FSA3051 —High Performance SPDT Analog Switch with Over-Voltage Tolerance

Features

- Low On Capacitance: 7.7 pF Typical
- Low On Resistance: 6 Ω Typical
- Low Power Consumption: 1 µA Maximum
  - 15 µA Maximum I_{CCT} over an Expanded Voltage Range (V_{IN}=1.8 V, V_{CC}=5.5 V)
- Wide -3 db Bandwidth: 1.0 GHz
- Packaged in Ultra Small 6-Lead TMLP
- Broad V_{CC} Operating Range: 1.6 V to 5.5 V
- Over-Voltage Tolerance (OVT) on all Data Ports up to 6 V without External Components

Applications

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

Description

The FSA3051 is a 6 Ω, bi-directional, low-power, two-port, high-speed, Single Pole / Double Throw (SPDT) analog switch. It features an extremely low on capacitance (C_{ON}) of 7.7 pF and wide bandwidth of 1.0 GHz.

The FSA3051 contains special circuitry on the switch I/O pins for applications where the V_{CC} supply is powered-off (V_{CC}=0 V), which allows the device to withstand an over-voltage condition. This device is designed to minimize current consumption even when the control voltage applied to the select (S) pin is lower than the supply voltage (V_{CC}). This feature is especially

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FSA3051/D

Analog Symbols

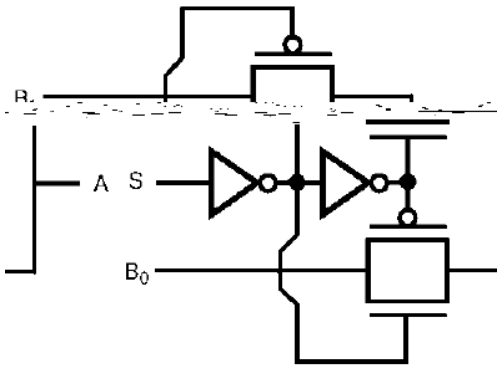


Figure 1. Logic Symbol

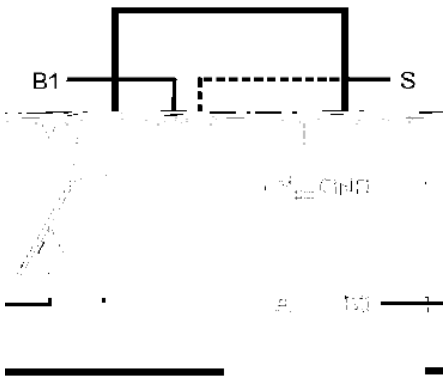


Figure 2. Analog Symbol

Pin Assignments

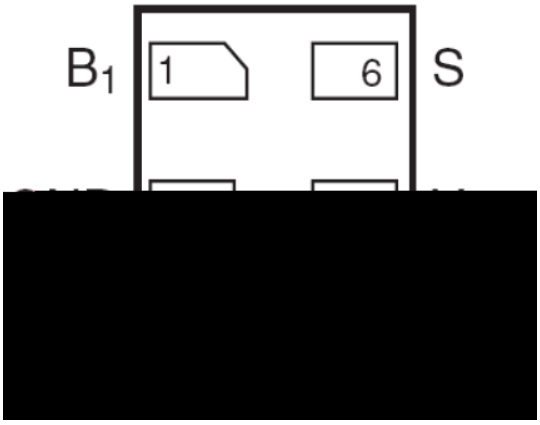


Figure 3. 6-Lead TMLP (Top-Through View)

Pin Definitions

UMLP Pin#	Name	Description
1	B_1	Data Port
2	GND	Ground
3	B_0	Data Port
4	A	Data Port
5	V_{CC}	Supply Voltage
6	S	Switch Select

Truth Table

S	Function
LOW	B_0 connected to A
HIGH	B_1 connected to A

Notes:
1. LOW $\leq V_{IL}$.
2. HIGH $\geq V_{IH}$.

DC Electrical Characteristics

All typical value are at T_A=25°C unless otherwise specified.

