

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):

564121###

Representative (Tested) Model:

564121110

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:	564121### (###=110-309)
Product Type:	Indoor, LED Light Engine
Rating Input:	120Vac, 60Hz, 42W
Declared CCT:	3000/4000/5000K
Declared Light Output:	3000 lm
LED Manufacturer:	Samsung
LED Model:	SPMWH1228FD5XXVXXX and SPMWH1228FD5XXRXXX
LED Quantity:	SPMWH1228FD5XXVXXX: 138 pcs SPMWH1228FD5XXRXXX: 138 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:	201110006-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.:	NTCLR20120231
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:
1. Photometric and Electrical Measurements – Light Distribution Method: Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25\text{ }^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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.
2. Photometric and Electrical Measurements – Integrating Sphere Method: Photometric parameters were measured using an integrating sphere, as spectroradiometer and software. The ambient temperature condition inside the sphere was measured at $25\text{ }^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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.

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	0.3812	41.46	0.9049
4000K	120.0	60	0.3758	41.20	0.9100
5000K	120.0	60	0.3804	41.50	0.9054

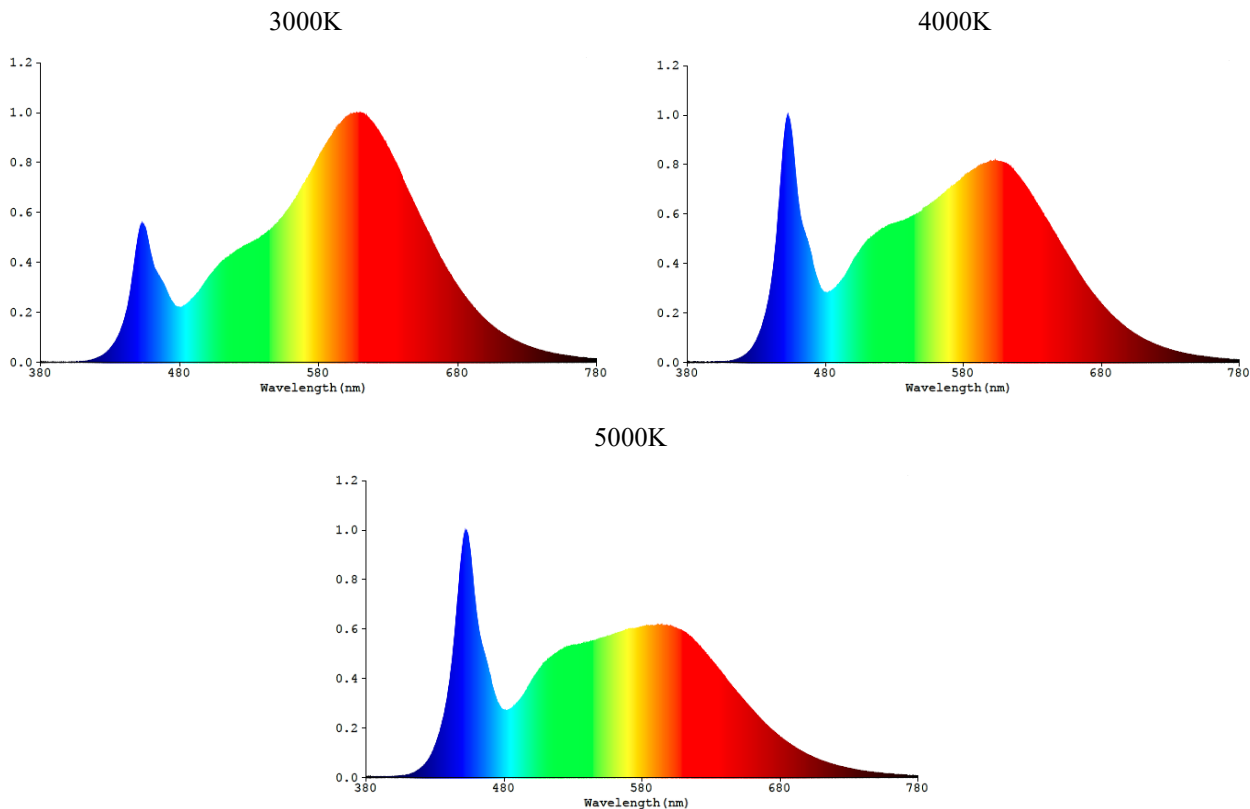
Color Data:

Rated CCT (K)	Test CCT (K)	R _a	R ₉	R _f	R _g	R _{cs, h1}	Chromaticity		
							(x, y)	(u', v')	Duv
3000K	2922	85.8	21	87	97	-10%	(0.4381, 0.3970)	(0.2544, 0.5187)	-0.0030
4000K	3930	88.7	35	87	97	-9%	(0.3808, 0.3693)	(0.2284, 0.4983)	-0.0036
5000K	4850	87.1	29	86	97	-10%	(0.3496, 0.3558)	(0.2128, 0.4874)	0.0003

Output Data:

Rated CCT (K)	Light output (lm)	Efficacy (lm/W)
3000K	3736.9	90.13
4000K	4071.9	98.83
5000K	4037.5	97.28

Spectrum Diagram:



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

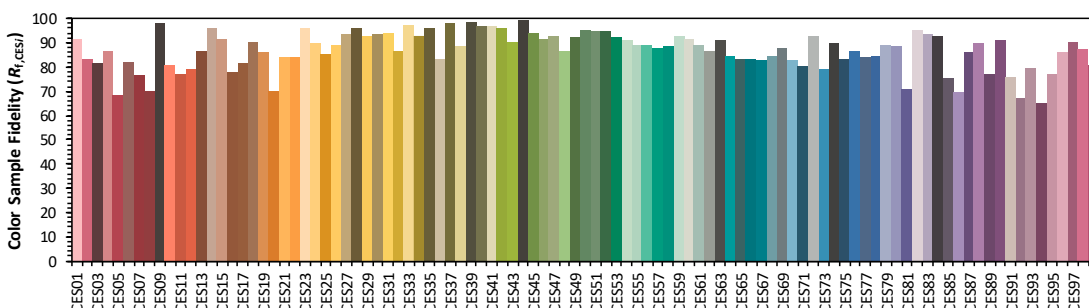
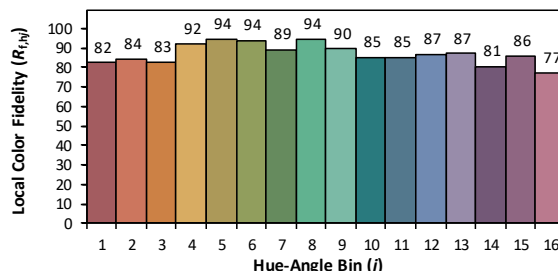
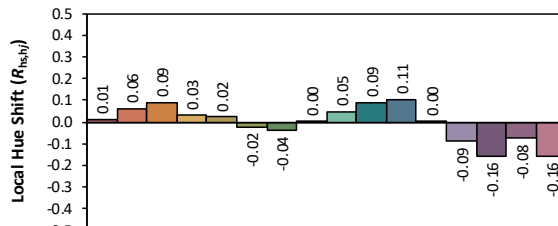
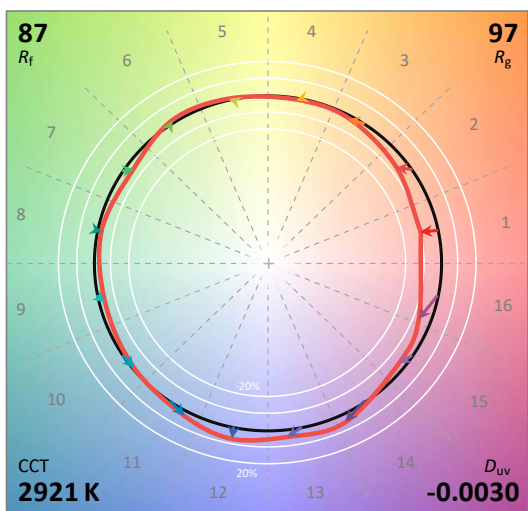
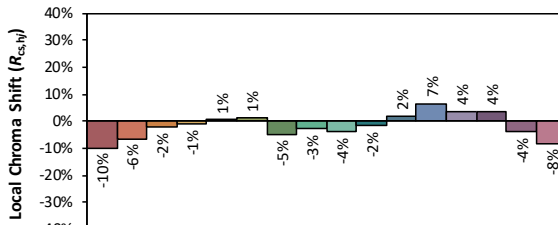
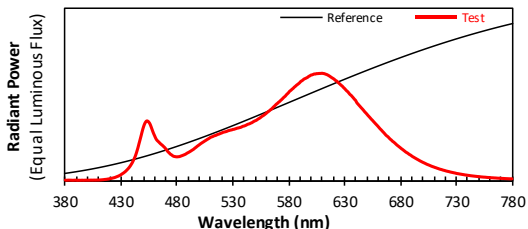
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Date: 2021/1/5

Manufacturer: ETI Solid State Lighting (2

Model: 564121###



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

x 0.4381
 y 0.3969
 u' 0.2545
 v' 0.5187

CIE 13.3-1995
(CRI)
 R_a 86
 R_9 21

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	0.0023	447	0.3824	514	0.4178	581	0.8328	648	0.6416	715	0.1063
381	0.0010	448	0.4224	515	0.4212	582	0.8401	649	0.6307	716	0.1031
382	0.0018	449	0.4635	516	0.4267	583	0.8503	650	0.6193	717	0.1006
383	0.0024	450	0.4991	517	0.4304	584	0.8582	651	0.6066	718	0.0968
384	0.0017	451	0.5271	518	0.4338	585	0.8694	652	0.5954	719	0.0941
385	0.0019	452	0.5460	519	0.4386	586	0.8777	653	0.5838	720	0.0912
386	0.0010	453	0.5546	520	0.4423	587	0.8875	654	0.5716	721	0.0879
387	0.0010	454	0.5510	521	0.4472	588	0.8954	655	0.5613	722	0.0853
388	0.0016	455	0.5399	522	0.4505	589	0.9035	656	0.5494	723	0.0830
389	0.0021	456	0.5218	523	0.4529	590	0.9128	657	0.5382	724	0.0806
390	0.0011	457	0.4945	524	0.4555	591	0.9244	658	0.5266	725	0.0776
391	0.0005	458	0.4659	525	0.4594	592	0.9300	659	0.5159	726	0.0754
392	0.0013	459	0.4384	526	0.4639	593	0.9388	660	0.5045	727	0.0732
393	0.0010	460	0.4152	527	0.4662	594	0.9468	661	0.4923	728	0.0709
394	0.0008	461	0.3917	528	0.4696	595	0.9510	662	0.4803	729	0.0687
395	0.0018	462	0.3752	529	0.4711	596	0.9565	663	0.4701	730	0.0658
396	0.0007	463	0.3650	530	0.4753	597	0.9618	664	0.4584	731	0.0636
397	0.0014	464	0.3547	531	0.4767	598	0.9706	665	0.4475	732	0.0622
398	0.0017	465	0.3439	532	0.4802	599	0.9754	666	0.4362	733	0.0601
399	0.0016	466	0.3347	533	0.4835	600	0.9825	667	0.4238	734	0.0583
400	0.0016	467	0.3263	534	0.4875	601	0.9847	668	0.4145	735	0.0565
401	0.0016	468	0.3159	535	0.4891	602	0.9888	669	0.4066	736	0.0547
402	0.0018	469	0.3060	536	0.4923	603	0.9931	670	0.3952	737	0.0530
403	0.0026	470	0.2931	537	0.4948	604	0.9925	671	0.3845	738	0.0509
404	0.0020	471	0.2794	538	0.4995	605	0.9962	672	0.3764	739	0.0497
405	0.0023	472	0.2662	539	0.5047	606	0.9961	673	0.3655	740	0.0480
406	0.0028	473	0.2566	540	0.5070	607	0.9975	674	0.3581	741	0.0465
407	0.0023	474	0.2453	541	0.5108	608	0.9980	675	0.3493	742	0.0453
408	0.0030	475	0.2389	542	0.5155	609	0.9983	676	0.3395	743	0.0434
409	0.0029	476	0.2308	543	0.5216	610	0.9995	677	0.3297	744	0.0423
410	0.0030	477	0.2249	544	0.5253	611	0.9972	678	0.3216	745	0.0410
411	0.0041	478	0.2224	545	0.5284	612	0.9959	679	0.3132	746	0.0398
412	0.0045	479	0.2206	546	0.5341	613	0.9914	680	0.3049	747	0.0386
413	0.0057	480	0.2195	547	0.5380	614	0.9881	681	0.2961	748	0.0375
414	0.0065	481	0.2209	548	0.5448	615	0.9831	682	0.2888	749	0.0361
415	0.0082	482	0.2216	549	0.5511	616	0.9770	683	0.2805	750	0.0355
416	0.0092	483	0.2250	550	0.5563	617	0.9705	684	0.2724	751	0.0345
417	0.0103	484	0.2290	551	0.5603	618	0.9630	685	0.2638	752	0.0329
418	0.0122	485	0.2327	552	0.5679	619	0.9561	686	0.2578	753	0.0319
419	0.0138	486	0.2371	553	0.5748	620	0.9499	687	0.2510	754	0.0311
420	0.0162	487	0.2412	554	0.5805	621	0.9422	688	0.2427	755	0.0301
421	0.0183	488	0.2467	555	0.5882	622	0.9326	689	0.2373	756	0.0297
422	0.0204	489	0.2538	556	0.5969	623	0.9269	690	0.2297	757	0.0285
423	0.0234	490	0.2592	557	0.6030	624	0.9166	691	0.2220	758	0.0275
424	0.0259	491	0.2651	558	0.6100	625	0.9071	692	0.2163	759	0.0267
425	0.0297	492	0.2713	559	0.6180	626	0.8978	693	0.2099	760	0.0264
426	0.0340	493	0.2782	560	0.6265	627	0.8877	694	0.2039	761	0.0252
427	0.0380	494	0.2849	561	0.6360	628	0.8799	695	0.1978	762	0.0243
428	0.0428	495	0.2916	562	0.6434	629	0.8679	696	0.1922	763	0.0240
429	0.0480	496	0.3010	563	0.6520	630	0.8580	697	0.1859	764	0.0229
430	0.0546	497	0.3085	564	0.6610	631	0.8467	698	0.1802	765	0.0225
431	0.0617	498	0.3175	565	0.6690	632	0.8355	699	0.1749	766	0.0218
432	0.0685	499	0.3251	566	0.6805	633	0.8268	700	0.1694	767	0.0208
433	0.0764	500	0.3327	567	0.6904	634	0.8139	701	0.1647	768	0.0203
434	0.0852	501	0.3409	568	0.7004	635	0.8014	702	0.1598	769	0.0196
435	0.0957	502	0.3479	569	0.7113	636	0.7931	703	0.1547	770	0.0191
436	0.1063	503	0.3547	570	0.7189	637	0.7811	704	0.1495	771	0.0183
437	0.1185	504	0.3613	571	0.7293	638	0.7694	705	0.1454	772	0.0181
438	0.1325	505	0.3683	572	0.7369	639	0.7563	706	0.1413	773	0.0174
439	0.1487	506	0.3747	573	0.7478	640	0.7458	707	0.1366	774	0.0169
440	0.1663	507	0.3816	574	0.7565	641	0.7259	708	0.1323	775	0.0163
441	0.1879	508	0.3875	575	0.7678	642	0.7134	709	0.1283	776	0.0158
442	0.2099	509	0.3940	576	0.7778	643	0.7014	710	0.1250	777	0.0153
443	0.2362	510	0.4011	577	0.7863	644	0.6898	711	0.1207	778	0.0149
444	0.2688	511	0.4059	578	0.7992	645	0.6778	712	0.1176	779	0.0147
445	0.3039	512	0.4089	579	0.8091	646	0.6667	713	0.1136	780	0.0147
446	0.3437	513	0.4148	580	0.8199	647	0.6549	714	0.1100	N/A	N/A

