OPTICAL ENERGY DESIGN & DEVICES

www.herculux.cn

HERCULUX

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Shenzhen Herculux photoelectric technology co., LTD
Address: shenzhen nanshan district nanshan cloud valley innovation industrial park comprehensive service building, 501-505
Factory: chengdu shuangliu district, iot industrial park 2 road herculux photoelectric park
TEL: 0755-2937 1541 FAX: 0755-2907 5140

Specification

1.	Product Number:	HK-50@14-13_40-D6-20-1g-1
2.	Family:	Focus
3.	Type:	Single
4.	Size(L*W*H/Φ*H):	Φ:50mm; H:13.9mm
5.	Material:	PC
6.	Efficiency:	80%
7.	Operating Temperature(T_{opr}):	-40℃ to +120℃
8.	Waterproof:	\
9.	Standard FWHM:	13° -40°
10.	Suitable LES:	6mm
11.	Application:	Indoor lighting: down light, track light...
12.	Technology:	Calculus principle, Fresnel technology, multi-level reflect technology

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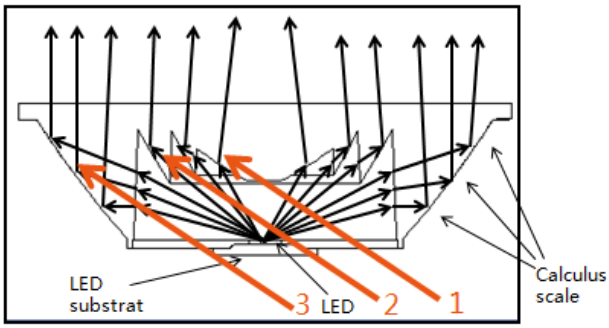
Technology

Multi-level Reflect Technology-Photon

- **Design Principle :** • Photon Lens designed by one refracting surface and several fully reflecting surfaces, can control the light distribution well by lower lens height



Multi-level Reflect Technology-Photon

Why can make the light distribution well by lower lens height ?

- 1、Area 1 is refracting surface, control the light from the middle of the LED, to control the small beam angle;
- 2、Area 2 are fully reflecting surfaces, little far away from the COB, control some long lights to be small beam angle;
- 3、Area 3 are periphery fully reflecting surfaces, control the outermost lights also the best lights, can make smaller beam angle and make a clear edge light spot;

- The multi-level reflect technology separate the lights to be 3 areas, and control every part light very well by different best technology, to make sure get a clear edge light spot even lower lens height!

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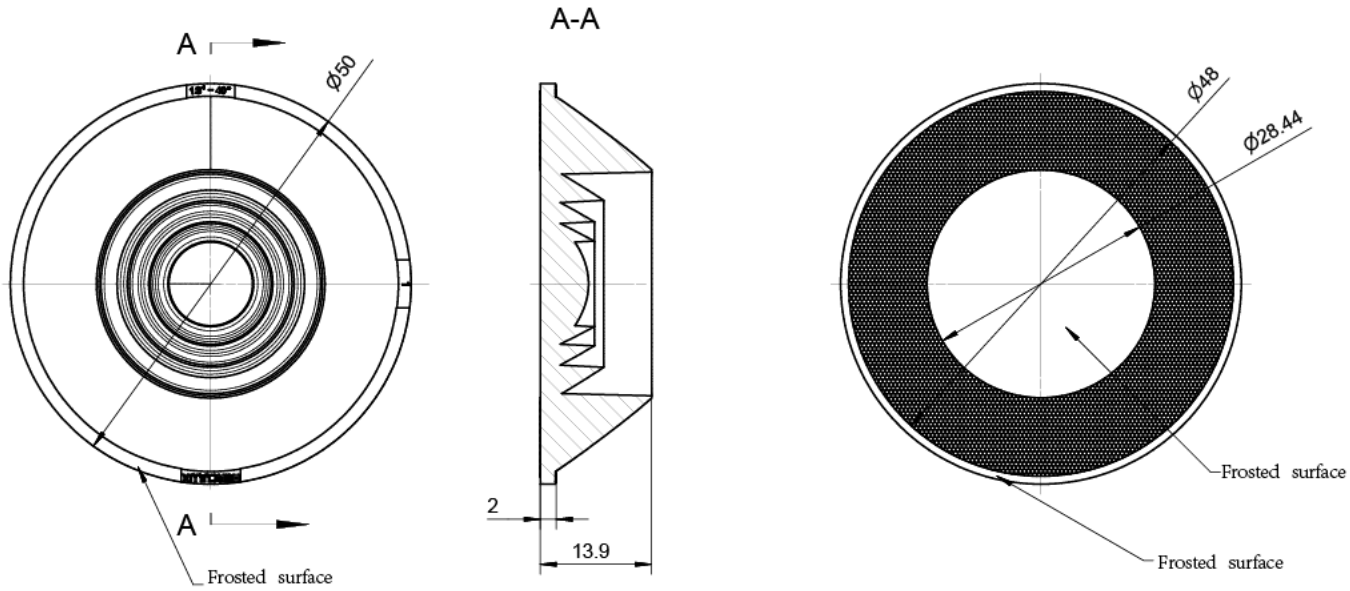
2Ddrawing



Technical Requirement:

1. The surface don't have any defects of flash, shrink and bubble.
2. The uncharted fillet and pattern draft subiect to the 3D drawing.
3. The uncharted dimensional tolerance subiect to the 3D drawing.
4. The thimble can't exist at the undersurface of the locating pillar.

