

LM-79-08 Test Report

For

Revolution Lighting Technologies, Inc. (Brand Name: Revolution Lighting Technologies.)

2280 Ward Ave. Simi Valley CA. 93065

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model name(s): 151051-102
151051-103
151051-105

Remark: This is a multiple list report, the original report NO. is
GZE1707105-A.

Representative (Tested) Model: 151051-102
151051-105

Model Different: All construction and rating are the same, except CCT

Test & Report By:

Bill Luo

Engineer: Bill Luo

Date: Aug.31,2017

Review By:

Tommy Liang

Manager: Tommy Liang

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.

Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

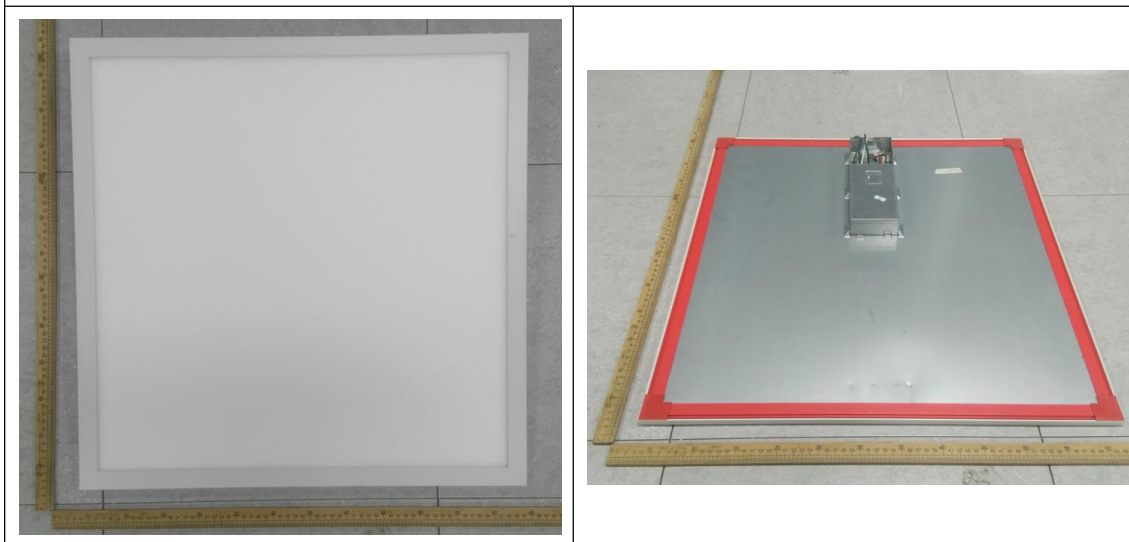
Address: Standard-Tech Building, No.6 Guanhong Road,Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

1.1 Product Information:

Organization Name	Revolution Lighting Technologies, Inc.	
Brand Name	Revolution Lighting Technologies.	
Model Number	151051-102 151051-103 151051-105	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces	
Rated Voltage / Frequency	100-277Vac, 60Hz	
Nominal Power	20W	
Rated Initial Lamp Lumen	--	
Declared CCT	3500K,4000K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series (3000K)	
Sample Number	GZE1707105-A1(3500K), A2(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo



1.2 Test Specifications:

Date of Receipt	Aug.21,2017
Date of Test	Aug.30,2017
Test item	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 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

1.3 Test Methods

<p>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.</p>
<p>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 25° C ± 1° 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.</p>
<p>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 25° C ± 1° 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.</p>

2.1 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-08-30	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	151051-102		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170710	120.0	60	0.1688	19.94	0.9846	12.86
5-A1	277.0	60	0.0787	19.82	0.9091	10.72
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

