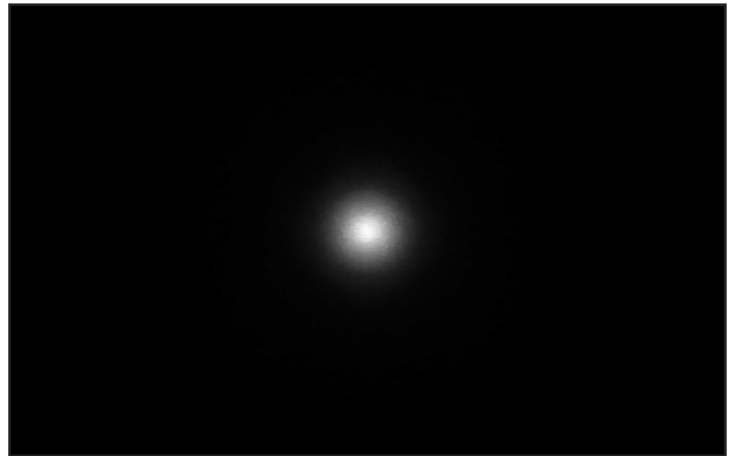
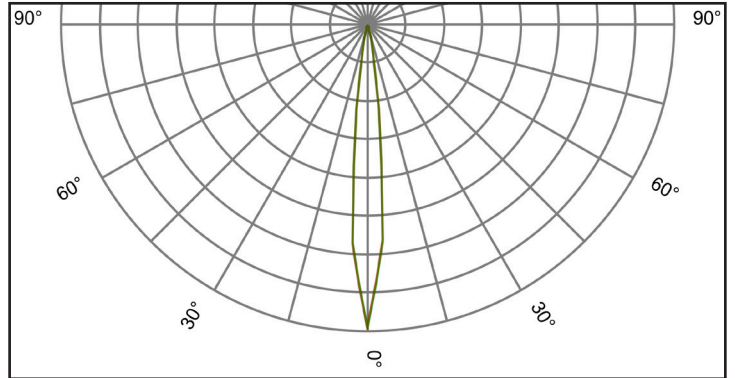
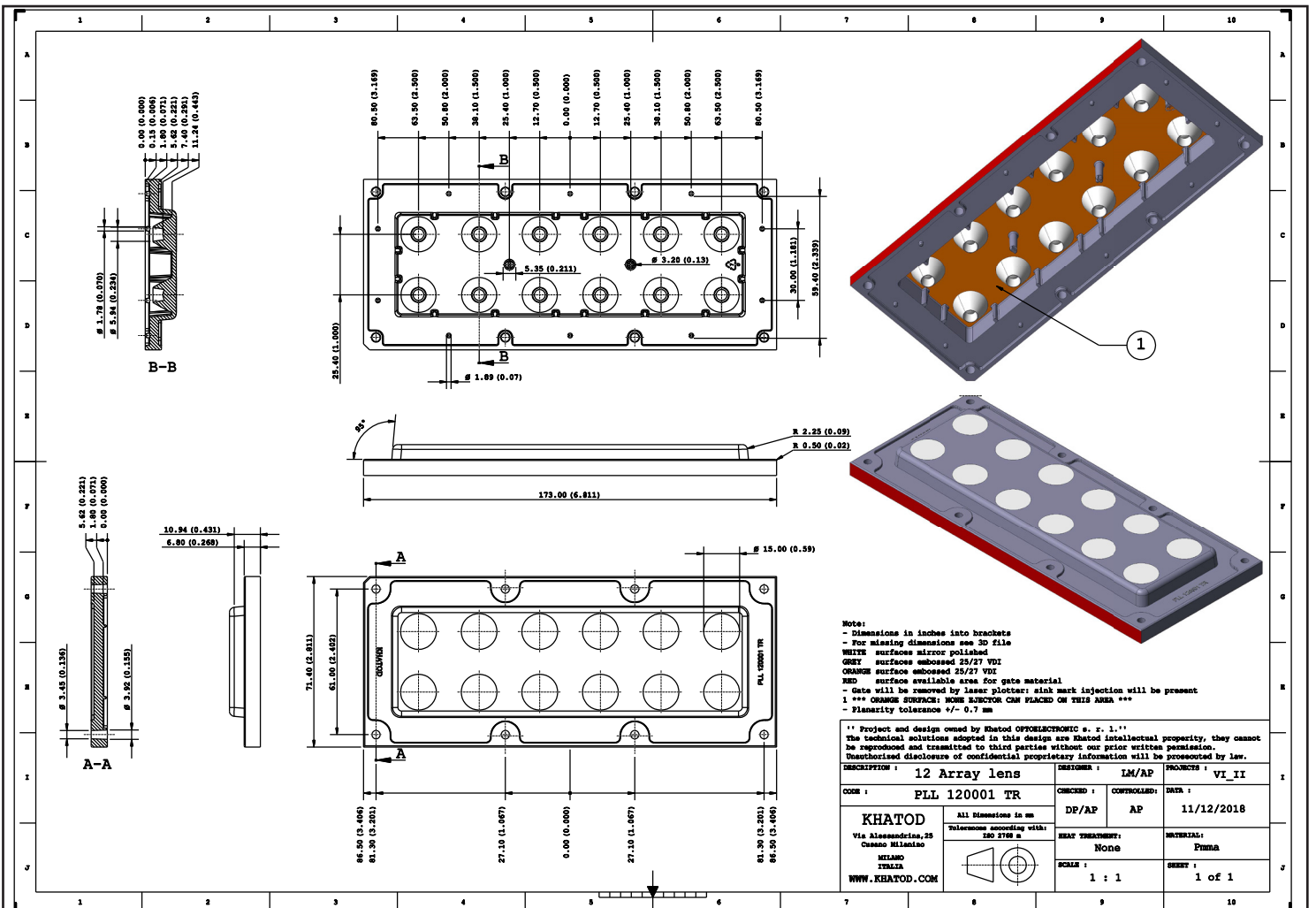


