MOTOROLA
SEMICONDUCTORS
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8-Bit MPUs
8-Bit MCUs
8-Bit Peripherals

THE M6800 FAMILY

The MC6800 microprocessor was the first MPU of the M6800 Family and still remains a highly cost-effective processor for a great many process-control and data-communications applications. Seventy-two powerful instructions and six different addressing modes give it unexcelled capability, and a full range of compatible peripheral chips offer the widest possible lattitude in system implementation. After years of field experience, the MC6800 has earned an enviable reputation as one of the easiest-to-use processors available.

Moreover, to tailor the system to your specific needs at the lowest cost, the MC6800 (and its peripherals) is available in three different packages, two different temperature ranges and three speed ranges.

The table to the right lists devices in the M6800 Family. The following microprocessor and microcomputer families are derivations and enhancements of the MC6800 architecture to provide easy migration within the M6800 Family as processing-power requirements change.

Device	Function
MC6800	MPU
MC6802	MPU (with Clock, RAM)
MC6808	MPU (with Clock)
MCM6810	128 x 8 Static RAM
MC6821	Peripheral Interface Adapter
MC6822	Industrial Interface Adapter
MC6828[1]	Priority Interrupt Controller
MC6829	Memory Management Unit
MC6835	CRT Controller with ROM
MC6839	Floating Point ROM (IEEE Standard Draft 6.0)
MC6840	Programmable Timer
MC6843	Floppy-Disk Controller
MC6844	Direct Memory Access Controller
MC6845	CRT Controller
MC6846	ROM-I/O-Timer
MC6847, Y	Video Display Generator
MC6850	Asynchronous Interface Adapter
MC6852	Synchronous Serial Data Adapter
MC6854	Advanced Data Link Controller
MC6859	Data Security Device
MC6860[2]	Digital Modem
MC6862[2]	Digital Modulation
MC68488	General-Purpose Interface Adapter

[1]Motorola Digital Bipolar [2]Motorola Logic and Special Functions

THE M6801 FAMILY PROCESSORS: HIGH-PERFORMANCE MCUs

Frequency				Memory
1 MHz	1.25 MHz	1.5 MHz	2 MHz	
MC6801	MC6801-1	MC68A01	MC68B01	2K ROM, 128 Bytes RAM, Expansion Bus
MC68701	MC68701-1	–	–	2K EPROM, 128 Bytes RAM, Expansion Bus
MC6803	MC6803-1	MC68A03	MC68B03	No ROM, 128 Bytes RAM, Expansion Bus
MC6803E	MC6803E-1	–	–	No ROM, 128 Bytes RAM, External Clock, Expansion Bus
MC6801U4	MC6801U4-1	–	–	4K ROM, 192 Bytes RAM, Expansion Bus
MC6803U4	MC6803U4-1	–	–	No ROM, 192 Bytes RAM, Expansion Bus
MC68120	MC68120-1	–	–	2K ROM, 128 Bytes Dual-Port RAM, Expansion Bus
MC68121	MC68121-1	–	–	No ROM, 128 Bytes Dual-Port RAM, Expansion Bus

THE HMOS M6805 FAMILY PROCESSORS: MEDIUM-PERFORMANCE MCUs

Device	No. of Pins	Memory (Bytes)			I/O Lines	Special Features
		ROM	EPROM	RAM		
MC6805P2	28	1K	–	64	20 Programmable Bidirectional	Self-Check
MC6805P4	28	1K	–	112	20 Programmable Bidirectional	Self-Check, Standby RAM
MC6805R2	40	2K	–	64	2 to 5 Inputs, 24 Programmable Bidirectional	1 to 4 Channel 8-Bit A/D, Self Check
MC6805T2	28	2.5K	–	64	2 Special Function, 19 Programmable Bidirectional	PLL, Self-Check
MC6805U2	40	2K	–	64	8 Inputs, 24 Programmable Bidirectional	Self-Check
MC68705P3	28	–	1.8K	112	20 Programmable Bidirectional	Self-Programming Bootstrap
MC68705R3	40	–	3.8K	112	2 to 5 Inputs, 24 Programmable Bidirectional	1 to 4 Channel 8-Bit A/D, Self-Programming Bootstrap
MC68705U3	40	–	3.8K	112	8 Inputs, 24 Programmable Bidirectional	Self-Programming Bootstrap
MC6805U3	40	3.8K	–	112	8 Inputs, 24 Programmable Bidirectional	Self-Check
MC6805R3	40	3.8K	–	112	2 to 5 Inputs, 24 Programmable Bidirectional	1 to 4 Channel 8-Bit A/D, Self Check