Symbol	Parameter	Condition	V_{CC} (V)	T_A=- 40°C to +85°C			Unit
				Min.	Typ.	Max.	
V_{IK}	Clamp Diode Voltage	I_{IN}=-18 mA	3.0			-1.2	V
V_{IH}	Input Voltage High		1.8 to 4.3	1.3			V
			4.3 to 5.5	1.7			
V_{IL}	Input Voltage Low		1.8 to 4.3			0.5	V
			4.3 to 5.5			0.7	
I_{IN}	Control Input Leakage	V_{CNTRL}=0 to V_{CC}	1.8	-1		1	µA
			5.5	-1		1	
I_{OZ}	Off State Leakage	V_{SW}=0 V to V_{CC}	1.8	-2		2	µA
		V_{SW}=0 V to 3.6 V	5.5	-2		2	
I_{OFF}	Power-Off Leakage Current (All I/O Ports)	V_{SW}=0 V to 4.3 V, V_{CC}=0 V Figure 5	0	-2		2	µA
R_{ON}	Switch On Resistance[5]	V_{SW}=0.4 V, I_{ON}=-8 mA Figure 4	3.0		4	10	Ω
		V_{SW}=1.8 V, I_{ON}=-8 mA Figure 4	3.0		6	10	
R_{ON}	Switch On Resistance[5]	V_{SW}=0.4 V, I_{ON}=-8 mA Figure 4	1.8		6	10	Ω
		V_{SW}=1.8 V, I_{ON}=-8 mA Figure 4	1.8		14	25	
ΔR_{ON}	On Resistance Match Between Channels[5,6]	V_{SW}=0.4 V, I_{ON} = -8 mA	3.0		35		mΩ
			1.8		40		
I_{CC}	Quiescent Supply Current	V_{CNTRL}=0 or V_{CC}, I_{OUT}=0	5.5			1	µA
I_{CCT}	Increase in I_{CC} Current per Control Voltage and V_{CC}	V_{CNTRL}=1.8 V	3.0			10	µA
		V_{CNTRL}=2.6 V	5.5			.294.4 Tm [(=)0.2(1)-27.5(.)32.7/MCID	

AC Electrical Characteristics[8]

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

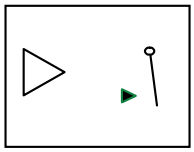
t_{ON}	Turn-On Time S to Output	R_L=50 Ω, C_L=5 pF, V_{SW}=0.8 V, Figure 6, Figure 7	3.0 to 3.6 1.8		34 110		ns

Test Diagrams (Continued)

