



TEST REPORT

For

Beyond LED Technology

1939 Parker Court, Stone Mountain, GA 30087

Model Number:	MRS4-20/30/40/D10/U/35-40-50	
Report Type:	Electrical, Photometric and ISTMT tests according to the following standards and show the compliance to DLC Program SSL Technical Requirements V5.1	
Standards:	IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting ANSI/UL 1598-2008: Standard for Safety of Luminaires CIE 190:2010 Calculation and presentation of unified glare rating tables for indoor lighting luminaires IES TM-30-18: IES Method for Evaluating Light Source Color Rendition	
Project Engineer:	George Yang	
Report Number:	RKS210506002-10	
Sample Size:	One sample was received on 2021-05-06 and used for testing.	
Test Date:	2021-05-10 to 2021-05-15	
Report Date:	2021-05-25	
Reviewed By:	Seven Xia/ EE Engineer	
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax: +86-0512-88934268	

1. Product Information and Description[#]

Product Primary Use: Direct Linear Ambient Luminaires
 Voltage and Frequency: 120-277VAC, 50/60Hz
 LED Source Manufacturer: Lumileds Holding B.V.
 LED Source Model: L128-xx80RA35000Q1
 Luminaire length: 4ft
 Auxiliary Ballast Model: NA
 Auxiliary Housing Model: NA
 White Tunable: Yes
 Field-Adjustable Light Output: Yes

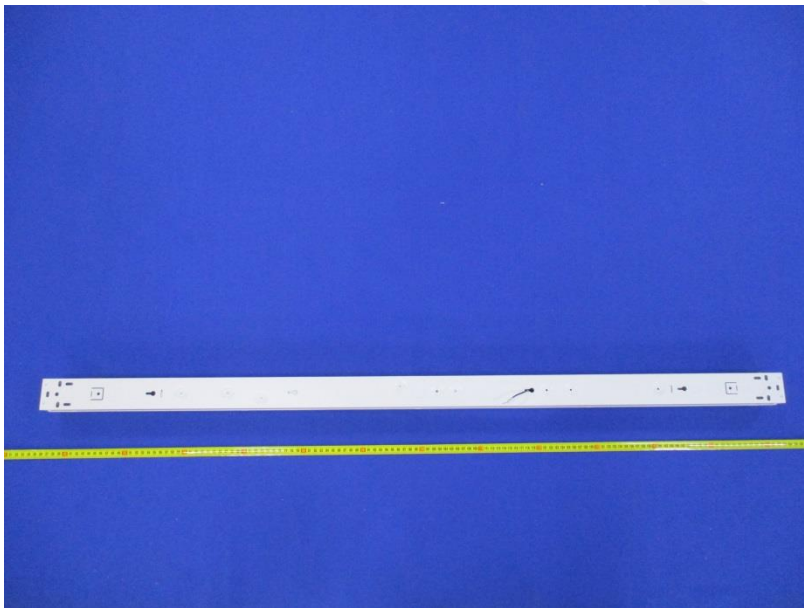
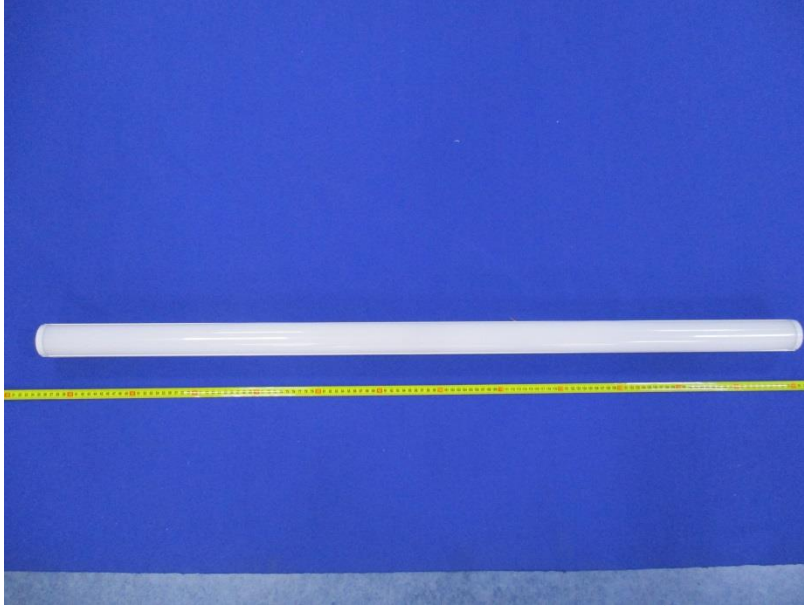
2. Product Rated Values[#]