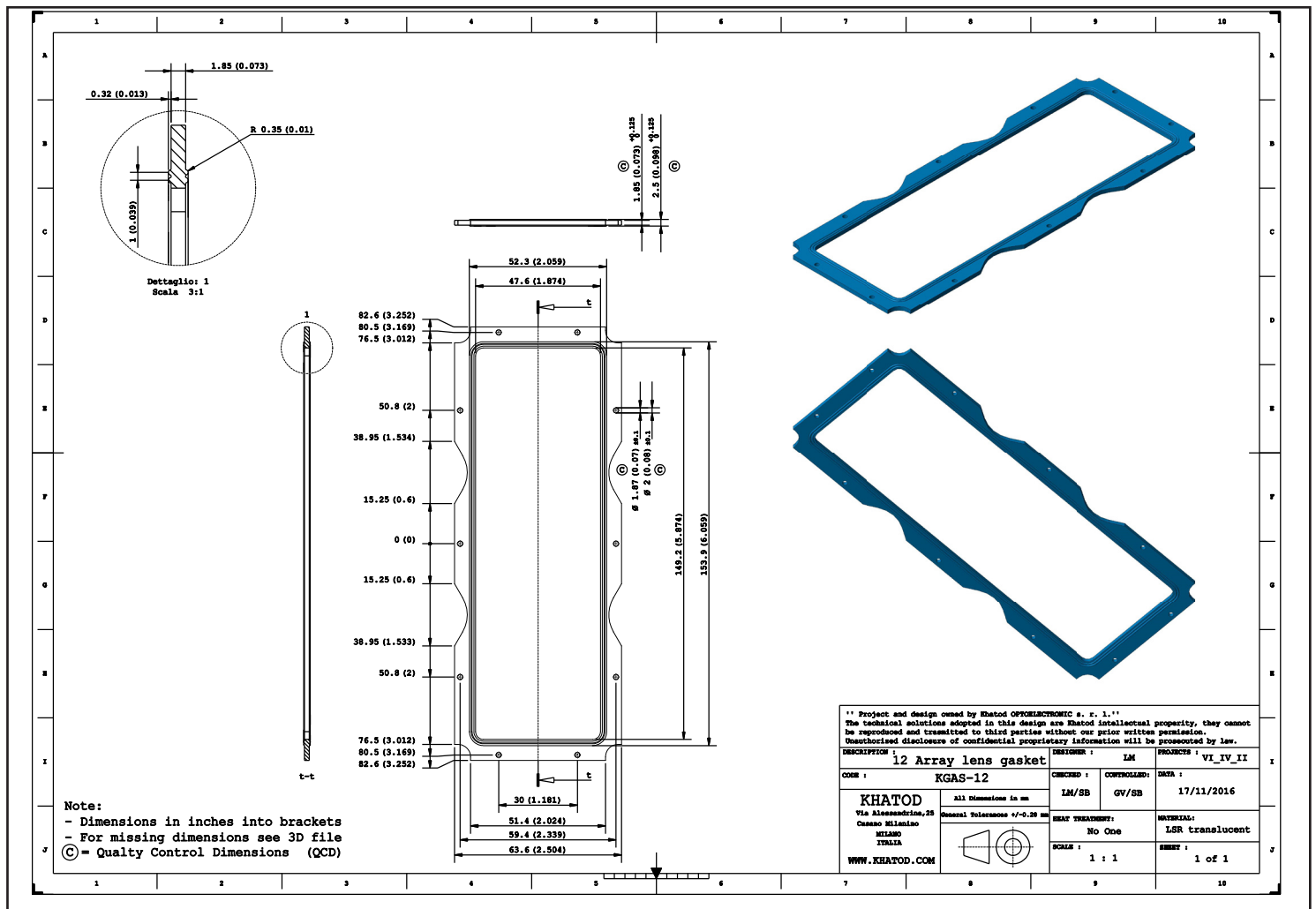
PLL120001TRUV - Narrow Beam



- Material = PMMA UV
- Full angle at 50% from maximum: ~ 15°
- Full angle at 10% from maximum: ~ 31°
- The light spots here represented refer to tests carried out with LEDs, 3x3mm size, without Dome



KGAS12 - Gasket for PLL12xxx



KGAS12 - Physical Characteristics

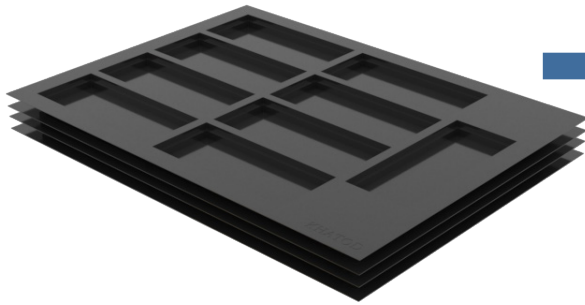
Hardness sh A : 65 +/-5	Color : Transparent	Abbrev. : SIL 65H TRASP
Basic Element : VMQ	Vulcanization: 10min @ 150°C	Annealing : 4 hours@200°C

Original Parameters	Unit of Measure	Detected Values	Test Method
Hardness	Shore A	65	ASTM D 2240
Hardness	IRHD		
100% Modulus	MPa		ASTM D 412
100% Modulus	N/mm ²		

Tensile strenght	MPa	9	ASTM D 412
Elongation	%	620	ASTM D 412
Tear resistance	N/mm	30	ASTM D 624/B
Specific Gravity	g/cm ³	1.16	ASTM D 297
Brittleness Point	°C		
TR-TEST TR10	°C		ASTM D 1329
TR TEST TR-30	°C		
Compression Set 25% Temperature: 175°C @ 22h	%	27	ASTM D 395/B

