# Logic PD, Inc.

## 37x Torpedo + Wireless SOM -31

**FCC 15.207:2013**

**FCC 15.247:2013**

**Report #: LGPD0096.1**

Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

# CERTIFICATE OF TEST

**Last Date of Test: June 03, 2013**
**Logic PD, Inc.**
**Model: 37x Torpedo + Wireless SOM -31**

## Emissions

| Test Description | Specification | Test Method | Pass/Fail |
|---|---|---|---|
| Channel Spacing | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Dwell Time | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Number of Hopping Channels | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Occupied Bandwidth | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Output Power | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Band Edge Compliance - Hopping Mode | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Band Edge Compliance | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Spurious Conducted Emissions | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| Spurious Radiated Emissions | FCC 15.247:2013 | ANSI C63.10:2009 | Pass |
| AC Powerline Conducted Emissions | FCC 15.207:2013 | ANSI C63.10:2009 | Pass |

## Deviations From Test Standards

None

**Approved By:**

*Tim O'Shea, Operations Manager*

**NVLAP Lab Code: 200881-0**

***Test Facility***

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
9349 W Broadway Ave.
Brooklyn Park, MN 55445

Phone: (763) 425-2281 Fax: (763) 424-3469

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834E-1).

***This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.***

***Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.***

NORTHWEST EMC
REV 2012.08.02

# REVISION HISTORY

| Revision Number | Description | Date | Page Number |
|---|---|---|---|
| 00 | None | | |

## Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

NORTHWEST EMC

REV 2012.05.24

# ACCREDITATIONS AND AUTHORIZATIONS

## United States

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

**A2LA** - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

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

## Canada

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

## European Union

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

## Australia/New Zealand

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

## Korea

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

## Japan

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

## Taiwan

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

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

## Singapore

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

## Hong Kong

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

## Vietnam

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

## Russia

**GOST** – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

## SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

# MEASUREMENT UNCERTAINTY

## Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is listed below. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-1 as applicable), and are available upon request.

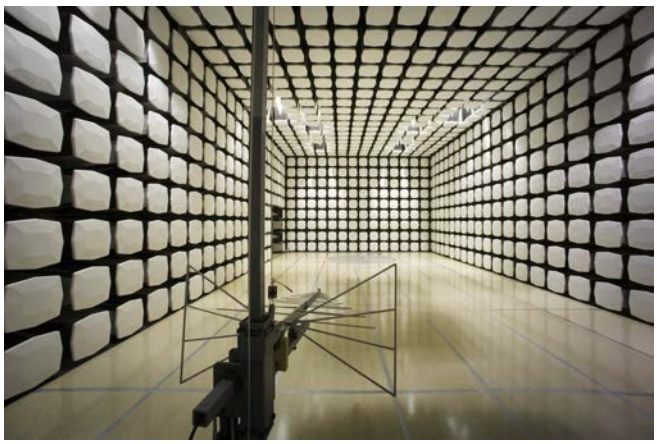
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

| Test | + MU | - MU |
|---|---|---|
| Frequency Accuracy (Hz) | 0.12 | -0.01 |
| Amplitude Accuracy (dB) | 0.49 | -0.49 |
| Conducted Power (dB) | 0.41 | -0.41 |
| Radiated Power via Substitution (dB) | 0.69 | -0.68 |
| Temperature (degrees C) | 0.81 | -0.81 |
| Humidity (% RH) | 2.89 | -2.89 |
| Field Strength (dB) | 3.80 | -3.80 |
| AC Powerline Conducted Emissions (dB) | 2.94 | -2.94 |

# LOCATIONS

REV 2013.02.26

| Oregon | California | New York | Minnesota | Washington |
|---|---|---|---|---|
| Labs EV01-12<br>22975 NW Evergreen Pkwy<br>Hillsboro, OR 97124<br>(503) 844-4066 | Labs OC01-13<br>41 Tesla<br>Irvine, CA 92618<br>(949) 861-8918 | Labs NY01-04<br>4939 Jordan Rd.<br>Elbridge, NY 13060<br>(315) 685-0796 | Labs MN01-08<br>9349 W Broadway Ave.<br>Brooklyn Park, MN 55445<br>(763) 425-2281 | Labs NC01-05,SU02,SU07<br>19201 120th Ave. NE<br>Bothell, WA 98011<br>(425) 984-6600 |
| **VCCI** | | | | |
| A-0108 | A-0029 | | A-0109 | A-0110 |
| **Industry Canada** | | | | |
| 2834D-1, 2834D-*2* | 2834B-1, 2834B-2, 2834B-3 | | 2834E-1 | 2834C-1 |
| **NVLAP** | | | | |
| NVLAP Lab Code: 200630-0 | NVLAP Lab Code: 200676-0 | NVLAP Lab Code: 200761-0 | NVLAP Lab Code: 200881-0 | NVLAP Lab Code: 200629-0 |



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

| | |
|---|---|
| **Company Name:** | Logic PD, Inc. |
| **Address:** | 6201 Bury Drive |
| **City, State, Zip:** | Eden Prairie, MN 55346 |
| **Test Requested By:** | Nathan Kro |
| **Model:** | 37x Torpedo + Wireless SOM -31 |
| **First Date of Test:** | May 29, 2013 |
| **Last Date of Test:** | June 03, 2013 |
| **Receipt Date of Samples:** | May 21, 2013 |
| **Equipment Design Stage:** | Production |
| **Equipment Condition:** | No Damage |

## Information Provided by the Party Requesting the Test

| **Functional Description of the EUT (Equipment Under Test):** |
|---|
| Bluetooth radio module with 1 antenna |

| **Testing Objective:** |
|---|
| To demonstrate compliance under FCC 15.247 requirements. |

# CONFIGURATIONS

## Configuration LGPD0096- 1

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| 802.11 and BT module | Logic PD, Inc. | 37x Torpedo + Wireless SOM -31 | 1413M00359 |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Power Supply | Sceptre | AD2405A | None |

| Remote Equipment Outside of Test Setup Boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Laptop | Acer | Aspire One | LUSAL0B1370114F42B1601 |
| Laptop Supply | Delta Electronics Inc | ADP-40TH A | AP0400100201108409P101 |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Power | No | 1.8m | No | Power Supply | AC Mains |
| DC Power | No | 1.5m | No | 802.11 and BT module | Power Supply |
| DC Power | No | 2.4m | Yes | Laptop | Laptop Supply |
| Serial | Yes | > 3.0m | No | 802.11 and BT module | Laptop |
| **PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.** | | | | | |

## Configuration LGPD0096- 2

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| 802.11 and BT module | Logic PD, Inc. | 37x Torpedo + Wireless SOM -31 | 1413M00359 |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Power Supply | Sceptre | AD2405A | None |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Power | No | 1.8m | No | Power Supply | AC Mains |
| DC Power | No | 1.5m | No | 802.11 and BT module | Power Supply |
| **PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.** | | | | | |

# MODIFICATIONS

WTD 12.5.23

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 5/29/2013 | Spurious Radiated Emissions | Modified from delivered configuration. | Power lowered to pass radiated band edge. Modification authorized by Nathan Kro. | EUT remained at Northwest EMC following the test. |
| 2 | 5/30/2013 | AC Powerline Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 3 | 6/3/2013 | Output Power | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 4 | 6/3/2013 | Occupied Bandwidth | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 5 | 6/3/2013 | Spurious Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 6 | 6/3/2013 | Band Edge Compliance | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 7 | 6/3/2013 | Channel Spacing | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 8 | 6/3/2013 | Number of Hopping Channels | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 9 | 6/3/2013 | Dwell Time | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 10 | 6/3/2013 | Band Edge Compliance - Hopping Mode | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

# DUTY CYCLE

**TEST DESCRIPTION**

The Duty Cycle (x) were measured for each of the EUT operating modes. The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

The EUT operates at 100% Duty Cycle.

# Channel Spacing

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The channel carrier frequencies in the 2400-2483.5MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Or, if the output power is less than 125 mW, the channel separation can be 25 kHz or 2/3 of the 20dB bandwidth. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

# Channel Spacing

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

**DEVIATIONS FROM TEST STANDARD**

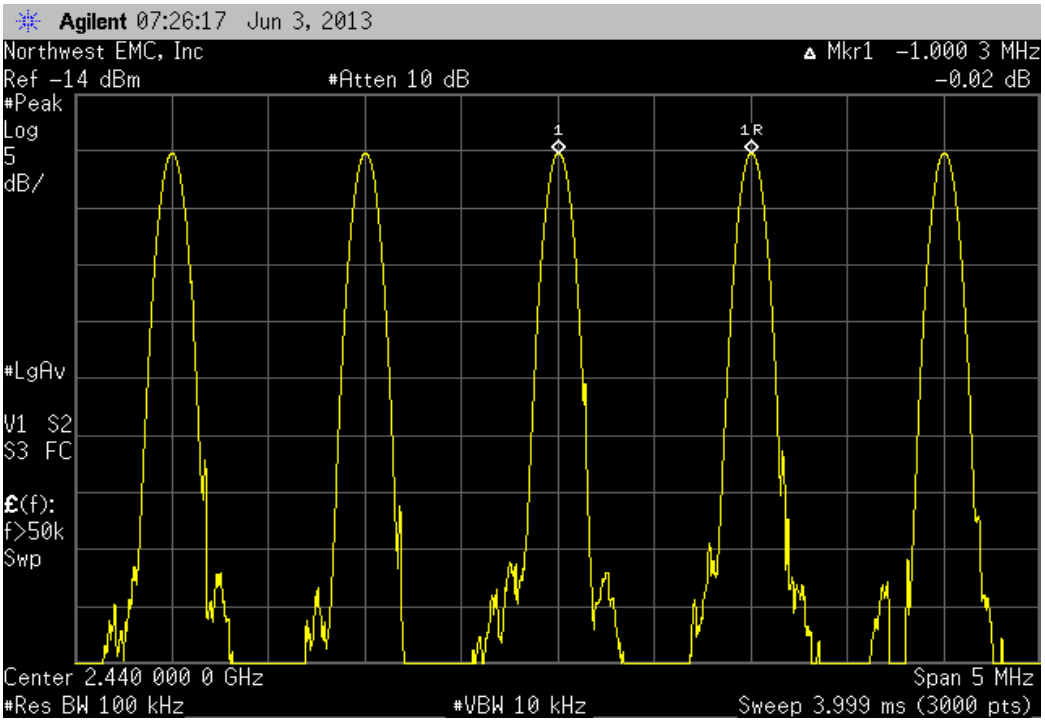
None

| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

| | Value | Limit | Result |
|---|---|---|---|
| Hopping Mode | 1.0 MHz | ≥ 1 MHz | Pass |

# Channel Spacing

| Hopping Mode | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit | Result |
| | | | | 1.0 MHz | ≥ 1 MHz | Pass |



# Dwell Time

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels * 400 mS. For Bluetooth this would be 79 Channels * 400mS = 31.6 Sec.

On Time During 31.6 Sec = Pulse Width * Average Number of Pulses * Scale Factor

- Average Number of Pulses is based on 4 samples.

- Scale Factor = 31.6 Sec / Screen Capture Sweep Time = 31.6 Sec / 6.32 Sec = 5

# Dwell Time

| | | | |
|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | **Temperature:** | 23.1°C |
| **Attendees:** | None | **Humidity:** | 39% |
| **Project:** | None | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** 110VAC/60Hz | **Job Site:** MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |

**COMMENTS**

None

**DEVIATIONS FROM TEST STANDARD**

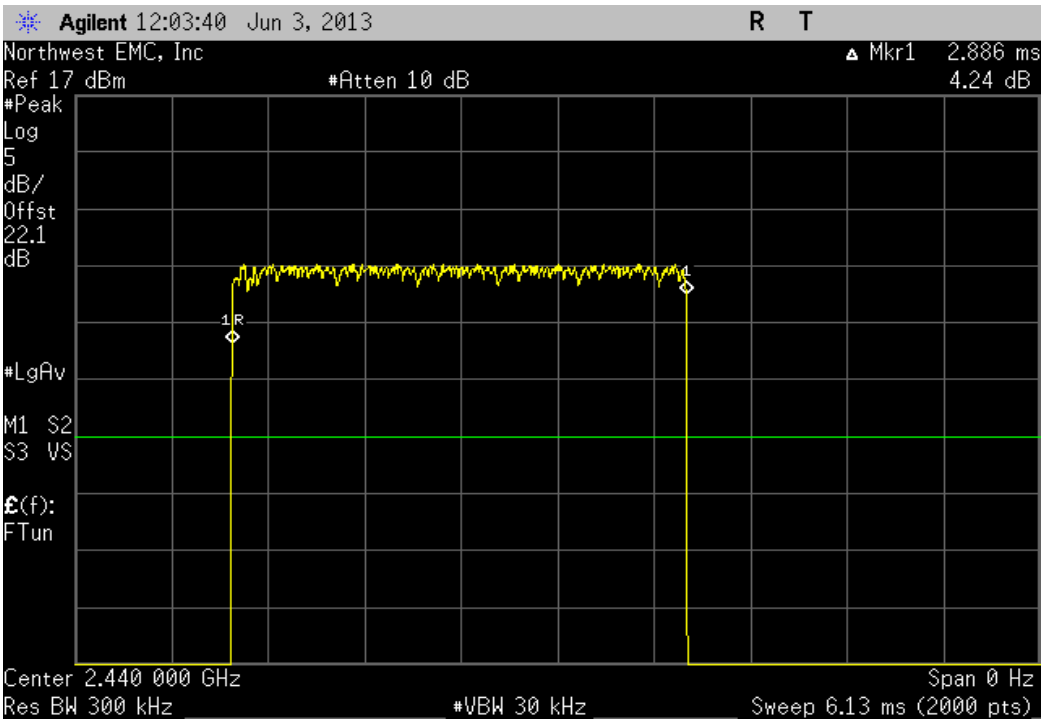
None

| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

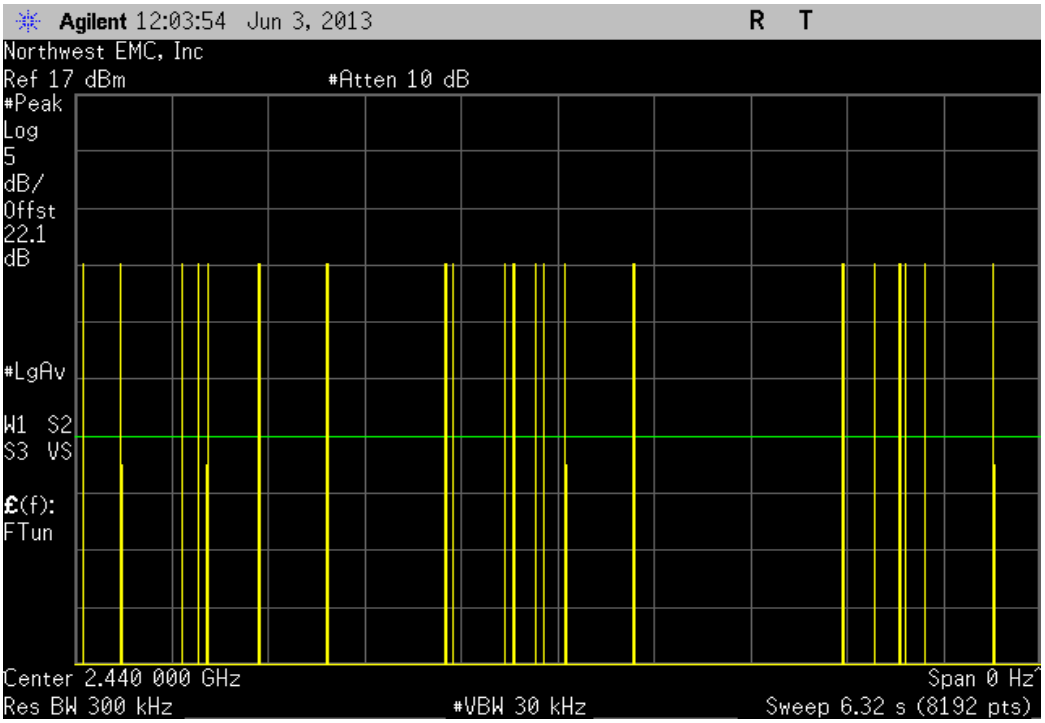
| | | Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
|---|---|---|---|---|---|---|---|---|
| Hopping Mode | | | | | | | | |
| | DH5, GFSK | | | | | | | |
| | Mid Channel, 2440 MHz | 2.886 | N/A | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 21 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 24 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 13 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 25 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | 2.886 | N/A | 20.75 | 5 | 299.42 | 400 | Pass |
| | 2DH5, pi/4-DQPSK | | | | | | | |
| | Mid Channel, 2440 MHz | 2.873 | N/A | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 24 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 21 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 20 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 21 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | 2.873 | N/A | 21.5 | 5 | 308.85 | 400 | Pass |
| | 3DH5, 8-DPSK | | | | | | | |
| | Mid Channel, 2440 MHz | 2.895 | N/A | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 16 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 26 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 18 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | N/A | 27 | N/A | N/A | N/A | N/A | N/A |
| | Mid Channel, 2440 MHz | 2.895 | N/A | 21.75 | 5 | 314.83 | 400 | Pass |

# Dwell Time

| Hopping Mode, DH5, GFSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| 2.886 | N/A | N/A | N/A | N/A | N/A | N/A |

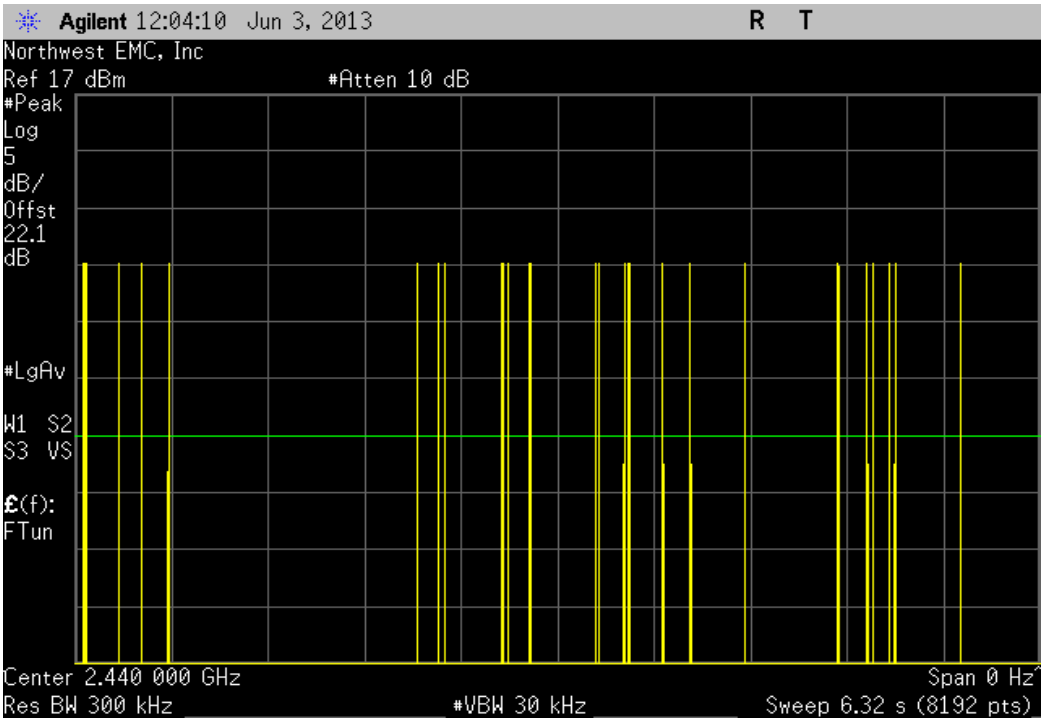



| Hopping Mode, DH5, GFSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 21 | N/A | N/A | N/A | N/A | N/A |

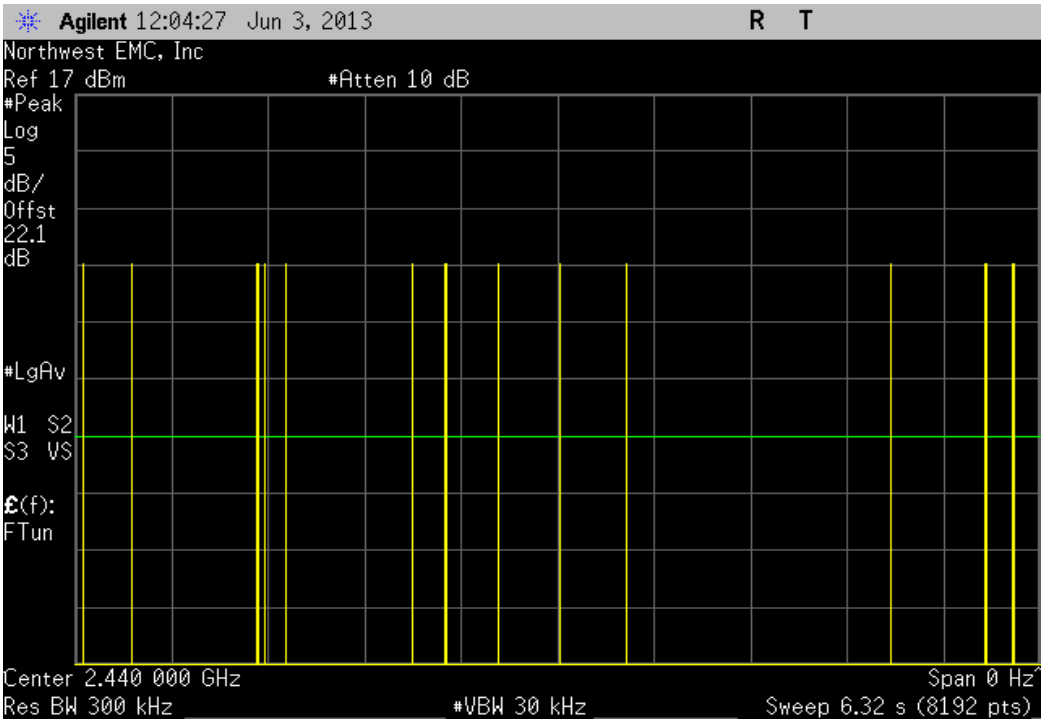


# Dwell Time

| Hopping Mode, DH5, GFSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 24 | N/A | N/A | N/A | N/A | N/A |

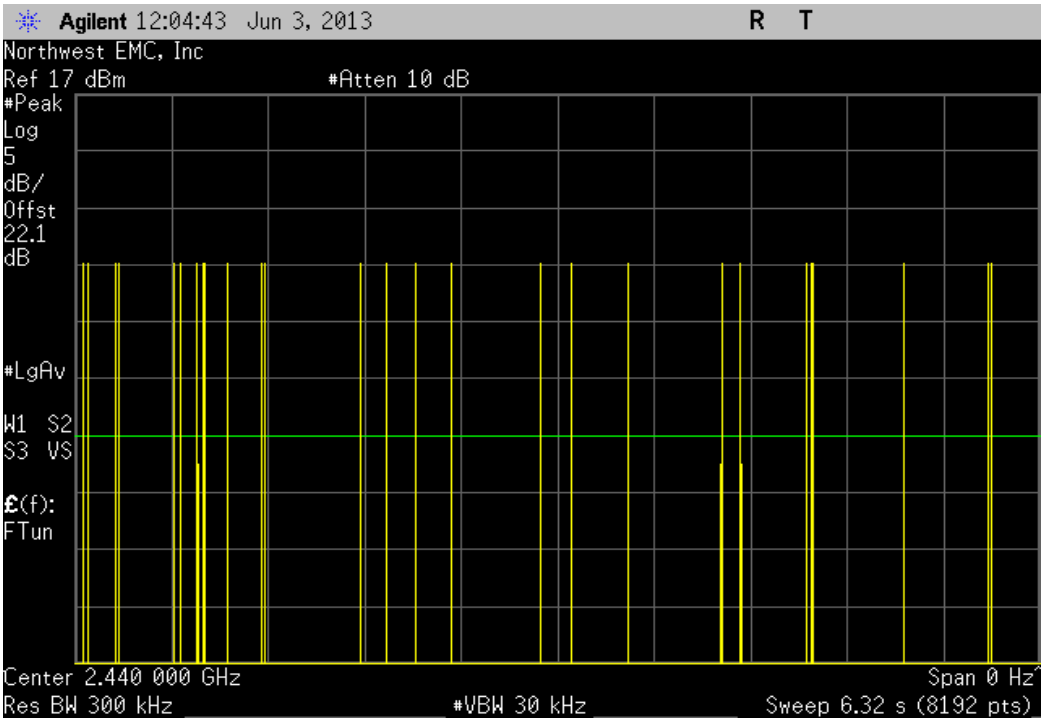



| Hopping Mode, DH5, GFSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 13 | N/A | N/A | N/A | N/A | N/A |



# Dwell Time

| Hopping Mode, DH5, GFSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 25 | N/A | N/A | N/A | N/A | N/A |



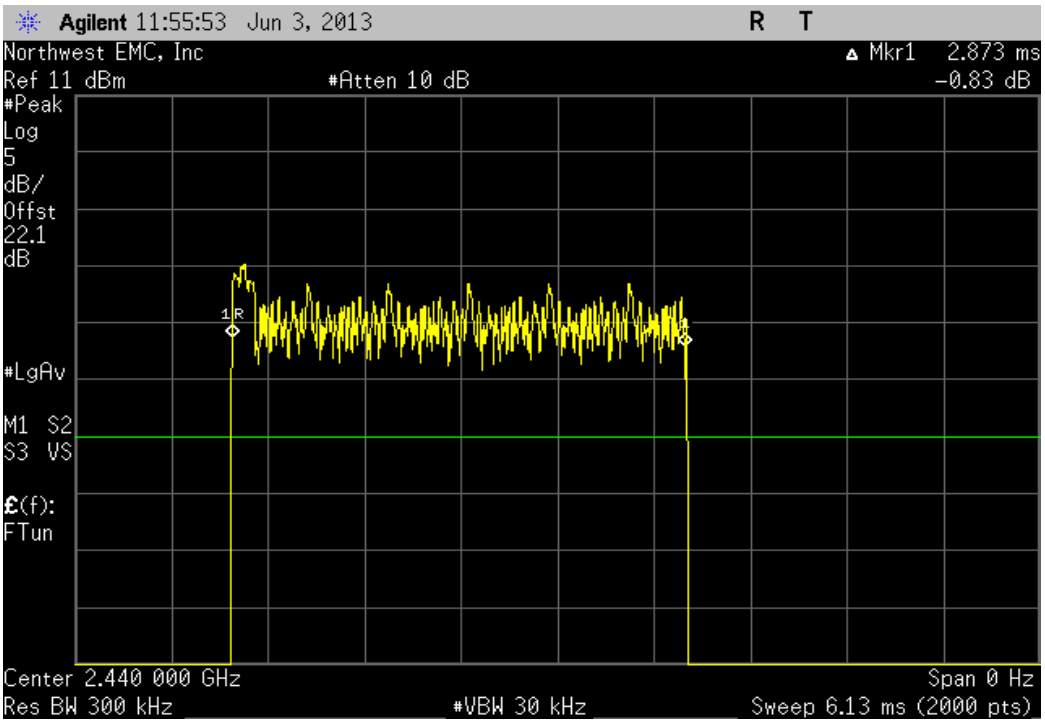

| Hopping Mode, DH5, GFSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| 2.886 | N/A | 20.75 | 5 | 299.42 | 400 | Pass |

**Calculation Only**

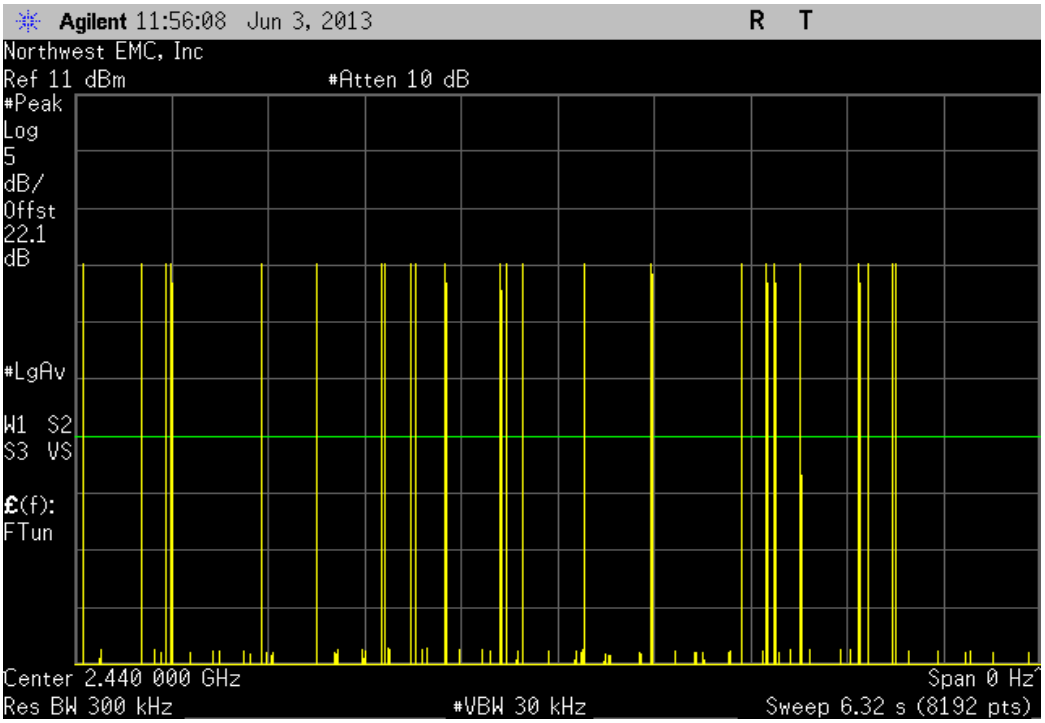
**No Screen Capture Required**

# Dwell Time

| Hopping Mode, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| 2.873 | N/A | N/A | N/A | N/A | N/A | N/A |

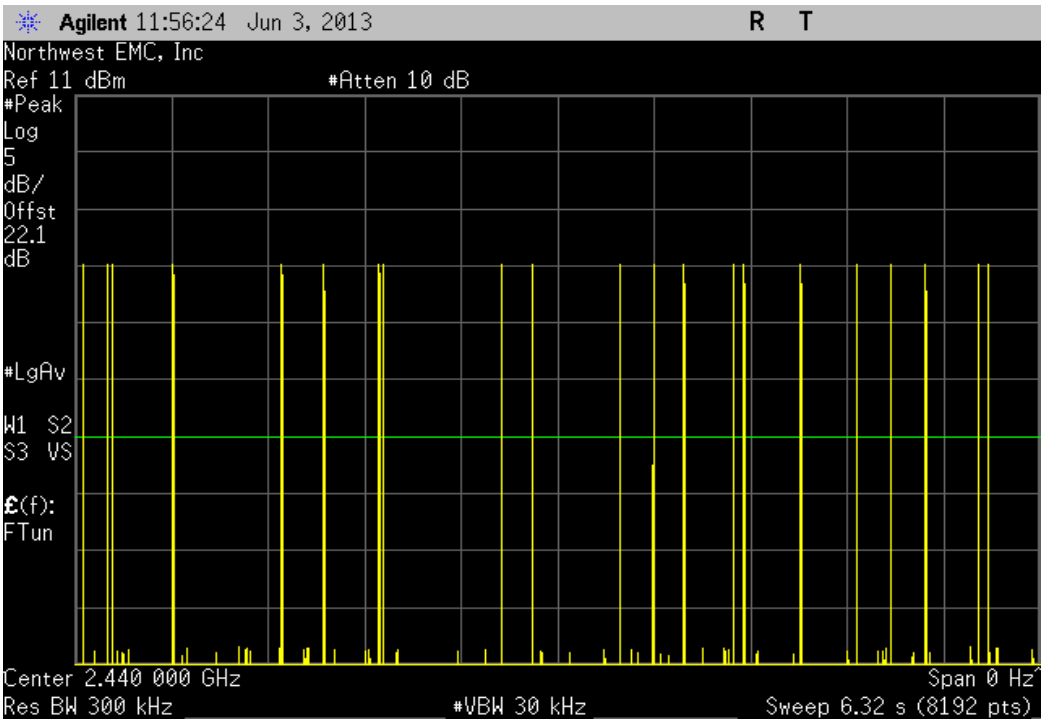



| Hopping Mode, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 24 | N/A | N/A | N/A | N/A | N/A |

