

FEATURES

- 1 Ω typical on resistance**
- 0.2 Ω on resistance flatness**
- ±3.3 V to ±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**
- Continuous current per channel**
- LFCSP: 504 mA**
- TSSOP: 315 mA**
- 14-lead TSSOP and 16-lead, 4 mm × 4 mm LFCSP**

FUNCTIONAL BLOCK DIAGRAM

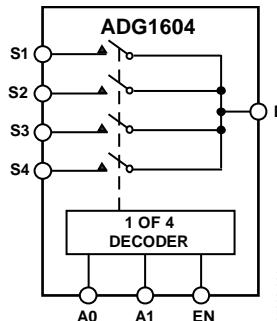


Figure 1.

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 ADG1604 is a complementary metal-oxide semiconductor (CMOS) analog multiplexer and switches one of four inputs to a common output, D, as determined by the 3-bit binary address lines, A0, A1, and EN. Logic 0 on the EN pin disables the device. 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. All switches exhibit break-before-make switching action. Inherent in the design is low charge injection for minimum transients when switching the digital inputs.

The ultralow on resistance of these switches make them ideal solutions for data acquisition and gain switching applications where low on resistance and distortion is critical. The on resistance profile is very flat over the full analog input range, ensuring excellent linearity and low distortion when switching audio signals.

The CMOS construction ensures ultralow power dissipation, making the devices ideally suited for portable and battery-powered instruments.

PRODUCT HIGHLIGHTS

1. 1.6 Ω maximum on resistance over temperature.
2. Minimum distortion: THD + N = 0.007%.
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. Ultralow power dissipation: <16 nW.
6. 14-lead TSSOP and 16-lead, 4 mm × 4 mm LFCSP.

TABLE OF CONTENTS

Features	1	Continuous Current per Channel, S or D	7
Applications	1	Absolute Maximum Ratings	8
Functional Block Diagram	1	ESD Caution.....	8
General Description	1	Pin Configurations and Function Descriptions	9
Product Highlights	1	Typical Performance Characteristics	10
Revision History	2	Test Circuits.....	13
Specifications.....	3	Terminology	16
±5 V Dual Supply	3	Outline Dimensions.....	17
12 V Single Supply.....	4	Ordering Guide	17
5 V Single Supply.....	5		
3.3 V Single Supply.....	6		

REVISION HISTORY

3/16—Rev. A to Rev. B

Changed CP-16-13 to CP-16-26	Throughout
Changes to Figure 2, Figure 3, and Table 7	9
Updated Outline Dimensions	17
Changes to Ordering Guide	17

9/09—Rev. 0 to Rev. A

Changes to On Resistance (R_{ON}) Parameter, On Resistance Match Between Channels (ΔR_{ON}) Parameter, and On Resistance Flatness (R_{FLATON}) Parameter, Table 4	6
---	---

1/09—Revision 0: Initial Version

SPECIFICATIONS **$\pm 5\text{ V DUAL SUPPLY}$**

$V_{DD} = +5\text{ V} \pm 10\%$, $V_{SS} = -5\text{ V} \pm 10\%$, 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	
On Resistance (R_{ON})	1	1.4	1.6	Ω typ	$V_S = \pm 4.5\text{ V}$, $I_S = -10\text{ mA}$; see Figure 22
On Resistance Match Between Channels (ΔR_{ON})	0.04	0.09	0.1	Ω max	$V_{DD} = \pm 4.5\text{ V}$, $V_{SS} = \pm 4.5\text{ V}$
On Resistance Flatness ($R_{FLATNESS}$)	0.08	0.2	0.34	Ω typ	$V_S = \pm 4.5\text{ V}$, $I_S = -10\text{ mA}$
	0.25	0.29		Ω max	
LEAKAGE CURRENTS					
Source Off Leakage, I_S (Off)	± 0.1			nA typ	$V_{DD} = +5.5\text{ V}$, $V_{SS} = -5.5\text{ V}$
	± 0.2	± 1	± 8	nA max	$V_S = \pm 4.5\text{ V}$, $V_D = \mp 4.5\text{ V}$; see Figure 23
Drain Off Leakage, I_D (Off)	± 0.1			nA typ	$V_S = \pm 4.5\text{ V}$, $V_D = \mp 4.5\text{ V}$; see Figure 23
	± 0.2	± 2	± 16	nA max	
Channel On Leakage, I_D , I_S (On)	± 0.2			nA typ	$V_S = V_D = \pm 4.5\text{ V}$; see Figure 24
	± 0.4	± 2	± 16	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}	0.005		± 0.1	μA typ	$V_{IN} = V_{GND}$ or V_{DD}
Digital Input Capacitance, C_{IN}	8			μA max	
				pF typ	
DYNAMIC CHARACTERISTICS ¹					
Transition Time, $t_{TRANSITION}$	150			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
	278	336	376	ns max	$V_S = 2.5\text{ V}$; see Figure 29
t_{ON} (EN)	116			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
	146	166	177	ns max	$V_S = 2.5\text{ V}$; see Figure 31
t_{OFF} (EN)	186			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
	234	277	310	ns max	$V_S = 2.5\text{ V}$; see Figure 31
Break-Before-Make Time Delay, t_D	50			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
			28.5	ns min	$V_{S1} = V_{S2} = 2.5\text{ V}$; see Figure 30
Charge Injection	140			pC typ	$V_S = 0\text{ V}$, $R_S = 0\ \Omega$, $C_L = 1\text{ nF}$; see Figure 32
Off Isolation	70			dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$; see Figure 25
Channel-to-Channel Crosstalk	70			dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$; see Figure 27
Total Harmonic Distortion + Noise (THD + N)	0.007			% typ	$R_L = 110\ \Omega$, 5V p-p, $f = 20\text{ Hz}$ to 20 kHz ; see Figure 28
-3 dB Bandwidth	15			MHz typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$; see Figure 26
C_S (Off)	63			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
C_D (Off)	270			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
C_D , C_S (On)	360			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
POWER REQUIREMENTS					
I_{DD}	0.001			μA typ	$V_{DD} = +5.5\text{ V}$, $V_{SS} = -5.5\text{ V}$
			1.0	μA max	Digital inputs = 0 V or V_{DD}
V_{DD}/V_{SS}			$\pm 3.3/\pm 8$	V min/max	

¹ Guaranteed by design, not subject to production test.

