PRELIMINARY

Soraa Internal Report: IES LM79-08

Test results reported for:

Customer Reference P/N: SP38-18-60D-930-03
Manufacturing P/N: SP38-18-60D-930-03

Soraa PAR38, E26/120V, 3000K, 95CRI, 18.5W, 60degree

Relevant Standards
IES LM-79
ANSI C78.377
IES PR-16

Soraa Lamp Lab

6500 Kaiser Dr., Fremont, CA 94555 TEL: (510) 456-2200

1.0 Description of test sample

Customer reference ID	SP38-18-60D-930-03
Manufacturer reference ID	SP38-18-60D-930-03
Lamp description	Vivid 3000K 95CRI 18.5W 60 degree
Rated voltage	120V
Rated power	18.5W
Nominal CCT	3000K

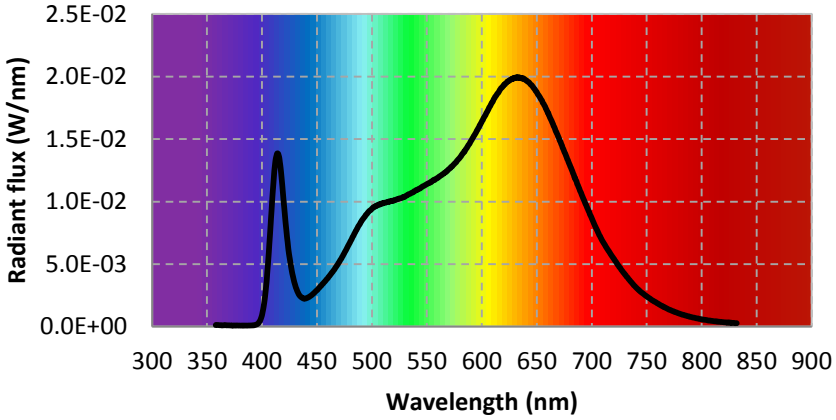
2.0 Results - Sphere Measurements

Test conditions	
Orientation	Horizontal
Stabilization time (min)	50-55
Correction factor applied	Self absorption correction
Sphere geometry	65" Sphere
	95% coating reflectance
	2pi geometry
Ambient temperature (°C)	25±1

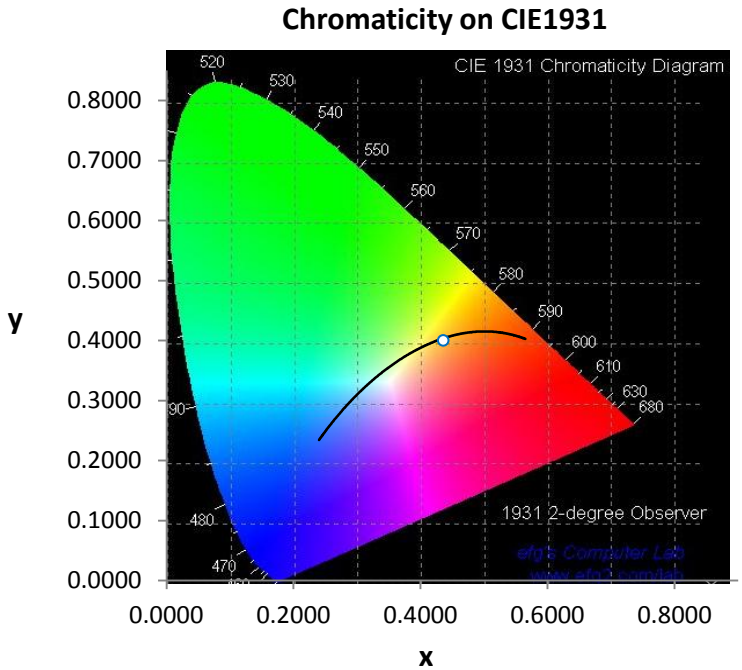
Instrument				
	Instrument	Manufacture	Model	
Photometric	Spectrometer	Instrument systems	CAS 140T	
	Integrating sphere	Labsphere	65"	
	Standard lamp	Labsphere	CSFS-1400 lamp	
Electrical instrument	Power supply for standard lamp	Labsphere	LPS-150-0268	
	Power supply for aux lamp	Labsphere	LPS-100-0833	
	Power supply for test lamps	APT	Variplus 105	
	Power meter for test lamps	Chroma	66202	
Thermometer	Digital multimeter	YOKOGAWA	TY720	

