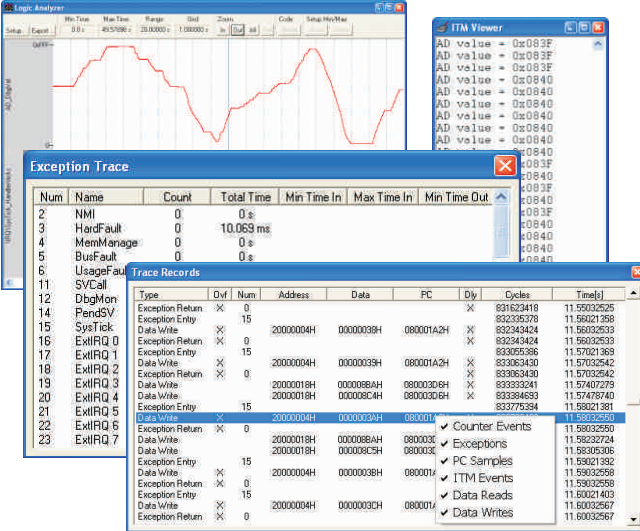# KEIL™
An ARM® Company

Newsletter 2009

ULINK*Pro* Debug and Trace Unit

ULINK®*Pro* is a new debug unit that allows real-time data and instruction trace streaming via USB.

Features	ULINK2	ULINK*Pro*
Run control debug (ARM & Cortex-Mx)	Yes	Yes
Run control debug (8051 & C166)	Yes	-
Data Trace (Cortex-M3)	Yes	Yes
Instruction Trace (Cortex-M3)	-	Yes
Performance		
JTAG Clock speed	10MHz	50MHz
Flash Download	28KByte/s	600KByte/s
Data Trace streaming	500Kbit/s	100Mbit/s

Data Trace: available for Cortex™-M3 based devices using Serial Wire Viewer (SWV) or ETM™.

Data Trace Windows provide information from the running target for program data, exceptions, variables, and printf-style outputs

Instruction (ETM) Trace: requires a Cortex-M3 device with ETM. It records instruction by instruction program execution.

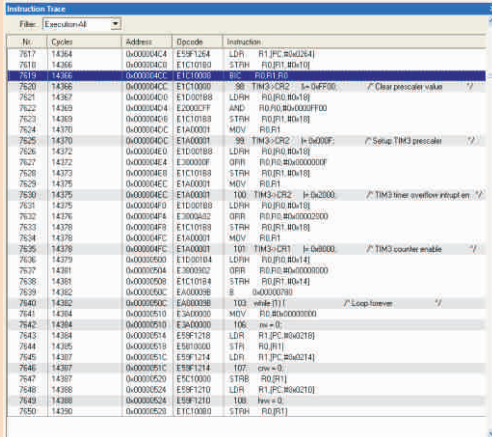More information: **www.keil.com/ULINKPro**

µVision4
Enhanced for Productivity

ULINK*Pro*
Fast Debug and Trace Unit

Keil Cx51 and C166
Latest Devices and Features

RTOS & Middleware
New Features and Improvements

MDK-ARM and MPS
Cortex MCU Development

Instruction Trace on Cortex-M3 enables instruction by instruction analysis of application behavior

2009

µVision4 IDE and Debugger

The **Disassembly** Window and **Source** Windows are fully synchronized making program debugging and cursor navigation easier.

Debug Restore Views allow you to save multiple window layouts. You can quickly select the view which best suits your program analysis.

