Testing Cert #1007.01

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# Atlas Compliance & Engineering, Inc.

# FCC
# Test Report

**FCC CFR 47 Part 15.207, 15.209 and 15.247 COMPLIANCE**

*Stack Labs, Inc.*
*10054 Pasadena Ave.*
*Cupertino, CA 95014*

*Product:*
*Stack Downlight*
*Model:*
*BR3001E2626Z*

| | |
|---|---|
| Contains FCC ID: | 2AGFX-STACK001 |
| Test Report Number: | 1603STKmodule_247 |
| Date of Report: | January 20, 2016 |

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# Change History

## 1603STKmodule_247

| Rev. | Change Description | Reason/Application | Date | Appvd. |
|---|---|---|---|---|
| D | Report for review | Applies to BR3001E2626Z | January 20, 2016 | MEB |
| C1 | Release of report | Applies to BR3001E2626Z | January 27, 2016 | MEB |

# General Information

| | |
|---|---|
| Test Report Number: | 1603STKmodule_247 |
| Date Product Tested: | January 8-19, 2016 |
| Date of Report: | January 20, 2016 |
| Applicant: | Stack Labs, Inc.<br>10054 Pasadena Ave.<br>Cupertino, CA 95014 |
| Contact Person | Mr Kent S Whiting |
| Equipment Tested: | Stack Downlight |
| Trade Name: | Stack |
| Model: | BR3001E2626Z |
| Purpose of Test: | To demonstrate the compliance of the Stack Downlight, BR3001E2626Z, with the requirements of FCC CFR 47 Part 15 Rules and Regulations to the limits of Subpart C 15.207, 15.209 and 15.247 using the procedure stated in ANSI C63.10. |
| Frequency Range Investigated: | 9 KHz to 24.835 GHz |
| Contains FCC ID: | 2AGFX-STACK001 |
| Test Site Locations: | Field Strength Measurement Facility:<br>Atlas Compliance & Engineering, Inc.<br>726 Hidden Valley Road<br>Royal Oaks, California 95076<br>Conducted Interference Measurement Facility:<br>Atlas Compliance & Engineering, Inc.<br>1792 Little Orchard Street<br>San Jose, California 95125 |
| Test Personnel: | Bruce Smith<br>EMC Engineer |

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# Test Equipment

**The following list contains the test equipment that was utilized in making the measurements in this report.**

| Description _ Model | Serial | Manufacturer | Calibration Due |
|---|---|---|---|
| BiLog Antenna _ CBL6112B | 2783 | Chase Electronics Ltd. | 5/8/17 |
| Active Loop Antenna _ 6502 | 9108-2669 | EMCO | 12/28/17 |
| Double Ridge Guide Horn Antenna _ 3115 | 9003-3340 | EMCO | 12/14/17 |
| LISN _ 4825/2 | 9808-1088 | EMCO | 12/2/16 |
| Pre amp 9kHz-2GHz _ CPA9231A | 3259 | Schaffner | 10/1/16 |
| EMI Test Receiver 9 kHz - 2500 MHz _ ESPC | DE15934 845296/0024 | Rohde & Schwarz | 2/19/16 |
| EMI Test Receiver 9 kHz - 2500 MHz _ ESPC (bat) | DE14459 843820/0015 | Rohde & Schwarz | 2/17/16 |
| Pre amp 1Ghz-26.5GHz _ 8449B | 3008A00910 | HP | 2/24/16 |
| Spectrum Analyzer 100Hz-22GHz _ 8566B | 2542A13058 (IF) 2637A03426 (RF) | HP | 2/18/16 |
| Quasi-Peak Adapter _ 85650A | 2521A00716 | HP | 2/18/16 |
| Temperature and humidity probe _ RH-20F | 200-97-082591 | Omega Engineering | 3/31/16 |
| Chamber – HPI160SCable 50 ft. | 0002 | Semflex | 12/10/16 |
| RF Cable 75 ft. _ BM95012.900 | 109 | Bracke | 4/27/16 |

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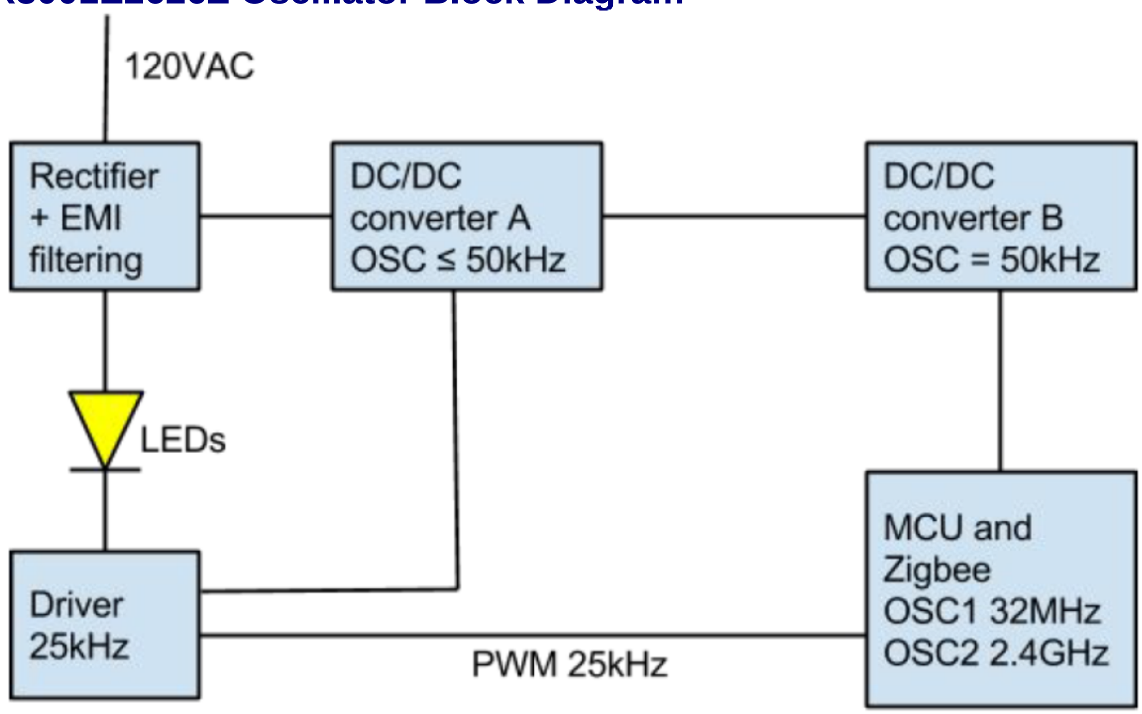
# Test Configuration

| | |
|---|---|
| Customer: | Stack Labs, Inc. |
| Test Date: | January 8-19, 2016 |
| Specification: | FCC CRF 47 Part 15.247 Limits,<br>ANSI C63.10 Methods |

## BR3001E2626Z Oscillator Overview:

The Stack Downlight is a responsive LED lamp that adjusts to ambient light, movement, and its environment. It does this using built in sensors, mesh connections to other Stack lamps, connections to the cloud, and processing intelligence to couple this all together. In order to do all this it employs multiple oscillators. From the rectified and filtered line voltage (120VAC) a Buck Switch Mode Power Supply (SMPS), converter A, converts down to a DC rail voltage, this converter operates at 50 KHz or less depending on load. The Rail A is used to feed the LED Driver and Converter B. Converter B is another SMPS that also operates at 50 KHz. Converter B's rail feeds the MCU and transmitter that operate at 32MHz and 2.4GHz respectively. The MCU also controls the Driver which operates at 25 KHz.

