

# **OPTICAL ENERGY DESIGN & DEVICES**

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**HERCULUX**



## Specification



1. Product Number:	HK-75@21-13_40-D9-20-1g-1
2. Family:	Photo
3. Type:	Single
4. Size(L*W*H/ $\Phi$ *H):	$\Phi$ :75mm; H:21.08mm
5. Material:	PC
6. Efficiency:	85%
7. Operating Temperature( $T_{opr}$ ):	-40°C to +120°C
8. Waterproof:	\
9. Standard FWHM:	13° -40°
10. Suitable LES:	9mm
11. Application:	Indoor lighting: down light, track light...
12. Technology:	Calculus principle, Fresnel technology, multi-level reflect technology



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Factory: chengdu shuangliu district, iot industrial park 2 road herculux photoelectric  
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# Index

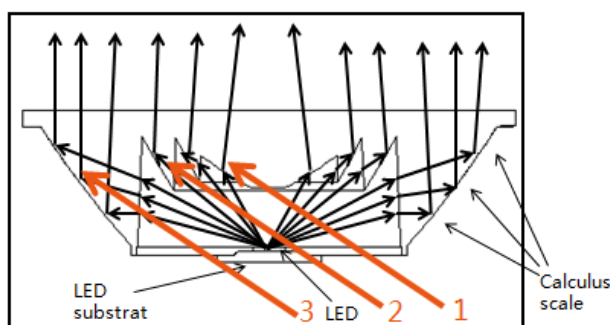
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## Technology



### 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



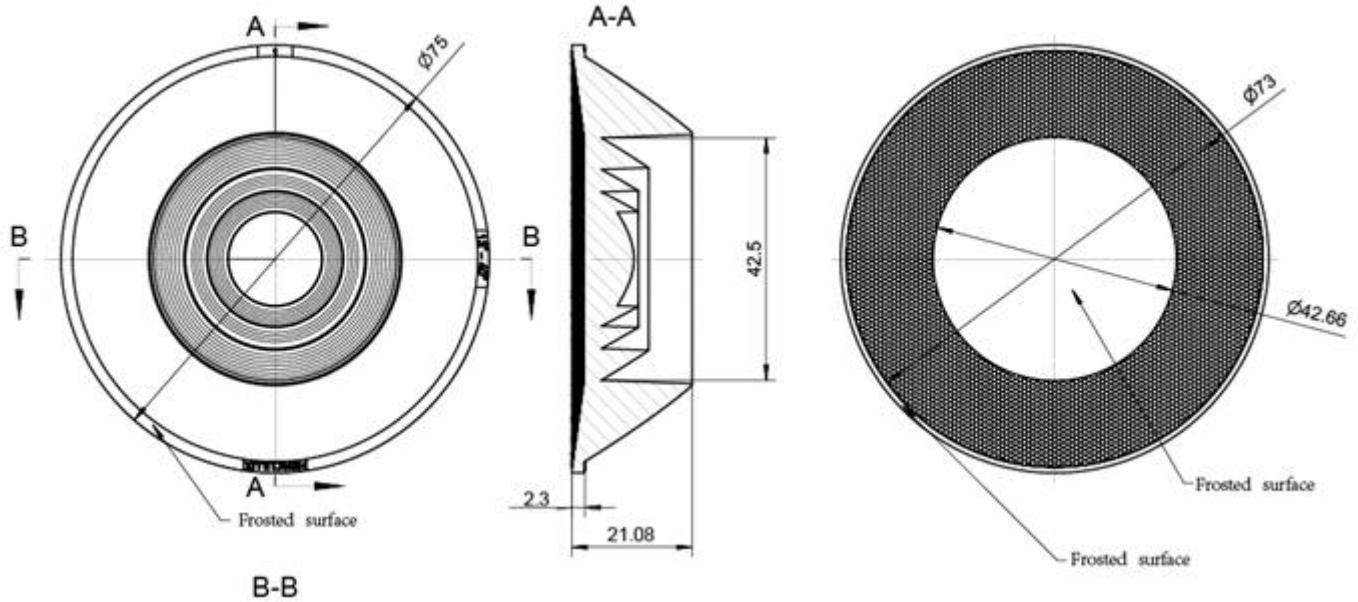
### Multi-level Reflect Technology- Photon

