



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

ATG Electronics Corp.

9020 Rancho Park Court Rancho Cucamonga, CA 91730

Test Model: RTUS22-S-20W-5K-PE

Report Type:	Electrical and Photometric tests including: Input Current, Power, Power Factor, Luminous Flux, Luminous Efficacy, CRI, CCT, Chromaticity Coordinate, Spectral Power Distribution, Power Factor, THD
Test Engineer:	Carl Du <i>Carl Du</i>
Report Number:	RSZ161107508-10A2
Test Date:	2016-11-13
Report Date:	2016-11-19
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
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Accreditation:	The IAS Accreditation Number TL-460.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). 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 2016-11-07 and used for testing.

Model Tested:	RTUS22-S-20W-5K-PE
Manufacturer:	ATG Electronics Corp.
Brand Name:	ATG
Product Designation:	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces
Burning Time Before Test:	0hour(For New Products)
Driver Model:	WP-UL-T25-48-0.52A

Rated Values:

Rated Voltage/Frequency:	120-277 V AC 50/60Hz
Rated Power:	20W
Nominal CCT:	5000K
Nominal Lumen Output:	2600 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 IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25~50°C	2016-03-10	2017-03-09
High Accuracy Array spectroradiometer	EVERFINE	HAAS-2000	M112048CA1361125	380-780nm	2016-07-08	2017-07-07
Power meter	YOKOGAWA	WT310	C20E17024V	2kV/20A	2016-07-08	2017-07-07
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2016-03-04	2017-03-03
Thermal Meter	SENSING	N/A	N/A	25、50°C	2016-03-10	2017-03-09
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-09-24	2017-09-23
AC Power Supply	ALL Power	APW-105N	970613	220V±10% 50Hz	2016-03-04	2017-03-03

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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 π 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.

Additional Test

The Additional Test item may not be covered by IESNA LM-79-2008. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at 25°C \pm 1°C. Test voltage for THD and power factor test would be equal to rated voltage or, in case of a voltage range, maximum value of that range.

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.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-15 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

5. Test Result

[Integrating Sphere System]

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

Test orientation: **Downward**

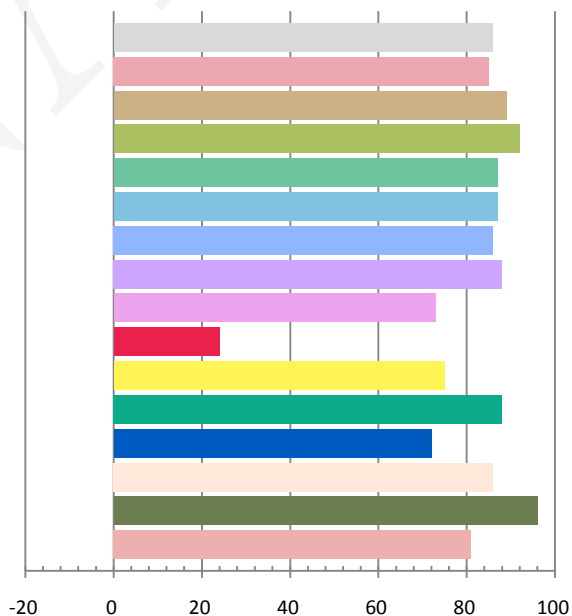
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.1609	19.09	0.9882	2576.7	134.97

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.287	5070	-0.000415	0.3431	0.3492	0.2110	0.4832

