

IES LM-79-08

MEASUREMENT AND TEST REPORT For

ATG Electronics Corp.

9020 Rancho Park Court Rancho Cucamonga, CA 91730

Test Model: FZL-5K

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution, THD, Power Factor
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	RSZ150605503-10
Test Date:	2015-08-19
Report Date:	2015-08-27
Reviewed By:	Jeanne Han/Safety Manager <i>Jeanne Han</i>
Prepared By:	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
Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	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 2015-06-05 and used for testing. Sample No.: RSZ150605503-S01 Model: FZL-5K

Model Tested: FZL-5K
Manufacturer: ATG Electronics Corp.
Brand Name: ATG
Product Designation: Horizontal Refrigerated Case Luminaires
Dimmable: Continuous Dimming
Dimming Range: 10% to 100%
Burning Time Before Test: 0 hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277VAC 50/60Hz
Rated Power: 25W
Nominal Light Output: 2900 lm
Nominal CCT: 5000K
Nominal CRI: 80
Length: 5ft

2. Standards Used

- IESNA 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

3. Description of Test Equipment

Device	Manufacturer	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	N/A	2014-12-27	2015-12-27
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2015-03-25	2016-03-24
Digital CC&CV DC Power Supply	EVERFINE	WY305	1101047	30V/5A	2015-03-05	2016-03-05
Temperature/humidity/clock	Victor	VC230	EE209	0~40°C0~90%	2013-04-01	2016-03-31
Standard Light Source	EVERFINE	D204	LSD090808	N/A	2015-08-05	2016-08-05
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010	1011001T	N/A	2015-03-05	2016-03-05
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2015-03-05	2016-03-05
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2015-03-05	2016-03-05
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2015-03-05	2016-03-05
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2015-03-20	2016-03-20
Thermal Meter	Victor	VC230	EE091	0~40°C0~90%	2013-04-01	2016-03-31

Device	Manufacturer	Model No	Serial No	Test Range	Calibration date	Calibration due date
Standard Light Source	EVERFINE	D908	1012003	N/A	2015-05-15	2016-05-14

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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement. The system and standard light source has been calibrated regularly and traceable to the National Primary Standards.

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 $U=32\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.0(K=2)$, at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement. The standard light source has been calibrated regularly and traceable to the National Primary Standards.

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 uncertainty of the luminous intensity is $U=2.82\%$ ($K=2$), 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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. 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.

5. Test Result

[Integrating Sphere System]

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

Test orientation: **Downward**

Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.10	60.0	0.2174	25.68	0.9841

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
3266.8	10.171	127.2	5098	3.67E-03