Test Model	CCT(K)	Light Output (lm)	Power(W)	Luminous Efficacy (lm/W)
MRS4-20/30/40/D10/U/35-40-50	3500	4672	40	116.8
		3600	30	120
		2440	20	122
	4000	5120	40	128
		3930	30	131
		2660	20	133
	5000	4760	40	119
		3660	30	122
		2480	20	124

3. Test List

Test Model	CCT(K)	Power(W)	Test Item			
			Goniophotometer Test	Integrating Sphere Test	THDi and PF Test	In-Situ Temperature Measurement Test
MRS4-20/30/40/D10/U/35-40-50	3500	40	Yes	Yes	Yes	Yes

4. Product Photo



5. Test Result

Control Setting: 3500K/40W

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4742.84	≥1500	≥1350	Pass
Power(W)	40.49	None.	None.	N/A
Total Efficacy(lm/W)	117.13	≥115	≥111.55	Pass
CCT(K)	3376	3220~3710	No tolerances	Pass
Duv	-0.00027	-0.0055~0.0065	No tolerances	Pass
IES R _f	84	70	69	Pass
IES R _g	96	89	88	
IES Rcs,h1	-12%	-12%~23%	-13%~24%	
R _a	82.7	≥80	≥79	
R ₉	11	≥0	≥-1	

Goniophotometer Test; Orientation: Downward; Test Voltage: 120V 60Hz;

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4725.1	≥1500	≥1350	Pass
Power(W)	40.31	None.	None.	N/A
Total Efficacy(lm/W)	117.27	≥115	≥111.55	Pass
Zonal Lumen Distribution(0-60°)	63.59%	0-60°≥40%	0-60°≥37%	Pass

Goniophotometer THDi, PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9981	≥0.9	≥0.87	Pass
120	THDi	4.76%	≤20%	≤25%	Pass
277	Power Factor	0.9648	≥0.9	≥0.87	Pass
277	THDi	8.53%	≤20%	≤25%	Pass

Integrating Sphere THDi, PF Test; Orientation: Downward;

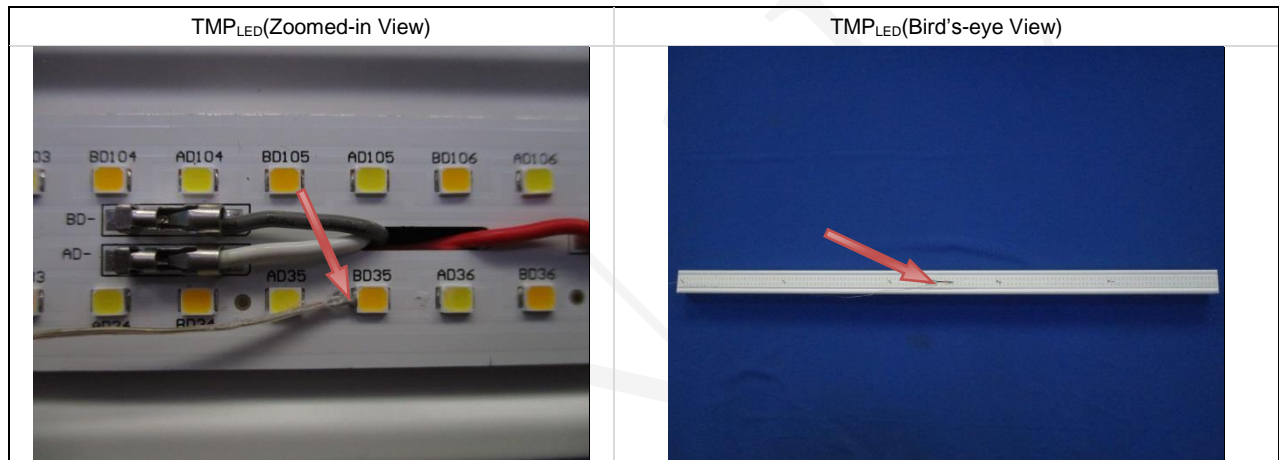
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9955	≥0.9	≥0.87	Pass
120	THDi	4.97%	≤20%	≤25%	Pass
277	Power Factor	0.9567	≥0.9	≥0.87	Pass
277	THDi	8.42%	≤20%	≤25%	Pass

