

Contents

1	AS229701TN1SA	Tunnel entrance reinforced lighting - 65° max candela	Pag. 2
2	AS229701TN2SA	Tunnel entrance reinforced lighting - 55° max candela	Pag. 3
3	AS229701TN3SA	Oval symmetrical optics for permanent tunnel lighting	Pag. 4
4	AS229704TN1	Tunnel entrance reinforced lighting - 65° max candela	Pag. 5
5	AS229704TN2	Tunnel entrance reinforced lighting - 55° max candela	Pag. 6
6	AS229704TN3	Oval symmetrical optics for permanent tunnel lighting	Pag. 7
7	ETI PLLSA2039	Fixing Adhesive Tape Technical Drawing	Pag. 8
8	Assembly Specifications		Pag. 9
9	Thermal shock resistance level		Pag. 10
10	Application Examples		Pag. 11
11	Packaging - AS229701TNxSA		Pag. 12
12	Packaging - AS229704TNx		Pag. 13
13	Materials / Use and Maintenance / Disclaimer		Pag. 14

TUNNEL lenses AS2297xxTN is the new Khatod's family of optics for outdoor lighting applications specifically designed for tunnel lighting.

They perform best in combination with the most popular 5050 package LEDs.

AS229701TNxSA is a single lens, 25x25mm provided with self-adhesive.

AS229704TNx, 25x140mm, 4-in-a-row linear design.

The family includes 2 counterbeam optics for tunnel entrance lighting and an oval symmetric beam for tunnel permanent lighting.

Made of optical grade PMMA HT, these lenses work perfectly within -40° to +105°C temperature range.

High lighting efficiency and excellent light distribution.

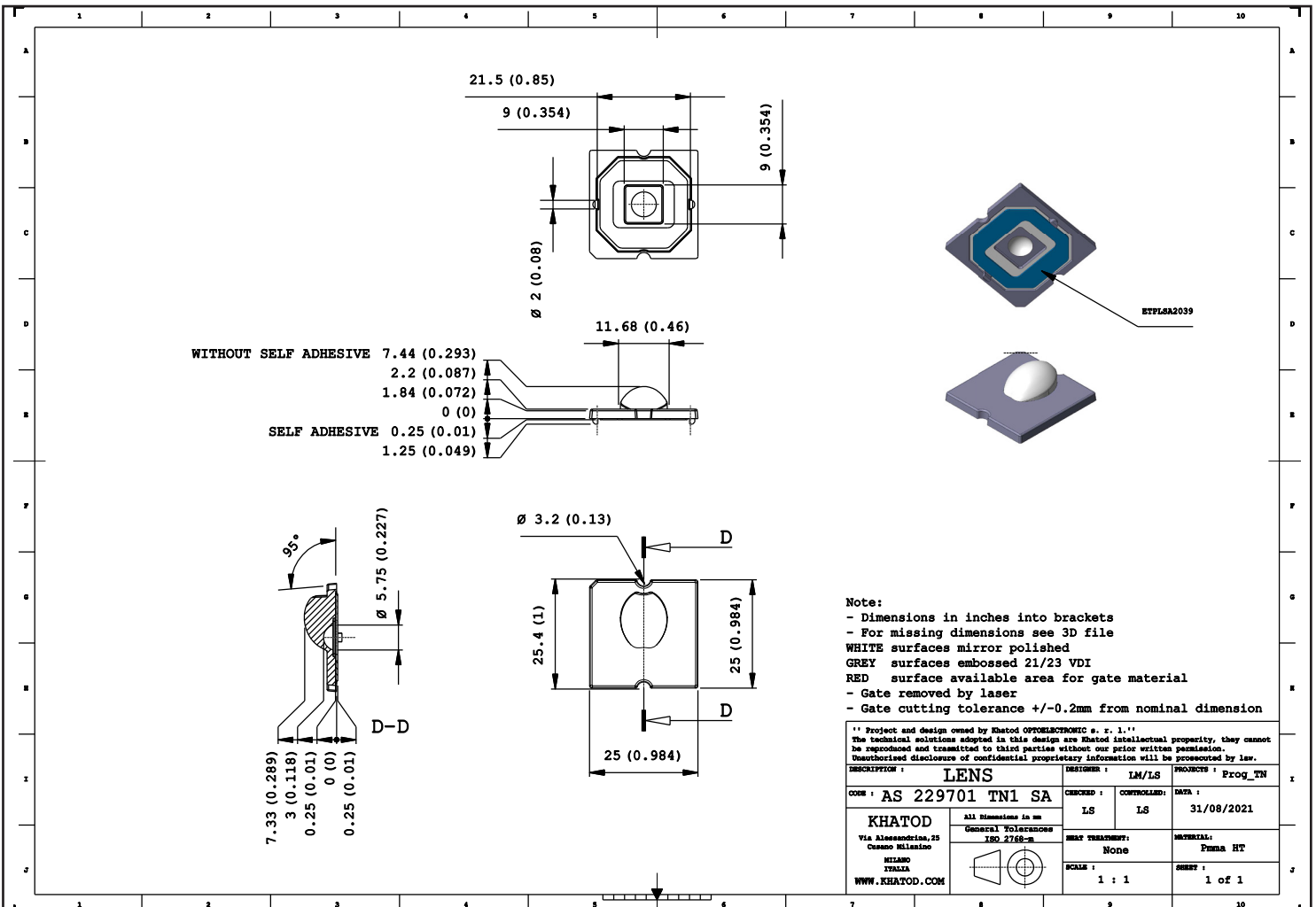
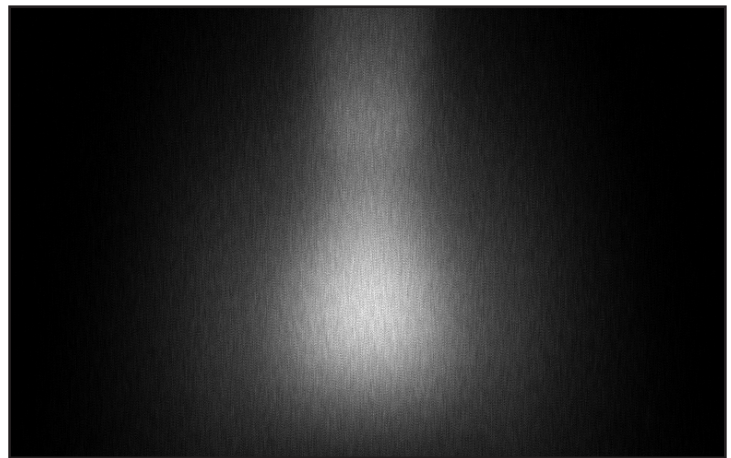
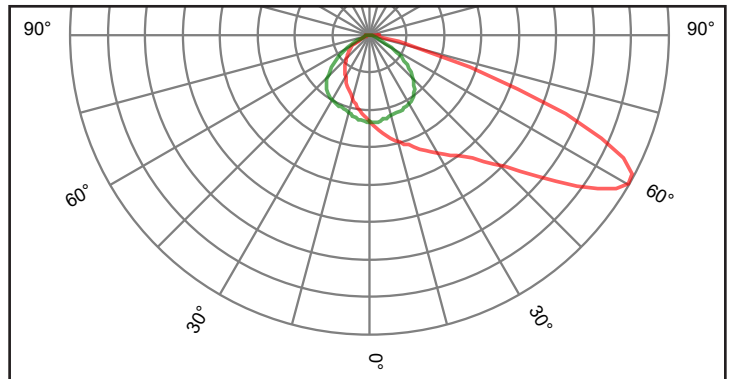
Can be used individually or configured in multiple parts so to create the perfect lighting fixture to meet the required standards.

