

## 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):

564101###

Representative (Tested) Model:

564101110

#### 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: 2021-02-22

- 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:	564101### (###=110-309)
Product Type:	Indoor, LED Light Engine
Rating Input:	120Vac, 60Hz, 14W
Declared CCT:	3000/4000/5000K
Declared Light Output:	1000 lm
LED Manufacturer:	Samsung
LED Model:	SPMWH1228FD5XXVXXX and SPMWH1228FD5XXRXXX
LED Quantity:	SPMWH1228FD5XXVXXX: 45 pcs SPMWH1228FD5XXRXXX: 45 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:	201110004-S1~S3

**Laboratory Information:**

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

**Report Information:**

Issued Date of Test Report:	2021-01-31
Revised Date of Test Report:	2021-02-22
Test Report No.:	NTCLR20120227-R1
Remark (If applicable):	Revision 1 (2021-02-22) 1. Corrected Quantity of LED.

<b>Test Specification:</b>	
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

<b>Test Methods:</b>
<p><b>1. Photometric and Electrical Measurements – Light Distribution Method:</b></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><b>2. Photometric and Electrical Measurements – Integrating Sphere Method:</b></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	0.1215	13.83	0.9441
4000K	120.0	60	0.1209	13.75	0.9439
5000K	120.0	60	0.1228	13.93	0.9415

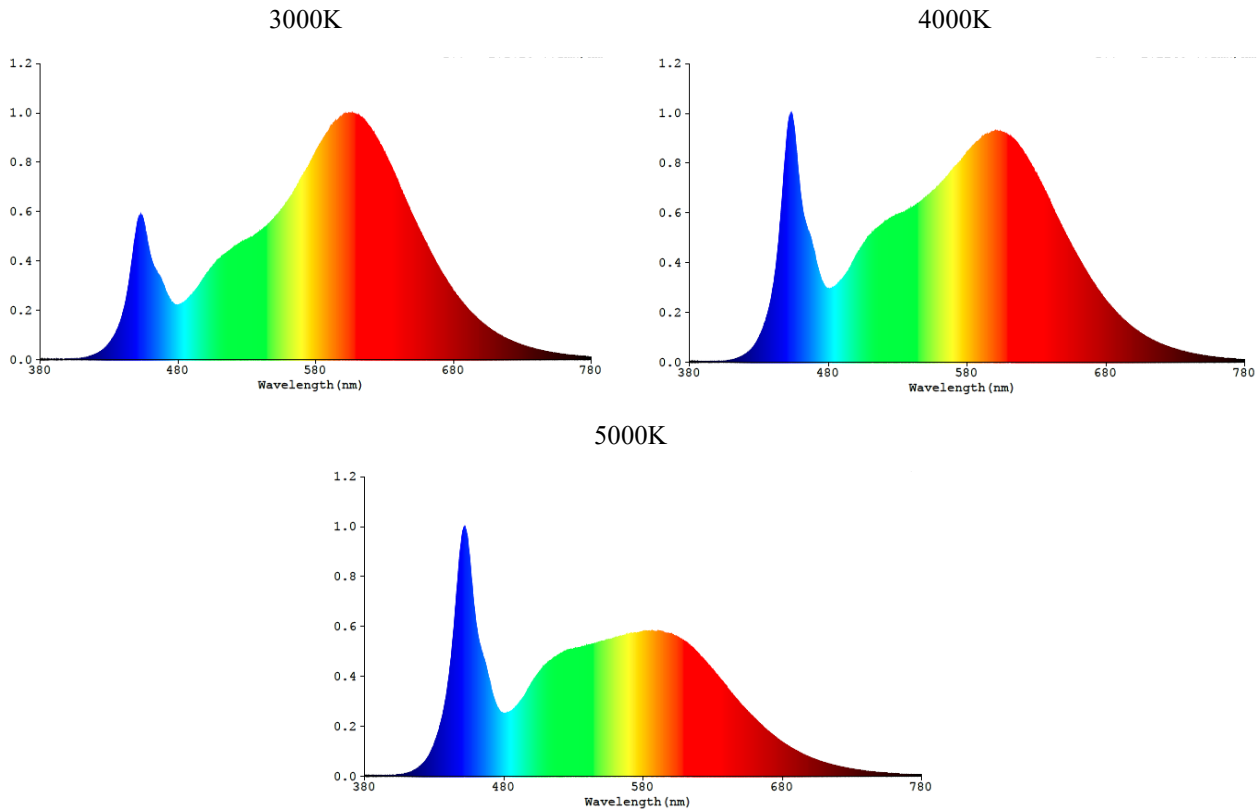
**Color Data:**

Rated CCT (K)	Test CCT (K)	R <sub>a</sub>	R <sub>9</sub>	R <sub>f</sub>	R <sub>g</sub>	R <sub>cs, h1</sub>	Chromaticity		
							(x, y)	(u', v')	Duv
3000K	2996	84.7	15	86	96	-10%	(0.4333, 0.3961)	(0.2517, 0.5176)	-0.0027
4000K	3722	87.3	27	87	97	-10%	(0.3902, 0.3743)	(0.2326, 0.5020)	-0.0038
5000K	5037	85.5	19	85	97	-11%	(0.3443, 0.3533)	(0.2102, 0.4854)	0.0012

**Output Data:**

Rated CCT (K)	Light output (lm)	Efficacy (lm/W)
3000K	1066.5	77.11
4000K	1161.2	84.45
5000K	1158.9	83.19

