

### FEATURES

- 2.1  $\Omega$  on resistance
- 0.5  $\Omega$  maximum on resistance flatness at 25°C
- Up to 390 mA continuous current
- Fully specified at +12 V,  $\pm 15$  V,  $\pm 5$  V
- No  $V_L$  supply required
- 3 V logic-compatible inputs
- Rail-to-rail operation
- 8-lead MSOP and 8-lead 3 mm  $\times$  2 mm LFCSP packages

### APPLICATIONS

- Automatic test equipment
- Data acquisition systems
- Battery-powered systems
- Relay replacements
- Sample-and-hold systems
- Audio signal routing
- Video signal routing
- Communication systems

### GENERAL DESCRIPTION

The ADG1419 is a monolithic *i*CMOS® device containing a single-pole/double-throw (SPDT) switch. An EN input on the LFCSP package is used to enable or disable the device. When disabled, all channels are switched off.

The *i*CMOS (industrial CMOS) modular manufacturing process combines high voltage, complementary metal-oxide semiconductor (CMOS) and bipolar technologies. It enables the development of a wide range of high performance analog ICs capable of 33 V operation in a footprint that no other generation of high voltage parts has achieved. Unlike analog ICs using conventional CMOS processes, *i*CMOS components can tolerate high supply voltages while providing increased performance, dramatically lower power consumption, and reduced package size.

The on resistance profile is very flat over the full analog input range ensuring excellent linearity and low distortion when switching audio signals. The *i*CMOS construction ensures ultralow power dissipation, making the part ideally suited for portable and battery-powered instruments.

### FUNCTIONAL BLOCK DIAGRAM

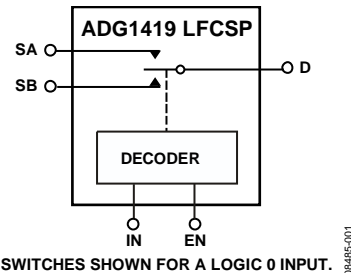


Figure 1. 8-Lead LFCSP Functional Block Diagram

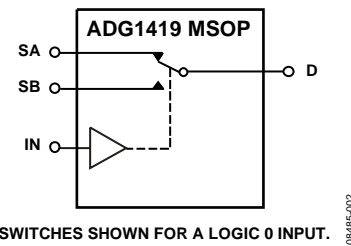


Figure 2. 8-Lead MSOP Functional Block Diagram

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. The ADG1419 exhibits break-before-make switching action for use in multiplexer applications.

### PRODUCT HIGHLIGHTS

1. 2.4  $\Omega$  maximum on resistance at 25°C.
2. Minimum distortion.
3. 3 V logic-compatible digital inputs:  $V_{INH} = 2.0$  V,  $V_{INL} = 0.8$  V.
4. No  $V_L$  logic power supply required.
5. 8-lead MSOP and 8-lead, 3 mm  $\times$  2 mm LFCSP packages.

#### Rev. 0

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## REVISION HISTORY

10/09—Revision 0: Initial Version

# SPECIFICATIONS

## ±15 V DUAL SUPPLY

$V_{DD} = +15\text{ V} \pm 10\%$ ,  $V_{SS} = -15\text{ V} \pm 10\%$ ,  $GND = 0\text{ V}$ , unless otherwise noted.

Table 1.

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
<b>ANALOG SWITCH</b>					
Analog Signal Range			$V_{DD}$ to $V_{SS}$	V	
On Resistance, $R_{ON}$	2.1			$\Omega$ typ	$V_S = \pm 10\text{ V}$ , $I_S = -10\text{ mA}$ ; see Figure 22
	2.4	2.8	3.2	$\Omega$ max	$V_{DD} = +13.5\text{ V}$ , $V_{SS} = -13.5\text{ V}$
On Resistance Match Between Channels, $\Delta R_{ON}$	0.05			$\Omega$ typ	$V_S = \pm 10\text{ V}$ , $I_S = -10\text{ mA}$
	0.2	0.25	0.3	$\Omega$ max	
On Resistance Flatness, $R_{FLAT(ON)}$	0.4			$\Omega$ typ	$V_S = \pm 10\text{ V}$ , $I_S = -10\text{ mA}$
	0.5	0.6	0.65	$\Omega$ max	
<b>LEAKAGE CURRENTS</b>					
Source Off Leakage, $I_S$ (Off)	$\pm 0.1$			nA typ	$V_{DD} = +16.5\text{ V}$ , $V_{SS} = -16.5\text{ V}$
	$\pm 0.5$	$\pm 2$	$\pm 75$	nA max	$V_S = \pm 10\text{ V}$ , $V_D = \pm 10\text{ V}$ ; see Figure 23
Drain Off Leakage, $I_D$ (Off)	$\pm 0.2$			nA typ	$V_S = \pm 10\text{ V}$ , $V_D = \pm 10\text{ V}$ ; see Figure 23
	$\pm 0.6$	$\pm 3$	$\pm 100$	nA max	
Channel On Leakage, $I_D$ , $I_S$ (On)	$\pm 0.2$			nA typ	$V_S = V_D = \pm 10\text{ V}$ ; see Figure 24
	$\pm 1$	$\pm 3$	$\pm 100$	nA max	
<b>DIGITAL INPUTS</b>					
Input High Voltage, $V_{INH}$			2.0	V min	
Input Low Voltage, $V_{INL}$			0.8	V max	
Input Current, $I_{INL}$ or $I_{INH}$	0.005			$\mu\text{A}$ typ	$V_{IN} = V_{GND}$ or $V_{DD}$
			$\pm 0.1$	$\mu\text{A}$ max	
Digital Input Capacitance, $C_{IN}$	4			pF typ	
<b>DYNAMIC CHARACTERISTICS<sup>1</sup></b>					
Transition Time, $t_{TRANSITION}$	130			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	155	190	220	ns max	$V_S = +10\text{ V}$ ; see Figure 25
$t_{ON}$ (EN)	85			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	110	125	140	ns max	$V_S = 10\text{ V}$ ; see Figure 27
$t_{OFF}$ (EN)	115			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	140	160	180	ns max	$V_S = 10\text{ V}$ ; see Figure 27
Break-Before-Make Time Delay, $t_D$	15			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
			8	ns min	$V_{S1} = V_{S2} = 10\text{ V}$ ; see Figure 26
Charge Injection	-16			pC typ	$V_S = 0\text{ V}$ , $R_S = 0\ \Omega$ , $C_L = 1\text{ nF}$ ; see Figure 28
Off Isolation	-64			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ ; see Figure 29
Channel-to-Channel Crosstalk	-64			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ ; see Figure 30
Total Harmonic Distortion + Noise	0.016			% typ	$R_L = 10\text{ k}\Omega$ , $5\text{ V rms}$ , $f = 20\text{ Hz}$ to $20\text{ kHz}$ ; see Figure 32
-3 dB Bandwidth	135			MHz typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ ; see Figure 31
Insertion Loss	0.16			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ ; see Figure 31
$C_S$ (Off)	19			pF typ	$f = 1\text{ MHz}$ ; $V_S = 0\text{ V}$
$C_D$ (Off)	44			pF typ	$f = 1\text{ MHz}$ ; $V_S = 0\text{ V}$
$C_D$ , $C_S$ (On)	114			pF typ	$f = 1\text{ MHz}$ ; $V_S = 0\text{ V}$