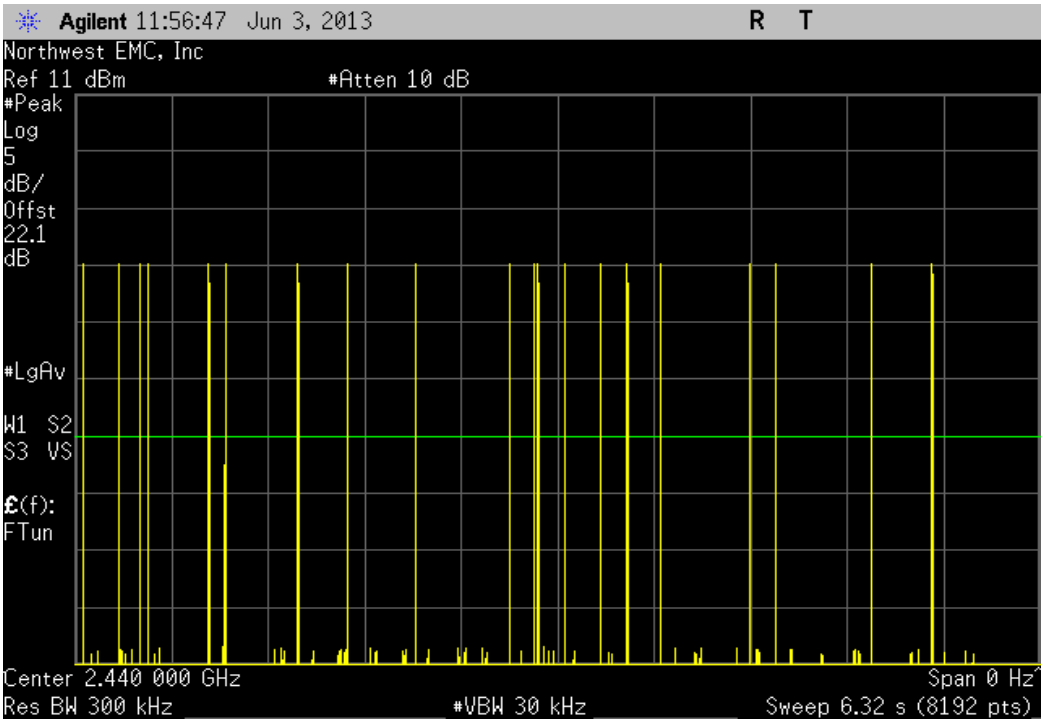


# Dwell Time

| Hopping Mode, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 21 | N/A | N/A | N/A | N/A | N/A |

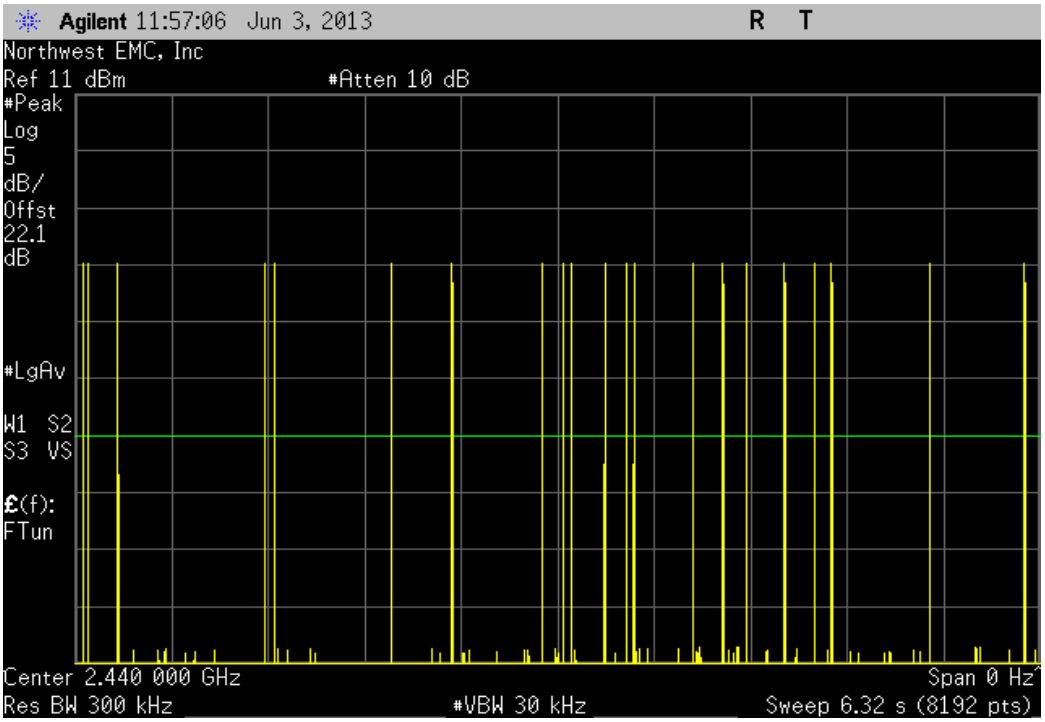



| Hopping Mode, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 20 | N/A | N/A | N/A | N/A | N/A |



# Dwell Time

| Hopping Mode, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 21 | N/A | N/A | N/A | N/A | N/A |



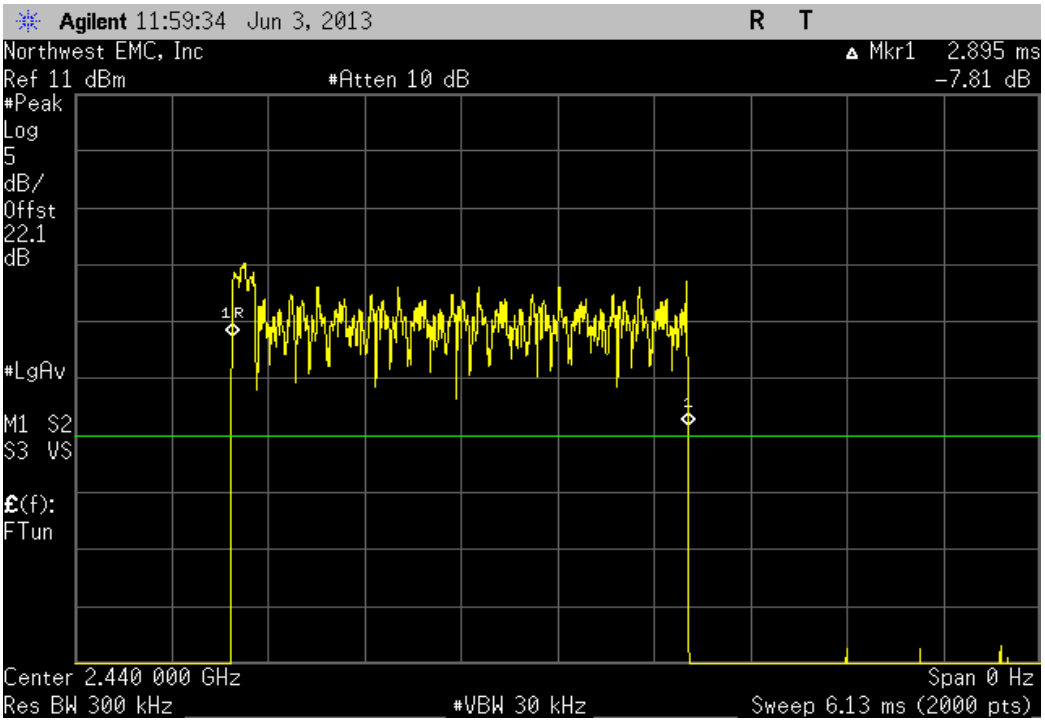

| Hopping Mode, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| 2.873 | N/A | 21.5 | 5 | 308.85 | 400 | Pass |

**Calculation Only**

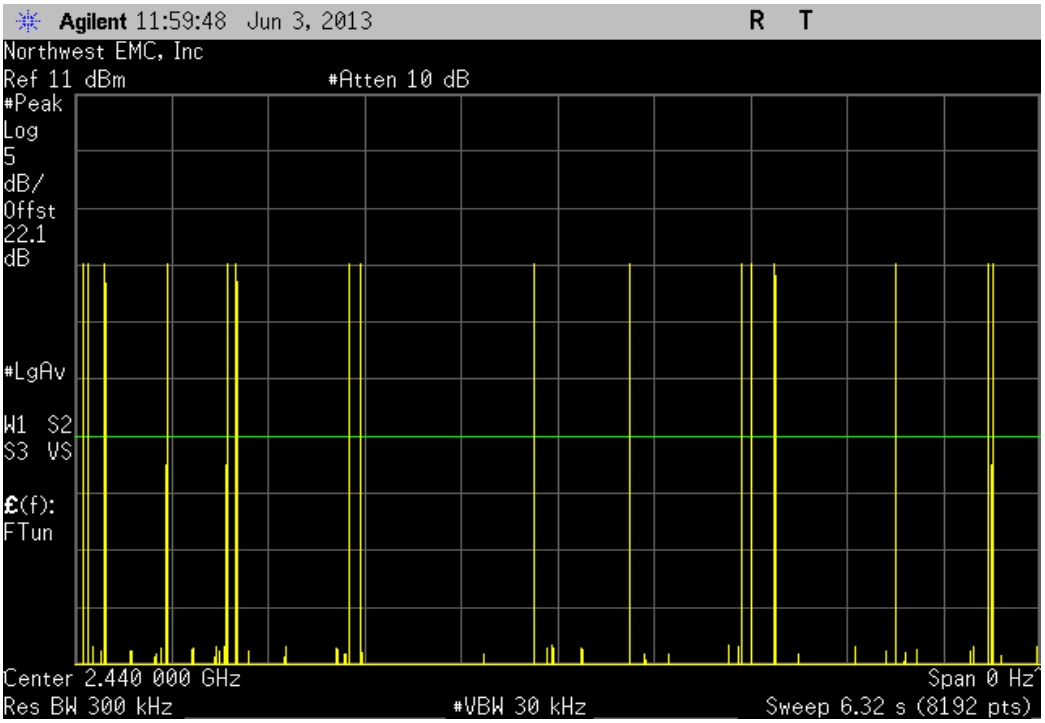
**No Screen Capture Required**

# Dwell Time

| Hopping Mode, 3DH5, 8-DPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| 2.895 | N/A | N/A | N/A | N/A | N/A | N/A |

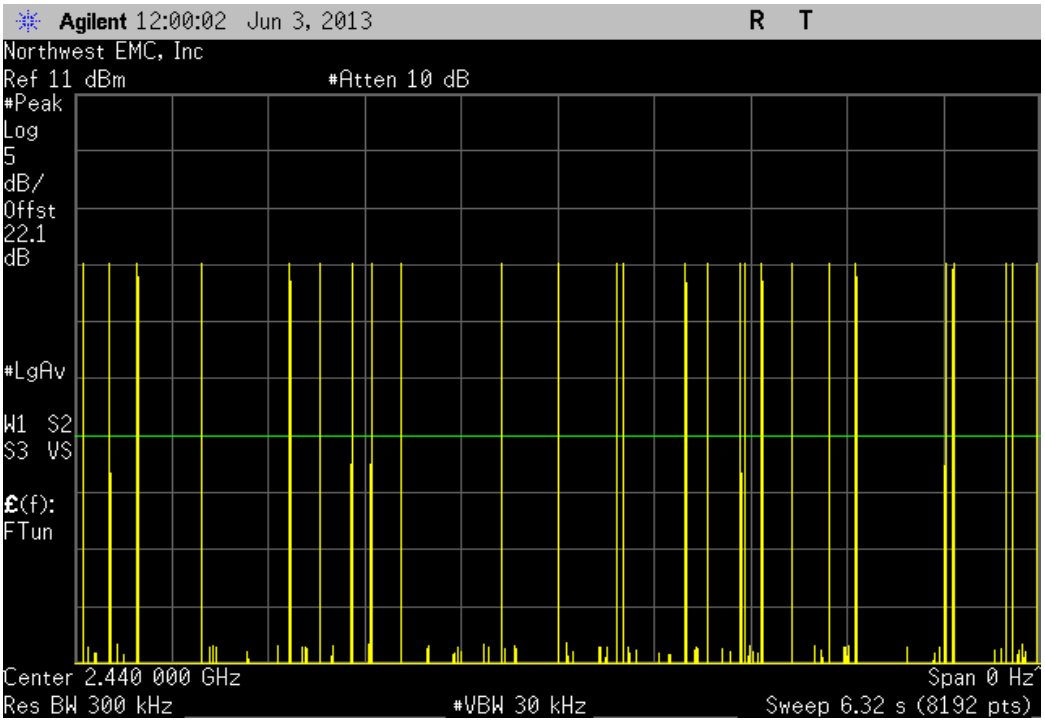



| Hopping Mode, 3DH5, 8-DPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 16 | N/A | N/A | N/A | N/A | N/A |

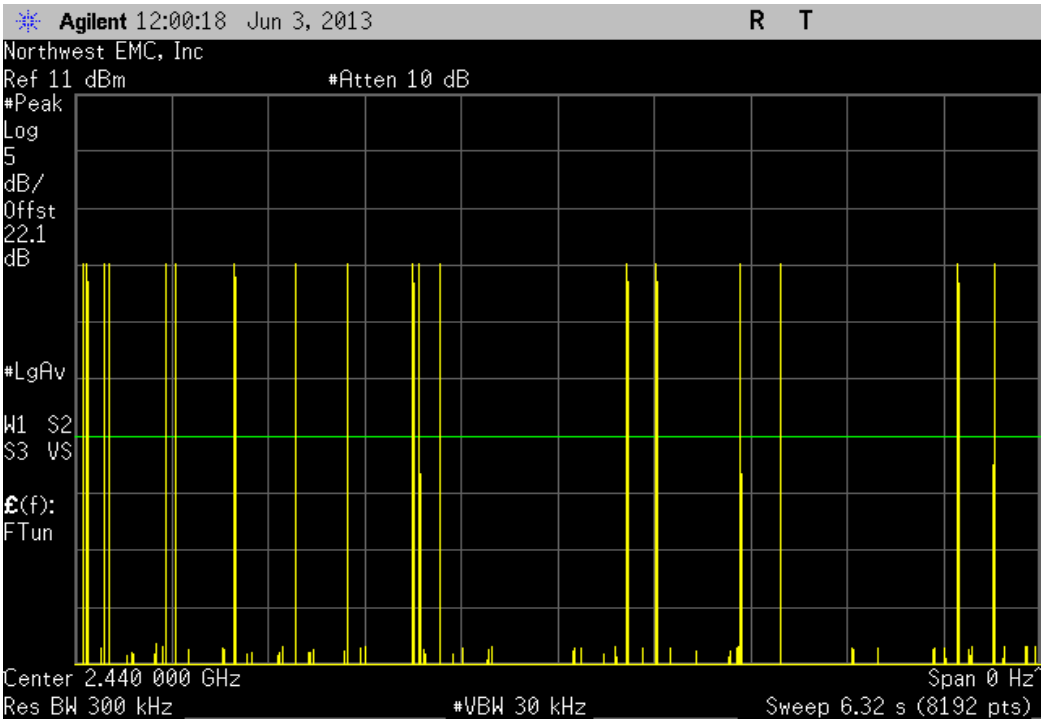


# Dwell Time

| Hopping Mode, 3DH5, 8-DPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 26 | N/A | N/A | N/A | N/A | N/A |

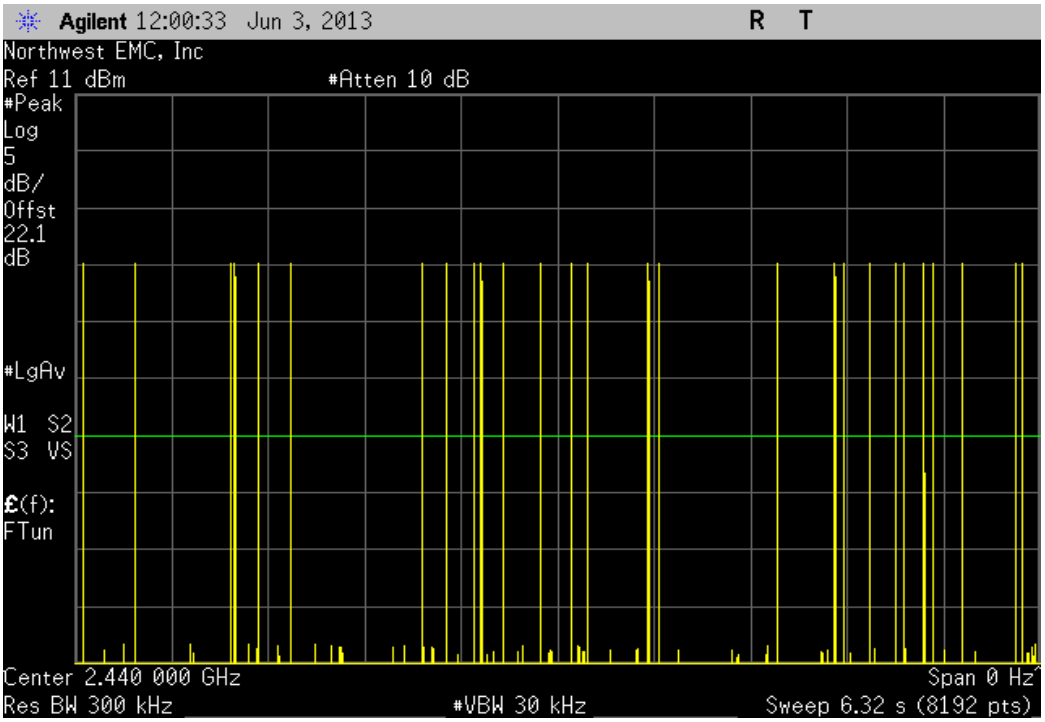



| Hopping Mode, 3DH5, 8-DPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 18 | N/A | N/A | N/A | N/A | N/A |



# Dwell Time

| Hopping Mode, 3DH5, 8-DPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| N/A | 27 | N/A | N/A | N/A | N/A | N/A |




| Hopping Mode, 3DH5, 8-DPSK, Mid Channel, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Result |
| 2.895 | N/A | 21.75 | 5 | 314.83 | 400 | Pass |

**Calculation Only**

**No Screen Capture Required**

# Number of Hopping Frequencies

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The number of hopping frequencies was measured across the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

# Number of Hopping Frequencies

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| **FCC 15.247:2013** | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

**DEVIATIONS FROM TEST STANDARD**

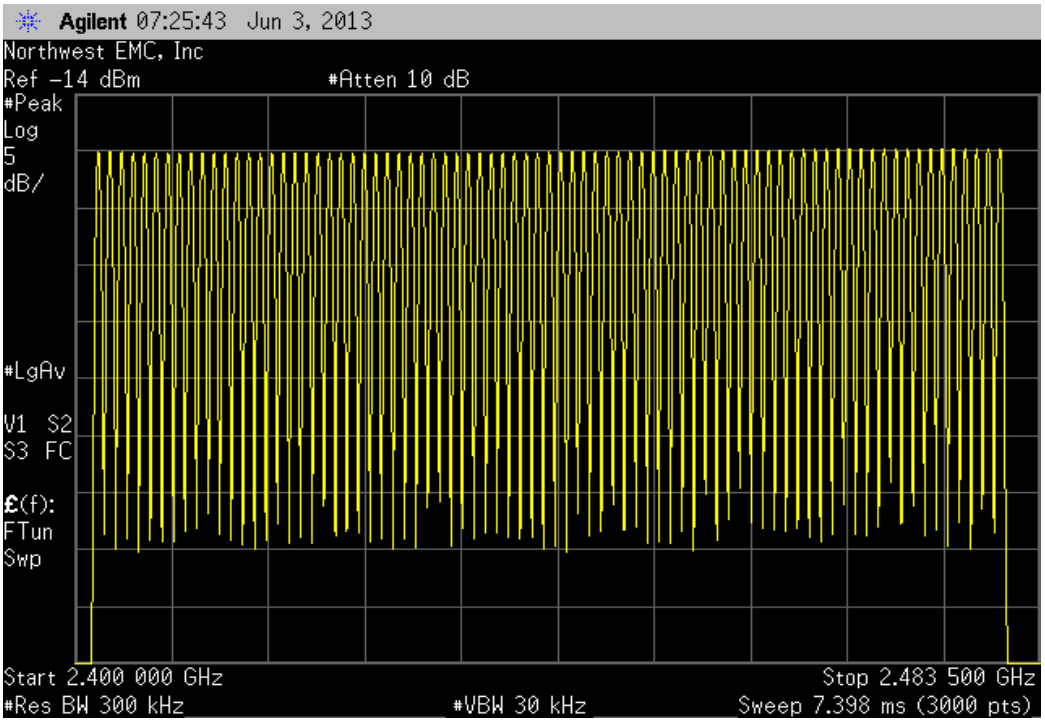
None

| **Configuration #** | 1 | *Signature* Trevor Buls |
|---|---|---|

| | Number of Channels | Limit | Result |
|---|---|---|---|
| Hopping Mode | 79 | ≥ 15 | Pass |

# Number of Hopping Frequencies

| Hopping Mode | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Number of Channels | Limit | Result |
| | | | | | 79 | ≥ 15 | Pass |



# Occupied Bandwidth

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

# Occupied Bandwidth

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

**DEVIATIONS FROM TEST STANDARD**

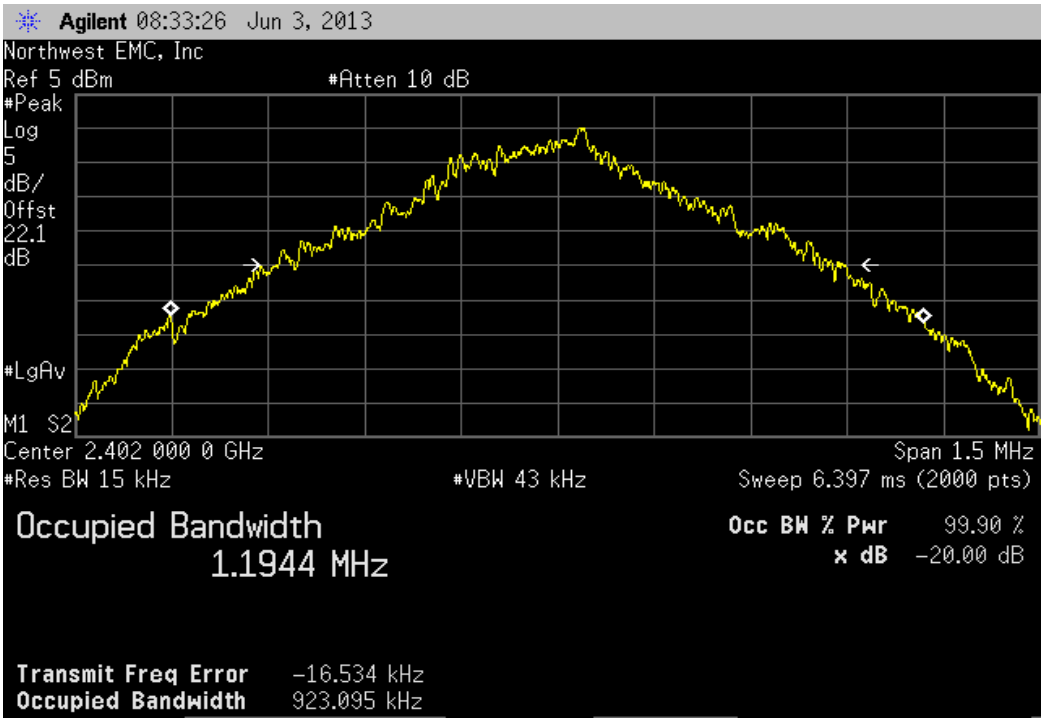
None

| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

| | | Value | Limit | Result |
|---|---|---|---|---|
| DH5, GFSK | | | | |
| | Low Channel | 923.095 kHz | < 1.5 MHz | Pass |
| | Mid Channel | 893.039 kHz | < 1.5 MHz | Pass |
| | High Channel | 906.714 kHz | < 1.5 MHz | Pass |
| 2DH5, pi/4-DQPSK | | | | |
| | Low Channel | 1.365 MHz | < 1.5 MHz | Pass |
| | Mid Channel | 1.346 MHz | < 1.5 MHz | Pass |
| | High Channel | 1.361 MHz | < 1.5 MHz | Pass |
| 3DH5, 8-DPSK | | | | |
| | Low Channel | 1.359 MHz | < 1.5 MHz | Pass |
| | Mid Channel | 1.366 MHz | < 1.5 MHz | Pass |
| | High Channel | 1.358 MHz | < 1.5 MHz | Pass |

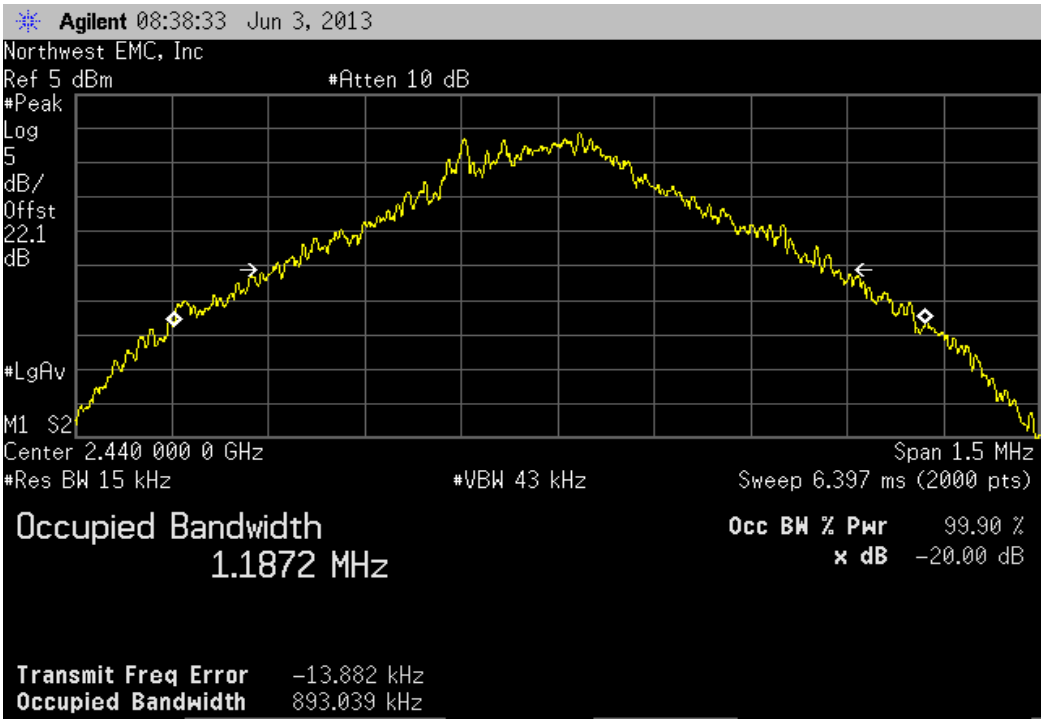
DH5, GFSK, Low Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 923.095 kHz | < 1.5 MHz | Pass |



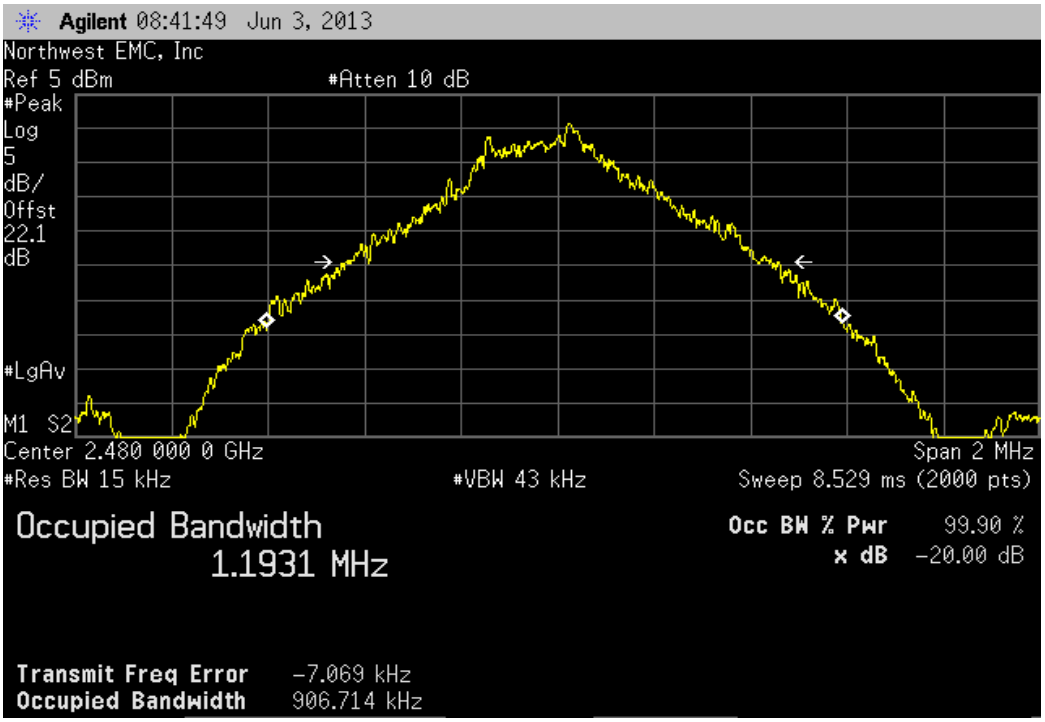

DH5, GFSK, Mid Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 893.039 kHz | < 1.5 MHz | Pass |



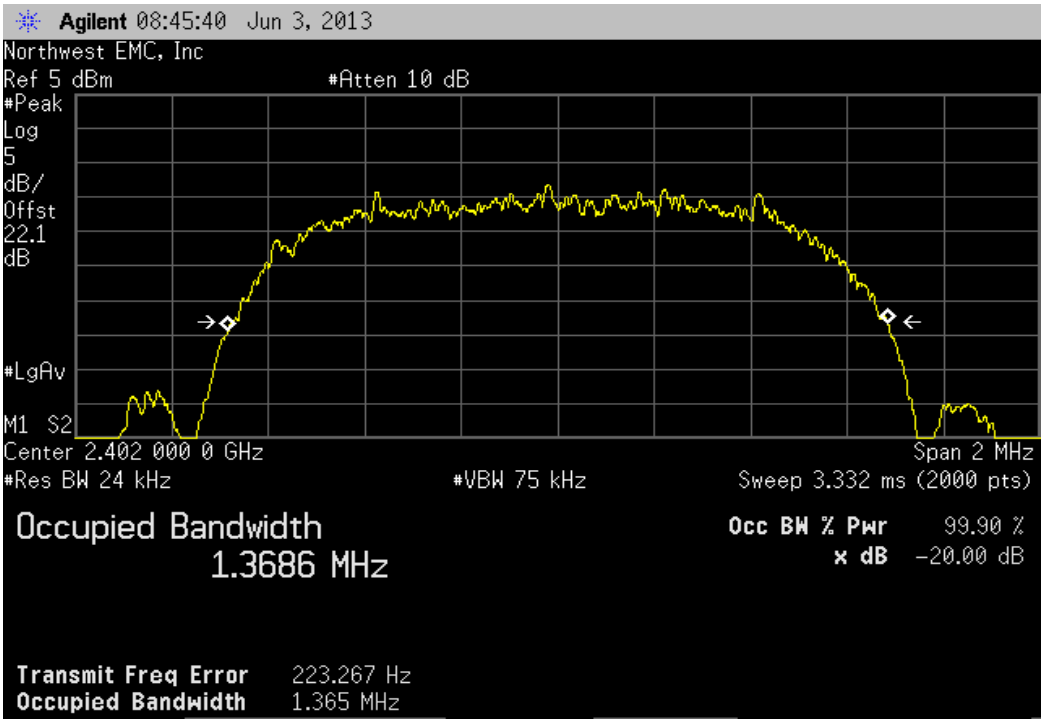
DH5, GFSK, High Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 906.714 kHz | < 1.5 MHz | Pass |