Optical Design			HK 50@14(13° -40°)zoom Lens	HK-50@14-13_40-D6-20-1g-1		1.01.7921
Structure Design				Pages	Qty	Weight
Assess				2		
Authorized			Material:PC	CDHK		

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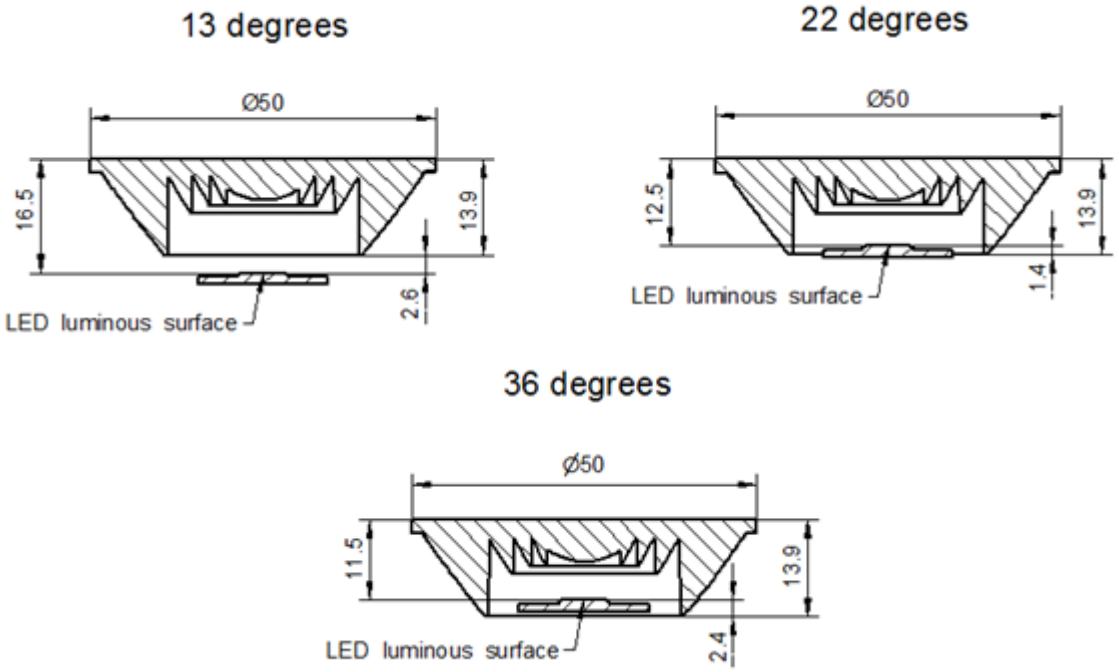
D50 zoom position



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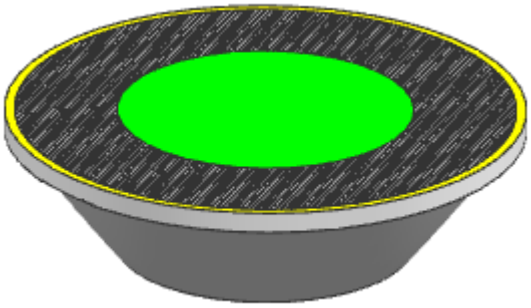
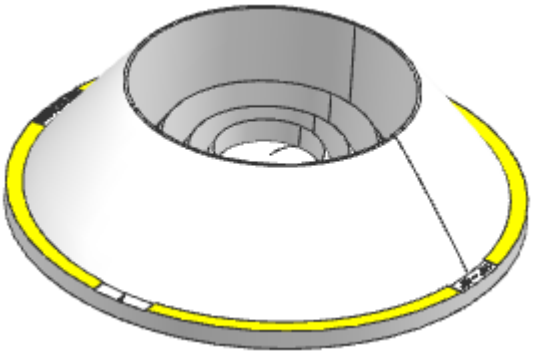
3D drawing





