

# ADG201A/ADG202A—SPECIFICATIONS ( $V_{DD} = +15V$ , $V_{SS} = -15V$ , unless otherwise specified)

| Parameter                                            | K Version<br>– 40°C to |        | B Version<br>– 40°C to |        | T Version<br>– 55°C to |         | Units    | Test Conditions                                                                                                                     |
|------------------------------------------------------|------------------------|--------|------------------------|--------|------------------------|---------|----------|-------------------------------------------------------------------------------------------------------------------------------------|
|                                                      | 25°C                   | + 85°C | 25°C                   | + 85°C | 25°C                   | + 125°C |          |                                                                                                                                     |
| ANALOG SWITCH                                        |                        |        |                        |        |                        |         |          |                                                                                                                                     |
| Analog Signal Range                                  | ± 15                   | ± 15   | ± 15                   | ± 15   | ± 15                   | ± 15    | Volts    | – 10V ≤ V <sub>S</sub> ≤ + 10V<br>I <sub>DS</sub> = 1.0mA<br>Test Circuit 1                                                         |
| R <sub>ON</sub>                                      | 60                     |        | 60                     |        | 60                     |         | Ω typ    |                                                                                                                                     |
|                                                      | 90                     | 145    | 90                     | 145    | 90                     | 145     | Ω max    |                                                                                                                                     |
| R <sub>ON</sub> vs. V <sub>D</sub> (V <sub>S</sub> ) | 20                     |        | 20                     |        | 20                     |         | % typ    | V <sub>S</sub> = 0V, I <sub>DS</sub> = 1mA                                                                                          |
| R <sub>ON</sub> Drift                                | 0.5                    |        | 0.5                    |        | 0.5                    |         | %/°C typ |                                                                                                                                     |
| R <sub>ON</sub> Match                                | 5                      |        | 5                      |        | 5                      |         | % typ    |                                                                                                                                     |
| I <sub>S</sub> (OFF)                                 | 0.5                    |        | 0.5                    |        | 0.5                    |         | nA typ   | V <sub>D</sub> = ± 14V; V <sub>S</sub> = ± 14V; Test Circuit 2                                                                      |
| OFF Input Leakage                                    | 2                      | 100    | 2                      | 100    | 1                      | 100     | nA max   |                                                                                                                                     |
| I <sub>D</sub> (OFF)                                 | 0.5                    |        | 0.5                    |        | 0.5                    |         | nA typ   | V <sub>D</sub> = ± 14V; V <sub>S</sub> = ± 14V; Test Circuit 2                                                                      |
| OFF Output Leakage                                   | 2                      | 100    | 2                      | 100    | 1                      | 100     | nA max   |                                                                                                                                     |
| I <sub>D</sub> (ON)                                  | 0.5                    |        | 0.5                    |        | 0.5                    |         | nA typ   | V <sub>D</sub> = ± 14V; Test Circuit 3                                                                                              |
| ON Channel Leakage                                   | 2                      | 200    | 2                      | 200    | 1                      | 200     | nA max   |                                                                                                                                     |
| 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   |                                                                                                                                     |
| DYNAMIC CHARACTERISTICS                              |                        |        |                        |        |                        |         |          |                                                                                                                                     |
| t <sub>OPEN</sub>                                    | 30                     |        | 30                     |        | 30                     |         | ns typ   | Test Circuit 4<br>Test Circuit 4<br>V <sub>S</sub> = 10V(p-p); f = 100kHz<br>R <sub>L</sub> = 75Ω; Test Circuit 6<br>Test Circuit 7 |
| t <sub>ON</sub> <sup>1</sup>                         | 300                    |        | 300                    |        | 300                    |         | ns max   |                                                                                                                                     |
| t <sub>OFF</sub> <sup>1</sup>                        | 250                    |        | 250                    |        | 250                    |         | ns max   |                                                                                                                                     |
| OFF Isolation                                        | 80                     |        | 80                     |        | 80                     |         | dB typ   |                                                                                                                                     |
| Channel-to-Channel Crosstalk                         | 80                     |        | 80                     |        | 80                     |         | dB typ   | R <sub>S</sub> = 0Ω; C <sub>L</sub> = 1000pF; V <sub>S</sub> = 0V<br>Test Circuit 5                                                 |
| C <sub>S</sub> (OFF)                                 | 5                      |        | 5                      |        | 5                      |         | pF typ   |                                                                                                                                     |
| C <sub>D</sub> (OFF)                                 | 5                      |        | 5                      |        | 5                      |         | pF typ   |                                                                                                                                     |
| C <sub>D</sub> , C <sub>S</sub> (ON)                 | 16                     |        | 16                     |        | 16                     |         | pF typ   |                                                                                                                                     |
| C <sub>IN</sub> Digital Input Capacitance            | 5                      |        | 5                      |        | 5                      |         | pF typ   |                                                                                                                                     |
| Q <sub>INJ</sub> Charge Injection                    | 20                     |        | 20                     |        | 20                     |         | pC typ   |                                                                                                                                     |
|                                                      |                        |        |                        |        |                        |         |          |                                                                                                                                     |
| POWER SUPPLY                                         |                        |        |                        |        |                        |         |          |                                                                                                                                     |
| I <sub>DD</sub>                                      | 0.6                    |        | 0.6                    |        | 0.6                    |         | mA typ   | Digital Inputs = V <sub>INL</sub> or V <sub>INH</sub>                                                                               |
| I <sub>DD</sub>                                      |                        | 2      |                        | 2      |                        | 2       | mA max   |                                                                                                                                     |
| I <sub>SS</sub>                                      | 0.1                    |        | 0.1                    |        | 0.1                    |         | mA typ   |                                                                                                                                     |
| I <sub>SS</sub>                                      |                        | 0.2    |                        | 0.2    |                        | 0.2     | mA max   |                                                                                                                                     |
| Power Dissipation                                    |                        | 33     |                        | 33     |                        | 33      | mW max   |                                                                                                                                     |

