TESTING
NVLAP LAB CODE 600149-0

Ningbo TengLi Testing Co., Ltd

2nd floor, Block B, Ningbo Testing and Certification Base, No. 66
Qingyi Road, Ningbo National Hi-Tech Zone, Ningbo, Zhejiang
Tel: 86574-8783 6802
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LM-79-08 Test Report

For

Espen Technology, Inc.

(Brand Name: Espen)

12257 FLORENCE AVE SANTA FE SPRINGS, CA 90670 USA

Model name(s): L24T8/850/8G-XT 2C N

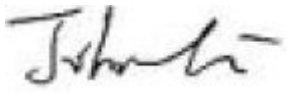
Report Type:	Testing and Report According to IES LM-79-2008
Type of Luminaire:	2-lamp External Driver Lamp-Style Retrofit Kits (UL Type C)
Report Date:	2018-10-15
Prepared By:	Ningbo TengLi Testing Co., Ltd 2nd floor, Block B, Ningbo Testing and Certification Base, No. 66 Qingyi Road, Ningbo National Hi-Tech Zone, Ningbo, Zhejiang

Test & Report By:

Johnson Sun

Engineer: Johnson Sun

Review By:



Manager: John Li

Note: 1. The results contained in this report pertain only to the tested samples

2. This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

1.1 Product Information:		
Model Number	L24T8/850/8G-XT 2C N	
Remark	N/A	
Representative (Tested) Model	L24T8/850/8G-XT 2C N	
Model Difference	All construction and rating are the same, except model name.	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2-lamp External Driver Lamp-Style Retrofit Kits (UL Type C)	
LED Manufacturer	Lumileds Holding B.V.	
LED Model	L128-3080RA35000Q1	
Dimming	N/A	
Sample Number	STD180968NB-B3, 8	
Date of Receipt	Sep.30, 2018	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

1.2 Rated Values:	
Rated Voltage / Frequency	120-277Vac, 50/60 Hz
Nominal Power	10W
Rated Initial Lamp Lumen	--
Declared CCT	5000K

1.3 Test Specifications:

Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2015 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.4 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method: Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25° C ± 1° 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 or rated 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° horizontal intervals.
2) Chromaticity Measurement – Sphere-Spectroradiometer Method: Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.
3) Electrical Measurements: Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25º C ± 1º C. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Summary of Test Result

Criteria Item	Measured Value			Compliance	Requirement (DLC V4.3)
Power(W)	5000K Bare Lamp	120V	10.44	N/A	N/A
		277V	10.53		
	5000K In Luminaire	120V	20.57		
		277V	20.69		
Power Factor	5000K Bare Lamp	120V	0.9919	Pass	>= 0.9(-3%)
		277V	0.8942		
	5000K In Luminaire	120V	0.9937		
		277V	0.8941		
THD %	5000K Bare Lamp	120V	4.78	Pass	<= 20(+5)
		277V	20.06		
	5000K In Luminaire	120V	4.78		
		277V	20.20		
CRI	5000K Bare Lamp		85.0	Pass	>= 80(-2)
	5000K In Luminaire		85.2		
CCT (K)	5000K Bare Lamp		4952	Pass	<=5000K
	5000K In Luminaire		4983		
Luminous Intensity Distribution	Zonal lumens in the 0-60°:		84.2	Pass	>= 75(-2)
	SC: 0-180° (if applicable):		1.32	Pass	1.0-2.0(±0.1)
	SC: 90-270° (if applicable):		1.17	Pass	
Total Luminous	5000K Bare Lamp	120V	1324	Pass	>=800(-10%)
		277V	1323		
	5000K In Luminaire	120V	2121.9		>=1350(-10%)
		277V	2120.9		
Luminous Efficacy	5000K Bare Lamp	120V	126.82	Pass	Standard: >= 110(-3%)
		277V	125.64		
	5000K In Luminaire	120V	103.16		Standard: >= 100(-3%)
		277V	102.51		

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2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2018-09-30	**Test Ambient:**	25.2 º C
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	L24T8/850/8G-XT 2C N		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD180968	120.0	60	0.0877	10.44	0.9919	4.78
NB-B3	277.0	60	0.0425	10.53	0.8942	20.06

Chromaticity Measurement - Sphere-Spectroradiometer Method:

