



Shenzhen Belling Efficiency Testing Lab



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Test report of

IES LM-79-08

**Approved Method: Electrical and Photometric
Measurements of Solid-State Lighting Products**

Applicant:

CARSON TECHNOLOGY CO LTD

Address:

6F 6 Sec 4 XinYi Rd Da An District TAIPEI 10683 TAIWAN

For Product:

Fuel Pump Canopy Luminaires

Model No.:

CT-D02140CPN

Test laboratory: Shenzhen Belling Efficiency Testing Lab., 1/F., Building 1, 1F, No.1 building, Meibaohe industrial park, Dalang street, Shenzhen, Guangdong Prov.518101, China.

Zac Kuang

Jason Zhou

Complied by: Zac Kuang

Review by: Jason Zhou

Project Engineer

Technical Manager

Note: 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 Shenzhen Belling Efficiency Testing Lab. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



1 General

1.1 Product Information

Manufacturer	DongGuan FangTai Photoelectric Co. Ltd
Manufacturer Address	102, 1F., Building B, No. 7, Zhengan West Road, Xiagang Community Industrial Xinyongsheng Technology Park, Changan Town, Dongguan City, GD province, China 523878
Brand Name	Carson
Luminaire Type	Fuel Pump Canopy Luminaires
Model Number	CT-D02140CPN
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	140 W
Nominal CCT	5000K
Date of Receipt Samples	2017-08-07

1.2 Standards or methods

- ANSI C78.377-2015: Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits-Related Power Quality Requirements for Lighting Equipment
- CIE Publication No.13.3-1995: Method of Measuring and Specifying Color Rendering of Light Sources
- IESNA LM-79-08 Approved Method: Electric & Photometric Measurement of Solid-state Lighting Products



1.3 Equipment list

Device	Manufacture	Model No.	Serial No.	Calibration due date
Goniophotometric System	SENSING	GMS-3000	N.A	2017-09-21
AC Power Source	ALL POWER	APW-110N	992257	2017-08-27
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S13100234	2017-09-15
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2017-08-29
Integral Sphere	SENSING	SPR-600M	N.A	2017-08-27
Digital Power Meter	YOKOGAWA	WT210	91L929742	2017-08-29
Optical Color and Electrical Measurement System	SENSING	SPR-3000	N.A	2017-08-27
Temperature/humidity/clock	VICTOR	VC230	57636	2017-09-13
Digital Anemometer	TECMAN	TD8901	026141	2017-09-13

Statement of Traceability: Shenzhen Belling Efficiency Testing Lab attests that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit (SI).



2 Test conducted and method

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, the air flow around the sample(s) being tested did not affect the performance.

2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within ± 0.2 percent under load.

2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

2.4 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.

2.5 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 method according to IESNA LM-79-08 following chapter.



3 Test Result Summary

3.1 Integrating Sphere System

3.1.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
CT-D02140CPN	120.0	60	1.268	151.0	0.992

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	CT-D02140CPN	120	60	0.992
		277	60	0.924
Total harmonic distortion	CT-D02140CPN	120	60	12.3%
		277	60	14.9%
Off state power (W)	CT-D02140CPN	120	60	0
	CT-D02140CPN	277	60	0

3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
CT-D02140CPN	18165.30	120.3	5172	81.5	-2

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
CT-D02140CPN	0.001	0.3406	0.3509	0.2086	0.4837



3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
CT-D02140CPN	120.07	60	1.2649	150.6600	0.9914

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-40°(%lm)	Zonal Lumen in 40-70°(%lm)
18112.92	120.22	45.005	48.318

