Modules Take Portable Medical Equipment Design to the Next Level

X86-based computer-on-modules (COMs) bring enhanced portability to medical devices and provide the ability to customize features that meet developers' size, performance, I/O and power efficiency goals.

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The medical device market is seeing tremendous growth resulting from the innovation and miniaturization of portable equipment. Products such as heart monitors, respiratory products and medical imaging that include ultrasound systems are made more mobile. In a recent report from MarketsandMarkets, it is predicted that the total portable medical devices market revenue will exceed $20 billion by 2018. Designers are seeking out smaller embedded computing form factor solutions that meet the requirements of highly integrated, higher performance, smaller form factor (SFF) and less power consumption.

Many of today's medical equipment developers prefer to use their own hardware IP since they have specific I/O and connectivity requirements related to the peripheral devices that will be used with the system. OEMs often need custom features such as alarms as well as form factors that are a proven fit for their equipment. Therefore, most medical equipment OEMs would prefer to design with custom or semi-custom boards and modules. A small form factor computer-on-module (COM) design approach provides an optimum customization foundation that gives developers the option to either build their own carrier boards or use a trusted COM supplier's carrier board. This allows OEMs to stay focused on their product differentiation.

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Platforms that Propel Portable Medical Device Design

A common practice for medical equipment developers is to use custom monolithic boards for portable applications; this approach ensures a perfect fit for the application. Such custom applications typically support higher volume run rates which can take advantage of economies of scale in production costs as well as amortization of NRE costs over higher volumes. Many large medical customers also want a single standardized processor architecture that can be optimized across their entire portfolio to streamline the design process, minimize software development and maintenance, simplify upgrades and ultimately reduce time-to-market.

In the past, OEMs had to contend with finding a suitable balance between performance and low-power requirements in small form factor designs. A new range of x86-based COM solutions offer the small form factor technology that give designers the features needed for mobile, connected medical devices. Designers need to focus on connectivity, security, scalability and sustainability since these are the primary elements of the Internet of Things (IoT) and are essential in enabling seamless integration and deployment. Modules with an Intel® Atom™ processor E3800 support a wider range of interfaces and can meet the requirements of low power and high density while also offering long product availability and scalability.

Enabling Connected Healthcare Requires Intelligent Devices

Greater emphasis has been made on connected healthcare that provides the ability to seamlessly link patients, clinicians and patient care organizations. Real-time patient monitoring is an essential service in the healthcare industry and connected systems are used to share data locally or remotely. By gaining access to real-time data, doctors can make more informed decisions and more closely monitor the progress of the treatment. Technology advancements in SFF COMs along with the convergence of wireless technology make a whole new range of medical devices possible.

Satisfying Portable Device Needs

Designers must take healthcare needs, device requirements and strict budget guidelines into account while designing small form factor modules for medical systems. Modules such as Intel Atom processor E3800-based COM Express® and SMARC modules offersincreased performance, security and design flexibility. These modules provide useful building blocks for a range of healthcare applications that include slim

graphics-rich tablets, handheld PCs and stationary HMIs. The latest module platforms are key enablers due to performance per watt, low power and interface configuration advantages. These proven open architecture platforms also enable medical OEMs to avoid the delay of validating hardware, which becomes a crucial competitive advantage in medical device development where time-to-market translates into higher market share.

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Intel Atom processor E3800-based modules are especially suitable for medical devices with custom I/O and requirements of custom, small form factors. The low power consumption makes them suitable for mobile or battery-powered solutions such as patient monitoring requiring 2D graphics such as electrocardiograms (ECG). Low power consumption also enables longer device use, useful during a typical 8-12 hour nursing shift.

Medical OEMs can find a valuable resource with computing suppliers that provide complete board support packages which include the board, module and drivers all in one package. Access to a board support package gives developers a jump start on software development since they can use a standard board while they are developing their own custom carrier board. Going this route decreases time-to-market, reduces engineering costs and increases scalability.

Medical equipment OEMs need to keep medical safety (such as IEC60601-1), UL and EMC standards in mind during development. By partnering with a knowledgeable supplier, OEMs are able to take advantage of additional testing and individual component certification, decreasing the time for medical safety certification.

Matching the variety of medical equipment requirements, Intel Atom processor E3800-based platforms offer excellent performance-per-watt ratios and give developers extended temperature operation options. The roadmap for integrated Intel architecture guarantees a long lifespan of seven years or more, making it popular for medical systems design.

Modules Provide a Solid Computing Foundation

A key advantage of x86-based small form factor solutions is that they are compliant with most software tools and can run familiar operating systems such as Microsoft's. The fact that the module can be replaced without redesigning the entire system facilitates upgrades to the next generation modules.

Today's broad range of COMs is ideal for medical systems since they allow for the implementation of passive cooling. Since the Intel Atom processor E3800 can handle extended temperature it is built to release heat and can therefore be made fan-less, and still offer high processing power.

Modules are well-suited for designs that demand a lot of application-specific customization since the required customization can be designed into the module's carrier board. This enables an upgrade of the module while the customization and IP of the carrier board remains the same. Today's small form factor modules provide the computing resources and interface support necessary for connected healthcare. Broad Ethernet and Wi-Fi® network connectivity is supported along with connectivity and interface options that include USB, SATA, PCI Express and DP/DVI/HDMI display interfaces.

Enablers of Successful Portable Medical Device Design

The numerous technology and interoperability requirements for medical applications present unique challenges and demands for embedded computers. Mobility requirements in combination with the need for high processing power and connectivity add to these challenges.

Small form factor embedded platforms continue to advance to deliver the right features to meet the connectivity, computing performance and graphics requirements of the medical industry. Computer-on-modules bring enhanced portability to medical devices and provides the ability to customize features that meet developers' size, performance, I/O and power efficiency goals. x86-based modules are efficient building blocks for medical OEMs, used to quickly and efficiently take medical equipment to the next level.

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