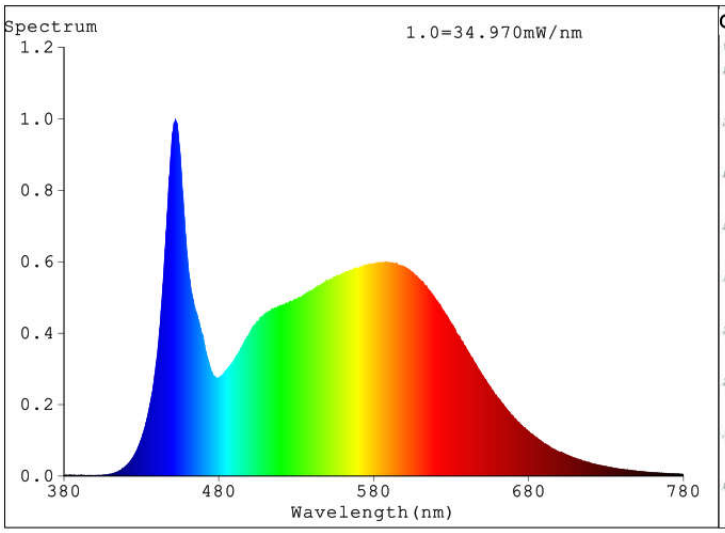
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4952
Duv	0.0021
Chromaticity (x, y)	x=0.3469 y=0.3572
Chromaticity (u', v')	u'=0.2105 v'=0.4877
Color Rendering Index (CRI)	85.0
R9	15

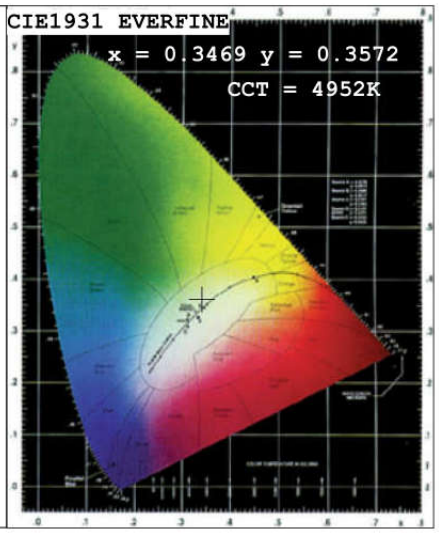
Special Color Rendering Indices			
R1	83	R9	15
R2	91	R10	79
R3	96	R11	82
R4	83	R12	61
R5	83	R13	86
R6	87	R14	98
R7	88	R15	78
R8	69	--	--

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	1342	1323
Luminous Efficacy (lm/W)	128.54	125.64
Worst Luminous/Highest Watts	125.64	

Spectral Power Distribution & Chromaticity Diagram





2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-10-08	Test Ambient:	25.2 º C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	L24T8/850/8G-XT 2C N		

Electrical Measurement for 2-lamp in Lithonia 2GT8 lensed 2x2:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD180968	120.0	60	0.1725	20.57	0.9937	4.78
NB-B3, 8	277.0	60	0.0835	20.69	0.8941	20.20

Chromaticity Measurement - Sphere-Spectroradiometer Method for 2-lamp in Lithonia 2GT8 lensed 2x2:

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4983
Duv	0.0015
Chromaticity (x, y)	x=0.3459 y=0.3553
Chromaticity (u', v')	u'=0.2105 v'=0.4866
Color Rendering Index (CRI)	85.2
R9	16

Special Color Rendering Indices			
R1	84	R9	16
R2	92	R10	80
R3	96	R11	82
R4	82	R12	61
R5	84	R13	86
R6	87	R14	98
R7	87	R15	78
R8	69	--	--

Photometric Measurement – Goniophotometer Method for 2-lamp in Lithonia 2GT8 lensed 2x2:

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2121.9	2120.9
Luminous Efficacy (lm/W)	103.16	102.51
Worst Luminous/Highest Watts	102.51	
Zonal lumens in the 0-60° zone (%)	84.2	--
SC: 0-180° (if applicable)	1.32	--
SC: 90-270° (if applicable)	1.17	--
Beam Angle (°)	100.6	--
Center Beam Candle Power (cd)	854	--

