High Voltage Latch-Up Proof, Dual SPDT Switches

Data Sheet

ADG5236

FEATURES

- Latch-up immune under all circumstances
- 2.5 pF off source capacitance
- 12 pF off drain capacitance
- −0.6 pC charge injection
- Low leakage: 0.4 nA maximum at 85°C
- ±9 V to ±22 V dual-supply operation
- 9 V to 40 V single-supply operation
- 48 V supply maximum ratings
- Fully specified at ±15 V, ±20 V, +12 V, and +36 V
- V_{SS} to V_{DD} analog signal range

APPLICATIONS

- High voltage signal routing
- Automatic test equipment
- Analog front-end circuits
- Precision data acquisition
- Industrial instrumentation
- Amplifier gain select
- Relay replacement

FUNCTIONAL BLOCK DIAGRAMS

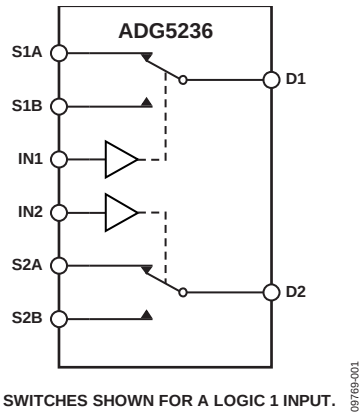

Figure 1. TSSOP Package

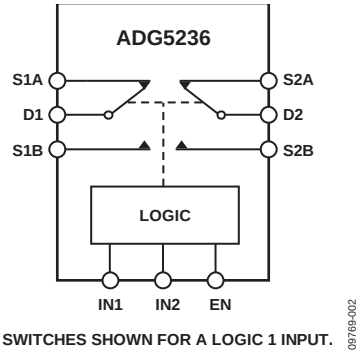

Figure 2. LFCSP Package

GENERAL DESCRIPTION

The ADG5236 is a monolithic CMOS device containing two independently selectable single-pole/double throw (SPDT) switches. An EN input on the LFCSP package enables or disables the device. When disabled, all channels switch off. Each switch conducts equally well in both directions when on and has an input signal range that extends to the supplies. In the off condition, signal levels up to the supplies are blocked. Both switches exhibit break-before-make switching action for use in multiplexer applications.

The ultralow capacitance and charge injection of these switches make them ideal solutions for data acquisition and sample-and-hold applications, where low glitch and fast settling are required. Fast switching speed together with high signal bandwidth make the device suitable for video signal switching.

PRODUCT HIGHLIGHTS

1. Trench Isolation Guards Against Latch-Up.
   A dielectric trench separates the P and N channel transistors thereby preventing latch-up even under severe overvoltage conditions.
2. Ultralow Capacitance and <1 pC Charge Injection.
3. Dual-Supply Operation.
   For applications where the analog signal is bipolar, the ADG5236 can be operated from dual supplies up to ±22 V.
4. Single-Supply Operation.
   For applications where the analog signal is unipolar, the ADG5236 can be operated from a single rail power supply up to 40 V.
5. 3 V Logic-Compatible Digital Inputs.
   V_{INH} = 2.0 V, V_{INL} = 0.8 V.
6. No V_L Logic Power Supply Required.

Rev. B
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One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
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REVISION HISTORY

11/13—Rev. A to Rev. B

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4/12—Rev. 0 to Rev. A

Updated Outline Dimensions ... 19
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7/11—Revision 0: Initial Version

SPECIFICATIONS

±15 V DUAL SUPPLY

V_{DD} = +15 V ± 10%, V_{SS} = −15 V ± 10%, GND = 0 V, unless otherwise noted.

Table 1.

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			V_{DD} to V_{SS}	V max	
On Resistance, R_{ON}	160			Ω typ	V_S = ±10 V, I_S = −1 mA, see Figure 25
	200	250	280	Ω max	V_{DD} = +13.5 V, V_{SS} = −13.5 V
On-Resistance Match Between Channels, ΔR_{ON}	1.4			Ω typ	V_S = ±10 V, I_S = −1 mA
	8	9	10	Ω max	
On-Resistance Flatness, $R_{FLAT (ON)}$	38			Ω typ	V_S = ±10 V, I_S = −1 mA
	50	65	70	Ω max	
LEAKAGE CURRENTS					V_{DD} = +16.5 V, V_{SS} = −16.5 V
Source Off Leakage, I_S (Off)	0.01			nA typ	V_S = ±10 V, V_D = ∓10 V, see Figure 27
	0.1	0.2	0.4	nA max	
Drain Off Leakage, I_D (Off)	0.01			nA typ	V_S = ±10 V, V_D = ∓10 V, see Figure 27
	0.1	0.4	1.2	nA max	
Channel On Leakage, I_D (On), I_S (On)	0.02			nA typ	V_S = V_D = ±10 V, see Figure 24
	0.2	0.4	1.2	nA max	
DIGITAL INPUTS					
Input High Voltage, V_{INH}			2.0	V min	
Input Low Voltage, V_{INL}			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			μA typ	V_{IN} = V_{GND} or V_{DD}
			±0.1	μA max	
Digital Input Capacitance, C_{IN}	3			pF typ	
DYNAMIC CHARACTERISTICS[1]					
Transition Time, $t_{TRANSITION}$	150			ns typ	R_L = 300 Ω, C_L = 35 pF
	230	280	315	ns max	V_S = 10 V, see Figure 30
t_{ON}	170			ns typ	R_L = 300 Ω, C_L = 35 pF
	215	265	300	ns max	V_S = 10 V, see Figure 32
t_{OFF}	160			ns typ	R_L = 300 Ω, C_L = 35 pF
	185	205	225	ns max	V_S = 10 V, see Figure 32
Break-Before-Make Time Delay, t_D	75			ns typ	R_L = 300 Ω, C_L = 35 pF
			30	ns min	V_{S1} = V_{S2} = 10 V, see Figure 31
Charge Injection, Q_{INJ}	−0.6			pC typ	V_S = 0 V, R_S = 0 Ω, C_L = 1 nF, see Figure 33
Off Isolation	−85			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 28
Channel-to-Channel Crosstalk	−85			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 26
−3 dB Bandwidth	266			MHz typ	R_L = 50 Ω, C_L = 5 pF, see Figure 29
Insertion Loss	−7			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 29
C_S (Off)	2.5			pF typ	V_S = 0 V, f = 1 MHz
C_D (Off)	12			pF typ	V_S = 0 V, f = 1 MHz
C_D (On), C_S (On)	15			pF typ	V_S = 0 V, f = 1 MHz

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
POWER REQUIREMENTS					V_{DD} = +16.5 V, V_{SS} = −16.5 V
I_{DD}	45			µA typ	Digital inputs = 0 V or V_{DD}
	55		70	µA max	
I_{SS}	0.001			µA typ	Digital inputs = 0 V or V_{DD}
			1	µA max	
V_{DD}/V_{SS}			±9/±22	V min/V max	GND = 0 V

[1] Guaranteed by design; not subject to production test.

±20 V DUAL SUPPLY

V_{DD} = +20 V ± 10%, V_{SS} = −20 V ± 10%, GND = 0 V, unless otherwise noted.

