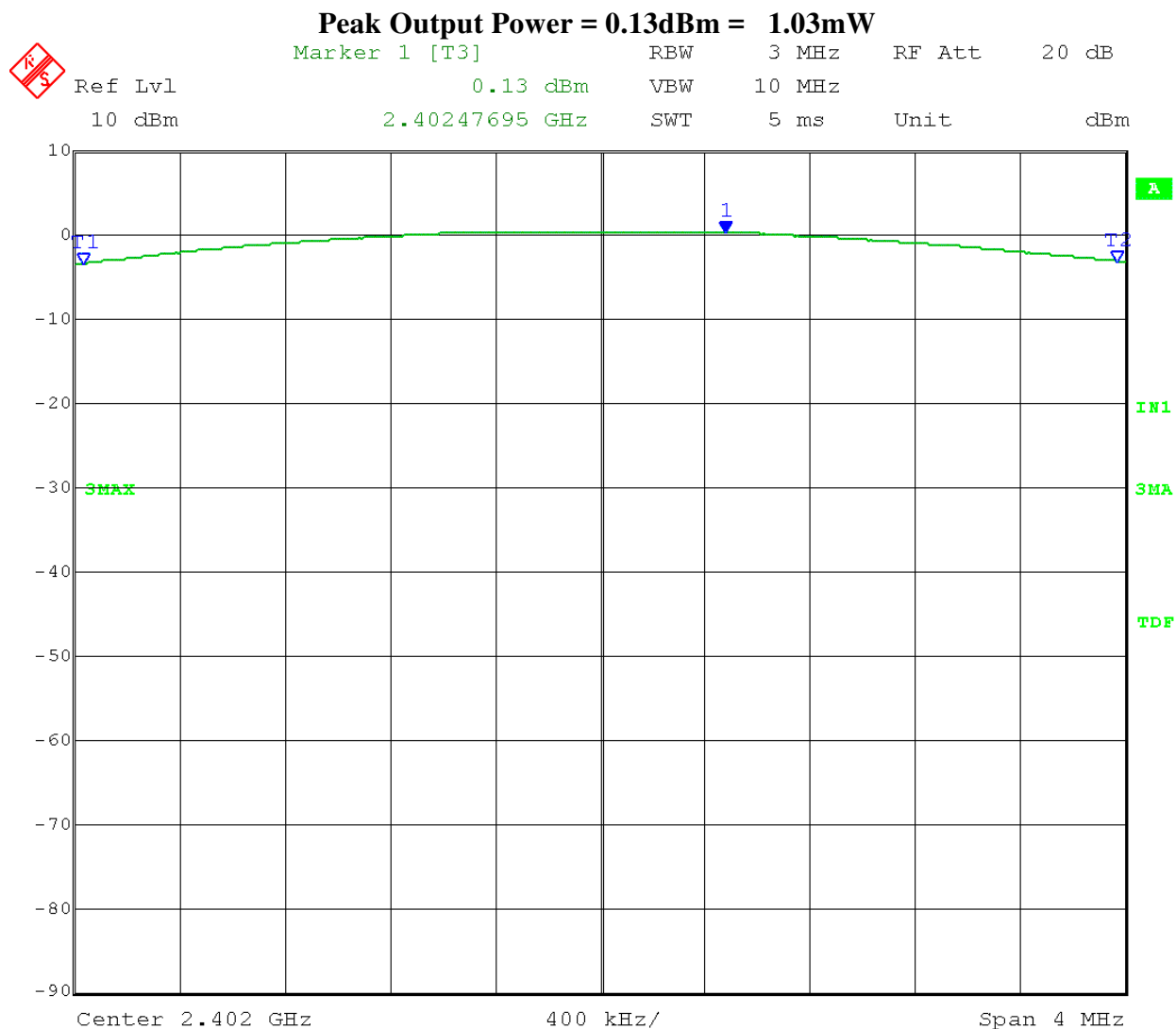
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Company:  
Model Tested:  
Report Number:  
DLS Project:

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Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Peak Power Output - Conducted – 15.247 (b)(3)  
Operator: Paul L

Comment: Low Channel – Ch.17 2.440 GHz



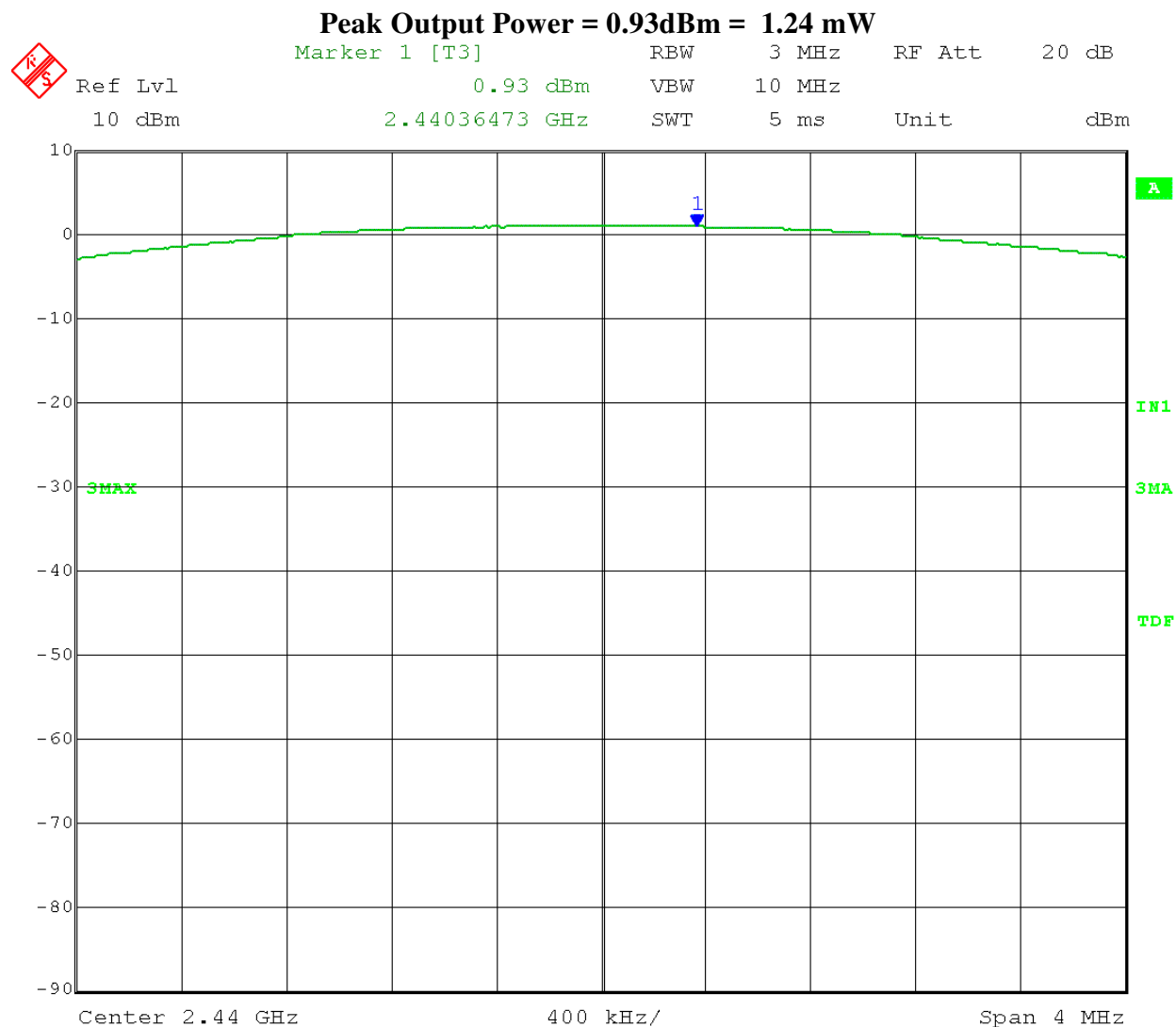
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Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Peak Power Output - Conducted – 15.247 (b)(3)  
Operator: Paul L

Comment: **Mid Channel – Ch.17 2.440 GHz**



Date: 25.JAN.2016 10:14:16



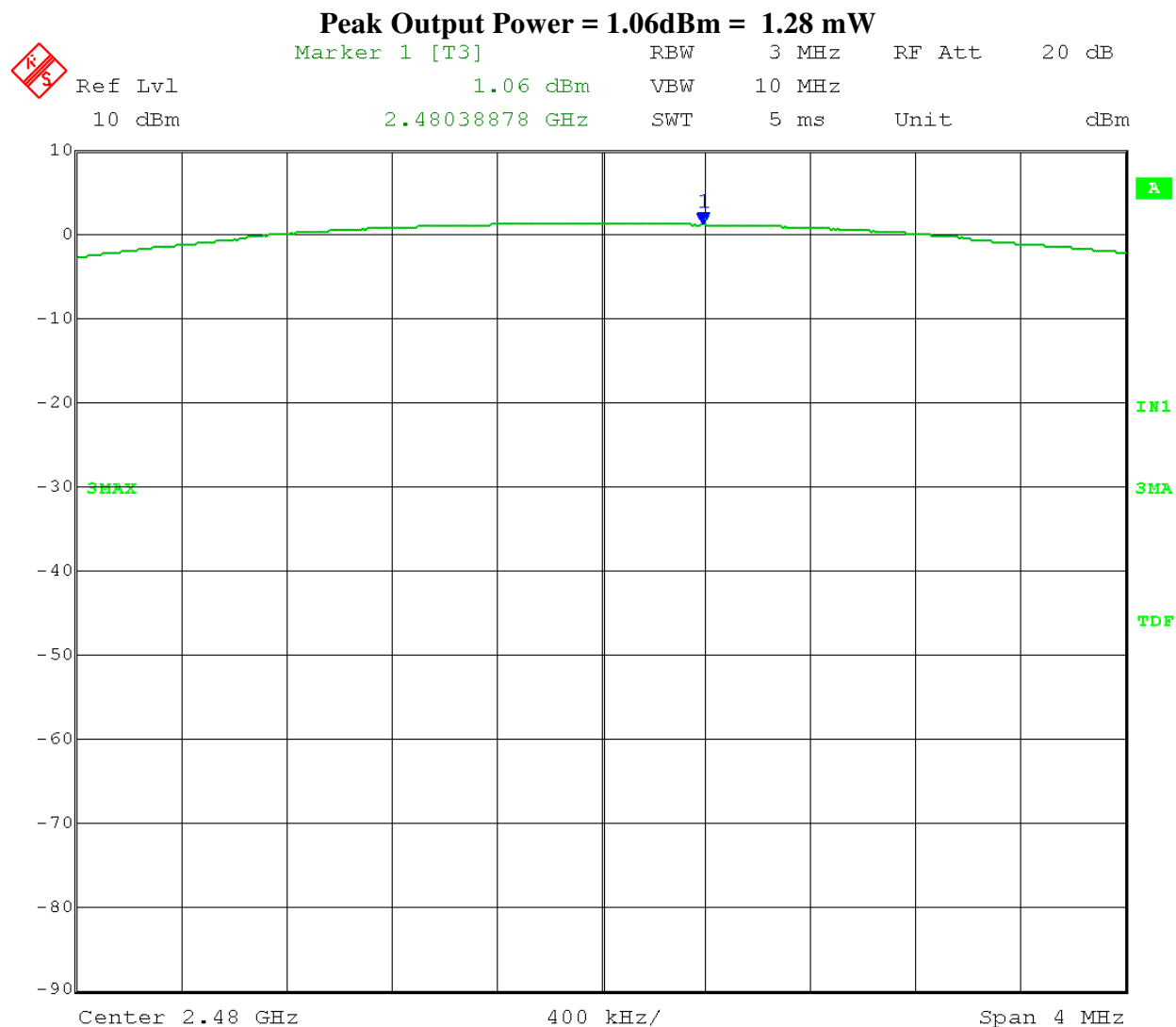
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Company:  
Model Tested:  
Report Number:  
DLS Project:

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Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Peak Power Output - Conducted – 15.247 (b)(3)  
Operator: Paul L

Comment: High Channel – Ch.39 2.480 GHz



Date: 25.JAN.2016 10:25:29



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## Appendix B

### B3.0 Peak Power Spectral Density (PSD)

#### Rule Part:

FCC Part 15.247(e)

#### Test Procedure:

558074 D01 DTS Meas Guidance v03r04 Sections 10.0 and 10.2  
ANSI C63.10-2013 Sections 11.10 and 11.10.2

#### Limit:

+8 dBm in any 3 kHz band segment within the fundamental during any time interval of continuous transmission.

#### Results:

Compliant

#### Notes:

The EUT was set to transmit at its maximum power, maximum data rate, and maximum duty cycle (83%). PSD Method PKPSD was used for this test.



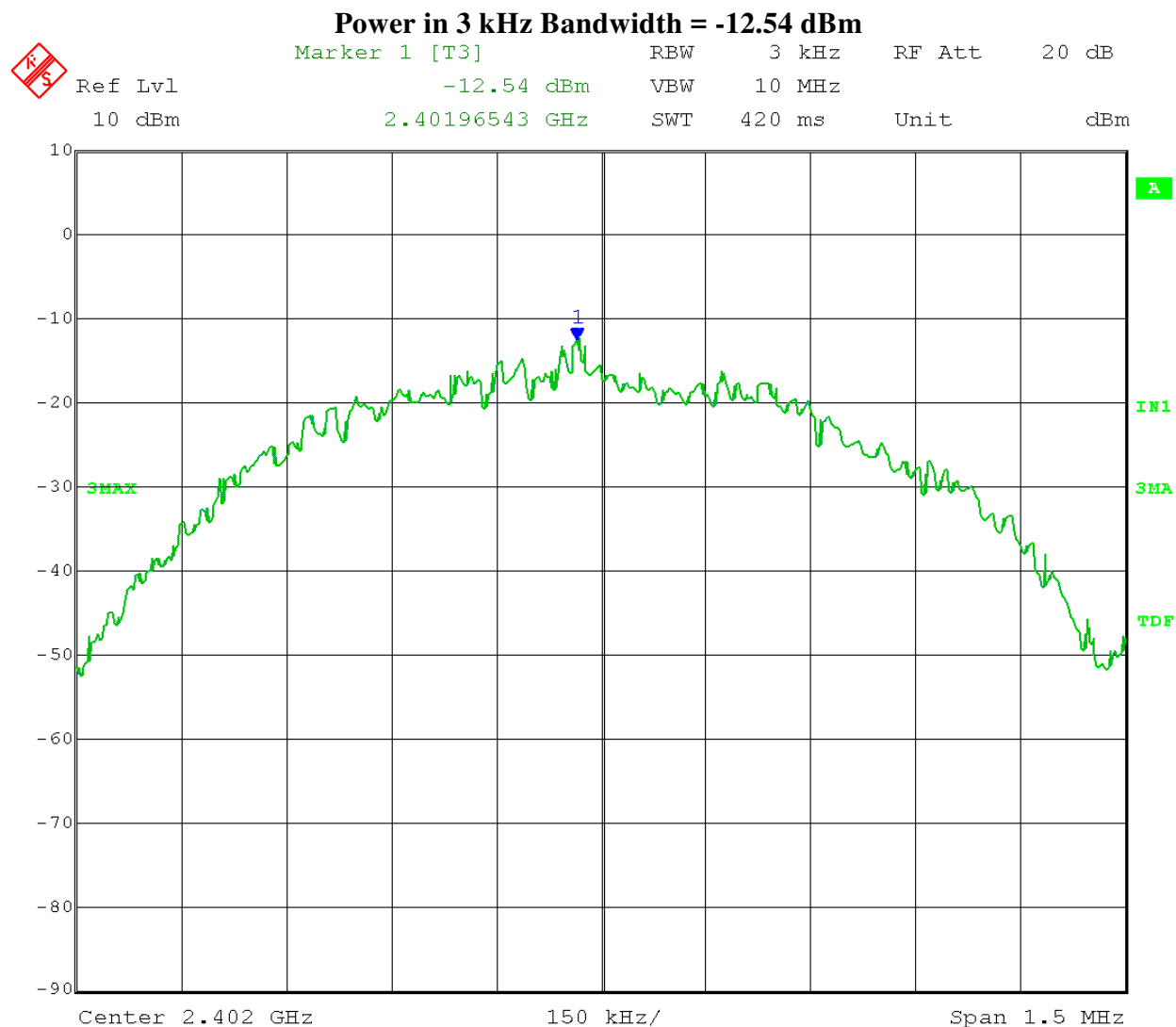
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Company:  
Model Tested:  
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Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Peak Power Spectral Density - Conducted – 15.247 (e)  
Operator: Paul L

Comment: Low Channel –Ch.37 2.402 GHz



Date: 25.JAN.2016 10:36:07



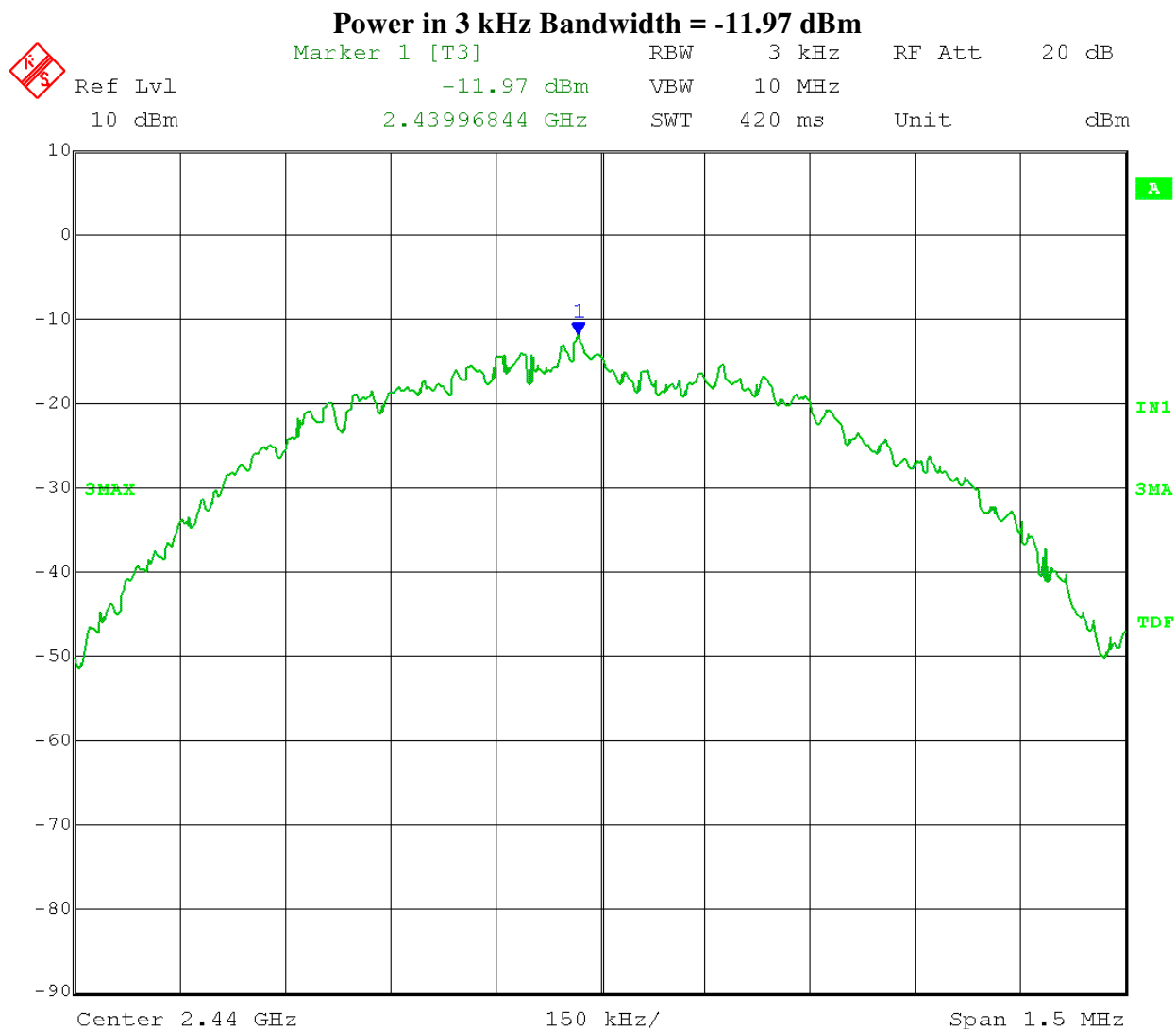


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Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Peak Power Spectral Density - Conducted – 15.247 (e)  
Operator: Paul L

