LM-79-08 Test Report

For

IKIO LED LIGHTING

(Brand Name: IKIO)

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

Dual Mode Internal Driver (UL Type A and Type B)

Model name(s): T803-NANO-0010-XXA&B-J
Remark: XX could be 3500, 4000, 5000 refers to CCT.

Representative (Tested) Model: T803-NANO-0010-35A&B-J
T803-NANO-0010-50A&B-J

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

Test & Report By:

Garman Mo

Engineer: Garman Mo

Date: May.14,2018

Review By:

Univ Xie

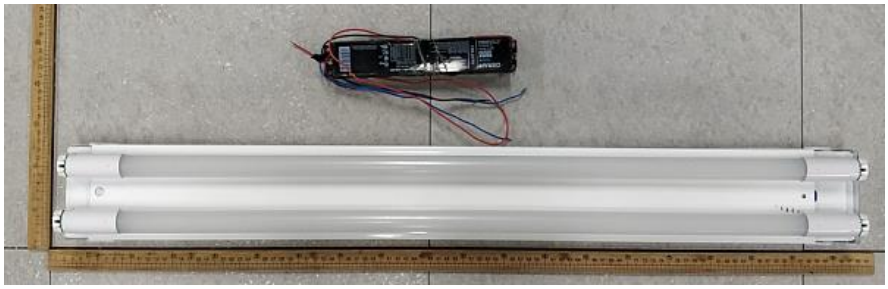
Manager: Univ Xie

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:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	T803-NANO-0010-XXA&B-J	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Dual Mode Internal Driver (UL Type A and Type B)	
Rated Voltage / Frequency	120-277 Vac, 50/60 Hz	
Nominal Power	10W	
Rated Initial Lamp Lumen	--	
Declared CCT	3500K,4000K,5000K	
LED Manufacturer	Xiamen Dacol Photoelectronics Technology Co.,Ltd.	
LED Model	SMD 2835	
Test Ballast	OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC	
Sample Number	JDE181502-F1,F2(3500K),F3(5000K)	
Lamp Length	900	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo



1.2 Test Specifications:

Date of Receipt	May.06,2018
Date of Test	May.07,2018
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 C78.377-2008 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

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 25 ºC ±1 ºC. 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 ºC ±1 ºC. 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.

2.1.1 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-05-07	**Test Ambient:**	25.2 ºC
Test Orientation	Horizontal	**Stabilization Time (min)**	90
Model Number	T803-NANO-0010-35A&B-J , with ballast OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE181502-F1	120.0	60	0.0915	10.64	0.9689	6.33
	277.0	60	0.0435	10.87	0.9030	13.59
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

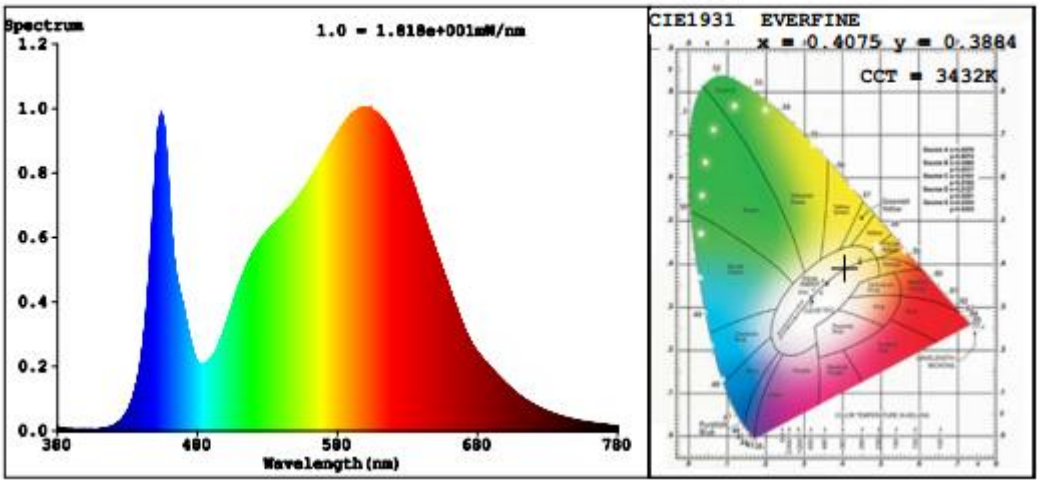
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3432
Duv	-0.0015
Chromaticity (x, y)	x=0.4075 y=0.3884
Chromaticity (u', v')	u'=0.2381 v'=0.5106
Color Rendering Index (CRI)	82.6
R9	10