## BR3001E2626Z Oscillator Block Diagram



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## BR3001E2626Z Pulsed Operation:

*§ 15.35(c)*

*Unless otherwise specified, e.g. §15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.*

One of the main features of the ZigBee protocol is that it is designed for low power consumption so that battery operated devices can utilize it for communication without quickly draining their resources. With that in mind ZigBee transmitters are operated as pulsed transmitters only putting power out into the air when it is required for them to. This pulsed operation is thus used for getting a realistic average value of the signal being put out.

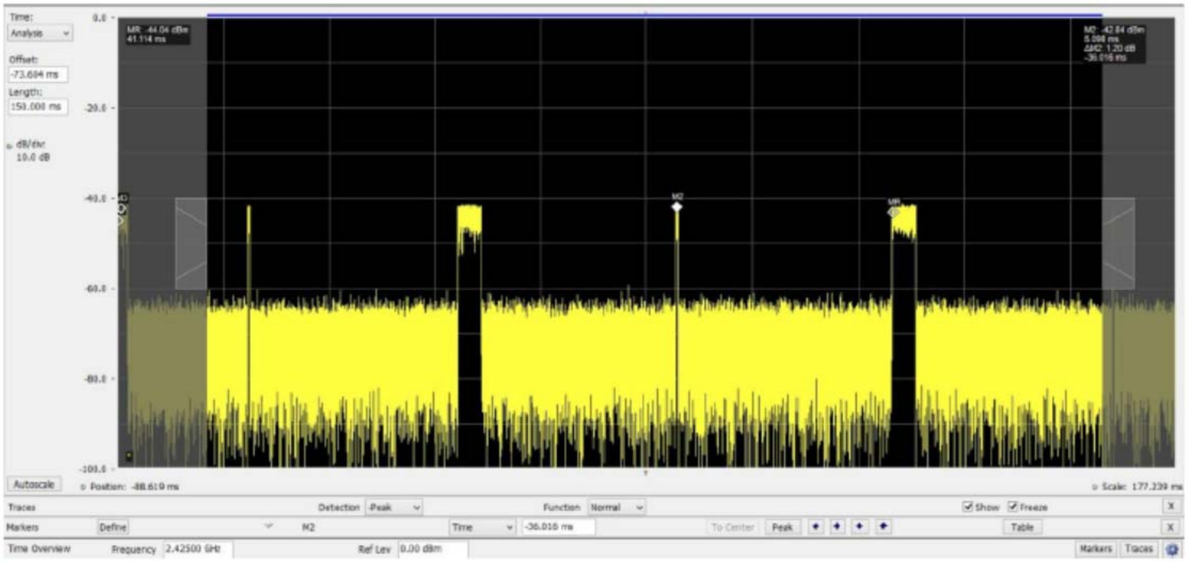
Our Worst case operation will be during our Over The Air (OTA) update procedure, where we utilize our biggest packets and continually transmit the data needed to update the software on the device. During this procedure we transmit one large packet (120 Bytes) followed by a smaller packet (50 Bytes) and then repeat this until all the data is sent. At the 250 KB/s data rate we operate at, each byte means 32us of transmission air time. Between sends it takes our processor an average of 32ms to process and queue up the next data to be sent.

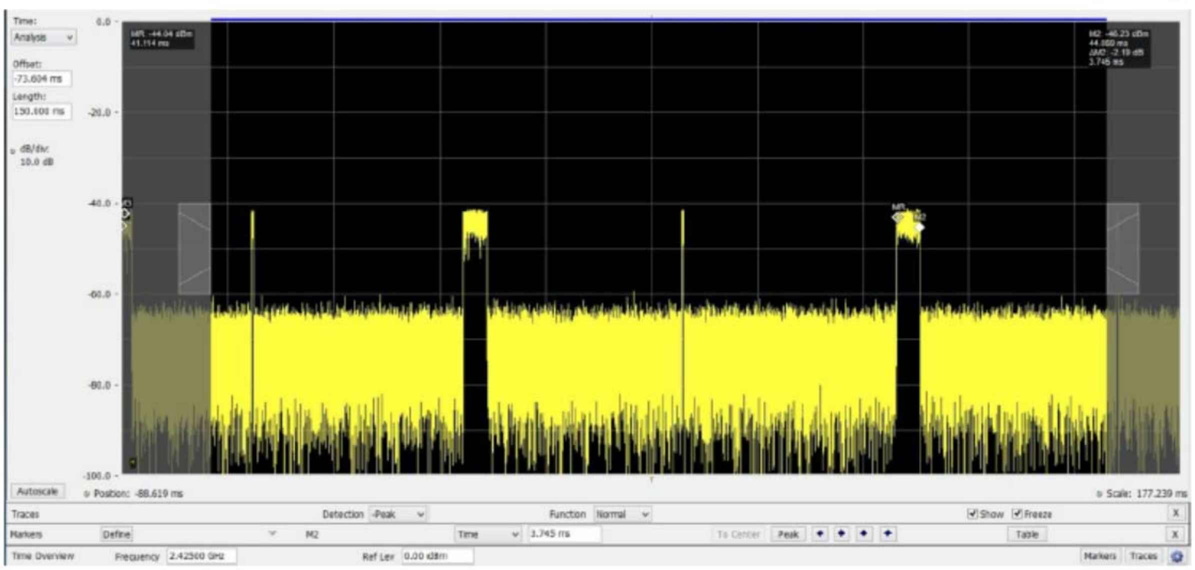
To do this on a 100ms timescale the sequence of events as requested in 15.35(c) would look like this:

120 Bytes(3.84ms) 32ms ---- Processing 50 ---- Bytes (1.6ms) 32ms ---- Processing120 ---- Bytes(3.84ms) ----

$$DutyCycle = \frac{Ton}{Ton+Toff} = \frac{3.84ms+1.6ms+3.84ms}{100ms} = 9.28\%$$

As can also be seen when capturing data on a spectrum analyzer:





## Testing:

In order to create this OTA scenario though another device must be present for communication. As the second device's output would corrupt the test results, we instead loop a data transmission at 10% duty cycle to replicate the same resulting average value. The setup specifics are 76 Byte Payload with a 22ms wait interval between packets.

$$DutyCycle = \frac{2.432ms}{2.432ms+22ms} = 9.95\%$$

*ANSI C63.10 section 7.5 Procedure for determining the average value of pulsed emissions*
*Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval. The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation (10):*

$$\delta(dB) = 20\log(\Delta) \qquad (10)$$

*where*
*δ is the duty cycle correction factor (dB)*
*Δ is the duty cycle (dimensionless)*

Duty cycle correction factor therefore is 20log(9.95) = 19.95dB

## EUT Description / Note:

The EUT, BR3001E2626Z, a Stack Downlight was powered up and in a continuous transmitting mode at full power for fundamental emissions measurements. The EUT contains a ZigBee module and interface was through the host circuits to send commands to place it in the different operating modes. The EUT was running at a 10% duty cycle for all other emission measurements to simulate a normal condition of operation. The power for the EUT was supplied by the AC mains.