Color Rendering Index

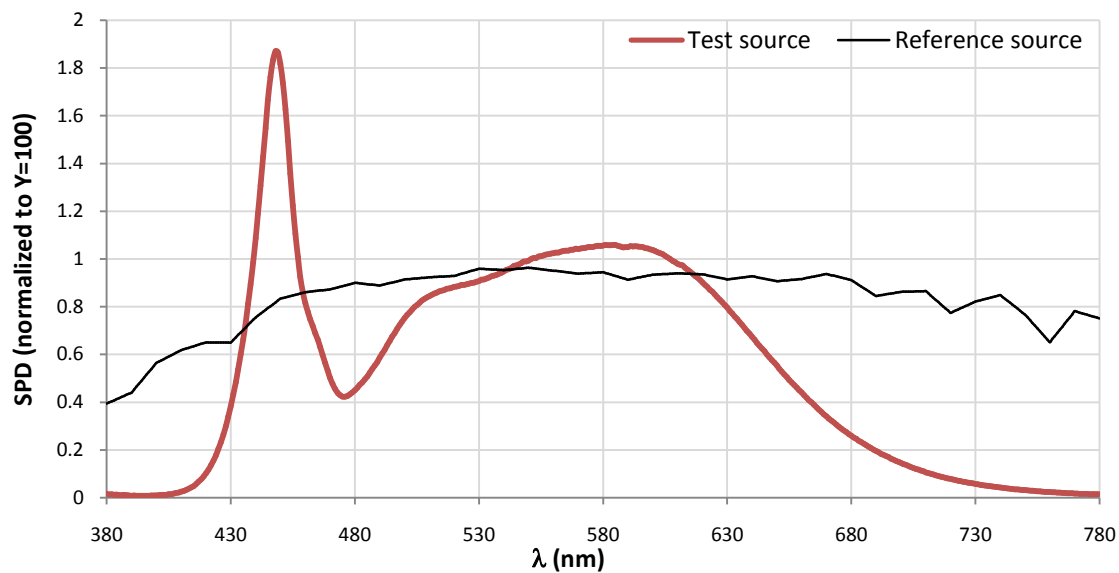
Ra			
85.9			
R1	R2	R3	R4
85	89	92	87
R5	R6	R7	R8
87	86	88	73
R9	R10	R11	R12
24	75	88	72
R13	R14	R15	
86	96	81	



