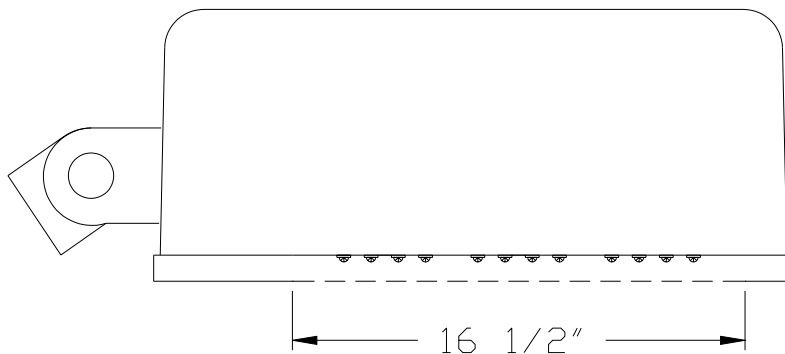




INDEPENDENT TEST LABORATORY REPORT No. 27153

GREEN MACHINE - LED OUTDOOR AREA LUMINAIRE, CAT# SB329-1000-7C  
WITH SPECULAR REFLECTOR AND CLEAR FLAT GLASS LENS  
FIFTY SIX LEDS. LUMINAIRE OUTPUT: 7667 Lms.  
LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

IESNA CUTOFF CLASSIFICATION: CUTOFF



PREPARED FOR:

GREEN MACHINE LIGHT ENGINE  
SANTA CLARA, CA

CERTIFIED BY:

*James E. Walker III*

DATE: MAY 28, 2010

LABORATORY RESULTS MAY NOT BE REPRESENTATIVE OF FIELD PERFORMANCE.  
BALLAST FACTORS HAVE NOT BEEN APPLIED

TESTED IN 30 PLANES LEFT SIDE, 30 PLANES RIGHT SIDE, LEFT AND RIGHT AVERAGED

VERTICAL TEST INCREMENTS ARE 2.5 DEGREES.

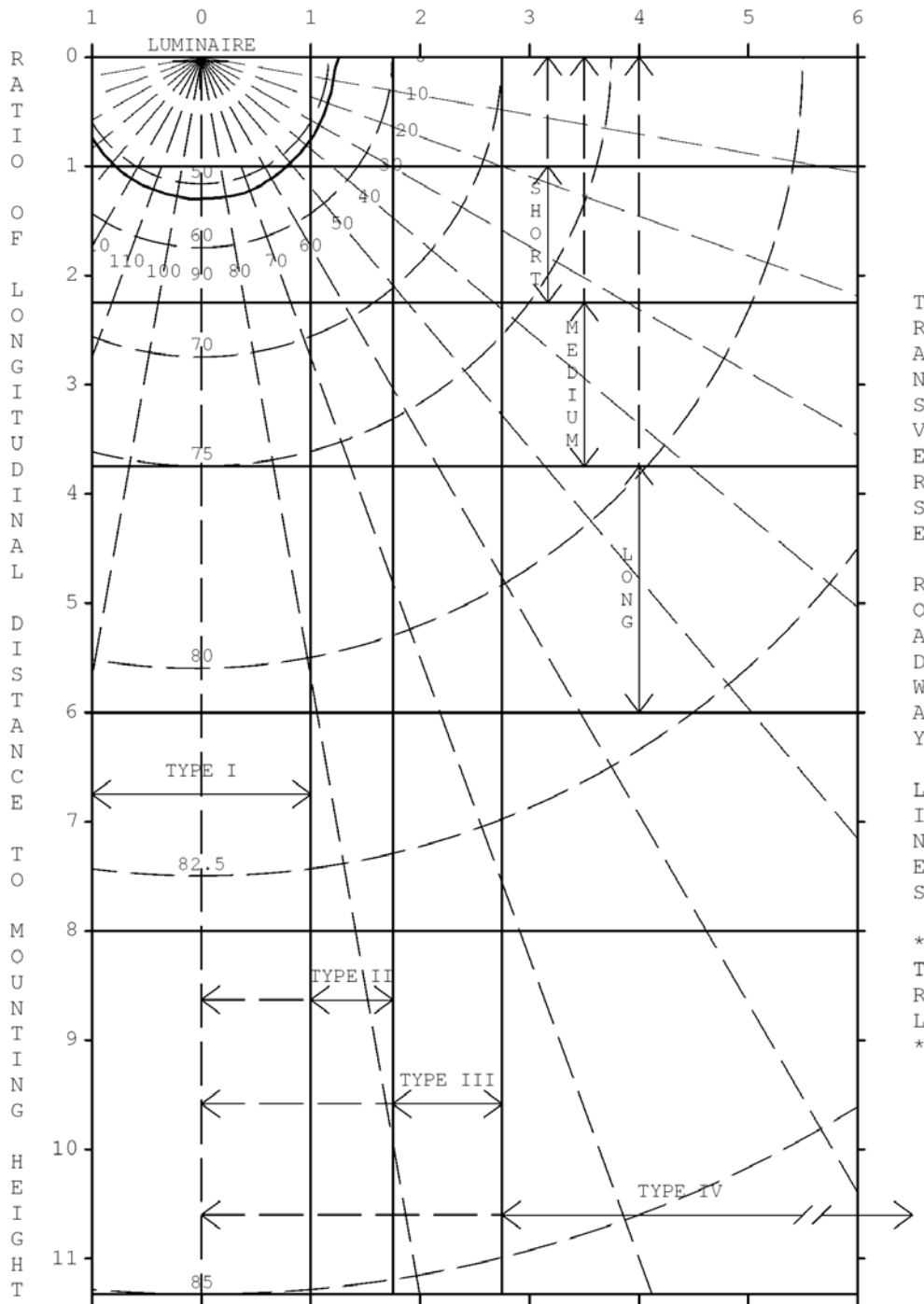
TEST DISTANCE EXCEEDS FIVE TIMES THE GREATEST  
LUMINOUS OPENING OF LUMINAIRE.

