Product Information



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Product Information

Q4/2016 - Q1/2017

Leading Edge Solutions for Debugging and Test

Support for Microcontroller Families AURIX, TriCore, Power Architecture, Cortex, ARM, SH-2A, XE166, XC2000, C166/ST10





Release 9.19.02 UDE

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Overview^{ew}

Universal Debug Engine – Workbench for fast AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, SH-2A, C166, ST10 Development

The Universal Debug Engine (UDE) is a state-of-the-art Development Environment for application development with the supported microcontroller families. It offers a collection of tools including source file management, project building and a powerful HLL debugger. These tools include various high-speed communication paths to the customer's hardware target system with target monitoring. All components work together in an optimized manner.

The goal: Minimized turn-around time for efficient application engineering

The UDE and its accompanying package, is a powerful HLL debugger to test microcontroller applications created in C/C++ language and/or Assembly. The UAD, the communication add-on of the UDE, and the optional target monitor offer real-time execution between breakpoints on the customer's target system.

The user benefits from the Integrated Development Environment, with integrated tools. A single Graphical User Interface is used for Development, Debugging and Emulation. Multiple high-speed interfaces allow the user flexible access to the target system.

Further benefits

- Save development time start with just one tool.
- Cost efficient for workgroups save by choosing the right mixture of UDE ROM monitor or emulator solutions.
- **One-stop support** for all components of the Integrated Development Environment (debugger, editor, compiler, RTOS ...).

The Universal Debug Engine and a AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 cross compiler (Tasking, Keil, HighTec (GNU), Byte Craft, NXP's CodeWarrior, TI's CodeComposer, Green Hills and Wind River) create a complete and powerful package for starting a professional development project.

The Universal Debug Engine is an open platform which offers different interfaces to other tools. Optionally, it can be feature-enhanced by the following components, which can be included into the workbench:

User Definable Enhancements

The open interface of the User Definable Enhancements enables the user to easily create completely new types of applications:

- HTML Scripts based on standard UDE ActiveX Control and customer-specific controls provide fully customized hardware visualization and control.
- The Automation Interface of the UDE components allow using basic UDE services for controlling the debugger, processing target communication, program flow control, symbol processing by external C/C++, Visual Basic and VBA applications.
- The COM interface allows the standard UDE desktop to be replaced with custom desktops specifically tailored to fit the requirements of service tools, like Matlab™, Lab VIEW™, or another third-party software.





Universal Debug Engine – High Level Language Debugger

UDE - The Flexible Debug Platform with multi-core debugging features is one of the most powerful development workbenches available. The UDE allows users to keep projects organized, supports building applications, and allows software to be run and tested in a convenient and cost-efficient way.

Enhancements of UDE 4.6

Complete Eclipse based TriCore Development Platform

- Complete TriCore / TriCore AURIX TC29x, TC27x, TC26x, TC23x MCA (Multi-core Architecture)
 Development Platform and emulation kits with DAP/DAP2 support.
- Hardware Security Module (HSM) debug / trace, Generic Timer Module (GTM), CIF video stream trace supported.
- **DF1** FLASH programming support.

Complete Eclipse based **Power Architecture** Development Platform

- Power Architecture® based Automotive SOCs
 - NXP MPC57xx (MPC5746M, MPC5777M, MPC5748G, MPC5746C, MPC77xK, MPC574xP, MPC5746R, S32R274, ...) support.
 - STMicroelectronics SPC56x, SPC57x, SPC58x support.
- Hardware Security Module (HSM) debug / trace support.
- Generic Timer Module (GTM) support.
- Universal Emulation Configurator (UEC) with Nexus Trace and Sequence Processing Unit (SPU) support.
- Nexus code, data, watchpoint and ownership trace via AURORA or parallel interface with UAD3+ for Code Coverage.
- Automatic generation of **Code Coverage** reports.
- Time Processor Unit Multi-eTPU, Dualcore and LockStep supported.
- Support JTAG over MCAN debugging added.

Enhanced Cortex- M0/M0+/M3/M4/M7/R4, Cortex-A8/A9, ARM7/9/11 support

- Multi-core Debug via one JTAG chain support, and CoreSight **GigaByte Trace**.
- NetX51, NetX52 with rcX and netX RTOS support.
- Xilinx's Zynq-7000 programmable SoC, ERTEC200p, STM's STM32F3, STM32F4, Infineon's TLE 987x / TLE 986x, XMC1400,

XMC4700, XMC4800, Spansion FM4.

• Kinetis mass erase support.

SQIROM mode with Micron FLASHs, S25FLxxx **SPI FLASH** and **SPIFI Programming** support.

Software Test and Test Automation

- PikeTec's Time Partition Testing (TPT) systematic test case design supported.
- **Tool Qualification Packages (TQPs)** for the **TESSY** test platform for various architectures and cross compilers coupled with the full range of UDE features.
- LieberLieber uml debugger allows together with UDE graphical debugging at UML model level.

Further features and enhancements

- Universal Trace Framework (UTF) with persistent trace streams for offline analysis of captured and saved trace data.
- Unique search function supports the rapid analysis of very large amounts of trace data, bookmarks of trace points introduced.
- **Graphical code coverage** analysis allows branch coverage to fulfil **ISO26262** requirements. The analysis is based only on code trace and works also for highly optimized code.
- Automatic generation of **Code Coverage** reports for further analysis.
 - ta from On-
- Profiling functions based on code trace data from Onchip Emulators (MCDS and SPU) including AURORA trace, Nexus, ETM, ETB, ITM, PTM, FTM and also instruction pointer snooping or simulator output.
- Accumulation of **Profiling** and **Coverage data** over multiple trace measurement tasks.
- Data trace for **GTM** Multi-channel sequencers.
- Extended multi-core-run control manager, extended multi-core / multi-program loader.
- **RTOS-Awareness** for RTX (CMSIS), PXROS-HR, CMX, μC/OSII, rcX, OSEK, **FreeRTOS** / **SafeRTOS**.
- Improved Graphical window with Hardware Trace (MCDS, NEXUS, and ETM) Signal Chart, Graphical display of IP and function traces.
- Graphical Chart of Variables Trace Data.
- Eclipse 4.5 (Mars) support.
- Enhancement / extensions of UDE object model.

Unrivalled Flexible Target System Access

- DAP/DAP2 The 2- or 3-wire debug interface for TriCore AUDO Future, TriCore AUDO MAX, and TriCore AURIX (multi-core) devices is supported.
- SWD Support of the CoreSight debug interface for Cortex, including ITM.
- JTAG (IEEE 1149.1, IEEE1149.7) debug interfaces are fully supported by UDE. It offers direct high-speed access to the MCU's internal units.
- ETB trace, ETM trace, CoreSight trace, Nexus class 3 trace, ITM trace, PTM trace, FTM trace and OCDS L2 trace support allows the user to watch the flow of a running program.

Development Tools

Debug Solutions

Want to access the target system the way you like? Universal Debug Engine escorts you either way.

Our debugging software escorts you either way. Please look at the following overview about the different debug solutions, and their accompanying support. You will see typical variants for remote debug connection, using the Universal Debug Engine, and regarding the available communication interfaces on the AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 MCU hardware:

Controller Peripheral	Interface	Baud Rate ¹	Supported Derivative	Monitor
DAP/DAP2, Single Pin DAP, DAP over CAN	LVTTL	up to 160 MHz	XE166, XC2000, TriCore AUDO Future, AURIX	no
SWD, ITM	LVTTL	up to 80 MHz	Cortex-M0/M0+M3/M4/M7, Cortex-A8/A9	no
JTAG, cJTAG	LVTTL	up to 50 MHz	XE166, XC2000, C166CBC, C166S V2, TriCore Power Architecture, ARM/Cortex, XScale, SH-2A	no (partly req.)
OCDS L2, ETM, CoreSight, Nexus Trace	LVTTL	up to 500 MHz	TriCore, Power Architecture, ARM7, ARM9, ARM11	no
AURORA Trace	LVTTL	Up to 3.1 Gbit/s	TriCore AURIX PowerArchitecture	no
CAN (On-Chip CAN)	CAN	up to 1 Mbps	C166, ST10, XC166, C166CBC, TriCore	required
ASCO / ASC1 asynchronous	RS232	up to 625 kbps	C166, ST10, XE166, XC2000, TriCore	required
ASCO / ASC1 asynchronous/ synchronous	RS485/TTL	up to 625 kbps	C166, ST10, XC166, C166CBC, TriCore	required
SSC synchronous	RS485/TTL	up to 5 Mbps	C166, ST10, XC166, C166CBC	required
3-Pin-Hardware Interface	TTL	up to 400 kHz	C166, ST10, XC166, C166CBC	required
Emulation Device	Master Interface	-	TriCore ED, XC2000 ED, Power Architecture ED	no

¹⁾ The Baud Rate is defined by the physical transfer frequency of the transmission medium.

Debugging via DAP - Support

This new debug interface was established by Infineon, for the TriCore AUDO Future, AUDO MAX, and AURIX devices, as well as for other upcoming 16bit and 32bitmicrocontrollers. The Device Access Port **DAP/DAP2** allows debug communication with higher transmission rates than existing JTAG based communication channels (up to 160 MHz).

Single Pin DAP, and DAP over CAN are supported. All features of the DAP are supported by the UAD2, UAD2^{pro}, UAD2⁺, UAD3⁺.

Debugging via SWD - Support

The Serial Wire Debug (SWD) interface, or Serial Wire Debug Port (SW-DP) is one of the features of the debug and trace technology ARM CoreSight[™].

Both the SWD debug port and the alternative JTAG debug port can be combined to the Serial Wire JTAG Debug Port (SWJ-DP), or the CoreSight standard port. When using SWD, the TDO signal can provide trace event messages, via the Serial Wire Output (SWO).

The **SWD** and **ITM** target connections are supported by the communication devices UAD2, UAD2^{pro}, UAD2+, and UAD3⁺.

Debugging via JTAG - Support of OCDS L1, L2, EmbeddedICE, ETM, ETB, CoreSight, Nexus, and H-UDI

JTAG offers direct access to microcontrollers with an On-Chip Debug Support module (e.g. C166CBC, C166S V2, TriCore, Power Architecture, ARM7, ARM9, ARM11, Cortex-M0, Cortex-M0+, Cortex-M3, Cortex-M4, Cortex-M7, Cortex-R4, Cortex-A8, Cortex-A9, XScale, and SH-2A OCDS L1, NEXUS and EmbeddedICE are the base of the latest generation of development environments with new features:

- Event Triggering by the on-chip trigger unit, by software breakpoints or by the Break Input pin.
- Hardware breakpoints for debugging in ROM.
- Additional execution of data transfers.
- Complex trigger conditions.
- Symbolic conditions for enhanced definitions.
- Task-specific breakpoints automatic selection and optimized usage of the on-chip resources.
- Access to the entire address space of the controller without any external hard- or software resources.
- Optimized support for single-chip applications.

OCDS L2, ETM, ETB, ITM, PTM, FTM, CoreSight, Nexus, and AURORA trace support the recording of the running program's trace of the core, SPU, PCP, PCP2, and DMA activity, if available. This feature allows the user to watch the running program's flow, within the process environment, in real time. Timing measurements of critical sections are also possible.

OCDS L2, ETM, Nexus, and AURORA trace are supported by the Universal Access Device - Trace Board option (UAD2⁺, UAD3⁺).

Debugging via the Monitor

- Available for C166, ST10, XE166, XC2000, ARM, and TriCore derivatives.
- **CAN bus is available for application,** even when debug communication channel is CAN.





The Universal Debug Engine gives you the following advantages

General Technical Information

- UDE supports derivatives of AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SuperH SH-2A, C166, ST10
- Multi-core Debug Support.
- Enhanced state-of-the-art debugging solution for debugging of complex high-level language based Cand C++ -applications.
- Code syntax highlighting.
- HTML based help for all windows and dialog boxes including usage summaries and fundamentals.
- FLASH programming tool for programming internal (on-chip) or external FLASH memories.
- Service Monitors available for each of the communication interfaces the ideal solution for onsite application parameter setup.

Breakpoints

• Simple, Complex and Data breakpoints.

Host/Target System Communication

High-speed downloading is achieved by the communication devices UAD2, UAD2⁺, UAD2^{pro} and UAD3⁺.

- DAP and Single Pin DAP (SPD) up to 80 MHz.
- DAP over CAN Physical Layer (DXCPL).
- DAP2 up to 160MHz.
- DAP over CAN.
- SWD up to 100 MHz.
- JTAG/cJTAG up to 3.5 MByte/s @ 50 MHz.
- CAN up to 1 Mbps.
- ASCx RS232/RS485/TTL, up to 1 Mbps.
- SSC RS485/TTL, up to 2.5 Mbps.
- 3Pin-Hardware Interface TTL, up to 400 kbps.
- **CAN bus monitoring** (even in parallel to debugging via CAN bus) with decoding of standard and user-defined CANopen messages.

