

# Report of Test

## LLI-14224-1A

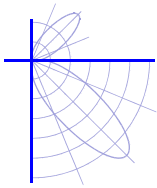
Lighting Services Inc. LED Adjustable Track Luminaire. Cat No. LX2030-T1912-8330S1.  
 Black cylindrical aluminum housing with aluminum accessory holder(extent: 5" x 2.7" dia).  
 "XTM19803020CCA 00" LED module screwed to support arm assembly. Plane of LED ~3" above opening.  
 "Parabolic" faceted "S1" reflector & clear convex lens assembly (2.1" x 2" dia).  
 One "LTF DA12W400C1530LP-000" dimmable LED driver mounted in track assembly.  
 L/O (accessory holder): 2.2" dia. Pivoting track stem adjusted to direct beam to nadir. Tested at 120 V, 60 Hz.



### Performance Summary

|                    |                |                  |                 |
|--------------------|----------------|------------------|-----------------|
| Total Light Output | 376 lm         | Power Factor     | 0.90            |
| Luminaire Power    | 13.8 W         | THD(i)*          | 14.2 %          |
| Luminous Efficacy  | 27.2 lm/W      |                  |                 |
| CCT                | 2960 K         | Beam at 10% Imax | 31.9°V x 31.9°H |
| CIE(x,y) 1931      | (0.438, 0.402) | Beam at 50% Imax | 16.6°V x 16.6°H |
| CRI                | 84             | Beam at 90% Imax | 7.3°V x 7.3°H   |

**PREPARED FOR : Lighting Services Inc., Stony Point, NY 10980.**



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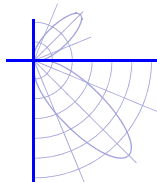
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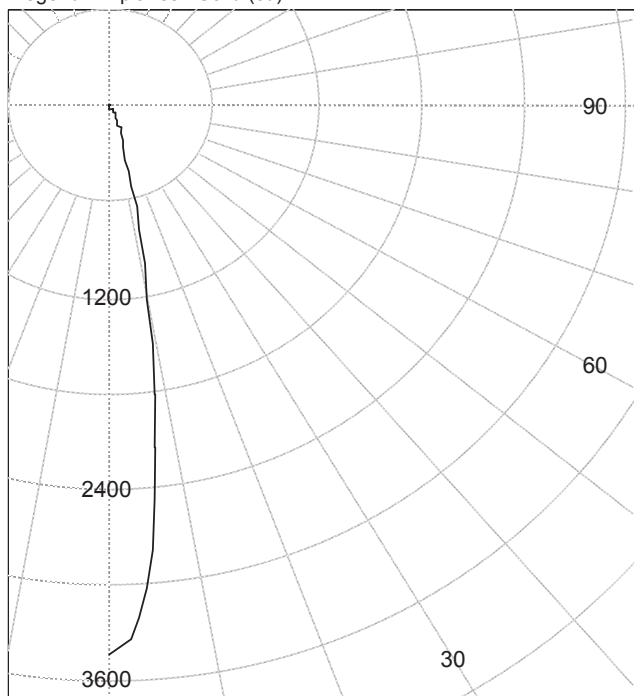
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Legend: All planes - Solid (cd)



(Rotational symmetry)

**INTENSITY SUMMARY (cd)**

| Gamma | All Planes | Flux (lm) | Gamma | C0 | Flux (lm) |
|-------|------------|-----------|-------|----|-----------|
| 0     | 3446       |           | 90    | 0  |           |
| 5     | 2790       | 211       | 95    | 0  | 0         |
| 10    | 1227       |           | 100   | 0  | 0         |
| 15    | 420        | 128       | 105   | 0  | 0         |
| 20    | 148        |           | 110   | 0  | 0         |
| 25    | 55         | 28        | 115   | 0  | 0         |
| 30    | 21         |           | 120   | 0  | 0         |
| 35    | 9          | 6         | 125   | 0  | 0         |
| 40    | 5          |           | 130   | 0  | 0         |
| 45    | 2          | 2         | 135   | 0  | 0         |
| 50    | 1          |           | 140   | 0  | 0         |
| 55    | 0          | 0         | 145   | 0  | 0         |
| 60    | 0          | 0         | 150   | 0  | 0         |
| 65    | 0          | 0         | 155   | 0  | 0         |
| 70    | 0          | 0         | 160   | 0  | 0         |
| 75    | 0          | 0         | 165   | 0  | 0         |
| 80    | 0          | 0         | 170   | 0  | 0         |
| 85    | 0          | 0         | 175   | 0  | 0         |
| 90    | 0          | 0         | 180   | 0  | 0         |

