



# Precision 8-Ch/Dual 4-Ch Low Voltage Analog Multiplexers

## FEATURES

- 2.7-to 12-V Single Supply or  $\pm 3$ - to  $\pm 6$ -V Dual Supply Operation
- Low On-Resistance— $r_{ON}$ : 3.9  $\Omega$  Typ.
- Fast Switching:  $t_{ON}$  — 42 ns,  $t_{OFF}$  — 24 ns
- Break-Before-Make Guaranteed
- Low Leakage
- TTL, CMOS, LV Logic (3 V) Compatible
- 2000-V ESD Protection (HBM)

## BENEFITS

- High Accuracy
- Single and Dual Power Rail Capacity
- Wide Operating Voltage Range
- Simple Logic Interface

## APPLICATIONS

- Data Acquisition Systems
- Battery Operated Equipment
- Portable Test Equipment
- Sample and Hold Circuits
- Communication Systems
- SDSL, DSLAM
- Audio and Video Signal Routing

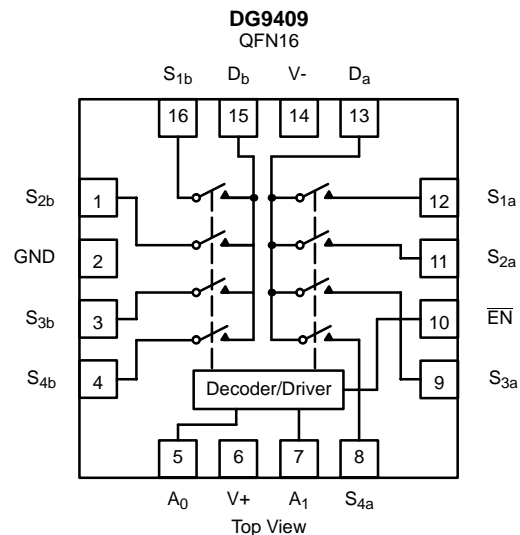
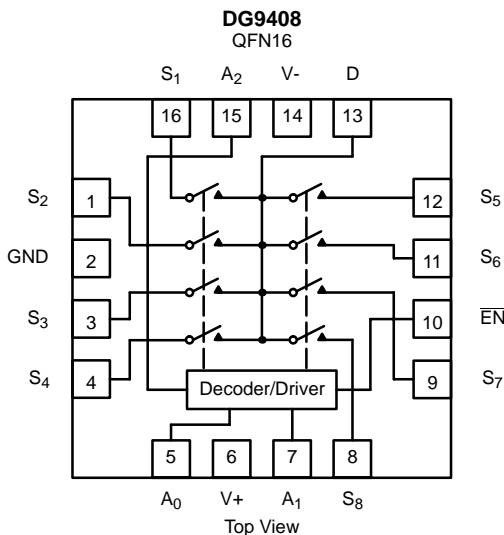
## DESCRIPTION

The DG9408/9409 uses BiCMOS wafer fabrication technology that allows the DG9408/9409 to operate on single and dual supplies. Single supply voltage ranges from 3- to 12-V while dual supply operation is recommended with  $\pm 3$  to  $\pm 6$  V.

The DG9408 is an 8-channel single-ended analog multiplexer designed to connect one of eight inputs to a common output

as determined by a 3-bit binary address ( $A_0$ ,  $A_1$ ,  $A_2$ ). The DG9409 is a dual 4-channel differential analog multiplexer designed to connect one of four differential inputs to a common dual output as determined by its 2-bit binary address ( $A_0$ ,  $A_1$ ). Break-before-make switching action to protect against momentary crosstalk between adjacent channels.

## FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION





# TRUTH TABLES AND ORDERING INFORMATION

## TRUTH TABLE — DG9408

| A <sub>2</sub> | A <sub>1</sub> | A <sub>0</sub> | EN | On Switch |
|----------------|----------------|----------------|----|-----------|
| X              | X              | X              | 1  | None      |
| 0              | 0              | 0              | 0  | 1         |
| 0              | 0              | 1              | 0  | 2         |
| 0              | 1              | 0              | 0  | 3         |
| 0              | 1              | 1              | 0  | 4         |
| 1              | 0              | 0              | 0  | 5         |
| 1              | 0              | 1              | 0  | 6         |
| 1              | 1              | 0              | 0  | 7         |
| 1              | 1              | 1              | 0  | 8         |

## TRUTH TABLE — DG9409

| A <sub>1</sub> | A <sub>0</sub> | EN | On Switch |
|----------------|----------------|----|-----------|
| X              | X              | 1  | None      |
| 0              | 0              | 0  | 1         |
| 0              | 1              | 0  | 2         |
| 1              | 0              | 0  | 3         |
| 1              | 1              | 0  | 4         |

X = Don't Care

For low and high voltage levels for V<sub>AX</sub> and V<sub>EN</sub> consult "Digital Control" Parameters for Specific V+ operation. See Specifications Tables for:

Single Supply 12 V

Dual Supply V+ = 5 V, V- = -5 V

Single Supply 5 V

Single Supply 3 V

## ORDERING INFORMATION — DG9408

| Temp Range  | Package             | Part Number |
|-------------|---------------------|-------------|
| -40 to 85°C | 16-Pin QFN (4x4 mm) | DG9408DN    |

## ORDERING INFORMATION — DG9409

| Temp Range  | Package             | Part Number |
|-------------|---------------------|-------------|
| -40 to 85°C | 16-Pin QFN (4x4 mm) | DG9409DN    |

## ABSOLUTE MAXIMUM RATINGS

Voltage Referenced to V-

|   |                            |
|---|----------------------------|
| V+  | 14 V                       |
| GND   | 7 V                        |
| Digital Inputs <sup>a</sup> , V <sub>S</sub> , V <sub>D</sub> | (V-) -0.3 V to (V+) +0.3 V |
| Current (Any Terminal Except S or D)                          | 30 mA                      |
| Continuous Current, S or D                                    | 100 mA                     |
| Peak Current, S or D  |                            |
| (Pulsed at 1 ms, 10% Duty Cycle Max)                          | 200 mA                     |
| Package Solder Reflow Conditions <sup>d</sup>                 |                            |
| 16-Pin (4x4 mm) QFN   | 240°C                      |
| Storage Temperature   | -65 to 150°C               |

Power Dissipation (Package)<sup>b</sup>, (T<sub>A</sub> = 70°C)

|                                  |         |
|----------------------------------|---------|
| 16-Pin (4x4 mm) QFN <sup>c</sup> | 1880 mW |
|----------------------------------|---------|

### Notes

- Signals on S<sub>X</sub>, D<sub>X</sub> or I<sub>NX</sub> exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
- All leads soldered or welded to PC board.
- Derate 23.5 mW/°C above 70°C.
- Manual soldering with soldering iron is not recommended for leadless components. The QFN is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper lip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

