MITSUBISHI

MITSUBISHI FLASH MCUs

YOUR DEVELOPMENT WILL TURN AROUND AND SOAR:

High-speed processing from prototype development to mass production

THE ANSWER TO TODAY's PRODUCT DEMANDS:

•Shorter system development •Low-volume, High-variety mass-production
•Post-shipment upgrades •Large-capacity flash memory
•High-speed reprogramming •Low-power-source-voltage operation

YOUR DEVELOPMENT WILL TURN AROUND AND SOAR:
High-speed processing from prototype development to mass production

Original technology from Mitsubishi brings DINOR and New DINOR high-performance Flash MCUs. Maximize the advantages of Flash MCUs.

In addition to the conventional dual power source NOR-type flash memory, we have now added the DINOR-type flash memory, which enables large memory integration and operation with a single power source. We have applied this type of memory to mainly 16-bit and 32-bit MCUs. We are also developing 8-bit and 16-bit flash MCUs employing the New DINOR-type technology. This New DINOR-type flsh memory is appropriate to small and mid-sized memory integration and operates with single power source.

NOR Type (Total Erasure)
- 7751 Series

NOR Type (Block Erasure)
- M32R/E Series
- M16C/20 Series
- 7751 Series
- 38000 Series

DINOR Type
- M32R/E Series
- M16C/80 Series
- M16C/60 Series
- 7900 Series

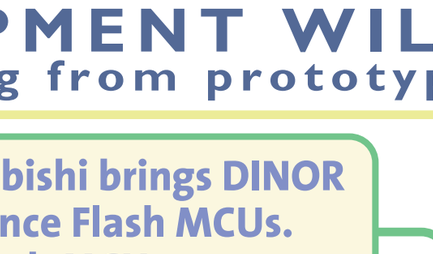
- 2.5 V, 3.3 V, or 5 V Single-Power-Source Operation
- Large Size (up to 768 Kbytes, now planning 1 Mbyte version)
- Low Voltage Operation, High-speed Read-out — High speed even at low voltage
- High-speed Reprogramming (64 Kbytes per 2 seconds)
- Security function againt read-out and tampering contents of flash memory by unauthorized persons
- Auto-reprogramming and Erasure Commands
- High Reliability and Wide Range Operation Temperature

New-DINOR Type
- M16C/20 Series
- 7900 Series
- 38000 Series

- 5 V Single-power-source operation
- Large Size (small and mid size)
- High-speed Read-out
- Low Current Consuption
- Security function againt read-out and tampering contents of flash memory by unauthorized persons
- Auto-reprogramming and Erasure Commands
- High Reliability and Wide Range Operation Temperature

High-speed Reprogramming

Reprogramming (erasing + programming) time is independent of clock frequencies at a constant 64 Kbytes/2 sec. for the DINOR type and more speedy with the New DINOR type. Also, high-speed rerogramming is enabled even on the mass-production line.



Safe programming/erasing by command execution

Commands are provided for auto reprogramming and auto erasing. Execution of these commands simplifies reprogramming and erasing, so safe reprogramming is guaranteed no matter how it is done. Users can also develop their own reprogramming software.easily.

- Independent of clock frequencies.
- Reprogramming sequence is automatically controlled by a control circuit. Since users' reprogramming software need not to control this sequence, complicated processing, such as timer-triggered wait insertion, is unnecessary.

High Reliability

Data retention, erasing, and programming are highly reliable, so these works proceed without a worry.

Proper Memory Block Assignment

For example, a small-sized block is provided for data storage according to end-user/product; so it is used in place of an E²PROM.

Flash MCU

Flexible Support from Development to Post-mass-production

4 Market
- On-board reprogramming
- Upgradable products

3 Mass Production
- Easy to be tailored for modified specifications
- Parameters, such as a county code, is programmable.
- No IC socket required

2 Initial Stage of Mass production
- Production-line programming
- Avoid production risks

Low volume production

1 Development
- Faster development process
- Cost reduction
- Development environment same as mass-production environment
- Same dimensions of mounting area on PCB as mask ROM version

Mitsubishi's Flash MCUs have been developed to meet such market needs. The result is MCUs that provide a seamless environment in going from product development through to mass production. In-situ programmability gives a smooth and fast development process for trial manufacturing, evaluation and product modifications.

Single-power-source Operation

The same power source voltage is used for the MCU operation and the flash memory reprogramming, so power source design is easy. Select the power source voltage from 5 V, 3.3 V, or 2,5 V.

High-speed Operation at Low Power Source Voltage

The Mitsubishi flash MCUs meet the contrary requirements for "low power source voltage" and "fast operation" at the same time.

Security Fuction

The security function is provided against read-out and tampering contents of the flash memory by unauthorized persons.

Wide Variety of Memory Size Options as well as Large-sized Memory Version

Memory variations from 32 Kbytes to 768 Kbytes are available. Also, the 1 Mbyte version is currently under the planning.

Additional Programming Available

1 block of data can be programmed little by little. For example, with the DINOR type, programming to 1 page at a time can increase the number of real programming cycles.

Fast Serial Programmer Plus Wide-range Communication Protocol Supported

Supports Various Reprogramming Methods

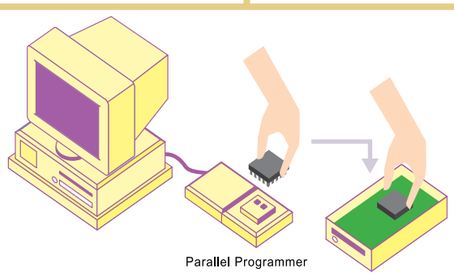
Mitsubishi's Flash MCUs support the CPU reprogramming mode in addition to the following on-board programming modes with serial programmers. Users can control their own reprogramming by using any sort of interface.

Parallel Reprogramming

A flash MCU is mounted on an IC socket over a parallel programmer, and its internal flash memory will be reprogrammed.

Examples

- ***Development stage***
  A flash MCU mounted on an IC socket over a board can repeatedly be programmed/erased. (Used in place of an EPROM version).
- ***Mass-production stage***
  A flash MCU can be programmed before being mounted on a board.

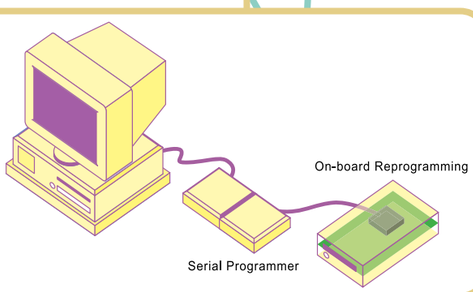


Serial Reprogramming

By using the dedicated interface, with a flash MCU mounted on a board, the internal flash memory is reprogrammed (on-board reprogramming).

Examples

- ***Development stage***
  With a flash MCU mounted on a board, half-debugged programs can be reprogrammed.
- ***Mass-production stage***
  Even after a flash MCU is mounted on a board, parameters such as a country code can be programmed, and this MCU will be shipped.
- Even after mounting under Mass-production Stage, program errors can be corrected.

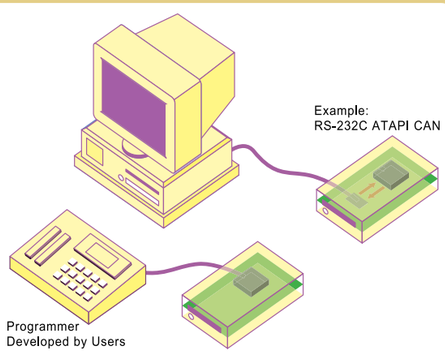


CPU Reprogramming

Users can develop their original reprogramming control software by using software commands for the CPU reprogramming. Any sort of interface can be used.

