



FAST CMOS OCTAL BUFFER/LINE DRIVER

IDT54/74FCT244/A/C

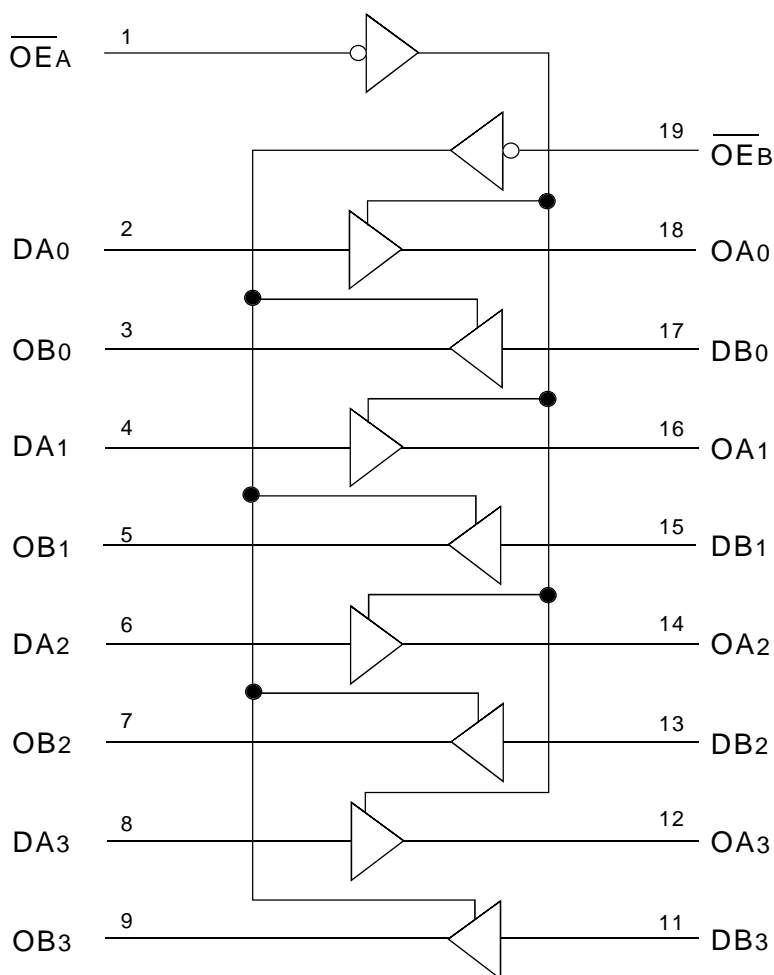
FEATURES:

- IDT54/74FCT244A equivalent to FAST™ speed and drive
- IDT54/74FCT244A 25% faster than FAST
- IDT54/74FCT244C up to 55% faster than FAST
- $I_{OL} = 64\text{mA}$ (commercial) and 48mA (military)
- CMOS power levels (1mW typ. static)
- Military product compliant to MIL-STD-883, Class B
- Meets or exceeds JEDEC Standard 18 specifications
- Available in the following packages:
 - Commercial: SOIC
 - Military: CERDIP, LCC, CERPACK

DESCRIPTION:

The IDT octal buffer/line drivers are built using an advanced dual metal CMOS technology. The FCT244 is designed to be employed as a memory and address driver, clock driver, and bus-oriented transmitter/receiver which provides improved board density.

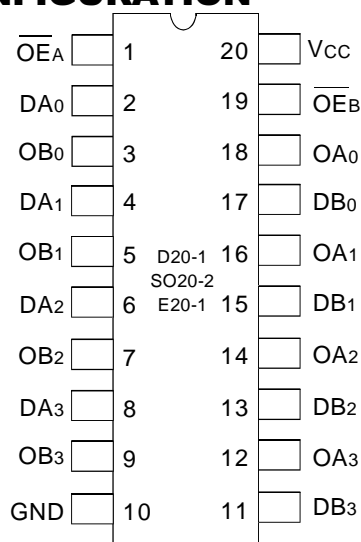
FUNCTIONAL BLOCK DIAGRAM



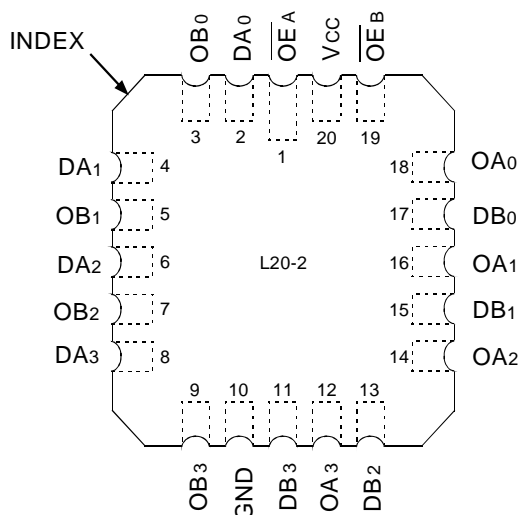
MILITARY AND COMMERCIAL TEMPERATURE RANGES

JUNE 2000

PIN CONFIGURATION



DIP/ SOIC/ CERPACK
TOP VIEW



LCC
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Commercial	Military	Unit
V _{TERM} ⁽²⁾	Terminal Voltage with Respect to GND	-0.5 to +7	-0.5 to +7	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

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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.

