

μVision2 Device Support

The μ Vision2 IDE supports more than 400 different devices from 25 different silicon vendors. Keil Software is constantly enhancing the popular μ Vision2 development platform and adding support for new 8051, 251, C16x and ST10 devices.

The μ Vision2 Debugger allows program testing for almost all these devices using either a ROM monitor, an OCDS/JTAG interface, or the integrated simulator providing full peripheral simulation. The capabilities of the μ Vision2 debugger may also be expanded with user-supplied DLL's.

C51 Compiler Version 7

C51 Version 7 defines a new standard for code efficiency and fulfills the requirements of cost-efficient single-chip designs. The PK51 Professional Developer's Kit provides chip support for advanced 8051 variants like the **Philips 51MX** and **Dallas 390**. Support is added for extended memory, special memory areas, and variable banking. The new **ISD51 In-System Debugger** allows in-system testing of standard 8051 target systems.

C251 Compiler Version 3.5

The Keil C251 Compiler is the de facto industry standard for the advanced 251 architecture. C251 Version 3.5 supports new 251 devices from Atmel (C251Basic Line, 251SmartCard, @Web C251) and provides code banking. For detailed information refer to www.keil.com/c251.

C166 Compiler Version 5

C166 Version 5 unlocks the features and the performance of the Infineon C16x, XC16x, and ST10 devices. Version 5 improves code density, includes an EC++ Compiler, supports the XC16x devices, provides OCDS debugging, and offers device simulation for the entire family of C16x/ST10 microcontrollers.

The **Keil MCB167-NET** board is the standard hardware for embedded Internet applications. The Keil TCP/IP SDK (System Developer's Kit) gives you everything you need to develop TCP/IP solutions with the 16x/ST10 microcontroller family.



KEIL[™]
SOFTWARE



μVISION 2

C51

Version 7
Extended Device Support

C251

Version 3.5
With Code Banking Support

C166

Version 5
New EC++ Compiler

This Newsletter Contains Information About:

C51 Single Chip Support	Page 2
C51 Extended Device Support	Page 3
C166 Compiler Version 5	Page 4
TCP/IP Solutions with Keil C166	Page 5
μ Vision2 Device Database [™]	Page 6
μ Vision2 Supports ARM7TDMI	Page 7

New Code Optimizations

C51 Version 7 adds new optimizations that generate smaller programs and help you put more features in less code space (so you can fit larger programs in single-chip devices).

- **Dynamic Register Allocation** puts more variables in registers and reduces code (fewer MOV instructions are generated) and data space (less overlaid data is required).
- **Common Tail Optimization** combines identical code in conditional statement blocks and further reduces code space.

Linker Code Packing

Linker Code Packing (available only in the PK51 Professional Developer's Kit) analyzes and optimizes your entire program. **AJMP** and **ACALL** instructions are used (instead of **LJMP** and **LCALL**) and subroutines are generated for common code blocks.

Full Device Simulation

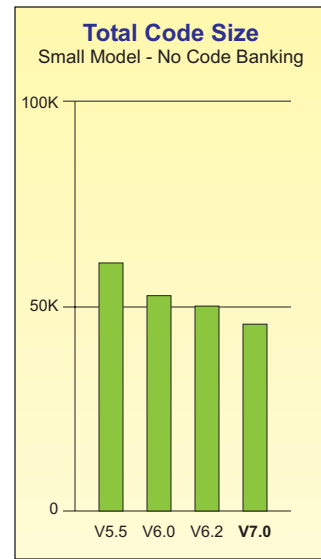
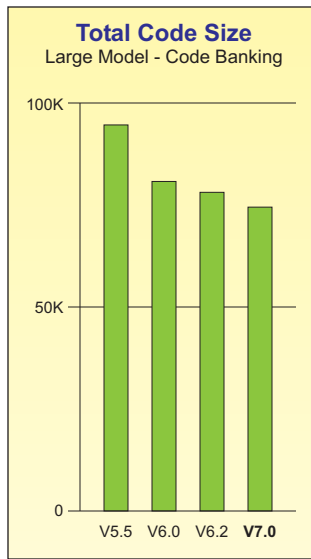
The μ Vision2 Debugger includes full on-chip peripheral simulation and helps you debug your single-chip applications faster than ever.

