MEMS power connectors improve healthcare device reading consistency

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Through 2016, the home healthcare market is projected to grow at an annual rate of 7.7 percent. [1] This projection underscores a significant trend: More patient treatments are shifting away from healthcare facilities into home environments as patients grapple with the rising costs of on-going healthcare treatment plans.

The skyrocketing costs are compounded by aging populations that are driving a surge in demand for portable medical-diagnostic equipment to facilitate in-home treatments. A proliferation of new equipment is thus emerging in several home healthcare segments:

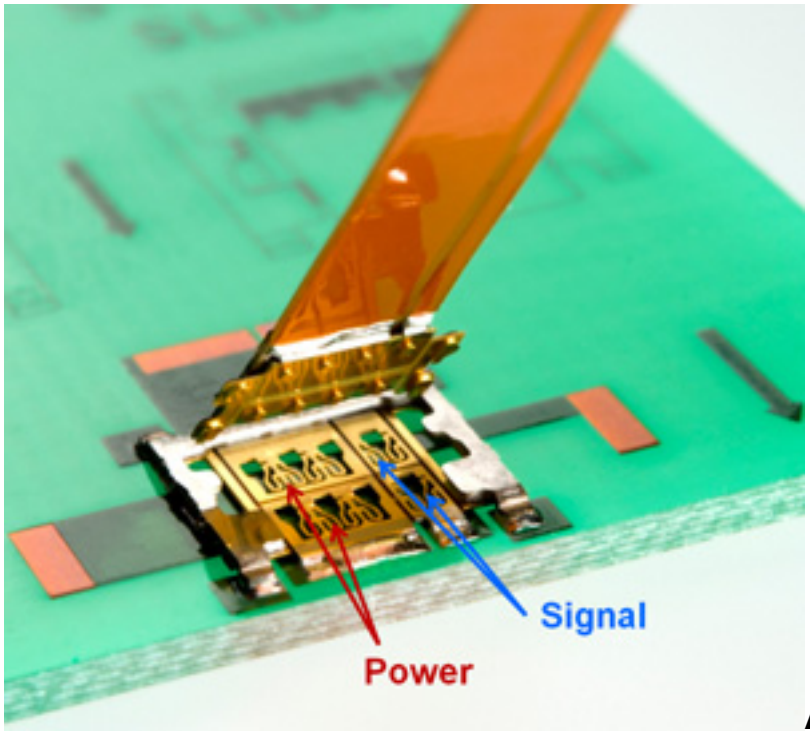
·Respiratory therapy

·Home infusion therapy

·Rehabilitation services

·Monitoring of patients with chronic conditions

This movement from treatment to proactive monitoring opens up new opportunities for the home healthcare market. Most patients prefer home healthcare over hospitals for the convenience, comfort and cost-effectiveness that familiar home settings offer.



Adapting medical devices for

in-home use

As healthcare providers and patients navigate this transition, electronic innovators are navigating the technological challenges of devices traditionally used in doctor offices, clinics and hospital settings that are now transitioning to patient homes. Among the challenges, power management plays heavily into the final product in terms of ease-of-patient-use, size, performance and durability of medical devices. When weighing the system-level tradeoffs, it is important to make power management decisions early in the design cycle.

To meet this growing need for improved portability and miniaturization, the power connector industry has stepped up with new extremely-small, low-profile connectors. A method of combining electrical and mechanical components to produce a system of unprecedentedly miniature dimensions, Micro-Electrical Mechanical System (MEMS) has emerged as the key technology for the design of small and portable devices in a range of dynamic healthcare markets. MEMS technology can be used in biomedical applications such as surgical tools, drug delivery and biosensors, as well as in diagnostic and other in-vitro applications.

A compatible replacement for larger connectors in existing designs, MEMS technology offers ultra-low profile and high-performance power connections. With a successful track record of real-world applications and customers, the MEMS approach provides a powerful and viable tool for design engineers addressing the demand for ever smaller micro-products.

Benefits of MEMS in medical devices

MEMS I/O connectors have already made remarkable contributions to the field of medicine in the effort to improve patient care and safety – specifically during minimally-invasive surgery. The technology also benefits patients requiring frequent blood and urine monitoring as well as patients receiving medications via sensored patches.

From the medical device manufacturing perspective, MEMS provides many additional benefits:

·Reliable and flexible socketed interface

·More robust capabilities compared to conventional connectors

·Improved reading consistency

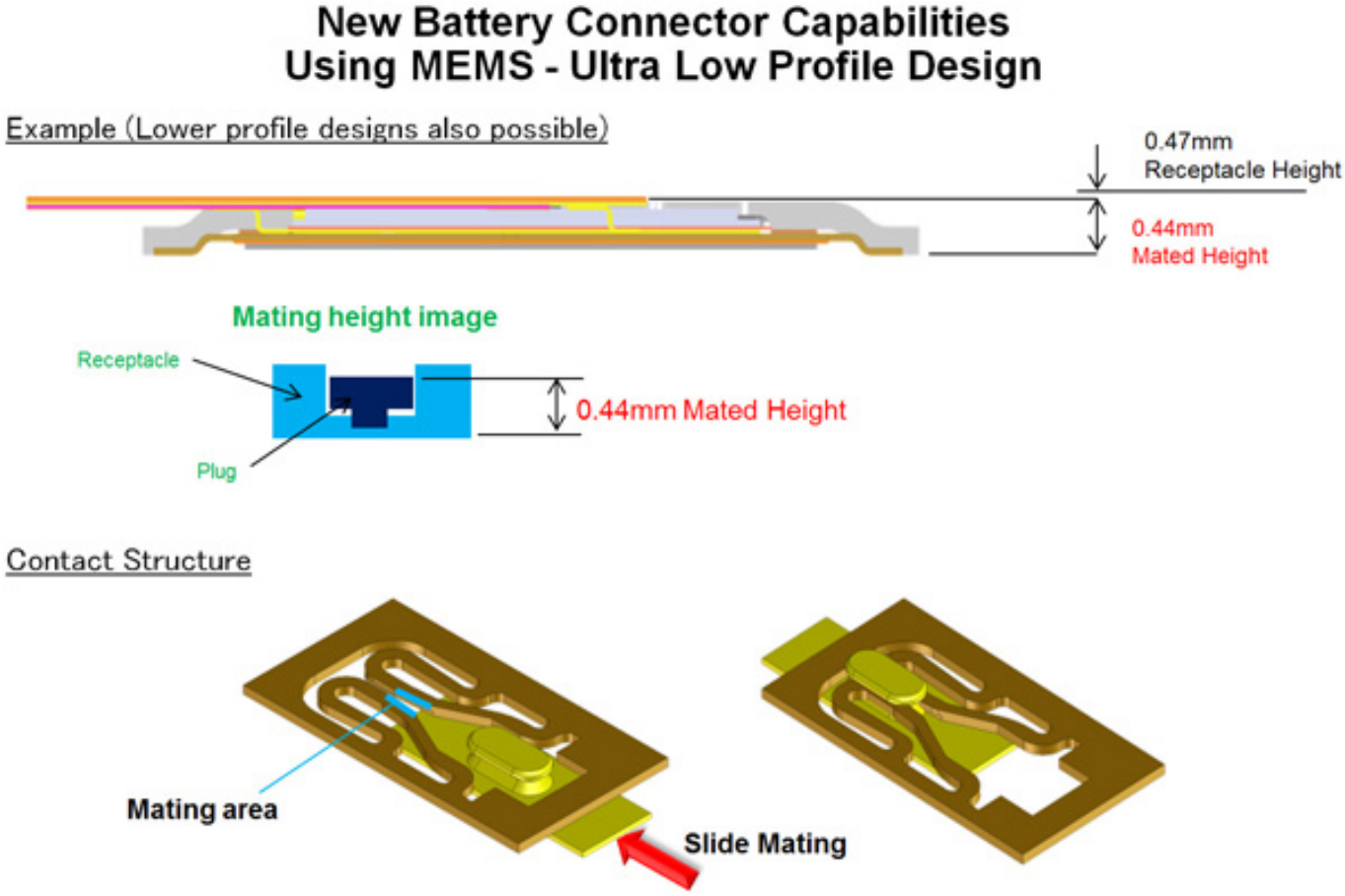
·Less frequent battery changes

·Smaller device footprints

The smaller device footprint is also beneficial to patients as they experience less pain during invasive procedures. MEMS I/O connectors also have also proven particularly innovative in medical battery connectors, camera modules and sheet connector I/O applications – such as those found in sensors for small form-factor, high-density ultrasound connectors.

Manufacturing advantages of MEMS

Standard power connectors for medical devices generally comprise molded plastic with stamped terminals and contacts to produce a relatively large overall footprint. Conversely, MEMS technology comprises masking, etching , plating, printing and laminating – with the end result a very low-profile contact sheet. MEMS I/O systems typically employ etching and drilling on extremely thin layers of sheet metal to create a sandwich-like insulated electrical connection. Sheets may be as thin as 150 microns (0.15 mm).



By leveraging MEMS, manufacturers can produce significantly smaller, low-power consumption connectors that deliver higher performance than larger components. Additionally, MEMS manufacturing processes reduce time-to-market and the cost of producing plastic-injected mold and dye stamping terminals as found in traditional connectors.

MEMS technology also integrates the high-density/high-speed functionalities of connectors and cabling in micro-miniature products into smaller form-factor sheet connectors that eliminate EMI interference. The connectors are rated for the same number of mating cycles as standard micro-miniature connectors, which typically rate at 15-30 mating-unmating cycles, with some models ranging well into the thousands. Stringent testing shows that the MEMS mating interfaces can withstand dropping and shock up to 6000 G with negligible impact.

Production of MEMS-enabled systems growing exponentially

By eliminating most of the traditional connector body – without sacrificing performance or density – MEMS I/O technology represents an important paradigm shift for medical device designers and manufacturers. Not only does MEMS drive down size and valuable space on the PCB, but also, by replacing permanent soldered PCB connections with a simple socketed mating interface, MEMS enables a level of design flexibility that previously could only be found in larger connectors.

Not surprisingly, the use of MEMS-enabled systems in medical devices has thus grown exponentially and is likely to continue a rapid growth trajectory.

[1] Home Healthcare Market Current Trends, Opportunities & Global Forecasts to 2016.