Single–Chip Microcontrollers (CSIC)

In Brief . . .

Motorola offers the most comprehensive selection of high–performance single–chip control systems available from a single source. Microcontroller device families range from industry–standard 8–bit controllers to state–of–the–art 16– and 32–bit modular controllers. Within the price and performance categories of each family, there are a variety of on–chip capabilities to match specific applications.

Motorola device families are structured so that upward migration need not involve complete code development. The M68HC11 Family is upward code compatible with M6800 and M6801 software, while the M68HC16 family is source–code compatible with the M68HC11 family. Motorola's newest 8–bit MCU product line, the M68HC08 family, is fully upward object code compatible with the M68HC05 and M6805 families. In addition, M68300 and M68HC16 devices share standard internal modules and bus configurations.

M68HC05 CSIC Family

It all started with the 68HC05 Family, and Motorola's CSIC (Customer–Specified Integrated Circuits) approach to microcontroller design. Today, customers can select from over 70 mask ROM 68HC05 devices and over 30 one–time programmable (OTP) 68HC705 devices — and that number is growing all the time, as Motorola continues to develop derivatives of the 68HC05 based on customer demand.

With so many standard 68HC05 microcontrollers from which to choose, most customers will find the right device for an application among these existing devices. For some high–volume applications, however, a customer may opt for Motorola to develop a new derivative to meet an application's precise requirements. The result is a new microcontroller which can then be added to the selection of standard devices.

M68HC05 Industry Solutions

Motorola's 68HC05 and 68HC08 Families consist of a variety of microcontroller designs to meet the requirements of a broad range of applications. The 68HC05 Family, already over 100 devices strong, offers a wide range of standard products from which to choose, while the flagship 68HC08 offers a large library of modules from which derivatives can be developed.

68HC05 General–Purpose Microcontrollers

68HC05 C–Family. These flexible, general–purpose devices feature a wide variety of memory options capable of handling complex programs. On–chip SCI provides asynchronous communications, with software–selectable baud rates from 75 Hz to 131 kHz. The high–speed, synchronous 4–wire serial system SPI is ideal for driving off–chip displays and peripherals.

All C–Family devices include a powerful 16–bit free–running programmable counter in conjunction with input capture and output compare functions for simultaneous input waveform measurement and output waveform generation. A watchdog timer guards against runaway software in noisy environments.

The high–packing density of Motorola's HCMOS process allows standard devices to run at bus frequencies up to 2.1 MHz. Motorola also offers high–speed versions which run at frequencies up to 4.2 MHz from an 8.4 MHz crystal or external clock. Low–voltage versions are available for applications requiring extremely low power consumption to extend battery life or minimize heat dissipation.

68HC05 J–Family. This 20–pin family provides a low–cost, low pin count, 8–bit upgrade for existing 4–bit applications. It combines a powerful 68HC05 CPU with a flexible, 15–stage multifunction timer and real–time interrupt capability.

68HC05 K–Family. Our lowest–cost family offers a 16–pin count and is appropriate for logic replacement.

68HC05 P–Family. Born out of the CSIC design concept, this family offers an extremely cost–competitive 28–lead family of microcontrollers with a variety of ROM sizes and special features such as Serial Input/Output Port (SIOP) to control display drivers and communicate with other peripherals. Other options include A/D input and on–chip EEPROM for non–volatile data storage. Low–voltage and high–speed versions are also available.

The flagship 68HC(7)08XL36 OTP and ROM versions are the first two devices in the 68HC08 Family and are intended for general purpose uses.

Low–Voltage Microcontrollers

The 68HC05 Family has been capable of 3.0 V operation since 1980 and includes some 2.2 V selections. Recently, Motorola announced several 68HC05 microcontrollers capable of 1.8 Vdc and 500 kHz operation. This new low–voltage capability affords a greater than threefold power savings over 3.0 V versions of the same chips, a significant design consideration for any portable electronic application. The new devices are collectively designated 68HCL05 and include the following versions: 68HCL05C4, C8, C12, J1A, K0, P1, and P4. They are designed to provide lower–power control technology to accommodate trends in portable applications toward compactness, lightweight design, and extended battery life.

Automotive

68HC05 B–Family. EEPROM memory in these devices makes it possible to store information that must be retained after the power is removed. Applications include electric seat control (storage of seat positions) and audio systems (storage of radio stations).

68HC05 C– and D–Families. These general–purpose microcontrollers are used for cruise control, ignition systems, and in–car entertainment systems.

68HC05 J–, K–, and P–Families. With their low pin count and low cost, these devices are ideal for automotive applications such as car alarms, power windows, keyless entry, and air bags.

68HC05 V– and X–Families. Both these groups contain integrated automotive multiplex interfaces that allow them to talk to other electronic modules within a vehicle. The V series adds an on–chip voltage regulator.

Computer

68HC05 BD–Family. These devices are ideal for computer monitor applications. They include a horizontal and vertical sync processor as well as 16 channels of pulse–width modulation.

68HC05 C–Family. These are general purpose devices for keyboard and monitor control.

68HC05 J–, P–, and E–Families. These low–cost, low pin count devices are appropriate for applications like a cordless PC mouse and trackball.

Consumer

68HC05 C– and D–Families. The multiple communication lines (I/O ports, SCI and SPI) and free–running timer in this group of devices make it possible to execute several tasks in parallel. These features are used in consumer products like CD players, automotive entertainment systems, and remote controls.

68HC05 J–, K–, and P–Families. The free–running timer in these cost–effective microcontrollers allows multitasking in applications such as washing machines, oven controls, and remote controls.

68HC05 L–Family. These low–power, small–footprint devices can drive large LCD displays, making them ideal for hand–held consumer products like portable CD players.

Industrial

68HC05 B–Family. On–chip features include EEPROM; 8–channel, 8–bit A/D converter; and Pulse Length Modulated outputs. Typical industrial applications include Programmable Logic Controllers (PLC) and data acquisition systems.

68HC05 C– and D–Families. These general–purpose devices can be used in applications such as process control systems where multiple I/O lines and LED outputs are required.

68HC05 J– and P–Families. These devices are popular in low–cost industrial applications such as smoke detectors, security devices, thermostats, and furnace ignition systems.

68HC05 L–Family. Multi–port controllers with LCD driver, 16–bit timer and watchdog timer on board. Excellent for display panels requiring tone output and low power consumption such as thermostats and alarms.

68HC705MC4. This device is intended for use in industrial motor control and power supply applications.

68HC05 X–Family. These devices have Controlled Area Network (CAN) controllers with 4K thru 32K ROM for integrated messaging on factory automation, sensor, and switch applications.

Telecommunications

68HC05 B–Family. These devices can store user–programmable telephone numbers in 256 bytes of non–volatile EEPROM memory. They can also communicate with analog inputs like battery life in hand–held equipment, using the A/D module. The D/A module can be used to control analog outputs such as telephone volume and line cards.

68HC05 C–Family. This group of microcontrollers has proven useful as a general–purpose device for communications applications.

68HC05 E–Family. Like the 68HC05 B–Series devices, E–Series devices are ideal for number storage and keyboard interrupt applications.

68HC05 F–Family. These devices — except for the F5, which features an integrated DTMF receiver — include an on–chip Dual–Tone Multi–Frequency Generator (DTMG) for digital transmission and reception, as well as an LED drive for user information. These features make the F–Family suitable for a number of telecommunications applications, including auto dialing, number storage, and display control.

68HC05 J– and P–Families. These low pin count, low–cost microcontrollers have a variety of telecommunications uses, with features ranging from EEPROM to multifunction timers.

68HC05 L–Family. With its large LCD driving capability and low power consumption, this series is well–suited to applications in hand–held communication equipment. The on–chip tone generator and display functions can be used in pager systems to alert users to incoming messages.

Television and Video

68HC05 B–Family. These devices are ideal for EEPROM storage, with 256 bytes of EEPROM to store TV or satellite channel frequencies and preset volume or brightness levels. Features include Analog–to–Digital (A/D) conversion and PWM.

68HC05 C– and D–Families. With up to 32K of user ROM, these devices can be used in the television and video market as general–purpose microcontrollers.

68HC05 CC–Family. Evolved from the T–Series, CC–Series devices feature closed–caption Data Slicer (DSL) and enhanced OSD features for decoding and displaying closed captions.

68HC05CO. This device has no on–chip user ROM, but is capable of addressing up to 64K of external memory, making it ideal for applications that require large amounts of operating code, like televisions. The I^2C bus module and 4 MHz internal bus speed also allow interconnection with standard TV peripherals.

68HC05 K– and RC–Families. These devices are used in remote control applications.

68HC05 T–Family. All T–Family devices have On Screen Display (OSD) modules that can overlay graphical images onto television screens. They also contain D/A converters that can drive analog outputs like volume control, and A/D converters that can be used to automatically adjust the fine tuning. Some members of the T–Series have I^2C interfaces that can communicate with industry–standard TV peripherals.