**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!



## 2Ddrawing



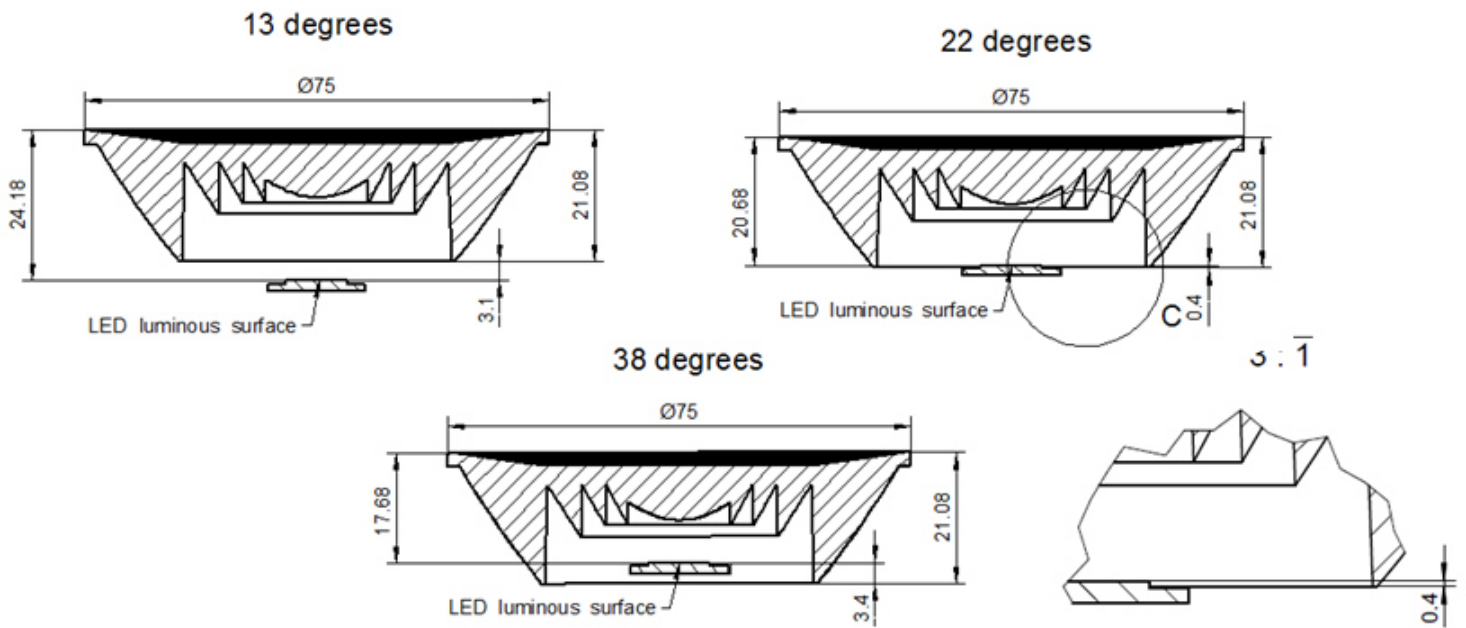
Technical Requirement:

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

Optical Design				HK-75@21-13_40-D9-20-1g-1		1.01.6920
Structure Design			HK 75@21 (13° -40° ) zoom Lens	Pages	Qty	Weight
Assess				2		
Authorized			Material:PC	CDHK		