UDE supports communication to the host PC via a number of standard interfaces: USB, IEEE1394, and **Ethernet**.

Graphical Display

- Flexible calculation of curve data points from the targeted program data with UDE expressions.
- Update of data after program hold or with programmable refresh rates, during running and stopped target program.

Watch and Locals Display

- C/C++ and Assembly expressions supported.
- Watch expressions: C variables and constants, linked in C syntax, to a self-calculating expression.

Simulator Support

- UDE-Sim Support.
- Infineon TSIM Support.
- Simulator Virtualizer Synopsys Simulator Support.

Automation Support

- Batch and Script control for the debugger.
- UDE object model for internal and external automation, and extendable macro library.
- Automation support in HTML view or by standard script languages (e.g. VBA, HTML, JavaScript).

Compilers

Optimized support for Compilers and the **ELF**, **DWARF2.0**, and **DWARF3.0** format.

- GNU C/C++ Compiler (HighTec).
- Tasking C/C++ Compiler.
- Keil C/C++ Compiler (Keil).
- RDS C/C++ Compiler (ARM).
- C/C++ Compiler (ImageCraft).
- eTPU Compiler (Byte Craft).
- Diab C/C++ Compiler (Wind River).
- CodeWarrior C/C++ Compiler (NXP).
- Renesas C/C++ Compiler.
- CodeComposer Compiler (TI).
- Green Hills Compiler.

Third Party Tool Support

- Simulator Virtualizer Synopsys Simulator Support.
- CASE Tool EasyCODE (EasyCODE).
- CASE Tool X32 (Blue River Software).

RTOS Support

- CMX-RTX (CMX Company).
- PXROS (HighTec).
- μC/OS-II (Micriµm).
- rcX Real-Time Kernel (Hilscher).
- RTX Real-Time Kernel (KEIL/ARM).
- OSEK ORTI.
- OSE-Illuminator (Enea).
- Nucleus (Mentor Graphics).
- FreeRTOS / SafeRTOS.

System Requirements

- Microsoft Windows® compatible PC.
- 1 GHz or faster 32 Bit (x86) or 64 Bit (x64) PC with
 1 GByte RAM (32 Bit) or 2 GByte RAM (64 Bit)
 - 1 GByte available hard disk space.
- Operating System:
 - Windows®Vista, Windows®7, Windows®8.1.
- Microsoft .NET™ Framework 3.5 SP1.
- Microsoft Windows[®] Scripting Host V5.6.
- Microsoft Internet Explorer® 6.0 or higher.
- Adobe® Acrobat Reader 4.0 or higher.
- CDROM drive for installation.
- IEEE1394, USB2.0, PCI or TCP/IP network access
- Administrator permissions for the current login during installation.

PLS offers one-stop, complete tool chain support!

PLS is NXP Connect Proven partner.



UDE Trace Visualization and Analysing - Detect Performance Bottlenecks of your Target Application

The knowledge of CPU load distribution of the running target application is a basic requirement to optimize their real-time behaviour. The UDE analysing functions of real-time target data include:

- Trace profiling to calculate function execution time.
- Several types of code coverage algorithms provide qualification of software quality in real process environment.
- Two optimized views of program flow assist to identify critical code sequences by two-dimensional line chart.
- Optimized view of traced data accesses enables identification of critical accesses by two-dimensional line chart.

UDE supports trace data processing from MCDS, NEXUS, ETM, ETB, ITM, PTM, FTM and CoreSight based trace channels over various hardware interfaces. UDE provides an additional feature to read memory locations periodically directly on the access device to obtain shortest polling periods. This method can be used to poll the instruction pointer or variables.

Trace Profiling Support

UDE supports three methods to evaluate execution times:

- IP Snooping trace of instruction pointer of AURIX, TriCore, XC166, XE166/XC2000 and Cortex-M, Cortex-R, Cortex-A CPU periodically with minimum poll period of 1 millisecond. This method helps to estimate distribution of core execution times and can be used without any additional trace hardware requirements.
- Calculation of function execution times by full code trace of MCDS, NEXUS, ETM, ITM, PTM, FTM and CoreSight trace channels .The results are influenced by size of trace and quality of related time information from trace channel.



UDE supports also a special optimized trace mode of AURIX processors with MCDS, called **Compact Function Trace**, which provides best utilization of trace memory for calculation of function execution time.

Profiling Visualisation and Result Export Functions

The results are available as chart diagrams and as numeric result tables. Additionally, the UDE profiling page enables the results to be saved in a free selectable **XML**

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		Pro	VCT_SetEnded (and car_sizes a) LIDCTS_Tages VCT_Coordinated (and car_sizes a)	Function Function	5x75088428 5x75088428 5x75088388	5x000000044 5x000000044	2 8 3	276,80 910,30	170,00 200,00 510,00	108,08 208,08 128,08
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stem	Profiling Mode	Compact Punct	prystelled bol_adore officit_adore	Function Function	5x75009488 5x75009448 5x75009488	5x0000018A 5x000000173 5x000000173	3	275,04 205,04 260,03	275,00 285,00	279,88 279,88
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	Start Ten		RCC1_HOLeChiladeCallect P 1/1718_GetBeCast	Function Function	3x75008803 3x75008820	0+00000000 0+00000000	1	348,08 338,00	140,00 200,00	248,88
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storage based data sink for later processing. Additional HTML profiling reports can be generated by UDE or results can be used for later internal and external scripts for automatic post-processing.

Trace Code Coverage Support

UDE supports trace coverage by three coverage algorithms:

- Statement coverage of machine code
- Branch coverage of machine code
- Branch coverage of control flow

One of **MCDS**, **NEXUS**, **ETM**, **ITM**, **PTM**, **FTM** or **CoreSight** trace channel provides the required full program trace for coverage analysis.

Code Coverage Visualisation

The **trace code coverage** summary chart page contains a bar chart, which displays the code coverage results of all functions, which were hit by the code trace address data.







UDE Profiling Support - Detect Performance Bottlenecks of your Target Application

In addition to bar graphs, for a quick overview, the generated contains a detailed list of statements and branch coverage per function, source text lines, and individual machine instructions. Likewise, code not executed, only partially covered areas of code or jumps not executed can be located very quickly. The fast and safe evaluation of immense volumes of trace data is supported by a new module that complies with ISO 26262 requirements, which for the first time also enables coverage analysis of optimized code. At the same time, the DWARF format that is typically used for debugging information has been extended. Therefore control flow changes triggered by the compiler are recognizable for the debugger. A first implementation by the compiler manufacturer HighTec h as already proved its continuous suitability for practical use.

Result Export Functions

The report can be used as proof of the software quality assurance in the context of the documents required by the **ISO 262626** standard.

Statement Coverage Overview in Program Windows

The **program window** displays the statement code coverage information as line marker, if coverage results are available. It displays the generalized statement coverage information, if the appropriate statement or instruction was completely covered, partly covered or not covered.

UDE Instruction Pointer Trace Chart

This UDE window displays all code trace records of the current debugger instance assigned core as data series of a 2-dimensional scientific diagram. This feature makes it easier to visualize and evaluate target data to accelerate the verification of complex software algorithms and input from process environment. A suitable trace configuration for a **MCDS**, **Nexus**, **CoreSight**, **ETM**, **ETB**, **ITM**, **PTM** or **FTM** trace channel is required to deliver the data filling this specific line-chart view.

Features of the Instruction Pointer Trace Chart Window

The **Instruction pointer mode** (left image) displays the instruction pointer trace as data series of hexadecimal addresses. The Function trace mode displays the instruction pointer trace assigned to the high-level language function ranges select the mode using Change mode of graphical view.

The **Find** function enhances the search- and zoomfunction to find specific trace samples and zoom into specific trace data sample ranges recorded from trace channels.







Debugger

UDE Multi-core and Multi-target Support

UDE provides in depth support for all available on-chip debug resources and peripherals. Experience a completely new and unique debugger concept, based on a customizable set of standard components and core specific add-ons.

The tool enables the control and monitoring of several cores of multi-core architectures within a single and consistent user interface.

This is supported by a flexible multi-core program loader that enables the loading of program code and data as well as symbol information separately for each core. Control of the cores is carried out by a multi-core run control manager, which offers a definition of core groups.

Therefore, a very flexible control of the run-time behaviour of the complex architecture is possible, including combined start and stop mechanism of the several cores.

Sophisticated Multi-core Debug Features

- Debugging of multiple CPU's in the same framework.
- Common and core specific views enables sophisticated debugging of programs, which program execution is distributed into different cores.
- Multi-core run-control enables synchronisation of program execution of multiples core (common stop by break of one core, common start of all core of the dedicated run-control group).

- Flexible distribution of loaded programs into different cores – Multi-program load feature allows assigning loaded programs to specific cores and enables to manage architecture specific structures of memory devices like common program flash and core specific local memories.
- Multi-core target manager enhances management of separate cores during debugging of distributed programs.

Multi-core Scenarios

- Several cores on one Chip using the same JTAG-Chain (AURIX).
- Several cores on different Chips using the same JTAG-Chain.
- Several cores on different Chips using different Debug-Channels.

Multi-core Controls

- Multi-core debugger selection
- Multi-core program loading
- Multi-core FLASH programming
- Multi-core run-control
- Multi-core breakpoints
- Multi-core trace
- Multi-core scripting / Object model structure



Debugger

UDE Chart Windows (scientific 2-dimensional) for verification of complex data processing algorithms

Together, the UDE Chart Windows, along with the verification of complex software algorithms, help the developer to quickly evaluate complex target program data from the process environment.

The Chart Windows can be used with all microcontroller families supported by UDE. The UDE window displays preprocessed target system data as curves of

a scientific 2-dimensional diagram.

Basic features of the Chart Windows

- Multiple curves in one diagram window.
- Separate x- and y-axis for each curve.
- Flexible calculation of curve data points from target program data with UDE expressions.
- On-the-fly data acquisition after program hold or with programmable refresh rates during running and stopped target program.
- Legend, Cursor, Zoom, Pan, and Axis markers.
- Save and restore of complex settings in UDE workspace, and in separate file.
- Printer support.

The UDE Chart Windows also feature zoom, pan, and cursor functions to help evaluate the data and view details of the current curves. In particular, the cursor function makes it easier to access to the particular data values at specific coordinates of the curve.



Synopsys Virtualizer Simulator Support

The coupling of the PLS UDE and Synopsys virtual platforms reduces test times on the real hardware as the joint solution allows a more detailed analysis of timing behavior and performance of an embedded application at a very early stage of system design. This prevents downstream errors that cause redesigns and significantly reduces development cost and schedule.



SYNOPSYS°

The software architecture of the Universal Debug Engine (UDE) guarantees optimal conditions for debugging SoCbased systems. For example, by means of the intelligent use of modern on-chip debugging and on-chip trace units, valuable functions such as profiling and code coverage are available for the system optimization.

Interoperability Description and Customer Benefits

The UDE can establish a connection to Synopsys virtual platforms. The support includes multi-core designs with TriCore, Power Architecture and ARM cores. The solution offers debugging of software at high level language level on the virtual platforms with configuration and control of the processor models.

The simple-to-use modular structure of the UDE connection to the Synopsys tools is established via a special target interface component. UDE also offers virtual target configuration and control of the processor models. If the real hardware is available, a simple exchange of this component allows a smooth continuation of work.



Debugger^{gel}

Variables Access Time Chart

This UDE window displays all data-access trace records of the current debugger instance assigned core as data series of a 2-dimensional scientific diagram. This feature makes it easier to detect time-related variable access problems and to accelerate the verification of complex software

algorithms and input from process environment.

A suitable trace configuration for a MCDS, Nexus, CoreSight, ETM, ETB, ITM, PTM, FTM trace channel is required to deliver the data filling this specific line-chart view. The pre-processing algorithm detects automatically the high-level variables from recorded trace channel.



UDE Real Time Data Monitoring and Collection

The UDE makes it easy to **program variables**, contents of complex terms and physical terms, and **record in real-time** for evaluation. The UDE makes it possible to analyse the real-time behaviour of the developed software. The user can recognize and solve distribution problems with the performance of the processor, as well as synchronization problems between multiple parallel running programs.

By using only debug interfaces the UDE has minimal influence on the behaviour of the system. The UDE also allows the user to view a transparent read-out of system information, in the background of the active program. The



information is visualized with a graphical representation of multiple signals in a chart.

All necessary signal data can be obtained as a result of scanning values from individual variables, elements from complex data structures, or via any complex combination from multiple data points. The option to compute complex physical values, in real-time, and from program variables, helps the developer to simplify the interpretation and evaluation of the displayed diagrams.