**Spectrum Diagram:**



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

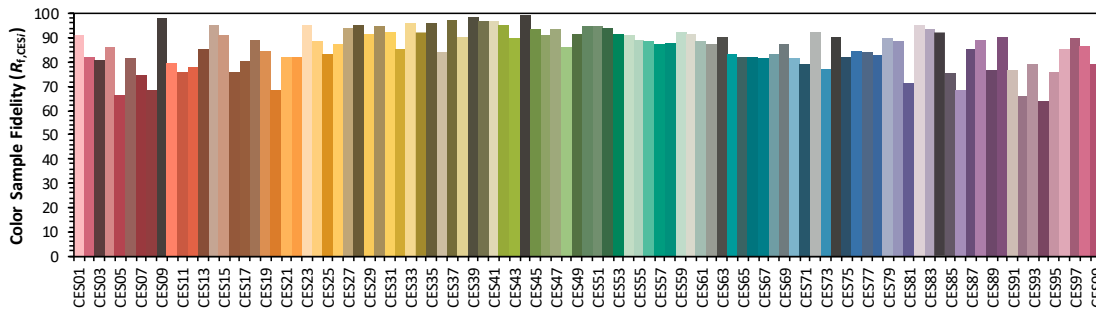
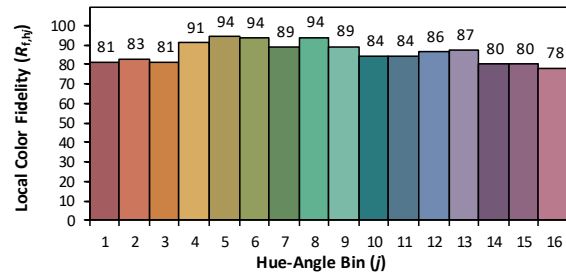
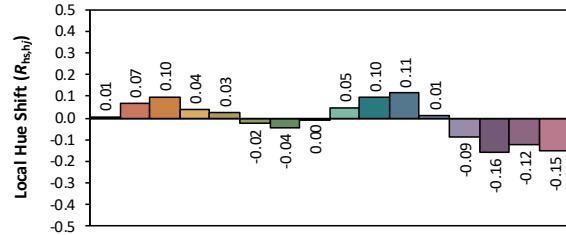
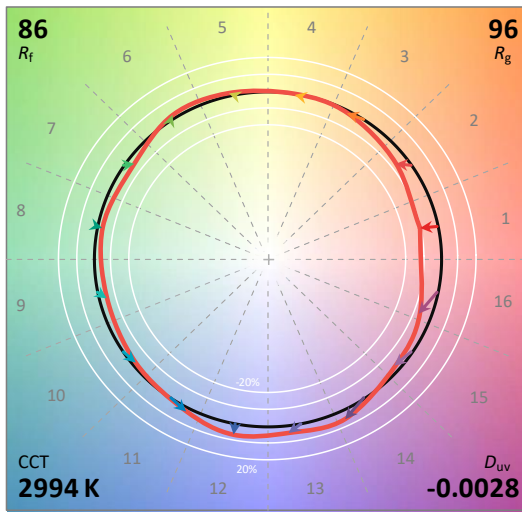
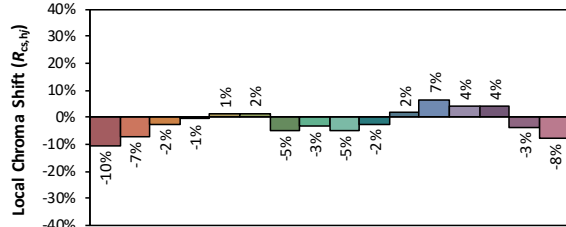
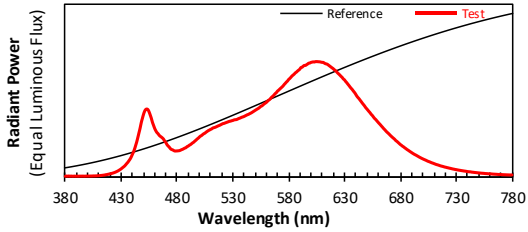
**ANSI/IES TM-30-18 Color Rendition Report**