12 V SINGLE SUPPLY

$V_{DD} = 12 \text{ V} \pm 10\%$, $V_{SS} = 0 \text{ V}$, $GND = 0 \text{ V}$, 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 V to V_{DD}	V	
On Resistance (R_{ON})	0.95				Ω typ	$V_S = 0 \text{ V}$ to 10 V, $I_S = -10 \text{ mA}$; see Figure 22
	1.1	1.25		1.45	Ω max	$V_{DD} = 10.8 \text{ V}$, $V_{SS} = 0 \text{ V}$
On Resistance Match Between Channels (ΔR_{ON})	0.03				Ω typ	$V_S = 10 \text{ V}$, $I_S = -10 \text{ mA}$
	0.06	0.07		0.08	Ω max	
On Resistance Flatness ($R_{FLAT(ON)}$)	0.2				Ω typ	$V_S = 0 \text{ V}$ to 10 V, $I_S = -10 \text{ mA}$
	0.23	0.27		0.32	Ω max	
LEAKAGE CURRENTS						
Source Off Leakage, I_S (Off)	± 0.1				nA typ	$V_{DD} = 13.2 \text{ V}$, $V_{SS} = 0 \text{ V}$
	± 0.2	± 1	± 8		nA max	$V_S = 1 \text{ V}/10 \text{ V}$, $V_D = 10 \text{ V}/1 \text{ V}$; see Figure 23
Drain Off Leakage, I_D (Off)	± 0.1				nA typ	$V_S = 1 \text{ V}/10 \text{ V}$, $V_D = 10 \text{ V}/1 \text{ V}$; see Figure 23
	± 0.2	± 2	± 16		nA max	
Channel On Leakage, I_D , I_S (On)	± 0.2				nA typ	$V_S = V_D = 1 \text{ V}$ or 10 V; see Figure 24
	± 0.4	± 2	± 16		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}	0.001		± 0.1		μA typ	$V_{IN} = V_{GND}$ or V_{DD}
Digital Input Capacitance, C_{IN}	8				μA max	
					pF typ	
DYNAMIC CHARACTERISTICS¹						
Transition Time, $t_{TRANSITION}$	100				ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
	161	192	220		ns max	$V_S = 8 \text{ V}$; see Figure 29
t_{ON} (EN)	80				ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
	95	104	111		ns max	$V_S = 8 \text{ V}$; see Figure 31
t_{OFF} (EN)	144				ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
	173	205	234		ns max	$V_S = 8 \text{ V}$; see Figure 31
Break-Before-Make Time Delay, t_D	25				ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
			18		ns min	$V_{S1} = V_{S2} = 8 \text{ V}$; see Figure 30
Charge Injection	125				pC typ	$V_S = 6 \text{ V}$, $R_S = 0 \Omega$, $C_L = 1 \text{ nF}$; see Figure 32
Off Isolation	70				dB typ	$R_L = 50 \Omega$, $C_L = 5 \text{ pF}$, $f = 1 \text{ MHz}$; see Figure 25
Channel-to-Channel Crosstalk	70				dB typ	$R_L = 50 \Omega$, $C_L = 5 \text{ pF}$, $f = 1 \text{ MHz}$; see Figure 27
Total Harmonic Distortion + Noise	0.013				% typ	$R_L = 110 \Omega$, 5 V p-p, $f = 20 \text{ Hz}$ to 20 kHz; see Figure 28
−3 dB Bandwidth	19				MHz typ	$R_L = 50 \Omega$, $C_L = 5 \text{ pF}$; see Figure 26
C_S (Off)	60				pF typ	$V_S = 6 \text{ V}$, $f = 1 \text{ MHz}$
C_D (Off)	270				pF typ	$V_S = 6 \text{ V}$, $f = 1 \text{ MHz}$
C_D , C_S (On)	350				pF typ	$V_S = 6 \text{ V}$, $f = 1 \text{ MHz}$
POWER REQUIREMENTS						
I_{DD}	0.001				μA typ	$V_{DD} = 12 \text{ V}$
			1		μA max	Digital inputs = 0 V or V_{DD}
I_{DD}	230				μA typ	
			360		μA max	Digital inputs = 5 V
V_{DD}			3.3/16		V min/max	

¹ Guaranteed by design, not subject to production test.

5 V SINGLE SUPPLY

$V_{DD} = 5 \text{ V} \pm 10\%$, $V_{SS} = 0 \text{ V}$, 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	
On Resistance (R_{ON})	1.7			Ω typ	$V_S = 0 \text{ V}$ to 4.5 V, $I_S = -10 \text{ mA}$; see Figure 22
	2.15	2.4	2.7	Ω max	$V_{DD} = 4.5 \text{ V}$, $V_{SS} = 0 \text{ V}$
On Resistance Match Between Channels (ΔR_{ON})	0.05			Ω typ	$V_S = 0 \text{ V}$ to 4.5 V, $I_S = -10 \text{ mA}$
	0.09	0.12	0.15	Ω max	
On Resistance Flatness ($R_{FLATNESS}$)	0.4			Ω typ	$V_S = 0 \text{ V}$ to 4.5 V, $I_S = -10 \text{ mA}$
	0.53	0.55	0.6	Ω max	
LEAKAGE CURRENTS					
Source Off Leakage, I_S (Off)	± 0.05			nA typ	$V_{DD} = 5.5 \text{ V}$, $V_{SS} = 0 \text{ V}$
	± 0.2	± 1	± 8	nA max	$V_S = 1 \text{ V}/4.5 \text{ V}$, $V_D = 4.5 \text{ V}/1 \text{ V}$; see Figure 23
Drain Off Leakage, I_D (Off)	± 0.05			nA typ	
	± 0.2	± 2	± 16	nA max	$V_S = 1 \text{ V}/4.5 \text{ V}$, $V_D = 4.5 \text{ V}/1 \text{ V}$; see Figure 23
Channel On Leakage, I_D , I_S (On)	± 0.1			nA typ	
	± 0.4	± 2	± 16	nA max	$V_S = V_D = 1 \text{ V}$ or 4.5 V; see Figure 24
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}	0.001		± 0.1	μA typ	
				μA max	
Digital Input Capacitance, C_{IN}	8			pF typ	
DYNAMIC CHARACTERISTICS ¹					
Transition Time, $t_{TRANSITION}$	175			ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
	283	337	380	ns max	$V_S = 2.5 \text{ V}$; see Figure 29
t_{ON} (EN)	135			ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
	174	194	212	ns max	$V_S = 2.5 \text{ V}$; see Figure 31
t_{OFF} (EN)	228			ns typ	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
	288	342	385	ns max	$V_S = 2.5 \text{ V}$; see Figure 31
Break-Before-Make Time Delay, t_D	30		21	ns min	$R_L = 300 \Omega$, $C_L = 35 \text{ pF}$
				pC typ	$V_{S1} = V_{S2} = 2.5 \text{ V}$; see Figure 30
Charge Injection	70			dB typ	$V_S = 2.5 \text{ V}$, $R_S = 0 \Omega$, $C_L = 1 \text{ nF}$; see Figure 32
Off Isolation	70				$R_L = 50 \Omega$, $C_L = 5 \text{ pF}$, $f = 100 \text{ kHz}$; see Figure 25
Channel-to-Channel Crosstalk	70			dB typ	$R_L = 50 \Omega$, $C_L = 5 \text{ pF}$, $f = 100 \text{ kHz}$; see Figure 27
Total Harmonic Distortion + Noise	0.09			% typ	$R_L = 110 \Omega$, $f = 20 \text{ Hz}$ to 20 kHz, $V_S = 3.5 \text{ V}$ p-p; see Figure 28
-3 dB Bandwidth	16			MHz typ	$R_L = 50 \Omega$, $C_L = 5 \text{ pF}$; see Figure 26
C_S (Off)	70			pF typ	$V_S = 2.5 \text{ V}$, $f = 1 \text{ MHz}$
C_D (Off)	300			pF typ	$V_S = 2.5 \text{ V}$, $f = 1 \text{ MHz}$
C_D , C_S (On)	400			pF typ	$V_S = 2.5 \text{ V}$, $f = 1 \text{ MHz}$
POWER REQUIREMENTS					
I_{DD}	0.001			μA typ	$V_{DD} = 5.5 \text{ V}$
		1		μA max	Digital inputs = 0 V or V_{DD}
V_{DD}			3.3/16	V min/max	

