

HD404638/HD404639/HD4074639

Abbreviated
Information

Description

The HD404638, HD404639, and HD4074639 are HMCS400-series microcomputers designed to increase program productivity with large-capacity memory. Each microcomputer has a high-precision dual-tone multi frequency (DTMF) generator, four timers, two serial interfaces, voltage comparator, input capture circuit, 32-kHz oscillator for clock, and four low-power dissipation modes.

The HD404638 and HD404639 are mask ROM versions. The HD4074639 is a PROM version (ZTAT™ microcomputer). Program can be written to the PROM by a PROM writer, which can dramatically shorten system development periods and smooth the process from debugging to mass production.

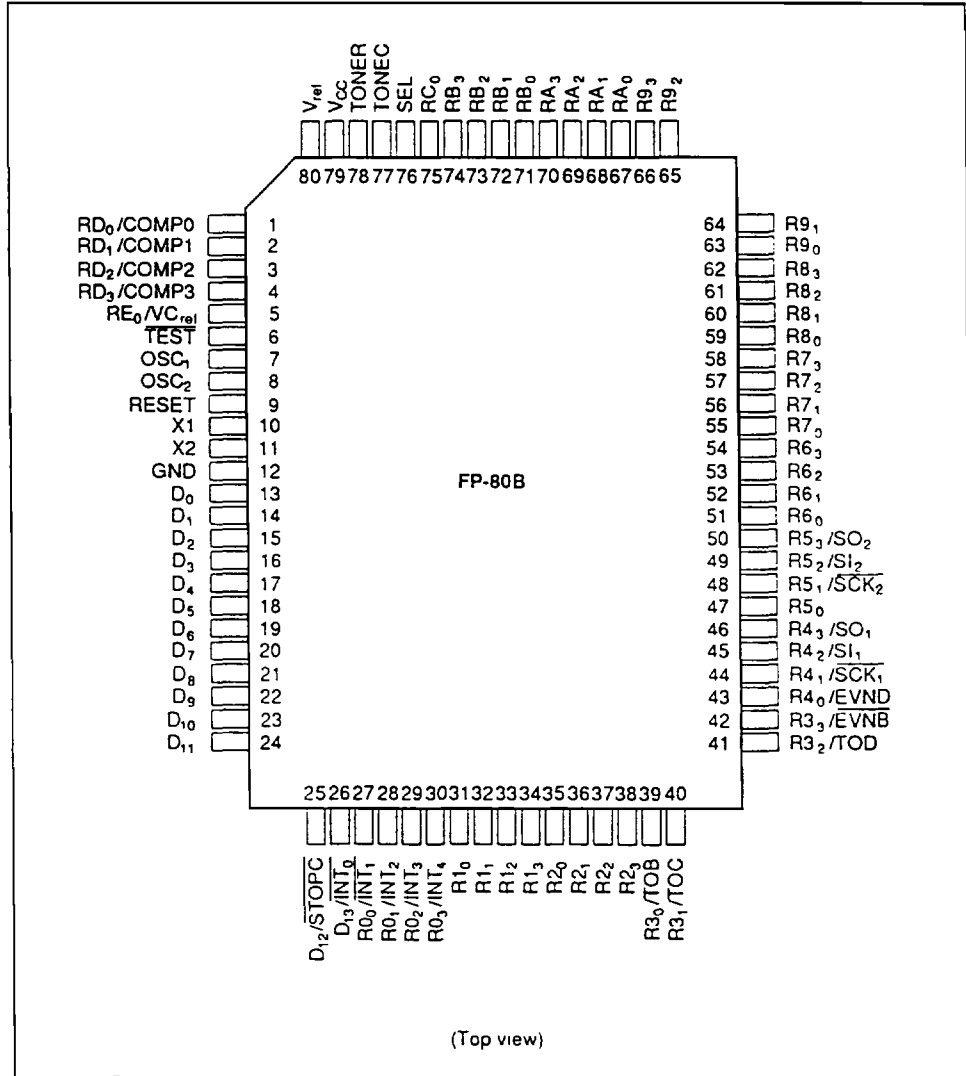
Features

- 8,192-word × 10-bit ROM (HD404638)
- 16,384-word × 10-bit ROM (HD404639, HD4074639) (the ZTAT™ version is 27256-compatible)
- 1,152-digit × 4-bit RAM
- 61 I/O pins and 7 dedicated input pins
 - 12 large-current output pins: Eight 15-mA sinks (a maximum of 7 pins can be used at the same time) and four 10-mA sources
- Four timer/counters
- Eight-bit input capture circuit
- Three timer outputs (including two PWM outputs)
- Two event counter inputs (including one double-edge function)
- Two clock-synchronous 8-bit serial interfaces
- Voltage comparator (4 channels)
- On-chip DTMF generator ($f_{OSC} = 400$ kHz, 800 kHz, 2 MHz, 3.58 MHz or 4 MHz)
- Built-in oscillators
 - Main clock: Ceramic filter or crystal (an external clock is also possible)
 - Subclock: 32.768-kHz crystal
- Eleven interrupt sources
 - Five by external sources, including three double-edge function
 - Six by internal sources
- Subroutine stack up to 16 levels, including interrupts
- Four low-power dissipation modes
 - Subactive mode
 - Standby mode
 - Watch mode
 - Stop mode
- One external input for transition from stop mode to active mode
- Instruction cycle time: 1 μ s ($f_{OSC} = 4$ MHz at 1/4 division ratio)
 - 1/4, 1/8, 1/16, or 1/32 division ratio can be selected
- Two operating modes
 - MCU mode
 - MCU/PROM mode (HD4074639)

Ordering Information

Type	Product Name	ROM (Words)	Package
Mask ROM	HD404638FS	8,192	80-pin plastic QFP (FP-80B)
