intersil

HIP7038A8

PRELIMINARY

April 1994

J1850 8-Bit 68HC05 Microcontroller
8K EEPROM Version

Features

- **Direct Replacement for HIP7030A2/A8 Microcontrollers**
  - **All Hardware and Software Features**
  - **Equivalent Timing and Performance**
- **Memory**
  - **176 Bytes of RAM**
  - **7744 Bytes of Programmable EEPROM**
  - **242 Bytes of Bootstrap Program**
- **Single 5V Supply**
- **10MHz Operating Frequency (5.0MHz Internal Bus Frequency) at 5V.**
- **28 Lead Small Outline Ceramic Package**
  - **Same Terminal Assignment as HIP7030A2 and HIP7030A8**
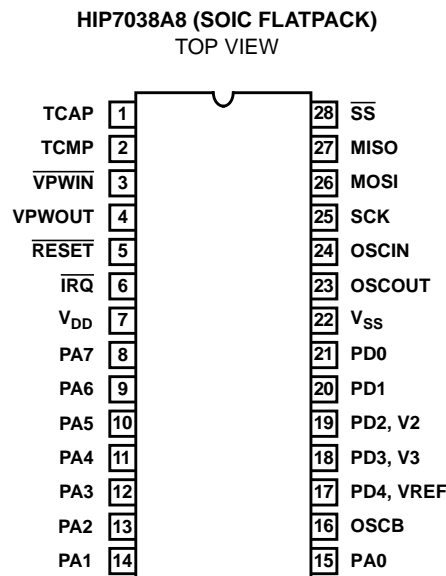
Description

The HIP7038A8 HCMOS Microcomputer is an EEPROM version of the HIP7030A family of low-cost single-chip J1850 microcontrollers. These microcontrollers provide the system designer with a complete set of building blocks for implementing a "Class B" VPW multiplexed communications network interface, which fully complies with SAE Recommended Practice J1850. The HIP7038A8 contains all hardware and software features of the HIP7030A2/A8 microcontrollers with equivalent timing, performance characteristics, and an identical footprint.

The device can be programmed using the HIP7038A8 EEPROM Programmer available from Intersil. In-circuit Emulation Tools are also provided for system development.
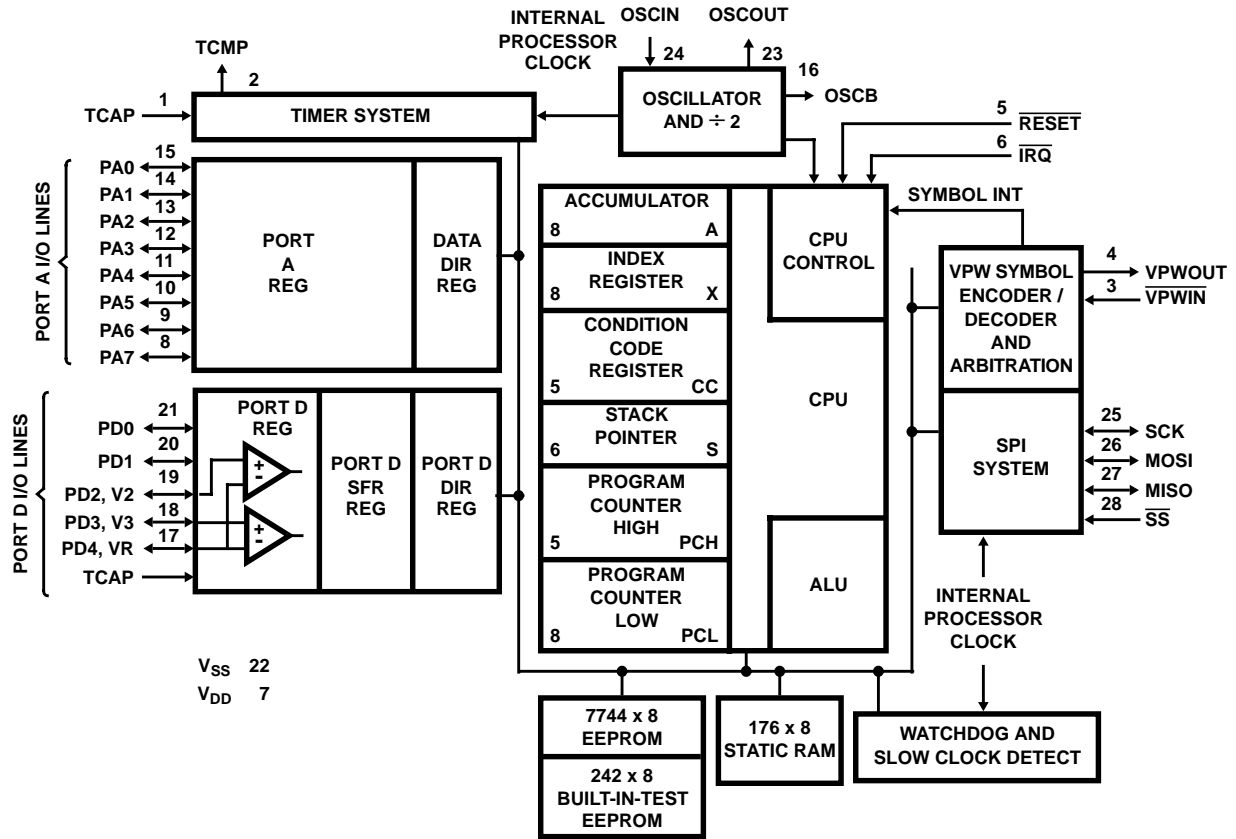
Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
HIP7038A8F	-40°C to +85°C	28 Lead Ceramic SOIC

