



## 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):

544365##

544363##

Representative (Tested) Model: 54436511

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:

laston

Engineer: Leo Liu Date: 2017-07-11

Review By:

incer Tven

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.

Laboratory: Dongguan New Testing Centre Co., Ltd Page 1/11 Address: 3F, No. 1 the 1<sup>st</sup> North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China Tel: 86-755-2344 3526 Website: http://www.ntc-cert.com



R NVLAP LAB CODE 600150-0

Touuci Intoi mation.	
Client Name:	ELEC-TECH INTERNATIONAL CO LTD
Brand Name:	ETI
Model Number:	544363##, 544365## (##=11-30)
Product type:	LED Light Engine
Rating Input:	AC120V, 60Hz, 16W
Declared CCT:	3000K
Declared Light output:	1000lm
LED Manufacturer:	Samsung
LED Model:	SPMWHX229A
LED Quantity:	40 pcs
Forward current of LED Chip:	100 mA
Date of Receipt Samples:	2017-06-18
Quantity of Receipt Samples:	3
Sample Number:	170618006-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
<b><u>Report Information</u></b>	
Issued Date of Test Report:	2017-07-12
Revised Date of Test Report:	N/A
Test Report No.:	NTCR17060056
Remark (If applicable)	N/A





<b>Test Specifications:</b>	
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  $25^{\circ} \text{ C} \pm 1^{\circ} \text{ C}$ , 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 25° C  $\pm$  1° 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 Cor	ndition:			
Test Ambient	Test Humidity	Orientation	Stabilization Time	Test Time
25.2 °C	56 %	Face Down	90 mins	25 mins
Electric	al Data:			

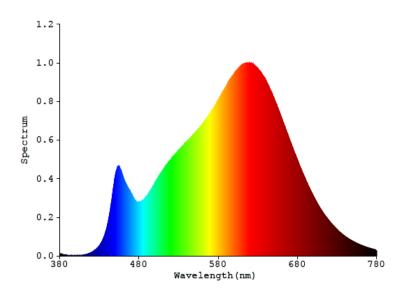
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	<b>Power Factor</b>
120.0	60	0.1364	15.98	0.9765

Color Data:

Parameter	Result
CCT(K)	3004
Color Rendering Index (CRI)	92.1
R9	54
Chromaticity, x	0.4372
Chromaticity, y	0.4052
Chromaticity u'	0.2503
Chromaticity v'	0.5219
Duv	0.00039

S	Special Color Rendering									
R1	92	R9	54							
R2	97	R10	92							
R3	98	R11	92							
R4	91	R12	81							
R5	92	R13	94							
R6	96	R14	100							
R7	90	R15	88							
R8	79	-	-							

### Spectrum Diagram:





NVLAP LAB CODE 600150-0

Report No: NTCR17060056 Report Version: V1.1

**Goniophotemeter Test Results:** 

Test Co	ndition:			
Test Ambient	Test Humidity	Orientation	Stabilization Time	Test Time
24.6 °C	45 %	Face Down	90 mins	25 mins
Electric	al Data:			

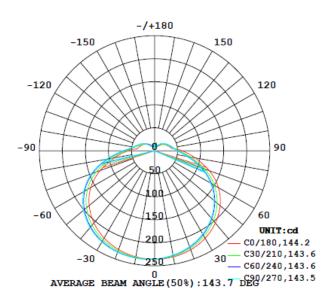
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	<b>Power Factor</b>
120.0	60	0.1364	15.98	0.9766

#### **Goniophotometer Data:**

Parameter	Result
Total Luminous (lm)	1145.8
Total Luminous per foot (lm/ft)	N/A
Luminous Efficacy (lm/w)	71.7
Zonal Lumens Distribution (0-90°)	84.0%
Beam Angle (°)	143.7
Center Beam Candle Power (cd)	235

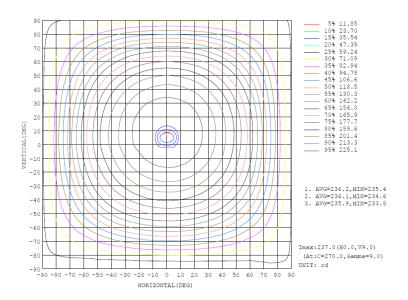
### **Luminous Intensity Distribution Diagram:**