## D75 zoom position



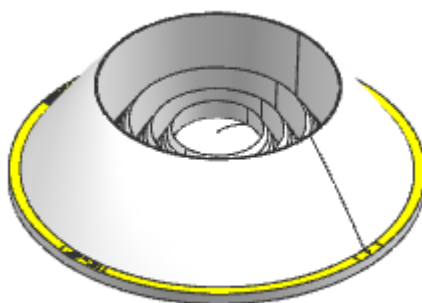
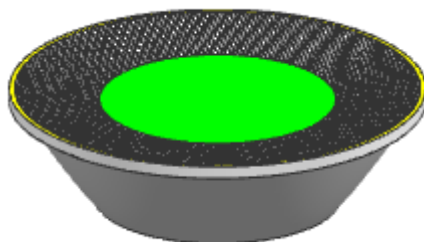


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## 3D drawing

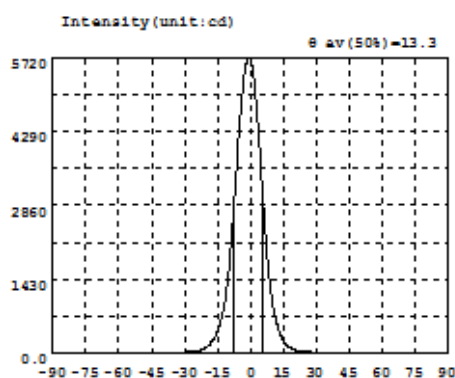
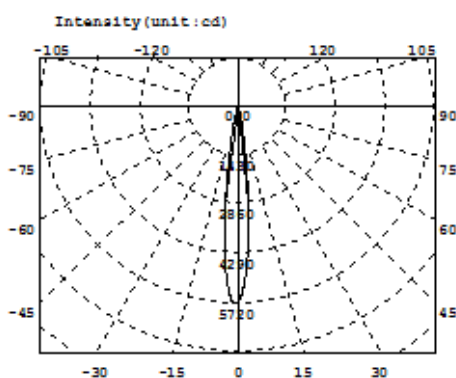




# Test report

Test light source: CREE 1520

## Small angle test



Intensity data: (deg , cd) CO-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	3.719	-58.5	8.374	-27.0	38.92	4.5	3756	36.0	18.84	67.5	5.509
-88.5	3.860	-57.0	8.719	-25.5	45.83	6.0	2813	37.5	17.70	69.0	5.220
-87.0	4.026	-55.5	9.081	-24.0	56.16	7.5	1960	39.0	16.39	70.5	4.970
-85.5	4.306	-54.0	9.575	-22.5	72.89	9.0	1315	40.5	15.12	72.0	4.761
-84.0	4.318	-52.5	10.21	-21.0	100.3	10.5	870.9	42.0	14.05	73.5	4.510
-82.5	4.251	-51.0	11.05	-19.5	144.1	12.0	581.8	43.5	13.12	75.0	4.280
-81.0	4.074	-49.5	11.98	-18.0	207.0	13.5	378.1	45.0	12.30	76.5	4.074
-79.5	3.924	-48.0	12.97	-16.5	296.5	15.0	248.8	46.5	11.57	78.0	3.931
-78.0	3.964	-46.5	14.06	-15.0	428.5	16.5	168.6	48.0	10.85	79.5	3.791
-76.5	4.248	-45.0	15.30	-13.5	621.6	18.0	116.9	49.5	10.20	81.0	3.816
-75.0	4.568	-43.5	16.45	-12.0	907.8	19.5	83.76	51.0	9.610	82.5	3.768
-73.5	4.873	-42.0	17.67	-10.5	1348	21.0	63.37	52.5	9.079	84.0	3.643
-72.0	5.182	-40.5	18.95	-9.0	1996	22.5	50.50	54.0	8.650	85.5	3.369
-70.5	5.500	-39.0	20.23	-7.5	2811	24.0	41.86	55.5	8.238	87.0	3.263
-69.0	5.833	-37.5	21.32	-6.0	3739	25.5	35.77	57.0	7.855	88.5	3.158
-67.5	6.165	-36.0	22.46	-4.5	4637	27.0	31.34	58.5	7.484	90.0	2.946
-66.0	6.510	-34.5	23.82	-3.0	5315	28.5	27.93	60.0	7.101		
-64.5	6.869	-33.0	25.49	-1.5	5671	30.0	25.35	61.5	6.750		
-63.0	7.229	-31.5	27.56	0.0	5676	31.5	23.25	63.0	6.392		
-61.5	7.637	-30.0	30.38	1.5	5335	33.0	21.52	64.5	6.092		
-60.0	8.042	-28.5	34.04	3.0	4660	34.5	20.06	66.0	5.800		

