Photometric Test Report

Relevant Standards

☑ IES LM-79-2008
☑ ANSI C82.77-10-2014
☑ UL1598-2008

Prepared For

Beyond LED Technology

Model Number
ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70
(Blank means without senser; M1 means with sensor.)
Project Number
4790253640
Report Number
4790253640-1a

Test Date
2/18/2022
Issue Date
2/24/2022
Revision Date
N/A

Prepared By	Approved By
Becky Fan	Susie Shao
Becky Fan	Susie Shao

1.0 Test List

Sample Received Date: 2022-2-16

Test No.	Test Item	Sample ID	Model Number	Test Conducted By
1	Integrating Sphere Test	**4671540**	**ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70**	**Lily Chen**
2	Goniophotometer Test	**4671540**	**ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70**	**Lily Chen**
3	THD and PF Test	**4671540**	**ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70**	**Lily Chen**
4	In-Situ Temperature Measurement Test	**4671540**	**ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70**	**Lily Chen**

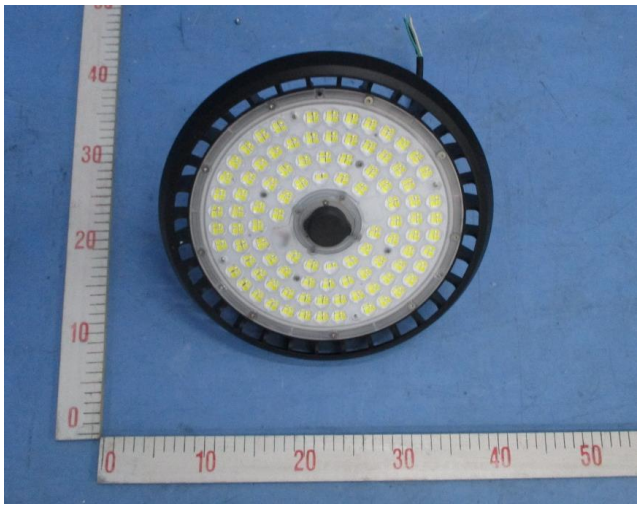
Remark (if any)

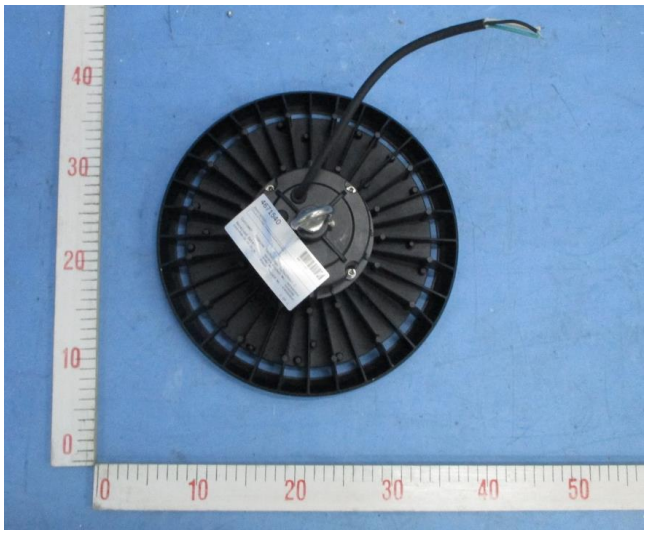
[X] 1. UL test equipment information is recorded on Meter Use in UL's Aurora database.
[X] 2. At the temperature measurement point of LED is referred to the LM-80 test report, which is provided by the customer.
[X] 3. At the temperature measurement point for the hottest location on the driver case is provided by the driver manufacturer or the customer.

2.0 Product Description

Luminaire Description: High Bay Luminaires (Commercial and Industrial)
Model Number: ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70
Electrical Ratings and CCT: 100-277 VAC, 50/60 Hz, 150 W, 5000K
Driver Model Number: G6-160M260A12H
LED Package: BXVN-xxE-21L-3FJ
Family Model and Variation: ZPS-GC377-150W.V7-50K-E1-D3-[Blank; M1]-CM-90-L70 (Blank means without senser; M1 means with sensor.)

Photos of Luminaire Characteristics





3.0 LM-79 Measurement and Test Results

3.1 Integrating Sphere Test

Model No.	ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70	Sample ID.	4671540
Operate time (Min.)	55	Stabilization time (Min.)	50

Test Method

1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric paramters 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 reference standard lamp is power 100W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.
3.The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%.Photometric measurement conditions was using 4π geometry.The self-absorption factor is applied in the final test result.The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 5 nm intervals over the range of 380 to 780 nm.

