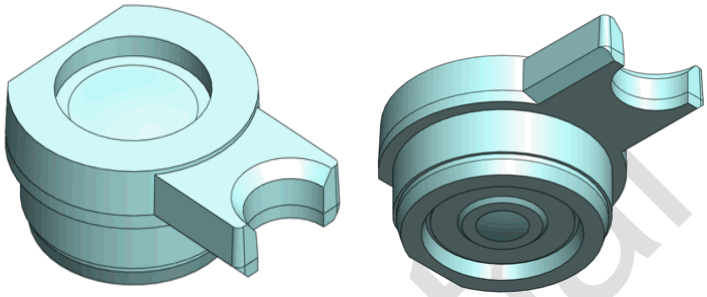
L242-ZSZ1: Lens Set



General Description

This datasheet provides specification, dimension, and assembly guide of the L242-ZSZ1 Lens Set.

Ordering Information

Part Number	Description	Packing Type	MOQ
L242-ZSZ1	Lens Set for PAA3905E1-Q	Tray	2,880

RoHS compliant

For any additional inquiries, please contact us at https://www.pixart.com

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1.0 Introduction

1.1 Overview

The L242-ZSZ1 lens set is designed to match PixArt Imaging's latest optical motion tracking chip, PAA3905E1-Q. The L242-ZSZ1 lens set is a precision-molded optical component. It needs to be handled with care to avoid scratches and/or contamination of the optical surfaces. Since the lens is made of polycarbonate, Cyanoacrylate-based adhesive is prohibited as it may potentially damage the lens set.

Note: Throughout this document, the L242-ZSZ1 is referred to as the “lens set”.

1.2 Terminology

Term	Description
PCB	Printed Circuit Board
UV	Ultraviolet

2.0 Specification

2.1 Operating Specification

Table 1. Operating Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Ambient Temperature	T_A	0		60	°C	

3.0 Mechanical Specification

3.1 Mechanical Dimension

Table 2. Lens Set Dimension

Parameter	Symbol	Min.	Nominal	Max.	Unit
Body Dimension X	A	3450	3550	3650	µm
Body Dimension Y	B	2650	2750	2850	µm
Height	C	1360	1460	1560	µm