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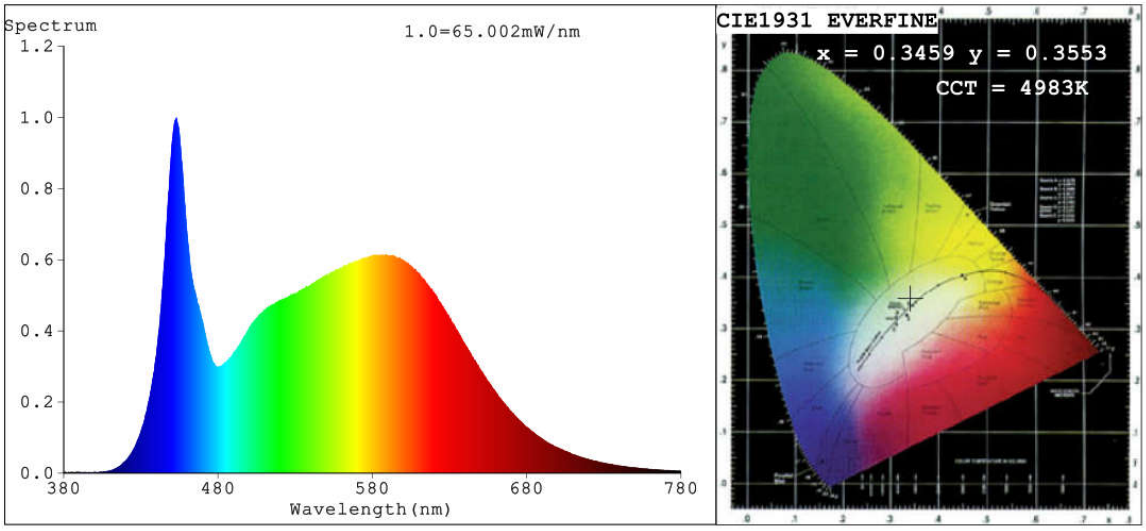
Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

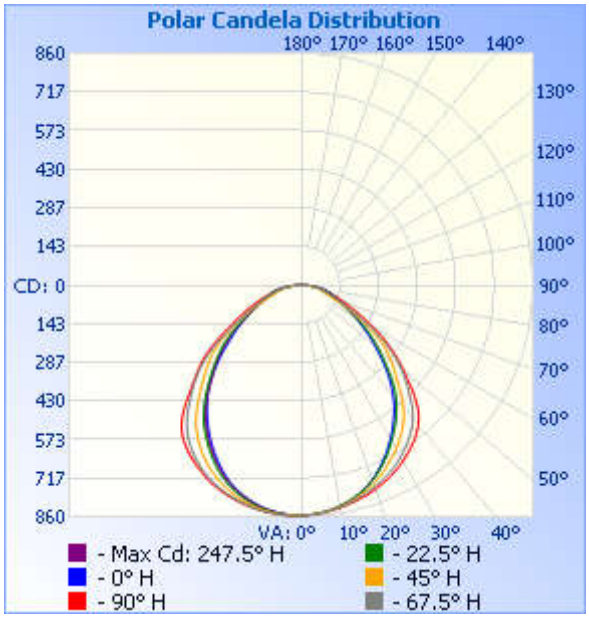
Zonal Lumen Summary

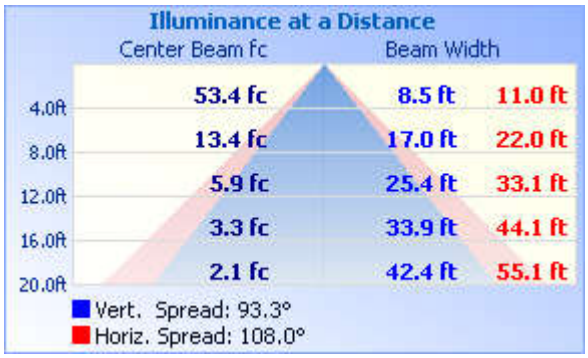
Zone	Lumens	% Luminaire
0-30	661.1	31.2%
0-40	1,075.0	50.7%
0-60	1,787.4	84.2%
60-90	326.8	15.4%
70-100	142.9	6.7%
90-120	3.2	0.2%
0-90	2,114.2	99.7%
90-180	7.4	0.3%
0-180	2,121.6	100%

