



Date of issue 2022-01-12

Version 1.0

Total pages 19

Test report of

IES LM-79-08

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

Applicant:

P.Q.L., Inc.

Address:

2285 Ward Avenue / Simi Valley, CA 93065

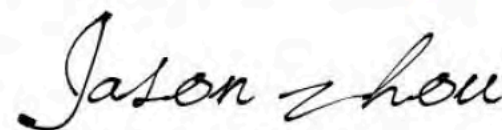
For Product:

Outdoor Pole/Arm-Mounted Area and Roadway Luminaires

Model No.:

STL3P-100W-3000K-C-MB-HC-P, STL3P-100W-5700K-C-MB-HC-P

Test laboratory: Shenzhen Belling Efficiency Testing Lab Co., Ltd, 1Floor, No.1 Building, Meibaohe Industrial Park, Dalang Street, Longhua District, Shenzhen, Guangdong Prov.518101 China.



Complied by: Sam Chen

Review by: Jason Zhou

Project Engineer

Technical Manager

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 use in part without prior written consent from Shenzhen Belling Efficiency Testing Lab Co., Ltd. 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. Government.



1 General

1.1 Product Information

Manufacturer	P.Q.L., Inc.
Manufacturer Address	2285 Ward Avenue / Simi Valley, CA 93065
Brand Name	Superior Life®
Luminaire Type	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires
Model Number	STL3P-100W-3000K-C-MB-HC-P STL3P-100W-5700K-C-MB-HC-P
Rated Inputs	AC 120-277V 50/60Hz
Rated Power	100 W
Nominal CCT	3000K / 5700K
Dimming Capability	Continuous
Integral Control Sensors	No
Date of Receipt Samples	2021-11-29
Date of test	2021-12-01 to 2021-12-14
Burning Time Before Test	0hour(For New Products)

1.2 Standards or methods

- ANSI C78.377-2017:Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-10:2014:Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment - Solid State
- 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
- IES TM-15-11: Backlight, Uplight, and Glare (BUG) Ratings

Note: This report contains data that are not covered by the NVLAP accreditation. See the following description:

TM-15-11 test are not in NVLAP accreditation scope.



1.3 Equipment list

Device	Manufacture	Model No.	Serial No.	Calibration due date
Goniophotometric System	SENSING	GMS-3000	N.A	2022-03-31
AC Power Source	ALL POWER	APW-110N	992257	2022-03-31
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S1510065	2022-04-07
Total Spectral Radiant Flux Standard Lamp	SENSING	12V/20W	LSD12201731	2022-04-07
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2022-03-31
Integral Sphere	SENSING	SPR-600M	N.A	2022-03-31
Digital Power Meter	YOKOGAWA	WT210	91L929742	2022-03-31
Optical Color and Electrical Measurement System	SENSING	SPR-3000	S1101108	2022-03-31
Environment Measurer	XUYAO	HS-1	N/A	2022-04-03
Environment Measurer	XUYAO	HS-1	N/A	2022-04-03
Stop watch	KISLO	K610	N/A	2022-04-22
Digital Anemometer	TECMAN	TD8901	026141	2022-09-08

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

1.4 Report Revision

Original report BL211129002-9 dated at 2021-12-30 was recalled and declared as invalid by Shenzhen Belling Efficiency Testing Laboratory Co.,Ltd. Report BL211129002-9A was issued on to replace report BL211129002-9.

Report Number	Report Data	Contents
BL211129002-9	2021-12-30	Original report
BL211129002-9A	2022-01-12	Updated the model number; Updated the sensor information.



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.

Integrating Sphere Uncertainty: The uncertainty of the light output (luminous flux) measurements is $U=1.8\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=20\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=1.8(K=2)$, at the 95% confidence level. The uncertainty of power meter AC current $U=0.18\%$ of rdg, AC Voltage $U=0.16\%$ of rdg, Power $U=0.20\%$ ($K=2$), at the 95% confidence level.



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.

