

LM-79-08 Test Report

For

ETI Solid State Lighting (Zhuhai) Ltd

No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High Tech District, Zhuhai City,
Guangdong Prov., China 519085

LED Ceiling Light

Model Name(s):

564111###

Representative (Tested) Model:

564111110

Model Difference:

1. ## can be 11-30 indicated color tunable, tunable from 3000K, 4000K and 5000K;
2. The third # can be 0-9 indicated factory code.

Prepare by:



Engineer: Alan Wang

Date: 2021-01-06

Review by:



Technical Lead: Vincent Yuan

Issue Date: 2021-01-31

Revised Date: N/A

- Note:
1. The results contained in this report pertain only to the tested samples.
 2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd
 3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

Client Information:

Applicant Name:	ETI Solid State Lighting (Zhuhai) Ltd
Brand Name:	Commercial Electric
Factory 1 Name:	ETI Solid State Lighting (Zhuhai) Ltd
Factory 1 Address:	No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High tech District, Zhuhai City, Guangdong Prov., China 519085
Factory 2 Name:	NVC VIETNAM TECHNOLOGY AND LIGHTING COMPANY LIMITED
Factory 2 Address:	Lot CN23-1, Yen Phong Industrial park, Dong Phong commune, Yen Phong district, Bac Ninh province, Vietnam

Product Information:

Model Number:	564111### (###=110-309)
Product Type:	Indoor, LED Light Engine
Rating Input:	120Vac, 60Hz, 22W
Declared CCT:	3000/4000/5000K
Declared Light Output:	1600 lm
LED Manufacturer:	Samsung
LED Model:	SPMWH1229AQ5XXVXXX and SPMWH1229AQ5XXRXXX
LED Quantity:	SPMWH1229AQ5XXVXXX: 32 pcs SPMWH1229AQ5XXRXXX: 32 pcs

Test Information:

Standard Lamp:	Total Spectral Radiant Flux Standard Lamp, trace to NIST. 1. D908S for Gonio 2. D215S for Integrating Sphere
Date of Receipt Samples:	2020-11-10
Quantity of Receipt Samples:	3 pcs
Sample Number:	201110005-S1~S3

Laboratory Information:

Test Laboratory:	Dongguan New Testing Centre Co., Ltd
Laboratory Address:	3F, No. 1 the 1 st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China
Laboratory Contact Name:	Neil Zhong
Laboratory Contact E-mail:	Neil_zhong@ntc-cert.com

Report Information:

Issued Date of Test Report:	2021-01-31
Revised Date of Test Report:	N/A
Test Report No.:	NTCLR20120229
Remark (If applicable):	N/A

Test Specification:	
Date of Test	2020-11-11
Test Item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Fidelity Index 8. Gamut Index 9. Local Chroma Shift
Reference Standard	IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products ANSI C78.377-2017 Specifications for the Chromaticity of Solid State Lighting Products CIE 13.3-1995 Method of Measuring and Specifying Color Rendering Properties of Light Sources CIE 15-2004 Technical Report Colorimetry ANSI IES TM-30-18 IES Method for Evaluating Light Source Color Rendition Addendum A for IES TM-15-11 Backlight, Uplight, and Glare (BUG) Ratings ANSI IES TM-30-18 IES Method for Evaluating Light Source Color Rendition

Test Methods:
<p>1. Photometric and Electrical Measurements – Light Distribution Method:</p> <p>Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25 °C ± 1°C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at required Voltage and Frequency. It was stabilized before measurement was made. Luminous Flux, Luminaire Efficacy and Zonal Lumen were calculated from the software taken at 1° vertical intervals and 15° horizontal intervals.</p>
<p>2. Photometric and Electrical Measurements – Integrating Sphere Method:</p> <p>Photometric parameters were measured using an integrating sphere, as spectroradiometer and software. The ambient temperature condition inside the sphere was measured at 25 °C± 1°C. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at require Voltage and Frequency. It was stabilized before measurement was made. Chromaticity Coordinates, Correlated Color Temperature and Color Rendering Index were calculated from the spectral radiant flux measurements taken at least 1 nm intervals over the rage of 380 to 780 nm.</p>

Integrating Sphere Test Results:

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.4	41.0	Face Down	90	10

Electrical Data:

Rated CCT (K)	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
3000K	120.0	60	0.1995	22.11	0.9198
4000K	120.0	60	0.1967	21.91	0.925276.16
5000K	120.0	60	0.1992	22.09	0.9201

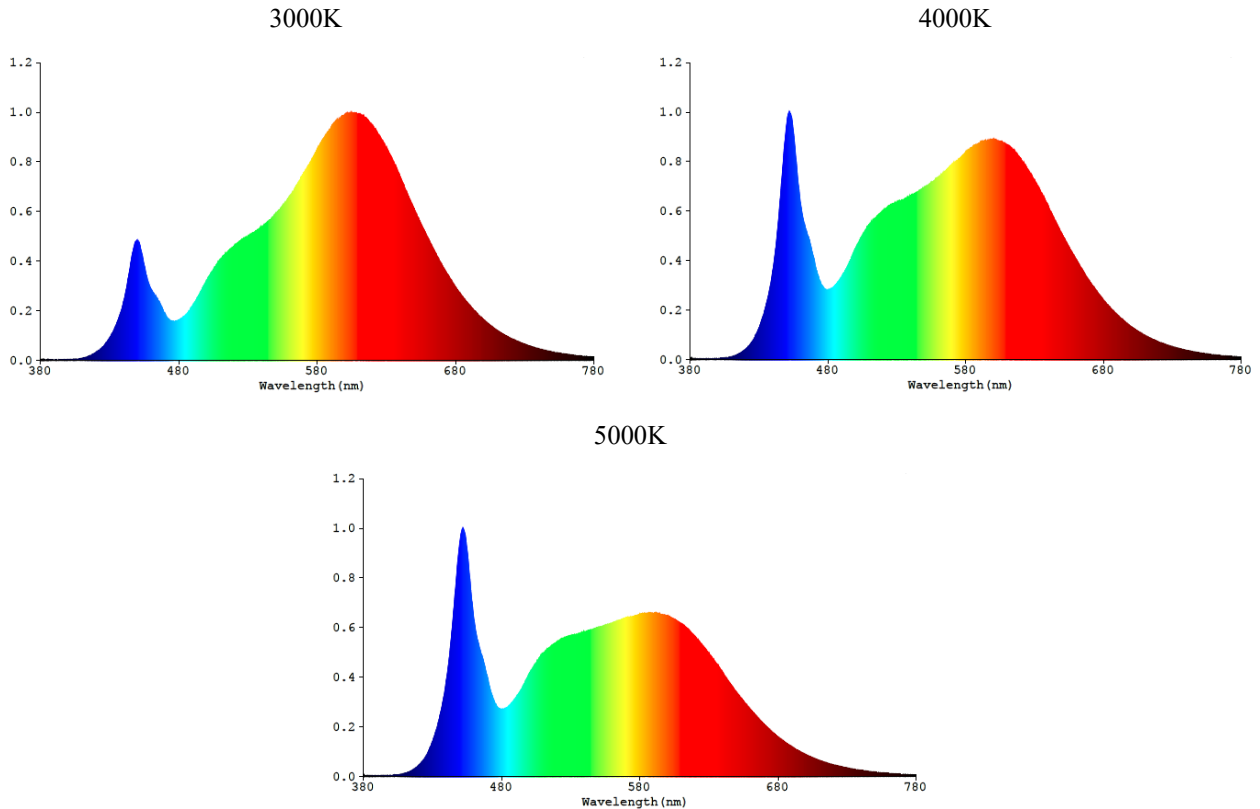
Color Data:

Rated CCT (K)	Test CCT (K)	R _a	R ₉	R _r	R _g	R _{cs, h1}	Chromaticity		
							(x, y)	(u', v')	Duv
3000K	2925	83.9	12	86	97	-11%	(0.4432, 0.4075)	(0.2531, 0.5236)	0.0005
4000K	3924	86.8	25	87	97	-10%	(0.3826, 0.3767)	(0.2265, 0.5019)	-0.0006
5000K	4775	85.4	19	86	96	-11%	(0.3525, 0.3625)	(0.2122, 0.4910)	0.0025a

Output Data:

Rated CCT (K)	Light output (lm)	Efficacy (lm/W)
3000K	1683.9	76.16
4000K	1868.7	85.29
5000K	1814.6	82.15

Spectrum Diagram:



IES TM-30-18 Color Rendition Result (3000K):

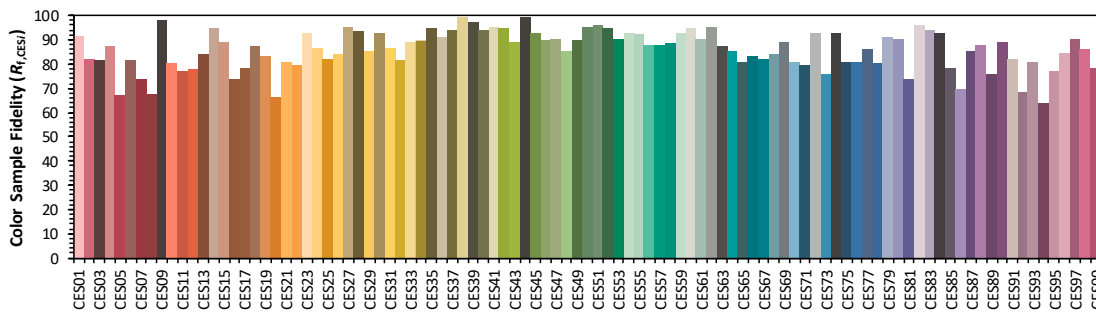
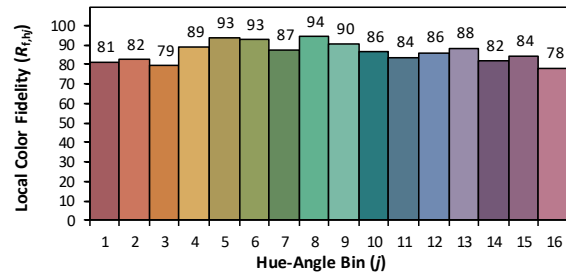
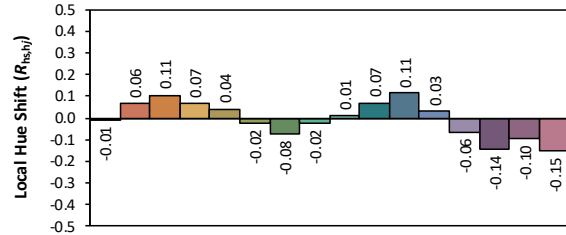
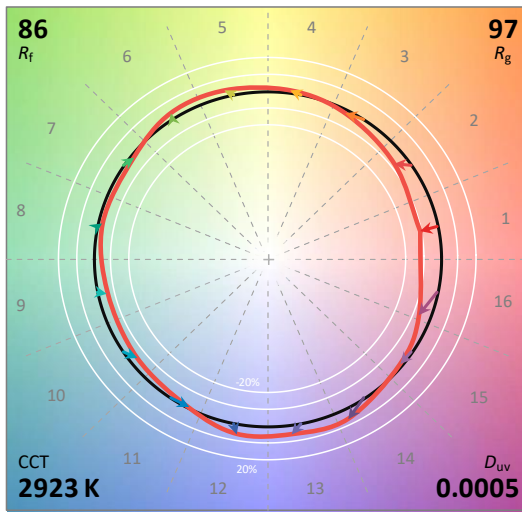
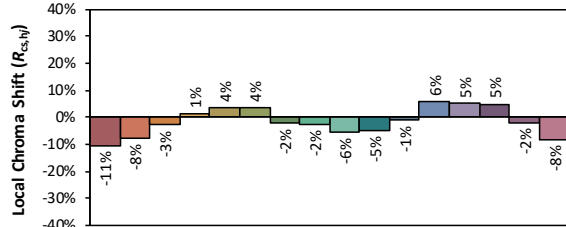
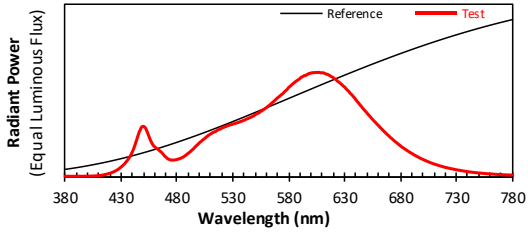
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: ETI Solid State Lighting (2

Date: 2021/1/5

Model: 564111###



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.4432
 y 0.4074
 u' 0.2532
 v' 0.5236

CIE 13.3-1995 (CRI)	
R_a	84
R_9	12

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Spectrum Data (3000K):

