High Voltage, Latch-Up Proof, 4-/8-Channel Multiplexers

Enhanced Product

ADG5208-EP/ADG5209-EP

FEATURES

- Latch-up proof
- 2.9 pF off source capacitance
- 34 pF off drain capacitance
- 0.2 pC charge injection
- Low on resistance: 160 Ω typical
- ±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
- Human body model (HBM) ESD rating
  - 8 kV I/O port to supplies
  - 2 kV I/O port to I/O port
  - 8 kV all other pins
- Supports defense and aerospace applications (AQEC standard)
- Military temperature range: −55°C to +125°C
- Controlled manufacturing baseline
- One assembly and test site
- One fabrication site
- Enhanced product change notification
- Qualification data available on request

APPLICATIONS

- Automatic test equipment
- Data acquisition
- Instrumentation
- Avionics
- Audio and video switching
- Communication systems

GENERAL DESCRIPTION

The ADG5208-EP/ADG5209-EP are monolithic CMOS analog multiplexers comprising eight single channels and four differential channels, respectively. The ADG5208-EP switches one of eight inputs to a common output, as determined by the 3-bit binary address lines, A0, A1, and A2. The ADG5209-EP switches one of four differential inputs to a common differential output, as determined by the 2-bit binary address lines, A0 and A1.

An EN input on both devices enables or disables the device. When EN is disabled, all channels switch off. 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 coupled with high signal bandwidth make these devices suitable for video signal switching.

FUNCTIONAL BLOCK DIAGRAM

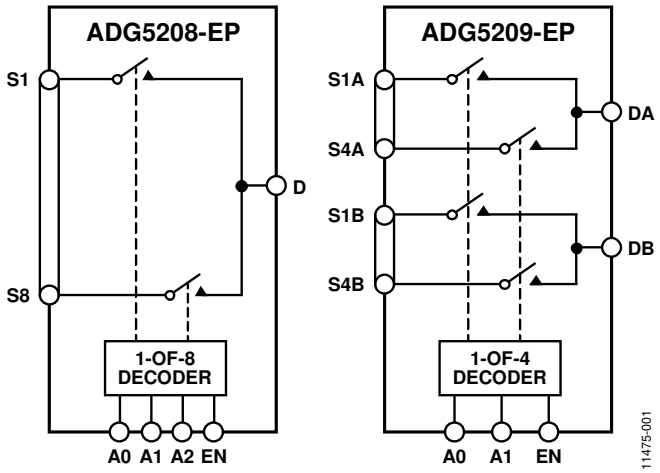

Figure 1.

Each switch conducts equally well in both directions when on, and each switch has an input signal range that extends to the power supplies. In the off condition, signal levels up to the supplies are blocked.

The ADG5208-EP/ADG5209-EP do not have V_L pins; instead, the logic power supply is generated internally by an on-chip voltage generator.

Additional application and technical information can be found in the ADG5208/ADG5209 data sheet.

PRODUCT HIGHLIGHTS

1. Trench Isolation Guards Against Latch-Up.
   A dielectric trench separates the P and N channel transistors to prevent latch-up even under severe overvoltage conditions.
2. 0.2 pC Charge Injection.
3. Dual-Supply Operation.
   For applications where the analog signal is bipolar, the ADG5208-EP/ADG5209-EP can be operated from dual supplies of up to ±22 V.
4. Single-Supply Operation.
   For applications where the analog signal is unipolar, the ADG5208-EP/ADG5209-EP can be operated from a single rail power supply of 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. C
Document Feedback

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7/2013—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	−55°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			V_{DD} to V_{SS}	V	
On Resistance, R_{ON}	160			Ω typ	V_S = ±10 V, I_S = −1 mA; see Figure 26
	200	250	280	Ω max	V_{DD} = +13.5 V, V_{SS} = −13.5 V
On-Resistance Match Between Channels, ΔR_{ON}	3.5			Ω typ	V_S = ±10 V, I_S = −1 mA
	8	9	10	Ω max	
On-Resistance Flatness, $R_{FLAT (ON)}$	40			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)	±0.005			nA typ	V_S = ±10 V, V_D = ∓10 V; see Figure 28
	±0.1	±0.2	±0.4	nA max	
Drain Off Leakage, I_D (Off)	±0.005			nA typ	V_S = ±10 V, V_D = ∓10 V; see Figure 28
	±0.1	±0.4	±1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	±0.01			nA typ	V_S = V_D = ±10 V; see Figure 25
	±0.2	±0.5	±1.4	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
	180	210	245	ns max	V_S = 10 V; see Figure 31
t_{ON} (EN)	125			ns typ	R_L = 300 Ω, C_L = 35 pF
	150	185	215	ns max	V_S = 10 V; see Figure 33
t_{OFF} (EN)	160			ns typ	R_L = 300 Ω, C_L = 35 pF
	185	210	230	ns max	V_S = 10 V; see Figure 33
Break-Before-Make Time Delay, t_D	55			ns typ	R_L = 300 Ω, C_L = 35 pF
			20	ns min	V_{S1} = V_{S2} = 10 V; see Figure 32
Charge Injection, Q_{INJ}	0.2			pC typ	V_S = 0 V, R_S = 0 Ω, C_L = 1 nF; see Figure 34
Off Isolation	−86			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 29
Channel-to-Channel Crosstalk	−80			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 27
−3 dB Bandwidth					R_L = 50 Ω, C_L = 5 pF; see Figure 30
ADG5208-EP	110			MHz typ	
ADG5209-EP	240			MHz typ	
Insertion Loss	−6.4			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 30
C_S (Off)	2.9			pF typ	V_S = 0 V, f = 1 MHz
C_D (Off)					
ADG5208-EP	34			pF typ	V_S = 0 V, f = 1 MHz
ADG5209-EP	17			pF typ	V_S = 0 V, f = 1 MHz

