

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

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 include:
 - 10/100 Ethernet
 - 100VG-AnyLAN
 - ATM25
 - SONET OCI 51.8 Mbps
 - USB1.1
 - T1/E1
 - Token Ring 4/16 Mbps

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.

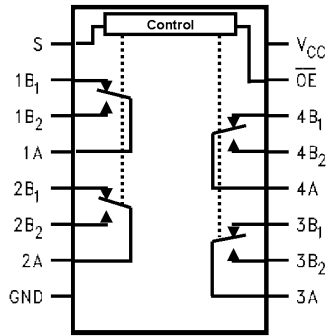
When \overline{OE} is LOW, the select pin connects the A Port to the selected B Port output. When \overline{OE} is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

Ordering Information

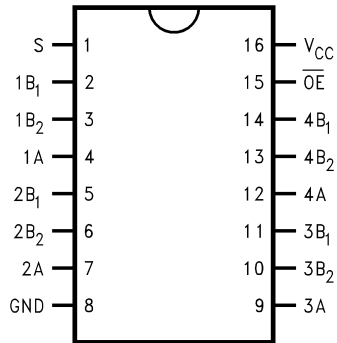
Part Number	Package Number	Pb-Free	Package	Packing Method
FSAL200QSC	MQA16	Yes	16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide	
FSAL200MTC	MTC16	Yes	16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide	

This device is also available in tape and reel. To order, append X to the part number.

Analog Symbol



Connection Diagram



Truth Table

S	$\overline{\text{OE}}$	Function
X	HIGH	Disconnect
LOW	LOW	A=B1
HIGH	LOW	A=B2

Pin Descriptions

Pin Name	Function
$\overline{\text{OE}}$	Switch Enable
S	Select Input
A, B1, B2	Data Port

Absolute Maximum Ratings

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 ratings. The “Recommended Operating Conditions” table defines the conditions for actual device operation.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	-0.5	7.0	V
V_S	DC Switch Voltage ⁽¹⁾	-0.5	0.5	V
V_{IN}	DC Input Voltage ⁽¹⁾	-0.5	7.0	V
I_{IK}	DC Input Diode Current @ (I_{IK}) $V_{IN} < 0V$		-50	mA
I_{OUT}	DC Output Current		120	mA
I_{CC}/I_{GND}	DC V_{CC} or Ground Current		± 100	mA
T_{STG}	Storage Temperature Range	-65	+150	°C
P_D	Power Dissipation @ $\pm 85^\circ C$		0.5	W
T_A	Ambient Temperature with Power Applied	-40	85	°C

Recommended Operating Conditions⁽²⁾

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

1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
2. Control input must be held HIGH or LOW; it must not float.

DC Electrical Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C			Units
				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 ≤ V _{IN} ≤ 5.5V	0 - 5.5			100	nA
R _{ON}	Switch On Resistance ⁽³⁾	I _{ON} = 10 - 30 mA	4.5 - 5.5		6	12	Ω
		I _{ON} = 10 - 30 mA	3.0 - 3.6		15	22	
I _{IN}	Control Input Leakage Current	V _{IN} = V _{CC} or GND	5.5			±1	mA
		V _{IN} = V _{CC} or GND	3.6			±1	
I _{CC}	Quiescent Supply Current All Channels ON or OFF	V _{IN} = V _{CC} or GND I _{OUT} = 0	5.5			1	mA
	Analog Signal Range		V _{CC}	0		V _{CC}	V
ΔR _{ON}	On Resistance Match Between Channels ^(3,4)	I _A = -30 mA, V _{Bn} = 3.15	4.5 - 5.5		0.4	2	Ω
		I _A = -10 mA, V _{Bn} = 2.1	3.0 - 3.6		1	3	
I _O	Output Current	B _n , B _n , S = 0V to 5V	4.5 - 5.5	100			mA
			3.0 - 3.6	80			
R _{flat}	On Resistance Flatness ^(3,5)	A, B ₁ , B ₂ = 0V to 5V	4.5 - 5.5		3		Ω
		A, B ₁ , B ₂ = 0V to 5V	3.0 - 3.6		7		

