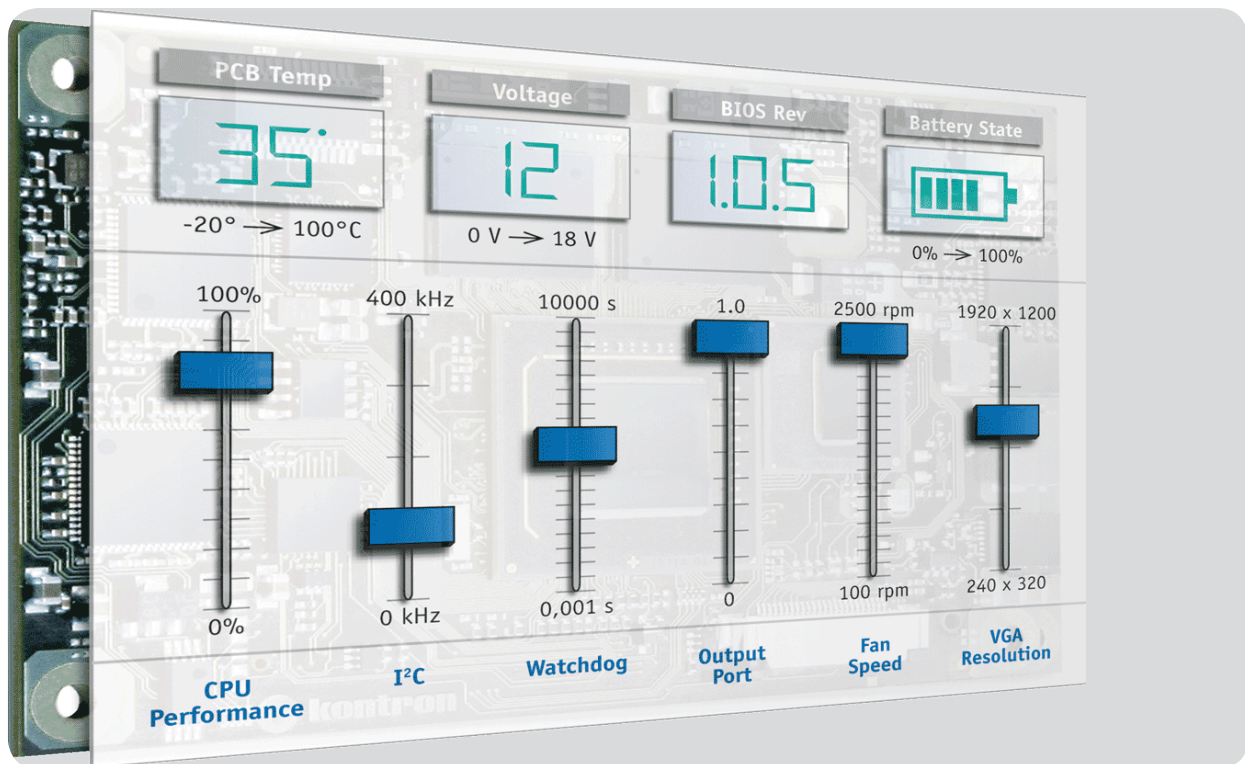


» Whitepaper «



Middleware Tools Speed Time to Market for COMs-Based Embedded Design

K-station Simplifies Software Development from Module to Module

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Industry standards are well accepted on the hardware side of embedded technology and have helped to dramatically simplify system development. This standardization is not nearly as prevalent on the software side of things, and as such, application developers can face time-consuming challenges when migrating from one silicon platform to the next. The Kontron K-station middleware tool can significantly reduce these challenges for developers (as detailed in this whitepaper). The software library and shell tools of the Kontron K-station allow developers to optimize their application as developed on one technology platform, and later port it to another technology platform in Kontron's portfolio without having to start from scratch.

