

*Testing Tomorrow's Technology*

**Application for**

**US Code Title 47, Part 2, Subpart J, Section 2.947, Certification  
Per**

**Part 15, Subpart C, for Intentional Radiators, Section 15.249  
for Intentional radiators**

**Operating within the Band 2400 MHz to 2483.5 MHz**

**US Code Title 47, Part 2, Subpart J, Section 2.902, Verification  
Per**

**Part 15, Subpart B, for Unintentional Radiators, section 15.101, 15.107 and 15.109**

**and**

**Industry Canada, RSS-210 Issue 8 and RSS-Gen Issue 4**

**For the**

**Acuity Brands Lighting**

**Model: DTL01**

**UST Project: 14-0271**

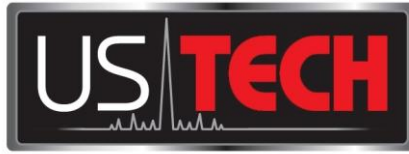
**Test Date(s): November 5-6, 2014**

**Issue Date: November 7, 2014**

**3505 Francis Circle Alpharetta, GA 30004**

**PH: 770-740-0717 Fax: 770-740-1508**

**[www.ustech-lab.com](http://www.ustech-lab.com)**



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I certify that I am authorized to sign for the test facility and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

**US TECH (Agent Responsible For Test):**

By: 

Name: George Yang

Title: Laboratory Manager

Date: November 7, 2014

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FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

## MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: Acuity Brands Lighting

MODEL(S): DTL01  
FCC ID: 2ADCB-DTL01  
IC: 6715C-DTL01

DATE: November 7, 2014

This report concerns (check one): Original grant  X  
Class II change  \_\_\_\_\_

Equipment type: Intentional Radiator Operating within the bands 2400-2483.5 MHz

Deferred grant requested per 47 CFR 0.457(d) (1) (ii)? yes \_\_\_\_\_ No  X

If yes, defer until: \_\_\_\_\_  
date

N.A. agrees to notify the Commission by N.A.  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech  
3505 Francis Circle  
Alpharetta, GA 30004

Phone Number: (770) 740-0717  
Fax Number: (770) 740-1508

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## **SUMMARY OF TEST REQUIREMENTS**

<b><u>FCC Requirement</u></b>	<b><u>Title</u></b>	<b><u>Disposition</u></b>
15.205	Restricted Bands	Pass
15.207	Intentional Radiator Power Line Conducted Emissions	Pass
15.209	Intentional Radiator Radiated Emissions	Pass
15.249(a)	Fundamental Field Strength	Pass
15.107	Unintentional Radiator Power Line Conducted Emissions	Pass
15.109	Unintentional Radiator Radiated Emissions	Pass

N/A = Not applicable for this unit.

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<b>Appendix</b>	<b>Title</b>
A	Agency Agreement
B	Application Forms
C	Letter of Confidentiality
D	Equipment Label
E	Block Diagram(s)
F	Schematic(s)
G	Test Configuration Photographs
H	External Photographs
I	Internal Photographs
J	Theory of Operation
K	User's Manual

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## **1 General Information**

### **1.1 Purpose of this Report**

This report is prepared as a means of presenting test data to be used by a Telecom Certification Body in determination of whether this product is permitted for unlicensed dissemination to the general public according to the FCC Rules and Regulations for RF Devices Intentional Radiators.

### **1.2 Product Description**

The Equipment Under Test (EUT) is the Acuity Brands Lighting Model DTL01. The EUT incorporates an ISM band transceiver operating in the 2400-2483.5 MHz frequency band. Per 47 CFR Part 15.31(m) the EUT was evaluated at the low, middle and high channels for operation in this band. Test data for these channels is provided herein.

The EUT is a radio module intended for installation in Bluetooth streetlight control applications and to communicate with Acuity Brands Lighting key fob, Model DTL02.

The EUT is powered through a 3 VDC by a Dark to Light (DTL) custom host board and has the following features:

Frequency Hopping: 40 channels, 1 MHz bandwidth, 2 MHz spacing, 1600 hops per seconds

Modulation: FHSS/GFSK

Data Packet: DH1, DH3, and DH5

Bluetooth rated maximum output power: 0 dBm

Frequency band of operation: 2400 MHz to 2483.5 MHz

### **1.3 Related Submittal(s)/Grant(s)**

The EUT is subject to the following FCC authorizations:

- a) Certification under section 15.249 as a transmitter.
- b) Verification under 15.101 as a digital device and receiver.

The manufacturer is seeking Limited Modular Approval for this device.



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### **1.3.1 Certification of the Transmitter**

The EUT employs FHSS modulation, but is not being certified under CFR 15.247 because the field strength of the fundamental and its harmonics are within the limits specified in 47 CFR 15.249. Therefore the EUT is instead being presented under the requirements of CFR 15.249. The EUT will operate within the frequency band of 2400 MHz to 2483.5 MHz.

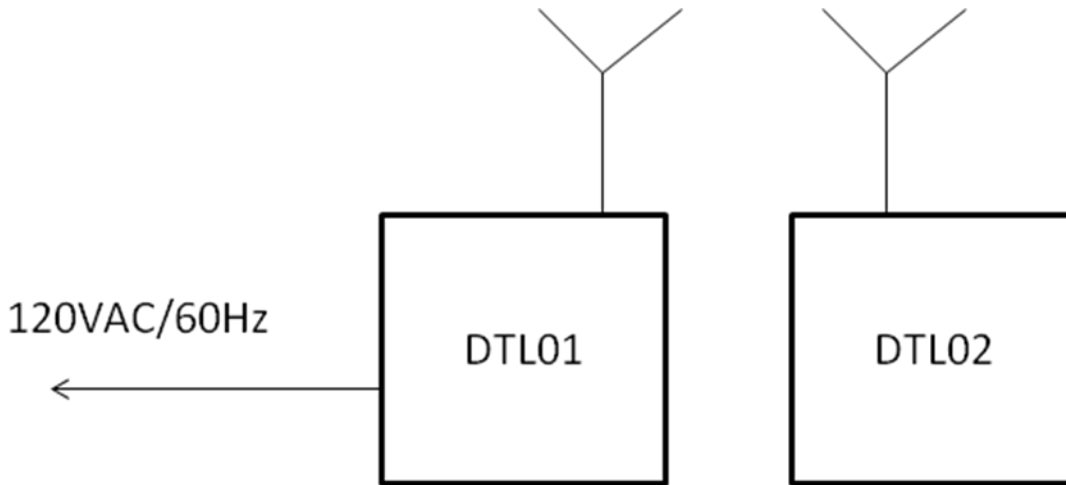
### **1.3.3 Verification of the Digital apparatus**

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

## **2 Tests and Measurements**

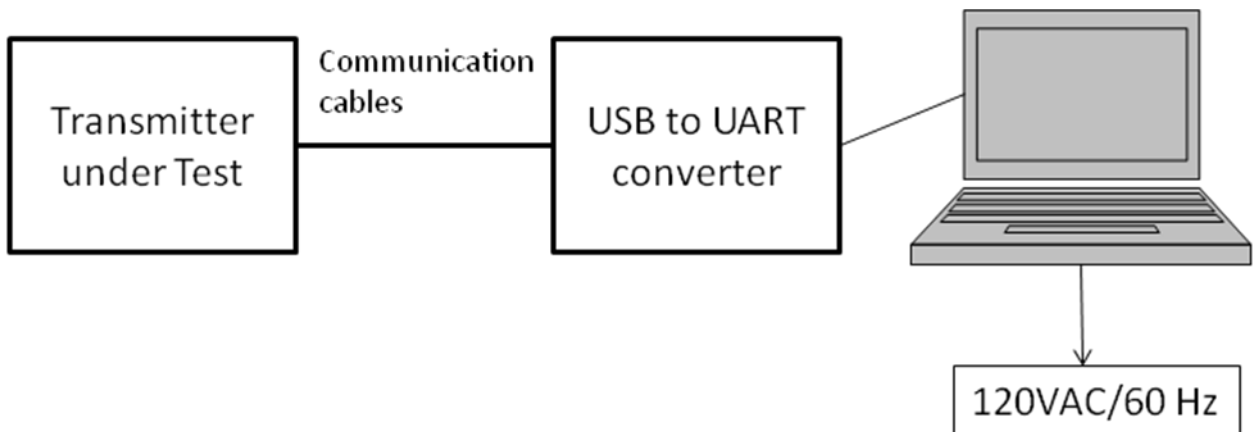
### **2.1 Configuration of Tested System**

The sample was set up and tested per ANSI C63.4:2009 and ANSI C63.4:2014. Conducted and radiated emissions data were taken with the EMC test receiver (or spectrum analyzer's) resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. A Block diagram of the tested system is shown in Figure 1. A listing of the EUT and its test peripherals is found in Table 1 below. Test configuration photographs for spurious and fundamental emissions measurements are in the attached appendices.



