LM-79-08 Test Report

For

ELEC-TECH INTERNATIONAL CO LTD

No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District, Zhuhai City, Guangdong Province, P.R. China 519085

LED Ceiling Light

Model name(s):

544375## 544373##

Representative (Tested) Model:

54437511

Model Difference: All models are identical to each, except model name. ##=11-30 intends CCT 3000K, 4000K and 5000K. (The product is color tunable luminaire, tunable from 3000K, 4000K and 5000K).

Prepare By:

Engineer: Leo Liu

Date: 2017-07-11

Review By:

Technical Lead: Vincent Yuan

Date: 2017-07-12

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Product Information:

Client Name:	ELEC-TECH INTERNATIONAL CO LTD
Brand Name:	ETI
Model Number:	544373##, 544375## (##=11-30)
Product type:	LED Light Engine
Rating Input:	AC120V, 60Hz, 24W
Declared CCT:	3000K
Declared Light output:	1600lm
LED Manufacturer:	Samsung
LED Model:	SPMWHX229A
LED Quantity:	60 pcs
Forward current of LED Chip:	100 mA
Date of Receipt Samples:	2017-06-18
Quantity of Receipt Samples:	3
Sample Number:	170618007-S1

Laboratory Information:

Test Laboratory:	Dongguan New Testing Centre Co., Ltd
Laboratory Address:	3F, No. 1 the 1st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China
Laboratory Contact Name:	Neil Zhong
Laboratory Contact E-mail:	Neil_ntc@163.com

Report Information

Issued Date of Test Report:	2017-07-12
Revised Date of Test Report:	N/A
Test Report No.:	NTCR17060059
Remark (*If applicable*)	N/A

Test Specifications:	
Date of Test	2017-06-25
Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate
Reference Standard	IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products ANSI C78.377-2008 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

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° C ± 1° 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 120 Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° Vertical intervals.

2. Photometric and Electrical Measurements – Integrating Sphere Method:

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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 120 Volts AC, 60Hz. 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 5 nm intervals over the range of 380 to 780 nm.

Integrating Sphere Test Results

Test Condition:

Test Ambient	Test Humidity	Orientation	Stabilization Time	Test Time
25.0 °C	50 %	Face Down	90 mins	25 mins

Electrical Data:

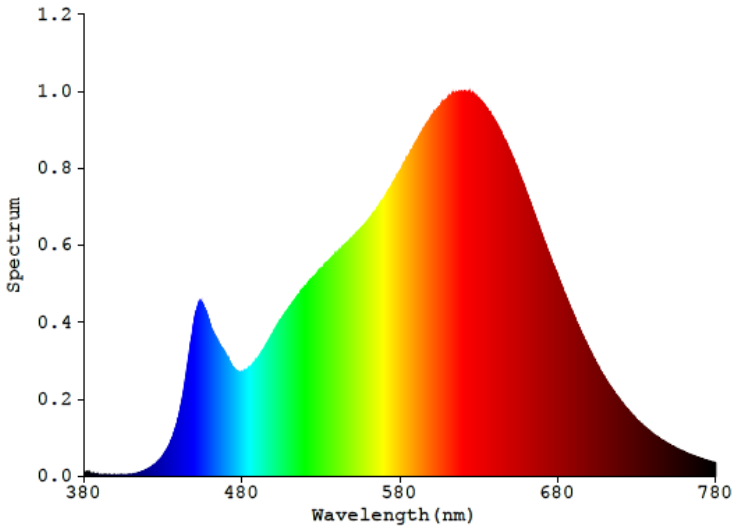
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.1961	22.98	0.9770

Color Data:

Parameter	Result
CCT (K)	2955
Color Rendering Index (CRI)	93.2
R9	59
Chromaticity, x	0.4402
Chromaticity, y	0.4053
Chromaticity u′	0.2522
Chromaticity v′	0.5224
Duv	0.00004

Special Color Rendering			
R1	94	R9	59
R2	98	R10	94
R3	98	R11	94
R4	93	R12	83
R5	93	R13	95
R6	97	R14	100
R7	91	R15	89
R8	81	-	-

Spectrum Diagram:



Goniophotemeter Test Results:

Test Condition:

Test Ambient	Test Humidity	Orientation	Stabilization Time	Test Time
25.6 °C	51 %	Face Down	90 mins	25 mins

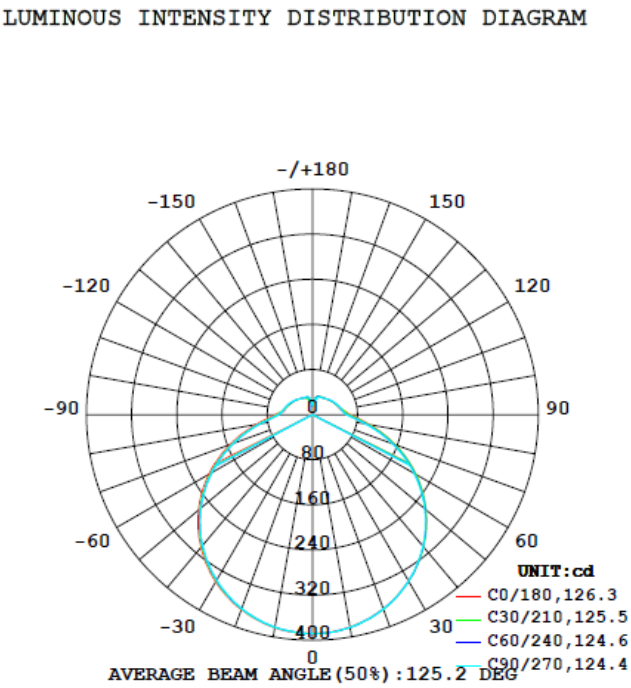
Electrical Data:

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.1961	22.98	0.9770

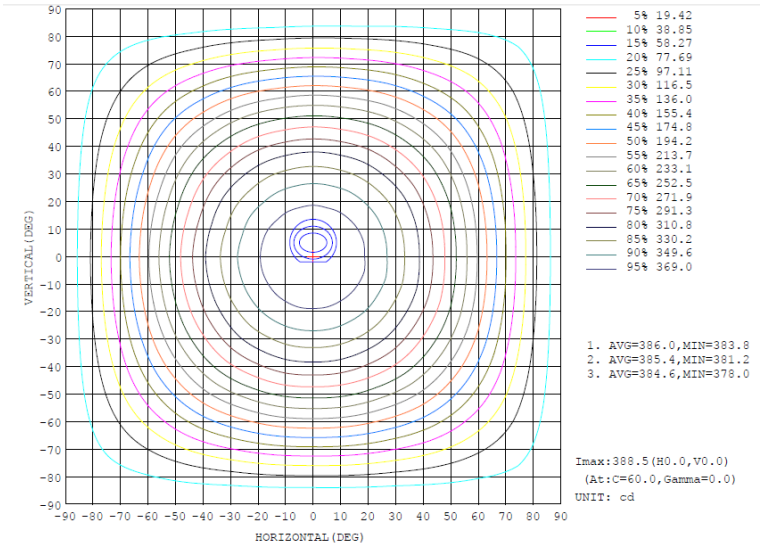
Goniophotometer Data:

Parameter	Result
Total Luminous (lm)	1610.9
Total Luminous per foot (lm/ft)	N/A
Luminous Efficacy (lm/w)	70.11
Zonal Lumens Distribution (0-90°)	82.9%
Beam Angle (°)	125.2
Center Beam Candle Power (cd)	389

Luminous Intensity Distribution Diagram:



Isocandela Diagram:



Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	382.2	383.0	382.8	382.9	383.1	382.6	382.9	382.4	0- 10	36.79	36.79	2.28,2.28
20	366.1	366.9	367.0	367.3	368.0	366.0	365.8	366.5	10- 20	106.2	143.0	8.88,8.88
30	340.4	341.1	340.2	341.4	342.0	339.1	339.1	339.8	20- 30	163.7	306.7	19,19
40	305.5	305.9	304.4	306.0	307.0	302.8	302.5	304.3	30- 40	202.7	509.4	31.6,31.6
50	262.0	262.2	259.3	261.2	263.3	257.6	257.8	260.2	40- 50	218.9	728.3	45.2,45.2
60	211.6	210.9	207.5	209.6	212.0	206.0	205.8	209.2	50- 60	210.6	938.9	58.3,58.3
70	156.0	154.2	150.5	152.2	155.2	148.7	148.9	153.1	60- 70	179.2	1118	69.4,69.4
80	102.8	98.94	95.13	97.12	101.3	93.93	93.91	98.78	70- 80	131.4	1249	77.6,77.6
90	66.60	62.58	59.95	62.42	65.18	60.29	59.65	63.69	80- 90	84.72	1334	82.8,82.8
100	50.56	53.68	51.93	53.92	49.87	52.35	51.84	55.01	90-100	61.67	1396	86.7,86.7
110	47.05	48.07	48.25	48.25	46.34	46.81	48.00	49.13	100-110	52.75	1449	89.9,89.9
120	43.41	43.70	44.60	43.96	42.96	42.68	44.15	44.41	110-120	45.29	1494	92.7,92.7
130	40.01	40.16	40.70	40.35	39.70	39.40	40.14	40.62	120-130	37.62	1532	95.1,95.1
140	37.08	37.26	37.12	37.36	36.58	36.39	36.66	37.40	130-140	29.87	1561	96.9,96.9
150	35.42	35.30	34.61	34.91	34.17	34.03	34.20	35.06	140-150	22.47	1584	98.3,98.3
160	34.53	34.82	34.06	33.69	32.49	31.07	33.81	32.67	150-160	15.75	1600	99.3,99.3
170	28.82	29.69	29.58	30.38	30.01	26.74	30.51	27.13	160-170	8.992	1609	99.9,99.9
180	18.58	17.75	21.11	19.09	18.57	17.76	21.13	19.07	170-180	2.316	1611	100,100
DEG	LUMINOUS INTENSITY:cd Less than 35% Percent = 19.2 %									UNIT:lm		

Luminous Distribution Intensity Data:

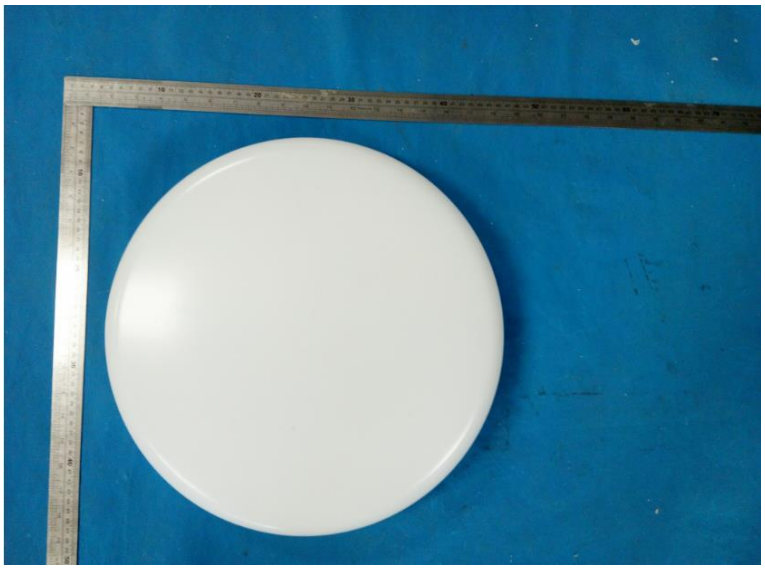
Table--1 UNIT: cd

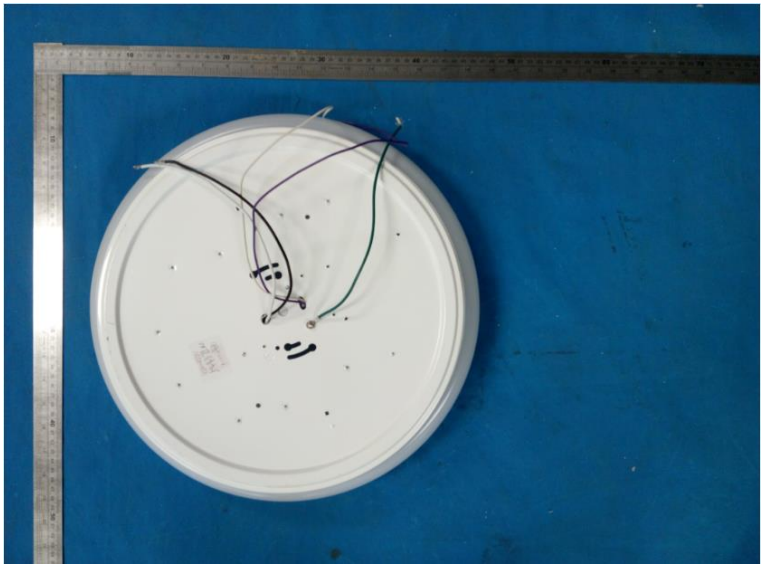
γ (DEG) \ C (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270
0	388	388	388	388	389	388	388	388	388	388	389	389	388	388	388	388	389	388	388
5	387	387	387	386	387	387	387	387	387	387	387	387	387	387	387	387	386	387	387
10	382	383	383	383	383	383	383	383	383	383	383	383	383	383	383	383	383	382	383
15	376	377	376	376	376	376	376	376	376	377	376	376	377	376	376	375	375	375	376
20	366	368	367	367	367	367	367	368	367	367	367	368	368	366	367	366	366	366	366
25	355	356	355	355	355	355	355	355	355	355	356	356	356	355	355	354	354	353	354
30	340	342	341	341	341	341	340	341	341	341	341	341	342	340	340	339	339	339	339
35	324	326	325	325	324	323	323	324	324	325	324	325	326	324	324	322	322	322	322
40	305	307	306	306	305	305	304	305	305	306	305	306	307	305	305	303	303	302	302
45	285	287	285	285	284	284	283	284	283	285	284	285	286	283	283	282	281	281	281
50	262	264	262	262	261	260	259	260	260	261	261	262	263	260	260	258	258	257	258
55	238	240	238	237	235	236	234	236	235	236	236	237	238	235	235	233	233	232	232
60	212	214	212	211	208	209	208	208	208	210	209	211	212	208	208	206	206	205	206
65	184	186	184	183	181	180	179	180	180	181	181	182	184	180	179	178	177	177	177
70	156	157	156	154	152	152	150	151	151	152	152	154	155	152	151	149	148	148	149
75	128	130	128	126	123	123	122	122	122	124	124	126	127	124	123	120	120	119	120
80	103	104	101	98.9	96.6	96.2	95.1	95.9	95.7	97.1	97.9	99.8	101	98.2	96.2	93.9	93.4	92.8	93.9
85	82.2	82.2	78.8	76.9	74.7	74.3	73.5	74.1	74.2	75.8	76.5	79.1	80.3	77.3	75.0	72.8	72.1	71.6	72.6
90	66.6	67.2	64.5	62.6	60.8	60.3	60.0	60.5	61.0	62.4	63.5	64.9	65.2	63.8	62.2	60.3	59.5	58.9	59.6
95	59.5	59.7	58.2	56.4	54.8	54.5	54.4	54.8	55.5	56.7	57.6	54.1	55.3	53.4	56.5	55.1	54.2	53.9	54.4
100	50.6	50.5	54.2	53.7	52.5	51.8	51.9	52.4	53.0	53.9	52.8	49.5	49.9	48.8	51.8	52.4	52.0	51.4	51.8
105	48.9	48.7	49.8	51.0	50.4	50.1	50.2	50.6	51.3	50.9	49.2	48.0	48.2	47.4	48.2	49.5	49.7	49.5	49.9
110	47.0	46.7	47.0	48.1	48.1	48.2	48.3	48.5	48.6	48.3	46.9	46.5	46.3	45.8	46.0	46.8	47.4	47.5	48.0
115	45.2	44.9	44.9	45.6	45.9	46.2	46.5	46.4	46.4	46.0	45.0	44.7	44.7	44.2	44.1	44.7	45.2	45.5	46.1
120	43.4	43.3	43.1	43.7	44.0	44.3	44.6	44.5	44.3	44.0	43.3	43.1	43.0	42.6	42.5	42.7	43.3	43.6	44.2
125	41.7	41.6	41.4	41.9	42.0	42.5	42.6	42.7	42.5	42.2	41.6	41.4	41.3	40.9	40.8	41.0	41.4	41.7	42.1
130	40.0	40.1	39.9	40.2	40.3	40.6	40.7	41.0	40.7	40.4	39.9	39.8	39.7	39.4	39.2	39.4	39.8	40.0	40.1
135	38.5	38.6	38.4	38.6	38.6	38.7	38.7	39.3	39.1	38.8	38.3	38.3	38.2	37.8	37.8	37.8	38.1	38.3	38.3
140	37.1	37.3	37.1	37.3	37.0	37.1	37.1	37.6	37.3	37.4	36.9	36.9	36.6	36.4	36.4	36.4	36.6	36.7	36.7
145	36.0	36.2	36.0	36.1	35.7	35.7	35.8	36.2	36.0	36.0	35.8	35.5	35.3	34.9	35.0	35.1	35.2	35.1	35.3
150	35.4	35.5	35.6	35.3	34.9	34.8	34.6	34.8	34.9	34.9	34.6	34.4	34.2	33.6	33.6	34.0	34.0	34.0	34.2
155	34.5	35.3	35.2	35.1	34.3	34.7	33.9	34.1	33.1	34.0	33.8	33.7	33.0	32.7	32.5	33.1	33.0	33.2	33.7
160	34.5	35.1	35.1	34.8	34.5	32.6	34.1	32.2	33.0	33.7	33.6	33.7	32.5	30.8	31.0	31.1	32.8	33.3	33.8
165	33.4	33.8	33.9	33.4	32.9	30.8	27.0	28.8	33.0	33.6	33.2	33.1	32.9	27.7	26.9	28.7	32.6	33.0	33.4
170	28.8	30.0	30.5	29.7	29.2	30.6	29.6	30.0	30.2	30.4	30.9	30.6	30.0	28.9	27.6	26.7	28.6	30.2	30.5
175	22.0	22.9	22.9	21.9	21.0	20.7	20.8	21.9	22.8	23.3	23.0	21.7	22.6	20.2	21.0	20.2	20.3	21.5	22.4
180	18.6	19.2	19.0	17.8	19.0	18.8	21.1	20.0	19.5	19.1	18.8	18.2	18.6	19.2	19.0	17.8	19.0	18.8	21.1