LIGHTING SCIENCES, INC.  
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 SCOTTSDALE, AZ, USA 85260

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RATIO OF TRANSVERSE DISTANCE TO MOUNTING HEIGHT



NOTE:  
 CONTOUR LINE  
 IS FOR 50%  
 OF THE MAXIMUM  
 INTENSITY

LONGITUDINAL ROADWAY LINES \*LRL\*

IES ROADWAY CLASSIFICATION: TYPE II, VERY SHORT

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LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

\*\*\* THIS IS AN ABSOLUTE TEST REPORT \*\*\*

UTILIZATION TABLE

CO-EFFICIENT OF UTILIZATION

RATIO	HOUSE SIDE	STREET SIDE	TOTAL
0.5	0.255	0.257	0.511
1.0	0.393	0.396	0.789
1.5	0.450	0.453	0.903
2.0	0.474	0.477	0.951
2.5	0.486	0.488	0.974
3.0	0.491	0.493	0.984
3.5	0.495	0.495	0.990
4.0	0.496	0.497	0.993
5.0	0.499	0.499	0.997
TOTAL:	0.500	0.500	1.000
PERCENT:	50.0	50.0	100.0

EFFICACY (LUMENS PER WATT) 56.4

THE ABOVE COEFFICIENTS HAVE BEEN CALCULATED BASED ON LUMINAIRE LUMENS  
BECAUSE IN AN ABSOLUTE TEST THE BARE LAMP LUMENS ARE UNKNOWN.  
LIGHTING DESIGN CALCULATIONS MADE USING THESE COEFFICIENTS SHOULD  
THEREFORE USE THE LUMINAIRE LUMENS IN THE CALCULATION FORMULA

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LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

ZONAL LUMEN SUMMARY PER IES PUBLICATION TM-15-07

\*\*\* THIS IS AN ABSOLUTE TEST REPORT \*\*\*

FORWARD LIGHT:

LUMENS	3832.8
% LUMENS	50.0 %
FORWARD LOW ZONE (0 TO 30 DEGREES)	15.5 %
FORWARD MID ZONE (30 TO 60 DEGREES)	27.1 %
FORWARD HIGH ZONE (60 TO 80 DEGREES)	7.2 %
FORWARD VERY HIGH ZONE (80 TO 90 DEGREES)	0.2 %

