

SYNIOS P2720 – General Information

Application Note

Abstract

This application note provides insight into the LED product family of the SYNIOS P2720 (KxDMLy31).

A basic overview of the construction, handling and processing of the SYNIOS P2720 is presented.

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2. Handling
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Construction of the SYNIOS P2720

The product family SYNIOS P2720 is especially developed for use as small size light source with a wide range of operating currents, with its slim design suitable for a big variety of applications – from mid- to high-power.

The common package of the product family consists of an Au-plated lead frame and a white epoxy mold compound in which a highly efficient semiconductor chip is mounted and electrically connected (Fig1.).

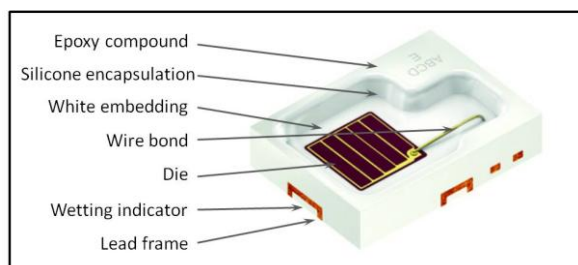


Fig. 1: Design of the SYNIOS P2720



Depending on the brightness requirements the SYNIOS P2720 is available in three different chip sizes (500µm, 750µm & 1000µm).

The product group comprises the colors white, converted yellow, yellow, red and super red, whereas the red color group covers an extended wavelength range starting at $\lambda_{\text{dom}} = 612\text{nm}$ to 628nm.

The color coordinates of the white version (KWDMLy31.SG) is within the white field of UNECE/FMVSS.

The final encapsulation of the LED is silicone depending on the type either clear or converter filled.

Figure 2 shows an overview about the available variants of the SYNIOS P2720 and their specific designation.

SYNIOS P2720 (KxDMLy31.zz)						
Die size	Color	White	Yellow (converted)	Yellow	Red	Super red
Acronym		KWDMLy31.SG	KYDMLy31.FY	KYDMLy31.23	KRDMLy31.23	KSDMLy31.23
1000µm	S					
750µm	Q					
500µm	N					
Technology		InGaN		InGaIP		

Fig 2: Overview of SYNIOS P2720 family

Within the product family there are also differences in the ESD stability of the

devices. In the versions white and converted yellow the LED features an ESD protection diode, which provides ESD stability of up to 8kV according to JESD22-A114-F (HBM). All other of the product group provides ESD robustness of 2kV.

Nevertheless as a matter of principle the common ESD safety precautions have to be observed during handling, assembly and production of electronic devices.

The common QFN-like design with identical solder pad layout and equal small dimensions (2.7mm x 2.0mm x 0.6mm) involves an additional benefit concerning design flexibility due to the exchangeability. With one circuit board layout, for example, several applications with different brightness requirements can be implemented. With the same layout either the brightness by different chip sizes can be adapted at the end of the development phase or later after some years.

Also with the same board layout different requirements in brightness like for UNECE and FMVSS regulation can be fulfilled by the wide brightness range of the family for each color.

As a small LED without lens the SYNIOS P2720 is also perfectly suited for light guide applications.

As with all LEDs from OSRAM Opto Semiconductors, the SYNIOS P2720 product group also fulfills the current RoHS guidelines (European Union & China).

Handling

Accessorily to general guidelines for the handling of LEDs, additional care should be taken that mechanical stresses (e.g. sheering forces) to the elastic silicone encapsulation must be eliminated or reduced to the greatest extent possible (see also application note "Handling of Silicone Resin LEDs").

In general, all types of sharp objects (e.g. forceps, fingernails, etc.) should be avoided in order to prevent stress to or penetration of the encapsulation, since this can lead to impairment of the component.

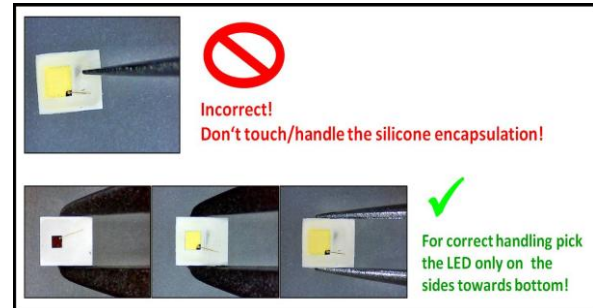


Fig. 3: Manual Handling of the SYNIOS P2720

For manual assembly and placement – in the production of prototypes, for example – the use of so-called vacuum tweezers is recommended (Figure 4). The effective mechanical stress on the LED is minimized by individually exchangeable soft rubber suction tips.



