Integrated Device Technology, Inc.

FAST CMOS OCTAL BUS TRANSCEIVER (OPEN DRAIN)

IDT54/74FCT621T/AT

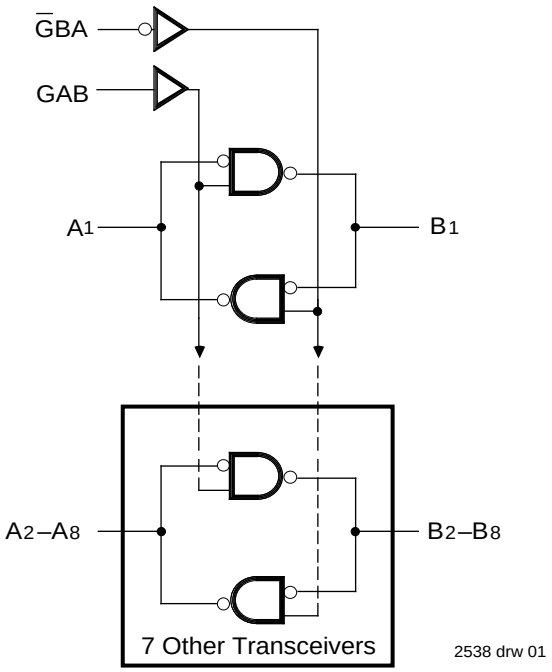
FEATURES:

- Std. and A 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.)
- 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

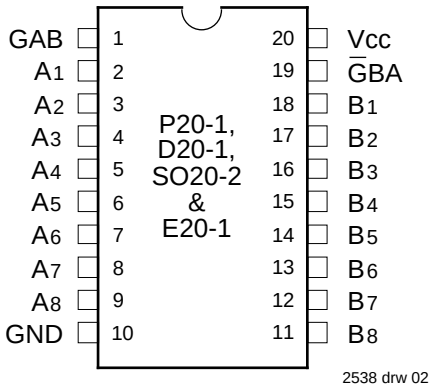
DESCRIPTION:

The IDT54/74FCT621T/AT is an octal transceiver with non-inverting Open-Drain bus compatible outputs in both send and receive directions. The B bus outputs are capable of sinking 64mA providing very good capacitive drive characteristics. These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing.

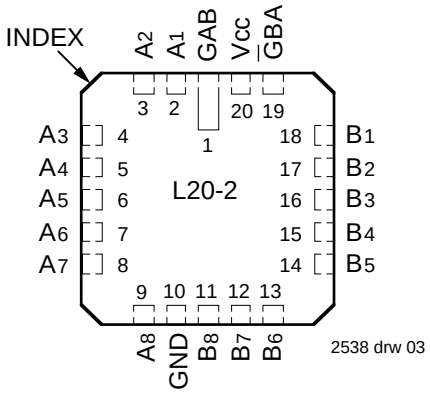
FUNCTIONAL BLOCK DIAGRAM (1)



PIN CONFIGURATIONS



DIP/SOIC/CERPACK TOP VIEW



LCC TOP VIEW

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PIN DESCRIPTION

Pin Names	Description
$\overline{G}$BA, GAB	Enable Inputs
$A_1 – A_8$	A Inputs or Open-drain Outputs
$B_1 – B_8$	B Inputs or Open-drain Outputs

2538 tbl 01

FUNCTION TABLE(1)

Enable Inputs		
$\overline{G}$BA	GAB	Function
L	L	B data to A bus
H	H	A data to B bus
H	L	OFF
L	H	B data to A bus A data to B bus

NOTE: 2538 tbl 02

1. H = HIGH Voltage Level.
   L = LOW Voltage Level.
   OFF = HIGH if pull-up resistor is connected to Open-Drain output.

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 V_{CC} +0.5	–0.5 to V_{CC} +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: 2538 lnk 03

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 V_{CC} by +0.5V unless otherwise noted.
2. Input and V_{CC} 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: 2538 lnk 04

1. 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 ± 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[5]	V_{CC} = Max., V_I = 2.7V		—	—	±1	µA
I_{IL}	Input LOW Current[5]	V_{CC} = Max., V_I = 0.5V		—	—	±1	µA
I_I	Input HIGH Current[5]	V_{CC} = Max., V_I = V_{CC} (Max.)		—	—	±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_N= –18mA		—	–0.7	–1.2	V
I_{OH}	Output HIGH Current	V_{CC} = Max. V_{IN} = V_{IH} or V_{IL}	V_{OH} = Vcc (Max.)	—	—	20	µA
V_{OL}	Output LOW Voltage (B Bus)	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OL} = 48mA MIL.[4] I_{OL} = 64mA COM'L.	—	0.3	0.55	V
V_{OL}	Output LOW Voltage (A Bus)	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OL} = 32mA MIL.[4] I_{OL} = 48mA COM'L.	—	0.3	0.5	V
I_{OFF}	Input/Output Power Off Leakage[5]	V_{CC} = 0V, V_{IN} or V_O ≤ 4.5V		—	—	±1	µA
V_H	Input Hysteresis	—		—	200	—	mV
I_{CC}	Quiescent Power Supply Current	V_{CC} = max., V_{IN} = GND or Vcc		—	0.01	1	mA

