CY54/74FCT373T
CY54/74FCT573T

8-Bit Latches

SCCS021 - May 1994 - Revised February 2000

Features

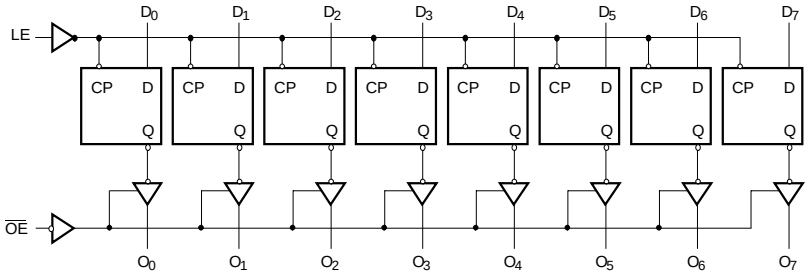
- **Function and pinout compatible with FCT, and F logic**
- **FCT-C speed at 4.2 ns max. (Com'l), FCT-A speed at 5.2 ns max. (Com'l)**
- **Reduced V_{OH} (typically = 3.3V) versions of equivalent FCT functions**
- **Edge-rate control circuitry for significantly improved noise characteristics**
- **Power-off disable feature**
- **ESD > 2000V**
- **Matched rise and fall times**
- **Extended commercial range of –40˚C to +85˚C**
- **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)

Functional Description

The FCT373T and FCT573T consist of eight latches with three-state outputs for bus organized applications. When latch enable (LE) is HIGH, the flip-flops appear transparent to the data. Data that meets the required set-up times are latched when LE transitions from HIGH to LOW. Data appears on the bus when the ($\overline{OE}$) is LOW. When output enable is HIGH, the bus output is in the impedance state. In this mode, data may be entered into the latches. The FCT573T is identical to the FCT373T except for the flow-through pinout, which simplifies board design.

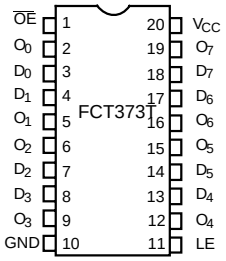
The outputs are designed with a power-off disable feature to allow for live insertion of boards.

Logic Block Diagram

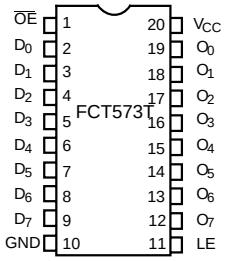


Pin Configurations

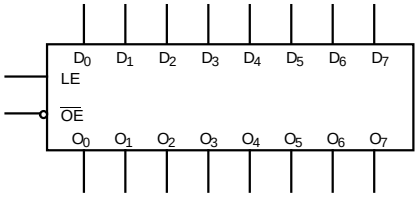
DIP/SOIC/QSOP Top View



DIP/SOIC/QSOP Top View



Logic Symbol



Function Table[1]

Inputs			Outputs
$\overline{OE}$	LE	D	O
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

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	T, AT, CT	–40°C to +85°C	5V ± 5%
Military[4]	All	–55°C to +125°C	5V ± 10%

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

Notes:

1. H = HIGH Voltage Level
   L = LOW Voltage Level
   X = Don't Care
   Z = HIGH Impedance
   Q_n = Previous state of flip flops (Q_{n-1})
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.
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.

Capacitance[6]

Parameter	Description	Typ.[5]	Max.	Unit
C_{IN}	Input Capacitance	6	10	pF
C_{OUT}	Output Capacitance	8	12	pF

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., One Input Toggling, 50% Duty Cycle, Outputs Open, $\overline{OE}$=GND, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC} - 0.2V$	0.6	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, Eight Bits Toggling at f_1=2.5 MHz, $\overline{OE}$=GND, LE=V_{CC}, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC} - 0.2V$	1.3	2.6[11]	mA
		V_{CC}=Max., 50% Duty Cycle, Outputs Open, Eight Bits Toggling at f_1=2.5 MHz, $\overline{OE}$=GND, LE=$V_{CC}V_{IN}$=3.4V or V_{IN}=GND	3.3	10.6[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	FCT373T/FCT573T				FCT373AT/FCT573AT				Unit	Fig. No.[13]
		Military		Commercial		Military		Commercial			
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay D to O	1.5	8.5	1.5	8.0	1.5	5.6	1.5	5.2	ns	1, 3
t_{PLH} t_{PHL}	Propagation Delay LE to O	2.0	15.0	2.0	13.0	2.0	9.8	2.0	8.5	ns	1, 5
t_{PZH} t_{PZL}	Output Enable Time	1.5	13.5	1.5	12.0	1.5	7.5	1.5	6.5	ns	1, 7, 8
t_{PHZ} t_{PLZ}	Output Disable Time	1.5	10.0	1.5	7.5	1.5	6.5	1.5	5.5	ns	1, 7, 8
t_S	Set-Up Time HIGH to LOW D to LE	2.0		2.0		2.0		2.0		ns	9
t_H	Set-Up Time HIGH to LOW D to LE	1.5		1.5		1.5		1.5		ns	9
t_W	LE Pulse Width HIGH	6.0		6.0		6.0		5.0		ns	5