## EUT Support Program

The EUT was tested at lowest channel, 2405 MHz, mid channel, 2445 MHz, and highest channel, 2480 MHz in a continuous transmit mode. The transmitter was at full power and 100% modulation. The EUT was then operated in 10% duty cycle to find worst case levels of unwanted emissions. Preliminary radiated tests were performed to identify which operating mode produced the worst case (maximum) transmit level. Using this mode the module was tested to find maximum transmit level. Tests were performed with the measurement antenna in both horizontal and vertical orientations and the EUT in all three orthogonal orientations.

## EUT Modifications for Compliance

There were no modifications performed on the EUT. The test results state the emission levels of the EUT in the condition as it was received on January 8, 2016.

## EUT Support Devices

*Table 1 – Support Equipment Used For Test*

| Model: | Description: | S/N | FCC ID# |
|---|---|---|---|
| NA | Light bulb clip mount socket | NA | NA |

## I/O Ports and Cables

*Table 2 – EUT Port Termination's*

| I/O Port | Cable Type | Length | Connector | Termination |
|---|---|---|---|---|
| AC power | Unshielded twin lead | 1.5 m | IEC | AC mains |

*Table 3 – Host Port Termination's*

| I/O Port | Cable Type | Length | Connector | Termination |
|---|---|---|---|---|
| NA | | | | |

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# Equipment Under Test

The photographs below show the condition of the EUT for test.


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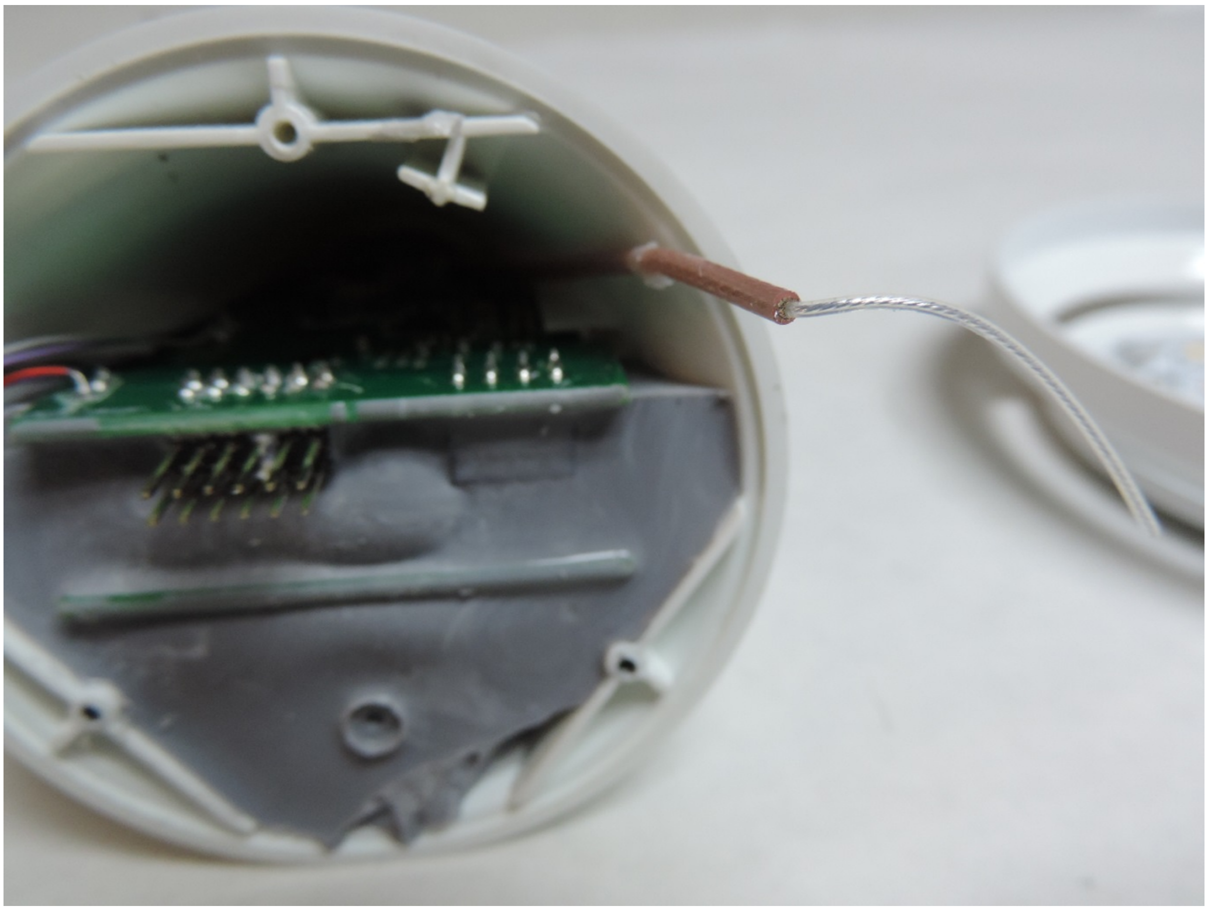