## NOTES

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

Specifications subject to change without notice.

## ABSOLUTE MAXIMUM RATINGS\*

( $T_A = +25^\circ C$  unless otherwise stated)

|                              |                                                                |
|------------------------------|----------------------------------------------------------------|
| $V_{DD}$ to $V_{SS}$         | 44V                                                            |
| $V_{DD}$ to GND              | 25V                                                            |
| $V_{SS}$ to GND              | –25V                                                           |
| Analog Inputs <sup>1</sup>   |                                                                |
| Voltage at S, D              | $V_{SS} - 0.3V$ to $V_{DD} + 0.3V$                             |
| Continuous Current, S or D   | 30mA                                                           |
| Pulsed Current S or D        |                                                                |
| 1ms Duration, 10% Duty Cycle | 70mA                                                           |
| Digital Inputs <sup>1</sup>  |                                                                |
| Voltage at IN                | $V_{SS} - 2V$ to $V_{DD} + 2V$ or 20mA, Whichever Occurs First |

## Power Dissipation (Any Package)

|                        |        |
|------------------------|--------|
| Up to +75°C            | 470mW  |
| Derates above +75°C by | 6mW/°C |

## Operating Temperature

|                                    |                 |
|------------------------------------|-----------------|
| Commercial (K Version)             | –40°C to +85°C  |
| Industrial (B Version)             | –40°C to +85°C  |
| Extended (T Version)               | –55°C to +125°C |
| Storage Temperature Range          | –65°C to +150°C |
| Lead Temperature (Soldering 10sec) | +300°C          |

## NOTE

<sup>1</sup>Overvoltage at IN, S or D will be clamped by diodes. Current should be limited to the Maximum Rating above.

\*COMMENT: 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. Only one Absolute Maximum Rating may be applied at any one time.

## CAUTION

ESD (electrostatic discharge) sensitive device. The digital control inputs are diode protected; however, permanent damage may occur on unconnected devices subject to high energy electrostatic fields. Unused devices must be stored in conductive foam or shunts. The protective foam should be discharged to the destination socket before devices are removed.