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Different modules, operating systems and design environments can complicate the embedded software development process on many levels. By nature, the combination of hardware and software creates a “custom” application in which a wide range of minor configuration settings and adaptations may still be necessary before an application will run as intended. This is most common in migration situations or product line extensions, where designers are coming to market with a new product that uses the same carrier board as an existing device but is now paired with a different module. As a result, embedded designers frequently face software re-design challenges when adapting an existing solution to use a different core processing module.

Even though the PICMG® Computer-on-Module (COM) specification from COM Express™ covers mechanical dimensions and mounting, electrical pin-out and cooling requirements, a key challenge for designers is the current absence of standardization for software interfaces used to access embedded hardware components. To answer this challenge, “middleware” has gained significant importance to the designer – with embedded manufacturers such as Kontron bridging the gap and offering a standardized means of accessing the range of hardware-based features and functions.

K-station, Kontron’s middleware tool kit for COMs, was created to significantly save time in the design process – providing a comprehensive developer’s library of ready-made functions and applications delivered through a user-friendly interface. Essential as a system engineer resource, these ready-to-use utilities enable fine tuning and simple customizations within an existing design. Similar to fine tuning the settings on a stereo equalizer, K-station permits simple modifications to the application design without the need to rewrite the software. Instead of struggling through a software re-design, designers can keep moving quickly to market – making the most of their own experience and know-how, augmented by the existing code bases within the K-station tool that supports different hardware module configurations.

The Case for K-station

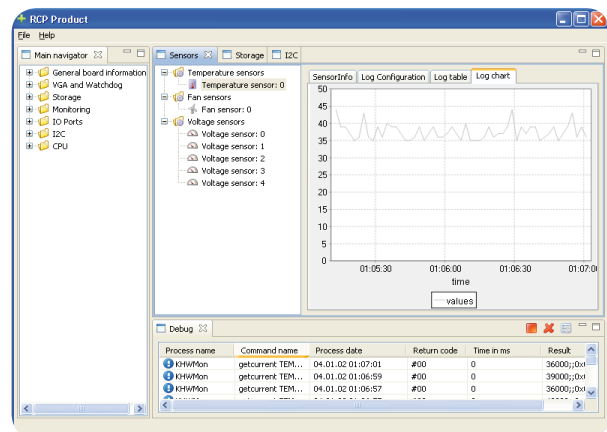
Kontron’s K-station is a value-added utility designed for use not only by the engineers involved in product and software development, but also by the application developers responsible for product support and maintenance, as well as for software solution integrators. It offers a range of software function blocks and lets customers benefit more directly through the use of segments of Kontron’s own intellectual property. K-station even offers a comprehensive reference application for use on COM Express™ compatible modules such as the nanoETXexpress-SP.

For those who may have been familiar with using JIDA32 (JumpTec Intelligent Device Architecture) for ETX®, K-station is the extension of that technology tool. In fact, K-station is completely backward compatible with JIDA32.

Therefore, migration from a solution that took advantage of the JIDA32 tool can easily transition to a newer Kontron technology and be further fine-tuned with K-station. By including shell tools for JIDA32, K-flash and DMI/SMBIOS, K-station enables quick, simple evaluation. The enhanced reference GUI uses JIDA32 libraries and provides sample code and reference applications for easy testing and debugging.

K-station acts as a software library and tool kit, offering drivers and code in addition to completely self-contained functions. Intended to deliver a range of convenient design options, K-station users can pick and choose the tools they wish to implement at various stages of development, adding them to their own applications via a user-friendly design interface and main navigation screen. K-station is particularly valuable in providing high-level support in transitioning from design and testing in reference applications to the actual end-use applications. Its source code acts as a sand-box for developers; once tested in reference applications, functions can be easily transferred via shell tools and incorporated in the final application. K-station’s utilities span the range of software considerations, including the software application itself, BIOS and hardware. Since all interfaces are both stored in the K-station library and encapsulated as shell tools, designers can universally link to any higher program language such as C, C++, C# or Java.