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



3 Test Result Summary

3.1 Integrating Sphere System (Total operating time for integrating sphere test: 1.0 hour)

3.1.1 Model Number: STL3P-100W-3000K-C-MB-HC-P

Electrical data

Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.13	60	0.872	104.45	0.998

Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)
15395.87	147.4	3019

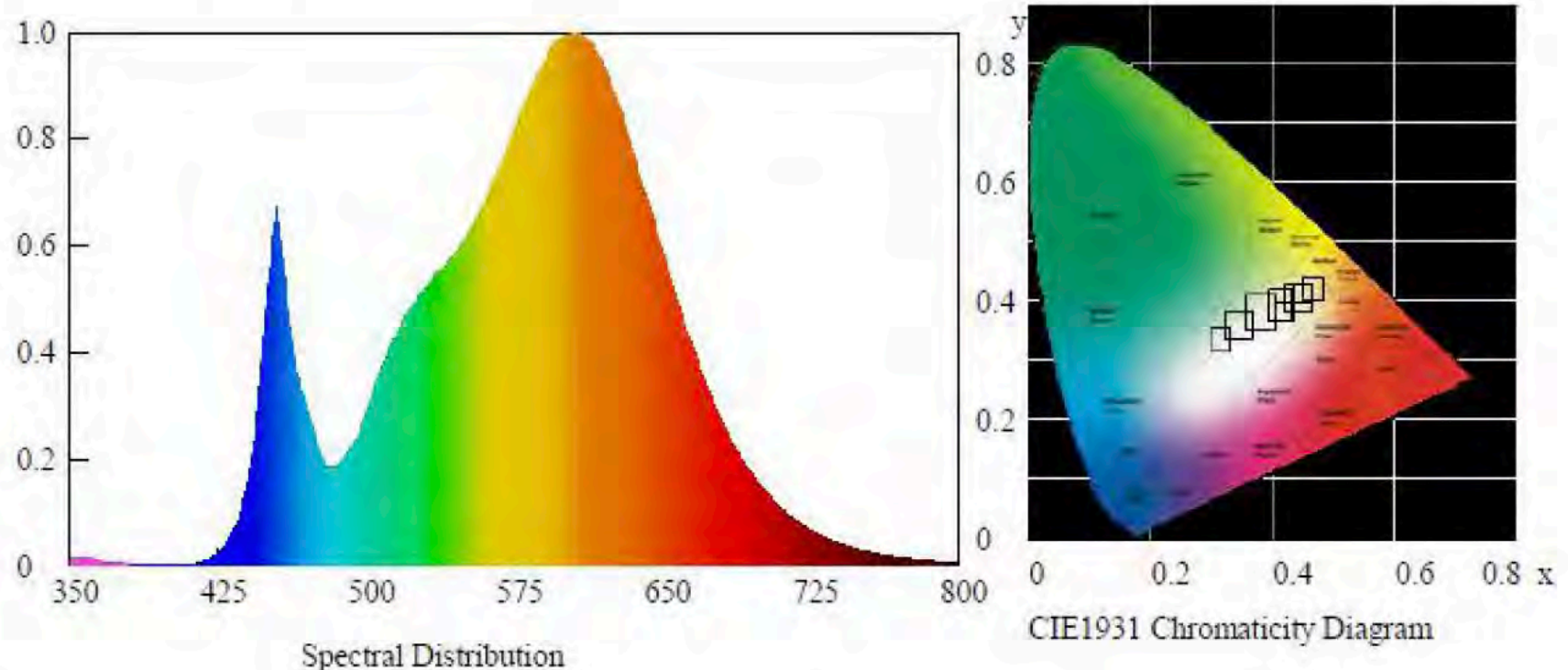
Chromaticity Coordinate

Duv	x	y	u'	v'
-0.00145	0.4335	0.3993	0.2504	0.5190

Color Rendering

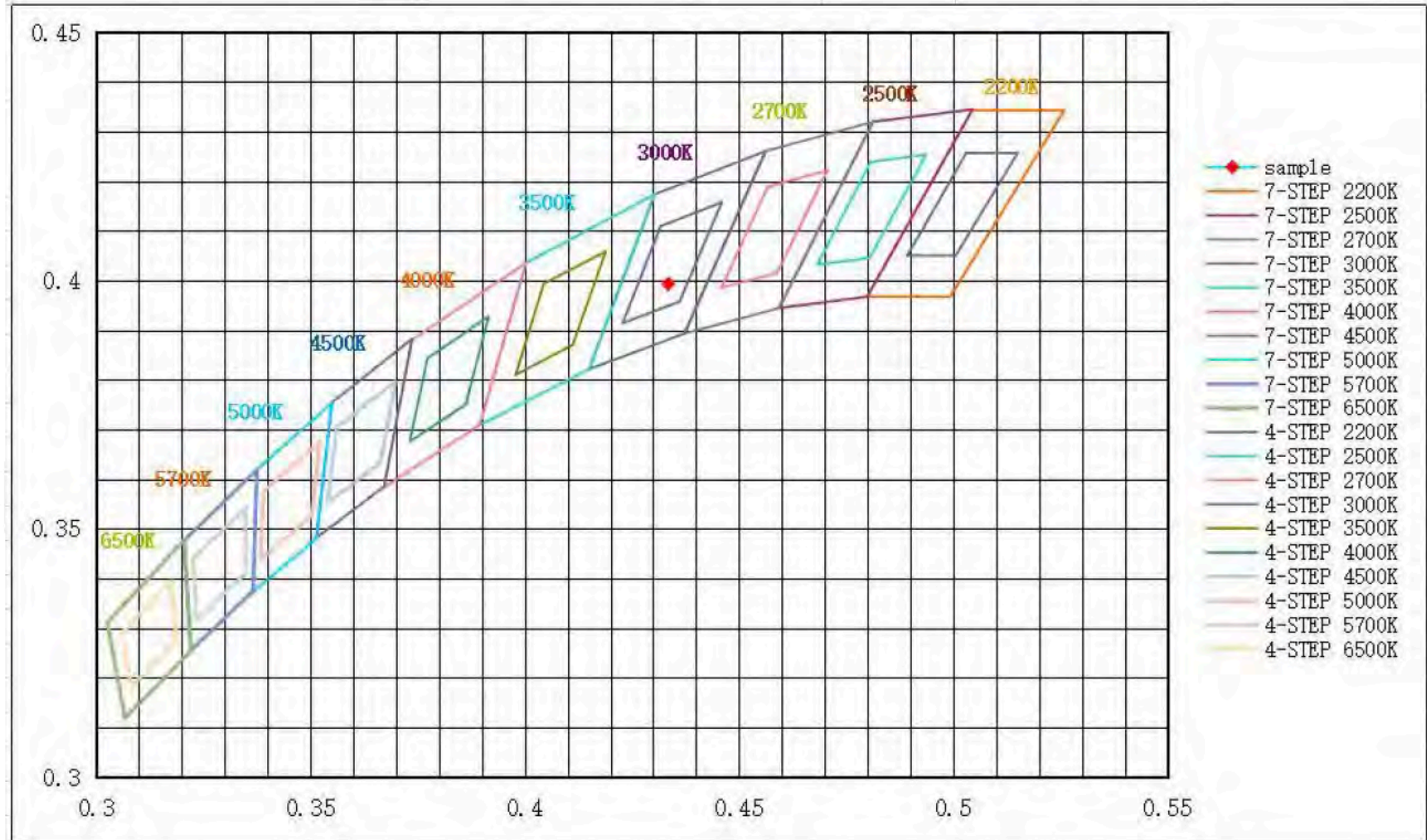
CRI	R9	Rf	Rg	Rcs,h1(%)
83.5	13	84	96	-11

