Embedded Modules Speed Development and Decrease Costs in Medical Equipment Designs

By Wolfgang Heinz-Fischer, Head of Marketing and PR, TQ-Group

Developments and trends on the electronics market are generally quickly reflected on the electrical medical equipment market. Cost pressure and time constraints are also heightened here, forcing companies to focus on their core competencies.

This does not usually include processor cores, which are generally "common" technology which can be purchased easier and cheaper. In the past, there were many arguments in favour of using an embedded module, but today it is becoming increasingly more important to use the same module in different devices, as was the case previously for processors. In real applications, this platform concept is becoming more important than the ability to scale a system. Which factors play a role when selecting a platform, and what does the market offer?

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Electrical medical equipment has a wide range of requirements for the processor used. This starts with computing power and includes the necessary interfaces. Almost every device today has a display, and therefore needs graphics, communicated via LAN or WLAN, and the interfaces for a series of sensors. Depending on whether it is a mobile battery-operated device or a stationary device, power dissipation is a crucial criterion. As the focus of costs and development time is today all about software, it is important to consistently find the same software environment. It is thus not always easy to find the right processor for a number of devices, which is why it is sometimes necessary to select several platforms.

There are many reasons to employ a platform solution. Technology is becoming increasingly complex, increasing development times and the need for development resources. And this is precisely what conflicts with the market requirements. In some cases, the technical require- ments for implementation are simply lacking: The use of a module with complex technology, e.g. a processor with 1.2 GHz clocking and DDR3 memory, requires a layer structure with Microvia and at least 10 or 12 layers.

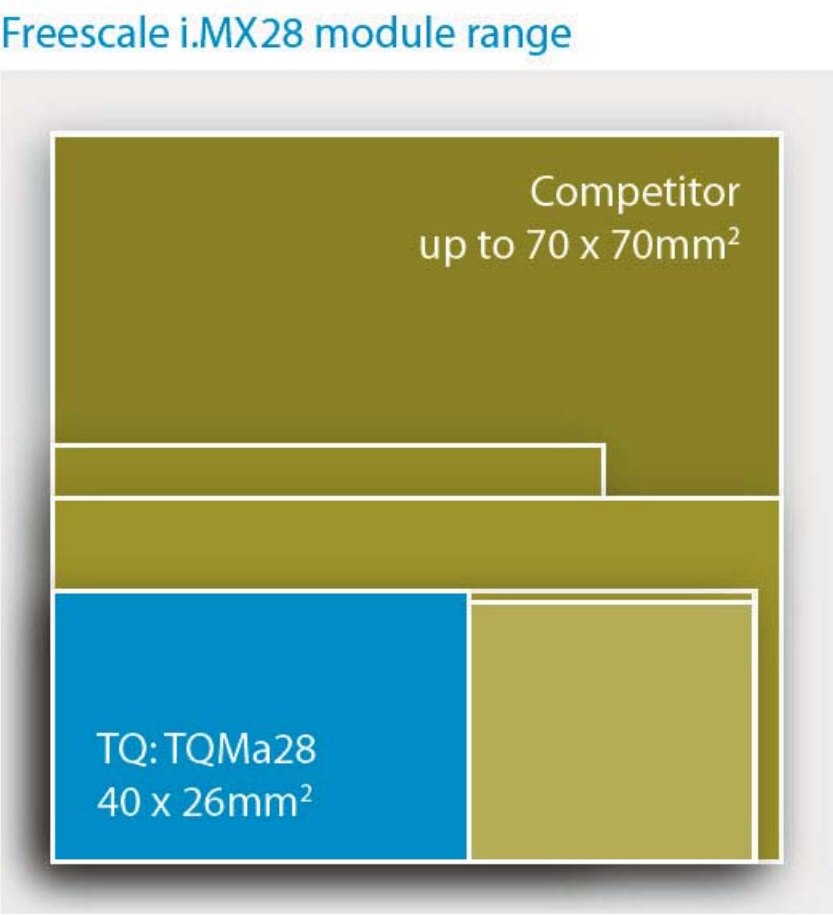
If the processor were to be integrated, the entire application board would have to have this layered structure. In cases of normal use, the additional costs often incurred for the module's plug are calculated based on the layers saved for the application board.

The average price of a PCB with dimensions of 175 mm x 120 mm and 12 layers is around 20 to 25 Euros ($26 to $33.) for medium-sized quantities. The layered structure can be reduced to 8 or less layers by using one module. For 8 layers, the PCB price is around 15 to 20 Euros ($20-$26) for the same quantities.

A module's counter-plug set is around 5 or 6 Euros ($6.50 to $8.) in higher quantities, meaning no additional material costs are incurred by using a module. Along with this, all the known arguments in favour of using a module of course also apply: Time is clearly saved for users during development due to the fact that the processor module already exists as ready-made hardware.

As the application board has a much simpler structure, it can be developed quicker and produced later on. Software development can begin immediately, as the reference platform is already available, usually with the relevant BSPs and drivers. Initial performance tests can thus commence very early on.