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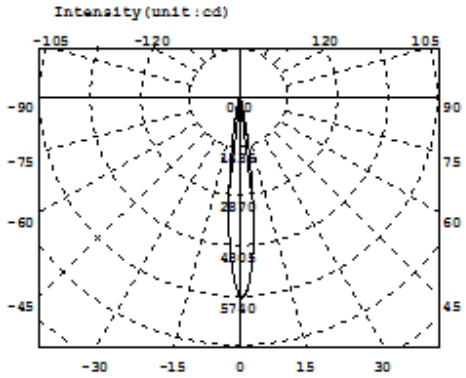
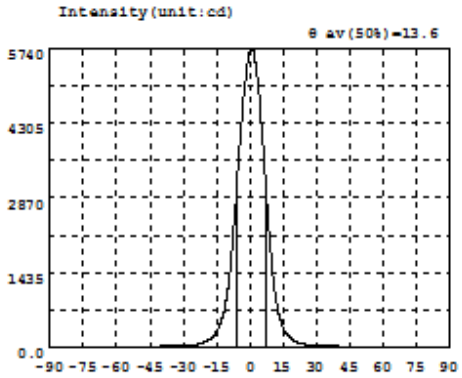
Test report

Test light source: CREE 1204

Small angle test





Intensity data:(deg , cd) C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	2.089	-58.5	16.06	-27.0	53.79	4.5	4687	36.0	36.32	67.5	12.24
-88.5	2.408	-57.0	16.19	-25.5	60.10	6.0	3848	37.5	34.14	69.0	11.56
-87.0	2.728	-55.5	16.99	-24.0	68.77	7.5	2921	39.0	32.03	70.5	10.80
-85.5	3.059	-54.0	18.01	-22.5	81.23	9.0	2056	40.5	29.94	72.0	10.08
-84.0	3.497	-52.5	19.17	-21.0	98.92	10.5	1357	42.0	27.98	73.5	9.345
-82.5	4.315	-51.0	20.41	-19.5	124.4	12.0	873.2	43.5	26.28	75.0	8.695
-81.0	5.107	-49.5	21.77	-18.0	162.7	13.5	580.2	45.0	24.88	76.5	8.093
-79.5	5.846	-48.0	22.90	-16.5	219.1	15.0	391.0	46.5	23.72	78.0	7.473
-78.0	6.550	-46.5	23.89	-15.0	302.9	16.5	273.0	48.0	22.56	79.5	6.749
-76.5	7.225	-45.0	25.11	-13.5	433.8	18.0	199.2	49.5	21.42	81.0	6.021
-75.0	7.850	-43.5	26.78	-12.0	629.7	19.5	149.4	51.0	20.34	82.5	5.224
-73.5	8.515	-42.0	28.47	-10.5	943.2	21.0	116.8	52.5	19.28	84.0	4.355
-72.0	9.194	-40.5	30.25	-9.0	1441	22.5	94.84	54.0	18.33	85.5	3.577
-70.5	9.958	-39.0	32.35	-7.5	2152	24.0	79.25	55.5	17.33	87.0	3.220
-69.0	10.70	-37.5	34.41	-6.0	2975	25.5	67.71	57.0	16.45	88.5	2.794
-67.5	11.49	-36.0	36.31	-4.5	3886	27.0	59.38	58.5	15.94	90.0	2.480
-66.0	12.23	-34.5	38.16	-3.0	4681	28.5	53.07	60.0	16.05		
-64.5	13.00	-33.0	40.27	-1.5	5289	30.0	48.22	61.5	14.90		
-63.0	13.77	-31.5	42.53	0.0	5676	31.5	44.27	63.0	14.15		
-61.5	14.75	-30.0	45.33	1.5	5696	33.0	41.15	64.5	13.49		
-60.0	15.49	-28.5	49.06	3.0	5317	34.5	38.58	66.0	12.88		

Electricity Parameter:

Current I: 0.1000A Power: 3.660W
Voltage V: 36.59V PF: 0.000

Optical Parameter(Distance=2.559m):

Equivalent Luminous flux: Φ eff= 521.81lm Efficiency: Eff=142.60lm/W
Diffuse angle: @(25%): 19.3deg @(50%): 13.6deg @(75%): 8.9deg @(50%): 13.6deg
Diffuse angle: @(25%): 19.3deg @(50%): 13.8deg @(75%): 9.1deg @(50%): 13.8deg
Imax=5740cd (C=0.0deg,G=1.0deg) C0-180Plane Imax= 5740cd(G=1.0deg)
C0-180Plane I0= 5676cd

