

FST3345 8-Bit Bus Switch

General Description

The Fairchild Switch FST3345 provides 8-bits of high-speed CMOS TTL-compatible bus switching. 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 an 8-bit switch bank with dual output enable inputs (OE and $\overline{\text{OE}}$). When $\overline{\text{OE}}$ is LOW or OE is HIGH, the switch is ON and Port A is connected to Port B. When $\overline{\text{OE}}$ is HIGH and OE is LOW, the switch is OPEN and a high-impedance state exists between the two ports.

Features

- 4 Ω 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.

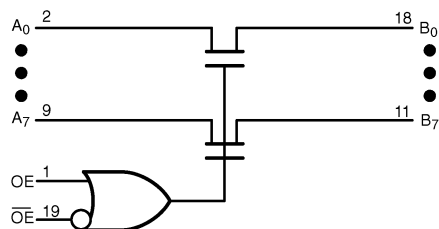
Ordering Code:

Order Number	Package Number	Package Description
FST3345WM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
FST3345QSC	MQA20	20-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide
FST3345MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
FST3345MTCX_NL (Note 1)	MTC20	Pb-Free 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

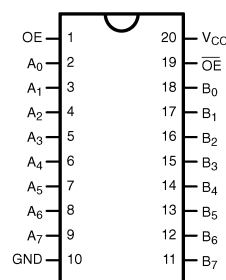
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

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

Logic Diagram



Connection Diagram



Pin Descriptions

Pin Name	Description
OE, $\overline{\text{OE}}$	Bus Switch Enables
A	Bus A
B	Bus B

Truth Table

Inputs		Function
OE	$\overline{\text{OE}}$	
X	L	Connect
H	X	Connect
L	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	0nS/V to 5nS/V
Switch I/O	0nS/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} (V)	$T_A = -40\text{ °C to }+85\text{ °C}$			Units	Conditions
			Min	Typ (Note 5)	Max		
V_{IK}	Clamp Diode Voltage	4.5			–1.2	V	$I_{IN} = -18mA$
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	$0 \leq V_{IN} \leq 5.5V$
I_{OZ}	OFF-STATE Leakage Current	5.5			±1.0	µA	$0 \leq A, B \leq V_{CC}$
R_{ON}	Switch On Resistance (Note 6)	4.5		4	7	Ω	$V_{IN} = 0V, I_{IN} = 64mA$
		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	$V_{IN} = 2.4V, I_{IN} = 15mA$
I_{CC}	Quiescent Supply Current	5.5			3	µA	$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$
ΔI_{CC}	Increase in I_{CC} per Input	5.5			2.5	mA	One Input at 3.4V Other Inputs at V_{CC} or GND

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

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.

AC Electrical Characteristics

Symbol	Parameter	T _A = −40 °C to +85 °C, C _L = 50 pF, R _U = R _D = 500Ω				Units	Conditions	Figure No.
		V _{CC} = 4.5 - 5.5V		V _{CC} = 4.0V				
		Min	Max	Min	Max			
t _{PHL} , t _{PLH}	Propagation Delay Bus to Bus (Note 7)		0.25		0.25	ns	V _I = OPEN	Figures 1, 2
t _{PZH} , t _{PZL}	Output Enable Time	1.5	6.5		7.0	ns	V _I = 7V for t _{PZL} V _I = OPEN for t _{PZH}	Figures 1, 2
t _{PHZ} , t _{PLZ}	Output Disable Time	1.0	8.0		8.2	ns	V _I = 7V for t _{PLZ} V _I = OPEN for t _{PHZ}	Figures 1, 2

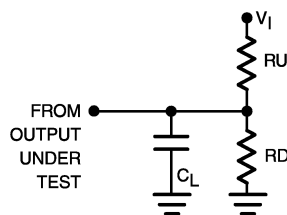
Note 7: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On Resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

Capacitance (Note 8)

Symbol	Parameter	Typ	Max	Units	Conditions
C_{IN}	Control Pin Input Capacitance	4		pF	$V_{CC} = 5.0\text{V}$
$C_{I/O}$	Input/Output Capacitance	5		pF	$V_{CC}, \overline{OE} = 5.0\text{V}$, $OE = 0\text{V}$

Note 8: $T_A = +25^\circ\text{C}$, $f = 1\text{ MHz}$, Capacitance is characterized but not tested.

