Integrated Device Technology, Inc.

HIGH-SPEED BiCMOS 10-BIT INTERFACE LATCHES

ADVANCE INFORMATION
IDT54/74FBT841A
IDT54/74FBT841B
IDT54/74FBT841C

FEATURES:

- Functionally equivalent to the 54/74BCT841 series
- **IDT54/74FBT841B 20% faster than the 841A**
- **IDT54/74FBT841C 15% faster than the 841B**
- Significant reduction in ground bounce from standard CMOS devices
- TTL compatible input and output levels
- Low power in all three states
- ±10% power supply for both military and commercial grades
- JEDEC standard pinout for DIP, SOIC and LCC packages
- Military product compliant to MIL-STD-883, Class B

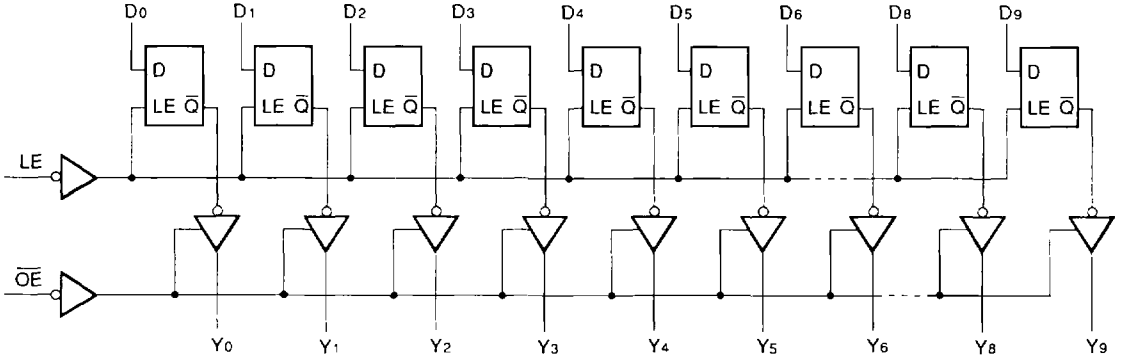
DESCRIPTION:

The FBT series of BiCMOS Bus Interface Latches are built using advanced BiCEMOS™, a dual metal BiCMOS technology. This technology is desgined to supply the highest device speeds while maintaining CMOS power levels.

The IDT54/74FBT841 series are 3-state, 10-bit bus interface latches.

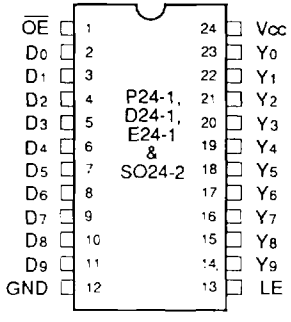
The FBT series of bus interface devices are ideal for use in designs needing to drive large capacitive loads with low static(DC) current loading. All data inputs have a 200mV typical input hysteresis for improved noise rejection.

FUNCTIONAL BLOCK DIAGRAM

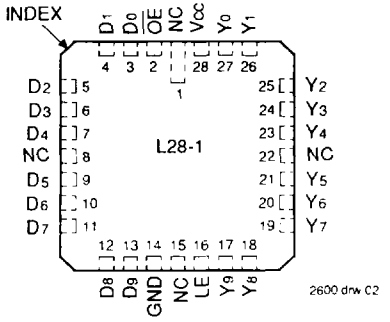


2600 drw 01

PIN CONFIGURATIONS



DIP/SOIC/CERPACK TOP VIEW



2600 drw 02

LCC TOP VIEW

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PIN DESCRIPTION

Name	I/O	Description
D_{0-9}	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_{0-9}	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.

2600 tbl 05

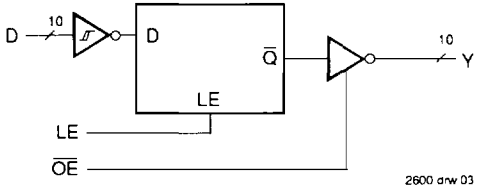
FUNCTION TABLE[1]

Inputs			Internal	Outputs	
$\overline{OE}$	LE	D_I	Q_I	Y_I	Function
H	X	X	X	Z	High Z
H	H	L	L	Z	High Z
H	H	H	H	Z	High Z
H	L	X	NC	Z	Latched (High Z)
L	H	L	L	L	Transparent
L	H	H	H	H	Transparent
L	L	X	NC	NC	Latched

NOTE: 2600 tbl 06

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

LOGIC SYMBOL



2600 drw 03

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Rating	Commercial	Military	Unit
V_{TERM}	Terminal Voltage with Respect to GND	–0.5 to +7.0	–0.5 to +7.0	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

