



CY54/74FCT841T

SCCS035 - September 1994 - Revised March 2000

10-Bit Latch

Features

- Function, pinout, and drive compatible with FCT, F, and AM29841 logic
- FCT-C speed at 5.5 ns max. (Com'l)
FCT-B speed at 6.5 ns max. (Com'l)
- Reduced V_{OH} (typically = 3.3V) versions of equivalent FCT functions
- Edge-rate control circuitry for significantly improved noise characteristics
- Power-off disable feature
- Matched rise and fall times
- ESD > 2000V
- Fully compatible with TTL input and output logic levels
- Sink current 64 mA (Com'l),
32 mA (Mil)
- Source current 32 mA (Com'l),
12 mA (Mil)

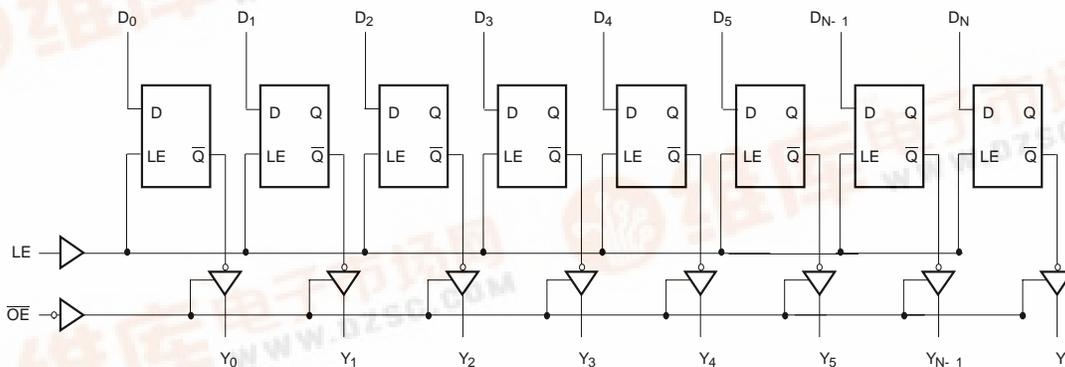
- High-speed parallel latches
- Buffered common latch enable input

Functional Description

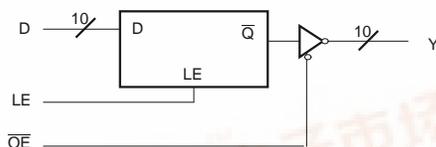
The FCT841T bus interface latch is designed to eliminate the extra packages required to buffer existing latches and provide extra data width for wider address/data paths or buses carrying parity. The FCT841T is a buffered 10-bit wide version of the FCT373 function.

The FCT841T high-performance interface is designed for high-capacitance load drive capability while providing low-capacitance bus loading at both inputs and outputs. Outputs are designed for low-capacitance bus loading in the high impedance state and are designed with a power-off disable feature to allow for live insertion of boards.

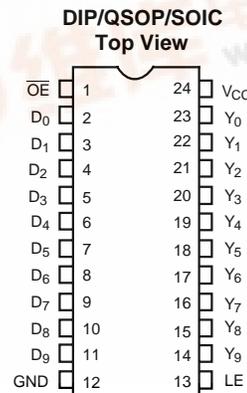
Functional Block Diagram



Logic Block Diagram



Pin Configurations



Pin Description

| Name | I/O | Description |
|-----------------|-----|---|
| D | I | The latch data inputs. |
| LE | I | The latch enable input. The latches are transparent when LE is HIGH. Input data is latched on the HIGH-to-LOW transition. |
| Y | O | The three-state latch outputs. |
| \overline{OE} | I | The output enable control. When the \overline{OE} is LOW, the outputs are enabled. When \overline{OE} is HIGH, the outputs Y_1 are in the high impedance (off) state. |

Function Table^[1]

| Inputs | | | Internal Outputs | | Function |
|-----------------|----|---|------------------|----|------------------|
| \overline{OE} | LE | D | O | Y | |
| H | X | X | X | Z | High Z |
| H | H | L | L | Z | |
| H | H | H | H | Z | |
| H | L | X | NC | Z | Latched (High Z) |
| L | H | L | L | L | Transparent |
| L | H | H | H | H | |
| L | L | X | NC | NC | Latched |

Maximum Ratings^[2, 3]