Source: 1 CIE F1

Manufacturer: ETI Solid State Lighting (2

Date: 2021/1/6

Model: 564101###



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

$x$  0.4333  
 $y$  0.3959  
 $u'$  0.2518  
 $v'$  0.5176

CIE 13.3-1995 (CRI)	
$R_a$	85
$R_9$	15

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

**Spectrum Data (3000K):**

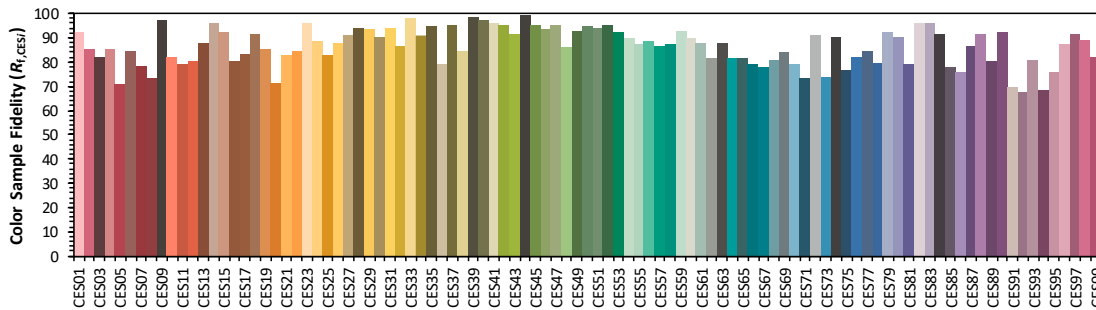
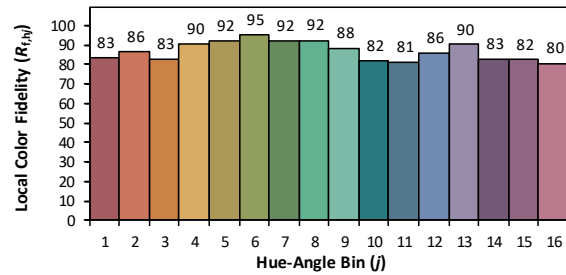
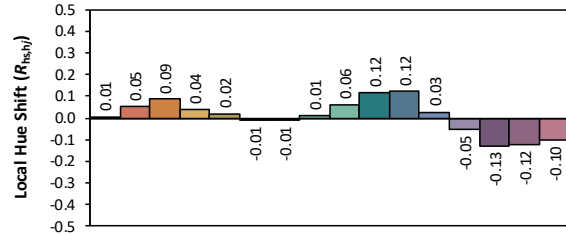
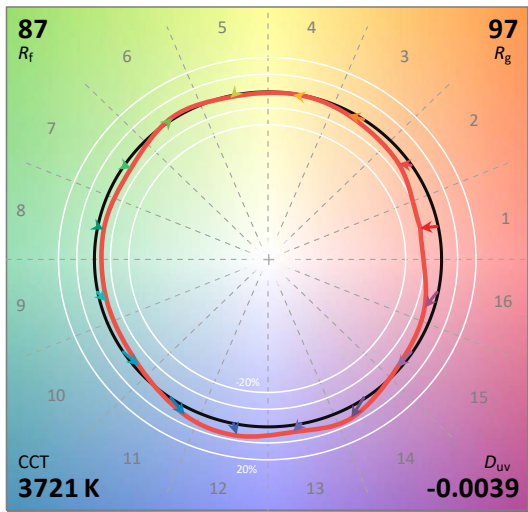
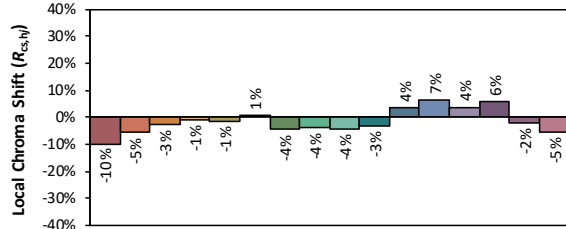
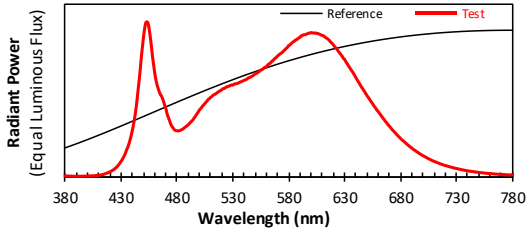
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0011	447	0.4219	514	0.4267	581	0.8516	648	0.6130	715	0.0956
381	0.0035	448	0.4683	515	0.4309	582	0.8623	649	0.5986	716	0.0922
382	0.0018	449	0.5046	516	0.4356	583	0.8733	650	0.5877	717	0.0896
383	0.0039	450	0.5397	517	0.4401	584	0.8816	651	0.5758	718	0.0872
384	0.0018	451	0.5667	518	0.4440	585	0.8900	652	0.5641	719	0.0842
385	0.0032	452	0.5821	519	0.4488	586	0.9005	653	0.5529	720	0.0815
386	0.0023	453	0.5858	520	0.4538	587	0.9074	654	0.5395	721	0.0794
387	0.0018	454	0.5804	521	0.4589	588	0.9168	655	0.5297	722	0.0766
388	0.0031	455	0.5612	522	0.4610	589	0.9245	656	0.5164	723	0.0746
389	0.0019	456	0.5347	523	0.4648	590	0.9329	657	0.5042	724	0.0720
390	0.0025	457	0.5059	524	0.4684	591	0.9467	658	0.4950	725	0.0700
391	0.0020	458	0.4711	525	0.4720	592	0.9493	659	0.4836	726	0.0675
392	0.0022	459	0.4443	526	0.4758	593	0.9579	660	0.4724	727	0.0651
393	0.0026	460	0.4180	527	0.4793	594	0.9649	661	0.4613	728	0.0634
394	0.0025	461	0.3979	528	0.4811	595	0.9653	662	0.4512	729	0.0610
395	0.0028	462	0.3819	529	0.4845	596	0.9712	663	0.4395	730	0.0594
396	0.0028	463	0.3720	530	0.4867	597	0.9776	664	0.4289	731	0.0575
397	0.0024	464	0.3586	531	0.4910	598	0.9847	665	0.4173	732	0.0556
398	0.0027	465	0.3495	532	0.4932	599	0.9862	666	0.4074	733	0.0539
399	0.0031	466	0.3422	533	0.4942	600	0.9915	667	0.3965	734	0.0523
400	0.0030	467	0.3341	534	0.4973	601	0.9938	668	0.3861	735	0.0506
401	0.0033	468	0.3235	535	0.5026	602	0.9960	669	0.3776	736	0.0491
402	0.0033	469	0.3069	536	0.5059	603	0.9950	670	0.3680	737	0.0474
403	0.0037	470	0.2948	537	0.5100	604	0.9979	671	0.3579	738	0.0461
404	0.0036	471	0.2773	538	0.5146	605	0.9984	672	0.3486	739	0.0445
405	0.0047	472	0.2653	539	0.5177	606	0.9979	673	0.3396	740	0.0428
406	0.0044	473	0.2557	540	0.5213	607	0.9970	674	0.3312	741	0.0414
407	0.0050	474	0.2431	541	0.5264	608	0.9963	675	0.3227	742	0.0405
408	0.0053	475	0.2350	542	0.5314	609	0.9939	676	0.3118	743	0.0397
409	0.0061	476	0.2317	543	0.5364	610	0.9919	677	0.3048	744	0.0377
410	0.0067	477	0.2260	544	0.5398	611	0.9913	678	0.2960	745	0.0367
411	0.0077	478	0.2214	545	0.5453	612	0.9853	679	0.2871	746	0.0354
412	0.0086	479	0.2216	546	0.5501	613	0.9802	680	0.2781	747	0.0342
413	0.0096	480	0.2219	547	0.5555	614	0.9778	681	0.2711	748	0.0332
414	0.0112	481	0.2230	548	0.5620	615	0.9729	682	0.2629	749	0.0321
415	0.0122	482	0.2241	549	0.5681	616	0.9654	683	0.2570	750	0.0311
416	0.0147	483	0.2276	550	0.5745	617	0.9582	684	0.2488	751	0.0302
417	0.0161	484	0.2325	551	0.5808	618	0.9505	685	0.2422	752	0.0287
418	0.0183	485	0.2361	552	0.5868	619	0.9434	686	0.2345	753	0.0281
419	0.0204	486	0.2412	553	0.5925	620	0.9363	687	0.2284	754	0.0274
420	0.0223	487	0.2467	554	0.6000	621	0.9269	688	0.2215	755	0.0266
421	0.0250	488	0.2503	555	0.6089	622	0.9206	689	0.2148	756	0.0254
422	0.0277	489	0.2591	556	0.6134	623	0.9092	690	0.2085	757	0.0249
423	0.0308	490	0.2635	557	0.6215	624	0.8988	691	0.2018	758	0.0241
424	0.0343	491	0.2713	558	0.6301	625	0.8897	692	0.1960	759	0.0233
425	0.0381	492	0.2767	559	0.6369	626	0.8798	693	0.1902	760	0.0225
426	0.0429	493	0.2840	560	0.6437	627	0.8696	694	0.1855	761	0.0224
427	0.0476	494	0.2921	561	0.6534	628	0.8605	695	0.1798	762	0.0214
428	0.0535	495	0.2981	562	0.6625	629	0.8476	696	0.1743	763	0.0205
429	0.0595	496	0.3078	563	0.6691	630	0.8400	697	0.1684	764	0.0199
430	0.0664	497	0.3155	564	0.6806	631	0.8265	698	0.1635	765	0.0193
431	0.0743	498	0.3252	565	0.6908	632	0.8159	699	0.1582	766	0.0188
432	0.0822	499	0.3324	566	0.6989	633	0.8029	700	0.1536	767	0.0181
433	0.0901	500	0.3421	567	0.7094	634	0.7911	701	0.1490	768	0.0172
434	0.1009	501	0.3505	568	0.7206	635	0.7778	702	0.1447	769	0.0170
435	0.1126	502	0.3558	569	0.7290	636	0.7662	703	0.1406	770	0.0167
436	0.1236	503	0.3642	570	0.7417	637	0.7554	704	0.1356	771	0.0160
437	0.1374	504	0.3715	571	0.7497	638	0.7421	705	0.1312	772	0.0155
438	0.1516	505	0.3765	572	0.7592	639	0.7301	706	0.1279	773	0.0150
439	0.1693	506	0.3846	573	0.7682	640	0.7158	707	0.1238	774	0.0147
440	0.1912	507	0.3914	574	0.7771	641	0.6997	708	0.1193	775	0.0142
441	0.2126	508	0.3982	575	0.7867	642	0.6870	709	0.1162	776	0.0138
442	0.2386	509	0.4030	576	0.7992	643	0.6764	710	0.1124	777	0.0135
443	0.2704	510	0.4088	577	0.8095	644	0.6634	711	0.1087	778	0.0131
444	0.3031	511	0.4132	578	0.8207	645	0.6507	712	0.1048	779	0.0132
445	0.3417	512	0.4203	579	0.8299	646	0.6372	713	0.1019	780	0.0132
446	0.3816	513	0.4239	580	0.8429	647	0.6252	714	0.0991	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: 2021/1/6