AC Loading and Waveforms



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

Note: C_L includes load and stray capacitance

Note: Input PRR = 1.0 MHz $t_W = 500\text{ nS}$

FIGURE 1. AC Test Circuit

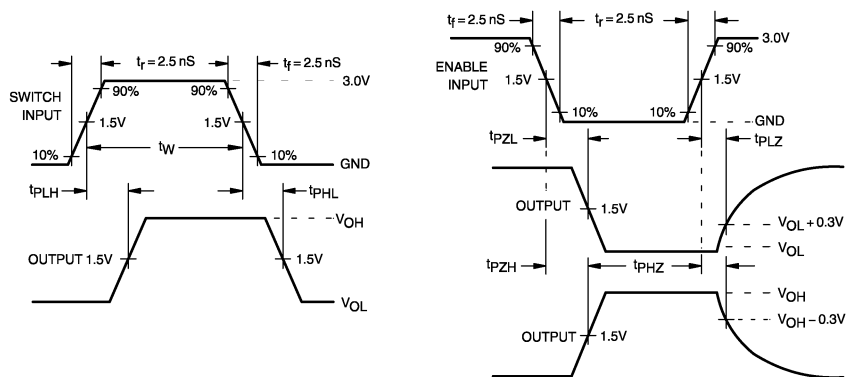
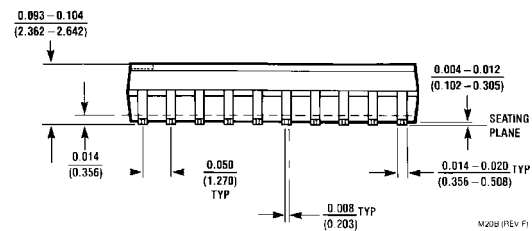


FIGURE 2. AC Waveforms



The drawing shows the MGA20 package with the following dimensions and features:

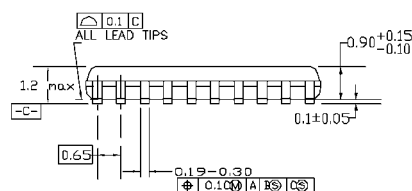
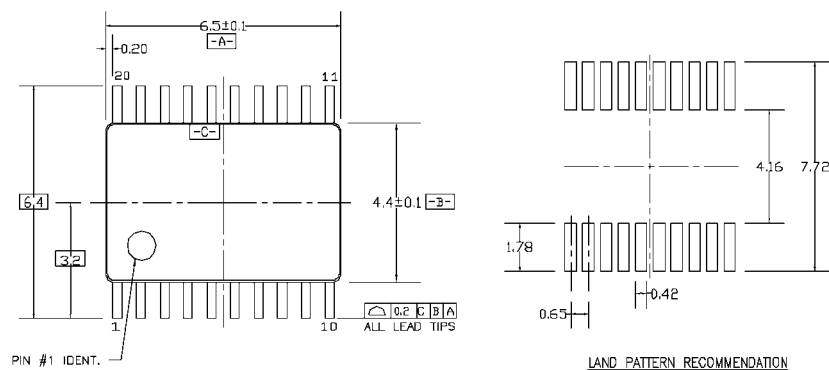
- Top View Dimensions:**
 - Overall width: 0.057 ± 0.002
 - Distance from left edge to first pin: 0.063 ± 0.005 TYP
 - Pin pitch: 0.025 TYP
 - Distance from last pin to right edge: 0.026 ± 0.002
 - Overall length: 0.058 ± 0.002
 - Distance from bottom edge to pin centerline: 0.006 ± 0.002 TYP
 - Distance from bottom edge to seating plane: 0.010 ± 0.002 TYP
- Feature Control Table:**

--C--	0.004
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- Seating Plane:** Indicated by a horizontal line across the package.
- Side View Dimensions:**
 - Lead angle: $45^\circ \times 0.015$
 - Lead thickness: 0.010 TYP
 - Lead width at base: 0.007 TYP
 - Distance from package body to lead start: 0.026 ± 0.002 TYP
 - Lead angle tolerance: $5^\circ \pm 3^\circ$ TYP
- Feature Control Table (Side View):**

--C--	0.007	--M--	C	A	--S--
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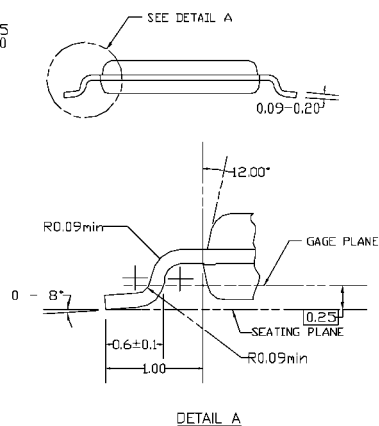
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS

NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AG, REF NOTE 6, DATE 7/93.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.



MTC20REV D1

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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