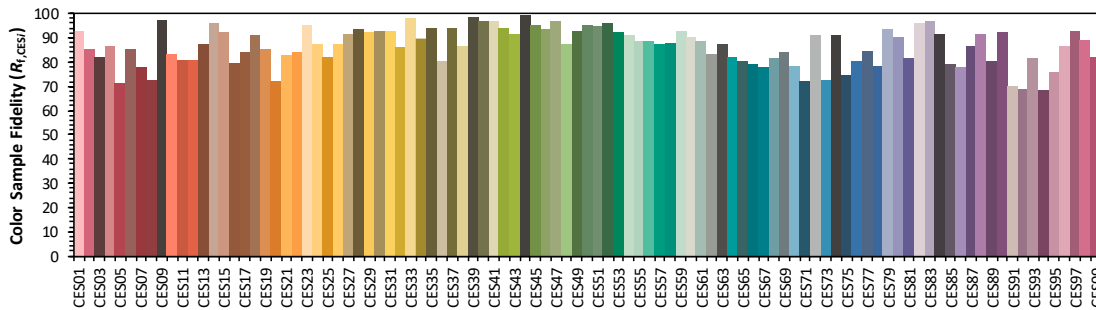
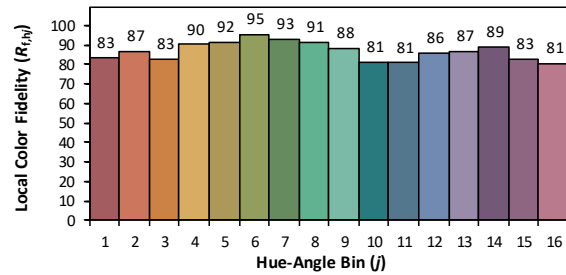
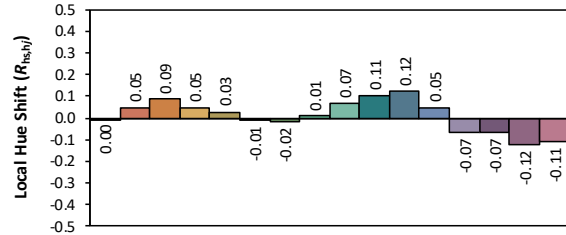
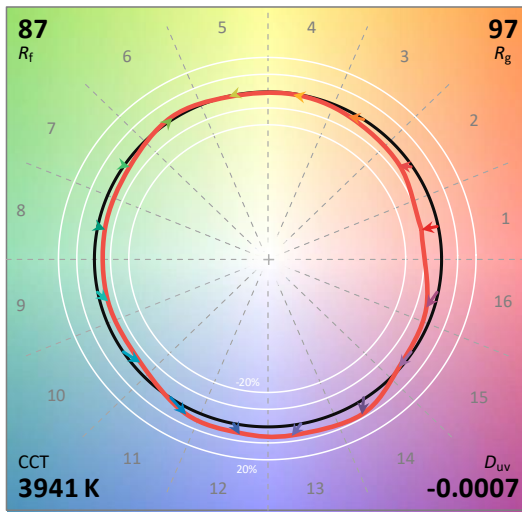
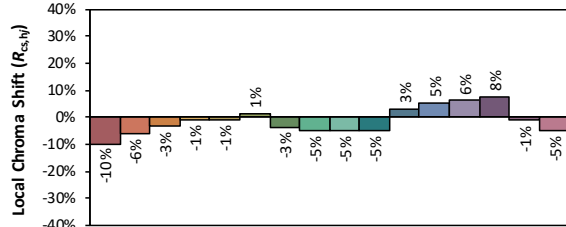
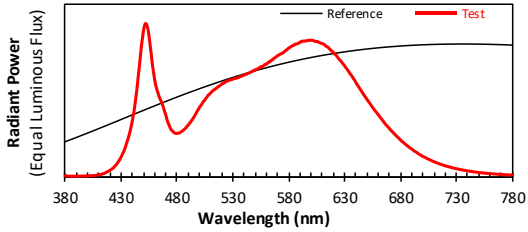
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0024	447	0.4456	514	0.4290	581	0.8615	648	0.6345	715	0.1043
381	0.0029	448	0.4681	515	0.4350	582	0.8708	649	0.6228	716	0.1009
382	0.0024	449	0.4792	516	0.4424	583	0.8803	650	0.6110	717	0.0981
383	0.0033	450	0.4799	517	0.4483	584	0.8901	651	0.5970	718	0.0952
384	0.0026	451	0.4733	518	0.4523	585	0.8978	652	0.5859	719	0.0915
385	0.0023	452	0.4605	519	0.4558	586	0.9079	653	0.5742	720	0.0884
386	0.0023	453	0.4354	520	0.4626	587	0.9152	654	0.5611	721	0.0865
387	0.0026	454	0.4093	521	0.4690	588	0.9220	655	0.5495	722	0.0842
388	0.0023	455	0.3814	522	0.4713	589	0.9304	656	0.5373	723	0.0816
389	0.0027	456	0.3538	523	0.4765	590	0.9370	657	0.5257	724	0.0789
390	0.0024	457	0.3316	524	0.4804	591	0.9487	658	0.5155	725	0.0765
391	0.0023	458	0.3107	525	0.4851	592	0.9533	659	0.5031	726	0.0742
392	0.0029	459	0.2953	526	0.4894	593	0.9600	660	0.4932	727	0.0720
393	0.0033	460	0.2856	527	0.4920	594	0.9666	661	0.4816	728	0.0698
394	0.0023	461	0.2750	528	0.4964	595	0.9664	662	0.4701	729	0.0674
395	0.0022	462	0.2679	529	0.4980	596	0.9740	663	0.4589	730	0.0654
396	0.0028	463	0.2606	530	0.5019	597	0.9783	664	0.4484	731	0.0637
397	0.0036	464	0.2510	531	0.5059	598	0.9860	665	0.4371	732	0.0612
398	0.0033	465	0.2411	532	0.5083	599	0.9869	666	0.4270	733	0.0595
399	0.0029	466	0.2337	533	0.5121	600	0.9915	667	0.4159	734	0.0578
400	0.0037	467	0.2208	534	0.5150	601	0.9935	668	0.4059	735	0.0556
401	0.0040	468	0.2093	535	0.5188	602	0.9950	669	0.3958	736	0.0545
402	0.0039	469	0.1954	536	0.5222	603	0.9949	670	0.3866	737	0.0523
403	0.0043	470	0.1875	537	0.5273	604	0.9965	671	0.3753	738	0.0508
404	0.0044	471	0.1762	538	0.5300	605	0.9962	672	0.3663	739	0.0491
405	0.0053	472	0.1686	539	0.5352	606	0.9965	673	0.3572	740	0.0478
406	0.0057	473	0.1641	540	0.5392	607	0.9978	674	0.3479	741	0.0455
407	0.0064	474	0.1598	541	0.5432	608	0.9952	675	0.3389	742	0.0445
408	0.0071	475	0.1577	542	0.5488	609	0.9925	676	0.3297	743	0.0430
409	0.0082	476	0.1583	543	0.5530	610	0.9937	677	0.3216	744	0.0416
410	0.0092	477	0.1574	544	0.5576	611	0.9933	678	0.3120	745	0.0406
411	0.0103	478	0.1590	545	0.5632	612	0.9887	679	0.3043	746	0.0391
412	0.0114	479	0.1609	546	0.5660	613	0.9843	680	0.2950	747	0.0377
413	0.0136	480	0.1635	547	0.5726	614	0.9803	681	0.2860	748	0.0370
414	0.0150	481	0.1669	548	0.5783	615	0.9780	682	0.2787	749	0.0356
415	0.0180	482	0.1695	549	0.5835	616	0.9711	683	0.2723	750	0.0345
416	0.0201	483	0.1740	550	0.5928	617	0.9657	684	0.2639	751	0.0338
417	0.0227	484	0.1788	551	0.5978	618	0.9580	685	0.2577	752	0.0327
418	0.0258	485	0.1838	552	0.6039	619	0.9535	686	0.2498	753	0.0316
419	0.0287	486	0.1891	553	0.6073	620	0.9464	687	0.2428	754	0.0305
420	0.0321	487	0.1978	554	0.6161	621	0.9371	688	0.2359	755	0.0295
421	0.0351	488	0.2043	555	0.6240	622	0.9318	689	0.2293	756	0.0286
422	0.0402	489	0.2137	556	0.6289	623	0.9208	690	0.2234	757	0.0275
423	0.0437	490	0.2221	557	0.6381	624	0.9110	691	0.2169	758	0.0269
424	0.0495	491	0.2307	558	0.6435	625	0.9047	692	0.2099	759	0.0262
425	0.0549	492	0.2391	559	0.6519	626	0.8949	693	0.2036	760	0.0254
426	0.0606	493	0.2498	560	0.6588	627	0.8862	694	0.1984	761	0.0245
427	0.0675	494	0.2586	561	0.6672	628	0.8767	695	0.1921	762	0.0241
428	0.0747	495	0.2684	562	0.6771	629	0.8652	696	0.1867	763	0.0233
429	0.0831	496	0.2807	563	0.6840	630	0.8587	697	0.1803	764	0.0222
430	0.0919	497	0.2909	564	0.6951	631	0.8463	698	0.1750	765	0.0215
431	0.1011	498	0.3015	565	0.7040	632	0.8335	699	0.1703	766	0.0212
432	0.1110	499	0.3111	566	0.7136	633	0.8238	700	0.1650	767	0.0202
433	0.1206	500	0.3220	567	0.7227	634	0.8133	701	0.1606	768	0.0199
434	0.1348	501	0.3320	568	0.7335	635	0.7990	702	0.1559	769	0.0191
435	0.1475	502	0.3394	569	0.7427	636	0.7889	703	0.1508	770	0.0187
436	0.1615	503	0.3507	570	0.7534	637	0.7778	704	0.1464	771	0.0181
437	0.1773	504	0.3578	571	0.7611	638	0.7646	705	0.1420	772	0.0175
438	0.1935	505	0.3660	572	0.7700	639	0.7527	706	0.1378	773	0.0166
439	0.2137	506	0.3761	573	0.7799	640	0.7383	707	0.1332	774	0.0163
440	0.2362	507	0.3845	574	0.7875	641	0.7249	708	0.1293	775	0.0160
441	0.2621	508	0.3941	575	0.7965	642	0.7123	709	0.1247	776	0.0155
442	0.2898	509	0.3993	576	0.8088	643	0.6992	710	0.1213	777	0.0153
443	0.3235	510	0.4078	577	0.8186	644	0.6848	711	0.1176	778	0.0146
444	0.3545	511	0.4130	578	0.8274	645	0.6738	712	0.1141	779	0.0145
445	0.3894	512	0.4207	579	0.8391	646	0.6592	713	0.1110	780	0.0145
446	0.4210	513	0.4252	580	0.8523	647	0.6464	714	0.1070	N/A	N/A