**SPECIFICATIONS (SINGLE SUPPLY 12 V)**

| Parameter                               | Symbol          | Test Conditions<br>Unless Otherwise Specified<br><br>V+ = 12 V, ± 10%, V- = 0 V<br>VA, VEN = 0.8 V or 2.4 V <sup>f</sup> | Temp <sup>b</sup> | Limits<br>-40 to 85°C |                  |                  | Unit |
|---|-----------------|--|-------------------|-----------------------|------------------|------------------|------|
|   |                 |  |                   | Min <sup>c</sup>      | Typ <sup>d</sup> | Max <sup>c</sup> |      |
| Analog Switch                           |                 |  |                   |                       |                  |                  |      |
| Analog Signal Range <sup>e</sup>        | VANALOG         |  | Full              | 0                     |                  | 12               | V    |
| On-Resistance                           | rON             | V+ = 10.8 V, VD = 2 V or 9 V, IS = 50 mA<br>Sequence Each Switch On  | Room<br>Full      |                       | 4                | 7<br>7.5         | Ω    |
| rON Match Between Channels <sup>g</sup> | ΔrON            | V+ = 10.8 V, VD = 2 V or 9 V, IS = 50 mA   | Room              |                       |                  | 3.6              |      |
| On-Resistance Flatness <sup>i</sup>     | rON<br>Flatness |  | Room              |                       |                  | 8                |      |
| Switch Off Leakage Current              | IS(off)         | VEN = 2.4 V, VD = 11 V or 1 V, VS = 1 V or 11 V  | Room<br>Full      | -2<br>-15             |                  | 2<br>15          | nA   |
|   | ID(off)         |  | Room<br>Full      | -2<br>-15             |                  | 2<br>15          |      |
| Channel On Leakage Current              | ID(on)          | VEN = 0 V, VS = VD = 1 V or 11 V   | Room<br>Full      | -2<br>-15             |                  | 2<br>15          |      |
| Digital Control                         |                 |  |                   |                       |                  |                  |      |
| Logic High Input Voltage                | VINH            |  | Full              | 2.4                   |                  |                  | V    |
| Logic Low Input Voltage                 | VINL            |  | Full              |                       |                  | 0.8              |      |
| Input Current                           | IIN             | VAX = VEN = 2.4 V or 0.8 V   | Full              | -1                    |                  | 1                | μA   |
| Dynamic Characteristics                 |                 |  |                   |                       |                  |                  |      |
| Transition Time                         | tTRANS          | VS1 = 8 V, VS8 = 0 V, (DG9408)<br>VS1b = 8 V, VS4b = 0 V, (DG9409)<br>See Figure 2                                       | Room<br>Full      |                       | 42               | 71<br>75         | ns   |
| Break-Before-Make Time                  | tBBM            | VS(all) = VDA = 5 V<br>See Figure 4  | Room<br>Full      | 2                     | 24               |                  |      |
| Enable Turn-On Time                     | tON(EN)         | VAX = 0 V, VS1 = 5 V (DG9408)<br>VAX = 0 V, VS1b = 5 V (DG9409)<br>See Figure 3  | Room<br>Full      |                       | 42               | 70<br>75         |      |
| Enable Turn-Off Time                    | tOFF(EN)        |  | Room<br>Full      |                       | 24               | 44<br>46         |      |
| Charge Injection <sup>e</sup>           | Q               | CL = 1 nF, VGEN = 0 V, RGEN = 0 Ω  | Room              |                       | 29               |                  | pC   |
| Off Isolation <sup>e, h</sup>           | OIRR            | f = 100 kHz, RL = 1 kΩ   | Room              |                       | -80              |                  | dB   |
| Crosstalk <sup>e</sup>                  | XTALK           |  | Room              |                       | -85              |                  |      |
| Source Off Capacitance <sup>e</sup>     | CS(off)         | f = 1 MHz, VS = 0 V, VEN = 2.4 V   | DG9408            | Room                  |                  | 21               | pF   |
|   |                 |  | DG9409            | Room                  |                  | 23               |      |
| Drain Off Capacitance <sup>e</sup>      | CD(off)         | f = 1 MHz, VD = 0 V, VEN = 2.4 V   | DG9408            | Room                  |                  | 211              |      |
|   |                 |  | DG9409            | Room                  |                  | 112              |      |
| Drain On Capacitance <sup>e</sup>       | CD(on)          | f = 1 MHz, VD = 0 V, VEN = 0 V   | DG9408            | Room                  |                  | 238              |      |
|   |                 |  | DG9409            | Room                  |                  | 137              |      |
| Power Supplies                          |                 |  |                   |                       |                  |                  |      |
| Power Supply Current                    | I+              | VEN = VA = 0 V or V+   | Room              |                       |                  | 1.0              | μA   |