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4 Test Data

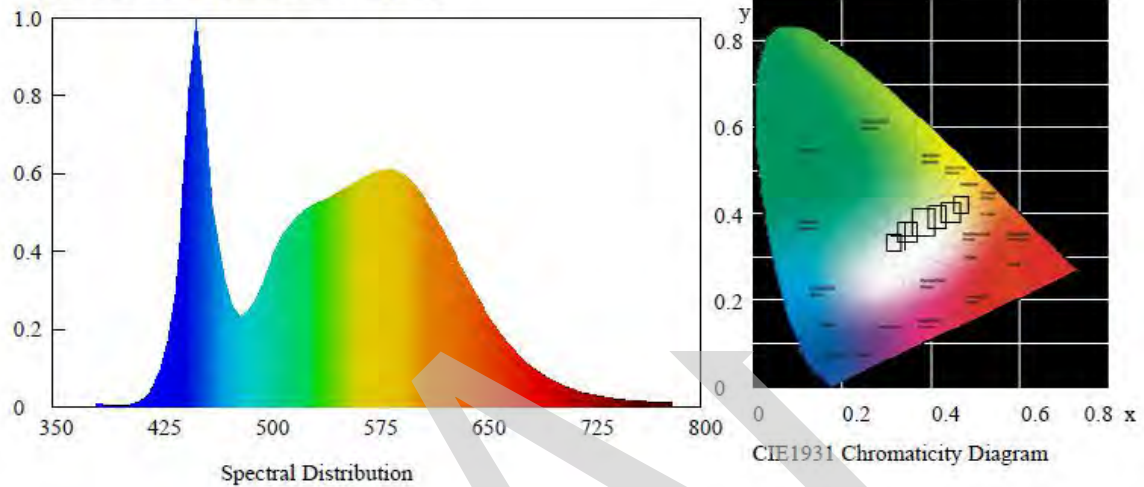
CT-D02140CPN

Test Condition

Temperature: 25°C
Spectrum Range: 380-780 nm

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.3406$ $y=0.3509$ $u'=0.2086$ $v'=0.4837$

Correlated Color Temperature: 5172 K

Dominant Wavelength: 567.0 nm(E)

