



## FST16210 20-Bit Bus Switch

### General Description

The Fairchild Switch FST16210 provides 20-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.

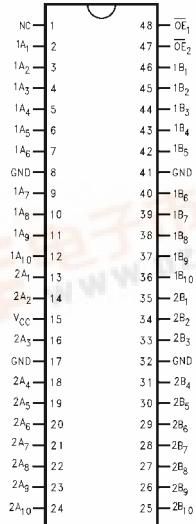
The device is organized as a 10-bit or 20-Bit bus switch. When  $\overline{OE}_1$  is LOW, the switch is ON and Port 1A is connected to Port 1B. When  $\overline{OE}_2$  is LOW, Port 2A is connected to Port 2B.

### Ordering Code:

Order Number	Package Number	Package Description
FST16210MTD	MTD48	48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide

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

### Connection Diagram



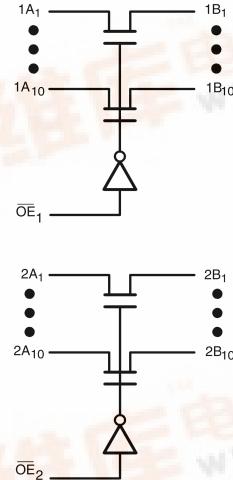
### Pin Descriptions

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

### 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.

### Logic Diagram



### Truth Table

Inputs		Inputs/Outputs	
$\overline{OE}_1$	$\overline{OE}_2$	1A, 1B	2A, 2B
L	L	1A = 1B	2A = 2B
L	H	1A = 1B	Z
H	L	Z	2A = 2B
H	H	Z	Z

Absolute Maximum Ratings <sup>(Note 1)</sup>				Recommended Operating Conditions <sup>(Note 3)</sup>			
Supply Voltage ( $V_{CC}$ )		-0.5V to +7.0V		Power Supply Operating ( $V_{CC}$ )	4.0V to 5.5V		
DC Switch Voltage ( $V_S$ )		-0.5V to +7.0V		Input Voltage ( $V_{IN}$ )	0V to 5.5V		
DC Input Voltage ( $V_{IN}$ ) <sup>(Note 2)</sup>		-0.5V to +7.0V		Output Voltage ( $V_{OUT}$ )	0V to 5.5V		
DC Input Diode Current ( $I_{IK}$ ) $V_{IN} < 0V$		-50mA		Input Rise and Fall Time ( $t_r, t_f$ )			
DC Output ( $I_{OUT}$ ) Sink Current		128mA		Switch Control Input	0nS/V to 5nS/V		
DC $V_{CC}/GND$ Current ( $I_{CC}/I_{GND}$ )		+/- 100mA		Switch I/O	0nS/V to DC		
Storage Temperature Range ( $T_{STG}$ )	-65°C to +150 °C			Free Air Operating Temperature ( $T_A$ )	-40 °C to +85 °C		
<b>Note 1:</b> 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.							
<b>Note 2:</b> The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.							
<b>Note 3:</b> Unused control inputs must be held high or low. They may not float.							
DC Electrical Characteristics							
Symbol	Parameter	$V_{CC}$ (V)	$T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$			Units	Conditions
			Min	Typ (Note 4)	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		$\pm 1.0$	$\mu\text{A}$		$0 \leq V_{IN} \leq 5.5\text{V}$
		0		10	$\mu\text{A}$		$V_{IN} = 5.5\text{V}$
$I_{OZ}$	OFF-STATE Leakage Current	5.5		$\pm 1.0$	$\mu\text{A}$		$0 \leq A, B \leq V_{CC}$
$R_{ON}$	Switch On Resistance (Note 5)	4.5		4	7	$\Omega$	$V_{IN} = 0\text{V}, I_{IN} = 64\text{mA}$
		4.5		4	7	$\Omega$	$V_{IN} = 0\text{V}, I_{IN} = 30\text{mA}$
		4.5		8	12	$\Omega$	$V_{IN} = 2.4\text{V}, I_{IN} = 15\text{mA}$
		4.0		11	20	$\Omega$	$V_{IN} = 2.4\text{V}, I_{IN} = 15\text{mA}$
$I_{CC}$	Quiescent Supply Current	5.5		3	$\mu\text{A}$		$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$
$\Delta I_{CC}$	Increase in $I_{CC}$ per Input	5.5			2.5	$\text{mA}$	One input at 3.4V Other inputs at $V_{CC}$ or GND
<b>Note 4:</b> Typical values are at $V_{CC} = 5.0\text{V}$ and $T_A = +25^{\circ}\text{C}$							
<b>Note 5:</b> 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	TA = -40 °C to +85 °C, CL = 50pF, RU = RD = 500Ω				Units	Conditions	Figure No.			
		VCC = 4.5 – 5.5V		VCC = 4.0V							
		Min	Max	Min	Max						
t <sub>PHL, t<sub>PLH</sub></sub>	Prop Delay Bus to Bus (Note 6)		0.25		0.25	ns	V <sub>I</sub> = OPEN	Figure 1, Figure 2			
t <sub>PZH, t<sub>PZL</sub></sub>	Output Enable Time	1.5	6.0		6.5	ns	V <sub>I</sub> = 7V for t <sub>PZL</sub> V <sub>I</sub> = OPEN for t <sub>PZH</sub>	Figure 1, Figure 2			
t <sub>PHZ, t<sub>PLZ</sub></sub>	Output Disable Time	1.5	7.0		7.2	ns	V <sub>I</sub> = 7V for t <sub>PLZ</sub> V <sub>I</sub> = OPEN for t <sub>PHZ</sub>	Figure 1, Figure 2			

