



# Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

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## Test Report

Prepared for: Rift Labs

Model: Viola

Description: LED Lamp

Serial Number: 0000001

FCC ID: 2ACZK-VIO05

To

FCC Part 15.247 DTS

Date of Issue: December 19, 2016

On the behalf of the applicant:

Rift Labs  
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Attention of:

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Project No: p1660027

**Kenneth Lee**  
**Project Test Engineer**

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## Test Report Revision History

| Revision | Date              | Revised By  | Reason for Revision  |
|----------|-------------------|-------------|--|
| 1.0      | September 2, 2016 | Kenneth Lee | Original Document  |
| 2.0      | December 19, 2016 | Kenneth Lee | Updated Peak Power Output Test Procedure, Updated to ANSI C63.10-2013 and Updated additional information |
|          |                   |             |  |
|          |                   |             |  |



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**ILAC / A2LA**

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

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



**FCC Site Reg. #349717**

**IC Site Reg. #2044A-2**

**Non-accredited tests contained in this report:**

**N/A**

**The applicant has been cautioned as to the following**

**15.21 - Information to User**

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**15.27(a) - Special Accessories**

Equipment marked to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.



## Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.10-2013 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

| Environmental Conditions |                 |                    |
|--------------------------|-----------------|--------------------|
| Temperature<br>(°C)      | Humidity<br>(%) | Pressure<br>(mbar) |
| 26.4                     | 30.7            | 948.6              |

### EUT Description

**Model:** Viola

**Description:** LED Lamp

**Firmware:** N/A

**Software:** N/A

**Serial Number:** 0000001

**Additional Information:** The EUT is capable of implementing a single modulation, BLE.

### EUT Operation during Tests

The EUT was put into a test mode which allowed the selection of the lowest, middle and the highest channel of operation

**Accessories:** None

**Cables:** None

**Modifications:** None

### 15.203: Antenna Requirement:

- ☒ The antenna is permanently attached to the EUT
- ☐ The antenna uses a unique coupling
- ☐ The EUT must be professionally installed
- ☐ The antenna requirement does not apply



## Test Results Summary

| Specification                | Test Name                          | Pass, Fail, N/A | Comments               |
|------------------------------|------------------------------------|-----------------|------------------------|
| 15.247(b)                    | Peak Output Power                  | Pass            |                        |
| 15.247(b)                    | Conducted Spurious Emissions       | N/A             | EUT has no RF Ports    |
| 15.247(d), 15.209(a), 15.205 | Radiated Spurious Emissions        | Pass            |                        |
| 15.247(d), 15.209(a), 15.205 | Emissions At Band Edges            | Pass            |                        |
| 15.247(a)(2)                 | Occupied Bandwidth                 | Pass            |                        |
| 15.247(e)                    | Transmitter Power Spectral Density | Pass            |                        |
| 15.207                       | A/C Powerline Conducted Emissions  | N/A             | EUT is Battery Powered |



## Peak Output Power

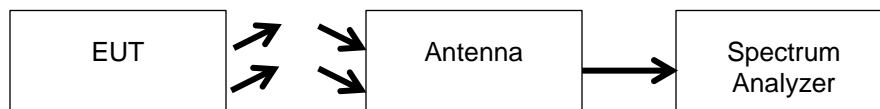
**Engineer:** Kenneth Lee

**Test Date:** 09/02/2016

## Test Procedure

The EUT was tested in a semi-anechoic test chamber set 1m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and was raised from 1 to 4 meters to ensure the TX signal levels were maximized. FCC KDB 558074 section 9.1.1 test method was used.

