Integrated Device Technology, Inc.

FAST CMOS 8-INPUT MULTIPLEXER

IDT54/74FCT151T/AT/CT

FEATURES:

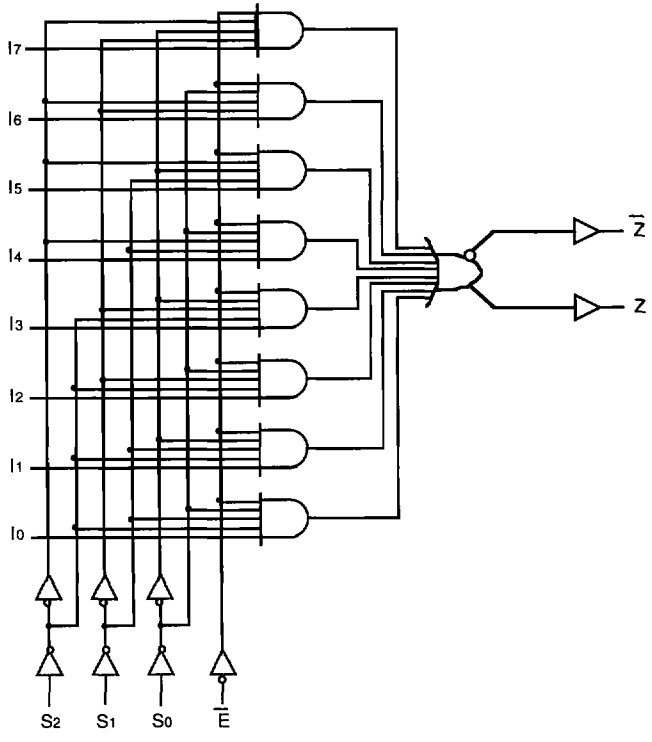
- Std., A, and C speed grades
- Low input and output leakage ≤1μA (max.)
- CMOS power levels
- True TTL input and output compatibility
  - V_{OH} = 3.3V (typ.)
  - V_{OL} = 0.3V (typ.)
- High drive outputs (-15mA I_{OH}, 48mA I_{OL})
- Power off disable outputs permit "live insertion"
- Meets or exceeds JEDEC standard 18 specifications
- Product available in Radiation Tolerant and Radiation Enhanced versions
- Military product compliant to MIL-STD-883, Class B and DESC listed (dual marked)
- Available in DIP, SOIC, CERPACK and LCC packages

DESCRIPTION:

The IDT54/74FCT151T/AT/CT are high-speed 8-input multiplexers built using an advanced dual metal CMOS technology. They select one bit of data from up to eight sources under the control of three select inputs. Both assertion and negation outputs are provided.

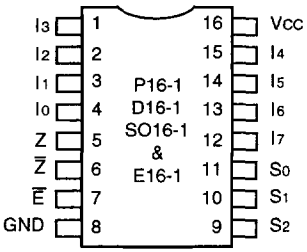
The IDT54/74FCT151T/AT/CT has a common Active-LOW *enable ($\overline{E}$) input. When $\overline{E}$ is LOW, data from one of eight inputs* is routed to the complementary outputs according to the 3-bit code applied to the Select (S_0-S_2) inputs. A common application of the 'FCT151 is data routing from one of eight sources.

FUNCTIONAL BLOCK DIAGRAM



2635 drw 01

PIN CONFIGURATIONS



DIP/SOIC/CERPACK
TOP VIEW

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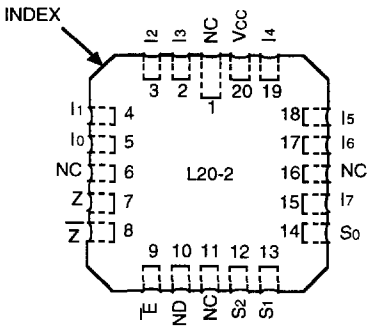

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LCC
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Commercial	Military	Unit
V_{TERM}(2)	Terminal Voltage with Respect to GND	–0.5 to +7.0	–0.5 to +7.0	V
V_{TERM}(3)	Terminal Voltage with Respect to GND	–0.5 to Vcc +0.5	–0.5 to Vcc +0.5	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	–60 to +120	–60 to +120	mA

NOTES: 2635 lnk 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.
2. Input and Vcc terminals only.
3. 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