NOTES:

2538 tbl 05

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. These are maximum I_{OL} values per output, for 8 outputs turned on simultaneously. Total maximum I_{OL} (all outputs) is 512mA for commercial and 384mA for military. Derate I_{OL} for number of outputs exceeding 8 turned on simultaneously.
4. The test limit for this parameter is ±5µA at T_A = –55°C.
5. This parameter is guaranteed but not tested.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
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]	Vcc = Max. Outputs Open $\overline{G}$BA = GAB = GND or V_{CC} One Input Toggling 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	0.15	0.25	mA/MHz
I_C	Total Power Supply Current[6,7]	Vcc = Max. Outputs Open $\overline{G}$BA = GAB = GND or V_{CC} One Bit Toggling at f_i =10MHz 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	1.5	3.5	mA
			V_{IN} = 3.4V V_{IN} = GND	—	1.8	4.5	
		Vcc = Max. Outputs Open $\overline{G}$BA = GAB = GND or V_{CC} Eight Bits Toggling at f_i = 2.5MHz 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	3.0	6.0[5]	
			V_{IN} = 3.4V V_{IN} = GND	—	5.0	14.0[5]	

NOTES: 2538 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. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$
   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 Output 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.
7. This test is performed with outputs tied to GND through a pull-down resistor.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

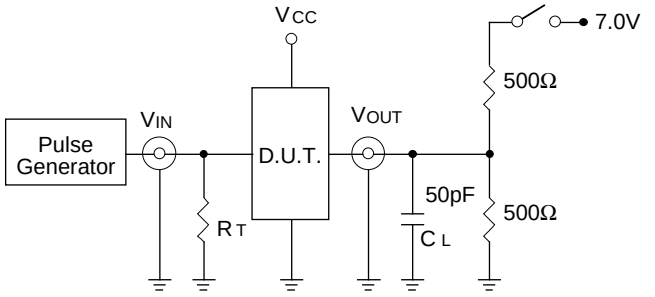
			IDT54/74FCT621T				IDT54/74FCT621AT				
			Com'l.		Mil.		Com'l.		Mil.		
Symbol	Parameter	Condition[1]	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	Unit
t_{PLH}	Propagation Delay A to B	C_L = 50pF	5.5	13.0	5.5	13.5	5.5	12.0	5.5	12.5	ns
t_{PHL}		R_L = 500Ω	1.5	8.5	1.5	9.5	1.5	6.8	1.5	7.6	
t_{PLH}	Propagation Delay B to A		5.5	12.5	5.5	13.0	5.5	12.0	5.5	12.5	ns
t_{PHL}			1.5	8.0	1.5	9.0	1.5	6.4	1.5	7.2	
t_{PLH}	Propagation Delay $\overline{G}$BA to A		5.5	14.0	5.5	14.5	5.5	13.0	5.5	13.5	ns
t_{PHL}			1.5	8.5	1.5	9.5	1.5	6.8	1.5	7.6	
t_{PLH}	Propagation Delay GAB to B		5.5	14.0	5.5	14.5	5.5	13.0	5.5	13.5	ns
t_{PHL}			1.5	8.0	1.5	9.0	1.5	6.4	1.5	7.2	

NOTES: 2538 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



2538 drw 03

SWITCH POSITION

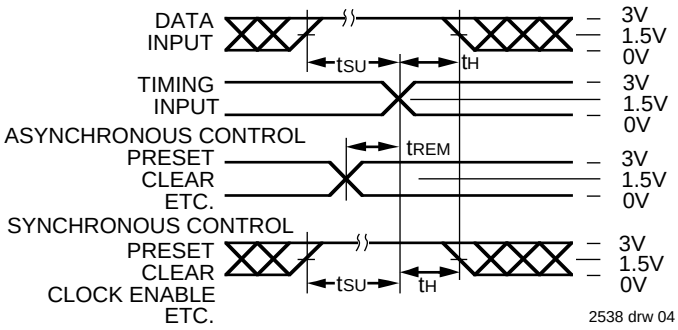
Test	Switch
Open Drain Disable Low Enable Low	Closed
All Other Tests	Open

