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<br>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<br>Radiated SN: I1602162 |
| Date of Tests: | January 25th through 28th , 2016 |
| Test Conducted For: | Wilson Sporting Goods<br>8750 W Bryn Mawr Ave<br>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.

166 South Carter, Genoa City, WI 53128

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

SIGNATURE PAGE

Tested By:

Paul Leo
Test Engineer

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

## Table of Contents

**United States Department of Commerce**
**National Institute of Standards and Technology**

NVLAP®

# 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 Communique dated January 2009).*

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

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

*For the National Voluntary Laboratory Accreditation Program*

**ELECTROMAGNETIC COMPATIBILITY & TELECOMMUNICATIONS**

**NVLAP LAB CODE 100276-0**

**Emissions**

| ***Designation*** | ***Description*** |
|---|---|
| Off-site test location | D.L.S. Electronics performs radiated emissions testing at an additional location, 166 South Carter Street, Genoa City, WI 53128. |

## 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.

## 2.0 Introduction

From January 25th to 28th, 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

## 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 |

## 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 |

## 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.

## 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

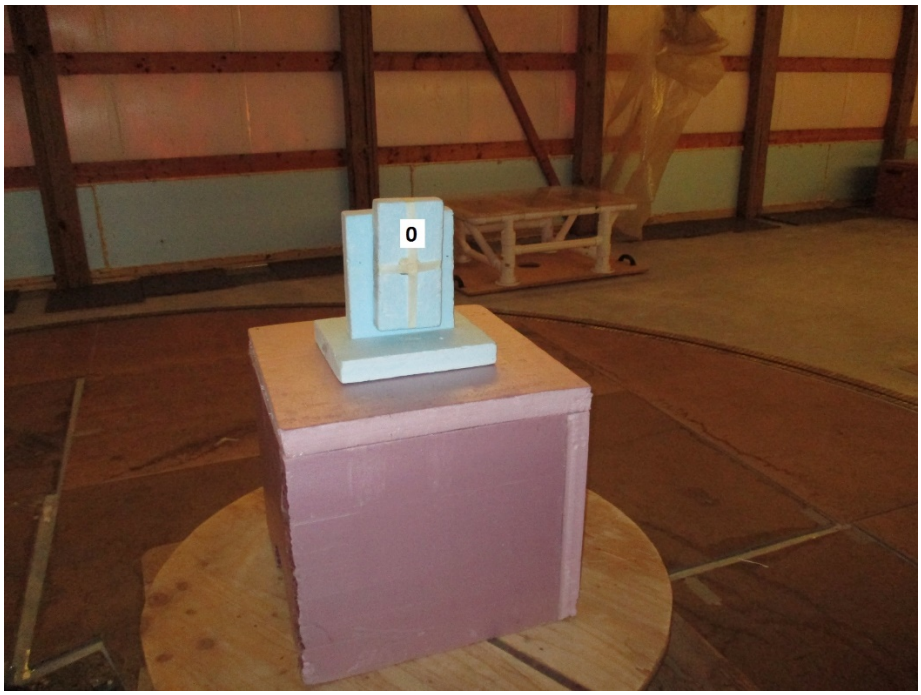
The Wilson Football Tag model MSC1108, as provided from Wilson Sporting Goods, tested from January 25th to 28th, 2016 **meets** the requirements of CFR 47 Part 15 Subpart C Section 15.247.