NOTE: 2635 lnk 02

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

PIN DESCRIPTION

Pin Names	Description
I0 - I7	Data Inputs
S0 - S2	Selects Inputs
Ē	Enable Input (Active LOW)
Z	Data Output
Z̄	Inverted Data Output

2635 tbl 03

FUNCTION TABLE(1)

Inputs				Outputs	
S2	S1	S0	Ē	Z	Z̄
X	X	X	H	L	H
L	L	L	L	I0	Ī0
L	L	H	L	I1	Ī1
L	H	L	L	I2	Ī2
L	H	H	L	I3	Ī3
H	L	L	L	I4	Ī4
H	L	H	L	I5	Ī5
H	H	L	L	I6	Ī6
H	H	H	L	I7	Ī7

NOTE: 2635 tbl 04

1. H = HIGH Voltage Level, L = LOW Voltage Level, X = Don't care, Z = High Impedance.

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DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
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[4]	V_{CC} = Max.	V_I = 2.7V	—	—	±1	µA
I_{IL}	Input LOW Current[4]	V_{CC} = Max.	V_I = 0.5V	—	—	±1	µA
I_{OZH}	High Impedance Output Current[4]	V_{CC} = Max.	V_O = 2.7V	—	—	±1	µA
I_{OZL}			V_O = 0.5V	—	—	±1	
I_I	Input HIGH Current[4]	V_{CC} = Max., V_I = V_{CC} (Max.)		—	—	20	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.[3], V_O = GND		–60	–120	–225	mA
V_{OH}	Output HIGH Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OH} = –6mA MIL. I_{OH} = –8mA COM'L.	2.4	3.3	—	V
			I_{OH} = –12mA MIL. I_{OH} = –15mA COM'L.	2.0	3.0	—	V
V_{OL}	Output LOW Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OL} = 32mA MIL. I_{OL} = 48mA COM'L.	—	0.3	0.5	V
V_H	Input Hysteresis	—		—	200	—	mV
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max. V_{IN} = GND or V_{CC}		—	0.01	1	mA

2635 tbl 05

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. The test limit for this parameter is ±5µA at T_A = -55°C.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
ΔI_{CC}	QuiescentPower 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 $\overline{E}$ or $\overline{OE}$ = GND One Bit Toggling 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	0.15	0.25	mA/ MHz
I_C	Total Power Supply Current[5]	V_{CC} = Max. Outputs Open f_i = 10MHz 50% Duty Cycle $\overline{E}$ or $\overline{OE}$= GND One Input Toggling	V_{IN} = V_{CC} V_{IN} = GND V_{IN} = 3.4V V_{IN} = GND	— —	3.2 3.5	6.5 7.5	mA

NOTES:
2635 tbl 06

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.
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. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_O)$
   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_O = Number of Inputs at f_i
   All currents are in milliamps and all frequencies are in megahertz.

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SWITCHING CHARACTERISTICS OVER OPERATING RANGE

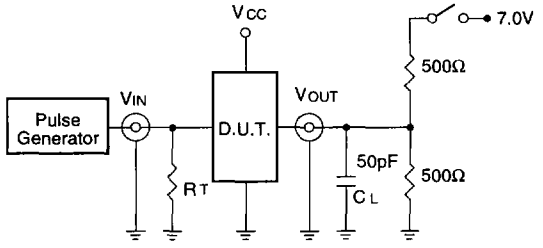
			IDT54/74FCT151T				IDT54/74FCT151AT				IDT54/74FCT151CT				
			Com'l.		Mil.		Com'l.		Mil.		Com'l.		Mil.		
Symbol	Parameter	Condition[1]	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Unit
t_{PLH} t_{PHL}	Propagation Delay S_N to $\overline{Z}$	C_L = 50pF R_L = 500Ω	1.5	9.0	1.5	10.0	1.5	6.6	1.5	7.4	1.5	5.6	1.5	6.2	ns
t_{PLH} t_{PHL}	Propagation Delay S_N to Z		1.5	10.5	1.5	11.5	1.5	6.8	1.5	7.6	1.5	5.8	1.5	6.5	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}$ to $\overline{Z}$		1.5	7.0	1.5	7.5	1.5	5.6	1.5	6.3	1.5	4.8	1.5	5.4	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}$ to Z		1.5	9.5	1.5	11.0	1.5	5.8	1.5	6.6	1.5	5.0	1.5	5.7	ns
t_{PLH} t_{PHL}	Propagation Delay I_N to $\overline{Z}$		1.5	6.5	1.5	7.5	1.5	5.2	1.5	5.8	1.5	4.4	1.5	4.9	ns
t_{PLH} t_{PHL}	Propagation Delay I_N to Z		1.5	7.5	1.5	9.0	1.5	5.5	1.5	6.1	1.5	4.7	1.5	5.2	ns

