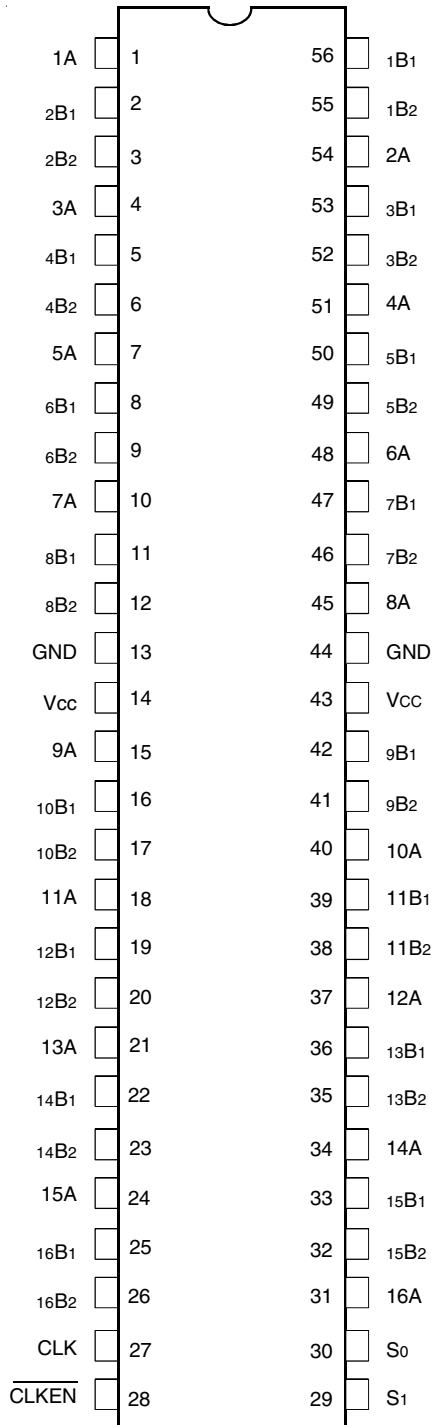




## PIN CONFIGURATION



SSOP/ TSSOP  
TOP VIEW

## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

| Symbol                           | Description                          | Max         | Unit |
|----------------------------------|--------------------------------------|-------------|------|
| V <sub>TERM</sub> <sup>(2)</sup> | Terminal Voltage with Respect to GND | -0.5 to +7  | V    |
| T <sub>STG</sub>                 | Storage Temperature                  | -65 to +150 | °C   |
| I <sub>OUT</sub>                 | Maximum Continuous Channel Current   | 128         | mA   |

### 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.
- V<sub>cc</sub>, Control, and Switch terminals.

## CAPACITANCE<sup>(1)</sup>

| Symbol           | Parameter                       | Conditions <sup>(2)</sup> | Typ.       | Unit |    |
|------------------|---------------------------------|---------------------------|------------|------|----|
| C <sub>IN</sub>  | Control Input Capacitance       |                           | 6          | pF   |    |
| C <sub>I/O</sub> | Switch Input/Output Capacitance | A Port                    | Switch Off | 17   | pF |
|                  |                                 | B Port                    | Switch Off | 12   |    |

### NOTES:

- Capacitance is characterized but not tested.
- T<sub>A</sub> = 25°C, f = 1MHz, V<sub>IN</sub> = 0V, V<sub>OUT</sub> = 0V.

## PIN DESCRIPTION

| Pin Names        | I/O | Description  |
|------------------|-----|--|
| A1               | I/O | Bus A1   |
| B1, B2           | I/O | Buses B1, B2   |
| S <sub>0,1</sub> | I   | Control Pins   |
| CLK              | I   | Clock Input. Clocks S <sub>0,1</sub> on Rising Edge. |
| CLKEN            | I   | Clock Enable Input                                   |

## FUNCTION TABLE<sup>(1)</sup>

| S1 | S0 | CLK | CLKEN | Description         |
|----|----|-----|-------|---------------------|
| X  | X  | X   | H     | Last State          |
| L  | L  | ↑   | L     | Disconnect          |
| L  | H  | ↑   | L     | A to B1 and A to B2 |
| H  | L  | ↑   | L     | A to B1 or B1 to A  |
| H  | H  | ↑   | L     | A to B2 or B2 to A  |

### NOTE:

- H = HIGH Voltage Level  
L = LOW Voltage Level  
Z = High-Impedance  
↑ = LOW-to-HIGH Transition

## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

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

| Symbol    | Parameter                      | Test Conditions <sup>(1)</sup>                          | Min.               | Typ. <sup>(2)</sup> | Max.    | Unit          |
|-----------|--------------------------------|---|--------------------|---------------------|---------|---------------|
| $V_{IH}$  | Control Input HIGH Voltage     | Guaranteed Logic HIGH for Control Inputs                | 2                  | —                   | —       | V             |
| $V_{IL}$  | Control Input LOW Voltage      | Guaranteed Logic LOW for Control Inputs                 | —                  | —                   | 0.8     | V             |
| $I_{IH}$  | Control Input HIGH Current     | $V_{CC} = \text{Max.}$<br>$V_i = V_{CC}$                | —                  | —                   | $\pm 1$ | $\mu\text{A}$ |
| $I_{IL}$  | Control Input LOW Current      |   | $V_i = \text{GND}$ | —                   | —       |               |
| $I_{OZH}$ | Current During                 | $V_{CC} = \text{Max.}, V_o = 0$ to $5\text{V}$          | —                  | —                   | $\pm 1$ | $\mu\text{A}$ |
| $I_{OZL}$ | Bus Switch Disconnect          |   | —                  | —                   | $\pm 1$ |               |
| $V_{IK}$  | Clamp Diode Voltage            | $V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$           | —                  | -0.7                | -1.2    | V             |
| $I_{OFF}$ | Switch Power Off Leakage       | $V_{CC} = 0\text{V}, V_{IN}$ or $V_o \leq 5.5\text{V}$  | —                  | —                   | $\pm 1$ | $\mu\text{A}$ |
| $I_{CC}$  | Quiescent Power Supply Current | $V_{CC} = \text{Max.}, V_{IN} = \text{GND}$ or $V_{CC}$ | —                  | 0.1                 | 3       | $\mu\text{A}$ |

## BUS SWITCH IMPEDANCE OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

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

| Symbol   | Parameter                                    | Test Conditions  | Min. | Typ. <sup>(1)</sup> | Max. | Unit        |
|----------|--|--|------|---------------------|------|-------------|
| $R_{ON}$ | Switch On Resistance <sup>(2)</sup>          | $V_{CC} = \text{Min.}, V_{IN} = 0\text{V}, I_{ON} = 64\text{mA}$   | —    | 4                   | 7    | $\Omega$    |
|          |  | $V_{CC} = \text{Min.}, V_{IN} = 0\text{V}, I_{ON} = 30\text{mA}$   | —    | 4                   | 7    |             |
|          |  | $V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$ | —    | 6                   | 15   |             |
| $I_{OS}$ | Short Circuit Current, A to B <sup>(3)</sup> | $A(B) = 0\text{V}, B(A) = V_{CC}$                                  | 100  | —                   | —    | $\text{mA}$ |

### NOTES:

1. Typical values are at  $V_{CC} = 5.0\text{V}$ ,  $+25^{\circ}\text{C}$  ambient.
2. The voltage drop between the indicated ports divided by the current through the switch.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

## POWER SUPPLY CHARACTERISTICS

| Symbol           | Parameter   | Test Conditions <sup>(1)</sup>   |   | Min. | Typ. <sup>(2)</sup> | Max. | Unit        |
|------------------|---|--|---|------|---------------------|------|-------------|
| $\Delta I_{CC}$  | Quiescent Power Supply Current<br>TTL Inputs HIGH | V <sub>CC</sub> = Max.<br>V <sub>IN</sub> = 3.4V <sup>(3)</sup>  |   | —    | 0.5                 | 1.5  | mA          |
| I <sub>CCD</sub> | Dynamic Power Supply Current <sup>(4,5)</sup>     | V <sub>CC</sub> = Max.<br>Clock Pin Toggling<br>50% Duty Cycle<br>16 Switches Toggling<br>One Select Toggling at<br>50% of CLK Frequency   | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND  |      |                     |      | μA/<br>MHz/ |
| I <sub>CCD</sub> | Dynamic Power Supply Current <sup>(4,5)</sup>     | V <sub>CC</sub> = Max.<br>Clock Pin Toggling<br>50% Duty Cycle<br>32 Switches Toggling<br>Two Select Pins Toggling at<br>50% of CLK Frequency  | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND  |      |                     |      | μA/<br>MHz/ |
| I <sub>C</sub>   | Total Power Supply Current <sup>(6)</sup>         | V <sub>CC</sub> = Max.<br>f <sub>CP</sub> = 10MHz (CLK)<br>50% Duty Cycle<br>$\overline{CLKEN}$ = LOW<br>S <sub>0</sub> = HIGH or LOW<br>f <sub>i</sub> = 2.5MHz (S <sub>1</sub> )<br>16 Switches Toggling | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND  |      |                     |      | mA          |
|                  |   | V <sub>CC</sub> = Max.<br>f <sub>CP</sub> = 10MHz (CLK)<br>50% Duty Cycle<br>$\overline{CLKEN}$ = LOW<br>S <sub>1</sub> = HIGH<br>f <sub>i</sub> = 2.5MHz (S <sub>0</sub> )<br>16 MUXes Exchanging         | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND  |      |                     |      |             |
|                  |   | V <sub>CC</sub> = Max.<br>f <sub>CP</sub> = 10MHz (CLK)<br>50% Duty Cycle<br>$\overline{CLKEN}$ = LOW<br>S <sub>1</sub> = LOW<br>f <sub>i</sub> = 2.5MHz (S <sub>0</sub> )<br>32 Switches Toggling         | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = GND  |      |                     |      |             |
|                  |   |  | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = 3.4V |      |                     |      |             |
|                  |   |  | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = 3.4V |      |                     |      |             |
|                  |   |  | V <sub>IN</sub> = V <sub>CC</sub><br>V <sub>IN</sub> = 3.4V |      |                     |      |             |

