Integrated Device Technology, Inc.

FAST CMOS OCTAL BUFFER/ LINE DRIVER

PRELIMINARY
IDT 54/74FCT540/A
IDT 54/74FCT541/A

FEATURES:

- IDT54/74FCT540/41 equivalent to FAST™ speed; **IDT54/74FCT540A/41A 30% faster than FAST™**
- Equivalent to FAST™ output drive over full temperature and voltage supply extremes
- I_{OL} = 64mA (commercial), 48mA (military)
- Octal buffer/line driver with 3-state output
- Pinout arrangement for flow-through architecture
- CMOS power levels (5μW typ. static)
- Substantially lower input current levels than FAST™ (5μA max.)
- Available in CERDIP, Plastic DIP, LCC and SOIC
- TTL input and output level compatible
- CMOS output level compatible
- Product available in Radiation Tolerant and Enhanced versions
- Military product compliant to MIL-STD-883, Class B

DESCRIPTION:

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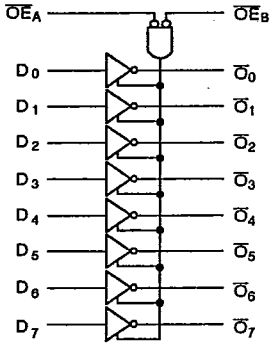
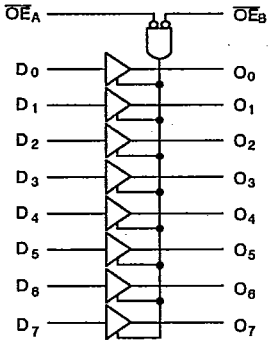
The IDT54/74FCT540/A and IDT54/74FCT541/A are octal buffer/line drivers built using advanced CEMOS™, a dual metal CMOS technology.

These devices are similar in function to the IDT54/74FCT240 and IDT54/74FCT241, respectively, except that the inputs and outputs are on opposite sides of the package. This pinout arrangement makes these devices especially useful as output ports for microprocessors, allowing ease of layout and greater board density.

FUNCTIONAL BLOCK DIAGRAM

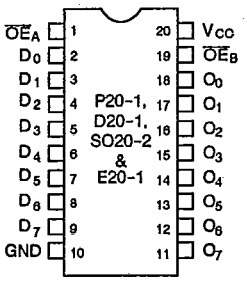


IDT54/74FCT540

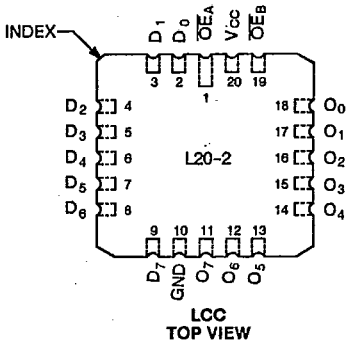


IDT54/74FCT541

PIN CONFIGURATIONS



DIP/SOIC/CERPACK TOP VIEW



LCC TOP VIEW

DEFINITION OF FUNCTIONAL TERMS

PIN NAMES	DESCRIPTION
$\overline{OE}_A$, $\overline{OE}_B$	3-State Output Enable Input (Active LOW)
D_{XX}	Inputs
O_{XX}	Outputs

TRUTH TABLE

INPUTS		OUTPUT	
$\overline{OE}_A$, $\overline{OE}_B$	D	540	541
L	L	H	L
L	H	L	H
H	X	Z	Z

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

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FAST is a trademark of Fairchild Semiconductor Co.

DSC-4029/-1

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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:

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.

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:

1. This parameter is guaranteed by characterization data and 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_{OZ}	Off State (High Impedance) Output Current	V_{CC} = Max.	V_O = V_{CC}	–	–	10	µA
			V_O = 2.7V	–	–	10[4]	
			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		-60	-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. V_{IN} = V_{IH} or V_{IL}	I_{OH} = -300µA	V_{HC}	V_{CC}	–	
			I_{OH} = -12mA MIL.	2.4	4.3	–	
			I_{OH} = -15mA 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_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OL} = 300µA	–	GND	V_{LC}	
			I_{OL} = 48mA MIL.	–	0.3	0.55	
			I_{OL} = 64mA COM'L.	–	0.3	0.55	

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 exceed one second.
4. This parameter is guaranteed but not tested.