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Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
<b>POWER REQUIREMENTS</b>					
$I_{DD}$	0.002			$\mu\text{A typ}$	$V_{DD} = +16.5\text{ V}, V_{SS} = -16.5\text{ V}$ Digital inputs = 0 V or $V_{DD}$
$I_{DD}$ , 8-Lead MSOP	58		1.0	$\mu\text{A max}$	Digital inputs = 5 V
$I_{DD}$ , 8-Lead LFCSP	120		95	$\mu\text{A typ}$	Digital inputs = 5 V
$I_{SS}$	0.002		190	$\mu\text{A max}$	Digital inputs = 0 V, 5 V or $V_{DD}$
$V_{DD}/V_{SS}$			1.0	$\mu\text{A typ}$	Digital inputs = 0 V, 5 V or $V_{DD}$
			$\pm 4.5/\pm 16.5$	V min/max	Ground = 0 V

<sup>1</sup> Guaranteed by design, not subject to production test.

## +12 V SINGLE SUPPLY

$V_{DD} = 12\text{ V} \pm 10\%$ ,  $V_{SS} = 0\text{ V}$ ,  $\text{GND} = 0\text{ V}$ , unless otherwise noted.

**Table 2.**

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
<b>ANALOG SWITCH</b>					
Analogue Signal Range			0 V to $V_{DD}$	V	
On Resistance, $R_{ON}$	4			$\Omega\text{ typ}$	$V_S = 0\text{ V to }10\text{ V}, I_S = -10\text{ mA}$ ; see Figure 22
	4.6	5.5	6.2	$\Omega\text{ max}$	$V_{DD} = +10.8\text{ V}, V_{SS} = 0\text{ V}$
On Resistance Match Between Channels, $\Delta R_{ON}$	0.08			$\Omega\text{ typ}$	$V_S = 0\text{ V to }10\text{ V}, I_S = -10\text{ mA}$
	0.25	0.3	0.35	$\Omega\text{ max}$	
On Resistance Flatness, $R_{FLAT(ON)}$	1.2			$\Omega\text{ typ}$	$V_S = 0\text{ V to }10\text{ V}, I_S = -10\text{ mA}$
	1.5	1.75	1.9	$\Omega\text{ max}$	
<b>LEAKAGE CURRENTS</b>					
Source Off Leakage, $I_S$ (Off)	$\pm 0.1$			nA typ	$V_{DD} = +13.2\text{ V}, V_{SS} = 0\text{ V}$ $V_S = 1\text{ V}/10\text{ V}, V_D = 10\text{ V}/1\text{ V}$ ; see Figure 23
	$\pm 0.5$	$\pm 2$	$\pm 75$	nA max	
Drain Off Leakage, $I_D$ (Off)	$\pm 0.2$			nA typ	$V_S = 1\text{ V}/10\text{ V}, V_D = 10\text{ V}/1\text{ V}$ ; see Figure 23
	$\pm 0.6$	$\pm 3$	$\pm 100$	nA max	
Channel On Leakage, $I_D, I_S$ (On)	$\pm 0.2$			nA typ	$V_S = V_D = 1\text{ V or }10\text{ V}$ ; see Figure 24
	$\pm 1$	$\pm 3$	$\pm 100$	nA max	
<b>DIGITAL INPUTS</b>					
Input High Voltage, $V_{INH}$			2.0	V min	
Input Low Voltage, $V_{INL}$			0.8	V max	
Input Current, $I_{INL}$ or $I_{INH}$	0.005			$\mu\text{A typ}$	$V_{IN} = V_{GND}$ or $V_{DD}$
			$\pm 0.1$	$\mu\text{A max}$	
Digital Input Capacitance, $C_{IN}$	4			pF typ	
<b>DYNAMIC CHARACTERISTICS<sup>1</sup></b>					
Transition Time, $t_{TRANSITION}$	200			ns typ	$R_L = 300\ \Omega, C_L = 35\text{ pF}$
	255	265	370	ns max	$V_S = 8\text{ V}$ ; see Figure 25
$t_{ON}$ (EN)	145			ns typ	$R_L = 300\ \Omega, C_L = 35\text{ pF}$
	190	220	245	ns max	$V_S = 8\text{ V}$ ; see Figure 27
$t_{OFF}$ (EN)	130			ns typ	$R_L = 300\ \Omega, C_L = 35\text{ pF}$
	170	205	220	ns max	$V_S = 8\text{ V}$ ; see Figure 27
Break-Before-Make Time Delay, $t_D$	55			ns typ	$R_L = 300\ \Omega, C_L = 35\text{ pF}$
			33	ns min	$V_{S1} = V_{S2} = 8\text{ V}$ ; see Figure 26
Charge Injection	13			pC typ	$V_S = 6\text{ V}, R_S = 0\ \Omega, C_L = 1\text{ nF}$ ; see Figure 28
Off Isolation	-60			dB typ	$R_L = 50\ \Omega, C_L = 5\text{ pF}, f = 1\text{ MHz}$ ; see Figure 29

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
Channel-to-Channel Crosstalk	-60			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 1 \text{ MHz}$ ; see Figure 30
-3 dB Bandwidth	95			MHz typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ ; see Figure 31
Insertion Loss	0.3			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 1 \text{ MHz}$ ; see Figure 31
$C_S$ (Off)	32			pF typ	$f = 1 \text{ MHz}$ ; $V_S = 6 \text{ V}$
$C_D$ (Off)	72			pF typ	$f = 1 \text{ MHz}$ ; $V_S = 6 \text{ V}$
$C_D$ , $C_S$ (On)	123			pF typ	$f = 1 \text{ MHz}$ ; $V_S = 6 \text{ V}$
<b>POWER REQUIREMENTS</b>					
$I_{DD}$	0.001			$\mu\text{A}$ typ	$V_{DD} = 13.2 \text{ V}$ Digital inputs = 0 V or $V_{DD}$
$I_{DD}$ , 8-Lead MSOP	58		1.0	$\mu\text{A}$ max	Digital inputs = 5 V
$I_{DD}$ , 8-Lead LFCSP	120		95	$\mu\text{A}$ max	Digital inputs = 5 V
$V_{DD}$			190	$\mu\text{A}$ max	Ground = 0 V, $V_{SS} = 0 \text{ V}$
			5/16.5	V min/max	

<sup>1</sup> Guaranteed by design, not subject to production test.

