

**FEATURES**

**4.5  $\Omega$  typical on resistance at  $\pm 5$  V and 25°C**  
**1  $\Omega$  typical on-resistance flatness at  $\pm 5$  V and 25°C**  
**Up to 234 mA continuous current**  
 **$\pm 3.3$  V to  $\pm 8$  V dual-supply operation**  
**3.3 V to 16 V single-supply operation**  
**No  $V_L$  supply required**  
**3 V logic-compatible inputs**  
**Rail-to-rail operation**

**APPLICATIONS**

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

**GENERAL DESCRIPTION**

The ADG1634-KGD is a monolithic industrial CMOS (*i*CMOS<sup>®</sup>) analog switch comprising four independently selectable SPDT switches.

All channels exhibit break-before-make switching action that prevents momentary shorting when switching channels. An  $\overline{EN}$  input on the ADG1634-KGD is used to enable or disable the device. When disabled, all channels are switched off.

The ultralow, on resistance and on-resistance flatness of this switch make the device an ideal solution for data acquisition and gain switching applications, where low distortion is critical. Its *i*CMOS construction ensures ultralow power dissipation, making the ADG1634-KGD ideally suited for portable and battery-powered instruments.

Additional application and technical information can be found in the [ADG1634](#) data sheet.

Known Good Die (KGD): this die is fully guaranteed to data sheet specifications.

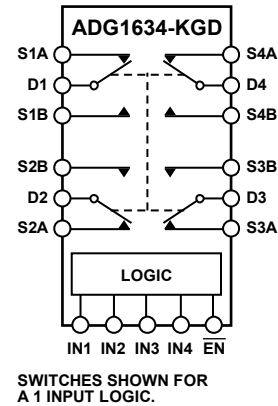
**FUNCTIONAL BLOCK DIAGRAM**


Figure 1.

22638-001

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**REVISION HISTORY**

11/2020—Revision 0: Initial Version

## SPECIFICATIONS

### ±5 V DUAL SUPPLY

$V_{DD} = +5\text{ V} \pm 10\%$ ,  $V_{SS} = -5\text{ V} \pm 10\%$ , and  $GND = 0\text{ V}$ , 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, $R_{ON}$	4.5			$\Omega$ typ	Supply voltage ( $V_S$ ) = $\pm 4.5\text{ V}$ , supply current ( $I_S$ ) = $-10\text{ mA}$ , see Figure 3
	5	7	8	$\Omega$ max	$V_{DD} = \pm 4.5\text{ V}$ , $V_{SS} = \pm 4.5\text{ V}$
On-Resistance Match Between Channels, $\Delta R_{ON}$	0.12			$\Omega$ typ	$V_S = \pm 4.5\text{ V}$ , $I_S = -10\text{ mA}$
	0.25	0.3	0.35	$\Omega$ max	
On-Resistance Flatness, $R_{FLAT(ON)}$	1			$\Omega$ typ	$V_S = \pm 4.5\text{ V}$ , $I_S = -10\text{ mA}$
	1.3	1.7	2	$\Omega$ max	
<b>LEAKAGE CURRENTS</b>					
Source Off Leakage, $I_S$ (Off)	$\pm 0.01$			nA typ	$V_{DD} = +5.5\text{ V}$ , $V_{SS} = -5.5\text{ V}$ $V_S = \pm 4.5\text{ V}$ , drain voltage ( $V_D$ ) = $\pm 4.5\text{ V}$ , see Figure 4
	$\pm 0.1$	$\pm 1.5$	$\pm 12$	nA max	
Drain Off Leakage, $I_D$ (Off)	$\pm 0.02$			nA typ	$V_S = \pm 4.5\text{ V}$ , $V_D = \pm 4.5\text{ V}$ , see Figure 4
	$\pm 0.15$	$\pm 2$	$\pm 20$	nA max	
Channel On Leakage, $I_D$ , $I_S$ (On)	$\pm 0.02$			nA typ	$V_S = V_D = \pm 4.5\text{ V}$ , see Figure 5
	$\pm 0.15$	$\pm 2$	$\pm 20$	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 $I_{INH}$	$\pm 1$			nA typ	Input voltage ( $V_{IN}$ ) = GND voltage ( $V_{GND}$ ) or $V_{DD}$
			$\pm 0.1$	$\mu\text{A}$ max	
Digital Input Capacitance, $C_{IN}$	8			pF typ	
<b>DYNAMIC CHARACTERISTICS<sup>1</sup></b>					
Transition Time, $t_{TRANSITION}$	161			ns typ	Load resistance ( $R_L$ ) = $300\ \Omega$ , load capacitance ( $C_L$ ) = $35\text{ pF}$
	200	236	264	ns max	$V_S = 2.5\text{ V}$ , see Figure 6
$t_{ON}(\overline{EN})$	61			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	79	88	98	ns max	$V_S = 2.5\text{ V}$ , see Figure 8
$t_{OFF}(\overline{EN})$	162			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	199	232	259	ns max	$V_S = 2.5\text{ V}$ , see Figure 8
Break-Before-Make Time Delay, $t_D$	44			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
			30	ns min	S1x voltage ( $V_{S1x}$ ) = S2x voltage ( $V_{S2x}$ ) = $2.5\text{ V}$ , see Figure 7
Charge Injection	-12.5			pC typ	$V_S = 0\text{ V}$ , $R_S = 0\ \Omega$ , $C_L = 1\text{ nF}$ , see Figure 9
Off Isolation	-64			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , frequency ( $f$ ) = $1\text{ MHz}$ , see Figure 10
Channel-to-Channel Crosstalk	-64			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , see Figure 12
Total Harmonic Distortion + Noise, THD + N	0.3			% typ	$R_L = 110\ \Omega$ , $V_S = 5\text{ V p-p}$ , $f = 20\text{ Hz}$ to $20\text{ kHz}$ , see Figure 13
-3 dB Bandwidth	103			MHz typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , see Figure 11
Source Capacitance Off, $C_S$ (Off)	19			pF typ	$V_S = 0\text{ V}$ , $f = 1\text{ MHz}$
Drain Capacitance Off, $C_D$ (Off)	33			pF typ	$V_S = 0\text{ V}$ , $f = 1\text{ MHz}$
Source and Drain Capacitance On, $C_D$ , $C_S$ (On)	57			pF typ	$V_S = 0\text{ V}$ , $f = 1\text{ MHz}$