AS229701TN1SA - Counterbeam optic for tunnel entrance lighting - 65° Max cd

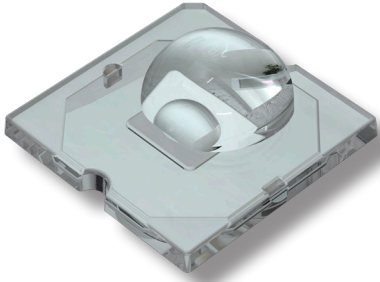


Self-adhesive Fixing

- Material = PMMA HT
- Angle 65° max candela
- Full angle at 50% from maximum: ~ 110°x110°
- Full angle at 10% from maximum: ~ 144°x130°
- The light spots here represented refer to tests carried out with 1 LED 5.0x5.0mm and ~ 605 Lumen

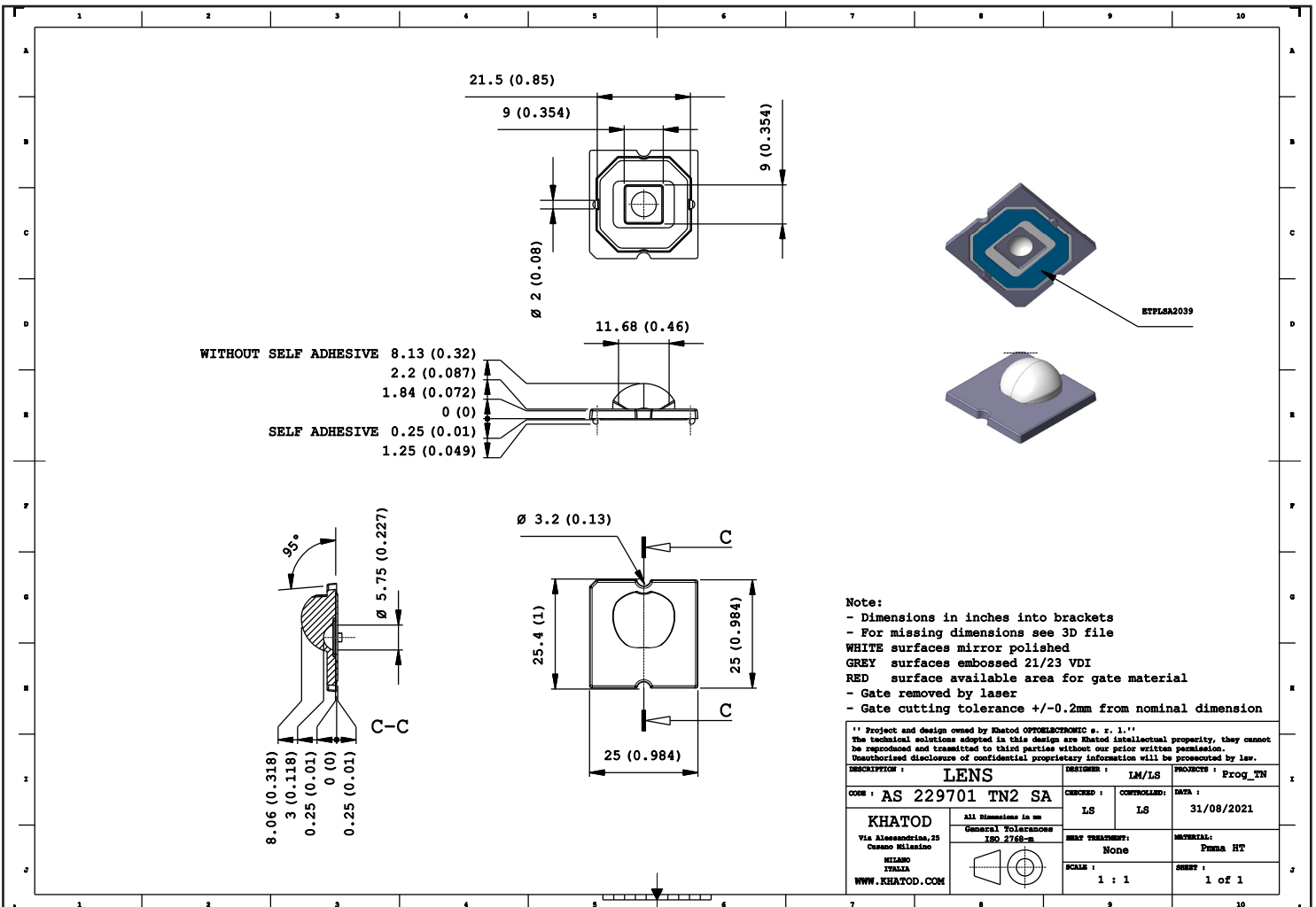
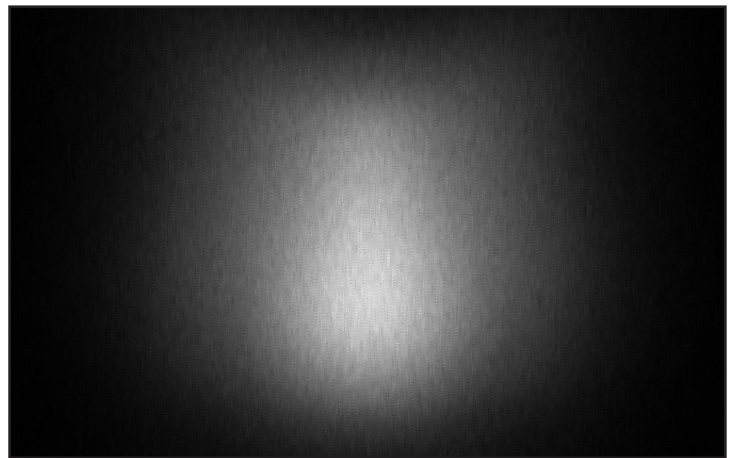
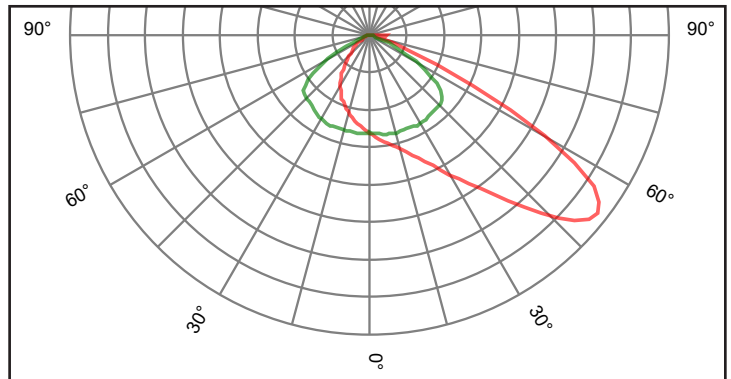


AS229701TN2SA - Counterbeam optic for tunnel entrance lighting - 55° Max cd

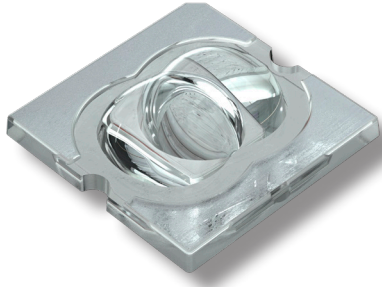


Self-adhesive Fixing

- Material = PMMA HT
- Angle 55° max Candela
- Full angle at 50% from maximum: ~ 100°x120°
- Full angle at 10% from maximum: ~ 130°x140°
- The light spots here represented refer to tests carried out with 1 LED 5.0x5.0mm and ~ 605 Lumen