With hardware-independent APIs, K-station is a flexible solution with limitless target markets. There is no need to disclose source code or configurations which aid in buffering IP. Customization capabilities allow configurations to be modified as well as default values, adjusted and set to match specific needs and to help preserve the software image overall. Re-use of fully encapsulated functions, existing JIDA32 code and sample code for hands-on development promote quick time to market, which is perhaps the most significant benefit for designers. Developed specifically for use with any Kontron ETX® and COM Express™ module, K-station also supports the majority of operating systems in use today and those to come. Kontron plans to offer K-station for use with other small form factor SBC and module products families in the near-term future as well.



Use K-station with:

ETX®	COM Express™		
	COM Express™	COM Express™ Compatible Description	
	Basic	Compact	Ultra
ETX®-CD	ETXexpress®-PC	microETXexpress®-PC	nanoETXexpress-SP
ETX®-PM3	ETXexpress®-MC	microETXexpress®-PM	
ETX®-PM	ETXexpress®-CD	microETXexpress®-DC	
ETX®-DC	ETXexpress®-PM	microETXexpress®-SP	
ETX®-LX			

K-station is compatible with all COM modules; however, older modules may not support all of the K-station's BIOS update and modification tools. All other features are broadly supported and future support will be extended with new COM developments.



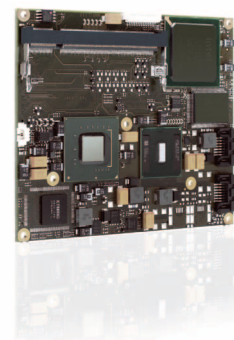
nanoETXexpress-SP



microETXexpress®-SP



ETXexpress®-PC



ETX®-DC

Features and Benefits that Speed Time to Market

Developers using K-station can easily implement a range of functions frequently required in embedded design including configuration, control, maintenance and monitoring. Designers often must integrate monitoring systems such as 'watchdog timers,' special temperature settings, voltage or hardware ventilation, or program limit values and threshold value switches. For example, a system might require minimized noise in its operation but without compromising overall system cooling in the process. Using Kontron's K-station, the BIOS may be set such that the cooling solution runs when system temperature reaches defined stages, and then terminates cooling operations when the system temperature responds and lowers to more acceptable operating levels.

K-station also supports the smart battery management tool known as MARS (Mobile Application platform for Rechargeable Systems). MARS is a completely integrated modular hardware reference design that allows designers to choose from a range of smart battery capabilities. When fine-tuned using K-station, designers have an even faster and more efficient means of controlling battery charging levels and programming intelligent discharge of battery power – monitoring the status of system power connections, as well as current battery voltage, capacity and remaining life for numerous batteries that may be designed into the system. MARS is ideal for customizing solutions

based on ETX®, COM Express™ (basic FF pin-out type 2), microETXexpress® and nanoETXexpress (compatible to COM Express™ COM.0 pin-out type 1) and is particularly valuable to designers creating wireless or portable devices such as ultra-portable medical devices, or man-wearable computers such as those being used in military field applications.

K-station's "Kioports" function allows simple integration of GPIO (General Purpose Input/Output) pin access. The K-flash tool, for instance, lets designers update, backup and verify the BIOS: the "Kamimod" tool allows designers to replace the dark boot logo with a customer-specific logo. Security properties are also a simple add-on and can be quickly incorporated as a software feature.

Middleware Bridge

Standardized mechanics and electronics have become the foundation of embedded design. A developer using the COM Express™ standard can be certain of its standard form factor and connector layout, saving development time and associated costs along the design path. These benefits however don't necessarily translate to the software portion of the design – and there are as many ways to develop software as there are designers. Whatever the approach, embedded software design requires precise attention to detail, frequently starting at the BIOS level.

A common example of this is when a developer needs to make a customer's logo appear on the splash screen when

the system is booted. This means that default settings within the computing module's BIOS would need to be modified in order to create the custom splash screen. BIOS modifications would also be required to accept compatibility with older software or activate a TPM (Trusted Platform Module) for integrated security features. These types of functions require extra design work before finalizing the application code.