Table 2.

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			V_{DD} to V_{SS}	V max	
On Resistance, R_{ON}	140			Ω typ	V_S = ±15 V, I_S = −1 mA, see Figure 25
	160	200	230	Ω max	V_{DD} = +18 V, V_{SS} = −18 V
On-Resistance Match Between Channels, ΔR_{ON}	1.3			Ω typ	V_S = ±15 V, I_S = −1 mA
	8	9	10	Ω max	
On-Resistance Flatness, $R_{FLAT (ON)}$	33			Ω typ	V_S = ±15 V, I_S = −1 mA
	45	55	60	Ω max	
LEAKAGE CURRENTS					V_{DD} = +22 V, V_{SS} = −22 V
Source Off Leakage, I_S (Off)	0.01			nA typ	V_S = ±15 V, V_D = ∓15 V, see Figure 27
	0.1	0.2	0.4	nA max	
Drain Off Leakage, I_D (Off)	0.01			nA typ	V_S = ±15 V, V_D = ∓15 V, see Figure 27
	0.1	0.4	1.2	nA max	
Channel On Leakage, I_D (On), I_S (On)	0.02			nA typ	V_S = V_D = ±15 V, see Figure 24
	0.2	0.4	1.2	nA max	
DIGITAL INPUTS					
Input High Voltage, V_{INH}			2.0	V min	
Input Low Voltage, V_{INL}			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			µA typ	V_{IN} = V_{GND} or V_{DD}
			±0.1	µA max	
Digital Input Capacitance, C_{IN}	3			pF typ	
DYNAMIC CHARACTERISTICS[1]					
Transition Time, $t_{TRANSITION}$	150			ns typ	R_L = 300 Ω, C_L = 35 pF
	210	260	290	ns max	V_S = 10 V, see Figure 30
t_{ON}	150			ns typ	R_L = 300 Ω, C_L = 35 pF
	190	235	267	ns max	V_S = 10 V, see Figure 32
t_{OFF}	155			ns typ	R_L = 300 Ω, C_L = 35 pF
	180	200	215	ns max	V_S = 10 V, see Figure 32
Break-Before-Make Time Delay, t_D	60			ns typ	R_L = 300 Ω, C_L = 35 pF
			30	ns min	V_{S1} = V_{S2} = 10 V, see Figure 31
Charge Injection, Q_{INJ}	−0.6			pC typ	V_S = 0 V, R_S = 0 Ω, C_L = 1 nF, see Figure 33
Off Isolation	−85			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 28
Channel-to-Channel Crosstalk	−85			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 26
−3 dB Bandwidth	266			MHz typ	R_L = 50 Ω, C_L = 5 pF, see Figure 29
Insertion Loss	−7			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 29

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
C_S (Off)	2.5			pF typ	V_S = 0 V, f = 1 MHz
C_D (Off)	12			pF typ	V_S = 0 V, f = 1 MHz
C_D (On), C_S (On)	15			pF typ	V_S = 0 V, f = 1 MHz
POWER REQUIREMENTS					V_{DD} = +22 V, V_{SS} = −22 V
I_{DD}	50			µA typ	Digital inputs = 0 V or V_{DD}
	70		110	µA max	
I_{SS}	0.001			µA typ	Digital inputs = 0 V or V_{DD}
			1	µA max	
V_{DD}/V_{SS}			±9/±22	V min/V max	GND = 0 V

[1] Guaranteed by design; not subject to production test.

12 V SINGLE SUPPLY

V_{DD} = 12 V ± 10%, V_{SS} = 0 V, GND = 0 V, unless otherwise noted.

Table 3.

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			0 V to V_{DD}	V max	
On Resistance, R_{ON}	350			Ω typ	V_S = 0 V to 10 V, I_S = −1 mA, see Figure 25
	500	610	700	Ω max	V_{DD} = 10.8 V, V_{SS} = 0 V
On-Resistance Match Between Channels, ΔR_{ON}	3			Ω typ	V_S = 0 V to 10 V, I_S = −1 mA
	20	21	22	Ω max	
On-Resistance Flatness, $R_{FLAT (ON)}$	145			Ω typ	V_S = 0 V to 10 V, I_S = −1 mA
	280	335	370	Ω max	
LEAKAGE CURRENTS					V_{DD} = 13.2 V, V_{SS} = 0 V
Source Off Leakage, I_S (Off)	0.01			nA typ	V_S = 1 V/10 V, V_D = 10 V/1 V, see Figure 27
	0.1	0.2	0.4	nA max	
Drain Off Leakage, I_D (Off)	0.01			nA typ	V_S = 1 V/10 V, V_D = 10 V/1 V, see Figure 27
	0.1	0.4	1.2	nA max	
Channel On Leakage, I_D (On), I_S (On)	0.02			nA typ	V_S = V_D = 1 V/10 V, see Figure 24
	0.2	0.4	1.2	nA max	
DIGITAL INPUTS					
Input High Voltage, V_{INH}			2.0	V min	
Input Low Voltage, V_{INL}			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			µA typ	V_{IN} = V_{GND} or V_{DD}
			±0.1	µA max	
Digital Input Capacitance, C_{IN}	3			pF typ	
DYNAMIC CHARACTERISTICS[1]					
Transition Time, $t_{TRANSITION}$	220			ns typ	R_L = 300 Ω, C_L = 35 pF
	390	430	490	ns max	V_S = 8 V, see Figure 30
t_{ON}	275			ns typ	R_L = 300 Ω, C_L = 35 pF
	380	440	510	ns max	V_S = 8 V, see Figure 32
t_{OFF}	160			ns typ	R_L = 300 Ω, C_L = 35 pF
	195	225	245	ns max	V_S = 8 V, see Figure 32
Break-Before-Make Time Delay, t_D	145			ns typ	R_L = 300 Ω, C_L = 35 pF
			65	ns min	V_{S1} = V_{S2} = 8 V, see Figure 31
Charge Injection, Q_{INJ}	−0.6			pC typ	V_S = 6 V, R_S = 0 Ω, C_L = 1 nF, see Figure 33

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
Off Isolation	−90			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 28
Channel-to-Channel Crosstalk	−90			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 26
−3 dB Bandwidth	185			MHz typ	R_L = 50 Ω, C_L = 5 pF, see Figure 29
Insertion Loss	−11			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 29
C_S (Off)	3			pF typ	V_S = 6 V, f = 1 MHz
C_D (Off)	16			pF typ	V_S = 6 V, f = 1 MHz
C_D (On), C_S (On)	16			pF typ	V_S = 6 V, f = 1 MHz
POWER REQUIREMENTS					V_{DD} = 13.2 V
I_{DD}	40			µA typ	Digital inputs = 0 V or V_{DD}
			65	µA max	
V_{DD}			9/40	V min/V max	GND = 0 V, V_{SS} = 0 V

[1] Guaranteed by design; not subject to production test.

36 V SINGLE SUPPLY

V_{DD} = 36 V ± 10%, V_{SS} = 0 V, GND = 0 V, unless otherwise noted.

Table 4.