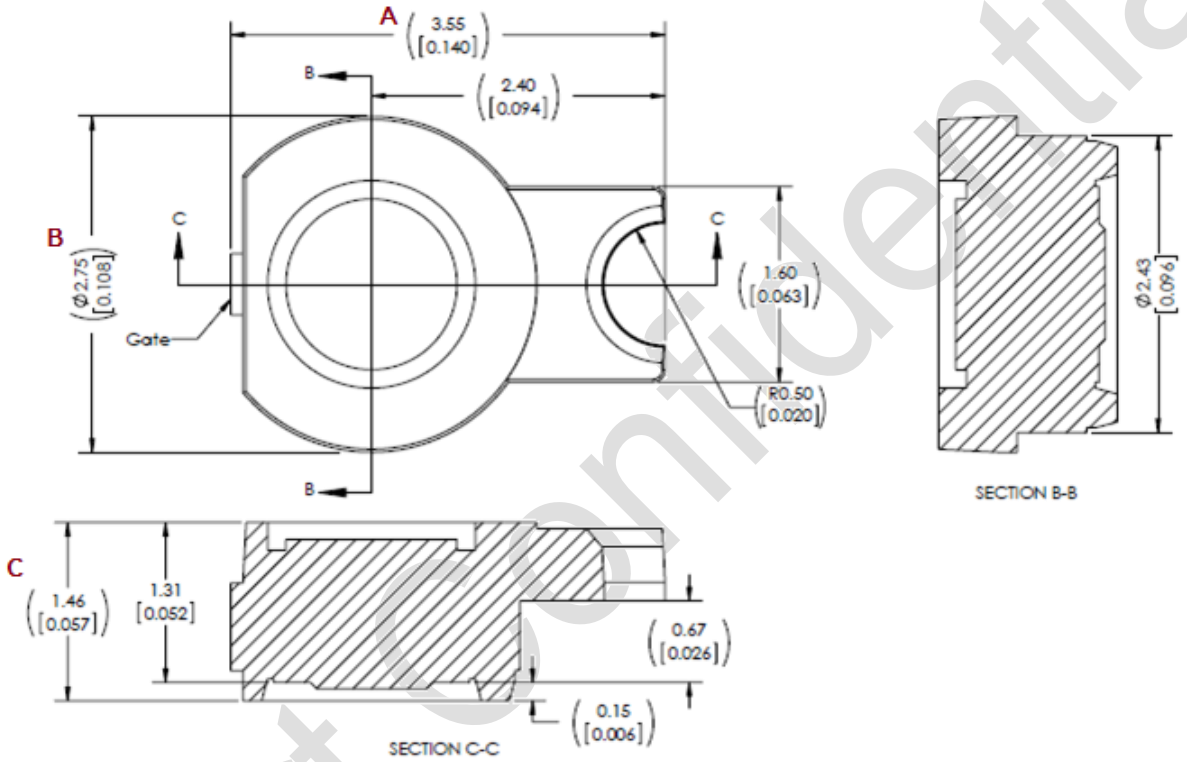


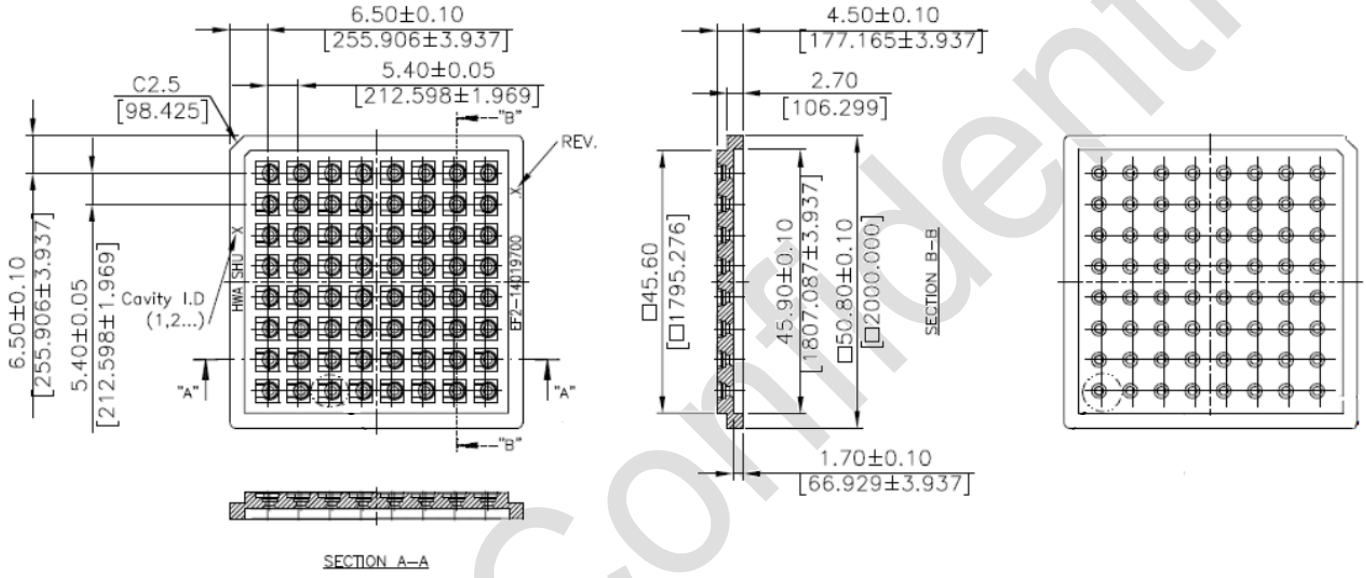
Figure 1. Lens Set Dimension

Notes:

1. Dimensions in millimeters/[inches].
2. Dimensional tolerance: ±0.10mm unless otherwise stated.
3. Bracket ( ) indicates reference dimensions.
4. Maximum flashes: +0.20mm
5. Lens Optical detail not shown.