Fig. 4: Examples of vacuum styluses

If there is no alternative to the exceptional use of a tweezers (anti-static), the LED must be picked and handled only at the epoxy housing (Figure 3).

Please note even after being soldered on the PCB board touching of the silicon must be avoided in order to avoid damages of the bond wire or of the LED housing.

As it can be seen in Figure 5, the SYNIOS P2720 is packaged in tape and reel.

When processing by means of automated placement machines, care should be taken

to use an appropriate pick and place tool and to ensure that the process parameters are conform to the package's characteristics.

Figure 6 shows the recommended design of the placement tool for damage-free processing of the SYNIOS P2720.

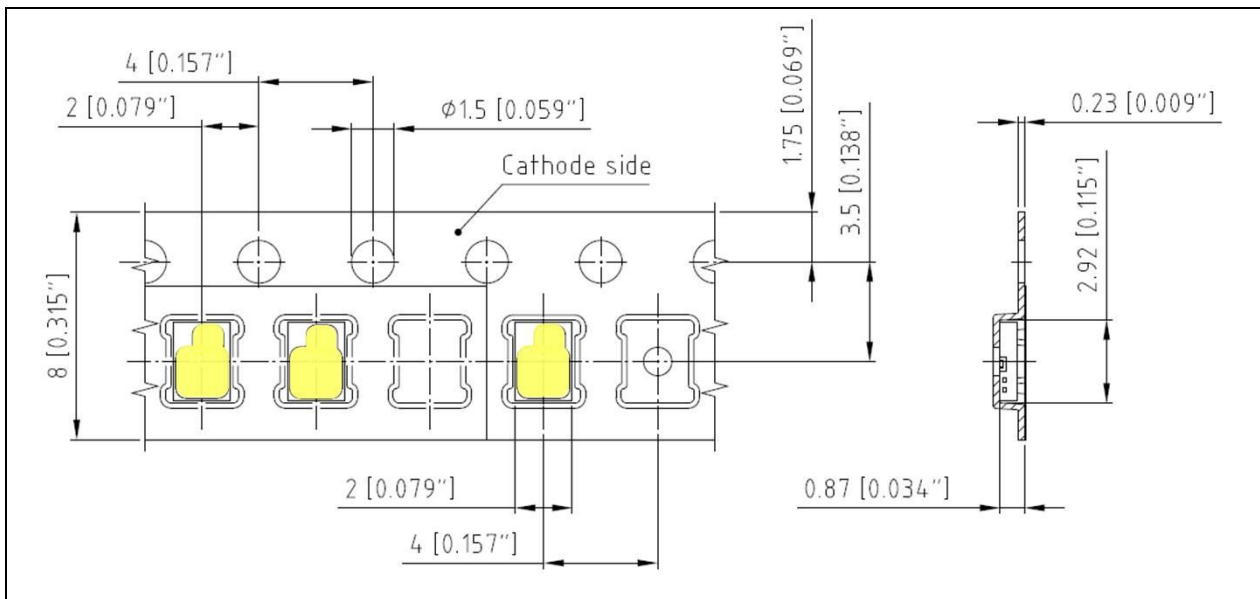


Fig. 5: Position of the LED in the tape – method of taping

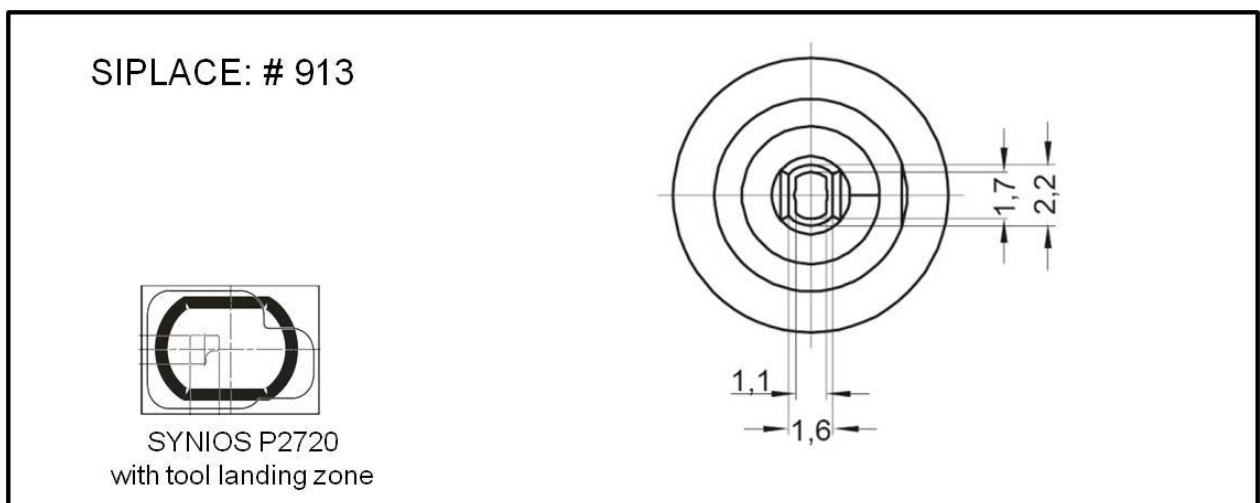


Fig. 6: Design proposals of the pick and place tool for the SYNIOS P2720 (dimensions in mm)

If possible, the tool should pick up the LED across the entire surface or along the

package rim (Figure 7). The same applies when depositing or placing the LED. Forces

should be applied over the entire surface or along the rim.