NOTES: 2600 tbl 01

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 Vcc by +0.5V unless otherwise noted.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

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

NOTE: 2600 tbl 02

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

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Commercial: T_A = 0°C to +70°C, V_{CC} = 5.0V ± 10%; 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 = 2.7V		—	—	10	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_I = 0.5V		—	—	-10	µA
I_{OZH}	High Impedance	V_{CC} = Max.	V_O = 2.7V	—	—	50	µA
I_{OZL}	Output Current		V_O = 0.5V	—	—	-50	
I_I	Input HIGH Current	V_{CC} = Max., V_I = 5.5V		—	—	100	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_N = -18mA		—	-0.7	-1.2	V
I_{OS}	Short Circuit Current	V_{CC} = Max., V_O = GND[3]		-75	-150	-225	mA
V_{OH}	Output HIGH Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OH} = -12mA MIL. I_{OH} = -15mA COM'L.	2.4	3.3	—	V
			I_{OH} = -18mA MIL. I_{OH} = -24mA COM'L.	2.0	3.0	—	V
V_{OL}	Output LOW Voltage		I_{OL} = 32mA MIL. I_{OL} = 48mA COM'L.	—	0.3	0.5	V
V_H	Input Hysteresis	V_{CC} = 5V		—	200	—	mV
I_{OFF}	Bus Leakage Current	V_{CC} = 0V, V_O = 4.5V		—	—	100	µA
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max. V_{IN} = GND or V_{CC}		—	0.2	1.5	mA

2600 tbl 03

NOTES:
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 excedd one second.

6

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current (Inputs TTL HIGH)	V_{CC} = Max. V_{IN} = 3.4V[3]		—	—	2.0	mA
I_{CCD}	Dynamic Power Supply Current[4]	V_{CC} = Max., Outputs Open $\overline{OE}$ = GND One Input Toggling LE = V_{CC} 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	—	0.25	mA/ MHz
I_C	Total Power Supply Current[6]	V_{CC} = Max., Outputs Open f_i = 10MHz, 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	—	4.0	mA
		$\overline{OE}$ = GND, LE = V_{CC} One Bit Toggling	V_{IN} = 3.4V V_{IN} = GND	—	—	5.0	
		V_{CC} = Max., Outputs Open f_i = 2.5MHz, 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	—	7.8[5]	
		$\overline{OE}$ = GND, LE = V_{CC} Ten Bit Toggling	V_{IN} = 3.4V V_{IN} = GND	—	—	17.8[5]	

2600 tbl 04

NOTES:

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. 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	Condition[1]	54/74FBT841A				54/74FBT841B				54/74FBT841C				Unit
			Com'l.		Mil.		Com'l.		Mil.		Com'l.		Mil.		
			Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	
tPLH tPHL	Data (DI) to Output (YI) (LE = HIGH)	CL = 50pF RL = 500Ω	—	8.0	—	—	—	6.5	—	—	—	5.5	—	—	ns
tPLH tPHL		CL = 300pF[3] RL = 500Ω	—	—	—	—	—	—	—	—	—	—	—	—	ns
tSU	Data to LE Set-up Time	CL = 50pF	—	1.5	—	—	—	1.5	—	—	—	1.5	—	—	ns
tH	Data to LE Hold Time	RL = 500Ω	—	3.5	—	—	—	2.5	—	—	—	2.5	—	—	ns
tPLH tPHL	Latch Enable (LE) to YI	CL = 50pF RL = 500Ω	—	10.0	—	—	—	8.0	—	—	—	6.4	—	—	ns
tPLH tPHL		CL = 300pF[3] RL = 500Ω	—	—	—	—	—	—	—	—	—	—	—	—	ns
tW	LE Pulse Width HIGH	CL = 50pF RL = 500Ω	—	4.0	—	—	—	4.0	—	—	—	4.0	—	—	ns
tPZH tPZL	Output Enable Time $\overline{OE}$ to YI	CL = 50pF RL = 500Ω	—	8.0	—	—	—	8.0	—	—	—	6.5	—	—	ns
tPZH tPZL		CL = 300pF[3] RL = 500Ω	—	—	—	—	—	—	—	—	—	—	—	—	ns
tPHZ tPLZ	Output Disable Time $\overline{OE}$ to YI	CL = 50pF[3] RL = 500Ω	—	15.0	—	—	—	7.0	—	—	—	6.0	—	—	ns
tPHZ tPLZ		CL = 50pF RL = 500Ω	—	—	—	—	—	—	—	—	—	—	—	—	ns

NOTES:
1 See test circuits and waveforms
2 Minimum limits are guaranteed but not tested on Propagation Delays
3. This parameter guaranteed but not tested.

