Everywhere you imagine. RENESAS

16-/32-bit CISC microcontrollers

M16C Platform
M16C/Tiny - M16C - M32C

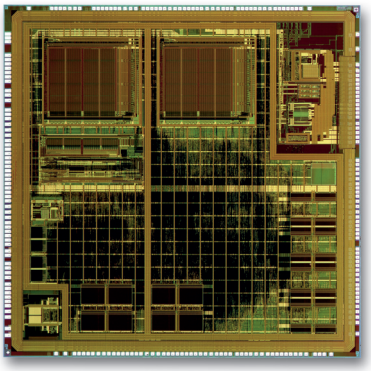
October 2006

www.renesas.eu

Introduction

Renesas Technology is one of the largest semiconductor companies in the world

- Established on April 1st, 2003 as a joint venture between Hitachi Ltd and Mitsubishi Electric Corp.
- Headquartered in Tokyo, Japan with over 26000 employees worldwide
- Designs and manufactures highly integrated semiconductor solutions for industrial, consumer, automotive and telecoms markets
- Ranked the No. 1 microcontroller supplier globally and the No. 1 global supplier of embedded flash MCU's



Renesas Technology owes its success, to its outstanding technology, its excellent quality and to its drive and commitment to listen and meet our customers' needs. As a result, today Renesas Technology is the world's leading microcontroller company offering a huge range of 8-, 16- and 32-bit microcontrollers. These feature:

- A complete product line-up
- Outstanding memory integration
- World leading embedded Flash technology
- Leading peripheral integration
- High performance CPU's
- Low power consumption
- Low EMS / EMI
- Advanced packaging options

Renesas microcontroller families

Today, Renesas offer the H8 and M16C CISC microcontroller families and the high-performance SH RISC microcontroller family.

H8 Microcontroller families

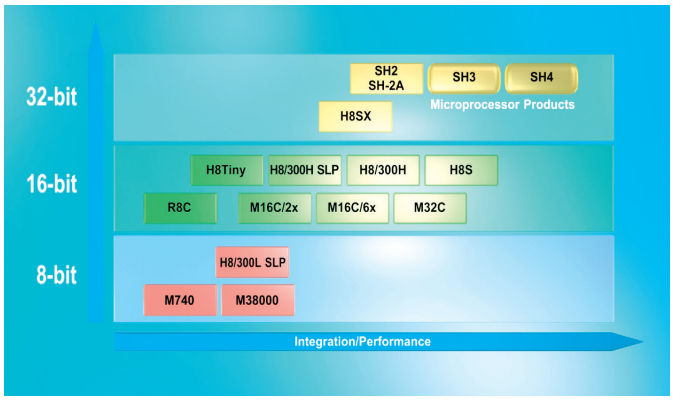
The H8 family comprises of a wide range of CISC micro-controllers from low-cost 8-bit to the most sophisticated, high performance 32-bit.

- The H8/300L Super Low Power series of 8-bit micro-controllers has been developed to meet the demands of the next generation of power critical applications.
- The H8/300H Tiny provides design engineers with a low cost 16-bit alternative to many 8-bit microcontrollers available today.
- The H8/300H provides a highly competitive 16-bit Flash microcontroller family for consumer and industrial applications.
- The H8S leading edge 16-bit family combines high memory and peripheral integration with high performance.
- The H8SX family now provides an H8 code-compatible roadmap to 32-bit performance.

M16C Microcontroller families

The M16C platform consists of a wide range of 16-bit micro-controllers featuring high efficiency 'C' programming, high-speed processing and low power consumption.

- The R8C Tiny comes as an ultra low-cost, Flash family in small pin-count packages addressing the classic 8-bit market.
- The M16C/2x and M16C/6x high performance families provide high peripheral integration, low power consumption and low EMS/EMI.
- The M32C family with its rich set of peripherals builds the performance bridge between the 16-bit CISC and 32-bit RISC world.

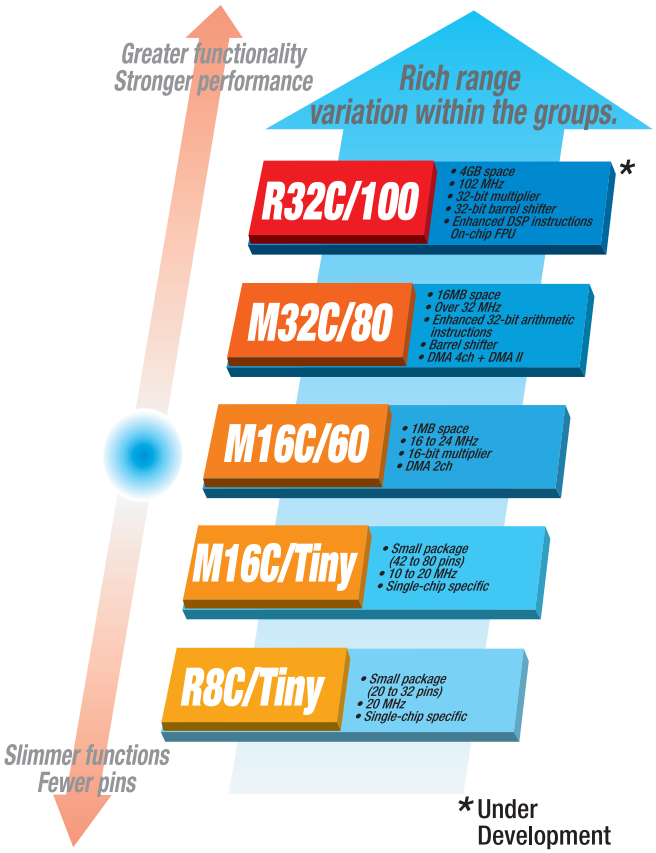


The SH Microcontroller Families

The SH microcontroller families offer the highest performance levels found on microcontrollers today. In particular SH-2A offers up to 480 DMIPS today and also interrupt response times of just 30ns. Renesas developed world's fastest Flash technology - called MONOS Flash - to support such high speed with no wait states. The family ranges from:

- The low cost SH-Tiny series with 64KB and 128KB Flash options and in 48-/64-pin packages. Aimed for example at white goods motor control.
- The mid-class SH2-based SH708xF and SH714xF series with up to 80MHz (zero wait) 512KB MONOS Flash and 176 pins, triple fast ADC as well as strong timer resources to drive up to two motors. Available in 3V and 5V.
- The highend SH-2A products with 512KB MONOS Flash in the SH7211F as well as a line-up of highly integrated rom-less versions with 4 x SCI, 3 x IIC, 2 x CAN, USB host and function and TFT drive on the SH7203, for example. At 200MHz and with additional FPU this device competes with industrial PC, yet is a fraction of the cost and power consumption, available long term and in Renesas' best-in-class quality.