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			0 V to V_{DD}	V max	
On Resistance, R_{ON}	150			Ω typ	V_S = 0 V to 30 V, I_S = −1 mA, see Figure 25
	170	215	245	Ω max	V_{DD} = 32.4 V, V_{SS} = 0 V
On-Resistance Match Between Channels, ΔR_{ON}	1.4			Ω typ	V_S = 0 V to 30 V, I_S = −1 mA
	8	9	10	Ω max	
On-Resistance Flatness, $R_{FLAT(ON)}$	35			Ω typ	V_S = 0 V to 30 V, I_S = −1 mA
	50	60	65	Ω max	
LEAKAGE CURRENTS					V_{DD} = 39.6 V, V_{SS} = 0 V
Source Off Leakage, I_S (Off)	0.01			nA typ	V_S = 1 V/30 V, V_D = 30 V/1 V, see Figure 27
	0.1	0.2	0.4	nA max	
Drain Off Leakage, I_D (Off)	0.01			nA typ	V_S = 1 V/30 V, V_D = 30 V/1 V, see Figure 27
	0.1	0.4	1.2	nA max	
Channel On Leakage, I_D (On), I_S (On)	0.02			nA typ	V_S = V_D = 1 V/30 V, see Figure 24
	0.2	0.4	1.2	nA max	
DIGITAL INPUTS					
Input High Voltage, V_{INH}			2.0	V min	
Input Low Voltage, V_{INL}			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			µA typ	V_{IN} = V_{GND} or V_{DD}
			±0.1	µA max	
Digital Input Capacitance, C_{IN}	3			pF typ	
DYNAMIC CHARACTERISTICS[1]					
Transition Time, $t_{TRANSITION}$	180			ns typ	R_L = 300 Ω, C_L = 35 pF
	250	275	305	ns max	V_S = 18 V, see Figure 30
t_{ON}	170			ns typ	R_L = 300 Ω, C_L = 35 pF
	225	265	295	ns max	V_S = 18 V, see Figure 32

Parameter	25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
t_{OFF}	170			ns typ	R_L = 300 Ω, C_L = 35 pF
	215	215	225	ns max	V_S = 18 V, see Figure 32
Break-Before-Make Time Delay, t_D	75			ns typ	R_L = 300 Ω, C_L = 35 pF
			35	ns min	V_{S1} = V_{S2} = 18 V, see Figure 31
Charge Injection, Q_{INJ}	−0.6			pC typ	V_S = 18 V, R_S = 0 Ω, C_L = 1 nF, see Figure 33
Off Isolation	−85			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 28
Channel-to-Channel Crosstalk	−85			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 26
−3 dB Bandwidth	266			MHz typ	R_L = 50 Ω, C_L = 5 pF, see Figure 29
Insertion Loss	−7			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz, see Figure 29
C_S (Off)	2.5			pF typ	V_S = 18 V, f = 1 MHz
C_D (Off)	12			pF typ	V_S = 18 V, f = 1 MHz
C_D (On), C_S (On)	15			pF typ	V_S = 18 V, f = 1 MHz
POWER REQUIREMENTS					V_{DD} = 39.6 V
I_{DD}	85			μA typ	Digital inputs = 0 V or V_{DD}
	100		130	μA max	
V_{DD}			9/40	V min/V max	GND = 0 V, V_{SS} = 0 V

[1] Guaranteed by design; not subject to production test.

CONTINUOUS CURRENT PER CHANNEL, SxA, SxB, OR Dx

Table 5.

Parameter	25°C	85°C	125°C	Unit
CONTINUOUS CURRENT, SxA, SxB, or Dx				
V_{DD} = +15 V, V_{SS} = −15 V				
TSSOP (θ_{JA} = 112.6°C/W)	19	7	2.8	mA max
LFCSP (θ_{JA} = 30.4°C/W)	30	7.7	2.8	mA max
V_{DD} = +20 V, V_{SS} = −20 V				
TSSOP (θ_{JA} = 112.6°C/W)	21	7	2.8	mA max
LFCSP (θ_{JA} = 30.4°C/W)	31	7.7	2.8	mA max
V_{DD} = 12 V, V_{SS} = 0 V				
TSSOP (θ_{JA} = 112.6°C/W)	14	6.3	2.7	mA max
LFCSP (θ_{JA} = 30.4°C/W)	22.5	7.3	2.8	mA max
V_{DD} = 36 V, V_{SS} = 0 V				
TSSOP (θ_{JA} = 112.6°C/W)	24	7.4	2.8	mA max
LFCSP (θ_{JA} = 30.4°C/W)	35	7.8	2.8	mA max

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Table 6.

Parameter	Rating
V_{DD} to V_{SS}	48 V
V_{DD} to GND	−0.3 V to +48 V
V_{SS} to GND	+0.3 V to −48 V
Analog Inputs[1]	V_{SS} − 0.3 V to V_{DD} + 0.3 V or 30 mA, whichever occurs first
Digital Inputs[1]	V_{SS} − 0.3 V to V_{DD} + 0.3 V or 30 mA, whichever occurs first
Peak Current, SxA, SxB, or Dx Pin	63 mA (pulsed at 1 ms, 10% duty cycle maximum)
Continuous Current, SxA, SxB, or Dx[2]	Data + 15%
Temperature Range	
Operating	−40°C to +125°C
Storage	−65°C to +150°C
Junction Temperature	150°C
Thermal Impedance, θ_{JA}	
16-Lead TSSOP (4-Layer Board)	112°C/W
16-Lead LFCSP	30.4°C/W
Reflow Soldering Peak Temperature, Pb Free	260(+0/−5)°C

[1] Overvoltages at the INx, SxA, SxB, and Dx pins are clamped by internal diodes. Limit the current to the maximum ratings given.
[2] See Table 5.

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Only one absolute maximum rating can be applied at any one time.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATIONS AND FUNCTION DESCRIPTIONS

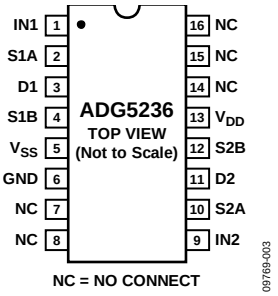


Figure 3. TSSOP Pin Configuration

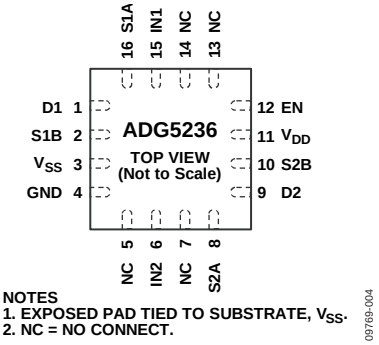


Figure 4. LFCSP Pin Configuration

Table 7. Pin Function Descriptions

Pin No.			
TSSOP	**LFCSP**	**Mnemonic**	**Description**
1	15	IN1	Logic Control Input 1.
2	16	S1A	Source Terminal 1A. This pin can be an input or output.
3	1	D1	Drain Terminal 1. This pin can be an input or output.
4	2	S1B	Source Terminal 1B. This pin can be an input or output.
5	3	V_{SS}	Most Negative Power Supply Potential.
6	4	GND	Ground (0 V) Reference.
7, 8, 14 to 16	5, 7, 13, 14	NC	No Connect. These pins are open.
9	6	IN2	Logic Control Input 2.
10	8	S2A	Source Terminal 2A. This pin can be an input or output.
11	9	D2	Drain Terminal 2. This pin can be an input or output.
12	10	S2B	Source Terminal 2B. This pin can be an input or output.
13	11	V_{DD}	Most Positive Power Supply Potential.
N/A[1]	12	EN	Active High Digital Input. When this pin is low, the device is disabled and all switches are off. When this pin is high, the INx logic inputs determine the on switches.
N/A[1]	EP	Exposed Pad	Exposed Pad. The exposed pad is connected internally. For increased reliability of the solder joints and maximum thermal capability, it is recommended that the pad be soldered to the substrate, V_{SS}.