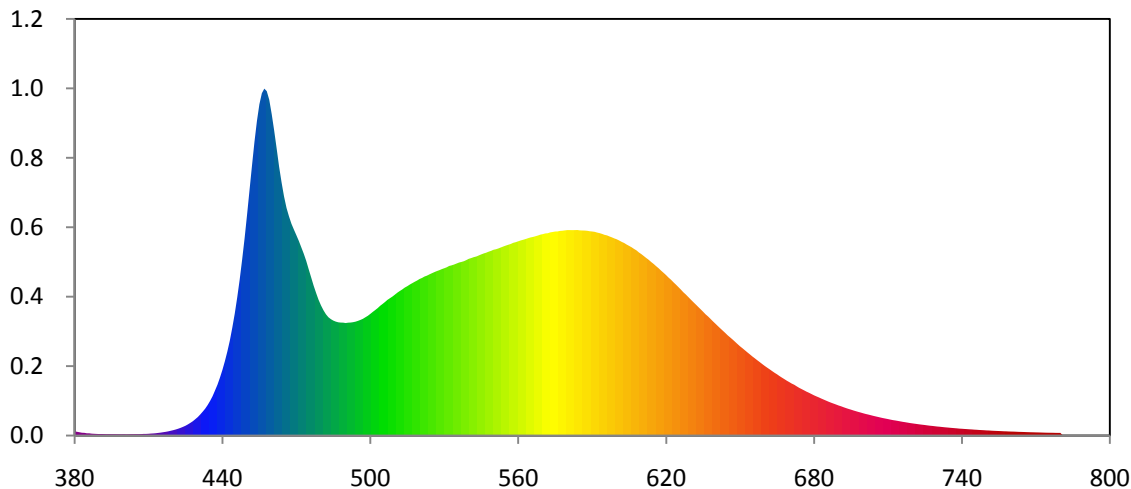
Chromaticity Coordinate

x	y	u	v	u'	v'
0.3430	0.3573	0.2078	0.3247	0.2078	0.4871

Color Rendering Index

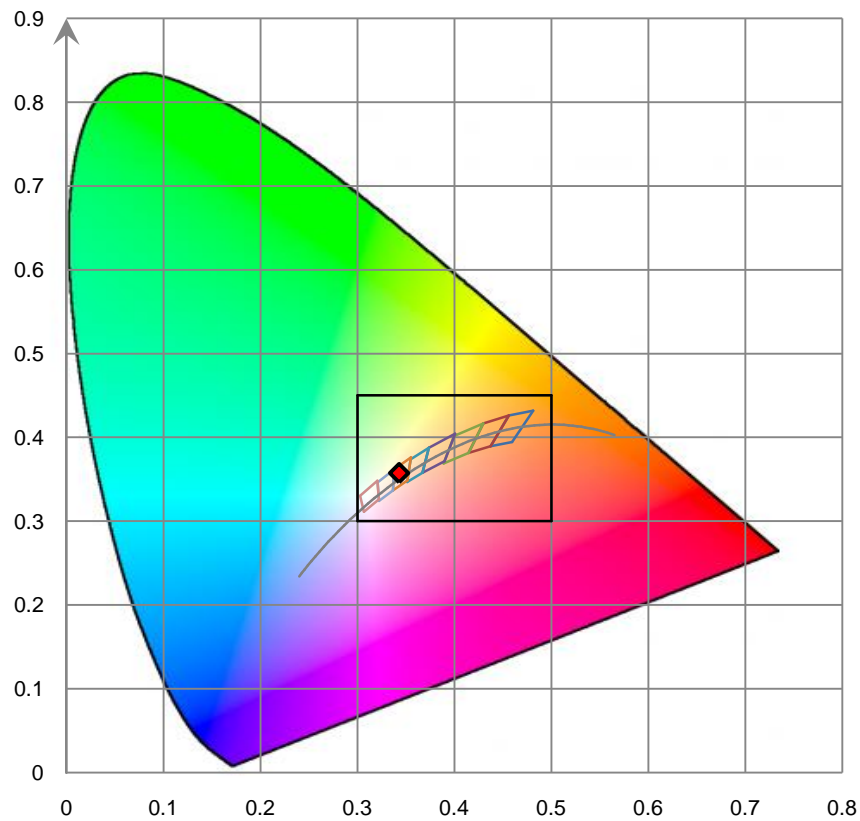
Ra			
82.9			
R1	R2	R3	R4
82	93	94	77
R5	R6	R7	R8
82	89	83	63
R9	R10	R11	R12
5	83	76	61
R13	R14	R15	
86	97	76	