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM













#### ZONAL FLUX DIAGRAM:

γ	CO	C45	C90	C135	C180	C225	C270	C315	γ	∲ zone		%lum,lamg
10	234.2	231.5	230.4	231.0	234.1	235.8	236.8	235.8	0- 10	22.38	22.38	1.95,1.95
20	228.9	224.3	221.6	223.1	228.5	232.9	235.1	232.9	10- 20	65.48	87.86	7.67,7.67
30	219.4	212.2	208.4	210.9	218.9	225.7	229.0	226.1	20- 30	103.5	191.4	16.7,16.7
40	204.9	195.3	190.9	193.9	204.8	213.6	218.2	214.3	30-40	133.0	324.4	28.3,28.3
50	185.6	173.3	168.2	172.2	185.2	196.0	201.4	196.9	40- 50	150.9	475.3	41.5,41.5
60	159.9	145.7	139.9	144.2	159.7	171.9	178.1	173.0	50- 60	154.5	629.8	55,55
70	126.0	111.5	105.5	109.2	125.6	139.1	146.2	140.8	60-70	141.6	771.4	67.3,67.3
80	89.06	75.71	70.97	73.34	88.24	98.78	106.3	101.2	70- 80	112.6	883.9	77.1,77.1
90	58.52	51.09	48.75	49.92	57.56	64.08	69.19	65.99	80- 90	78.46	962.4	84,84
100	36.23	40.46	39.30	40.18	36.48	45.67	47.35	46.43	90-100	53.60	1016	88.7,88.7
110	31.26	34.07	34.18	34.14	31.74	36.86	38.31	37.39	100-110	40.22	1056	92.2,92.2
120	26.50	28.73	29.67	29.16	27.52	29.43	31.33	29.70	110-120	31.56	1088	94.9,94.9
130	20.93	24.20	24.69	24.91	23.31	22.14	22.07	20.98	120-130	23.43	1111	97,97
140	14.10	18.99	19.16	21.00	18.44	14.63	13.21	12.76	130-140	15.38	1127	98.3,98.3
150	10.09	13.61	13.97	16.66	13.79	9.252	9.428	8.730	140-150	8.833	1135	99.1,99.1
160	12.98	12.33	11.82	12.17	10.29	8.460	14.28	14.36	150-160	5.470	1141	99.6,99.6
170	17.35	15.46	8.710	13.19	12.76	11.45	16.90	16.22	160-170	3.737	1145	99.9,99.9
180	3.313	6.477	5.449	5.391	3.311	6.470	5.451	5.369	170-180	1.175	1146	100,100
DEG		LUM	INOUS INTE	NSITY:cd	Less than	35% Percen	t = 21.4 %			UNI	T:lm	1





