

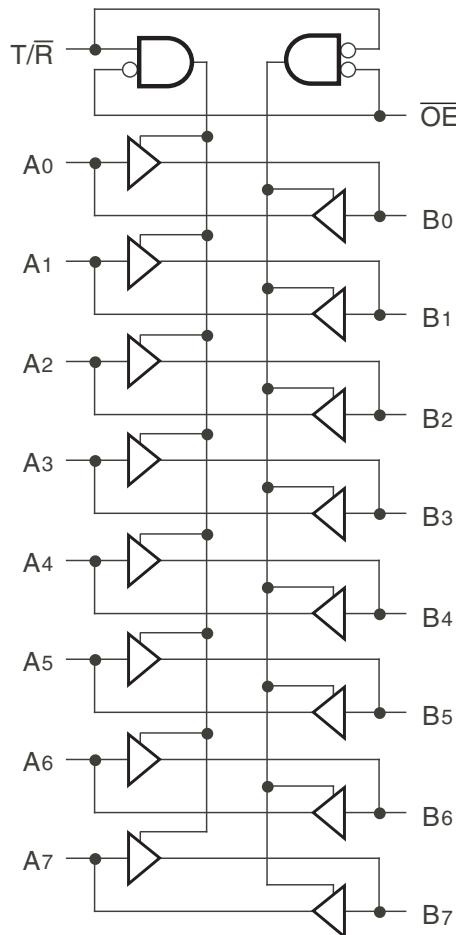
FEATURES:

- Std., A, and C grades
- Low input and output leakage $\leq 1\mu\text{A}$ (max.)
- CMOS power levels
- True TTL input and output compatibility:
 - $V_{OH} = 3.3\text{V}$ (typ.)
 - $V_{OL} = 0.3\text{V}$ (typ.)
- High Drive outputs (-15mA I_{OH} , 64mA I_{OL})
- Meets or exceeds JEDEC standard 18 specifications
- Military product compliant to MIL-STD-883, Class B and DESC listed (dual marked)
- Power off disable outputs permit "live insertion"
- Available in the following packages:
 - Industrial: SOIC, SSOP, QSOP, TSSOP
 - Military: CERDIP, LCC

DESCRIPTION:

The IDT octal bidirectional transceivers are built using an advanced dual metal CMOS technology. The FCT245T is designed for asynchronous two-way communication between data buses. The transmit/receive (T/\bar{R}) input determines the direction of data flow through the bidirectional transceiver. Transmit (active high) enables data from A ports to B ports, and receive (active low) from B ports to A ports. The output enable (\bar{OE}) input, when high, disables both A and B ports by placing them in high Z condition.

