Lab Code: 200707-0

IESNA LM-79-08
ELECTRICAL AND PHOTOMETRIC MEASUREMENTS OF SOLID-STATE LIGHTING PRODUCTS

MEASUREMENT AND TEST REPORT

For

Eiko Limited

23220 W. 84th Street Shawnee, KS, USA

Model: LEDP-6WMR16/830-DIM

Report Type: Original Report	**Product Type:** MR16 LED LAMP
Test Engineer:	Jack Zhou
Report Number:	RSZ120808515-10
Test Date:	2011-12-06
Report Date:	2012-08-08
Reviewed By:	Jeanne Han
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

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT	Rating	Brand	Manufacturer	Model
MR16 LED LAMP	12V 6W GU5.3 3000K	Eiko	Eiko Limited	LEDP-6WMR16/830-DIM

1.2 Objective

The following test report is prepared on behalf of *Eiko Limited* in accordance with the following American National Standards or illumination Engineering Society of North America Test Guides:

- ANSI C78.377-2008 Specification for the Chromaticity of Solid State Lighting Products
- IESNA LM-79-2008: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- ANSI/UL 153-2005: Portable Electric Luminaires
- UL 1598-2004: Luminaires
- ASTM E 283-2004: Restricted air movement
- IESNA LM-16: Correlated Color Temperature
- INSNA LM-58-94: Color Rendering Index and Correlated Color Temperature
- CIE Publication No.13.3-1995: Method of Measuring and Specifying Color Rendering of Light Sources

1.3 Test Facility

The test facility used by Bay Area Compliance Laboratories Corp. (Shenzhen). is6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade ZoneShenzhen, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Shenzhen). is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The NVLAP Lab Code is 200707-0.

2 - SUMMARY OF TEST RESULT

SPECTRORADIOMETRIC TESTING IN INTEGRATING SPHERE	
PHOTOMETRIC	-
Total Integrated Flux (Lumens)	364.266
SPECTRORADIOMETRIC	-
Observer	-
Chromaticity Ordinate x	0.4306
Chromaticity Ordinate y	0.3963
Observer	-
Chromaticity Ordinate u	0.2498
Chromaticity Ordinate v	0.3449
Correlated Color Temp CCT (K)	3045
Color Rendering Index (CRI)	83.5
Total Radiant Flux (W)	1.144
ELECTRICAL	-
Input Voltage (Volts AC)	12.02
Input Current (A AC)	0.712
Input Power (Watts)	5.86
Power Factor	0.685
EFFICACY	-
Lumens/Watt	62.161

LUMINOUS INTENSITY DISTRIBUTION	
Center beam candlepower(if applicable)(cd)	677.1
Beam angle(if applicable)(°)	40.0
Zonal lumens in the 0° -60° zone(%)	98.1%
Zonal lumens in the 60° -90° zone(%)	1.9%
Zonal lumens in the 90° -120° zone(%)	0.0%
Zonal lumens in the 120° -180° zone(%)	0.0%

Note: The test data was only good for the test sample. It may have deviation for other test sample.

3 - Test Method

Test methods according to IESNA LM-79-08 following chapter:

4.0 SEASONING OF SSL PRODUCT

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning.

5.0 STABILIZATION OF SSL PRODUCT

Before measurements are taken. The SSL product under test shall be operated long enough to reach stabilization and temperature equilibrium. The time required fir stabilization depends on the type of SSL products under test. The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaries. The SSL product during stabilization shall be operated in the ambient temperature as specified in section 2.2 and in the operating orientation as specified in 6. It can be judged that stability is reached when the variation (maximum –minimum) of at least 3 reading of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5%. The stabilization time used for each SSL product shall be reported.

9.0 TEST METHODS FOR TLTAL LUMINOUS FLUX MEASUREMENT

10.0 LUMINOUS INTENSITY DISTRIBUTION

11.0 LUMINOUS EFFICACY

12.0 TEST METHODS FOR COLOR CHARACTERISTICS OF SSL PRODUCTS

13.0 UNCERTAINTY STATEMENT

The uncertainty of the light output measurements is *U*=1.50% (K=2), the uncertainty of the correlated color temperature measurements is *U*=14K (K=2), at the 95% confidence level. This calibration results traceable to the NATIONAL INSTITUTE OF METROLOGY (NIM).