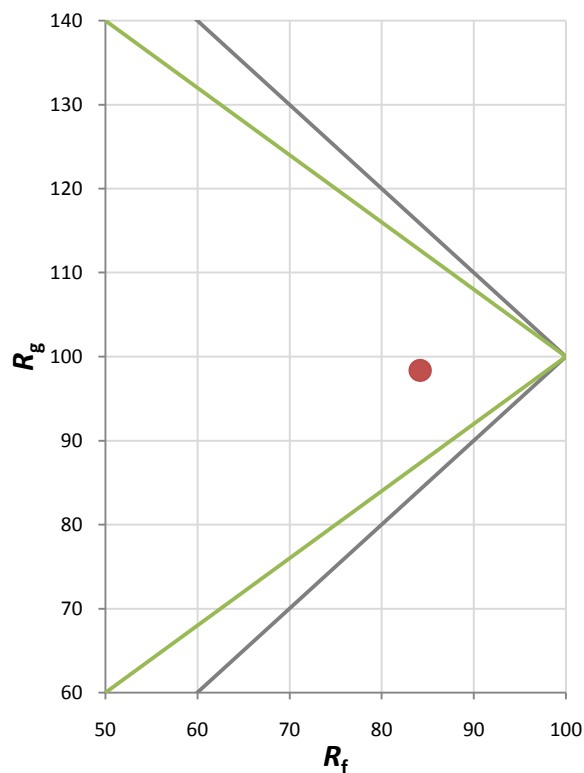
Fidelity Index and Gamut Index

Fidelity Index R_f	84
Gamut Index R_g	98

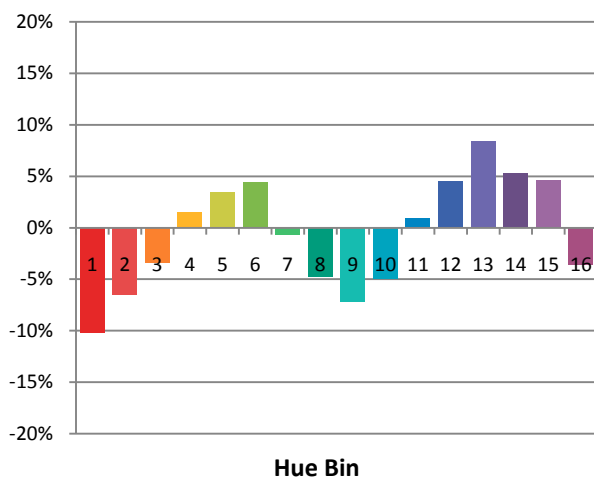
Spectral Power Distribution Comparison



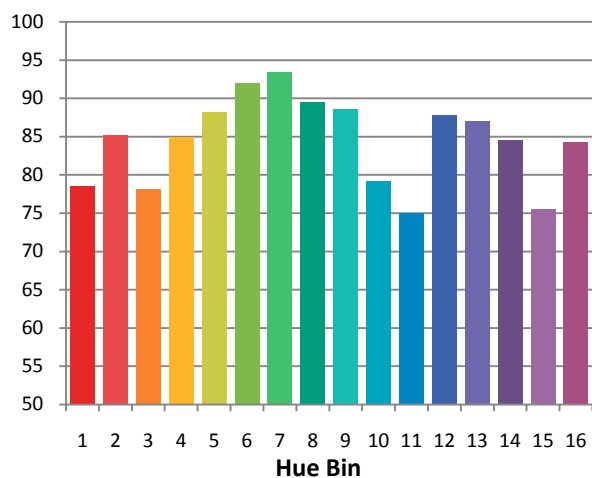
Plot of R_g versus R_f



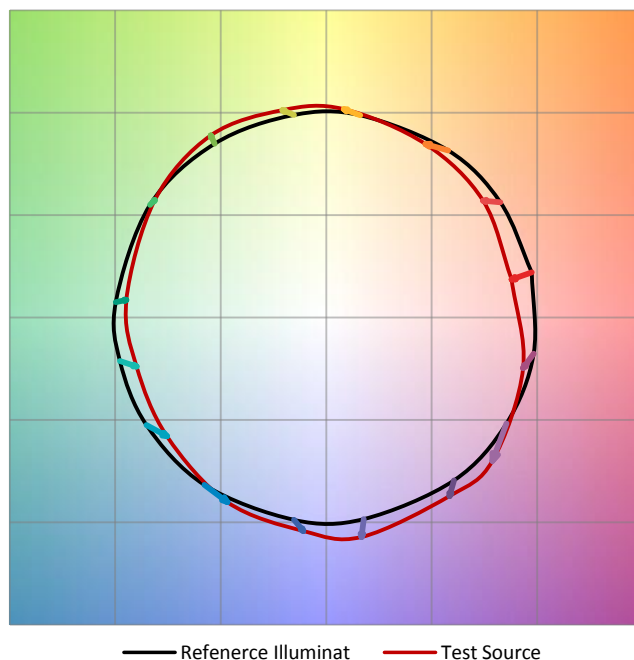
Chroma Shift by Hue



R_f by Hue

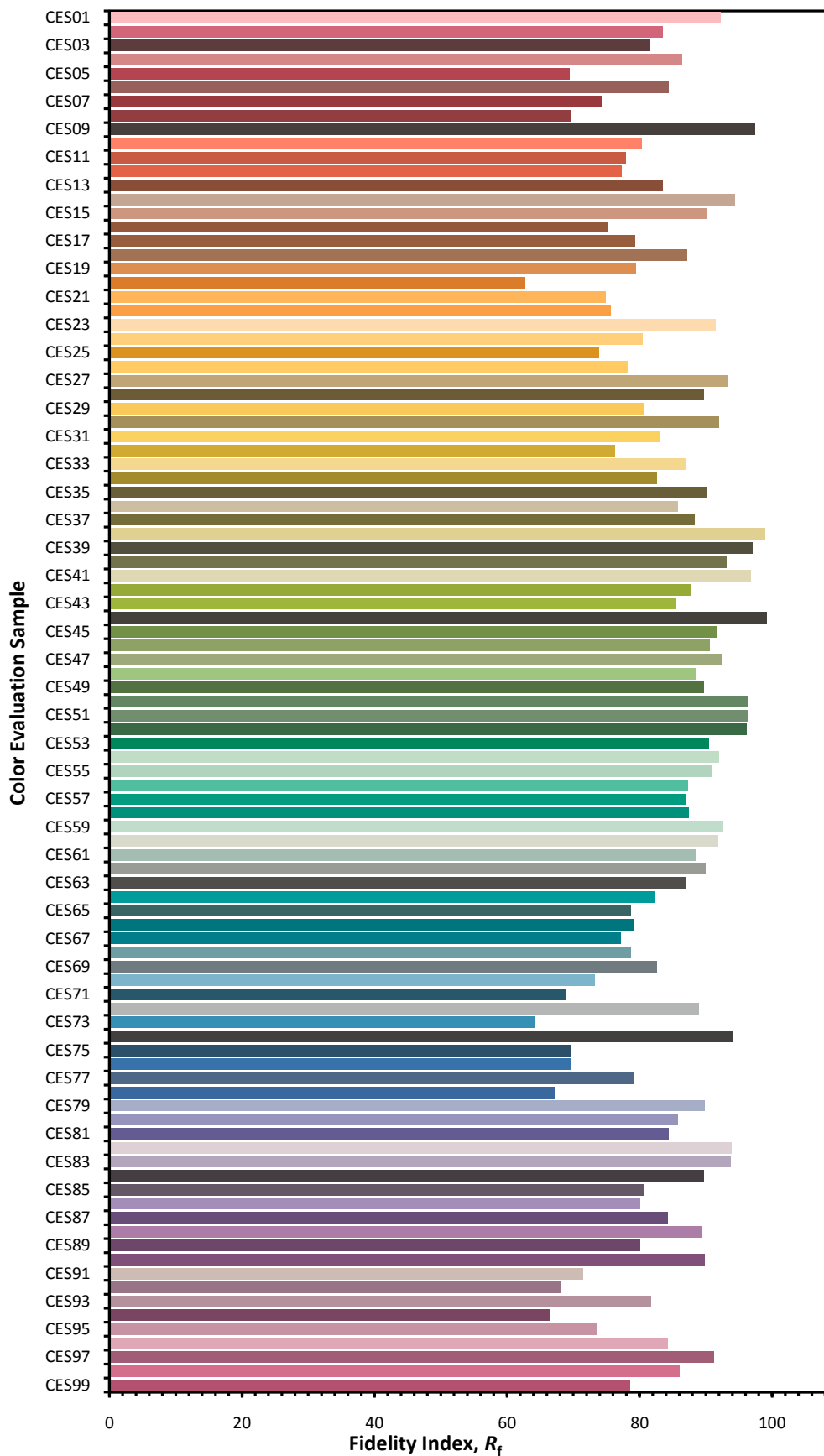


Color Vector Graphic

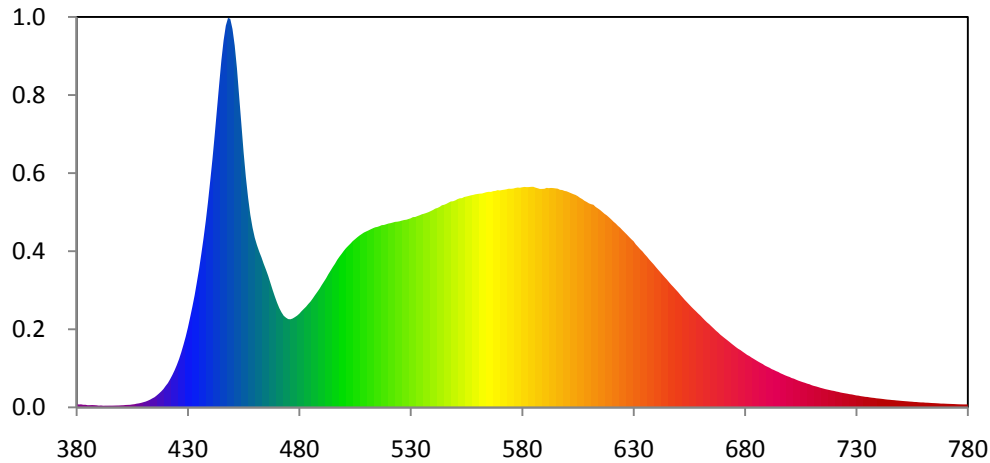


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



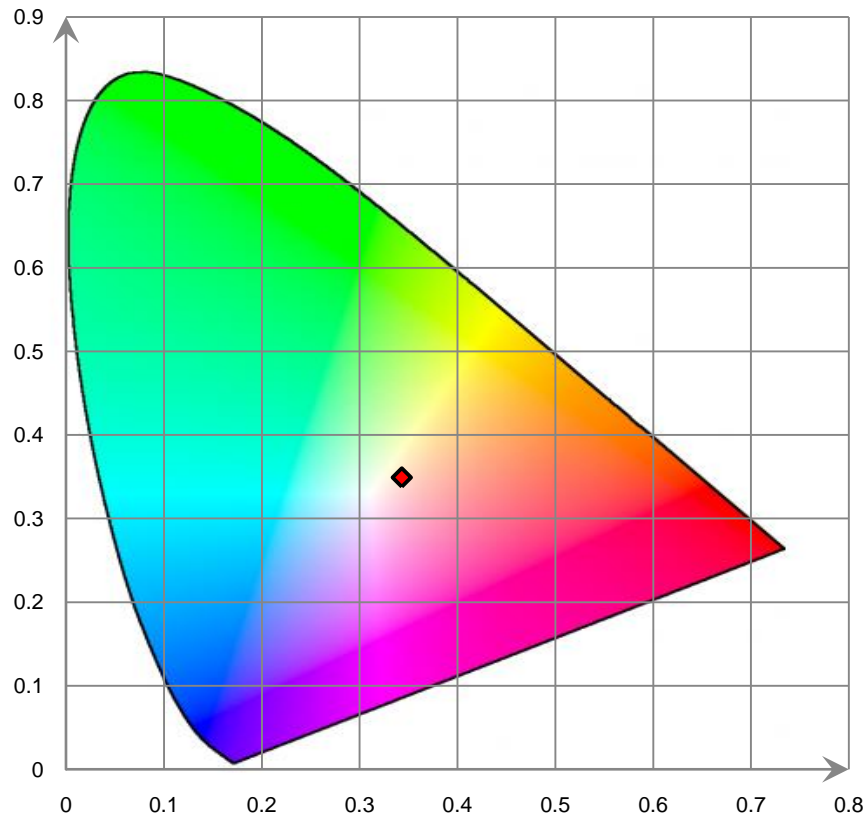
Relative Spectral Power Distribution



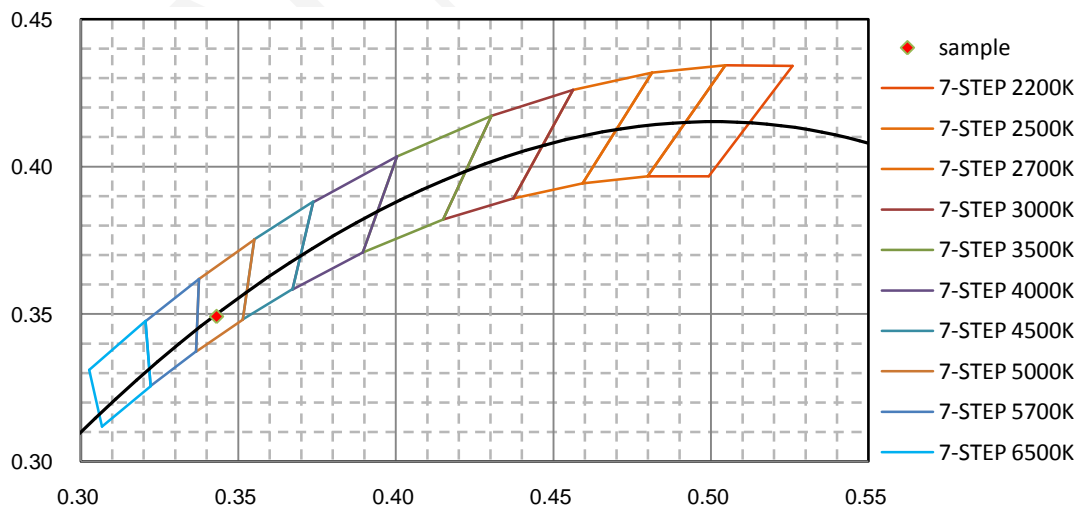
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	6.403E-01	421	4.399E+00	462	2.820E+01	503	2.968E+01	544	3.660E+01
381	5.219E-01	422	5.100E+00	463	2.717E+01	504	3.012E+01	545	3.669E+01
382	5.503E-01	423	5.863E+00	464	2.601E+01	505	3.046E+01	546	3.686E+01
383	4.717E-01	424	6.706E+00	465	2.496E+01	506	3.080E+01	547	3.708E+01
384	4.772E-01	425	7.663E+00	466	2.384E+01	507	3.112E+01	548	3.730E+01
385	3.993E-01	426	8.722E+00	467	2.257E+01	508	3.139E+01	549	3.733E+01
386	4.056E-01	427	9.966E+00	468	2.130E+01	509	3.167E+01	550	3.748E+01
387	4.262E-01	428	1.134E+01	469	2.009E+01	510	3.185E+01	551	3.771E+01
388	4.005E-01	429	1.281E+01	470	1.897E+01	511	3.204E+01	552	3.786E+01
