

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### ATG Electronics Corp.

9020 Rancho Park Court Rancho Cucamonga, CA 91730

**Test Model: RTUS22-S-40W-5K-PE**

<b>Report Type:</b>	Electrical and Photometric tests including: Input Current, Power, Power Factor, Luminous Flux, Luminous Efficacy, CRI, CCT, Chromaticity Coordinate, Spectral Power Distribution
<b>Test Engineer:</b>	Bill Xiong <i>Bill Xiong</i>
<b>Report Number:</b>	RSZ160630509-10A2
<b>Test Date:</b>	2016-07-04
<b>Report Date:</b>	2016-07-06
<b>Reviewed By:</b>	Jeanne Han/Safety Manager <i>Jeanne Han</i>
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008
<b>Test Facility:</b>	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
<b>Accreditation:</b>	The NVLAP Lab Code is 200707-0.

**STATEMENT:** This test may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). The test data was only valid for the test sample(s). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

## 1. Product Description

### General Information:

One sample was received on 2016-06-30 and used for testing.

Model Tested: RTUS22-S-40W-5K-PE  
Manufacturer: ATG Electronics Co.,Ltd  
Brand Name: ATG  
Product Designation: 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces  
Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120-277VAC 50/60Hz  
Rated Power: 40W  
Nominal CCT: 5000K  
Nominal Lumen Output: 5000 lm

## 2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition (This method is not in NVLAP accreditation scope)

## 3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2016-03-10	2017-03-09
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2015-07-24	2016-07-23
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2015-07-27	2016-07-26
Temperature/humidity/clock	Victor	VC230	EE023	0~40°C0~90%	2016-03-21	2017-03-20
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	30V/5A	2016-03-04	2017-03-03

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

## 4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%.

### Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

4 $\pi$  geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is U=1.8% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=20K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.8(K=2), at the 95% confidence level.

The uncertainty of power meter AC current U=0.19 % of rdg, AC Voltage U=0.15% of rdg, Power U=0.20% (K=2), at the 95% confidence level.

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## 5. Test Result

### [Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

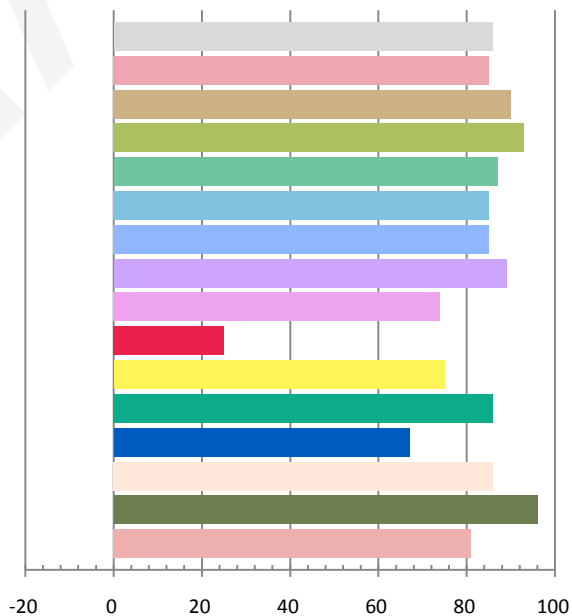
### Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.3397	40.56	0.9945	5133.2	126.57

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
16.505	4942	-0.00109	0.3465	0.3506	0.2128	0.4844

