

## FST34X2245 32-Bit Bus Switch with 25Ω Series Resistors in Outputs

### General Description

The Fairchild Switch FST34X2245 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.

The FST34X2245 has equivalent 25Ω series resistors to reduce signal-reflection noise, eliminating the need for external terminating resistors.

### Features

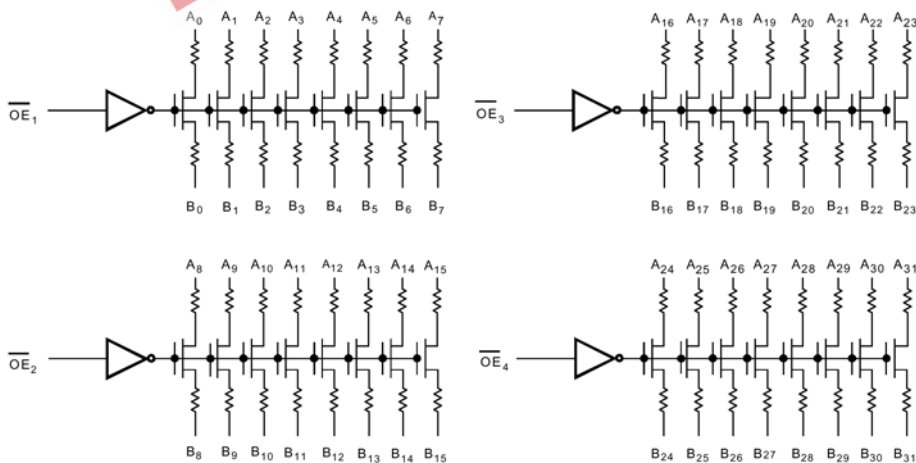
- 25Ω switch connection between two ports
- Minimal propagation delay through the switch
- Low  $I_{CC}$
- Zero bounce in flow-through mode
- Control inputs compatible with TTL level
- 32-bit version of FST32245
- Packaged in 20.5mm 80-lead package

### Ordering Code:

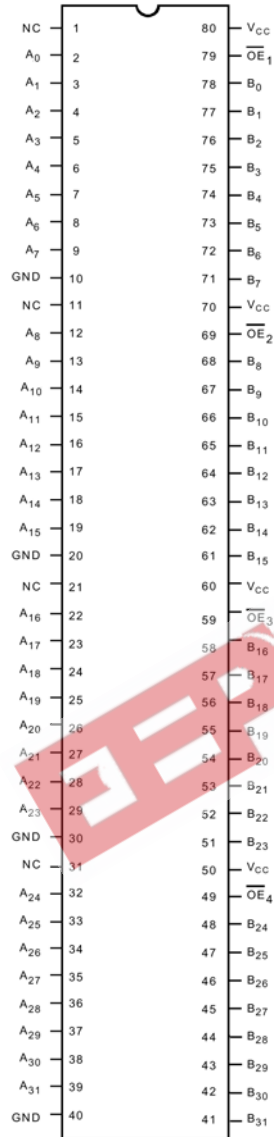
| Order Number                  | Package Number | Package Description                               |
|-------------------------------|----------------|---|
| FST34X2245QSPX                | MQA80A         | 80-Lead, QVSOP, JEDEC MO-154, 0.150" Wide         |
| FST34X2245QSPX_NL<br>(Note 1) | MQA80A         | Pb-Free 80-Lead, QVSOP, JEDEC MO-154, 0.150" Wide |

Note 1: "\_NL" indicates Pb-Free product (per JEDEC J-STD-020B). Device is available in Tape and Reel only.

### Logic Diagram



**Connection Diagram**



**Pin Descriptions**

| Pin Name          | Description       |
|-------------------|-------------------|
| $\overline{OE}_n$ | Bus Switch Enable |
| A <sub>n</sub>    | Bus A             |
| B <sub>n</sub>    | Bus B             |
| NC                | No Connect        |

**Function Table**

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



**Absolute Maximum Ratings** (Note 2)

|   |                  |
|---|------------------|
| 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 3)            | -0.5V to +7.0V   |
| DC Input Diode Current ( $I_{IK}$ ) $V_{IN} < 0V$ | -50mA            |
| DC Output ( $I_{OUT}$ ) Sink Current              | 128mA            |
| DC $V_{CC}/GND$ Current ( $I_{CC}/I_{GND}$ )      | +/- 100mA        |
| Storage Temperature Range ( $T_{STG}$ )           | -65°C to +150 °C |