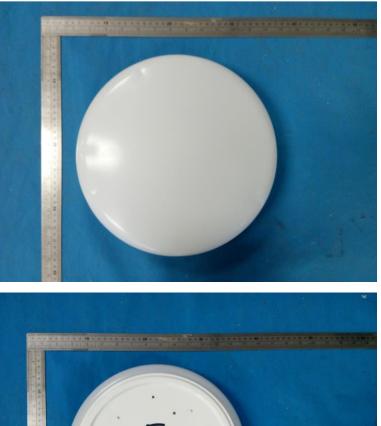
NVLAP LAB CODE 600150-0

**Luminous Distribution Intensity Data:** 

Table1																TINT	T: ed		
C (DEG)																041	1. cu		
y (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270
0	236	235	235	235	235	235	235	235	235	235	235	235	236	235	235	235	235	235	235
5	235	235	234	234	234	233	233	233	233	233	234	234	235	236	236	236	236	236	236
10	234	233	232	232	231	231	230	230	230	231	232	232	234	234	235	236	236	237	237
15	232		230	228	227	227	226	226	227	228	228	229	232	233	234	235	236	236	236
20	229	227	226	224	223	222	222	222	222	223	224	226	228	230	232	233	234	235	235
25	225	223	220	219	217	216	216	216	216	218	219	221	224	226	228	230	231	232	233
30	219	217	214	212	210	209	208	209	209	211	213	215	219	221	224	226	228	229	229
35	213	210	207	205	202	201	200	201	201	203	205	208	212	215	218	220	222	224	224
40	205	202	198	195	193	191	191	191	192	194	197	200	205	207	211	214	216	217	218
45	196	192	188	185	182	181	180	180	182	184	187	190	195	199	203	206	208	210	211
50	186	182	177	173	171	169	168	169	170	172	175	180	185	189	193	196	199	200	201
55	174	169	164	160	157	156	155	155	156	159	163	167	173	177	181	185	188	190	191
60	160	155	150	146	143	141	140	140	141	144	148	153	160	164	168	172	175	177	178
65	144	139	133	129	126	125	123	124	125	127	131	136	144	148	153	157	161	162	163
70	126	122	115	111	108	107	106	106	107	109	113	118	126	130	135	139	143	145	146
75	107	103	96.7	92.9	90.1	88.8	87.6	87.7	88.2	90.4	93.6	98.9	107	110	115	119	124	126	127
80	89.1	85.0	79.0	75.7	73.1	72.2	71.0	71.2	71.4	73.3	76.0	81.2	88.2	90.7	94.8	98.8	103	105	106
85	73.6	69.6	64.2	61.5	59.4	58.7	57.8	58.0	58.1	59.6	61.8	66.2	72.7	73.0	76.4	79.6	83.4	85.2	86.4
90	58.5	56.7	53.0	51.1	49.7	49.2	48.8	48.8	48.8	49.9	51.5	54.3	57.6	59.3	61.9	64.1	66.9	68.1	69.2
95	47.3	47.7	45.8	44.6	43.7	43.6	43.8	43.3	43.3	44.0	44.9	44.0	42.7	49.4	51.7	52.9	54.6	55.4	56.0
100	36.2	2 38.3	40.7	40.5	39.8	39.5	39.3			40.2		37.1	36.5	38.9	44.7	45.7		47.0	47.4
105	34.1	34.4	36.2	37.2	37.6	37.0	36.7	36.9	36.9	37.0	35.7	34.0	34.0	34.6	39.0	41.1	41.8	42.0	42.1
110	31.3	31.6	32.7	34.1	34.5	34.3	34.2						31.7	32.0	34.6	36.9	38.0	38.2	38.3
115	28.9	29.2	29.8	31.2	31.9	31.9	31.9	32.1	32.0	31.5	30.4	29.5	29.6	29.6	31.3	33.0	34.4	34.7	34.8
120	26.5	5 26.9	27.3	28.7	29.6	29.5	29.7	30.0	29.7	29.2	28.1	27.5	27.5	27.4	28.3	29.4	31.0		
125		24.4																	
130		21.9																	
135		3 19.2																	
140		15.9																	
145		13.3																	10.4
150	10.1	11.5	12.8	13.6	13.5	12.5	14.0	15.0	16.3	16.7	15.6	15.1	13.8	12.6	10.2	9.25	10.4	9.89	9.43
155	11.6	5 11.1	11.8	11.6	11.7	10.7	12.5	13.0	14.4	14.6	13.7	13.6	12.4	11.4	9.43	7.99	9.69	10.5	11.2
160	13.0	14.1	13.7	12.3	9.08	9.90	11.8	11.3	10.7	12.2	12.6	12.3	10.3	10.1	10.2	8.46	10.3	13.3	14.3
165	16.3	3 17.1	16.5	15.3	12.5	9.42	14.2	9.36	9.08	12.7	12.5	12.6	9.12	9.77	11.4	9.50	11.1	14.7	16.9
100								10.3		13.2	14 1	14.1	12.8	10.0	8.21	11.5	13.8	15.2	16.9
170	17.4	17.6	17.0	15.5	14.4	12.0	8.71	10.5	11.1										
175	13.4	17.6 13.7 4.55	13.0	13.3	11.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2	13.4	13.7	13.0	13.3	11.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG)	13.4	13.7	13.0	13.3	11.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2	13.4	4.55	13.0	13.3	11.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C (DEG) (DEG)	13.4 3.31 285	4.55 300	13.0 5.69 315	13.3 6.48 330	11.9 6.68 345	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C (DEG) (DEG) 0	13.4 3.31 285 235	300 235	13.0 5.69 315 235	13.3 6.48 330 235	11.9 6.68 345 235	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG) 0 5 10	13.4 3.31 285 235 236	300 235 236	13.0 5.69 315 235 236 236	13.3 6.48 330 235 235 235	11.9 6.68 345 235 235 235	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C (DEG) (DEG) 0 5	13.4 3.31 285 235 236 237	300 235 236	13.0 5.69 315 235 236	13.3 6.48 330 235 235	11.9 6.68 345 235 235	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C (DEG) 0 5 10 15	13.4 3.31 285 235 236 237 236	300 235 236 236	13.0 5.69 315 235 236 236 236	13.3 6.48 330 235 235 235 235 234	11.9 6.68 345 235 235 234 233	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C (DEG) (DEG) 0 5 10 15 20	13.4 3.31 285 235 236 237 236 235	300 235 236 236 234	13.0 5.69 315 