

LM-79-08 Test Report

For

MaxLite Inc.

(Brand Name: MaxLite)

10 York Ave, West Caldwell, NJ 07006, USA

Model name(s): MLVT14D20ZZ/SB @ @##

Report Type: Testing and Report According to IES LM-79-2008
Type of Luminaire: 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces
Report Date: 2018-12-19
Ningbo TengLi Testing Co., Ltd
Prepared By: 2nd floor, Block B, Ningbo Testing and Certification Base,
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Test & Report By:

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Engineer: Xeon Ren

Review By:

John Li

Engineer: 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	MLVT14D20ZZ/SB@@##	
Remark	ZZ = CCT (30=3000K, 35 = 3500K, 40 = 4000K, 45=4500K, 50=5000K) @@ = EM Option (Blank = None, EM = Battery Backup Unit) ## = Motion Sensing Option (Blank = None, MS = Motion Sensor). This is a multiple list report, the original report No.STD181210NB-A	
Representative (Tested) Model	MLVT14D2030/SB MLVT14D2050/SB	
Model Difference	All construction and rating are the same, except CCT.	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces	
LED Manufacturer	SAMSUNG ELECTRONICS	
LED Model	SPMWHx228Fxxxxxxxx	
Dimming	Dimmable	
Sample Number	STD181210NB-A1(3000K),A2(5000K)	
Date of Receipt	Dec.06, 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	20W
Rated Initial Lamp Lumen	--
Declared CCT	3000K, 3500K, 4000K, 4500K, 5000K

1.3 Test Specifications:

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 C78.377-2015 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. 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 $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. 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 V4.4)	
Power (W)	3000K	120V	19.41	N/A	N/A	
		277V	19.61			
	5000K	120V	19.17			
		277V	19.27			
Power Factor	3000K	120V	0.9899	Pass	≥ 0.9(-3%)	
		277V	0.9362			
	5000K	120V	0.9708			
		277V	0.9181			
THD %	3000K	120V	10.73	Pass	≤ 20(+5)	
		277V	18.56			
	5000K	120V	10.54			
		277V	18.65			
CRI	3000K	83.8		Pass	≥ 80(-2)	
	5000K	85.3				
CCT (K)	3000K	3014		Pass	≤ 5000K	
	5000K	5055				
Luminous Intensity Distribution	Zonal lumens in the 0-60 °		79.9	Pass	≥ 80(-3)	
	SC: 0-180 °(if applicable):		1.29	Pass	1.0-2.0(±0.1)	
	SC: 90-270 °(if applicable):		1.23	Pass	1.0-2.0(±0.1)	
Total Luminous	3000K	120V	2506.8	Pass	≥ 1500(-10%)	
		277V	2515.2			
	5000K	120V	2553			
		277V	2532			
Luminous Efficacy	3000K	120V	129.15	Pass	Standard: ≥ 100(-3%)	Premium: ≥ 125(-3%)
		277V	128.26			
	5000K	120V	133.18			
		277V	131.40			

2.2 Electrical, Photometric and Chromaticity Measurements

Test date	2018-12-06	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	MLVT14D2030/SB		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD18121	120.0	60	0.1634	19.41	0.9899	10.73
ONB-A1	277.0	60	0.0756	19.61	0.9362	18.56