Spectral Distribution





7/4 Step Quadrangle





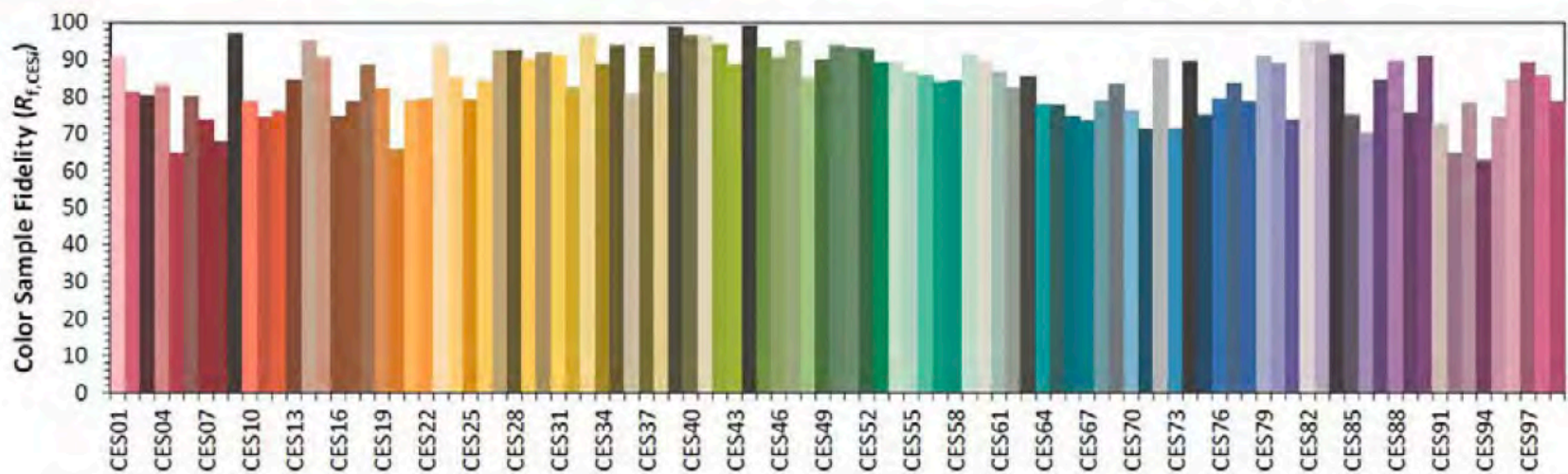
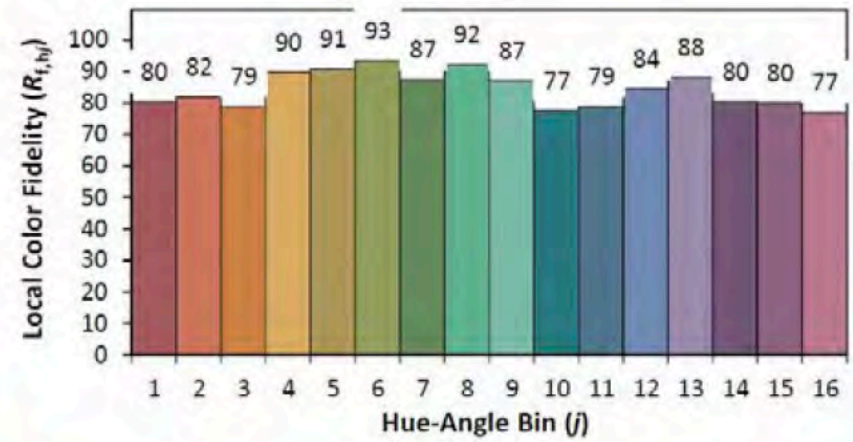
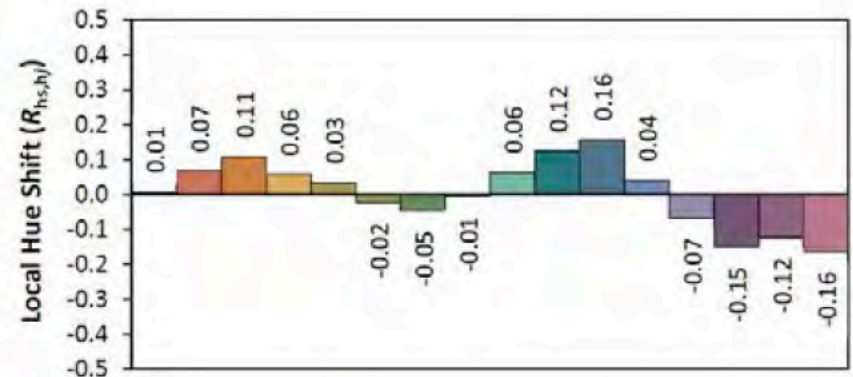
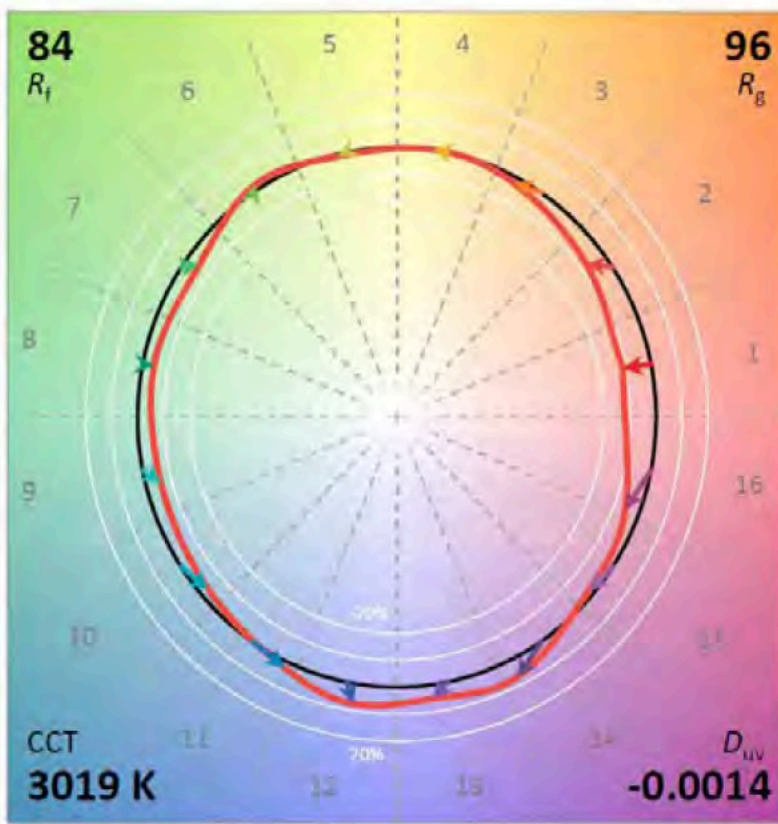
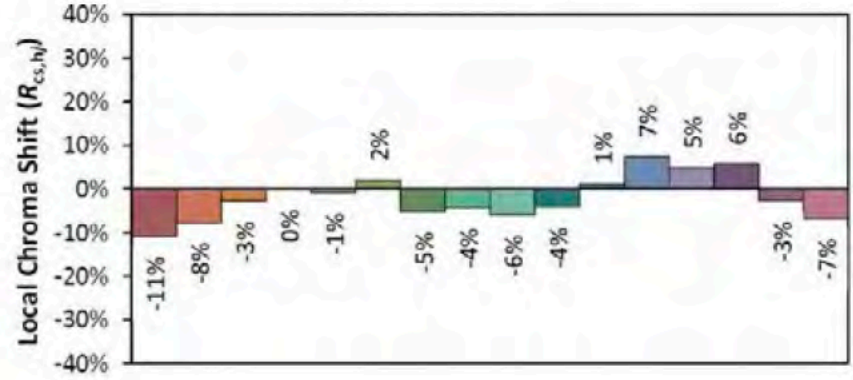
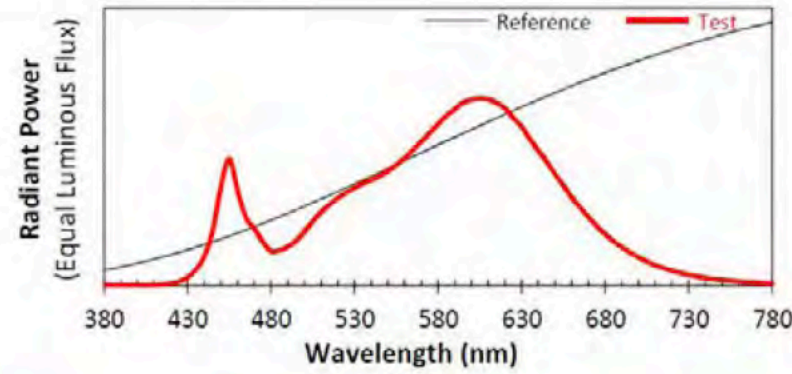
ANSI/IES TM-30-18 Color Rendition Report

Source: BL211129002-9A

Manufacturer: P.Q.L., Inc.

Date: 2022-01-12

Model: STL3P-100W-3000K-C-MB-HC-P



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.4335
 y 0.3993
 u' 0.2504
 v' 0.5190

CIE 13.3-1995 (CRI)	
R_a	83
R_g	12

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.



