

### FEATURES

**44 V Supply Maximum Rating**  
 **$V_{SS}$  to  $V_{DD}$  Analog Signal Range**  
**Single-/Dual-Supply Specifications**  
**Wide Supply Ranges (10.8 V to 16.5 V)**  
**Microprocessor Compatible (100 ns  $\overline{WR}$  Pulse)**  
**Extended Plastic Temperature Range**  
 (–40°C to +85°C)  
**Low Leakage (20 pA typ)**  
**Low Power Dissipation (28 mW max)**  
**Available in 18-Lead DIP/SOIC and 20-Lead PLCC Packages**  
**Superior Alternative to:**  
**DG528**  
**DG529**  
**ADG529A is obsolete**

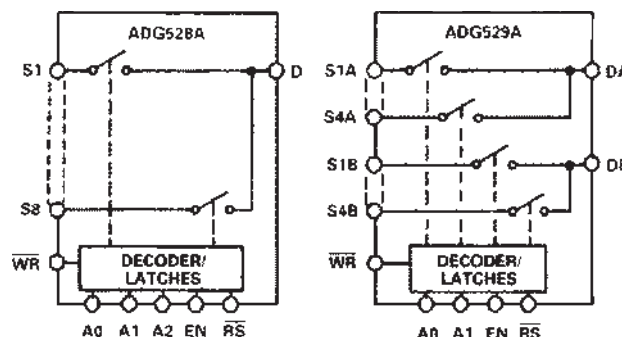
### GENERAL DESCRIPTION

The ADG528A and ADG529A are CMOS monolithic analog multiplexers with eight channels and four dual channels, respectively. On-chip latches facilitate microprocessor interfacing. The ADG528A switches one of eight inputs to a common output, depending on the state of three binary addresses and an enable input. The ADG529A switches one of four differential inputs to a common differential output, depending on the state of two binary addresses and an enable input. Both devices have TTL and 5 V CMOS logic-compatible digital inputs.

The ADG528A and ADG529A are designed on an enhanced  $LC^2MOS$  process, which gives an increased signal capability of  $V_{SS}$  to  $V_{DD}$  and enables operation over a wide range of supply voltages. The devices can comfortably operate anywhere in the 10.8 V to 16.5 V single- or dual-supply range. These multiplexers also feature high switching and low  $R_{ON}$ .

The ADG529A is no longer available.

### FUNCTIONAL BLOCK DIAGRAMS



### PRODUCT HIGHLIGHTS

- Single-/dual-supply specifications with a wide tolerance.**  
 The devices are specified in the 10.8 V to 16.5 V range for both single- and dual-supplies.
- Easily Interfaced**  
 The ADG528A and ADG529A can be easily interfaced with microprocessors. The  $\overline{WR}$  signal latches the state of the address control lines and the enable line. The  $\overline{RS}$  signal clears both the address and enable data in the latches resulting in no output (all switches off).  $\overline{RS}$  can be tied to the microprocessor reset pin.
- Extended Signal Range**  
 The enhanced  $LC^2MOS$  processing results in a high breakdown and an increased analog signal range of  $V_{SS}$  to  $V_{DD}$ .
- Break-Before-Make Switching**  
 Switches are guaranteed break-before-make so that input signals are protected against momentary shorting.
- Low Leakage**  
 Leakage currents in the range of 20 pA make these multiplexers suitable for high precision circuits.

# ADG528A—SPECIFICATIONS

## DUAL SUPPLY ( $V_{DD} = +10.8\text{ V}$ to $+16.5\text{ V}$ , $V_{SS} = -10.8\text{ V}$ to $-16.5\text{ V}$ , unless otherwise noted.)

