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**CODE NUMBER: 130000002901**

**COLOR MIXING-ZOOM WITH MLA - PL1564**



- Innovative design
- Zoom Range 13° to 45°
- Equipped with Moving Lenslet Array (MLA)
- High optical efficiency over 90%
- Robust Mounting
- Shadows or glare totally eliminated
- Easy fixing onto the PCB

**Typical Applications:**

- Architectural lighting
- Stage lighting
- Entertainment & decorative lighting
- Shop windows, halls & entrances
- Downlights
- Flashlights
- Lamps

Full range of Color Mixing Optics Equipped with Moving Lenslet Array (MLA) Ø 45 mm ; beam angles from 13° to 45°. Can be equipped with a special MLA to be mounted on top of the lens allowing ZOOM and AUTOFOCUS applications. By sliding it on top of the lens you can vary the beam angles in a range from 13° to 45° by preserving a perfect color mixing and a high optical efficiency over 90% in the full range of the beam angles. The MLA and the lens fit perfectly as they have the same diameter. The beam angles vary from the narrow configuration when the device is in contact with the lens, to the wider configurations when the MLA is made sliding over the lens.

The color mixing performance exceeds any expectations: the red, green, blue and white beams produced by the high brightness chips are perfectly mixed and concentrated in a unique light beam of high intensity while delivering an incomparable uniformity level. Shadows or glare are totally eliminated and the highest in light color mixing is guaranteed.

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## 1 Light Source Model

Parameter	Symbol	Value	Unit
Lens / Reflector Model	-	PL1564 + PL1590WI	-
Material (more info on page 8)	-	PMMA	-
Dimensions	-	See Page 6 - 7	-
Source Model	-	LUMINUS - SST-50 WHITE	-
Number of Source	<i>N</i>	1	-
Power Supply Type	-	ISO TECH ISP3303	-
Drive Type	-	-	-
Driving Voltage	<i>V<sub>f</sub></i>	-	V
Driving Current	<i>I<sub>f</sub></i>	-	mA
Nominal Flux	$\Phi$	450 x 1	lm

## 2 Measurement Setup

Parameter	Symbol	Value	Unit
Operator	-	Simone Bassi	-
Goniophotometer Type	-	KLM12M	-
Measurement Distance	<i>z</i>	5	m
Room Temperature	<i>T</i>	25	°C
Date	-	05 October 2013	-

## 3 Result

Parameter	Symbol	Value	Unit
Total Flux	$\Phi$	450	lm
Max Intensity	<i>I<sub>max</sub></i>	3738	cd
Max Illuminance at 5 m	<i>E<sub>max</sub></i>	150	lx
General optical Measurement Tolerance	-	± 10%	-

## Notes

- Intensity (*I*) and illuminance (*E*) data are normalized by 1000 lm\*
- The optical values shown are the result of optical simulations carried out with 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.

\*These data refer only to the Graphics you will find in the following pages of this Test Report.

## 4 How to Mount the MLA on TOP of the Lens

The MLA and the lens fit perfectly as they are complementary, have the same diameter and Lenlet Array.

- Keep the locating pin aligned with the injection gate of the lens as explained in fig. A.
- Use a holder for the MLA.
- Place the MLA onto the lens by using the locating pins as shown in fig. A. Keep the device lenslet array facing down toward the lenslet array of the lens. Lens and MLA will fit easily in position.
- Fix the MLA to its holder by using glue or screws. Also a flange can help for a robust assembly solution.
- For narrow beam configuration, keep the MLA in contact with the lens.
- For wider beam configurations in a range from 13° to 45°, slide the MLA on top of the lens along the optical axis.

