Integrated Device Technology, Inc.

HIGH-PERFORMANCE CMOS BUS INTERFACE LATCHES

IDT54/74FCT841A/B/C

FEATURES:

- Equivalent to AMD's Am29841-46 bipolar registers in pinout/function, speed and output drive over full temperature and voltage supply extremes
- IDT54/74FCT841A equivalent to FAST™ speed
- **IDT54/74FCT841B 25% faster than FAST**
- **IDT54/74FCT841C 40% faster than FAST**
- Buffered common latch enable, clear and preset inputs
- I_{OL} = 48mA (commercial) and 32mA (military)
- Clamp diodes on all inputs for ringing suppression
- CMOS power levels (1mW typ. static)
- TTL input and output level compatible
- CMOS output level compatible
- Substantially lower input current levels than AMD's bipolar Am29800 series (5µA max.)
- Product available in Radiation Tolerant and Radiation Enhanced versions
- Military product compliant to MIL-STD-883, Class B

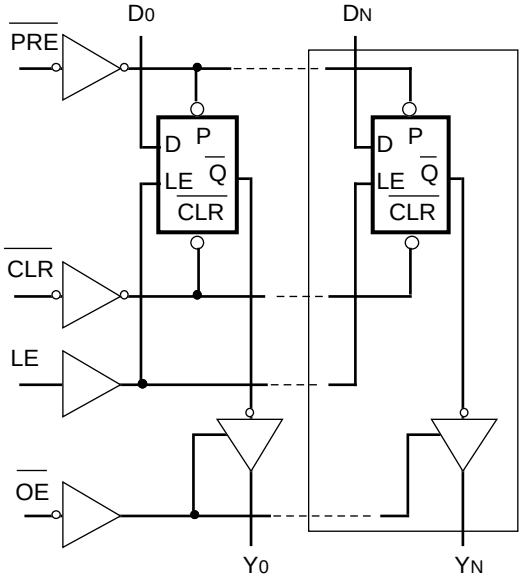
DESCRIPTION:

The IDT54/74FCT800 series is built using an advanced dual metal CMOS technology.

The IDT54/74FCT840 series bus interface latches are designed to eliminate the extra packages required to buffer existing latches and provide extra data width for wider address/data paths or buses carrying parity. The IDT54/74FCT841 is a buffered, 10-bit wide version of the popular '373 function.

All of the IDT54/74FCT800 high-performance interface family are designed for high-capacitance load drive capability, while providing low-capacitance bus loading at both inputs and outputs. All inputs have clamp diodes and all outputs are designed for low-capacitance bus loading in the high-impedance state.

FUNCTIONAL BLOCK DIAGRAM



2607 drw 01

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FAST is a trademark of National Semiconductor Co.

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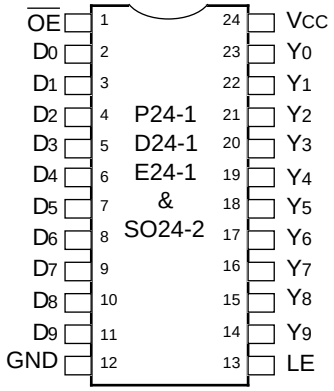
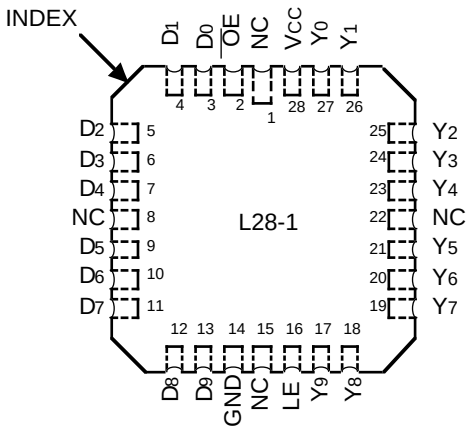
PIN CONFIGURATIONS



DIP/CERPACK/SOIC
TOP VIEW

2607 drw 02



LCC
TOP VIEW

2607 drw 03

PIN DESCRIPTION

Name	I/O	Description
$\overline{CLR}$	I	When $\overline{CLR}$ is LOW, the outputs are LOW if $\overline{OE}$ is LOW. When $\overline{CLR}$ is HIGH, data can be entered into the latch.
D_I	I	The latch data inputs.
LE	I	The latch enable input. The latches are transparent when LE is HIGH. Input data is latched on the HIGH-to-LOW transition.
Y_I	O	The 3-state latch outputs.
$\overline{OE}$	I	The output enable control. When $\overline{OE}$ is LOW, the outputs are enabled. When $\overline{OE}$ is HIGH, the outputs (Y_I) are in the high-impedance (off) state.
$\overline{PRE}$	I	Preset line. When $\overline{PRE}$ is LOW, the outputs are HIGH if $\overline{OE}$ is LOW. Preset overrides $\overline{CLR}$.

