FAIRCHILD SEMICONDUCTOR®

June 2006

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.

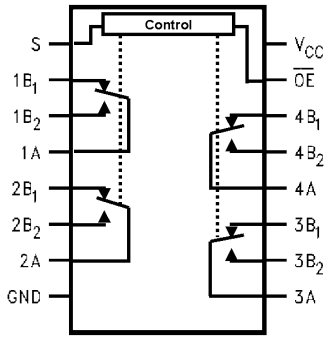
When $\overline{OE}$ is LOW, the select pin connects the A Port to the selected B Port output. When $\overline{OE}$ is HIGH, the switch is OPEN and a high-impedance state exists between the two ports.

Ordering Information

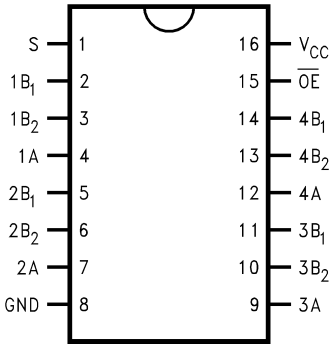
Part Number	Package Number	Pb-Free	Package	Packing Method
FSAL200QSC	MQA16	Yes	16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide	
FSAL200MTC	MTC16	Yes	16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide	

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

Analog Symbol



Connection Diagram



Truth Table

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

Pin Descriptions

Pin Name	Function
$\overline{OE}$	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 @ ±85°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 Vcc = 2.3V - 3.6V	0	10	ns/V
	Control Input Vcc = 4.5V - 5.5V	0	5	ns/V
O_{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	VB_n = 3V	4.5 - 5.5		10	20	ns	Figure 1
	S to Output	VB_n = 1.5V	3.0 - 3.6		28	40	ns	Figure 2
t_{OFF}	Turn-Off Time	VB_n = 3V	4.5 - 5.5		5	10	ns	Figure 1
	S to Output	VB_n = 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	$\Delta R_{ON/RL}$ 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