Comment: Mid Channel –Ch.17 2.440 GHz



Date: 25.JAN.2016 10:33:34

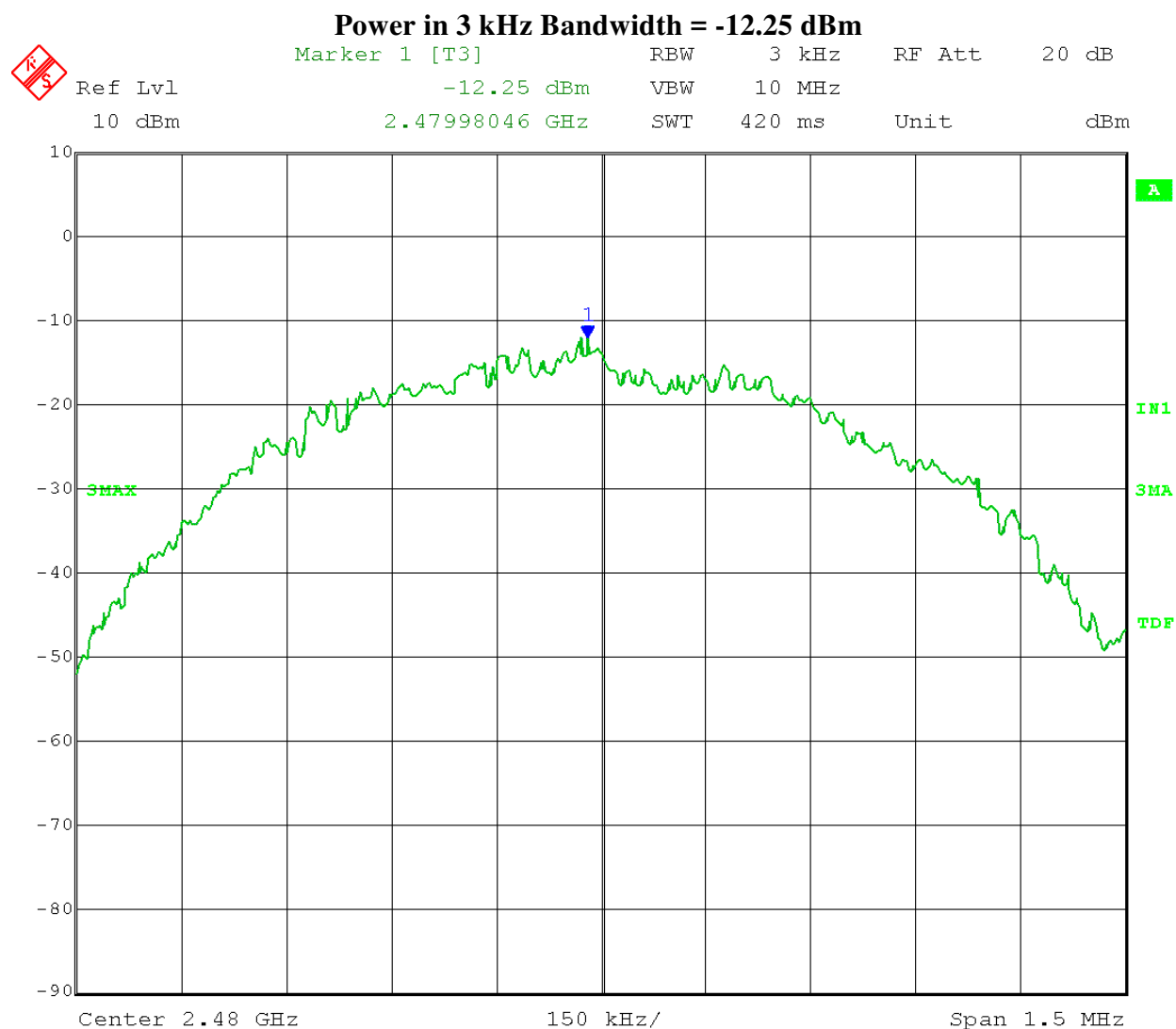


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Company: Wilson Sporting Goods  
Model Tested: MSC1108  
Report Number: 21656  
DLS Project: 7913

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Peak Power Spectral Density - Conducted – 15.247 (e)  
Operator: Paul L

Comment: High Channel –Ch.39 2.480 GHz



Date: 25.JAN.2016 10:30:00



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## **Appendix B**

### **B4.0 RF Conducted Spurious Emissions**

#### **Rule Part:**

FCC Part 15.247(d)

#### **Test Procedure:**

558074 D01 DTS Meas Guidance v03r04 Sections 11.0, 11.1, 11.2 and 11.3  
ANSI C63.10-2013 Sections 11.11, 11.11.1, 11.11.2 and 11.11.3

#### **Limit:**

20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. (Device complies with Power Option 1).

#### **Results:**

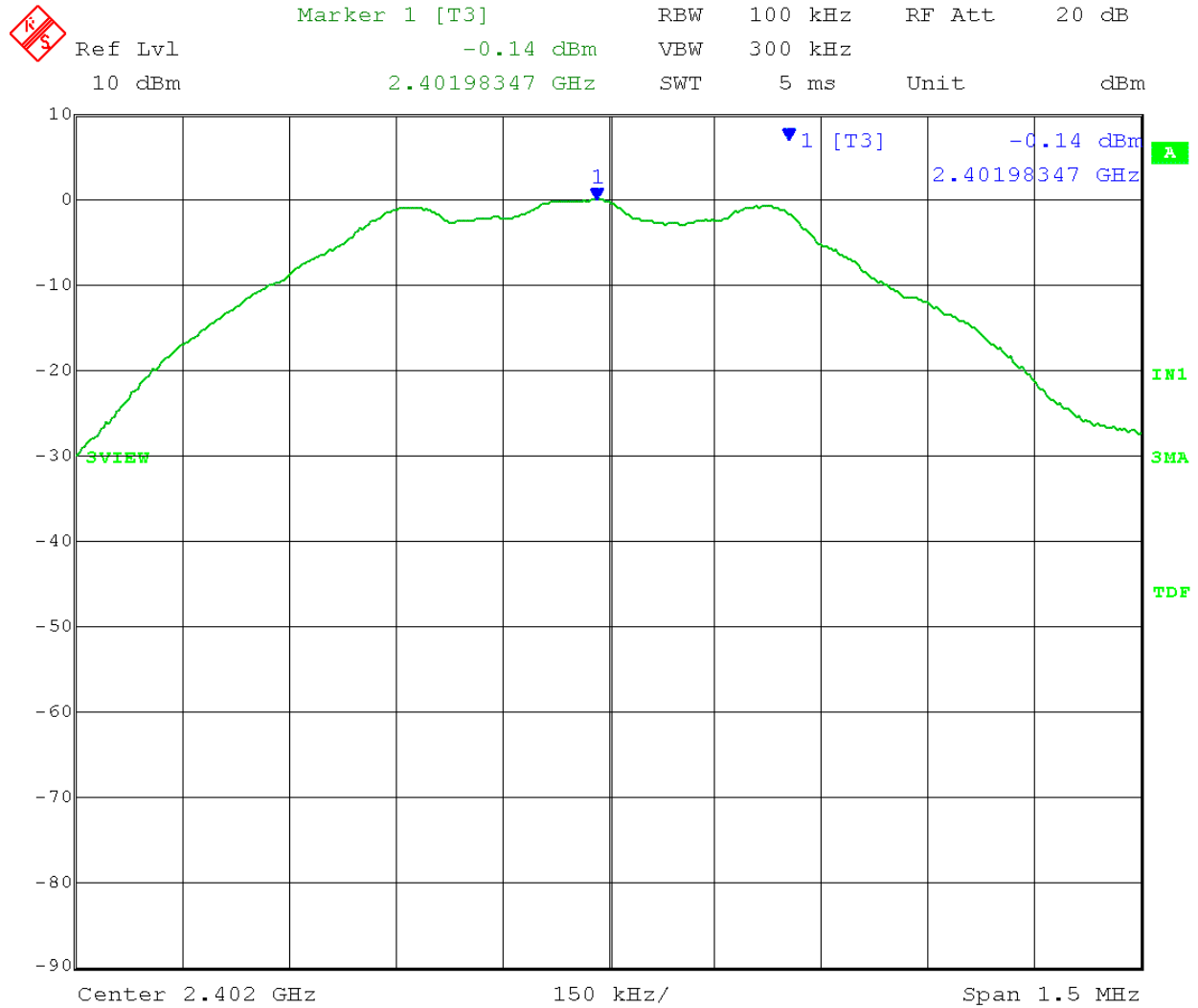
Compliant

#### **Notes:**

The EUT was set to transmit at its maximum power, and maximum duty cycle (83%). A peak detector was used for this test.

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Low Channel – Ch.37 2.402 GHz  
Reference Level= -0.14  
Limit= -0.14-20= -20.14



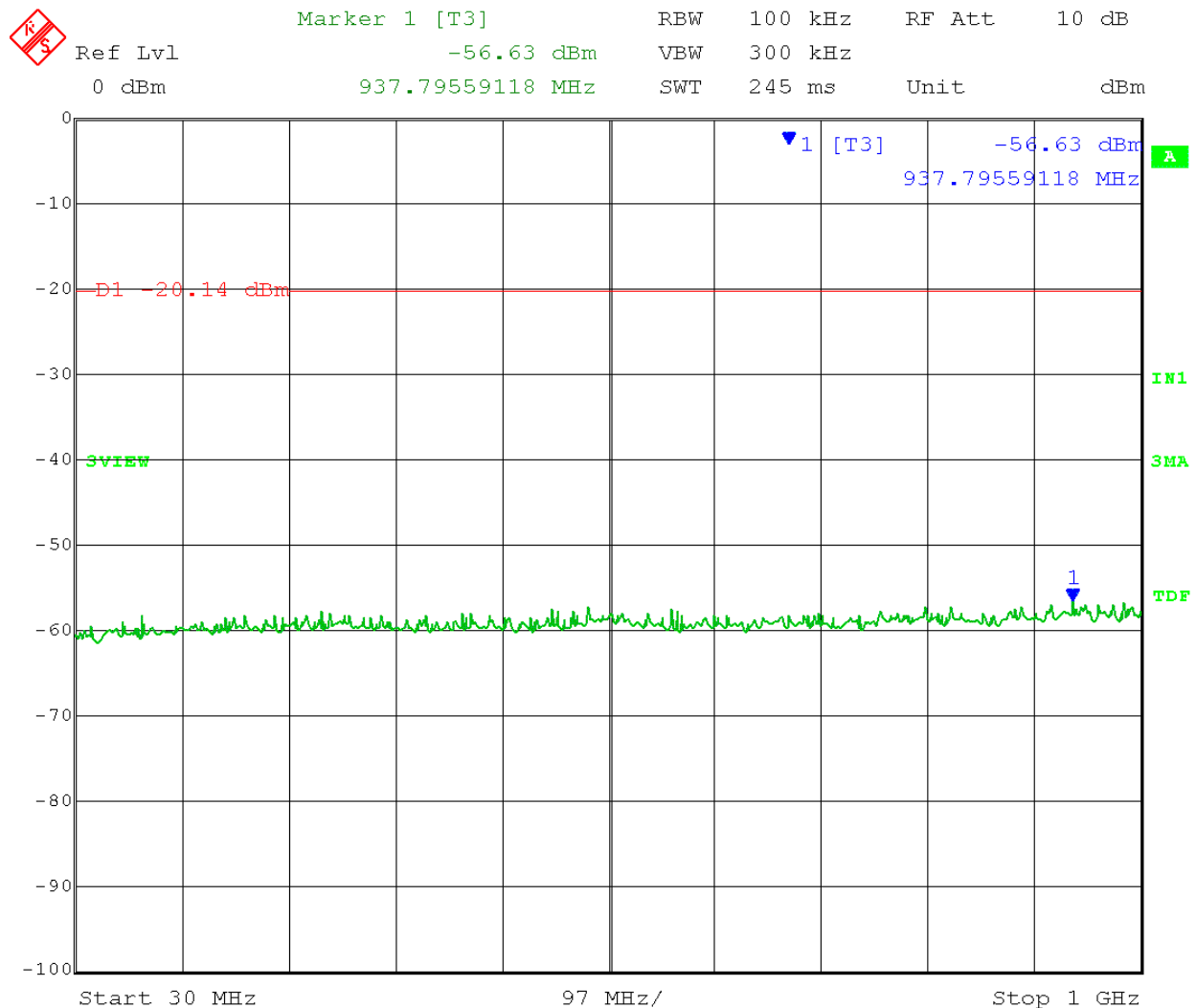
Date: 25.JAN.2016 11:39:25

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Low Channel – Ch.37 2.402GHz

Frequency Range: 30MHz to 1GHz  
Limit = -20.14dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



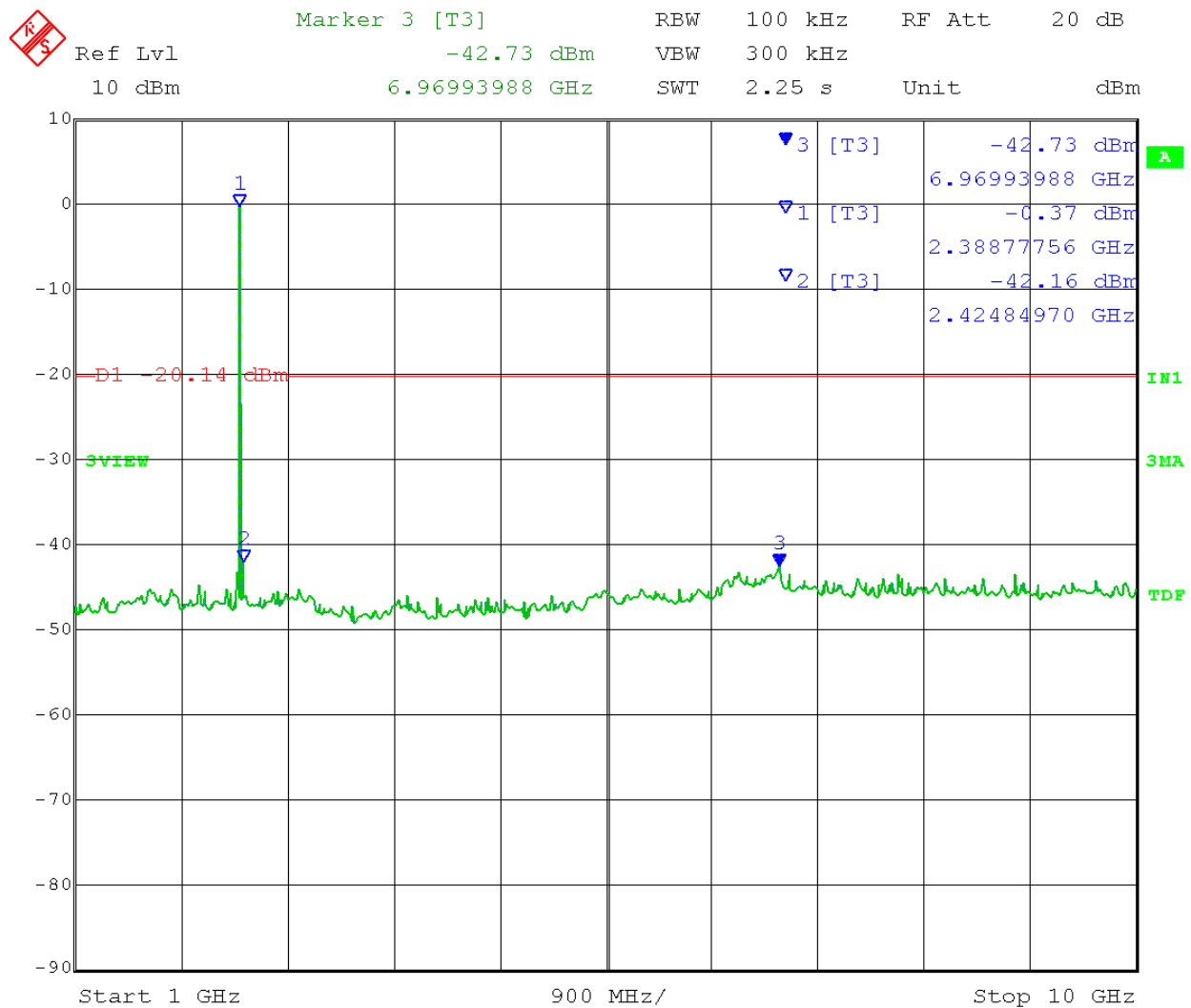
Date: 25.JAN.2016 11:49:13

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Low Channel – Ch.37 2.402GHz

Frequency Range: 1GHz to 10GHz  
Limit = -20.14dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



