FAIRCHILD SEMICONDUCTOR®

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FSAL200
Wide Bandwidth Quad 2:1 Analog Multiplexer/Demultiplexer Switch

General Description

The Fairchild Switch FSAL200 is a rail-to-rail quad 2:1 high-speed CMOS TTL-compatible analog multiplexer/demultiplexer switch. The low On Resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

When $\overline{OE}$ is LOW, the select pin connects the A Port to the selected B Port output. When $\overline{OE}$ is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

Features

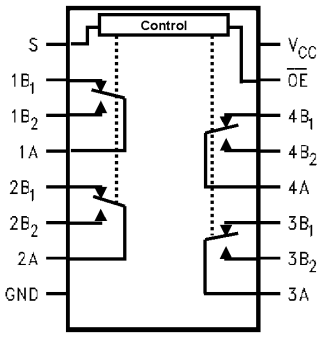
- Typical 6Ω switch connection between two ports
- Minimal propagation delay through the switch
- Low I_{CC}
- Zero bounce in flow-through mode
- Control inputs compatible with TTL level
- Rail-to-rail signal handling
- Low insertion loss
- Route communications signals including:
  - 10/100 Ethernet
  - USB1.1
  - 100VG-AnyLAN
  - Token Ring 4/16 Mbps
  - ATM25
  - SONET OCI 51.8 Mbps
  - T1/E1

Ordering Code:

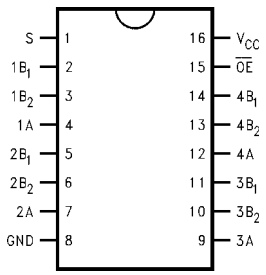
Order Number	Package Number	Package Description
FSAL200QSC	MQA16	16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide

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

Analog Symbol



Connection Diagram



Truth Table

S	$\overline{OE}$	Function
X	H	Disconnect
L	L	A = B_1
H	L	A = B_2

Pin Descriptions

Pin Name	Description
$\overline{OE}$	Switch Enable
S	Select Input
A, B_1, B_2	Data Port

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Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	–0.5V to +7.0V
DC Switch Voltage (V_S) (Note 2)	–0.5V to V_{CC} +0.5V
DC Input Voltage (V_{IN}) (Note 2)	–0.5V to +7.0V
DC Input Diode Current (I_{IK})	
@ (I_{IK}) V_{IN} < 0V	–50 mA
DC Output Current (I_{OUT})	120 mA
DC V_{CC} or Ground Current (I_{CC}/I_{GND})	±100 mA
Storage Temperature Range (T_{STG})	–65°C to +150°C
Power Dissipation (P_D) @ +85°C	0.5 W
Ambient Temperature with	
Power Applied	–40°C to +85°C

Recommended Operating Conditions (Note 3)

Supply Voltage Operating (V_{CC})	3.0V to 5.5V
Control Input Voltage (V_{IN})	0V to V_{CC}
Switch Input Voltage (V_{IN})	0V to V_{CC}
Output Voltage (V_{OUT})	0V to V_{CC}
Operating Temperature (T_A)	–40°C to +85°C
Input Rise and Fall Time (t_r, t_f)	
Control Input V_{CC} = 2.3V - 3.6V	0 ns/V to 10 ns/V
Control Input V_{CC} = 4.5V - 5.5V	0 ns/V to 5 ns/V
Thermal Resistance (θ_{JA})	350°C/W

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

Note 2: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Note 3: Control input must be held HIGH or LOW, it must not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	T_A = –40°C to +85°C			Units	Conditions
			Min	Typ	Max		
V_{IH}	HIGH Level Input Voltage	4.5 - 5.5	2.0			V	
		3.0 - 3.6	2.0				
V_{IL}	LOW Level Input Voltage	4.5 - 5.5	–0.5		0.8	V	
		3.0 - 3.6	–0.5		0.8		
I_{OZ}	OFF State Leakage Current	0 – 5.5			100	nA	0 ≤ V_{IN} ≤ 5.5V
R_{ON}	Switch On Resistance	4.5 - 5.5		6	12	Ω	I_{ON} = 10 - 30 mA
	(Note 4)	3.0 - 3.6		15	22		I_{ON} = 10 - 30 mA
I_{IN}	Control Input Leakage Current	5.5			±1	µA	V_{IN} = V_{CC} or GND
		3.6			±1		V_{IN} = V_{CC} or GND
I_{CC}	Quiescent Supply Current All Channels ON or OFF	5.5			1	µA	V_{IN} = V_{CC} or GND I_{OUT} = 0
	Analog Signal Range	V_{CC}	0		V_{CC}	V	
ΔR_{ON}	On Resistance Match Between	4.5 - 5.5		0.4	2	Ω	I_A = –30 mA, V_{Bn} = 3.15
	Channels (Note 4)(Note 5)	3.0 - 3.6		1	3		I_A = –10 mA, V_{Bn} 2.1
I_O	Output Current	4.5 - 5.5	100			mA	B_n, B_n, S = 0V to 5V
		3.0 - 3.6	80				
R_{flat}	On Resistance Flatness	4.5 - 5.5		3		Ω	A, B_1, B_2 = 0V to 5V
	(Note 4)(Note 6)	3.0 - 3.6		7			A, B_1, B_2 = 0V to 5V

Note 4: 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 Ports).