389	3.715E-01	430	1.447E+01	471	1.798E+01	512	3.224E+01	553	3.789E+01
390	3.201E-01	431	1.633E+01	472	1.721E+01	513	3.243E+01	554	3.810E+01
391	3.475E-01	432	1.826E+01	473	1.659E+01	514	3.261E+01	555	3.819E+01
392	2.991E-01	433	2.028E+01	474	1.624E+01	515	3.269E+01	556	3.829E+01
393	3.102E-01	434	2.265E+01	475	1.599E+01	516	3.282E+01	557	3.840E+01
394	3.111E-01	435	2.504E+01	476	1.595E+01	517	3.300E+01	558	3.848E+01
395	3.203E-01	436	2.777E+01	477	1.609E+01	518	3.304E+01	559	3.859E+01
396	3.155E-01	437	3.061E+01	478	1.634E+01	519	3.316E+01	560	3.865E+01
397	3.218E-01	438	3.373E+01	479	1.661E+01	520	3.330E+01	561	3.871E+01
398	3.392E-01	439	3.718E+01	480	1.697E+01	521	3.337E+01	562	3.874E+01
399	3.457E-01	440	4.100E+01	481	1.741E+01	522	3.348E+01	563	3.886E+01
400	3.722E-01	441	4.491E+01	482	1.783E+01	523	3.360E+01	564	3.898E+01
401	3.888E-01	442	4.927E+01	483	1.822E+01	524	3.363E+01	565	3.904E+01
402	4.289E-01	443	5.386E+01	484	1.871E+01	525	3.370E+01	566	3.903E+01
403	4.516E-01	444	5.838E+01	485	1.916E+01	526	3.382E+01	567	3.916E+01
404	4.654E-01	445	6.283E+01	486	1.971E+01	527	3.393E+01	568	3.920E+01
405	5.299E-01	446	6.642E+01	487	2.031E+01	528	3.399E+01	569	3.935E+01
406	5.778E-01	447	6.913E+01	488	2.087E+01	529	3.412E+01	570	3.929E+01
407	6.709E-01	448	7.055E+01	489	2.145E+01	530	3.425E+01	571	3.936E+01
