

Integrated Device Technology, Inc.

HIGH-SPEED BiCMOS 10-BIT BUFFERS AND BUS DRIVERS

ADVANCE INFORMATION
IDT54/74FBT827A/B/C
IDT54/74FBT828A/B/C

FEATURES:

- Functionally equivalent to 54/74BCT827A/828A
- **IDT54/74FBT827B/828B 25% faster than the 827A/828A**
- **IDT54/74FBT827C/828C 10% faster than the 827B/828B**
- Significant reduction in ground bounce from standard CMOS devices
- TTL compatible input and output levels
- Low power in all three states
- $\pm 10\%$ 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

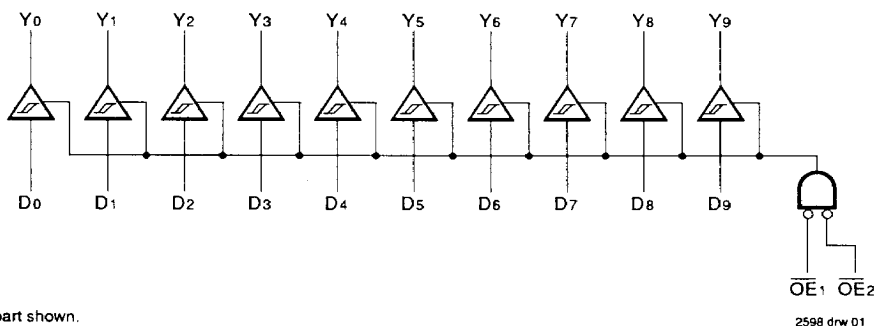
DESCRIPTION:

The FBT series of BiCMOS buffers and bus 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 IDT54/74FBT827 and IDT54/74FBT828 are 3-state, 10-bit bus drivers. They provide bus interface to wide data/address paths or buses carrying parity. The output buffers are enabled when the two active-low output enable pins are both logic low.

The FBT series of buffers 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⁽¹⁾



PRODUCT SELECTOR GUIDE

	10-Bit Buffers
Non-inverting	IDT54/74FBT827A/B/C
Inverting	IDT54/74FBT828A/B/C

2598 tbl 01

BiCEMOS is a trademark of Integrated Device Technology, Inc.

MILITARY AND COMMERCIAL TEMPERATURE RANGES

JUNE 1990

©1990 Integrated Device Technology, Inc.

6.65-j

DCS-5013/-
1

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:

2598 tbl 05

- 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:

2598 tbl 06

- 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 Output Current	V _{CC} = Max.	V _O = 2.7V	—	—	50	μA
I _{OZL}			V _O = 0.5V	—	—	-50	μA
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
V _{OL}	Output LOW Voltage		I _{OH} = -18mA MIL. I _{OH} = -24mA COM'L.	2.0	3.0	—	V
			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

NOTES:

2598 tbl 05

- 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°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.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ.	Max.	Unit
ΔIcc	Quiescent Power Supply Current (Inputs TTL HIGH)	Vcc = Max. VIN = 3.4V ⁽³⁾		—	—	2.0	mA
IcCD	Dynamic Power Supply Current ⁽⁴⁾	Vcc = Max., Outputs Open OE1 = OE2 = GND One Input Toggling 50% Duty Cycle	VIN = Vcc VIN = GND	—	—	0.25	mA/ MHz
Ic	Total Power Supply Current ⁽⁶⁾	Vcc = Max., Outputs Open fi = 10MHz, 50% Duty Cycle	VIN = Vcc VIN = GND	—	—	4.0	mA
		OE1 = OE2 = GND One Bit Toggling	VIN = 3.4V VIN = GND	—	—	5.0	
		Vcc = Max., Outputs Open fi = 2.5MHz, 50% Duty Cycle	VIN = Vcc VIN = GND	—	—	7.8 ⁽⁵⁾	
		OE1 = OE2 = GND Ten Bits Toggling	VIN = 3.4V VIN = GND	—	—	17.8 ⁽⁵⁾	

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 Vcc = 5.0V, +25°C ambient, and maximum loading.
3. Per TTL driven input (VIN = 3.4V); all other inputs at Vcc 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 Ic formula. These limits are guaranteed but not tested.
6. Ic = IQUIESCENT + IINPUTS + IDYNAMIC
Ic = Icc + ΔIcc DHNT + IcCD (fCP/2 + fiNi)
Icc = Quiescent Current
ΔIcc = Power Supply Current for a TTL High Input (VIN = 3.4V)
DH = Duty Cycle for TTL Inputs High
NT = Number of TTL Inputs at DH
IcCD = Dynamic Current Caused by an Output Transition Pair (HLH or LHL)
fCP = Clock Frequency for Register Devices (Zero for Non-Register Devices)
fi = Input Frequency
Ni = Number of Inputs at fi
All currents are in milliamps and all frequencies are in megahertz.