Relative Spectral Power Distribution

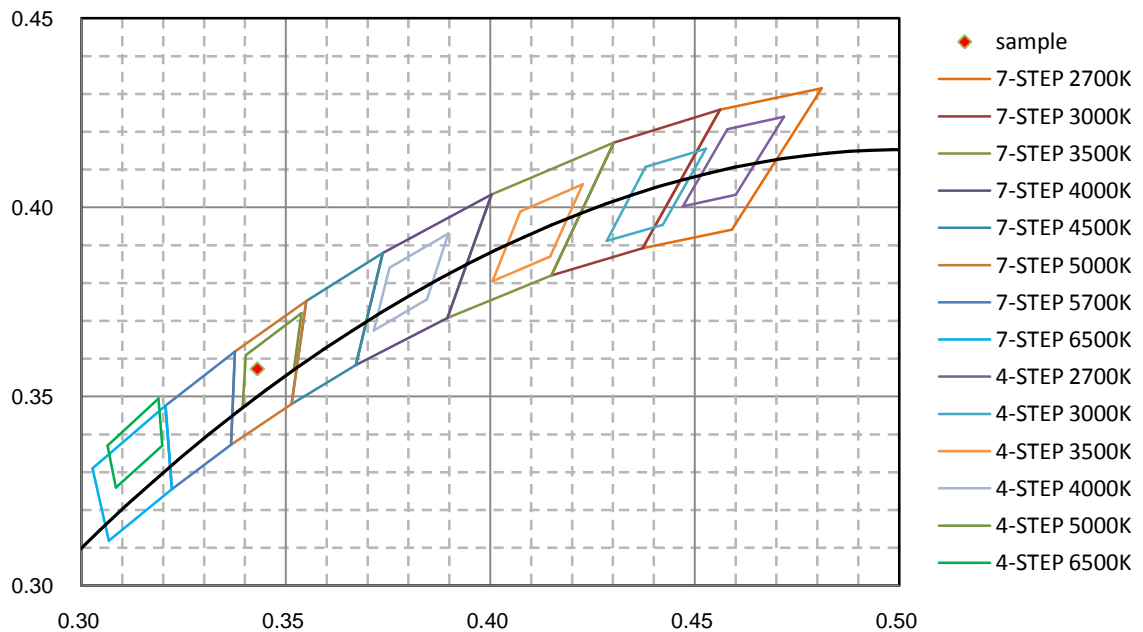


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	9.987E-01	465	5.549E+01	550	4.311E+01	635	2.874E+01	720	2.827E+00
385	5.282E-01	470	4.648E+01	555	4.408E+01	640	2.596E+01	725	2.450E+00
390	3.578E-01	475	3.858E+01	560	4.506E+01	645	2.326E+01	730	2.103E+00
395	2.958E-01	480	3.019E+01	565	4.596E+01	650	2.072E+01	735	1.823E+00
400	2.933E-01	485	2.667E+01	570	4.674E+01	655	1.836E+01	740	1.579E+00
405	3.147E-01	490	2.610E+01	575	4.734E+01	660	1.617E+01	745	1.374E+00
410	4.174E-01	495	2.661E+01	580	4.767E+01	665	1.422E+01	750	1.200E+00
415	6.894E-01	500	2.823E+01	585	4.760E+01	670	1.240E+01	755	1.051E+00
420	1.250E+00	505	3.054E+01	590	4.734E+01	675	1.079E+01	760	9.302E-01
