

Keil Development Tools for the Infineon C16x and XC16x microcontrollers use leading compiler technology to generate the most efficient code possible. The C166 Compiler is fully integrated into the  $\mu$ Vision3 IDE/Debugger which combines Project Management, Source Code Editing, Program Debugging, and Flash Programming in a single, powerful environment. This brochure provides details about the:

- C166 C Compiler and ECI66 Embedded C++ Compiler.
- Infineon XC16x Devices Currently Available.
- ULINK USB-JTAG Adapter for Debugging & Flash Programming.

Detailed information for the  $\mu$ Vision3 IDE/Debugger is provided in the  **$\mu$ Vision3 Quick Start** guide that explains features such as Editor Functions, Configuration Wizard, Function & Template Window, CPU & Peripheral Simulation, Logic Analyzer, Target Debugging and Flash Programming. Ask your Keil representative for a copy of this brochure.

# XC16x Newsletter

The screenshot displays the Keil  $\mu$ Vision3 IDE interface. The main window shows the source code for a project named 'Measure'. The code includes functions for handling escape keys, task management, and a main loop that reads an analog-to-digital converter (ADC) value and displays it. A 'Logic Analyzer' window is overlaid on the code, showing a digital signal trace with a red waveform and a time scale from 0.0814892 Sec to 0.08248 Sec. A 'Serial #1' window shows the output of the program, including the message 'Analog0 (5.000000) entered.' and the current time and ADC measurements: 'Time: 0:00:07.390 P2:3412 AN0:4.59V AN1:2.99V AN2:1.29V AN3:4.19V'. The 'Analog/Digital Converter' window is also visible, showing the configuration for the ADC, including the mode 'Single Ch. Conversion' and the conversion result '0x0003'. The bottom of the IDE shows the 'Output Window' with the command 'Build' and the 'Watchers' window displaying the current time and ADC measurements.

*$\mu$ Vision3 integrates the development tools in a single, intelligent environment and supports all C16x and XC16x devices.*

The ANSI standard Keil C166 compiler is specifically designed for the XC16x and C16x microcontroller families. Extensions incorporated into the compiler support all resources of your embedded hardware and allow efficient access to interrupts, register banks, SFRs, and memory spaces.

## Configuration Wizard

The  $\mu$ Vision3 configuration wizard simplifies editing the startup code (and many other configuration files). A graphical interface helps you quickly select the options that match your target system and easily spot potential startup problems.

## Embedded C++

Keil C166 Version 5 includes an efficient Embedded C++ compiler. EC++ is a new, evolving C++ standard for embedded systems that avoids the overhead involved with C++ programming. The Keil EC++ implementation includes numerous I66-specific language extensions.

## In-Line Assembly

A new, updated in-line assembler enables you to insert assembly instructions directly into your program and offers:

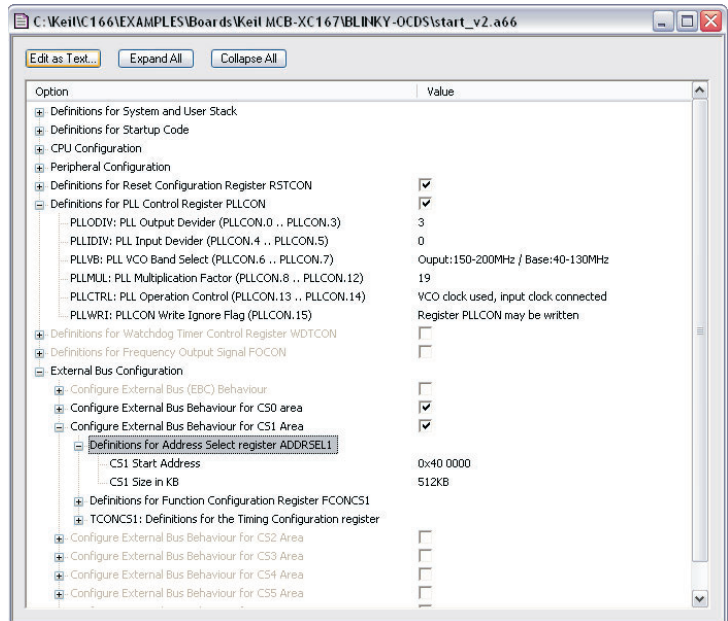
- Access to C program variables by name,
- C-level debugging information (source-level and symbolic),
- Optimized MAC instruction utilization.