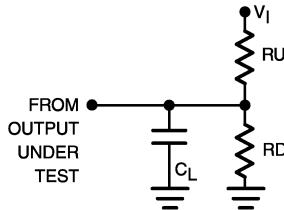
**Note 6:** This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage source (zero output impedance).

## Capacitance (Note 7)

Symbol	Parameter	Typ	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	6		PF	V <sub>CC</sub> , OE = 5.0V

**Note 7:** TA = +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<sub>L</sub> includes load and stray capacitance

**Note:** Input PRR = 1.0 MHz, t<sub>W</sub> = 500 ns

FIGURE 1. AC Test Circuit

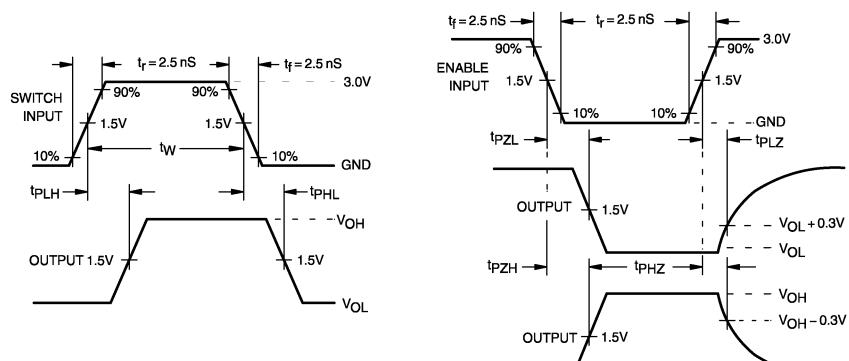
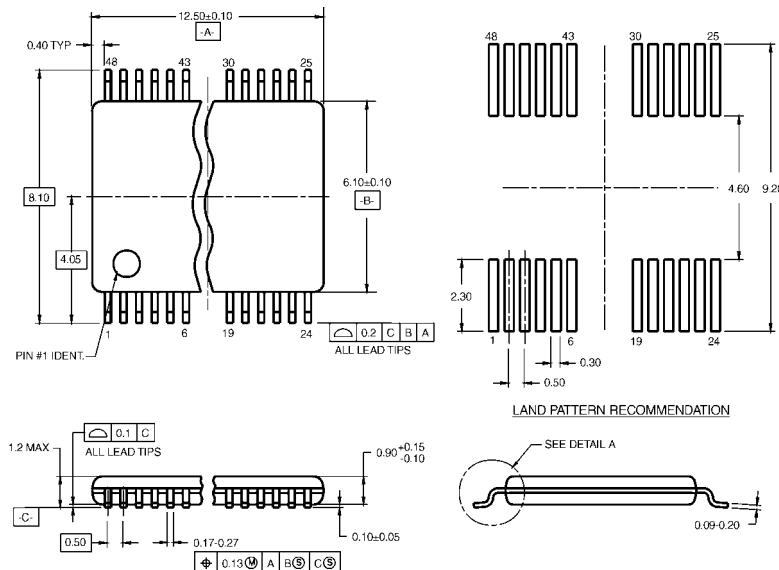


FIGURE 2. AC Waveforms

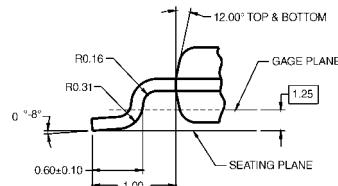
**Physical Dimensions** inches (millimeters) unless otherwise noted



NOTES:  
 A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB,  
 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.

MTD48RevB1

**48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide  
 Package Number MTD48**



DETAIL A

**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.

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

**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](http://www.fairchildsemi.com)