Colour Fidelity Index: $R_f=80$

Gamut Index: $R_g=95$

Luminous Flux: 18165.30 lm

Purity: 0.0749

Chromaticity Difference: 0.001Duv

Peak Wavelength: 450.0 nm

Color Ratio: $K_r=33.6\%$ $K_g=55.1\%$ $K_b=11.3\%$

Bandwidth: 22.6nm

Radiant Flux: 51.311 W

Photosynthetically Active Radiation(PAR): 50.39W

Photosynthetic Photon Flux(PPF):231.27 μ mol/s

Rendering Index: $R_a=81.5$

$R_1=80$ $R_2=87$ $R_3=92$ $R_4=82$ $R_5=81$ $R_6=82$ $R_7=85$ $R_8=64$

$R_9=-2$ $R_{10}=69$ $R_{11}=81$ $R_{12}=61$ $R_{13}=82$ $R_{14}=95$ $R_{15}=74$ $R_e=74$

Electric Parameters

Voltage: 120.0 V

Current: 1.268 A

Power Factor: 0.992

Power: 151.0 W

Luminous Efficacy: 120.3 lm/W



Zonal Flux Diagram

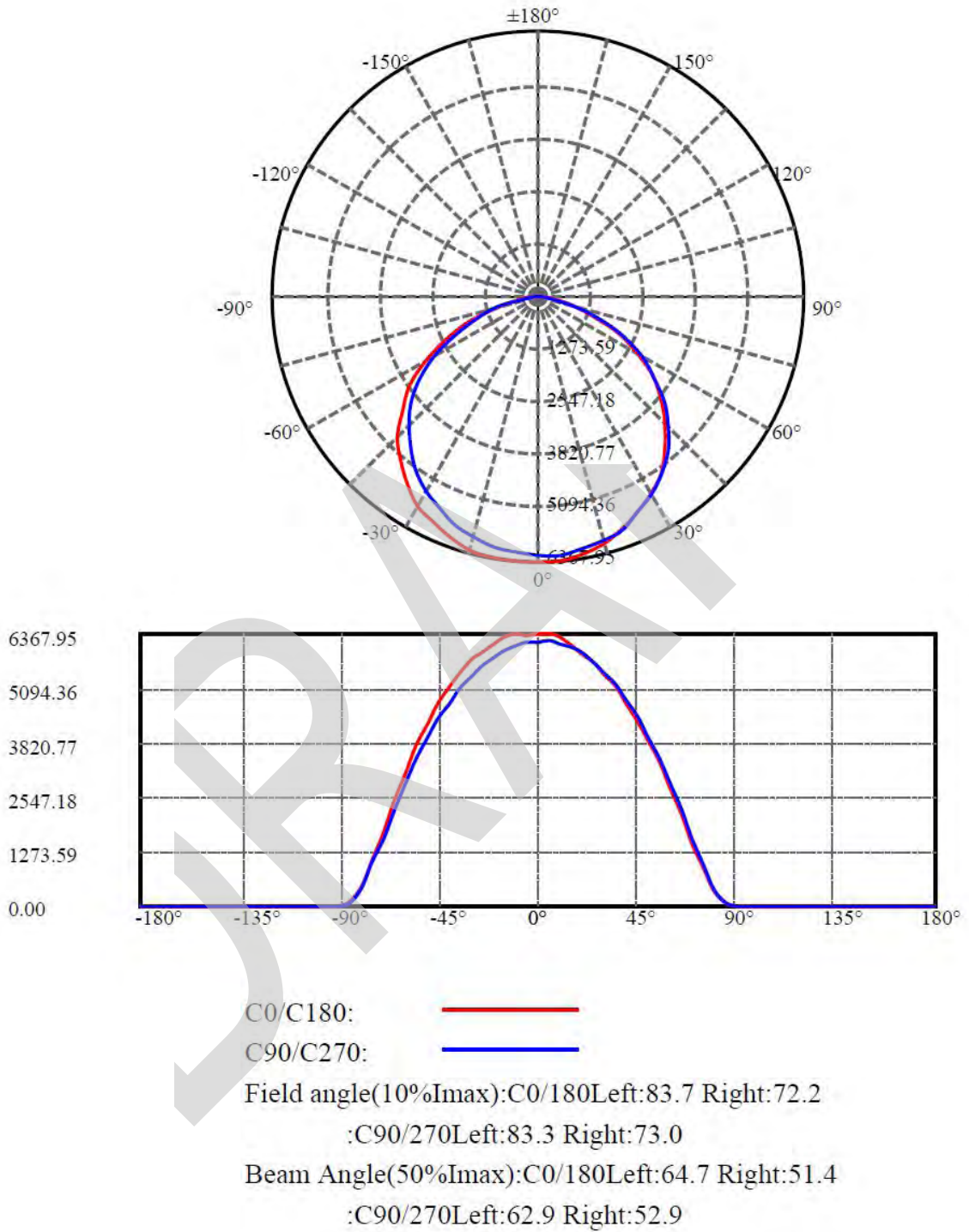
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	6205.526	.000	.000	.000%	.000%
5.0	6200.894	148.315	148.315	.819%	.819%
10.0	6144.908	441.648	589.963	2.438%	3.257%
15.0	6039.630	722.779	1312.742	3.990%	7.248%
20.0	5888.020	983.006	2295.748	5.427%	12.675%
25.0	5689.046	1214.221	3509.968	6.704%	19.378%
30.0	5455.840	1410.395	4920.363	7.787%	27.165%
35.0	5166.647	1564.236	6484.599	8.636%	35.801%
40.0	4825.588	1667.129	8151.728	9.204%	45.005%
45.0	4433.821	1714.455	9866.182	9.465%	54.470%
50.0	3988.565	1701.866	11568.050	9.396%	63.866%
55.0	3479.537	1623.814	13191.860	8.965%	72.831%
60.0	2905.116	1475.795	14667.660	8.148%	80.979%
65.0	2271.827	1258.525	15926.180	6.948%	87.927%
70.0	1587.971	977.326	16903.510	5.396%	93.323%
75.0	963.833	667.001	17570.510	3.682%	97.005%
80.0	414.393	368.775	17939.280	2.036%	99.041%
85.0	82.639	135.056	18074.340	.746%	99.787%
90.0	1.686	23.089	18097.430	.127%	99.914%
95.0	.476	.592	18098.020	.003%	99.918%
100.0	.618	.297	18098.320	.002%	99.919%
105.0	.863	.396	18098.710	.002%	99.922%
110.0	1.236	.548	18099.260	.003%	99.925%
115.0	1.840	.779	18100.040	.004%	99.929%
120.0	2.394	1.029	18101.070	.006%	99.935%
125.0	2.883	1.220	18102.290	.007%	99.941%
130.0	3.347	1.355	18103.640	.007%	99.949%
135.0	3.643	1.412	18105.060	.008%	99.957%
140.0	3.938	1.404	18106.460	.008%	99.964%
145.0	4.208	1.359	18107.820	.008%	99.972%
150.0	4.479	1.279	18109.100	.007%	99.979%
155.0	4.620	1.151	18110.250	.006%	99.985%
160.0	4.607	.968	18111.220	.005%	99.991%
165.0	4.491	.750	18111.970	.004%	99.995%
170.0	4.414	.528	18112.500	.003%	99.998%
175.0	4.427	.316	18112.810	.002%	99.999%
180.0	4.530	.107	18112.920	.001%	100.000%