## ORDERING GUIDE

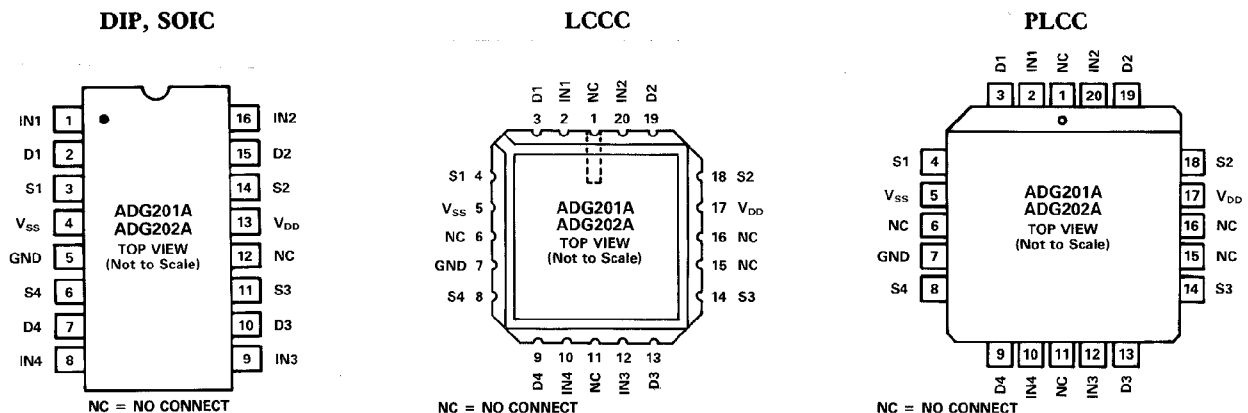
| Model <sup>1</sup> | Temperature Range | Package Option <sup>2</sup> |
|--------------------|-------------------|-----------------------------|
| ADG201AKN          | -40°C to +85°C    | N-16                        |
| ADG201AKR          | -40°C to +85°C    | R-16A                       |
| ADG201AKP          | -40°C to +85°C    | P-20A                       |
| ADG201ABQ          | -40°C to +85°C    | Q-16                        |
| ADG201ATQ          | -55°C to +125°C   | Q-16                        |
| ADG201ATE          | -55°C to +125°C   | E-20A                       |
| ADG202AKN          | -40°C to +85°C    | N-16                        |
| ADG202AKR          | -40°C to +85°C    | R-16A                       |
| ADG202AKP          | -40°C to +85°C    | P-20A                       |
| ADG202ABQ          | -40°C to +85°C    | Q-16                        |
| ADG202ATQ          | -55°C to +125°C   | Q-16                        |
| ADG202ATE          | -55°C to +125°C   | E-20A                       |

## NOTES

<sup>1</sup>To order MIL-STD-883, Class B processed parts, add/883B to T grade part numbers. See Analog Devices Military Products Databook (1990) for military data sheet.

<sup>2</sup>E = Leadless Ceramic Chip Carrier (LCCC); N = Plastic DIP; R = 0.15" Small Outline IC (SOIC); P = Plastic Leaded Chip Carrier (PLCC); Q = Cerdip.

## PIN CONFIGURATIONS



## ADG201A/ADG202A FUNCTIONAL DIAGRAM

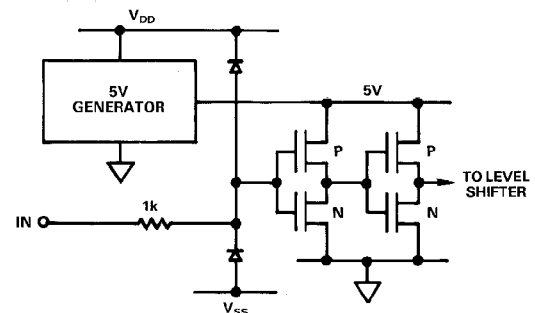
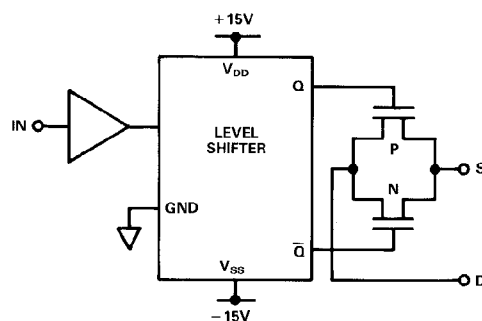
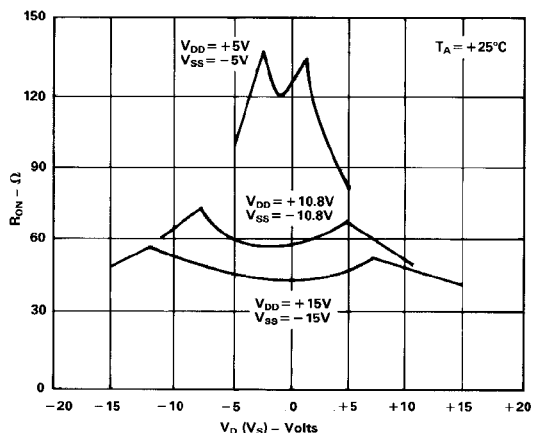