The M16C Platform Introduction



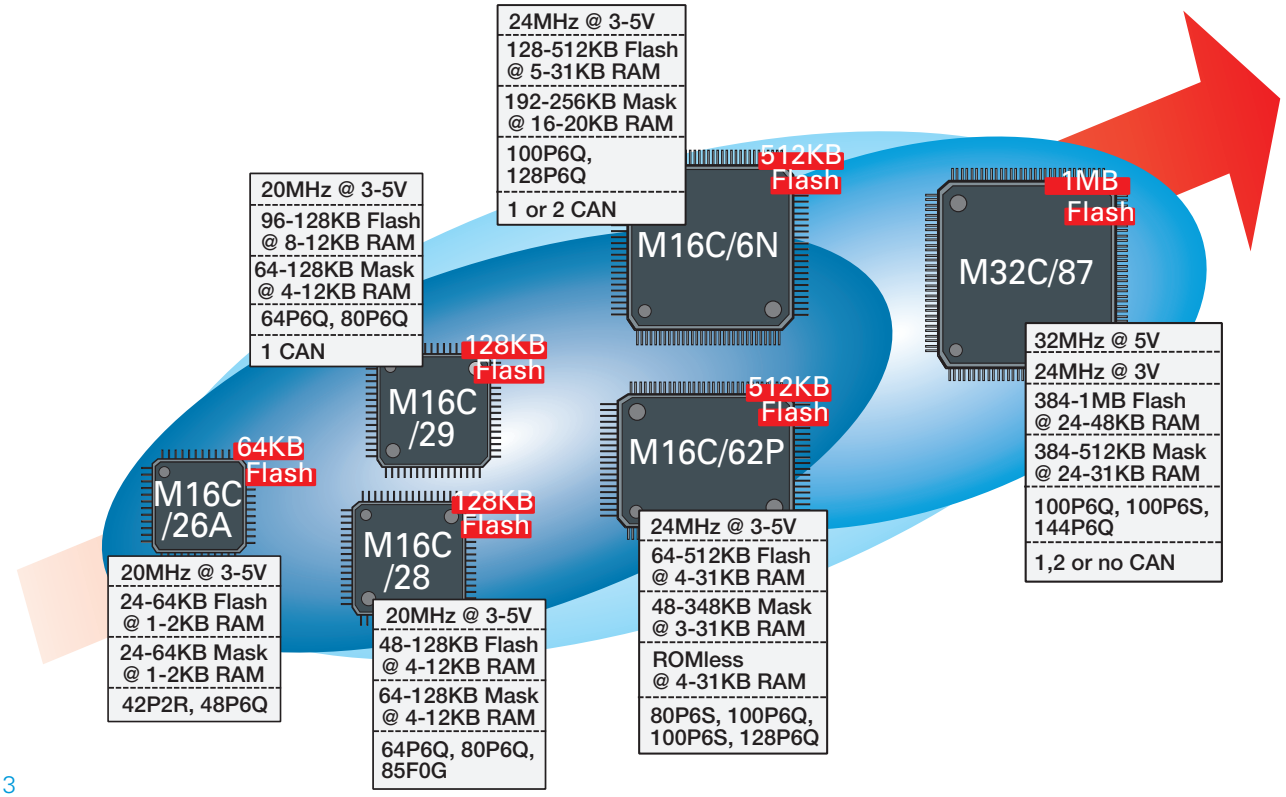
The M16C Platform is part of Renesas Technology's microcontroller product line up. It comprises of a wide range of 16- and 32-bit microcontrollers, and offers code and pin compatibility throughout the families. Within the M16C Platform the M16C/Tiny provides the low pin count entry level; 100-pin solutions are supported by the industrial standard M16C; and the M32C, with its rich set of peripherals and memory integration, builds the performance bridge between the 16-bit CISC and 32-bit RISC world.

Key benefits for your success

Easy
Powerful
Fast
Versatile
Compatible
Silent
Power Wise

With hundreds of different package and memory options the M16C Platform is **the perfect foundation for your application designs.**

M16C Platform Flash Roadmap



Key Benefits of M16C Platform

Easy

Platform of Products - Learn Once, Use Everywhere

After designing with the M16C Platform development environment and the embedded peripherals for the first time, this knowledge and experience can then be adapted to any other member of the M16C Platform easily. Therefore there is no need to change microcontroller cores for new designs and engineers can fully utilise the platform concept of the M16C.

Powerful

Packed with Peripherals – Minimum External Components

The members of the M16C Platform provide a high level of embedded peripherals to reduce the total system cost and to support you with ready to use devices. Typical peripherals are:

- Virtual EEPROM Data Memory
- CPU External Memory Interface
- PWM & Three Phase Motor Control
- 16-bit Timers
- Hardware Multiplier
- U(S)ART, USB, CAN/LIN
- 10-bit A/D Converter
- D/A Converter
- Input Capture/Output Compare
- Watchdog Timer
- On-Chip Oscillator
- Interrupt Handler

Fast

CISC, but with RISC like Speed – Fast, Efficient Code Execution

- M16C provides an average instruction time of three clock cycles at 50ns
- M32C provides an average instruction time of two clock cycles. at 31ns
- Optimized code size is achieved by the instruction set being optimised to support programming in C language
- Hardware multiplier is embedded
- Sum-of-products operation for one data is executed in two cycles for M32C and nine cycles for M16C.

Versatile

Flash – Mask – ROMless Memory – Various Packages

- Package options are available for 42-, 48-, 64-, 80-, 100-,128- and 144-pin
- Wide range of Flash memory line-up from **24K – 1Mbyte**
- Wide range of Mask memory line-up from **24K – 512kbytes**
- ROMless versions available

Compatible

Pin Compatibility - One PCB Design For Multiple MCU's

The M16C Platform provides pin-compatibility through the whole family within the same package type. This provides easy upgrading without the need for hardware re-design.

Silent

Excellent Noise Characteristics

The M16C Platform utilises several design techniques aimed at providing the best EMI/EMS performance without the need for external components.
Using the M16C Platform makes the CE marking for your end product to an easy task.

Power Wise

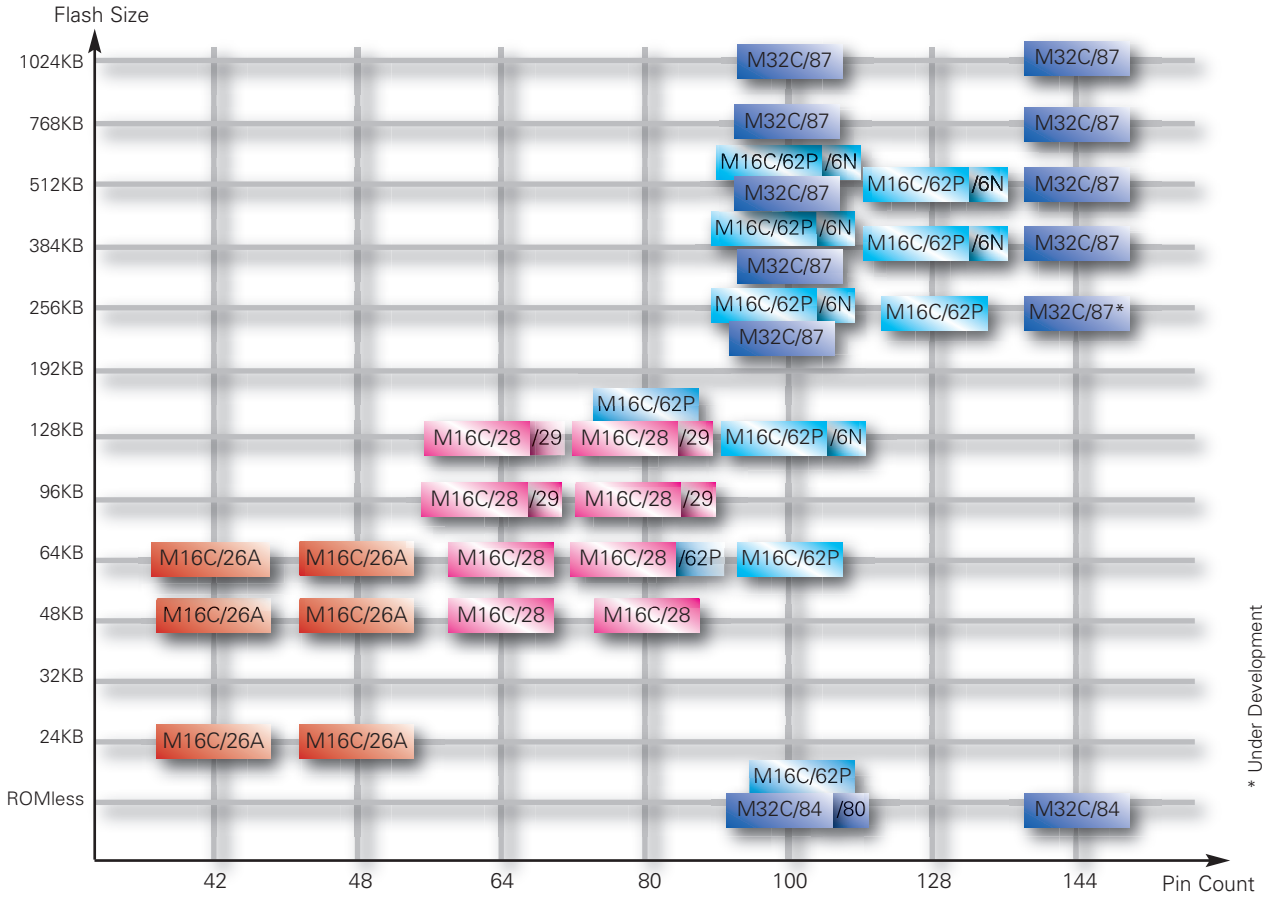
Low Power Operation

The M16C Platform members feature low power operation by the provision of several different operation modes.