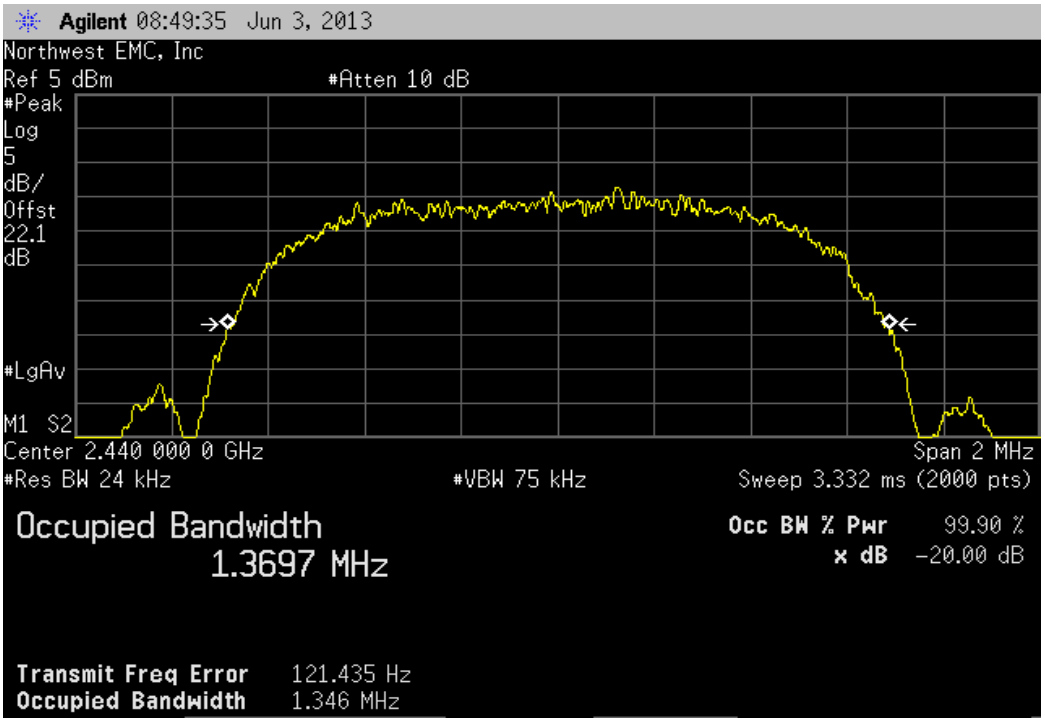

2DH5, pi/4-DQPSK, Low Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 1.365 MHz | < 1.5 MHz | Pass |



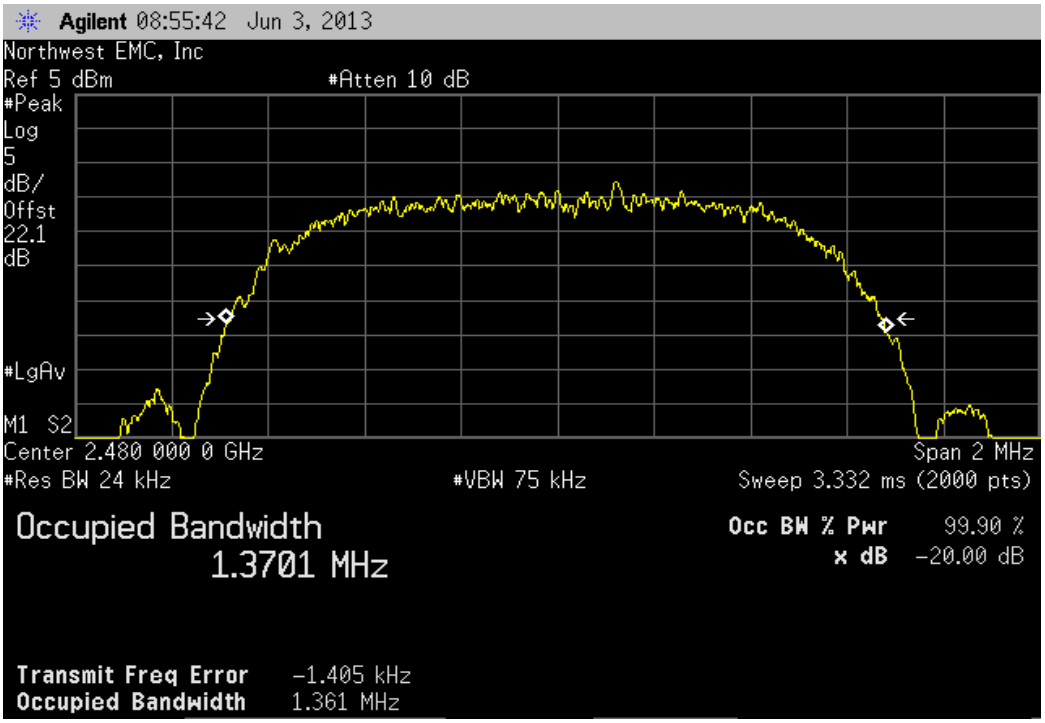
2DH5, pi/4-DQPSK, Mid Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 1.346 MHz | < 1.5 MHz | Pass |

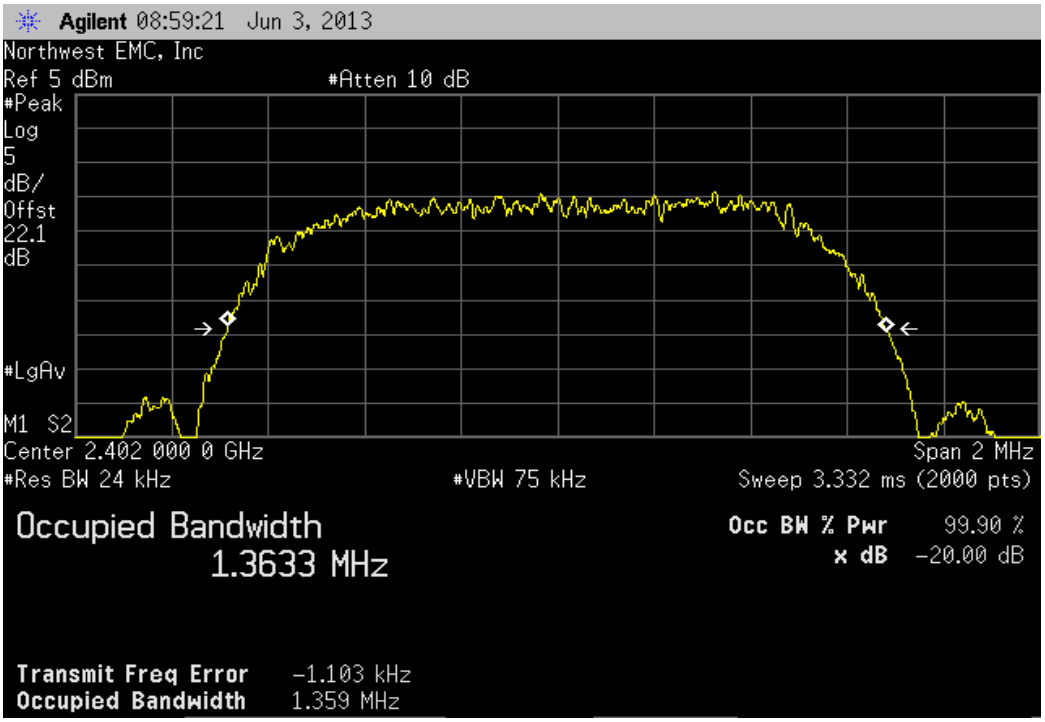



2DH5, pi/4-DQPSK, High Channel

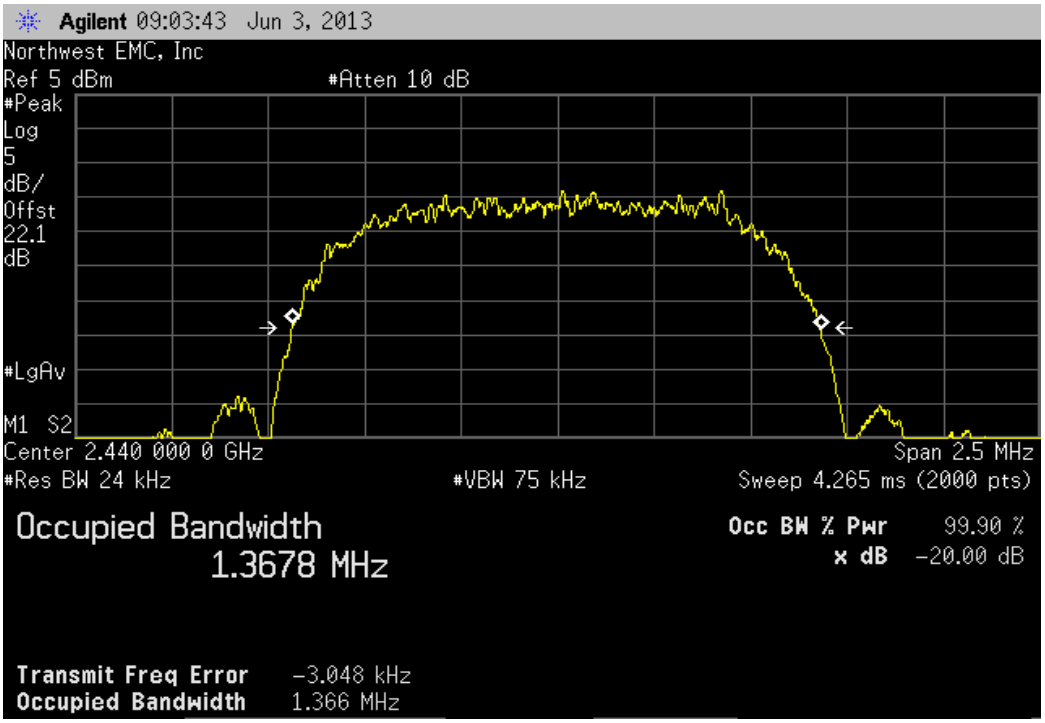
| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 1.361 MHz | < 1.5 MHz | Pass |



| 3DH5, 8-DPSK, Low Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 1.359 MHz | < 1.5 MHz | Pass |

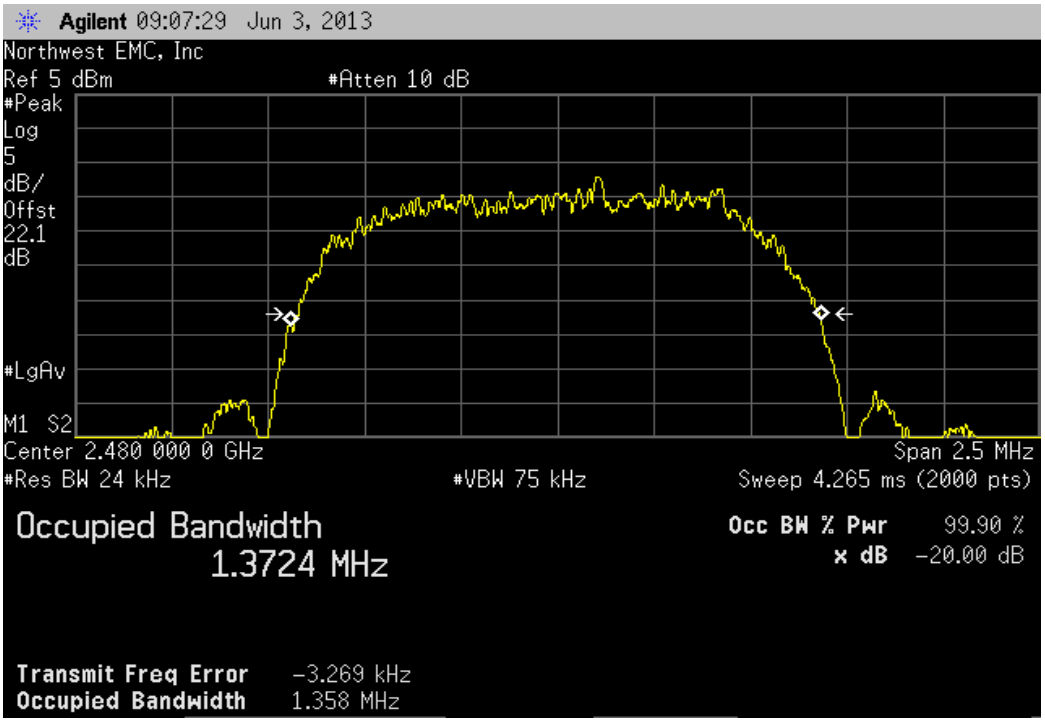



| 3DH5, 8-DPSK, Mid Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 1.366 MHz | < 1.5 MHz | Pass |



3DH5, 8-DPSK, High Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 1.358 MHz | < 1.5 MHz | Pass |



# Output Power

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

**De Facto EIRP Limit:** Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +27dBm.

# Output Power

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

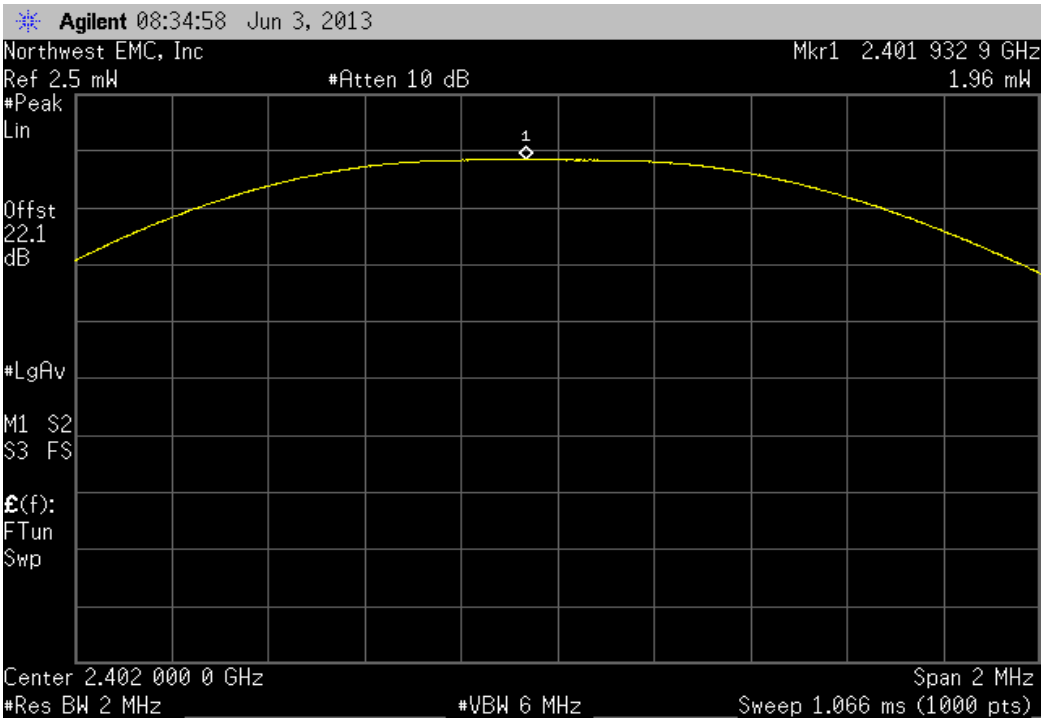
**DEVIATIONS FROM TEST STANDARD**

None

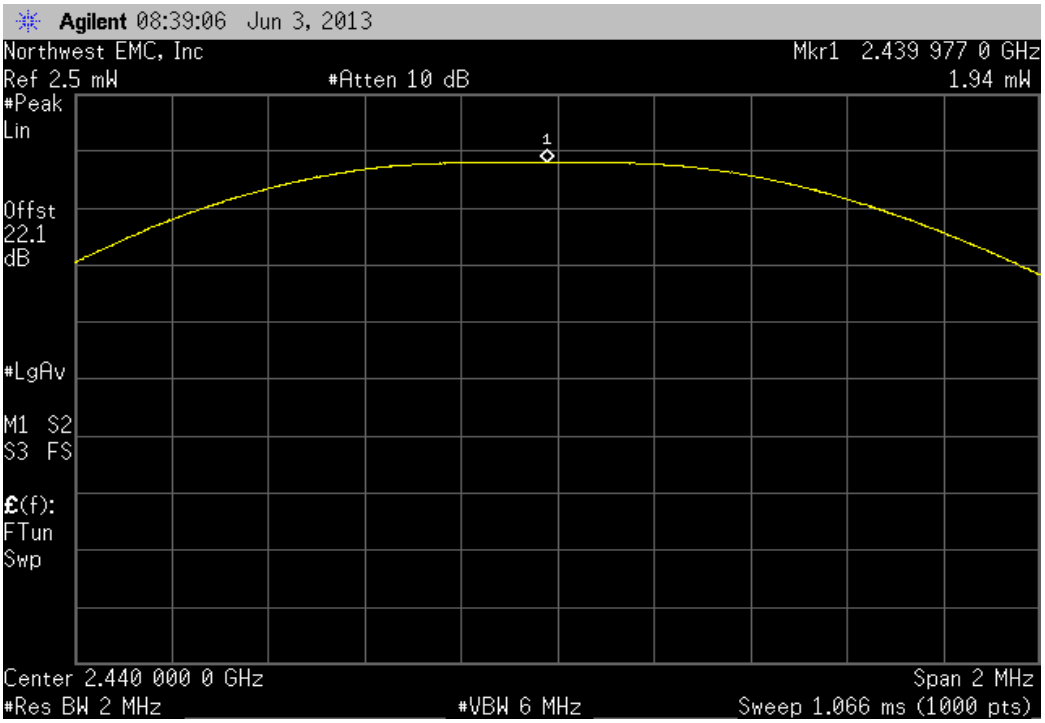
| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

| | | Value | Limit | Result |
|---|---|---|---|---|
| DH5, GFSK | | | | |
| | Low Channel | 1.958 mW | < 125 mW | Pass |
| | Mid Channel | 1.94 mW | < 125 mW | Pass |
| | High Channel | 2.112 mW | < 125 mW | Pass |
| 2DH5, pi/4-DQPSK | | | | |
| | Low Channel | 839.653 uW | < 125 mW | Pass |
| | Mid Channel | 816.582 uW | < 125 mW | Pass |
| | High Channel | 909.285 uW | < 125 mW | Pass |
| 3DH5, 8-DPSK | | | | |
| | Low Channel | 985.145 uW | < 125 mW | Pass |
| | Mid Channel | 959.622 uW | < 125 mW | Pass |
| | High Channel | 1.065 mW | < 125 mW | Pass |

| DH5, GFSK, Low Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 1.958 mW | < 125 mW | Pass |

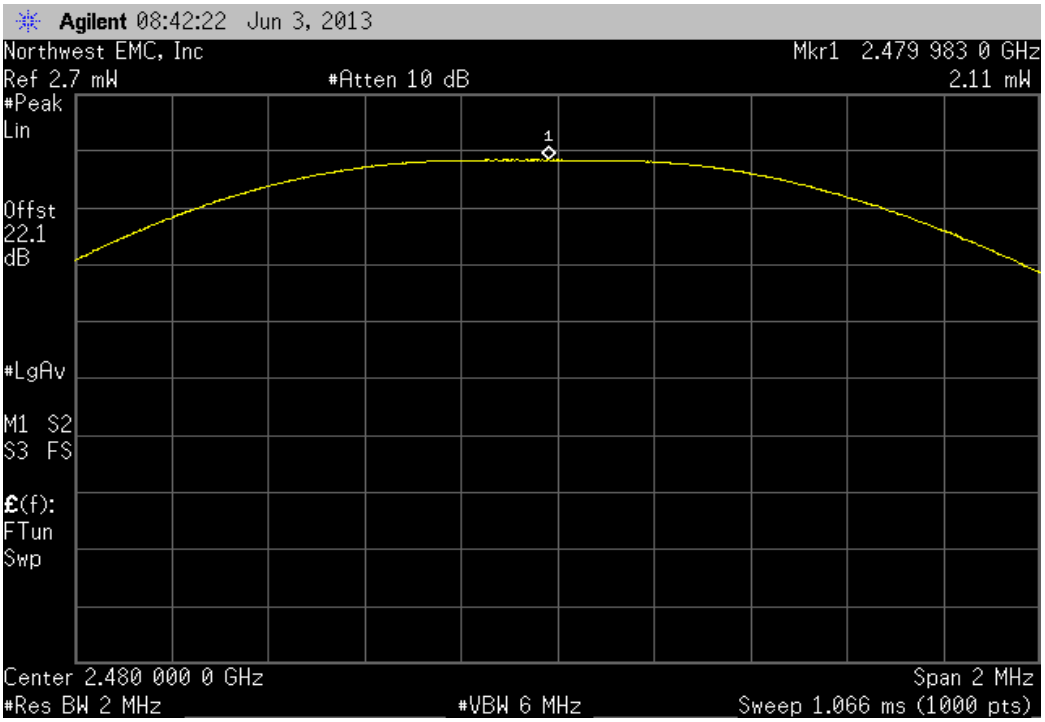



| DH5, GFSK, Mid Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 1.94 mW | < 125 mW | Pass |



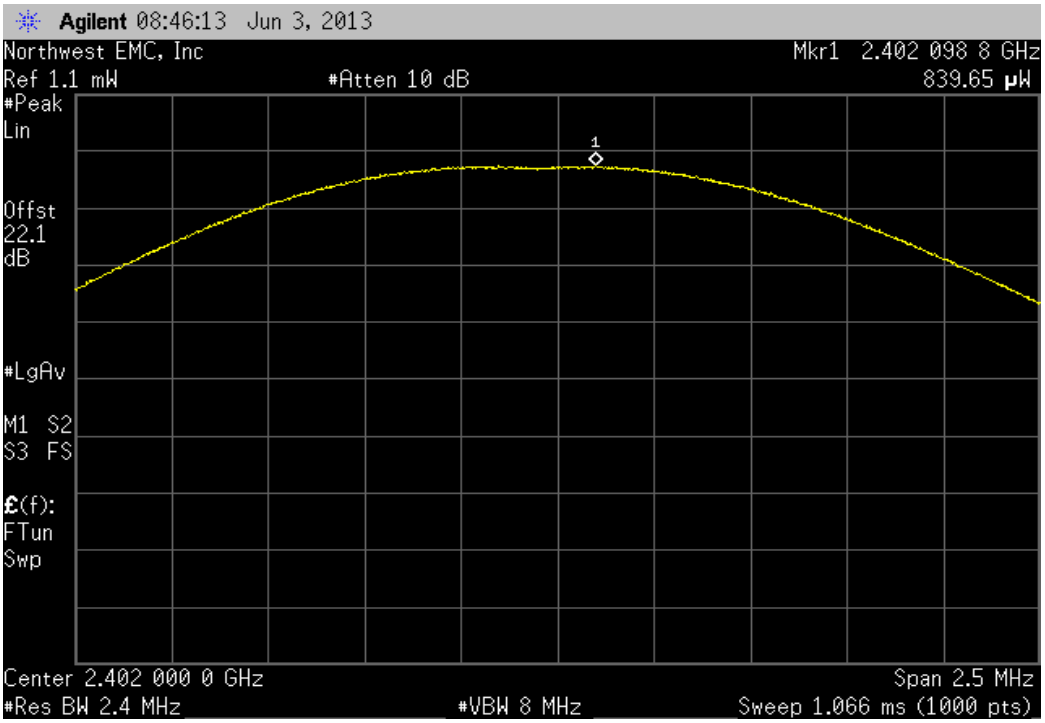
DH5, GFSK, High Channel

| Value | Limit | Result |
|---|---|---|
| 2.112 mW | < 125 mW | Pass |



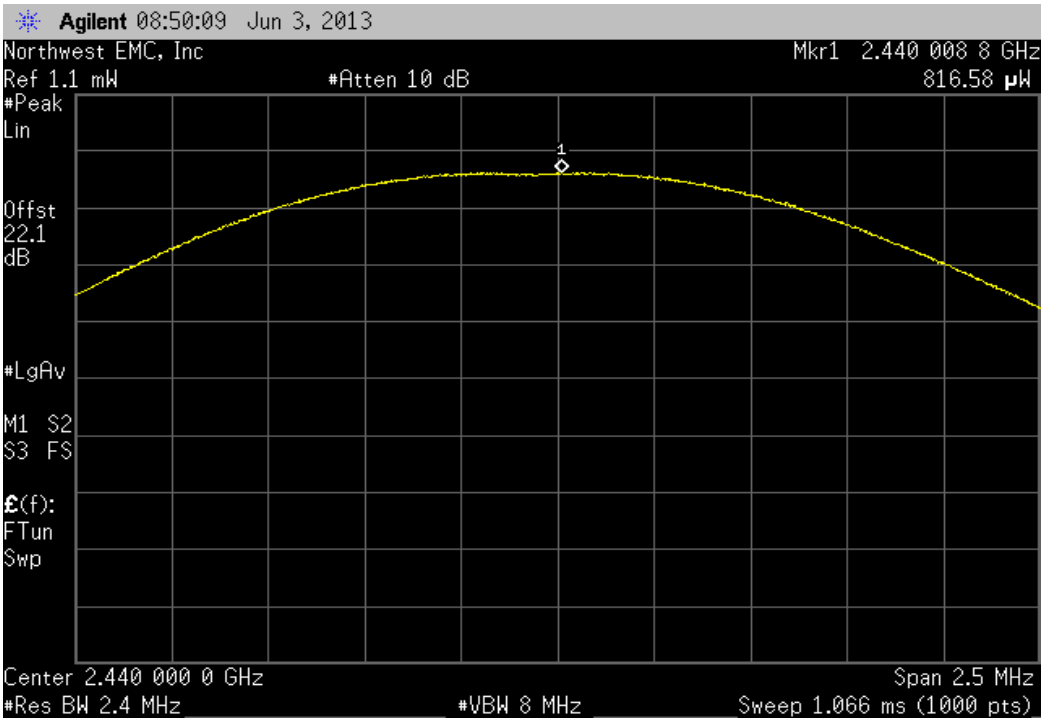

2DH5, pi/4-DQPSK, Low Channel

| Value | Limit | Result |
|---|---|---|
| 839.653 uW | < 125 mW | Pass |



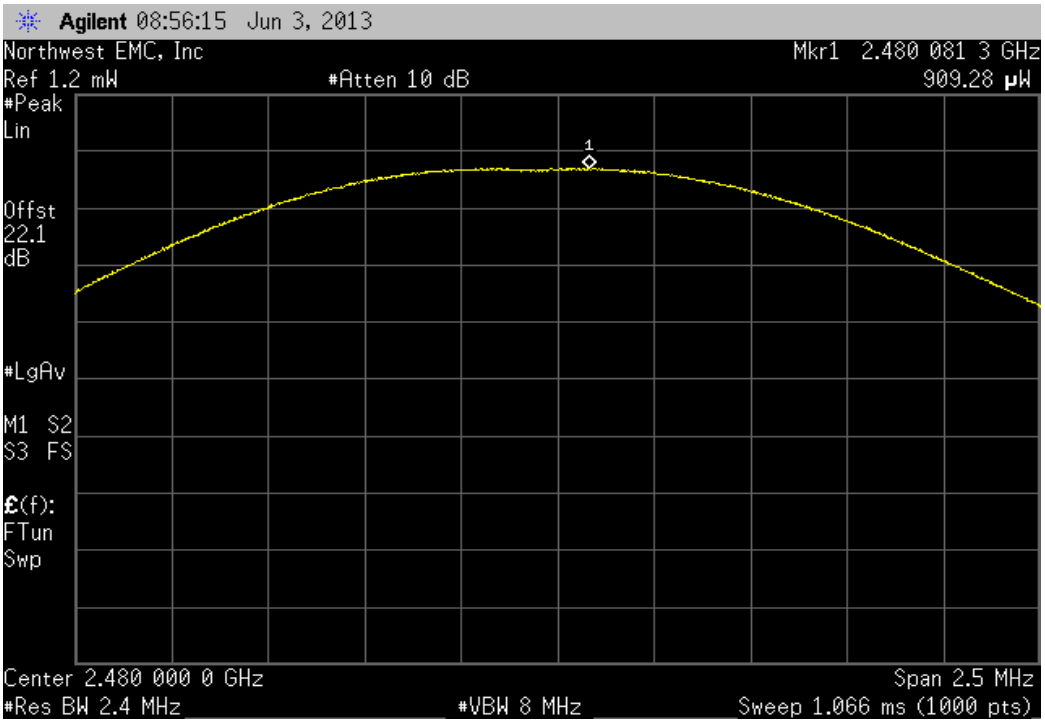
2DH5, pi/4-DQPSK, Mid Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 816.582 uW | < 125 mW | Pass |