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
POWER REQUIREMENTS					$V_{DD} = +5.5\text{ V}$ , $V_{SS} = -5.5\text{ V}$ Digital inputs = 0 V or $V_{DD}$
Supply Current, $I_{DD}$	0.001		1.0	$\mu\text{A typ}$ $\mu\text{A max}$	
$V_{DD}/V_{SS}$			$\pm 3.3/\pm 8$	V min/max	

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

## 12 V SINGLE SUPPLY

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

Table 2.

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analog Signal Range			0 to $V_{DD}$	V	
$R_{ON}$	4			$\Omega$ typ	$V_S = 0\text{ V to }10\text{ V}$ , $I_S = -10\text{ mA}$ , see Figure 3
	4.5	6.5	7.5	$\Omega$ max	$V_{DD} = 10.8\text{ V}$ , $V_{SS} = 0\text{ V}$
$\Delta R_{ON}$	0.12			$\Omega$ typ	$V_S = 10\text{ V}$ , $I_S = -10\text{ mA}$
	0.25	0.3	0.35	$\Omega$ max	
$R_{FLAT(ON)}$	0.9			$\Omega$ typ	$V_S = 0\text{ V to }10\text{ V}$ , $I_S = -10\text{ mA}$
	1.2	1.6	1.9	$\Omega$ max	
LEAKAGE CURRENTS					$V_{DD} = 13.2\text{ V}$ , $V_{SS} = 0\text{ V}$
$I_S$ (Off)	$\pm 0.01$			nA typ	$V_S = 1\text{ V}/10\text{ V}$ , $V_D = 10\text{ V}/1\text{ V}$ , see Figure 4
	$\pm 0.1$	$\pm 1.5$	$\pm 12$	nA max	
$I_D$ (Off)	$\pm 0.02$			nA typ	$V_S = 1\text{ V}/10\text{ V}$ , $V_D = 10\text{ V}/1\text{ V}$ , see Figure 4
	$\pm 0.15$	$\pm 2$	$\pm 20$	nA max	
$I_D, I_S$ (On)	$\pm 0.02$			nA typ	$V_S = V_D = 1\text{ V or }10\text{ V}$ , see Figure 5
	$\pm 0.15$	$\pm 2$	$\pm 20$	nA max	
DIGITAL INPUTS					
$V_{INH}$			2.0	V min	
$V_{INL}$			0.8	V max	
$I_{INL}$ or $I_{INH}$	$\pm 1$			nA typ	$V_{IN} = V_{GND}$ or $V_{DD}$
			$\pm 0.1$	$\mu\text{A max}$	
$C_{IN}$	8			pF typ	
DYNAMIC CHARACTERISTICS <sup>1</sup>					
Transition Time, $t_{TRANSITION}$	127			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	151	182	205	ns max	$V_S = 8\text{ V}$ , see Figure 6
$t_{ON}(\overline{EN})$	31			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	38	43	47	ns max	$V_S = 8\text{ V}$ , see Figure 8
$t_{OFF}(\overline{EN})$	128			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
	152	180	200	ns max	$V_S = 8\text{ V}$ , see Figure 8
$t_D$	45			ns typ	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$
			30	ns min	$V_{S1} = V_{S2} = 8\text{ V}$ , see Figure 7
Charge Injection	-12.4			pC typ	$V_S = 6\text{ V}$ , $R_S = 0\ \Omega$ , $C_L = 1\text{ nF}$ , see Figure 9
Off Isolation	-64			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , see Figure 10
Channel-to-Channel Crosstalk	-64			dB typ	$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , see Figure 12