Parameter	25°C	−40°C to +85°C	−55°C to +125°C	Unit	Test Conditions/Comments
C_D (On), C_S (On)					
ADG5208-EP	37			pF typ	V_S = 0 V, f = 1 MHz
ADG5209-EP	21			pF typ	V_S = 0 V, f = 1 MHz
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		80	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	−55°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			V_{DD} to V_{SS}	V	
On Resistance, R_{ON}	140			Ω typ	V_S = ±15 V, I_S = −1 mA; see Figure 26
	160	200	230	Ω max	V_{DD} = +18 V, V_{SS} = −18 V
On-Resistance Match Between Channels, ΔR_{ON}	3.5			Ω typ	V_S = ±15 V, I_S = −1 mA
	8	9	10	Ω max	
On-Resistance Flatness, $R_{FLAT (ON)}$	34			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)	±0.005			nA typ	V_S = ±15 V, V_D = ∓15 V; see Figure 28
	±0.1	±0.2	±0.4	nA max	
Drain Off Leakage, I_D (Off)	±0.005			nA typ	V_S = ±15 V, V_D = ∓15 V; see Figure 28
	±0.1	±0.4	±1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	±0.01			nA typ	V_S = V_D = ±15 V; see Figure 25
	±0.2	±0.5	±1.4	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, $t_{TRANSITION}$	140			ns typ	R_L = 300 Ω, C_L = 35 pF
	170	195	220	ns max	V_S = 10 V; see Figure 31
t_{ON} (EN)	120			ns typ	R_L = 300 Ω, C_L = 35 pF
	140	170	195	ns max	V_S = 10 V; see Figure 33
t_{OFF} (EN)	160			ns typ	R_L = 300 Ω, C_L = 35 pF
	185	205	220	ns max	V_S = 10 V; see Figure 33
Break-Before-Make Time Delay, t_D	45			ns typ	R_L = 300 Ω, C_L = 35 pF
			20	ns min	V_{S1} = V_{S2} = 10 V; see Figure 32
Charge Injection, Q_{INJ}	0.4			pC typ	V_S = 0 V, R_S = 0 Ω, C_L = 1 nF; see Figure 34
Off Isolation	−86			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 29
Channel-to-Channel Crosstalk	−80			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 27

Parameter	25°C	−40°C to +85°C	−55°C to +125°C	Unit	Test Conditions/Comments
−3 dB Bandwidth					R_L = 50 Ω, C_L = 5 pF; see Figure 30
ADG5208-EP	121			MHz typ	
ADG5209-EP	225			MHz typ	
Insertion Loss	−5.6			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 30
C_S (Off)	2.8			pF typ	V_S = 0 V, f = 1 MHz
C_D (Off)					
ADG5208-EP	33			pF typ	V_S = 0 V, f = 1 MHz
ADG5209-EP	17			pF typ	V_S = 0 V, f = 1 MHz
C_D (On), C_S (On)					
ADG5208-EP	36			pF typ	V_S = 0 V, f = 1 MHz
ADG5209-EP	21			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		120	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	−55°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			0 V to V_{DD}	V	
On Resistance, R_{ON}	350			Ω typ	V_S = 0 V to 10 V, I_S = −1 mA; see Figure 26
	500	610	700	Ω max	V_{DD} = 10.8 V, V_{SS} = 0 V
On-Resistance Match Between Channels, ΔR_{ON}	5			Ω typ	V_S = 0 V to 10 V, I_S = −1 mA
	20	22	24	Ω max	
On-Resistance Flatness, $R_{FLAT (ON)}$	160			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)	±0.005			nA typ	V_S = 1 V/10 V, V_D = 10 V/1 V; see Figure 28
	±0.1	±0.2	±0.4	nA max	
Drain Off Leakage, I_D (Off)	±0.005			nA typ	V_S = 1 V/10 V, V_D = 10 V/1 V; see Figure 28
	±0.1	±0.4	±1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	±0.01			nA typ	V_S = V_D = 1 V/10 V; see Figure 25
	±0.2	±0.5	±1.4	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	

Parameter	25°C	−40°C to +85°C	−55°C to +125°C	Unit	Test Conditions/Comments
DYNAMIC CHARACTERISTICS[1]					
Transition Time, $t_{TRANSITION}$	200			ns typ	R_L = 300 Ω, C_L = 35 pF
	250	295	335	ns max	V_S = 8 V; see Figure 31
t_{ON} (EN)	180			ns typ	R_L = 300 Ω, C_L = 35 pF
	225	280	320	ns max	V_S = 8 V; see Figure 33
t_{OFF} (EN)	165			ns typ	R_L = 300 Ω, C_L = 35 pF
	200	225	245	ns max	V_S = 8 V; see Figure 33
Break-Before-Make Time Delay, t_D	95			ns typ	R_L = 300 Ω, C_L = 35 pF
			45	ns min	V_{S1} = V_{S2} = 8 V; see Figure 32
Charge Injection, Q_{INJ}	0.2			pC typ	V_S = 6 V, R_S = 0 Ω, C_L = 1 nF; see Figure 34
Off Isolation	−86			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 29
Channel-to-Channel Crosstalk	−80			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 27
−3 dB Bandwidth					R_L = 50 Ω, C_L = 5 pF; see Figure 30
ADG5208-EP	95			MHz typ	
ADG5209-EP	180			MHz typ	
Insertion Loss	−8.9			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 30
C_S (Off)	3.3			pF typ	V_S = 6 V, f = 1 MHz
C_D (Off)					
ADG5208-EP	38			pF typ	V_S = 6 V, f = 1 MHz
ADG5209-EP	19			pF typ	V_S = 6 V, f = 1 MHz
C_D (On), C_S (On)					
ADG5208-EP	41			pF typ	V_S = 6 V, f = 1 MHz
ADG5209-EP	24			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}
	50		75	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	−55°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			0 V to V_{DD}	V	
On Resistance, R_{ON}	150			Ω typ	V_S = 0 V to 30 V, I_S = −1 mA; see Figure 26
	170	215	245	Ω max	V_{DD} = 32.4 V, V_{SS} = 0 V
On-Resistance Match Between Channels, ΔR_{ON}	3.5			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
	55	65	70	Ω max	
LEAKAGE CURRENTS					V_{DD} = 39.6 V, V_{SS} = 0 V
Source Off Leakage, I_S (Off)	±0.005			nA typ	V_S = 1 V/30 V, V_D = 30 V/1 V; see Figure 28
	±0.1	±0.2	±0.4	nA max	