IES TM-30-18 Color Rendition Result (4000K):

ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1
Date: 2021/1/5

Manufacturer: ETI Solid State Lighting (2
Model: 564111###



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3826
 y 0.3766
 u' 0.2266
 v' 0.5018

CIE 13.3-1995 (CRI)	
R_a	87
R_9	25

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Spectrum Data (4000K):

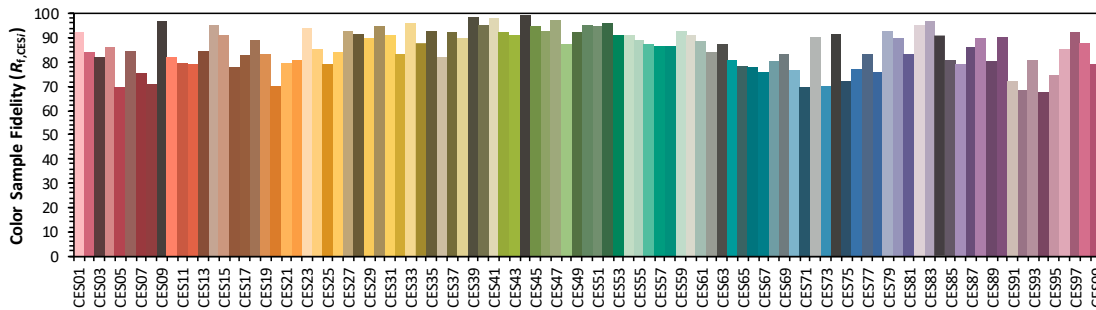
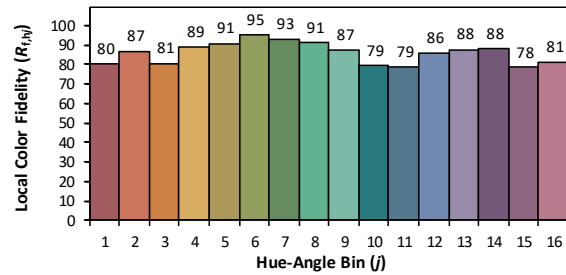
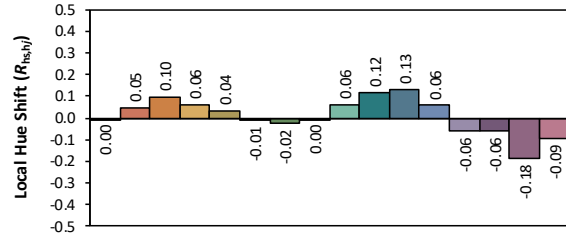
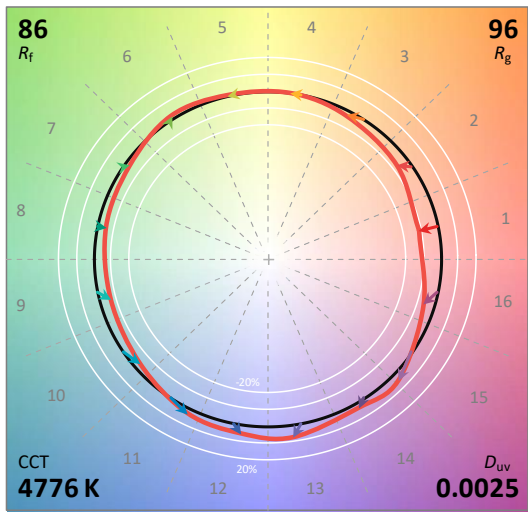
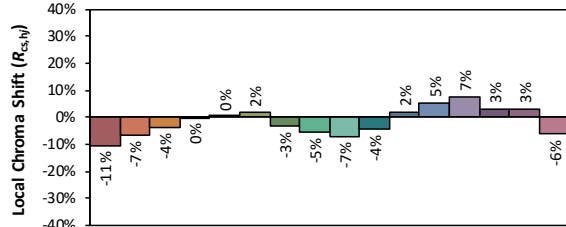
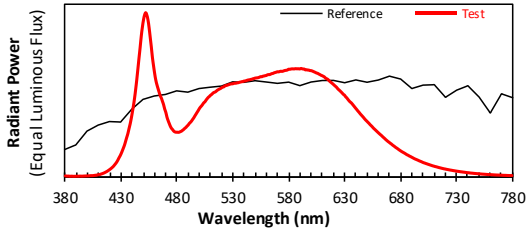
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0059	447	0.7708	514	0.5704	581	0.8425	648	0.5274	715	0.0844
381	0.0063	448	0.8430	515	0.5754	582	0.8480	649	0.5161	716	0.0815
382	0.0044	449	0.9000	516	0.5822	583	0.8522	650	0.5065	717	0.0792
383	0.0041	450	0.9522	517	0.5876	584	0.8562	651	0.4955	718	0.0769
384	0.0035	451	0.9875	518	0.5925	585	0.8585	652	0.4858	719	0.0747
385	0.0038	452	1.0000	519	0.5974	586	0.8651	653	0.4754	720	0.0716
386	0.0028	453	0.9873	520	0.6021	587	0.8658	654	0.4648	721	0.0694
387	0.0043	454	0.9620	521	0.6093	588	0.8680	655	0.4547	722	0.0683
388	0.0033	455	0.9143	522	0.6106	589	0.8723	656	0.4438	723	0.0661
389	0.0033	456	0.8550	523	0.6157	590	0.8738	657	0.4339	724	0.0638
390	0.0033	457	0.7948	524	0.6217	591	0.8817	658	0.4251	725	0.0620
391	0.0037	458	0.7294	525	0.6242	592	0.8825	659	0.4164	726	0.0594
392	0.0035	459	0.6811	526	0.6262	593	0.8841	660	0.4065	727	0.0581
393	0.0041	460	0.6324	527	0.6296	594	0.8856	661	0.3966	728	0.0564
394	0.0040	461	0.5954	528	0.6321	595	0.8839	662	0.3876	729	0.0545
395	0.0044	462	0.5679	529	0.6345	596	0.8867	663	0.3775	730	0.0528
396	0.0046	463	0.5459	530	0.6360	597	0.8878	664	0.3693	731	0.0513
397	0.0044	464	0.5227	531	0.6397	598	0.8899	665	0.3596	732	0.0497
398	0.0053	465	0.5050	532	0.6430	599	0.8888	666	0.3494	733	0.0483
399	0.0052	466	0.4896	533	0.6416	600	0.8900	667	0.3401	734	0.0468
400	0.0055	467	0.4708	534	0.6451	601	0.8897	668	0.3322	735	0.0452
401	0.0058	468	0.4479	535	0.6468	602	0.8885	669	0.3242	736	0.0436
402	0.0070	469	0.4230	536	0.6505	603	0.8842	670	0.3167	737	0.0423
403	0.0067	470	0.4021	537	0.6539	604	0.8827	671	0.3077	738	0.0413
404	0.0066	471	0.3729	538	0.6578	605	0.8815	672	0.3000	739	0.0397
405	0.0070	472	0.3523	539	0.6587	606	0.8813	673	0.2926	740	0.0382
406	0.0084	473	0.3355	540	0.6630	607	0.8769	674	0.2848	741	0.0370
407	0.0081	474	0.3173	541	0.6669	608	0.8739	675	0.2782	742	0.0363
408	0.0102	475	0.3045	542	0.6677	609	0.8707	676	0.2694	743	0.0350
409	0.0113	476	0.2974	543	0.6716	610	0.8685	677	0.2624	744	0.0338
410	0.0124	477	0.2898	544	0.6752	611	0.8656	678	0.2556	745	0.0327