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature -65°C to +150°C

Ambient Temperature with
Power Applied -65°C to +135°C

Supply Voltage to Ground Potential -0.5V to +7.0V

DC Input Voltage -0.5V to +7.0V

DC Output Voltage -0.5V to +7.0V

DC Output Current (Maximum Sink Current/Pin) 120 mA

Power Dissipation 0.5W

Static Discharge Voltage >2001V
(per MIL-STD-883, Method 3015)

Operating Range

| Range | Range | Ambient Temperature | V _{CC} |
|-------------------------|-------|---------------------|-----------------|
| Commercial | All | -40°C to +85°C | 5V ± 5% |
| Military ^[4] | All | -55°C to +125°C | 5V ± 10% |

Notes:

- H = HIGH Voltage Level, L = LOW Voltage Level, X = Don't Care, NC = No Change, Z = High Impedance.
- Unless otherwise noted, these limits are over the operating free-air temperature range.
- Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.
- T_A is the "instant on" case temperature.

Electrical Characteristics Over the Operating Range

| Parameter | Description | Test Conditions | | Min. | Typ. ^[5] | Max. | Unit |
|------------------|---|---|-------|------|---------------------|------|------|
| V _{OH} | Output HIGH Voltage | V _{CC} = Min., I _{OH} = -32 mA | Com'l | 2.0 | | | V |
| | | V _{CC} = Min., I _{OH} = -15 mA | Com'l | 2.4 | 3.3 | | V |
| | | V _{CC} = Min., I _{OH} = -12 mA | Mil | 2.4 | 3.3 | | V |
| V _{OL} | Output LOW Voltage | V _{CC} = Min., I _{OL} = 64 mA | Com'l | | 0.3 | 0.55 | V |
| | | V _{CC} = Min., I _{OL} = 32 mA | Mil | | 0.3 | 0.55 | V |
| V _{IH} | Input HIGH Voltage | | | 2.0 | | | V |
| V _{IL} | Input LOW Voltage | | | | | 0.8 | V |
| V _H | Hysteresis ^[6] | All inputs | | | 0.2 | | V |
| V _{IK} | Input Clamp Diode Voltage | V _{CC} = Min., I _{IN} = -18 mA | | | -0.7 | -1.2 | V |
| I _I | Input HIGH Current | V _{CC} = Max., V _{IN} = V _{CC} | | | | 5 | μA |
| I _{IH} | Input HIGH Current | V _{CC} = Max., V _{IN} = 2.7V | | | | ±1 | μA |
| I _{IL} | Input LOW Current | V _{CC} = Max., V _{IN} = 0.5V | | | | ±1 | μA |
| I _{OZH} | Off State HIGH-Level Output Current | V _{CC} = Max., V _{OUT} = 2.7V | | | | 10 | μA |
| I _{OZL} | Off State LOW-Level Output Current | V _{CC} = Max., V _{OUT} = 0.5V | | | | -10 | μA |
| I _{OS} | Output Short Circuit Current ^[7] | V _{CC} = Max., V _{OUT} = 0.0V | | -60 | -120 | -225 | mA |
| I _{OFF} | Power-Off Disable | V _{CC} = 0V, V _{OUT} = 4.5V | | | | ±1 | μA |

Capacitance^[6]

| Parameter | Description | Typ. ^[5] | Max. | Unit |
|------------------|--------------------|---------------------|------|------|
| C _{IN} | Input Capacitance | 5 | 10 | pF |
| C _{OUT} | Output Capacitance | 9 | 12 | pF |

Notes:

5. Typical values are at V_{CC}=5.0V, T_A=+25°C ambient.
6. This parameter is specified but not tested.
7. Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample and hold techniques are preferable in order to minimize internal chip heating and more accurately reflect operational values. Otherwise prolonged shorting of a high output may raise the chip temperature well above normal and thereby cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