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
	THD + N	0.3			
-3 dB Bandwidth	109			MHz typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ ; see Figure 11
$C_S$ (Off)	19			pF typ	$V_S = 6 \text{ V}$ , $f = 1 \text{ MHz}$
$C_D$ (Off)	32			pF typ	$V_S = 6 \text{ V}$ , $f = 1 \text{ MHz}$
$C_D$ , $C_S$ (On)	56			pF typ	$V_S = 6 \text{ V}$ , $f = 1 \text{ MHz}$
POWER REQUIREMENTS					
$I_{DD}$	0.001			$\mu\text{A typ}$	$V_{DD} = 12 \text{ V}$ Digital inputs = 0 V or $V_{DD}$
			1.0	$\mu\text{A max}$	Digital inputs = 0 V or $V_{DD}$
$V_{DD}$			600	$\mu\text{A typ}$	Digital inputs = 5 V
			3.3/16	$\mu\text{A max}$	Digital inputs = 5 V
				V min/max	

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

### 5 V SINGLE SUPPLY

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

Table 3.

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
	ANALOG SWITCH				
Analog Signal Range			0 to $V_{DD}$	V	
$R_{ON}$	8.5			$\Omega$ typ	$V_S = 0 \text{ V to } 4.5 \text{ V}$ , $I_S = -10 \text{ mA}$ , see Figure 3
	10	12.5	14	$\Omega$ max	$V_{DD} = 4.5 \text{ V}$ , $V_{SS} = 0 \text{ V}$
$\Delta R_{ON}$	0.15			$\Omega$ typ	$V_S = 0 \text{ V to } 4.5 \text{ V}$ , $I_S = -10 \text{ mA}$
	0.3	0.35	0.4	$\Omega$ max	
$R_{FLAT(ON)}$	1.7			$\Omega$ typ	$V_S = 0 \text{ V to } 4.5 \text{ V}$ , $I_S = -10 \text{ mA}$
	2.3	2.7	3	$\Omega$ max	
LEAKAGE CURRENTS					
$I_S$ (Off)	$\pm 0.01$			nA typ	$V_{DD} = 5.5 \text{ V}$ , $V_{SS} = 0 \text{ V}$ $V_S = 1 \text{ V}/4.5 \text{ V}$ , $V_D = 4.5 \text{ V}/1 \text{ V}$ , see Figure 4
	$\pm 0.1$	$\pm 1.5$	$\pm 12$	nA max	
$I_D$ (Off)	$\pm 0.02$			nA typ	$V_S = 1 \text{ V}/4.5 \text{ V}$ , $V_D = 4.5 \text{ V}/1 \text{ V}$ , see Figure 4
	$\pm 0.15$	$\pm 2$	$\pm 20$	nA max	
$I_D$ , $I_S$ (On)	$\pm 0.02$			nA typ	$V_S = V_D = 1 \text{ V or } 4.5 \text{ V}$ , see Figure 5
	$\pm 0.15$	$\pm 2$	$\pm 20$	nA max	
DIGITAL INPUTS					
$V_{INH}$			2.0	V min	
$V_{INL}$			0.8	V max	
$I_{INL}$ or $I_{INH}$	$\pm 1$			nA typ	$V_{IN} = V_{GND}$ or $V_{DD}$
			$\pm 0.1$	$\mu\text{A max}$	
$C_{IN}$	8			pF typ	
DYNAMIC CHARACTERISTICS <sup>1</sup>					
Transition Time, $t_{TRANSITION}$	199			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
	254	303	337	ns max	$V_S = 2.5 \text{ V}$ , see Figure 6
$t_{ON}(\overline{EN})$	68			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
	90	102	110	ns max	$V_S = 2.5 \text{ V}$ , see Figure 8
$t_{OFF}(\overline{EN})$	201			ns typ	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$
	256	300	333	ns max	$V_S = 2.5 \text{ V}$ , see Figure 8