BACK LIGHT:

LUMENS	3833.9
% LUMENS	50.0 %
BACK LIGHT LOW ZONE (0 TO 30 DEGREES)	15.3 %
BACK LIGHT MID ZONE (30 TO 60 DEGREES)	26.9 %
BACK LIGHT HIGH ZONE (60 TO 80 DEGREES)	7.6 %
BACK LIGHT VERY HIGH ZONE (80 TO 90 DEGREES)	0.2 %

UPLIGHT:

LUMENS	0.0
% LUMENS	0.0 %
UPLIGHT LOW ZONE (90 TO 100 DEGREES)	0.0 %
UPLIGHT HIGH ZONE (100 TO 180 DEGREES)	0.0 %

TRAPPED LIGHT: NOT APPLICABLE TO AN ABSOLUTE TEST

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IES BUG RATING (BACK LIGHT, UPLIGHT, GLARE)  
PER ADDENDUM TO IES TM-15-07

	LUMENS	SECONDARY SOLID ANGLE RATING
BACK LIGHT		
BH (60-80 DEGREES)	582.6	B2
BM (30-60 DEGREES)	2061.0	B2
BL (0-30 DEGREES)	1174.6	B3
UPLIGHT		
UH (100-180 DEGREES)	0.0	U0
UL (90-100 DEGREES)	0.0	U0
FVH (80-90 DEGREES)	13.0	U1
BVH (80-90 DEGREES)	15.7	U1
GLARE LIGHT		
FVH (80-90 DEGREES)	13.0	G1
BVH (80-90 DEGREES)	15.7	G1
FH (60-80 DEGREES)	552.5	G0
BH (60-80 DEGREES)	582.6	G0

IES BUG RATING: B3 U1 G0

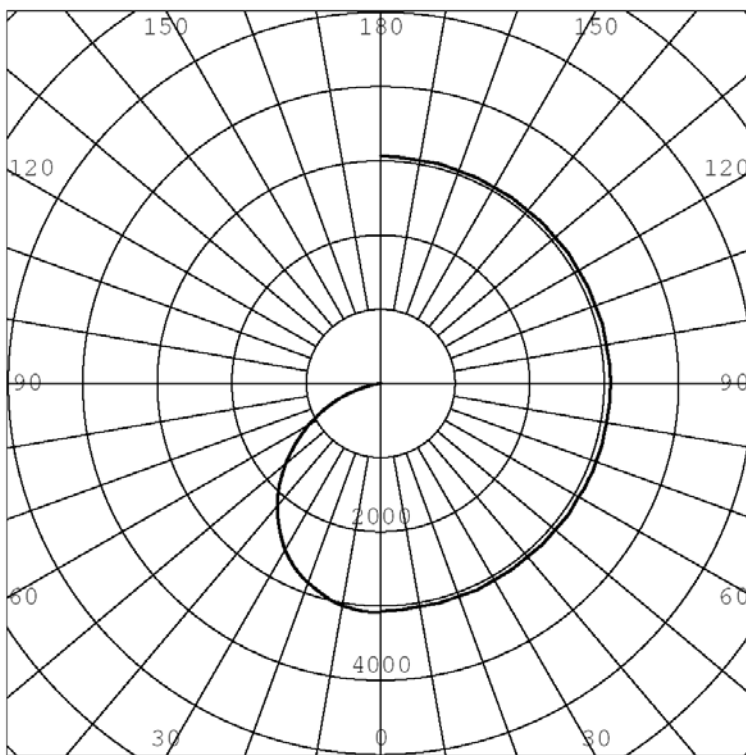
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LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

INTENSITY (CANDLEPOWER)  
IN MAX. PLANE

ANGLE	CANDLEPOWER
0.0	3079
5.0	3078
10.0	3036
15.0	2963
20.0	2862
25.0	2741
30.0	2580
35.0	2385
40.0	2167
45.0	1932
50.0	1670
52.5	1536
55.0	1397
57.5	1258
60.0	1123
62.5	989
65.0	858
67.5	729
70.0	597
72.5	465
75.0	320
77.5	205
80.0	107
82.5	52
85.0	19
87.5	1
90.0	0



