

P54/74FCT373T/AT/CT—P54/74FCT533T/AT/CT— P54/74FCT563T/AT/CT—P54/74FCT573T/AT/CT OCTAL TRANSPARENT LATCHES W/ 3-STATE OUTPUTS

FEATURES

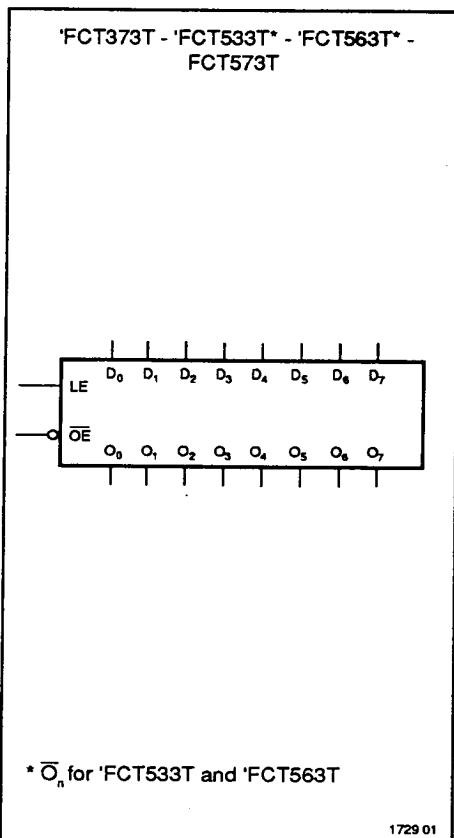
- Function, Pinout and Drive Compatible with the Fastest Bipolar Logic
- FCT-C speed at 4.2ns max. (Com'I)
FCT-A speed at 5.2ns max. (Com'I)
- Reduced V_{OH} (typically = 3.0V) versions of Equivalent and FCT functions
- Edge-rate Control Circuitry for Significantly Improved Noise Characteristics
- ESD protection exceeds 2000V
- Power-off disable feature
- Matched Rise and Fall times
- Fully Compatible with TTL Input and Output Logic Levels
- 64 mA Sink Current (Com'I), 32 mA (Mil)
15 mA Source Current (Com'I), 12 mA (Mil)
- Manufactured in 0.7 micron PACE Technology™

DESCRIPTION

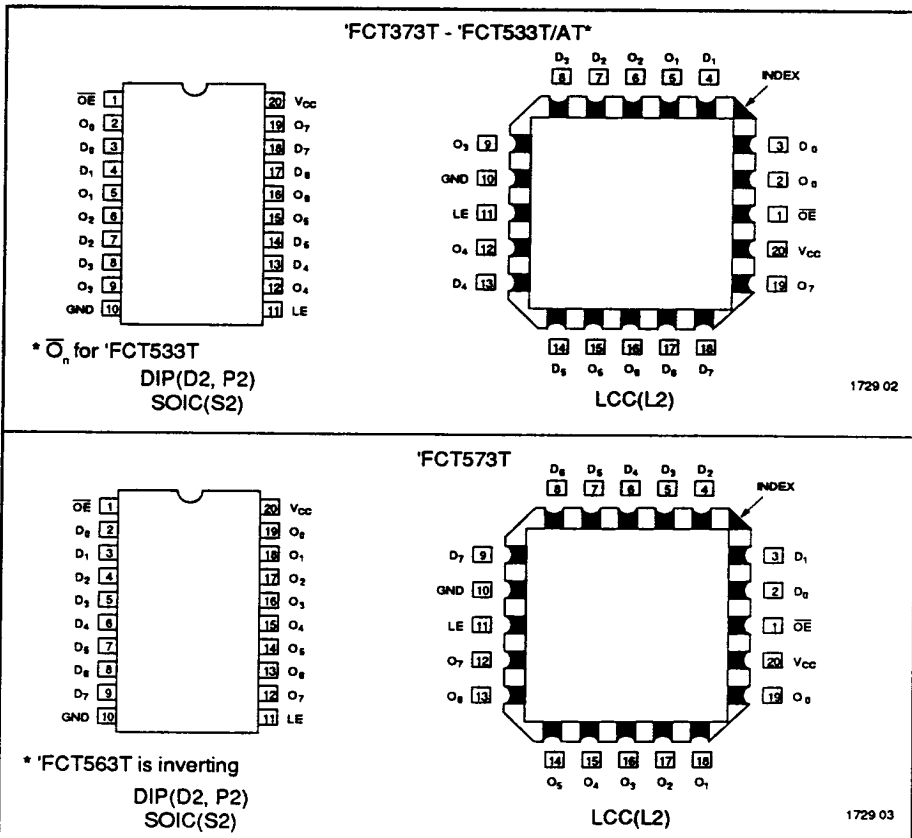
The 'FCT373T, 'FCT533T, 'FCT563T and 'FCT573T consist of eight latches with 3-state outputs for bus organized system applications. When latch enable (LE) is high, the flip flops appear transparent to the data. Data that meets the required set-up times are latched when LE transitions from HIGH to LOW. Data appears on the bus when the output enable ($\overline{OE}$) is LOW. When output