Monitor 1
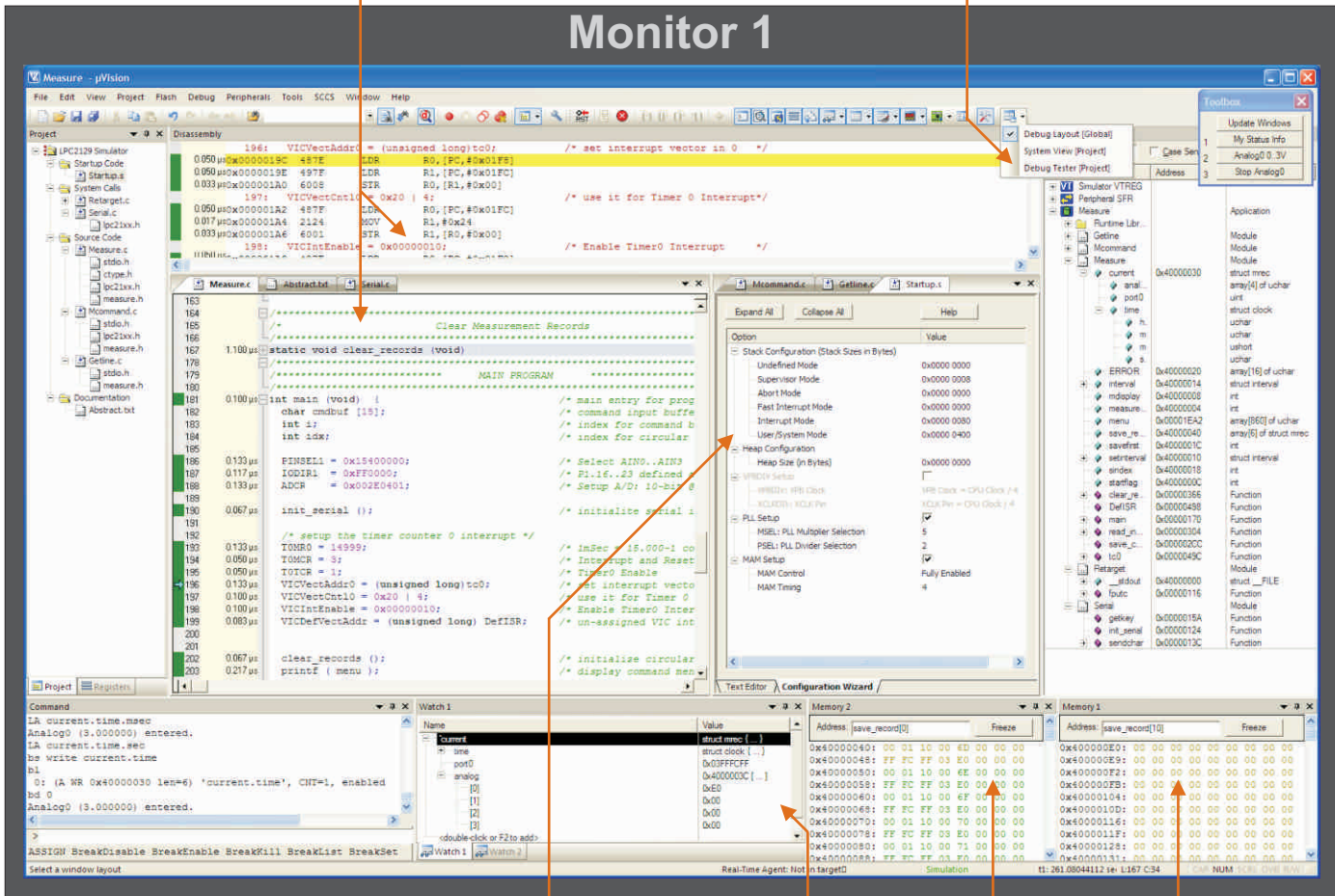
The **Configuration Wizard** provides an easy way to set up tool and device parameters for your application. The dialogs are based on the specific device selected from the µVision4 integrated Device Database.

µVision4 enables you to drag and drop individual windows anywhere on the visual surface. This increases your flexibility, for instance, you may have multiple memory and variable watch windows.

The flexible window management system introduced in **µVision4** enables you to use multiple monitors and provides complete control over window placement. This new interface allows you to make better use of your screen space and to organise multiple windows.
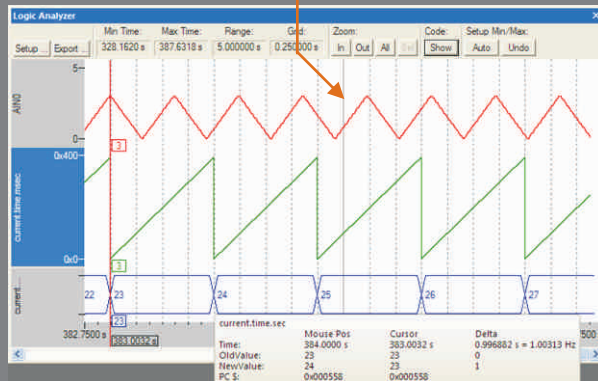
Application development often requires working with more than one project at the same time, for instance working on a bootloader and application programs. The µVision **Multi-Project Workspace** combines several projects and simplifies the build and debug process of such applications.