INTENSITY (CANDLEPOWER)  
IN MAX. CONE

ANGLE	CANDLEPOWER
0.0	3072
5.0	3067
15.0	3066
25.0	3069
35.0	3064
45.0	3071
55.0	3081
60.0	3066
62.5	3079
65.0	3073
67.5	3085
70.0	3076
72.5	3082
75.0	3086
77.5	3073
80.0	3081
82.5	3080
85.0	3083
87.5	3081
90.0	3083
95.0	3083
105.0	3087
115.0	3072
125.0	3077
135.0	3069
145.0	3064
155.0	3066
165.0	3070
175.0	3067
180.0	3068

MAXIMUM INTENSITY (CANDLEPOWER): 3087 CD

PLANE OF MAXIMUM: 105.0

VERTICAL ANGLE OF MAXIMUM: 2.5

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LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

INTENSITY (CANDLEPOWER) SUMMARY

VERT. ANGLE	HORIZONTAL ANGLES - STREET SIDE									
	0.0	5.0	15.0	25.0	35.0	45.0	55.0	65.0	75.0	85.0
0.0	3079	3079	3079	3079	3079	3079	3079	3079	3079	3079
2.5**	3072	3067	3066	3069	3064	3071	3081	3073	3086	3083
5.0	3063	3047	3050	3049	3048	3055	3065	3057	3070	3072
10.0	3020	3000	3006	3001	3002	3012	3026	3017	3033	3033
15.0	2947	2934	2939	2935	2937	2944	2953	2946	2962	2966
20.0	2841	2825	2826	2828	2831	2842	2853	2844	2862	2869
25.0	2719	2695	2696	2700	2697	2708	2727	2729	2741	2750
30.0	2565	2544	2538	2541	2539	2549	2568	2580	2586	2593
35.0	2364	2345	2345	2341	2349	2359	2375	2390	2391	2402
40.0	2162	2136	2134	2128	2140	2152	2161	2180	2181	2180
45.0	1888	1859	1867	1889	1903	1906	1919	1937	1945	1933
50.0	1616	1585	1585	1599	1626	1636	1651	1675	1682	1670
55.0	1343	1300	1332	1339	1347	1351	1370	1397	1406	1395
60.0	1046	1020	1021	1019	1060	1079	1094	1113	1126	1120
65.0	804	779	786	777	773	775	825	843	854	856
70.0	522	501	504	500	521	521	530	579	591	596
75.0	267	249	252	249	259	261	286	296	311	317
80.0	84	77	81	79	80	79	87	95	101	105
85.0	11	8	10	9	10	13	11	12	14	17
90.0	0	0	0	0	0	0	0	0	0	0

VERT. ANGLE	HORIZONTAL ANGLES - HOUSE SIDE										
	90.0	95.0	105.0	115.0	125.0	135.0	145.0	155.0	165.0	175.0	180.0
0.0	3079	3079	3079	3079	3079	3079	3079	3079	3079	3079	3079
2.5**	3083	3083	3087	3072	3077	3069	3064	3066	3070	3067	3068
5.0	3072	3072	3078	3061	3061	3053	3048	3047	3051	3046	3048
10.0	3035	3035	3036	3020	3011	3001	2988	2983	2983	2975	2964
15.0	2966	2968	2963	2946	2937	2917	2902	2896	2889	2887	2877
20.0	2868	2868	2862	2835	2824	2801	2788	2779	2771	2764	2758
25.0	2749	2750	2741	2712	2694	2668	2658	2649	2636	2633	2618
30.0	2588	2593	2580	2556	2537	2512	2495	2484	2478	2484	2468
35.0	2390	2395	2385	2369	2351	2327	2311	2301	2294	2301	2288
40.0	2171	2176	2167	2159	2140	2117	2103	2087	2081	2085	2063
45.0	1929	1936	1932	1921	1906	1891	1879	1855	1833	1828	1787
50.0	1672	1676	1670	1665	1650	1633	1611	1583	1555	1547	1521
55.0	1398	1400	1397	1401	1382	1357	1336	1321	1306	1292	1269
60.0	1124	1126	1123	1129	1113	1094	1074	1061	1051	1034	1009
65.0	860	862	858	861	854	835	814	806	809	791	767
70.0	600	601	597	596	583	571	564	556	568	550	526
75.0	321	321	320	328	328	321	313	300	311	306	279
80.0	106	108	107	112	112	105	100	102	99	90	73
85.0	17	18	19	17	15	16	16	15	16	12	8
90.0	0	0	0	0	0	0	0	0	0	0	0

\*\* DENOTES VERTICAL ANGLE OF MAXIMUM CONE

\*\*\* DENOTES LATERAL ANGLE OF MAXIMUM PLANE

INTENSITY WAS MEASURED IN 2.5 DEGREE STEPS - TABULATIONS ARE AVAILABLE

LIGHTING SCIENCES, INC.  
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WITH SPECULAR REFLECTOR AND CLEAR FLAT GLASS LENS  
FIFTY SIX LEDS. LUMINAIRE OUTPUT: 7667 Lms.  
LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

\*\* ILLUMINANCE (FOOTCANDLE) TABLE FOR SINGLE LUMINAIRE AT 20.0 FT. \*\*

LATERAL RATIOS	CURB LINE														
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
-3.00	.035	.035	.030	.022	.016	.011	.007	.005	.003	.002	.001	.001	.001	.000	.000
-2.50	.078	.077	.061	.043	.029	.018	.011	.007	.004	.003	.002	.001	.001	.000	.000
-2.00	0.18	0.17	0.13	.084	.050	.029	.017	.010	.006	.003	.002	.001	.001	.001	.000
-1.50	0.51	0.44	0.29	0.16	.087	.045	.024	.013	.007	.004	.002	.001	.001	.001	.000
-1.00	1.5	1.2	0.66	0.30	0.13	.065	.032	.016	.008	.005	.003	.002	.001	.001	.000
-0.50	4.6	3.1	1.3	0.47	0.18	.082	.038	.019	.009	.005	.003	.002	.001	.001	.000
HOUSE	CURB LINE														
STREET	7.7	4.8	1.7	0.56	0.21	.089	.041	.019	.010	.005	.003	.002	.001	.001	.000
0.50	4.7	3.1	1.3	0.47	0.18	.082	.038	.018	.009	.005	.003	.002	.001	.001	.000
1.00	1.6	1.2	0.65	0.29	0.13	.064	.031	.015	.008	.005	.003	.001	.001	.001	.000
1.50	0.53	0.43	0.28	0.15	.082	.043	.023	.012	.007	.004	.002	.001	.001	.001	.000
2.00	0.19	0.17	0.12	.079	.046	.026	.015	.008	.005	.003	.002	.001	.001	.000	.000
2.50	.079	.070	.055	.039	.025	.015	.009	.006	.003	.002	.001	.001	.001	.000	.000
3.00	.035	.031	.026	.019	.013	.009	.006	.004	.002	.002	.001	.001	.000	.000	.000
3.50	.016	.015	.013	.010	.007	.005	.004	.002	.002	.001	.001	.001	.000	.000	.000
4.00	.008	.007	.006	.005	.004	.003	.002	.002	.001	.001	.001	.000	.000	.000	.000
4.50	.004	.004	.003	.003	.002	.002	.001	.001	.001	.001	.000	.000	.000	.000	.000
5.00	.002	.002	.002	.002	.001	.001	.001	.001	.001	.000	.000	.000	.000	.000	.000
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0

CORRECTION FACTORS FOR OTHER MOUNTING HEIGHTS: SEE ISOFOOTCANDLE PAGE

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FIFTY SIX LEDS. LUMINAIRE OUTPUT: 7667 Lms.  
LUMINAIRE OPERATING AT 120 VAC AND 136 WATTS

**ELECTRICAL MEASUREMENTS**

INPUT VOLTAGE:	120.0	VOLTS AC
INPUT CURRENT:	1.140	AMPS
INPUT POWER:	136.0	WATTS
POWER FACTOR:	99.4	PERCENT
TOTAL HARMONIC DISTORTION:	5.78	PERCENT
OFF STATE POWER:	0.00	WATTS

