HERCULUX 恒坤光电 Chengdu HercuLux Photoelectric Technology Co.,Ltd

Product Approval

Approval number：

Customer：

Manufacturer：Chengdu HercuLux Photoelectric Technology Co.,Ltd

PN	Code	Product
HK-DX-45@21-15-D9-21-1g-1	1.01.02559	HK Glareless 45@21-15° lens
HK-DX-45@21-24-D9-21-1g-1	1.01.02537	HK Glareless 45@21-24° lens
HK-DX-45@21-36-D9-21-1g-1	1.01.02539	HK Glareless 45@21-36° lens
HK-DX-45@21-60-D9-21-1g-1	1.01.12861	HK Glareless 45@21-60° lens

Supplier confirmation				Client confirmation			
Proposed		DATE		Qualified☐		DATE	
Project manager		DATE		Unqualified☐			
Audit		DATE		Audit		DATE	
Approved		DATE		Approved		DATE	
Stamp		DATE		Stamp		DATE	

(Confirmation of acceptance by both parties must be signed and sealed)

Factory: Chengdu Shuangliu District, Iot industrial park 2 road HercuLux Photoelectric Park
电话： 028-85887727（801） 028-85887990（801） 传真： 028-85887730 http://www.herculux.com/
Sales Dept: Shenzhen Nanshan District Nanshan Cloud Valley Innovation Industrial Park Comprehensive Service Building,
TEL: 0755-2937 1541 FAX: 0755-2907 5140

*Approval In duplicate， for both supplier and customer.

Disclaimer

Please use this product within the permitted range and environment according to the structure and material of the product. If the usage exceeds the recommended value, please test and verify by yourself. If the product is damaged due to out-of-range use, our company will not be responsible for the warranty.

Product material:

Customized products: The specifications and models of materials used are subject to the agreement between the two parties.

Conventional products: As a product that we continuously research and improve, under the premise of ensuring the quality and availability of the product, our company reserves the right to change the material. If the material specification and model change, without prior notice.

product data:

The measurement data and dimensional tolerances of the 2D drawings in the product data sheet of this acknowledgement are for reference only, and the final size shall prevail in kind.

The measurement data presented in this acknowledgment is a performance test of the product based on our company's internal test conditions and quality requirements, and the reported data is a typical value of the average results of multiple measurements. Therefore, in some cases, the actual product may deviate from the data provided. We reserve the right to notify you in advance of this data.

Product changes and improvements:

Changes and improvements of customized products are subject to the agreement between the two parties in the contract or technical documents.

As the conventional products that we continue to research and improve, our company reserves the right to make technical changes to its products, and reserves the right to make changes to data resulting from improvements withou t prior notice.

Operation cautions:

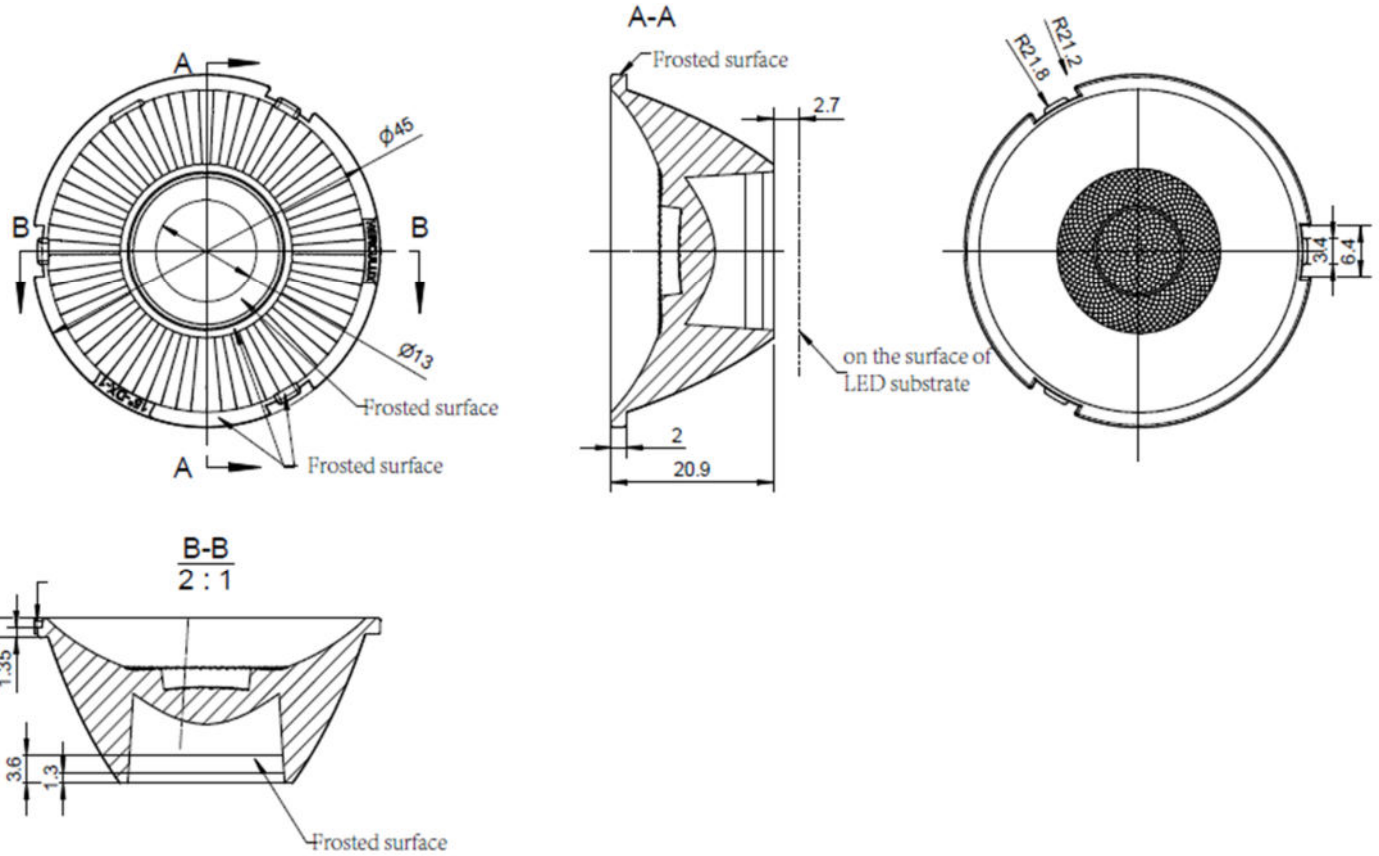
1. Please wear clean gloves during product assembly to prevent product surface contamination.
2. Try to avoid touching the optical surface of the lens when taking the lens.
3. When the surface of the product is polluted, please wipe it gently with a soft cotton cloth dipped in analytically pure neutral solvent. It is forbidden to use industrial solvents (alcohol, isopropanol, acetone, ether, toluene, xylene, carbon tetrachloride, MMA monomerm,etc.) wipe.

HERCULUX 恒坤光电

Basic product information

TEL: 0755-2937 1541 FAX: 0755-2907 5140 http://www.herculux.cn/ Date updated: 2022/12/23

Product Picture:	
Size(L*W*H/Φ*H):	Φ:45mm; H:20.9mm
Material:	PC
Effiency:	\
Temperature(Topr):	Material extreme temperature resistance：-40℃ to +120℃ long-term use temperature：-40℃ to +100℃
FWHM:	15°、24°、36°、60°
Matched LES:	15°-D6， 24°、36°、60°-D9
Recommended MAX power:	Not more than 20W



Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

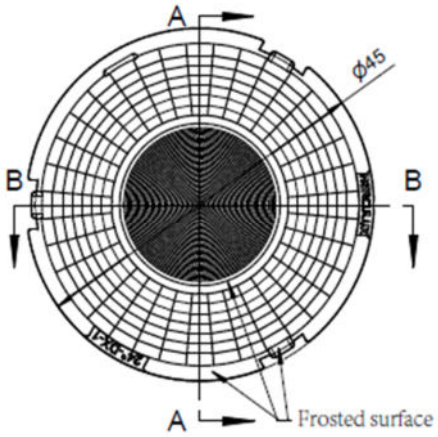
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

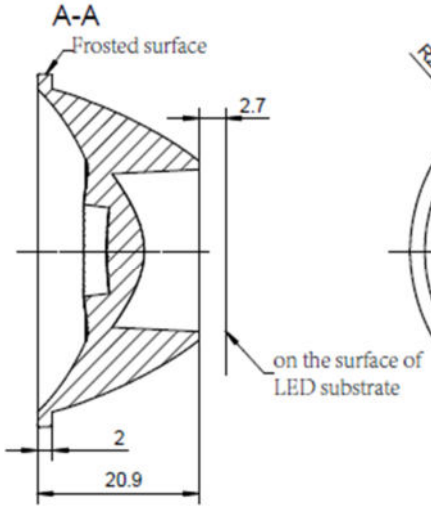
3, The surface has no flash, shrinkage, bubbles and other defects.

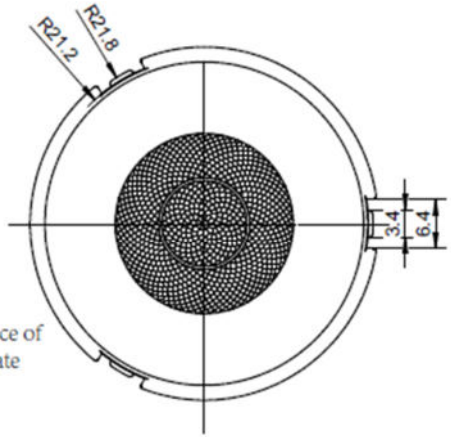
***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

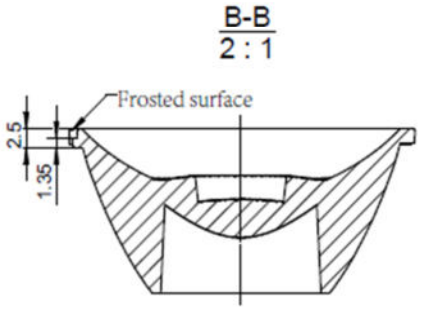
Optical design			HK Glareless 45@21-15º lens		HK-DX-45@21-15-D9-21-1g-1
Structure desig					1.01.02559
Review					Number of drawin / qty / weight
Validation			Material:	PC	CDHK

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0









Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

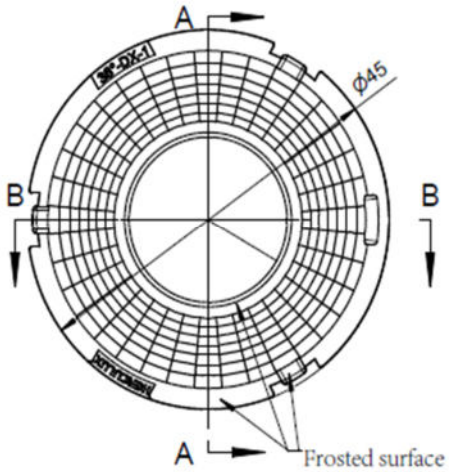
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

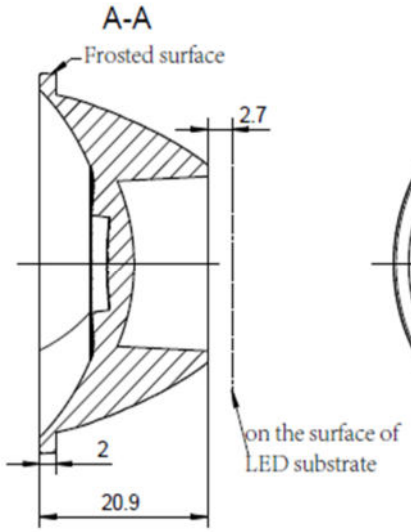
3, The surface has no flash, shrinkage, bubbles and other defects.

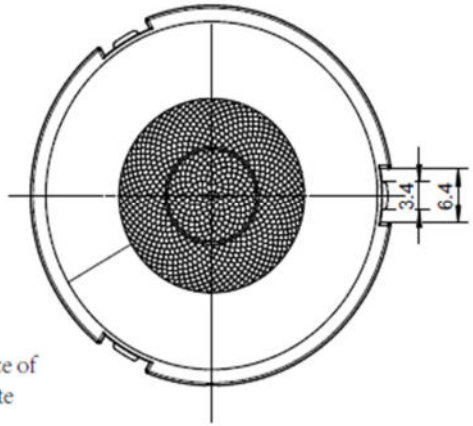
***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

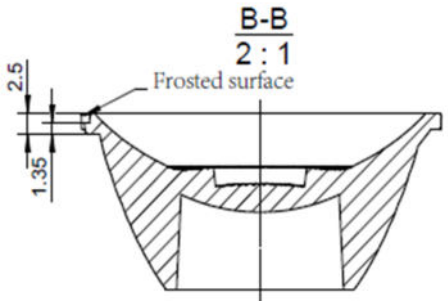
Optical design			HK Glareless 45@21-24º lens		HK-DX-45@21-24-D9-21-1g-1
Structure desig					1.01.02537
Review					Number of drawin / qty / weight
Validation			Material:	PC	CDHK