[1] N/A means not applicable.

TRUTH TABLES FOR SWITCHES

Table 8. TSSOP Truth Table

INx	SxA	SxB
0	Off	On
1	On	Off

Table 9. LFCSP Truth Table

EN	INx	SxA	SxB
0	X[1]	Off	Off
1	0	Off	On
1	1	On	Off

[1] X means don't care.

TYPICAL PERFORMANCE CHARACTERISTICS

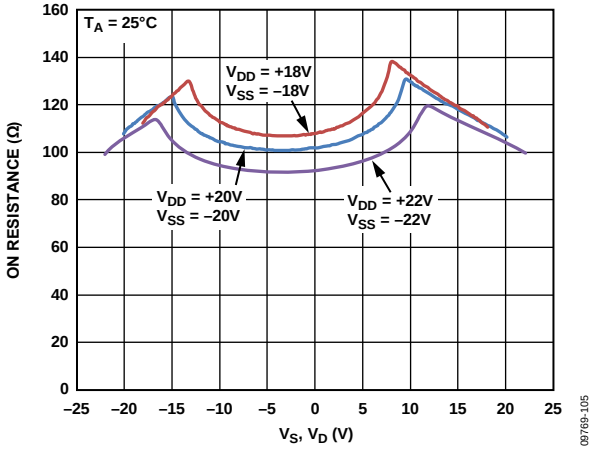


Figure 5. On Resistance vs. V_S, V_D (Dual Supply)

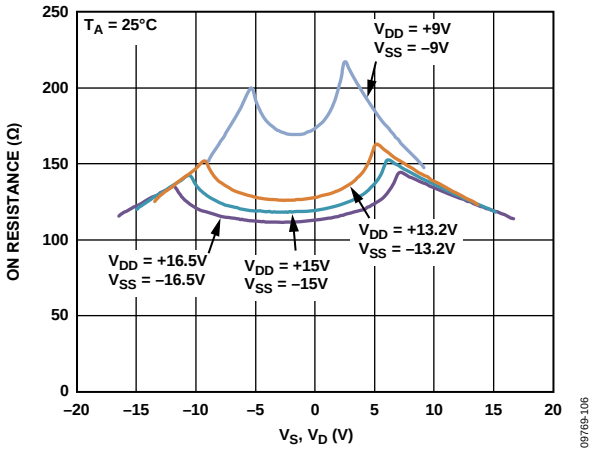


Figure 6. On Resistance vs. V_S, V_D (Dual Supply)

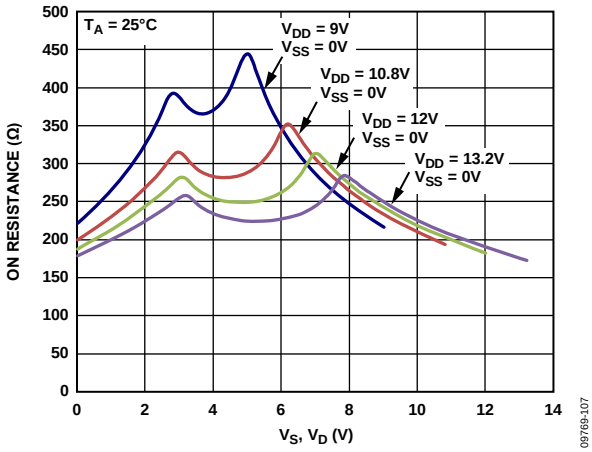


Figure 7. On Resistance vs. V_S, V_D (Single Supply)

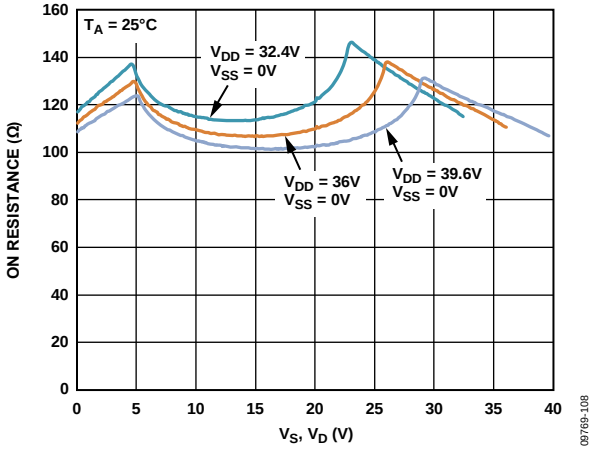


Figure 8. On Resistance vs. V_S, V_D (Single Supply)

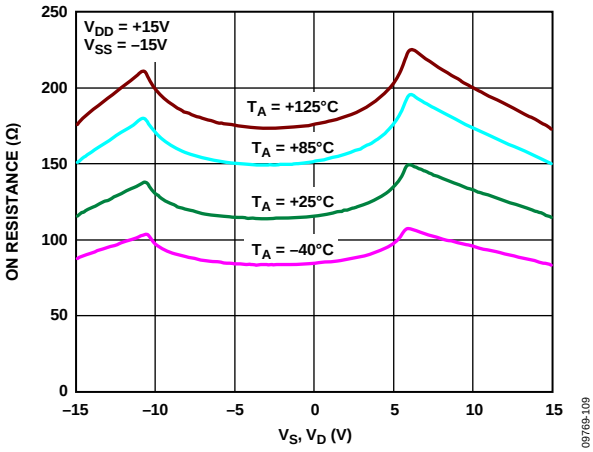


Figure 9. On Resistance vs. V_D or V_S for Different Temperatures, ±15 V Dual Supply

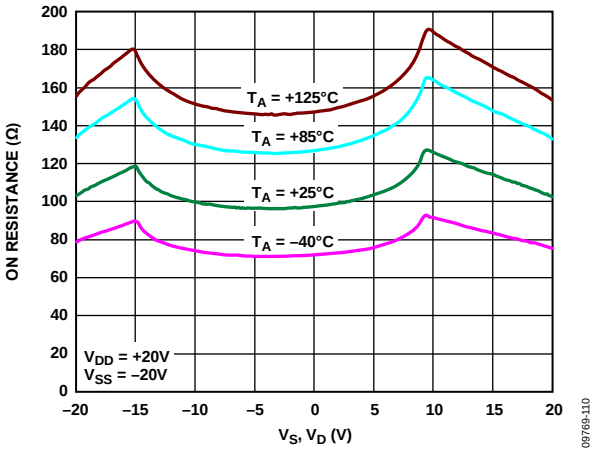


Figure 10. On Resistance vs. V_D or V_S for Different Temperatures, ±20 V Dual Supply

