



FAST CMOS OCTAL TRANSPARENT LATCH

IDT74FCT373/A/C

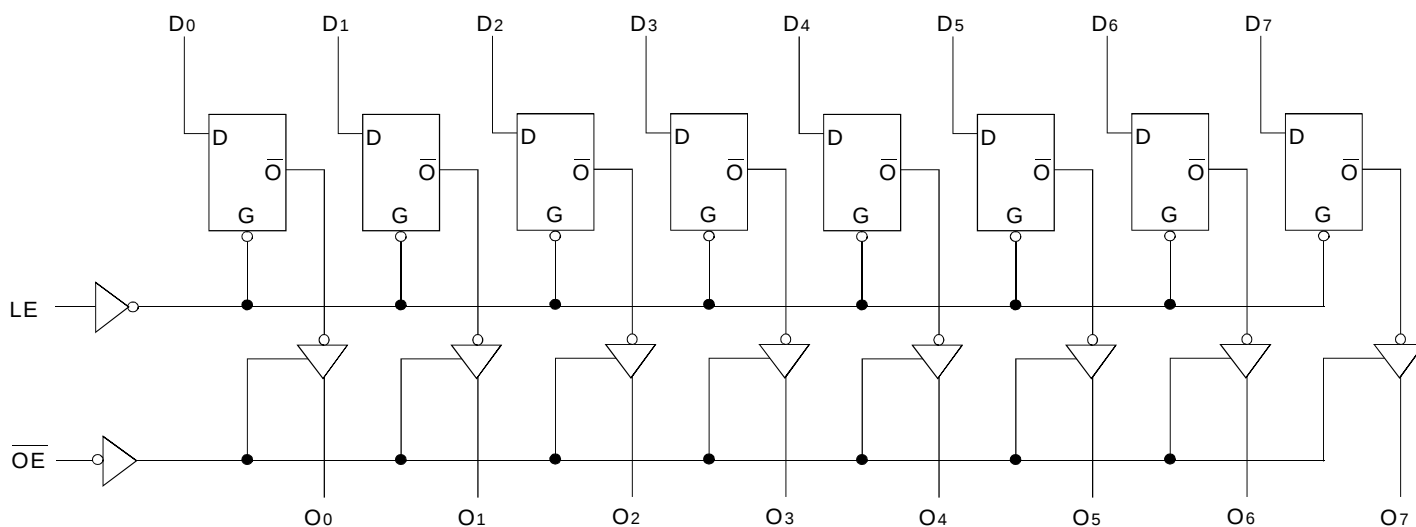
FEATURES:

- IDT74FCT373 equivalent to FAST™ speed and drive
- IDT74FCT373A up to 30% faster than FAST
- Equivalent to FAST output drive over full temperature and voltage supply extremes
- $I_{OL} = 48\text{mA}$
- CMOS power levels (1mW typ. static)
- Octal transparent latch with 3-state output control
- Available in SOIC package

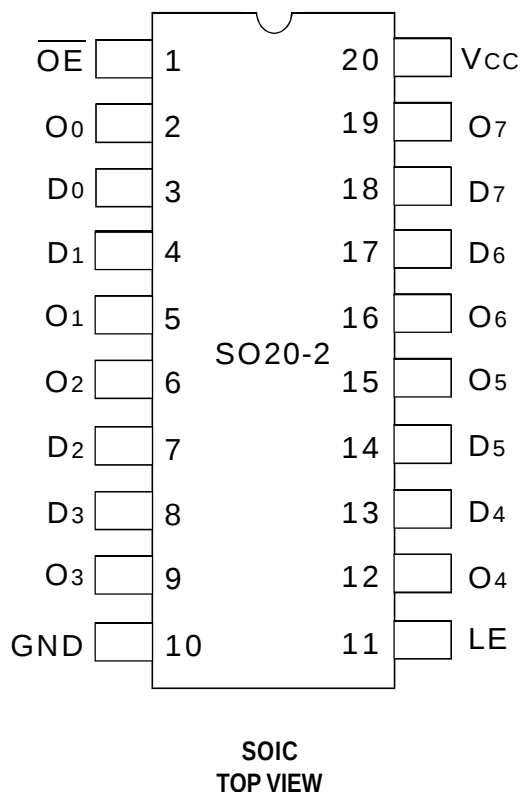
DESCRIPTION:

The IDT74FCT373 is an octal transparent latch built using an advanced dual metal CMOS technology. These octal latches have 3-state outputs and are intended for bus oriented applications. The flip-flops appear transparent to the data when Latch Enable (LE) is high. When LE is low, the data that meets the set-up time is latched. Data appears on the bus when the Output Enable ($\overline{OE}$) is low. When $\overline{OE}$ is high, the bus output is in the high-impedance state.

FUNCTIONAL BLOCK DIAGRAMS



PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	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}	V
T _A	Operating Temperature	0 to +70	°C
T _{BIAS}	Temperature Under Bias	−55 to +125	°C
T _{STG}	Storage Temperature	−55 to +125	°C
P _T	Power Dissipation	0.5	W
I _{OUT}	DC Output Current	120	mA

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NOTES:

- 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. No terminal voltage may exceed V_{CC} by +.5V unless otherwise noted.
- Input and V_{CC} terminals only.
- Outputs and I/O terminals only.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Typ.	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	6	10	pF
C _{OUT}	Output Capacitance	V _{OUT} = 0V	8	12	pF

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NOTE:

- This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Pin Names	Description
D _N	Data Inputs
LE	Latch Enable Input (Active HIGH)
$\overline{OE}$	Output Enable Input (Active LOW)
O _N	3-State Outputs
$\overline{O_N}$	Complementary 3-State Outputs

FUNCTION TABLE⁽¹⁾

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

NOTE:

- 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: $V_{LC} = 0.2V$; $V_{HC} = V_{CC} - 0.2V$

Commercial: $T_A = 0^{\circ}C$ to $+70^{\circ}C$, $V_{CC} = 5.0V \pm 5\%$

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	$V_{CC} = \text{Max.}$	$V_I = V_{CC}$	—	—	5	μA
			$V_I = 2.7V$	—	—	5 ⁽⁴⁾	
I_{IL}	Input LOW Current		$V_I = 0.5V$	—	—	-5 ⁽⁴⁾	
			$V_I = GND$	—	—	-5	
I_{OZH}	Off State (High Impedance) Output Current	$V_{CC} = \text{Max.}$	$V_O = V_{CC}$	—	—	10	μA
			$V_O = 2.7V$	—	—	10 ⁽⁴⁾	
I_{OZL}			$V_O = 0.5V$	—	—	-10 ⁽⁴⁾	
			$V_O = GND$	—	—	-10	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}$, $I_N = -18mA$		—	-0.7	-1.2	V
I_{OS}	Short Circuit Current	$V_{CC} = \text{Max.}$ ⁽³⁾ , $V_O = GND$		-60	-120	—	mA
V_{OH}	Output HIGH Voltage	$V_{CC} = 3V$, $V_{IN} = V_{LC}$ or V_{HC} , $I_{OH} = -32\mu A$		V_{HC}	V_{CC}	—	V
		$V_{CC} = \text{Min.}$	$I_{OH} = -300\mu A$	V_{HC}	V_{CC}	—	
		$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -15mA$	2.4	4.3	—	
V_{OL}	Output LOW Voltage	$V_{CC} = 3V$, $V_{IN} = V_{LC}$ or V_{HC} , $I_{OL} = 300\mu A$		—	GND	V_{LC}	V
		$V_{CC} = \text{Min.}$	$I_{OL} = 300\mu A$	—	GND	V_{LC} ⁽⁴⁾	
		$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 48mA$	—	0.3	0.5	

NOTES:

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 5.0V$, $+25^{\circ}C$ ambient and maximum loading.
- Not more than one output should be shorted at one time. Duration of the short circuit test should not exceed one second.
- This parameter is guaranteed but not tested.