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FUNCTION TABLE(1)

Inputs					Inter-nal	Out-puts	
$\overline{CLR}$	$\overline{PRE}$	$\overline{OE}$	LE	D_I	Q_I	Y_I	Function
H	H	H	X	X	X	Z	High Z
H	H	H	H	L	L	Z	High Z
H	H	H	H	H	H	Z	High Z
H	H	H	L	X	NC	Z	Latched (High Z)
H	H	L	H	L	L	L	Transparent
H	H	L	H	H	H	H	Transparent
H	H	L	L	X	NC	NC	Latched
H	L	L	X	X	H	H	Preset
L	H	L	X	X	L	L	Clear
L	L	L	X	X	H	H	Preset
L	H	H	L	X	L	Z	Latched (High Z)
H	L	H	L	X	H	Z	Latched (High Z)

NOTE:
1. H = HIGH, L = LOW, X = Don't Care, NC = No Change, Z = High Impedance

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ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Commercial	Military	Unit
V_{TERM}(2)	Terminal Voltage with Respect to GND	–0.5 to +7.0	–0.5 to +7.0	V
V_{TERM}(3)	Terminal Voltage with Respect to GND	–0.5 to V_{CC}	–0.5 to V_{CC}	V
T_A	Operating Temperature	0 to +70	–55 to +125	°C
T_{BIAS}	Temperature Under Bias	–55 to +125	–65 to +135	°C
T_{STG}	Storage Temperature	–55 to +125	–65 to +150	°C
P_T	Power Dissipation	0.5	0.5	W
I_{OUT}	DC Output Current	120	120	mA

NOTE: 2607 tbl 03
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. No terminal voltage may exceed V_{CC} by +0.5V unless otherwise noted.
2. Input and V_{CC} terminals only.
3. 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

NOTE: 2607 tbl 04
1. This parameter is measured at characterization but not tested.

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°C to +70°C, V_{CC} = 5.0V ± 5%; Military: T_A = –55°C to +125°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		2.0	—	—	V
V_{IL}	Input LOW Level	Guaranteed Logic LOW Level		—	—	0.8	V
I_{IH}	Input HIGH Current	V_{CC} = 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} = 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} = Min., I_N = –18mA		—	–0.7	–1.2	V
I_{OS}	Short Circuit Current	V_{CC} = Max.(3), V_O = GND		–75	–120	—	mA
V_{OH}	Output HIGH Voltage	V_{CC} = 3V, V_{IN} = V_{LC} or V_{HC}, I_{OH} = –32µA		V_{HC}	V_{CC}	—	V
		V_{CC} = Min.	I_{OH} = –300µA	V_{HC}	V_{CC}	—	
		V_{IN} = V_{IH} or V_{IL}	I_{OH} = –15mA MIL.	2.4	4.3	—	
			I_{OH} = –24mA COM'L.	2.4	4.3	—	
V_{OL}	Output LOW Voltage	V_{CC} = 3V, V_{IN} = V_{LC} or V_{HC}, I_{OL} = 300µA		—	GND	V_{LC}	V
		V_{CC} = Min.	I_{OL} = 300µA	—	GND	V_{LC}(4)	
		V_{IN} = V_{IH} or V_{IL}	I_{OL} = 32mA MIL.	—	0.3	0.5	
			I_{OL} = 48mA COM'L.	—	0.3	0.5	

NOTES: 2607 tbl 05
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the short circuit test should not exceed one second.
4. 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} = 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} = Max. V_{IN} = 3.4V[3]		—	0.5	2.0	mA
I_{CCD}	Dynamic Power Supply Current[4]	V_{CC} = Max. Outputs Open $\overline{OE}$ = GND LE = V_{CC} 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} = Max. Outputs Open fi = 10MHz 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (FCT)	—	1.7	4.0	mA
		$\overline{OE}$ = GND LE = V_{CC} One Bit Toggling	V_{IN} = 3.4V V_{IN} = GND	—	2.0	5.0	
		V_{CC} = Max. Outputs Open fi = 2.5MHz 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (FCT)	—	3.2	6.5[5]	
		$\overline{OE}$ = GND LE = V_{CC} Eight Bits Toggling	V_{IN} = 3.4V V_{IN} = GND	—	5.2	14.5[5]	

