



UL-CCIC Company Limited
No.2 Chengwan Road,
Suzhou Industrial Park
Suzhou 215122, China
86-512-68086400



Photometric Test Report

Relevant Standards

- IES LM-79-2008
- ANSI C82.77-2002
- UL1598-2008/ UL1993-2012

Prepared For

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Catalog Number

HL-AR80UW-50@

Project Number

4787531913

Report Number

4787531913_3d

Test Date

11/30/2016-12/1/2016

Issue Date

1/17/2017

Prepared By

Marcel Ma

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Approved By

Duff Yang

Duff Yang

The results contained in this report pertain only to the tested sample.

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1.0 Test Summary

DLC Technical Requirements v4.1

<i>Architectural Flood and Spot Luminaires</i>				
Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Minimum Light Output (lm/ft)	IES LM-79-2008	1000	9861	Pass
Spacing Criteria (0-180°)	IES LM-79-2008	N/A	N/A	N/A
Spacing Criteria (90-270°)	IES LM-79-2008	N/A	N/A	N/A
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	85%	99.80%	Pass
Zonal Lumen Requirement 2	IES LM-79-2008	N/A	N/A	N/A
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	120	122.24	Pass
Allowable CCTs* (K)	IES LM-79-2008	≤5700	4972	Pass
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥65	70.4	Pass
L70 Lumen maintenance (hours)	IES LM-80-2015 IES TM-21-2011	≥50000	≥50000	Pass
L90 Lumen maintenance (hours)	IES LM-80-2015 IES TM-21-2011	≥36000	≥36000	Pass
Power Factor	ANSI C82.77-2002	≥0.9	0.991	Pass
Total Harmonic Distortion (A%)	ANSI C82.77-2002	≤20%	17.10%	Pass
In-Situ Temperature Measurement Test for LED (°C)	UL1598-2008/ UL1993-2012	105	49.8	Pass
In-Situ Temperature Measurement Test for Driver (°C)	UL1598-2008/ UL1993-2012	N/A	N/A	N/A
Minimum Luminaire Warranty (years)	N/A	5	5	Pass

*Defined by ANSI C78.377-2011‡

‡ANSI C78.377-2015 also referred to for Duv and (x,y) chromaticity coordinates tolerances for indoor categories.



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3.0 Test List

Test Item	Test	Test Date	Model Number	Tests Conducted By
1	Integrating Sphere Test	11/30/2016	HL-AR80UW-50@	Gavin Yang
2	Goniophotometer Test	11/30/2016	HL-AR80UW-50@	Gavin Yang
3	THD and PF Test	11/30/2016	HL-AR80UW-50@	Gavin Yang
4	In-Situ Temperature Measurement Test	12/1/2016	HL-AR80UW-50@	Gavin Yang

Remark (if any)