Measurement results				
Photometric			Electrical	
Total lumen (lm)	1041		Input voltage (V)	119.6
Luminous efficacy (lm/W)	58		Current (A)	0.152
Chromaticity coordinates	u' = 0.2500		Power (W)	18.0
	v' = 0.5214		pf	0.989
	x = 0.4362			
	y = 0.4000			
CCT (K)	3015			
CRI	96			
R9	95			
Duv				

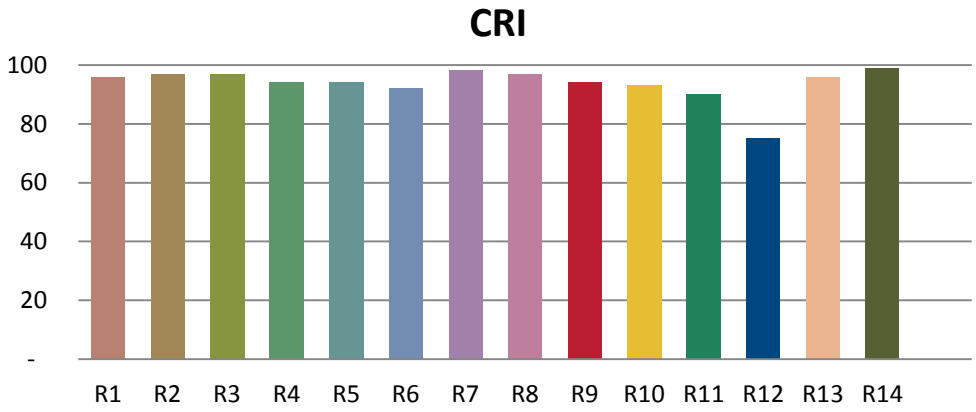
Spectral power distribution



Chromaticity on CIE1931



CRI	
R1	96
R2	97
R3	97
R4	94
R5	94
R6	92
R7	98
R8	97
R9	94
R10	93
R11	90
R12	75
R13	96
R14	99
Ra	96



Spectral Power Distribution									
WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)
380	8.49E-05	421	8.75E-03	462	4.13E-03	503	9.61E-03	544	1.11E-02
381	8.34E-05	422	7.83E-03	463	4.25E-03	504	9.65E-03	545	1.11E-02
382	8.60E-05	423	6.98E-03	464	4.35E-03	505	9.72E-03	546	1.12E-02
383	8.23E-05	424	6.19E-03	465	4.48E-03	506	9.75E-03	547	1.12E-02
384	8.64E-05	425	5.57E-03	466	4.60E-03	507	9.76E-03	548	1.13E-02
385	8.63E-05	426	5.02E-03	467	4.74E-03	508	9.81E-03	549	1.13E-02
386	8.50E-05	427	4.51E-03	468	4.87E-03	509	9.85E-03	550	1.14E-02
387	8.63E-05	428	4.08E-03	469	4.99E-03	510	9.86E-03	551	1.15E-02
388	9.13E-05	429	3.69E-03	470	5.14E-03	511	9.90E-03	552	1.15E-02
389	9.06E-05	430	3.37E-03	471	5.29E-03	512	9.90E-03	553	1.15E-02
390	9.23E-05	431	3.09E-03	472	5.42E-03	513	9.94E-03	554	1.16E-02
391	9.81E-05	432	2.86E-03	473	5.59E-03	514	9.96E-03	555	1.16E-02
392	1.15E-04	433	2.67E-03	474	5.75E-03	515	9.97E-03	556	1.17E-02
393	1.14E-04	434	2.52E-03	475	5.91E-03	516	1.00E-02	557	1.17E-02
394	1.42E-04	435	2.41E-03	476	6.07E-03	517	1.00E-02	558	1.18E-02
395	1.75E-04	436	2.34E-03	477	6.23E-03	518	1.00E-02	559	1.19E-02