ISD51 In-System Debugger

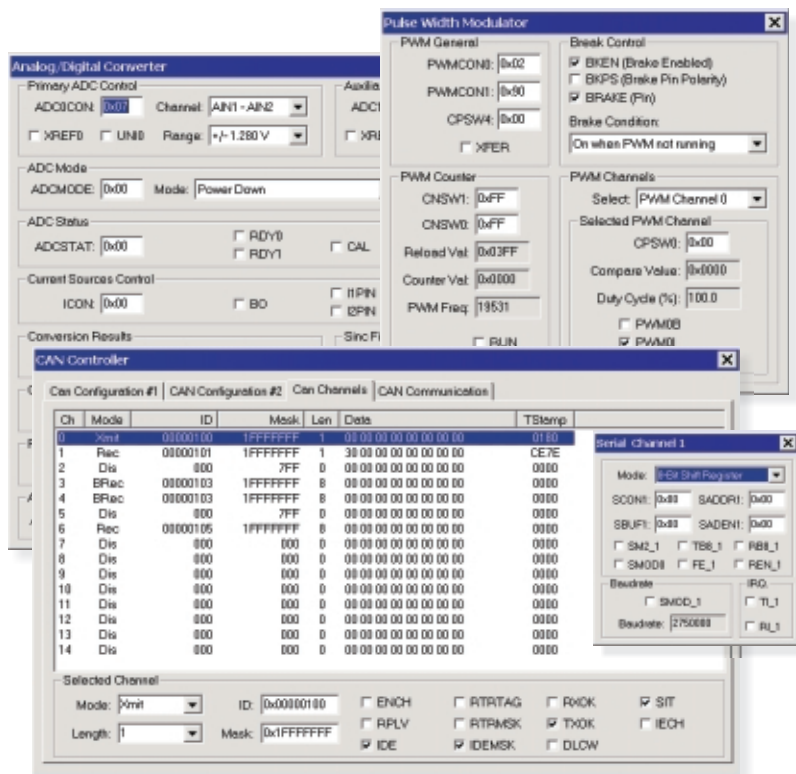
ISD51 is a new debug monitor technology which works in all standard 8051 target systems with no hardware modifications. ISD51 is a small module (530 bytes) that you link to your application. Using a standard 8051 serial port, ISD51 provides:

- Real-time program execution and single-stepping.
- Multiple software breakpoints (and hardware breakpoints on some devices).
- Access to CPU registers, all memory spaces, and SFRs.
- Support for single-chip devices like the Philips LPC and Infineon C868.

For more information and configuration details refer to www.keil.com/c51.



C51 Version 7 continues to shrink the size of your 8051 applications. Check www.keil.com/benchmks for detailed code comparisons.



The μ Vision2 Debugger provides complete simulation for the on-chip peripherals of more than 135 devices. Included are: CAN, I²C, PWM, ADC, DAC, EEPROM, UART, Timers, and more.

Advanced Chip Support

The PK51 Professional Developer's Kit provides compiler and debugger support for the advanced capabilities of many new 8051 variants. Features like math acceleration, large stack space, and enhanced data pointers improve the performance of your applications.

The μ Vision2 debugger includes full device simulation which allows you to develop and test software modules before the hardware is available. This shortens time-to-market.

Extended Memory Support

The Keil C51 Compiler now provides two user-configurable memory types, **far** and **const far**, for accessing the extended address spaces of many new 8051 devices such as:

- Dallas Semiconductor DS80C390.
- Philips 80C51MX.
- Analog Devices MicroConverters.

Alternatively, you may use **far** and **const far** to access special memory areas like:

- FLASH and EEPROM memory.
- Strings in code-banked ROM.
- Any weird memory configuration.