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

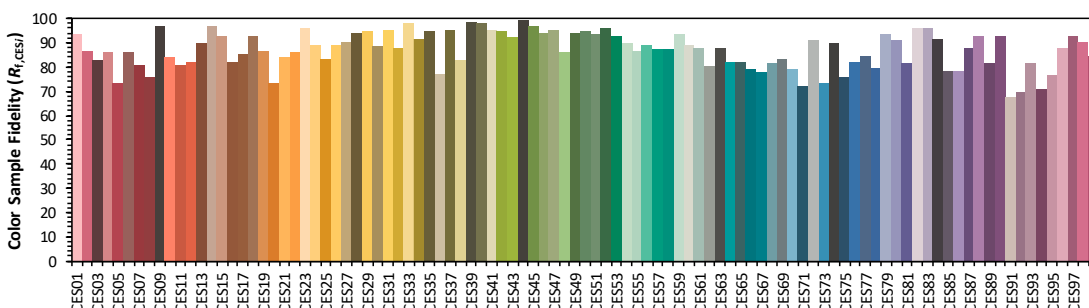
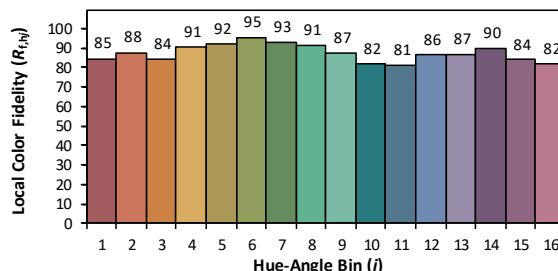
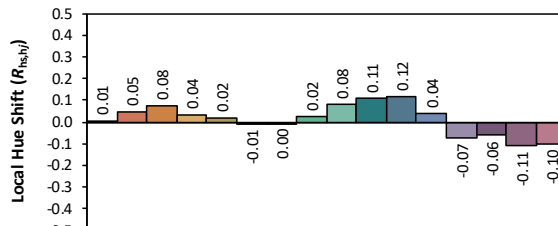
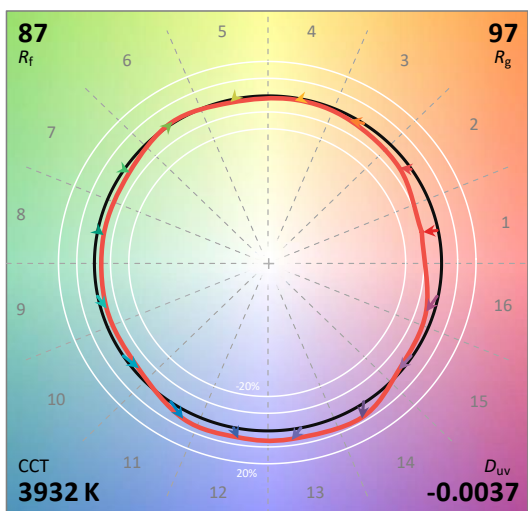
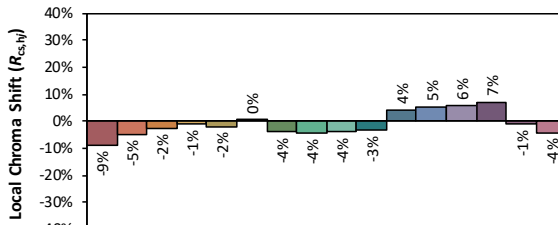
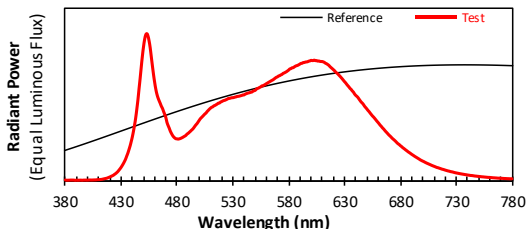
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Date: 2021/1/5