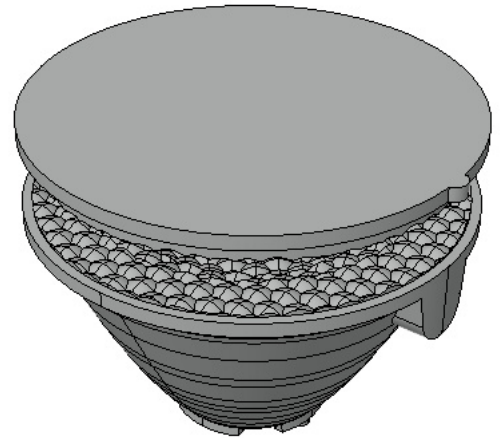


Fig. A

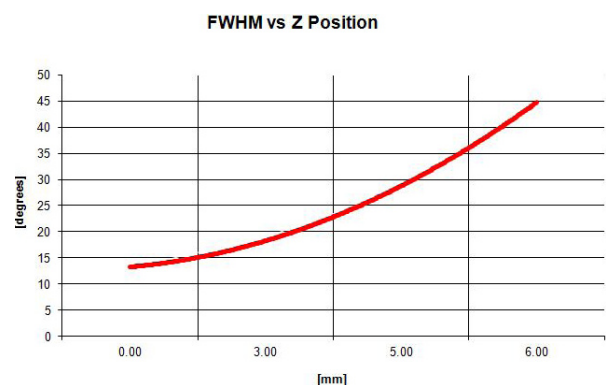
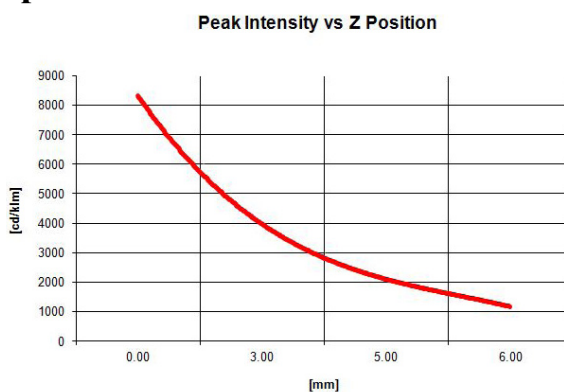
The lens and the device coupled together, make a high precision optical system enabling ZOOM and AUTOFOCUS applications by just sliding the MLA on top of the lens.

## 5 Parameter

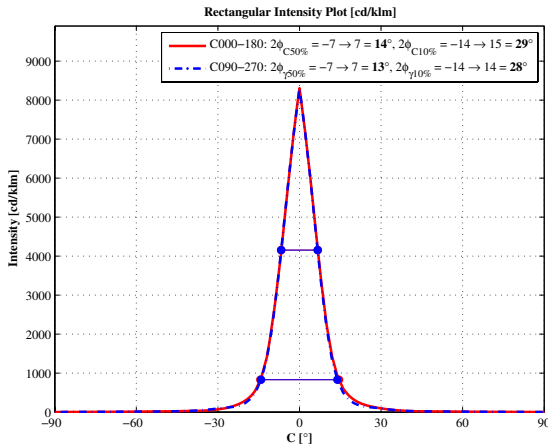
The mechanical system you will use requires a careful alignment between the lens and the MLA. Accurate alignment tolerances are to be met as follows:

Parameter	Ideal Tolerance	Max Tolerance
Centering	± 0.10mm	± 0.15mm
Rotation	± 1.00°	± 1.50°
Nearest Position (Narrow Beam)	0.30 mm	0.50mm
Coaxiality	± 0.40°	± 0.70°
Tilt	± 0.35°	± 0.50°