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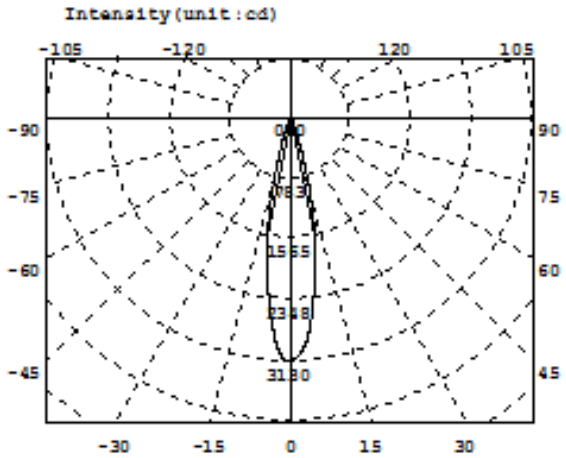
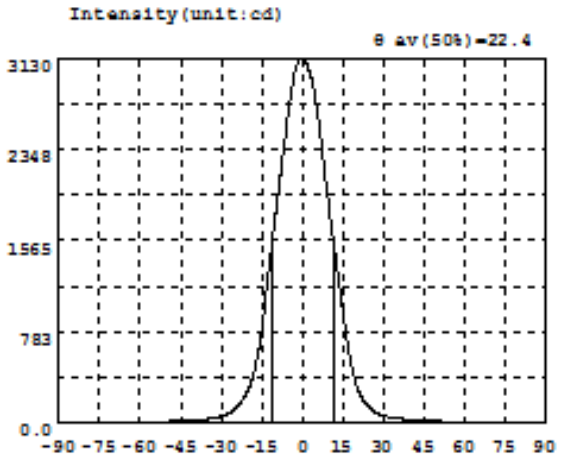
Middle angle test





Intensity data:(deg , cd) C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	1.643	-58.5	10.77	-27.0	87.79	4.5	2828	36.0	41.05	67.5	9.112
-88.5	2.064	-57.0	11.34	-25.5	110.6	6.0	2590	37.5	37.36	69.0	8.672
-87.0	2.319	-55.5	11.99	-24.0	142.4	7.5	2303	39.0	33.95	70.5	8.208
-85.5	2.653	-54.0	12.72	-22.5	186.4	9.0	2013	40.5	30.71	72.0	7.666
-84.0	3.178	-52.5	13.59	-21.0	243.5	10.5	1736	42.0	27.76	73.5	7.070
-82.5	3.816	-51.0	14.63	-19.5	319.5	12.0	1478	43.5	25.23	75.0	6.648
-81.0	4.416	-49.5	15.81	-18.0	427.9	13.5	1224	45.0	23.11	76.5	6.322
-79.5	4.940	-48.0	17.12	-16.5	582.1	15.0	966.7	46.5	21.37	78.0	6.007
-78.0	5.437	-46.5	18.63	-15.0	799.4	16.5	720.6	48.0	19.85	79.5	5.591
-76.5	5.841	-45.0	20.26	-13.5	1082	18.0	521.6	49.5	18.28	81.0	5.131
-75.0	6.120	-43.5	22.16	-12.0	1386	19.5	369.7	51.0	16.92	82.5	4.575
-73.5	6.443	-42.0	24.29	-10.5	1680	21.0	271.7	52.5	15.69	84.0	3.951
-72.0	6.817	-40.5	26.81	-9.0	1953	22.5	206.0	54.0	14.54	85.5	3.281
-70.5	7.404	-39.0	29.62	-7.5	2225	24.0	158.2	55.5	13.51	87.0	2.856
-69.0	7.877	-37.5	32.63	-6.0	2503	25.5	122.9	57.0	12.65	88.5	2.569
-67.5	8.334	-36.0	35.94	-4.5	2770	27.0	97.85	58.5	11.89	90.0	2.375
-66.0	8.731	-34.5	40.07	-3.0	2980	28.5	79.98	60.0	11.28		
-64.5	9.177	-33.0	45.08	-1.5	3101	30.0	67.29	61.5	10.74		
-63.0	9.593	-31.5	51.45	0.0	3127	31.5	58.01	63.0	10.33		
-61.5	9.941	-30.0	59.93	1.5	3078	33.0	50.92	64.5	9.952		
-60.0	10.33	-28.5	71.53	3.0	2985	34.5	45.42	66.0	9.536		

Electricity Parameter:

Current I: 0.1000A Power: 3.660W
Voltage V: 36.59V PF: 0.000

Optical Parameter(Distance=2.559m):

Equivalent Luminous flux: Φ eff= 612.1lm Efficiency: Eff=167.26lm/W
Diffuse angle: @(25%): 31.2deg @(50%): 22.4deg @(75%): 14.0deg @(50%): 22.4deg
Diffuse angle: @(25%): 31.2deg @(50%): 22.5deg @(75%): 14.0deg @(50%): 22.5deg
Imax=3129cd (C=0.0deg,G=-0.5deg) C0-180Plane Imax= 3129cd(G=-0.5deg)
C0-180Plane I0= 3127cd