FUNCTIONAL BLOCK DIAGRAM

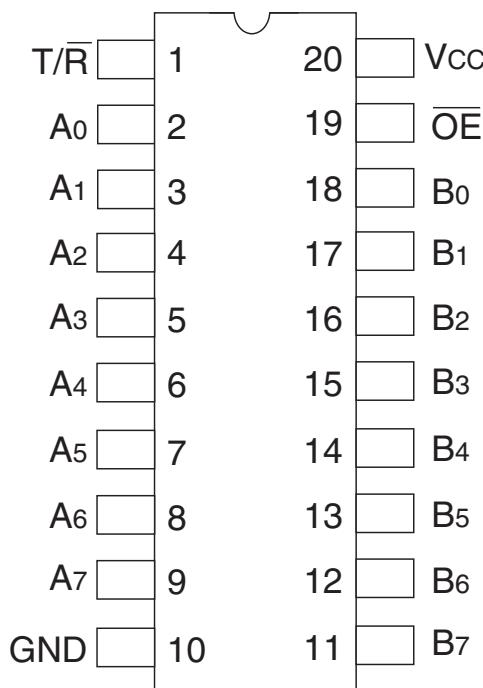


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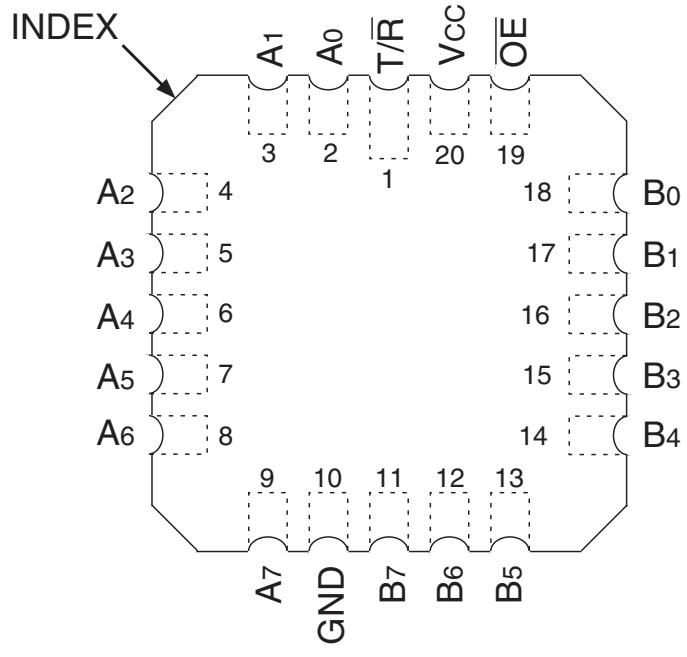
MILITARY AND INDUSTRIAL TEMPERATURE RANGES

DECEMBER 2016

PIN CONFIGURATION



CERDIP/ SOIC/ SSOP/ QSOP/ TSSOP
TOP VIEW



DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Industrial: $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 5\%$; Military: $T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 10\%$

| 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 ⁽⁴⁾ | $V_{CC} = \text{Max.}$ | $V_I = 2.7\text{V}$ | — | — | ± 1 | μA |
| I_{IL} | Input LOW Current ⁽⁴⁾ | $V_{CC} = \text{Max.}$ | $V_I = 0.5\text{V}$ | — | — | ± 1 | μA |
| I_{OZH} | High Impedance Output Current | $V_{CC} = \text{Max.}$ (3-State output pins) ⁽⁴⁾ | $V_O = 2.7\text{V}$ | — | — | ± 1 | μA |
| I_{OZL} | | | $V_O = 0.5\text{V}$ | — | — | ± 1 | |
| I_I | Input HIGH Current ⁽⁴⁾ | $V_{CC} = \text{Max.}, V_I = V_{CC} (\text{Max.})$ | | — | — | ± 1 | μA |
| V_{IK} | Clamp Diode Voltage | $V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$ | | — | -0.7 | -1.2 | V |
| V_H | Input Hysteresis | — | | — | 200 | — | mV |
| I_{CC} | Quiescent Power Supply Current | $V_{CC} = \text{Max.}, V_{IN} = \text{GND or } V_{CC}$ | | — | 0.01 | 1 | mA |

OUTPUT DRIVE CHARACTERISTICS

| Symbol | Parameter | Test Conditions ⁽¹⁾ | | Min. | Typ. ⁽²⁾ | Max. | Unit |
|----------|-----------------------|---|--|------|---------------------|------|------|
| V_{OH} | Output HIGH Voltage | $V_{CC} = \text{Min}$ $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -6\text{mA MIL}$ | 2.4 | 3.3 | — | V |
| | | | $I_{OH} = -8\text{mA IND}$ | — | — | — | |
| | | | $I_{OH} = -12\text{mA MIL}$ $I_{OH} = -15\text{mA IND}$ | 2 | 3 | — | |
| V_{OL} | Output LOW Voltage | $V_{CC} = \text{Min}$ $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 48\text{mA MIL}$ $I_{OL} = 64\text{mA IND}$ | — | 0.3 | 0.55 | V |
| I_{OS} | Short Circuit Current | $V_{CC} = \text{Max.}, V_O = \text{GND}$ ⁽³⁾ | | -60 | -120 | -225 | mA |

NOTES:

1. For conditions shown as Min. or Max., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 5.0\text{V}$, $+25^\circ\text{C}$ ambient.
3. Not more than one output should be tested at one time. Duration of the test should not exceed one second.
4. The test limit for this parameter is $\pm 5\mu\text{A}$ at $T_A = -55^\circ\text{C}$.