Parameter	25°C	−40°C to +85°C	−55°C to +125°C	Unit	Test Conditions/Comments
Drain Off Leakage, I_D (Off)	±0.005			nA typ	V_S = 1 V/30 V, V_D = 30 V/1 V; see Figure 28
	±0.1	±0.4	±1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	±0.01			nA typ	V_S = V_D = 1 V/30 V; see Figure 25
	±0.2	±0.5	±1.4	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, $t_{TRANSITION}$	170			ns typ	R_L = 300 Ω, C_L = 35 pF
	205	225	235	ns max	V_S = 18 V; see Figure 31
t_{ON} (EN)	150			ns typ	R_L = 300 Ω, C_L = 35 pF
	180	195	215	ns max	V_S = 18 V; see Figure 33
t_{OFF} (EN)	180			ns typ	R_L = 300 Ω, C_L = 35 pF
	225	225	230	ns max	V_S = 18 V; see Figure 33
Break-Before-Make Time Delay, t_D	55			ns typ	R_L = 300 Ω, C_L = 35 pF
			20	ns min	V_{S1} = V_{S2} = 18 V; see Figure 32
Charge Injection, Q_{INJ}	0.3			pC typ	V_S = 18 V, R_S = 0 Ω, C_L = 1 nF; see Figure 34
Off Isolation	−86			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 29
Channel-to-Channel Crosstalk	−80			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 27
−3 dB Bandwidth					R_L = 50 Ω, C_L = 5 pF; see Figure 30
ADG5208-EP	105			MHz typ	
ADG5209-EP	195			MHz typ	
Insertion Loss	−6.2			dB typ	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz; see Figure 30
C_S (Off)	2.7			pF typ	V_S = 18 V, f = 1 MHz
C_D (Off)					
ADG5208-EP	32			pF typ	V_S = 18 V, f = 1 MHz
ADG5209-EP	16			pF typ	V_S = 18 V, f = 1 MHz
C_D (On), C_S (On)					
ADG5208-EP	35			pF typ	V_S = 18 V, f = 1 MHz
ADG5209-EP	20			pF typ	V_S = 18 V, f = 1 MHz
POWER REQUIREMENTS					V_{DD} = 39.6 V
I_{DD}	80			μA typ	Digital inputs = 0 V or V_{DD}
	100		155	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, Sx, D, OR Dx

Table 5. ADG5208-EP

Parameter	25°C	85°C	125°C	Unit
CONTINUOUS CURRENT, Sx OR D				
V_{DD} = +15 V, V_{SS} = −15 V				
TSSOP (θ_{JA} = 112.6°C/W)	40	24	14.5	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	69	37	18	mA maximum
V_{DD} = +20 V, V_{SS} = −20 V				
TSSOP (θ_{JA} = 112.6°C/W)	42	26.5	14.5	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	75	40	18	mA maximum
V_{DD} = 12 V, V_{SS} = 0 V				
TSSOP (θ_{JA} = 112.6°C/W)	28	19	12	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	40	25	14.5	mA maximum
V_{DD} = 36 V, V_{SS} = 0 V				
TSSOP (θ_{JA} = 112.6°C/W)	40	26	14.5	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	72	39	18	mA maximum

Table 6. ADG5209-EP

Parameter	25°C	85°C	125°C	Unit
CONTINUOUS CURRENT, Sx OR Dx				
V_{DD} = +15 V, V_{SS} = −15 V				
TSSOP (θ_{JA} = 112.6°C/W)	29	19	12	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	51	30	16	mA maximum
V_{DD} = +20 V, V_{SS} = −20 V				
TSSOP (θ_{JA} = 112.6°C/W)	30	20	12.5	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	55	32	17	mA maximum
V_{DD} = 12 V, V_{SS} = 0 V				
TSSOP (θ_{JA} = 112.6°C/W)	20	14	10	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	29	20	12.5	mA maximum
V_{DD} = 36 V, V_{SS} = 0 V				
TSSOP (θ_{JA} = 112.6°C/W)	30	20	12.5	mA maximum
LFCSP (θ_{JA} = 30.4°C/W)	54	31	17	mA maximum

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Table 7.

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, Sx, D, or Dx Pins	
ADG5208-EP	126 mA (pulsed at 1 ms, 10% duty cycle maximum)
ADG5209-EP	92 mA (pulsed at 1 ms, 10% duty cycle maximum)
Continuous Current, Sx, D, or Dx Pins[2]	Data + 15%
Temperature Range	
Operating	−55°C to +125°C
Storage	−65°C to +150°C
Junction Temperature	150°C
Thermal Impedance, θ_{JA}	
16-Lead TSSOP (4-Layer Board)	112.6°C/W
16-Lead LFCSP (4-Layer Board)	30.4°C/W
Reflow Soldering Peak Temperature, Pb Free	260(+0/−5)°C
HBM ESD	
I/O Port to Supplies	8 kV
I/O Port to I/O Port	2 kV
All Other Pins	8 kV

[1] Overvoltages at the Ax, EN, Sx, D, and Dx pins are clamped by internal diodes. Limit current to the maximum ratings given.
[2] See Table 5 and Table 6.

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

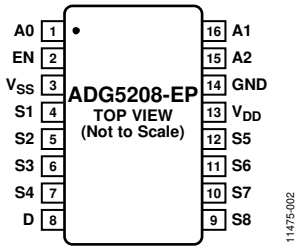

Figure 2. ADG5208-EP Pin Configuration (TSSOP)

Table 8. ADG5208-EP Pin Function Descriptions

Pin No.	Mnemonic	Description
1	A0	Logic Control Input.
2	EN	Active High Digital Input. When low, the device is disabled and all switches are off. When high, the Ax logic inputs determine the on switches.
3	V_{SS}	Most Negative Power Supply Potential. In single-supply applications, this pin can be connected to ground.
4	S1	Source Terminal 1. This pin can be an input or an output.
5	S2	Source Terminal 2. This pin can be an input or an output.
6	S3	Source Terminal 3. This pin can be an input or an output.
7	S4	Source Terminal 4. This pin can be an input or an output.
8	D	Drain Terminal. This pin can be an input or an output.
9	S8	Source Terminal 8. This pin can be an input or an output.
10	S7	Source Terminal 7. This pin can be an input or an output.
11	S6	Source Terminal 6. This pin can be an input or an output.
12	S5	Source Terminal 5. This pin can be an input or an output.
13	V_{DD}	Most Positive Power Supply Potential.
14	GND	Ground (0 V) Reference.
15	A2	Logic Control Input.
16	A1	Logic Control Input.

Table 9. ADG5208-EP Truth Table

A2	A1	A0	EN	On Switch
X[1]	X[1]	X[1]	0	None
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8

[1] X is don't care.

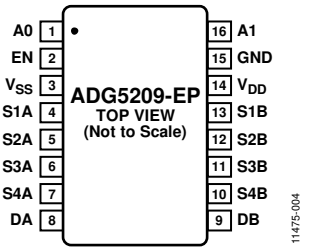

Figure 3. ADG5209-EP Pin Configuration (TSSOP)

Table 10. ADG5209-EP Pin Function Descriptions

Pin No.	Mnemonic	Description
1	A0	Logic Control Input.
2	EN	Active High Digital Input. When low, the device is disabled and all switches are off. When high, Ax logic inputs determine the on switches.
3	V_{SS}	Most Negative Power Supply Potential. In single-supply applications, this pin can be connected to ground.
4	S1A	Source Terminal 1A. This pin can be an input or an output.
5	S2A	Source Terminal 2A. This pin can be an input or an output.
6	S3A	Source Terminal 3A. This pin can be an input or an output.
7	S4A	Source Terminal 4A. This pin can be an input or an output.
8	DA	Drain Terminal A. This pin can be an input or an output.
9	DB	Drain Terminal B. This pin can be an input or an output.
10	S4B	Source Terminal 4B. This pin can be an input or an output.
11	S3B	Source Terminal 3B. This pin can be an input or an output.
12	S2B	Source Terminal 2B. This pin can be an input or an output.
13	S1B	Source Terminal 1B. This pin can be an input or an output.
14	V_{DD}	Most Positive Power Supply Potential.
15	GND	Ground (0 V) Reference.
16	A1	Logic Control Input.