## Function In-lining

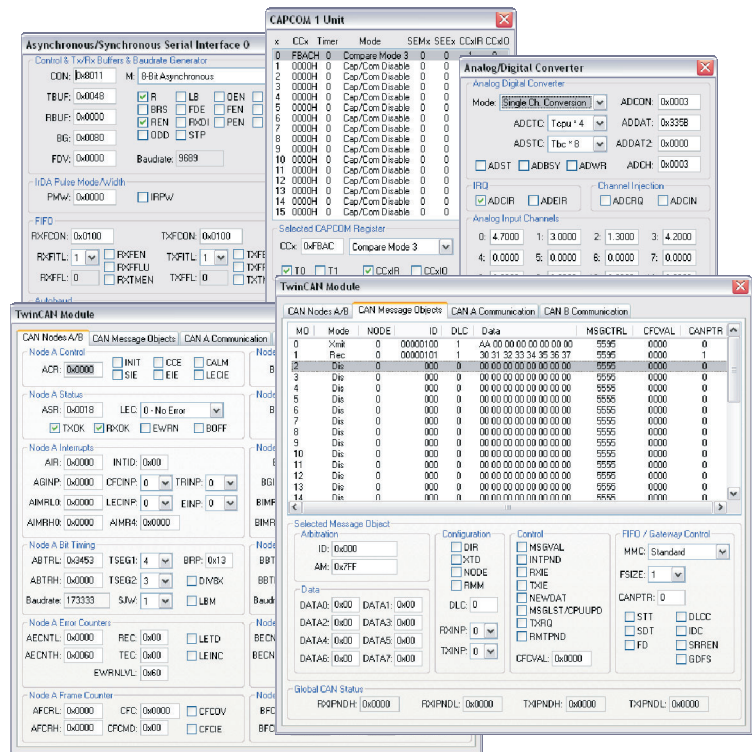
Functions defined with the `__inline` attribute are directly embedded when called (CALL and RET instructions are no longer required). Parameters are accessed directly (they are not passed in special registers or stored on the stack) by the generated code.

## Accurate Device Simulation

The  $\mu$ Vision3 Debugger accurately simulates all on-chip peripherals and has debug dialogs that help you rapidly test I66 applications.



The Configuration Wizard provides a graphical editor for startup files.



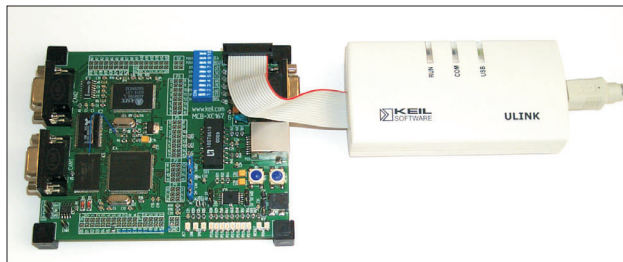
The  $\mu$ Vision3 Debugger provides debug dialogs and accurate simulation of on-chip peripherals. A/D converters, CAN, TwinCAN, CAPCOM, ASC, SSC, PWM, PEC, Timers, Watchdog, and I/O Ports are all fully simulated.

Feature	Benefit
The C166 Compiler is highly optimized. In-line functions give you the fastest execution speed. In-line assembly allows optimized MAC instruction sequences.	There is almost no size or speed penalty when using Keil C166. DSP algorithms using the MAC unit may be directly written as C functions.
Embedded C++ Compiler includes specific compiler extensions for the 166 architecture.	EC++ allows you to write object-oriented programs while avoiding the overhead of the C++ language.
The µVision3 Simulator is the only debugger that accurately simulates all on-chip peripherals of the Infineon C16x and XC16x devices.	You may write and test application code before production hardware is available. Investigate different hardware configurations to optimize the hardware design.
The µVision3 Device Database automatically configures the development tools for the target microcontroller.	Mistakes in tool settings are practically eliminated and tool configuration time is minimized.
The µVision3 IDE integrates third-party tools like SVCS, CASE, and FLASH/Device Programming.	Quickly access development tools and third-party tools. All configuration details are saved in the µVision3 project.
Identical Editor, Debugger, and Simulator Interfaces.	No need to learn different tool interfaces.
Advanced RTX166 is a full-featured, high-performance Real-Time Operating System that incorporates TCP/IP networking and a Flash File System.	Allows you to implement complex, time-critical applications that can be easily connected to the Internet and accessed using a standard web browser.