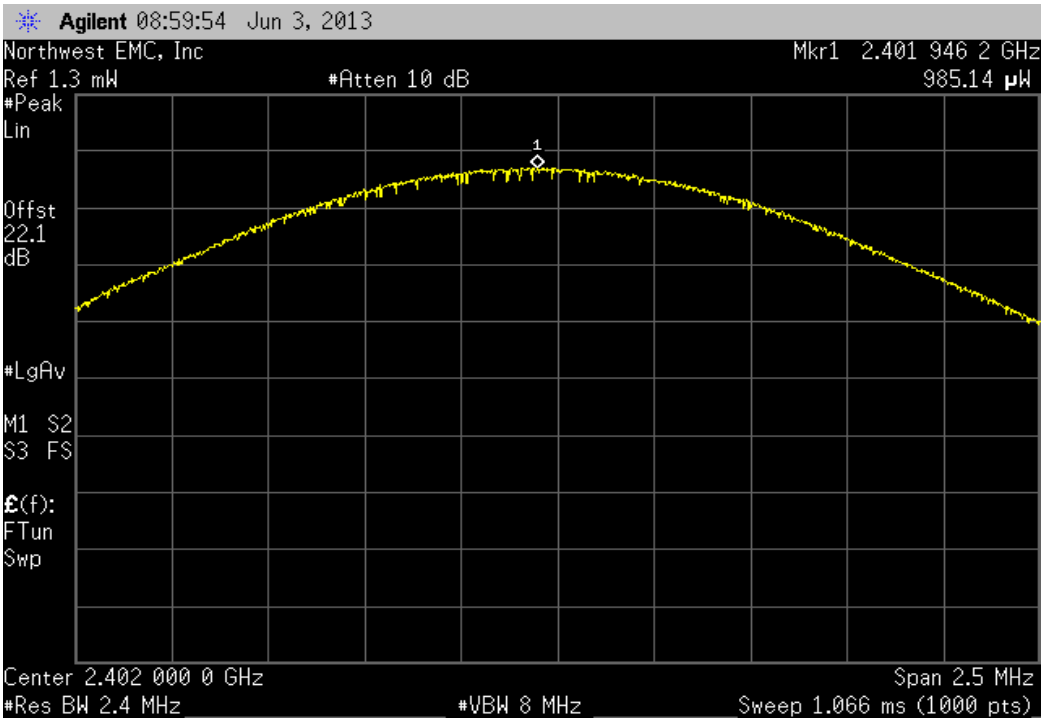



2DH5, pi/4-DQPSK, High Channel

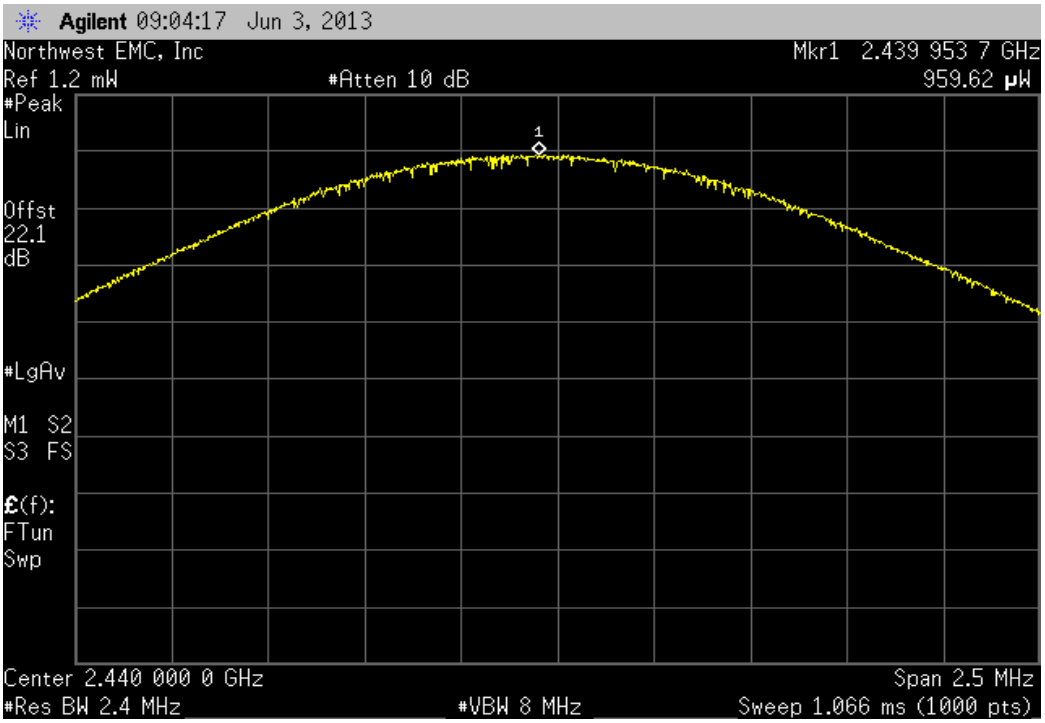
| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 909.285 uW | < 125 mW | Pass |



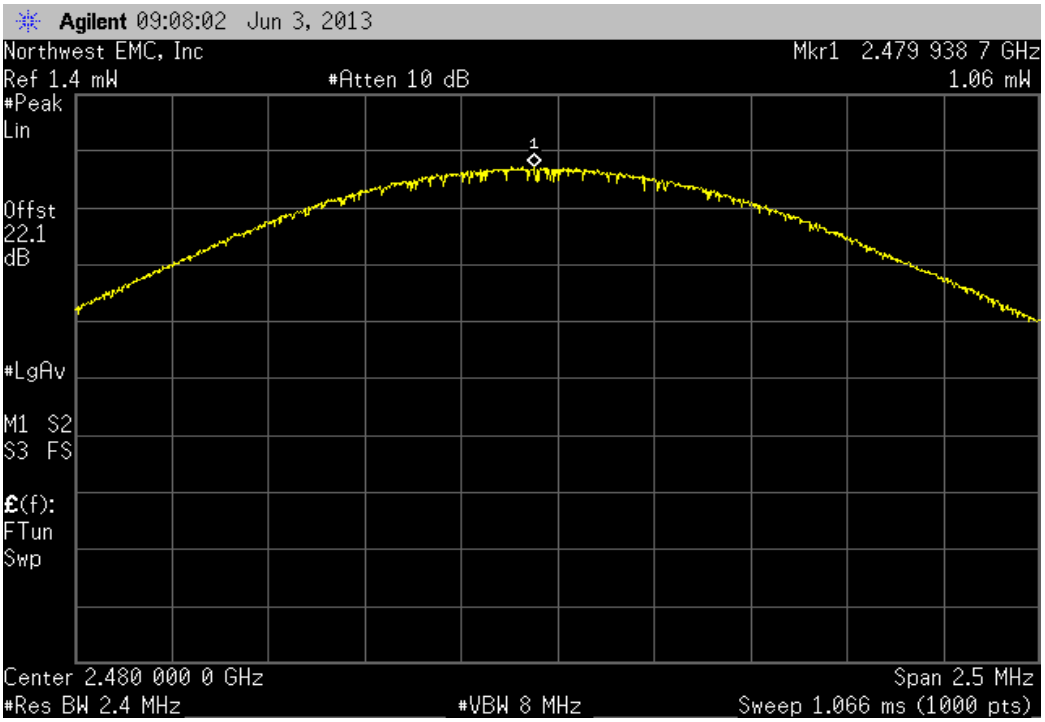
| 3DH5, 8-DPSK, Low Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 985.145 uW | < 125 mW | Pass |




| 3DH5, 8-DPSK, Mid Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 959.622 uW | < 125 mW | Pass |



| 3DH5, 8-DPSK, High Channel | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit | Result |
| | | | | 1.065 mW | < 125 mW | Pass |



# Band Edge Compliance - Hopping Mode

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

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

# Band Edge Compliance -Hopping Mode

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

**DEVIATIONS FROM TEST STANDARD**

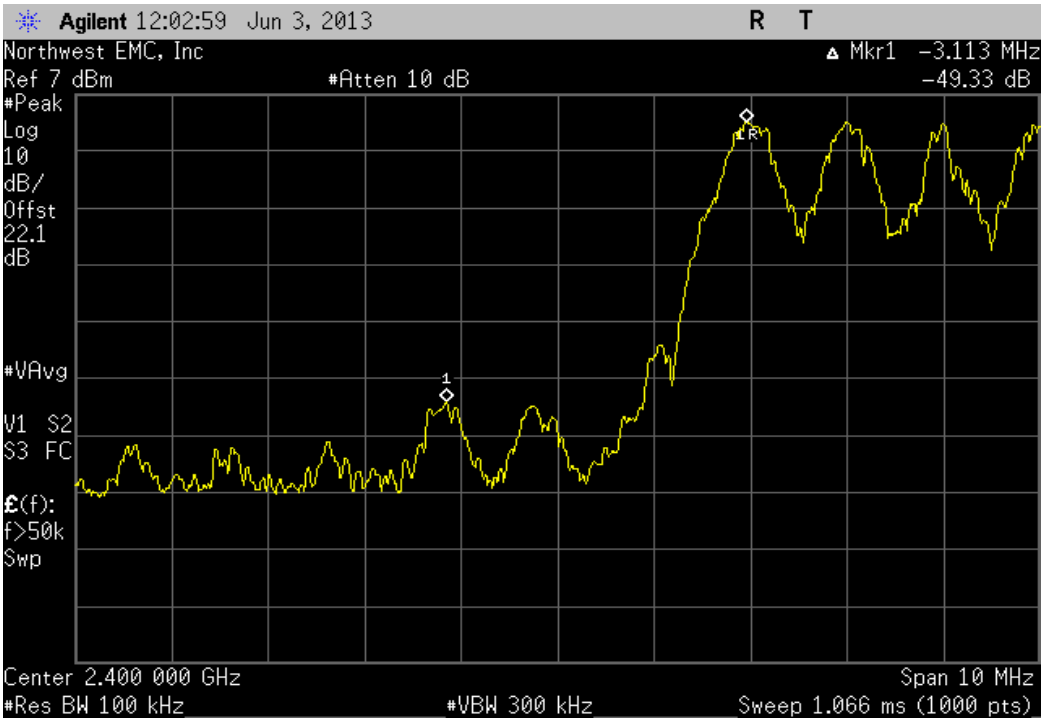
None

| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

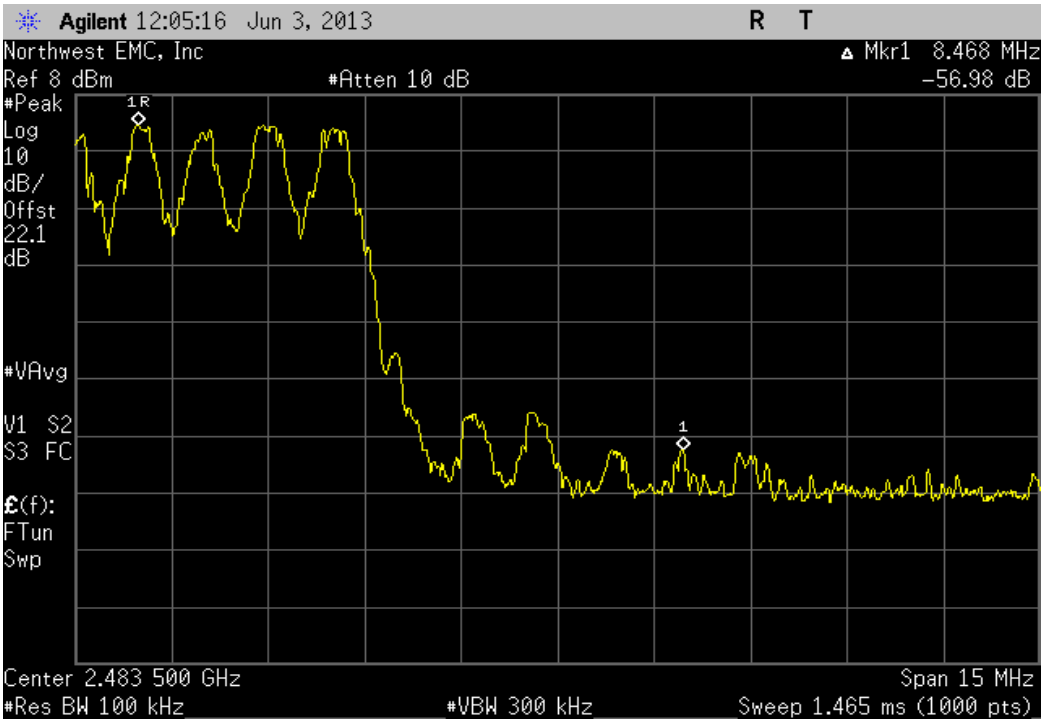
| | | Value | Limit | Result |
|---|---|---|---|---|
| Hopping Mode | | | | |
| | DH5, GFSK | | | |
| | Low Channel, 2402 MHz | -49.33 dBc | ≤ -20 dBc | Pass |
| | High Channel, 2480 MHz | -56.98 dBc | ≤ -20 dBc | Pass |
| | 2DH5, pi/4-DQPSK | | | |
| | Low Channel, 2402 MHz | -48.73 dBc | ≤ -20 dBc | Pass |
| | High Channel, 2480 MHz | -50.7 dBc | ≤ -20 dBc | Pass |
| | 3DH5, 8-DPSK | | | |
| | Low Channel, 2402 MHz | -48.32 dBc | ≤ -20 dBc | Pass |
| | High Channel, 2480 MHz | -46.84 dBc | ≤ -20 dBc | Pass |

# Band Edge Compliance -Hopping Mode

| Hopping Mode, DH5, GFSK, Low Channel, 2402 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -49.33 dBc | ≤ -20 dBc | Pass |

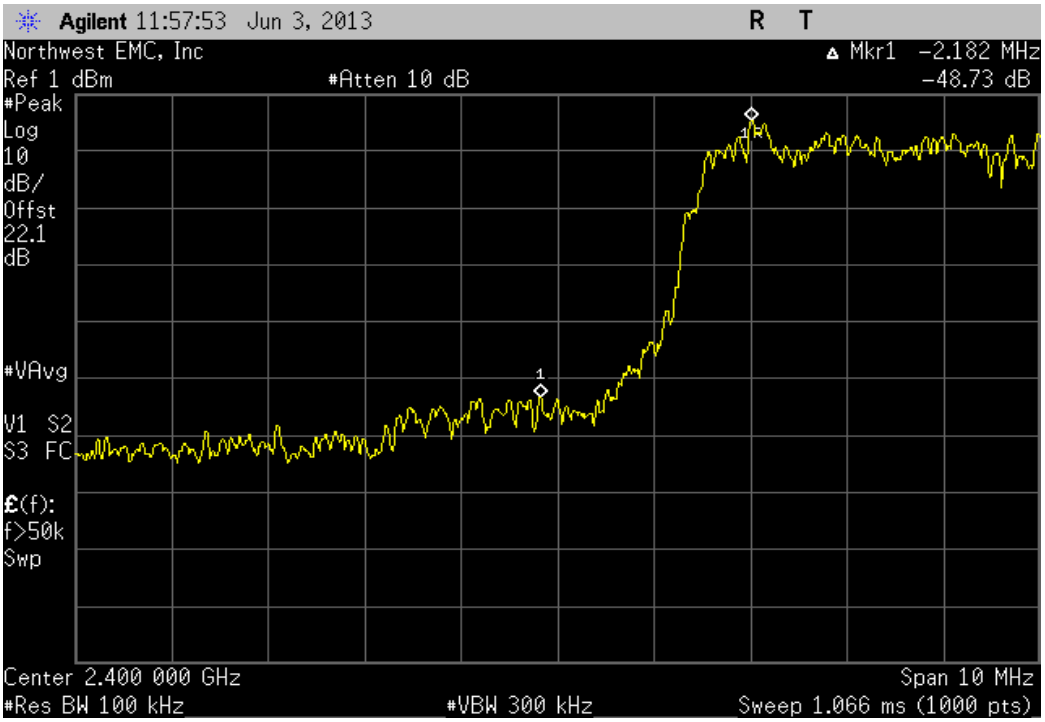



| Hopping Mode, DH5, GFSK, High Channel, 2480 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -56.98 dBc | ≤ -20 dBc | Pass |

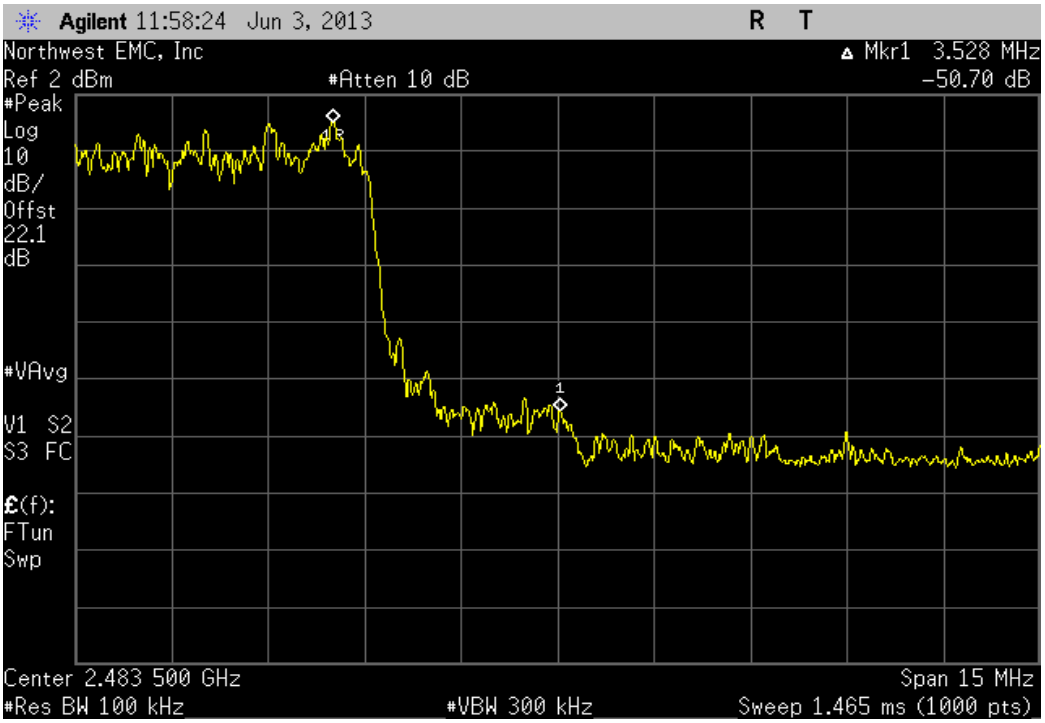


# Band Edge Compliance -Hopping Mode

| Hopping Mode, 2DH5, pi/4-DQPSK, Low Channel, 2402 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -48.73 dBc | ≤ -20 dBc | Pass |

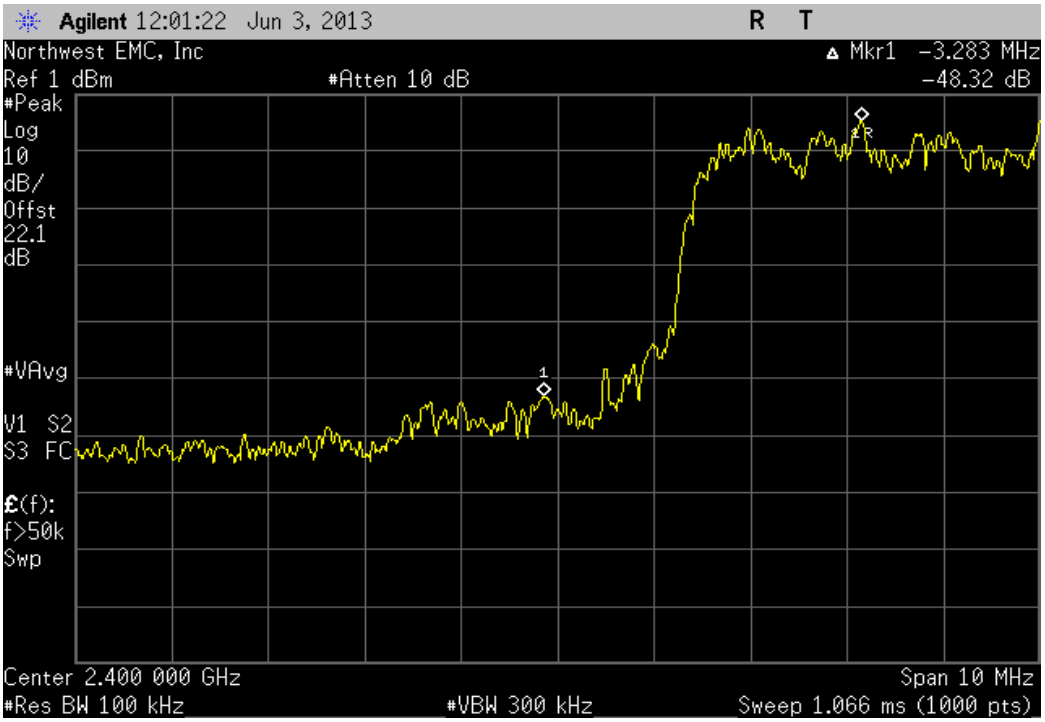



| Hopping Mode, 2DH5, pi/4-DQPSK, High Channel, 2480 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -50.7 dBc | ≤ -20 dBc | Pass |

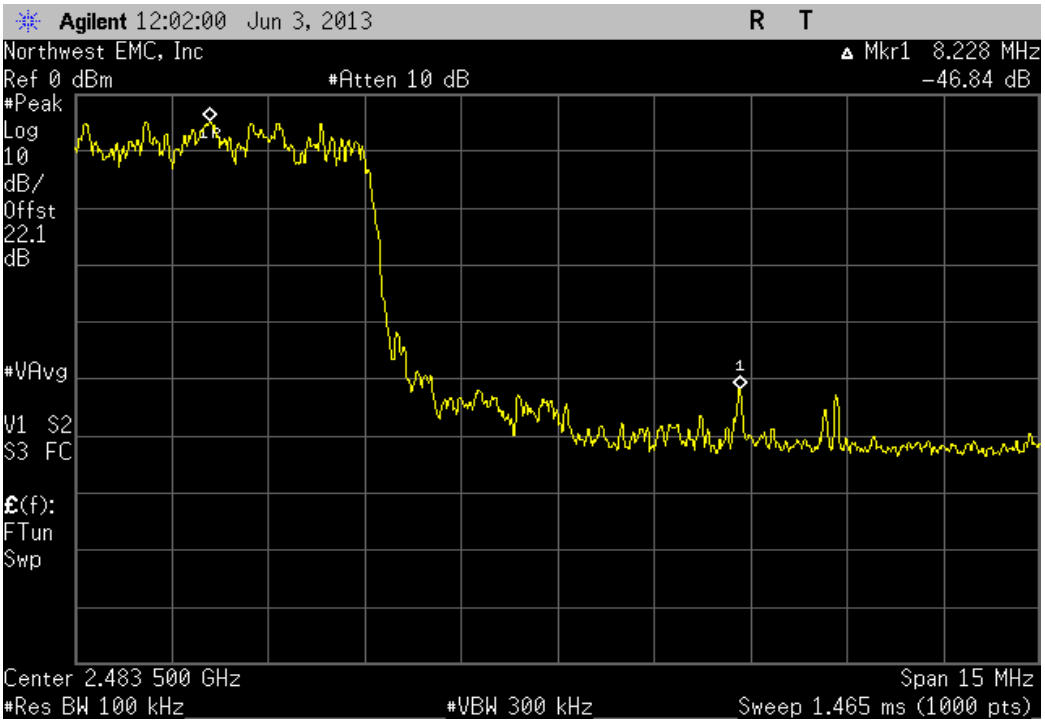


# Band Edge Compliance -Hopping Mode

| Hopping Mode, 3DH5, 8-DPSK, Low Channel, 2402 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -48.32 dBc | ≤ -20 dBc | Pass |




| Hopping Mode, 3DH5, 8-DPSK, High Channel, 2480 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -46.84 dBc | ≤ -20 dBc | Pass |



# Band Edge Compliance

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

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

# Band Edge Compliance

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

**DEVIATIONS FROM TEST STANDARD**

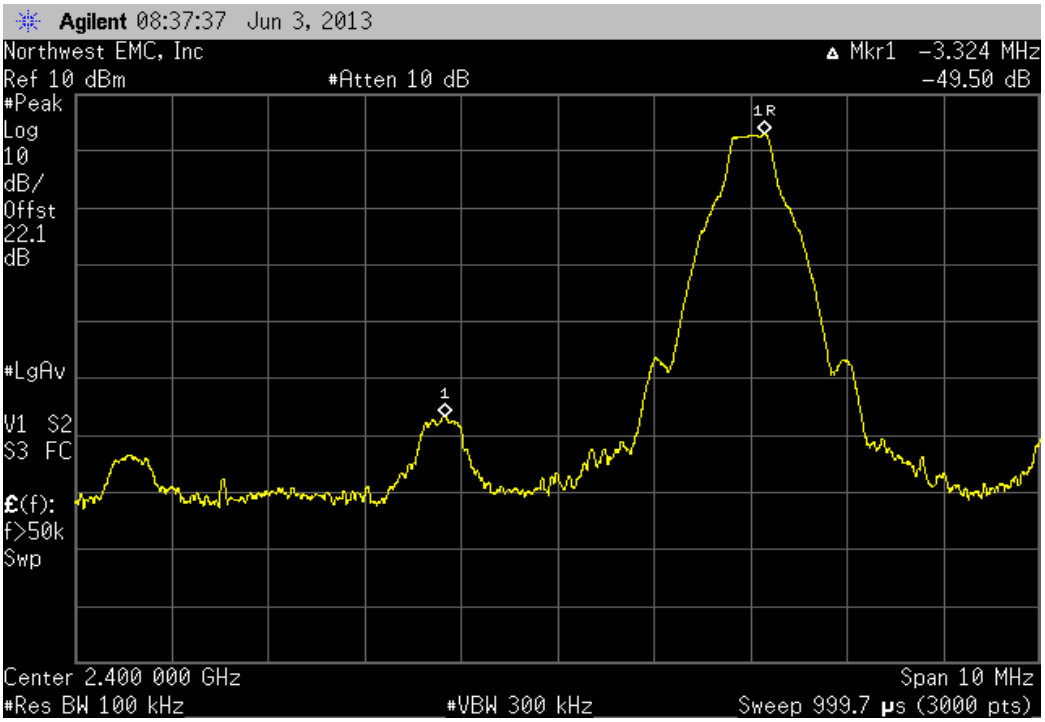
None

| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

| | | Value | Limit | Result |
|---|---|---|---|---|
| DH5, GFSK | | | | |
| | Low Channel | -49.5 dBc | ≤ -20 dBc | Pass |
| | High Channel | -55.09 dBc | ≤ -20 dBc | Pass |
| 2DH5, pi/4-DQPSK | | | | |
| | Low Channel | -46.25 dBc | ≤ -20 dBc | Pass |
| | High Channel | -46.69 dBc | ≤ -20 dBc | Pass |
| 3DH5, 8-DPSK | | | | |
| | Low Channel | -46.72 dBc | ≤ -20 dBc | Pass |
| | High Channel | -46.8 dBc | ≤ -20 dBc | Pass |

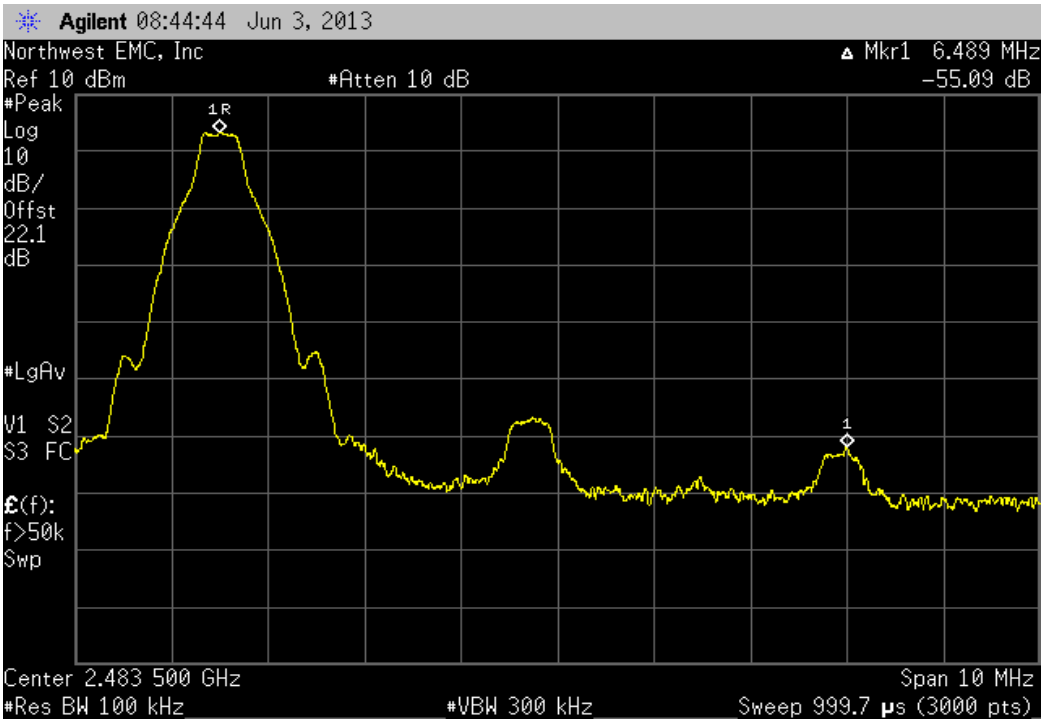
DH5, GFSK, Low Channel

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | -49.5 dBc | ≤ -20 dBc | Pass |

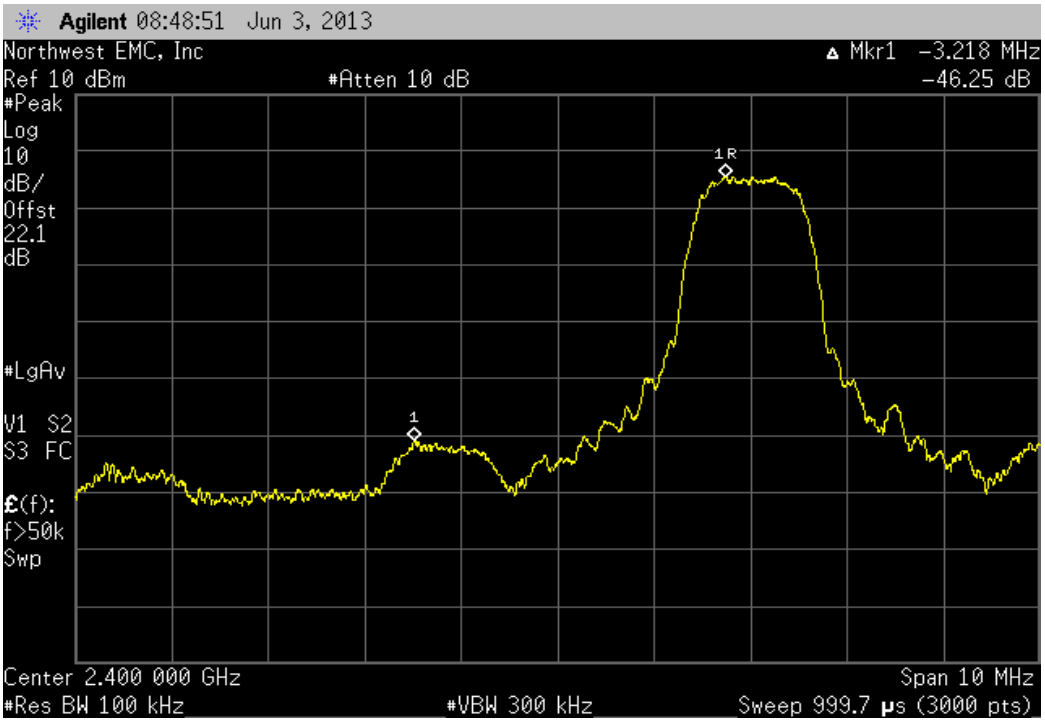



DH5, GFSK, High Channel

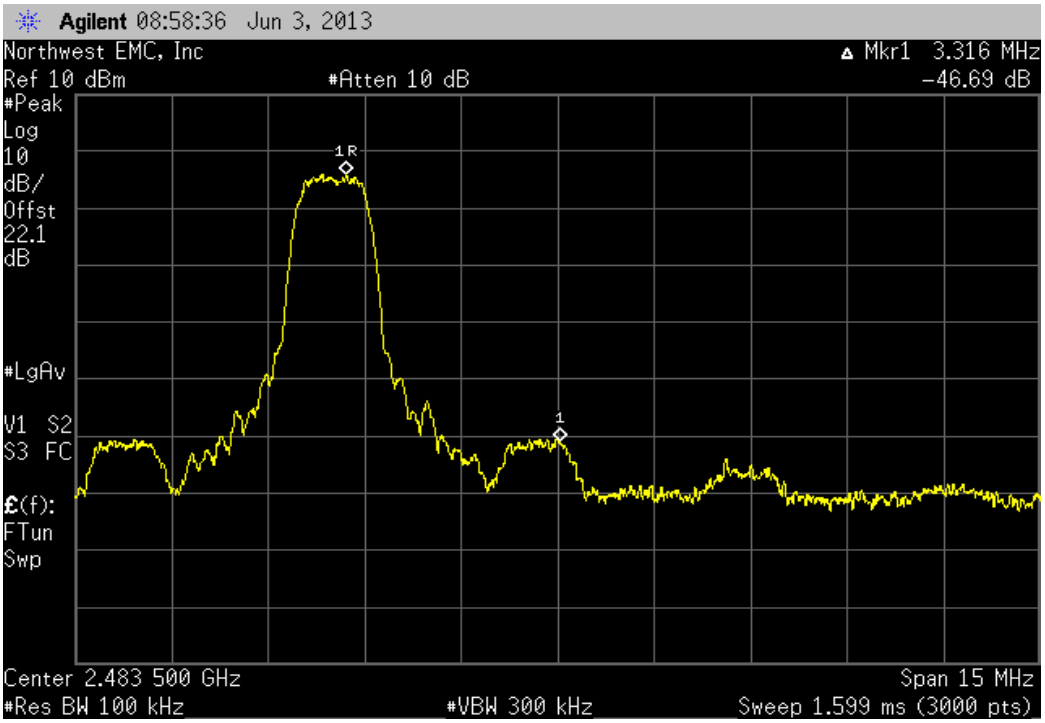
| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | -55.09 dBc | ≤ -20 dBc | Pass |