|                                                                    | ADG528A<br>ADG529A<br>K Version<br>−40°C to |                 | ADG528A<br>ADG529A<br>B Version<br>−40°C to |                 | ADG528A<br>ADG529A<br>T Version<br>−55°C to |                 |          |                                                                           |
|--------------------------------------------------------------------|---------------------------------------------|-----------------|---------------------------------------------|-----------------|---------------------------------------------|-----------------|----------|---------------------------------------------------------------------------|
| Parameter                                                          | +25°C                                       | +85°C           | +25°C                                       | +85°C           | +25°C                                       | +125°C          | Units    | Comments                                                                  |
| ANALOG SWITCH                                                      |                                             |                 |                                             |                 |                                             |                 |          |                                                                           |
| Analog Signal Range                                                | V <sub>SS</sub>                             | V <sub>SS</sub> | V <sub>SS</sub>                             | V <sub>SS</sub> | V <sub>SS</sub>                             | V <sub>SS</sub> | V min    |                                                                           |
| R <sub>ON</sub>                                                    | V <sub>DD</sub>                             | V <sub>DD</sub> | V <sub>DD</sub>                             | V <sub>DD</sub> | V <sub>DD</sub>                             | V <sub>DD</sub> | V max    |                                                                           |
|                                                                    | 280                                         |                 | 280                                         |                 | 280                                         |                 | Ω typ    | −10 V ≤ V <sub>S</sub> ≤ +10 V, I <sub>DS</sub> = 1 mA;<br>Test Circuit 1 |
|                                                                    | 450                                         | 600             | 450                                         | 600             | 450                                         | 600             | Ω max    |                                                                           |
|                                                                    | 300                                         | 400             | 300                                         | 400             | 300                                         | 400             | Ω max    | V <sub>DD</sub> = 15 V (±10%), V <sub>SS</sub> = −15 V (±10%)             |
| R <sub>ON</sub> Drift                                              | 0.6                                         |                 | 0.6                                         |                 | 0.6                                         |                 | Ω max    | V <sub>DD</sub> = 15 V (±5%), V <sub>SS</sub> = −15 V (±5%)               |
| R <sub>ON</sub> Match                                              | 5                                           |                 | 5                                           |                 | 5                                           |                 | %/°C typ | −10 V ≤ V <sub>S</sub> ≤ +10 V, I <sub>DS</sub> = 1 mA                    |
| I <sub>S</sub> (OFF), Off Input Leakage                            | 0.02                                        |                 | 0.02                                        |                 | 0.02                                        |                 | % typ    | −10 V ≤ V <sub>S</sub> ≤ +10 V, I <sub>DS</sub> = 1 mA                    |
|                                                                    | 1                                           | 50              | 1                                           | 50              | 1                                           | 50              | nA typ   | V1 = ±10 V, V2 = ∓10 V; Test Circuit 2                                    |
| I <sub>D</sub> (OFF), Off Input Leakage                            | 0.04                                        |                 | 0.04                                        |                 | 0.04                                        |                 | nA max   |                                                                           |
| ADG528A                                                            | 1                                           | 100             | 1                                           | 100             | 1                                           | 100             | nA typ   | V1 = ±10 V, V2 = ∓10 V; Test Circuit 3                                    |
| ADG529A                                                            | 1                                           | 50              | 1                                           | 50              | 1                                           | 50              | nA max   |                                                                           |
| I <sub>D</sub> (ON), On Channel Leakage                            | 0.04                                        |                 | 0.04                                        |                 | 0.04                                        |                 | nA max   |                                                                           |
| ADG528A                                                            | 1                                           | 100             | 1                                           | 100             | 1                                           | 100             | nA typ   | V1 = ±10 V, V2 = ∓10 V; Test Circuit 4                                    |
| ADG529A                                                            | 1                                           | 50              | 1                                           | 50              | 1                                           | 50              | nA max   |                                                                           |
| I <sub>DIFF</sub> , Differential Off Output Leakage (ADG529A only) |                                             | 25              |                                             | 25              |                                             | 25              | nA max   | V1 = ±10 V, V2 = ∓10 V; Test Circuit 5                                    |
| DIGITAL CONTROL                                                    |                                             |                 |                                             |                 |                                             |                 |          |                                                                           |
| V <sub>INH</sub> , Input High Voltage                              |                                             | 2.4             |                                             | 2.4             |                                             | 2.4             | V min    |                                                                           |
| V <sub>INL</sub> , Input Low Voltage                               |                                             | 0.8             |                                             | 0.8             |                                             | 0.8             | V max    |                                                                           |
| I <sub>INL</sub> or I <sub>INH</sub>                               |                                             | 1               |                                             | 1               |                                             | 1               | μA max   | V <sub>IN</sub> = 0 to V <sub>DD</sub>                                    |
| C <sub>IN</sub> Digital Input Capacitance                          | 8                                           |                 | 8                                           |                 | 8                                           |                 | pF max   |                                                                           |
| DYNAMIC CHARACTERISTICS <sup>1</sup>                               |                                             |                 |                                             |                 |                                             |                 |          |                                                                           |
| t <sub>TRANSITION</sub>                                            | 200                                         |                 | 200                                         |                 | 200                                         |                 | ns typ   | V1 = ±10 V, V2 = ∓10 V; Test Circuit 6                                    |
|                                                                    | 300                                         | 400             | 300                                         | 400             | 300                                         | 400             | ns max   |                                                                           |
| t <sub>OPEN</sub>                                                  | 50                                          |                 | 50                                          |                 | 50                                          |                 | ns typ   | Test Circuit 7                                                            |
|                                                                    | 25                                          | 10              | 25                                          | 10              | 25                                          | 10              | ns min   |                                                                           |
| t <sub>ON</sub> (EN, $\overline{WR}$ )                             | 200                                         |                 | 200                                         |                 | 200                                         |                 | ns typ   | Test Circuits 8 and 9                                                     |
|                                                                    | 300                                         | 400             | 300                                         | 400             | 300                                         | 400             | ns max   |                                                                           |
| t <sub>OFF</sub> (EN, $\overline{RS}$ )                            | 200                                         |                 | 200                                         |                 | 200                                         |                 | ns typ   | Test Circuits 8 and 10                                                    |
|                                                                    | 300                                         | 400             | 300                                         | 400             | 300                                         | 400             | ns max   |                                                                           |
| t <sub>W</sub> Write Pulse Width                                   | 100                                         | 120             | 100                                         | 120             | 100                                         | 130             | ns min   | See Figure 1                                                              |
| t <sub>S</sub> Address, Enable Setup Time                          |                                             | 100             |                                             | 100             |                                             | 100             | ns min   | See Figure 1                                                              |
| t <sub>H</sub> , Address, Enable Hold Time                         |                                             | 10              |                                             | 10              |                                             | 10              | ns min   | See Figure 1                                                              |
| t <sub>RS</sub> Reset Pulse Width                                  |                                             | 100             |                                             | 100             |                                             | 100             | ns min   | See Figure 2                                                              |
| OFF Isolation                                                      | 68                                          |                 | 68                                          |                 | 68                                          |                 | dB typ   | V <sub>EN</sub> = 0.8 V, R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 15 pF,   |
|                                                                    | 50                                          |                 | 50                                          |                 | 50                                          |                 | dB min   | V <sub>S</sub> = 7 V rms, f = 100 kHz                                     |
| C <sub>S</sub> (OFF)                                               | 5                                           |                 | 5                                           |                 | 5                                           |                 | pF typ   | V <sub>EN</sub> = 0.8 V                                                   |
| C <sub>D</sub> (OFF)                                               |                                             |                 |                                             |                 |                                             |                 |          |                                                                           |
| ADG528A                                                            | 22                                          |                 | 22                                          |                 | 22                                          |                 | pF typ   | V <sub>EN</sub> = 0.8 V                                                   |
| ADG529A                                                            | 11                                          |                 | 11                                          |                 | 11                                          |                 | pF typ   |                                                                           |
| Q <sub>INJ</sub> , Charge Injection                                | 4                                           |                 | 4                                           |                 | 4                                           |                 | pC typ   | R <sub>S</sub> = 0 Ω, V <sub>S</sub> = 0 V; Test Circuit 11               |

| Parameter         | ADG528A<br>ADG529A<br>K Version<br>–40°C to<br>+25°C +85°C | ADG528A<br>ADG529A<br>B Version<br>–40°C to<br>+25°C +85°C | ADG528A<br>ADG529A<br>T Version<br>–55°C to<br>+25°C +125°C | Units  | Comments                                               |
|-------------------|------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|--------|--------------------------------------------------------|
| POWER SUPPLY      |                                                            |                                                            |                                                             |        |                                                        |
| I <sub>DD</sub>   | 0.6                                                        | 0.6                                                        | 0.6                                                         | mA typ | V <sub>IN</sub> = V <sub>INL</sub> or V <sub>INH</sub> |
| I <sub>SS</sub>   | 1.5                                                        | 1.5                                                        | 1.5                                                         | mA max | V <sub>IN</sub> = V <sub>INL</sub> or V <sub>INH</sub> |
|                   | 20                                                         | 20                                                         | 20                                                          | μA typ |                                                        |
| Power Dissipation | 0.2                                                        | 0.2                                                        | 0.2                                                         | mA max |                                                        |
|                   | 10                                                         | 10                                                         | 10                                                          | mW typ |                                                        |
|                   | 2.8                                                        | 2.8                                                        | 2.8                                                         | mW max |                                                        |

## NOTE

<sup>1</sup>Sample tested at +25°C to ensure compliance.