Once configured, you may use variables in these memory spaces as easily and transparently as variables in the standard 8051 memory spaces.

MCBx51 Evaluation Board

The Keil MCBx51 Evaluation Board introduces you to the 8051 and 251 microcontroller family. This evaluation board includes 2K-limited versions of the Keil 8051 and Keil 251 development tools. The MCBx51 allows you to investigate the capabilities of the 8051 and 251 and create real working programs.

MCBx51 supports numerous PLCC44 8051 and 251 device variants including many high-speed versions. Detailed information about the MCBx51 board and devices supported may be found at www.keil.com/mcbx51.

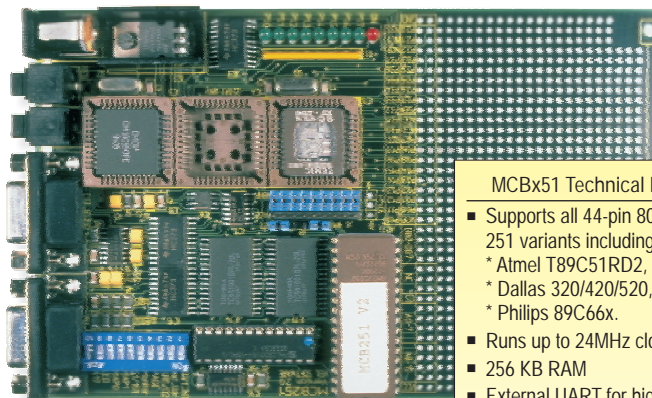
Extended 8051 Device Overview

- **Philips 51MX** provides 8MB code and 8MB xdata space and adds CPU instructions for generic pointer access.
- **Dallas 390** provides 16MB code and 16MB xdata space and adds math accelerator and 24-bit JMP instructions.
- **Analog Devices MicroConverters** provide 16MB xdata space with a high-precision A/D converter.
- **Atmel** provides several 8051 derivatives with on-chip EEPROM that may be accessed using the **far** memory types.

Keil 8051 Development Tool Kits

Components	PK51	DK51	CA51
MACRO Assembler	✓	✓	✓
C Compiler	✓	✓	✓
BL51 Code Banking Linker	✓	✓	✓
μ Vision2 IDE	✓	✓	✓
μ Vision2 Debugger	✓	✓	
LX51 Extended Linker	✓		
Support for Extended Devices Like...			
Analog Devices MicroConverters	✓		
Dallas 390, and the Philips 51MX			
RTX51 Tiny Real-Time Kernel	✓		

The table above lists the components included in each of the Keil 8051 Development Tool Kits.



MCBx51 Technical Data

- Supports all 44-pin 8051 and 251 variants including
 - * Atmel T89C51RD2,
 - * Dallas 320/420/520,
 - * Philips 89C66x.
- Runs up to 24MHz clock
- 256 KB RAM
- External UART for high-speed debugger interface.
- Prototyping area: 3.8" x 2.2".

New Code Optimizations

Keil C166 uses leading compiler technology to generate the most efficient code for the C16x/ST10 microcontrollers. Version 5 adds two new optimizations that increase program efficiency:

- **Dynamic Register Allocation** puts more variables in registers and reduces code (fewer MOV instructions are generated) and data space (less stack space is required).
- **Common Tail Optimization** combines identical code in conditional statement blocks and further reduces code space.

XLARGE Memory Model

Keil C166 provides linear memory models (**HCOMPACT**, **HLARGE**, **XLARGE**) which provide optimum use of the extended instruction set. The new **XLARGE** memory model is designed for applications with huge data requirements.

Embedded C++

Keil C166 Version 5 includes an efficient Embedded C++ compiler based on the industry standard EDG front-end. EC++ avoids the painful overhead involved with C++ programming. Keil C166/EC++ includes numerous C16x/ST10-specific language extensions.