Manufacturer: ETI Solid State Lighting (2  
Model: 564101###



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

$x$  0.3902  
 $y$  0.3742  
 $u'$  0.2326  
 $v'$  0.5019

CIE 13.3-1995 (CRI)	
$R_a$	87
$R_9$	27

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	0.0051	447	0.6864	514	0.5310	581	0.8483	648	0.5484	715	0.0853
381	0.0047	448	0.7656	515	0.5359	582	0.8559	649	0.5363	716	0.0825
382	0.0052	449	0.8346	516	0.5418	583	0.8623	650	0.5251	717	0.0805
383	0.0045	450	0.9007	517	0.5463	584	0.8687	651	0.5141	718	0.0774
384	0.0036	451	0.9533	518	0.5519	585	0.8725	652	0.5039	719	0.0751
385	0.0043	452	0.9909	519	0.5547	586	0.8798	653	0.4936	720	0.0728
386	0.0037	453	0.9978	520	0.5601	587	0.8832	654	0.4824	721	0.0709
387	0.0028	454	0.9903	521	0.5668	588	0.8879	655	0.4724	722	0.0688
388	0.0029	455	0.9546	522	0.5679	589	0.8938	656	0.4605	723	0.0666
389	0.0029	456	0.9042	523	0.5713	590	0.8970	657	0.4511	724	0.0644
390	0.0027	457	0.8459	524	0.5772	591	0.9072	658	0.4413	725	0.0628
391	0.0032	458	0.7789	525	0.5796	592	0.9079	659	0.4302	726	0.0605
392	0.0034	459	0.7245	526	0.5825	593	0.9136	660	0.4215	727	0.0588
393	0.0031	460	0.6709	527	0.5848	594	0.9151	661	0.4121	728	0.0566
394	0.0028	461	0.6292	528	0.5896	595	0.9144	662	0.4025	729	0.0551
395	0.0038	462	0.5957	529	0.5905	596	0.9191	663	0.3923	730	0.0532
396	0.0038	463	0.5714	530	0.5909	597	0.9218	664	0.3823	731	0.0520
397	0.0039	464	0.5503	531	0.5955	598	0.9249	665	0.3733	732	0.0500
398	0.0040	465	0.5318	532	0.5981	599	0.9251	666	0.3635	733	0.0487
399	0.0038	466	0.5206	533	0.5990	600	0.9288	667	0.3539	734	0.0465
400	0.0048	467	0.5043	534	0.6017	601	0.9267	668	0.3454	735	0.0452
401	0.0052	468	0.4840	535	0.6033	602	0.9265	669	0.3350	736	0.0443
402	0.0054	469	0.4594	536	0.6081	603	0.9251	670	0.3280	737	0.0424
403	0.0057	470	0.4398	537	0.6107	604	0.9261	671	0.3190	738	0.0412
404	0.0057	471	0.4091	538	0.6142	605	0.9239	672	0.3105	739	0.0399
405	0.0062	472	0.3866	539	0.6166	606	0.9223	673	0.3015	740	0.0384
406	0.0059	473	0.3683	540	0.6207	607	0.9203	674	0.2939	741	0.0369
407	0.0074	474	0.3472	541	0.6237	608	0.9172	675	0.2861	742	0.0361
408	0.0080	475	0.3297	542	0.6260	609	0.9129	676	0.2780	743	0.0352
409	0.0086	476	0.3190	543	0.6311	610	0.9105	677	0.2702	744	0.0338
410	0.0098	477	0.3088	544	0.6369	611	0.9090	678	0.2625	745	0.0332
411	0.0111	478	0.3010	545	0.6390	612	0.9032	679	0.2563	746	0.0319
412	0.0122	479	0.2971	546	0.6427	613	0.8974	680	0.2482	747	0.0311
413	0.0137	480	0.2965	547	0.6468	614	0.8927	681	0.2410	748	0.0297
414	0.0148	481	0.2951	548	0.6513	615	0.8875	682	0.2346	749	0.0291
415	0.0177	482	0.2964	549	0.6564	616	0.8817	683	0.2289	750	0.0279
416	0.0199	483	0.2986	550	0.6621	617	0.8731	684	0.2223	751	0.0272
417	0.0231	484	0.3028	551	0.6653	618	0.8647	685	0.2164	752	0.0263
418	0.0253	485	0.3060	552	0.6700	619	0.8583	686	0.2090	753	0.0255
419	0.0284	486	0.3117	553	0.6745	620	0.8505	687	0.2035	754	0.0249
420	0.0321	487	0.3180	554	0.6803	621	0.8400	688	0.1974	755	0.0239
421	0.0353	488	0.3223	555	0.6873	622	0.8325	689	0.1911	756	0.0231
422	0.0403	489	0.3297	556	0.6887	623	0.8244	690	0.1870	757	0.0223
423	0.0440	490	0.3342	557	0.6945	624	0.8134	691	0.1803	758	0.0218
424	0.0503	491	0.3424	558	0.7017	625	0.8033	692	0.1746	759	0.0211
425	0.0559	492	0.3493	559	0.7054	626	0.7948	693	0.1702	760	0.0205
426	0.0626	493	0.3572	560	0.7093	627	0.7847	694	0.1653	761	0.0201
427	0.0707	494	0.3642	561	0.7178	628	0.7756	695	0.1600	762	0.0195
428	0.0795	495	0.3747	562	0.7251	629	0.7625	696	0.1555	763	0.0188
429	0.0895	496	0.3846	563	0.7284	630	0.7574	697	0.1503	764	0.0180
430	0.0998	497	0.3957	564	0.7355	631	0.7441	698	0.1453	765	0.0173
431	0.1115	498	0.4064	565	0.7435	632	0.7325	699	0.1412	766	0.0171
432	0.1244	499	0.4167	566	0.7487	633	0.7215	700	0.1369	767	0.0164
433	0.1379	500	0.4294	567	0.7572	634	0.7101	701	0.1329	768	0.0157
434	0.1558	501	0.4371	568	0.7637	635	0.6989	702	0.1291	769	0.0154
435	0.1753	502	0.4456	569	0.7690	636	0.6882	703	0.1253	770	0.0153
436	0.1911	503	0.4560	570	0.7774	637	0.6779	704	0.1211	771	0.0147
437	0.2137	504	0.4630	571	0.7832	638	0.6662	705	0.1170	772	0.0142
438	0.2385	505	0.4720	572	0.7891	639	0.6545	706	0.1135	773	0.0140
439	0.2667	506	0.4802	573	0.7946	640	0.6411	707	0.1100	774	0.0132
440	0.2993	507	0.4889	574	0.7994	641	0.6288	708	0.1064	775	0.0129
441	0.3349	508	0.4979	575	0.8061	642	0.6163	709	0.1028	776	0.0125
442	0.3754	509	0.5027	576	0.8141	643	0.6057	710	0.1003	777	0.0121
443	0.4248	510	0.5110	577	0.8205	644	0.5927	711	0.0968	778	0.0118
444	0.4803	511	0.5151	578	0.8281	645	0.5807	712	0.0943	779	0.0119
445	0.5486	512	0.5235	579	0.8342	646	0.5703	713	0.0914	780	0.0119
446	0.6139	513	0.5275	580	0.8452	647	0.5592	714	0.0886	N/A	N/A