¹ Guaranteed by design, not subject to production test.

3.3 V SINGLE SUPPLY

$V_{DD} = 3.3\text{ V}$, $V_{SS} = 0\text{ V}$, $GND = 0\text{ V}$, 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	
On Resistance (R_{ON})	3.2	3.4	3.6	Ω typ	$V_S = 0\text{ V}$ to V_{DD} , $I_S = -10\text{ mA}$, $V_{DD} = 3.3\text{ V}$, $V_{SS} = 0\text{ V}$; see Figure 22
On Resistance Match Between Channels (ΔR_{ON})	0.06	0.07	0.08	Ω typ	$V_S = 0\text{ V}$ to V_{DD} , $I_S = -10\text{ mA}$
On Resistance Flatness ($R_{FLAT(ON)}$)	1.2	1.3	1.4	Ω typ	$V_S = 0\text{ V}$ to V_{DD} , $I_S = -10\text{ mA}$
LEAKAGE CURRENTS					
Source Off Leakage, I_S (Off)	±0.02			nA typ	$V_{DD} = 3.6\text{ V}$, $V_{SS} = 0\text{ V}$
	±0.25	±1	±8	nA max	$V_S = 0.6\text{ V}/3\text{ V}$, $V_D = 3\text{ V}/0.6\text{ V}$; see Figure 23
Drain Off Leakage, I_D (Off)	±0.02			nA typ	$V_S = 0.6\text{ V}/3\text{ V}$, $V_D = 3\text{ V}/0.6\text{ V}$; see Figure 23
	±0.25	±2	±16	nA max	
Channel On Leakage, I_D , I_S (On)	±0.05			nA typ	$V_S = V_D = 0.6\text{ V}$ or 3 V ; see Figure 24
	±0.6	±2	±16	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}	0.001		±0.1	μA typ	$V_{IN} = V_{GND}$ or V_{DD}
Digital Input Capacitance, C_{IN}	8			μA max	
DYNAMIC CHARACTERISTICS¹					
Transition Time, $t_{TRANSITION}$	280			ns typ	$R_L = 300\text{ Ω}$, $C_L = 35\text{ pF}$
	460	526	575	ns max	$V_S = 1.5\text{ V}$; see Figure 29
t_{ON} (EN)	227			ns typ	$R_L = 300\text{ Ω}$, $C_L = 35\text{ pF}$
	308	332	346	ns max	$V_S = 1.5\text{ V}$; see Figure 31
t_{OFF} (EN)	357			ns typ	$R_L = 300\text{ Ω}$, $C_L = 35\text{ pF}$
	480	549	601	ns max	$V_S = 1.5\text{ V}$; see Figure 31
Break-Before-Make Time Delay, t_D	25		20	ns typ	$R_L = 300\text{ Ω}$, $C_L = 35\text{ pF}$
				ns min	$V_{S1} = V_{S2} = 1.5\text{ V}$; see Figure 30
Charge Injection	60			pC typ	$V_S = 1.5\text{ V}$, $R_S = 0\text{ Ω}$, $C_L = 1\text{ nF}$; see Figure 32
Off Isolation	70			dB typ	$R_L = 50\text{ Ω}$, $C_L = 5\text{ pF}$, $f = 100\text{ kHz}$; see Figure 25
Channel-to-Channel Crosstalk	70			dB typ	$R_L = 50\text{ Ω}$, $C_L = 5\text{ pF}$, $f = 100\text{ kHz}$; see Figure 27
Total Harmonic Distortion + Noise	0.15			% typ	$R_L = 110\text{ Ω}$, $f = 20\text{ Hz}$ to 20 kHz , $V_S = 2\text{ V p-p}$; see Figure 28
–3 dB Bandwidth	15			MHz typ	$R_L = 50\text{ Ω}$, $C_L = 5\text{ pF}$; see Figure 26
C_S (Off)	76			pF typ	$V_S = 1.5\text{ V}$, $f = 1\text{ MHz}$
C_D (Off)	316			pF typ	$V_S = 1.5\text{ V}$, $f = 1\text{ MHz}$
C_D , C_S (On)	420			pF typ	$V_S = 1.5\text{ V}$, $f = 1\text{ MHz}$
POWER REQUIREMENTS					
I_{DD}	0.001			μA typ	$V_{DD} = 3.6\text{ V}$
		1.0	1.0	μA max	Digital inputs = 0 V or V_{DD}
V_{DD}			3.3/16	V min/max	

¹ Guaranteed by design, 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 V, V _{SS} = -5 V				
TSSOP (θ_{JA} = 150.4°C/W)	315	189	95	mA maximum
LFCSP (θ_{JA} = 48.7°C/W)	504	259	112	mA maximum
V _{DD} = 12 V, V _{SS} = 0 V				
TSSOP (θ_{JA} = 150.4°C/W)	378	221	112	mA maximum
LFCSP (θ_{JA} = 48.7°C/W)	627	311	126	mA maximum
V _{DD} = 5 V, V _{SS} = 0 V				
TSSOP (θ_{JA} = 150.4°C/W)	249	158	91	mA maximum
LFCSP (θ_{JA} = 48.7°C/W)	403	224	105	mA maximum
V _{DD} = 3.3 V, V _{SS} = 0 V				
TSSOP (θ_{JA} = 150.4°C/W)	256	165	98	mA maximum
LFCSP (θ_{JA} = 48.7°C/W)	410	235	116	mA maximum