Note 5: ΔR_{ON} = R_{ON} max – R_{ON} min measured at identical V_{CC}, temperature and voltage levels.

Note 6: Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = -40°C$ to $+85°C$			Units	Conditions	Figure Number
			Min	Typ	Max			
t_{ON}	Turn On Time	4.5 – 5.5		10	20	ns	VB_n = 3V	Figures 1, 2
	S to Output	3.0 - 3.6		28	40	ns	VB_n = 1.5V	
t_{OFF}	Turn Off Time	4.5 – 5.5		5	10	ns	VB_n = 3V	Figures 1, 2
	S to Output	3.0 - 3.6		4	20	ns	VB_n = 1.5V	
Q	Charge Injection	5.0		7		pC	C_L = 0.1 nF, V_{GEN} = 0V	Figure 3
	(Note 7)	3.3		3			R_{GEN} = 0 Ω	
OIRR	Off Isolation	4.5 - 5.5		–55		dB	R_L = 100 Ω	Figure 4
	(Note 8)						f = 30 MHz	
		3.0 - 3.6		–75		dB	R_L = 50 Ω	Figure 4
							f = 1 MHz	
Xtalk	Crosstalk	4.5 - 5.5		–70		dB	R_L = 100 Ω	Figure 5
							f = 30 MHz	
		3.0 - 3.6		–75		dB	R_L = 50 Ω	Figure 5
							f = 1 MHz	
BW	–3dB Bandwidth	4.5 - 5.5		137		MHz	R_L = 100 Ω	Figure 8
		3.0 - 3.6		110		MHz	R_L = 50 Ω	Figure 8
D	$\Delta R_{ON/RL}$ Distortion	4.5 - 5.5		2		%	R_L = 100 Ω	
	(Note 7)	3.0 - 3.6		3				

Note 7: Guaranteed by Design.

Note 8: Off Isolation = 20 $\log_{10}$ [V_A / V_{Bn}]

Capacitance (Note 9)

Symbol	Parameter	Typ	Max	Units	Conditions	Figure Number
C_{IN}	Control Pin Input Capacitance	2.3		pF	V_{CC} = 0V	
C_{IO-B}	B Port Off Capacitance	12		pF	V_{CC} = 5.0V and 3.0V	Figure 6
	A Port Off Capacitance	20		pF	V_{CC} = 5.0V and 3.0V	Figure 7
C_{ON}	Channel On Capacitance	15		pF	V_{CC} = 5.0V and 3.0V	Figure 7

Note 9: T_A = +25°C, f = 1 MHz, Capacitance is characterized but not tested in production.

AC Loading and Waveforms

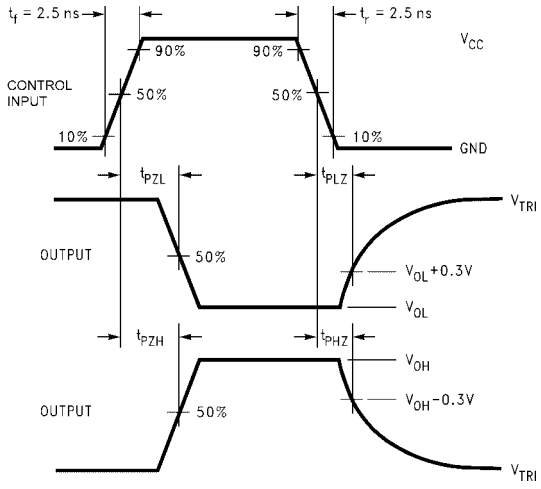


FIGURE 1. AC Waveforms

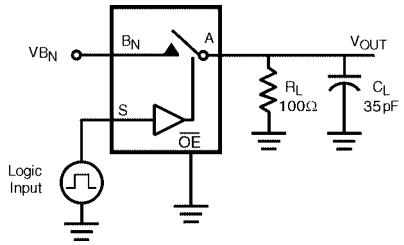


FIGURE 2. t_{ON}, t_{OFF} Loading

AC Loading and Waveforms (Continued)

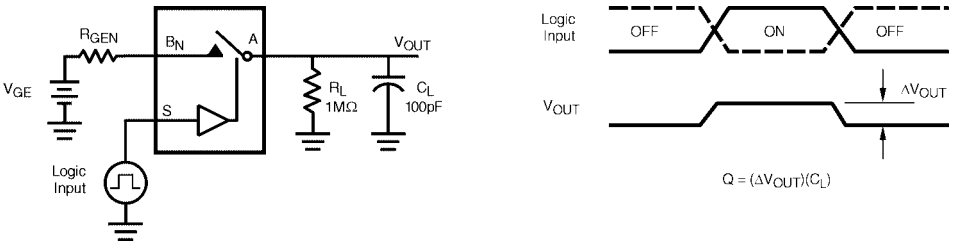


FIGURE 3. Charge Injection Test

Note: R_L = 50 Ω when V_{CC} = 3.3±10% for the Off Isolation, Crosstalk and Bandwidth test.