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0









Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

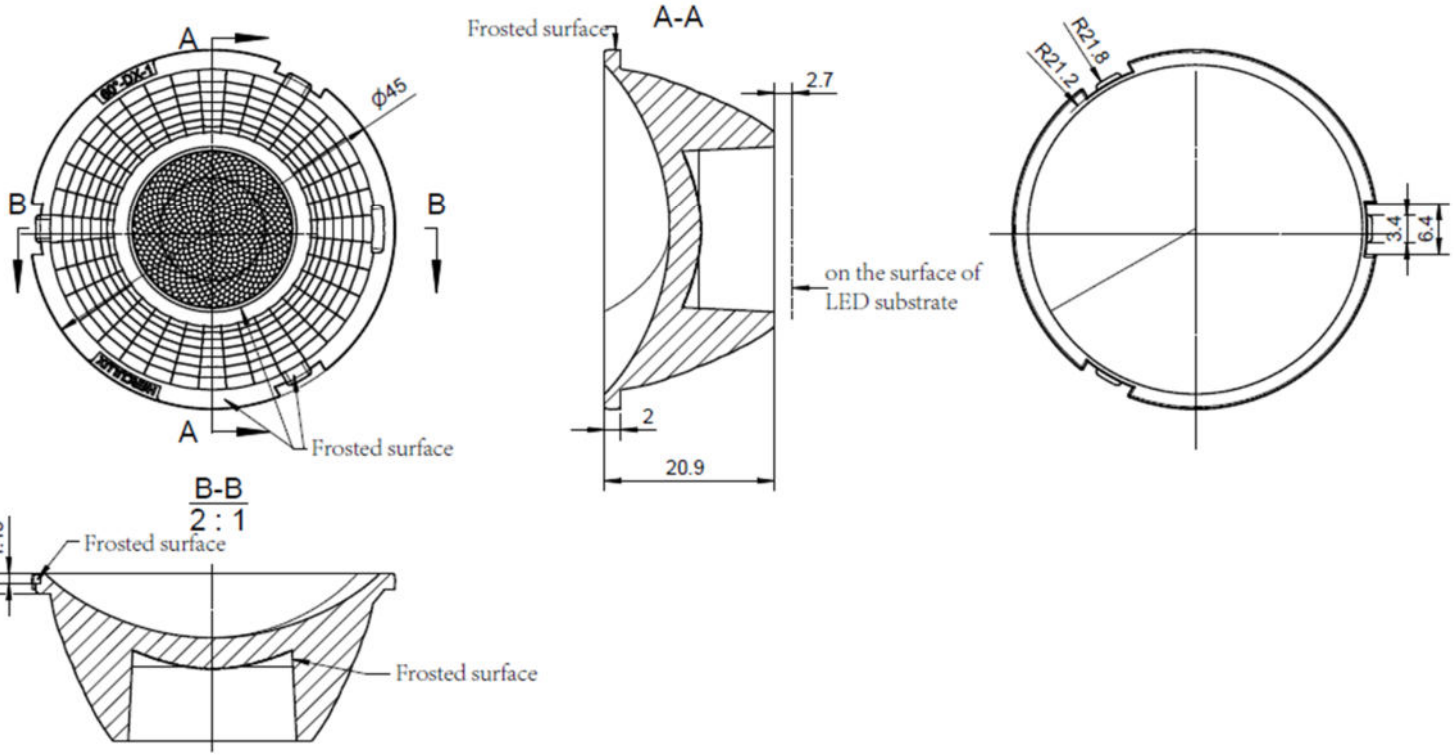
3, The surface has no flash, shrinkage, bubbles and other defects.

***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

Optical design			HK Glareless 45@21-36º lens		HK-DX-45@21-36-D9-21-1g-1
Structure desig					1.01.02539
Review					Number of drawin / qty / weight
Validation			Material:	PC	CDHK

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0

2D drawing



Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

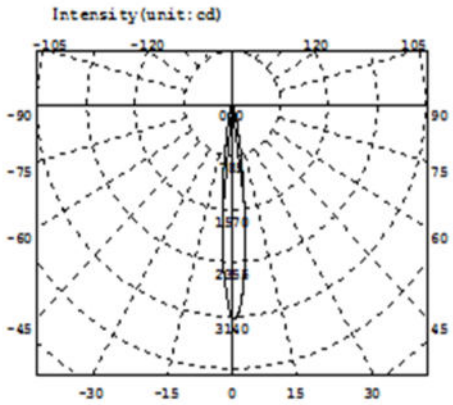
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

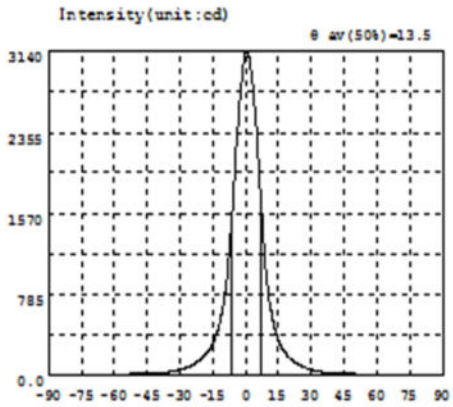
3, The surface has no flash, shrinkage, bubbles and other defects.

***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

Optical design			HK Glareless 45@21-60º lens		HK-DX-45@21-60-D9-21-1g-1
Structure desig					1.01.12861
Review					Number of drawin / qty / weight
Validation			Material:	PC	CDHK

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0





Intensity data:(deg , cd) C0-180

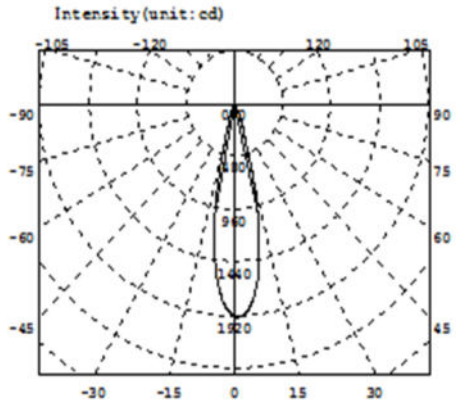
A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.3051	-58.5	3.287	-27.0	67.72	4.5	2521	36.0	23.27	67.5	0.7855
-88.5	0.3283	-57.0	3.696	-25.5	81.87	6.0	2070	37.5	19.96	69.0	0.6935
-87.0	0.3177	-55.5	4.204	-24.0	98.60	7.5	1559	39.0	17.26	70.5	0.6553
-85.5	0.3392	-54.0	4.843	-22.5	118.0	9.0	1112	40.5	15.04	72.0	0.5657
-84.0	0.3489	-52.5	5.536	-21.0	140.6	10.5	791.1	42.0	13.16	73.5	0.4342
-82.5	0.3599	-51.0	6.267	-19.5	167.9	12.0	582.3	43.5	11.33	75.0	0.4267
-81.0	0.4155	-49.5	7.161	-18.0	198.6	13.5	441.4	45.0	9.415	76.5	0.3557
-79.5	0.4044	-48.0	8.104	-16.5	241.8	15.0	336.3	46.5	7.849	78.0	0.3271
-78.0	0.4824	-46.5	9.170	-15.0	299.2	16.5	266.1	48.0	6.670	79.5	0.3469
-76.5	0.4768	-45.0	10.35	-13.5	376.6	18.0	216.8	49.5	5.778	81.0	0.3244
-75.0	0.5257	-43.5	11.86	-12.0	484.2	19.5	178.4	51.0	4.908	82.5	0.3545
-73.5	0.5743	-42.0	13.61	-10.5	638.2	21.0	148.1	52.5	4.162	84.0	0.5738
-72.0	0.6665	-40.5	15.74	-9.0	860.9	22.5	123.6	54.0	3.522	85.5	0.3204
-70.5	0.7556	-39.0	18.20	-7.5	1181	24.0	103.2	55.5	2.980	87.0	0.2626
-69.0	1.087	-37.5	21.12	-6.0	1602	25.5	85.71	57.0	2.511	88.5	0.2325
-67.5	1.074	-36.0	24.55	-4.5	2091	27.0	70.47	58.5	2.049	90.0	0.4635
-66.0	1.405	-34.5	28.67	-3.0	2544	28.5	57.95	60.0	1.629		
-64.5	1.755	-33.0	33.70	-1.5	2912	30.0	47.89	61.5	1.258		
-63.0	2.144	-31.5	39.76	0.0	3120	31.5	39.75	63.0	1.120		
-61.5	2.513	-30.0	47.07	1.5	3102	33.0	33.04	64.5	0.9914		
-60.0	2.885	-28.5	56.15	3.0	2874	34.5	27.46	66.0	0.8856		

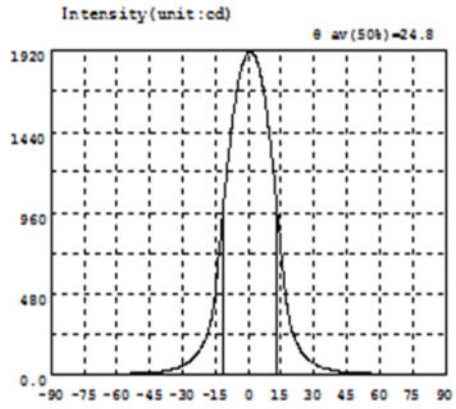
Electricity Parameter:

Current I: 0.1000A Power: 3.230W
Voltage V: 32.29V PF: 1.000

Optical Parameter(Distance=2.410m):

Equivalent Luminous flux: Φ eff= 326.1lm Efficiency: Eff=100.97lm/W
Diffuse angle: @(25%): 19.9deg@(50%): 13.5deg@(75%): 8.6deg @(50%): 13.5deg
Diffuse angle: @(25%): 19.9deg@(50%): 13.5deg@(75%): 8.8deg @(50%): 13.5deg
Imax=3139cd (C=0.0deg,G=0.5deg) C0-180Plane Imax= 3139cd(G=0.5deg)
C0-180Plane I0= 3120cd





Intensity data:(deg , cd) C0-180

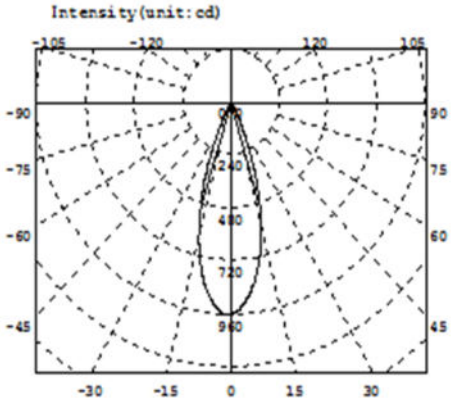
A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.2548	-58.5	1.787	-27.0	73.28	4.5	1841	36.0	30.19	67.5	0.7952
-88.5	0.2687	-57.0	2.209	-25.5	88.91	6.0	1761	37.5	25.27	69.0	0.6039
-87.0	0.2692	-55.5	2.691	-24.0	109.2	7.5	1651	39.0	21.46	70.5	0.5142
-85.5	0.3321	-54.0	3.270	-22.5	135.5	9.0	1508	40.5	18.26	72.0	0.4571
-84.0	0.3559	-52.5	3.903	-21.0	168.0	10.5	1339	42.0	15.46	73.5	0.4052
-82.5	0.3779	-51.0	4.677	-19.5	209.5	12.0	1149	43.5	13.03	75.0	0.3743
-81.0	0.3649	-49.5	5.531	-18.0	265.9	13.5	940.9	45.0	11.08	76.5	0.3736
-79.5	0.3889	-48.0	6.441	-16.5	353.0	15.0	730.7	46.5	9.392	78.0	0.3848
-78.0	0.3416	-46.5	7.538	-15.0	493.8	16.5	537.6	48.0	7.982	79.5	0.3834
-76.5	0.3347	-45.0	8.912	-13.5	690.1	18.0	379.8	49.5	6.842	81.0	0.3803
-75.0	0.3624	-43.5	10.58	-12.0	900.1	19.5	281.2	51.0	5.855	82.5	0.3938
-73.5	0.3683	-42.0	12.46	-10.5	1107	21.0	220.5	52.5	5.009	84.0	0.3629
-72.0	0.4180	-40.5	14.84	-9.0	1301	22.5	176.1	54.0	4.223	85.5	0.3343
-70.5	0.5937	-39.0	17.63	-7.5	1474	24.0	142.1	55.5	3.553	87.0	0.2917
-69.0	0.5692	-37.5	20.56	-6.0	1615	25.5	114.7	57.0	2.950	88.5	0.2682
-67.5	0.6411	-36.0	23.98	-4.5	1731	27.0	93.58	58.5	2.415	90.0	0.3682
-66.0	0.7964	-34.5	28.61	-3.0	1819	28.5	77.15	60.0	1.999		
-64.5	0.9234	-33.0	34.30	-1.5	1880	30.0	64.47	61.5	1.594		
-63.0	1.041	-31.5	41.51	0.0	1910	31.5	53.60	63.0	1.298		
-61.5	1.193	-30.0	50.64	1.5	1914	33.0	43.96	64.5	1.112		
-60.0	1.137	-28.5	61.12	3.0	1891	34.5	36.22	66.0	0.9742		

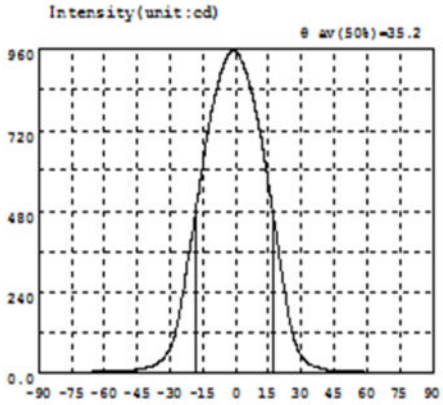
Electricity Parameter:

Current I: 0.1000A Power: 0.2700W
Voltage V: 2.700V PF: 1.000

Optical Parameter(Distance=2.559m):

Equivalent Luminous flux: Φ eff= 410.51m Efficiency: Eff=1520.63lm/W
Diffuse angle: @(25%): 32.1deg@(50%): 24.8deg@(75%): 17.4deg@(50%): 24.8deg
Diffuse angle: @(25%): 32.1deg@(50%): 25.0deg@(75%): 17.4deg@(50%): 25.0deg
Imax=1916cd (C=0.0deg,G=1.0deg) C0-180Plane Imax= 1916cd(G=1.0deg)
C0-180Plane I0= 1910cd