Specifications subject to change without notice.

## SINGLE SUPPLY (V<sub>DD</sub> = +10.8 V to +16.5 V, V<sub>SS</sub> = GND = 0 V, unless otherwise noted.)

| Parameter                                                          | ADG528A<br>ADG529A<br>K Version<br>–40°C to<br>+25°C +85°C | ADG528A<br>ADG529A<br>B Version<br>–40°C to<br>+25°C +85°C | ADG528A<br>ADG529A<br>T Version<br>–55°C to<br>+25°C +125°C | Units          | Comments                                                                  |
|--------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|----------------|---------------------------------------------------------------------------|
| ANALOG SWITCH                                                      |                                                            |                                                            |                                                             |                |                                                                           |
| Analog Signal Range                                                | GND V <sub>DD</sub>                                        | GND V <sub>DD</sub>                                        | GND V <sub>DD</sub>                                         | V min<br>V max |                                                                           |
| R <sub>ON</sub>                                                    | 500                                                        | 500                                                        | 500                                                         | Ω typ          | GND ≤ V <sub>S</sub> ≤ +10 V, I <sub>DS</sub> = 0.5 mA;<br>Test Circuit 1 |
|                                                                    | 700 1000                                                   | 700 1000                                                   | 700 1000                                                    | Ω max          |                                                                           |
| R <sub>ON</sub> Drift                                              | 0.6                                                        | 0.6                                                        | 0.6                                                         | %/°C typ       | GND ≤ V <sub>S</sub> ≤ +10 V, I <sub>DS</sub> = 0.5 mA                    |
| R <sub>ON</sub> Match                                              | 5                                                          | 5                                                          | 5                                                           | % typ          | GND ≤ V <sub>S</sub> ≤ +10 V, I <sub>DS</sub> = 0.5 mA                    |
| I <sub>S</sub> (OFF), Off Input Leakage                            | 0.02                                                       | 0.02                                                       | 0.02                                                        | nA typ         | V1 = +10 V/GND, V2 = GND/+10 V;<br>Test Circuit 2                         |
|                                                                    | 1 50                                                       | 1 50                                                       | 1 50                                                        | nA max         |                                                                           |
| I <sub>D</sub> (OFF), Off Input Leakage                            | 0.04                                                       | 0.04                                                       | 0.04                                                        | nA typ         | V1 = +10 V/GND, V2 = GND/+10 V;<br>Test Circuit 3                         |
| ADG528A                                                            | 1 100                                                      | 1 100                                                      | 1 100                                                       | nA max         |                                                                           |
| ADG529A                                                            | 1 50                                                       | 1 50                                                       | 1 50                                                        | nA max         |                                                                           |
| I <sub>D</sub> (ON), On Channel Leakage                            | 0.04                                                       | 0.04                                                       | 0.04                                                        | nA typ         | V1 = +10 V/GND, V2 = GND/+10 V;<br>Test Circuit 4                         |
| ADG528A                                                            | 1 100                                                      | 1 100                                                      | 1 100                                                       | nA max         |                                                                           |
| ADG529A                                                            | 1 50                                                       | 1 50                                                       | 1 50                                                        | nA max         |                                                                           |
| I <sub>DIFF</sub> , Differential Off Output Leakage (ADG529A only) | 25                                                         | 25                                                         | 25                                                          | nA max         | V1 = +10 V/GND, V2 = GND/+10 V;<br>Test Circuit 5                         |
| DIGITAL CONTROL                                                    |                                                            |                                                            |                                                             |                |                                                                           |
| V <sub>INH</sub> , Input High Voltage                              | 2.4                                                        | 2.4                                                        | 2.4                                                         | V min          |                                                                           |
| V <sub>INL</sub> , Input Low Voltage                               | 0.8                                                        | 0.8                                                        | 0.8                                                         | V max          | V <sub>IN</sub> = 0 to V <sub>DD</sub>                                    |
| I <sub>INL</sub> or I <sub>INH</sub>                               | 1                                                          | 1                                                          | 1                                                           | μA max         |                                                                           |
| C <sub>IN</sub> , Digital Input Capacitance                        | 8                                                          | 8                                                          | 8                                                           | pF max         |                                                                           |
| DYNAMIC CHARACTERISTICS <sup>1</sup>                               |                                                            |                                                            |                                                             |                |                                                                           |
| t <sub>TRANSITION</sub>                                            | 300                                                        | 300                                                        | 300                                                         | ns typ         | V1 = +10 V/GND, V2 = GND/+10 V;<br>Test Circuit 6                         |
|                                                                    | 450 600                                                    | 450 600                                                    | 450 600                                                     | ns max         |                                                                           |
| t <sub>OPEN</sub>                                                  | 50                                                         | 50                                                         | 50                                                          | ns typ         | Test Circuit 7                                                            |
|                                                                    | 25 10                                                      | 25 10                                                      | 25 10                                                       | ns min         |                                                                           |
| t <sub>ON</sub> (EN, $\overline{\text{WR}}$ )                      | 250                                                        | 250                                                        | 250                                                         | ns typ         | Test Circuits 8 and 9                                                     |
|                                                                    | 450 600                                                    | 450 600                                                    | 450 600                                                     | ns max         |                                                                           |
| t <sub>OFF</sub> (EN, $\overline{\text{RS}}$ )                     | 250                                                        | 250                                                        | 250                                                         | ns typ         | Test Circuits 8 and 10                                                    |
|                                                                    | 450 600                                                    | 450 600                                                    | 450 600                                                     | ns max         |                                                                           |
| t <sub>W</sub> Write Pulse Width                                   | 100 120                                                    | 100 120                                                    | 100 130                                                     | ns min         | See Figure 1                                                              |