Figure 9. Break-Before-Make Interval Timing

Figure 10. Bandwidth

Figure 11. Channel Off Isolation



V_{OUT}

Figure 12. Channel-to-Channel Crosstalk

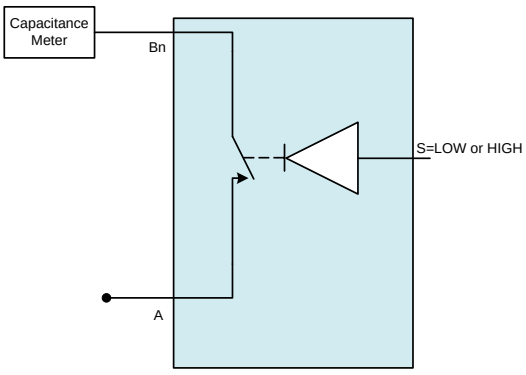


Figure 13. Channel Off Capacitance

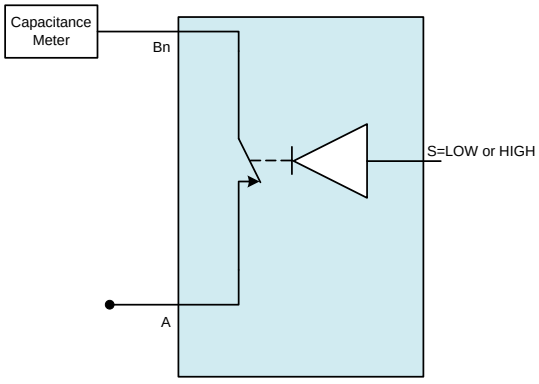


Figure 14. Channel On Capacitance

Carrier Tape Orientation

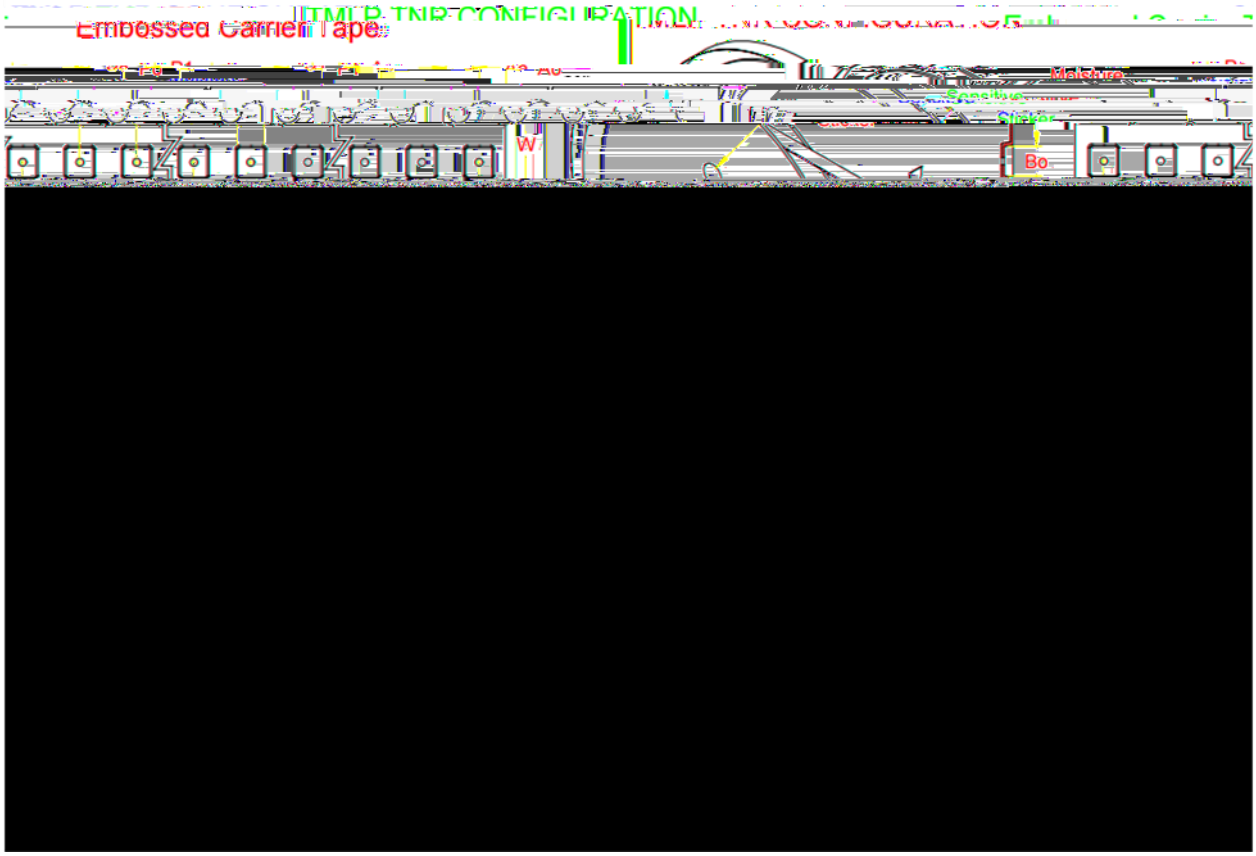
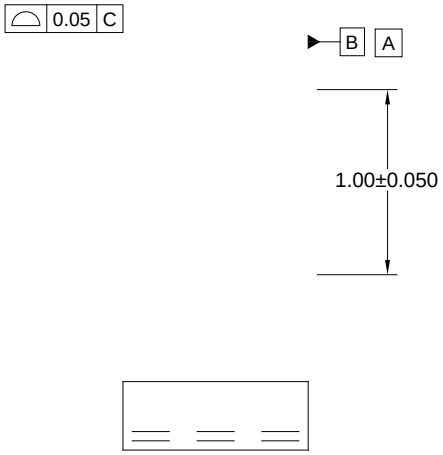


Figure 15. TMLP Carrier Tape Packing

Part Number	Unit Orientation
FSA3051TMX	Top Left
FSA3051TMX-F147	Bottom Left

Physical Dimensions



NOTES:

A. NO JEDEC STANDARD APPLIES
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009