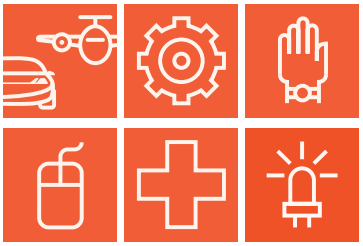
Recommended pick and place tools of LEDs

Application Note

Published by ams-OSRAM AG
Tobelbader Strasse 30,
8141 Premstaetten Austria
Phone +43 3136 500-0
ams-osram.com

Recommended pick and place tools of LEDs

Application Note No. AN037



Valid for:
all SMT LEDs

Abstract

SMT devices are developed for assembly by automatic placement machines. To achieve a damage-free processing of LEDs, appropriate and individual pick and place tools (the nozzles) must be used.

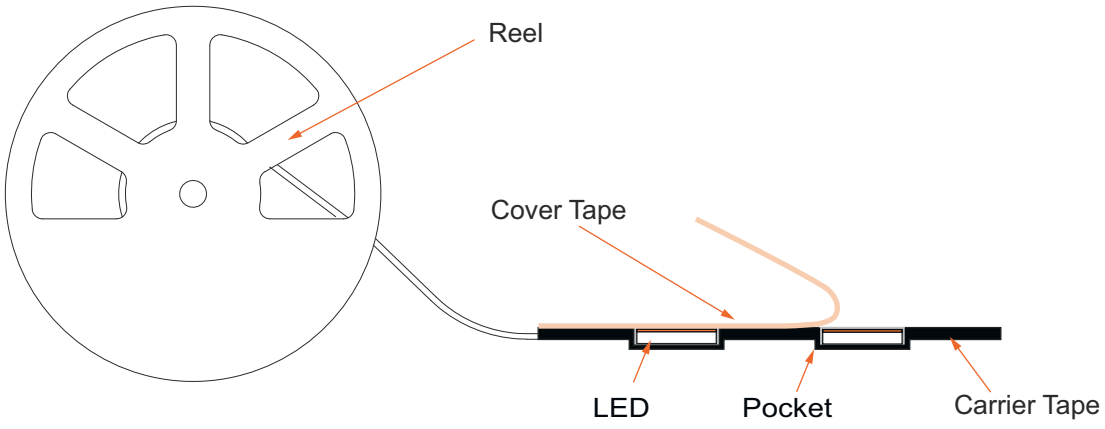
The following pages provide information about important parameters that should be considered for LED assembly. Furthermore a recommended nozzle design for each SMT LED in the portfolio is given.

Table of contents

1 Automated LED placement

Most LEDs from ams-OSRAM are delivered on tape and reel. Figure 1 shows the principle structure of LEDs in tape on reel with cover tape.

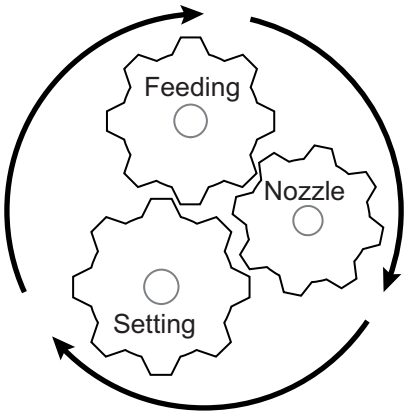
Figure 1: LEDs on tape and reel



Automated placement systems usually offer the best placement accuracy for LEDs. In this process, a placement head picks up the LEDs from the feeder and places them on the PCB. To avoid damage to the LED, the placement process must be strictly controlled by using an appropriate pick and place tool and to ensure that the process parameters conform with the

package characteristics. An initial production run is recommended to ensure that all settings are correct. There are some key factors which define a good assembly process. The three most important parameters are the settings for component feeding (Feeding), the system parameters (setting) and the nozzle used (Figure 2). The correct individual coordination of these interacting factors is the prerequisite for a good placement process.

Figure 2: Important interacting parameters

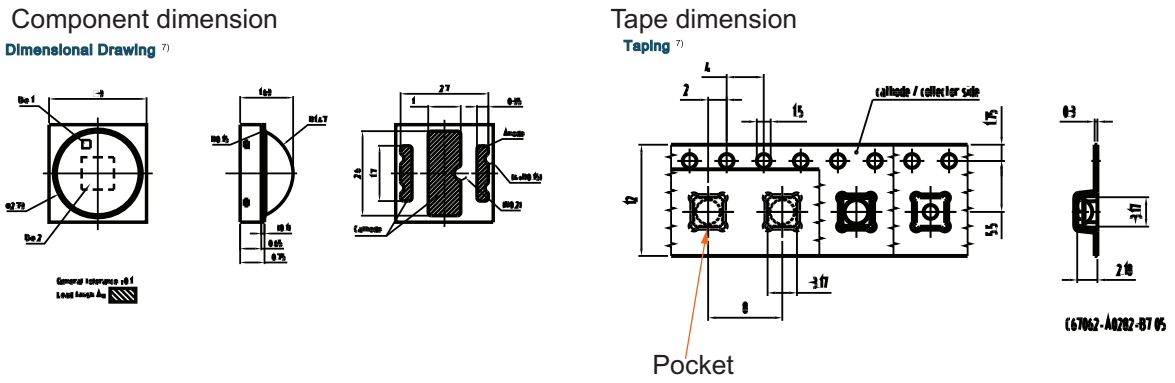


1.1 System parameter settings

Defined and proper process parameters can reduce this risk of damage to the LED. The default settings of the machine may be a good starting point.

One of the first parameter that should be defined is the pickup position. Therefore the data concerning the component and pocket dimensions should be taken into account. These can be found in the corresponding data sheet for the component. Figure 3 shows an example of a data sheet entry. After the inital setting it is recommended to check the final settings again before each production.

Figure 3: Data sheet entry for component and pocket dimensions

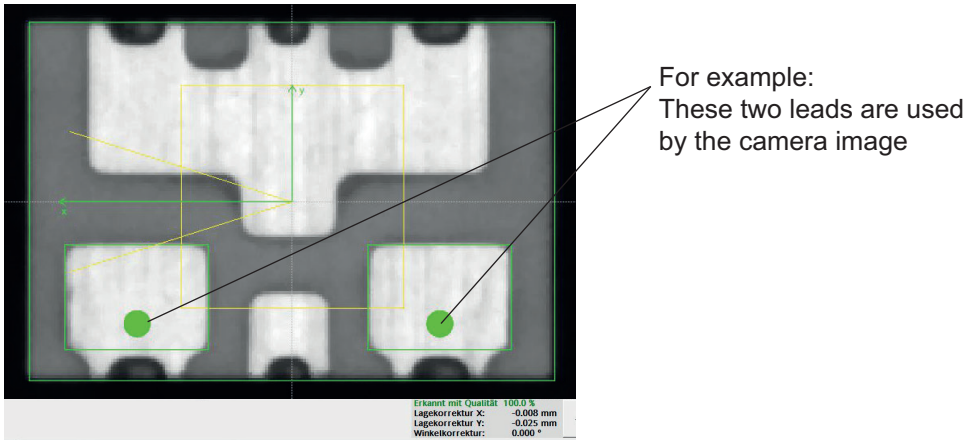


1.1.1 Vision System

A high component placement accuracy can be achieved with component placement machines that use vision systems. This enables exact placement of the LEDs at their beforehand programmed positions. Reference points, so-called fiducials, which are located on the PCB, are used for orientation. These are recognized by the vision system camera before starting the assembly process. Furthermore, most vision systems have special contrast illumination and algorithms in order to recognize the contours and component-specific markers more easily for further improving the assembly precision. The vision system uses the "look-up" method, which means that the component is viewed from the bottom side. For this, the component is first picked up from the tape and then the bottom side of the component is checked with a camera. With the help of an image processing system (into which the LED-specific data have been programmed) the footprint and the polarity are detected. This can significantly improve the quality of the assembly.

For a good placement result, especially with more complex footprints, it is recommended to use a pick-and-place machine with integrated vision system. Figure 4 shows an example of how to teach-in the footprint to the ASM Assembly Systems GmbH & Co. KG Vision System. For recognition purposes, it is recommended to teach in the pads of the component backside and not the outline of the part.