Packaging

Item	Quantity	Total Lens	Size (L*W*H)	G.W.
Trays	9 pcs per Tray	9 pcs	50*32 cm	0.52 Kg
Outer Box	20 Trays per Outer Box	180 pcs	50*32*38 cm	10.5 Kg



180 Lenses / Trays



20 Trays / Outer Box

Determination of thermal shock resistance degree



Initial Visual Inspection

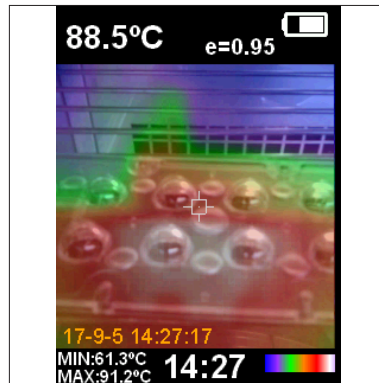
Before starting with testing, a visual inspection was performed in order to check the integrity of the part under test.

The part resulted physically intact.

Photo: the part in the climatic chamber.



Temperature set in the climatic chamber



Temperature detected on the part by IR thermal camera



Final Visual Inspection

After testing, a final visual inspection was performed. The result was positive. (view photo)

Photo: the part in the climatic chamber after testing.

Based on the testing result, PLL12xxxUV test specimen proved to overcome the thermal stress test up to 85°C, without any physical deterioration of the material.