USER ROM — 1248 BYTES

USER RAM — 64 BYTES

DATA DIRECTION REGISTER A

PORT A

PA7*
PA6*
PA5*
PA4*
PA3**
PA2**
PA1**
PA0**

*8 mA SINK CAPABILITY
**EXTERNAL INTERRUPT CAPABILITY

CPU CONTROL

ARITHMETIC/LOGIC UNIT

ACCUMULATOR

IRQ

M68HC05 MCU

INDEX REGISTER

RESET

RESET

STACK POINTER

0 0 0 0 0 0 0 0 1 1

PROGRAM COUNTER

0 0 0 0 0

CONDITION CODE REGISTER

1 1 1 H I N C Z

DATA DIRECTION REGISTER B

PORT B

PB5
PB4
PB3
PB2
PB1
PB0

COP WATCHDOG AND ILLEGAL ADDRESS DETECT

MULTIFUNCTION TIMER

CPU CLOCK

VDD
VSS

POWER

OSC1
OSC2

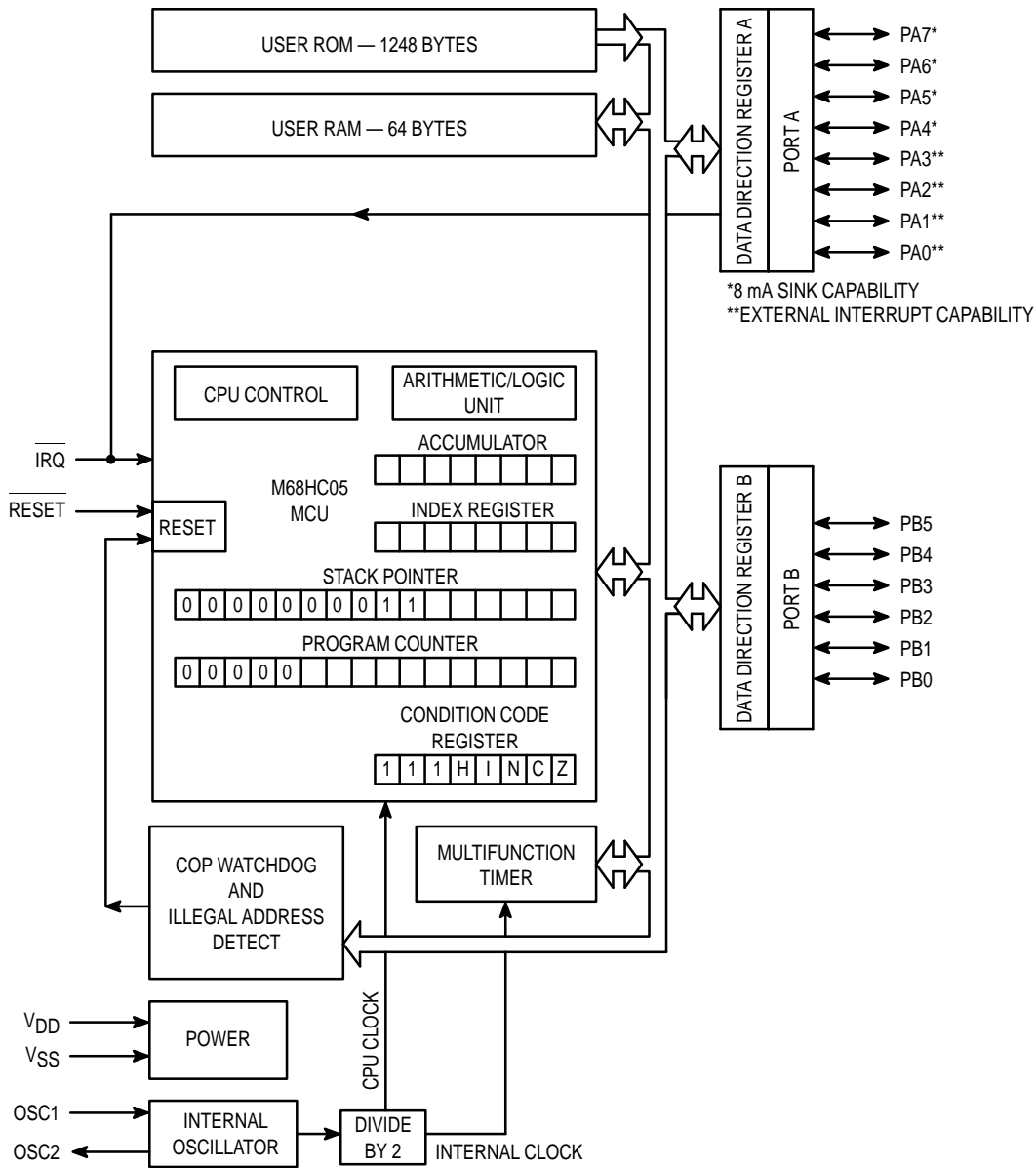INTERNAL OSCILLATOR

DIVIDE BY 2

INTERNAL CLOCK

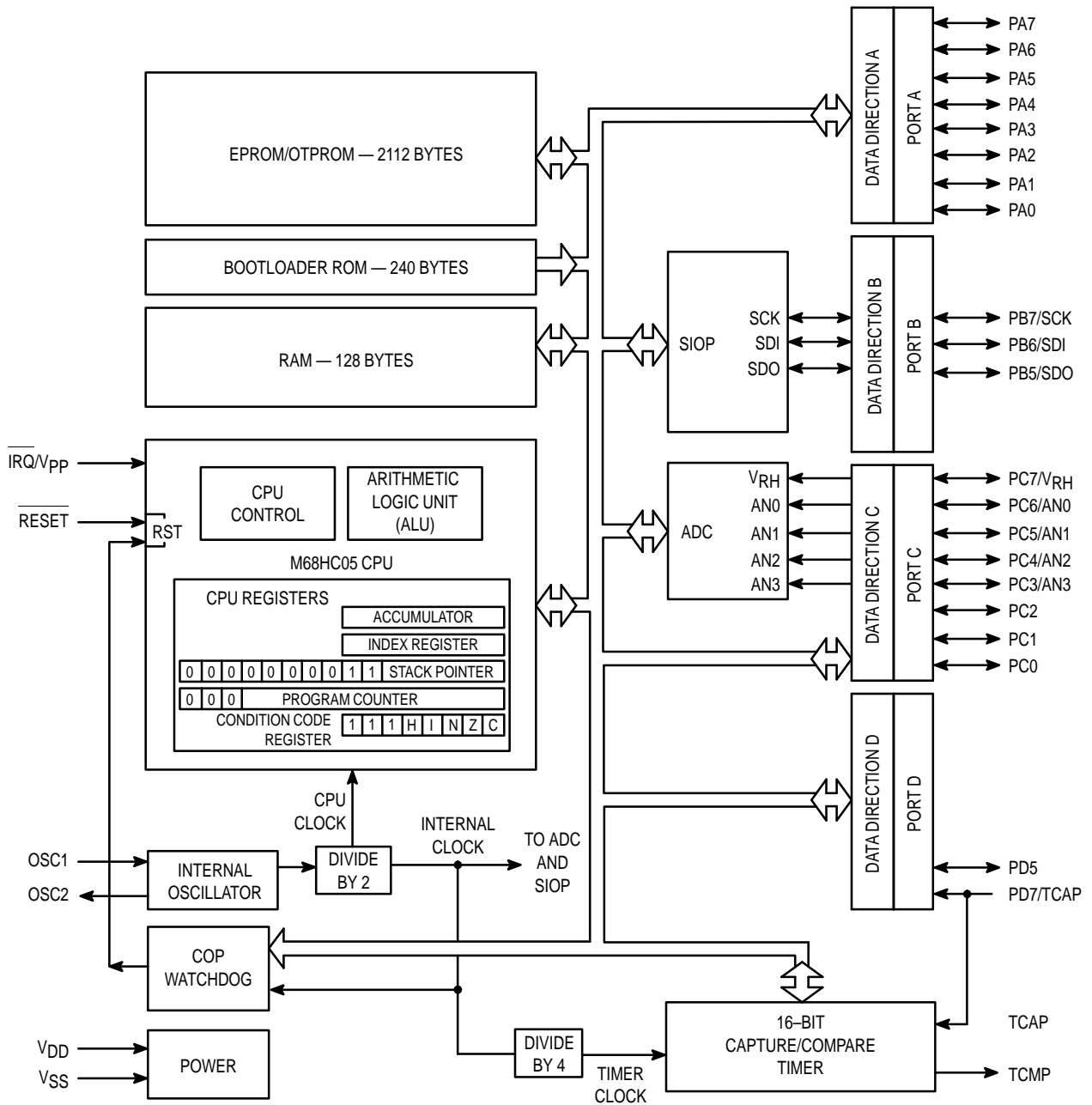**Figure 1. MC68HC05J1A Block Diagram**

Figure 2. MC68HC705P9 Block Diagram

68HC05 MICROCONTROLLERS

All 68HC05 products have a standard operating voltage range from 3 V to 5.5 V unless noted in Comments.
All 68HC05 products have a standard operating temperature range from 0 – 70°C.
Contact a Motorola Sales Office for availability of extended temperature versions.

Table 1. 68HC05 Microcontrollers

Motorola Part Number	ROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	PWM	Display Drive	I/O	COP	Comments	Packages
MC68HC05B4	4K	176		16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		24 i/o 8 i 2 o	✔		56 SDIP – B 52 PLCC – FN 64 QFP – FU
MC68HC05B6	6K	176	256	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		24 i/o 8 i 2 o	✔	On–Chip Charge Pump EEPROM Write Protect	56 SDIP – B 52 PLCC – FN 64 QFP – FU
MC68HC05B8	7.25K	176	256	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		24 i/o 8 i 2 o	✔	On–Chip Charge Pump EEPROM Write Protect	56 SDIP – B 52 PLCC – FN 64 QFP – FU
MC68HC05B16	15K	352	256	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		24 i/o 8 i 2 o	✔	On–Chip Charge Pump EEPROM Write Protect	56 SDIP – B 52 PLCC – FN 64 QFP – FU
MC68HC05BD3	3.75K	128		MFT, RTI	I²C		16 ch (8–bit)		24 i/o	✔	Horizontal and Vertical Sync Signal Processor	40 DIP – P 42 SDIP – B
MC68HC05BD5	7.75K	256		MFT, RTI	I²C		16 ch (8–bit)		24 i/o	✔	Horizontal and Vertical Sync Signal Processor	40 DIP – P 42 SDIP – B
MC68HC05C4A	4K	176		16–bit: (1IC, 1OC)	SPI SCI				24 i/o 7 i	✔	KBI (8 pins) 1 High Current Pin (5 mA sink) Mask Option Pullups High Speed Option (HSC05C4A) Low Power Option (HCL05C4A) (1.8 V minimum)	40 DIP – P 44 PLCC – FN 44 QFP – FB 42 SDIP – B
MC68HC05C5	5K	176	128	16–bit: (1IC, 1OC)	SIOP				32 i/o	✔	8 High Current Pins (10 mA sink) LVPI, On–Chip Charge Pump	40 DIP – P 44 PLCC – FN
MC68HC05C8A	8K	176		16–bit: (1IC, 1OC)	SPI SCI				24 i/o 7 i	✔	KBI (8 pins) 1 High Current Pin (5 mA sink) Mask Option Pullups High Speed Option (HSC05C8A) Low Power Option (HCL05C8A) (1.8 V minimum)	40 DIP – P 44 PLCC – FN 44 QFP – FB 42 SDIP – B
MC68HC05C9A	16K	352		16–bit: (1IC, 1OC)	SPI SCI				24 i/o 7 i	✔	KBI (8 pins) 1 High Current Pin (5 mA sink) Mask Option Pullups High Speed Option (HSC05C9A) Low Power Option (HCL05C9A)	40 DIP – P 44 PLCC – FN 44 QFP – FB 42 SDIP – B
MC68HC05C12	12K	176		16–bit: (1IC, 1OC)	SCI SPI				24 i/o 7 i	✔	1 High Current Pin (20 mA sink) KBI (8 pins) Mask Option Pullups (8 pins) High Speed Option (HSC05C12) Low Power Option (HCL05C12): (1.8 V minimum)	40 DIP – P 44 PLCC – FN 44 QFP – FB 42 SDIP – B
MC68HC05CJ4	4K	224		16–bit: (1IC, 1OC) MFT	SPI SCI I²C				24 i/o	✔	I²C (Slave Only)	44 QFP – FB
MC68HC05D9	16K	352		16–bit: (1IC, 1OC)	SCI		5 ch (6–bit)		31 i/o	✔	8 High Current Pins (25 mA sink) 30 kHz PWM	40 DIP – P 44 PLCC – FN
MC68HC05D24	24K	352		16–bit: (1IC, 1OC)	SCI		5 ch (6–bit)		31 i/o	✔	8 High Current Pins (24 mA sink) 30 kHz PWM	40 DIP – P 44 PLCC – FN
XC68HC05D32	32K	352		16–bit: (1IC, 1OC)	SCI		5 ch (6–bit)		31 i/o	✔	8 High Current Pins (24 mA sink) 30 kHz PWM	40 DIP – P 44 PLCC – FN
MC68HC05E1	4K	368		MFT, RTI					20 i/o	✔	32 kHz PLL Clock Synthesizer	28 DIP – P 28 SOIC – DW
MC68HC05E6	6K	128	160	16–bit: (1IC, 1OC) MFT, RTI		4 ch (8–bit)			32 i/o 4 i	✔	KBI (8 pins) Pin for External LVI	44 QFP – FB 28 SOIC – DW
MC68HC05E16	16K	352	320	16–bit: (2IC, 2OC) MFT, RTI	Dual I²C	4 ch (8–bit)			47 i/o 2 i	✔	KBI (8 pins) LVI 32 kHz Programmable PLL Periodic Interrupt (.25, .5, 1s)	44 QFP – FB 64 QFP – FU 56 SDIP – B
MC68HC05F5	5K	224		MFT, RTI					30 i/o 1 i	✔	DTMF Receiver Mask IRQ	40 DIP – P 44 PLCC – FN
MC68HC05F6	4K	320		16–bit: (1IC, 1OC)	SPI				26 i/o 4 i 2 o		DTMF Generator 8 High Current Pins (10 mA sink) KBI (6 pins)	42 SDIP – B 44 QFP – FB