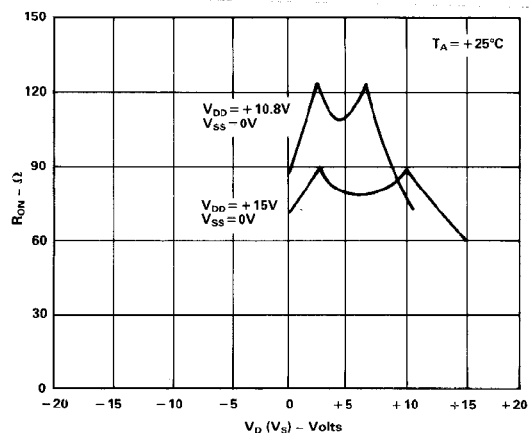
Figure 1. Typical Digital Input Cell

# ADG201A/ADG202A—Typical Performance Characteristics

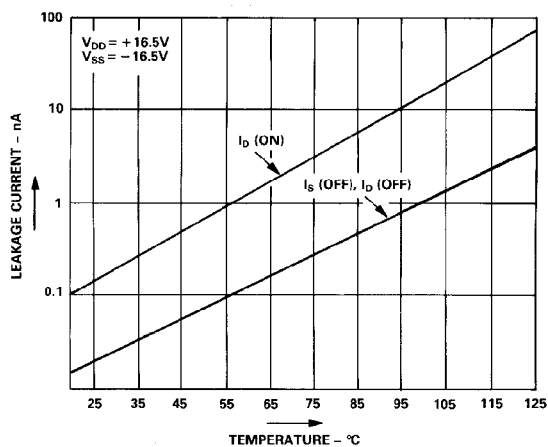
The switches are guaranteed functional with reduced single or dual supplies down to 4.5V.



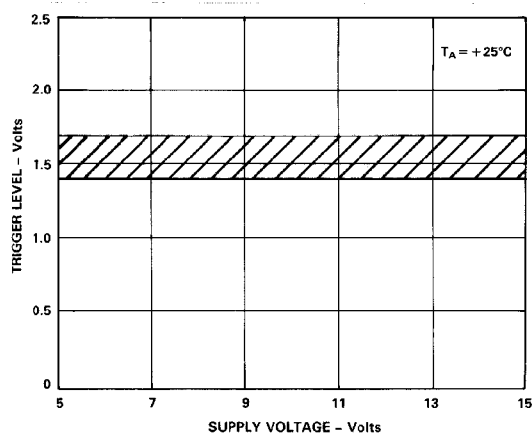
$R_{ON}$  as a Function of  $V_D$  ( $V_S$ ): Dual Supply Voltage



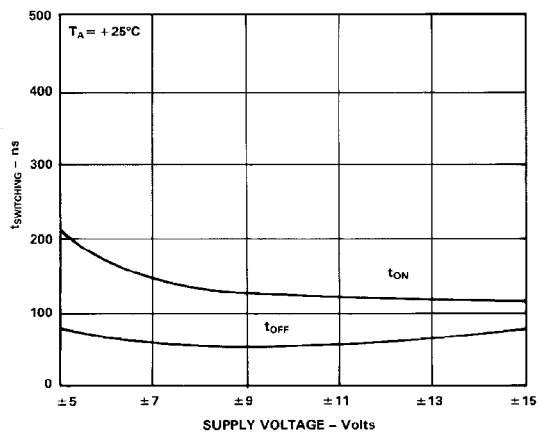
$R_{ON}$  as a Function of  $V_D$  ( $V_S$ ): Single Supply Voltage