### Color Rendering Index

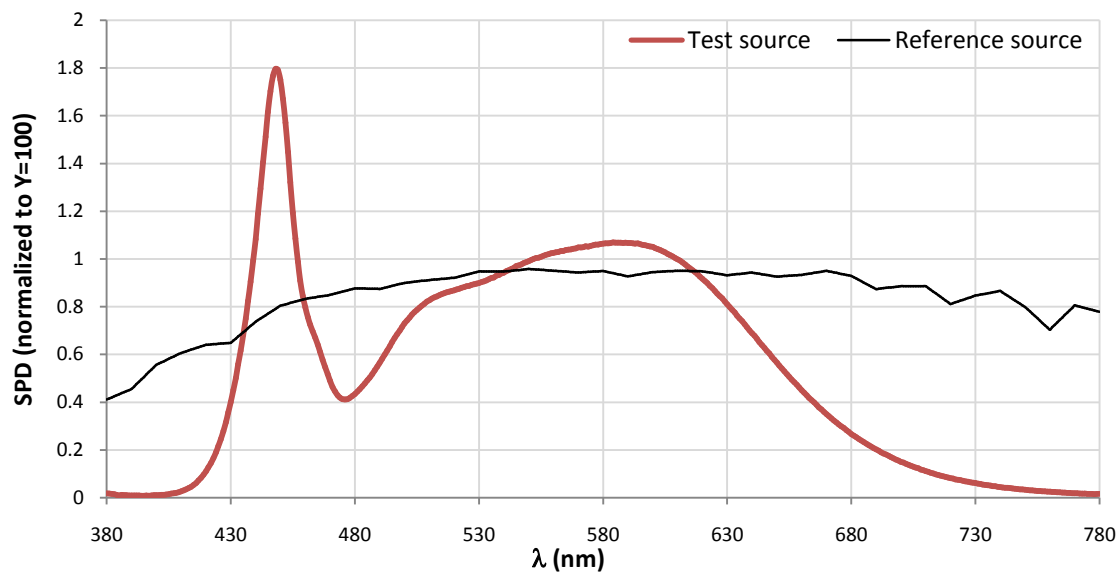
Ra			
85.9			
R1	R2	R3	R4
85	90	93	87
R5	R6	R7	R8
85	85	89	74
R9	R10	R11	R12
25	75	86	67
R13	R14	R15	
86	96	81	



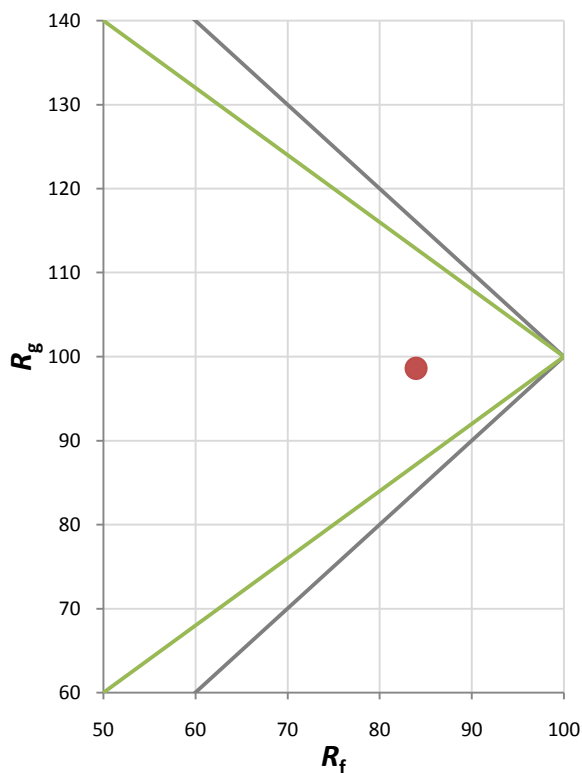
### Fidelity Index and Gamut Index

Fidelity Index $R_f$	84
Gamut Index $R_g$	99

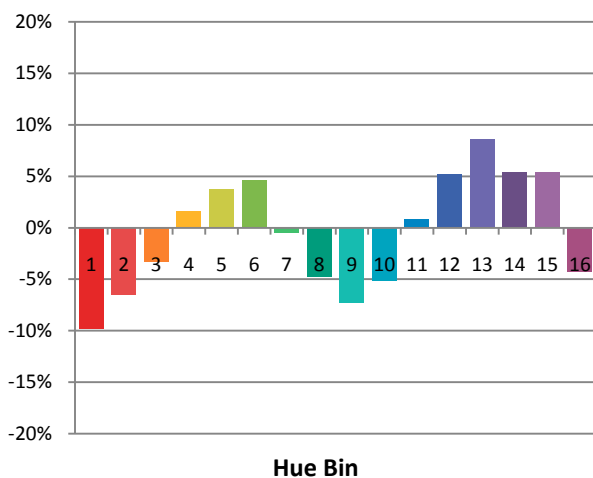
### Spectral Power Distribution Comparison