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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. $V_{IN} \geq V_{HC}$; $V_{IN} \leq V_{LC}$ f_i = 0		–	0.001	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 $\overline{OE}_A$ = $\overline{OE}_B$ = GND 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 f_i = 10MHz 50% Duty Cycle $\overline{OE}_A$ = $\overline{OE}_B$ = GND One Input Toggling	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (FCT)	–	1.5	4.0	mA
			V_{IN} = 3.4V V_{IN} = GND	–	1.8	5.0	
		V_{CC} = Max. Outputs Open f_i = 2.5MHz 50% Duty Cycle $\overline{OE}_A$ = $\overline{OE}_B$ = GND Eight Inputs Toggling	$V_{IN} \geq V_{HC}$ $V_{IN} \leq V_{LC}$ (FCT)	–	3.0	6.5[5]	
			V_{IN} = 3.4V V_{IN} = GND	–	5.0	14.5[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 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

		[1]	IDT54/74FCT540/541					IDT54/74FCT540A/541A					
				COM'L.		MIL.			COM'L.		MIL.		
			[3]	MIN.[2]	MAX.	MIN.[2]	MAX.	[3]	MIN.[2]	MAX.	MIN.[2]	MAX.	
t_{PLH} t_{PHL}	Propagation Delay D_n to O_n IDT54/74FCT540	C_L = 50pF R_L = 500Ω	5.0	2.0	8.5	2.0	9.5	3.5	2.0	4.8	2.0	5.1	ns
t_{PLH} t_{PHL}	Propagation Delay D_n to O_n IDT54/74FCT541		5.0	2.0	8.0	2.0	9.0	3.5	2.0	4.8	2.0	5.1	ns
t_{PZH} t_{PZL}	Output Enable Time		7.0	2.0	10.0	2.0	10.5	4.2	2.0	6.2	2.0	6.5	ns
t_{PHZ} t_{PLZ}	Output Disable Time		6.0	2.0	9.5	2.0	12.5	4.0	2.0	5.6	2.0	5.9	ns

NOTES:

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. Typical values are at V_{CC} = 5.0V, +25°C ambient and maximum loading.

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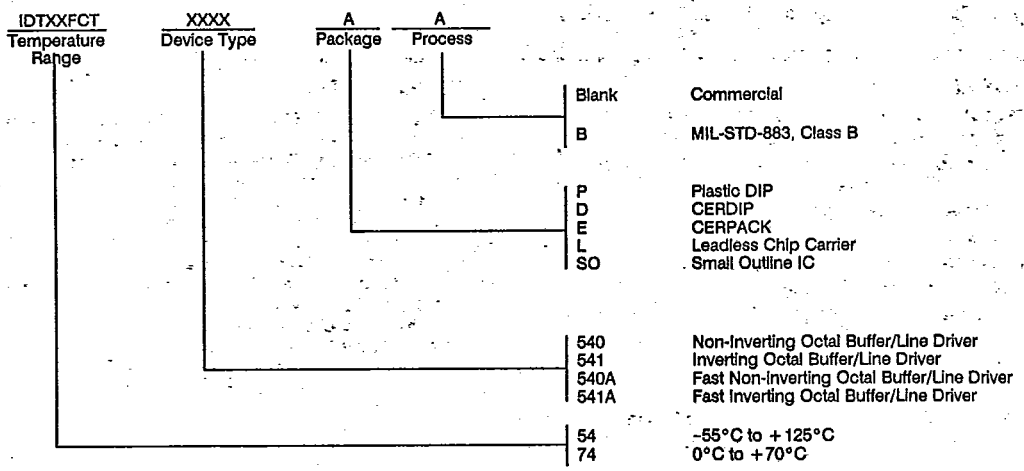
ORDERING INFORMATION



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