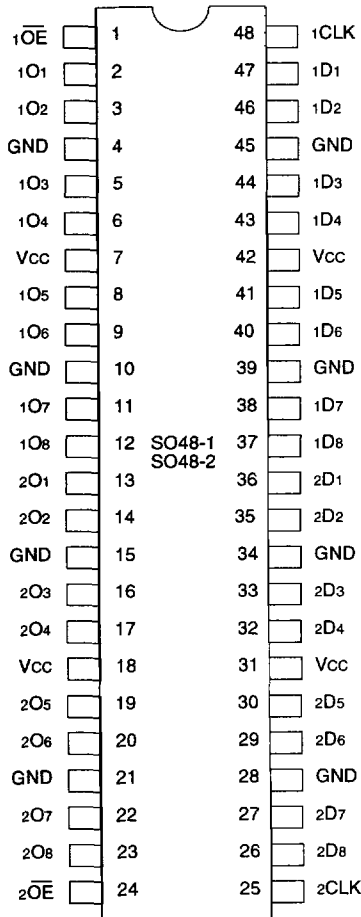


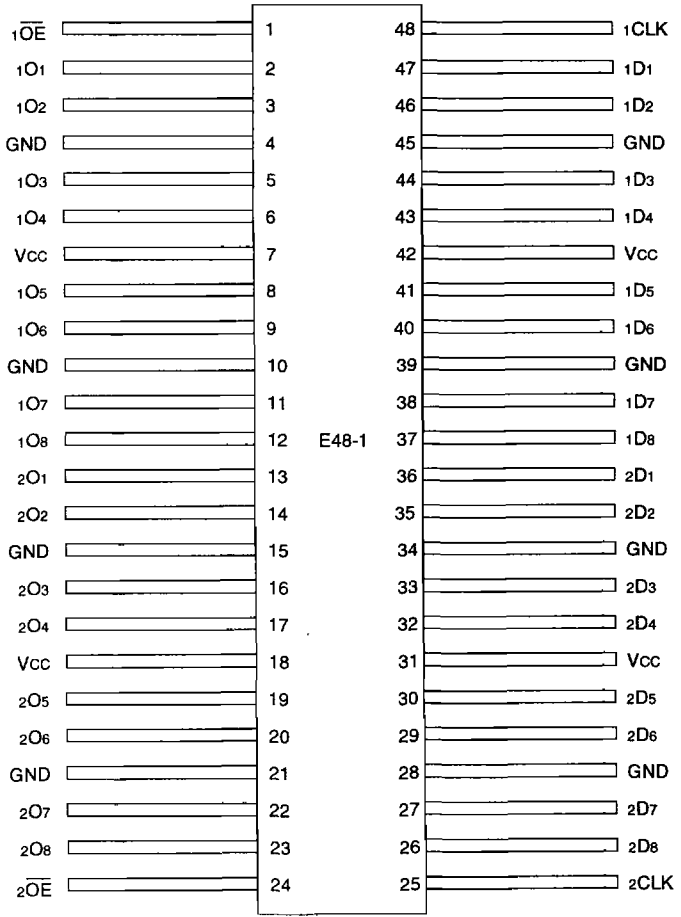


**PIN CONFIGURATIONS**



**SSOP  
TSSOP  
TOP VIEW**

2542 drw 03



**CERPACK  
TOP VIEW**

2542 drw 04

**5**

### PIN DESCRIPTION

Pin Names	Description
xDx	Data Inputs
xCLK	Clock Inputs
xOx	3-State Outputs.
xOE	3-State Output Enable Input (Active LOW)

2542 tbl 01

### FUNCTION TABLE<sup>(1)</sup>

Function	Inputs			Outputs
	xDx	xCLK	xOE	xOx
Hi-Z	X	L	H	Z
	X	H	H	Z
Load Register	L	↑	L	L
	H	↑	L	H
	L	↑	H	Z
	H	↑	H	Z

**NOTE:**

- H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Don't Care  
 Z = High Impedance  
 ↑ = LOW-to-HIGH Transition

2542 tbl 02

### ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Symbol	Rating	Commercial	Military	Unit
VTERM <sup>(2)</sup>	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	V
VTERM <sup>(3)</sup>	Terminal Voltage with Respect to GND	-0.5 to V <sub>CC</sub> +0.5	-0.5 to V <sub>CC</sub> +0.5	V
T <sub>A</sub>	Operating Temperature	-40 to +85	-55 to +125	°C
T <sub>BIAS</sub>	Temperature Under Bias	-55 to +125	-65 to +135	°C
T <sub>STG</sub>	Storage Temperature	-55 to +125	-65 to +150	°C
P <sub>T</sub>	Power Dissipation	1.0	1.0	W
I <sub>OUT</sub>	DC Output Current	-60 to +120	-60 to +120	mA

**NOTES:**

2542 lmk 03

- Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
- All device terminals except FCT162XXXT Output and I/O terminals.
- Output and I/O terminals for FCT162XXXT.