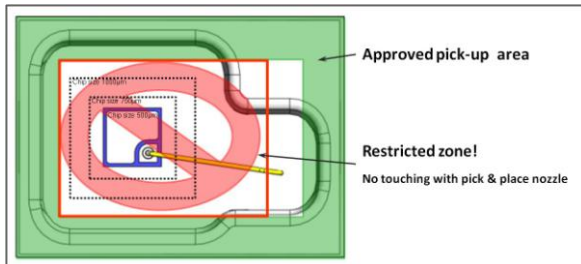


Fig. 7: Recommended pick-up area for SYNIOS P2720

Since the SYNIOS P2720 is generally supplied in tape with dry pack, it should be factory-sealed when stored.

The hermetic pack should only be opened for immediate mounting and processing, after which the remaining LEDs should be repacked according to the moisture level in the datasheet (q.v. JEDEC J-STD-033B.1 - Moisture Sensitivity Levels).

Storage

PCBs or assemblies containing LEDs should not be stacked such that force is applied to the LED, or should not be handled directly at the LED.

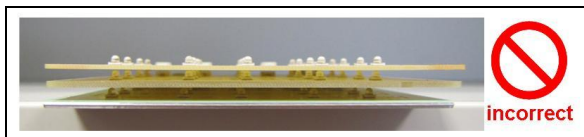


Fig. 8: Incorrect storage of LEDs

Generally, all LED assemblies should be allowed to return to room temperature after soldering, before subsequent handling, or the next process step.

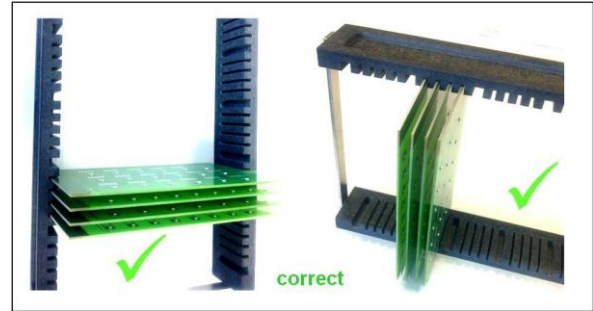


Fig. 9: Correct storage of assemblies with LEDs

Cleaning

From today's perspective any direct mechanical or chemical cleaning of the SYNIOS P2720 is forbidden.

Isopropyl alcohol (IPA) can be used if cleaning is mandatory. Other substances or especially ultrasonic cleaning of SYNIOS P2720 are generally not recommended.

