IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai, China

Test Model: 12T5HE/3F/840/DIR

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS161013008-10
Test Date:	2016-10-15 to 2016-10-17
Report Date:	2016-10-18
Reviewed By:	Blake Zhang
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Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	The IAS Accreditation Number TL-460.

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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).
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1. Product Description

General Information:

Two samples were received on 2016-10-13 and used for testing with ballast,and only sample #1 was used for Photometric testing.

Model Tested:	12T5HE/3F/840/DIR
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	Integral LED Lamp
Burning Time Before Test:	0hour(For New Products)
Ballast:	ICN-2S28-N

Rated Values:

Rated Voltage/Frequency:	120 VAC 60Hz
Rated Power:	12W
Nominal CCT:	4000K
Nominal Lumen Output:	1550 lm
Nominal CRI:	80

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
Spectral photometer	SENSING	SPR3000	90902027	350nm～800nm	2016-03-10	2017-03-09
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2016-03-04	2017-03-03
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50HZ	2016-03-04	2017-03-03
Standard Light Source	EVERFINE	D204	01331191	24V/100W	2016-08-27	2017-08-26
Thermal Meter	SENSING	N/A	N/A	25、50°C	2016-03-10	2017-03-09
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V， 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2016-03-21	2017-03-20
Standard Light	EVERFINE	D908	1012003	N/A	2016-09-08	2017-09-07

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Source						

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.

4π 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=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=32K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.1 (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.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

The uncertainty of the luminous intensity is U=1.6% (K=2) , at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_f, 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.

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5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **0.5hour**

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	0.1203	14.26	0.9881	1582.2	110.95

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
4.826	3906	-0.00005	0.3846	0.3792	0.2269	0.5033

Color Rendering Index

Ra
84.3

R1	R2	R3	R4
83	90	95	83
R5	R6	R7	R8
83	87	86	67
R9	R10	R11	R12
15	77	82	65
R13	R14	R15	
85	98	77	

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Fidelity Index and Gamut Index

Fidelity Index R_f	83
Gamut Index R_g	96

Spectral Power Distribution Comparison

Plot of R_g versus R_f

Chroma Shift by Hue
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue Bin

R_f by Hue
100
95
90
85
80
75
70
65
60
55
50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Hue Bin

Color Vector Graphic
Refenerce Illuminat
Test Source

Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
CES15
CES17
CES19
CES21
CES23
CES25
CES27
CES29
CES31
CES33
CES35
CES37
CES39
CES41
CES43
CES45
CES47
CES49
CES51
CES53
CES55
CES57
CES59
CES61
CES63
CES65
CES67
CES69
CES71
CES73
CES75
CES77
CES79
CES81
CES83
CES85
CES87
CES89
CES91
CES93
CES95
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