**Recommended Operating Conditions** (Note 4)

|  |                  |
|--|------------------|
| 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 2:** 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 3:** The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

**Note 4:** Unused control inputs must be held HIGH or LOW. They may not float.

**DC Electrical Characteristics**

| Symbol          | Parameter                                  | $V_{CC}$<br>(V) | $T_A = -40\text{ }^\circ\text{C to } +85\text{ }^\circ\text{C}$ |                 |           | Units         | Conditions   |
|-----------------|--|-----------------|---|-----------------|-----------|---------------|--|
|                 |  |                 | Min   | Typ<br>(Note 5) | Max       |               |  |
| $V_{IK}$        | Clamp Diode Voltage                        | 4.5             |   |                 | -1.2      | V             | $I_{IN} = -18\text{ mA}$                             |
| $V_{IH}$        | 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             |   |                 | $\pm 1.0$ | $\mu\text{A}$ | $0 \leq V_{IN} \leq 5.5V$                            |
|                 |  | 0               |   |                 | 10        | $\mu\text{A}$ | $V_{IN} = 5.5V$                                      |
| $I_{OZ}$        | OFF-STATE Leakage Current                  | 5.5             |   |                 | $\pm 1.0$ | $\mu\text{A}$ | $0 \leq A, B \leq V_{CC}$                            |
| $R_{ON}$        | Switch On Resistance<br>(Note 6)           | 4.5             | 20  | 26              | 38        | $\Omega$      | $V_{IN} = 0V, I_{IN} = 64\text{ mA}$                 |
|                 |  | 4.5             | 20  | 27              | 40        | $\Omega$      | $V_{IN} = 0V, I_{IN} = 30\text{ mA}$                 |
|                 |  | 4.5             | 20  | 28              | 48        | $\Omega$      | $V_{IN} = 2.4V, I_{IN} = 15\text{ mA}$               |
|                 |  | 4.0             | 20  | 30              | 48        | $\Omega$      | $V_{IN} = 2.4V, I_{IN} = 15\text{ mA}$               |
| $I_{CC}$        | Quiescent Supply Current (Note 7)          | 5.5             |   |                 | 3         | $\mu\text{A}$ | $V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$              |
| $\Delta I_{CC}$ | Increase in $I_{CC}$ per Input<br>(Note 8) | 5.5             |   |                 | 2.5       | mA            | One Input at 3.4V<br>Other Inputs at $V_{CC}$ or GND |

**Note 5:** Typical values are at  $V_{CC} = 5.0V$  and  $T_A = +25\text{ }^\circ\text{C}$

**Note 6:** 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 7:** Per  $V_{CC}$  pin.

**Note 8:** Per TTL input, control pins only.

### AC Electrical Characteristics

| Symbol                | Parameter                             | $T_A = -40\text{ }^\circ\text{C to } +85\text{ }^\circ\text{C}$ ,<br>$C_L = 50\text{ pF}$ , $R_U = R_D = 500\text{ }\Omega$ |      |                         |      | Units | Conditions  | Figure Number |
|-----------------------|---------------------------------------|---|------|-------------------------|------|-------|---|---------------|
|                       |                                       | $V_{CC} = 4.5 - 5.5\text{ V}$   |      | $V_{CC} = 4.0\text{ V}$ |      |       |   |               |
|                       |                                       | Min   | Max  | Min                     | Max  |       |   |               |
| $t_{PHL}$ , $t_{PLH}$ | Propagation Delay Bus to Bus (Note 9) |   | 1.25 |                         | 1.25 | ns    | $V_I = \text{OPEN}$   | Figures 1, 2  |
| $t_{PZH}$ , $t_{PZL}$ | Output Enable Time                    | 1.0   | 5.9  |                         | 6.4  | ns    | $V_I = 7\text{ V}$ for $t_{PZL}$<br>$V_I = \text{OPEN}$ for $t_{PZH}$ | Figures 1, 2  |
| $t_{PHZ}$ , $t_{PLZ}$ | Output Disable Time                   | 1.0   | 6.0  |                         | 5.7  | ns    | $V_I = 7\text{ V}$ for $t_{PLZ}$<br>$V_I = \text{OPEN}$ for $t_{PHZ}$ | Figures 1, 2  |