Full Device Simulation

μVision2 includes full on-chip peripheral simulation and debug dialogs help you to test C16x/ST10 applications faster than ever.

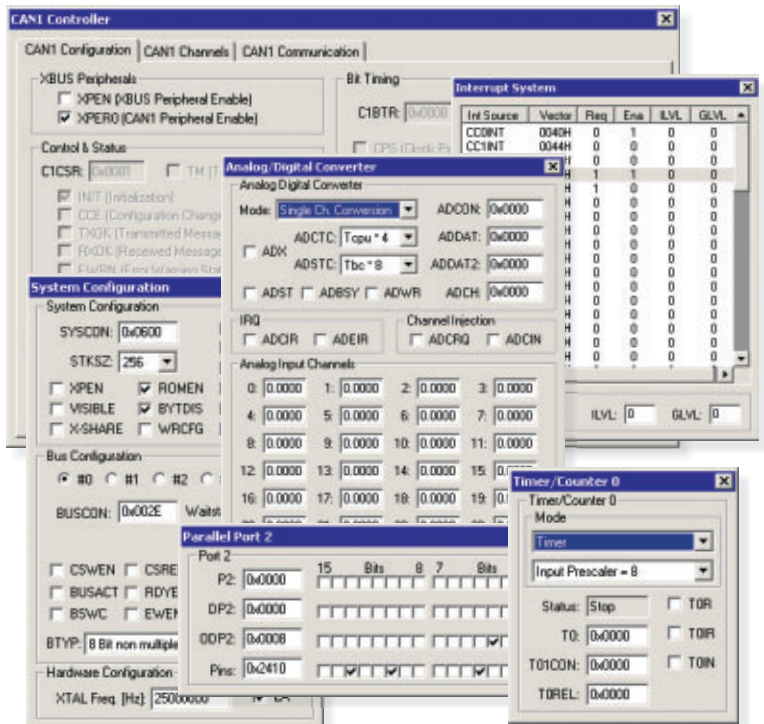
OCDS Debugging Support

Keil C166 Version 5 supports all C16x/ST10 variants including the new XC166 devices. New variants integrate on-chip debugging system (OCDS) which may be connected to the μVision2 Debugger via a PC LPT port or USB port using the Keil USB-JTAG Link.

For more information about Keil C166 Version 5, refer to www.keil.com/c166.

C166 Version 5 Benefits

- New optimizations improve code density and reduce data space requirements.
- Support for all Infineon C16x and ST10 device variants including the new XC16x and Super I/O architecture.
- New XLARGE memory model provide large data accesses.
- 64KB near data area available in all memory models.
- Optimum bit-field access with I66 bit and BFLD instructions.
- C support for byte-aligned int, long, float, and struct variables.
- Built-in support for the ST10-2xx and XC166 MAC unit.
- Includes EC++ compiler optimized for C16x/ST10 devices.
- Full device simulation support including debug dialogs.
- Powerful target debugger supports OCDS debugging via PC LPT port or the Keil USB-JTAG Link.
- Built-in interface for the RTX166 real-time operating system.
- Complete debugging information included in object modules.
- Supported by all emulator vendors.



The μVision2 Debugger provides debug dialogs and complete simulation for the on-chip peripherals. Fully simulated are: A/D converter, CAN, TwinCAN CAPCOM, ASC, SSC, PWM, PEC, Timers, Watchdog, I/O Ports, and more.

Keil MCB167-NET Board

The Keil MCB167-NET evaluation board is a high-speed single-board computer that supports all variants of the Infineon C167 and ST Microelectronics ST10-I67/I68. It offers two CAN interfaces and an Ethernet controller for embedded TCP/IP applications.

The MCB167-NET runs at speeds up to 50MHz and is in-system programmable using I67 FLASH derivatives or external FLASH memory devices.

