FAIRCHILD SEMICONDUCTOR™

December 2001
Revised December 2001

# FST34X245
# 32-Bit Bus Switch

## General Description

The Fairchild Switch FST34X245 provides 32-bits of high speed CMOS TTL-compatible bus switching in a standard flow-through mode. The low On Resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

The device is organized as a 32-bit switch. When $\overline{OE}$ is LOW, the switch is ON and Port A is connected to Port B. When $\overline{OE}$ is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

## Features

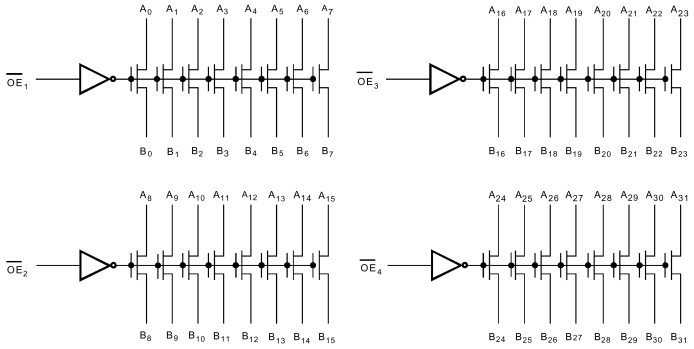
- 4Ω switch connection between two ports
- Minimal propagation delay through the switch
- Low $I_{CC}$
- Zero bounce in flow-through mode
- Control inputs compatible with TTL level
- 32-bit version of FST3245
- Packaged in 20.5mm 80-lead package

## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| FST34X245QSP | MQA80A | 80-Lead, QVSOP, JEDEC MO-154, 0.150" Wide |

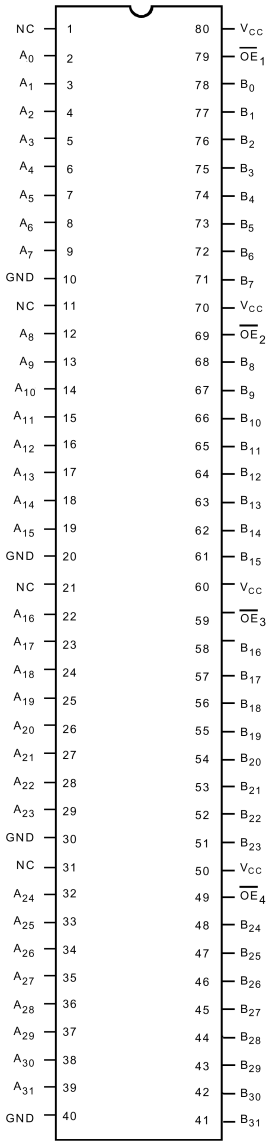
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

## Logic Diagram



## Connection Diagram




## Pin Descriptions

| Pin Name | Description |
|---|---|
| $\overline{OE}_n$ | Bus Switch Enable |
| $A_n$ | Bus A |
| $B_n$ | Bus B |
| NC | No Connect |

## Function Table

| Input $\overline{OE}_n$ | Function |
|---|---|
| L | Connect |
| H | Disconnect |

## Absolute Maximum Ratings (Note 1)

| | |
|---|---|
| Supply Voltage ($V_{CC}$) | −0.5V to +7.0V |
| DC Switch Voltage ($V_S$) | −0.5V to +7.0V |
| DC Input Voltage ($V_{IN}$) (Note 2) | −0.5V to +7.0V |
| DC Input Diode Current ($I_{IK}$) $V_{IN}$ < 0V | −50 mA |
| DC Output ($I_{OUT}$) Sink Current | 128 mA |
| DC $V_{CC}$/GND Current ($I_{CC}$/$I_{GND}$) | +/− 100 mA |
| Storage Temperature Range ($T_{STG}$) | −65°C to +150 °C |

## Recommended Operating Conditions (Note 3)

| | |
|---|---|
| Power Supply Operating ($V_{CC}$) | 4.0V to 5.5V |
| Input Voltage ($V_{IN}$) | 0V to 5.5V |
| Output Voltage ($V_{OUT}$) | 0V to 5.5V |
| Input Rise and Fall Time ($t_r$, $t_f$) | |
| Switch Control Input | 0 ns/V to 5 ns/V |
| Switch I/O | 0 ns/V to DC |
| Free Air Operating Temperature ($T_A$) | −40 °C to +85 °C |

**Note 1:** The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 2:** The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