425	2.267E+00	510	3.271E+01	595	4.658E+01	680	9.351E+00	765	8.301E-01
430	4.283E+00	515	3.466E+01	600	4.554E+01	685	8.095E+00	770	7.411E-01
435	8.047E+00	520	3.633E+01	605	4.401E+01	690	6.974E+00	775	6.633E-01
440	1.524E+01	525	3.767E+01	610	4.209E+01	695	6.011E+00	780	6.192E-01
445	2.829E+01	530	3.882E+01	615	3.980E+01	700	5.173E+00	785	0.000E+00
450	5.126E+01	535	3.991E+01	620	3.723E+01	705	4.453E+00	790	0.000E+00
455	7.686E+01	540	4.102E+01	625	3.445E+01	710	3.830E+00	795	0.000E+00
460	7.458E+01	545	4.203E+01	630	3.157E+01	715	3.294E+00	800	0.000E+00

CIE 1931 x y Chromaticity Diagram



7-Step & 4-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

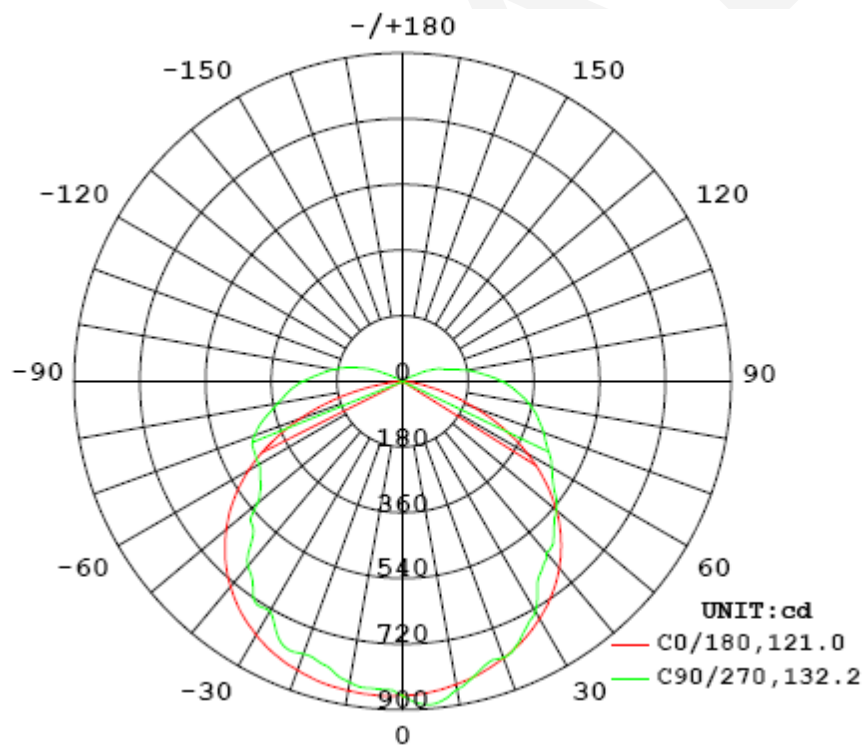
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60.0	0.2166	25.59	0.9845