- In normal operation mode the M16C gives a power consumption of around 0.75mA/MHz
- During wait mode the power consumption is reduced to 3µA
- During stop mode the power consumption drops down to 0.8µA

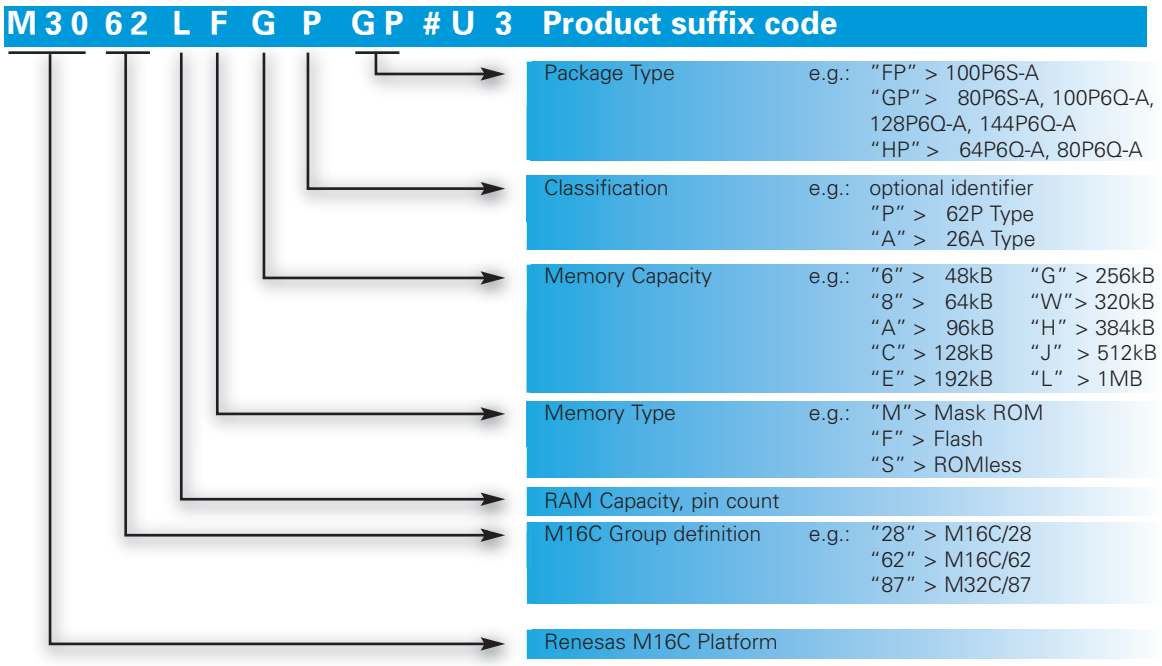
M16C Platform Product Line-up (focus flash types)

The M16C Platform encompass hundreds of different MCUs, all based on the same core. One architecture spans from 42-pin to 144-pin packages and from 24kBytes to 1MByte Flash giving you a world wide unique platform for your success.



M16C Platform Nomenclature

Below you can find an easy to use part name decoder. The below product code sample shows a quite successful M16C/62P device in a 100-pin, 0.5pitch, LQFP package with 256KB embedded Flash and 20KB RAM.



Low cost, low power consumption, small package

The M16C/Tiny Series with a wide range of memory and package types is subdivided into the M16C/26A, M16C/28 and M16C/29 device groups. These application optimised general purpose MCUs combine small foot print with high CPU performance, thus providing an excellent solution for cost sensitive applications in home appliances and industrial applications. Renesas Technology focuses with the M16C/Tiny Series devices mainly on home appliances and industrial applications, which require high computing power in a small package. It is primarily targeted at motor control, metering and sensor applications. To meet the constantly increasing requirements of modern home appliances the M16C/Tiny Series has the familiar M16C 16-Bit CISC register core architecture. Two direct memory access controller channels (DMAC) are implemented to speed up the processing.

Main Features:

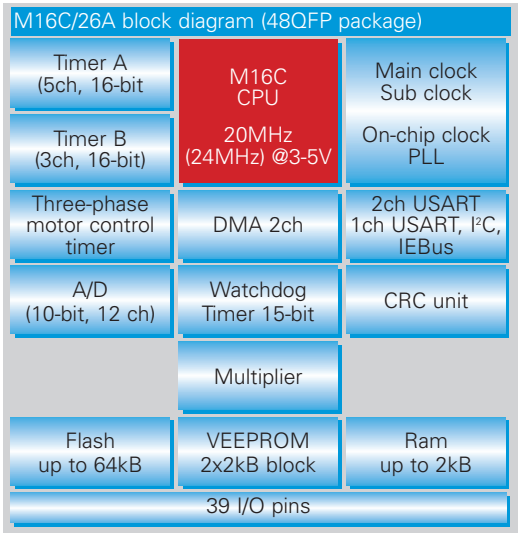
- Up to 128kbytes full-speed Flash with up to 12kbytes RAM
- Various mask options are available
- 2x2kbytes embedded Virtual EEPROM
- 42-, 48-, 64- and 80-pin package options
- 2 DMA channels
- PLL, Main-, Sub- and On-Chip-oscillator
- 8 channels of 16-bit Timer
- 3-phase motor control function
- Up to 5 serial interfaces that offer support for synchronous, asynchronous and I²C communication
- Multi-Master I²C-bus interface
- Optional 1 CAN channel 2.OB compliant
- 10-bit ADC multiple channels (2 S/H circuits)
- Timer S featuring InputCapture/OutputCompare
- 71 I/O pins available with the 80-pin package
- High efficient M16C family low power modes

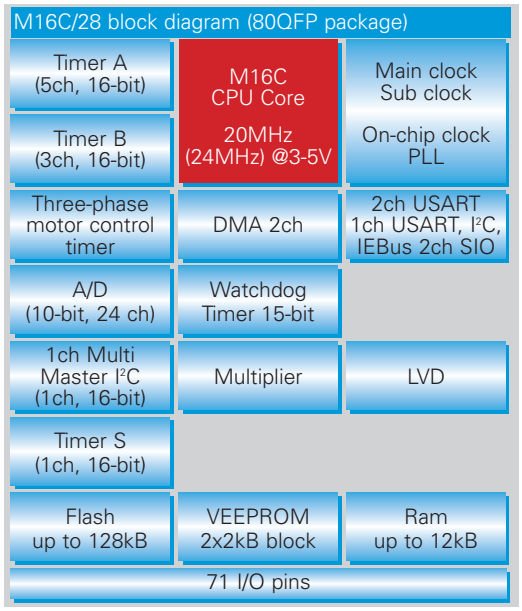
Focus Products:

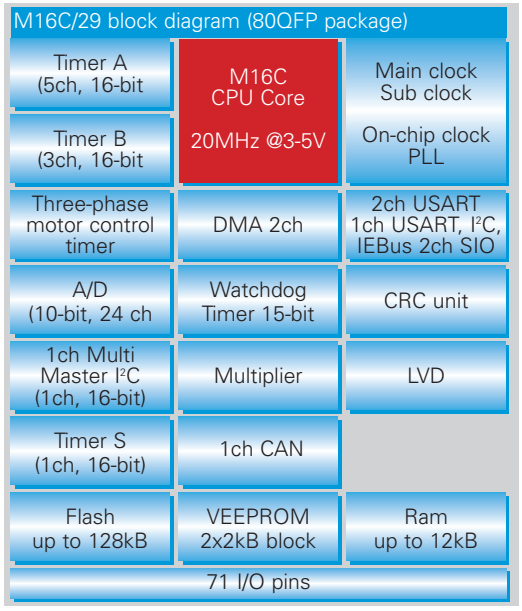
- M16C/26A
- M16C/28
- M16C/29 (1x CAN2.0B)

StarterKits:

RSKM16C26A (supporting M16C/26A)
RSKM16C29 (supporting M16C/28 and /29)







The industrial standard microcontroller

The M16C is an easy to design-in 16-bit industrial quasi-standard microcontroller, utilized in endless applications worldwide. 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 thirteen 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. The CPU requires one machine cycle for minimum operation and two machine cycles for a register to register operation. Multiple sizes of embedded Flash memory make it extremely versatile. And several internal design features are included in the M16C to provide low EMI and high EMS protection making it the best solution for effective designs for electrically noisy environments.

Main Features:

- High CPU performance 24MHz at 3 to 5V
- Up to 512kbytes full-speed Flash with up to 31kbytes RAM
- Various mask options are available
- 2x4kbytes embedded virtual EEPROM
- 80-, 100- and 128-pin package options
- 2 DMA channels
- PLL, Main-, Sub- and On-Chip-oscillator
- 11 channels of 16-bit Timer
- 3-phase motor control function
- Up to 5 serial interfaces that offer support for synchronous, asynchronous and I²C communication
- 1 CAN or 2 CAN options CAN2.0B compliant
- 10-bit ADC multiple channels
- PWM generation and measurement by Timer Unit
- 87 available I/O pins and one additional pure input pin with the 100-pin package
- Allows mixed 5V and 3V IC connection to external bus
- High efficient M16C family low power modes

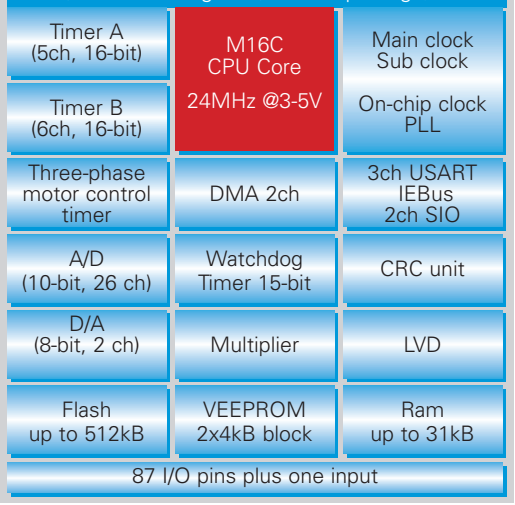
Focus Products:

- M16C/62P
- M16C/6N4 /6N5 (/6N4 2x CAN2.0B/6N5 1x CAN2.0B)
- M16C/6NK /6NM (2x CAN2.0B)
- M16C/6NL /6NN (1x CAN2.0B)

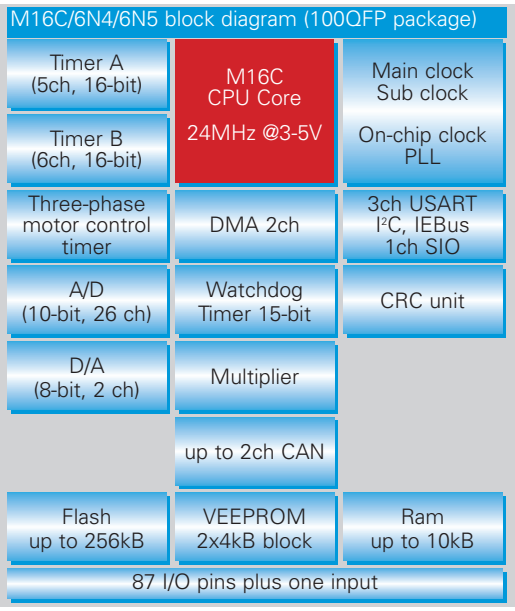
StarterKits:

- RSKM16C62P (supporting M16C/62P)
- RSKM16C6NK (supporting all M16C/6Nx)

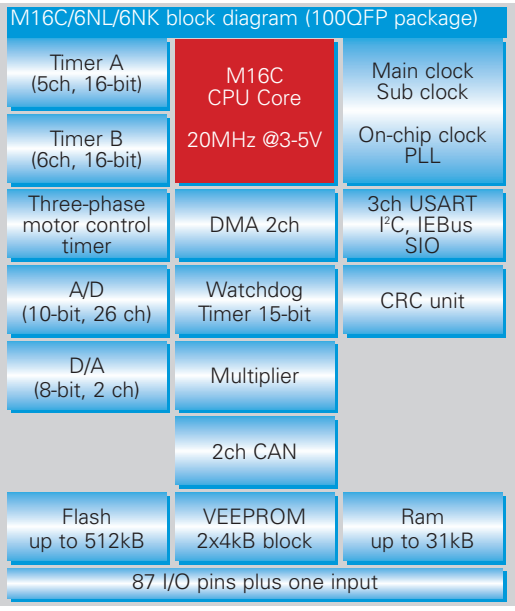
M16C/62P block diagram (100QFP package)



M16C/6N4/6N5 block diagram (100QFP package)



M16C/6NL/6NK block diagram (100QFP package)