Examples

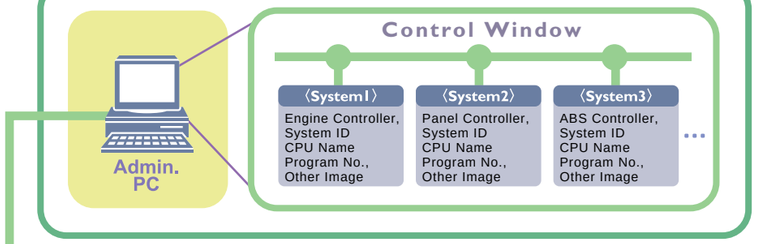
- System-dedicated interface is used.
- Software can be upgraded after hardware sales.
- Original programmers, such as a simple programmer for service people, can be developed.



Mitsubishi Flash MCUs

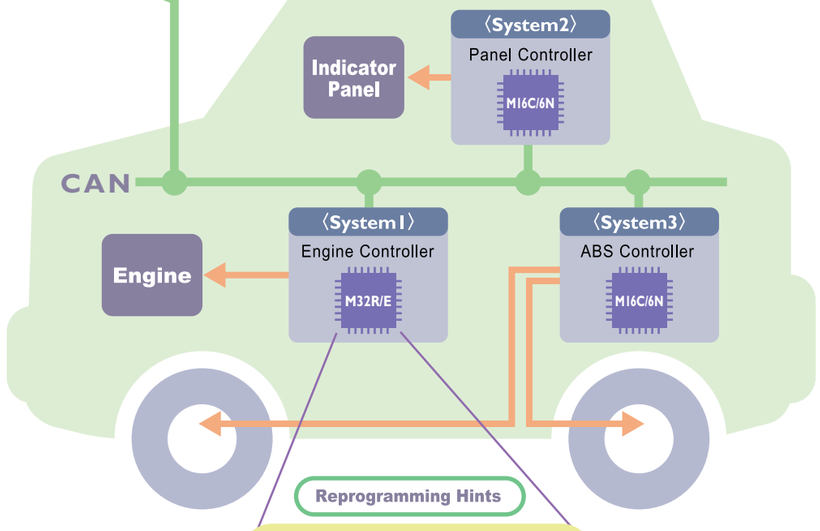
Application Example

Most Mitsubishi Flash MCUs support the CPU reprogramming mode, which allows a user to develop user-original reprogramming control software appropriate to the user's system.



During System Development

- Security Code Management
- CPU Reprogramming Format Management
- Program Version Management



Reprogramming Hints

<Programming Area Assignment>

Flash Memory Map

- Core
  - Programming-disabled Blocks
    - Base Program
    - Flash Erase/Program
      - -CPU Name
      - -Security Code
      - -System Name
      - -System ID
- Others
  - Reprogramming-enabled Blocks
    - Control Program
      - -Program ver.NO
      - -Other things

Certain MCU's programs on the network can be reprogrammed using the CPU reprogramming.

The above shows an example of CAN system using multiple MCUs. When the administrative PC issues a version-upgrade command and send new date, the target MCU upgrades its own program using the CPU reprogramming.

Flash MCUs Lineup

Bits	Series	Group	Flash Memory Type	MCU	Internal Memory (bytes) Flash Memory	Internal Memory (bytes) RAM	Power Source Voltage	Programming Voltage	Number of Blocks	Reprogramming Methods P	Reprogramming Methods S	Reprogramming Methods C	Erasure	Related Page
32-bit	M32R/E	32170	DINOR	M32170FxVFP/WG**	768K	40K	4.5V to 5.5V(External I/O), 3.0V to 3.6V (Internal Logic)	3.0V to 3.6V	15	NA	A	A	Total/Block	7
					512K	32K			11					
					384K	32K			9					
		32171	DINOR	M32171FxVFP	512K	16K			11					
					384K	16K			9					
16-bit	M16C/80	M16C/80	DINOR	M30803FGFP	256K	20K	4.2V to 5.5V	4.2V to 5.5V	7	A	A	A	Total/Block	9
				M30803FGGP										
				M30805FGGP ★										
				M30800FCFP	128K	10K			5					
				M30800FCGP										
				M30802FCGP										
	M16C/60	M16C/62	DINOR	M30624FGAFP	256K	20K	2.7V to 5.5V	4.2V to 5.5V	7	A	A	A	Total/Block	10
				M30624FGAGP										
				M30625FGAGP										
				M30624FGMFP			2.2V to 3.6V	2.7V to 3.6V						
				M30624FGMGP										
				M30625FGMGP										
				M30620FCAFP	128K	10K	2.7V to 5.5V	4.2V to 5.5V	5					
				M30620FCAGP										
				M30621FCAGP										
				M30620FCMFP			2.2V to 3.6V	2.7V to 3.6V						
				M30620FCMGP										
				M30621FCMGP										
				M30620FCTFP **			4.2V to 5.5V	4.2V to 5.5V						—
				M30621FCTGP **										
		M16C/6K	NewDINOR	M306K1F8LRP **	64K	3K	4.5V to 5.5V	4.5V to 5.5V	4	A	A	A	Total/Block	
				M306K2F8LGP **										
		M16C/6N	DINOR	M306N0FGTFP ★	256K	10K	4.2V to 5.5V	4.5V to 5.5V	7	A	A	A	Total/Block	
				M306N1FCTFP ★	128K	5K			5					
	M16C/20	M16C/20	NOR	M30201F6SP	48K	2K	4.0V to 5.5V	11.4V to 12.6V	1	A	A	A	Total	11
				M30201F6FP										—
				M30201F6TFP										
		M16C/21	NOR	M30218FCFP	128K	12K	4.0V to 5.5V	11.4V to 12.6V	4	A	A	A	Total/Block	11
		M16C/22	NewDINOR	M30220FCGP **	128K	10K	2.7V to 5.5V	4.5V to 5.5V	4	A	A	A	Total/Block	
				M30220FCRP **										
				M30221FCFP **										

Bits	Series	Group	Flash Memory Type	MCU	Internal Memory (bytes) Flash Memory	Internal Memory (bytes) RAM	Power Source Voltage	Programming Voltage	Number of Blocks	Reprogramming Methods P	Reprogramming Methods S	Reprogramming Methods C	Erasure	Related Page
16-bit	7900	7902	DINOR	M37902FJCHP **	498K	12K	4.5V to 5.5V	4.5V to 5.5V	11	A	A	A	Total/Block	12
				M37902FGCHP **	248K	6K	4.5V to 5.5V	4.5V to 5.5V	7					
				M37902FGMHP **			3.0V to 3.6V	3.0V to 3.6V						
				M37902FCCHP **	120K	4K	4.5V to 5.5V	4.5V to 5.5V	5					
				M37902FCMHP **			3.0V to 3.6V	3.0V to 3.6V						
		7903	NewDINOR	M37903F8CHP ★	61K	2K	4.5V to 5.5V	4.5V to 5.5V	4	A	A	A	Total/Block	
		7905	NewDINOR	M37905F8CFP **	60K	3K	4.5V to 5.5V	4.5V to 5.5V	6	A	A	A	Total/Block	
				M37905F8CSP **										
		7906	NewDINOR	M37906F8CFP **	60K	3K	4.5V to 5.5V	4.5V to 5.5V	6	A	A	A	Total/Block	
				M37906F8CSP **										
8-bit	38000	3803	NOR	M38039FFSP ★	60K	2K	4.0V to 5.5V	11.7V to 12.6V	2	A	A	A	Total/Block (Parallel/Serial, Total Erasure Only)	13
				M38039FFFP ★										
				M38039FFHP ★										
		3804	NOR	M38049FFSP ★										
				M38049FFFP ★										
				M38049FFHP ★										
		3850	NewDINOR	M38507F8FP **	32K	1K	2.7V to 5.5V	4.5V to 5.5V	1	A	A	A	Total	
				M38507F8SP **										
		3851	NewDINOR	M38517F8FP **	32K	1K	2.7V to 5.5V	4.5V to 5.5V	1	A	A	A	Total	
				M38517F8SP **										
		3886	NOR	M38869FFAGP	60K	2K	4.0V to 5.5V	11.7V to 12.6V	2	A	A	A	Total/Block (Parallel/Serial, Total Erasure Only)	
				M38869FFAHP										
		38B7	NOR	M38B79FFFP **	60K	2K	4.0V to 5.5V	11.7V to 12.6V	2	A	A	A		
		38C2	NewDINOR	M38C29FFFP **	60K	2K	2.5V to 5.5V (Tentative Value)	4.5V to 5.5V	2	A	A	A	Total/Block	
				M38C29FFHP **										
	740	7516	NewDINOR	M37516F8HP ★	32K	1K	2.7V to 5.5V	4.5V to 5.5V	1	A	A	A	Total	
				M37516F8HKP **										
	7600	7641	NewDINOR	M37641F8FP **	32K	2.5K	3.0V to 3.6V, 4.15V to 5.25V	4.5V to 5.25V	3	A	A	A	Total/Block	
				M37641F8HP **										