Parameter	Description	FCT373CT/ FCT573CT		Unit	Fig. No.[13]
		Commercial			
		Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay D to O	1.5	4.2	ns	1, 3
t_{PLH} t_{PHL}	Propagation Delay LE to O	2.0	5.5	ns	1, 5
t_{PZH} t_{PZL}	Output Enable Time	1.5	5.5	ns	1, 7, 8
t_{PHZ} t_{PLZ}	Output Disable Time	1.5	5.0	ns	1, 7, 8
t_S	Set-Up Time, HIGH to LOW D to LE	2.0		ns	9
t_H	Set-Up Time, HIGH to LOW D to LE	1.5		ns	9
t_W	LE Pulse Width HIGH	5.0		ns	5

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

Ordering Information–FCT373T

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.2	CY74FCT373CTQCT	Q5	20-Lead (150-Mil) QSOP	Commercial
	CY74FCT373CTSOC/SOCT	S5	20-Lead (300-Mil) Molded SOIC	
5.2	CY74FCT373ATQCT	Q5	20-Lead (150-Mil) QSOP	Commercial
	CY74FCT373ATSOC/SOCT	S5	20-Lead (300-Mil) Molded SOIC	
5.6	CY54FCT373ATDMB	D6	20-Lead (300-Mil) CerDIP	Military
8.0	CY74FCT373TSOC/SOCT	S5	20-Lead (300-Mil) Molded SOIC	Commercial
8.5	CY54FCT373TDMB	D6	20-Lead (300-Mil) CerDIP	Military

Ordering Information—FCT573T

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.2	CY74FCT573CTQCT	Q5	20-Lead (150-Mil) QSOP	Commercial
	CY74FCT573CTSOC/SOCT	S5	20-Lead (300-Mil) Molded SOIC	
5.2	CY74FCT573ATPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT573ATQCT	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT573ATSOC/SOCT	S5	20-Lead (300-Mil) Molded SOIC	
8.0	CY74FCT573TQCT	Q5	20-Lead (150-Mil) QSOP	Commercial
	CY74FCT573TSOC/SOCT	S5	20-Lead (300-Mil) Molded SOIC	
8.5	CY54FCT573TDMB	D6	20-Lead (300-Mil) CerDIP	Military

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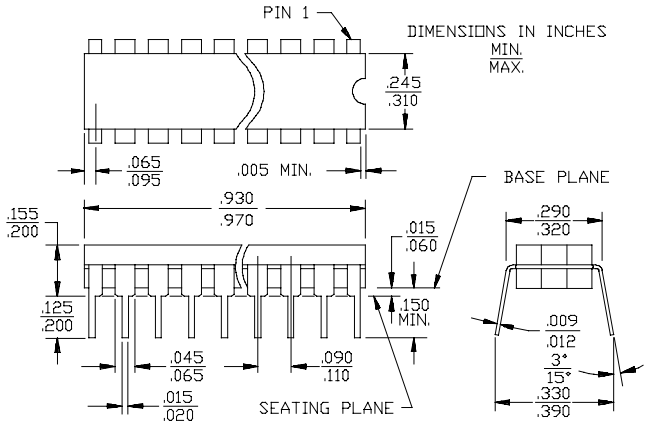
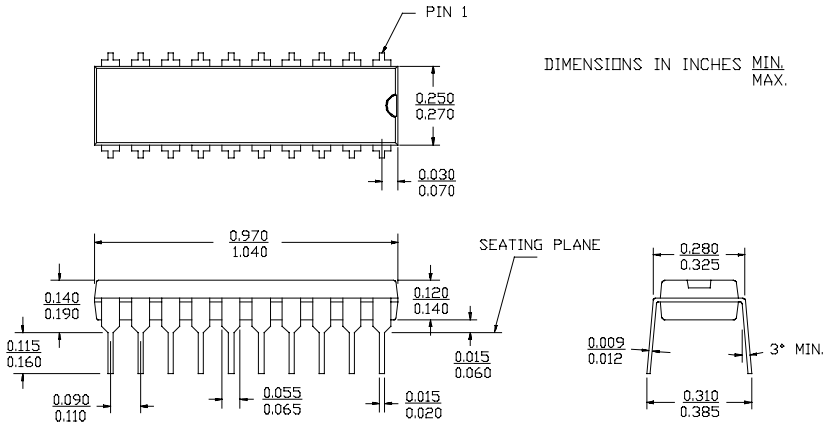
Package Diagrams