Power Supply Characteristics

| Parameter | Description | Test Conditions | Typ. ^[5] | Max. | Unit |
|-----------------|--|--|---------------------|----------------------|--------|
| I_{CC} | Quiescent Power Supply Current | $V_{CC} = \text{Max.}, V_{IN} \leq 0.2V, V_{IN} \geq V_{CC}-0.2V$ | 0.1 | 0.2 | mA |
| ΔI_{CC} | Quiescent Power Supply Current (TTL inputs HIGH) | $V_{CC} = \text{Max.}, V_{IN} = 3.4V, f_1 = 0, \text{Outputs Open}^{[8]}$ | 0.5 | 2.0 | mA |
| I_{CCD} | Dynamic Power Supply Current ^[9] | $V_{CC} = \text{Max.}, 50\% \text{ Duty Cycle, Outputs Open, One Input Toggling, } \overline{OE} = \text{GND, LE} = V_{CC}, V_{IN} \leq 0.2V \text{ or } V_{IN} \geq V_{CC}-0.2V$ | 0.06 | 0.12 | mA/MHz |
| I_C | Total Power Supply Current ^[10] | $V_{CC} = \text{Max.}, 50\% \text{ Duty Cycle, Outputs Open, One Bit Toggling at } f_1 = 10 \text{ MHz, } \overline{OE} = \text{GND, LE} = V_{CC}, V_{IN} \leq 0.2V \text{ or } V_{IN} \geq V_{CC}-0.2V$ | 0.7 | 1.4 | mA |
| | | $V_{CC} = \text{Max.}, 50\% \text{ Duty Cycle, Outputs Open, One Bit Toggling at } f_1 = 10 \text{ MHz, } \overline{OE} = \text{GND, LE} = V_{CC}, V_{IN} = 3.4V \text{ or } V_{IN} = \text{GND}$ | 1.0 | 2.4 | mA |
| | | $V_{CC} = \text{Max.}, 50\% \text{ Duty Cycle, Outputs Open, Ten Bits Toggling at } f_1 = 2.5 \text{ MHz, } \overline{OE} = \text{GND, LE} = V_{CC}, V_{IN} \leq 0.2V \text{ or } V_{IN} \geq V_{CC}-0.2V$ | 1.0 | 3.2 ^[11] | mA |
| | | $V_{CC} = \text{Max.}, 50\% \text{ Duty Cycle, Outputs Open, Ten Bits Toggling at } f_1 = 2.5 \text{ MHz, } \overline{OE} = \text{GND, LE} = V_{CC}, V_{IN} = 3.4V \text{ or } V_{IN} = \text{GND}$ | 4.1 | 13.2 ^[11] | mA |

Notes:

8. Per TTL driven input ($V_{IN}=3.4V$); all other inputs at V_{CC} or GND.
9. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
10. $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_0/2 + f_1 N_1)$
 I_{CC} = Quiescent Current with CMOS input levels
 ΔI_{CC} = Power Supply Current for a TTL HIGH input ($V_{IN}=3.4V$)
 D_H = Duty Cycle for TTL inputs HIGH
 N_T = Number of TTL inputs at D_H
 I_{CCD} = Dynamic Current caused by an input transition pair HLH or LHL)
 f_0 = Clock frequency for registered devices, otherwise zero
 f_1 = Input signal frequency
 N_1 = Number of inputs changing at f_1
All currents are in milliamps and all frequencies are in megahertz.
11. Values for these conditions are examples of the I_{CC} formula. These limits are specified but not tested.

Switching Characteristics Over the Operating Range^[12]