FUNCTION TABLE (1)

Inputs			Outputs
OE _A	OE _B	D	
L	L	L	L
L	L	H	H
H	H	X	Z

NOTE:

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

PIN DESCRIPTION

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

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 $+70^\circ C$, $V_{CC} = 5.0V \pm 5\%$; Military: $T_A = -55^\circ C$ to $+125^\circ C$, $V_{CC} = 5.0V \pm 10\%$

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
I_{IL}	Input LOW Current		$V_I = 2.7V$	—	—	5 ⁽⁴⁾	
			$V_I = 0.5V$	—	—	-5 ⁽⁴⁾	
			$V_I = \text{GND}$	—	—	-5	
I_{OZH}	Off State (High Impedance) Output Current	$V_{CC} = \text{Max.}$	$V_O = V_{CC}$	—	—	10	μA
I_{OZL}			$V_O = 2.7V$	—	—	10 ⁽⁴⁾	
			$V_O = 0.5V$	—	—	-10 ⁽⁴⁾	
			$V_O = \text{GND}$	—	—	-10	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_N = -18mA$		—	-0.7	-1.2	V
I_{OS}	Short Circuit Current	$V_{CC} = \text{Max.}^{(3)}, V_O = \text{GND}$		-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
		$V_{CC} = \text{Min.}$ $V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -300\mu A$	V_{HC}	V_{CC}	—	
			$I_{OH} = -12mA \text{ MIL.}$	2.4	4.3	—	
			$I_{OH} = -15mA \text{ COM'L.}$	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
		$V_{CC} = \text{Min.}$ $V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 300\mu A$	—	GND	$V_{LC}^{(4)}$	
			$I_{OL} = 48mA \text{ MIL.}$	—	0.3	0.55	
			$I_{OL} = 64mA \text{ COM'L.}$	—	0.3	0.55	

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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 $V_{CC} = 5.0V$, $+25^\circ C$ 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} ≥ V _{HC} ; V _{IN} ≤ 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	mA
I _{CCD}	Dynamic Power Supply Current ⁽⁴⁾	V _{CC} = Max. Outputs Open O _{EA} = O _{EB} = GND One Input Toggling 50% Duty Cycle	V _{IN} ≥ V _{HC} V _{IN} ≤ V _{LC}	—	0.15	0.25	mA/ MHz
I _C	Total Power Supply Current ⁽⁶⁾	V _{CC} = Max. Outputs Open f _i = 10MHz 50% Duty Cycle O _{EA} = O _{EB} = GND One Bit Toggling	V _{IN} ≥ V _{HC} V _{IN} ≤ V _{LC} (FCT)	—	1.7	4	mA
			V _{IN} = 3.4V V _{IN} = GND	—	2	5	
		V _{CC} = Max. Outputs Open f _i = 2.5MHz 50% Duty Cycle O _{EA} = O _{EB} = GND Eight Bits Toggling	V _{IN} ≥ V _{HC} V _{IN} ≤ V _{LC} (FCT)	—	3.2	6.5 ⁽⁵⁾	
			V _{IN} = 3.4V V _{IN} = 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°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.

$$I_C = I_{CC} + I_{INPUTS} + I_{DYNAMIC}$$

$$I_C = I_{CC} + \Delta I_{CC} \cdot D_{HNT} + I_{CCD} (f_{CP}/2 + f_i N_i)$$

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 (1,2)

