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FSA2259 Low-Voltage, Dual-SPDT (0.8Ω) Analog Switch with 16kV ESD

Features

- 0.8Ω Typical On Resistance (R_{ON}) for +3.0V Supply
- 0.40Ω Maximum R_{ON} Flatness for +3.0V Supply
- -3db Bandwidth: > 50MHz
- Low I_{CCT} Current Over an Expanded Control Input Range
- Packaged in 10-Lead UMLP (1.4 x 1.8mm)
- Power-Off Protection on Common Ports
- Broad V_{CC} Operating Range: 1.65 to 4.4V
- ESD HBM JEDEC: JESD22-A114
 - I/O to GND: 8.5kV
 - Power to GND: 16.0kV

Applications

- Cell Phone, PDA, Digital Camera, and Notebook
- LCD Monitor, TV, and Set-Top Box

Description

The FSA2259 is a high-performance, dual, Single Pole Double Throw (SPDT) analog switch that features low R_{ON} of 0.8Ω (typical) at 3.0V V_{CC} . The FSA2259 operates over a wide V_{CC} range of 1.65V to 4.4V and is designed for break-before-make operation. The select input is TTL-level compatible.

The FSA2259 features very low quiescent current even when the control voltage is lower than the V_{CC} supply. This feature suits mobile handset applications by allowing direct interface with baseband processor general-purpose I/Os with minimal battery consumption.

Related Resources

For additional information, please contact <u>analogswitch@fairchildsemi.com</u>.

Ordering Information

Part Number	Top Mark	Operating Temperature Range	Package
FSA2259UMX	JT	-40 to +85°C	10-Lead, Quad, Ultrathin Molded Leadless Package (UMLP), 1.4 x 1.8mm

Analog Symbol



Figure 1. FSA2259

Pin Configuration



Figure 2. 10-Pin UMLP (Top Through View)

Pin Description

Pin#	Name	Description
1	Vcc	Supply Voltage
2	1B ₁	Data Ports
3	1A	Data Ports
4	S1	Switch Select Pins
5	1B ₀	Data Ports
6	GND	Ground
7	2B ₀	Data Ports
8	S2	Switch Select Pins
9	2A	Data Ports
10	2B ₁	Data Ports

Truth Table

Control Input, Sn	Function
LOW Logic Level	nB0 Connected to nA
HIGH Logic Level	nB1 Connected to nA

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Min.	Max.	Units	
V _{CC}	Supply Voltage		-0.5	5.5	V
V _{SW}	Switch I/O Voltage ⁽¹⁾	1B0, 1B1, 2B0, 2B1, 1A, 2A Pins	-0.5	V _{CC} + 0.3	V
V _{IN}	Control Input Voltage ⁽¹⁾	S1, S2	-0.5	5.5	V
I _{IK}	Input Clamp Diode Current	ode Current			
I _{SW}	Switch I/O Current (Continuous)			350	mA
I _{SWPEAK}	Peak Switch Current (Pulsed at 1ms Duration	on, <10% Duty Cycle)		500	mA
T _{STG}	Storage Temperature Range		-65	+150	°C
TJ	Maximum Junction Temperature			+150	°C
TL	Lead Temperature (Soldering, 10 seconds)			+260	°C
		I/O to GND		8.5	
FOD	Human Body Model, JEDEC:	Power to GND		16.0	kV
ESD		All Other Pins		8.0	
	Charged Device Model, JEDEC: JESD22-C		2.0	kV	

Note:

1. Input and output negative ratings may be exceeded if input and output diode current ratings are observed.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Max.	Units
V _{CC}	Supply Voltage	1.65	4.40	V
VIN	Control Input Voltage	0	Vcc	V
V _{SW}	Switch I/O Voltage	0	Vcc	V
T _A	Operating Temperature	-40	+85	°C