**ZONAL FLUX AND PERCENTAGES**

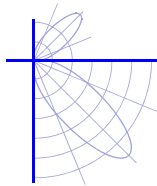
| Zone   | Flux (lm) | %Lamp | %Luminaire |
|--------|-----------|-------|------------|
| 0-30   | 367       | N / A | 97.7       |
| 0-40   | 373       | N / A | 99.3       |
| 0-60   | 375       | N / A | 100.0      |
| 0-90   | 376       | N / A | 100.0      |
| 40-90  | 2         | N / A | 0.7        |
| 60-90  | 0         | N / A | 0.0        |
| 90-180 | 0         | N / A | 0.0        |
| 0-180  | 376       | N / A | 100.0      |

Total Light Output = 376 lm

Signed

P. Lawrance  
Authorized Signatory

Date of test 15-Aug-2014  
Date of report 26-Aug-2014



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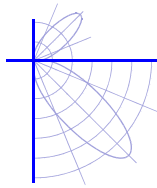
"Parabolic" faceted "S1" reflector & clear convex lens assembly (2.1" x 2" dia).

One "LTF DA12W400C1530LP-000" dimmable LED driver mounted in track assembly.

L/O (accessory holder): 2.2" dia. Pivoting track stem adjusted to direct beam to nadir. Tested at 120 V, 60 Hz.

**Intensity (cd) and Flux (lm) data**

| Gamma | Intensity | Flux | Gamma | Intensity | Flux |
|-------|-----------|------|-------|-----------|------|
| 0.0   | 3446      |      | 90.0  | 0         |      |
| 2.5   | 3290      |      | 92.5  | 0         |      |
| 5.0   | 2790      | 211  | 95.0  | 0         |      |
| 7.5   | 1987      |      | 97.5  | 0         | 0    |
| 10.0  | 1227      |      | 100.0 | 0         |      |
| 12.5  | 710       |      | 102.5 | 0         |      |
| 15.0  | 420       | 128  | 105.0 | 0         |      |
| 17.5  | 249       |      | 107.5 | 0         | 0    |
| 20.0  | 148       |      | 110.0 | 0         |      |
| 22.5  | 90        |      | 112.5 | 0         |      |
| 25.0  | 55        | 28   | 115.0 | 0         |      |
| 27.5  | 34        |      | 117.5 | 0         | 0    |
| 30.0  | 21        |      | 120.0 | 0         |      |
| 32.5  | 13        |      | 122.5 | 0         |      |
| 35.0  | 9         | 6    | 125.0 | 0         |      |
| 37.5  | 6         |      | 127.5 | 0         | 0    |
| 40.0  | 5         |      | 130.0 | 0         |      |
| 42.5  | 3         |      | 132.5 | 0         |      |
| 45.0  | 2         | 2    | 135.0 | 0         |      |
| 47.5  | 2         |      | 137.5 | 0         | 0    |
| 50.0  | 1         |      | 140.0 | 0         |      |
| 52.5  | 1         |      | 142.5 | 0         |      |
| 55.0  | 0         | 0    | 145.0 | 0         |      |
| 57.5  | 0         |      | 147.5 | 0         | 0    |
| 60.0  | 0         |      | 150.0 | 0         |      |
| 62.5  | 0         |      | 152.5 | 0         |      |
| 65.0  | 0         | 0    | 155.0 | 0         |      |
| 67.5  | 0         |      | 157.5 | 0         | 0    |
| 70.0  | 0         |      | 160.0 | 0         |      |
| 72.5  | 0         |      | 162.5 | 0         |      |
| 75.0  | 0         | 0    | 165.0 | 0         |      |
| 77.5  | 0         |      | 167.5 | 0         | 0    |
| 80.0  | 0         |      | 170.0 | 0         |      |
| 82.5  | 0         |      | 172.5 | 0         |      |
| 85.0  | 0         | 0    | 175.0 | 0         |      |
| 87.5  | 0         |      | 177.5 | 0         | 0    |
| 90.0  | 0         |      | 180.0 | 0         |      |