Figure 4: Teaching the ASM Assembly Systems GmbH & Co. KG Vision System



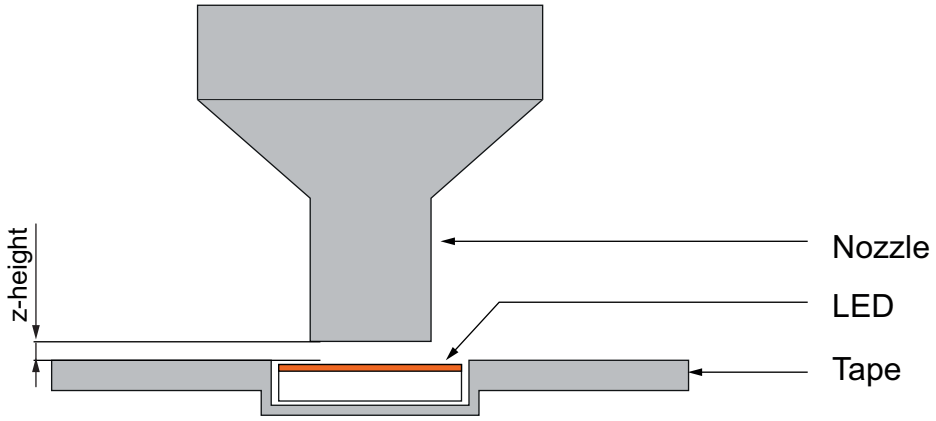
Z-height

Regarding the pickup of the components from the carrier tape, the Z-height (see Figure 5) also influences the process. This allows two different ways of picking up the components with the nozzle:

- With contact
- Contact-less (harvesting method)

In order to reduce the mechanical stress on the component to a minimum and to avoid possible damage to the LED, it is important to place the nozzle correctly when picking up the component from the tape. Particularly with lightweight components, it should be noted that the vacuum of the nozzles can lift the component before the nozzle has reached it final position. To avoid errors, it is essential to check the component-specific z-height.

Figure 5: Nozzle pick-up with z-height definition



Placement force

The placement force applied to the top of the package should be kept to minimum. For example, it can be tested with the standard default setting (2.0 N in most cases) at the beginning and should be then further reduced, if possible.

1.2 Tape feeder

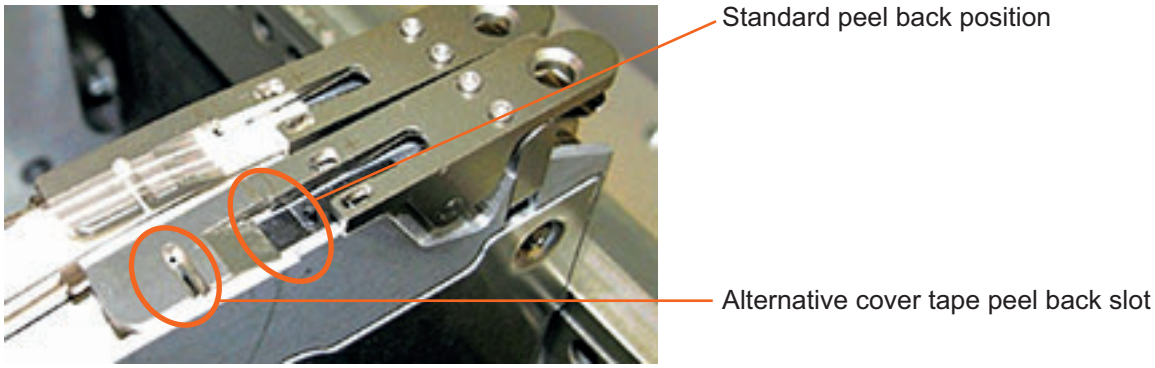
Automatic placement machines are usually equipped with specific feeder units (pneumatic or electric) which transport the tape. Electric feeders have the advantage that they generate less vibration during the placement process and are therefore preferably recommended for the pick and placement of LEDs. Figure 6 shows an electric feeder.

Figure 6: Electric feederl

In some cases, the indexing process, the process when the tape in the feeder is moved to the next pick-up position, can cause problems. It may happen that some LEDs in the pocket get misaligned, tilted or twisted. It is also possible for the LEDs to “jump” out of the tape pocket, resulting in pick-up errors, wrong placement position and damage of the LED package or bond wire. To avoid this the nozzle pick-up position should be directly after the cover tape peel off position. It is recommended that tape pockets are not be left open or uncovered before pick-up.

Additionally, the angle at which the cover tape is peeled back should be as small as possible to reduce the pulling force of the LED during indexing. Depending on the feeder design and construction there is an optional peel back slot / position with reduced risk of misaligned LEDs, see Figure 7.

Figure 7: Feeder peel back position



1.3 Nozzle set-up

Nozzles are individually manufactured for the various placement machines and are usually only developed for a specific component shape or component geometry. The right nozzle selection, combined with a proper set-up, helps to pick the components from the tape for a proper placement without risk of pre-damage or tilting. Therefore, ams-OSRAM AG provides an overview of most products in the portfolio with corresponding nozzle recommendation in chapter "2 Overview of recommended nozzle designs". Since most of the in-house tests are performed with a system from ASM Assembly Systems GmbH & Co. KG, mainly nozzles from this company are recommended. If nozzles of other manufacturers are used, it is always important that the geometry is according to the recommended nozzle. If you have any questions, please contact ams-OSRAM AG.

Non touch area

For some products non touch areas are defined and they vary depending on the design of the LED. Non touch area describes the area, in which the nozzle is not allowed touch the LED. It is important that this non-touch area is taken into account if a nozzle other than the recommended one is used.

2 Overview of recommended nozzle designs

For the processing of LEDs it must be ensured that the process parameters are conform to the package characteristics during assembly. If nozzles or nozzle designs other than the recommendations are used, it must be strictly observed that especially the critical and optical relevant area (area over die/s and wire bond/s) is not loaded.

If further information or support regarding the processing of LEDs is needed please contact ams-OSRAM AG.

A catalog with a linkage of the tools to the associated LED product family is listed in Table 1. This table shows the LED product families and the recommended nozzle design with the nozzle number and a dimension drawing of the nozzle. Alternative nozzles are indicated for some products. Since most products were tested with SIPLACE pick and place machines, SIPLACE nozzles are often recommended. If other types of pick and place machines are used in the field, please use modified tools according to the given dimensions and body structure for the mounting.

Table 1: Recommended nozzle designs for the SMT portfolio

Product family	Recommended nozzle design
Advanced Power TOPLED® Lx GxxP	SIPLACE 3121424
Power TOPLED® Lx E6xx / Lx Exxx / Lxx T67x SFH 4250 / SFH 4240 / SFH 4250S /	SIPLACE 3121424
Power TOPLED® Lens Lx E63x / Lx E65x SFH 4258 / SFH 4259 / SFH 4248 / SFH 4249 / SFH 4258S / SFH 4259S	SIPLACE 3082992
TOPLED® Lx T67x / Lx T68xx SFH 320 FA / SFH 320 / SFH 4243 / SFH 4257	SIPLACE 3121424

Table 1: Recommended nozzle designs for the SMT portfolio

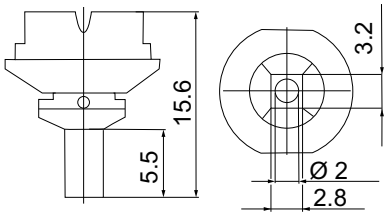
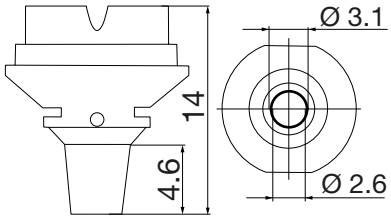
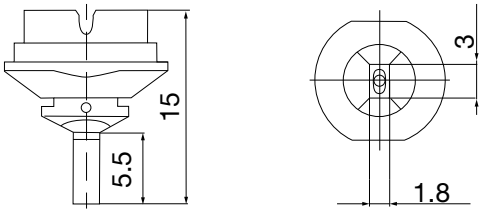
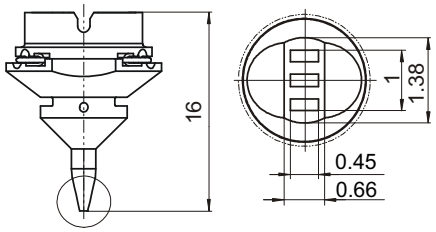
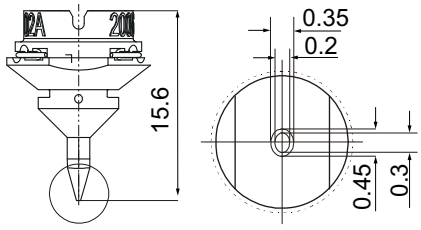
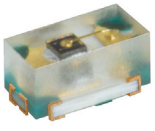
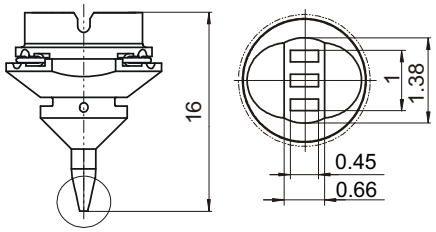
Product family		Recommended nozzle design
TOPLED® Reverse Gullwing SFH 3211 FA SFH 2270 R		SIPLACE 3121424 
TOPLED® Lens SFH 3219		SIPLACE 3082992 
TOPLED® E3014 LUW JLSH KW DCLMS11.PC		SIPLACE 03090143 
TOPLED® E1608 Kx DELxS1		SIPLACE 2007 
Chip LED CT ELLN51.14		SIPLACE 03054154 - 2006 
Chip LED SFH 4053 SFH 4043		SIPLACE 2007 