Relative Spectral Power Distribution

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.900E-02	421	1.389E+00	462	1.666E+01	503	1.401E+01	544	2.105E+01
381	2.480E-02	422	1.586E+00	463	1.568E+01	504	1.439E+01	545	2.125E+01
382	1.680E-02	423	1.893E+00	464	1.517E+01	505	1.476E+01	546	2.147E+01
383	1.690E-02	424	2.149E+00	465	1.439E+01	506	1.512E+01	547	2.145E+01
384	1.770E-02	425	2.417E+00	466	1.400E+01	507	1.523E+01	548	2.167E+01
385	1.510E-02	426	2.815E+00	467	1.328E+01	508	1.557E+01	549	2.190E+01
386	1.260E-02	427	3.128E+00	468	1.287E+01	509	1.566E+01	550	2.186E+01
387	1.340E-02	428	3.606E+00	469	1.217E+01	510	1.599E+01	551	2.205E+01
388	1.430E-02	429	3.980E+00	470	1.173E+01	511	1.630E+01	552	2.225E+01
389	1.650E-02	430	4.372E+00	471	1.103E+01	512	1.659E+01	553	2.246E+01
390	1.430E-02	431	4.980E+00	472	1.061E+01	513	1.663E+01	554	2.245E+01
391	7.100E-03	432	5.431E+00	473	1.001E+01	514	1.689E+01	555	2.265E+01
392	4.300E-03	433	6.145E+00	474	9.664E+00	515	1.692E+01	556	2.285E+01
393	8.300E-03	434	6.698E+00	475	9.196E+00	516	1.718E+01	557	2.282E+01
394	1.290E-02	435	7.550E+00	476	8.982E+00	517	1.742E+01	558	2.326E+01
395	1.540E-02	436	8.229E+00	477	8.834E+00	518	1.764E+01	559	2.324E+01
396	1.280E-02	437	8.993E+00	478	8.584E+00	519	1.763E+01	560	2.342E+01
397	1.140E-02	438	1.015E+01	479	8.566E+00	520	1.786E+01	561	2.363E+01
398	7.400E-03	439	1.110E+01	480	8.445E+00	521	1.783E+01	562	2.363E+01
399	3.600E-03	440	1.260E+01	481	8.538E+00	522	1.803E+01	563	2.384E+01
400	1.590E-02	441	1.382E+01	482	8.659E+00	523	1.823E+01	564	2.403E+01
401	2.030E-02	442	1.568E+01	483	8.649E+00	524	1.843E+01	565	2.423E+01
402	2.530E-02	443	1.720E+01	484	8.829E+00	525	1.841E+01	566	2.442E+01
403	2.700E-02	444	1.936E+01	485	8.872E+00	526	1.862E+01	567	2.463E+01
404	3.740E-02	445	2.095E+01	486	9.116E+00	527	1.881E+01	568	2.461E+01
405	4.860E-02	446	2.314E+01	487	9.201E+00	528	1.902E+01	569	2.478E+01
406	6.090E-02	447	2.453E+01	488	9.464E+00	529	1.899E+01	570	2.474E+01
407	7.170E-02	448	2.647E+01	489	9.751E+00	530	1.916E+01	571	2.493E+01
408	7.450E-02	449	2.728E+01	490	9.905E+00	531	1.934E+01	572	2.513E+01
409	1.130E-01	450	2.841E+01	491	1.025E+01	532	1.931E+01	573	2.532E+01
410	1.487E-01	451	2.834E+01	492	1.061E+01	533	1.951E+01	574	2.547E+01
411	1.891E-01	452	2.854E+01	493	1.081E+01	534	1.971E+01	575	2.565E+01
412	2.317E-01	453	2.758E+01	494	1.120E+01	535	1.968E+01	576	2.564E+01
413	2.895E-01	454	2.692E+01	495	1.140E+01	536	1.989E+01	577	2.582E+01
414	3.761E-01	455	2.530E+01	496	1.179E+01	537	2.008E+01	578	2.599E+01
415	4.594E-01	456	2.419E+01	497	1.219E+01	538	2.005E+01	579	2.616E+01
416	5.764E-01	457	2.236E+01	498	1.241E+01	539	2.048E+01	580	2.632E+01
417	6.846E-01	458	2.117E+01	499	1.282E+01	540	2.047E+01	581	2.629E+01
418	8.061E-01	459	1.957E+01	500	1.324E+01	541	2.066E+01	582	2.645E+01
419	9.834E-01	460	1.865E+01	501	1.344E+01	542	2.063E+01	583	2.659E+01
420	1.150E+00	461	1.737E+01	502	1.385E+01	543	2.085E+01	584	2.653E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.666E+01	626	2.278E+01	667	9.862E+00	708	2.849E+00	749	5.365E-01
586	2.679E+01	627	2.253E+01	668	9.612E+00	709	2.728E+00	750	5.252E-01
587	2.697E+01	628	2.227E+01	669	9.358E+00	710	2.613E+00	751	5.091E-01
588	2.712E+01	629	2.198E+01	670	9.058E+00	711	2.515E+00	752	4.942E-01
589	2.703E+01	630	2.170E+01	671	8.824E+00	712	2.457E+00	753	4.676E-01
590	2.713E+01	631	2.127E+01	672	8.597E+00	713	2.372E+00	754	4.199E-01
591	2.724E+01	632	2.097E+01	673	8.360E+00	714	2.282E+00	755	4.027E-01
592	2.736E+01	633	2.068E+01	674	8.091E+00	715	2.187E+00	756	4.086E-01
593	2.723E+01	634	2.039E+01	675	7.873E+00	716	2.095E+00	757	3.126E-01
594	2.730E+01	635	1.998E+01	676	7.666E+00	717	2.033E+00	758	2.827E-01
595	2.739E+01	636	1.968E+01	677	7.411E+00	718	1.953E+00	759	3.030E-01
596	2.746E+01	637	1.937E+01	678	7.208E+00	719	1.875E+00	760	2.772E-01
597	2.731E+01	638	1.906E+01	679	7.012E+00	720	1.818E+00	761	3.133E-01
598	2.736E+01	639	1.863E+01	680	6.799E+00	721	1.746E+00	762	3.412E-01
599	2.740E+01	640	1.831E+01	681	6.653E+00	722	1.694E+00	763	3.469E-01
600	2.742E+01	641	1.790E+01	682	6.452E+00	723	1.606E+00	764	2.875E-01
601	2.744E+01	642	1.761E+01	683	6.271E+00	724	1.553E+00	765	2.488E-01
602	2.723E+01	643	1.739E+01	684	6.079E+00	725	1.511E+00	766	2.324E-01
603	2.720E+01	644	1.697E+01	685	5.875E+00	726	1.430E+00	767	2.647E-01
604	2.718E+01	645	1.664E+01	686	5.697E+00	727	1.388E+00	768	2.458E-01
605	2.713E+01	646	1.633E+01	687	5.552E+00	728	1.348E+00	769	1.933E-01
606	2.689E+01	647	1.601E+01	688	5.388E+00	729	1.321E+00	770	1.664E-01
607	2.682E+01	648	1.561E+01	689	5.236E+00	730	1.275E+00	771	1.794E-01
608	2.673E+01	649	1.531E+01	690	5.089E+00	731	1.224E+00	772	1.885E-01
609	2.665E+01	650	1.499E+01	691	4.909E+00	732	1.144E+00	773	1.705E-01
610	2.655E+01	651	1.466E+01	692	4.761E+00	733	1.086E+00	774	1.408E-01
611	2.623E+01	652	1.428E+01	693	4.588E+00	734	1.064E+00	775	1.429E-01
612	2.612E+01	653	1.399E+01	694	4.454E+00	735	1.010E+00	776	1.403E-01
613	2.597E+01	654	1.368E+01	695	4.310E+00	736	9.695E-01	777	1.458E-01
614	2.579E+01	655	1.331E+01	696	4.192E+00	737	9.143E-01	778	1.305E-01
615	2.563E+01	656	1.308E+01	697	4.069E+00	738	8.485E-01	779	1.450E-01
616	2.529E+01	657	1.271E+01	698	3.917E+00	739	8.221E-01	780	1.261E-01
617	2.511E+01	658	1.243E+01	699	3.796E+00	740	8.119E-01		
618	2.494E+01	659	1.208E+01	700	3.690E+00	741	7.958E-01		
619	2.475E+01	660	1.180E+01	701	3.573E+00	742	7.740E-01		
620	2.455E+01	661	1.153E+01	702	3.439E+00	743	6.940E-01		
621	2.417E+01	662	1.126E+01	703	3.339E+00	744	6.455E-01		
622	2.393E+01	663	1.092E+01	704	3.222E+00	745	5.973E-01		
623	2.368E+01	664	1.065E+01	705	3.112E+00	746	5.497E-01		
624	2.342E+01	665	1.039E+01	706	3.021E+00	747	5.497E-01		
625	2.302E+01	666	1.010E+01	707	2.934E+00	748	5.401E-01		