Group	Device	Package Code	Package Type	Memory Type	Memory Size ROM + VEE	Memory Size RAM	Supply voltage @ frequency	Clock Generation	Operation Modes	Memory Space	Avaliaibel Ports	MultifunctionTimer	Serial Interfaces	A/D Converter	D/A Converter	DMA	CRC	Watchdog	CAN	Intelligent IO	Others
M16C/26A	M30263F3AFP M30263F6AFP M30263F8AFP M30263M3A-xxxFP M30263M6A-xxxFP M30263M8A-xxxFP	PRSP0042GA-B (42P2R-E)	42pin 450mil SSOP 0.8mm pitch	Flash Mask	24K + 4K 48K + 4K 64K + 4K 24K 48K 64K	1K 2K 2K 1K 2K 2K	3V to 5.5V @ 20MHz; 2.7 to 5.5V @ 10MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip	1Mbyte	33 I/O	Timer A: 5x16bit Timer B: 3x16bit Three phase motor control circuit	1ch SIO, UART 1ch SIO, UART, I2C, IEBus	10 channels x 10bit	-	2 channels	1 channel CCITT-CRC or CRC-16	15bit with prescaler	-	-	-
	M30260F3AGP M30260F6AGP M30260F8AGP M30260M3A-xxxGP M30260M6A-xxxGP M30260M8A-xxxGP	PLQP0048KB-A (48P6Q-A)	48pin 7x7mm LQFP 0.5mm pitch	Flash Mask	24K + 4K 48K + 4K 64K + 4K 24K 48K 64K	1K 2K 2K 1K 2K 2K					39 I/O		2ch SIO, UART 1ch SIO, UART, I2C, IEBus	12 channels x 10bit							
M16C/28	M30281F6HP M30281F8HP M30281FAHP M30281FCHP (*) M30281M6-xxxHP M30281M8-xxxHP M30281MA-xxxHP M30281MC-xxxHP (*)	PLQP0064KB-A (64P6Q-A)	64pin 10x10mm LQFP 0.5mm pitch	Flash Mask	48K + 4K 64K + 4K 96K + 4K 128K + 4K 48K 64K 96K 128K	4K 4K 8K 12K 4K 4K 8K 12K	3V to 5.5V @ 20MHz; 2.7 to 5.5V @ 10MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip	1Mbyte	55 I/O	Timer A: 5x16bit Timer B: 3x16bit Three phase motor control circuit	2ch SIO, UART 1ch SIO, UART, I2C, IEBus 1ch SIO 1ch Multi-master I2C	13 channels x 10bit	-	2 channels	-	15bit with prescaler	-	-	Timer S: 8x16bit (Input Capture/ Output Compare)
	M30280F8HP M30280F8HP M30280FAHP M30280FCHP (*) M30280M6-xxxHP M30280M8-xxxHP M30280MA-xxxHP M30280MC-xxxHP (*)	PLQP0080KA-A (80P6Q-A)	80pin 12x12mm LQFP 0.5mm pitch	Flash Mask	48K + 4K 64K + 4K 96K + 4K 128K + 4K 48K 64K 96K 128K	4K 4K 8K 12K 4K 4K 8K 12K					71 I/O		2ch SIO, UART 1ch SIO, UART, I2C, IEBus 2ch SIO 1ch Multi-master I2C	24 channels x 10bit							
	M30280F6WG (*) M30280F8WG (*) M30280FAWP (*)	PTLG0085JB-A (85F0G)	85pin 7x7mm TFLGA 0.65mm pitch	Flash	48K + 4K 64K + 4K 96K + 4K	4K 4K 8K															
M16C/29	M30291FAHP M30291FCHP M30291M8-xxxHP (*) M30291MA-xxxHP (*) M30291MC-xxxHP (*)	PLQP0064KB-A (64P6Q-A)	64pin 10x10mm LQFP 0.5mm pitch	Flash Mask	96K + 4K 128K + 4K 64K 96K 128K	8K 12K 4K 8K 12K	3V to 5.5V @ 20MHz; 2.7 to 5.5V @ 10MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip	1Mbyte	55 I/O	Timer A: 5x16bit Timer B: 3x16bit Three phase motor control circuit	2ch SIO, UART 1ch SIO, UART, I2C, IEBus 1ch SIO 1ch Multi-master I2C	16 channels x 10bit	-	2 channels	1 channel CCITT-CRC or CRC-16	15bit with prescaler	1 x CAN2.0B	-	Timer S: 8x16bit (Input Capture/ Output Compare)
	M30290FAHP M30290FCHP M30290M8-xxxHP (*) M30290MA-xxxHP (*) M30290MC-xxxHP (*)	PLQP0080KA-A (80P6Q-A)	80pin 12x12mm LQFP 0.5mm pitch	Flash Mask	96K + 4K 128K + 4K 64K 96K 128K	8K 12K 4K 8K 12K					71 I/O		2ch SIO, UART 1ch SIO, UART, I2C, IEBus 2ch SIO 1ch Multi-master I2C	27 channels x 10bit							
M16C/N4 M16C/N5	M306N4FCFP M306N4FGFP M306N5FCFP	PRQP0100JB-A (100P6S-A)	100pin 14x20mm QFP 0.65 mm pitch	Flash	128K + 4K 256K + 4K 128K + 4K	5K 10K 5K	3V to 5.5V @ 24MHz;	Main Clock; Sub Clock; PLL; OCO	Single Chip; Memory expansion; Microprocessor	1Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	3ch SIO, UART, I2C, IEBus 1ch SIO	26 channels x 10bit	2 channels x 8bit	2 channels	1 channel CCITT-CRC	15bit with prescaler	2x CAN2.0B 1x CAN2.0B	-	-
	M306N4FCGP M306N4FGGP M306N5FCGP M306N4MC-xxxGP (*) M306N4MG-xxxGP (*) M306N5MC-xxxGP (*)	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	Flash Mask	128K + 4K 256K + 4K 128K + 4K 128K 256K 128K	5K 10K 5K 5K 10K 5K													2x CAN2.0B 1x CAN2.0B 2x CAN2.0B		
M16C/NK	M306NKFHGP M306NKFJGP M306NKME-xxxGP M306NKMG-xxxGP	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	Flash Mask	384K + 4K 512K + 4K 192K 256K	31K 31K 16K 20K	3V to 5.5V @ 24MHz;	Main Clock; Sub Clock; PLL; OCO	Single Chip	1Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	3ch SIO, UART, I2C, IEBus 2ch SIO	26 channels x 10bit	2 channels x 8bit	2 channels	1 channel CCITT-CRC	15bit with prescaler	2x CAN2.0B	-	-
M16C/NL	M306NLFHGP M306NLFJGP M306NLME-xxxGP M306NLMG-xxxGP			Flash Mask	384K + 4K 512K + 4K 192K 256K	31K 31K 16K 20K													1x CAN2.0B		
M16C/NM	M306NMFHGP M306NMFJGP M306NMME-xxxGP M306NMMG-xxxGP	PLQP0128KB-A (128P6Q-A)	128pin 14x20mm LQFP 0.5mm pitch	Flash Mask	384K + 4K 512K + 4K 192K 256K	31K 31K 16K 20K					113 I/O +1 Input		3ch SIO, UART, I2C, IEBus 4ch SIO						2x CAN2.0B		
M16C/NN	M306NNFHGP M306NNFJGP M306NNME-xxxGP M306NNMG-xxxGP			Flash Mask	384K + 4K 512K + 4K 192K 256K	31K 31K 16K 20K													1x CAN2.0B		
M16C/62P	M30623F8PGP M30621FCPGP	PRQP0080JA-A (80P6S-A)	80pin 14x14mm QFP 0.65mm pitch	Flash	64K + 4K 128K + 4K	4K 10K			Single Chip	-	70 I/O +1 Input		2ch SIO, UART,I2C,IEBus 1ch SIO, I2C,IEBus + 2ch SIO								
	M30622F8PGP M30620FCPGP M30624FGPGP M30626FHPGP M30626FJPGP M30622M8P-xxxGP M30622M8P-xxxGP M30622MAP-xxxGP M30620MCP-xxxGP M30622MEP-xxxGP M30622MGP-xxxGP M30624MGP-xxxGP M30622MWP-xxxGP M30624MWP-xxxGP M30622MHP-xxxGP M30624MHP-xxxGP M30626MHP-xxxGP	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	Flash Mask	64K + 4K 128K + 4K 256K + 4K 384K + 4K 512K + 4K 48K 64K 96K 128K 192K 256K 256K 320K 320K 384K 384K 384K	4K 10K 20K 31K 31K 4K 4K 5K 10K 12K 12K 20K 16K 24K 16K 24K 31K															
	M30622SPGP			ROMless	-	4 K															