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
t <sub>D</sub>	57		37	ns typ	R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF
Charge Injection	-5			ns min	V <sub>S1</sub> = V <sub>S2</sub> = 2.5 V, see Figure 7
Off Isolation	-64			pC typ	V <sub>S</sub> = 2.5 V, R <sub>S</sub> = 0 Ω, C <sub>L</sub> = 1 nF, see Figure 9
Channel-to-Channel Crosstalk	-64			dB typ	R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f = 100 kHz, see Figure 10
THD + N	0.27			dB typ	R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f = 100 kHz, see Figure 12
-3 dB Bandwidth	104			% typ	R <sub>L</sub> = 110 Ω, f = 20 Hz to 20 kHz, V <sub>S</sub> = 3.5 V p-p, see Figure 13
C <sub>S</sub> (Off)	21			MHz typ	R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, see Figure 11
C <sub>D</sub> (Off)	37			pF typ	V <sub>S</sub> = 2.5 V, f = 1 MHz
C <sub>D</sub> , C <sub>S</sub> (On)	62			pF typ	V <sub>S</sub> = 2.5 V, f = 1 MHz
POWER REQUIREMENTS					V <sub>DD</sub> = 5.5 V
I <sub>DD</sub>	0.001		1.0	μA typ	Digital inputs = 0 V or V <sub>DD</sub>
V <sub>DD</sub>			3.3/16	μA max	
				V min/max	

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

### 3.3 V SINGLE SUPPLY

V<sub>DD</sub> = 3.3 V, V<sub>SS</sub> = 0 V, and 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 to V <sub>DD</sub>	V	
R <sub>ON</sub>	13.5	15	16.5	Ω typ	V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = -10 mA, see Figure 3, V <sub>DD</sub> = 3.3 V, V <sub>SS</sub> = 0 V
ΔR <sub>ON</sub>	0.25	0.28	0.3	Ω typ	V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = -10 mA
R <sub>FLAT(ON)</sub>	5	5.5	6.5	Ω typ	V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = -10 mA
LEAKAGE CURRENTS					
I <sub>S</sub> (Off)	±0.01			nA typ	V <sub>DD</sub> = 3.6 V, V <sub>SS</sub> = 0 V
	±0.1	±1.5	±12	nA max	V <sub>S</sub> = 0.6 V/3 V, V <sub>D</sub> = 3 V/0.6 V, see Figure 4
I <sub>D</sub> (Off)	±0.01			nA typ	V <sub>S</sub> = 0.6 V/3 V, V <sub>D</sub> = 3 V/0.6 V, see Figure 4
	±0.15	±2	±20	nA max	
I <sub>D</sub> , I <sub>S</sub> (On)	±0.01			nA typ	V <sub>S</sub> = V <sub>D</sub> = 0.6 V or 3 V, see Figure 5
	±0.15	±2	±20	nA max	
DIGITAL INPUTS					
V <sub>INH</sub>			2.0	V min	
V <sub>INL</sub>			0.8	V max	
I <sub>INL</sub> or I <sub>INH</sub>	±1			nA typ	V <sub>IN</sub> = V <sub>GND</sub> or V <sub>DD</sub>
			±0.1	μA max	
Digital Input Capacitance, C <sub>IN</sub>	8			pF typ	
DYNAMIC CHARACTERISTICS <sup>1</sup>					
t <sub>TRANSITION</sub>	309			ns typ	R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF
	429	466	508	ns max	V <sub>S</sub> = 1.5 V, see Figure 6
t <sub>ON</sub> ( $\overline{EN}$ )	132			ns typ	R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF
	184	201	210	ns max	V <sub>S</sub> = 1.5 V, see Figure 8
t <sub>OFF</sub> ( $\overline{EN}$ )	313			ns typ	R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF
	416	470	509	ns max	V <sub>S</sub> = 1.5 V, see Figure 8

