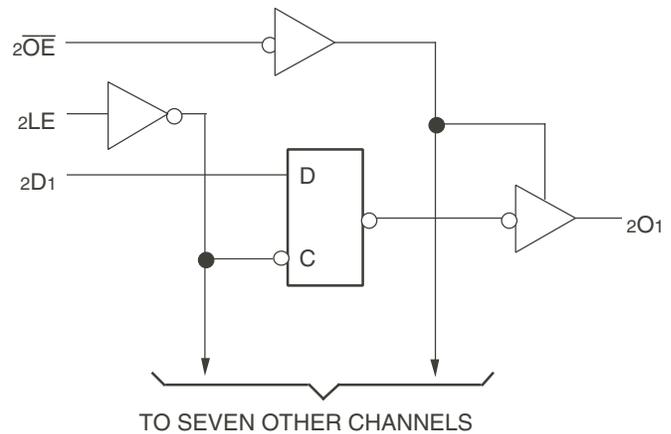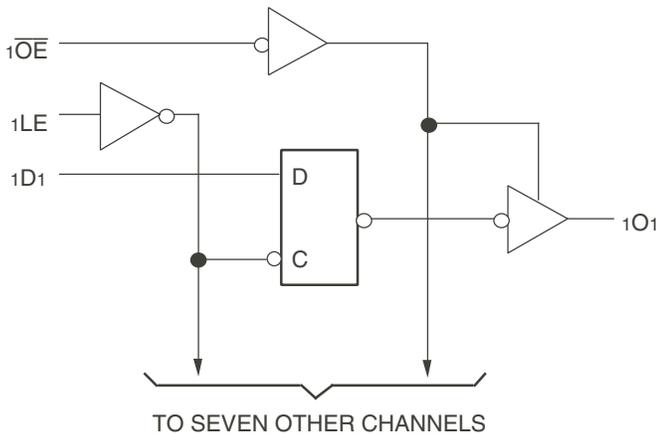## FEATURES:

- 0.5 MICRON CMOS Technology
- High-speed, low-power CMOS replacement for ABT functions
- Typical $t_{SK(o)}$ (Output Skew) < 250ps
- Low input and output leakage ≤1µA (max.)
- V_{CC} = 5V ±10%
- High drive outputs (–32mA I_{OH}, 64mA I_{OL})
- Power off disable outputs permit "live insertion"
- Typical V_{OLP} (Output Ground Bounce) < 1.0V at V_{CC} = 5V, T_A = 25°C
- Available in SSOP and TSSOP packages
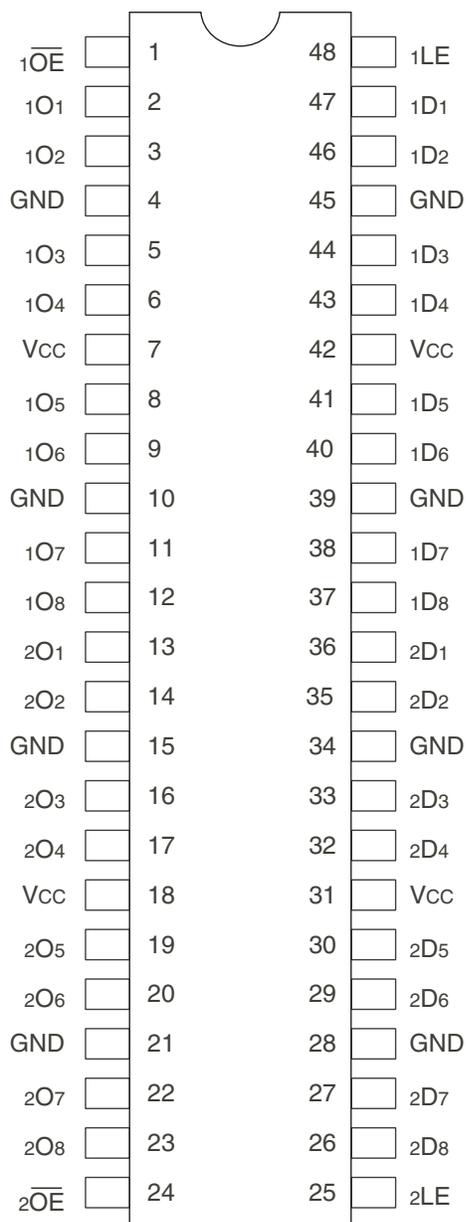
DESCRIPTION:

The FCT16373T 16-bit transparent D-type latch is built using advanced dual metal CMOS technology. These high-speed, low-power latches are ideal for temporary storage of data. They can be used for implementing memory address latches, I/O ports, and bus drivers. The Output Enable and Latch Enable controls are organized to operate each device as two 8-bit latches, or one 16-bit latch. Flow-through organization of signal pins simplifies layout. All inputs are designed with hysteresis for improved noise margin.

The FCT16373T is ideally suited for driving high-capacitance loads and low-impedance backplanes. The output buffers are designed with power off disable capability to allow "live insertion" of boards when used as backplane drivers.

FUNCTIONAL BLOCK DIAGRAM

TO SEVEN OTHER CHANNELS

INDUSTRIAL TEMPERATURE RANGE

JULY 2017

DSC-5454/7

PIN CONFIGURATION

$1\overline{OE}$	1	48	1LE
$1O_1$	2	47	$1D_1$
$1O_2$	3	46	$1D_2$
GND	4	45	GND
$1O_3$	5	44	$1D_3$
$1O_4$	6	43	$1D_4$
V_{CC}	7	42	V_{CC}
$1O_5$	8	41	$1D_5$
$1O_6$	9	40	$1D_6$
GND	10	39	GND
$1O_7$	11	38	$1D_7$
$1O_8$	12	37	$1D_8$
$2O_1$	13	36	$2D_1$
$2O_2$	14	35	$2D_2$
GND	15	34	GND
$2O_3$	16	33	$2D_3$
$2O_4$	17	32	$2D_4$
V_{CC}	18	31	V_{CC}
$2O_5$	19	30	$2D_5$
$2O_6$	20	29	$2D_6$
GND	21	28	GND
$2O_7$	22	27	$2D_7$
$2O_8$	23	26	$2D_8$
$2\overline{OE}$	24	25	2LE

TOP VIEW

Package Type	Package Code	Order Code
TSSOP	PAG56	PAG
SSOP	PVG56	PVG

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Description	Max	Unit
V_{TERM}[2]	Terminal Voltage with Respect to GND	−0.5 to 7	V
V_{TERM}[3]	Terminal Voltage with Respect to GND	−0.5 to V_{CC}+0.5	V
T_{STG}	Storage Temperature	−65 to +150	°C
I_{OUT}	DC Output Current	−60 to +120	mA

NOTES:
1. 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.
2. All device terminals except FCT162XXX Output and I/O terminals.
3. Outputs and I/O terminals for FCT162XXX.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter[1]	Conditions	Typ.	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	3.5	6	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	3.5	8	pF

NOTE:
1. This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Pin Names	Description
xDx	Data Inputs
xLE	Latch Enable Input (Active HIGH)
$x\overline{OE}$	Output Enable Input (Active LOW)
xOx	3-State Outputs

FUNCTION TABLE[1]

Inputs			Outputs
xDx	xLE	$x\overline{OE}$	xOx
H	H	L	H
L	H	L	L
X	X	H	Z

NOTE:
1. H = HIGH voltage level
   L = LOW voltage level
   X = Don't care
   Z = High-impedance

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: T_A = –40°C to +85°C, V_{CC} = 5.0V ±10%