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 | mA |
| I_{CCD} | Dynamic Power Supply Current ⁽⁴⁾ | V _{CC} = Max. Outputs Open $\overline{OE} = T/\bar{R} = GND$ 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⁾ | V _{CC} = Max. Outputs Open $f_i = 10MHz$ | V _{IN} = V _{CC} V _{IN} = GND | — | 1.5 | 3.5 | mA |
| | | 50% Duty Cycle $\overline{OE} = T/\bar{R} = GND$ One Bit Toggling | V _{IN} = 3.4V V _{IN} = GND | — | 1.8 | 4.5 | |
| | | V _{CC} = Max. Outputs Open $f_i = 2.5MHz$ | V _{IN} = V _{CC} V _{IN} = GND | — | 3 | 6 ⁽⁵⁾ | |
| | | 50% Duty Cycle $\overline{OE} = T/\bar{R} = GND$ Eight Bits Toggling | V _{IN} = 3.4V V _{IN} = GND | — | 5 | 14 ⁽⁵⁾ | |

NOTES:

1. For conditions shown as Min. or Max., 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 ΔI_{CC} formula. These limits are guaranteed but not tested.

6. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$

$$I_C = I_{CC} + \Delta I_{CC} D_{H} N_t + I_{CCD} (f_{CP}/2 + f_i N_t)$$

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 = Output Frequency

N_i = Number of Outputs at f_i

All currents are in milliamps and all frequencies are in megahertz.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE - INDUSTRIAL

| Symbol | Parameter | Condition ⁽¹⁾ | 74FCT245AT | | 74FCT245CT | | Unit |
|------------------|---|--------------------------|---------------------|------|---------------------|------|------|
| | | | Min. ⁽²⁾ | Max. | Min. ⁽²⁾ | Max. | |
| t _{PLH} | Propagation Delay A to B, B to A | CL = 50pF RL = 500Ω | 1.5 | 4.6 | 1.5 | 4.1 | ns |
| t _{PHL} | | | 1.5 | 6.2 | 1.5 | 5.8 | ns |
| t _{PZH} | Output Enable Time OE to A or B | | 1.5 | 5 | 1.5 | 4.8 | ns |
| t _{PZL} | Output Disable Time OE to A or B | | 1.5 | 6.2 | 1.5 | 5.8 | ns |
| t _{PZH} | Output Enable Time T/R to A or B ⁽³⁾ | | 1.5 | 5 | 1.5 | 4.8 | ns |
| t _{PZL} | Output Disable Time T/R to A or B ⁽³⁾ | | | | | | |