Table 1. 68HC05 Microcontrollers (continued)

Motorola Part Number	ROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	PWM	Display Drive	I/O	COP	Comments	Packages
MC68HC05F8	8K	320		16–bit: (1IC, 1OC) 16–bit: auto	SPI				50 i/o 2 o	✔	DTMF Generator KBI (8 pins) Manchester Encoder/Decoder 8 High Current Pins (10 mA sink)	64 QFP – FU
MC68HC05G1	8K	176		16–bit: (1IC, 1OC) RTC	SPI	4 ch (8–bit)			40 i/o 8 i	✔	32 kHz PLL – Standby modes	56 SDIP – B 64 QFP – FU
MC68HC05G3	24K	768		16–bit: (1IC, 1OC) 8–bit: Event Cntr	Dual SPI	8 ch (8–bit)	4 ch (8–bit)		48 i/o 16 i 4 o	✔	KBI (8 pins) Dual Oscillators – Selectable Clock Dual IRQ	80 QFP – FU
MC68HC05J1A	1.2K	64		MFT, RTI					14 i/o	✔	KBI (4 pins) 4 High Current Pins (8 mA sink) Mask Option Pulldowns (14 pins) High Speed Version (HSC05J1A) Low Power Version (HCL05J1A): (1.8 V minimum)	20 DIP – P 20 SOIC – DW
MC68HC05J3	2K	128		16–bit: (1IC, 1OC) MFT, RTI					14 i/o	✔	14 High Current Pins (8 mA sink) KBI (4 pins)	20 DIP – P 20 SOIC – DW
MC68HC05K0	0.5K	32		MFT, RTI					10 i/o	✔	4 High Current Pins (8 mA sink) Programmable Pulldowns (10 pins) Low Voltage Reset Mask Option Low power version (HCL05K0): (1.8 V minimum)	16 DIP – P 16 SOIC – DW
MC68HC05K1	0.5K	32		MFT, RTI					10 i/o	✔	4 High Current Pins (8 mA sink) PEP (64 bits) Programmable Pulldowns (10 pins) Low Voltage Reset Mask Option	16 DIP – P 16 SOIC – DW
MC68HC05K3	920	64	16 PEEP	MFT, RTI					10 i/o	✔	KBI (4 pins), Programmable Pulldowns (10 pins) 4 High Current Pins (8 mA sink) On–Chip Charge Pump 1.8 V Operating Voltage	16 DIP – P 16 SOIC – DW
MC68HC05L1	4K	128		16–bit: (2IC, 2OC)		6 ch (8–bit)		64 Segment LCD: (3/4 x 12/16)	17 i/o 15 i 2 o			56 SDIP – B 64 QFP – FU
MC68HC05L5	8K	256		16–bit: (1IC, 1OC) RTI 8–bit: (1IC, 1OC)	SIOP			156 Segment LCD: (1–4 x 27–39)	14 i/o 10 i 15 o	✔	KBI (8 pins), Dual Oscillators 8 High Current Pins (10 mA sink) Programmable Pullups (24 pins), Open Drain (31 pins), 2.2 V	80 QFP – FU
MC68HC05L16	16K	512		16–bit: (1IC, 1OC) RTI 8–bit: (1IC, 1OC)	SIOP			156 Segment LCD: (1–4 x 27–39)	16 i/o 8 i 15 o	✔	KBI (8 pins), Dual Oscillators 8 High Current Pins (10 mA sink) Programmable Pullups (24 pins) Open Drain (31 pins), 2.2 V Operation	80 QFP – FU
MC68HC05P1A	2K	128		16–bit: (1IC, 1OC)					20 i/o 1 i	✔	KBI (8 pins) Mask Option Pullups (8 pins) 2 High Current Pins (20 mA)	28 DIP – P 28 SOIC – DW
MC68HC05P3	3K	128	128	16–bit: (1IC, 1OC) MFT, RTI					22 i/o	✔	KBI (6 pins) On–Chip Charge Pump	28 DIP – P 28 SOIC – DW
MC68HC05P4	4K	176		16–bit: (1IC, 1OC)	SIOP				20 i/o 1 i	✔	High Speed Option (68HSC05P4) Low Power Option (68HCL05P4): (1.8 V minimum)	28 DIP – P 28 SOIC – DW
MC68HC05P6	4.5K	176		16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o 1 i	✔		28 DIP – P 28 SOIC – DW
MC68HC05P7	2K	128		16–bit: (1IC, 1OC)	SIOP				20 i/o 1 i	✔		28 DIP – P 28 SOIC – DW
MC68HC05P8	2K	112	32	MFT, RTI		4 ch (8–bit)			16 i/o 4 i	✔	LVPI Option on EEPROM On–Chip Charge Pump	28 DIP – P 28 SOIC – DW
MC68HC05P9	2K	128		16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o 1 i	✔		28 DIP – P 28 SOIC – DW
XC68HC05P18	8K	192	128	16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o	✔	2 High Current Pin KBI (8 pins) Mask Option Pullups (8 pins) LVR, Mask option clock out	28 DIP – P 28 SOIC – DW

Table 1. 68HC05 Microcontrollers (continued)

Motorola Part Number	ROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	PWM	Display Drive	I/O	COP	Comments	Packages
MC68HC05PE0	2K	128		16–bit: (1IC, 1OC)					20 i/o	✔	1 High Current Pin (20 mA sink) PEP (64 bits), KBI (8 pins) Mask Option Pulldowns (8 pins) RC Oscillator Option	28 DIP – P 28 SOIC – DW
XC68HC05RC16	16K	350		Infrared Timer					12 i/o	✔	Mask Option Pullups (12 pins) KBI (12 pins), Low Power Stop Pin	28 DIP – P 28 SOIC – DW
MC68HC05SC11	6K	128							5 i/o		Security Features, 8K EPROM Smartcard Applications, 5 V Only	Die 16 DIP – P 20 SOIC – DW
MC68HC05SC21	6K	128	3K						5 i/o		Security Features On–Chip Charge Pump Smartcard Applications	Die 16 DIP – P 20 SOIC – DW
MC68HC05SC24	3K	128	1K						5 i/o		Security Features On–Chip Charge Pump Smartcard Applications	Die 16 DIP – P 20 SOIC – DW
MC68HC05SC26	6K	224	1024						5 i/o	✔	Smartcard Security Features On–Chip Charge Pump High Speed Option	Die 44 PLCC – FN
MC68HC05SC27	16K	240	3K						5 i/o	✔	Security Features On–Chip Charge Pump Smartcard Applications High Speed Option	Die 16 DIP – P 20 SOIC – DW
XC68HC05SC28	12K	256	8K						5 i/o	✔	Security Features, On–Chip Charge Pump Smartcard Applications High Speed Option	Die 44 PLCC – FN
MC68HC05T1	8K	320		16–bit: (1IC, 1OC)	SIOP	1 ch (6–bit)	9 ch (6–bit)	OSD (64 Char ROM)	29 i/o 1 i	✔	Open Drain PWM Outputs 5 V Only	40 DIP – P 42 SDIP – B
XC68HC05T2	15K	320		16–bit: (1IC, 1OC)	SIOP	1 ch (6–bit)	9 ch (6–bit)	OSD (64 Char ROM)	29 i/o 1 i	✔	Open Drain PWM Outputs 5 V Only	40 DIP – P 42 SDIP – B
MC68HC05T10	12K	320		16–bit: (1IC, 1OC) RTC	I^{2}C	1 ch (8–bit)	8 ch (6–bit) 1 ch (14–bit)	OSD (64 Char ROM)	20 i/o 4 i		Open Drain PWM Outputs KBI (8 pins) 5 V Only	56 SDIP – B
MC68HC05T16	24K	320		16–bit: (1IC, 2OC) 8–bit PAC	I^{2}C	2 ch (5–bit)	9 ch (7–bit) 1 ch (14–bit)	OSD (128 Char EPROM)	40 i/o	✔	12 V Open Drain I/O lines (up to 22) 4 row OSD buffer Timer output compare functions do not have output pins	56 SDIP – B
MC68HC05X1	12K	336		16–bit: (1IC, 2OC) MFT, RTI	SSI				24 i/o	✔	KBI (8 pins) SAE J1850 Serial Mux Interface 5 V Operation Only	44 PLCC – FN
MC68HC05X4	4K	176		16–bit: (1IC, 1OC) MFT, RTI					16 i/o	✔	CAN (Controller Area Network) KBI (16 pins)	28 SOIC – DW
MC68HC05X16	15K	352	255	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		32 i/o	✔	CAN (Controller Area Network) KBI (8 pins) EEPROM Write Protect On–Chip Charge Pump	64 QFP – FU
MC68HC05X32	32K	528	255	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		32 i/o	✔	CAN (Controller Area Network) KBI (8 pins) EEPROM Write Protect On–Chip Charge Pump	64 QFP – FU

ONE–TIME PROGRAMMABLE (OTP) / EMULATOR MCUs

All 68HC705 products have a standard operating voltage range from 3 V to 5.5 V unless noted in Comments.
All 68HC705 products have a standard operating temperature range from 0 – 70°C.
Contact a Motorola Sales Office for availability of extended temperature versions.