★ : New Product ★★ : Under Development P : Reprogrammed with parallel programmer. S : Reprogrammed with serial programmer.
C : Reprogramming mode using user-original reprogramming software. A : Reprogramming Available NA : Reprogramming Not Avaiable

● **Note :** For supported MCUs, please contact a Mitsubishi local sales office in your region.

flash mcu

Mitsubishi MCU Technical Information

Please visit our Web site. Here we introduce to you lineups and specifications of Mitsubishi Flash MCUs, as well as their most recent technical information available for your system developments.

● http://www.infomicom.mesc.co.jp/indexe.htm ●

Mitsubishi Development Support Tools Homepage

This homepage was give a facelift in February 2000 to make it more convenient, and the latest information on Mitsubishi development support tools can always be found.

● http://www.tool-spt.mesc.co.jp/index_e.htm ●

M32R Family

M32R/E Series

M32R Family CPU Core Overview

Architecture	Mitsubishi Original 32-bit RISC
Linear Logic Address Space	4 Gbytes
Instructions	83 (16-bit/32-bit Length Instructions)
General-purpose Registers	32-bit x 16
Control Registers	32-bit x 5
DSP Function	Multiply-Accumulate Function: 32-bit x 16 bit Multiplier + 56-bit Accumulator
Pipelines	5 Stages

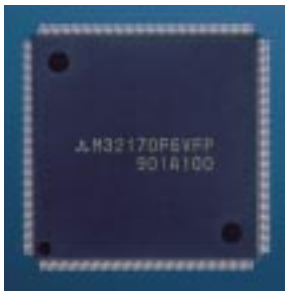
- **The M32R CPU is a Mitsubishi's original 32-bit high-performance compact RISC core.**
- **Most of the often-used instructions can quickly be executed only in 1 clock.**
- **Compounded instructions are provided to perform 2 operations in 1 clock, such as load-and-update-address and store-and-update-address instructions.**
- **16/32-bit instructions formats are used to ensure high code efficiency.**
- **On the programming model, a wide 4-Gbyte logic address space is provided, so that it is unnecessary to take segment-partitioning into consideration.**
- **DSP instrusions (multiply-accumulator included) come standard on all variations.**

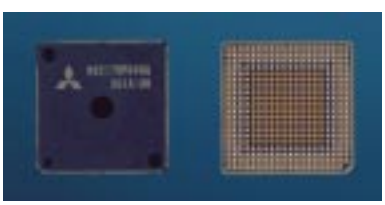
Features

- This MCU Series packages the M32R CPU core, peripheral I/Os and ROM/RAM on a single chip.
- Large-sized internal flash memory improves productivity in both development and production stages.
- All necessary peripheral I/Os are embedded in the flash MCU, and these I/Os combine one another; so flash MCUs can flexibly support system development.
- The 32170 and 32171 Groups are high-performance functional-versatility MCUs and are appropriated to automotive, industrial, and office use.

32170 Group DINOR

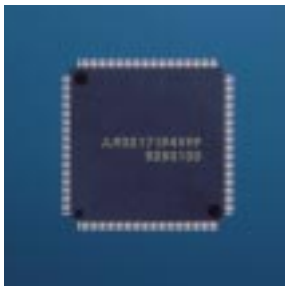
The M32170FxVFP/WG have rich internal peripheral functions such as the industry's largest (768 Kbytes) DINOR flash memory, 40-Kbyte RAM, 64-channel timer and CAN. Each of these MCUs improves operating speed and widens the operating temperature range (–40 +125°C). This MCU is best-appropriate to embedded systems requiring high precision and high reliability.





32171 Group DINOR

The M32171FxVFP maintains the software compatibility with the 32170 Group and the same operation speed as that of the the 32170 Group; but this MCU offers less memory size, peripheral functions, and pins.



M32R/E Series (32170/32171 Group) Product Lineup and Programmers

	Group			M32170FxVFP/WG ★★	M32171FxVFP
Performance	CPU Core			M32R CPU Core	
	Internal Operating Frequency			40 MHz , 32 MHz (PLL Multiplier (x 4) incorporated)	
	Internal Memory		Flash Memory	768 K / 512 K / 384 Kbytes	512 K / 384 Kbytes
			RAM	40 K / 32 K / 32 Kbytes	16 Kbytes
	Internal Peripheral Devices	Multi-Junction Timer (MJT)	Output Timers	35 ch	11 ch
			I/O Timers	10 ch	10 ch
			16-bit Input Timers	11 ch	8 ch
			32-bit Input Timers	8 ch	8 ch
		10-bit A-D Converter		32 ch (10-bit)	16 ch (10-bit)
		DMA Controller		10 ch	10 ch
		Serial I/O		6 ch	3 ch
		Real-Time Debugger (RTD)		1 ch	1 ch
		Interrupt Controller		Interrupt control for internal peripheral devices; any of 8 interrupt priority levels, incorporating the interrupt-disabled state, can be set.	
		Wait Controller		Wait control at access to externally-expanded area; expansion with waits from 1 through 4 and external signals is available.	
		CAN		1 ch	
		Boundary Scan		Available	
	Power Source Voltage			3.3 V (Internal), 5 V (I/O)	
	Power Consumption (Typ.)			250 mW@40 MHz	
	Package			255-pin FBGA, 240-pin QFP	144-pin LQFP
	Operating Ambient Temperature			– 40 to 85°C (@40 MHz), – 40 to 125°C (@32 MHz) (Note)	
Programmer	Serial programmer	YDC Corporation		Main unit : NET IMPRESS★★ Control module : FL202★★	

Note : This does not guaranty continuous operation at 125 ˚C. If interested in use at 125 ˚C, please contact a Mitsubishi local sales office in your region. For the detailed information concerning programmers, supported MCUs, and applicability to mass-production or production equipment, please contact the concerned manufacturers.

★★ : Under development or evaluation

M16C Family

M16C/80 Series

Flash MCU 16 bit

M16C/80 Series CPU Core Overview

Performance	Machine Cycles	50 ns (5 V at 20 MHz)
	Operation Speed	15 MIPS (20 MHz)
	Address Space	16 Mbytes
Instructions	106	
Registers	General-purpose Registers: 16-bit x 4 x 2 Banks, 24-bit x 4 x 2 Banks Dedicated Registers: 16-bit x 1, 24-bit x 4 Others: High-speed Interruot Registers, DMAC-related Registers	

Features

•DINOR-type Flash Memory Embedded

The ROM-code-protect function is provided to protect data against read-out and tampering by unauthorized persons even in the flash memory parallel I/O mode.

•Reduced Number of Cycles

For execution of frequently-used instructions, 1 cycle is required, and for that of high-functional instructions, 2 or 3 cycles are required. The processing for which a competitor's RISC MCU requires 3 or 4 instructions can be completed only in 1 instruction with few cycles.