### Electricity Parameter:

Current I: 0.1000A      Power: 3.400W  
Voltage V: 34.00V      PF: 0.000

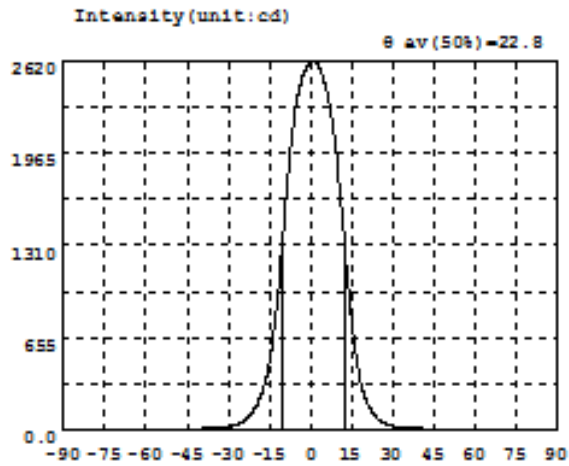
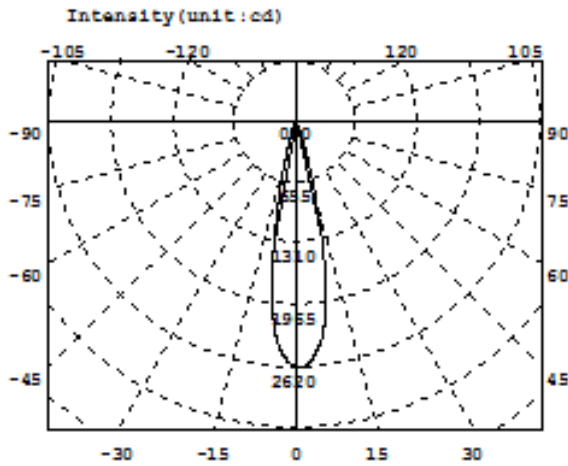
### Optical Parameter (Distance=2.559m) :

Equivalent Luminous flux:  $\Phi_{eff} = 459.81\text{lm}$       Efficiency:  $Eff = 135.25\text{lm/W}$   
Diffuse angle:       $\theta(25\%) : 18.8\text{deg}$   $\theta(50\%) : 13.3\text{deg}$   $\theta(75\%) : 8.7\text{deg}$   $\theta(50\%) : 13.3\text{deg}$   
Diffuse angle:       $\theta(25\%) : 19.0\text{deg}$   $\theta(50\%) : 13.3\text{deg}$   $\theta(75\%) : 8.7\text{deg}$   $\theta(50\%) : 13.3\text{deg}$   
Imax=5711cd (C=0.0deg, G=-0.5deg)      CO-180Plane Imax= 5711cd(G=-0.5deg)  
CO-180Plane IO= 5676cd