3.1.2 Model Number: STL3P-100W-5700K-C-MB-HC-P

Electrical data

Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.11	60	0.875	104.86	0.998

Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)
15949.37	152.1	5618

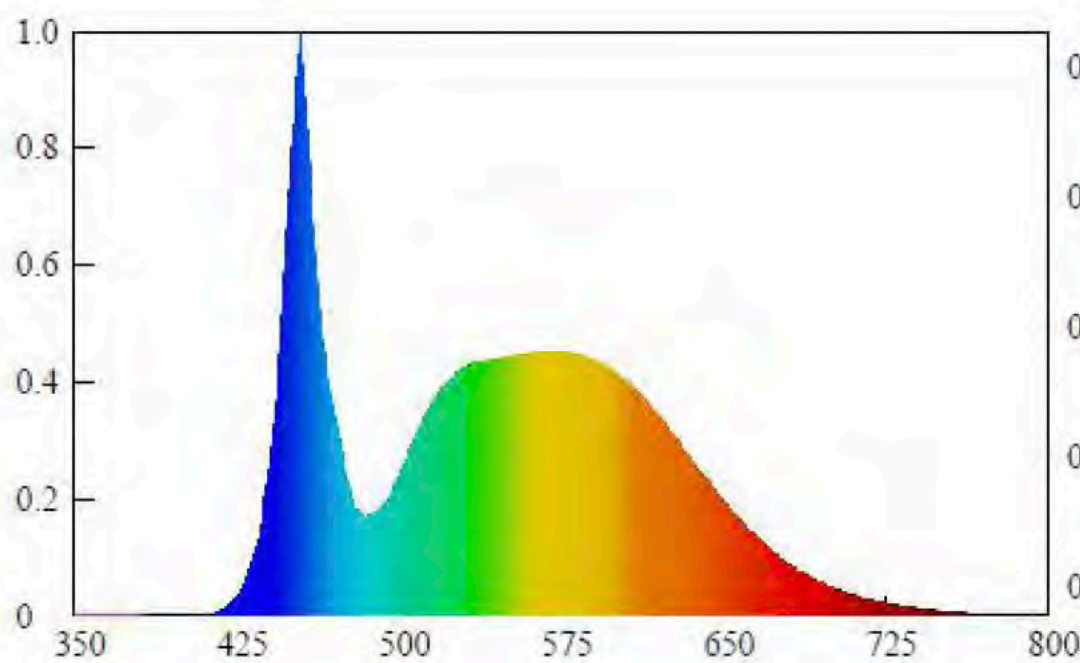
Chromaticity Coordinate

Duv	x	y	u'	v'
+0.00215	0.3298	0.3429	0.2043	0.4781

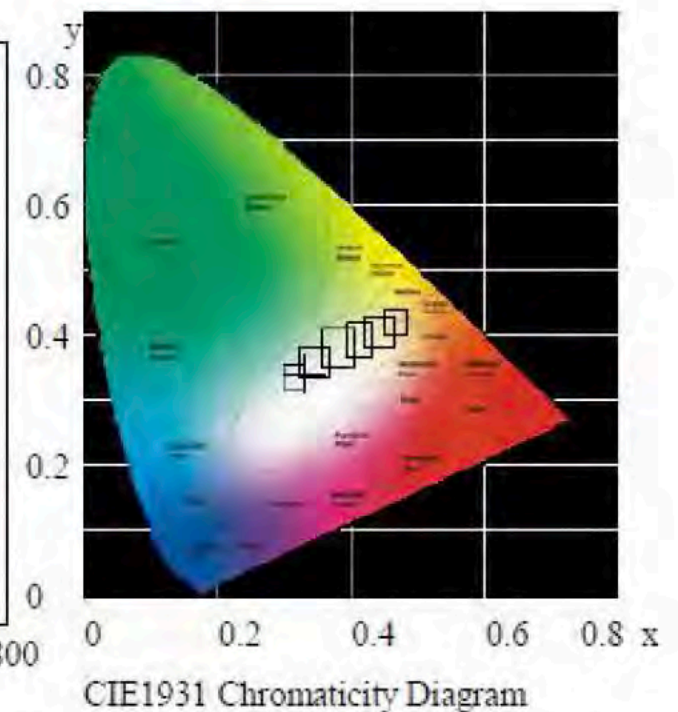
Color Rendering

CRI	R9	Rf	Rg	Rcs,h1(%)
82.4	10	81	94	-13

Spectral Distribution



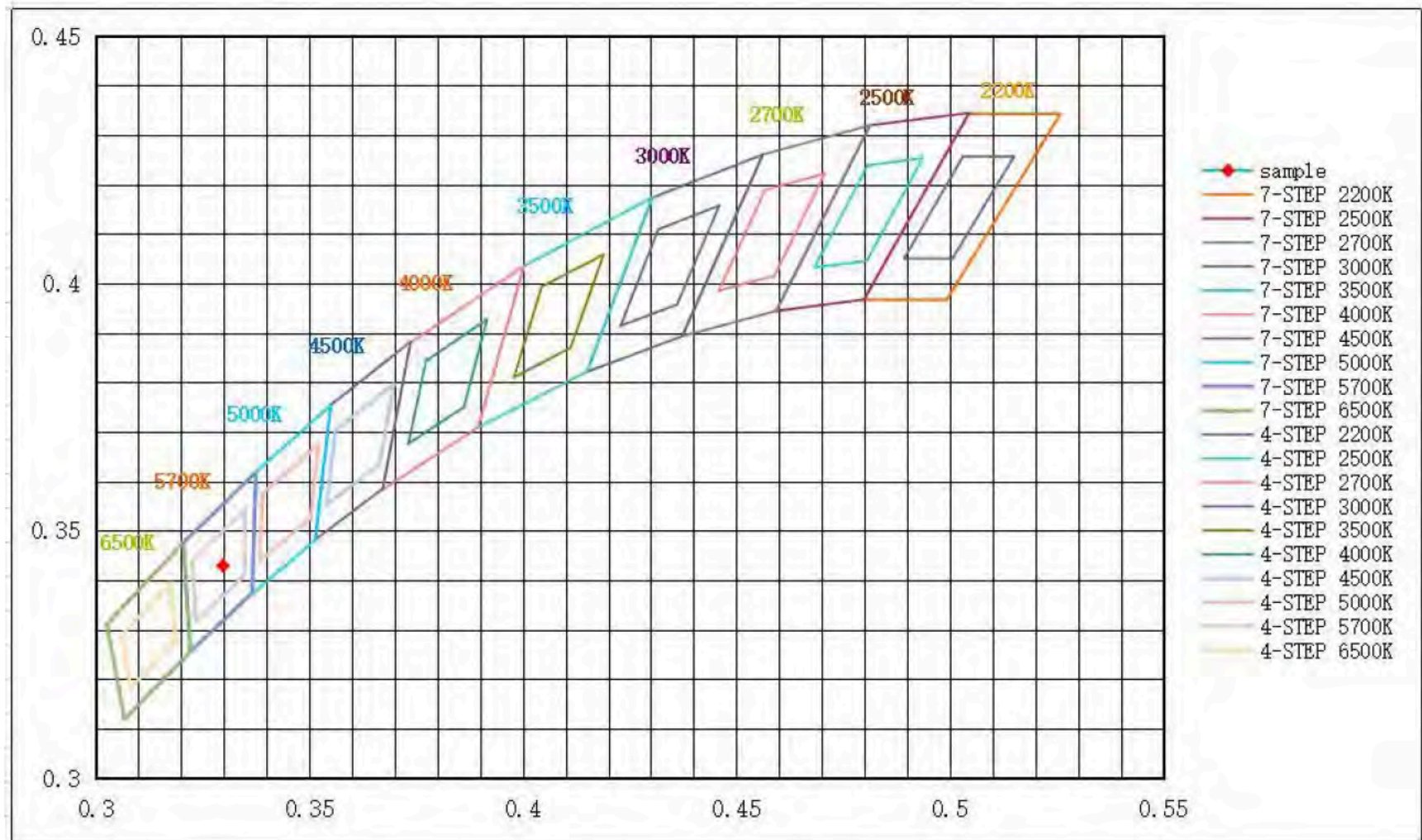
Spectral Distribution



CIE1931 Chromaticity Diagram



7/4 Step Quadrangle