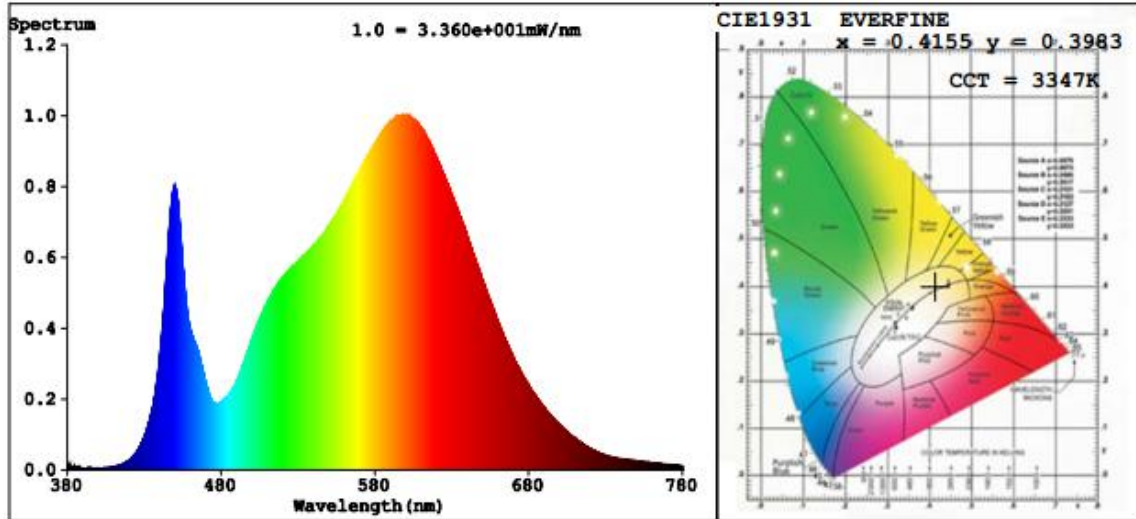
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	79	R9	0
Frequency (Hz)	60	R2	88	R10	73
CCT (K)	3347	R3	96	R11	79
Duv	0.0011	R4	80	R12	63
Chromaticity (x, y)	x=0.4155 y=0.3983	R5	79	R13	81
Chromaticity (u', v')	x=0.4155 y=0.3983	R6	85	R14	98
Color Rendering Index (CRI)	81.2	R7	84	R15	72
R9	0	R8	59	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2537.9	2520.5	>=2000(-10%)	
Luminous Efficacy (lm/W)	127.28	127.17	Standard: >=	Premium: >=
Most Worst Luminous/Highest Watts	126.40		100(-3%)	125(-3%)
Zonal lumens in the 0-60° zone (%)	78.3	--	>= 75(-3)	
SC: 0-180° (if applicable)	1.25	--	1.0-2.0(±0.1)	
SC: 90-270° (if applicable)	1.26	--	1.0-2.0(±0.1)	
Beam Angle (°)	112.8	--	--	
Center Beam Candle Power (cd)	881	--	--	

Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	684.6	27%
0-40	1,122.0	44.2%
0-60	1,987.4	78.3%
60-90	550.2	21.7%
70-100	234.6	9.2%
90-120	0.0	0%
0-90	2,537.7	100%
90-180	0.0	0%
0-180	2,537.7	100%

Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-10	83.4	3.3%	90-100	0.0	0%
10-20	238.9	9.4%	100-110	0.0	0%
20-30	362.4	14.3%	110-120	0.0	0%
30-40	437.3	17.2%	120-130	0	0%
40-50	454.2	17.9%	130-140	0	0%
50-60	411.2	16.2%	140-150	0	0%
60-70	315.6	12.4%	150-160	0	0%
70-80	185.1	7.3%	160-170	0	0%
80-90	49.5	2.0%	170-180	0	0%