ABSOLUTE MAXIMUM RATINGS

T_A = 25°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 ¹	V _{SS} – 0.3 V to V _{DD} + 0.3 V or 30 mA, whichever occurs first
Digital Inputs ¹	GND – 0.3 V to V _{DD} + 0.3 V or 30 mA, whichever occurs first
Peak Current, S or D	1150 mA (pulsed at 1 ms, 10% duty-cycle maximum)
Continuous Current, S or D ²	Data + 15%
Operating Temperature Range Industrial (Y Version)	-40°C to +125°C
Storage Temperature Range	-65°C to +150°C
Junction Temperature	150°C
θ _{JA} Thermal Impedance	
16-Lead TSSOP, 2-Layer Board	150.4°C/W
16-Lead LFCSP, 4-Layer Board	48.7°C/W
Reflow Soldering Peak Temperature, Pb free	260°C

¹ Overvoltages at IN, S, or D are clamped by internal diodes. Current should be limited to the maximum ratings given.

² 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 CONFIGURATIONS AND FUNCTION DESCRIPTIONS

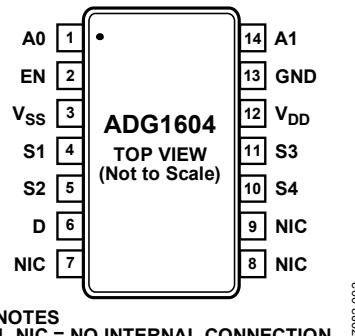


Figure 2. 14-Lead TSSOP Pin Configuration

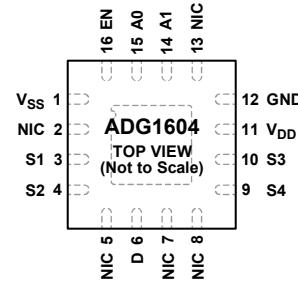


Figure 3. 16-Lead LFCSP Pin Configuration

Table 7. Pin Function Descriptions

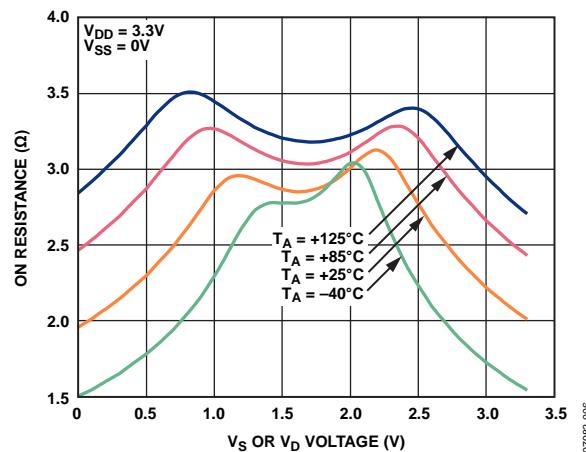
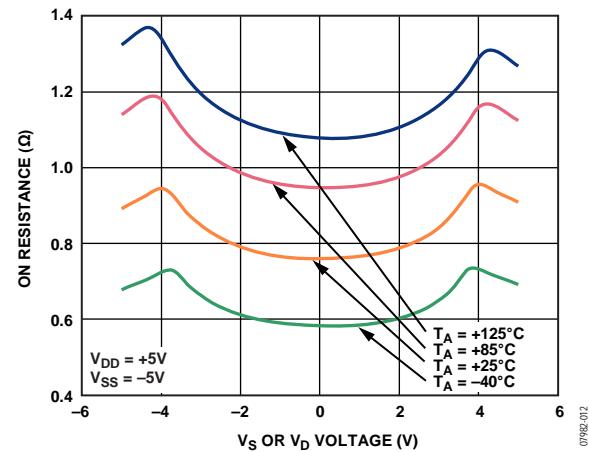
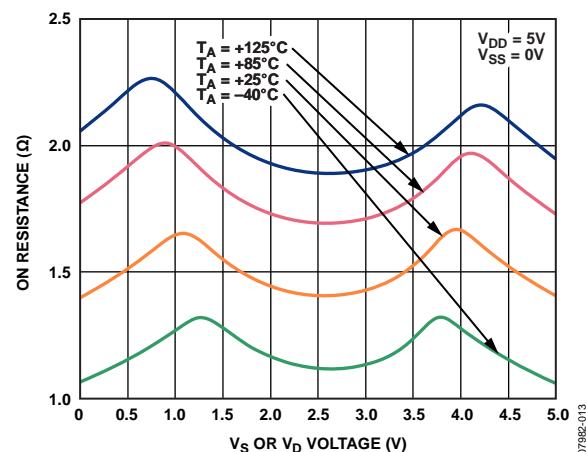
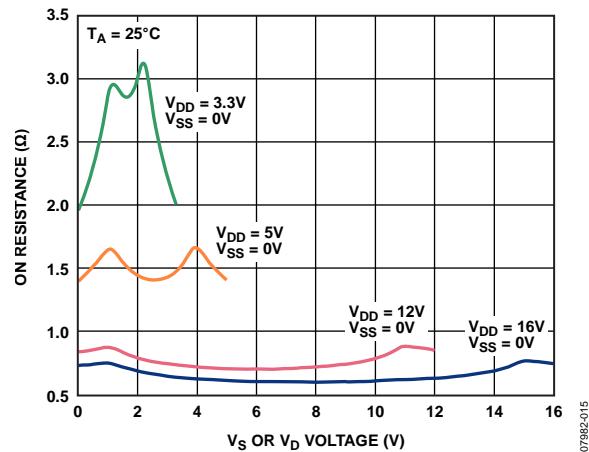
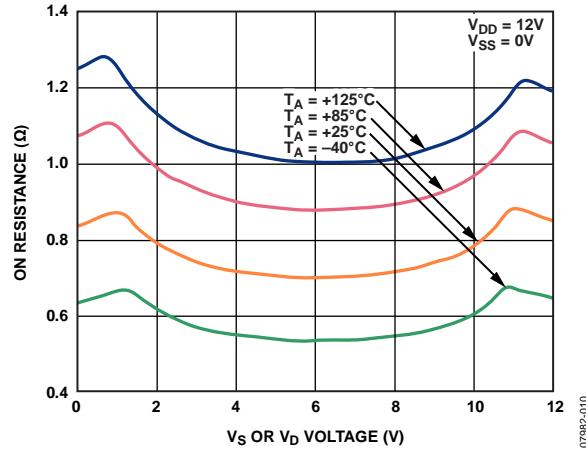
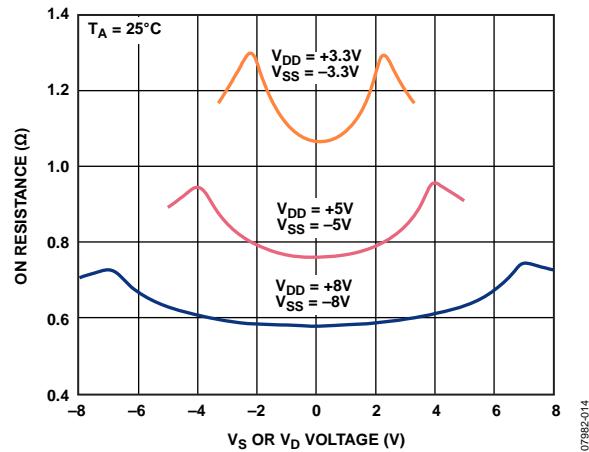
Pin No.		Mnemonic	Description
14-Lead TSSOP	16-Lead LFCSP		
1	15	A0	Logic Control Input.
2	16	EN	Active High Digital Input. When this pin is low, the device is disabled and all switches are off. When this pin is high, the Ax logic inputs determine the on switch.
3	1	V _{ss}	Most Negative Power Supply Potential.
4	3	S1	Source Terminal. This pin can be an input or output.
5	4	S2	Source Terminal. This pin can be an input or output.
6	6	D	Drain Terminal. This pin can be an input or output.
7, 8, 9	2, 5, 7, 8, 13	NIC	No Internal Connection.
10	9	S4	Source Terminal. This pin can be an input or output.
11	10	S3	Source Terminal. This pin can be an input or output.
12	11	V _{dd}	Most Positive Power Supply Potential.
13	12	GND	Ground (0 V) Reference.
14	14	A1	Logic Control Input.
N/A ¹	0	EPAD	Exposed Pad. Tie the exposed pad to the substrate, V _{ss} .