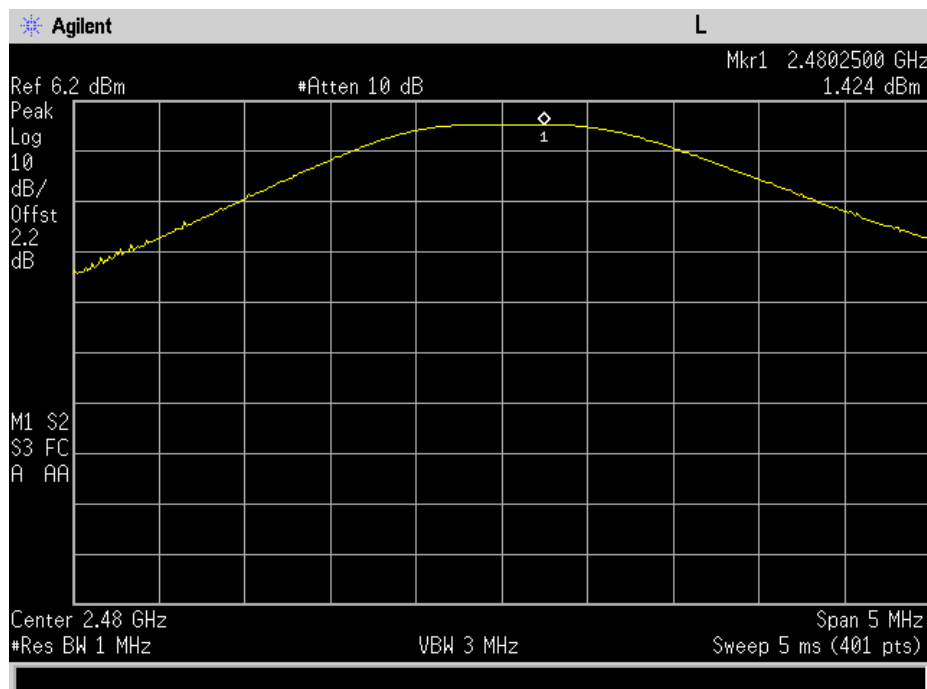
## Test Setup



## Transmitter Peak Output Power

| Tuned Frequency (MHz) | Measured Value (dBm) | Specification Limit | Result |
|-----------------------|----------------------|---------------------|--------|
| 2402                  | 0.665                | 1 W (30 dBm)        | Pass   |
| 2441                  | 1.606                | 1 W (30 dBm)        | Pass   |
| 2480                  | 1.424                | 1 W (30 dBm)        | Pass   |

## Sample Plot – High Channel







## Radiated Spurious Emissions

**Engineer:** Kenneth Lee

**Test Date:** 09/02/2016

### Test Procedure Radiated Spurious Emissions: 30 – 1000 MHz

The EUT was tested in a semi-anechoic test chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and was raised from 1 to 4 meters to ensure the TX signal levels were maximized.

All emissions from 30 MHz to 1 GHz were examined.

Measured Level includes antenna and receiver cable correction factors.

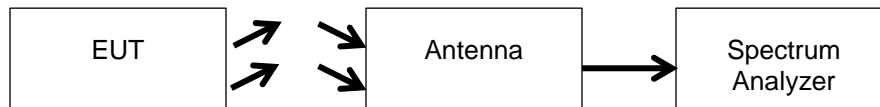
Correction factors were input into the spectrum analyzer before recording “Measured Level”.

RBW = 100 KHz

VBW = 300 KHz

Detector – Quasi Peak

#### Test Setup



### Test Procedure for Radiated Spurious Emissions above 1 GHz

The EUT was tested in a semi anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Spurious Emissions. The antenna, band reject filter, amplifier and cable correction factors were input into the spectrum analyzer before recording the Measured Level to ensure accurate readings. The spectrum for each tuned frequency was examined to the 10th harmonic.

#### Test Setup



| Detector Settings | RBW (MHz) | VBW (MHz) | Span         |
|-------------------|-----------|-----------|--------------|
| Peak              | 1         | 3         | As Necessary |
| Average           | 1         | 3         | As Necessary |

**See Annex A for Test Data**



## Emissions at Band Edges

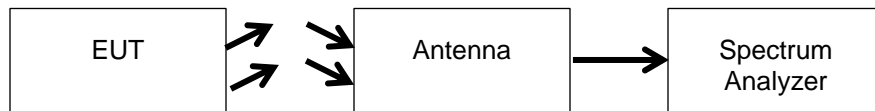
**Engineer:** Kenneth Lee

**Test Date:** 09/02/2016

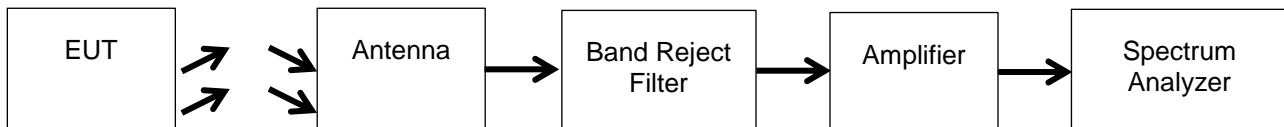
### Test Procedure

The EUT was tested in a semi-anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for band edge and restricted band for both peak and average measurements. The cable and antenna correction factors were input into the analyzer as a reference level offset to ensure accurate readings. For the restricted band the amplifier and band reject filter correction factors were also input to the spectrum analyzer.