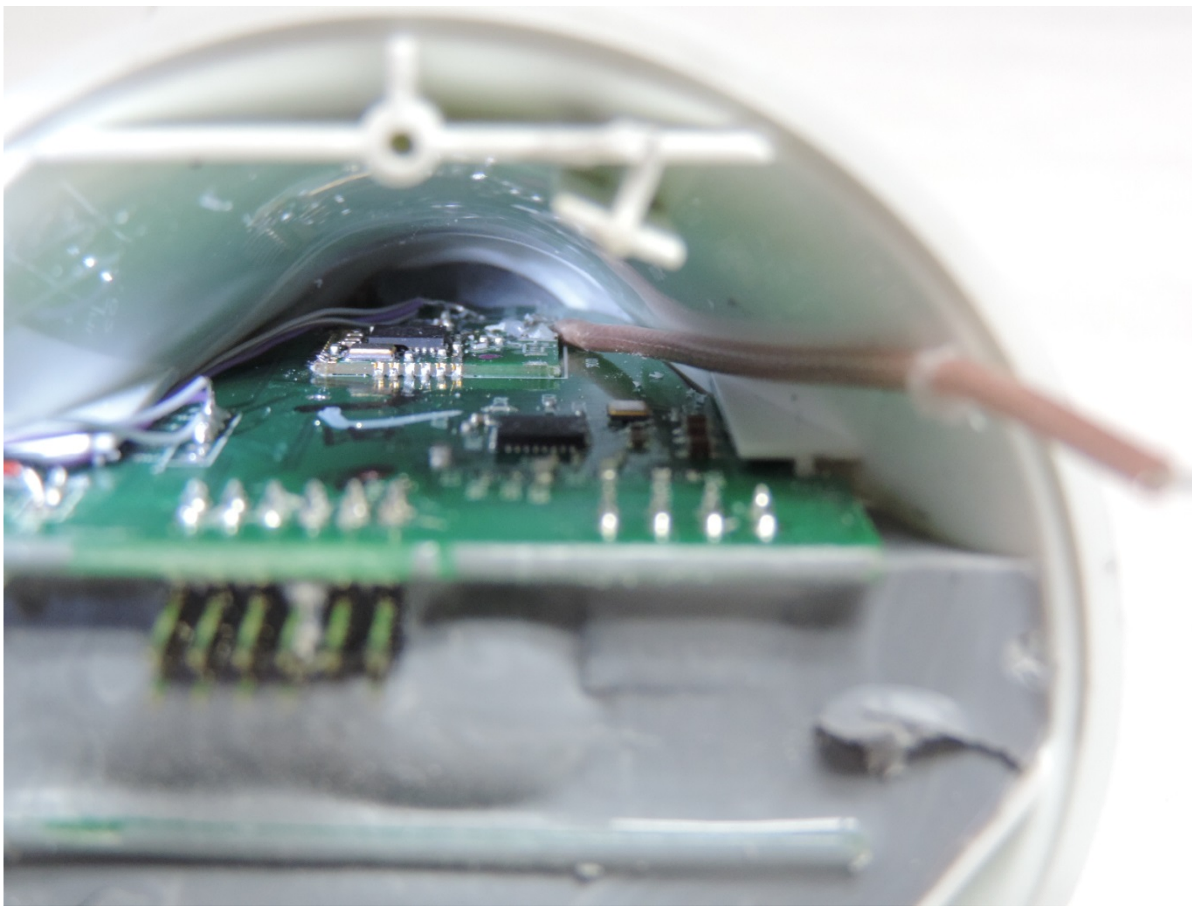

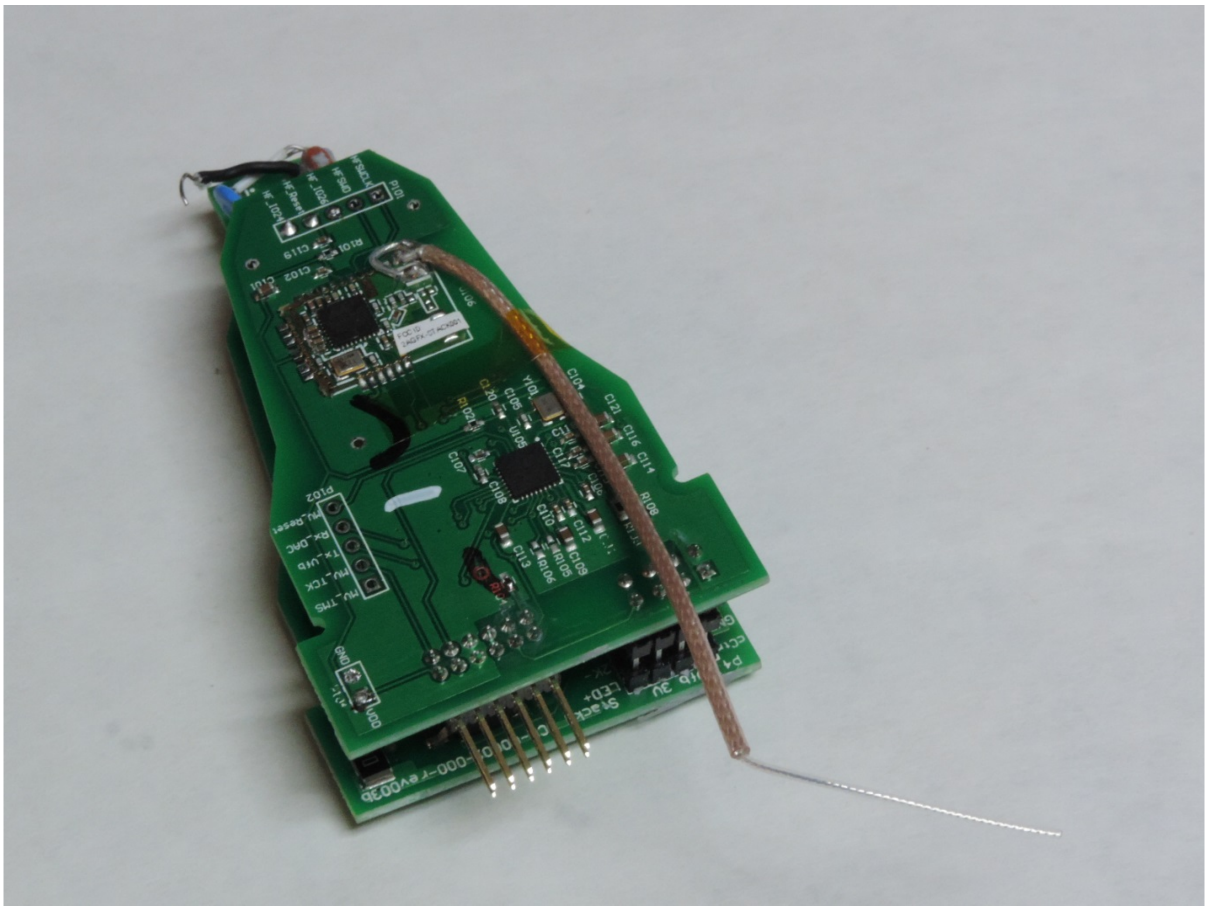

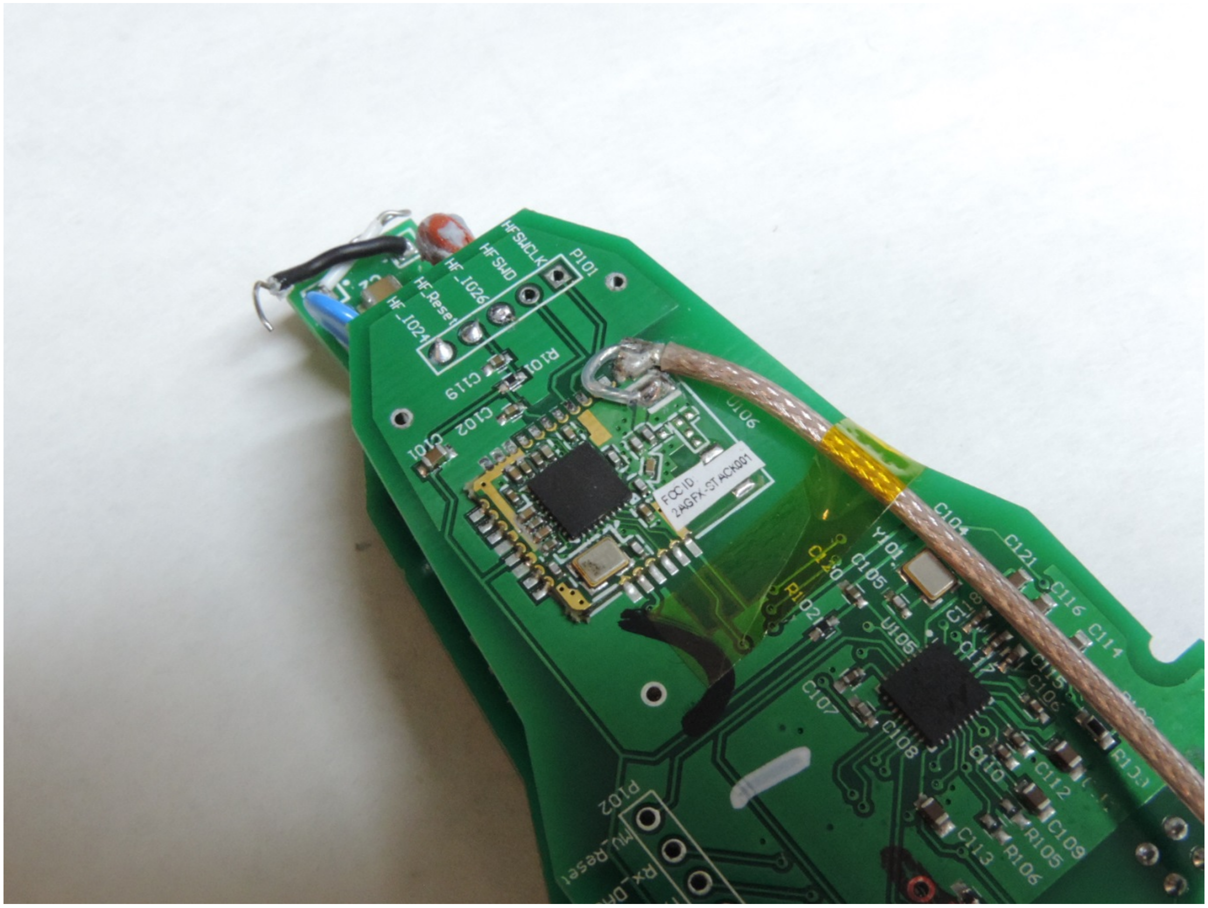
FCC ID
2AGFX-STACK001

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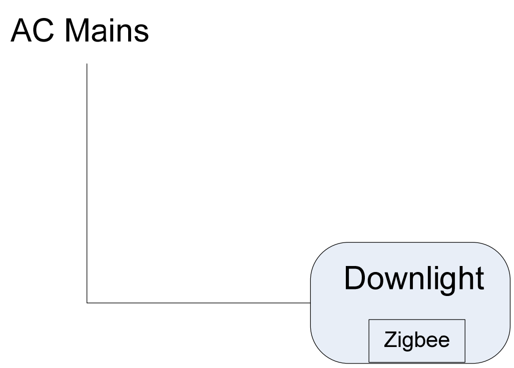
# Equipment Block Diagram

Following is the block diagram of the test setup. Refer to TEST CONFIGURATION pages for port connections and information.

*Figure 1 – Test Setup Diagram*




**EUT:**
**Downlight**

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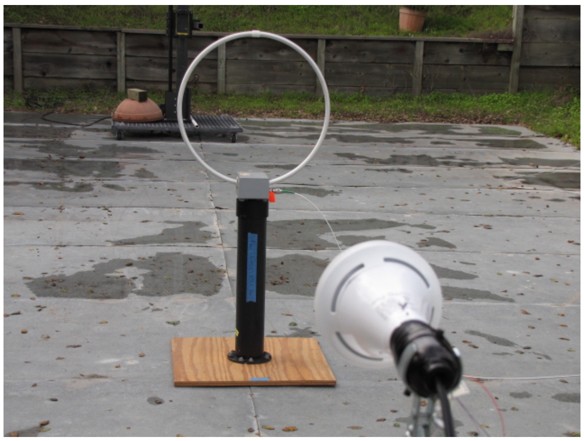