235 236 236 235 233	13.3 6.48 330 235 235 235 234 232	11.9 6.68 345 235 234 233 234 233	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG) (DEG) 0 5 10 15 20 25	13.4 3.31 285 235 236 237 236 235 232	300 235 236 236 234 232	13.0 5.69 315 235 236 235 233 233 230	13.3 6.48 330 235 235 235 234 232 229	11.9 6.68 345 235 235 234 233 230 226	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C (DEG) 0 5 10 15 20 25 30	13.4 3.31 285 235 236 237 236 235 232 232 229	300 235 236 236 234 232 228	13.0 5.69 315 235 236 236 235 233 230 226	13.3 6.48 330 235 235 234 232 229 224	11.9 6.68 345 235 235 234 233 230 226 222	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C(DEG) 0 5 10 15 20 25 30 35	13.4 3.33 285 235 236 237 236 235 232 229 224	300 235 236 236 234 232 228 223	13.0 5.69 315 235 236 235 233 230 226 221	13.3 6.48 330 235 235 234 232 229 224 219	11.9 6.68 345 235 235 234 233 230 226 222 216	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C(DEG) 0 5 10 15 20 25 30 35 40	13.4 3.33 285 235 236 237 236 235 232 229 224 217	300 235 236 236 234 232 228 223 217	13.0 5.69 315 235 236 235 233 230 226 221 214	13.3 6.48 330 235 235 235 235 234 232 229 224 219 212	11.9 6.68 345 235 235 234 233 230 226 222 216 208	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C(DEG) (DEG) 0 5 10 15 20 25 30 35 40 45	13.4 3.31 285 235 236 237 236 235 232 229 224 217 210	300 235 236 236 234 232 228 223 217 209	13.0 5.69 315 235 236 235 233 230 226 221 214 206	13.3 6.48 330 235 235 235 235 234 232 229 224 219 212 212 204	11.9 6.68 345 235 235 234 233 230 226 222 216 208 200	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C(DEG) (DEG) 0 5 10 15 20 20 25 30 35 40 45 50	13.4 3.33 285 235 236 237 236 232 229 224 217 210 201	300 235 236 236 236 236 236 236 236 232 228 223 217 209 199	13.0 5.69 315 235 236 235 233 230 226 221 214 206 197	13.3 6.48 330 235 235 235 234 232 229 224 219 212 204 194	11.9 6.68 345 235 234 233 230 226 222 216 208 200 190	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C(DEG) (DEG) 0 5 10 20 25 30 35 40 45 55 55	13.4 3.33 285 235 236 237 236 237 236 237 236 237 232 229 224 217 210 201 190	300 235 236 236 236 236 236 236 236 232 228 223 217 209 199 188	13.0 5.69 315 235 236 236 233 230 226 221 214 206 197 186	13.3 6.48 330 235 235 235 235 234 232 229 224 219 212 204 194 183	11.9 6.68 345 235 235 234 233 230 226 222 216 208 200 190 178	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table2 C(DEG) C(DEG) C(DEG) 0 5 10 15 15 20 25 30 35 40 45 55 60	13.4 3.33 285 235 236 237 236 237 236 237 236 237 236 232 229 224 217 210 201 190 177	300 235 236 236 236 236 234 232 228 223 217 209 199 188 176	13.0 5.69 315 235 236 233 230 226 221 214 206 197 186 173	13.3 6.48 330 235 235 235 235 235 232 229 224 212 204 194 183 170 154 137	11.9 6.68 345 235 235 234 233 230 226 222 2216 208 200 190 178 165	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           25           30           35           40           55           50           55           60	285 235 236 237 236 235 232 229 229 229 229 221 210 201 190 177 163	300 235 236 236 236 236 236 236 236 236 232 228 223 228 223 227 209 188 176 161	13.0 5.69 315 235 236 235 233 230 226 221 214 206 197 186 173 158	13.3 6.48 330 235 235 235 234 232 224 212 224 212 224 212 204 194 183 170 154	11.9 6.68 345 235 235 234 233 230 226 222 2216 208 200 190 178 165 150	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
Table-2 C(DEG) C(DEG) C(DEG) C) 20 25 30 35 40 45 55 55 60 65 70	285 235 236 237 236 237 236 237 232 229 224 217 210 201 190 1777 163 146	300 235 236 236 236 236 236 232 232 232 228 228 228 228 228 228 228	13.0 5.69 315 235 236 236 236 236 233 230 226 221 214 206 221 214 197 186 173 158 141 121	13.3 6.48 330 235 235 235 235 235 232 229 224 212 204 212 204 194 194 194 154 137 118	11.9 6.68 345 235 235 234 233 230 226 222 216 208 200 190 190 178 165 150 132	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG) 0 5 10 15 20 25 30 30 30 35 55 60 65 70 75	13.4 3.31 285 235 236 237 236 237 236 237 236 232 229 224 217 210 201 190 1777 163 146 126 106 86.0	300 235 236 236 236 236 236 236 236 232 232 223 217 209 199 199 199 198 176 161 144 145 104 88.8	13.0 5.69 315 235 236 236 236 236 236 232 230 226 221 214 206 197 186 173 158 141 121 101 81.9	13.3 