¹ N/A means not applicable.

Table 8. ADG1604 Truth Table

EN	A1	A0	S1	S2	S3	S4
0	X	X	Off	Off	Off	Off
1	0	0	On	Off	Off	Off
1	0	1	Off	On	Off	Off
1	1	0	Off	Off	On	Off
1	1	1	Off	Off	Off	On

TYPICAL PERFORMANCE CHARACTERISTICS



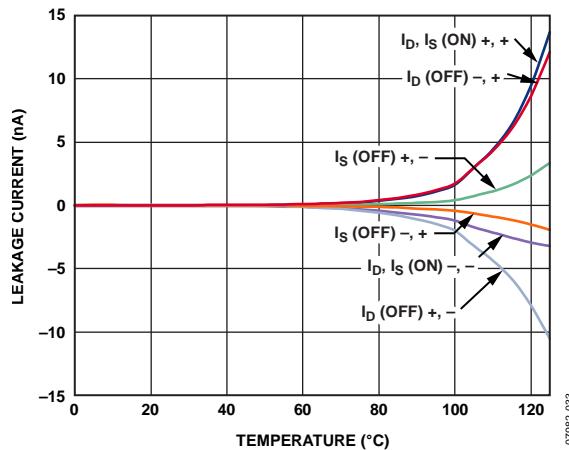
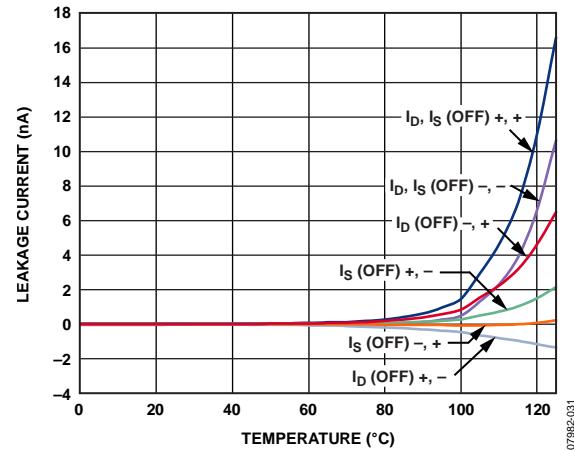
Figure 10. Leakage Currents as a Function of Temperature, ± 5 V Dual Supply

Figure 13. Leakage Currents as a Function of Temperature, 3.3 V Single Supply

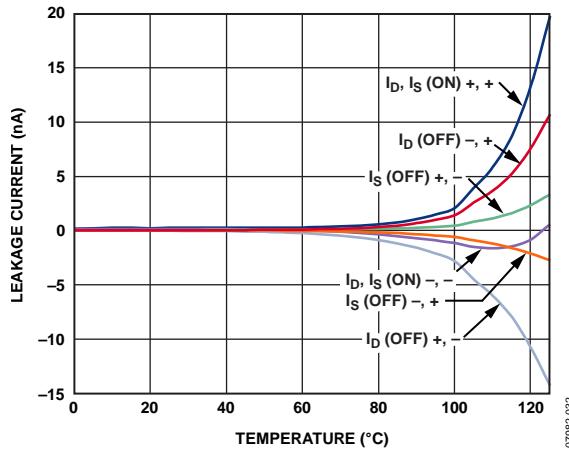


Figure 11. Leakage Currents as a Function of Temperature, 12 V Single Supply

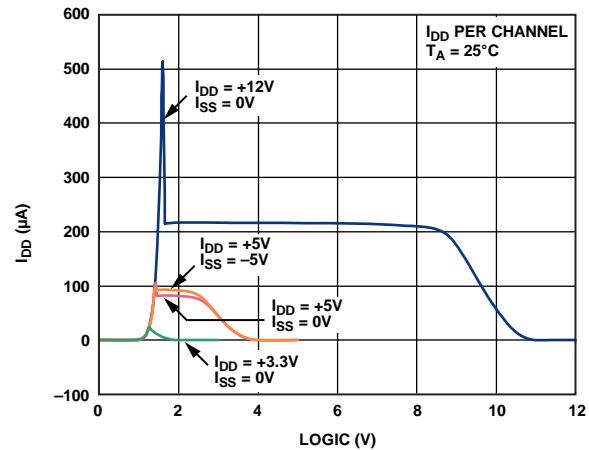
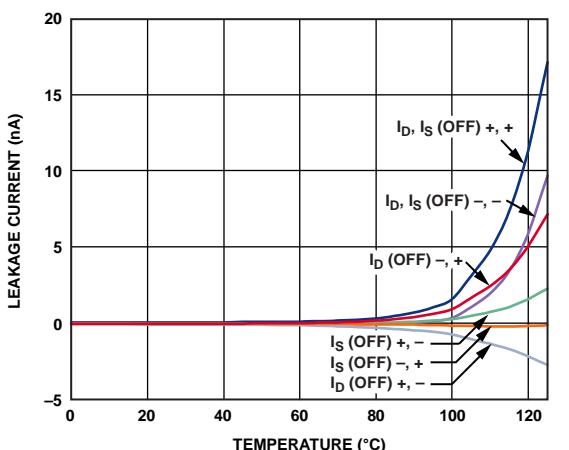
Figure 14. I_{DD} vs. Logic Level