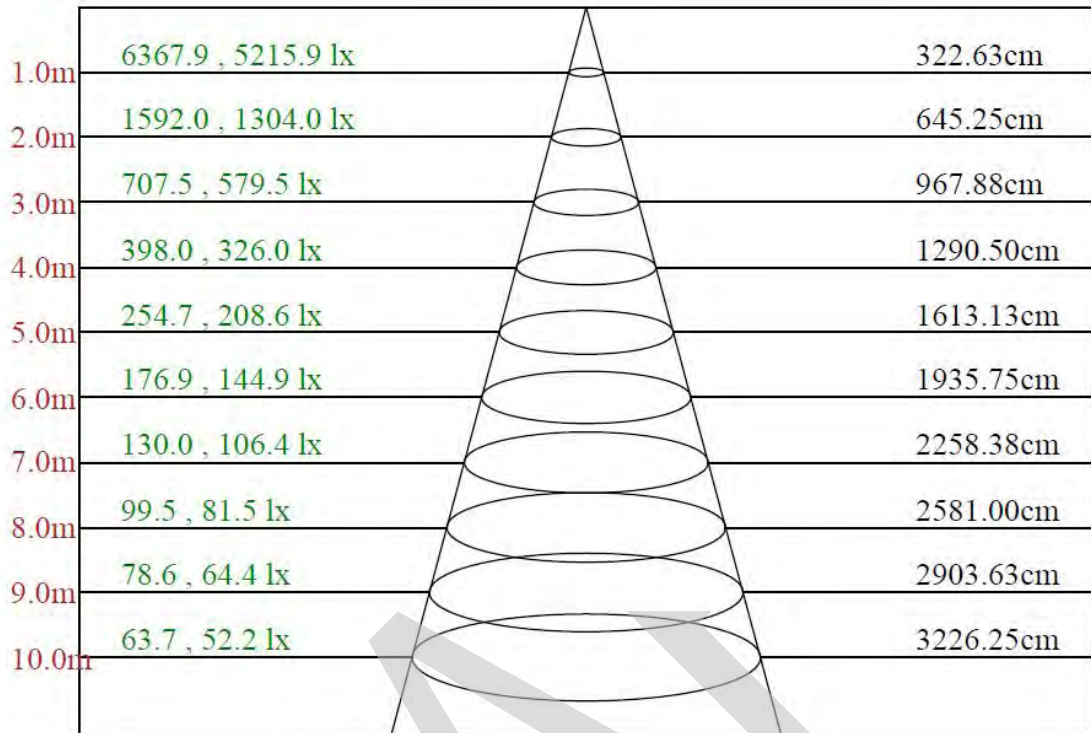
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