For dusty LEDs, a simple cleaning by means of purified compressed air (e.g. central supply or spray can) is recommended here.

In any case, all materials and methods should be tested beforehand, particularly as to whether or not damage is associated with the component.

Notes concerning cleaning can be also found in the corresponding data sheets.

Processing

Generally, the SYNIOS P2720 product family is compatible with existing industrial SMT processing methods, so that current populating techniques can be used for the mounting process.

The individual soldering conditions for each LED type according to JEDEC can be found in the respective data sheet.

A standard reflow soldering process with forced convection under standard N₂ atmosphere is recommended for mounting the component, in which a typical lead-free

SnAgCu metal alloy is used as solder. Figure 10 shows the temperature profile for lead-free soldering with the recommended peak temperature of 245°C.

In this context, it is recommended to check the profile on all new PCB materials and designs. As a good starting point, the recommended temperature profile provided by the solder paste manufacturer can be used. The maximum temperature for the profile as specified in the data sheet should not be exceeded, however.

When developing the circuitry, special attention should be given to the position and orientation of the LED on the circuit board. Depending on the position and orientation of the LED, the mechanical stress on the LED can vary.

In general, it is recommended that all twisting, warping, bending and other forms

of stress to the circuit board should be avoided after soldering in order to prevent breakage of the LED housing or solder joints.

Therefore, separation of the circuit boards should not be done by hand, but should exclusively be carried out with a specially designed tool.

For further information such as regarding PCB type, solder pad, solder stencil, voids, post reflow inspection and verification of the design please see also application notes "Processing of SMD LEDs".

The SYNIOS P2720 features a good self alignment during soldering additionally supported by the four wetting indicators (Fig. 11).