# ADG528A

| Parameter                                     | ADG528A<br>ADG529A<br>K Version<br>–40°C to<br>+25°C +85°C | ADG528A<br>ADG529A<br>B Version<br>–40°C to<br>+25°C +85°C | ADG528A<br>ADG529A<br>T Version<br>–55°C to<br>+25°C +125°C | Units  | Comments                                                                |
|-----------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|--------|-------------------------------------------------------------------------|
| DYNAMIC CHARACTERISTICS <sup>1</sup> (Cont'd) |                                                            |                                                            |                                                             |        |                                                                         |
| t <sub>S</sub> Address,<br>Enable Setup Time  | 100                                                        | 100                                                        | 100                                                         | ns min | See Figure 1                                                            |
| t <sub>H</sub> Address,<br>Enable Hold Time   | 10                                                         | 10                                                         | 10                                                          | ns min | See Figure 1                                                            |
| t <sub>RS</sub> Reset Pulse Width             | 100                                                        | 100                                                        | 100                                                         | ns min | See Figure 2                                                            |
| OFF Isolation                                 | 68                                                         | 68                                                         | 68                                                          | dB typ | V <sub>EN</sub> = 0.8 V, R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 15 pF, |
|                                               | 50                                                         | 50                                                         | 50                                                          | dB min | V <sub>S</sub> = 3.5 V rms, f = 100 kHz                                 |
| C <sub>S</sub> (OFF)                          | 5                                                          | 5                                                          | 5                                                           | pF typ | V <sub>EN</sub> = 0.8 V                                                 |
| C <sub>D</sub> (OFF)                          |                                                            |                                                            |                                                             |        |                                                                         |
| ADG528A                                       | 22                                                         | 22                                                         | 22                                                          | pF typ | V <sub>EN</sub> = 0.8 V                                                 |
| ADG529A                                       | 11                                                         | 11                                                         | 11                                                          | pF typ |                                                                         |
| Q <sub>INJ</sub> , Charge Injection           | 4                                                          | 4                                                          | 4                                                           | pC typ | R <sub>S</sub> = 0 Ω, V <sub>S</sub> = 0 V; Test Circuit 11             |
| POWER SUPPLY                                  |                                                            |                                                            |                                                             |        |                                                                         |
| I <sub>DD</sub>                               | 0.6                                                        | 0.6                                                        | 0.6                                                         | mA typ | V <sub>IN</sub> = V <sub>INL</sub> or V <sub>INH</sub>                  |
|                                               | 1.5                                                        | 1.5                                                        | 1.5                                                         | mA max |                                                                         |
| Power Dissipation                             | 11                                                         | 10                                                         | 10                                                          | mW typ |                                                                         |
|                                               | 25                                                         | 25                                                         | 25                                                          | mW max |                                                                         |

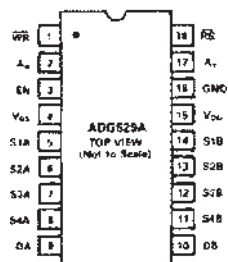
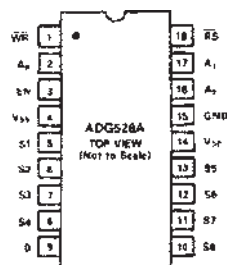
## NOTE

<sup>1</sup>Sample tested at +25°C to ensure compliance.

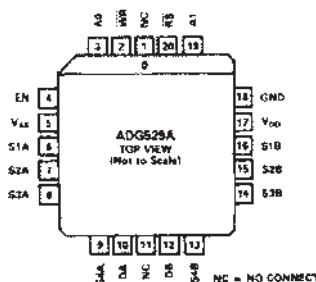
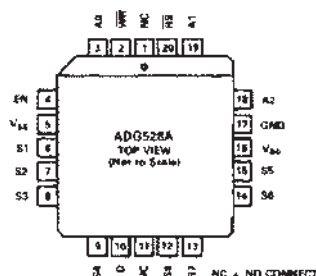
Specifications subject to change without notice.

## PIN CONFIGURATIONS

## DIP/SOIC



**PLCC**



### ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

|                            |      |
|----------------------------|------|
| $V_{DD}$ to $V_{SS}$ ..... | 44 V |
|----------------------------|------|

|                        |      |
|------------------------|------|
| V <sub>DD</sub> to GND | 25 V |
|------------------------|------|

|                        |            |
|------------------------|------------|
| V <sub>SS</sub> to GND | .....-25 V |
|------------------------|------------|

### Analog Inputs<sup>2</sup>

Voltage at S, D . . . . .  $V_{SS} - 2\text{ V}$  to  $V_{DD} + 2\text{ V}$  or 20 mA,  
whichever Occurs First

Continuous Current, S or D ..... 20 mA

Pulsed Current, S or D

1 ms duration, 10% Duty Cycle ..... 40 mA

Digital Inputs<sup>1</sup>

Voltage at A, EN,  $\overline{\text{WR}}$ ,  $\overline{\text{RS}}$  . . . . .  $V_{\text{SS}} - 4 \text{ V}$  to  $V_{\text{DD}} + 4 \text{ V}$  or  
20 mA, whichever Occurs First

Power Dissipation (Any Package)

|                   |        |
|-------------------|--------|
| Up to +75°C ..... | 470 mW |
|-------------------|--------|

Derates above +75°C ..... 6 mW/°C

Operating Temperature

Commercial (K Version) ..... -40°C to +85°C

|                              |                |
|------------------------------|----------------|
| Commercial (R Version) ..... | -40°C to +85°C |
| Industrial (B Version) ..... | -40°C to +85°C |

|                              |                 |
|------------------------------|-----------------|
| Industrial (E Version) ..... | -40°C to +85°C  |
| Extended (T Version) .....   | -55°C to +125°C |

|                                 |                   |
|---------------------------------|-------------------|
| Extended (1 Version) .....      | 55 °C to +125 °C  |
| Storage Temperature Range ..... | -65 °C to +150 °C |

|                                      |                   |
|--------------------------------------|-------------------|
| Storage Temperature Range            | -55 °C to +150 °C |
| Lead Temperature (Soldering, 10 sec) | +300°C            |

## NOTES

<sup>1</sup>Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

<sup>2</sup>Overvoltage at A, EN,  $\overline{\text{WR}}$ ,  $\overline{\text{RS}}$ , S or D will be clamped by diodes. Current should be limited to the maximum rating above.