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
V_{IH}	Input HIGH Level	Guaranteed Logic HIGH Level		2	—	—	V
V_{IL}	Input LOW Level	Guaranteed Logic LOW Level		—	—	0.8	V
I_{IH}	Input HIGH Current (Input pins)[5]	V_{CC} = Max.	V_I = V_{CC}	—	—	±1	µA
	Input HIGH Current (I/O pins)[5]			—	—	±1	
I_{IL}	Input LOW Current (Input pins)[5]		V_I = GND	—	—	±1	
	Input LOW Current (I/O pins)[5]			—	—	±1	
I_{OZH}	High Impedance Output Current	V_{CC} = Max.	V_O = 2.7V	—	—	±1	µA
I_{OZL}	(3-State Output pins)[5]		V_O = 0.5V	—	—	±1	
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18mA		—	–0.7	–1.2	V
I_{OS}	Short Circuit Current	V_{CC} = Max., V_O = GND[3]		–80	–140	–250	mA
V_H	Input Hysteresis	—		—	100	—	mV
I_{CCL} I_{CCH} I_{CCZ}	Quiescent Power Supply Current	V_{CC} = Max V_{IN} = GND or V_{CC}		—	5	500	µA

OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
I_O	Output Drive Current	V_{CC} = Max., V_O = 2.5V[3]		–50	—	180	mA
V_{OH}	Output HIGH Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OH} = –3mA	2.5	3.5	—	V
			I_{OH} = –15mA	2.4	3.5	—	V
			I_{OH} = –32mA[4]	2	3	—	V
V_{OL}	Output LOW Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OL} = 64mA	—	0.2	0.55	V
I_{OFF}	Input/Output Power Off Leakage[5]	V_{CC} = 0V, V_{IN} = or V_O ≤ 4.5V		—	—	±1	µA

NOTES:
1. For conditions shown as Min. or Max., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
4. Duration of the condition can not exceed one second.
5. This test limit for this parameter is ±5µA at T_A = –55°C.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	V_{CC} = Max. V_{IN} = 3.4V[3]		—	0.5	1.5	mA
I_{CCD}	Dynamic Power Supply Current[4]	V_{CC} = Max. Outputs Open x$\overline{OE}$ = GND One Input Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ V_{IN} = GND	—	60	100	µA/ MHz
I_C	Total Power Supply Current[6]	V_{CC} = Max. Outputs Open f_i = 10MHz	$V_{IN} = V_{CC}$ V_{IN} = GND	—	0.6	1.5	mA
		50% Duty Cycle x$\overline{OE}$ = GND xLE = V_{CC} One Bit Toggling	V_{IN} = 3.4V V_{IN} = GND	—	0.9	2.3	
		V_{CC} = Max. Outputs Open f_i = 2.5MHz	$V_{IN} = V_{CC}$ V_{IN} = GND	—	2.4	4.5[5]	
		50% Duty Cycle x$\overline{OE}$ = GND xLE = V_{CC} Sixteen Bits Toggling	V_{IN} = 3.4V V_{IN} = GND	—	6.4	16.5[5]	

NOTES:
1. For conditions shown as Min. or Max., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V). All other inputs at V_{CC} or GND.
4. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
5. Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.
6. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}N_{CP}/2 + f_iN_i)$
   I_{CC} = Quiescent Current (I_{CCL}, I_{CCH} and I_{CCZ})
   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_{CP} = Clock Frequency for Register Devices (Zero for Non-Register Devices)
   N_{CP} = Number of Clock Inputs at f_{CP}
 f_i = Input Frequency
   N_i = Number of Inputs at f_i