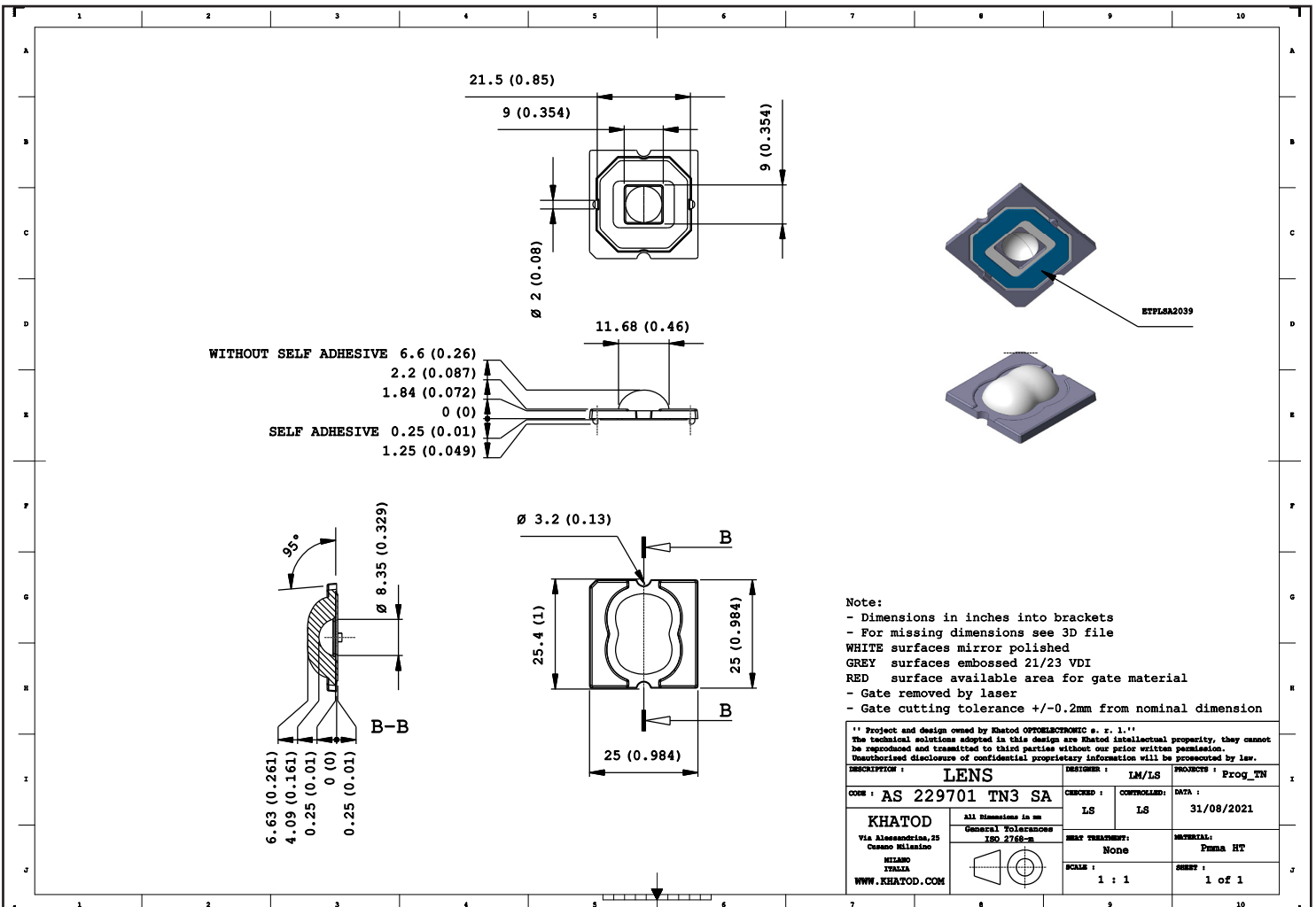
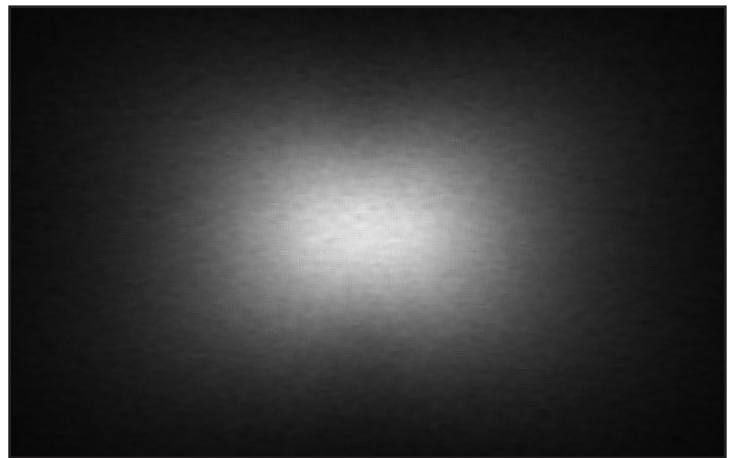
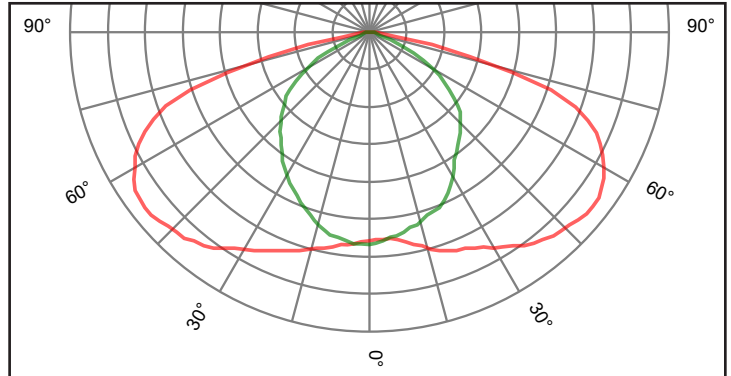


AS229701TN3SA - Oval symmetrical optic for permanent tunnel lighting

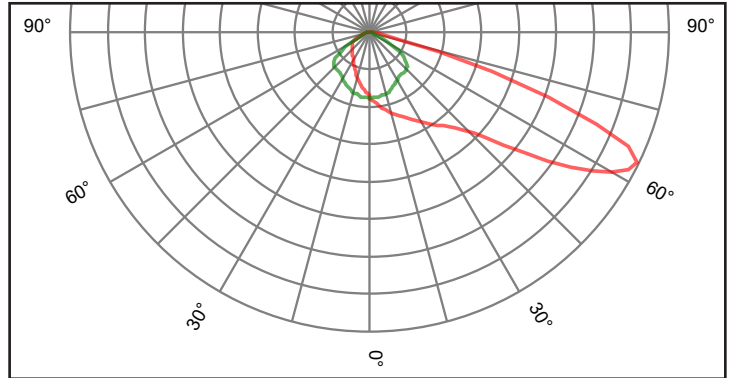
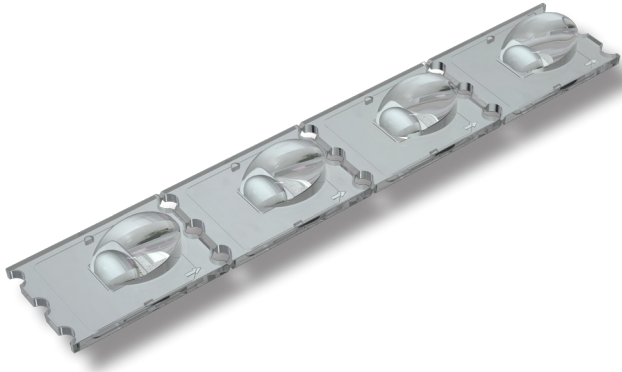