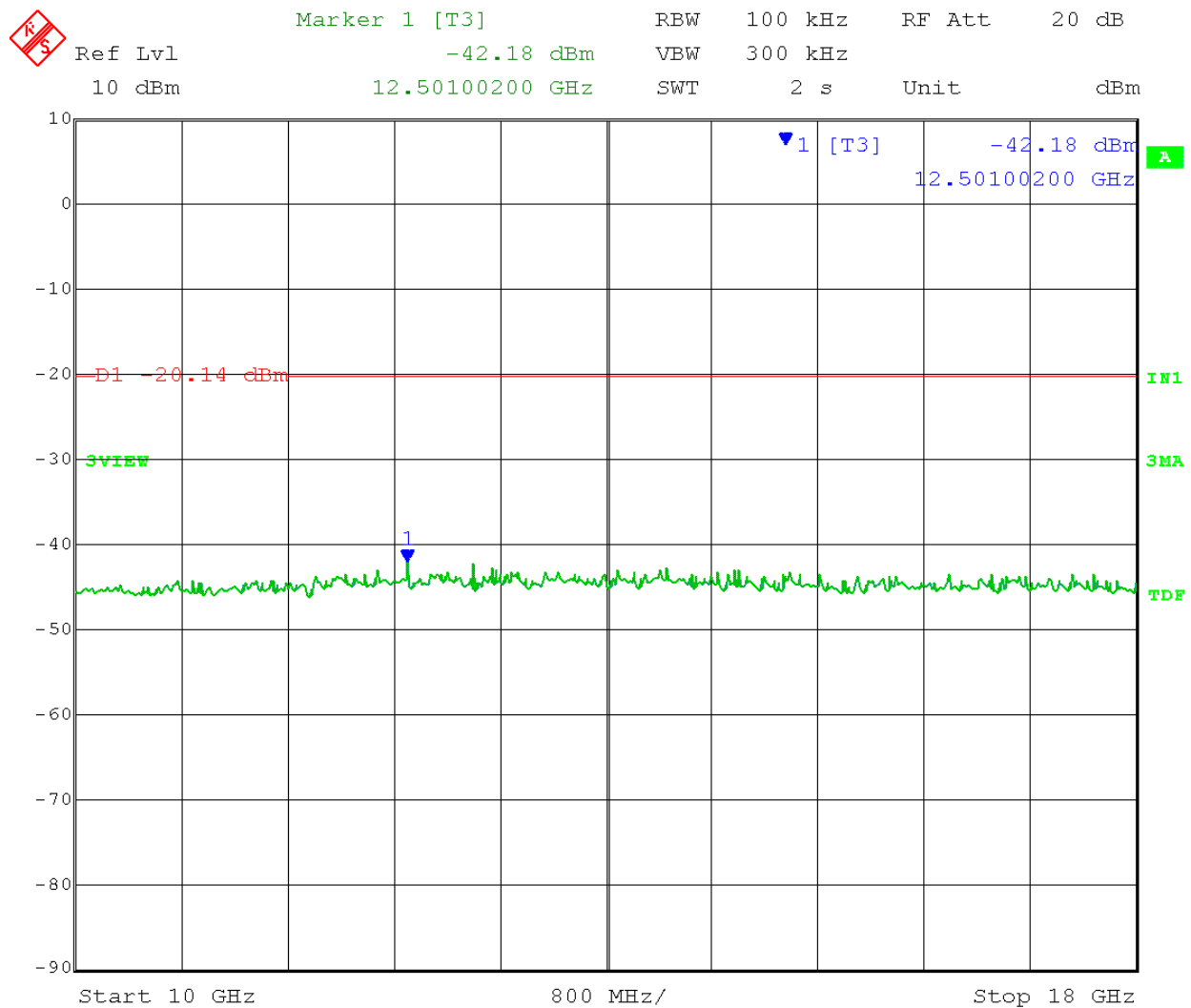
Date: 25.JAN.2016 11:44:00

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Low Channel – Ch.37 2.402GHz

Frequency Range: 10GHz to 18GHz  
Limit = -20.14dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



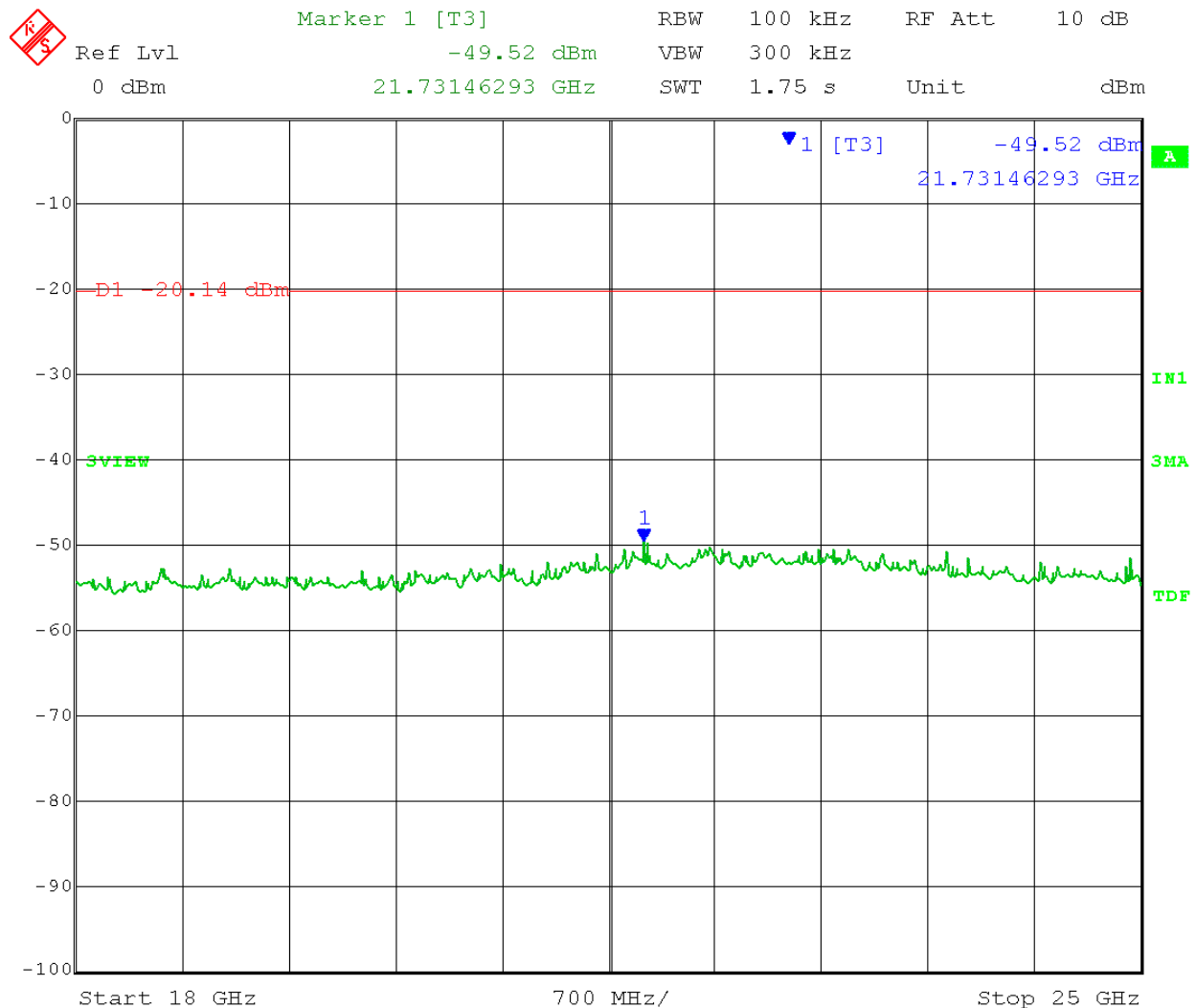
Date: 25.JAN.2016 11:45:17

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Low Channel – Ch.37 2.402GHz

Frequency Range: 18GHz to 25GHz  
Limit = -20.14dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency

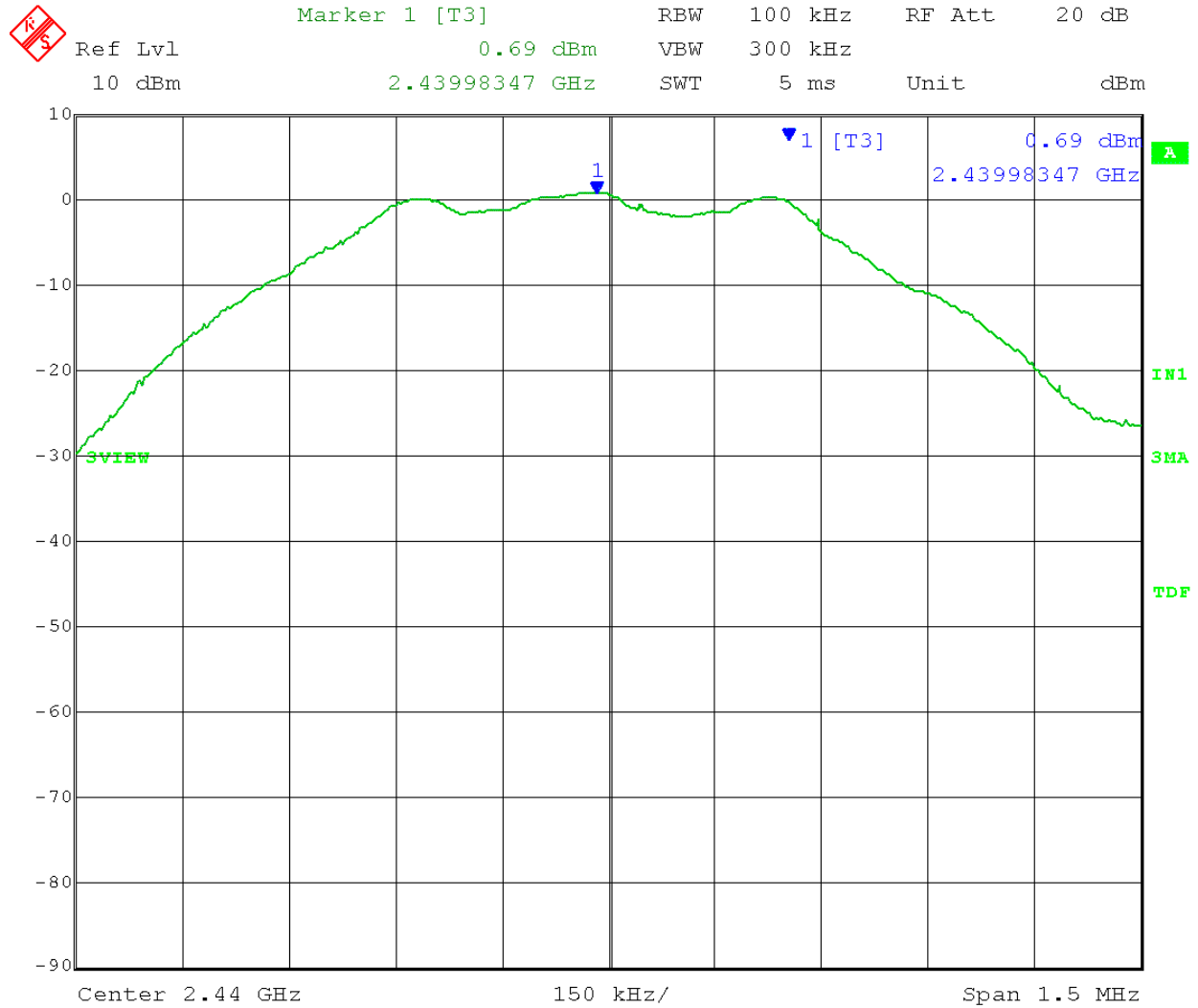


Date: 25.JAN.2016 11:47:31



Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Mid Channel – Ch.17 2.440 GHz  
Reference Level= 0.69dbm  
Limit= 0.69-20= -19.31



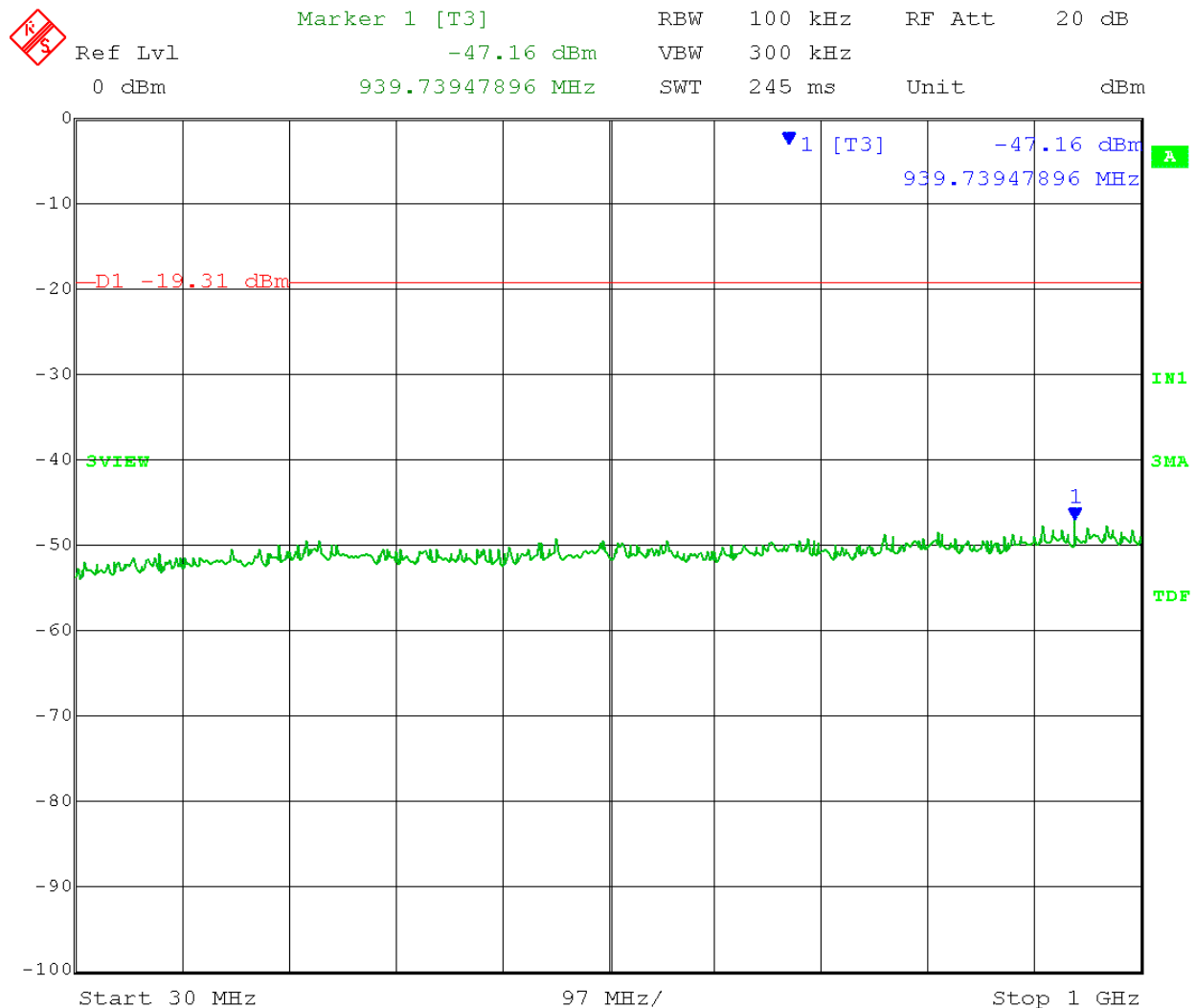
Date: 25.JAN.2016 11:12:41

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted - 15.247 (d)  
Operator: Paul L

Comment: Mid Channel - Ch.17 2.440GHz

Frequency Range: 30MHz to 1GHz  
Limit = -19.31dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



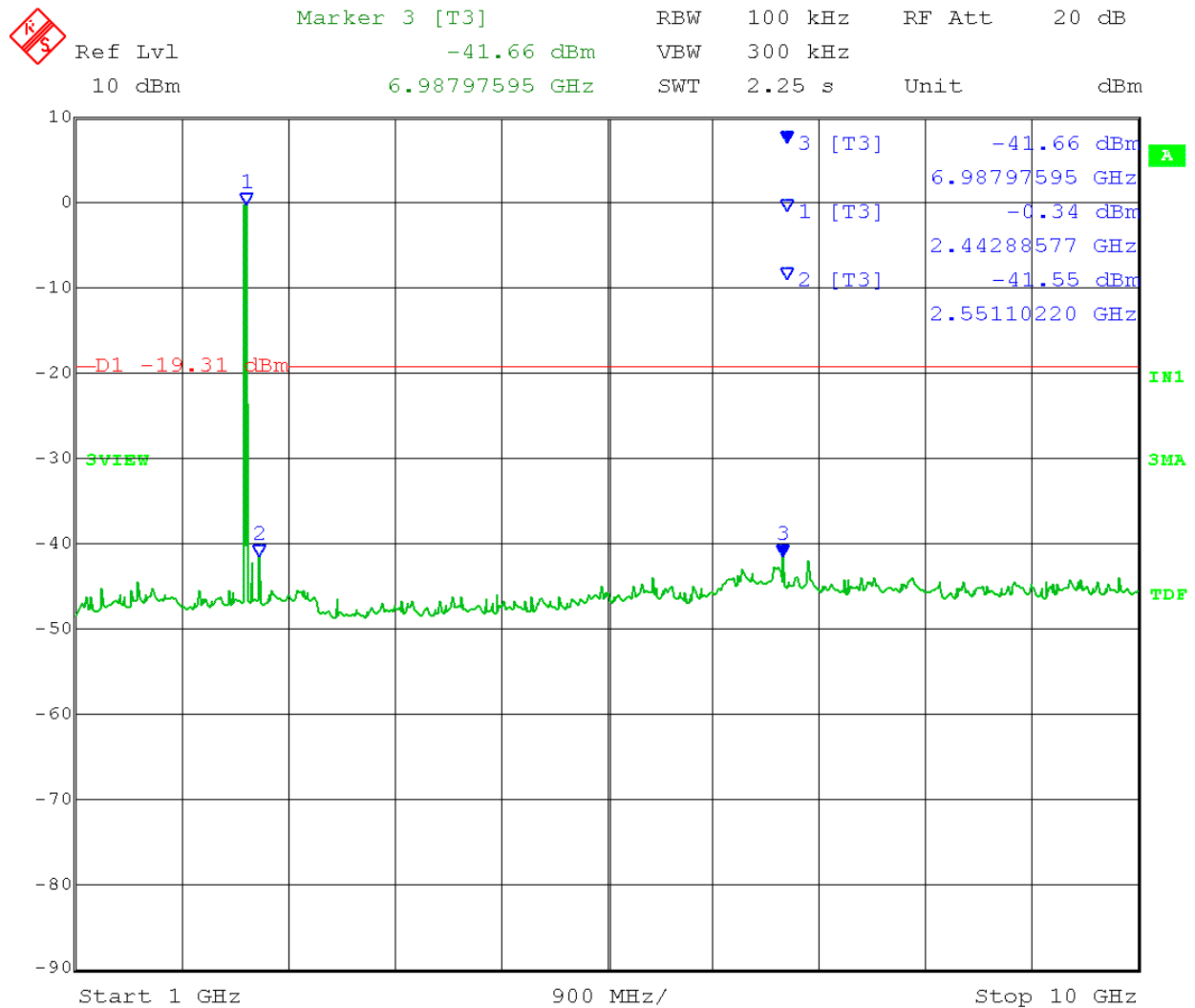
Date: 25.JAN.2016 11:34:28

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Mid Channel – Ch.17 2.440GHz

Frequency Range: 1GHz to 10GHz  
Limit = -19.31dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