1. UL test equipment information is recorded on Meter Use in UL's Laboratory Project Management (LPM) database.



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4.0 Production Description

Luminaire Description: Architectural Flood and Spot Luminaires

Model Number: HL-AR80UW-50@

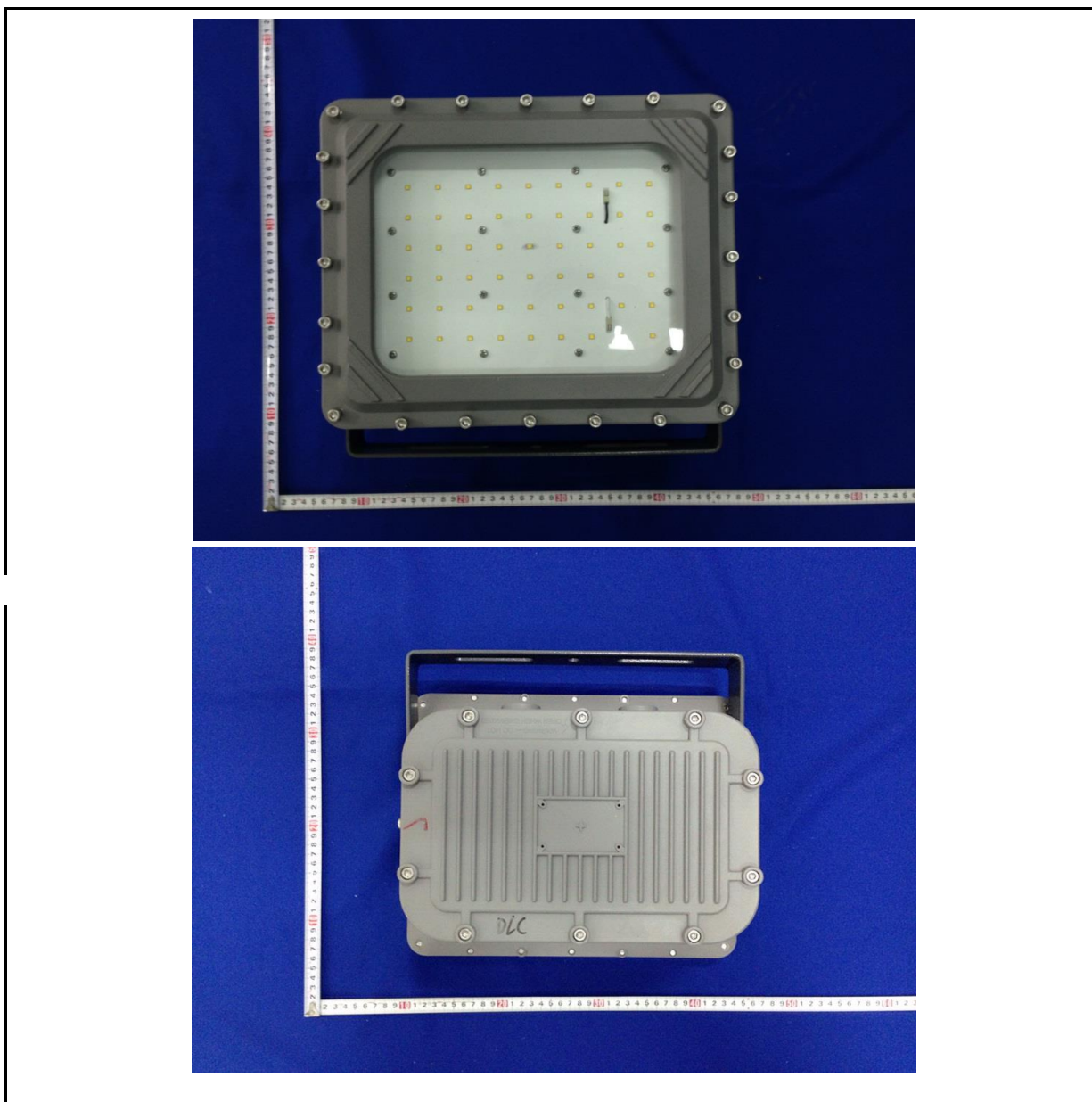
Rated Voltage: 100-240V/277V

Frequency: 50/60 HZ

LED Package: Xlamp XP-G3 White LEDs (Series: XPGDWT)

Variations: @= suffix representing finish color, like B=Bronze, G=Grey, L=Black.

Photos of Luminaire Characteristics





5.0 LM-79 Measurement and Test Results

5.1 Integrating Sphere Test for the lower CCT

Model No.	HL-AR80UW-50@	Sample ID.	428679-5
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1. The sample was tested according to the IES LM-79-2008.
2. Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$.
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. 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 1 nm intervals over the range of 380 to 780 nm.