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	285	300	315	330	345
0	388	388	388	389	389
5	386	387	387	387	387
10	382	382	382	383	383
15	375	376	376	376	376
20	365	366	366	367	367
25	353	354	354	355	355
30	339	340	340	341	341
35	322	323	323	325	324
40	303	304	304	306	306
45	281	283	283	285	285
50	258	260	260	262	263
55	233	235	236	238	238
60	206	209	209	212	212
65	178	180	181	184	185
70	149	152	153	156	157
75	121	123	125	128	129
80	94.7	97.0	98.8	102	104
85	73.3	75.5	77.1	80.0	82.6
90	60.4	62.1	63.7	66.0	67.5
95	55.0	56.4	57.9	59.5	59.9
100	52.5	53.8	55.0	55.4	50.9
105	50.6	52.0	52.1	50.9	49.2
110	48.5	49.2	49.1	48.1	47.4
115	46.4	46.9	46.6	46.0	45.6
120	44.4	44.8	44.4	44.1	43.8
125	42.4	42.6	42.4	42.3	42.1
130	40.4	40.7	40.6	40.5	40.3
135	38.5	38.8	38.9	38.9	38.7
140	36.9	37.1	37.4	37.4	37.3
145	35.5	35.5	36.0	36.1	36.0
150	34.2	34.4	35.1	35.2	35.5
155	33.5	33.4	35.0	35.0	35.1
160	33.8	34.0	32.7	34.2	32.0
165	33.4	32.4	28.5	27.1	30.1
170	29.7	29.2	27.1	27.6	28.3
175	22.6	22.2	21.2	20.0	20.1
180	19.9	19.5	19.1	18.8	18.2

Photo of Sample:





Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2016-12-03	2017-12-02
NTC-F01-006	2.0 meter Integrating Sphere	2016-12-03	2017-12-02
NTC-F01-013	Standard Lamp	2016-12-27	2017-12-26
NTC-F01-031	Digital Power Meter	2016-12-05	2017-12-04
NTC-F01-019	Temperature & Humidity Meter	2016-11-28	2017-11-27

*******END OF DATASHEET*******