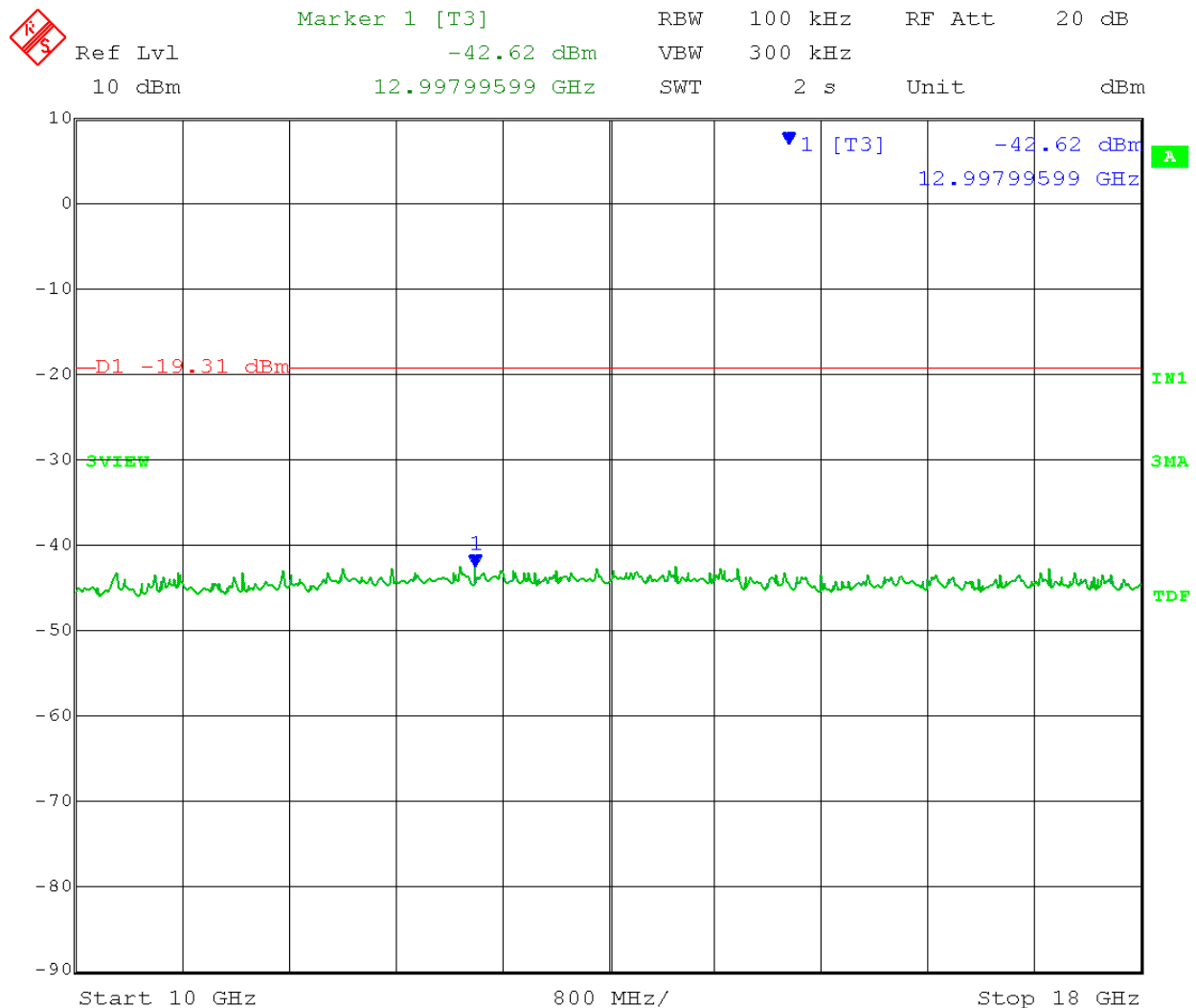
Date: 25.JAN.2016 11:26:29

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Mid Channel – Ch.17 2.440GHz

Frequency Range: 10GHz to 18GHz  
Limit = -19.31dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



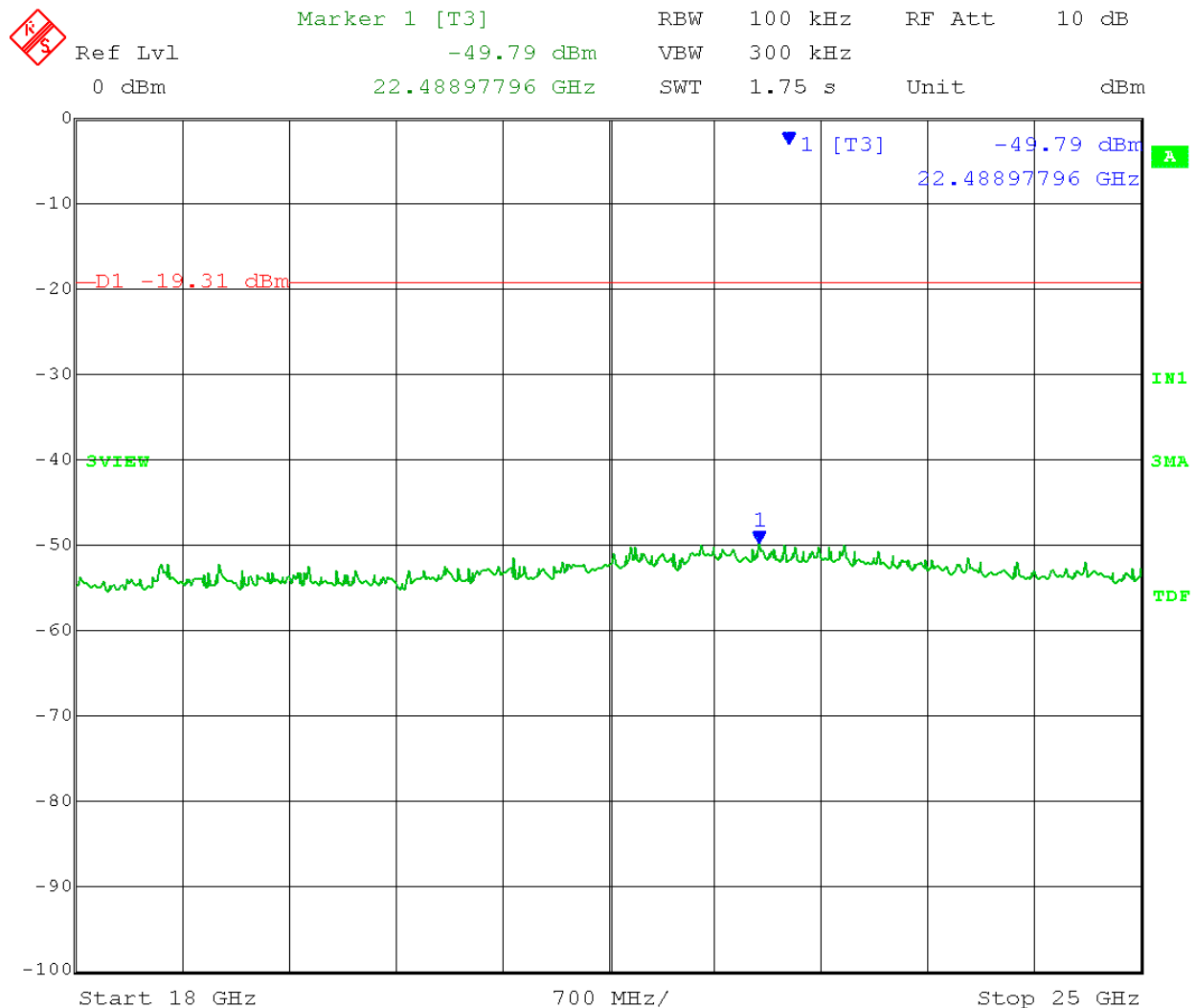
Date: 25.JAN.2016 11:28:28

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: Mid Channel – Ch.17 2.440GHz

Frequency Range: 18GHz to 25GHz  
Limit = -19.31dbm

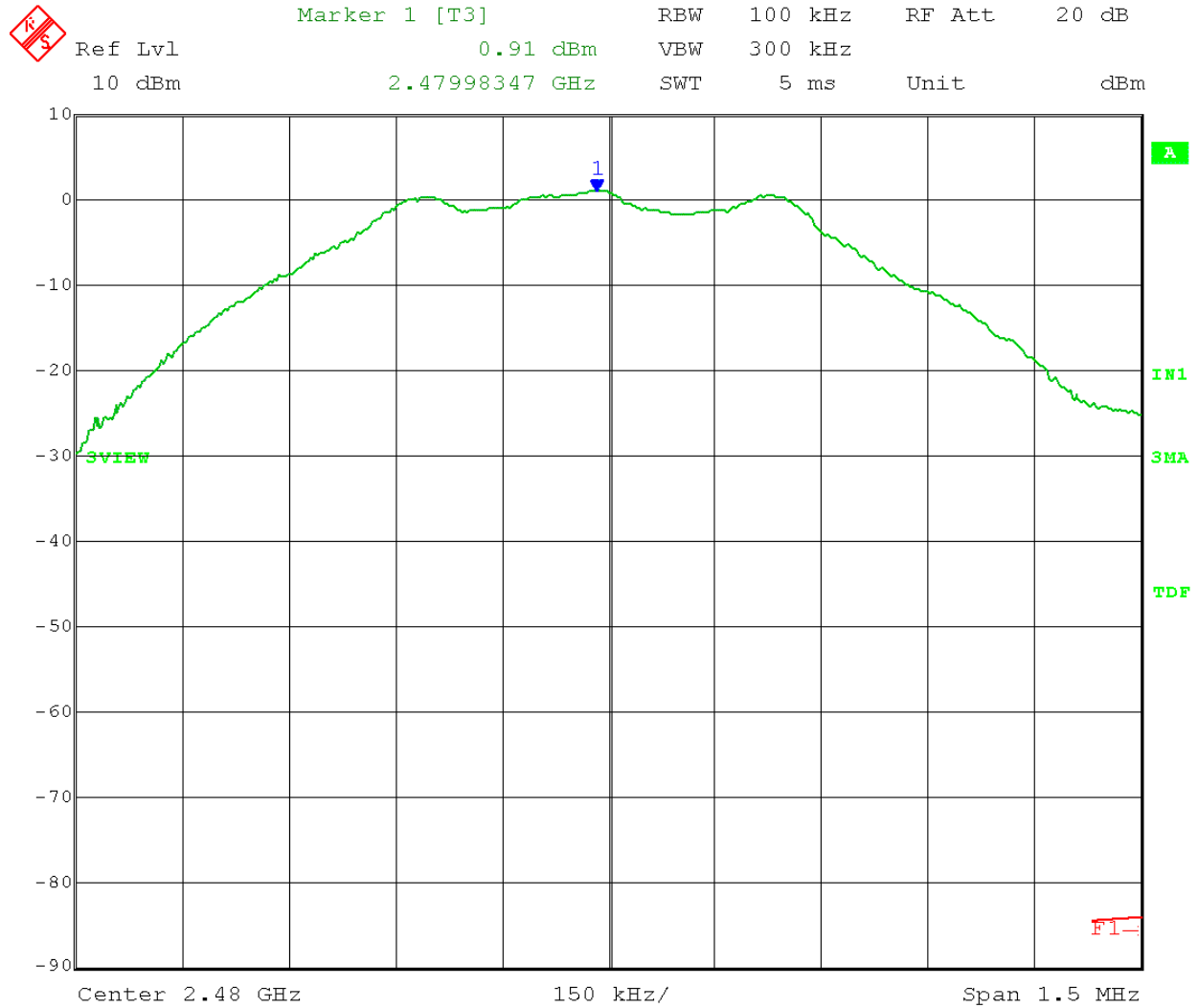
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



Date: 25.JAN.2016 11:32:00

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: **High Channel – Ch.39 2.480GHz**  
Reference Level= 0.91dbm  
Limit= 0.91-20= -19.09



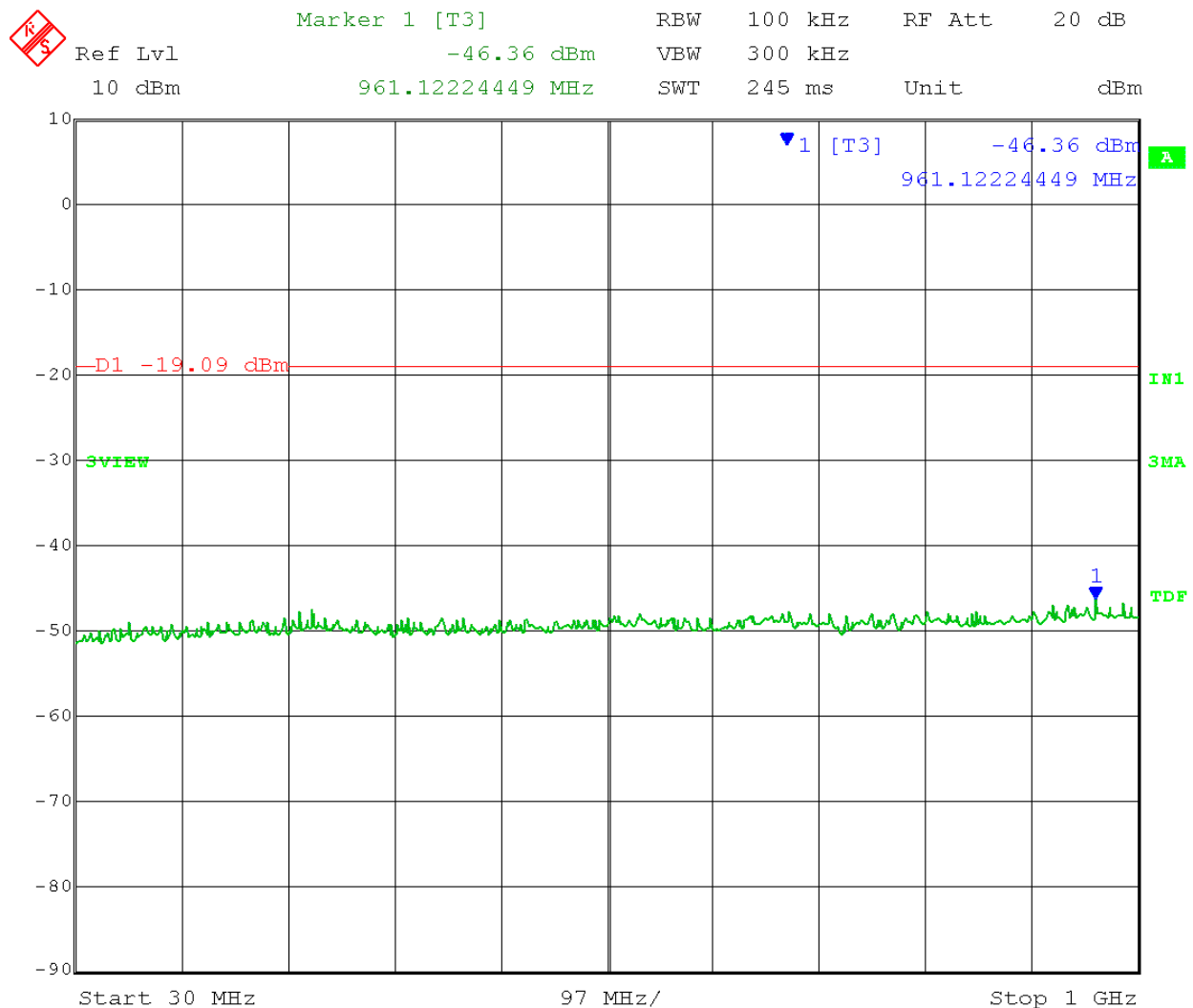
Date: 25.JAN.2016 10:55:28

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: High Channel – Ch.39 2.480GHz

Frequency Range: 30MHz to 1GHz  
Limit = -19.09dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



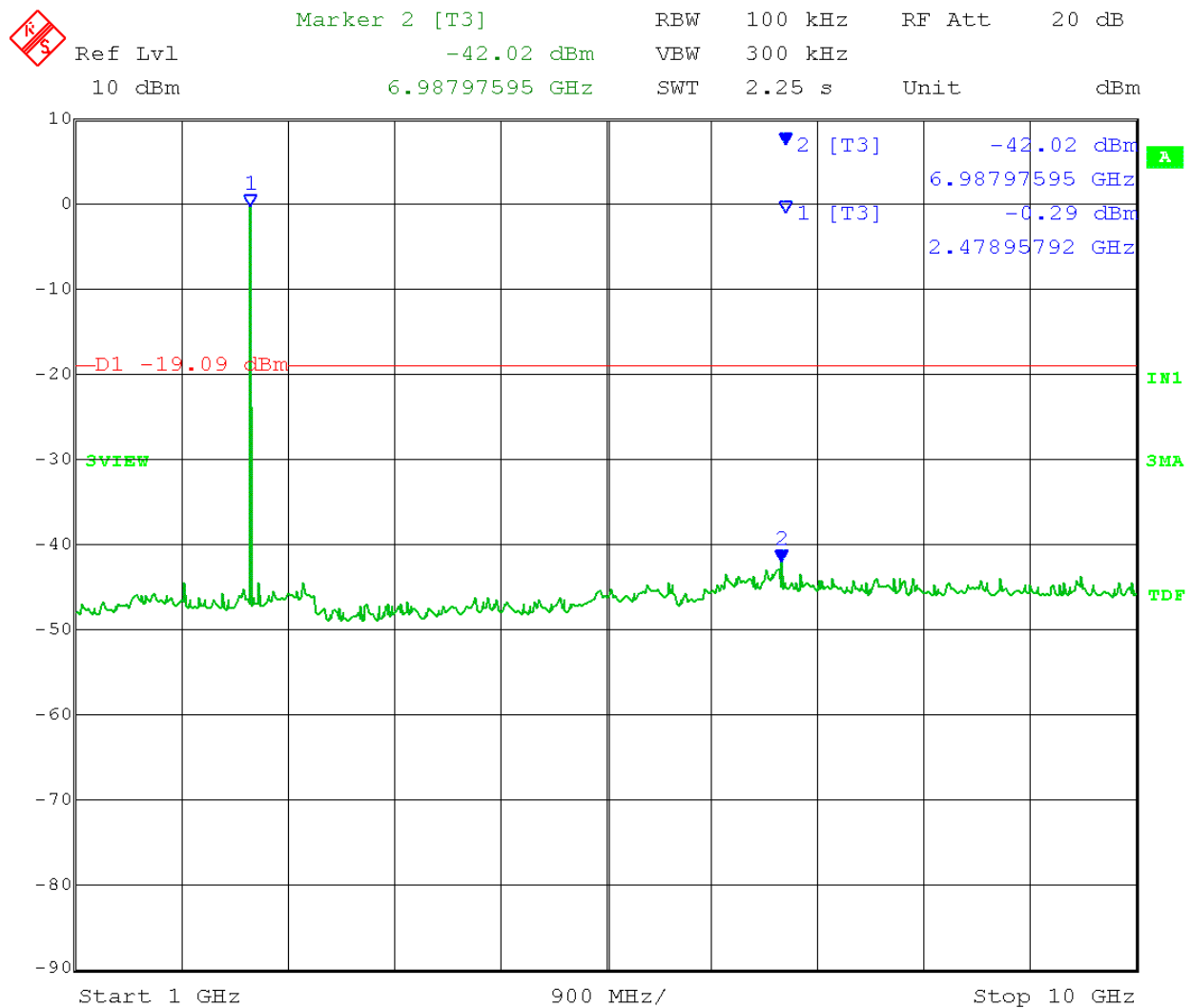
Date: 25.JAN.2016 11:20:03

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: High Channel – Ch.39 2.480GHz

Frequency Range: 1GHz to 10GHz  
Limit = -19.09dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