| Parameter | Description | Test Load | FCT841AT | | | | FCT841BT | | FCT841CT | | Unit | Fig. No. ^[13] |
|--------------------------------------|---|--|----------|------|------------|------|------------|------|------------|------|------|--------------------------|
| | | | Military | | Commercial | | Commercial | | Commercial | | | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | |
| t _{PLH} t _{PHL} | Propagation Delay D ₁ to Y ₁ (L=HIGH) | C _L = 50 pF R _L = 500Ω | 1.5 | 10.0 | 1.5 | 9.0 | 1.5 | 6.5 | 1.5 | 5.5 | ns | 1, 3 |
| | Propagation Delay D ₁ to Y ₁ (LE=HIGH) | C _L = 300 pF R _L = 500Ω | 1.5 | 15.0 | 1.5 | 13.0 | 1.5 | 13.0 | 1.5 | 13.0 | ns | 1, 3 |
| t _{SU} | Data to LE Set-Up Time | C _L = 50 pF R _L = 500Ω | 2.5 | | 2.5 | | 2.5 | | 2.5 | | ns | 9 |
| t _H | Data to LE Hold Time | C _L = 50 pF R _L = 500Ω | 3.0 | | 2.5 | | 2.5 | | 2.5 | | ns | 9 |
| t _{PLH} t _{PHL} | Propagation Delay LE to Y ₁ | C _L = 50 pF R _L = 500Ω | 1.5 | 13.0 | 1.5 | 12.0 | 1.5 | 8.0 | 1.5 | 6.4 | ns | 1, 3 |
| | Propagation Delay LE to Y ₁ ^[12] | C _L = 300 pF R _L = 500Ω | 1.5 | 20.0 | 1.5 | 16.0 | 1.5 | 15.5 | 1.5 | 15.0 | ns | 1, 3 |
| t _W | LE Pulse Width (HIGH) | C _L = 50 pF R _L = 500Ω | 5.0 | | 4.0 | | 4.0 | | 4.0 | | ns | 5 |
| t _{PZH} t _{PZL} | Output Enable Time OE to Y ₁ | C _L = 50 pF R _L = 500Ω | 1.5 | 13.0 | 1.5 | 11.5 | 1.5 | 8.0 | 1.5 | 6.5 | ns | 1, 7, 8 |
| | Output Enable Time OE to Y ₁ ^[12] | C _L = 300 pF R _L = 500Ω | 1.5 | 25.0 | 1.5 | 23.0 | 1.5 | 14.0 | 1.5 | 12.0 | ns | 1, 7, 8 |
| t _{PHZ} t _{PLZ} | Output Disable Time OE to Y ₁ ^[12] | C _L = 5 pF R _L = 500Ω | 1.5 | 9.0 | 1.5 | 7.0 | 1.5 | 6.0 | 1.5 | 5.7 | ns | 1, 7, 8 |
| | Output Disable Time OE to Y ₁ | C _L = 50 pF R _L = 500Ω | 1.5 | 10.0 | 1.5 | 8.0 | 1.5 | 7.0 | 1.5 | 6.0 | ns | 1, 7, 8 |

Ordering Information

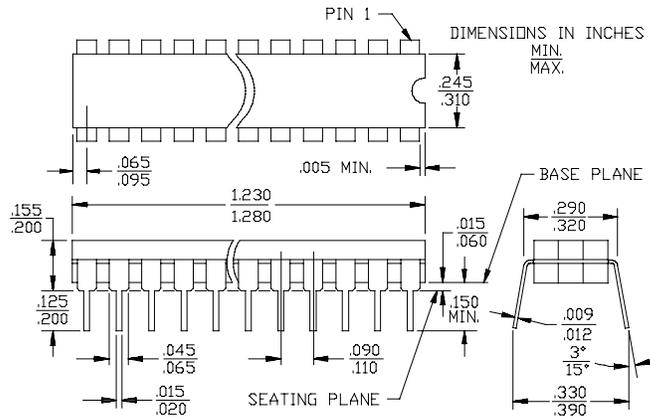
| Speed (ns) | Ordering Code | Package Name | Package Type | Operating Range |
|------------|----------------------|--------------|-------------------------------|-----------------|
| 5.5 | CY74FCT841CTQCT | Q13 | 24-Lead (150-Mil) QSOP | Commercial |
| | CY74FCT841CTSOC/SOCT | S13 | 24-Lead (300-Mil) Molded SOIC | |
| 6.5 | CY74FCT841BTPC | P13/P13A | 24-Lead (300-Mil) Molded DIP | Commercial |
| 9.0 | CY74FCT841ATSOC/SOCT | S13 | 24-Lead (300-Mil) Molded SOIC | Commercial |
| 10.0 | CY54FCT841ATDMB | D14 | 24-Lead (300-Mil) CerDIP | Military |

Notes:

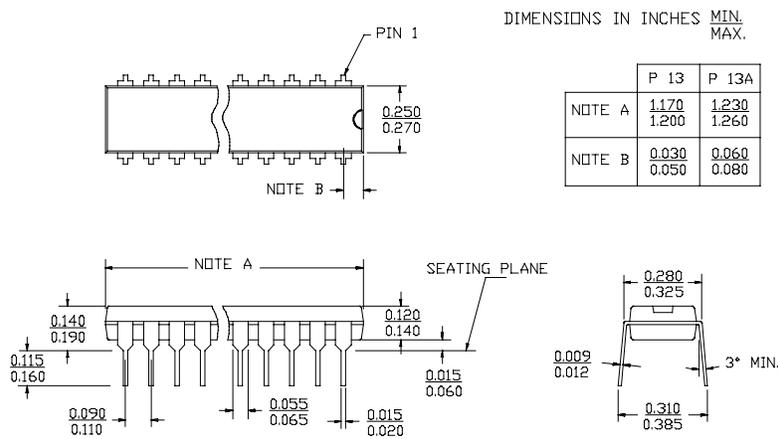
12. Minimum limits are specified but not tested on Propagation Delays.
13. See "Parameter Measurement Information" in the General Information section.