Self-adhesive Fixing

- Material = PMMA HT
- Full angle at 50% from maximum: ~ 100°x150°
- Full angle at 10% from maximum: ~ 140°x160°
- The light spots here represented refer to tests carried out with 1 LED 5.0x5.0mm and ~ 605 Lumen

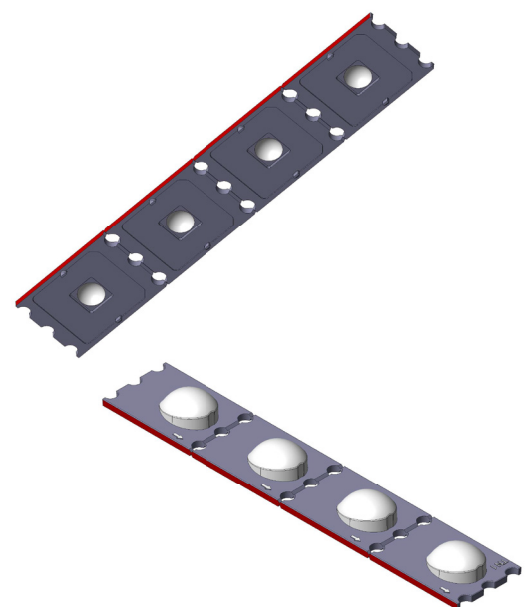
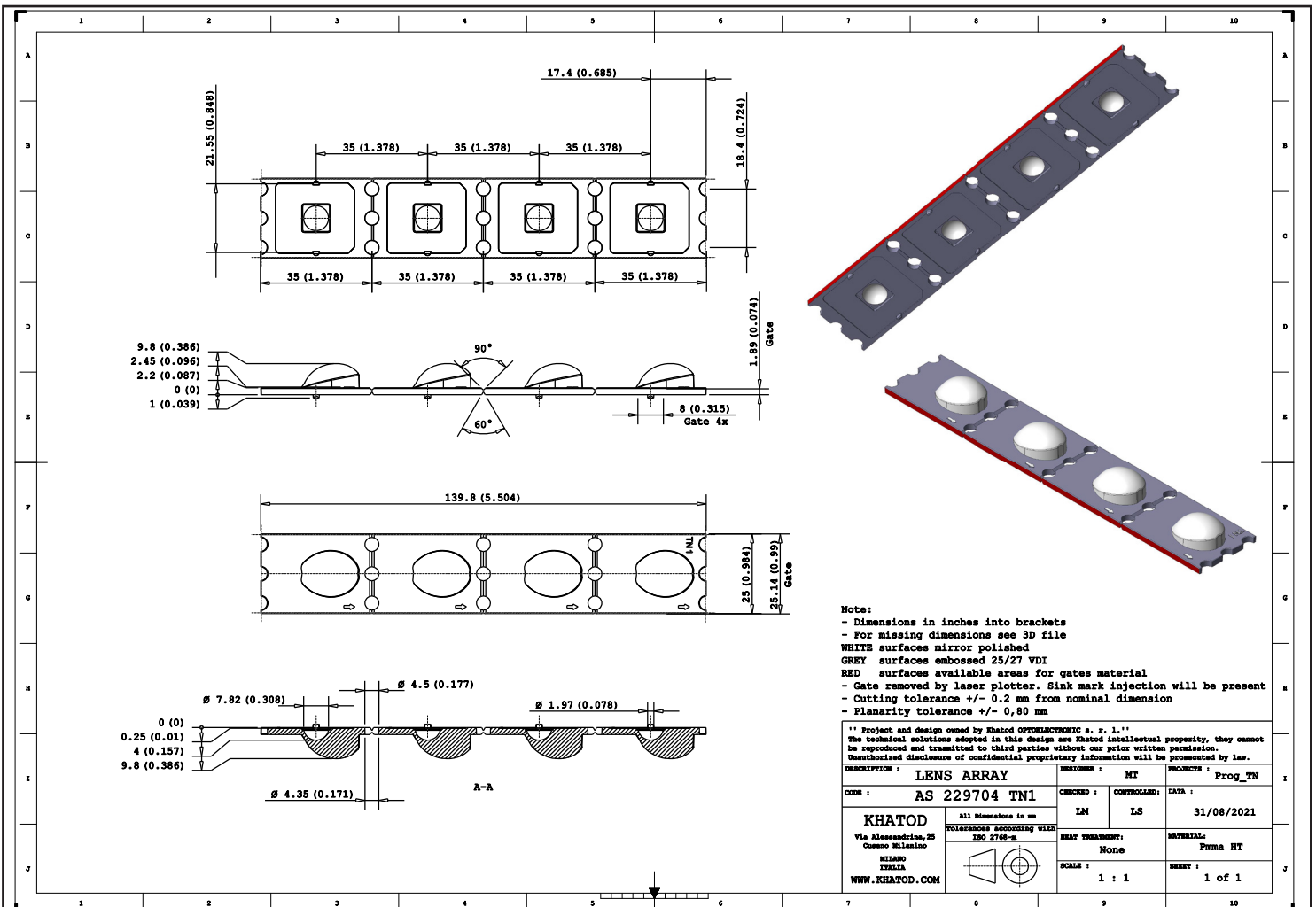
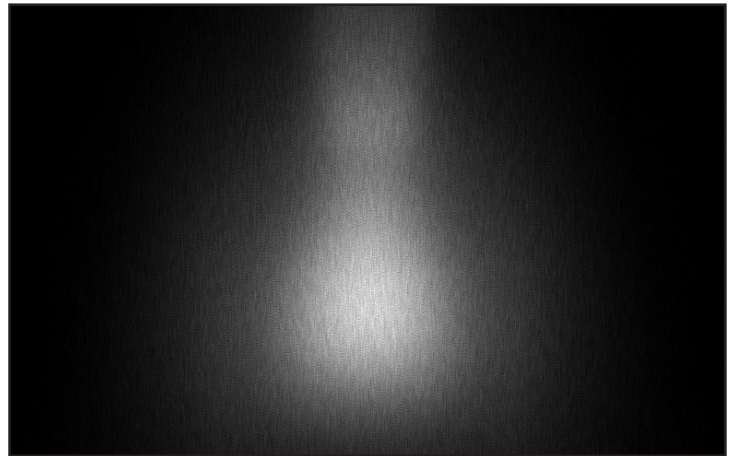


AS229704TN1 - Counterbeam optic for tunnel entrance lighting - 65° Max cd



Pre-factured for customized length
Screw Fixing

- Material = PMMA HT
- Angle 65° max candela
- Full angle at 50% from maximum: ~ 110°x110°
- Full angle at 10% from maximum: ~ 144°x130°
- The light spots here represented refer to tests carried out with 4 LEDs 5.0x5.0mm and ~ 605 Lumen@LED

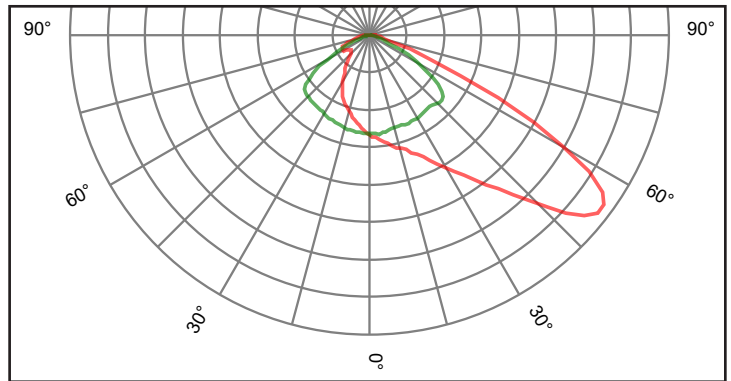


Note:
- Dimensions in inches into brackets
- For missing dimensions see 3D file
WHITE surfaces mirror polished
GREY surfaces embossed 25/27 VDI
RED surfaces available areas for gates material
- Gate removed by laser plotter. Sink mark injection will be present
- Cutting tolerance +/- 0.2 mm from nominal dimension
- Planarity tolerance +/- 0,80 mm