396	2.24E-04	437	2.28E-03	478	6.41E-03	519	1.01E-02	560	1.19E-02
397	3.17E-04	438	2.25E-03	479	6.57E-03	520	1.01E-02	561	1.20E-02
398	4.47E-04	439	2.24E-03	480	6.74E-03	521	1.01E-02	562	1.20E-02
399	6.49E-04	440	2.26E-03	481	6.91E-03	522	1.02E-02	563	1.21E-02
400	9.32E-04	441	2.30E-03	482	7.08E-03	523	1.02E-02	564	1.22E-02
401	1.36E-03	442	2.34E-03	483	7.25E-03	524	1.02E-02	565	1.22E-02
402	1.91E-03	443	2.39E-03	484	7.43E-03	525	1.03E-02	566	1.23E-02
403	2.60E-03	444	2.45E-03	485	7.60E-03	526	1.03E-02	567	1.24E-02
404	3.46E-03	445	2.51E-03	486	7.75E-03	527	1.03E-02	568	1.24E-02
405	4.56E-03	446	2.59E-03	487	7.92E-03	528	1.03E-02	569	1.25E-02
406	5.73E-03	447	2.67E-03	488	8.08E-03	529	1.04E-02	570	1.26E-02
407	7.03E-03	448	2.75E-03	489	8.21E-03	530	1.04E-02	571	1.27E-02
408	8.40E-03	449	2.84E-03	490	8.37E-03	531	1.05E-02	572	1.28E-02
409	9.77E-03	450	2.91E-03	491	8.51E-03	532	1.05E-02	573	1.28E-02
410	1.10E-02	451	3.02E-03	492	8.63E-03	533	1.06E-02	574	1.29E-02
411	1.22E-02	452	3.11E-03	493	8.74E-03	534	1.06E-02	575	1.30E-02
412	1.31E-02	453	3.21E-03	494	8.87E-03	535	1.06E-02	576	1.31E-02
413	1.36E-02	454	3.29E-03	495	8.98E-03	536	1.07E-02	577	1.32E-02
414	1.39E-02	455	3.40E-03	496	9.09E-03	537	1.07E-02	578	1.33E-02
415	1.37E-02	456	3.50E-03	497	9.20E-03	538	1.08E-02	579	1.34E-02
416	1.33E-02	457	3.59E-03	498	9.28E-03	539	1.08E-02	580	1.35E-02
417	1.26E-02	458	3.70E-03	499	9.33E-03	540	1.09E-02	581	1.36E-02
418	1.17E-02	459	3.80E-03	500	9.43E-03	541	1.09E-02	582	1.38E-02
419	1.07E-02	460	3.90E-03	501	9.51E-03	542	1.10E-02	583	1.39E-02
420	9.71E-03	461	4.02E-03	502	9.58E-03	543	1.10E-02	584	1.40E-02