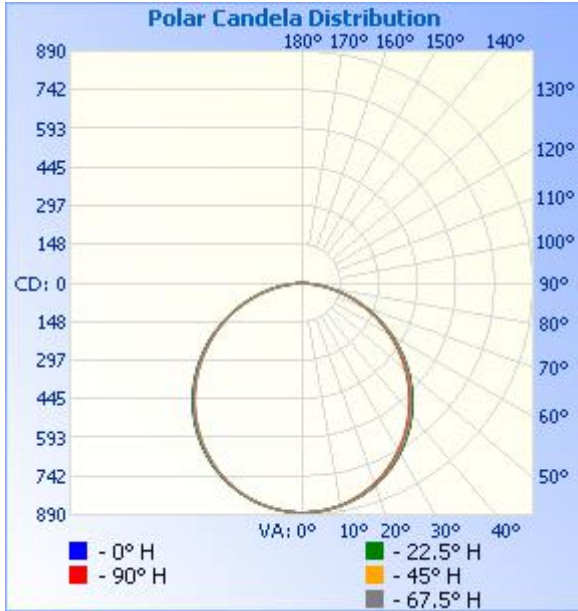
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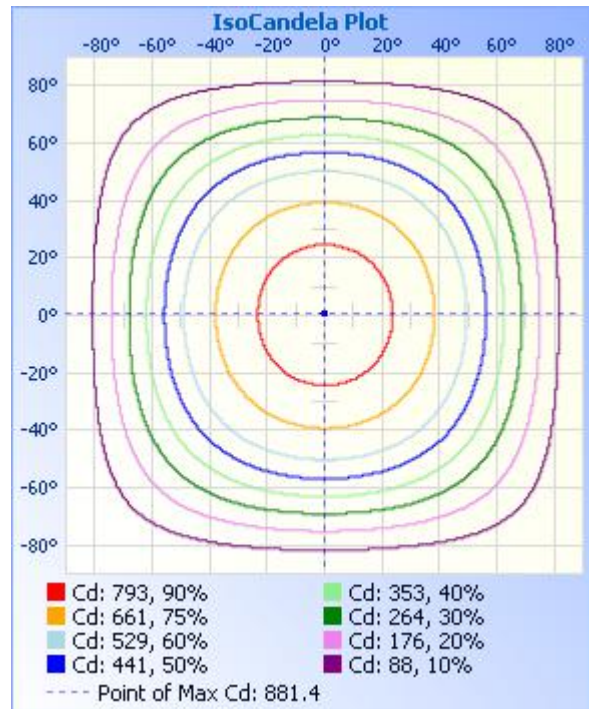
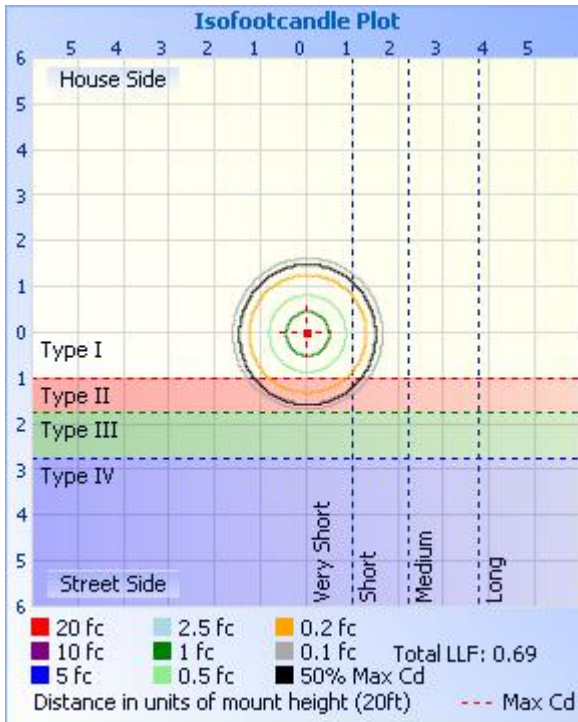
Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	3.05 fc	52.1 ft	50.3 ft
34.0ft	0.76 fc	104.3 ft	100.6 ft
51.0ft	0.34 fc	156.4 ft	150.9 ft
68.0ft	0.19 fc	208.6 ft	201.2 ft
85.0ft	0.12 fc	260.7 ft	251.5 ft
102.0ft	0.08 fc	312.8 ft	301.7 ft

■ Vert. Spread: 113.8°
 ■ Horiz. Spread: 111.9°



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Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	881	881	881	881	881	881	881	881	881	881	881	881	881	881	881	881	
5	876	877	878	878	878	878	878	878	877	877	877	877	877	876	877	876	
10	864	865	866	868	868	868	868	866	865	865	865	865	865	864	864	864	
15	844	846	848	850	851	850	849	847	845	845	845	846	845	845	844	844	
20	816	818	822	825	827	825	823	820	818	817	818	819	820	819	817	816	
25	781	784	788	792	795	793	790	786	783	783	785	786	787	785	783	781	
30	740	743	748	753	756	754	750	746	742	741	744	746	747	745	742	739	
35	692	695	701	707	711	708	704	699	695	694	697	700	700	698	695	691	
40	639	642	649	655	659	657	652	647	642	641	644	647	649	646	642	638	
45	580	584	591	598	602	600	595	589	584	583	586	590	591	588	584	580	
50	517	522	529	535	539	538	533	527	522	521	524	527	529	526	522	517	
55	451	455	462	469	472	471	467	460	456	455	458	461	462	459	455	451	
60	382	386	393	399	402	401	397	391	387	386	389	391	392	390	386	382	
65	311	315	321	326	329	328	325	320	318	315	317	319	319	317	315	311	
70	240	243	248	253	255	255	252	248	243	243	245	246	246	245	242	240	
75	170	173	176	180	183	183	180	175	171	171	173	174	174	173	172	171	
80	104	106	109	111	113	113	110	106	103	103	104	106	105	105	104	104	
85	41.6	42.5	44.1	46.9	48.1	47.7	45.4	43.5	41.9	40.8	40.4	41.2	41.8	41.7	40.5	40.3	
90	0.01	0.01	0.02	0.01	0.03	0.03	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
95	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	
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	0.05	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	0.00	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	
165	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	
170	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	
175	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	
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	