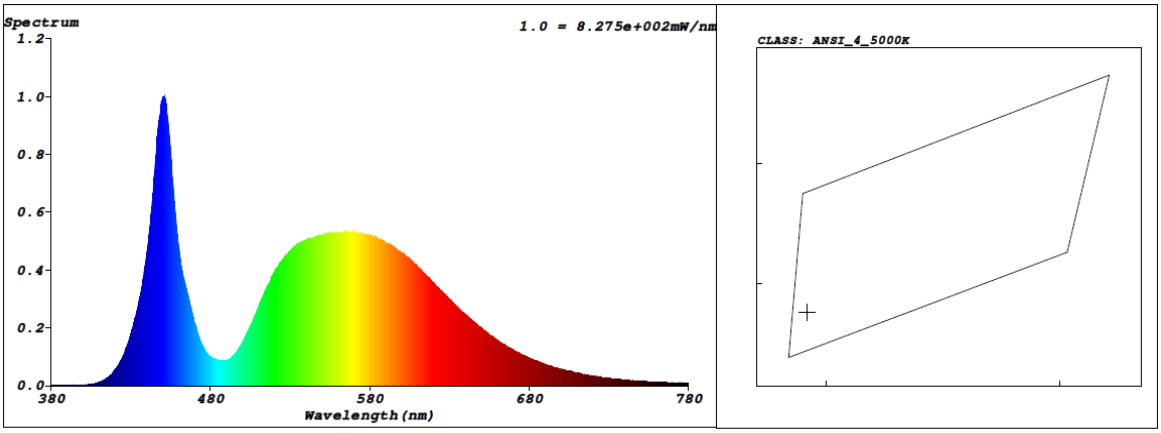
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	119.90	60	1.257	150.5	0.9981	Horizontal

Test Results

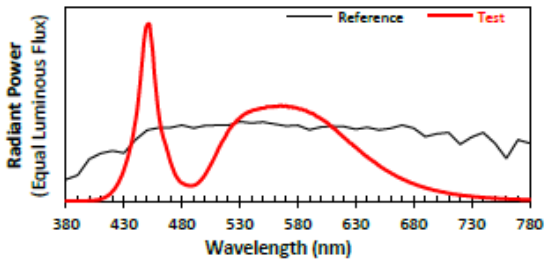
CCT (K)	CRI (Ra)	R9	Rf	Rg	Luminous Flux (lm)	Luminous Efficacy (lm/W)
5226	72	-22	72	94	25587.00	170.01

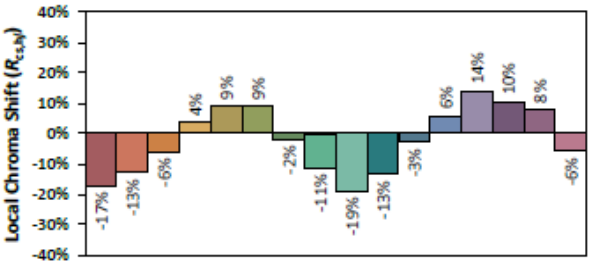
Spectrum

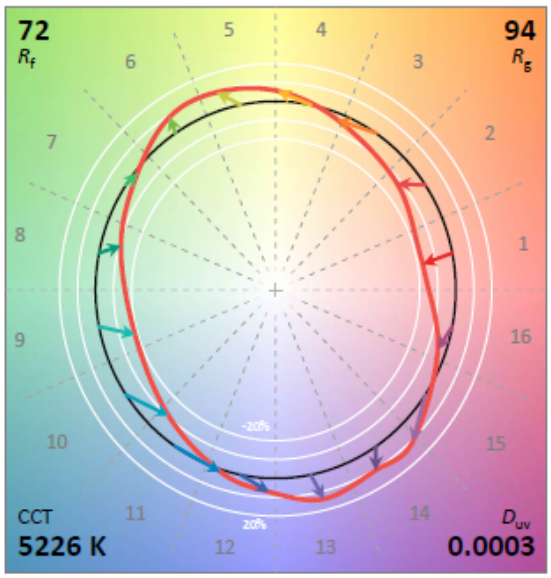


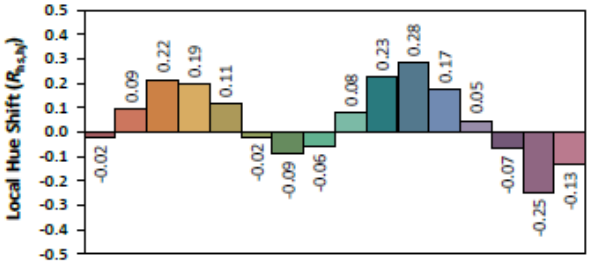
3.1 Integrating Sphere Test (Cont'd)