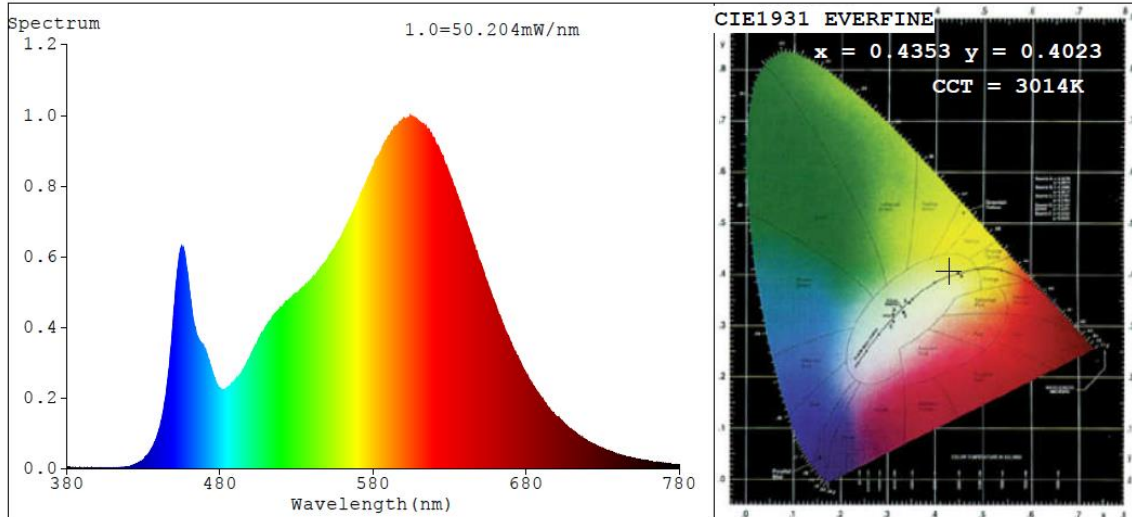
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	12
Frequency (Hz)	60	R2	94	R10	85
CCT (K)	3014	R3	94	R11	81
Duv	-0.0005	R4	81	R12	71
Chromaticity (x, y)	x=0.4353 y=0.4023	R5	83	R13	86
Chromaticity (u', v')	u'=0.2503 v'=0.5204	R6	92	R14	98
Color Rendering Index (CRI)	83.8	R7	82	R15	76
R9	12	R8	60	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2506.8	2515.2
Luminous Efficacy (lm/W)	129.15	128.26
Worst Luminous/Highest Watts	127.83	
SC: 0-180 °(if applicable)	1.29	--
SC: 90-270 °(if applicable)	1.23	--
Zonal lumens in the 0-60 °zone (%)	79.9	--
Beam Angle (°)	108.9	--
Center Beam Candle Power (cd)	899	--

Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	697.8	27.8%
0-40	1,141.9	45.6%
0-60	2,003.5	79.9%
60-90	501.8	20%
70-100	205.1	8.2%
90-120	0.4	0%
0-90	2,505.3	100%
90-180	1.2	0%
0-180	2,506.6	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	85.0	3.4%	90-100	0.1	0%
10-20	243.6	9.7%	100-110	0.1	0%
20-30	369.1	14.7%	110-120	0.2	0%
30-40	444.2	17.7%	120-130	0.1	0%
40-50	457.3	18.2%	130-140	0.2	0%
50-60	404.3	16.1%	140-150	0.2	0%
60-70	296.8	11.8%	150-160	0.2	0%
70-80	164.3	6.6%	160-170	0.1	0%
80-90	40.8	1.6%	170-180	0.1	0%