Date: 25.JAN.2016 11:02:29

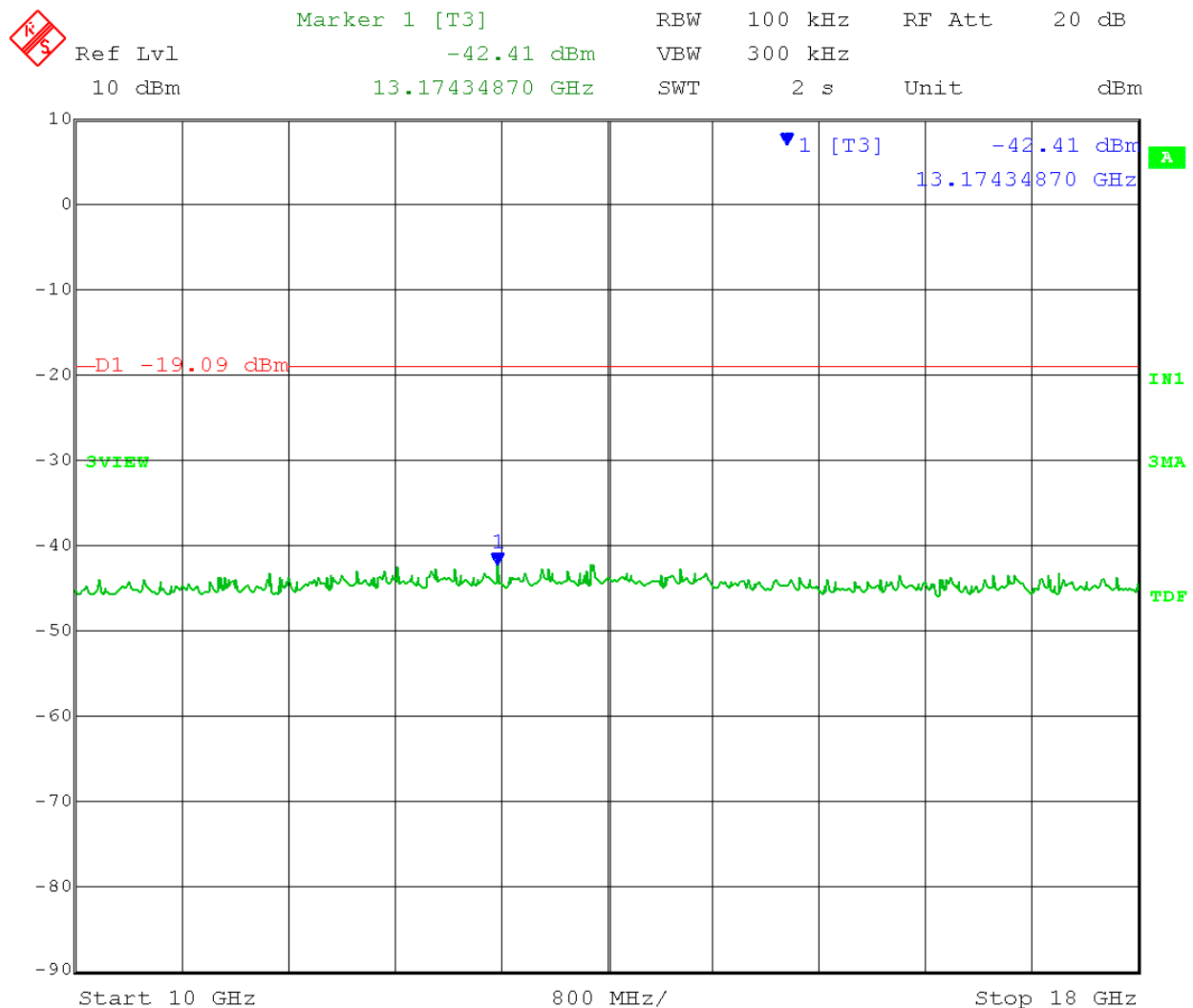


Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: High Channel – Ch.39 2.480GHz

Frequency Range: 10GHz to 18GHz  
Limit = -19.09dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



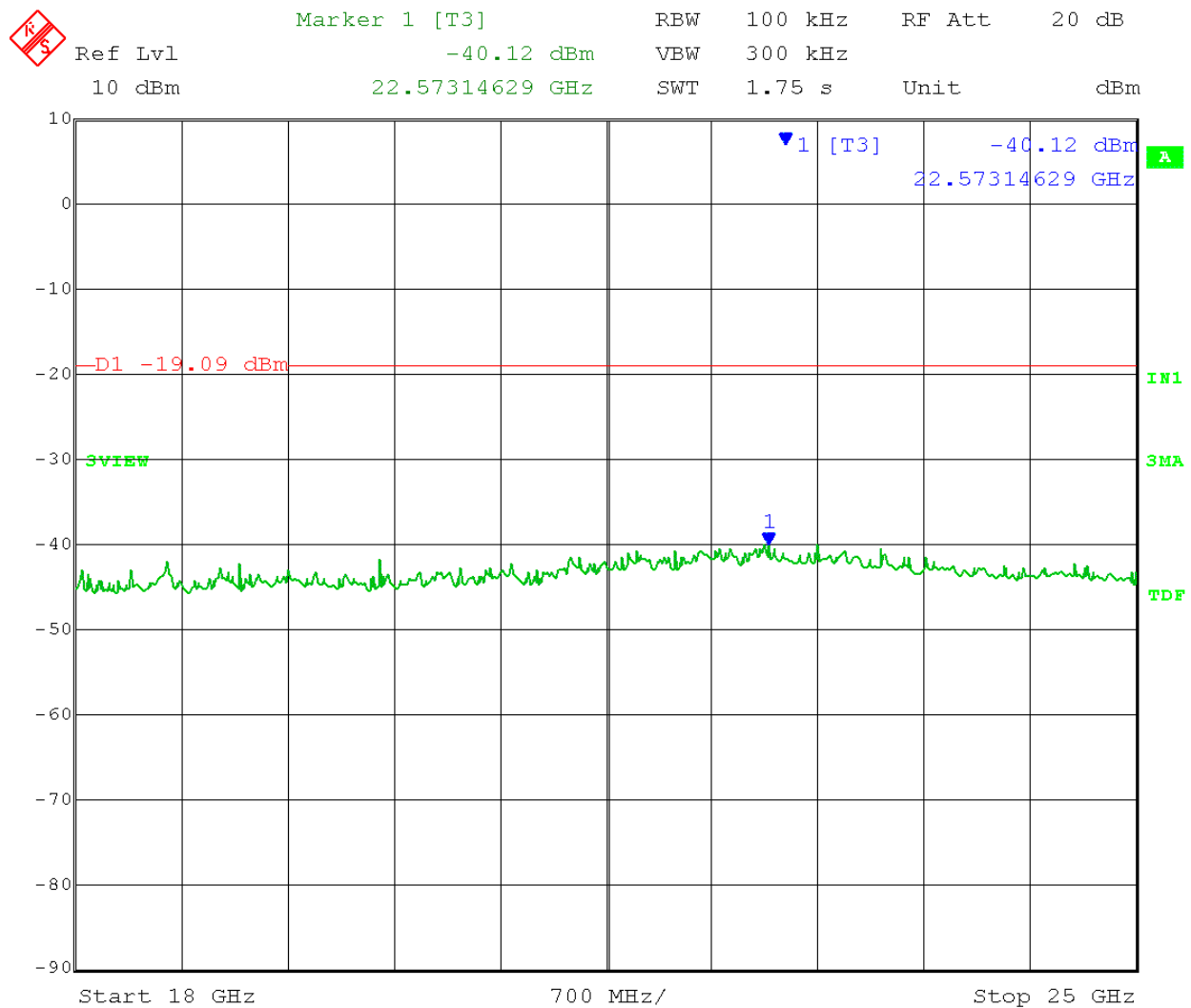
Date: 25.JAN.2016 11:22:48

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Spurious Emissions - Conducted – 15.247 (d)  
Operator: Paul L

Comment: High Channel – Ch.39 2.480GHz

Frequency Range: 18GHz to 25GHz  
Limit = -19.09dbm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



Date: 25.JAN.2016 11:07:39



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

Wilson Sporting Goods  
MSC1108  
21656  
7913

## **Appendix B**

### **B5.0 Radiated Emissions in Restricted Bands**

#### **Rule Part:**

FCC Parts 15.247(d), 15.205, 15.209

#### **Test Procedure:**

558074 D01 DTS Meas Guidance v03r04 Sections 12.0 and 12.1  
ANSI C63.10-2013 Sections 11.12 and 11.12.1

#### **Limits:**

FCC Part 15.209

#### **Results:**

Compliant

#### **Notes:**

The EUT was set to transmit continuously at its maximum power. Peak measurements were taken with RBW = 1 MHz, VBW = 3 MHz. Average measurements were taken with RBW = 1 MHz, VBW = 3MHz.



166 South Carter, Genoa City, WI 53128

Company: Wilson Sporting Goods  
Model Tested: MSC1108  
Report Number: 21656  
DLS Project: 7913

## Radiated Emissions in Restricted Bands - 1 to 25GHz

1GHz to 18GHz Tested at a 3 Meter Distance

18GHz to 25GHz Tested at a 1 Meter Distance

EUT: Bluetooth Football  
Manufacturer: Wilson Sporting Goods  
Operating Condition: 70deg F; 28%R.H.  
Test Site: G1  
Operator: Paul L  
Test Specification: **Low channel: 2402MHz, 83% Duty Cycle, 1.62 Duty Cycle Correction Factor**  
Comment: **FCC Part 15.247 and Part 15.205**  
Date: 01-25-2016  
Notes: All other emissions at least 20 dB under the limit. No emissions found from 18-25GHz

Frequency (MHz)	Measurement Type	Antenna Polarization	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Duty Cycle Correction (dB)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	EUT Angle (deg)	Comment
4804.00	Max Peak	Vert	59.76	32.84	-36.2	0	56.4	74	17.6	1.8	177	2nd Harmonic
4804.00	Average	Vert	45.96	32.84	-36.2	1.62	44.2	54	9.8	1.8	177	2nd Harmonic
4804.00	Max Peak	Horz	62.16	32.84	-36.2	0	58.8	74	15.2	1.8	172	2nd Harmonic
4804.00	Average	Horz	47.82	32.84	-36.2	1.62	46.1	54	7.9	1.8	172	2nd Harmonic



166 South Carter, Genoa City, WI 53128

Company: Wilson Sporting Goods  
Model Tested: MSC1108  
Report Number: 21656  
DLS Project: 7913

## Radiated Emissions in Restricted Bands – 1 GHz to 25 GHz

1 GHz to 18 GHz Tested at a 3 Meter Distance

18 GHz to 25 GHz Tested at a 1 Meter Distance

EUT: Bluetooth Football  
Manufacturer: Wilson Sporting Goods  
Operating Condition: 67deg F 28%R.H.  
Test Site: G1  
Operator: Paul L  
Test Specification: **Mid channel: 2440MHz, 83% Duty Cycle, 1.62 Duty Cycle Correction Factor**  
Comment: **FCC Part 15.247 and Part 15.205**  
Date: 01-25-2016  
Notes: All other emissions at least 20 dB under the limit. No emissions found from 18-25GHz

Frequency (MHz)	Measurement Type	Antenna Polarization	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Duty Cycle Correction (dB)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	EUT Angle (deg)	Comment
4880.00	Max Peak	Vert	56.81	32.99	-36.4	0	53.4	74	20.6	1.7	178	2nd Harmonic
4880.00	Average	Vert	41.16	32.99	-36.4	1.62	39.4	54	14.6	1.7	178	2nd Harmonic
4880.00	Max Peak	Horz	59.41	32.99	-36.4	0	56.0	74	18.0	1.7	193	2nd Harmonic
4880.00	Average	Horz	46.26	32.99	-36.4	1.62	44.5	54	9.5	1.7	193	2nd Harmonic
7320.00	Max Peak	Vert	49.74	36.46	-33.5	0	52.7	74	21.3	2.0	181	3rd Harmonic
7320.00	Average	Vert	37.11	36.46	-33.5	1.62	41.7	54	12.3	2.0	181	3rd Harmonic
7320.00	Max Peak	Horz	50.14	36.46	-33.5	0	53.1	74	20.9	1.5	147	3rd Harmonic
7320.00	Average	Horz	38.19	36.46	-33.5	1.62	42.8	54	11.2	1.5	147	3rd Harmonic



166 South Carter, Genoa City, WI 53128

Company: Wilson Sporting Goods  
Model Tested: MSC1108  
Report Number: 21656  
DLS Project: 7913

## Radiated Emissions in Restricted Bands – 1 GHz to 25 GHz

1 GHz to 18 GHz Tested at a 3 Meter Distance

18 GHz to 25 GHz Tested at a 1 Meter Distance

EUT: Bluetooth Football  
Manufacturer: Wilson Sporting Goods  
Operating Condition: 67deg F 28%R.H.  
Test Site: G1  
Operator: Paul L  
Test Specification: **High channel: 2480MHz, 83% Duty Cycle, 1.62 Duty Cycle Correction Factor**  
Comment: **FCC Part 15.247 and Part 15.205**  
Date: 01-26-2016  
Notes: All other emissions at least 20 dB under the limit. No emissions found from 18-25GHz

Frequency (MHz)	Measurement Type	Antenna Polarization	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Duty Cycle Correction (dB)	Total Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	EUT Angle (deg)	Comment
4960.00	Max Peak	Vert	57.92	33.08	-36.4	0	54.6	74	19.4	1.5	172	2nd Harmonic
4960.00	Average	Vert	50.88	33.08	-36.4	1.62	49.2	54	4.8	1.5	172	2nd Harmonic
4960.00	Max Peak	Horz	58.02	33.08	-36.4	0	54.7	74	19.3	1.6	167	2nd Harmonic
4960.00	Average	Horz	51.02	33.08	-36.4	1.62	49.3	54	4.7	1.6	167	2nd Harmonic
7440.00	Max Peak	Vert	40.74	36.56	-32.8	0	44.5	74	29.5	2.2	174	3rd Harmonic
7440.00	Average	Vert	40.71	36.56	-32.8	1.62	46.1	54	7.9	2.2	174	3rd Harmonic
7440.00	Max Peak	Horz	51.64	36.56	-32.8	0	55.4	74	18.6	1.5	127	3rd Harmonic
7440.00	Average	Horz	40.46	36.56	-32.8	1.62	45.8	54	8.2	1.5	127	3rd Harmonic



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

Wilson Sporting Goods  
MSC1108  
21656  
7913

## **Appendix B**

### **B6.0 Radiated Spurious Emissions**

#### **Rule Part:**

FCC Parts 15.247(d) and 15.209

#### **Test Procedure:**

ANSI C63.4-2014 Section 8.0

#### **Limit:**

FCC Part 15.209

#### **Results:**

Compliant

#### **Notes:**

The measurement bandwidth on the receiver was set 120 kHz from 30 to 1000 MHz, and 1 MHz from 1 to 12.5 GHz. The detector was set to Quasi-Peak below 1 GHz and both Peak and Average above 1 GHz. The test distance was 3 meters.

No emissions were found in the 1-5GHz range.

**Electric Field Strength**

EUT: Bluetooth Football  
Manufacturer: Wilson  
Operating Condition: 63 deg. F; 26% R.H.  
Test Site: DLS Site 2  
Operator: Paul L #7913  
Test Specification: Tx Radiated Restricted Band; Digital Device  
Comment: Bluetooth Low-Energy  
Date: 1-28-2016

**TEXT: "Horz 3 meters"**

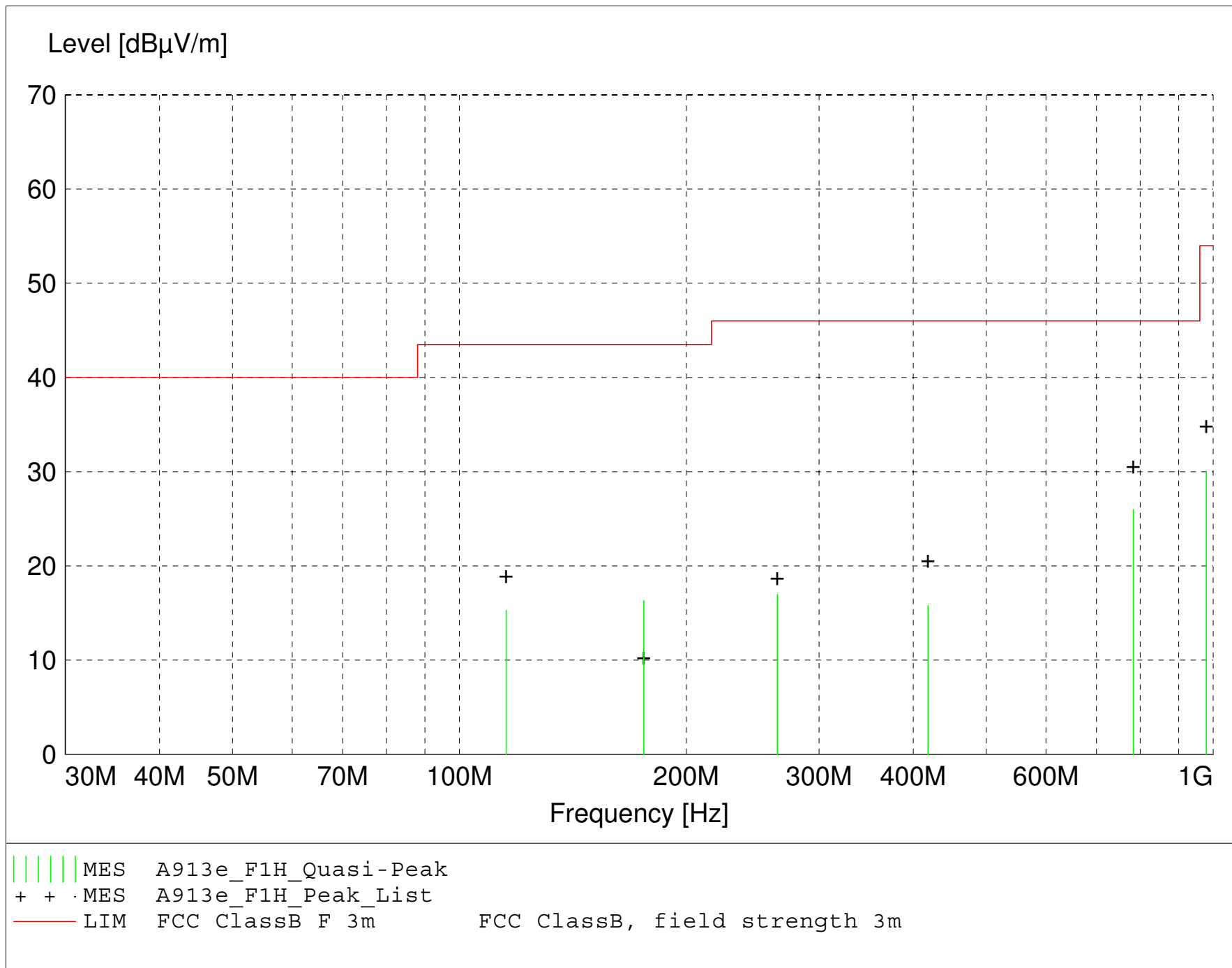
Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization

Equations: 
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)  
| Final maximized level using Quasi-Peak detector  
X Final maximized level using Average detector  
# Final maximized level using Peak detector





**MEASUREMENT RESULT: "A913e\_F1H\_Final"**

1/28/2016 11:28AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
783.550000	21.74	21.97	-17.7	26.0	46.0	20.0	4.00	0	QUASI-PEAK	noise floor
979.250000	22.60	22.83	-15.5	29.9	54.0	24.1	4.00	0	QUASI-PEAK	noise floor
175.650000	22.71	15.73	-22.1	16.3	43.5	27.2	4.00	0	QUASI-PEAK	noise floor
115.350000	25.26	12.64	-22.6	15.3	43.5	28.2	4.00	0	QUASI-PEAK	noise floor
264.050000	26.09	12.18	-21.3	17.0	46.0	29.0	2.50	0	QUASI-PEAK	RB
418.500000	20.28	15.78	-20.3	15.8	46.0	30.2	1.00	0	QUASI-PEAK	noise floor