Pinout

HIP7038A8 (SOIC FLATPACK)
TOP VIEW

Pin	Signal	Pin	Signal
1	TCAP	28	$\overline{SS}$
2	TCMP	27	MISO
3	$\overline{VPWIN}$	26	MOSI
4	VPWOUT	25	SCK
5	$\overline{RESET}$	24	OSCIN
6	$\overline{IRQ}$	23	OSCOUT
7	V_{DD}	22	V_{SS}
8	PA7	21	PD0
9	PA6	20	PD1
10	PA5	19	PD2, V2
11	PA4	18	PD3, V3
12	PA3	17	PD4, VREF
13	PA2	16	OSCB
14	PA1	15	PA0

File Number **3647.1**

Block Diagram

Absolute Maximum Ratings

Supply Voltage (V_{DD}) . . . . -0.3V to +6.0V
Input or Output Voltage
   Pins with V_{DD} Diode . . . . -0.3V to V_{DD} +0.3V
   Pins without V_{DD} Diode. . . . . -0.3V to +10.0V
Current Drain Per Pin, I (Excluding V_{DD} and V_{SS}) 25mA
ESD Classification . . . . Class 2
Gate Count . . . . 21000 Gates

Thermal Information

Operating Temperature Range (T_A) . . . . -40°C to +125°C
Storage Temperature Range (T_{STG}) . . . . -65°C to +150°C
Junction Temperature . . . . +150°C
Lead Temperature (During Soldering) . . . . +265°C
   1/16in. ± 1/32in. (1.59 ± 0.79mm) from case for 10s Max.

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Operating Conditions

Operating Voltage Range. . . . . +4.5V to +5.5V
Operating Temperature Range. . . . . -40°C to +85°C
Input Low Voltage. . . . . 0V to +0.8V

Input High Voltage. . . . . (0.8•V_{DD}) to V_{DD}
Input Rise and Fall Time
   CMOS Inputs. . . . . 100ns Max.
   CMOS Schmitt Inputs . . . . .Unlimited

DC Electrical Specifications V_{DD} = 5V_{DC} ±10%, V_{SS} = 0V_{DC}, T_A = -40°C to +85°C Unless Otherwise Specified.