Spectral Power Distribution									
WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)	WL (nm)	SPD(W/nm)
585	1.41E-02	626	1.98E-02	667	1.57E-02	708	7.14E-03	749	2.49E-03
586	1.43E-02	627	1.98E-02	668	1.55E-02	709	6.97E-03	750	2.42E-03
587	1.44E-02	628	1.98E-02	669	1.53E-02	710	6.81E-03	751	2.36E-03
588	1.45E-02	629	1.99E-02	670	1.51E-02	711	6.67E-03	752	2.30E-03
589	1.47E-02	630	1.99E-02	671	1.49E-02	712	6.53E-03	753	2.25E-03
590	1.48E-02	631	1.99E-02	672	1.47E-02	713	6.37E-03	754	2.17E-03
591	1.50E-02	632	1.99E-02	673	1.45E-02	714	6.23E-03	755	2.12E-03
592	1.51E-02	633	1.99E-02	674	1.42E-02	715	6.10E-03	756	2.07E-03
593	1.53E-02	634	1.99E-02	675	1.40E-02	716	5.97E-03	757	2.00E-03
594	1.54E-02	635	1.99E-02	676	1.38E-02	717	5.83E-03	758	1.96E-03
595	1.56E-02	636	1.99E-02	677	1.36E-02	718	5.70E-03	759	1.90E-03
596	1.57E-02	637	1.98E-02	678	1.34E-02	719	5.57E-03	760	1.86E-03
597	1.59E-02	638	1.98E-02	679	1.31E-02	720	5.44E-03	761	1.79E-03
598	1.61E-02	639	1.98E-02	680	1.29E-02	721	5.30E-03	762	1.75E-03
599	1.62E-02	640	1.97E-02	681	1.27E-02	722	5.18E-03	763	1.69E-03
600	1.64E-02	641	1.96E-02	682	1.25E-02	723	5.05E-03	764	1.66E-03
601	1.65E-02	642	1.96E-02	683	1.23E-02	724	4.91E-03	765	1.60E-03
602	1.67E-02	643	1.95E-02	684	1.20E-02	725	4.78E-03	766	1.56E-03
603	1.69E-02	644	1.94E-02	685	1.18E-02	726	4.67E-03	767	1.51E-03
604	1.71E-02	645	1.93E-02	686	1.16E-02	727	4.54E-03	768	1.47E-03
605	1.72E-02	646	1.92E-02	687	1.14E-02	728	4.43E-03	769	1.42E-03
606	1.74E-02	647	1.91E-02	688	1.12E-02	729	4.31E-03	770	1.38E-03
607	1.76E-02	648	1.90E-02	689	1.09E-02	730	4.20E-03	771	1.34E-03
608	1.77E-02	649	1.89E-02	690	1.08E-02	731	4.09E-03	772	1.31E-03
609	1.79E-02	650	1.87E-02	691	1.05E-02	732	3.98E-03	773	1.27E-03
610	1.80E-02	651	1.86E-02	692	1.03E-02	733	3.88E-03	774	1.24E-03
611	1.82E-02	652	1.85E-02	693	1.01E-02	734	3.76E-03	775	1.20E-03
612	1.84E-02	653	1.83E-02	694	9.89E-03	735	3.65E-03	776	1.16E-03
613	1.85E-02	654	1.82E-02	695	9.70E-03	736	3.55E-03	777	1.14E-03
614	1.86E-02	655	1.80E-02	696	9.49E-03	737	3.45E-03	778	1.10E-03
615	1.87E-02	656	1.78E-02	697	9.28E-03	738	3.34E-03	779	1.06E-03
616	1.89E-02	657	1.77E-02	698	9.07E-03	739	3.25E-03	780	1.03E-03
617	1.90E-02	658	1.75E-02	699	8.87E-03	740	3.16E-03		
618	1.91E-02	659	1.73E-02	700	8.67E-03	741	3.08E-03		
619	1.92E-02	660	1.71E-02	701	8.46E-03	742	2.99E-03		
620	1.93E-02	661	1.69E-02	702	8.25E-03	743	2.91E-03		
621	1.94E-02	662	1.67E-02	703	8.06E-03	744	2.83E-03		
622	1.95E-02	663	1.65E-02	704	7.87E-03	745	2.75E-03		
623	1.96E-02	664	1.63E-02	705	7.69E-03	746	2.69E-03		
624	1.96E-02	665	1.61E-02	706	7.49E-03	747	2.62E-03		
625	1.97E-02	666	1.59E-02	707	7.30E-03	748	2.55E-03		