**Electric Field Strength**

EUT: Bluetooth Football  
Manufacturer: Wilson  
Operating Condition: 63 deg. F; 26% R.H.  
Test Site: DLS Site 2  
Operator: Paul L #7913  
Test Specification: Tx Radiated Restricted Band; Digital Device  
Comment: Bluetooth Low-Energy  
Date: 1-28-2016

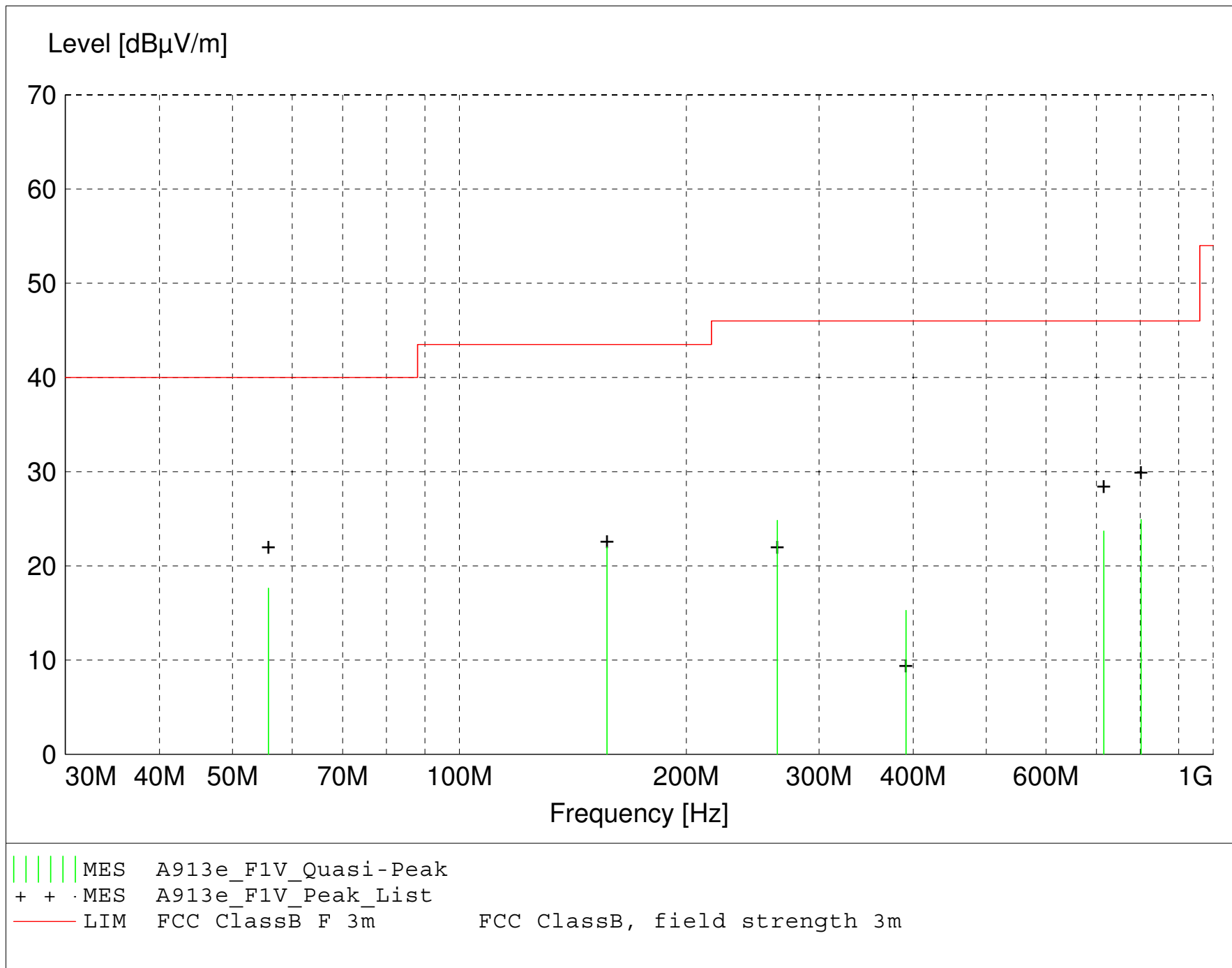
**TEXT: "Vert 3 meters"**

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with VERTICAL Antenna Polarization

Equations: 
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)  
| Final maximized level using Quasi-Peak detector  
X Final maximized level using Average detector  
# Final maximized level using Peak detector



**MEASUREMENT RESULT: "A913e\_F1V\_Final"**

1/28/2016 11:18AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
802.100000	22.28	19.90	-17.2	24.9	46.0	21.1	1.00	0	QUASI-PEAK	noise floor
264.050000	33.95	12.18	-21.3	24.8	46.0	21.2	1.00	0	QUASI-PEAK	RB
156.950000	31.63	12.79	-22.4	22.0	43.5	21.5	1.00	0	QUASI-PEAK	noise floor
715.900000	21.94	19.86	-18.1	23.7	46.0	22.3	1.00	0	QUASI-PEAK	noise floor
55.800000	30.84	10.42	-23.6	17.6	40.0	22.4	1.00	0	QUASI-PEAK	noise floor
391.200000	20.42	15.17	-20.3	15.3	46.0	30.7	1.00	0	QUASI-PEAK	noise floor



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

Wilson Sporting Goods  
MSC1108  
21656  
7913

## **Appendix B**

### **B7.0 Band-Edge Measurements – RF Conducted**

#### **Rule Part:**

FCC Parts 15.247(d)

#### **Test Procedure:**

558074 D01 DTS Meas Guidance v03r04 Sections 11.0, 11.2 and 11.3  
ANSI C63.10-2013 Sections 11.11, 11.11.2 and 11.11.3

#### **Limit:**

20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. (Device complies with Power Option 1).

#### **Results:**

Compliant

#### **Notes:**

The EUT was set to transmit at its maximum power and maximum duty cycle (83%). This was a conducted measurement.



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

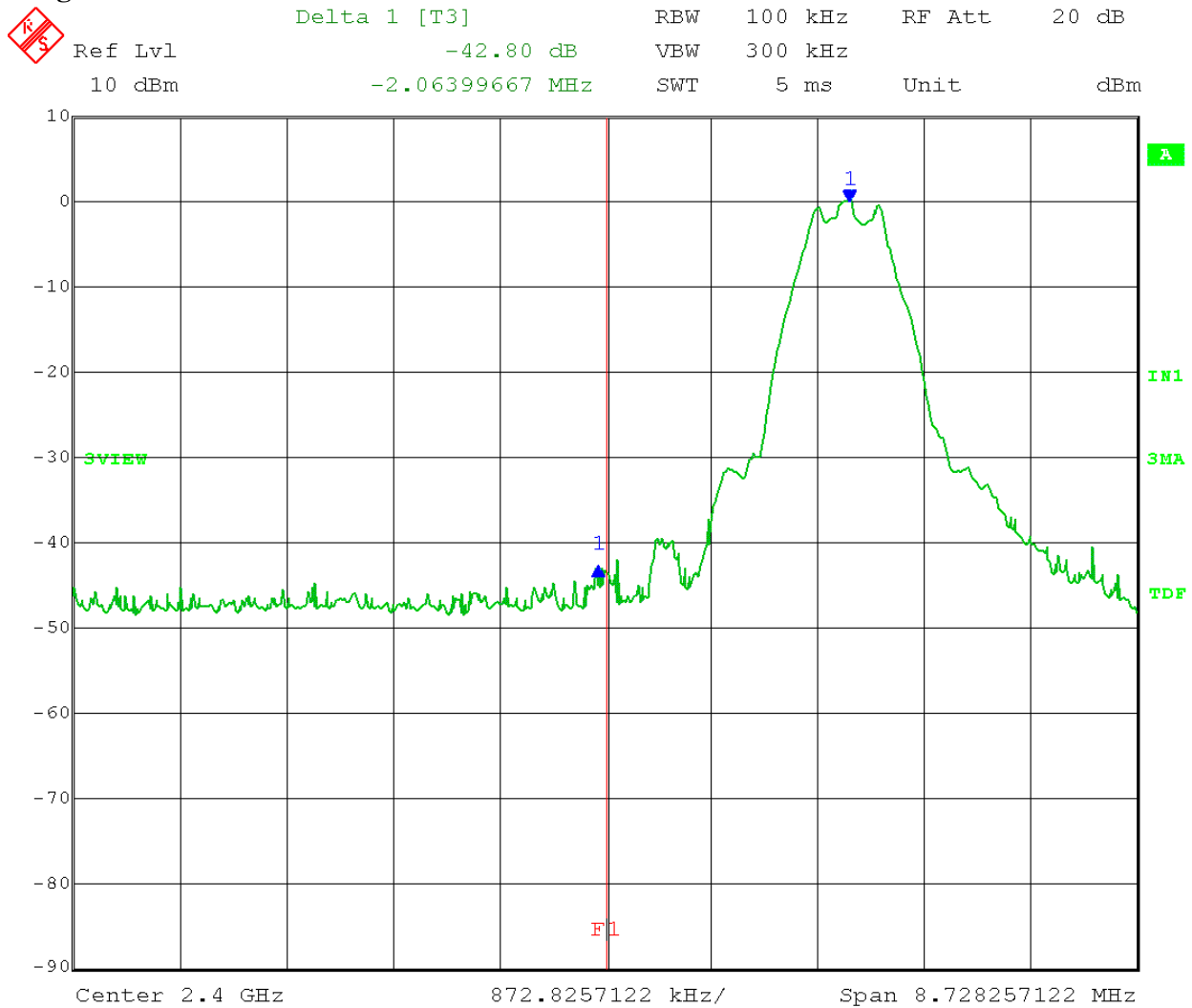
Wilson Sporting Goods  
MSC1108  
21656  
7913

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Low Band-Edge Compliance - Conducted - 15.247 (d)  
Operator: Paul L

Comment: Low Channel - Ch.37 2.402 GHz

**Band-Edge Frequency = 2.400 GHz**

**Band-Edge > 20 dB Below Peak In-Band Emission**



Date: 25.JAN.2016 10:44:20



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

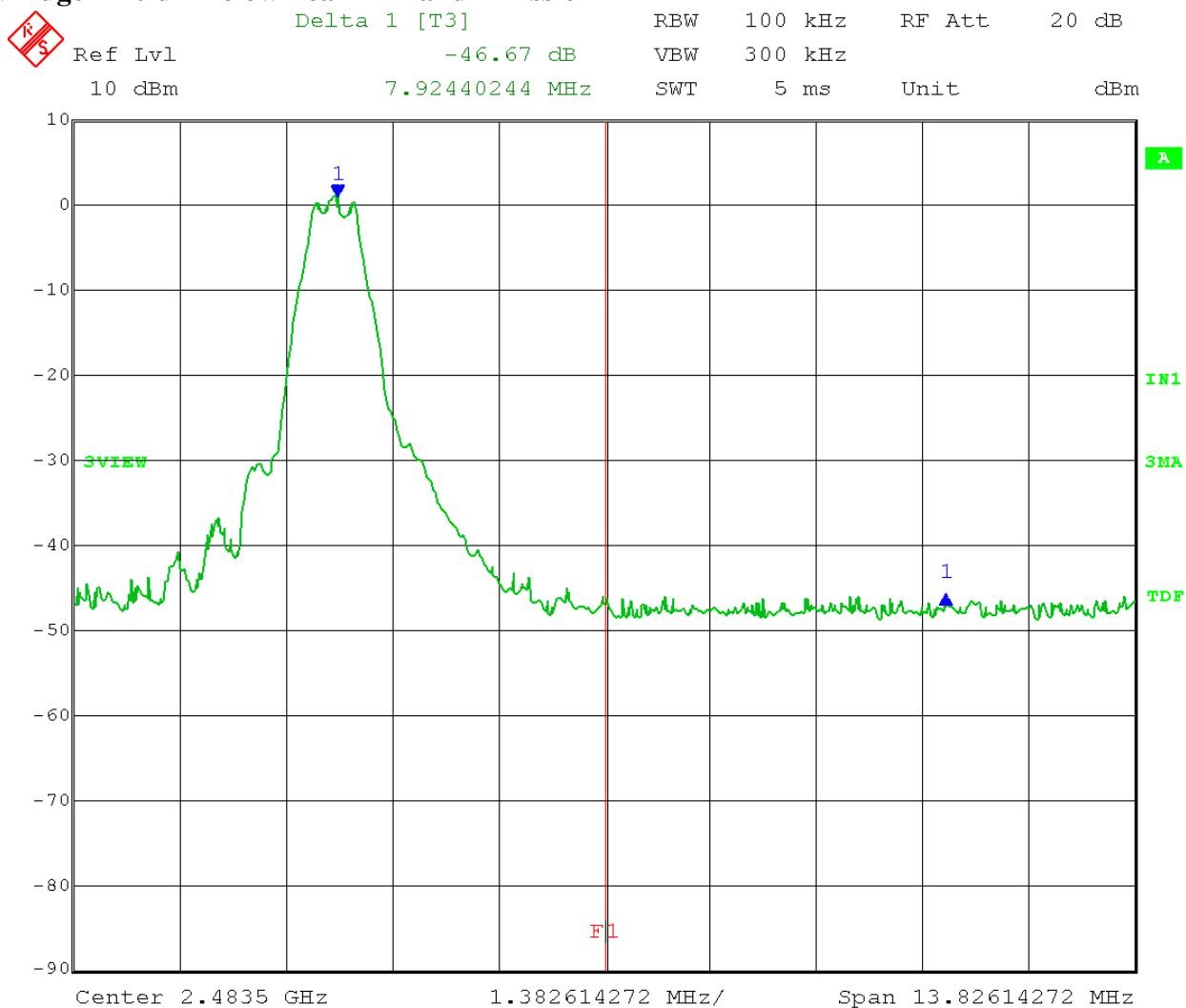
Wilson Sporting Goods  
MSC1108  
21656  
7913

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Low Band-Edge Compliance - Conducted - 15.247 (d)  
Operator: Paul L

Comment: High Channel - Ch.39 2.480 GHz

**Band-Edge Frequency = 2.4835 GHz**

**Band-Edge > 20 dB Below Peak In-Band Emission**



Date: 25.JAN.2016 10:50:27





166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

Wilson Sporting Goods  
MSC1108  
21656  
7913

## **Appendix B**

### **B8.0 Band Edge Measurements - Radiated**

#### **Rule Part:**

FCC Parts 15.247(d) and 15.205

#### **Test Procedure:**

558074 D01 DTS Meas Guidance v03r04 Sections 12.0 and 12.1  
ANSI C63.10-2013 Sections 11.12 and 11.12.1

#### **Limit:**

FCC Part 15.209

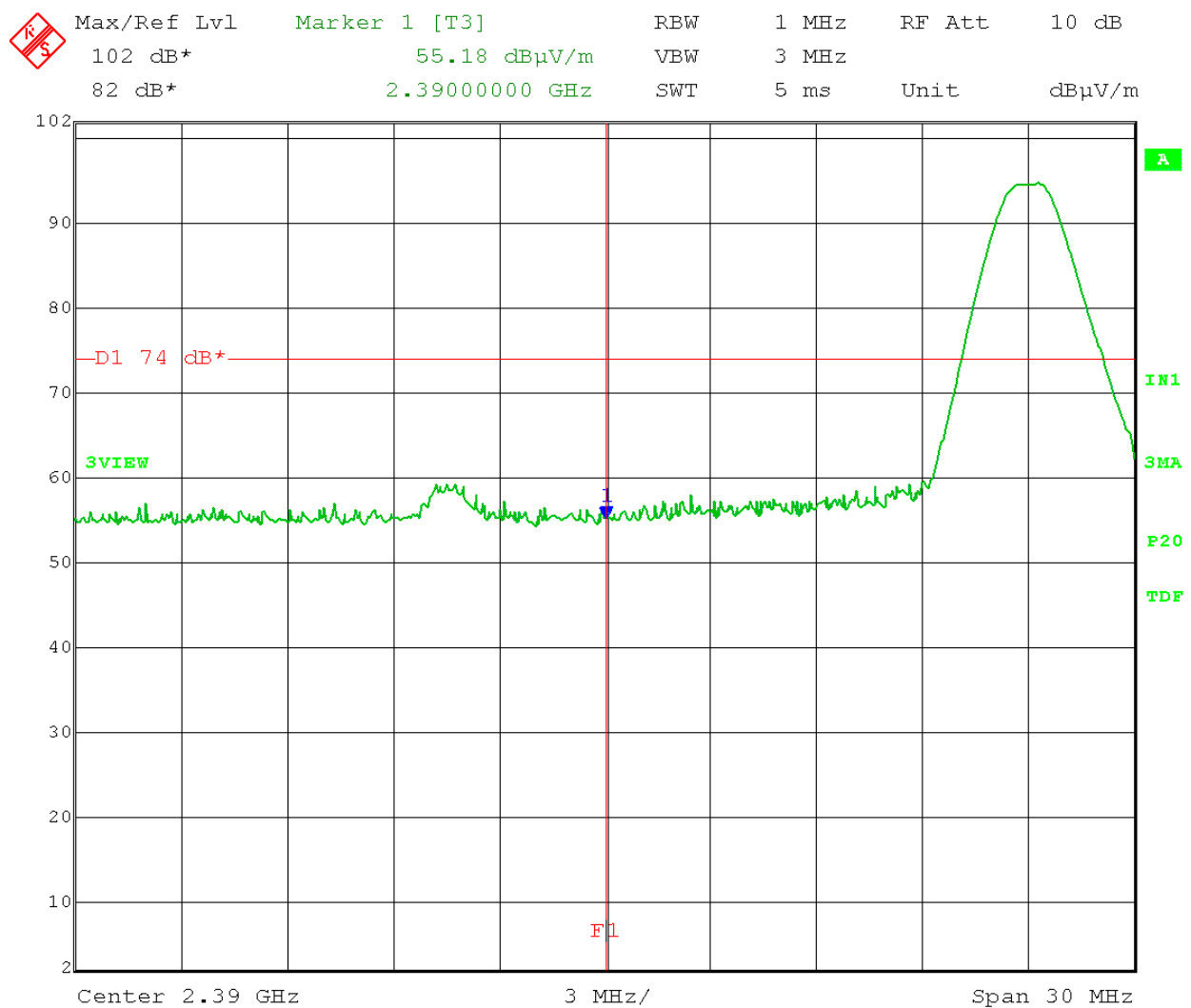
#### **Results:**

Compliant

#### **Notes:**

The EUT was set to transmit continuously at its maximum power and maximum duty cycle of 83%. A duty cycle correction factor of 1.62 was added to the measured average level. Peak measurements were taken with RBW = 1 MHz, VBW = 3 MHz. Average measurements were taken with RBW = 1 MHz, VBW = 3MHz.