The data is pre-processed in the **Universal Access Device 2/3** (UAD2, UAD2^{pro}, UAD2⁺, UAD3⁺), which is connected

directly to the target system. Thanks to a 32bit controller with its inherently powerful communication equipment, the user is guaranteed that even complex expressions, requiring a minimum sampling period (in the range of 1 millisecond), can be captured.

Following this, the computed data is buffered in the Universal Access Device. Captured data can be stored for up to 30 minutes and are retained until read-out by the UDE. The data can also be stored in XML-Format and subsequently evaluated, via script, or another program (e.g. Excel).

Multiple selectable modes of the viewing window ensure the user an optimal display of the recorded data. For a more detailed examination of the data, the graphical representation also enables the use of additional functions, such as zoom, data cursor, and switchable function markers.

Development Tools

UDE Triggered Transfer

The UDE TTF Recorder uses the **Triggered Transfer** feature of new Infineon microcontrollers. Triggered Transfer is part of the on-chip debug support, which is implemented on these controllers. It allows transferring the value of a single memory location via the JTAG debug interface.

The transfer is triggered by a debug event of the on-chip debug support (OCDS) unit. There are several types of debug events that can trigger the transfer depending on the actual type of controller. A typical use case, provided by all supported controller types, is to trigger on write accesses on a single variable and to transfer the new value of the variable to the recorder.

Data is recorded while the target system is running.

UDE eTPU Support

Enhanced Time Processing Unit (eTPU)

The NXP Enhanced Time Processor Unit is an autonomous, programmable I/O controller with its own instruction set.

Features

- Multi-eTPU support by UDE.
- Loading of ELF files for symbolical debugging in Power Architecture/eTPU multi core debugger.
- Loading of ELF files for standalone eTPU debugging *.
- Source code debugging (Source and Mixed mode).
- Manual start of eTPU channels is possible.
- Support of special data types; 'signed int24', and 'unsigned int24'.
- Support of hardware based code and data breakpoints; complex trigger conditions based on NEXUS debug hardware.

*The Power Architecture core is configured and prepared with an endless loop in program FLASH.

UDE supports the Byte Craft eTPU C Compiler.

UDE Simulator Support

UDE Sim Support

UDE Sim is a dynamic binary translation (DBT) instruction set (IS) and full system simulator providing high simulation performance. The simulation may not only include the instruction set architecture, but may also comprise the IO components available on the target platform.

Diverse target models are available for **UDE Sim**. The MPC5744K, MPC5746M and MPC5777M targets provided within this installation package resemble the 32 Bit Power Architecture Book E user mode programmers model, as well as a subset of the MPC5744K, MPC5746M and MPC5777M microcontroller family's peripheral components.



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Infineon TSIM Support

The **TSIM simulator** is an instruction model of the TriCore architecture. It can be used to debug programs without having any hardware. The time to finish a new product can be shorter with use of the simulator in early stages of developing.

Some additional configurations can be made to set up the **TSIM** simulator to your own requirements. The UDE debugger uses the TSIM interface like a real hardware platform. All ad vantages of HLL-Debugging are offered with the combination of UDE and TSIM environment.



Debuggerger

UDE CAN Message Recording with CANopen Visualization

The UDE CAN recorder tool provides the visualization of CAN bus communication and can be used as an add-on or as a stand-alone application.

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Mag	Tine		Id	Size	Data
467	0:01:04.3	128	0x704	1	05
468	0:01:04.3	154	0x187	1	05
469	0:01:04.4	139	0x307	1	00
470	0:01:04.4	144	0x287	3	01 02 03
471	0:01:04.6	576	0x107	1	01
472	0:01:04.9	997	0x187	1	03
473	0:01:05.0	182	0x707	1	05
474	0:01:05.3	119	0x107	1	07
475	0:01:05.4	141	0x307	1	01
476	0:01:05.4	151	0x287	3	03 02 01
477	0:01:05.6	41	0x187	1	0B
470	0:01:05.0	105	0x707	1	05
479	0:01:05.9	962	0x187	1	0.9
10:1	0×000 F	Ext	Uara :		Send
) Janeta			Mose 0	First A	not recording

Equipped with the CANopen message formatter plug-in the CAN recorder can visualize the CANopen communication or a

user-defined CAN-Layer-7-protocol.

The recorder can be configured for filtering and for displaying of symbolic information. The recorder can also export CAN message streams to a file and the CAN bus can be sent or stimulated, via the send bar. CAN baud rates from 50 kbit/s up to 1 Mbit/s, and standard / extended CAN identifiers are supported. The UDE CAN recorder supports a Common Object Model (COM).

11Re	MsgId	Data	Interpretation
15738	0x187	05	Oil pressure 5
15977	0x704	05	Heartbeat Message Node: 4 Send Okay
15993	0x307	00	775 RPD02 Node 7 Content: Engine direction 0
16007	0x287	01 02 03	Sensor array 2 287 1'st Sensor 1, 2'st Sensor 2, 3'st
16059	0x187	02	Oil pressure 2
16365	0x707	05	Heartbeat Message Node: 7 Send Okay
16381	0x187	01	Oil pressure 1
16702	0x187	04	Oil pressure 4
17023	0x187	07	Oil pressure 7
17167	0x707	05	Heartbeat Message Node: 7 Send Okay
17186	0x307	01	775 RPD02 Node 7 Content: Engine direction 1
17271	0x287	03 02 01	Sensor array 2 287 1'st Sensor 3, 2'st Sensor 2, 3'st
17345	0x187	0 A	Oil pressure 10

UDE CAN Monitoring with/without On-chip Debug Support (OCDS) and CAN Bootstrap Loader

CAN Bootstrap loading for XE166, XC2000, TriCore, and ST10

The usage of the CAN bootstrap loading mechanism is supported by UDE and UDE MemTool.

OCDS Support of XE166, XC2000 and TriCore

The latest software package, UDE-LIC-TC-Monitor, provides support of On-Chip Debug System (OCDS). The OCDS can accomplish direct debugging, via CAN-bus, and uses a standardized close connection to the JTAG.

The OCDS can enable hardware breakpoints for debugging, within the FLASH memory, and data breakpoints. These allow dedicated halt, with read or write access, to program variables.

The UDE-LIC-TC-Monitor is now available for the members of XE166/XC2000, and TriCore families, without limitations, and is also available via CAN-bus. In addition to the extended application capabilities, the developer will benefit from **substantial cost savings**, since

there is no longer a need for specific adaptation for user hardware.

This feature allows the usage of UDE CAN recorder as a

by other applications.

CANopen Message Formatter

CAN recorder and can visualize the CANopen

plug-in of user applications as well as the script-controlled

The CANopen message formatter is a plug-in for the UDE

communication. The plug-in scans and interprets DCF-files automatically. This makes data of CANopen networks and CAN nodes available to the user. If no DCF-file is available the message formatter interprets all CANopen standard objects corresponding to the default specification.

In other cases the CANopen message formatter handles an interpretation file for the visualization functionality of the UDE CAN recorder. This file can be edited. For example, the developer can use the CANopen message formatter for the visualization of a user-defined CAN-Layer 7 protocol.

The target monitor requires approximately 16 kByte FLASH memory, 1 kByte RAM for the TriCore derivatives, and approximately 4 kByte FLASH memory, 100 Byte RAM for members of the XE166 family. A message object and a CAN identifier also need to be provided.

The application and target monitor share utilization of one CAN module and can be easily implemented as the access to a separate CAN module of TwinCAN or MultiCAN units of the microcontroller. The monitor software includes the C and assembler text for the various common compiler packages and can be easily integrated into existing applications.



Debugger

PXROS-HR Complete Development Platform for TriCore and for Power Architecture

The Development Platform basic features include, a GNU complier port, the Eclipse integrated development environment, and the Universal Debug Engine. This product is available for TriCore and Power Architecture. The platform can extend with the PXROS-HR real-time operating system.

UDE Support

The Development Platform includes a **direct connection** from the UDE to PLS, to debug and test applications. The IDE can be started with all necessary settings, directly from the UDE. This feature greatly simplifies function testing of the program, on target hardware. Of course, the UDE also allows PXROS-HR testing, with memory protection.

The Development Platform is a common well integrated product of HighTec and PLS.

Main Features

Eclipse IDE

- Project management.
- Version control.
- Setup wizards.
- DAvE importer.

Compiler TriCore

- 16/32 Bit instructions for reduced code size.
- Addressing modes: absolute, register relative, circular.
- Saturating integer arithmetic and packed data operations.
- FPU and PCP support.

Compiler Power Architecture

- 16/32 Bit instructions for reduced code size (VLE).
- SPE support.

Universal Debug Engine

- Target access via JTAG.
- Supports OCDS LII, Nexus and on-chip trace.
- FLASH programming.
- Real time Data Monitoring and Graphical View.
- Execution Time measurement.
- Instruction Pointer Profiling.
- Simulated I/O.

PXROS-HR with Memory Protection

The PXROS-HR is a real-time operating system, with integrated MPU management, and an optional component of the Development Platform.

Modern micro-controllers such as TriCore and Power Architecture are used to create the Memory Protection Unit.

This guarantees the developer safe integration of components consisting of different software. These features make the PXROS-HR an ideally suited product for safety-critical applications and rugged industrial solutions.

A library that was developed especially for the PXROS debug monitor PXmon, allows the Universal Debug Engine to use the JTAG debug channel as fast communications vehicle for the exchange of data, with a running PXROS-HR application. A graphical display shows system conditions, such as stack consumption of individual tasks, processing task sequences, and processor workload due to individual application parts, as well as the workload of resources.

101.7 ject Explorer 23 Clock TC1796 LedServer_TC1796 PXROS-HR-System TC1796 Includes Libraries iofunc.c setup.c SystemInit.c SystemMain.c tc1796_spi.e MMC CS MMC_CS_ENAB MMC CS PIN get_cpu_frequency[void f spilnitihuInterface", intl if spiSend(hwInterface", ewint8 if spiSetSpeed(euint8) SetSSC1Regs(int)

This provides the user an effective tool to test PXROS-HR based programs and to optimize the performance parameters of the application.



MCDS Support

Universal Emulation Configurator (UEC) - MCDS and SPU Support

Support of AUDO-NG and AUDO Future Emulation Device On-Chip Full Featured Emulator

The AUDO-NG, AUDO Future, AUDO MAX, and AURIX family emulation devices (TC17xxED, TC27xxED) implement a new-generation debugging solution called **Multi Core Debug Support (MCDS)**. This new full-featured emulator on-silicon begins a new age of debugging capabilities.

Sequence Processing Unit (SPU) is used by Power Architecture and can be debugged by UDE.

Current implementations of on-chip emulators:

- Comparatively small capacity of the on-chip trace memory due to limited chip surface.
- Very complex programmable logic for data filtering, which arise internally with large bandwidth to the optimal utilization of the trace memory.
- Strong adjustment to the system properties, and consequently the concrete implementation is very different from chip to chip.

Due to these characteristics the emphasis of error tracing shifts on the definition of the measuring task and thus the programming of the filter logic, while with traditional external emulators the evaluation of the trace data is the centre of attention.

Universal Emulation Configurator

is the hardware-independent tool for description of measuring tasks for on-chip emulators and is comparable with development environments for the hardware draft. The UEC allows the user to quickly and easily describe measuring tasks and create configuration data for an on chip emulator, totally independent of the respective target hardware.

For maximum freedom for the user in the description of the analysis tasks, the UEC offers various interfaces:

- Trace Qualification Language (**TQL**) this assemblersimilar language serves as the presentation layer between the hardware-independent upper layers and the on-chip emulator hardware.
- High Level Trace Qualification Language (**HTQL**) this compiler-similar language allows the user to edit an abstract description for the functional hardware-independent description of the state-machine.
- A XML based library format contains the measuring task by embedded HTQL code and the description of its visualization for the schematic input.

The graphical user interface of the **UDE** combines the easy-to-use interfaces of logic analyser user front ends, with complete support of the whole observation, and trace capabilities of the **Multi Core Debug Support** unit. With the **Universal Emulation Configurator** the user now has a powerful configuration tool, to complete complex analysis tasks quickly and easily.

- Functional description of tasks on the basis of a statemachine is now possible, independent of the actual target or emulator hardware.
- The user can now complete sophisticated measurement tasks independent of the actual target or emulator hardware.
- A fast and simple definition of complex measuring tasks is now possible and is done by joining predefined subtasks from expandable libraries and also defines parameters.



The increase of the use efficiency due the **Universal Emulation Configurator** is absolutely comparable with the transition from the logical design to the description of behaviour in the chip design.

AUDO Future and AURIX Emulation Device

For the first time, enhanced features of the AUDO Future's MCDS unit are integrated performance counters.

For application optimization, important data, such as the instruction counter, cache hits and misses separate from program data, interrupts, stall and idle cycles, etc., can be configured, recorded, and analysed.