NOTES: 2607 tbl 06

1. For conditions shown as Max. or Min., 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. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$
   I_{CC} = Quiescent Current
   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)
   f_i = Input Frequency
   N_i = 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]	FCT841A Com'l. Min.[2]	FCT841A Com'l. Max.	FCT841A Mil. Min.[2]	FCT841A Mil. Max.	FCT841B Com'l. Min.[2]	FCT841B Com'l. Max.	FCT841B Mil. Min.[2]	FCT841B Mil. Max.	FCT841C Com'l. Min.[2]	FCT841C Com'l. Max.	FCT841C Mil. Min.[2]	FCT841C Mil. Max.	Unit
t_{PLH} t_{PHL}	Propagation Delay D_I to Y_I (LE = HIGH)		C_L = 50pF R_L = 500Ω	1.5	9.0	1.5	10.0	1.5	6.5	1.5	7.5	1.5	5.5	1.5	6.3	ns
			C_L = 300pF[4] R_L = 500Ω	1.5	13.0	1.5	15.0	1.5	13.0	1.5	15.0	1.5	13.0	1.5	15.0	
t_{PLH} t_{PHL}	Propagation Delay LE to Y_I		C_L = 50pF R_L = 500Ω	1.5	12.0	1.5	13.0	1.5	8.0	1.5	10.5	1.5	6.4	1.5	6.8	ns
			C_L = 300pF[4] R_L = 500Ω	1.5	16.0	1.5	20.0	1.5	15.5	1.5	18.0	1.5	15.0	1.5	16.0	
t_{PLH}	Propagation Delay, $\overline{PRE}$ to Y_I		C_L = 50pF	1.5	12.0	1.5	14.0	1.5	8.0	1.5	10.0	1.5	7.0	1.5	9.0	ns
t_{PHL}			R_L = 500Ω	1.5	14.0	1.5	17.0	1.5	10.0	1.5	13.0	1.5	9.0	1.5	12.0	
t_{PHL}	Propagation Delay, $\overline{CLR}$ to Y_I			1.5	13.0	1.5	14.0	1.5	10.0	1.5	11.0	1.5	9.0	1.5	10.0	ns
t_{PLH}				1.5	14.0	1.5	17.0	1.5	10.0	1.5	10.0	1.5	9.0	1.5	9.0	
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to Y_I		C_L = 50pF R_L = 500Ω	1.5	11.5	1.5	13.0	1.5	8.0	1.5	8.5	1.5	6.5	1.5	7.3	ns
			C_L = 300pF[4] R_L = 500Ω	1.5	23.0	1.5	25.0	1.5	14.0	1.5	15.0	1.5	12.0	1.5	13.0	
t_{PHZ} t_{PLZ}	Output Disable Time $\overline{OE}$ to Y_I		C_L = 5pF[4] R_L = 500Ω	1.5	7.0	1.5	9.0	1.5	6.0	1.5	6.5	1.5	5.7	1.5	6.0	ns
			C_L = 50pF R_L = 500Ω	1.5	8.0	1.5	10.0	1.5	7.0	1.5	7.5	1.5	6.0	1.5	6.3	
t_{SU}	Data to LE Set-up Time		C_L = 50pF	2.5	—	2.5	—	2.5	—	2.5	—	2.5	—	2.5	—	ns
t_H	Data to LE Hold Time		R_L = 500Ω	2.5	—	3.0	—	2.5	—	2.5	—	2.5	—	2.5	—	ns
t_W	LE Pulse Width[3]	HIGH		4.0	—	5.0	—	4.0	—	4.0	—	4.0	—	4.0	—	ns
t_W	$\overline{PRE}$ Pulse Width[3]	LOW		5.0	—	7.0	—	4.0	—	4.0	—	4.0	—	4.0	—	ns
t_W	$\overline{CLR}$ Pulse Width[3]	LOW		4.0	—	5.0	—	4.0	—	4.0	—	4.0	—	4.0	—	ns
t_{REM}	Recovery Time $\overline{PRE}$ to LE			4.0	—	4.0	—	4.0	—	4.0	—	4.0	—	4.0	—	ns
t_{REM}	Recovery Time $\overline{CLR}$ to LE			3.0	—	3.0	—	3.0	—	3.0	—	3.0	—	3.0	—	ns

NOTES:

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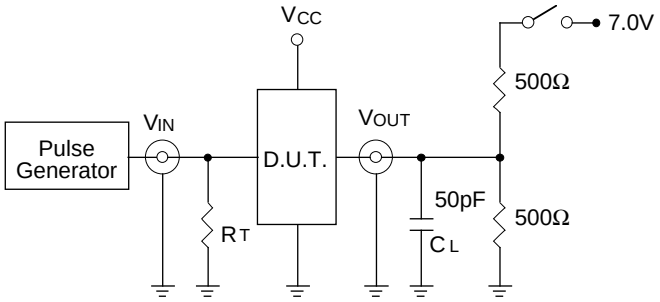
1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. These parameters are guaranteed but not tested.
4. These conditions are guaranteed but not tested.