Intensity data:(deg , cd) C0-180

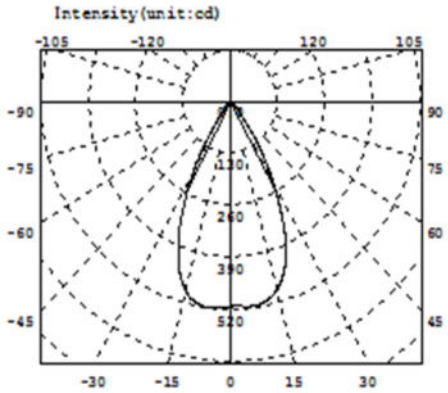
A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.2599	-58.5	3.073	-27.0	133.0	4.5	896.8	36.0	17.94	67.5	0.6125
-88.5	0.2605	-57.0	3.498	-25.5	181.2	6.0	865.4	37.5	14.48	69.0	0.5425
-87.0	0.3052	-55.5	3.972	-24.0	238.9	7.5	829.3	39.0	12.00	70.5	0.4583
-85.5	0.3156	-54.0	4.469	-22.5	301.9	9.0	786.9	40.5	9.752	72.0	0.4146
-84.0	0.3482	-52.5	4.986	-21.0	363.6	10.5	738.5	42.0	8.190	73.5	0.2112
-82.5	0.3590	-51.0	5.560	-19.5	425.0	12.0	684.3	43.5	7.053	75.0	0.3861
-81.0	0.3693	-49.5	6.180	-18.0	487.7	13.5	624.6	45.0	6.170	76.5	0.3521
-79.5	0.2979	-48.0	6.933	-16.5	552.8	15.0	561.6	46.5	5.450	78.0	0.3752
-78.0	0.3995	-46.5	7.807	-15.0	618.4	16.5	499.2	48.0	4.836	79.5	0.3723
-76.5	0.4355	-45.0	8.838	-13.5	681.5	18.0	437.1	49.5	4.237	81.0	0.3551
-75.0	0.5056	-43.5	10.12	-12.0	739.1	19.5	372.2	51.0	3.713	82.5	0.3503
-73.5	0.5987	-42.0	11.69	-10.5	790.6	21.0	300.4	52.5	3.212	84.0	0.3762
-72.0	0.7508	-40.5	13.73	-9.0	834.3	22.5	236.9	54.0	2.729	85.5	0.3345
-70.5	0.8722	-39.0	16.48	-7.5	871.4	24.0	178.5	55.5	2.300	87.0	0.6916
-69.0	1.016	-37.5	20.39	-6.0	904.0	25.5	129.4	57.0	1.937	88.5	0.7451
-67.5	1.218	-36.0	25.66	-4.5	929.7	27.0	92.56	58.5	1.577	90.0	0.5851
-66.0	1.467	-34.5	32.69	-3.0	947.8	28.5	67.00	60.0	1.253		
-64.5	1.716	-33.0	41.87	-1.5	956.4	30.0	49.66	61.5	1.067		
-63.0	2.003	-31.5	53.89	0.0	955.4	31.5	37.51	63.0	1.027		
-61.5	2.306	-30.0	70.40	1.5	944.2	33.0	28.87	64.5	0.8798		
-60.0	2.666	-28.5	95.38	3.0	923.4	34.5	22.64	66.0	0.6867		

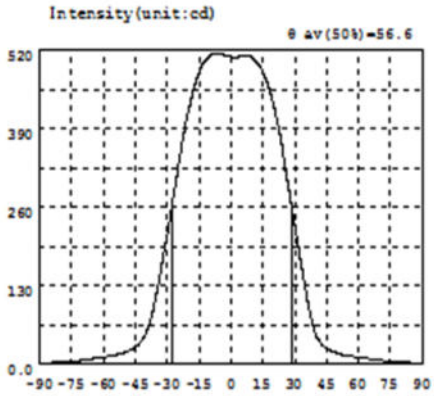
Electricity Parameter:

Current I: 0.1000A Power: 3.700W
Voltage V: 37.09V PF: 1.000

Optical Parameter(Distance=2.410m):

Equivalent Luminous flux: Φ eff= 353.7lm Efficiency: Eff=95.61lm/W
Diffuse angle: @(25%): 46.3deg@(50%): 35.2deg@(75%): 23.5deg@(50%): 35.2deg
Diffuse angle: @(25%): 46.4deg@(50%): 35.2deg@(75%): 23.7deg@(50%): 35.2deg
Imax=956.9cd (C=0.0deg,G=-1.0deg) C0-180Plane Imax= 956.9cd(G=-1.0deg)
C0-180Plane I0= 955.4cd





Intensity data:(deg , cd)　C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	1.186	-58.5	12.02	-27.0	280.4	4.5	510.1	36.0	103.9	67.5	6.994
-88.5	1.220	-57.0	12.98	-25.5	313.9	6.0	510.9	37.5	77.68	69.0	6.336
-87.0	1.311	-55.5	13.91	-24.0	346.4	7.5	510.8	39.0	56.94	70.5	5.553
-85.5	1.538	-54.0	14.99	-22.5	377.2	9.0	509.3	40.5	43.60	72.0	4.892
-84.0	1.810	-52.5	16.24	-21.0	404.6	10.5	505.6	42.0	35.27	73.5	4.347
-82.5	2.082	-51.0	17.78	-19.5	428.6	12.0	499.9	43.5	29.50	75.0	3.892
-81.0	2.378	-49.5	19.64	-18.0	450.0	13.5	493.4	45.0	25.46	76.5	3.500
-79.5	2.717	-48.0	21.87	-16.5	467.8	15.0	483.7	46.5	22.36	78.0	3.117
-78.0	3.090	-46.5	24.67	-15.0	483.4	16.5	470.5	48.0	19.91	79.5	2.722
-76.5	3.454	-45.0	28.13	-13.5	495.9	18.0	454.9	49.5	17.89	81.0	2.401
-75.0	3.838	-43.5	32.68	-12.0	503.7	19.5	436.4	51.0	16.28	82.5	2.094
-73.5	4.281	-42.0	38.77	-10.5	509.5	21.0	414.1	52.5	14.96	84.0	1.817
-72.0	4.818	-40.5	47.30	-9.0	513.4	22.5	388.9	54.0	13.92	85.5	1.598
-70.5	5.450	-39.0	59.71	-7.5	514.8	24.0	361.1	55.5	13.05	87.0	1.386
-69.0	6.270	-37.5	77.51	-6.0	514.6	25.5	324.2	57.0	12.30	88.5	1.233
-67.5	7.038	-36.0	100.2	-4.5	513.0	27.0	291.8	58.5	11.50	90.0	1.124
-66.0	7.760	-34.5	126.9	-3.0	511.4	28.5	261.2	60.0	10.60		
-64.5	8.452	-33.0	155.7	-1.5	510.3	30.0	229.1	61.5	9.767		
-63.0	9.211	-31.5	185.8	0.0	508.6	31.5	196.3	63.0	9.042		
-61.5	10.02	-30.0	214.9	1.5	507.5	33.0	164.0	64.5	8.355		
-60.0	10.95	-28.5	248.5	3.0	508.6	34.5	133.1	66.0	7.685		

Electricity Parameter:

Current I:　0.1000A　　Power:　3.250W
Voltage V:　32.50V　　PF:　1.000

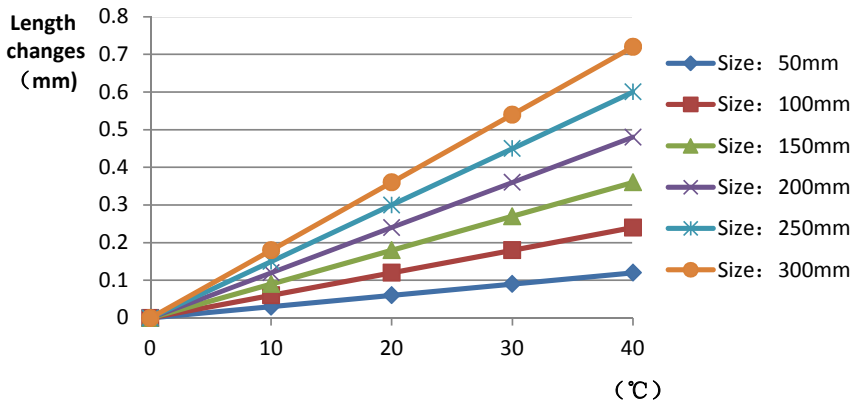
Optical Parameter(Distance=2.410m):

Equivalent Luminous flux: Φ eff= 457.3lm　　Efficiency: Eff=140.71lm/W
Diffuse angle:　@(25%): 69.1deg @(50%): 56.6deg @(75%): 44.6deg @(50%): 56.6deg
Diffuse angle:　@(25%): 69.1deg @(50%): 57.0deg @(75%): 45.1deg @(50%): 57.0deg
Imax=515.0cd (C=0.0deg,G=-7.0deg)　　C0-180Plane Imax= 515.0cd(G=-7.0deg)
C0-180Plane I0= 508.6cd

		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Judgment	Remarks
1.Size	diameter	45			44.97	44.94	44.97	44.94		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			20.96	20.97	20.96	20.97		
	thickness	2			2.21	2.15	2.21	2.15		
	Gate shear can not affect the appearance of the lamp									
	See attachment "Appearance Inspection Standards"									
2.Appearance Quality		See attachment "Appearance Inspection Standards"	E		No burr	No burr	No burr	No burr		OK
					No stains	No stains	No stains	No stains		
3.Material		PC				Color	Transparent			OK
4.Optical index	Testing LED	D6								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle				13.7	13.5	13.4	13.4		
	K-value				9.19	9.63	9.45	9.95		
	Efficiency				81.41%	81.91%	81.66%	81.66%		
	Facula	See the signature sample			`					
Comprehensive judgment		Qualified								

Remarks:
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right

PC product size changes with temperature table



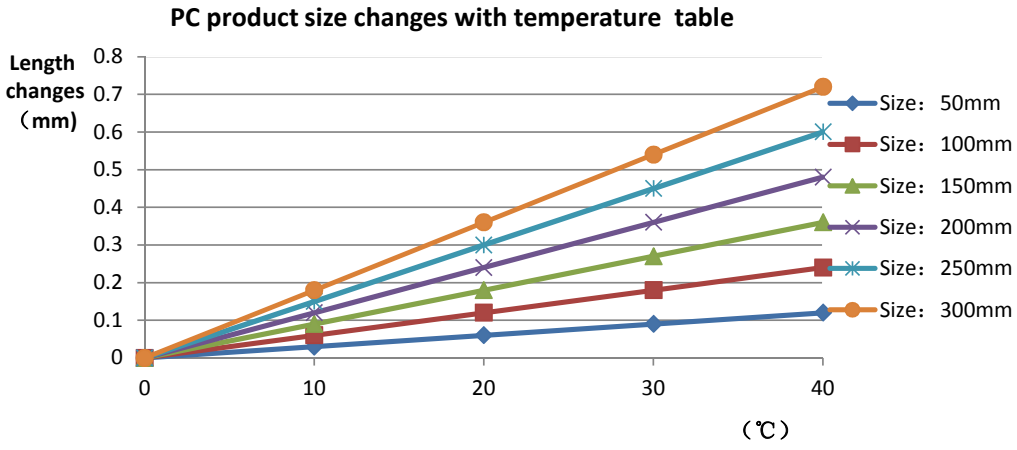
Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Test result5	Test result6	Test result7	Test result8	Judgment	Remarks
1.Size	diameter	45			44.97	45.04	44.99	44.96	44.95	44.94	44.94	45.02		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			20.82	20.85	20.85	20.86	20.82	20.80	20.82	20.88		
	thickness	2			2.00	2.05	2.06	2.02	2.03	2.00	1.98	2.05		
	Gate shear can not affect the appearance of the lamp													
	See attachment "Appearance Inspection Standards"													

2.Appearance Quality	See attachment "Appearance Inspection Standards	E	No burr	No burr	No burr	No burr	OK
			No stains	No stains	No stains	No stains	
3.Material	PC		Color	Transparent			OK

4.Optical index	esting LE	CITIZEN:CLU028								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle		24.7	24.8	24.7	25	24.5	24.7	24.8	24.3
	K-valu		4.67	4.73	4.61	4.76	4.77	4.69	4.84	4.70
	ficien		85.63%	85.21%	84.17%	84.79%	85.00%	85.63%	84.80%	84.50%
	acu	See the signature sample	`							
Comprehensive judgment		Qualified								

Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right



Precautions:
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2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

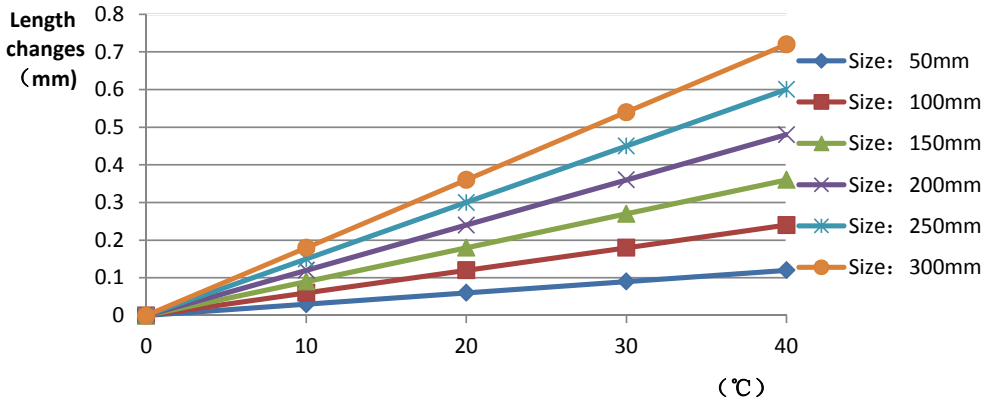
		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Test result5	Test result6	Test result7	Test result8	Judgment	Remarks
1.Size	diameter	45			45.03	45.01	45.00	45.00	45.05	45.03	44.95	45.02		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			20.98	20.99	20.98	20.94	20.97	20.96	20.92	20.97		
	thickness	2			1.97	1.98	2.00	2.00	1.98	1.94	1.92	1.97		
	Gate shear can not affect the appearance of the lamp													
	See attachment "Appearance Inspection Standards"													