## Middle angle test



Intensity data: (deg , cd) C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.9172	-58.5	6.321	-27.0	40.79	4.5	2498	36.0	19.06	67.5	4.653
-88.5	1.019	-57.0	6.615	-25.5	52.25	6.0	2396	37.5	17.04	69.0	4.336
-87.0	1.070	-55.5	6.936	-24.0	69.88	7.5	2246	39.0	15.35	70.5	4.065
-85.5	1.146	-54.0	7.271	-22.5	96.49	9.0	2033	40.5	13.86	72.0	3.789
-84.0	1.302	-52.5	7.667	-21.0	134.4	10.5	1750	42.0	12.68	73.5	3.470
-82.5	1.582	-51.0	8.116	-19.5	185.3	12.0	1419	43.5	11.76	75.0	3.181
-81.0	1.825	-49.5	8.650	-18.0	251.9	13.5	1081	45.0	11.02	76.5	2.940
-79.5	2.109	-48.0	9.250	-16.5	345.7	15.0	784.6	46.5	10.30	78.0	2.697
-78.0	2.438	-46.5	9.916	-15.0	481.5	16.5	551.3	48.0	9.726	79.5	2.377
-76.5	2.695	-45.0	10.56	-13.5	677.2	18.0	374.6	49.5	9.118	81.0	2.089
-75.0	3.012	-43.5	11.21	-12.0	939.6	19.5	258.8	51.0	8.570	82.5	1.781
-73.5	3.308	-42.0	11.91	-10.5	1265	21.0	183.2	52.5	8.100	84.0	1.528
-72.0	3.577	-40.5	12.70	-9.0	1615	22.5	129.8	54.0	7.636	85.5	1.330
-70.5	3.931	-39.0	13.79	-7.5	1940	24.0	92.55	55.5	7.215	87.0	1.088
-69.0	4.177	-37.5	15.22	-6.0	2197	25.5	66.73	57.0	6.825	88.5	0.9862
-67.5	4.506	-36.0	16.87	-4.5	2378	27.0	49.90	58.5	6.494	90.0	0.9069
-66.0	4.776	-34.5	18.85	-3.0	2492	28.5	39.34	60.0	6.158		
-64.5	5.083	-33.0	21.26	-1.5	2562	30.0	32.53	61.5	5.849		
-63.0	5.400	-31.5	24.30	0.0	2604	31.5	27.77	63.0	5.565		
-61.5	5.708	-30.0	28.14	1.5	2609	33.0	24.25	64.5	5.261		
-60.0	5.993	-28.5	33.34	3.0	2574	34.5	21.44	66.0	4.939		

### Electricity Parameter:

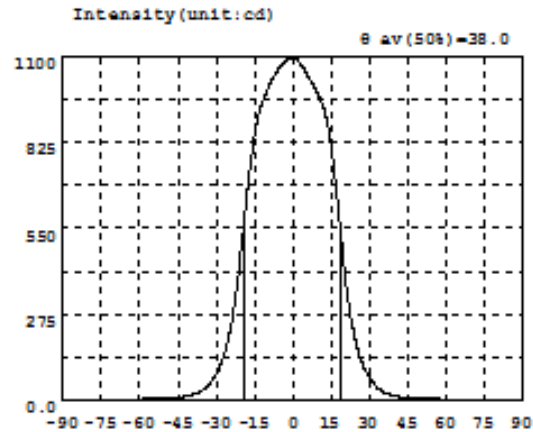
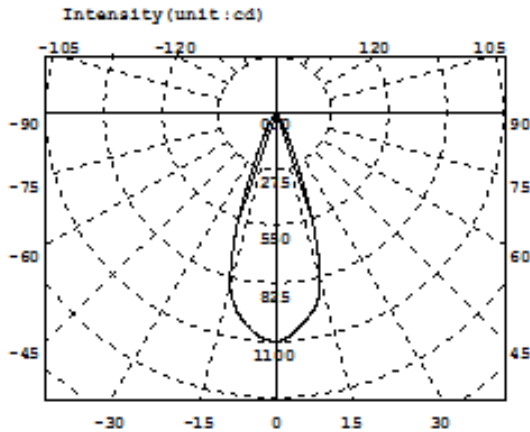
Current I: 0.1000A      Power: 3.410W  
Voltage V: 34.09V      PF: 0.000