**Figure 1. Test Configuration for Normal Use Mode**

Note: DTL01 is the EUT



**Figure 2. Test Configuration for Continuous Transition Mode**

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**Table 1. EUT and Peripherals**

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID/IC Number	CABLES P/D
(EUT) Acuity Brands Lighting	DTL01	Engineering Sample	Pending: FCC ID: 2ADCB-DTL01 IC: 6715C-DTL01	0.5 m UD (x2) 0.5 m UP (x2) 1.5 m UP
Acuity Brands Lighting	DTL02	Engineering Sample	Pending: FCC ID: 2ADCB-DTL02 IC: 6715C-DTL02	N/A
USB to Serial Cable	N/A	N/A	N/A	0.5 m UD (x3) 0.5 m UP (x2)
HP Laptop	Elite Book 8530p	2CE01000TG	N/A	1.0 m P 0.5 m UD

**S = Shielded P = Power**  
**U = Unshielded D = Data**

**Table 2. Details of I/O Cables Attached to EUT**

DESCRIPTION OF CABLE	DETAILS OF CABLE			CABLE LENGTH
Communication Cables (X4) (VCC, TX, RX and GND)	Manufacturer and Part Number			0.5 meters
	CND			
	Shield Type	Shield Termination	Type of Backshell	
	N/A	N/A	N/A	
Power Cable	Manufacturer and Part Number			1.5 m
	CND			
	Shield Type	Shield Termination	Type of Back Shell	
	N/A	N/A	N/A	

Shield Type

N/A = None  
 F = Foil  
 B = Braided  
 2B = Double Braided  
 CND = Could Not Determine

Shield Termination

N/A = None  
 360 = 360 Degrees  
 P = Pigtail/Drain Wire  
 CND = Could Not Determine  
 MU = Metal Unshielded

Type of Backshell

N/A = Not Applicable  
 PS = Plastic Shielded  
 PU = Plastic Unshielded  
 MS = Metal Shielded

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## **2.2 EUT Characterization**

The sample used for testing was received by US Tech on November 5, 2014 in good operating condition.

## **2.3 Test Facility**

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and registered with the FCC under designation number 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

## **2.4 Modifications to EUT**

No modifications were made by US Tech to bring the EUT into compliance with FCC Part 15, Subpart B, Class B Limits for the receiver and digital portion of the EUT or the Subpart C, Transmitter requirements.

## 2.5 Test Equipment

Table 2 describes test equipment used to evaluate this product.

**Table 3. Test Instruments used for Evaluation**

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	8566B	HEWLETT-PACKARD	2410A00109	2/3/2014
QUASI_PEAK ADAPTER	85650A	HEWLETT-PACKARD	2430A00523	2/3/2014
SPECTRUM ANALYZER	E4407B	Agilent	US41442935	11/8/2013
PREAMP	8447D	HEWLETT-PACKARD	2944A07436	2/6/2014
PREAMP	8449B	HEWLETT-PACKARD	3008A00480	2/6/2014
BICONICAL ANTENNA	3110B	EMCO	9307-1431	2/11/2013 2 yr.
LOG PERIODIC ANTENNA	3146	EMCO	9305-3600	7/1/2014 2 yr.
HORN ANTENNA	3115	EMCO	9107-3723	7/08/2014
HORN ANTENNA	SAS-571	A.H. SYSTEMS	605	7/23/2013 2 yrs
HORN ANTENNA	3116	EMCO	9505-2255	8/9/2012 2 yr with 90 day extension
LOOP ANTENNA	SAS-200/562	A. H. Systems	142	9/12/2013 2 yr cycle
LISN (X2)	9247-50-TS-50-N	Solar Electronics	955824 & 955826	3/20/2014

**Note: The calibration interval of the above test instruments is 12 months unless stated otherwise, and all calibrations are traceable to NIST/USA.**

## **2.6 Measurement Standards (CFR 15.31)**

Intentional and unintentional radiators are to use the methods of ANSI C63.4:2009 and ANSI C63.4:2014. Measurements were made on an Open Area Test Site (OATS) wherever possible. For battery powered equipment, new (or fully charged) batteries are used. Section 15.31(m) indicates that if the EUT System operates over the 2400 MHz to 2483.5 MHz ISM band, measurements must be made near the bottom of the band (around 2400 MHz for example) and in the middle of the band (2440 MHz) as well as near the top of the band (2483.5 MHz).

## **2.7 Frequency Range of Radiated Measurements (CFR 15.33)**

The frequency range is detailed below for intentional and unintentional radiators.

### **2.7.1 Frequency Range for Intentional Radiators**

The spectrum was investigated from the lowest RF signal generated without going below 9 kHz to the 10<sup>th</sup> harmonic of the highest fundamental transmitter frequency.

### **2.7.2 Frequency Range for Unintentional Radiators**

The spectrum was investigated from the lowest RF signal generated without going below the lowest frequency for which an emissions limit is specified (30 MHz) to the 5<sup>th</sup> harmonic of the highest fundamental frequency of the digital device.

### **2.7.3 Measurement Detector Function and Bandwidth (CFR 15.35)**

On any frequency below 1000 MHz, the limits shown are based upon measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths. On frequencies above 1000 MHz, the radiation limits are based upon the use of measuring instrumentation employing an average detector function.

When average detector measurements are specified for use, including emission measurements below 1000 MHz, there is also a corresponding limit for Peak detector measurements having a limit of 20 dB above the corresponding average limit unless a different peak emission limit is specified. Measurements above 1000 MHz utilize a minimum resolution bandwidth of 1 MHz.

When radiated emissions limits are expressed in terms of the average value of the emission and pulsed operation is employed, the measurement field strength is determined by averaging over one complete pulse train (Duty Cycle) including blanking intervals for pulse trains up to 0.1 second in duration. The exact method of calculating the average field strength is included in paragraph 2.11 of this report. Refer to Figures 3 and 4 for duty cycle measurement data.

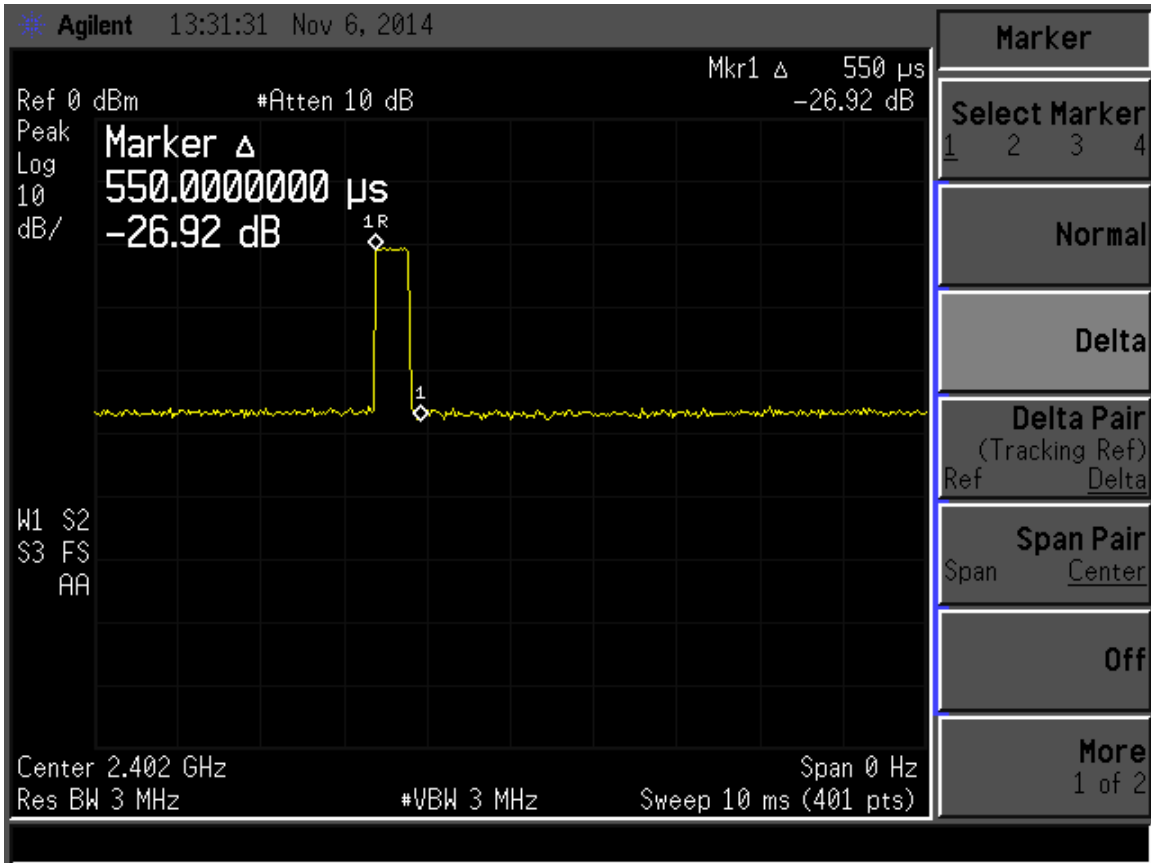
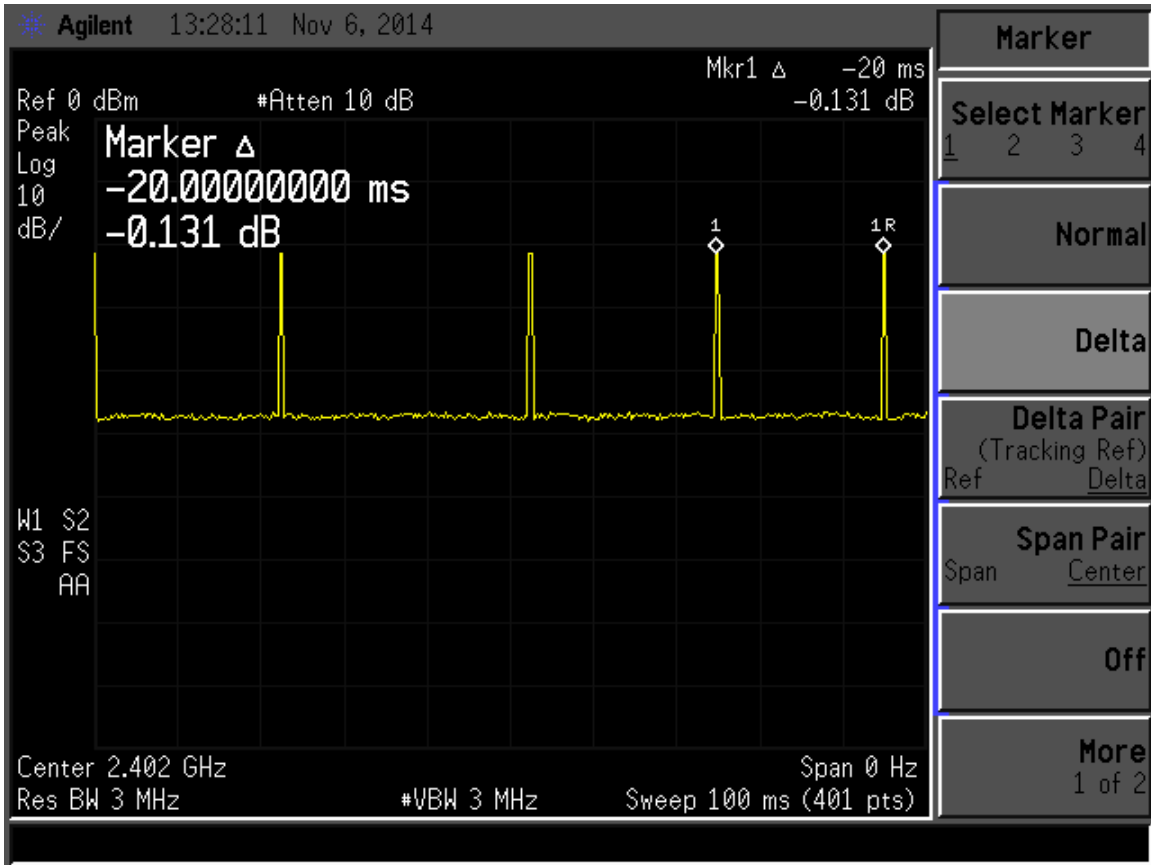