Table 11. ADG5209-EP Truth Table

A1	A0	EN	On Switch Pair
X[1]	X[1]	0	None
0	0	1	1
0	1	1	2
1	0	1	3
1	1	1	4

[1] X is don't care.

TYPICAL PERFORMANCE CHARACTERISTICS

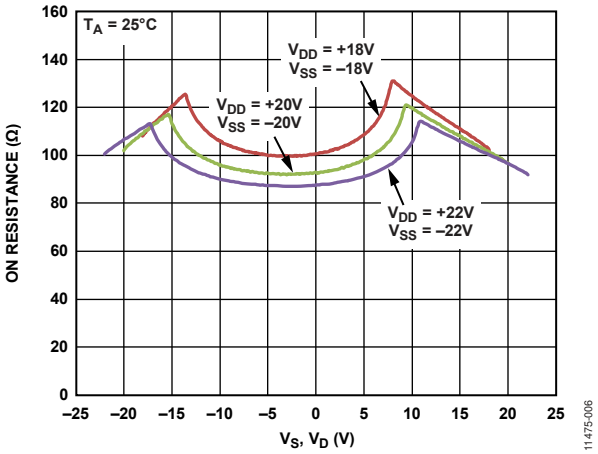

Figure 4. R_{ON} as a Function of V_S, V_D (±20 V Dual Supply)

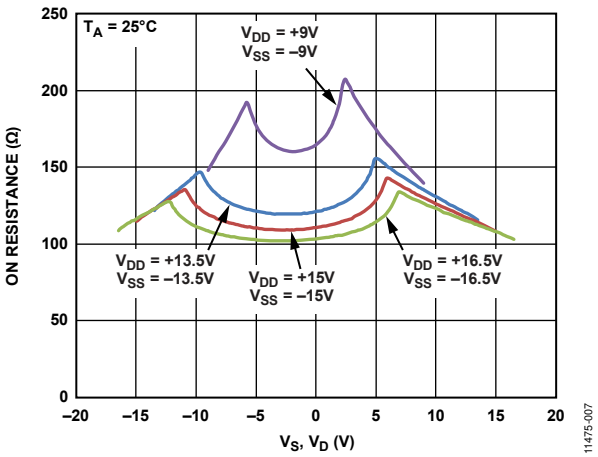

Figure 5. R_{ON} as a Function of V_S, V_D (±15 V Dual Supply)

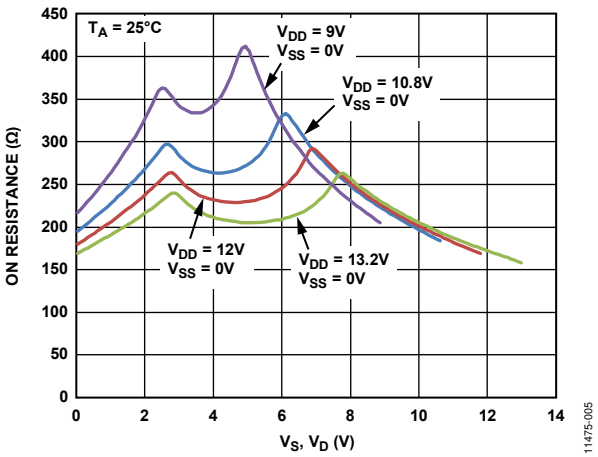

Figure 6. R_{ON} as a Function of V_S, V_D (12 V Single Supply)

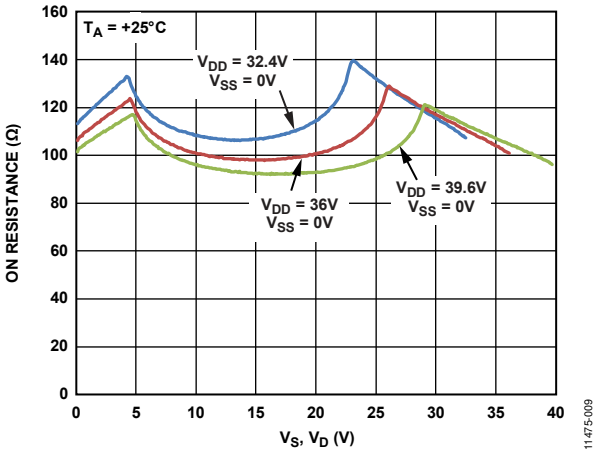

Figure 7. R_{ON} as a Function of V_S, V_D (36 V Single Supply)

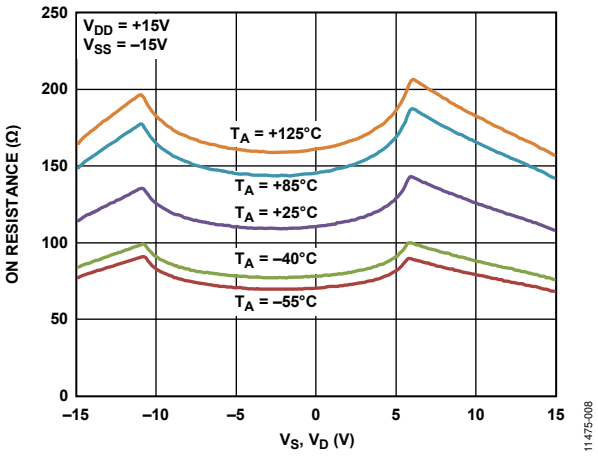

Figure 8. R_{ON} as a Function of V_S, V_D for Different Temperatures, ±15 V Dual Supply

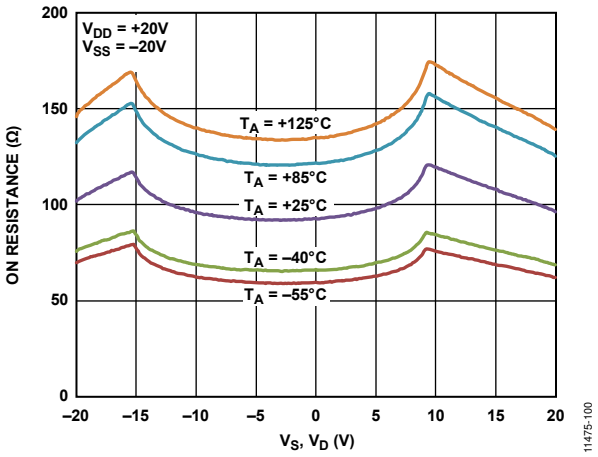

Figure 9. R_{ON} as a Function of V_S, V_D for Different Temperatures, ±20 V Dual Supply

