

M16C/6N – The Industrial CAN Standard Microcontroller

M16C/6N



Description

The M16C/6N is an easy to design-in 16-bit industrial standard microcontroller concept, utilized in endless applications worldwide. With up to two embedded CAN 2.0B compliant interfaces, the M16C/6N is an ideal solution for flexible industrial design. More than 11 different Flash and 11 different Mask microcontrollers are currently available, with 100 and 128-pin package line-ups supported.

These products are designed for industrial usage but utilise the existing automotive know-how at a price level suitable for industrial applications. The M16C/6N offers an upward compatible peripheral concept and pin compatibility to the M32C/8x and a downward compatible peripheral concept to the M16C/Tiny.

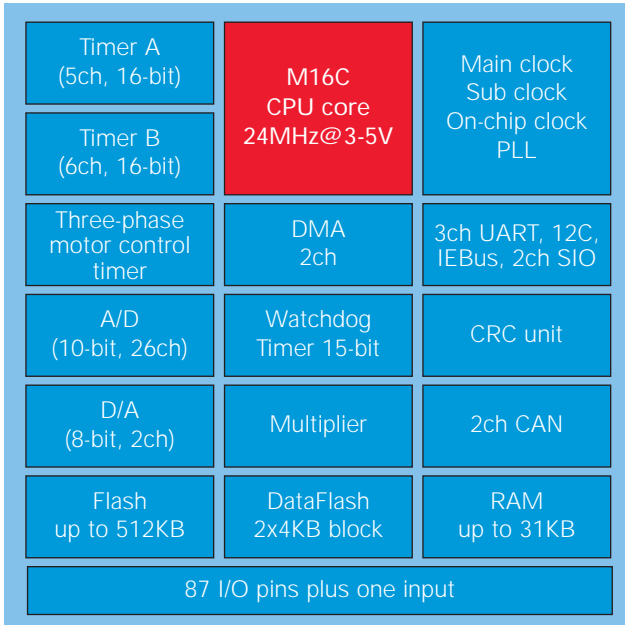
It provides a high level of performance, combined with internal peripherals, which reduce the need for external components. The M16C core has been designed to take advantage of the best features of both accumulator and register based architectures. The CPU has a total of 13 16-bit registers, seven of which come in two sets of register banks. A hardware multiplier circuit is also implemented. The architecture makes it fast with efficient code execution. Multiple sizes of Flash Memory on board make it extremely versatile. The M16C platform utilises several design techniques aimed at providing the best EMI/EMS performance without the need for external components, making it the best solution for effective designs for electrically noisy environments. Using the M16C platform makes CE marking of your end product an easy task.

Key Features:

- High CPU performance 24MHz @ 5V and 3V
- Up to 512KB Flash with 31KB RAM
- 4KB embedded DataFlash
- Two DMA channels
- PLL, Main, Sub, and on-chip oscillator
- Up to three serial ports USART including IIC
- Up to four serial synchronous ports
- 26ch 10-bit ADC
- 2ch 8-bit DAC
- Up to 113 available I/O pins
- High efficient M16C family low power modes
- Best EMI/EMS performance
- 2ch or 1ch CAN interface option