## 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**

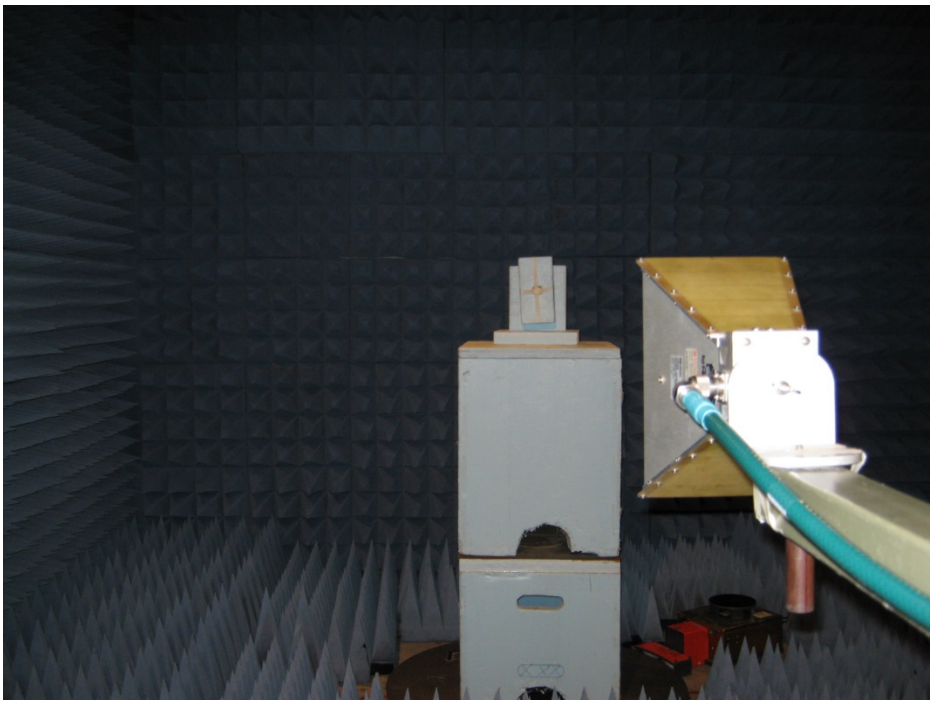



**Back**

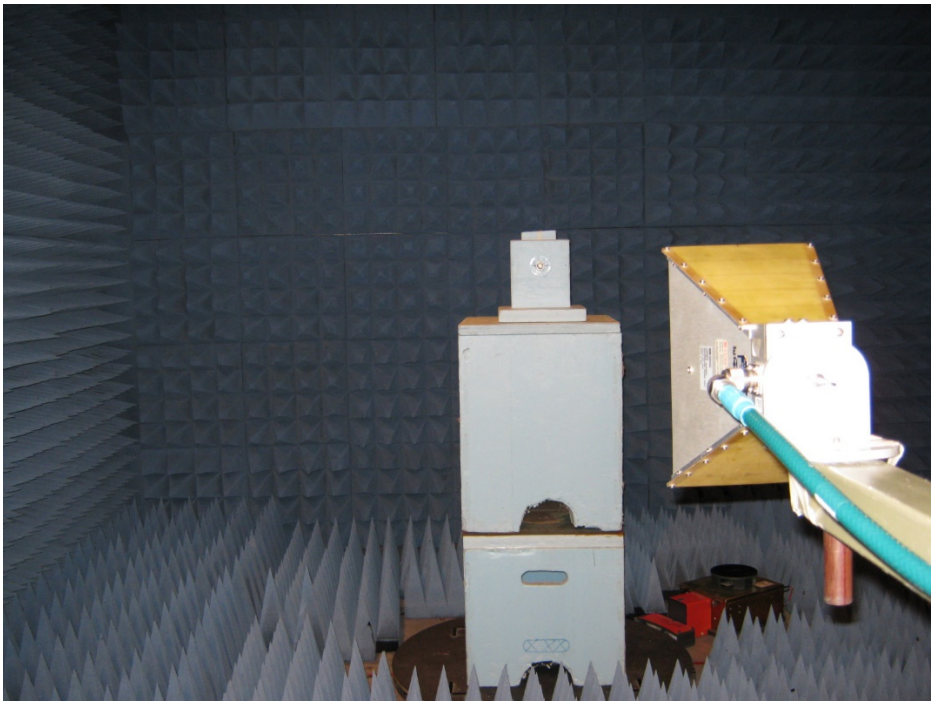
## Appendix A

### Radiated Emissions Above 1 GHz

**Front**

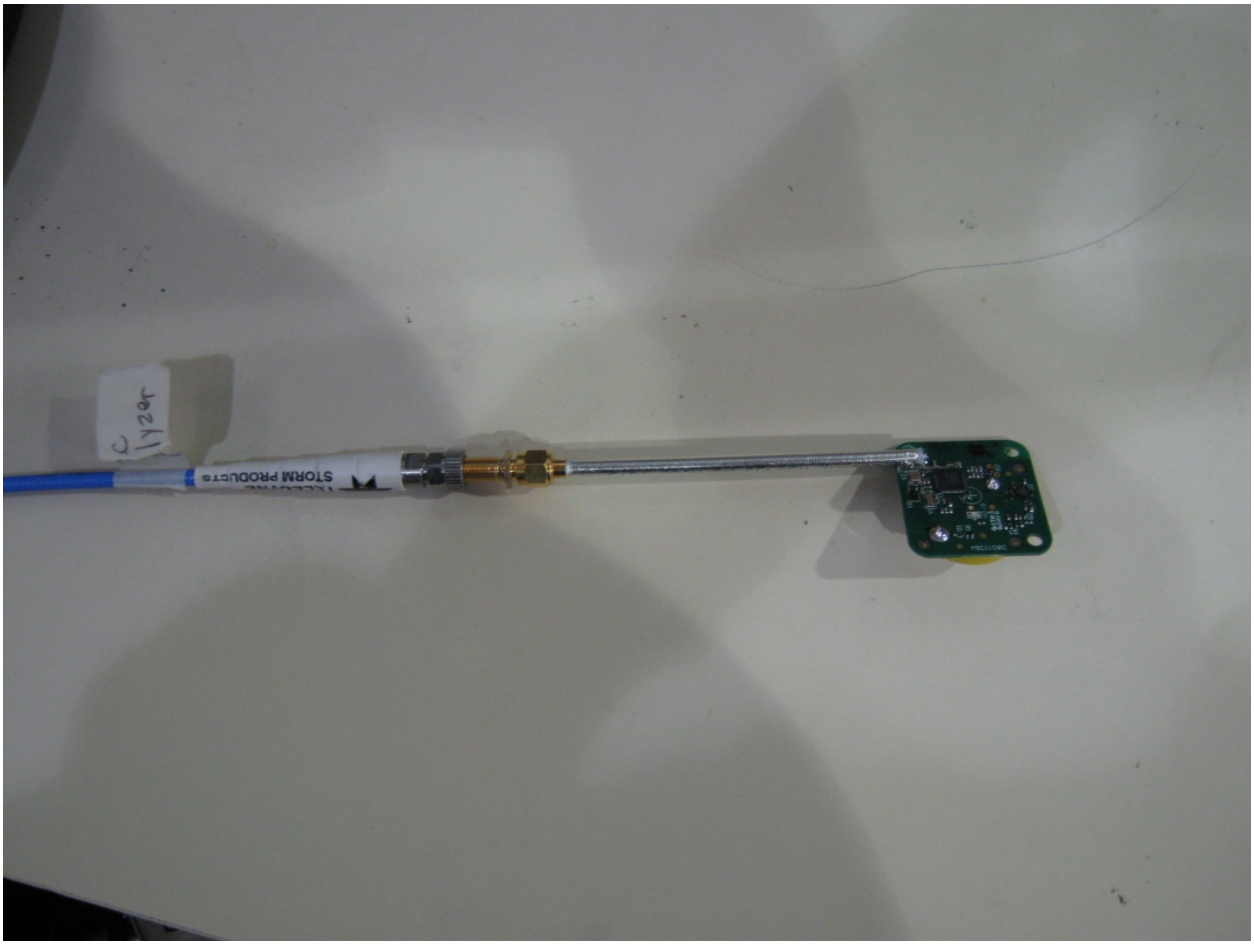


**Back**



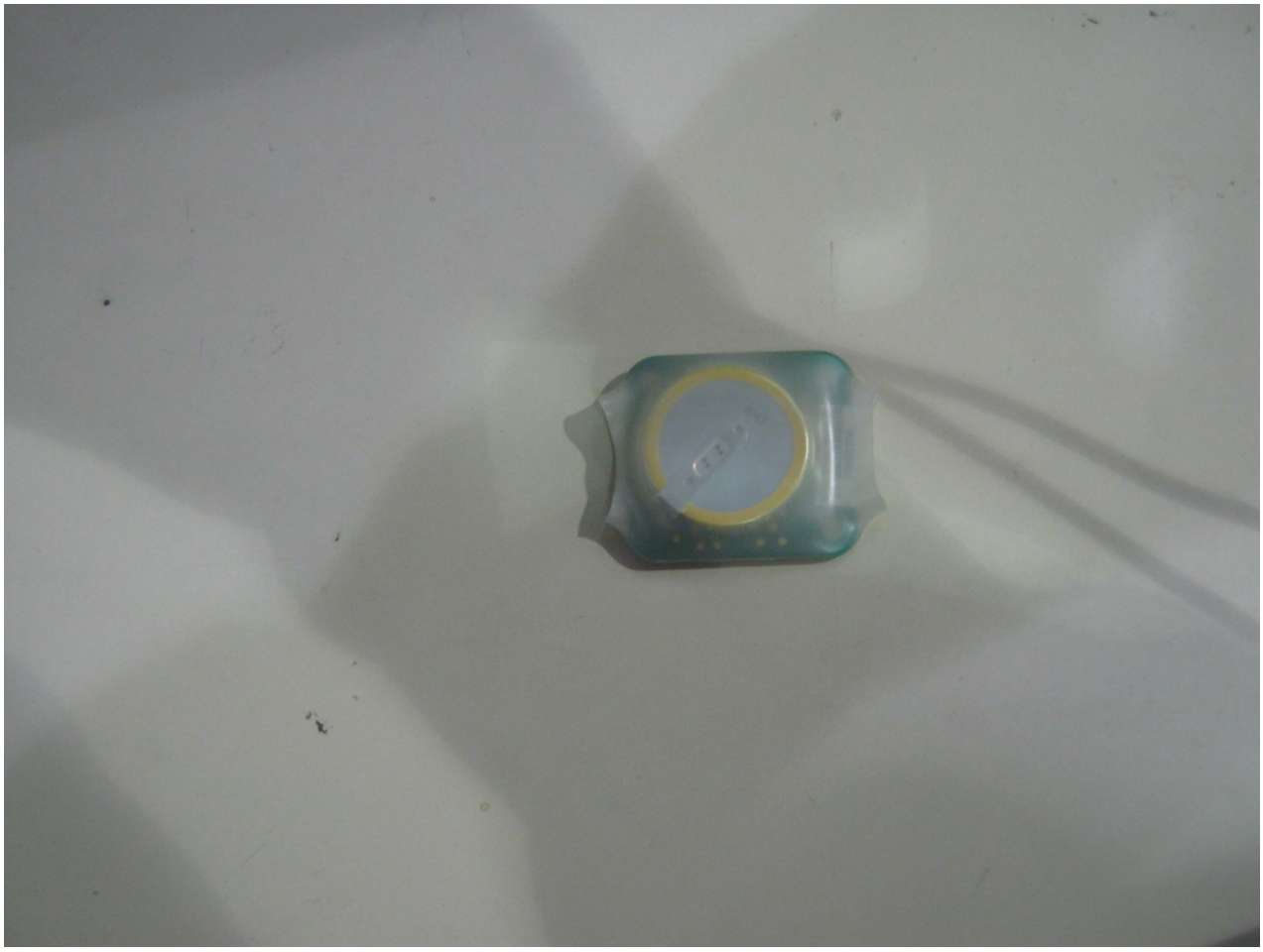
## Appendix A

**RF Conducted**



## Appendix A

**EUT in shrink wrap housing**



## 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.

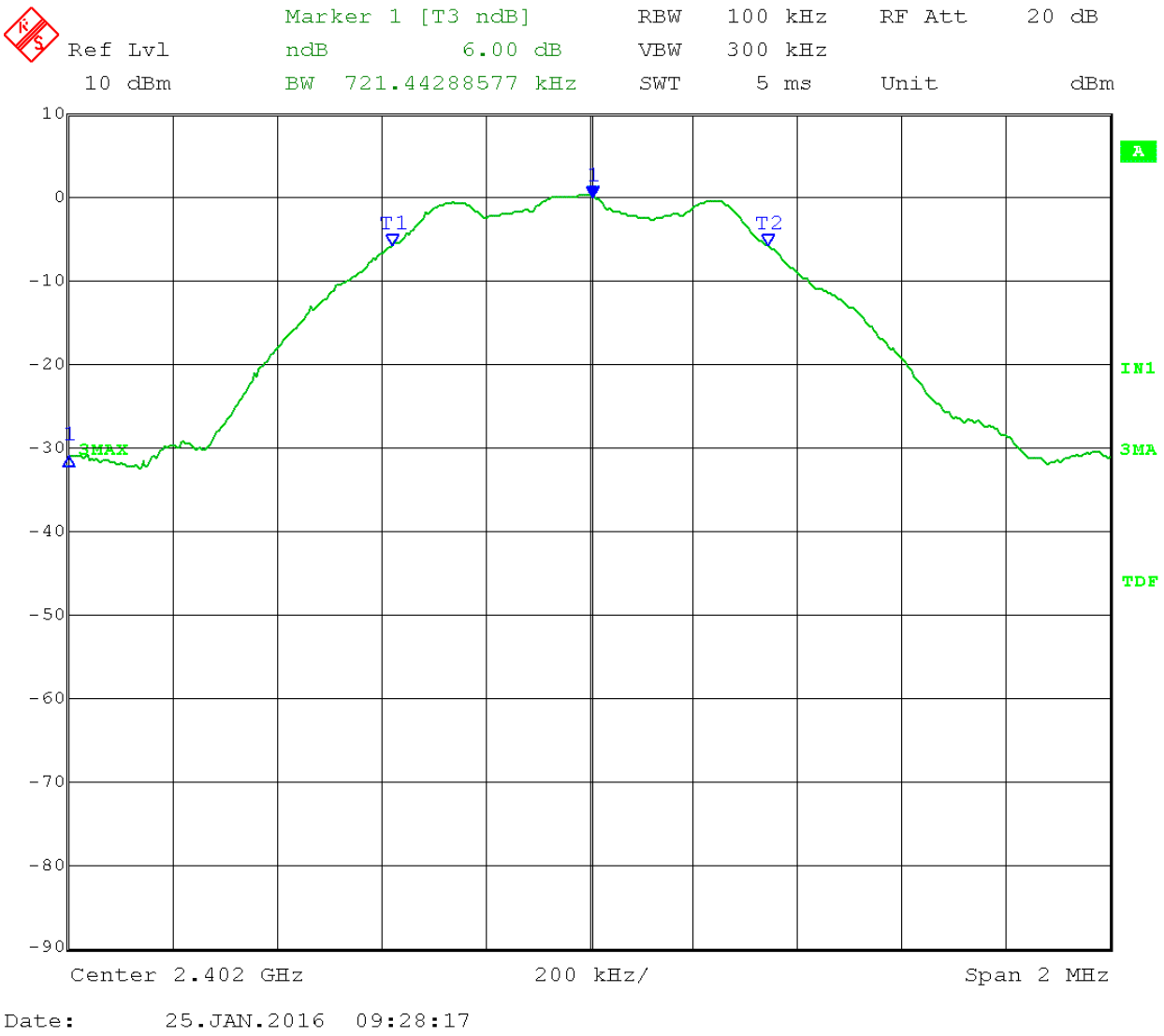
166 South Carter, Genoa City, WI 53128

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

| | |
|---|---|
| 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

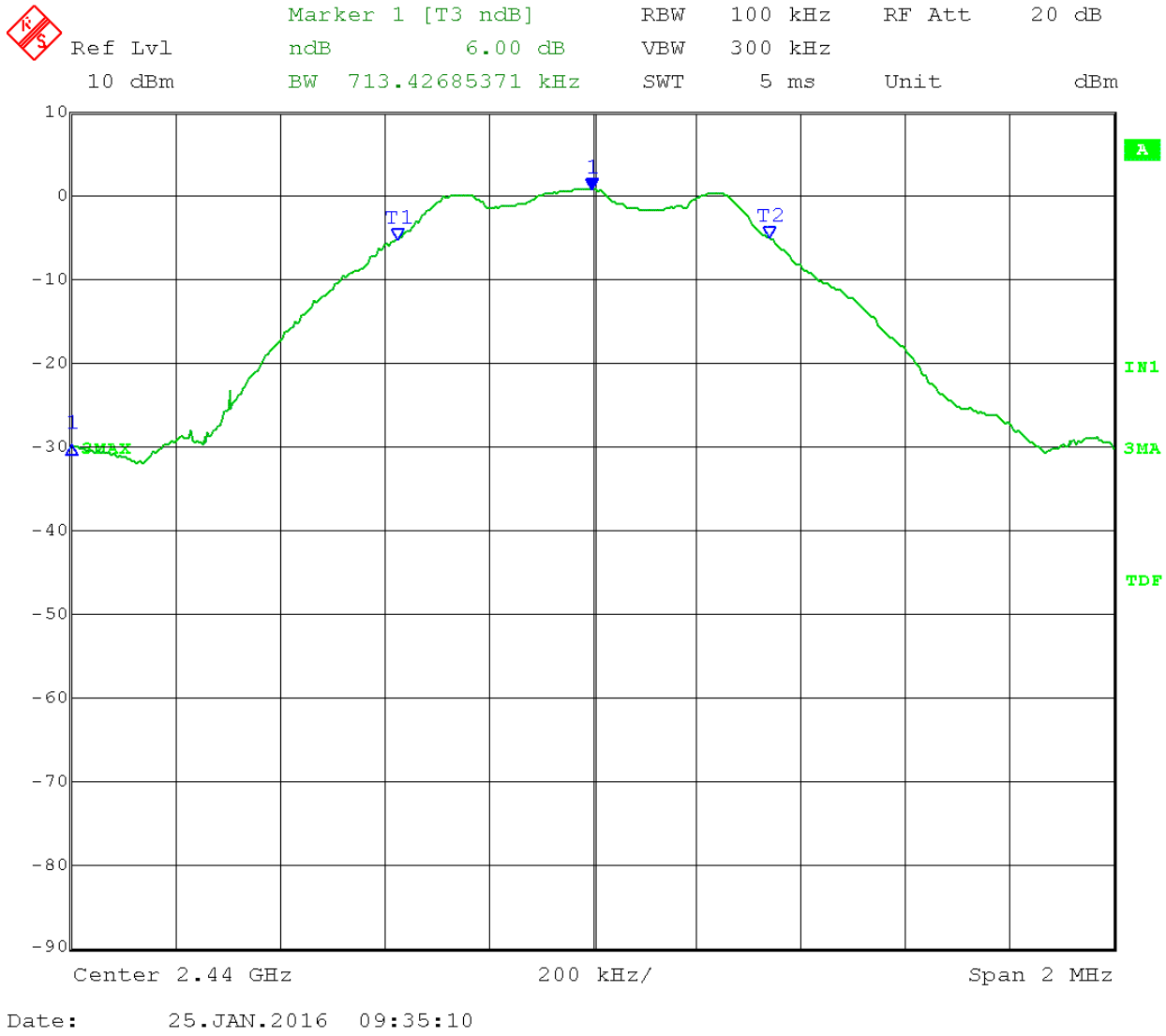


166 South Carter, Genoa City, WI 53128

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

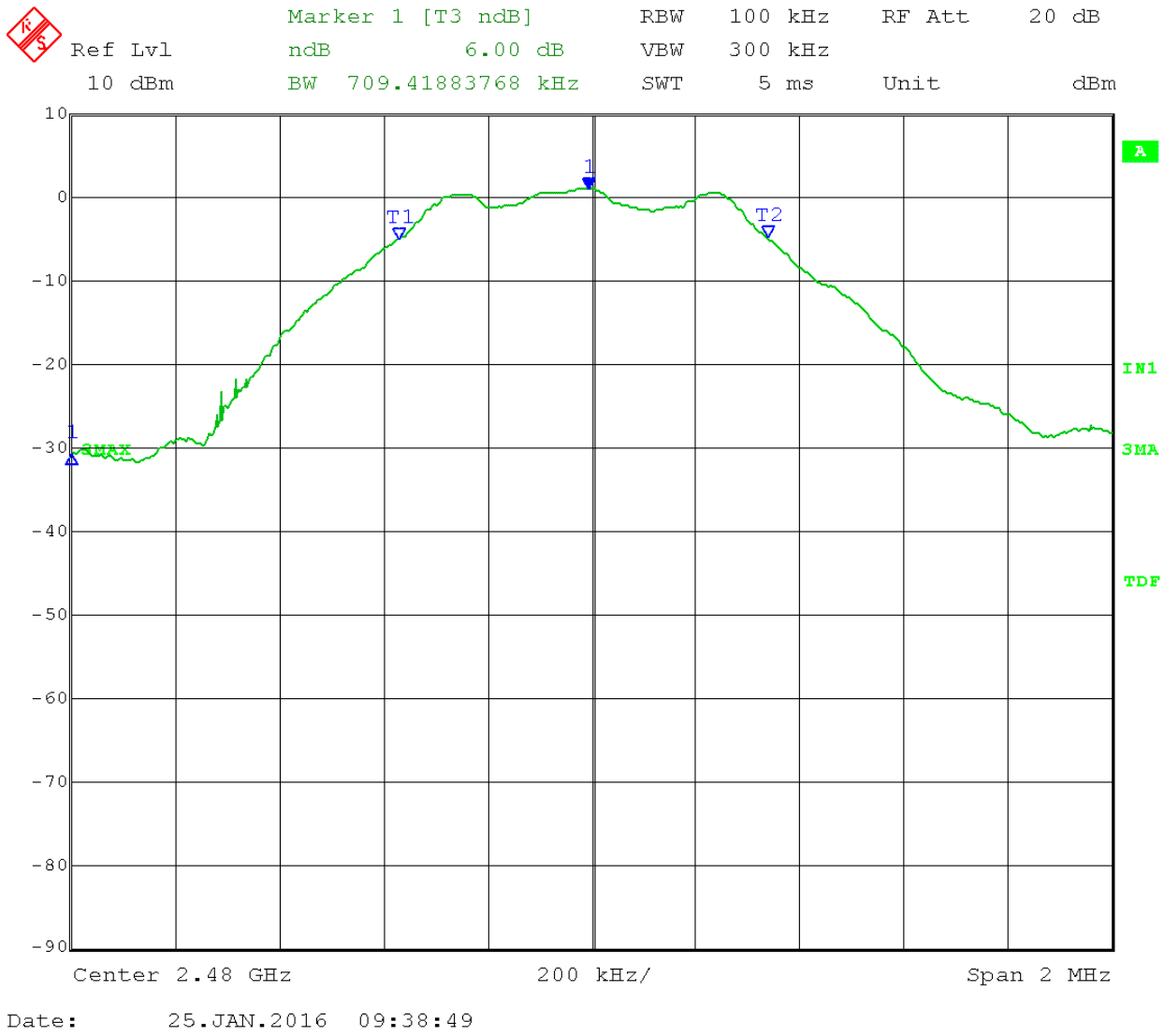


166 South Carter, Genoa City, WI 53128

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



## 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.

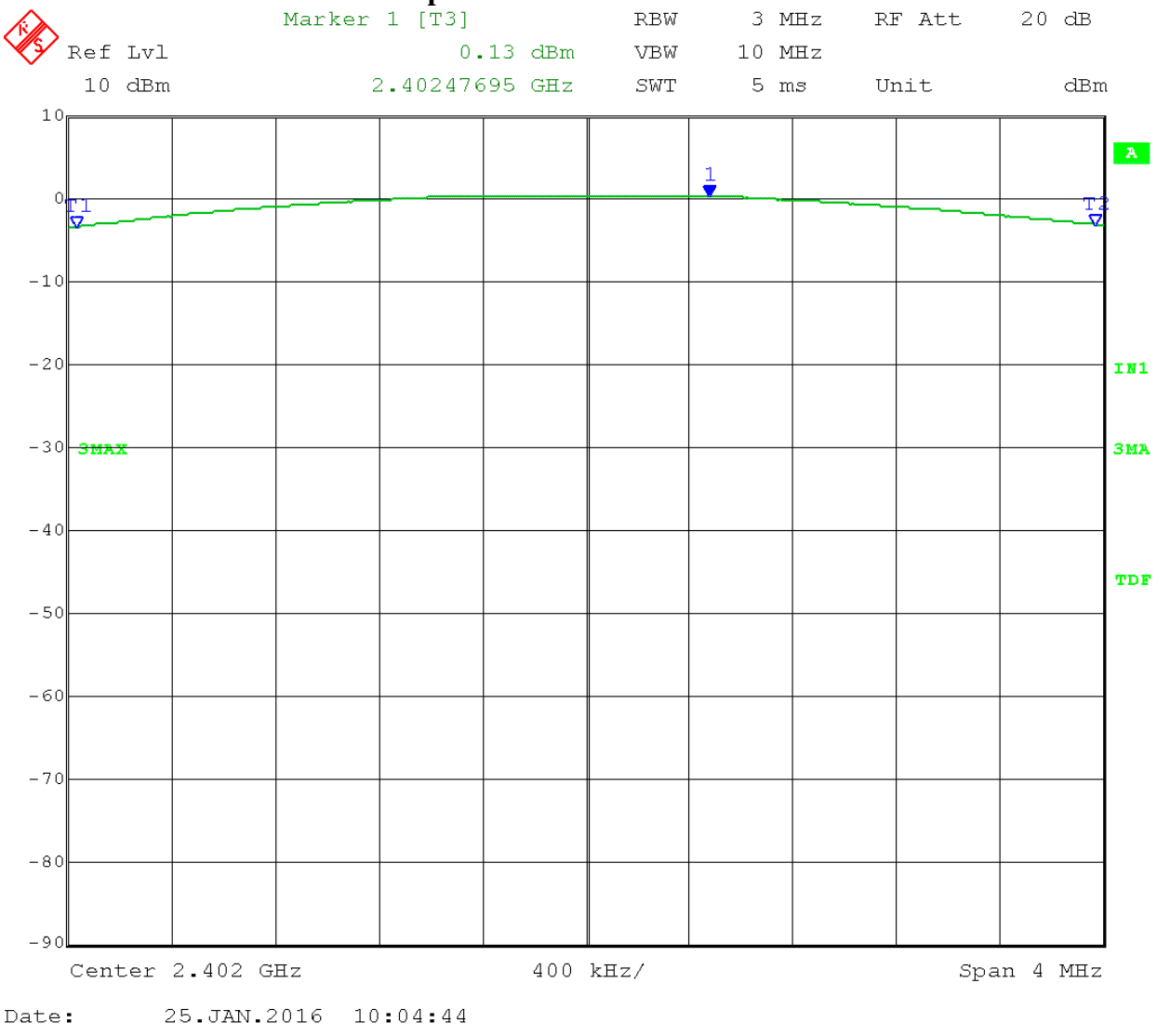
166 South Carter, Genoa City, WI 53128

| | |
|---|---|
| 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 Output - Conducted – 15.247 (b)(3) |
| Operator: | Paul L |

Comment: Low Channel – Ch.17 2.440 GHz

**Peak Output Power = 0.13dBm = 1.03mW**



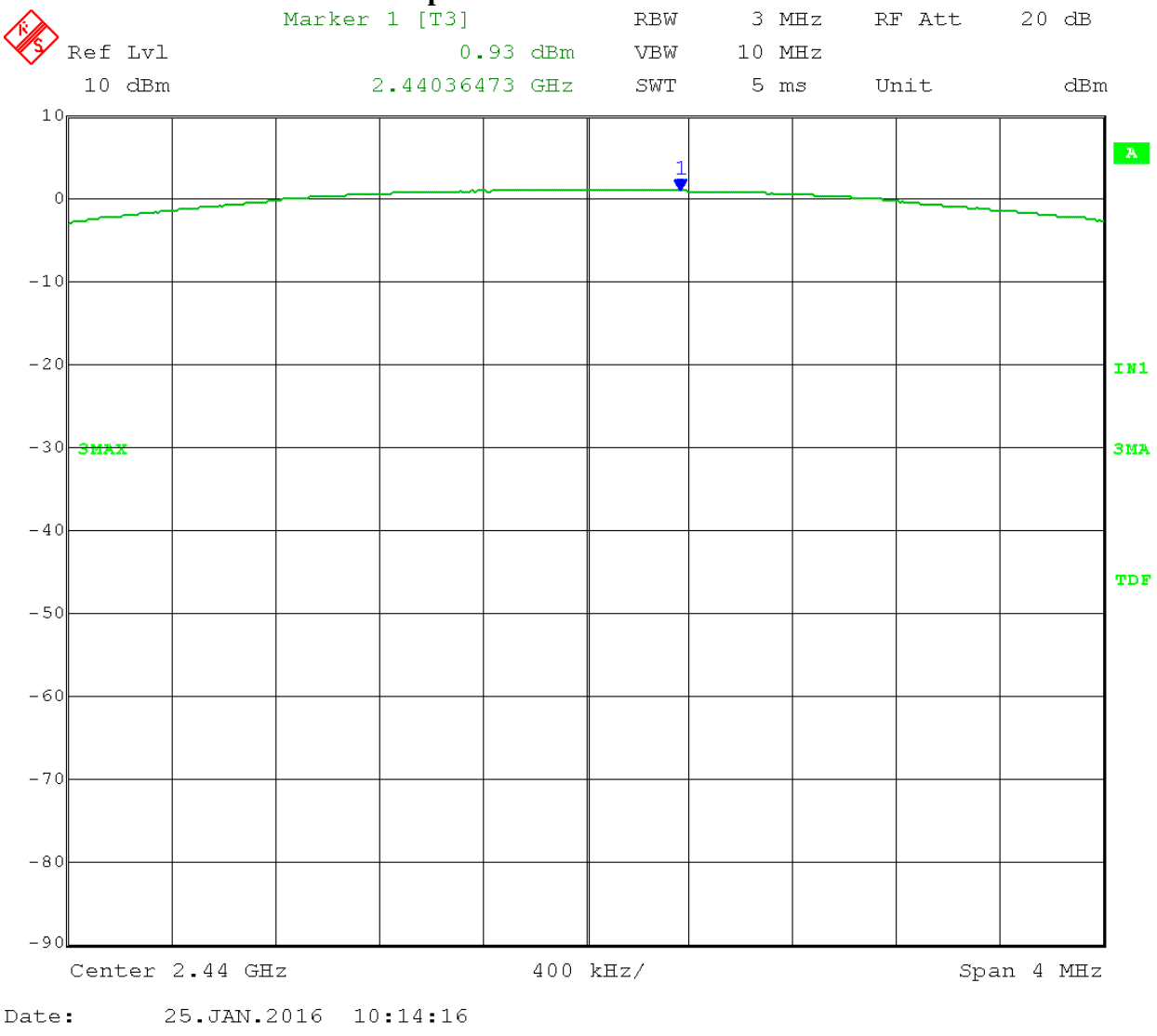
166 South Carter, Genoa City, WI 53128

| | |
|---|---|
| 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 Output - Conducted – 15.247 (b)(3) |
| Operator: | Paul L |

Comment: Mid Channel – Ch.17 2.440 GHz

**Peak Output Power = 0.93dBm = 1.24 mW**



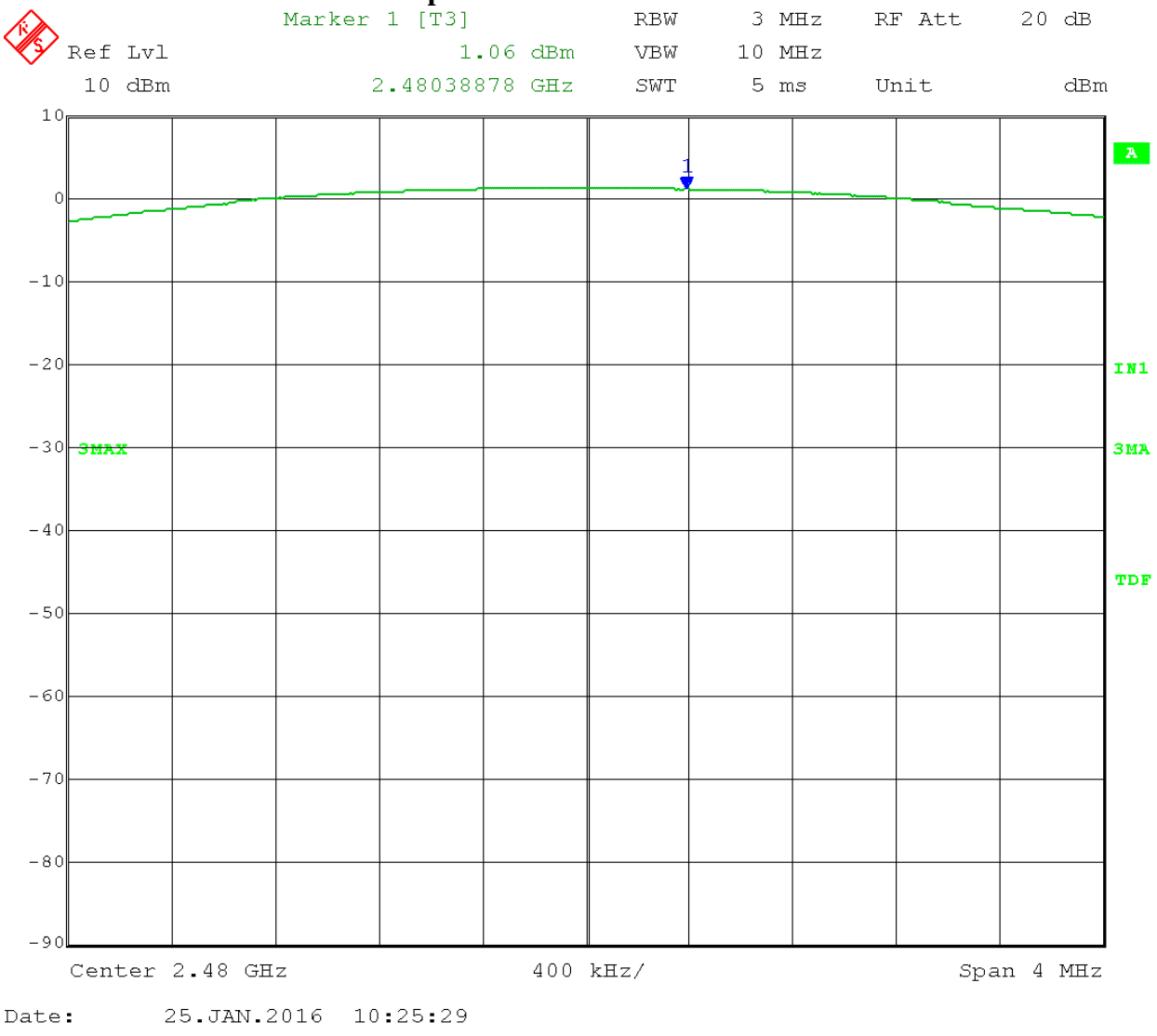
166 South Carter, Genoa City, WI 53128

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 Output - Conducted – 15.247 (b)(3)
Operator: Paul L

Comment: High Channel – Ch.39 2.480 GHz

**Peak Output Power = 1.06dBm = 1.28 mW**



## 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.

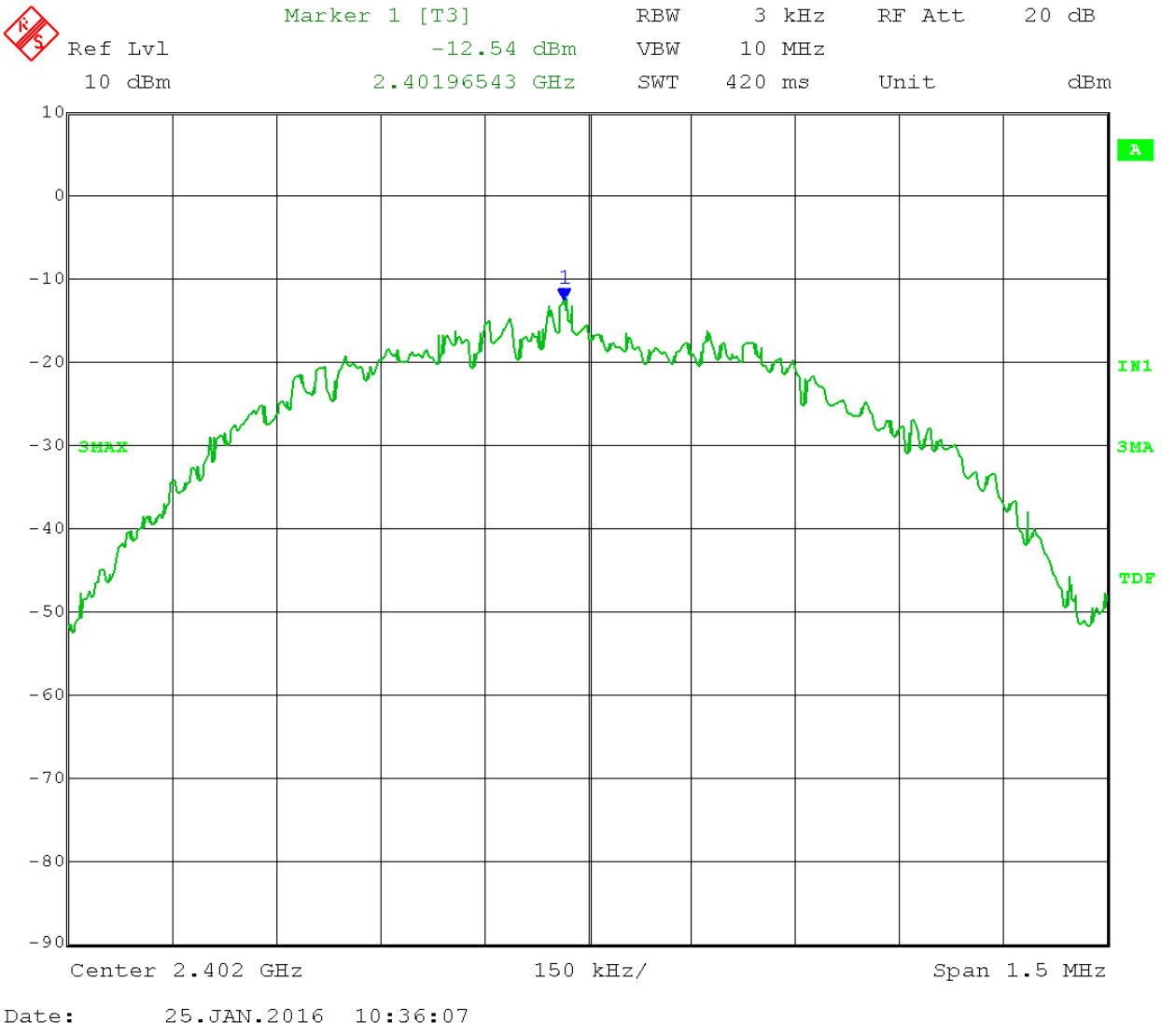
166 South Carter, Genoa City, WI 53128

| | |
|---|---|
| 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: Low Channel –Ch.37 2.402 GHz