### CAPACITANCE (T<sub>A</sub> = +25°C, f = 1.0MHz)

Symbol	Parameter <sup>(1)</sup>	Conditions	Typ.	Max.	Unit
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = 0V	3.5	6.0	pF
C <sub>I/O</sub>	I/O Capacitance	V <sub>OUT</sub> = 0V	3.5	8.0	pF

**NOTE:**

- This parameter is measured at characterization but not tested.

2542 lmk 04

## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Commercial:  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V} \pm 10\%$ ; Military:  $T_A = -55^\circ\text{C}$  to  $+125^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V} \pm 10\%$

Symbol	Parameter	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Unit
V <sub>IH</sub>	Input HIGH Level	Guaranteed Logic HIGH Level	2.0	—	—	V
V <sub>IL</sub>	Input LOW Level	Guaranteed Logic LOW Level	—	—	0.8	V
I <sub>IH</sub>	Input HIGH Current (Input pins) <sup>(5)</sup>	V <sub>CC</sub> = Max. V <sub>I</sub> = V <sub>CC</sub>	—	—	±1	μA
	Input HIGH Current (I/O pins) <sup>(5)</sup>		—	—	±1	
I <sub>IL</sub>	Input LOW Current (Input pins) <sup>(5)</sup>	V <sub>I</sub> = GND	—	—	±1	μA
	Input LOW Current (I/O pins) <sup>(5)</sup>		—	—	±1	
I <sub>OZH</sub>	High Impedance Output Current	V <sub>CC</sub> = Max. V <sub>O</sub> = 2.7V	—	—	±1	μA
I <sub>OZL</sub>	(3-State Output pins) <sup>(5)</sup>		V <sub>O</sub> = 0.5V	—	—	
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = Min., I <sub>IIN</sub> = -18mA	—	-0.7	-1.2	V
I <sub>OS</sub>	Short Circuit Current	V <sub>CC</sub> = Max., V <sub>O</sub> = GND <sup>(3)</sup>	-80	-140	-225	mA
V <sub>H</sub>	Input Hysteresis	—	—	100	—	mV
I <sub>CC1</sub>	Quiescent Power Supply Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = GND or V <sub>CC</sub>	—	5	500	μA
I <sub>CCH</sub>						
I <sub>CCZ</sub>						

2542 Ink 05

## OUTPUT DRIVE CHARACTERISTICS FOR FCT16374T

Symbol	Parameter	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Unit	
I <sub>O</sub>	Output Drive Current	V <sub>CC</sub> = Max., V <sub>O</sub> = 2.5V <sup>(3)</sup>	-50	—	-180	mA	
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = Min. V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -3mA	2.5	3.5	—	V
			I <sub>OH</sub> = -12mA MIL.	2.4	3.5	—	V
			I <sub>OH</sub> = -15mA COM'L.	—	—	—	—
			I <sub>OH</sub> = -24mA MIL. I <sub>OH</sub> = -32mA COM'L. <sup>(4)</sup>	2.0	3.0	—	V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = Min. V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	—	0.2	0.55	V	
I <sub>OFF</sub>	Input/Output Power Off Leakage <sup>(5)</sup>	V <sub>CC</sub> = 0V, V <sub>IN</sub> or V <sub>O</sub> ≤ 4.5V	—	—	±1	μA	

2542 Ink 06

## OUTPUT DRIVE CHARACTERISTICS FOR FCT162374T

Symbol	Parameter	Test Conditions <sup>(1)</sup>	Min.	Typ. <sup>(2)</sup>	Max.	Unit	
I <sub>ODL</sub>	Output LOW Current	V <sub>CC</sub> = 5V, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> = 1.5V <sup>(3)</sup>	60	115	200	mA	
I <sub>ODH</sub>	Output HIGH Current	V <sub>CC</sub> = 5V, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> = 1.5V <sup>(3)</sup>	-60	-115	-200	mA	
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = Min. V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -16mA MIL.	2.4	3.3	—	V
			I <sub>OH</sub> = -24mA COM'L.	—	—	—	—
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = Min. V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 16mA MIL.	—	0.3	0.55	V
			I <sub>OL</sub> = 24mA COM'L.	—	—	—	—

### NOTES:

2542 Ink 07

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at V<sub>CC</sub> = 5.0V, +25°C ambient.
- Not more than one output should be tested at one time. Duration of the test should not exceed one second.
- Duration of the condition can not exceed one second.
- The test limit for this parameter is ±5μA at T<sub>A</sub> = -55°C.



### POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions <sup>(1)</sup>		Min.	Typ. <sup>(2)</sup>	Max.	Unit
$\Delta I_{CC}$	Quiescent Power Supply Current TTL Inputs HIGH	$V_{CC} = \text{Max.}$ $V_{IN} = 3.4V^{(3)}$		—	0.5	1.5	mA
$I_{CCD}$	Dynamic Power Supply Current <sup>(4)</sup>	$V_{CC} = \text{Max.}$ Outputs Open $\overline{xOE} = \text{GND}$ One Input Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	60	100	$\mu A/$ MHz
$I_C$	Total Power Supply Current <sup>(6)</sup>	$V_{CC} = \text{Max.}$ Outputs Open $f_{CP} = 10\text{MHz}$ 50% Duty Cycle $\overline{xOE} = \text{GND}$ $f_i = 5\text{MHz}$ 50% Duty Cycle One Bit Toggling	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	0.6	1.5	mA
			$V_{IN} = 3.4V$ $V_{IN} = \text{GND}$	—	1.1	3.0	
		$V_{CC} = \text{Max.}$ Outputs Open $f_{CP} = 10\text{MHz}$ 50% Duty Cycle $\overline{xOE} = \text{GND}$ Sixteen Bits Toggling $f_i = 2.5\text{MHz}$ 50% Duty Cycle	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	3.0	5.5 <sup>(5)</sup>	
			$V_{IN} = 3.4V$ $V_{IN} = \text{GND}$	—	7.5	19.0 <sup>(5)</sup>	

**NOTES:**

2542 tbf 08

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at  $V_{CC} = 5.0V$ ,  $+25^\circ\text{C}$  ambient.
- Per TTL driven input ( $V_{IN} = 3.4V$ ). All other inputs at  $V_{CC}$  or  $\text{GND}$ .
- 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.
- $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$   
 $I_C = I_{CC} + \Delta I_{CC} \text{DH}_{NT} + I_{CCD} (f_{CP} \text{NCP}/2 + f_i \text{N}_i)$   
 $I_{CC} = \text{Quiescent Current} (I_{CC1}, I_{CC2} \text{ and } I_{CC3})$   
 $\Delta I_{CC} = \text{Power Supply Current for a TTL High Input} (V_{IN} = 3.4V)$   
 $\text{DH} = \text{Duty Cycle for TTL Inputs High}$   
 $\text{NT} = \text{Number of TTL Inputs at DH}$   
 $I_{CCD} = \text{Dynamic Current Caused by an Input Transition Pair (HLH or LHL)}$   
 $f_{CP} = \text{Clock Frequency for Register Devices (Zero for Non-Register Devices)}$   
 $\text{NCP} = \text{Number of Clock Inputs at } f_{CP}$   
 $f_i = \text{Input Frequency}$   
 $\text{N}_i = \text{Number of Inputs at } f_i$

**SWITCHING CHARACTERISTICS OVER OPERATING RANGE**

Symbol	Parameter	Condition <sup>(1)</sup>	FCT16374T/162374T				FCT16374AT/162374AT				Unit
			Com'l.		Mil.		Com'l.		Mil.		
			Min. <sup>(2)</sup>	Max.	Min. <sup>(2)</sup>	Max.	Min. <sup>(2)</sup>	Max.	Min. <sup>(2)</sup>	Max.	
tPLH	Propagation Delay xCLK to xOx	CL = 50pF RL = 500Ω	2.0	10.0	2.0	11.0	2.0	6.5	2.0	7.2	ns
tPZH	Output Enable Time		1.5	12.5	1.5	14.0	1.5	6.5	1.5	7.5	ns
tPHZ	Output Disable Time		1.5	8.0	1.5	8.0	1.5	5.5	1.5	6.5	ns
tPLZ	Output Disable Time		1.5	8.0	1.5	8.0	1.5	5.5	1.5	6.5	ns
tsu	Set-up Time HIGH or LOW, xDx to xCLK		2.0	—	2.0	—	2.0	—	2.0	—	ns
th	Hold Time HIGH or LOW, xDx to xCLK		1.5	—	1.5	—	1.5	—	1.5	—	ns
tw	xCLK Pulse Width HIGH or LOW		7.0	—	7.0	—	5.0	—	6.0	—	ns
tsk(o)	Output Skew <sup>(3)</sup>		—	0.5	—	0.5	—	0.5	—	0.5	ns