TCP/IP Applications

Detailed application notes for the Keil MCB167-NET board may be found at www.keil.com/appnotes. For instance, *AppNote 164: Tiny TCP/IP Stack and Web Server* includes complete C source for a small web server and a TCP/IP socket. Several examples using commercial TCP/IP stacks are also available for the Keil C166 C Compiler and the MCB167-NET board.

TCP/IP SDK

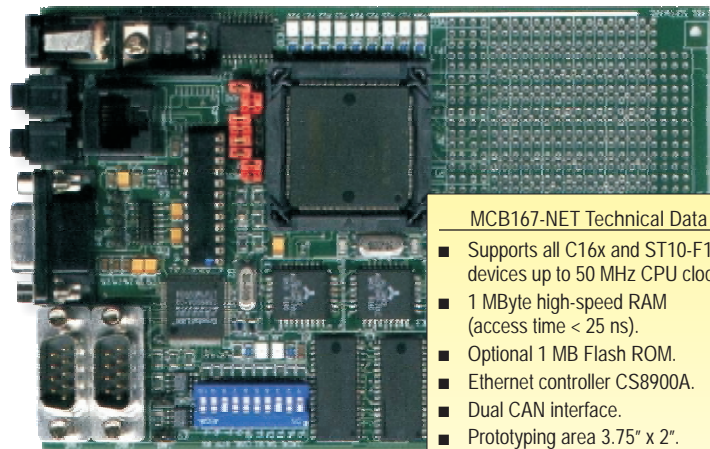
The Keil/US Software TCP/IP SDK (System Developers Kit) gives you everything you need to create C16x/ST10 TCP/IP applications. It includes the Keil PKI66, MCB167-NET, and RTX166 RTOS and the US Software USNET TCP/IP Stack.

USNET is a portable embedded TCP/IP stack designed specifically for embedded applications. It provides high-performance and versatility for embedded applications which require a TCP/IP network connection.

USNET includes pre-integrated support for the Keil MCB167-NET Evaluation Board and the RTX166 real-time kernel which allows you to implement complex, time-critical software projects incorporating TCP/IP.

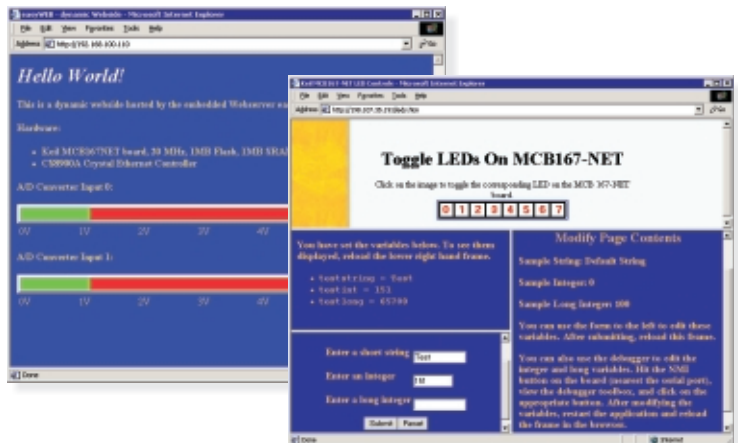
RTX166 is fully integrated into the C166 compiler and μ Vision2 IDE and Debugger environment.

For more details about TCP/IP solutions refer to www.keil.com/mcb167net.

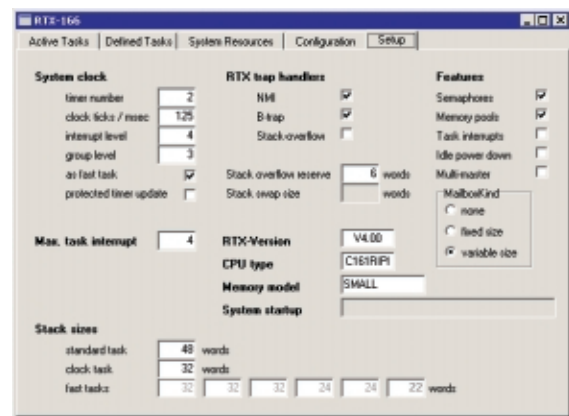


MCB167-NET Technical Data

- Supports all C16x and ST10-F168 devices up to 50 MHz CPU clock.
- 1 MByte high-speed RAM (access time < 25 ns).
- Optional 1 MB Flash ROM.
- Ethernet controller CS8900A.
- Dual CAN interface.
- Prototyping area 3.75" x 2".