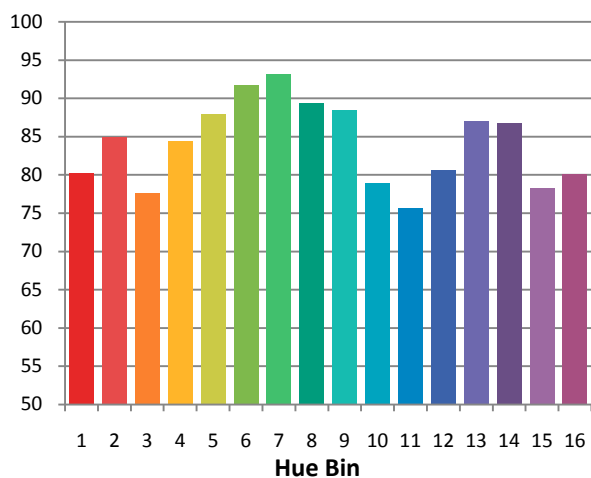
### Plot of $R_g$ versus $R_f$



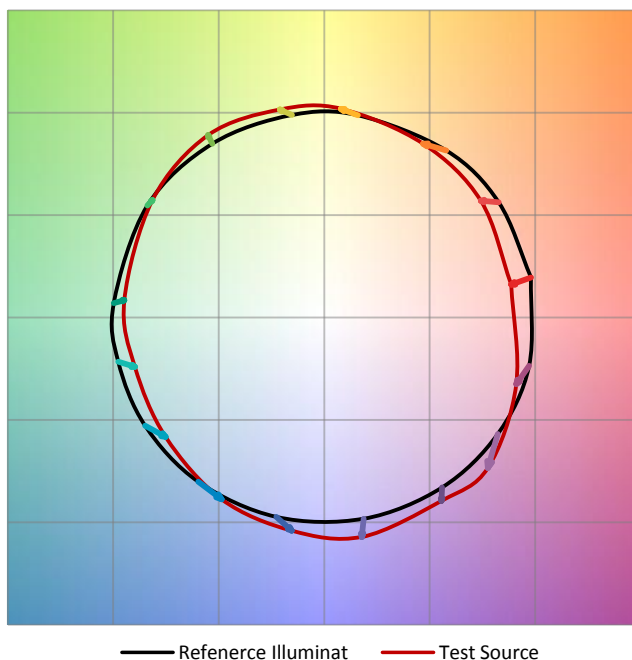
Chroma Shift by Hue



$R_f$  by Hue

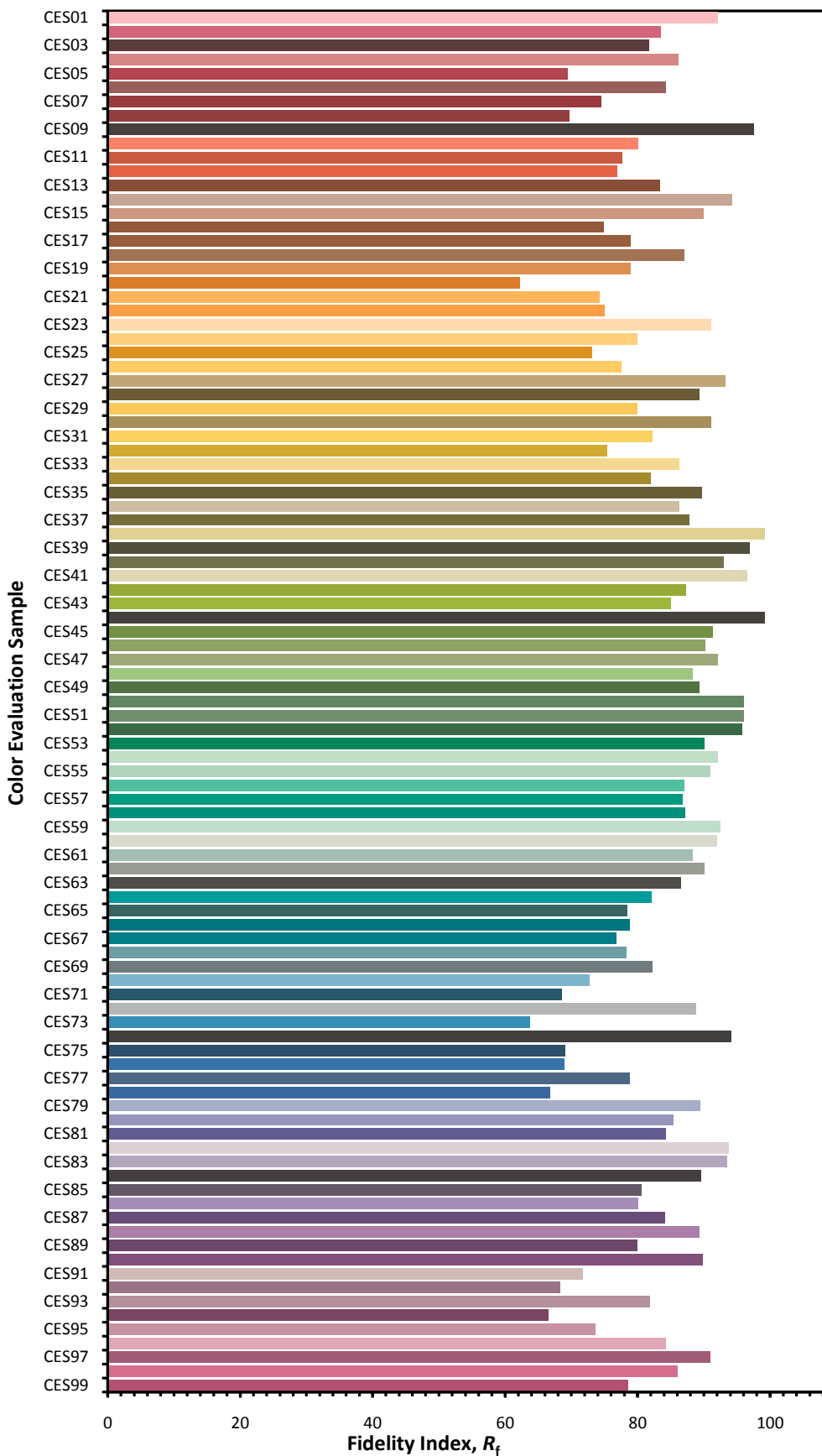


Color Vector Graphic