Visit **www.keil.com/uv4** for more information about µVision4.

µVision4 IDE and Debugger

The **Logic Anlayzer** is used to graphically display variable changes in simulation or from data trace captured on a Cortex-M3 based MCU.

Call Stack Window allows you to view current call nesting including variable values. By clicking on a function name you can browse to the location where it was called.

Monitor 2

The **Source Browser** displays information about symbol and variable definitions and their usage in your program. You can navigte through your source code using the F12 key and the Source Browser window.

The µVision4 **System Viewer** windows provide information of device peripheral register contents. Detailed status information is available and can be changed directly from within the System Viewer window.

The µVision Device Simulation has been updated to support many new devices such as Infineon XC88x, SiLABS C8051Fxx, Atmel SAM7/9, and Cortex-M3 MCUs from Luminary, NXP, and Toshiba. These models can be expanded to include additional peripherals using AGSI DLLs.

To connect to various target hardware, µVision supports interfaces for many debug adapters including ADI miDAS-Link, Atmel SAM-ICE, Infineon DAS, and ST-Link. µVision has also been expanded to support data and instruction trace capabilities for ARM and Cortex MCUs.

Development Tools News

RTX - Faster and Smaller

RTX now supports multi-threading for standard ANSI C run-time library functions. The RAM requirements are reduced; and the Cortex-M3 implementation has been further enhanced for execution speed. RTX is available for most ARM and Cortex-Mx processor-based MCUs.

Flash File System

New features of RL-Flash:

Faster SD Card Interface

By implementing a file cache the speed for reading and writing to SD cards is increased by at least 4 times.

FAT32 File Support

A FAT32 file system, sub-folders and long file names are now supported. Sub-folders and long file names may also be used with the FAT12 or FAT16 file systems.

More information: **www.keil.com/rl-arm**

Cx51

µVision4 will be introduced into the Keil Cx51 tools during Q2/09. Additions to Cx51 include new ULINK2 flash and debug support for the Infineon XC800 family and the NXP LPC952/954 family debug interface.

New Device Support in Cx51 Development Tools		
Analog Devices	Energy Measurement	ADE5xx, ADE7xx
Evatronix	Configurable 8051 IP	R8051XC, T8051
Infineon	Embedded Power ICs	TLE78xx, XC878
NXP	General Purpose	LPC95x, 93xx
Ramtron	F-RAM Enhanced	VRS51Lxx
Silicon Labs	Analog Mixed Signal	F36x, F41x, F9xx, T600
Syntek	General Purpose	STK603x

More information: **www.keil.com/C51**

C166

The Keil C166 tools use the System Viewer windows to provide information for all Infineon XC2000 and XE166 device peripherals. New device support has been added for the latest XC22xx, XC23xx, XC27xx, and XE16x families. µVision4 will be added to Keil C166 development tools during Q2/09.

More information: **www.keil.com/C166**

TCPnet Networking Suite

TCP/IP and UDP are easy to implement using the **TCPnet** Networking Suite provided within the ARTX166 Advanced RTOS and RL-ARM Real-Time Library.

New enhancements to TCPnet include:

Ajax Support

The HTTP Server has been expanded to support the **XMLHttpRequest** object enabling data to be retrieved from the server asynchronously (in the background), for dynamic screen updates.

HTTP File Upload

This new feature allows uploading of files via a standard web browser e.g. to upload a new firmware or configuration.

Multicast UDP Datagrams (IGMP)

Datagrams can be sent simultaneously to several devices using the Internet Group Management Protocol.

New Evaluation Boards

- **MCB1700** - NXP (Cortex-M3) with Ethernet, CAN, USB-Host/OTG, QVGA LCD and MicroSD card
- **MCBTMPM330** - Toshiba (Cortex-M3) with 512KB Flash, 32KB SRAM, ETM, ADC, UART's, and 79 GPIO
- **MCBSTM32E** - ST (Cortex-M3) with QVGA LCD, ETM, USB, joystick, and MicroSD card interface
- **MCB2470** - NXP (ARM7TDMI) with Ethernet, CAN, USB-Host/OTG, and QVGA LCD with Touchscreen
- **MCB2900** - NXP (ARM968E-S) with USB Host/OTG, Dual CAN, LIN and QVGA LCD
- **MCBZ32AN** - Zilog (ARM922T) with 32MB SDRAM, 4MB NOR Flash, USB OTG, and MicroSD card interface