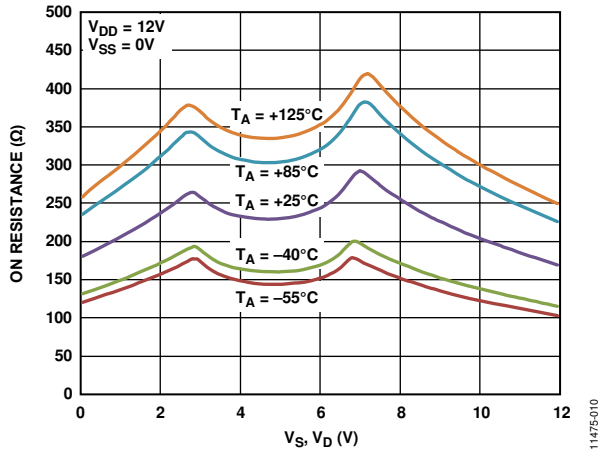

Figure 10. R_{ON} as a Function of V_S, V_D for Different Temperatures, 12 V Single Supply

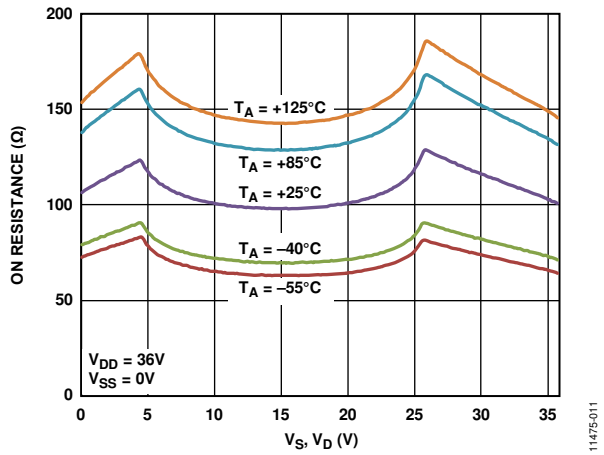

Figure 11. R_{ON} as a Function of V_S, V_D for Different Temperatures, 36 V Single Supply