Figure 3. Transmitter Pulse Width



**Figure 4. Transmitter Pulse Train within 100ms**

$$(2.75 \text{ ms})/100 \text{ ms} = .0275 = 2.75\% \text{ percent}$$

$$\text{Duty Cycle} = 20 \text{ Log} (.0275) = \boxed{\boxed{-31 \text{ dB}}}$$

The Duty Cycle factor applied in this test report is -20 dB.



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## 2.8 Antenna Requirement (CFR 15.203)

The EUT has an integrated PIFA antenna; there are no external antenna ports.

**Table 4. Allowed Antenna(s)**

MANUFACTURER	TYPE OF ANTENNA	MODEL	REPORT REFERENCE	GAIN dB <sub>i</sub>	TYPE OF CONNECTOR
Acuity Brands Lighting	PIFA	Engineering Sample	Antenna	2.0	PIFA Antenna

## 2.9 Restricted Bands of Operation (CFR 15.205)

Only radiated harmonics and other spurious signals can be permitted to fall into the restricted bands of 15.205. All signals found in paragraph 2.7 above shall be examined for this requirement. Limits are based upon the limits of paragraph 15.209. Above 1 GHz, the limits are for Average value. See tables below for peak and average measurements. According to CFR 15.35, the peak limits can exceed the average limits by 20 dB.

## 2.10 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

For an intentional radiator that is designed to be connected to the public utility power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz - 30 MHz shall not exceed the limits of the table depicted in 15.207 (a) except as applicable per section 15.207.

The AC power line emissions were evaluated while the radio was installed within the host device and transmitting as it would in normal operation. The worst case emission was 4.1 dB below the limit at 0.1500 MHz on the phase line of the EUT. All other emissions were at least 4.7 dB below the limits. See Table 13 for test data.

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**2.11 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.249 (a), (e))**

The EUT was placed into a continuous transmit mode of operation. A preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the product. To obtain the worse case results the EUT was tested in X, Y and Z axes to determine the worst case orientation. Radiated measurements below 30 MHz were tested with a RBW = 9 kHz; emissions below 1 GHz were tested with a RBW = 120 kHz and radiated measurements above 1 GHz were measured using a RBW =1 MHz. All VBW was set to three times the RBW value.

Test data is found in Tables 5-7.

**Table 5. Intentional Radiator, Peak Radiated Emissions (CFR 15.209), 0.009 MHz to 30MHz**

Peak Radiated Emissions, Digital Device and Receiver							
Test By: CF	Test: Radiated Emissions- .009 MHz to 30 MHz			Client: Acuity Brands Lighting			
	Project: 14-0271	Requirement 15.209		Model: DTL01			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	QP Limits (dBuV/m)	Distance / Polarity (meters)	Margin (dB)	Detector PK / QP
All emissions were at least 20 dB below the applicable limit.							

SAMPLE CALCULATION: N/A

Test Date: November 6, 2014

Tested by  
 Signature: 

Name: Carrie Fincannon

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**Table 6. Peak Fundamental and Harmonics, (CFR15.209, 15.249(a)),  
 30 MHz to 25 GHz**

Radiated Fundamental and Harmonics Emissions								
Test By: JW	Test: Fundamental and Harmonics CFR 15.209, 15.249 (a)				Client: Acuity Brands Lighting			
	Project: 14-0271		Class: N/A		Model: DTL01			
Frequency (MHz)	Test Data (dBuV)	DF+FL*	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Peak Limits (dBuV/m)	Distance / Polarity (Meters)	Margin (dB)	Det PK / AVG
<b>Low Channel</b>								
2402	62.65	0	30.83	93.48	114	3.0m./VERT	20.5	<b>PK</b>
4804	53.94	-8.00	2.59	48.53	74	1.0m./VERT	25.4	<b>PK</b>
7206	46.59	-8.00	8.83	47.42	74	1.0m./VERT	26.6	<b>PK</b>
<b>Mid Channel</b>								
2440	63.08	0	30.83	93.91	114	3.0m./VERT	20.1	<b>PK</b>
4880	56.04	-8.00	2.72	50.76	74	1.0m./VERT	23.2	<b>PK</b>
<b>High Channel</b>								
2480	61.62	0	30.73	92.35	114	3.0m./VERT	21.6	<b>PK</b>
4960	51.88	-8.00	3.00	46.88	74	1.0m./VERT	27.1	<b>PK</b>

All other emissions were at least 20 dB below the applicable limit.

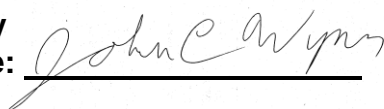
\*measurements at 1 meter were extrapolated to 3 meters using a factor of -9.5 dB.

Note: The transmitter was programmed to transmit at >98% duty cycle

Sample Calculation at 2402 MHz:

Magnitude of Measured Frequency	62.65 dBuV
+Correction Factors	30.83 dB/m
Corrected Result	93.48 dBuV/m

**Test Date: November 5, 2014**

Tested by  
 Signature: 

Name: John Wynn

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**Table 7. AVERAGE Fundamental and Harmonics, (CFR15.209, 15.249(a)),  
 30 MHz to 25 GHz**

Radiated Fundamental and Harmonics Emissions								
Test By: JW	Test: Fundamental and Harmonics CFR 15.249 (a)				Client: Acuity Brands Lighting			
	Project: 14-0271		Class: N/A		Model: DTL01			
Frequency (MHz)	Test Data (dBuV)	DF+FL	AF+CL- PA+DC (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarity (Meters)	Margin (dB)	Det PK / AVG
<b>Low Channel</b>								
2402	61.27	-20.00	30.83	72.10	94	3.0m./VERT	21.9	<b>AVG</b>
4804	50.93	-28.00	2.59	25.52	54	1.0m./VERT	28.5	<b>AVG</b>
7206	35.17	-28.00	8.83	16.00	54	1.0m./VERT	38.0	<b>AVG</b>
<b>Mid Channel</b>								
2440	61.88	-20.00	30.83	72.71	94	3.0m./VERT	21.3	<b>AVG</b>
4880	53.4	-28.00	2.72	27.82	54	1.0m./VERT	25.9	<b>AVG</b>
<b>High Channel</b>								
2480	61.07	-20.00	30.73	72.35	94	3.0m./VERT	22.2	<b>AVG</b>
4958	51.88	-28.00	3.00	26.88	54	1.0m./VERT	27.1	<b>AVG</b>

All other emissions were at least 20 dB below the applicable limit.

\*measurements at 1 meter were extrapolated to 3 meters using a factor of -9.5 dB.

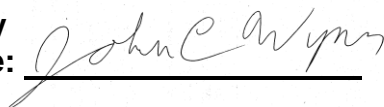
\*duty cycle factor = -20 dB

Note: The transmitter was programmed to transmit at >98% duty cycle

Sample Calculation at 2402 MHz:

Magnitude of Measured Frequency	61.27 dBuV
+Correction Factors	10.83 dB/m
Corrected Result	72.10 dBuV/m

**Test Date: November 5, 2014**

Tested by  
 Signature: 

Name: John Wynn

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

## 2.12 20 dB Bandwidth Measurement per CFR 15.249, 99% Occupied Bandwidth (IC RSS 210, A8.1)

These measurements were performed while the EUT was in a constant transmit mode. A method similar to the marker delta method was used to capture the points. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW  $\geq$  RBW.