Max , Ave Beam angle of C0plane116.26

**Luminous Intensity Distribution Data**

C/γ(°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	6367.95	6367.95	6273.22	6110.55	5906.68	5696.64	5412.47	5148.89	4753.52
22.5	6312.35	6275.28	6188.80	6059.06	5879.91	5673.99	5412.47	5091.23	4732.92
45.0	6250.57	6219.68	6141.43	6022.00	5855.20	5643.10	5393.94	5087.11	4730.86
67.5	6201.15	6194.97	6129.08	6032.29	5871.68	5676.05	5435.12	5132.41	4778.23
90.0	6188.80	6221.74	6139.37	6048.77	5951.98	5682.23	5470.13	5175.66	4827.65
112.5	6151.73	6159.97	6114.66	6040.53	5896.39	5727.53	5484.54	5196.25	4862.65
135.0	6092.01	6120.84	6083.78	6005.52	5894.33	5725.47	5486.60	5218.90	4899.72
157.5	6079.66	6104.37	6092.01	6011.70	5886.09	5715.17	5503.07	5220.96	4907.96
180.0	6367.95	6345.30	6353.53	6283.52	6129.08	5945.81	5785.19	5472.19	5130.35
202.5	6312.35	6337.06	6299.99	6213.51	6089.95	5906.68	5678.11	5404.23	5076.81
225.0	6250.57	6250.57	6209.39	6124.96	5976.70	5805.78	5577.21	5299.21	4967.68
247.5	6201.15	6207.33	6151.73	6048.77	5906.68	5713.11	5480.42	5190.07	4862.65
270.0	6188.80	6155.85	6102.31	5966.40	5809.90	5597.80	5373.34	5103.58	4751.46
292.5	6151.73	6133.20	6067.30	5941.69	5783.13	5573.09	5330.10	5039.75	4704.09
315.0	6092.01	6073.48	5993.17	5875.79	5698.70	5492.78	5268.32	4977.97	4648.50
337.5	6079.66	6046.71	5978.75	5849.02	5671.93	5449.53	5202.43	4907.96	4574.36
360.0	6367.95	6367.95	6273.22	6110.55	5906.68	5696.64	5412.47	5148.89	4753.52
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	4325.20	3885.14	3351.18	2760.80	2130.06	1443.93	858.49	346.57	61.16
22.5	4335.49	3879.99	3362.51	2783.04	2174.13	1463.70	861.99	355.63	67.34
45.0	4337.55	3899.97	3396.90	2823.82	2196.37	1531.03	868.79	372.51	68.57
67.5	4397.27	3946.92	3431.49	2848.32	2230.96	1540.30	925.21	395.58	76.81
90.0	4426.10	3955.77	3436.02	2884.77	2254.65	1564.39	934.68	406.70	84.43
112.5	4456.99	4023.93	3513.45	2951.08	2306.54	1615.67	964.95	430.38	85.87
135.0	4496.11	4068.21	3560.19	3005.65	2372.23	1657.06	988.84	438.41	87.31
157.5	4522.88	4090.45	3575.84	3002.35	2365.02	1704.42	1002.23	446.23	89.16
180.0	4741.16	4261.36	3771.27	3141.14	2471.89	1749.11	1059.27	482.07	101.52
202.5	4691.74	4226.35	3711.55	3143.20	2467.78	1747.05	1055.15	489.68	97.40
225.0	4590.84	4158.40	3625.06	3040.24	2416.30	1718.22	1040.73	460.44	96.99
247.5	4477.58	4034.85	3550.93	2964.05	2307.16	1623.49	1011.90	447.47	93.49
270.0	4384.91	3952.48	3450.03	2873.44	2210.37	1567.89	1009.84	417.82	89.58
292.5	4308.72	3865.99	3353.24	2803.43	2171.25	1518.47	1005.73	402.99	80.72
315.0	4259.30	3808.33	3310.00	2743.71	2152.71	1518.47	892.26	369.22	73.51
337.5	4189.29	3758.91	3272.93	2712.82	2121.83	1444.34	941.27	368.60	68.37
360.0	4325.20	3885.14	3351.18	2760.80	2130.06	1443.93	858.49	346.57	61.16
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.00	0.00	0.00	0.00	0.21	0.82	1.03	2.06	2.47
22.5	0.00	0.00	0.00	0.41	1.24	1.65	2.47	2.68	3.30
45.0	0.41	0.21	0.41	0.62	1.24	1.65	2.27	2.88	3.50
67.5	0.21	0.00	0.41	0.41	1.03	1.65	2.27	2.88	3.30
90.0	0.41	0.00	0.21	1.03	1.24	1.65	2.27	2.68	3.09
112.5	0.41	0.21	0.41	0.62	1.24	1.44	2.27	2.68	3.30
135.0	0.82	0.21	0.21	0.82	1.03	1.44	2.27	2.68	3.09
157.5	1.65	0.00	0.21	0.41	0.82	1.65	2.27	2.68	3.30
180.0	3.09	0.41	0.62	0.82	1.03	1.65	2.47	2.88	3.30
202.5	4.12	0.62	0.82	1.24	1.44	2.27	2.68	3.30	3.50
225.0	3.09	1.03	1.03	1.03	1.44	2.06	2.68	3.09	3.50
247.5	3.30	0.82	1.03	1.44	1.44	2.06	2.47	3.09	3.30
270.0	2.88	1.03	1.03	1.03	1.65	2.06	2.68	3.09	3.50
292.5	3.30	1.03	1.24	1.24	1.65	2.27	2.68	3.30	3.71
315.0	1.85	1.03	1.03	1.24	1.65	2.47	2.68	3.09	3.71
337.5	1.44	1.03	1.24	1.44	1.44	2.68	2.88	3.09	3.71
360.0	0.00	0.00	0.00	0.00	0.21	0.82	1.03	2.06	2.47