6.48 330 235 235 235 235 234 229 212 204 194 183 170 154 137 118 97.9 79.4	11.9 6.68 345 235 235 234 233 226 222 216 208 200 190 178 165 150 132 113	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table-2           C(DEG)           C(DEG)           0           5           10           15           20           25           30           35           40           45           50           55           60           65           70           75           80	285 235 235 237 236 237 237 237 237 237 237 237 237 237 237	300 235 236 236 236 236 236 236 236 232 232 223 217 209 199 199 199 198 176 161 144 125 104 88.8	13.0 5.69 315 235 236 236 236 236 236 232 230 226 221 214 206 197 186 173 158 141 121 101 81.9	13.3 6.48 330 235 235 235 235 234 229 212 204 194 183 170 154 137 118 97.9 79.4	11.9 6.68 345 235 235 234 233 230 226 202 216 208 200 190 178 165 150 132 113 94.4	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C (DEG)           0           5           10           15           20           25           30           35           40           45           55           60           65           75           80           85	13.4 3.31 285 235 236 237 236 237 236 237 236 232 229 224 217 210 201 190 1777 163 146 126 106 86.0	300 235 236 236 236 232 232 232 232 232 232 232	13.0 5.69 315 235 236 233 230 226 221 221 206 197 186 197 186 197 158 141 121 101 81.9 66.0 54.2	13.3 6.48 330 235 235 235 232 224 222 224 222 224 219 212 204 194 183 170 154 137 118 97.9 4 64.3 53.2	11.9 6.68 345 235 234 233 2230 226 222 216 200 190 178 165 150 132 113 94.4 76.6	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table-2 C(DEG) 0 5 10 15 15 20 25 30 35 40 45 55 55 60 65 70 75 80 85 90	13.4 3.31 285 235 236 237 236 237 236 237 236 232 229 224 217 210 201 190 177 163 146 106 86.0 68.7	300 235 236 236 236 236 236 234 232 228 223 217 209 188 176 161 144 125 104 84.8 68.1 125 55.4 47.1	13.0 5.69 315 235 236 233 230 226 221 221 206 197 186 197 186 197 158 141 121 101 81.9 66.0 54.2	13.3 6.48 330 235 235 235 232 224 222 224 222 224 219 212 204 194 183 170 154 137 118 97.9 4 64.3 53.2	11.9 6.68 345 235 234 233 230 222 216 208 208 200 178 165 150 132 113 113 113 76.6 61.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 (DEG) 0 0 5 10 15 20 25 30 35 40 45 50 55 60 65 75 80 85 90 95	13.4 3.32 285 235 236 237 236 237 232 229 224 210 201 190 177 163 146 126 86.0 68.7 55.7	300 235 236 236 236 232 232 234 232 223 234 232 223 234 232 223 234 232 234 232 234 232 234 232 234 232 234 234	13.0 5.69 315 235 236 236 233 230 230 230 232 232 232 232 222 222	13.3 6.48 330 235 235 235 234 232 229 212 204 219 212 204 194 194 193 170 154 137 170 154 137 97.9 79.4 64.3 53.2 23.5 23.5 23.5 23.5 23.5 23.5 23	11.9 6.68 345 235 235 234 233 230 226 222 216 208 200 190 178 165 150 132 113 94.4 76.6 61.9 51.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 (DEG) 0 5 10 15 20 25 30 35 50 55 60 65 65 65 65 65 65 85 90 95 100 100 15 15 15 15 15 15 15 15 15 15	13.4 3.33 285 235 235 237 236 237 237 236 237 232 237 237 236 237 237 236 237 237 236 237 237 236 237 236 237 237 236 237 236 237 236 237 236 235 236 237 237 236 237 236 237 237 236 237 237 236 237 237 236 237 237 236 237 237 237 244 261 106 166 3 1466 8.5,77 4 47,72 4 4 27,72 24 24 26 26 27 27 27 27 27 27 27 27 27 27 27 27 27	300 235 236 236 236 236 236 236 236 232 223 223	13.0 5.69 315 235 236 236 233 223 223 224 224 224 224 197 186 197 186 197 188 141 101 81.9 66.0 54.2 46.4 37.4	13.3 6.48 330 235 235 235 232 229 224 229 222 229 222 229 222 194 194 183 170 154 137 118 97.9 79.4 64.3 53.2 45.8 9.9 35.1	11.9 6.68 345 235 235 234 233 230 226 202 216 208 202 216 208 200 178 165 150 178 165 150 178 165 150 94.4 76.6 61.9 94.5	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG) 0 0 0 5 10 15 15 20 25 35 40 45 50 55 50 55 60 65 70 75 80 85 90 95 100	13.4 3.337 285 235 235 236 237 232 229 224 217 210 201 190 177 163 126 126 126 168.6.0 68.7.7 47.2 42.0	300 235 236 236 236 232 232 234 232 223 234 232 223 234 232 223 234 232 234 232 234 232 234 232 234 232 234 234	13.0 5.69 315 235 236 236 233 223 223 224 224 224 224 197 186 197 186 197 188 141 101 81.9 66.0 54.2 46.4 37.4	13.3 6.48 330 235 235 235 232 229 224 229 222 229 222 229 222 229 222 229 222 194 194 183 170 154 137 118 97.9 79.4 64.3 53.2 