NVLAP LAB CODE 201011-0

Report No.: GZE161032-C

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 or B)

Model name(s): IK-T802U-0015-XXA&B-J

Representative (Tested) Model:
IK-T802U-0015-30A&B-J
IK-T802U-0015-35A&B-J
IK-T802U-0015-40A&B-J
IK-T802U-0015-50A&B-J

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

Test & Report By:

Jack Luo

Engineer: Jack Luo
Date: Oct.28,2016

Review By:

Tommy Liang

Manager: Tommy Liang

Note: 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	IK-T802U-0015-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 or B)	
Rated Voltage / Frequency	100-277 Vac, 50/60 Hz	
Nominal Power	15W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO.,LTD	
LED Model	67-21S Series	
Test Ballast	OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC	
Test Ballast	--	
Sample Number	GZE161032-C1,C2(3000K),C3(3500K), C4(4000K), C5(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo

1.2 Test Specifications:

Date of Receipt	Oct.27, 2016
Date of Test	Oct.27, 2016
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	2016-10-28	**Test Ambient:**	25.2 ºC
Test Orientation	Horizontal	**Stabilization Time (min)**	90
Model Number	IK-T802U-0015-30A&B-J 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 %
GZE161032 -C1	120.0	60	0.1283	15.16	0.9847	4.68
	277.0	60	0.0609	15.00	0.8895	8.45

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

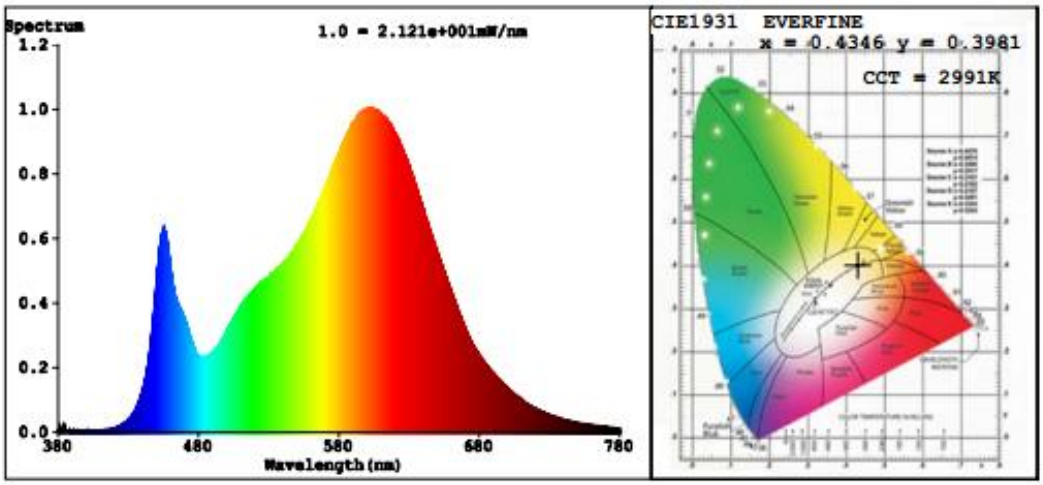
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2991
Duv	-0.0021
Chromaticity (x, y)	x=0.4346 y=0.3981
Chromaticity (u', v')	u'=0.2516 v'=0.5187
Color Rendering Index (CRI)	82.5
R9	6

Special Color Rendering Indices			
R1	82	R9	6
R2	94	R10	86
R3	93	R11	79
R4	79	R12	73
R5	83	R13	85
R6	92	R14	97
R7	80	R15	74
R8	57	--	--

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

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	1981	1971
Luminous Efficacy (lm/W)	130.67	131.40

Spectral Power Distribution & Chromaticity Diagram



2.1.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-10-28	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T802U-0015-30A&B-J 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 %
GZE161032	120.0	60	0.1248	14.59	0.9743	9.82
-C1	277.0	60	0.0590	14.45	0.8835	12.11