#### Band Edge Test Setup

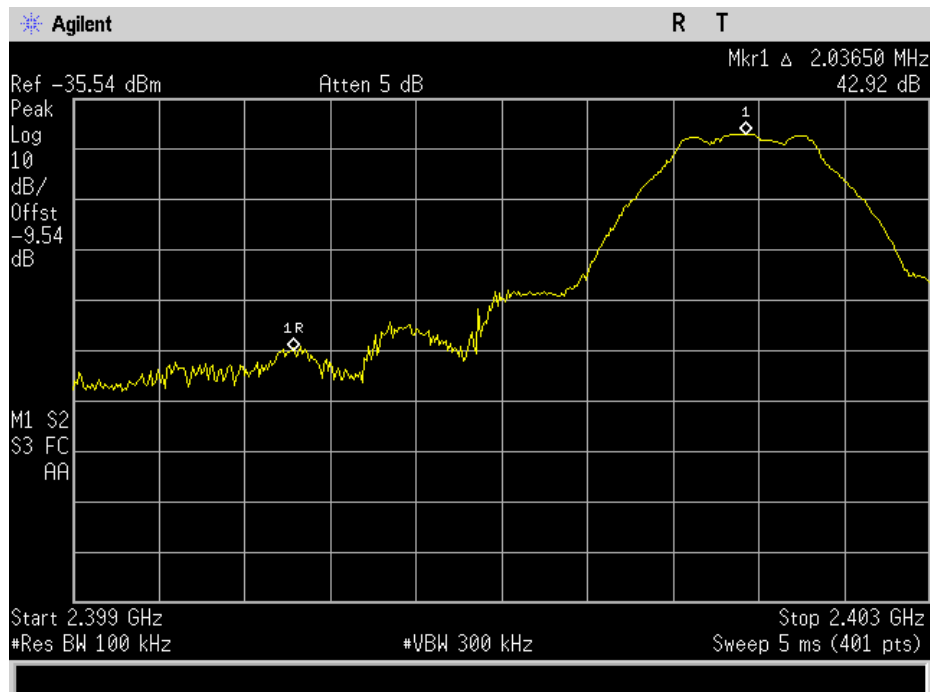


#### Restricted Band Test Setup

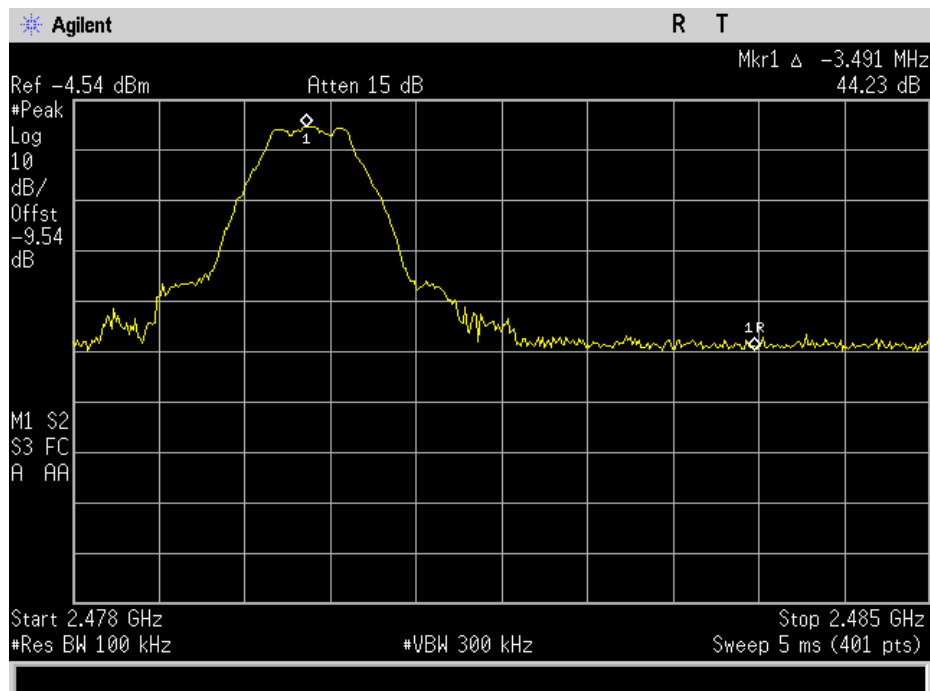




**Band Edge 2400 MHz**  
**Tuned Freq = 2402 MHz**

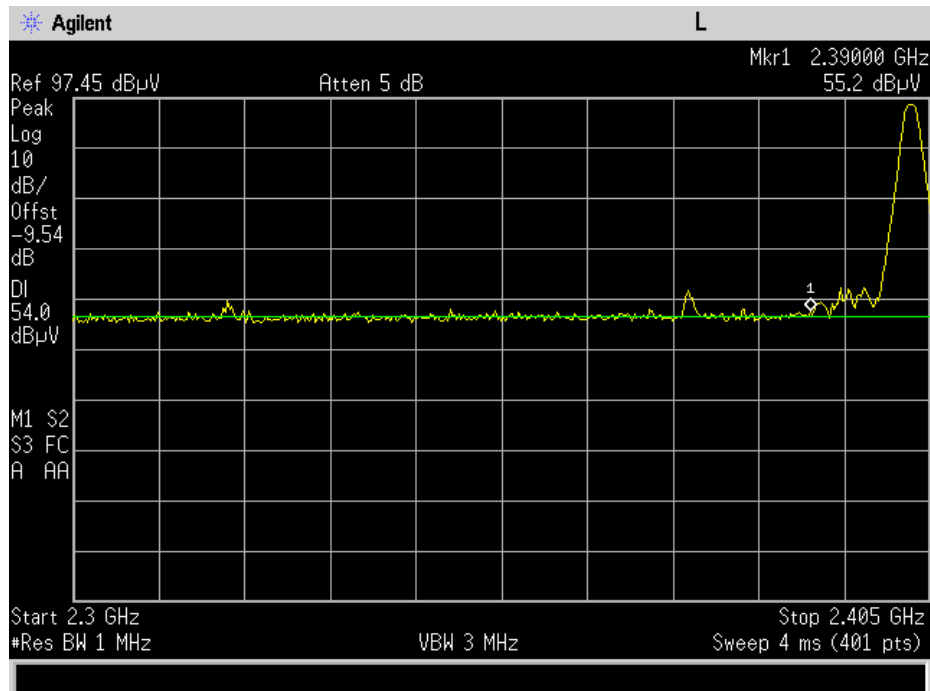


**Band Edge 2483.5 MHz**  
**Tuned Freq = 2480 MHz**

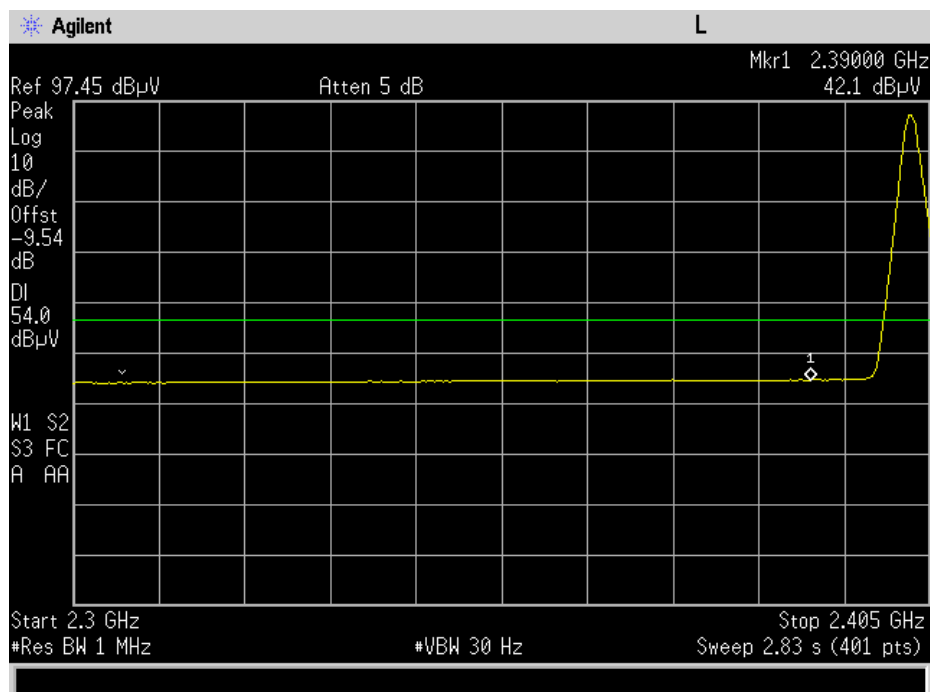




**Restricted Band 2300 – 2390 MHz – Peak**  
**Tuned Freq = 2402 MHz**

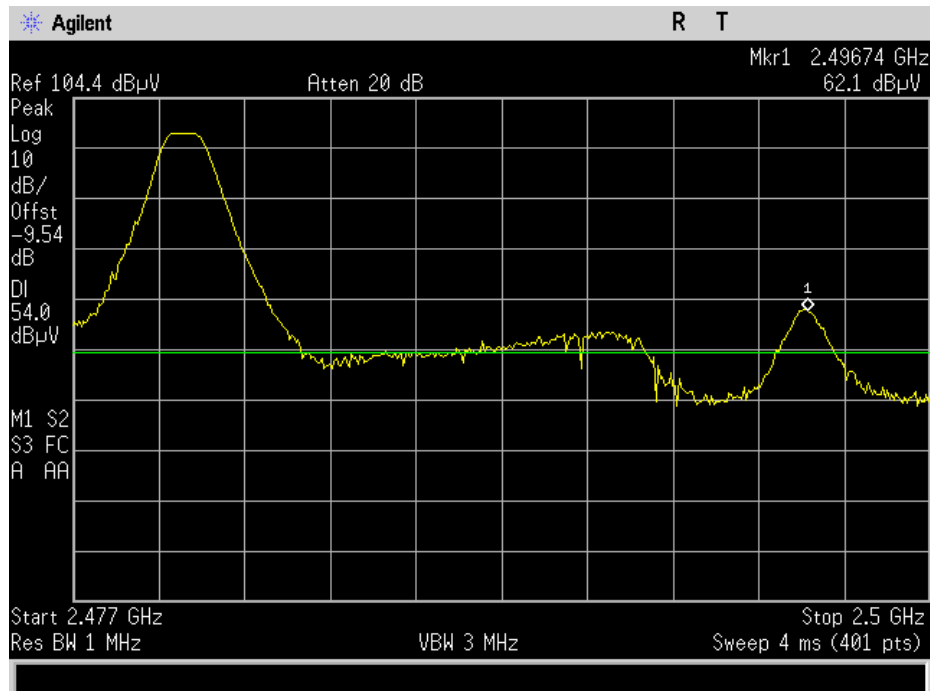


