CMOS 8-Bit Microcontroller

TMP88CH40N/M

The TMP88CH40N/M are the high-speed and high-function 8-bit single-chip microcomputer which incorporates the TLCS-870/X Series CPU core, as well as a sine wave drive PMD (Programmable Motor Driver), a 10-bit AD converter, multi-function Timer/Counters, and synchronous/asynchronous serial interfaces.

Product Type Name	ROM	RAM	Package	OTP
TMP88CH40N	16 Kbytes	512 + 128 bytes	P-SDIP28-400-1.78	TMP88PH40N
TMP88CH40M			P-SOP28-450-1.27	TMP88PH40M

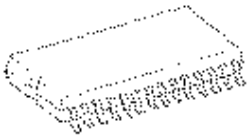
Features

- 8-bit single-chip microcomputer: TLCS-870/X Series
- Minimum instruction execution time: 0.20 µs (at 20.0 MHz operation)
- Fundamental machine instruction: 181 kinds, 842 instructions
- I/O port: 19 pins
  - Large-current output: 14 pins (typ. 20 mA), capable of LED direct drive
- Watchdog Timer (WDT)
- Time Base Timer (TBT)
- Programmable motor driver: 1 channel (PMD2)
  - Sine wave drive circuit (RAM for sine wave data is incorporated.)
  - Rotor position detection function
  - Timer and capture function for montor controlling
  - Overload protective function
  - Start functions for automatic commutation and automatic position detection

P-SDIP28-400-1.78

TMP88CH40N

P-SOP28-450-1.27



TMP88CH40M

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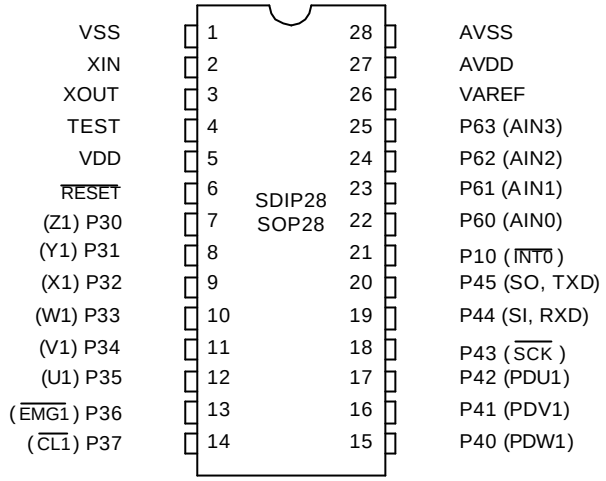
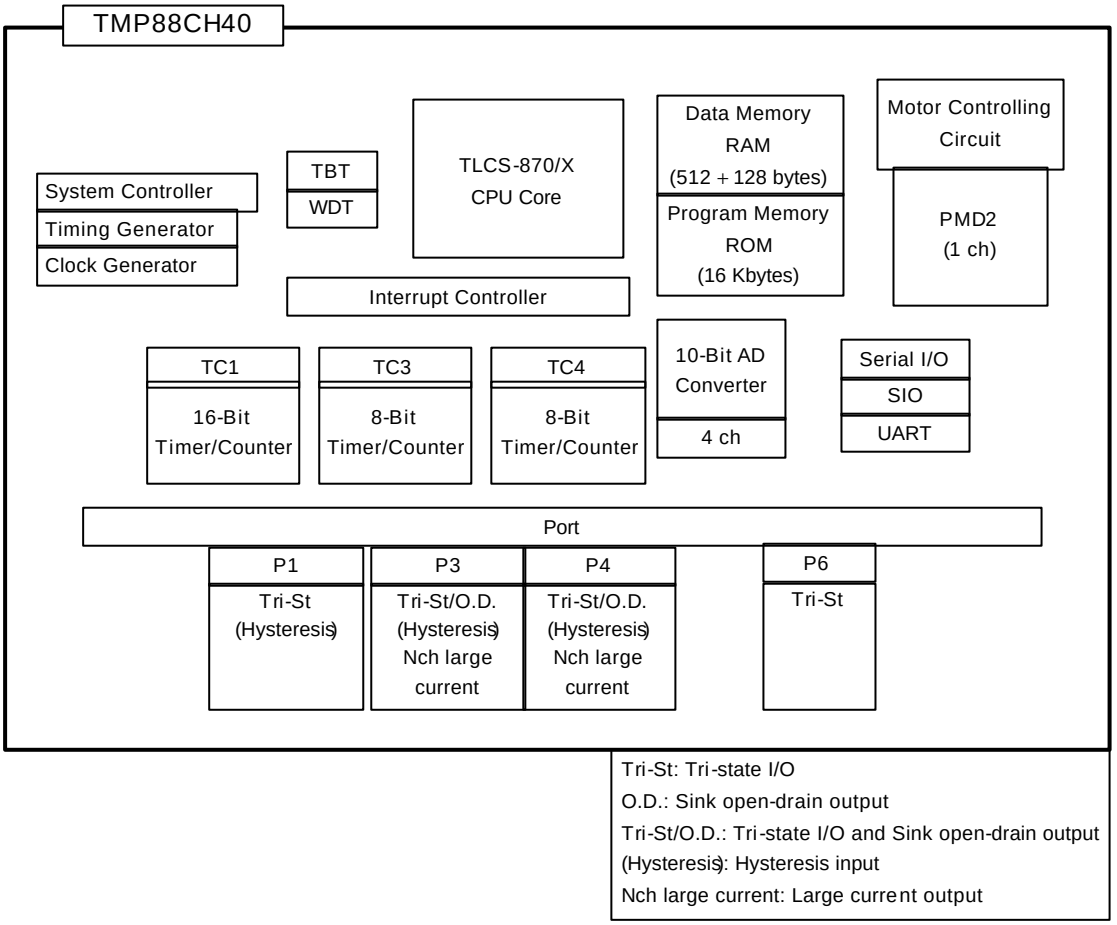
- 16-Bit Timer / Counter: 1 channel (TC1)
- 8-Bit Timer / Counter: 2 channels (TC3, TC4)
  - TC3: Timer
  - TC4: Timer, UART baud rate
- 10-bit successive approximation type AD converter (with sample-and-hold)
  - Analog input: 4 channels
- Serial interface: 2 channels (SIO and UART use the same I / O pins)
  - 8-bit SIO (synchronous): 1 channel
  - 8-bit UART (asynchronous): 1 channel
- Low power dissipation mode
  - IDLE mode: Halts CPU and operates only peripheral hardware. IDLE mode is reset by an interrupt. (CPU is restarted.)
  - Operating voltage: 4.5 to 5.5 V at 8 to 20 MHz