**Power in 3 kHz Bandwidth = -12.54 dBm**



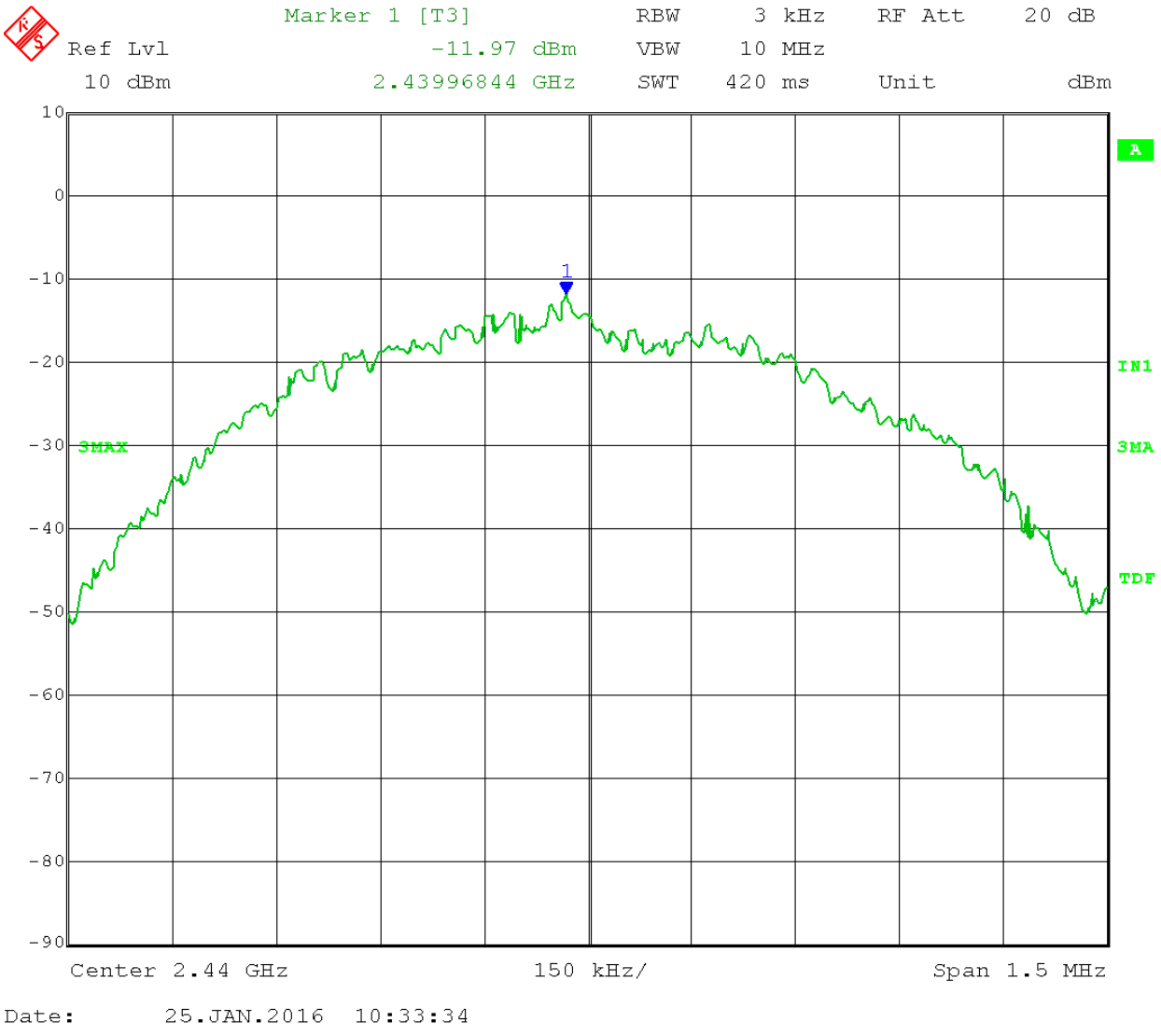
166 South Carter, Genoa City, WI 53128

| | |
|---|---|
| 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: Mid Channel –Ch.17 2.440 GHz