POWER SUPPLY CHARACTERISTICS

$V_{LC} = 0.2V$; $V_{HC} = V_{CC} - 0.2V$

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$ $V_{IN} \geq V_{HC}$; $V_{IN} \leq V_{LC}$		—	0.2	1.5	mA
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	$V_{CC} = \text{Max.}$ $V_{IN} = 3.4V^{(3)}$		—	0.5	2	mA
I_{CCD}	Dynamic Power Supply Current ⁽⁴⁾	$V_{CC} = \text{Max.}$ Outputs Open $\overline{OE} = \text{GND}$ One Input Toggling 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$	—	0.15	0.25	mA/ MHz
I_C	Total Power Supply Current ⁽⁶⁾	$V_{CC} = \text{Max.}$ Outputs Open $f_i = 10\text{MHz}$ 50% Duty Cycle $\overline{OE} = \text{GND}$ $LE = V_{CC}$ One Bit Toggling	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (FCT)	—	1.7	4	mA
			$V_{IN} = 3.4V$ $V_{IN} = \text{GND}$	—	2	5	
		$V_{CC} = \text{Max.}$ Outputs Open $f_i = 2.5\text{MHz}$ 50% Duty Cycle $\overline{OE} = \text{GND}$ $LE = V_{CC}$ Eight Bits Toggling	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (FCT)	—	3.2	6.5 ⁽⁵⁾	
			$V_{IN} = 3.4V$ $V_{IN} = \text{GND}$	—	5.2	14.5 ⁽⁵⁾	

NOTES:

- 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 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.
- $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$
 $I_{CC} = \text{Quiescent Current}$
 $\Delta I_{CC} = \text{Power Supply Current for a TTL High Input } (V_{IN} = 3.4V)$
 $D_H = \text{Duty Cycle for TTL Inputs High}$
 $N_T = \text{Number of TTL Inputs at } D_H$
 $I_{CCD} = \text{Dynamic Current Caused by an Output Transition Pair (HLH or LHL)}$
 $f_{CP} = \text{Clock Frequency for Register Devices (Zero for Non-Register Devices)}$
 $f_i = \text{Input Frequency}$
 $N_i = \text{Number of Inputs at } f_i$
 All currents are in milliamps and all frequencies are in megahertz.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

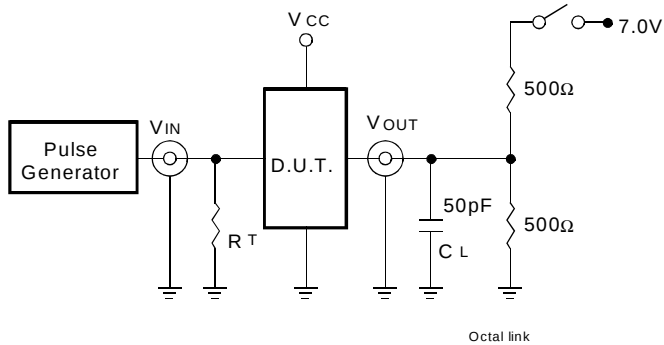
Symbol	Parameter	Conditions ⁽¹⁾	FCT373		FCT373A		FCT373C		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay ⁽²⁾ D _N to O _N	C _L = 50pF R _L = 500Ω	1.5	8	1.5	5.2	1.5	4.2	ns
t _{PLH} t _{PHL}	Propagation Delay ⁽²⁾ LE to O _N		2	13	2	8.5	2	5.5	ns
t _{PZH} t _{PZL}	Output Enable Time		1.5	12	1.5	6.5	1.5	5.5	ns
t _{PHZ} t _{PLZ}	Output Disable Time		1.5	7.5	1.5	5.5	1.5	5	ns
t _{su}	Set-up Time HIGH or LOW, D _N to LE		2	—	2	—	2	—	ns
t _h	Hold Time HIGH or LOW, D _N to LE		1.5	—	1.5	—	1.5	—	ns
t _w	LE Pulse Width HIGH		6	—	5	—	5	—	ns