Application notes at www.keil.com/appnotes introduce TCP/IP solutions from numerous stack vendors.

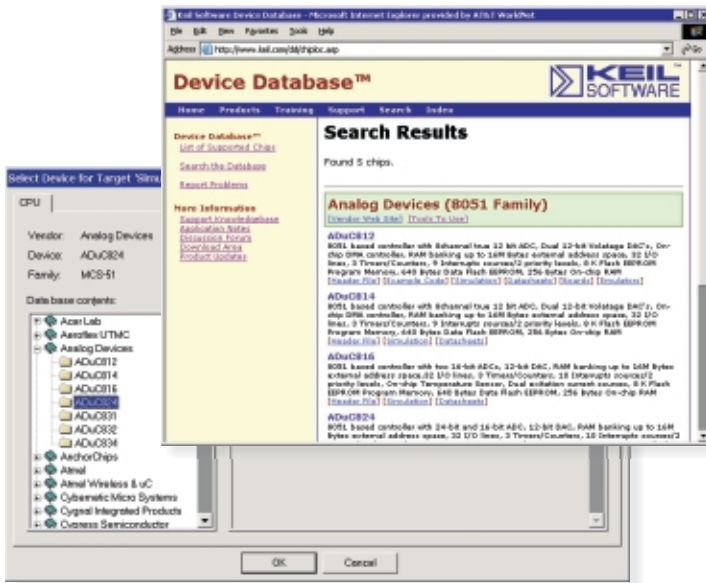


RTX166 dialogs in the μ Vision2 Debugger support kernel-aware debugging and provide detailed real-time kernel and task status.

Extensive Web Information

The Device Database™ (available on the web and in µVision2) provides detailed information about the devices supported by the Keil development tools. When you begin an embedded application, you should start with the web-based Device Database™ to locate:

- Header files which define special function registers for the device.
- Example code that helps you get started programming the on-chip peripherals.
- Details about simulated peripherals within the µVision2 Debugger.
- Third-party tools that help you develop your embedded applications.
- Evaluation boards that get you started quickly.



The Device Database™ contains web information and configures your tools.

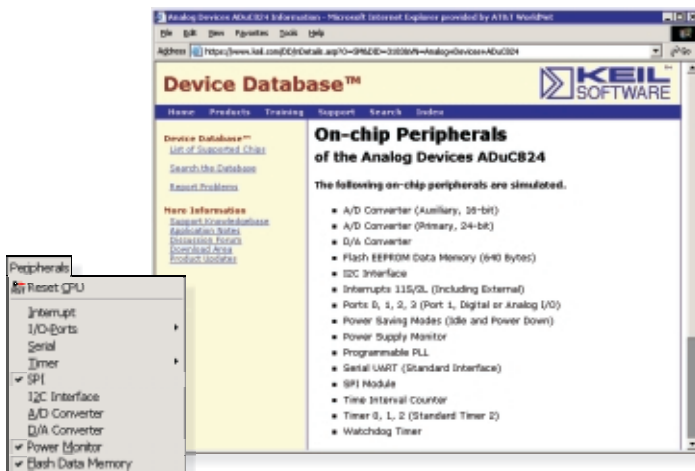
Simplifies Tool Configuration

When starting a new project in µVision2, you must select the target device from the Device Database™. This sets all required tool options and customizes project dialogs.

µVision2 displays only relevant options for the device selected and prevents you from selecting incompatible directives. Only seven dialogs are required to completely configure all tools including the assembler, compiler, linker, and debugger.