enable is HIGH, the bus output is in the high impedance state. In this mode, data may be entered into the latches. The 'FCT533T is the same as the 'FCT373T, except that the outputs are inverted. The 'FCT573T is identical to 'FCT373T except that all the inputs are on one side of the package and the outputs on the other side. The 'FCT563T is identical to 'FCT573T, but with inverted outputs.

LOGIC SYMBOL



PIN CONFIGURATIONS

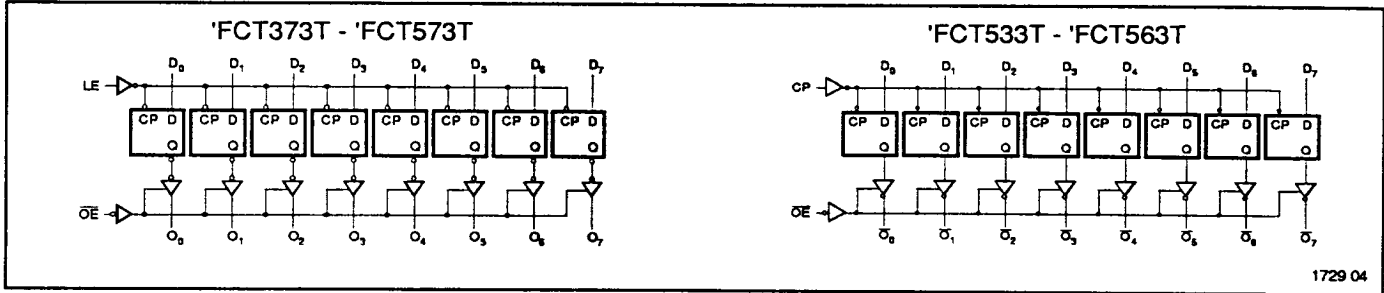


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LOGIC DIAGRAMS



ABSOLUTE MAXIMUM RATINGS^{1,2}

Symbol	Parameter	Value	Unit
T_{STG}	Storage Temperature	-65 to +150	°C
T_A	Ambient Temperature Under Bias	-65 to +135	°C
V_{CC}	V_{CC} Potential to Ground	-0.5 to +7.0	V
P_T	Power Dissipation	0.5	W

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Symbol	Parameter	Value	Unit
I_{OUTPUT}	Current Applied to Output	120	mA
V_{IN}	Input Voltage	-0.5 to +7.0	V
V_{OUT}	Voltage Applied to Output	-0.5 to +7.0	V

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Notes:

1. Operation beyond the limits set forth in the above table may impair the useful life of the device. Unless otherwise noted, these limits are over the operating free-air temperature range.

2. Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.

DC ELECTRICAL CHARACTERISTICS (Over recommended operating conditions)

Symbol	Parameter		Min	Typ ¹	Max	Units	V_{CC}	Conditions
V_{IH}	Input HIGH Voltage		2.0			V		
V_{IL}	Input LOW Voltage				0.8	V		
V_H	Hysteresis			0.2		V		All inputs
V_{IK}	Input Clamp Diode Voltage			-0.7	-1.2	V	MIN	$I_{IN} = -18mA$
V_{OH}	Output HIGH Voltage	Military	2.4	3.3		V	MIN	$I_{OH} = -12mA$
		Commercial	2.4	3.3		V	MIN	$I_{OH} = -15mA$
V_{OL}	Output LOW Voltage	Military		0.3	0.5	V	MIN	$I_{OL} = 32mA$
		Commercial		0.3	0.5	V	MIN	$I_{OL} = 48mA$
		Commercial		0.3	0.5	V	MIN	$I_{OL} = 64mA$
I_I	Input HIGH Current				20	μA	MAX	$V_{IN} = V_{CC}$
I_{IH}	Input HIGH Current				5	μA	MAX	$V_{IN} = 2.7V$
I_{IL}	Input LOW Current				-5	μA	MAX	$V_{IN} = 0.5V$
I_{OZH}	Off State I_{OUT} HIGH-Level Output Current				10	μA	MAX	$V_{OUT} = 2.7V$
I_{OZL}	Off State I_{OUT} LOW-Level Output Current				-10	μA	MAX	$V_{OUT} = 0.5V$
I_{OS}	Output Short Circuit Current ²		-60	-120	-225	mA	MAX	$V_{OUT} = 0.0V$
I_{OFF}	Power-off Disable				100	μA	0V	$V_{OUT} = 4.5V$
C_{IN}	Input Capacitance ³			6	10	pF	MAX	All inputs
C_{OUT}	Output Capacitance ³			8	12	pF	MAX	All outputs
I_{CC}	Quiescent Power Supply Current			0.2	1.5	mA	MAX	$V_{IN} \leq 0.2V$, $V_{IN} \geq V_{CC} - 0.2V$