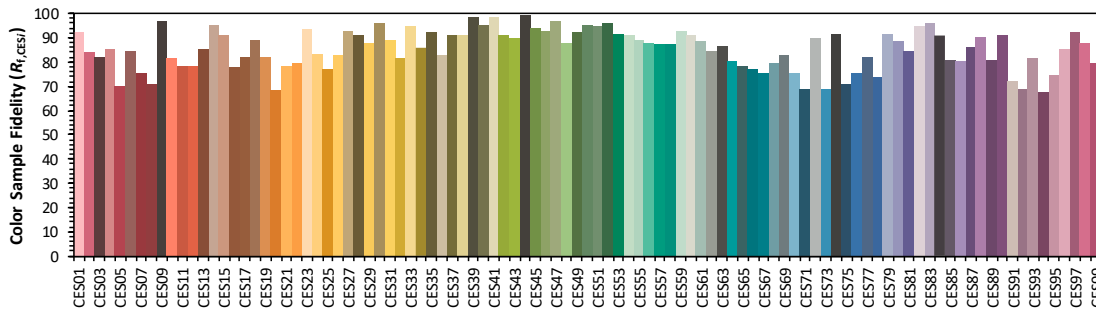
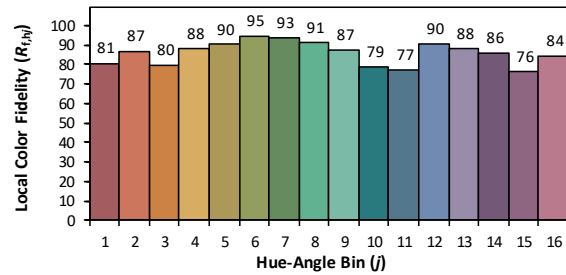
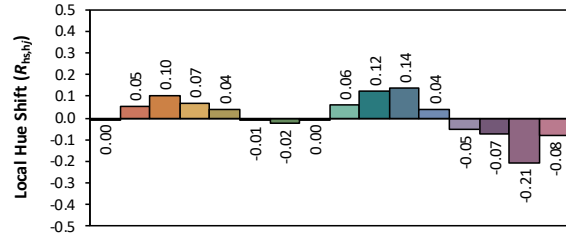
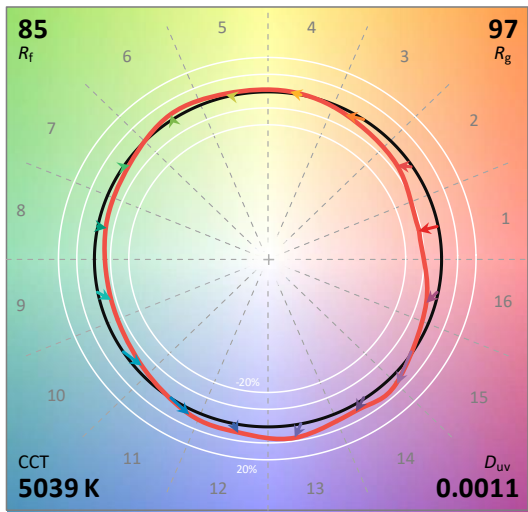
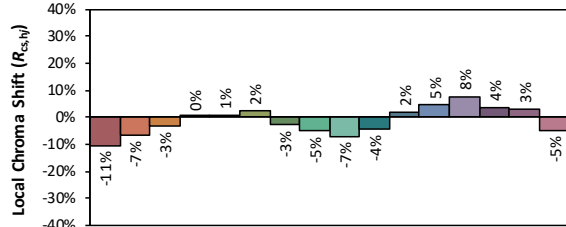
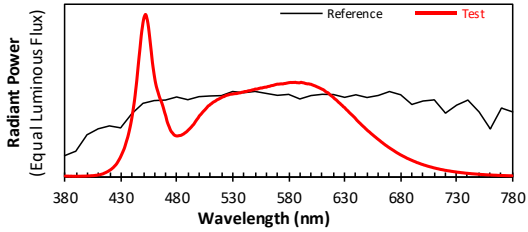