**Table 8. 20 dB Bandwidth and 99% Occupied Bandwidth**

Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2402.00	1.26	1.19
2440.00	1.29	1.13
2480.00	1.25	1.11

**Test Date: November 6, 2014**

**Tested by**  
**Signature:** 

**Name:** Carrie Fincannon

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01



Figure 5. Low Channel 20 dB Bandwidth

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

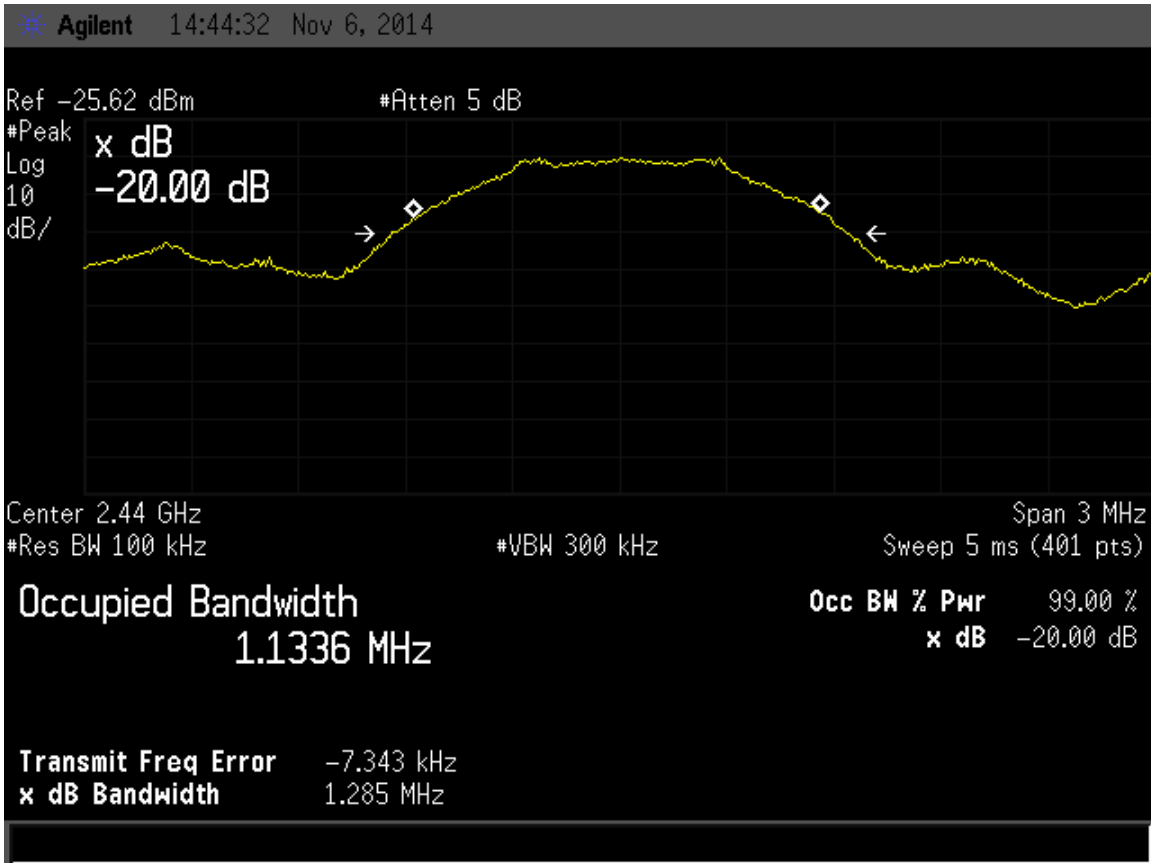


Figure 6. Mid Channel 20 dB Bandwidth

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

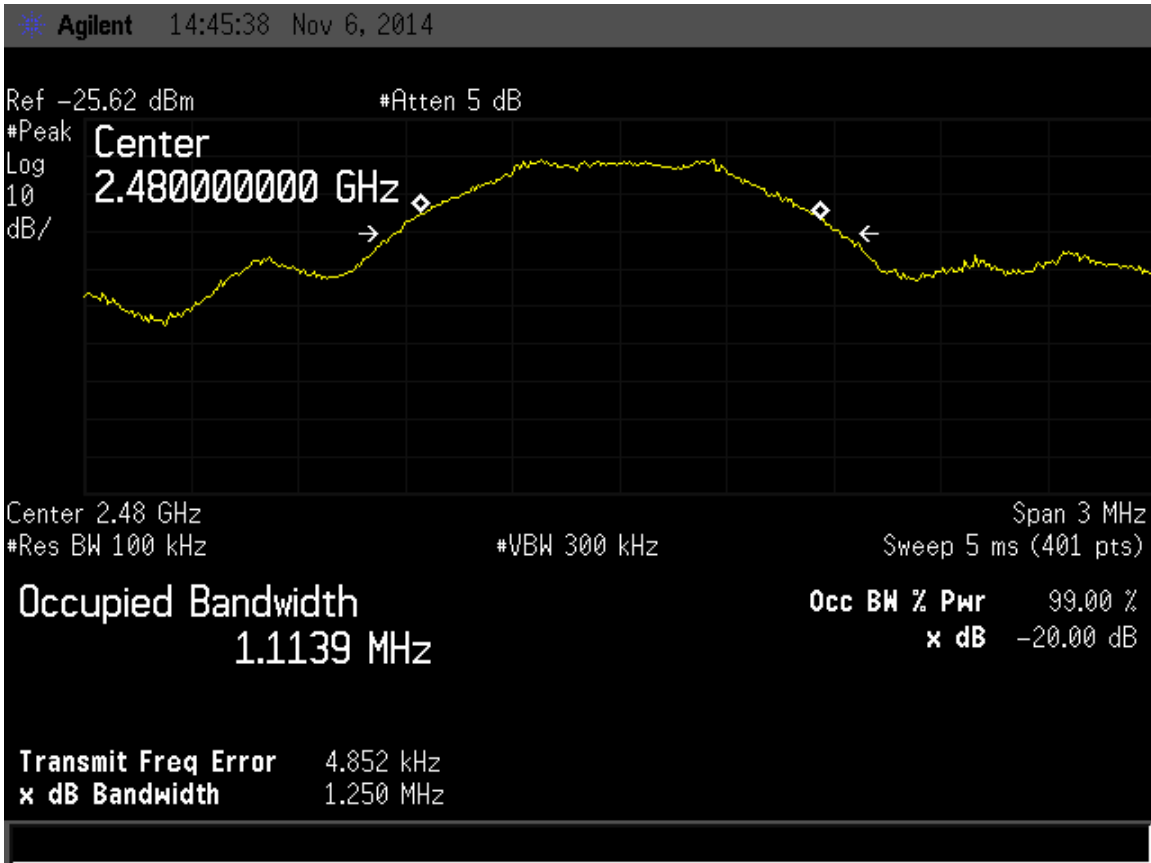


Figure 7. High Channel 20 dB Bandwidth



US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
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6715C-DTL01  
November 7, 2014  
DTL01

---

### **2.13 Band Edge Measurements (CFR15.249(d))**

Band Edge measurements were made using the marker delta procedure as cited in ANSI C63.10:2009 and/or ANSI C63.10:2013. Per the procedure the low and high channels were evaluated to show compliance to the band edge requirements of this subpart. The peak at the highest EUT related emission outside the upper and lower occupied bandwidth was compared to the restricted band limits. A measurement was made of the fundamental and the emission was measured using a spectrum analyzer in peak detection mode. A Resolution Bandwidth of 1% to 5% of the total span was used. This procedure was repeated for both channels. The limits were derived as described in the following sections.

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
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2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

### 2.13.1 High Band Edge

Above 2483.5 MHz the limit per section 15.249(d) is 50 dB below the fundamental or the value expressed by CFR 15.209 (54 dBuV/m) whichever is the lesser attenuation.

Note: The transmitter was programmed to transmit at >98% duty cycle

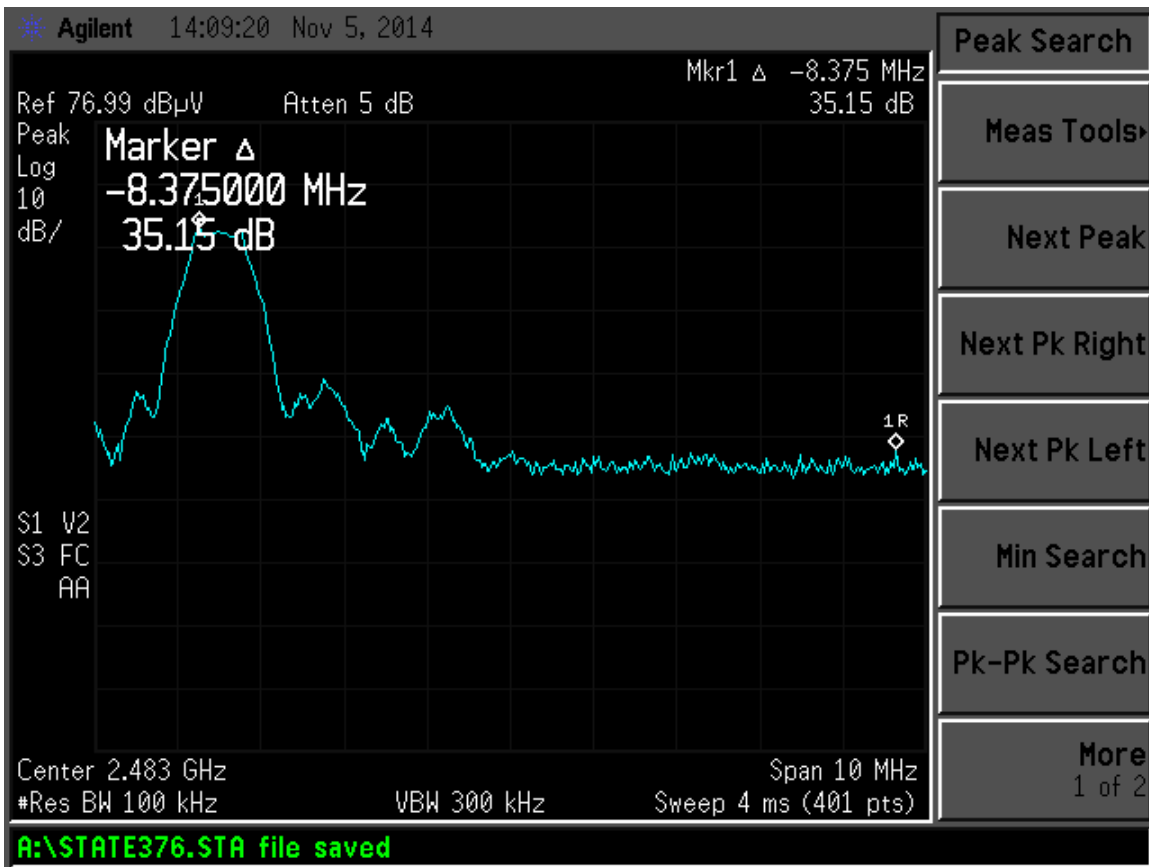


Figure 8. Radiated Band Edge – High Channel Delta PK

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
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2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