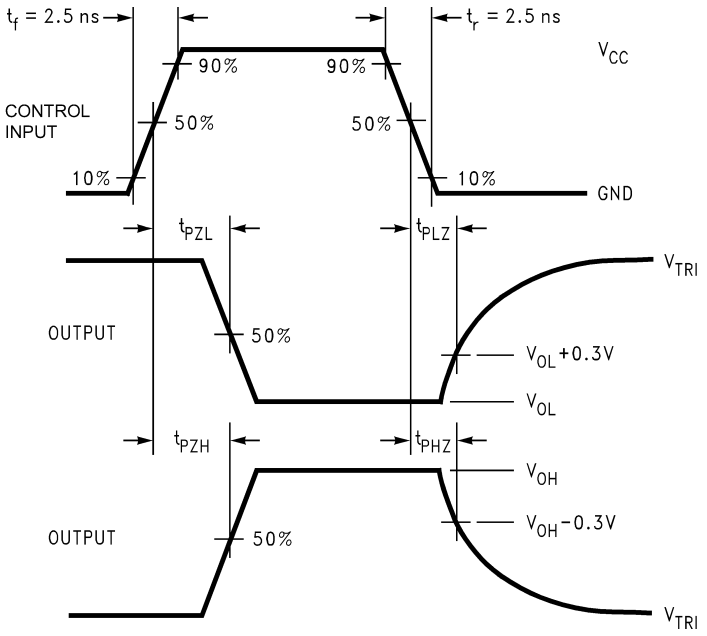


Figure 1. AC Waveforms

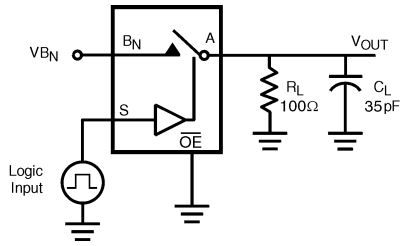


Figure 2. t_{on}, t_{off} Loading

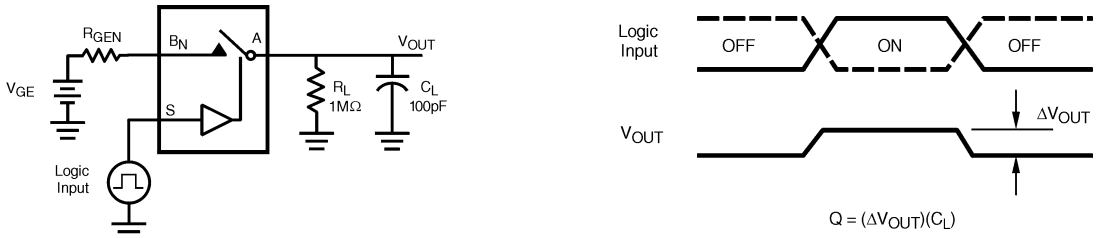


Figure 3. Charge Injection Test

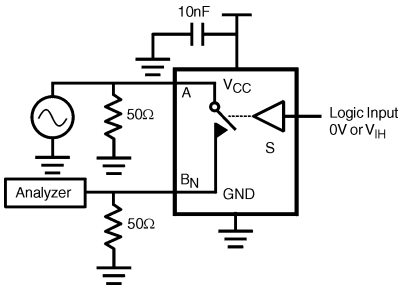


Figure 4. Off Isolation

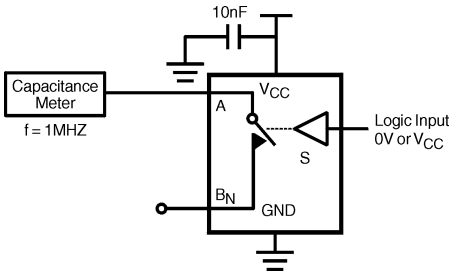


Figure 7. Channel On Capacitance

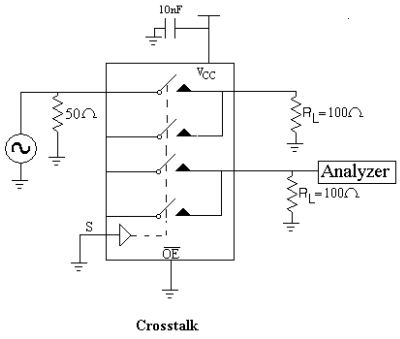


Figure 5. Crosstalk

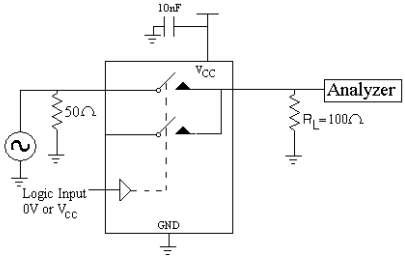


Figure 8. Bandwidth

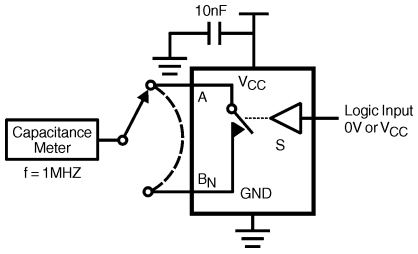


Figure 6. Channel Off Capacitance

Physical Dimensions

Dimensions are in inches (millimeters) unless otherwise noted.