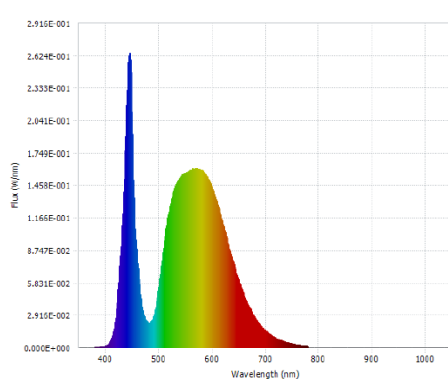
Integrating Sphere Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency(Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	119.96	60	0.6785	80.67	0.991	horizontal

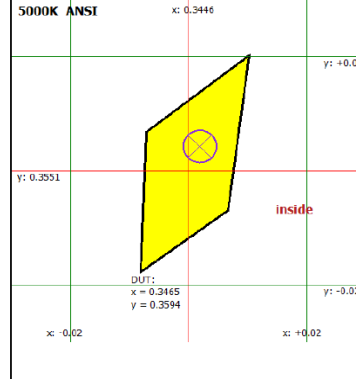
Test Results

CCT (K)	CRI (Ra)	Duv	Luminous Flux (lm)	Luminous Efficacy (lm/W)
4972	70.4	0.0033	9861	122.24

Spectral Flux Graph



Chromaticity Diagram



Spectral Result

Luminous Flux $\Phi(v)$	9861 (lm)	Chrom x	0.3465
Chrom y	0.3594	Chrom u	0.2094
Chrom v	0.3257	Duv	0.0033
Chrom u'	0.2094	Chrom v'	0.4886
CCT	4972.0 (K)	Luminous Efficacy η	122.24 (lm/W)
Ra	70.4	R1	68.6
R2	73.9	R3	78.1
R4	72.2	R5	69.3
R6	65.2	R7	78.8
R8	57.2	R9	-30.2
R10	38.4	R11	70.4
R12	42.0	R13	68.5
R14	87.6	R15	62.5
Rf	68	Rg	96



5.0 LM-79 Measurement and Test Results

5.3 Goniophotometer Test

Model No.	HL-AR80UW-50@	Sample ID.	428679-5
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method

1. The sample was tested according to the IES LM-79-2008.
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.
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 0.5° vertical intervals and 22.5° horizontal intervals.

Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency	Current (A)	Power (W)	Power Factor	Orientation
24.4	120.02	60	0.6748	80.4	0.993	horizontal

Test Result

Flux (lm)	Zonal Lumen Requirement (0°-90°)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
9669.164	99.8%	150.6	152.7	112	115.6	120.26



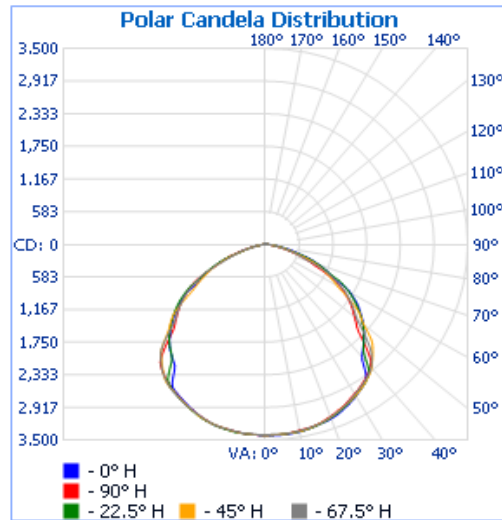
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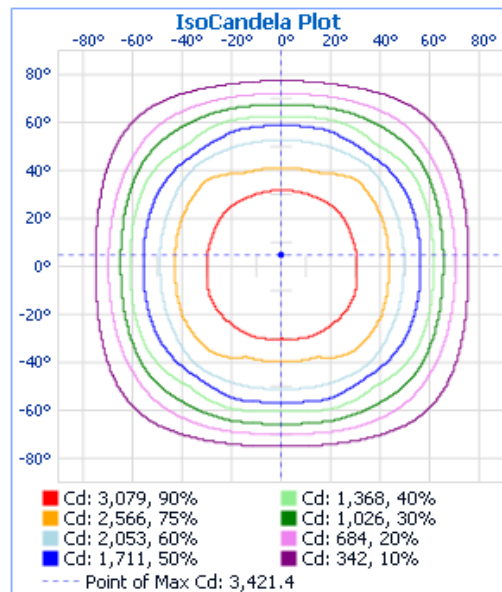
NVLAP LAB CODE: 600106-0