Table 2. One–Time Programmable (OTP)/Emulator MCUs

Motorola Part Number	EPROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	PWM	Display Drive	I/O	COP	Comments	Packages
MC68HC705B5	6K	176		16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		24 i/o 8 i 2 o	✔	Programmable Pulldowns (16 pins) EPROM Write Protect	56 SDIP – B 52 PLCC – FN
MC68HC705B16	15K	352	255	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		32 i/o 2 o	✔	On–Chip Charge Pump EEPROM Write Protect	52 PLCC – FN *52 Cerquad – FS 64 QFP – FU
XC68HC705B32	32K	528	255	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		32 i/o	✔	On–Chip Charge Pump EEPROM Write Protect	52 PLCC – FN 56 SDIP – B 64 QFP – FU
MC68HC705BD3	7.75K	256		MFT, RTI	I²C		16 ch (8–bit)		24 i/o	✔	Horizontal and Vertical Sync Signal Processor	42 SDIP – B *42 Cersdip – K 40 DIP – P *40 Cerdip – S
MC68HC705C4A	4K	176		16–bit: (1IC, 1OC)	SPI SCI				24 i/o 7 i	✔	Mask Option Register Pullups (8 pins) KBI (8 pins) 1 High Current Pin (20 mA sink) EPROM Security	40 DIP – P 44 PLCC – FN 42 SDIP – B 44 QFP – FB
MC68HC705C8A	8K	304		16–bit: (1IC, 1OC)	SPI SCI				24 i/o 7 i	✔	Mask Option Pullups (8 pins) KBI (8 pins) 1 High Current Pin (20 mA sink) High Speed Option (HSC705C8A) Superset of ROM C8A with more RAM EPROM Security	40 DIP – P 44 PLCC – FN *40 Cerdip – S 42 SDIP – B 44 QFP – FB *44 Cerquad – FS
MC68HC705C9A	16K	352		16–bit: (1IC, 1OC)	SPI SCI				31 i/o	✔	Mask Option Pullups (8 pins) KBI (8 pins) 1 High Current Pin (20 mA sink) EPROM Security	40 DIP – P *40 Cerdip – S *44 Cerquad – FS 44 PLCC – FN 42 SDIP – B 44 QFP – FB
MC68HC705CJ4	4K	224		16–bit: (1IC, 1OC) MFT	SPI SCI I²C				29 i/o 3 i	✔	8 High Current Pins (10 mA sink) I²C (Slave Only)	44 QFP – FB
XC68HC705D9	16K	352		16–bit: (1IC, 1OC)	SCI		5 ch (6–bit)		31 i/o	✔	8 High Current Pins (25 mA sink) 30 kHz PWM	40 DIP – P *44 Cerquad – FS 44 PLCC – FN
MC68HC705E1	4K	368		MFT, RTC RTI					20 i/o	✔	32 kHz PLL Clock Synthesizer	*28 Cerdip – S 28 DIP – P 28 SOIC – DW
XC68HC705F6	4K	320		16–bit: (1IC, 1OC)	SPI				26 i/o 4 i	✔	DTMF Generator 8 High Current Pins (10 mA sink) KBI (6 pins)	42 SDIP – B *42 Cersdip – K 64 QFP – FU *64 CQFP – FZ
MC68HC705F8	8K	320		16–bit: (1IC, 1OC) 16–bit: auto	SPI				50 i/o 2 o	✔	DTMF Generator KBI (8 pins) 8 High Current Pins (10 mA sink) Manchester Encoder/Decoder	64 QFP – FU *64 CQFP – FZ
MC68HC705G1	12K	176		16–bit: (1IC, 1OC) RTC	SPI	4 ch (8–bit)			40 i/o 8 i	✔	32 kHz PLL	56 SDIP – B *56 Cersdip – K 64 QFP – FU *64 CQFP – FZ
MC68HC705G4	32K	1024		16–bit: (1IC, 1OC) 8–bit: Event Cntr	Dual SPI	8 ch (8–bit)	4 ch (8–bit)		48 i/o 16 i 4 o	✔	KBI (8 pins) Dual IRQ Dual Oscillators, Selectable Clock	80 QFP – FU *80 CQFP – FZ
MC68HC705J1A	1.2K	64		MFT, RTI					14 i/o	✔	KBI (4 pins), EPROM Security Feature 4 High Current Pins (8 mA sink) Mask Option Pulldowns (14 pins)	20 DIP – P 20 SOIC – DW *20 Cerdip – S
MC68HC705J2	2K	112		MFT, RTI					14 i/o	✔		20 DIP – P 20 SOIC – DW *20 Cerdip – S
MC68HC705K1	0.5K	32		MFT, RTI					10 i/o	✔	4 High Current Pins (8 mA sink) PEP (64 bits) Programmable Pulldowns (10 pins) Low Voltage Reset Mask Option	16 DIP – P 16 SOIC – DW *16 Cerdip – S

Table 2. One–Time Programmable (OTP)/Emulator MCUs (continued)

Motorola Part Number	EPROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	PWM	Display Drive	I/O	COP	Comments	Packages
XC68HC705L1	6K	128		16–bit: (2IC, 2OC)		6 ch (8–bit)		64 Segment LCD: (3/4 x 12/16)	17 i/o 15 i 2 o			56 SDIP – B 64 QFP – FU *64 CQFP – FZ *56 Cersdip – K
MC68HC705L5	8K	256		16–bit: (1IC, 1OC) RTI 8–bit: (1IC, 1OC)	SIOP			156 Segment LCD: (1–4 x 27–39)	14 i/o 10 i 15 o		KBI (8 pins), Dual Oscillators 8 High Current Pins (10 mA sink) Programmable Pullups (24 pins) Open Drain (31 pins)	80 QFP – FU *80 CQFP – FZ
MC68HC705L16	16K	512		16–bit: (1IC, 1OC) RTI 8–bit: (1IC, 1OC)	SIOP			156 Segment LCD: (1–4 x 27–39)	16 i/o 8 i 15 o	✔	KBI (8 pins), Dual Oscillators 8 High Current Pins (10 mA sink) Programmable Pullups (24 pins) Open Drain (31 pins)	80 QFP – FU *80 CQFP – FZ
MC68HC705P6	4.5K	176		16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o 1 i	✔		28 DIP – P 28 SOIC – DW *28 Cerdip – S
MC68HC705P9	2K	128		16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o 1 i	✔		28 DIP – P 28 SOIC – DW *28 Cerdip – S
MC68HC705SR3	3.75K	192		8–bit Timer (7–bit prescaler)		4 ch (8–bit)			32 i/o		Programmable Pullups (24 pins) KBI (8 pins), LED drive (8 pins) LVR	40 DIP – P *40 Cerdip – S 42 SDIP – B 44 QFP – FB
MC68HC705T10	12K	320		16–bit: (1IC, 1OC) RTC	I²C	1 ch (8–bit)	8 ch (6–bit) 1 ch (14–bit)	OSD (64 Char EPROM)	20 i/o 4 i		Open Drain PWM Outputs KBI (8 pins) 5 V Only	56 SDIP – B *56 Cersdip – K
MC68HC705T16	24K	320		16–bit: (1IC, 2OC) 8–bit PAC	I²C	2 ch (5–bit)	9 ch (7–bit) 1 ch (14–bit)	OSD (128 Char EPROM)	40 i/o	✔	12 V Open Drain I/O Lines (Up to 22) 4 Row OSD Buffer Timer output compare functions do not have output pins	56 SDIP – B *56 Cersdip – K
XC68HC705V8	12K	512	128	16–bit: (1IC, 1OC) MFT, RTI	SPI	8 ch (8–bit)	1 ch (6–bit)		22 i/o	✔	LVR, On Chip Charge Pump, MDLC (Message Datalink Control) 5 V Regulator, KBI (16 pins)	56 SDIP – B 68 PLCC – FN 68 CLCC – FS 56 Cersdip – K
XC68HC705X4	4K	176		16–bit: (1IC, 1OC) MFT, RTI					16 i/o	✔	CAN (Controller Area Network) KBI (16 pins)	28 SOIC – DW

*Windowed packages available only in sample quantities.