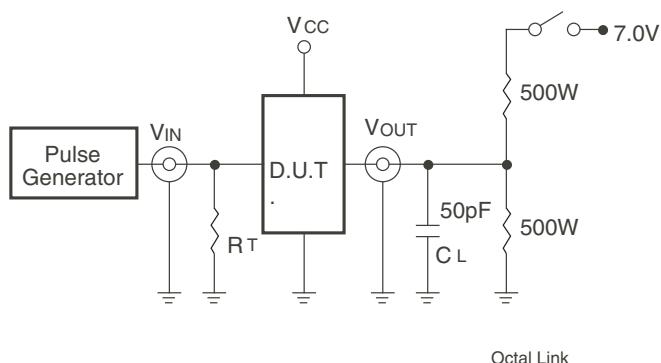
SWITCHING CHARACTERISTICS OVER OPERATING RANGE - MILITARY

| Symbol | Parameter | Condition ⁽¹⁾ | 54FCT245T | | 54FCT245AT | | 54FCT245CT | | Unit |
|------------------|---|--------------------------|---------------------|------|---------------------|------|---------------------|------|------|
| | | | Min. ⁽²⁾ | Max. | Min. ⁽²⁾ | Max. | Min. ⁽²⁾ | Max. | |
| t _{PLH} | Propagation Delay A to B, B to A | CL = 50pF RL = 500Ω | 1.5 | 7.5 | 1.5 | 4.9 | 1.5 | 4.5 | ns |
| t _{PHL} | | | 1.5 | 10 | 1.5 | 6.5 | 1.5 | 6.2 | ns |
| t _{PZH} | Output Enable Time OE to A or B | | 1.5 | 10 | 1.5 | 6 | 1.5 | 5.2 | ns |
| t _{PZL} | Output Disable Time OE to A or B | | 1.5 | 10 | 1.5 | 6.5 | 1.5 | 6.2 | ns |
| t _{PZH} | Output Enable Time T/R to A or B ⁽³⁾ | | 1.5 | 10 | 1.5 | 6 | 1.5 | 5.2 | ns |
| t _{PZL} | Output Disable Time T/R to A or B ⁽³⁾ | | | | | | | | |

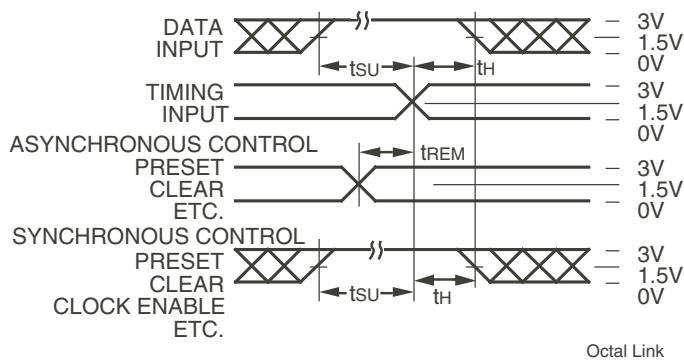
NOTES:

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

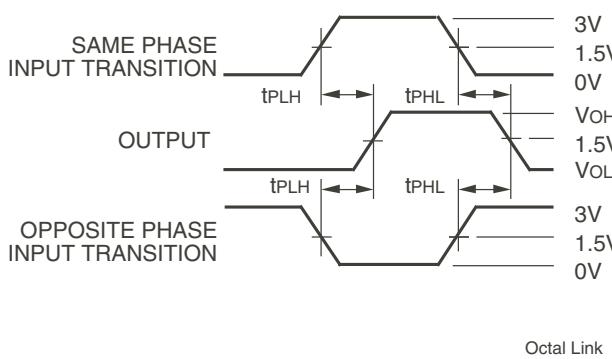
TEST CIRCUITS AND WAVEFORMS



Test Circuits for All Outputs



Set-Up, Hold, and Release Times



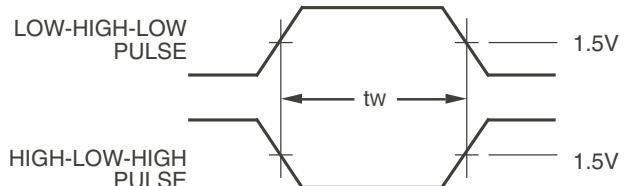
Propagation Delay

SWITCH POSITION

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

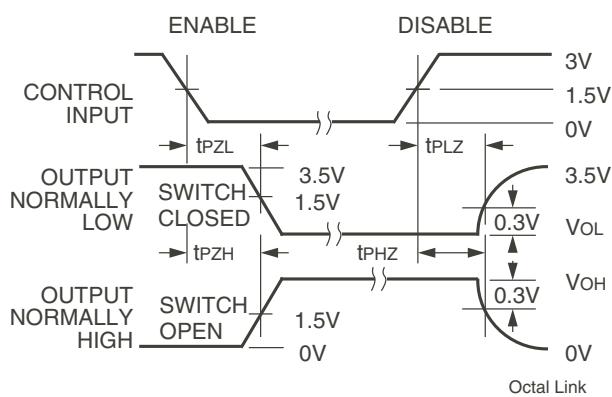
DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.
RT = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.