45.8 9.9 35.1	11.9 6.68 345 235 235 233 233 230 226 208 209 190 190 190 190 190 190 197 105 150 132 94.4 76.6 61.9 91.4 76.5 51.9 40.5 35.2	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG) 0 5 10 10 15 20 25 30 30 30 35 50 55 60 65 55 60 65 70 75 80 85 55 100 100 105 110 115	13.4 3.33 285 235 235 237 236 237 237 236 237 232 224 217 210 201 190 1177 163 146 126 68.0 68.7 55.7 47.2 47.2 38.3 34.8	300 235 236 236 236 236 236 236 236 232 223 223	13.0 5.69 315 235 236 236 236 233 223 223 2230 226 221 230 226 221 230 226 197 186 173 158 141 121 101 58 158 158 158 158 158 158 158 158 158	13.3 6.48 330 235 235 235 235 235 234 229 224 194 194 194 194 154 154 154 154 154 155 20,4 195 35,2 45,8 39.9 35,1 31.4	11.9 6.68 345 235 235 234 233 230 226 222 216 208 200 190 178 165 132 113 94.4 76.6 (1.9 51.9 40.5 35.2 32.3 29.6	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           215           30           35           40           45           50           55           60           65           70           75           80           85           90           100           115           120           125	285 235 236 237 236 237 232 229 224 2217 210 201 190 201 190 201 190 201 190 68.7 55.7 42.0 38.3 34.8 34.8	300 235 236 236 236 232 232 232 232 232 232 232	13.0 5.69 315 235 236 236 233 230 226 221 233 233 233 230 226 221 233 233 230 226 221 197 186 197 186 197 186 197 198 101 81.9 66.0 54.2 34 41.6 37.4 33.9 7 25.8	13.3 6.48 330 235 235 235 235 232 229 224 229 224 232 229 224 194 183 170 154 137 118 64.3 53.2 39.9 35.1 31.4 83.9 31.4 83.9 31.4 83.9 93.5 13.4 83.9 93.5 13.4 83.9 13.4 83.9 13.4 83.9 13.4 14.4 1	11.9 6.68 345 235 235 234 233 230 226 202 202 202 202 202 202 201 100 178 150 132 113 94.4 51.9 40.5 51.9 40.5 51.9 23.2 32.3 22.3 22.6 26.9	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 <b>Table-2 CODE O O O O O O O O O O</b>	285 235 235 235 235 237 236 237 232 229 224 210 201 190 201 190 201 190 201 190 201 190 201 190 201 190 201 190 201 210 201 201 201 201 201 201 201 20	300 235 236 236 236 236 234 232 232 232 232 232 232 232 232 232	13.0 5.69 315 235 236 236 233 230 222 214 206 197 186 173 158 197 141 121 101 141 121 101 54.2 46.4 33.4 29.7 25.2 23.2 2.	13.3 6.48 330 235 235 235 235 234 232 229 224 229 224 212 204 194 183 170 154 194 183 170 154 194 137 118 97.9 79.4 53.2 45.8 39.9 35.1 31.4 28.0 29.2	11.9 6.68 345 235 234 233 230 226 202 202 202 202 208 200 190 190 190 190 190 190 190 190 190 1	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           25           30           30           35           60           65           65           65           90           100           110           1120           120           121           130	13.4 3.33 285 235 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 235 235 235 232 235 235 235 235 236 237 236 235 236 237 236 237 236 237 236 235 235 236 237 236 236 237 236 237 236 236 236 237 236 236 236 236 236 236 237 236 236 236 236 236 236 236 236 236 236	3000 235 236 236 236 236 232 232 232 232 232 232	13.0 315 235 236 235 236 233 230 232 232 232 232 232 234 235 236 235 236 237 236 237 236 237 236 236 237 236 236 237 236 236 236 237 236 236 237 236 236 237 236 236 236 237 236 236 237 236 237 236 236 237 236 237 236 237 236 237 236 237 236 236 237 236 237 236 237 236 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 236 237 236 237 236 237 236 236 237 236 237 236 237 236 236 237 236 237 236 237 236 236 237 236 237 236 236 237 236 237 236 237 236 236 237 236 237 236 236 236 237 236 236 237 236 236 237 236 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 237 236 237 237 237 236 237 237 237 237 237 237 237 237	13.3 6.48 330 235 235 235 235 234 232 224 212 212 212 212 212 212 212 214 194 194 194 194 194 194 194 195 170 9 9 9 9 9 9 9 35.1 35 3.2 35 125 235 235 235 235 235 235 235 235 235 2	11.9 6.68 345 235 235 234 233 230 226 200 190 190 190 190 190 190 190 190 190 1	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           25           30           30           35           60           65           65           65           90           100           110           1120           120           121           130	13.4 3.33 285 235 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 235 235 235 232 235 235 235 235 236 237 