



ACHIEVING MECHANICAL STABILITY IN HOME APPLIANCE CIRCUITRY

Functionality, style and cost value attract home appliance customers. Manufacturers and their design engineers need to address all of these aspects while ensuring the safety and mechanical integrity of the electrical circuitry embedded within the appliance. Home appliance engineers should address the development of wire harness and selection of cables and power connectors as early as possible in the design cycle.

BUSINESS CHALLENGE

Reliable Connectivity:

Numerous factors impact wire harness design, including routing, voltage, amperage and operating temperature requirements. Manufacturers generally offer multiple variants or models of appliances. Therefore, they require a high mix of wire harness configurations to meet the different routing, voltage, amperage and operating temperature requirements for each of their models. Each connection point on a harness presents a risk of mis-mating or power/signal failure. To mitigate such risks, connectors and harness assemblies must pass extensive mating reliability and safety testing.

Optimizing wire harness assemblies is a key strategy to achieve maximum mechanical stability and meet performance and safety metrics. Advances in connectivity enable modularity and design flexibility for wire harnessing in a variety of multi-circuit wire-to-wire and panel-mount appliance applications, including HVAC, refrigerators and washing machines. Harnessing can be designed around a single system rather than using different power and signal connector styles, which results in savings in both cost and assembly time.



SOLUTIONS

Molex's connector portfolio helps home appliance OEMs meet electrical and safety requirements while optimizing wire harness assemblies to support their designs. In short, our connectors offer mechanical features that ensure safe and reliable connectivity while offering maximum design flexibility.





SOLUTIONS

TERMINAL POSITION ASSURANCE

Terminal backouts can occur with crimped connector systems when assemblers mis-mate connectors or fail to ensure they are fully seated. Damage during transport or handling can also lead to terminals backing out of connector housings. The result can be end-product failure, safety hazards, expensive repairs and damage to brand reputation.

The primary function of a terminal position assurance (TPA) retainer is to prevent connector terminal backout. It ensures the terminal is seated properly and makes contact, which is particularly important for connectors in high-vibration appliances such as washers and dryers. Molex offers a number of product families that offer TPA retainers, such as the FIT Family of Connectors.



Mega-Fit Receptacle with TPA



*Mini-Fit Sigma
Sealed Connectors*

PROTECTING CONNECTIONS FROM FOAM

The refrigerator manufacturing process includes foam insulation injection, which keeps cold air in and hot air out to maintain cooling. Assemblers inject high-pressure foam into the refrigerator's exoskeleton. It then bulks up and hardens, making it impossible to be reworked. The foam injection process is messy and, if not properly performed, can infiltrate electrical terminals and connector housings and create problems with contact reliability.

Different regions of the world use different approaches to protect connection points from foam leakage. In India, for example, they seal the connections in the back of the refrigerator with hot glue. However, this doesn't provide 100% protection because hot glue hardens, creating voids into which foam can leak. Meanwhile, in other regions of the world, manufacturers use tape or taped sheets and panels to seal and prevent foam leakage, and this requires costly manual labor.

Molex engineers have responded to the challenges created by foam-in-place insulation with innovative connector designs. As a result, Molex offers connectors, such as the Mini-Fit Sigma Sealed Connector Family that seals and protects the terminal housing and contacts from the foam insulation process.

APPLICATION BRIEF

CUSTOM AND OFF-THE-SHELF CABLE ASSEMBLIES

Engineering and producing harness assemblies can add to home appliance production costs and time to market. In response, Molex offers expert in-house engineers to design a wide range of custom cable assemblies and wire harnesses that include high-power, overmolded and sealed off-the-shelf options. Additionally, as a global manufacturer, Molex provides build-to-print resources and quick turnaround times for quotes, samples, 3D drawings and models. We also offer quick availability of off-the-shelf cable assemblies through our distributors.



*Micro-Fit
Off-the-Shelf
Cable Assemblies
with TPA Retainers*





SOLUTIONS

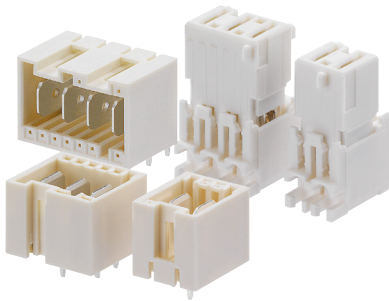
AUTOMATED CONNECTOR ASSEMBLY

Appliance OEMs need reliable connectors, because an unreliable connection can result in end-product failure and increased risk of overheating and fire. The RAST block terminal standard was developed by European appliance manufacturers and wire harness makers and has gained traction worldwide.

RAST Connectors can also accommodate IDT (insulation displacement technology) to enable more efficient assembly processes. Terminated in a single-step process, RAST IDT terminals are highly suitable for high-speed, fully

automated assembly and testing. RAST 5 IDT connectors are available in 10.A, 1- to 12-circuit and 16.0A, 2- to 4-circuit versions suitable for indirect mating. With 4 points of contact at the mating interface, the RAST 5 IDT design is an extremely reliable power connector meeting all industry standards and testing requirements. RAST IDT Power Connector Systems provide one of the most comprehensive solutions on the market and are an industry standard in home appliance wiring harnesses.

Additionally, OEMs have started developing their own automated processes for cable assembly based on their business needs. Often these machines will cut and strip wire ends, crimp terminals and even poke the crimped terminals into connector housings. Automated processes like this can be applied to single cable assemblies or complex cable harnesses. Molex Application Tooling engineers will work with OEMs to help them develop automated processes that are optimized to work with Molex connectors and cables.



RAST 5 Connector System Family



BENEFITS AND ROI

Implementing components with features such as wire harness optimization, terminal position assurance retainers, foam-in-place protection and automated assembly are effective home appliance design strategies to ensure reliable connectivity, performance and safety.

To learn more, visit www.molex.com/link/power.html

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