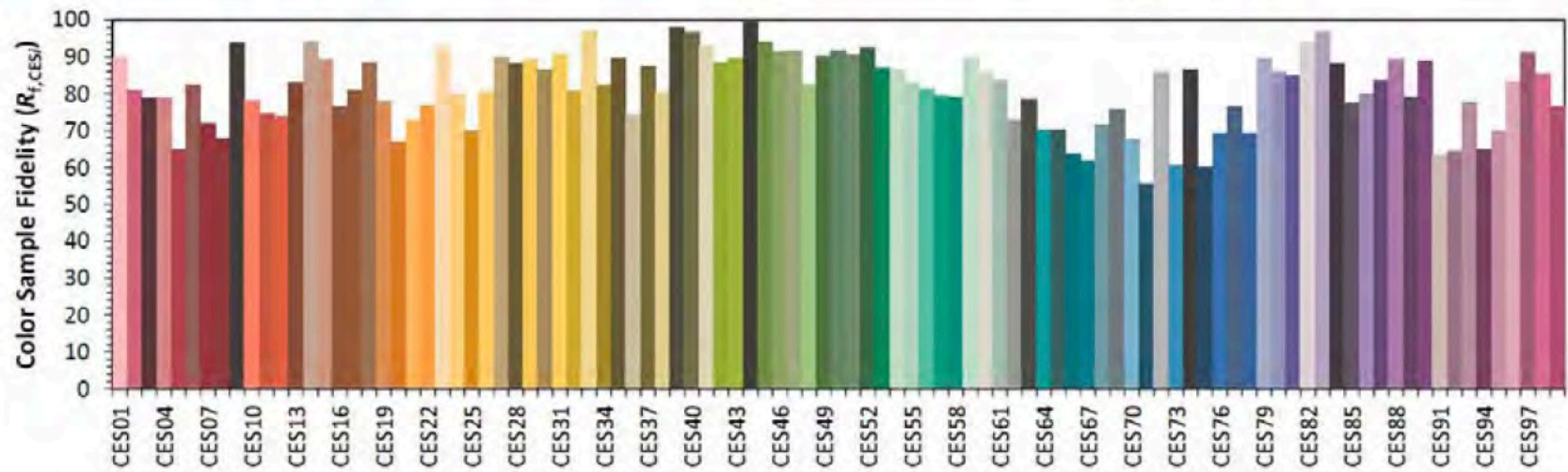
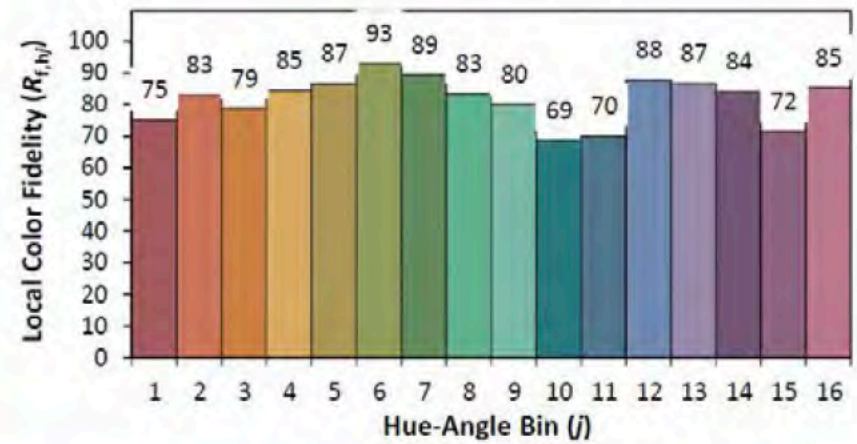
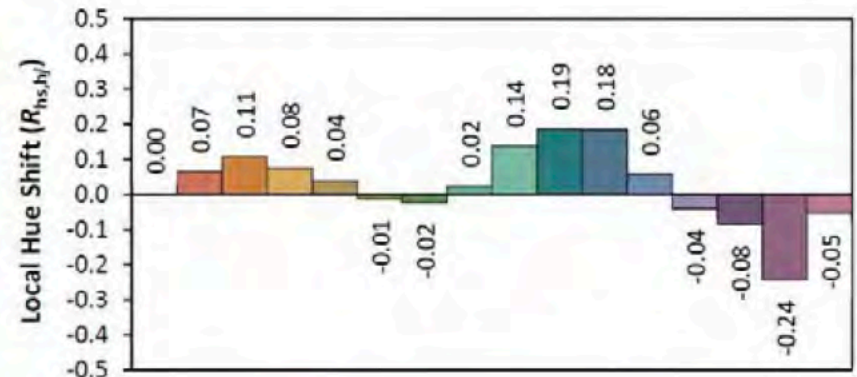
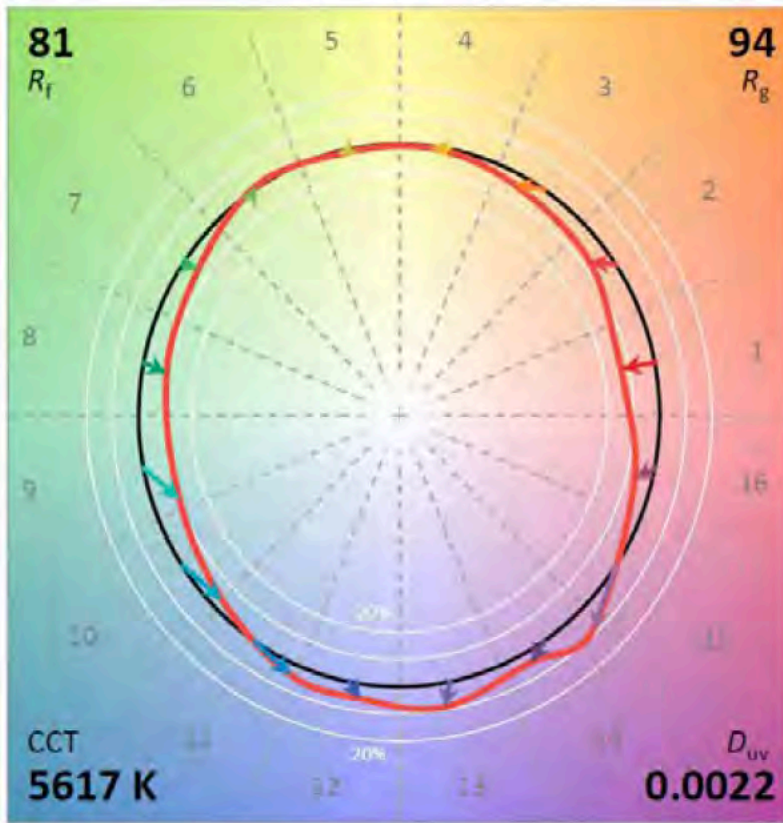
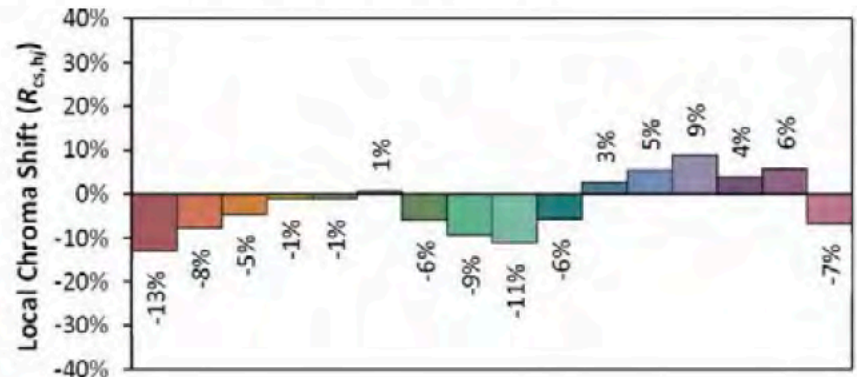
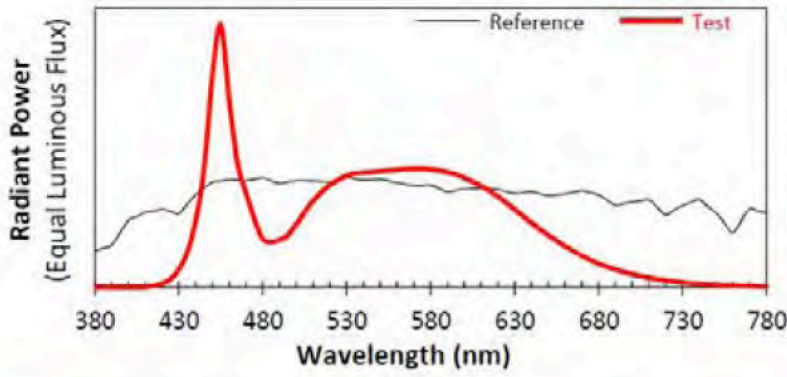
ANSI/IES TM-30-18 Color Rendition Report

Source: BL211129002-9A

Manufacturer: P.Q.L., Inc.

Date: 2022-01-12

Model: STL3P-100W-5700K-C-MB-HC-P



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3298
 y 0.3429
 u' 0.2043
 v' 0.4781

CIE 13.3-1995 (CRI)	
R_a	82
R_g	10

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.