## 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.

# ADG528A

TRUTH TABLES

| A2 | A1 | A0 | EN | $\overline{WR}$                  | $\overline{RS}$ | ON SWITCH PAIR                            |
|----|----|----|----|----------------------------------|-----------------|-------------------------------------------|
| X  | X  | X  | X  | $\overline{\text{L}}^{\text{H}}$ | 1               | Retains Previous Switch Condition         |
| X  | X  | X  | X  | X                                | 0               | NONE (Address and Enable Latches Cleared) |
| X  | X  | X  | 0  | 0                                | 1               | NONE                                      |
| 0  | 0  | 0  | 1  | 0                                | 1               | 1                                         |
| 0  | 0  | 1  | 1  | 0                                | 1               | 2                                         |
| 0  | 1  | 0  | 1  | 0                                | 1               | 3                                         |
| 0  | 1  | 1  | 1  | 0                                | 1               | 4                                         |
| 1  | 0  | 0  | 1  | 0                                | 1               | 5                                         |
| 1  | 0  | 1  | 1  | 0                                | 1               | 6                                         |
| 1  | 1  | 0  | 1  | 0                                | 1               | 7                                         |
| 1  | 1  | 1  | 1  | 0                                | 1               | 8                                         |

X = Don't Care

ADG528A

| A1 | A0 | EN | $\overline{WR}$                  | $\overline{RS}$ | ON SWITCH PAIR                            |
|----|----|----|----------------------------------|-----------------|-------------------------------------------|
| X  | X  | X  | $\overline{\text{L}}^{\text{H}}$ | 1               | Retains Previous Switch Condition         |
| X  | X  | X  | X                                | 0               | NONE (Address and Enable Latches Cleared) |
| X  | X  | 0  | 0                                | 1               | NONE                                      |
| 0  | 0  | 1  | 0                                | 1               | 1                                         |
| 0  | 1  | 1  | 0                                | 1               | 2                                         |
| 1  | 0  | 1  | 0                                | 1               | 3                                         |
| 1  | 1  | 1  | 0                                | 1               | 4                                         |

X = Don't Care

ADG529A

TIMING DIAGRAMS

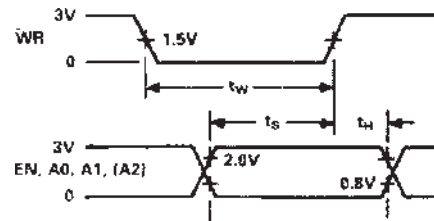


Figure 1.

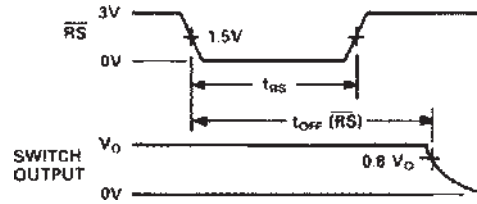


Figure 2.

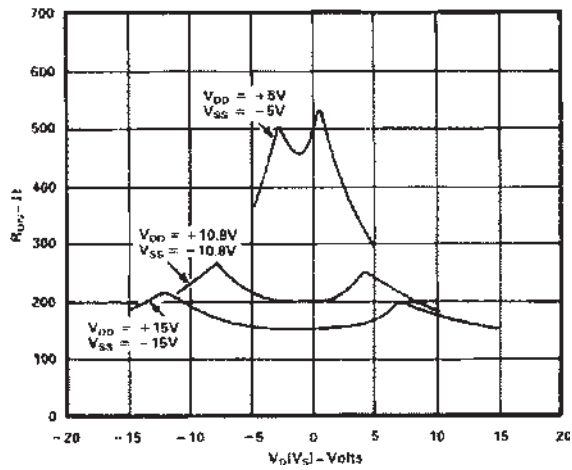
Figure 1 shows the timing sequence for latching the switch address and enable inputs. The latches are level sensitive; therefore, while  $\overline{WR}$  is held low, the latches are transparent and the switches respond to the address and enable inputs. This input data is latched on the rising edge of  $\overline{WR}$ .

Figure 2 shows the Reset Pulse Width,  $t_{RS}$ , and Reset Turn-off Time,  $t_{OFF}(\overline{RS})$ .

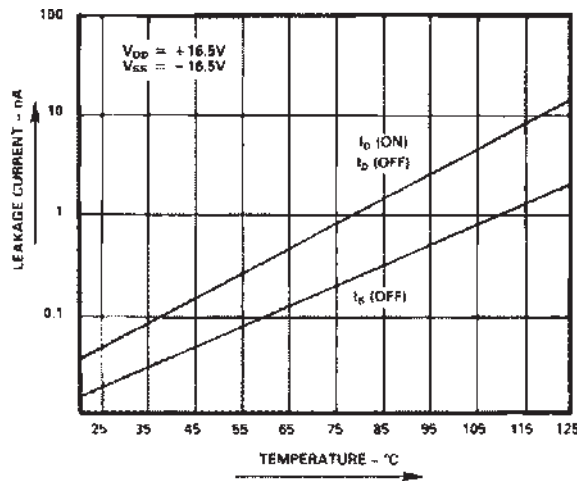
Note: All digital input signals rise and fall times measured from 10% to 90% of 3 V.  $t_R = t_F = 20$  ns.

# Typical Performance Characteristics—ADG528A

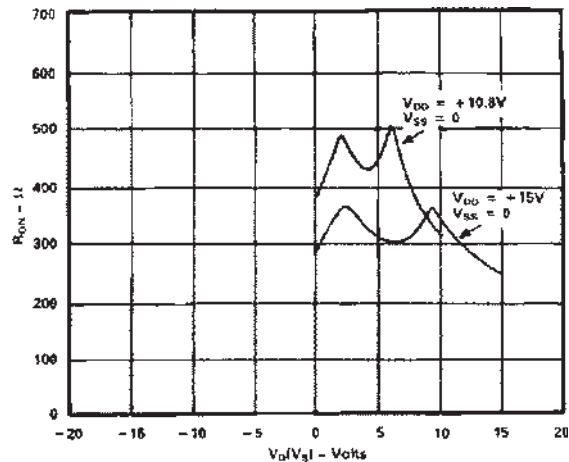
The multiplexers are guaranteed functional with reduced single or dual supplies down to 4.5 V.