In-Situ Temperature Measurement Test: Test Voltage: 120V 60Hz;

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
TMP _{LED} (°C)	53.2	≤115	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
Drive Current/Individual LED source(mA)	88.7	≤150	With +5% tolerance	Pass
L ₇₀ Lumen Maintenance Life (Hours)	>54000	≥50000	None.	Pass
Color Maintenance	0.002	≤0.004	≤0.0044	Pass

Note:

1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.



Test Data

[Integrating Sphere System]

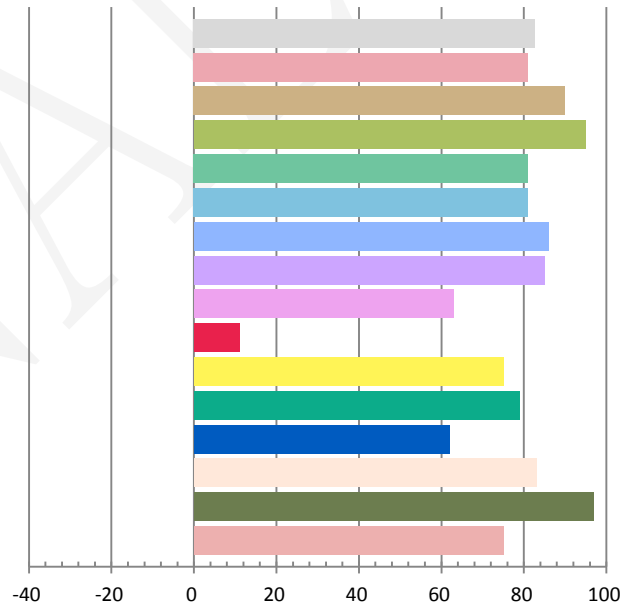
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.3387	40.49	0.9956	4742.84	117.13

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.257	3376	-0.00027	0.4122	0.3934	0.2391	0.5134