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

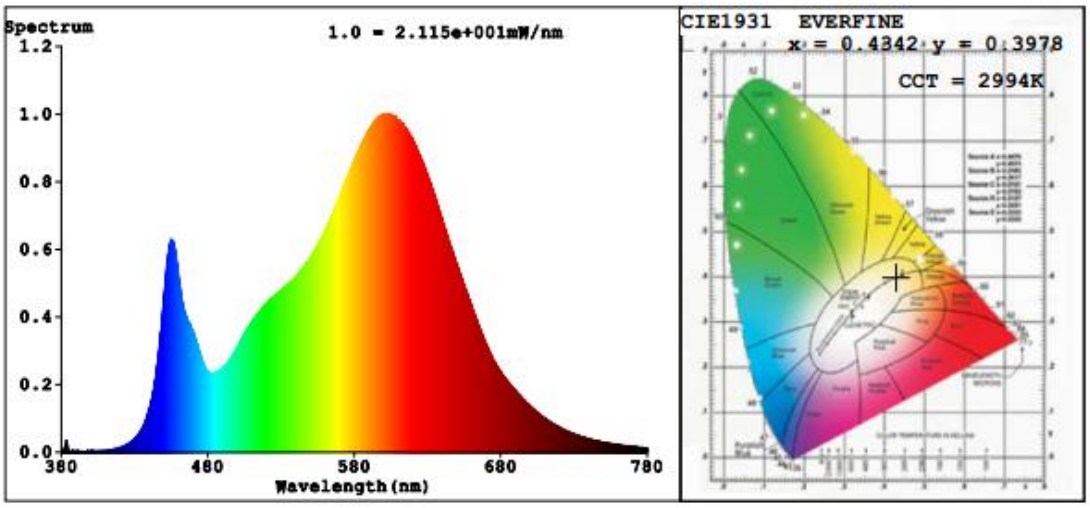
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2994
Duv	-0.0022
Chromaticity (x, y)	x=0.4342 y=0.3978
Chromaticity (u', v')	u'=0.2516 v'=0.5185
Color Rendering Index (CRI)	82.4
R9	6

Special Color Rendering Indices			
R1	82	R9	6
R2	94	R10	86
R3	93	R11	78
R4	79	R12	73
R5	83	R13	85
R6	93	R14	97
R7	80	R15	74
R8	57	--	--

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

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	1922	1908
Luminous Efficacy (lm/W)	131.73	132.04

Spectral Power Distribution & Chromaticity Diagram



Summary	

Sample No.	Test Method	Voltage (Vac)	Frequency (Hz)	Lumen Output(lm)	Lumen Efficacy(lm/w)	Power (W)
GZE161032-C1	With Ballast	120.0	60	1981	130.67	15.16
GZE161032-C1	Connected to line voltage	120.0	60	1922	131.73	14.59

The measured lumen efficacy of test condition “with ballast” was more than test condition “Connect to line voltage”, but had more power consumption. So the following test will be conducted as test condition “with ballast”.

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-10-28	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T802U-0015-30A&B-J OSRAM SYLVANIA QTP 2x32T8/UNV ISN-SC		

Electrical Measurement for 2-lamp in Lithonia 2PM3 9 cell 2x2 parabolic:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161032	120.0	60	0.2560	30.32	0.9868	4.51
-C1,C2	277.0	60	0.1219	30.00	0.8882	8.77

Chromaticity Measurement for 2-lamp in Lithonia 2PM3 9 cell 2x2 parabolic-Sphere-Spectroradiometer Method:

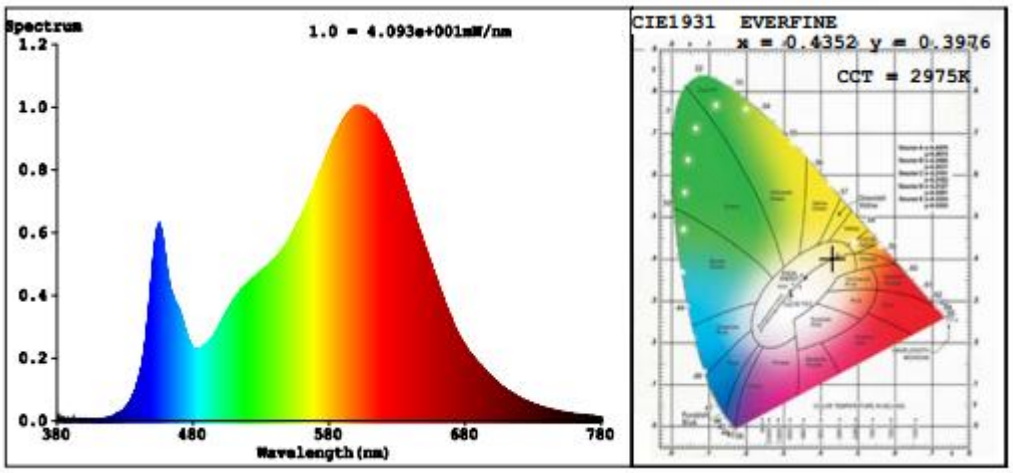
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2975
Duv	-0.0024
Chromaticity (x, y)	x=0.4352 y=0.3976
Chromaticity (u', v')	u'=0.2523 v'=0.5185
Color Rendering Index (CRI)	82.3
R9	6

Special Color Rendering Indices			
R1	82	R9	6
R2	94	R10	86
R3	92	R11	78
R4	79	R12	73
R5	82	R13	85
R6	92	R14	97
R7	80	R15	74
R8	57	--	--

Photometric Measurement 2-lamp in Lithonia 2PM3 9 cell 2x2 parabolic–Goniophotometer Method:

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	3191.7	3175.7
Luminous Efficacy (lm/W)	105.27	105.86
Zonal lumens in the 0-60 °zone (%)	91.1	--
SC: 0-180 °(if applicable)	1.43	--
SC: 90-270 °(if applicable)	1.16	--
Beam Angle ( )	97.9	--
Center Beam Candle Power (cd)	1366	--