3.2 Packing Information

Item	Description
Product Number	L242-ZSZ1
Tray quantity	64 pcs
Inner Box quantity	2,880 pcs [45 Trays per Inner Box]
Shipping Box quantity	23,040 pcs [8 Inner Boxes per Shipping Box]
Tray Size	50.8 x 50.8 x 4.5 mm^3
Inner Box Size	185 x 93 x 65 mm^3
Shipping Box Size	387 x 202 x 165 mm^3



Notes:

1. All cells are identical.
2. All dimensions are in mm.

Figure 2. Lens Set Tray

3.3 Package Handling Information

3.3.1 Sample of Inner Box Label

Note: This label is used on inner box

3.3.2 Sample of Shipping Box Label

Note: This label is used on shipping box

4.0 Assembly Guide

4.1 Recommended Tool

- Plastic or Soft Tip Tweezers

Figure 3. Soft Tip Tweezers

- Round Tip Tweezers

Figure 4. Round Tip Tweezers

- Magnifier

Figure 5. Magnifier with Light

- Dial Gauge Indicator

Figure 6. Digimatic Indicator

4.2 Lens Handling and Attach Guide

4.2.1 Handling Tips and Precaution

Use a pair of tweezers to pick and hold the lens set at the two flat edges from the tray. Refer to Figure 7 for correct position to pick and hold the lens barrel.

Plastic tweezers are recommended to avoid scratches on the lens.

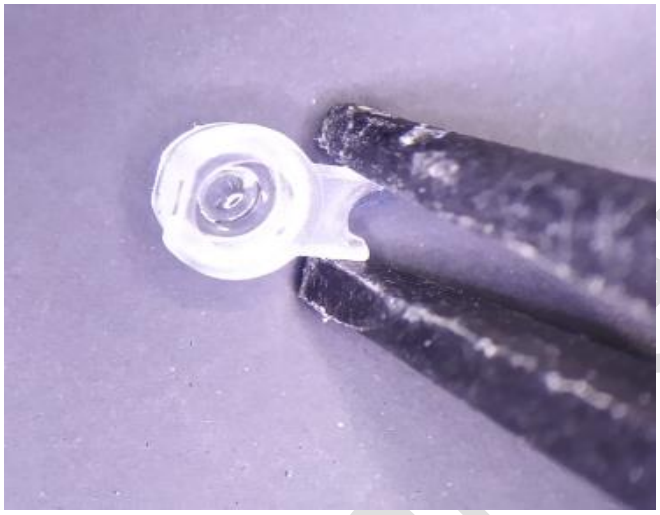


Figure 7. Handling Lens Set

Do not touch the optical surfaces (areas highlighted in red) as shown in Figure 8.

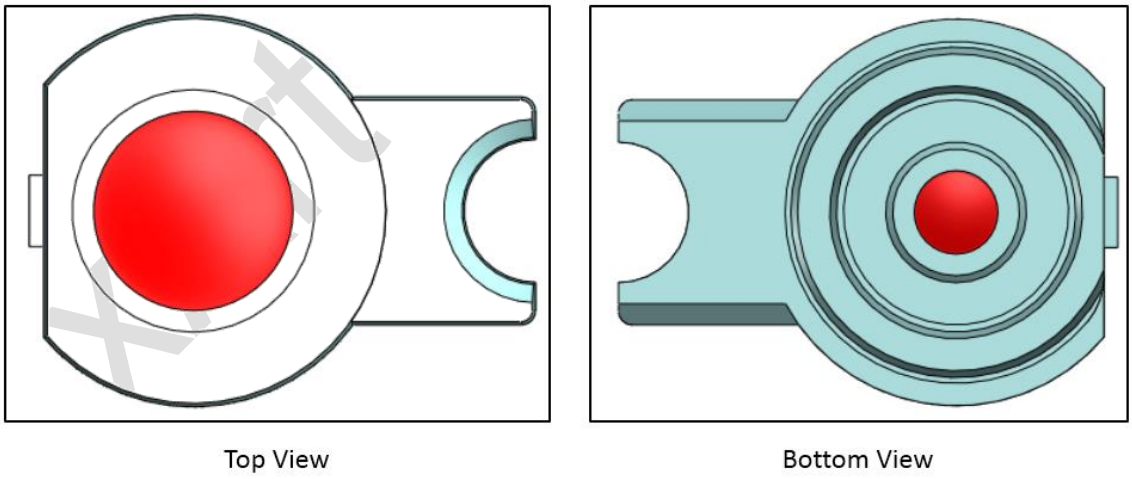


Figure 8. Lens Assembly Top and Bottom Views

To minimize particle contamination, it is recommended to use CDA (clean dry air) air blow system to clean the lens set before assembling.

4.3 Lens Set to Chip Package Attachment

4.3.1 Lens Set to Chip Package

1. This is the no-wash solder process Surface mounted chip package with Kapton tape intact. Do not remove Kapton tape before lens set attach process to avoid contamination into chip package cavity.