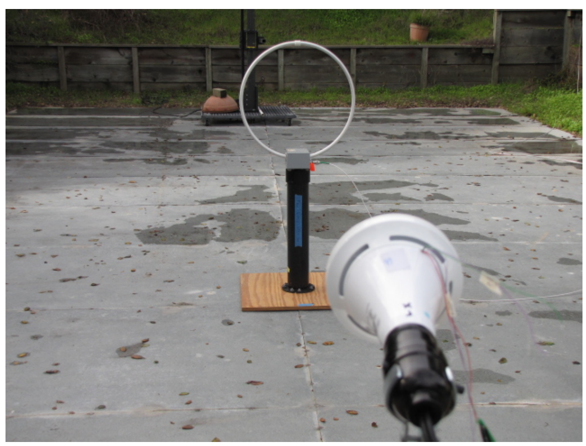
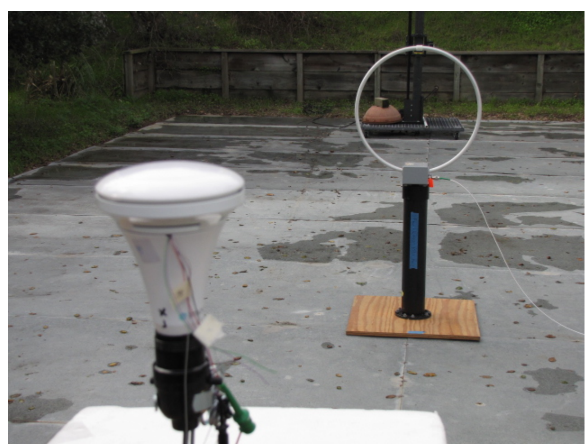
# Test Setup (Radiated Emissions)

The photographs below show the test setup for radiated emission testing.







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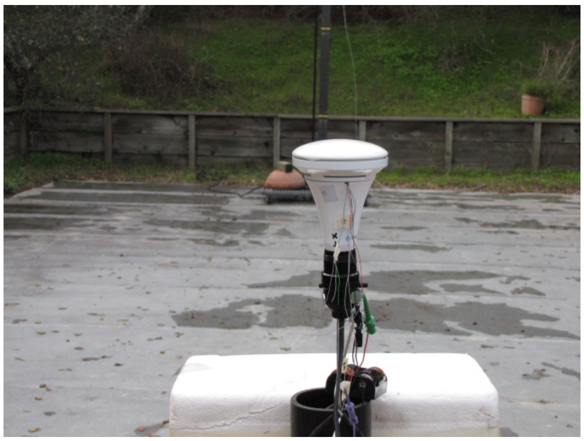

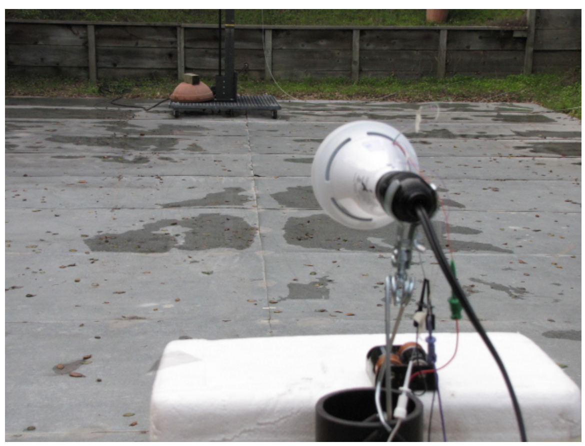

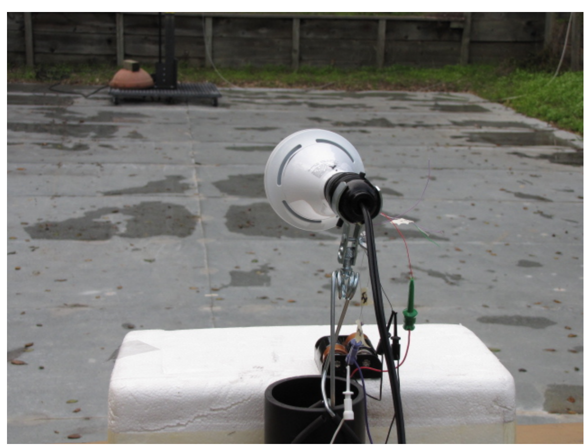

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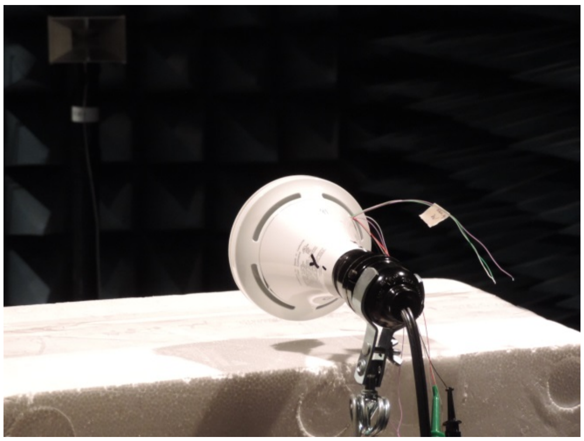