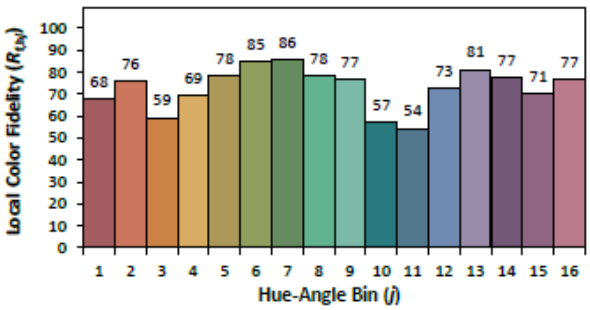
ANSI/IES TM-30-18 Color Rendition Report

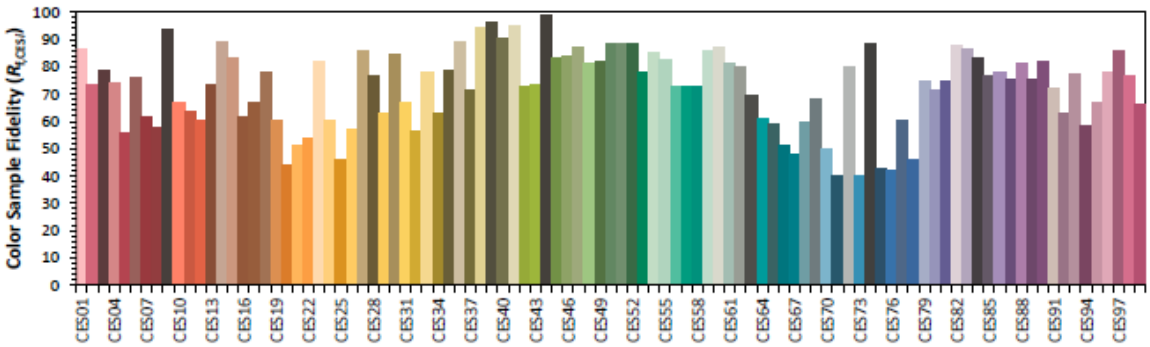












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3391
y	0.3474
u'	0.2090
v'	0.4817

CIE 13.3-1995 (CRI)

R_a	72
R_9	-22

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

3.0 LM-79 Measurement and Test Results

3.2 Goniophotometer Test

Model No.	ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70	Sample ID.	4671540
Operate time (Min.)	60	Stabilization time (Min.)	50

Test Method

1.The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning.
2.Photometric paramters were measured using a type C goniophotometer and software.
3.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 reference standard lamp is power 1000W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.
4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

Goniophotometer Test Conditions

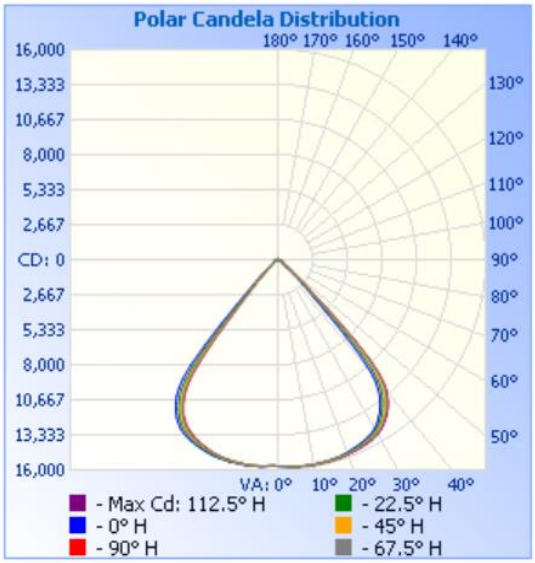
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.7	119.96	60	1.254	150.09	0.9983	Horizontal