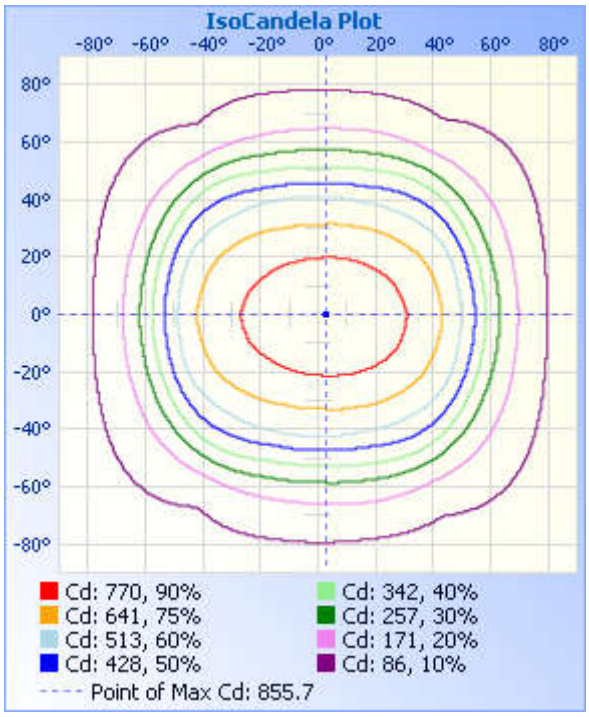
Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	80.8	3.8%	90-100	0.6	0%
10-20	231.4	10.9%	100-110	1.2	0.1%
20-30	348.9	16.4%	110-120	1.3	0.1%
30-40	413.8	19.5%	120-130	1.2	0.1%
40-50	400.1	18.9%	130-140	1.1	0.1%
50-60	312.3	14.7%	140-150	0.9	0%
60-70	184.5	8.7%	150-160	0.5	0%
70-80	105.5	5.0%	160-170	0.3	0%
80-90	36.7	1.7%	170-180	0.1	0%