Definitions

CAN	–	Controller Area Network
CCTV	–	Closed Caption Television
COP	–	Computer Operating Properly (Watch Dog Timer)
DTMF	–	Dual–Tone Multi–Frequency
EBI	–	External Bus Interface
IC	–	Input Capture
I²C	–	Inter–Integrated Circuit
IDE	–	Integrated Device Electronics (IBM PC/AT Type)
i/o	–	Bidirectional Input and Output Port Pins
i	–	Input Only Port Pins
KBI	–	Key Board Interrupt
LCD	–	Liquid Crystal Display
LVI	–	Low Voltage Interrupt
LVPI	–	Low Voltage Program Inhibit
LVR	–	Low Voltage Reset
MDLC	–	Message Data Link Controller (J1850)
MFT	–	Multi Function Timer
o	–	Output Only Port Pins

OC	–	Output Compare
OSD	–	On–Screen Display
PEEP	–	Personality EEPROM
PEP	–	Personality EPROM
PIO	–	Parallel Input Output (IBM PC/AT Type)
PLL	–	Phase–Lock Loop
PWM	–	Pulse–Width Modulation
RTC	–	Real–Time Clock
RTI	–	Real–Time Interrupt
SCI	–	Serial Communications Interface (asynchronous)
SCI+	–	Serial Communications Interface (async. and sync.)
SIO	–	Serial Input Output (IBM PC/AT Type)
SIOP	–	Simple Serial I/O Port
SPI	–	Serial Peripheral Interface
VFD	–	Vacuum Fluorescent Display
VREG	–	Voltage Regulator
WDOG	–	Watch Dog Timer

Package Definitions

B	–	Shrink DIP (70 mil spacing)
DW	–	Small Outline (Wide–Body SOIC)
FA	–	7 x 7 mm Quad Flat Pack (QFP)
FB	–	10 x 10 mm Quad Flat Pack (QFP)
FE	–	CQFP (windowed) – Samples Only
FN	–	Plastic Quad (PLCC)
FS	–	CLCC (windowed) – Samples Only
FT	–	28 x 28 mm Quad Flat Pack (QFP)
FU	–	14 x 14 mm Quad Flat Pack (QFP)
FZ	–	CQFP (windowed) – Samples Only
K	–	Cersdip (windowed) – Samples Only
L	–	Ceramic Sidebraze
P	–	Dual–in–Line Plastic
S	–	Cerdip (windowed) – Samples Only

MCU NEW PRODUCTS

All 68HC05 and 68HC705 products have a standard operating voltage range from 3 V to 5.5 V unless noted in Comments.
All 68HC05 and 68HC705 products have a standard operating temperature range from 0 to 70°C.
Contact a Motorola Sales Office for availability of the following MCUs:

Table 3. MCU New Products

Motorola Part Number	ROM/ EPROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	PWM	Display Drive	I/O	COP	Comments	Packages
68HC05B32	32K	528	256	16–bit: (2IC, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		32 i/o	✔	On–Chip Charge Pump EEPROM Write Protect	52 PLCC – FN 56 SDIP – B 64 QFP – FU
68HC05C0	0	512		16–bit: (1IC, 1OC) MFT	SCI+				18 i/o	✔	Mux or Non–Mux EBI (16–bit) 3 Chip Selects, KBI (8 pins) Programmable Pullups (8 pins) 1 High Current Pin (20 mA sink)	40 DIP – P *40 Cerdip – S 44 PLCC – FN *44 Cerquad – FS
68HC705D32A	32K	352		16–bit: (1IC, 1OC)	SCI	5 ch (6–bit)			31 i/o	✔	8 High Current Pins (24 mA sink) 30 kHz PWM, KBI (8 pins)	40 DIP – P *40 Cerdip – S 44 PLCC – FN *44 Cerquad –FS
68HC705E5	5K	384		MFT, RTI	I²C				20 i/o	✔	32 kHz PLL Clock Synthesizer	28 DIP – P *28 Cerdip – S 28 SOIC – DW
68HC705JP7	6K + 64–bit PEP	224		16–bit: (1IC, 1OC) MFT, RTI	SIOP	See Com– ments			14 i/o	✔	Two voltage comparators used with timer to create 4 channel A/D, KBI (4 pins), Programmable Pulldowns (14 pins), 6 Hi Current Pins (10 mA sink), EPROM security feature, LVI	20 DIP – P 20 SOIC – DW
68HC805K3		64	920 16PEEP	MFT, RTI					10 i/o	✔	KBI (4 pins), Programmable Pulldowns (10 pins), 4 High Current Pins (8 mA sink), On–Chip Charge Pump, 1.8 V EE Read	16 DIP – P 16 SOIC – DW
68HC705MC4	3.5K	176		16–bit: (2IC or 1IC, 1OC) MFT, RTI	SCI	6 ch (8–bit)	2 hi sp (8–bit 24 kHz Max)		22 i/o	✔	One 8–bit High Current Port (10 mA Source Pin, 20 mA Max/Port) Low EMI Pinout 1 High Sink Current Pin (10 mA) Commutation Mux for PWM	28 DIP – P *28 Cerdip – S 28 SOIC – DW
68HC05MC4	3.5K	176		16–bit: (2IC or 1IC, 1OC) MFT, RTI	SCI	6 ch (8–bit)	2 hi sp (8–bit 24 kHz Max)		22 i/o	✔	One 8 bit High Current Port (10 mA Source Pin, 20 mA Max/Port) Low EMI Pinout 1 High Sink Current Pin (10 mA) Commutation Mux for PWM	28 DIP – P 28 SOIC – DW
68HC705P6A	4K	176		16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o	✔	KBI (8 pins) 2 High Current Pins (15 mA sink)	28 DIP – P 28 SOIC – DW
68HC05P9A	2K	128		16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o	✔	KBI (8 pins) 2 High Current Pins (15 mA sink)	28 DIP – P 28 SOIC – DW
68HC05P18		192	8K + 128	16–bit: (1IC, 1OC)	SIOP	4 ch (8–bit)			20 i/o	✔	KBI (8 pins), LVR 2 High Current Pins Pullups (8 pins), clock out option	28 DIP – P 28 SOIC – DW
68HC705RC16	16K	350		Infrared Timer					12 i/o	✔	Mask Option Pullups (12 pins) KBI (12 pins)	28 DIP – P *28 Cerdip – S 28 SOIC – DW
68HC705RC17	16K	350		Infrared Timer					12 i/o	✔	Mask Option Pullups (12 pins) KBI (12 pins) Phase–Locked Loop (PLL)	28 DIP – P *28 Cerdip – S 28 SOIC – DW
68HC05RC17	16K	350		Infrared Timer					12 i/o	✔	Mask Option Pullups (12 pins) KBI (12 pins) Phase–Locked Loop (PLL)	28 DIP – P 28 SOIC – DW
68HC05SR3	3.75K	192		8–bit Timer (7–bit prescaler)		4 ch (8–bit)			32 i/o		Mask Option Pullups (24 pins) KBI (8 pins), LED Drive (8 pins), LVR	40 DIP – P 42 SDIP – B 44 QFP – FB
68HC05V7	10K	384	128	16–bit: (1IC, 1OC) MFT, RTI	SPI	8 ch (8–bit)	1 ch (6–bit)		22 i/o 16 i	✔	MDLC (Message Datalink Control) 5 V Power Regulator KBI (16 pins), LVR	56 SDIP – B 68 PLCC – FN
68HC705X32	32K	528	255	16–bit: (21C, 2OC)	SCI+	8 ch (8–bit)	2 ch (8–bit)		32 i/o	✔	CAN (Controller Area Network)	64 QFP – FU
68HC08XL36	36K	1K		4 ch 16–bit: (IC, OC, or PWM)	SCI SPI				43 i/o	✔	8 MHz Internal Bus (5 V) Direct Memory Access Module (3 ch) Programmable PLL, LVI/LVR KBI (8 pins), Programmable Pullups (8 pins)	56 SDIP – B 64 QFP – FU
68HC708XL36	36K	1K		4 ch 16–bit: (IC, OC, or PWM)	SCI SPI				43 i/o	✔	8 MHz Internal Bus (5 V) Direct Memory Access Module (3 ch) Programmable PLL, LVI/LVR KBI (8 pins), Programmable Pullups (8 pins)	56 SDIP – B *56 Cerdip – K 64 QFP – FU *64 CQFP – FE

M68HC08 Family

The M68HC08 Family offers a unique combination of high–speed, low–power, enhanced processing performance for cost–sensitive 8–bit applications. Full upward object code compatibility with the world's leading 8–bit microcontroller allows current M68HC05 users to leverage their resource and time investment. M68HC08 modular design utilizes a growing library of on–chip peripherals. The flagship 68HC(7)08X36 OTP and ROM versions for general purpose use are the first two devices in the family.

Features

- Architecturally Enhanced 8–Bit CPU
  - 8 MHz bus speed yields 125 ns minimum instruction cycle
  - 16–bit stack with stack pointer operations and addressing modes
  - 16–bit index register
  - 78 new instructions including advanced looping control
  - Eight new addressing modes
- Fully upward object code compatible with the M68HC05 and M6805 families
- Direct Memory Access Module
  - Memory–to–memory transfer
  - Peripheral–to–memory and memory–to–peripheral transfer
- Timing Interface Module
  - Four independently programmable channels
  - Input capture, output compare, buffered, and unbuffered PWM configurations
- Interface Modules
  - Serial Communications Interface (UART)
  - Serial Peripheral Interface
  - System Interface Module
- System Control Modules
  - Low Voltage Inhibit, PLL, COP, and System Integration Module
- Clock Generator Module
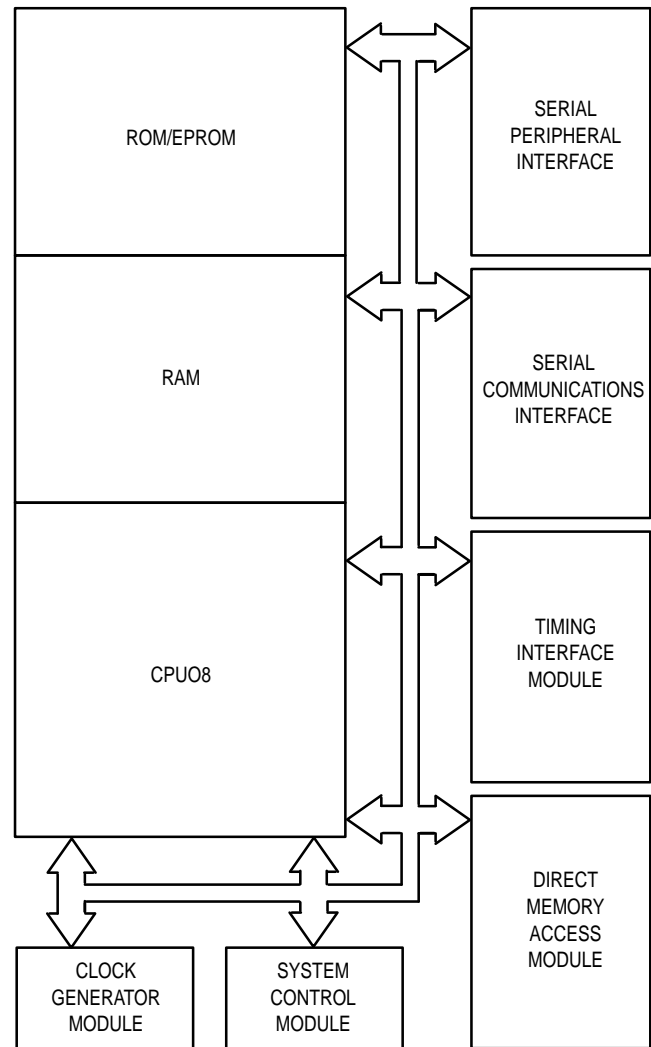 - Generates two different clock signals from a user–selected source

Figure 3. Block Diagram of Typical M68HC08 MCU

M68HC05 Microcontroller Development Tools

Motorola now offers two fully modular development system choices: the new Motorola Modular Evaluation System (MMEVS) and our popular, high–performance Motorola Modular Development System (MMDS). You can now build a customized MMEVS or MMDS to emulate the MCU in your target design in four simple steps. First, order the MMEVS or MMDS system platform (M68MMPFB0508 or M68MMDS05). Second, select and order the emulation module (EM) that contains circuitry specific to emulating the particular HC05/08 MCU in your target application. Third, complete the system by ordering target cable accessories to connect the MMEVS or MMDS to your target MCU socket. Finally, select the appropriate parallel programmer to program your prototype devices.