Package Diagrams

24-Lead (300-Mil) CerDIP D14
MIL-STD-1835 D-9Config.A

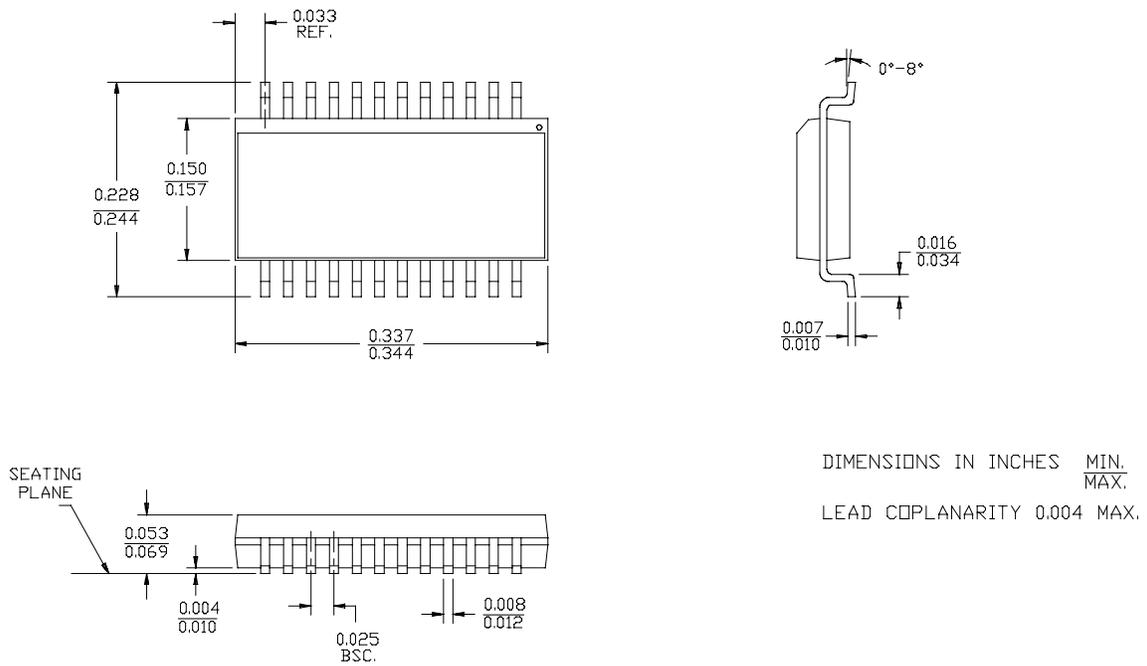


24-Lead (300-Mil) Molded DIP P13/P13A

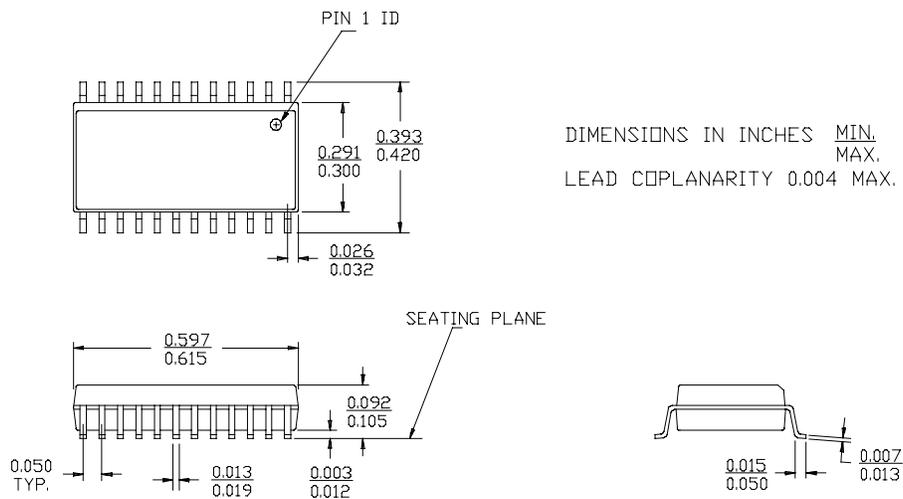


Package Diagrams (continued)

24-Lead Quarter Size Outline Q13



24-Lead (300-Mil) Molded SOIC S13



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