Special Color Rendering Indices			
R1	82	R9	10
R2	90	R10	76
R3	95	R11	76
R4	80	R12	60
R5	81	R13	84
R6	86	R14	98
R7	84	R15	76
R8	62	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1224	1239	Bare Lamp: >= 1200(-10%)
Luminous Efficacy (lm/W)	115.08	113.97	Bare lamp: >= 110(-3%)
Most worst Luminous/Highest Watts	112.60		

Spectral Power Distribution & Chromaticity Diagram



2.1.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-05-07	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	T803-NANO-0010-35A&B-J , Connected to line voltage		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE181502-F1	120.0	60	0.0785	9.183	0.9751	5.81
	277.0	60	0.0367	9.402	0.9236	12.47
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

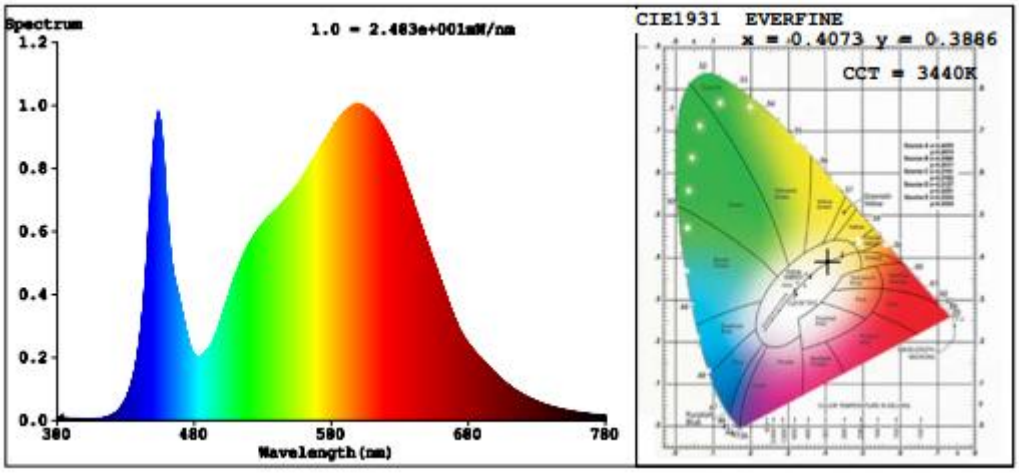
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3440
Duv	-0.0013
Chromaticity (x, y)	x=0.4073 y=0.3886
Chromaticity (u', v')	u'=0.2379 v'=0.5107
Color Rendering Index (CRI)	82.5
R9	10

Special Color Rendering Indices			
R1	81	R9	10
R2	90	R10	75
R3	95	R11	78
R4	80	R12	60
R5	81	R13	84
R6	86	R14	97
R7	85	R15	76
R8	63	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1387	1400	Bare Lamp: >= 1200(-10%)
Luminous Efficacy (lm/W)	151.04	148.91	Bare lamp: >= 110(-3%)
Most worst Luminous/Highest Watts	147.52		

Spectral Power Distribution & Chromaticity Diagram



Summary

Sample No.	Test Method	Voltage (Vac)	Frequency (Hz)	Lumen Output(lm)	Lumen Efficacy(lm/w)	Power (W)
JDE181502-F1	With Ballast	120.0	60	1224	115.08	10.64
JDE181502-F1	Connected to line voltage	120.0	60	1387	151.04	9.183

The measured lumen efficacy of test condition "with ballast" was less than test condition "Connect to line voltage". So the following test will be "with ballast".