Color Rendering Index

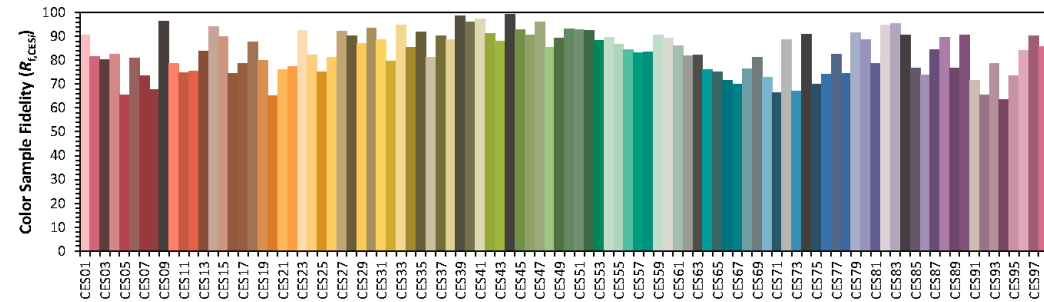
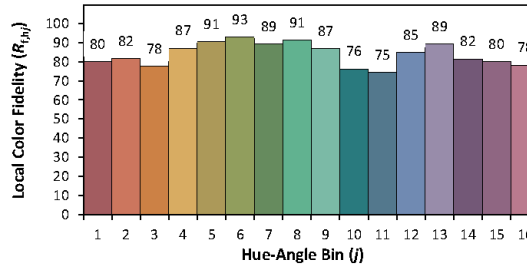
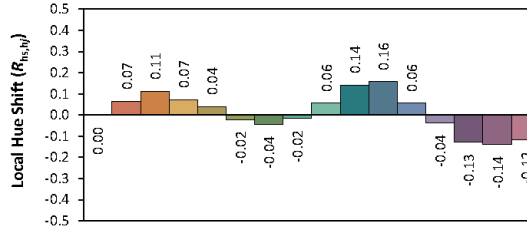
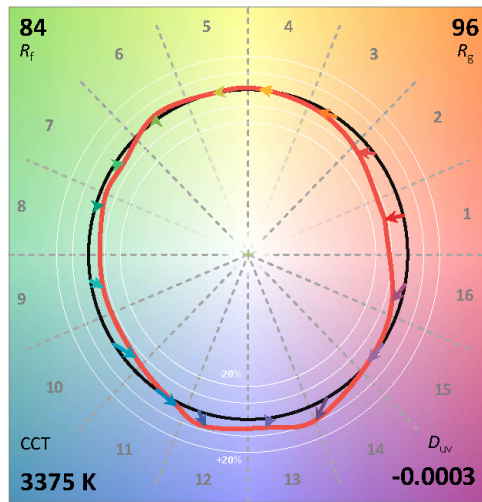
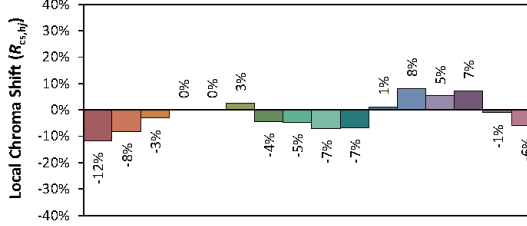
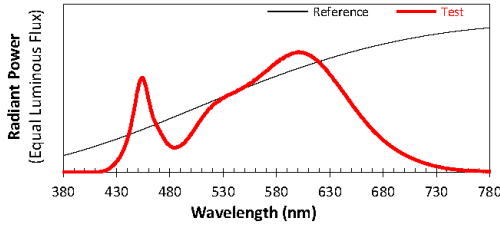
Ra			
82.7			
R1	R2	R3	R4
81	90	95	81
R5	R6	R7	R8
81	86	85	63
R9	R10	R11	R12
11	75	79	62
R13	R14	R15	
83	97	75	



ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD
Date: 2021/5/11

Manufacturer: SHANGHAI HONGBAO LIGHTING CO LTD
Model: MRS4-20/30/40/D10/U/35-40-50



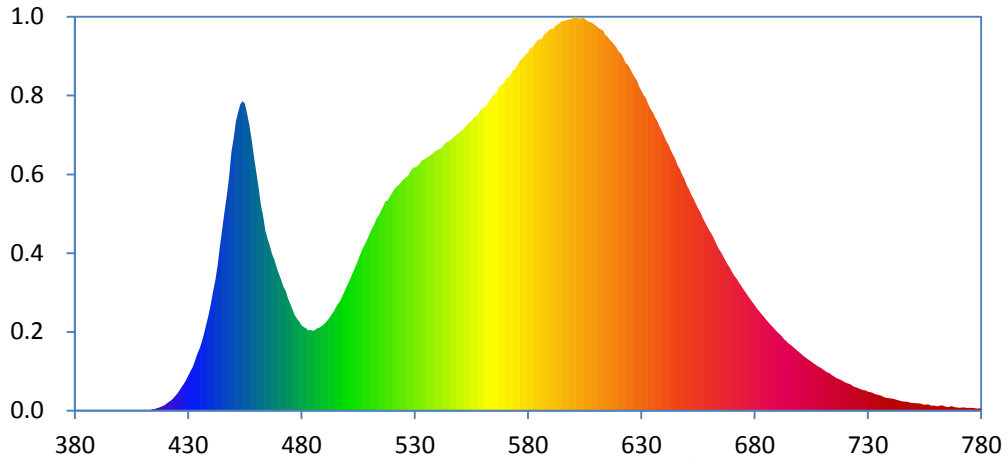
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.4122
 y 0.3934
 u' 0.2391
 v' 0.5134

