

June 1997 Revised December 2000

# FST3244 8-Bit Bus Switch

## **General Description**

The Fairchild Switch FST3244 provides 8-bits of high-speed CMOS TTL-compatible bus switching in a standard '244 pin-out. 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 two 4-bit switches with separate  $\overline{\text{OE}}$  inputs. When  $\overline{\text{OE}}$  is LOW, the switch is ON and Port A is connected to Port B. When  $\overline{\text{OE}}$  is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

### **Features**

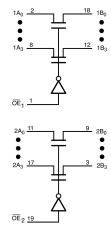
- $\blacksquare$  4 $\Omega$  switch connection between two ports.
- Minimal propagation delay through the switch.
- Low I<sub>CC</sub>.
- Zero bounce in flow-through mode.
- Control inputs compatible with TTL level.

# **Ordering Code:**

| Order Number | Package Number | Package Description   |  |  |  |  |  |
|--------------|----------------|---|--|--|--|--|--|
| FST3244WM    | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide   |  |  |  |  |  |
| FST3244QSC   | MQA20          | 20-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150 Wide       |  |  |  |  |  |
| FST3244MTC   | MTC20          | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |  |  |  |  |  |

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

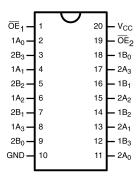
## **Logic Diagram**



# **Pin Descriptions**

| Pin Name                           | Description       |  |  |  |
|------------------------------------|-------------------|--|--|--|
| $\overline{OE}_1, \overline{OE}_2$ | Bus Switch Enable |  |  |  |
| 1A, 2A                             | Bus A             |  |  |  |
| 1B, 2B                             | Bus B             |  |  |  |

### **Connection Diagram**



### **Truth Table**

| Inp             | uts             | Inputs/Outputs |         |  |  |
|-----------------|-----------------|----------------|---------|--|--|
| OE <sub>1</sub> | OE <sub>2</sub> | 1A, 1B         | 2A, 2B  |  |  |
| L               | L               | 1A = 1B        | 2A = 2B |  |  |
| L               | Н               | 1A = 1B        | Z       |  |  |
| Н               | L               | Z              | 2A = 2B |  |  |
| Н               | Н               | Z              | Z       |  |  |

# **Absolute Maximum Ratings**(Note 1)

| Supply Voltage (V <sub>CC</sub> )                                    | -0.5V to +7.0V   |
|--|------------------|
| DC Switch Voltage (V <sub>S</sub> )                                  | -0.5V to +7.0V   |
| DC Input Voltage (V <sub>IN</sub> ) (Note 2)                         | -0.5V to +7.0V   |
| DC Input Diode Current (I <sub>IK</sub> ) V <sub>IN</sub> <0V        | –50mA            |
| DC Output (I <sub>OUT</sub> ) Sink Current                           | 128mA            |
| DC V <sub>CC</sub> /GND Current (I <sub>CC</sub> /I <sub>GND</sub> ) | +/- 100mA        |
| Storage Temperature Range (Toxo)                                     | -65°C to +150 °C |

# Recommended Operating Conditions (Note 3)

 $\begin{array}{ll} \mbox{Power Supply Operating ($V_{CC}$)} & 4.0 \mbox{V to } 5.5 \mbox{V} \\ \mbox{Input Voltage ($V_{IN}$)} & 0 \mbox{V to } 5.5 \mbox{V} \\ \mbox{Output Voltage ($V_{OUT}$)} & 0 \mbox{V to } 5.5 \mbox{V} \\ \end{array}$ 

Input Rise and Fall Time (t<sub>r</sub>, t<sub>f</sub>)

Switch Control Input 0nS/V to 5nS/V Switch I/O 0nS/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 tables 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**

|                   |                                       | V <sub>CC</sub> (V) | T <sub>A</sub> = -40 °C to +85 °C |                 |      |       |  |
|-------------------|---------------------------------------|---------------------|-----------------------------------|-----------------|------|-------|--|
| Symbol            | Parameter                             |                     | Min                               | Typ<br>(Note 4) | Max  | Units | Conditions                                     |
| V <sub>IK</sub>   | Clamp Diode Voltage                   | 4.5                 |                                   |                 | -1.2 | V     | I <sub>IN</sub> = -18mA                        |
| V <sub>IH</sub>   | High Level Input Voltage              | 4.0-5.5             | 2.0                               |                 |      | V     |  |
| V <sub>IL</sub>   | Low Level Input Voltage               | 4.0-5.5             |                                   |                 | 0.8  | V     |  |
| I <sub>I</sub>    | Input Leakage Current                 | 5.5                 |                                   |                 | ±1.0 | μΑ    | 0≤ V <sub>IN</sub> ≤5.5V                       |
| l <sub>OZ</sub>   | OFF-STATE Leakage Current             | 5.5                 |                                   |                 | ±1.0 | μΑ    | 0 ≤A, B ≤V <sub>CC</sub>                       |
| R <sub>ON</sub>   | Switch On Resistance                  | 4.5                 |                                   | 4               | 7    | Ω     | $V_{IN} = 0V$ , $I_{IN} = 64mA$                |
|                   | (Note 5)                              | 4.5                 |                                   | 4               | 7    | Ω     | $V_{IN} = 0V, I_{IN} = 30mA$                   |
|                   |                                       | 4.5                 |                                   | 8               | 15   | Ω     | $V_{IN} = 2.4V, I_{IN} = 15mA$                 |
|                   |                                       | 4.0                 |                                   | 11              | 20   | Ω     | V <sub>IN</sub> = 2.4V, I <sub>IN</sub> = 15mA |
| I <sub>CC</sub>   | Quiescent Supply Current              | 5.5                 |                                   |                 | 3    | μΑ    | $V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$        |
| Δ I <sub>CC</sub> | Increase in I <sub>CC</sub> per Input | 5.5                 |                                   |                 | 2.5  | mA    | One input at 3.4V                              |
|                   |                                       |                     |                                   |                 |      |       | Other inputs at V <sub>CC</sub> or GND         |

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

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.