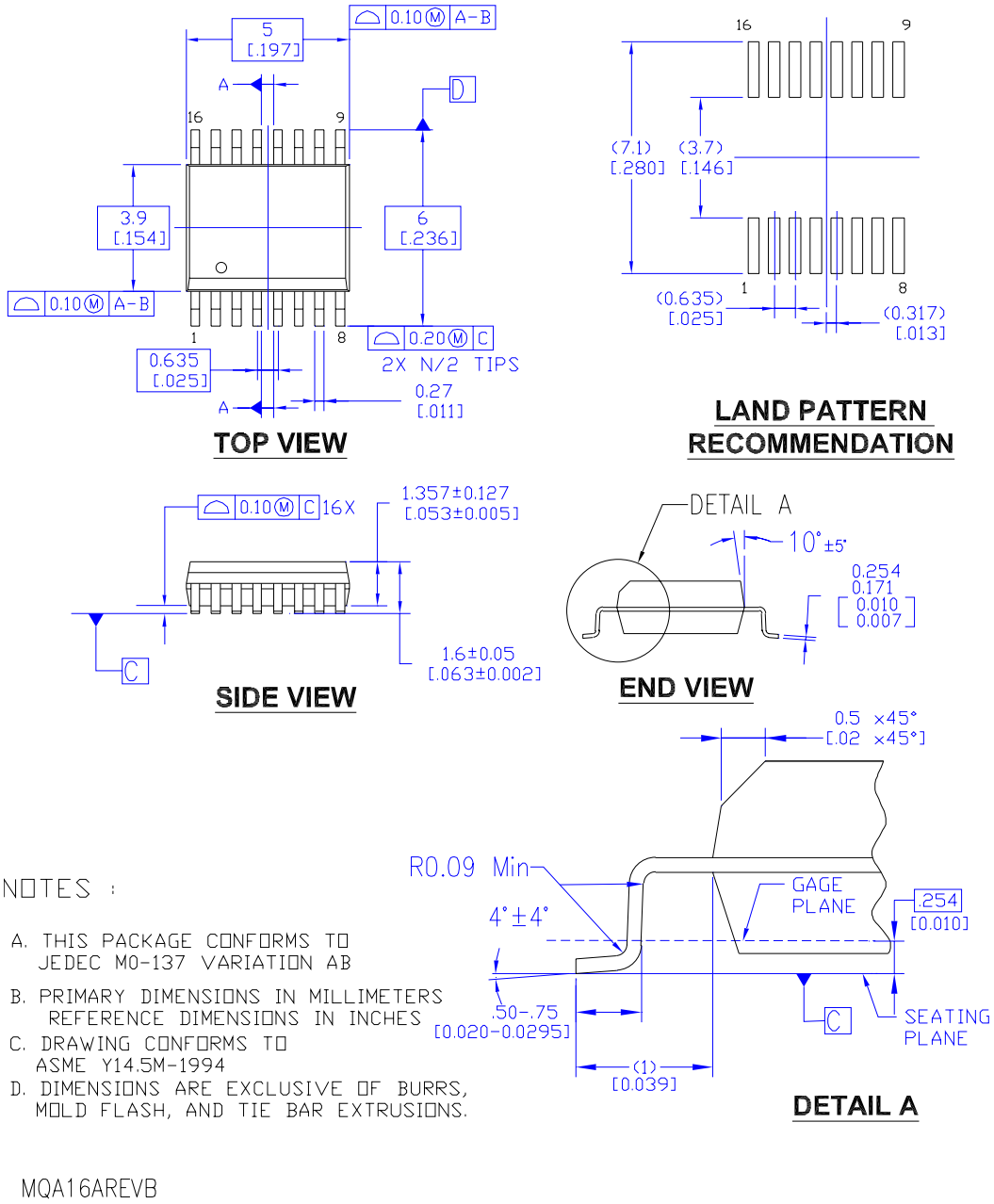


Figure 9. 16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0/0150" Wide, Package Number MQA16

Physical Dimensions (Continued)

Dimensions are in inches (millimeters) unless otherwise noted.

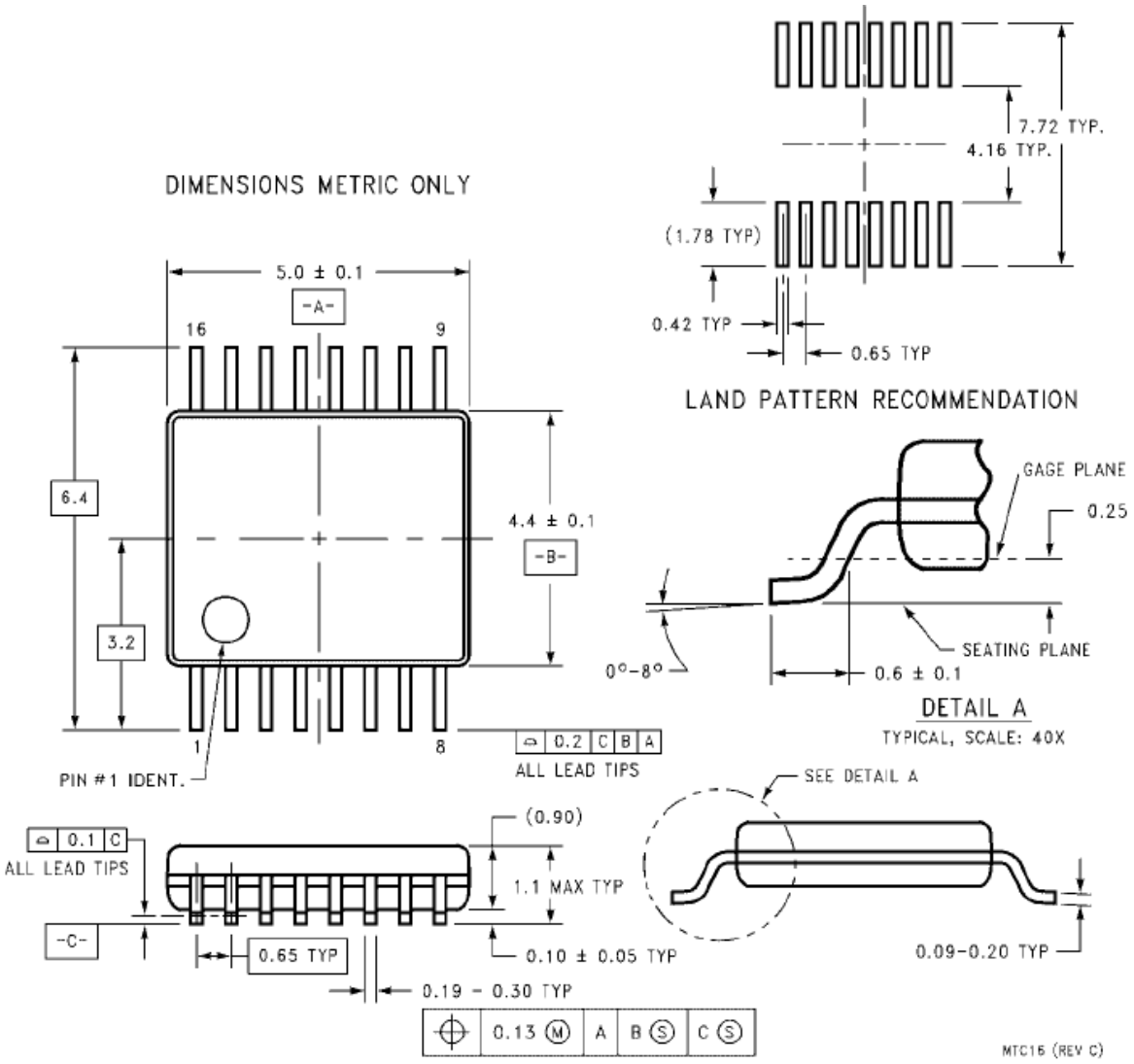


Figure 10. 16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide, Package Number MTC16

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