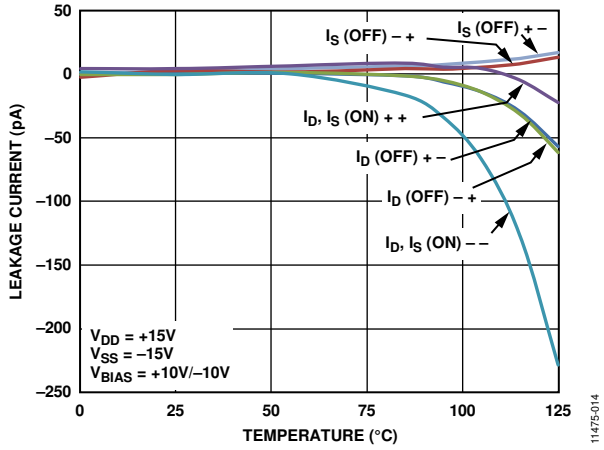

Figure 12. Leakage Currents vs. Temperature, ±15 V Dual Supply

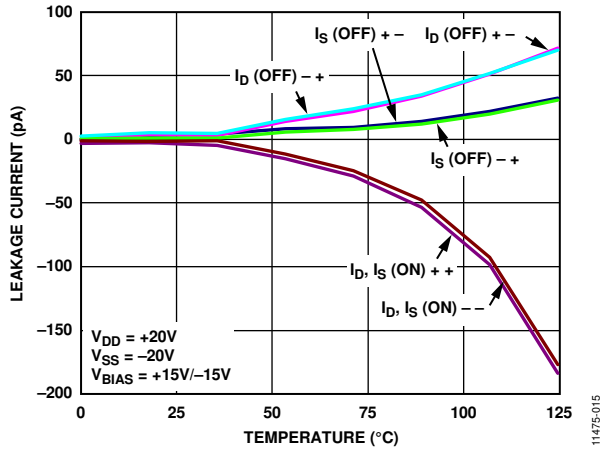

Figure 13. Leakage Currents vs. Temperature, ±20 V Dual Supply

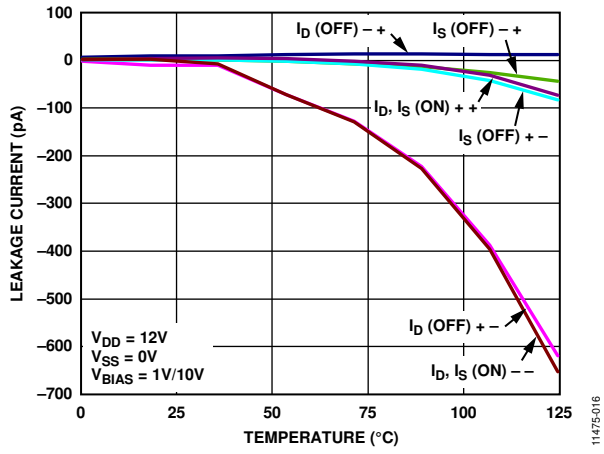

Figure 14. Leakage Currents vs. Temperature, 12 V Single Supply

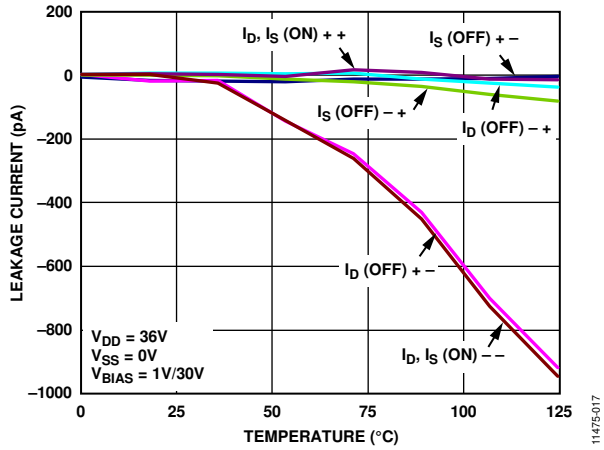

Figure 15. Leakage Currents vs. Temperature, 36 V Single Supply

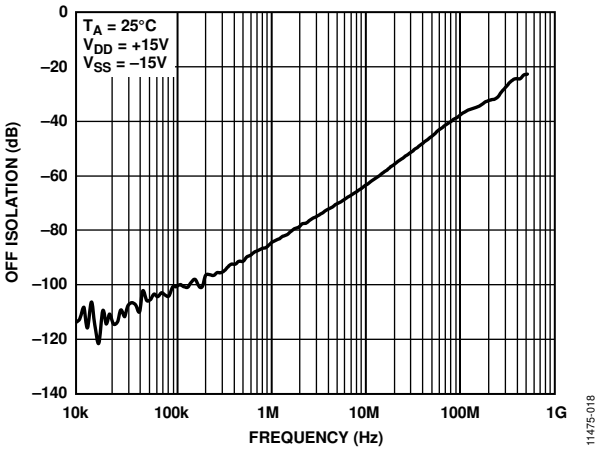

Figure 16. Off Isolation vs. Frequency, ±15 V Dual Supply

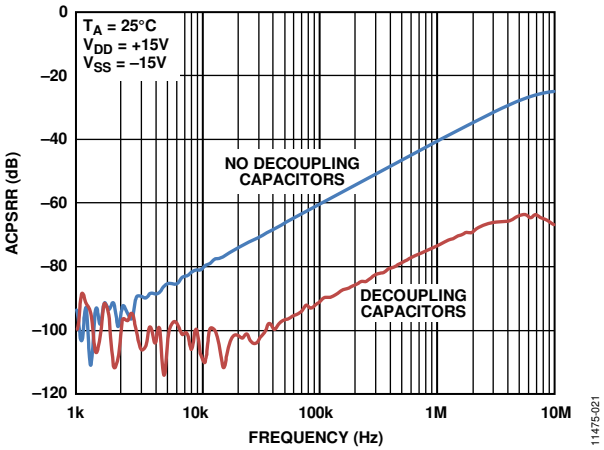

Figure 19. ACPSRR vs. Frequency, ±15 V Dual Supply

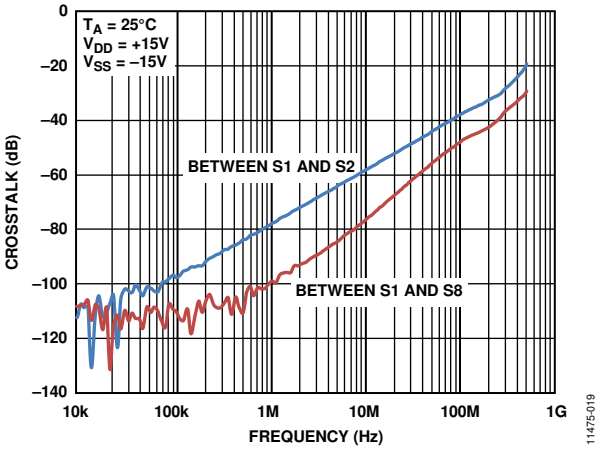

Figure 17. Crosstalk vs. Frequency, ±15 V Dual Supply

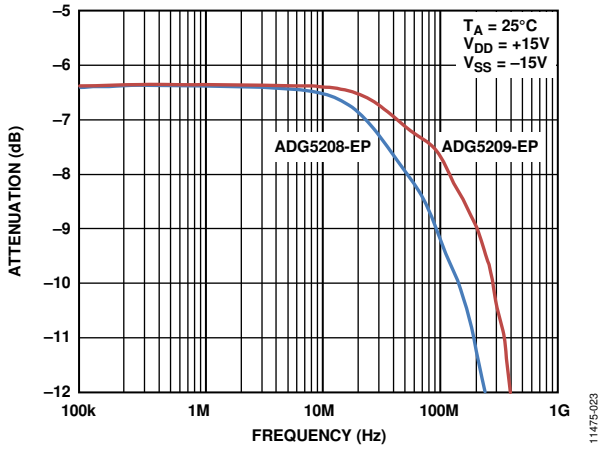

Figure 20. Bandwidth

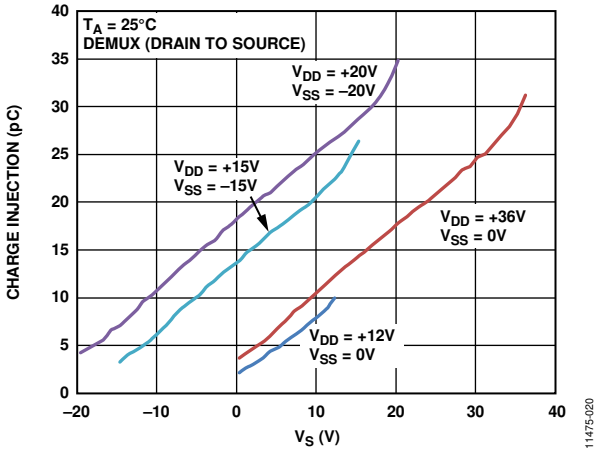

Figure 18. Charge Injection vs. Source Voltage, Drain to Source

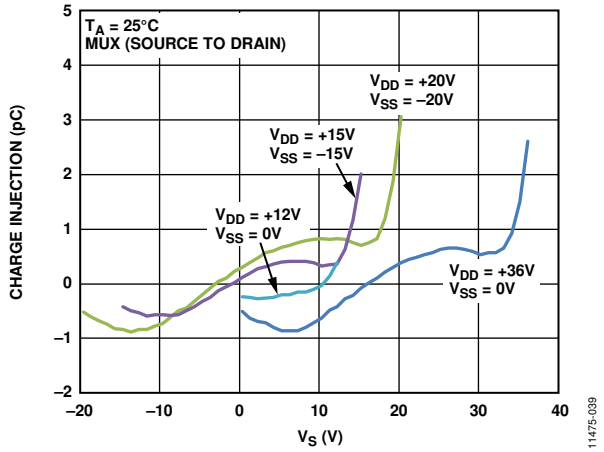