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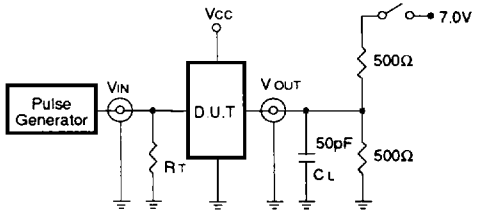
TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



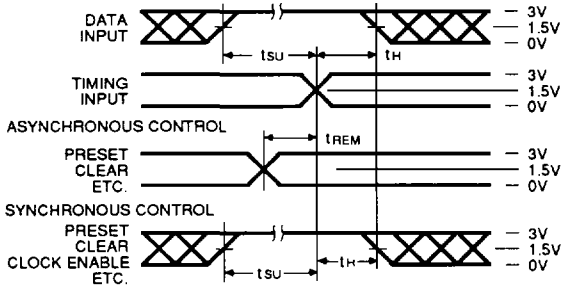
SWITCH POSITION

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

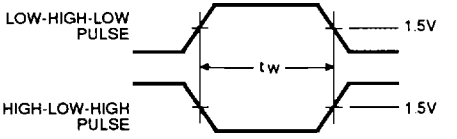
DEFINITIONS: 2600 tbl 08

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

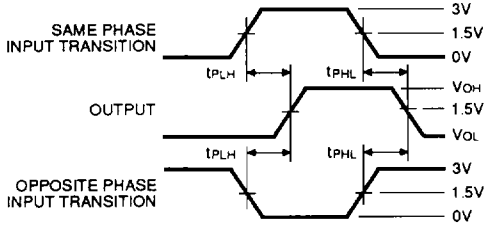
SET-UP, HOLD AND RELEASE TIMES



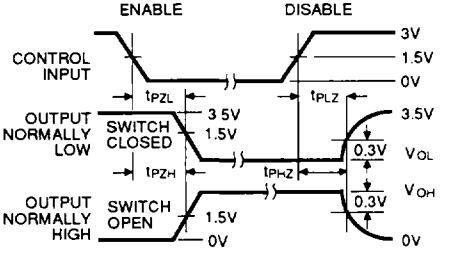
PULSE WIDTH



PROPAGATION DELAY



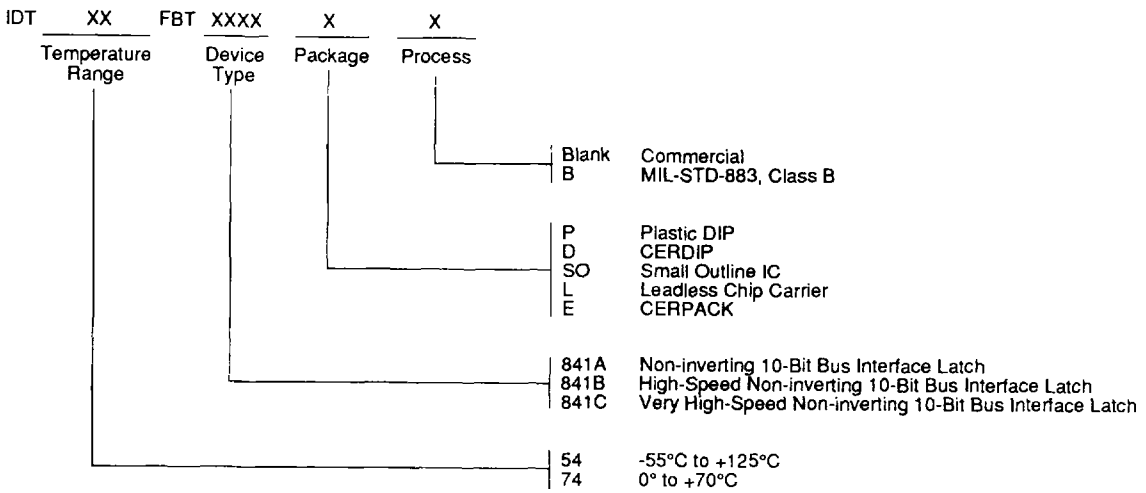
ENABLE AND DISABLE TIMES



NOTES 2600 drw 04

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
2. Pulse Generator for All Pulses: Rate ≤ 1.0 MHz; Zo ≤ 50Ω; t_F ≤ 2.5ns; t_R ≤ 2.5ns.

ORDERING INFORMATION



2600 drw 04

6