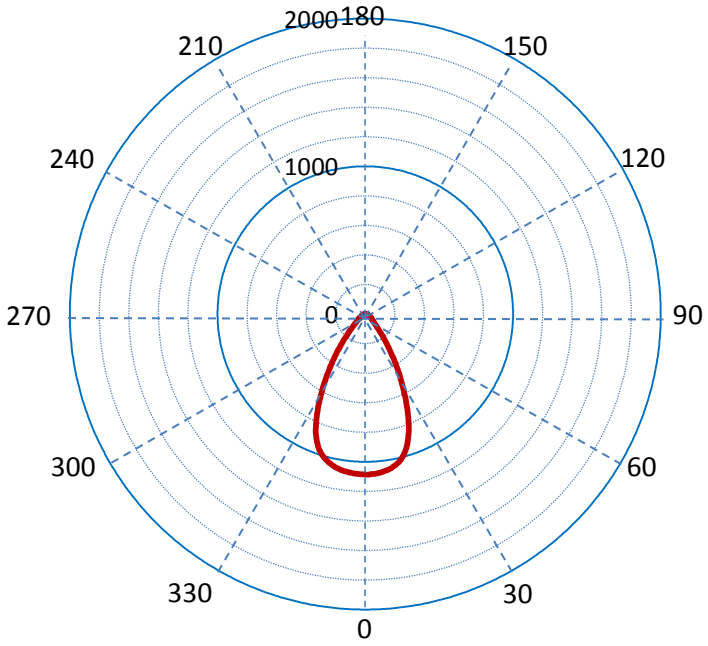
3.0 Results - Goniometric Measurements

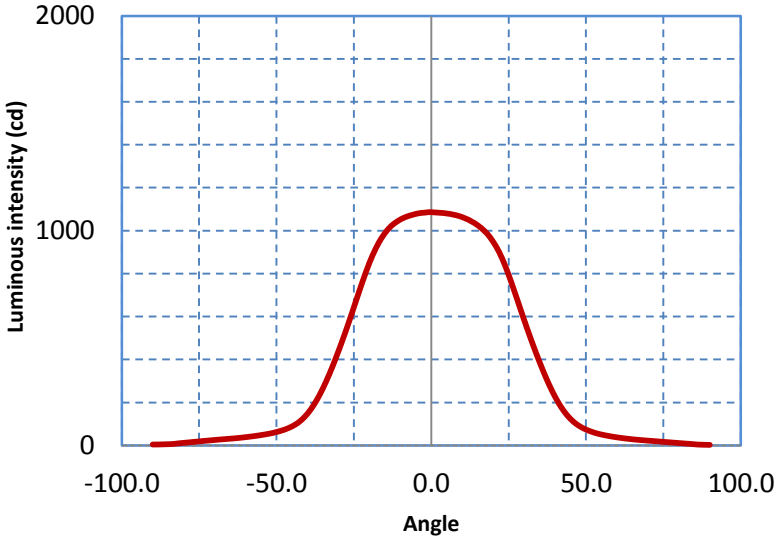
Test conditions	
Goniometer distance (m)	1
Temperature (°C)	25±1
Stabilization time (min)	50

Instrument				
	Instrument	Manufacture	Model	
Photometric	Photometer and color meter	Minolta	CL-200A	
Electrical instrument	Power supply for test lamps	APT	Variplus 105	
	Power meter for test lamps	Chroma	66202	
Thermometer	Digital multimeter	YOKOGAWA	TY720	

Measurement results				
Photometric			Electrical	
Central beam candle power(cd)	1086		Input voltage (V)	119.6
Beam Angle (°)	58		Current (A)	0.152
Field Angle (°)	89		Power (W)	18.0260
Chromaticity coordinates	u'= 0.2500		pf	0.9890
	v'= 0.5214			
	x = 0.4362			
	y = 0.4000			
CCT (K)	3015			