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-05-07	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	T803-NANO-0010-35A&B-J, with ballast OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for 2-lamp in Lithonia C2 25 MVOLT GEB10IS:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE181502-F 1,F2	120.0	60	0.1837	21.25	0.9641	6.78
	277.0	60	0.0873	21.72	0.8983	14.00
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for 2-lamp in Lithonia C2 25 MVOLT GEB10IS - Sphere-Spectroradiometer Method:

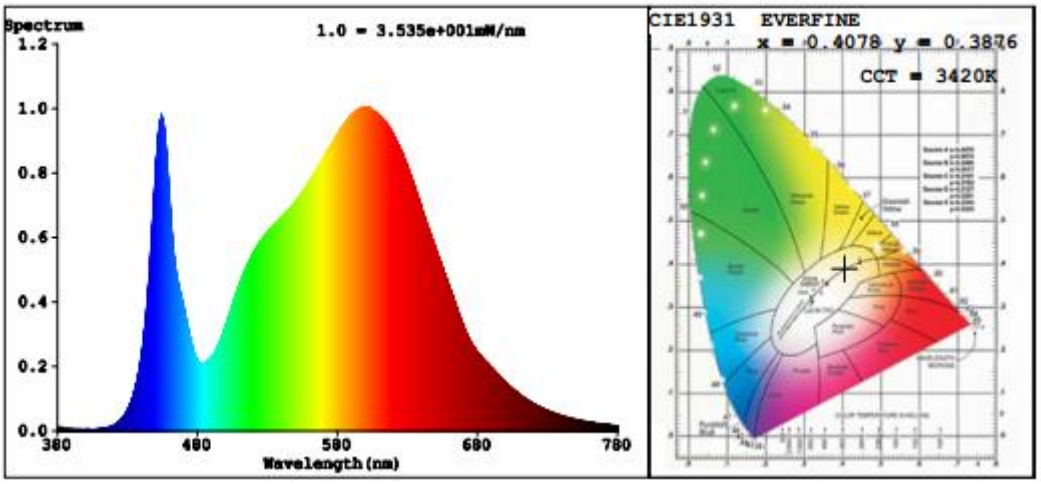
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3420
Duv	-0.0019
Chromaticity (x, y)	x=0.4078 y=0.3876
Chromaticity (u', v')	u'=0.2386 v'=0.5103
Color Rendering Index (CRI)	82.9
R9	12

Special Color Rendering Indices			
R1	82	R9	12
R2	91	R10	77
R3	95	R11	78
R4	80	R12	61
R5	81	R13	84
R6	86	R14	98
R7	84	R15	76
R8	63	--	--

Photometric Measurement 2-lamp in Lithonia C2 25 MVOLT GEB10IS – Goniophotometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	2242.0	2268.4	In luminaire (2 lamps): >= 2200(-10%)
Luminous Efficacy (lm/W)	105.51	104.44	In luminaire: >= 100(-3%)
Most worst Luminous/Highest Watts	103.22		
Zonal lumens in the 0-60 °zone (%)	61.5	--	>=40(-3)
SC: 0-180 °(if applicable)	1.37	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.21	--	1.0-2.0(±0.1)
Beam Angle (°)	127.8	--	--
Center Beam Candle Power (cd)	571	--	--