CIE 1931 x y Chromaticity Diagram

7-Step Chromaticity Quadrangles

[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hours**

Test orientation: **Downward**

Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1195	14.19	0.9895

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1590.1	112.06	504.9	1.22	1.29

Luminous Intensity Distribution

	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	103.2	113.6	119.0	113.7	112.4
Field Angle (10% I_{max}):	155.3	179.6	183.9	179.5	174.6

Luminous Intensity (cd) Distribution Data

γ \ C	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	505	505	505	505	505	505	505	505
5.0°	503	504	504	504	504	503	503	502
10.0°	496	498	498	499	499	498	496	495
15.0°	484	486	488	490	491	489	485	482
20.0°	467	470	474	478	478	476	470	464
25.0°	445	449	455	461	463	459	451	443
30.0°	417	423	432	441	443	438	429	417
35.0°	385	393	406	415	420	414	403	388
40.0°	350	360	375	387	393	386	373	354
45.0°	310	323	343	356	362	355	340	318
50.0°	269	284	308	321	328	320	306	280
55.0°	227	244	270	284	290	283	268	240
60.0°	185	204	232	245	250	244	229	201
65.0°	145	165	192	205	211	204	191	162
70.0°	106	128	155	168	174	168	154	126
75.0°	70	95	121	134	139	133	121	93
80.0°	37	67	92	104	106	103	92	65
85.0°	12	45	69	77	79	77	69	43
90.0°	1	30	51	57	58	57	51	28
95.0°	0	19	38	43	43	43	38	19
100.0°	0	14	30	34	34	34	29	13
105.0°	0	11	24	27	28	27	24	10
110.0°	1	9	20	23	23	23	20	9
115.0°	1	9	18	21	21	20	17	8
120.0°	1	8	15	18	18	18	15	7
125.0°	1	7	13	16	16	16	13	5
130.0°	1	5	12	14	15	14	12	3
135.0°	1	3	11	13	14	13	10	3
140.0°	2	3	9	12	13	12	9	2
145.0°	2	3	7	11	11	10	7	2
150.0°	2	3	5	9	10	8	4	3
155.0°	2	3	3	5	6	5	3	3
160.0°	2	3	3	4	4	4	3	3
165.0°	2	3	3	3	3	3	3	2
170.0°	2	3	3	3	3	3	3	2
175.0°	2	3	3	3	3	3	2	2
180.0°	0	0	0	0	0	0	0	0

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Luminous Intensity (cd) Distribution Data (cont.)

