TEXAS INSTRUMENTS

CY54/74FCT841T

SCCS035 - September 1994 - Revised March 2000

10-Bit Latch

Features

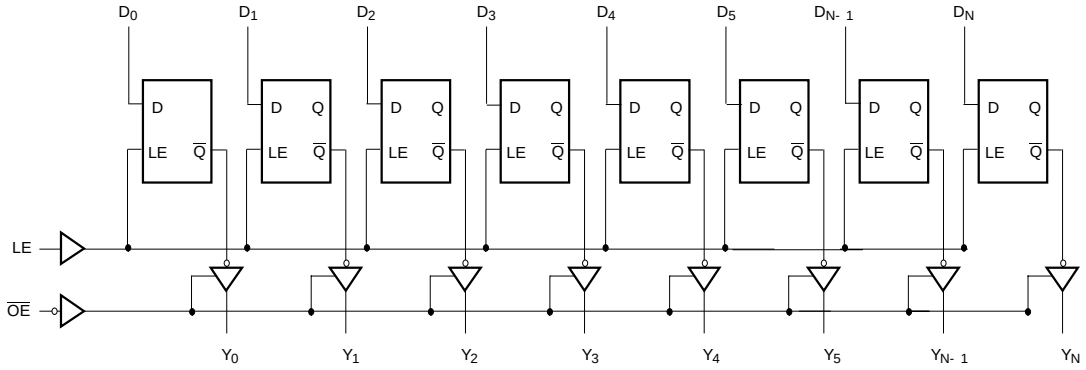
- **Function, pinout, and drive compatible with FCT, F, and AM29841 logic**
- **FCT-C speed at 5.5 ns max. (Com'l) FCT-B speed at 6.5 ns max. (Com'l)**
- **Reduced V_{OH} (typically = 3.3V) versions of equivalent FCT functions**
- **Edge-rate control circuitry for significantly improved noise characteristics**
- **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

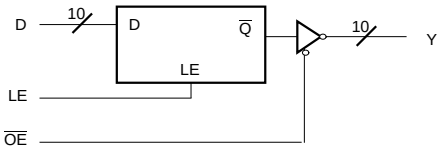
The FCT841T bus interface latch is designed to eliminate the extra packages required to buffer existing latches and provide extra data width for wider address/data paths or buses carrying parity. The FCT841T is a buffered 10-bit wide version of the FCT373 function.

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

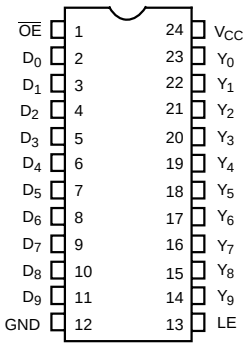


Logic Block Diagram



Pin Configurations

DIP/QSOP/SOIC
Top View



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 H H	X H H	X L H	X L H	Z Z Z	High Z
H	L	X	NC	Z	Latched (High Z)
L L	H H	L H	L H	L H	Transparent
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:

1. H = HIGH Voltage Level, L = LOW Voltage Level, X = Don't Care, NC = No Change, Z = High Impedance.
2. Unless otherwise noted, these limits are over the operating free-air temperature range.
3. Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.
4. 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} = Max., $V_{IN} \le 0.2V$, $V_{IN} \ge V_{CC}$-0.2V	0.1	0.2	mA
ΔI_{CC}	Quiescent Power Supply Current (TTL inputs HIGH)	V_{CC} = Max., V_{IN} = 3.4V, f_1 = 0, Outputs Open[8]	0.5	2.0	mA
I_{CCD}	Dynamic Power Supply Current[9]	V_{CC} = Max., 50% Duty Cycle, Outputs Open, One Input Toggling, $\overline{OE}$ =GND, LE = V_{CC}, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC}$–0.2V	0.06	0.12	mA/MHz
I_C	Total Power Supply Current[10]	V_{CC}=Max., 50% Duty Cycle, Outputs Open, One Bit Toggling at f_1=10 MHz, $\overline{OE}$ = GND, LE = V_{CC}, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC}$–0.2V	0.7	1.4	mA
		V_{CC} = Max., 50% Duty Cycle, Outputs Open, One Bit Toggling at f_1 =10 MHz, $\overline{OE}$ = GND, LE = V_{CC}, V_{IN} = 3.4V or V_{IN} = GND	1.0	2.4	mA
		V_{CC} = Max., 50% Duty Cycle, Outputs Open, Ten Bits Toggling at f_1 = 2.5 MHz, $\overline{OE}$ =GND, LE = V_{CC}, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC}$–0.2V	1.0	3.2[11]	mA
		V_{CC}=Max., 50% Duty Cycle, Outputs Open, Ten Bits Toggling at f_1 = 2.5 MHz, $\overline{OE}$ = GND, LE = V_{CC}, V_{IN} = 3.4V or V_{IN} = 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. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
    $I_C = I_{CC}+\Delta I_{CC}D_HN_T+I_{CCD}(f_0/2 + f_1N_1)$
    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 $\overline{OE}$ 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 $\overline{OE}$ 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 $\overline{OE}$ 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 $\overline{OE}$ 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.