THE CMOS M146805 FAMILY PROCESSORS: MEDIUM-PERFORMANCE MCUs

Device	No. of Pins	Memory (Bytes)		I/O Lines	Special Features
		ROM	RAM		
MC146805E2	40	—	112	16 Programmable Bidirectional	External Bus
MC146805F2	28	1K	64	16 Programmable Bidirectional	Self-Check
MC146805G2	40	2K	112	32 Programmable Bidirectional	Self-Check

SPECIAL PERIPHERALS

Device	Function
MC146818	CMOS Real-Time Clock
MC146823	CMOS Peripheral Interface Adapter (Similar to MC6821)

THE M6809 FAMILY PROCESSORS: HIGH-PERFORMANCE MPUs

PROCESSORS

Device	Features
MC6809	On-Chip Oscillator
MC6809E	External Clocking for Synchronization of Multiprocessor Systems

MPUs/EXPANDABLE MCUs SUPPORTED BY ALL M6800-FAMILY PERIPHERALS

MC6800	MC6801	MC6803U4
MC6802	MC6801U4	MC68120
MC6808	MC68701	MC68121
MC6809	MC6803	MC146805E2
MC6809E	MC6803E	

PRE-PROGRAMMED ROM-BASED MICROCOMPUTERS

Device	Source	Function
MC6801L1	MC6801	LILbug Monitor
MC6801G1	MC6801	LILbug Monitor
MC6805P2P2	MC6805P2	Monitor and Keyboard Encoder
MC6805P2P3	MC6805P2	Monitor and Game Plus
MC6805P2P4	MC6805P2	Monitor and Game (XTAL Osc)
MC6805R2L1	MC6805R2	Monitor and DVM
MC6805U2P2	MC6805U2	Monitor and Keyboard Encoder
MC6805P4P1*	MC6805P4	Mini-Monitor and Custom
MC6805T2P1	MC6805T2	Monitor and TV-Demo
MC6805T2P2	MC6805T2	Monitor and Ham Radio
MC146805G2P1	MC146805G2	Monitor and Bicycle Component
MC146805F2P1	MC146805F2	Monitor and Keyless Entry Demo.
MC68120L1	MC68120	UNICORN Monitor
MC6801U4L1	MC6801U4	UNICORN Monitor
MC6801U4G1	MC6801U4	UNICORN Monitor

*Mini-monitor has only two commands: execute and memory examine/charge.

PART MARKING

SPEED DESIGNATION — The following letters identify the speed of the corresponding device.

MC68XX	1.0 MHz
MC68AXX	1.5 MHz
MC68BXX	2.0 MHz

In cases where a −1 follows the package designator, the device operates at 1.25 MHz (example: MC68XXL-1).

PACKAGE DESIGNATION — The part is marked with the following descriptors to identify the package type.

MC68XXP	Plastic
G	Plastic
L	Ceramic
S	Cerdip
Z	Leadless Chip Carrier

For further information on higher-speed extended-temperature devices, please contact your local Motorola Sales Office.

BETTER LEVEL — The part is marked with a suffix letter(s) as shown to indicate the level of testing that the part received.

MC68XX	CP	S
Part Identification	Standard Package Suffix C = Ext. Temp. (−40°C to +85°C)	"BETTER" Processing Level I = Suffix S Level II = Suffix D Level III = Suffix DS

THE "BETTER" PROGRAM

Motorola standard commercial integrated circuits are manufactured under stringent in-process controls and quality inspections combined with the industry's finest outgoing quality inspections. The "BETTER" program offers three levels of extra processing, each tailored to meet different user needs at nominal costs.

The program is designed to:

- Eliminate Incoming Electrical Inspection
- Eliminate Need for Independent Test Labs and Associated Extra Time and Costs
- Reduce Field Failures
- Reduce Service Calls
- Reduce Equipment Downtime
- Reduce Board and System Rework
- Reduce Infant Mortality
- Save Time and Money
- Increase End-Customer Satisfaction

BETTER PROCESSING — STANDARD PRODUCT PLUS:

Level I (Suffix S)

- 100% temperature cycling per MIL-STD-883B, Method 1010, ten cycles from −25°C to +150°C.
- 100% high temperature functional test at t_{max}.

Level II (Suffix D)

- 100% burn-in to MIL-STD-883B test conditions equivalent to 160 hours at +125°C.
- 100% post burn-in DC parametric test at 25°C.

Level III (Suffix DS)

- Combination of Levels I and II above.