408	7.318E-01	449	7.037E+01	490	2.211E+01	531	3.446E+01	572	3.942E+01
409	8.196E-01	450	6.853E+01	491	2.274E+01	532	3.448E+01	573	3.950E+01
410	9.323E-01	451	6.552E+01	492	2.336E+01	533	3.465E+01	574	3.960E+01
411	1.044E+00	452	6.139E+01	493	2.410E+01	534	3.479E+01	575	3.959E+01
412	1.208E+00	453	5.631E+01	494	2.475E+01	535	3.497E+01	576	3.963E+01
413	1.392E+00	454	5.124E+01	495	2.541E+01	536	3.508E+01	577	3.974E+01
414	1.623E+00	455	4.617E+01	496	2.601E+01	537	3.521E+01	578	3.981E+01
415	1.841E+00	456	4.171E+01	497	2.671E+01	538	3.537E+01	579	3.977E+01
416	2.164E+00	457	3.801E+01	498	2.729E+01	539	3.555E+01	580	3.985E+01
417	2.510E+00	458	3.489E+01	499	2.782E+01	540	3.575E+01	581	3.993E+01
418	2.882E+00	459	3.257E+01	500	2.837E+01	541	3.599E+01	582	3.989E+01
419	3.319E+00	460	3.073E+01	501	2.886E+01	542	3.612E+01	583	3.989E+01
420	3.880E+00	461	2.938E+01	502	2.928E+01	543	3.632E+01	584	3.994E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	3.994E+01	626	3.170E+01	667	1.389E+01	708	4.294E+00	749	1.223E+00
586	3.980E+01	627	3.130E+01	668	1.355E+01	709	4.186E+00	750	1.191E+00
587	3.968E+01	628	3.088E+01	669	1.315E+01	710	4.011E+00	751	1.154E+00
588	3.956E+01	629	3.046E+01	670	1.283E+01	711	3.883E+00	752	1.119E+00
589	3.957E+01	630	3.009E+01	671	1.251E+01	712	3.785E+00	753	1.088E+00
590	3.960E+01	631	2.953E+01	672	1.220E+01	713	3.664E+00	754	1.053E+00