### ±5 V DUAL SUPPLY

$V_{DD} = +5 \text{ V} \pm 10\%$ ,  $V_{SS} = -5 \text{ V} \pm 10\%$ ,  $GND = 0 \text{ V}$ , unless otherwise noted.

Table 3.

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
<b>ANALOG SWITCH</b>					
Analog Signal Range			$V_{DD}$ to $V_{SS}$	V	
On Resistance, $R_{ON}$	4.5			$\Omega$ typ	$V_S = \pm 4.5 \text{ V}$ , $I_S = -10 \text{ mA}$ ; see Figure 22
	5.2	6.2	7	$\Omega$ max	$V_{DD} = +4.5 \text{ V}$ , $V_{SS} = -4.5 \text{ V}$
On Resistance Match Between Channels, $\Delta R_{ON}$	0.1			$\Omega$ typ	$V_S = \pm 4.5 \text{ V}$ , $I_S = -10 \text{ mA}$
	0.3	0.35	0.4	$\Omega$ max	
On Resistance Flatness, $R_{FLAT(ON)}$	1.3			$\Omega$ typ	$V_S = \pm 4.5 \text{ V}$ , $I_S = -10 \text{ mA}$
	1.6	1.85	2	$\Omega$ max	
<b>LEAKAGE CURRENTS</b>					
Source Off Leakage, $I_S$ (Off)	$\pm 0.1$			nA typ	$V_{DD} = +5.5 \text{ V}$ , $V_{SS} = -5.5 \text{ V}$ $V_S = \pm 4.5 \text{ V}$ , $V_D = \mp 4.5 \text{ V}$ ; see Figure 23
	$\pm 0.5$	$\pm 2$	$\pm 75$	nA max	
Drain Off Leakage, $I_D$ (Off)	$\pm 0.1$			nA typ	$V_S = \pm 4.5 \text{ V}$ , $V_D = \mp 4.5 \text{ V}$ ; see Figure 23
	$\pm 0.6$	$\pm 3$	$\pm 100$	nA max	
Channel On Leakage, $I_D$ , $I_S$ (On)	$\pm 0.1$			nA typ	$V_S = V_D = \pm 4.5 \text{ V}$ ; see Figure 24
	$\pm 1$	$\pm 3$	$\pm 100$	nA max	
<b>DIGITAL INPUTS</b>					
Input High Voltage, $V_{INH}$			2.0	V min	
Input Low Voltage, $V_{INL}$			0.8	V max	
Input Current, $I_{INL}$ or $I_{INH}$	0.001			$\mu\text{A}$ typ	$V_{IN} = V_{GND}$ or $V_{DD}$
			$\pm 0.1$	$\mu\text{A}$ max	
Digital Input Capacitance, $C_{IN}$	4			pF typ	

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Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
<b>DYNAMIC CHARACTERISTICS<sup>1</sup></b>					
Transition Time, $t_{\text{TRANSITION}}$	310			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
	410	495	560	ns max	$V_S = 3 \text{ V}$ ; see Figure 25
$t_{\text{ON}}$ (EN)	230			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
	305	355	390	ns max	$V_S = 3 \text{ V}$ ; see Figure 27
$t_{\text{OFF}}$ (EN)	220			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
	290	335	365	ns max	$V_S = 3 \text{ V}$ ; see Figure 27
Break-Before-Make Time Delay, $t_D$	65			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
			31	ns min	$V_{S1} = V_{S2} = 3 \text{ V}$ ; see Figure 26
Charge Injection	59			pC typ	$V_S = 0 \text{ V}$ , $R_S = 0 \Omega$ , $C_L = 1 \text{ nF}$ ; see Figure 28
Off Isolation	-60			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 1 \text{ MHz}$ ; see Figure 29
Channel-to-Channel Crosstalk	-60			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 1 \text{ MHz}$ ; see Figure 30
Total Harmonic Distortion + Noise	0.04			% typ	$R_L = 10 \text{ k}\Omega$ , 5 V p-p, $f = 20 \text{ Hz}$ to 20 kHz; see Figure 32
-3 dB Bandwidth	105			MHz typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ ; see Figure 31
Insertion Loss	0.28			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 1 \text{ MHz}$ ; see Figure 31
$C_S$ (Off)	26			pF typ	$V_S = 0 \text{ V}$ , $f = 1 \text{ MHz}$
$C_D$ (Off)	62			pF typ	$V_S = 0 \text{ V}$ , $f = 1 \text{ MHz}$
$C_D$ , $C_S$ (On)	128			pF typ	$V_S = 0 \text{ V}$ , $f = 1 \text{ MHz}$
<b>POWER REQUIREMENTS</b>					
$I_{\text{DD}}$	0.001		1.0	$\mu\text{A}$ typ $\mu\text{A}$ max	$V_{\text{DD}} = +5.5 \text{ V}$ , $V_{\text{SS}} = -5.5 \text{ V}$ Digital inputs = 0 V or $V_{\text{DD}}$
$I_{\text{SS}}$	0.001		1.0	$\mu\text{A}$ typ $\mu\text{A}$ max	Digital inputs = 0 V or $V_{\text{DD}}$
$V_{\text{DD}}/V_{\text{SS}}$			$\pm 4.5/\pm 16.5$	V min/max	Ground = 0 V

<sup>1</sup> Guaranteed by design, not subject to production test.

## CONTINUOUS CURRENT PER CHANNEL, S OR D

Table 4.

Parameter	25°C	85°C	125°C	Unit	Test Conditions/Comments
<b>CONTINUOUS CURRENT PER CHANNEL<sup>1</sup></b>					
$\pm 15 \text{ V}$ Dual Supply					$V_{\text{DD}} = +13.5 \text{ V}$ , $V_{\text{SS}} = -13.5 \text{ V}$
8-Lead MSOP ( $\theta_{\text{JA}} = 206^\circ\text{C/W}$ )	215	135	80	mA maximum	
8-Lead LFCSP ( $\theta_{\text{JA}} = 50.8^\circ\text{C/W}$ )	390	215	100	mA maximum	
+12 V Single Supply					$V_{\text{DD}} = 10.8 \text{ V}$ , $V_{\text{SS}} = 0 \text{ V}$
8-Lead MSOP ( $\theta_{\text{JA}} = 206^\circ\text{C/W}$ )	175	115	70	mA maximum	
8-Lead LFCSP ( $\theta_{\text{JA}} = 50.8^\circ\text{C/W}$ )	320	185	95	mA maximum	
$\pm 5 \text{ V}$ Dual Supply					$V_{\text{DD}} = +4.5 \text{ V}$ , $V_{\text{SS}} = -4.5 \text{ V}$
8-Lead MSOP ( $\theta_{\text{JA}} = 206^\circ\text{C/W}$ )	165	110	70	mA maximum	
8-Lead LFCSP ( $\theta_{\text{JA}} = 50.8^\circ\text{C/W}$ )	310	180	95	mA maximum	

<sup>1</sup> Guaranteed by design, not subject to production test.

## ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ , unless otherwise noted.

Table 5.

Parameter	Rating
$V_{DD}$ to $V_{SS}$	35 V
$V_{DD}$ to GND	-0.3 V to +25 V
$V_{SS}$ to GND	+0.3 V to -25 V
Analog Inputs <sup>1</sup>	$V_{SS} - 0.3\text{ V}$ to $V_{DD} + 0.3\text{ V}$ or 30 mA, whichever occurs first
Digital Inputs <sup>1</sup>	GND - 0.3 V to $V_{DD} + 0.3\text{ V}$ or 30 mA, whichever occurs first
Peak Current, S or D (Pulsed at 1 ms, 10% Duty-Cycle Maximum)	
8-Lead MSOP (4-Layer Board)	400 mA
8-Lead LFCSP	600 mA
Continuous Current per Channel, S or D	Data in Table 4 + 15% mA
Operating Temperature Range	
Industrial	-40°C to +125°C
Storage Temperature Range	-65°C to +150°C
Junction Temperature	150°C
Reflow Soldering Peak Temperature, Pb Free	260°C

<sup>1</sup> Over voltages at IN, S, or D are clamped by internal diodes. Current should be limited to the maximum ratings given.

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.

## THERMAL RESISTANCE

Table 6. Thermal Resistance

Package Type	$\theta_{JA}$	$\theta_{JC}$	Unit
8-Lead MSOP (4-Layer Board)	206	44	°C/W
8-Lead LFCSP	50.8		°C/W

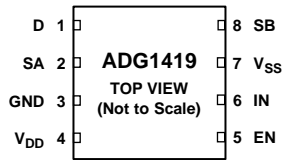
## ESD CAUTION



**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.

# ADG1419

## PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

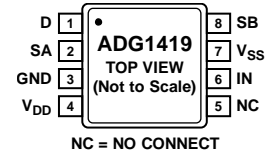


**NOTES**

1. EXPOSED PAD TIED TO SUBSTRATE,  $V_{SS}$ .

Figure 3. 8-Lead LFCSP Pin Configuration

08485-003



NC = NO CONNECT

Figure 4. 8-Lead MSOP Pin Configuration

08485-004

**Table 7. 8-Lead LFCSP Pin Function Descriptions**

Pin No.	Mnemonic	Description
1	D	Drain Terminal. This pin can be an input or output.
2	SA	Source Terminal. This pin can be an input or output.
3	GND	Ground (0 V) Reference.
4	$V_{DD}$	Most Positive Power Supply Potential.
5	EN	Active High Digital Input. When this pin is low, the device is disabled and all switches are turned off. When this pin is high, the IN logic input determines which switch is turned on.
6	IN	Logic Control Input.
7	$V_{SS}$	Most Negative Power Supply Potential.
8	SB	Source Terminal. This pin can be an input or output.
	EPAD	Exposed pad tied to substrate, $V_{SS}$ .

**Table 8. 8-Lead LFCSP Truth Table**

EN	IN	Switch A	Switch B
0	X	Off	Off
1	0	On	Off
1	1	Off	On

**Table 9. 8-Lead MSOP Pin Function Descriptions**

Pin No.	Mnemonic	Description
1	D	Drain Terminal. This pin can be an input or output.
2	SA	Source Terminal. This pin can be an input or output.
3	GND	Ground (0 V) Reference.
4	$V_{DD}$	Most Positive Power Supply Potential.
5	NC	No Connect.
6	IN	Logic Control Input.
7	$V_{SS}$	Most Negative Power Supply Potential.
8	SB	Source Terminal. This pin can be an input or output.

**Table 10. 8-Lead MSOP Truth Table**

IN	Switch A	Switch B
0	On	Off
1	Off	On



# TYPICAL PERFORMANCE CHARACTERISTICS

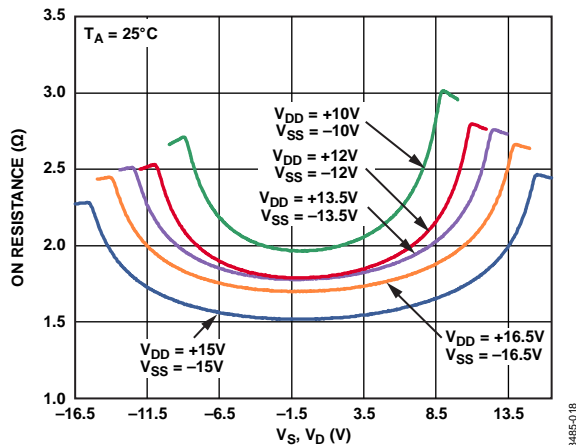


Figure 5. On Resistance as a Function of  $V_D$  ( $V_S$ ) for Dual Supply

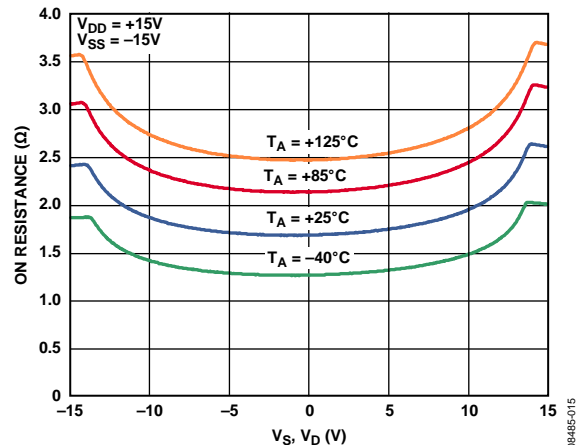


Figure 8. On Resistance as a Function of  $V_D$  ( $V_S$ ) for Different Temperatures,  $\pm 15$  V Dual Supply

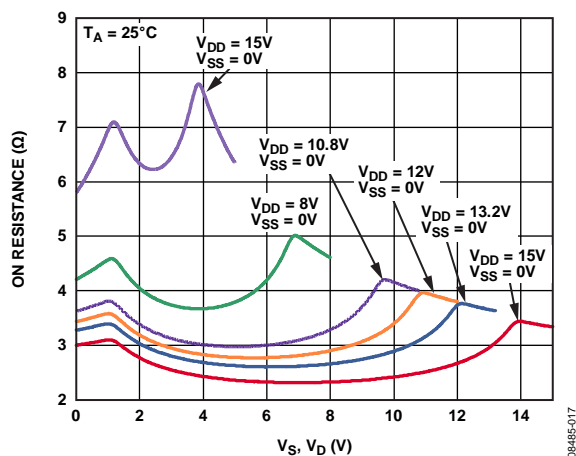


Figure 6. On Resistance as a Function of  $V_D$  ( $V_S$ ) for Single Supply

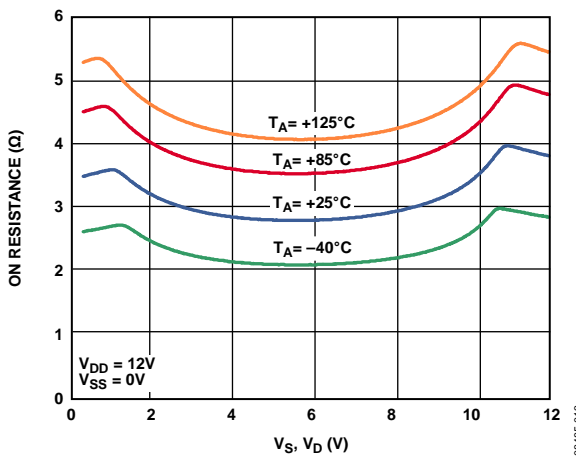


Figure 9. On Resistance as a Function of  $V_D$  ( $V_S$ ) for Different Temperatures, +12 V Single Supply