Remark:

1. 0 hour season, Pre-heating the lamp for 45 minutes at least;
2. Ambient:65%RH, 25℃;

Attachment A – Spectral Flux

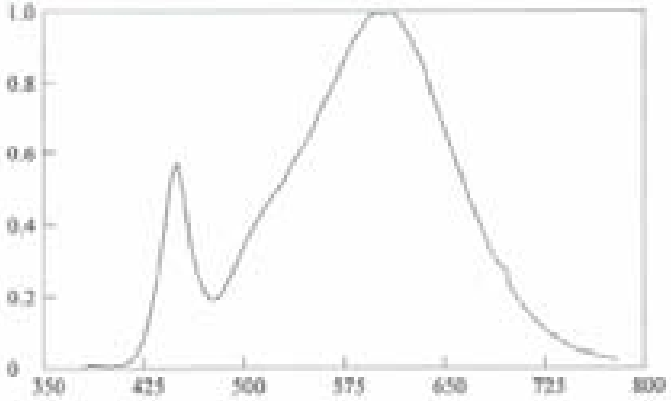
Report of Spectroradiometric & Electric Analysis for Light Source

Product: LEDP-6WMR16/830-DIM
Manufacturer: Jointluck
Sample No.: 1# Date: 12-6-2011
Tested By: Blake Reviewed By: Jack

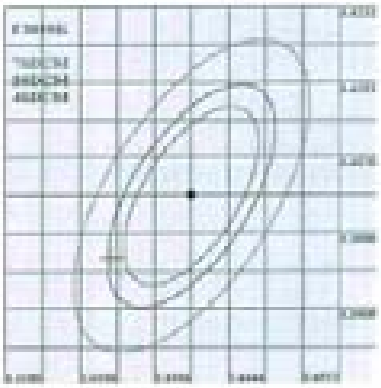
Test Condition

Temperature: 25°C RH: 65%
Spectrum Range: 380-780 nm Scan Step: 5 nm

Spectroradiometric Parameters



Spectral Distribution



SDCM:F3000K

x0=0.4400 y0=0.4030

Chromaticity Coordinates: x=0.4306 y=0.3963 u=0.2498 v=0.3449

Correlated Color Temperature: 3045 K Dominant Wavelength: 582.0 nm(E)
Luminous Flux: 364.266 lm Purity: 0.4838
Chromaticity Difference: -2.25E-03duv Peak Wavelength: 609.0 nm
Red Color Ratio: 44.2% Green Color Ratio: 48.5%
Blue Color Ratio: 7.2% Color Tolerance: 4.7 SDCM
Rendering Index: Ra=83.5 Radiant Flux: 1.144 W

R1=82 R2=91 R3=96 R4=81 R5=82 R6=87 R7=85 R8=64
R9=19 R10=78 R11=80 R12=73 R13=84 R14=98 R15=77

Electric Parameters

Voltage: 12.02 V Current: 0.712 A
Power Factor: 0.685 Power: 5.86 W

Luminous Efficacy: 62.161 lm/W

Attachment B– Light Intensity Test Data

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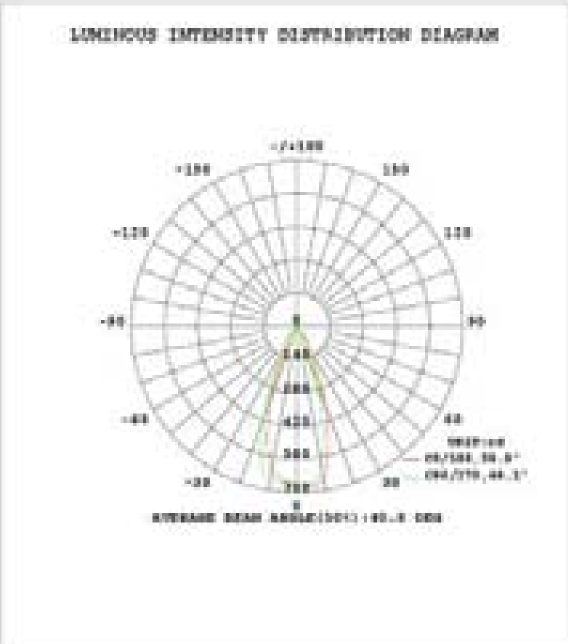
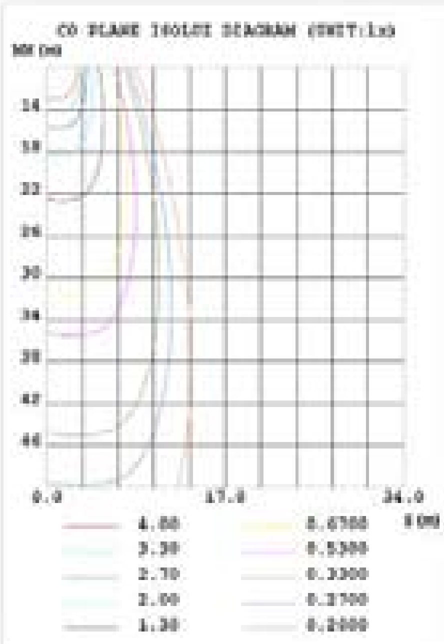
LUMINAIRE PHOTOMETRIC TEST REPORT

NAME: Joinluck	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Joinluck	DIM.:	PROTECTION ANGLE:

DATA OF LAMP		PHOTOMETRIC DATA	Eff: 64.95 lm/W		
MODEL	LEDP-6WMR16/830-DIM	Imax(cd)	677.1	S/MH(C0/180)	0.65
NOMINAL POWER(W)	8	LOR(%)	100.0	S/MH(C90/270)	0.57
RATED VOLTAGE(V)	12	TOTAL FLUX(lm)	370.35	η UP,DN(C0-180)	0.0,44.5
NOMINAL FLUX(lm)	370.349	CIE CLASS	DIRECT	η UP,DN(C180-360)	0.0,55.5
LAMPS INSIDE	1	η up(%)	0.0	CIBSE SHR NOM	0.50
TEST VOLTAGE(V)	12.0	η down(%)	100.0	CIBSE SHR MAX	0.65





C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.249
Humidity:65.0%
Test Distance:2.461m (K=1.0000)
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 2 Of 11

ZONAL FLUX DIAGRAM

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lm,Lamp
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0- 10	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10- 20	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20- 30	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30- 40	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40- 50	[illegible]	[illegible]	[illegible]
60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	50- 60	[illegible]	[illegible]	[illegible]
70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60- 70	[illegible]	[illegible]	[illegible]
80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	70- 80	[illegible]	[illegible]	[illegible]
90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	80- 90	[illegible]	[illegible]	[illegible]
100	0	0	0	0	0	0	0	0	90-100	[illegible]	[illegible]	[illegible]
110	0	0	0	0	0	0	0	0	100-110	[illegible]	[illegible]	[illegible]
120	0	0	0	0	0	0	0	0	110-120	0	[illegible]	[illegible]
130	0	0	0	0	0	0	0	0	120-130	0	[illegible]	[illegible]
140	0	0	0	0	0	0	0	0	130-140	0	[illegible]	[illegible]
150	0	0	0	0	0	0	0	0	140-150	[illegible]	[illegible]	[illegible]
160	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	150-160	[illegible]	[illegible]	[illegible]
170	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	160-170	[illegible]	[illegible]	[illegible]
180	0	0	0	0	0	0	0	0	170-180	[illegible]	[illegible]	[illegible]
360	LUMINOUS INTENSITY:cd									UNIT:lm		

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

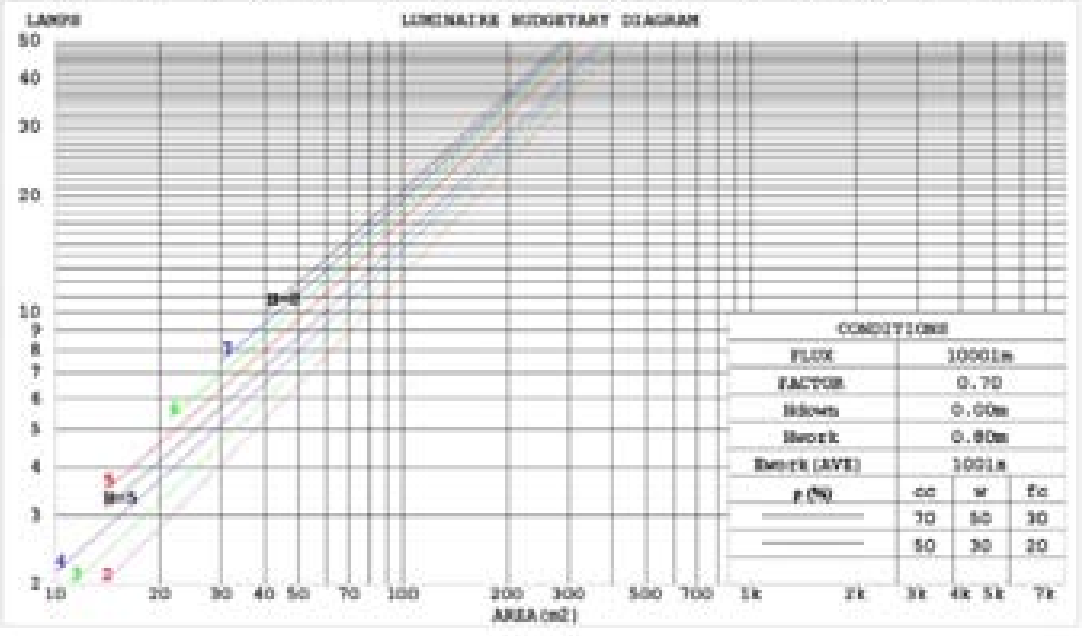
γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:2.461m [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 3 Of 11

CU AND LUMINAIRE BUDGETARY ESTIMATE DIAGRAM

NAME: Jackluck	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Jackluck	DIR.:	PROTECTION ANGLE:

ρcc	80%			70%			50%			30%			10%			0
ρw	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
ρfc	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio			Coefficients of Utilization(CU)												
0.0	1.19	1.19	1.19	1.16	1.16	1.16	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	.00
1.0	1.11	1.09	1.06	1.09	1.07	1.05	1.05	1.03	1.02	1.01	.00	.99	.98	.97	.96	.94
2.0	1.04	.00	.97	1.02	.99	.96	.99	.96	.94	.96	.94	.92	.93	.91	.90	.88
3.0	.97	.93	.89	.96	.92	.88	.94	.90	.87	.91	.88	.86	.89	.86	.84	.83
4.0	.93	.87	.83	.91	.86	.83	.89	.84	.81	.87	.83	.80	.85	.82	.79	.78
5.0	.87	.81	.77	.86	.81	.77	.84	.80	.76	.82	.78	.76	.81	.78	.75	.74
6.0	.83	.77	.73	.81	.76	.73	.80	.75	.72	.79	.75	.72	.77	.74	.71	.70
7.0	.78	.73	.69	.77	.72	.69	.76	.72	.68	.75	.71	.68	.74	.70	.67	.66
8.0	.74	.69	.65	.74	.69	.65	.73	.68	.65	.72	.68	.64	.71	.67	.64	.63
9.0	.71	.66	.62	.70	.65	.62	.70	.65	.62	.69	.64	.61	.68	.64	.61	.60
10.0	.68	.62	.59	.67	.62	.59	.67	.62	.59	.66	.62	.59	.65	.61	.59	.57



C Range: 0 - 360DEG
C Interval: 22.50DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.00DEG
Test System:EVERFINE GO-B5000_V2 SYSTEM V2.0.269
Humidity:60.0%
Test Distance:2.46lm [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 4 Of 11

WEC AND CCEC

NAME: Joinluck	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Joinluck	SOR.:	PROTECTION ANGLE:

pcc	80%			70%			50%			30%			10%			0
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
pfc	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Wall Exitance Coefficients(WEC)									
0.0																
1.0	.173	.098	.031	.166	.095	.030	.153	.088	.028	.142	.082	.026	.131	.076	.025	
2.0	.163	.089	.027	.158	.087	.027	.147	.082	.025	.137	.077	.024	.128	.073	.023	
3.0	.154	.082	.025	.149	.080	.024	.140	.076	.023	.132	.072	.022	.124	.069	.021	
4.0	.145	.076	.022	.141	.076	.022	.134	.071	.021	.127	.068	.021	.120	.065	.020	
5.0	.138	.070	.020	.134	.069	.020	.128	.066	.020	.121	.064	.019	.116	.062	.019	
6.0	.131	.066	.019	.128	.065	.019	.122	.062	.018	.116	.061	.018	.111	.059	.017	
7.0	.124	.062	.017	.122	.061	.017	.117	.059	.017	.112	.057	.017	.107	.056	.016	
8.0	.119	.058	.016	.116	.057	.016	.112	.056	.016	.108	.054	.016	.103	.053	.015	
9.0	.114	.055	.015	.111	.054	.015	.107	.053	.015	.103	.052	.015	.100	.051	.015	
10.0	.109	.052	.014	.107	.052	.014	.103	.051	.014	.100	.049	.014	.096	.049	.014	

pcc	80%			70%			50%			30%			10%			0
pw	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
pfc	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Ceiling Cavity Exitance Coefficients(CCEC)									
0.0	.191	.191	.191	.163	.163	.163	.111	.111	.111	.044	.044	.044	.020	.020	.020	
1.0	.171	.157	.145	.144	.135	.125	.100	.093	.086	.058	.054	.050	.018	.017	.016	
2.0	.155	.133	.114	.133	.114	.098	.091	.079	.069	.053	.046	.040	.017	.015	.013	
3.0	.142	.114	.091	.122	.098	.079	.084	.068	.055	.048	.040	.033	.016	.013	.011	
4.0	.131	.099	.076	.113	.085	.066	.077	.059	.045	.045	.035	.027	.014	.011	.009	
5.0	.122	.087	.061	.105	.075	.053	.072	.053	.037	.042	.031	.022	.013	.010	.007	
6.0	.114	.077	.051	.098	.067	.045	.068	.047	.031	.039	.028	.019	.013	.009	.006	
7.0	.107	.070	.043	.092	.060	.038	.064	.042	.027	.037	.025	.016	.012	.008	.005	
8.0	.101	.063	.037	.087	.055	.033	.060	.039	.023	.035	.023	.014	.011	.007	.005	
9.0	.096	.058	.032	.083	.050	.028	.057	.035	.020	.033	.021	.012	.011	.007	.004	
10.0	.091	.054	.028	.079	.047	.025	.055	.033	.018	.032	.019	.011	.010	.006	.003	

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-85000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:3.46lm [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 5 Of 11