| SPECIFICATIONS (DUAL SUPPLY V+ = 5 V, V- = -5 V) |                 |   |                   |                       |                  |                  |      |
|--|-----------------|---|-------------------|-----------------------|------------------|------------------|------|
| Parameter  | Symbol          | Test Conditions<br>Unless Otherwise Specified<br><br>V+ = 5 V, V- = -5 V ± 10%<br>VA, VEN = 0.8 V or 2.0 V <sup>f</sup> | Temp <sup>b</sup> | Limits<br>-40 to 85°C |                  |                  | Unit |
|  |                 |   |                   | Min <sup>c</sup>      | Typ <sup>d</sup> | Max <sup>c</sup> |      |
| Analog Switch                                    |                 |   |                   |                       |                  |                  |      |
| Analog Signal Range <sup>e</sup>                 | VANALOG         |   | Full              | -5                    |                  | 5                | V    |
| On-Resistance                                    | rON             | V+ = 4.5 V, V- = -4.5 V, VD = ± 3.5 V, IS = 50 mA<br>Sequence Each Switch On  | Room<br>Full      |                       | 5                | 8<br>8.5         | Ω    |
| rON Match Between Channels <sup>g</sup>          | ΔrON            | V+ = 4.5 V, V- = -4.5 V, VD = ± 3.5 V, IS = 50 mA   | Room              |                       |                  | 3.6              |      |
| On-Resistance Flatness <sup>i</sup>              | rON<br>Flatness |   | Room              |                       |                  | 8.2              |      |
| Switch Off Leakage Current <sup>a</sup>          | IS(off)         | V+ = 5.5 V, V- = -5.5 V<br>VEN = 2.4 V, VD = ± 4.5 V, VS = ∓ 4.5 V  | Room<br>Full      | -2<br>-15             |                  | 2<br>15          | nA   |
|  | ID(off)         |   | Room<br>Full      | -2<br>-15             |                  | 2<br>15          |      |
| Channel On Leakage Current <sup>a</sup>          | ID(on)          | V+ = 5.5 V, V- = -5.5 V<br>VEN = 0 V, VD = ± 4.5 V, VS = ∓ 4.5 V  | Room<br>Full      | -2<br>-15             |                  | 2<br>15          |      |
| Digital Control                                  |                 |   |                   |                       |                  |                  |      |
| Logic High Input Voltage                         | VINH            |   | Full              | 2.0                   |                  |                  | V    |
| Logic Low Input Voltage                          | VINL            |   | Full              |                       |                  | 0.8              |      |
| Input Current <sup>a</sup>                       | IIN             | VAX = VEN = 2.0 V or 0.8 V  | Full              | -1                    |                  | 1                | μA   |
| Dynamic Characteristics                          |                 |   |                   |                       |                  |                  |      |
| Transition Time <sup>e</sup>                     | tTRANS          | VS1 = 3.5 V, VS8 = -3.5 V, (DG9408)<br>VS1b = 3.5 V, VS4b = -3.5 V, (DG9409)<br><a href="#">See Figure 2</a>            | Room<br>Full      |                       | 68               | 89<br>94         | ns   |
| Break-Before-Make Time <sup>e</sup>              | tBBM            | VS(all) = VDA = 3.5 V<br><a href="#">See Figure 4</a>   | Room<br>Full      | 1                     | 16               |                  |      |
| Enable Turn-On Time <sup>e</sup>                 | tON(EN)         | VAX = 0 V, VS1 = 3.5 V (DG9408)<br>VAX = 0 V, VS1b = 3.5 V (DG9409)<br><a href="#">See Figure 3</a>                     | Room<br>Full      |                       | 68               | 88<br>94         |      |
| Enable Turn-Off Time <sup>e</sup>                | tOFF(EN)        |   | Room<br>Full      |                       | 58               | 78<br>81         |      |
| Source Off Capacitance <sup>e</sup>              | CS(off)         | f = 1 MHz, VS = 0 V, VEN = 2.0 V  | DG9408            | Room                  |                  | 23               | pF   |
|  |                 |   | DG9409            | Room                  |                  | 23               |      |
| Drain Off Capacitance <sup>e</sup>               | CD(off)         | f = 1 MHz, VD = 0 V, VEN = 2.0 V  | DG9408            | Room                  |                  | 223              |      |
|  |                 |   | DG9409            | Room                  |                  | 113              |      |
| Drain On Capacitance <sup>e</sup>                | CD(on)          | f = 1 MHz, VD = 0 V, VEN = 0 V  | DG9408            | Room                  |                  | 246              |      |
|  |                 |   | DG9409            | Room                  |                  | 137              |      |
| Power Supplies                                   |                 |   |                   |                       |                  |                  |      |
| Power Supply Current                             | I+              | VEN = VA = 0 V or V+  | Room              |                       |                  | 1.0              | μA   |
|  | I-              |   | Room              | -1.0                  |                  |                  |      |

**SPECIFICATIONS (SINGLE SUPPLY 5 V)**

| Parameter                               | Symbol       | Test Conditions<br>Unless Otherwise Specified<br><br>V+ = 5 V, ± 10%, V- = 0 V<br>VA, VEN = 0.8 V or 2.0 V <sup>f</sup> | Temp <sup>b</sup> | Limits<br>-40 to 85°C |                  |                  | Unit |
|---|--------------|---|-------------------|-----------------------|------------------|------------------|------|
|   |              |   |                   | Min <sup>c</sup>      | Typ <sup>d</sup> | Max <sup>c</sup> |      |
| Analog Switch                           |              |   |                   |                       |                  |                  |      |
| Analog Signal Range <sup>e</sup>        | VANALOG      |   | Full              | 0                     |                  | 5                | V    |
| On-Resistance                           | rON          | V+ = 4.5 V, VD or VS = 1 V or 3.5 V, IS = 50 mA   | Room Full         |                       | 7                | 10.5<br>11       | Ω    |
| rON Match Between Channels <sup>g</sup> | ΔrON         | V+ = 4.5 V, VD = 1 V or 3.5 V, IS = 50 mA   | Room              |                       |                  | 3.6              |      |
| On-Resistance Flatness <sup>i</sup>     | rON Flatness |   | Room              |                       |                  | 9                |      |
| Switch Off Leakage Current <sup>a</sup> | IS(off)      | V+ = 5.5 V<br>VS = 1 V or 4 V, VD = 4 V or 1 V  | Room Full         | -2<br>-15             |                  | 2<br>15          | nA   |
|   | ID(off)      |   | Room Full         | -2<br>-15             |                  | 2<br>15          |      |
| Channel On Leakage Current <sup>a</sup> | ID(on)       | V+ = 5.5 V<br>VD = VS = 1 V or 4 V, Sequence Each Switch On   | Room Full         | -2<br>-15             |                  | 2<br>15          |      |
| Digital Control                         |              |   |                   |                       |                  |                  |      |
| Logic High Input Voltage                | VINH         | V+ = 5 V  | Full              | 2.0                   |                  |                  | V    |
| Logic Low Input Voltage                 | VINL         |   | Full              |                       |                  | 0.8              |      |
| Input Current <sup>a</sup>              | IIN          | VAX = VEN = 2.0 V or 0.8 V  | Full              | -1                    |                  | 1                | μA   |
| Dynamic Characteristics                 |              |   |                   |                       |                  |                  |      |
| Transition Time <sup>e</sup>            | tTRANS       | VS1 = 3.5 V, VS8 = 0 V, (DG9408)<br>VS1b = 3.5 V, VS4b = 0 V, (DG9409)<br><a href="#">See Figure 2</a>                  | Room Full         |                       | 73               | 94<br>104        | ns   |
| Break-Before-Make Time <sup>e</sup>     | tOPEN        | VS(all) = VDA = 3.5 V<br><a href="#">See Figure 4</a>   | Room Full         | 2                     | 29               |                  |      |
| Enable Turn-On Time <sup>e</sup>        | tON(EN)      | VAX = 0 V, VS1 = 3.5 V (DG9408)<br>VAX = 0 V, VS1b = 3.5 V (DG9409)<br><a href="#">See Figure 3</a>                     | Room Full         |                       | 74               | 94<br>104        |      |
| Enable Turn-Off Time <sup>e</sup>       | tOFF(EN)     |   | Room Full         |                       | 38               | 57<br>61         |      |
| Charge Injection <sup>e</sup>           | Q            | CL = 1 nF, RGEN = 0 Ω, VGEN = 0 V   | Room              |                       | 20               |                  | pC   |
| Off Isolation <sup>e, h</sup>           | OIRR         | RL = 1 kΩ, f = 100 kHz  | Room              |                       | -81              |                  | dB   |
| Crosstalk <sup>e</sup>                  | XTALK        |   | Room              |                       | -85              |                  |      |
| Source Off Capacitance <sup>e</sup>     | CS(off)      | f = 1 MHz, VS = 0 V, VEN = 0 V  | DG9408<br>Room    |                       | 22               |                  | pF   |
|   |              |   | DG9409<br>Room    |                       | 24               |                  |      |
| Drain Off Capacitance <sup>e</sup>      | CD(off)      | f = 1 MHz, VD = 0 V, VEN = 2.0 V  | DG9408<br>Room    |                       | 223              |                  |      |
|   |              |   | DG9409<br>Room    |                       | 113              |                  |      |
| Drain On Capacitance <sup>e</sup>       | CD(on)       | f = 1 MHz, VD = 0 V, VEN = 0 V  | DG9408<br>Room    |                       | 244              |                  |      |
|   |              |   | DG9409<br>Room    |                       | 143              |                  |      |
| Power Supplies                          |              |   |                   |                       |                  |                  |      |
| Power Supply Current                    | I+           | VEN = VA = 0 V or V+  | Room              |                       |                  | 1.0              | μA   |