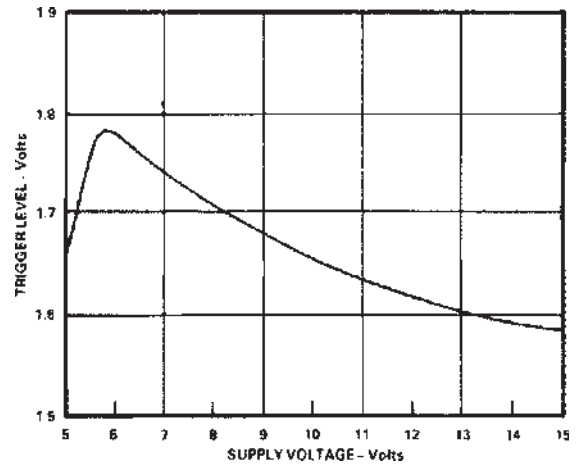
TPC 1.  $R_{ON}$  as a Function of  $V_D(V_S)$ : Dual Supply Voltage,  $T_A = +25^\circ C$



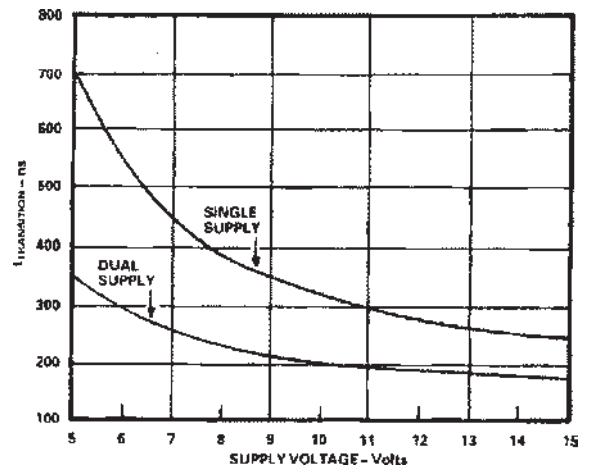
TPC 2. Leakage Current as a Function of Temperature (Note: Leakage Currents Reduce as the Supply Voltages Reduce)



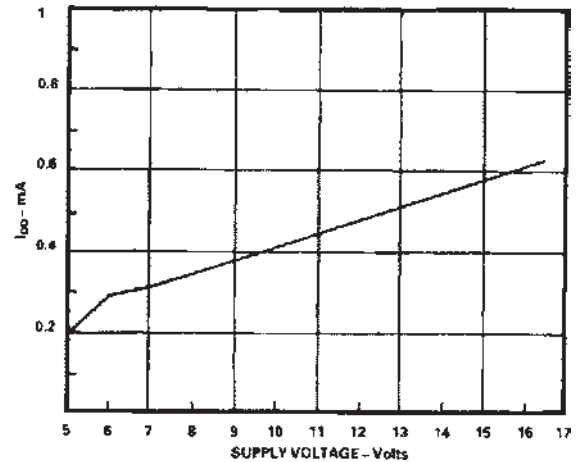
TPC 3.  $R_{ON}$  as a Function of  $V_D(V_S)$ : Single Supply Voltage,  $T_A = +25^\circ C$



TPC 4. Trigger Levels vs. Power Supply Voltage, Dual or Single Supply,  $T_A = +25^\circ C$



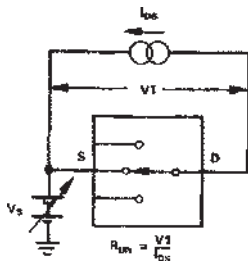
TPC 5.  $t_{TRANSITION}$  vs. Supply Voltage: Dual and Single Supplies,  $T_A = +25^\circ C$  (Note: For  $V_{DD}$  and  $|V_{SS}| < 10 V$ ;  $V1 = V_{DD}/V_{SS}$ ,  $V2 = V_{SS}/V_{DD}$ . See Test Circuit 6)



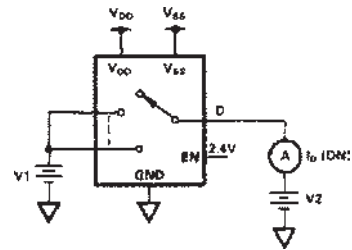
TPC 6.  $I_{DD}$  vs. Supply Voltage: Dual or Single Supply,  $T_A = +25^\circ C$

# ADG528A

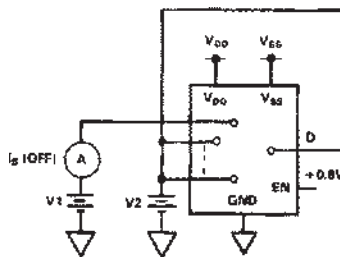
## Test Circuits



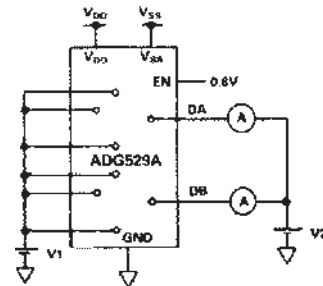
Test Circuit 1.  $R_{ON}$



Test Circuit 4.  $I_D$  (ON)

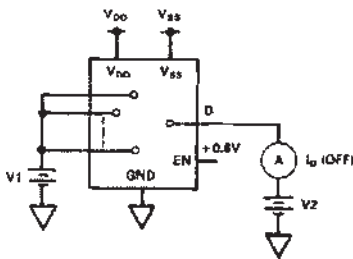


Test Circuit 2.  $I_S$  (OFF)

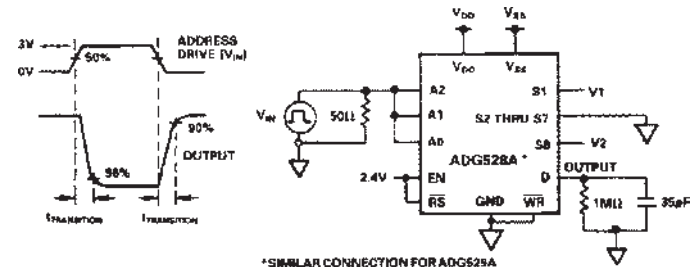


$$I_{DIFF} = I_{DA} (OFF) - I_{DB} (OFF)$$

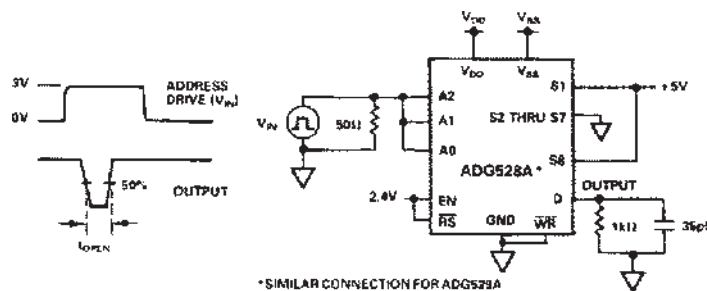
Test Circuit 5.  $I_{DIFF}$



Test Circuit 3.  $I_D$  (OFF)