Parameter	25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
$t_D$	81		48	ns typ ns min	$R_L = 300 \Omega$ , $C_L = 35 \text{ pF}$ $V_{S1} = V_{S2} = 1.5 \text{ V}$ , see Figure 7
Charge Injection	-10			pC typ	$V_S = 1.5 \text{ V}$ , $R_S = 0 \Omega$ , $C_L = 1 \text{ nF}$ , see Figure 9
Off Isolation	-64			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 100 \text{ kHz}$ , see Figure 10
Channel-to-Channel Crosstalk	-64			dB typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 100 \text{ kHz}$ , see Figure 12
THD + N	0.6			% typ	$R_L = 110 \Omega$ , $f = 20 \text{ Hz to } 20 \text{ kHz}$ , $V_S = 2 \text{ V p-p}$ , see Figure 13
-3 dB Bandwidth	117			MHz typ	$R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , see Figure 11
$C_S$ (Off)	22			pF typ	$V_S = 1.5 \text{ V}$ , $f = 1 \text{ MHz}$
$C_D$ (Off)	39			pF typ	$V_S = 1.5 \text{ V}$ , $f = 1 \text{ MHz}$
$C_D$ , $C_S$ (On)	64			pF typ	$V_S = 1.5 \text{ V}$ , $f = 1 \text{ MHz}$
POWER REQUIREMENTS					$V_{DD} = 3.6 \text{ V}$
$I_{DD}$	0.001		1.0	$\mu\text{A typ}$ $\mu\text{A max}$	Digital inputs = 0 V or $V_{DD}$
$V_{DD}$			3.3/16	V min/max	

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

## CONTINUOUS CURRENT PER CHANNEL, S OR D

Table 5.

Parameter	25°C	85°C	125°C	Unit
CONTINUOUS CURRENT, S OR D				
$V_{DD} = +5 \text{ V}$ , $V_{SS} = -5 \text{ V}$				
$\theta_{JA} = 95^\circ\text{C/W}$	112	77	52	mA max
$\theta_{JA} = 30.4^\circ\text{C/W}$	220	136	73	mA max
$V_{DD} = 12 \text{ V}$ , $V_{SS} = 0 \text{ V}$				
$\theta_{JA} = 95^\circ\text{C/W}$	119	80	52	mA max
$\theta_{JA} = 30.4^\circ\text{C/W}$	234	140	73	mA max
$V_{DD} = 5 \text{ V}$ , $V_{SS} = 0 \text{ V}$				
$\theta_{JA} = 95^\circ\text{C/W}$	87	63	42	mA max
$\theta_{JA} = 30.4^\circ\text{C/W}$	171	112	66	mA max
$V_{DD} = 3.3 \text{ V}$ , $V_{SS} = 0 \text{ V}$				
$\theta_{JA} = 95^\circ\text{C/W}$	70	52	35	mA max
$\theta_{JA} = 30.4^\circ\text{C/W}$	140	94	59	mA max

## ABSOLUTE MAXIMUM RATINGS

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

Table 6.

Parameter	Rating
$V_{DD}$ to $V_{SS}$	18 V
$V_{DD}$ to GND	-0.3 V to +18 V
$V_{SS}$ to GND	+0.3 V to -18 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, Sxx or Dx	450 mA (pulsed at 1 ms, 10% duty cycle maximum)
Continuous Current, Sxx or Dx <sup>2</sup>	Data + 15%
Temperature	
Operating Range	-40°C to +125°C
Storage Range	-65°C to +150°C
Junction	150°C

<sup>1</sup> Overvoltages at INx, Sxx, or Dx are clamped by internal diodes. Current should be limited to the maximum ratings given.

<sup>2</sup> See Table 5.

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.

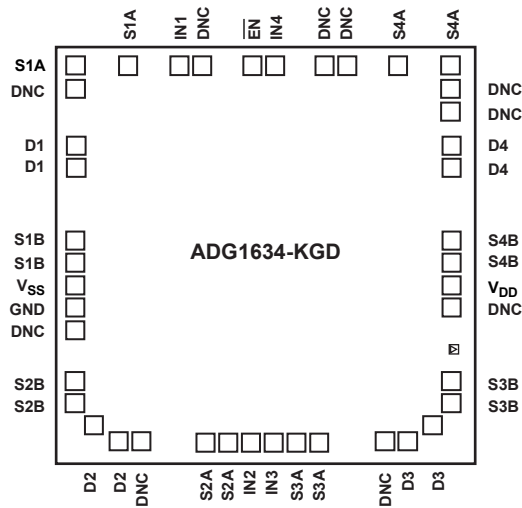
### ESD CAUTION



**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 CONFIGURATION AND FUNCTION DESCRIPTIONS



NOTES  
 1. DNC = DO NOT CONNECT. DO NOT CONNECT TO THIS PAD.

