

ADG608/ADG609

FEATURES

- +3 V, +5 V, ± 5 V Power Supplies**
- V_{SS} to V_{DD} Analog Signal Range**
- Low On Resistance (30 Ω max)**
- Fast Switching Times**
 - t_{ON} 75 ns max
 - t_{OFF} 45 ns max
- Low Power Dissipation (1.5 μ W max)**
- Break-Before-Make Construction**
- ESD > 5000 V as per Military Standard 3015.7**
- TTL and CMOS Compatible Inputs**

APPLICATIONS

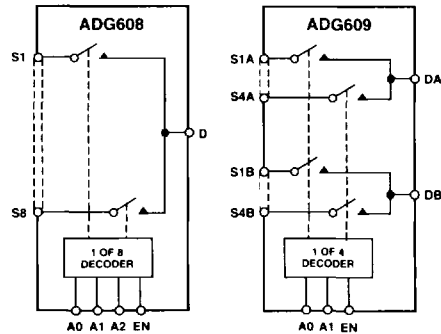
- Automatic Test Equipment**
- Data Acquisition Systems**
- Communication Systems**
- Avionics and Military Systems**
- Microprocessor Controlled Analog Systems**
- Medical Instrumentation**
- Battery Powered Instruments**
- Remote Powered Equipment**
- Compatible with ± 5 V DACs and ADCs such as AD7840/8, AD7870/1/2/4/5/6/8**

GENERAL DESCRIPTION

The ADG608 and ADG609 are monolithic CMOS analog multiplexers comprising eight single channels and four differential channels respectively, fully specified for ± 5 V, +5 V and +3 V power supplies. The ADG608 switches one of eight inputs to a common output as determined by the 3-bit binary address lines A0, A1 and A2. The ADG609 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 is used to enable or disable the device. When disabled, all channels are switched OFF. All the address and enable inputs are TTL compatible over the full specified operating temperature range, making the parts suitable for bus-controlled systems such as data acquisition systems, process controls, avionics and ATEs since the TTL compatible address inputs simplify the digital interface design and reduce the board space requirements.

The ADG608/ADG609 are designed on an enhanced LC²MOS process that provides low power dissipation yet gives high switching speed and low on resistance. Each channel conducts equally well in both directions when ON and has an input signal range which extends to the supplies. In the OFF condition, signal levels up to the supplies are blocked. All channels exhibit break-before-make switching action preventing momentary shorting when switching channels. Inherent in the design is low charge injection for minimum transients when switching the digital inputs.

FUNCTIONAL BLOCK DIAGRAMS



The ability to operate from single +3 V, +5 V or ± 5 V bipolar supplies makes the ADG608 and ADG609 perfect for use in battery operated instruments and with the new generation of DACs and ADCs from Analog Devices. The use of 5 V supplies and reduced operating currents gives much lower power dissipation than devices operating from ± 15 V supplies.

PRODUCT HIGHLIGHTS

1. **Extended Signal Range**
The ADG608/ADG609 are fabricated on an enhanced LC²MOS process giving an increased signal range which extends to the supplies.
2. **Low Power Dissipation**
3. **Low R_{ON}**
4. **Fast Switching Times**
5. **Break-Before-Make Switching**
Switches are guaranteed break-before-make so that input signals are protected against momentary shorting.
6. **Single/Dual Supply Operation**

ORDERING GUIDE

Model	Temperature Range	Package Option*
ADG608BN	-40°C to +85°C	N-16
ADG608BR	-40°C to +85°C	R-16A
ADG608BRU	-40°C to +85°C	RU-16
ADG608TRU	-55°C to +125°C	RU-16
ADG609BN	-40°C to +85°C	N-16
ADG609BR	-40°C to +85°C	R-16A
ADG609BRU	-40°C to +85°C	RU-16

*N = Plastic DIP; RU = Thin Shrink Small Outline Package (TSSOP); R = 0.15" Small Outline IC (SOIC). For outline information see Package Information section.