NOTES:

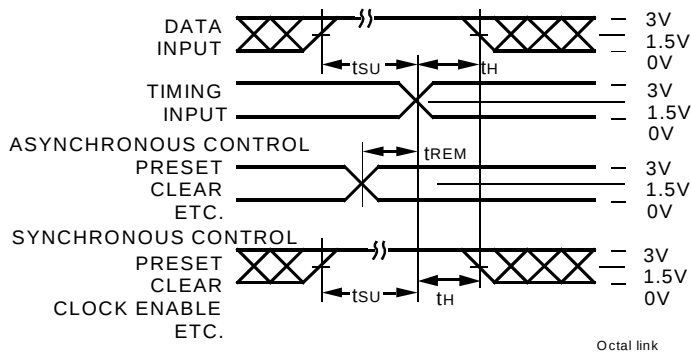
1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.

TEST CIRCUITS AND WAVEFORMS

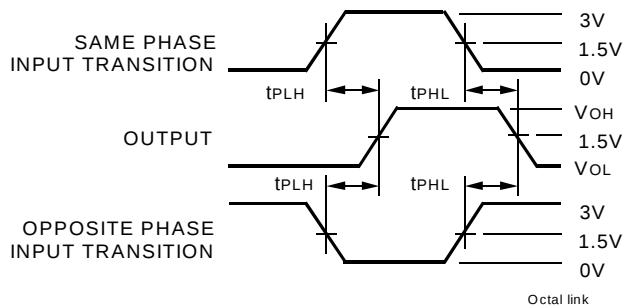
TEST CIRCUITS FOR ALL OUTPUTS



SET-UP, HOLD, AND RELEASE TIMES



PROPAGATION DELAY



SWITCH POSITION

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

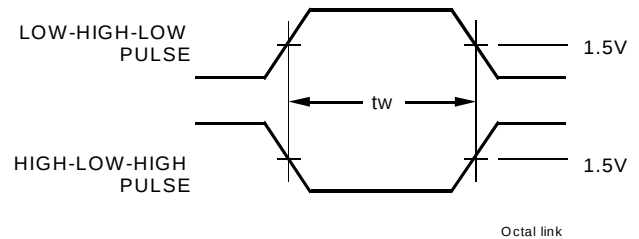
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DEFINITIONS:

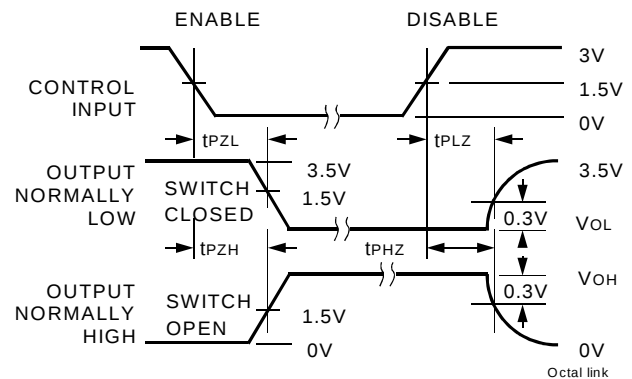
CL = Load capacitance: includes jig and probe capacitance.

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

PULSE WIDTH



ENABLE AND DISABLE TIMES



NOTES:

- Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
- Pulse Generator for All Pulses: Rate $\leq 1.0\text{MHz}$; $Z_o \leq 50\Omega$; $t_f \leq 2.5\text{ns}$; $t_r \leq 2.5\text{ns}$.

ORDERING INFORMATION

IDT	XX	FCT	XXXX	X	
	Temp. Range		Device Type	Package	
				SO	Small Outline IC (SO20-2)
				373 373A 373C	Octal Transparent Latch
				74	0°C to +70°C



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