411	0.0134	478	0.2850	545	0.6775	612	0.8616	679	0.2495	746	0.0317
412	0.0157	479	0.2818	546	0.6818	613	0.8542	680	0.2404	747	0.0309
413	0.0176	480	0.2829	547	0.6854	614	0.8487	681	0.2341	748	0.0298
414	0.0201	481	0.2837	548	0.6891	615	0.8462	682	0.2276	749	0.0289
415	0.0228	482	0.2862	549	0.6929	616	0.8385	683	0.2221	750	0.0276
416	0.0260	483	0.2892	550	0.6969	617	0.8309	684	0.2153	751	0.0271
417	0.0297	484	0.2938	551	0.6992	618	0.8233	685	0.2098	752	0.0264
418	0.0336	485	0.2997	552	0.7030	619	0.8170	686	0.2033	753	0.0256
419	0.0376	486	0.3051	553	0.7064	620	0.8109	687	0.1982	754	0.0248
420	0.0421	487	0.3126	554	0.7112	621	0.8010	688	0.1925	755	0.0241
421	0.0468	488	0.3190	555	0.7170	622	0.7958	689	0.1869	756	0.0235
422	0.0525	489	0.3284	556	0.7169	623	0.7878	690	0.1819	757	0.0224
423	0.0581	490	0.3366	557	0.7211	624	0.7777	691	0.1768	758	0.0217
424	0.0660	491	0.3466	558	0.7283	625	0.7677	692	0.1708	759	0.0211
425	0.0735	492	0.3547	559	0.7323	626	0.7602	693	0.1658	760	0.0206
426	0.0821	493	0.3656	560	0.7332	627	0.7520	694	0.1615	761	0.0200
427	0.0932	494	0.3764	561	0.7404	628	0.7431	695	0.1566	762	0.0192
428	0.1043	495	0.3867	562	0.7470	629	0.7324	696	0.1514	763	0.0188
429	0.1159	496	0.3996	563	0.7481	630	0.7252	697	0.1469	764	0.0182
430	0.1294	497	0.4120	564	0.7565	631	0.7138	698	0.1426	765	0.0175
431	0.1449	498	0.4267	565	0.7605	632	0.7041	699	0.1380	766	0.0170
432	0.1611	499	0.4378	566	0.7659	633	0.6936	700	0.1335	767	0.0165
433	0.1770	500	0.4511	567	0.7727	634	0.6833	701	0.1303	768	0.0158
434	0.1984	501	0.4614	568	0.7772	635	0.6718	702	0.1266	769	0.0157
435	0.2222	502	0.4709	569	0.7827	636	0.6626	703	0.1228	770	0.0150
436	0.2433	503	0.4824	570	0.7893	637	0.6527	704	0.1186	771	0.0144
437	0.2694	504	0.4931	571	0.7920	638	0.6405	705	0.1153	772	0.0141
438	0.2970	505	0.5007	572	0.7976	639	0.6308	706	0.1116	773	0.0141
439	0.3287	506	0.5123	573	0.8015	640	0.6186	707	0.1088	774	0.0132
440	0.3649	507	0.5218	574	0.8040	641	0.6044	708	0.1051	775	0.0128
441	0.4066	508	0.5317	575	0.8081	642	0.5948	709	0.1017	776	0.0124
442	0.4520	509	0.5379	576	0.8146	643	0.5826	710	0.0987	777	0.0123
443	0.5073	510	0.5456	577	0.8198	644	0.5715	711	0.0952	778	0.0115
444	0.5651	511	0.5526	578	0.8267	645	0.5606	712	0.0930	779	0.0114
445	0.6342	512	0.5609	579	0.8314	646	0.5496	713	0.0898	780	0.0115
446	0.7024	513	0.5663	580	0.8391	647	0.5381	714	0.0872	N/A	N/A

IES TM-30-18 Color Rendition Result (5000K):

ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1
Date: 2021/1/5

Manufacturer: ETI Solid State Lighting (2
Model: 564111###



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3524
 y 0.3623
 u' 0.2122
 v' 0.4909

CIE 13.3-1995 (CRI)	
R_a	85
R_g	20

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

Spectrum Data (5000K):