Universal Emulation Configurator 2 (UEC2) -

The so-called emulation device XC2000ED with integrated on chip emulator, is now available for development and test purposes. Until now, the Universal Emulation Configurator UEC2 was the only device that had offered a complete support of this highperformance debug hardware.

With this unit, important data, such as instruction counter, interrupt acknowledges, stall and idle cycles, and many more, can be recorded and analyzed for application optimization.

With the Universal Access Device 2 (UAD2, UAD2^{pro}) and the **XC2000 Emulator**, PLS now offers developers an extremely rapid and flexible communication tool to access all Infineon microcontrollers.



Support for new XC2000 Emulation Device

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The XE166 and XC2000 Emulator offer the usage of MCDS-driven XC2000EDs in the customer's hardware, in a flexible way.

Benefits of the XE166, XC2000 Emulator

- XC2090ED emulation device, with complete MCDS/UDE UEC2 support, and alternative JTAG interface.
- Smallest PCB dimension of 33 x 42 mm², vertical distance between target PCB and emulator PCB of 9 mm (7 mm in capacitor areas).
- SMT Emulator foot for target assembling, suitable for re-flow oven; hot air wand and soldering iron.

UDE supports Renesas' power train microcontroller series SH725x

The UDE 4.6 is an outstanding software and hardware tool for the development, test, and service of SH725x-and SH726x based MCU applications.

SH725x incorporates an SH-2A CPU core with speeds clocked to 200 MHz, up to 3.8 Mbytes of FLASH memory, maximum of 256 Kbytes RAM and powerful peripheral



functions such as CAN, Advanced Timer Unit, DMA controller, serial interfaces, and more make the device ideal for demanding power train applications.

The intuitive and configurable user interface of the UDE 4.6 offers SH725x users, among other things, unrestricted C/C++ support, a powerful symbol browser, freely configurable toolbars, extensive contextual menus and HTML as description language for application-specific windows. By using standard script language, a high degree of automation is guaranteed. All on-chip debug capabilities of the controller, including the maximum ten code breakpoints and two data breakpoints, are usable at a high level of abstraction inside the debugger.

An additional advantage offered by the UDE 4.6 is the high transfer speeds. In combination with the PLS' Universal Access Device 2 (UAD2, UAD2^{pro}), download rates of greater than 1.5 Mbytes/s can be achieved via the JTAG interface. This not only guarantees SH725x users a fast FLASH programming, but also short turn-around times during the development and real-time data visualization, via the JTAG-based debug port.



Debugger 9 el

UDE Visual Platform

UDE comes with an additional new front end based on .NET Framework:

- Modern and state-of-the-art look and feel.
- Two different interface modes are provided for working with document windows:
 - Multiple documents mode the IDE provides a parent frame that serves as a visual and logical container for all document windows.
 - Tabbed documents mode Document windows are placed side-by-side on multiple tabbed panes.
- Multiple docked panes with multiple views, and two modes:
 - Parallel view mode all views share one pane row.
- Tabbed view mode different views can be switched in full row display mode, via the tab key.
- Auto-hide views: Views will be opened on demand and disappear, if not used, Floating frame views, Full drag and drop support for windows navigation.



UDE comes with additional new front end as plug-in for **Eclipse 3.4 - 4.5** IDE (incl. C/C++ IDE support).

Features

- Seamless integration of **complete functionality** of Universal Debug Engine inside the Eclipse IDE.
- UDE provides a unique perspective of the Eclipse IDE, and integrates UDE workspace within Eclipse workspace.
- UDE Eclipse Integration feature is included in the standard UDE 4.05.01 installation package, which can also be added to each existing Eclipse (Ganymede, Galileo, Helios, Indigo, Juno, Kepler, Luna, Mars) installation.
- UDE extensions are available with Eclipse IDE for C/C++ developers (CDT) as a part of the package.
- UDE Integration Package for HighTec PXROS-HR

Development Platform and TASKING VX-toolset are also available.

- UDE debug session can be started via the Eclipse launch configuration.
- Code breakpoint can be set either by C/C++ editors or by UDE specific functions.
- UDE controls instruction pointer marker of C/C++ editors.
- UDE Eclipse Plug-in will also support Eclipse RCP stand-alone application mode.

The same UDE installation can be used with 3 different front-ends, **UDE Desktop**, **UDE Visual Platform**, and **UDE Eclipse** alternatively.

pls Development Tools





Communication Hardware

Field proven debug and test support for Infineon's new AUDO Future, AUDO MAX and AURIX microcontroller family

The Universal Debug Engine is optimized for the special features of the new 32 bit microcontrollers TC1736, TC1767 and TC1797 from the AUDO Future and the TC1782, and TC1784 from the AUDO MAX and TC23x, TC26x, TC27x, TC29x from the AURIX family.

The debug support has been significantly extended from the previous TriCore derivatives. For example, changes in the hardware structure now allow monitoring of the system status (running/hold), without having to use the internal system bus. For the first time, by using the UDE's Universal Access Device 2, the user can test a program without any real-time violations.

New 2- or 3 wire debug interface for AUDO Future/MAX, AURIX and other upcoming devices

The new 2- or 3 wire **Device Access Port DAP/DAP2** allows debug communication via 2- or 3-wire interfaces with higher transmission rates than existing JTAG based communication channels up to 160 MHz.

UEC for AUDO Future/MAX/AURIX

Special so-called emulation devices, with integrated on chip emulator are now available to users of the TC1767, TC1784, TC1797, TC29x, TC27x, TC26x, TC23x for development and test purposes. The PLS **Universal Emulation Configurator UEC** is the **only** product on the market which offers complete support of this highperformance hardware.

Now, important data such as instruction counter, cache hits and misses separate for program and data, interrupts, stall and idle cycles, etc., can be recorded and analysed for optimization of the application.

Universal Access Device 2^{pro} -Smart Communication Accelerator

Universal Access Device UAD2pro

The Universal Access Device **UAD2**^{pro} is the alternate smart member of the UDE target access device family. It offers the fastest available target access, via JTAG (up to **50 MHz** shift clock - download rate up to **3.5 MByte/s**). The UAD2^{pro} also supports the ASC, and CAN bootstrap loader. The **UAD2**^{pro} is comparable to the UAD2, but it is equipped with a more flexible target interface connector.

Accessing your AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 derivatives is now easier than ever!



High-Speed Target Access Modes UAD2^{pro}

- Separated target interface adapter.
- 1.6V 5.5V I/O ring voltage.
- Standard 16 pin JTAG /OCDS connector.
- SPD via CAN and DAP over CAN Physical Layer (DXCPL) adapter solution.
- 10 pin Infineon DAP connector.
- 10 & 20 pin CoreSight connector with Serial Wire Debug (SWD) support.
- Standard 20 pin **ARM** JTAG connector.
- Nexus Debug Port connector.
- UAD2pro with active adapters and optional isolated target interface available.
- Additional customer specific debug connectors are also possible.

Flexible Serial Target Access UAD2pro

The UAD2^{pro} features flexible, high-speed communication to the TriCore, PowerArchitecture, and C166, XC166, ST10 target systems via a serial D-Sub connector.

The following serial modes are available:

- Asynchronous serial RS232 interface.
- CAN interface.

Host Connection via USB2.0

- 480 Mbps communication speed
- Supported OS: Windows®Vista, Windows®7, Windows®8.1 (32 bit and 64 bit)



Communication Hardware

Universal Access Device 3⁺ – High-Speed Target Communication Accelerator Add-On for UDE

The **Universal Access Device UAD3**⁺ is the latest extension of the well-established UAD family. The **UAD3**⁺ provides highly optimized high end trace, multicore and multi-target debugging, profiling, and calibration targeted for users of complex 16 Bit and 32 Bit microcontrollers.

The UAD3⁺ is designed for use in multicore and multitarget systems, with high clock frequencies, and offers real-time trace recording and profiling.

It is the consequent advancement of the established UAD2x family. Application fields are **debugging / trace / profiling / calibration** for the development, integration and system level test of modern microcontroller systems with high clock frequencies and multi-core targets.

High-Speed Multi-Target Access support, up to 100MHz

The UAD3⁺ is a modular concept and offers high-speed debug access to AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A and other MCU architectures. Optional JTAG extender pods are available with galvanic electrical isolation and ensure flexible adaptation with the target connector.

The UAD3⁺ is truly facilitates first class performance.

• High-speed JTAG/ DAP debug access with up to **100 MHz/ 160 MHz shift clock**.

- Multi Target / Multi System Access Up to eight cores and targets can be controlled, all with different debug protocols. Supported JTAG connector features include:
 - \circ Standard I/O ring voltage 1.6V 5.5V,
 - extended I/O ring voltage 0.8 3.3V on request.
 - o OCDS JTAG connector; 16 pin.
 - **ARM CoreSight connector**; 10 & 20 pin.
 - **ARM JTAG connector**; standard 20 pin.
 - Nexus Debug Port connector.
 - CoreSight Serial Wire Debug (SWD) connector.
 - Additional customer-specific debug connectors.
 - Optional galvanic isolation.
- Separated JTAG extender pods are connected to the UAD3⁺ by Gigabit serial cables and offers lengths up to 5m.
- Wide range of host interfaces including: USB2.0, Gigabit-Ethernet (10/100/1000Mbps), IEEE1394b (FireWire-800).
- Standalone communication operating mode device without host PC.
- Automatic firmware update of UAD3+.

High Speed Serial Trace support up to 4 Lanes @ 3.125 Gbit/s

The Universal Access Device 3⁺ allows the user to record real-time trace information up to 500MHz.

- ETM Mictor and Nexus class 3 Mictor connector.
- Maximum trace frontend bandwidth **800 MByte/s**.
- Trace memory extendable, up to **4 GBytes**.
- Time-endless trace for a continuous tracing and observation.
- Trace stream width up to 32 bit, and Half Rate clock mode up to 250 MHz, serial AURORA trace up to 3.125 Gbit/s.
 - Target MCU I/O voltage used for I/O operations, 0.8V – 3.3 Volts.

New

- Variable time stamps are possible and are inserted by the trace board on the frontend.
- Intelligent trace filters for optimal trace utilization, including Automatic edge detection.
- Separated trace pod is connected to the UAD3+ by a Gigabit serial multilane cable, with possible lengths of 0.5m, 1m, 2m, and 5m.

Development Tools

• External Trigger Pins.

2

Communication Hardware

Universal Access Device 2+ –

Target Communication Accelerator Add-On for UDE

Universal Access Device 2+

The **Universal Access Device 2**⁺ (**UAD2**⁺) add-on interface hardware for the UDE supports the AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 derivatives.



Supported Target Access Modes

The Universal Access Device 2⁺ is optimized for high-speed communication between the UDE on the host PC and a target system. The UAD2⁺ supports all access features of UDE in the most optimized possible manner.

- Infineon JTAG/OCDS L1 connector (2.5V to 3.3V I/O ring voltage) supports up to 50 MHz shift clock with download rates up to 3.5 MByte/s.
- Infineon DAP connector.
- JTAG with **Nexus** support for PowerArchitecture.
- ARM and CoreSight JTAG connector (2.5V to 3.3V I/O ring voltage) supports up to 25 MHz shift clock with download rates up to 1 MByte/s.
- Flexible serial high-speed communication via a serial D-Sub/Pin header (ASC/SSC via RS232, RS485, TTL, CAN, and 3Pin).

Other Features

- Galvanic isolated target interfaces minimize the negative effects of potential differences between UAD2⁺ and the target.
- The JTAG port is provided via a dedicated pod.
- Host communication via USB, IEEE1394 (Firewire[™]), and 100 Mbit Ethernet.

fast-PC67C and fast-PC276C High-Speed Communication Boards

The fast-PC67C and fast-PC276 cards are PC boards optimized for high-speed communication between the Universal Debug Engine on the host PC and a C166, XE166, XC2000, or ST10 microcontroller systems.

Equipped by an integrated C167CR or ST10F276 microcontroller and 1 MByte of RAM, the fast-PC6x board may serve as hardware based simulator for C166, XE166, XC2000, or ST10 code development too.



Common Features of our High-Speed Communication Boards:

• ST10F276 microcontroller with 1 MByte SRAM, and up to 1 MByte FLASH-EPROM (256 kByte by default), 20 MHz, 24 MHz, or 40 MHz internal system clock.