NOTES:
2635 tbl 07

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



2635 drw 04

SWITCH POSITION

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

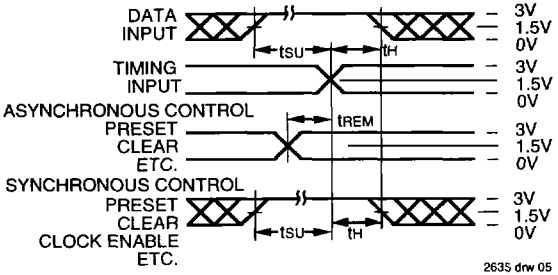
2635 lnk 08

DEFINITIONS:

CL= Load capacitance: includes jig and probe capacitance.

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

SET-UP, HOLD AND RELEASE TIMES



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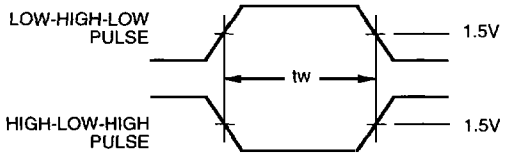
PULSE WIDTH



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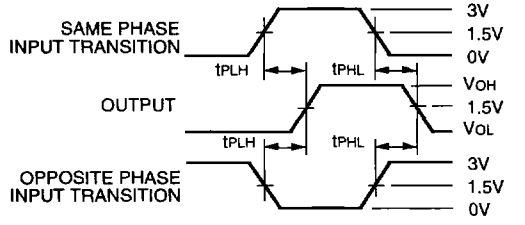
PROPAGATION DELAY



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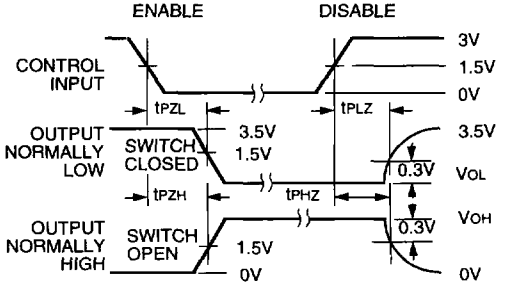
ENABLE AND DISABLE TIMES



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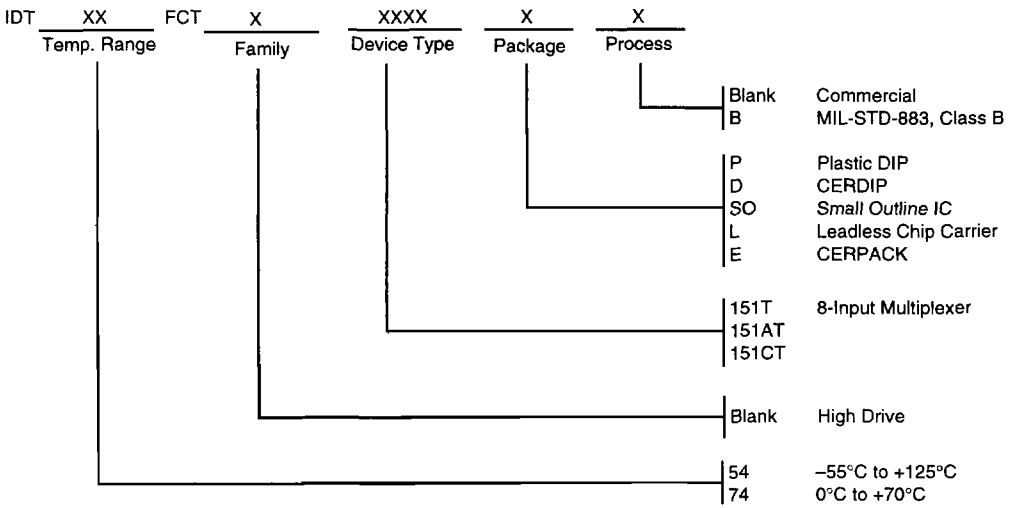
NOTES:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; tF ≤ 2.5ns; tR ≤ 2.5ns

ORDERING INFORMATION



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