Group	Device	Package Type	Memory Type	Memory Size		
				ROM + VEE	RAM	
M16C/6NK (2ch CAN)	M306NKFHGP	100-pin 14x14mm LQFP 0.5mm pitch	Flash	384K+4K	31K	
	M306NKFJGP			512K+4K	31K	
	M306NKME-xxxGP		Mask	192K	16K	
	M306NKMGP-xxxGP			256K	20K	
M16C/6NL (1ch CAN)	M306NLFHGP	100-pin 14x14mm LQFP 0.5mm pitch	Flash	384K+4K	31K	
	M306NLFJGP			512K+4K	31K	
	M306NLMME-xxxGP		Mask	192K	16K	
	M306NLMGP-xxxGP			256K	20K	
M16C/6NM (2ch CAN)	M306NMFHGP	128-pin 14x20mm LQFP 0.5mm pitch	Flash	384k+4K	31K	
	M306NMFJGP			512k+4K	31K	
	M306NMME-xxxGP		Mask	192K	16K	
	M306NMMGP-xxxGP			256K	20K	
M16C/6NN (1ch CAN)	M306NNFHGP	128-pin 14x20mm LQFP 0.5mm pitch	Flash	384k+4K	31K	
	M306NNFJGP			512k+4K	31K	
	M306NNME-xxxGP		Mask	192K	16K	
	M306NNMG-xxxGP			256K	20K	
M16C/6N5 (1ch CAN)	M306N4FCGP	100-pin 14x14mm LQFP 0.5mm pitch	Flash	128k+4K	5K	
	M306N4FGGP			256k+4K	10K	
M16C/6N4 (2ch CAN)	M306N5FCGP		128-pin 14x20mm LQFP 0.5mm pitch	Flash	128k+4K	5K
	M306N4MC-xxxGP				128K	5K
	M306N4MG-xxxGP			Mask	256K	10K
	M306N5MC-xxxGP				128K	5K

M16C/6NK – 100-pin Block Diagram



- **M16C CPU Core (16-bit)**
 - 24 MHz, 3V - 5V
- Single chip, (+memory expansion and microprocessor mode)
- **Clock generation circuit**
 - Main clock with Xin/Xout
 - Sub clock with Xcin/Xcout
 - On-chip oscillator with 1MHz
 - PLL frequency synthesizer
 - Main clock stop / Re-oscillation detection

Pin count Device	100-pin 6NK	128-pin 6NM	100-pin 6NL	128-pin 6NN	100-pin 6N4	100-pin 6N5
Peripherals						
• Timer						
– Timer A 16-bit	5ch	5ch	5ch	5ch	5ch	5ch
– Timer B 16-bit	6ch	6ch	6ch	6ch	6ch	6ch
– Three-phase motor control	1ch	1ch	1ch	1ch	1ch	1ch
• Serial I/O						
– USART, I ² C, IEBus	3ch	3ch	3ch	3ch	3ch	3ch
– SIO	2ch	4ch	2ch	4ch	1ch	1ch
• DMA	2ch	2ch	2ch	2ch	2ch	2ch
• Watchdog Timer	1ch	1ch	1ch	1ch	1ch	1ch
• A/D Converter (10-bit)	26ch	26ch	26ch	26ch	26ch	26ch
• D/A Converter (8-bit)	2ch	2ch	2ch	2ch	2ch	2ch
• I/O ports (+ one input only pin)	87	113	87	113	87	87
• Interrupts (7 priority levels)						
– Internal sources	32	34	30	32	31	29
– External sources	9	12	9	12	9	9
– Software sources	4	4	4	4	4	4
• CRC (CRC-CCITT)	1ch	1ch	1ch	1ch	1ch	1ch
• CAN (2.0B Bosch compliant)	2ch	2ch	1ch	1ch	2ch	1ch

M16C/6N Development Tools

Compiler

- Renesas Embedded Workbench HEW4.0, C-Compiler
- IAR
- Tasking
- GNU

M16C/6N Starter Kit (RSK)

The kit includes:

- CPU board with target microcontroller
- LCD panel for user/diagnostic interaction
- E8a on-chip debugger
- Trial C compiler and IDE
- Tutorial session
- Sample peripheral driver code
- (Part: R0K3306NKS001BE)

E8a On-chip Debugger (OCD)

- Low cost OCD
- (Part: R0E00008AKCE00)

Full Specification Emulator

Full Trace, breakpoint and performance analysis

- (Part: PC7501 + M306NKT-EPB)



Greater functionality
Stronger performance

Rich range
variation within the groups.

R32C/100

M32C/80

M16C/60

M16C/Tiny

R8C/Tiny

Slimmer functions
Fewer pins