

TECHNICAL PAPER

AVX Jumper Pins: Solutions for Solid-State Lighting Board-to-Board Applications

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Abstract

It is now a foregone conclusion that solid-state lighting (SSL), specifically based on the light-emitting diode (LED) and its organic relative (OLED), will become the technology standard for luminaires across a wide variety of application sectors. Its performance with respect to luminous output, power efficiency, lifetime, and reliability is unmatched. Many of the challenges endured by early adopters, such as cooling, manufacturability, and form factor limitations, have largely been solved. By the year 2035, it is projected that 85% of all lighting installations will be solid-state (“2019 Lighting R&D Opportunities”).

AVX JUMPER PINS SOLUTIONS FOR SOLID-STATE LIGHTING BOARD-TO-BOARD APPLICATIONS

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Along with the technological developments of the light-emitting device itself, there have been numerous challenges in developing the supporting electronics. One example particular to LEDs is their direct current (DC) power requirement. The standard incandescent bulb can take advantage of alternating current (AC) for efficiently delivering high power using voltage transformation. In contrast, the DC voltage across an LED is a fixed value based on the device’s physical material composition. As such, high power LED devices require a higher DC current. When it comes to supporting electronics like power supplies, PCBs, and PCB interconnect, a high DC current requirement is undesirable as it leads to bulky and expensive conductors and connectors.

SSL form factor is another critical parameter that directly affects manufacturability, cost, and widespread adoption. While some designs are entirely custom, a more modular approach is gaining traction. An excellent example is LED sign lighting. Individual SSL modules are chosen to satisfy the given lighting requirements for an application, and then the modules are connected to achieve a given form factor.

In some cases, the individual SSL modules are connected using wires, and in other cases, board-to-board connectors may be preferable. A rigid LED example is shown in the following figure where PCB mount connectors are used to provide electrical signal propagation and mechanical support.



Figure 1
9159 Series Interconnect System from AVX
for LED Lighting Modules

In both rigid and flexible designs, a new family of “poke-home” board mount connectors has been developed specifically to achieve low cost, low profile, and ease of installation. The poke-home concept is shown in figure 2, where a multi-strand or solid conductor is simply stripped and pressed into the contact. Two varieties are available, with and without wire stops to control the insertion depth of the conductor. Horizontal and vertical entry are also configurable options.

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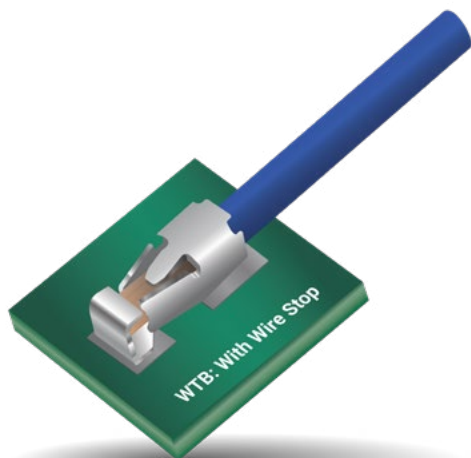


Figure 2
Poke-home wire to PCB contact [AVX]

These contacts support a wide range of wire gauges (from 24 AWG down to 18 AWG) and current ratings as high as 12 amps making them ideal candidates for LED power transfer. In the context of rigid SSL assemblies, these contacts can be used in conjunction with a new type of board to board connection from AVX termed the “Jumper Pin.” Shown in figure 3, the Jumper Pin is a solid conductor captured in a plastic spacer that can be used to connect two PCB’s with poke-home contacts on either side. This effectively absorbs the component and assembly tolerances during the mating process and eliminates the PCB and housing tolerance stack-up issues common to traditional connector systems in linear and coplanar applications.

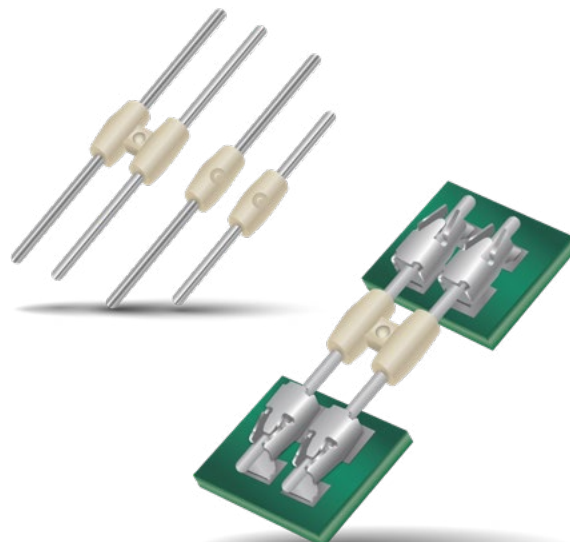


Figure 3
Jumper Pin connector used to bridge PCB’s with poke-home contacts.