**IES TM-30-18 Color Rendition Result (5000K):**

**ANSI/IES TM-30-18 Color Rendition Report**

Source: 1 CIE F1  
Date: 2021/1/6

Manufacturer: ETI Solid State Lighting (2  
Model: 564101###



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

$x$  0.3442  
 $y$  0.3531  
 $u'$  0.2102  
 $v'$  0.4853

CIE 13.3-1995 (CRI)	
$R_a$	86
$R_9$	19

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	0.0052	447	0.8008	514	0.4655	581	0.5808	648	0.3037	715	0.0478
381	0.0045	448	0.8707	515	0.4699	582	0.5817	649	0.2964	716	0.0460
382	0.0044	449	0.9229	516	0.4752	583	0.5809	650	0.2903	717	0.0449
383	0.0046	450	0.9675	517	0.4777	584	0.5818	651	0.2835	718	0.0436
384	0.0037	451	0.9913	518	0.4816	585	0.5813	652	0.2785	719	0.0423
385	0.0045	452	1.0000	519	0.4851	586	0.5826	653	0.2723	720	0.0404
386	0.0039	453	0.9781	520	0.4890	587	0.5804	654	0.2660	721	0.0397
387	0.0034	454	0.9447	521	0.4929	588	0.5802	655	0.2605	722	0.0382
388	0.0041	455	0.8923	522	0.4943	589	0.5793	656	0.2546	723	0.0373
389	0.0033	456	0.8309	523	0.4979	590	0.5795	657	0.2488	724	0.0364
390	0.0041	457	0.7690	524	0.5013	591	0.5825	658	0.2434	725	0.0352
391	0.0034	458	0.7048	525	0.5033	592	0.5807	659	0.2375	726	0.0339
392	0.0039	459	0.6550	526	0.5050	593	0.5795	660	0.2321	727	0.0331
393	0.0039	460	0.6093	527	0.5071	594	0.5781	661	0.2267	728	0.0318
394	0.0041	461	0.5719	528	0.5092	595	0.5752	662	0.2214	729	0.0311
395	0.0044	462	0.5441	529	0.5093	596	0.5741	663	0.2152	730	0.0300
396	0.0044	463	0.5220	530	0.5106	597	0.5727	664	0.2105	731	0.0289
397	0.0046	464	0.4984	531	0.5117	598	0.5732	665	0.2047	732	0.0282
398	0.0046	465	0.4788	532	0.5128	599	0.5710	666	0.1996	733	0.0276
399	0.0050	466	0.4628	533	0.5130	600	0.5704	667	0.1943	734	0.0265
400	0.0056	467	0.4432	534	0.5141	601	0.5671	668	0.1900	735	0.0256
401	0.0060	468	0.4204	535	0.5162	602	0.5646	669	0.1846	736	0.0250
402	0.0058	469	0.3952	536	0.5173	603	0.5617	670	0.1802	737	0.0241
403	0.0070	470	0.3739	537	0.5180	604	0.5595	671	0.1754	738	0.0232
404	0.0070	471	0.3452	538	0.5209	605	0.5558	672	0.1712	739	0.0224
405	0.0076	472	0.3248	539	0.5220	606	0.5531	673	0.1666	740	0.0220
406	0.0081	473	0.3082	540	0.5240	607	0.5499	674	0.1624	741	0.0213
407	0.0094	474	0.2906	541	0.5259	608	0.5468	675	0.1576	742	0.0205
408	0.0100	475	0.2781	542	0.5256	609	0.5431	676	0.1531	743	0.0200
409	0.0109	476	0.2705	543	0.5279	610	0.5399	677	0.1487	744	0.0191
410	0.0123	477	0.2615	544	0.5301	611	0.5369	678	0.1447	745	0.0187
411	0.0137	478	0.2558	545	0.5310	612	0.5320	679	0.1407	746	0.0182
412	0.0154	479	0.2531	546	0.5320	613	0.5260	680	0.1365	747	0.0177
413	0.0174	480	0.2519	547	0.5346	614	0.5214	681	0.1331	748	0.0172
414	0.0195	481	0.2525	548	0.5363	615	0.5188	682	0.1293	749	0.0167
415	0.0233	482	0.2542	549	0.5374	616	0.5133	683	0.1259	750	0.0159
416	0.0258	483	0.2550	550	0.5407	617	0.5061	684	0.1223	751	0.0155
417	0.0296	484	0.2571	551	0.5407	618	0.5003	685	0.1187	752	0.0151
418	0.0328	485	0.2612	552	0.5410	619	0.4955	686	0.1147	753	0.0145
419	0.0375	486	0.2645	553	0.5440	620	0.4898	687	0.1120	754	0.0142
420	0.0417	487	0.2702	554	0.5453	621	0.4824	688	0.1089	755	0.0138
421	0.0462	488	0.2747	555	0.5477	622	0.4772	689	0.1057	756	0.0132
422	0.0522	489	0.2805	556	0.5471	623	0.4717	690	0.1028	757	0.0128
423	0.0580	490	0.2876	557	0.5496	624	0.4647	691	0.0998	758	0.0124
424	0.0655	491	0.2941	558	0.5510	625	0.4578	692	0.0967	759	0.0121
425	0.0727	492	0.3010	559	0.5526	626	0.4526	693	0.0941	760	0.0118
426	0.0813	493	0.3085	560	0.5524	627	0.4454	694	0.0912	761	0.0116
427	0.0925	494	0.3169	561	0.5554	628	0.4399	695	0.0878	762	0.0111
428	0.1044	495	0.3239	562	0.5571	629	0.4321	696	0.0861	763	0.0107
429	0.1165	496	0.3347	563	0.5579	630	0.4275	697	0.0832	764	0.0103
430	0.1310	497	0.3453	564	0.5608	631	0.4199	698	0.0808	765	0.0102
431	0.1465	498	0.3550	565	0.5624	632	0.4125	699	0.0779	766	0.0099
432	0.1622	499	0.3636	566	0.5633	633	0.4068	700	0.0761	767	0.0095
433	0.1792	500	0.3752	567	0.5655	634	0.3988	701	0.0734	768	0.0090
434	0.2021	501	0.3825	568	0.5678	635	0.3922	702	0.0715	769	0.0090
435	0.2251	502	0.3900	569	0.5696	636	0.3857	703	0.0694	770	0.0087
436	0.2474	503	0.3987	570	0.5712	637	0.3796	704	0.0671	771	0.0083
437	0.2761	504	0.4060	571	0.5709	638	0.3728	705	0.0651	772	0.0081
438	0.3069	505	0.4129	572	0.5719	639	0.3663	706	0.0632	773	0.0080
439	0.3413	506	0.4208	573	0.5727	640	0.3585	707	0.0613	774	0.0078
440	0.3812	507	0.4286	574	0.5728	641	0.3498	708	0.0597	775	0.0074
441	0.4267	508	0.4368	575	0.5726	642	0.3429	709	0.0576	776	0.0073
442	0.4737	509	0.4408	576	0.5748	643	0.3359	710	0.0556	777	0.0071
443	0.5336	510	0.4472	577	0.5752	644	0.3298	711	0.0541	778	0.0069
444	0.5944	511	0.4515	578	0.5769	645	0.3227	712	0.0524	779	0.0068
445	0.6667	512	0.4577	579	0.5783	646	0.3161	713	0.0506	780	0.0069
446	0.7350	513	0.4621	580	0.5799	647	0.3097	714	0.0494	N/A	N/A

**Goniophotometer Test Results (Test for 3000K):**

**Test Condition:**

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
24.9	36.8	Face Down	90	25

**Electrical Data:**

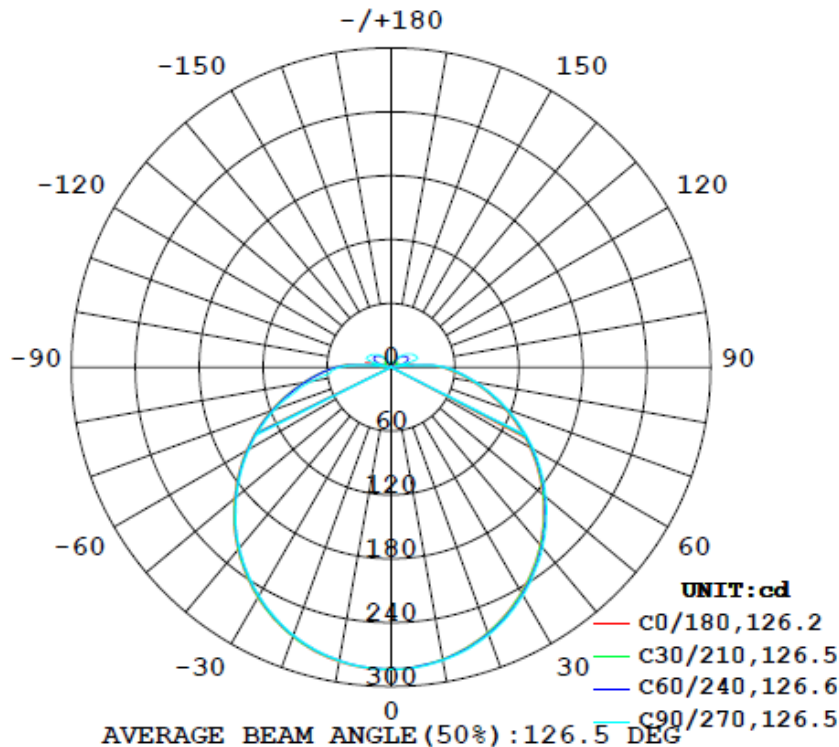
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60	0.1215	13.83	0.9441