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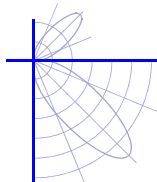
L/O (accessory holder): 2.2" dia. Pivoting track stem adjusted to direct beam to nadir. Tested at 120 V, 60 Hz.

**Candela trace through origin.**

| Vertical Trace |                |       |                |
|----------------|----------------|-------|----------------|
| Angle          | Intensity (cd) | Angle | Intensity (cd) |
| 90.0           | 0              | 0.0   | 3446           |
| 87.0           | 0              | -3.0  | 3221           |
| 84.0           | 0              | -6.0  | 2480           |
| 81.0           | 0              | -9.0  | 1505           |
| 78.0           | 0              | -12.0 | 791            |
| 75.0           | 0              | -15.0 | 420            |
| 72.0           | 0              | -18.0 | 224            |
| 69.0           | 0              | -21.0 | 121            |
| 66.0           | 0              | -24.0 | 67             |
| 63.0           | 0              | -27.0 | 37             |
| 60.0           | 0              | -30.0 | 21             |
| 57.0           | 0              | -33.0 | 12             |
| 54.0           | 1              | -36.0 | 8              |
| 51.0           | 1              | -39.0 | 5              |
| 48.0           | 1              | -42.0 | 3              |
| 45.0           | 2              | -45.0 | 2              |
| 42.0           | 3              | -48.0 | 1              |
| 39.0           | 5              | -51.0 | 1              |
| 36.0           | 8              | -54.0 | 1              |
| 33.0           | 12             | -57.0 | 0              |
| 30.0           | 21             | -60.0 | 0              |
| 27.0           | 37             | -63.0 | 0              |
| 24.0           | 67             | -66.0 | 0              |
| 21.0           | 121            | -69.0 | 0              |
| 18.0           | 224            | -72.0 | 0              |
| 15.0           | 420            | -75.0 | 0              |
| 12.0           | 791            | -78.0 | 0              |
| 9.0            | 1505           | -81.0 | 0              |
| 6.0            | 2480           | -84.0 | 0              |
| 3.0            | 3221           | -87.0 | 0              |
| 0.0            | 3446           | -90.0 | 0              |

| Horizontal Trace |                |       |                |
|------------------|----------------|-------|----------------|
| Angle            | Intensity (cd) | Angle | Intensity (cd) |
| 90.0             | 0              | 0.0   | 3446           |
| 87.0             | 0              | -3.0  | 3221           |
| 84.0             | 0              | -6.0  | 2480           |
| 81.0             | 0              | -9.0  | 1505           |
| 78.0             | 0              | -12.0 | 791            |
| 75.0             | 0              | -15.0 | 420            |
| 72.0             | 0              | -18.0 | 224            |
| 69.0             | 0              | -21.0 | 121            |
| 66.0             | 0              | -24.0 | 67             |
| 63.0             | 0              | -27.0 | 37             |
| 60.0             | 0              | -30.0 | 21             |
| 57.0             | 0              | -33.0 | 12             |
| 54.0             | 1              | -36.0 | 8              |
| 51.0             | 1              | -39.0 | 5              |
| 48.0             | 1              | -42.0 | 3              |
| 45.0             | 2              | -45.0 | 2              |
| 42.0             | 3              | -48.0 | 1              |
| 39.0             | 5              | -51.0 | 1              |
| 36.0             | 8              | -54.0 | 1              |
| 33.0             | 12             | -57.0 | 0              |
| 30.0             | 21             | -60.0 | 0              |
| 27.0             | 37             | -63.0 | 0              |
| 24.0             | 67             | -66.0 | 0              |
| 21.0             | 121            | -69.0 | 0              |
| 18.0             | 224            | -72.0 | 0              |
| 15.0             | 420            | -75.0 | 0              |
| 12.0             | 791            | -78.0 | 0              |
| 9.0              | 1505           | -81.0 | 0              |
| 6.0              | 2480           | -84.0 | 0              |
| 3.0              | 3221           | -87.0 | 0              |
| 0.0              | 3446           | -90.0 | 0              |

Note: Luminaire orientation as tested.  
The left and right sides of photometric data have been averaged.