Chip-Specific Dialogs

The Device Database™ configures the µVision2 Debugger and enables chip-specific dialogs for on-chip peripherals. This simplifies testing your peripheral drivers in simulation or target debugging mode.

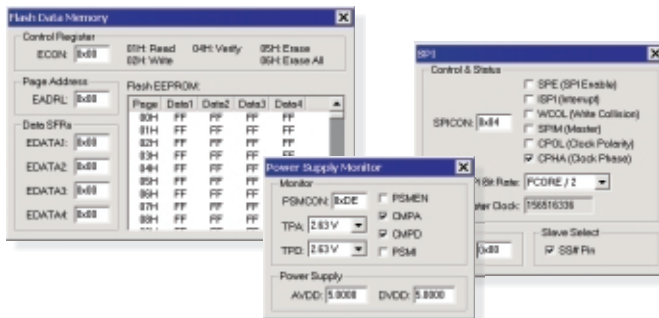


Peripheral simulation is available for most devices.

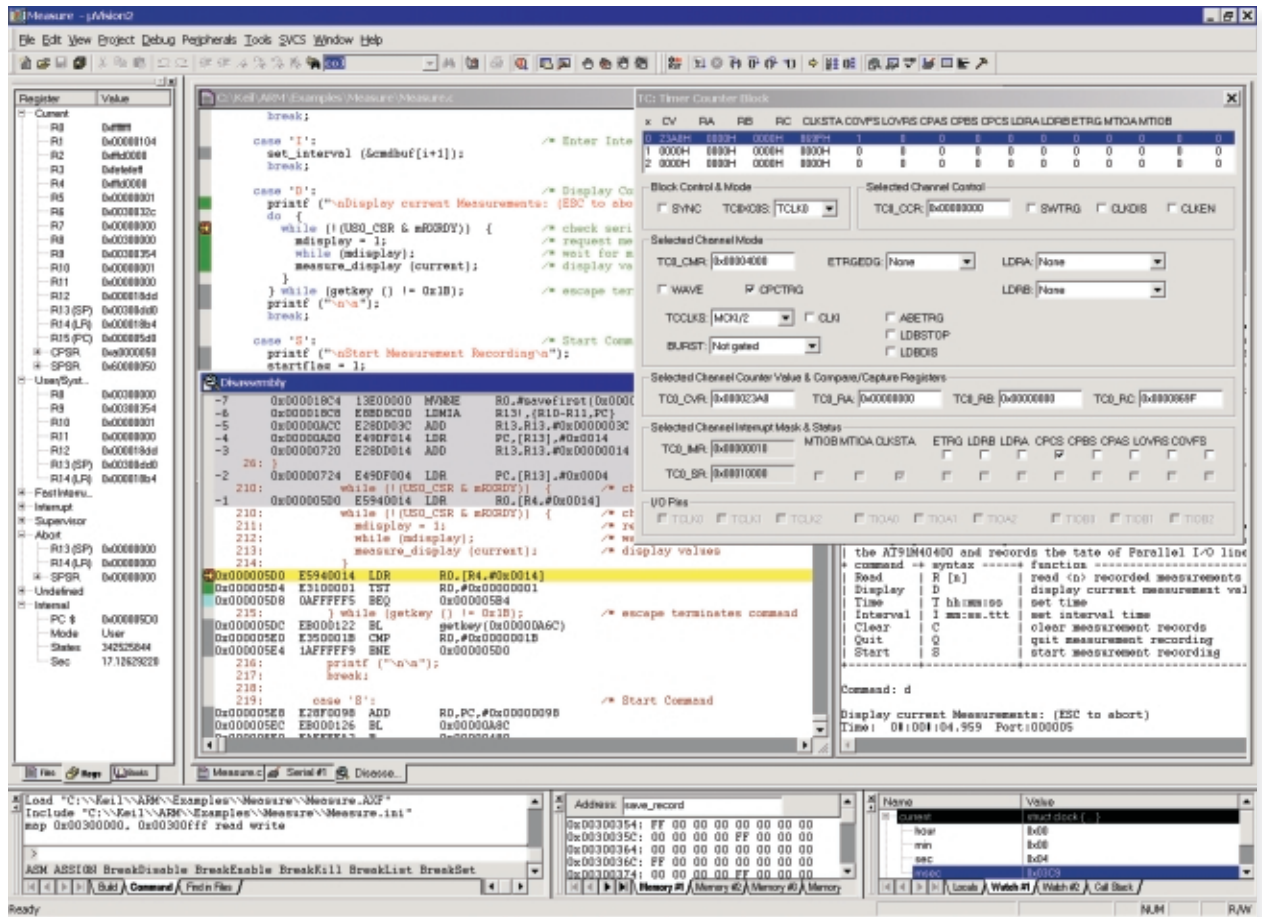
New Device Support

Frequent updates to the Device Database™ ensure that the µVision2 IDE always supports the latest 8051, 251, C16x, and ST10 devices.

To find out more information about the Device Database™ and the chips supported refer to www.keil.com/dd.



Peripheral dialogs are available in simulation and target debugging mode.



In July 2002 the µVision2 IDE incorporates support for the popular 32-bit ARM7TDMI architecture. Initially, the Atmel AT91xxx devices are supported followed by ARM7 chips from other silicon vendors.

The µVision2 Debugger provides source-level, symbolic simulation and in-circuit debugging.

Simulation: The µVision2 Debugger simulates the complete instruction set as well as the on-chip peripherals of the selected device. Dialogs are provided for viewing and changing peripheral settings. A built-in C script language may be used to provide input into the simulated device.

In-circuit Debugging: The µVision2 Debugger uses the Keil USB-JTAG Link to interface to the on-chip ICE of the ARM7TDMI devices.

For more information and product details visit www.keil.com/arm.

µVision2/ARM Features

- Powerful, easy-to-use IDE for the GNU or ARM development tools.
- Integrated Command Database™ simplifies toolset configuration.
- High-speed CPU/peripheral simulator.
- Dialogs are provided for all on-chip peripherals.
- C script functions allow you to add functionality and generate signals for on-chip peripherals.