22638-002

Figure 2. Pad Configuration

Table 7. Pad Function Descriptions

Pad No.	Mnemonic	X Coordinate	Y Coordinate	Description
1	S1A	-710	+710	Source Terminal 1A. This pad can be an input or an output.
2	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
3	D1	-710	+413	Drain Terminal 1. This pad can be an input or an output.
4	D1	-710	+328	Drain Terminal 1. This pad can be an input or an output.
5	S1B	-710	+55	Source Terminal 1B. This pad can be an input or an output.
6	S1B	-710	-30	Source Terminal 1B. This pad can be an input or an output.
7	V <sub>SS</sub>	-710	-117	Most Negative Power Supply Potential. In single-supply applications, connect this pad to ground.
8	GND	-710	-203	Ground (0 V) Reference.
9	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
10	S2B	-710	-480	Source Terminal 2B. This pad can be an input or an output.
11	S2B	-710	-565	Source Terminal 2B. This pad can be an input or an output.
12	D2	-641	-651	Drain Terminal 2. This pad can be an input or an output.
13	D2	-545	-710	Drain Terminal 2. This pad can be an input or an output.
14	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
15	S2A	-215	-710	Source Terminal 2A. This pad can be an input or an output.
16	S2A	-130	-710	Source Terminal 2A. This pad can be an input or an output.
17	IN2	-43	-710	Logic Control Input 2.
18	IN3	+43	-710	Logic Control Input 3.
19	S3A	+130	-710	Source Terminal 3A. This pad can be an input or an output.
20	S3A	+215	-710	Source Terminal 3A. This pad can be an input or an output.
21	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
22	D3	+545	-710	Drain Terminal 2. This pad can be an input or an output.
23	D3	+641	-651	Drain Terminal 2. This pad can be an input or an output.

Pad No.	Mnemonic	X Coordinate	Y Coordinate	Description
24	S3B	+710	-565	Source Terminal 3B. This pad can be an input or an output.
25	S3B	+710	-480	Source Terminal 3B. This pad can be an input or an output.
26	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
27	V <sub>DD</sub>	+710	-117	Most Positive Power Supply Potential.
28	S4B	+710	-30	Source Terminal 4B. This pad can be an input or an output.
29	S4B	+710	+55	Source Terminal 4B. This pad can be an input or an output.
30	D4	+710	+328	Drain Terminal 4. This pad can be an input or an output.
31	D4	+710	+413	Drain Terminal 4. This pad can be an input or an output.
32	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
33	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
34	S4A	+710	+710	Source Terminal 4A. This pad can be an input or an output.
35	S4A	+510	+710	Source Terminal 4A. This pad can be an input or an output.
36	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
37	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
38	IN4	+43	+710	Logic Control Input 4.
39	$\overline{\text{EN}}$	-43	+710	Active Low Digital Input. When this pad is high, the device is disabled, and all switches are off. When this pad is low, INx logic inputs determine the on switches.
40	DNC	Not applicable	Not applicable	Do Not Connect. Do not connect to this pad.
41	IN1	-320	+710	Logic Control Input 1.
42	S1A	-510	+710	Source Terminal 1A. This pad can be an input or an output.

Table 8. Truth Table

$\overline{\text{EN}}$	INx	SxA	SxB
1	X (don't care)	Off	Off
0	0	Off	On
0	1	On	Off

TEST CIRCUITS

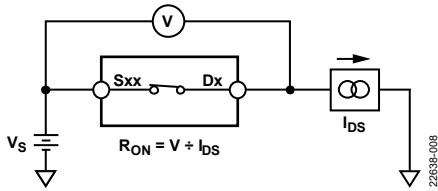


Figure 3. On Resistance ( $I_{DS}$  is the Drain to Source Current.)

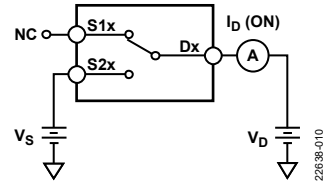


Figure 5. On Leakage

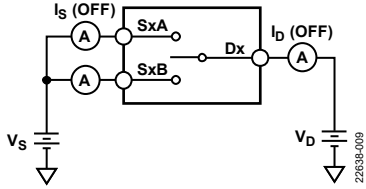


Figure 4. Off Leakage

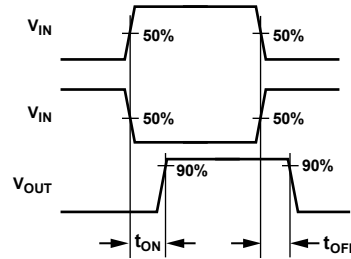
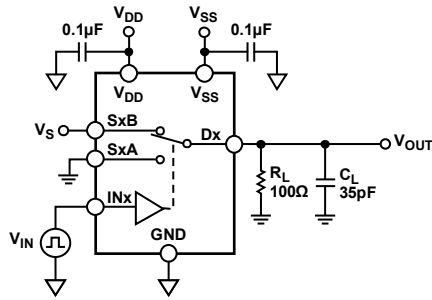