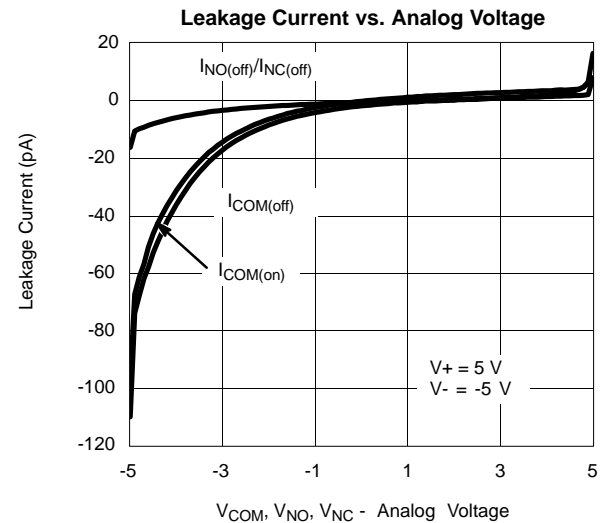
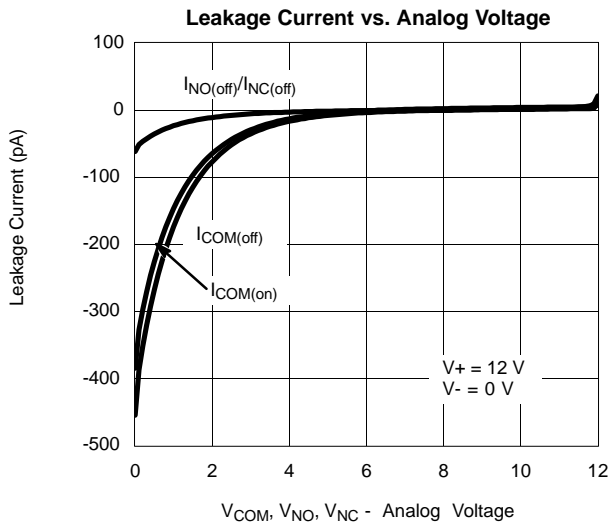
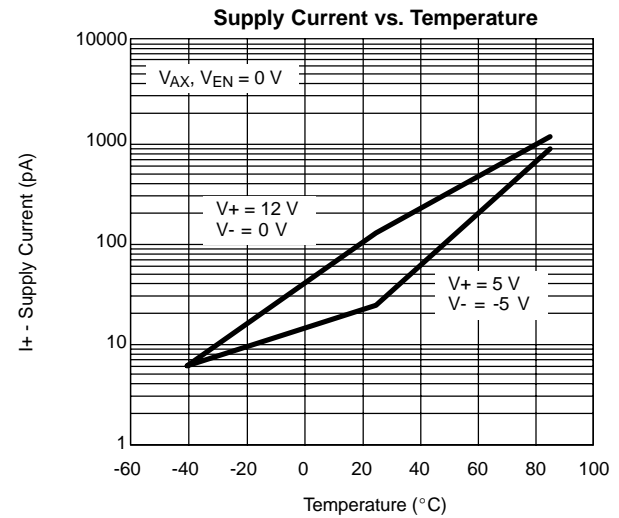
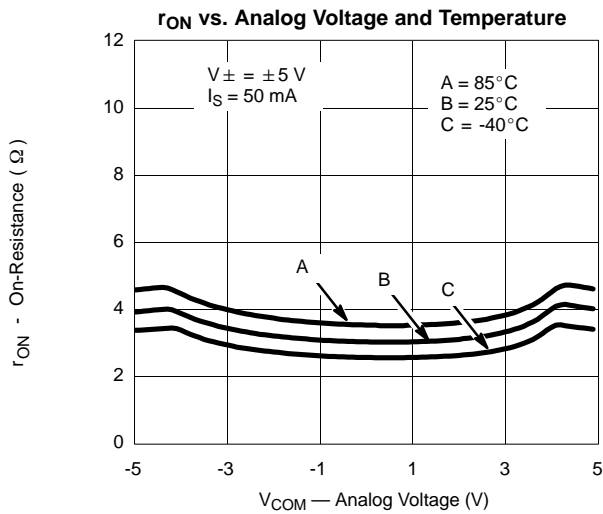
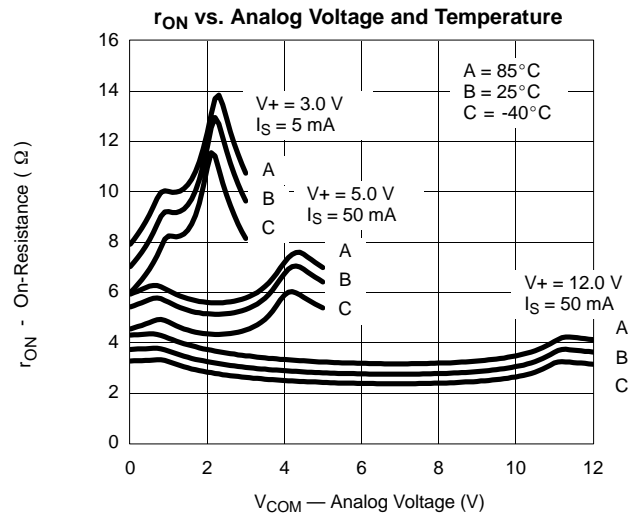
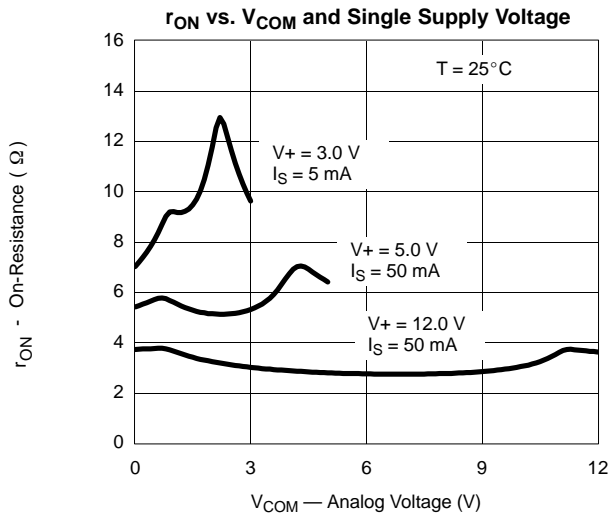
| SPECIFICATIONS (SINGLE SUPPLY 3 V)                  |                             |  |                   |                       |                  |                  |      |
|---|-----------------------------|--|-------------------|-----------------------|------------------|------------------|------|
| Parameter   | Symbol                      | Test Conditions<br>Unless Otherwise Specified<br><br>V+ = 3 V, ±10%, V- = 0 V<br>V <sub>EN</sub> = 0.4 V or 1.8 V <sup>f</sup>         | Temp <sup>b</sup> | Limits<br>-40 to 85°C |                  |                  | Unit |
|   |                             |  |                   | Min <sup>c</sup>      | Typ <sup>d</sup> | Max <sup>c</sup> |      |
| Analog Switch                                       |                             |  |                   |                       |                  |                  |      |
| Analog Signal Range <sup>e</sup>                    | V <sub>ANALOG</sub>         |  | Full              | 0                     |                  | 3                | V    |
| On-Resistance                                       | r <sub>ON</sub>             | V+ = 2.7 V, V <sub>D</sub> = 0.5 or 2.2 V, I <sub>S</sub> = 5 mA   | Room<br>Full      |                       | 12               | 25.5<br>26.5     | Ω    |
| r <sub>ON</sub> Match Between Channels <sup>g</sup> | Δr <sub>ON</sub>            | V+ = ±2.7 V, V <sub>D</sub> = 0.5 V or 2.2 V, I <sub>S</sub> = 5 mA  | Room              |                       |                  | 3.6              |      |
| On-Resistance Flatness <sup>i</sup>                 | r <sub>ON</sub><br>Flatness |  | Room              |                       |                  | 13               |      |
| Switch Off Leakage Current <sup>a</sup>             | I <sub>S(off)</sub>         | V+ = 3.3 V<br>V <sub>S</sub> = 2 or 1 V, V <sub>D</sub> = 1 or 2 V   | Room<br>Full      | -2<br>-15             |                  | 2<br>15          | nA   |
|   | I <sub>D(off)</sub>         |  | Room<br>Full      | -2<br>-15             |                  | 2<br>15          |      |
| Channel On Leakage Current <sup>a</sup>             | I <sub>D(on)</sub>          | V+ = 3.3 V<br>V <sub>D</sub> = V <sub>S</sub> = 1 or 2 V, Sequence Each Switch On  | Room<br>Full      | -2<br>-15             |                  | 2<br>15          |      |
| Digital Control                                     |                             |  |                   |                       |                  |                  |      |
| Logic High Input Voltage                            | V <sub>INH</sub>            |  | Full              | 1.8                   |                  |                  | V    |
| Logic Low Input Voltage                             | V <sub>INL</sub>            |  | Full              |                       |                  | 0.4              |      |
| Input Current <sup>a</sup>                          | I <sub>IN</sub>             | V <sub>AX</sub> = V <sub>EN</sub> = 1.8 V or 0.4 V   | Full              | -1                    |                  | 1                | μA   |