Uncorrected UGR Table

NAME: Jointluck	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Jointluck	SUR.:	PROTECTION ANGLE:

ceiling/cavity	0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
walls	0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimensions	Viewed crosswise					Viewed endwise				
x = 2H y = 2H	2.5	3.4	2.7	3.5	3.7	1.2	2.0	1.4	2.2	2.4
3H	2.7	3.5	2.9	3.7	3.9	1.4	2.2	1.7	2.4	2.6
4H	2.8	3.5	3.0	3.7	4.0	1.5	2.3	1.8	2.5	2.7
6H	2.9	3.6	3.2	3.8	4.1	1.6	2.3	1.9	2.6	2.8
8H	2.9	3.6	3.2	3.8	4.1	1.6	2.3	1.9	2.5	2.8
12H	2.9	3.6	3.2	3.9	4.1	1.6	2.2	1.9	2.5	2.8
4H 2H	2.6	3.2	2.7	3.4	3.6	1.2	1.9	1.6	2.2	2.4
3H	2.7	3.4	3.0	3.6	3.9	1.5	2.2	1.8	2.5	2.7
4H	2.9	3.5	3.2	3.8	4.1	1.7	2.3	2.1	2.6	2.9
6H	3.0	3.6	3.4	3.9	4.3	1.9	2.4	2.3	2.8	3.1
8H	3.1	3.6	3.5	4.0	4.3	1.9	2.4	2.3	2.8	3.1
12H	3.2	3.6	3.6	4.0	4.4	1.9	2.4	2.3	2.7	3.1
8H 4H	2.8	3.3	3.2	3.7	4.1	1.8	2.3	2.1	2.6	3.0
6H	3.1	3.5	3.5	3.9	4.3	2.0	2.4	2.4	2.8	3.2
8H	3.2	3.6	3.7	4.0	4.4	2.1	2.4	2.5	2.8	3.3
12H	3.3	3.6	3.8	4.1	4.5	2.1	2.4	2.5	2.8	3.3
12H 4H	2.8	3.3	3.2	3.4	4.0	1.7	2.2	2.1	2.6	2.9
6H	3.1	3.4	3.5	3.9	4.3	2.0	2.3	2.4	2.8	3.2
8H	3.2	3.5	3.7	4.0	4.4	2.1	2.4	2.5	2.8	3.3

Variations with the observer position at spacings:		
S = 1.0H	+ 2.0 / - 2.1	+ 1.3 / - 1.9
1.5H	+ 2.4 / - 2.1	+ 2.3 / - 1.6
2.0H	+ 3.2 / - 1.5	+ 2.2 / - 1.3

CIE Pub.117 Corrected 370.3 lm Total Lamp Luminous Flux.(Blog(F/F0) = -3.5)

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:2.46lm [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 6 Of 11

UTILIZATION FACTORS TABLE

NAME: Jointech	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Jointech	SUR.:	PROTECTION ANGLE:

REFLECTANCE										
Ceiling	0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0
Walls	0.7	0.5	0.3	0.7	0.5	0.3	0.7	0.5	0.3	0
Working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0
ROOM INDEX	UTILIZATION FACTORS(PERCENT) k(RI) x RCR = 5									
k = 0.60	86	79	75	85	79	75	85	79	75	72
0.80	94	87	84	92	87	83	92	87	83	79
1.00	99	92	89	97	92	89	96	92	89	86
1.25	102	97	93	101	96	93	99	95	92	89
1.50	105	100	97	104	99	96	102	98	95	91
2.00	108	104	100	107	103	100	104	101	98	93
2.50	110	106	103	108	105	102	105	102	100	96
3.00	111	108	105	110	106	104	106	104	102	95
4.00	113	111	108	111	109	107	108	106	104	97
5.00	115	113	110	113	111	109	109	107	106	98
ROOM INDEX	UF(Total)									Direct
According to DIN EN 13032-2 2004				Suspended					SERROM = 1.25	

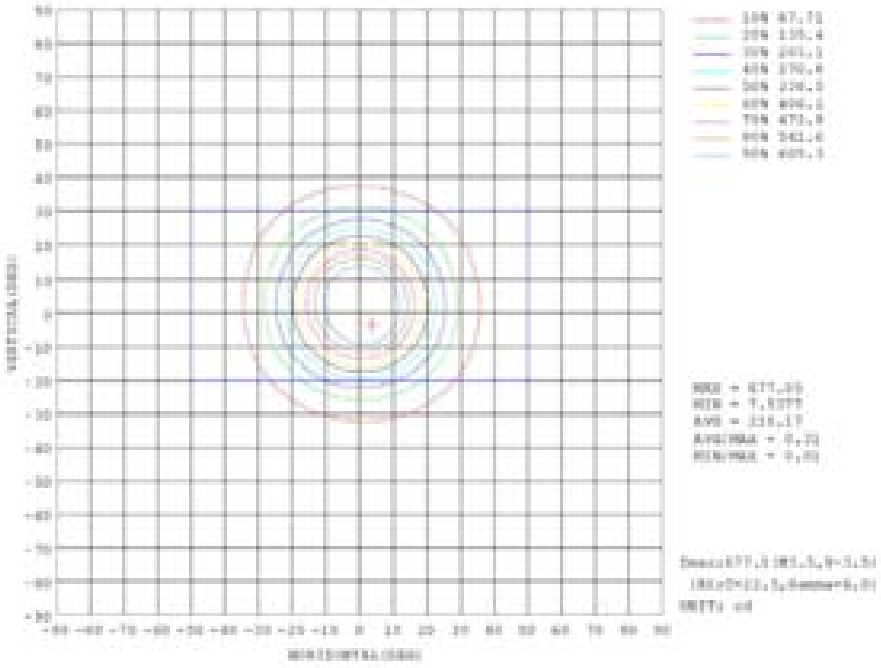
C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:2.46Lm [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 7 Of 11