236 235 236 237 236 237 236 237 236 235 235 236 237 236 236 237 236 237 236 236 236 237 236 236 236 236 236 236 237 236 236 236 236 236 236 236 236 236 236	300 235 236 236 236 236 234 232 232 232 232 232 232 232 232 232	13.0 315 235 236 235 236 233 230 232 232 232 232 232 234 235 236 235 236 237 236 237 236 237 236 237 236 236 237 236 236 236 236 237 236 236 237 236 236 237 236 236 236 237 236 236 237 236 237 236 237 236 236 237 236 237 236 237 236 237 236 236 237 236 236 237 236 237 236 236 237 236 237 236 237 236 237 236 236 237 236 237 236 236 236 237 236 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 236 237 237 236 237 237 237 236 237 237 237 237 237 237 237 237	13.3 6.48 330 235 235 235 235 234 232 224 212 212 212 212 212 212 212 214 194 194 194 194 194 194 194 195 170 9 9 9 9 9 9 9 35.1 35 3.2 35 125 235 235 235 235 235 235 235 235 235 2	11.9 6.68 345 235 235 234 233 230 226 200 190 190 190 190 190 190 190 190 190 1	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           25           30           35           40           45           50           55           60           65           90           95           100           105           110           115           120           130           135           140	285 235 235 235 237 232 232 232 224 217 210 190 177 168 86.0 68.7 55.7 47.2 47.2 38.3 34.8 34.8 34.8 34.8	3000 235 236 236 236 236 232 232 232 232 232 232	13.0 13.0 5.69 235 235 235 233 230 226 221 221 224 226 221 186 173 158 141 121 101 158 141 121 101 54.2 46.4 41.6 37.4 32.9 7 25.8 21.0 16.6 17.8 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6	13.3 6.48 330 235 235 235 235 235 234 232 224 212 204 212 204 183 170 194 183 170 194 183 170 194 183 170 194 183 170 194 183 170 194 183 170 194 194 195 194 194 194 194 194 194 194 194 194 194	11.9 6.68 345 235 235 234 233 230 226 222 216 222 216 222 216 222 216 323 230 226 222 216 323 226 222 216 323 226 222 2178 1159 145 150 150 150 150 150 150 225 225 226 226 226 226 226 226 227 226 227 226 226	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           25           30           35           40           45           50           55           60           65           90           95           100           105           110           115           120           130           135           140	285 236 235 235 235 232 232 232 224 221 201 190 177 163 201 146 126 126 126 38.3 31.2 31.2 229 224 201 190 177 163 38.3 34.8 31.2 25,7 7 47.2 9,87	3000 235 236 236 236 236 236 236 236 232 228 228 228 228 223 227 209 188 176 161 144 125 161 161 144 125 5.4 47.1 144 125 3.4 7.1 22.2 104 23.2 223 223 223 223 223 223 223 223 22	13.0 5.69 315 235 235 233 230 233 230 226 221 222 222 224 197 186 197 158 141 101 81.9 66.0 54.2 46.4 41.6 33.4 25.7 25.2 26.9 206 207 206 207 206 207 207 206 207 206 207 207 207 207 207 207 207 207	13.3 6.48 330 235 235 234 232 229 222 224 219 212 229 212 212 212 219 212 219 119 1	11.9 6.68 345 235 235 234 233 220 222 216 208 190 1785 150 150 150 132 113 94.4 76.6 61.9 51.9 40.5 35.2 32.3 29.6 20.6 20.6 16.9 32.3 29.6 20.6 20.6 16.9 35.2 35.	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           25           30           35           40           45           50           55           60           65           70           75           80           85           90           105           110           115           120           121           130           135           140           145	285 235 235 235 237 237 237 237 237 237 237 237 237 237	3000 235 236 236 236 236 236 236 232 232 232 233 217 209 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	13.0 5.69 315 235 236 236 236 236 233 226 221 220 221 220 221 220 197 186 173 158 197 141 121 101 9 66.0 54.2 441.6 33.4 29.7 25.8 21.0 16.6 12.8 9.90 9.90	13.3 6.48 330 235 235 234 232 224 229 224 229 224 212 204 194 194 194 194 194 194 197.9 4 64.3 35.1 2 8.3 3.1 4 28.0 24.5 20.2 16.0 12.2 9.20 8.34	11.9 6.68 345 235 235 234 233 230 222 222 216 202 208 200 200 190 190 190 190 190 190 190 190 190 1	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180	285 235 235 236 237 236 237 232 232 229 224 201 201 100 177 163 146 68 60.7 55.7 47.2 38.3 34.8 34.8 34.2 26.6 21.7 5.5.7 47.2 26.6 21.7 5.5.7 47.2 26.6 21.7 16.8 12.5 9.87 9.9.7 9.977	300 300 235 236 