Choosing Between the MMEVS and MMDS

Build an economical MMEVS system to perform traditional debugging activities such as executing code in run or step mode; setting breakpoints; monitoring or modifying CPU registers, memory and application variables; and creating log or script files to record test results or automate the testing process. Or, create an MMDS system to add high–performance, advanced emulation features such as real–time, dual–ported memory and a real–time bus state analyzer with an 8K trace buffer. In addition, the MMDS includes a built–in power supply and is fully enclosed in a metal case. Both the MMEVS and MMDS include a host–based Integrated Development Environment (IDE) comprised of an editor, assembler, and hardware debugger.

Modular Architecture Benefits

The MMEVS replaces Motorola's older–style EVS and EVM development tool products. A proper subset of the MMDS architecture, the new MMEVS is fully compatible with all EM products supported by the MMDS. The MMEVS extends the emulation performance beyond that of the EVS and EVM by supporting full, real–time, non–intrusive, in–circuit emulation for the new high–speed devices (68HSC05) in the HC05 Family and the new HC08 architecture. The MMEVS also extends emulation support to all low–voltage HC05/HC08 derivatives. The common hardware, firmware, and software design of the MMEVS and MMDS also provide greater flexibility in mixing and matching Motorola hardware tools with the ever–increasing variety of C compilers, assemblers, and integrated development environment product offerings from Motorola's third party developer companies.

CONFIGURATION AND ORDER INFORMATION FOR MMDS/MMEVS

Table 4. Configuration and Order Information for MMDS/MMEVS

Devices	Platform	Emulation Modules	Package Type	In–Circuit Target Cable		
				Low Noise Flexcable	Target Head Adapter	Surface Mount Adapter
68HC05A16 68HC705A24	M68MMPFB0508 OR M68MMDS05	M68EM05A24	56 SDIP – B	M68CBL05B	M68TB05A24B56	
68HC05B4/B6/B8/B16/B32 68HC705B5/B16/B32	M68MMPFB0508 OR M68MMDS05	M68EM05B32	56 SDIP – B	M68CBL05B	M68TB05B32B56	
			64 QFP – FU	M68CBL05C	M68TC05B32FU64	M68TQS064SAG1† M68TQP064SA1†
			52 PLCC – FN	M68CBL05C	M68TC05B32FN52	
68HC05BD3/BD5 68HC705BD3/BD5	M68MMPFB0508 OR M68MMDS05	M68EM05BD3	40 DIP – P	M68CBL05B	M68TB05BD3P40	
			42 SDIP – B	M68CBL05B	M68TB05BD3B42	
68HC05BS8 68HC705BS8	M68MMPFB0508 OR M68MMDS05	M68EM05BS8	44 QFP – FB	M68CBL05C	M68TC05BS8FB44	M68TQS044SAG1† M68TQP044SAMO1†
			52 PLCC – FN	M68CBL05B	M68TB05BS8FN52	
68HC05C0	M68MMPFB0508 OR M68MMDS05	M68EM05C0	40 DIP – P	M68CBL05B	M68TB05C0P40	
			42 SDIP – B	M68CBL05B	M68TB05C0B42	
			44 PLCC – FN	M68CBL05	M68TC05C0FN44	
			44 QFP – FB	M68CBL05C	M68TC05C0FB44	M68TQS044SAG1† M68TQP044SAMO1†
68HC05C5 68HC705C5	Refer to the Configuration and Order Information for Other Motorola Development Tools Section to select a development tool for the 68HC05C5/68HC705C5.					
68HC05C4/C4A/C8A/C12A 68HC705C4A/705C8A	M68MMPFB0508 OR M68MMDS05	M68EM05C9	40 DIP – P	M68CBL05B	M68TB05C9P40	
			44 PLCC – FN	M68CBL05C	M68TC05C4FN44	
			44 QFP – FB	M68CBL05C	M68TC05C9FB44	M68TQS044SAG1† M68TQP044SAMO1†
			42 SDIP – B	M68CBL05B	M68TB05C9B42	

Table 4. Configuration and Order Information for MMDS/MMEVS (continued)

Devices	Platform	Emulation Modules	Package Type	In–Circuit Target Cable		
				Low Noise Flexcable	Target Head Adapter	Surface Mount Adapter
68HC05C9/C9A 68HC705C9/705C9A	M68MMPFB0508 OR M68MMDS05	M68EM05C9	40 DIP – P	M68CBL05B	M68TB05C9P40	
			44 PLCC – FN	M68CBL05C	M68TC05C9FN44	
			42 SDIP – B	M68CBL05B	M68TB05C9B42	
			44 QFP – FB	M68CBL05C	M68TC05C9FB44	M68TQS044SAG1† M68TQP044SAMO1†
68HC05CCV 68HC705CCV	Refer to the Configuration and Order Information for Other Motorola Development Tools Section to select a development tool for the 68HC05CCV/68HC705CCV.					
68HC05CJ4 68HC705CJ4	M68MMPFB0508 OR M68MMDS05	M68EM05CJ4	44 QFP – FB	M68CBL05C	M68TC05CJ4FB44	M68TQS044SAG1† M68TQP044SAMO1†
68HC05D9/D24/D32 68HC705D9/D32A	M68MMPFB0508 OR M68MMDS05	M68HC05D32EM	40 DIP – P	M68CBL05B	M68TB05C9P40	
			44 PLCC – FN	M68CBL05C	M68TC05C9FN44	
			44 QFP – FB	M68CBL05C	M68TC05C9FB44	M68TQS044SAG1† M68TQP044SAMO1†
68HC05E6 68HC705E6	M68MMPFB0508 OR M68MMDS05	M68EM05E6	28 SOIC – DW	M68CBL05C	M68TC05E6P28	M68DIP28SOIC
			44 QFP – FB	M68CBL05C	M68TC05E6FB44	M68TQS044SAG1† M68TQP044SAMO1†
68HC05F4 68HC705F4	M68MMPFB0508 OR M68MMDS05	M68EM05F4	28 DIP – P	M68CBL05C	M68TC05E6P28	
			28 SOIC – DW	M68CBL05C	M68TC05E6P28	M68DIP28SOIC
			44 QFP – FB	M68CBL05C	M68TC05E6FB44	M68TQS044SAG1 M68TQP044SAMO1†
68HC05F6 68HC705F6	M68MMPFB0508 OR M68MMDS05	M68EM05F6	42 SDIP – B	M68CBL05B	M68TB05F6B42	
			44 QFP – FB	M68CBL05C	M68TC05F6FB44	M68TQS044SAG1† M68TQP044SAMO1†
			64 QFP – FU	M68CBL05C	M68TC05F6FU64	M68TQS064SAG1† M68TQP064SAMO1†
68HC05F8 68HC705F8	Refer to the Configuration and Order Information for Other Motorola Development Tools Section to select a development tool for the 68HC05F8/68HC705F8.					
68HC05G1 68HC705G1	M68MMPFB0508 OR M68MMDS05	M68EM05G1	56 SDIP – B	M68CBL05B	M68TB05G1B56	
			64 QFP – FU	M68CBL05C	M68TC05G1FU64	M68TQS064SAG1† M68TQP064SAMO1†
68HC05G3 68HC705G4	M68MMPFB0508 OR M68MMDS05	M68EM05G4	80 QFP – FU	M68CBL05E	M68TE05G4FU80	M68TQS080SBG1† M68TQP080SBMO1†
68HC05J1 68HC705J2	M68MMPFB0508 OR M68MMDS05	M68HC05JPEM	20 DIP – P	M68CBL05A	M68TA05J2P20	
			20 SOIC – DW	M68CBL05A	M68TA05J2P20	M68DIP20SOIC
68HC05J1A 68HC705J1A	M68MMPFB0508 OR M68MMDS05	M68EM05J1A	20 DIP – P	M68CBL05A	M68TA05J2P20	
			20 SOIC – DW	M68CBL05A	M68TA05J2P20	M68DIP20SOIC
68HC05J3 68HC705J3	M68MMPFB0508 OR M68MMDS05	M68EM05J3	20 DIP – P	M68CBL05A	M68TA05J2P20	M68DIP20SOIC
			20 SOIC – DW	M68CBL05A	M68TA05J2P20	
68HC05K0/K1/K3 68HC705K1	M68MMPFB0508 OR M68MMDS05	M68EM05K3	16 DIP – P	M68CBL05A	M68TA05K1P16	
			16 SOIC – DW	M68CBL05A	M68TA05K1P16	M68DIP16SOIC
68HC05L1 68HC705L1	M68MMPFB0508 OR M68MMDS05	M68EM05L1	56 SDIP – B	M68CBL05B	M68TB05L1B56	M68TQS064SAG1†
			64 QFP – FU	M68CBL05C	M68TC05L1FU64	M68TQP064SAMO1†
68HC05L2 68HC705L2	M68MMPFB0508 OR M68MMDS05	M68HC05L2EM	42 SDIP – B	42–SDIP ribbon cable assembly included with M68HC05L2EM.		
68HC05L5/L16 68HC705L5/L16	M68MMPFB0508 OR M68MMDS05	M68EML05L16	80 QFP – FU	M68CBL05E	M68TE05L16FU80	M68TQS080SBG1† M68TQP080SBMO1†
68HC05L7/L9/L11 68HC705L10 68HC05M4	Refer to the Configuration and Order Information for Other Motorola Development Tools Section to select a development tool for the 68HC05L7/L9, 68HC05L10, 68HC05L11, or 68HC05M4.					
68HC05MC4 68HC705MC4	M68MMPFB0508 OR M68MMDS05	M68EM05MC4	28 DIP – P 28 SOIC – DW	M68CBL05A M68CBL05A	M68TA05MC4P28* M68TA05MC4P28*	M68DIP28SOIC
68HC05P3	M68MMPFB0508 OR M68MMDS05	M68EM05P3	28 DIP – P	M68CBL05A	M68TA05X4P28	
			28 SOIC – DW	M68CBL05A	M68TA05X4P28	M68DIP28SOIC