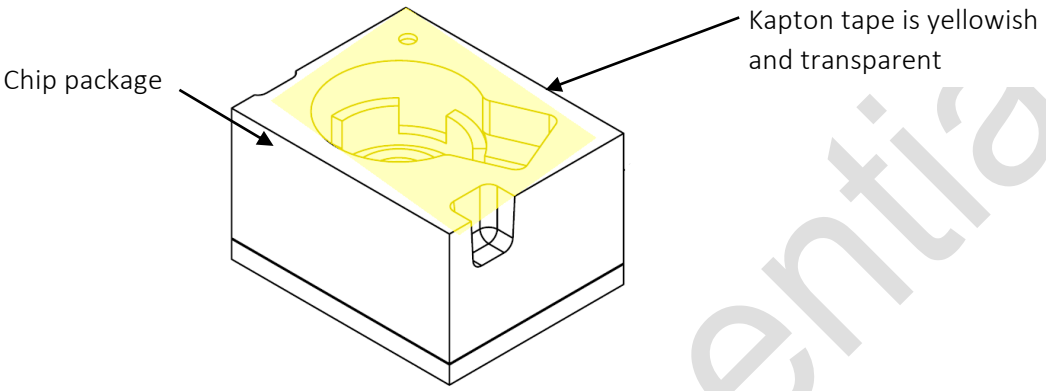


Figure 9. Chip Package with Kapton Tape Intact

2. Remove the protective Kapton tape using tweezers under a magnifier with light. Hold the PCB assembly (groove face towards operator) and peel off the Kapton tape using round tip tweezers at the groove on the chip package as shown in Figure 10.

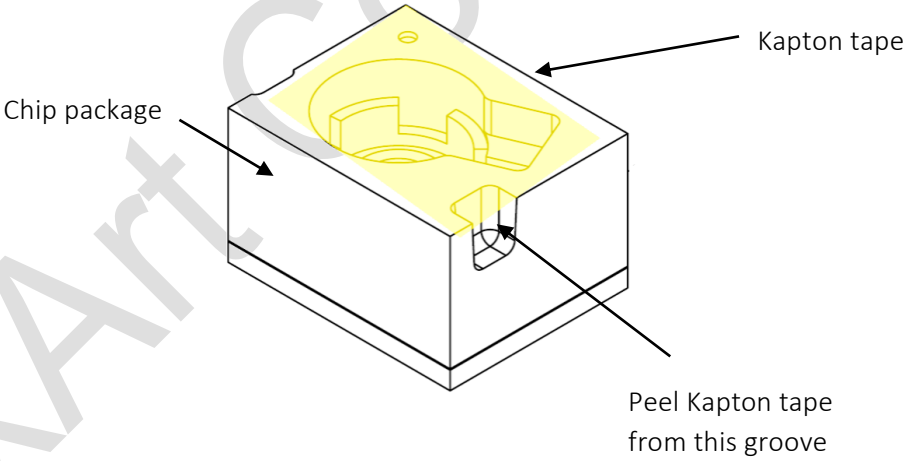


Figure 10. Remove Kapton Tape with Tweezers

3. Place the PCB assembly horizontally with package cavity facing up. Insert the lens with plastic or soft-tip tweezers onto the optical aperture (the chip's package cavity).

4. Use a 3.5 mm diameter flat tip jig to press the lens barrel vertically onto the upper package cavity of the chip's package. Press the jig with force (<2kg) distribute evenly to the lens barrel to avoid lens tilting and damage the chip's package.

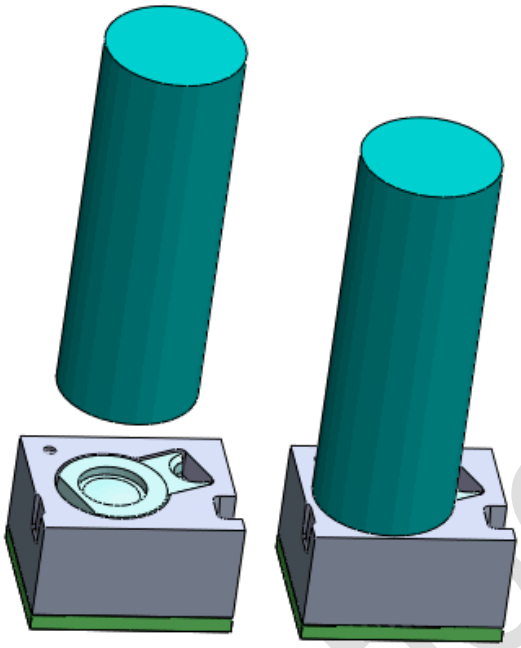


Figure 11. Flat Tip Jig with 3.5mm Diameter

5. Recommend to verify the lens set placement is horizontally flat against chip package top surface. Refer to Figure 12 for details.