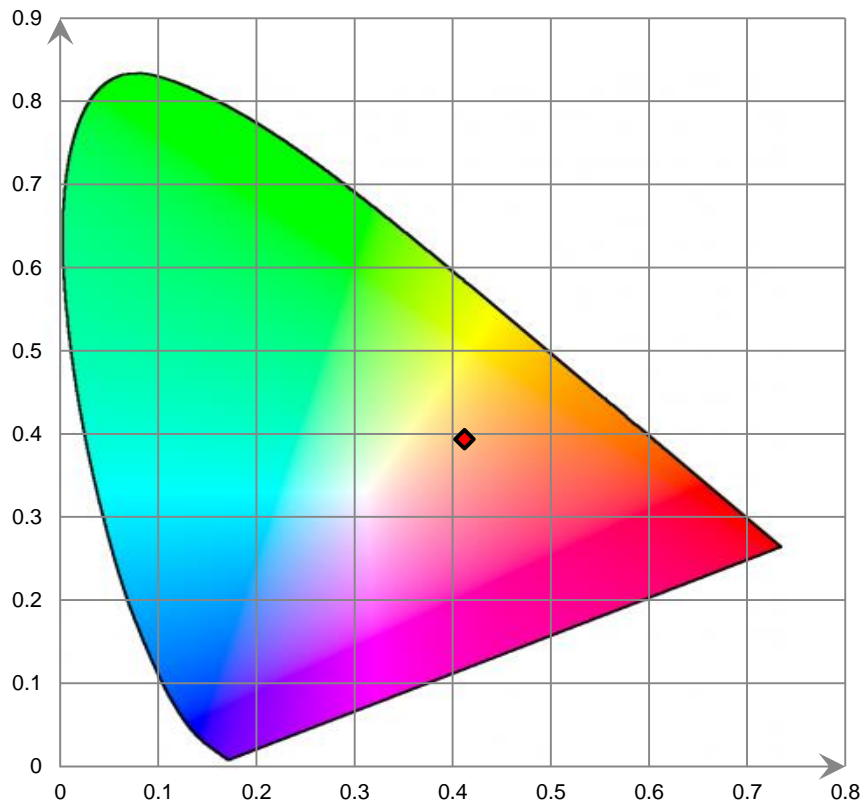
CIE 13.3-1995
(CRI)
 R_a 83
 R_0 11

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

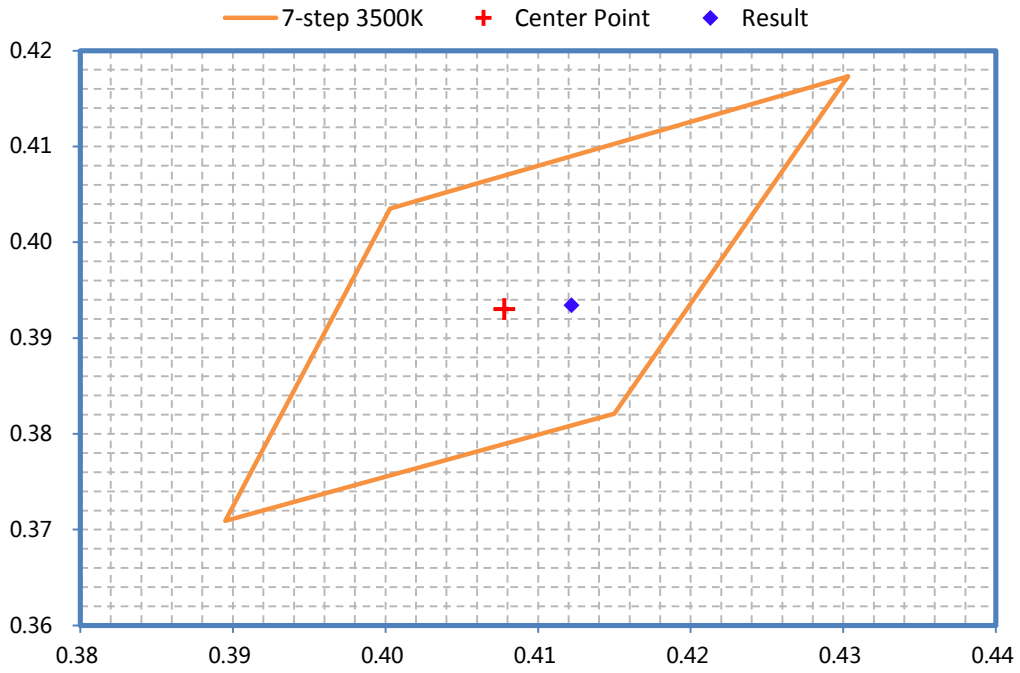
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

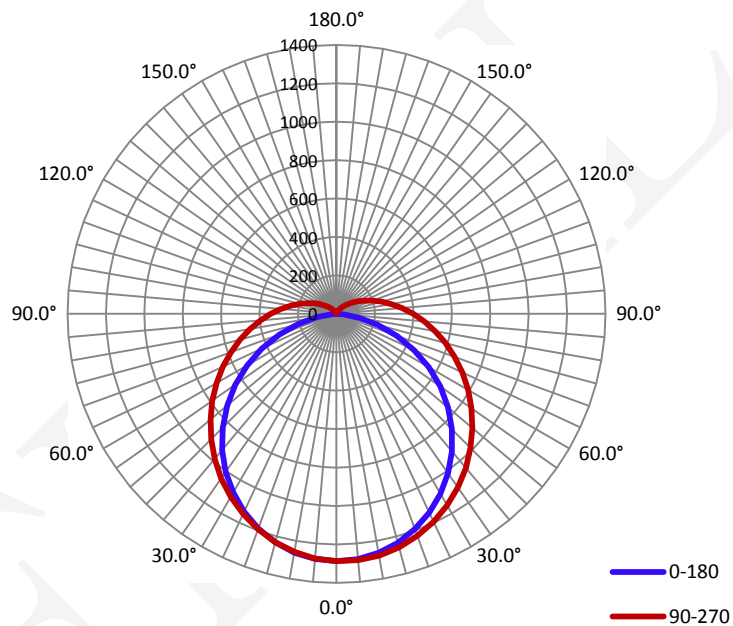
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.337	40.31	0.997

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4725.1	117.27	1287.3	1.24	1.30

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	110.7	120.8	136.4	121.3	122.3
Field Angle (10% I _{max}):	158.5	204.8	235.4	205.9	201.2