Table 1: Recommended nozzle designs for the SMT portfolio

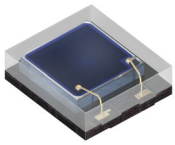
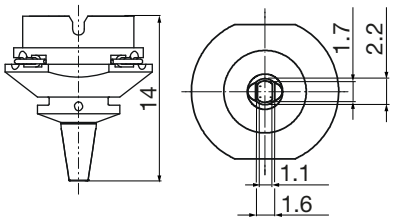
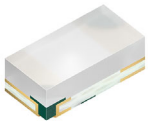
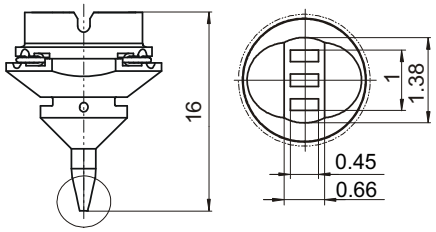
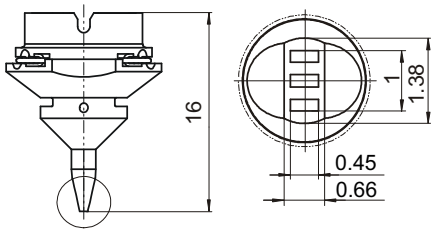
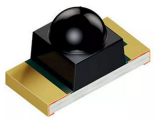
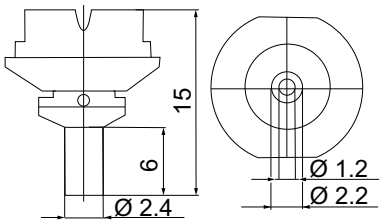
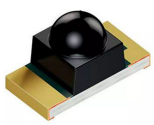
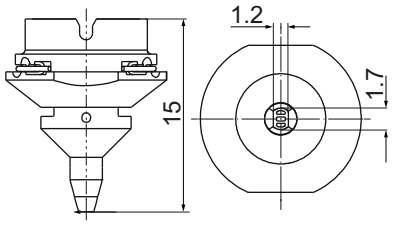
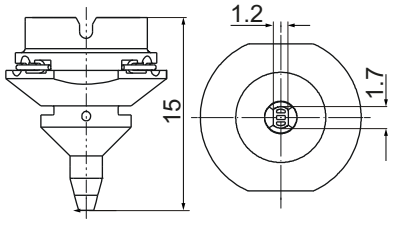
Product family	Recommended nozzle design
Chip LED SFH 2704	SIPLACE 933 / 2033  
Chip LED 0402 Lx QHxG KR EGLP41.22	SIPLACE 2007  
Chip LED Lens SFH 4045 SFH 4047	SIPLACE 2007  
Chip LED Lens SFH 4059	SIPLACE 03091123  
Chip LED Lens SFH 4059SR	SIPLACE 2004  
Chip LED 0603 Lx Q3xx Lx Q976	SIPLACE 2004  

Table 1: Recommended nozzle designs for the SMT portfolio

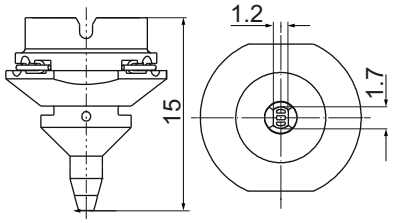
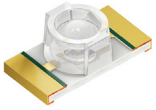
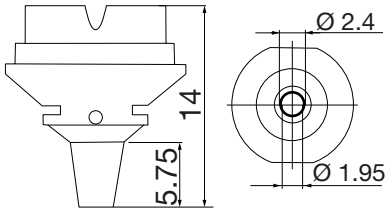
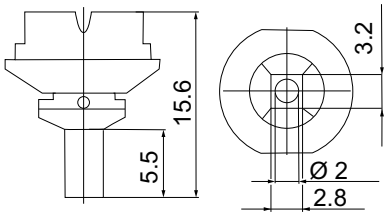
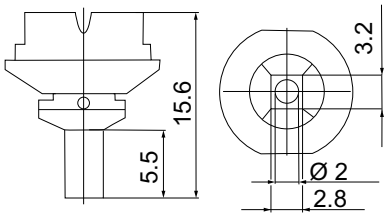
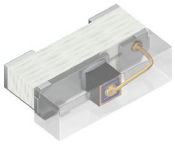
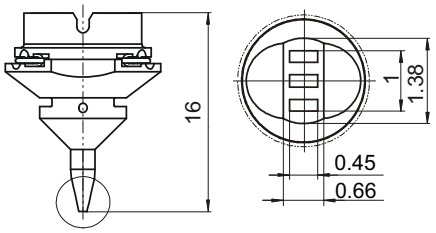
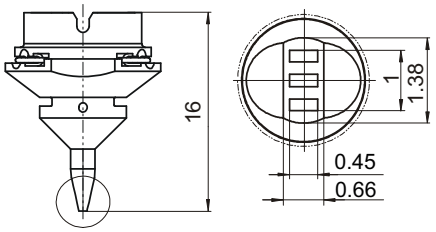
Product family		Recommended nozzle design
Chip LED 0805 Lx R97x		SIPLACE 2004 
Chip LED with Lens SFH 4052 SFH 4056		SIPLACE 3085131 
DISPLIX® P2828 KRTBLFLP71.32 KRTB LFLM71.32		SIPLACE 3121424 
DISPLIX® P3333 KRTBLSLPS1.32 KRT LSLPS1.32		SIPLACE 3121424 
FIREFLY® Lx VHxx SFH 4030 SFH 4060		SIPLACE 2007 
FIREFLY® E1608 Cx DELSS1.x2		SIPLACE 2007 

Table 1: Recommended nozzle designs for the SMT portfolio

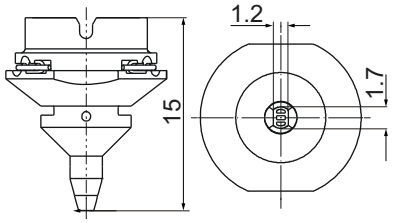
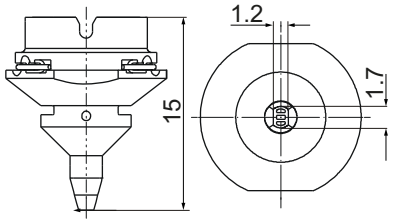
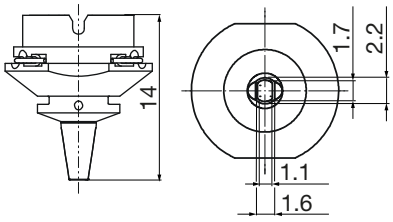
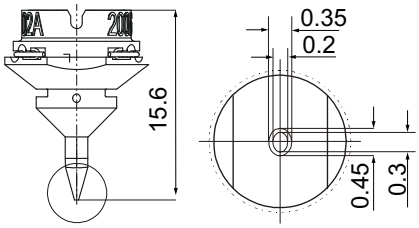
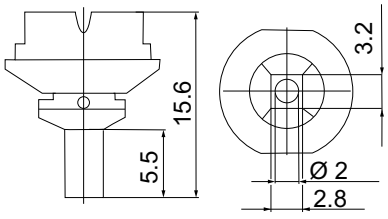
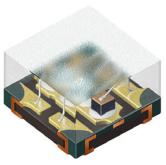
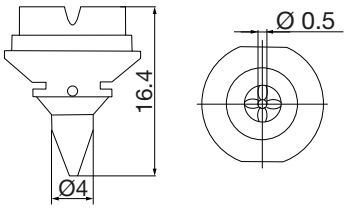
Product family		Recommended nozzle design
Micro SIDELED® Lx Y87x LW Y1SG KRBTQCLP61 SFH 4254 / SFH 3204 CUW Y3SH.B2 KRTB AILMS1		SIPLACE 2004 
Mini TOPLED® Lx M67x / Lx Mxxx LCB M67x SFH 4247		SIPLACE 2004 
Mini TOPLED® Lx MxSG		SIPLACE 2033 
MULTILED® SFH 7018		SIPLACE 03054154 - 2006 
MULTILED® Lxxx Gxxx		SIPLACE 3121424 
Multi Chip LED LRTB RxxG		SIPLACE 3146362 