| Dynamic Characteristics                             |                             |  |                   |                       |                  |                  |      |
| Transition Time                                     | t <sub>TRANS</sub>          | V <sub>S1</sub> = 1.5 V, V <sub>S8</sub> = 0 V, (DG9408)<br>V <sub>S1b</sub> = 1.5 V, V <sub>S4b</sub> = 0 V, (DG9409)<br>See Figure 2 | Room<br>Full      |                       | 140              | 165<br>182       | ns   |
| Break-Before-Make Time                              | t <sub>BBM</sub>            | V <sub>S(all)</sub> = V <sub>DA</sub> = 1.5 V<br>See Figure 4  | Room<br>Full      | 2                     | 63               |                  |      |
| Enable Turn-On Time                                 | t <sub>ON(EN)</sub>         | V <sub>AX</sub> = 0 V, V <sub>S1</sub> = 1.5 V (DG9408)<br>V <sub>AX</sub> = 0 V, V <sub>S1b</sub> = 1.5 V (DG9409)<br>See Figure 3    | Room<br>Full      |                       | 140              | 162<br>178       |      |
| Enable Turn-Off Time                                | t <sub>OFF(EN)</sub>        |  | Room<br>Full      |                       | 76               | 97<br>104        |      |
| Charge Injection <sup>e</sup>                       | Q                           | C <sub>L</sub> = 1 nF, R <sub>GEN</sub> = 0 Ω, V <sub>GEN</sub> = 0 V  | Room              |                       | 7                |                  | pC   |
| Off Isolation <sup>e, h</sup>                       | OIRR                        | f = 100 kHz, R <sub>L</sub> = 1 kΩ   | Room              |                       | -81              |                  | dB   |
| Crosstalk <sup>e</sup>                              | X <sub>TALK</sub>           |  | Room              |                       | -85              |                  |      |
| Source Off Capacitance <sup>e</sup>                 | C <sub>S(off)</sub>         | f = 1 MHz, V <sub>S</sub> = 0 V, V <sub>EN</sub> = 1.8 V   | DG9408            | Room                  |                  | 23               | pF   |
|   |                             |  | DG9409            | Room                  |                  | 25               |      |
| Drain Off Capacitance <sup>e</sup>                  | C <sub>D(off)</sub>         | f = 1 MHz, V <sub>D</sub> = 0 V, V <sub>EN</sub> = 1.8 V   | DG9408            | Room                  |                  | 230              |      |
|   |                             |  | DG9409            | Room                  |                  | 120              |      |
| Drain On Capacitance <sup>e</sup>                   | C <sub>D(on)</sub>          | f = 1 MHz, V <sub>D</sub> = 0 V, V <sub>EN</sub> = 0 V   | DG9408            | Room                  |                  | 256              |      |
|   |                             |  | DG9409            | Room                  |                  | 147              |      |
| Power Supplies                                      |                             |  |                   |                       |                  |                  |      |
| Power Supply Current                                | I+                          | V <sub>EN</sub> = V <sub>A</sub> = 0 V or V+   | Room              |                       |                  | 1.0              | μA   |