Manufacturer: ETI Solid State Lighting (2

Model: 564121###



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

x 0.3808
 y 0.3692
 u' 0.2284
 v' 0.4983

CIE 13.3-1995
(CRI)
 R_a 89
 R_9 36

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	0.0037	447	0.6929	514	0.5088	581	0.7559	648	0.5033	715	0.0832
381	0.0017	448	0.7702	515	0.5137	582	0.7580	649	0.4944	716	0.0809
382	0.0019	449	0.8432	516	0.5180	583	0.7635	650	0.4854	717	0.0778
383	0.0021	450	0.9064	517	0.5241	584	0.7645	651	0.4754	718	0.0758
384	0.0024	451	0.9556	518	0.5248	585	0.7695	652	0.4672	719	0.0737
385	0.0031	452	0.9872	519	0.5316	586	0.7744	653	0.4570	720	0.0711
386	0.0027	453	0.9953	520	0.5346	587	0.7778	654	0.4476	721	0.0688
387	0.0029	454	0.9798	521	0.5391	588	0.7801	655	0.4381	722	0.0665
388	0.0022	455	0.9459	522	0.5421	589	0.7841	656	0.4304	723	0.0645
389	0.0012	456	0.8989	523	0.5440	590	0.7886	657	0.4216	724	0.0628
390	0.0022	457	0.8367	524	0.5478	591	0.7934	658	0.4122	725	0.0604
391	0.0015	458	0.7757	525	0.5512	592	0.7943	659	0.4027	726	0.0591
392	0.0020	459	0.7166	526	0.5557	593	0.7990	660	0.3939	727	0.0574
393	0.0021	460	0.6645	527	0.5563	594	0.7997	661	0.3847	728	0.0552
394	0.0026	461	0.6196	528	0.5589	595	0.8024	662	0.3748	729	0.0531
395	0.0015	462	0.5851	529	0.5608	596	0.8036	663	0.3669	730	0.0515
396	0.0025	463	0.5602	530	0.5613	597	0.8049	664	0.3572	731	0.0500
397	0.0026	464	0.5404	531	0.5629	598	0.8087	665	0.3496	732	0.0485
398	0.0029	465	0.5225	532	0.5654	599	0.8101	666	0.3405	733	0.0469
399	0.0023	466	0.5030	533	0.5670	600	0.8140	667	0.3316	734	0.0455
400	0.0025	467	0.4887	534	0.5699	601	0.8127	668	0.3238	735	0.0442
401	0.0030	468	0.4674	535	0.5706	602	0.8129	669	0.3152	736	0.0428
402	0.0036	469	0.4483	536	0.5721	603	0.8156	670	0.3071	737	0.0416
403	0.0031	470	0.4268	537	0.5745	604	0.8121	671	0.3003	738	0.0402
404	0.0032	471	0.3944	538	0.5765	605	0.8127	672	0.2924	739	0.0391
405	0.0036	472	0.3732	539	0.5799	606	0.8092	673	0.2845	740	0.0377
406	0.0040	473	0.3554	540	0.5798	607	0.8099	674	0.2780	741	0.0364
407	0.0041	474	0.3350	541	0.5851	608	0.8074	675	0.2714	742	0.0353
408	0.0049	475	0.3196	542	0.5881	609	0.8063	676	0.2640	743	0.0341
409	0.0056	476	0.3058	543	0.5910	610	0.8062	677	0.2561	744	0.0337
410	0.0057	477	0.2956	544	0.5934	611	0.8039	678	0.2490	745	0.0327
411	0.0064	478	0.2884	545	0.5950	612	0.8003	679	0.2439	746	0.0315
412	0.0073	479	0.2831	546	0.5980	613	0.7947	680	0.2365	747	0.0302
413	0.0083	480	0.2823	547	0.5994	614	0.7911	681	0.2309	748	0.0296
414	0.0103	481	0.2806	548	0.6047	615	0.7861	682	0.2239	749	0.0285
415	0.0119	482	0.2823	549	0.6084	616	0.7804	683	0.2182	750	0.0279
416	0.0138	483	0.2845	550	0.6107	617	0.7720	684	0.2123	751	0.0269
417	0.0154	484	0.2881	551	0.6184	618	0.7651	685	0.2061	752	0.0263
418	0.0182	485	0.2919	552	0.6234	619	0.7585	686	0.2007	753	0.0251
419	0.0213	486	0.2965	553	0.6262	620	0.7515	687	0.1945	754	0.0248
420	0.0244	487	0.3010	554	0.6310	621	0.7446	688	0.1896	755	0.0238
421	0.0281	488	0.3061	555	0.6346	622	0.7358	689	0.1843	756	0.0231
422	0.0318	489	0.3146	556	0.6408	623	0.7291	690	0.1787	757	0.0224
423	0.0356	490	0.3196	557	0.6425	624	0.7225	691	0.1735	758	0.0216
424	0.0414	491	0.3267	558	0.6463	625	0.7143	692	0.1686	759	0.0209
425	0.0467	492	0.3334	559	0.6507	626	0.7063	693	0.1633	760	0.0208
426	0.0533	493	0.3411	560	0.6558	627	0.6977	694	0.1587	761	0.0200
427	0.0606	494	0.3479	561	0.6603	628	0.6890	695	0.1540	762	0.0195
428	0.0700	495	0.3571	562	0.6651	629	0.6796	696	0.1494	763	0.0185
429	0.0796	496	0.3678	563	0.6694	630	0.6703	697	0.1447	764	0.0182
430	0.0901	497	0.3777	564	0.6739	631	0.6621	698	0.1396	765	0.0175
431	0.1022	498	0.3864	565	0.6784	632	0.6520	699	0.1356	766	0.0171
432	0.1152	499	0.3976	566	0.6824	633	0.6428	700	0.1317	767	0.0163
433	0.1297	500	0.4089	567	0.6881	634	0.6341	701	0.1283	768	0.0158
434	0.1458	501	0.4196	568	0.6939	635	0.6241	702	0.1241	769	0.0154
435	0.1662	502	0.4272	569	0.6994	636	0.6171	703	0.1203	770	0.0150
436	0.1857	503	0.4350	570	0.7025	637	0.6069	704	0.1167	771	0.0148
437	0.2098	504	0.4430	571	0.7084	638	0.5992	705	0.1134	772	0.0142
438	0.2348	505	0.4511	572	0.7106	639	0.5869	706	0.1099	773	0.0136
439	0.2639	506	0.4574	573	0.7158	640	0.5777	707	0.1067	774	0.0134
440	0.2959	507	0.4673	574	0.7187	641	0.5708	708	0.1032	775	0.0130
441	0.3338	508	0.4751	575	0.7256	642	0.5631	709	0.1000	776	0.0125
442	0.3764	509	0.4833	576	0.7287	643	0.5523	710	0.0970	777	0.0124
443	0.4243	510	0.4902	577	0.7330	644	0.5416	711	0.0940	778	0.0119
444	0.4828	511	0.4961	578	0.7371	645	0.5316	712	0.0907	779	0.0118
445	0.5462	512	0.4992	579	0.7427	646	0.5243	713	0.0879	780	0.0118
446	0.6211	513	0.5059	580	0.7483	647	0.5149	714	0.0861	N/A	N/A