ISOCANDELA DIAGRAM

NAME: Jinlook	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Jinlook	QTY.:	PROTECTION ANGLE:



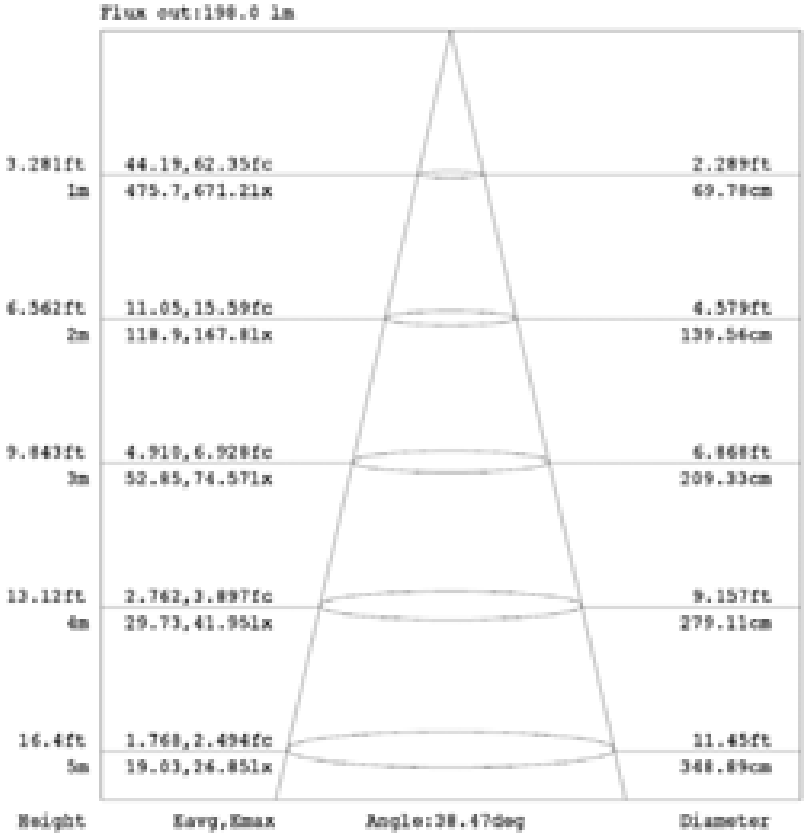
C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-RS000_V2 SYSTEM V2.0.369
Humidity:65.0%
Test Distance:2.44m [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 8 Of 11

AAI Figure

NAME: Jointlock	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Jointlock	POS.:	PROTECTION ANGLE:



Note:The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

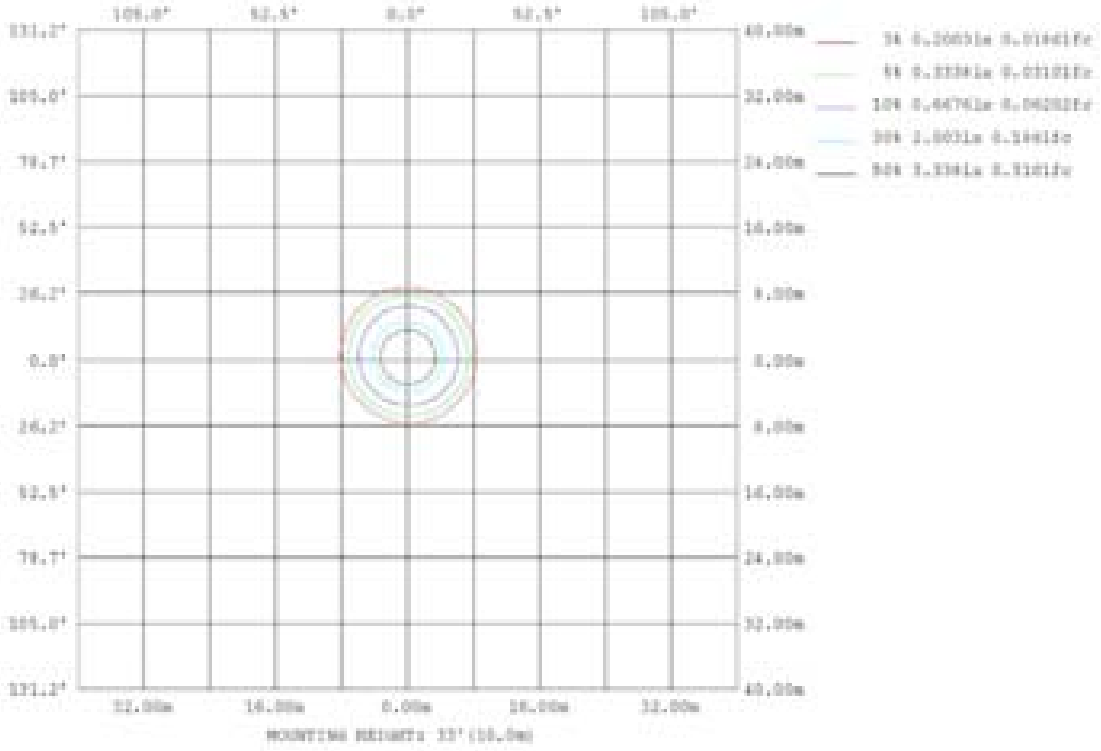
C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.269
Humidity:65.8%
Test Distance:2.46lm [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 9 Of 11

ISOLUX DIAGRAM

NAME: Joshlwh	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Joshlwh	DIM.:	PROTECTION ANGLE:

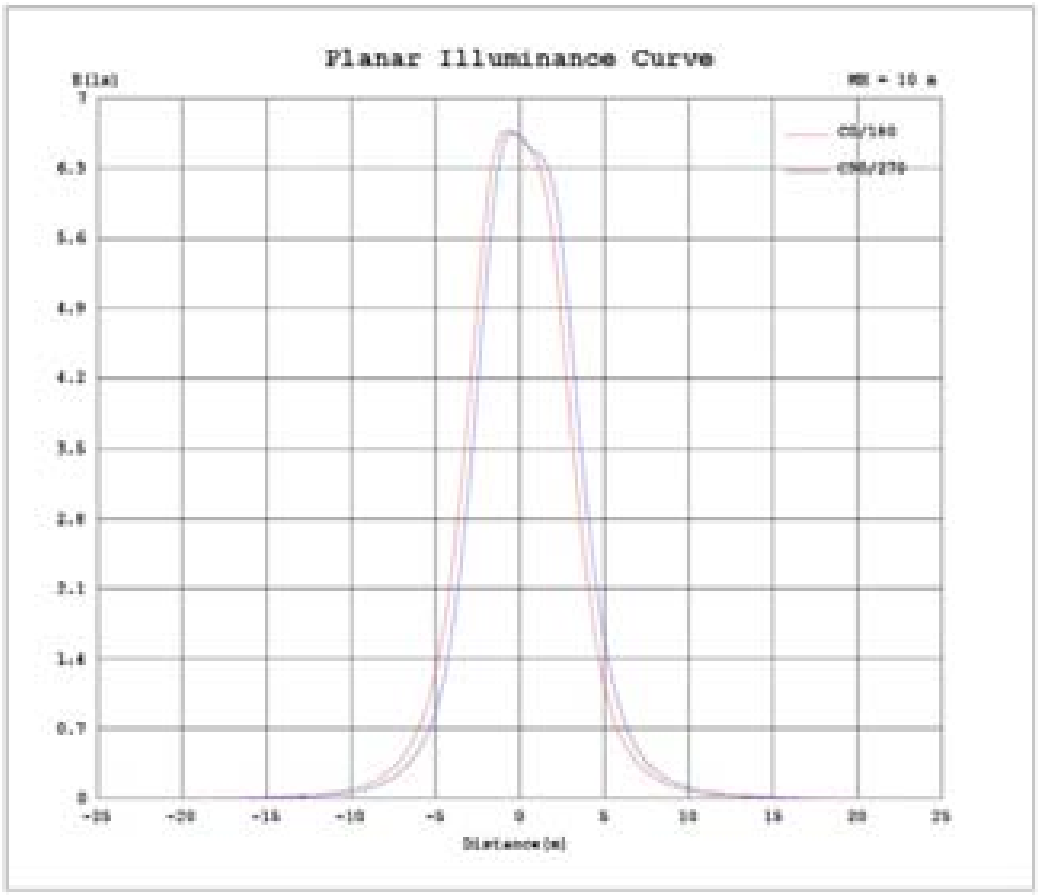


C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-B5000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:2.46m [K=1.0000]
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 10 Of 11

Planar Illuminance Curve



C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Jack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-A5000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:2.441m (K=1.0000)
Remarks:

EVERFINE GONIOPHOTOMETERS SYSTEM TEST REPORT Page 11 Of 11

LUMINOUS DISTRIBUTION INTENSITY DATA

NAME: Joinlook	TYPE:	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Joinlook	DIR.:	PROTECTION ANGLE:

Table=1 UNIT: cd

γ \ C(DEG) (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338			
0	681	681	681	681	681	681	681	681	681	681	681	681	681	681	681	681			
5	674	677	677	674	667	662	657	652	648	648	649	650	654	660	666	670			
10	649	639	618	602	585	586	583	598	612	631	644	650	655	662	664	657			
15	512	485	453	438	420	424	426	454	485	521	555	571	582	582	571	537			
20	348	320	291	272	259	263	269	297	326	362	394	407	418	416	405	371			
25	209	194	171	156	147	153	157	171	191	218	245	255	265	262	256	228			
30	122	111	98.6	90.2	84.6	83.6	88.4	96.1	109	124	143	146	154	150	149	131			
35	72.8	65.5	58.7	54.2	50.6	48.8	51.6	56.6	63.6	71.5	80.7	84.1	87.6	85.5	83.7	77.4			
40	42.8	37.6	33.0	31.6	29.4	27.8	29.1	33.4	37.7	41.1	46.5	51.2	51.6	49.5	47.4	46.1			
45	24.7	21.2	18.7	18.4	17.0	15.9	16.3	19.4	22.0	23.2	26.1	29.0	29.6	27.3	26.5	26.5			
50	14.6	12.6	11.2	11.2	10.4	9.61	9.82	11.9	13.3	13.6	16.0	16.8	17.1	15.5	15.1	15.4			
55	9.04	7.78	7.13	7.25	6.78	6.33	6.50	7.54	8.29	8.33	8.99	10.2	10.6	9.36	9.21	9.44			
60	6.00	5.25	4.91	4.99	4.75	4.49	4.52	5.16	5.58	5.60	5.93	6.63	6.80	6.21	6.10	6.22			
65	4.15	3.74	3.53	3.57	3.45	3.32	3.31	3.70	3.99	4.02	4.21	4.60	4.76	4.40	4.34	4.30			
70	2.97	2.73	2.58	2.57	2.50	2.44	2.43	2.67	2.90	2.97	3.10	3.32	3.43	3.27	3.20	3.10			
75	2.12	1.97	1.83	1.80	1.74	1.70	1.71	1.88	2.06	2.16	2.27	2.39	2.47	2.40	2.34	2.22			
80	1.40	1.27	1.12	1.08	1.00	1.00	1.03	1.18	1.35	1.46	1.58	1.66	1.71	1.67	1.64	1.51			
85	0.71	0.57	0.43	0.35	0.28	0.31	0.35	0.47	0.65	0.76	0.90	0.98	1.01	1.00	0.96	0.81			
90	0.05	0.03	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.10	0.23	0.30	0.35	0.33	0.27	0.15			
95	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.01	0.01			
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
160	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
165	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
170	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01			
175	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.1DEG
Operators:Zack
Test Date:2011-12-06

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-B5000_V2 SYSTEM V2.0.269
Humidity:65.0%
Test Distance:2.461m [K=1.0000]
Remarks:

Attachment C–Color Spatial Uniformity

C0 /180										
Gamma\C	I(cd)	CIE x	CIE y	CIE u'	CIE v'	CCT(K)	Ra	dEuv(NBS)	du'v'	Ip
-20	317.61	0.4293	0.3974	0.2485	0.5176	3078	83.3	2.70	0.0011	7946
-15	477.11	0.4307	0.3978	0.2492	0.5179	3056	83.3	3.07	0.0004	11915
-10	618.69	0.4308	0.3972	0.2496	0.5177	3049	83.3	2.88	0.0000	15816
-5	654.05	0.4294	0.3956	0.2494	0.5169	3060	83.4	1.77	0.0008	17374
0	642.23	0.4272	0.3931	0.2490	0.5155	3079	83.7	0.00	0.0022	17125
5	629.35	0.4287	0.3943	0.2494	0.5162	3063	83.4	1.03	0.0015	16722
10	600.90	0.4323	0.3978	0.2503	0.5182	3027	83.2	3.77	0.0009	16200
15	488.06	0.4327	0.3987	0.2502	0.5186	3028	83.1	4.22	0.0011	13735
20	333.42	0.4317	0.3986	0.2495	0.5184	3045	83.2	3.77	0.0008	9768

C90/270										
Gamma\C	I(cd)	CIE x	CIE y	CIE u'	CIE v'	CCT(K)	Ra	dEuv(NBS)	du'v'	Ip
-20	387.26	0.4298	0.3969	0.2490	0.5175	3066	83.3	2.46	0.0006	9716
-15	548.53	0.4303	0.3968	0.2494	0.5175	3055	83.3	2.57	0.0002	13757
-10	631.67	0.4297	0.3958	0.2494	0.5170	3057	83.4	1.95	0.0007	16507
-5	634.77	0.4270	0.3931	0.2488	0.5155	3084	83.6	0.21	0.0023	16842
0	638.66	0.4263	0.3924	0.2487	0.5151	3089	83.6	0.66	0.0027	17005
5	647.75	0.4299	0.3958	0.2496	0.5170	3053	83.4	2.07	0.0006	17410
10	582.71	0.4329	0.3988	0.2502	0.5187	3026	83.1	4.29	0.0012	16284
15	425.53	0.4324	0.3991	0.2498	0.5187	3038	83.1	4.19	0.0011	12376
20	266.13	0.4315	0.3992	0.2492	0.5186	3053	83.1	3.96	0.0010	8035

Weighted Average Point	
u'	v'
0.2496	0.5177

Attachment D– EUT PHOTO

D1.EUT PHOTO

D2.EUT PHOTO