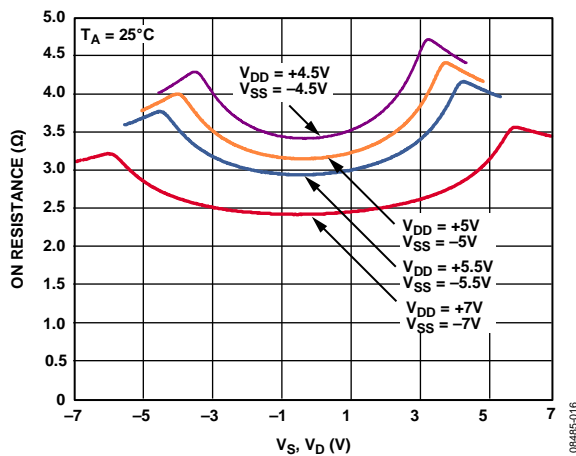


Figure 7. On Resistance as a Function of  $V_D$  ( $V_S$ ) for Dual Supply

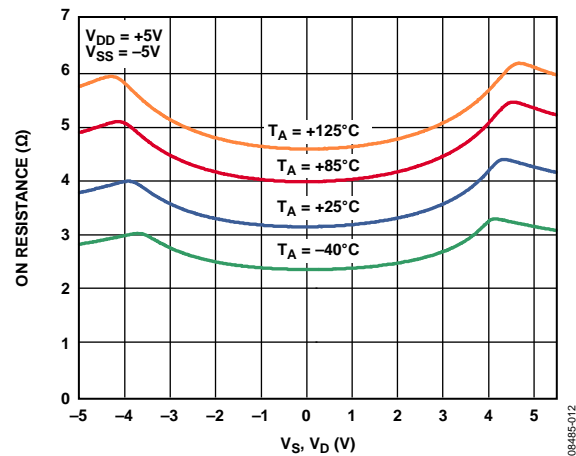


Figure 10. On Resistance as a Function of  $V_D$  ( $V_S$ ) for Different Temperatures,  $\pm 5$  V Dual Supply