Figure 12. Leakage Currents as a Function of Temperature, 5 V Single Supply

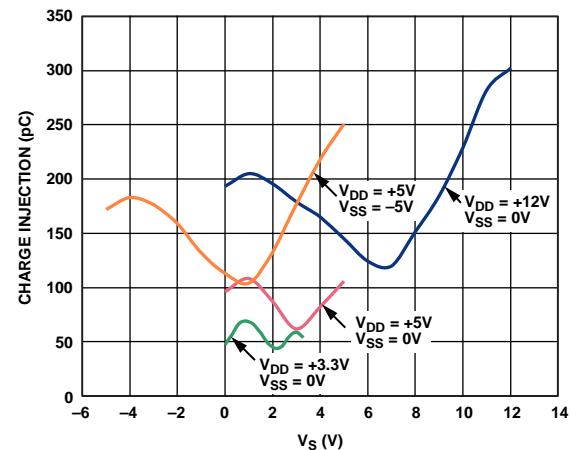


Figure 15. Charge Injection vs. Source Voltage

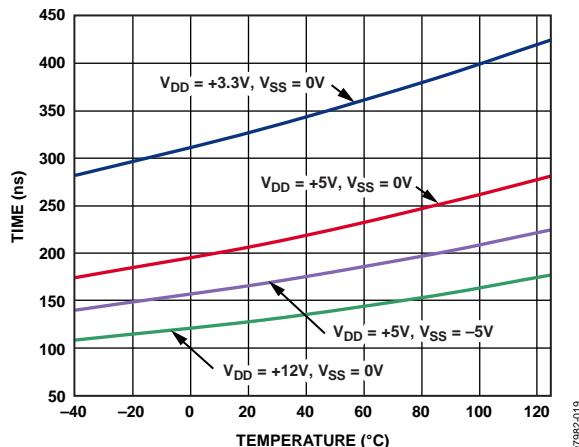
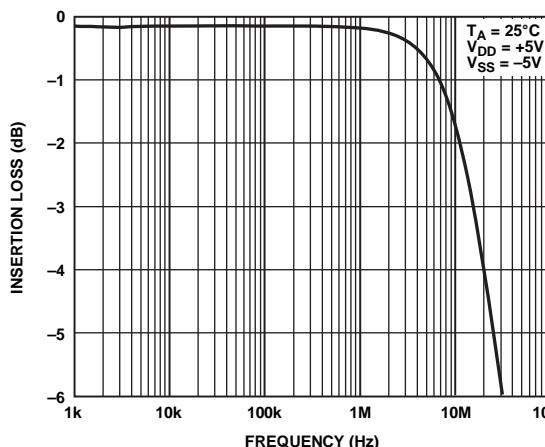
Figure 16. t_{ON}/t_{OFF} Times vs. Temperature