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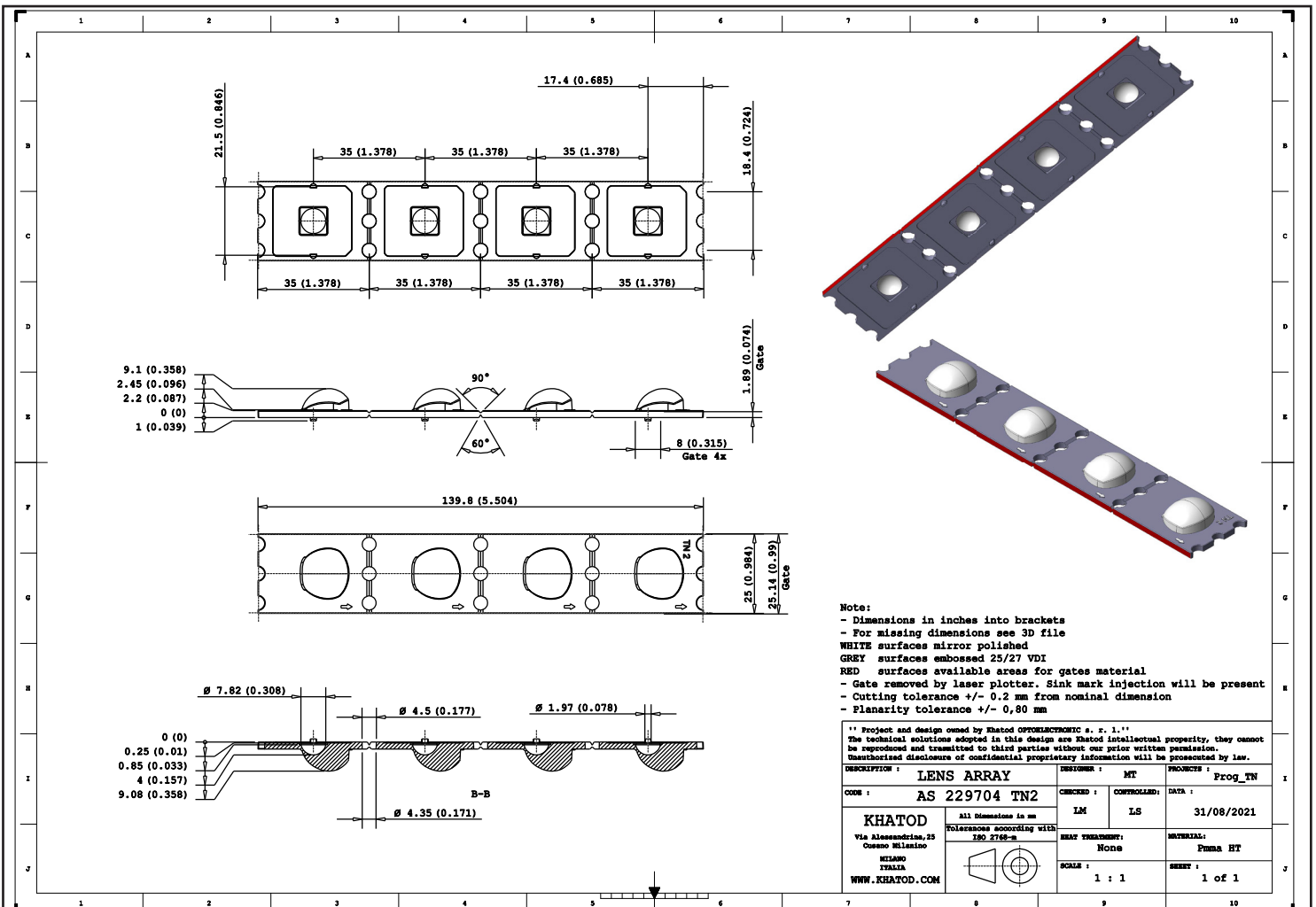
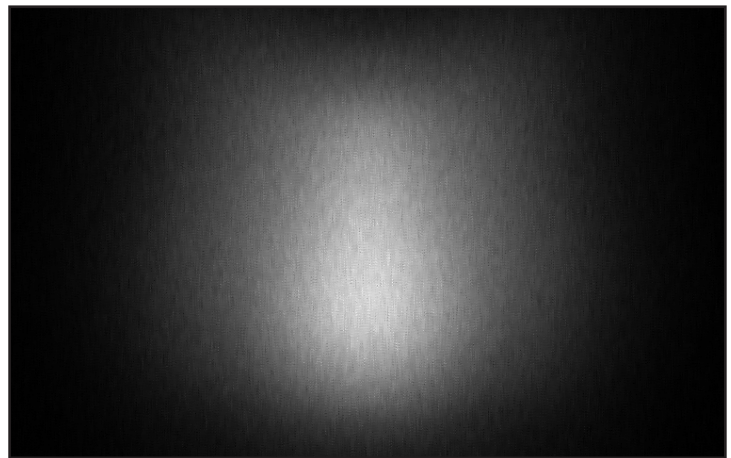
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CODE : AS 229704 TN1	CHECKED : IM	DATA : 31/08/2021
KHATOD Via Alessandro, 25 Cusano Milanino MILANO ITALIA WWW.KHATOD.COM	All dimensions in mm Tolerances according with ISO 2768-m	DRAWING METHOD : None SCALE : 1 : 1
	MATERIAL : PMMA HT SHEET : 1 of 1	

AS229704TN2 - Counterbeam optic for tunnel entrance lighting - 55° Max cd



Pre-factured for customized length
Screw Fixing

- Material = PMMA HT
- Angle 55° max candela
- Full angle at 50% from maximum: ~ 100°x120°
- Full angle at 10% from maximum: ~ 130°x140°
- The light spots here represented refer to tests carried out with 4 LEDs 5.0x5.0mm and ~ 605 Lumen@LED



Note:
- Dimensions in inches into brackets
- For missing dimensions see 3D file
WHITE surfaces mirror polished
GREY surfaces embossed 25/27 VDI
RED surfaces available areas for gates material
- Gate removed by laser plotter. Sink mark injection will be present
- Cutting tolerance +/- 0.2 mm from nominal dimension
- Planarity tolerance +/- 0,80 mm