### Optical Parameter (Distance=2.559m) :

Equivalent Luminous flux:  $\Phi_{eff}$  = 463.0lm      Efficiency:  $Eff$  = 135.80lm/W  
Diffuse angle:       $\theta$  (25%) : 29.3deg    $\theta$  (50%) : 22.8deg    $\theta$  (75%) : 16.8deg    $\theta$  (50%) : 22.8deg  
Diffuse angle:       $\theta$  (25%) : 29.4deg    $\theta$  (50%) : 22.8deg    $\theta$  (75%) : 16.8deg    $\theta$  (50%) : 22.8deg  
 $I_{max}$  = 2612cd (C=0.0deg, C=1.0deg)      C0-180Plane  $I_{max}$  = 2612cd (C=1.0deg)  
C0-180Plane  $I_0$  = 2604cd



## Big angle test



Intensity data: (deg , cd) CO-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	1.159	-58.5	5.797	-27.0	145.6	4.5	1056	36.0	26.19	67.5	3.990
-88.5	1.210	-57.0	6.148	-25.5	189.6	6.0	1035	37.5	21.08	69.0	3.725
-87.0	1.235	-55.5	6.521	-24.0	247.9	7.5	1013	39.0	17.54	70.5	3.464
-85.5	1.315	-54.0	6.936	-22.5	325.6	9.0	990.2	40.5	15.02	72.0	3.255
-84.0	1.594	-52.5	7.490	-21.0	425.4	10.5	965.3	42.0	13.25	73.5	3.022
-82.5	1.811	-51.0	8.118	-19.5	541.3	12.0	935.4	43.5	11.93	75.0	2.826
-81.0	2.068	-49.5	8.813	-18.0	657.2	13.5	889.1	45.0	10.77	76.5	2.609
-79.5	2.334	-48.0	9.646	-16.5	759.8	15.0	810.4	46.5	9.773	78.0	2.370
-78.0	2.526	-46.5	10.83	-15.0	847.2	16.5	714.0	48.0	8.897	79.5	2.115
-76.5	2.715	-45.0	12.00	-13.5	907.7	18.0	599.3	49.5	8.179	81.0	1.859
-75.0	2.884	-43.5	13.31	-12.0	948.9	19.5	478.6	51.0	7.550	82.5	1.626
-73.5	3.076	-42.0	14.90	-10.5	980.9	21.0	362.7	52.5	6.999	84.0	1.353
-72.0	3.302	-40.5	17.30	-9.0	1008	22.5	276.9	54.0	6.573	85.5	1.224
-70.5	3.537	-39.0	20.69	-7.5	1031	24.0	212.9	55.5	6.216	87.0	1.198
-69.0	3.794	-37.5	25.37	-6.0	1052	25.5	163.4	57.0	5.899	88.5	1.121
-67.5	4.085	-36.0	31.80	-4.5	1070	27.0	125.9	58.5	5.605	90.0	1.008
-66.0	4.329	-34.5	40.46	-3.0	1083	28.5	97.27	60.0	5.324		
-64.5	4.610	-33.0	51.84	-1.5	1091	30.0	74.60	61.5	5.030		
-63.0	4.903	-31.5	66.76	0.0	1093	31.5	56.71	63.0	4.749		
-61.5	5.186	-30.0	86.13	1.5	1087	33.0	43.29	64.5	4.491		
-60.0	5.494	-28.5	111.7	3.0	1074	34.5	33.38	66.0	4.223		

### Electricity Parameter:

Current I: 0.1000A      Power: 3.400W  
Voltage V: 34.00V      PF: 0.000

### Optical Parameter (Distance=2.559m) :

Equivalent Luminous flux:  $\Phi$  eff= 458.7lm      Efficiency: Eff=134.92lm/W  
Diffuse angle:      @ (25%): 45.9deg @ (50%): 38.0deg @ (75%): 30.3deg @ (50%): 38.0deg  
Diffuse angle:      @ (25%): 45.9deg @ (50%): 38.0deg @ (75%): 30.3deg @ (50%): 38.0deg  
Imax=1093cd (C=0.0deg,G=0.0deg)      CO-180Plane Imax= 1093cd(G=0.0deg)  
CO-180Plane IO= 1093cd