5.2 Goniophotometer Test (Cont'd)

Light Distribution Curve



IsoCandela Plot





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5.2 Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	2,750.8	28.4%
0-40	4,603.3	47.6%
0-60	8,102.7	83.8%
60-90	1,549.6	16%
70-100	472.3	4.9%
90-120	4.9	0.1%
0-90	9,652.4	99.8%
90-180	16.8	0.2%
0-180	9,669.2	100%

Lumens Per Zone

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	81.5	0.8%	90-95	1.1	0%
5-10	243.2	2.5%	95-100	0.8	0%
10-15	400.0	4.1%	100-105	0.8	0%
15-20	547.8	5.7%	105-110	0.7	0%
20-25	680.7	7.0%	110-115	0.7	0%
25-30	797.7	8.2%	115-120	0.7	0%
30-35	896.9	9.3%	120-125	0.9	0%
35-40	955.6	9.9%	125-130	1.0	0%
40-45	965.3	10.0%	130-135	1.2	0%
45-50	918.5	9.5%	135-140	1.3	0%
50-55	856.5	8.9%	140-145	1.3	0%
55-60	759.2	7.9%	145-150	1.3	0%
60-65	623.4	6.4%	150-155	1.3	0%
65-70	455.9	4.7%	155-160	1.1	0%
70-75	280.0	2.9%	160-165	1.0	0%
75-80	137.7	1.4%	165-170	0.8	0%
80-85	44.6	0.5%	170-175	0.6	0%
85-90	8.1	0.1%	175-180	0.2	0%



5.2 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	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411	3411
1	3416	3412	3409	3404	3415	3406	3410	3411	3416	3411	3410	3406	3415	3404	3409	3412	3416
2	3418	3412	3410	3403	3413	3405	3409	3411	3413	3411	3409	3405	3413	3403	3410	3412	3418
3	3418	3412	3409	3401	3411	3405	3408	3410	3410	3410	3408	3405	3411	3401	3409	3412	3418
4	3421	3412	3408	3403	3411	3403	3408	3410	3405	3410	3408	3403	3411	3403	3408	3412	3421
5	3421	3408	3408	3403	3411	3404	3404	3407	3405	3407	3404	3404	3411	3403	3408	3408	3421
6	3417	3406	3409	3402	3407	3401	3404	3406	3404	3406	3404	3401	3407	3402	3409	3406	3417
7	3413	3406	3402	3400	3403	3397	3400	3404	3401	3404	3400	3397	3403	3400	3402	3406	3413
8	3413	3404	3403	3397	3394	3392	3397	3402	3398	3402	3397	3392	3394	3397	3403	3404	3413
9	3407	3402	3397	3390	3387	3385	3390	3400	3391	3400	3390	3385	3387	3390	3397	3402	3407
10	3404	3399	3396	3385	3379	3382	3385	3395	3382	3395	3385	3382	3379	3385	3396	3399	3404
11	3400	3395	3394	3380	3374	3374	3376	3385	3378	3385	3376	3374	3374	3380	3394	3395	3400
12	3389	3388	3387	3375	3370	3369	3366	3379	3371	3379	3366	3369	3370	3375	3387	3388	3389
13	3379	3381	3377	3369	3366	3364	3360	3372	3364	3372	3360	3364	3366	3369	3377	3381	3379
14	3371	3372	3366	3359	3360	3357	3354	3363	3357	3363	3354	3357	3360	3359	3366	3372	3371
15	3366	3364	3355	3352	3351	3349	3347	3356	3352	3356	3347	3349	3351	3352	3355	3364	3366
16	3352	3354	3345	3345	3341	3337	3339	3343	3344	3343	3339	3337	3341	3345	3345	3354	3352
17	3342	3344	3332	3334	3327	3324	3328	3332	3328	3332	3328	3324	3327	3334	3332	3344	3342
18	3338	3335	3320	3320	3310	3310	3316	3319	3320	3319	3316	3310	3310	3320	3320	3335	3338
19	3329	3322	3307	3304	3293	3294	3302	3305	3304	3305	3302	3294	3293	3304	3307	3322	3329
20	3319	3305	3290	3287	3277	3278	3288	3290	3282	3290	3288	3278	3277	3287	3290	3305	3319
25	3237	3219	3203	3203	3191	3198	3190	3200	3178	3200	3190	3198	3191	3203	3203	3219	3237
30	3132	3120	3123	3094	3083	3107	3095	3099	3074	3099	3095	3107	3083	3094	3123	3120	3132
35	3009	3014	3015	2988	2979	2991	3001	2952	2752	2952	3001	2991	2979	2988	3015	3014	3009
40	2599	2706	2861	2849	2824	2812	2791	2542	2545	2542	2791	2812	2824	2849	2861	2706	2599
45	2406	2410	2625	2526	2344	2489	2499	2362	2348	2362	2499	2489	2344	2526	2625	2410	2406
50	2203	2194	2210	2057	2010	2023	2135	2116	2095	2116	2135	2023	2010	2057	2210	2194	2203
55	1968	1938	1832	1798	1770	1762	1685	1640	1793	1640	1685	1762	1770	1798	1832	1938	1968
60	1668	1643	1392	1508	1483	1444	1306	1502	1346	1502	1306	1444	1483	1508	1392	1643	1668
65	1203	1207	1115	1152	1038	1022	1008	1069	1037	1069	1008	1022	1038	1152	1115	1207	1203
70	882	861	782	664	696	619	639	695	623	695	639	619	696	664	782	861	882
75	523	444	415	388	356	322	325	332	321	332	325	322	356	388	415	444	523
80	246	213	183	156	134	116	113	120	115	120	113	116	134	156	183	213	246
85	57	52	43	36	31	26	22	22	22	22	22	22	26	31	36	43	52
90	6	5	4	4	3	2	2	2	2	2	2	2	2	3	4	4	5
95	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
100	2	2	1	1	2	1	1	1	1	1	1	1	1	2	1	1	2
105	1	1	2	1	1	2	1	2	1	2	1	2	1	1	2	1	1
110	1	1	1	1	2	1	2	2	1	2	2	1	2	1	1	1	1
115	2	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	2
120	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2
125	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
130	2	2	2	2	2	3	2	3	3	3	2	3	2	2	2	2	2
135	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3
140	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
145	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
150	4	4	4	5	4	4	5	5	5	5	5	4	4	5	4	4	4
155	5	5	5	5	5	5	5	5	6	5	5	5	5	5	5	5	5
160	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
165	7	7	6	6	6	6	6	7	6	7	6	6	6	6	6	7	7
170	7	7	8	8	8	8	8	7	8	7	8	8	8	8	8	7	7
175	9	8	8	8	8	8	8	9	8	8	9	8	8	8	8	8	9
180	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8