## ■ ULINK USB-JTAG Adapter

The ULINK USB-JTAG Adapter connects µVision3 to the On-Chip Debugging System (OCDS) of the XC16x, C161U, C165UTAH, or C165H device. ULINK allows you to:

- Download target programs.
- Examine memory and registers.
- Single-step through programs.
- Insert multiple breakpoints.
- Run programs in real-time.
- Program on-chip FLASH.



*ULINK connects the PC's USB Port to the OCDS Interface of the C16x or XC16x device.*

## ■ XC16x Family

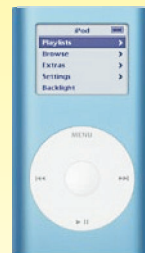
Infineon's next generation of 16-bit microcontrollers offers a wide range of products scalable in performance, memory, and peripherals. This makes it easy to find the controller that best fits to your application needs.

The migration path from C16x to XC16x is supported by the same basic architecture and instruction set, so that a high level of reuse can be accomplished.

The XC16x family with its enhanced 16-bit architecture and its powerful feature set is more than just a 16-bit Microcontroller. Both built in safety features and high performance peripherals are standard for the XC16x family and make these devices the controller of choice for industrial and automotive applications.

## Register to Win

**Register to win one of three Apple mini iPods from Infineon. Visit the Infineon web site and sign-up today!**



[www.infineon.com/keil](http://www.infineon.com/keil)

XC16x Family	Type	Max. CPU Clock (MHz)	Oscillator PLL/Prescaler/Direct Input	Instruction Cycle Time (ns)	ROM/Flash	RAM	Linear Address Space	I/O Lines	ADC Inputs (10-bit)	Timers/Counters (16-bit)	Capture/Compare Channels	Dedicated PWM Channels	Interrupt Vectors/Priorities	ASC	SSC	I <sup>2</sup> C	J1850	Real-Time Clock	CAN Interface 2.0B	OCDS/JTAG	Hardware Powerdown	Watchdog Timer	Osc Watchdog	On-chip Bootstrapper Loader	Package	
XC161	XC161CJ-16F20F	20	✓	50	128kB Flash	8kB	16MB	99	12	9	32	-	74/16x8	2	2	✓	✓	✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-144
	XC161CJ-16F40F	40	✓	25	128kB Flash	8kB	16MB	99	12	9	32	-	74/16x8	2	2	✓	✓	✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-144
XC164	XC164CM-8F20F	20	✓	50	64kB Flash	6kB	16MB	47	14	11	16	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-64
	XC164CM-8F40F	40	✓	25	64kB Flash	6kB	16MB	47	14	11	16	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-64
	XC164CS-16F20F	20	✓	50	128kB Flash	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
	XC164CS-16F40F	40	✓	25	128kB Flash	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
	XC164CS-16R20F	20	✓	50	128kB ROM	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
	XC164CS-16R40F	40	✓	25	128kB ROM	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
	XC164CS-8F20F	20	✓	50	64kB Flash	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
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	XC164CS-8R20F	20	✓	50	64kB ROM	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
	XC164CS-8R40F	40	✓	25	64kB ROM	6kB	16MB	79	14	11	32	7	75/16x8	2	2			✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-100
XC167	XC167CI-16F20F	20	✓	50	128kB Flash	8kB	16MB	103	16	11	32	7	77/16x8	2	2	✓		✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-144
	XC167CI-16F40F	40	✓	25	128kB Flash	8kB	16MB	103	16	11	32	7	77/16x8	2	2	✓		✓	2	✓	✓	✓	✓	✓	✓	P-TQFP-144

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[www.infineon.com/microcontrollers](http://www.infineon.com/microcontrollers)



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