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Low Band-Edge Radiated –Peak 15.247 (d)  
Operator: Paul L  
Comment: Low Channel:38 Frequency- 2402MHz  
Limit: 74dBμV/m @ 3meters Horizontal



Date: 25.JAN.2016 14:12:38

Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

Test: Low Band-Edge Radiated –Average 15.247(d)

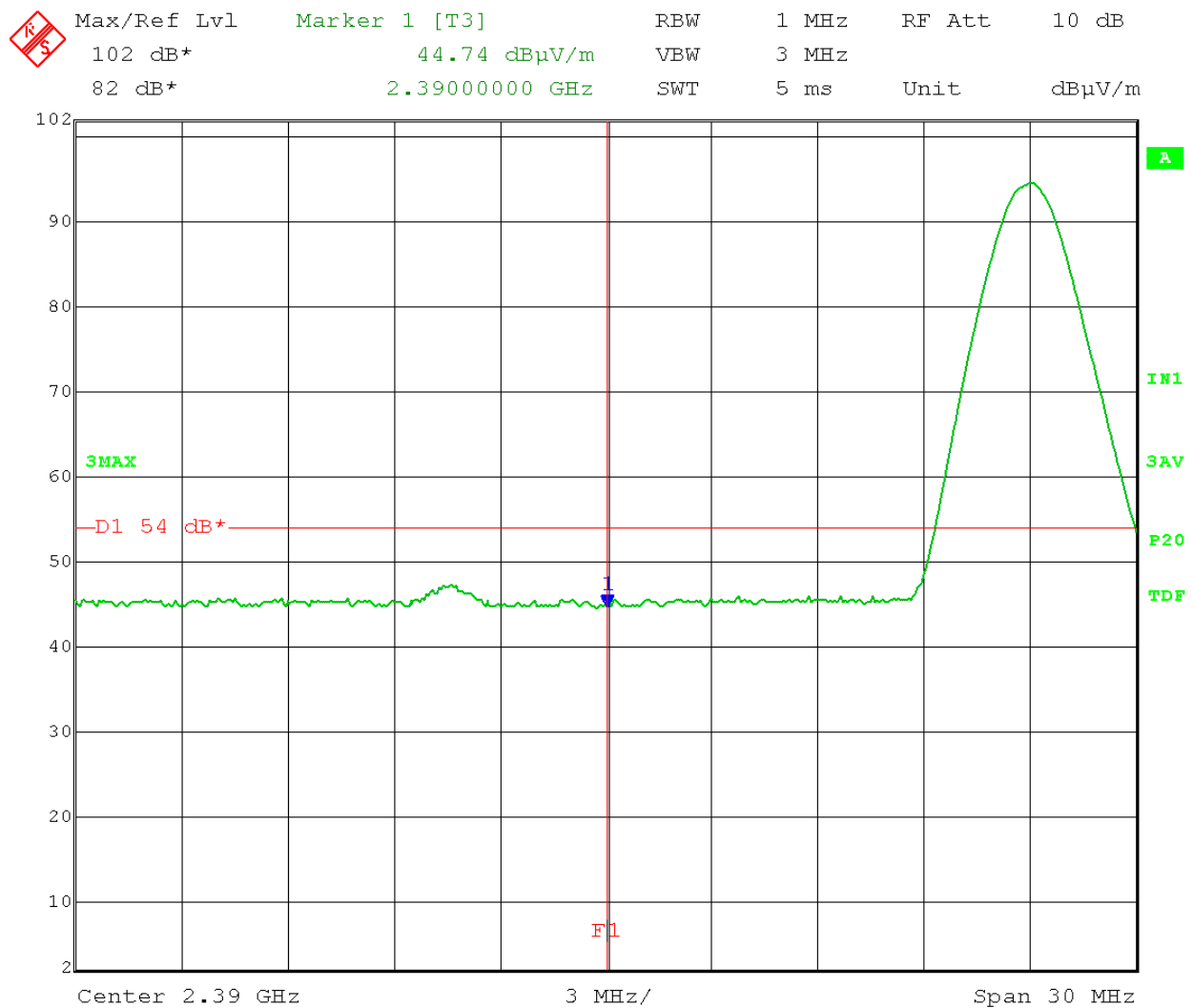
Operator: Paul L

Comment: LowChannel:37 Frequency- 2402MHz

Duty cycle correction (83% duty cycle) =  $20\log(1/0.83)=1.62$  dB

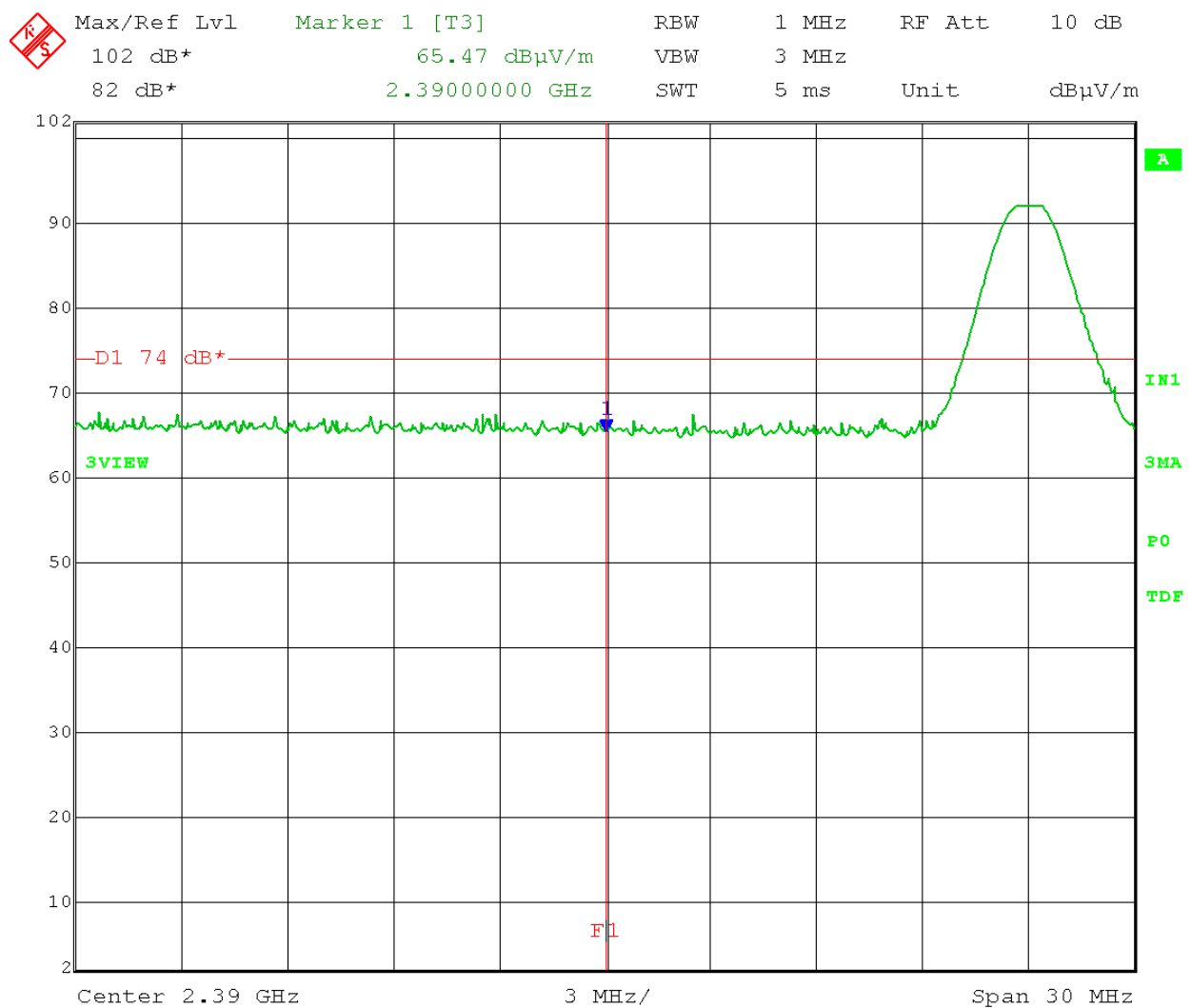
$44.74$  dB $\mu$ V/m +  $1.62$  dB =  $46.36$  dB $\mu$ V/m

Limit: 54dB $\mu$ V/m @ 3meters Horizontal



Date: 25.JAN.2016 14:08:43

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: Low Band-Edge Radiated –Peak 15.247 (d)  
Operator: Paul L  
Comment: Low Channel:38 Frequency- 2402MHz  
Limit: 74dBμV/m @ 3meters Vertical



Date: 25.JAN.2016 13:51:16

Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

Test: Low Band-Edge Radiated –Average 15.247 (d)

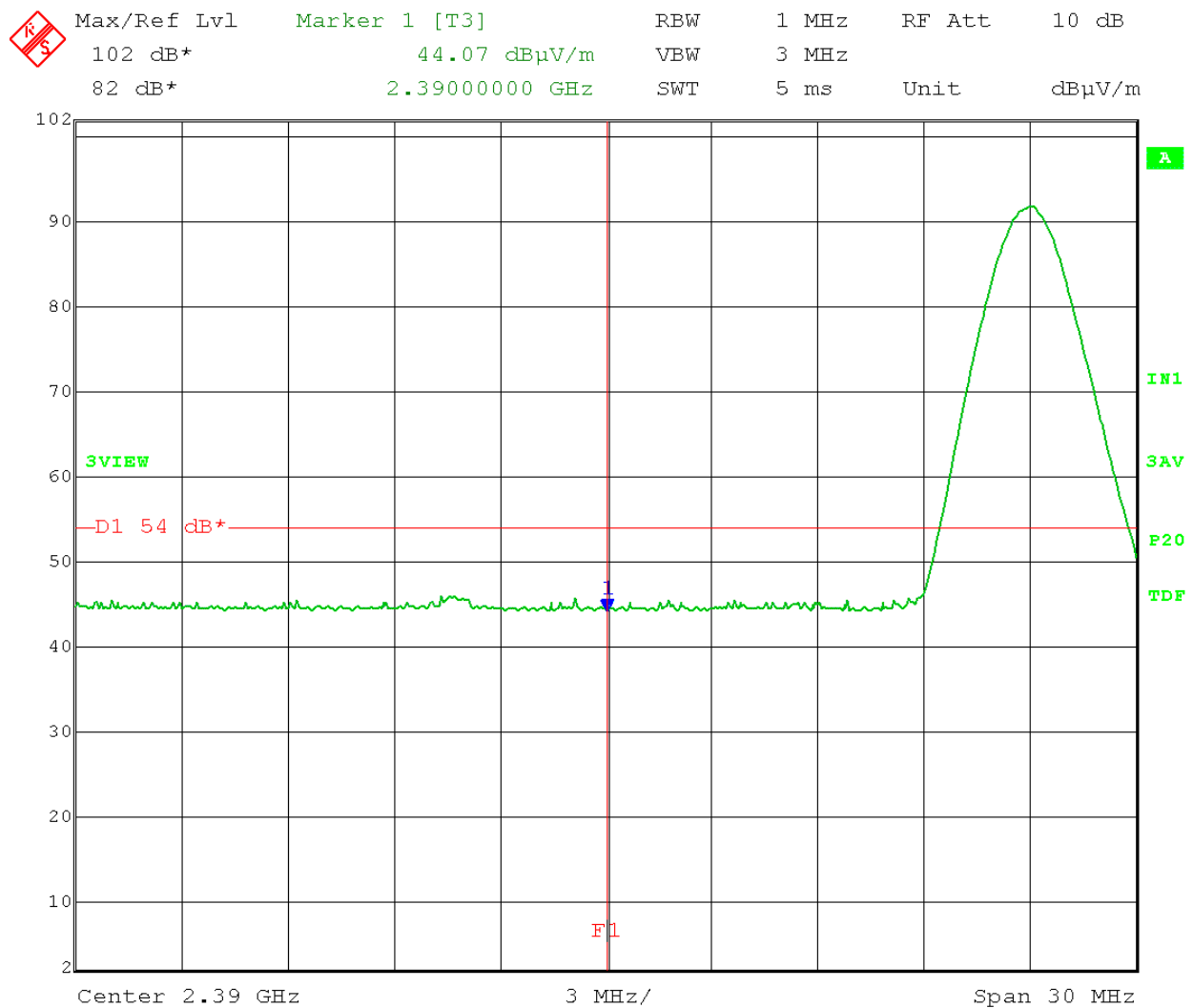
Operator: Paul L

Comment: LowChannel:37 Frequency- 2402MHz

Duty cycle correction (83% duty cycle) =  $20\log(1/0.83)=1.62$  dB

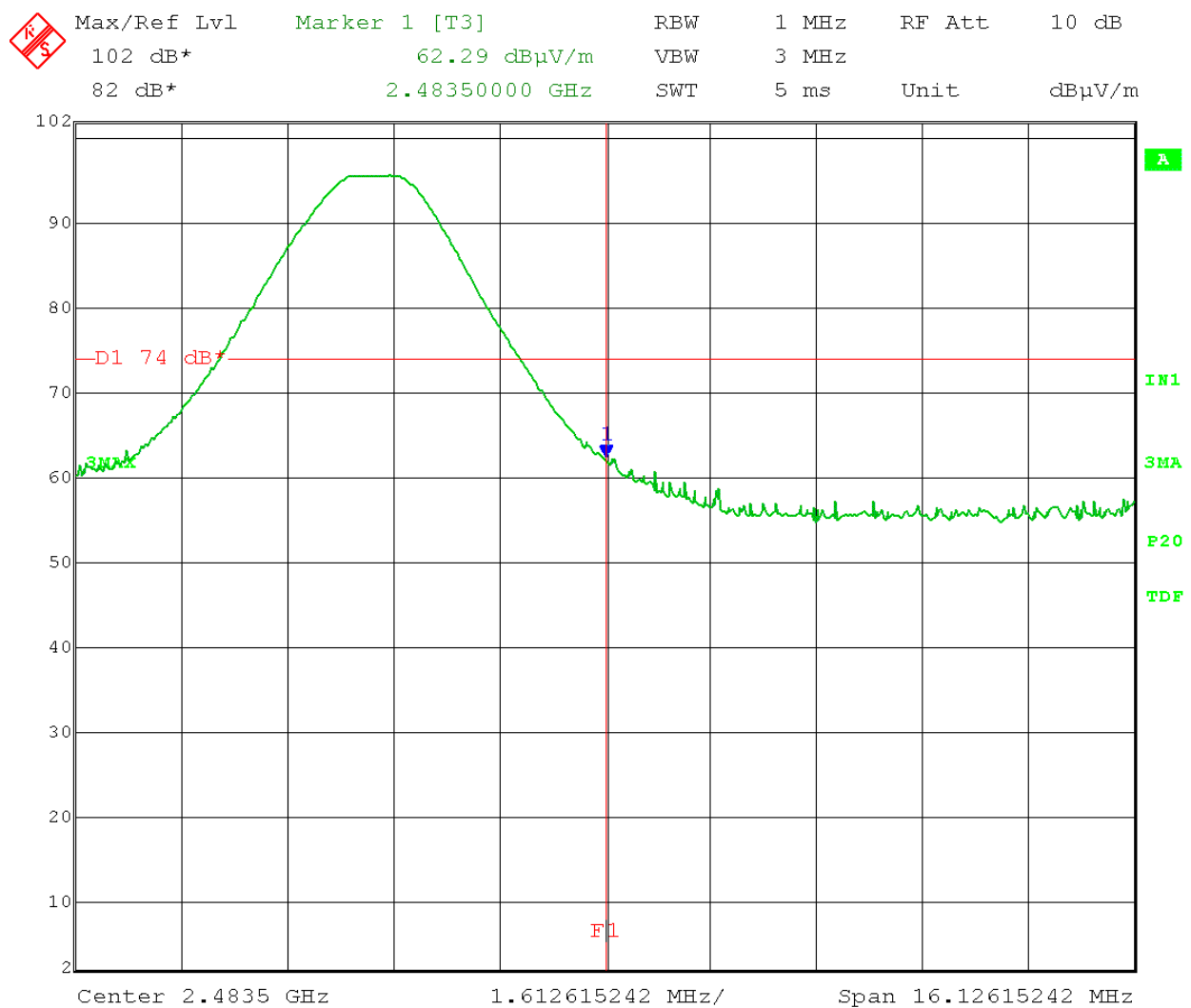
$44.07$  dB $\mu$ V/m +  $1.62$  dB =  $45.69$  dB $\mu$ V/m

Limit: 54dB $\mu$ V/m @ 3meters Vertical



Date: 25.JAN.2016 13:54:48

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: High Band-Edge Radiated –Peak 15.247 (d)  
Operator: Paul L  
Comment: High Channel:39 Frequency- 2480MHz  
Limit: 74dBμV/m @ 3meters Horizontal



Date: 25.JAN.2016 13:13:23

Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

Test: High Band-Edge Radiated –Average 15.247 (d)