Photometric Data

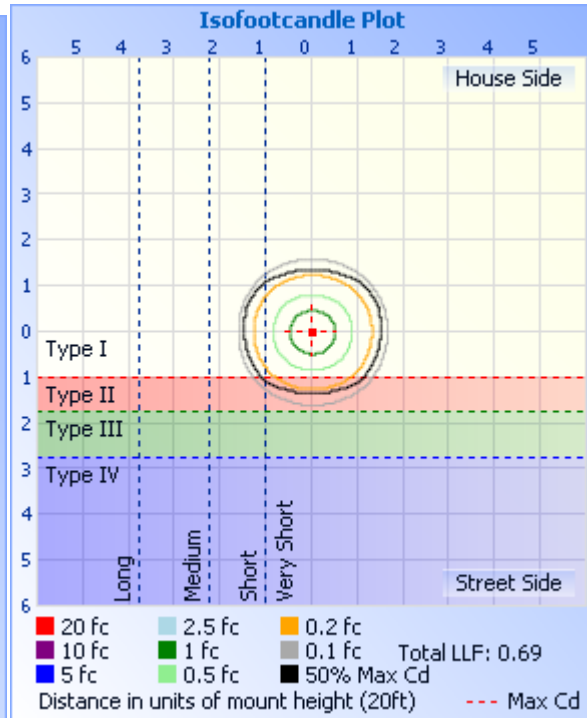
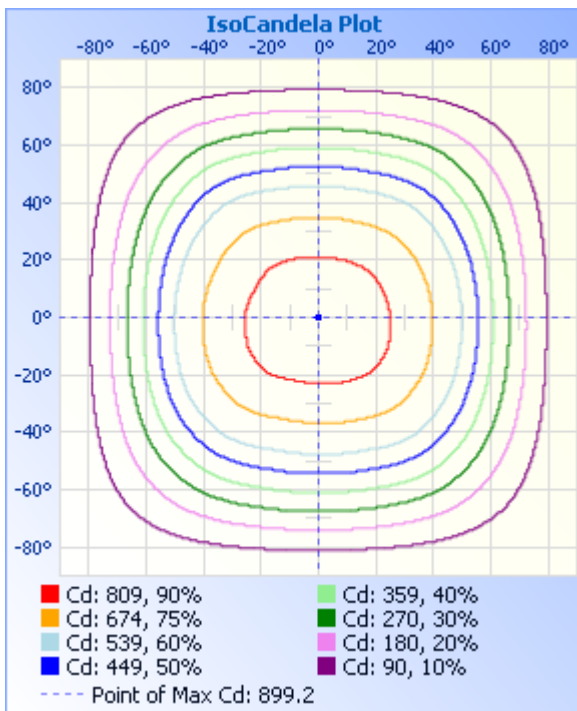
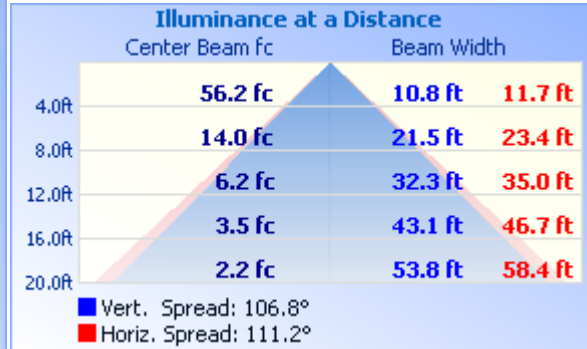
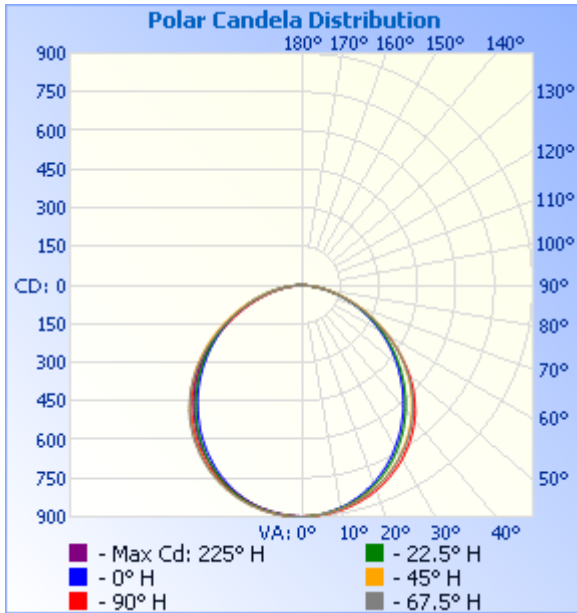