236 236 236 236 236 232 232	13.0 5.69 315 235 236 233 232 230 226 231 230 226 231 230 226 231 230 226 231 230 226 231 197 197 186 197 197 188 197 101 54.2 46.4 57.4 33.4 25.8 9.99 8.73 11.4	13.3 6.48 330 235 235 235 234 232 229 224 229 224 219 229 224 219 229 221 212 204 194 194 193 170 154 183 31.7 118 33.2 45.8 97.9 79.4 45.8 97.9 35.1 31.4 24.5 20.5 131.4 24.5 20.5 131.4 24.5 20.5 131.4 24.5 20.5 131.4 24.5 20.5 131.4 24.5 20.5 131.4 24.5 25.5 23.5 23.5 23.5 23.5 23.5 23.5 23	11.9 6.68 345 235 234 233 2235 2235 2235 2235 223	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           20           25           30           35           60           55           60           65           65           65           65           70           75           80           90           105           100           110           115           120           120           130           135           140           145           150           155           160	285 235 235 235 237 236 237 232 229 224 210 201 190 201 190 201 190 201 190 201 190 201 190 201 190 201 217 106 86.0 55.7 47.2 47.2 47.2 43.3 34.8 31.4 8 31.4 12.5 5.7 16.8 177 16.8 1.2 5.7 16.8 177 16.8 1.2 5.7 177 16.8 1.2 5.7 177 16.8 1.2 5.7 177 16.8 1.2 5.7 177 16.8 1.2 177 177 16.8 1.2 177 177 177 177 177 177 177 177 177 17	300 235 236 236 236 236 236 236 236 232 232 232	13.0           13.0           5.69           315           235           236           233           230           226           231           232           233           230           2261           211           212           214           206           173           135           141           101           96.0           94.2           46.4           41.6           12.7           25.8           12.8           9.90           8.73           12.8           9.90           11.4           14.4	13.3 6.48 330 235 235 232 222 222 222 222 222 222 222	11.9 6.68 345 235 234 233 232 232 232 232 232 232 232 232	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175           180           Table2           C(DEG)           0           5           10           15           20           23           30           35           60           65           60           65           70           75           80           85           90           105           110           115           120           130           135           140           145           150           155           160           165	285 235 236 237 236 237 236 237 232 229 224 201 201 201 177 163 126 126 126 126 126 126 126 126 126 126	300 235 236 236 236 236 236 232 232 232 232 232	13.0           5.69           315           235           236           236           237           238           230           221           214           206           1373           1315           141           101           81.9           206           37.4           33.4           121           101           81.9           29.7           25.8           29.7           25.8           9.90           9.90           9.93           11.4           14.7	13.3 6.48 330 235 235 235 235 232 229 224 221 224 212 204 104 104 105 115 105 105 105 235 232 229 224 219 212 204 105 105 105 235 235 235 235 235 235 235 235 235 23	11.9 6.68 345 235 234 233 234 226 222 221 230 222 221 230 222 221 100 178 100 178 150 150 150 150 150 150 150 150 150 150	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7
175 180 Table2 C(DEG) (DEG) 0 0 5 10 5 20 25 30 35 50 60 45 55 60 65 65 65 65 65 70 75 80 85 100 115 115 110 115 120 125 140 145 155 160 155 160 165 170	2285 235 235 235 235 232 236 237 236 236 237 236 236 237 236 236 237 236 236 236 236 237 236 236 236 236 236 236 236 236 236 236	300 300 235 236 236 236 236 236 232 232 232 232 232	13.0 5.69 315 235 236 236 236 236 232 221 214 221 221 221 221 221 221 221 22	13.3 6.48 330 235 235 235 232 222 222 222 222 222 222	11.9 6.68 345 235 234 233 230 226 223 223 223 222 216 208 190 178 150 178 150 132 113 234 4.4 0.5 35.2 32.3 32.3 230 226 216 208 209 222 222 222 222 223 223 233 23	10.7	9.96	9.52	10.8	10.7	10.4	10.4	10.4	9.44		6.47	10.6	10.7	10.7











NVLAP LAB CODE 600150-0

Report No: NTCR17060056 Report Version: V1.1

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





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