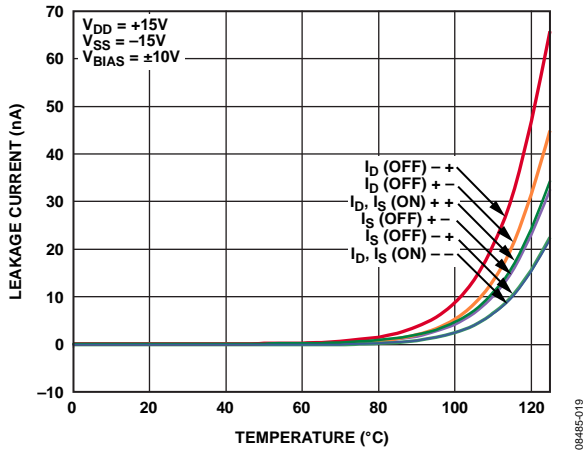


Figure 11. Leakage Currents as a Function of Temperature, ±15 V Dual Supply

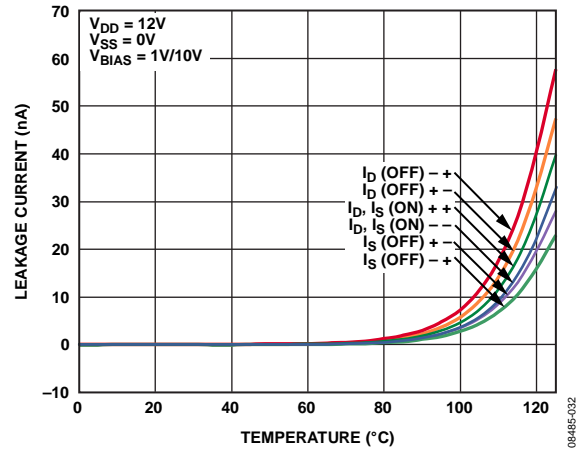


Figure 12. Leakage Currents as a Function of Temperature, +12 V Single Supply

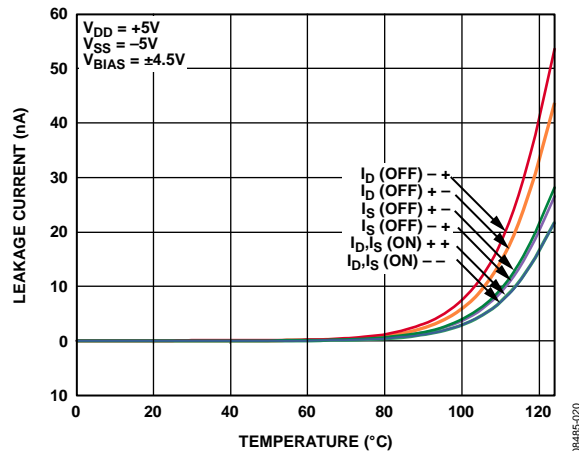


Figure 13. Leakage Currents as a Function of Temperature, ±5 V Dual Supply

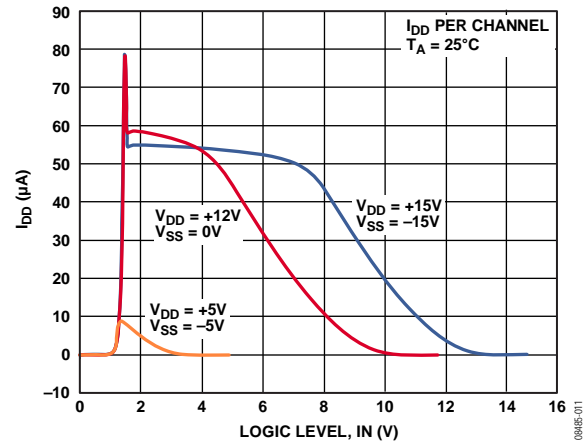


Figure 14.  $I_{DD}$  vs. Logic Level

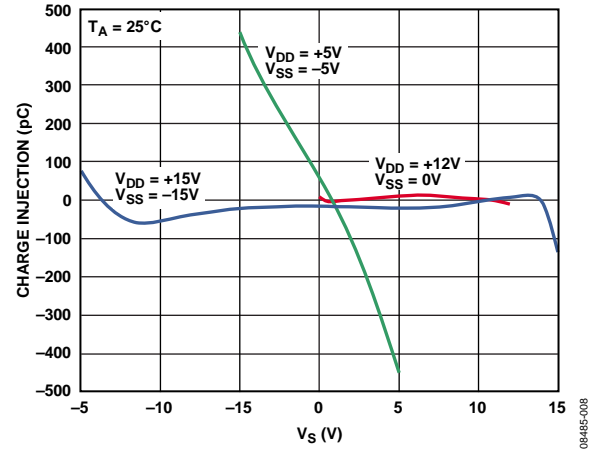


Figure 15. Charge Injection vs. Source Voltage

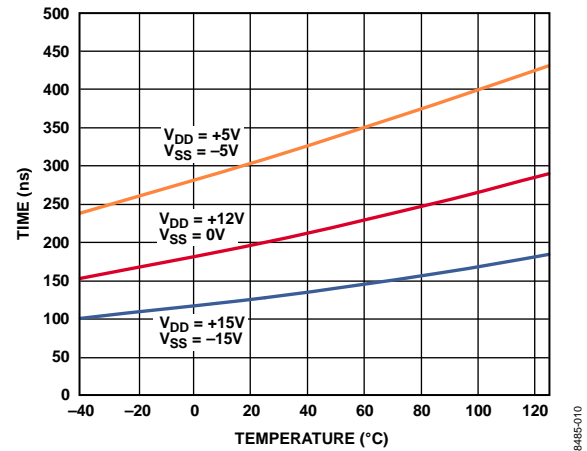


Figure 16.  $t_{TRANSITION}$  Times vs. Temperature

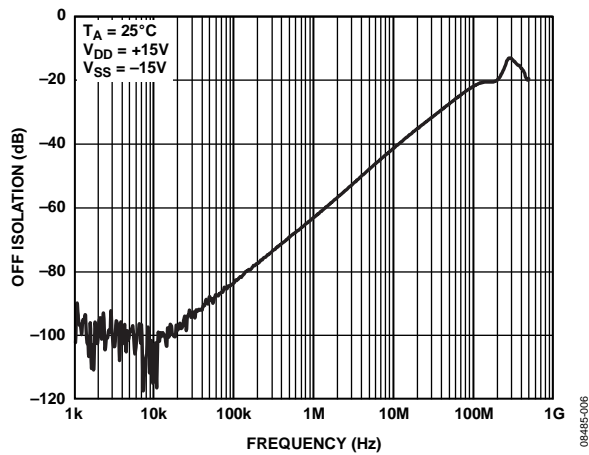


Figure 17. Off Isolation vs. Frequency

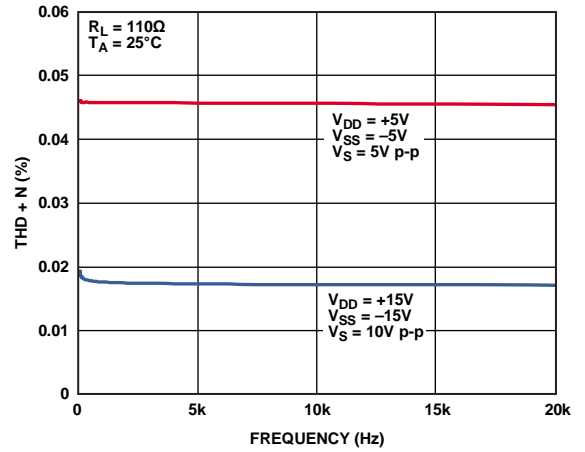


Figure 20. THD + N vs. Frequency

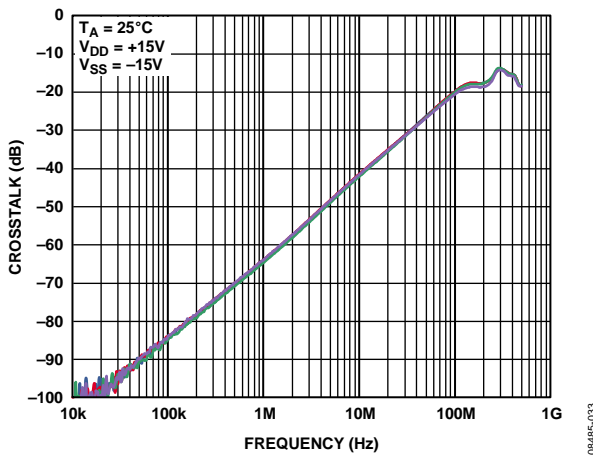


Figure 18. Crosstalk vs. Frequency

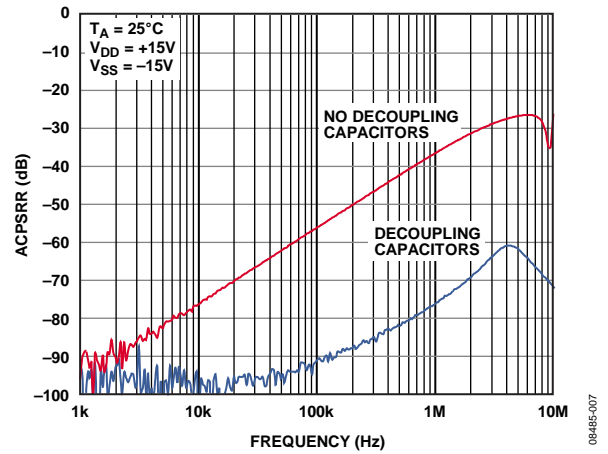


Figure 21. ACPSRR vs. Frequency

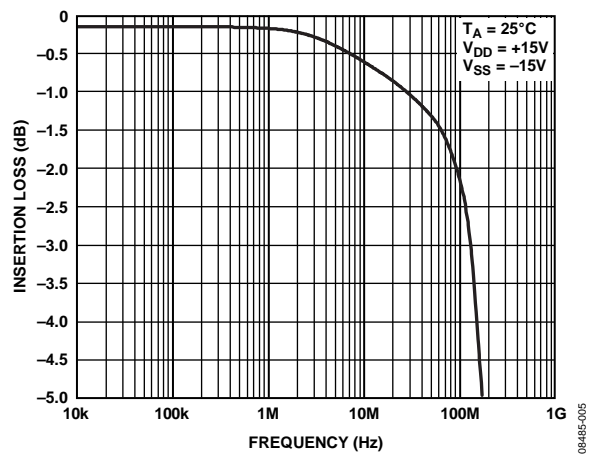


Figure 19. On Response vs. Frequency