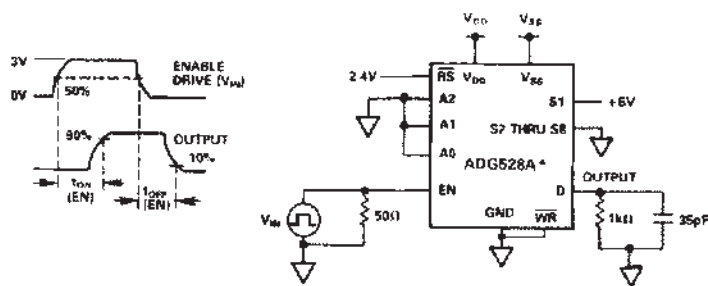


Test Circuit 6. Switching Time of Multiplexer,  $t_{TRANSITION}$



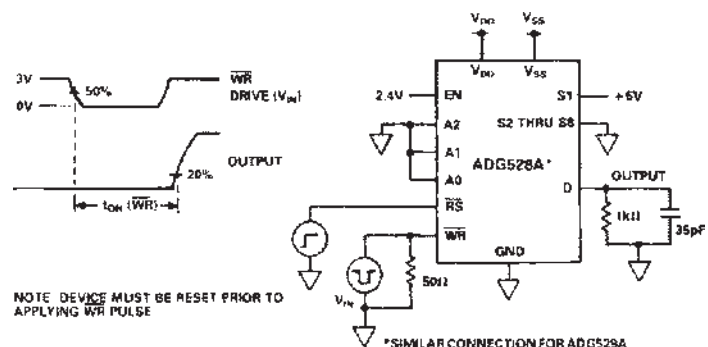
Test Circuit 7. Break-Before-Make Delay,  $t_{OPEN}$





\*SIMILAR CONNECTION FOR ADG528A

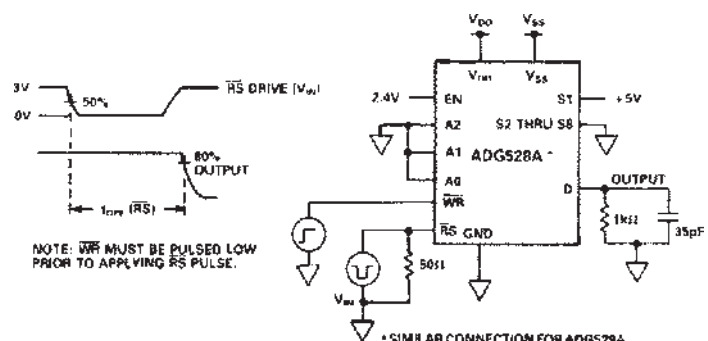
Test Circuit 8. Enable Delay,  $t_{ON}(EN)$ ,  $t_{OFF}(EN)$



NOTE: DEVICE MUST BE RESET PRIOR TO APPLYING WR PULSE

\*SIMILAR CONNECTION FOR ADG528A

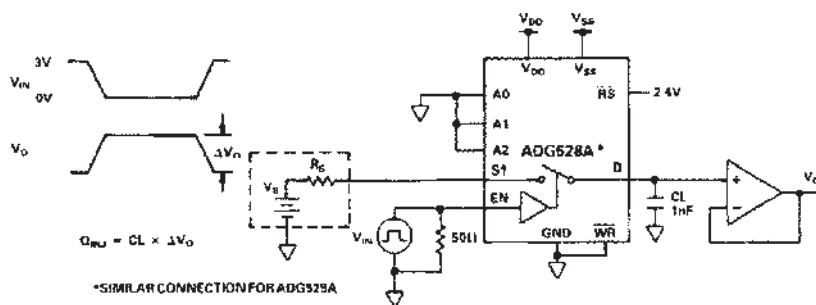
Test Circuit 9. Write Turn-On Time,  $t_{ON}(\overline{WR})$



NOTE: WR MUST BE PULSED LOW PRIOR TO APPLYING RS PULSE.

\*SIMILAR CONNECTION FOR ADG528A

Test Circuit 10. Reset Turn-Off Time,  $t_{OFF}(\overline{RS})$



\*SIMILAR CONNECTION FOR ADG528A

Test Circuit 11. Charge Injection

# ADG528A

## TERMINOLOGY

|                |                                                                                           |                     |                                                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| $R_{ON}$       | Ohmic resistance between terminals D and S                                                | $t_{OFF} (EN)$      | Delay time between the 50% and 10% points of the digital input and switch “OFF” condition                                                   |
| $R_{ON} Match$ | Difference between the $R_{ON}$ of any two channels                                       | $t_{TRANSITION}$    | Delay time between the 50% and 90% points of the digital inputs and switch “ON” condition when switching from one address state to another. |
| $R_{ON} Drift$ | Change in $R_{ON}$ versus temperature                                                     | $t_{OPEN}$          | “OFF” time measured between 50% points of both switches when switching from one address state to another                                    |
| $I_S (OFF)$    | Source terminal leakage current when the switch is off.                                   | $V_{INL}$           | Maximum input voltage for Logic “0”                                                                                                         |
| $I_D (OFF)$    | Drain terminal leakage current when the switch is off.                                    | $V_{INH}$           | Minimum input voltage for Logic “1”                                                                                                         |
| $I_D (ON)$     | Leakage current that flows from the closed switch into the body.                          | $I_{INL} (I_{INH})$ | Input current of the digital input                                                                                                          |
| $V_S (V_D)$    | Analog voltage on terminal S or D                                                         | $V_{DD}$            | Most positive voltage supply                                                                                                                |
| $C_S (OFF)$    | Channel input capacitance for “OFF” condition                                             | $V_{SS}$            | Most negative voltage supply                                                                                                                |
| $C_D (OFF)$    | Channel output capacitance for “OFF” condition                                            | $I_{DD}$            | Positive supply current                                                                                                                     |
| $C_{IN}$       | Digital input capacitance                                                                 | $I_{SS}$            | Negative supply current                                                                                                                     |
| $t_{ON} (EN)$  | Delay time between the 50% and 90% points of the digital input and switch “ON” condition. |                     |                                                                                                                                             |

Technical drawings of the 18-pin connector showing top, side, and cross-sectional views with dimensions in inches and millimeters.