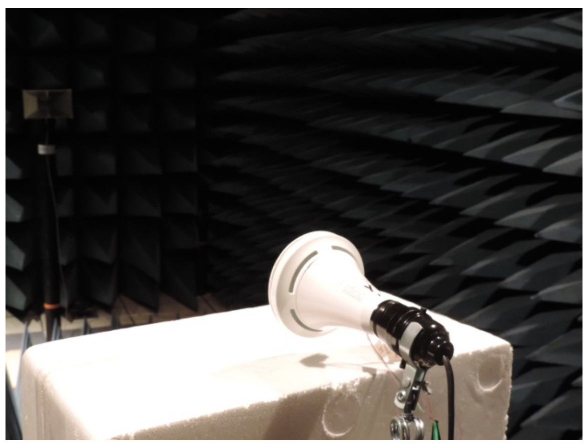

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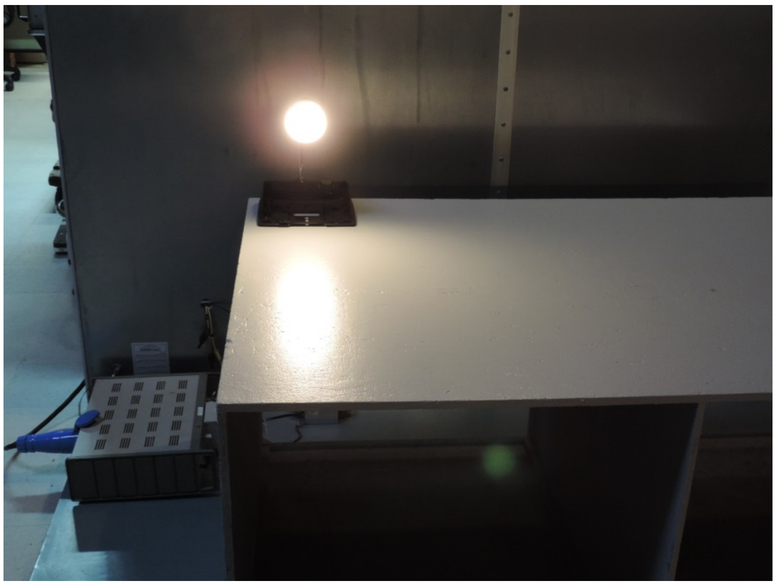
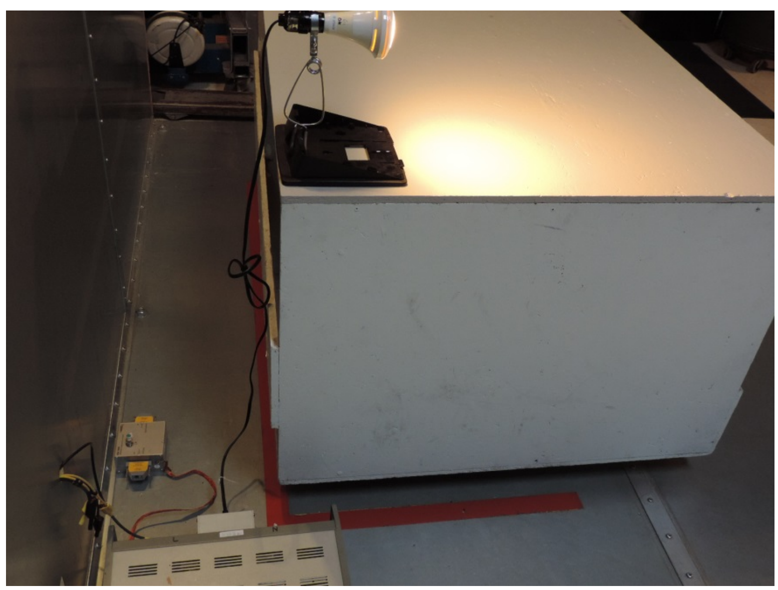
# Test Setup (Conducted Emissions)

The photographs below show worst case setup for line conducted testing.





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## Test Methods for Emissions

The test procedure stated in ANSI C63.10-2013 and FCC KDB 558074 was used to collect the test data. The emission data of the EUT was taken with the Rohde & Schwarz EMI Test Receiver and HP 8566B. Incorporating the application of correction factors programmed into the Test Receiver and verified for distance, antenna, cable loss, and amplifier gain, the data was reduced as shown in the Sample Calculations. These correction factors are available upon request. The corrected data was then compared to the emission limits to determine compliance.

During radiated emission testing, the EUT was placed on a nonconductive rotating table 0.8 meter above the conductive grid. The nonconductive table dimensions were 1 meter deep by 1.5 meters wide at 0.8 meter high. The EUT is centered on the tabletop and the measurement antenna was placed 10 or 3 meters from the EUT as noted in the test data.

For emissions testing, scans in the frequency range of 9 kHz to 24.835 GHz were made. Measurement bandwidths and detectors stated in ANSI C63.4 were used.

Measurements were made at a distance of 3 or 10 meters.

## Conducted Emission Testing

For the conducted emissions testing, the EMCO LISN, Model No. 4825/2, was used for the EUT. During conducted emission testing the EUT was located on a wooden test bench measuring 0.8 meter high, 1 meter deep, and 1.5 meters in width. The vertical conducting surface was 0.4 meter from the back of the test bench. The LISNs were placed on the ground plane of the test area in accordance with ANSI C63.4-2014.

The metal plane used for conducted emission testing was grounded to the earth by a heavy gage braided wire attached to the plane. All other objects were kept a minimum of 1 meter away from the EUT during the conducted test.

For conducted emissions testing a scan of the frequency band 150 kHz to 30 MHz was made stepping every 5 kHz. Each frequency was measured at a bandwidth of 10 kHz for 20 msec. All readings within 25 dB of the limits were recorded, and those emissions were then measured using the CISPR quasi-peak and average detectors at a bandwidth of 10 kHz for a 2 second measurement time. All emissions within 6 dB of the limit were examined with additional measurements to ensure compliance with the FCC 15.207 limits. The results of the conducted emissions test are shown in test tables below.

## Temperature and Humidity

The ambient temperature of the actual EUT was within the range of 10° to 40° C (50° to 104° F) unless the particular equipment requirements specify testing over a different temperature range. The humidity levels were within the range of 10% to 90% relative humidity unless the EUT operating requirements call for a different level.

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## Sample Calculations

An example of how the EMI Test Receiver reading is converted using correction factors is given for the emissions recorded in Table 6. These correction factors are programmed into the EMI Test Receiver and verified. For radiated emissions in dBμV/m, the EMI Test Receiver reading in dBμV is corrected by using the following formula:

| | |
|---|---|
| 33.90 | Meter Reading (dBμV/m) |
| 34.01 | - Pre amp Gain (dB) |
| 12.48 | + Cable Loss (dB) |
| 33.12 | + Antenna Factor (dB) |
| 45.49 | = Corrected Reading (dBμV/m) |

This reading is then compared to the applicable specification limits and the difference will determine compliance.