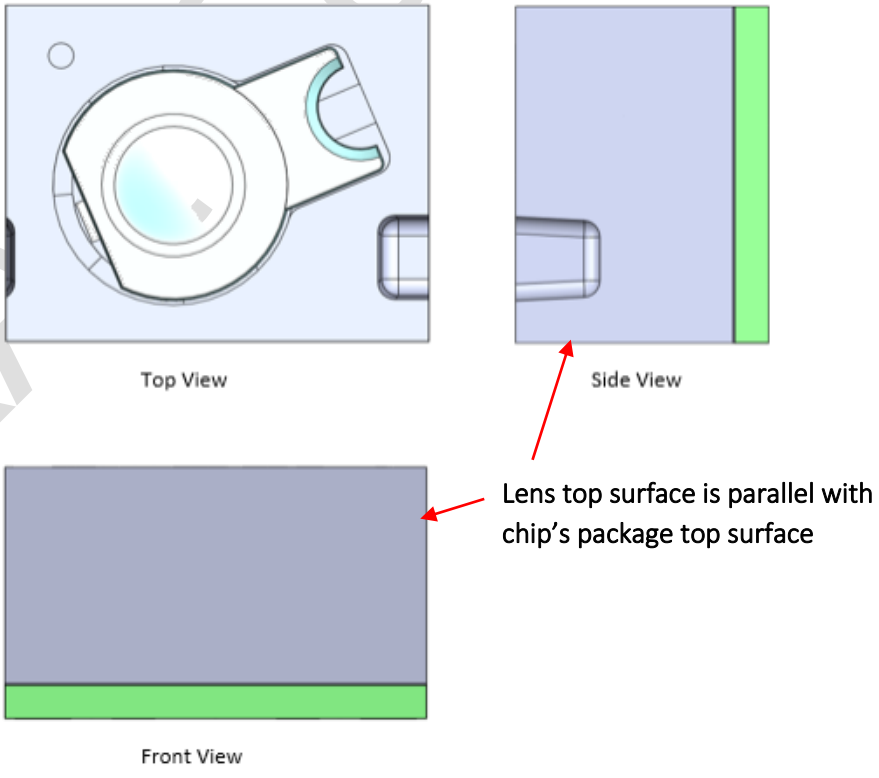


Figure 12. Side and Front View to Verify Planarity of the Lens Set

6. Step to examine the height of lens set
   a. Set dial gauge to zero at the 4 points denoted with yellow circles.
   b. Measure the height at the 4 points denoted with orange circles respectively.
   c. The delta of each pair measurement must not exceed 100µm.

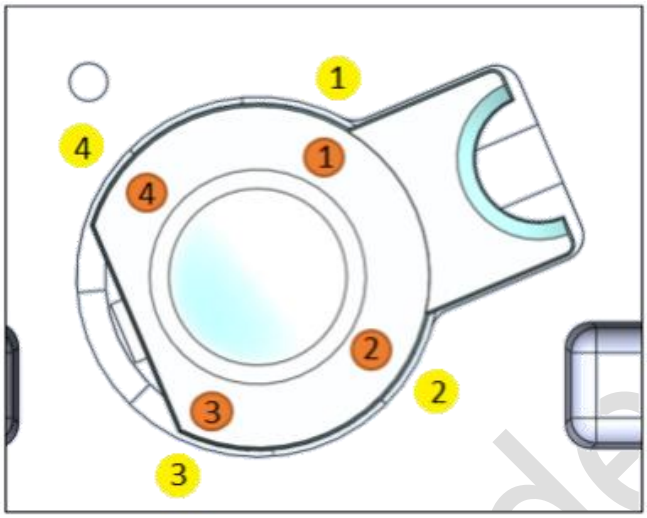


Figure 13. 4-point Pairs Denoted Yellow / Orange Circles

Examples of good and bad lens assembly are as shown in below figures.