3.2 Goniophotometer System (Total operating time for luminous intensity distribution: 1.0 hour)

3.2.1 Model Number: STL3P-100W-3000K-C-MB-HC-P

Electrical data

Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.120	60	0.866	103.820	0.998

Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
15349.71	147.85	99.82	0.59

IESNA Luminaire Flux Distribution Table:

	Lumens	% Luminaire
FL - Front-Low (0-30)	1688.6	11.0
FM - Front-Medium (30-60)	5858.3	38.2
FH - Front-High (60-80)	2279.9	14.9
FVH - Front-Very High (80-90)	59.9	0.4

BL - Back-Low (0-30)	1375.6	9.0
BM - Back-Medium (30-60)	3204.2	20.9
BH - Back-High (60-80)	824.6	5.4
BVH - Back-Very High (80-90)	30.4	0.2

UL - Uplight-Low (90-100)	4.5	0.0
UH - Uplight-High (100-180)	23.7	0.2
Total	15349.7	100.0

BUG Rating	B3-U2-G2
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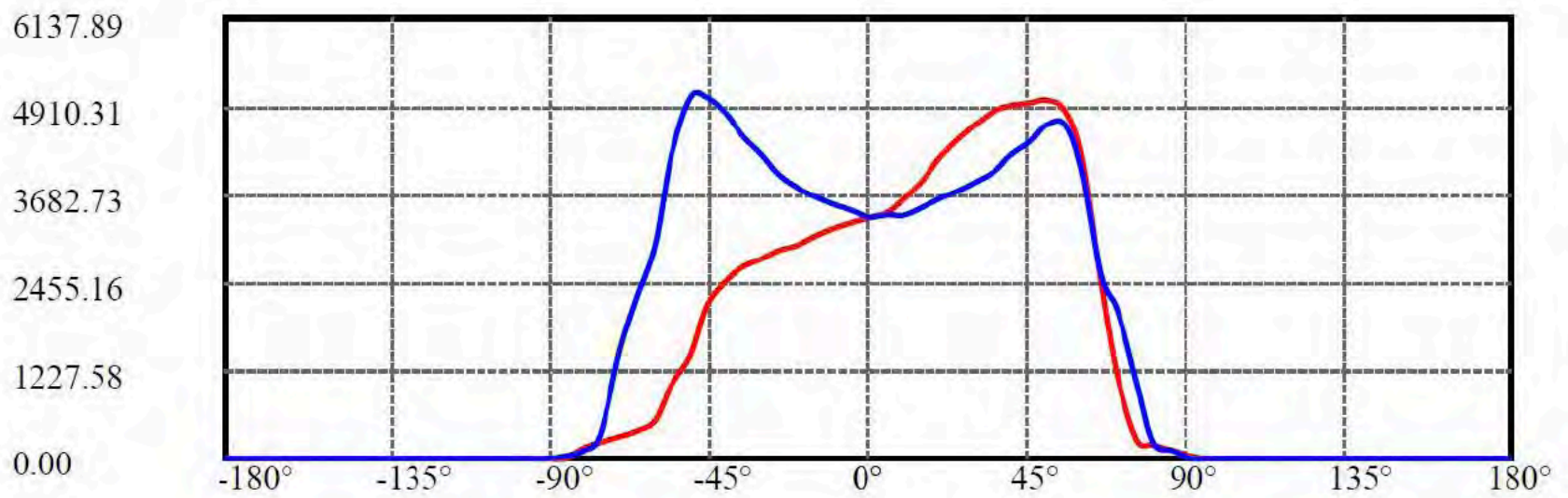
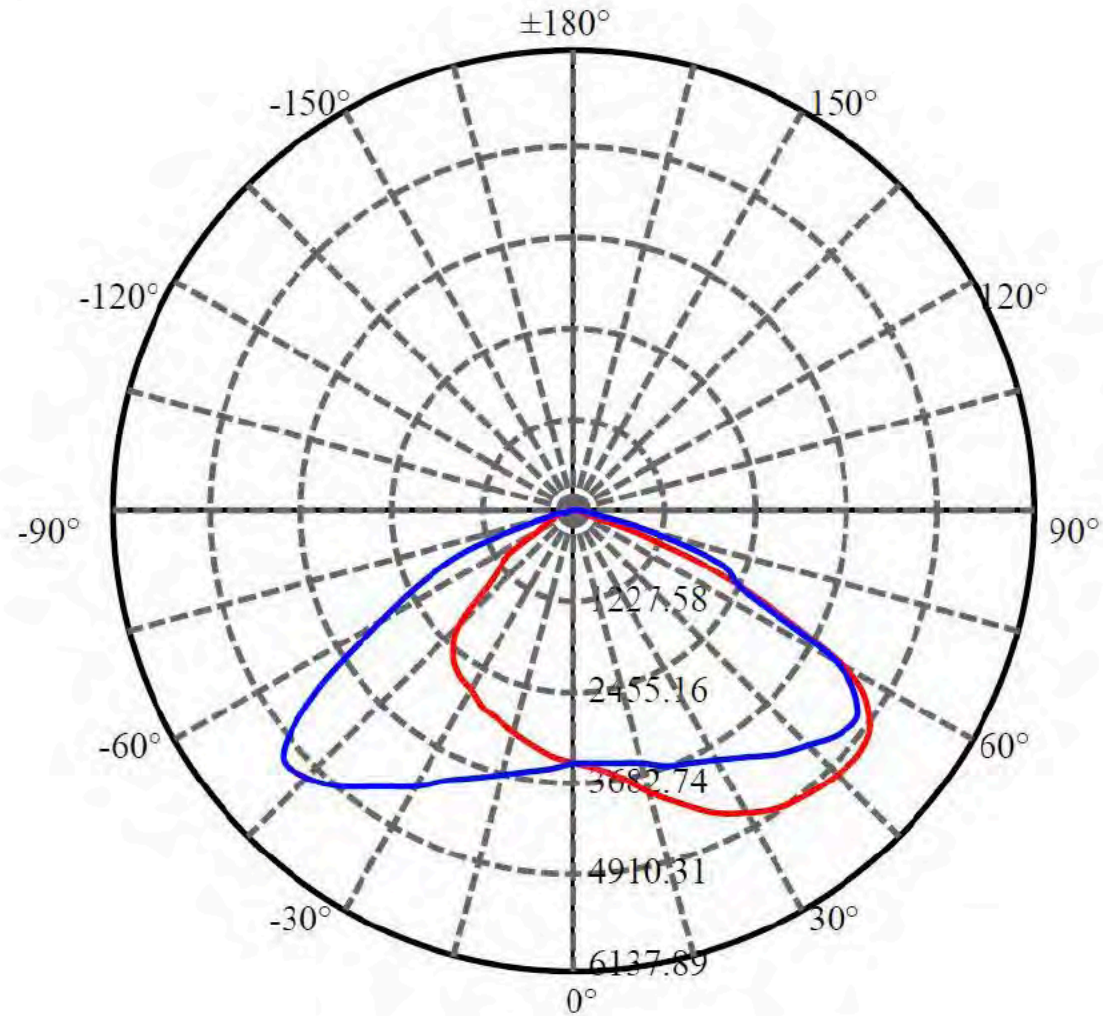
**Zonal Flux Diagram**

Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	3368.323	0.000	0	0.00%	0.00%
5.0	3386.552	80.753	80.753	0.00%	0.53%
10.0	3439.213	244.179	324.932	0.00%	2.12%
15.0	3518.072	412.701	737.633	0.00%	4.81%
20.0	3621.277	588.383	1326.016	0.00%	8.64%
25.0	3748.563	772.960	2098.976	0.00%	13.67%
30.0	3878.760	965.244	3064.22	0.00%	19.96%
35.0	3996.784	1159.729	4223.949	0.00%	27.52%
40.0	4088.478	1348.965	5572.914	0.00%	36.31%
45.0	4128.437	1521.429	7094.343	0.00%	46.22%
50.0	4067.572	1656.124	8750.466	0.00%	57.01%
55.0	3838.748	1719.097	10469.564	0.00%	68.21%
60.0	3330.570	1657.168	12126.731	0.00%	79.00%
65.0	2394.276	1391.721	13518.452	0.00%	88.07%
70.0	1501.923	986.543	14504.995	0.00%	94.50%
75.0	538.809	533.415	15038.41	0.00%	97.97%
80.0	181.641	192.772	15231.182	0.00%	99.23%
85.0	69.028	68.113	15299.295	0.00%	99.67%
90.0	11.961	22.176	15321.47	0.00%	99.82%
95.0	1.456	3.674	15325.144	0.00%	99.84%
100.0	1.694	0.856	15326	0.00%	99.85%
105.0	2.144	1.027	15327.026	0.00%	99.85%
110.0	2.779	1.287	15328.313	0.00%	99.86%
115.0	3.625	1.622	15329.935	0.00%	99.87%
120.0	4.340	1.936	15331.871	0.00%	99.88%
125.0	5.068	2.175	15334.045	0.00%	99.90%
130.0	5.610	2.322	15336.367	0.00%	99.91%
135.0	5.994	2.345	15338.712	0.00%	99.93%
140.0	6.113	2.242	15340.954	0.00%	99.94%
145.0	6.192	2.053	15343.007	0.00%	99.96%
150.0	6.259	1.833	15344.84	0.00%	99.97%
155.0	6.073	1.561	15346.401	0.00%	99.98%
160.0	5.795	1.245	15347.645	0.00%	99.99%
165.0	5.451	0.927	15348.572	0.00%	99.99%
170.0	5.253	0.635	15349.207	0.00%	100.00%
175.0	5.240	0.375	15349.583	0.00%	100.00%
180.0	5.455	0.128	15349.71	0.00%	100.00%



Luminous Intensity Distribution Diagram Light Distribution Curve [Unit:cd]



C0/C180: 

C90/C270: 