•Improved ROM Code and Bus Cycle Efficiency

Enhanced instructions and addressing modes provide a very high ROM code efficiency. For the same processing, the M16C/80 realizes a smaller code size than competitors' RISC MUCs. This results in a 50 % decrease in bus cycles, allowing even largr programs to be executed st high speed.

•Interrupt Processing Time Shorten

Interrupt sequence with the highest priority is shortened to 5 cycles from the conventional 18 cycles. The interrupt return cycle is shortened to 4 cycles from conventional 6 cycles.

M16C/80 Group DINOR

New Product

The M16C/80 Group is positioned as the upper-class group in the M16C Family, providing MCUs with superior features such as instruction cycle reduction, operating frequency improvement, C lanquage code efficiency (top-class memory usage efficiency in the industry), and high-speed interrupt processing. As for internal peripheral functions, the M16C/80 Group incorporates the DRAM controller and X-U converter in addition to the M16C/60 Series's sophisticated internal peripheral functions.

Combination of Memory and Package

Group	MCU	Memory Size (bytes)		Package
		Flash Memory	RAM	
M16C/80	M30803FGFP	256K	20K	100P6S-A
	M30803FGGP	256K	20K	100P6Q-A
	M30805FGGP★	256K	20K	144P6Q-A
	M30800FCFP	128K	10K	100P6S-A
	M30800FCGP	128K	10K	100P6Q-A
	M30802FCGP	128K	10K	144P6Q-A

★ : New Product

100P6S-A : 100-pin Plastic Molded QFP (0.65 mm Pitch)
100P6Q-A : 100-pin Plastic Molded LQFP (0.5 mm Pitch)
144P6Q-A : 144-pin Plastic Molded LQFP (0.5 mm Pitch)

Lineup

		Group	M16C/80 (100-pin Version)★	M16C/80 (144-pin Version)★
Performance	Programmable I/O Port Pins	Input Only	1	
		CMOS I/O	87	123
		N-channel Open-drain	2	
	DMA Controller (channels)		4	
	Timers (16-bit)		5(Input) + 6 (Output)	
	CRC Operation Circuit		1	
	Serial I/O (Pins)	Clock Sync. /UART	5	
		Clock Sync. Only	–	
		UART Only	–	
	A-D Converter (resolution X channels)		10-bit X (8 + 2)	
	D-A Converter (resolution X channels)		8-bit X 2	
	External Interrupts (sources)		8	
	Watchdog Timer		Available	
	Other Functions		DRAM Controller, X-Y Converter Three-phase Motor Control Circuit, Sub-clock Circuit	
	Operating Voltage (V)		4.2 to 5.5 (20 MHz), 2.7 to 5.5 (10 MHz) (Planning Stage)	
	Operating Ambient Temperature (°C)		– 20 to 85 (Standard), – 40 to 85 (Available)	
	Minimum Instruction Execution Time (ns)		50 (20 MHZ)	
Programmer	Parallel programmer	Sunny Giken Inc.	MFW-1	
		Ando Electric Co., Ltd.	AF9708 , AF9709 , AF9723	–
	Serial programmer	Sunny Giken Inc.	MFW-1, SFW-62SA	
		YDC Corporation	NET IMPRESS	
		Mitsubishi	PC card-type Flash programmer(MSA0655), Flash Start(MSA0806)	

For the detailed information concerning programmers, supported MCUs, and applicability to mass-production or production equipment, please contact the concerned manufacturers.

★ : New product

M16C/60 Series

M16C/60 Series CPU Core Overview

Performance	Machine Cycles	62.5 ns (5 V at 16 MHz)
	Operation Speed	8 MIPS (16 MHz)
	Address Space	1 Mbytes
Instructions	91	
Registers	General-purpose Registers: 16-bit x 6 x 2 Banks, Dedicated Registers: 16-bit x 5	

The DINOR-type flash memory is embedded in the M16C/60 Series.
The programming voltage is in the range from 4.2 V to 5.5 V for the 5 V version and 2.7 V to 3.6 V for the 3.3 V version. Also, the operating voltage range of this series can be applied to the conventional One Time PROM versions. The ROM-code-protect function is provided to protect data against read-out and tampering by unauthorized persons even in the flash memory parallel I/O mode.

Combination of Memory and Package

Group	MCU	Memory Size (bytes) Flash Memory	Memory Size (bytes) RAM	Package
M16C/62	M30624FGAFP	256K	20K	100P6S-A
	M30624FGAGP	256K	20K	100P6Q-A
	M30625FGAGP	256K	20K	80P6S-A
	M30624FGMFP	256K	20K	100P6S-A
	M30624FGMGP	256K	20K	100P6Q-A
	M30625FGMGP	256K	20K	80P6S-A
	M30620FCAFP	128K	10K	100P6S-A
	M30620FCAGP	128K	10K	100P6Q-A
	M30621FCAGP	128K	10K	80P6S-A
	M30620FCMFP	128K	10K	100P6S-A
	M30620FCMGP	128K	10K	100P6Q-A
	M30621FCMGP	128K	10K	80P6S-A

The 9th digit of the MCU name represents the operating voltage as follows: "A" for the 5 V version and "M" for the 3 V version.

100P6S-A : 100-pin Plastic Molded QFP (0.65 mm Pitch)
100P6Q-A : 100-pin Plastic Molded LQFP (0.5 mm Pitch)
80P6S-A : 80-pin Plastic Molded LQFP (0.65 mm Pitch)

M16C/62 Group (Enhanced-Internal-Peripheral-Function Type) DINOR New Product

The M16C/62 Group provides a large-sized internal RAM, 5 serial I/Os, 11 timers, 8 external interrupts, and the following functions:

- Advanced serial I/O function enabling I²C-BUS (subset) operation **(Note 1)**
- Advanced serial I/O function enabling IEBus **(Note 2)**
- Advanced timer function enabling three-phase motor control (100-pin version only)

Notes 1: I²C-BUS
Purchase of MITSUBISHI ELECTRIC CORPORATION'S I²C components conveys a license under the Philips I²C Patents Rights to use these components an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

2: IEBus is a trademark of NEC Corporation.

Lineup

	Group		M16C/62 (100-pin Version)★	M16C/62 (80-pin Version)★
Performance	Programmable I/O Port Pins: Input Only		1	
	Programmable I/O Port Pins: CMOS I/O		85	67
	Programmable I/O Port Pins: N-channel Open-drain		2	
	DMA Controller (channels)		2	
	Timers (16-bit)		5 + 6	
	CRC Operation Circuit		1	
	Serial I/O (Pins): Clock Sync. /UART		3	2
	Serial I/O (Pins): Clock Sync. Only		2	
	Serial I/O (Pins): UART Only		–	1
	A-D Converter (resolution X channels)		10-bit X (8 + 2)	
	D-A Converter (resolution X channels)		8-bit X 2	
	External Interrupts (sources)		8	5
	Watchdog Timer		Available	
	Other Functions		Three-phase Motor Control Circuit, Sub-clock Circuit	
	Operating Voltage (V)	5V Version	4.2 to 5.5 V (16 MHz), 2.7 to 5.5 V (10 MHz, 1 Wait)	
	Operating Voltage (V)	3V Version	2.7 to 3.6V (10 MHz), 2.4 to 2.7 (7 MHz), 2.2 to 2.4 (7 MHz, 1 Wait)	
	Operating Ambient Temperature (°C)		– 20 to 85 (Standard), – 40 to 85 (Available)	
	Minimum Instruction Execution Time (ns)		62.5 (16 MHz)	
Programmer	Parallel programmer	Sunny Giken Inc.	MFW-1	
	Parallel programmer	Suisei Electronics System Co., Ltd.	EFP-I	–
	Parallel programmer	Ando Electric Co., Ltd.	AF9708, AF9709, AF9723	
	Parallel programmer	SEGGER Microcontroller Systeme GmbH (Germany)	Flasher 3	–
	Serial programmer	Sunny Giken Inc.	MFW-1-SFW-62SA	
	Serial programmer	Suisei Electronics System Co., Ltd.	EFP-I	
	Serial programmer	YDC Corporation	NET IMPRESS	
	Serial programmer	Ando Electric Co., Ltd.	AF9708, AF9709	
	Serial programmer	SEGGER Microcontroller Systeme GmbH (Germany)	Flasher 3	
	Serial programmer	Mitsubishi	PC card-type Flash programmer(MSA0655), Flash Start(MSA0806)	

For the detailed information concerning programmers, supported MCUs, and applicability to mass-production or production equipment, please contact the concerned manufacturers.