Optional features of our High-Speed Communication Boards:

- Memory Extension Add-On available, extending the on-board RAM by 2 MByte static RAM.
- CAN bus D-Sub male connector (CiA pin assignment), as debugging communication channel to C167CR, C164Cl or equivalent ST10 CAN target systems.
- On-board high-speed CAN bus interface driver for ISO-DIS 11898 standard.
- 96 C167CR I/O pins are accessible via two 50-pin connectors.
- Automatic firmware updates are possible via onboard FLASH programming.
- Up to 192 kByte FLASH-EPROM is available for customer software.
- Flexible serial high-speed communication to a C166, XE166, XC2000, ST10, or TriCore target system via a serial D-Sub connector:

The following serial modes are available:

- 1. Asynchronous serial RS232 interface.
- 2. Asynchronous serial RS485 interface.
- 3. CAN interface.
- 4. 3Pin-Software-SSC interface.



Monitor

Monitor Development Kit – Add-On for Universal Debug Engine

Your Universal Target System Access to C166, XC166, ST10, TriCore, ARM Hardware

The Monitor Development kit add-on for the UDE provides universal target system access to C166, XC 166, ST10, TriCore, and ARM hardware. The basic package of Universal Debug Engine includes target monitors for a number of evaluation boards and a generic bootstrap loader monitor.

Although the basic package of the UDE includes target monitors for a number of evaluation boards, as well as a generic bootstrap loader monitor, the Monitor Development Kit ad-on allows the developer to create application hardware specific monitors for C166, XC166, ST10, TriCore and ARM, with on-chip CAN controller based target systems.

In addition to the ASC/RS232, many other serial interfaces are supported to allow the developer maximum flexibility for adapting the microcontroller hardware.

The monitor requires 3-18 kByte in ROM/FLASH, and 100-3000 bytes of RAM. Debugging, via a particular serial interface, disables the interface for the application, except for CAN debugging which can be used in parallel to an application running CAN.

Watchdog handling support is possible.

The portable monitor development toolkit is available for the various compilers; e.g. for Tasking and GNU compiler.

For your convenience, the first monitor adaptation to your target system is FREE of charge.

Package Contents

- Source code for various communication paths between target and host PC:
 - 1. Asynchronous serial RS232 interface.
 - 2. Asynchronous serial RS232 interface with bootstrap loader support.
 - 3. Synchronous serial interface (SSC Interface C165/C167).
 - 4. Synchronous serial interface (3Pin Interface).
 - CAN (C166, XC166, ST10, TriCore, and ARM derivatives with on-chip CAN controller). The CAN interface may be shared with the application.
- Monitor Main Code in multiple object files for the C166, XC166, ST10, TriCore, and ARM derivatives.
- Source examples for monitor reset code.
- Product user manual.
- Software is free for use in customer applications but is not for resale as a development tool.

Please note: Not all interfaces are supported on all derivatives.

Package Support

Monitor Development Kit- Basic version (Level B) Level B includes monitor software **including one fully configured adaptation** specially designed to fit the customer's requirements. Support during start-up of the customized monitor is included, and available, via telephone or e-mail. The user may generate an unlimited number of additional customer specific configurations. Additional configuration services are available by PLS, upon request.

Monitor Development Kit- Source included version (Level S)

In addition to Level B, the Level S kit comes with all sources for target routines, including source updates via the Internet, and includes **an unlimited number of customized adaptations from PLS for one year from purchase date.**

Access to Target (Communication Channels)



Controller Peripheral	Interface	Transfer rate
ASC	RS232/TTL	up to 115 kbps
SSC	RS485/TTL	up to 5 Mbps
3-Pin	RS485/TTL	variable
CAN (On-Chip CAN)	CAN-Bus	up to 1 Mbps

Resources required by the monitor:

- 3 to 18 kByte ROM (dep. from the used target).
- 100 Bytes to 3 kByte of RAM (depending from the used target).
- Debug interrupt; communication channel interrupt.
- Optional one timer.
- CAN Monitor: 2 message objects, and 4 identifier.

Special Solutions Available:

- Bootstrap loader + SSC / 3Pin / CAN combines availability of special interfaces with the convenience of ROMless debug target systems.
- Service Monitors for all interfaces available for integration into the product; especially useful for on-site control and setting parameters in the application.

Development Tools

• Watchdog handling is possible.

FLASH Programmi

In-System Memory Programming FLASH and OTP - UDE MemTool

Speed up your turn-around cycle by programming the FLASH directly from the Universal Debug Engine! When using the debugger as a service and maintenance tool, firmware updates may be performed quickly and easily, in just one step!

Usage

UDE MemTool is used for programming on-chip or external FLASH/OTP EPROM's, on the AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 target systems directly from within the Universal Debug Engine Integrated Development Environment.

Supported Controller Derivatives

Latest AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 derivative's On-Chip FLASH (for complete list see our website http://www.pls-mc.com).

Supported external FLASH-EPROM's

- M29Fxxx, M29Wxxx Family and 100% compatible external FLASH.
- AT29Cxxx Family external FLASH.
- SST39VFxxx, SST39LFxxx Family external FLASH.
- M58BWxxx Family external FLASH. •
- i28Fxxx Family external FLASH. •
- 24LC xx Family external FLASH.
- I²C, SPI, SPIFI FLASH support. •
- NOR-/NAND-FLASH support.
- Further devices under preparation, or on request.

Features

- Easy-to-Use: FLASH/OTP programming is integrated • in the debugger-to-target program download.
- Loading Intel Hex and Motorola S-Record files.
- Transparent Erase Mode.
- Setting and Resetting the Chip/Sector Protection if applicable (on-chip only) support.
- UCB, DF1 handling for some derivatives.
- ABM, BMI header handling for some derivatives.

Operation

Automatic activation is done after the download of an application into the target, if write access onto the FLASH is required. All areas to be programmed are displayed in a dialog box. Programming may be started, or cancelled manually.

Communication between Host PC and Target System

All communication channels supported by UDE, as ASC and CAN bootstrap loader, ASC, SSC, 3Pin, CAN and JTAG, DAP, SWD can be used. Use of appropriate interface hardware is required. The MemTool also offers the host-target communication, via bootstrap loader mechanism of the C166, ST10, XE166, XC2000, TriCore, TriCore AURIX, MPC55xx, MPC56xx, MPC57xx, SPC56x, SPC57x, SPC58x derivatives, and a standard RS232 host interface (COMx). Beside RS232, the usage of the K-Line interface is also possible.

UDE MemTool only uses on-chip RAM for execution (IRAM; XRAM when available).

UDE MemTool and Automation

The UDE MemTool comes with a separate front-end interface standalone tool, outside of the UDE. All programming functions are also available via standard COM automation interfaces. Using these interfaces, the features of MemTool may be integrated into automatic production and test systems, or can be executed via scripts.

The MemTool can be further customized to include even more advanced features; e.g. integration into automatic production and test systems. With a full-custom MemTool, even more advanced features can be included into MemTool; e.g. integration into automatic production and test systems. Please contact us for a quote regarding a MemTool to fit your specific needs

Development Tools

Target µController² Communication interface	Universal Access Device 3+	Universal Access Device 2+	Universal Access Device 2 ^{pro}	fast-PC6x Interface Card	Host Serial RS232
TriCore, PowerPC, C166, ST10, XC166, XC2000, XMC1000, XMC4500		1	1	~	~
ASC bootstrap loader					
TriCore , PowerPC, ST10, XC166, XC2000, XMC4500 CAN bootstrap loader		1	1	1	
TriCore , PowerPC, C166, XC166, XC2000 K-Line interface		✓ ¹	✓ ¹	✓ ¹	✓ ¹
TriCore, Power PC, XE166, XC2000, ARM, Cortex, SH-2A JTAG/DAP/SWD interface	1	1	1		

Communication devices supported between Host PC and Target System

¹⁾ External K-Line adapter required ²⁾ Ask for supported derivatives and see website <u>http://www-pls-mc.com</u>

Universal Debug Engine Derivatives Support Summary

UDE Derivative Family	S1 C1	10 66	C1 CI	166 BC	sc [,] s	160 V2	6 2	Tr Fut	iCc ture	ore e, I [I	AL MA MC	JD X, A]		NG IRI	, X	Ρ	'ov	/er	Ar [M	ch CA	ite]	ctu	re		Co	orte	ex-ľ	VIO/I	AR M0 ⁻	RM7 +/M	⊂AI 3/Ⅳ []	RM 14/N MC/	9 / //7- A]	ARI R4-	M11 -A8	/ A 9))	(Sc	ale		R 85	H 50	SH 2/	1- 4
	C166 C167 ST10F167/168/169	ST10F269, ST10F272, ST10F276,	C16111 C16511TAH EGOLD		SPA0000 XC166	VC3000 VE166 VC3000ED		TC1100, TC1130, TC1765, TC1775	TC1736, TC1782, TC1784, TC1784ED	TC1766, TC1766ED, TC1796, TC1796ED	TC1767, TC1767ED, TC1797, TC1797ED	TC1791, TC1793, TC1798, TC1798ED	TC22x, TC23x, TC23xED, TC24x,	TC26x TC26x,ED, TC27x, TC27xED	TC29x, TC29xED, future AURIX	PPC440, PPC460EX, PPC460GT	Xilinx XC5VFX Virtex5	MPC551x. MPC553x. MPC555x. MPC556x	MPC560x MPC563x MPC564x MPC566x		MICODIA, SICODO, SICODO, SICOD4A Secti Secteur Sectes	MDC 5725 MDC 5745 MDC 5775	SPC57× SPC58×	ADuC70xx. AT91Mx. AT91SAMx.	Ertec200p. EM773. i.MX21. i.MX25	LH7A400N0x. LPC2xxx. LPC3xxx	MAC7xxx. NetX10. NetX51. NetX100.	NUC100. NS7520. NET+ARM	STR7xx. ST30F77xx. STR91x	TMS470	i.MX31, i.MX35, i.MX37, IXP4x	PXA255/27x, XScale	i.MX51, OMAP35xx, AM35xx	Xilinx Zynq-7000	A2Fxx, AT91SAM3, EFM32x, EM773	FM3, FM4, LM3S, LPC1xxx, LPC4xxx	Kinetis K20 K30 K60 K80 KV40 KV5	STM32, TLE98xx, TMPx3, TX03	XMC1000, XMC4000, XMC4500, XMC4800	TMS570 RM4xx	RH850		SH7201, SH7211, SH7251, SH7254	SH7266, SH7267
UDE for C166	~	✓	·																																									
UDE for C166CBC			~	 ✓ 		L																																						
UDE for XC166					~																																							
UDE for TriCore							,	~	✓ .	~	✓	\checkmark																																
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CAN or CAN-BSL ¹	✓	✓			\checkmark	~	 ✓ 	1	/ 1 v	<1 V	1	1	1	√ 1	√ 1																	√ 2	✓	√ 2										
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AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, C166, ST10 Compilers - An Essential Part of Your Development Environment for the creation of Embedded Applications

We offer cross compiler packages for the AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166, ST10 families – HighTec (GNU), Wind River, Byte Craft, ImageCraft, and Renesas. The compilers are fully supported by the UDE. Using the Universal Debug Engine, you will be able to optimize the flexibility and efficiency of the selected compiler. A description of all supported compilers can be seen below. Since each compiler has its' own characteristics and features, please contact us if you have special development, or system requirements.

HIGHTEC GNU C/C++ TriCore, Power Architecture, ARM Compiler

The GNU C/C++ Compiler, for the TriCore, or ARM architecture is based on the GNU software. The GNU software was ported and modified by HighTec Systeme GmbH.

TriCore architecture support

- All TriCore derivatives are supported.
- Fast and flexible TriCore interrupt/trap interface.
- TriCore-optimized DSP support library (C++).
- PCP C compiler.

Power Architecture support

- Little-endian and big-endian format are supported.
- VLE and SPE are supported.

ARM architecture support

- Support of "ARM Procedure Call" standard.
- 32bit ARM and 16bit Thumb instruction code.
- Little-endian and big-endian format are supported.

Comp

Other compiler features

Supports the "ISO C" standard.

Debugging Support:

 When using UDE the complete symbolic information is used for C-level high-performance debugging.

Support and updates are included for 1 year.

TASKING C166, ST10, XE166, XC2000, TriCore, ARM C/C++

The Tasking compiler is designed for all derivatives of the C166, ST10, XE166, XC2000, TriCore and ARM microcontroller families. The generated program code shows compact size and excellent performance.

C166, ST10, XE166, XC2000 Architecture Support

- User stack model for function calls are supported (to speed up RTOS task switches).
- VX technology for optimization of code size/ speed.

TriCore Architecture Support

- PCP assembler support for the TriCore's PCP.
- Infineon Technologies TriCore EABI compliant.
- Language extensions for Embedded/DSP/TriCore.
- VX technology for optimization of code size/ speed.

ARM Architecture Support

• ARM Mode and Thumb Mode Code Generation.

Other Compiler Features

• ISO C'99 and ISO C++ 14882-1998 compliant.

- C-level interrupt functions.
- IEEE floating-point operations.
- Re-entrant code and libraries.
- Industry standard ELF / DWARF3.0 and IEEE-695 output formats.