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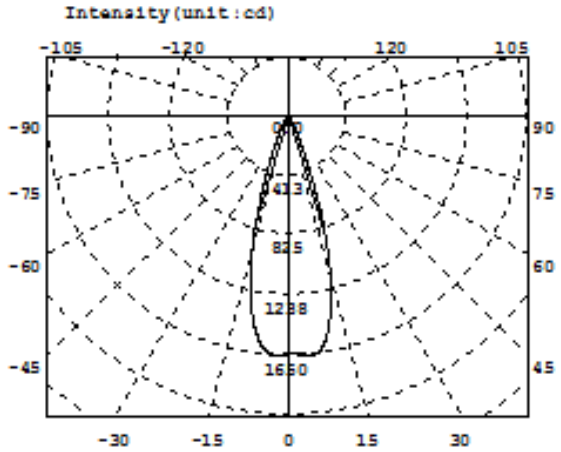
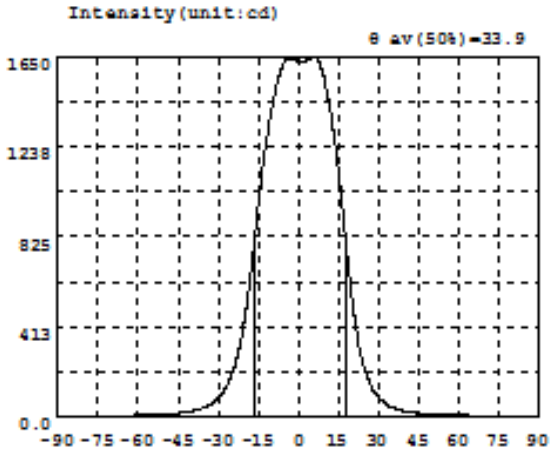
Big angle test





Intensity data:(deg , cd) C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	1.452	-58.5	9.531	-27.0	138.7	4.5	1642	36.0	41.88	67.5	7.751
-88.5	1.796	-57.0	10.04	-25.5	178.3	6.0	1648	37.5	35.95	69.0	7.292
-87.0	1.962	-55.5	10.62	-24.0	228.3	7.5	1629	39.0	31.31	70.5	6.845
-85.5	2.321	-54.0	11.34	-22.5	294.8	9.0	1579	40.5	27.50	72.0	6.408
-84.0	2.729	-52.5	12.21	-21.0	386.0	10.5	1500	42.0	24.32	73.5	5.961
-82.5	3.139	-51.0	13.25	-19.5	502.3	12.0	1397	43.5	21.56	75.0	5.584
-81.0	3.624	-49.5	14.47	-18.0	642.7	13.5	1273	45.0	19.19	76.5	5.277
-79.5	4.020	-48.0	15.81	-16.5	802.3	15.0	1127	46.5	17.34	78.0	5.033
-78.0	4.428	-46.5	17.37	-15.0	966.1	16.5	960.9	48.0	15.88	79.5	4.636
-76.5	4.810	-45.0	19.31	-13.5	1121	18.0	781.9	49.5	14.69	81.0	4.212
-75.0	5.064	-43.5	21.65	-12.0	1256	19.5	609.0	51.0	13.59	82.5	3.765
-73.5	5.336	-42.0	24.30	-10.5	1371	21.0	461.4	52.5	12.66	84.0	3.232
-72.0	5.719	-40.5	27.58	-9.0	1468	22.5	335.5	54.0	11.90	85.5	2.758
-70.5	6.165	-39.0	31.46	-7.5	1547	24.0	255.4	55.5	11.18	87.0	2.344
-69.0	6.565	-37.5	35.98	-6.0	1603	25.5	195.0	57.0	10.56	88.5	1.949
-67.5	7.025	-36.0	41.45	-4.5	1634	27.0	150.1	58.5	10.07	90.0	1.701
-66.0	7.480	-34.5	48.33	-3.0	1643	28.5	116.9	60.0	9.633		
-64.5	7.863	-33.0	57.33	-1.5	1638	30.0	92.23	61.5	9.253		
-63.0	8.260	-31.5	69.58	0.0	1628	31.5	73.44	63.0	8.877		
-61.5	8.620	-30.0	86.16	1.5	1621	33.0	59.60	64.5	8.500		
-60.0	9.043	-28.5	108.8	3.0	1628	34.5	49.44	66.0	8.119		

Electricity Parameter:

Current I: 0.1000A Power: 3.660W
Voltage V: 36.59V PF: 0.000

Optical Parameter(Distance=2.559m):

Equivalent Luminous flux: Φ eff= 601.6lm Efficiency: Eff=164.39lm/W
Diffuse angle: @(25%): 42.1deg @(50%): 33.9deg @(75%): 26.1deg @(50%): 33.9deg
Diffuse angle: @(25%): 42.3deg @(50%): 34.0deg @(75%): 26.4deg @(50%): 34.0deg
Imax=1648cd (C=0.0deg,G=5.5deg) C0-180Plane Imax= 1648cd(G=5.5deg)
C0-180Plane I0= 1628cd