Figure 19. On Response vs. Frequency

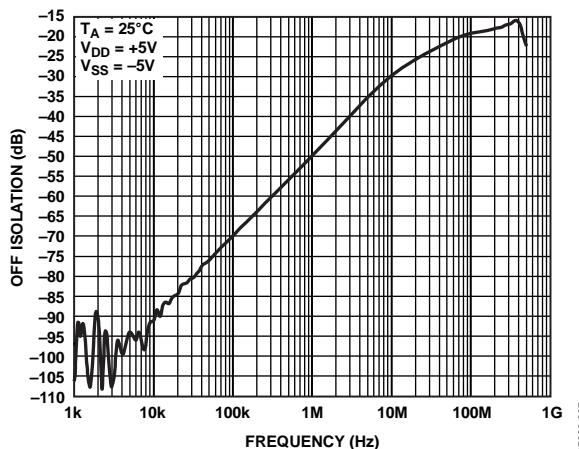


Figure 17. Off Isolation vs. Frequency

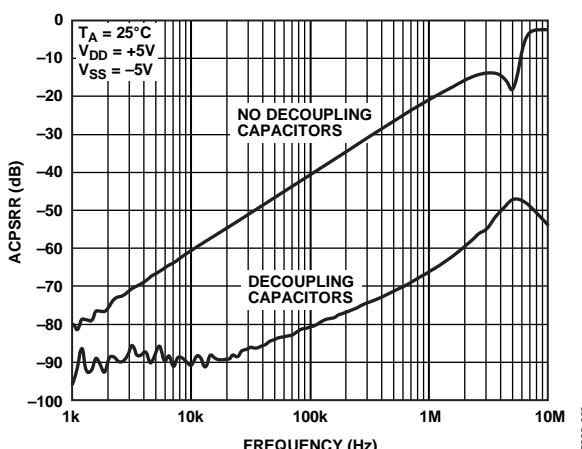


Figure 20. ACPSRR vs. Frequency

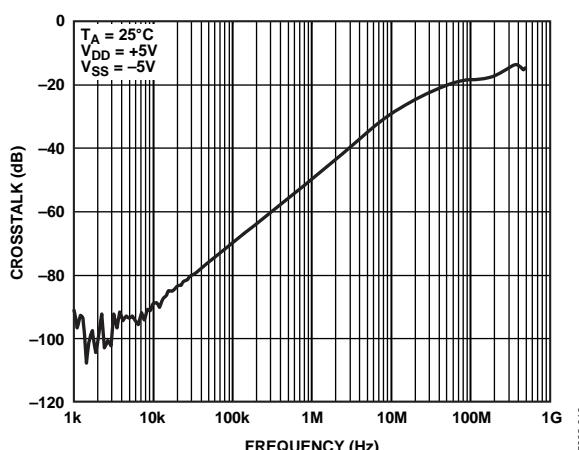


Figure 18. Crosstalk vs. Frequency

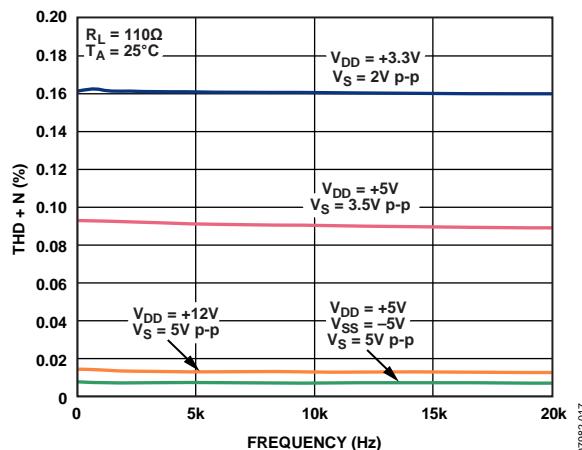


Figure 21. THD + N vs. Frequency

TEST CIRCUITS

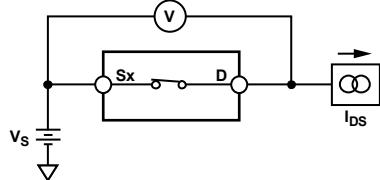


Figure 22. On Resistance

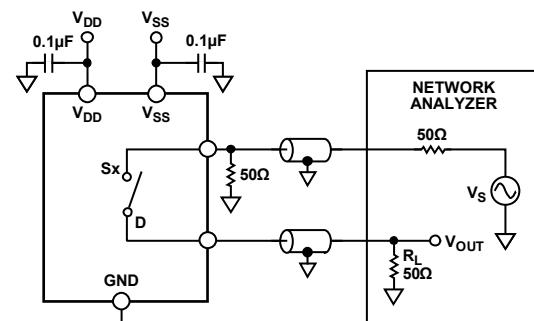


Figure 25. Off Isolation

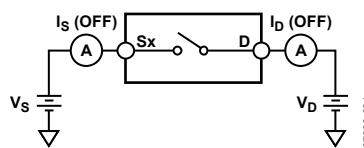


Figure 23. Off Leakage

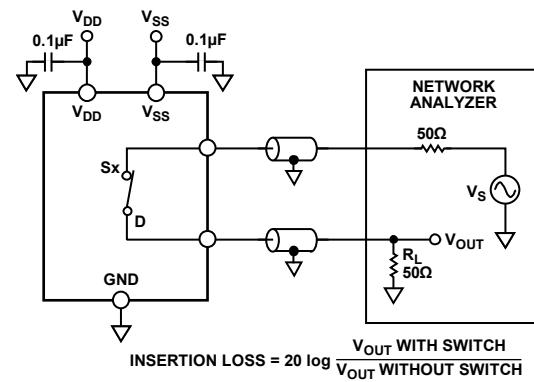


Figure 26. Bandwidth

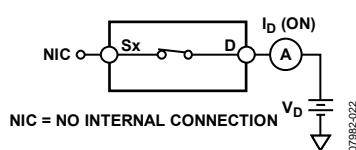


Figure 24. On Leakage

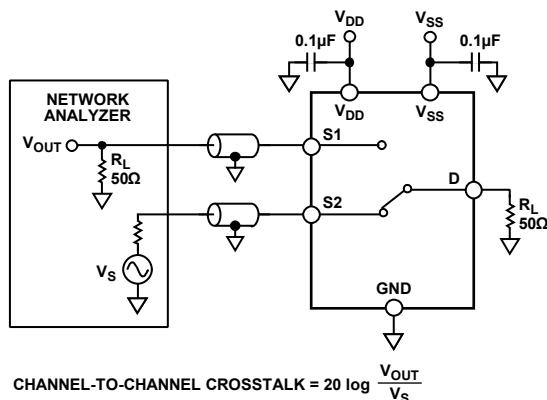
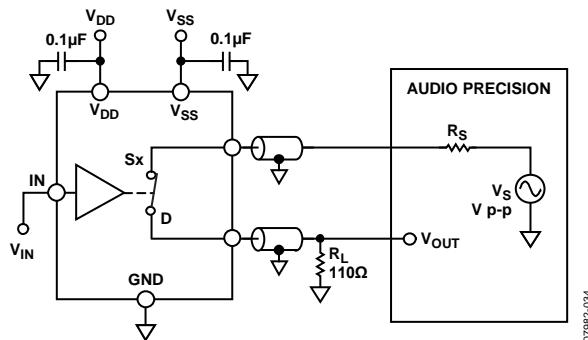
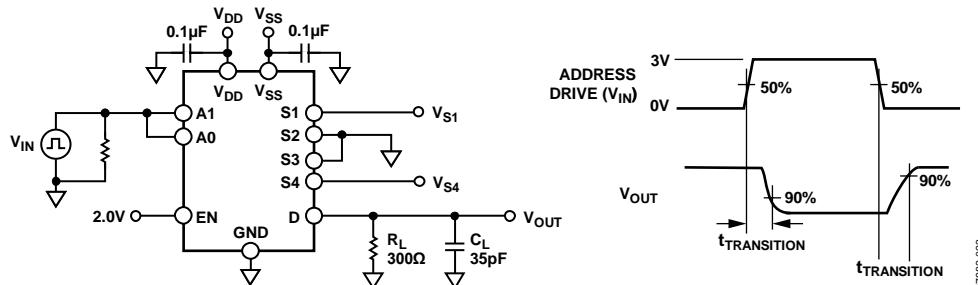