Table 1: Recommended nozzle designs for the SMT portfolio

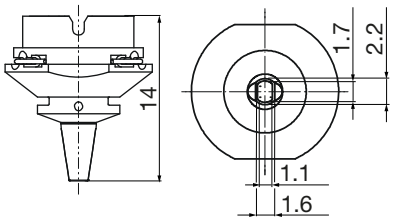
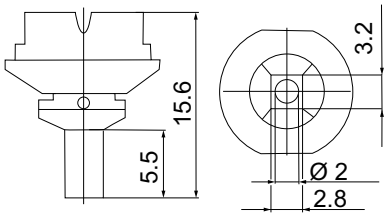
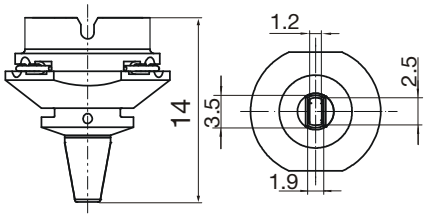
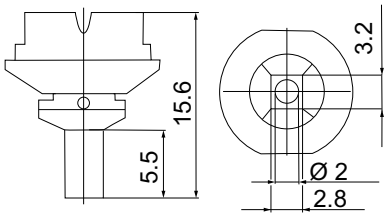
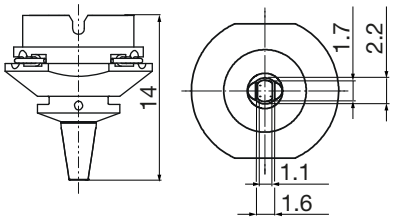
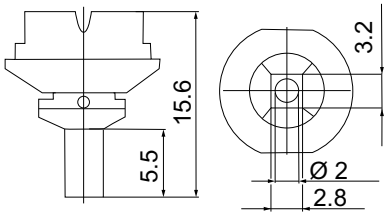
Product family		Recommended nozzle design
Multi Chip LED LTRB RxSx		SIPLACE 2033 
Multi TOPLED® Lxx T67x LxG T77x SFH 7252 / SFH 331 / SFH 7251 / SFH 7250		SIPLACE 3121424 
OSIRE® E3323 KRTBDWLM32.32 KRTBDWLM31.32		SIPLACE 2035 
OSIRE® E3635 LRTBGVSR		SIPLACE 3121424 
OSIRE® E5515 KRTBAELPSx.32		SIPLACE 2033 
OSIRE® E3731i		SIPLACE 3121424 

Table 1: Recommended nozzle designs for the SMT portfolio

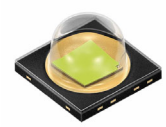
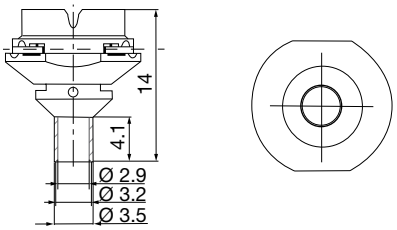
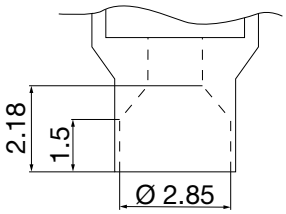
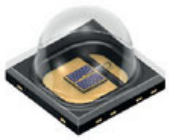
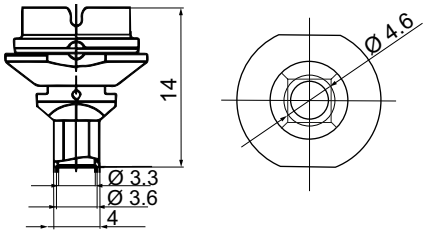
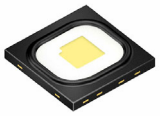
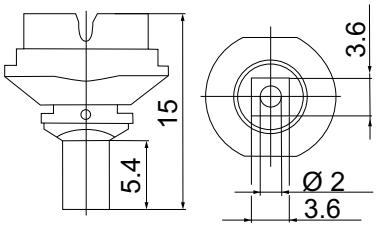
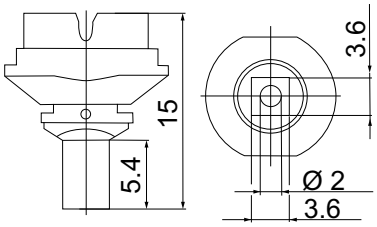
Product family		Recommended nozzle design
OSLON® Black Lx H9GP SFH 47xx		SIPLACE 3090409  Essemtec paraquda SP26/BN15 
OSLON® Black SFH 4728 SFH 4718 SFH 47267 SFH 47278		SIPLACE 3245614 
OSLON® Black Flat LUW HxxP Lx H9PP SFH 4735		SIPLACE 3124628 
OSLON® Black Flat KW H2L531.TE		SIPLACE 3124628 

Table 1: Recommended nozzle designs for the SMT portfolio

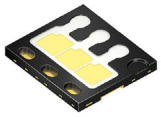
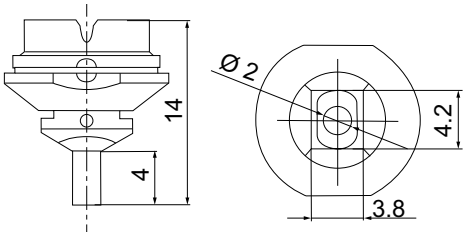
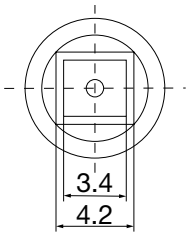
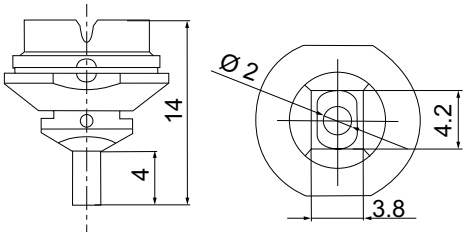
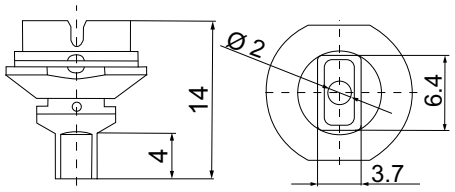
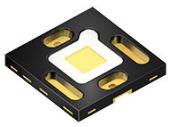
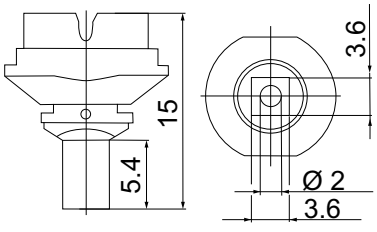
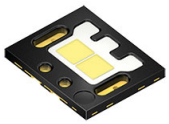
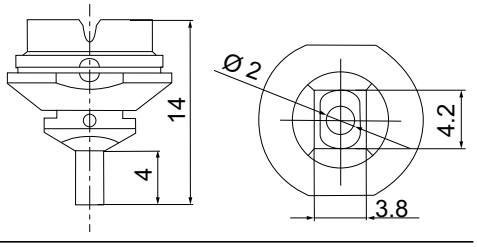
Product family		Recommended nozzle design
OSLON® Black Flat KW H3L531.TE		SIPLACE 3110067  Essemtec paraquda SP26/BN36 
OSLON® Black Flat KW H4L531.TE		SIPLACE 3110067 
OSLON® Black Flat KW H5L531.TE		SIPLACE 3110071 
OSLON® Black Flat S KW HHL532.TK KW HHL533.TK		SIPLACE 3124628 
OSLON® Black Flat S KW2 HIL532.TK KW2 HIL533.TK		SIPLACE 3110067 

Table 1: Recommended nozzle designs for the SMT portfolio

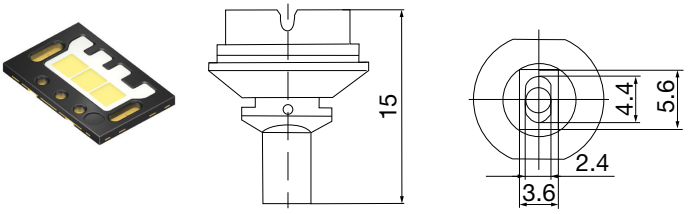
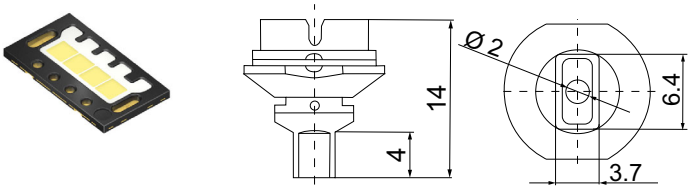
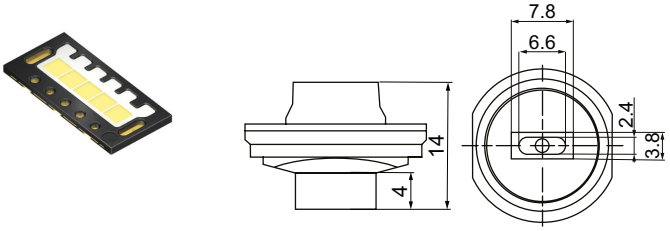
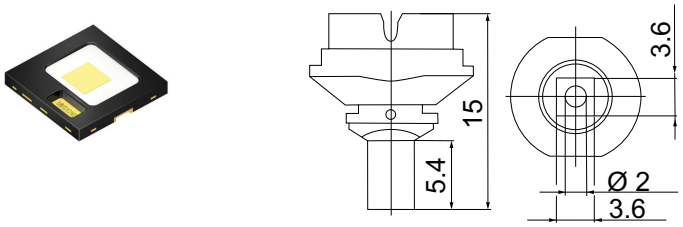
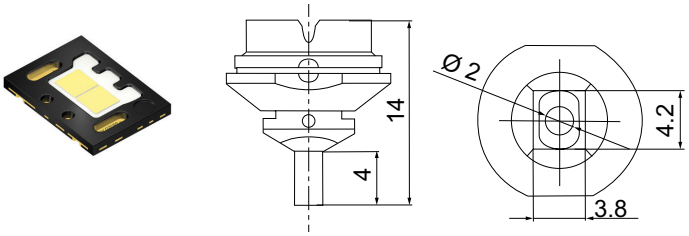
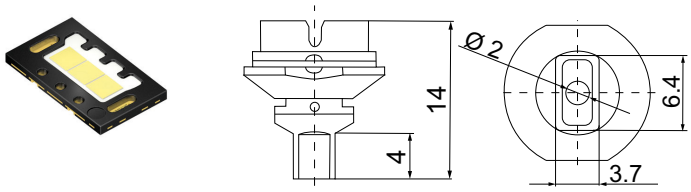
Product family	Recommended nozzle design
OSLON® Black Flat S KW HJL531.TE KW3 HJL533.TK	SIPLACE 3081896 
OSLON® Black Flat S KW HKL531.TE KW4 HKL533.TK	SIPLACE 3271548 
OSLON®Black Flat S KW HLL531.TE	SIPLACE 3271553 
OSLON® Black Flat X KW HHL631.TK	SIPLACE 03120648-01 
OSLON® Black Flat X KW2 HNL632.TK	SIPLACE 3110067 
OSLON® Black Flat X KW3 HML631.TK	SIPLACE 3110071 