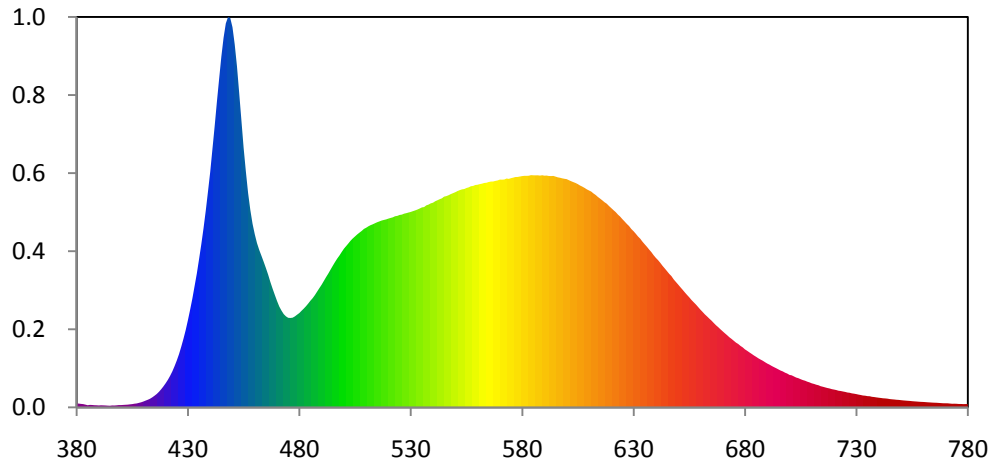


— Reference Illuminant — Test Source

### Color Fidelity by CES Sample



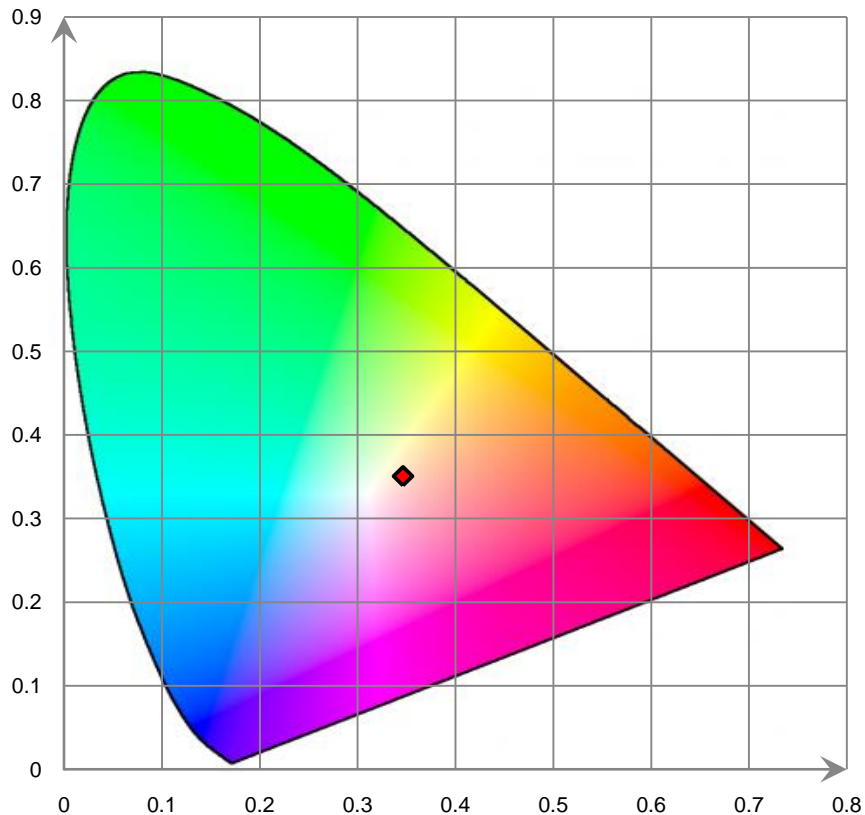
### Relative Spectral Power Distribution