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Notes:

- Typical limits are at $V_{CC} = 5.0V$, $T_A = +25^\circ C$ ambient.
- 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 parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

3. This parameter is guaranteed but not tested.

RECOMMENDED OPERATING CONDITIONS

Free Air Ambient Temperature	Min	Max
Military	-55°C	+125°C
Commercial	0°C	+70°C
Supply Voltage (V_{CC})	Min	Max
Military	+4.5V	+5.5V
Commercial	+4.75V	+5.25V

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FUNCTION TABLES (Each Latch)

Inputs			Outputs 'FCT373/'FCT573	Outputs 'FCT533/'FCT563
$\overline{OE}$	LE	D	O_n	$\overline{O}_n$
L	H	H	H	L
L	H	L	L	H
L	L	X	Q_0	$\overline{Q}_0$
H	X	X	Z	Z

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H = HIGH Voltage Level

Z = HIGH Impedance

L = LOW Voltage Level

 Q_0 = previous state of flip flops (Q_{n-1})

X = Don't Care

 $\overline{Q}_0$ = previous state of flip flops ($\overline{Q}_{n-1}$)

DC CHARACTERISTICS (Over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Typ ¹	Max	Units	Conditions
ΔI_{CC}	Quiescent Power Supply Current (TTL inputs)	0.5	2.0	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 3.4V^2$, $f_1 = 0$, Outputs Open
I_{CCD}	Dynamic Power Supply Current ³	0.15	0.25	mA/ mHz	$V_{CC} = \text{MAX}$, One Input Toggling, 50% Duty Cycle, Outputs Open, $\overline{OE} = \text{GND}$, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
I_C	Total Power Supply Current ⁵	1.7	4.0	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1 = 10\text{MHz}$, $\overline{OE} = \text{GND}$, $LE = V_{CC}$, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
		2.0	5.0	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1 = 10\text{MHz}$, $\overline{OE} = \text{GND}$, $LE = V_{CC}$, $V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$
		3.2	6.5 ⁴	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, Eight Bits Toggling at $f_1 = 2.5\text{MHz}$, $\overline{OE} = \text{GND}$, $LE = V_{CC}$, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
		5.2	14.5 ⁴	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, Eight Bits Toggling at $f_1 = 2.5\text{MHz}$, $\overline{OE} = \text{GND}$, $LE = V_{CC}$, $V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$

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Notes:

- Typical values are at $V_{CC} = 5.0V$, +25°C ambient and maximum loading.
- Per TTL driven input ($V_{IN} = 3.4V$); all other inputs at V_{CC} or GND.
- This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
- Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.
- $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_0/2 + f_1 N_T)$
 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 Register Devices (Zero for Non-Register Devices) f_1 = Input Frequency N_T = Number of Inputs at f_1

All currents are in milliamps and all frequencies are in megahertz.

AC CHARACTERISTICS ('FCT373T — 'FCT573T)

Sym.	Parameter	'FCT373T 'FCT573T				'FCT373AT 'FCT573AT				'FCT373CT 'FCT573CT				Units	Fig. No.
		MIL		COM'L		MIL		COM'L		MIL		COM'L			
		Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.		
t_{PLH} t_{PHL}	Prop Delay D _n to O _n	1.5	8.5	1.5	8.0	1.5	5.6	1.5	5.2	1.5	5.1	1.5	4.2	ns	1, 3
t_{PLH} t_{PHL}	Prop Delay LE to O _n	2.0	15.0	2.0	13.0	2.0	9.8	2.0	8.5	2.0	8.0	2.0	5.5	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	1.5	6.3	1.5	5.5	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	1.5	5.9	1.5	5.0	ns	

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AC CHARACTERISTICS ('FCT533T)

Sym.	Parameter	'FCT533T				'FCT533AT				'FCT533CT				Units	Fig. No.
		MIL		COM'L		MIL		COM'L		MIL		COM'L			
		Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.		
t_{PLH} t_{PHL}	Prop Delay D _n to O _n	1.5	12.0	1.5	10.0	1.5	5.6	1.5	5.2	1.5	5.1	1.5	4.2	ns	1, 2
t_{PLH} t_{PHL}	Prop Delay LE to O _n	2.0	14.0	2.0	13.0	2.0	9.8	2.0	8.5	2.0	8.0	2.0	5.5	ns	1, 5
t_{PZH} t_{PZL}	Output Enable Time	1.5	12.5	1.5	11.0	1.5	7.5	1.5	6.5	1.5	6.3	1.5	5.5	ns	1 7 8
t_{PHZ} t_{PLZ}	Output Disable Time	1.5	8.5	1.5	7.0	1.5	6.5	1.5	5.5	1.5	5.9	1.5	5.0	ns	