Pin Assignments

P-SDIP28-400-1.78, P-SOP28-450-1.27



Block Diagram



Tri-St: Tri-state I/O
O.D.: Sink open-drain output
Tri-St/O.D.: Tri-state I/O and Sink open-drain output
(Hysteresis): Hysteresis input
Nch large current: Large current output

Specification List (compared to the TMP88CS43F) (: Incorporated, –: Not incorporated)

Function \ Product			TMP88CS43F	TMP88CH40N/M
Package			P-QFP80-1420-0.80	P-SDIP28-400-1.78 P-SOP28-450-1.27
ROM (byte)			64 K	16 K
RAM (byte)			2 K + 128	512 + 128
CPU Core			TLCS-870/X	TLCS-870/X
Operating range (fc = 8 – 20 MHz)			4.5 to 5.5 V	4.5 to 5.5 V
Number of I/O ports			71	19
PMD (Sine wave control circuit)			2 ch	1 ch
16-bit TC	TC1 (TC1B)			(Note)
	CTC (CTC1)			–
8-bit TC	TC3 (TC3C)			(Note)
	TC4 (TC5B) (can be used as UART baud rate)			(Note)
	TC5 (TC6)	Suitable for cascade connection, and used as a 16-bit timer.		–
	TC6 (TC6)			–
High-speed PWM			2 ch	–
10-bit AD converter			16 ch	4 ch
Serial Commu-nication	UART		1 ch (Pins are selectable)	1 ch (Uses the same I/O pins with SIO.)
	SIO		1 ch	1 ch (Uses the same I/O pins with UART.)
TBT				
WDT				
DVO				–
Standby				–
Port 0	Output: Tri-state/Programmable open-drain Input: Schmitt		P00 to P03	–
Port 1	Output: Tri-state Input: Schmitt		P10 to P17	P10
Port 2	Output: Open-drain Input: Schmitt		P20 to P22	–
Port 3	Output: Tri-state/Programmable open-drain Nch large current Input: Schmitt		P30 to P37	P30 to P37
Port 4	Output: Tri-state/Programmable open-drain Nch large current Input: Schmitt		P40 to P47	P40 to P45
Port 5	Output: Tri-state/Programmable open-drain Nch large current Input: Schmitt		P50 to P57	–
Port 6	Output: Tri-state Input: Normal		P60 to P67	P60 to P63
Port 7	Output: Tri-state Input: Normal		P70 to P77	–
Port 8	Output: Tri-state/Programmable open-drain Input: Normal		P80 to P87	–
Port 9	Output: Tri-state/Programmable open-drain Input: Normal		P90 to P97	–
OTP			TMP88PS43F	TMP88PH40N/M

Note: No timer I/O pin