While COMs are scalable and interchangeable to improve performance from generation to generation – or even within a single generation – the same degree of standardization is not as readily available in low-level software. When a module is exchanged in order to achieve performance improvements, developers frequently need to rewrite portions of software, particularly for functions that are closely tied to the CPU, such as booting from flash. Duplicating work through time-consuming, repetitive steps (i.e., researching commands from a program manual, conducting performance tests, incorporating new programming in the overall application code) can be avoided with K-station.

Enabling More Efficient Design Development

Kontron offers complex customization of BIOS requirements as a value-added service, available to developers facing more difficult application demands. K-station, in contrast, is appropriate for making adjustments or minor configuration adaptations to quickly and easily accommodate a new module, and puts a range of auxiliary tools at the developer's disposal. K-station's shell tools currently access JIDA functions and DMI information in the BIOS, allowing designers to flash and modify the AMI BIOS. Future K-station implementations will replace JIDA access with EAPI (Extended Application Programming Interface) in both its software library and its shell tools. Designers are able to move faster – tightening up the application development phase of designing with Kontron modules, realizing faster and more efficient device development and more effective maintenance, and parameterization in the field.

K-station represents a new opportunity for designers – supporting their need to get to market quickly, expertly building-in the right functionality but avoiding re-inventing the wheel with each design or re-design. The K-station tool kit provides a tangible competitive advantage, bringing a uniform approach to adding or adapting software functionality and accessing hardware features regardless of the programming language, operating system, or the platform powering the Kontron COM central to the design. As a result, designers gain improved portability and streamlined development time. Similar to the increasing levels of modularization and

standardization that characterize embedded hardware development, options for standard software design interfaces shorten development time, simplify coding and allow designers to really focus on the mission-specific aspects of their software design.

Using existing codes or drivers is a simple means of saving time and money when integrating certain standard functions. Designers are in turn free to concentrate their efforts more centrally on the application-specific aspects of the design. This represents a significant industry shift, as some of the same standardization and modular design options commonly found in hardware sectors begin to be applied to software development as well. Embedded manufacturers are driving this trend, sharing the design knowledge and practical experience garnered over many years of design and execution of complex embedded scenarios. Kontron is recognized as a design partner to its customers, and K-station is designed to readily share that software expertise in an easy-to-use utility adding further partnership and value to Kontron's comprehensive family of modular solutions.

K-station In Action

K-station's functionality is currently in use by systems engineers worldwide.

In fact, embedded systems specialist and Kontron sales and design partner b-Plus GmbH has implemented K-station tools on behalf of one of its customers for the manufacture, programming and maintenance of embedded devices. Another b-Plus customer has saved a great deal of money and effortlessly moved to a newer form factor. "K-station's roots in JIDA32 have made the migration from legacy Computer-on-Modules to Kontron's new nanoETXexpress-SP a no-brainer," said Thomas Limbrunner, head of development at b-Plus. "It was so simple - it wasn't even necessary to adapt the software code."

Future generations of K-station will only increase the speed and effectiveness of customizing embedded designs. Developers can anticipate predefined BIOS settings that can be transferred to new assemblies via memory stick, quickly creating a "cloned" assembly and saving valuable time and resources. K-station will also address the issue of no monitors available in the field, and is planning to offer remote control tools for simple terminal maintenance and additional adjustments. Future versions will also include a full set of commands at the manufacturing side, allowing convenient duplication of the connected system from a host PC (i.e. a laptop or netbook), fault analysis, or minor software updates.

About Kontron

Kontron designs and manufactures embedded and communications standards-based, rugged COTS and custom solutions for OEMs, systems integrators, and application providers in a variety of markets.

Kontron engineering and manufacturing facilities, located throughout Europe, North America, and Asia-Pacific, work together with streamlined global sales and support services to help customers reduce their time-to-market and gain a competitive advantage. Kontron's diverse product portfolio includes: boards & mezzanines, Computer-on-Modules, HMIs & displays, systems & platforms, and rugged & custom capabilities.

Kontron is a Premier member of the Intel® Embedded Alliance and has been a VDC Platinum Vendor for Embedded Computer Boards 5 years running. Kontron is listed on the German TecDAX stock exchange under the symbol "KBC".

For more information, please visit: www.kontron.com

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