Test Result

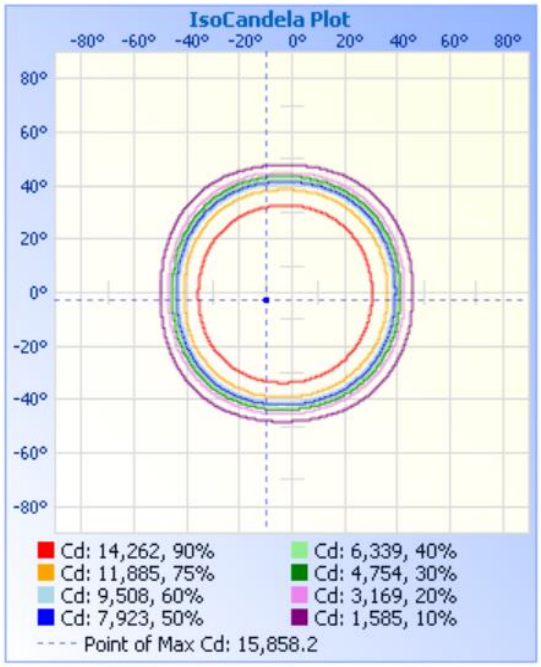
Zonal Lumen Requirement (20-50°)	Field Angle (10%)		Beam Angle (50%)		Flux (lm)	Luminous Efficacy (lm/W)
	Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread		
72.5%	95.8	95.6	82.9	82.6	25746.3	171.54

3.2 Goniophotometer Test (Cont'd)

Light Distribution Curve



IsoCandela Plot



3.2 Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	13,038.9	50.6%
0-40	21,340.1	82.9%
0-60	25,111.0	97.5%
60-90	579.0	2.2%
70-100	278.8	1.1%
90-120	5.9	0%
0-90	25,690.0	99.8%
90-180	56.3	0.2%
0-180	25,746.3	100%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	1,507.0	5.9%	90-100	2.0	0%
10-20	4,459.0	17.3%	100-110	1.8	0%
20-30	7,072.9	27.5%	110-120	2.2	0%
30-40	8,301.2	32.2%	120-130	4.7	0%
40-50	3,283.7	12.8%	130-140	8.6	0%
50-60	487.2	1.9%	140-150	11.7	0%
60-70	302.3	1.2%	150-160	12.0	0%
70-80	204.6	0.8%	160-170	9.5	0%
80-90	72.2	0.3%	170-180	3.9	0%

3.2 Goniophotometer Test (Cont'd)

Intensity Data(cd)