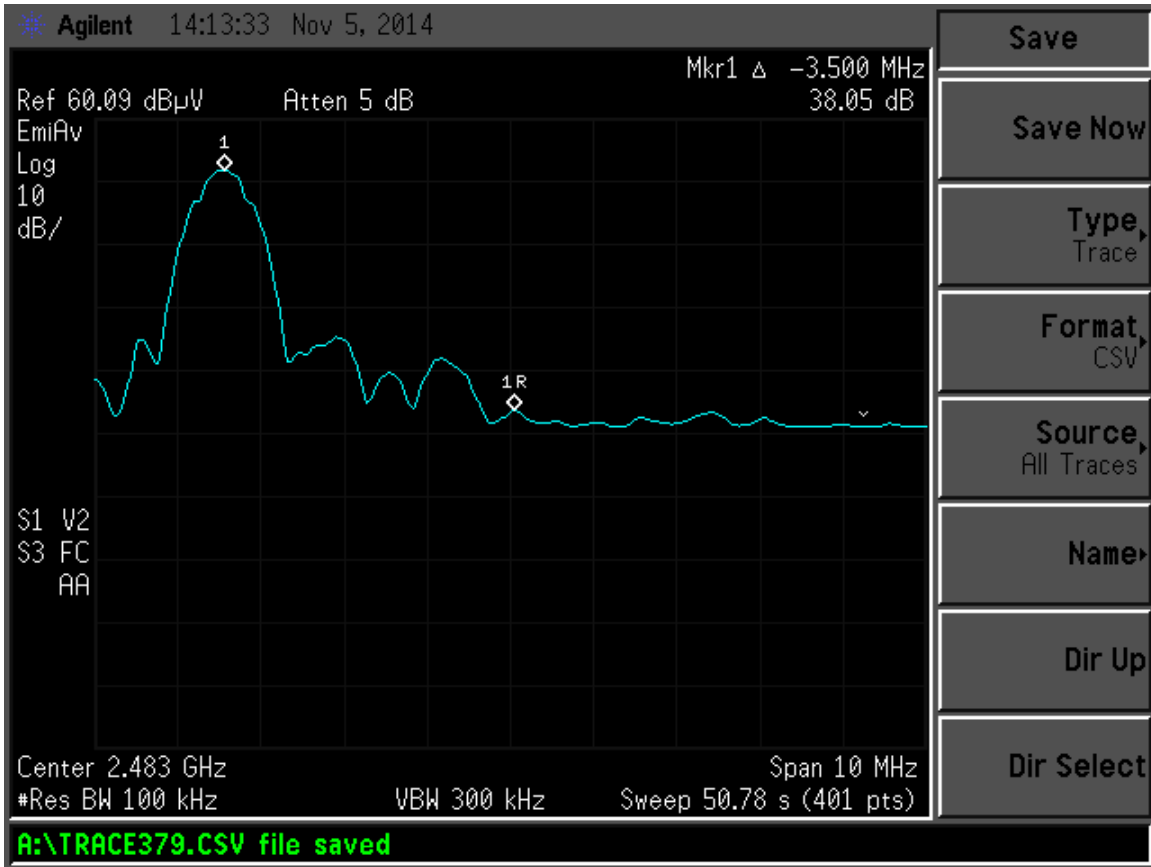


Figure 9. Radiated Band Edge – High Channel Delta AVG

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
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Acuity Brands Lighting  
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The PEAK High Channel fundamental recorded in Table 6 is 92.35 dBuV/m:

Magnitude of Fundamental (PK)	92.35dBuV/m
- Delta (from figure 8)	35.15 dB
Measured Difference	57.20dBuV/m
Applied Limit	74.00 dBuV/m
-Measured Difference	57.20 dBuV/m
Passing Margin	16.80 dB

The AVG High Channel fundamental recorded in Table 7 is 72.35 dBuV/m;

Magnitude of Fundamental (AVG)	72.35dBuV/m
- Delta (from figure 9)	38.05 dB
Measured Difference	34.30dBuV/m
-Duty Factor	20.00 dB
Corrected Difference	14.30dBuV/m
Applied Limit	54.00 dBuV/m
-Corrected Difference	14.30 dBuV/m
Passing Margin	39.70 dB

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

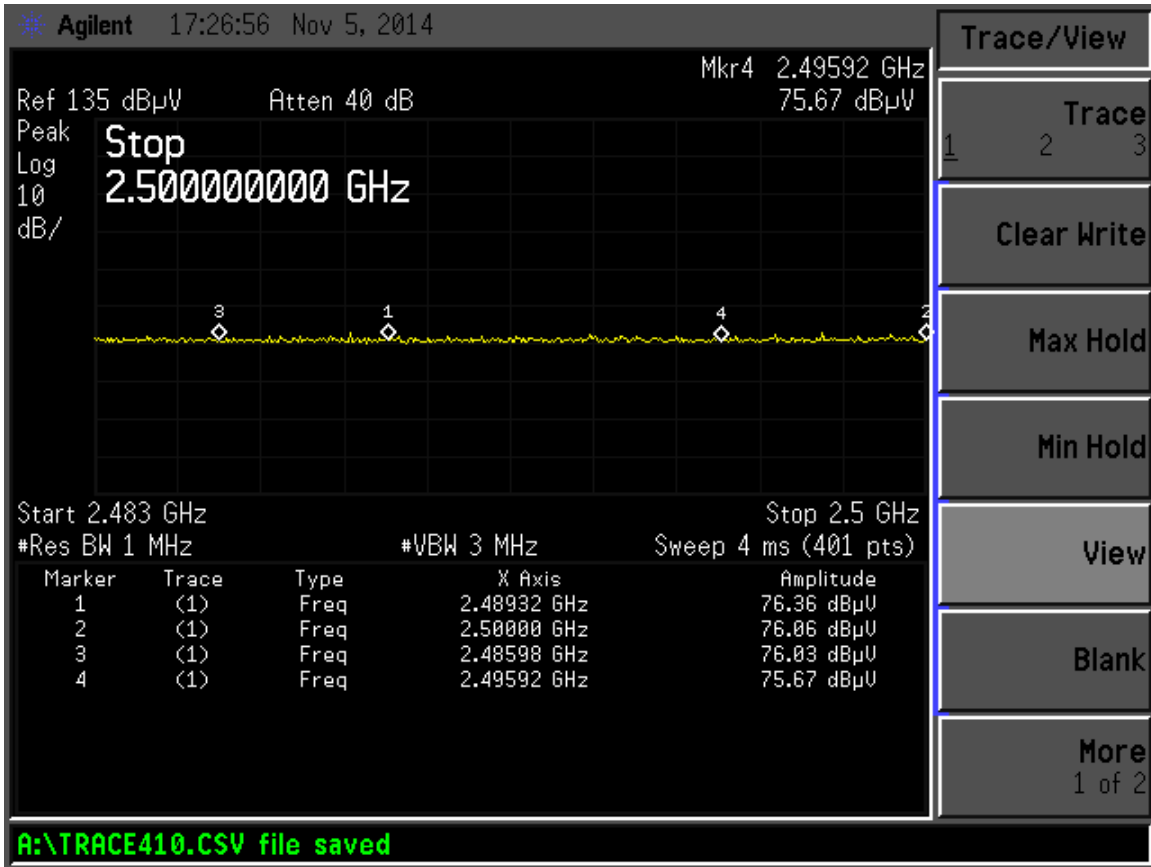


Figure 10. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

**Table 9. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz**

<b>Test By:</b> CF	<b>Client:</b> Acuity Brands Lighting						
	<b>Project:</b> 14-0271				<b>Model:</b> DTL01		
<b>Frequency (MHz)</b>	<b>Test Data (dBuV)</b>	<b>AF+CL-PA (dB/m)</b>	<b>Corrected Results (dBuV/m)</b>	<b>Peak Limits (dBuV/m)</b>	<b>Distance / Polarity (Meters)</b>	<b>Margin (dB)</b>	<b>Det PK / AVG</b>
2489	76.36	-4.59	71.77	74	3m/VERT	2.2	<b>PK</b>
2500	76.06	-4.00	72.06	74	3m/VERT	1.9	<b>PK</b>
2486	76.03	-4.59	71.44	74	3m/VERT	2.6	<b>PK</b>
2496	75.67	-4.59	71.08	74	3m/VERT	2.9	<b>PK</b>

Sample Calculation at 2489.00 MHz:

Magnitude of Measured Frequency	76.36 dBuV
+Correction Factors	-4.59 dB/m
Corrected Result	71.77 dBuV/m