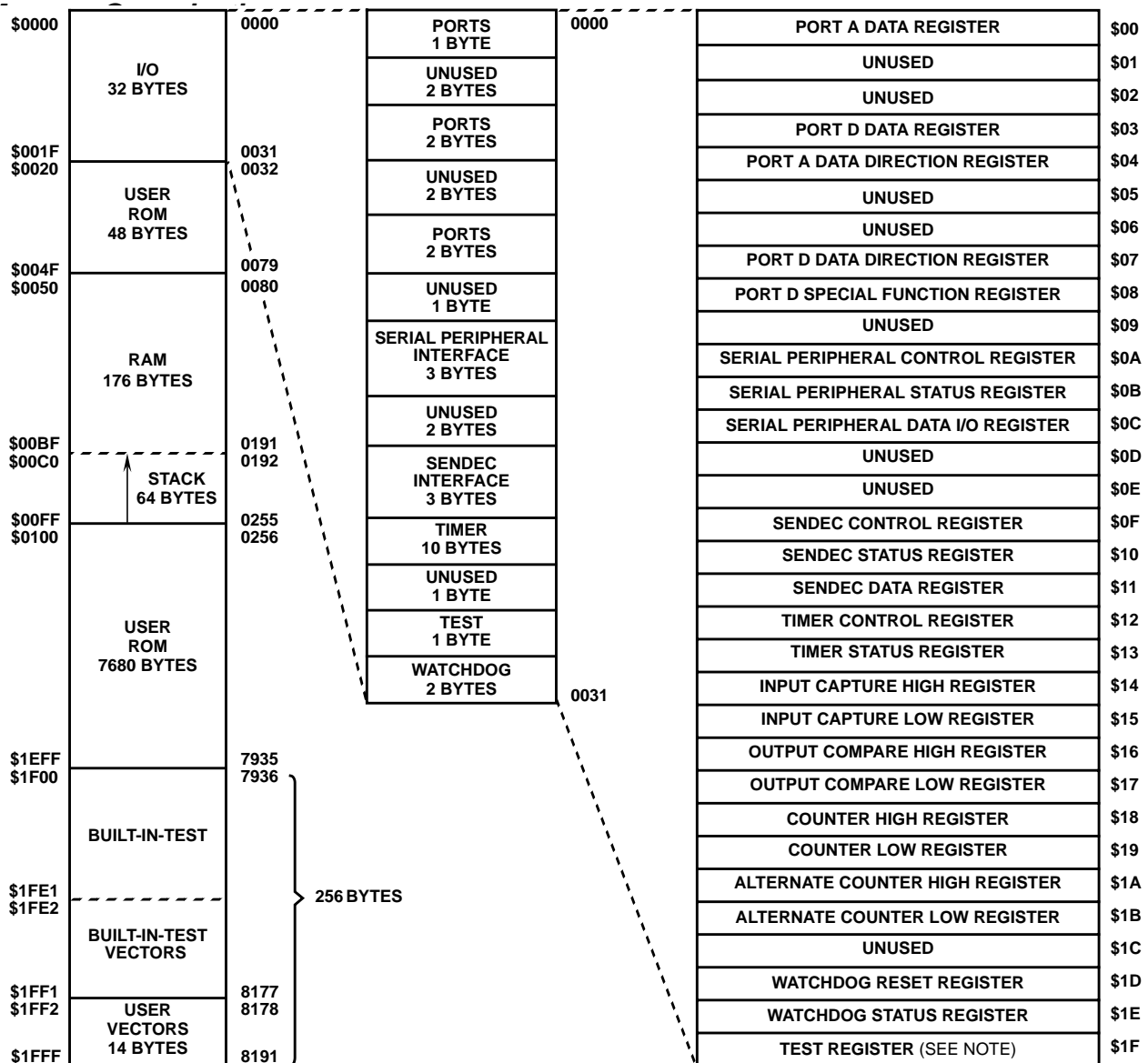| PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY CURRENT						
RUN	I_{RUN}		-	50	-	mA
WAIT	I_{WAIT}		-	4	-	mA
STOP	I_{STOP}	T_A = +25°C	-	100	-	µA
		T_A = -40°C to +85°C	-	100	-	µA
Powerdown Input Voltage: RESET, IRQ, VPWIN, OSCIN	V_{INPD}	V_{DD} = 0	-0.3	-	9	V