**Restricted Band 2300 – 2390 MHz – Avg**  
**Tuned Freq = 2402 MHz**

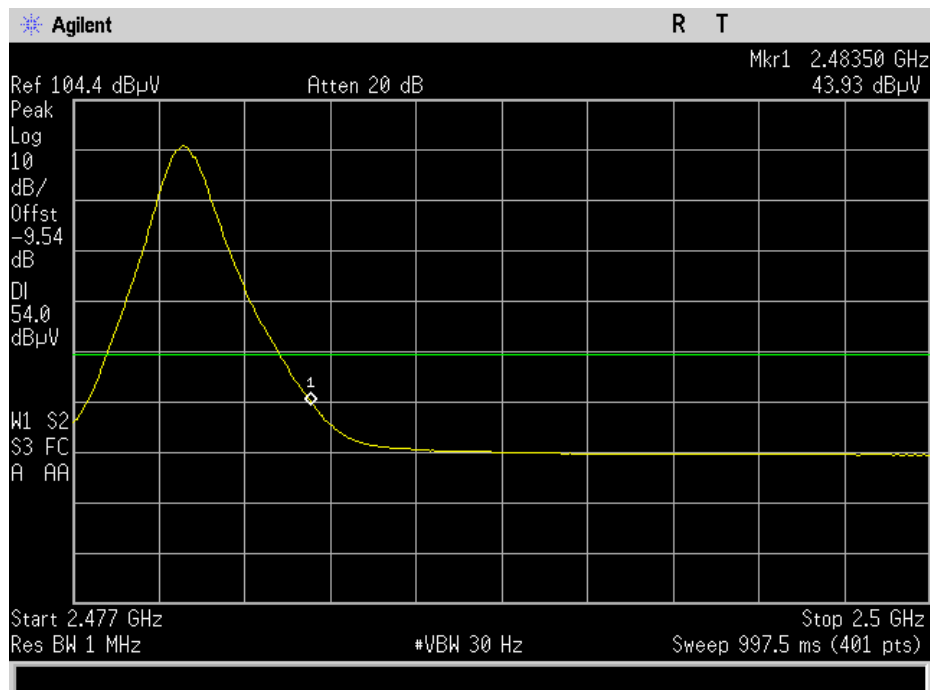




**Restricted Band 2483.5 – 2500 MHz – Peak**  
**Tuned Freq = 2480 MHz**



**Restricted Band 2483.5 – 2500 MHz – Avg**  
**Tuned Freq = 2480 MHz**





## Occupied Bandwidth

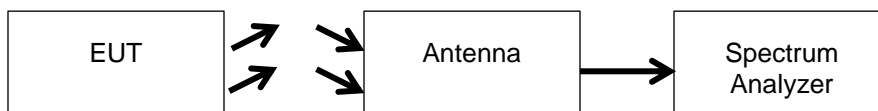
Engineer: Kenneth Lee

Test Date: 09/02/2016

### Test Procedure

The EUT was tested in a semi-anechoic test chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and was raised from 1 to 4 meters to ensure the TX signal levels were maximized. The Span was set wide enough to capture the entire transmit spectrum and the resolution bandwidth was set to at least 1% of the span. The analyzer was set to max hold and when the entire spectrum was captured the 6dB and 99% bandwidths were measured to verify the bandwidth met the specification.