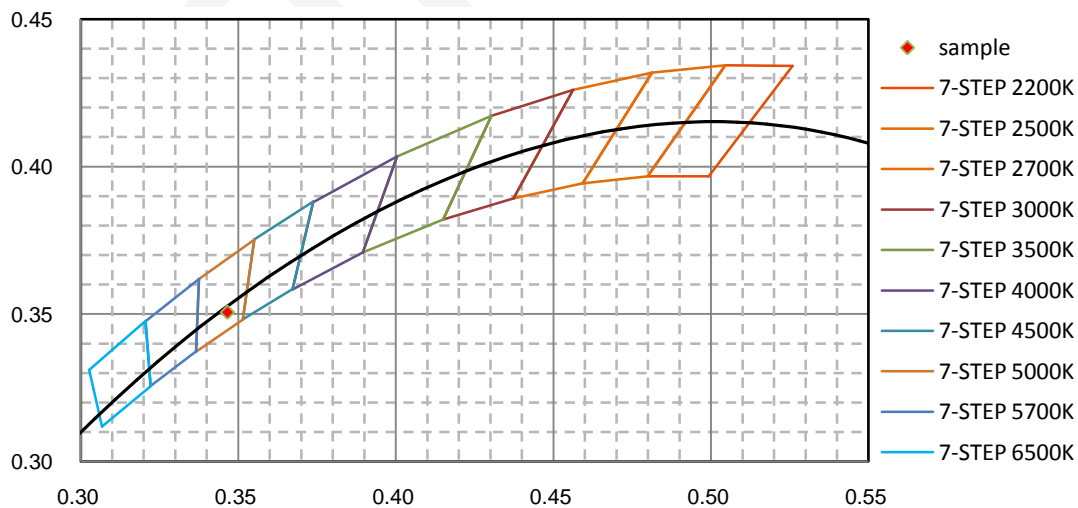
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.390E+00	421	9.549E+00	462	5.446E+01	503	5.766E+01	544	7.231E+01
381	1.310E+00	422	1.091E+01	463	5.241E+01	504	5.844E+01	545	7.290E+01
382	1.199E+00	423	1.245E+01	464	5.035E+01	505	5.914E+01	546	7.308E+01
383	1.139E+00	424	1.425E+01	465	4.818E+01	506	5.983E+01	547	7.339E+01
384	9.477E-01	425	1.623E+01	466	4.591E+01	507	6.045E+01	548	7.378E+01
385	7.468E-01	426	1.841E+01	467	4.337E+01	508	6.104E+01	549	7.410E+01
386	8.686E-01	427	2.099E+01	468	4.107E+01	509	6.173E+01	550	7.443E+01
387	8.265E-01	428	2.375E+01	469	3.889E+01	510	6.213E+01	551	7.482E+01
388	7.522E-01	429	2.675E+01	470	3.681E+01	511	6.263E+01	552	7.514E+01
389	7.258E-01	430	3.016E+01	471	3.489E+01	512	6.303E+01	553	7.540E+01
390	6.810E-01	431	3.382E+01	472	3.345E+01	513	6.334E+01	554	7.551E+01
391	7.233E-01	432	3.771E+01	473	3.225E+01	514	6.372E+01	555	7.587E+01
392	7.033E-01	433	4.200E+01	474	3.149E+01	515	6.405E+01	556	7.610E+01
393	6.629E-01	434	4.635E+01	475	3.098E+01	516	6.434E+01	557	7.648E+01
394	6.136E-01	435	5.129E+01	476	3.093E+01	517	6.463E+01	558	7.660E+01
395	5.729E-01	436	5.642E+01	477	3.102E+01	518	6.485E+01	559	7.692E+01
396	6.814E-01	437	6.192E+01	478	3.147E+01	519	6.503E+01	560	7.701E+01
397	6.457E-01	438	6.801E+01	479	3.206E+01	520	6.530E+01	561	7.722E+01
398	7.148E-01	439	7.461E+01	480	3.263E+01	521	6.553E+01	562	7.739E+01
399	7.955E-01	440	8.142E+01	481	3.342E+01	522	6.575E+01	563	7.762E+01
400	8.014E-01	441	8.930E+01	482	3.416E+01	523	6.611E+01	564	7.769E+01
401	8.469E-01	442	9.726E+01	483	3.500E+01	524	6.624E+01	565	7.795E+01
402	9.116E-01	443	1.057E+02	484	3.592E+01	525	6.655E+01	566	7.810E+01
403	9.414E-01	444	1.136E+02	485	3.692E+01	526	6.667E+01	567	7.812E+01
404	1.047E+00	445	1.214E+02	486	3.779E+01	527	6.700E+01	568	7.833E+01
405	1.134E+00	446	1.279E+02	487	3.886E+01	528	6.718E+01	569	7.850E+01
406	1.271E+00	447	1.328E+02	488	4.006E+01	529	6.739E+01	570	7.878E+01