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Quality detection

Sample test report

1.Size		Standard	Upper limit	Lower limit	Test result 1	Test result 2	Test result 3	Judge
	OD	50	50.15	49.85	49.93	49.92	49.93	OK
	Height	13.9	14	13.8	13.86	13.90	13.83	OK
	BH	2	2.1	1.9	1.97	1.99	1.97	OK
		Cutting the spure object to no effect for the quality						
2. optical indicatrix	Suitable LED	CREE 1204						
		Appearance standard			Test result 1	Test result 2	Test result 3	Judge
	Small angle	angle	13±2°		12.9°	13.6°	12.8°	OK
		K value	＞8.8		12	11	12	OK
		transmittance	＞80%		83.2%	82.4%	82.1%	OK
	Middle angle	angle	22±2°		22.4°	21.9°	22.2°	OK
		K value	＞4.3		5.1	5.3	5.2	OK
		transmittance	＞86%		88.9%	89.4%	89.8%	OK
	Big angle	angle	36±3°		33.9°	34.3°	33.8°	OK
		K value	＞2.4		2.7	2.7	2.8	OK
		transmittance	＞84%		93%	92.7%	86.7%	OK
	facula	See sample signed sealed samples						
3. Appearance quality		Find the attached <the appearance inspection standard>	E	No burrs No stains	No burrs No stains	No burrs No stains	No burrs No stains	OK
4. Material		PC			Colour	transparent		OK
Comprehensive judgment		OK						

Notes：

Tool Number ： V-vernier 2D-quadratic element H-height gauge M-measuring microscope

P-Knitting pin T-thickness gauge R-radius gauge E-eye survey

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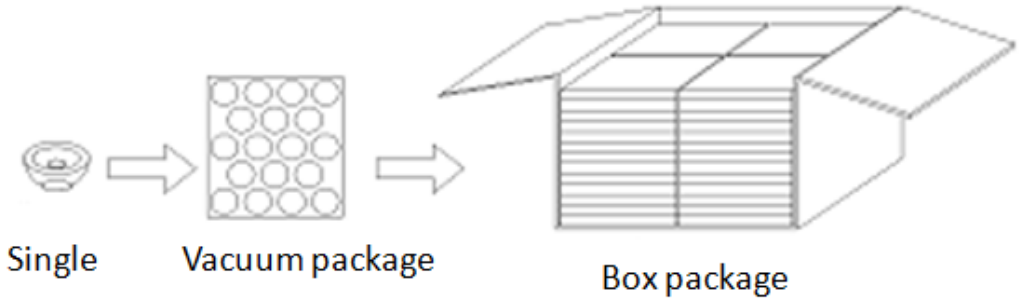
Announcement：

1. Pls wear clean gloves when assembling, to prevent the surface of the lens be soiled.
2. Try to avoid touching the total-reflection surface.
3. Once the surface be soiled, pls use soft cotton to wipe with litmusless reagent, not industrial solvent.

Packing

<table>
<tr><td colspan="8">Shenzhen Herculux Optoelectronics Technology Co., LTD</td></tr>
<tr><td colspan="2">Part model</td><td colspan="2">HK-50@14-13_40-D6-20-1g-1</td><td>Part name</td><td colspan="3">HK 50@14（13°-40°）zoom Lens</td></tr>
<tr><td colspan="2">Material</td><td colspan="2">PC</td><td>Customer</td><td colspan="3"></td></tr>
<tr><td colspan="2">Packing diagram</td><td colspan="6"> 
</td></tr>
<tr><td colspan="2" rowspan="2">Packing</td><td>14</td><td>A/ Box</td><td>4</td><td>Box/Floor</td><td>16</td><td>Floor/Carton</td></tr>
<tr><td>896</td><td>A/ Carton</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="8">Packing Material</td><td>NO.</td><td>Part No</td><td>Part name</td><td>Size</td><td colspan="2">Dosage</td><td>Remarks</td></tr>
<tr><td>1</td><td>2.07.0019</td><td>Blister box</td><td>23cm*21cm</td><td colspan="2">64</td><td></td></tr>
<tr><td>2</td><td>2.08.0001</td><td>PE film</td><td>30cm*30cm</td><td colspan="2">64</td><td></td></tr>
<tr><td>3</td><td>2.06.0005</td><td>Reel label paper</td><td>62cm*42cm</td><td colspan="2">1</td><td></td></tr>
<tr><td>4</td><td>2.06.0005</td><td>Box label paper</td><td>62cm*70cm</td><td colspan="2">1</td><td></td></tr>
<tr><td>5</td><td>2.06.0003</td><td>big plate</td><td>36cm*46.8cm</td><td colspan="2">17</td><td></td></tr>
<tr><td>6</td><td>2.06.0001</td><td>big carton</td><td>36cm*46.8cm*42.8cm</td><td colspan="2">1</td><td></td></tr>
<tr><td>7</td><td></td><td></td><td></td><td colspan="2"></td><td></td></tr>
<tr><td>Remark</td><td colspan="7">Retail packaging is not restricted by this specification</td></tr>
</table>

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Appearance inspection standards（Indoor lighting lens）