Table 1: Recommended nozzle designs for the SMT portfolio

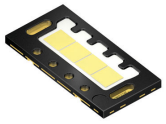
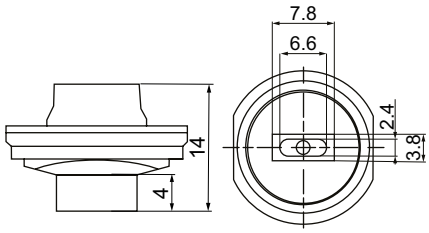
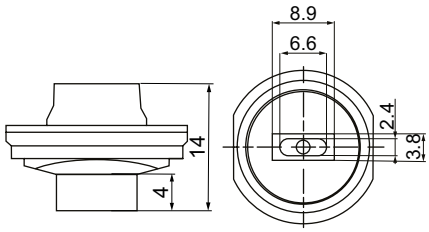
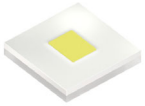
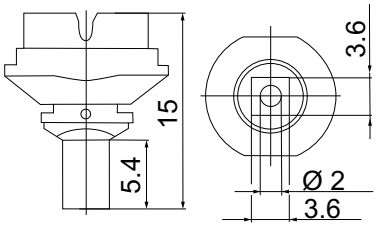
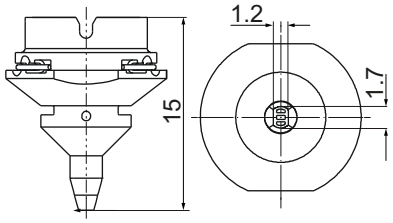
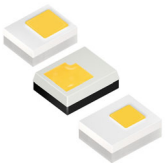
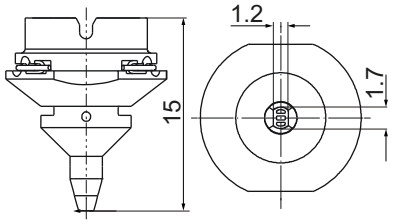
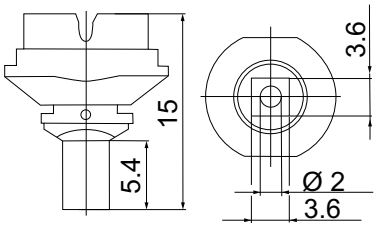
Product family		Recommended nozzle design
OSLON® Black Flat X KW4 HPL631.TK		SIPLACE 3271548 
OSLON®Black Flat X KW5 HQL631.TK		SIPLACE 3271553 
OSLON® Boost KW CULPM1		SIPLACE 3124628 
OSLON® Compact CM LUW CEUN.CE		SIPLACE 2004 
OSLON® Compact CL / OSLON® PL single / OSLON® Boost HM LCY CEUP LUW CEUP.xx KW CELNm1.TG KY CELNMx.FY KW CELMM1.TG		SIPLACE 2004 
OSLON® Compact PL KW2 CFLNM1.TG		SIPLACE 3124628 

Table 1: Recommended nozzle designs for the SMT portfolio

Product family	Recommended nozzle design
OSLON® Compact PL KW4 CHLNM1.TG	SIPLACE 3110067-01
OSLON® PURE 1414 Gx VJPEx.xx	Juk-0354/23 or PAN-0355/23
OSLON® PURE 1010	SIPLACE 2031 JUK-0166/18
OSLON® SX / OSLON® MX / OSLON® LX / OSLON® Signal Lx Cxxx / Lxx Cxxx / LxW Cxxx	SIPLACE 3086301 Essemtec paraquda SP26/BN04

Table 1: Recommended nozzle designs for the SMT portfolio

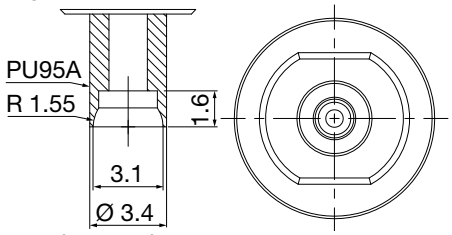
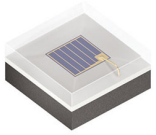
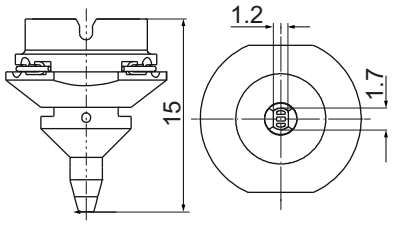
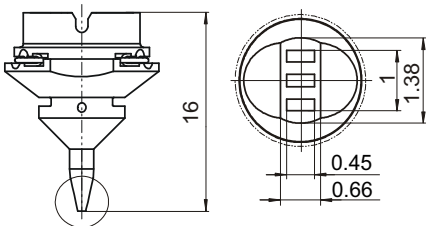
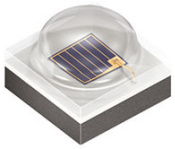
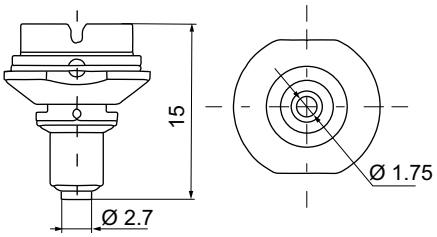
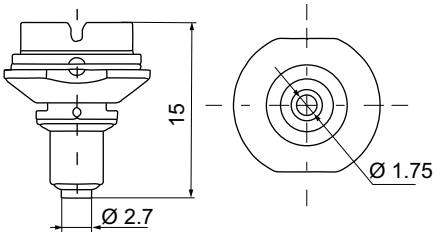
Product family		Recommended nozzle design
OSLON® Signal Lx CRBP.01		ChingYi: P/N: JUK-0400/19  Alternative nozzle: SIPLACE 0309409
OSLON® P1616 Flat SFH 4170S SFH 4180S SFH 4170S A01 SFH 4180S A01		SIPLACE 2004  SIPLACE 2007 
OSLON® P1616 SFH 4172 SFH 4182S		SIPLACE 3148796 
OSLON® P1616 SFH 4171 SFH 4171S SFH 4181S A01 SFH 4181S		SIPLACE 3148796 

Table 1: Recommended nozzle designs for the SMT portfolio

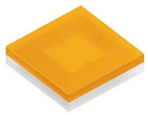
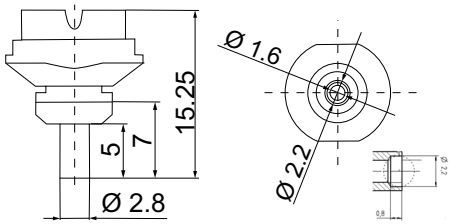
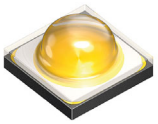
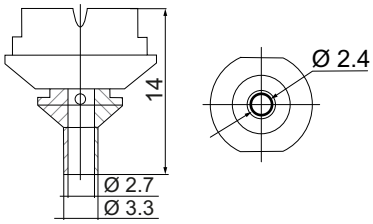
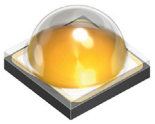
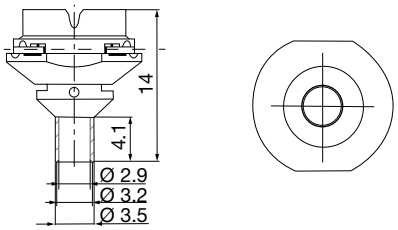
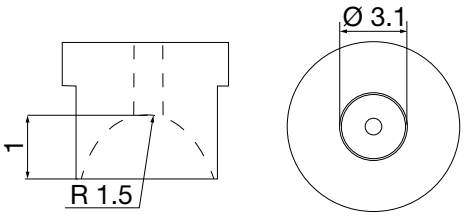
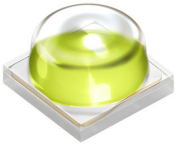
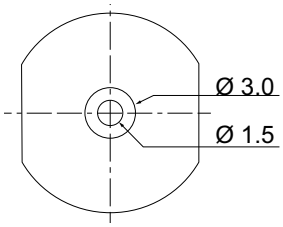
Product family		Recommended nozzle design
OSLON® Square Flat KW CSLPM2		SIPLACE 3112054 
OSLON® Square GW CSSRM1.xx LCW CQAR.xx		SIPLACE 3086301 
OSLON® Square GW CSSRM2.xx		SIPLACE 03090409  ChingYi: P/N: JUK-0381/15  Alternative nozzle: SIPLACE 03122708-03
OSLON® Square Gx CSBRMx.xx		ChingYi: PAN-0636/20 ChingYi: P/N: JUK-0635/20 