- Simulation may be expanded with user-provided DLLs that simulate external peripherals.
- Extensive data and code coverage analysis and performance analyzer.
- Automated test procedures in batch or DDE mode.
- USB interface to target hardware using the Keil USB-JTAG link.

At Keil Software we **don't** make a compiler for every different architecture. We concentrate on just a few chip families and support those very well. That's why Keil C compilers lead the way in code quality, flexibility, and reliability. Most of our customers will agree that we have the best development tools for the 8051, 251, C16x, and ST10 microcontroller families.

Another plus is service and support. All Keil products include one year of free technical support and updates.

On our web site at www.keil.com we provide product information and a multitude of application notes. The technical support knowledge base (available 24 hours a day) contains over 1500 articles that answer most technical questions while the discussion forum allows you to share questions and ideas with colleagues around the world.

Only the μ Vision2 Debugger includes full peripheral simulation for on-chip peripherals of more than 100 different controllers. This makes it possible to test your whole target application - even when hardware is unavailable. The following table exemplifies this with the Philips LPC peripheral set:

Simulated LPC Peripherals	762	764	767	768	769
Interrupt System	✓	✓	✓	✓	✓
I/O Ports (all modes)	✓	✓	✓	✓	✓
Timers (including pin toggle)	✓	✓	✓	✓	✓
Watchdog Timer	✓	✓	✓	✓	✓
Pulse Width Modulation				✓	✓
Enhanced Serial UART	✓	✓	✓	✓	✓
I ² C Interface	✓	✓	✓	✓	✓
Keypad Interrupt	✓	✓	✓	✓	✓
Analog Comparator	✓	✓	✓	✓	✓
A/D Converter			✓	✓	✓
D/A Converter					✓
CPU Slowdown Modes	✓	✓	✓	✓	✓