2.Appearance Quality	See attachment "Appearance Inspection Standards"	E	No burr	No burr	No burr	No burr	OK
			No stains	No stains	No stains	No stains	
3.Material	PC		Color	Transparent			OK

4.Optical index	esting LE	CITIZEN:CLU028								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle		35.2	35.2	35.7	36.6	35.2	36.4	36.0	35.5
	K-value		2.67	2.67	2.66	2.58	2.73	2.62	2.65	2.71
	fficien		83.8%	84.8%	85.2%	85.5%	85.9%	85.9%	85.5%	85.9%
	acu	See the signature sample	`							
Comprehensive judgment	Qualified									

Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right

PC product size changes with temperature table

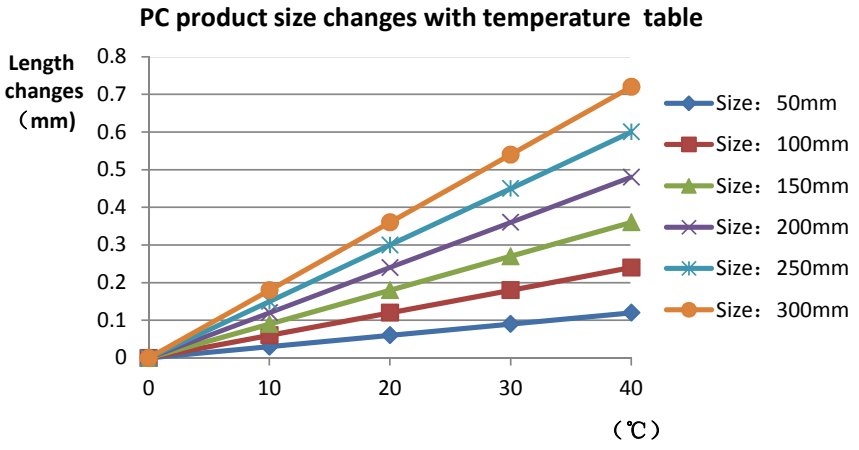


Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

Sample parameter test rep HK Glareless 45@21-60° lens

1.Size		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Judgment	Remarks
	diameter	45			45.08	45.09	45.08	45.09		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			20.94	20.99	20.94	20.99		
	thickness	2			2.07	2.17	2.07	2.17		
	Gate shear can not affect the appearance of the lamp									
	See attachment "Appearance Inspection Standards"									
2.Appearance Quality		See attachment "Appearance Inspection Standards"	E		No burr	No burr	No burr	No burr		OK
					No stains	No stains	No stains	No stains		
3.Material		PC				Color	Transparent			OK
4.Optical index	Testing LED	CITIZEN:CLU028								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle				56.6	55.5	55.2	56.3		
	K-value									
	Efficiency				85.30%	85.40%	85.60%	85.40%		
	Facula	See the signature sample								
Comprehensive judgment		Qualified								

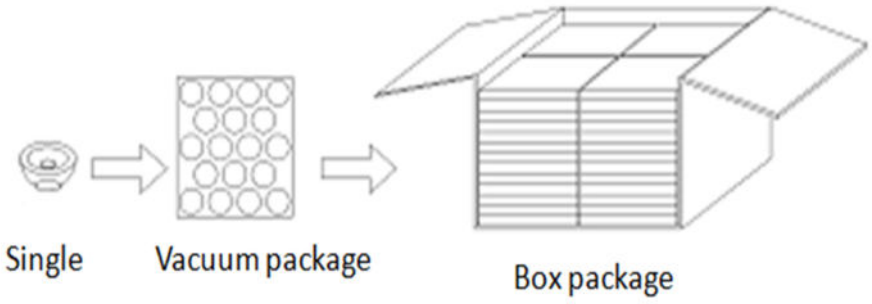
Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right



Precautions：
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

PN	HK-DX-45@21-15-D9-21-1g-1	Product Name	HK Glareless 45@21-15º lens
Product material	PC	Customer	

Package diagram



Product packing							
	18	A/ Box	4	pcs/Layer		
	11	Layer/Box	792	A/ Carton		

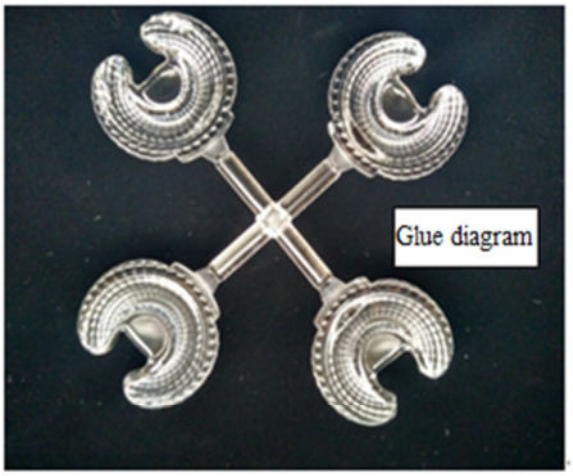
Packaging Materials	NO.	Part No	Part name	Size	Dosage	Unit	Remarks
	1	2.07.0066	Blister box	23cm*21cm	44	BAG	
	2	2.08.0001	PE film	25cm*27cm	44	PCS	
	3	2.06.0005	Reel label paper	62mm*42mm	44	PCS	
	4	2.06.0005	Box label paper	62mm*70mm	1	PCS	
	5	2.06.0003	big plate	46cm*42cm	12	PCS	
	6	2.06.0011	big flat carton	48cm*44cm*37cm	1	PCS	

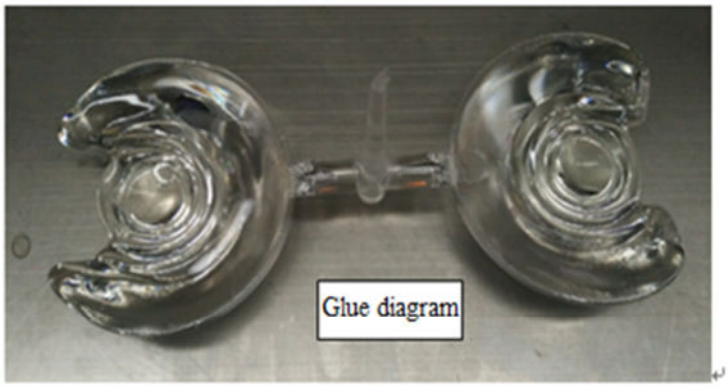
Remarks	The loose packing is not subject to this specification. Customer's requirements shall prevail

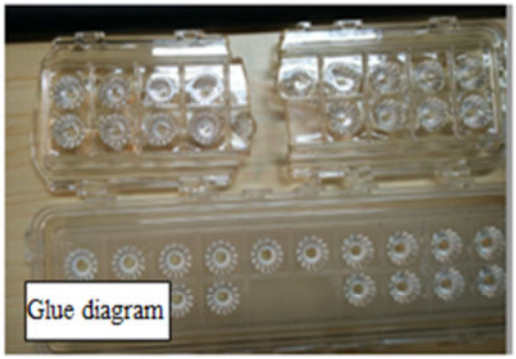
Special notice

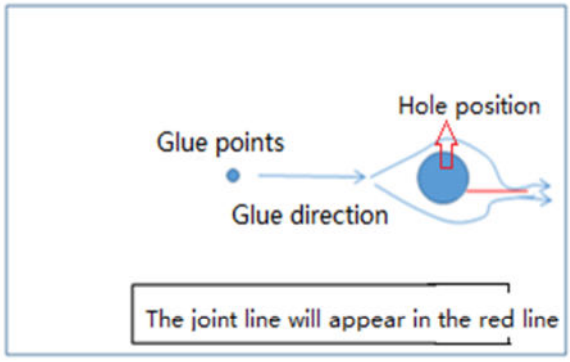
When gule pass through holes, columns and other structures, or part of the thin structure, will form a weld line. The product which uses multi-point injection welding line will appear because of the combination of sol, as shown below:

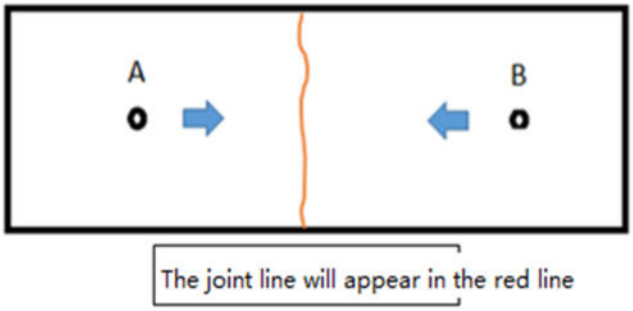
Synthetl











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.

Appearance inspection standards

1 Operating procedures

1.1.1Sampling standards, sampling plan and AQL

Test level：GB/T2828.1-2012The first part is according to the acceptance quality limit (AQL) retrieval batch inspection sampling plan, general inspection level Ⅱ level, CR class defect coefficient 0, MA defect rejection level AQL = 0.65, MI class defect rejection level AQL = 1.0; defect level please see 5.4.

2 Code table

Code	Code description	Unit	Code		Code description	Unit
N	Amount/pcs	pcs	D		Diameter	mm
L	Length	mm	H		Depth	mm
W	Width	mm	DS		Distance	mm
S	Proportion	mm²	SS		Offset	mm

3 Test conditions

3.1 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;

3.2 Light: 2x40w cool white fluorescent lamp, the light source is 500-550mm away from the lens surface; in order to make the appearance defect can be correctly recognized, the illumination should be 500-1000Lux, and the observation time is 10 seconds.

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

4 Appearance inspection standards

Test items	Judging standard	Inspection equipment	Defect level		
		Testing method	MI	MA	CR
Check the sample	When start the machine and process, all products have to check the appearance of the sample, the appearance of the sample is divided into qualified samples and limited samples. 1: Qualified sample refers to the appearance and structure standard of the product which recognized by the client, the sample size should be confirmed before mass production;	Sample comparison, visual			√

	2: The limited sample refers to the limit of a particular exceptionally developed sample. Limit the sample only for its specific point of exception to confirm; The priority is higher than the other criteria in this table. When there is a limited sample, the limit sample shall prevail.				
Raw edge	Not allowed to affect the size and assembly	Visual, point card		√	
Scratch	1: Non-optical surface and non-exposed surface scratches should be visually insignificant and the length is less than 1/10 of the maximum surface size.	Visual, point card, calipers		√	
Fingerprint	Fingerprints are not allowed on all products	Visual		√	
Foreign objects, black spots, white spots	The product may not be attached to foreign objects, including oil, fiber, dregs of water gap and so on				√
Deformation	Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces.	Visual, feeler			√
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.	Visual, point card		√	
	Ejection strain: the optical surface and the appearance of the exposed surface after assembly are not allowed to have a strain, and the structural surface does not allow visual obvious strain.				
Insufficient filling	Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces，The signature sample shall prevail.	Visual, point card		√	
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.Part shrink reference point defects	Visual, point card		√	
Flow marks、Welding line	1：Product does not allow the presence of flow marks and welding lines unless the structure can not be avoided;	Visual		√	
	2: The remaining flow marks shall not appear in the optical surface, a single L ≤ 10mm, no more than two				

Bubble	No bubbles are allowed	Visual		√	
Foreign objects, black spots, white spots	Not obvious or D ≤ 0.3mm black spots and foreign bodies in the area of 100x100mm not more than 1; Exceeded foreign matter black spots is judged bad.	Visual, point card	√		
Damaged	No damage is allowed	Visual			√
Cold glue	Optical surface may not have cold glue, non-optical surface cold glue should meet the visual is not obvious.	Visual	√		
Bad incision	1: Do not affect the product size, shall not penetrate the optical surface, the cut should be smooth;	Visual			√
	2: Laser cutting products, the optical surface burns shall not occur after the processing is completed. Beading must not affect product installation				
	3: Three molds and hot runner gate shall not appear residue.				
Scrub	Scrub surface should be uniform, off the scrub phenomenon should not be obvious，A single off scrub imprint requires D ≤ 1 mm and no more than 1 area within a 50x50 mm area	Visual		√	

HERCULUX 恒坤光电

Chengdu HercuLux Photoelectric Technology Co.,Ltd

Product Approval

Approval number:

Customer:

Manufacturer: Chengdu HercuLux Photoelectric Technology Co.,Ltd

PN	Code	Product
HK-DX-45@21-15-D9-21-1g-1_PMMA	1.01.02559_PMMA	HK Glareless 45@21-15° lens
HK-DX-45@21-24-D9-21-1g-1_PMMA	1.01.02537_PMMA	HK Glareless 45@21-24° lens
HK-DX-45@21-36-D9-21-1g-1_PMMA	1.01.02539_PMMA	HK Glareless 45@21-36° lens
HK-DX-45@21-60-D9-21-1g-1_PMMA	1.01.12861_PMMA	HK Glareless 45@21-60° lens

Supplier confirmation				Client confirmation			
Proposed		DATE		Qualified☐		DATE	
Project manager		DATE		Unqualified☐			
Audit		DATE		Audit		DATE	
Approved		DATE		Approved		DATE	
Stamp		DATE		Stamp		DATE	

(Confirmation of acceptance by both parties must be signed and sealed)

Factory: Chengdu Shuangliu District, Iot industrial park 2 road HercuLux Photoelectric Park
电话: 028-85887727（801） 028-85887990（801） 传真: 028-85887730 http://www.herculux.com/
Sales Dept: Shenzhen Nanshan District Nanshan Cloud Valley Innovation Industrial Park Comprehensive Service Building,
TEL: 0755-2937 1541 FAX: 0755-2907 5140

*Approval In duplicate， for both supplier and customer.