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715	15715
1	15742	15713	15714	15696	15693	15679	15697	15661	15673	15699	15648	15672	15670	15714	15699	15713	15726
2	15750	15735	15715	15706	15701	15695	15687	15705	15678	15694	15674	15680	15691	15710	15707	15699	15737
3	15783	15748	15750	15731	15739	15730	15714	15693	15733	15713	15697	15704	15727	15737	15729	15732	15744
4	15788	15783	15789	15766	15785	15764	15767	15740	15760	15749	15756	15773	15743	15753	15750	15778	15768
5	15801	15816	15809	15781	15790	15790	15784	15799	15792	15743	15744	15766	15761	15790	15771	15787	15786
6	15816	15829	15817	15800	15810	15796	15805	15795	15782	15790	15769	15766	15759	15790	15792	15810	15793
7	15812	15819	15831	15816	15810	15826	15831	15795	15806	15780	15756	15785	15798	15795	15786	15787	15812
8	15804	15831	15831	15820	15829	15851	15828	15818	15821	15796	15777	15769	15786	15777	15777	15810	15814
9	15817	15826	15828	15827	15841	15834	15832	15815	15804	15801	15763	15769	15793	15771	15790	15790	15809
10	15802	15815	15817	15832	15836	15858	15827	15822	15823	15768	15781	15776	15744	15788	15772	15803	15790
11	15803	15823	15824	15830	15845	15838	15840	15826	15809	15760	15761	15735	15763	15747	15747	15776	15816
12	15787	15806	15821	15822	15830	15845	15848	15824	15808	15763	15740	15719	15732	15738	15742	15777	15795
13	15787	15797	15815	15811	15839	15835	15838	15798	15793	15780	15747	15713	15708	15724	15726	15758	15783
14	15756	15791	15825	15809	15832	15825	15841	15813	15803	15776	15698	15697	15680	15695	15703	15750	15772
15	15770	15781	15806	15802	15832	15842	15829	15822	15771	15730	15675	15686	15665	15676	15667	15719	15755
16	15724	15771	15804	15786	15818	15816	15820	15789	15763	15728	15675	15650	15641	15656	15673	15700	15738
17	15715	15748	15781	15798	15807	15828	15809	15785	15749	15694	15637	15613	15595	15613	15631	15665	15727
18	15692	15721	15753	15779	15798	15814	15788	15744	15730	15669	15629	15573	15551	15568	15592	15639	15707
19	15648	15702	15745	15759	15781	15776	15773	15742	15698	15610	15563	15505	15509	15525	15536	15582	15652
20	15609	15659	15716	15735	15753	15758	15729	15695	15659	15589	15505	15450	15438	15452	15495	15550	15631
25	15325	15412	15508	15562	15599	15612	15584	15492	15369	15255	15134	15060	14999	15030	15118	15221	15374
30	14841	15002	15152	15248	15306	15328	15271	15116	14931	14712	14508	14343	14265	14353	14516	14699	14908
35	13711	14013	14280	14446	14537	14525	14388	14106	13738	13332	12931	12631	12526	12743	13077	13445	13828
40	11084	11993	12568	12874	12992	12943	12637	11843	10455	8721	6920	5901	5580	6453	8174	9998	11464
45	3159	4032	5257	6152	6434	6168	5112	3539	2741	2243	1943	1780	1706	1880	2163	2606	3437
50	981	1198	1482	1677	1735	1659	1439	1183	936	760	645	579	561	603	697	855	1086
55	458	480	513	545	563	562	530	492	457	429	417	402	396	409	430	449	472
60	369	385	406	409	408	408	404	393	369	348	339	330	321	331	349	362	376
65	301	314	331	338	337	336	335	324	306	287	281	269	261	269	284	294	308
70	238	249	268	278	274	274	277	265	247	229	220	213	204	208	224	235	245
75	185	194	211	220	219	220	219	212	196	182	172	165	161	165	173	184	190
80	142	153	165	173	178	179	175	171	148	131	121	111	109	116	126	141	148
85	56	82	103	119	123	115	108	84	53	26	12	7	6	12	22	43	70
90	1	2	7	10	12	9	4	2	2	1	0	3	0	2	0	1	3
95	3	1	2	1	2	1	2	3	1	4	1	0	3	3	1	2	3
100	2	1	2	2	1	1	2	3	1	3	3	2	3	1	2	3	2
105	1	2	1	1	2	2	1	1	1	1	1	2	0	2	2	2	3
110	2	1	2	2	2	2	1	3	0	0	3	2	0	3	1	3	2
115	2	2	3	2	2	1	1	2	3	3	1	4	2	3	1	3	2
120	2	3	4	3	3	4	3	4	5	4	4	7	5	3	5	4	3
125	4	4	5	5	4	4	2	6	5	5	7	6	5	5	5	7	5
130	8	8	8	6	5	7	7	9	7	9	7	11	10	9	9	8	8
135	11	11	10	9	9	10	9	10	11	10	12	13	13	12	14	12	12
140	14	15	15	14	14	14	15	13	16	13	16	18	18	17	17	15	14
145	20	18	18	17	17	18	19	19	19	18	21	20	20	22	20	19	19
150	22	21	22	20	20	21	23	24	24	22	24	23	23	24	24	23	23
155	26	24	25	24	26	24	25	23	25	28	29	29	29	26	24	26	25
160	30	29	28	29	27	28	27	28	31	33	31	29	32	31	30	30	31
165	34	34	33	34	34	33	33	35	32	35	35	34	34	35	32	35	34
170	39	39	37	39	39	38	38	36	38	38	40	39	40	39	38	38	38
175	42	44	44	44	42	40	42	42	42	43	39	42	44	43	41	43	41
180	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44