# Quality detection

## Sample test report

		Standard	Upper limit	Lower limit	Test result 1	Test result 2	Test result 3	Test result 4	Judge
1. Size	OD	75	75.20	74.80	74.96	74.97	75	75	OK
	Height	21.08	21.18	20.78	20.83	20.82	20.86	20.85	OK
	BH	2.3	2.40	2.30	2.40	2.37	2.40	2.38	OK
		Cutting the spure object to no effect for the quality							
2. optical indicator	Suitable LED	CREE 1520							
		Appearance standard			Test result 1	Test result 2	Test result 3	Test result 4	Judge
	Small angle	angle	13±2°		13.1°	13.2°	13.4°	13.3°	OK
		K value	>9.9		13.2	12.5	12.5	12.4	OK
		transmittance	>85%		87.8%	87.7%	87.1%	88.3%	OK
	Middle angle	angle	22±2°		22.8°	22.8°	22.6°	22.8°	OK
		K value	>4.7		5.6	5.7	5.8	5.5	OK
		transmittance	>88%		90.3%	90.7%	91.1%	89%	OK
	Big angle	angle	38±2°		38.2°	38°	38.6°	38.4°	OK
		K value	>2		2.3	2.4	2.3	2.3	OK
transmittance		>85%		91.6%	88.4%	92.3%	91.5%	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	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									



**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

Shenzhen Herculux Optoelectronics Technology Co., LTD						
Part model	HK-75@21-13_40-D9-20-1g-1		Part name	HK 75@21 ( 13° -40° ) zoom Lens		
Material	PC		Customer			
Packing diagram	<p style="text-align: center;"> <span>Single</span>      <span>Vacuum package</span>      <span>Box package</span> </p>					
Packing	8	A/ Box	4	Box/Floor	13	Floor/Carton
	416	A/ Carton				
Packing Material	NO.	Part No	Part name	Size	Dosage	Remarks
	1	2.07.0019	Blister box	23cm*21cm	52	
	2	2.08.0001	PE film	30cm*30cm	52	
	3	2.06.0005	Reel label paper	62cm*42cm	1	
	4	2.06.0005	Box label paper	62cm*70cm	1	
	5	2.06.0003	big plate	36cm*46.8cm	14	
	6	2.06.0001	big carton	36cm*46.8cm*42.8cm	1	
7						
Remark	Retail packaging is not restricted by this specification					



## 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: 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; V should be 1.0 (including corrected visual acuity) above, no color blindness, color weakness.
		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	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.			√	
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.		√		
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 $D \leq 0.3\text{mm}$ 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 disassembled, and the specific product shall be in accordance with the standard of the sample size.			√	
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.		√		



## Appearance inspection standards (Outdoor lighting lens)

Test items	Judging standard	Defect level			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.
		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 $L \leq 10$ mm 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 $L \leq 10$ mm not allowed more than 2		√		
Bubble	No bubbles are allowed in the optical part, and 2 non-optical parts allow 2 bubbles with $D \leq 0.5$ mm.		√		
Foreign matter、 Dark spots	Non-optical surface is not obvious or $D \leq 0.5$ mm dark spots and foreign bodies allowed to exist no more than 3; optical surface allows $D \leq 0.3$ mm 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,		√		