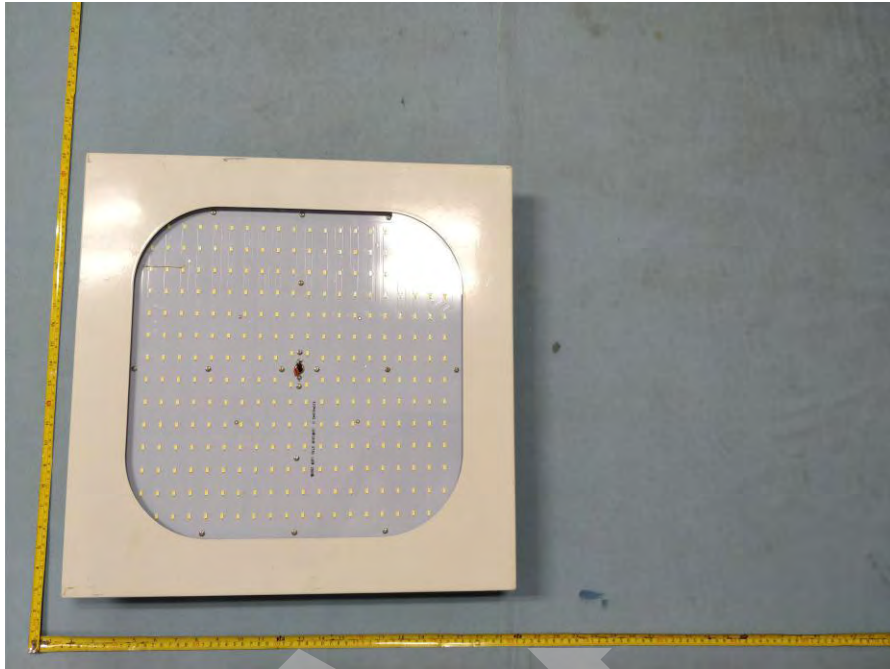
C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	2.88	3.09	3.09	3.50	3.50	3.30	3.09	3.30	3.30
22.5	3.50	3.71	4.32	4.53	4.53	4.74	4.74	4.53	4.32
45.0	3.71	3.91	4.32	4.53	4.53	4.74	4.74	4.53	4.32
67.5	3.50	3.71	4.12	4.32	4.74	4.53	4.53	4.53	4.53
90.0	3.50	3.91	4.12	4.12	4.53	4.32	4.32	4.32	4.53
112.5	3.50	3.71	4.12	4.32	4.53	4.53	4.32	4.53	4.32
135.0	3.50	3.91	3.91	4.53	4.53	4.32	4.74	4.53	4.74
157.5	3.30	3.91	4.12	4.53	4.53	4.53	4.53	4.53	4.53
180.0	3.71	3.91	4.12	4.74	4.53	4.74	4.32	4.53	4.32
202.5	3.71	3.91	4.32	4.94	4.94	4.94	4.74	4.74	4.53
225.0	3.91	4.12	4.53	4.53	4.94	4.94	4.53	4.32	4.53
247.5	3.91	4.12	4.53	4.53	4.74	4.74	4.74	4.53	4.74
270.0	3.91	4.12	4.12	4.32	4.74	4.74	4.53	4.32	4.53
292.5	3.71	4.32	4.32	4.74	4.74	4.74	4.53	4.32	4.53
315.0	3.91	4.32	4.53	4.74	4.94	4.74	4.74	4.53	4.53
337.5	4.12	4.32	4.74	4.74	4.94	5.15	4.74	4.53	4.53
360.0	2.88	3.09	3.09	3.50	3.50	3.30	3.09	3.30	3.30

C/γ(°)	180.0
0.0	3.30
22.5	4.74
45.0	4.74
67.5	4.74
90.0	4.74
112.5	4.74
135.0	4.74
157.5	4.53
180.0	3.30
202.5	4.74
225.0	4.74
247.5	4.74
270.0	4.74
292.5	4.74
315.0	4.74
337.5	4.53
360.0	3.30

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Photo Document



****End of test report****