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
3264.27	127.56	890	1.30	1.24

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	121.0	122.1	132.2	121.6	124.2
Field Angle (10% I _{max}):	158.2	204.8	223.6	206.6	198.3

Luminous Intensity (cd) Distribution Data

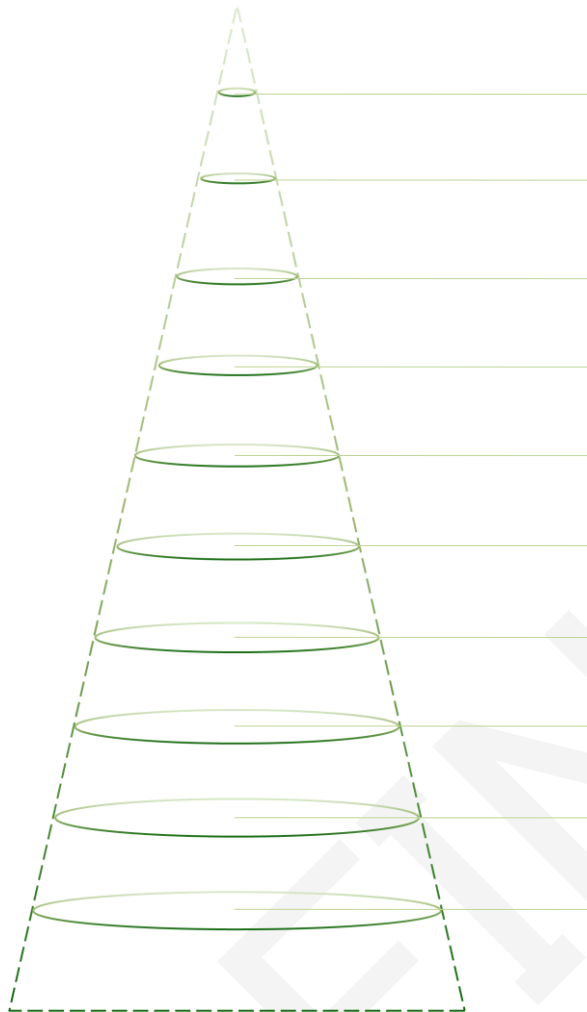
C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	861	861	861	861	861	861	861	861
5.0°	863	849	848	836	845	843	842	842
10.0°	861	845	847	833	837	836	836	833
15.0°	855	838	834	805	807	805	817	821
20.0°	842	828	805	785	795	782	783	807
25.0°	826	808	782	788	790	783	757	781
30.0°	803	780	779	741	728	727	753	741
35.0°	773	737	750	718	715	710	712	700
40.0°	734	696	689	665	660	650	663	657
45.0°	688	657	669	607	578	586	626	630
50.0°	632	625	607	552	519	537	571	582
55.0°	565	551	519	476	476	462	484	502
60.0°	488	492	452	448	455	435	415	458
65.0°	398	414	400	436	450	425	376	382
70.0°	300	314	377	427	433	415	359	290
75.0°	196	222	366	387	392	374	343	208
80.0°	96	190	310	338	348	327	287	190
85.0°	26	147	252	299	313	290	237	133
90.0°	1	93	209	260	274	251	197	89
95.0°	0	61	160	214	230	208	153	59
100.0°	1	36	123	175	191	170	116	34
105.0°	1	11	81	130	149	126	76	11
110.0°	1	5	26	88	105	85	25	5
115.0°	1	3	12	26	47	25	12	3
120.0°	1	2	5	14	18	13	5	3
125.0°	1	2	3	6	8	6	3	2
130.0°	1	2	3	4	4	4	3	2
135.0°	1	2	2	3	3	3	2	2
140.0°	1	1	2	2	2	2	2	1
145.0°	1	1	2	2	2	2	2	1
150.0°	1	1	2	2	2	2	2	1
155.0°	1	1	2	2	2	2	2	1
160.0°	1	1	2	2	2	2	2	1
165.0°	1	1	2	2	2	2	1	1
170.0°	1	1	1	1	2	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	861	861	861	861	861	861	861	861
5.0°	855	871	882	875	889	890	888	879
10.0°	843	871	871	848	858	865	881	886
15.0°	828	860	835	809	819	830	850	879
20.0°	808	834	795	781	806	806	815	856
25.0°	782	796	761	762	771	787	790	824
30.0°	751	757	749	714	727	740	773	788
35.0°	713	711	698	650	651	673	725	742
40.0°	667	660	649	600	613	627	675	705
45.0°	613	625	570	573	586	603	599	673
50.0°	550	577	529	528	549	554	556	611
55.0°	476	496	496	495	505	520	521	540
60.0°	394	407	455	452	472	475	484	431
65.0°	304	327	403	420	438	443	429	373
70.0°	211	284	360	386	412	409	386	326
75.0°	126	237	316	357	383	379	341	269
80.0°	57	168	281	326	351	346	305	197
85.0°	14	123	238	287	313	307	264	151
90.0°	0	81	192	247	273	265	216	107
95.0°	0	47	141	198	224	213	160	61
100.0°	0	41	93	152	179	166	106	48
105.0°	0	17	75	109	130	117	84	20
110.0°	1	5	38	84	103	91	41	6
115.0°	1	3	19	42	64	44	21	4
120.0°	1	3	7	23	29	24	7	3
125.0°	1	2	4	10	15	10	4	2
130.0°	1	2	3	4	5	4	3	2
135.0°	1	2	2	3	3	3	2	2
140.0°	1	2	2	2	2	2	2	2
145.0°	1	1	2	2	2	2	2	2
150.0°	1	1	1	2	2	2	2	1
155.0°	1	1	1	2	2	2	2	1
160.0°	1	1	1	1	2	2	2	1
165.0°	1	1	1	1	1	2	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Average Area Illumination Figure