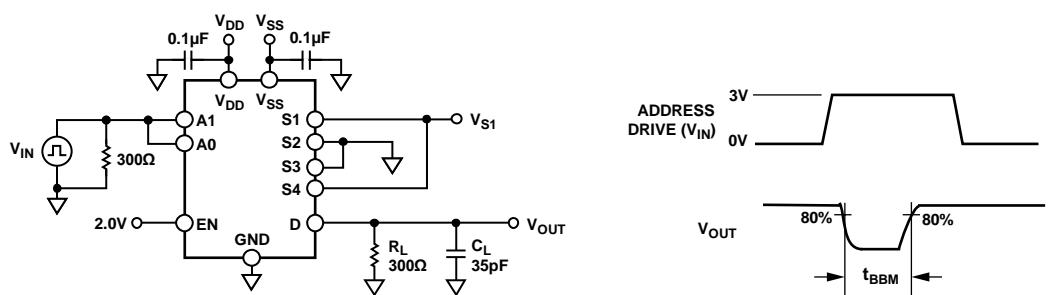
Figure 27. Channel-to-Channel Crosstalk



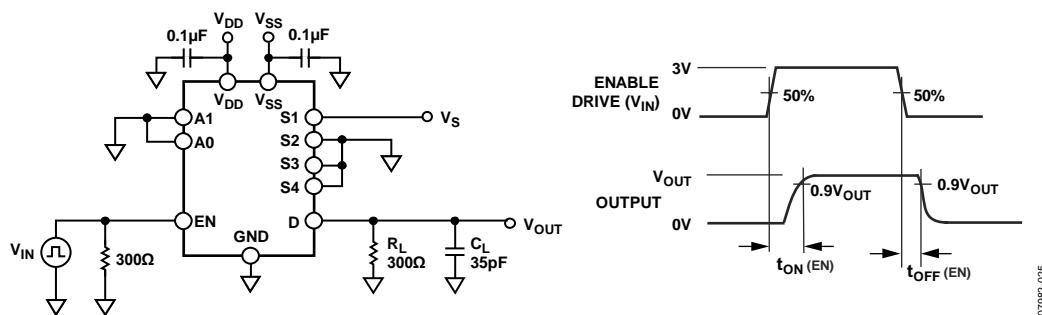
07982-034



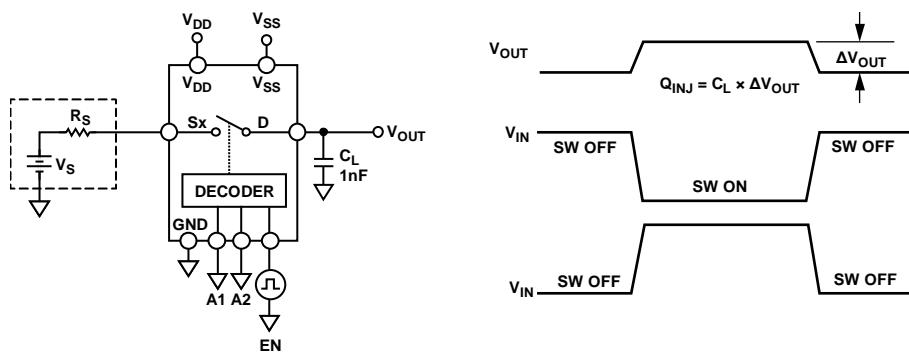
07982-023



07982-024



07982-025



07982-026

TERMINOLOGY

I_{DD}

The positive supply current.

I_{SS}

The negative supply current.

V_D (V_S)

The analog voltage on Terminal D and Terminal S.

R_{ON}

The ohmic resistance between Terminal D and Terminal S.

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.

I_S (Off)

The source leakage current with the switch off.

I_D (Off)

The drain leakage current with the switch off.

I_D, I_S (On)

The channel leakage current with the switch on.

V_{INL}

The maximum input voltage for Logic 0.

V_{INH}

The minimum input voltage for Logic 1.

I_{INL} (I_{INH})

The input current of the digital input.

C_S (Off)

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

C_D (Off)

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

C_D, C_S (On)

The on switch capacitance, which is measured with reference to ground.

C_{IN}

The digital input capacitance.

t_{TRANSITION}

The delay time between the 50% and 90% points of the digital input and switch on condition when switching from one address state to another. See Figure 29.

t_{ON} (EN)

The delay between applying the digital control input and the output switching on. See Figure 31.

t_{OFF} (EN)

The delay between applying the digital control input and the output switching off. See Figure 31.

Charge Injection

A measure of the glitch impulse transferred from the digital input to the analog output during switching. See Figure 32.

Off Isolation

A measure of unwanted signal coupling through an off switch. See Figure 25.

Crosstalk

A measure of unwanted signal that is coupled through from one channel to another as a result of parasitic capacitance. See Figure 27.

Bandwidth

The frequency at which the output is attenuated by 3 dB. See Figure 26.

On Response

The frequency response of the on switch.

Insertion Loss

The loss due to the on resistance of the switch.

Total Harmonic Distortion + Noise (THD + N)

The ratio of the harmonic amplitude plus noise of the signal to the fundamental. See Figure 28.

AC Power Supply Rejection Ratio (ACPSRR)

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.

OUTLINE DIMENSIONS

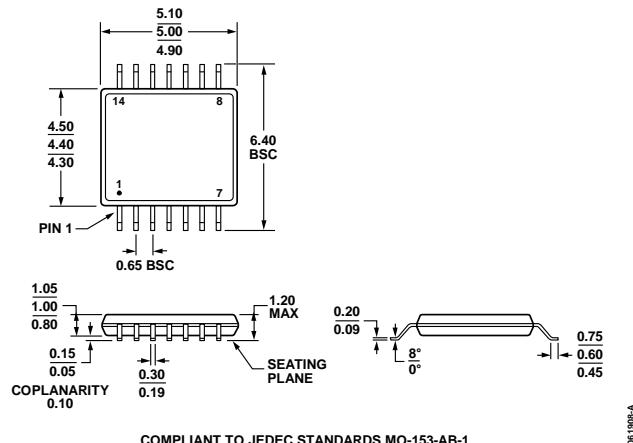
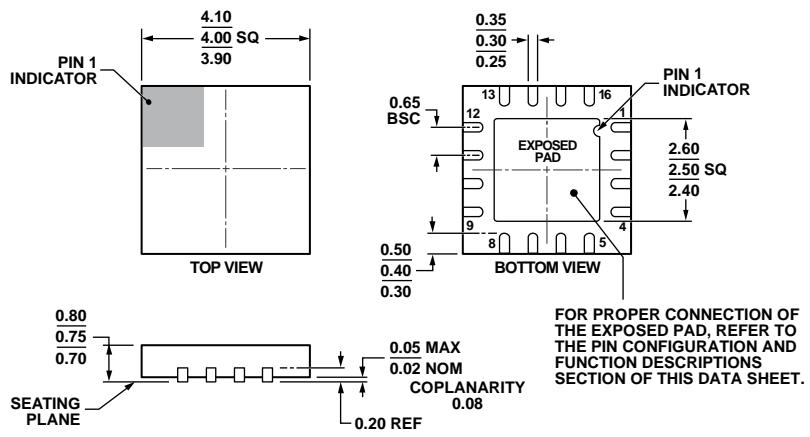


Figure 33. 14-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-14)

Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MO-220-WGGC.

Figure 34. 16-Lead Lead Frame Chip Scale Package [LFCSP]
4 mm × 4 mm Body and 0.75 mm Package Height
(CP-16-26)

Dimensions shown in millimeters

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Package Option
ADG1604BRUZ	-40°C to +125°C	14-Lead Thin Shrink Small Outline Package [TSSOP]	RU-14
ADG1604BRUZ-REEL	-40°C to +125°C	14-Lead Thin Shrink Small Outline Package [TSSOP]	RU-14
ADG1604BRUZ-REEL7	-40°C to +125°C	14-Lead Thin Shrink Small Outline Package [TSSOP]	RU-14
ADG1604BCPZ-REEL	-40°C to +125°C	16-Lead Lead Frame Chip Scale Package [LFCSP]	CP-16-26
ADG1604BCPZ-REEL7	-40°C to +125°C	16-Lead Lead Frame Chip Scale Package [LFCSP]	CP-16-26

¹ Z = RoHS Compliant Part.

NOTES

NOTES

NOTES



**Стандарт
Электрон
Связь**

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литер Н,
помещение 100-Н Офис 331