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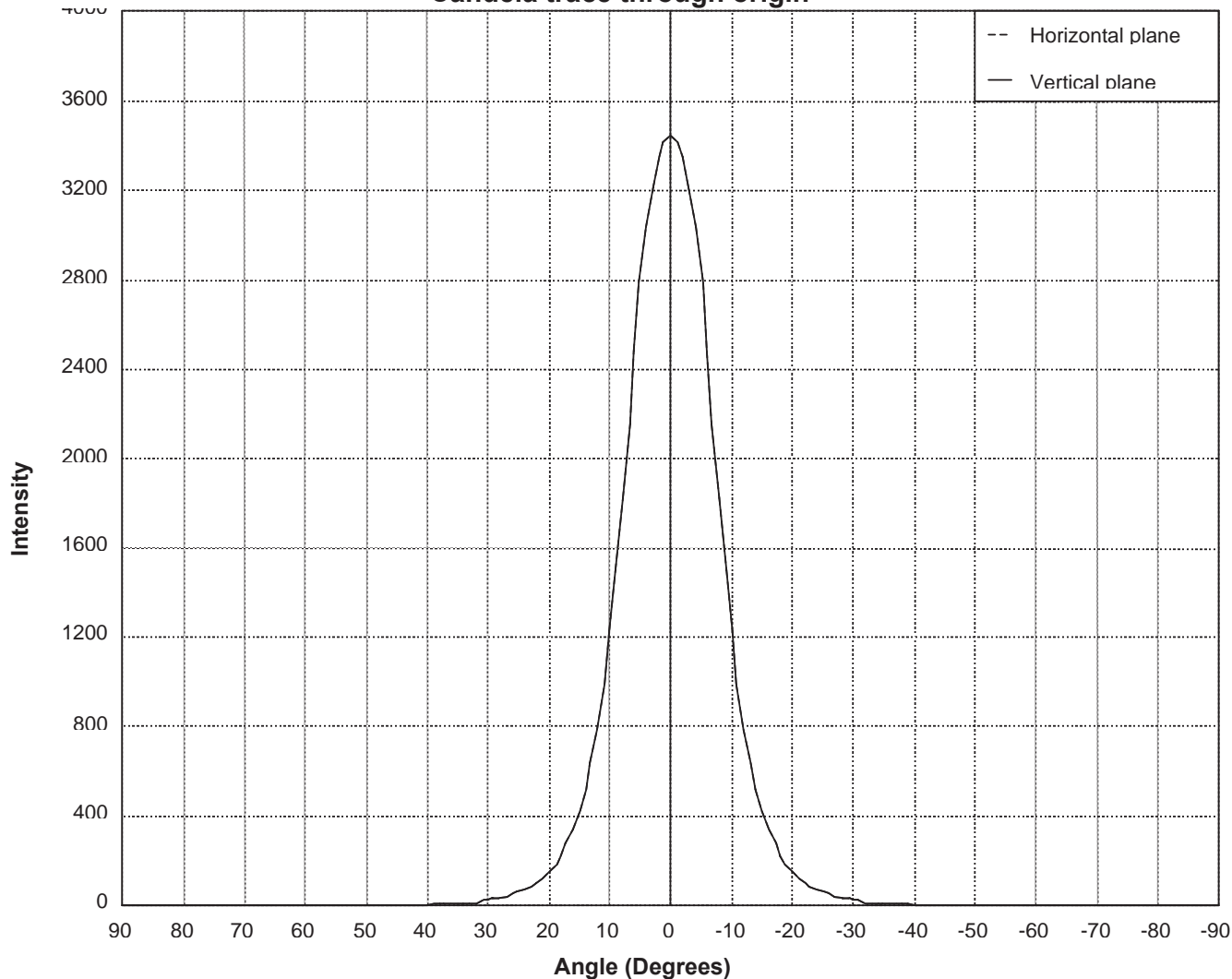
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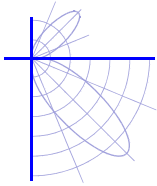
L/O (accessory holder): 2.2" dia. Pivoting track stem adjusted to direct beam to nadir. Tested at 120 V, 60 Hz.