**Goniophotometer Data:**

Parameter	Results
Total Luminous (lm)	1066.5
Luminous Efficacy (lm/w)	77.11
Zonal Lumens Distribution (0-60°)	64.0%
Beam Angle (°)	126.5

**Luminous Intensity Distribution Diagram:**

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM

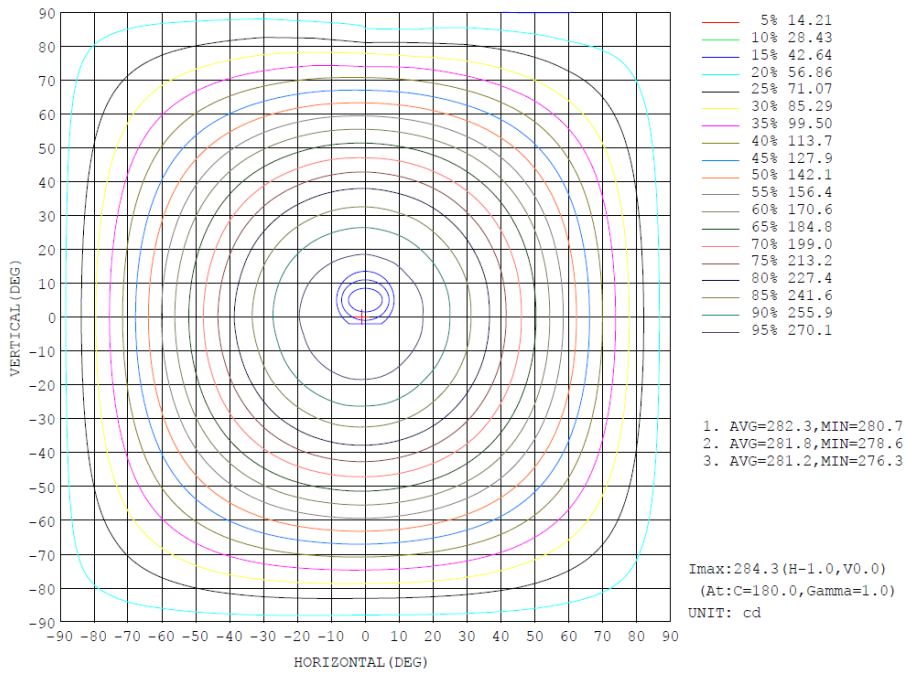


**Zonal Flux Diagram:**

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	φ zone	φ total	%lum, lamp
10	278.4	278.4	279.6	279.9	280.9	280.0	279.8	278.9	0- 10	26.89	26.89	2.52,2.52
20	265.4	265.6	267.5	268.2	269.2	268.5	267.8	265.9	10- 20	77.52	104.4	9.79,9.79
30	244.4	245.2	247.6	248.8	249.8	249.3	247.8	246.0	20- 30	119.1	223.5	21,21
40	217.8	219.0	221.1	222.5	223.5	222.7	221.5	219.3	30- 40	147.0	370.5	34.7,34.7
50	185.9	187.4	189.8	191.2	192.0	190.7	189.5	186.5	40- 50	158.7	529.2	49.6,49.6
60	150.4	152.3	154.3	156.3	156.8	155.8	154.1	151.3	50- 60	153.7	682.9	64,64
70	113.4	115.6	116.9	119.1	119.6	118.6	116.4	113.3	60- 70	134.1	817.0	76.6,76.6
80	77.70	80.14	80.63	82.90	83.52	82.71	74.96	76.16	70- 80	103.6	920.6	86.3,86.3
90	47.25	49.76	51.49	51.20	51.81	51.63	48.11	42.21	80- 90	69.96	990.5	92.9,92.9
100	21.64	4.357	6.394	5.386	24.62	3.772	5.541	5.328	90-100	27.04	1018	95.4,95.4
110	6.848	7.856	26.37	8.395	8.244	7.447	24.61	8.097	100-110	11.16	1029	96.5,96.5
120	2.300	11.68	24.09	12.48	2.771	11.02	22.76	11.62	110-120	12.23	1041	97.6,97.6
130	3.567	12.39	19.65	13.08	3.285	12.56	19.19	11.18	120-130	10.95	1052	98.6,98.6
140	2.293	9.724	13.78	10.17	4.143	9.789	13.97	8.589	130-140	8.226	1060	99.4,99.4
150	2.566	5.993	7.301	6.010	2.510	5.605	7.577	5.284	140-150	4.397	1065	99.8,99.8
160	1.234	1.532	2.601	1.422	1.394	1.379	2.060	1.963	150-160	1.534	1066	100,100
170	0.8182	0.7705	0.5901	0.6514	1.135	0.7622	0.8379	0.5227	160-170	0.3314	1066	100,100
180	0.3818	0.3619	0.3233	0.3510	0.3504	0.3672	0.3467	0.3544	170-180	0.0611	1066	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