One clear advantage for users is the fact that the "time-to-market" is significantly shortened. But risk minimization is also crucial. And risk means time and money. As the application board's design is much simpler, the risk of any redesign is greatly reduced.



Comparison of size ARM9 Module TQMa28

During the product's lifecycle, a redesign is generally only necessary for the embedded module. Less risk and prompt completion of a development can significantly contribute to a product's market success.

Attempts have previously been made to always use the same processor wherever possible in order to utilise the infrastructural investments made, e.g. for development tools, software drivers, BSPs, test tools etc. including for new developments, but the vast number of processors and relevant embedded modules drew people to always select the optimum processor the each development and device.

As the software portion of an overall development and in a device's added value is constantly increasing, further considerations have deemed to more beneficial to focus on a processor or platform in the form of an embedded module. So if the right processor has been found, we have to also find the right module to use as a platform.

The first question is, of course, whether or not the module provides the necessary output and interfaces, not just for current use but also for further planned applications for which the processor would be suitable. If the module does not possess all the processor's functions, there is a risk that, although the processor may be suitable for the application, it may not provide the necessary signals. The same applies for board size. The smaller a module, the more likely it is to mechanically fit into all devices for which the processor is suitable.

When it comes to electrical medical devices, long-term availability is also important, since they must be supplied over a long period of time. As already mentioned, software is playing an increasingly important role, so the relevant drivers should be provided for the platform(s). In doing so, the application software should be able to run on as many platforms as possible. Choosing the right module which will be successful over the long-term is thus always a question of whether or not the module restricts the processor in any way.

Thus in most cases the use of modules constitutes a significant advantage for the developer. They allow him to fully concentrate on his core competence thus saving design resources and enabling several devices to be developed within a short space of time. The probability of developing a device within the prescribed time limit also increases since the device's complex parts are already available as a tested and ready-to-use solution.

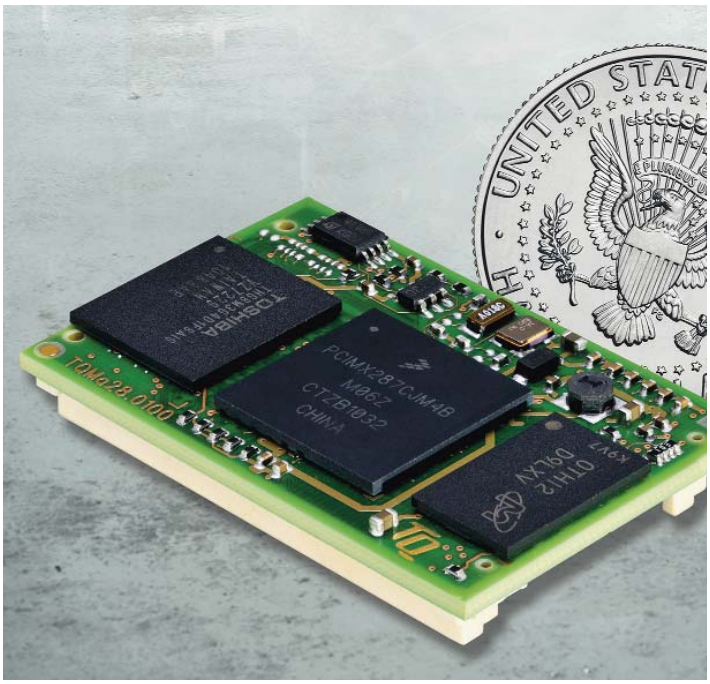
And time-to-market, i.e. the possibility of being the first on the market, may provide a decisive competitive advantage. Even lifecycle management becomes simpler since the probability of a redesign lies predominantly on the module side, and thus is not a problem for the developer but must be carried out by the module provider. Moreover, the use of a module is also advantageous with regard to costs.

The development and production costs are considerably lower and easier to calculate. The entire investment for a product development may be up to 200,000 Euros lower than the cost of a fully integrated development. And these lower investment costs also imply lower interest costs since the development, as a rule, must be pre-financed.

The strong points of a platform concept become evident in any case upon deployment in a second device. Here, the savings are even higher since the developer is able to draw on many pre-existing elements.

An example of this is the optimum use of investments that have already been made on one occasion. In addition, the higher number of units of the module deployed arising from several projects also offers the buyer the possibility of benefitting from quantity discounts. Thus as a rule, the successful route to the fast development of electro-medical devices passes through a processor platform.

All TQ modules consistently provide these requirements as an optimum platform module: compact design, all processor signals available, robust, suitable for industrial applications, and available for at least 10 years.



ARM9 Module TQMa28 next to a US half-dollar coin

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Our business philosophy
We are a leading technology service provider for electronic modules and systems.

We are a leading technology service provider for the development and production of electronic modules and systems. We are distinguished by a high degree of technological know-how, superior quality and the highest customer service.

Our customers are the focus of our work.
Our customers are the focus of all our activities and efforts. Our goals and operations are oriented to meet the customer's wishes by consistently and systematically considering quality and cost requirements.

Quality, delivery and flexibility as well as good customer relationships based on partnership are top priorities. To ensure a strong customer satisfaction is our most important goal and our most important foundation of success.

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