### Test Setup



### 6 dB Occupied Bandwidth Summary

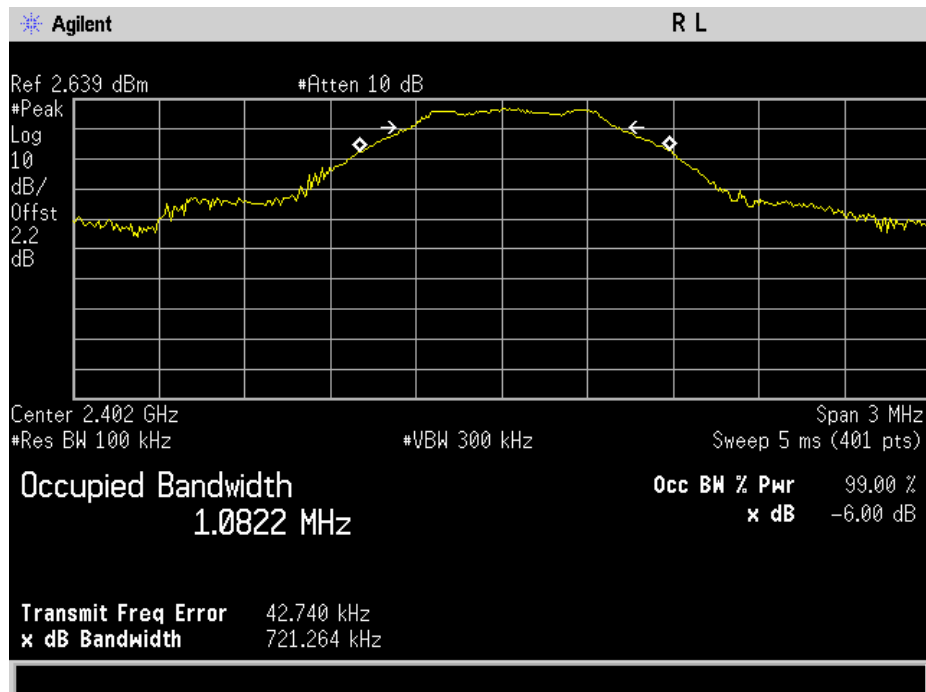
| Frequency (MHz) | Measured Bandwidth (kHz) | Specification Limit (kHz) | Result |
|-----------------|--------------------------|---------------------------|--------|
| 2402            | 721.264                  | ≥ 500                     | Pass   |
| 2441            | 723.417                  | ≥ 500                     | Pass   |
| 2480            | 711.607                  | ≥ 500                     | Pass   |

### 99% Bandwidth Summary

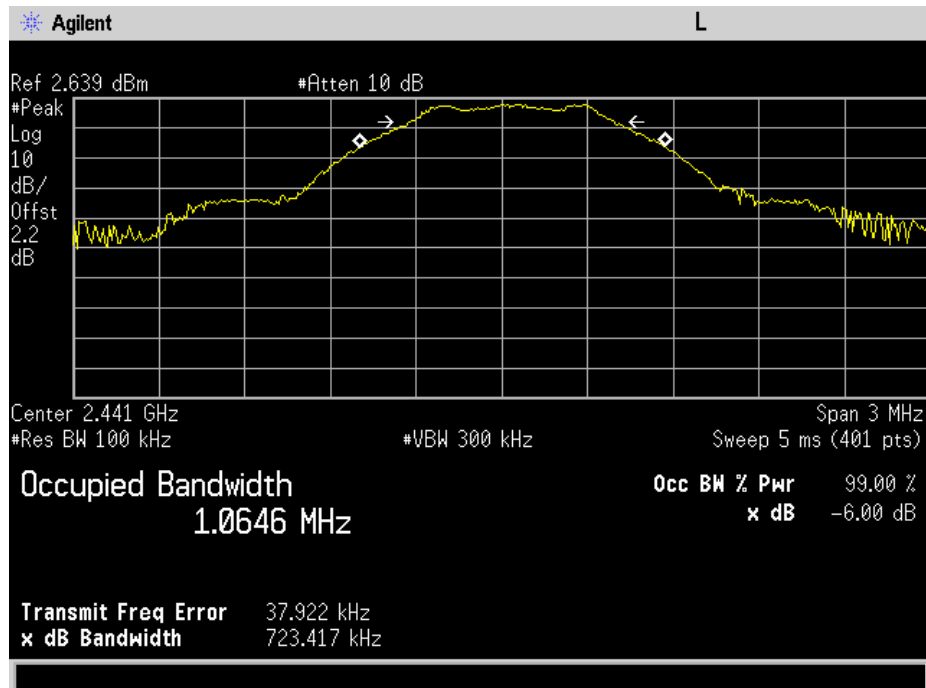
| Frequency (MHz) | Measured Bandwidth (MHz) | Result |
|-----------------|--------------------------|--------|
| 2402            | 1.0822                   | Pass   |
| 2441            | 1.0646                   | Pass   |
| 2480            | 1.0627                   | Pass   |