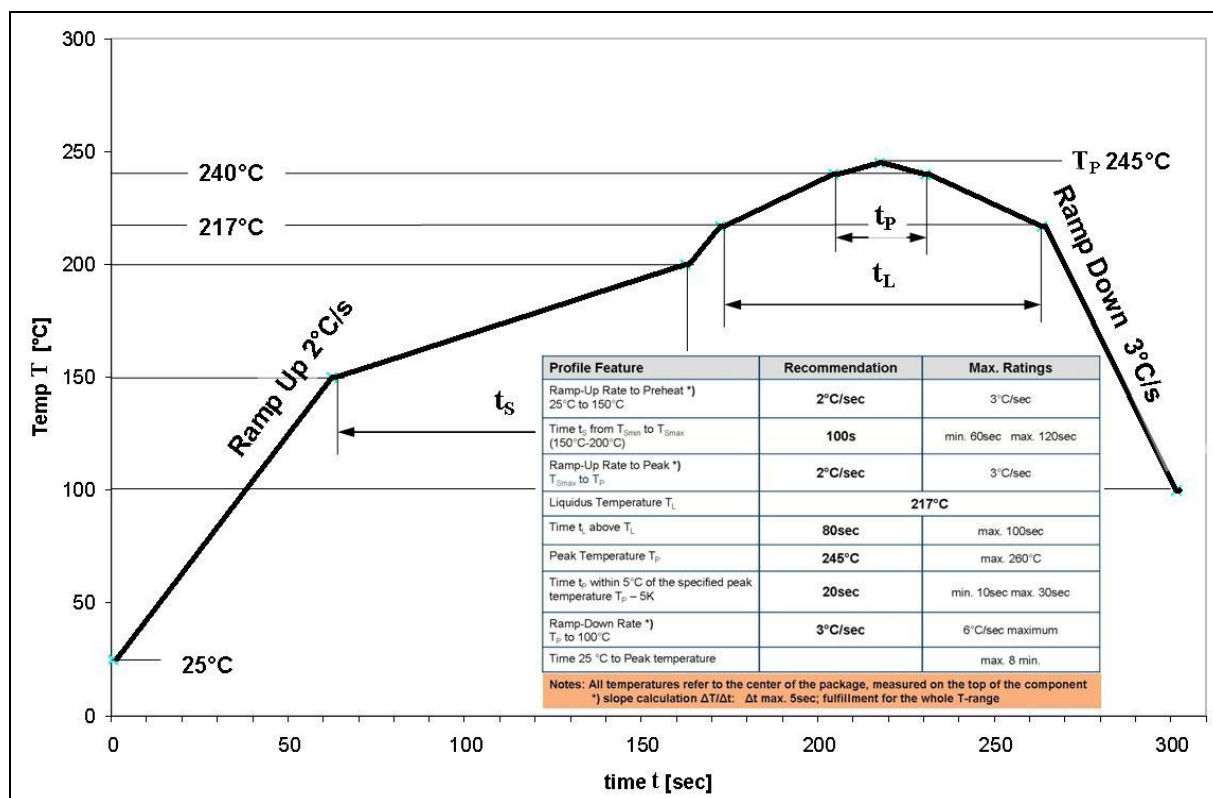


Fig. 10: Temperature profile for lead-free reflow soldering according to JEDEC JSTD-020

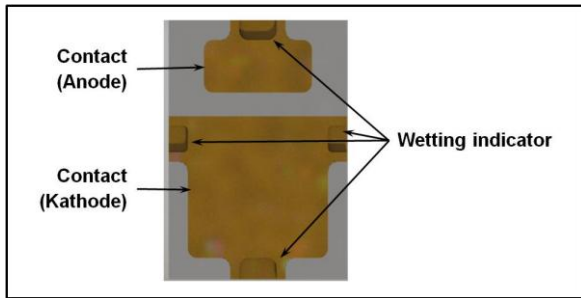


Fig. 11: bottom only-terminated contacts with wetting indicators

Fig 12 shows the LED before and after the IR soldering process.

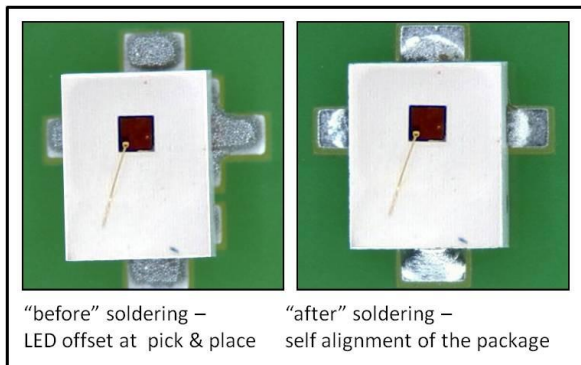


Fig. 12: Self alignment of the SYNIOS P2720 during soldering

If a narrow LED clustering is requested in the application, please note a direct side by side contact between the housings has to be avoided due to the risk of short circuits.

Summary

The SYNIOS P2720 LED family is designed as small size high-flux light source. The design of the package enables the use of various chip sizes to satisfy different brightness levels and a wide range of operating currents as well.

With primary focus on automotive applications the LED is qualified based on the guidelines of IEC 60810, "Lamps for road vehicles - Performance requirements". In addition the SYNIOS P2720 group features an improved corrosive robustness according to the following test conditions: 40°C / 90% rh / 15ppm H₂S / 336h; = Stricter than IEC 60068-2-43 (H₂S) [25°C / 75% rh / 10ppm H₂S / 21 days] = Regarding relevant gas (H₂S) stricter than EN 60068-2-60 (method 4) [25°C / 75% rh / 200ppb SO₂, 200ppb NO₂, 10ppb Cl₂ / 21 days].

The relevant information can also be found in the datasheet of the LED product.

Currently the product group comprises the automotive preferred colors white, yellow, red and super red.

Generally supplied in tape and reel, the SYNIOS P2720 is compatible with existing industrial SMT processing methods, so that all customary populating techniques can be used for assembly.

It should also be kept in mind that the LED is not suitable for any direct mechanical or chemical cleaning.

During handling and processing mechanical stress to the silicone encapsulation must be reduced or eliminated to the greatest extent possible. Penetration of the silicone should be avoided. Either can lead to impairment of the component.

OSRAM Opto Semiconductors supports its customers during their development and design process in finding the best solution for a specific application.

Appendix



Don't forget: LED Light for you is your place to be whenever you are looking for information or worldwide partners for your LED Lighting project.

www.ledlightforyou.com

Revision History

Date	Revision History
Sept. 2014	Release application note

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