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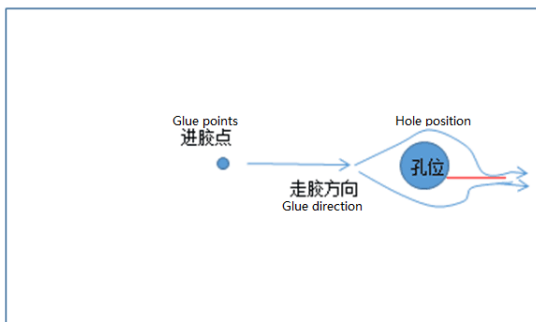
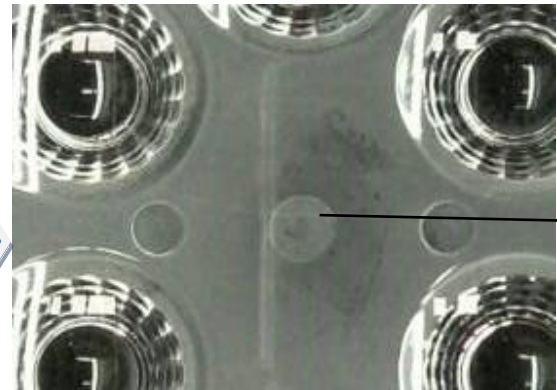
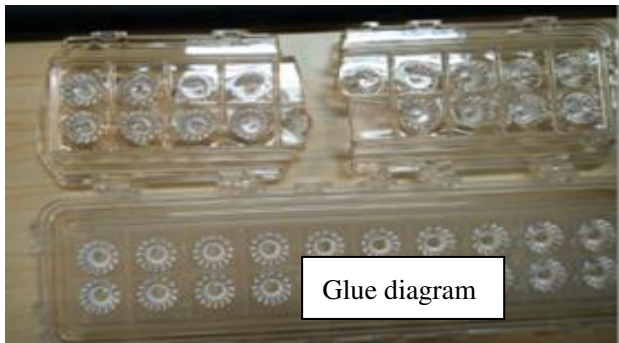
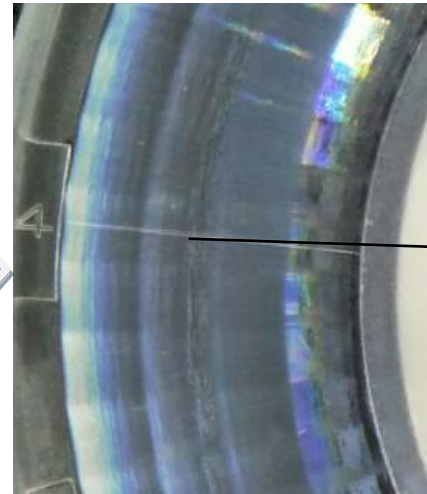
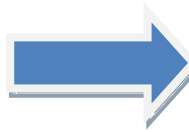
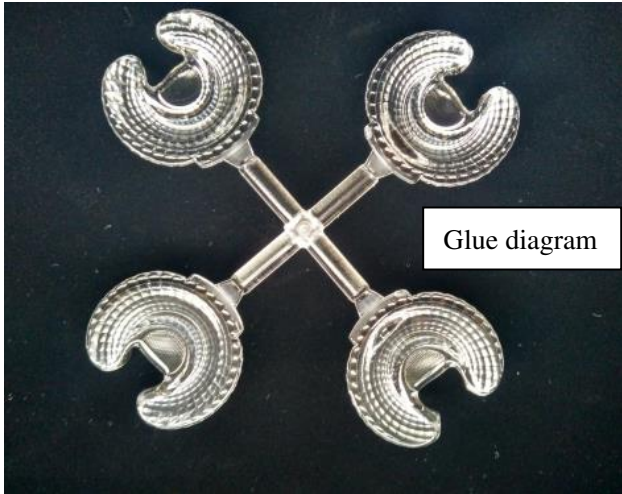
	non-assembled surface thimble height should not exceed the product size tolerances; thimble printing should be less than the product surface and no more than 0.3; thimble surface treatment should be consistent with the product side.				
Air stripe	Air stripe should be not visually obvious, specific products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





## 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.