Insulation Displacement Technology Meets SKEDD to Deliver Superior Benefits for Many Industries

By Ulrich Schmidt|March 15, 2022|Comments Offon Insulation Displacement Technology Meets SKEDD to Deliver Superior Benefits for Many Industries

Updated: March 29th, 2022

From RAST to SKEDD: Insulation displacement technology (IDT) offers solutions for crowded PCBs, including direct mating, flexible placement, compatibility with numerous cable types, and other benefits.

The international terminal block standard for consumer appliances, RAST (Raster Anschluss Steck Technik or Raster Connection Plug Technology) connectors have been in widespread use since their invention in 1986. While some assume that the technology has reached the end of its life cycle, the system is more relevant than ever and has moved beyond white goods. More and more sub-assemblies in the automotive industry are produced by Tier 2 suppliers yet must plug and play with primary wiring systems and PCBs in the final production process. RAST connectors can be used as a direct mating system on the edge of the PCB, which is difficult for crimp connectors, saving costs and installation space, and coordinating easily with other systems.

RAST 5 connectors with a 5 mm pitch are designed to cater to currents that draw up to 16 A and 2.5 mm pitch connectors can relay signal and small load currents of up to 4 A. RAST connectors tend to rely on IDT, which offers a budget-friendly production solution for cable harnesses of industrial quality. This explains why RAST connectors have become the standard for several sensor, switch, actuator, and motor control lines that can be connected directly or indirectly to the PCB or its components. They are particularly dominant in vehicle lighting, LED headlights, LED taillights, and interior lighting.

The dilemma facing direct connectors for modern applications in white goods, heating technology, and automobiles is that the edge of the printed circuit board is full! This is where evolution meets revolution: a direct connector is needed that can assume any position on the PCB, without soldering and, of course, without being plugged onto a corresponding part. In addition, the connector needs to be plugged in and plugged out several times. IDT allows all the advantages of automated cable assembly and also accommodates these goals.

IDT provides direct connection

This is made possible by the SmartSKEDD connector. SKEDD technology can be seen as an extension of press-fit technology and uses reversible contacting in the plated-through PCB hole. The individual contact comprises two spring-loaded symmetrical contact tongues which retract when inserted into a plated-through hole in the PCB. The contact pressure from the two tongues then creates a steadfast mechanical-electrical connection inside the hole with no need for soldering.

The IDT-based connectors can mate and lock without using tools, which is especially convenient when mounting entire sub-assemblies. This enables completely new designs. The connectors can mate right in the center of a printed circuit board, or even on the reverse side, if the edge and surface of the PCB are already full.

Reversible mating also makes it possible to easily replace components. With the reduction of installation space and weight, an electrical interface, and a contact resistance, a potential source of error as well as an assembly process are omitted. The thermal load of an FR4 printed circuit board, caused by a soldering process or the use of additional devices for a press-fit process, is also eliminated.

Robust and reliable locking system

The SmartSKEDD connector comes in two model versions. Both direct connectors are exceptionally robust.

Three solid pins on each housing guarantee secure positioning and prevent mismating. Each side of the connector features two snap-fits that lock the connector tightly onto the PCB. The geometry of the snap-fits also varies to hold firmly on different board thicknesses. To release the connector, simply press on this primary lock. The retaining forces are roughly more than 50 N.

If a secondary lock is needed, as is the case for many automotive applications under the LV 214 standard, or the application just needs that extra measure of retention, the second SmartSKEDD model features a pre-assembled central pin. This pin increases the retaining force of the entire system to almost 100 N. Again, this assembly is tool-free; it is delivered and pinned in the locked position. This central pin then additionally locks into the printed circuit board and reliably secures the connector. During servicing, a simple screwdriver is sufficient to turn the pin from the “lock” position to the “release” position.

In general, the connector was designed to be holistically robust throughout the connector life cycle. In particular, the focus was on tolerance management (production, assembly, contacting), assembly, packaging, and transport. The spring contacts are also geometrically optimized (spring leg symmetry) and have a silver coating.

IDT provides superior benefits for many industries

Whether board-to-board, wire-to-board, or component-to-board, directly pluggable and detachable connections can be made anywhere, including novel locations such as on the center or the rear of the PCB, with IDT technology. The advantages in series processing are enormous, due in part to eliminating the need for soldering.

Advantages of IDT Over SKEDD

Direct Mating	Cost savings of material and process/benefits: ▪ No pin header required: - less installation space and weight ▪ Eliminated: - one electrical interface - one contact resistance - one potential source of defects ▪ One mounting process less ▪ One press-fit or soldering process less: - no thermal stress for the PCB - no additional devices as required for press fit due to high insertion forces ▪ No additional technical requirement for the FR4 PCB
Reversibility	▪ Designed for a minimum five mating cycles ▪ No special tools required - easy manual connector plug-in and plug-out by hand (using a screwdriver if pin version) ▪ Easy exchange of complete components possible, e.g. for maintenance and servicing ▪ Disconnect feature supports sustainable recycling
Positioning	▪ Arbitrary mating: anywhere, even on the reverse of the PCB - new design possibilities for applications, e.g. a PCB can be used for different device models if all holes are arranged accordingly for SmartSKEDD - if a PCB's topside is fitted to capacity with components, the connector can mate on the reverse ▪ Customizable for board-, wire-,and component-to-board connections
IDT	▪ Single and flat ribbon cables possible ▪ Cable harnesses can be pre-assembled with highly-automated machinery ▪ Assemblers can rely on over 30 years of know-how in proven IDT assembly ▪ Cable assembly can be processed on tried and tested knuckle joint presses, semi-automatic machines,and fully-automatic machines - zero-defect quality during cable assembly - assembly machines have testing stations which eliminate all defects - highly-efficient cable assembly for any lot size
Housing	▪ Connectors with positioning pins and snap-fits - secure positioning and protection against mismating on PCB - durable and secure retention on the PCB ▪ Keying options via keying pins in housing - keying option: zero-defect quality during device assembly - protection against mismating prevents accidental mix-ups and faulty connections ▪ Halogen-free material ▪ Glow wire resistant material

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