## 6 Graphics



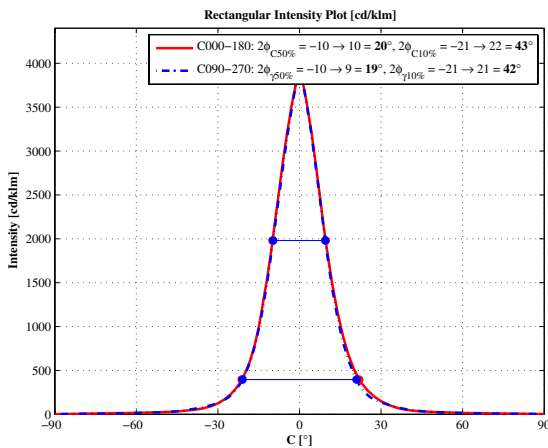
## 7 Graphics



Realistic View - Target @ 5 meters

### Narrow Configuration

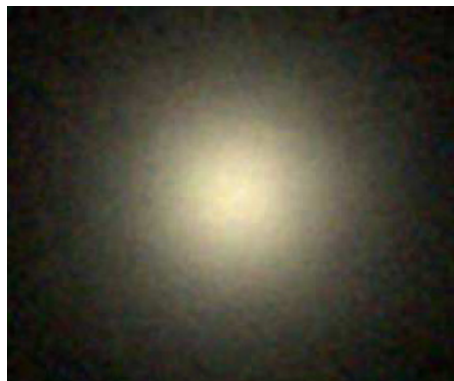
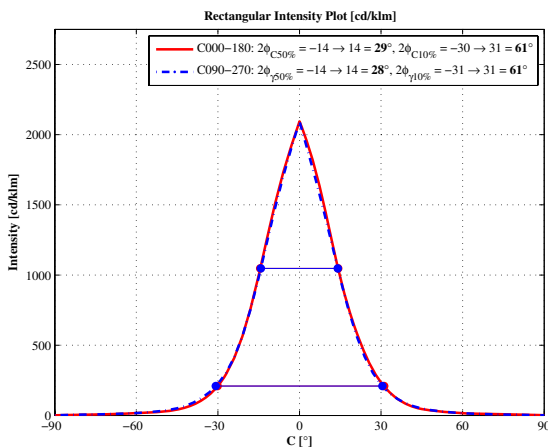
- MLA Position = 0 mm
- Full angle at 50% from maximum: ~ 13.0°
- Full angle at 10% from maximum: ~ 28.0°
- 8.306 cd/Klm



Realistic View - Target @ 5 meters

### Medium Configuration

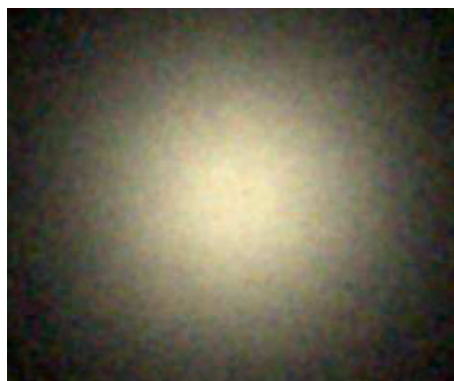
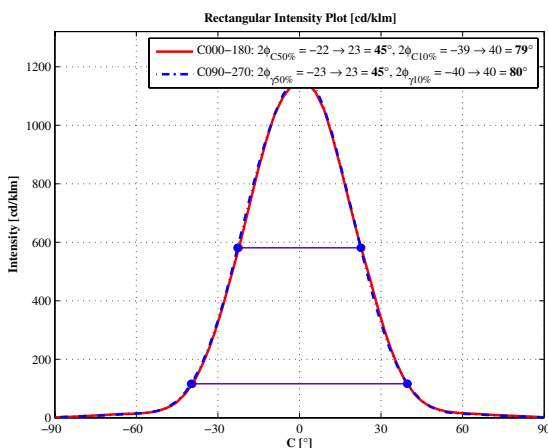
- MLA Position = 3 mm
- Full angle at 50% from maximum: ~ 19.0°
- Full angle at 10% from maximum: ~ 42.0°
- 3.692 cd/Klm



Realistic View - Target @ 5 meters

### Medium Configuration

- MLA Position = 5 mm
- Full angle at 50% from maximum: ~ 30.0°
- Full angle at 10% from maximum: ~ 61.0°
- 2.095 cd/Klm