Pulse Width

Octal Link

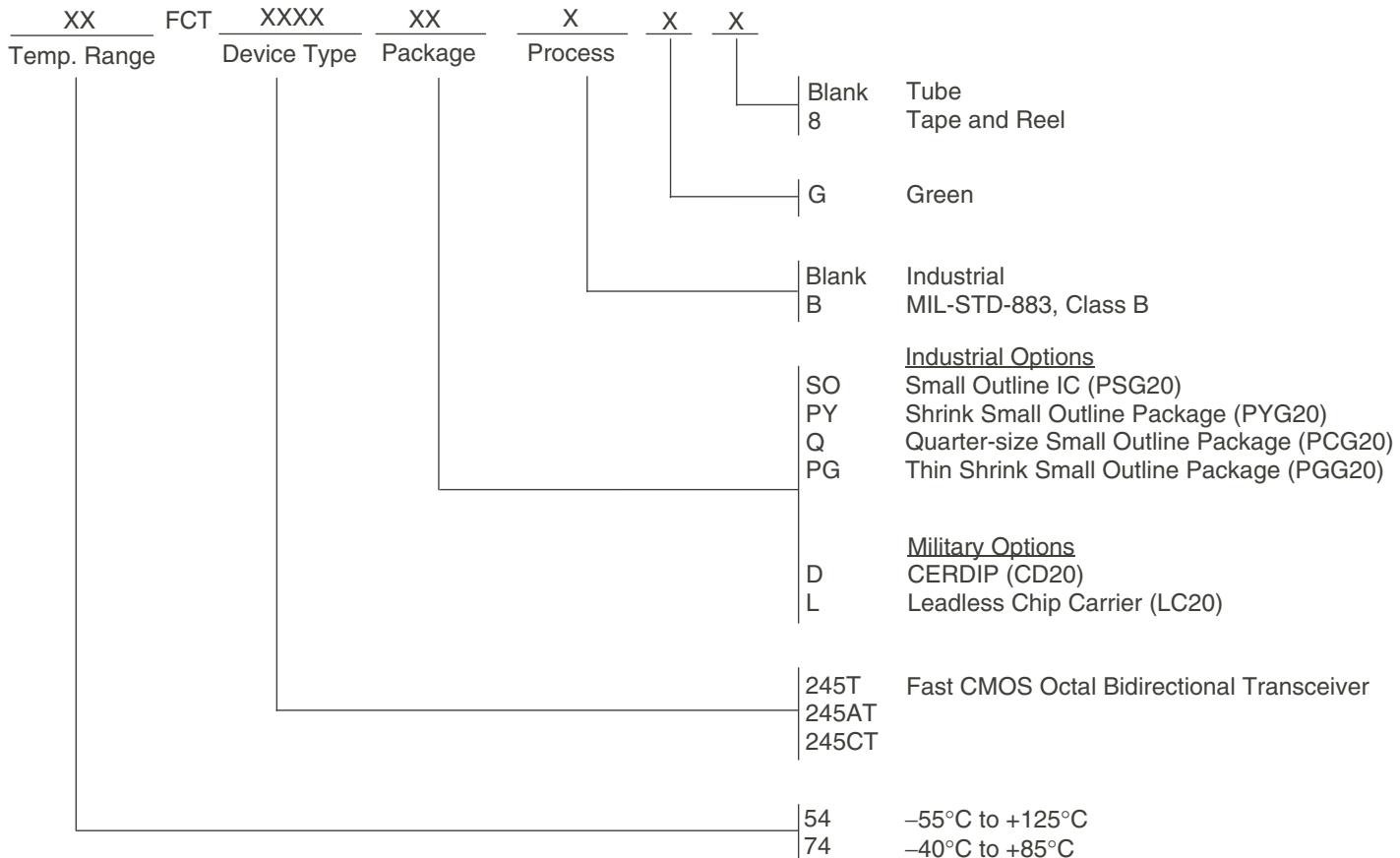


Enable and Disable Times

NOTES:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
2. Pulse Generator for All Pulses: Rate $\leq 1.0\text{MHz}$; t_F $\leq 2.5\text{ns}$; t_R $\leq 2.5\text{ns}$.

ORDERING INFORMATION



Datasheet Document History

| | | |
|------------|-------|--|
| 09/29/2009 | Pg. 7 | Updated the ordering information by removing the "IDT" notation and non RoHS part. |
| 12/12/2016 | Pg. 7 | Updated the ordering information by adding detailed package information and Tape & Reel. |

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