Table 4. Configuration and Order Information for MMDS/MMEVS (continued)

Devices	Platform	Emulation Modules	Package Type	In–Circuit Target Cable		
				Low Noise Flexcable	Target Head Adapter	Surface Mount Adapter
68HC05P8	M68MMPFB0508	M68HC05JPEM	28 DIP – P	M68CBL05A	M68TA05P8P28	
			28 SOIC – DW	M68CBL05A	M68TA05P8P28	M68DIP28SOIC
68HC05P1/P4/P6/P7/P9 68HC705P6/705P9	M68MMPFB0508 OR M68MMDS05	M68HC05P9EM (Included with MMDS)	28 DIP – P	M68CBL05A	M68TA05P9P28	
			28 SOIC – DW	M68CBL05A	M68TA05P9P28	M68DIP28SOIC
68HC05P18 68HC805P18	M68MMPFB0508 OR M68MMDS05	M68EM05P18*	28 DIP – P 28 SOIC – DW	M68CBL05A M68CBL05A	M68TA05P9P28 M68TA05P9P28	M68DIP28SOIC
68HC05RC16 68HC705RC16	M68MMPFB0508 OR M68MMDS05	M68EM05RC16	28 DIP – P	M68CBL05A	M68TA05RC16P28	
			28 SOIC – DW	M68CBL05A	M68TA05RC16P28	M68DIP28SOIC
68HC05SC11/SC21/SC24/ SC27		CONTACT SALES OFFICE	die/card	ISO Adapter Included w/EM.		
68HC05SR3 68HC705SR3	M68MMPFB0508 OR M68MMDS05	M68EM05SR3	40 DIP – P	M68CBL05B	M68TB05SR3P40	
			44 QFP – FB	M68CBL05C	M68TC05SR3FB44	M68TQS044SAG1† M68TQP044SAMO1†
			42 SDIP – B	M68CBL05B	M68TB05SR3B42	
68HC05T1/T2	Refer to the Configuration and Order Information for Other Motorola Development Tools Section to select a development tool for the 68HC05T1/T2.					
68HC05T10 68HC705T10	M68MMPFB0508 OR M68MMDS05	M68EM05T7	56 SDIP – B	M68CBL05B	M68TB05T7B56	
68HC05V7 68HC705V8	M68MMPFB0508 OR M68MMDS05	M68EM05V8	56 SDIP – B	M68CBL05B	M68TB05V8B56	
68HC05V12 68HC705V12	M68MMPFB0508 OR M68MMDS05	M68EM05V12*	68 PLCC – FN	M68CBL05C	M68TC05V12FN68*	
68HC05X4 68HC705X4	M68MMPFB0508 OR M68MMDS05	M68EM05X4	28 DIP – P	M68CBL05A	M68TA05X4P28	
			28 SOIC – DW	M68CBL05A	M68TA05X4P28	M68DIP28SOIC
68HC05X16/X32 68HC705X32	M68MMPFB0508 OR M68MMDS05	M68EML05X32	64 QFP – FU	M68CBL05E	M68TE05X32FU64	M68TQS064SAG1† M68TQP064SA1†
68HC08XL36 68HC708XL36	M68MMPFB0508 OR M68MMDS05	M68EML08XL36	64 QFP – FU 56 SDIP – B	M68CBL05C M68CBL05B	M68TC08XL36FU64* M68TB08XL36B56*	M68TQS064SAG1† M68TQP064SAM01†

* Development tools that are scheduled for availability during 1Q96.

† To support more than one QFP target system, separate purchase of additional TQPACKs is required. Contact your Motorola representative for details.
Each QFP target head includes one TQSOCKET with guides (M68TQS0xxSyG1) and one TQPACK disposable surface mount adapter (M68TQP0xxSy1 (1.2 mm lead length) or M68TQP0xxSyMO1 (1.6 mm lead length)). Order additional TQSOCKETs and TQPACKs using part numbers referenced in the Surface Mount Adapters column to support multiple target systems. Contact your Motorola representative for details.

CONFIGURATION AND ORDER INFORMATION FOR OTHER MOTOROLA DEVELOPMENT TOOLS (EVM/EVS/ICS)

Table 5. Configuration and Order Information for Other Motorola Development Tools (EVM/EVS/ICS)

Devices	Development Tool	Package Type	In–Circuit Target Cable			Comments
			Low Noise Flexcable	Target Head Adapter	Surface Mount Adapter	
68HC05C5 68HC705C5	M68HC05C5EVS	40 DIP – P	Not Available			For DIP package user must supply a ribbon cable assembly to interface to user's target system.
		44 PLCC – P	Not Available			For PLCC package, user has the option to order 44PLCC05M, which is the old–style ribbon cable assembly with PLCC target adapter.
68HC05CCV 68HC705CCV	Order M68HC05CCVEM and M68HC05PFB	42 SDIP – B	M68CBL05B	M68TB05CCVB42		
		44 QFP – FB	M68CBL05C	M68TC05CCVFB44	M68TQS044SAG1† M68TQP044SAMO1†	
68HC05J1A 68HC705J1A	M68HC705JICS	20 DIP – P	20 DIP Ribbon Cable Assembly Included With M68HC705JICS			M68HC705KICS In–Circuit Simulator
		20 SOIC – DW	See Above		M68DIP20SOIC	For the SOIC package, user may order M68DIP20SOIC, which is a 20–pin DIP to SOIC adapter.
68HC05K0/K1 68HC705K1	M68HC705KICS	16 DIP – P	16 DIP Ribbon Cable Assembly Included With M68HC705KICS			M68HC705KICS In–Circuit Simulator
		16 SOIC – DW	See Above		M68DIP16SOIC	For the SOIC package, user may order M68DIP16SOIC, which is a 16 pin DIP to SOIC adapter.
68HC05L7/L9	M68HC05L9EVM2	128 QFP – FT	Not Available			
68HC05L10	M68HC05L10EVM	128 QFP – FT	Not Available			
68HC05L11	M68HC05L11EVM	100 QFP – FU	Not Available			
68HC05M4	M68HC05M4EVM	52 PLCC – FN	Not Available			For PLCC package, user has the option to order 52PLCCU, which is the old–style ribbon cable assembly with PLCC target adapter.
68HC05T1/T2	M68HC05T2EVS	40 DIP – P	Not Available			For DIP/SDIP package, user must supply a ribbon cable assembly to interface to user's target system.
		42 SDIP – B	Not Available			
		44 PLCC – FN	Not Available			For PLCC package, user has the option to order 44PLCC05M, which is the old–style ribbon cable assembly with PLCC target adapter.

CONFIGURATION AND ORDER INFORMATION FOR PROGRAMMERS

Table 6. Configuration and Order Information for Programmers

Devices	Packages Supported	Programmer Boards	Comments
68HC705A24	56 SDIP – B	M68HC05UPGMR	M68HC705UPGMR requires package adapter, M68UPA05A24B56.
68HC705B5/B16/B32	52 PLCC – FN 56 SDIP – B	M68HC05BPGMR	For QFP package, order M68HC705X32PGMR.
68HC705BD3/BD5	40 DIP – P 42 SDIP – B	M68HC705UPGMR	M68HC705UPGMR requires package adapter. For 40 DIP – P, order M68UPA05BD3P40. For 42 SDIP – B, order M68UPA05BD3B42.
68HC705C4A/C5/C8/C8A/C9	40 DIP – P/S 44 PLCC – FN/FS	M68HC05PGMR–2	Order M68ADT05P40FB44 adapter to program 44 QFP – FB.
68HC705D9	40 DIP – P/S 44 PLCC – FN/FS	M68HC05PGMR–2	Order M68ADT05P40FB44 adapter to program 44 QFP – FB.
68HC705E6	44 QFP – FB 28 SOIC – DW	M68HC705E6PGMR	
68HC705F4	28 DIP – P 28 SOIC – DW 44 QFP – FB	M68HC705F4PGMR	
68HC705F6	64 QFP – FU/FZ 42 SDIP – B/K	M68HC705F6PGMR64	
68HC705F8	64 QFP – FU/FZ	M68HC705F8PGMR	
68HC705G1	56 SDIP – B 64 QFP – FU	M68HC705G1PGMR	
68HC705J1A	20 DIP – P	M68HC705JICS	M68HC705JICS In–circuit simulator. SOIC requires user–supplied socket or adapter. (Available from Yamaichi, part number IC51–0282–334–1)
68HC705J2/J3	20 DIP – P/S	M68HC705J2PGMR	SOIC requires user–supplied socket or adapter. (Available from Yamaichi, part number IC51–0282–334–1)
68HC705K1	16 DIP – P/S	M68HC705KICS M68HC705K1GANG	M68HC705K1GANG Programs up to 8 68HC705K1S or P.
	16 SOIC – DW**	M68HC705K1GANGY	M68HC705K1GANGY Programs up to 8 68HC705K1S, P, or DW.
68HC705L1	56 SDIP – B/K 64 QFP – FU/FZ	M68HC705L1PGMR	
68HC705L2	42 SDIP – B	M68HC705L2PGMR	
68HC705L5/L16	80 QFP – FU/FZ	M68HC705L5PGMR	
68HC705MC4	28 DIP – P 28 SOIC – DW	M68HC705MC4PGMR	
68HC705P3	28 DIP – P 28 SOIC – DW	M68HC705E6PGMR	
68HC705P6/P9	28 DIP – P/S	M68HC705P9PGMR	SOIC requires user–supplied socket or adapter.
68HC805P18	28 DIP – P/S	M68HC805P18PGMR*	SOIC requires user–supplied socket or adapter.
68HC705SR3	40 DIP – P 42 SDIP – B 44 QFP – FB	M68HC05SR3PGMRSG	M68HC05SR3PGMRSG requires package adapter. For 40 DIP – P, order M68HC05SR3PAP40. For 42 SDIP – B, order M68HC05SR3PAB42. For 44 QFP – FB, order M68HC05SR3PAFB44.
68HC705T10	56 SDIP – B/K	M68HC705T10PGMR	
68HC705V8	56 SDIP – B 68 PLCC – FN	M68HC705V8PGMR	
68HC705V12	68 PLCC – FN	M68HC705V12PGMR*	
68HC705X4	28 DIP – P/S 28 SOIC – DW	M68HC705X4PGMR	
68HC705X32	64 QFP – FU 68 PLCC – FN	M68HC705X32PGMR	
68HC708XL36	64 QFP – FU 56 SDIP – B/K	M68SPGMR08*	

*Development tools that are scheduled for availability during 1Q96.
**SOIC on M68HC705K1GANGY only.