591	3.975E+01	632	2.910E+01	673	1.187E+01	714	3.536E+00	755	1.024E+00
592	3.971E+01	633	2.864E+01	674	1.154E+01	715	3.430E+00	756	9.857E-01
593	3.974E+01	634	2.825E+01	675	1.122E+01	716	3.319E+00	757	9.654E-01
594	3.971E+01	635	2.776E+01	676	1.090E+01	717	3.222E+00	758	9.267E-01
595	3.966E+01	636	2.731E+01	677	1.060E+01	718	3.139E+00	759	9.009E-01
596	3.961E+01	637	2.681E+01	678	1.037E+01	719	3.049E+00	760	8.946E-01
597	3.941E+01	638	2.635E+01	679	1.008E+01	720	2.978E+00	761	8.590E-01
598	3.937E+01	639	2.592E+01	680	9.791E+00	721	2.874E+00	762	8.399E-01
599	3.921E+01	640	2.542E+01	681	9.505E+00	722	2.791E+00	763	8.101E-01
600	3.913E+01	641	2.496E+01	682	9.293E+00	723	2.689E+00	764	7.864E-01
601	3.896E+01	642	2.449E+01	683	9.018E+00	724	2.607E+00	765	7.738E-01
602	3.879E+01	643	2.403E+01	684	8.776E+00	725	2.542E+00	766	7.513E-01
603	3.862E+01	644	2.357E+01	685	8.530E+00	726	2.475E+00	767	7.243E-01
604	3.847E+01	645	2.314E+01	686	8.283E+00	727	2.389E+00	768	6.888E-01
605	3.823E+01	646	2.265E+01	687	8.056E+00	728	2.339E+00	769	6.833E-01
606	3.795E+01	647	2.218E+01	688	7.842E+00	729	2.253E+00	770	6.682E-01
607	3.772E+01	648	2.176E+01	689	7.566E+00	730	2.165E+00	771	6.469E-01
608	3.742E+01	649	2.131E+01	690	7.368E+00	731	2.118E+00	772	6.269E-01
609	3.720E+01	650	2.088E+01	691	7.184E+00	732	2.035E+00	773	6.147E-01