Figure 21. Charge Injection vs. Source Voltage, Source to Drain

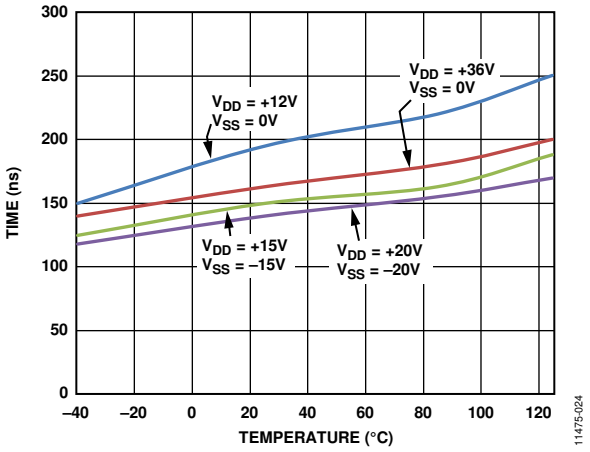

Figure 22. $t_{TRANSITION}$ Times vs. Temperature

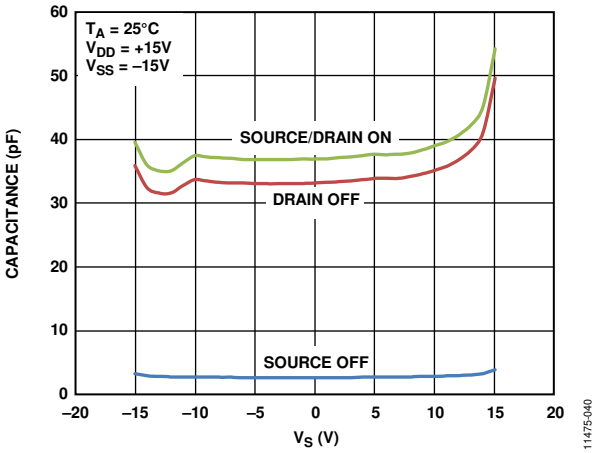

Figure 24. ADG5208-EP Capacitance vs. Source Voltage, ±15 V Dual Supply

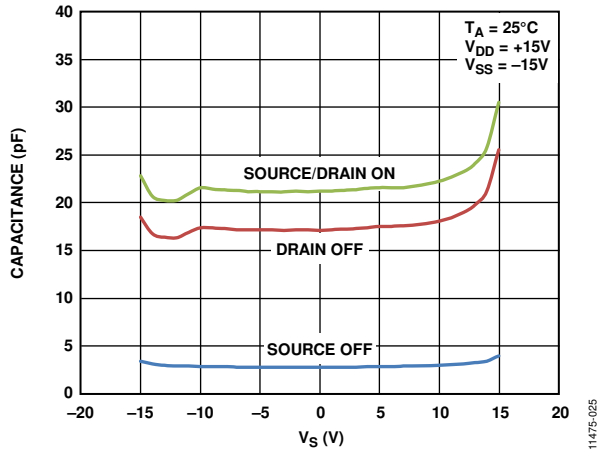

Figure 23. ADG5209-EP Capacitance vs. Source Voltage, ±15 V Dual Supply

TEST CIRCUITS

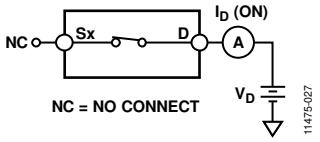

Figure 25. On Leakage

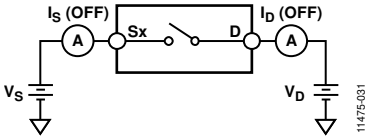

Figure 28. Off Leakage

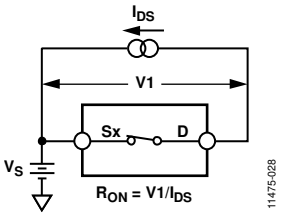

Figure 26. On Resistance

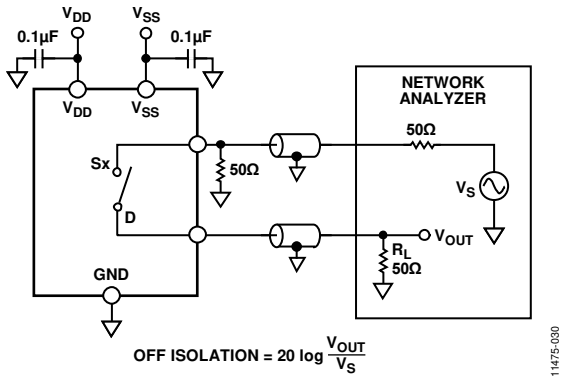

Figure 29. Off Isolation

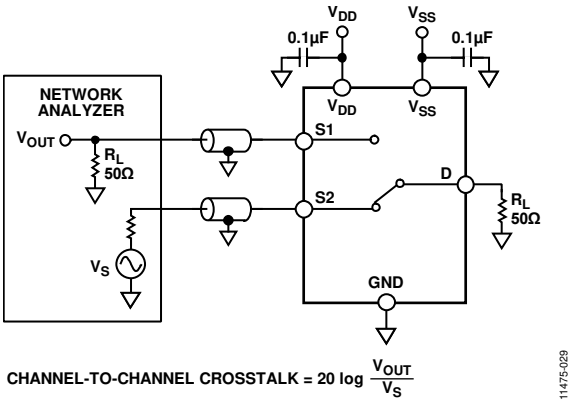

Figure 27. Channel-to-Channel Crosstalk

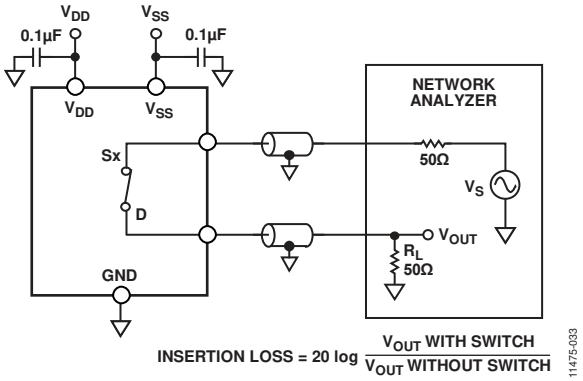

Figure 30. Bandwidth

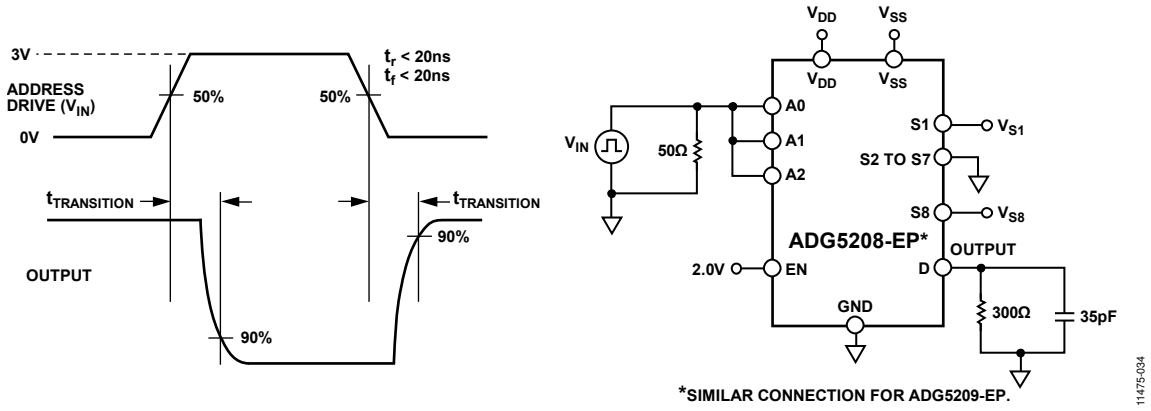

Figure 31. Address to Output Switching Times, $t_{TRANSITION}$