Luminous Intensity (cd) Distribution Data

$\frac{C}{Y}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1287.3	1287.3	1287.3	1287.3	1287.3	1287.3	1287.3	1287.3
5.0°	1281.6	1283.1	1284.1	1286.0	1286.8	1286.3	1285.6	1284.2
10.0°	1263.7	1267.6	1270.3	1275.3	1277.6	1276.7	1272.6	1269.1
15.0°	1234.6	1241.1	1245.9	1254.1	1258.1	1256.8	1248.1	1242.5
20.0°	1193.2	1204.6	1212.9	1223.8	1230.2	1227.0	1213.1	1205.2
25.0°	1142.3	1156.5	1170.1	1185.0	1194.9	1189.1	1168.7	1157.6
30.0°	1082.2	1098.4	1118.8	1138.6	1151.5	1143.8	1117.3	1100.3
35.0°	1012.4	1031.9	1058.3	1083.9	1102.0	1092.1	1057.9	1032.8
40.0°	935.6	957.4	990.5	1023.7	1047.5	1033.8	991.2	958.5
45.0°	848.6	877.5	917.6	961.1	987.3	970.6	920.3	875.1
50.0°	757.5	790.9	840.0	894.3	924.1	902.1	844.2	789.5
55.0°	659.5	699.0	758.4	826.6	856.6	829.3	765.9	697.3
60.0°	554.5	602.5	676.5	753.6	791.2	759.2	683.5	601.6
65.0°	446.5	505.1	595.5	682.0	723.1	688.2	602.9	502.8
70.0°	333.7	406.8	515.6	610.3	653.4	615.7	524.3	407.8
75.0°	223.8	315.4	438.6	539.9	586.6	546.5	447.4	316.7
80.0°	121.2	232.7	369.0	473.8	521.7	477.5	375.2	234.1
85.0°	37.8	161.2	306.1	409.0	458.5	412.1	310.3	163.1
90.0°	0.0	108.1	248.4	350.1	398.7	350.9	250.9	110.0
95.0°	0.0	71.9	202.4	300.0	342.3	300.3	204.2	73.2
100.0°	0.0	47.5	162.2	253.4	290.6	252.6	163.1	49.0
105.0°	0.0	31.2	127.7	211.1	243.3	210.0	128.3	32.7
110.0°	0.0	21.7	100.0	172.4	201.1	171.8	100.1	22.5
115.0°	0.0	15.4	77.2	138.4	163.0	137.8	77.0	15.5
120.0°	0.0	11.0	58.1	109.9	130.6	108.9	58.5	11.1
125.0°	0.0	7.6	43.8	85.0	102.4	85.0	43.9	7.9
130.0°	0.0	5.6	33.2	65.2	78.5	64.7	33.3	5.3
135.0°	0.0	4.0	25.3	48.8	58.5	48.1	24.0	3.7
140.0°	0.0	2.7	18.6	36.5	42.9	34.7	16.4	2.7
145.0°	0.6	3.3	14.3	26.3	30.5	23.1	10.4	2.5
150.0°	1.4	3.1	10.4	18.7	20.5	15.4	6.5	2.8
155.0°	2.2	3.5	7.6	12.0	13.0	9.1	4.7	2.9
160.0°	2.3	2.7	5.7	7.6	7.8	5.3	3.5	2.9
165.0°	2.8	3.6	5.0	4.7	5.0	4.2	3.7	3.2
170.0°	3.2	3.5	3.8	4.1	3.6	3.0	3.7	3.4
175.0°	3.3	3.4	4.4	4.0	4.5	4.3	4.1	3.6