**Note 3:** Unused control inputs must be held HIGH or LOW. They may not float.

## DC Electrical Characteristics

| Symbol | Parameter | $V_{CC}$ (V) | $T_A$ = −40 °C to +85 °C | | | Units | Conditions |
|---|---|---|---|---|---|---|---|
| | | | Min | Typ (Note 4) | Max | | |
| $V_{IK}$ | Clamp Diode Voltage | 4.5 | | | −1.2 | V | $I_{IN}$ = −18 mA |
| $V_{IH}$ | HIGH Level Input Voltage | 4.0–5.5 | 2.0 | | | V | |
| $V_{IL}$ | LOW Level Input Voltage | 4.0–5.5 | | | 0.8 | V | |
| $I_I$ | Input Leakage Current | 5.5 | | | ±1.0 | µA | 0 ≤ $V_{IN}$ ≤ 5.5V |
| | | 0 | | | 10 | µA | $V_{IN}$ = 5.5V |
| $I_{OZ}$ | OFF-STATE Leakage Current | 5.5 | | | ±1.0 | µA | 0 ≤ A, B ≤ $V_{CC}$ |
| $R_{ON}$ | Switch On Resistance | 4.5 | | 4 | 7 | Ω | $V_{IN}$ = 0V, $I_{IN}$ = 64 mA |
| | (Note 5) | 4.5 | | 4 | 7 | Ω | $V_{IN}$ = 0V, $I_{IN}$ = 30 mA |
| | | 4.5 | | 8 | 15 | Ω | $V_{IN}$ = 2.4V, $I_{IN}$ = 15 mA |
| | | 4.0 | | 11 | 20 | Ω | $V_{IN}$ = 2.4V, $I_{IN}$ = 15 mA |
| $I_{CC}$ | Quiescent Supply Current (Note 6) | 5.5 | | | 3 | µA | $V_{IN}$ = $V_{CC}$ or GND, $I_{OUT}$ = 0 |
| $\Delta I_{CC}$ | Increase in $I_{CC}$ per Input | 5.5 | | | 2.5 | mA | One Input at 3.4V |
| | (Note 7) | | | | | | Other Inputs at $V_{CC}$ or GND |

**Note 4:** Typical values are at $V_{CC}$ = 5.0V and $T_A$ = +25°C

**Note 5:** Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B) pins.

**Note 6:** Per $V_{CC}$ pin.

**Note 7:** Per TTL input, control pins only.

## AC Electrical Characteristics

| Symbol | Parameter | $T_A = -40\,^\circ C$ to $+85\,^\circ C$, $C_L = 50pF$, $RU = RD = 500\Omega$ | | | | Units | Conditions | Figure Number |
|---|---|---|---|---|---|---|---|---|
| | | $V_{CC} = 4.5 - 5.5V$ | | $V_{CC} = 4.0V$ | | | | |
| | | Min | Max | Min | Max | | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Bus to Bus (Note 8) | | 0.25 | | 0.25 | ns | $V_I$ = OPEN | Figures 1, 2 |
| $t_{PZH}$, $t_{PZL}$ | Output Enable Time | 1.5 | 5.9 | | 6.4 | ns | $V_I$ = 7V for $t_{PZL}$<br>$V_I$ = OPEN for $t_{PZH}$ | Figures 1, 2 |
| $t_{PHZ}$, $t_{PLZ}$ | Output Disable Time | 1.5 | 6.0 | | 5.7 | ns | $V_I$ = 7V for $t_{PLZ}$<br>$V_I$ = OPEN for $t_{PHZ}$ | Figures 1, 2 |

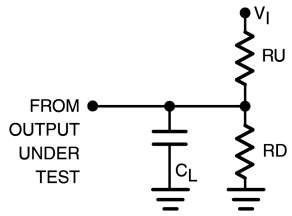
**Note 8:** This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On Resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

## Capacitance (Note 9)

| Symbol | Parameter | Typ | Max | Units | Conditions |
|---|---|---|---|---|---|
| $C_{IN}$ | Control Pin Input Capacitance | 3 | | pF | $V_{CC}$ = 5.0V |
| $C_{I/O}$ | Input/Output Capacitance | 5 | | pF | $V_{CC}$, $\overline{OE}$ = 5.0V |