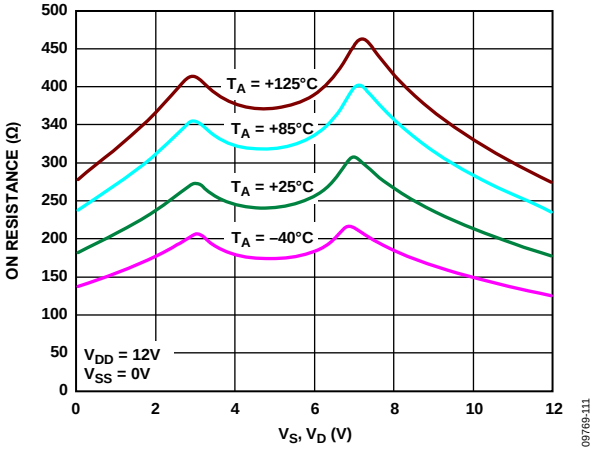


Figure 11. On Resistance vs. V_D or V_S for Different Temperatures, 12 V Single Supply

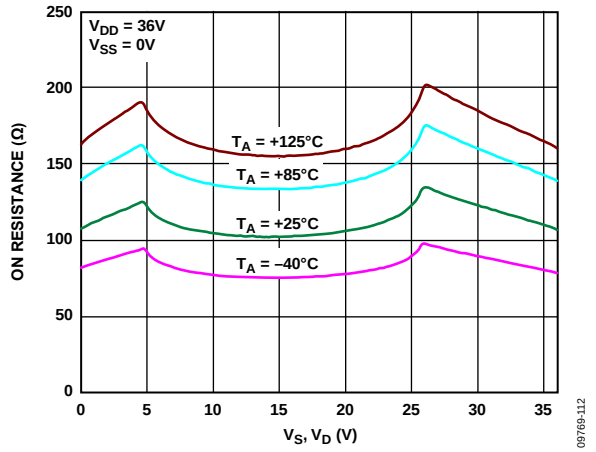


Figure 12. On Resistance vs. V_S or V_D for Different Temperatures, 36 V Single Supply