**Power in 3 kHz Bandwidth = -11.97 dBm**



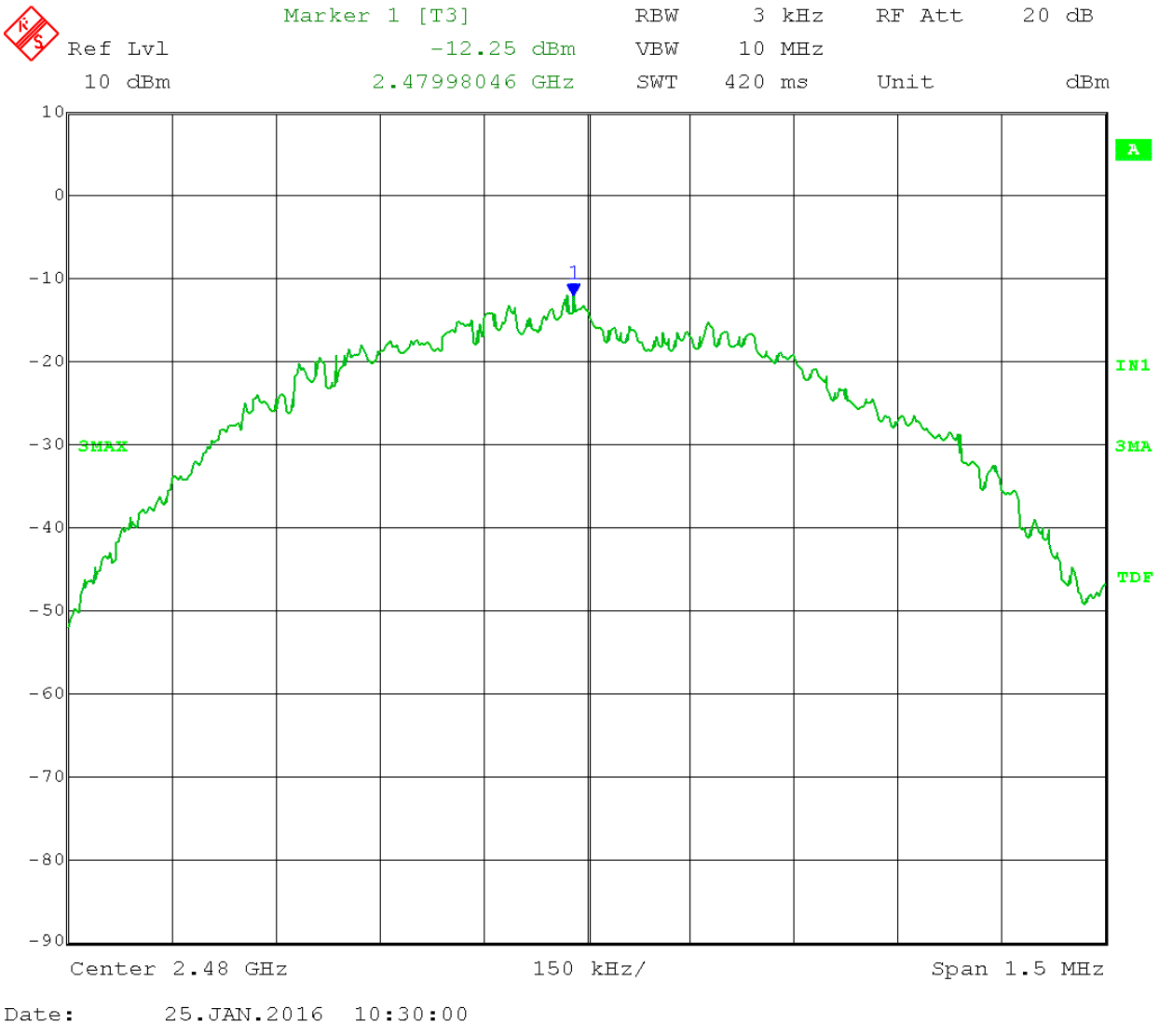
166 South Carter, Genoa City, WI 53128

| | |
|---|---|
| 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

**Power in 3 kHz Bandwidth = -12.25 dBm**



## 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:**

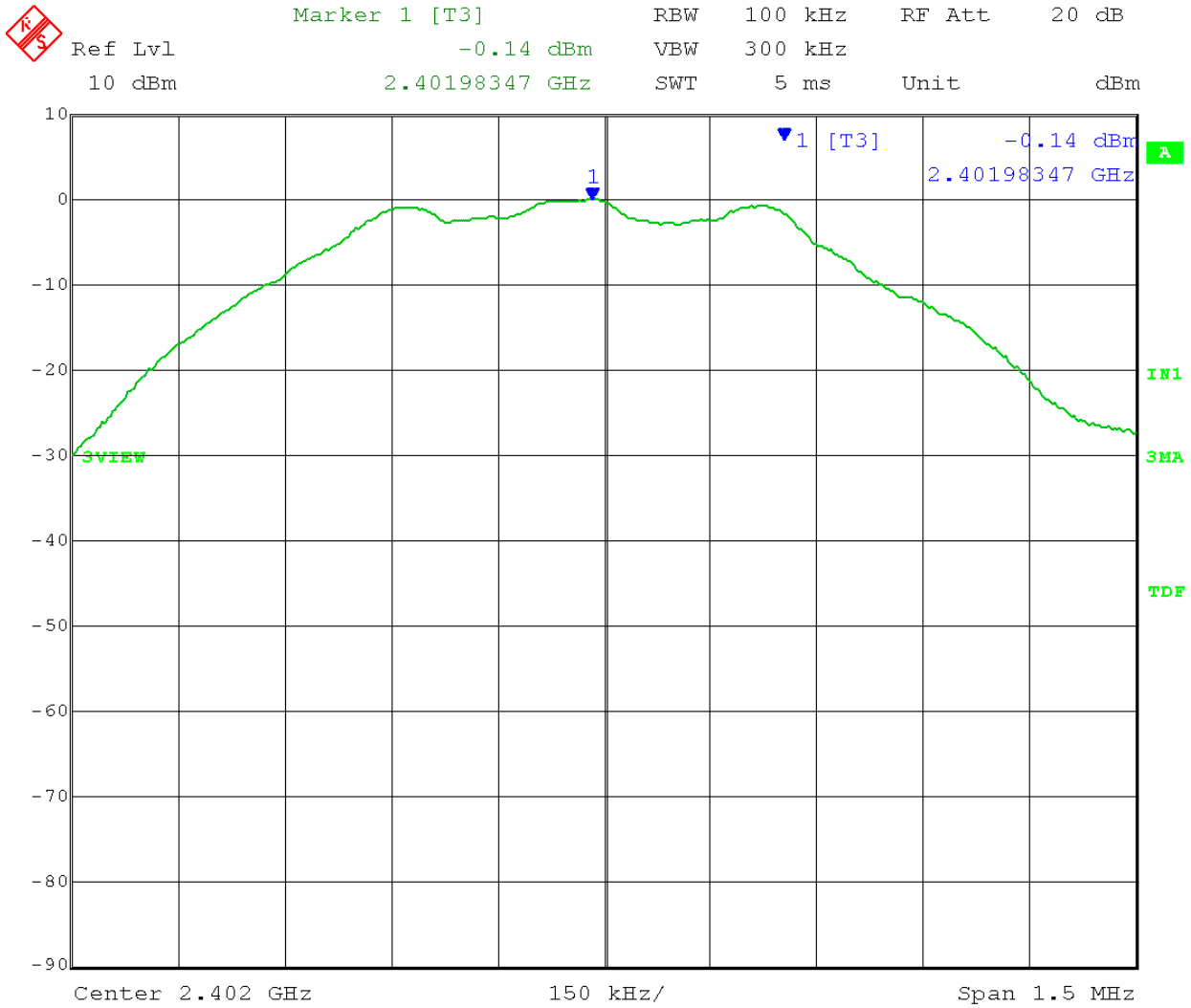
Compliant

**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

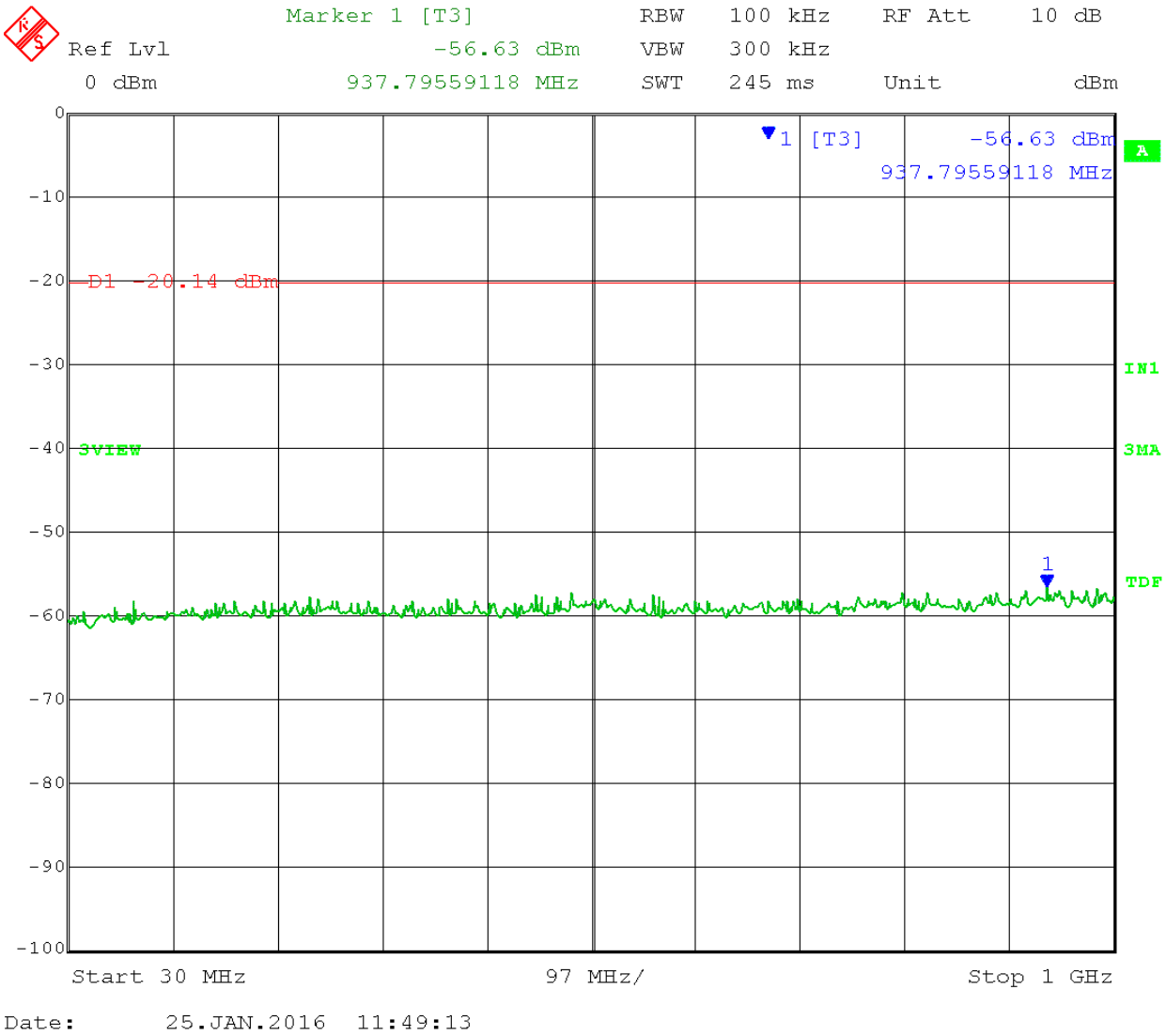



Date: 25.JAN.2016 11:39:25

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

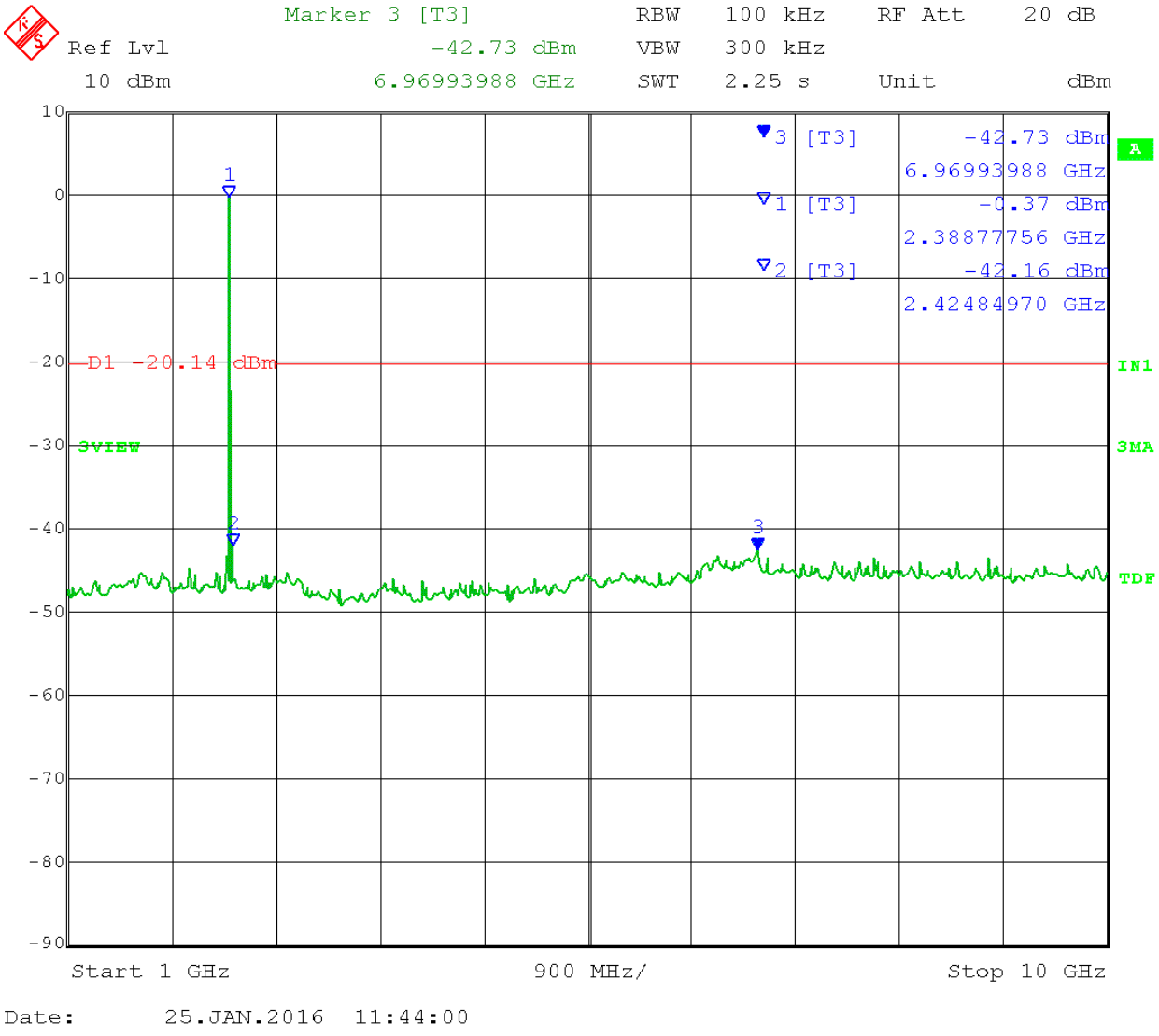



Date: 25.JAN.2016 11:49:13

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

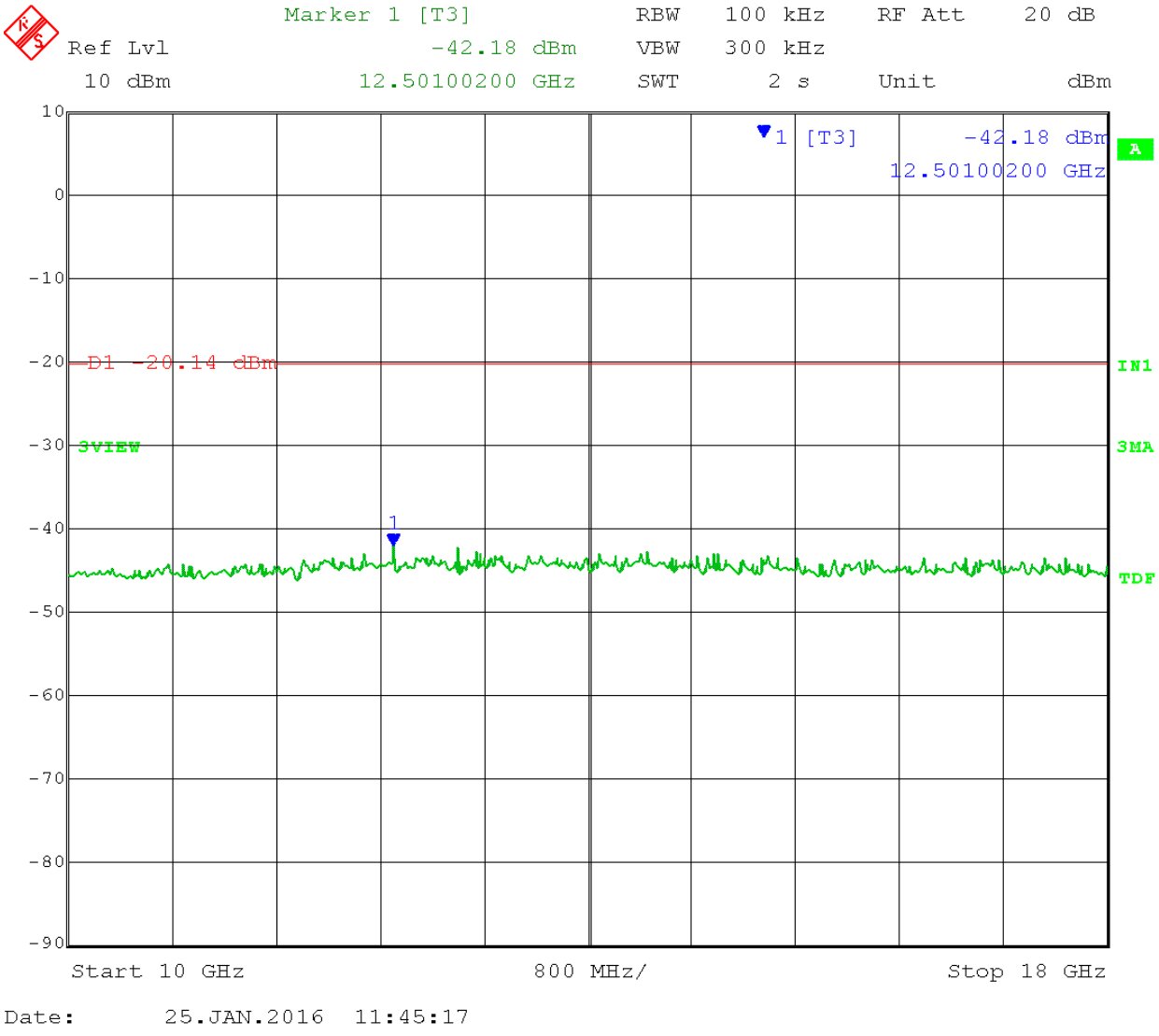
Frequency Range: 1GHz to 10GHz
Limit = -20.14dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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

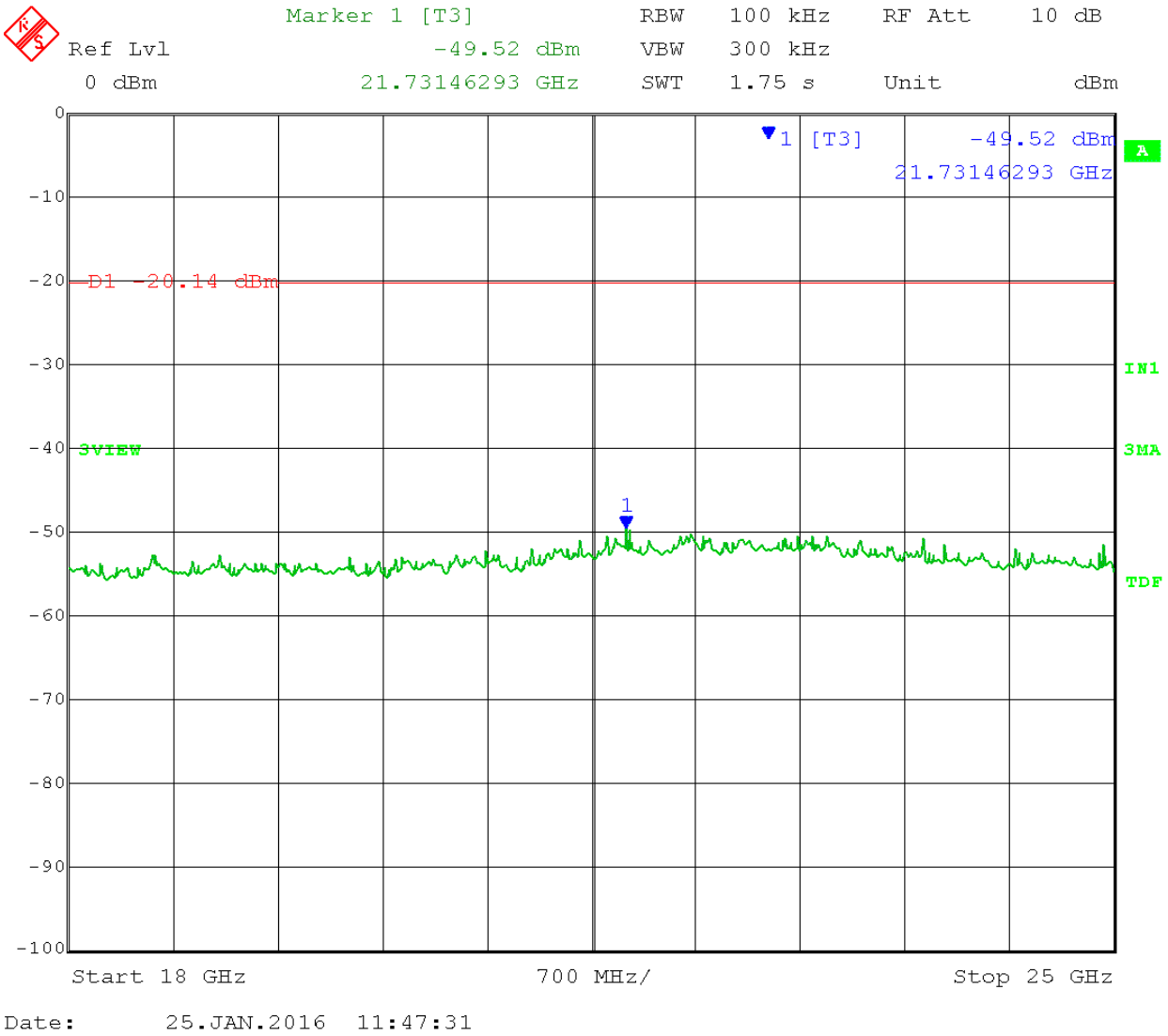



Date: 25.JAN.2016 11:45:17

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

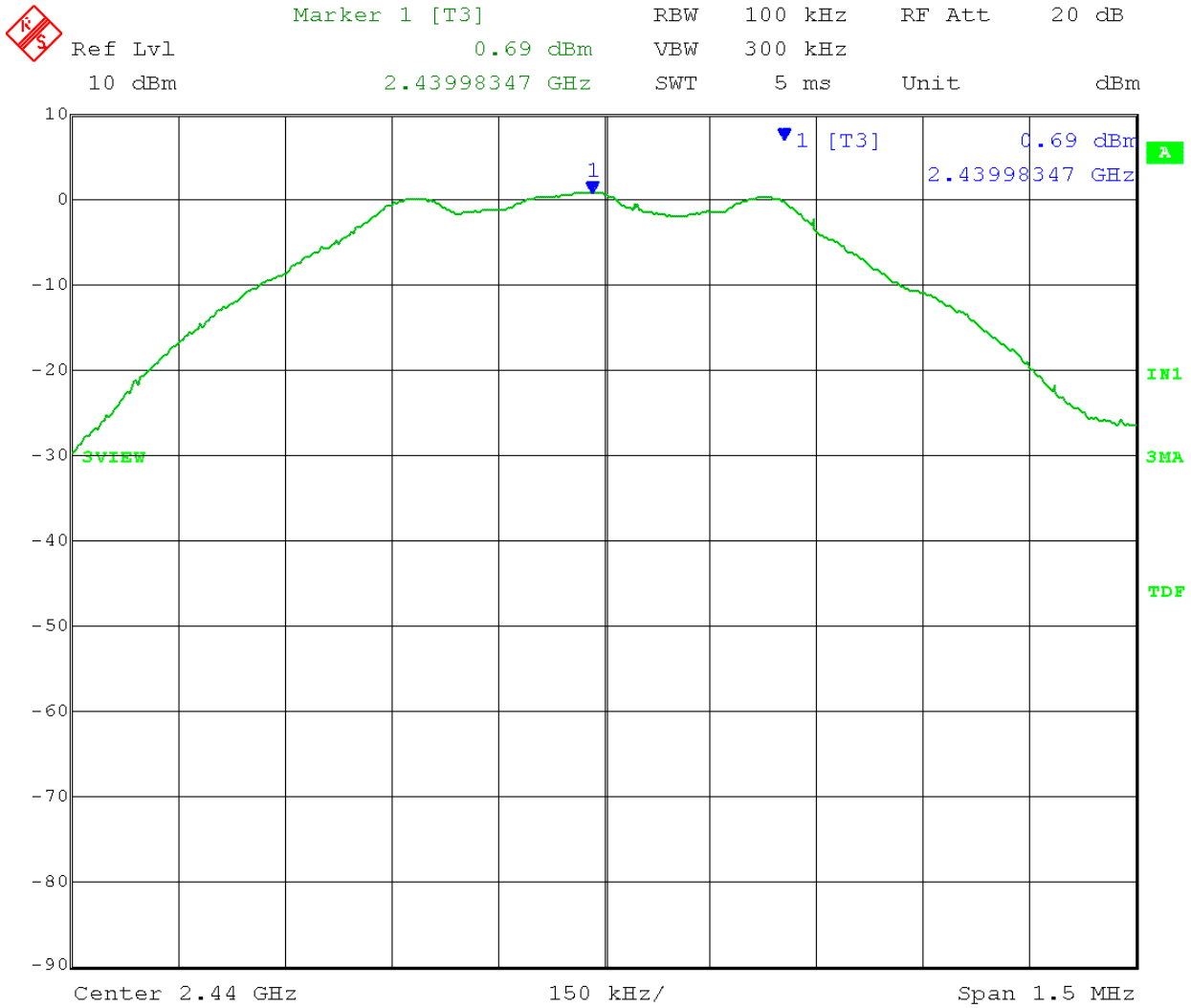
Frequency Range: 18GHz to 25GHz
Limit = -20.14dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency




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

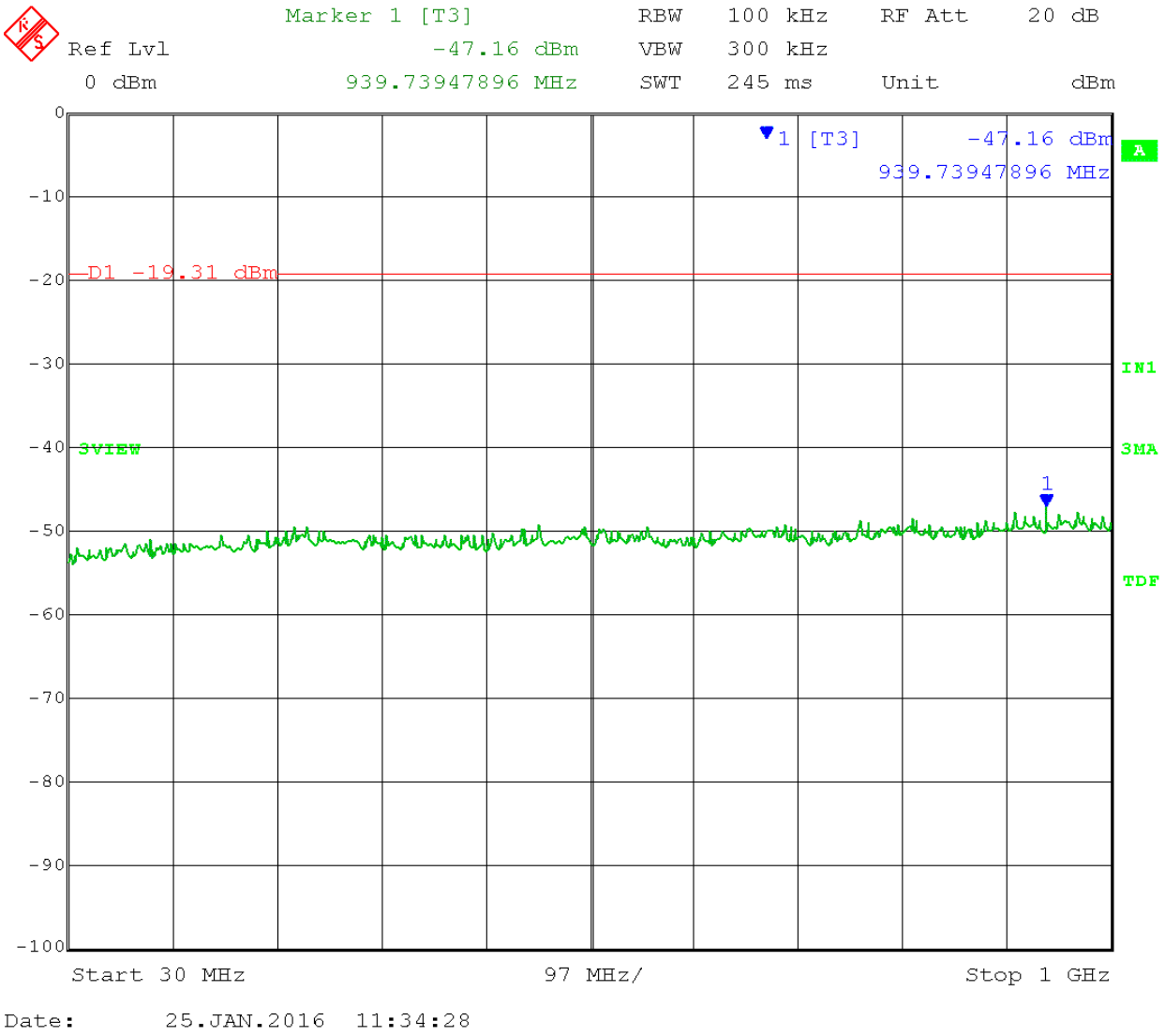



Date: 25.JAN.2016 11:12:41

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

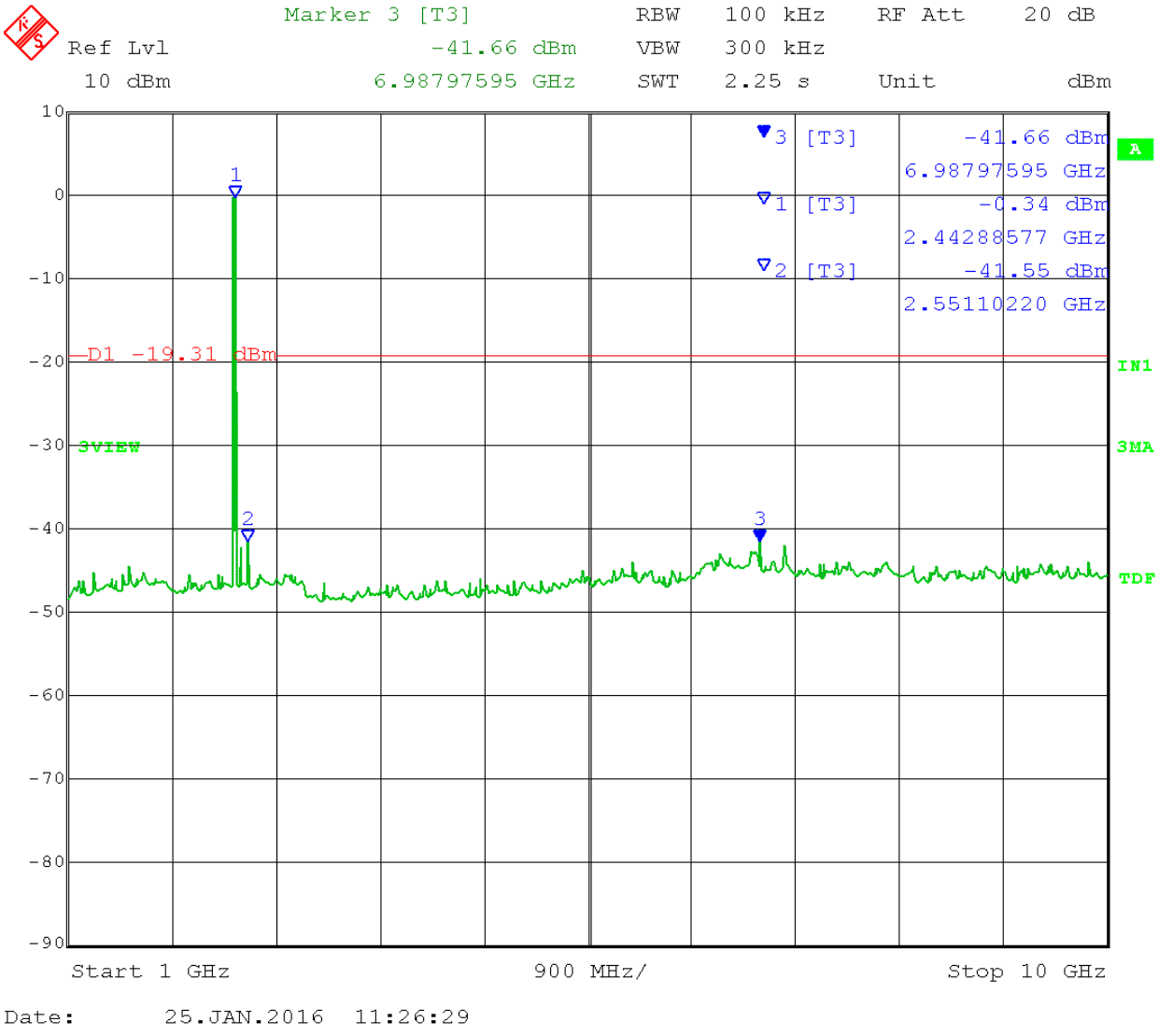
Frequency Range: 30MHz to 1GHz
Limit = -19.31dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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