### NOTES:

- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type. T<sub>A</sub> = -40°C to +85°C
- Typical values are at V<sub>CC</sub> = 5.0V, +25°C ambient.
- Per TTL driven input (V<sub>IN</sub> = 3.4V). All other inputs at V<sub>CC</sub> or GND. Switch inputs do not contribute to  $\Delta I_{CC}$ .
- This parameter represents the current required to switch the internal capacitance of the control inputs at the specified frequency.  
Switch inputs generate no significant power supply currents as they transition. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
- C<sub>PD</sub> = I<sub>CCD</sub>/V<sub>CC</sub>  
C<sub>PD</sub> = Power Dissipation Capacitance
- I<sub>C</sub> = I<sub>QUIESCENT</sub> + I<sub>INPUTS</sub> + I<sub>DYNAMIC</sub>  
I<sub>C</sub> = I<sub>CC</sub> +  $\Delta I_{CC}$  D<sub>HNT</sub> + I<sub>CCD</sub> (f<sub>i</sub>N)  
I<sub>CC</sub> = Quiescent Current  
 $\Delta I_{CC}$  = Power Supply Current for a TTL High Input (V<sub>IN</sub> = 3.4V)  
D<sub>H</sub> = Duty Cycle for TTL Inputs High  
N<sub>T</sub> = Number of TTL Inputs at D<sub>H</sub>  
I<sub>CCD</sub> = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
f<sub>i</sub> = Control Input Frequency  
N = Number of Control Inputs Toggling at f<sub>i</sub>

## SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

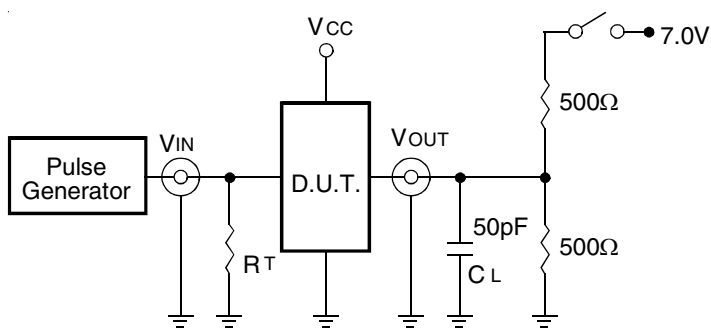
Industrial:  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 5.0\text{V} \pm 10\%$