### **AC Electrical Characteristics**

|                                     | Parameter                      | $T_A = -40$ °C to +85 °C,<br>$C_L = 50$ pF, RU = RD = $500\Omega$ |      |                 |      | H-2r- | 0 1111   | -:           |
|-------------------------------------|--------------------------------|---|------|-----------------|------|-------|--|--------------|
| Symbol                              |                                | V <sub>CC</sub> = 4.5 - 5.5V                                      |      | $V_{CC} = 4.0V$ |      | Units | Conditions   | Figure No.   |
|                                     |                                | Min   | Max  | Min             | Max  |       |  |              |
| t <sub>PHL</sub> ,t <sub>PLH</sub>  | Prop Delay Bus to Bus (Note 6) |   | 0.25 |                 | 0.25 | ns    | V <sub>I</sub> = OPEN                                  | Figures 1, 2 |
| t <sub>PZH</sub> , t <sub>PZL</sub> | Output Enable Time             | 1.0   | 5.6  |                 | 6.1  | ns    | $V_I = 7V$ for $t_{PZL}$<br>$V_I = OPEN$ for $t_{PZH}$ | Figures 1, 2 |
| t <sub>PHZ</sub> , t <sub>PLZ</sub> | Output Disable Time            | 1.0   | 6.2  |                 | 5.6  | ns    | $V_I = 7V$ for $t_{PLZ}$<br>$V_I = OPEN$ for $t_{PHZ}$ | Figures 1, 2 |

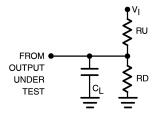
Note 6: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

### Capacitance (Note 7)

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

Note 7: T<sub>A</sub> = +25°C, f = 1 MHz, Capacitance is characterized but not tested.

# **AC Loading and Waveforms**



Note: Input driven by 50  $\Omega$  source terminated in 50  $\Omega$  Note:  $C_L$  includes load and stray capacitance Note: Input PRR = 1.0 MHz,  $t_W$  = 500 nS

### FIGURE 1. AC Test Circuit

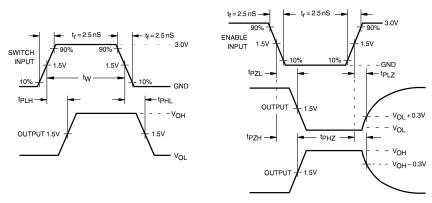
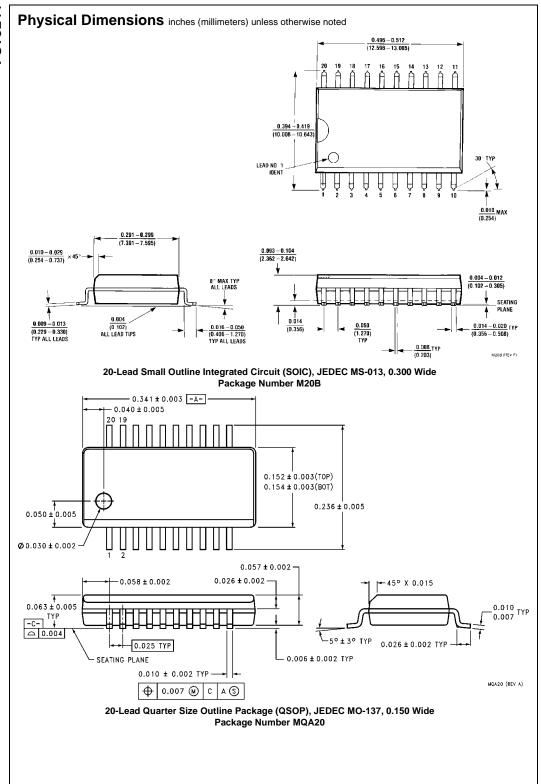
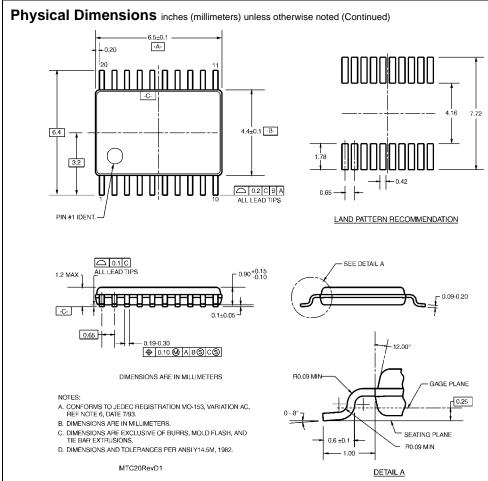


FIGURE 2. AC Waveforms





20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide Package Number MTC20

### **Technology Description**

The Fairchild Switch family derives from and embodies Fairchild's proven switch technology used for several years in its 74LVX3L384 (FST3384) bus switch product.

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