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2.2 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-08-30	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	151051-105		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170710	120.0	60	0.1676	19.85	0.9867	12.51
5-A2	277.0	60	0.0785	19.77	0.9096	10.39
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

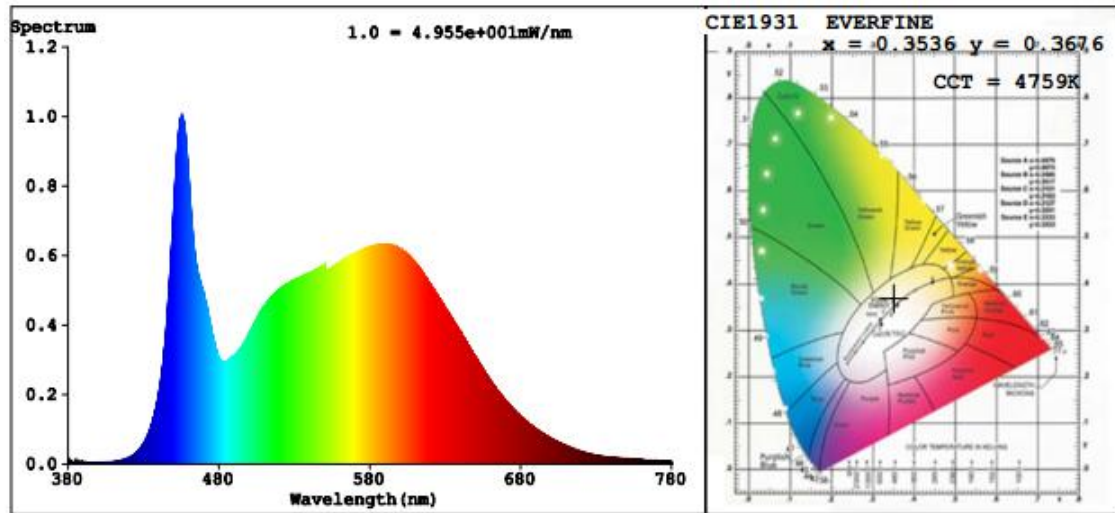
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	12
Frequency (Hz)	60	R2	92	R10	80
CCT (K)	4759	R3	96	R11	79
Duv	0.0046	R4	80	R12	56
Chromaticity (x, y)	x=0.3536 y=0.3676	R5	82	R13	86
Chromaticity (u', v')	u'=0.2110 v'=0.4935	R6	88	R14	98
Color Rendering Index (CRI)	84.1	R7	86	R15	76
R9	12	R8	66	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2587	2574	>=2000(-10%)	
Luminous Efficacy (lm/W)	130.33	130.20	Standard: >=	Premium: >=
Most Worst Luminous/Highest Watts	129.67		100(-3%)	125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
151051-102	3500K	2537.9	19.94	127.28
151051-103	4000K	2554* ¹	19.90* ²	128.34* ³
151051-105	5000K	2587	19.85	130.33

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

$$2554=(2587-2537.9)/3+2537.9$$

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

$$19.90=(19.94+19.85)/2$$

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

$$128.34=2554/19.90$$

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2017-07-01	2018-06-30
ST-R-327	Spectral analysis system HAAS-2000	2017-07-01	2018-06-30
D204	Standard Lamp	2017-07-12	2018-07-11
PF2010	Power Meter for Integrating Sphere	2017-07-01	2018-06-30
GO-R5000	Goniophotometer system	2017-07-01	2018-06-30
D908S	Standard Lamp	2017-07-12	2018-07-11
PF210	Power Meter for Goniophotometer	2017-07-07	2018-07-06

Expand Uncertainty:
Photometric Measurement (Sphere):2.04%, k=2
Chromaticity Measurement(Sphere):28.8K, k=2
Photometric Measurement(Goniophotometer):2.36%, k=2

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

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