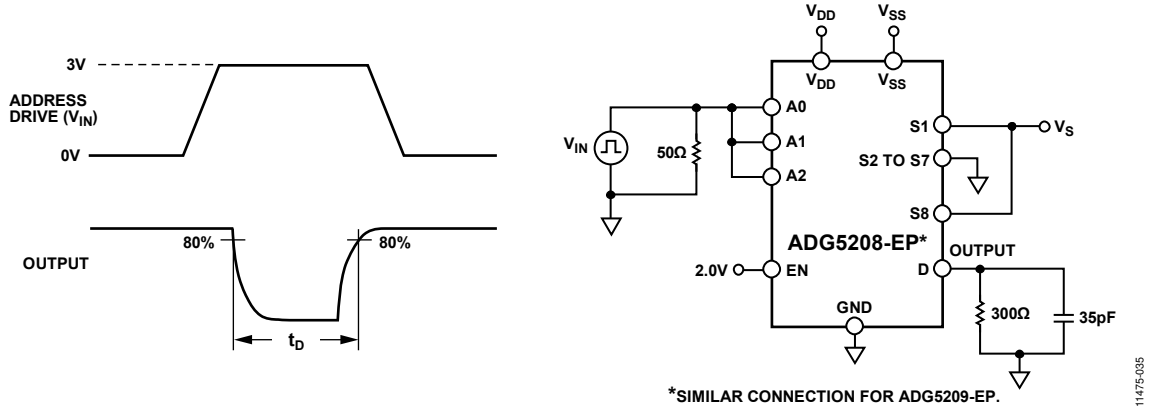

Figure 32. Break-Before-Make Time Delay, t_D

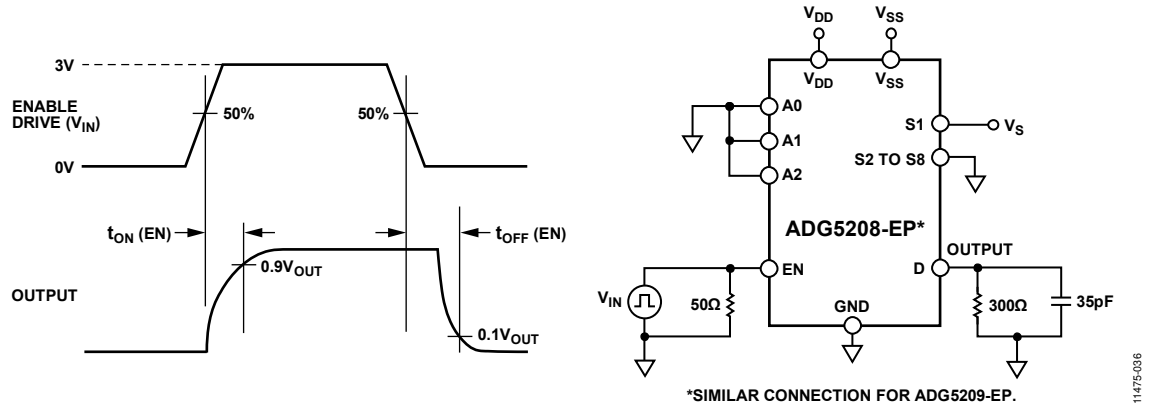

Figure 33. Enable Delay, t_{ON} (EN), t_{OFF} (EN)

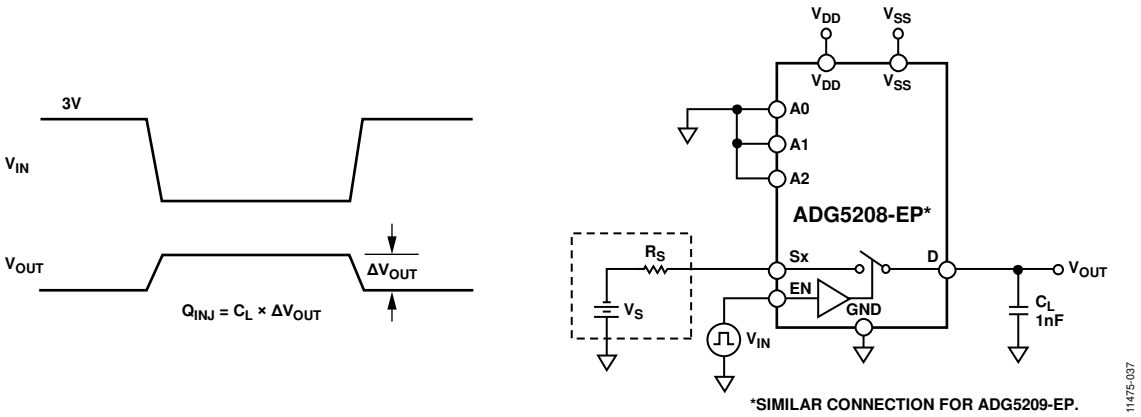

Figure 34. Charge Injection

OUTLINE DIMENSIONS

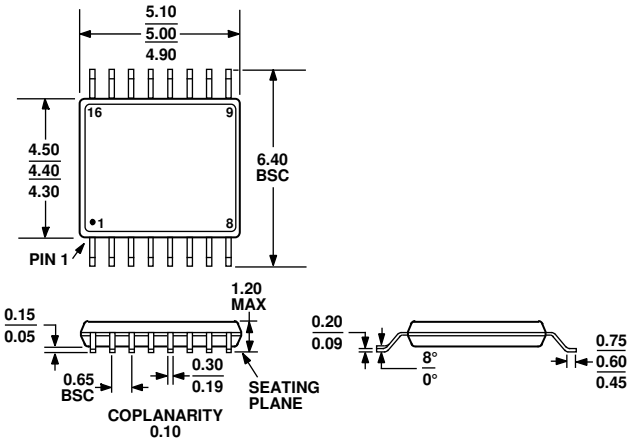

Figure 35. 16-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-16)
Dimensions shown in millimeters

ORDERING GUIDE[1]

Model	Temperature Range	Package Description	Package Option
ADG5208SRU-EP-RL7	−55°C to +125°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADG5209SRU-EP-RL7	−55°C to +125°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADG5208SRUZ-EP-RL7	−55°C to +125°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADG5209SRUZ-EP-RL7	−55°C to +125°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16

[1] Z = RoHS Compliant Part.

NOTES

D11475-0-11/17(C)