### 6dB and 99% Bandwidth 2402 MHz

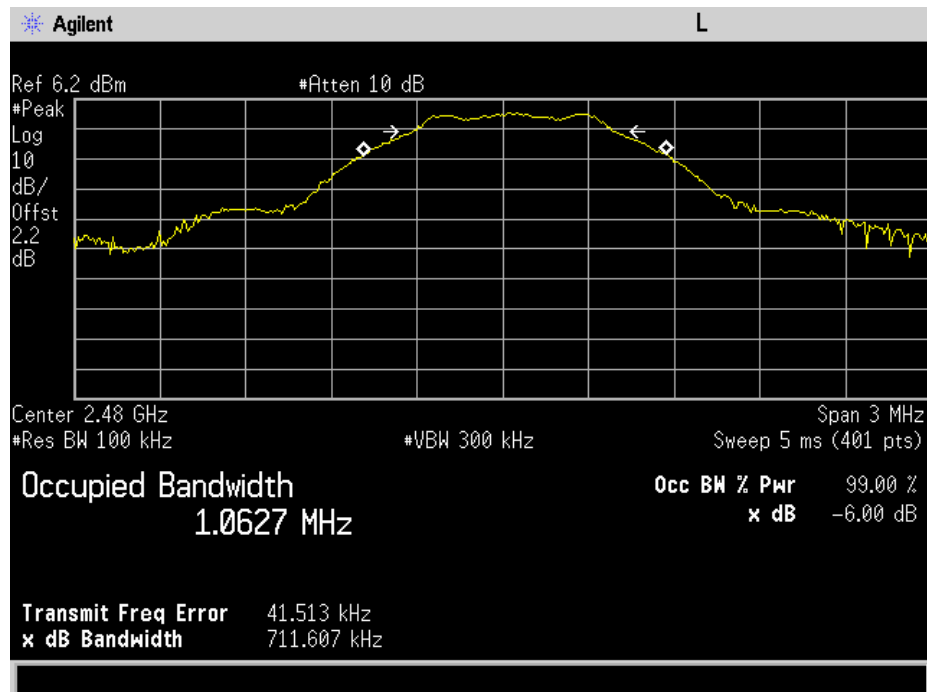


### 6dB and 99% Bandwidth 2441 MHz





### 6dB and 99% Bandwidth 2480 MHz







## Transmitter Power Spectral Density (PSD)

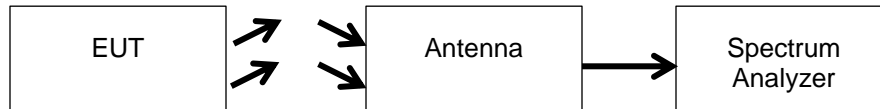
**Engineer:** Kenneth Lee

**Test Date:** 09/02/2016

### Test Procedure

The EUT was tested in a semi-anechoic test chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and was raised from 1 to 4 meters to ensure the TX signal levels were maximized.