Table--1

UNIT: cd

C (DEG) γ (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	899	899	899	899	899	899	899	899	899	899	899	899	899	899	899	899		
5	896	894	892	892	893	893	894	894	895	897	896	895	894	895	896	895		
10	884	882	880	877	877	879	882	882	887	889	886	882	882	884	887	886		
15	864	863	859	854	852	857	863	863	870	872	871	861	859	863	869	870		
20	838	835	832	822	818	826	836	838	848	850	847	831	827	835	845	846		
25	806	802	798	782	777	788	803	806	818	821	816	791	787	797	813	813		
30	767	761	756	735	728	741	765	767	781	783	777	746	740	752	773	775		
35	720	714	707	682	674	688	718	723	736	740	730	695	687	700	726	729		
40	666	660	651	623	616	630	665	670	683	689	676	636	629	642	673	676		
45	603	598	590	561	553	567	605	611	620	628	614	576	567	579	611	614		
50	531	528	524	494	487	500	538	542	548	559	547	510	502	512	545	543		
55	450	451	452	426	420	432	466	466	468	482	474	442	435	443	472	465		
60	366	369	377	356	352	361	389	384	384	400	398	373	367	373	394	382		
65	284	288	299	285	283	290	310	302	300	315	319	302	298	302	315	300		
70	208	211	223	216	215	220	232	224	222	236	241	232	229	231	237	222		
75	139	141	150	149	149	152	158	153	152	162	168	164	163	162	163	151		
80	78.9	79.0	84.8	86.0	86.9	88.9	91.7	88.9	89.2	95.9	100	100	99.0	98.2	96.1	87.0		
85	26.7	26.1	29.0	31.2	31.9	33.6	34.3	33.3	34.3	38.4	41.8	42.9	42.3	41.0	37.8	31.8		
90	0.00	0.00	0.00	0.00	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.69	1.38	0.38	0.00	0.00		
95	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.08	0.00	0.00		
100	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.26	0.00	0.00		
105	0.00	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	0.00	0.03	0.18	0.78	0.34	0.11	0.00		
110	0.00	0.00	0.00	0.05	0.59	0.20	0.00	0.00	0.00	0.06	0.13	0.31	0.82	0.35	0.22	0.08		
115	0.00	0.00	0.00	0.03	0.38	0.17	0.00	0.00	0.00	0.11	0.17	0.32	0.65	0.36	0.28	0.15		
120	0.00	0.00	0.00	0.03	0.03	0.19	0.00	0.00	0.03	0.16	0.21	0.33	0.33	0.31	0.32	0.20		
125	0.00	0.00	0.00	0.18	0.00	0.27	0.00	0.00	0.03	0.22	0.29	0.33	0.08	0.31	0.43	0.25		
130	0.00	0.00	0.05	0.31	0.00	0.33	0.00	0.00	0.20	0.22	0.33	0.54	0.08	0.62	0.50	0.32		
135	0.00	0.00	0.03	0.33	0.00	0.33	0.03	0.00	0.22	0.25	0.34	0.68	0.08	0.66	0.51	0.34		
140	0.00	0.00	0.10	0.34	0.00	0.33	0.08	0.00	0.23	0.30	0.45	0.71	0.10	0.71	0.56	0.38		
145	0.00	0.00	0.34	0.36	0.00	0.33	0.30	0.03	0.25	0.33	0.50	0.71	0.15	0.72	0.67	0.44		
150	0.00	0.00	0.35	0.38	0.05	0.33	0.32	0.08	0.39	0.38	0.51	0.71	0.23	0.54	0.73	0.56		
155	0.06	0.08	0.37	0.40	0.05	0.33	0.34	0.16	0.43	0.44	0.51	0.71	0.33	0.41	0.75	0.63		
160	0.06	0.19	0.39	0.42	0.19	0.36	0.37	0.33	0.45	0.47	0.51	0.71	0.41	0.40	0.76	0.70		
165	0.28	0.33	0.45	0.46	0.31	0.62	0.51	0.43	0.51	0.54	0.52	0.71	0.49	0.39	0.76	0.78		
170	0.42	0.47	0.69	0.47	0.32	0.70	0.73	0.53	0.52	0.53	0.52	0.71	0.50	0.34	0.77	0.78		
175	0.54	0.52	0.74	0.51	0.33	0.73	0.74	0.64	0.53	0.53	0.53	0.71	0.51	0.33	0.77	0.78		
180	0.54	0.55	0.74	0.51	0.33	0.80	0.75	0.69	0.54	0.52	0.53	0.71	0.51	0.33	0.78	0.78		