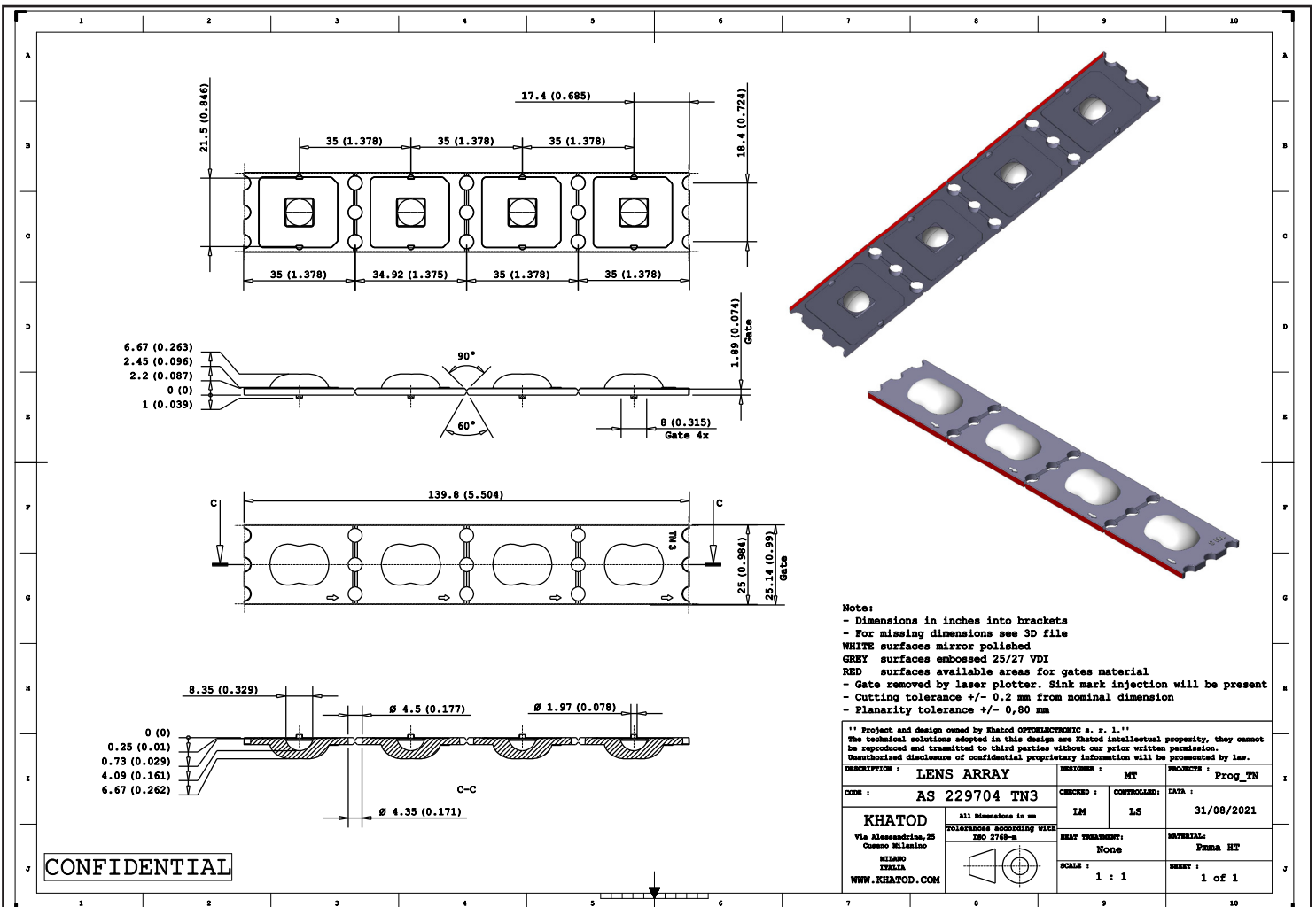
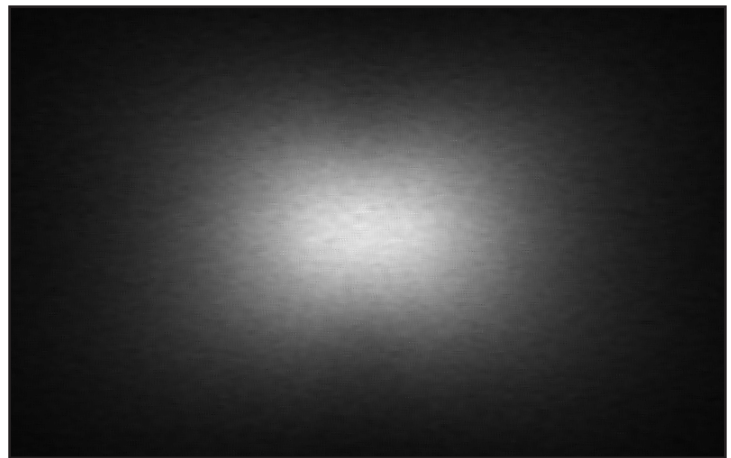
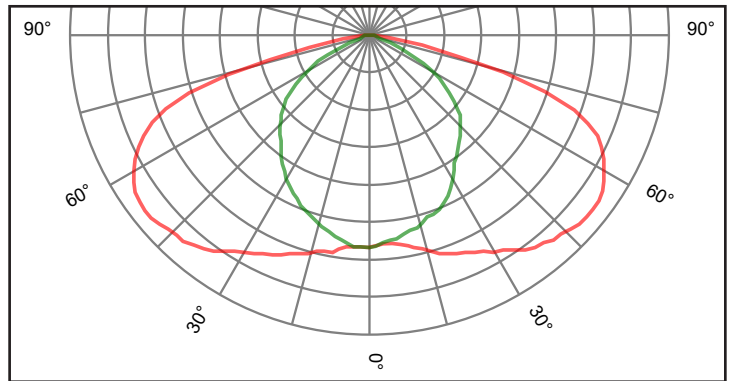
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DESCRIPTION :	LENS ARRAY	DRAWING :	MT
CODE :	AS 229704 TN2	PROJECT :	Prog_TN
Khatod Via Alessandro, 25 Cusano Milanino MIANO ITALIA WWW.KHATOD.COM	All dimensions in mm Tolerances according with ISO 2768-m	CHECKED :	IM
		CONTROLLED :	LS
		DATE :	31/08/2021
		MATERIAL :	PMMA HT
		SCALE :	1 : 1
		SHEET :	1 of 1