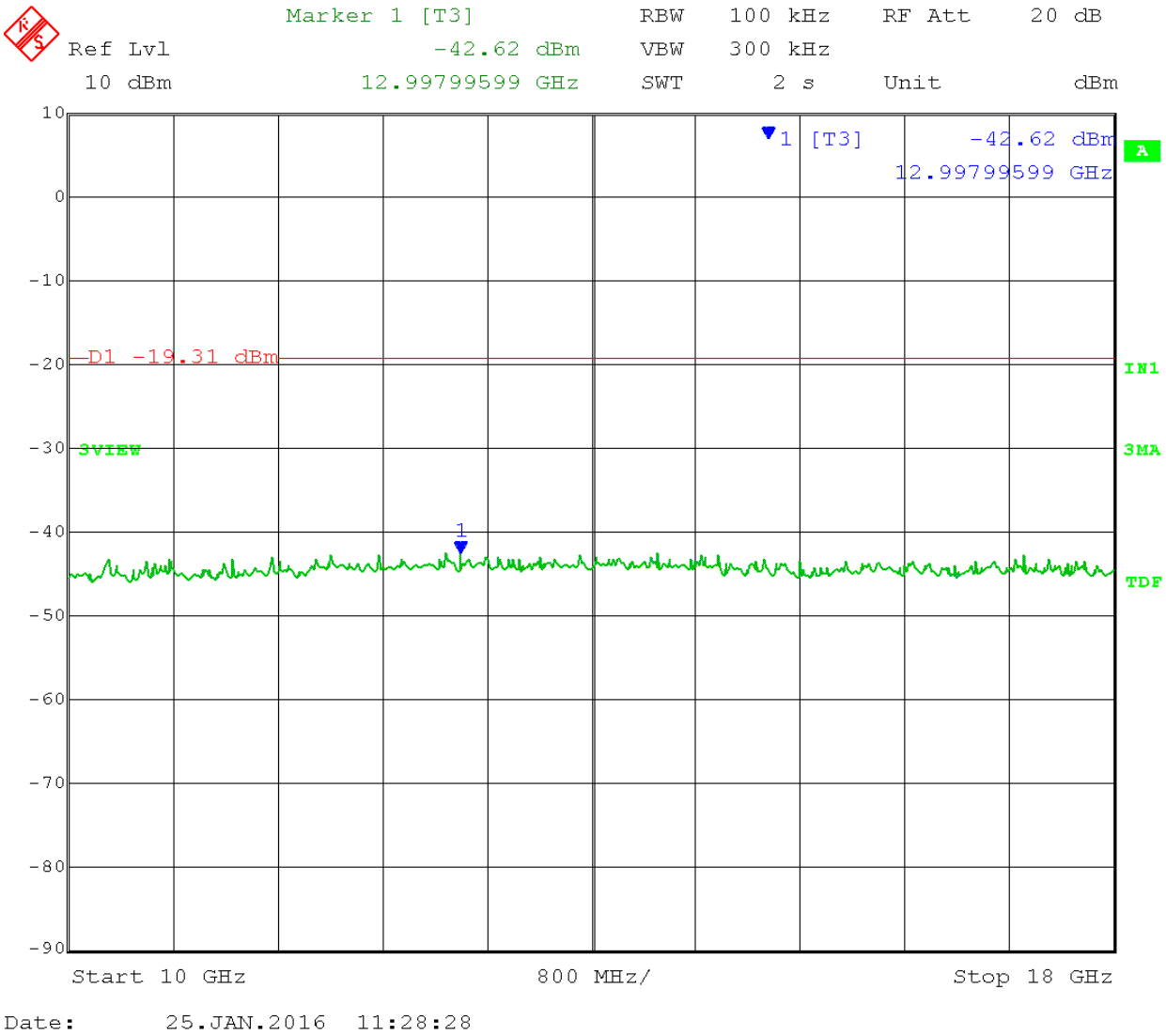
Frequency Range: 1GHz to 10GHz
Limit = -19.31dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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

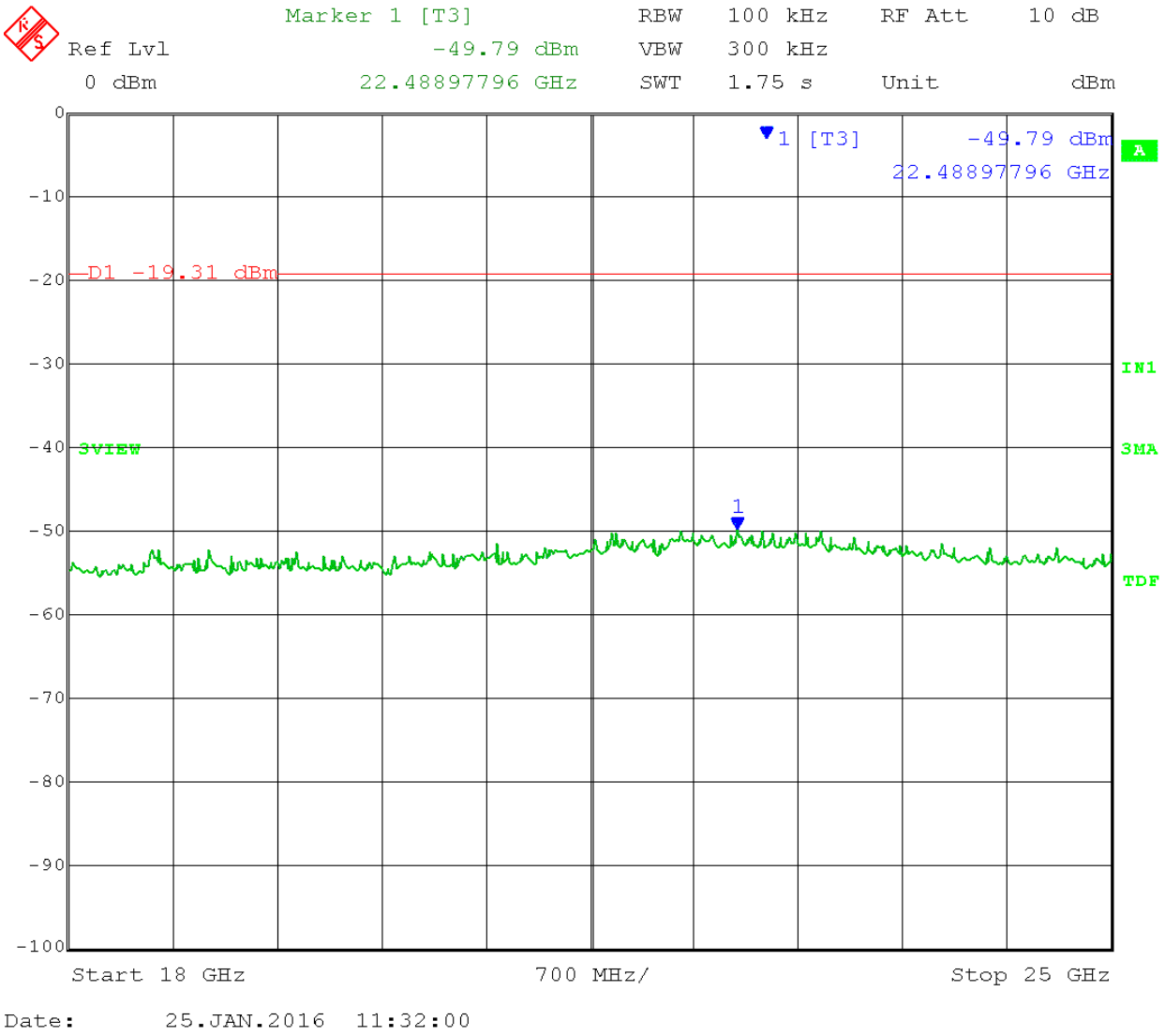



Date: 25.JAN.2016 11:28:28

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

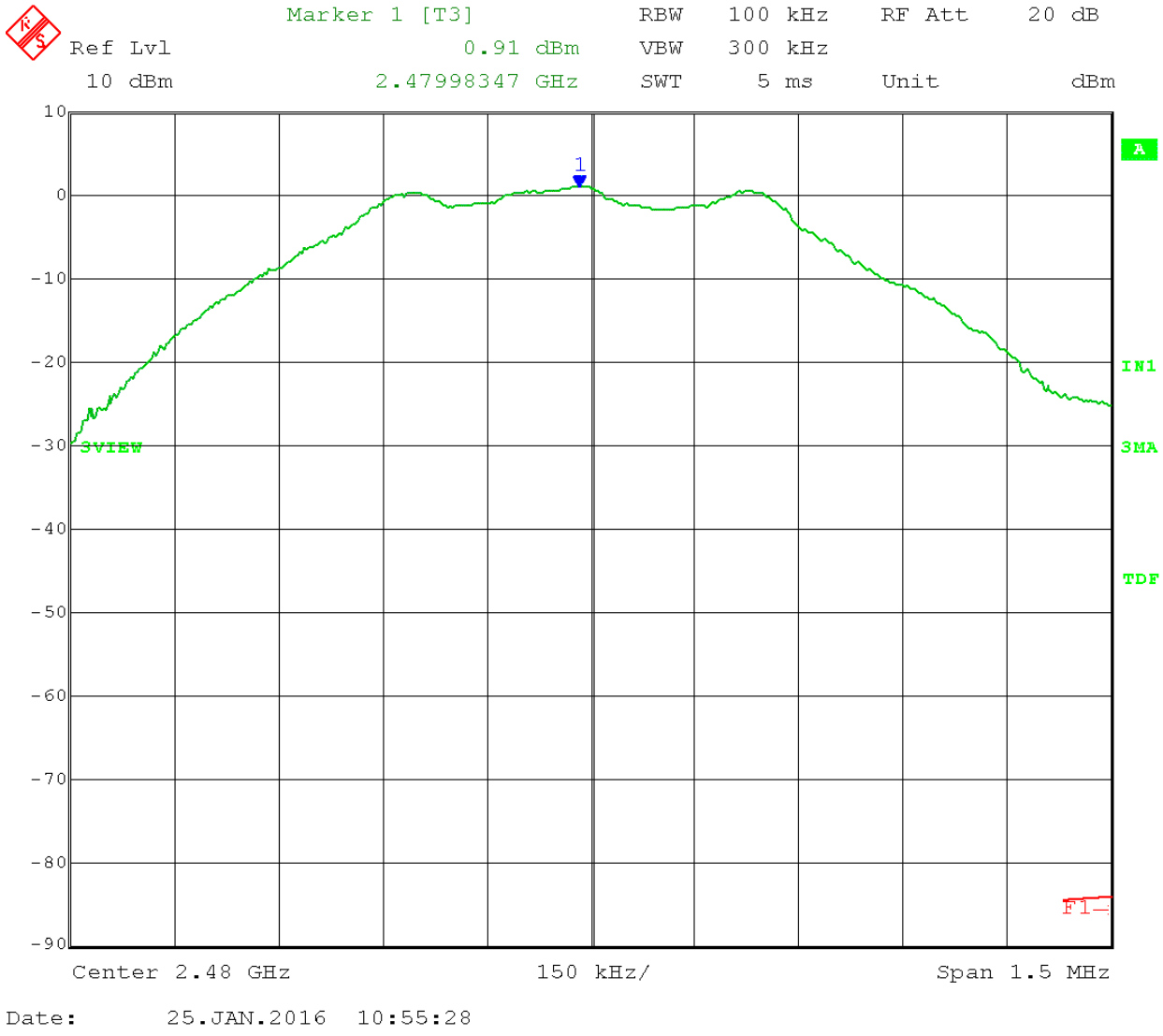
Frequency Range: 18GHz to 25GHz
Limit = -19.31dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency




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

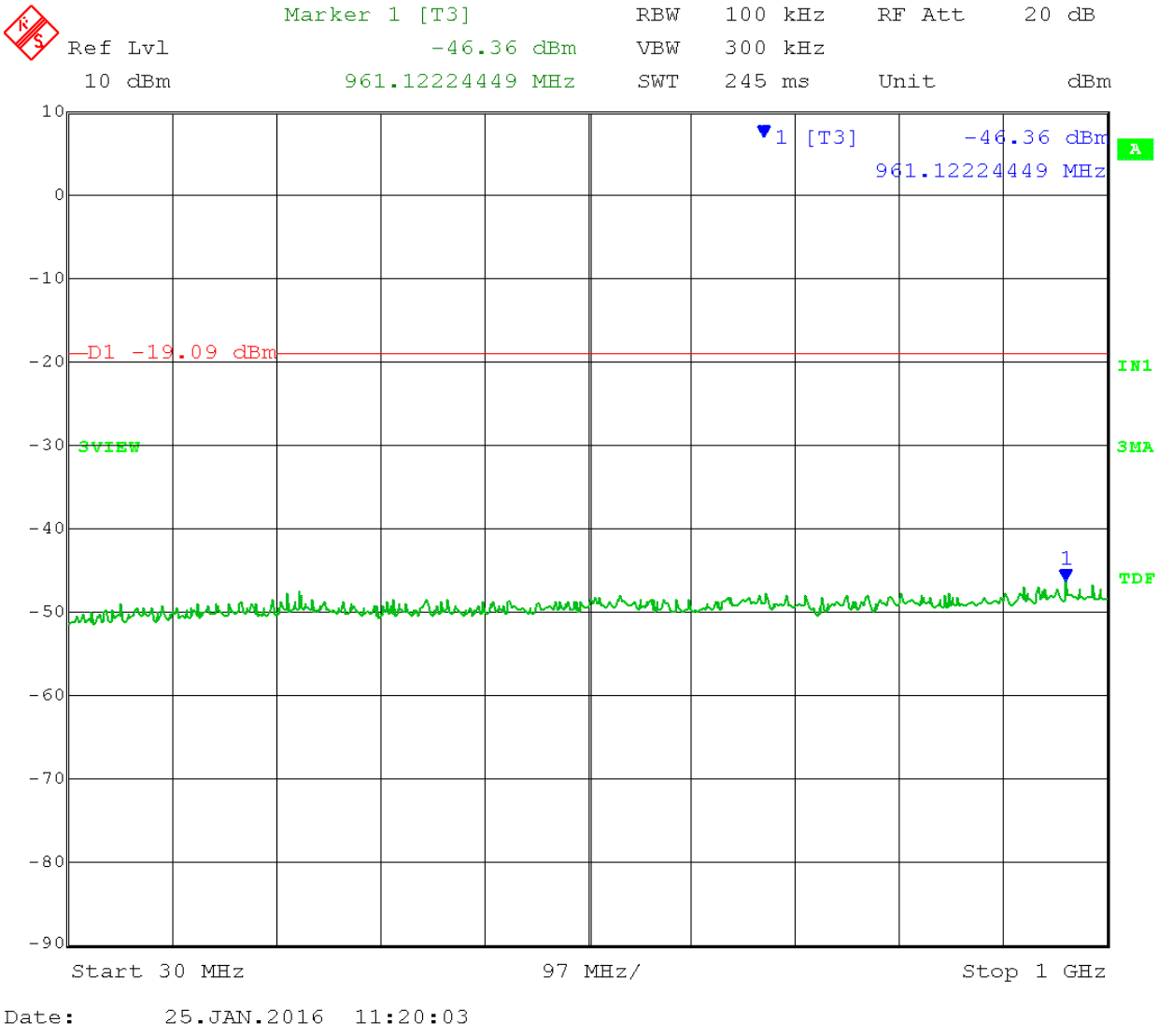



Date: 25.JAN.2016 10:55:28

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

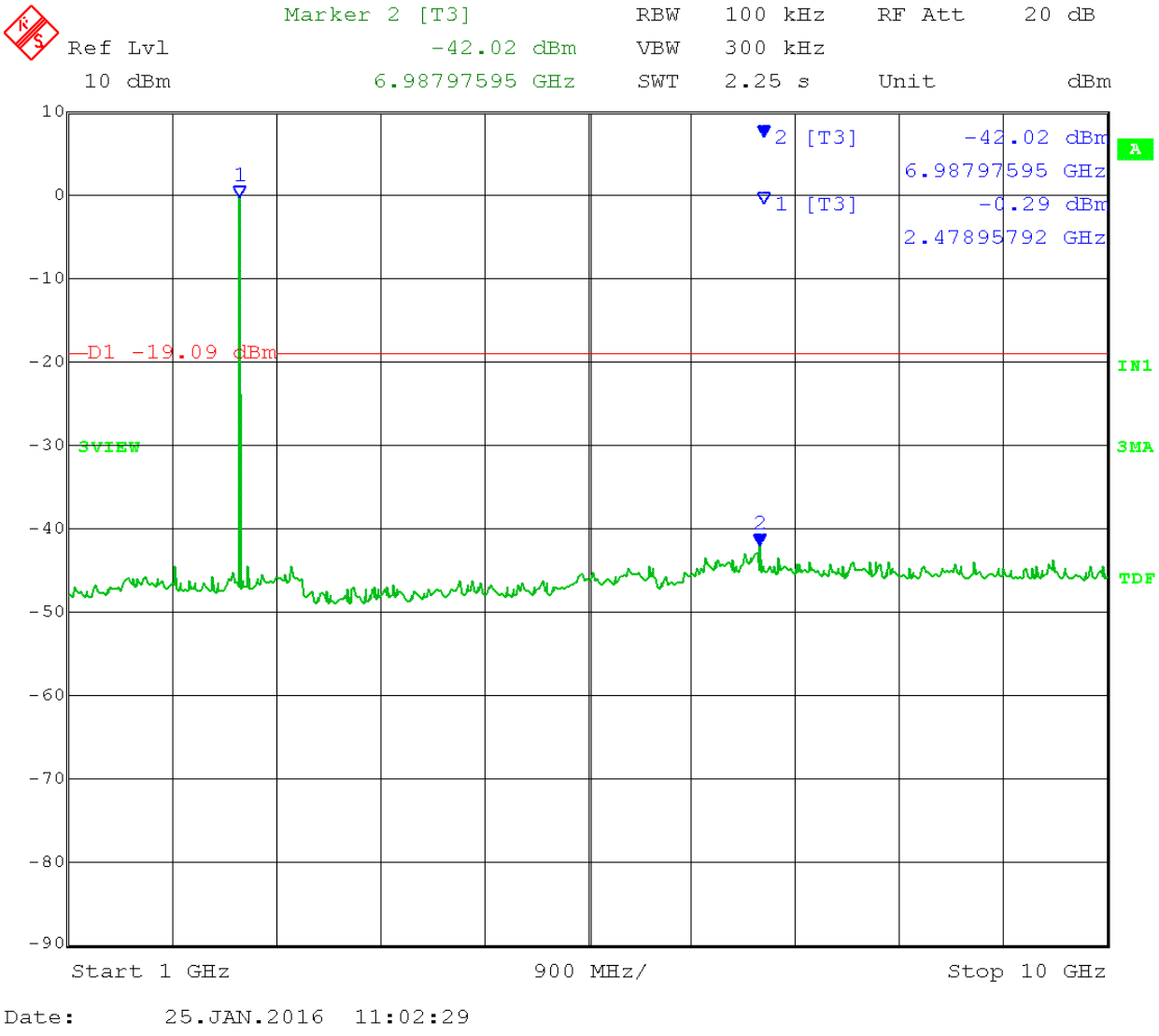



Date: 25.JAN.2016 11:20:03

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

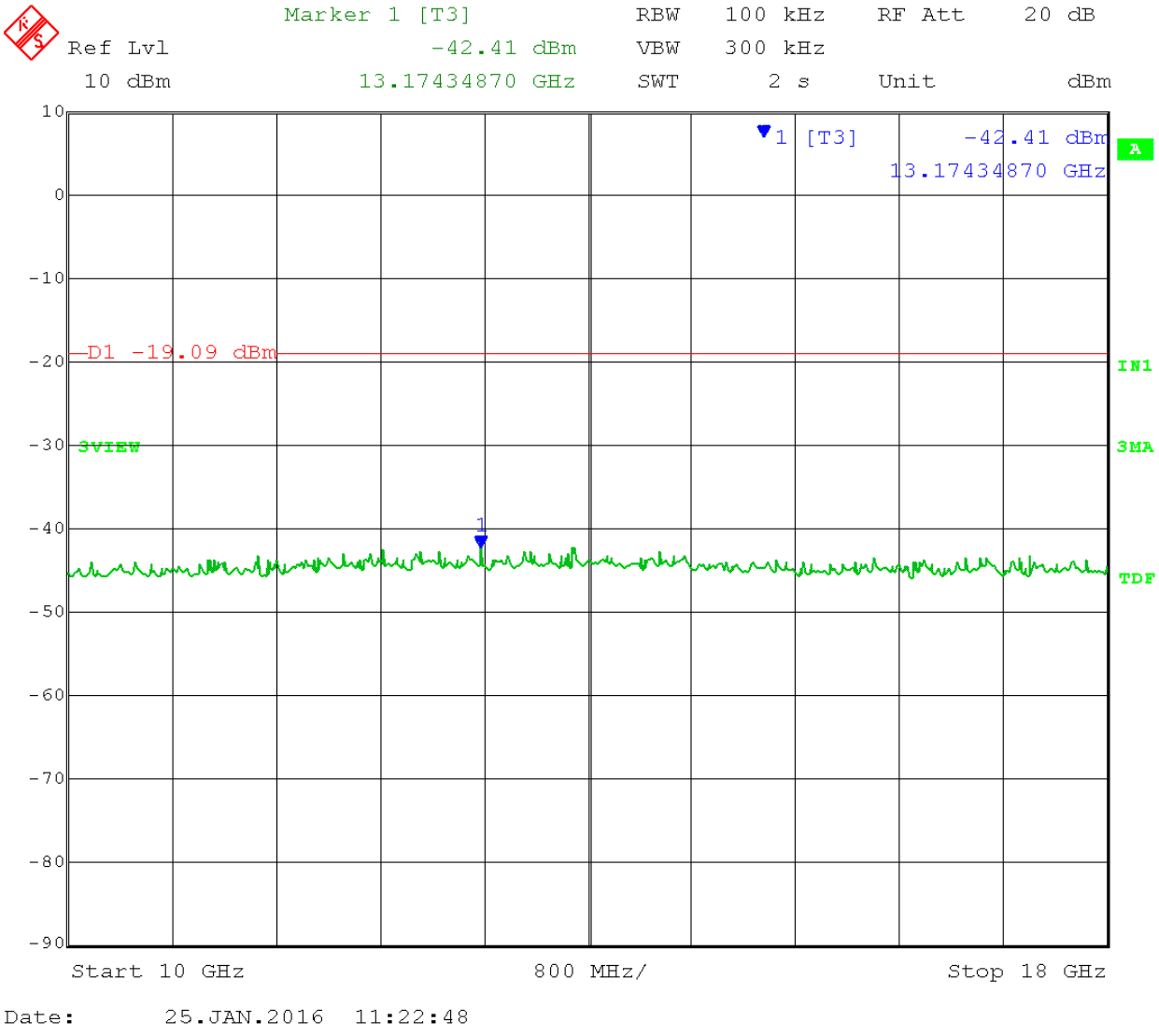
Frequency Range: 1GHz to 10GHz
Limit = -19.09dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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