Table 1: Recommended nozzle designs for the SMT portfolio

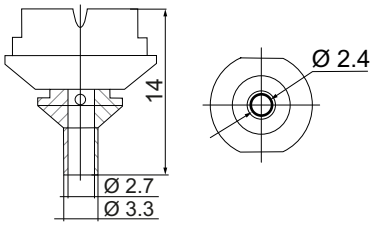
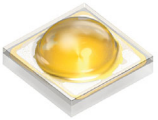
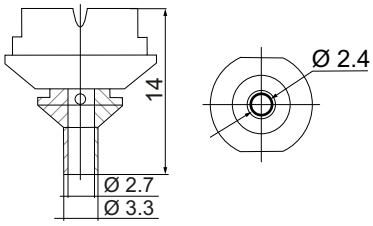
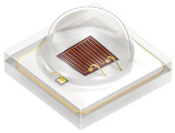
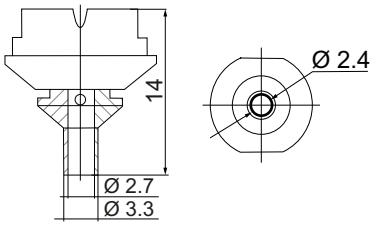
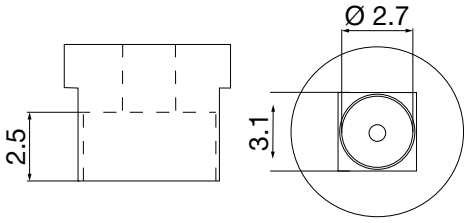
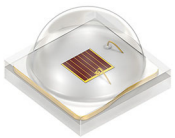
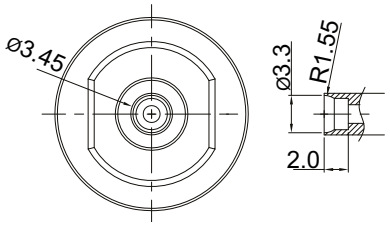
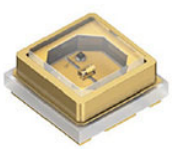
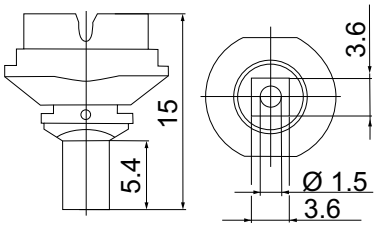
Product family	Recommended nozzle design
OSLON® SSL 80 White / Colors GW CS8PM1.xM LCW CR7P.xC Cx CS8pMx.xx Lx Cx7P	 SIPLACE 3086301 
OSLON® SSL 150 White / Colors GW CSHOM1.xM LCW CRDP.xC Gx CSHPMx.xx Lx CxDP	 SIPLACE 3086301 
OSLON® SSL 120 Gx CSSPM1.xx	 SIPLACE 3086301  ChingYi: P/N: JUK-0778/16 
OSLON® Optimal GF CSSRML.24 GH CSSRML.24 GD CSSRML.24 GW CSSRML.24	 ChingYi: P/N: JUK-0312/22 
OSLON® UV 3535	 SIPLACE 3077709 

Table 1: Recommended nozzle designs for the SMT portfolio

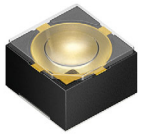
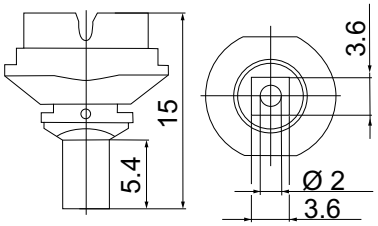
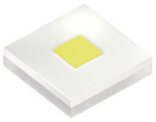
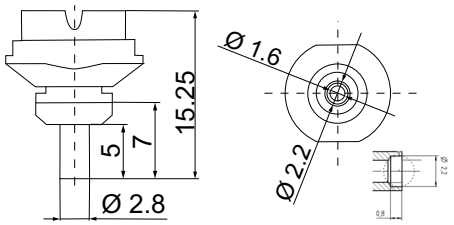
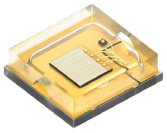
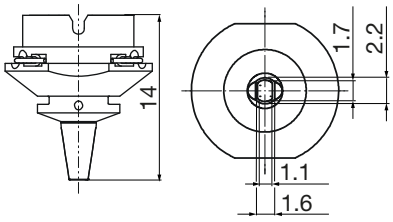
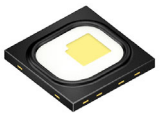
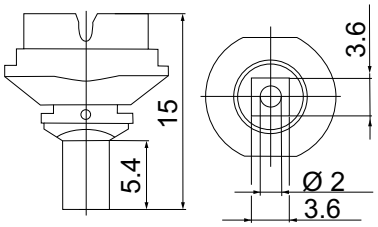
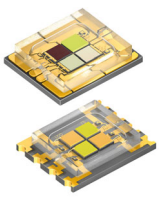
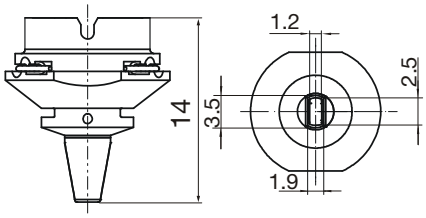
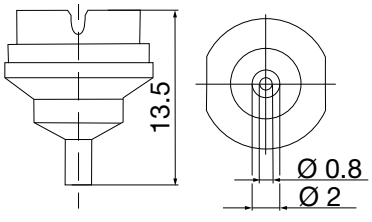
Product family		Recommended nozzle design
OSLUX® SFH 4780S SFH 4786S SFH 4796S SFH 4787S		SIPLACE 3124628 
OSRAM OSTAR® Projection Compact KW CSLxx1		SIPLACE 3112054 
OSRAM OSTAR® Projection Compact LE x Q9Wx LE BA Q6WM LCR H9RN LE x Q8WP LE x Q7WP		SIPLACE 2033 
OSRAM OSTAR® Projection Cube LCG H9Rx		SIPLACE 3124628 
OSRAM OSTAR® Stage LE RTDUW S2Wx LE x Q8WP		SIPLACE 2035 
PointLED® Lx P4xx		SIPLACE 3096148 

Table 1: Recommended nozzle designs for the SMT portfolio

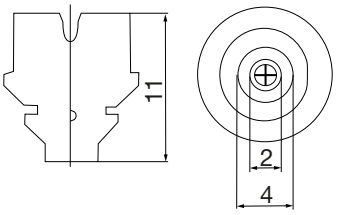
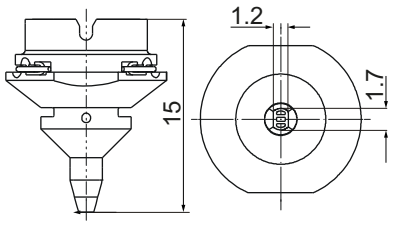
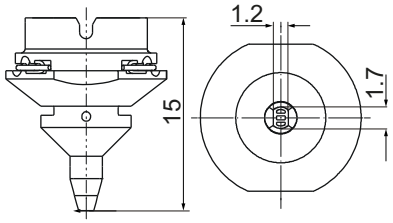
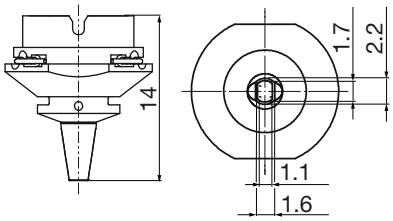
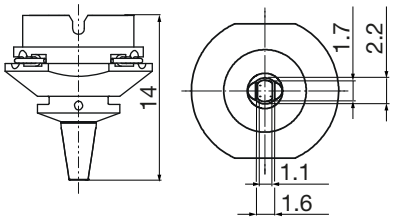
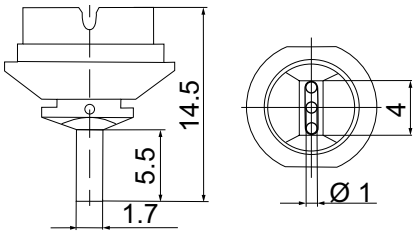
Product family	Recommended nozzle design
Power SIDELED® Lx B6SP	SIPLACE 2038  
SIDELED® Lx A67x SFH 4256 SFH 325 SFH 4244 SFH 4255	SIPLACE 2004  
SMARTLED® 0603 Lx L2xx SFH 4050 / SFH 3010	SIPLACE 2004  
SYNIOS® P2720 Kx DMLx31 SFH 4770S / SFH 4775S SFH 4776	SIPLACE 2033  
SYNIOS® E2314 KW DNLS31.RA	SIPLACE 2033  
SYNIOS® E4014 KW DPLS3x	SIPLACE 03085846-02  