Spectral Power Distribution & Chromaticity Diagram

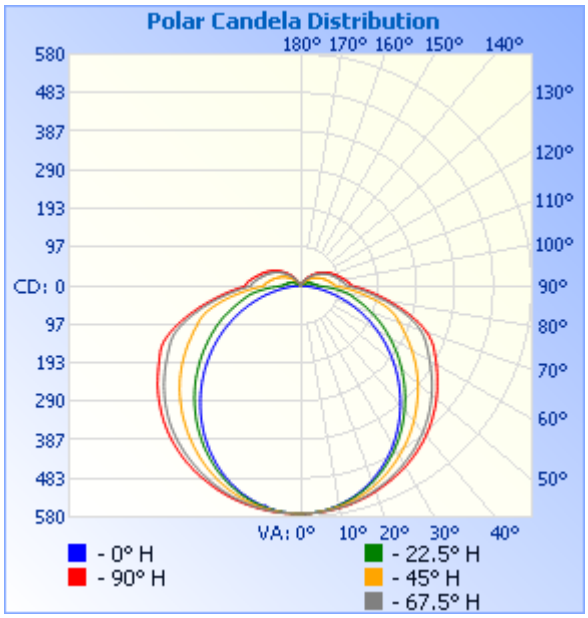


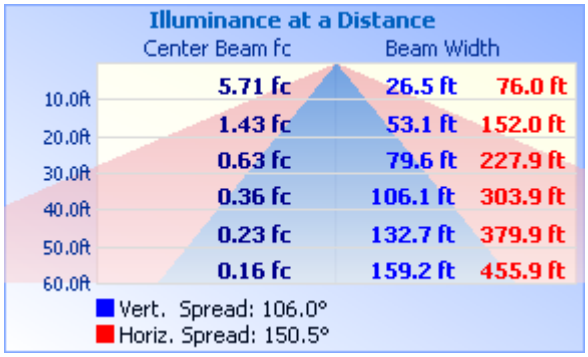
Zonal Lumen Tabulation

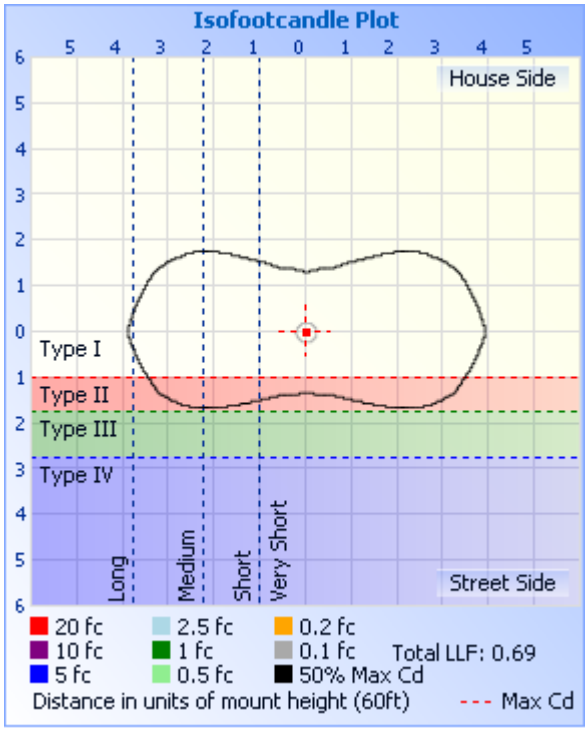
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	448.8	20%
0-40	743.9	33.2%
0-60	1,378.3	61.5%
60-90	636.0	28.4%
70-100	431.3	19.2%
90-120	182.4	8.1%
0-90	2,014.3	89.8%
90-180	227.7	10.2%
0-180	2,242.0	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	54.1	2.4%	90-100	78.4	3.5%
10-20	155.8	7.0%	100-110	60.6	2.7%
20-30	238.9	10.7%	110-120	43.3	1.9%
30-40	295.0	13.2%	120-130	26.5	1.2%
40-50	320.2	14.3%	130-140	13.2	0.6%
50-60	314.2	14.0%	140-150	4.1	0.2%
60-70	283.1	12.6%	150-160	0.8	0%
70-80	222.1	9.9%	160-170	0.5	0%
80-90	130.8	5.8%	170-180	0.2	0%