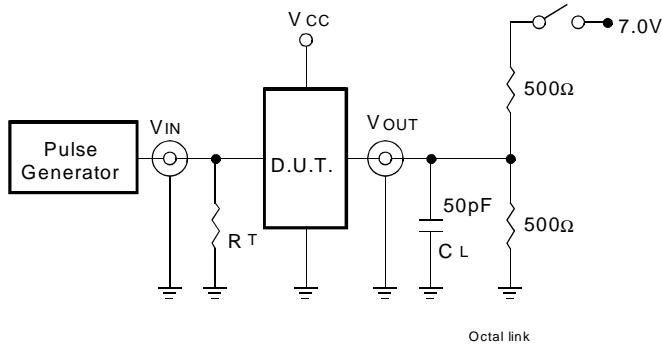
Symbol	Parameter	Condition	54/74FCT244		54/74FCT244A		54/74FCT244C		Unit						
			Com'l.		Mil.		Com'l.			Mil.					
			Min.	Max.	Min.	Max.	Min.	Max.		Min.	Max.				
t _{PLH} t _{PHL}	Propagation Delay DN to ON	C _L = 50pF R _L = 500Ω	1.5	6.5	1.5	7	1.5	4.8	1.5	5.1	1.5	4.1	1.5	4.6	ns
t _{PZH} t _{PZL}	Output Enable Time		1.5	8	1.5	8.5	1.5	6.2	1.5	6.5	1.5	5.8	1.5	6.5	
t _{PHZ} t _{PLZ}	Output Disable Time		1.5	7	1.5	7.5	1.5	5.6	1.5	5.9	1.5	5.2	1.5	5.7	

NOTES:

- See test circuit and wave forms.
- Minimum limits are guaranteed but not tested on Propagation Delays.

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



SWITCH POSITION

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

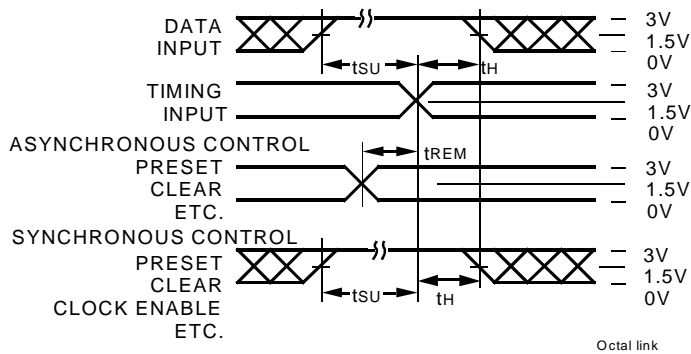
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DEFINITIONS:

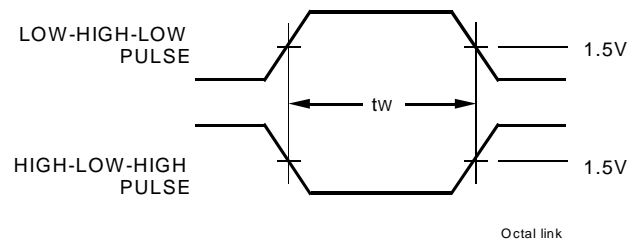
C_L = Load capacitance: includes jig and probe capacitance.

R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

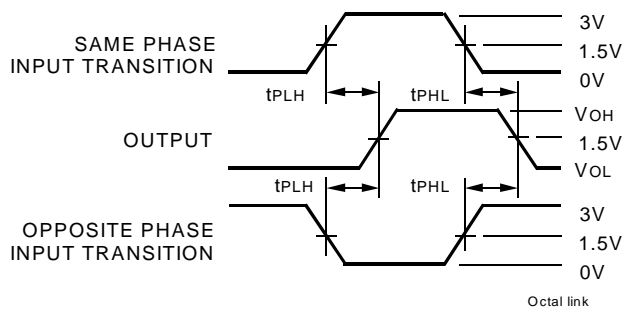
SET-UP, HOLD, AND RELEASE TIMES



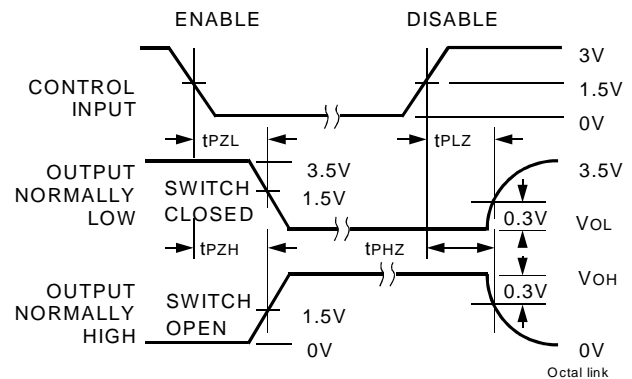
PULSE WIDTH



PROPAGATION DELAY



ENABLE AND DISABLE TIMES



NOTES:

- 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	XX	X	
Temp. Range	Device Type	Package	Process			
					Blank	Commercial
					B	MIL-STD-883, Class B
					SO	<u>Commercial Options</u> Small Outline IC (SO20-2)
					D	<u>Military Options</u> CERDIP (D20-1)
					E	CERPACK (E20-1)
					L	Leadless Chip Carrier (L20-2)
					244	Octal Buffer/Line Driver
					244A	
					244C	
					54	- 55°C to +125°C
					74	0°C to +70°C



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