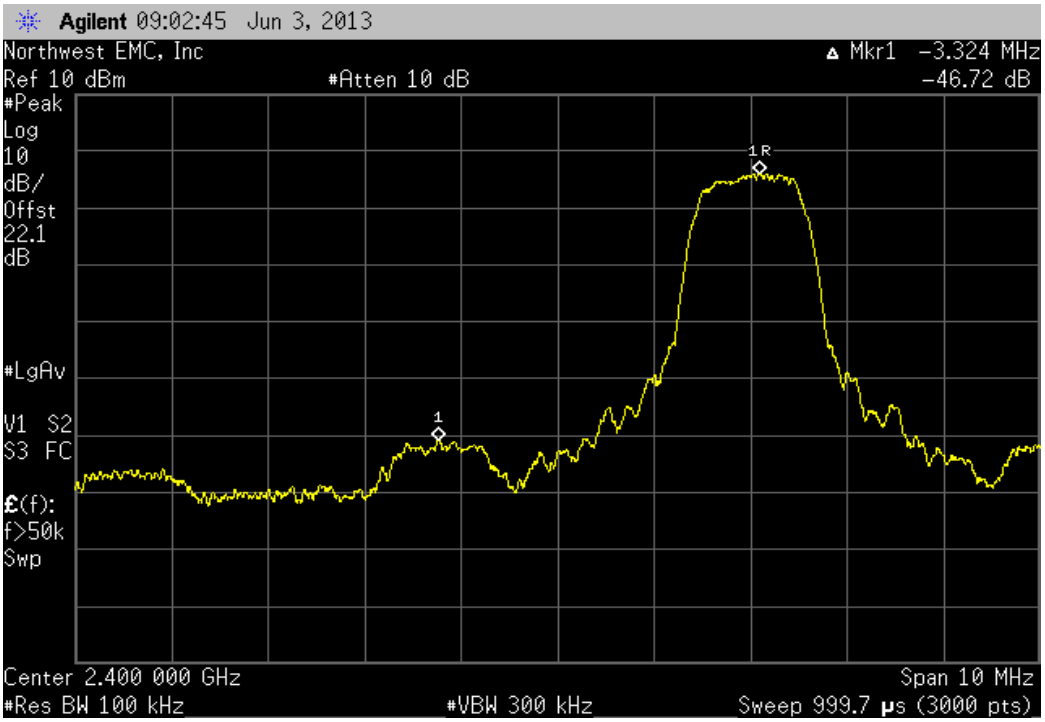
| 2DH5, pi/4-DQPSK, Low Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -46.25 dBc | ≤ -20 dBc | Pass |



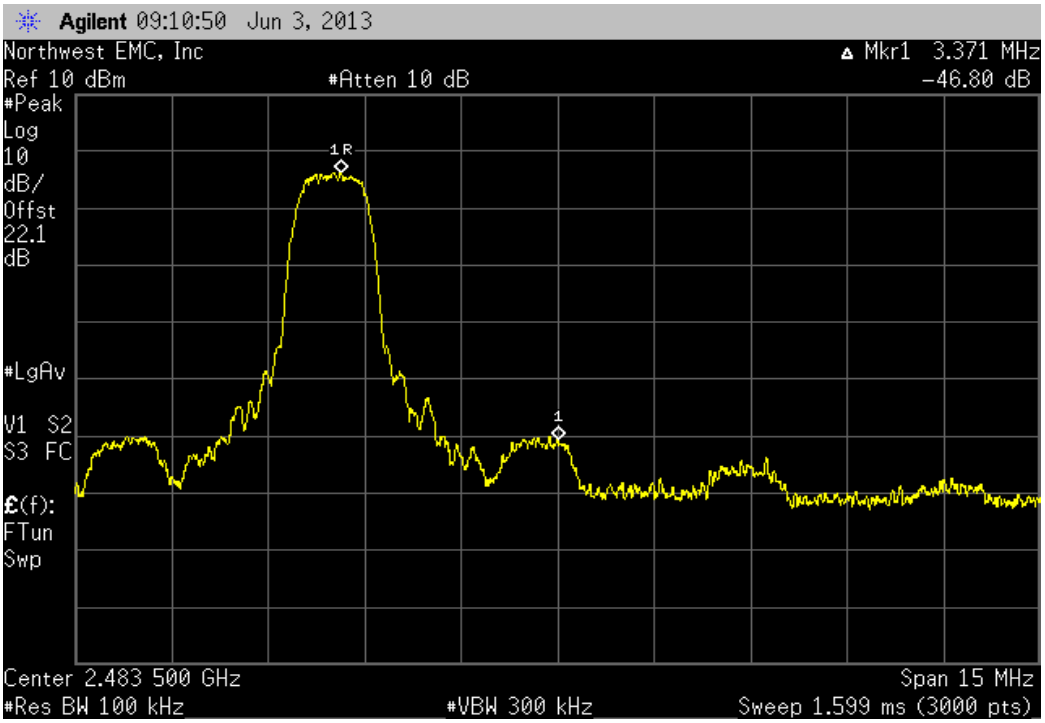

| 2DH5, pi/4-DQPSK, High Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -46.69 dBc | ≤ -20 dBc | Pass |



| 3DH5, 8-DPSK, Low Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -46.72 dBc | ≤ -20 dBc | Pass |




| 3DH5, 8-DPSK, High Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | -46.8 dBc | ≤ -20 dBc | Pass |



# Spurious Conducted Emissions

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator - 20db, 'SMA' | SM Electronics | SA26B-20 | RFW | 4/12/2013 | 12 |
| 40 GHz DC block | Fairview Microwave | SD3379 | AMI | 10/5/2012 | 12 |
| Signal Generator MXG | Agilent | N5183A | TIK | 6/7/2012 | 36 |
| Spectrum Analyzer | Agilent | E4440A | AAX | 5/15/2012 | 24 |

**TEST DESCRIPTION**

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# Spurious Conducted Emissions

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | **Work Order:** | LGPD0096 |
| **Serial Number:** | 1413M00359 | | | **Date:** | 06/03/13 |
| **Customer:** | Logic PD, Inc. | | | **Temperature:** | 23.1°C |
| **Attendees:** | None | | | **Humidity:** | 39% |
| **Project:** | None | | | **Barometric Pres.:** | 1015.6 |
| **Tested by:** | Trevor Buls | **Power:** | 110VAC/60Hz | **Job Site:** | MN08 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |
| | |

**COMMENTS**

None

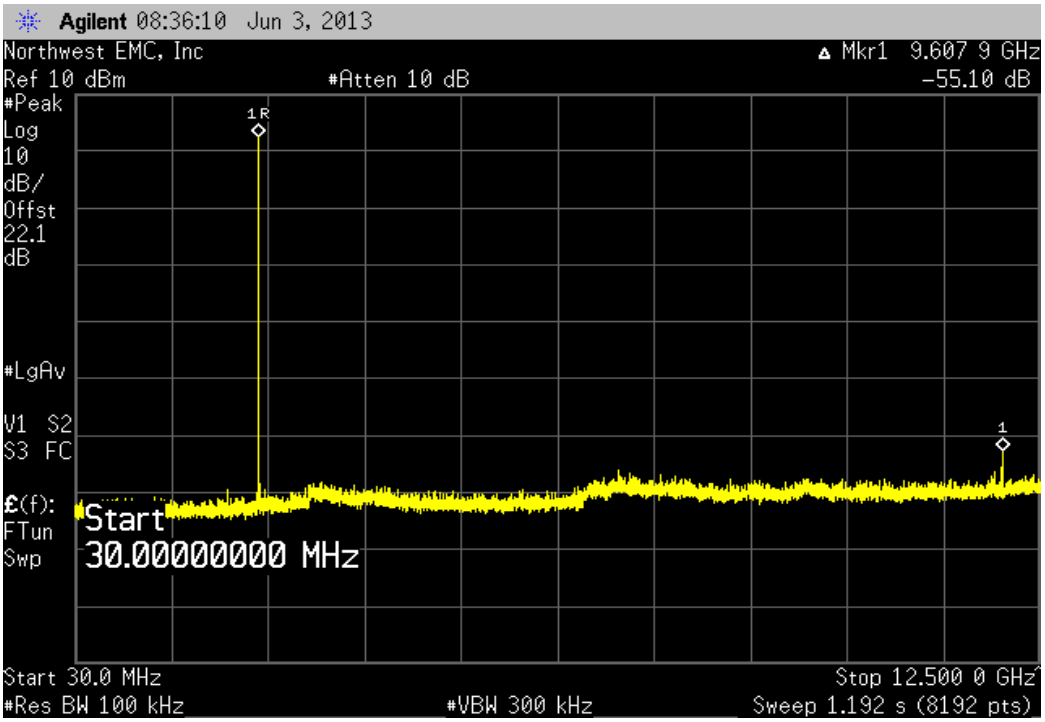
**DEVIATIONS FROM TEST STANDARD**

None

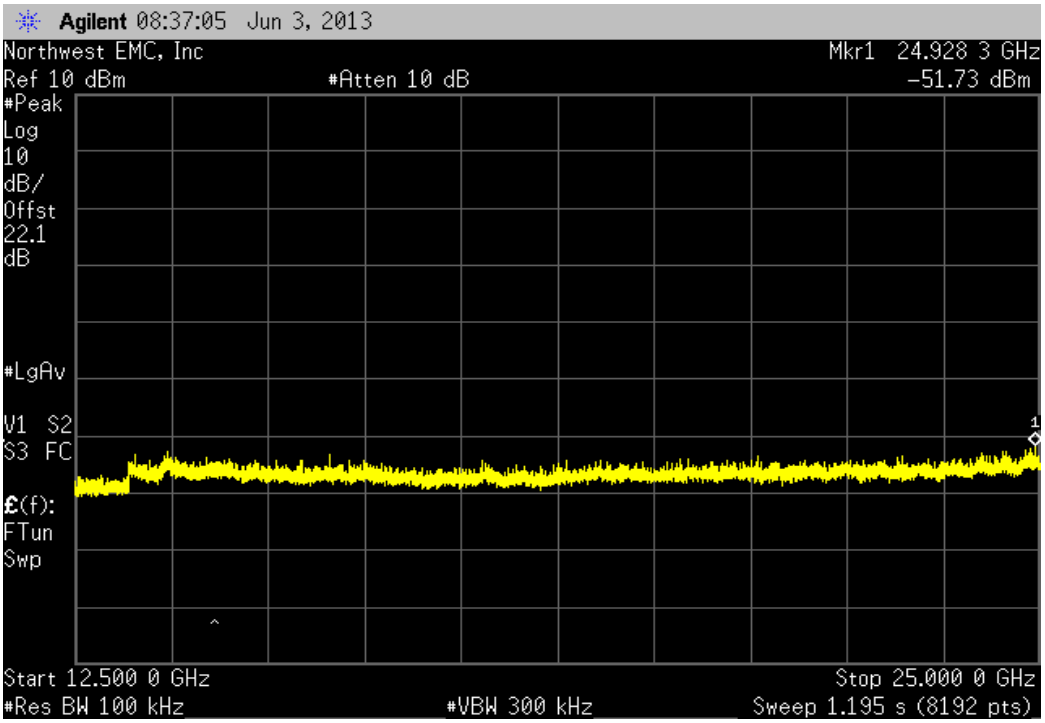
| Configuration # | 1 | Signature | Trevor Buls |
|---|---|---|---|

| | | Frequency Range | Value | Limit | Result |
|---|---|---|---|---|---|
| DH5, GFSK | | | | | |
| | Low Channel | 30 MHz - 12.5 GHz | -55.1 dBc | ≤ -20 dBc | Pass |
| | Low Channel | 12.5 GHz - 25 GHz | -54.16 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | 30 MHz - 12.5 GHz | -58.9 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | 12.5 GHz - 25 GHz | -53.83 dBc | ≤ -20 dBc | Pass |
| | High Channel | 30 MHz - 12.5 GHz | -56.37 dBc | ≤ -20 dBc | Pass |
| | High Channel | 12.5 GHz - 25 GHz | -56.13 dBc | ≤ -20 dBc | Pass |
| 2DH5, pi/4-DQPSK | | | | | |
| | Low Channel | 30 MHz - 12.5 GHz | -51.02 dBc | ≤ -20 dBc | Pass |
| | Low Channel | 12.5 GHz - 25 GHz | -46.85 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | 30 MHz - 12.5 GHz | -51.92 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | 12.5 GHz - 25 GHz | -47.71 dBc | ≤ -20 dBc | Pass |
| | High Channel | 30 MHz - 12.5 GHz | -50.76 dBc | ≤ -20 dBc | Pass |
| | High Channel | 12.5 GHz - 25 GHz | -47.36 dBc | ≤ -20 dBc | Pass |
| 3DH5, 8-DPSK | | | | | |
| | Low Channel | 30 MHz - 12.5 GHz | -51.62 dBc | ≤ -20 dBc | Pass |
| | Low Channel | 12.5 GHz - 25 GHz | -47.92 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | 30 MHz - 12.5 GHz | -50.59 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | 12.5 GHz - 25 GHz | -45.87 dBc | ≤ -20 dBc | Pass |
| | High Channel | 30 MHz - 12.5 GHz | -51.25 dBc | ≤ -20 dBc | Pass |
| | High Channel | 12.5 GHz - 25 GHz | -48.03 dBc | ≤ -20 dBc | Pass |

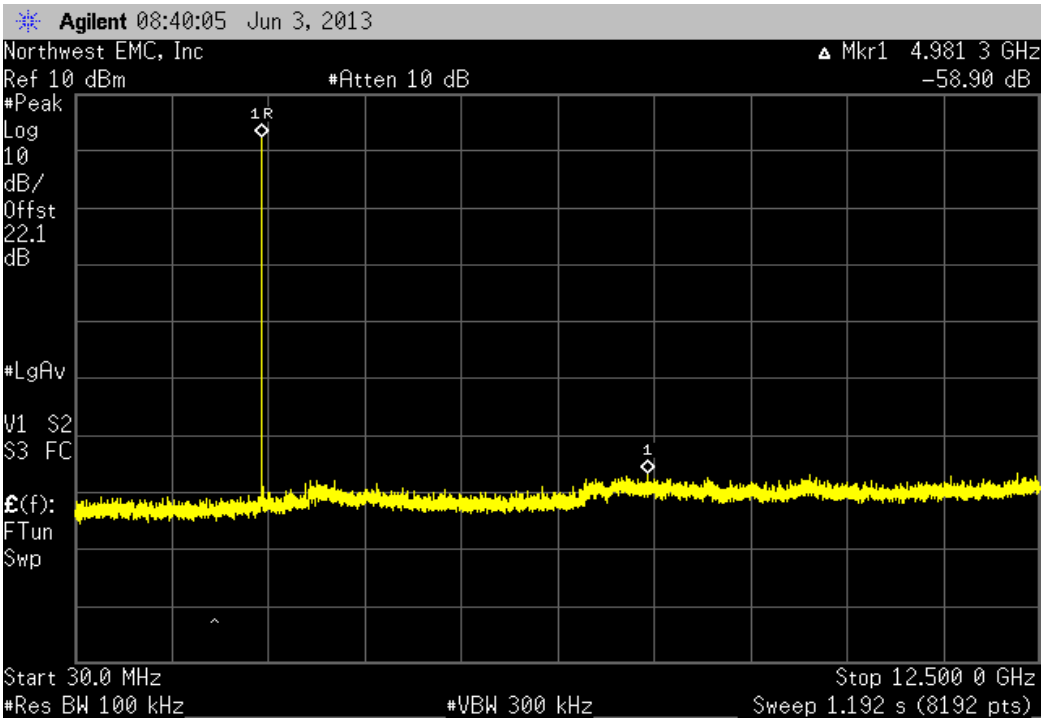
| DH5, GFSK, Low Channel | | | | |
|---|---|---|---|---|
| Frequency Range | | Value | Limit | Result |
| 30 MHz - 12.5 GHz | | -55.1 dBc | ≤ -20 dBc | Pass |



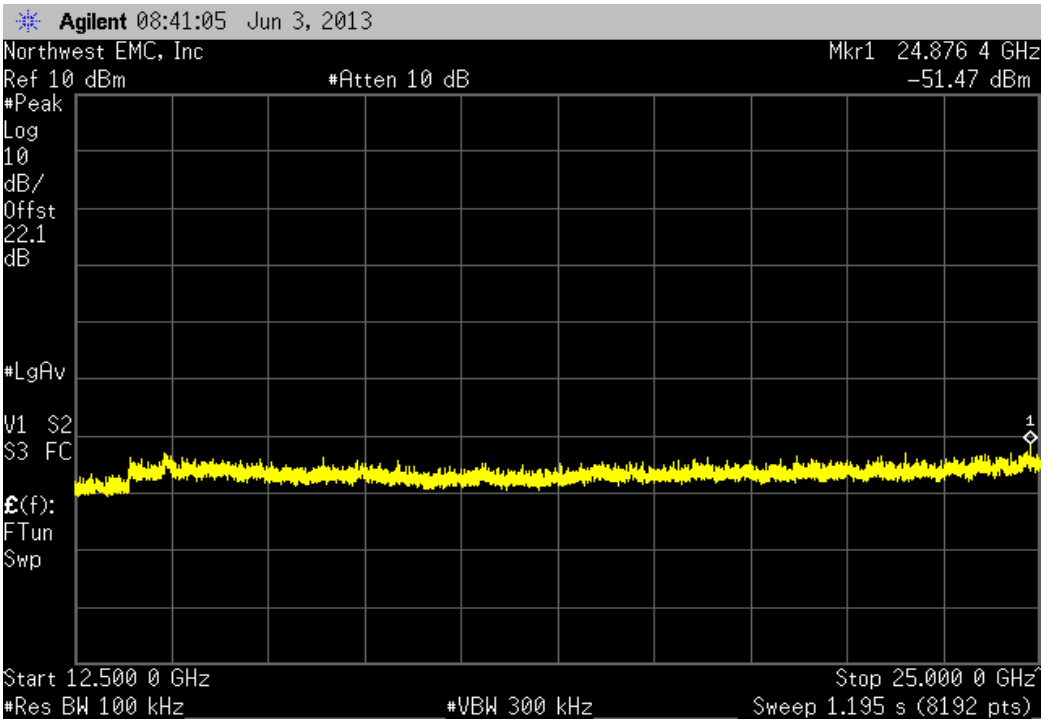

| DH5, GFSK, Low Channel | | | | |
|---|---|---|---|---|
| Frequency Range | | Value | Limit | Result |
| 12.5 GHz - 25 GHz | | -54.16 dBc | ≤ -20 dBc | Pass |



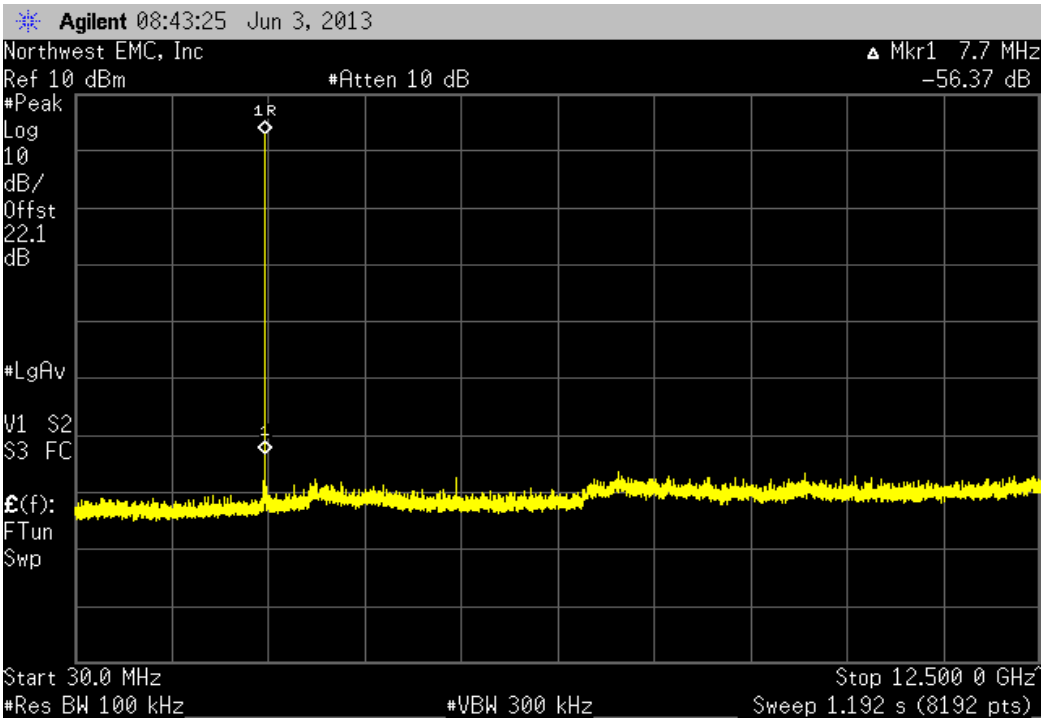
| DH5, GFSK, Mid Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -58.9 dBc | ≤ -20 dBc | Pass |



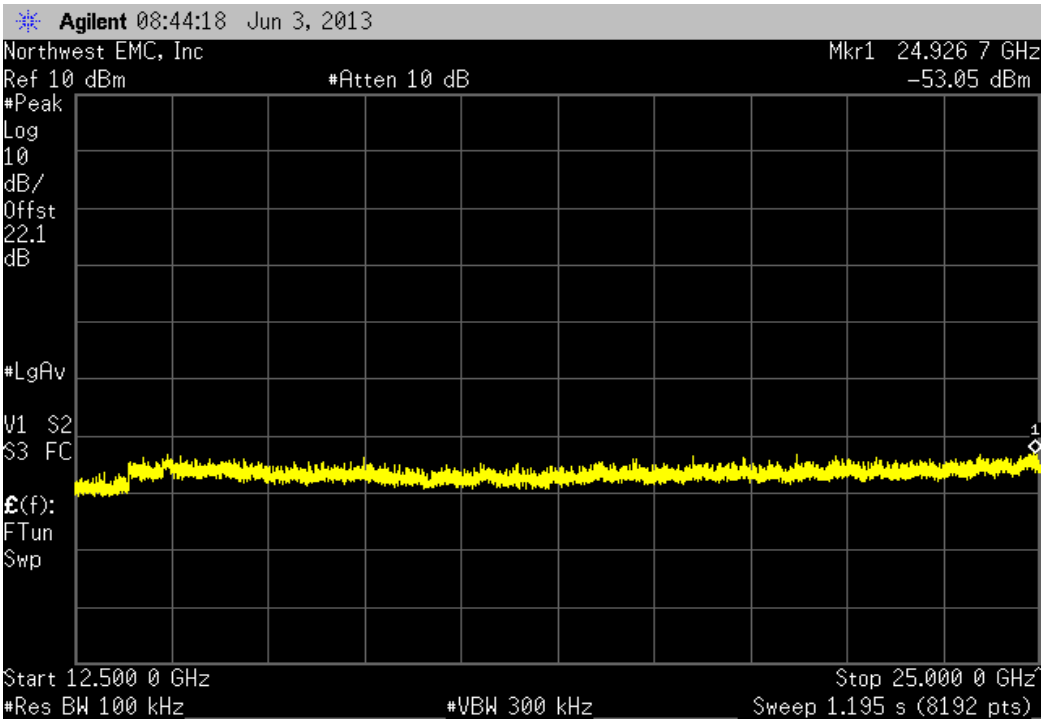

| DH5, GFSK, Mid Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -53.83 dBc | ≤ -20 dBc | Pass |



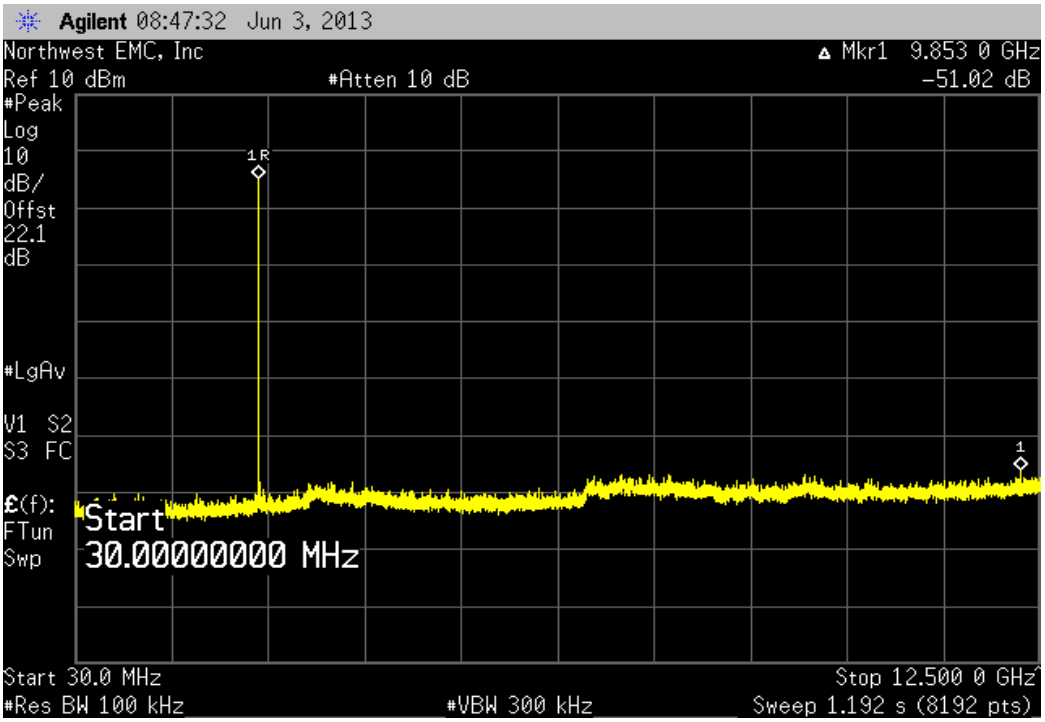
| DH5, GFSK, High Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -56.37 dBc | ≤ -20 dBc | Pass |



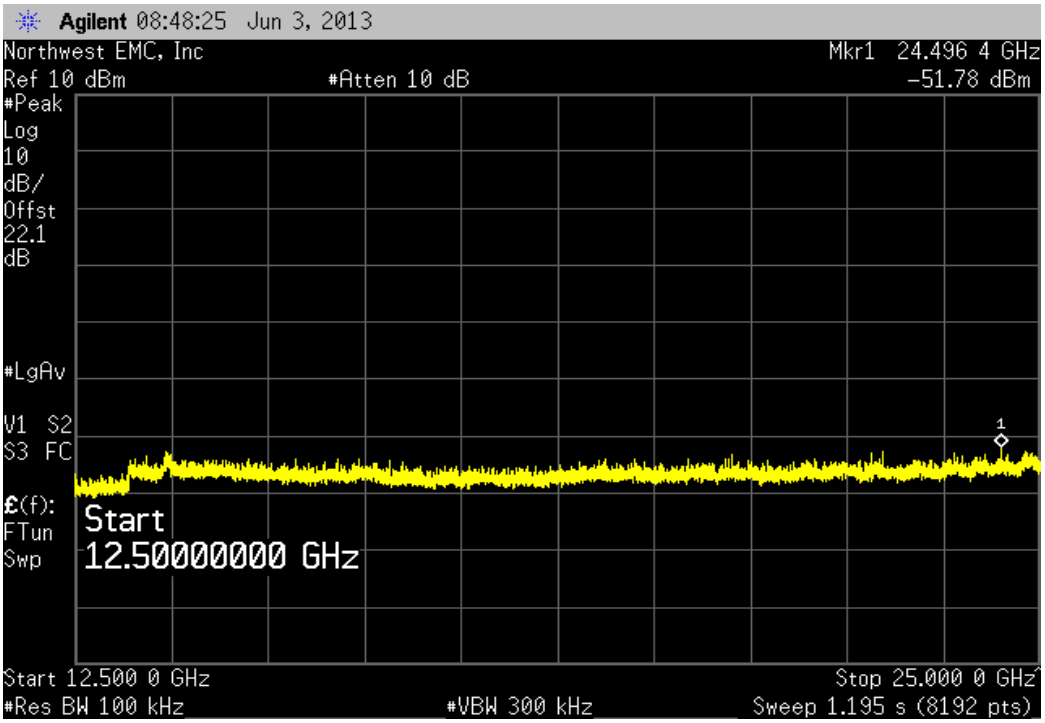

| DH5, GFSK, High Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -56.13 dBc | ≤ -20 dBc | Pass |



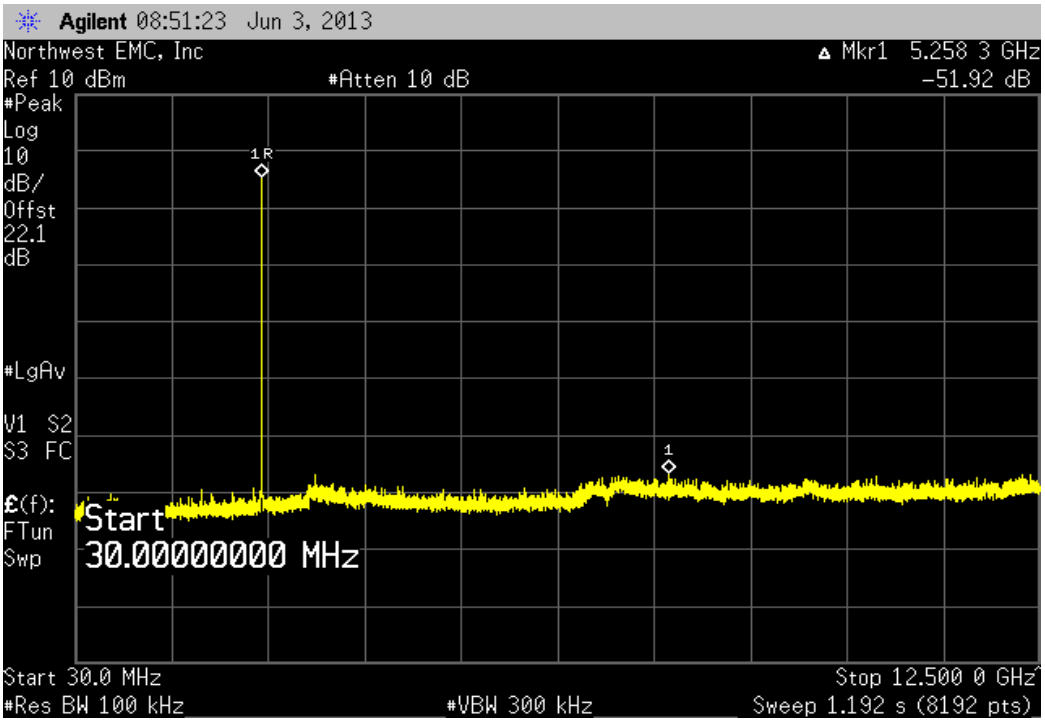
| 2DH5, pi/4-DQPSK, Low Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -51.02 dBc | ≤ -20 dBc | Pass |