Angle: 124.20°. Flux out: 2181.0 lm.



Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	188.9	720.8	3521.0
1.0	377.7	180.2	880.2
1.5	566.6	80.1	391.2
2.0	755.5	45.1	220.1
2.5	944.3	28.8	140.8
3.0	1133.2	20.0	97.8
3.5	1322.1	14.7	71.9
4.0	1510.9	11.3	55.0
4.5	1699.8	8.9	43.5
5.0	1888.7	7.2	35.2

Zonal Lumen Density Measurement

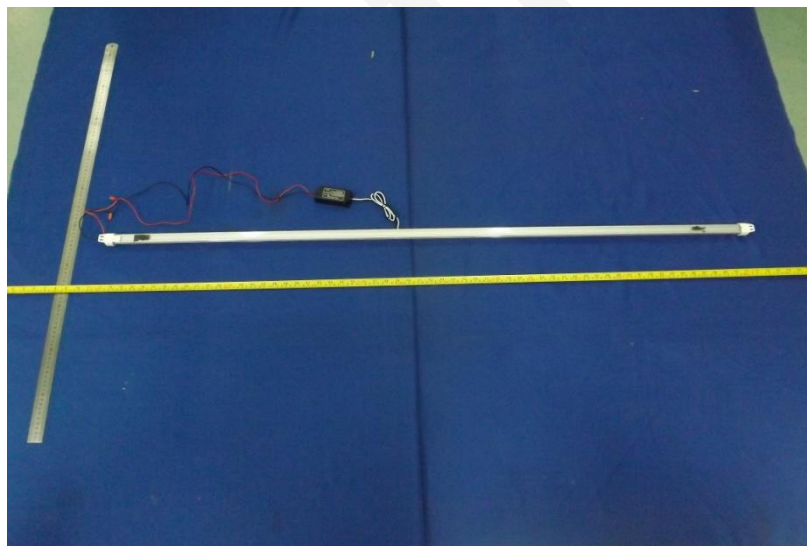
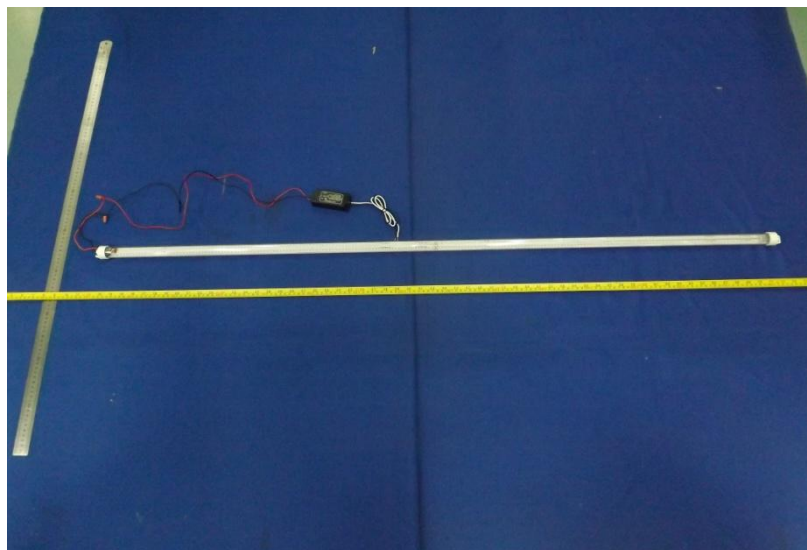
Deg	Flux (lm)	%
0-5	20.6	0.63
5-10	61.4	1.88
10-15	99.9	3.06
15-20	134.9	4.14
20-25	167.4	5.12
25-30	195.0	5.98
30-35	215.7	6.61
35-40	228.9	7.01
40-45	237.5	7.28
45-50	239.3	7.33
50-55	233.1	7.14
55-60	221.1	6.77
60-65	206.5	6.33
65-70	191.4	5.86
70-75	172.7	5.29
75-80	150.4	4.61
80-85	127.6	3.91
85-90	105.2	3.22
90-95	83.1	2.55
95-100	64.1	1.96
100-105	45.9	1.41
105-110	30.1	0.92
110-115	16.5	0.51
115-120	6.8	0.21
120-125	3.3	0.10
125-130	1.6	0.05
130-135	1.0	0.03
135-140	0.7	0.02
140-145	0.6	0.02
145-150	0.5	0.01
150-155	0.4	0.01
155-160	0.3	0.01
160-165	0.2	0.01
165-170	0.2	0.01
170-175	0.1	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	20.6	0.63
0-10	82.0	2.51
0-15	182.0	5.57
0-20	316.8	9.71
0-25	484.2	14.83
0-30	679.3	20.81
0-35	895.0	27.42
0-40	1123.8	34.43
0-45	1361.4	41.71
0-50	1600.7	49.04
0-55	1833.8	56.18
0-60	2054.9	62.95
0-65	2261.4	69.28
0-70	2452.9	75.14
0-75	2625.6	80.43
0-80	2776.0	85.04
0-85	2903.6	88.95
0-90	3008.8	92.17
0-95	3091.9	94.72
0-100	3156.0	96.68
0-105	3201.9	98.09
0-110	3232.0	99.01
0-115	3248.5	99.52
0-120	3255.3	99.73
0-125	3258.7	99.83
0-130	3260.2	99.88
0-135	3261.2	99.91
0-140	3262.0	99.93
0-145	3262.5	99.95
0-150	3263.0	99.96
0-155	3263.4	99.97
0-160	3263.7	99.98
0-165	3264.0	99.99
0-170	3264.1	100.00
0-175	3264.2	100.00
0-180	3264.3	100.00

[Additional Test]

Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Power Factor:	277	60	0.8899
Total Harmonic Distortion:	277	60	17.78%
Total Harmonic Distortion:	120	60	14.36%

6. Product Photo



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