C++ Compiler

 C++ features like Dynamic Allocation of Objects, Passing References, Operator Overloading, Data Hiding, and Inheritance, are supported.

Debugging Support

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

RTOS Support

• Nucleus PLUS (Mentor Graphics), CMX-RTX (CMX Company), and OSE (Enea).



Compiler

Tools by ARM KEIL/ARM and CA166 Compiler

The Keil/ARM C/C++ compiler is designed for all derivatives of the ARM7, ARM9, ARM11, and Cortex microcontroller families. The Keil CA166 compiler is designed for all derivatives of the C166, ST10, and XC166 microcontroller families.

ARM architecture support

- ARM Mode and Thumb/Thumb2 mode code function attributes for Hardware Support.
- C-level interrupt functions.
- User stack model for function calls are supported (to speed up RTOS task switches).
- Industry standard ELF / DWARF3.0 output format.
- Little-endian and big-endian format are supported.

C166, ST10, XC166 architecture support

- 7 memory models.
- Full pointer support for the 16K page architecture.
- C-level access to Special Function, MCU Registers.

Green Hills

Green Hills C/C++ Power Architecture Compiler

The Green Hills Software C/C++ compiler is designed for all derivatives of the PowerArchitecture microcontroller families.

Power Architecture support

 Highly optimized compiler in program execution speed and program size.

Compiler compatibility

- Standard (ANSI/ISO) C++.
- Embedded C++ (EC++) with Templates.
- K&R Mode and Extensions to ANSI C.
- GNU C/C++ Extensions.
- MISRA C.

Byte Craft eTPU C Compiler

The Byte Craft eTPU C compiler is designed for the Enhanced Time Processing Unit (eTPU).

eTPU architecture support

- Highly optimized generated code.
- eTPU compiler works in conjunction with a host CPU compiler, to create CPU/eTPU applications.

Other compiler features

- Enhanced memory management support.
- Object libraries can be included directly in C source files, using Absolute Code mode.
- Extensions to the C language designed specifically for the embedded systems developer.

Library Set

- C-interface and runtime library (different models).
- Floating point libraries.
- Re-entrant Run-time Library.
- Thread-safe Floating-point Operations.

Debugging Support:

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

RTOS Support

- ARTX-ARM (Keil).
- RTX 166 (Keil).
- CMX-RTX (CMX Company).

Debugging Support:

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

RTOS Support

INTEGRITY, velOSity, µ-velOSity royalty-free RTOS *

* on request.

The C Compiler Package Includes:

- Optimizing C Compiler.
- BCLink Linker.
- Build-in Macro Assembler.

Debugging Support:

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

Support and updates are included for 1 year.





WIND RIVER

Wind River C/C++ TriCore, Power Architecture, and ARM Compiler

The Wind River Compiler combines industry-leading optimization technology, with the flexibility and control needed to fully exploit today's complex CPUs.

TriCore architecture support

• All TriCore derivatives are supported.

Power Architecture support

- Diab technology.
- VLE support.

ARM architecture support

- ARM7, ARM9, ARM11, and Cortex support.
- ARM and Thumb instruction set support.

Compiler features

- Industry-leading optimization technology.
- Performance and code size.
- Designed for demanding embedded requirements.
- 100% C++ ANSI compliance.
- Interoperability with other development tools.
- Professional support.

Debugging Support:

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

Support and updates are included for 1 year.



Everywhere you imagine.

The RENESAS compiler has a powerful optimization function for exhibiting the microcomputer performance to its full capacity in order to create a compact code.

SH-2A architecture support

• All SuperH derivatives are supported.

Compiler features

- Optimising ANSI C and ANSI C++ compiler.
- Extended language function for the SuperH RISC engine family.
- Complies with C/C++ language in ANSI specification.
- Introduces the latest optimization technology developed for supercomputers.
- Extended language function for SuperH RISC engine family.
- Improved compile list output.

- Data types of 'long long' and 'unsigned long long' are supported.
- Standard object format (ELF/DWARF2).

Library set

Renesas C/C++ SH-2A Compiler

- Embedded C++ language spec-compliant class libraries.
- High performance DSP library optimized by DSP instruction.

Debugging Support:

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

CodeWarrior C/C++ Compiler for MPC55xx, MPC56xx, MPC57xx PowerArchitecture

The CodeWarrior Development Studio is designed for all derivatives of the NXP MCP55xx, MCP56xx, MCP57xx Power Architecture.

MPC55xx architecture support

 All NXP MPC55xx, MPC56xx, MPC57xx derivatives are supported.

Compiler Features

- VLE Support.
- Industry standard ELF /DWARF 2.0 output format.

Debugging Support:

 When using UDE, the complete symbolic information is used for C-level high-performance debugging.

Support and updates are included for 1 year.



RTOS Support

Need a Real-Time Operating System for Your Application?

Universal Debug Engine supports it.

HIGHTEC 🖌

PXROS Real-Time Kernel for TriCore, Power Architecture, ARM

PXROS stands for Portable eXtendable Real-Time Operating System. PXROS is a micro-kernel real-time operating system ported to run on TriCore, Power Architecture, and Cortex-M microcontrollers. PXROS allows you to design modern, object-oriented applications with independent tasks and associated handlers for high priority actions.

Manufacturer: HighTec EDV Systeme

- PXROS Real-Time Kernel.
- PXmon/ PXmon-RT Task Level Debugger.
- PXtcp TCP/ IP functionality.

Features

- PXROS-HR (TriCore) memory protection system.
- Pre-emptive multitasking.
- Scalable execution time.
- No interrupt locking for task switches.
- Implemented as C library.
- Small kernel code (7 to 14 kByte).
- Task execution management.
- Handling for dynamically allocated memory objects.
- Timer management.
- Compiler support: GNU, and TASKING.

CMX

CMX-RTX™ for TriCore, Power Architecture, ARM, Cortex-M, XC166

The CMX-RTX[™] Real-Time Operating System (RTOS) is a fully pre-emptive operating system, with a powerful set of system functions, very moderate memory requirements, and fast system response time.

Manufacturer: CMX Company

- CMX-RTX™ Real-Time Kernel.
- CMXBug[™] Task Level Debugger (include in the CMX-RTX package included).
- CMXTracker[™] CMX System activities logger.

Features

- Pre-emptive multitasking.
- Scalable execution time.
- Very small kernel code (approx. 5 kByte only).
- Fast context switch and interrupts.
- Handling for dynamically allocated memory objects.
- FREE System Level Debugger CMXBug™.
- Compiler support: KEIL, TASKING.



rcX – High Performance Real-Time Operating System

The Architecture of rcX is organized to provide excellent Hard-Real-Time performance for small to medium sized embedded netX applications. The internal Kernel arrangements covering the Object Data Structures, Intertask Communication Paths and the Time Management. They are highly optimized in their sizes and access speed.

Manufacturer:

Hilscher Gesellschaft für Systemautomation mbH

Features

- Pre-emptive Multitasking Kernel.
- Well-crafted Services for Semaphore, Mutex, Event, Message, and Queue.
- Memory and Timer-Objects.
- Dynamic creation of an unlimited number of Objects.
- Centralized configuration in one parameter-file.
- On-Chip-integrated in netX-ROM.



SAFERTOS for TriCore, PowerArchitecture, Cortex, ARM

SAFERTOS® is a safety certified Real Time Operating System (RTOS) for embedded processors. It delivers superior performance and pre-certified dependability, whilst utilizing minimal resources.

Manufacturer: WITTENSTEIN Group

Features

- Developed by WHIS, a safety systems company.
- Supports a wide range of international development standards.
- Based on the FreeRTOS functional model.
- Available pre-certified to IEC 61508-3 SIL 3.





KE

RTX – Real-Time Operating System

The Keil RTX is a royalty-free, deterministic Real-Time Operating System designed for ARM and Cortex-M devices. It allows you to create programs that simultaneously perform multiple functions and helps to create applications which are better structured and more easily maintained.

Manufacturer: ARM Ltd and ARM Germany GmbH

Features

- Royalty-free, deterministic RTOS with source code.

Nucleus PLUS for C166, TriCore, ARM

Nucleus PLUS for C166, or TriCore, is a portable, scalable, well-documented, and robust Real-Time Operating System (RTOS) for time-critical applications running on C166, TriCore, ARM7, and ARM9 microcontrollers.

Manufacturer: Mentor Graphics.

- Nucleus PLUS Real-Time Kernel.
- Nucleus DBUG+ Task Level Debugger for Nucleus PLUS.

Features

- Pre-emptive multitasking.
- Scalable execution times.
- No interrupt locking for task switches.
- C/OS-II The Real-Time Kernel

MicroC/OS-II Support for C166, TriCore, ARM

µC/OS-II, The Real-Time Kernel is a portable, ROMable, scalable, pre-emptive real-time, multitasking kernel for microprocessors and microcontrollers. µC/OS-II can manage up to 63 application tasks.

Manufacturer: Micrium

Features

- Semaphores and Event Flags.
- Mutual Exclusion Semaphores.

OSE Real-Time OS for C166, TriCore, ARM

The OSE Real-Time Operating System (RTOS) is a fully preemptive operating system for C166, ST10, TriCore, and ARM microcontrollers. The kernel has excellent performance due to its optimized handling of interrupts, dispatches, and memory allocation.

Manufacturer: Enea OSE Systems AB

- OSE Real Time Operating System. •
- OSE Simulator.
- OSE System Level Debugger.

Features

- Pre-emptive multitasking.
- Scalable execution time.
- No interrupt locking for task switches. .
- Basic set of 6 system calls, sufficient for the majority • of applications.
- Full compatible with other kernels in the OSE family.
- Very compact kernel code (6 kByte only).
- OSE inter-process communication management.
- Optional: Simulator, and System Level Debugger.
- Compiler support: TASKING.



- Flexible Scheduling: round-robin, pre-emptive, and collaborative.
- High-speed real-time operation with low interrupt latency.
- Small footprint for resource constrained systems.
- Unlimited number of tasks each with 254 priority levels.
- Unlimited number of mailboxes, semaphores, mutex, and timers.
- Support for multithreading and thread-safe operation.
- Source code included.
 - Implemented as C library.
 - Small kernel code (21...45 kByte).
 - Task execution management.
 - Task communication and synchronization management.
 - Handling for dynamically allocated memory objects.
 - Timer management.
 - Optional: System Level Debugger DBUG+.
 - Compiler support: TASKING, GNU.
 - No royalties for embedded code!

- Message Mailboxes and Queues. •
 - MISRA C Compliance, Source Code included.
 - Task Management (Create, Delete, Change Priority, Suspend/Resume etc.).
 - Fixed Sized Memory Block management.
 - Time Management.
 - No royalties for embedded code!

ORTI / Tessy Support Port

ORTI, the OSEK Run-Time Interface, supported by UDE

The OSEK Run Time Interface (ORTI) is a universal interface for development tools to the OSEK Operating System. The OSEK operating system is designed to represent a uniform environment, which supports efficient utilization of resources for automotive control unit application software. The OSEK operating system is a single processor operating system constructed especially for distributed embedded control units.

The ORTI Run Time interface allows the developer to display and evaluate information about the OSEK operating system, such as the state of the OSEK, its' performance, the state of different tasks, the different operating system objects, etc.

Support by Universal Debug Engine

The UDE, the Universal Debug Engine, features debugging on the kernel level. The ORTI support of UDE allows an easy access to the OSEK operating system objects, from within the debugger environment. The UDE interprets the symbol information from the ORTI file and displays the available objects in a separate view.

🖬 ORTI - C:\Samples\os.orti	
Name	Value 🔺
H Name	
🖃 Cyclic	
vs_ID	2
STATE	"OSEKOStaskStatus[2]&0x3" n
STACK	stack_0
vs_SHAREDST	FALSE
vs_REALPRIOR	1
vs_ASSIGNEDP	2
CURRENTACTI	"(OSEKOStaskStatus[2]&0x3)!=
vs_MAXACTIVA	1
vs_Event_Mask	0x0
vs_Event_Flags	0x0
🖃 Loop	
vs_ID	1
STATE	"OSEKOStaskStatus[1]&0x3" n
STACK	stack_1
vs_SHAREDST	TRUE
vs_REALPRIOR	0
100101/50.0	

The Universal Debug Engine realizes the ORTI view as ActiveX control and demonstrates the simple integration of new components into UDE via the COM technology.



Test automation with Universal Debug Engine

The test system TESSY from Razorcat, offers automated module testing of C code directly on the target system, using the Universal Debug Engine (UDE) debugging technology. It supports the whole unit testing cycle and works transparently on all target platforms currently supported by UDE.

As a UDE client, TESSY builds the complete test driver, including the necessary module environment, and controls the testing process. It allows systematic and reproducible testing in batch mode as well as step-by-step execution using test data from the TESSY database.