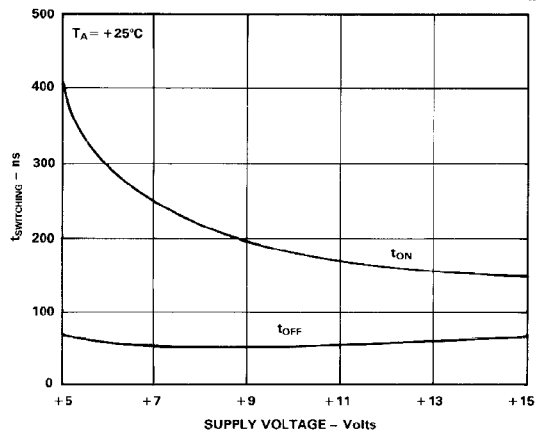
Leakage Current as a Function of Temperature (Note: Leakage Currents Reduce as the Supply Voltages Reduce)



Trigger Level vs. Power Supply Voltage: Dual or Single Supply Voltage

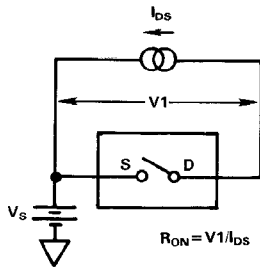


Switching Time vs. Supply Voltage (Dual Supply)

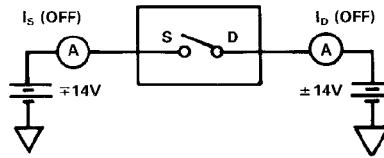


Switching Time vs. Supply Voltage (Single Supply)

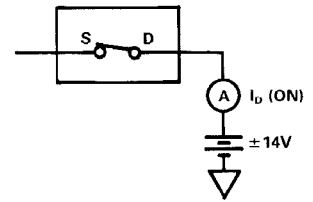
# Test Circuits—ADG201A/ADG202A



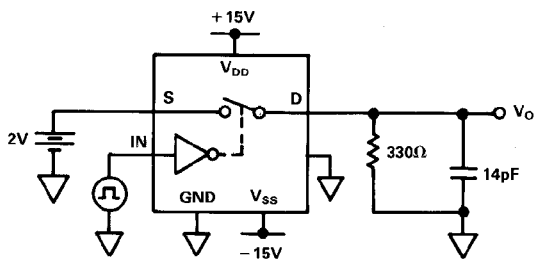
Test Circuit 1



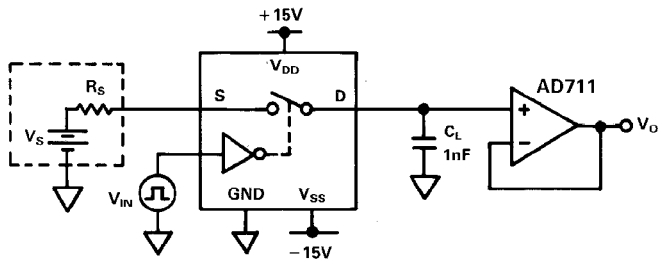
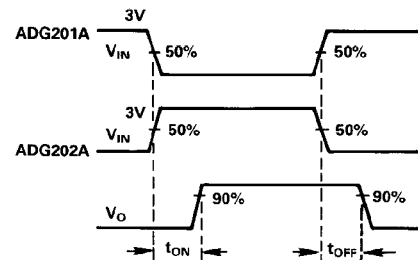
Test Circuit 2



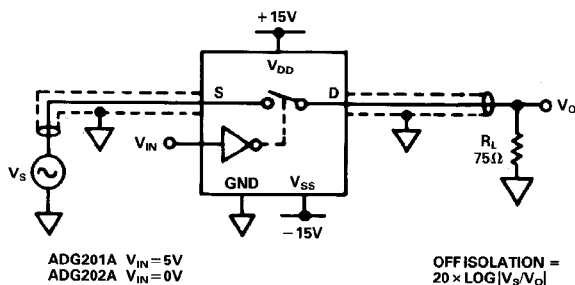
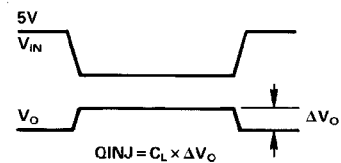
Test Circuit 3