3.2 Corrected UGR values generated per CIE 190-2010

Ceiling		0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
Wall		0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
Floor Cavity			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimension			View Crosswise						View Endwise		
x	y										
2H	2H	13.82	14.90	14.19	15.22	15.54	14.49	15.57	14.86	15.89	16.21
	3H	15.62	16.57	16.01	16.91	17.28	16.36	17.31	16.75	17.65	18.02
	4H	16.40	17.29	16.82	17.64	18.04	17.22	18.10	17.63	18.46	18.85
	6H	17.21	18.02	17.64	18.40	18.80	18.12	18.93	18.54	19.31	19.71
	8H	17.57	18.33	18.01	18.73	19.14	18.58	19.34	19.02	19.74	20.15
	12H	17.81	18.53	18.24	18.92	19.36	19.03	19.75	19.47	20.14	20.58
4H	2H	14.38	15.26	14.79	15.62	16.01	15.01	15.90	15.43	16.25	16.65
	3H	16.41	17.13	16.83	17.54	17.95	17.14	17.86	17.56	18.27	18.69
	4H	17.36	18.00	17.80	18.42	18.88	18.17	18.81	18.61	19.24	19.69
	6H	18.35	18.90	18.82	19.35	19.83	19.27	19.82	19.74	20.27	20.75
	8H	18.78	19.29	19.26	19.75	20.23	19.82	20.33	20.30	20.79	21.27
	12H	19.07	19.52	19.57	20.01	20.49	20.37	20.82	20.86	21.31	21.79
8H	4H	17.71	18.23	18.19	18.68	19.16	18.52	19.04	19.00	19.49	19.97
	6H	18.91	19.32	19.42	19.83	20.32	19.85	20.26	20.36	20.77	21.26
	8H	19.48	19.85	20.01	20.37	20.87	20.56	20.92	21.09	21.45	21.95
	12H	19.87	20.19	20.40	20.70	21.28	21.29	21.61	21.81	22.11	22.69
12H	4H	17.77	18.21	18.26	18.70	19.18	18.58	19.02	19.07	19.51	19.99
	6H	19.03	19.40	19.57	19.87	20.42	19.98	20.35	20.52	20.82	21.37
	8H	19.67	19.99	20.19	20.49	21.07	20.77	21.10	21.30	21.60	22.18

4.0 THD and PF Test

Model No.	ZPS-GC377-150W.V7-50K-E1-D3-M1-CM-90-L70	Sample ID.	4671540

Test Method

1. The samples were tested according to the ANSI C82.77-10-2014.
2. The ambient temperature condition was maintained at 25° C ± 1° C. The sample measurement was made using a digital power meter and power supply. The sample was operated at rated voltage and stabilized before measurement. The total harmonic distortion were calculated from thedigital power meter.

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Current THD
25.5	119.96	60	1.254	150.09	0.9983	1.64%
25.5	277.01	60	0.558	145.15	0.9389	9.64%

5.0 In-Situ Temperature Measurement Test

Test Method

1. In-Situ Temperature Measurement Test is conducted according to the UL1598-2008.
2. The testing was conducted in a room with ambient temperature of 25°C ± 5°C. The apparatus construction followed those described in UL1598-2008 for normal temperature testing. Thermocpuples were placed on the LED package in the locations indicated by LM-80 report. Thermocpuples were placed on the LED driver case in the locations specified by the manufacture if necessary. The temperature was recorded after the lamp was operated by 3.5 hours in stability or by 7.5 hours.

In-Situ Temperature Measurement Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.9	120.00	60	1.254	150.09	0.9983	Horizontal

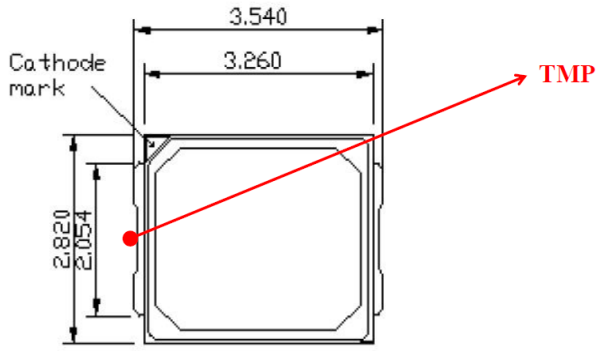
Test Results(LED)

Thermocouple Location	Manufacturer Declared Current (mA)	Temperature for Lighting source (°C)		LED Model Number	LM-80 Limit Current (mA)	LM-80 Limit Temp. (°C)
		Test result column 1	Test result (Correct to 25 °C)			
TMP of LEDs	N/A	56.9	56.0	BXVN-xxE-21L-3FJ	150	105
Ambient temperature	N/A	25.9	25.0			

Test Results(Driver)