Photometric Data







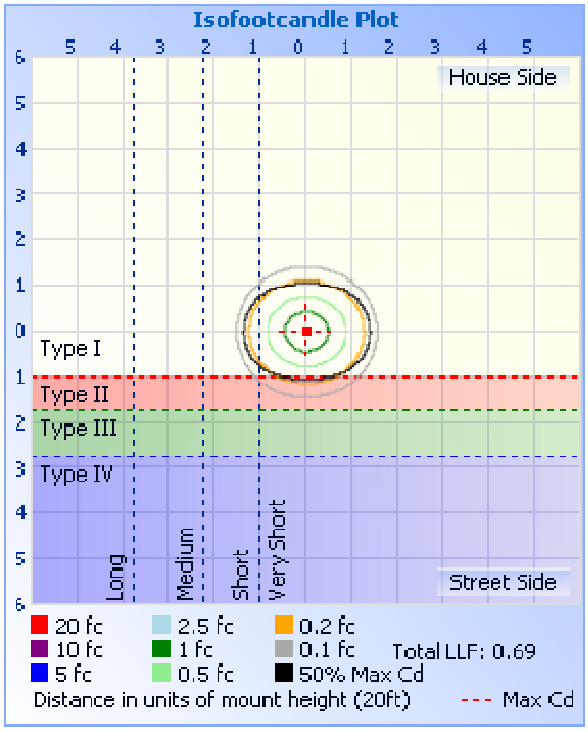


Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	854	854	854	854	854	854	854	854	854	854	854	854	854	854	854	854
5	855	855	853	851	849	848	848	848	849	848	849	849	850	852	854	855
10	849	848	843	838	833	832	834	836	838	837	835	835	836	840	845	849
15	839	834	824	814	807	807	813	819	824	820	815	811	812	819	828	837
20	824	816	798	780	769	771	784	797	805	799	786	777	776	787	804	820
25	803	791	762	734	719	724	746	771	783	773	749	731	727	743	771	796
30	774	755	717	679	661	670	702	737	754	740	705	676	669	689	727	763
35	740	711	661	617	599	613	653	696	720	698	655	618	607	628	673	720
40	690	651	588	542	530	548	590	645	676	646	592	554	540	555	602	659
45	597	572	508	461	449	464	505	566	601	568	506	469	461	473	519	578
50	503	490	439	388	365	380	435	487	499	485	435	384	374	398	448	495
55	413	384	356	313	291	306	357	387	404	384	353	307	298	321	365	390
60	304	270	256	234	226	228	254	274	305	272	251	229	231	241	265	277
65	227	193	173	177	172	168	163	185	215	185	161	169	175	182	180	199
70	163	140	114	138	134	132	104	128	153	129	103	133	137	142	119	145
75	115	101	83.0	105	108	103	78.6	93.9	109	94.6	78.7	103	110	108	86.8	104
80	82.3	67.9	65.1	72.2	78.2	72.6	64.1	64.7	78.3	65.0	65.6	73.5	80.5	73.9	68.6	68.9
85	33.1	30.4	29.3	36.0	36.5	37.4	32.3	31.7	35.9	33.3	34.2	40.1	39.9	38.1	32.0	30.8
90	0.29	0.52	0.83	1.06	0.30	0.84	0.55	0.43	0.37	0.37	0.69	0.57	0.26	1.21	0.49	0.49
95	0.48	0.46	0.57	0.38	0.39	0.57	0.46	0.37	0.46	0.51	0.80	0.75	0.38	0.88	0.54	0.71
100	0.88	0.77	0.80	0.37	0.42	0.52	0.74	0.57	1.31	1.14	1.09	0.67	0.50	0.55	1.37	1.40
105	1.54	1.34	1.27	0.40	0.43	0.60	1.26	1.40	2.12	1.73	1.32	0.88	0.60	0.69	1.52	2.03
110	1.85	1.69	1.17	0.45	0.44	0.68	1.20	1.72	2.44	2.37	1.66	1.00	0.67	0.74	1.17	2.34
115	2.14	1.53	1.05	0.51	0.45	0.75	1.23	1.74	2.49	2.06	1.76	1.16	0.76	0.77	1.29	1.91
120	1.28	1.36	1.03	0.77	0.50	0.83	1.25	1.69	2.40	1.97	1.79	1.20	0.86	0.95	1.30	1.69
125	1.31	1.29	1.01	0.81	0.68	0.83	1.29	1.73	2.50	2.21	1.79	1.26	1.03	1.17	1.31	1.74
130	1.29	1.28	1.03	1.00	0.74	0.83	1.33	1.71	2.30	2.32	1.77	1.27	1.31	1.28	1.32	1.74
135	1.28	1.26	1.08	1.00	0.77	0.83	1.40	1.73	2.26	2.33	1.75	1.28	1.32	1.26	1.33	1.71
140	1.27	1.27	1.26	1.00	0.91	0.83	1.40	1.72	2.22	2.33	1.63	1.29	1.32	1.19	1.34	1.77
145	1.28	1.28	1.15	0.99	1.25	0.83	1.03	1.63	2.22	2.34	1.31	1.31	1.32	1.15	1.22	1.75
150	1.35	1.28	1.03	0.95	1.16	0.83	0.92	1.54	1.81	1.74	1.26	1.08	1.33	1.23	1.14	1.74
155	1.34	1.22	0.94	0.92	1.11	0.83	0.90	1.12	1.57	1.55	1.26	0.95	1.33	1.34	1.12	1.31
160	1.26	1.14	0.74	0.92	1.00	0.83	0.89	1.13	1.54	1.51	1.26	0.96	1.34	1.33	1.14	0.86
165	1.26	0.97	0.74	1.08	1.20	1.03	0.88	1.20	1.50	1.46	1.26	0.95	1.28	1.31	1.16	0.86
170	1.31	0.97	0.74	1.23	1.37	1.23	0.87	1.29	1.47	1.46	1.26	0.92	1.28	1.38	1.17	0.86
175	1.34	1.26	0.83	1.27	1.41	1.25	0.86	1.33	1.44	1.46	1.26	0.90	1.28	1.39	1.25	0.86
180	1.48	1.26	0.91	1.26	1.40	1.26	0.86	1.34	1.43	1.49	1.26	0.91	1.28	1.40	1.26	0.86

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-702	2 meter Integrating Sphere	Verified by D204 standard lamp	
ST-R-701	Spectral analysis system HAAS-2000	Verified by D204 standard lamp	
D204	Standard Lamp	2018-02-08	2019-02-07
ST-R-704	Power Meter for Integrating Sphere	2018-01-07	2019-01-06
ST-R-714	Goniophotometer system	Verified by D908S standard lamp	
D908S	Standard Lamp	2018-02-13	2019-02-14
ST-R-711	Power Meter for Goniophotometer	2018-01-07	2019-01-06
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

4. Product Photo

******** END OF REPORT ********