Luminous intensity distribution





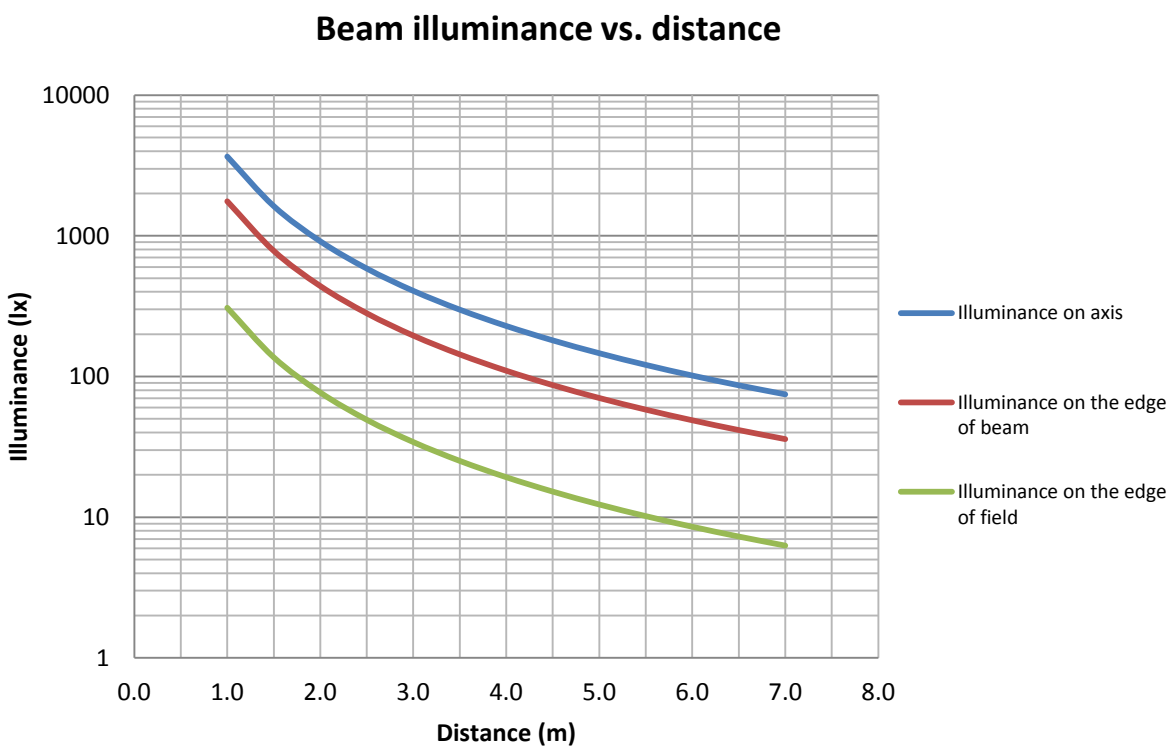
Zonal Lumen Tabulation

Zones (°)	Lumens	%lamp	Zones (°)	Lumens	%lamp
0-5	22.6	2.2%	45-50	33.0	3.2%
5-10	67.1	6.4%	50-55	22.9	2.2%
10-15	108.6	10.4%	55-60	17.5	1.7%
15-20	143.2	13.7%	60-65	13.9	1.3%
20-25	161.8	15.5%	65-70	11.1	1.1%
25-30	152.7	14.7%	70-75	8.9	0.9%
30-35	124.3	11.9%	75-80	6.5	0.6%
35-40	87.9	8.4%	80-85	3.9	0.4%
40-45	54.1	5.2%	85-90	1.5	0.1%
				Total lumen	1041

Accumulated Zonal Lumen Tabulation

Zones (°)	Lumens	%lamp	Zones (°)	Lumens	%lamp
0-5	22.6	2.2%	0-50	955.3	91.7%
0-10	89.8	8.6%	0-55	978.2	93.9%
0-15	198.3	19.0%	0-60	995.7	95.6%
0-20	341.5	32.8%	0-65	1009.5	96.9%
0-25	503.3	48.3%	0-70	1020.7	98.0%
0-30	656.0	63.0%	0-75	1029.5	98.9%
0-35	780.3	74.9%	0-80	1036.0	99.5%
0-40	868.2	83.4%	0-85	1039.9	99.9%
0-45	922.3	88.6%	0-90	1041.4	100.0%

Center and edge illuminance, beam and field diameter					
Distance (m)	E on axis (lx)	Beam D(m)	E on the edge of beam (lx)	Field D(m)	E on the edge of field (lx)
1.0	3657	0.33	1758	0.7	308
1.5	1626	0.49	781	1.0	137
2.0	914	0.65	440	1.4	77
2.5	585	0.81	281	1.7	49
3.0	406	0.98	195	2.1	34
3.5	299	1.14	144	2.4	25
4.0	229	1.30	110	2.8	19
4.5	181	1.47	87	3.1	15
5.0	146	1.63	70	3.5	12
5.5	121	1.79	58	3.8	10
6.0	102	1.95	49	4.2	9
6.5	87	2.12	42	4.5	7
7.0	75	2.28	36	4.9	6
7.5	65	2.44	31	5.2	5
8.0	57	2.61	27	5.6	5
8.5	51	2.77	24	5.9	4
9.0	45	2.93	22	6.3	4
9.5	41	3.09	19	6.6	3
10.0	37	3.26	18	7.0	3