Determination of mechanical impact resistance degree (IK tests)

Note

The present document is an internal document showing the tests carried out by Khatod in its laboratory. The tests, photos and videos presented in this document are made available for demonstration purposes only. Khatod, with its laboratory, is not a certification body. If customers need IK accredited certifications, they have to apply to the appointed Certification Bodies, under their sole care and responsibility.

Initial Visual Inspection

- Before starting with testing, a visual inspection was performed in order to check the integrity of the part under test. The part resulted physically intact.

Tests Execution

Tests were carried out on the part under test according to IK06 (1 Joule)
Test parameters are as follows:

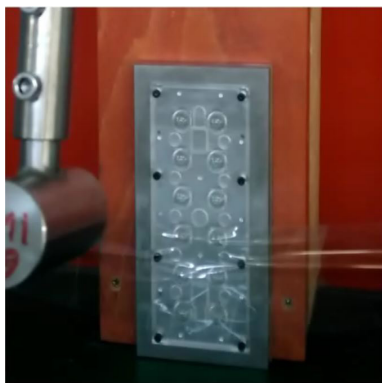
- Impact energy: 1 Joule
- Impacting element: 500 grams
- Distance between impacting element and the part under test: 20 cm
- Number of impacts: 5



1st impact test

2nd impact test

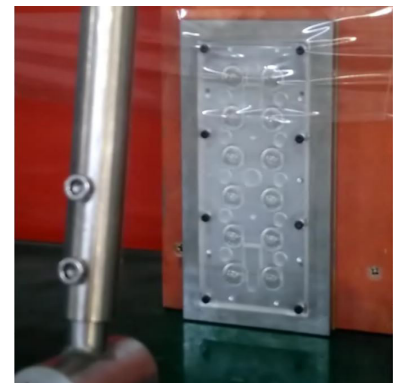
3rd impact test



1st TEST



2nd TEST



3rd TEST

Final Visual Inspection

Final Visual Inspection:
At the conclusion of the tests, a final visual inspection has been carried out and the result is positive (See photo 5)



Photo 5

Final Visual Inspection:
After testing, a final visual inspection was performed. The result was positive. (view photo)

IP X5 Test

Note

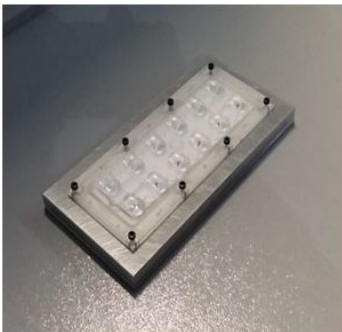
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Data and Analysis

The sample has been subjected to the water-penetration resistance test as follows:

- Assembly of the components to test :
A moisture indicator paper sheet has been interposed between the lens and the clamping base
- Positioning of the assembled sample under the device of watering with nozzle \varnothing 6.3 millimeters
- Water flow: 12.5 l/min \pm 5%
- Water pressure: 30 kPa @ distance of 3m
- Duration of water spraying test on the wrap surface per m^2 : 1 min
- Minimum duration of the test: 3 min
- Distance between the nozzle and the wrap surface: 2.5 Meters



PLL12xxxx assembled with KGAS12



Testing under water jet



Testing under water jet

Conclusion



The test paper sheet is dry

As shown in the photo, the test paper sheet is completely dry after disassembling the system.

Based on the water penetration resistance test, KGAS12 gasket proved to be fit for purpose.

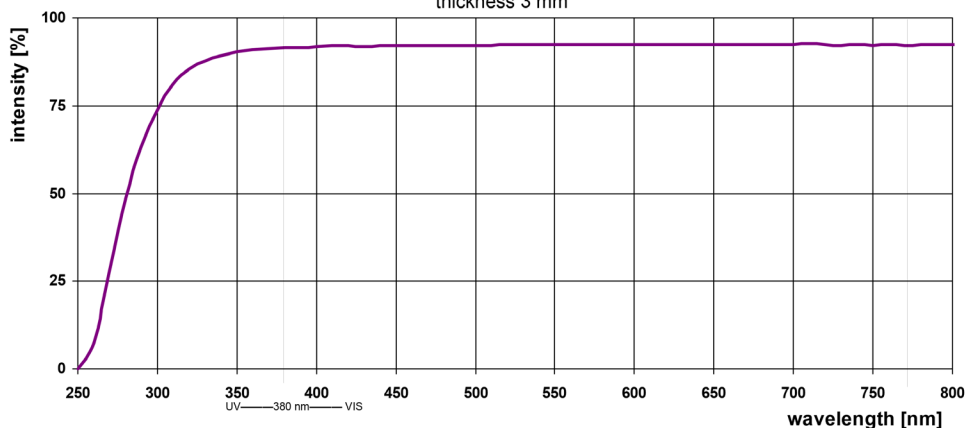
The product has passed the Khatod test.