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

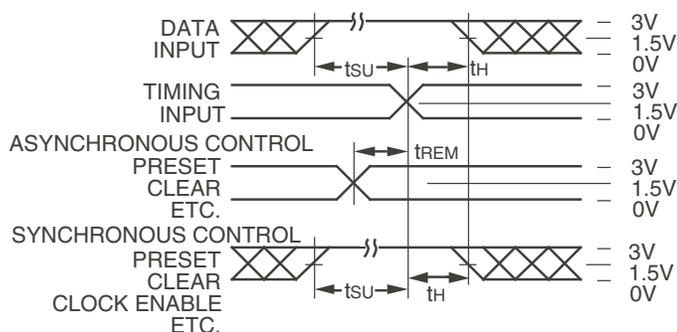| Symbol	Parameter	Condition[2]	FCT16373AT		FCT16373CT		Unit
			Min.[2]	Max.	Min.[2]	Max.	
t_{PLH} t_{PHL}	Propagation Delay xDx to xOx	$C_L = 50pF$ $R_L = 500\Omega$	1.5	5.2	1.5	3.6	ns
t_{PLH} t_{PHL}	Propagation Delay xLE to xOx		2	8.5	2	3.7	ns
t_{PZH} t_{PZL}	Output Enable Time		1.5	6.5	1.5	4.4	ns
t_{PHZ} t_{PLZ}	Output Disable Time		1.5	5.5	1.5	3.9	ns
t_{SU}	Set-up Time HIGH or LOW, xDx to xLE		2	—	2	—	ns
t_H	Hold Time HIGH or LOW, xDx to xLE		1.5	—	1.5	—	ns
t_W	xLE Pulse Width HIGH		5	—	5	—	ns
$t_{SK(o)}$	Output Skew[3]		—	0.5	—	0.5	ns

NOTES:

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested.
3. Skew between any two outputs, of the same package, switching in the same direction. This parameter is guaranteed by design.
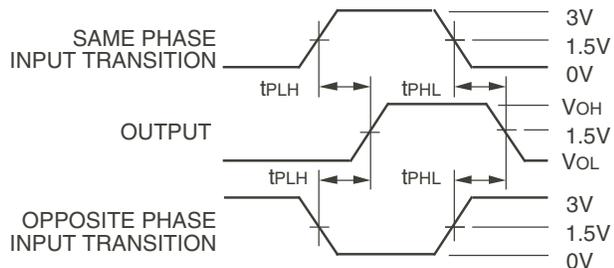
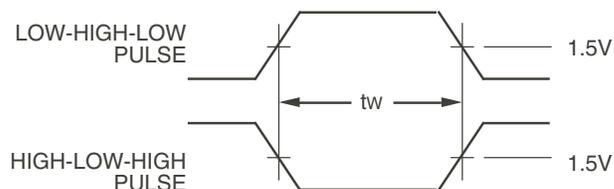# TEST CIRCUITS AND WAVEFORMS
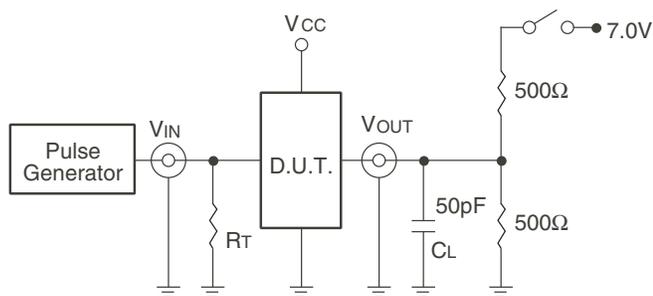
Test Circuits for All Outputs

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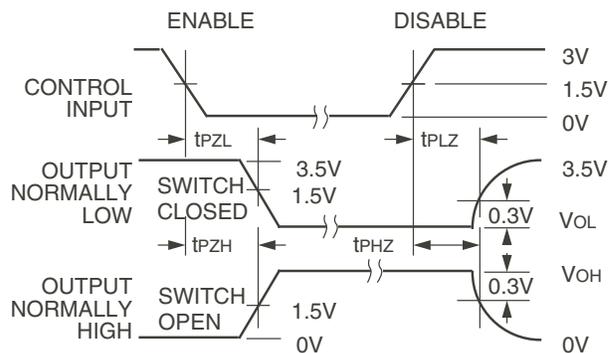
Test	Switch
Open Drain Disable Low Enable Low	Closed
All Other Tests	Open

DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.