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6.0 THD and PF Test

Model No.	HL-AR80UW-50@	Sample ID.	428679-5
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Test Method

1. The samples were tested according to the ANSI C82.77-2002.
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 the digital power meter.

Test Results

Temperature (°C)	Voltage (Vac)	Frequency	Current (A)	Power (W)	Power Factor	Current THD
24.9	277.02	60	0.3019	75.83	0.9067	17.10%



7.0 In-Situ Temperature Measurement Test

Model No.	HL-AR80UW-50@	Sample ID.	428679-5
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Test Method

1. In-Situ Temperature Measurement Test is conducted according to the UL1598-2008, Section 14 or UL1993-2012, Section 8.5.
 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. Thermocouples were placed on the LED package in the locations indicated by LM-80 report. 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	Current (A)	Power (W)	Power Factor	Orientation
24.5	120.02	60	0.6748	80.67	0.9911	horizontal

Test Results(LED)

Thermocouple Location	Manufacturer Declared Current (mA)	Temperature for Lighting source (°C)		Model Number	LM-80 Limit Current (mA)	Limit Temp. (°C)
		Test result column 1	Test result (Correct to 25 °C)			
TMP of LEDs	525	49.3	49.8	Xlamp XP-G3 White LEDs (Series: XPGDWT)	1000	55
TMP of Driver	N/A	54.4	54.9	HLG-100H-36A	N/A	90
Ambient temperature	N/A	24.5	25.0	N/A	N/A	N/A