	M30620SPGP			-	10K														
	M30622F8PFP	PRQP0100JB-A (100P6S-A)	100pin 14x20mm QFP 0,65mm pitch	Flash	64K + 4K	4K	3V to 5,5V @ 24MHz; 2,7 to 5,5V @ 10MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip; Memory expansion; Microprocessor (for ROMless Version only Microprocessor Mode)	1Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	3ch SIO, UART,I2C,IEBus 2ch SIO	26 channels x 10bit	2 channels x 8bit	2 channels	1 channel CCITT-CRC	15bit with prescaler	-	-	-
	M30620FCPFP				128K + 4K	10K													
	M30624FGPFP				256K + 4K	20K													
	M30626FHPFP				384K + 4K	31K													
	M30626FJPFP				512K + 4K	31K													
	M30622M6P-xxxFP			Mask	48K	4K													
	M30622M8P-xxxFP				64K	4K													
	M30622MAP-xxxFP				96K	5K													
	M30620MCP-xxxFP				128K	10K													
	M30622MEP-xxxFP				192K	12K													
	M30622MGP-xxxFP				256K	12K													
	M30624MGP-xxxFP				256K	20K													
	M30622MWP-xxxFP				320K	16K													
	M30624MWP-xxxFP				320K	24K													
	M30626MWP-xxxFP				320K	31K													
	M30622MHP-xxxFP				384K	16K													
	M30624MHP-xxxFP				384K	24K													
	M30626MHP-xxxFP				384K	31K													
	M30622SPFP			ROMless	-	4 K													
	M30620SPFP				-	10K													
	M30625FGPGP	PLQP0128KB-A (128P6Q-A)	128pin 14x20mm LQFP 0,5mm pitch	Flash	256K + 4K	20K					113 I/O +1 Input								
	M30627FHPGP				384K + 4K	31K													
	M30623MEP-xxxGP			Mask	192K	12K													
	M30625MGP-xxxGP				256K	20K													
	M30623MWP-xxxGP				320K	16K													
	M30625MWP-xxxGP				320K	24K													
	M30627MWP-xxxGP				320K	31K													
	M30623MHP-xxxGP				384K	16K													
	M30625MHP-xxxGP				384K	24K													
	M30627MHP-xxxGP				384K	31K													
M32C/80	M30800SAGP	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0,5mm pitch	ROMless	BL type includes bootloader	8K	4,2V to 5,5V @ 32MHz; 3,0 to 5,5V @ 24MHz	Main Clock; Sub Clock; PLL; OCO	Microprocessor Mode	16Mbyte	47 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	5ch SIO, UART,I2C,IEBus	10 channels x 10bit	2 channels x 8bit	4 channels	1 channel CCITT-CRC	15bit with prescaler	-	-	DMAII; X-Y Converter
	M30800SAGP-BL																		
	M30800SAFP	PRQP0100JB-A (100P6S-A)	100pin 14x20mm QFP 0 65mm pitch																
	M30800SAFP-BL																		
M32C/84	M30840SGP	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	ROMless	-	10K	4,2V to 5,5V @ 32MHz; 3,0 to 5,5V @ 24MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip; Memory expansion; Microprocessor (for ROMless Version only Microprocessor Mode)	16Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	5ch SIO, UART,I2C,IEBus	26 channels x 10bit	2 channels x 8bit	4 channels	1 channel CCITT-CRC	15bit with prescaler	1 x CAN2.0B	8 channels x 16bit Time measurement or Waveform generation; Various communication function like UART, SIO, HDLC	DMAII; X-Y Converter
	M30840SFP	PRQP0100JB-A (100P6S-A)	100pin 14x20mm QFP 0,65mm pitch	ROMless	-	10K					123 I/O +1 Input			34 channels x 10bit						
	M30842SGP	PLQP0144KA-A (144P6Q-A)	144pin 20x20mm LQFP 0,5mm pitch	ROMless	-	10K														
M32C/87	M30873FHGP (*)	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	Flash	384k+4K	24K	4,2V to 5,5V @ 32MHz; 3,0 to 5,5V @ 24MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip; Memory expansion; Microprocessor	16Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	6ch SIO, UART,I2C,IEBus, IrDA	26 channels x 10bit	2 channels x 8bit	4 channels	1 channel CCITT-CRC	15bit with prescaler	2 x CAN2.0B	8 channels x 16bit Time measurement or Waveform generation; Various communication function like UART, SIO, HDLC, SIO with variable length	DMAII; X-Y Converter; 4ch Real Time Ports
	M30876FJGP (*)				512K+4K	31K														
	M30879FKGP				768K+4K	48K														
	M30879FLGP				1M + 4K	48K														
	M30876MH-xxxGP			Mask	384K	24K														
	M30873MJ-xxxGP				512K	31K														
	M30879FLFP	PRQP0100JB-A (100P6S -A)	100pin 14x20mm QFP 0,65mm pitch	Flash	1M + 4K	48K														
	M30876MJ-xxxFP			Mask	512K	31K														
	M30875FHGP (*)	PLQP0144KA-A (144P6Q-A)	144pin 20x20mm LQFP 0,5mm pitch	Flash	384k+4K	24K					123 I/O +1 Input		7ch SIO, UART,I2C,IEBus, IrDA	34 channels x 10bit						
	M30878FJGP (*)				512K+4K	31K														
	M30878FKGP				768K+4K	48K														
	M30878FLGP				1M + 4K	48K														
	M30875MH-xxxGP			Mask	384K	24K														
	M30878MJ-xxxGP				512K	31K														
M32C/87A	M30873FHAGP (*)	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	Flash	384k+4K	24K	4,2V to 5,5V @ 32MHz; 3,0 to 5,5V @ 24MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip; Memory expansion; Microprocessor	16Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	6ch SIO, UART,I2C,IEBus, IrDA	26 channels x 10bit	2 channels x 8bit	4 channels	1 channel CCITT-CRC	15bit with prescaler	1 x CAN2.0B	8 channels x 16bit Time measurement or Waveform generation; Various communication function like UART, SIO, HDLC, SIO with variable length	DMAII; X-Y Converter; 4ch Real Time Ports
	M30876FJAGP (*)				512K+4K	31K														
	M30879FKAGP				768K+4K	48K														
	M30879FLAGP				1M + 4K	48K														
	M30876MHA-xxxGP			Mask	384K	24K														
	M30873MJA-xxxGP				512K	31K														
	M30879FLAFP	PRQP0100JB-A (100P6S -A)	100pin 14x20mm QFP 0,65mm pitch	Flash	1M + 4K	48K														
	M30876MJA-xxxFP			Mask	512K	31K														
	M30875FHAGP (*)	PLQP0144KA-A (144P6Q-A)	144pin 20x20mm LQFP 0,5mm pitch	Flash	384k+4K	24K					123 I/O +1 Input		7ch SIO, UART,I2C,IEBus, IrDA	34 channels x 10bit						
	M30878FJAGP (*)				512K+4K	31K														
	M30878FKAGP				768K+4K	48K														
	M30878FLAGP				1M + 4K	48K														
	M30875MHA-xxxGP			Mask	384K	24K														
	M30878MJA-xxxGP				512K	31K														
M32C/87B	M30873FHBGP (*)	PLQP0100KB-A (100P6Q-A)	100pin 14x14mm LQFP 0.5mm pitch	Flash	384k+4K	24K	4,2V to 5,5V @ 32MHz; 3,0 to 5,5V @ 24MHz	Main Clock; Sub Clock; PLL; OCO	Single Chip; Memory expansion; Microprocessor	16Mbyte	87 I/O +1 Input	Timer A: 5x16bit Timer B: 6x16bit Three phase motor control circuit	6ch SIO, UART,I2C,IEBus, IrDA	26 channels x 10bit	2 channels x 8bit	4 channels	1 channel CCITT-CRC	15bit with prescaler	-	8 channels x 16bit Time measurement or Waveform generation; Various communication function like UART, SIO, HDLC, SIO with variable length	DMAII; X-Y Converter; 4ch Real Time Ports
	M30876FJBGP (*)				512K+4K	31K														
	M30879FKBGP				768K+4K	48K														
	M30879FLBGP				1M + 4K	48K														
	M30876MHB-xxxGP			Mask	384K	24K														
	M30873MJB-xxxGP				512K	31K														
	M30879FLBFP	PRQP0100JB-A (100P6S-A)	100 pin 14x20mm QFP 0,65mm pitch	Flash	1M + 4K	48K														
	M30876MJB-xxxFP			Mask	512K	31K														
	M30875FHBGP (*)	PLQP0144KA-A (144P6Q-A)	144pin 20x20mm LQFP 0,5mm pitch	Flash	384k+4K	24K					123 I/O +1 Input		7ch SIO, UART,I2C,IEBus, IrDA	34 channels x 10bit						
	M30878FJBGP (*)				512K+4K	31K														
	M30878FKBGP				768K+4K	48K														
	M30878FLBGP				1M + 4K	48K														
	M30875MHB-xxxGP			Mask	384K	24K														
	M30878MJB-xxxGP				512K	31K														

The upward compatible path for performance requirements

With a high performance 32MHz CPU, large memory integration and enhanced peripheral functions for highly sophisticated applications, the M32C closes the gap between the 16-bit and 32-bit microcontroller market.