NOTE:

1. This device contains circuitry to protect the inputs against damage due to high static voltages of electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit. For proper operation it is recommended that V_{IN} and V_{OUT} be constrained to the range V_{SS}<(V_{IN} or V_{OUT})<V_{DD}. Reliability of operation is enhanced if unused inputs except OSC2 are connected to an appropriate logic voltage level (e.g., either V_{SS} or V_{DD}).

Functional Description

The HIP7038A8 MCU is functionally identical to the HIP7030A2 and HIP7030A8 microcontrollers. The device differs only in that the on-board masked ROM has been replaced with EEPROM, which allows the device to be rapidly programmed by the user. For detailed information about the functions included on the HIP7038A8 refer to File Number 3646, the technical specification of the HIP7030A2 Microcontroller. Only differences are presented here.

The availability of the HIP7038A8 dramatically reduces the time-to-market of new products by providing the development engineer rapid feedback during the design phase of a HIP7030A2/8 project.

The EEPROM is reusable and can be reprogrammed up to 10^4 times.

$0000 I/O 32 BYTES	0000
$001F $0020 USER ROM 48 BYTES	0031 0032
$004F $0050 RAM 176 BYTES	0079 0080
$00BF $00C0 STACK 64 BYTES	0191 0192
$00FF $0100 USER ROM 7680 BYTES	0255 0256
$1EFF $1F00 BUILT-IN-TEST	7935 7936
$1FE1 $1FE2 BUILT-IN-TEST VECTORS	256 BYTES
$1FF1 $1FF2 USER VECTORS 14 BYTES $1FFF	8177 8178 8191

	0000	
PORTS 1 BYTE	PORT A DATA REGISTER	$00
UNUSED 2 BYTES	UNUSED	$01
	UNUSED	$02
PORTS 2 BYTES	PORT D DATA REGISTER	$03
UNUSED 2 BYTES	PORT A DATA DIRECTION REGISTER	$04
	UNUSED	$05
PORTS 2 BYTES	UNUSED	$06
	PORT D DATA DIRECTION REGISTER	$07
UNUSED 1 BYTE	PORT D SPECIAL FUNCTION REGISTER	$08
SERIAL PERIPHERAL INTERFACE 3 BYTES	UNUSED	$09
	SERIAL PERIPHERAL CONTROL REGISTER	$0A
	SERIAL PERIPHERAL STATUS REGISTER	$0B
UNUSED 2 BYTES	SERIAL PERIPHERAL DATA I/O REGISTER	$0C
SENDEC INTERFACE 3 BYTES	UNUSED	$0D
	UNUSED	$0E
	SENDEC CONTROL REGISTER	$0F
TIMER 10 BYTES	SENDEC STATUS REGISTER	$10
	SENDEC DATA REGISTER	$11
UNUSED 1 BYTE	TIMER CONTROL REGISTER	$12
TEST 1 BYTE	TIMER STATUS REGISTER	$13
WATCHDOG 2 BYTES	INPUT CAPTURE HIGH REGISTER	$14
	INPUT CAPTURE LOW REGISTER	$15
	OUTPUT COMPARE HIGH REGISTER	$16
	OUTPUT COMPARE LOW REGISTER	$17
	COUNTER HIGH REGISTER	$18
	COUNTER LOW REGISTER	$19
	ALTERNATE COUNTER HIGH REGISTER	$1A
	ALTERNATE COUNTER LOW REGISTER	$1B
	UNUSED	$1C
	WATCHDOG RESET REGISTER	$1D
	WATCHDOG STATUS REGISTER	$1E
	TEST REGISTER (SEE NOTE)	$1F

NOTE: Accessable in test mode only.

FIGURE 1. MEMORY MAP OF THE HIP7038A8

For information regarding Intersil Corporation and its products, see web site **http://www.intersil.com**