

Integrated Device Technology, Inc.

HIGH-SPEED BiCMOS OCTAL BUFFER/LINE DRIVER

ADVANCE INFORMATION
IDT54/74FBT244
IDT54/74FBT244A
IDT54/74FBT244C

FEATURES:

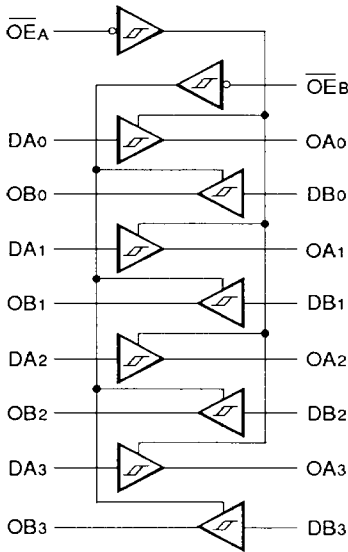
- IDT54/74FBT244 is equivalent to the 54/74BCT244
- IDT54/74FBT244A is 25% faster than the 244
- IDT54/74FBT244C is 10% faster than the 244A
- Significant reduction in ground bounce from standard CMOS devices
- TTL compatible input and output levels
- ±10% power supply for both military and commercial 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 Octal Buffers and Line Drivers are built using advanced BiCEMOS™, a dual metal BiCMOS technology. This technology is designed to supply the highest device speeds while maintaining CMOS power levels.

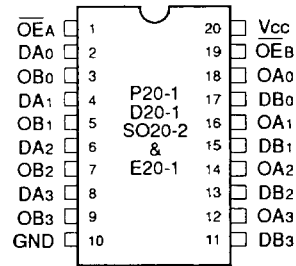
The FBT series of bus interface devices are ideal for use in designs needing to drive large capacitive loads with low static (DC) current loading. All data inputs have a 200mV typical input hysteresis for improved noise rejection.

FUNCTIONAL BLOCK DIAGRAM

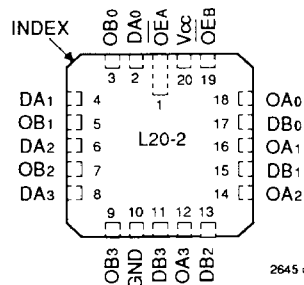


2645 drw 01

PIN CONFIGURATIONS



DIP/SOIC/CERPACK
TOP VIEW



LCC
TOP VIEW

2645 drw 02

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MILITARY AND COMMERCIAL TEMPERATURE RANGES

JUNE 1990

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PIN DESCRIPTION

Pin Names	Description
OE _A , OE _B	3-State Output Enable Inputs
D _{xx}	Inputs
O _{xx}	Outputs

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FUNCTION TABLE

Inputs		Output
OE _A , OE _B	D	
L	L	L
L	H	H
H	X	Z

NOTE:

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

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

NOTE:

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- 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.

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:

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- This parameter is measured at characterization but not tested.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Commercial: $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 10\%$; Military: $T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 10\%$

Symbol	Parameter	Test Conditions ⁽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	$V_{CC} = \text{Max.}$, $V_i = 2.7\text{V}$		—	—	10	μA	
I_{iL}	Input LOW Current	$V_{CC} = \text{Max.}$, $V_i = 0.5\text{V}$		—	—	-10	μA	
I_{OZH}	High Impedance	$V_{CC} = \text{Max.}$	$V_o = 2.7\text{V}$	—	—	50	μA	
I_{OZL}	Output Current		$V_o = 0.5\text{V}$	—	—	-50		
I_i	Input HIGH Current	$V_{CC} = \text{Max.}$, $V_i = 5.5\text{V}$		—	—	100	μA	
V_{iK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}$, $I_N = -18\text{mA}$		—	-0.7	-1.2	V	
I_{OS}	Short Circuit Current	$V_{CC} = \text{Max.}$, $V_o = \text{GND}^{(3)}$		-75	—	-225	mA	
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}$ $V_{IN} = V_{IH}$ or V_{iL}	$I_{OH} = -12\text{mA MIL.}$	2.4	3.3	—	V	
			$I_{OH} = -15\text{mA COM'L.}$	—	—	—	—	
			$I_{OH} = -18\text{mA MIL.}$	2.0	3.0	—	V	
			$I_{OH} = -24\text{mA COM'L.}$	—	—	—	—	
V_{OL}	Output LOW Voltage		$I_{OL} = 48\text{mA MIL.}$	—	0.3	0.55	V	
			$I_{OL} = 64\text{mA COM'L.}$	—	—	—	—	
V_H	Input Hysteresis	$V_{CC} = 5\text{V}$		—	200	—	mV	
I_{OFF}	Bus Leakage Current	$V_{CC} = 0\text{V}$, $V_o = 4.5\text{V}$		—	—	100	μA	
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$ $V_{IN} = \text{GND}$ or V_{CC}		—	0.2	1.5	mA	

NOTES:

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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 $V_{CC} = 5.0\text{V}$, $+25^\circ\text{C}$ 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.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current (Inputs TTL HIGH)	$V_{CC} = \text{Max.}$ $V_{IN} = 3.4V^{(3)}$		—	—	2.0	mA
I_{CCD}	Dynamic Power Supply Current ⁽⁴⁾	$V_{CC} = \text{Max.}$, Outputs Open $\overline{OE}A = \overline{OE}B = \text{GND}$ One Input Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	—	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 $\overline{OE}A = \overline{OE}B = \text{GND}$ One Bit Toggling	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	—	4.0	mA
			$V_{IN} = 3.4V$ $V_{IN} = \text{GND}$	—	—	5.0	
		$V_{CC} = \text{Max.}$, Outputs Open $f_i = 2.5\text{MHz}$, 50% Duty Cycle $\overline{OE}A = \overline{OE}B = \text{GND}$ Eight Bits Toggling	$V_{IN} = V_{CC}$ $V_{IN} = \text{GND}$	—	—	6.5 ⁽⁵⁾	
			$V_{IN} = 3.4V$ $V_{IN} = \text{GND}$	—	—	14.5 ⁽⁵⁾	