Photometric Data







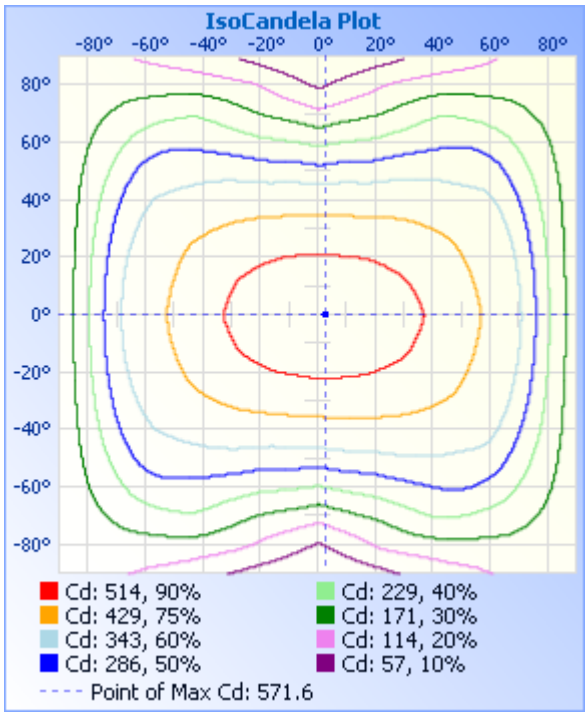


Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338		
0	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571		
5	571	571	570	568	568	568	569	570	570	570	569	568	568	569	570	571		
10	569	567	564	559	558	559	562	565	566	565	562	559	559	561	564	567		
15	563	559	553	545	542	544	551	557	559	557	551	544	544	547	554	561		
20	556	549	539	524	520	525	535	546	549	545	535	524	522	528	540	551		
25	546	536	520	500	493	500	516	532	537	531	515	499	496	504	522	539		
30	534	521	498	471	462	472	493	516	524	515	492	470	464	476	501	525		
35	520	505	473	440	427	440	469	498	508	496	467	437	429	445	477	509		
40	504	486	447	405	389	405	442	477	490	475	440	402	391	412	451	490		
45	484	464	418	369	349	369	413	454	468	451	411	365	351	376	424	469		
50	462	439	389	331	306	332	384	429	444	426	381	327	309	339	396	444		
55	438	412	357	293	263	294	353	401	418	398	349	289	266	302	366	418		
60	412	384	326	255	219	257	321	373	393	370	316	252	222	264	334	390		
65	388	357	293	219	175	221	290	348	368	344	284	215	177	229	302	363		
70	350	327	263	182	131	185	262	318	335	315	256	179	133	192	273	331		
75	294	274	232	147	88.8	151	230	270	284	270	226	144	90.8	157	240	279		
80	235	217	182	117	50.1	124	181	214	227	215	181	115	51.7	129	188	221		
85	182	163	128	78.9	18.4	83.4	131	162	176	162	129	79.6	20.3	87.1	134	168		
90	139	122	87.1	41.2	1.94	43.5	87.1	117	129	116	84.5	39.7	1.72	46.4	91.8	125		
95	131	115	80.2	33.7	0.78	36.2	78.7	106	118	105	74.1	30.9	0.84	39.1	85.3	117		
100	118	104	71.1	28.1	0.66	29.9	69.9	97.3	107	95.0	65.2	25.3	0.79	33.1	76.1	106		
105	107	94.2	63.9	23.0	0.66	24.6	62.2	88.0	96.4	85.7	58.4	20.1	0.83	27.4	68.1	95.5		
110	96.6	84.8	55.9	18.2	0.66	19.1	54.5	79.2	86.6	77.0	50.8	15.0	1.14	22.0	59.5	86.2		
115	85.9	74.9	48.2	13.1	0.91	13.8	46.7	69.7	76.7	67.9	43.2	10.2	1.35	16.5	51.3	76.5		
120	75.2	65.1	40.4	8.07	0.96	8.66	38.7	59.8	66.9	58.1	34.9	5.07	1.40	10.8	43.1	66.5		
125	63.8	54.7	32.1	3.32	0.98	3.67	30.1	50.0	56.7	48.4	26.8	1.18	1.50	5.62	34.4	56.0		
130	52.3	43.9	23.8	1.66	1.00	1.50	22.2	39.2	45.5	38.1	19.4	1.28	1.54	1.44	25.9	45.1		
135	41.0	33.4	16.1	1.65	1.02	1.41	14.4	29.5	34.8	28.4	12.3	1.30	1.55	1.46	17.5	34.4		
140	29.6	23.4	8.47	1.63	1.04	1.38	6.84	19.9	24.2	19.2	5.43	1.34	1.55	1.48	9.26	23.9		
145	19.0	14.0	2.29	1.61	1.05	1.34	1.63	10.7	14.6	10.5	1.37	1.39	1.58	1.52	1.68	13.5		
150	9.02	4.92	1.72	1.60	1.08	1.35	1.45	2.39	4.82	2.71	1.37	1.42	1.63	1.56	1.68	3.57		
155	1.85	1.52	1.64	1.58	1.15	1.36	1.47	1.39	1.69	2.05	1.38	1.44	1.68	1.65	1.70	1.56		
160	1.29	1.53	1.55	1.56	1.25	1.38	1.49	1.45	1.50	1.53	1.44	1.52	1.73	1.68	1.74	1.66		
165	1.29	1.54	1.72	1.54	1.38	1.92	1.44	1.53	1.59	1.56	1.64	1.67	1.98	1.82	2.05	1.87		
170	1.44	1.55	1.85	1.71	1.74	2.02	1.85	1.59	1.68	1.56	1.66	2.02	2.00	1.84	1.99	2.00		
175	1.47	1.57	1.94	1.84	1.86	1.99	1.99	1.75	1.72	1.57	1.67	1.94	2.03	1.86	1.99	2.04		
180	1.53	1.57	1.91	1.90	1.86	1.98	1.99	1.75	1.66	1.57	1.55	1.90	1.92	1.86	1.99	2.00		