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

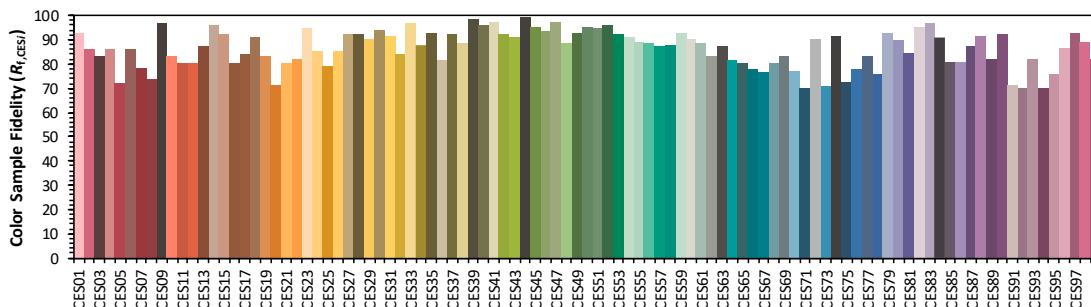
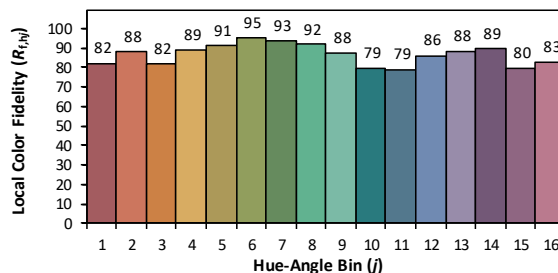
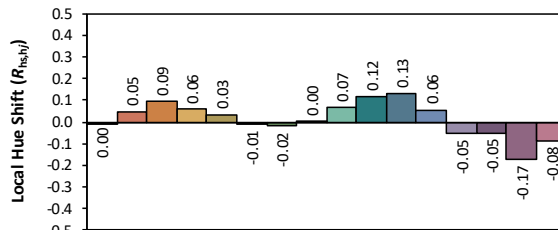
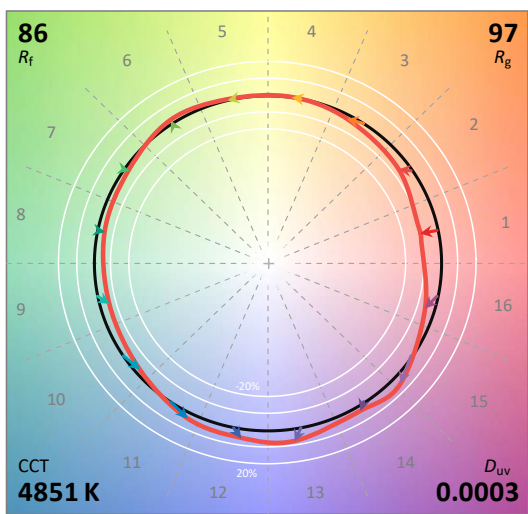
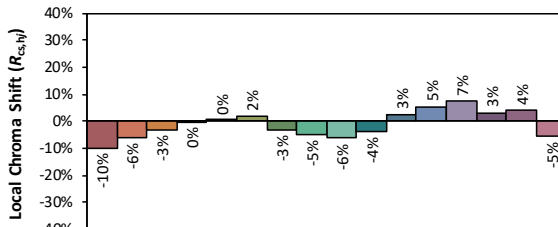
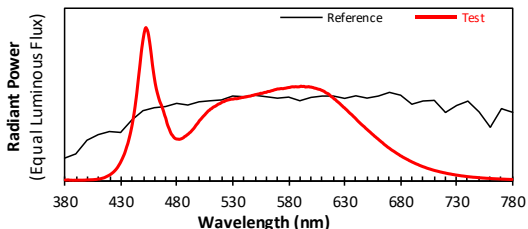
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Date: 2021/1/5

Manufacturer: ETI Solid State Lighting (2

Model: 564121###



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

x 0.3495
 y 0.3556
 u' 0.2128
 v' 0.4873

CIE 13.3-1995
(CRI)