Luminous Intensity Distribution									
Angle (°C)	CP (cd)	Angle (°C)	CP (cd)	Angle (°C)	CP (cd)	Angle (°C)	CP (cd)	Angle (°C)	CP (cd)
-90.0	4.1	-69.5	26.0	-49.0	66.3	-28.5	497.2	-8.0	1065.0
-89.5	4.2	-69.0	26.6	-48.5	68.5	-28.0	517.1	-7.5	1067.5
-89.0	4.2	-68.5	27.2	-48.0	70.7	-27.5	537.7	-7.0	1070.0
-88.5	4.3	-68.0	27.8	-47.5	73.2	-27.0	558.2	-6.5	1072.0
-88.0	4.4	-67.5	28.4	-47.0	75.7	-26.5	579.3	-6.0	1074.0
-87.5	4.6	-67.0	28.9	-46.5	78.6	-26.0	600.4	-5.5	1076.0
-87.0	4.8	-66.5	29.5	-46.0	81.5	-25.5	621.9	-5.0	1078.0
-86.5	5.0	-66.0	30.1	-45.5	84.9	-25.0	643.3	-4.5	1079.5
-86.0	5.2	-65.5	30.7	-45.0	88.3	-24.5	665.0	-4.0	1081.0
-85.5	5.4	-65.0	31.2	-44.5	92.4	-24.0	686.6	-3.5	1082.0
-85.0	5.6	-64.5	31.8	-44.0	96.4	-23.5	708.1	-3.0	1083.0
-84.5	5.9	-64.0	32.4	-43.5	101.2	-23.0	729.5	-2.5	1083.5
-84.0	6.2	-63.5	33.1	-43.0	105.9	-22.5	750.5	-2.0	1084.0
-83.5	6.7	-63.0	33.7	-42.5	111.7	-22.0	771.4	-1.5	1085.0
-83.0	7.1	-62.5	34.4	-42.0	117.5	-21.5	791.6	-1.0	1086.0
-82.5	8.1	-62.0	35.1	-41.5	124.4	-21.0	811.8	-0.5	1086.0
-82.0	9.1	-61.5	35.9	-41.0	131.3	-20.5	830.7	0.0	1086.0
-81.5	9.9	-61.0	36.7	-40.5	139.4	-20.0	849.5	0.5	1085.5
-81.0	10.6	-60.5	37.5	-40.0	147.5	-19.5	866.7	1.0	1085.0
-80.5	11.3	-60.0	38.3	-39.5	156.9	-19.0	883.9	1.5	1084.5
-80.0	11.9	-59.5	39.2	-39.0	166.2	-18.5	899.5	2.0	1084.0
-79.5	12.6	-59.0	40.0	-38.5	176.9	-18.0	915.0	2.5	1083.5
-79.0	13.2	-58.5	40.9	-38.0	187.5	-17.5	929.0	3.0	1083.0
-78.5	13.9	-58.0	41.8	-37.5	199.4	-17.0	943.0	3.5	1082.5
-78.0	14.6	-57.5	42.8	-37.0	211.2	-16.5	955.0	4.0	1082.0
-77.5	15.3	-57.0	43.8	-36.5	224.4	-16.0	967.0	4.5	1081.0
-77.0	16.0	-56.5	44.8	-36.0	237.5	-15.5	977.5	5.0	1080.0
-76.5	16.7	-56.0	45.8	-35.5	251.8	-15.0	988.0	5.5	1079.0
-76.0	17.3	-55.5	47.0	-35.0	266.0	-14.5	997.0	6.0	1078.0
-75.5	18.0	-55.0	48.1	-34.5	281.5	-14.0	1006.0	6.5	1076.5
-75.0	18.7	-54.5	49.3	-34.0	296.9	-13.5	1013.5	7.0	1075.0
-74.5	19.4	-54.0	50.4	-33.5	313.3	-13.0	1021.0	7.5	1073.5
-74.0	20.1	-53.5	51.7	-33.0	329.7	-12.5	1027.0	8.0	1072.0
-73.5	20.8	-53.0	52.9	-32.5	347.0	-12.0	1033.0	8.5	1070.0
-73.0	21.4	-52.5	54.3	-32.0	364.2	-11.5	1038.0	9.0	1068.0
-72.5	22.1	-52.0	55.6	-31.5	382.4	-11.0	1043.0	9.5	1065.5
-72.0	22.7	-51.5	57.2	-31.0	400.6	-10.5	1047.5	10.0	1063.0
-71.5	23.4	-51.0	58.7	-30.5	419.5	-10.0	1052.0	10.5	1060.0
-71.0	24.0	-50.5	60.5	-30.0	438.3	-9.5	1055.5	11.0	1057.0
-70.5	24.7	-50.0	62.3	-29.5	457.8	-9.0	1059.0	11.5	1054.0
-70.0	25.3	-49.5	64.3	-29.0	477.2	-8.5	1062.0	12.0	1051.0