## Notes

- Leakage parameters are guaranteed by worst case test condition and not subject to production test.
- Room = 25°C, Full = as determined by the operating temperature suffix.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Guaranteed by design, not subject to production test.
- $V_{\text{IN}}$  = input voltage to perform proper function.
- $\Delta r_{\text{DON}} = r_{\text{DON Max}} - r_{\text{DON Min}}$ .
- Worst case isolation occurs on Channel 4 do to proximity to the drain pin.
- $r_{\text{DON}}$  flatness is measured as the difference between the minimum and maximum measured values across a defined Analog signal.

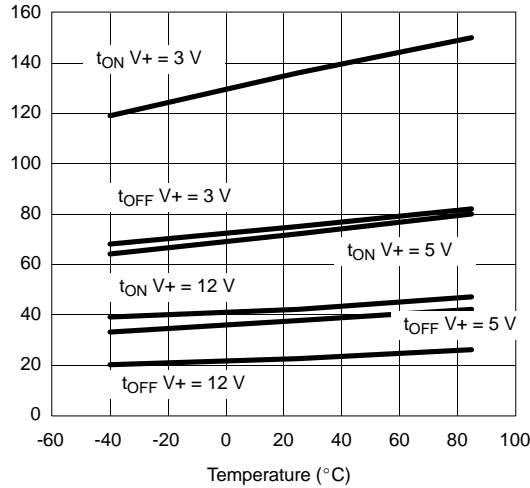


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

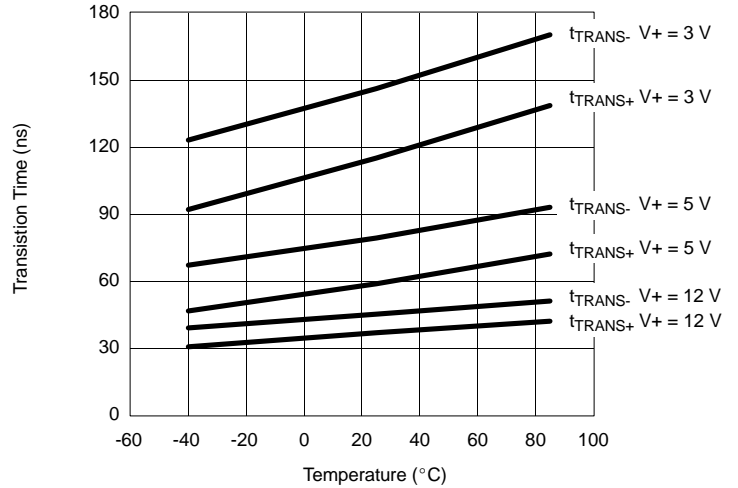


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

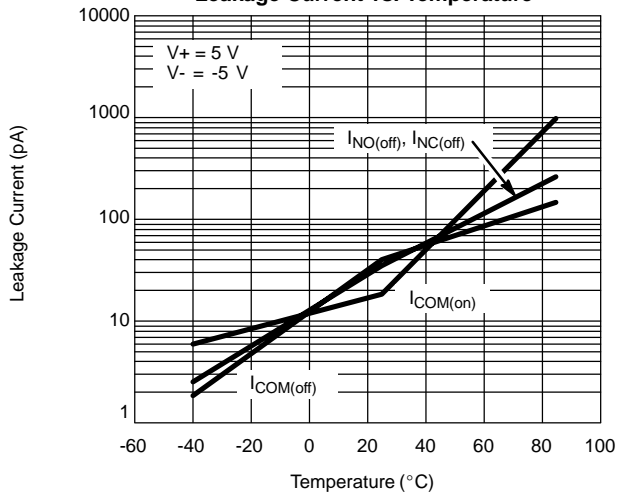
**Switching Time vs. Temperature and Single Supply Voltage**



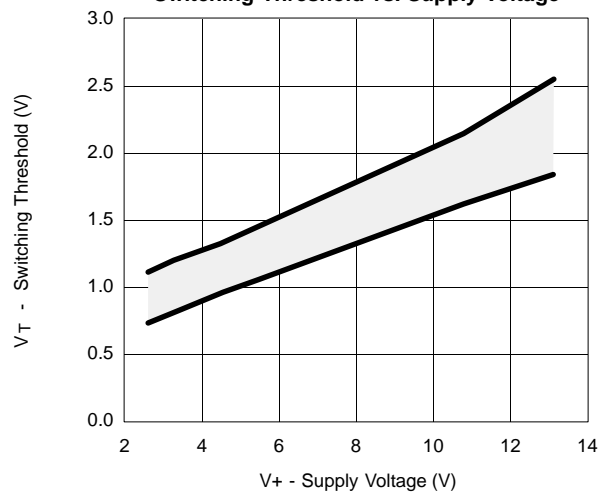
**Transition Time vs. Temperature and Single Supply Voltage**



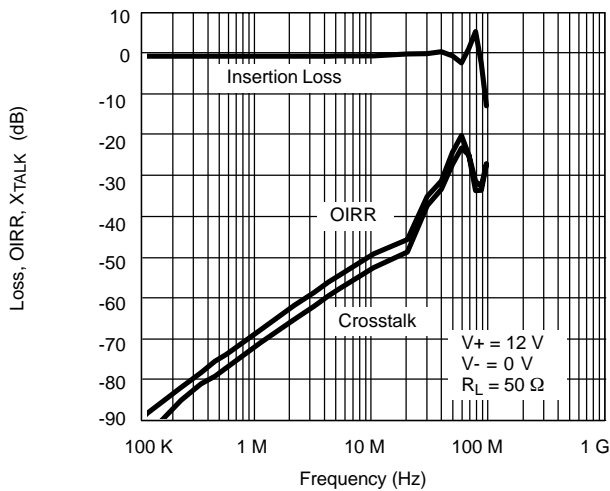
**Leakage Current vs. Temperature**



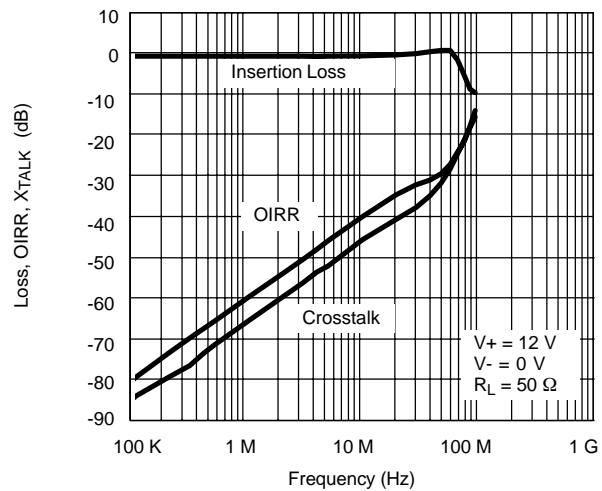
**Switching Threshold vs. Supply Voltage**