2598 1b/ 08

SWITCHING CHARACTERISTICS OVER OPERATING RANGE – IDT54/74FBT827A/B/C

Symbol	Parameter	Condition ⁽¹⁾	54/74FBT827A				54/74FBT827B				54/74FBT827C				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.	
tPHL	Propagation Delay	CL = 50pF RL = 500Ω	—	7.0	—	—	—	5.0	—	—	—	4.4	—	—	ns
tPLH	DI to Yi		—	7.0	—	—	—	5.0	—	—	—	4.4	—	—	ns
tPZH	Output Enable Time		—	12.0	—	—	—	8.0	—	—	—	7.0	—	—	ns
tPZL	OE to Yi		—	12.0	—	—	—	8.0	—	—	—	7.0	—	—	ns
tPHZ	Output Disable Time		—	12.0	—	—	—	7.0	—	—	—	6.0	—	—	ns
tPLZ	OE to Yi		—	12.0	—	—	—	7.0	—	—	—	6.0	—	—	ns

SWITCHING CHARACTERISTICS OVER OPERATING RANGE – IDT54/74FBT828A/B/C

Symbol	Parameter	Condition ⁽¹⁾	54/74FBT828A				54/74FBT828B				54/74FBT828C				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.	
tPHL	Propagation Delay DI to Yi	CL = 50pF RL = 500Ω	—	7.0	—	—	—	5.5	—	—	—	4.4	—	—	ns
tPZH	Output Enable Time OE to Yi		—	11.0	—	—	—	8.0	—	—	—	7.0	—	—	ns
tPZL															
tPHZ	Output Disable Time OE to Yi		—	10.0	—	—	—	7.0	—	—	—	6.0	—	—	ns

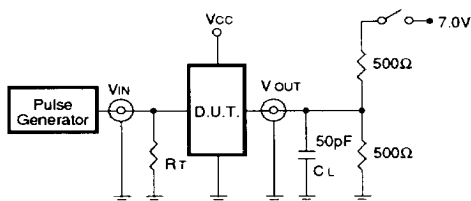
NOTES:

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

2598 t01 07

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



SWITCH POSITION

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

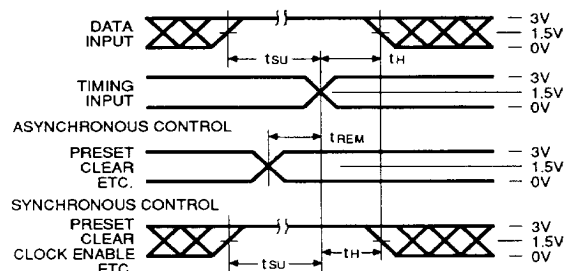
DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.

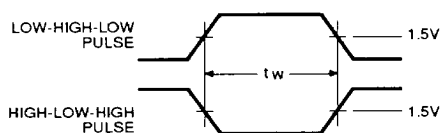
RT = Termination resistance: should be equal to ZOUT of the Pulse Generator.

2598 tbi 08

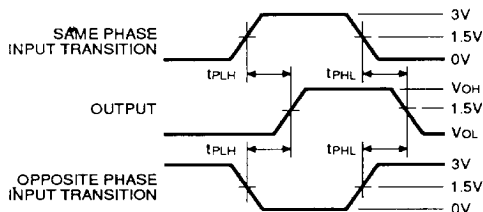
SET-UP, HOLD AND RELEASE TIMES



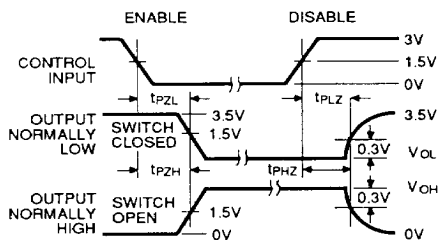
PULSE WIDTH



PROPAGATION DELAY



ENABLE AND DISABLE TIMES



NOTES

2598 drw 04

- Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
- Pulse Generator for All Pulses: Rate ≤ 1.0 MHz; $Z_0 \leq 50\Omega$; $t_r \leq 2.5$ ns; $t_R \leq 2.5$ ns.

ORDERING INFORMATION

IDT	XX	FBT	XXXX	X	X	
	Temperature Range		Device Type	Package	Process	
					Blank B	Commercial MIL-STD-883, Class B
					P	Plastic DIP
					D	CERDIP
					SO	Small Outline IC
					L	Leadless Chip Carrier
					E	CERPACK
					827A	Non-inverting 10-Bit Buffer and Line Driver
					828A	Inverting 10-Bit Buffer and Line Driver
					827B	High-Speed Non-inverting 10-Bit Buffer and Line Driver
					828B	High-Speed Inverting 10-Bit Buffer and Line Driver
					827C	Very High-Speed Non-inverting 10-Bit Buffer and Line Driver
					828C	Very High-Speed Inverting 10-Bit Buffer and Line Driver
					54	-55°C to +125°C
					74	0° to +70°C

2598 drw 04