**Candela trace through origin**



Note: The intensity units are expressed as candelas.  
The left and right sides of photometric data have been averaged.  
Both the vertical and the horizontal trace pass through the nadir.





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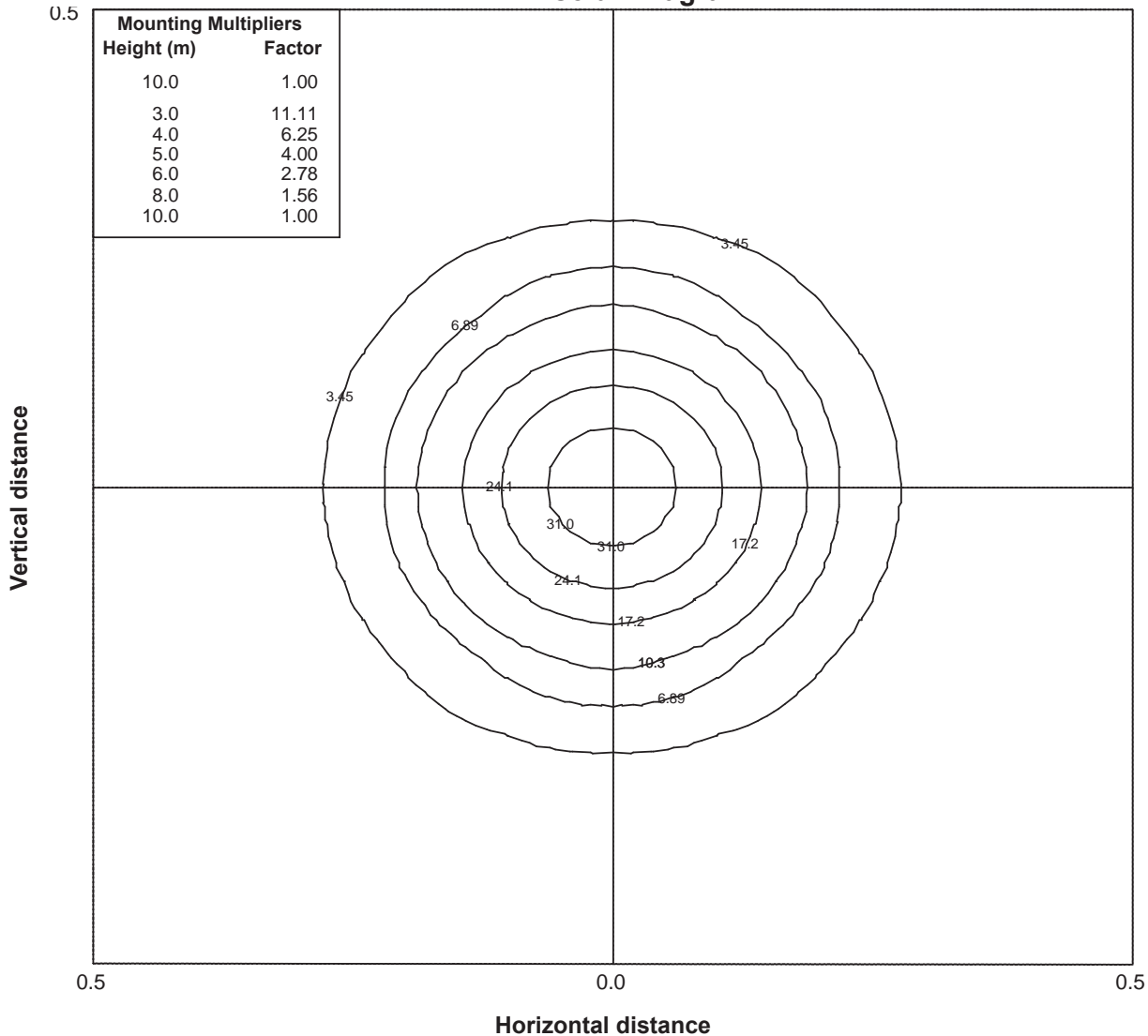
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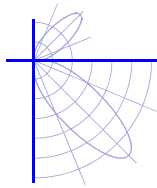
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**Isolux Diagram**