Materials

PMMA UV Optics MP1000025

	Parameter	Unit	Standard	PMMA UV
Mechanical Properties				
Tensile Modulus	1 mm/min	MPa	ISO 527	3200
Stress @ Break	5 mm/min	MPa	ISO 527	76
Strain @ Break	5 mm/min	%	ISO 527	5.5
Charpy Impact Strength	23°C	kJ/m ²	ISO 179/1eU	20
Thermal Properties				
Vicat Softening Temperature	B / 50	°C	ISO 306	103
Glass Transition Temperature		°C	ISO 11357	112
Temp. of Deflection under Load	0.45 MPa	°C	ISO 75	100
Temp. of Deflection under Load	1.8 MPa	°C	ISO 75	95
Coeff. of Linear Therm. Expansion	0 - 50°C	E-5 /°K	ISO 11359	8
Classes of construction product			DIN EN 13501-1	E
Flammability UL 94	1.5 mm	Class	IEC 60695-11-10	HB
Rheological Properties				
Melt Volume Rate, MVR	230°C / 3.8kg	cm ³ /10min	ISO 1133	1.4
Optical Properties				
Luminous transmittance	d=3 mm			
Luminous transmittance	D65	%	ISO 13468-2	92
Haze			ASTM D1003	< 0.5
Refractive Index	589nm/23°C		ISO 489	1.49
Other Properties				
Density		g/cm ³	ISO 1183	1.19
Recommended Processing Conditions				
Predrying Temperature		°C		max. 93
Predrying Time in Desiccant-Type Drier		h		2 - 3
Melt Temperature		°C		220 - 260
Die Temperature (Extrusion)		°C		220 - 260

Transmission in the UV- and VIS- area
PMMA UV - Polymethylmethacrylate
thickness 3 mm



Notes:

- The optical values shown are the result of optical simulations carried out with LIGHTTOOLS, ASAP and ZEMAX software systems. The optical simulations are carried out on the basis of the typical values provided in the LED manufacturers' official datasheets. The photometric analysis has been carried out on physical samples. On request, by supplying your PCB, we can provide the measurement photometric file.

Use and Maintenance

- DO NOT HANDLE OR INSTALL LENSES WITHOUT WEARING GLOVES, SKIN OILS MAY DAMAGE LENS OR LIGHT TRANSMISSION;
- CLEAN LENSES WITH MILD SOAP AND WATER AND A SOFT CLOTH;
- DO NOT USE ANY COMMERCIAL CLEANING SOLVENTS ON LENSES.

Disclaimer

Please note that flow lines and weld lines on the external surfaces of the lenses are acceptable if the optical performance of the lens is within the specifications.

Should you require further information, please contact Khatod for advice. All lens testing must be subject to identical conditions as Khatod test condition. Khatod Optoelectronic, Milan, Italy, manufactures lenses for LEDs. Any other use of the lens shall void our liability and warranty. The lenses are an inert component to be used in the manufacture of various products. Our warranty and liability are limited only to the manufacture of the lens. You may not modify, copy, distribute reproduce, license or alter the lens and related materials of Khatod. Khatod does not warrant against damages or defects arising out of the use or misuse of the products; against defects or damage arising from improper installation, or against defects in the product or in its components. No warranty of any kind, expressed or implied, is made regarding the safety of the products. The entire risk as to the quality or performance of the product is with the buyer. In no event shall Khatod be liable for any direct, indirect, punitive, incidental, special, consequential damages, or any damages whatsoever arising out of or connected with the use or misuse of the product. Khatod shall not have any obligation with respect to the product or any part thereof, whether based on contract, tort, strict liability or otherwise. Buyer assumes all risks and liability from use of the product. The laws of Milan, Italy govern this product warranty and liability and you hereby consent to the exclusive jurisdiction and venue of courts in Milan, Italy in all disputes arising out of or relating to the use of this product. Production, marketing, distribution, sale of these products as well as their possible modifications and variations are only exclusive right of Khatod Optoelectronic. No company can perform any of these actions without written permission released by Khatod Optoelectronic. The information contained in this document is proprietary of Khatod Optoelectronic and may change without notice.

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