Table 1: Recommended nozzle designs for the SMT portfolio

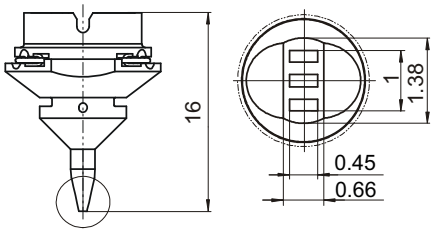
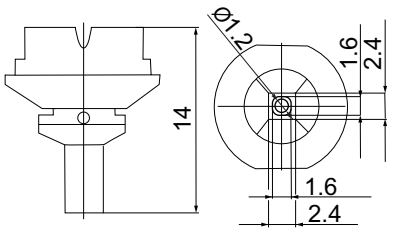
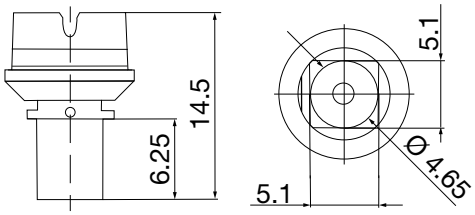
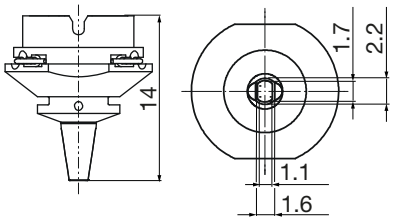
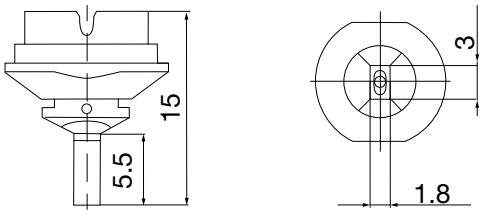
Product family	Recommended nozzle design
SYNIOS® P1515 Kx SITQA1.23 	SIPLACE 2007 
SYNIOS® S2222 KT DDLM31.13 	SIPLACE 3120648-01 
DURIS® E5050 GW J9LHSx.4M 	SIPLACE 3083400 
DURIS® E 2835 GW JBLMSxEM 	SIPLACE 2033  Alternative nozzle: ChingYi: P/N: JUK-0344/17
DURIS® E 3 GW JCLPSx.Ex LUW JNSH.xC 	SIPLACE 3090143  Alternative nozzle: ChingYi: P/N: JUK-0436/15

Table 1: Recommended nozzle designs for the SMT portfolio

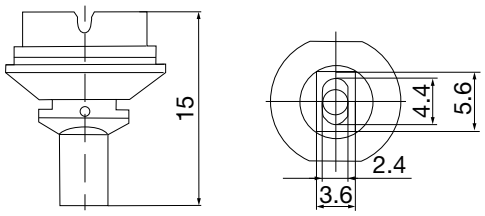
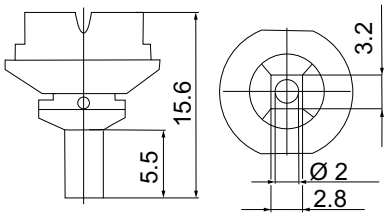
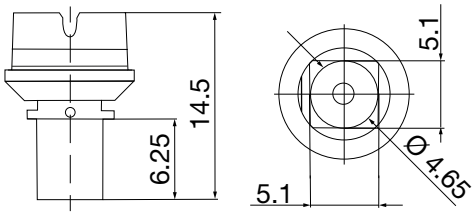
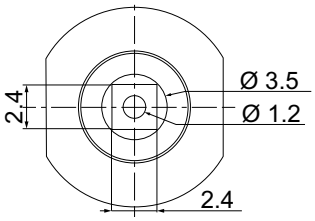
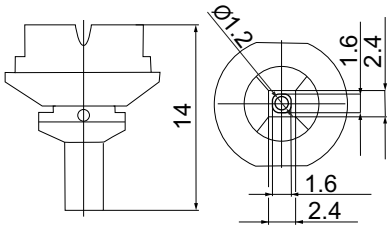
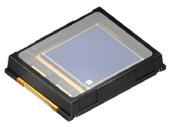
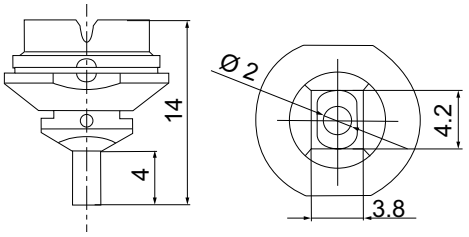
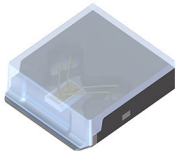
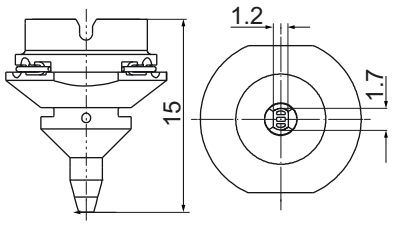
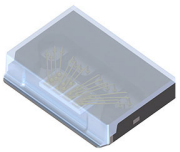
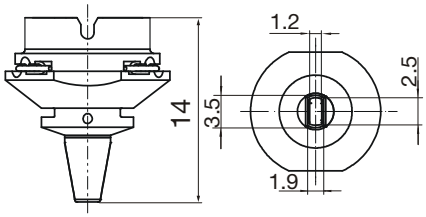
Product family	Recommended nozzle design
DURIS® E 5 GW JDSxS1.xC GW JDSxSx.EM 	SIPLACE 3081896  Alternative nozzle: ChingYi: P/N: JUK-0436/15
DURIS® S 5 Gx PSLx31.xx GW PSLPS1.xC GW PSLRS1.xC 	SIPLACE 3121424  Alternative nozzle dimensions: Outer dimension: Ø 3.0mm Inner dimension: Ø 1.5mm
DURIS® S 8 GW P9Lx3x.xM 	SIPLACE 3083400  Alternative nozzle dimensions: Outer dimension: Ø 5,0mm Inner dimension: Ø 3,2mm
OSCONIQ® C 2424 	ChingYi: P/N: JUK-0530/19  SIPLACE 3120648-01 

Table 1: Recommended nozzle designs for the SMT portfolio

Product family	Recommended nozzle design
OSCONIQ® P 3737 GW PUSRA1.PM	ChingYi: P/N: JUK-0461/15
OSCONIQ® P 2226 GWDASPA1.EC Gx DASPA1.xx	SIPLACE 0328149
MIDLED® Toplooker SFH 4651 SFH 4641 SFH 4650 SFH 4640 SFH 3600	SIPLACE 2033 Recommended Nozzle-Design
MIDLED® Sidelooker SFH 4656 SFH 4646 SFH 4655 SFH 4645 SFH 4647 SFH 3605	SIPLACE 2007
IR TOPLED® D5140 SFH 2200 / SFH 2201 SFH 2240	SIPLACE 3110067

Table 1: Recommended nozzle designs for the SMT portfolio

Product family		Recommended nozzle design
IR TOPLED® D5140 SFH 2200 / SFH 2201 SFH 2240		SIPLACE 3110067 
SMT Laser SPL S1L90A_3 SPL S1L90H_3		SIPLACE 2004 
SMT Laser SPL S4L90A_3		SIPLACE 2035 

3 General recommendation

Before the assembly process, the nozzle tip should be checked to ensure that it is clean and free of dust. Residues could interact with the LED surface during pickup and placement. The equipment used should be well maintained to avoid faults.

4 Solution proposals for potential issues

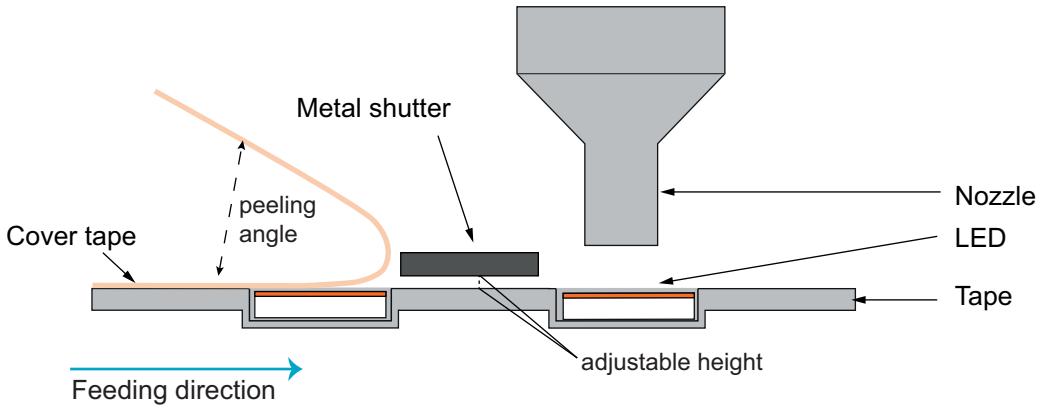
4.1 Components tilting due to vibration

As already mentioned, electric feeders are preferred because they reduce the move out of components in tape pocket due to their lower vibration. A further reduction in vibration can be achieved by installing a special spacer adapter in the feeder unit to adjust for the dedicated tape pocket height.