Note: The isolux levels are based on a mounting height of H = 10.0 metres. Grid values show multiples of mounting height.  
 The isolux contours are set to 10%, 20%, 30%, 50%, 70%, 90% of the maximum.  
 The isolux contour units are expressed as lux. The left and right sides of photometric data have been averaged.



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**LM-79 Performance Data**

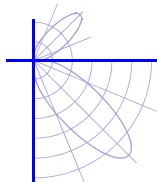
|                 |  |                |
|-----------------|--|----------------|
| <b>Spectral</b> | CIE 1931 (x, y) <sup>(1)</sup>                         | (0.438, 0.402) |
|                 | CIE 1976 (u', v') <sup>(1)</sup>                       | (0.252, 0.521) |
|                 | Correlated Color Temperature (CCT) <sup>(1)</sup>      | 2960 K         |
|                 | Color Spatial Uniformity <sup>(2)</sup>                | 0.0030         |
|                 | Color Rendering Index (Ra) <sup>(1)</sup>              | 84             |
|                 | Special CRI 9 (R <sub>g</sub> ) <sup>(1),(3)</sup>     | 21             |
|                 | Distance from Planckian Locus (Duv) <sup>(1),(3)</sup> | -0.0009        |
|                 | Scotopic/Photopic Ratio <sup>(1),(3)</sup>             | 1.31           |

|                   |              |         |
|-------------------|--------------|---------|
| <b>Electrical</b> | Voltage      | 120 V   |
|                   | Frequency    | 60 Hz   |
|                   | Current      | 0.127 A |
|                   | Power        | 13.8 W  |
|                   | Power Factor | 0.90    |
|                   | Current THD  | 14.2 %  |

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

- (1) Value is computed from the weighted average of the spatial measurements
- (2) Value is the maximum deviation of the spatial u' and v' measurements from the weighted average
- (3) Quantity is in addition to the scope of IESNA LM-79-08





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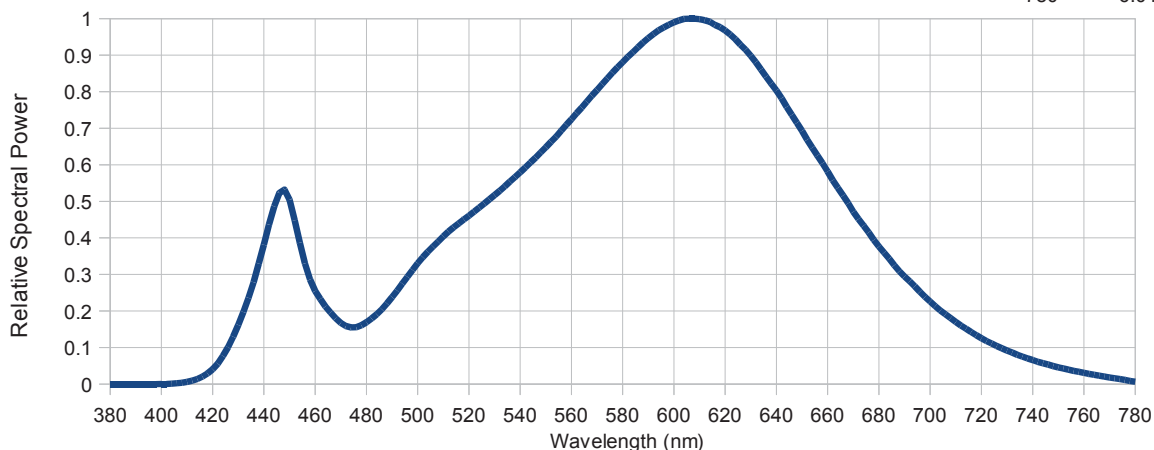
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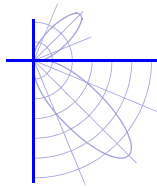
**LM-79 Performance Data**