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0058	447	0.7893	514	0.5164	581	0.6552	648	0.3538	715	0.0560
381	0.0050	448	0.8575	515	0.5209	582	0.6568	649	0.3461	716	0.0544
382	0.0044	449	0.9120	516	0.5271	583	0.6579	650	0.3395	717	0.0525
383	0.0047	450	0.9567	517	0.5311	584	0.6577	651	0.3324	718	0.0509
384	0.0034	451	0.9866	518	0.5352	585	0.6575	652	0.3257	719	0.0492
385	0.0039	452	1.0000	519	0.5382	586	0.6589	653	0.3178	720	0.0480
386	0.0040	453	0.9850	520	0.5431	587	0.6584	654	0.3113	721	0.0464
387	0.0033	454	0.9565	521	0.5469	588	0.6583	655	0.3042	722	0.0451
388	0.0034	455	0.9091	522	0.5486	589	0.6583	656	0.2965	723	0.0438
389	0.0036	456	0.8508	523	0.5547	590	0.6573	657	0.2902	724	0.0424
390	0.0039	457	0.7912	524	0.5563	591	0.6602	658	0.2837	725	0.0411
391	0.0040	458	0.7268	525	0.5585	592	0.6585	659	0.2773	726	0.0401
392	0.0038	459	0.6763	526	0.5609	593	0.6569	660	0.2708	727	0.0386
393	0.0045	460	0.6292	527	0.5633	594	0.6566	661	0.2645	728	0.0376
394	0.0043	461	0.5898	528	0.5655	595	0.6515	662	0.2583	729	0.0364
395	0.0041	462	0.5616	529	0.5666	596	0.6526	663	0.2527	730	0.0352
396	0.0046	463	0.5383	530	0.5670	597	0.6508	664	0.2460	731	0.0342
397	0.0051	464	0.5158	531	0.5698	598	0.6504	665	0.2396	732	0.0332
398	0.0053	465	0.4943	532	0.5702	599	0.6477	666	0.2338	733	0.0323
399	0.0056	466	0.4796	533	0.5709	600	0.6471	667	0.2269	734	0.0310
400	0.0057	467	0.4597	534	0.5727	601	0.6452	668	0.2213	735	0.0304
401	0.0060	468	0.4395	535	0.5737	602	0.6421	669	0.2153	736	0.0293
402	0.0068	469	0.4124	536	0.5763	603	0.6391	670	0.2104	737	0.0285
403	0.0073	470	0.3930	537	0.5776	604	0.6360	671	0.2048	738	0.0276
404	0.0072	471	0.3642	538	0.5797	605	0.6325	672	0.2002	739	0.0265
405	0.0078	472	0.3437	539	0.5807	606	0.6306	673	0.1941	740	0.0257
406	0.0088	473	0.3260	540	0.5833	607	0.6264	674	0.1892	741	0.0251
407	0.0098	474	0.3091	541	0.5841	608	0.6232	675	0.1842	742	0.0242
408	0.0106	475	0.2963	542	0.5862	609	0.6190	676	0.1786	743	0.0231
409	0.0119	476	0.2885	543	0.5887	610	0.6163	677	0.1745	744	0.0226
410	0.0134	477	0.2794	544	0.5904	611	0.6126	678	0.1694	745	0.0220
411	0.0146	478	0.2743	545	0.5913	612	0.6088	679	0.1643	746	0.0211
412	0.0170	479	0.2720	546	0.5933	613	0.6018	680	0.1598	747	0.0206
413	0.0193	480	0.2720	547	0.5947	614	0.5979	681	0.1552	748	0.0199
414	0.0220	481	0.2713	548	0.5974	615	0.5941	682	0.1512	749	0.0194
415	0.0249	482	0.2722	549	0.5991	616	0.5875	683	0.1473	750	0.0187
416	0.0285	483	0.2754	550	0.6015	617	0.5808	684	0.1435	751	0.0181
417	0.0321	484	0.2783	551	0.6025	618	0.5753	685	0.1390	752	0.0176
418	0.0364	485	0.2838	552	0.6034	619	0.5696	686	0.1346	753	0.0169
419	0.0411	486	0.2888	553	0.6048	620	0.5638	687	0.1316	754	0.0165
420	0.0461	487	0.2958	554	0.6076	621	0.5573	688	0.1273	755	0.0160
421	0.0513	488	0.3011	555	0.6104	622	0.5514	689	0.1242	756	0.0156
422	0.0574	489	0.3091	556	0.6099	623	0.5450	690	0.1205	757	0.0150
423	0.0637	490	0.3156	557	0.6132	624	0.5366	691	0.1169	758	0.0146
424	0.0721	491	0.3251	558	0.6145	625	0.5301	692	0.1130	759	0.0140
425	0.0805	492	0.3320	559	0.6164	626	0.5240	693	0.1096	760	0.0137
426	0.0901	493	0.3398	560	0.6177	627	0.5172	694	0.1067	761	0.0133
427	0.1017	494	0.3500	561	0.6214	628	0.5103	695	0.1038	762	0.0130
428	0.1153	495	0.3593	562	0.6229	629	0.5026	696	0.1008	763	0.0125
429	0.1275	496	0.3710	563	0.6231	630	0.4978	697	0.0975	764	0.0120
430	0.1418	497	0.3818	564	0.6260	631	0.4884	698	0.0947	765	0.0117
431	0.1584	498	0.3931	565	0.6290	632	0.4817	699	0.0920	766	0.0113
432	0.1759	499	0.4036	566	0.6302	633	0.4729	700	0.0887	767	0.0111
433	0.1940	500	0.4154	567	0.6338	634	0.4644	701	0.0859	768	0.0108
434	0.2174	501	0.4250	568	0.6357	635	0.4569	702	0.0837	769	0.0104
435	0.2409	502	0.4325	569	0.6378	636	0.4515	703	0.0811	770	0.0102
436	0.2635	503	0.4416	570	0.6402	637	0.4437	704	0.0789	771	0.0099
437	0.2929	504	0.4513	571	0.6395	638	0.4353	705	0.0764	772	0.0095
438	0.3213	505	0.4570	572	0.6417	639	0.4267	706	0.0742	773	0.0092
439	0.3546	506	0.4673	573	0.6433	640	0.4182	707	0.0718	774	0.0091
440	0.3933	507	0.4760	574	0.6426	641	0.4100	708	0.0695	775	0.0088
441	0.4335	508	0.4841	575	0.6439	642	0.4013	709	0.0672	776	0.0084
442	0.4798	509	0.4899	576	0.6466	643	0.3937	710	0.0654	777	0.0082
443	0.5341	510	0.4970	577	0.6484	644	0.3850	711	0.0632	778	0.0079
444	0.5937	511	0.5019	578	0.6493	645	0.3773	712	0.0617	779	0.0079
445	0.6593	512	0.5086	579	0.6514	646	0.3699	713	0.0598	780	0.0079
446	0.7252	513	0.5139	580	0.6557	647	0.3621	714	0.0578	N/A	N/A

Goniophotometer Test Results (Test for 3000K):

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.4	42.8	Face Down	90	25

Electrical Data:

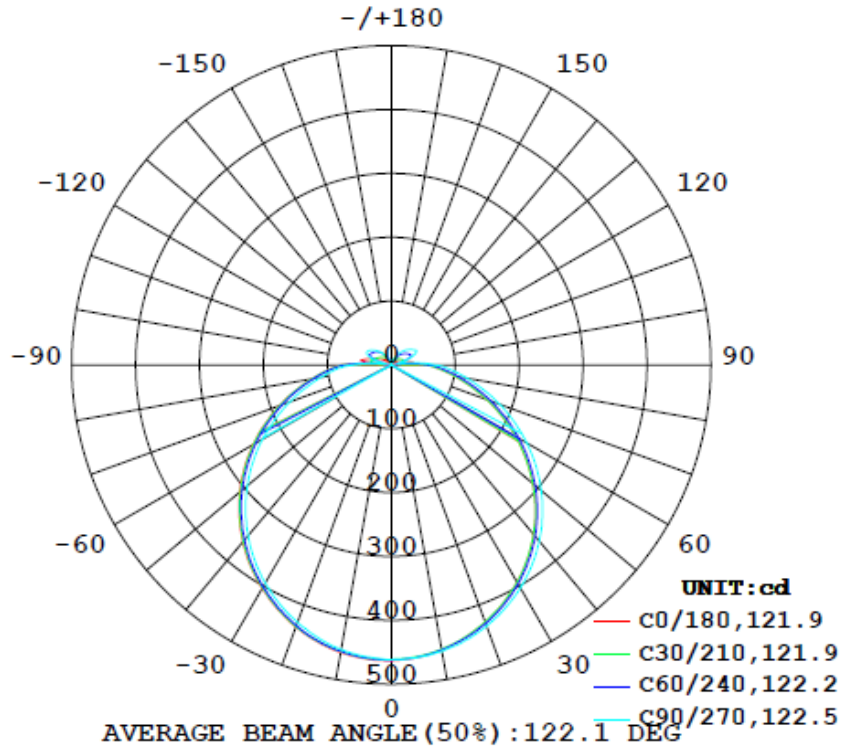
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60	0.1995	22.11	0.9198

Goniophotometer Data:

Parameter	Results
Total Luminous (lm)	1683.9
Luminous Efficacy (lm/w)	76.16
Zonal Lumens Distribution (0-60°)	64.8
Beam Angle (°)	122.1

Luminous Intensity Distribution Diagram:

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM

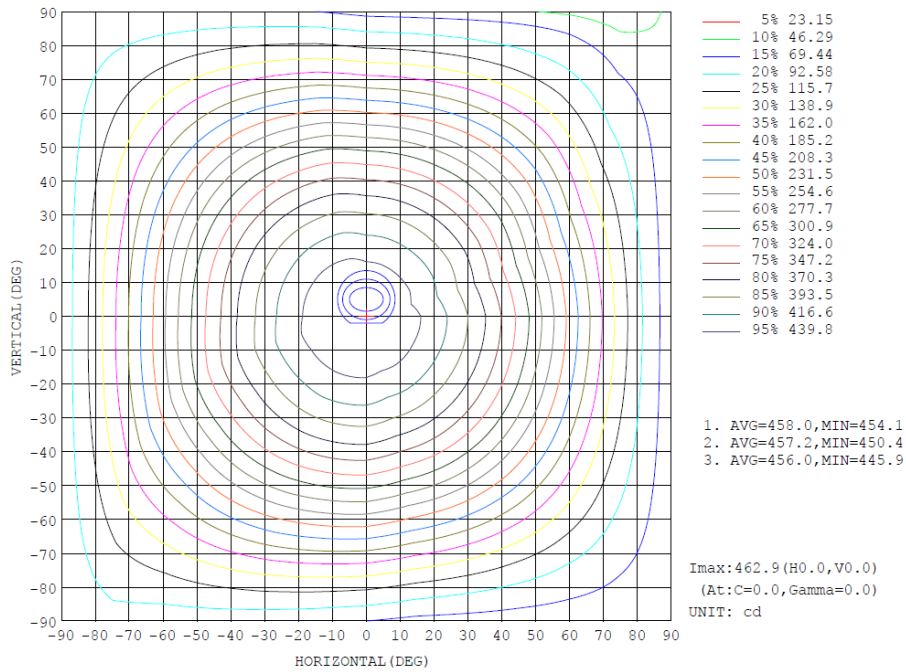


Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	φ zone	φ total	%lum, lamp
10	452.9	453.1	455.5	455.4	456.9	455.3	452.2	450.3	0- 10	43.66	43.66	2.59,2.59
20	428.9	429.5	435.0	436.7	436.9	435.7	429.0	426.1	10- 20	125.5	169.2	10,10
30	393.4	394.2	403.4	405.4	404.2	402.6	394.7	390.3	20- 30	192.1	361.3	21.5,21.5
40	346.3	347.7	360.1	363.5	361.5	359.0	348.9	343.8	30- 40	236.2	597.5	35.5,35.5
50	288.9	291.1	306.2	312.0	309.5	306.5	294.5	287.7	40- 50	252.8	850.3	50.5,50.5
60	225.2	227.3	244.7	252.7	249.7	247.6	232.9	225.1	50- 60	240.9	1091	64.8,64.8
70	159.5	162.1	180.5	189.7	186.0	184.2	169.2	161.1	60- 70	204.0	1295	76.9,76.9
80	100.4	103.3	120.0	130.3	126.5	125.4	112.0	103.9	70- 80	151.9	1447	85.9,85.9
90	51.74	56.58	69.61	78.84	77.38	74.69	61.38	50.30	80- 90	98.73	1546	91.8,91.8
100	31.16	11.33	15.60	15.48	46.56	16.70	8.201	17.11	90-100	34.70	1581	93.9,93.9
110	18.63	24.90	28.73	27.62	29.37	30.09	35.50	24.46	100-110	22.97	1604	95.2,95.2
120	13.11	24.85	45.43	28.70	18.71	28.82	43.00	22.39	110-120	27.70	1631	96.9,96.9
130	9.372	21.48	37.75	25.90	11.89	25.74	35.96	20.12	120-130	22.96	1654	98.2,98.2
140	5.382	16.45	28.66	20.95	9.878	20.52	25.97	15.38	130-140	16.25	1670	99.2,99.2
150	5.131	10.60	18.25	14.28	6.645	13.19	14.71	10.02	140-150	9.068	1680	99.7,99.7
160	2.152	3.989	7.484	6.118	2.862	3.648	4.854	3.830	150-160	3.625	1683	100,100
170	0.7623	1.006	1.681	1.295	1.505	1.250	1.592	1.161	160-170	0.7078	1684	100,100
180	0.6561	0.6322	0.5803	0.6646	0.6456	0.6428	0.6179	0.6217	170-180	0.0898	1684	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

Isocandela Diagram:



Luminous Distribution Intensity Data:

Table--1 UNIT: cd

C (DEG) Y (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270
0	463	462	462	462	462	461	461	461	461	461	460	459	463	462	462	462	462	461	461
5	460	459	459	459	460	458	460	460	460	460	460	460	461	461	461	461	460	460	458
10	453	453	452	453	453	453	455	455	456	455	456	456	457	457	455	455	455	454	452
15	443	442	442	443	444	444	447	447	448	448	448	450	448	448	447	448	447	446	442
20	429	429	429	430	431	431	435	436	437	437	437	439	437	437	436	436	435	434	429
25	413	413	412	414	415	416	421	421	422	422	423	425	422	421	421	420	419	418	414
30	393	393	393	394	396	397	403	404	405	405	406	409	404	404	403	403	402	400	395
35	371	371	371	372	374	376	383	384	386	385	386	390	384	384	383	382	381	379	373
40	346	346	347	348	350	352	360	362	363	364	364	368	362	361	360	359	357	356	349
45	319	319	319	321	323	325	334	336	338	339	340	344	337	336	335	334	332	331	323
50	289	289	289	291	294	297	306	308	311	312	313	318	310	309	308	307	305	303	295
55	258	257	257	260	263	266	276	279	282	283	284	290	280	280	279	278	276	273	264
60	225	225	225	227	231	234	245	248	251	253	254	260	250	250	249	248	245	242	233
65	192	192	192	194	198	202	213	216	220	221	222	228	218	218	217	215	213	210	201
70	160	159	160	162	166	170	181	185	188	190	191	197	186	186	185	184	182	179	169
75	129	128	129	131	135	139	149	154	157	159	160	165	155	155	155	154	152	148	139
80	100	99.7	100	103	107	111	120	125	129	130	131	136	127	127	126	125	123	120	112
85	76.5	75.8	76.9	79.3	83.0	86.9	94.8	99.4	103	104	105	109	101	101	100	99.8	98.2	95.6	88.5
90	51.7	52.6	54.2	56.6	59.0	61.7	69.6	73.4	76.8	78.8	79.6	85.1	77.4	77.6	75.5	74.7	72.5	69.8	61.4
95	21.8	10.1	10.7	19.1	28.7	34.5	41.9	42.3	38.6	28.0	14.2	14.3	8.92	7.95	12.0	23.1	33.5	37.6	31.4
100	31.2	24.2	22.2	11.3	9.01	10.9	15.6	13.7	11.4	15.5	35.1	38.9	46.6	36.6	33.8	16.7	6.35	8.67	8.20
105	24.0	17.8	19.3	18.4	15.4	14.1	11.9	13.0	15.9	24.0	29.7	29.3	37.4	28.3	30.2	26.4	18.8	15.0	20.0
110	18.6	14.5	19.4	24.9	26.5	28.8	28.7	29.2	26.9	27.6	26.4	22.8	29.4	22.4	27.2	30.1	30.5	32.4	35.5
115	15.1	12.9	19.4	25.6	34.7	39.3	40.4	41.1	38.0	29.1	24.5	18.4	23.2	18.5	25.4	29.7	38.0	44.3	43.0
120	13.1	11.9	18.2	24.8	33.3	41.1	45.4	44.6	37.9	28.7	22.7	15.7	18.7	15.9	23.2	28.8	36.6	43.5	43.0
125	7.72	11.1	16.8	23.2	30.9	37.7	41.7	41.2	35.8	27.9	20.9	13.5	10.1	14.2	21.5	27.7	34.8	40.6	40.2
130	9.37	11.1	15.0	21.5	27.9	34.0	37.8	37.4	33.0	25.9	19.1	13.1	11.9	14.4	19.6	25.7	32.1	37.0	36.0
135	8.93	8.94	13.8	19.2	24.8	29.9	33.3	33.2	29.8	23.7	17.4	13.1	11.7	13.4	17.7	23.5	29.0	32.5	31.2
140	5.38	6.38	11.8	16.4	21.3	25.5	28.7	28.7	26.0	20.9	15.6	9.22	9.88	9.21	15.8	20.5	25.2	27.5	26.0
145	3.36	4.12	9.97	13.7	17.5	20.7	23.6	23.8	21.6	17.8	13.3	5.85	3.69	5.12	13.2	17.1	20.7	22.2	20.4
150	5.13	3.33	7.63	10.6	13.4	15.7	18.3	18.4	17.1	14.3	10.6	4.47	6.64	4.68	9.80	13.2	15.7	16.5	14.7
155	3.59	2.76	4.60	7.40	9.30	10.7	12.7	13.0	12.2	10.3	6.82	3.84	4.57	4.04	4.76	8.67	10.4	10.8	9.40
160	2.15	2.07	2.44	3.99	5.30	6.01	7.48	7.68	7.24	6.12	3.09	3.18	2.86	2.48	2.43	3.65	5.19	5.53	4.85
165	1.30	1.29	1.46	1.85	2.32	2.66	3.24	3.24	3.04	2.30	1.91	2.18	2.08	1.94	1.65	1.66	2.14	2.63	2.59
170	0.76	0.82	0.78	1.01	1.25	1.48	1.68	1.57	1.44	1.30	1.32	1.50	1.50	1.50	1.22	1.25	1.43	1.58	1.59
175	0.58	0.57	0.61	0.62	0.60	0.59	0.86	0.88	0.89	0.80	0.85	0.99	0.78	0.79	0.94	1.01	0.98	0.91	0.70
180	0.66	0.63	0.67	0.63	0.65	0.62	0.58	0.63	0.65	0.66	0.59	0.69	0.65	0.64	0.64	0.64	0.64	0.63	0.62

Table--2 UNIT: cd

C (DEG) Y (DEG)	285	300	315	330	345														
0	461	461	461	460	459														
5	458	458	457	456	456														
10	452	451	450	450	447														
15	442	441	440	439	436														
20	429	427	426	425	422														
25	412	411	409	409	405														
30	394	392	390	389	384														
35	372	370	368	367	362														
40	348	346	344	342	336														
45	321	319	317	315	308														
50	292	290	288	286	278														
55	262	260	257	255	247														
60	231	228	225	222	213														
65	198	196	193	190	181														
70	167	164	161	158	149														
75	137	134	131	127	119														
80	110	107	104	100	92.4														
85	86.7	84.1	80.7	76.6	70.0														
90	59.0	55.7	50.3	40.2	24.6														
95	28.0	20.6	11.3	18.7	28.1														
100	6.48	8.38	17.1	24.5	22.4														
105	18.5	20.0	22.7	20.7	16.6														
110	33.5	30.7	24.5	19.1	13.3														
115	39.4	31.2	23.7	17.7	11.7														
120	38.2	30.4	22.4	16.3	10.9														
125	35.6	28.7	21.3	15.5	9.51														
130	32.1	26.2	20.1	14.4	10.5														
135	28.3	23.3	18.0	13.4	7.37														
140	23.7	19.9	15.4	11.6	4.65														
145	18.7	16.1	12.9	9.91	4.45														
150	14.1	12.3	10.0	7.67	3.58														
155	9.18	8.25	7.09	4.72	2.71														
160	4.95	4.56	3.83	2.47	1.73														
165	2.57	2.49	2.02	1.53	1.06														
170	1.53	1.43	1.16	0.84	0.66														
175	0.67	0.65	0.65	0.65	0.66														
180	0.62	0.61	0.62	0.63	0.65														

Photo of Sample:



Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2020-11-12	2021-11-11
NTC-F01-006	2.0 meter Integrating Sphere	2020-11-12	2021-11-11
NTC-F01-012	Standard Lamp	2020-11-12	2021-11-11
NTC-F01-013	Standard Lamp	2020-11-12	2021-11-11
NTC-F01-031	Digital Power Meter	2020-08-22	2021-08-21
NTC-F01-019	Temperature & Humidity Meter	2020-11-13	2021-11-12

*****End of Report*****