Disclaimer

Please use this product within the permitted range and environment according to the structure and material of the product. If the usage exceeds the recommended value, please test and verify by yourself. If the product is damaged due to out-of-range use, our company will not be responsible for the warranty.

Product material:

Customized products: The specifications and models of materials used are subject to the agreement between the two parties.

Conventional products: As a product that we continuously research and improve, under the premise of ensuring the quality and availability of the product, our company reserves the right to change the material. If the material specification and model change, without prior notice.

product data:

The measurement data and dimensional tolerances of the 2D drawings in the product data sheet of this acknowledgement are for reference only, and the final size shall prevail in kind.

The measurement data presented in this acknowledgment is a performance test of the product based on our company's internal test conditions and quality requirements, and the reported data is a typical value of the average results of multiple measurements. Therefore, in some cases, the actual product may deviate from the data provided. We reserve the right to notify you in advance of this data.

Product changes and improvements:

Changes and improvements of customized products are subject to the agreement between the two parties in the contract or technical documents.

As the conventional products that we continue to research and improve, our company reserves the right to make technical changes to its products, and reserves the right to make changes to data resulting from improvements without prior notice.

Operation cautions:

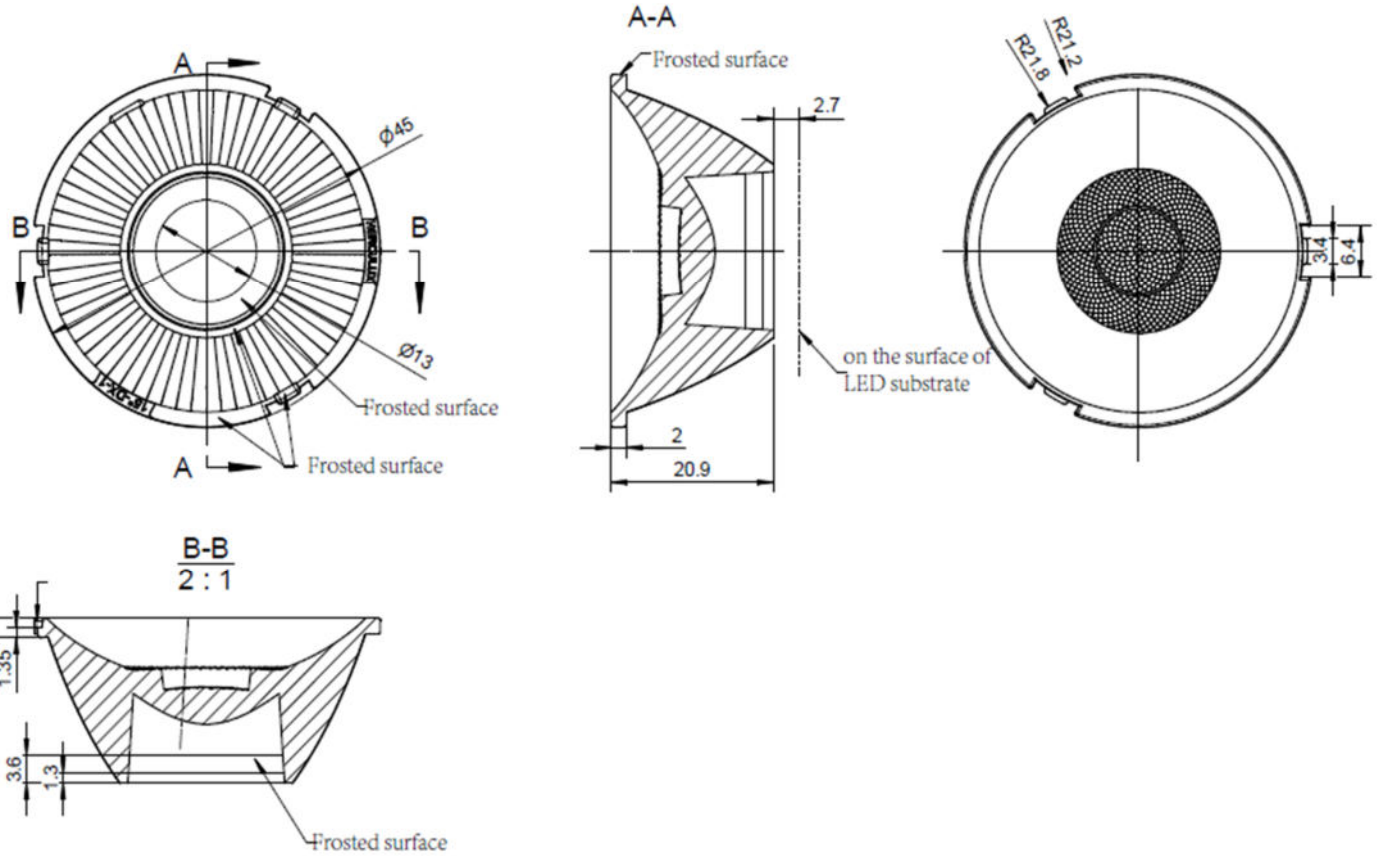
1. Please wear clean gloves during product assembly to prevent product surface contamination.
2. Try to avoid touching the optical surface of the lens when taking the lens.
3. When the surface of the product is polluted, please wipe it gently with a soft cotton cloth dipped in analytically pure neutral solvent. It is forbidden to use industrial solvents (alcohol, isopropanol, acetone, ether, toluene, xylene, carbon tetrachloride, MMA monomerm,etc.) wipe.
4. The lens made of PC should not be exposed to direct sunlight in the storage and use environment. If the lens turns yellow or cracks due to long-term sunlight exposure, our company will not be responsible for the warranty.

HERCULUX 恒坤光电

Basic product information

TEL: 0755-2937 1541 FAX: 0755-2907 5140 http://www.herculux.cn/ Date updated: 2023/8/26

Product Picture:	
Size(L*W*H/Φ*H):	Φ:45mm; H:20.9mm
Material:	PMMA
Effiency:	\
Temperature(Topr):	Material extreme temperature resistance: -40℃ to +100℃ long-term use temperature: -40℃ to +80℃
FWHM:	15°、24°、36°、60°
Matched LES:	15°-D6, 24°、36°、60°-D9
Recommended MAX power:	Not more than 20W



Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

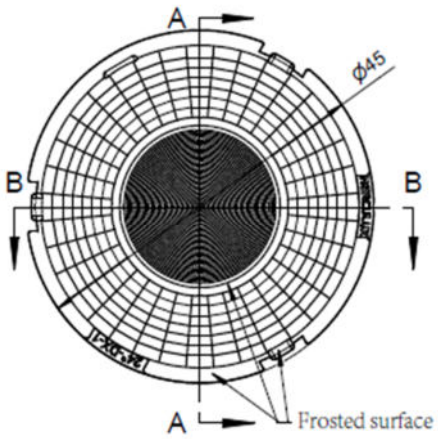
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

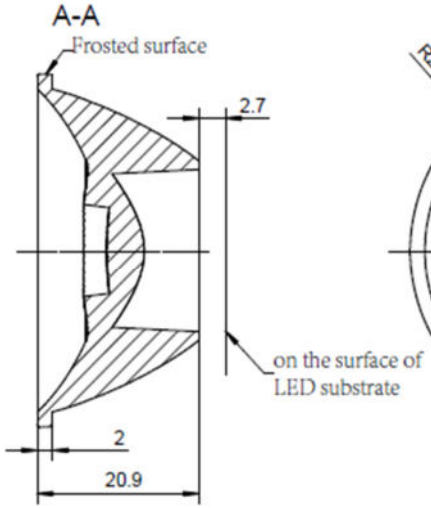
3, The surface has no flash, shrinkage, bubbles and other defects.

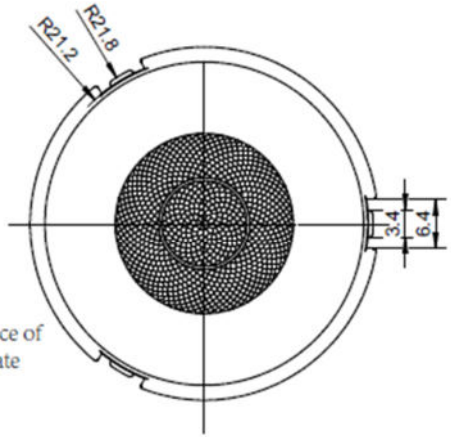
***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

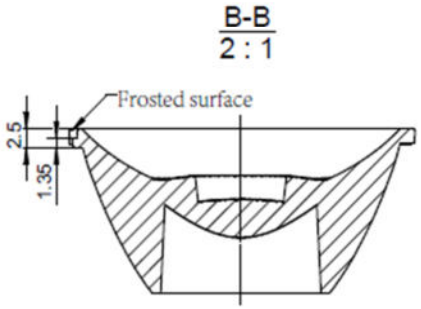
Optical design			HK Glareless 45@21-15º lens		HK-DX-45@21-15-D9-21-1g-1_PMMA
Structure desig					1.01.02559_PMMA
Review					Number of drawin / qty / weight
Validation			Material:	PMMA	CDHK

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0









Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

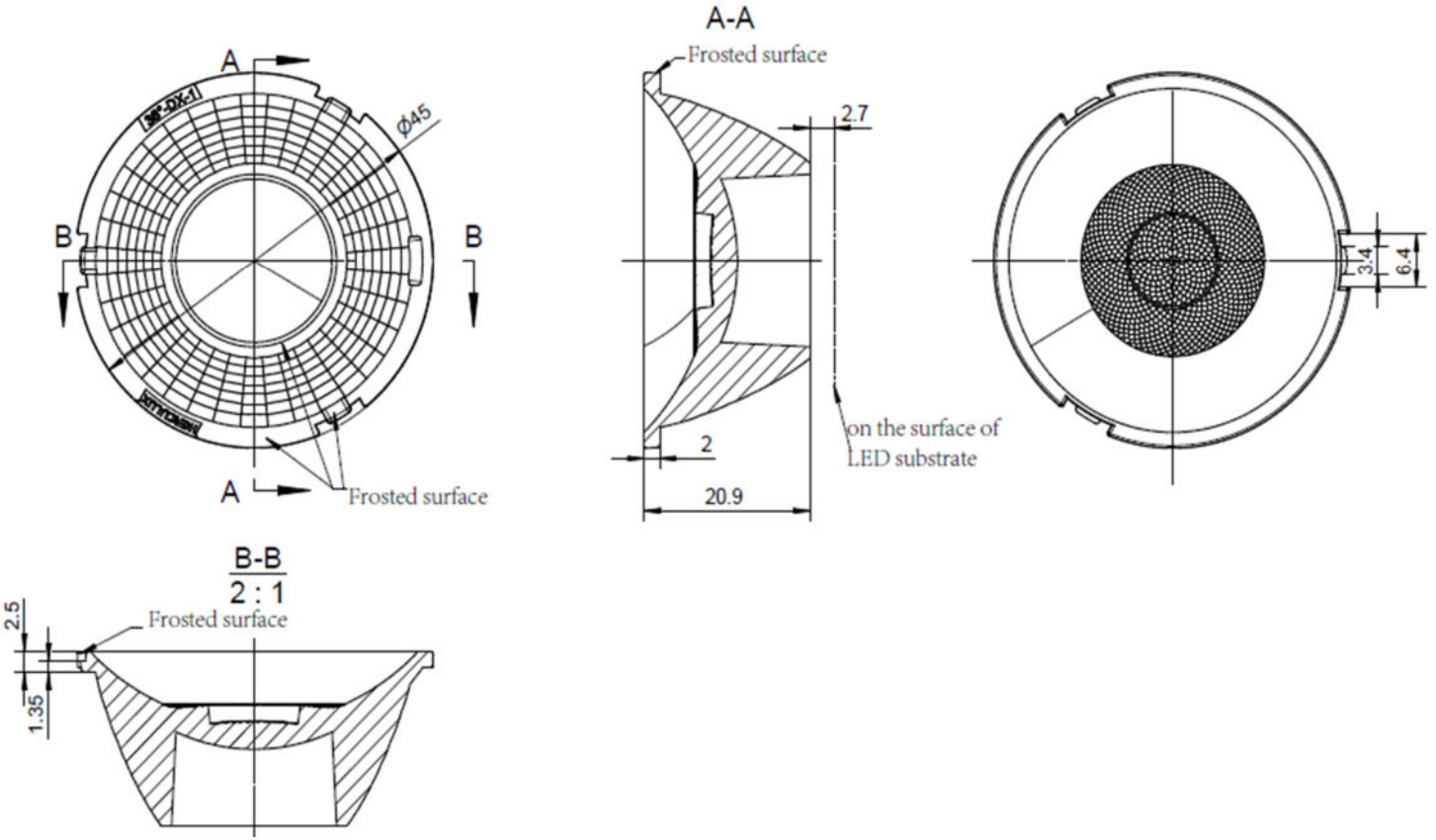
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

3, The surface has no flash, shrinkage, bubbles and other defects.