**Insertion Loss, Off Isolation and Crosstalk vs. Frequency (DG9408)**

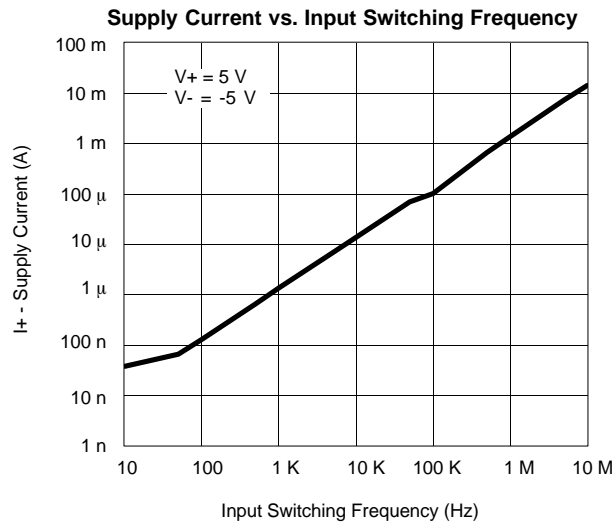


**Insertion Loss, Off Isolation and Crosstalk vs. Frequency (DG9404)**





**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



**SCHEMATIC DIAGRAM (TYPICAL CHANNEL)**

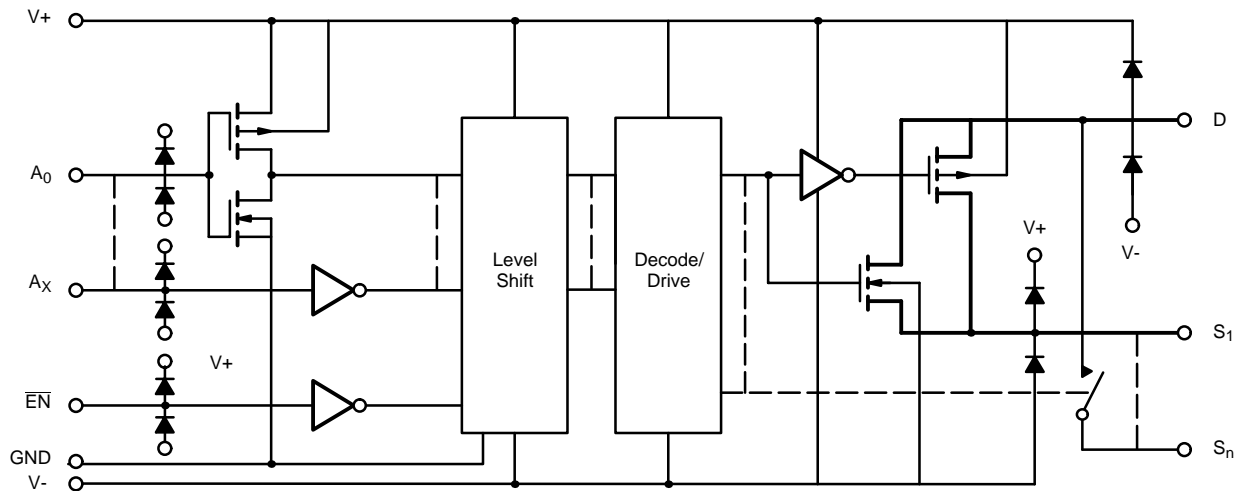
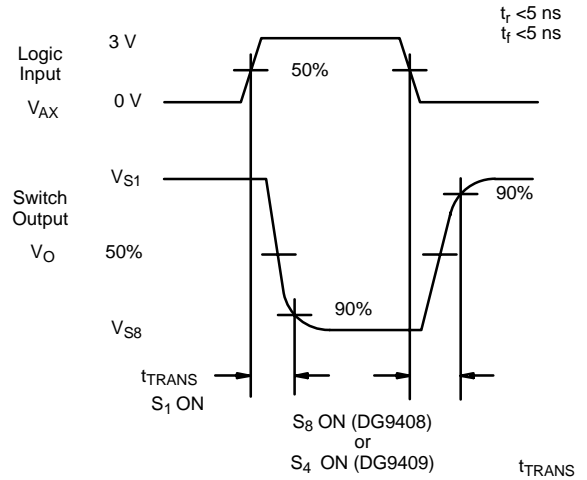
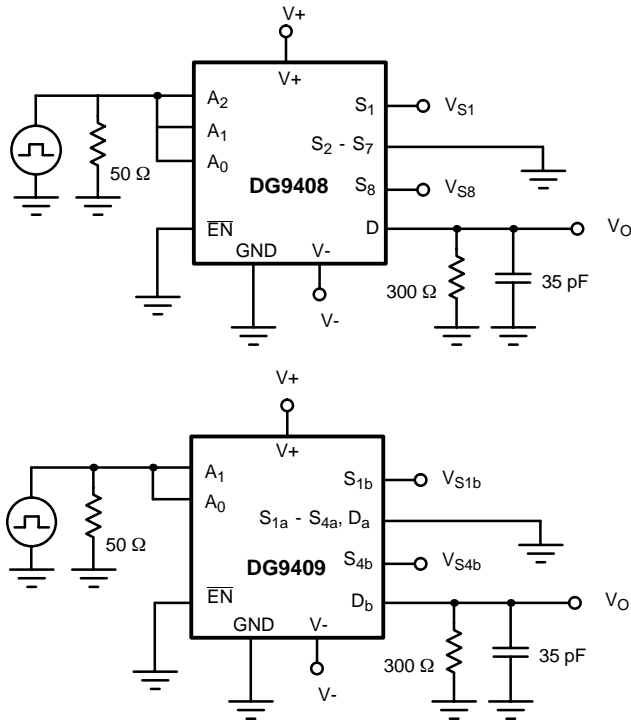


FIGURE 1.

### TEST CIRCUITS



Return to Specifications:

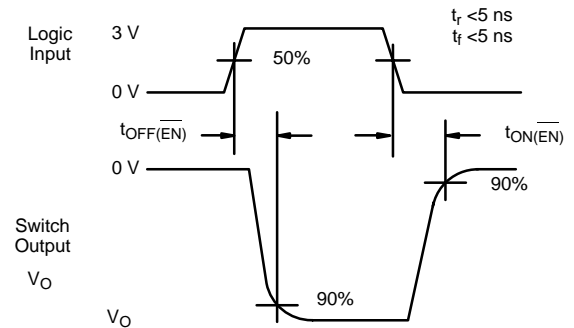
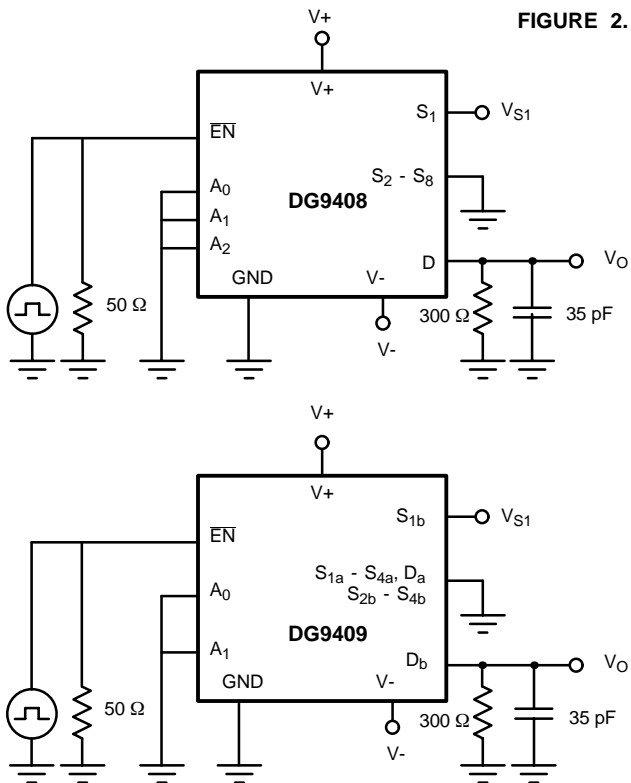
Single Supply 12 V