More information: **www.keil.com/boards**
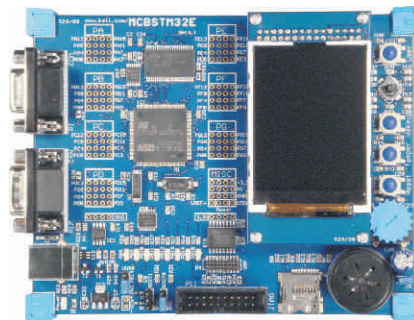
MCBSTM32E for evaluation of the STM32E family

Development Tools for ARM and Cortex-Mx Devices

MDK-ARM

In addition to the new features available in µVision4, MDK-ARM v4.0 includes new compiler enhancements, and is the first tool kit to be compliant with the CMSIS standard.

ARM Cortex-M0 Support

MDK-ARM now supports the ARM Cortex-M0 processor-based devices being released by several MCU vendors.

Link-Time Code Generation

Enables multi-file compilation that performs the following additional code optimizations:

- Function in-lining across modules
- Removing un-referenced variables and functions
- Optimizing memory accesses by re-arraning variables
- Re-using memory pools where possible
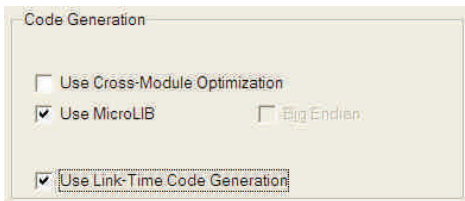
*Link-Time code generation is selected in the µVision Options - Target dialog*

More information: **www.keil.com/arm**

Microcontroller Prototyping System

The ARM MPS provides a system in which you can prototype a custom Cortex-Mx processor-based design.

The Microcontroller Prototyping System (MPS) features:

- Cortex-M3 or Cortex-M0 processor operating at up to 50MHz in FPGA
- Altera Stratix III (EP3SL50) FPGA for system prototyping
- CAN, FlexRay, RS232, DVI, USB, Ethernet, Audio, MMC
- Free synthesis and Place and Route Tool
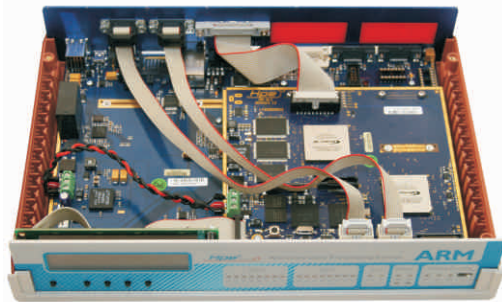
MPS for Cortex-Mx processor-based designs

The platform is delivered with a comprehensive example AHB system allowing you to quickly add your own and third-party IP; it also includes MDK-ARM (Eval) & ULINK2 enabling fast software development.

More information regarding MPS is available at:

www.arm.com/products/DevTools/mps.html

Cortex Microcontroller Software Interface Standard (CMSIS)

CMSIS provides common standard for interfacing software applications to peripherals, RTOS, and middleware components used on ARM Cortex-M3 and Cortex-M0 processor-based devices.

As part of CMSIS, ARM provides the following software layers for various compiler implementations:

- **Core Peripheral Access Layer:** name and address definitions, helper functions for core register and peripheral access, and a device independent interface for RTOS Kernels including debug channel definitions.
- **Middleware Access Layer:** common methods to access device specific peripherals used by middleware components.