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# FCC Part 15 Subpart C 15.207 and 15.209 Limits

*Table 4 – Conducted Limits*

| Frequency MHz | Limit Quasi-Peak dBμV | Limit Average dBμV |
|---|---|---|
| 0.15-0.50 | 66-56 | 56-46 |
| 0.50-5 | 56 | 46 |
| 5-30 | 60 | 50 |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Both Quasi-Peak and Average limits for power line conducted testing must be met.
3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

*Table 5 – Radiated Emission Limits, General Requirements*

| Frequency MHz | Field Strength μV/m | Measurement Distance Meters |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 – 960 | 200 | 3 |
| Above 960 | 500 | 3 |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.
3. The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.
4. The emission limits shown are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

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## Report of Measurements Radiated Data

Radiated emissions measurements were performed from 9 kHz to 30 MHz at 3-meter distance. The loop antenna was placed at 1-meter height and was rotated about its vertical axis. The EUT was also rotated 360 degrees in front of the measurement antenna. No emissions were observed from the EUT in this frequency range.

Measurements were performed in the frequency range of 30 MHz to 1 GHz at 10-meter distance. The Bilog antenna was searched from 1 to 4 meters in height in both horizontal and vertical orientation. The EUT was also rotated 360 degrees in front of the measurement antenna. The EUT was tested in all three orthogonal orientations.

Measurements were performed in the frequency range of 1 GHz to 24.835 GHz at 3-meter distance. The Horn antenna was in both horizontal and vertical orientation. The EUT was also rotated 360 degrees in front of the measurement antenna. Only the second harmonics of the transmitter was observed, all others were baseline of the noise floor measurements. Measurements above 18 GHz were performed as exploratory at a much closer distance with the standard gain horn. No emissions were observed above the second harmonic of the fundamental frequency.

Exploratory radiated emissions measurements of the transmitter frequencies were made to determine the maximum transmit level of the EUT. All frequencies were searched for any emissions from the Zigbee module and EUT. No other emissions were observed. The transmit frequency of 2480 MHz was determined to be the highest level. With the EUT in the X orientation and the measurement antenna in Horizontal orientation the highest level was recorded.

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## Report of Measurements Maximum Unwanted Emission Levels Data

The following tables report the results of the Maximum Unwanted Emission Level measurements for the Stack Downlight, BR3001E2626Z. These measurements were taken and compared to the general emission limits of 15.209 and the radiated emission requirements of 15.247. Final testing of the low, middle and high channels was performed to find worst case levels in all three orientations of the EUT. The EUT was operating in the worst case condition at 2480MHz with the EUT orientation in the X axis and the receive measurement antenna in horizontal orientation.

All emissions within the restricted bands of operation were below the limits of FCC part 15.209(a).

The EUT was operated at maximum transmit power and 100% duty cycle for fundamental transmitter frequencies. The EUT was operated in a maximum transmit power and 10% duty cycle for all other emissions measurements.

The frequency range of 30 MHz to 1 GHz was scanned at a distance of 10 meters to find all emissions from the EUT. The frequency range from 1 GHz to 18 GHz was scanned at a distance of 3 meters. Higher frequencies were scanned at a much closer distance to identify any emissions from the EUT. No emissions were observed between 9 kHz and 30 MHz and also above 5 GHz. Reported measurements above 5 GHz were the baseline levels of the measurement system.

| **Polarization, Orientation** | **Fundamental Frequency MHz** | **PK Level dBµV/m** |
|---|---|---|
| Low CH H X | 2405 | 100.36 |
| Low CH V X | 2405 | 91.06 |
| Low CH H Y | 2405 | 95.06 |
| Low CH V Y | 2405 | 94.26 |
| Low CH H Z | 2405 | 91.66 |
| Low CH V Z | 2405 | 93.96 |
| Mid CH H X | 2440 | 101.13 |
| Mid CH V X | 2440 | 90.83 |
| Mid CH H Y | 2440 | 96.23 |
| Mid CH V Y | 2440 | 96.43 |
| Mid CH H Z | 2440 | 88.83 |
| Mid CH V Z | 2440 | 94.13 |
| **Hi CH H X** | **2480** | **101.34** |
| Hi CH V X | 2480 | 91.14 |
| Hi CH H Y | 2480 | 97.74 |
| Hi CH V Y | 2480 | 96.24 |
| Hi CH H Z | 2480 | 90.44 |
| Hi CH V Z | 2480 | 93.24 |

After finding the maximum transmitter level operating in low, mid and high transmit channels and in horizontal and vertical receive antenna orientations and all three EUT orientations (X, Y and Z), unwanted emissions measurements were made using this configuration of the transmitter as it is the worst case condition.

Using the duty cycle averaging factor based on 9.95% duty cycle.

Duty Cycle Correction Factor = 19.95dB

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# Radiated Data

Stack Labs, Inc.

Product - Stack Downlight

Model - BR3001E2626Z

*Table 6 – Radiated Data*

| Frequency MHz | QP Level dBμV/m | QP Limit dBμV/m | Margin dB | Azimuth, Height | Antenna, Polarization | |
|---|---|---|---|---|---|---|
| The data below was taken at 10 meter distance. | | | | | | |
| 46.25 | 13.31 | 30.00 | 16.69 | 112, 4 | BiLog, H | |
| 127.45 | 20.75 | 30.00 | 9.25 | 180, 4 | BiLog, H | |
| 166.0 | 9.34 | 30.00 | 20.66 | 180, 4 | BiLog, H | |
| 186.45 | 13.72 | 30.00 | 16.28 | 247, 4 | BiLog, H | |
| 37.7 | 19.72 | 30.00 | 10.28 | 270, 1.2 | BiLog, V | |
| 42.65 | 16.84 | 30.00 | 13.16 | 337, 1.1 | BiLog, V | |
| 76.85 | 15.28 | 30.00 | 14.72 | 0, 1.1 | BiLog, V | |
| 170.55 | 17.86 | 30.00 | 12.14 | 67, 1 | BiLog, V | |
| 177.5 | 17.50 | 30.00 | 12.50 | 67, 1 | BiLog, V | |
| The data below was taken at 3 meter distance | | | | | | |
| **Emission Frequency MHz** | **PK Level dBμV/m** | **PK Limit dBμV/m** | **AV Level dBμV/m** | **AV Limit dBμV/m** | **PK Margin dB** | **AV Margin dB** |
| Lowest Channel | | | | | | |
| 4810 | 65.87 | 74 | 45.92 | 54 | -8.13 | -8.08 |
| 7215 | 59.28 | 74 | 39.33 | 54 | -14.72 | -14.67 |
| 9620 | 60.42 | 74 | 40.47 | 54 | -13.58 | -13.53 |
| 12025 | 61.88 | 74 | 41.93 | 54 | -12.12 | -12.07 |
| Middle Channel | | | | | | |
| 4880 | 63.91 | 74 | 43.96 | 54 | -10.09 | -10.04 |
| 7320 | 60.83 | 74 | 40.88 | 54 | -13.17 | -13.12 |
| 9760 | 61.82 | 74 | 41.87 | 54 | -12.18 | -12.13 |
| 12200 | 62.3 | 74 | 42.35 | 54 | -11.7 | -11.65 |
| Highest Channel | | | | | | |
| 4960 | 66.8 | 74 | 46.85 | 54 | -7.2 | -7.15 |
| 7440 | 66.91 | 74 | 46.96 | 54 | -7.09 | -7.04 |
| 9920 | 59.77 | 74 | 39.82 | 54 | -14.23 | -14.18 |
| 12400 | 63.31 | 74 | 43.36 | 54 | -10.69 | -10.64 |
| No other emissions were observed | | | | | | |