R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

Set-up, Hold, and Release Times

Pulse Width
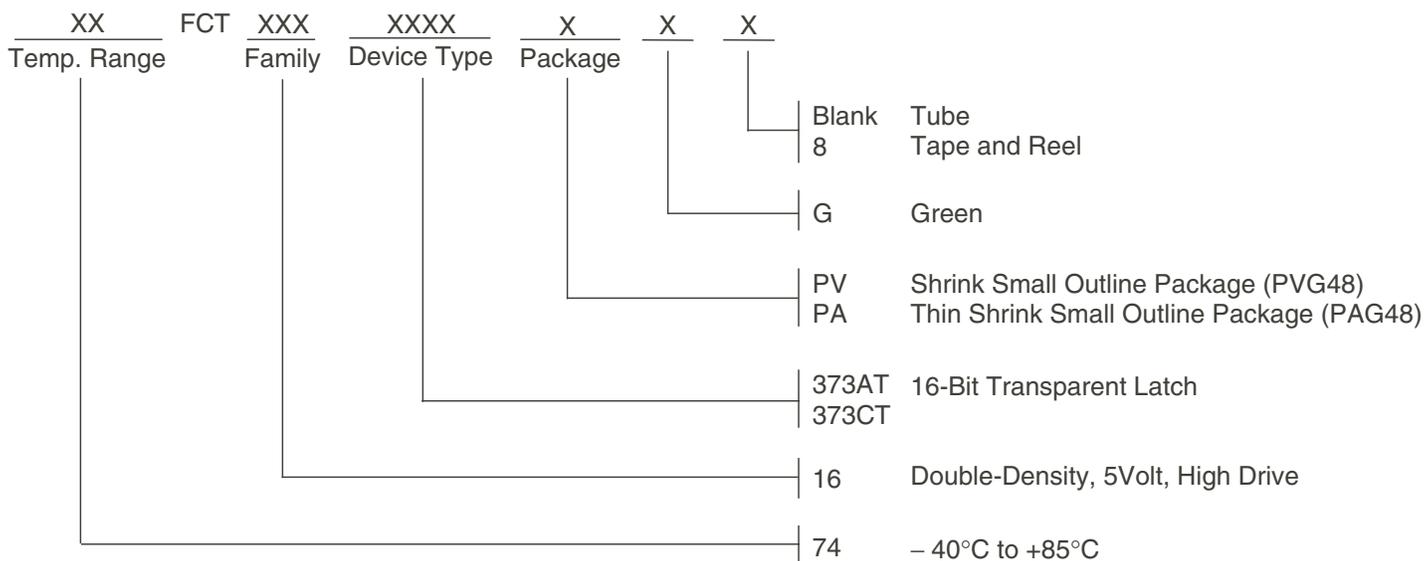

Propagation Delay

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 $\leq$ 1.0MHz; $t_F \leq$ 2.5ns; $t_R \leq$ 2.5ns.

6

ORDERING INFORMATION

```
  XX        FCT    XXX       XXXX        X        X     X
Temp. Range      Family   Device Type  Package
```

Blank	Tube
8	Tape and Reel

G	Green

PV	Shrink Small Outline Package (PVG48)
PA	Thin Shrink Small Outline Package (PAG48)

373AT	16-Bit Transparent Latch
373CT	

16	Double-Density, 5Volt, High Drive

74	− 40°C to +85°C

Orderable Part Information

Speed (ns)	Orderable Part ID	Pkg. Code	Pkg. Type	Temp. Grade
A	74FCT16373ATPAG	PAG48	TSSOP	I
	74FCT16373ATPAG8	PAG48	TSSOP	I
	74FCT16373ATPVG	PVG48	SSOP	I
	74FCT16373ATPVG8	PVG48	SSOP	I
C	74FCT16373CTPAG	PAG48	TSSOP	I
	74FCT16373CTPAG8	PAG48	TSSOP	I
	74FCT16373CTPVG	PVG48	SSOP	I
	74FCT16373CTPVG8	PVG48	SSOP	I

Datasheet Document History

09/10/2009	Pg. 7	Updated the ordering information by removing the "IDT" notation and non RoHS part.
07/31/2017	Pg. 2, 7	Added table under pin configuration diagram with detailed package information. Updated the ordering information diagram by adding Tube, Tape and Reel. Added orderable part information table.

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