★ : New product

M16C Family

M16C/20 Series

Flash MCU 16 bit

M16C/20 Series CPU Core Overview

Performance	Machine Cycles	100 ns (5 V at 10 MHz)
	Operation Speed	5 MIPS (10 MHz)
	Address Space	1 Mbyte
Instructions	91	
Registers	General-purpose Registers: 16-bit x 6 x 2 Banks,	
	Dedicated Registers: 16-bit x 5	

The ROM-code-protect function is provided to protect data against read-out and tampering by unauthorized persons even in the flash memory parallel I/O mode.

M16C/62 Group (LCD Version) New DINOR

Under Development

The M16C/22 Group has inherited many of the M16C/61 Group's peripheral I/Os while adding the LCD functions, so this group is appropriate to cameras, meters and LCDs that require high-speed data processing.

M16C/20 Group (Compact Version)

New Product

M16C/20 Group consists of the 16-bit MCUs, compactly integrating the M16C CPU core, internal ROM, RAM, internal peripheral functions, pins, etc. into one chip. Each of these MCUs incorporates an A-D converter, serial I/O, 16-bit timers, etc., and its CPU also incorporates a multiplier, enabling high-speed operations.

M16C/21 Group (High-Breakdown-Voltage Version)

New Product

Each of the M16C/21 Group MCUs incorporates the FLD (VFD) function, in addition to the various internal peripheral functions inherited from the M16C/61 Group. Therefore, this group is appropriate to control of sound equipment and electric household appliances, requiring high-speed processing (breakdown voltage: available up to Vcc–50 V).

Combination of Memory and Package

Group	MCU	Memory Size (bytes)		Package
		Flash Memory	RAM	
M16C/20	M30201F6SP	48K	2K	52P4B
	M30201F6FP			56P6S-A
M16C/21	M30218FCFP	128K	12K	100P6S-A
M16C/22	M30220FCGP★★	128K	10K	144P6Q-A
	M30220FCRP★★			144PFB-A
	M30220FCFP★★			120P6R-A

★★ : Under Development

52P4B : 52-pin Plastic Molded SDIP
56P6S-A : 56-pin Plastic Molded QFP (0.65 mm Pitch)
100P6S-A : 100-pin Plastic Molded QFP (0.65 mm Pitch)
144PFB-A : 144-pin Plastic Molded LQFP (0.4 mm Pitch)
144P6Q-A : 144-pin Plastic Molded LQFP (0.5 mm Pitch)
120P6R-A : 120-pin Plastic Molded LQFP (0.4 mm Pitch)

Lineup

	Group		M16C/20	M16C/21	M16C/22 (144-pin Version)★★	M16C/22 (120-pin Version)★★
Performance	Programmable I/O Port Pins	Input Only	–	–	1	
		CMOS I/O	43	36	102	81
		N-channel Open-drain	–	–	2	
	DMA Controller (channels)		–	2	2	
	Timers (16-bit)		1 + 2 + 3	5 + 3	8 + 6	
	CRC Operation Circuit		–	1	–	
	Serial I/O (Pins)	Clock Sync. /UART	1	2	3	2
		Clock Sync. Only	–	1 (with auto-transfer function)	–	
		UART Only	1	–	–	
	A-D Converter (resolution X channels)		10-bit X (8 + 5)	10-bit X 8	10-bit X 8	10-bit X 7
	D-A Converter (resolution X channels)		–	8-bit X 2	8-bit X 3	8-bit X 2
	External Interrupts (sources)		3	6	8	
	Watchdog Timer		Available	Available	Available	
	Other Functions		LED-drive Port X 8, Sub-clock Circuit	FLD (VFD) Function (56 Control Pins), Sub-clock Circuit	LCD-drive Control Circuit, 48 SEG X 4 COM	LCD-drive Control Circuit, 40 SEG X 4 COM
	Operating Voltage (V)		4.0 to 5.5 (10 MHz)		4.0 to 5.5 (10 MHz), 2.7 to 5.5 (7 MHz, 1 Wait)	
	Operating Ambient Temperature (°C)		– 20 to 85 (Standard Type), – 40 to 85 (Under Development)		– 20 to 85	
	Minimum Instruction Execution Time (ns)		100 (10 MHz)		100 (10 MHz)	
Programmer	Parallel programmer	Sunny Giken Inc.	MFW-1	MFW-1★★	MFW-1★★	
	Serial programmer	Sunny Giken Inc.	–	–	MFW-1★★	
		YDC Corporation	NET IMPRESS			
		Mitsubishi	PC card-type Flash programmer(MSA0655)	–	PC card-type Flash programmer(MSA0655), Flash Start(MSA0806)	

For the detailed information concerning programmers, supported MCUs, and applicability to mass-production or production equipment, please contact the concerned manufacturers.

★ : New product ★★ : Under development or evaluation

7700 Family

7900 Series

Flash MCU 16 bit

7900 Series CPU Core Overview

Instructions	103 (7700 Family Basic Instructions) + 100
Minimum Instruction Execution Time	38 ns (at 26 MHz operating frequency as for the 7902 Group)
Address Space	16 Mbytes

Features

- **16-bit MCU capable of also 8/32-bit processing**
- **Resourceful peripheral I/Os included**
- **Easily connected to external ASICs**

7902 Group DINOR

This general-purpose MCU has a good balance of internal peripheral circuits. The 5 V version executes the shortest instructions in 38 ns. Memories different in size are lined up, and users can choose the capacity they need.

7905, 7906 Group New DINOR Under Development

Appropriated to high-performance motor control for electric household appliances, etc.

Combination of Memory and Package

Group	MCU	Memory Size (bytes) Flash Memory	Memory Size (bytes) RAM	Package
7902	M37902FJCHP ★★	498K	12K	100P6Q-A
	M37902FGCHP ★★	248K	6K	100P6Q-A
	M37902FGMHP ★★			
	M37902FCCHP ★★	120K	4K	100P6Q-A
	M37902FCMHP ★★			
7903	M37903F8CHP ★	61K	2K	100P6Q-A
7905	M37905F8CFP ★★	60K	3K	64P6N-A
	M37905F8CSP ★★			64P4B
7906	M37906F8CFP ★★	60K	3K	42P2R-E
	M37906F8CSP ★★			42P4B

The 9th digit of the MCU name represents the operating voltage as follows: "C" for the 5 V version and "M" for the 3.3 V version.

★★ : Under Development

100P6Q-A : 100-pin Plastic Molded LQFP (0.5 mm Pitch)
64P6N-A : 64-pin Plastic Molded QFP
64P4B : 64-pin Plastic Molded SDIP
42P2R-E : 42-pin Plastic Molded SSOP
42P4B : 42-pin Plastic Molded SDIP

Lineup

	Group		7902** / 7903*	7905**	7906**
Performance	Programmable I/O Port Pins		84	50	30
	DMA Controller (channels)		–		
	Timers (16-bit)		5 + 3	10 + 3	
	Serial I/O (channels)	Clock Sync. /UART	2	3	2
		UART Only	–		
	10-bit A-D Converter (channels)		8	12	5
	8-bit D-A Converter (resolution x channels)		3	2	
	External Interrupts (sources)		5	8	5
	12-bit Watchdog Timer		Available		
	Other Functions		Real-time Output	Motor-control Circuit × 2	Motor-control Circuit × 1
	Operating Ambient Temperature (°C)		– 20 to 85		
	Minimum Instruction Execution Time (ns)		38 (26 MHz) for 5 V Version, 50 (20 MHz) for 3.3 V Version	50 (20 MHz)	

	Group		7902**	7903*	7905**	7906**
Programmer	Parallel programmer	Suisei Electronics System Co., Ltd.	EFP-I		–	EFP-I**
		Ando Electric Co., Ltd.	AF9708**, AF9709**, AF9723**	–		
	Serial programmer	Suisei Electronics System Co., Ltd.	EFP-I			
		YDC Corporation	NET IMPRESS**	–		

For the detailed information concerning programmers, supported MCUs, and applicability to mass-production or production equipment, please contact the concerned manufacturers.