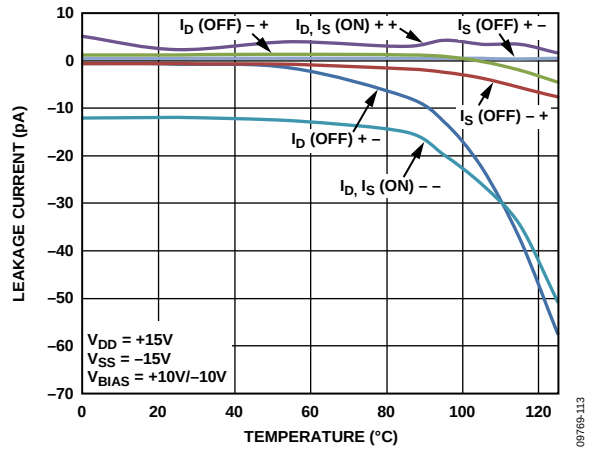


Figure 13. Leakage Current vs. Temperature, ±15 V Dual Supply

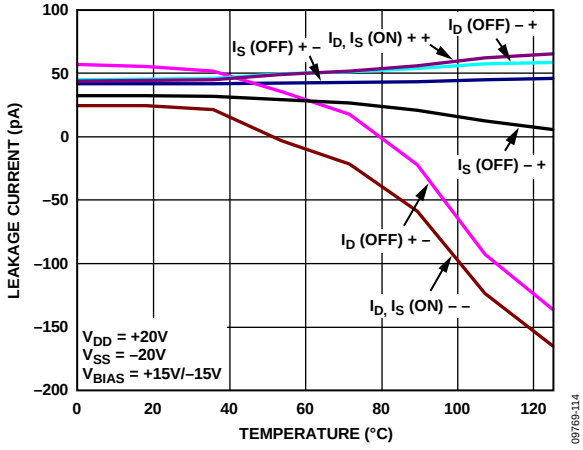


Figure 14. Leakage Current vs. Temperature, ±20 V Single Supply

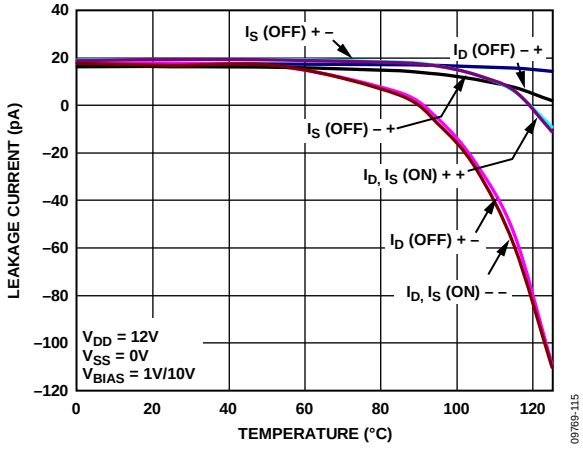


Figure 15. Leakage Current vs. Temperature, 12 V Single Supply

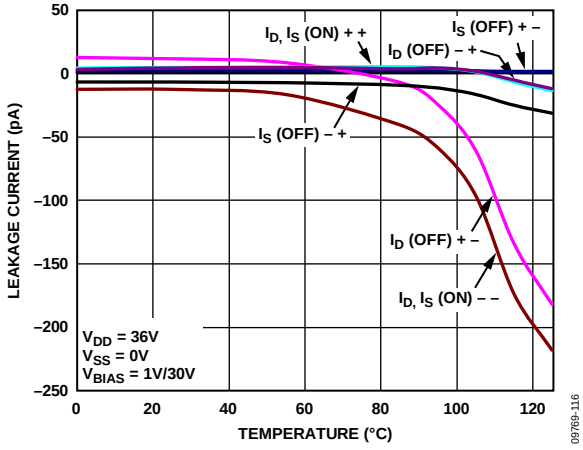


Figure 16. Leakage Current vs. Temperature, 36 V Single Supply

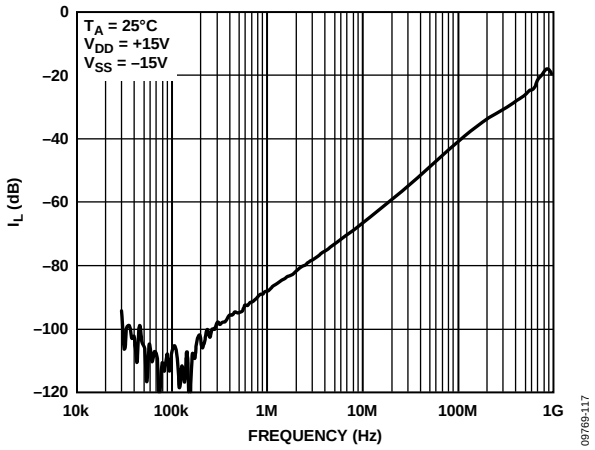


Figure 17. Off Isolation vs. Frequency

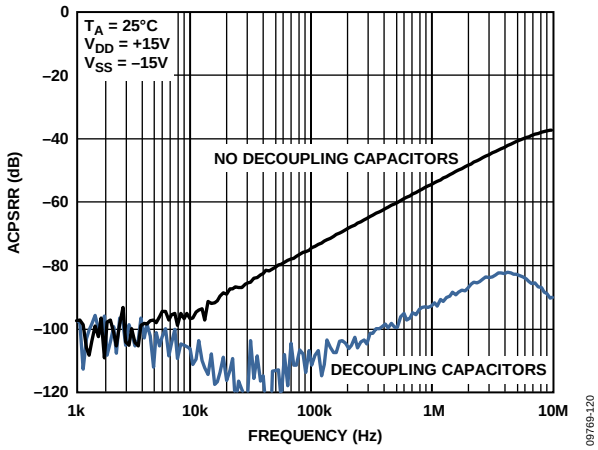


Figure 20. ACPSRR vs. Frequency

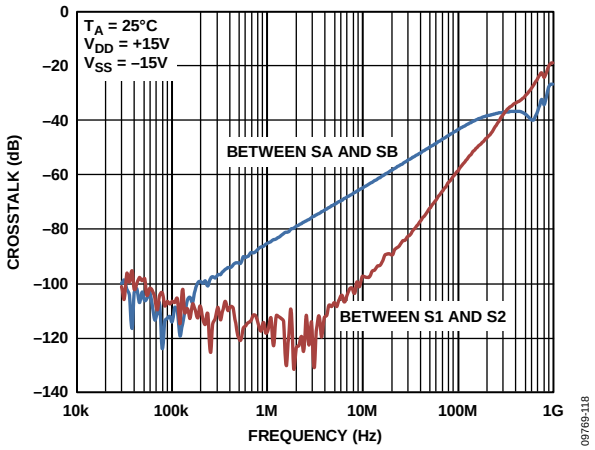


Figure 18. Crosstalk vs. Frequency

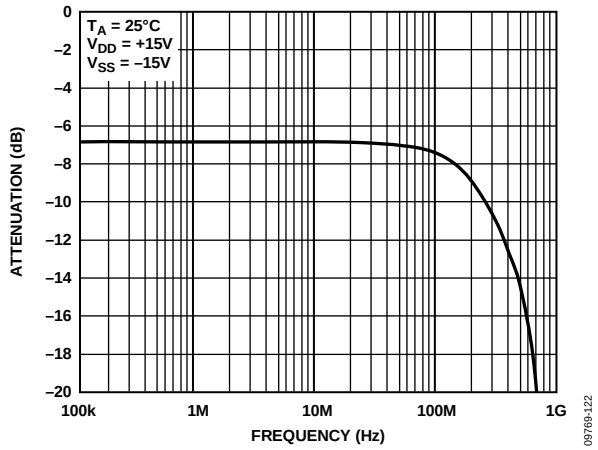


Figure 21. Bandwidth

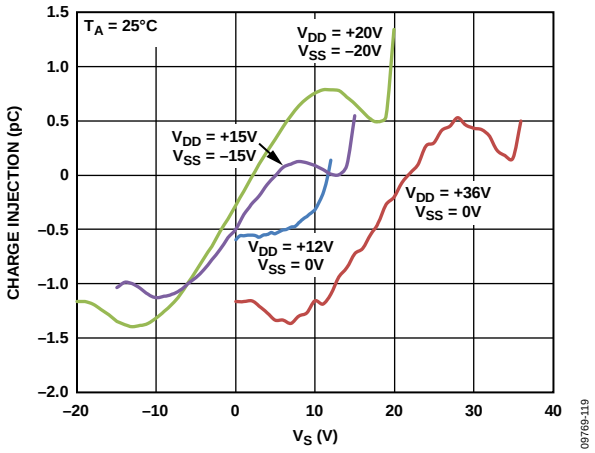


Figure 19. Charge Injection vs. Source Voltage

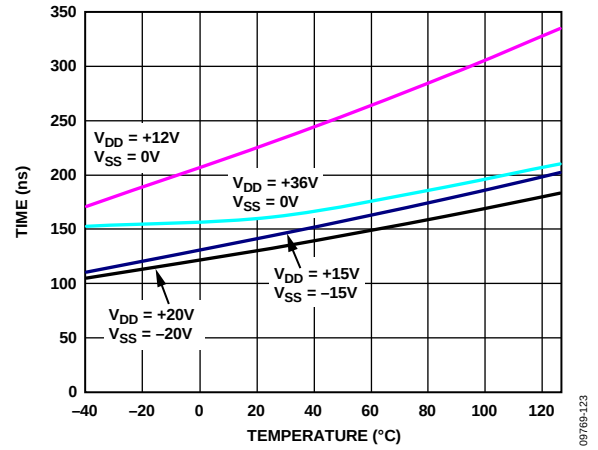


Figure 22. $t_{TRANSITION}$ Time vs. Temperature

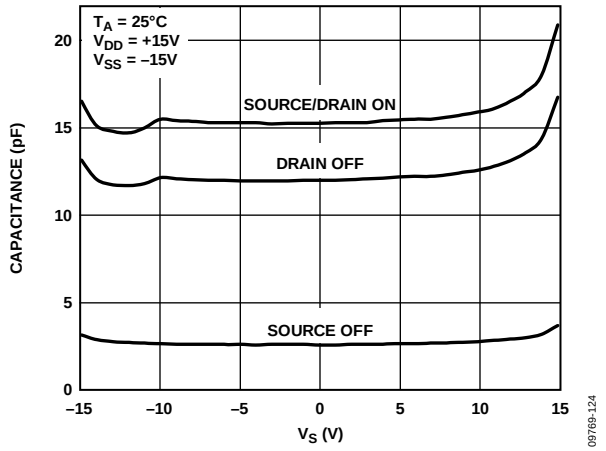


Figure 23. Capacitance vs. Source Voltage, Dual Supply

TEST CIRCUITS

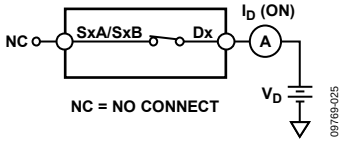


Figure 24. On Leakage

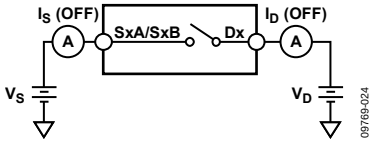


Figure 27. Off Leakage