A key design detail specific to Jumper Pins is the ability to support variable board-to-board spacing when end stops are not used in the receiving contact. The two boards can effectively slide into the correct spacing position at any point along the Jumper Pin length.

AVX’s series 10-9296 Jumper Pins are rated for 6.5A, 300 VAC based on contact spacing, three mating cycle durability, and operating temperatures spanning -40°C to +105°C, making them ideal candidates for LED lighting power distribution. The insulator is made from a glass-filled Nylon (PA-66) rated to UL94 V-0 standards, and the Jumper Pins consist of brass contacts with a lead-free, tin-over-nickel-plating. They are available in one and two position configurations; pin lengths of 26 mm and 38.15 mm, but pin lengths up to 68mm can be supported upon request.

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Both lengths have a standard 1mm diameter pin that is mating-compatible with traditional two-position 4mm-pitch poke-home connectors, as well as the 70-9296 Series 2.5mm STRIPT contacts. This offers two advantages: a short insulator (just 5.1mm) and a unique insulator geometry with dual-chamfered ends that provide a tight connection when seated within a corresponding housing cavity, as shown in the figure below.

70-9296-001-025-016
2.5MM POKE HOME CONTACT – NO STOP

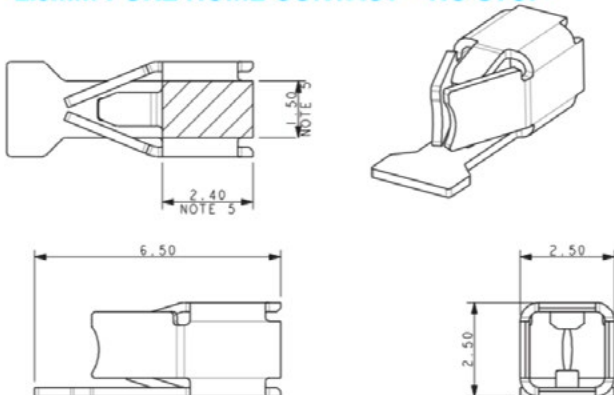


Figure 4
No Stop 2.5mm Poke Home Contact [AVX]

AVX has also developed a series of low profile connectors to support variable board-to-board spacing by incorporating the no stop poke-home contact into plastic housing. A hole in the back of the housing allows Jumper Pins to pass through the connector, unrestricted, until the final user-defined mating dimension is achieved. This solution is available in one and two position options on a 3mm pitch – an example is shown in figure 5.

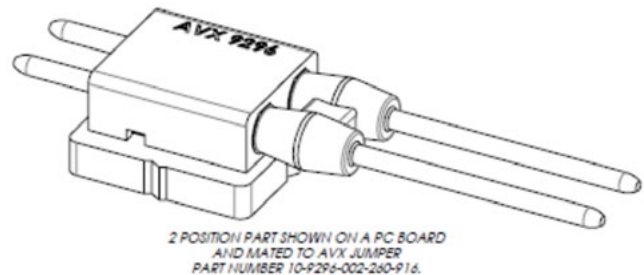


Figure 5
Two Position 00-9296-212 Low Profile Poke Home without Wire Stop [AVX]

AVX Interconnect is committed to supporting the development and growth of the SSL market. To date, it has developed more than 20 connector solutions designed to address the specific size, cost, configuration, and versatility demands created by the evolution of this market over the last ten years. The Jumper Pin is one such example that has solved many of the challenges in rigid board-to-board connections. To learn more about other AVX offerings for SSL lighting, [visit the AVX website](#).

For more information on AVX jumper pins, poke-home contacts, and poke-home connectors, please visit the links below:

- » [Jumper Pins](#)
- » [Poke Home Contacts](#)
- » [Poke Home Connectors](#)



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