AS229704TN3 - Oval symmetrical optic for permanent tunnel lighting

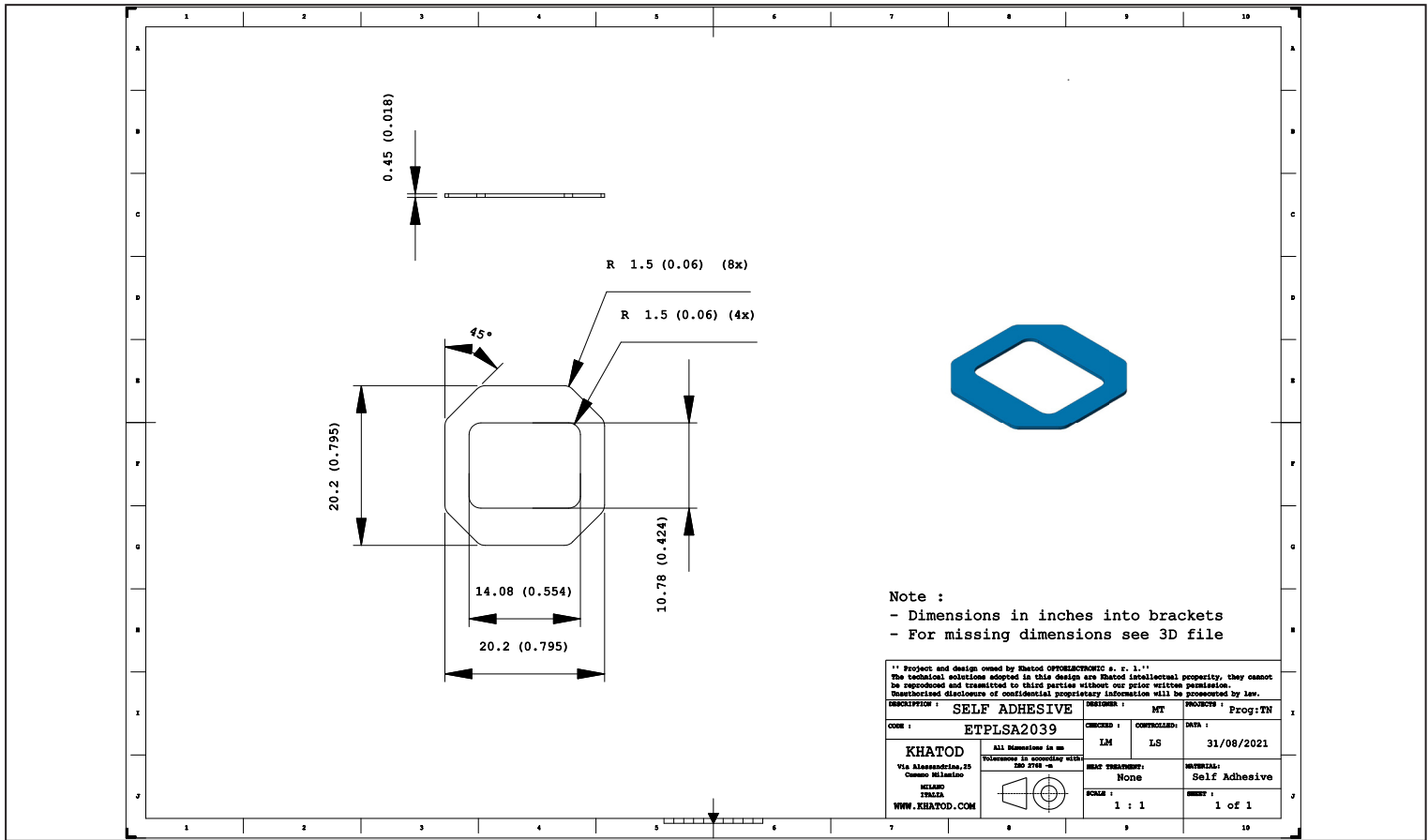


Pre-factured for customized length
Screw Fixing

- Material = PMMA HT
- Full angle at 50% from maximum: $\sim 100^\circ \times 150^\circ$
- Full angle at 10% from maximum: $\sim 140^\circ \times 160^\circ$
- The light spots here represented refer to tests carried out with 4 LEDs 5.0x5.0mm and ~ 605 Lumen@LED



ETIPLLSA2039 - Fixing Adhesive Tape Technical Drawing



3M High Strength Double Coated Tape with Adhesive 300LSE

9474LE • 9495LE

Technical Data November, 2008

Product Description 3M™ Double Coated Tapes with 3M™ Adhesive 300LSE provides high bond strength to most surfaces, including many low surface energy plastics such as polypropylene and powder coated paints. The acrylic adhesive also provides excellent adhesion to surfaces contaminated lightly with oil typically used with machine parts.

Construction	Product Number	Total Tape Thickness (w/o liner)	Faceside ¹ Adhesive Type/ Thickness	Carrier Type/ Thickness	Backside ² Adhesive Type/ Thickness	Liner Color, Type, Print	Liner Caliper ³
	3M™ Double Coated Tape 9474LE	0.0067" (0.17mm)	0.0028" (0.071mm)	Clear Polyester (0.013mm)	0.0034" (0.086mm)	Faceside Liner/ Tan, 58# Polycoated Kraft, no print Backside liner/ Tan, 58# Polycoated Kraft, *3M 300LSE*	0.0042" (0.11mm) 0.0042" (0.11mm)
	3M™ Double Coated Tape 9495LE	0.0067" (0.17mm)	0.0028" (0.071mm)	Clear Polyester (0.013mm)	0.0034" (0.086mm)	Tan, 58# Polycoated Kraft, *3M 300LSE*	0.0042" (0.11mm)

Note 1: Faceside (FS) adhesive is on the interior of the roll, exposed when unrolled.
Note 2: Backside (BS) adhesive is on the exterior of the roll, exposed when liner is removed.
Note 3: The caliper listed is based on a calculation from manufacturing controlled adhesive coat weights using a density of 1.012 g/cc.

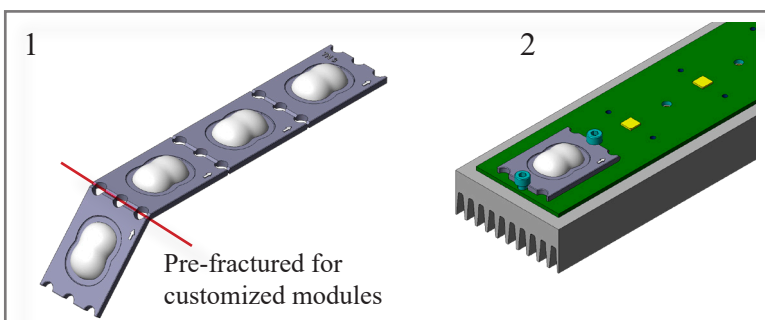
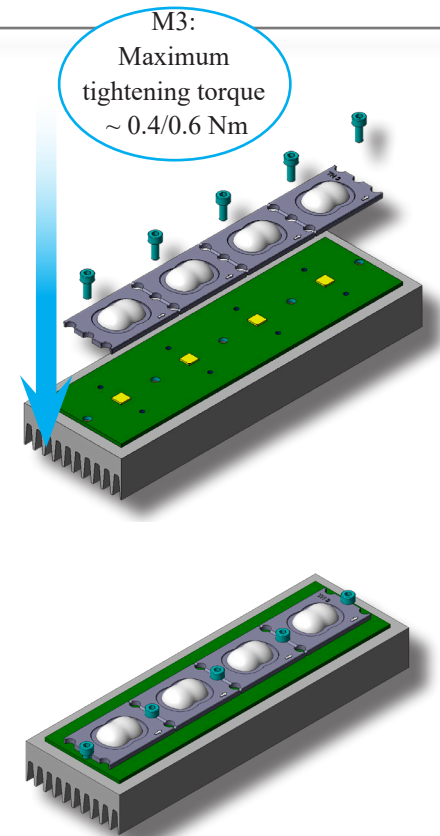
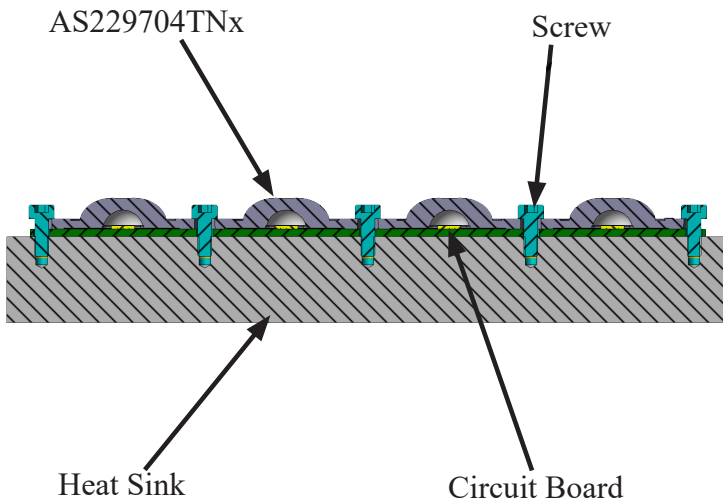
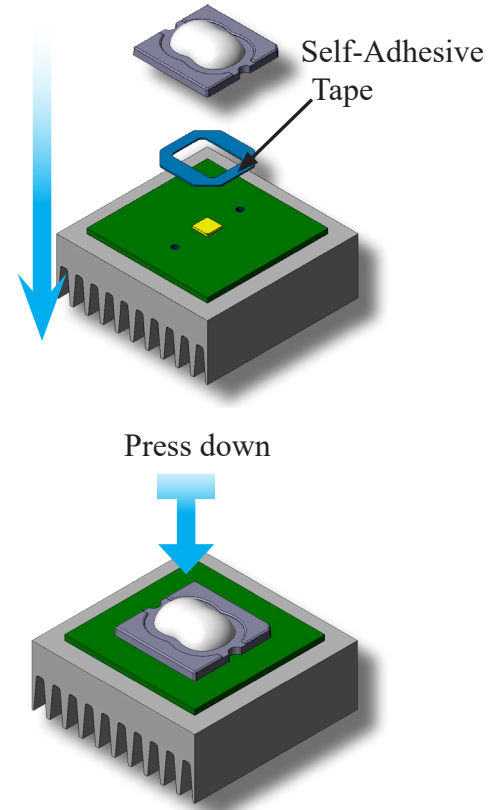
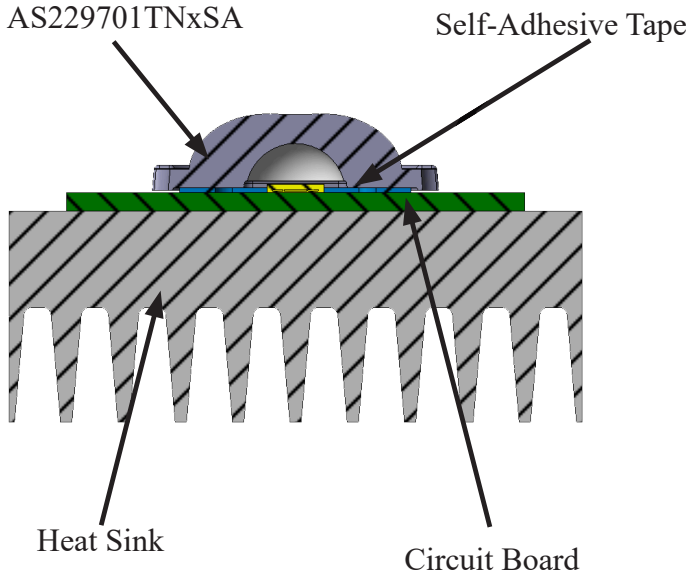
3M™ High Strength Double Coated Tape with Adhesive 300LSE