Figure 6. Switching Timings,  $t_{ON}$  and  $t_{OFF}$

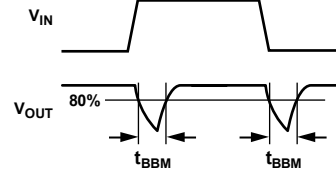
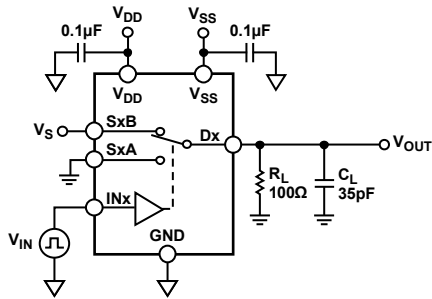


Figure 7. Break-Before-Make Delay,  $t_D$

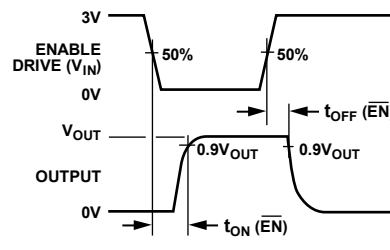
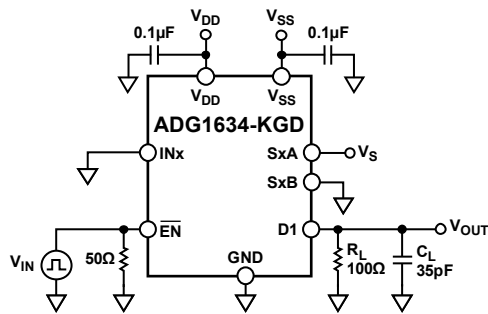


Figure 8. Enable Delay,  $t_{ON}(\overline{EN})$ ,  $t_{OFF}(\overline{EN})$

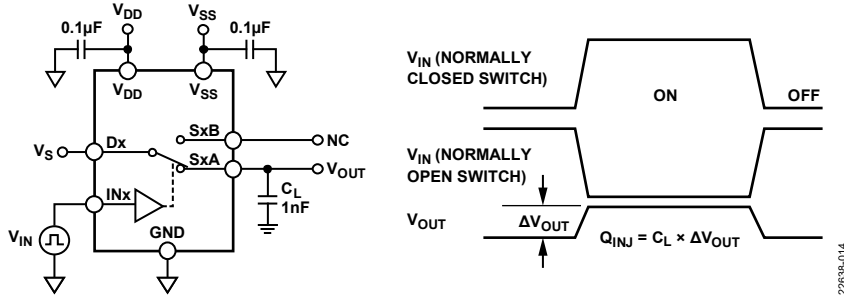
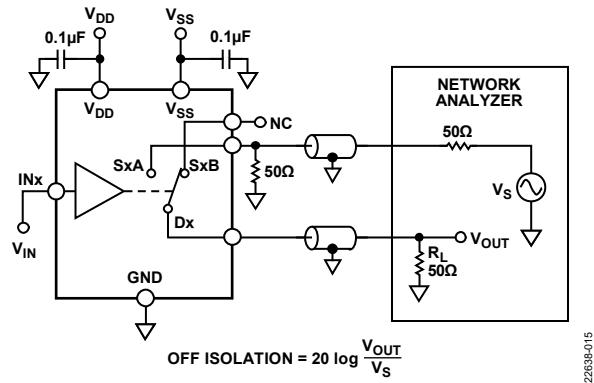
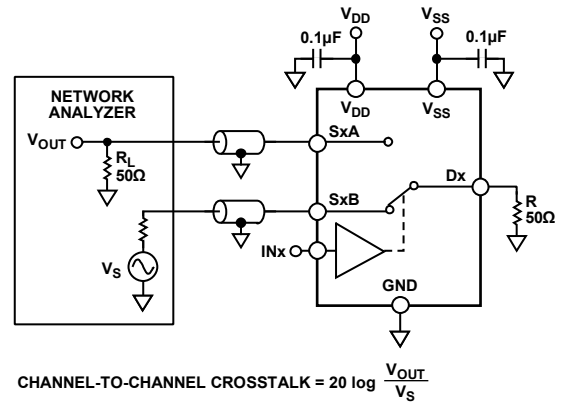


