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November 1998
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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.

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.

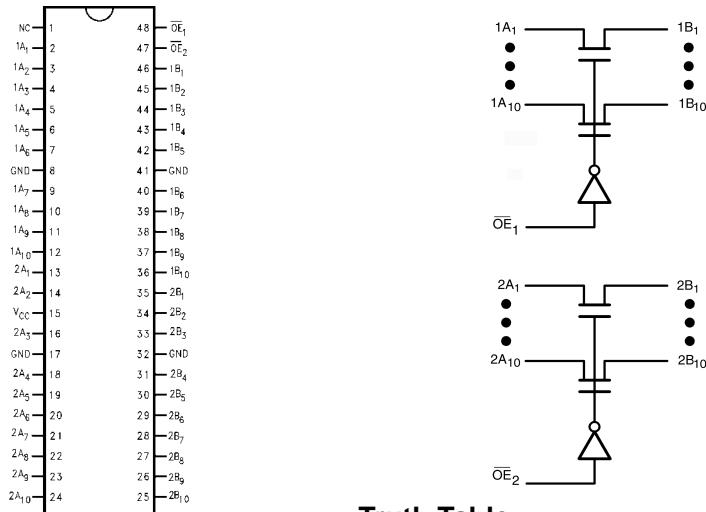
Ordering Code:

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

Logic Diagram



Pin Descriptions

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

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

FST16210

Absolute Maximum Ratings (Note 1)			Recommended Operating Conditions (Note 3)			
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}) (Note 2)	-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		
<p>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.</p> <p>Note 2: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.</p> <p>Note 3: Unused control inputs must be held high or low. They may not float.</p>						
DC Electrical Characteristics						
Symbol	Parameter	V_{CC} (V)	$T_A = -40$ °C to +85 °C			
			Min	Typ (Note 4)	Max	Units
V_{IK}	Clamp Diode Voltage	4.5		-1.2	V	
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	$0 \leq V_{IN} \leq 5.5V$
		0		10	μA	$V_{IN} = 5.5V$
I_{OZ}	OFF-STATE Leakage Current	5.5		± 1.0	μA	$0 \leq A, B \leq V_{CC}$
R_{ON}	Switch On Resistance (Note 5)	4.5		4	Ω	$V_{IN} = 0V, I_{IN} = 64mA$
		4.5		4	Ω	$V_{IN} = 0V, I_{IN} = 30mA$
		4.5		8	Ω	$V_{IN} = 2.4V, I_{IN} = 15mA$
		4.0		11	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 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

Symbol	Parameter	$T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $C_L = 50\text{pF}$, $R_U = R_D = 500\Omega$				Units	Conditions	Figure No.			
		$V_{CC} = 4.5 - 5.5\text{V}$		$V_{CC} = 4.0\text{V}$							
		Min	Max	Min	Max						
t_{PHL}, t_{PLH}	Propagation Delay Bus to Bus (Note 6)		0.25		0.25	ns	$V_I = \text{OPEN}$	Figures 1, 2			
t_{PZH}, t_{PZL}	Output Enable Time	1.5	6.0		6.5	ns	$V_I = 7\text{V}$ for t_{PZL} $V_I = \text{OPEN}$ for t_{PZH}	Figures 1, 2			
t_{PHZ}, t_{PLZ}	Output Disable Time	1.5	7.0		7.2	ns	$V_I = 7\text{V}$ for t_{PLZ} $V_I = \text{OPEN}$ for t_{PHZ}	Figures 1, 2			

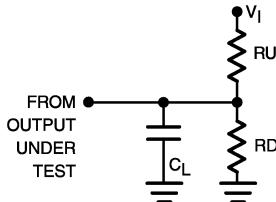
Note 6: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On Resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage source (zero output impedance).

Capacitance (Note 7)

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	6		pF	$V_{CC}, \overline{OE} = 5.0\text{V}$

Note 7: $T_A = +25^{\circ}\text{C}$, $f = 1\text{ MHz}$, 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

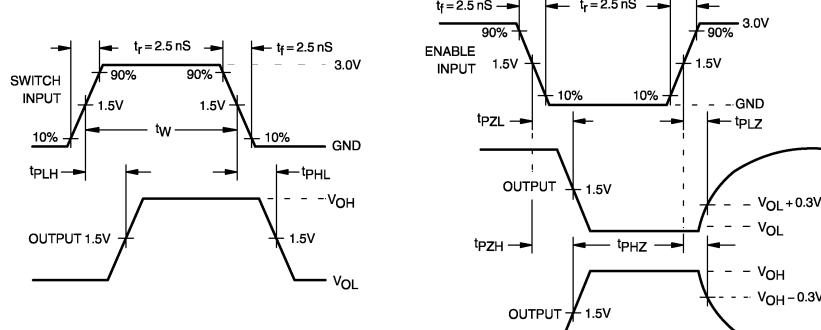
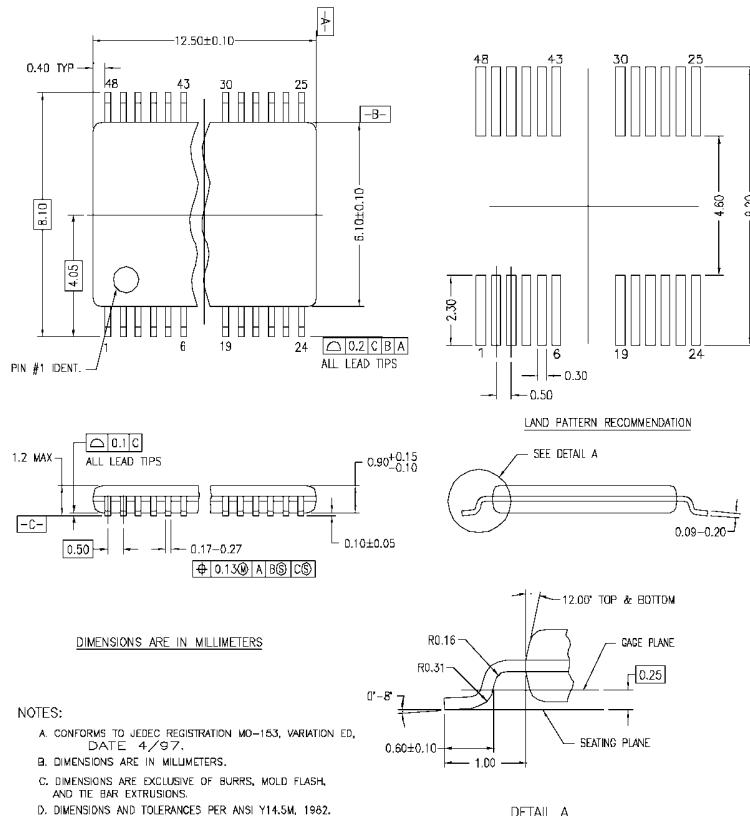


FIGURE 2. AC Waveforms

FST16210 20-Bit Bus Switch

Physical Dimensions inches (millimeters) unless otherwise noted



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

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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