Figure 14. Good Lens Assembly

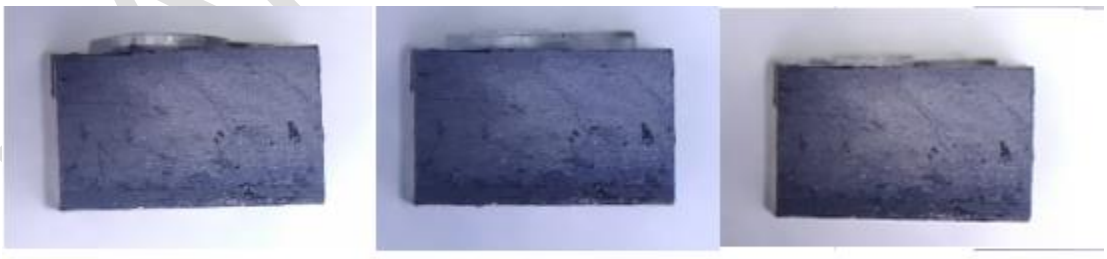


Figure 15. Bad Lens Assembly

7. Disassemble the lens assembly before the gluing process if found lens set not fitted as expected. Refer to Section 4.3.2 for detail step to disassemble.

4.3.2 Lens Disassembly Method

The lens disassembly is optional step to remove the assembly lens set before applying epoxy.

1. Use a tweezers to pry up the lens set from the package cavity using either one of the slots. Do not exert excessive force as the tweezers might slip and damage the lens set.

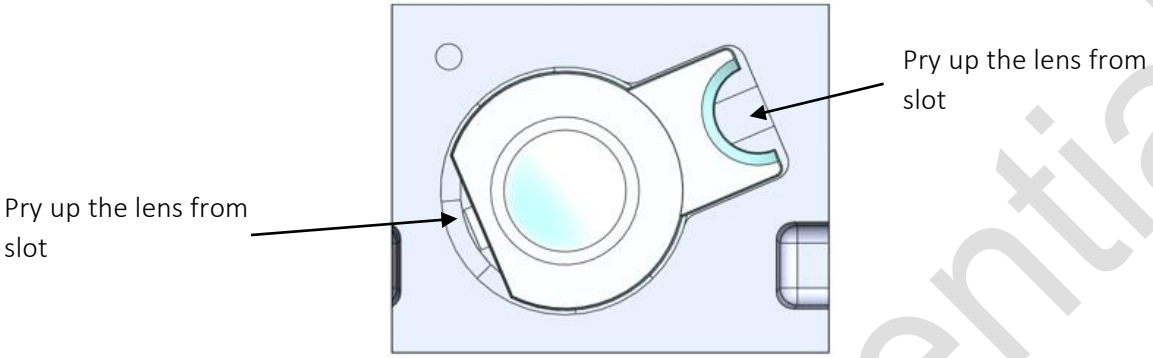


Figure 16. Lens Disassembly – Pry up Lens Set from Slots

2. Put on a new Kapton tape to cover the package cavity to avoid contamination.

4.4 Gluing

The lens can be attached securely to the chip package with the use of adhesive, especially for applications where mechanical impact is expected.

User has to perform a product level mechanical robustness test to ascertain if glue to secure the lens is required for the particular design and application.

The chip package is made of liquid crystal polymer while the lens barrel is made of polycarbonate.

This section covers the details of securing the lens set to chip package using adhesive.

1. Fit the lens set properly to the chip package.
2. Once the lens set is secured properly to the chip's package, insert a cleaned nozzle of glue dispenser vertically inside the gluing slot as near as possible. This is to ensure the glue can flow to lens barrel evenly and dispense appropriate amount of glue.

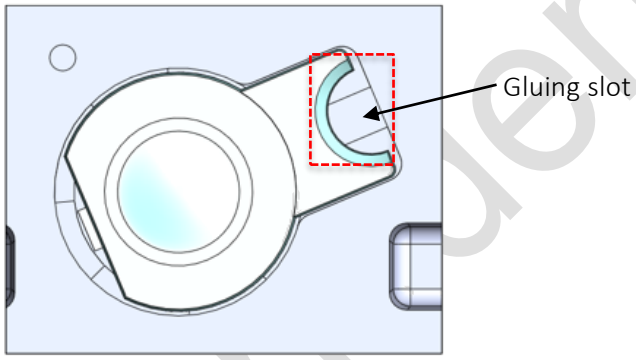


Figure 17. Lens Gluing Slot

User owns the responsibility to perform qualification of the product (chip package and lens assembly) in specific use model, where the qualification has to cover the reliability and effectiveness of the recommended process in securing the lens assembly to the chip package.