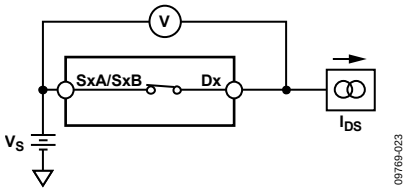


Figure 25. On Resistance

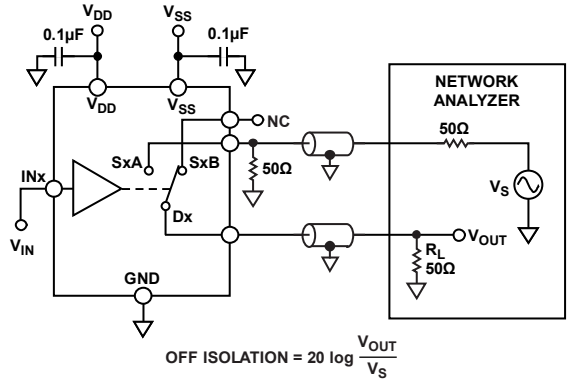


Figure 28. Off Isolation

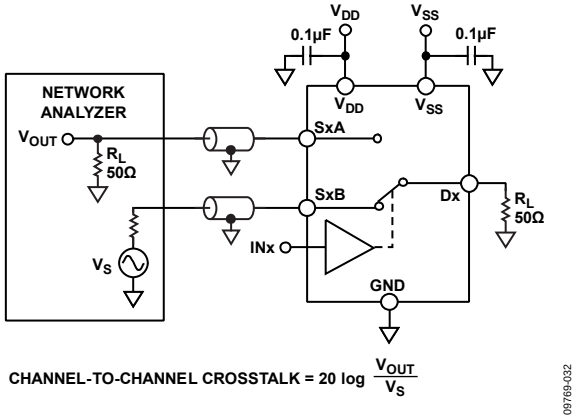


Figure 26. Channel-to-Channel Crosstalk

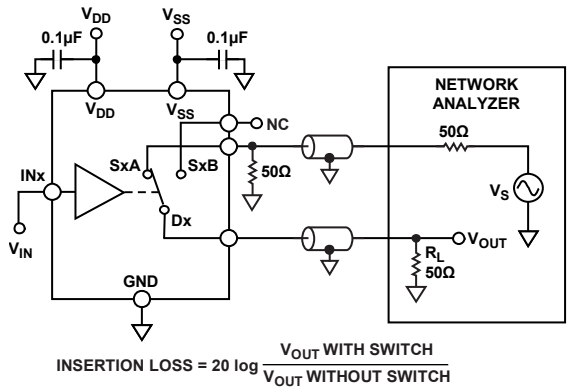


Figure 29. Bandwidth

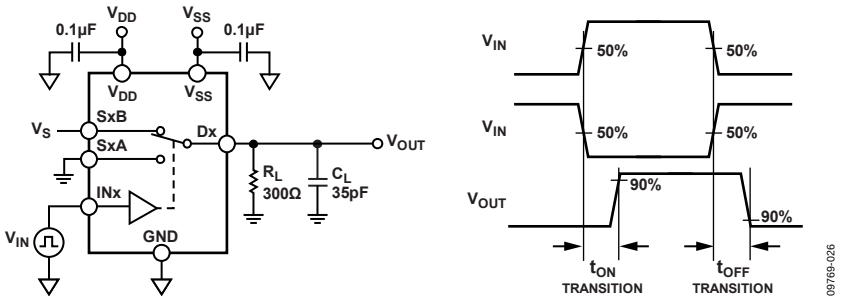


Figure 30. Switching Times

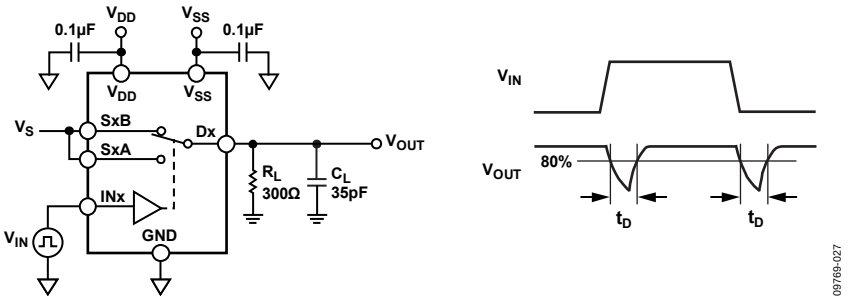


Figure 31. Break-Before-Make Time Delay t_D

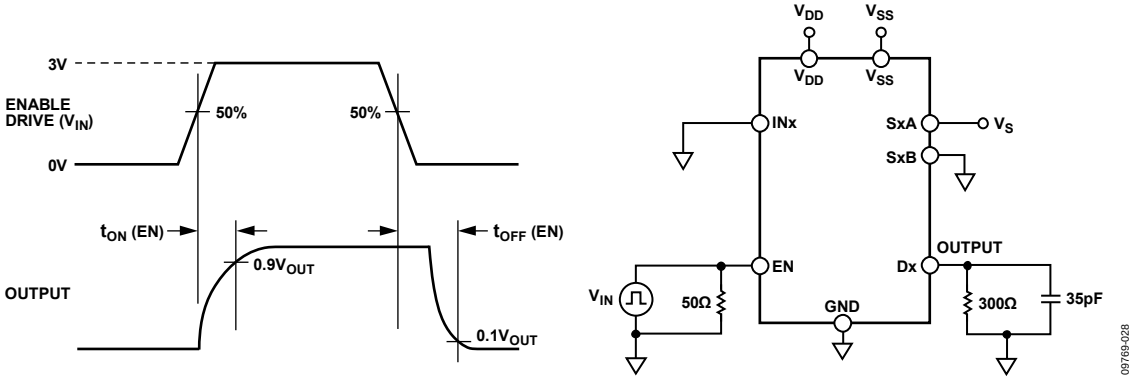


Figure 32. Enable Delay, t_{ON} (EN), t_{OFF} (EN)

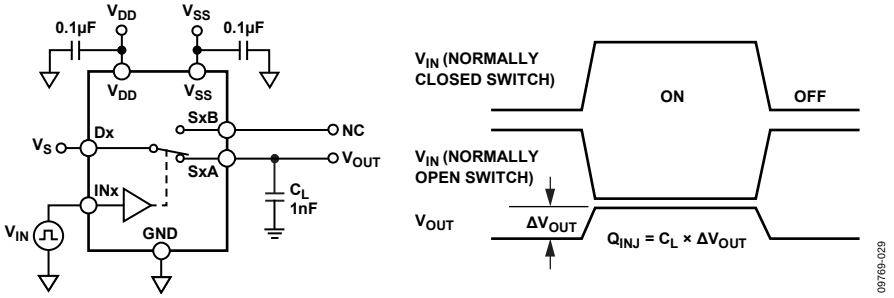


Figure 33. Charge Injection

TERMINOLOGY

I_{DD}
I_{DD} represents the positive supply current.

I_{SS}
I_{SS} represents the negative supply current.

V_D, V_S
V_D and V_S represent the analog voltage on Terminal D and Terminal S, respectively.

R_{ON}
R_{ON} represents the ohmic resistance between Terminal D and Terminal S.

ΔR_{ON}
ΔR_{ON} represents the difference between the R_{ON} of any two channels.

$R_{FLAT (ON)}$
Flatness that is defined as the difference between the maximum and minimum value of on resistance measured over the specified analog signal range is represented by $R_{FLAT (ON)}$.