Symbol	Parameter	Condition <sup>(1)</sup>	FCT16374CT/162374CT				FCT16374ET/162374ET				Unit
			Com'l.		Mil.		Com'l.		Mil.		
			Min. <sup>(2)</sup>	Max.	Min. <sup>(2)</sup>	Max.	Min. <sup>(2)</sup>	Max.	Min. <sup>(2)</sup>	Max.	
tPLH	Propagation Delay xCLK to xOx	CL = 50pF RL = 500Ω	2.0	5.2	2.0	6.2	1.5	3.7	—	—	ns
tPZH	Output Enable Time		1.5	5.5	1.5	6.2	1.5	4.4	—	—	ns
tPHZ	Output Disable Time		1.5	5.0	1.5	5.7	1.5	3.6	—	—	ns
tPLZ	Output Disable Time		1.5	5.0	1.5	5.7	1.5	3.6	—	—	ns
tsu	Set-up Time HIGH or LOW, xDx to xCLK		2.0	—	2.0	—	1.5	—	—	—	ns
th	Hold Time HIGH or LOW, xDx to xCLK		1.5	—	1.5	—	0.0	—	—	—	ns
tw	xCLK Pulse Width HIGH or LOW		5.0	—	6.0	—	3.0 <sup>(4)</sup>	—	—	—	ns
tsk(o)	Output Skew <sup>(3)</sup>		—	0.5	—	0.5	—	0.5	—	—	ns

**NOTES:**

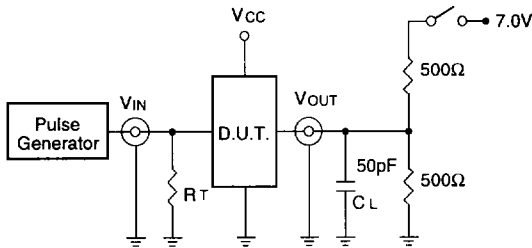
2542 tbi 09

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.
4. This limit is guaranteed but not tested.

**5**

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



2542 drw 05

SWITCH POSITION

Test	Switch
Open Drain Disable Low Enable Low	Closed
All Other Tests	Open

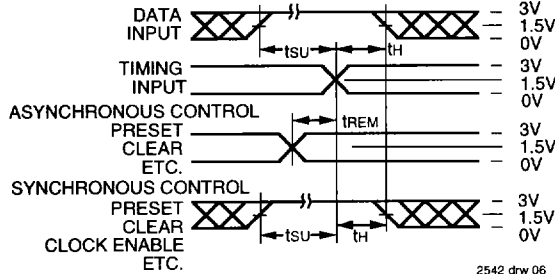
DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.

RT = Termination resistance: should be equal to Zout of the Pulse Generator.

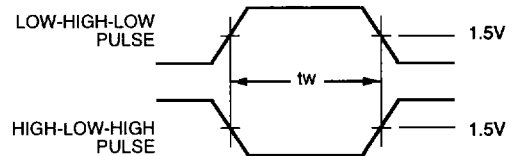
2542 Ink 10

SET-UP, HOLD AND RELEASE TIMES



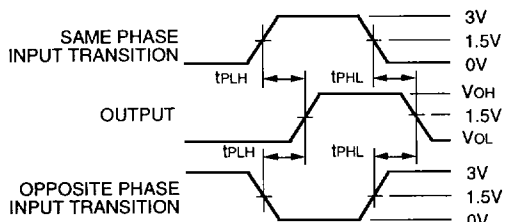
2542 drw 06

PULSE WIDTH



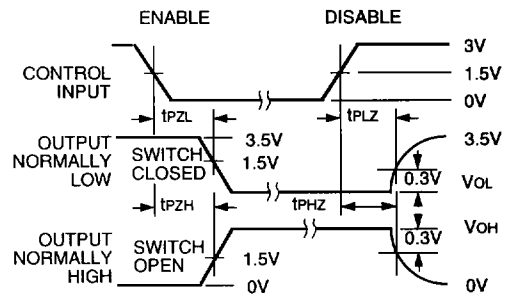
2542 drw 07

PROPAGATION DELAY



2542 drw 08

ENABLE AND DISABLE TIMES



NOTES:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; tr ≤ 2.5ns; tr ≤ 2.5ns

2542 drw 09

**ORDERING INFORMATION**

IDT	XX	FCT	XXXX	X	X	
Temp. Range		Device Type		Package	Process	
					Blank B	Commercial MIL-STD-883, Class B
					PV PA E	Shrink Small Outline Package (SO48-1) Thin Shrink Small Outline Package (SO48-2) CERPACK (E48-1)
					16374T 16374AT 16374CT 16374ET 162374T 162374AT 162374CT 162374ET	Non-Inverting 16-Bit Register
					54 74	-55°C to +125°C -40°C to +85°C

2542 drw 10