Test items	Judging standard	Defect level			Sampling standards According to GB / T2828.1 count sampling inspection program the first part:
		MI	MA	CR	
Point defect	Do not exceed the limit of the limit sample of sign sample.		√		Batch-by-lot sampling plan was retrieved by acceptance quality limit (AQL); AQL = 0.4. The judgment principle is: AQL rejection number × coefficient, CR class coefficient 0, MA class coefficient 1, MI class coefficient 1.5;
Raw edge	Not allowed to affect the size and assembly.		√		
Scratch	Scratches can not exceed the limit of limit sample standard version; Not allowed to scratch.		√		
Fingerprint	Fingerprints are not allowed on all products.		√		
Deformation	Product deformation shall not affect product size, assembly and optical performance.			√	Sight distance and working hours: Sight distance should be 30-35cm, each side of the inspection time does not exceed 12s, the visual angle of 45-135 degrees;
Poor ejection	Products may not appear bad ejection, including no convex top, thimble printed on the assembly surface shall not be higher than the product surface, non-assembled surface thimble height should not exceed the product size tolerances; thimble printing should be less than the product surface and no more than 0.3; thimble surface treatment should be consistent with the product side. Top strain: optical surface and the appearance of the exposed surface assembly does not allow a strain, the structural surface does not allow significant visual strain.		√		Light: 2x40w cool white fluorescent lamp, chip should be from the lens surface 500-550mm, in order to make the bad appearance can be correctly found, the illumination should not be less than 500Lux； ff should be 1.0 (including corrected vi acuity) above, no color blindness, color weakness.
Insufficient filling	The exposed surface of the assembled product shall not be filled insufficiently, the insufficiently filled structure surface shall not affect the assembly, and the disputed product shall be in accordance with the standard of the sample sign.		√		
Shrink	When the entire surface of the product shrinks, the optical properties and dimensions must meet the requirements, and the visual will not significantly affect the appearance; Local shrink refer to point defects		√		
Flow marks、Welding line	Product does not allow the presence of flow marks and welding lines unless the structure can not be avoided; special circumstances need to		√		

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	sign a temporary sample version.				
Bubble	No bubbles are allowed.		√		
Foreign matter、Dark spots	Visual is not obvious or black spots and foreign body D ≤ 0.3mm is allowed to exist no more than 2;	√			
Damaged	There shall be no damage to the appearance of the product after it has been assembled and assembled, and the specific product shall be in accordance with the standard of the sample sign.			√	
Cold glue	Optical surface can not have cold glue, non-optical surface should be kept cold visual is not obvious.	√			
Poor incision	1: Do not affect the product size; 2: Do not go deep into the optical surface; 3: Cut should be smooth.			√	
Scrub	Scrub surface should be uniform, off the scrub phenomenon should not be obvious.		√		
Air stripe	Air stripe should be not visually obvious, specific products in accordance with the standard sample size.		√		

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Appearance inspection standards（Outdoor lighting lens）

Test items	Judging standard	Defect level		
		MI	MA	CR
Point defect	Do not exceed the limit of the limit sample of sign sample.		√	
Raw edge	Not allowed to affect the size and assembly.		√	
Scratch	Allow L ≤ 10mm shallow scratches allowed to exist no more than 2, deep scratches are not allowed.		√	
Fingerprint	Fingerprints are not allowed on all products.		√	
Deformation	Product deformation shall not affect product size, assembly and optical performance. Must follow the drawings.			√
Insufficient filling	Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces.		√	
Shrink	When the entire surface of the product shrinks, the optical properties and dimensions must meet the requirements, and the visual will not significantly affect the appearance.		√	
Flow marks 、Welding line	1：Product does not allow the presence of flow marks and welding lines unless the structure can not be avoided; special circumstances need to sign a temporary sample version. 2: The remaining flow marks shall not appear in the optical surface, a single flow marks L ≤ 10mm not allowed more than 2		√	
Bubble	No bubbles are allowed in the optical part, and 2 non-optical parts allow 2 bubbles with D≤0.5mm.		√	
Foreign matter、Dark spots	Non-optical surface is not obvious or D≤0.5mm dark spots and foreign bodies allowed to exist no more than 3; optical surface allows D≤0.3mm foreign matter and black spots no more than 2.	√		
Damaged	Damage shall not affect product assembly, water resistance and exposed appearance.			√
Cold glue	Do not exceed the limit of the limit sample of sign sample.	√		
Scrub abnormalities	Scrub surface should be uniform, off the scrub phenomenon should not be obvious.		√	
Poor ejection	Products may not appear bad ejection, including no convex top, thimble printed on the assembly surface shall not be higher than the product surface,		√	

Sampling standards According to GB / T2828.1 count sampling inspection program the first part:
Batch-by-lot sampling plan was retrieved by acceptance quality limit (AQL); AQL = 0.4. The judgment principle is: AQL rejection number × coefficient, CR class coefficient 0, MA class coefficient 1, MI class coefficient 1.5;

Sight distance and working hours: Sight distance should be 30-35cm, each side of the inspection time does not exceed 12s, the visual angle of 45-135 degrees;

Light: 2x40w cool white fluorescent lamp, chip should be from the lens surface 500-550mm, in order to make the bad appearance can be correctly found, the illumination should not be less than 500Lux;

Visual inspection staff should be 1.0 (including corrected visual acuity) above, no color blindness, color weakness.