**Test Date: November 5, 2014**

**Tested by**  
**Signature:** 

**Name:** Carrie Fincannon

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

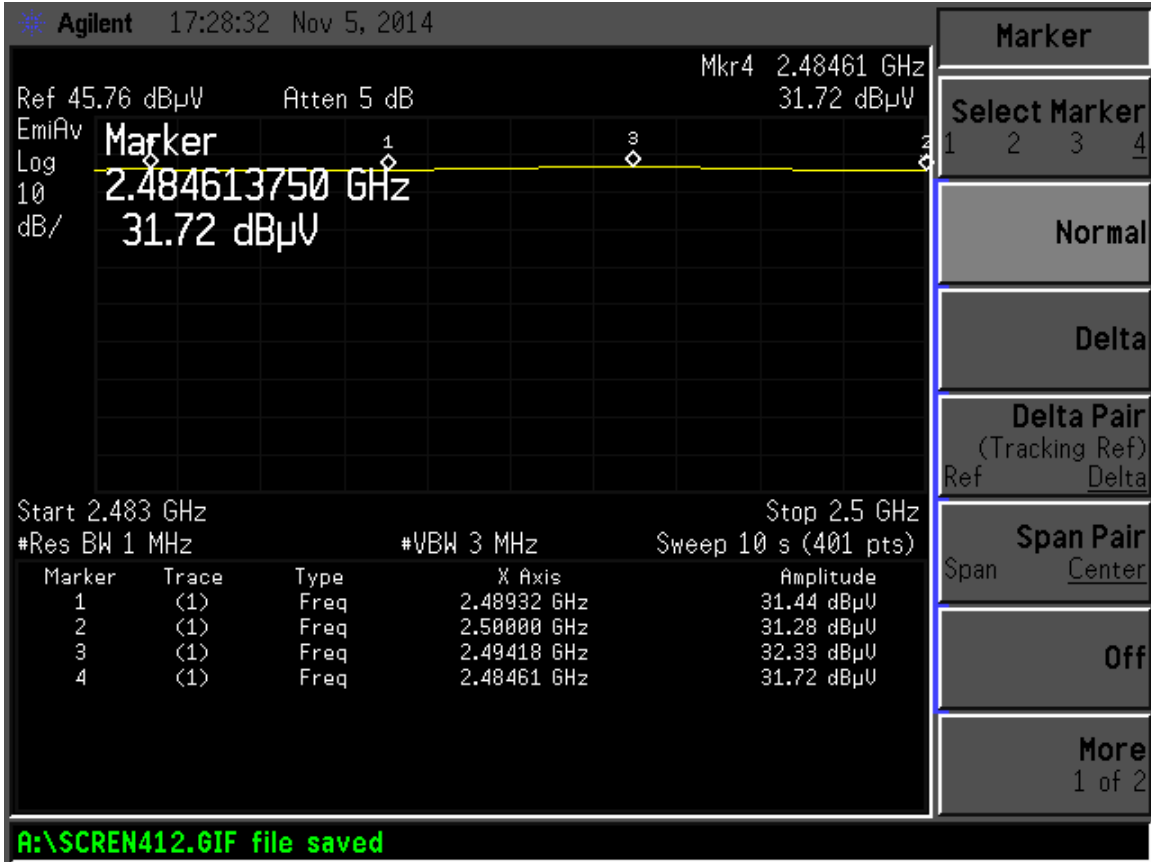


Figure 11. Radiated Restricted Band Measurements AVG, 2.4835 GHz to 2.5 GHz

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
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 2ADCB-DTL01  
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 November 7, 2014  
 DTL01

**Table 10. Radiated Restricted Band Measurements AVG, 2.4835 GHz to 2.5 GHz**

Test By: CF	Client: Acuity Brands Lighting						
	Project: 14-0271				Model: DTL01		
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	AVG Limits (dBuV/m)	Distance / Polarity (Meters)	Margin (dB)	Det PK / AVG
2489	31.44	-4.59	26.85	54.0	3m/VERT	27.2	<b>AVG</b>
2500	31.28	-4.00	27.28	54.0	3m/VERT	26.7	<b>AVG</b>
2494	32.33	-4.59	27.74	54.0	3m/VERT	26.3	<b>AVG</b>
2485	31.72	-4.59	27.13	54.0	3m/VERT	26.9	<b>AVG</b>

Sample Calculation at 2489.00 MHz:

Magnitude of Measured Frequency	31.44 dBuV
+Correction Factors	-4.59 dB/m
Corrected Result	26.85 dBuV/m

**Test Date: November 5, 2014**

Tested by  
 Signature: 

Name: Carrie Fincannon



### 2.13.2 Low Band Edge

Below 2400 MHz the limit per section 15.249(d) is 50 dB below the fundamental or the value expressed by CFR 15.209 (54 dBuV/m) whichever is the lesser attenuation.