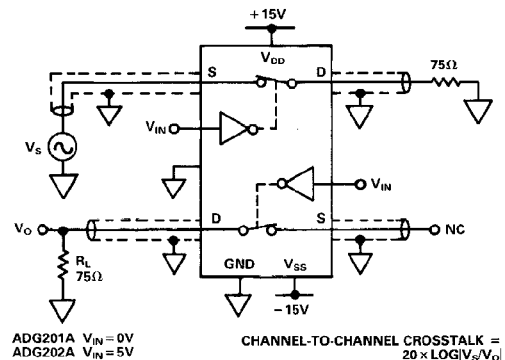
Test Circuit 4



Test Circuit 5. Charge Injection



Test Circuit 6. Off Isolation



Test Circuit 7. Channel-to-Channel Crosstalk

# ADG201A/ADG202A

## TERMINOLOGY

|                 |                                                                 |
|-----------------|-----------------------------------------------------------------|
| $R_{ON}$        | Ohmic resistance between terminals OUT and S                    |
| $R_{ON}$ Match  | Difference between the $R_{ON}$ of any two channels             |
| $I_S$ (OFF)     | Source terminal leakage current when the switch is off          |
| $I_D$ (OFF)     | Drain terminal leakage current when the switch is off           |
| $I_D$ (ON)      | Leakage current that flows from the closed switch into the body |
| $V_D$ ( $V_S$ ) | Analog voltage on terminal D, S                                 |
| $C_S$ (OFF)     | Switch input capacitance "OFF" condition                        |
| $C_D$ (OFF)     | Switch output capacitance "OFF" condition                       |
| $C_{IN}$        | Digital input capacitance                                       |
| $C_D, C_S$ (ON) | Input or output capacitance when the switch is on               |

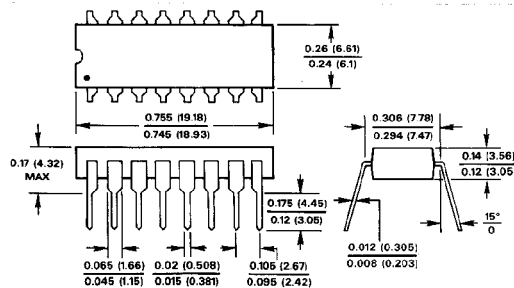
|                         |                                                                                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| $t_{ON}$                | Delay time between the 50% and 90% points of the digital input and switch "ON" condition                                                        |
| $t_{OFF}$               | Delay time between the 50% and 90% points of the digital input and switch "OFF" condition                                                       |
| $t_{OPEN}$              | "OFF" time measured between 50% points of both switches, which are connected as a multiplexer, when switching from one address state to another |
| $V_{INL}$               | Maximum Input Voltage for a Logic Low                                                                                                           |
| $V_{INH}$               | Minimum Input Voltage for a Logic High                                                                                                          |
| $I_{INL}$ ( $I_{INH}$ ) | Input current of the digital input                                                                                                              |
| $V_{DD}$                | Most positive voltage supply                                                                                                                    |
| $V_{SS}$                | Most negative voltage supply                                                                                                                    |
| $I_{DD}$                | Positive supply current                                                                                                                         |
| $I_{SS}$                | Negative supply current                                                                                                                         |

## MECHANICAL INFORMATION

### OUTLINE DIMENSIONS

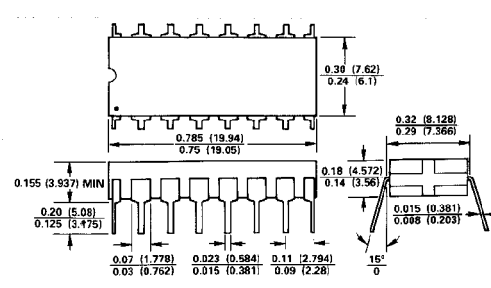
Dimensions shown in inches and (mm).