Field angle(10%Imax):C0/180Left:60.8 Right:73.6

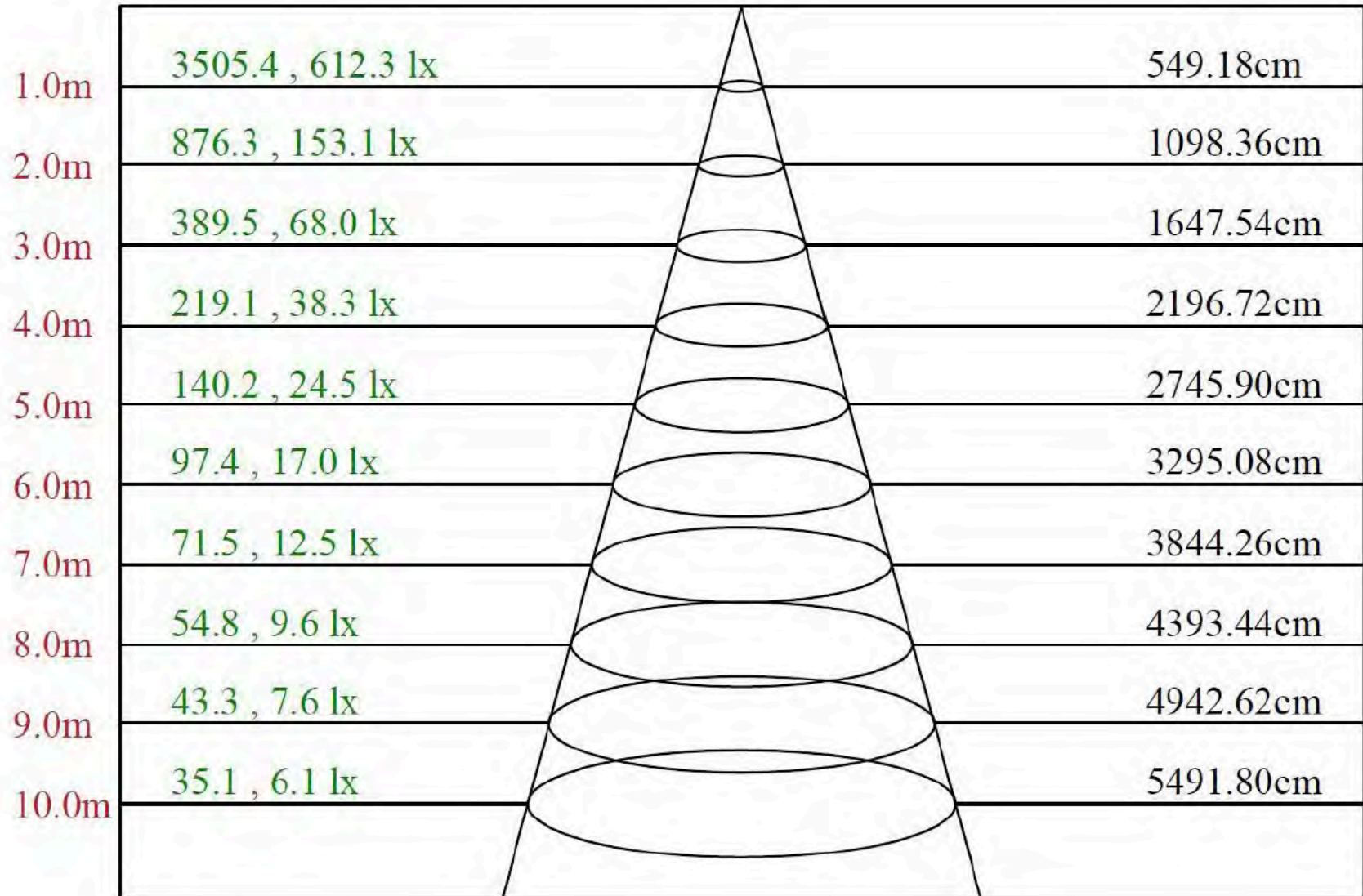
:C90/270Left:74.3 Right:78.4

Beam Angle(50%Imax):C0/180Left:39.6 Right:64.9

:C90/270Left:63.0 Right:65.4



Lux distance Curve



Max , Ave Beam angle of C292.5 plane 139.98

**Luminous Intensity Distribution Data**

<i>C/γ</i> (°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	3368.32	3445.04	3622.87	3874.79	4177.53	4446.39	4668.68	4835.92	4916.37
22.5	3368.32	3442.92	3601.70	3826.10	4086.49	4361.71	4592.46	4768.18	4888.85
45.0	3368.32	3436.57	3555.12	3701.20	3942.54	4230.45	4518.37	4787.23	5051.86
67.5	3368.32	3400.58	3483.14	3612.28	3781.64	3993.34	4228.33	4476.03	4772.41
90.0	3368.32	3389.99	3411.16	3489.49	3605.93	3730.83	3855.74	4018.75	4238.92
112.5	3368.32	3354.00	3351.89	3362.47	3385.76	3436.57	3489.49	3538.18	3578.41
135.0	3368.32	3322.25	3267.21	3199.46	3167.71	3150.77	3116.90	3053.39	2947.53
157.5	3368.32	3273.56	3201.58	3133.83	3027.98	2939.07	2856.50	2746.42	2579.17
180.0	3368.32	3294.73	3190.99	3070.32	2966.59	2884.02	2771.82	2651.15	2483.91
202.5	3368.32	3292.61	3229.10	3146.53	3055.50	2972.94	2892.49	2769.70	2581.29
225.0	3368.32	3313.78	3307.43	3284.14	3243.92	3222.75	3210.05	3152.89	3004.69
247.5	3368.32	3373.06	3400.58	3434.45	3487.38	3561.47	3656.74	3741.42	3775.29
270.0	3368.32	3470.44	3548.77	3646.15	3771.06	3957.36	4221.98	4505.66	4804.17
292.5	3368.32	3464.09	3584.76	3756.24	3963.71	4219.87	4516.25	4869.79	5299.55
315.0	3368.32	3451.39	3618.63	3862.09	4107.66	4408.28	4738.54	5085.73	5377.88
337.5	3368.32	3459.85	3652.50	3889.61	4169.06	4461.21	4725.84	4948.12	5115.37
360.0	3368.32	3445.04	3622.87	3874.79	4177.53	4446.39	4668.68	4835.92	4916.37
<i>C/γ</i> (°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	4962.94	4994.70	4831.69	4205.68	2448.13	1131.13	256.37	178.89	101.62
22.5	5005.28	5087.85	5043.39	4675.03	3556.81	1878.65	561.44	192.23	90.19
45.0	5276.26	5447.74	5498.55	5344.01	4854.97	3345.32	1101.91	356.93	187.57
67.5	5159.83	5625.57	5943.12	5617.10	3895.11	2671.26	1381.78	175.93	88.07
90.0	4425.22	4645.39	4643.27	4001.81	2547.42	2077.44	1052.80	233.30	96.75
112.5	3572.06	3504.31	3330.72	2983.52	2160.00	1131.13	584.09	210.86	70.07
135.0	2750.65	2430.98	2030.86	1601.11	1148.06	610.76	232.66	125.96	45.09
157.5	2291.26	1848.80	1247.56	937.84	502.58	309.51	232.03	156.03	7.83
180.0	2145.18	1431.74	1044.33	520.58	392.50	299.56	230.76	139.94	1.27
202.5	2282.79	1789.52	1217.92	894.87	445.21	301.68	227.16	142.90	2.75
225.0	2767.59	2392.87	1939.83	1516.43	1061.27	474.21	203.23	109.45	26.68
247.5	3756.24	3639.80	3351.89	2786.64	1692.14	950.76	279.87	150.31	46.15
270.0	5022.22	5028.57	4216.90	2976.96	2211.44	1475.78	333.22	133.37	47.63
292.5	5765.29	6137.89	6091.32	4994.70	3091.92	2781.77	682.74	135.70	60.12
315.0	5640.39	5803.40	5830.92	5528.19	4825.34	2775.00	751.76	290.03	147.13
337.5	5231.80	5272.03	5157.71	4704.67	3475.52	1816.83	509.15	174.44	85.53
360.0	4962.94	4994.70	4831.69	4205.68	2448.13	1131.13	256.37	178.89	101.62
<i>C/γ</i> (°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	28.79	1.06	0.85	1.06	1.27	1.48	1.91	2.54	3.18
22.5	30.27	1.27	1.06	1.06	1.48	1.91	2.33	2.96	3.81
45.0	41.92	1.69	1.27	1.69	2.12	2.54	3.39	4.23	4.66
67.5	13.55	1.91	1.69	1.91	2.96	3.60	4.66	5.29	5.93
90.0	13.34	1.06	1.69	1.91	2.54	3.18	3.81	4.66	5.08
112.5	5.29	1.69	2.12	2.75	3.39	4.66	5.29	5.72	6.35
135.0	2.12	1.48	2.54	3.18	4.23	5.29	5.93	6.99	7.62
157.5	1.06	1.48	2.12	2.96	4.23	5.29	6.56	7.41	8.05
180.0	0.64	1.27	1.69	2.75	3.39	4.87	6.14	7.20	7.83
202.5	1.06	1.27	1.69	2.54	3.18	4.45	5.50	6.77	7.62
225.0	1.91	1.69	2.54	3.18	3.81	5.08	5.93	6.99	7.62
247.5	2.75	1.91	2.54	3.39	4.45	5.72	6.56	7.20	7.62
270.0	1.69	1.06	1.48	1.69	2.33	3.39	3.60	4.23	4.45
292.5	4.66	1.48	1.48	1.91	2.12	2.75	3.18	3.60	3.60
315.0	18.42	1.48	1.27	1.27	1.69	2.12	2.54	2.75	3.39
337.5	23.92	1.48	1.06	1.06	1.27	1.69	2.12	2.54	2.96
360.0	28.79	1.06	0.85	1.06	1.27	1.48	1.91	2.54	3.18



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	3.39	4.02	4.66	4.87	5.08	5.29	5.08	5.29	5.29
22.5	4.23	4.66	5.08	5.29	5.50	5.50	5.50	5.50	5.72
45.0	5.50	5.50	5.72	6.14	5.72	5.72	5.50	5.29	5.72
67.5	6.56	6.77	6.77	6.56	6.56	5.93	5.50	5.72	5.50
90.0	5.29	5.29	5.50	5.93	5.50	5.29	4.66	4.87	4.87
112.5	6.77	7.20	6.77	6.56	6.14	5.72	5.29	5.08	5.08
135.0	8.05	8.05	7.62	7.41	7.20	6.14	5.72	5.29	5.29
157.5	8.47	8.68	7.83	7.83	7.20	6.77	5.72	5.50	5.08
180.0	8.05	7.83	8.05	7.83	7.20	6.77	6.35	5.50	5.29
202.5	7.83	7.62	7.83	7.62	7.20	6.77	6.35	5.72	5.50
225.0	7.62	7.20	7.41	7.41	7.20	6.77	6.35	5.72	5.72
247.5	7.62	7.41	7.20	7.20	6.99	6.35	5.93	5.72	5.50
270.0	4.87	4.87	4.87	4.87	4.66	4.23	4.02	4.02	4.02
292.5	4.23	4.66	4.87	5.08	5.08	5.08	5.08	4.66	5.08
315.0	3.81	4.23	4.45	4.87	5.08	5.08	5.08	5.08	5.08
337.5	3.60	3.81	4.45	4.66	4.87	5.29	5.08	5.08	5.08
360.0	3.39	4.02	4.66	4.87	5.08	5.29	5.08	5.29	5.29
C/γ(°)	180.0								
0.0	5.46								
22.5	5.46								
45.0	5.46								
67.5	5.46								
90.0	5.46								
112.5	5.46								
135.0	5.46								
157.5	5.46								
180.0	5.46								
202.5	5.46								
225.0	5.46								
247.5	5.46								
270.0	5.46								
292.5	5.46								
315.0	5.46								
337.5	5.46								
360.0	5.46								



4 Additional Test

Model Number	Test Voltage (V)	Frequency(Hz)	Power Factor	THD
STL3P-100W-3000K- C-MB-HC-P	120	60	0.997	4.5%
	277	60	0.966	11.6%
STL3P-100W-5700K- C-MB-HC-P	277	60	0.966	11.9%

5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
STL3P-100W-3000K- C-MB-HC-P	3000K	15395.87	104.45	147.4
STL3P-100W-3500K- C-MB-HC-P	3500K	15506.57 * ¹	104.66 * ²	148.2 * ³
STL3P-100W-4000K- C-MB-HC-P	4000K	15617.27 * ¹	104.66 * ²	149.2 * ³
STL3P-100W-4500K- C-MB-HC-P	4500K	15727.97 * ¹	104.66 * ²	150.3 * ³
STL3P-100W-5000K- C-MB-HC-P	5000K	15838.67 * ¹	104.66 * ²	151.3 * ³
STL3P-100W-5700K- C-MB-HC-P	5700K	15949.37	104.86	152.1

*1: This value is calculated and the calculation formula is as below:

$$15506.57=(15949.37-15395.87)/5+15395.87$$

$$15617.27=(15949.37-15395.87)/5+15506.57$$

$$15727.97=(15949.37-15395.87)/5+15617.27$$

$$15838.67=(15949.37-15395.87)/5+15727.97$$

*2: This value is calculated and the calculation formula is as below:

$$104.66=(104.45+104.86)/2$$

*3: This value is calculated and the calculation formula is as below:

$$148.2=15506.57/104.66$$

$$149.2=15617.27/104.66$$

$$150.3=15727.97/104.66$$

$$151.3=15838.67/104.66$$



Photo Document



End of test report