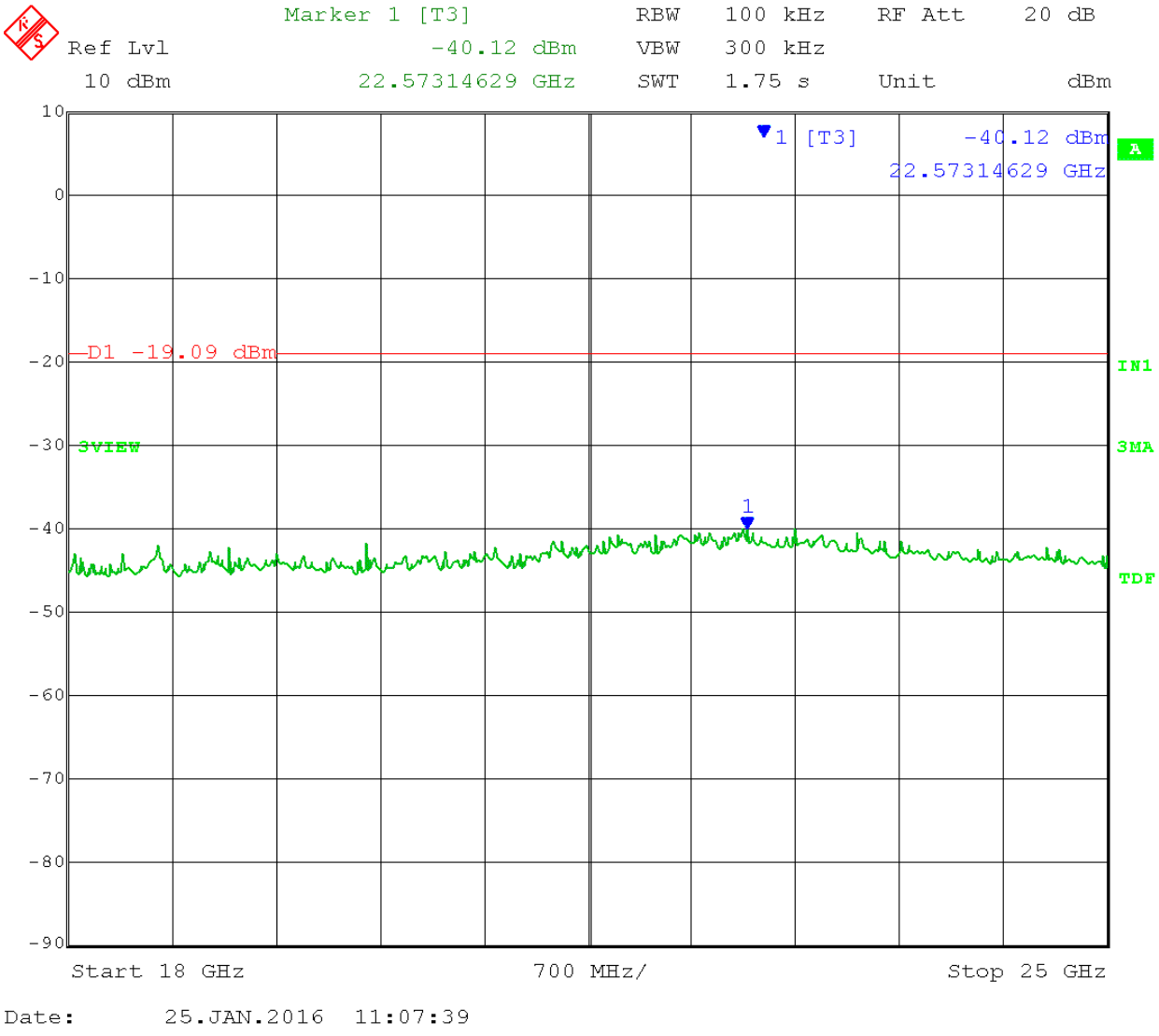
Frequency Range: 10GHz to 18GHz
Limit = -19.09dbm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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

## 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 from18-25GHz

| 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 from18-25GHz

| 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 from18-25GHz

| 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 |
| | | | | | | | | | | | | |

## 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.

***FCC Pt.15.247***

***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: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

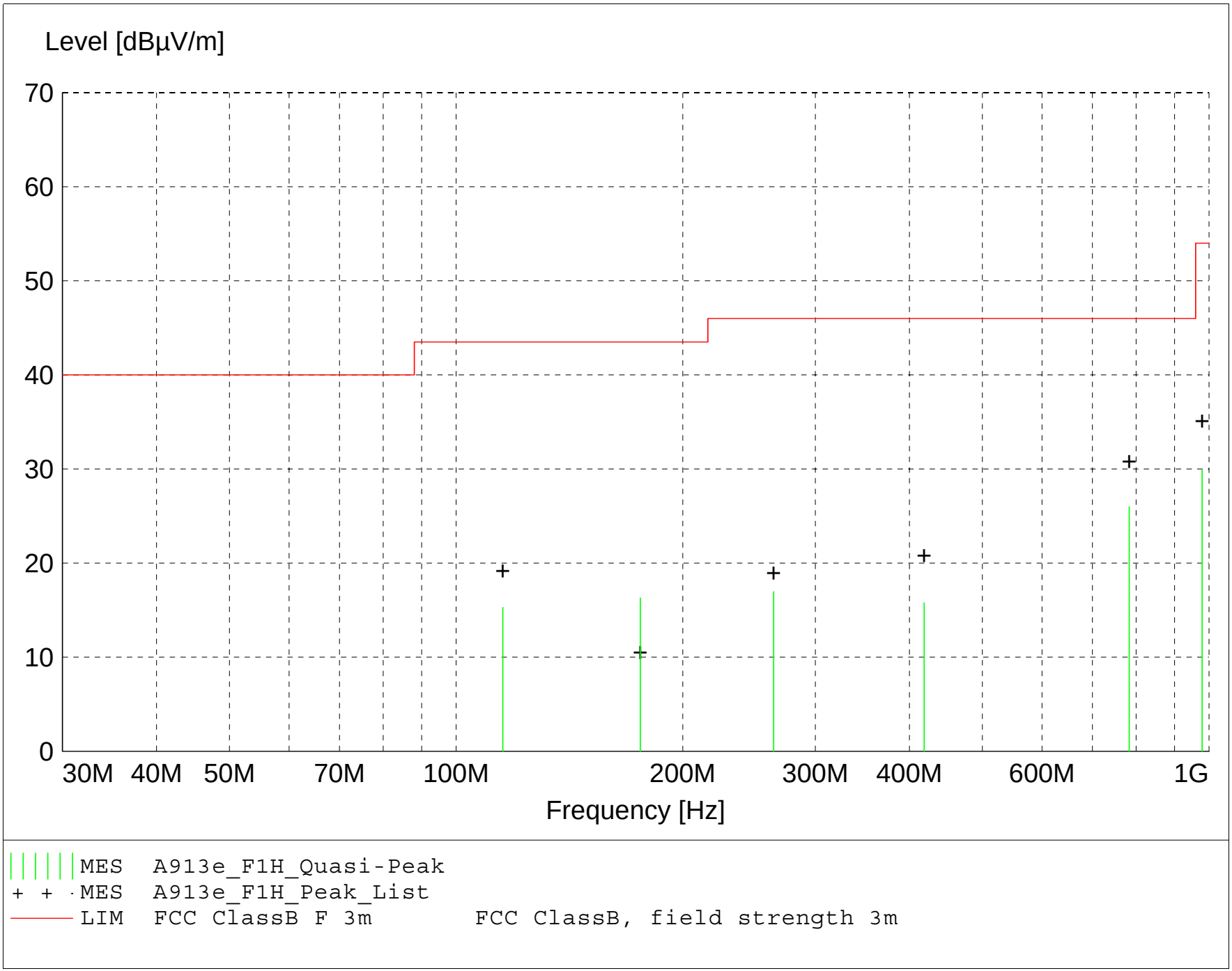
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

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 dector

# Final maximized level using Peak detector


Level [dBµV/m]
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A913e_F1H_Quasi-Peak
MES A913e_F1H_Peak_List
LIM FCC ClassB F 3m
FCC ClassB, field strength 3m

***MEASUREMENT RESULT: "A913e_F1H_Final"***

1/28/2016 11:28AM

| Frequency | Level | Antenna Factor | System Loss | Total Level | Limit | Margin | Height Ant. | EuT Angle | Final Detector | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBµV | 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 |

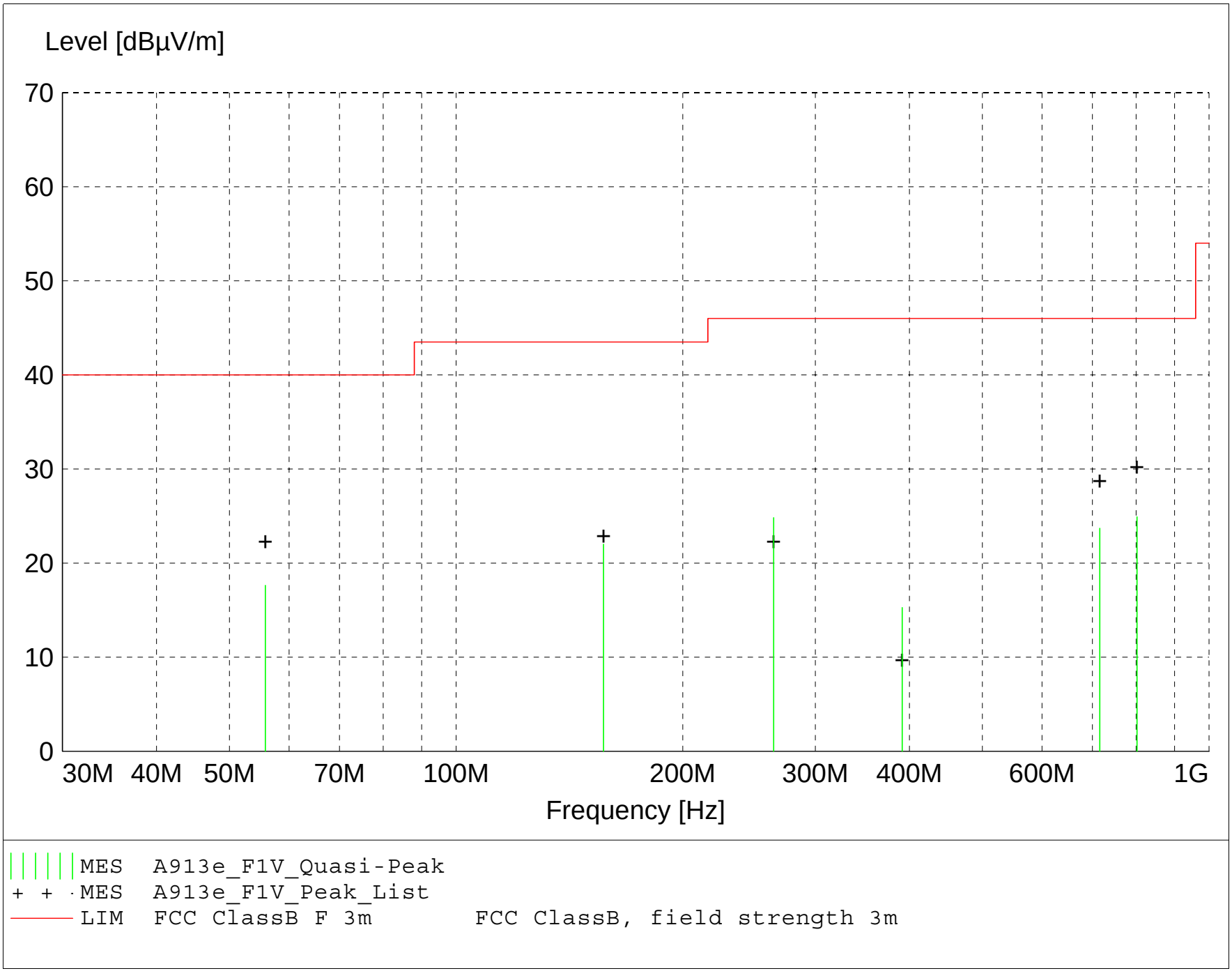
***FCC Pt.15.247***

***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:       Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

                 Margin(dB)  = Limit(dBµV/m) - Total Level(dBµV/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 dector