★ : New product ★★ : Under development or evaluation

740 Family CPU Core Overview

Instructions	71
Minimum Instruction Execution Time	240ns (at 16.8 MHz: 3803/3804 Group)

- **Rich product lineup is provided, consisting of a general-purpose (low/high number of pins) type, LCD-driver or high-breakdown-voltage-output-ports incorporating type, etc.**
- **The number of pins ranges from 42 to 100. Additionally, various packages are provided such as a shrink DIP, multiple flat packages differing lead pitch.**
- **As for the 3850/3851 and 7516 Groups, the NEW-DINOR-type flash memory is incorporated, and these MCUs' operating voltage ranges from 2.7 to 5.5 V. As for the 38C2 Group, its operating voltage ranges from 2.5 to 5.5 V. So, these MCU groups enable the low voltage operation. Also, the ROM-code-protect function is provided against read-out and tampering contents of the flash memory by unauthorized persons even in the parallel I/O mode.**

3850/3851 Group
New DINOR — Under Development

Each of these 42-pin general-purpose MCUs is equipped with standard CMOS I/O ports. 8-bit MCU functions and performance have been integrated into a small package to meet needs for downsized lighter-weight applied products and system cost reductions.

3803/3804 Group
New Product

The 3803 and 3804 Groups are general-purpose, 64-pin MCUs equipped with standard CMOS I/O ports. Each of these groups is also equipped with various internal peripheral functions, such as an A-D converter, D-A convertor, multi-functional timers, serial I/O, etc.

3886 Group

These 80-pin general-purpose MCUs are equipped with standard CMOS I/O ports. Each MCU functions well as a keyboard controlling MCU thanks to a bus interface circuit and comparator circuit.

38C2 Group
New DINOR — Under Development

Each of these 64-pin MUCs is equipped with the LCD function. This MCU offers the low power consumption thanks to the sub-clock oscillation circuit and key-on wake-up function, which are appropriate to portable products.

38B7 Group
Under Development

Each of these MCUs is equipped with high-breakdown output ports and FLD (VFD) function, so this MCU is appropriate to the display system of VCRs, electric household appliances, audio equipment, etc.

7516 Group
New DINOR — Under Development

Ultra small packages, featuring 48/44 pins, are provided for these MCU groups. These MCUs support the I²-C BUS, so they can be applied to the smart battery system. Also, thanks to ultra small packages, these MCUs are appropriate to portable products, requiring reduction of board dimensions.

Combination of Memory and Package

Group	MCU	Memory Size (bytes) Flash Memory	Memory Size (bytes) RAM	Package
3850	M38507F8FP ★★	32K	1K	42-pin SSOP(42P2R-A/E)(0.8 mm Pitch)
	M38507F8SP ★★	32K	1K	42-pin SDIP(42P4B)(1.778 mm Pitch)
3851	M38517F8FP ★★	32K	1K	42-pin SSOP(42P2R-A/E)(0.8mm Pitch)
	M38517F8SP ★★	32K	1K	42-pin SDIP(42P4B)(1.778 mm Pitch)
3803	M38039FFSP ★	60K	2K	64-pin SDIP(64P4B)(1.778 mm Pitch)
	M38039FFFP ★	60K	2K	64-pin QFP(64P6N-A)(0.8 mm Pitch)
	M38039FFHP ★	60K	2K	64-pin LQFP(64P6Q-A)(0.5 mm Pitch)
3804	M38049FFSP ★	60K	2K	64-pin SDIP(64P4B)(1.778 mm Pitch)
	M38049FFFP ★	60K	2K	64-pin QFP(64P6N-A)(0.8 mm Pitch)
	M38049FFHP ★	60K	2K	64-pin LQFP(64P6Q-A)(0.5 mm Pitch)
3886	M38869FFAGP	60K	2K	80-pin QFP(80P6S-A)(0.65 mm Pitch)
	M38869FFAHP	60K	2K	80-pin LQFP(80P6Q-A)(0.5 mm Pitch)
38B7	M38B79FFFP ★★	60K	2K	100-pin QFP(100P6S-A)(0.65 mm Pitch)
38C2	M38C29FFFP ★★	60K	2K	64-pin QFP(64P6N-A)(0.8 mm Pitch)
	M38C29FFHP★★	60K	2K	64-pin LQFP(64P6Q-A)(0.5 mm Pitch)
7516	M37516F8HP ★	32K	1K	48-pin LQFP(48P6D-A)(0.5 mm Pitch)
	M37516F8HKP ★★	32K	1K	44-pin QFN(48P0X)(0.65 mm Pitch)

★ : New Product, ★★ : Under Development

Note : I²C-BUS (3851/3804/3886/7516Group)
Purchase of MITSUBISHI ELECTRIC CORPORATION'S I²C components conveys a license under the Philips I²C Patents Rights to use these components an I²C system,provided that the system conforms to the I²C Standard Specification as defined by Philips.

Lineup

	Group	3850 ★★	3851 ★★	3803 ★	3804★	3886	38C2★★	38B7★★	7516★
Performance	Programmable I/O Port Pins: CMOS I/O	32	32	54	54	64	51	75	38 (**Note 3**)
	Programmable I/O Port Pins: N-channel Open-drain	2	2	2	2	8	–	–	2
	Programmable I/O Port Pins: High-breakdown-voltage Output	–	–	–	–	–	–	52	–
	Timers (bit X channels)	8-bit X 4	8-bit X 4	8-bit X 4, 16-bit X 1	8-bit X 4, 16-bit X 1	8-bit X 4	8-bit X 4, 16-bit X 2	8-bit X 6, 16-bit X 1	8-bit X 4
	Serial I/O (channels): Clock Sync. /UART	8-bit X 1	8-bit X 1	8-bit X 2	8-bit X 2	8-bit X 1	8-bit X 2	8-bit X 1	8-bit X 1
	Serial I/O (channels): Clock Sync. Only	8-bit X 1	8-bit X 1	8-bit X 1	8-bit X 1	8-bit X 1	–	8-bit X 2 (**Note 3**)	8-bit X 1
	A-D Converter (resolution x channels)	10-bit X 5	10-bit X 5	10-bit X 16	10-bit X 16	10-bit X 8	10-bit X 8	10-bit X 16	10-bit X 8 (**Note 4**)
	D-A Converter (resolution x channels)	–	–	8-bit X 2	8-bit X 2	8-bit X 2	–	8-bit X 1	–
	External Interrupts (sources)	6	7	8	9	9	6	5	7
	PWM (bit X channels)	8-bit X 1	8-bit X 1	8-bit X 1	8-bit X 1	14-bit X 2	16-bit X 1, 10-bit X 2	14-bit X 1, 8-bit X 1	8-bit X 1
	Watchdog Timer	Available	Available	Available	Available	Available	Available	Available	Available
	Sub-clock Circuit	Available	Available	Available	Available	Available	Available	Available	Available
	Other Functions	–	I²C-BUS	Software Pullup	I²C-BUS, Software Pullup	Comparator X 8, Bus Interface, I²C-BUS (Option), Key-on Wake-up, Software Pullup	LCD Display Function: 4 COM X 24 SEG, Key-on Wake-up, Software Pullup	FLD (VFD) Function, Software Pullup, Buzzer Output	I²C-BUS (Option)
	Operating Voltage (V)	2.7 to 5.5	2.7 to 5.5	4.0 to 5.5	4.0 to 5.5	4.0 to 5.5	2.5 to 5.5 (**Note 1**)	4.0 to 5.5	2.7 to 5.5
	Operating Ambient Temperature (°C)	– 20 to 85	– 20 to 85	– 20 to 85	– 20 to 85	– 20 to 85	– 20 to 85	– 20 to 85	– 20 to 85
	Minimum Instruction Execution Time (μs)	0.5 (8 MHz)	0.5 (8 MHz)	0.24 (16.8 MHz)	0.24 (16.8 MHz)	0.4 (10 MHz)	0.25 (8 MHz)	0.48 (4.19 MHz)	0.5 (8 MHz)
Programmer	Parallel programmer: Suisei Electronics System Co., Ltd.	EFP-I★★	EFP-I★★	–	–	–	EFP-I★★	–	EFP-I★★
	Parallel programmer: Ando Electric Co., Ltd.	–	–	AF9708 , AF9709 , AF9723	AF9708 , AF9709 , AF9723	AF9708 , AF9709 , AF9723	–	AF9708★★ , AF9709★★ , AF9723★★	–
	Parallel programmer: Hi-Lo Systems Co., Ltd.	–	–	–	–	ALL-11	–	–	–
	Serial programmer: Suisei Electronics System Co., Ltd.	EFP-I★★	EFP-I★★	MSP-Ⅱ , EFP-I	MSP-Ⅱ , EFP-I	MSP-Ⅱ , EFP-I	EFP-I★★	EFP-I★★	EFP-I★★