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DC Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	Vcc (V)	T _A =+25⁰C			T _A =-40 to +85⁰C		Unit
-,				Min.	Typ.	Max.	Min.	Max.	
			3.60 to 4.30				1.7		
.,			2.70 to 3.60				1.5		.,
VIH	Control Input Voltage High		2.30 to 2.70				1.4		V
			1.65 to 1.95				0.9		
			3.60 to 4.30					0.7	
	Operators I la servició (alta esa la servi		2.70 to 3.60					0.5	
VIL	Control Input Voltage Low		2.30 to 2.70					0.4	V
			1.65 to 1.95					0.4	
I _{IN}	Control Input Leakage (S1,S2)	V_{IN} =0 to V_{CC}	1.65 to 4.30				-0.5	0.5	μA
I _{NO(0FF),} I _{NC(OFF)}	Off Leakage Current of Port nB0 and nB1	nA=0.3V, V_{CC} -0.3V nB0 or nB1= V_{CC} -0.3V, 0.3V, or Floating Figure 4	1.95 to 4.30	-10		10	-50	50	nA
I _{A(ON)}	On Leakage Current of Port nA	nA=0.3V, V_{CC} -0.3V nB0 or nB1= V_{CC} -0.3V, 0.3V, or Floating Figure 5	1.95 to 4.30	-20		20	-100	100	nA
I _{OFF}	Power-Off Leakage Current (Common Port Only 1A, 2A)	$\begin{array}{l} \mbox{Common Port (1A, 2A), V_{IN}=0V to 4.3V, } \\ \mbox{V}_{CC}=0V nB0, \\ \mbox{nB1=Floating} \end{array}$	0V					±1	μA
		I _{ON} =100mA, nB0 or nB1=0.7V, 3.6V Figure 3	4.30		0.50			1.00	
		I _{ON} =100mA, nB0 or nB1=0.7V, 2.3V Figure 3	3.00		0.80			1.20	
R _{on}	Switch On Resistance ^(2,5)	I _{ON} =100mA, nB0 or nB1=0V, 0.7V, 1.6V, 2.3V Figure 3	2.30		1.10				Ω
		I _{ON} =100mA, nB0 or nB1=0V, 0.7V, 1.65V Figure 3	1.65		1.50				
			4.30		0.08			0.25	
	On Resistance Matching	I _{ON} =100mA, nB0 or	3.00		0.20			0.25	~
$\Delta \mathbf{R}_{ON}$	Between Channels ^(3,5)	nB1=0.7V	2.30	- /	0.40			1	Ω
			1.65		0.50				
			4.30					0.4	
D	On Resistance Eletrose ^(4,5)	I _{OUT} =100mA, nB0 or	3.00					0.4	
I™FLAT(ON)	On Resistance Fidthess	nB1=0V to V _{CC}	2.30		0.9	1			Ω
			1.65		1.2				
Icc	Quiescent Supply Current	V_{IN} =0 or V_{CC} , I_{OUT} =0	4.30	-100		100	-500	500	nA
	Incroase in L per Input	Input at 2.6V	4 30		3			7	
CCT	morease in icc per input	Input at 1.8V	4.30		7			15	μΑ

Notes:

2. On resistance is determined by the voltage drop between A and B pins at the indicated current through the switch.

3. $\Delta R_{ON} = R_{ON max} - R_{ON min}$ measured at identical V_{CC}, temperature, and voltage.

4. Flatness is defined as the difference between the maximum and minimum value of on resistance (R_{ON}) over the specified range of conditions.

5. Guaranteed by characterization, not production tested for V_{CC} =1.65 – 3.0V.

FSA2259 — Low-Voltage, Dual-SPDT (0.8Ω) Analog Switch with 16kV ESD

AC Electrical Characteristics

All typical value are for V_{CC} =3.3V at 25°C unless otherwise specified.

Symbol Parameter		Conditions	Conditions V _{cc} (V)		T _A =+25ºC		°C	T _A =-40 to +85°C		Unit	Figure
				Min.	Тур.	Max.	Min.	Max.		J	
		nB0 or	3.60 to 4.30			55		60			
+	Turn-On	nB1=1.5V,	2.70 to 3.60			60		65			
LON	Time	R _L =50Ω,	2.30 to 2.70			65		70	ns		
		C _L =35pF	1.65 to 1.95		70					Figure 6	
		nB0 or	3.60 to 4.30			30	5	35		Figure 7	
	Turn-Off	nB1=1.5V,	2.70 to 3.60			35	5	40			
LOFF	Time	R _L =50Ω,	2.30 to 2.70			40	5	45	ns		
		C _L =35pF	1.65 to 1.95		40						
		ake $\begin{array}{c} nB0 \text{ or} \\ nB1=1.5V, \\ R_{L}=50\Omega, \\ C_{L}=35pF \end{array}$	3.60 to 4.30		15		2				
	Break-		2.70 to 3.60		15		2		ns	Figure 8	
ι _{BBM}	Time ⁽⁶⁾		2.30 to 2.70		15		2				
	Time		1.65 to 1.95		16		2				
Q	Charge Injection ⁽⁶⁾	C _L =1.0nF, V _S =0V, R _S =0Ω	1.65 to 4.30		25				рС	Figure 12	
OIRR	Off Isolation ⁽⁶⁾	f=100kHz, R _L =50Ω, C _L =0pF	1.65 to 4.30		-80				dB	Figure 10	
Xtalk	Crosstalk ⁽⁶⁾	f=100kHz, R _L =50Ω, C _L =0pF	1.65 to 4.30		-100				dB	Figure 11	
BW	-3db Bandwidth ⁽⁶⁾	$R_L=50\Omega, C_L=0pF$	1.65 to 4.30		>50				MHz	Figure 9	
THD+N	Total Harmonic Distortion + Noise ⁽⁶⁾	$ f=20Hz to 20kHz, \\ R_L=32\Omega, \\ V_{IN}=2V_{pp} $	1.65 to 4.30		.06				%	Figure 15	

Notes:

6. Guaranteed by characterization, not production tested

Capacitance

All capacitance specifications are guaranteed by characterization and are not production tested.

Symbol		Conditiona		Т	T _A =+25⁰C		Unit	Figuro
Symbol	Farameter	Conditions	V _{CC} (V)	Min.	Тур.	Max.	Unit	Figure
CIN	Control Pin Input Capacitance	f=1MHz	0		1.5	/	pF	Figure 13
C _{OFF}	B Port Off Capacitance	f=1MHz	3.3		30		pF	Figure 13
CON	A Port On Capacitance	f=1MHz	3.3		50		pF	Figure 14









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