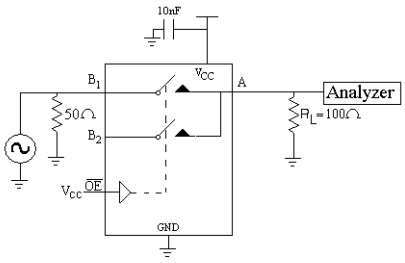


FIGURE 4. Off Isolation

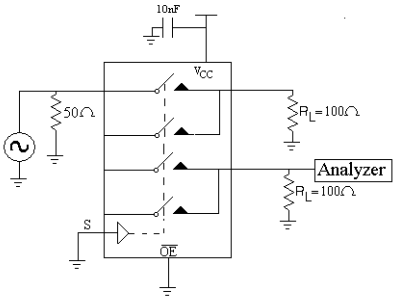


FIGURE 5. Crosstalk

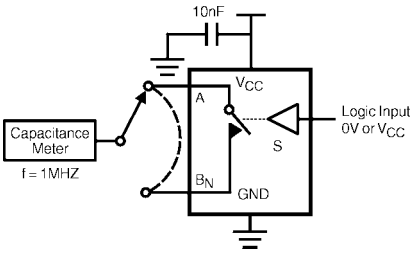


FIGURE 6. Channel Off Capacitance

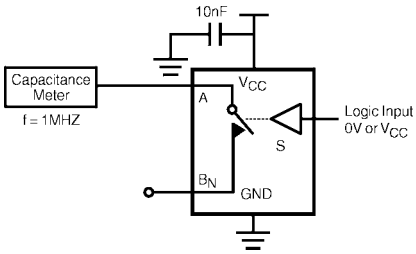


FIGURE 7. Channel On Capacitance

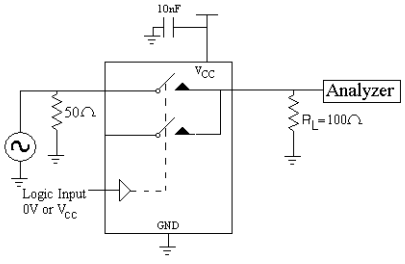
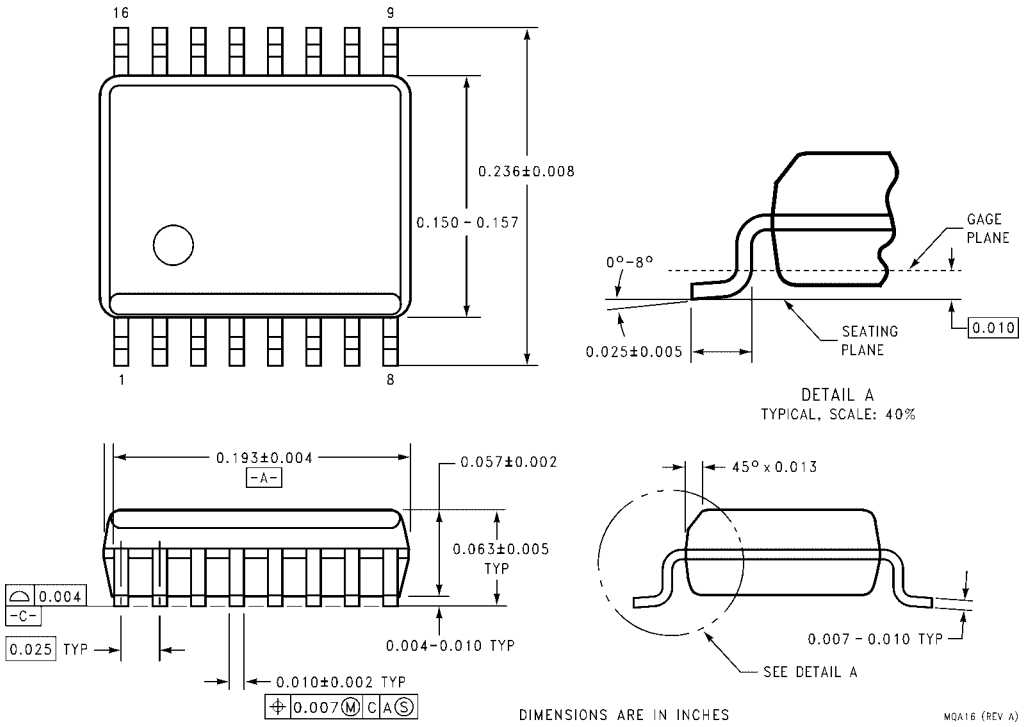


FIGURE 8. Bandwidth

Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide
Package Number MQA16

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