Note: the adhesive process is not reversible, such that the epoxy will permanently secure the lens to the chip package and thus is not re-workable.

Examples of adhesive and glue dispenser:

Item	Parameter	Description
Material A Material Part number: LOCTITE AA 3106 Category: Adhesive with UV cure	Curing Parameter: ▪ UV Irradiance ▪ UV Wavelength ▪ UV Curing Time Glue Dispensing Parameter: ▪ Dispenser Nozzle Inner Diameter ▪ Dispense Pressure ▪ Dispense Time	 ▪ 50 mW/cm^2 ▪ 365 nm ▪ 10 s ▪ 0.25 mm ▪ 0.3 MPa ▪ 1.25 s

Item	Parameter	Description
Material B Material Part number: LOCTITE EA E-60HP Category: 2-part glue with Room Temp cure	Curing Parameter: ▪ Curing Temperature ▪ Curing Time Glue Dispensing Parameter: ▪ Dispenser Nozzle Inner Diameter ▪ Dispense Pressure ▪ Dispense Time	 ▪ 25 °C ▪ 24 hours ▪ 0.25 mm ▪ 0.3 MPa ▪ 4 s
Material C Material Part Number: SUNNICO SUV-343 Category: Adhesive with UV cure	Curing Parameter: ▪ UV Irradiance ▪ UV Wavelength ▪ UV Fixture Time Glue Dispensing Parameter: ▪ Dispenser Nozzle Inner Diameter ▪ Dispense Pressure ▪ Dispense Time	 ▪ 140 mW/cm^2 ▪ 365 nm ▪ 10 to 15 s ▪ 0.25 mm ▪ 0.3MPa ▪ 5 s
Material D Material Part Number: LOCTITE 3129 Category: Epoxy with temperature cure **Note :** Recommended curing temperature differ from LOCTITE 3129 datasheet.	Curing Parameter: ▪ Curing Temperature ▪ Curing Time Glue Dispensing Parameter: ▪ Dispenser Nozzle Inner Diameter ▪ Dispense Pressure ▪ Dispense Time	 ▪ 70 °C ▪ 15 mins ▪ 0.25 mm ▪ 0.3 MPa ▪ 5 s
Material E Material Part Number: EPOTEK 730 Category: Epoxy with temperature cure **Note:** Epoxy cures at 70 °C @ 30 mins, and achieves full strength at room temperature in 24 hours.[2]	Curing Parameter: ▪ Curing Temperature ▪ Curing Time Glue Dispensing Parameter: ▪ Dispenser Nozzle Inner Diameter ▪ Dispense Pressure ▪ Dispense Time	 ▪ 70 °C ▪ 30 mins ▪ 0.25 mm ▪ 0.5 MPa ▪ 4 s
Material F Material Part Number: LOCTITE ABLESTIK UV 300X Category: Adhesive with UV cure	Curing Parameter: ▪ UV Irradiance ▪ UV Wavelength ▪ UV Curing Time ▪ UV Tack-Free Time Glue Dispensing Parameter: ▪ Dispenser Nozzle Inner Diameter ▪ Dispense Pressure ▪ Dispense Time	 ▪ > 50 mW/cm^2 ▪ 365 nm ▪ 1 s ▪ 5 s ▪ 0.25 mm ▪ 0.3 MPa ▪ 5 s

Note:

1. The above adhesive materials are for reference only. User owns the qualification of the selected material when use with the chip package and lens assembly.
2. The curing and dispensing parameters serves as a guideline only. User should evaluate the optimal parameters based on their application requirements, assembly equipment, oven loading, etc.
3. The glue curing temperature must not exceed 70°C.
4. The operating temperature of the assembled chip package and lens assembly is 0°C to 60°C.

4.5 ESD Prevention

The following is the step to avoid ESD

- Working Environment

1. Equalize potentials of terminals when transporting or storing the devices.
2. Equalize the potentials of electric device, work bench and operator's body that come close contact with the chip package.
3. Prepare an environment that does not generate static electricity.