20-Lead (300-Mil) CerDIP D6
MIL-STD-1835 D-8 Config.A

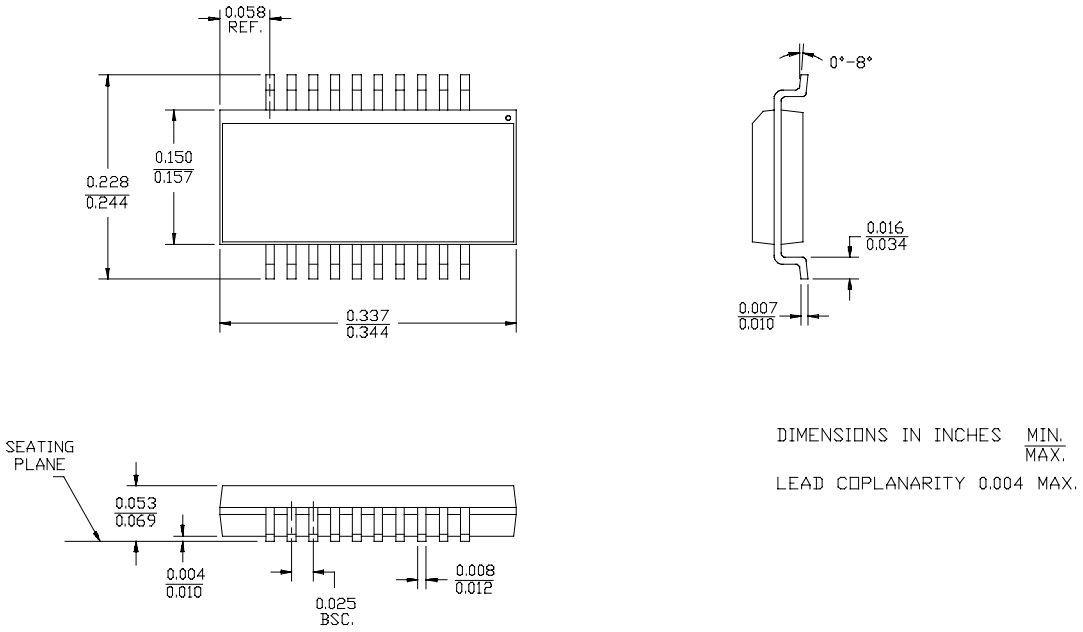


20-Lead (300-Mil) Molded DIP P5

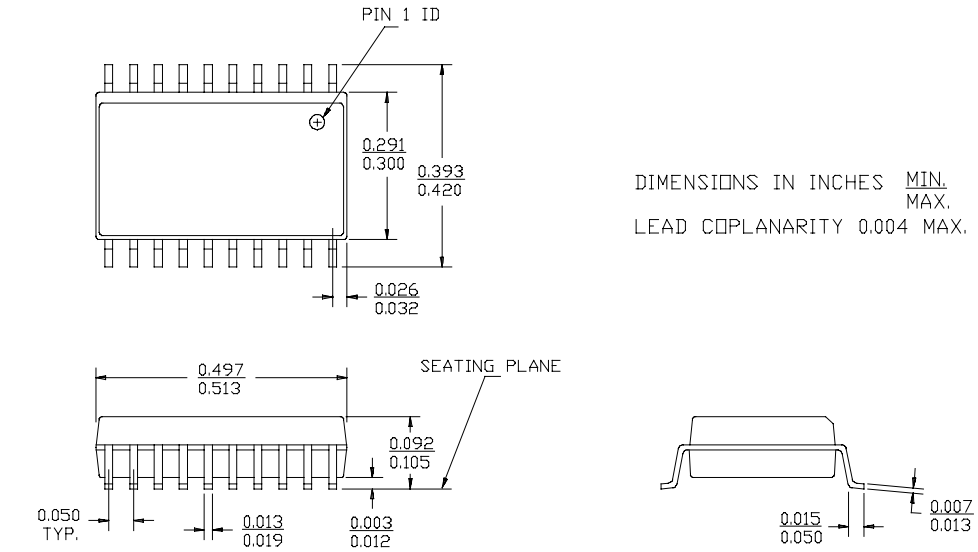


Package Diagrams (continued)

20-Lead Quarter Size Outline Q5



20-Lead (300-Mil) Molded SOIC S5



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