**Top View Dimensions:**

- Overall width: 0.920 (23.37)
- Width between pin 1 and pin 18: 0.900 (22.86)
- Width between pin 1 and pin 9: 0.880 (22.35)
- Pin pitch (BSC): 0.100 (2.54)
- Pin 1 location: 0.280 (7.11) from right edge, 0.250 (6.35) from bottom edge, 0.240 (6.10) from top edge.

**Side View Dimensions:**

- Pin height: 0.210 (5.33) MAX
- Pin diameter: 0.150 (3.81)
- Pin diameter: 0.130 (3.30)
- Pin diameter: 0.115 (2.92)
- Pin diameter: 0.022 (0.56)
- Pin diameter: 0.018 (0.46)
- Pin diameter: 0.014 (0.36)
- Pin diameter: 0.070 (1.78)
- Pin diameter: 0.060 (1.52)
- Pin diameter: 0.045 (1.14)
- Pin diameter: 0.015 (0.38) MIN
- Seating Plane: 0.005 (0.13) MIN

**Cross-sectional View Dimensions:**

- Pin diameter: 0.325 (8.26)
- Pin diameter: 0.310 (7.87)
- Pin diameter: 0.300 (7.62)
- Pin diameter: 0.195 (4.95)
- Pin diameter: 0.130 (3.30)
- Pin diameter: 0.115 (2.92)
- Pin diameter: 0.014 (0.36)
- Pin diameter: 0.010 (0.25)
- Pin diameter: 0.008 (0.20)
- Pin diameter: 0.060 (1.52) MAX
- Pin diameter: 0.015 (0.38) GAUGE PLANE
- Pin diameter: 0.430 (10.92) MAX

070706-A

*Dimensions Shown in inches and (millimeters)*

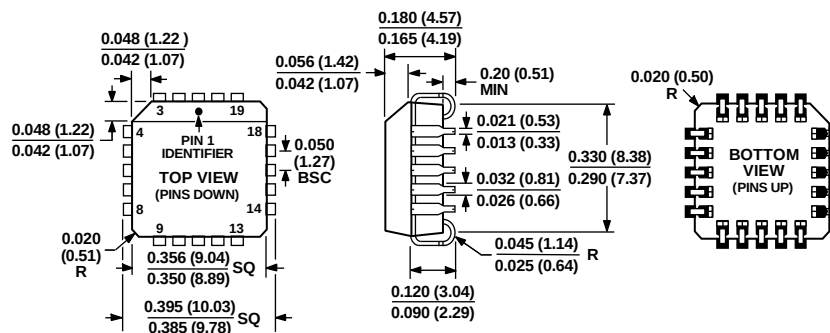
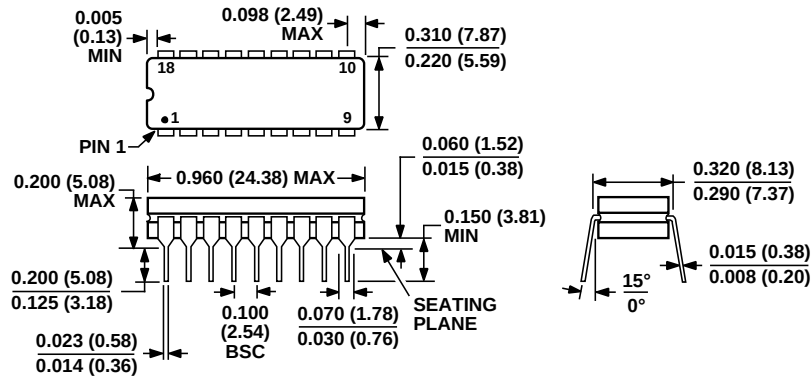


Figure 2. 20-Lead Plastic Leaded Chip Carrier [PLCC]  
(P-20)

*Dimensions shown in inches and (millimeters)*



**CONTROLLING DIMENSIONS ARE IN INCHES; MILLIMETERS DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF INCH EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.**

Figure 3. 18-Lead Ceramic Dual In-Line Package [CERDIP]  
(Q-18)

*Dimensions shown in inches and (millimeters)*

## ORDERING GUIDE

| Model <sup>1</sup> | Temperature Range | Package Description                           | Package Option |
|--------------------|-------------------|-----------------------------------------------|----------------|
| ADG528AKN          | −40°C to +85°C    | 18-Lead Plastic Dual In-Line Package [PDIP]   | N−18           |
| ADG528AKNZ         | −40°C to +85°C    | 18-Lead Plastic Dual In-Line Package [PDIP]   | N−18           |
| ADG528AKP          | −40°C to +85°C    | 20-Lead Plastic Leaded Chip Carrier [PLCC]    | P−20           |
| ADG528AKP-REEL     | −40°C to +85°C    | 20-Lead Plastic Leaded Chip Carrier [PLCC]    | P−20           |
| ADG528AKPZ         | −40°C to +85°C    | 20-Lead Plastic Leaded Chip Carrier [PLCC]    | P-20           |
| ADG528AKPZ-REEL    | −40°C to +85°C    | 20-Lead Plastic Leaded Chip Carrier [PLCC]    | P-20           |
| ADG528ATQ          | −55°C to +125°C   | 18-Lead Ceramic Dual In-Line Package [CERDIP] | Q-18           |
| ADG528ABCHIPS      | −55°C to +125°C   | DIE                                           |                |

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

**REVISION HISTORY****8/2017—Rev. B to Rev. C**

|                                  |    |
|----------------------------------|----|
| Added ADG529A Obsolete Note..... | 1  |
| Updated Outline Dimensions.....  | 11 |
| Changes to Ordering Guide` ..... | 12 |

**10/2004—Rev. A to Rev. B**

|                                           |           |
|-------------------------------------------|-----------|
| Deleted 20-Lead LCC Package .....         | Universal |
| Changes to Features .....                 | 5         |
| Changes to Ordering Guide.....            | 6         |
| SOIC added to DIP Pin Configuration ..... | 5         |