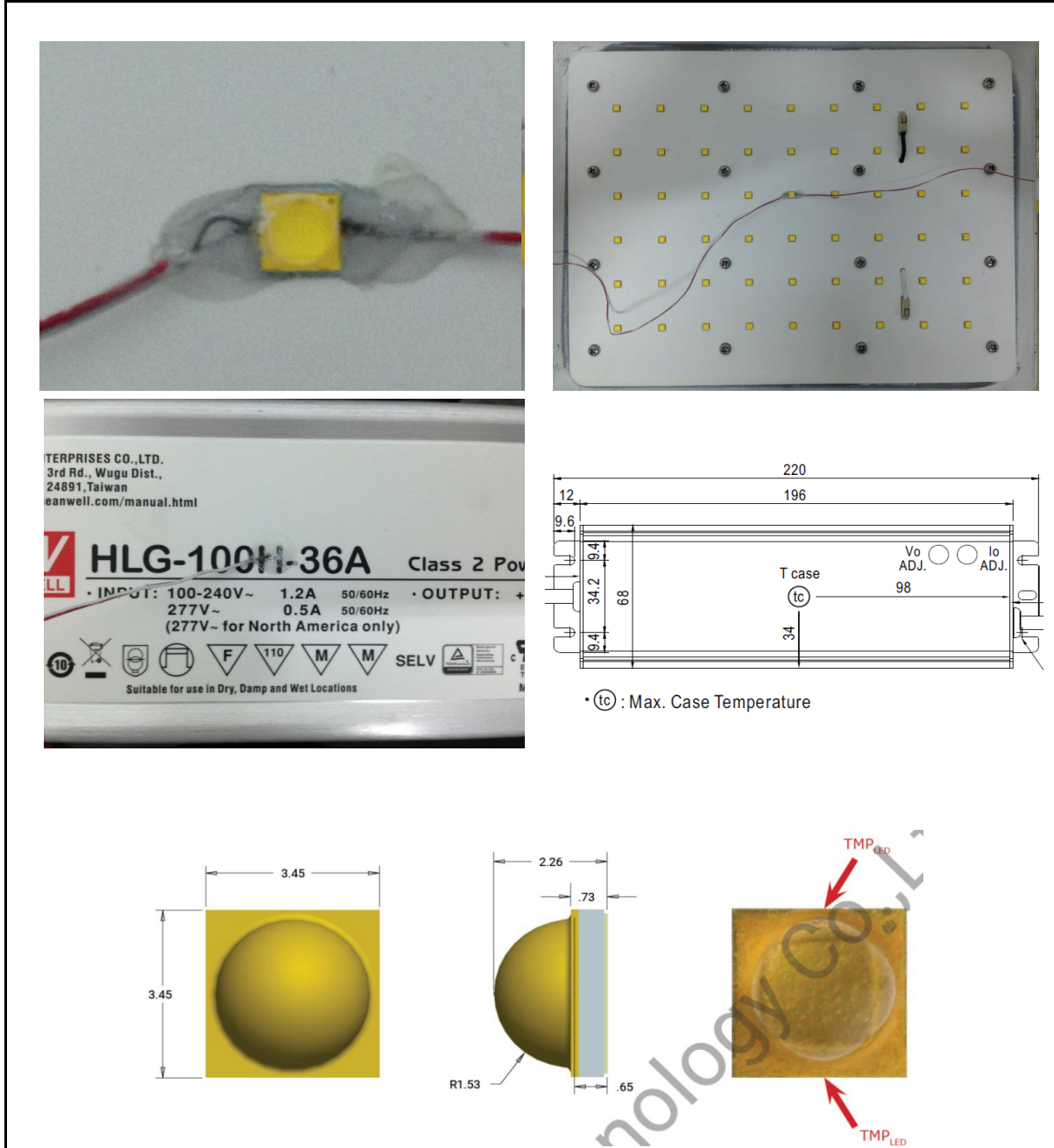
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7.0 In-Situ Temperature Measurement Test (Cont'd)

Test Photos for Tc Point of LED Packages





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