	HD404639FS	16,384	
ZTAT™	HD4074639FS	16,384	80-pin plastic QFP (FP-80B)

Pin Arrangement



Pin Description

Item	Symbol	Pin Number	I/O	Function
Power supply	V _{CC}	79		Applies power voltage
	GND	12		Connected to ground
Test	TEST	6	I	Used for factory testing only: Connect this pin to V _{CC}
Reset	RESET	9	I	Resets the MCU
Oscillator	OSC ₁	7	I	Input/output pins for the internal oscillator circuit: Connect them to a ceramic filter, crystal, or connect OSC ₁ to an external oscillator circuit
	OSC ₂	8	O	
	X1	10	I	Used for a 32.768-kHz crystal for clock purposes. If not to be used, fix the X1 pin to V _{CC} and leave the X2 pin open.
	X2	11	O	
Port	D ₀ –D ₁₁	13–24	I/O	Input/output pins addressed by individual bits; pins D ₄ –D ₁₁ are large-current sink pins that can each supply up to 15 mA, D ₀ –D ₃ are large-current source pins that can each supply up to 10 mA
	D ₁₂ , D ₁₃	25, 26	I	Input pins addressable by individual bits
	R ₀ –R _{C0}	27–75	I/O	Input/output pins addressable in 4-bit units
Interrupt	$\overline{\text{INT}}_0$, $\overline{\text{INT}}_1$, $\overline{\text{INT}}_2$ – $\overline{\text{INT}}_4$	26–30	I	Input pins for external interrupts
Stop clear	$\overline{\text{STOPC}}$	25	I	Input pin for transition from stop mode to active mode
Serial	$\overline{\text{SCK}}_1$, $\overline{\text{SCK}}_2$	44, 48	I/O	SCI clock input/output pin
	SI ₁ , SI ₂	45, 49	I	SCI receive data input pin
	SO ₁ , SO ₂	46, 50	O	SCI transmit data output pin
Timer	TOB, TOC, TOD	39–41	O	Timer output pins
	$\overline{\text{EVNB}}$, EVND	42, 43	I	Event count input pins
DTMF	TONER	78	O	Output pin for DTMF row signals
	TONEC	77	O	Output pin for DTMF column signals.
	VT _{ref}	80		Reference voltage pin for DTMF signals. Voltage conditions being V _{CC} ≥ VT _{ref} ≥ GND
Voltage comparator	COMP0–3	1–4	I	Analog input pins for voltage comparator
	VC _{ref}	5		Reference voltage pin for inputting the threshold voltage of the analog input pin.
Division rate	SEL	76	I	Input pin for selecting system clock division rate after RESET input or after stop mode cancellation. 1/4 division rate: Connect it to V _{CC} 1/32 division rate: Connect it to GND

Block Diagram