                 #       Final maximized level using Peak detector
```


Level [dBµV/m]
70
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES A913e_F1V_Quasi-Peak
MES A913e_F1V_Peak_List
LIM FCC ClassB F 3m FCC ClassB, field strength 3m

***MEASUREMENT RESULT: "A913e_F1V_Final"***

1/28/2016 11:18AM

| Frequency | Level | Antenna Factor | System Loss | Total Level | Limit | Margin | Height Ant. | EuT Angle | Final Detector | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBµV | 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 |

## 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.

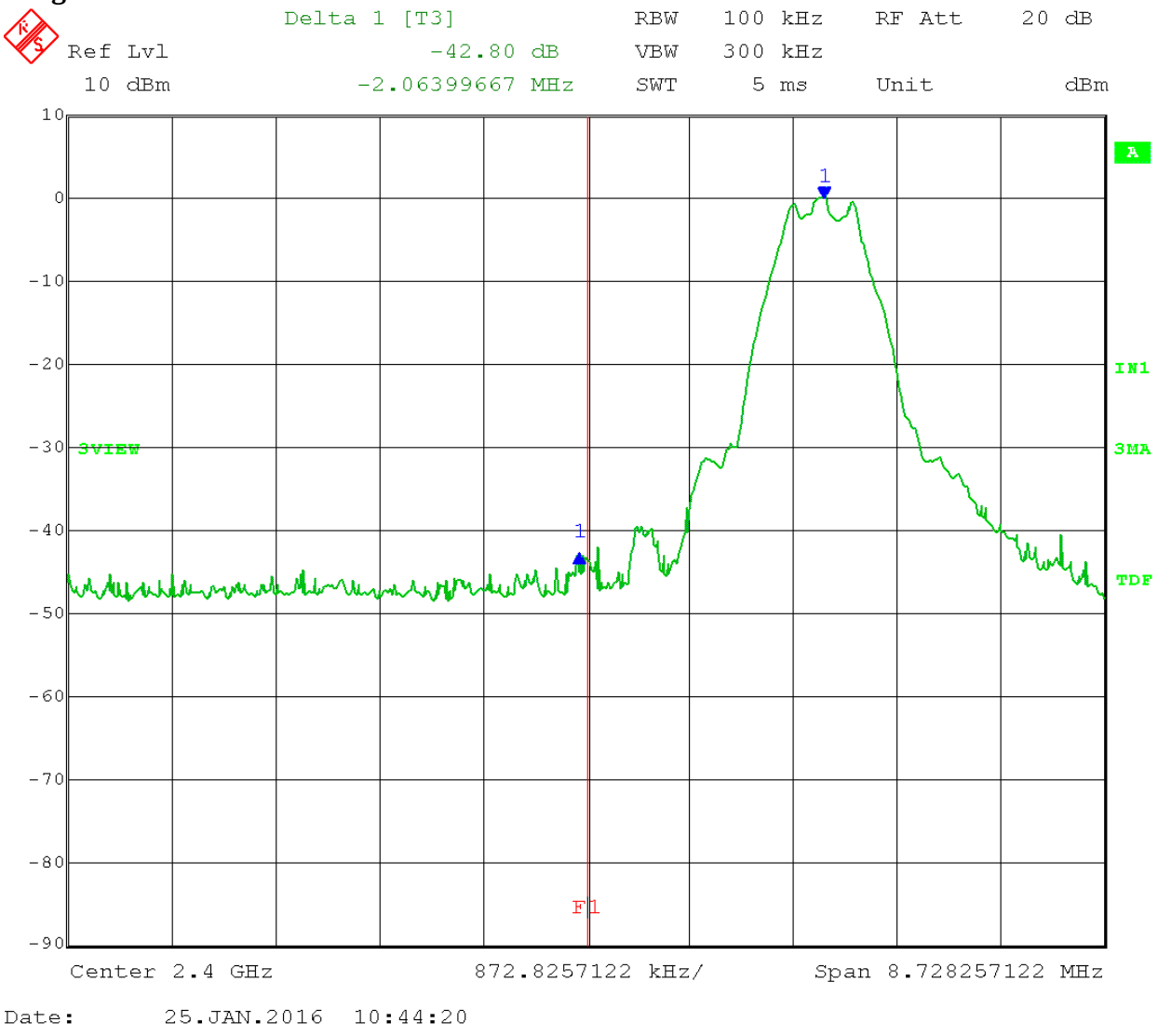
166 South Carter, Genoa City, WI 53128

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



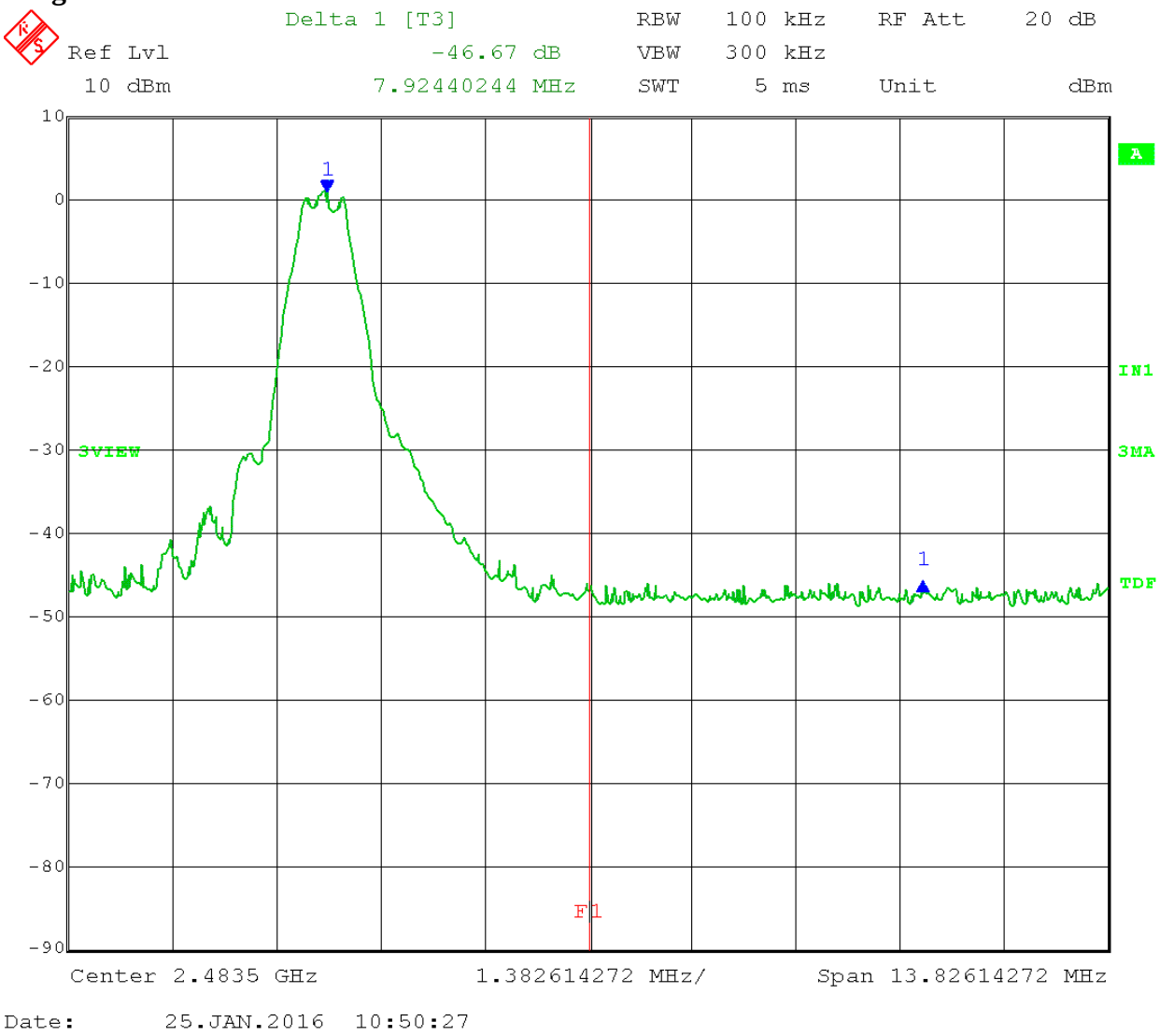
DLS ELECTRONIC SYSTEMS, INC.
166 South Carter, Genoa City, WI 53128

| | |
|---|---|
| Company: | Wilson Sporting Goods |
| Model Tested: | MSC1108 |
| Report Number: | 21656 |
| DLS Project: | 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**



## 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

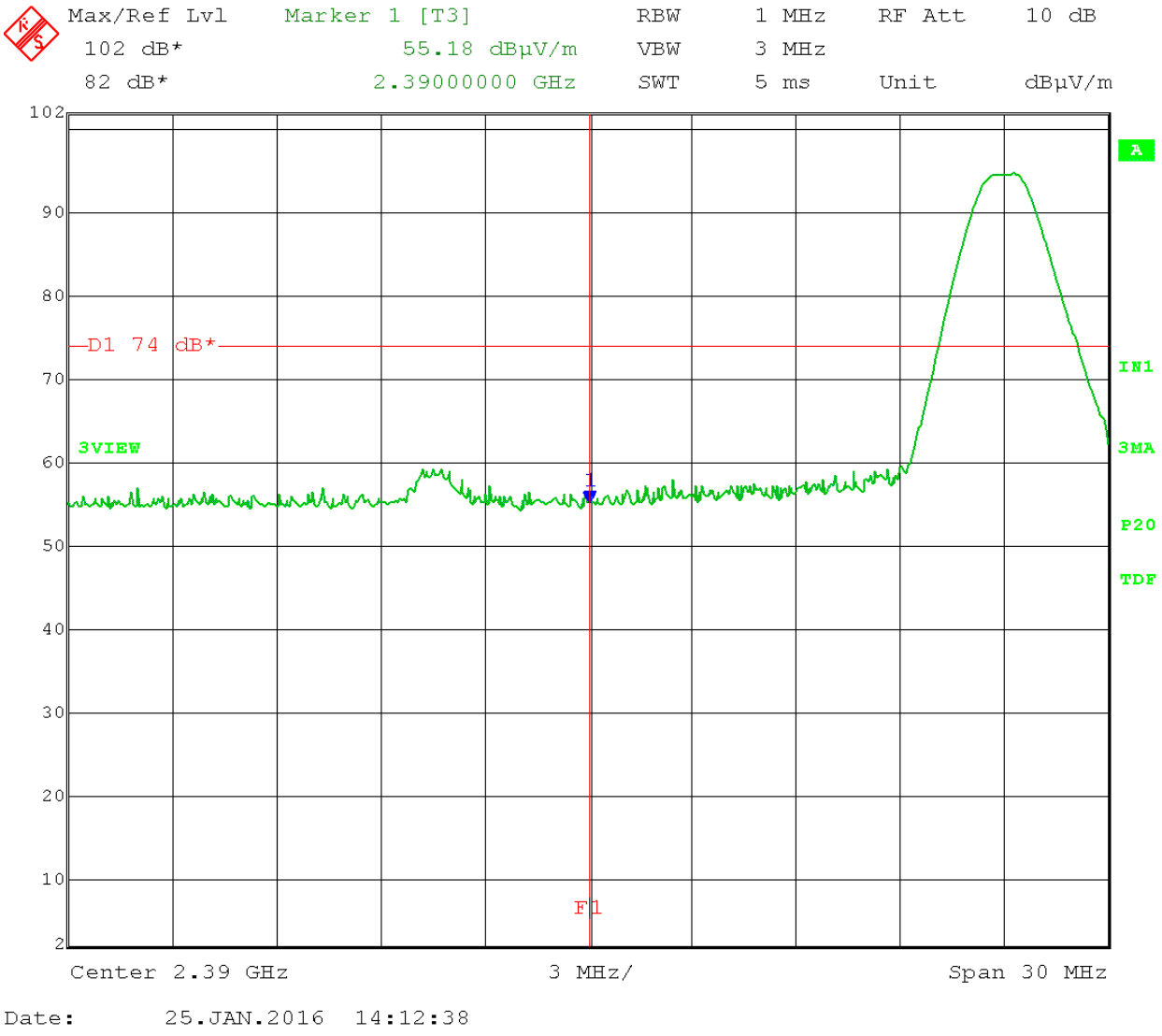
EUT: Bluetooth Football

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

Operator: Paul L

Comment: Low Channel:38 Frequency- 2402MHz

Limit: 74dBµV/m @ 3meters Horizontal



Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

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

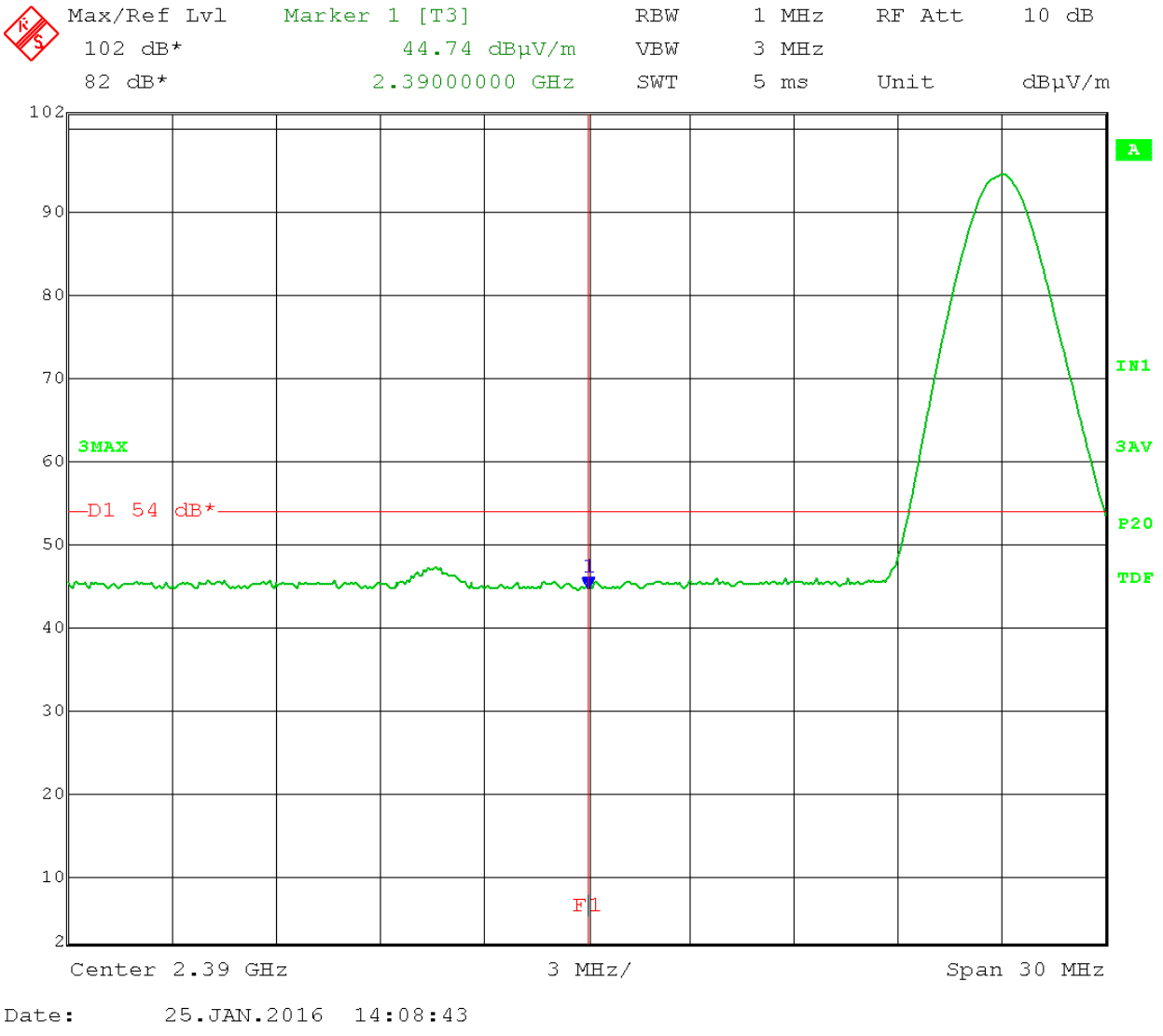
Operator: Paul L

Comment: LowChannel:37 Frequency- 2402MHz

Duty cycle correction (83% duty cycle) = 20Log(1/.83)=1.62 dB

44.74 dBµV/m + 1.62 dB = 46.36 dBµV/m

Limit: 54dBµV/m @ 3meters Horizontal




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

Test Date: 1-25-2016

Company: Wilson

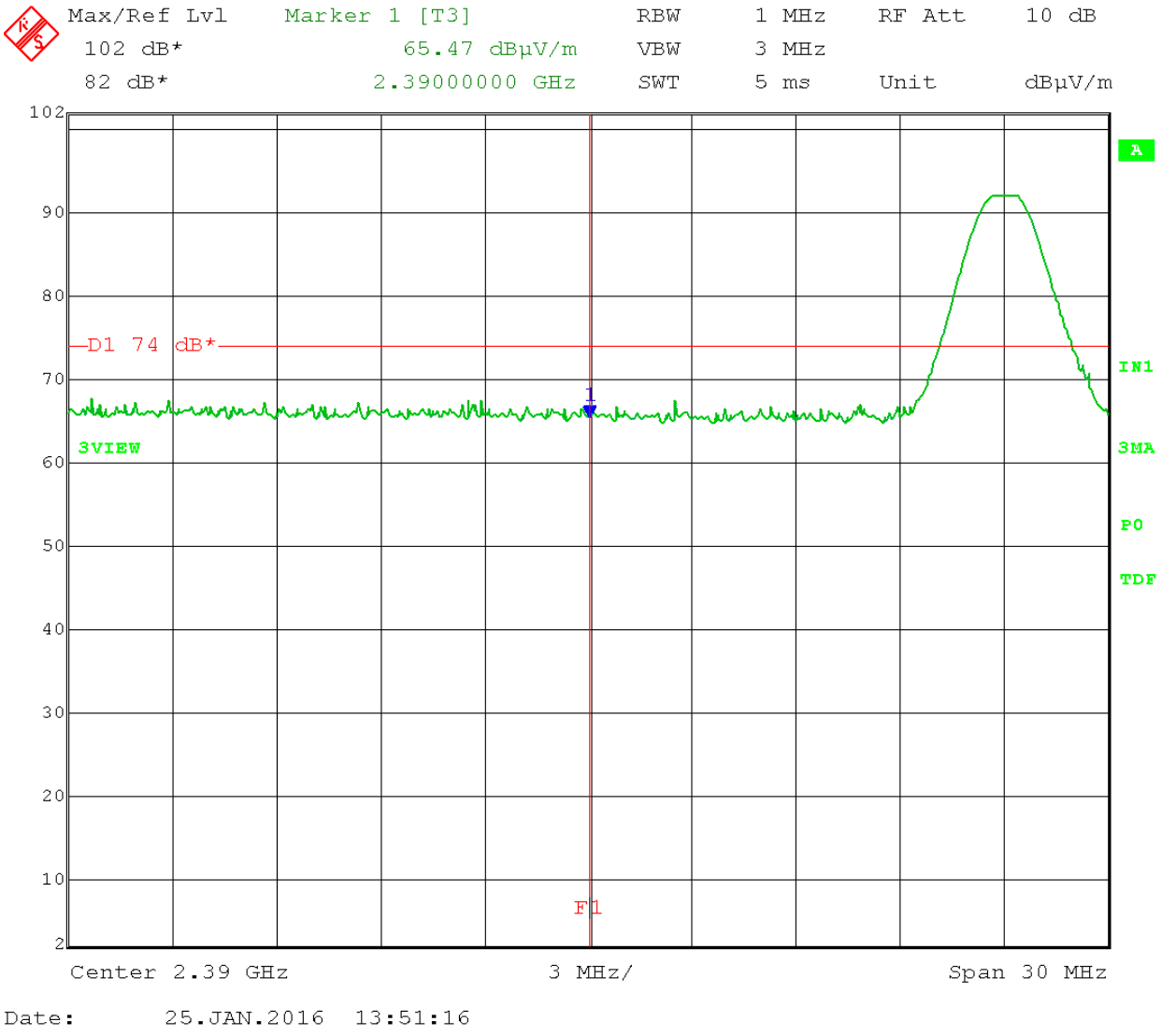
EUT: Bluetooth Football

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

Operator: Paul L

Comment: Low Channel:38 Frequency- 2402MHz

Limit: 74dBµV/m @ 3meters Vertical



Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

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

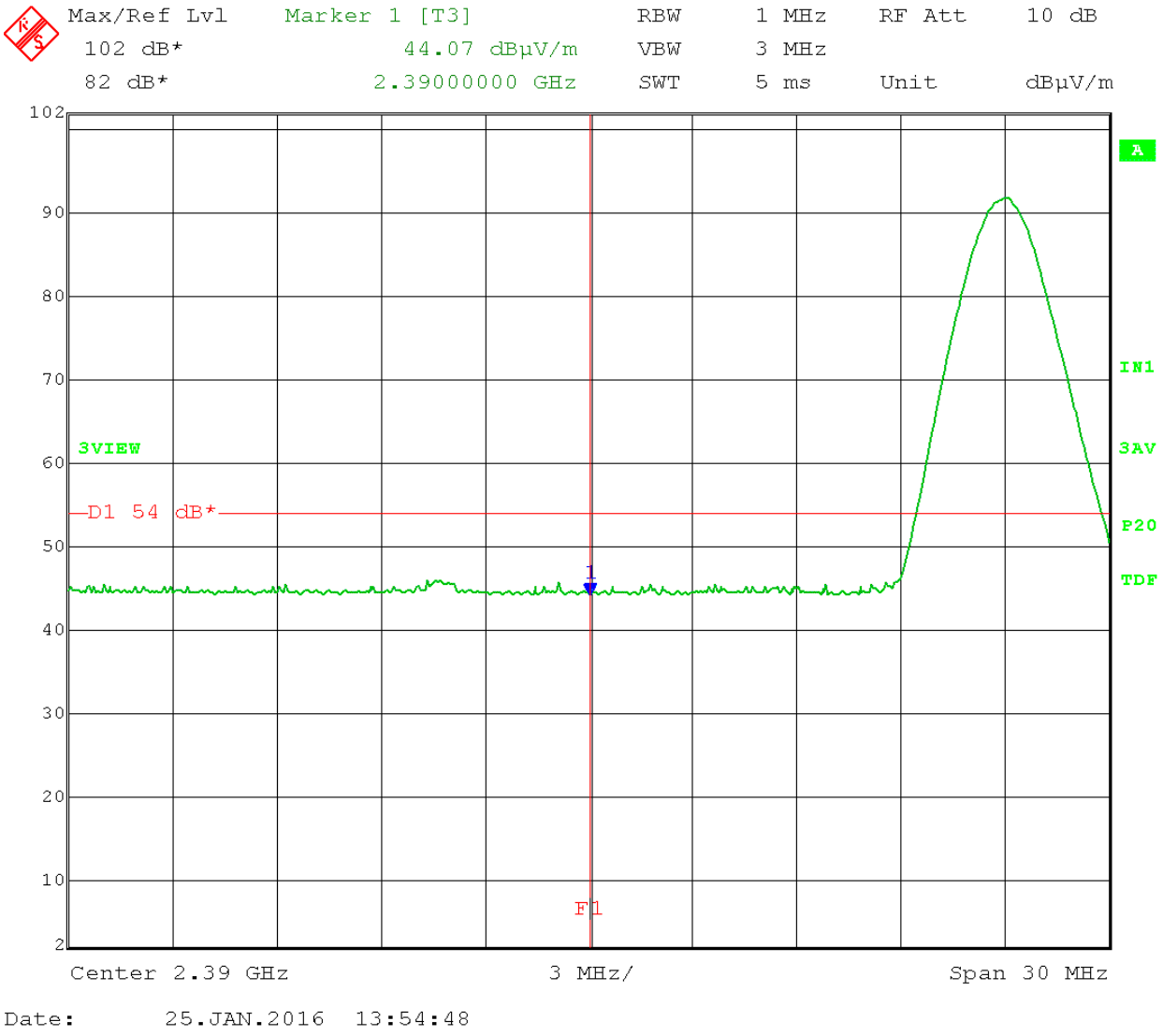
Operator: Paul L

Comment: LowChannel:37 Frequency- 2402MHz

Duty cycle correction (83% duty cycle) = 20Log(1/.83)=1.62 dB

44.07 dBµV/m + 1.62 dB = 45.69 dBµV/m