**Summary Relative Spectral Irradiance Distribution (wavelength – nm, irradiance – relative to peak = 1)**

|     |          |     |          |     |          |     |          |
|-----|----------|-----|----------|-----|----------|-----|----------|
| 380 | 0.00E+00 | 480 | 1.69E-01 | 580 | 8.81E-01 | 680 | 3.76E-01 |
| 385 | 0.00E+00 | 485 | 1.98E-01 | 585 | 9.15E-01 | 685 | 3.34E-01 |
| 390 | 0.00E+00 | 490 | 2.38E-01 | 590 | 9.47E-01 | 690 | 2.94E-01 |
| 395 | 0.00E+00 | 495 | 2.84E-01 | 595 | 9.72E-01 | 695 | 2.60E-01 |
| 400 | 2.68E-05 | 500 | 3.31E-01 | 600 | 9.90E-01 | 700 | 2.26E-01 |
| 405 | 1.45E-03 | 505 | 3.69E-01 | 605 | 1.00E+00 | 705 | 1.96E-01 |
| 410 | 5.94E-03 | 510 | 4.04E-01 | 610 | 9.99E-01 | 710 | 1.70E-01 |
| 415 | 1.71E-02 | 515 | 4.34E-01 | 615 | 9.87E-01 | 715 | 1.47E-01 |
| 420 | 4.06E-02 | 520 | 4.61E-01 | 620 | 9.68E-01 | 720 | 1.25E-01 |
| 425 | 8.87E-02 | 525 | 4.89E-01 | 625 | 9.36E-01 | 725 | 1.08E-01 |
| 430 | 1.62E-01 | 530 | 5.17E-01 | 630 | 8.99E-01 | 730 | 9.17E-02 |
| 435 | 2.57E-01 | 535 | 5.48E-01 | 635 | 8.51E-01 | 735 | 7.75E-02 |
| 440 | 3.81E-01 | 540 | 5.80E-01 | 640 | 8.04E-01 | 740 | 6.56E-02 |
| 445 | 5.04E-01 | 545 | 6.13E-01 | 645 | 7.48E-01 | 745 | 5.50E-02 |
| 450 | 5.04E-01 | 550 | 6.48E-01 | 650 | 6.93E-01 | 750 | 4.55E-02 |
| 455 | 3.58E-01 | 555 | 6.85E-01 | 655 | 6.36E-01 | 755 | 3.77E-02 |
| 460 | 2.55E-01 | 560 | 7.25E-01 | 660 | 5.82E-01 | 760 | 3.06E-02 |
| 465 | 2.04E-01 | 565 | 7.64E-01 | 665 | 5.26E-01 | 765 | 2.41E-02 |
| 470 | 1.67E-01 | 570 | 8.05E-01 | 670 | 4.71E-01 | 770 | 1.79E-02 |
| 475 | 1.55E-01 | 575 | 8.44E-01 | 675 | 4.24E-01 | 775 | 1.24E-02 |
|     |          |     |          |     |          | 780 | 6.01E-03 |



\* The spectral power distribution combines the weighted spectral power distributions of all spatial measurements.



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**LM-79 Performance Data**

**Spatial measurements**

| Vertical angle (deg) | CIE 1976 (u',v') coordinates |                      |
|----------------------|------------------------------|----------------------|
|                      | Horizontal 0 plane           | Horizontal 270 plane |
| 0                    | (0.251, 0.520)               | (0.250, 0.519)       |
| 1.5                  | (0.251, 0.520)               | (0.250, 0.519)       |
| 3                    | (0.252, 0.521)               | (0.251, 0.520)       |
| 4.5                  | (0.252, 0.522)               | (0.252, 0.521)       |
| 6                    | (0.253, 0.522)               | (0.253, 0.521)       |
| 7.5                  | (0.254, 0.522)               | (0.253, 0.521)       |
| 9                    | (0.254, 0.522)               | (0.252, 0.521)       |
| 10.5                 | (0.253, 0.522)               | (0.252, 0.520)       |
| 12                   | (0.252, 0.521)               | (0.252, 0.519)       |
| 13.5                 | (0.251, 0.521)               | (0.250, 0.519)       |