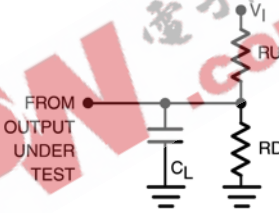
**Note 9:** This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On Resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

### Capacitance (Note 10)

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

**Note 10:**  $T_A = +25\text{ }^\circ\text{C}$ ,  $f = 1\text{ MHz}$ , 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  $t_W = 500\text{ ns}$

FIGURE 1. AC Test Circuit

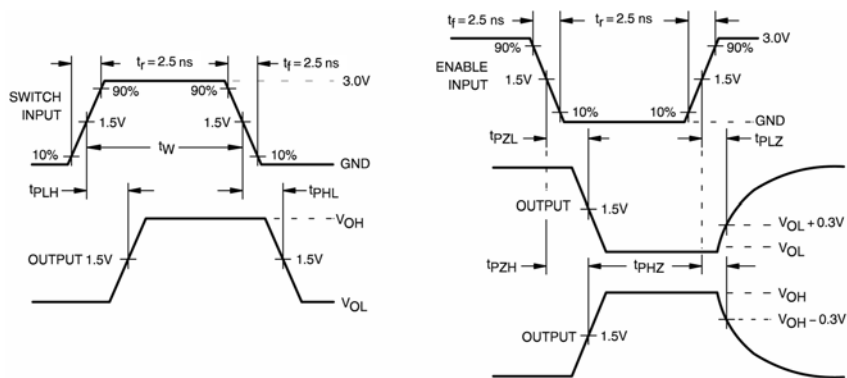
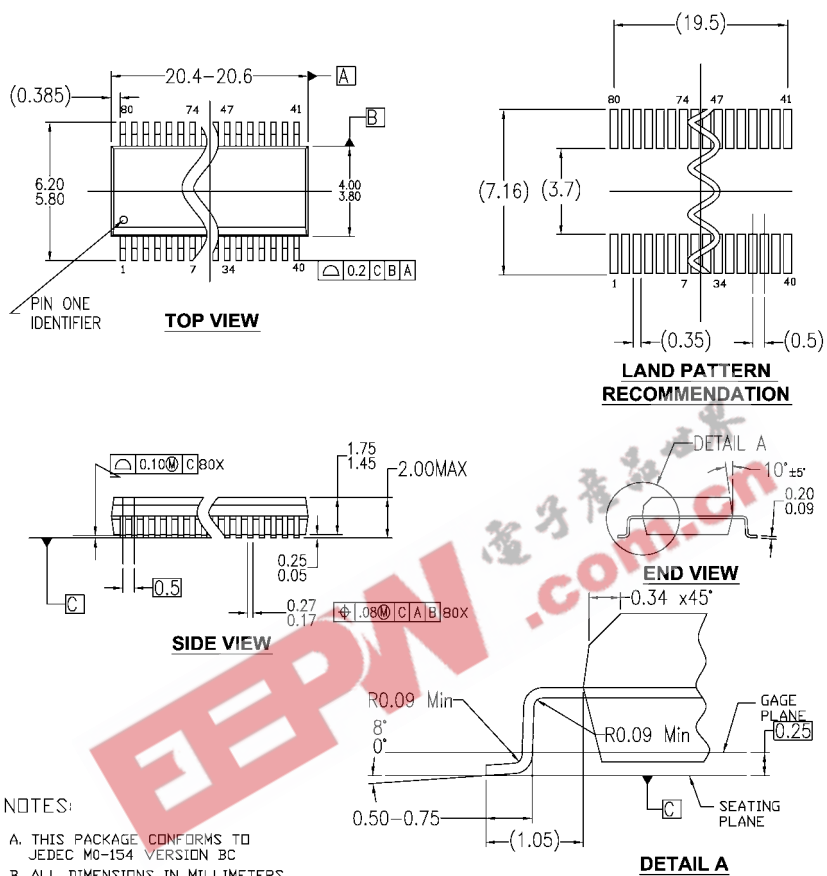


FIGURE 2. AC Waveforms

**Physical Dimensions** inches (millimeters) unless otherwise noted



- NOTES:
- A. THIS PACKAGE CONFORMS TO JEDEC MO-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.

MQA80A0EVA

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

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