NOTES:

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- 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, and maximum loading.
- 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.
- $I_C = I_{CC} + \Delta I_{CC} D_{HNT} + I_{CCD} (f_{CP}/2 + f_i N_i)$
 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⁾	IDT54/74FBT244				IDT54/74FBT244A				IDT54/74FBT244C				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	Propagation Delay Dn to On	$C_L = 50\text{pF}$ $R_L = 500\Omega$	1.5	5.5	—	—	1.5	4.8	—	—	1.5	4.1	—	—	ns
tPHL			1.5	8.7	—	—	1.5	6.2	—	—	1.5	5.8	—	—	ns
tPZH	Output Enable Time		1.5	7.7	—	—	1.5	5.6	—	—	1.5	5.2	—	—	ns
tPHZ	Output Disable Time		1.5	7.7	—	—	1.5	5.6	—	—	1.5	5.2	—	—	ns
tPLZ															

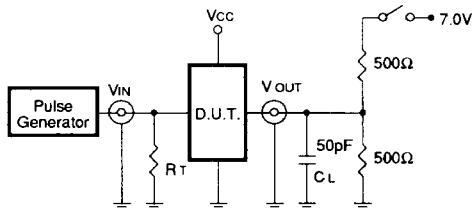
NOTES:

2645 tbi/07

- See test circuit and waveforms.
- Minimum limits are guaranteed but not tested on Propagation Delays.
- Typical values are at $V_{CC} = 5.0V$, $+25^\circ\text{C}$ ambient and maximum loading.

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



SWITCH POSITION

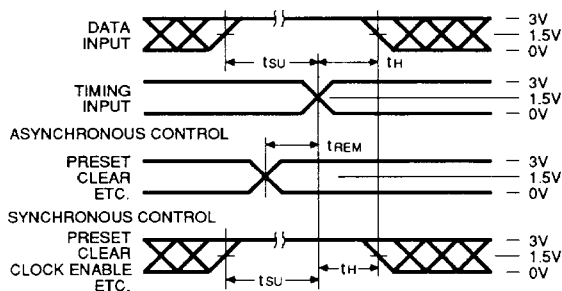
Test	Switch
Open Drain Disable Low Enable Low	Closed
All Other Outputs	Open

DEFINITIONS:

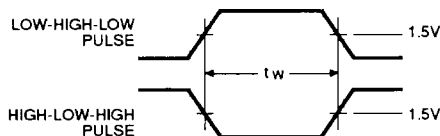
CL = Load capacitance: includes jig and probe capacitance.
RT = Termination resistance: should be equal to ZOUT of the Pulse Generator.

2645 tbl 08

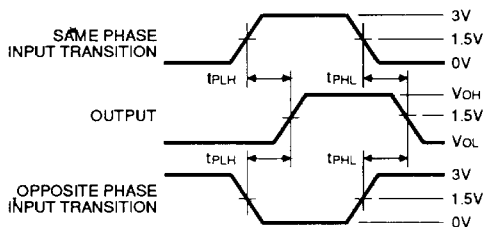
SET-UP, HOLD AND RELEASE TIMES



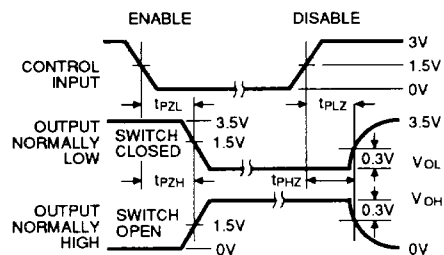
PULSE WIDTH



PROPAGATION DELAY



ENABLE AND DISABLE TIMES

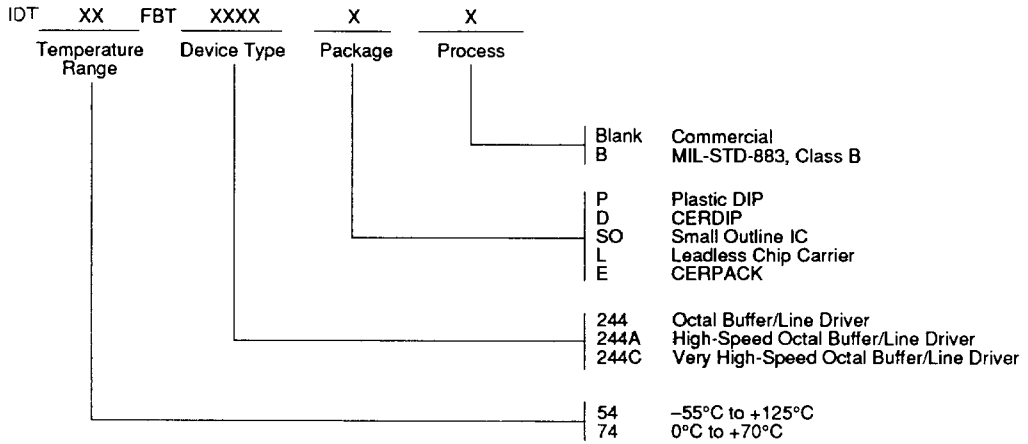


NOTES

- Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
- Pulse Generator for All Pulses: Rate ≤ 1.0 MHz; Zo $\leq 50\Omega$; tr ≤ 2.5 ns; ta ≤ 2.5 ns.

2645 drw 04

ORDERING INFORMATION



2645 drw 03