Limit: 54dBµV/m @ 3meters Vertical




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

Test Date: 1-25-2016

Company: Wilson

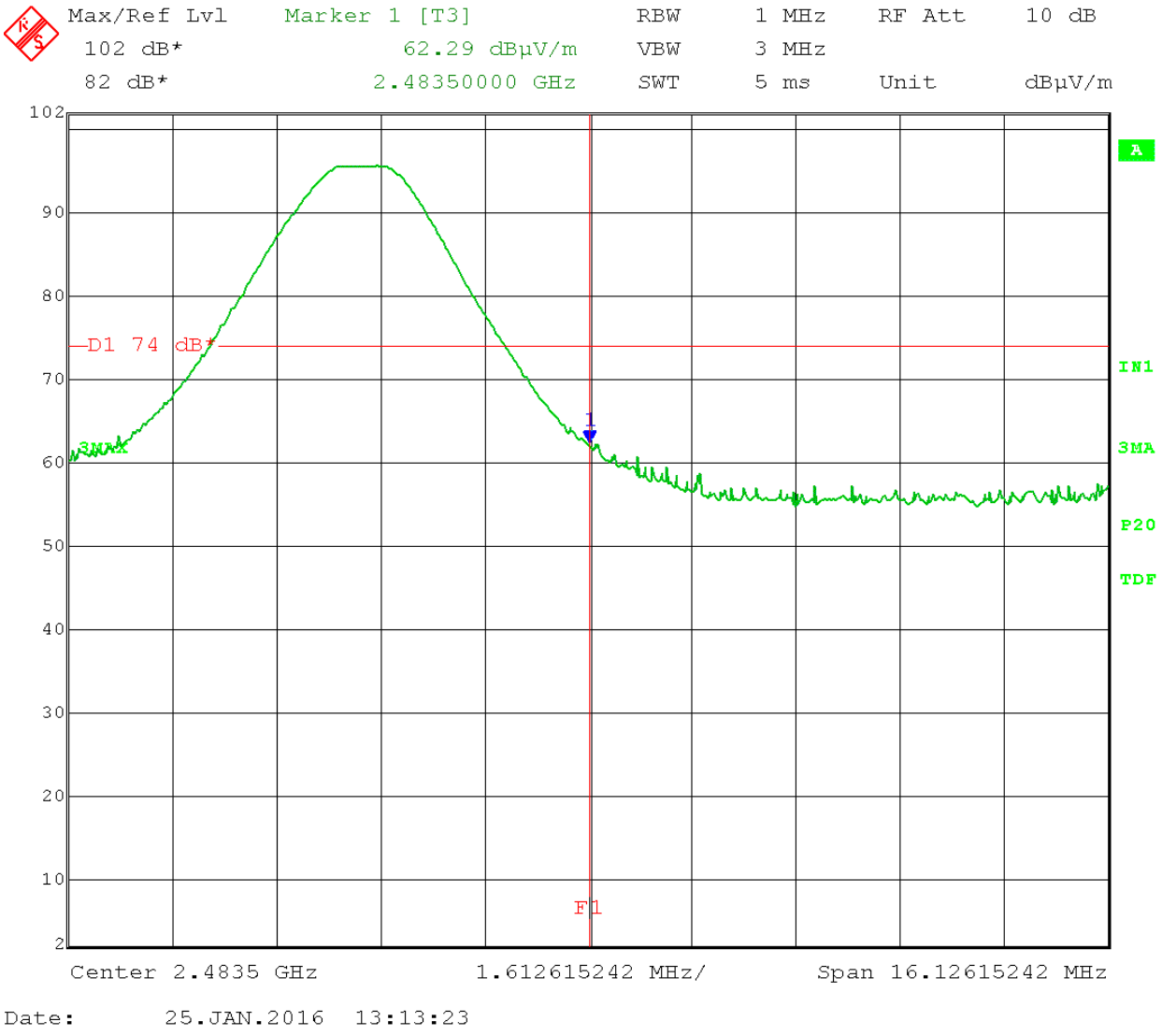
EUT: Bluetooth Football

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

Operator: Paul L

Comment: High Channel:39 Frequency- 2480MHz

Limit: 74dBµV/m @ 3meters Horizontal



Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

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

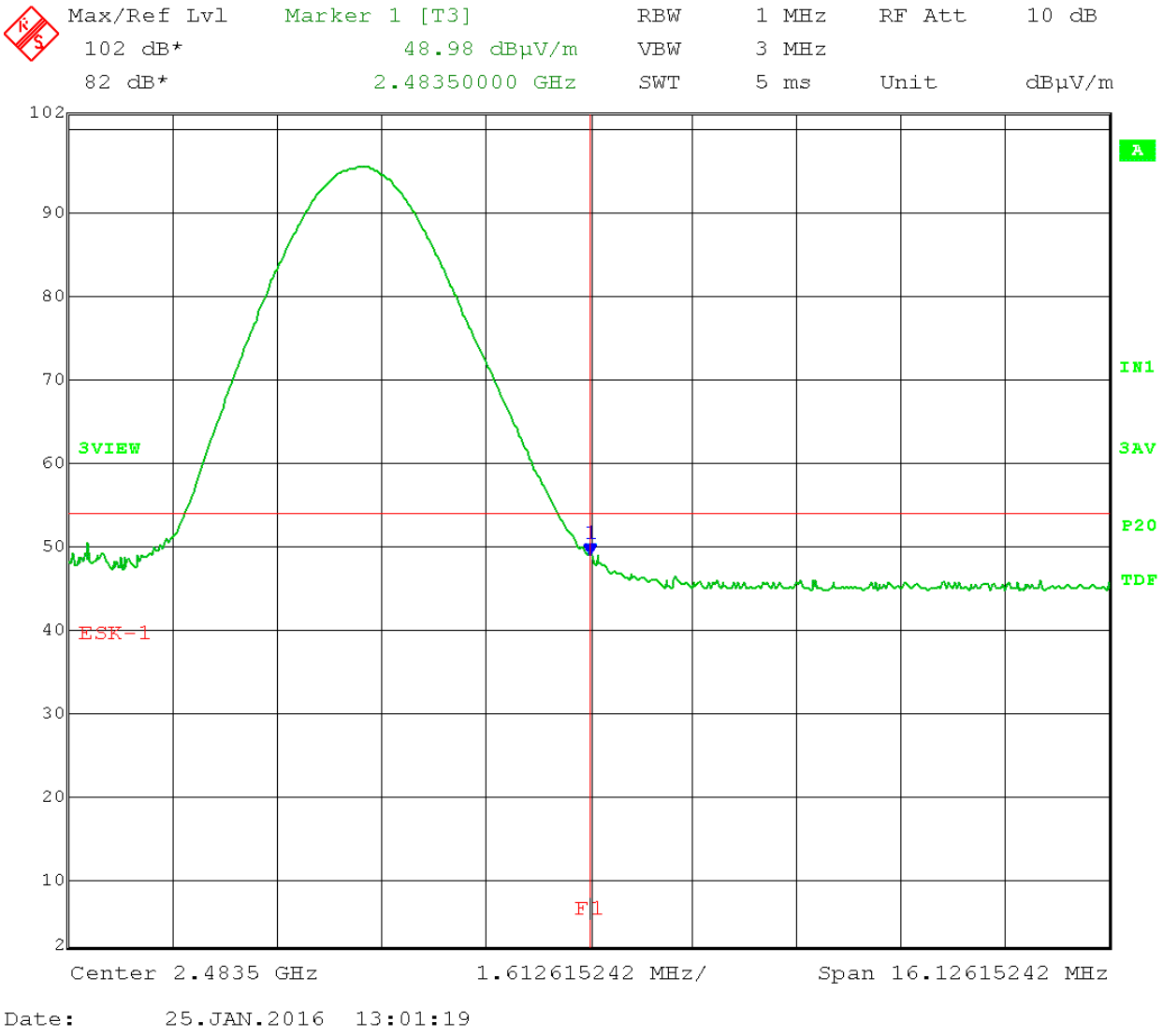
Operator: Paul L

Comment: High Channel:39 Frequency- 2480MHz

Duty cycle correction (83% duty cycle) = 20Log(1/.83)=1.62 dB

48.98 dBµV/m + 1.62 dB = 51.60 dBµV/m

Limit: 54dBµV/m @ 3meters Horizontal




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

Test Date: 1-25-2016

Company: Wilson

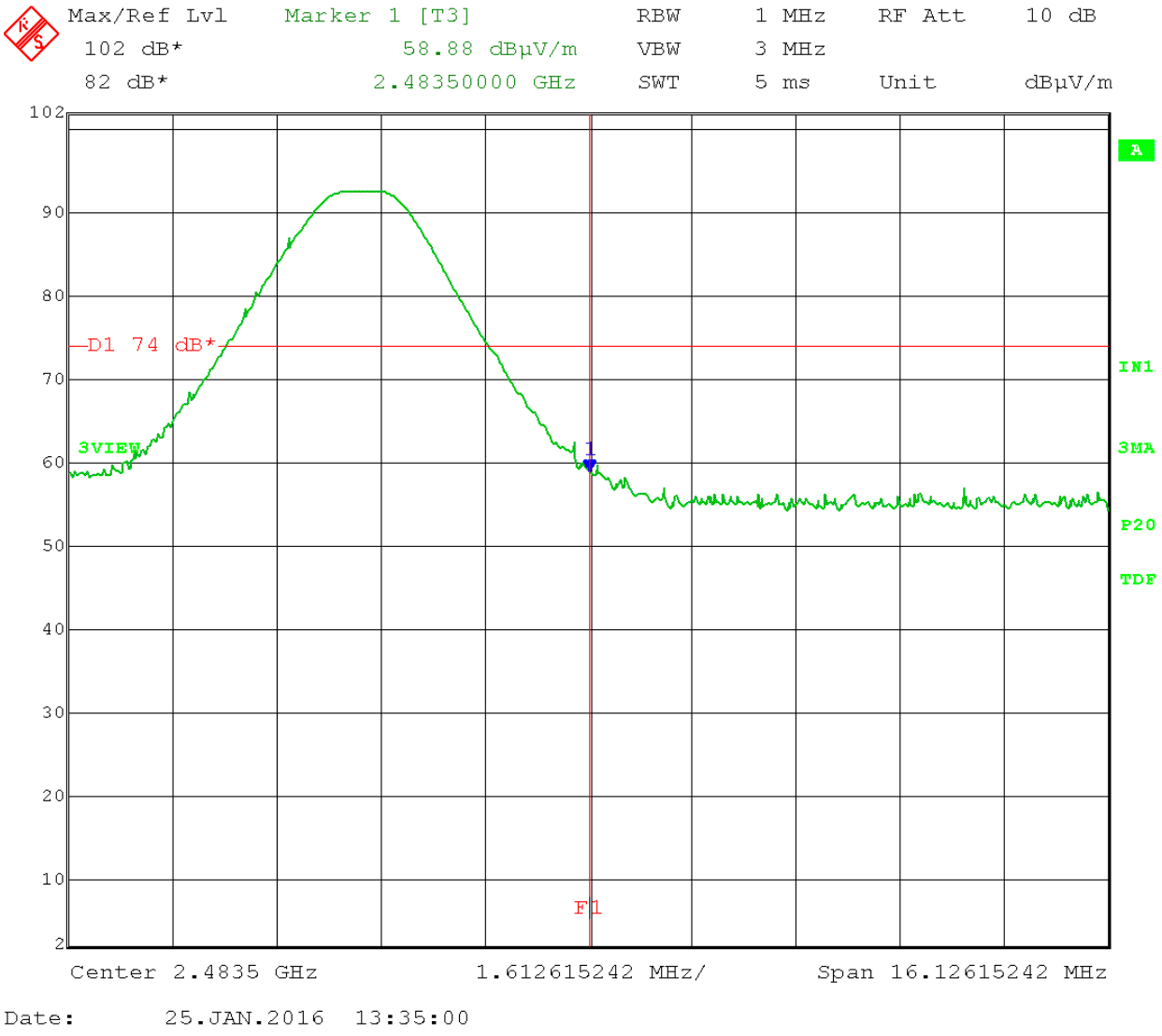
EUT: Bluetooth Football

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

Operator: Paul L

Comment: High Channel:39 Frequency- 2480MHz

Limit: 74dBµV/m @ 3meters Vertical



Test Date: 1-25-2016

Company: Wilson

EUT: Bluetooth Football

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

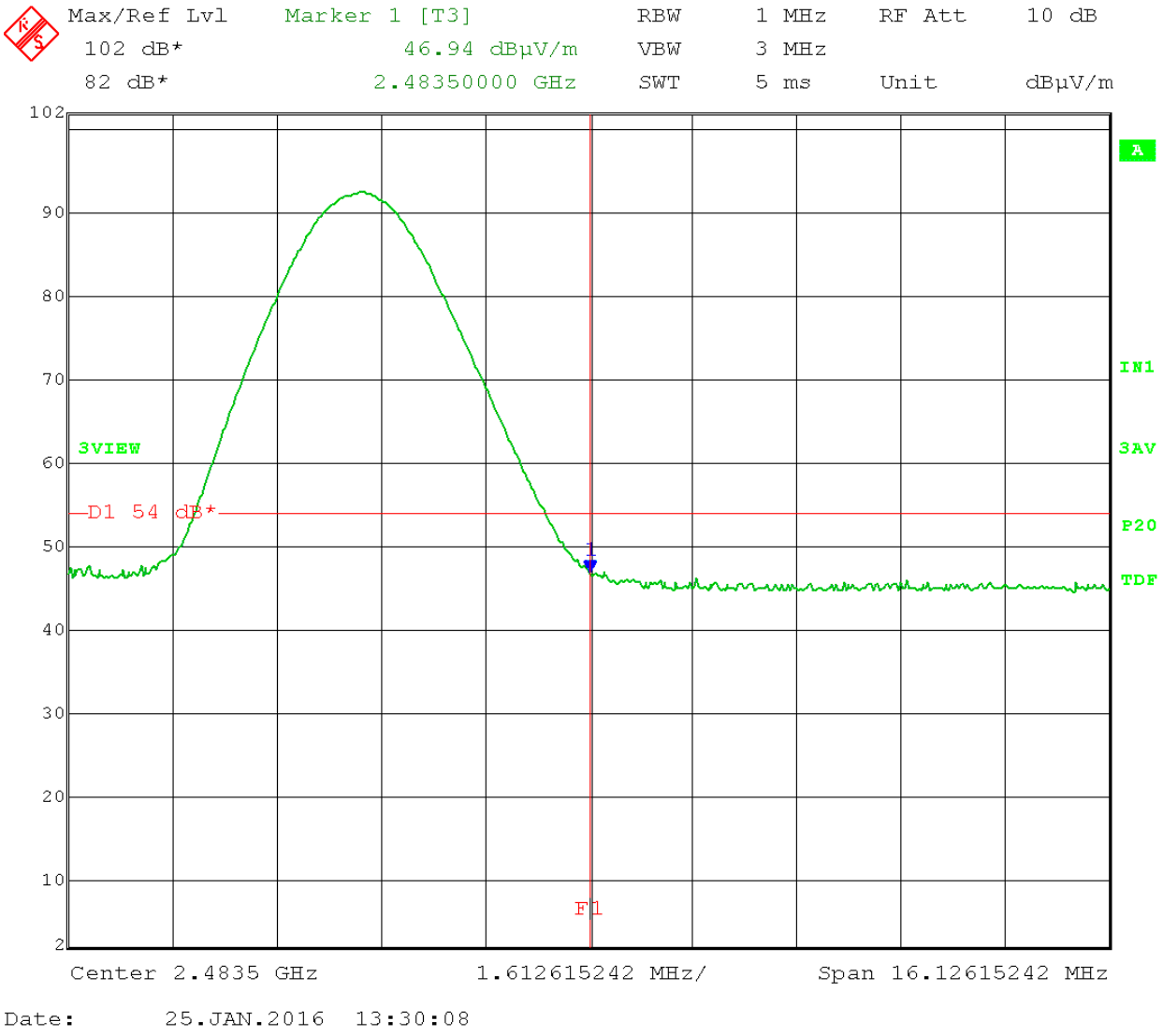
Operator: Paul L

Comment: High Channel:39 Frequency- 2480MHz

Duty cycle correction (83% duty cycle) = 20Log(1/.83)=1.62 dB

46.94 dBµV/m + 1.62 dB = 48.56 dBµV/m

Limit: 54dBµV/m @ 3meters Vertical




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

**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 ms / 0.521042084 ms) = 0.83 = 83%
20 log (83 / 100) = -1.62
Duty Cycle Correction Factor = 1.62 dB

**Notes:** Informational

ELECTRONIC SYSTEMS, INC.
166 South Carter, Genoa City, WI 53128

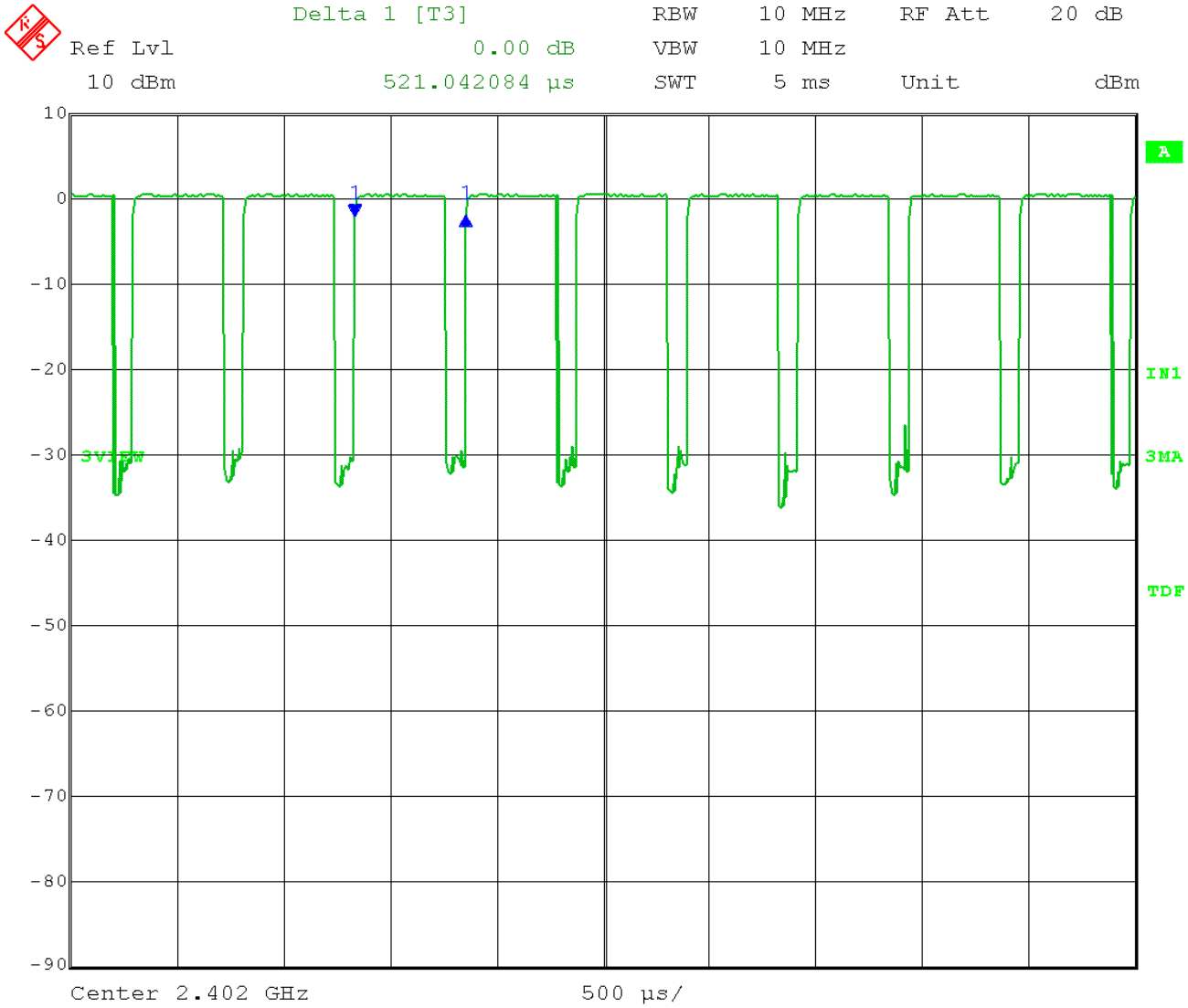
Company: Wilson Sporting Goods
Model Tested: MSC1108
Report Number: 21656
DLS Project: 7913

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 = 20log(83/100) = -1.62




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

ELECTRONIC SYSTEMS, INC.
166 South Carter, Genoa City, WI 53128

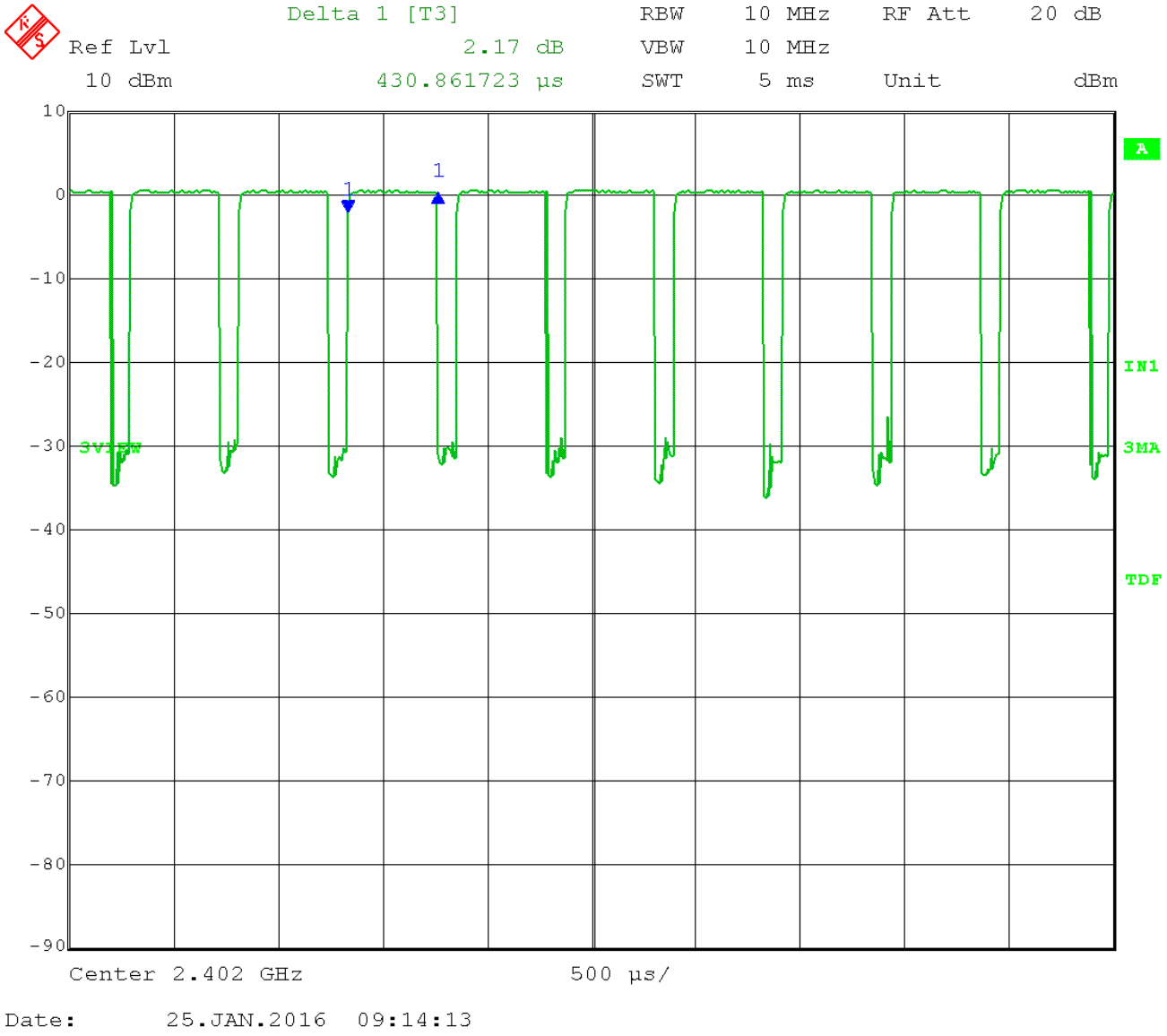
Company: Wilson Sporting Goods
Model Tested: MSC1108
Report Number: 21656
DLS Project: 7913

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



# 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 |
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