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	non-assembled surface thimble height should not exceed the product size tolerances; thimble printing should be less than the product surface and no more than 0.3; thimble surface treatment should be consistent with the product side.				
Air stripe	Air stripe should be not visually obvious, specific products in accordance with the standard sample size.		√		

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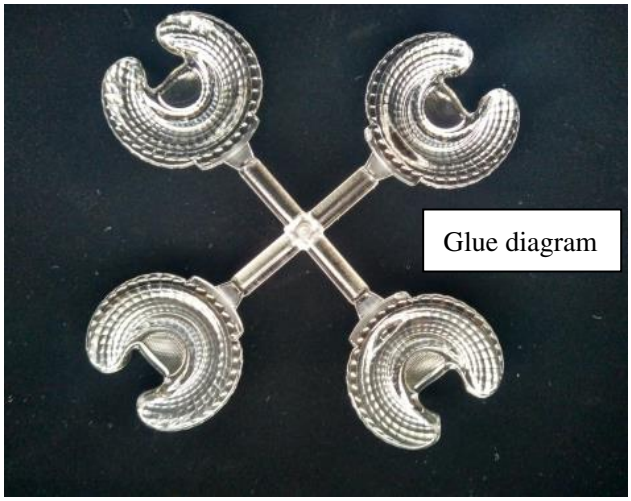
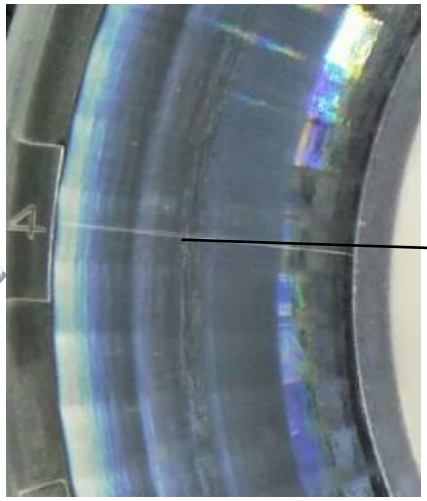
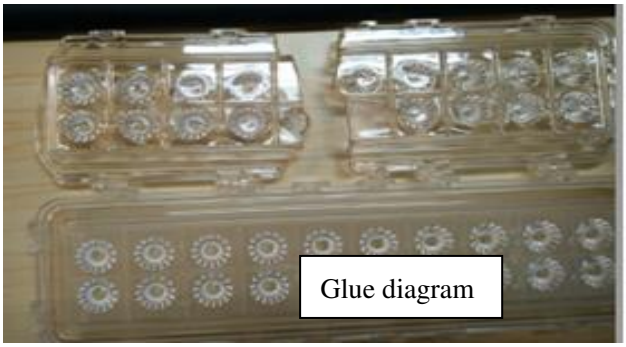
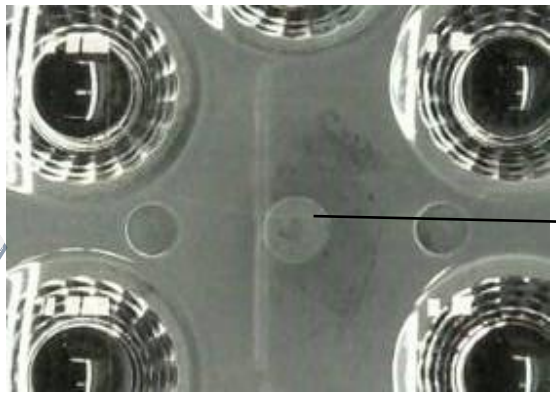
Description of welding line

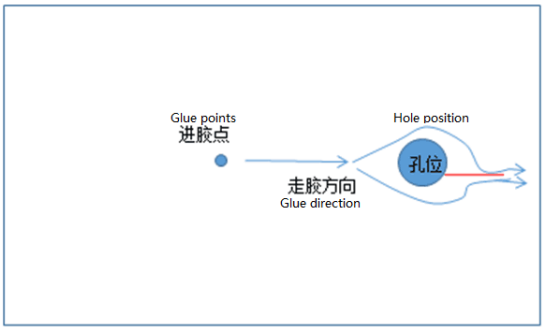
The colloid will form weld lines when passing through holes, columns, etc., or where the structure is thin. In the injection molding process using multi-point into the plastic, welding line will appear because of the combination of sol, as shown below:











Please note：

The appearance of lines in the structure of the product as well as at the screw hole is a normal phenomenon, will not affect the actual use of the product, and can not be avoided at this stage.