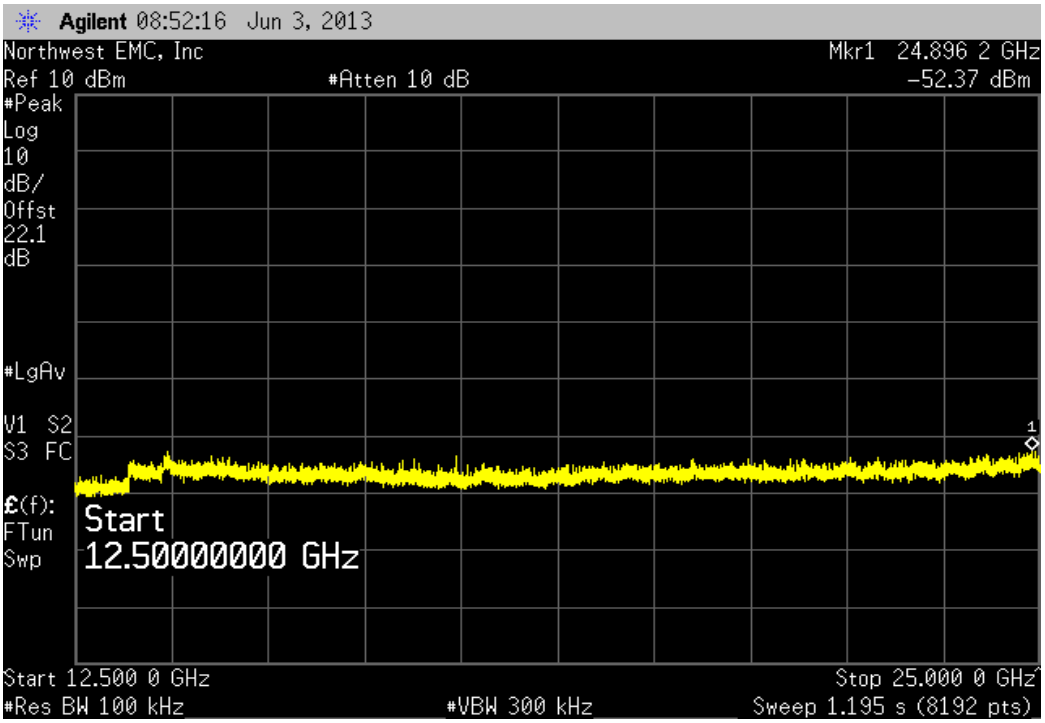

| 2DH5, pi/4-DQPSK, Low Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -46.85 dBc | ≤ -20 dBc | Pass |



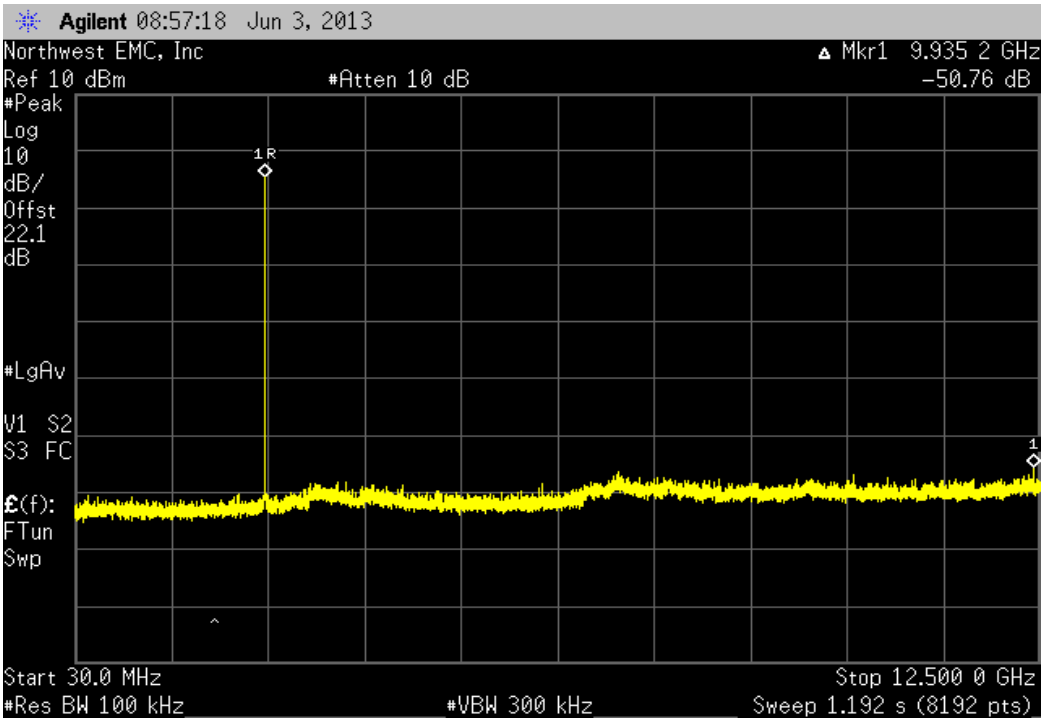
| 2DH5, pi/4-DQPSK, Mid Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -51.92 dBc | ≤ -20 dBc | Pass |



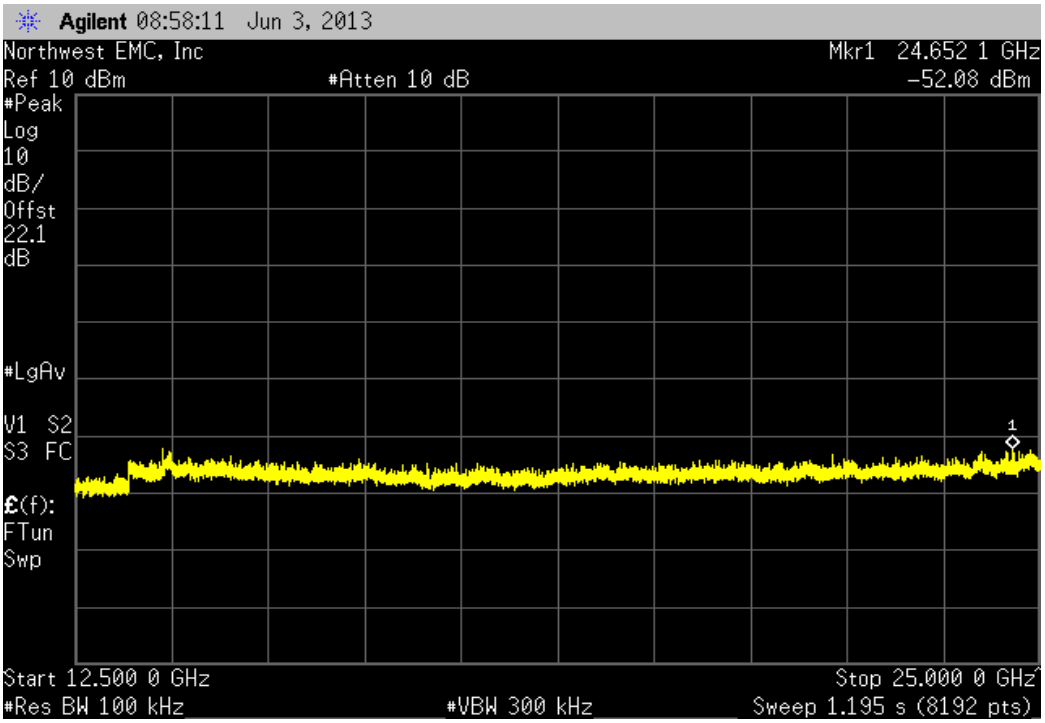

| 2DH5, pi/4-DQPSK, Mid Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -47.71 dBc | ≤ -20 dBc | Pass |



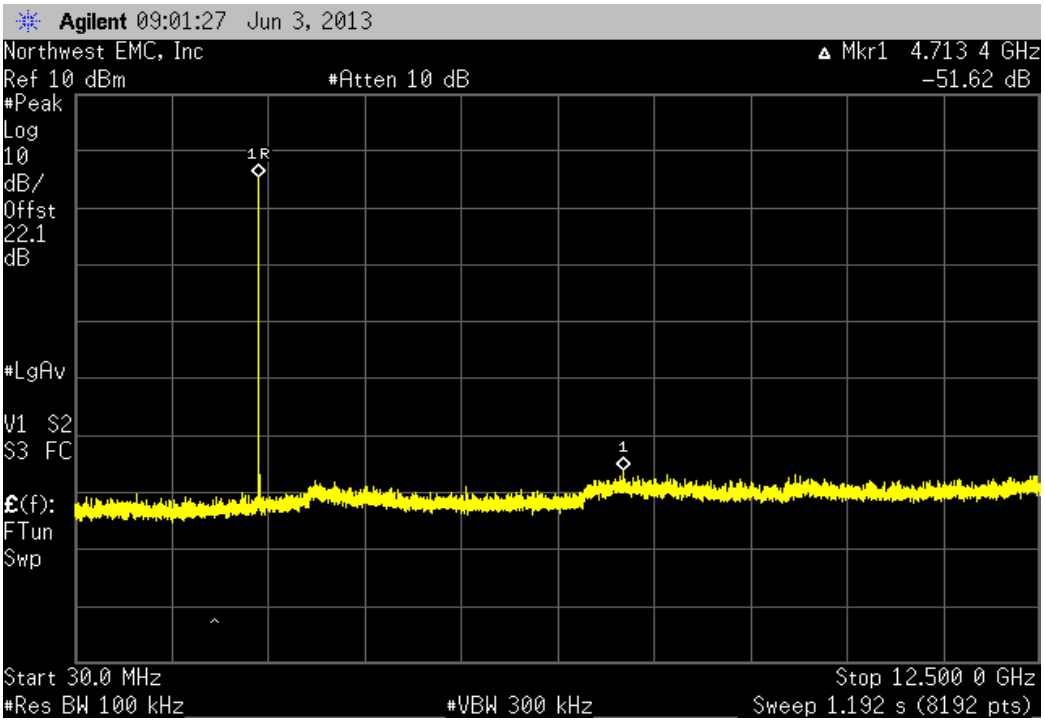
| 2DH5, pi/4-DQPSK, High Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -50.76 dBc | ≤ -20 dBc | Pass |



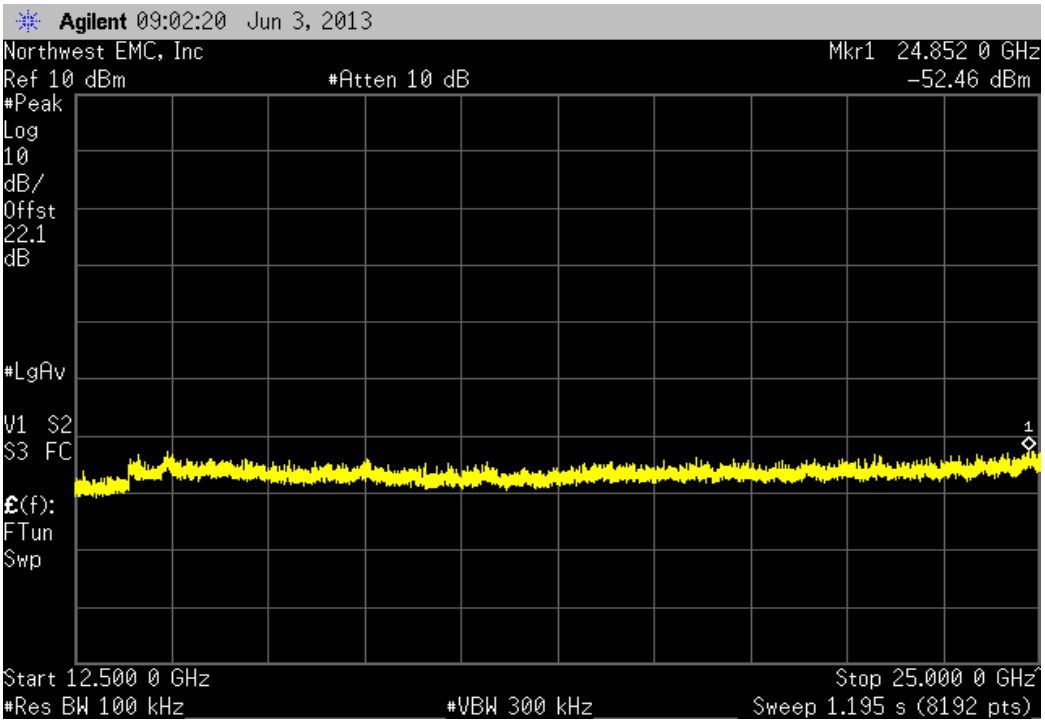

| 2DH5, pi/4-DQPSK, High Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -47.36 dBc | ≤ -20 dBc | Pass |



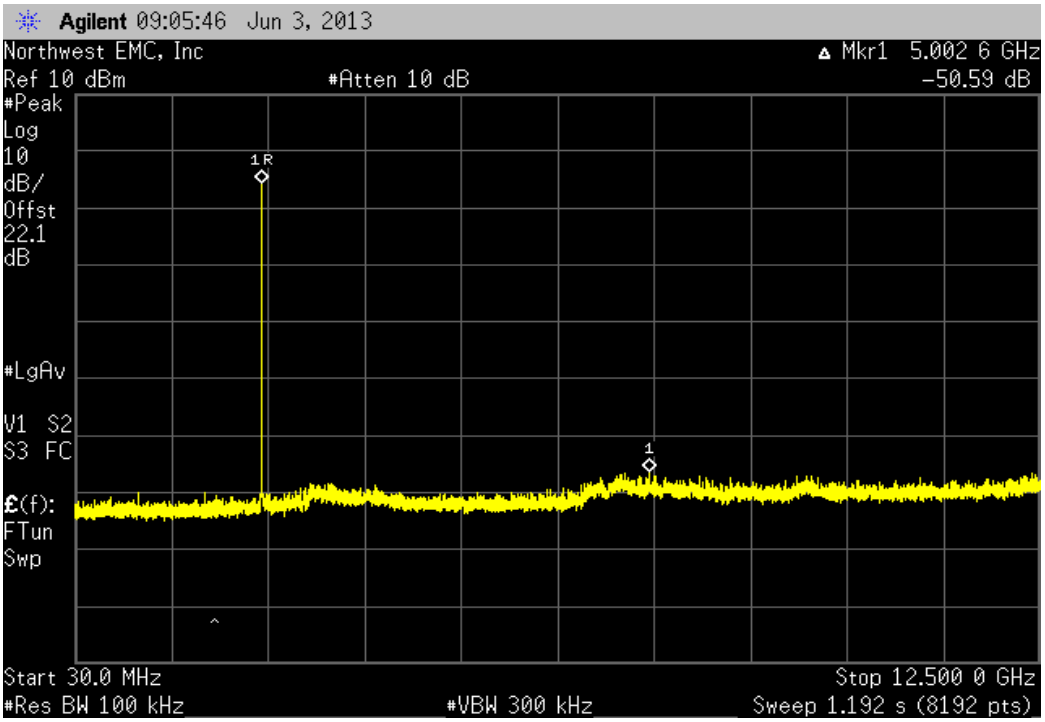
| 3DH5, 8-DPSK, Low Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -51.62 dBc | ≤ -20 dBc | Pass |



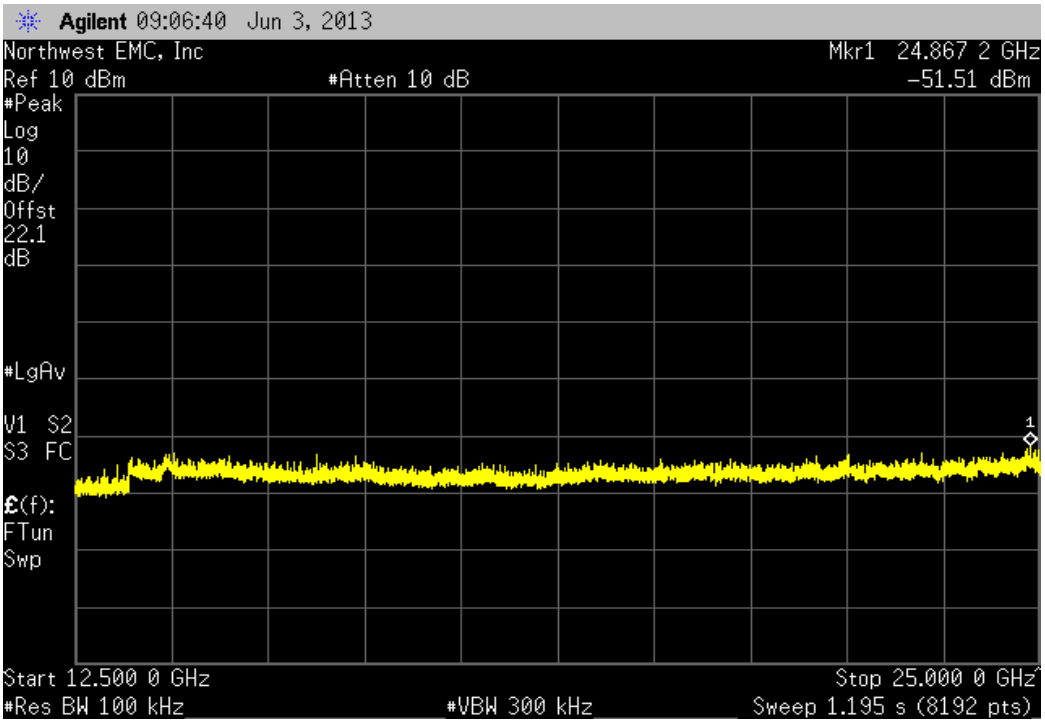

| 3DH5, 8-DPSK, Low Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -47.92 dBc | ≤ -20 dBc | Pass |



| 3DH5, 8-DPSK, Mid Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -50.59 dBc | ≤ -20 dBc | Pass |

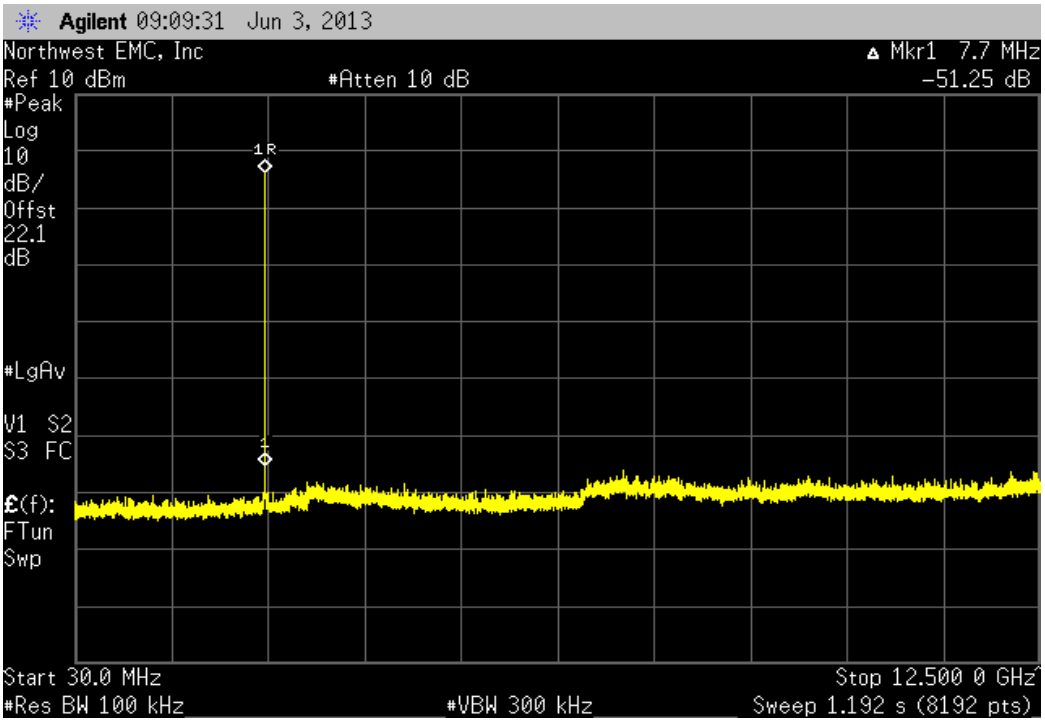



| 3DH5, 8-DPSK, Mid Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -45.87 dBc | ≤ -20 dBc | Pass |

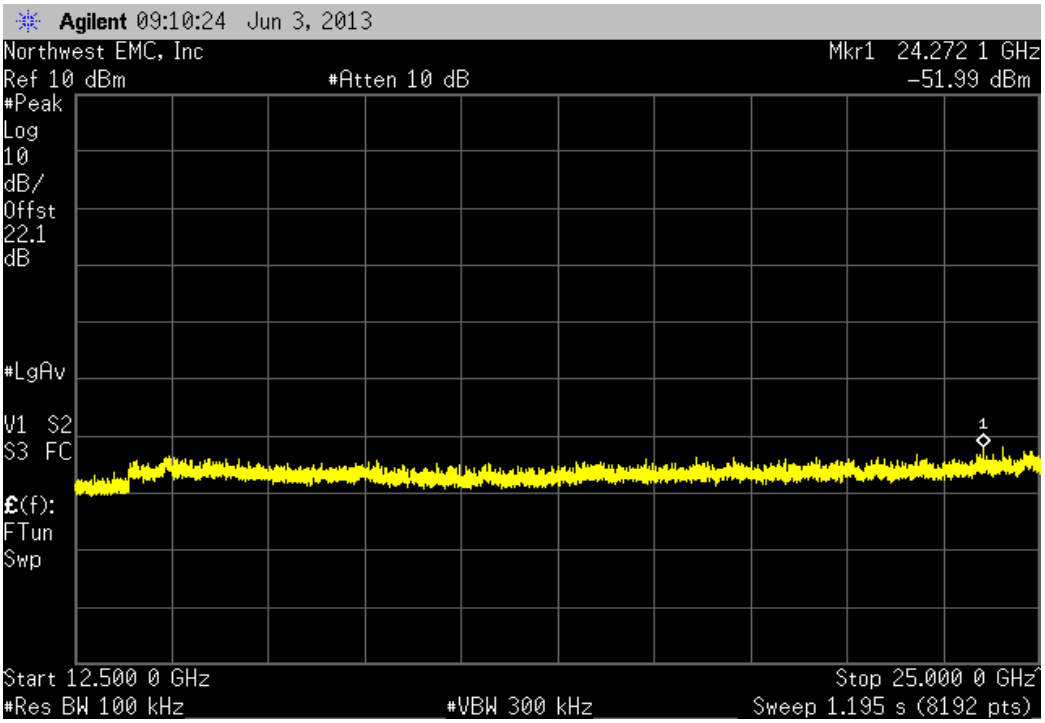


# Spurious Conducted Emissions

| 3DH5, 8-DPSK, High Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -51.25 dBc | ≤ -20 dBc | Pass |




| 3DH5, 8-DPSK, High Channel | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -48.03 dBc | ≤ -20 dBc | Pass |



# Spurious Radiated Emissions

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

**MODES OF OPERATION**

Transmitting Bluetooth EDR, Low, Mid, High (2402, 2440, 2480 MHz) at DH5, 2DH5, 3DH5 -PIFA (see comments)
Transmitting Bluetooth EDR, Low, Mid, High (2402, 2440, 2480 MHz) at DH5, 2DH5, 3DH5 -Chip (see comments)

**POWER SETTINGS INVESTIGATED**

110VAC/60Hz

**CONFIGURATIONS INVESTIGATED**

LGPD0096 - 1
LGPD0100 - 1

**FREQUENCY RANGE INVESTIGATED**

| Start Frequency | 30 MHz | Stop Frequency | 25 GHz |
|---|---|---|---|

**SAMPLE CALCULATIONS**

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| High Pass Filter | Micro-Tronics | HPM50111 | HGQ | 6/1/2012 | 24 mo |
| Low Pass Filter | Micro-Tronics | LPM50004 | HGK | 5/31/2012 | 24 mo |
| Attenuator, 20 dB, 'SMA' | SM Electronics | SA6-20 | REO | 5/20/2013 | 12 mo |
| Pre-Amplifier | Miteq | JSD4-18002600-26-8P | APU | 10/5/2012 | 12 mo |
| MN05 Cables | N/A | 6GHz Standard Gain Horn C | MNP | 10/5/2012 | 12 mo |
| Antenna, Horn | ETS | 3160-09 | AHG | NCR | 0 mo |
| MN05 Cables | ESM Cable Corp. | Standard Gain Horn Cables | MNJ | 5/20/2013 | 12 mo |
| Antenna, Horn | ETS | 3160-07 | AXP | NCR | 0 mo |
| Antenna, Horn | ETS Lindgren | 3160-08 | AIQ | NCR | 0 mo |
| Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | AVW | 5/20/2013 | 12 mo |
| Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | AVV | 5/20/2013 | 12 mo |
| Pre-Amplifier | Miteq | AMF-3D-00100800-32-13P | AVX | 5/20/2013 | 12 mo |
| MN05 Cables | ESM Cable Corp. | uble Ridge Guide Horn Cab | MNI | 5/20/2013 | 12 mo |
| Antenna, Horn (DRG) | ETS Lindgren | 3115 | AIP | 6/29/2011 | 36 mo |
| Pre-Amplifier | Miteq | AM-1616-1000 | PAD | 5/20/2013 | 12 mo |
| MN05 Cables | ESM Cable Corp. | Bilog Cables | MNH | 5/20/2013 | 12 mo |
| Antenna, Bilog | Teseq | CBL 6141B | AYD | 12/17/2012 | 12 mo |
| Spectrum Analyzer | Agilent | E4446A | AAT | 6/28/2012 | 24 mo |

**MEASUREMENT BANDWIDTHS**

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

**TEST DESCRIPTION**

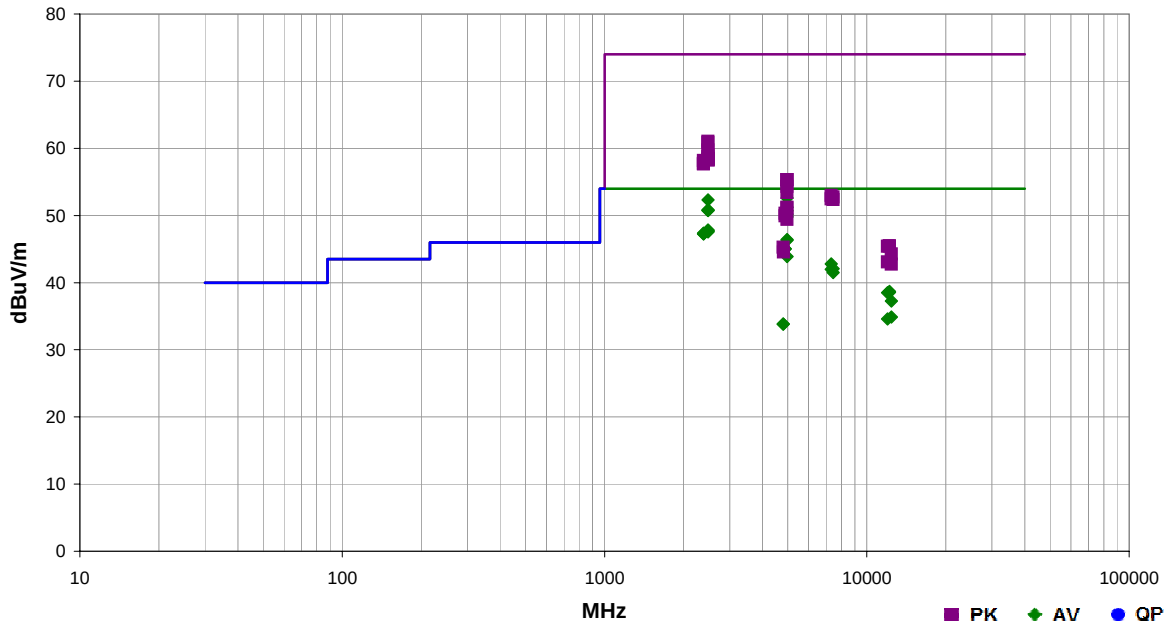
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify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

# Spurious Radiated Emissions

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | LGPD0096 | **Date:** | 05/21/13 | Trevor Buls | |
| **Project:** | None | **Temperature:** | 22.2 °C | | |
| **Job Site:** | MN05 | **Humidity:** | 48.5% RH | | |
| **Serial Number:** | 1413M00359 | **Barometric Pres.:** | 1000 mbar | **Tested by:** | Trevor Buls |
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | Logic PD, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting Bluetooth EDR, Low, Mid, High (2402, 2440, 2480 MHz) at DH5, 2DH5, 3DH5 -PIFA (see comments) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | EUT orientation is based on the transmit module. | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |

| **Run #** | 14 | **Test Distance (m)** | 3 | **Antenna Height(s)** | 1-4m | **Results** | Pass |
|---|---|---|---|---|---|---|---|




| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4959.967 | 47.5 | 5.1 | 1.2 | 318.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 52.6 | 54.0 | -1.4 | EUT on Side. High Ch, DH5 |
| 2483.508 | 35.9 | -3.6 | 1.0 | 247.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 52.3 | 54.0 | -1.7 | EUT Vertical, High Ch, DH5 |
| 4960.008 | 46.1 | 5.1 | 1.0 | 319.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 51.2 | 54.0 | -2.8 | EUT Horizontal. High Ch, DH5 |
| 2483.508 | 34.4 | -3.6 | 1.0 | 247.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 50.8 | 54.0 | -3.2 | EUT Vertical, High Ch, 3DH5 |
| 2483.550 | 34.3 | -3.6 | 1.0 | 247.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 50.7 | 54.0 | -3.3 | EUT Vertical, High Ch, 2DH5 |
| 2483.508 | 34.3 | -3.6 | 1.0 | 39.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 50.7 | 54.0 | -3.3 | EUT Horizontal, High Ch, DH5 |
| 4960.000 | 45.6 | 5.1 | 1.4 | 229.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 50.7 | 54.0 | -3.3 | EUT Vertical, High Ch, DH5 |
| 4960.042 | 45.0 | 5.1 | 1.1 | 325.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 50.1 | 54.0 | -3.9 | EUT on Side. High Ch, 3DH5 |
| 4960.075 | 44.7 | 5.1 | 1.1 | 325.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 49.8 | 54.0 | -4.2 | EUT on Side. High Ch, 2DH5 |
| 2483.508 | 31.4 | -3.6 | 1.0 | 156.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 47.8 | 54.0 | -6.2 | EUT Horizontal, High Ch, DH5 |
| 2483.592 | 31.3 | -3.6 | 3.1 | 66.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 47.7 | 54.0 | -6.3 | EUT Vertical, High Ch, DH5 |
| 2483.858 | 31.2 | -3.6 | 1.0 | 346.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 47.6 | 54.0 | -6.4 | EUT on Side, High Ch, DH5 |
| 2484.058 | 31.1 | -3.6 | 4.0 | 97.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 47.5 | 54.0 | -6.5 | EUT on Side, High Ch, DH5 |
| 2385.633 | 31.2 | -3.8 | 1.0 | 51.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 47.4 | 54.0 | -6.6 | EUT Vertical, Low Ch, 2DH5 |
| 2385.183 | 31.1 | -3.8 | 1.0 | 51.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 47.3 | 54.0 | -6.7 | EUT Vertical, Low Ch, 3DH5 |
| 2386.450 | 31.1 | -3.8 | 1.0 | 51.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 47.3 | 54.0 | -6.7 | EUT Vertical, Low Ch, DH5 |
| 4959.983 | 41.3 | 5.1 | 1.0 | 244.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 46.4 | 54.0 | -7.6 | EUT Vertical, High Ch, DH5 |
| 4960.008 | 41.2 | 5.1 | 1.0 | 353.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 46.3 | 54.0 | -7.7 | EUT Horizontal. High Ch, DH5 |
| 4880.025 | 40.3 | 4.7 | 1.0 | 325.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 45.0 | 54.0 | -9.0 | EUT on Side. Mid Ch, DH5 |
| 4880.017 | 40.3 | 4.7 | 1.4 | 234.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 45.0 | 54.0 | -9.0 | EUT Vertical, Mid Ch, DH5 |
| 4960.017 | 38.8 | 5.1 | 1.3 | 316.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 43.9 | 54.0 | -10.1 | EUT on Side. High Ch, DH5 |
| 7320.033 | 30.3 | 12.5 | 1.0 | 275.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 42.8 | 54.0 | -11.2 | EUT Vertical, Mid Ch, DH5 |
| 7440.083 | 28.6 | 13.5 | 1.1 | 278.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 42.1 | 54.0 | -11.9 | EUT Vertical, High Ch, DH5 |
| 7320.075 | 29.5 | 12.5 | 1.0 | 116.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 42.0 | 54.0 | -12.0 | EUT on Side. Mid Ch, DH5 |