R_a 87
 R_9 29

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	0.0054	447	0.7679	514	0.4859	581	0.6097	648	0.3510	715	0.0594
381	0.0047	448	0.8370	515	0.4901	582	0.6120	649	0.3429	716	0.0573
382	0.0057	449	0.8924	516	0.4954	583	0.6135	650	0.3369	717	0.0560
383	0.0056	450	0.9404	517	0.5005	584	0.6138	651	0.3302	718	0.0540
384	0.0035	451	0.9784	518	0.5028	585	0.6129	652	0.3238	719	0.0526
385	0.0041	452	1.0000	519	0.5065	586	0.6144	653	0.3177	720	0.0512
386	0.0035	453	0.9901	520	0.5115	587	0.6137	654	0.3106	721	0.0494
387	0.0029	454	0.9711	521	0.5159	588	0.6132	655	0.3040	722	0.0479
388	0.0037	455	0.9299	522	0.5166	589	0.6135	656	0.2981	723	0.0464
389	0.0035	456	0.8794	523	0.5209	590	0.6146	657	0.2907	724	0.0451
390	0.0034	457	0.8214	524	0.5242	591	0.6179	658	0.2855	725	0.0441
391	0.0036	458	0.7590	525	0.5262	592	0.6157	659	0.2786	726	0.0425
392	0.0039	459	0.7068	526	0.5283	593	0.6161	660	0.2735	727	0.0410
393	0.0037	460	0.6586	527	0.5299	594	0.6161	661	0.2663	728	0.0401
394	0.0040	461	0.6175	528	0.5318	595	0.6123	662	0.2608	729	0.0385
395	0.0036	462	0.5847	529	0.5333	596	0.6133	663	0.2541	730	0.0374
396	0.0041	463	0.5575	530	0.5332	597	0.6132	664	0.2491	731	0.0364
397	0.0041	464	0.5315	531	0.5346	598	0.6149	665	0.2418	732	0.0353
398	0.0047	465	0.5106	532	0.5364	599	0.6119	666	0.2355	733	0.0341
399	0.0052	466	0.4943	533	0.5357	600	0.6121	667	0.2301	734	0.0330
400	0.0058	467	0.4741	534	0.5364	601	0.6101	668	0.2241	735	0.0318
401	0.0056	468	0.4525	535	0.5378	602	0.6086	669	0.2183	736	0.0312
402	0.0063	469	0.4267	536	0.5403	603	0.6054	670	0.2137	737	0.0302
403	0.0064	470	0.4074	537	0.5412	604	0.6043	671	0.2082	738	0.0293
404	0.0067	471	0.3778	538	0.5439	605	0.6020	672	0.2025	739	0.0282
405	0.0071	472	0.3563	539	0.5439	606	0.5995	673	0.1977	740	0.0273
406	0.0078	473	0.3394	540	0.5457	607	0.5975	674	0.1934	741	0.0265
407	0.0084	474	0.3203	541	0.5468	608	0.5964	675	0.1885	742	0.0258
408	0.0093	475	0.3047	542	0.5481	609	0.5926	676	0.1835	743	0.0248
409	0.0103	476	0.2960	543	0.5497	610	0.5897	677	0.1785	744	0.0243
410	0.0116	477	0.2855	544	0.5515	611	0.5864	678	0.1740	745	0.0233
411	0.0127	478	0.2782	545	0.5525	612	0.5828	679	0.1697	746	0.0228
412	0.0141	479	0.2742	546	0.5536	613	0.5766	680	0.1638	747	0.0224
413	0.0163	480	0.2723	547	0.5567	614	0.5725	681	0.1607	748	0.0218
414	0.0182	481	0.2719	548	0.5581	615	0.5698	682	0.1556	749	0.0212
415	0.0206	482	0.2706	549	0.5600	616	0.5652	683	0.1518	750	0.0201
416	0.0241	483	0.2723	550	0.5624	617	0.5583	684	0.1478	751	0.0197
417	0.0278	484	0.2746	551	0.5635	618	0.5512	685	0.1441	752	0.0191
418	0.0312	485	0.2782	552	0.5654	619	0.5466	686	0.1400	753	0.0186
419	0.0352	486	0.2826	553	0.5667	620	0.5405	687	0.1367	754	0.0179
420	0.0392	487	0.2896	554	0.5684	621	0.5333	688	0.1317	755	0.0175
421	0.0445	488	0.2928	555	0.5717	622	0.5294	689	0.1286	756	0.0170
422	0.0501	489	0.2998	556	0.5705	623	0.5212	690	0.1247	757	0.0163
423	0.0562	490	0.3043	557	0.5732	624	0.5157	691	0.1211	758	0.0161
424	0.0632	491	0.3119	558	0.5758	625	0.5095	692	0.1180	759	0.0158
425	0.0711	492	0.3172	559	0.5775	626	0.5032	693	0.1144	760	0.0153
426	0.0798	493	0.3253	560	0.5774	627	0.4956	694	0.1110	761	0.0147
427	0.0901	494	0.3336	561	0.5821	628	0.4892	695	0.1081	762	0.0142
428	0.1024	495	0.3414	562	0.5831	629	0.4815	696	0.1053	763	0.0137
429	0.1144	496	0.3514	563	0.5836	630	0.4763	697	0.1015	764	0.0134
430	0.1289	497	0.3622	564	0.5864	631	0.4690	698	0.0985	765	0.0130
431	0.1439	498	0.3710	565	0.5886	632	0.4627	699	0.0957	766	0.0126
432	0.1605	499	0.3799	566	0.5903	633	0.4551	700	0.0928	767	0.0124
433	0.1774	500	0.3916	567	0.5933	634	0.4475	701	0.0903	768	0.0120
434	0.1991	501	0.3994	568	0.5953	635	0.4405	702	0.0879	769	0.0114
435	0.2228	502	0.4075	569	0.5970	636	0.4347	703	0.0849	770	0.0112
436	0.2441	503	0.4163	570	0.5995	637	0.4281	704	0.0821	771	0.0109
437	0.2724	504	0.4241	571	0.5996	638	0.4204	705	0.0799	772	0.0106
438	0.3022	505	0.4314	572	0.6005	639	0.4138	706	0.0776	773	0.0104
439	0.3354	506	0.4402	573	0.6020	640	0.4065	707	0.0756	774	0.0100
440	0.3719	507	0.4477	574	0.6020	641	0.3983	708	0.0730	775	0.0097
441	0.4156	508	0.4560	575	0.6012	642	0.3905	709	0.0708	776	0.0094
442	0.4606	509	0.4604	576	0.6035	643	0.3835	710	0.0686	777	0.0092
443	0.5154	510	0.4680	577	0.6043	644	0.3765	711	0.0667	778	0.0088
444	0.5723	511	0.4713	578	0.6060	645	0.3696	712	0.0648	779	0.0087
445	0.6396	512	0.4781	579	0.6077	646	0.3632	713	0.0631	780	0.0088
446	0.7037	513	0.4827	580	0.6090	647	0.3569	714	0.0612	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:

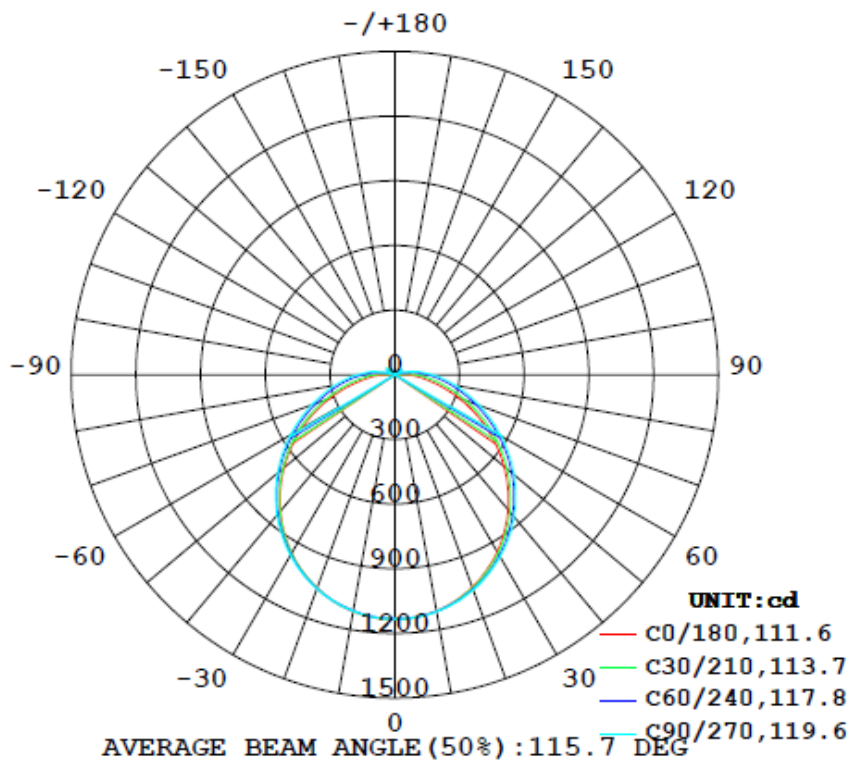
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60	0.3812	41.46	0.9049

Goniophotometer Data:

Parameter	Results
Total Luminous (lm)	3736.9
Luminous Efficacy (lm/w)	90.13
Zonal Lumens Distribution (0-60°)	69.2%
Beam Angle (°)	115.7

Luminous Intensity Distribution Diagram:

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM

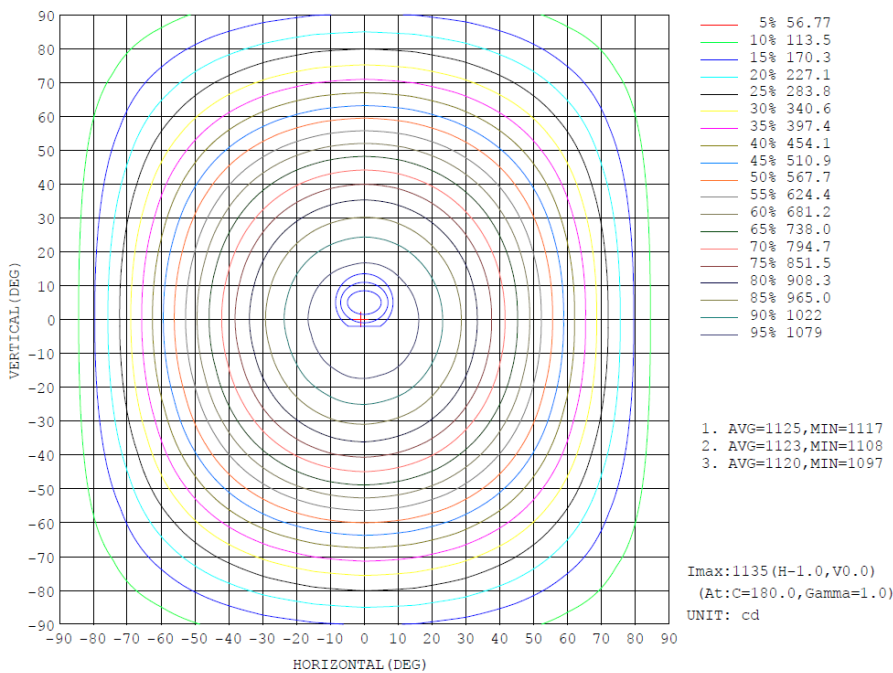


Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	zone	total	%lum, lamp
10	1112	1114	1116	1114	1115	1114	1113	1111	0- 10	107.2	107.2	2.87,2.87
20	1049	1057	1062	1057	1054	1055	1057	1051	10- 20	307.3	414.5	11.1,11.1
30	949.4	963.1	975.6	964.7	955.7	961.0	967.3	955.9	20- 30	466.5	881.0	23.6,23.6
40	817.3	839.4	860.8	842.5	825.6	837.2	850.3	832.2	30- 40	564.9	1446	38.7,38.7
50	661.4	693.9	722.1	696.2	670.7	690.9	710.7	686.2	40- 50	591.7	2038	54.5,54.5
60	490.6	534.2	568.4	533.7	498.8	530.2	559.3	526.8	50- 60	547.1	2585	69.2,69.2
70	315.9	374.2	417.9	369.5	322.0	368.9	410.2	367.7	60- 70	443.9	3029	81,81
80	163.8	234.7	285.3	227.7	164.0	230.3	282.9	230.7	70- 80	311.6	3340	89.4,89.4
90	66.38	127.3	173.8	120.2	64.16	125.7	174.5	127.4	80- 90	187.4	3528	94.4,94.4
100	12.45	39.29	94.66	35.50	7.030	32.70	87.55	27.32	90-100	87.49	3615	96.7,96.7
110	23.46	16.94	28.17	14.57	22.46	21.10	17.24	27.72	100-110	31.27	3646	97.6,97.6
120	16.34	36.73	22.08	31.73	16.51	40.98	39.30	39.69	110-120	24.40	3671	98.2,98.2
130	11.04	32.26	40.97	28.67	11.21	32.13	49.19	30.67	120-130	27.69	3698	99,99
140	7.440	21.05	33.64	18.82	6.895	21.65	34.57	20.45	130-140	19.89	3718	99.5,99.5
150	5.702	13.40	18.30	11.93	6.615	13.01	19.68	13.51	140-150	10.65	3729	99.8,99.8
160	6.045	10.47	10.99	10.47	6.740	7.027	11.56	11.24	150-160	5.143	3734	99.9,99.9
170	5.126	6.632	5.304	5.130	5.213	7.204	6.222	6.907	160-170	2.238	3736	100,100
180	5.635	5.220	5.831	5.238	5.540	5.319	4.798	3.948	170-180	0.5405	3737	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

Isocandela Diagram:



Luminous Distribution Intensity Data:

Table--1

UNIT: cd

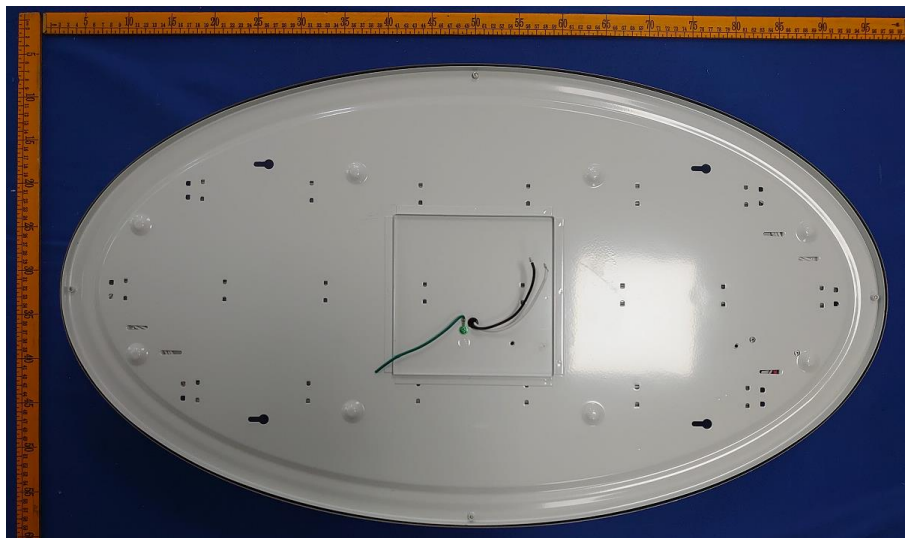
C (DEG) γ (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270
0	1135	1135	1135	1134	1132	1133	1133	1134	1132	1132	1132	1133	1135	1135	1135	1134	1132	1133	1133
5	1130	1130	1129	1129	1129	1129	1129	1130	1128	1128	1127	1128	1130	1130	1130	1130	1127	1126	1128
10	1112	1114	1114	1114	1114	1113	1116	1116	1114	1114	1113	1112	1115	1113	1114	1114	1111	1112	1113
15	1085	1087	1088	1089	1090	1090	1094	1094	1091	1090	1089	1087	1090	1089	1089	1089	1088	1087	1089
20	1049	1051	1053	1057	1059	1059	1062	1062	1058	1057	1054	1052	1054	1053	1054	1055	1055	1054	1057
25	1004	1005	1009	1014	1018	1019	1023	1022	1019	1015	1009	1007	1009	1008	1010	1012	1013	1014	1016
30	949	951	956	963	969	972	976	975	970	965	957	954	956	956	958	961	964	965	967
35	886	890	896	904	912	918	922	920	914	907	898	892	894	894	898	902	906	910	912
40	817	821	829	839	850	856	861	859	852	843	831	824	826	826	830	837	843	848	850
45	741	746	757	768	782	789	794	791	783	772	759	749	751	751	758	766	775	780	782
50	661	665	679	694	709	717	722	719	709	696	681	670	671	672	680	691	700	708	711
55	577	582	598	615	632	641	646	642	631	616	599	586	586	589	598	612	623	632	636
60	491	497	514	534	553	564	568	563	551	534	514	499	499	502	514	530	545	555	559
65	403	410	430	453	474	487	492	485	471	450	428	410	410	415	429	448	465	478	483
70	316	325	348	374	397	412	418	410	393	370	344	323	322	328	346	369	390	405	410
75	235	245	271	301	327	343	349	340	321	295	265	241	238	246	268	296	320	337	343
80	164	175	203	235	263	280	285	277	257	228	196	170	164	174	199	230	258	276	283
85	107	118	145	177	205	222	228	219	199	170	138	113	106	117	143	174	201	220	226
90	66.4	75.4	99.2	127	153	169	174	165	147	120	92.2	69.4	64.2	73.8	97.2	126	151	168	175
95	24.5	26.2	53.8	88.9	113	127	131	123	106	78.9	44.8	23.7	30.6	34.1	56.2	87.6	112	127	133
100	12.5	15.4	15.2	39.3	71.1	90.3	94.7	85.9	64.5	35.5	14.7	11.0	7.03	10.3	13.0	32.7	61.8	82.3	87.6
105	29.1	26.1	23.8	19.7	35.4	49.8	54.3	48.1	33.2	17.5	19.0	21.5	26.6	23.9	22.0	13.4	23.3	34.0	37.9
110	23.5	22.7	28.9	16.9	15.2	23.6	28.2	22.5	13.1	14.6	25.4	20.4	22.5	21.6	30.0	21.1	12.6	14.4	17.2
115	19.5	20.5	32.1	29.1	19.0	15.5	15.2	13.6	15.8	25.4	28.6	18.8	19.0	20.2	30.9	37.4	28.0	22.7	22.8
120	16.3	18.7	30.7	36.7	30.1	24.5	22.1	22.5	26.7	31.7	27.0	17.2	16.5	19.1	29.4	41.0	42.4	39.3	39.3
125	14.1	16.3	27.6	36.5	38.9	37.1	34.8	34.5	34.5	31.9	24.0	15.4	14.3	17.3	26.9	36.6	45.5	49.2	50.4
130	11.0	15.1	22.7	32.3	39.2	41.4	41.0	39.1	35.5	28.7	19.7	13.9	11.2	15.8	22.1	32.1	40.5	47.2	49.2
135	8.87	12.6	19.0	27.5	35.1	39.1	39.2	37.1	32.3	24.5	16.5	11.5	8.49	13.0	19.1	27.6	34.8	40.0	41.5
140	7.44	9.61	15.5	21.0	29.1	33.1	33.6	31.3	26.9	18.8	14.0	7.88	6.89	9.40	15.3	21.7	29.0	33.2	34.6
145	6.33	5.98	12.9	18.1	21.8	25.8	26.7	24.8	20.4	16.3	11.1	5.09	7.31	7.18	12.4	18.2	21.9	26.3	27.6
150	5.70	5.83	10.8	13.4	17.6	18.1	18.3	17.5	16.5	11.9	10.3	5.76	6.61	7.77	11.1	13.0	17.7	19.0	19.7
155	6.04	7.63	8.95	11.1	12.6	14.7	16.2	15.2	12.2	10.5	8.94	6.17	5.67	7.30	7.59	11.9	12.4	15.0	15.7
160	6.05	7.19	5.11	10.5	11.8	11.3	11.0	11.1	11.9	10.5	5.04	7.59	6.74	7.25	7.10	7.03	11.6	11.3	11.6
165	5.95	7.48	7.32	5.97	8.53	10.3	11.0	10.5	8.60	5.69	6.71	6.90	6.53	6.46	7.95	7.41	6.55	8.45	9.36
170	5.13	5.98	6.58	6.63	6.01	5.81	5.30	5.38	5.68	5.13	6.56	6.25	5.21	5.00	5.97	7.20	6.49	6.37	6.22
175	4.26	5.08	5.42	6.17	6.08	6.22	6.46	6.24	5.70	5.89	4.92	4.34	3.79	3.82	3.98	4.38	5.57	5.76	6.09
180	5.64	5.13	6.38	5.22	5.73	4.85	5.83	4.18	4.82	5.24	5.42	5.85	5.54	5.57	5.58	5.32	5.08	4.14	4.80

Table--2

UNIT: cd

C (DEG) γ (DEG)	285	300	315	330	345														
0	1134	1132	1132	1132	1133														
5	1128	1126	1126	1127	1127														
10	1112	1111	1111	1112	1111														
15	1088	1087	1086	1085	1085														
20	1056	1055	1051	1050	1049														
25	1015	1012	1008	1006	1005														
30	966	961	956	953	950														
35	910	904	897	892	889														
40	848	841	832	825	820														
45	780	772	762	752	746														
50	708	699	686	675	667														
55	633	622	607	594	584														
60	556	544	527	511	498														
65	478	465	446	426	411														
70	405	390	368	344	326														
75	338	321	296	268	246														
80	277	259	231	200	176														
85	220	203	175	144	119														
90	169	153	127	98.7	76.4														
95	128	111	79.4	41.8	26.3														
100	77.1	52.5	27.3	17.6	14.0														
105	31.0	18.8	15.7	25.4	24.9														
110	16.3	18.0	27.7	31.2	22.6														
115	26.2	32.9	39.6	30.4	21.1														
120	41.6	44.3	39.7	28.1	19.1														
125	49.9	45.4	35.1	25.3	17.4														
130	47.4	40.2	30.7	20.3	15.0														
135	40.0	34.2	26.3	17.7	11.2														
140	33.0	28.5	20.4	13.7	8.18														
145	26.2	21.6	17.6	12.9	6.48														
150	18.9	18.1	13.5	11.3	7.04														
155	15.1	13.1	11.6	9.61	7.39														
160	11.9	11.9	11.2	6.69	6.75														
165	9.58	8.97	6.41	7.05	7.62														
170	6.98	6.95	6.91	6.79	6.34														
175	6.20	6.28	6.06	5.49	5.41														
180	5.14	4.54	3.95	5.13	5.27														

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*******