Note: The transmitter was programmed to transmit at >98% duty cycle

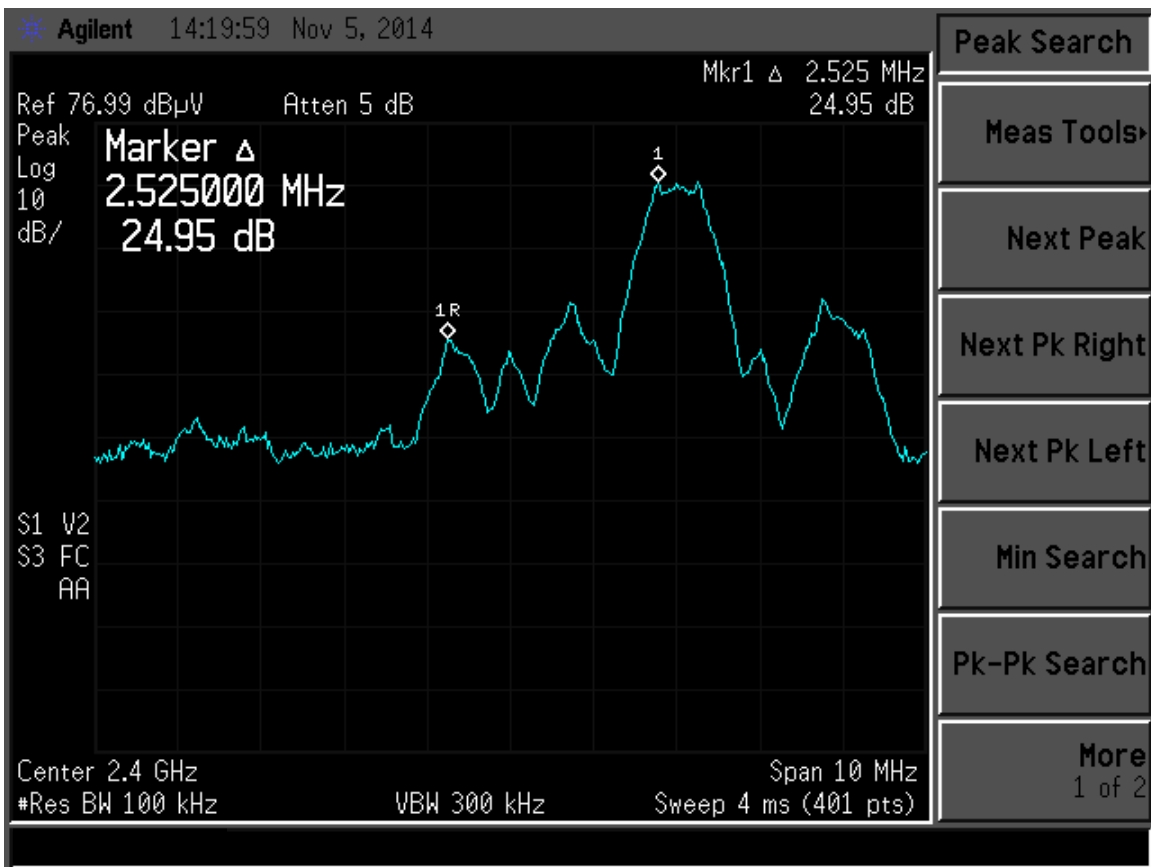


Figure 12. Radiated Band Edge – Low Channel Delta PK

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

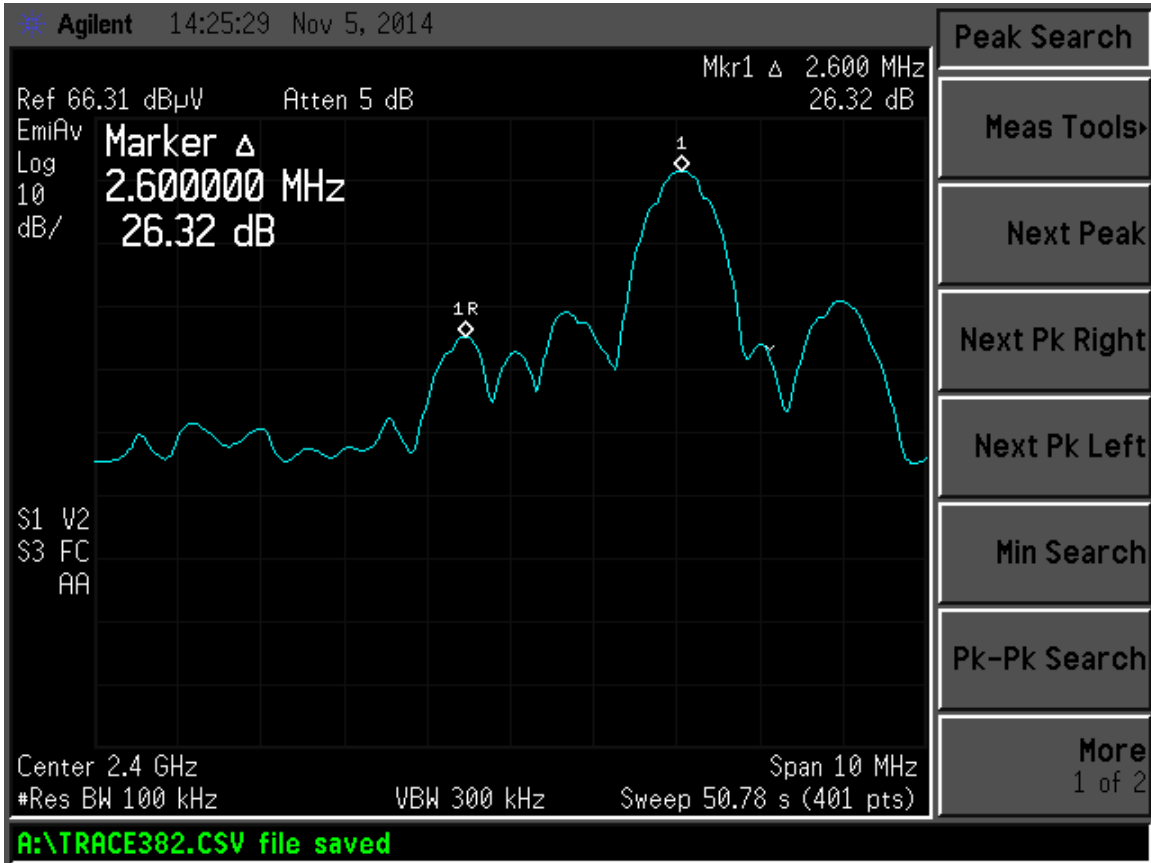


Figure 13. Radiated Band Edge – Low Channel Delta AVG

US Tech Test Report:	FCC Part 15.249/RSS 210
Report Number:	14-0271
Customer:	Acuity Brands Lighting
FCC ID:	2ADCB-DTL01
IC:	6715C-DTL01
Issue Date:	November 7, 2014
Model:	DTL01

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The PEAK Low Channel fundamental recorded in Table 6 is 93.48 dBuV/m:

Magnitude of Fundamental (PK)	93.48 dBuV/m
- Delta (from figure 12)	24.95 dB
<hr/> Measured Difference	68.53 dBuV/m
Applied Limit	74.00 dBuV/m
-Measured Difference	68.53 dBuV/m
<hr/> Passing Margin	5.47 dB

The AVG Low Channel fundamental recorded in Table 7 is 72.1 dBuV/m;

Magnitude of Fundamental (AVG)	72.10 dBuV/m
- Delta (from figure 13)	26.32 dB
<hr/> Measured Difference	45.78 dBuV/m
-Duty Factor	20.00 dB
<hr/> Corrected Difference	25.78 dBuV/m

Applied Limit	54.00 dBuV/m
-Corrected Difference	25.78 dBuV/m
<hr/> Passing Margin	28.22 dB

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

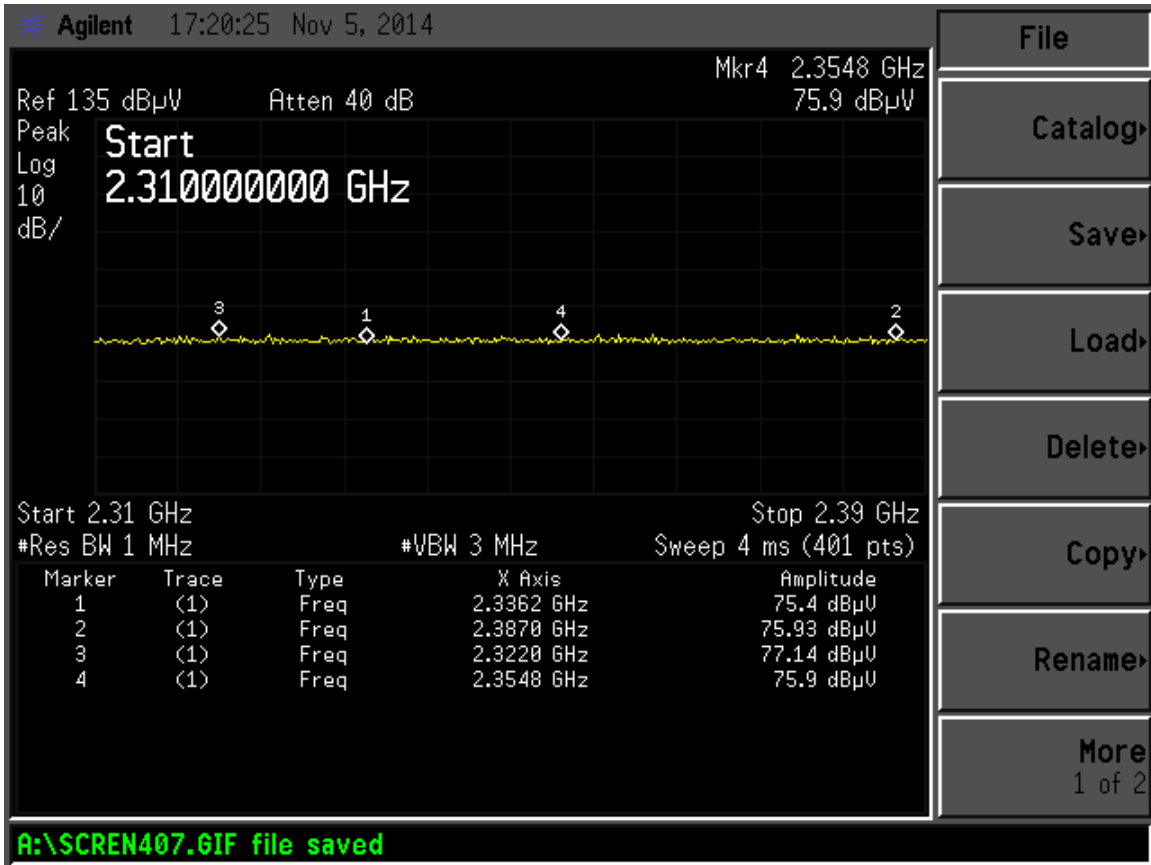


Figure 14. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

**Table 11. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz**

<b>Test By:</b> CF	<b>Client:</b> Acuity Brands Lighting						
	<b>Project:</b> 14-0271				<b>Model:</b> DTL01		
<b>Frequency (MHz)</b>	<b>Test Data (dBuV)</b>	<b>AF+CL-PA (dB/m)</b>	<b>Corrected Results (dBuV/m)</b>	<b>Peak Limits (dBuV/m)</b>	<b>Distance / Polarity (Meters)</b>	<b>Margin (dB)</b>	<b>Det PK / AVG</b>
2336	75.40	-4.64	70.76	74.0	3.0m./VERT	3.2	<b>PK</b>
2387	75.93	-4.79	71.14	74.0	3.0m./VERT	2.9	<b>PK</b>
2322	77.14	-4.65	72.49	74.0	3.0m./VERT	1.5	<b>PK</b>
2355	75.90	-4.90	71.00	74.0	3.0m./VERT	3.0	<b>PK</b>

Sample Calculation at 2336.00 MHz:

Magnitude of Measured Frequency	75.40 dBuV
+Correction Factors	-4.64 dB/m
Corrected Result	70.76 dBuV/m