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AC CHARACTERISTICS ('FCT563T)

Sym.	Parameter	'FCT563T				'FCT563AT				'FCT563CT				Units	Fig. No.
		MIL		COM'L		MIL		COM'L		MIL		COM'L			
		Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.		
t_{PLH} t_{PHL}	Prop Delay D _n to O _n	1.5	12.0	1.5	10.0	1.5	5.6	1.5	5.2	1.5	5.1	1.5	4.7	ns	1, 2
t_{PLH} t_{PHL}	Prop Delay LE to O _n	2.0	14.0	2.0	11.0	2.0	9.8	2.0	8.5	2.0	8.0	2.0	6.9	ns	1, 5
t_{PZH} t_{PZL}	Output Enable Time	1.5	12.5	1.5	11.0	1.5	7.5	1.5	6.5	1.5	6.3	1.5	5.5	ns	1 7 8
t_{PHZ} t_{PLZ}	Output Disable Time	1.5	8.5	1.5	7.0	1.5	6.5	1.5	5.5	1.5	5.9	1.5	5.0	ns	

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AC CHARACTERISTICS

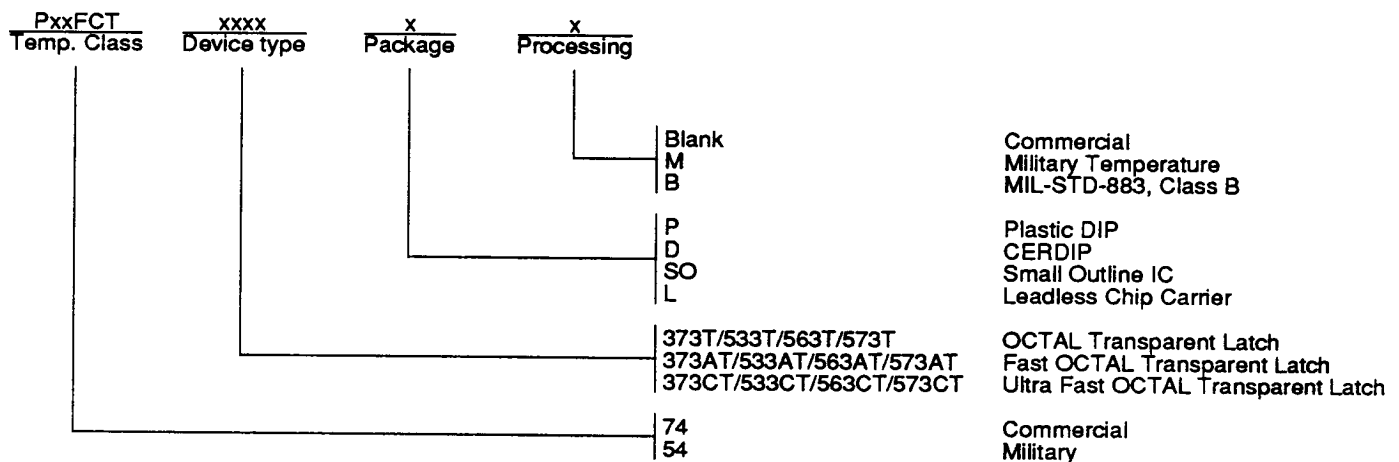
Sym.	Parameter	'FCT373T/'FCT533T 'FCT563T/'FCT573T				'FCT373AT/'FCT533AT 'FCT563AT/'FCT573AT				'FCT373CT/'FCT533CT 'FCT563CT/'FCT573CT				Units	Fig. No.
		MIL		COM'L		MIL		COM'L		MIL		COM'L			
		Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.		
t _s (H) t _s (L)	Setup Time, High to Low D _n to LE	2.0	—	2.0	—	2.0	—	2.0	—	2.0	—	2.0	—	ns	9
t _n (H) t _n (L)	Hold Time, High to Low D _n to LE	1.5	—	1.5	—	1.5	—	1.5	—	1.5	—	1.5	—	ns	
t _w (H)	LE Pulse Width High	6.0	—	6.0	—	6.0	—	5.0	—	6.0	—	5.0	—	ns	5

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Notes:

1. Minimum limits are guaranteed but not tested on Propagation Delays. AC Characteristics guaranteed with $C_L = 50$ pF as shown in Figure 1.

ORDERING INFORMATION



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