610	3.695E+01	651	2.039E+01	692	6.938E+00	733	1.982E+00	774	5.993E-01
611	3.679E+01	652	1.993E+01	693	6.764E+00	734	1.907E+00	775	5.785E-01
612	3.669E+01	653	1.947E+01	694	6.572E+00	735	1.878E+00	776	5.576E-01
613	3.631E+01	654	1.905E+01	695	6.407E+00	736	1.809E+00	777	5.502E-01
614	3.603E+01	655	1.862E+01	696	6.171E+00	737	1.752E+00	778	5.364E-01
615	3.575E+01	656	1.819E+01	697	6.006E+00	738	1.714E+00	779	5.375E-01
616	3.540E+01	657	1.780E+01	698	5.813E+00	739	1.648E+00	780	5.385E-01
617	3.505E+01	658	1.740E+01	699	5.652E+00	740	1.602E+00		
618	3.477E+01	659	1.700E+01	700	5.514E+00	741	1.562E+00		
619	3.442E+01	660	1.662E+01	701	5.311E+00	742	1.516E+00		
620	3.404E+01	661	1.620E+01	702	5.197E+00	743	1.458E+00		
621	3.364E+01	662	1.578E+01	703	5.014E+00	744	1.410E+00		
622	3.330E+01	663	1.539E+01	704	4.842E+00	745	1.380E+00		
623	3.288E+01	664	1.505E+01	705	4.705E+00	746	1.329E+00		
624	3.254E+01	665	1.466E+01	706	4.562E+00	747	1.309E+00		
625	3.211E+01	666	1.428E+01	707	4.439E+00	748	1.258E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Additional Test]

Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Power Factor:	277.0	60	0.9292
Total Harmonic Distortion:	277.0	60	11.07%
Total Harmonic Distortion:	120.0	60	8.84%

6. Product Photo





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