Since UDE is the underlying debug engine, all debugging features are available during the execution of the test. This allows debugging based on input data from the test database.

TESSY analyses the source code and recognizes the usage of variables and their respective types.

The interface information is stored separately from the test data and expected values.

Advantages with TESSY

- Systematic test case design using the classification tree method: Intuitive and easy to learn graphical representation of test specifications.
- **Quick overview** of test objects interface and variable usage within interface browser tools.

• Easy creation of module environment: Definition of unresolved references and all necessary stubs.



- **Automatic test driver generation**, test execution, and evaluation of test results.
- Test driver in client/server technology allows **unlimited number of test cases** and minimum code/data requirements on the target system.
- Powerful **support for regression testing**: An interface browser tool shows both, old and changed interfaces, and provides comfortable interface assignment which allows automatic re-usage of test data.

Development Tools



Curious About What the Universal Debug Engine Can Do for Your Application Development?

Interested in a Crash Course or Special AURIX, TriCore, PowerArchitecture, MCDS, Cortex and Universal Debug Engine Classes?

Are you interested in gaining expert's knowledge about development systems for the C166, ST10 and TriCore? Are you looking for support in configuring and launching your development environment?

Are you getting stuck in problems with your embedded application and need help?

In close cooperation with our partners in education we offer classes for all C166, ST10, XE166, XC2000, XE166, and TriCore related products. The contents of the classes may be fully adapted according to your special requirements. This way, immediate success is guaranteed when you start developing your application! You will be able to use all the tools of your embedded development tool chain efficiently right from the beginning - without the hassle of time-consuming, self-educating, trial-and-error methods!



Simply tell us your special questions or problems and we will construct and execute individual training classes for you or your entire department.

For example, one of our experienced staff members can personally teach you or your team, saving countless hours when back at your desk. We also offer technical consulting when working on your project.

Our goal is to enable you to work successfully with your development workbench, using all advanced features in a highly efficient way. Together, with an experienced support engineer on your side, we can turn problems into solutions!

Time and location of the classes may be scheduled according to your needs. We offer in-house classes at your site, as well as courses in our home office in Lauta, Germany.

Please contact us! Just fill in the Request Form on the last page of this booklet or give us a call. It would be our pleasure to offer you a customized quotation!

WILLERT SOFTWARE TOOLS

Independent Tool Selection Seminars

Our partner, Willert Software Tools GmbH, holds tool selection seminars on a regular basis. During these seminars you will be given the chance to install your previously purchased development environment and to start working with assistance. With the knowledge gained from this class, you will save time when launching your new project. *

An instructor is on duty and available to help you with all your questions and problems.

We would be pleased to send you detailed information. Just fill in the Request Form on the last page of this booklet or give us a call.



MICROCONSULT Debugging with UDE

This one-day class is held in cooperation with MicroConsult at their Munich / Germany headquarters or in-house with the customer. The class is especially intended for engineers and technicians employed in planning, development, preparing, and realizing complex embedded applications.

Based on your experience in application development with the C166, ST10, and TriCore architecture, you will be enabled to rate the features and performance of a debugger and to use it efficiently for development, testing, and maintenance.

Beside theory, you will also be presented hands-on instruction regarding how the Universal Debug Engine Integrated Development Environment is configured and adapted to supported target system hardware.

We would be pleased to serve you with detailed information about the agenda and upcoming classes. Just fill in the Request Form on the last page of this booklet or give us a call.

* Subject to previous knowledge and experience with similar development projects.



Packages Ordering Codes Overview - HLL Debugger UDE

UDE Access Device	UAD3+	UAD2⁺	UAD2 ^{pro}	fast-PC67C or fast-PC276C
Target MCU Host Communication	Host: USB2.0, IEEE1394b, Gigabit-Ethernet	Host: USB2.0, IEEE1394, Ethernet	Host: USB2.0	Host: PCI
TriCore / AURIX [MCA]				
JTAG / DAP OCDSL1	UDE-LIC-TC/UAD3+	UDE-LIC-TC/UAD2+ + UAD2-DAP-CB-10	UDE-LIC-TC/UAD2 ^{pro}	
OCDSL2 Trace Add-on	UDE-LIC-TC/UAD3+ Trace OCDSL2 Add-On 1-4 GByte			
Aurora Trace Add-on	UDE-LIC-TC-MCA/UAD3 ⁺ Aurora Trace Add-On 1-4 GByte			
MCDS UEC Add-on	UDE-LIC-TC-UEC	UDE-LIC-TC-UEC	UDE-TC-LIC-UEC	
ASC/CAN-Bootstrap Loader		UDE-LIC-TC/UAD2⁺	UDE-LIC-TC/UAD2 ^{pro}	UDE-LIC-TC/fast- PC276C/PCI
CAN-ROM / OCDSL1 Monitor Add-On		UDE-LIC-TC-Monitor	UDE-LIC-TC-Monitor	
Power Architecture [MCA]				
JTAG / OnCE	UDE-LIC-PA/UAD3⁺	UDE-LIC-PA/UAD2+	UDE-LIC-PA/UAD2pro	
Nexus Trace Add-on	UDE-LIC-PA-MCA/UAD3 ⁺ NEXUS Trace Add-On 1-4 GByte			
Aurora Trace Add-on	UDE-LIC-PA/UAD3⁺ Aurora Trace Add-On 1-4 GByte			
SPU UEC Add-on	UDE-LIC-PA-UEC	UDE-LIC-PA-UEC	UDE-LIC-PA-UEC	
XC2000, XE166				
JTAG / DAP OCDSL1	UDE-LIC-XC2000/UAD3+	UDE-LIC-XC2000/UAD2⁺ + UAD2⁺-DAP-CB-10	UDE-LIC-XC2000/UAD2pro	
MCDS UEC2 Add-on	UDE-LIC-XC2000-UEC2	UDE-LIC-XC2000-UEC2	UDE-LIC-XC2000-UEC2	
ASC-Bootstrap Loader		UDE-LIC-XC2000/UAD2+	UDE-LIC-XC2000/UAD2 ^{pro}	UDE-LIC-XC2000/fast- PC276C/PCI
CAN-Bootstrap Loader		UDE-LIC-XC2000/UAD2+	UDE-LIC-XC2000/UAD2pro	UDE-LIC-XC2000/fast- PC276C/PCI
ARM7, ARM9, ARM11, Cortex-	MO, Cortex-M3, Cortex-	M4, Cortex-M7, Cortex-	R4, Cortex-A8, Cortex-A	9, XScale
JTAG, SWD, ITM	UDE-LIC-CX/UAD3⁺	UDE-LIC-CX/UAD2*	UDE-LIC-CX/UAD2pro	
ETM Trace Add-on	UDE-LIC-CX/UAD3+ ETM Trace Add-On 1-4 GByte			
C166, ST10				
ASC/CAN-Bootstrap Loader		UDE-LIC-C166/UAD2+	UDE-LIC-C166/UAD2 ^{pro}	UDE-LIC-C166/fast- PC276C/PCI
ASC, SSC, CAN-ROM Monitor Add-on		UDE-LIC-C166-Monitor	UDE-LIC-C166-Monitor	UDE-LIC-C166-Mon
RH850				
JTAG	UDE-LIC-RH850/UAD3+		UDE-LIC-RH850/UAD2pro	
SH-2A	1			
JTAG	UDE-LIC-SH2A/UAD3+	UDE-LIC-SH2A/UAD2+	UDE-LIC-SH2A/UAD2 ^{pro}	

1) ST10F2xx only 2) not recommended for new projects





Package Content - HLL Debugger Universal Debug Engine

UDE-LIC-xx/UAD3⁺	Universal HLL-Debugger with Universal Access Device 3 ⁺ Communication System		
	target interface: see table 'Ordering Codes', host interfaces: USB2.0,	IEEE1394b (FireWire™),	
	Ethernet (TCP/IP) manual engl., software CD, Universal Access Devic	e, JTAG Pod, JTAG	
	Adapter, power supply, support & updates: 1 year included	(Windows Vista, Windows 7/8.1)	
UDE-LIC-xx/UAD2+	Universal HLL-Debugger with Universal Access Device 2* Communication System		
	target interface: see table 'Ordering Codes', galvanically isolated		
	host interfaces: USB2.0, IEEE1394 (FireWire™), Ethernet (TCP/IP)		
	manual engl., software CD, Universal Access Device, JTAG Extender (cable + pod),	
	power supply, support & updates: 1 year included	(Windows Vista, Windows 7/8.1)	
UDE-LIC-xx/UAD2 ^{pro}	Universal HLL-Debugger with Universal Access Device 2 Communica	ation System	
	target interface: see table 'Ordering Codes', host interface: USB2.0		
	manual, software CD, Universal Access Device, JTAG cable, power su	pply,	
	support & updates: 1 year included	(Windows Vista, Windows 7/8.1)	
UDE-LIC-xx/	Universal HLL-Debugger with fast-PC276C/PCI Communication Syst	tem	
fast-PC276C/PCI	target interface: see table 'Ordering Codes', host interface: PCI, optionally PCMCIA instead		
	of fast-PC67C/PCI, manual engl., software CD, optionally CAN / ASC	k cable	
	support & updates: 1 year included	(Windows Vista, Windows 7/8.1)	

Universal Debug Engine Add-Ons

UDE-LIC-xx A+	Architecture upgrade to C166, ST10, C166CBC, XC166, TriCore, Power Architecture, ARM,
	XScale
UDE-LIC-xx V+	Add-On for UDE-LIC-xx
	Support of rcX or RTX or OSEK Run Time Interface ORTI or uC/OS II or PXROS or Nucleus or CMX or Illuminator (OSE)
UDE-LIC-xx-	FLASH/OTP Memory Programming Tool, Add-On of ODE,
MemTool	custom specific configuration, manual engl., support & updates: 1 year included

Support / Service

UDE-SRVC	Maintenance and Support for additional one year via PLS Hotline and free
	updates for Universal Debug Engine UDE-xx

FLASH/OTP Memory Programming Tool

UDE-LIC-xx- MemTool/UAD3 ⁺	FLASH/OTP Memory Programming Tool via JTAG/DAP Universal Access Device 3 ⁺ , custom specific configurat support & updates: 1 year included	/SWD/OnCE ion, manual engl., (Windows Vista, Windows 7/8.1)
UDE-LIC-xx- MemTool/UAD2 ⁺	FLASH/OTP Memory Programming Tool via ASC, CAN, Universal Access Device 2 ⁺ , serial cable, custom specifi support & updates: 1 year included	JTAG/DAP/SWD/OnCE ic configuration, manual engl., (Windows Vista, Windows 7/8.1)
UDE-LIC-xx- MemTool/UAD2 ^{pro}	FLASH/OTP Memory Programming Tool via ASC, CAN, Universal Access Device 2 ^{pro} , custom specific configura support & updates: 1 year included (JTAG/DAP/SWD/OnCE ation, manual engl., Windows Vista, Windows 7/8.1)
UDE-LIC-xx- MemTool/ fast-PC276/PCI	FLASH/OTP Memory Programming Tool via ASCx, CAN fast-PC67C/PCI card, serial cable, custom specific conf support & updates: 1 year included (I, figuration, manual engl., (Windows Vista, Windows 7/8.1)
UDE-LIC-xx- MemTool/Custom	FLASH/OTP Memory Programming Tool, custom speci Development Service	ific extension,



Packages

C/C++ Cross Compiler

GNU C/C++ PA	C/C++ Compiler for Power Architecture, Assembler, Linker/ Locator,
(HighTec)	support & updates: 1 year, manual engl. (HighTec)
GNU C/C++ TriCore	C/C++ Compiler for TriCore, Assembler, Linker/ Locator for TriCore incl. TriCore-optimized DSP
(HighTec)	support Library and virtual I/O, support & updates: 1 year, manual engl. (HighTec)
GNU C/C++ ARM	C/C++ Compiler for ARM, Assembler, Linker/ Locator,
(HighTec)	support & updates: 1 year, manual engl. (HighTec)

RTOS / CASE

PXROS-HR	Enhanced Real-Time Operating System for TriCore, Power Architecture, Cortex-M supports Memory Protection Unit, PXview, PXmon
PXROS Basis Communication	PXtcp including TCP/IP socket, PPP and drivers
rcX for NetX	rcX Real-Time Kernel (Hilscher) for NetX-10 Architecture
RTX RTOS	RTX Real-Time Operating System for ARM / Cortex-M devices
CMX-RTX RTOS	Real-Time Operating System for C166, ST10, XC166, TriCore, ARM, Power Architecture CMXBug, no royalties Real Time Log for CMX_RTX
CMX-TRACKER	
μC/OS-II	Real-Time Kernel for C166, ST10, XC166, TriCore, ARM, Power Architecture
EasyCODE-STD	EasyCASE(C++) / EasyCODE(C++) Standard, CASE Tool for Structured and Object-Oriented Programming with C and C++ Structograms, incl. Project and Editor
EasyCODE-PRO	EasyCASE(C++) / EasyCODE(C++) Professional, incl. Project, Project Browser and Editor Modules
EasyCODE-DEV	EasyCASE(C++) / EasyCODE(C++) Developer, incl. Project, Project Browser, Documentation and Editor Modules

Evaluation License and Boards

UDE-EVAL UDE-STK/XC2000	Evaluation License Universal Debug Engine (valid for 1 month) The evaluation fee will be credited if UDE is purchased after evaluation, Microcontroller Starterkit based on Evaluation board XC2000 including Starterkit version of Universal Debug Engine
UDE-STK/XMC1000	Microcontroller Starterkit based on Evaluation board Cortex-M3 including Starterkit version of Universal Debug Engine
UDE-STK/PPC	Microcontroller Starterkit based on Evaluation board PowerArchitecture including Starterkit version of Universal Debug Engine
UDE-STK/TC275	Microcontroller Starterkit based on Evaluation board with TriCore TC275 including Starterkit version of Universal Debug Engine

For further information and tools selection, please give us a call or email your special configuration needs. We would be glad to serve you when selecting components for your complete AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166 and ST10 Development Environment.