3. 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).
4. ΔR_{ON} = R_{ON} maximum - R_{ON} minimum measured at identical V_{CC}, temperature, and voltage levels.
5. 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	Conditions	V _{CC} (V)	T _A = -40°C to +85°C			Units	Figure
				Min.	Typ.	Max.		
t _{ON}	Turn-On Time S to Output	V _{Bn} = 3V	4.5 - 5.5		10	20	ns	Figure 1
		V _{Bn} = 1.5V	3.0 - 3.6		28	40	ns	Figure 2
t _{OFF}	Turn-Off Time S to Output	V _{Bn} = 3V	4.5 - 5.5		5	10	ns	Figure 1
		V _{Bn} = 1.5V	3.0 - 3.6		4	20	ns	Figure 2
Q	Charge Injection ⁽⁶⁾	C _L = 0.1 nF, V _{GEN} = 0V	5.0		7		pC	Figure 3
		R _{GEN} = 0Ω	3.3		3			
OIRR	Off Isolation ⁽⁷⁾	R _L = 100Ω f = 30 MHz	4.5 - 5.5		-55		dB	Figure 4
		R _L = 50Ω f = 1 MHz	3.0 - 3.6		-75		dB	Figure 4
Xtalk	Crosstalk	R _L = 100Ω f = 30 MHz	4.5 - 5.5		-70		dB	Figure 5
		R _L = 50Ω f = 1 MHz	3.0 - 3.6		-75		dB	Figure 5
BW	-3dB Bandwidth	R _L = 100Ω	4.5 - 5.5		137		MHz	Figure 8
		R _L = 50Ω	3.0 - 3.6		110		MHz	Figure 8
D	ΔR _{ON/RL} Distortion ⁽⁶⁾	R _L = 100Ω	4.5 - 5.5		2		%	
			3.0 - 3.6		3			

6. Guaranteed by design.

7. Off Isolation = $20 \log_{10} [V_A / V_{Bn}]$.

Capacitance⁽⁸⁾

Symbol	Parameter	Conditions	Typ.	Max.	Units	Figure
C _{IN}	Control Pin Input Capacitance	V _{CC} = 0V	2.3		pF	
C _{IO-B}	B Port Off Capacitance	V _{CC} = 5.0V and 3.0V	8		pF	Figure 6
	A Port Off Capacitance	V _{CC} = 5.0V and 3.0V	13		pF	Figure 7
C _{ON}	Channel On Capacitance	V _{CC} = 5.0V and 3.0V	15		pF	Figure 7