#### 16-Pin Plastic (N-16)

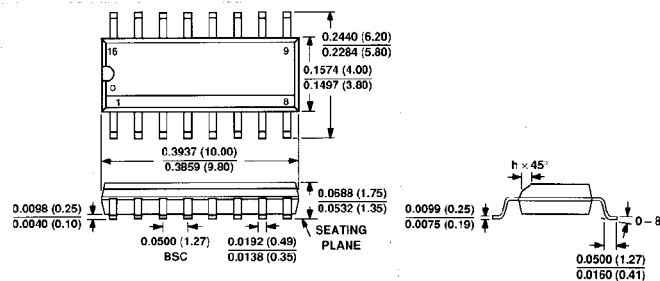


LEAD NO. 1 IDENTIFIED BY DOT OR NOTCH  
LEADS ARE SOLDER OR TIN-PLATED KOVAR OR ALLOY 42

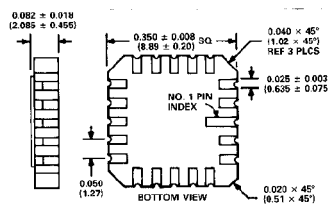
#### 16-Pin Cerdip (Q-16)



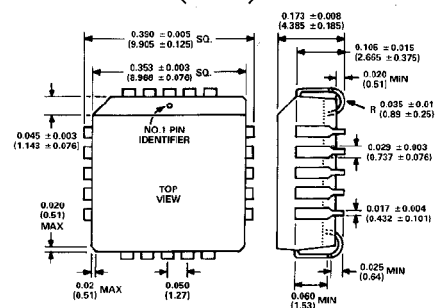
#### SOIC Package (R-16A)



#### 20-Terminal Leadless Ceramic Chip Carrier (E-20A)



#### 20-Terminal Plastic Leaded Chip Carrier (P-20A)



## Package/Price Information

For detailed packaging information, please select the **Datasheets** button.

60 Ohm, Quad SPST Switch (Normally Closed Switches, DG201A replacement)

| Model           | Status     | Package Description         | Pin Count | Temperature Range | Price* (100-499) |
|-----------------|------------|-----------------------------|-----------|-------------------|------------------|
| ADG201ABCHIPS   | PRODUCTION | CHIPS/DIE SALES             | 16        | INDUSTRIAL        | \$3.22           |
| ADG201ABQ       | PRODUCTION | CERDIP GLASS SEAL           | 16        | INDUSTRIAL        | \$3.71           |
| ADG201AKN       | PRODUCTION | PLASTIC/EPOXY DIP           | 16        | COMMERCIAL        | \$1.91           |
| ADG201AKN/+     | OBSOLETE   | PLASTIC/EPOXY DIP           | 16        | COMMERCIAL        | -                |
| ADG201AKP       | PRODUCTION | PLASTIC LEAD CHIP CARRIER   | 20        | COMMERCIAL        | \$2.17           |
| ADG201AKP-REEL  | PRODUCTION | PLASTIC LEAD CHIP CARRIER   | 20        | COMMERCIAL        | -                |
| ADG201AKR       | PRODUCTION | SO NARROW .150" - 2mm thick | 16        | COMMERCIAL        | \$1.91           |
| ADG201AKR-REEL  | PRODUCTION | SO NARROW .150" - 2mm thick | 16        | COMMERCIAL        | -                |
| ADG201AKR-REEL7 | PRODUCTION | SO NARROW .150" - 2mm thick | 16        | COMMERCIAL        | -                |
| ADG201ATCHIPS   | PRODUCTION | CHIPS/DIE SALES             | 16        | MILITARY          | \$4.40           |
| ADG201ATE       | PRODUCTION | CER. LEADLESS CHIP CARRIER  | 20        | MILITARY          | \$14.36          |
| ADG201ATE/883B  | PRODUCTION | CER. LEADLESS CHIP CARRIER  | 20        | MILITARY          | \$18.70          |
| ADG201ATQ       | PRODUCTION | CERDIP GLASS SEAL           | 16        | MILITARY          | \$8.21           |
| ADG201ATQ/883B  | PRODUCTION | CERDIP GLASS SEAL           | 16        | MILITARY          | \$11.48          |

\* This price is provided for budgetary purposes as recommended list price in U.S. Dollars per unit the stated volume. Pricing displayed for Evaluation Boards and Kits is based on 1-piece pricing. View [Pricing and Availability](#) (currently available to North American customers) for further information.