2538 lnk 08

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



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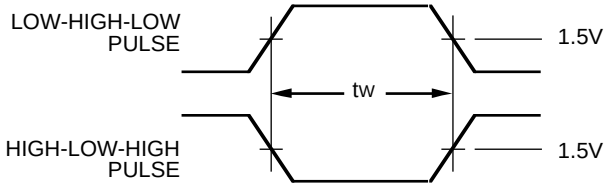
PULSE WIDTH



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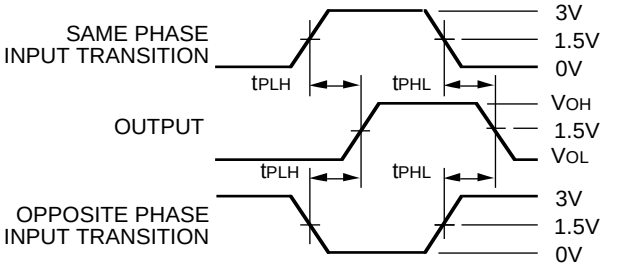
PROPAGATION DELAY



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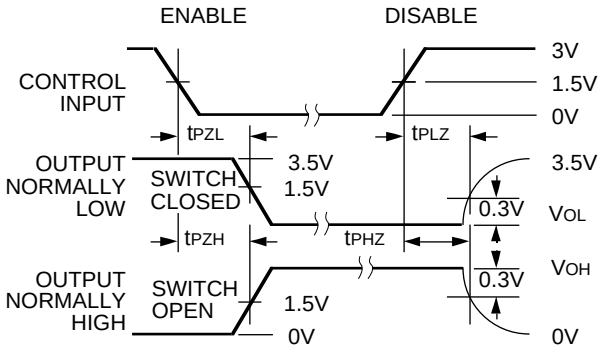
ENABLE AND DISABLE TIMES

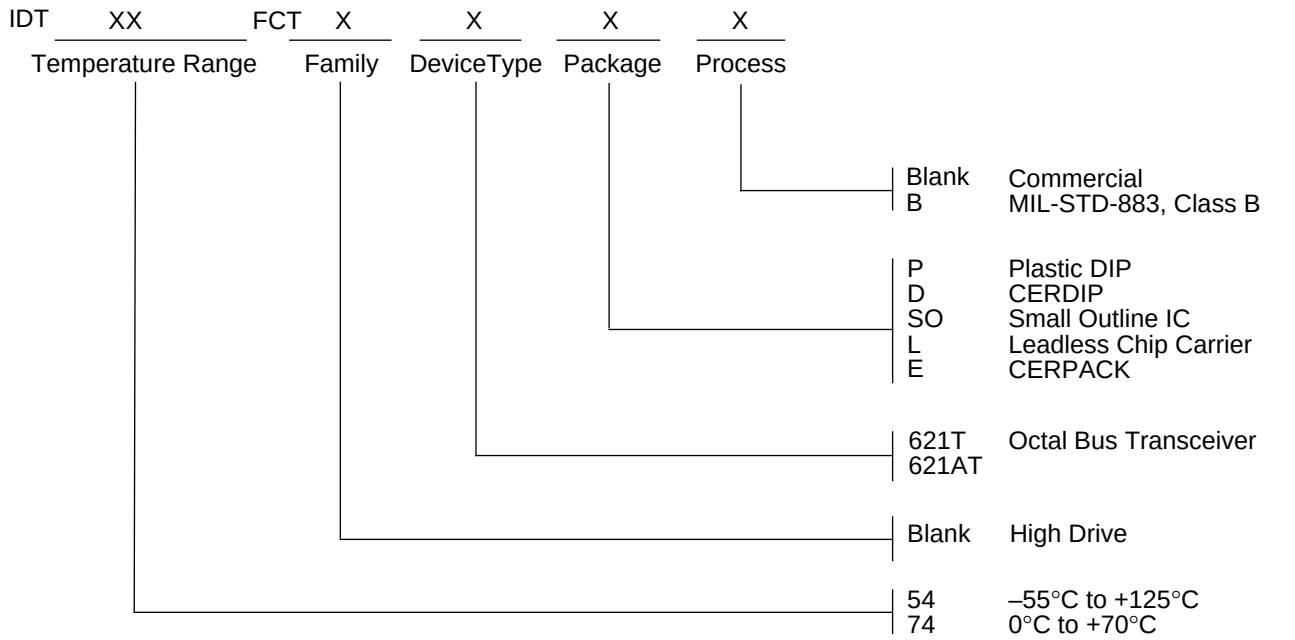


2538 drw 07

NOTES:

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

ORDERING INFORMATION



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