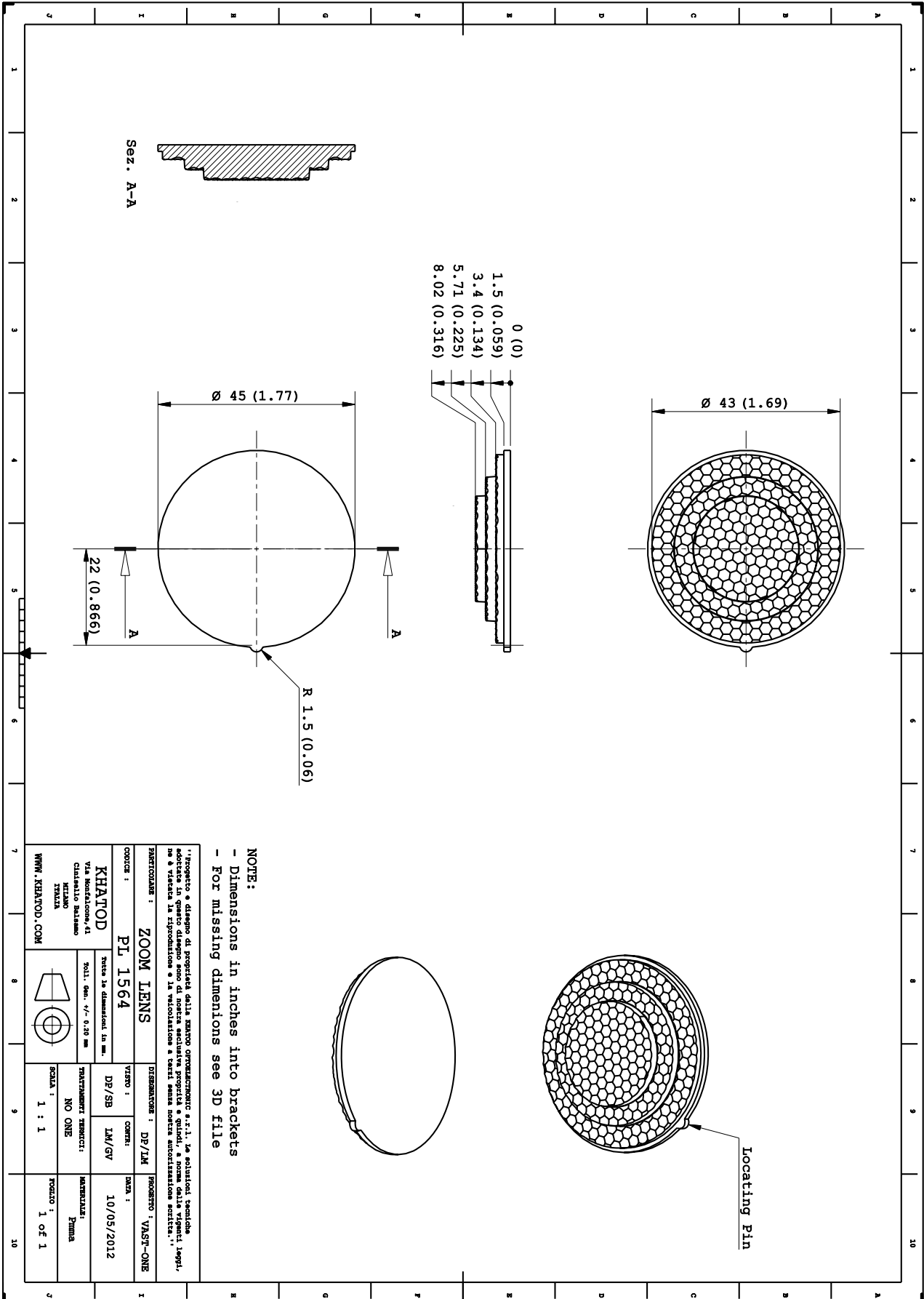


Realistic View - Target @ 5 meters

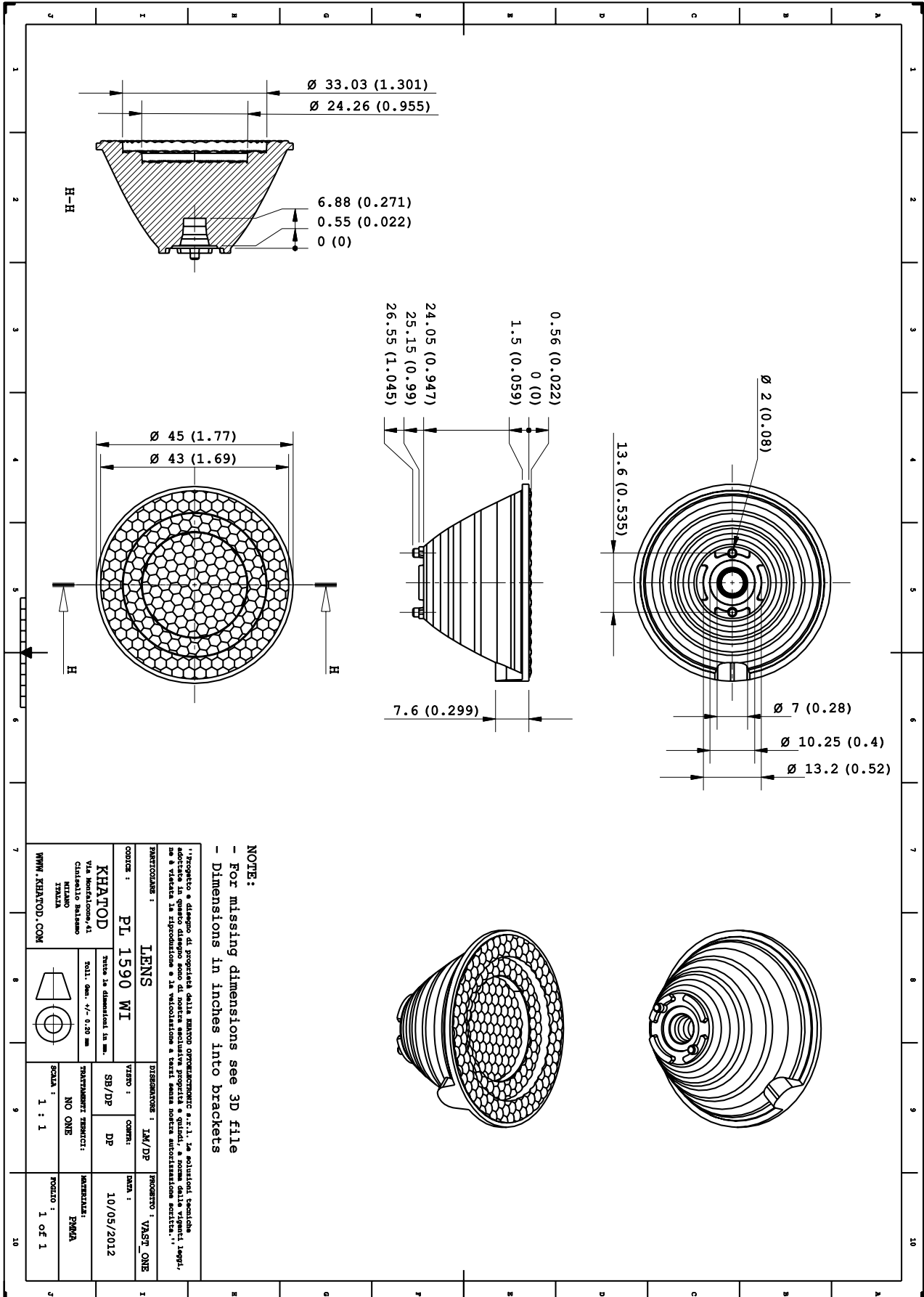
### Wide Configuration

- MLA Position = 6 mm
- Full angle at 50% from maximum: ~ 45.0°
- Full angle at 10% from maximum: ~ 80.0°
- 1.166 cd/Klm

## 8 Drawing



## 8 Drawing



## 9 Materials

Material	Top	Tstg
PMMA	-40°...85°C	-40°...85°C
PC	-40°...113°C	-40°...113°C
PC + Aluminium	-40°...113°C	-40°...113°C
APEC	-40°...180°C	-40°...180°C
ABS	-35°...70°C	-35°...70°C
APEC+ Aluminium	-40°...180°C	-40°...180°C

## 10 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.

## 11 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 specification described in the section Results on page 3.

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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