Test	Condition	AQL Level I	AQL Level II	AQL Level III
High Temperature Functional	$T_A = t_{max}$	0.15	0.15*	0.10
DC Parametric	$T_A = 25°C$	0.28	0.28	0.28
AC Parametric	$T_A = 25°C$	0.65	0.65	0.65
External Visual and Mechanical	Major Minor	0.11 2.50	0.11 2.50	0.11 2.50
Hermeticity (Not applicable to plastic package)	Gross	0.46	0.46	0.46

t_{max} = Maximum Operating Temperature of Device Under Test

*25°C

NOTES: 1. Major Defects — Affects Form, Fit, or Function
Minor Defects — Cosmetic
2. General Inspection Level II

MIL-STD-883B SCREENED MICROPROCESSORS AND PERIPHERALS

Basic Numbering Parameters — Example: MC68XX YYYY

MC68XX Y Y Y Y

Motorola Device Type

MIL-STD-883B Class
B = Processed per 883B method 5004, QCI per 5005

Case Outline
J = 24 pin
Q = 40 pin
T = 28 pin

Operating Temperature Range
A = −55°C to +125°C
E = −40°C to +85°C
S = 0°C to +70°C

Lead Finish
C = Gold Plate

Hi-Rel Offering			
Source Device	0°C to +70°C	−40°C to +85°C	−55°C to +125°C
MC6800	MC68B00BQCS	MC68A00BQCE	MC6800BQCA
*MC6801	MC68B01BQCS	MC68A01BQCE	No
MC68701	MC68701BQCS	No	No
MC6802	MC68B02BQCS	MC68A02BQCE	MC6802BQCA
MC6803	MC68B03BQCS	MC68A03BQCE	No
MC6809	MC68B09BQCS	MC68A09BQCE	MC6809BQCA
MC6809E	MC68B09EBQCS	MC68A09EBQCE	MC6809EBQCA
MCM6810	MCM68B10BJCS	MCM68A10BJCE	MCM6810BJCA
MC6821	MC68B21BQCS	MC68A21BQCE	MC6821BQCA
MC6840	MC68B40BTCS	MC68A40BTCE	MC6840BTCA
MC6845	MC68B45BQCS	MC68A45BQCE	MC6845BQCA
MC6850	MC68B50BJCS	MC68A50BJCE	MC6850BJCA
MC6852	MC68B52BJCS	MC68A52BJCE	MC6852BJCA
MC6854	MC68B54BTCS	MC68A54BTCE	MC6854BTCA
MC68488	MC68B488BQCS	MC68A488BQCE	MC68488BQCA
*MC6805P2	MC6805P2BTCE	MC6805P2BTCE	No
MC146805E2	MC146805E2BQCE	MC146805E2BQCE	No
*MC146805G2	MC146805G2BQCE	MC146805G2BQCE	No

*ROM base parts (source only)

MOTOROLA DEVELOPMENT SYSTEMS 8-BIT PRODUCT LINE

NOTE: For details on these and other Motorola Development Systems Products, please contact your local Sales Office or Distributor.

	Devices Supported			Associated System Products
EXORciser	**MC6800/6802** MDOS FORTRAN (Real-Time opt.) BASIC, MPL, COBOL Assembler, Editor and Linkage Editor Downline Loader Emulator Module **M6801/68701** Cross Macro Assembler Downline Loader Emulator Module Programmer Module	**MC6805P2, R2, U2/68705** Programmer Module Cross Macro Assembler Emulator Module **M146805** Cross Macro Assembler E2, G2, F2 Emulator Modules	**M6809** MDOS FORTRAN Pascal BASIC-M Compiler MPL Assembler, Editor and Linkage Editor Symbolic Debug Downline Loader Bus State Analyzer Emulator Module	EXORdisk II/III System EXORterm 155 Console EXORmacs Comm. Link PROM Programmer V Systems Analyzer 180 cps Printer EXORset/EXORciser Communications
EXORset DS35	**M6800** Cross Macro Assembler **M6801** Cross Macro Assembler	**M6805P2, R2, U2/68705** Cross Macro Assembler P2, R2, U2 Emulator Module **M146805** Cross Macro Assembler E2, G2, F2 Emulator Modules	**M6809** XDOS Pascal BASIC-M Assembler, Editor and Linkage Editor	EXORdisk III System 180 cps Printer PROM Programmer V EXORset/EXORciser Communications
EVALUATION MODULES	**M6800/6802** Educational Kit **M6801/68701** Evaluation Module **M68120** Evaluation Module	**M68705P3** Evaluation Module **M68705R3, U3** Evaluation Module	**M6809** Educational Kit	EXORciser II System EXORterm 155 Console EXORmacs System Cross Software Systems Analyzer
HARDWARE DEVELOPMENT STATION-200		**M6805** Assembler/Linkage Editor P2, R2, U2 Emulator Module **M146805** Assembler/Linkage Editor E2, G2, F2 Emulator Modules		EXORdisk III System EXORciser II System EXORset DS35 System EXORmacs System Systems Analyzer Cross Software EXORterm 155 Console 180 cps Printer PROM Programmer V

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AI5398-1 PRINTED IN USA 8-82 IMPERIAL LITHO 407796 25,000