***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

Optical design			HK Glareless 45@21-24º lens		HK-DX-45@21-24-D9-21-1g-1_PMMA
Structure desig					1.01.02537_PMMA
Review					Number of drawin / qty / weight
Validation			Material:	PMMA	CDHK

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0



Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

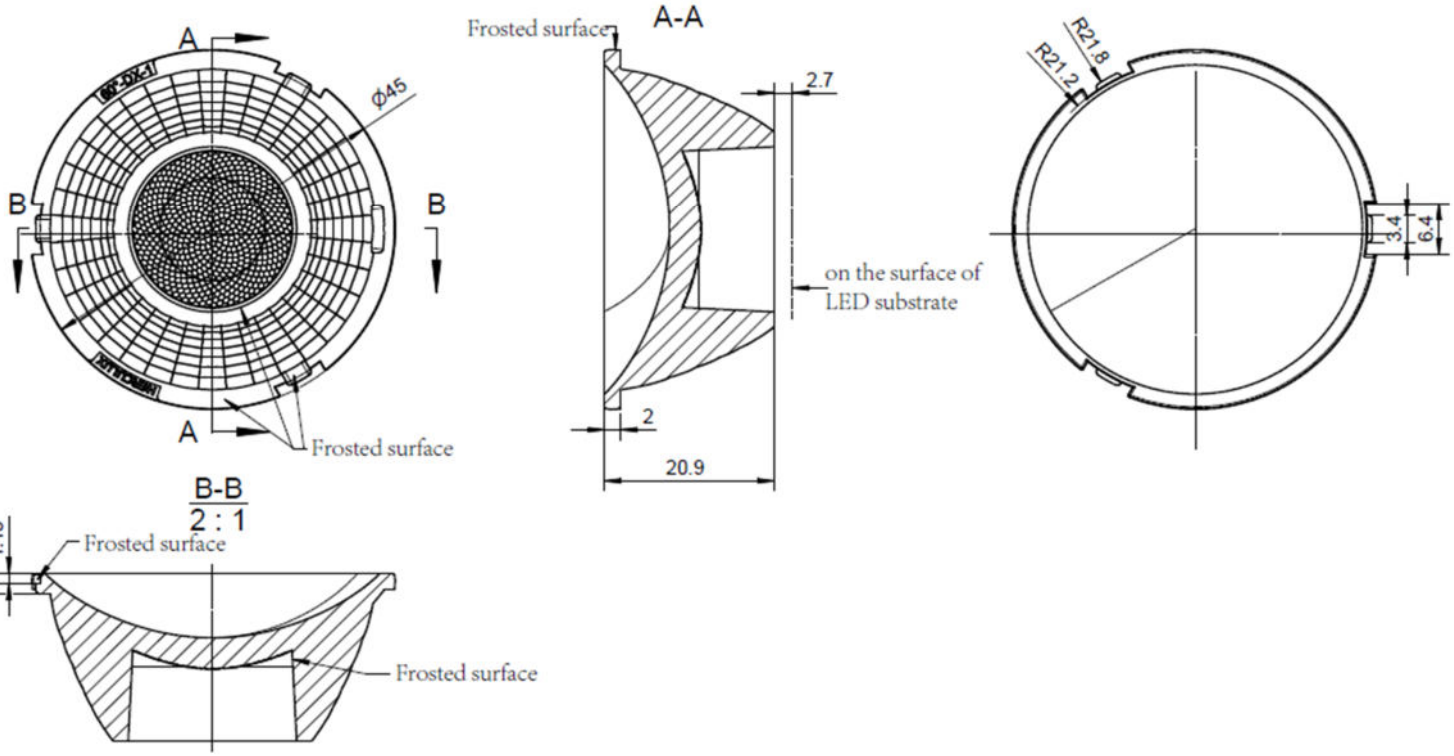
3, The surface has no flash, shrinkage, bubbles and other defects.

***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

Optical design			HK Glareless 45@21-36º lens		HK-DX-45@21-36-D9-21-1g-1_PMMA	
Structure desig					1.01.02539_PMMA	
Review					Number of drawin	qty / weight
Validation			Material:	PMMA	CDHK	

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0

2D drawing



Technical remark:

1. The 3D map is not indicated for rounded corners and draft angle.

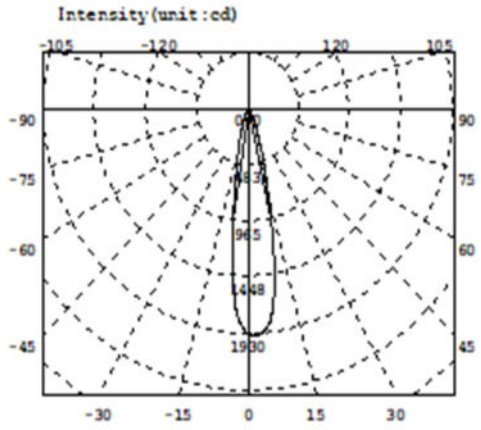
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.

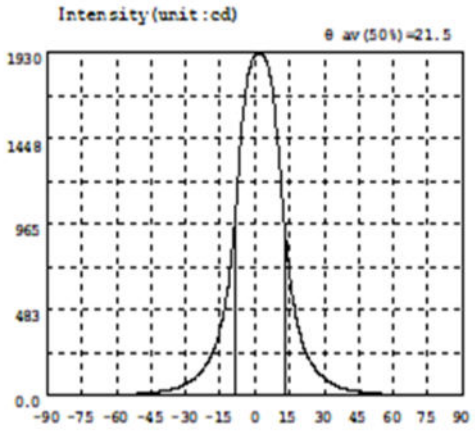
3, The surface has no flash, shrinkage, bubbles and other defects.

***4. When the lamp adopts rubber ring for waterproofing: the roughness of the contact surface between the radiator and the rubber ring is required: Ra<3.2μm**

Optical design			HK Glareless 45@21-60º lens		HK-DX-45@21-60-D9-21-1g-1_PMMA	
Structure desig					1.01.12861_PMMA	
Review					Number of drawin	qty / weight
Validation			Material:	PMMA	CDHK	

MT5 Tolerance table（mm）	Basic size	＜3	3～10	10～24	24～65	65～140	140～250	250～450	＞450
	olerance valu	±0.1	±0.15	±0.20	±0.35	±0.50	±0.80	±1.2	±2.0





Intensity data:(deg , cd) C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.7457	-58.5	8.613	-27.0	91.31	4.5	1894	36.0	54.06	67.5	6.046
-88.5	0.7343	-57.0	9.456	-25.5	107.4	6.0	1844	37.5	46.48	69.0	5.489
-87.0	0.7342	-55.5	10.28	-24.0	126.2	7.5	1734	39.0	40.14	70.5	5.004
-85.5	0.7344	-54.0	11.10	-22.5	148.7	9.0	1563	40.5	34.92	72.0	4.510
-84.0	0.7813	-52.5	11.99	-21.0	176.5	10.5	1340	42.0	30.64	73.5	4.004
-82.5	0.9077	-51.0	13.07	-19.5	207.9	12.0	1097	43.5	27.13	75.0	3.565
-81.0	1.137	-49.5	14.37	-18.0	250.3	13.5	874.4	45.0	24.32	76.5	3.144
-79.5	1.452	-48.0	15.58	-16.5	304.1	15.0	692.8	46.5	22.00	78.0	2.731
-78.0	1.757	-46.5	16.89	-15.0	373.9	16.5	547.5	48.0	20.08	79.5	2.313
-76.5	2.107	-45.0	18.32	-13.5	464.3	18.0	437.3	49.5	18.45	81.0	1.922
-75.0	2.495	-43.5	20.06	-12.0	580.8	19.5	351.9	51.0	17.07	82.5	1.581
-73.5	2.925	-42.0	22.12	-10.5	732.8	21.0	281.7	52.5	15.55	84.0	1.221
-72.0	3.342	-40.5	24.69	-9.0	929.5	22.5	233.6	54.0	14.11	85.5	0.8425
-70.5	3.766	-39.0	27.85	-7.5	1186	24.0	195.0	55.5	12.86	87.0	0.6843
-69.0	4.220	-37.5	31.77	-6.0	1448	25.5	163.4	57.0	11.85	88.5	0.6262
-67.5	4.699	-36.0	36.45	-4.5	1656	27.0	138.1	58.5	10.93	90.0	0.5693
-66.0	5.166	-34.5	42.22	-3.0	1791	28.5	117.6	60.0	10.04		
-64.5	5.690	-33.0	49.03	-1.5	1876	30.0	100.3	61.5	9.112		
-63.0	6.359	-31.5	57.01	0.0	1913	31.5	85.64	63.0	8.297		
-61.5	7.124	-30.0	66.54	1.5	1924	33.0	73.37	64.5	7.535		
-60.0	7.849	-28.5	77.86	3.0	1922	34.5	62.97	66.0	6.766		

Electricity Parameter:

Current I: 0.1000A Power: 3.299W

Voltage V: 33.00V PF: 1.000

Optical Parameter(Distance=2.410m):

Equivalent Luminous flux: Φ eff= 436.8lm Efficiency: Eff=132.43lm/W

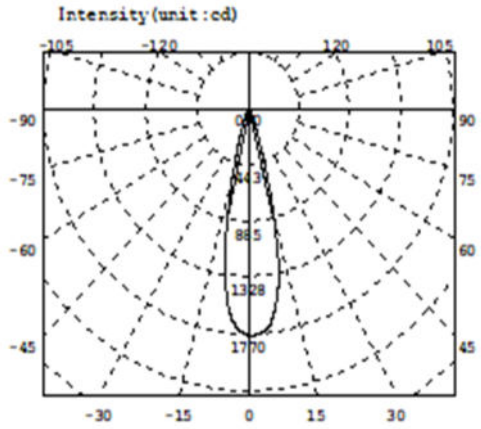
Diffuse angle: @(25%): 30.5deg@(50%): 21.5deg@(75%): 15.8deg@(50%): 21.5deg

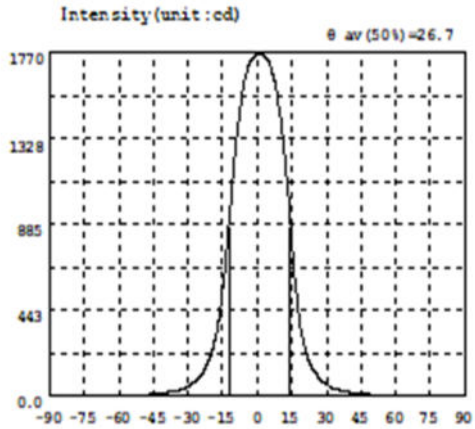
Diffuse angle: @(25%): 30.6deg@(50%): 21.7deg@(75%): 15.8deg@(50%): 21.7deg

Imax=1925cd (C=0.0deg,G=2.0deg)

C0-180Plane Imax= 1925cd(G=2.0deg)

C0-180Plane I0= 1913cd





Intensity data:(deg , cd) C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.9943	-58.5	6.381	-27.0	78.01	4.5	1737	36.0	31.26	67.5	4.295
-88.5	0.9831	-57.0	6.872	-25.5	96.07	6.0	1695	37.5	27.20	69.0	3.932
-87.0	0.9611	-55.5	7.418	-24.0	118.4	7.5	1625	39.0	23.76	70.5	3.608
-85.5	0.9729	-54.0	8.019	-22.5	149.1	9.0	1527	40.5	20.91	72.0	3.295
-84.0	1.040	-52.5	8.697	-21.0	187.4	10.5	1397	42.0	18.60	73.5	2.978
-82.5	1.154	-51.0	9.451	-19.5	238.4	12.0	1229	43.5	16.71	75.0	2.638
-81.0	1.311	-49.5	10.31	-18.0	309.4	13.5	1021	45.0	15.16	76.5	2.359
-79.5	1.471	-48.0	11.24	-16.5	407.6	15.0	797.6	46.5	13.82	78.0	2.072
-78.0	1.674	-46.5	12.26	-15.0	538.2	16.5	583.6	48.0	12.71	79.5	1.808
-76.5	1.889	-45.0	13.40	-13.5	719.0	18.0	424.3	49.5	11.78	81.0	1.560
-75.0	2.141	-43.5	14.74	-12.0	930.4	19.5	305.8	51.0	10.89	82.5	1.316
-73.5	2.416	-42.0	16.33	-10.5	1143	21.0	234.1	52.5	10.07	84.0	1.132
-72.0	2.712	-40.5	18.33	-9.0	1326	22.5	182.6	54.0	9.247	85.5	0.9586
-70.5	3.033	-39.0	20.66	-7.5	1474	24.0	143.6	55.5	8.552	87.0	0.9265
-69.0	3.400	-37.5	23.68	-6.0	1593	25.5	114.7	57.0	7.900	88.5	0.9241
-67.5	3.717	-36.0	27.07	-4.5	1673	27.0	93.28	58.5	7.333	90.0	0.8620
-66.0	4.068	-34.5	31.13	-3.0	1724	28.5	75.75	60.0	6.812		
-64.5	4.420	-33.0	36.55	-1.5	1748	30.0	62.20	61.5	6.294		
-63.0	4.897	-31.5	43.46	0.0	1765	31.5	51.41	63.0	5.771		
-61.5	5.397	-30.0	52.23	1.5	1765	33.0	42.91	64.5	5.241		
-60.0	5.876	-28.5	63.65	3.0	1752	34.5	36.24	66.0	4.725		

Electricity Parameter:

Current I: 0.1000A Power: 3.299W

Voltage V: 33.00V PF: 1.000

Optical Parameter(Distance=2.410m):

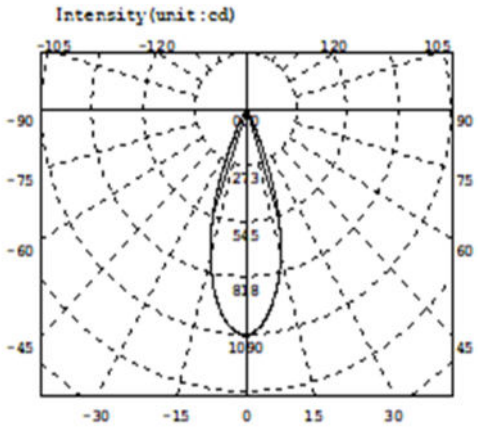
Equivalent Luminous flux: Φ eff= 438.8lm Efficiency: Eff=133.01lm/W

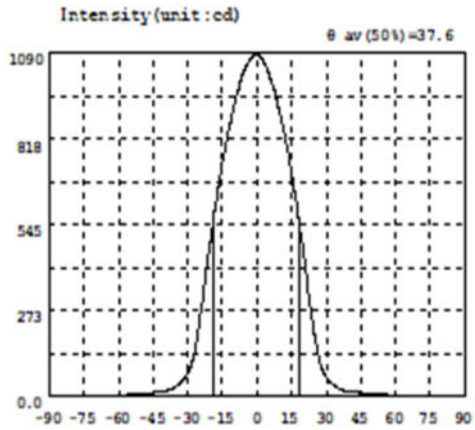
Diffuse angle: @(25%): 33.7deg@(50%): 26.7deg@(75%): 20.1deg@(50%): 26.7deg