2.3 Electrical, Photometric and Chromaticity Measurements

Test date	2018-12-06	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	MLVT14D2050/SB		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
STD18121	120.0	60	0.1646	19.17	0.9708	10.54
ONB-A2	277.0	60	0.0758	19.27	0.9181	18.65

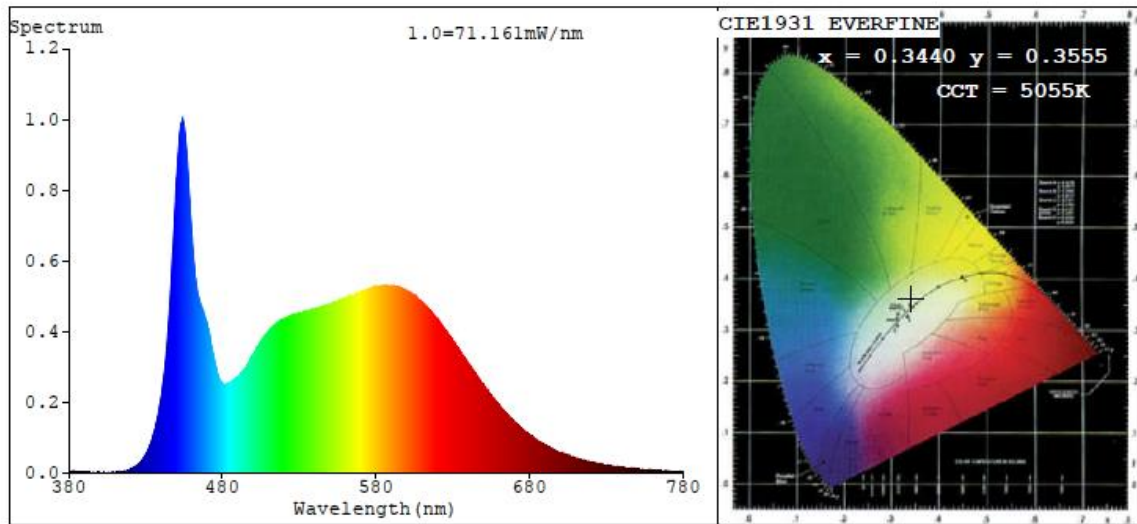
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120	R1	84	R9	15
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	5055	R3	95	R11	83
Duv	0.0024	R4	83	R12	62
Chromaticity (x, y)	x=0.3440 y=0.3555	R5	84	R13	87
Chromaticity (u', v')	u'=0.2092 v'=0.4864	R6	88	R14	98
Color Rendering Index (CRI)	85.3	R7	86	R15	79
R9	15	R8	68	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2553	2532
Luminous Efficacy (lm/W)	133.18	131.40
Worst Luminous/Highest Watts	131.40	

Spectral Power Distribution & Chromaticity Diagram



2.4 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
MLVT14D2030/SB	3000K	2506.8	19.41	129.15
MLVT14D2035/SB	3500K	2518 ^{*1}	19.29 ^{*2}	130.53 ^{*3}
MLVT14D2040/SB	4000K	2530 ^{*1}	19.29 ^{*2}	131.16 ^{*3}
MLVT14D2045/SB	4500K	2541 ^{*1}	19.29 ^{*2}	131.73 ^{*3}
MLVT14D2050/SB	5000K	2553	19.17	133.18

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

$$2518 = (2553 - 2506.8) / 4 * 1 + 2506.8$$

$$2530 = (2553 - 2506.8) / 4 * 2 + 2506.8$$

$$2541 = (2553 - 2506.8) / 4 * 3 + 2506.8$$

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

$$19.29 = (19.41 + 19.17) / 2$$

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

$$130.53 = 2518 / 19.29$$

$$131.16 = 2530 / 19.29$$

$$131.73 = 2541 / 19.29$$

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	
ST-R-705	Standard Lamp	2018-02-08	2019-02-09
ST-R-704	Power Meter for Integrating Sphere	2018-01-07	2019-01-06
ST-R-714	Goniophotometer system	Verified by D908S standard lamp	
ST-R-710	Standard Lamp	2018-02-13	2019-02-12
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 *******