Operating mode of the transmitter was 802.15.4. Only baseline noise floor was observed after the second harmonic. Note: PK – peak readings, AV – average readings using duty cycle correction factor. Duty Cycle Correction Factor = 19.95dB

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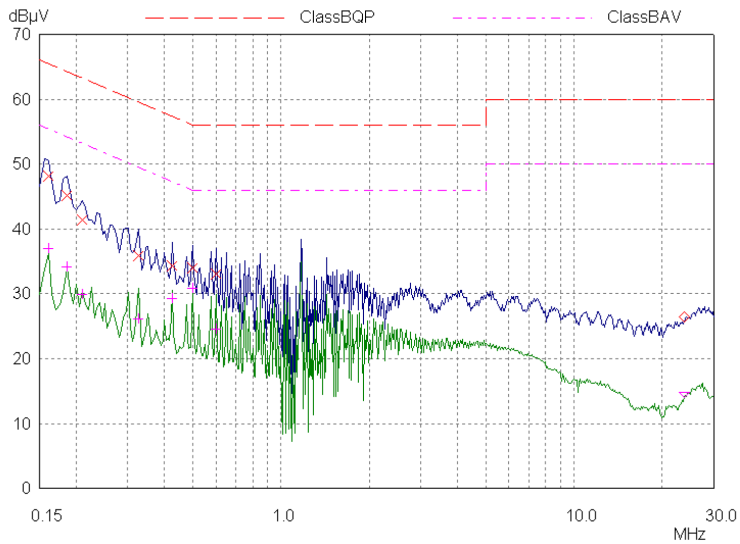
## Conducted Data for 15.207 Line

*Figure 2 – Line Scan*



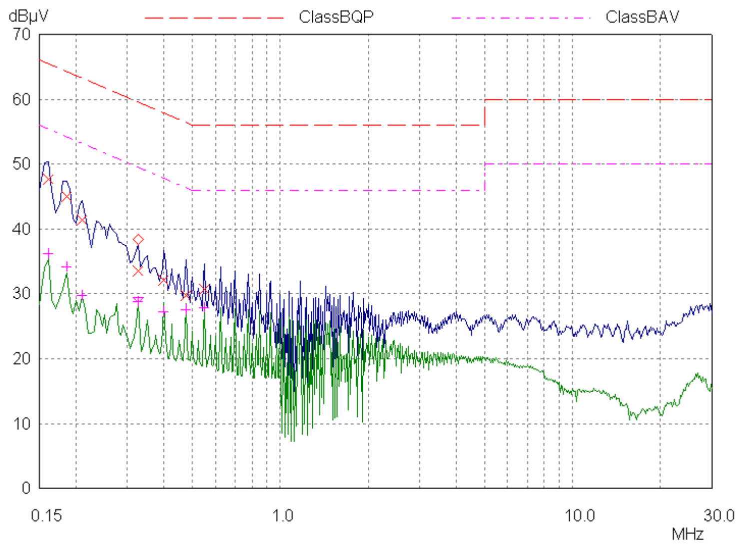

Blue Trace: Peak Measurement Green Trace: Average Measurement
Final Measurement: x = QP / + = AV at 2 second measurement time.

*Table 7 – Line Scan Data*

| Frequency MHz | Level dBµV | Detector | Limit dBµV | Margin dB | Phase | PE |
|---|---|---|---|---|---|---|
| 0.16 | 48.06 | QP | 65.46 | 17.40 | L1 | fl |
| 0.185 | 45.22 | QP | 64.26 | 19.04 | L1 | fl |
| 0.21 | 41.38 | QP | 63.21 | 21.83 | L1 | fl |
| 0.325 | 35.86 | QP | 59.58 | 23.72 | L1 | fl |
| 0.425 | 34.25 | QP | 57.35 | 23.10 | L1 | fl |
| 0.5 | 33.94 | QP | 56.00 | 22.06 | L1 | fl |
| 0.6 | 33.12 | QP | 56.00 | 22.88 | L1 | fl |
| 0.16 | 36.91 | AV | 55.46 | 18.55 | L1 | fl |
| 0.185 | 34.15 | AV | 54.26 | 20.11 | L1 | fl |
| 0.21 | 29.94 | AV | 53.21 | 23.27 | L1 | fl |
| 0.325 | 26.09 | AV | 49.58 | 23.49 | L1 | fl |
| 0.425 | 29.34 | AV | 47.35 | 18.01 | L1 | fl |
| 0.5 | 30.87 | AV | 46.00 | 15.13 | L1 | fl |
| 0.6 | 24.57 | AV | 46.00 | 21.43 | L1 | fl |

# Conducted Data for 15.207 Neutral

*Figure 3 – Neutral Scan*




Blue Trace: Peak Measurement Green Trace: Average Measurement
Final Measurement: x = QP / + = AV at 2 second measurement time.

*Table 8 – Neutral Scan Data*

| Frequency MHz | Level dBµV | Detector | Limit dBµV | Margin dB | Phase | PE |
|---|---|---|---|---|---|---|
| 0.16 | 47.73 | QP | 65.46 | 17.73 | N | fl |
| 0.185 | 44.98 | QP | 64.26 | 19.28 | N | fl |
| 0.21 | 41.40 | QP | 63.21 | 21.81 | N | fl |
| 0.325 | 33.45 | QP | 59.58 | 26.13 | N | fl |
| 0.4 | 32.10 | QP | 57.85 | 25.75 | N | fl |
| 0.475 | 29.77 | QP | 56.43 | 26.66 | N | fl |
| 0.55 | 30.67 | QP | 56.00 | 25.33 | N | fl |
| 0.16 | 36.16 | AV | 55.46 | 19.30 | N | fl |
| 0.185 | 34.15 | AV | 54.26 | 20.11 | N | fl |
| 0.21 | 29.82 | AV | 53.21 | 23.39 | N | fl |
| 0.325 | 28.74 | AV | 49.58 | 20.84 | N | fl |
| 0.4 | 27.27 | AV | 47.85 | 20.58 | N | fl |
| 0.475 | 27.58 | AV | 46.43 | 18.85 | N | fl |
| 0.55 | 27.83 | AV | 46.00 | 18.17 | N | fl |

Testing Cert #1007.01

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# COMPLIANCE VERIFICATION REPORT

# TEST CERTIFICATE

| | |
|---|---|
| APPLICANT: | Stack Labs, Inc.<br>10054 Pasadena Ave.<br>Cupertino, CA 95014 |
| Trade Name: | Stack |
| Model: | BR3001E2626Z |

I HEREBY CERTIFY THAT:

The measurements shown in this report were made in accordance with the procedures indicated and that the energy emitted by this equipment, as received, was found to be within the FCC CFR 47 Part 15 Subpart C requirements. Additionally, it should be noted that the results in this report apply only to the items tested, as identified herein.

I FURTHER CERTIFY THAT:

On the basis of the measurements taken at the test site, the equipment tested is capable of operation in compliance with the requirements set forth in FCC CFR 47 Part 15.207, 15.209 and 15.247 Rules and Regulations.

On this Date: January 20, 2016

Bruce Smith
Atlas Compliance & Engineering, Inc.