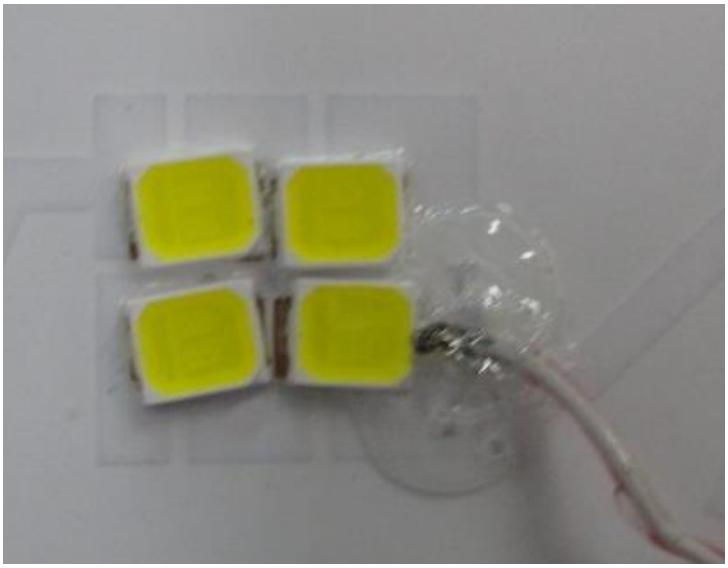
Thermocouple Location	Temperature for Driver (°C)		Driver Model Number	Driver Limit Temp. (°C)
	Test result column 1	Test result (Correct to 25 °C)		
Tc of Driver	51.7	50.8	G6-160M260A12H	75
Ambient temperature	25.9	25.0		

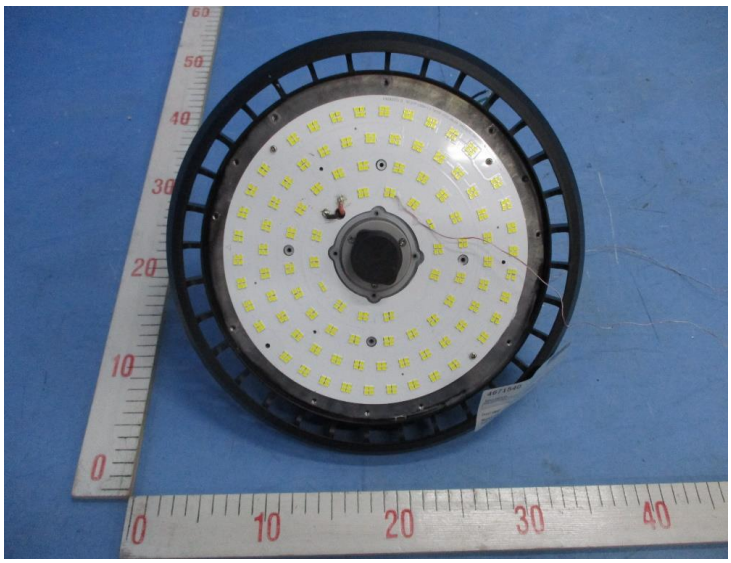
TMP point in LM-80 report



5.0 In-Situ Temperature Measurement Test (Cont'd)

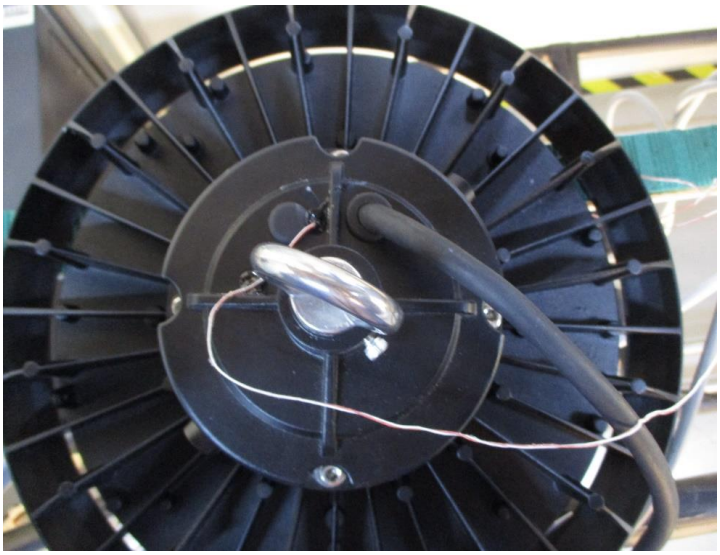
Test Photos for TMP of LED Packages





5.0 In-Situ Temperature Measurement Test (Cont'd)

Test Photos for Tc Point of Driver



TESTING
NVLAP LAB CODE 200952-0

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