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

AC Loading and Waveforms

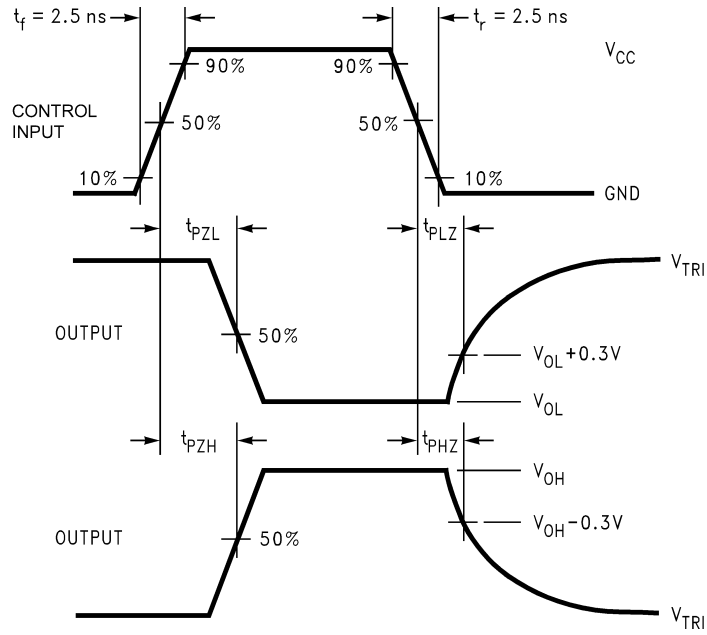


Figure 1. AC Waveforms

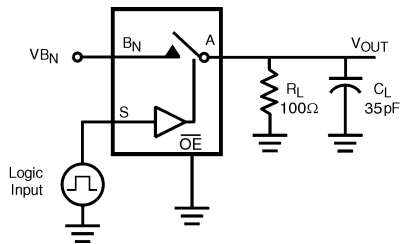


Figure 2. t_{on} , t_{off} Loading

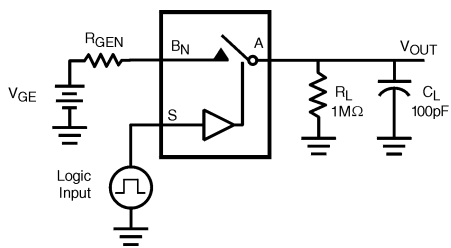


Figure 3. Charge Injection Test

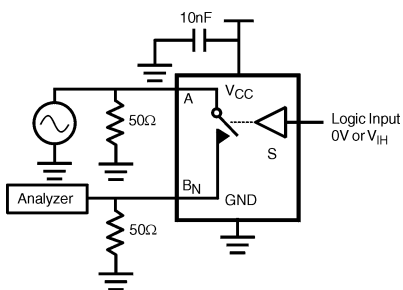
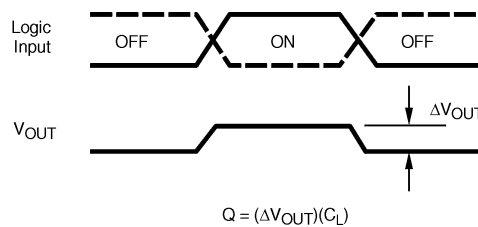