4.2 Feeder with metal shutter

It is possible to use feeders with a metal shutter. This metal shutter releases the LED-pocket or closes it mechanically by moving back and forward. One setting option is to specify how many LEDs are released (Figure 8). However, it must be ensured that this metal shutter does not touch the components, as otherwise mechanical damages may occur.

Figure 8: Feeder with metal shutter



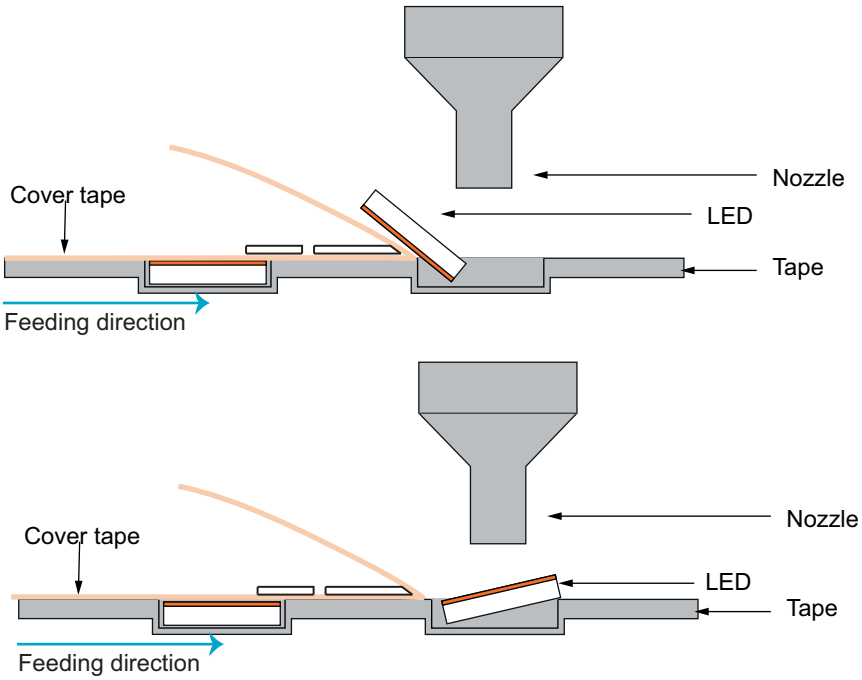
4.3 Stick on tape

As the potting material for LEDs often silicones are used, which might be "sticky" depending on the ambient temperature and humidity. They can be lifted during covertape removal (Figure 9).

This can lead to the following problems:

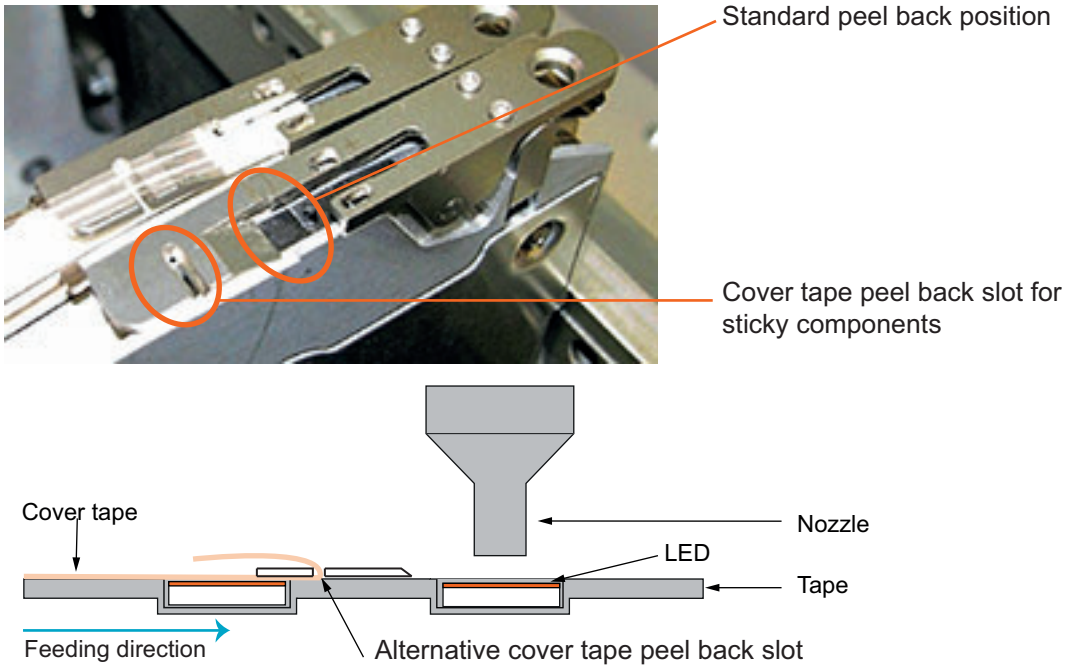
- The LED touches the nozzle while it is lifted from the tape
- The LED falls back "tilted" into the tape and cannot be picked up accurately by the nozzle

Figure 9: Lifted LED during cover tape removal



In these cases it is recommended to use the alternative pull back position of the cover tape as shown in Figure 10. Furthermore, we recommend controlling the humidity and providing an antistatic environment, e.g. with an ionizer. It is recommended to use electrical feed to control feeding speed and reduce any vibration of the carrier tape.

Figure 10: Feeder peel back position



ABOUT ams OSRAM Group (SIX: AMS)

The ams OSRAM Group (SIX: AMS) is a global leader in optical solutions. By adding intelligence to light and passion to innovation, we enrich people's lives. This is what we mean by Sensing is Life. With over 110 years of combined history, our core is defined by imagination, deep engineering expertise and the ability to provide global industrial capacity in sensor and light technologies. Our around 24,000 employees worldwide focus on innovation across sensing, illumination and visualization to make journeys safer, medical diagnosis more accurate and daily moments in communication a richer experience. Headquartered in Premstaetten/Graz (Austria) with a co-headquarters in Munich (Germany), the group achieved over EUR 5 billion revenues in 2021. Find out more about us on https://ams-osram.com

DISCLAIMER

PLEASE CAREFULLY READ THE BELOW TERMS AND CONDITIONS BEFORE USING THE INFORMATION SHOWN HEREIN. IF YOU DO NOT AGREE WITH ANY OF THESE TERMS AND CONDITIONS, DO NOT USE THE INFORMATION.

The information provided in this general information document was formulated using the utmost care; however, it is provided by ams-OSRAM AG or its Affiliates* on an "as is" basis. Thus, ams-OSRAM AG or its Affiliates* does not expressly or implicitly assume any warranty or liability whatsoever in relation to this information, including – but not limited to – warranties for correctness, completeness, marketability, fitness for any specific purpose, title, or non-infringement of rights. In no event shall ams-OSRAM AG or its Affiliates* be liable – regardless of the legal theory – for any direct, indirect, special, incidental, exemplary, consequential, or punitive damages arising from the use of this information. This limitation shall apply even if ams-OSRAM AG or its Affiliates* has been advised of possible damages. As some jurisdictions do not allow the exclusion of certain warranties or limitations of liabilities, the above limitations and exclusions might not apply. In such cases, the liability of ams-OSRAM AG or its Affiliates* is limited to the greatest extent permitted in law.

ams-OSRAM AG or its Affiliates* may change the provided information at any time without giving notice to users and is not obliged to provide any maintenance or support related to the provided information. The provided information is based on special conditions, which means that the possibility of changes cannot be precluded.

Any rights not expressly granted herein are reserved. Other than the right to use the information provided in this document, no other rights are granted nor shall any obligations requiring the granting of further rights be inferred. Any and all rights and licenses regarding patents and patent applications are expressly excluded.

It is prohibited to reproduce, transfer, distribute, or store all or part of the content of this document in any form without the prior written permission of ams-OSRAM AG or its Affiliates* unless required to do so in accordance with applicable law..

* ("Affiliate" means any existing or future entity: (i) directly or indirectly controlling a Party; (ii) under the same direct, indirect or joint ownership or control as a Party; or (iii) directly, indirectly or jointly owned or controlled by a Party. As used herein, the term "control" (including any variations thereof) means the power or authority, directly or indirectly, to direct or cause the direction of the management and policies of such Party or entity, whether through ownership of voting securities or other interests, by contract or otherwise.)

For further information on our products please see the Product Selector and scan this QR Code.

Published by ams-OSRAM AG
Tobelbader Strasse 30, 8141 Premstaetten, Austria

Published by ams-OSRAM AG
Tobelbader Strasse 30,
8141 Premstaetten Austria
Phone +43 3136 500-0
ams-osram.com