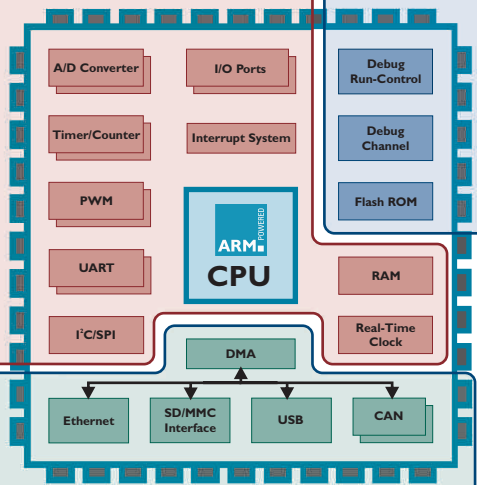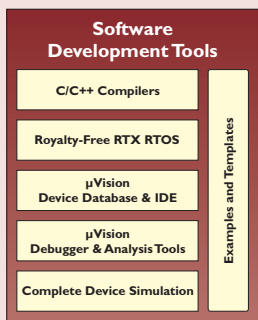Further information and download: **www.onArm.com**
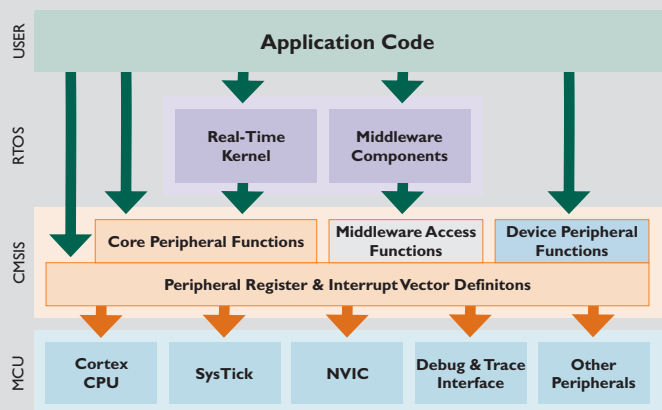
CMSIS Overview

Microcontroller Development Tools

C and C++ Development Tools

- Best-in-class Keil and ARM compilers for small, fast code
- Genuine Keil μVision® IDE/Debugger/Simulator
- Fast development and verification using Device Simulation
- Easy device configuration with Device Database support for more than 1,700 devices

Software Development Tools

- C/C++ Compilers
- Royalty-Free RTX RTOS
- μVision Device Database & IDE
- μVision Debugger & Analysis Tools
- Complete Device Simulation

Examples and Templates

CPU block diagram

- A/D Converter
- I/O Ports
- Debug Run-Control
- Timer/Counter
- Interrupt System
- Debug Channel
- PWM
- Flash ROM
- UART
- **ARM** POWERED **CPU**
- RAM
- I²C/SPI
- Real-Time Clock
- DMA
- Ethernet
- SD/MMC Interface
- USB
- CAN

RTOS and Middleware Components

- RTX RTOS Source Code
- TCPnet Networking Suite
- Flash File System
- USB Device Interface
- CAN Interface

Examples and Templates

RTOS and Middleware

- Easy implementation of complex applications
- Royalty-free RTX Real-Time Kernel
- TCP/IP Suite with Server Applications
- File System for ROM and Memory Cards
- Direct suport for USB and CAN interfaces
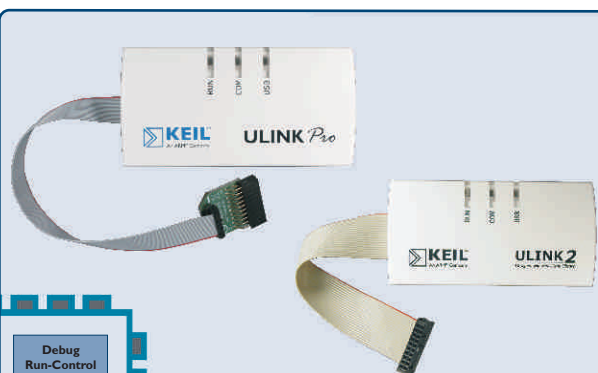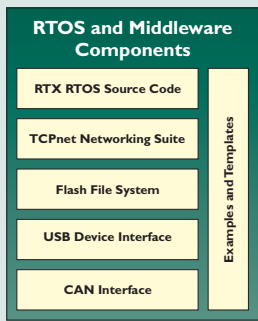
ULINK® USB Adapters

- Debugging and Flash Download
- ARM device support
- Data Trace for Cortex-M3
- ARM Instruction Trace (ULINK*Pro*)
- 8 and 16-bit support (ULINK2)

Evaluation Boards
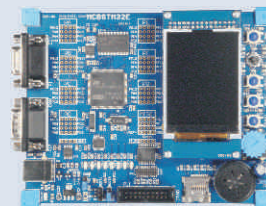
Keil provides a wide range of evaluation boards for 8, 16 and 32-bit devices

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Program examples and detailed technical information are available from your distributor and our web site (www.keil.com).