Volume discounts, conditions for educational institutions and further configurations upon request. All products are suitable for PC/AT and up running Microsoft Windows®Vista, Windows®7, Windows®8 (certain restrictions may apply to select products). Customer specific adaptations and manufacturing upon request. Prices excl. VAT and S/H. Payment terms: 30 days net. The German "Allgemeine Bedingungen für Lieferungen und Leistungen der Elektroindustrie" (General Conditions for Supplies and Services in the Electronics Industry) apply. Previous price lists void upon appearance of this catalogue. Above data is not considered complete and is intended for information only. Due to price adjustments parts of this list may be out of date. Please request your personal quotation.

Development Tools



Development Packages for TriCore AURIX and PowerArchitecture

To support you while choosing tools for your development environment, we have set up complete packages of optimally matching components to provide a quick and hassle-free project launch. Please request your personal quotation.

Professional Package for TriCore AURIX

Universal Debug Engine	Integrated Development Environment for TriCore,	Special Package Features
	HLL Full Screen Debugger,	JTAG/DAP Debugging,
	Communication Hardware Universal Access Device,	FLASH Programming,
	manual engl., software CD (Windows Vista, 7/8.1)	Professional RTOS included!
C/C++ Compiler	TriCore-Compiler Package incl. C/C++ Compiler,	GNU industry-standard compiler!
	Macro Assembler, Linker/ Locator (GNU)	Support and update service 1 year.
Universal Access Device 3+	Communication system for flexible target system access	Easy adaptation to your specific
	via JTAG/DAP and Aurora or trace	target system hardware via
	host interfaces: IEEE1394 (FireWire™), USB2.0, Gigabit-	JTAG/DAP and Universal Access
	Ethernet, incl. serial cable, power supply (110/220V AC)	Device 3+.
PXROS	Real-Time Operating System for TriCore, PXROS	
	development platform, including GNU C/C++, PXmon-RT,	
	PXemu, PXutil, supported compilers: GNU/Tasking	
TriBoard TC275A	Infineon Starter Kit with TC275A Evaluation Board	Support and update service 1 year.

Advanced Package for PowerArchitecture

Universal Debug Engine	Integrated Development Environment for	Special Package Features
	PowerArchitecture, HLL Full Screen Debugger,	JTAG/OnCE Debugging,
	Communication Hardware Universal Access Device,	FLASH Programming,
	manual engl., software CD (Windows Vista, 7/8.1)	RTOS ready.
C/C++ Compiler	Compiler Package incl. C/C++ Compiler,	GNU industry-standard compiler!
·	Macro Assembler, Linker/ Locator (GNU)	Support and update service 1 year.
Universal Access Device 2pro	Communication system for flexible target system access	Easy adaptation to your specific
	via JTAG, host interfaces: USB 2.0	target system hardware via
	incl. serial cable, power supply (110/220V AC)	JTAG/OnCE and UAD2 pro.
Starterkit board	PowerArchitecture Starter Kit with Evaluation Board	Support and update service 1 year.

Advanced Package for XC2000 or XMC1000

Universal Debug Engine	Integrated Development Environment for	Special Package Features
	XC2000/XMC1000, HLL Full Screen Debugger,	JTAG/DAP/SWD Debugging,
	Communication Hardware Universal Access Device,	FLASH Programming,
	manual engl., software CD (Windows Vista, 7/8.1)	RTOS ready.
C/C++ Compiler	Compiler Package incl. C/C++ Compiler,	GNU industry-standard compiler!
	Macro Assembler, Linker/ Locator	Support and update service 1 year.
Universal Access Device 2 ^{pro}	Communication system for flexible target system access	Easy adaptation to your specific
	via JTAG/OCDS, host interfaces: USB 2.0	target system hardware via
	incl. serial cable, power supply (110/220V AC)	JTAG/DAP/SWD and UAD2 pro.
Starterkit board	Starter Kit with XC2000 or XMC1000 Evaluation Board	Support and update service 1 year.



Support & Updates alles

Update and Upgrade

When you purchase a Universal Debug Engine Integrated Development Environment, you get a FREE Update Service for the Universal Debug Engine HLL Debugger for 12 months. The Update Service includes approximately two new software releases of the products including documentation, regular product news and updates, or upgrades of other development environment components (compiler, editor, evaluation hardware, etc.) at a favourable price.

General Conditions for the Updates Service:

- The Update Service is available for PLS products only.
- Updates/Upgrades for Universal Debug Engine cannot be separated for technical reasons.
- PLS offers a generous one-year warranty, which begins on the date of purchase. During this time, the Update Service is free of charge, without limitation.
- The Update Service starts when the Service Form is delivered to PLS.

- When the one-year warranty comes to an end, the Update Service and Support is available at a cost of 20 percent of the current list price of the product needing the extended Update Service and Support.
- If the Updates Service lapses and you do not immediately renewed it, an additional 10 percent reentry fee, in addition to the 20 percent of the current list price of product, will be charged.
- PLS delivers software and documentation updates on CD, disk, download, or via e-mail. Printed documentation updates are available upon request.
- Necessary updates for other (non-PLS) products for the latest version (e.g. Compiler, CodeWright, EasyCODE,) are not included and may be purchased separately.

Please contact us for your personalized quote.

Use only ONE Support Hotline for the Development Environment.

For questions or problems, we offer you our Technical Support Hotline. We specialize in supporting your entire development environment including interaction between the tools. Just give us a call, send a fax, or email and have the following information handy:

- Problem description (as detailed as possible).
- Tool names, their version, and serial numbers.
- Host platform operating system, PC type.
- Sample data or files to reconstruct the problem at PLS.

Problem files should be sent to PLS by email. Your query is usually processed within one day. All sensitive data will be protected against unauthorized access. Additionally, the latest technical information about our whole product spectrum is available on our Website.





 Phone:
 Toll Free: +1 (877) 77DEBUG (U.S. only) +49 (35722) 384-0

 Fax
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 eMail:
 support@pls-mc.com

 WWW:
 www.pls-mc.com
 General Conditions for obtaining PLS Technical Support:

- The PLS Technical Support is available for PLS and non-PLS products purchased at PLS and authorized distributors only.
- Getting Technical Support by PLS requires a valid and current Update Service (Maintenance) contract along with conditions described there.
- The PLS product warranty is one-year and begins on the date of purchase. During this time, the Technical Support is free of charge, without limitation. Non-PLS products may have different support periods, which we are obliged to observe.
- The Technical Support is available from the day of purchase.
- Technical Support covered by this Maintenance Contract is available via telephone, fax, email, or internet. On-site technical support is not part of the Maintenance contract - please ask for a quotation if required.
- It is required that the latest release of the Integrated Development Environment components are installed to receive technical support.

Development Tools

• Due to the given complexity, it is not possible to provide comprehensive application development support for a customer's individual project

Reference List

Auerswald GmbH	Cremlingen
Beckhoff Industrie Elektronik GmbH	Verl
Bizerba GmbH & Co. KG	Balingen
BMW AG	München
The Bosch Group	Worldwide
Carl Zeiss Jena GmbH	Jena
Conti Temic microelectronic GmbH	Worldwide
Daimler Chrysler AG	Stuttgart
Delphi	Worldwide
Eppendorf Instrumente GmbH	Hamburg
Hauni Maschinenbau AG	Hamburg
Heidelberg Finishing GmbH	Ludwigsburg
Infineon Technologies AG	Worldwide
LEAR Automotive Electronics GmbH	Kronach
Liebherr-Components Biberach GmbH	Biberach
Richard Wolf GmbH	Knittlingen
Robert Bosch GmbH	Stuttgart
Securiton AG	Zöllighofen, Schweiz
Sick AG	Reute
Siemens AG	Fürth
Sony-Wega Produktions GmbH	Stuttgart
United Automotive Electronic Systems Co., Ltd.	Shanghai
Voith Turbo GmbH & Co. KG	Heidenheim
Vector Informatik	Stuttgart
Volkswagen AG	Wolfsburg
WMF	Geislingen
Woodward Governor Company	Stuttgart



Going to Order

To find the special solution for your Development Task needs, please contact us, or your local distributor.

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Company Profile

What Can We Do For You? Your Success Is Our Goal.

PLS Programmierbare Logik & Systeme GmbH is one of the leading manufacturers of development tools for 16/32bit microcontroller applications, specializing in the AURIX, TriCore, PowerArchitecture, Cortex, ARM, XE166, XC2000, XScale, SH-2A, C166 and ST10 derivatives. PLS provides the following products and services:

- Consulting service in the tools selection phase to help assemble a complete development environment for fast project start-up.
- The PLS product line incorporates all the hardware and software tools for a complete development environment including HLL Debugger, Make tool, Compiler, Assembler, Monitor Development Toolkit, Emulators, Version Control System, professional editor, and Real-Time Operating System.
- Classes, including hands-on training, are being held in cooperation with MicroConsult of Munich/Germany, and Willert Software Tools of Bückeburg/Germany, to ensure a quick and hassle-free project launch, even if the controller architecture is not yet known to your developer team.
- All tools purchased from PLS are supported by PLS. Using PLS for your development project guarantees one-stop support for your entire project.

At PLS, we understand that tools are just part of a complex system for application engineering. We offer our customers advanced one-stop support to guarantee successful application development. We do our best to help you save on development time, allowing you to meet time-to-market goals.

For instant start-up, complete development tool packages containing all necessary components which offer our customers an optimum development tools suite.

To ensure your success, our team of experienced and highly motivated engineers is constantly improving the quality of our products and support.

In-house development, direct sales, permanent contact between the customer and PLS, and feedback for future product development guarantee short response time to customer needs.

PLS is certified of the quality management system in accordance with **DIN EN ISO 9001:2008**.

PLS products and services are available world-wide through our head office in Germany and from numerous distributors.

Just contact us - We look forward to help you!

Please visit our home page <u>http://www.pls-mc.com</u> for the latest information about PLS products.

PLS offers a download area for fast update services of latest UDE product versions.





Development Tools

Info Request

Have questions or need further information? Let us send you a quote today! For even faster service, please fill in the request form and fax for your individualized quote!

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INFO REQUEST

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Development Tools

Please send me information about the topics checked below.

Please send a quotation about the topics checked below.

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Name:	Fax:	
Department:	Email:	
Address:		
City / State:		
Country / ZIP:		
Universal Debug Engine		MCDS Emulation Device Support
Universal Access Device		Universal Emulation Configurator
		Multi-core (MCA) debugging Support
MCDS / NEXUS / ETM / ETB / ITM / PTM Trace Support		Profiling Support
JTAG / DAP / SWD On-chip Debug Support		Code Coverage Support
Debugging via CAN		Eclipse Support
FLASH/OTP In-System Programming		PXROS-HR Support
Monitor Development Kit		CIF Support
CANopen Support		GTM / eTPU / SPU Support
TriCore Support:derivativ	/e? 🗌	Evaluation Boards and Starterkits
Power Architecture Support:derivativ	/e?	New Power Architecture, Cortex, TriCore controller
Cortex Support:derivativ	/e?	DAvE Digital Application Engineer
XE166, XC2000 Support:derivativ	/e?	Product Training
ARM Support:derivativ	/e?	Updates / Maintenance
XScale Support:derivativ	ve?	
SH-2A Support:derivativ	/e?	
C166 / ST10 Support:derivativ	/e?	Administration, European Currency
RTOS Support:vendo	or?	Distributors and Marketing
C/C++ Compiler:vende	or?	Upcoming Trade Shows and Events