- Operator

1. The operator must wear wrist straps (connected to ground) properly where electrically conduct with bare skin.
2. Wear cotton or antistatic-treated materials clothes and gloves.
3. When a conductive floor mat is used, the operator must wear conductive shoes.
4. Hold the chip package body and avoid in contact with the chip package leads at any time.

- Equipment and Tools

1. Any electrical equipment and tools placed on top of the work table must be grounded and isolated from the surface of work bench itself.
2. Work bench surface must be made of conductive material or conductive mat.

- Transporting, Storing and Packing

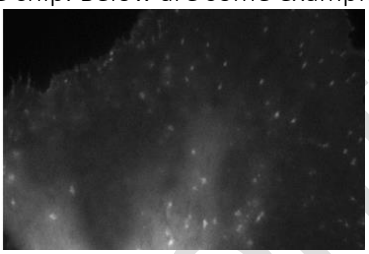
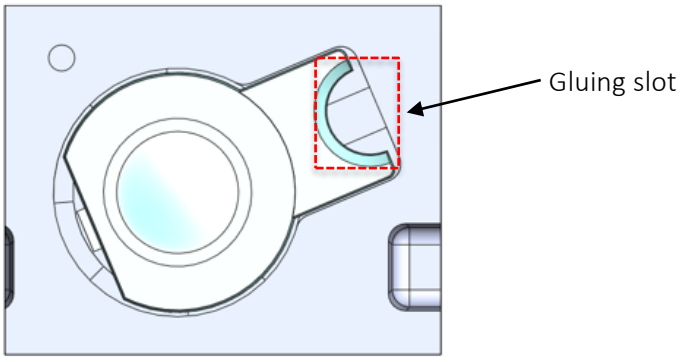
Use the original packing and conductive or shielding bag to store the package.

- Soldering Operation

1. Use a soldering iron with a grounding wire.
2. When performing manual soldering operation, the operator has to wear wrist strap (connected to ground).
3. Do not use the de-soldering pump during solder and de-solder process. Recommend to use solder-wick or equivalent.

5.0 Guidelines for Adhesive Selection

This section covers the guidelines for adhesive selection if the adhesives outlined in Section 4.4 are not available in your region.

No	Criteria	Description
1	Compatible with lens' material	The chip package is made of liquid crystal polymer while the lens set is made of polycarbonate. The adhesive must be compatible with these materials and able to secure these surfaces properly.
2	Viscosity	Recommended viscosity: 70,000 – 120,000 cP @ Room Temperature @ 2.5 rpm. As a guideline, the viscosity of the adhesive-has to enable a dispense volume of 0.5mm^3 dot. **Note:** Dispensing parameters (dispenser nozzle inner diameter, dispense time and pressure) need to be optimized to achieve 0.5mm^3 dot. For reference on the viscosity properties, refer to the respective datasheets attached together with this document.
3	No out-gassing / blooming effect	No out-gassing or blooming effect are allowed as these will contaminate the lens and the chip. Below are some examples on the out-gassing and blooming effect:  
4	Adhesion strength	The adhesion strength needs to meet user's drop test criteria in specific use model. **Note:** To increase adhesion strength, a lower viscosity adhesive (within the recommended value in Item 2) can be used to fill up the gluing slots adequately (red box in below picture). 
5	Dispenser nozzle outer diameter	The outer diameter of the dispenser nozzle should to exceed 0.55mm to ease insertion of the nozzle into the gluing slots. It is recommended to use a dispenser with an outer diameter of 0.4 – 0.5 mm.
6	Dispense volume	0.50 ± 0.03 mm^3 dot
7	Maximum curing temperature	70°C (Do not exceed this temperature)
8	Curing time	Do not exceed 1 hour @ 70°C
9	Color of adhesive	Not critical (no impact to product performance)

6.0 Precaution Step for Solder Rework

This is an optional step and only applicable before the glue is dispensed on the lens and/or cured.

For de-solder chip package from PCB, do disassemble the lens set first as it melts under the soldering heat. Put on a new Kapton tape to cover the package cavity to avoid contamination.

Revision History

Revision Number	Date	Description
0.8	20 Oct 2020	Initial Release
0.81	08 Nov 2021	Section 4.3.1: Added Flat tip jig diagram in step 4
1.0	07 Feb 2023	Section 4.4: Added three new examples of glue and the associated parameters. Also added figure showing the gluing slot. Restructured table of example glues and changes on notes.
1.1	21 Apr 2023	Added Section 5.0.