**Note 9:** $T_A = +25°C$, f = 1 MHz, Capacitance is characterized but not tested.

## AC Loading and Waveforms




**Note:** Input driven by 50 Ω source terminated in 50 Ω

**Note:** $C_L$ includes load and stray capacitance

**Note:** Input PRR = 1.0 MHz $t_W$ = 500 ns

**FIGURE 1. AC Test Circuit**

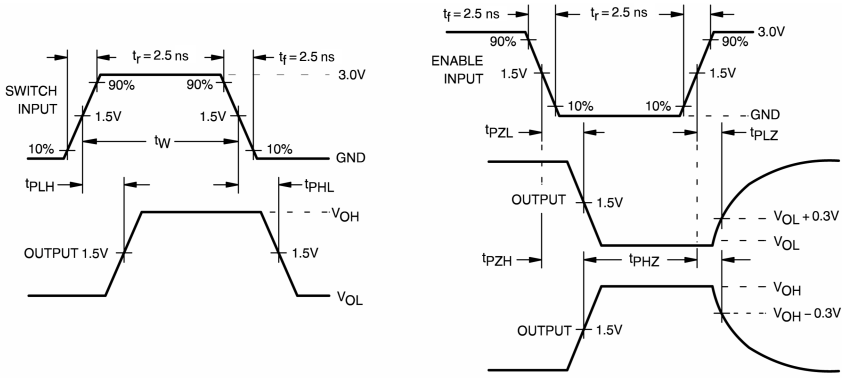
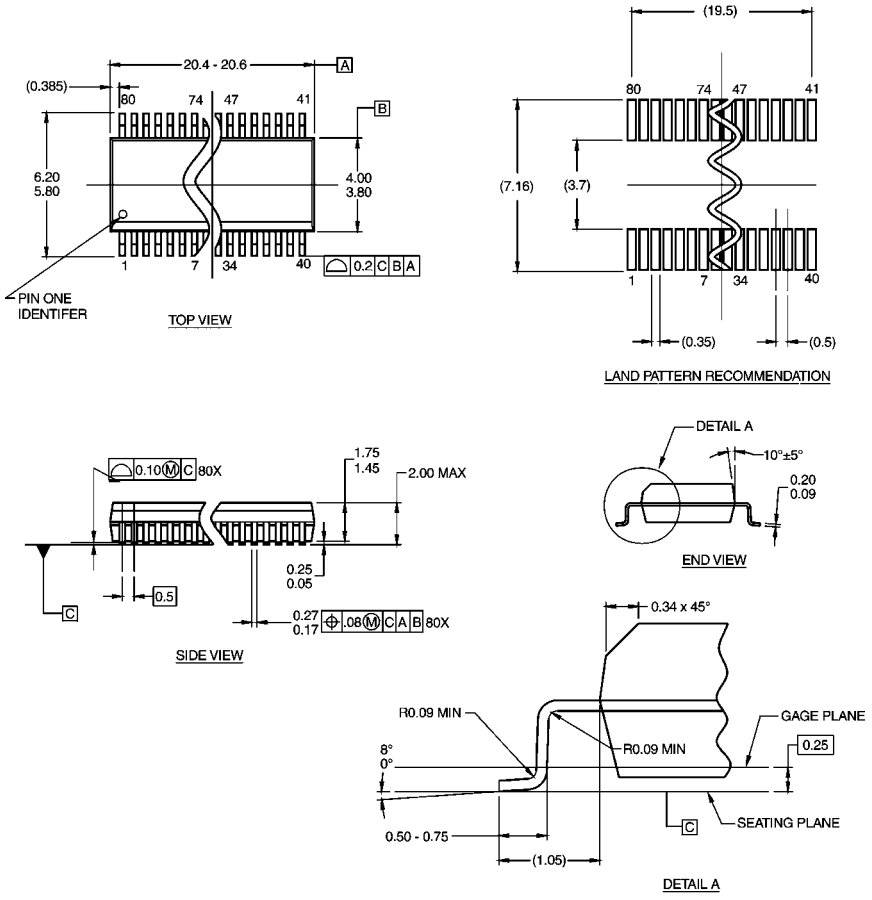



**FIGURE 2. AC Waveforms**

## Physical Dimensions inches (millimeters) unless otherwise noted




NOTES:
A. THIS PACKAGE CONFORMS TO JEDEC M0-154 VERSION BC.
B. ALL DIMENSIONS IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5M-1994.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

MQA80Arev1

**80-Lead, QVSOP, JEDEC MO-154, 0.150" Wide**
**Package Number MQA80A**



**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**www.fairchildsemi.com**