Figure 9. Charge Injection



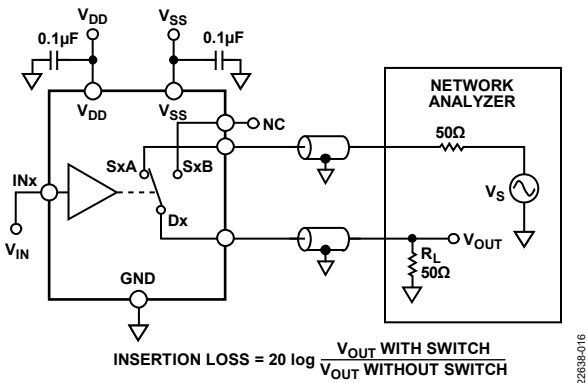
OFF ISOLATION =  $20 \log \frac{V_{OUT}}{V_S}$

Figure 10. Off Isolation



CHANNEL-TO-CHANNEL CROSSTALK =  $20 \log \frac{V_{OUT}}{V_S}$

Figure 12. Channel-to-Channel Crosstalk



INSERTION LOSS =  $20 \log \frac{V_{OUT \text{ WITH SWITCH}}}{V_{OUT \text{ WITHOUT SWITCH}}}$

Figure 11. Bandwidth

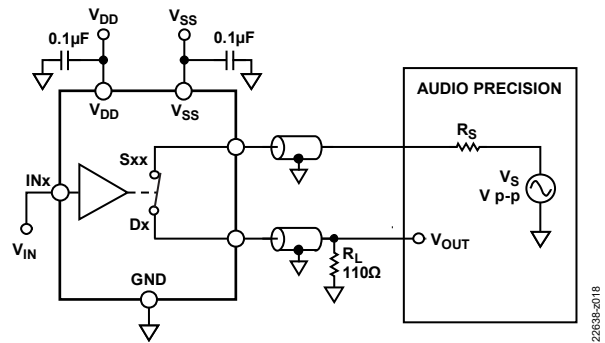


Figure 13. THD + Noise

### OUTLINE DIMENSIONS

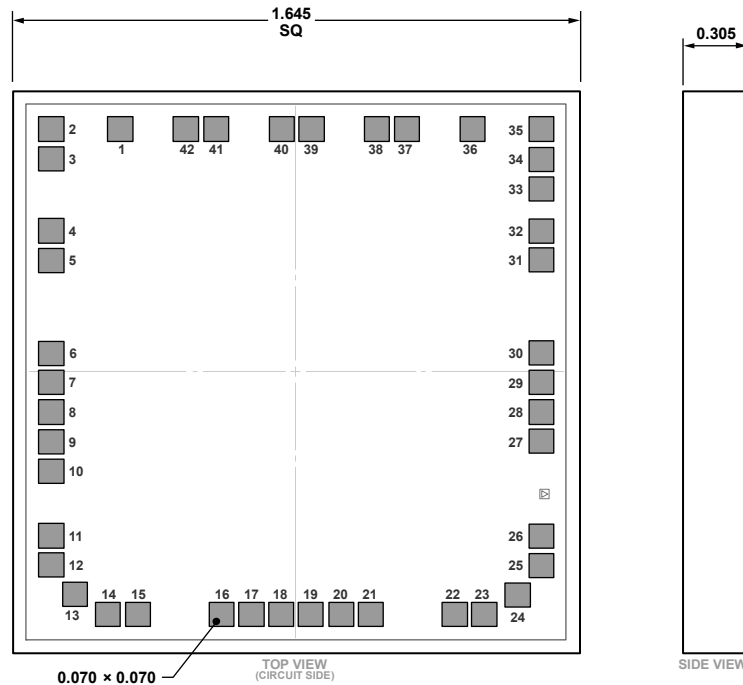


Figure 14. 42-Pad Bare Die [CHIP] (C-42-1)  
Dimensions shown in millimeters

### DIE SPECIFICATIONS AND ASSEMBLY RECOMMENDATIONS

Table 9. Die Specifications

Parameter	Value	Unit
Chip Size	1565 × 1565	μm
Scribe Line Width	80 × 80	μm
Die Size	1645 × 1645	μm
Thickness	305	μm
Backside Passivation	V <sub>SS</sub> Oxynitride	Not applicable
Bond Pads (Minimum)	70 × 70	μm
Bond Pad Composition	Aluminum (Al), Copper (Cu), 0.5%	Not applicable

Table 10. Assembly Recommendations

Assembly Component	Recommendation
Die Attach	Epoxy dispense
Bonding Method	Thermosonic gold ball bonding

### ORDERING GUIDE

Model <sup>1</sup>	Temperature Range	Description	EN Pin	Package Option
ADG1634-KGD-WP	−40°C to +125°C	42-Pad Bare Die [CHIP]	Yes	C-42-1

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

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