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ADG608/ADG609—SPECIFICATIONS

DUAL SUPPLY¹ ($V_{DD} = +5\text{ V} \pm 10\%$, $V_{SS} = -5\text{ V} \pm 10\%$, $GND = 0\text{ V}$, unless otherwise noted)

Parameter	B Version		T Version		Units	Test Conditions/ Comments
	+25°C	-40°C to +85°C	+25°C	-55°C to +125°C		
ANALOG SWITCH						
Analogue Signal Range	V_{SS} to V_{DD}		V_{SS} to V_{DD}		V	
R_{ON}	22		22		Ω typ	$-3.5\text{ V} \leq V_S \leq +3.5\text{ V}$, $I_S = -1\text{ mA}$; $V_{DD} = +4.5\text{ V}$, $V_{SS} = -4.5\text{ V}$; Test Circuit 1
	30	35	30	40	Ω max	
ΔR_{ON}	5	6	5	6	Ω max	$3\text{ V} \leq V_S \leq +3\text{ V}$, $I_{DS} = -1\text{ mA}$; $V_{DD} = +5\text{ V}$, $V_{SS} = -5\text{ V}$
R_{ON} Match	2	3	2	3	Ω max	$V_S = 0\text{ V}$, $I_{DS} = 1\text{ mA}$; $V_{DD} = +5\text{ V}$, $V_{SS} = -5\text{ V}$
LEAKAGE CURRENTS						
Source OFF Leakage I_S (OFF)	± 0.05		± 0.05		nA typ	$V_{DD} = +5.5\text{ V}$, $V_{SS} = -5.5\text{ V}$ $V_D = \pm 4.5\text{ V}$, $V_S = \pm 4.5\text{ V}$;
	± 0.5	± 2	± 0.5	± 10	nA max	Test Circuit 2
Drain OFF Leakage I_D (OFF)	± 0.05		± 0.05		nA typ	$V_D = \pm 4.5\text{ V}$, $V_S = \pm 4.5\text{ V}$;
ADG608	± 0.5	± 2	± 0.5	± 10	nA max	Test Circuit 3
ADG609	± 0.5	± 1	± 0.5	± 5	nA max	
Channel ON Leakage I_D , I_S (ON)	± 0.05		± 0.05		nA typ	$V_S = V_D = \pm 4.5\text{ V}$;
ADG608	± 0.5	± 3	± 0.5	± 20	nA max	Test Circuit 4
ADG609	± 0.5	± 1.5	± 0.5	± 10	nA max	
DIGITAL INPUTS						
Input High Voltage, V_{INH}		2.4		2.4	V min	
Input Low Voltage, V_{INL}		0.8		0.8	V max	
Input Current						
I_{INL} or I_{INH}		± 1		± 1	μA max	$V_{IN} = 0$ or V_{DD}
C_{IN} , Digital Input Capacitance	5		5		pF typ	
DYNAMIC CHARACTERISTICS ²						
$t_{TRANSITION}$	50		50		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$;
	75	90	75	100	ns max	$V_{SI} = \pm 3.5\text{ V}$, $V_{SK} = +3.5\text{ V}$;
						Test Circuit 5
t_{OPEN}	10		10		ns min	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$;
						$V_S = +3.5\text{ V}$; Test Circuit 6
t_{ON} (EN)	50		50		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$;
	75	90	75	100	ns max	$V_S = +3.5\text{ V}$; Test Circuit 7
t_{OFF} (EN)	30		30		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$;
	45	60	45	75	ns max	$V_S = +3.5\text{ V}$; Test Circuit 7
Charge Injection	6		6		pC typ	$V_S = 0\text{ V}$, $R_S = 0\ \Omega$, $C_L = 1\text{ nF}$;
						Test Circuit 8
OFF Isolation	85		85		dB typ	$R_L = 1\text{ k}\Omega$, $C_L = 15\text{ pF}$, $f = 100\text{ kHz}$;
						$V_S = 3\text{ V rms}$; Test Circuit 9
Channel-to-Channel Crosstalk	85		85		dB typ	$R_L = 1\text{ k}\Omega$, $C_L = 15\text{ pF}$, $f = 100\text{ kHz}$;
						Test Circuit 10
C_S (OFF)	9		9		pF typ	
C_D (OFF)						
ADG608	40		40		pF typ	
ADG609	20		20		pF typ	
C_D (ON)						
ADG608	54		54		pF typ	
ADG609	34		34		pF typ	
POWER REQUIREMENTS						
I_{DD}	0.05	0.2	0.05	0.2	μA typ	$V_{IN} = 0\text{ V}$ or V_{DD}
	0.2	2	0.2	2	μA max	
I_{SS}	0.01	0.1	0.01	0.1	μA typ	
	0.1	1	0.1	1	μA max	

NOTES

¹Temperature ranges are as follows: B Version: -40°C to $+85^\circ\text{C}$; T Version: -55°C to $+125^\circ\text{C}$.

²Guaranteed by design, not subject to production test.

Specifications subject to change without notice.