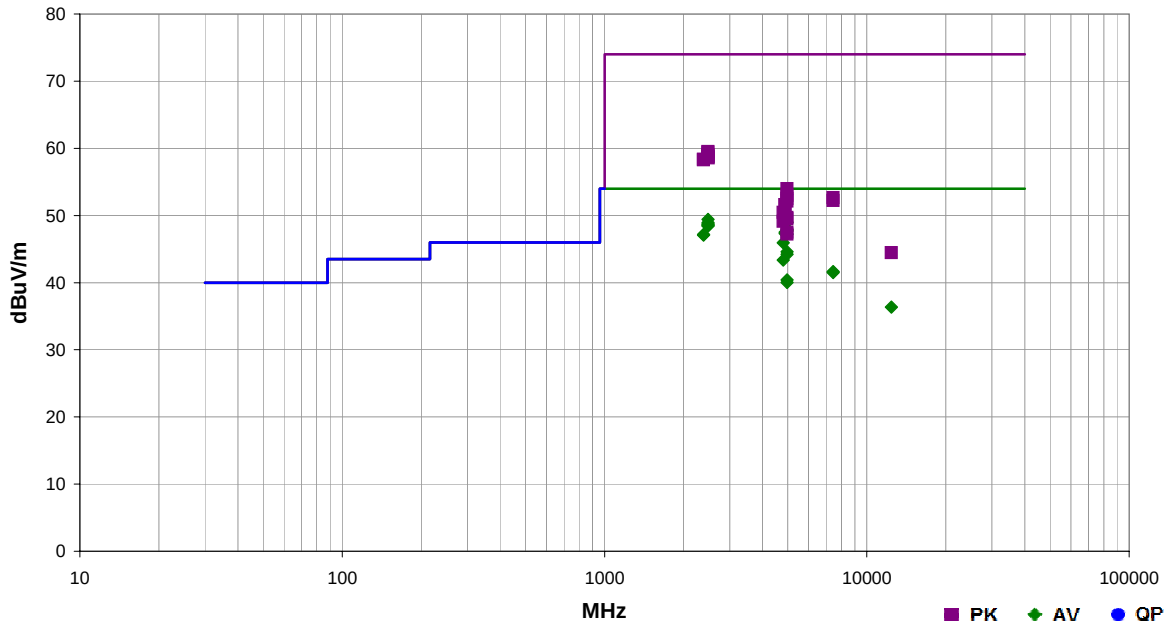
| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7442.175 | 28.0 | 13.5 | 4.0 | 336.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 41.5 | 54.0 | -12.5 | EUT on Side. High Ch, DH5 |
| 2483.625 | 44.6 | -3.6 | 1.0 | 247.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 61.0 | 74.0 | -13.0 | EUT Vertical, High Ch, DH5 |
| 2483.833 | 44.4 | -3.6 | 1.0 | 247.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 60.8 | 74.0 | -13.2 | EUT Vertical, High Ch, 2DH5 |
| 2483.775 | 43.3 | -3.6 | 1.0 | 247.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 59.7 | 74.0 | -14.3 | EUT Vertical, High Ch, 3DH5 |
| 2485.450 | 42.6 | -3.6 | 1.0 | 346.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 59.0 | 74.0 | -15.0 | EUT on Side, High Ch, DH5 |
| 2483.508 | 42.3 | -3.6 | 1.0 | 39.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.7 | 74.0 | -15.3 | EUT Horizontal, High Ch, DH5 |
| 12199.230 | 44.9 | -6.2 | 1.0 | 256.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 38.7 | 54.0 | -15.3 | EUT Vertical, Mid Ch, DH5 |
| 12199.440 | 44.8 | -6.2 | 1.0 | 230.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 38.6 | 54.0 | -15.4 | EUT on Side, Mid Ch, DH5 |
| 12009.360 | 45.2 | -6.7 | 1.0 | 222.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 38.5 | 54.0 | -15.5 | EUT on Side, Low Ch, DH5 |
| 2488.283 | 42.0 | -3.5 | 3.8 | 97.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.5 | 74.0 | -15.5 | EUT on Side, High Ch, DH5 |
| 2485.942 | 41.9 | -3.6 | 3.1 | 66.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.3 | 74.0 | -15.7 | EUT Vertical, High Ch, DH5 |
| 2485.058 | 41.8 | -3.6 | 1.0 | 156.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 58.2 | 74.0 | -15.8 | EUT Horizontal, High Ch, DH5 |
| 2388.533 | 42.0 | -3.8 | 1.0 | 51.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 58.2 | 74.0 | -15.8 | EUT Vertical, Low Ch, 3DH5 |
| 2388.583 | 41.6 | -3.8 | 1.0 | 51.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 57.8 | 74.0 | -16.2 | EUT Vertical, Low Ch, DH5 |
| 2388.133 | 41.5 | -3.8 | 1.0 | 51.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 57.7 | 74.0 | -16.3 | EUT Vertical, Low Ch, 2DH5 |
| 12399.270 | 43.0 | -5.7 | 1.1 | 256.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 37.3 | 54.0 | -16.7 | EUT Vertical, High Ch, DH5 |
| 4960.250 | 50.2 | 5.1 | 1.2 | 318.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 55.3 | 74.0 | -18.7 | EUT on Side. High Ch, DH5 |
| 4960.008 | 50.2 | 5.1 | 1.1 | 325.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 55.3 | 74.0 | -18.7 | EUT on Side. High Ch, 3DH5 |
| 4959.608 | 50.2 | 5.1 | 1.1 | 325.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 55.3 | 74.0 | -18.7 | EUT on Side. High Ch, 2DH5 |
| 12399.310 | 40.6 | -5.7 | 1.0 | 278.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 34.9 | 54.0 | -19.1 | EUT on Side, High Ch, DH5 |
| 12009.330 | 41.3 | -6.7 | 1.0 | 247.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 34.6 | 54.0 | -19.4 | EUT Vertical, Low Ch, DH5 |
| 4960.117 | 49.2 | 5.1 | 1.0 | 319.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 54.3 | 74.0 | -19.7 | EUT Horizontal. High Ch, DH5 |
| 4806.167 | 29.5 | 4.4 | 2.3 | 0.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 33.9 | 54.0 | -20.1 | EUT Vertical, Low Ch, DH5 |
| 4806.067 | 29.5 | 4.3 | 1.0 | 291.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 33.8 | 54.0 | -20.2 | EUT on Side. Low Ch, DH5 |
| 4960.100 | 48.3 | 5.1 | 1.5 | 225.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 53.4 | 74.0 | -20.6 | EUT Vertical, High Ch, DH5 |
| 7320.817 | 40.5 | 12.5 | 1.0 | 275.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 53.0 | 74.0 | -21.0 | EUT Vertical, Mid Ch, DH5 |
| 7438.908 | 39.3 | 13.5 | 1.1 | 278.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 52.8 | 74.0 | -21.2 | EUT Vertical, High Ch, DH5 |
| 7318.942 | 40.0 | 12.5 | 1.0 | 116.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 52.5 | 74.0 | -21.5 | EUT on Side. Mid Ch, DH5 |
| 7440.225 | 38.9 | 13.5 | 4.0 | 336.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 52.4 | 74.0 | -21.6 | EUT on Side. High Ch, DH5 |
| 4960.325 | 46.1 | 5.1 | 1.0 | 244.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 51.2 | 74.0 | -22.8 | EUT Vertical, High Ch, DH5 |
| 4959.733 | 46.0 | 5.1 | 1.0 | 353.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 51.1 | 74.0 | -22.9 | EUT Horizontal. High Ch, DH5 |
| 4880.167 | 45.6 | 4.7 | 1.4 | 234.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 50.3 | 74.0 | -23.7 | EUT Vertical, Mid Ch, DH5 |
| 4880.267 | 45.2 | 4.7 | 1.0 | 325.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 49.9 | 74.0 | -24.1 | EUT on Side. Mid Ch, DH5 |
| 4960.167 | 44.3 | 5.1 | 1.3 | 316.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 49.4 | 74.0 | -24.6 | EUT on Side. High Ch, DH5 |
| 12200.940 | 51.7 | -6.2 | 1.0 | 230.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 45.5 | 74.0 | -28.5 | EUT on Side, Mid Ch, DH5 |
| 12200.710 | 51.7 | -6.2 | 1.0 | 256.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 45.5 | 74.0 | -28.5 | EUT Vertical, Mid Ch, DH5 |
| 12009.300 | 52.1 | -6.7 | 1.0 | 222.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 45.4 | 74.0 | -28.6 | EUT on Side, Low Ch, DH5 |
| 4805.867 | 40.9 | 4.3 | 1.0 | 291.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 45.2 | 74.0 | -28.8 | EUT on Side. Low Ch, DH5 |
| 4808.592 | 40.2 | 4.4 | 2.3 | 0.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 44.6 | 74.0 | -29.4 | EUT Vertical, Low Ch, DH5 |
| 12399.190 | 50.0 | -5.7 | 1.1 | 256.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 44.3 | 74.0 | -29.7 | EUT Vertical, High Ch, DH5 |
| 12009.230 | 49.8 | -6.7 | 1.0 | 247.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 43.1 | 74.0 | -30.9 | EUT Vertical, Low Ch, DH5 |
| 12399.330 | 48.5 | -5.7 | 1.0 | 278.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 42.8 | 74.0 | -31.2 | EUT on Side, High Ch, DH5 |

# Spurious Radiated Emissions

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | LGPD0100 | **Date:** | 05/29/13 | Trevor Buls | |
| **Project:** | None | **Temperature:** | 22.4 °C | | |
| **Job Site:** | MN05 | **Humidity:** | 50.2% RH | | |
| **Serial Number:** | 1413M00359 | **Barometric Pres.:** | 1009.4 mbar | **Tested by:** | Trevor Buls |
| **EUT:** | 37x Torpedo + Wireless SOM -31 | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | Logic PD, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting Bluetooth EDR, Low, Mid, High (2402, 2440, 2480 MHz) at DH5, 2DH5, 3DH5 -Chip (see comments) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | EUT orientation is based on the transmit module. | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2013 | ANSI C63.10:2009 |

| **Run #** | 11 | **Test Distance (m)** | 3 | **Antenna Height(s)** | 1-4m | **Results** | Pass |
|---|---|---|---|---|---|---|---|




| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.500 | 33.0 | -3.6 | 2.1 | 232.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 49.4 | 54.0 | -4.6 | EUT Vertical, High Ch, DH5 |
| 4960.000 | 43.9 | 5.1 | 1.0 | 295.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 49.0 | 54.0 | -5.0 | EUT on Side, High Ch, DH5 |
| 2483.508 | 32.5 | -3.6 | 1.0 | 226.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 48.9 | 54.0 | -5.1 | EUT on Side, High Ch, DH5 |
| 2483.500 | 32.3 | -3.6 | 2.1 | 232.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 48.7 | 54.0 | -5.3 | EUT Vertical, High Ch, 3DH5 |
| 2483.500 | 32.2 | -3.6 | 2.1 | 232.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 48.6 | 54.0 | -5.4 | EUT Vertical, High Ch, 2DH5 |
| 2483.575 | 32.0 | -3.6 | 1.0 | 226.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 48.4 | 54.0 | -5.6 | EUT on Side, High Ch, 3DH5 |
| 2483.500 | 32.0 | -3.6 | 1.0 | 226.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 48.4 | 54.0 | -5.6 | EUT on Side, High Ch, 2DH5 |
| 4959.950 | 42.8 | 5.1 | 1.0 | 291.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 47.9 | 54.0 | -6.1 | EUT on Side, High Ch, 3DH5 |
| 4959.975 | 42.6 | 5.1 | 1.2 | 252.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 47.7 | 54.0 | -6.3 | EUT Vertical, High Ch, DH5 |
| 4879.967 | 42.8 | 4.7 | 1.0 | 300.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 47.5 | 54.0 | -6.5 | EUT on Side, Mid Ch, DH5 |
| 4879.983 | 42.6 | 4.7 | 1.0 | 251.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 47.3 | 54.0 | -6.7 | EUT Vertical, Mid Ch, DH5 |
| 4960.108 | 42.1 | 5.1 | 1.0 | 291.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 47.2 | 54.0 | -6.8 | EUT on Side, High Ch, 2DH5 |
| 2385.833 | 31.0 | -3.8 | 1.0 | 202.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 47.2 | 54.0 | -6.8 | EUT on Side, Low Ch, DH5 |
| 2386.675 | 30.9 | -3.8 | 1.0 | 121.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 47.1 | 54.0 | -6.9 | EUT Vertical, Low Ch, DH5 |
| 4804.058 | 41.6 | 4.3 | 1.0 | 302.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 45.9 | 54.0 | -8.1 | EUT on Side, Low Ch, DH5 |
| 4959.975 | 39.5 | 5.1 | 1.0 | 75.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 44.6 | 54.0 | -9.4 | EUT Horizontal, High Ch, DH5 |
| 4959.967 | 39.1 | 5.1 | 1.0 | 216.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 44.2 | 54.0 | -9.8 | EUT Horizontal, High Ch, DH5 |
| 4803.958 | 39.0 | 4.3 | 1.0 | 247.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 43.3 | 54.0 | -10.7 | EUT Vertical, Low Ch, DH5 |
| 7433.708 | 28.2 | 13.4 | 1.0 | 106.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 41.6 | 54.0 | -12.4 | EUT on Side, High Ch, DH5 |
| 7431.692 | 28.1 | 13.4 | 1.0 | 104.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 41.5 | 54.0 | -12.5 | EUT Vertical, High Ch, DH5 |
| 4959.942 | 35.3 | 5.1 | 1.0 | 238.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 40.4 | 54.0 | -13.6 | EUT Vertical, High Ch, DH5 |
| 4960.000 | 34.9 | 5.1 | 1.4 | 236.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 40.0 | 54.0 | -14.0 | EUT on Side, High Ch, DH5 |
| 2483.650 | 43.1 | -3.6 | 1.0 | 226.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 59.5 | 74.0 | -14.5 | EUT on Side, High Ch, DH5 |
| 2483.833 | 43.0 | -3.6 | 2.1 | 232.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 59.4 | 74.0 | -14.6 | EUT Vertical, High Ch, DH5 |

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.975 | 42.6 | -3.6 | 2.1 | 232.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 59.0 | 74.0 | -15.0 | EUT Vertical, High Ch, 2DH5 |
| 2484.292 | 42.5 | -3.6 | 1.0 | 226.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.9 | 74.0 | -15.1 | EUT on Side, High Ch, 2DH5 |
| 2486.750 | 42.3 | -3.6 | 1.0 | 226.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.7 | 74.0 | -15.3 | EUT on Side, High Ch, 3DH5 |
| 2485.442 | 42.1 | -3.6 | 2.1 | 232.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 58.5 | 74.0 | -15.5 | EUT Vertical, High Ch, 3DH5 |
| 2387.975 | 42.2 | -3.8 | 1.0 | 121.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 58.4 | 74.0 | -15.6 | EUT Vertical, Low Ch, DH5 |
| 2385.908 | 42.1 | -3.8 | 1.0 | 202.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.3 | 74.0 | -15.7 | EUT on Side, Low Ch, DH5 |
| 12399.380 | 42.1 | -5.7 | 1.2 | 239.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 36.4 | 54.0 | -17.6 | EUT on Side, High Ch, DH5 |
| 4960.008 | 48.9 | 5.1 | 1.0 | 291.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 54.0 | 74.0 | -20.0 | EUT on Side, High Ch, 3DH5 |
| 4960.233 | 47.9 | 5.1 | 1.0 | 291.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 53.0 | 74.0 | -21.0 | EUT on Side, High Ch, 2DH5 |
| 7434.333 | 39.2 | 13.4 | 1.0 | 104.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 52.6 | 74.0 | -21.4 | EUT Vertical, High Ch, DH5 |
| 4960.275 | 47.4 | 5.1 | 1.0 | 295.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 52.5 | 74.0 | -21.5 | EUT on Side, High Ch, DH5 |
| 7434.667 | 38.8 | 13.4 | 1.0 | 106.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 52.2 | 74.0 | -21.8 | EUT on Side, High Ch, DH5 |
| 4960.467 | 47.0 | 5.1 | 1.2 | 252.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 52.1 | 74.0 | -21.9 | EUT Vertical, High Ch, DH5 |
| 4880.225 | 46.9 | 4.7 | 1.0 | 251.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 51.6 | 74.0 | -22.4 | EUT Vertical, Mid Ch, DH5 |
| 4880.167 | 46.9 | 4.7 | 1.0 | 300.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 51.6 | 74.0 | -22.4 | EUT on Side, Mid Ch, DH5 |
| 4803.500 | 46.1 | 4.3 | 1.0 | 302.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 50.4 | 74.0 | -23.6 | EUT on Side, Low Ch, DH5 |
| 4960.250 | 44.6 | 5.1 | 1.0 | 75.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 49.7 | 74.0 | -24.3 | EUT Horizontal, High Ch, DH5 |
| 4960.292 | 44.4 | 5.1 | 1.0 | 216.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 49.5 | 74.0 | -24.5 | EUT Horizontal, High Ch, DH5 |
| 4804.433 | 44.8 | 4.3 | 1.0 | 247.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 49.1 | 74.0 | -24.9 | EUT Vertical, Low Ch, DH5 |
| 4959.883 | 42.4 | 5.1 | 1.0 | 238.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 47.5 | 74.0 | -26.5 | EUT Vertical, High Ch, DH5 |
| 4960.108 | 42.1 | 5.1 | 1.4 | 236.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 47.2 | 74.0 | -26.8 | EUT on Side, High Ch, DH5 |
| 12399.180 | 50.2 | -5.7 | 1.2 | 239.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 44.5 | 74.0 | -29.5 | EUT on Side, High Ch, DH5 |

# POWERLINE CONDUCTED EMISSIONS

## TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the DC input of the EUT. The power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

## TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Receiver | Rohde & Schwarz | ESCI | ARG | 04/01/2013 | 12 mo |
| Attenuator 20dB, BNC | Fairview Microwave | SA01B-20 | AQP | 08/15/2012 | 12 mo |
| High Pass Filter | TTE | H97-100K-50-720B | HGN | 05/31/2012 | 24 mo |
| DC Power Supply | EZ Digital Co | GP-4303D | TPY | NCR | 0 mo |
| MN03 Cables | ESM Cable Corp. | Conducted Cables | MNC | 01/17/2013 | 12 mo |
| LISN | Solar Electronics | 9252-50-R-24-BNC | LIY | 05/24/2013 | 12 mo |

## MEASUREMENT UNCERTAINTY

| Description | | |
|---|---|---|
| Expanded k=2 | 2.94 dB | -2.94 dB |

## CONFIGURATIONS INVESTIGATED

LGPD0096-2

## MODES INVESTIGATED

Transmitting BT EDR, High Ch
Transmitting BT EDR, Low Ch
Transmitting BT EDR, Mid Ch

# POWERLINE CONDUCTED EMISSIONS

| | | | |
|---|---|---|---|
| EUT: | 37x Torpedo + Wireless SOM -31 | Work Order: | LGPD0096 |
| Serial Number: | 1413M00359 | Date: | 05/30/2013 |
| Customer: | Logic PD, Inc. | Temperature: | 22.8°C |
| Attendees: | None | Relative Humidity: | 60.6% |
| Customer Project: | None | Bar. Pressure: | 1002.2 mb |
| Tested By: | Mike Sutherland, Trevor Buls | Job Site: | MN03 |
| Power: | 5 VDC | Configuration: | LGPD0096-2 |

## TEST SPECIFICATIONS

| Specification: | Method: |
|---|---|
| FCC 15.207:2013 | ANSI C63.10:2009 |

## TEST PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Run #: | 17 | Line: | High Line | Ext. Attenuation (dB): | 20 |

## COMMENTS

None

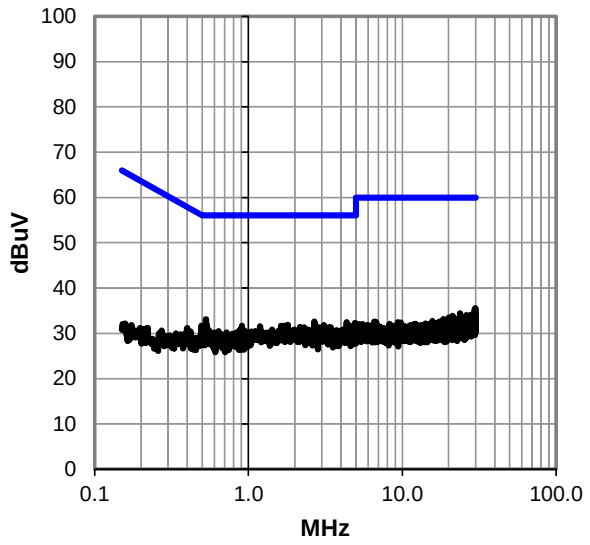
## EUT OPERATING MODES

Transmitting BT EDR, Low Ch

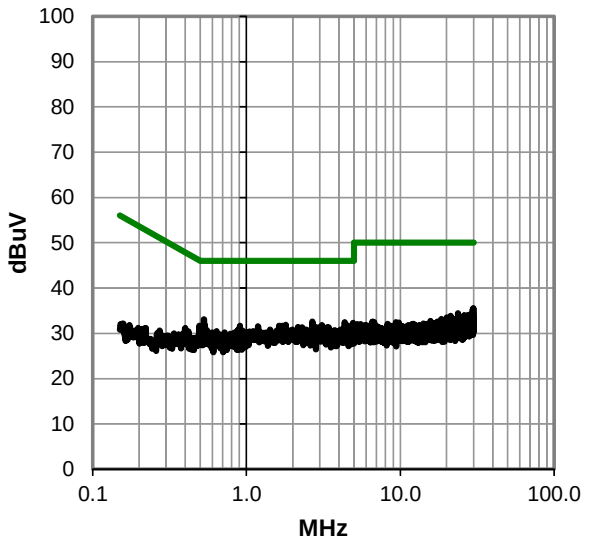
## DEVIATIONS FROM TEST STANDARD

None

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #17

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.529 | 12.9 | 20.2 | 33.1 | 56.0 | -22.9 |
| 2.680 | 12.3 | 20.3 | 32.6 | 56.0 | -23.4 |
| 4.344 | 12.1 | 20.4 | 32.5 | 56.0 | -23.5 |
| 4.928 | 11.9 | 20.4 | 32.3 | 56.0 | -23.7 |
| 1.800 | 11.6 | 20.3 | 31.9 | 56.0 | -24.1 |
| 3.096 | 11.5 | 20.3 | 31.8 | 56.0 | -24.2 |
| 4.544 | 11.4 | 20.4 | 31.8 | 56.0 | -24.2 |
| 0.906 | 11.5 | 20.2 | 31.7 | 56.0 | -24.3 |
| 1.712 | 11.4 | 20.3 | 31.7 | 56.0 | -24.3 |
| 29.960 | 13.2 | 22.4 | 35.6 | 60.0 | -24.4 |
| 0.493 | 11.5 | 20.2 | 31.7 | 56.1 | -24.4 |
| 1.184 | 11.3 | 20.2 | 31.5 | 56.0 | -24.5 |
| 2.808 | 11.1 | 20.3 | 31.4 | 56.0 | -24.6 |
| 2.160 | 11.1 | 20.3 | 31.4 | 56.0 | -24.6 |
| 3.416 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 3.344 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 2.960 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 29.660 | 12.9 | 22.4 | 35.3 | 60.0 | -24.7 |
| 4.656 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 0.889 | 10.7 | 20.2 | 30.9 | 56.0 | -25.1 |
| 2.448 | 10.5 | 20.3 | 30.8 | 56.0 | -25.2 |
| 3.744 | 10.3 | 20.4 | 30.7 | 56.0 | -25.3 |
| 29.590 | 12.3 | 22.4 | 34.7 | 60.0 | -25.3 |
| 3.512 | 10.3 | 20.4 | 30.7 | 56.0 | -25.3 |
| 0.874 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |
| 0.942 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.529 | 12.9 | 20.2 | 33.1 | 46.0 | -12.9 |
| 2.680 | 12.3 | 20.3 | 32.6 | 46.0 | -13.4 |
| 4.344 | 12.1 | 20.4 | 32.5 | 46.0 | -13.5 |
| 4.928 | 11.9 | 20.4 | 32.3 | 46.0 | -13.7 |
| 1.800 | 11.6 | 20.3 | 31.9 | 46.0 | -14.1 |
| 3.096 | 11.5 | 20.3 | 31.8 | 46.0 | -14.2 |
| 4.544 | 11.4 | 20.4 | 31.8 | 46.0 | -14.2 |
| 0.906 | 11.5 | 20.2 | 31.7 | 46.0 | -14.3 |
| 1.712 | 11.4 | 20.3 | 31.7 | 46.0 | -14.3 |
| 29.960 | 13.2 | 22.4 | 35.6 | 50.0 | -14.4 |
| 0.493 | 11.5 | 20.2 | 31.7 | 46.1 | -14.4 |
| 1.184 | 11.3 | 20.2 | 31.5 | 46.0 | -14.5 |
| 2.808 | 11.1 | 20.3 | 31.4 | 46.0 | -14.6 |
| 2.160 | 11.1 | 20.3 | 31.4 | 46.0 | -14.6 |
| 3.416 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 3.344 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 2.960 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 29.660 | 12.9 | 22.4 | 35.3 | 50.0 | -14.7 |
| 4.656 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 0.889 | 10.7 | 20.2 | 30.9 | 46.0 | -15.1 |
| 2.448 | 10.5 | 20.3 | 30.8 | 46.0 | -15.2 |
| 3.744 | 10.3 | 20.4 | 30.7 | 46.0 | -15.3 |
| 29.590 | 12.3 | 22.4 | 34.7 | 50.0 | -15.3 |
| 3.512 | 10.3 | 20.4 | 30.7 | 46.0 | -15.3 |
| 0.874 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |
| 0.942 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |

## CONCLUSION

Pass

Trevor Buls

Tested_By

# POWERLINE CONDUCTED EMISSIONS

| | | | |
|---|---|---|---|
| EUT: | 37x Torpedo + Wireless SOM -31 | Work Order: | LGPD0096 |
| Serial Number: | 1413M00359 | Date: | 05/30/2013 |
| Customer: | Logic PD, Inc. | Temperature: | 22.8°C |
| Attendees: | None | Relative Humidity: | 60.6% |
| Customer Project: | None | Bar. Pressure: | 1002.2 mb |
| Tested By: | Mike Sutherland, Trevor Buls | Job Site: | MN03 |
| Power: | 5 VDC | Configuration: | LGPD0096-2 |

## TEST SPECIFICATIONS

| Specification: | Method: |
|---|---|
| FCC 15.207:2013 | ANSI C63.10:2009 |

## TEST PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Run #: | 18 | Line: | Neutral | Ext. Attenuation (dB): | 20 |

## COMMENTS

None

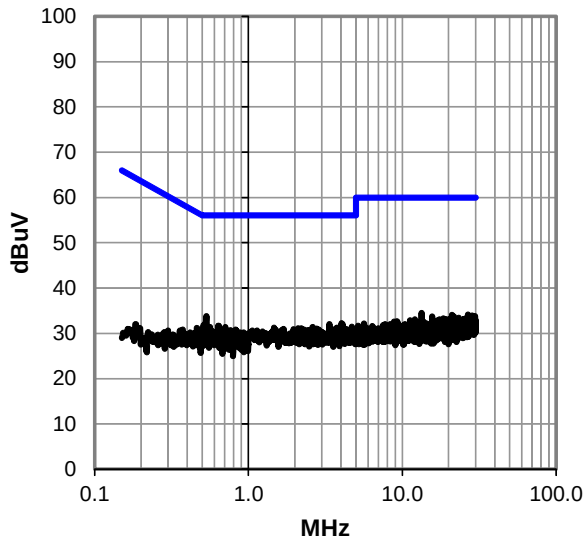
## EUT OPERATING MODES

Transmitting BT EDR, Low Ch

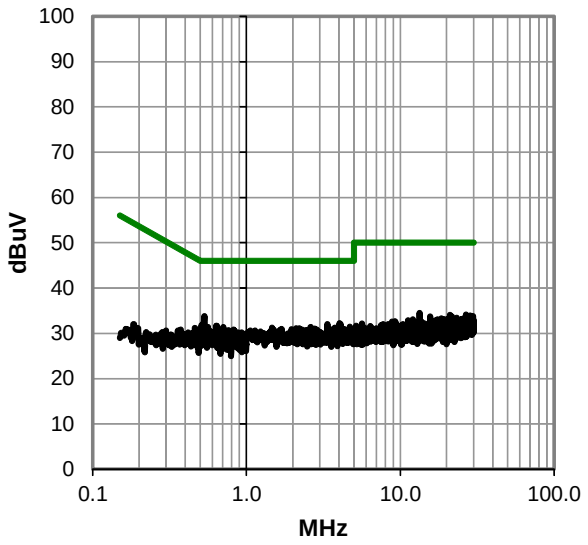
## DEVIATIONS FROM TEST STANDARD

None

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #18

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.534 | 13.6 | 20.2 | 33.8 | 56.0 | -22.2 |
| 4.032 | 11.9 | 20.4 | 32.3 | 56.0 | -23.7 |
| 4.080 | 11.7 | 20.4 | 32.1 | 56.0 | -23.9 |
| 3.352 | 11.7 | 20.3 | 32.0 | 56.0 | -24.0 |
| 0.510 | 11.6 | 20.2 | 31.8 | 56.0 | -24.2 |
| 0.640 | 11.5 | 20.2 | 31.7 | 56.0 | -24.3 |
| 4.704 | 11.1 | 20.4 | 31.5 | 56.0 | -24.5 |
| 2.616 | 11.1 | 20.3 | 31.4 | 56.0 | -24.6 |
| 0.563 | 11.2 | 20.2 | 31.4 | 56.0 | -24.6 |
| 0.708 | 11.2 | 20.2 | 31.4 | 56.0 | -24.6 |
| 3.744 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 1.464 | 11.0 | 20.2 | 31.2 | 56.0 | -24.8 |
| 2.200 | 10.8 | 20.3 | 31.1 | 56.0 | -24.9 |
| 2.104 | 10.8 | 20.3 | 31.1 | 56.0 | -24.9 |
| 4.208 | 10.7 | 20.4 | 31.1 | 56.0 | -24.9 |
| 2.768 | 10.7 | 20.3 | 31.0 | 56.0 | -25.0 |
| 4.304 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 1.696 | 10.7 | 20.3 | 31.0 | 56.0 | -25.0 |
| 3.576 | 10.5 | 20.4 | 30.9 | 56.0 | -25.1 |
| 2.872 | 10.5 | 20.3 | 30.8 | 56.0 | -25.2 |
| 2.296 | 10.5 | 20.3 | 30.8 | 56.0 | -25.2 |
| 0.823 | 10.6 | 20.2 | 30.8 | 56.0 | -25.2 |
| 2.440 | 10.4 | 20.3 | 30.7 | 56.0 | -25.3 |
| 0.764 | 10.5 | 20.2 | 30.7 | 56.0 | -25.3 |
| 1.136 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |
| 0.672 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.534 | 13.6 | 20.2 | 33.8 | 46.0 | -12.2 |
| 4.032 | 11.9 | 20.4 | 32.3 | 46.0 | -13.7 |
| 4.080 | 11.7 | 20.4 | 32.1 | 46.0 | -13.9 |
| 3.352 | 11.7 | 20.3 | 32.0 | 46.0 | -14.0 |
| 0.510 | 11.6 | 20.2 | 31.8 | 46.0 | -14.2 |
| 0.640 | 11.5 | 20.2 | 31.7 | 46.0 | -14.3 |
| 4.704 | 11.1 | 20.4 | 31.5 | 46.0 | -14.5 |
| 2.616 | 11.1 | 20.3 | 31.4 | 46.0 | -14.6 |
| 0.563 | 11.2 | 20.2 | 31.4 | 46.0 | -14.6 |
| 0.708 | 11.2 | 20.2 | 31.4 | 46.0 | -14.6 |
| 3.744 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 1.464 | 11.0 | 20.2 | 31.2 | 46.0 | -14.8 |
| 2.200 | 10.8 | 20.3 | 31.1 | 46.0 | -14.9 |
| 2.104 | 10.8 | 20.3 | 31.1 | 46.0 | -14.9 |
| 4.208 | 10.7 | 20.4 | 31.1 | 46.0 | -14.9 |
| 2.768 | 10.7 | 20.3 | 31.0 | 46.0 | -15.0 |
| 4.304 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 1.696 | 10.7 | 20.3 | 31.0 | 46.0 | -15.0 |
| 3.576 | 10.5 | 20.4 | 30.9 | 46.0 | -15.1 |
| 2.872 | 10.5 | 20.3 | 30.8 | 46.0 | -15.2 |
| 2.296 | 10.5 | 20.3 | 30.8 | 46.0 | -15.2 |
| 0.823 | 10.6 | 20.2 | 30.8 | 46.0 | -15.2 |
| 2.440 | 10.4 | 20.3 | 30.7 | 46.0 | -15.3 |
| 0.764 | 10.5 | 20.2 | 30.7 | 46.0 | -15.3 |
| 1.136 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |
| 0.672 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |

## CONCLUSION

Pass

Tested_By

# POWERLINE CONDUCTED EMISSIONS

| | | | |
|---|---|---|---|
| EUT: | 37x Torpedo + Wireless SOM -31 | Work Order: | LGPD0096 |
| Serial Number: | 1413M00359 | Date: | 05/30/2013 |
| Customer: | Logic PD, Inc. | Temperature: | 22.8°C |
| Attendees: | None | Relative Humidity: | 60.6% |
| Customer Project: | None | Bar. Pressure: | 1002.2 mb |
| Tested By: | Mike Sutherland, Trevor Buls | Job Site: | MN03 |
| Power: | 5 VDC | Configuration: | LGPD0096-2 |

## TEST SPECIFICATIONS

| Specification: | Method: |
|---|---|
| FCC 15.207:2013 | ANSI C63.10:2009 |

## TEST PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Run #: | 19 | Line: | Neutral | Ext. Attenuation (dB): | 20 |

## COMMENTS

None

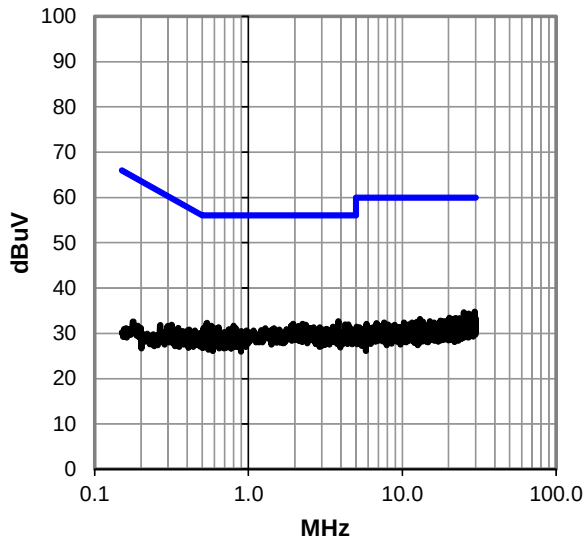
## EUT OPERATING MODES

Transmitting BT EDR, Mid Ch

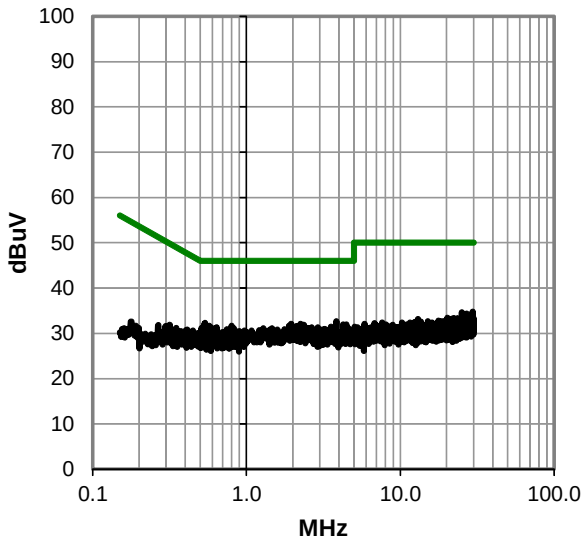
## DEVIATIONS FROM TEST STANDARD

None

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #19

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 3.840 | 12.3 | 20.4 | 32.7 | 56.0 | -23.3 |
| 0.538 | 12.1 | 20.2 | 32.3 | 56.0 | -23.7 |
| 2.240 | 11.8 | 20.3 | 32.1 | 56.0 | -23.9 |
| 1.952 | 11.8 | 20.3 | 32.1 | 56.0 | -23.9 |
| 4.464 | 11.6 | 20.4 | 32.0 | 56.0 | -24.0 |
| 4.256 | 11.6 | 20.4 | 32.0 | 56.0 | -24.0 |
| 2.360 | 11.6 | 20.3 | 31.9 | 56.0 | -24.1 |
| 0.572 | 11.5 | 20.2 | 31.7 | 56.0 | -24.3 |
| 0.801 | 11.5 | 20.2 | 31.7 | 56.0 | -24.3 |
| 1.888 | 11.4 | 20.3 | 31.7 | 56.0 | -24.3 |
| 2.120 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 3.544 | 11.1 | 20.4 | 31.5 | 56.0 | -24.5 |
| 2.904 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 2.656 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 0.590 | 11.1 | 20.2 | 31.3 | 56.0 | -24.7 |
| 0.640 | 11.1 | 20.2 | 31.3 | 56.0 | -24.7 |
| 4.336 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 0.510 | 11.0 | 20.2 | 31.2 | 56.0 | -24.8 |
| 4.592 | 10.8 | 20.4 | 31.2 | 56.0 | -24.8 |
| 1.464 | 10.9 | 20.2 | 31.1 | 56.0 | -24.9 |
| 1.288 | 10.9 | 20.2 | 31.1 | 56.0 | -24.9 |
| 0.827 | 10.9 | 20.2 | 31.1 | 56.0 | -24.9 |
| 3.624 | 10.7 | 20.4 | 31.1 | 56.0 | -24.9 |
| 3.232 | 10.6 | 20.3 | 30.9 | 56.0 | -25.1 |
| 0.745 | 10.7 | 20.2 | 30.9 | 56.0 | -25.1 |
| 3.104 | 10.5 | 20.3 | 30.8 | 56.0 | -25.2 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 3.840 | 12.3 | 20.4 | 32.7 | 46.0 | -13.3 |
| 0.538 | 12.1 | 20.2 | 32.3 | 46.0 | -13.7 |
| 2.240 | 11.8 | 20.3 | 32.1 | 46.0 | -13.9 |
| 1.952 | 11.8 | 20.3 | 32.1 | 46.0 | -13.9 |
| 4.464 | 11.6 | 20.4 | 32.0 | 46.0 | -14.0 |
| 4.256 | 11.6 | 20.4 | 32.0 | 46.0 | -14.0 |
| 2.360 | 11.6 | 20.3 | 31.9 | 46.0 | -14.1 |
| 0.572 | 11.5 | 20.2 | 31.7 | 46.0 | -14.3 |
| 0.801 | 11.5 | 20.2 | 31.7 | 46.0 | -14.3 |
| 1.888 | 11.4 | 20.3 | 31.7 | 46.0 | -14.3 |
| 2.120 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 3.544 | 11.1 | 20.4 | 31.5 | 46.0 | -14.5 |
| 2.904 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 2.656 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 0.590 | 11.1 | 20.2 | 31.3 | 46.0 | -14.7 |
| 0.640 | 11.1 | 20.2 | 31.3 | 46.0 | -14.7 |
| 4.336 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 0.510 | 11.0 | 20.2 | 31.2 | 46.0 | -14.8 |
| 4.592 | 10.8 | 20.4 | 31.2 | 46.0 | -14.8 |
| 1.464 | 10.9 | 20.2 | 31.1 | 46.0 | -14.9 |
| 1.288 | 10.9 | 20.2 | 31.1 | 46.0 | -14.9 |
| 0.827 | 10.9 | 20.2 | 31.1 | 46.0 | -14.9 |
| 3.624 | 10.7 | 20.4 | 31.1 | 46.0 | -14.9 |
| 3.232 | 10.6 | 20.3 | 30.9 | 46.0 | -15.1 |
| 0.745 | 10.7 | 20.2 | 30.9 | 46.0 | -15.1 |
| 3.104 | 10.5 | 20.3 | 30.8 | 46.0 | -15.2 |

## CONCLUSION

Pass

Trevor Buls

Tested_By

# POWERLINE CONDUCTED EMISSIONS

| | | | |
|---|---|---|---|
| EUT: | 37x Torpedo + Wireless SOM -31 | Work Order: | LGPD0096 |
| Serial Number: | 1413M00359 | Date: | 05/30/2013 |
| Customer: | Logic PD, Inc. | Temperature: | 22.8°C |
| Attendees: | None | Relative Humidity: | 60.6% |
| Customer Project: | None | Bar. Pressure: | 1002.2 mb |
| Tested By: | Mike Sutherland, Trevor Buls | Job Site: | MN03 |
| Power: | 5 VDC | Configuration: | LGPD0096-2 |

## TEST SPECIFICATIONS

| Specification: | Method: |
|---|---|
| FCC 15.207:2013 | ANSI C63.10:2009 |

## TEST PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Run #: | 20 | Line: | High Line | Ext. Attenuation (dB): | 20 |

## COMMENTS

None

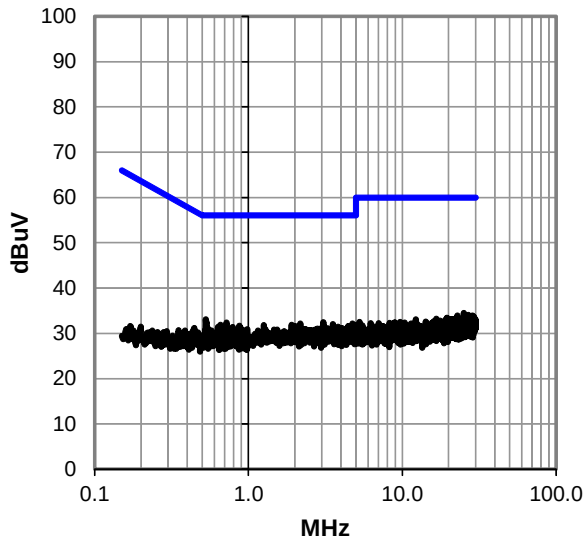
## EUT OPERATING MODES

Transmitting BT EDR, Mid Ch

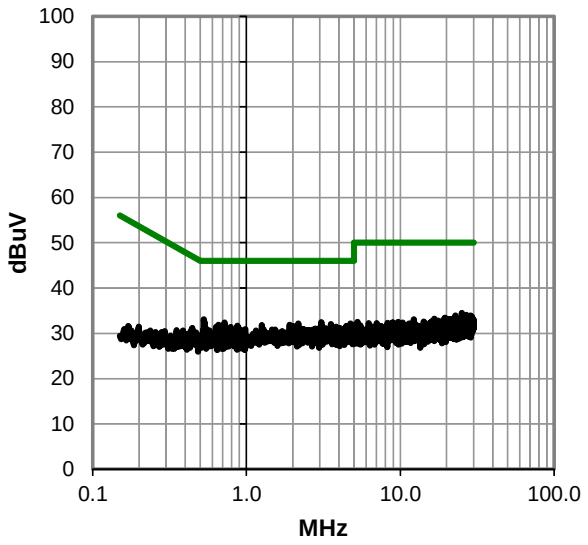
## DEVIATIONS FROM TEST STANDARD

None

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #20

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.529 | 12.9 | 20.2 | 33.1 | 56.0 | -22.9 |
| 3.064 | 12.1 | 20.3 | 32.4 | 56.0 | -23.6 |
| 0.719 | 12.2 | 20.2 | 32.4 | 56.0 | -23.6 |
| 2.176 | 11.9 | 20.3 | 32.2 | 56.0 | -23.8 |
| 4.744 | 11.8 | 20.4 | 32.2 | 56.0 | -23.8 |
| 3.536 | 11.7 | 20.4 | 32.1 | 56.0 | -23.9 |
| 0.657 | 11.7 | 20.2 | 31.9 | 56.0 | -24.1 |
| 1.904 | 11.6 | 20.3 | 31.9 | 56.0 | -24.1 |
| 1.256 | 11.6 | 20.2 | 31.8 | 56.0 | -24.2 |
| 4.912 | 11.4 | 20.4 | 31.8 | 56.0 | -24.2 |
| 0.874 | 11.5 | 20.2 | 31.7 | 56.0 | -24.3 |
| 2.008 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 4.520 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 0.640 | 11.3 | 20.2 | 31.5 | 56.0 | -24.5 |
| 3.824 | 11.1 | 20.4 | 31.5 | 56.0 | -24.5 |
| 0.791 | 11.2 | 20.2 | 31.4 | 56.0 | -24.6 |
| 4.384 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 0.889 | 11.0 | 20.2 | 31.2 | 56.0 | -24.8 |
| 4.040 | 10.8 | 20.4 | 31.2 | 56.0 | -24.8 |
| 2.936 | 10.7 | 20.3 | 31.0 | 56.0 | -25.0 |
| 2.808 | 10.7 | 20.3 | 31.0 | 56.0 | -25.0 |
| 3.864 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 2.352 | 10.6 | 20.3 | 30.9 | 56.0 | -25.1 |
| 0.981 | 10.7 | 20.2 | 30.9 | 56.0 | -25.1 |
| 1.536 | 10.6 | 20.3 | 30.9 | 56.0 | -25.1 |
| 1.152 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.529 | 12.9 | 20.2 | 33.1 | 46.0 | -12.9 |
| 3.064 | 12.1 | 20.3 | 32.4 | 46.0 | -13.6 |
| 0.719 | 12.2 | 20.2 | 32.4 | 46.0 | -13.6 |
| 2.176 | 11.9 | 20.3 | 32.2 | 46.0 | -13.8 |
| 4.744 | 11.8 | 20.4 | 32.2 | 46.0 | -13.8 |
| 3.536 | 11.7 | 20.4 | 32.1 | 46.0 | -13.9 |
| 0.657 | 11.7 | 20.2 | 31.9 | 46.0 | -14.1 |
| 1.904 | 11.6 | 20.3 | 31.9 | 46.0 | -14.1 |
| 1.256 | 11.6 | 20.2 | 31.8 | 46.0 | -14.2 |
| 4.912 | 11.4 | 20.4 | 31.8 | 46.0 | -14.2 |
| 0.874 | 11.5 | 20.2 | 31.7 | 46.0 | -14.3 |
| 2.008 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 4.520 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 0.640 | 11.3 | 20.2 | 31.5 | 46.0 | -14.5 |
| 3.824 | 11.1 | 20.4 | 31.5 | 46.0 | -14.5 |
| 0.791 | 11.2 | 20.2 | 31.4 | 46.0 | -14.6 |
| 4.384 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 0.889 | 11.0 | 20.2 | 31.2 | 46.0 | -14.8 |
| 4.040 | 10.8 | 20.4 | 31.2 | 46.0 | -14.8 |
| 2.936 | 10.7 | 20.3 | 31.0 | 46.0 | -15.0 |
| 2.808 | 10.7 | 20.3 | 31.0 | 46.0 | -15.0 |
| 3.864 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 2.352 | 10.6 | 20.3 | 30.9 | 46.0 | -15.1 |
| 0.981 | 10.7 | 20.2 | 30.9 | 46.0 | -15.1 |
| 1.536 | 10.6 | 20.3 | 30.9 | 46.0 | -15.1 |
| 1.152 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |

## CONCLUSION

Pass

Trevor Buls

Tested_By

# POWERLINE CONDUCTED EMISSIONS

| | | | |
|---|---|---|---|
| EUT: | 37x Torpedo + Wireless SOM -31 | Work Order: | LGPD0096 |
| Serial Number: | 1413M00359 | Date: | 05/30/2013 |
| Customer: | Logic PD, Inc. | Temperature: | 22.8°C |
| Attendees: | None | Relative Humidity: | 60.6% |
| Customer Project: | None | Bar. Pressure: | 1002.2 mb |
| Tested By: | Mike Sutherland, Trevor Buls | Job Site: | MN03 |
| Power: | 5 VDC | Configuration: | LGPD0096-2 |

## TEST SPECIFICATIONS

| Specification: | Method: |
|---|---|
| FCC 15.207:2013 | ANSI C63.10:2009 |

## TEST PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Run #: | 21 | Line: | High Line | Ext. Attenuation (dB): | 20 |

## COMMENTS

None

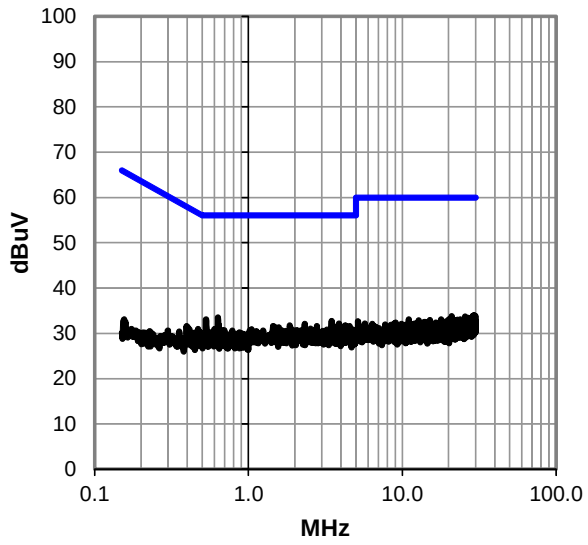
## EUT OPERATING MODES

Transmitting BT EDR, High Ch

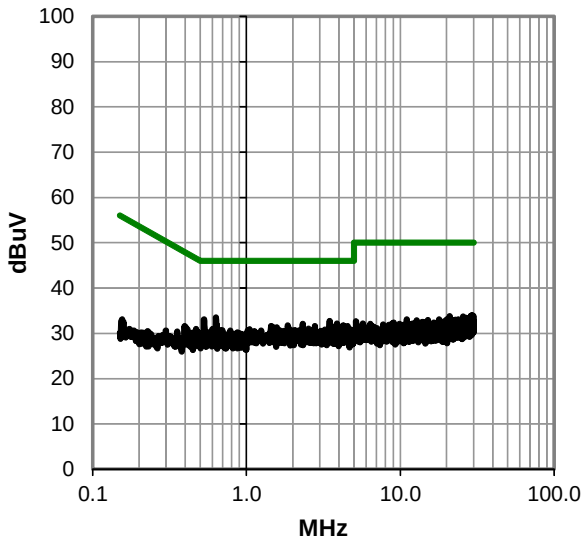
## DEVIATIONS FROM TEST STANDARD

None

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #21

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.635 | 13.3 | 20.2 | 33.5 | 56.0 | -22.5 |
| 0.531 | 12.9 | 20.2 | 33.1 | 56.0 | -22.9 |
| 3.472 | 12.4 | 20.3 | 32.7 | 56.0 | -23.3 |
| 3.872 | 11.8 | 20.4 | 32.2 | 56.0 | -23.8 |
| 2.320 | 11.8 | 20.3 | 32.1 | 56.0 | -23.9 |
| 1.856 | 11.5 | 20.3 | 31.8 | 56.0 | -24.2 |
| 4.240 | 11.4 | 20.4 | 31.8 | 56.0 | -24.2 |
| 4.296 | 11.3 | 20.4 | 31.7 | 56.0 | -24.3 |
| 1.448 | 11.4 | 20.2 | 31.6 | 56.0 | -24.4 |
| 2.784 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 4.552 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 3.696 | 11.1 | 20.4 | 31.5 | 56.0 | -24.5 |
| 1.480 | 11.2 | 20.2 | 31.4 | 56.0 | -24.6 |
| 1.576 | 11.1 | 20.3 | 31.4 | 56.0 | -24.6 |
| 3.656 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 2.536 | 10.7 | 20.3 | 31.0 | 56.0 | -25.0 |
| 0.601 | 10.8 | 20.2 | 31.0 | 56.0 | -25.0 |
| 4.024 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 1.048 | 10.7 | 20.2 | 30.9 | 56.0 | -25.1 |
| 4.728 | 10.5 | 20.4 | 30.9 | 56.0 | -25.1 |
| 3.240 | 10.5 | 20.3 | 30.8 | 56.0 | -25.2 |
| 2.216 | 10.4 | 20.3 | 30.7 | 56.0 | -25.3 |
| 0.672 | 10.5 | 20.2 | 30.7 | 56.0 | -25.3 |
| 0.697 | 10.5 | 20.2 | 30.7 | 56.0 | -25.3 |
| 0.786 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |
| 0.470 | 10.8 | 20.2 | 31.0 | 56.5 | -25.5 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.635 | 13.3 | 20.2 | 33.5 | 46.0 | -12.5 |
| 0.531 | 12.9 | 20.2 | 33.1 | 46.0 | -12.9 |
| 3.472 | 12.4 | 20.3 | 32.7 | 46.0 | -13.3 |
| 3.872 | 11.8 | 20.4 | 32.2 | 46.0 | -13.8 |
| 2.320 | 11.8 | 20.3 | 32.1 | 46.0 | -13.9 |
| 1.856 | 11.5 | 20.3 | 31.8 | 46.0 | -14.2 |
| 4.240 | 11.4 | 20.4 | 31.8 | 46.0 | -14.2 |
| 4.296 | 11.3 | 20.4 | 31.7 | 46.0 | -14.3 |
| 1.448 | 11.4 | 20.2 | 31.6 | 46.0 | -14.4 |
| 2.784 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 4.552 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 3.696 | 11.1 | 20.4 | 31.5 | 46.0 | -14.5 |
| 1.480 | 11.2 | 20.2 | 31.4 | 46.0 | -14.6 |
| 1.576 | 11.1 | 20.3 | 31.4 | 46.0 | -14.6 |
| 3.656 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 2.536 | 10.7 | 20.3 | 31.0 | 46.0 | -15.0 |
| 0.601 | 10.8 | 20.2 | 31.0 | 46.0 | -15.0 |
| 4.024 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 1.048 | 10.7 | 20.2 | 30.9 | 46.0 | -15.1 |
| 4.728 | 10.5 | 20.4 | 30.9 | 46.0 | -15.1 |
| 3.240 | 10.5 | 20.3 | 30.8 | 46.0 | -15.2 |
| 2.216 | 10.4 | 20.3 | 30.7 | 46.0 | -15.3 |
| 0.672 | 10.5 | 20.2 | 30.7 | 46.0 | -15.3 |
| 0.697 | 10.5 | 20.2 | 30.7 | 46.0 | -15.3 |
| 0.786 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |
| 0.470 | 10.8 | 20.2 | 31.0 | 46.5 | -15.5 |

## CONCLUSION

Pass

Trevor Buls

Tested_By

# POWERLINE CONDUCTED EMISSIONS

| | | | |
|---|---|---|---|
| EUT: | 37x Torpedo + Wireless SOM -31 | Work Order: | LGPD0096 |
| Serial Number: | 1413M00359 | Date: | 05/30/2013 |
| Customer: | Logic PD, Inc. | Temperature: | 22.8°C |
| Attendees: | None | Relative Humidity: | 60.6% |
| Customer Project: | None | Bar. Pressure: | 1002.2 mb |
| Tested By: | Mike Sutherland, Trevor Buls | Job Site: | MN03 |
| Power: | 5 VDC | Configuration: | LGPD0096-2 |

## TEST SPECIFICATIONS

| Specification: | Method: |
|---|---|
| FCC 15.207:2013 | ANSI C63.10:2009 |

## TEST PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Run #: | 22 | Line: | Neutral | Ext. Attenuation (dB): | 20 |

## COMMENTS

None

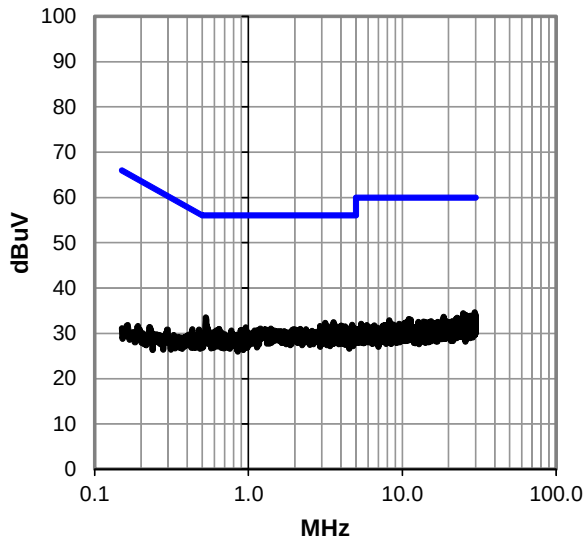
## EUT OPERATING MODES

Transmitting BT EDR, High Ch

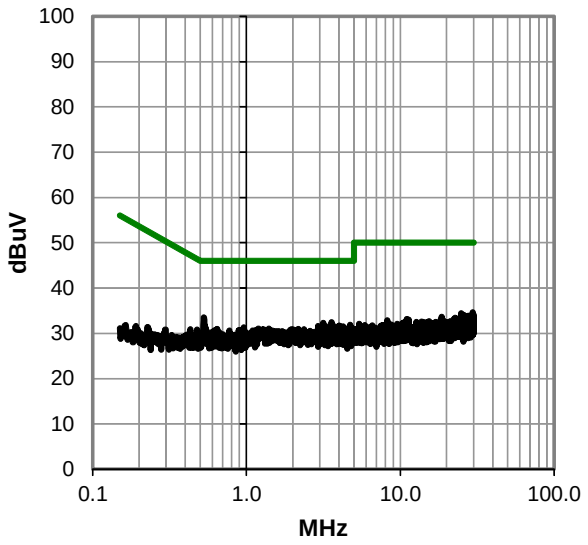
## DEVIATIONS FROM TEST STANDARD

None

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #22

Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.529 | 13.3 | 20.2 | 33.5 | 56.0 | -22.5 |
| 3.568 | 12.1 | 20.4 | 32.5 | 56.0 | -23.5 |
| 3.152 | 12.0 | 20.3 | 32.3 | 56.0 | -23.7 |
| 4.720 | 11.5 | 20.4 | 31.9 | 56.0 | -24.1 |
| 4.024 | 11.3 | 20.4 | 31.7 | 56.0 | -24.3 |
| 2.920 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 4.240 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 3.728 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 3.344 | 11.1 | 20.3 | 31.4 | 56.0 | -24.6 |
| 3.680 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 0.961 | 11.1 | 20.2 | 31.3 | 56.0 | -24.7 |
| 4.344 | 10.8 | 20.4 | 31.2 | 56.0 | -24.8 |
| 3.288 | 10.8 | 20.3 | 31.1 | 56.0 | -24.9 |
| 1.400 | 10.8 | 20.2 | 31.0 | 56.0 | -25.0 |
| 1.200 | 10.8 | 20.2 | 31.0 | 56.0 | -25.0 |
| 2.176 | 10.7 | 20.3 | 31.0 | 56.0 | -25.0 |
| 0.645 | 10.8 | 20.2 | 31.0 | 56.0 | -25.0 |
| 4.512 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 2.368 | 10.6 | 20.3 | 30.9 | 56.0 | -25.1 |
| 1.144 | 10.5 | 20.2 | 30.7 | 56.0 | -25.3 |
| 0.896 | 10.5 | 20.2 | 30.7 | 56.0 | -25.3 |
| 0.971 | 10.5 | 20.2 | 30.7 | 56.0 | -25.3 |
| 29.590 | 12.3 | 22.4 | 34.7 | 60.0 | -25.3 |
| 1.096 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |
| 0.614 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |
| 0.774 | 10.4 | 20.2 | 30.6 | 56.0 | -25.4 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|
| 0.529 | 13.3 | 20.2 | 33.5 | 46.0 | -12.5 |
| 3.568 | 12.1 | 20.4 | 32.5 | 46.0 | -13.5 |
| 3.152 | 12.0 | 20.3 | 32.3 | 46.0 | -13.7 |
| 4.720 | 11.5 | 20.4 | 31.9 | 46.0 | -14.1 |
| 4.024 | 11.3 | 20.4 | 31.7 | 46.0 | -14.3 |
| 2.920 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 4.240 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 3.728 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 3.344 | 11.1 | 20.3 | 31.4 | 46.0 | -14.6 |
| 3.680 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 0.961 | 11.1 | 20.2 | 31.3 | 46.0 | -14.7 |
| 4.344 | 10.8 | 20.4 | 31.2 | 46.0 | -14.8 |
| 3.288 | 10.8 | 20.3 | 31.1 | 46.0 | -14.9 |
| 1.400 | 10.8 | 20.2 | 31.0 | 46.0 | -15.0 |
| 1.200 | 10.8 | 20.2 | 31.0 | 46.0 | -15.0 |
| 2.176 | 10.7 | 20.3 | 31.0 | 46.0 | -15.0 |
| 0.645 | 10.8 | 20.2 | 31.0 | 46.0 | -15.0 |
| 4.512 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 2.368 | 10.6 | 20.3 | 30.9 | 46.0 | -15.1 |
| 1.144 | 10.5 | 20.2 | 30.7 | 46.0 | -15.3 |
| 0.896 | 10.5 | 20.2 | 30.7 | 46.0 | -15.3 |
| 0.971 | 10.5 | 20.2 | 30.7 | 46.0 | -15.3 |
| 29.590 | 12.3 | 22.4 | 34.7 | 50.0 | -15.3 |
| 1.096 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |
| 0.614 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |
| 0.774 | 10.4 | 20.2 | 30.6 | 46.0 | -15.4 |

## CONCLUSION

Pass

Trevor Buls

Tested_By