## TEST CIRCUITS

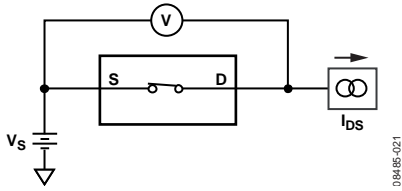


Figure 22. On Resistance

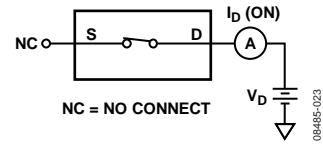


Figure 24. On Leakage

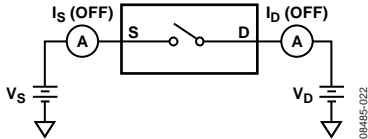


Figure 23. Off Leakage

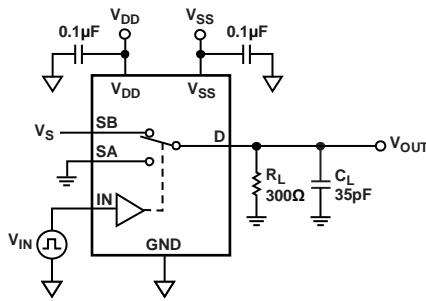


Figure 25. Switching Times,  $t_{ON}$  and  $t_{OFF}$

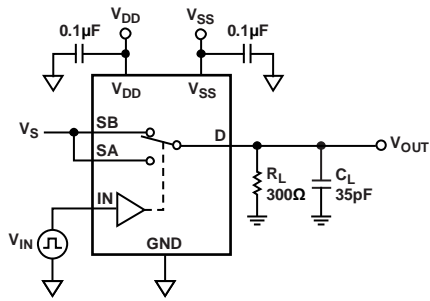
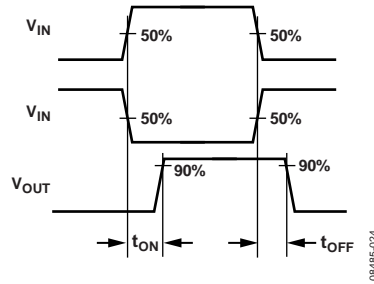


Figure 26. Break-Before-Make Time Delay

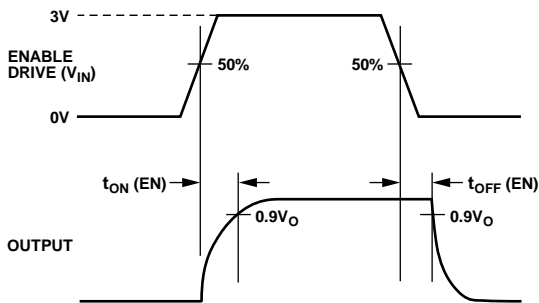
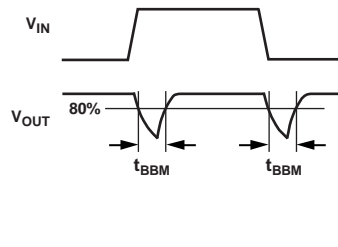
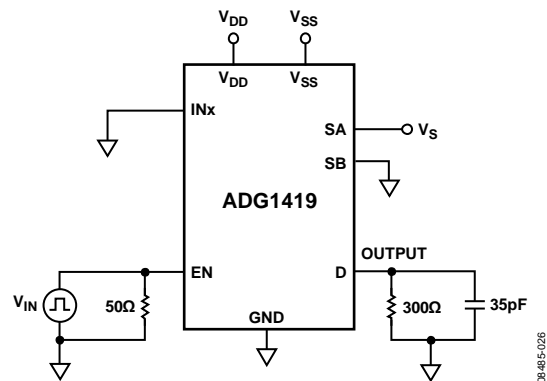


Figure 27. Enable Delay,  $t_{ON}(EN)$ ,  $t_{OFF}(EN)$



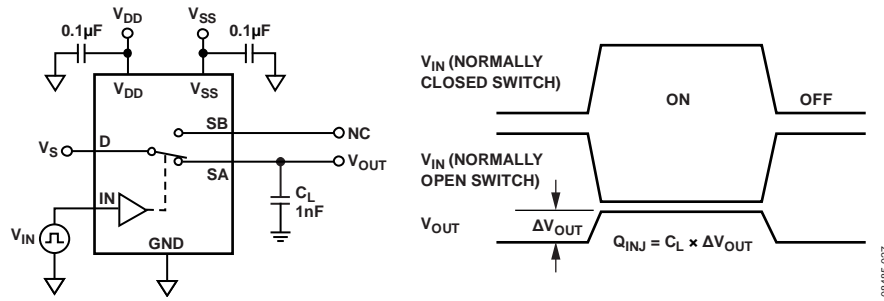


Figure 28. Charge Injection

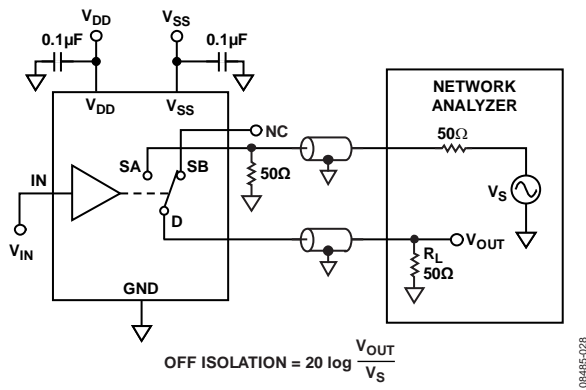


Figure 29. Off Isolation

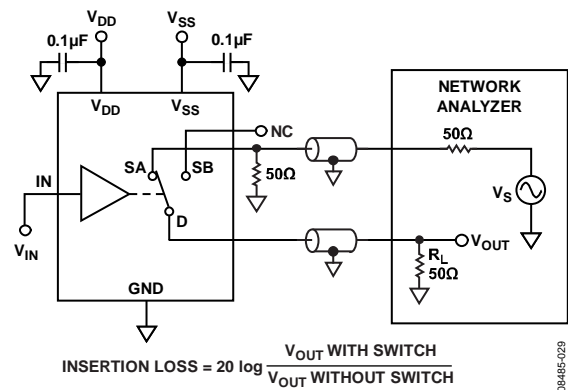


Figure 31. Bandwidth

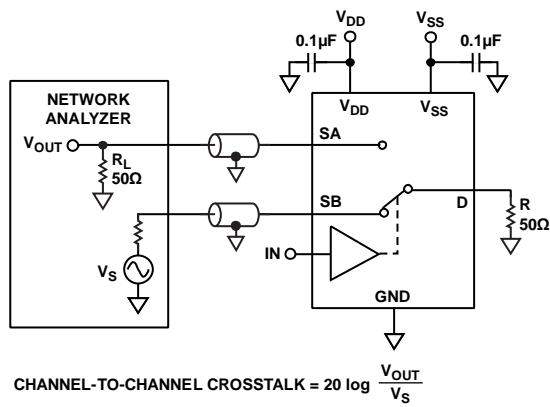


Figure 30. Channel-to-Channel Crosstalk

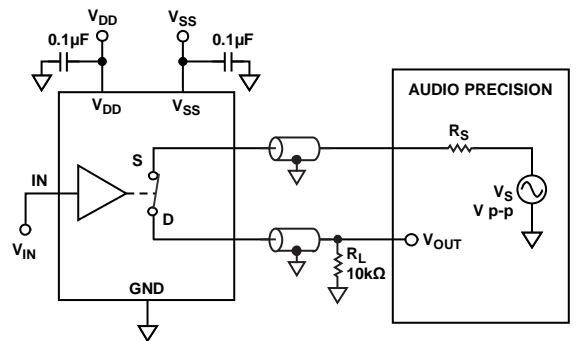


Figure 32. THD + N

## TERMINOLOGY

**I<sub>DD</sub>**

The positive supply current.

