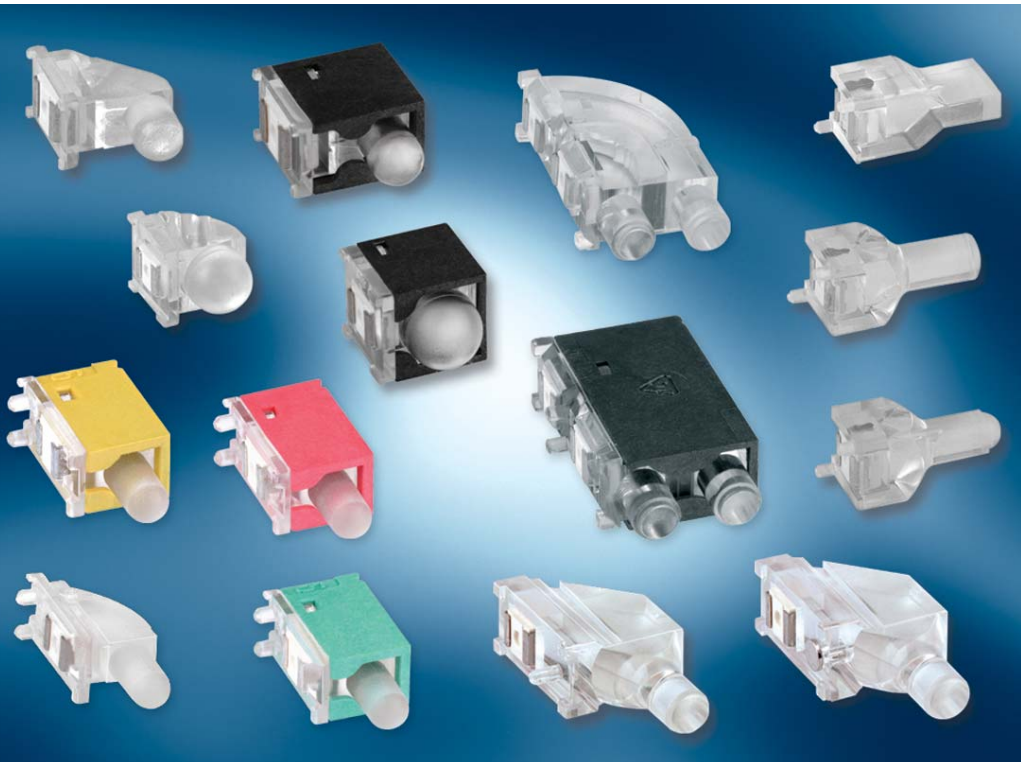
Make One Out of Two

LIGHT GUIDE WITH INTEGRATED LED

The simple idea to integrate the light guide directly into the LED does not only eliminate one processing step but offers additional side effects. One of it is the cost reduction. The second one, the luminous intensity of the LED, makes this combination interesting even for the use in low-cost displays.



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The concept is easy: Take a light guide and an LED and join them before the process of instrumentation. The result is the first light guide with integrated LED which is insertable fully automatic, in a word the M-Pipe. This SMD component has been designed and constructed by Mentor that has been setting new directions in the technical development and realization of mechanical, electronic and optoelectronic components for decades. The M-Pipe consists of a thermoplastic light guide material and is RoHS compliant. It resists soldering heat according to IPC / JEDEC J-STD-G20 and DIN EN 60068-2-58 – i.e. it withstands temperatures of 260 °C up to 40s or 200 °C up to 180s in reflow soldering. The M-PIPE can be operated at temperatures ranging from –40 to +100°C. It is the only component worldwide that meets the new high requirements as regards temperature resistance. Depending on the configuration the ESD resistance of the M-PIPE ranges from 7 to 12 kV and thus protects the sensitive electronics on the circuit board against electro static discharge.

Save one step

The M-PIPE can be used trouble-free with all infrared, thermal convection and vapor-phase soldering systems. A very good instrumentation with all standard automatic insertion equipment is natural in exactly the same way – no limitations exist with this.

The SMD component provides enough suction area or picking area for the insertion head, whether with or without the optional glare protection cap. And it is in this phase of processing when the advantages of the closed system of light guide and LED become especially striking: A complete process step in instrumentation is omitted, since the light guide and the LED are inserted as one unit. The often still manually carried out, time-consuming mounting of the separate light guide to the LED on the circuit board is replaced by this.

The system also convinces in other respects: Thanks to the new joining technology for LED and light guide, by which the perfectly balanced products are glued across their entire surface, the resistance values of the connection between light guide and LED is guaranteed. Thus the M-Pipe resists the load during the direct

mounting within the instrumentation process without complaints and reliably meets the requirements in the later operation.

Energy and resources

»Reconciliation of economy and ecology means that the chimney is smoking but that it is not polluting« [Peter Gillies (*1939), German journalist; chief editor of the German newspaper ›Welt‹ until 1995].