Spectral Power Distribution & Chromaticity Diagram

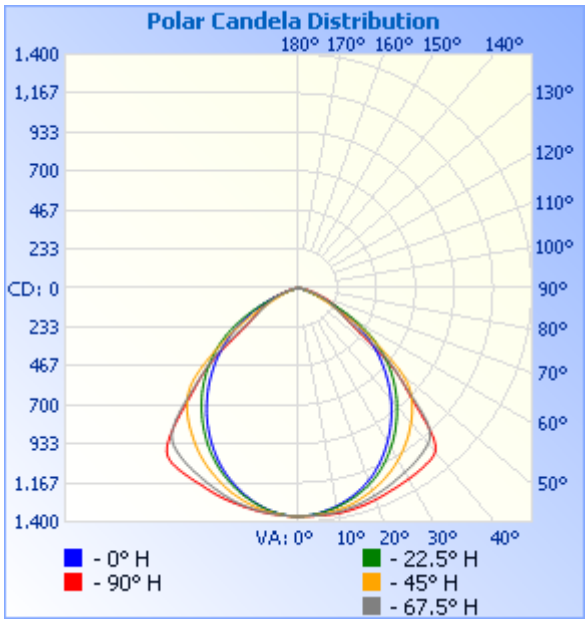


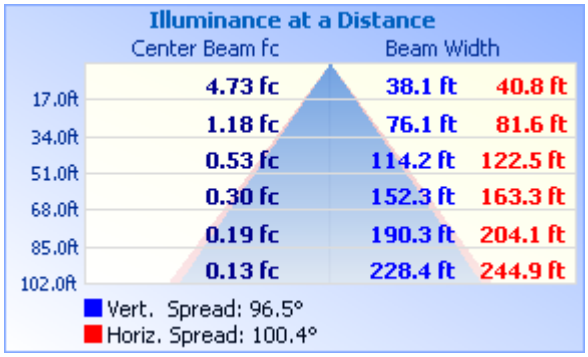
Zonal Lumen Tabulation

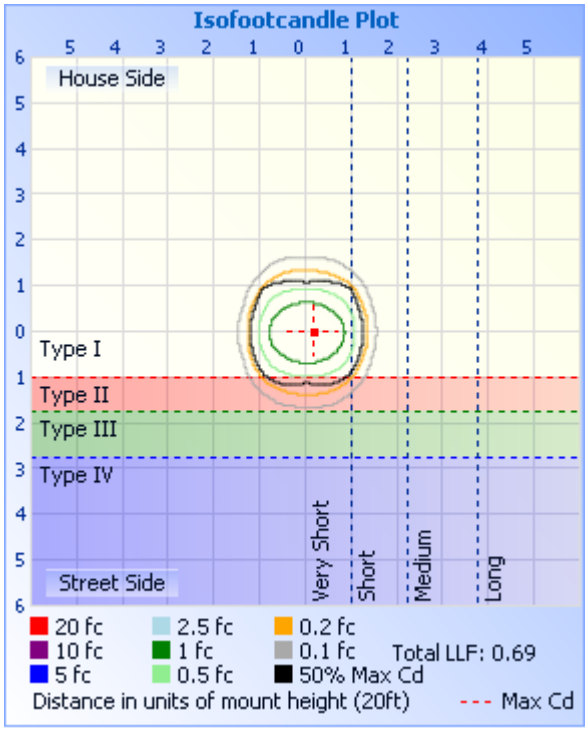
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,068.2	33.5%
0-40	1,766.3	55.4%
0-60	2,907.9	91.1%
60-90	281.3	8.8%
70-100	72.5	2.3%
90-120	0.3	0%
0-90	3,189.2	99.9%
90-180	2.0	0.1%
0-180	3,191.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	129.3	4.1%	90-100	0	0%
10-20	371.3	11.6%	100-110	0.1	0%
20-30	567.7	17.8%	110-120	0.2	0%
30-40	698.1	21.9%	120-130	0.4	0%
40-50	688.0	21.6%	130-140	0.5	0%
50-60	453.6	14.2%	140-150	0.3	0%
60-70	208.8	6.5%	150-160	0.2	0%
70-80	63.0	2.0%	160-170	0.2	0%
80-90	9.4	0.3%	170-180	0.1	0%