**Test Date: November 5, 2014**

**Tested by Signature:** 

**Name: Carrie Fincannon**

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

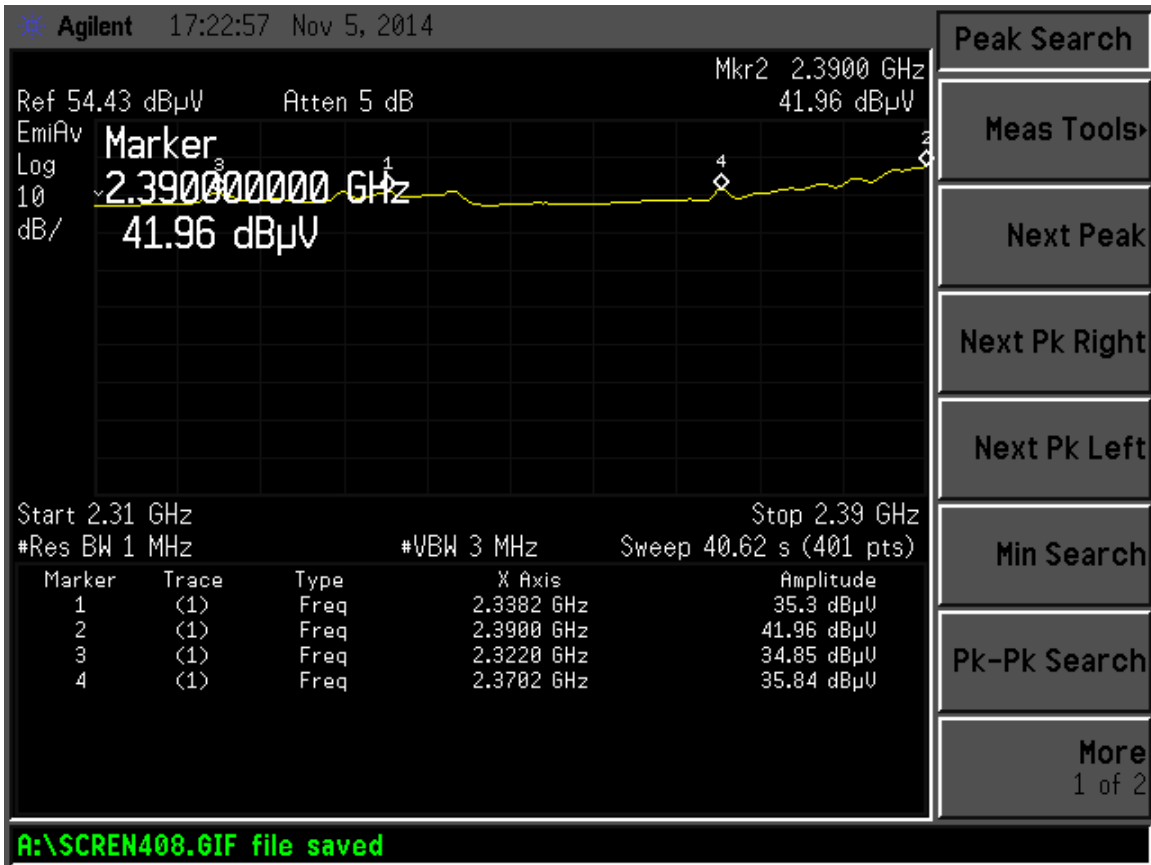


Figure 15. Radiated Restricted Band Measurements AVG, 2.31 GHz to 2.39 GHz

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

**Table 12. Radiated Restricted Band Measurements AVG, 2.31 GHz to 2.39 GHz**

<b>Test By:</b> CF	<b>Client:</b> Acuity Brands Lighting						
	<b>Project:</b> 14-0271				<b>Model:</b> DTL01		
<b>Frequency (MHz)</b>	<b>Test Data (dBuV)</b>	<b>AF+CL-PA (dB/m)</b>	<b>Corrected Results (dBuV/m)</b>	<b>Peak Limits (dBuV/m)</b>	<b>Distance / Polarity (Meters)</b>	<b>Margin (dB)</b>	<b>Det PK / AVG</b>
2338	35.30	-4.64	30.66	54.0	3.0m./VERT	23.3	<b>AVG</b>
2390	41.96	-4.79	37.17	54.0	3.0m./VERT	16.8	<b>AVG</b>
2322	34.85	-4.65	30.20	54.0	3.0m./VERT	23.8	<b>AVG</b>
2370	35.84	-4.79	31.05	54.0	3.0m./VERT	22.9	<b>AVG</b>

Sample Calculation at 2338.00 MHz:

Magnitude of Measured Frequency	35.30 dBuV
+Correction Factors	-4.64 dB/m
Corrected Result	30.66 dBuV/m

**Test Date: November 5, 2014**

**Tested by**  
**Signature:** 

**Name:** Carrie Fincannon

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
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DTL01

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## **2.14 Unintentional Radiator, Power Conducted Emissions (CFR 15.107, 15.207)**

The unit was set up and measured for conducted power line emissions. The measurement setup and test procedures were in accordance with ANSI C63.4:2009 and ANSI C63.4:2014. The EUT is connected to the power lines through the ac adaptor. This configuration is used to test and show compliance to CFR CFR15.107 for powerline conducted emissions.

Measurements were made over the 150 kHz to 30 MHz frequency range for the unit. The measurement receiver was connected to the RF (receiver) Port on the LISN and each power lead was individually measured. Test results are shown on Table 13 for the unit.

The worst-case power conducted emission was 4.1 dB below the limit at 0.15 MHz. This signal is found in Table 13. All other radiated emissions were 4.7 dB or more below the limit.

**NOTE: The test data provided in this section is to support the Verification requirement for the digital apparatus.**



US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

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 6715C-DTL01  
 November 7, 2014  
 DTL01

**Table 13. Power line Conducted Emissions Data, Class B**

<b>Tested By:</b> JW		<b>Test:</b> FCC Power Line Conducted Emissions 150 KHz – 30 MHz			<b>Client:</b> Acuity Brands Lighting		
		<b>Project:</b> 14-0271			<b>Model:</b> DTL01		
Frequency (MHz)	Test Data (dBuV)	LISN+CL-PA (dB)	Results (dBuV)	Limits (dBuV)	Margin (dB)	DET PK/QP /AVG	
Neutral							
0.15	60.15	1.55	61.70	65.8*	4.1	PK	
0.15	45.04	1.55	46.59	55.8	9.2	AVG	
0.59	48.90	0.44	49.34	56.0*	6.7	PK	
0.59	31.64	0.44	32.08	46.0	13.9	AVG	
1.04	45.16	0.39	45.55	56.0*	10.5	PK	
1.04	29.34	0.39	29.73	46.0	16.3	AVG	
5.55	38.06	0.48	38.54	50.0	11.5	PK	
18.23	37.17	0.97	38.14	50.0	11.9	PK	
25.18	39.18	1.16	40.34	50.0	9.7	PK	
Phase							
0.15	59.70	1.63	61.33	66.0*	4.7	PK	
0.15	42.41	1.63	44.04	56.0	12.0	AVG	
0.51	48.29	0.50	48.79	56.0*	7.2	PK	
0.51	24.04	0.50	24.54	46.0	21.5	AVG	
1.06	43.11	0.40	43.51	56.0*	12.5	PK	
1.06	21.25	0.40	21.65	46.0	24.3	AVG	
8.03	37.17	0.45	37.62	50.0	12.4	PK	
10.7	37.07	0.48	37.55	50.0	12.4	PK	
24.4	37.98	0.65	38.63	50.0	11.4	PK	

Note: (\*) Indicates that the limit used is Quasi-Peak (QP)

Sample Calculation at 0.15 MHz:

Magnitude of Measured Frequency	60.15 dBuV
+Correction Factors	1.55 dB/m
Corrected Result	61.70 dBuV

**Test Date: November 6, 2014**

**Tested by Signature:** 

**Name: Carrie Fincannon**

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

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## **2.15 Unintentional Radiator, Radiated Emissions (CFR 15.109, 15.209)**

Radiated emissions disturbance Measurements were performed with an instrument having both peak and quasi-peak detectors over the frequency range of 30 MHz to 12.5 GHz. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit.

For measurements from 30 MHz to 12.5 GHz, the test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emission was 7.7 dB below the limit at 938.66 MHz. This signal is found in Table 14. All other radiated emissions were 11.4 dB or more below the limit.

The EUT was tested in normal operation mode alongside Acuity Brands Radio Module DTL02.

**NOTE: The test data provided in this section is to support the Verification requirement for the digital apparatus.**

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
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 6715C-DTL01  
 November 7, 2014  
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**Table 14. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109, 15.209), 30 MHz – 1000 MHz**

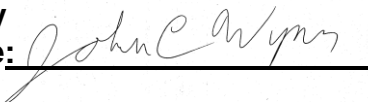
Peak Radiated Emissions, Digital Device and Receiver							
Test By: JW	Test: Radiated Emissions- 30 MHz to 1GHz			Client: Acuity Brands Lighting			
	Project: 14-0271	Requirement 15.109/15.209, Class: B		Model: DTL01			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	AVG Limits (dBuV/m)	Distance / Polarity (meters)	Margin (dB)	Detector PK / QP
938.66	41.1	-2.76	38.34	46.0	3m./VERT	7.7	PK
938.70	36.58	-1.96	34.62	46.0	3m./HORZ	11.4	PK
368.30	42.95	-11.52	31.43	46.0	3m./VERT	14.6	PK
444.44	44.92	-10.47	34.45	46.0	3m./VERT	11.6	PK
935.12	36.96	-2.76	34.20	46.0	3m./VERT	11.8	PK
<b>All other emission at least 20 dB from the applicable limit.</b>							

Tested from 30 MHz to 1 GHz

Sample Calculation at 938.66 MHz:

Magnitude of Measured Frequency	41.10 dBuV
+Correction Factors	-2.76 dB/m
Corrected Result	38.34 dBuV/m

**Test Date: November 5, 2014**

Tested by  
 Signature: 

Name: John C. Wynn

US Tech Test Report:  
 Report Number:  
 Customer:  
 FCC ID:  
 IC:  
 Issue Date:  
 Model:

FCC Part 15.249/RSS 210  
 14-0271  
 Acuity Brands Lighting  
 2ADCB-DTL01  
 6715C-DTL01  
 November 7, 2014  
 DTL01

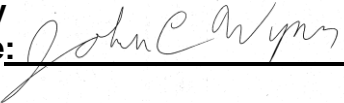
**Table 15. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109, 15.209), 1 GHz – 12.5 GHz**

Peak Radiated Emissions, Digital Device and Receiver							
Test By: JW	Test: Radiated Emissions- 1 GHz to 12.5 GHz			Client: Acuity Brands Lighting			
	Project: 14-0271	Requirement 15.109/15.209, Class: B		Model: DTL01			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	AVG Limits (dBuV/m)	Distance / Polarity (meters)	Margin (dB)	Detector PK / AVG
All other emissions were at least 20 dB below the applicable limit.							

Tested from 1 GHz to 12.5 GHz

Sample Calculation : N/A

**Test Date: November 5, 2014**

Tested by  
 Signature: 

**Name: John C. Wynn**

US Tech Test Report:  
Report Number:  
Customer:  
FCC ID:  
IC:  
Issue Date:  
Model:

FCC Part 15.249/RSS 210  
14-0271  
Acuity Brands Lighting  
2ADCB-DTL01  
6715C-DTL01  
November 7, 2014  
DTL01

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## **2.16 Measurement Uncertainty**

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4. A coverage factor of  $k=2$  was used to give a level of confidence of approximately 95%.

### **2.16.1 Conducted Emissions Measurement Uncertainty**

The measurement uncertainty (with a 95% confidence level) for this test is  $\pm 2.78$  dB.

The data listed in this test report does have sufficient margin to negate the effects of uncertainty. Therefore, the EUT unconditionally meets this requirement.

### **2.16.2 Radiated Emissions Measurement Uncertainty**

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is  $\pm 5.39$  dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is  $\pm 5.18$  dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is  $\pm 5.21$  dB.

The data listed in this test report does have sufficient margin to negate the effects of uncertainty. Therefore, the EUT unconditionally meets this requirement.