Figure 4. Off Isolation

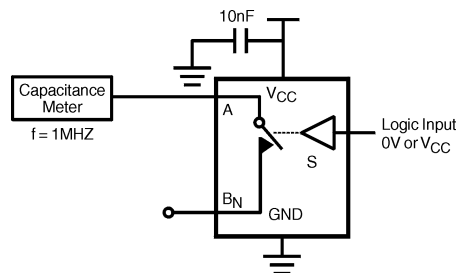


Figure 7. Channel On Capacitance

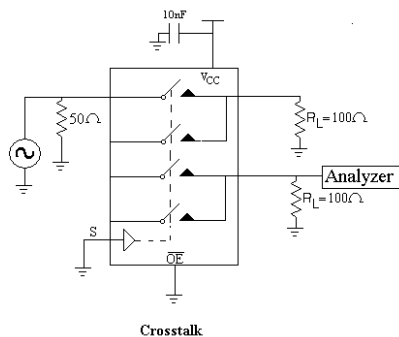


Figure 5. Crosstalk

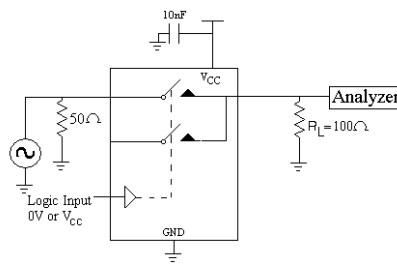


Figure 8. Bandwidth

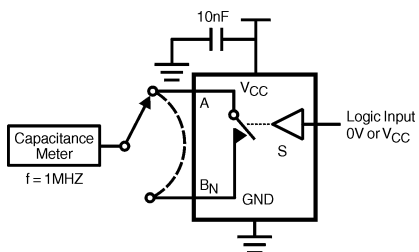
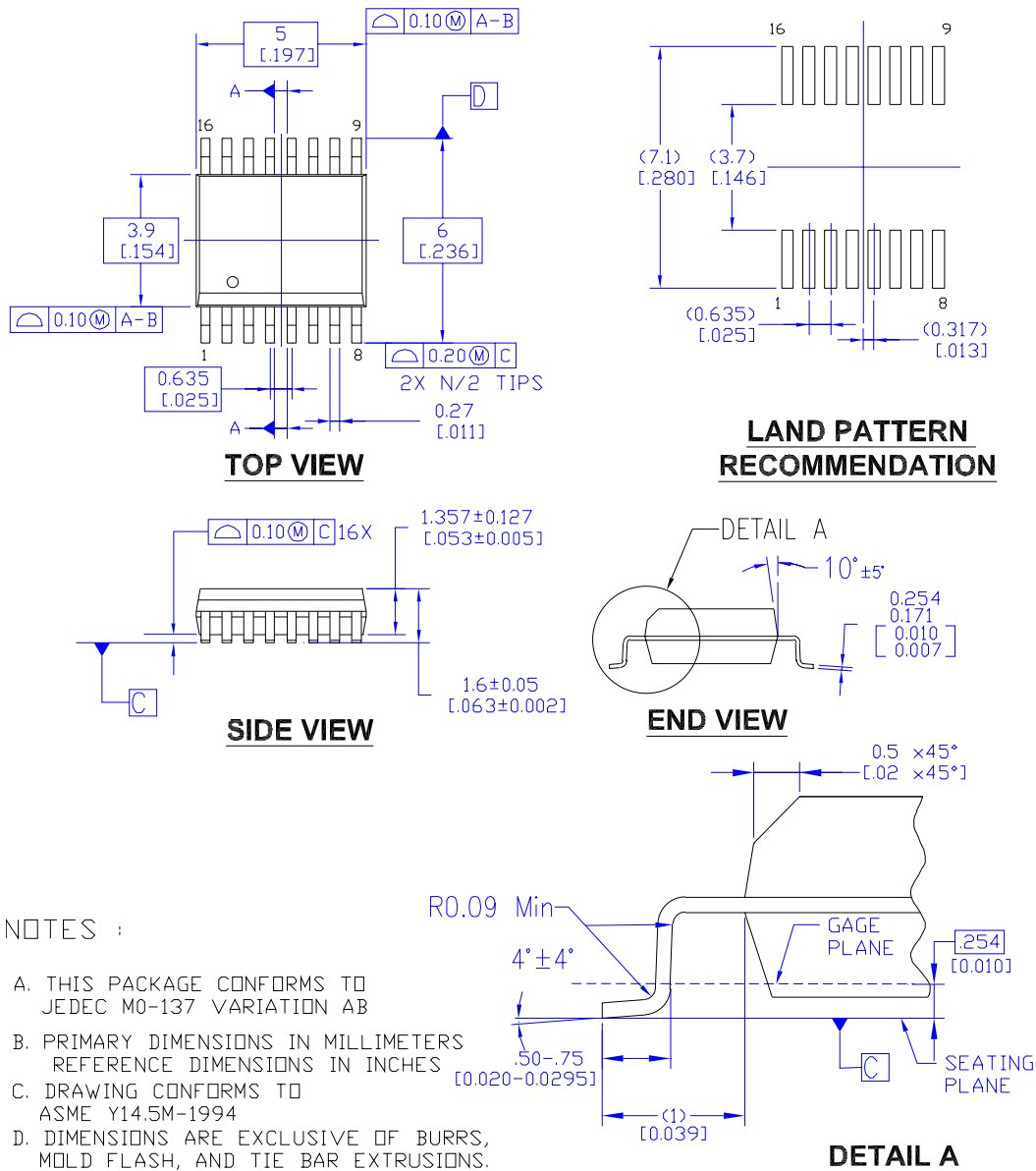


Figure 6. Channel Off Capacitance

Physical Dimensions

Dimensions are in inches (millimeters) unless otherwise noted.



NOTES :

- THIS PACKAGE CONFORMS TO JEDEC MO-137 VARIATION AB
- PRIMARY DIMENSIONS IN MILLIMETERS
REFERENCE DIMENSIONS IN INCHES
- DRAWING CONFORMS TO ASME Y14.5M-1994
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

MQA16AREVB

Figure 9. 16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0/0150" Wide, Package Number MQA16

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