**Isocandela Diagram:**



**Luminous Distribution Intensity Data:**

Table--1 UNIT: cd

C (DEG) γ (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	
0	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284
5	282	282	282	282	282	283	283	283	283	283	283	283	284	283	283	283	283	283	283	283
10	278	279	279	278	279	280	280	280	280	280	280	280	281	281	280	280	280	280	280	280
15	273	273	273	273	274	274	275	275	275	275	275	275	276	276	276	275	275	275	275	275
20	265	265	265	266	267	267	268	268	268	268	268	268	269	269	269	268	268	268	268	268
25	256	256	256	256	257	258	259	259	259	260	260	259	261	260	260	260	259	259	259	259
30	244	245	245	245	246	247	248	248	249	249	249	249	250	250	250	249	248	248	248	248
35	232	232	232	233	234	235	235	236	236	236	236	236	237	237	237	237	236	236	236	236
40	218	218	218	219	220	221	221	222	222	223	222	223	224	223	223	223	222	222	222	221
45	202	203	203	204	205	205	206	206	207	207	207	207	209	208	208	208	207	207	207	207
50	186	186	187	187	188	189	190	190	191	191	191	191	192	191	191	191	190	190	189	189
55	168	169	169	170	171	172	172	173	174	174	174	174	175	174	174	174	173	173	172	172
60	150	151	152	152	153	153	154	155	156	156	156	156	157	156	156	156	155	155	154	154
65	132	133	133	134	134	135	136	136	137	138	138	138	138	138	138	138	137	137	136	135
70	113	114	115	116	116	116	117	118	119	119	119	119	120	119	119	119	118	118	116	116
75	95.2	95.8	96.3	97.4	97.7	98.0	98.4	99.2	100	101	101	100	101	101	101	100	99.7	98.6	94.5	94.5
80	77.7	78.4	79.0	80.1	80.5	80.7	80.6	81.6	82.6	82.9	82.8	82.5	83.5	83.2	83.1	82.7	82.3	80.4	75.0	75.0
85	62.0	62.8	63.3	64.5	65.1	65.2	65.3	66.0	66.7	66.7	66.3	66.2	67.2	66.9	66.9	66.7	66.5	63.3	56.9	56.9
90	47.3	48.0	48.5	49.8	50.6	51.1	51.5	51.8	51.7	51.2	50.6	50.6	51.8	51.7	51.8	51.6	51.9	49.4	48.1	48.1
95	11.5	12.7	13.4	21.1	25.5	26.9	27.4	26.4	24.1	19.4	12.3	12.2	18.9	19.4	21.8	27.0	27.8	26.5	25.9	25.9
100	21.6	15.5	16.7	4.36	2.21	5.56	6.39	5.39	1.81	5.39	18.3	16.4	24.6	17.8	16.1	3.77	3.26	5.19	5.54	5.54
105	12.4	7.80	9.06	7.50	9.68	14.3	15.3	14.5	10.8	7.42	9.09	8.21	14.5	9.60	11.0	7.70	8.92	12.0	13.5	13.5
110	6.85	4.04	5.77	7.86	15.0	23.5	26.4	24.3	16.2	8.40	5.93	4.41	8.24	4.72	6.18	7.45	14.3	22.6	24.6	24.6
115	3.91	2.67	5.33	9.60	17.7	23.4	25.5	23.9	18.9	10.4	5.86	3.09	4.86	2.73	5.53	9.19	17.4	22.7	24.1	24.1
120	2.30	2.85	5.92	11.7	18.4	22.5	24.1	23.0	19.1	12.5	6.50	3.18	2.77	2.35	5.68	11.0	18.8	21.6	22.8	22.8
125	0.52	3.98	7.43	12.9	17.4	20.9	22.1	21.3	18.1	13.6	7.97	4.18	1.09	2.97	6.75	12.4	17.9	20.3	21.1	21.1
130	3.57	5.26	8.41	12.4	16.0	18.8	19.6	19.2	16.6	13.1	8.92	5.26	3.28	4.27	7.72	12.6	16.6	18.5	19.2	19.2
135	4.57	4.04	8.13	11.3	14.2	16.4	16.8	16.7	14.8	11.8	8.77	3.86	4.30	4.92	7.80	11.4	14.8	16.3	16.7	16.7
140	2.29	1.07	7.22	9.72	12.1	13.6	13.8	13.8	12.5	10.2	7.68	1.97	4.14	2.83	6.82	9.79	12.6	13.8	14.0	14.0
145	2.99	2.06	6.08	7.96	9.65	10.6	10.6	10.6	9.87	8.22	6.32	2.09	1.70	1.24	5.63	7.71	9.88	10.8	11.0	11.0
150	2.57	2.41	3.77	5.99	7.05	7.38	7.30	7.28	7.01	6.01	3.79	2.31	2.51	1.96	3.96	5.61	6.96	7.70	7.58	7.58
155	1.79	1.85	1.54	3.76	4.41	4.54	4.48	4.39	4.12	3.52	1.58	1.56	1.66	1.59	1.37	3.40	4.13	4.51	4.38	4.38
160	1.23	1.19	0.86	1.53	2.25	2.57	2.60	2.48	2.10	1.42	0.81	1.26	1.39	1.46	0.91	1.38	2.12	2.19	2.06	2.06
165	0.85	0.76	0.48	0.67	1.17	1.34	1.40	1.33	1.09	0.79	0.69	1.13	1.22	1.25	1.02	0.70	1.12	1.37	1.45	1.45
170	0.82	0.80	0.90	0.77	0.62	0.62	0.59	0.52	0.53	0.65	0.75	0.96	1.13	1.14	0.99	0.76	0.64	0.74	0.84	0.84
175	0.47	0.54	0.57	0.61	0.52	0.52	0.50	0.43	0.47	0.50	0.52	0.57	0.62	0.63	0.62	0.68	0.75	0.77	0.70	0.70
180	0.38	0.39	0.35	0.36	0.36	0.36	0.32	0.32	0.34	0.35	0.35	0.31	0.35	0.34	0.36	0.37	0.36	0.35	0.35	0.35

Table--2 UNIT: cd

C (DEG) γ (DEG)	285	300	315	330	345																
0	284	284	284	284	284																
5	283	283	282	282	282																
10	279	280	279	279	279																
15	274	274	273	273	274																
20	267	267	266	266	266																
25	258	257	257	257	256																
30	247	247	246	246	245																
35	235	234	233	233	233																
40	220	220	219	219	219																
45	205	204	204	203	203																
50	188	188	186	186	186																
55	171	170	169	169	169																
60	153	152	151	151	151																
65	135	133	133	132	132																
70	116	114	113	113	114																
75	95.6	94.7	93.6	93.4	94.9																
80	77.0	76.7	76.2	75.4	76.9																
85	56.8	60.2	59.8	59.2	60.9																
90	46.7	43.6	42.2	42.3	46.2																
95	24.1	21.1	16.1	8.85	12.3																
100	4.51	1.57	5.33	16.6	14.8																
105	13.3	8.75	6.48	9.05	8.12																
110	23.6	15.1	8.10	5.77	4.21																
115	23.0	17.8	10.1	5.55	2.79																
120	21.7	17.7	11.6	5.89	2.73																
125	20.1	16.5	12.0	6.78	3.24																
130	18.2	15.0	11.2	7.02	4.25																
135	15.9	13.3	10.0	6.58	3.62																
140	13.3	11.3	8.59	5.78	1.34																
145	10.4	8.96	6.82	4.95	1.80																
150	7.30	6.51	5.28	3.63	1.73																
155	4.31	4.15	3.56	2.18	1.46																
160	2.21	2.29	1.96	1.33	1.06																
165	1.41	1.40	1.19	0.68	0.57																
170	0.84	0.78	0.52	0.67	0.95																
175	0.71	0.80	0.72	0.61	0.50																
180	0.34	0.35	0.35	0.34	0.36																

**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**\*\*\*\*\*