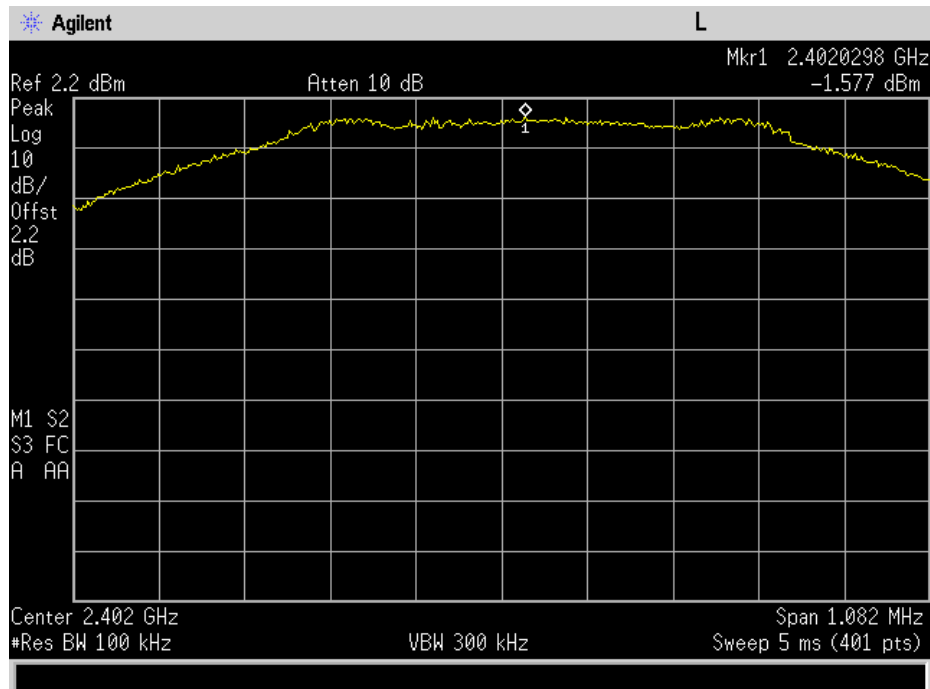
### Test Setup



### PSD Summary

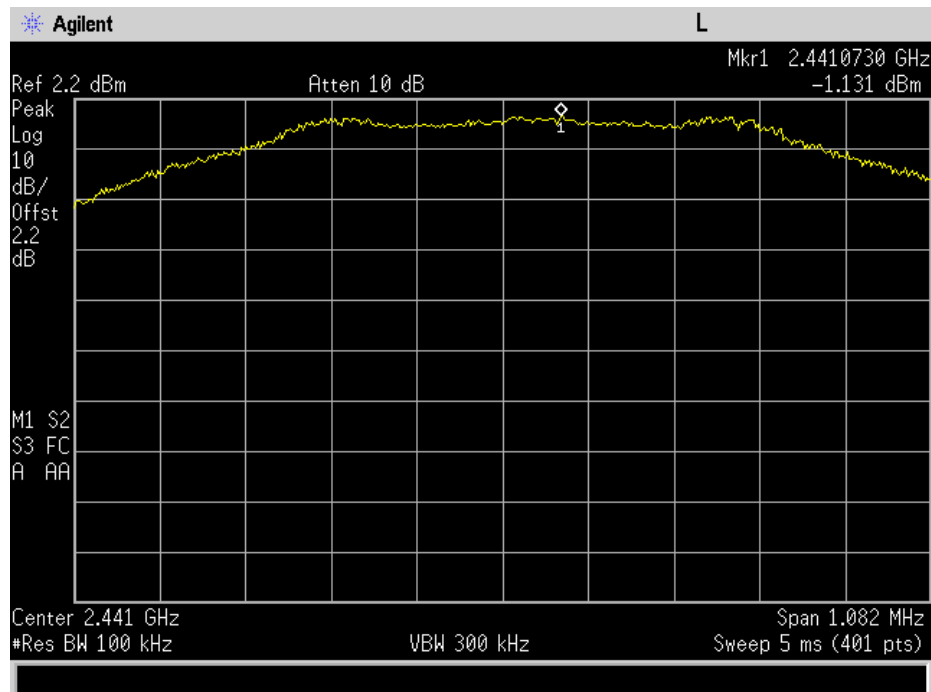
| Frequency (MHz) | Measured Data (dBm) | Specification Limit (dBm) | Result |
|-----------------|---------------------|---------------------------|--------|
| 2402            | -1.577              | 8                         | Pass   |
| 2441            | -1.131              | 8                         | Pass   |
| 2480            | -1.255              | 8                         | Pass   |

### PSD 2402 MHz

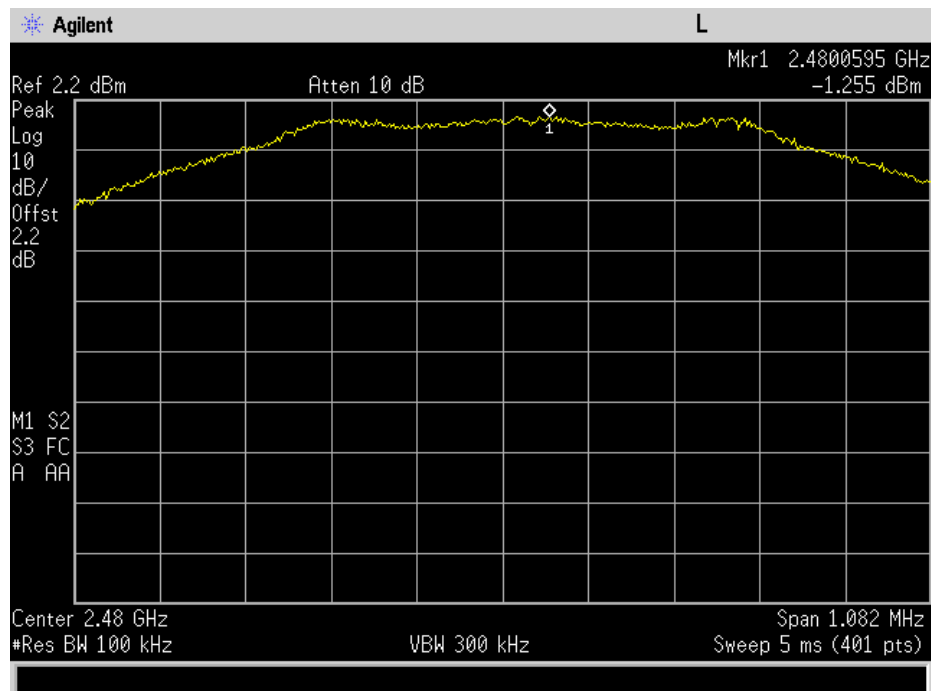




### PSD 2441 MHz



### PSD 2480 MHz





## Test Equipment Utilized

| Description                           | Manufacturer | Model #                       | CT Asset # | Last Cal Date | Cal Due Date |
|---------------------------------------|--------------|-------------------------------|------------|---------------|--------------|
| Bilog Antenna                         | Schaffner    | CBL6111C                      | i00267     | 3/1/16        | 3/1/18       |
| Horn Antenna                          | ARA          | DRG-118/A                     | i00271     | 6/16/16       | 6/16/18      |
| Humidity / Temp Meter                 | Newport      | IBTHX-W-5                     | i00282     | 5/26/16       | 5/26/17      |
| EMI Analyzer                          | Agilent      | E7405A                        | i00379     | 2/11/16       | 2/11/17      |
| 3 Meter Semi-Anechoic Chamber         | Panashield   | 3 Meter Semi-Anechoic Chamber | i00428     | 8/15/16       | 8/15/17      |
| Spectrum Analyzer                     | Agilent      | E4407B                        | i00331     | 9/18/15       | 9/18/16      |
| Preamplifier for 1-18GHz horn antenna | Miteq        | AFS44 00101 400 23-10P-44     | i00509     | N/A           | N/A          |

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT