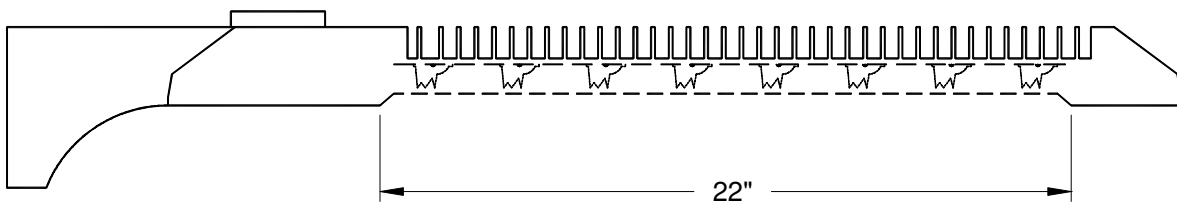




INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

IESNA CUTOFF CLASSIFICATION: CUTOFF



PREPARED FOR:

SOLAR OUTDOOR LIGHTING INC  
PALM CITY, FL

DATE: JUN 16, 2011

CERTIFIED BY:

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.

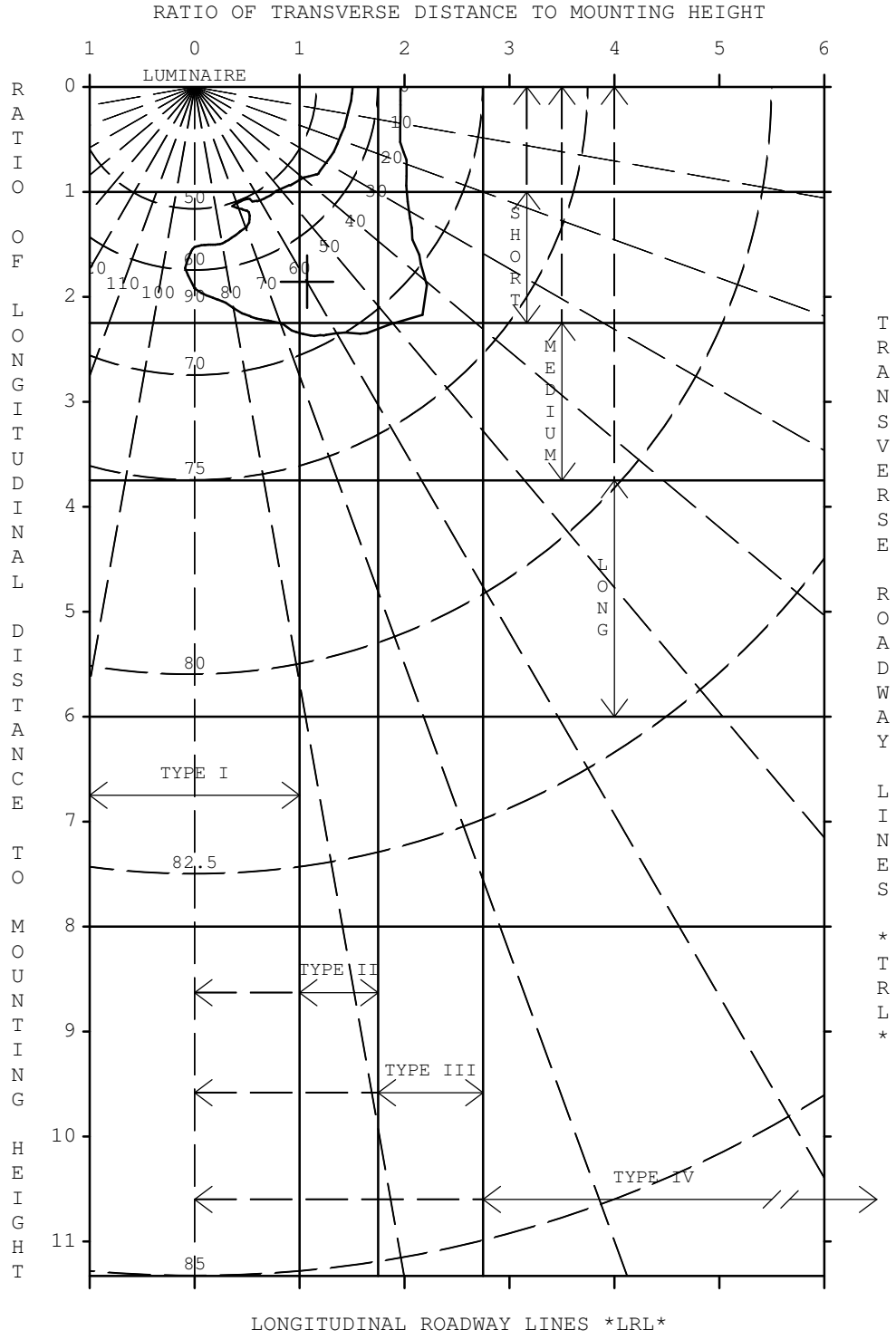
TEST DISTANCE EXCEEDS FIVE TIMES THE GREATEST  
LUMINOUS OPENING OF LUMINAIRE.

# LIGHTING SCIENCES, INC.

7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

CERTIFIED TEST REPORT NO.29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS



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

IES ROADWAY CLASSIFICATION: TYPE III, SHORT

LIGHTING SCIENCES, INC.  
7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

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

UTILIZATION TABLE

CO-EFFICIENT OF UTILIZATION

RATIO	HOUSE SIDE	STREET SIDE	TOTAL
0.5	0.117	0.215	0.332
1.0	0.152	0.430	0.582
1.5	0.169	0.607	0.776
2.0	0.177	0.708	0.885
2.5	0.182	0.757	0.939
3.0	0.185	0.778	0.963
3.5	0.188	0.790	0.978
4.0	0.189	0.796	0.984
5.0	0.190	0.803	0.993
TOTAL:	0.193	0.807	1.000

PERCENTAGE OUTPUTS

DOWNWARD:	STREET SIDE =	80.7%
	HOUSE SIDE =	19.3%
	TOTAL =	100.0%
UPWARD:	STREET SIDE =	0.0%
	HOUSE SIDE =	0.0%
	TOTAL =	0.0%

EFFICACY (LUMENS PER WATT) 75.6

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

LIGHTING SCIENCES, INC.  
7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

ZONAL LUMEN SUMMARY PER IES PUBLICATION TM-15-07

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

FORWARD LIGHT:

LUMENS	3058.0
% LUMENS	80.7 %
FORWARD LOW ZONE (0 TO 30 DEGREES)	7.2 %
FORWARD MID ZONE (30 TO 60 DEGREES)	39.7 %
FORWARD HIGH ZONE (60 TO 80 DEGREES)	33.5 %
FORWARD VERY HIGH ZONE (80 TO 90 DEGREES)	0.3 %

BACK LIGHT:

LUMENS	730.2
% LUMENS	19.3 %
BACK LIGHT LOW ZONE (0 TO 30 DEGREES)	4.5 %
BACK LIGHT MID ZONE (30 TO 60 DEGREES)	10.1 %
BACK LIGHT HIGH ZONE (60 TO 80 DEGREES)	4.4 %
BACK LIGHT VERY HIGH ZONE (80 TO 90 DEGREES)	0.3 %

UPLIGHT:

LUMENS	0.1
% 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

LIGHTING SCIENCES, INC.  
7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

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)	168.3	B1
BM (30-60 DEGREES)	381.5	B1
BL (0-30 DEGREES)	170.4	B1
UPLIGHT		
UH (100-180 DEGREES)	0.0	U1
UL (90-100 DEGREES)	0.0	U1
FVH (80-90 DEGREES)	12.0	U1
BVH (80-90 DEGREES)	10.0	U0
GLARE LIGHT		
FVH (80-90 DEGREES)	12.0	G1
BVH (80-90 DEGREES)	10.0	G0
FH (60-80 DEGREES)	1269.6	G1
BH (60-80 DEGREES)	168.3	G1

IES BUG RATING: B1 U1 G1

LIGHTING SCIENCES, INC.  
 7826 E. EVANS RD.  
 SCOTTSDALE, AZ, USA 85260

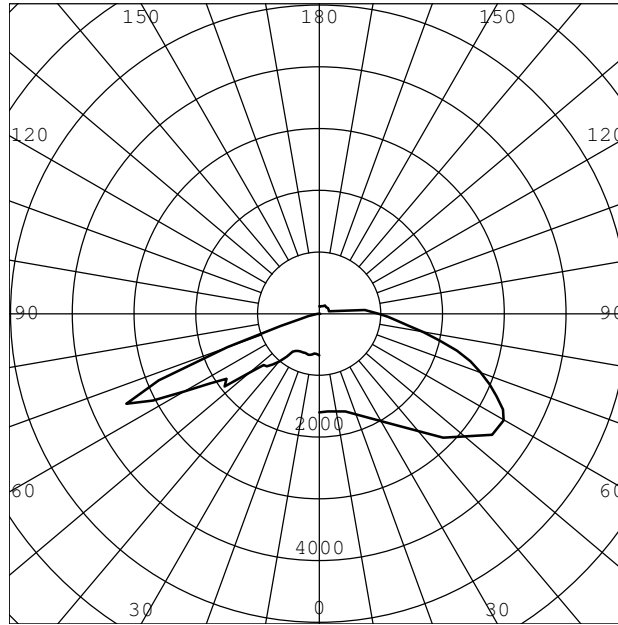
INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
 WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
 FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
 LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

INTENSITY (CANDLEPOWER)  
 IN MAX. PLANE

INTENSITY (CANDLEPOWER)  
 IN MAX. CONE

ANGLE	CANDLEPOWER
0.0	674
5.0	655
10.0	669
15.0	690
20.0	677
25.0	686
30.0	703
35.0	756
40.0	1014
45.0	1208
50.0	1503
52.5	1942
55.0	1844
57.5	2098
60.0	2518
62.5	3041
65.0	3455
67.5	2820
70.0	1588
72.5	658
75.0	309
77.5	184
80.0	103
82.5	39
85.0	12
87.5	1
90.0	0
95.0	0
105.0	0
115.0	0
125.0	0
135.0	0
145.0	0
155.0	0
165.0	0
175.0	0
180.0	0



ANGLE	CANDLEPOWER
0.0	1596
5.0	1592
15.0	1640
25.0	1857
35.0	2216
45.0	2840
55.0	3421
60.0	3455
62.5	3362
65.0	3174
67.5	2985
70.0	2787
72.5	2567
75.0	2314
77.5	1999
80.0	1717
82.5	1448
85.0	1263
87.5	1117
90.0	968
95.0	741
105.0	170
115.0	167
125.0	173
135.0	162
145.0	170
155.0	144
165.0	131
175.0	121
180.0	126

MAXIMUM INTENSITY (CANDLEPOWER) : 3455 CD  
 PLANE OF MAXIMUM: 60.0  
 VERTICAL ANGLE OF MAXIMUM: 65.0

LIGHTING SCIENCES, INC.  
7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

INTENSITY (CANDLEPOWER) SUMMARY

VERT. ANGLE	HORIZONTAL ANGLES - STREET SIDE										
	0.0	5.0	15.0	25.0	35.0	45.0	55.0	60.0	65.0	75.0	85.0
								****			
0.0	674	674	674	674	674	674	674	674	674	674	674
5.0	654	655	655	655	654	652	654	655	655	659	665
10.0	610	608	615	631	649	660	667	669	669	680	695
15.0	523	520	525	553	603	645	678	690	702	718	741
20.0	497	496	496	511	556	623	665	677	697	740	760
25.0	610	606	603	600	599	629	687	686	688	734	741
30.0	612	611	642	699	714	692	707	703	696	723	727
35.0	757	757	747	791	851	814	810	756	732	712	708
40.0	1048	1053	1065	1028	951	956	1121	1014	923	841	769
45.0	1160	1167	1229	1325	1316	1116	1207	1208	1068	1041	1073
50.0	1143	1167	1203	1323	1536	1440	1366	1503	1805	1636	1400
55.0	1569	1587	1604	1623	1698	2034	1845	1844	1795	1638	1545
60.0	1761	1772	1829	1990	2218	2351	2693	2518	2376	2408	2195
65.0**	1596	1592	1640	1857	2216	2840	3421	3455	3174	2314	1263
70.0	908	910	965	1065	1436	2393	2046	1588	1302	821	452
75.0	325	303	316	412	639	868	426	309	237	277	173
80.0	55	50	60	85	92	130	132	103	65	46	34
85.0	13	8	12	16	17	12	19	12	11	8	6
90.0	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	674	674	674	674	674	674	674	674	674	674	674
5.0	671	676	686	690	693	687	676	663	649	640	632
10.0	706	715	726	701	643	575	518	476	451	439	429
15.0	753	761	737	640	528	417	329	267	240	229	222
20.0	761	763	700	533	362	239	195	189	189	188	188
25.0	751	757	623	403	234	200	190	184	180	179	178
30.0	741	739	551	302	253	221	196	182	172	172	174
35.0	722	707	468	272	321	272	214	181	167	167	173
40.0	748	694	400	310	385	271	188	172	162	164	164
45.0	1011	838	364	362	422	238	179	170	171	173	174
50.0	1300	1122	430	330	339	205	182	219	178	167	171
55.0	1537	1349	360	273	244	185	232	182	164	141	142
60.0	2006	1546	268	208	187	222	172	166	132	121	123
65.0**	968	741	170	167	173	162	170	144	131	121	126
70.0	345	269	108	121	154	146	136	131	122	111	110
75.0	117	88	65	81	103	142	112	97	98	92	83
80.0	28	31	30	41	66	79	65	71	49	45	41
85.0	6	6	7	8	16	17	19	24	18	10	10
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

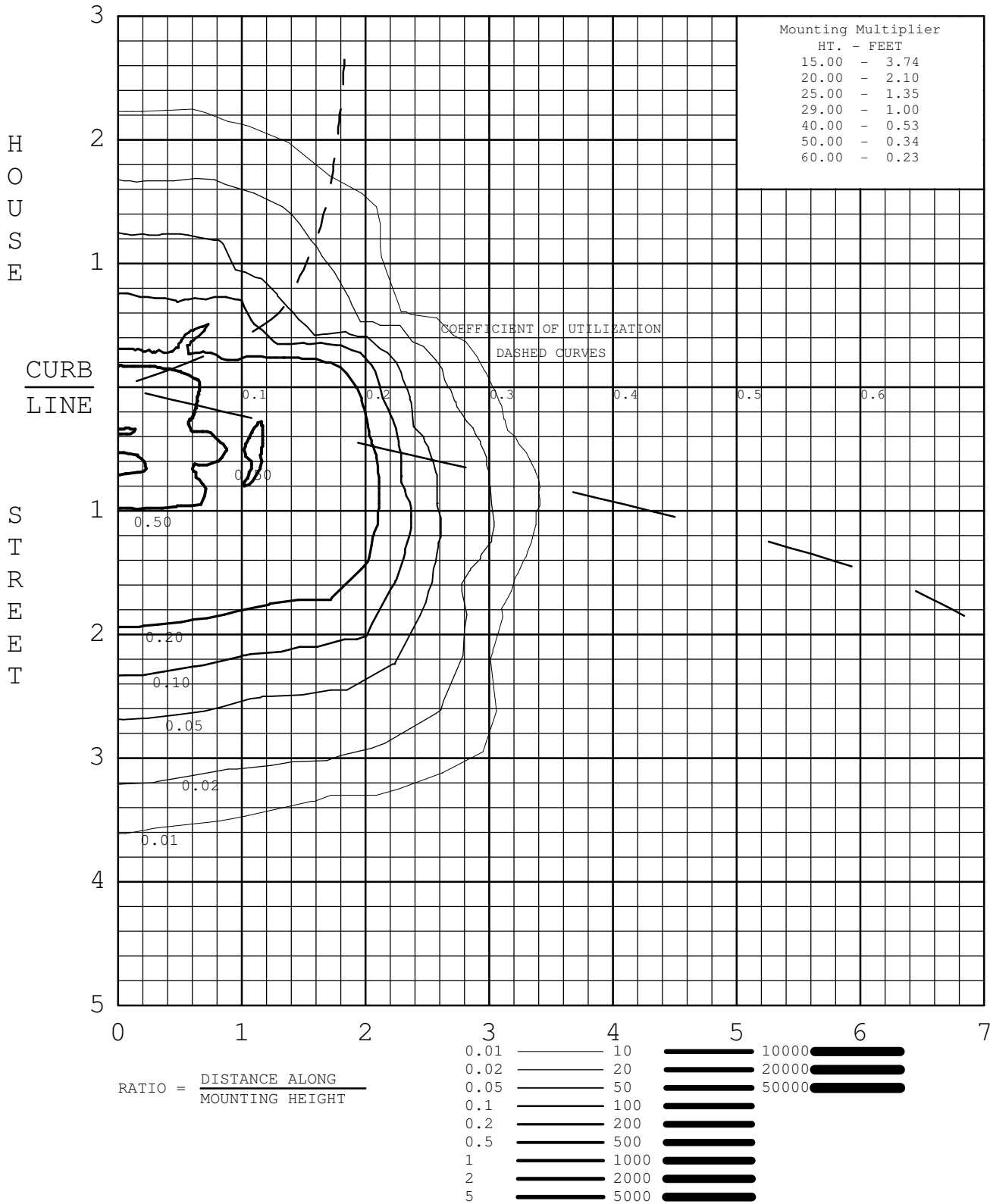
INTENSITY WAS MEASURED IN 2.5 DEGREE STEPS - TABULATIONS ARE AVAILABLE

# ISOFOOTCANDLE

CERTIFIED TEST REPORT NO.29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
 WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
 FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
 LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

## MOUNTING HEIGHT FOR ISOFC 29.0 FEET



LIGHTING SCIENCES, INC.  
7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

**ELECTRICAL MEASUREMENTS**

INPUT VOLTAGE:	13.5	VOLTS DC
INPUT CURRENT:	3.749	AMPS
INPUT POWER:	50.1	WATTS
OFF STATE POWER:	0.00	WATTS

**LIGHT OUTPUT**

LUMENS:	3788	lm
EFFICACY:	75.6	lm/W

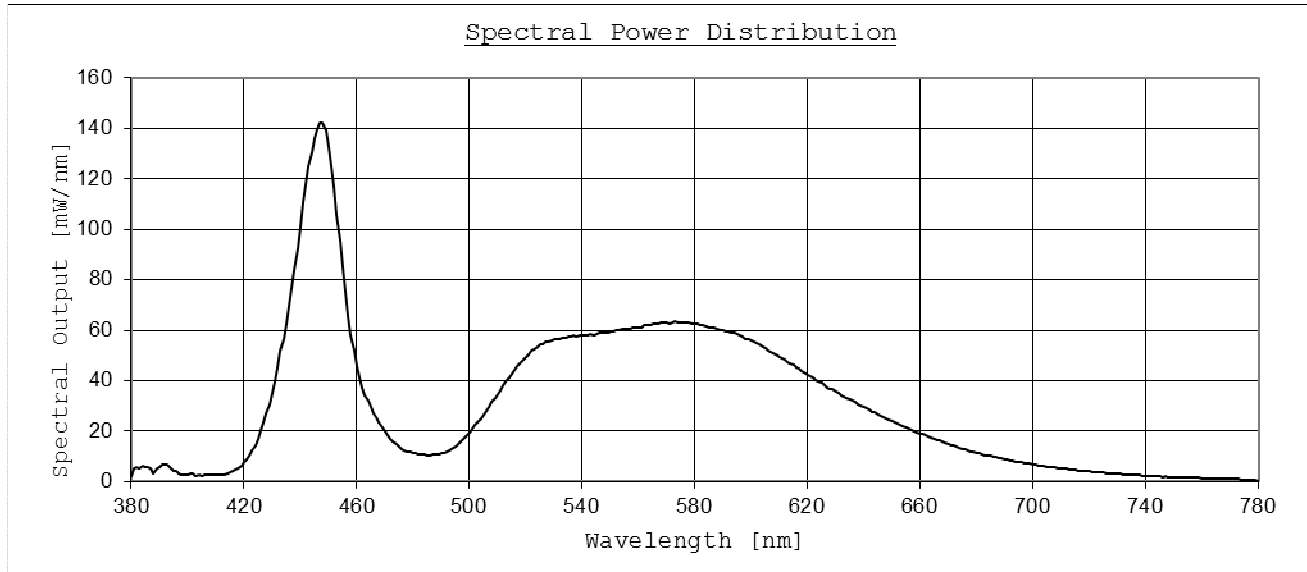
**SPECTRAL MEASUREMENTS**

X:	0.3271	
y:	0.3227	
u/u':	0.2104	
v:	0.3114	
v':	0.4671	
Duv:	0.0071	
CRI (R <sub>a</sub> ):	74.5	
CRI (R <sub>g</sub> ):	-3.9	
CCT:	5762	K
RADIANT FLUX:	12216	mW

LIGHTING SCIENCES, INC.  
 7826 E. EVANS RD.  
 SCOTTSDALE, AZ, USA 85260

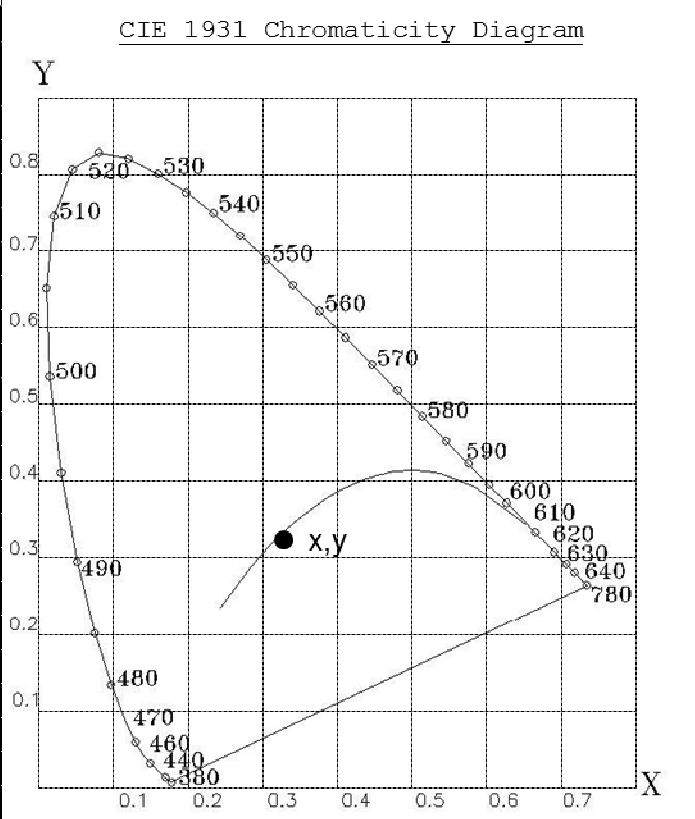
INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
 WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
 FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
 LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS



Tabulated Spectral Power Distribution

Wavelength [nm]	[mW/nm]	Wavelength [nm]	[mW/nm]
380	2.12524	590	59.85636
390	5.90357	600	55.94054
400	2.67816	610	49.61695
410	2.61550	620	42.55017
420	7.63033	630	35.88135
430	35.07181	640	29.74013
440	101.25328	650	24.15495
450	132.28239	660	19.11412
460	45.61694	670	14.94436
470	20.17660	680	11.48470
480	11.30481	690	9.00470
490	11.13192	700	6.95930
500	19.52506	710	5.33558
510	34.63059	720	4.10095
520	49.33305	730	3.15867
530	56.51007	740	2.41801
540	57.89941	750	1.89244
550	59.32257	760	1.43057
560	61.12770	770	1.09117
570	62.85333	780	0.38082
580	62.64195		



LIGHTING SCIENCES, INC.  
7826 E. EVANS RD.  
SCOTTSDALE, AZ, USA 85260

INDEPENDENT TEST LABORATORY REPORT No. 29178

SOLAR OUTDOOR LIGHTING - LED ROADWAY LUMINAIRE, CAT# 20/20 TYPE 3  
WITH ALUMINUM INTERIOR AND CLEAR FLAT GLASS LENS  
FORTY EIGHT LEDS. LUMINAIRE OUTPUT: 3788 Lms.  
LUMINAIRE OPERATING AT 13.5 VDC AND 50.1 WATTS

LUMINOUS OPENING



SIDE VIEW



**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.