9474LE • 9495LE

Typical Physical Properties and Performance Characteristics Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Product Number	3M™ Double Coated Tapes 9474LE, 9495LE
Adhesion to stainless steel ASTM D3330 - 180 degree 2 mil polyester as backing	Oz/in (N/100 mm) Faceside / Backside 100 (113) / 105 (119)
- 72 hour RT	
Adhesion to stainless steel ASTM D3330 - 90 degree 2 mil al foil	Oz/in (N/100 mm) Faceside/Backside 70 (79) / 80 (90)
- 15 minute RT	
- 72 hour RT	85 (96) / 100 (113)
- 72 hour 158°F (70°C)	106 (119) / 130 (147)
Adhesion to other surfaces ASTM D3330 - 90 degree, 2 mil al foil, 72 hour RT	Oz/in (N/100 mm) Faceside / Backside
ABS	100 (124) / 90 (102)
Polypropylene	90 (102) / 80 (90)
Polycarbonate	150 (169) / 140 (158)
Glass	90 (102) / 100 (113)
Shear Strength - ASTM D3654 Modified - (.5 inch ² sample size)	
1000 grams at 72°F (22°C)	>10,000 minutes
500 grams at 158°F (70°C)	>10,000 minutes
Relative High Temperature Operating Ranges:	
Long Term (days, weeks)	200°F (93°C)
Short Term (minutes, hours)	300°F (149°C)
Relative Solvent Resistance:	Very Good

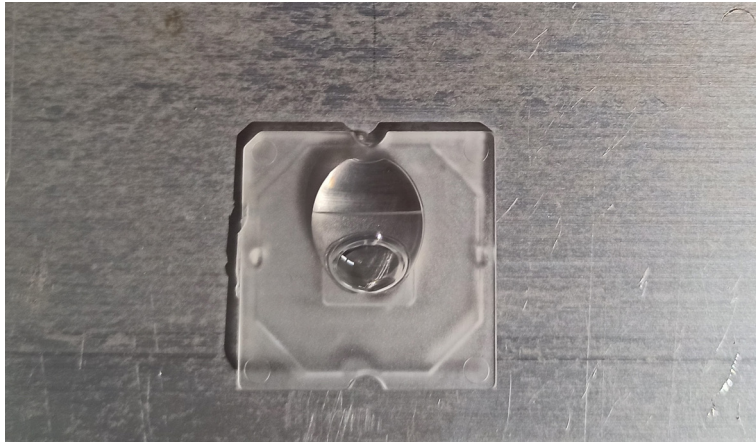
Assembly Specifications



Application Examples



Thermal shock resistance level



Initial Visual Inspection

Visual inspection to check the lens integrity before the test

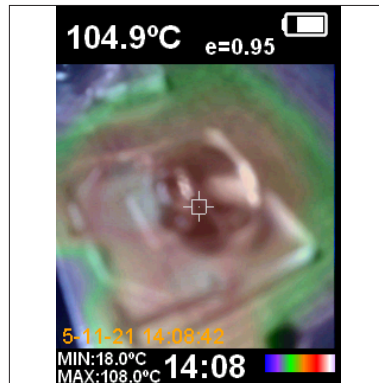
The part resulted physically intact.

The reference temperature of the component under test is 105° C.

Photo: the lens in the climatic chamber.



Temperature stress in the climatic chamber



Temperature detected on the part by IR thermal camera



Final Visual Inspection

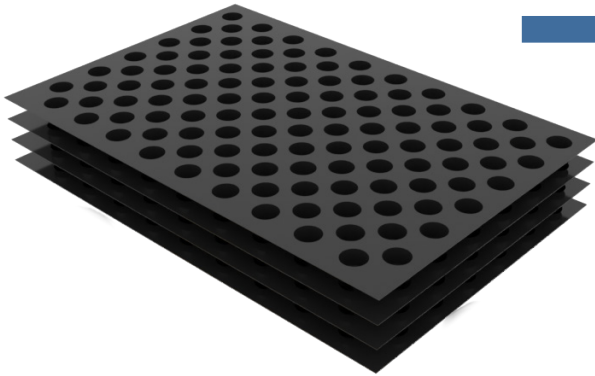
After testing, an expective view is made with positive result (view photo)

In the picture: the lens in the climatic chamber after testing.

Based on the testing result, AS229701TNxSA test specimens provided to overcome the thermal stress test up to 105°C without any physical deterioration of the material.

Packaging AS229701TNxSA

Item	Quantity	Total Lens	Size (L*W*H)	G.W.
Trays	76 pcs per Tray	76 pcs	50*32 cm	0.8 Kg
Outer Box	11 Trays per Outer Box	836 pcs	50*32*38 cm	13.8 Kg



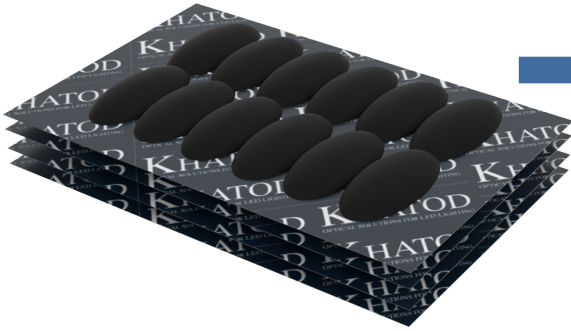
836 Lenses / 11 Trays



11 Trays / Outer Box

Packaging - AS229704TNx

Item	Quantity	Total Parts	Size (L*W*H)	G.W.
Skinpacked Cardboard	20 pcs per Skinpacked Cardboard	20 pcs	50*32 cm	0.52 Kg
Outer Box	30 Skinpacked Cardboard per Outer Box	600 pcs	50*32*38 cm	18.5 Kg



30 Skinpacked Cardboard
20 Modules each



30 Skinpacked Cardboard / Outer Box

Materials

Material	Top
PMMA HT	-40°...110°C
AS2297xxTNx Temperature resistance: long-term exposure	-40°...105°C
AS2297xxTNx Temperature resistance: short-term exposure	up to + 110 °C

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.

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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