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1287.3	1287.3	1287.3	1287.3	1287.3	1287.3	1287.3	1287.3
5.0°	1280.8	1280.0	1279.7	1278.6	1278.0	1278.3	1278.3	1279.3
10.0°	1262.2	1261.0	1259.7	1259.3	1258.6	1258.7	1257.3	1259.8
15.0°	1231.5	1230.4	1229.0	1230.0	1230.0	1228.8	1225.7	1229.2
20.0°	1189.5	1188.8	1187.4	1191.7	1192.5	1190.8	1184.1	1186.7
25.0°	1136.4	1136.8	1136.3	1146.4	1149.6	1145.8	1132.9	1134.9
30.0°	1074.7	1074.3	1078.6	1093.8	1100.3	1094.2	1075.4	1072.2
35.0°	1004.7	1003.7	1013.4	1034.4	1045.9	1036.7	1009.4	1001.1
40.0°	924.9	925.0	943.3	970.0	986.6	972.6	938.3	922.5
45.0°	837.4	839.9	867.5	901.6	922.2	902.9	864.2	837.4
50.0°	742.8	752.9	788.7	829.2	854.4	831.0	786.7	749.2
55.0°	643.1	660.1	707.0	758.8	789.0	762.1	707.0	656.4
60.0°	537.8	563.3	623.0	685.8	720.4	690.5	624.9	560.8
65.0°	428.3	465.1	541.2	613.2	652.4	619.0	546.0	465.7
70.0°	315.5	367.3	462.3	543.7	584.5	545.9	468.2	371.1
75.0°	205.5	277.7	387.7	476.3	519.1	475.7	395.4	283.4
80.0°	105.5	199.1	318.9	408.9	456.8	410.0	326.5	205.7
85.0°	28.9	132.6	258.0	349.7	397.4	352.4	263.0	140.6
90.0°	0.0	83.1	207.0	297.8	342.2	301.1	214.4	93.2
95.0°	0.0	53.3	163.4	247.4	290.6	251.8	169.7	61.3
100.0°	0.0	33.6	128.7	205.4	242.6	209.2	134.4	40.0
105.0°	0.0	21.6	99.0	168.5	200.5	172.9	104.5	26.4
110.0°	0.0	13.5	74.8	137.2	162.5	138.8	79.9	17.3
115.0°	0.0	9.2	55.7	106.7	129.3	109.8	60.3	11.6
120.0°	0.0	5.2	40.8	82.7	101.0	85.0	44.6	7.2
125.0°	0.0	3.0	30.0	62.4	77.5	64.6	32.8	4.4
130.0°	0.0	1.2	21.1	46.0	57.6	48.0	23.3	2.7
135.0°	0.0	0.8	14.6	33.0	41.5	34.3	16.3	2.2
140.0°	0.0	0.8	9.6	22.9	29.1	23.8	11.2	1.7
145.0°	0.0	0.9	5.8	14.8	19.6	15.8	7.1	1.5
150.0°	0.7	1.0	4.0	9.3	12.1	9.7	4.4	2.2
155.0°	0.9	1.6	3.8	5.5	7.1	6.2	3.9	2.6
160.0°	2.1	2.1	3.3	4.5	4.5	4.5	3.9	2.8
165.0°	2.6	2.8	3.1	3.9	4.2	4.2	3.8	3.5
170.0°	2.8	3.0	3.5	4.0	4.0	4.2	4.1	4.2
175.0°	3.3	3.5	3.7	4.0	3.8	4.1	4.1	3.8
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

6. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2020-12-23	2021-12-22
Power Meter	INVENTFINE	WT500	GSJWQ20009	2021-03-16	2022-03-15
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2020-12-23	2021-12-22
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2020-11-25	2021-11-24
Standard Light Source	INVENTFINE	N/A	JWWCR020105	2020-10-20	2021-10-19
Thermal Meter	ANYMETRE	TH-20E	N/A	2020-11-30	2021-11-29
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2020-11-25	2021-11-24
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2020-11-25	2021-11-24
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2020-11-25	2021-11-24
Power Meter	INVENTFINE	WT500	GSDSQ200007	2021-03-16	2022-03-15
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2020-12-23	2021-12-22
Wireless Weather Station	ZHONGXING	KG218	N/A	2020-11-27	2021-11-26
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2020-12-23	2022-12-22
Digital Multimeter	FLUKE	115C	37840512WS	2020-10-08	2021-10-07
Hybrid Recorder	YOKOGAWA	DR230	47JH0903	2020-11-25	2021-11-24
Power Supply	SC	SC/BP-11003	1608110030553	2020-11-25	2021-11-24

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

7. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%. The product was operated in its intended orientation in application during all testing.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement. 4π geometry was used during measurement.

Goniophotometer System

Type C goniophotometer was used for measuring luminous intensity distribution. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

ISTMT Test

The LED which has the highest temperature was measured at the location of LED case which is specified by LED source manufacturer and detailed by LM-80 report. The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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*****END OF REPORT*****