The ecologically aware handling of energy and resources moves ever more into the focus of today's society. Compared with conventional solutions the M-Pipe provides a considerably better balance of energy: Faster instrumentation in only one process step. Thus the problem of mixed instrumentation of THT and SMD components on the circuit board is also opposed. This saves costs on the one hand and is in addition ecologically progressive on the other hand. The agreeable side effect: By means of the symbiosis of LED and light guide the packaging units also blend into one; connected with this are an easy storage and thus lower costs for logistics.

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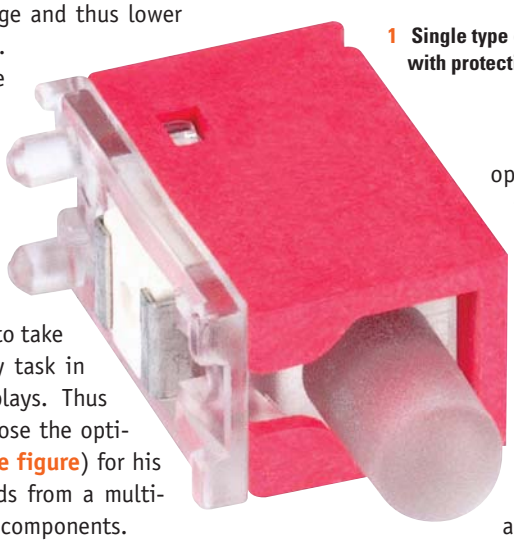
Many diverse designs as well as the possibilities of adjustment regarding to the dimensions in length, width and height allow the M-Pipe to take over almost every task in the field of displays. Thus the user may choose the optimal solution (**title figure**) for his individual demands from a multifarious system of components.



1 Single type of M-Pipe with protection cap

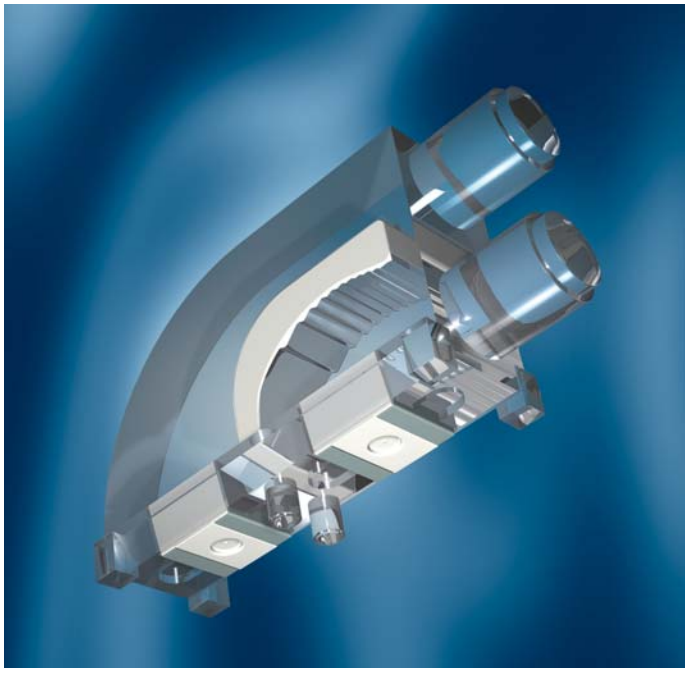
The assortment comprises components with a vertically emitting spherical or with a planar emitting surface with a diameter of 3 mm. Furthermore, a version emitting vertically over a surface area of 5 x 2 mm² is available. Additionally, the most diverse horizontally emitting SMD components are as single (**Figure 1** with red cap) and double type (**Figure 2**) with a diameter of 3 and 5 mm. The latter are available with as well as without cap.

These caps provide a safe glare protection with lined-up SMD components on a circuit board and reliably reduce the glare of the individual display elements as well as a possible launch of ambient light. Luminous efficacy and the efficiency of illumination at the emitting surface are optimal. Thanks to the clearly stronger LEDs the display elements are able to reach the best results even in the low-current mode of operation.

The fields of application are as manifold as the M-Pipe types: It is employed in the areas of industrial electronics and automation, e.g. automotive engineering, telecommunications and medical engineering. Since it is not possible to meet all customers' wishes and requirements, despite of a well thought-out system and a large choice of different designs, individual solutions in the form of tailor-made components are possible upon request. As far as made in TOPLED design, other LED colors as well as DUO or RGB LEDs are realizable upon request. ■

Summary: Easy but effective

The light guide with integrated LED ist mounted in only one step. Manually attaching the light guide is no longer necessary. The connection between LED and light guide is a stabil one, copes with high temperatures and offers a hight ESD resistance. Because of the hight luminouse intensity and efficiency factor the M-Pipe is a fine solution for all displays.



2 Double M-Pipe type with two LEDs but without cap

AUTHOR

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