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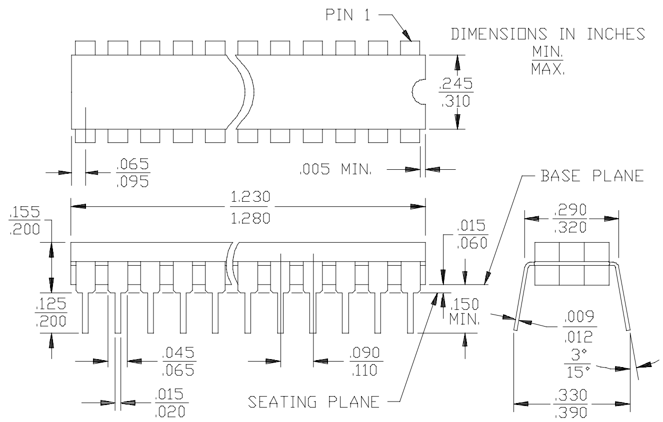
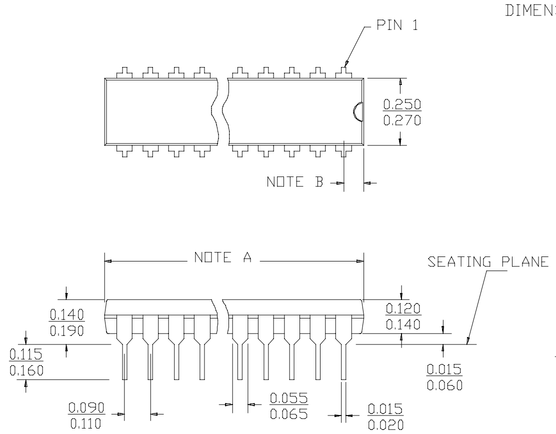
Package Diagrams

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



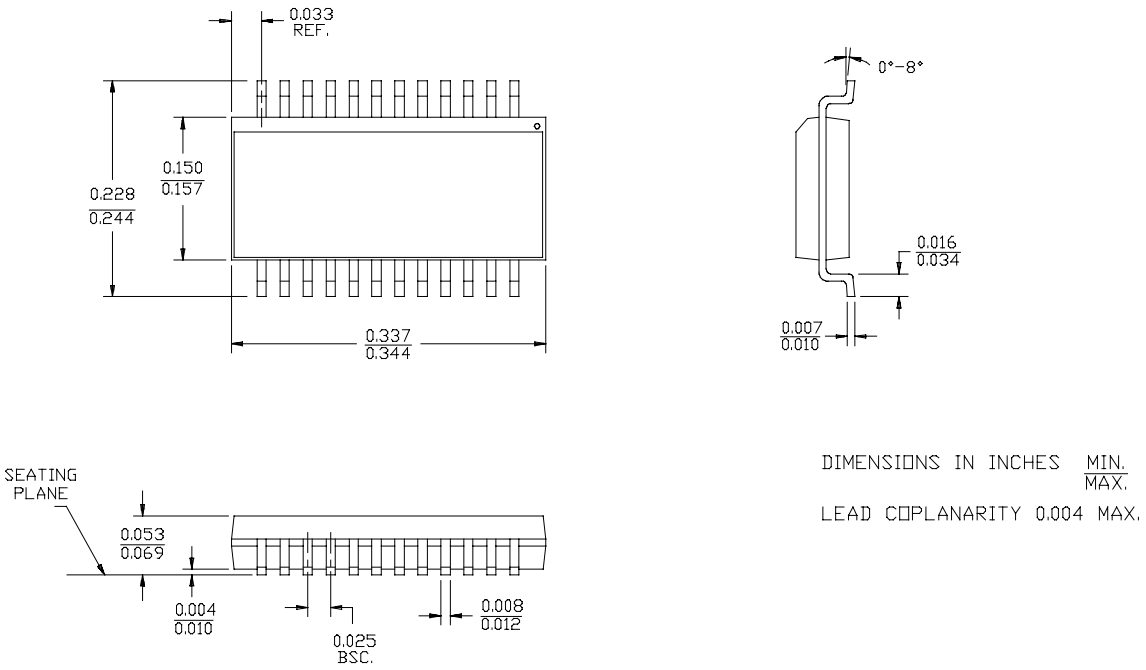
24-Lead (300-Mil) Molded DIP P13/P13A



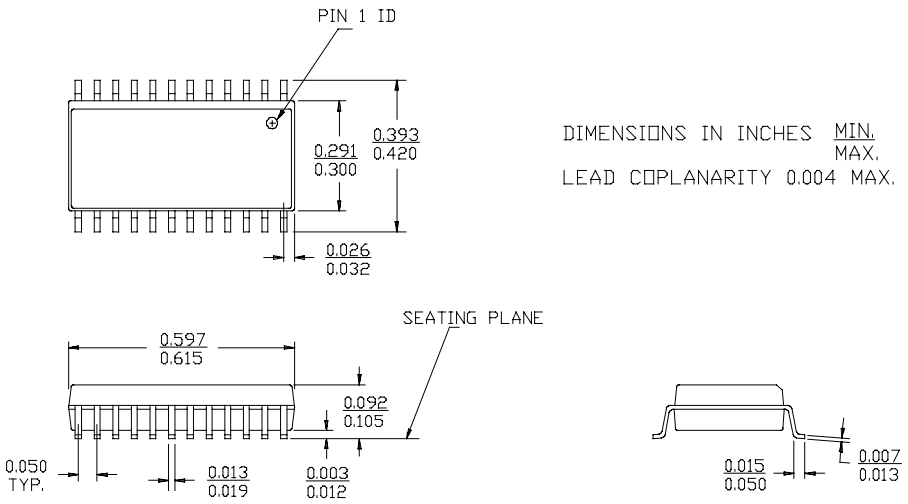
	P 13	P 13A
NOTE A	1.170 1.200	1.230 1.260
NOTE B	0.030 0.050	0.060 0.080

Package Diagrams (continued)

24-Lead Quarter Size Outline Q13



24-Lead (300-Mil) Molded SOIC S13



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