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



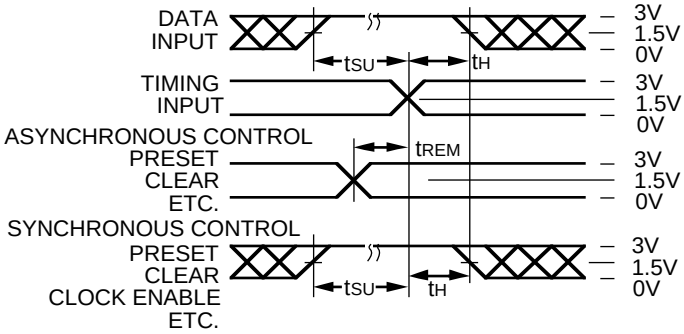
SWITCH POSITION

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

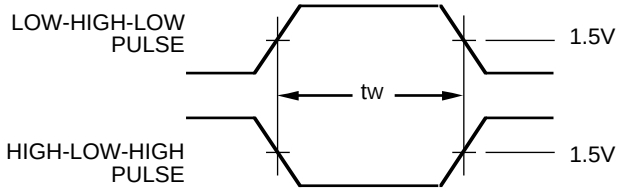
DEFINITIONS: 2607 tbl 08

C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

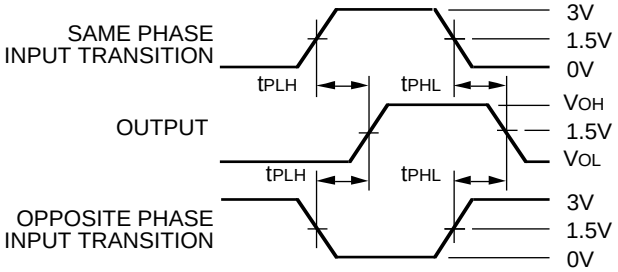
SET-UP, HOLD AND RELEASE TIMES



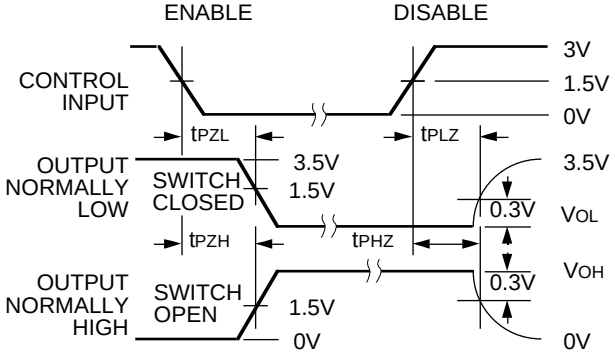
PULSE WIDTH



PROPAGATION DELAY



ENABLE AND DISABLE TIMES



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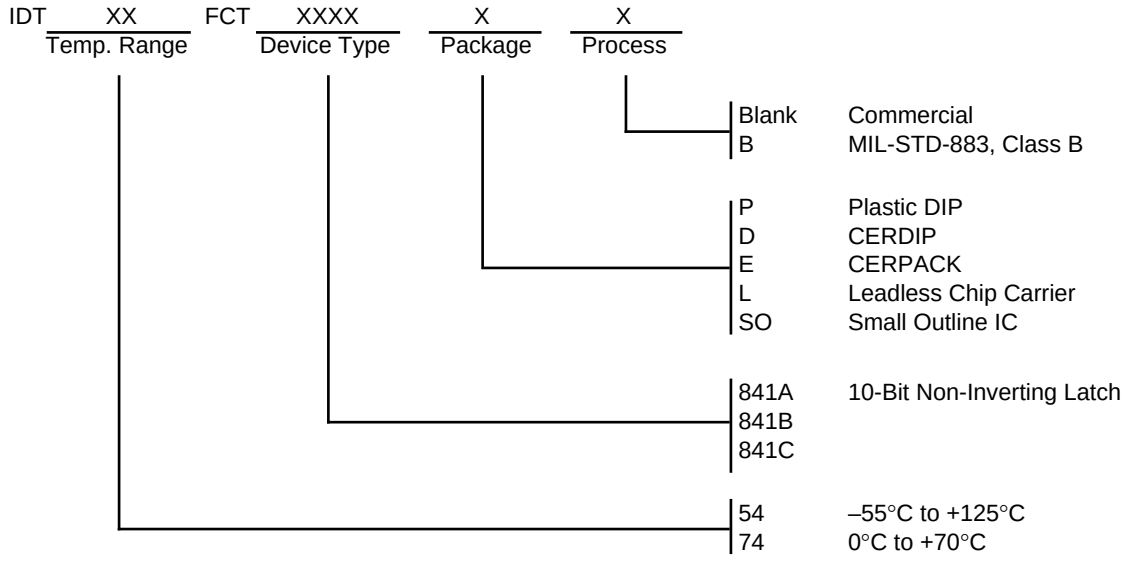
NOTES:
1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns

ORDERING INFORMATION



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