

# What's New in v3.1

## M16C SOFTWARE DEVELOPMENT TOOLSET

**TASKING**  
Embedded software development from Altium...

### HIGHLIGHTS

- **Faster compiler and assembler**
- **Support for MISRA-C:2004**
- **Run-time error checking**
- **Profiling using code instrumentation**
- **Support for new microcontrollers**
- **New license manager**

### INTRODUCING THE TASKING M16C TOOLSET

The TASKING M16C software development toolset from Altium excels in completeness of features, architecture support, compliance with relevant industry standards and performance of generated code. With the incorporation of its next-generation Viper C compiler technology, it has become widely recognized as the defacto industry standard for M16C software developments worldwide.

The latest release of the TASKING M16C software development toolset, v3.1r1, reduces your project's lead time by speeding up the edit-compile-debug cycle time and improves the quality of your products by detecting possible programming errors using the latest MISRA C checks. Improved compiler optimizations reduce the size, and increase the execution speed, of your application.

### FASTER COMPILER AND ASSEMBLER

The v3.1 compiler and assembler tools are much faster than the previous version's tools. Compilation time has been significantly improved and the assembler has been overhauled and now executes in a fraction of the time previously required.

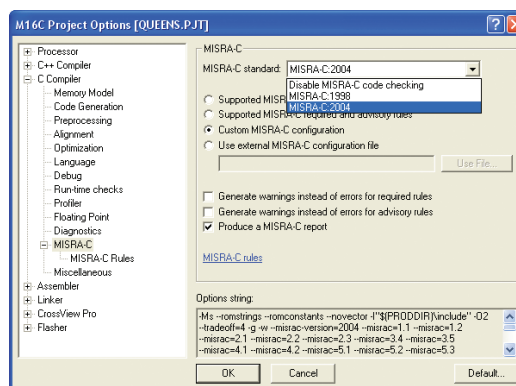
### MISRA-C:2004

The original MISRA C guidelines were published in 1998. Since then, the MISRA C guidelines have been widely adopted by users across automotive, aerospace, industrial and medical industries.

The MISRA-C:2004 guidelines are an update and have been refined in a number of ways:

- **Introduction of rules for arithmetic operation**
- **Number of supported MISRA C code checking rules within the compiler increased from 117 to 122**
- **Complex rules are split into components parts**

To ensure compatibility, the compiler is also able to check MISRA-C:1998.



Fully configurable MISRA C

### RUN-TIME ERROR CHECKING

TASKING's run-time error checking capabilities in the compiler offer a wealth of checks that reveal run-time errors when they first occur. The kind of errors found by run-time error checking are typically hard to find since they manifest themselves through secondary effects or, in the worst case, will not manifest at all prior to your product being shipped. By identifying the source line where the error first occurs, the run-time error checking facilities reduce the time spent in the debugger and increases the quality of your software. You can specify whether the application will terminate or continue when an error is detected.

These checks are implemented by generating additional code and/or enabling additional code in the standard C library. Run-time error checking has a nominal effect on code size and execution speed and can be enabled on a module by module basis, making it practical for use in debugging large applications.

**M16C**  
PLATFORM

**R8C**  
**Tiny**

**RENESAS**

The following type of checks are provided:

- **Bounds checking verifies all pointer operations to detect buffer overflows and other illegal operations such as:**
  - accessing uninitialized or null pointers
  - accessing objects outside their declared bounds
  - illegal pointer arithmetic
- **Malloc / free checks uncover dynamic memory allocation errors such as:**
  - buffer overflow
  - write to freed memory
  - multiple calls to free
  - passing an invalid pointer to free
- **Report an unhandled case value in a switch without a default part**
- **Stack overflow detect when the stack grows beyond its allocated size**
- **Divide by zero issues a message when a division by zero is attempted**

This is very useful if you want to know which functions or lexical blocks consume most cycles

- **Call graph profile – shows, for each function, which functions called it, which other functions it called, and how many times. There is also an estimate of how much time was spent in the subroutines of each function**

## DERIVATIVE SUPPORT

All M16C/R8C groups and a wide range of evaluation boards are supported. This is done in the form of SFR header files and predefined configurations for the evaluation boards.

This release includes support for the latest announced devices:

- M16C/6N4/6N5    ■ M16C/6NK/6NM
- M16C/6NL/6NN    ■ M16C/6S
- M16C/6H, M16C/6K and M16C/6V

## NEW LICENSE MANAGER

This TASKING toolset includes an updated version of the industry standard FLEXlm license manager, offering more stability as well as new functionality. The license 'borrowing' feature is a widely appreciated enhancement, allowing laptop users to take a license from the floating license pool for the period of time they are off-site, saving on cost for individual hardware-locked licenses.

## PRODUCT PACKAGING & ORDERING CODES

Product code: 07-200-299-024

Package content: EDE, C/C++/EC++ compiler, assembler/linker, CrossView Pro ROM monitor, simulator debugger, remote evaluation board access server and M16C Flasher

A trial version of the M16C software development toolset is available on CD-ROM or downloadable from our website at [www.altium.com/tasking/m16c](http://www.altium.com/tasking/m16c)

## PROFILING

In addition to the profiling features built into the debugger, the TASKING M16C compiler is now also shipped with a profiler that uses code instrumentation. Profiling can be used to determine which pieces of your code execute slower than expected and which functions contribute most to the overall execution time of a program. A profile can also tell you which functions are called more or less often than expected.

The advantage of this new profiling method is that it can give a complete call graph of the application annotated with the time spent in each function and basic block.

Several forms of profiling output can be obtained:

- **Flat profile – shows how much time is spent in each function, how many times that function has been called, and optionally how often each lexical block within the function is executed.**

Module	#Line	Function	Total time	Self time	% in function	Calls	#Callers	#Callees
queens.c	54	main	1.661700	1.322900	0.80 %	1	1	5
screen.c	43	set_cursor	1.272600	1.272600	0.77 %	196	4	4
screen.c	52	print_reversed	0.139300	0.139300	0.08 %	84	1	1
queens.c	104	display_field	1.339400	0.103300	0.06 %	168	2	2
queens.c	124	display_board	0.059100	0.059100	0.05 %	3	2	4
queens.c	78	find_legal_row	1.441500	0.049700	0.03 %	15	2	3
queens.c	204	display_status	0.056700	0.017800	0.01 %	6	2	1
queens.c	211	display_count	0.007900	0.007900	0.00 %	3	1	1
screen.c	24	init_screen	0.002200	0.002200	0.00 %	1	1	1
screen.c	34	exit_screen	0.001900	0.001900	0.00 %	1	1	1
queens_cstart.src		_cstart		0.000000	0.00 %			1

Module	#Line	Caller	Total time	Self time	Contribution %	Calls	Calls %
queens_cstart.src		_cstart	1.661700	1.322900	100.00 %	1	100.00 %

Module	#Line	Callee	Total time	Self time	Contribution %	Calls	Calls %
queens.c	124	display_board	0.059100	0.059100	84.85 %	1	16.67 %
queens.c	78	find_legal_row	0.049700	0.049700	28.36 %	1	16.67 %
queens.c	204	display_status	0.018900	0.009900	5.58 %	2	33.33 %
screen.c	24	init_screen	0.002200	0.002200	0.65 %	1	16.67 %
screen.c	34	exit_screen	0.001900	0.001900	0.56 %	1	16.67 %

### Detailed profile information

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