I_S (Off)
I_S (Off) is the source leakage current with the switch off.

I_D (Off)
I_D (Off) is the drain leakage current with the switch off.

I_D (On), I_S (On)
I_D (On) and I_S (On) represent the channel leakage currents with the switch on.

V_{INL}
V_{INL} is the maximum input voltage for Logic 0.

V_{INH}
V_{INH} is the minimum input voltage for Logic 1.

I_{INL}, I_{INH}
I_{INL} and I_{INH} represent the low and high input currents of the digital inputs.

C_D (Off)
C_D (Off) represents the off switch drain capacitance, which is measured with reference to ground.

C_S (Off)
C_S (Off) represents the off switch source capacitance, which is measured with reference to ground.

C_D (On), C_S (On)
C_D (On) and C_S (On) represent on switch capacitances, which are measured with reference to ground.

C_{IN}
C_{IN} is the digital input capacitance.

t_{ON}
t_{ON} represents the delay between applying the digital control input and the output switching on.

t_{OFF}
t_{OFF} represents the delay between applying the digital control input and the output switching off.

t_D
t_D represents the off time measured between the 80% point of both switches when switching from one address state to another.

Off Isolation
Off isolation is a measure of unwanted signal coupling through an off switch.

Charge Injection
Charge injection is a measure of the glitch impulse transferred from the digital input to the analog output during switching.

Crosstalk
Crosstalk is a measure of unwanted signal that is coupled through from one channel to another as a result of parasitic capacitance.

Bandwidth
Bandwidth is the frequency at which the output is attenuated by 3 dB.

On Response
On response is the frequency response of the on switch.

Insertion Loss
Insertion loss is the loss due to the on resistance of the switch.

AC Power Supply Rejection Ratio (ACPSRR)
ACPSRR is the ratio of the amplitude of signal on the output to the amplitude of the modulation. This is a measure of the ability of the device to avoid coupling noise and spurious signals that appear on the supply voltage pin to the output of the switch. The dc voltage on the device is modulated by a sine wave of 0.62 V p-p.

TRENCH ISOLATION

In the ADG5236, an insulating oxide layer (trench) is placed between the NMOS and the PMOS transistors of each CMOS switch. Parasitic junctions, which occur between the transistors in junction isolated switches, are eliminated, and the result is a completely latch-up proof switch.

In junction isolation, the N and P wells of the PMOS and NMOS transistors form a diode that is reverse-biased under normal operation. However, during overvoltage conditions, this diode can become forward-biased. A silicon controlled rectifier (SCR) type circuit is formed by the two transistors causing a significant amplification of the current that, in turn, leads to latch-up. With trench isolation, this diode is removed, and the result is a latch-up proof switch.

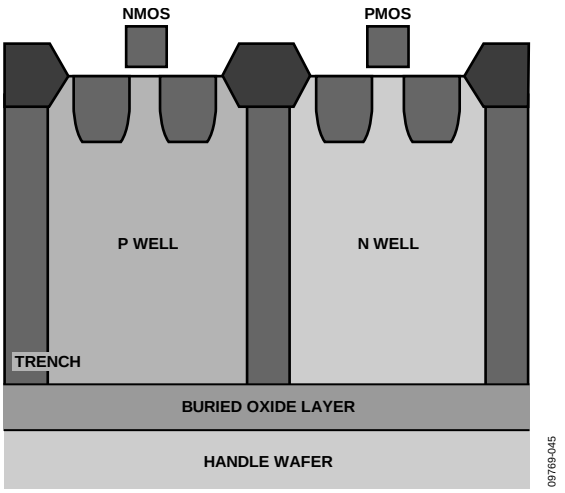
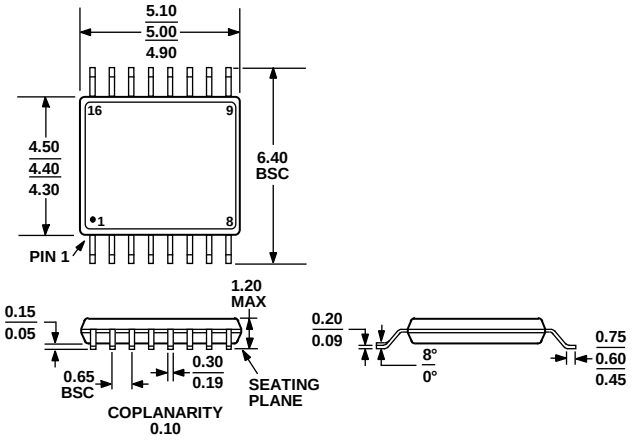


Figure 34. Trench Isolation

APPLICATIONS INFORMATION

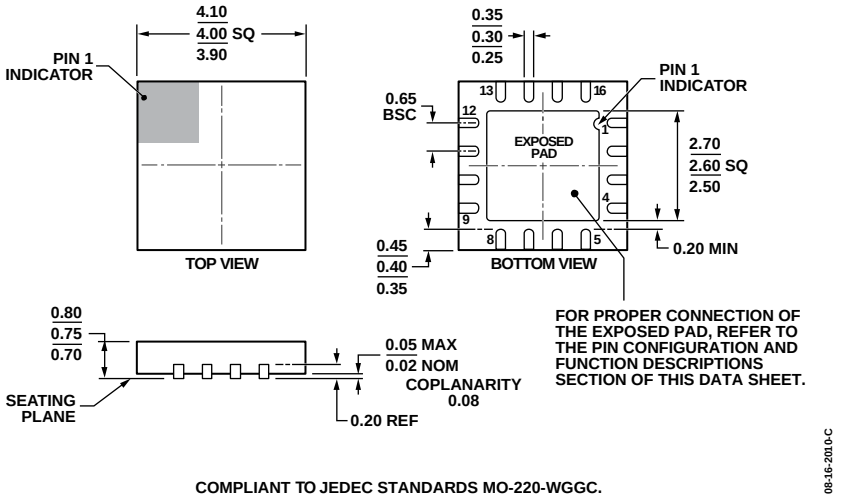
The ADG52xx family of switches and multiplexers provide a robust solution for instrumentation, industrial, automotive, aerospace, and other harsh environments that are prone to latch-up, which is an undesirable high current state that can lead to device failure and persists until the power supply is turned off. The ADG5236 high voltage switches allow single-supply operation from 9 V to 40 V and dual supply operation from ±9 V to ±22 V.

OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MO-153-AB

Figure 35. 16-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-16)
Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MO-220-WGGC.

Figure 36. 16-Lead Lead Frame Chip Scale Package [LFCSP_WQ]
4 mm × 4 mm Body, Very Very Thin Quad
(CP-16-17)
Dimensions shown in millimeters

ORDERING GUIDE

Model[1]	Temperature Range	Package Description	Package Option
ADG5236BRUZ	−40°C to +125°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADG5236BRUZ-RL7	−40°C to +125°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADG5236BCPZ-RL7	−40°C to +125°C	16-Lead Lead Frame Chip Scale Package [LFCSP_WQ]	CP-16-17

[1] Z = RoHS Compliant Part.

NOTES

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D09769-0-11/13(B)

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