**I<sub>SS</sub>**

The negative supply current.

**V<sub>D</sub> (V<sub>S</sub>)**

The analog voltage on Terminal D and Terminal S.

**R<sub>ON</sub>**

The ohmic resistance between Terminal D and Terminal S.

**R<sub>FLAT</sub> (ON)**

Flatness is defined as the difference between the maximum and minimum value of on resistance as measured over the specified analog signal range.

**I<sub>S</sub> (Off)**

The source leakage current with the switch off.

**I<sub>D</sub> (Off)**

The drain leakage current with the switch off.

**I<sub>D</sub>, I<sub>S</sub> (On)**

The channel leakage current with the switch on.

**V<sub>INL</sub>**

The maximum input voltage for Logic 0.

**V<sub>INH</sub>**

The minimum input voltage for Logic 1.

**I<sub>INL</sub> (I<sub>INH</sub>)**

The input current of the digital input.

**C<sub>S</sub> (Off)**

The off switch source capacitance, measured with reference to ground.

**C<sub>D</sub> (Off)**

The off switch drain capacitance, measured with reference to ground.

**C<sub>D</sub>, C<sub>S</sub> (On)**

The on switch capacitance, measured with reference to ground.

**C<sub>IN</sub>**

The digital input capacitance.

**t<sub>ON</sub> (EN)**

Delay time between the 50% and 90% points of the digital input and switch on condition. See Figure 27.

**t<sub>OFF</sub> (EN)**

Delay time between the 50% and 90% points of the digital input and switch off condition. See Figure 27.

**t<sub>TRANSITION</sub>**

Delay time between the 50% and 90% points of the digital inputs and the switch on condition when switching from one address state to another.

**T<sub>BBM</sub>**

Off time measured between the 80% point of both switches when switching from one address state to another. See Figure 26.

**Charge Injection**

A measure of the glitch impulse transferred from the digital input to the analog output during switching. See Figure 28.

**Off Isolation**

A measure of unwanted signal coupling through an off switch. See Figure 29.

**Crosstalk**

A measure of unwanted signal that is coupled through from one channel to another as a result of parasitic capacitance. See Figure 30.

**Bandwidth**

The frequency at which the output is attenuated by 3 dB. See Figure 31.

**On Response**

The frequency response of the on switch.

**Insertion Loss**

The loss due to the on resistance of the switch. See Figure 31.

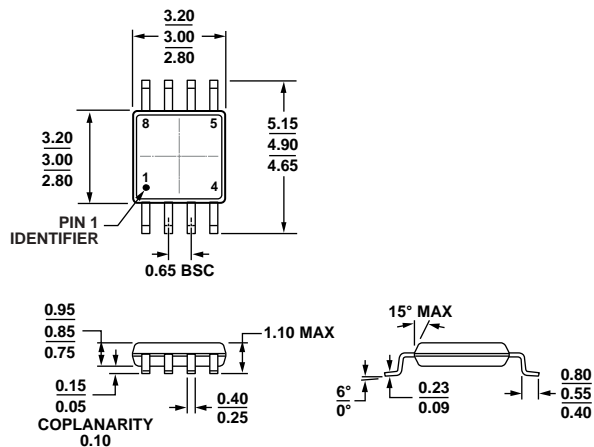
**THD + N**

The ratio of the harmonic amplitude plus noise of the signal to the fundamental. See Figure 32.

**AC Power Supply Rejection Ratio (ACPSRR)**

ACPSRR measures the ability of a part 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. The ratio of the amplitude of signal on the output to the amplitude of the modulation is the ACPSRR. See Figure 21.

# OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MO-187-AA  
 Figure 33. 8-Lead Mini Small Outline Package [MSOP]  
 (RM-8)  
 Dimensions shown in millimeters

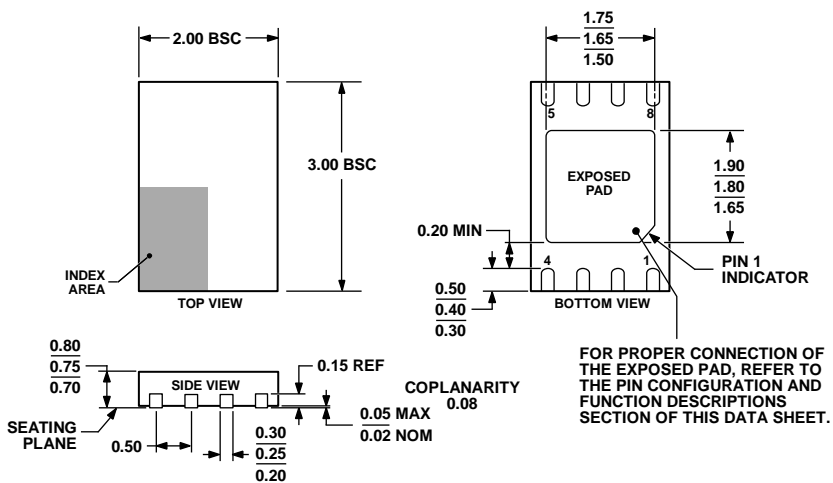


Figure 34. 8-Lead Lead Frame Chip Scale Package [LFCSP\_WD]  
 3 mm x 2 mm Body, Very Very Thin, Dual Lead  
 (CP-8-4)  
 Dimensions shown in millimeters

## ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option	Branding
ADG1419BRMZ <sup>1</sup>	-40°C to +125°C	8-Lead Mini Small Outline Package [MSOP]	RM-8	S1L
ADG1419BRMZ-REEL7 <sup>1</sup>	-40°C to +125°C	8-Lead Mini Small Outline Package [MSOP]	RM-8	S1L
ADG1419BCPZ-REEL7 <sup>1</sup>	-40°C to +125°C	8-Lead Lead Frame Chip Scale Package [LFCSP_WD]	CP-8-4	1C

<sup>1</sup> Z = RoHS Compliant Part.

**ADG1419**

**NOTES**