Photometric Data







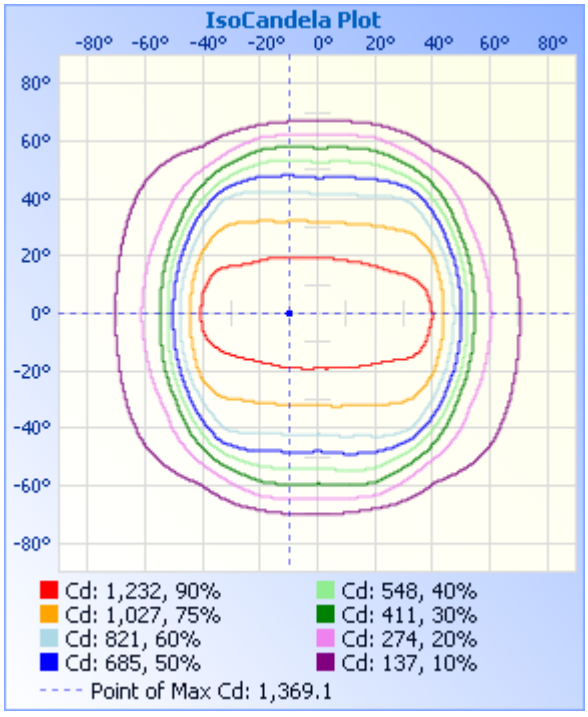


Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	
5	1363	1361	1358	1355	1354	1356	1363	1365	1368	1367	1361	1357	1356	1356	1360	1362	
10	1358	1352	1336	1327	1324	1331	1349	1361	1369	1362	1342	1329	1323	1326	1342	1354	
15	1347	1334	1308	1287	1282	1295	1324	1345	1362	1345	1313	1287	1275	1283	1312	1340	
20	1336	1311	1271	1236	1226	1247	1289	1324	1348	1319	1271	1232	1214	1227	1273	1317	
25	1320	1283	1221	1169	1152	1184	1245	1300	1332	1288	1217	1165	1140	1163	1224	1289	
30	1309	1251	1161	1088	1065	1105	1191	1273	1320	1256	1157	1084	1053	1086	1167	1263	
35	1298	1219	1088	998	967	1016	1125	1248	1306	1221	1087	994	958	1000	1101	1233	
40	1226	1168	1009	898	861	918	1049	1211	1275	1177	1010	893	854	906	1030	1182	
45	924	970	920	790	747	812	962	1039	996	1057	923	787	744	806	945	961	
50	673	694	788	673	626	696	826	746	732	750	814	673	628	696	791	695	
55	368	405	546	542	495	562	553	441	405	462	608	555	508	573	535	392	
60	278	248	321	389	353	400	324	277	298	272	371	420	381	428	309	258	
65	213	183	146	219	206	219	160	207	230	199	178	271	254	260	158	192	
70	139	120	80.7	82.6	87.6	81.6	95.9	138	151	133	99.8	127	132	110	95.3	129	
75	73.3	60.5	41.5	37.0	38.8	38.7	49.0	71.4	80.6	68.9	53.3	54.7	56.5	47.8	49.6	66.0	
80	34.7	27.3	19.3	16.3	16.4	17.0	21.9	32.0	37.1	30.6	25.3	23.0	22.3	20.7	23.6	30.1	
85	10.5	7.68	5.65	4.58	4.45	4.66	5.83	8.24	10.3	8.11	7.25	6.32	5.79	5.99	6.87	8.81	
90	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	
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	0.31	0.00	0.00	0.00	0.00	0.00	0.41	0.37	0.00	0.05	0.00	0.00	0.00	0.27	0.42	
110	0.27	0.27	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.11	0.21	0.00	0.00	0.00	0.48	0.32	
115	0.32	0.37	0.16	0.00	0.00	0.00	0.05	0.32	0.58	0.42	0.32	0.00	0.00	0.00	0.48	0.53	
120	0.42	0.42	0.42	0.00	0.00	0.00	0.37	0.42	0.74	0.64	0.16	0.00	0.16	0.21	0.48	0.53	
125	0.74	0.64	0.53	0.42	0.53	0.42	0.37	0.69	0.80	0.64	0.05	0.11	0.74	0.74	0.48	0.53	
130	0.69	0.74	0.48	0.58	0.63	0.53	0.37	0.74	0.85	0.64	0.05	0.27	0.74	0.74	0.48	0.53	
135	0.80	0.74	0.48	0.58	0.69	0.63	0.43	0.85	0.85	0.64	0.05	0.42	0.69	0.74	0.21	0.53	
140	0.80	0.74	0.26	0.63	0.74	0.85	0.38	0.85	0.80	0.64	0.05	0.48	0.64	0.74	0.16	0.48	
145	0.80	0.74	0.21	0.63	0.69	0.79	0.05	0.74	0.79	0.64	0.05	0.48	0.69	0.79	0.26	0.47	
150	0.80	0.58	0.11	0.63	0.74	0.69	0.00	0.64	0.69	0.64	0.32	0.48	0.64	0.79	0.32	0.37	
155	0.64	0.48	0.11	0.63	0.74	0.69	0.00	0.58	0.64	0.64	0.48	0.48	0.64	0.79	0.43	0.32	
160	0.58	0.48	0.11	0.63	0.74	0.69	0.00	0.58	0.64	0.64	0.48	0.42	0.64	0.79	0.53	0.32	
165	0.58	0.48	0.11	0.63	0.74	0.63	0.00	0.48	0.64	0.64	0.48	0.48	0.64	0.79	0.53	0.48	
170	0.79	0.48	0.21	0.58	0.74	0.53	0.37	0.48	0.64	0.64	0.48	0.47	0.95	1.32	0.69	0.48	
175	0.80	0.48	0.31	0.79	1.16	0.69	0.48	0.48	0.64	0.64	0.48	0.32	0.85	1.22	0.69	0.37	
180	0.69	0.48	0.26	0.79	1.27	0.69	0.43	0.48	0.64	0.64	0.48	0.26	0.79	1.22	0.69	0.43	