**Spatial measurements**

| Vertical angle (deg) | CIE 1976 (u',v') coordinates |                      |
|----------------------|------------------------------|----------------------|
|                      | Horizontal 0 plane           | Horizontal 270 plane |
| 13.5                 | (0.251, 0.521)               | (0.250, 0.519)       |
| 15                   | (0.251, 0.521)               | (0.250, 0.519)       |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |
| -                    | -                            | -                    |

**Test procedure**

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimize stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilized supply. The photometric output was monitored and measurements were performed once stability was achieved.

The goniophotometer was used to measure the spatial distribution of both luminous intensity and, in conjunction with a spectroradiometer, spectral irradiance. The distribution locus comprises points in two or more planes (as indicated in the table above) at no more than 10° vertical intervals. The CIE (x,y) coordinates and other derived metrics (CIE (u', v'), CCT and CRI) are calculated from the weighted sum (weighted for intensity and represented solid angle) of the measured spectral irradiances.

|                    |               |                      |           |
|--------------------|---------------|----------------------|-----------|
| Sample Orientation | Beam to nadir | Stabilization Time   | 2.25 hour |
|                    |               | Total Operation Time | 6.25 hour |

**Equipment and uncertainties**

LightLab International R80A C-gamma rotating mirror goniophotometer with a test distance of 8 m.

|                             |         |                   |         |
|-----------------------------|---------|-------------------|---------|
| Luminous Intensity          | ± 4 %   | Temperature       | ± 1 °C  |
| Luminous Flux               | ± 4 %   | Luminous Efficacy | ± 4.5 % |
| Horizontal, Vertical Angles | ± 0.25° |                   |         |

PhotoResearch PR-670 spectroradiometer (380 - 780 nm., 2 nm. per pixel) measuring at a distance from the sample deemed greater than five times the maximum observed luminous opening dimension.

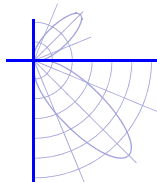
|                                |         |                             |         |
|--------------------------------|---------|-----------------------------|---------|
| CIE (x, y) coordinates         | ± 0.003 | CCT                         | ± 100 K |
| CIE (u', v') coordinates       | ± 0.002 | CRI (Ra)                    | ± 3     |
| Δ (u', v') Color difference    | ± 0.001 | Scotopic / Photopic Ratio * | ± 0.02  |
| Relative Spectral Irradiance * | ± 2 %   | R9 *                        | ± 3     |

Yokogawa WT210 power meter connected in circuit to the sample electrical supply

|               |         |              |          |
|---------------|---------|--------------|----------|
| Voltage       | ± 0.5 % | Frequency *  | ± 0.1 Hz |
| Current       | ± 0.5 % | Power        | ± 0.5 %  |
| Current THD * | ± 3 %   | Power Factor | ± 0.02   |

This report contains data that are not covered by the NVLAP accreditation. Quantities marked with \* are not covered. IESNA LM-79-08 Calculator v4.7 (13th Sep 2013)





**Test Report No. LLI-14224-1A**

Lighting Services Inc. LED Adjustable Track Luminaire. Cat No. LX2030-T1912-8330S1.  
Black cylindrical aluminum housing with aluminum accessory holder(extent: 5" x 2.7" dia).  
"XTM19803020CCA 00" LED module screwed to support arm assembly. Plane of LED ~3" above opening.  
"Parabolic" faceted "S1" reflector & clear convex lens assembly (2.1" x 2" dia).  
One "LTF DA12W400C1530LP-000" dimmable LED driver mounted in track assembly.  
L/O (accessory holder): 2.2" dia. Pivoting track stem adjusted to direct beam to nadir. Tested at 120 V, 60 Hz.

**Test Distance:** 8.0 metres  
**Test Temperature:** 24.7 degrees Celsius

**Significance:** The laboratory has not participated in the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

**Test Procedure:** Tested in accordance with the applicable sections of IESNA publication LM-79-08.

**Notes:** The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE Gamma coordinate system as defined in CIE publication number 121.

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