**LIGHT OUTPUT**

LUMENS:	7667	lm
EFFICACY:	56.4	lm/W

**SPECTRAL MEASUREMENTS**

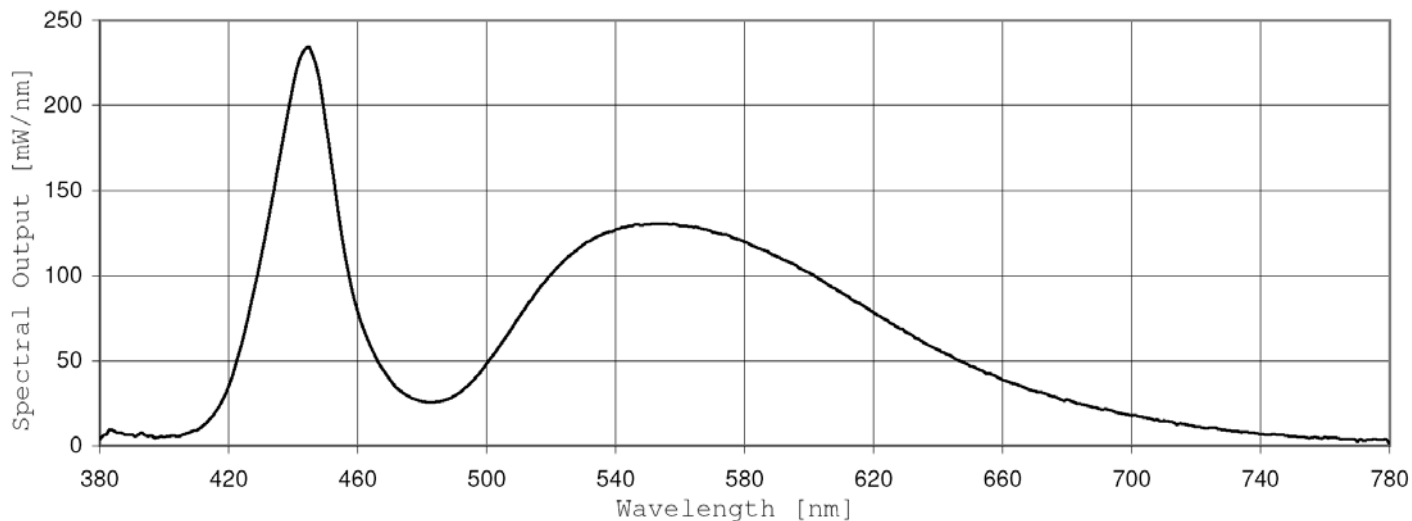
X:	0.3231	
y:	0.3345	
u/u':	0.2030	
v:	0.3152	
v':	0.4728	
Duv:	0.0010	
CRI (R <sub>a</sub> ):	71.0	
CRI (R <sub>g</sub> ):	-18.3	
CCT:	5939	K
RADIANT FLUX:	24698	mW

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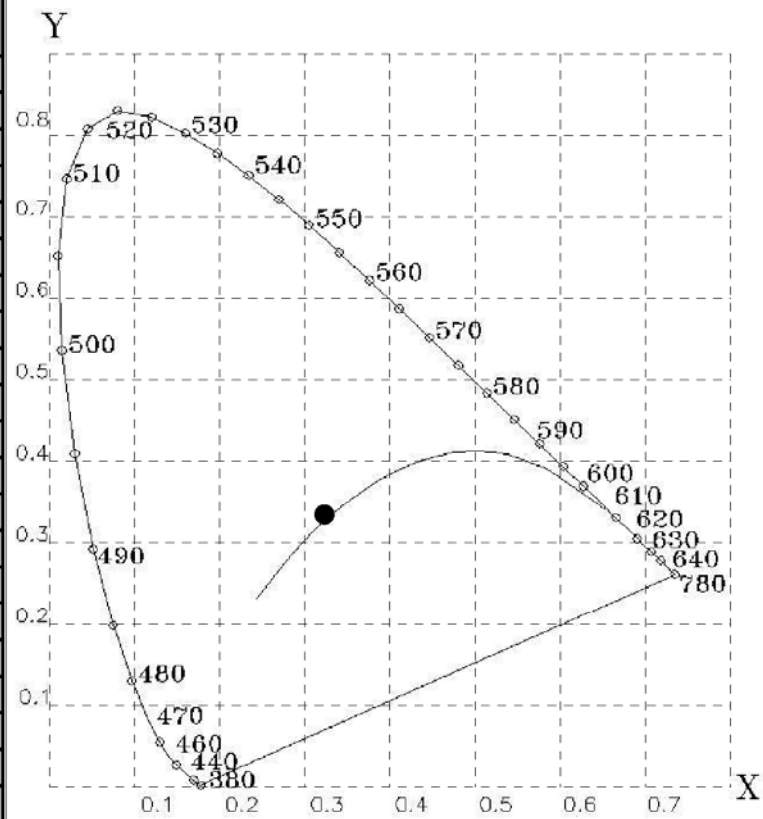
Spectral Power Distribution