Luminous Intensity Distribution									
Angle (°C)	CP (cd)	Angle (°C)	CP (cd)	Angle (°C)	CP (cd)	Angle (°C)	CP (cd)		
12.5	1047.0	33.0	463.2	53.5	55.9	74.0	17.7		
13.0	1043.0	33.5	444.1	54.0	53.9	74.5	17.1		
13.5	1039.0	34.0	424.9	54.5	52.2	75.0	16.5		
14.0	1035.0	34.5	406.3	55.0	50.5	75.5	16.0		
14.5	1030.0	35.0	387.7	55.5	49.0	76.0	15.4		
15.0	1025.0	35.5	369.8	56.0	47.5	76.5	14.9		
15.5	1019.5	36.0	351.9	56.5	46.1	77.0	14.4		
16.0	1014.0	36.5	334.8	57.0	44.7	77.5	13.8		
16.5	1007.5	37.0	317.6	57.5	43.4	78.0	13.2		
17.0	1001.0	37.5	301.4	58.0	42.1	78.5	12.7		
17.5	994.0	38.0	285.2	58.5	40.9	79.0	12.1		
18.0	987.0	38.5	270.0	59.0	39.7	79.5	11.6		
18.5	978.0	39.0	254.7	59.5	38.6	80.0	11.0		
19.0	969.0	39.5	240.6	60.0	37.5	80.5	10.5		
19.5	958.5	40.0	226.5	60.5	36.5	81.0	9.9		
20.0	948.0	40.5	213.6	61.0	35.4	81.5	9.4		
20.5	936.5	41.0	200.6	61.5	34.5	82.0	8.8		
21.0	925.0	41.5	189.0	62.0	33.5	82.5	8.3		
21.5	911.5	42.0	177.4	62.5	32.6	83.0	7.7		
22.0	898.0	42.5	167.1	63.0	31.7	83.5	7.2		
22.5	882.5	43.0	156.8	63.5	30.9	84.0	6.6		
23.0	867.0	43.5	147.7	64.0	30.1	84.5	6.0		
23.5	849.5	44.0	138.6	64.5	29.3	85.0	5.3		
24.0	832.0	44.5	130.8	65.0	28.5	85.5	4.7		
24.5	813.0	45.0	122.9	65.5	27.8	86.0	4.1		
25.0	794.0	45.5	116.2	66.0	27.0	86.5	3.8		
25.5	773.8	46.0	109.5	66.5	26.4	87.0	3.4		
26.0	753.6	46.5	103.9	67.0	25.7	87.5	3.2		
26.5	732.8	47.0	98.2	67.5	25.1	88.0	3.0		
27.0	711.9	47.5	93.5	68.0	24.5	88.5	2.9		
27.5	690.6	48.0	88.7	68.5	24.0	89.0	2.7		
28.0	669.3	48.5	84.7	69.0	23.4	89.5	2.6		
28.5	648.0	49.0	80.6	69.5	22.8	90.0	2.4		
29.0	626.6	49.5	77.2	70.0	22.2				
29.5	605.5	50.0	73.8	70.5	21.7				
30.0	584.4	50.5	70.8	71.0	21.1				
30.5	563.7	51.0	67.8	71.5	20.6				
31.0	543.0	51.5	65.2	72.0	20.0				
31.5	522.8	52.0	62.6	72.5	19.4				
32.0	502.6	52.5	60.3	73.0	18.8				
32.5	482.9	53.0	57.9	73.5	18.3				