407	1.367E+00	448	1.350E+02	489	4.126E+01	530	6.760E+01	571	7.876E+01
408	1.551E+00	449	1.347E+02	490	4.240E+01	531	6.788E+01	572	7.882E+01
409	1.756E+00	450	1.315E+02	491	4.373E+01	532	6.812E+01	573	7.916E+01
410	2.032E+00	451	1.256E+02	492	4.504E+01	533	6.843E+01	574	7.903E+01
411	2.334E+00	452	1.180E+02	493	4.628E+01	534	6.878E+01	575	7.927E+01
412	2.647E+00	453	1.088E+02	494	4.763E+01	535	6.916E+01	576	7.947E+01
413	2.999E+00	454	9.928E+01	495	4.897E+01	536	6.930E+01	577	7.967E+01
414	3.468E+00	455	8.977E+01	496	5.025E+01	537	6.988E+01	578	7.970E+01
415	4.027E+00	456	8.160E+01	497	5.146E+01	538	7.015E+01	579	7.985E+01
416	4.634E+00	457	7.421E+01	498	5.253E+01	539	7.056E+01	580	7.999E+01
417	5.385E+00	458	6.831E+01	499	5.373E+01	540	7.080E+01	581	8.008E+01
418	6.276E+00	459	6.353E+01	500	5.486E+01	541	7.130E+01	582	8.009E+01
419	7.249E+00	460	5.989E+01	501	5.578E+01	542	7.165E+01	583	8.013E+01
420	8.340E+00	461	5.683E+01	502	5.669E+01	543	7.201E+01	584	8.033E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	8.027E+01	626	6.430E+01	667	2.841E+01	708	8.885E+00	749	2.587E+00
586	8.024E+01	627	6.344E+01	668	2.775E+01	709	8.648E+00	750	2.504E+00
587	8.028E+01	628	6.271E+01	669	2.702E+01	710	8.319E+00	751	2.420E+00
588	8.017E+01	629	6.170E+01	670	2.632E+01	711	8.115E+00	752	2.349E+00
589	8.028E+01	630	6.096E+01	671	2.564E+01	712	7.843E+00	753	2.279E+00
590	8.015E+01	631	6.007E+01	672	2.498E+01	713	7.652E+00	754	2.227E+00
591	8.018E+01	632	5.913E+01	673	2.426E+01	714	7.319E+00	755	2.150E+00
592	8.003E+01	633	5.835E+01	674	2.369E+01	715	7.128E+00	756	2.081E+00
593	8.000E+01	634	5.733E+01	675	2.304E+01	716	6.914E+00	757	2.025E+00
594	8.006E+01	635	5.642E+01	676	2.241E+01	717	6.694E+00	758	1.964E+00
595	7.982E+01	636	5.555E+01	677	2.192E+01	718	6.540E+00	759	1.908E+00
596	7.957E+01	637	5.461E+01	678	2.127E+01	719	6.307E+00	760	1.874E+00
597	7.942E+01	638	5.371E+01	679	2.075E+01	720	6.164E+00	761	1.820E+00