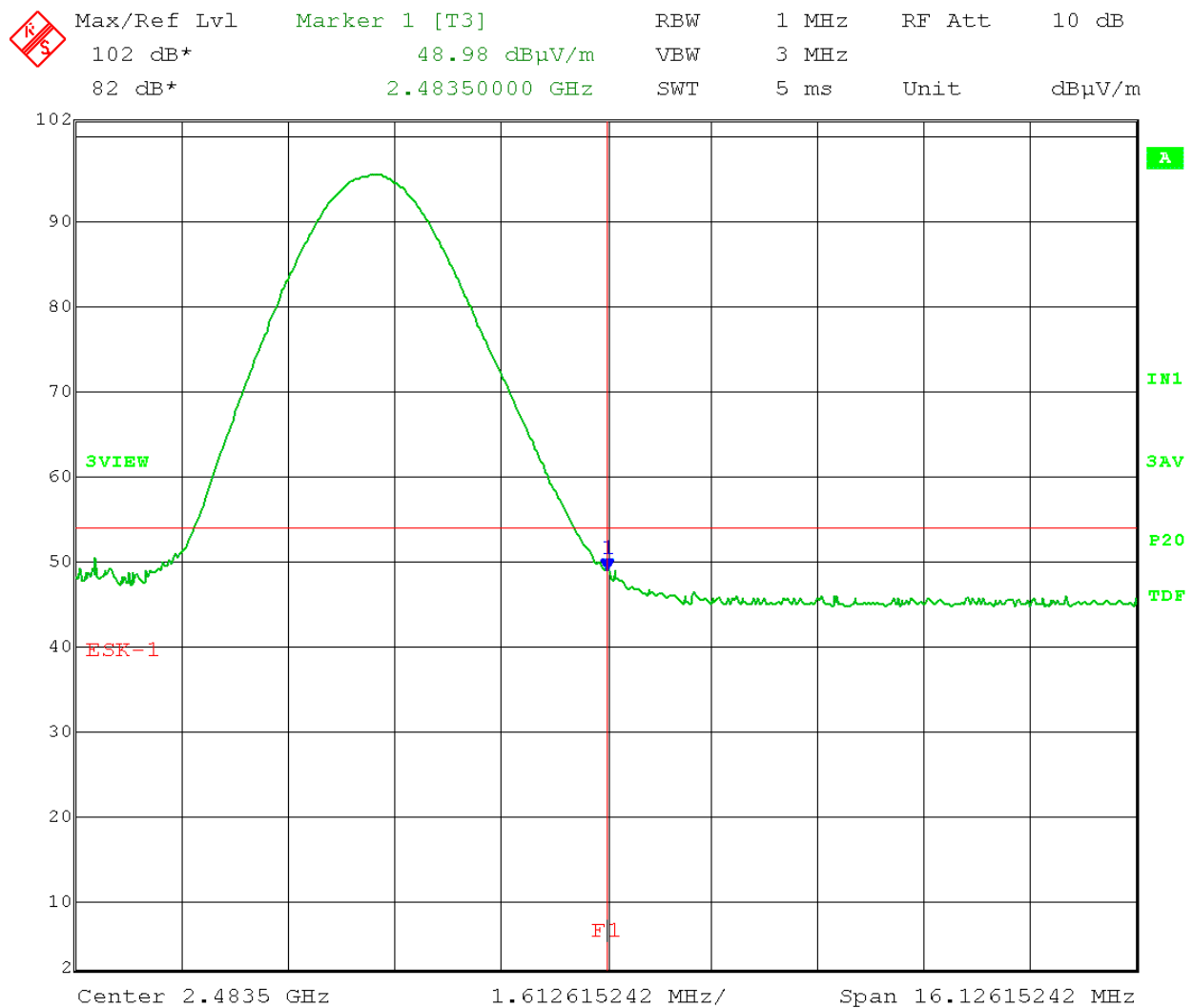
Operator: Paul L

Comment: High Channel:39 Frequency- 2480MHz

Duty cycle correction (83% duty cycle) =  $20\log(1/0.83)=1.62$  dB

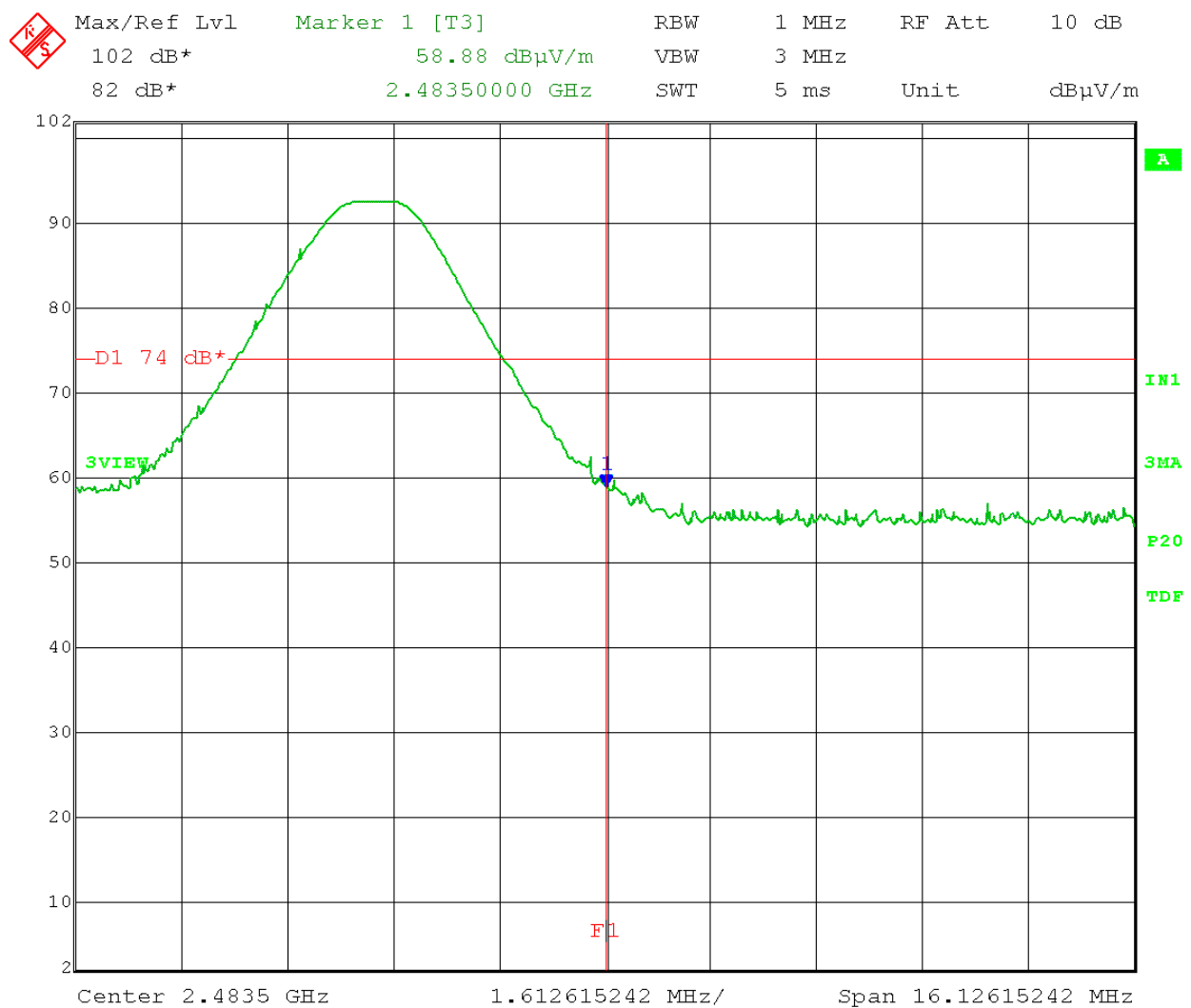
$48.98 \text{ dB}\mu\text{V/m} + 1.62 \text{ dB} = 50.60 \text{ dB}\mu\text{V/m}$

Limit: 54dB $\mu$ V/m @ 3meters Horizontal



Date: 25.JAN.2016 13:01:19

Test Date: 1-25-2016  
Company: Wilson  
EUT: Bluetooth Football  
Test: High Band-Edge Radiated –Peak 15.247 (d)  
Operator: Paul L  
Comment: High Channel:39 Frequency- 2480MHz  
Limit: 74dBμV/m @ 3meters Vertical



Date: 25.JAN.2016 13:35:00



Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

Test: High Band-Edge Radiated –Average 15.247 (d)

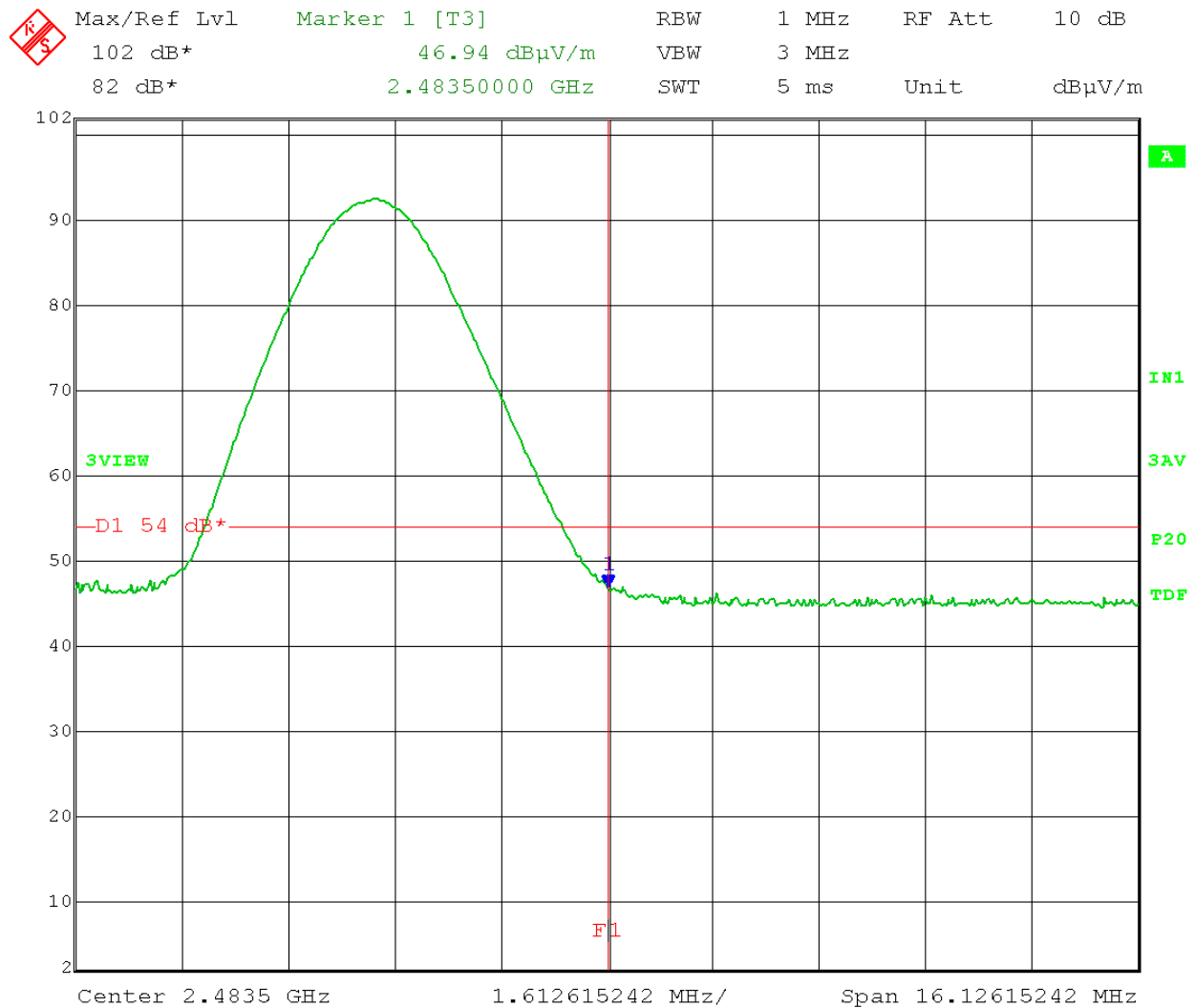
Operator: Paul L

Comment: High Channel:39 Frequency- 2480MHz

Duty cycle correction (83% duty cycle) =  $20\log(1/0.83)=1.62$  dB

$46.94$  dB $\mu$ V/m +  $1.62$  dB =  $48.56$  dB $\mu$ V/m

Limit: 54dB $\mu$ V/m @ 3meters Vertical



Date: 25.JAN.2016 13:30:08



166 South Carter, Genoa City, WI 53128

Company:	Wilson Sporting Goods
Model Tested:	MSC1108
Report Number:	21656
DLS Project:	7913

## Appendix B

### B9.0 Duty Cycle of Transmitter During Transmitter Testing

**Rule Part:** FCC Part15.247

**Test Procedure:** 558074 D01 DTS Meas Guidance v03r04 Section 6.0

**Limit:** Not Applicable

**Results:** Duty Cycle = 83%  
Duty Cycle Correction = 1.62 dB

**Sample Equations:** Total on Time = 0.430861723 ms  
Total on + off Time = 0.521042084 ms  
Duty cycle  $x = (0.430861723 \text{ ms} / 0.521042084 \text{ ms}) = 0.83 = 83\%$   
 $20 \log (83 / 100) = -1.62$   
Duty Cycle Correction Factor = 1.62 dB

**Notes:** Informational



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

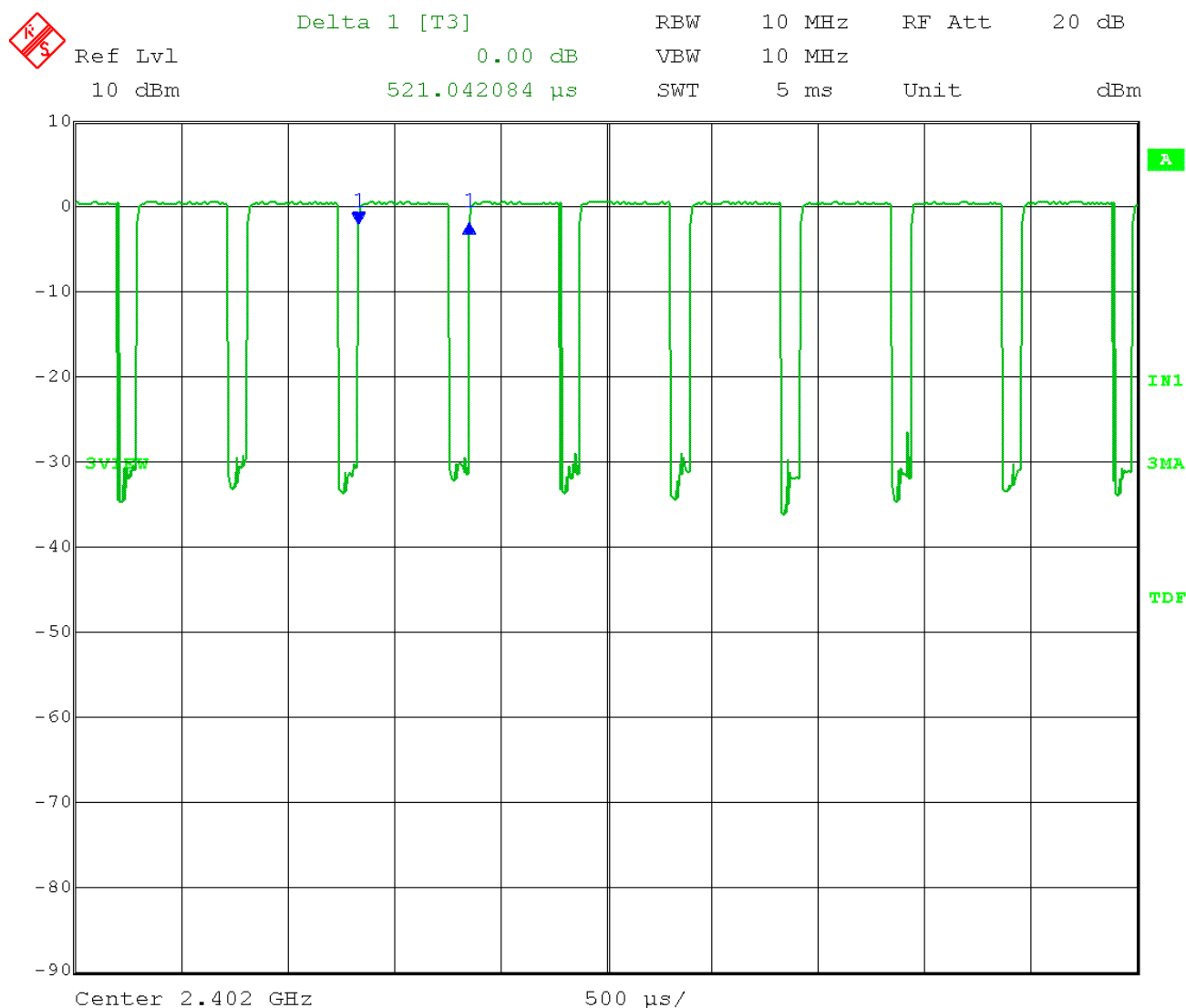
Wilson Sporting Goods  
MSC1108  
21656  
7913

Test Date: 1-25-2015  
Company: Wilson  
EUT: Bluetooth Football  
Test: Duty Cycle - Conducted - KDB558074 (6.0)  
Operator: Paul L

Comment: Low Channel - Ch. 2.402 GHz  
ON + OFF time = 0.521042084 ms

Duty cycle x = (0.430861723 ms / 0.521042084 ms) = 0.83 = 83%

Duty Cycle Correction Factor =  $20\log(83/100) = -1.62$



Date: 25.JAN.2016 09:11:34



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

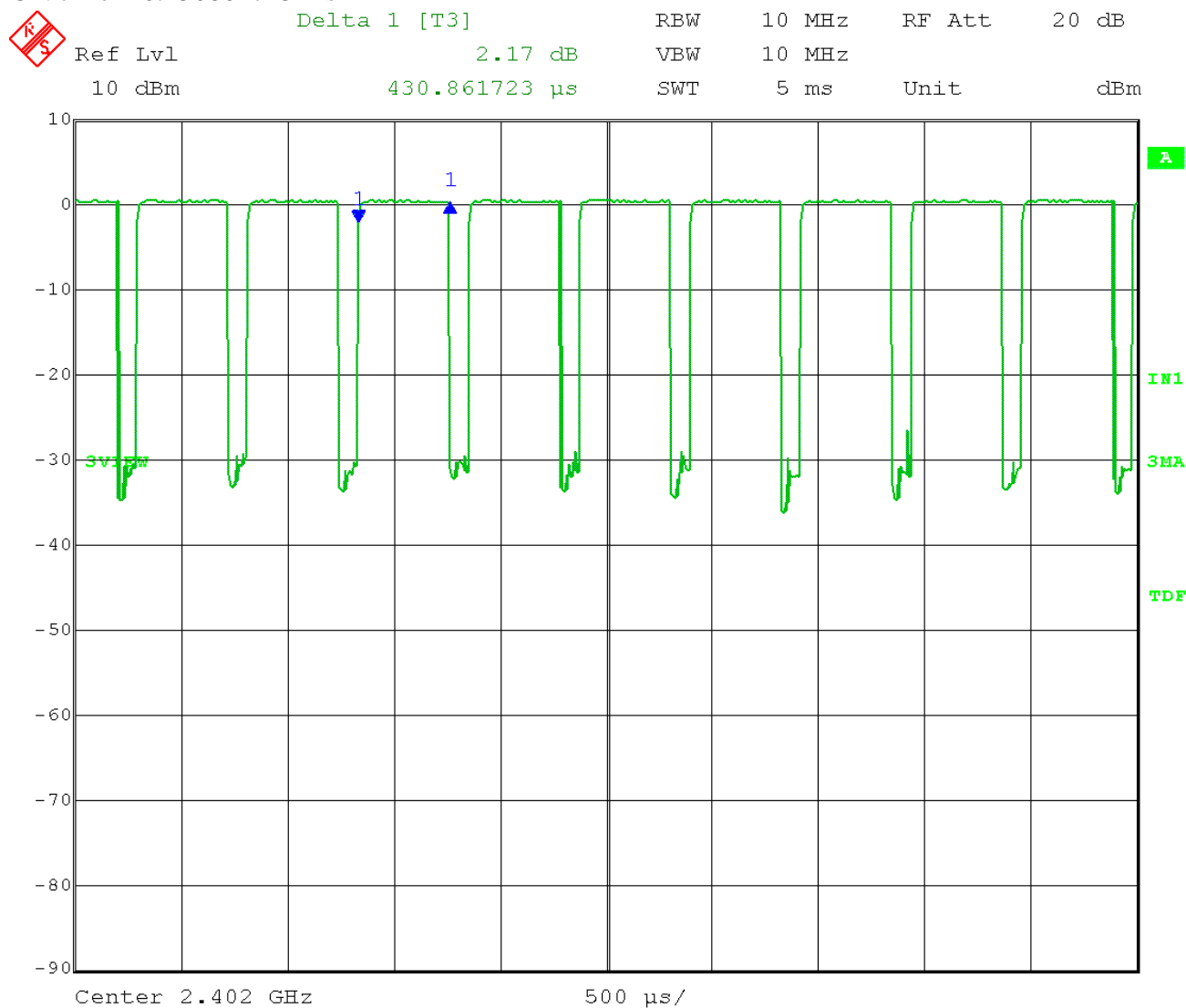
Wilson Sporting Goods  
MSC1108  
21656  
7913

Test Date: 1-25-2015  
Company: Wilson  
EUT: Bluetooth Football  
Test: Duty Cycle - Conducted - KDB558074 (6.0)  
Operator: Paul L

Comment: Low Channel - Ch. 2.402 GHz

Comment: Duty cycle x = Duty cycle x = (0.430861723 ms / 0.521042084 ms) = 0.83 = 83%

ON time = 0.430861723 ms



Date: 25.JAN.2016 09:14:13



166 South Carter, Genoa City, WI 53128

Company:  
Model Tested:  
Report Number:  
DLS Project:

Wilson Sporting Goods  
MSC1108  
21656  
7913

## END OF REPORT

Revision #	Date	Comments	By
1.0	02-03-2016	Preliminary Release	JS
1.1	02-04-2016	Corrected data pages 44-46, with minor edits	JS