Notes 1 : Tentative value. The minimum values are subject to change. **2 :** 1 channel of them is equipped with the 256-byte automatic transfer function.
3 : 34 port pins as for the M37516F8HKP **4 :** "10-bit X 6" as for the M37516F8HKP

For the detailed information concerning programmers, supported MCUs, and applicability to mass-production or production equipment, please contact the concerned manufacturers.

★ : New product
★★ : Under development or evaluation
(As for the programmers, this mark represents "currently being evaluated" or "being scheduled for evaluation".)

programmer

YDC Corporation (Yokogawa Digital Computer) http://www.ydc.co.jp/micom/index_E.htm

In-circuit Flash Micom Programmer NET IMPRESS Series

NET IMPRESS is a universal in-circuit flash micom programmer for programming various types of flash micoms soldered on the user system.
The NET IMPRESS family consists of the following four models specially designed to enable programming in specific fields of application.

Model	Outline	Application field		
		Development	Production	Maintenance
AF220	Including Ethernet (10Base-T) interface model	Yes	Yes	Yes
AF210	Standard model	Yes		Yes
AF120	One-touch key model with Ethernet interface	Yes	Yes	Yes
AF110	One-touch key model		Yes	Yes

The combination of NET IMPRESS and dedicated IMPRESS module enable the expanded functions.

• Control Module

The NET IMPRESS control modules give you the freedom and flexibility to program microcontrollers manufactured by different companies. In addition to the extensive line-up of basic modules for AF200, you can also use the IMPRESS Modules that come loaded with various extended functions. You can now program all sorts of different microcontrollers by changing the control modules, or just by exchanging the IMPRESS Module definition or parameters.

- *IMPRESS Definition Download Function (/P4 or larger model)*

  This enables you to switch your target micom without swapping the control module. (License for extra IMPRESS Definition can be purchased.)

- *AZ282 : F/DF sheet supports efficient installation of each programming condition specified from the target system.*

- *DOS Area*

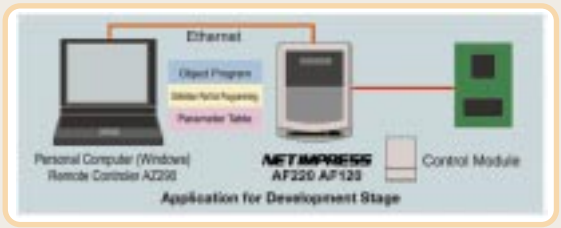
  The following control modules are available for each type of microcontroller (Specify the model code when ordering).

Model	Flash memory	DOS area
/P2 (2M)	- 128KB	About 1.7MB
/P4 (4M)	- 512KB	About 3MB
/P5 (4M)	- 768KB	About 3MB
/P8 (8M)	- 1MB	About 6.5MB
/E6 (4M)	- 2MB	About 1MB*

* /E6 is for production line application.

• Remote Control Application

NET IMPRESS offers two types of remote control software.



• Stand-alone operation

The Stand-alone Operation mode offers you the freedom of portable programming.

Supported MCUs : 32-bit M32R/E Series
16-bit M16C/80 Series
16-bit M16C/62 Series
16-bit M16C/22 Series
16-bit M16C/21 Series
16-bit M16C/20 Series
16-bit 7700 Family 7900 Series 7920 Group
16-bit 7700 Family 7900 Series 7902 Group

Contact Information

U.S. and Canada:
Yokogawa Digital Computer Corporation of America
3777 Stevens Creek Blvd. Suite 240, Santa Clara, CA 95051
Tel: +1-408-244-1932 Fax: +1-408-244-1881
URL: http://www.ydc.co.jp/index_e.html

Europe:
Ashling Microsystems Limited
National Technological Park, Limerick, Ireland
Tel: +353-61-334466 Fax: +353-61-334477
URL: http://www.ashling.com/

Japan:
YDC Corporation (Yokogawa Digital Computer)
Instruments Division
Tel: +81-42-333-6224 Fax: +81-42-352-6107
URL: http://www.ydc.co.jp/micom/index_E.htm

For details on the application of the programmer to production facilities, contact the manufacturer of the programmer.

Ando Electric Co., Ltd.

http://www.ando.co.jp/ando-e.htm

Flash Programmer AF9709, AF9708

As demand for microcontrollers with internal flash memory continues to rise, the device programmers used to write data must support not only writes to single devices, but serial writes to onboard devices. The Ando Electric AF9709 programmer handles both parallel and serial write processing. We also offer the AF9708, with a reduced function set and a lower price.

- Handles both serial and parallel programming
- High-speed programming: Up to 1 Mbit/3 s *
  * for x16-bit write; Varies with device characteristics.
- Prompt support for new devices
- Large-capacity programming: Handles 64 Mbit buffer RAM (AF9708: 16 Mbit)
- High-speed data transfer: Equipped with 10Base-T as standard for high-speed FTP transfer (Not provides as standard equipment in AF9708)

Supported MCUs: 16-bit M16C/80 Series
16-bit M16C/62 Group
16-bit M16C/20 Series
16-bit 7700 Family 7900 Series
16-bit 7700 Family 7770 Series
16-bit 7700 Family 7751 Series
8-bit 740 Family

Gang Programmer AF9723

AF9723 received CE marking in September 1999.
The AF9723 Gang Programmer consists of the main unit, which is equipped with eight device sockets, the Ethernet unit, and an optional expansion RAM board. A complete line-up of units is available to handle diverse flash devices, flash microcontrollers and cards.

- High-speed programming: Up to 1 Mbit/3 s *
  * for x16-bit write; Varies with device characteristics.
- High-speed data transfer (direct LAN connection)
- Large-capacity programming: Handles 64 Mbit buffer RAM
- Prompt support for new devices
- Eight-device gang programming

Contact Information

U.S. and Canada:
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URL: http://www.ando.co.jp/ando-e.htm

For details on the application of the programmer to production facilities, contact the manufacturer of the programmer.

programmer

Sunny Giken Inc.

http://www.iijnet.or.jp/sunny/english.html

Multifunctional Flash Microcomputer Programmer MFW-1

MFW-1 is a flash microcomputer programmer supporting Mitsubishi Electric Flash Memory Internal Microcomputer. Though MFW-1 is a small, it is serial programming, parallel programming by one unit, and it can be used as a gang programmer by the addition of the adapter. As for the function side as well, it features all contact pin test functions. Therefore, MFW-1 are the multiple function flash microcomputer programmers of the convenient function loading fully.