THIRD PARTY DEVELOPERS FOR 68HC05 AND 68HC705 FAMILY MCUs

Table 7. Third Party Developers for 68HC05 and 68HC705 Family MCUs

Programmers		
Advin Systems Inc.	USA	(408) 243–7000
		(800) 627–2456
	Canada:	
	Eastern	(514) 337–0723
	Western	(604) 986–1286
	France	+33 13961–1414
	Germany	+49 7459–1271
	UK	+44 1332–32651
	Hong Kong	(852) 833–5188
Ascend Systems Inc.	USA	(510) 606–2000
		(800) 541–3526
	Austria/	+43 2772–54581
	Germany	
	France	+33 148619528
BP Microsystems	USA	(800) 225–2102
		(713) 688–4600
	Canada	(905) 602–8550
	UK	+44 1280–700262
	France	+33 16941–2801
	Germany	+49–8856–932616
	Hong Kong	852–234–166–11
	Tokyo	81–3–3817–4980
Bytek	USA	(407) 994–3520
	Netherlands,	+31 16248–0100
	UK, Belgium	
	France	+33 16930–2880
	Germany	49 6181–75041
	Hong Kong	852 29198282
Circuit Equipment	USA	(216) 951–8840
Corporation	UK	+44 1734–575666
	France	+33 6185–5767
Data I/O	USA	(206) 881–6444
		(800) 426–1045
	Canada	(905) 678–0761
	France	+35 80502–3300
	Germany	+33–31956–8131
	Hong Kong	49–89–858–580
	Japan	81–3–3779–2151
	Netherlands	+31–402–582–911
	UK	+44–1734–440011
E.E. Tools Inc.	USA	(408) 734–8184
	Canada	
	Mexico	52–5–705–7422
	France	+33 16930–2880
	Germany	+49 89834–3047
	Japan	81–538–322822
Emulation	France	+33 16941–2801
Technology, Inc.	USA	(408) 982–0660
	UK	+44 1234 266455
		+44 1962–733140
	Germany	+49 89–4602071
		+49 81–047044
Logical Devices	USA	(800) 331–7766
Micro Enhanced	USA	(708) 352–3910
Technology		
(PEP) Programmers		

Nash Electronics	USA	(501) 289–6111
Needham's Electronics	USA	(916) 924–8037
Stag Programmers Ltd.	UK	+44–1707–332148
	USA	(800) 331–7766
		(Logical Devices)
Sunrise Electronics	USA	(909) 595–7774
System General	USA	(800) 967–4776
Corporation		(408) 263–6667
	Japan	81–3–3441–1510
	France	+33 2015–1133
	Germany	+41 1982–2050
TECI (The Engineers	USA	(800)–336–8321
Collaborative Inc.)		(802) 525–3458
Tribal Microsystems, Inc.	USA	(510) 623–8859
	Asia	886–2–764–0215
Vel Electronic	Germany	+49 851–751427

ICE/Evaluation Boards		
American Arium	USA	(714) 731–1661
Ashling Microsystems	USA	(508) 366–3220
		(Eastern Systems)
	UK	+44 1628–773070
	France	+33 14666–2750
	Germany	+49 8233–32681
Dr. Krohn & Stiller	Germany	+49 896100–0022
	UK	+44 1235–861461
	USA	(320) 617–9400
Emulation Technology,	France	+33 16941–2801
Inc.	USA	(408) 982–0660
	UK	+44 1234–266455
		+44 1962–733140
	Germany	+49 89460–2071
		+49 8104–7044
iSystem GmbH	Germany	+49 8131–25083
	USA	(408) 982–0660
		(Emulation
		Technology Inc)
	France	+33 62–072–954
		(ISIT Societe)
Lauterbach, Inc	USA	(508) 620–4521
	UK	(01254) 682092
		(Noral Micrologics Ltd.)
	Australia	(2) 6541873
		(Electro Optics)
	Germany	(08104) 8943–28
	France	(1) 39899622
		(Logic Instrument)
MetaLink Corporation	USA	(602) 926–0797
	UK	+44 1491–455907
	Canada	(613) 226–2365
	Hong Kong	896–2–501–6699
	Germany	+49 8091–55950
	France	+33 1–39–3956–8131

Orion Instruments	USA	(408) 747–0440		Sophia Systems	Japan	(044) 989–7000
	Canada	(416) 609–8396 (Multitest Elect. Inc.)			USA	(800) 824–9294
	France	+33 1–30–54–2222 (BSO France S.A.)		Vel Electronic	Germany	+49 85175–1427
Pentica Systems	USA	(800) PENTICA (617) 275–4419		Yokogawa Digital Computer Corp	Japan	81–422–56–9101
	UK	+44 0734–792101			USA	(408) 747–0400 (Orion Instruments)
	Germany	+49 7147–3085				

Assemblers/Linkers/Debuggers		
2500 Software Inc.	USA	(719) 395–8683
	France	+33 7443–8045 (CK Electronique)
		+33 6185–1914 (Societe L.S.I.T.)
	UK	+44 1364–654100 (Greymatter)
		+44 17183–31022 (System Science)
American Arium	USA	(714) 731–1661
Archimedes Software, Inc.	USA	(206) 822–6300
Avocet Systems, Inc.	USA	(207) 236–9055
		(800) 448–8500
BSO Tasking	USA	(617) 894–7800
		(800) 458–8276
	France	+33 1–3054–2222
	UK	+44 1252–510014
	Germany	+49 71–5222090
Byte Craft Ltd.	USA	(519) 888–6511
Cosmic Software	USA	(617) 932–2556
	Europe/Intnl	+33 143–995390
	UK	+44 1734–880241
HIWARE	USA	(206) 827–4832 (Archimedes)
	France	+33 16013–3668 (CK Electronique Avnet Group)
	Germany	+41 61331–7151 (HIWARE)
		+49 7031–2895–38 (Diessner)
	UK	+44 1734–792101 (Pentica)
		+44 1962–733140 (Nohau)
	Japan	81 3–3293–4716 (Lifeboat)
IAR Systems	USA/Canada	(415)–765–5500
	Germany	+49 89470–6022
	UK	+44 171924–3334
	France	+1–39–61–14–14
	Hong Kong	2687–1931
	Japan	03–293–4711 (Lifeboat)
Introl Corp.	USA	(414) 327–7171
		(800) 327–7171
	UK	+44 171–8331022 (System Science)
	France	+33 7443–8045 (CK Electronique)
		+33 14622–9988 (Micro Sigma S.A.)
	Japan	(81) 3 256 5881 (Soft Mart Inc.)
	Germany	+49 8104–9074 (Lauterbach GmbH)

P & E Microcomputer Systems, Inc	USA	(617) 353–9206
PseudoCorp	USA	(541) 683–9173
Software Development Systems (SDS)	USA	(708) 368–0400
	UK	+44 1442–876065
	Japan	+81 (0) 3 3493 7981
	Asia–Pac.	+61 (0) 3 720 5344
	Germany	+49 2534–800170 (H S P GmbH)
TECI (The Engineers Collaborative Inc.)	USA	(802) 525–3458
		(800) 336–8321

Compiler/Real–Time Kernel		
Archimedes Software, Inc.	USA	(206) 822–6300
Avocet Systems, Inc.	USA	(207) 236–9055
		(800) 448–8500
BSO Tasking	USA	(617) 894–7800
		(800) 458–8276
	France	+33 1–30542222
	UK	+44 1252–510014
	Germany	+49 71–5222090
Byte Craft Ltd.	USA	(519) 888–6511
Cosmic Software	USA	(617) 932–2556
	Europe/Intnl	+33 143–995390
	UK	+44 1734–880241
Embedded System Products, Inc.	USA	(713) 728–9688
	Europe	+33–143–995–390 (Cosmic Software)
Hi–Tech (distributed by Avocet in USA)	UK	+44–0734–792–101 (Pentica)
	Germany	+49–7147–3085 (Pentica)
HIWARE	USA	(206) 827–4832 (Archimedes)
	France	+33 16013–3668 (CK Electronique Avnet Group)
	Germany	+41 61331–7151 (HIWARE)
		+49 7031–2895–38 (Diessner)
	UK	+44 1734–792101 (Pentica)
		+44 1962–733140 (Nohau)
	Japan	81 33293–4716 (Lifeboat)

Miscellaneous Software and Hardware Support		
AMP Incorporated (sockets)	USA	(717) 564–0100
		(800) 522–6752
	Canada	(905) 475–6222
	Mexico	(525) 729–0400
	Europe	+44 1753–676–800
	Asia/Pacific	(81) 44–813–8502
McKenzie (now part of Berg Electronics) (adapters, sockets)	USA	(510) 6512700
	Germany	+49 89150–1001 (Infratron GmbH)
	France	+33 14594–1424 (Green Components)
	UK	+44 1295–271777 (Toby Electronics) +44 1501–44434 (Neltronic Ltd.)
Emulation Technology, Inc. (adapters)	France	+33 16941–2801
	USA	(408) 982–0660
	UK	+44 1234 266455 +44 1962–733140
	Germany	+49 89–4602071 +49 81–047044
USAR Incorporated (keyboard encoders)	USA	(212) 226–2042
Yamaichi Elec. Inc. (sockets)	USA	(408) 456–0797

On–Line Help

CSIC Microcontroller Division World Wide Web Site

http://design–net.com/csic/CSIC_home.html

The CSIC WWW pages provide a direct line to the latest information and software for 68HC05 and 68HC08 microcontrollers. The web site provides access to:

The Latest News and Press Releases

Product, Market, and Development Tool Overviews

On–Line MCU and Development Tool Selector Guides

On–Line Datasheets and Application Notes

Development Tool Software Upgrades

Free Development Software

Applications Software

3rd Party Development Tool Information

On–Line Technical Support

Freeware Bulletin Board

The Freeware Data Services are now mirrored on the CSIC WWW site for easy access. Customers unable to access the Internet can still access the Freeware development software and applications software by dial–up modem at 2400 to 9600 baud. To log in:

1. Make sure to set character format to 8–bits, no parity, 1 stop bit

2. Dial (512) 891–FREE (512–891–3733)

3. Follow directions from the system

The Freeware files are also accessible by anonymous FTP server:

freeware.aus.mot.com
(use email address for password)