2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-05-07	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	T803-NANO-0010-50A&B-J, with ballast OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JDE181502-F3	120.0	60	0.0940	10.83	0.9605	7.18
	277.0	60	0.0448	11.05	0.8913	14.42
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

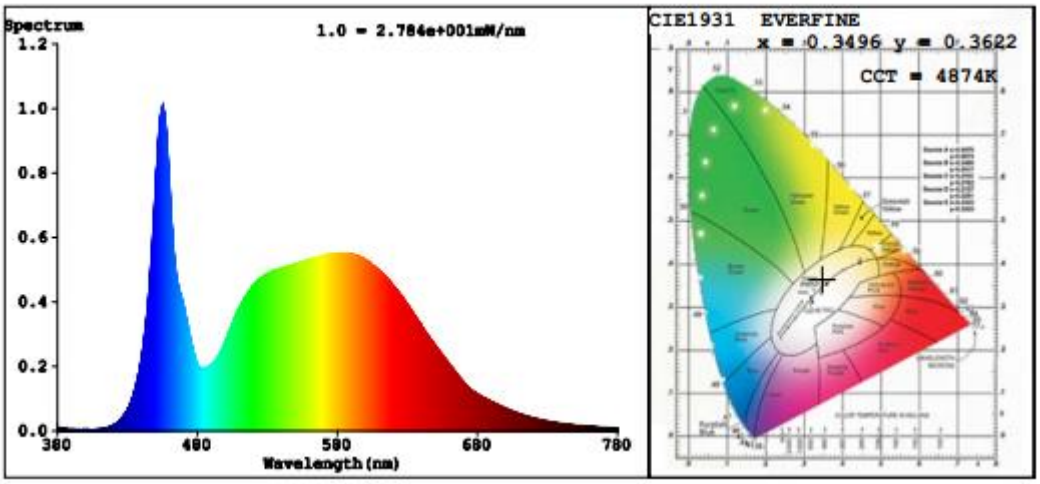
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4874
Duv	0.0035
Chromaticity (x, y)	x=0.3496 y=0.3622
Chromaticity (u', v')	u'=0.2103 v'=0.4904
Color Rendering Index (CRI)	82.1
R9	8

Special Color Rendering Indices			
R1	80	R9	8
R2	88	R10	71
R3	93	R11	77
R4	79	R12	49
R5	79	R13	83
R6	82	R14	96
R7	88	R15	75
R8	67	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	1282	1296	Bare Lamp: >= 1200(-10%)
Luminous Efficacy (lm/W)	118.36	117.32	Bare lamp: >= 110(-3%)
Most worst Luminous/Highest Watts	116.02		

Spectral Power Distribution & Chromaticity Diagram



2.4 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
T803-NANO-0010-35A&B-J	3500K	1224	10.64	115.08
T803-NANO-0010-45A&B-J	4500K	1243*1	10.74*2	115.74*3
T803-NANO-0010-50A&B-J	5000K	1282	10.83	118.36

*1: This value is calculated and the calculation formula is as below:
1243= (1282-1224)/3+1224

*2: This value is calculated and the calculation formula is as below:
10.74= (10.64+10.83)/2

*3: This value is calculated and the calculation formula is as below:
115.74= 1243/10.74

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 ********