2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-10-28	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T802U-0015-35A&B-J 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 %
GZE161032 -C3	120.0	60	0.1286	15.21	0.9853	4.94
	277.0	60	0.0611	15.04	0.8890	8.26

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

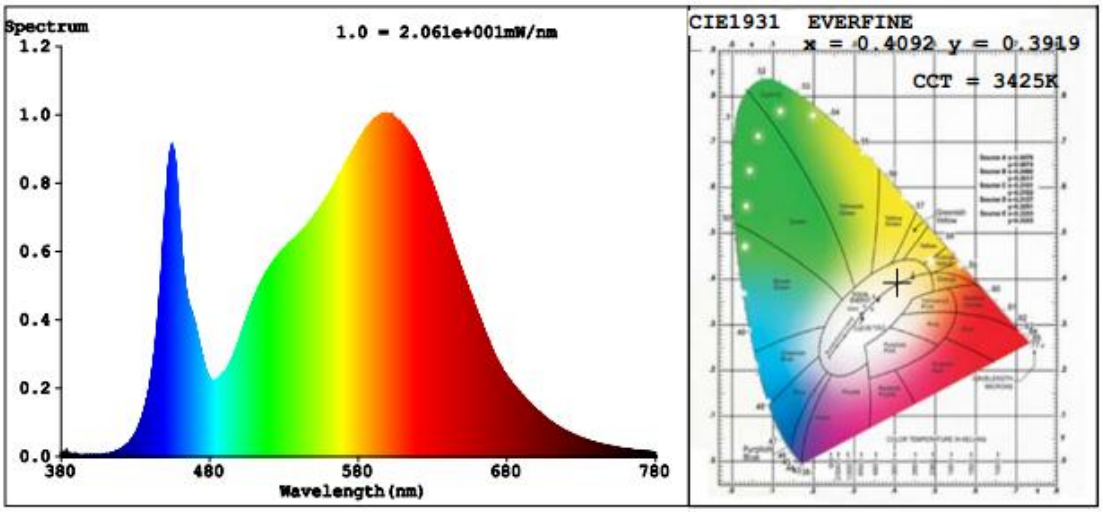
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3425
Duv	-0.0003
Chromaticity (x, y)	x=0.4092 y=0.3919
Chromaticity (u', v')	u'=0.2378 v'=0.5123
Color Rendering Index (CRI)	82.4
R9	7

Special Color Rendering Indices			
R1	81	R9	7
R2	90	R10	77
R3	96	R11	78
R4	80	R12	62
R5	81	R13	83
R6	87	R14	98
R7	84	R15	74
R8	61	--	--

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

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2026	2017
Luminous Efficacy (lm/W)	133.20	134.11

Spectral Power Distribution & Chromaticity Diagram



2.4 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-10-28	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T802U-0015-40A&B-J 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 %
GZE161032 -C4	120.0	60	0.1292	15.28	0.9858	4.74
	277.0	60	0.0615	15.12	0.8871	8.50

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

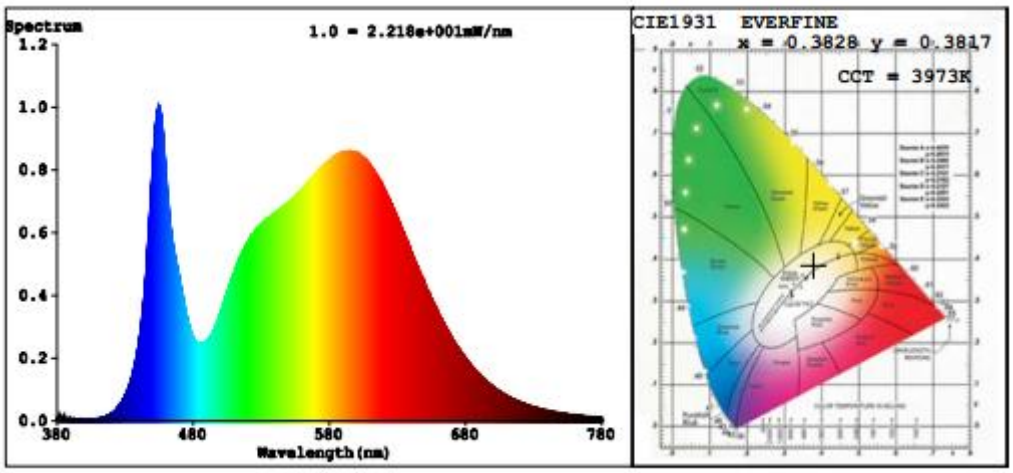
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3973
Duv	0.0016
Chromaticity (x, y)	x=0.3828 y=0.3817
Chromaticity (u', v')	u'=0.2247 v'=0.5041
Color Rendering Index (CRI)	82.2
R9	6