γ \ C	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	505	505	505	505	505	505	505	505
5.0°	501	502	502	502	502	503	503	502
10.0°	493	493	495	496	496	497	496	496
15.0°	479	480	483	487	488	488	486	483
20.0°	460	463	468	474	476	476	472	466
25.0°	437	441	449	456	458	458	453	444
30.0°	409	415	425	434	437	436	430	419
35.0°	378	386	397	409	414	411	403	389
40.0°	342	353	367	381	387	383	372	356
45.0°	303	316	334	348	355	352	339	319
50.0°	262	277	300	313	321	316	304	279
55.0°	220	237	263	277	285	279	266	238
60.0°	179	197	225	239	247	240	227	198
65.0°	140	159	188	202	208	203	189	160
70.0°	101	122	151	164	170	166	152	123
75.0°	66	91	118	129	133	130	118	91
80.0°	34	64	89	99	101	99	89	63
85.0°	10	43	66	73	74	73	66	42
90.0°	1	28	48	54	54	53	48	28
95.0°	1	18	36	40	41	40	36	18
100.0°	1	13	28	31	31	31	28	13
105.0°	1	10	22	25	25	25	22	10
110.0°	1	8	18	21	21	21	18	8
115.0°	1	8	15	18	18	18	15	8
120.0°	1	7	13	16	16	16	13	7
125.0°	1	7	12	14	14	14	12	7
130.0°	1	7	11	13	13	13	11	7
135.0°	1	6	10	12	12	12	10	6
140.0°	2	6	10	11	11	11	10	5
145.0°	2	5	9	10	11	10	9	5
150.0°	2	4	7	10	10	10	7	4
155.0°	2	3	6	8	8	8	7	3
160.0°	2	2	5	7	7	7	6	2
165.0°	2	2	4	5	6	6	4	2
170.0°	2	3	2	3	4	4	2	2
175.0°	2	2	2	2	2	2	2	2
180.0°	0	0	0	0	0	0	0	0

FINAL

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	12.0	0.76
5-10	35.7	2.25
10-15	58.2	3.66
15-20	78.8	4.96
20-25	96.7	6.08
25-30	111.3	7.00
30-35	122.0	7.67
35-40	128.5	8.08
40-45	130.7	8.22
45-50	128.3	8.07
50-55	121.7	7.66
55-60	111.4	7.01
60-65	98.2	6.18
65-70	83.0	5.22
70-75	67.1	4.22
75-80	51.6	3.24
80-85	37.7	2.37
85-90	26.7	1.68
90-95	19.2	1.21
95-100	14.2	0.89
100-105	10.9	0.69
105-110	8.7	0.55
110-115	7.2	0.46
115-120	6.1	0.38
120-125	5.1	0.32
125-130	4.3	0.27
130-135	3.6	0.23
135-140	3.0	0.19
140-145	2.5	0.16
145-150	1.9	0.12
150-155	1.4	0.09
155-160	0.9	0.06
160-165	0.6	0.04
165-170	0.4	0.02
170-175	0.2	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	12.0	0.76
0-10	47.8	3.00
0-15	106.0	6.67
0-20	184.8	11.62
0-25	281.5	17.71
0-30	392.8	24.70
0-35	514.8	32.37
0-40	643.3	40.46
0-45	774.0	48.68
0-50	902.3	56.74
0-55	1024.0	64.40
0-60	1135.4	71.41
0-65	1233.6	77.58
0-70	1316.6	82.80
0-75	1383.7	87.02
0-80	1435.3	90.26
0-85	1472.9	92.63
0-90	1499.7	94.31
0-95	1518.8	95.52
0-100	1533.1	96.41
0-105	1544.0	97.10
0-110	1552.7	97.65
0-115	1560.0	98.11
0-120	1566.1	98.49
0-125	1571.2	98.81
0-130	1575.5	99.09
0-135	1579.2	99.31
0-140	1582.2	99.51
0-145	1584.7	99.66
0-150	1586.6	99.78
0-155	1588.0	99.87
0-160	1588.9	99.93
0-165	1589.5	99.96
0-170	1589.9	99.99
0-175	1590.0	100.00
0-180	1590.1	100.00

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6. Product Photo

7. Product Test orientation in the Goniophotometer

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

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