The M32C Series is upwards code compatible with the M16C Series. All M16C 16-bit instructions have been maintained and added to by a set of complimentary 32-bit instructions. 32-bit registers are implemented by using 16-bit register pairs along a hardware barrel shifter. The numbers of cycles per instruction are reduced from three to an average of two. This ensures RISC like performance whilst maintaining excellent code density. DSP functionality is also provided with a two cycle multiply accumulate instruction to allow functions such as software modem, speech compression & telecommunication software stacks. A high level of communication channels is supported, such as full CAN controllers and various separate hardware UARTS. Also four independent DMA channels are integrated on the M32C/80 Series.

Main Features:

- High CPU performance 32MHz@ 5V and 24MHz@ 3.3V.
- Up to 1MByte full-speed Flash with up to 48kbytes RAM
- Various mask options as well as ROMless
- 2x4kbytes embedded virtual EEPROM
- 100- and 144–pin package options
- 4 DMA channels
- PLL, Main-, Sub- and On-Chip-oscillator
- 11 channels of 16-bit Timer
- 3-phase motor control function
- Up to seven serial ports (IIC and IrDA supported)
- No CAN,1CAN or 2CAN options (CAN2.0B compliant)
- 10-bit ADC multiple channels
- 8-bit DAC 2 channels
- Intelligent I/O supporting various communication functions and InputCapture/OutputCompare feature
- 123 available I/O pins and one additional pure input pin with the 144-pin package
- Allows mixed 5V and 3V IC connection to external bus
- Highly efficient M16C family low power modes

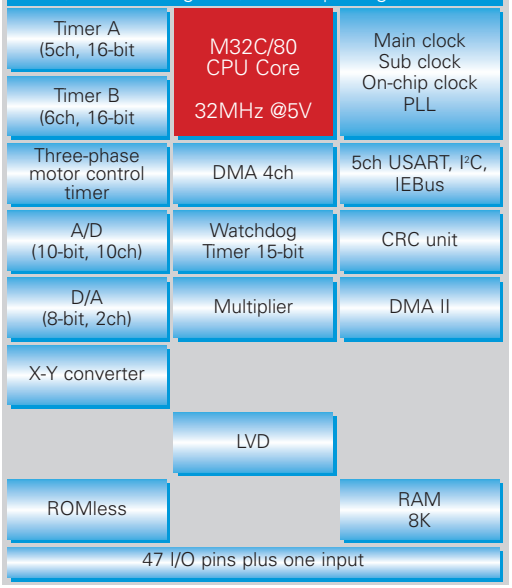
Focus Products:

- M32C/80 ROMless
- M32C/84 ROMless (1x CAN2.0B)
- M32C/87 (2x CAN2.0B)
- M32C/87A (1x CAN2.0B)
- M32C/87B

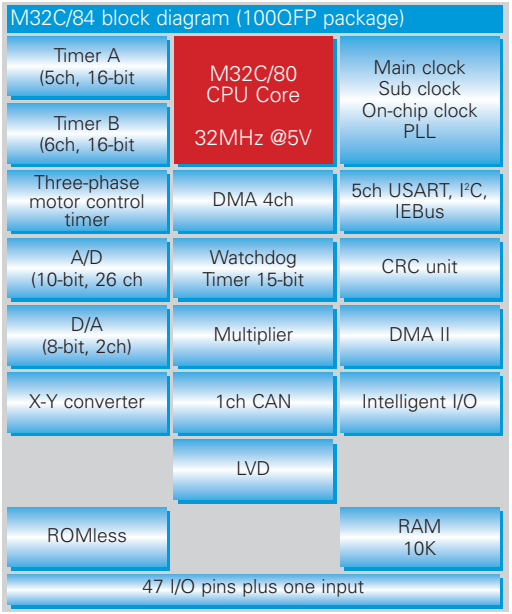
StarterKits:

- RSKM32C87 (supporting M32C/84 and /80 and M32C/87, /87A, /87B)

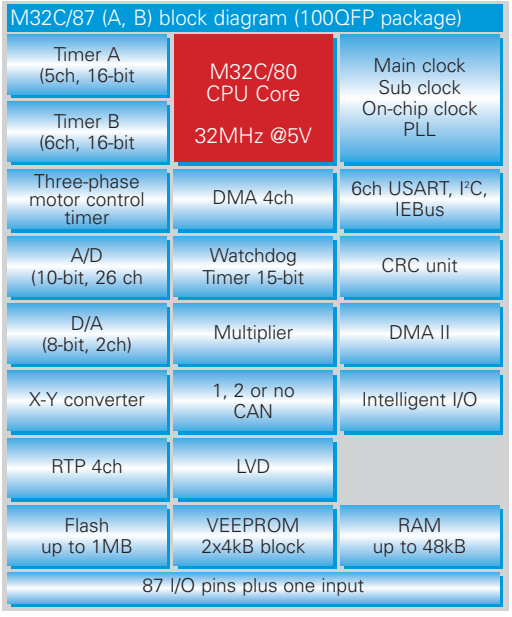
M32C/80 block diagram (100QFP package)



M32C/84 block diagram (100QFP package)



M32C/87 (A, B) block diagram (100QFP package)



Tool Support

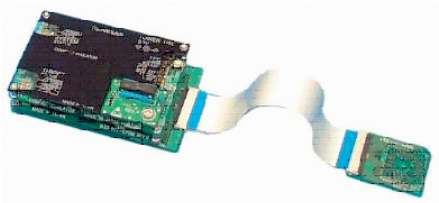
M16C Platform Tool Environment

A reliable, integrated development environment is essential in today's "fastest time-to-market" engineering climate. Wherever you are looking, the Renesas M16C Platform support tool chain provides a fitting tool to meet your requirements and speeds up the design time to market. Furthermore these tools can be reused for any other future development with a M16C Platform device.

On-chip debugging emulator
E8

Real time debug and easy connection with devices.