- Supports parallel programming mode
- Supports serial programming mode
- All signal pin contact test
- Supports gang programming
- Supports boot areas function
- Supports lock bit function
- Supports block function
- Can program to the user and boot ROM areas at the same time
- Supports ID code function
- Supports ROM code protect function
- Can be disconnected from the PC for stand-alone use
- Supports Windows98/95/NT/2000
- Comply with CE marking and FCC regulations

Supported MCUs: 16-bit M16C/80 Group
16-bit M16C/62 Group
16-bit M16C/6N Group
16-bit M16C/22 Group
16-bit M16C/21 Group
16-bit M16C/20 Group
16-bit M16C/2N Group
8-bit 740 Family 7641 Group

Ultra Small Flash Microcomputer Programmer SFW-62SA

SFW-62SA is a flash microcomputer programmer only for Serial programming Mitsubishi Electric Internal Microcomputer M16C family. SFW-62SA is convenient to reprogram data on mass production lines or when conducting maintenance, because it is ultra small, ultra lightweight. It is used in the same way as standard flash programmers, because a basic function is satisfactory.

- Supports serial programming mode (Standard serial I/O mode)
- Ultra small (card size) Approx.55(W) x 85(H) x 17(D)mm
- Ultra light Approx.55g
- Supports lock bit function
- Supports block function
- Supports ID code function
- ROM code protect function
- Supports data copy function
- Supports Windows 98/95/NT/2000
- Comply with CE marking and FCC regulations

Supported MCUs: 16-bit M16C/80 Group
16-bit M16C/62 Group
16-bit M16C/6N Group

Contact Information

Sunny Giken Inc.
TEL:0727-75-0339 FAX:0727-78-1709
E-mail: info@sunnygiken.co.jp
http://www.iijnet.or.jp/sunny/english.html

HI-LO SYSTEMS CO., LTD.

http://www.hilosystems.com.tw/

Universal Programmer ALL-11

- ALL-11 supports programming just about every type of device.
- Adapters and converters support nearly every type of IC package including PLCC, SOP, TSOP, QFP, TQFP, PGA and much more.
- ALL-11 includes a high speed CPU and expandable memory buffer to meet programming needs today and into the future.
- A high speed serial port (115K baud) connects the programmer to any desktop or laptop PC running Windows95/98/2000/NT.
- New SMD SIMM module pin driver circuits provide extremely accurate programmingwaveforms, high speed, high reliability and a compact form factor.
- Pin drivers are fully programmable to support programming of standard and low voltage device.
- ALL-11 is compact enough to use for field engineering work.
- PACKs range from universal PACK to multiple sockets gang programming PACK.

Supported MCUs: 16-bit M16C/62 Group
8-bit 740 Family 38000 Series 3886 Group

Contact Information

HI-LO SYSTEM RESEARCH CO., LTD.
TEL:+886-2-8792-3301 FAX:+886-2-8792-3285
E-mail: sales@hilosystems.com.tw
http://www.hilosystems.com.tw/

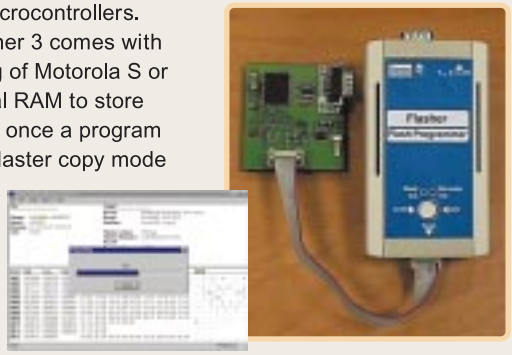
For details on the application of the programmer to production facilities, contact the manufacturer of the programmer.

SEGGER Microcontroller Systeme GmbH

http://www.segger.com/

FLASHER 3 Programming tool for Mitsubishi flash microcontrollers with on-chip flash

Flasher 3 is a programming tool for a variety of Mitsubishi flash microcontrollers. The MCUs can be programmed in parallel mode or in-circuit. Flasher 3 comes with an easy to use Windows program, which allows loading and saving of Motorola S or Intel hex files. The programmer uses a microcontroller and external RAM to store the program. It can be operated from the PC or simply stand-alone once a program has been loaded. It is perfectly suited as a tool for production; in Master copy mode it can be operated simply by a button touch.



- Serial (in target) and parallel programming supported
  Reads/programs MCU in serial mode (in circuit) or parallel mode. An adapter with ZIF-socket is available.
- User or boot area selectable (in parallel mode)
- High speed programming
  Parallel: App. 5 sec. for program/verify (DINOR)
  Serial: App. 17 sec. for program/verify (with 16MHz target, DINOR)
- Easy to use Windows program
- External AC-power supply and all cables included
- No power supply needed in serial programming mode
- Gang programming possible
  Up to 8 programmers can be cascaded and operated at once.

Supported MCUs: 16-bit M16C/80 Series
16-bit M16C/60 Series
16-bit M16C/20 Series
8-bit 740 Family 38000 Series

Contact Information

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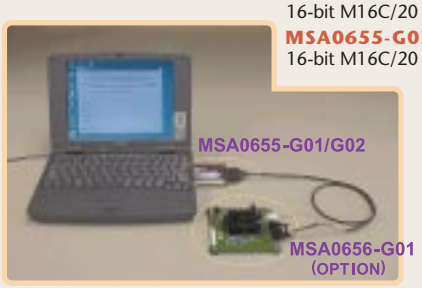
Kleinhuelsen 4, D-40721 Hilden
TEL: +49-2103-8958-99 FAX: +49-2103-8958-60
http://www.segger.com/

Mitsubishi Flash Programmers

PC Card-type Flash Programmer MSA0655-G01, MSA0655-G02

- PCMCIA standard compliant compact flash programmer
- High-speed data program/erase via serial transfer
  256KB data program time: approx. 6 seconds
  256KB data erase time: approx. 1 second
  (with Mitsubishi's standard boot program)
- By connecting the optional IC socket board (MSA0656-G01/G02/G03/G04), you can reprogram the on-chip flash before mounting.
- Dedicated cable for PC card-type flash programmer included
- 2.54mm pitch, 10-pin connector included
- Evaluation-use target board included

Supported MCUs: **MSA0655-G01**
16-bit M16C/80 Series M16C/80 Group
16-bit M16C/60 Series M16C/62 Group
MSA0655-G02
16-bit M16C/80 Series M16C/80 Group
16-bit M16C/60 Series M16C/62 Group
16-bit M16C/20 Series M16C/20 Group
MSA0655-G03 (Option)
16-bit M16C/20 Series M16C/22 Group



Flash Programmer M16C Flash Start MSA0806

- Supports standard serial I/O mode 2 (UART)
- High-speed serial cable: MF_Ten-Nine Cable
  (Built-in RS-232C driver)
- Performance
  Erase Time: approx. 1 second
  (for 128KB data on M30800FCFP at 115,200bps COM speed)
  Programming Time: approx. 35 seconds
  (for 128KB data on M30800FCFP at 115,200bps COM speed)

Supported MCUs: 16-bit M16C/80 Series M16C/80 Group
16-bit M16C/60 Series M16C/62 Group (M16C/62A Group)
16-bit M16C/20 Series M16C/22 Group
16-bit M16C/20 Series M16C/20 Group

Contact Information:
Contact your nearest Mitsubishi Electric or distributor.

Technical support:
Mitsubishi Electric Semiconductor Systems Corporation
E-mail: support@apl.mesc.co.jp

For details on the application of the programmer to production facilities, contact the manufacturer of the programmer.

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