| Symbol                 | Description <sup>(1)</sup>   | $V_{CC} = 5\text{V} \pm 10\%$ |      |      | $V_{CC} = 4\text{V}$ |      | Unit |
|------------------------|--|-------------------------------|------|------|----------------------|------|------|
|                        |  | Min.                          | Typ. | Max. | Min.                 | Max. |      |
| $t_{PLH}$<br>$t_{PHL}$ | Data Propagation Delay<br>A to B, B to A <sup>(2)</sup>                            | —                             | —    | 0.25 | —                    | 0.25 | ns   |
| $t_{PZH}$<br>$t_{PZL}$ | Switch CONNECT Delay<br>CLK $\uparrow$ to A-B1 or A-B2                             | 1.5                           | —    | 5.8  | —                    | 6.1  | ns   |
| $t_{PZH}$<br>$t_{PZL}$ | Switch CONNECT Delay<br>CLK $\uparrow$ to B1-B2                                    | 1.5                           | —    | 7.9  | —                    | 8.5  | ns   |
| $t_{PHZ}$<br>$t_{PLZ}$ | Switch DISCONNECT Delay<br>CLK $\uparrow$ to A, B                                  | 1.9                           | —    | 6.2  | —                    | 5.8  | ns   |
| $t_{EX}$               | Switch EXCHANGE Delay<br>CLK $\uparrow$ from A-B1(B2) to A-B2(B1)                  | 1.8                           | —    | 6.2  | —                    | 6.8  | ns   |
| $t_{SU}$               | Clock Enable Set-Up Time<br>$\overline{\text{CLKEN}}$ to CLK $\uparrow$            | 1.9                           | —    | —    | 2.2                  | —    | ns   |
| $t_H$                  | Clock Enable Hold Time<br>$\overline{\text{CLKEN}}$ after CLK $\uparrow$           | 1                             | —    | —    | 1.9                  | —    | ns   |
| $t_{SU}$               | Select Set-Up Time<br>$S_0, S_1$ to CLK $\uparrow$                                 | 1.9                           | —    | —    | 2.2                  | —    | ns   |
| $t_H$                  | Select Hold Time<br>$S_0, S_1$ after CLK $\uparrow$                                | 1                             | —    | —    | 0.5                  | —    | ns   |
| $ Q_{CI} $             | Charge Injection During Switch DISCONNECT<br>CLK $\uparrow$ to A, B <sup>(3)</sup> | —                             | 1.5  | —    | —                    | —    | pC   |
| $ Q_{DCI} $            | Charge Injection During Switch Exchange<br>CLK $\uparrow$ to A, B <sup>(3)</sup>   | —                             | 0.5  | —    | —                    | —    | pC   |

### NOTES:

- See test circuits and waveforms.
- The bus switch contributes no Propagation Delay other than the RC Delay of the load interacting with the RC of the switch.
- $|Q_{CI}|$  is the charge injection for a single switch DISCONNECT and applies to either single switches or multiplexers.  $|Q_{DCI}|$  is the charge injection for a multiplexer as the multiplexed port switches from one path to another. Charge injection is reduced because the injection from the DISCONNECT of the first path is compensated by the CONNECT of the second path.

TEST CIRCUITS AND WAVEFORMS



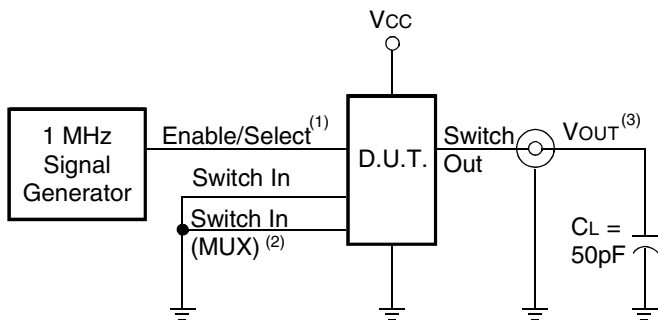
Test Circuits for All Outputs

SWITCH POSITION

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

DEFINITIONS:

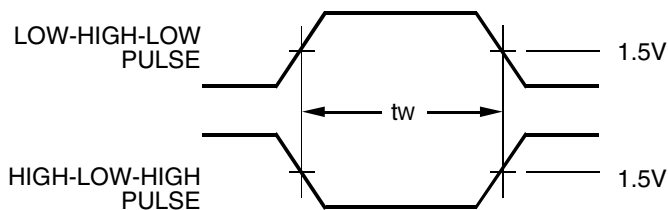
CL = Load capacitance: includes jig and probe capacitance.  
RT = Termination resistance: should be equal to ZOUT of the Pulse Generator.



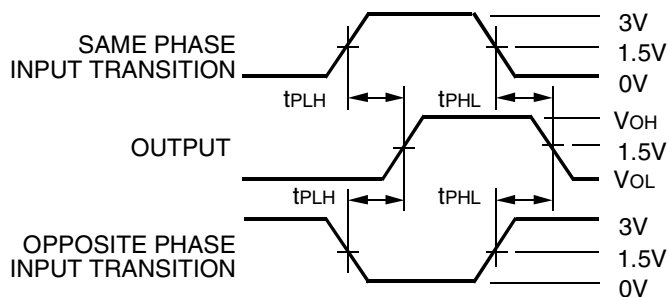
Charge Injection

NOTES:

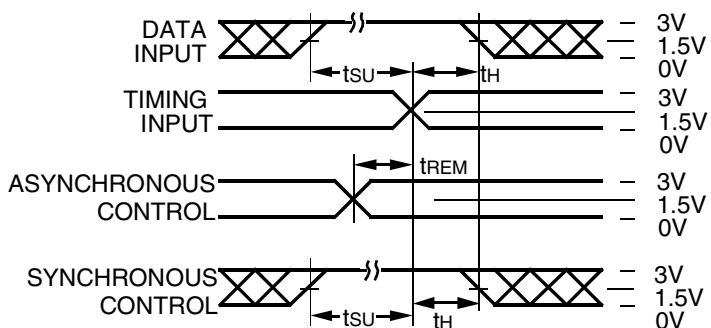
- Select is used with multiplexers for measuring IQocil during multiplexer select. During all other tests Enable is used.
- Used with multiplexers to measure IQocil only.
- Charge Injection =  $\Delta V_{out} C_L$ , with Enable toggling for IQocil or Select toggling for IQocil.  $\Delta V_{out}$  is the change in Vout and is measured with a 10MΩ probe.



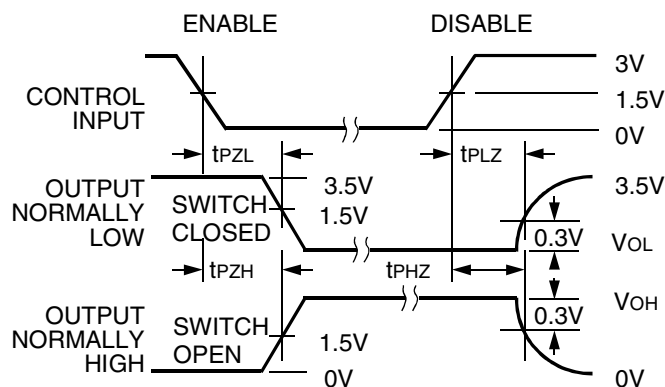
Pulse Width



Propagation Delay



Set-up, Hold, and Release Times

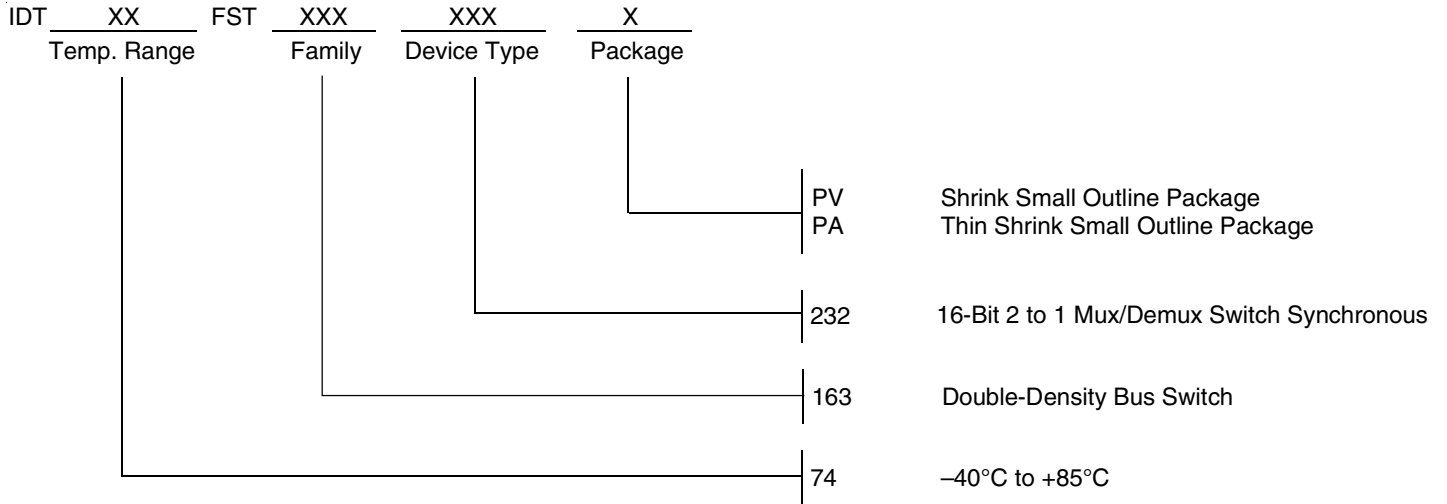


Enable and Disable Times

NOTES:

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

## ORDERING INFORMATION



## DATA SHEET DOCUMENT HISTORY

5/24/2002 Removed TVSOP package



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