598	7.922E+01	639	5.266E+01	680	2.007E+01	721	5.999E+00	762	1.762E+00
599	7.907E+01	640	5.173E+01	681	1.957E+01	722	5.769E+00	763	1.714E+00
600	7.894E+01	641	5.094E+01	682	1.903E+01	723	5.658E+00	764	1.661E+00
601	7.857E+01	642	5.001E+01	683	1.851E+01	724	5.494E+00	765	1.626E+00
602	7.823E+01	643	4.899E+01	684	1.798E+01	725	5.351E+00	766	1.591E+00
603	7.791E+01	644	4.807E+01	685	1.750E+01	726	5.151E+00	767	1.535E+00
604	7.760E+01	645	4.716E+01	686	1.699E+01	727	5.055E+00	768	1.490E+00
605	7.721E+01	646	4.620E+01	687	1.654E+01	728	4.850E+00	769	1.428E+00
606	7.673E+01	647	4.542E+01	688	1.614E+01	729	4.735E+00	770	1.412E+00
607	7.637E+01	648	4.430E+01	689	1.565E+01	730	4.594E+00	771	1.406E+00
608	7.593E+01	649	4.340E+01	690	1.517E+01	731	4.420E+00	772	1.330E+00
609	7.543E+01	650	4.251E+01	691	1.479E+01	732	4.285E+00	773	1.254E+00
610	7.503E+01	651	4.160E+01	692	1.434E+01	733	4.109E+00	774	1.263E+00
611	7.464E+01	652	4.072E+01	693	1.393E+01	734	4.044E+00	775	1.246E+00
612	7.401E+01	653	3.980E+01	694	1.356E+01	735	3.896E+00	776	1.177E+00
613	7.347E+01	654	3.892E+01	695	1.316E+01	736	3.844E+00	777	1.169E+00
614	7.279E+01	655	3.808E+01	696	1.275E+01	737	3.666E+00	778	1.141E+00
615	7.221E+01	656	3.716E+01	697	1.243E+01	738	3.579E+00	779	1.153E+00
616	7.160E+01	657	3.636E+01	698	1.201E+01	739	3.454E+00	780	1.155E+00
617	7.096E+01	658	3.558E+01	699	1.170E+01	740	3.343E+00		
618	7.043E+01	659	3.471E+01	700	1.124E+01	741	3.255E+00		
619	6.964E+01	660	3.381E+01	701	1.108E+01	742	3.148E+00		
620	6.893E+01	661	3.302E+01	702	1.069E+01	743	3.096E+00		
621	6.821E+01	662	3.218E+01	703	1.032E+01	744	3.007E+00		
622	6.754E+01	663	3.147E+01	704	1.008E+01	745	2.883E+00		
623	6.669E+01	664	3.071E+01	705	9.744E+00	746	2.794E+00		
624	6.598E+01	665	3.001E+01	706	9.436E+00	747	2.733E+00		
625	6.511E+01	666	2.920E+01	707	9.220E+00	748	2.635E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



## 6. Product Photo



\*\*\*\*\*END OF REPORT\*\*\*\*\*