Special Color Rendering Indices			
R1	81	R9	6
R2	89	R10	73
R3	95	R11	77
R4	79	R12	55
R5	80	R13	83
R6	84	R14	97
R7	86	R15	75
R8	63	--	--

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

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2077	2072
Luminous Efficacy (lm/W)	135.93	137.04

Spectral Power Distribution & Chromaticity Diagram



2.5 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-10-28	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T802U-0015-50A&B-J 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 %
GZE161032 -C5	120.0	60	0.1294	15.24	0.9818	4.42
	277.0	60	0.0615	15.09	0.8859	8.59

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

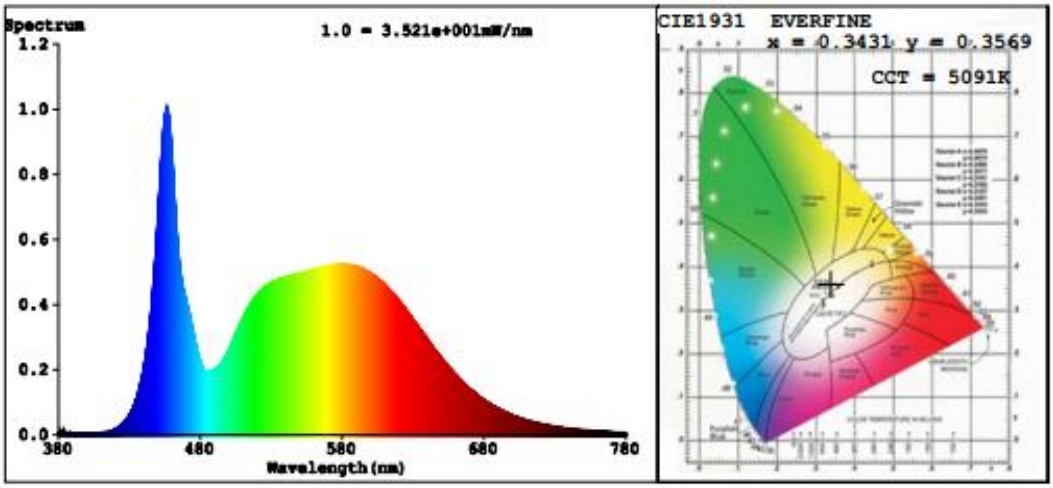
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	5091
Duv	0.0034
Chromaticity (x, y)	x=0.3431 y=0.3569
Chromaticity (u', v')	u'=0.2080 v'=0.4869
Color Rendering Index (CRI)	81.9
R9	4

Special Color Rendering Indices			
R1	80	R9	4
R2	89	R10	72
R3	93	R11	77
R4	79	R12	54
R5	80	R13	83
R6	83	R14	96
R7	86	R15	75
R8	65	--	--

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

Parameter	Result	
Test Voltage (V)	120.0	277.0
Frequency (Hz)	60	60
Total Luminous (lm)	2093	2094
Luminous Efficacy (lm/W)	137.34	138.77

Spectral Power Distribution & Chromaticity Diagram



3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-331	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-01	2017-06-30
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
EE-09	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-01	2017-06-30
PF210	Power Meter for Goniophotometer	2016-07-01	2017-06-30
ST-R-181A	Temperature Tester	2016-07-01	2017-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

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