Compact emulator
CPE



Low cost,
limited trace & breakpoint spec

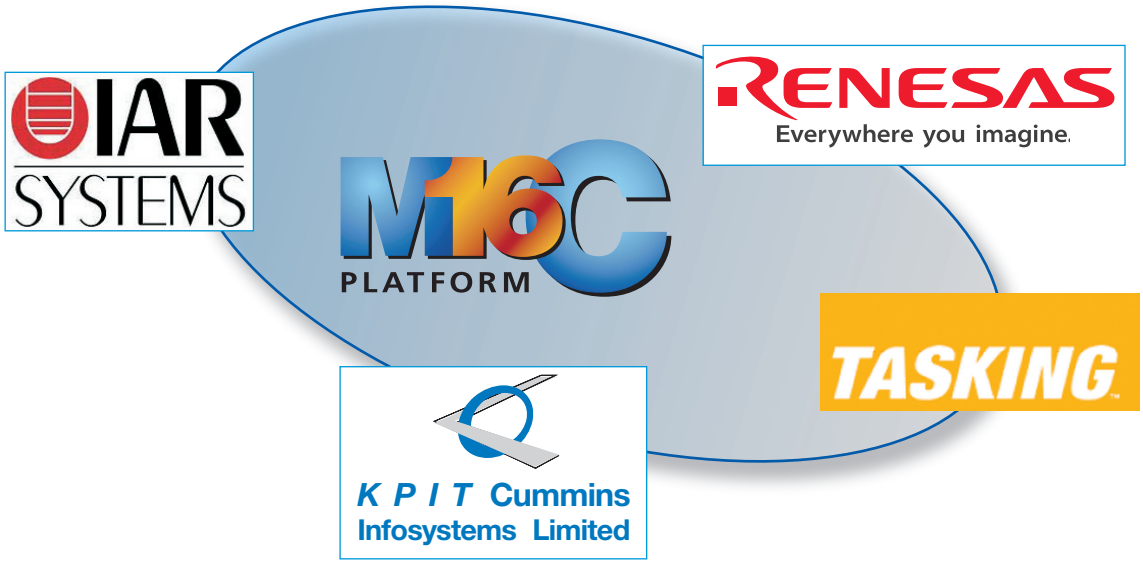
Full specification emulator
PC7501

Full trace,
breakpoint & performance analysis spec

Performance

Compilers

The key for any embedded development is the tool chain. Renesas Technolgy Europe has a number of different approaches to ensure that we offer the very best solutions to support you during you design. The selection ranges from supported third party compilers, free of charge GNU compiler and our own in house compiler.



High-performance Embedded Workshop

Renesas has developed a fully integrated development environment known as HEW (High-performance Embedded Workshop). HEW pulls together all of the development tasks into one easy-to-use application.

- Code development
- Project management
- Integrated debugger
- Compiler integration
- Flash programmer

Tool selection guide

Group	Development Environment	Renesas Compiler	Renesas Debugger	Flasher	On Chip debugging	Compact Emulator	Full Emulation Systerm		StarterKits
							Emulator	Probe	
M16C/26A	HEW4	S32HEWNC30-1-6	HEW4 (supplied as standard with hardware)	FDT	E8 ROE000080KCE00	M30260T2-CPE-GP (48pin package) M30263T2-CPE-FP (42pin package)	PC7501	M30260T-EPB-GP (48pin package) M30263T-EPB-FP (42pin package)	RSKM16C26A (ROK33026AS000BE)
M16C/28						M30290T2-CPE-HP (80pin package) M30291T2-CPE-HP (64pin package)		M30290T-EPB-HP (80pin package) M30291T-EPB-HP (64pin package)	RSKM16C29 (ROK330290S000BE)
M16C/29						M30290T2-CPE-HP (80pin package) M30291T2-CPE-HP (64pin package)		M30290T-EPB-HP (80pin package) M30291T-EPB-HP (64pin package)	RSKM16C29 (ROK330290S000BE)
M16C/6Nx						under planning		M306NKT-EPB	RSKM16C6NK (ROK3306NKS000BE)
M16C/62P						M3062PT-CPE		M3062PT2-EPB	RSKM16C62P (ROK33062PS000BE)
M32C/80		S32HEWNC308-1-6		ROMless device					
M32C/84				FDT	E8 ROE000080KCE00	M30850T2-CPE		M30850T-EPB	RSKM32C87 (ROK330879S000BE)
M32C/87						M30870T2-CPE		M30870T-EPB	

Renesas Starter Kit (RSK)

M16C/62P Starter Kit (RSK)
The kit includes:

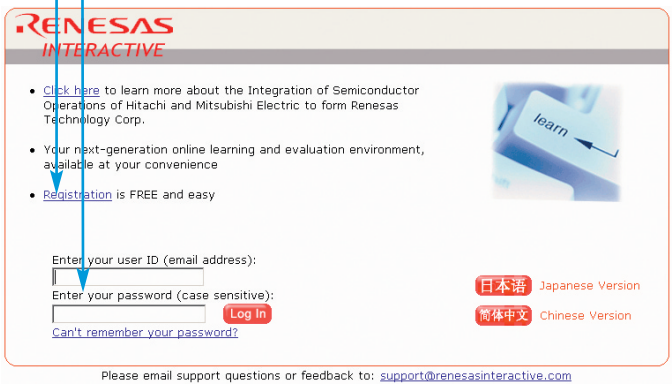
- CPU board with target microcontroller
- LCD panel for user/diagnostic interaction
- E8 on-chip debugger
- Trial C compiler and IDE
- Tutorial session
- Sample peripheral driver code

Renesas Interactive

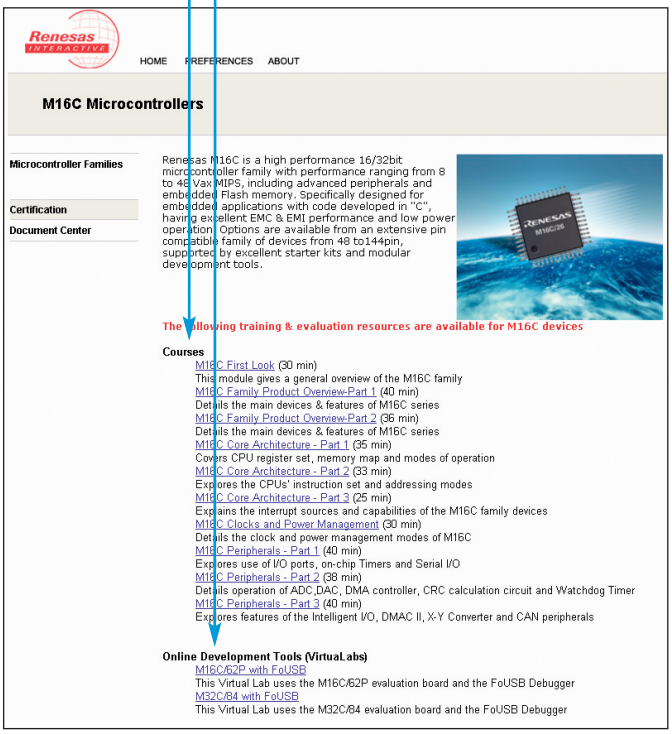
Do you know that there is the Renesas Interactive Webpage? Renesas Interactive gives 24/7 service with free, state of the art online training including virtual labs. So go to Renesas Interactive Webpage and give it a try!

http://www.renesasinteractive.com

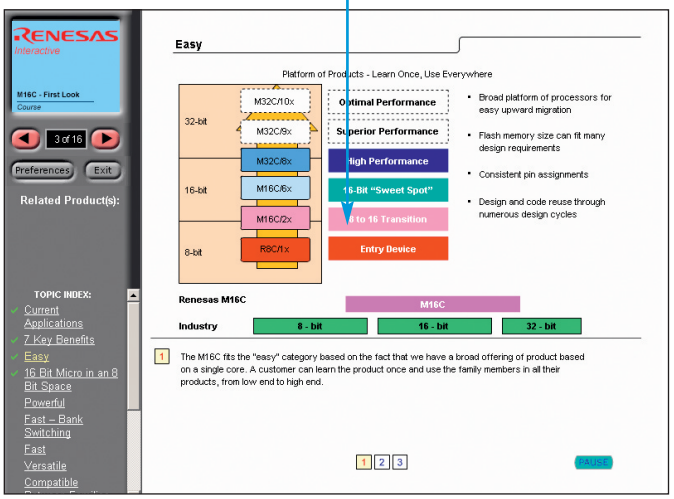
Free registration
Login password will be sent to you by email



M16C course selection
M16C virtual labs,
online development tools



A typical M16C course



References

- Renesas Homepage:
  http://www.renesas.eu

- M16C Platform Webpage:
  http://www.eu.renesas.com/m16c

- Microchooser:
  The Microchooser is a stand-alone parametric search tool that will help you find the Renesas microcontroller which most closely matches your requirements. It is quick and easy to use and you do not need to be connected to the Internet to use it
  http://www.microchooser.com