Tabulated Spectral Power Distribution

Wavelength [nm]	[mW/nm]	Wavelength [nm]	[mW/nm]
380	3.68164	590	111.19309
390	6.52152	600	101.64012
400	5.06453	610	90.07924
410	8.96290	620	78.23031
420	35.20000	630	66.72536
430	111.00013	640	56.40894
440	212.24034	650	46.74970
450	190.43295	660	38.49992
460	78.64979	670	32.04551
470	38.77118	680	27.13200
480	26.00779	690	21.54452
490	29.31050	700	17.64055
500	48.33534	710	14.72376
510	75.51208	720	10.98200
520	100.64735	730	8.81748
530	118.21239	740	6.80677
540	127.16690	750	5.42808
550	130.27106	760	5.15122
560	129.28668	770	2.54485
570	125.60364	780	1.16476
580	119.77006		

CIE 1931 Chromaticity Diagram

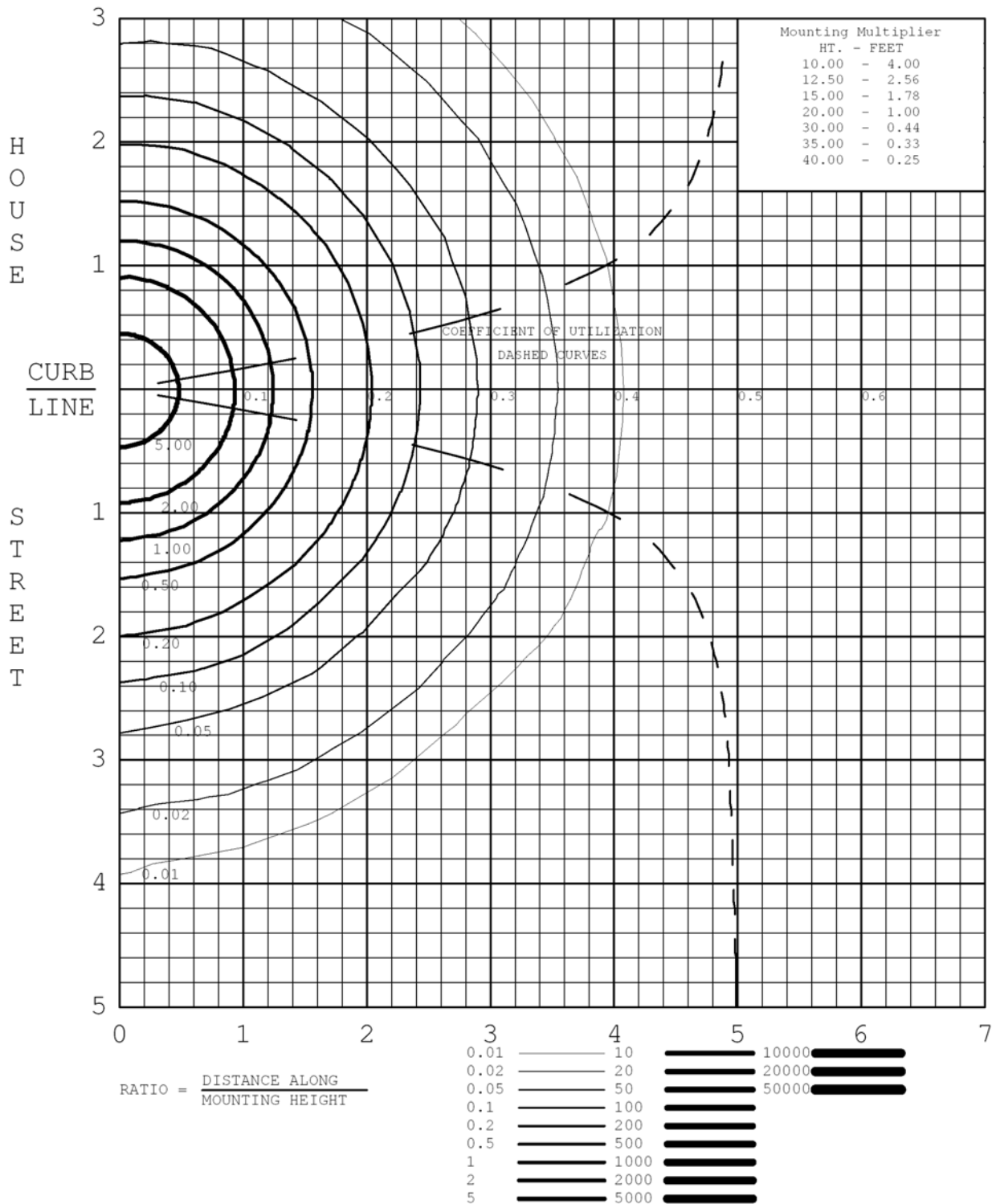


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MOUNTING HEIGHT FOR ISOFC 20.0 FEET



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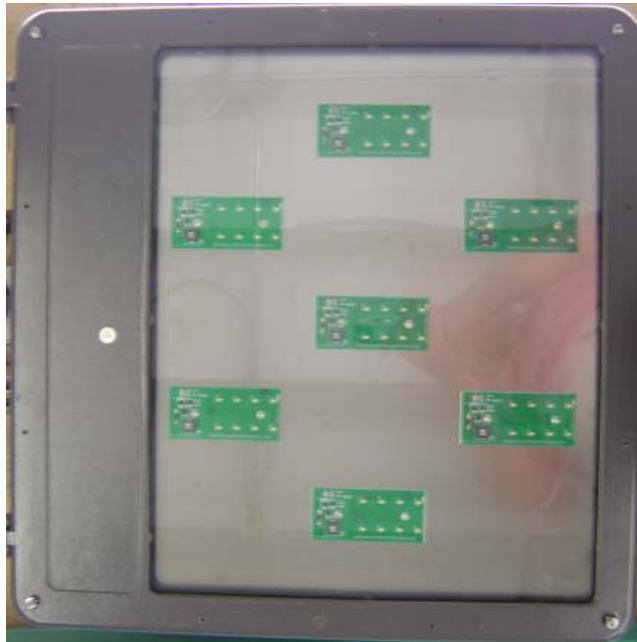
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SIDE VIEW



LUMINOUS OPENING



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**All testing was conducted in accordance with LM-79-08,**

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products as published by the Illuminating Engineering Society of North America (IESNA).

The condition of the item tested was new. Stabilization time before testing exceeded 16 hours.

The test results (luminous distribution and flux) were obtained by using a Lighting Sciences series 6000 Type C Moving Mirror Goniophotometer

- The photometric reference standard used is a set of three incandescent luminous intensity standard lamps calibrated and traceable to the U.S. National Institute of Standards and Technology.

The test results (colorimetric and luminous flux) were obtained by using a Lighting Sciences model 4000 Integrating Sphere of either 1 or 2 meters diameter, having an internal reflectance exceeding 0.80.  $4\pi$  geometry was used. Correction factors were applied for spectral mismatch and self-absorption. The spectroradiometer employed was a LSC model 500E having a bandwidth of .84.

- The photometric reference standard used is a set of three incandescent luminous flux standard lamps calibrated and traceable to the U.S. National Institute of Standards and Technology.
- The colorimetric reference standard used is an incandescent spectral standard lamp calibrated and traceable to the U.S. National Institute of Standards and Technology.

Power measurements were obtained with a Yokogawa WT210 power analyzer.

Ambient temperature during testing was  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , measured using an Omega model DP460.

Calibration certificates are on file at the laboratories of Lighting Sciences Inc.