Diffuse angle: @(25%): 33.8deg@(50%): 26.7deg@(75%): 20.2deg@(50%): 26.7deg

Imax=1767cd (C=0.0deg,G=1.0deg) C0-180Plane Imax= 1767cd(G=1.0deg)

C0-180Plane I0= 1765cd





Intensity data:(deg , cd) C0-180

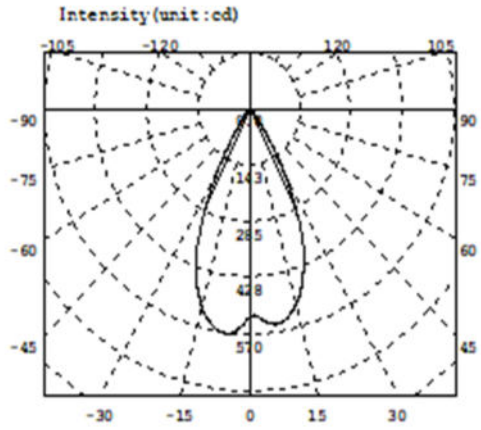
A	I	A	I	A	I	A	I	A	I	A	I
-90.0	1.005	-58.5	6.668	-27.0	146.5	4.5	1036	36.0	25.17	67.5	4.019
-88.5	0.9940	-57.0	7.215	-25.5	210.4	6.0	1007	37.5	21.06	69.0	3.636
-87.0	0.9932	-55.5	7.744	-24.0	287.8	7.5	969.9	39.0	18.14	70.5	3.273
-85.5	0.9835	-54.0	8.322	-22.5	371.3	9.0	926.0	40.5	16.12	72.0	2.899
-84.0	1.041	-52.5	8.956	-21.0	451.9	10.5	880.0	42.0	14.74	73.5	2.539
-82.5	1.144	-51.0	9.627	-19.5	529.8	12.0	829.7	43.5	13.67	75.0	2.239
-81.0	1.313	-49.5	10.32	-18.0	605.9	13.5	772.1	45.0	12.78	76.5	1.992
-79.5	1.461	-48.0	11.15	-16.5	677.0	15.0	707.8	46.5	11.90	78.0	1.754
-78.0	1.664	-46.5	12.14	-15.0	740.3	16.5	641.2	48.0	11.20	79.5	1.511
-76.5	1.912	-45.0	13.00	-13.5	800.1	18.0	567.0	49.5	10.40	81.0	1.312
-75.0	2.163	-43.5	14.03	-12.0	857.0	19.5	488.5	51.0	9.687	82.5	1.133
-73.5	2.468	-42.0	15.19	-10.5	905.9	21.0	408.3	52.5	9.029	84.0	1.012
-72.0	2.786	-40.5	16.98	-9.0	951.5	22.5	318.7	54.0	8.440	85.5	0.9504
-70.5	3.176	-39.0	19.63	-7.5	993.0	24.0	238.9	55.5	7.899	87.0	0.9290
-69.0	3.521	-37.5	23.35	-6.0	1027	25.5	169.8	57.0	7.361	88.5	0.9265
-67.5	3.905	-36.0	28.44	-4.5	1051	27.0	116.9	58.5	6.808	90.0	0.8857
-66.0	4.287	-34.5	35.48	-3.0	1068	28.5	83.47	60.0	6.236		
-64.5	4.706	-33.0	45.05	-1.5	1081	30.0	62.92	61.5	5.744		
-63.0	5.135	-31.5	58.01	0.0	1086	31.5	48.81	63.0	5.297		
-61.5	5.604	-30.0	75.76	1.5	1079	33.0	38.33	64.5	4.869		
-60.0	6.123	-28.5	102.1	3.0	1061	34.5	30.70	66.0	4.435		

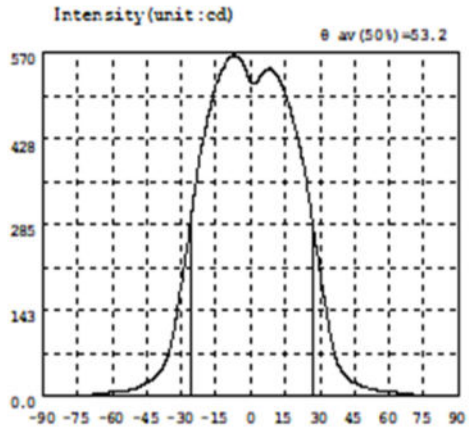
Electricity Parameter:

Current I: 0.1000A Power: 3.299W
Voltage V: 33.00V PF: 1.000

Optical Parameter(Distance=2.410m):

Equivalent Luminous flux: Φ eff= 440.5lm Efficiency: Eff=133.54lm/W
Diffuse angle: @(25%): 47.5deg@(50%): 37.6deg@(75%): 25.5deg@(50%): 37.6deg
Diffuse angle: @(25%): 47.5deg@(50%): 37.6deg@(75%): 25.5deg@(50%): 37.6deg
Imax=1086cd (C=0.0deg,G=0.0deg) C0-180Plane Imax= 1086cd(G=0.0deg)
C0-180Plane I0= 1086cd





Intensity data:(deg , cd)　C0-180

A	I	A	I	A	I	A	I	A	I	A	I
-90.0	0.6666	-58.5	7.986	-27.0	262.4	4.5	534.4	36.0	77.46	67.5	5.029
-88.5	0.6665	-57.0	8.485	-25.5	303.4	6.0	540.6	37.5	58.38	69.0	4.443
-87.0	0.6774	-55.5	9.043	-24.0	346.5	7.5	543.5	39.0	45.77	70.5	3.944
-85.5	0.6766	-54.0	9.682	-22.5	386.7	9.0	542.6	40.5	37.07	72.0	3.511
-84.0	0.6889	-52.5	10.64	-21.0	417.2	10.5	537.4	42.0	31.00	73.5	3.092
-82.5	0.7700	-51.0	12.20	-19.5	444.4	12.0	528.9	43.5	26.45	75.0	2.673
-81.0	0.9557	-49.5	14.40	-18.0	470.5	13.5	517.1	45.0	22.84	76.5	2.268
-79.5	1.227	-48.0	17.29	-16.5	495.0	15.0	502.6	46.5	19.99	78.0	1.902
-78.0	1.510	-46.5	19.89	-15.0	516.0	16.5	485.7	48.0	17.74	79.5	1.603
-76.5	1.838	-45.0	22.76	-13.5	531.0	18.0	465.2	49.5	15.90	81.0	1.339
-75.0	2.167	-43.5	26.22	-12.0	543.8	19.5	442.5	51.0	14.37	82.5	1.071
-73.5	2.529	-42.0	30.46	-10.5	555.3	21.0	418.7	52.5	12.65	84.0	0.8546
-72.0	2.936	-40.5	35.67	-9.0	563.0	22.5	392.6	54.0	11.23	85.5	0.7059
-70.5	3.339	-39.0	42.30	-7.5	566.0	24.0	362.8	55.5	10.14	87.0	0.6178
-69.0	3.715	-37.5	51.49	-6.0	565.7	25.5	322.1	57.0	9.327	88.5	0.5911
-67.5	4.154	-36.0	64.79	-4.5	560.1	27.0	284.0	58.5	8.701	90.0	0.5671
-66.0	4.718	-34.5	85.91	-3.0	549.9	28.5	247.1	60.0	8.162		
-64.5	5.415	-33.0	114.7	-1.5	534.9	30.0	211.0	61.5	7.616		
-63.0	6.171	-31.5	149.1	0.0	521.1	31.5	173.9	63.0	7.049		
-61.5	6.864	-30.0	185.1	1.5	518.2	33.0	138.1	64.5	6.418		
-60.0	7.452	-28.5	223.4	3.0	523.4	34.5	104.3	66.0	5.725		

Electricity Parameter:

Current I:　0.1000A　　Power:　3.299W

Voltage V:　33.00V　　PF:　1.000

Optical Parameter(Distance=2.410m):

Equivalent Luminous flux: Φ eff= 435.9lm　　Efficiency: Eff=132.15lm/W

Diffuse angle:　@(25%): 64.6deg@(50%): 53.2deg@(75%): 41.2deg@(50%): 53.2deg

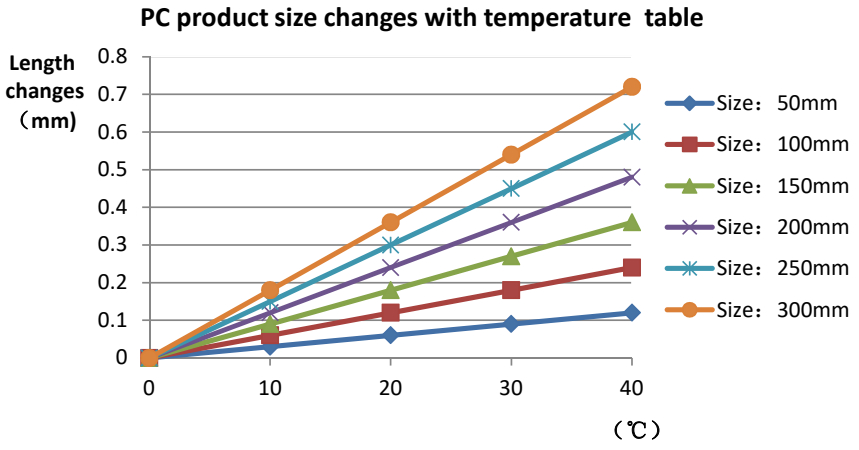
Diffuse angle:　@(25%): 65.6deg@(50%): 54.9deg@(75%): 44.8deg@(50%): 54.9deg

Imax=566.3cd (C=0.0deg,G=-7.0deg)　　C0-180Plane Imax= 566.3cd(G=-7.0deg)

C0-180Plane I0= 521.1cd

		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Judgment	Remarks
1.Size	diameter	45			45.12	45.07	45.12	45.07		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			21.01	20.97	21.01	20.97		
	thickness	2			2.16	2.14	2.16	2.14		
	Gate shear can not affect the appearance of the lamp									
	See attachment "Appearance Inspection Standards"									
2.Appearance Quality		See attachment "Appearance Inspection Standards"	E		No burr	No burr	No burr	No burr		OK
					No stains	No stains	No stains	No stains		
3.Material		PMMA				Color	Transparent			OK
4.Optical index	Testing LED	CITIZEN:CLU028								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle				21.5	21.3	21.4	21.6		
	K-value				4.42	4.50	4.40	4.35		
	Efficiency				90.64%	90.00%	90.10%	90.50%		
	Facula	See the signature sample				`				
Comprehensive judgment		Qualified								

Remarks:
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right



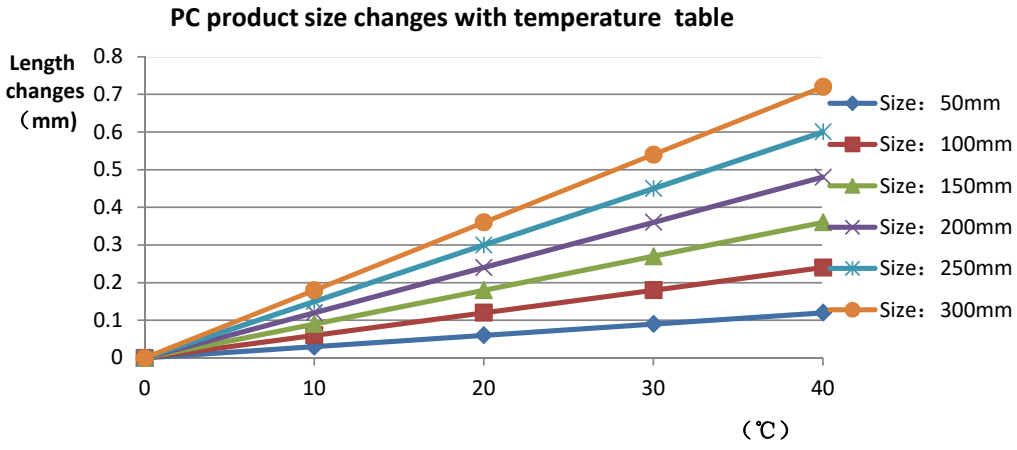
Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Test result5	Test result6	Test result7	Test result8	Judgment	Remarks
1.Size	diameter	45			45.11	45.12	45.08	45.05	45.07	45.08	45.07	45.12		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			20.86	20.87	20.84	20.85	20.98	20.84	20.85	20.94		
	thickness	2			2.03	2.06	2.03	2.03	2.04	2.03	2.05	2.06		
	Gate shear can not affect the appearance of the lamp													
	See attachment "Appearance Inspection Standards"													

2.Appearance Quality	See attachment "Appearance Inspection Standards	E	No burr	No burr	No burr	No burr	OK
			No stains	No stains	No stains	No stains	
3.Material	PMMA		Color	Transparent			OK

4.Optical index	esting LE	CITIZEN:CLU028								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle		26.7	27	26.3	26.5	26	26.1	26.2	26.4
	K-valu		4.03	3.90	4.10	4.10	4.20	4.10	4.10	4.10
	ficien		91.00%	90.70%	90.30%	91.20%	90.70%	91.00%	91.50%	90.10%
	acu	See the signature sample	`							
Comprehensive judgment	Qualified									

Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right



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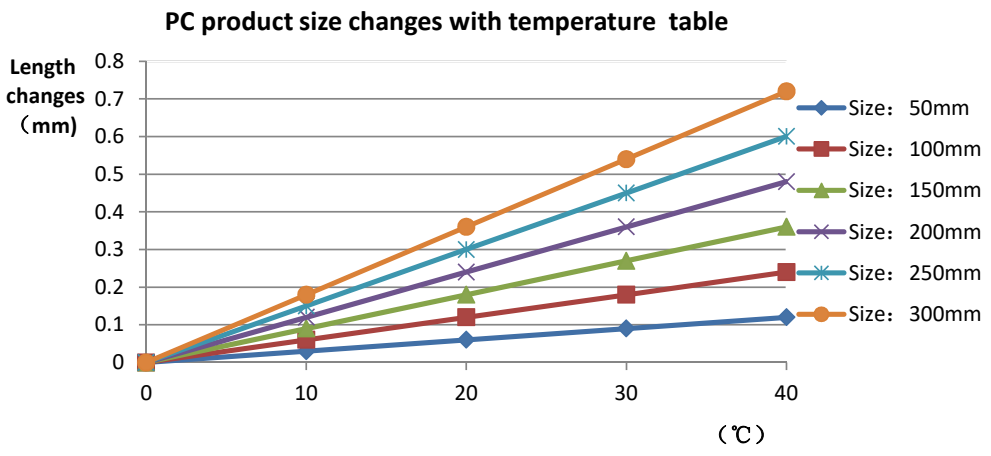
		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Test result5	Test result6	Test result7	Test result8	Judgment	Remarks
1.Size	diameter	45			45.22	45.12	45.16	45.19	45.16	45.17	45.10	45.11		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			21.01	21.01	20.99	21.01	21.01	21.01	20.99	21.01		
	thickness	2			1.99	1.98	1.98	2.00	1.98	1.98	1.94	2.04		
	Gate shear can not affect the appearance of the lamp													
	See attachment "Appearance Inspection Standards"													
2.Appearance Quality	See attachment "Appearance Inspection Standards"	E			No burr		No burr		No burr		No burr		OK	
					No stains		No stains		No stains		No stains			
3.Material	PMMA				Color		Transparent						OK	
4.Optical index	esting LE	CITIZEN:CLU028												
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.													
	FWHM	See light distribution curve												
	angle				37.6	37.0	37.3	38.0	36.7	36.9	37.0	37.1		
	K-value				2.47	2.50	2.50	2.30	2.55	2.50	2.50	2.50		
	fficien				91.5%	92.0%	91.3%	91.7%	91.1%	91.8%	91.8%	91.5%		
	acu	See the signature sample			`									
Comprehensive judgment	Qualified													

Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right



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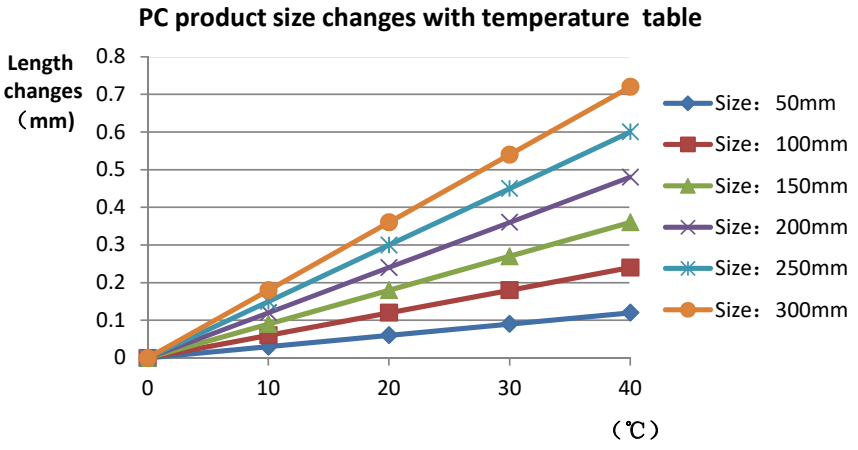
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

Sample parameter test rep HK Glareless 45@21-60° lens

		Standard size	Upper Size limit	Lower size limit	Test result1	Test result2	Test result3	Test result4	Judgment	Remarks
1.Size	diameter	45			45.22	45.22	45.22	45.22		Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test.
	height	20.9			21.06	21.01	21.06	21.01		
	thickness	2			2.13	2.12	2.13	2.12		
	Gate shear can not affect the appearance of the lamp									
	See attachment "Appearance Inspection Standards"									
2.Appearance Quality		See attachment "Appearance Inspection Standards"	E		No burr	No burr	No burr	No burr		OK
					No stains	No stains	No stains	No stains		
3.Material		PMMA				Color	Transparent			OK
4.Optical index	Testing LED	CITIZEN:CLU028								
	The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life.									
	FWHM	See light distribution curve								
	angle				53.2	54	53	53.5		
	K-value									
	Efficiency				90.44%	90.20%	90.00%	90.10%		
	Facula	See the signature sample								
Comprehensive judgment		Qualified								

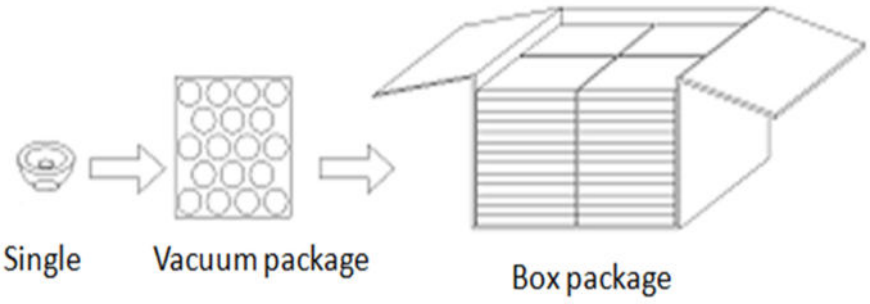
Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right



Precautions：
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

PN	HK-DX-45@21-15-D9-21-1g-1_PMMA	Product Name	HK Glareless 45@21-15º lens
Product material	PMMA	Customer	

Package diagram



Product packing							
	18	A/ Box	4	pcs/Layer		
	11	Layer/Box	792	A/ Carton		

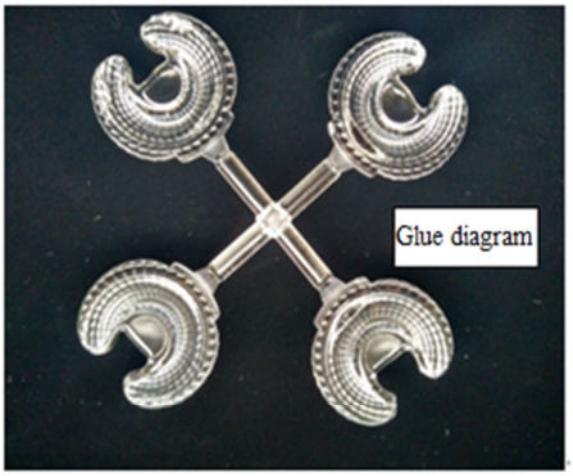
Packaging Materials	NO.	Part No	Part name	Size	Dosage	Unit	Remarks
	1	2.07.0066	Blister box	23cm*21cm	44	BAG	
	2	2.08.0001	PE film	25cm*27cm	44	PCS	
	3	2.06.0005	Reel label paper	62mm*42mm	44	PCS	
	4	2.06.0005	Box label paper	62mm*70mm	1	PCS	
	5	2.06.0003	big plate	46cm*42cm	12	PCS	
	6	2.06.0011	big flat carton	48cm*44cm*37cm	1	PCS	

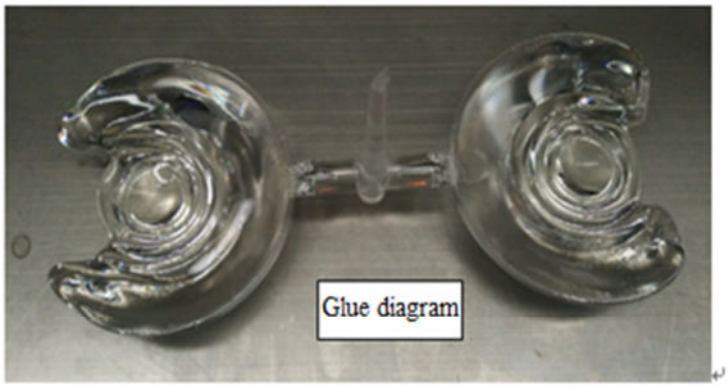
Remarks	The loose packing is not subject to this specification. Customer's requirements shall prevail

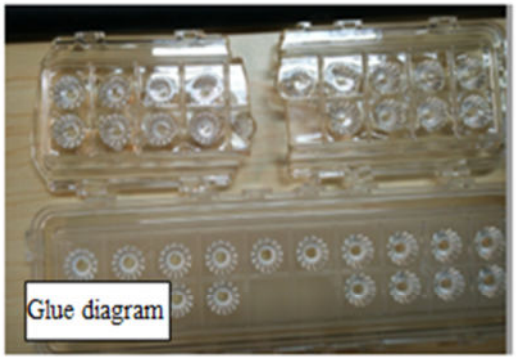
Special notice

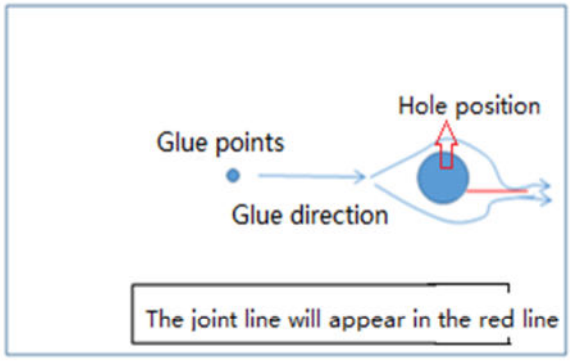
When gule pass through holes, columns and other structures, or part of the thin structure, will form a weld line. The product which uses multi-point injection welding line will appear because of the combination of sol, as shown below:

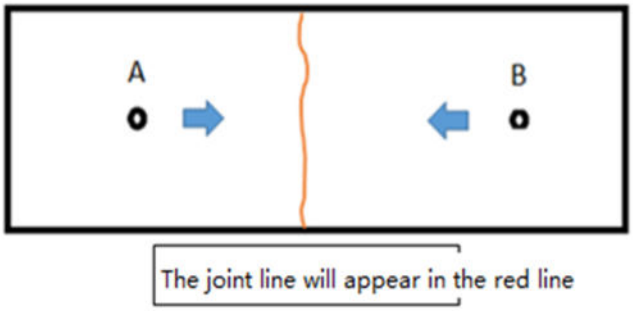
Synthetl











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.

Appearance inspection standards

1 Operating procedures

1.1.1Sampling standards, sampling plan and AQL

Test level：GB/T2828.1-2012The first part is according to the acceptance quality limit (AQL) retrieval batch inspection sampling plan, general inspection level Ⅱ level, CR class defect coefficient 0, MA defect rejection level AQL = 0.65, MI class defect rejection level AQL = 1.0; defect level please see 5.4.

2 Code table

Code	Code description	Unit	Code		Code description	Unit
N	Amount/pcs	pcs	D		Diameter	mm
L	Length	mm	H		Depth	mm
W	Width	mm	DS		Distance	mm
S	Proportion	mm^2	SS		Offset	mm

3 Test conditions

3.1 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;

3.2 Light: 2x40w cool white fluorescent lamp, the light source is 500-550mm away from the lens surface; in order to make the appearance defect can be correctly recognized, the illumination should be 500-1000Lux, and the observation time is 10 seconds.

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

4 Appearance inspection standards

Test items	Judging standard	Inspection equipment	Defect level		
		Testing method	MI	MA	CR
Check the sample	When start the machine and process, all products have to check the appearance of the sample, the appearance of the sample is divided into qualified samples and limited samples. 1: Qualified sample refers to the appearance and structure standard of the product which recognized by the client, the sample size should be confirmed before mass production;	Sample comparison, visual			√

	2: The limited sample refers to the limit of a particular exceptionally developed sample. Limit the sample only for its specific point of exception to confirm; The priority is higher than the other criteria in this table. When there is a limited sample, the limit sample shall prevail.				
Raw edge	Not allowed to affect the size and assembly	Visual, point card		√	
Scratch	1: Non-optical surface and non-exposed surface scratches should be visually insignificant and the length is less than 1/10 of the maximum surface size.	Visual, point card, calipers		√	
Fingerprint	Fingerprints are not allowed on all products	Visual		√	
Foreign objects, black spots, white spots	The product may not be attached to foreign objects, including oil, fiber, dregs of water gap and so on				√
Deformation	Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces.	Visual, feeler			√
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.	Visual, point card		√	
	Ejection strain: the optical surface and the appearance of the exposed surface after assembly are not allowed to have a strain, and the structural surface does not allow visual obvious strain.				
Insufficient filling	Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces，The signature sample shall prevail.	Visual, point card		√	
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.Part shrink reference point defects	Visual, point card		√	
Flow marks、Welding line	1：Product does not allow the presence of flow marks and welding lines unless the structure can not be avoided;	Visual		√	
	2: The remaining flow marks shall not appear in the optical surface, a single L ≤ 10mm, no more than two				

Bubble	No bubbles are allowed	Visual		√	
Foreign objects, black spots, white spots	Not obvious or D ≤ 0.3mm black spots and foreign bodies in the area of 100x100mm not more than 1; Exceeded foreign matter black spots is judged bad.	Visual, point card	√		
Damaged	No damage is allowed	Visual			√
Cold glue	Optical surface may not have cold glue, non-optical surface cold glue should meet the visual is not obvious.	Visual	√		
Bad incision	1: Do not affect the product size, shall not penetrate the optical surface, the cut should be smooth;	Visual			√
	2: Laser cutting products, the optical surface burns shall not occur after the processing is completed. Beading must not affect product installation				
	3: Three molds and hot runner gate shall not appear residue.				
Scrub	Scrub surface should be uniform, off the scrub phenomenon should not be obvious，A single off scrub imprint requires D ≤ 1 mm and no more than 1 area within a 50x50 mm area	Visual		√	