Dual Supply  $V_+ = 5\text{ V}$ ,  $V_- = -5\text{ V}$

Single Supply 5 V

Single Supply 3 V

FIGURE 2. Transition Time



Return to Specifications:

Single Supply 12 V

Dual Supply  $V_+ = 5\text{ V}$ ,  $V_- = -5\text{ V}$

Single Supply 5 V

Single Supply 3 V

FIGURE 3. Enable Switching Time

TEST CIRCUITS

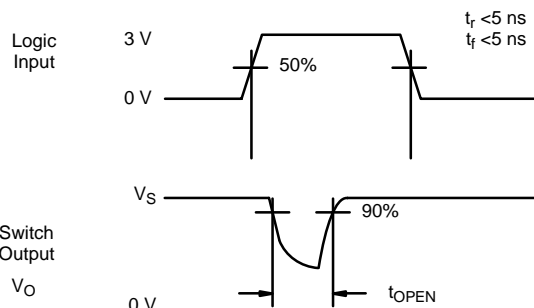
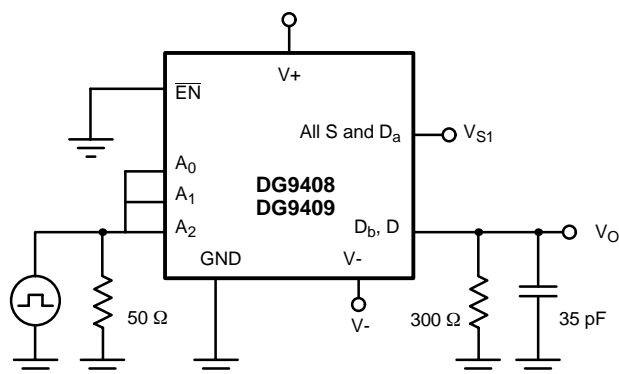


FIGURE 4. Break-Before-Make Interval

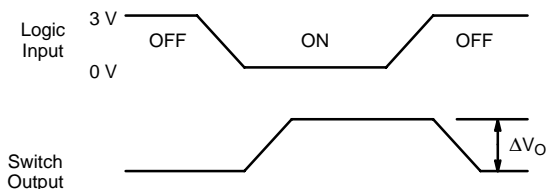
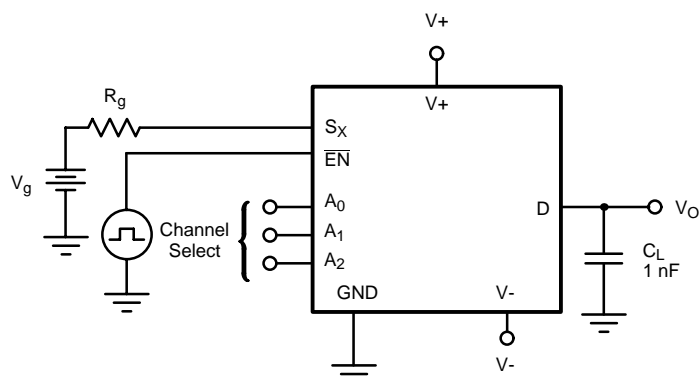
Return to Specifications:

Single Supply 12 V

Dual Supply  $V_+ = 5 \text{ V}$ ,  $V_- = -5 \text{ V}$

Single Supply 5 V

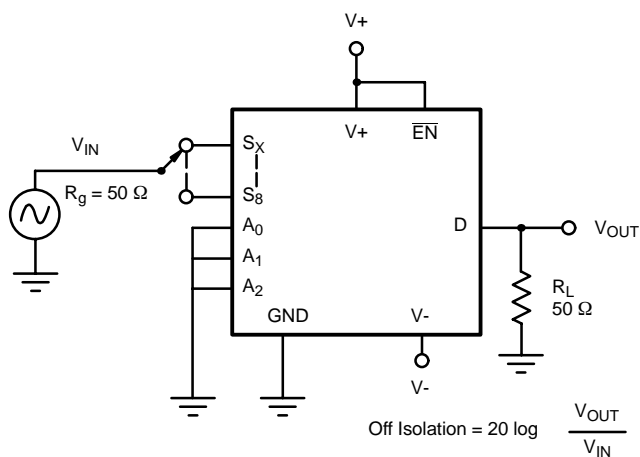
Single Supply 3 V



$\Delta V_O$  is the measured voltage due to charge transfer error  $Q$ , when the channel turns off.

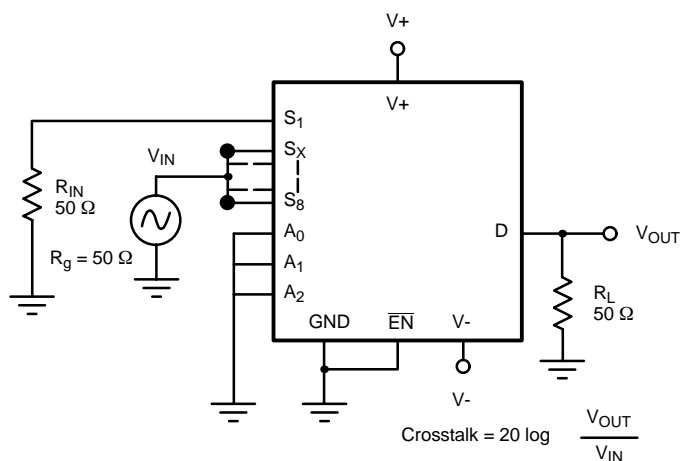
$$Q = C_L \times \Delta V_O$$

FIGURE 5. Charge Injection



$$\text{Off Isolation} = 20 \log \frac{V_{\text{OUT}}}{V_{\text{IN}}}$$

FIGURE 6. Off Isolation



$$\text{Crosstalk} = 20 \log \frac{V_{\text{OUT}}}{V_{\text{IN}}}$$

FIGURE 7. Crosstalk



TEST CIRCUITS

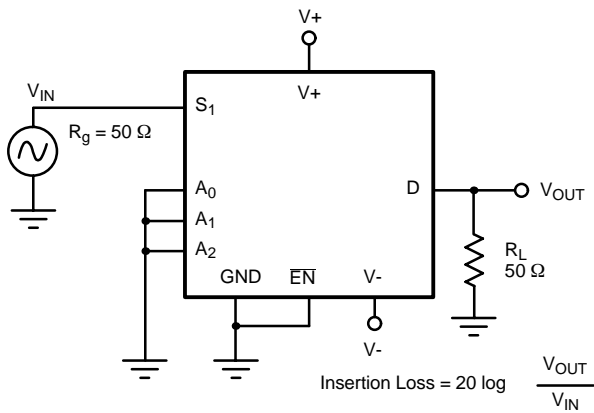


FIGURE 8. Insertion Loss

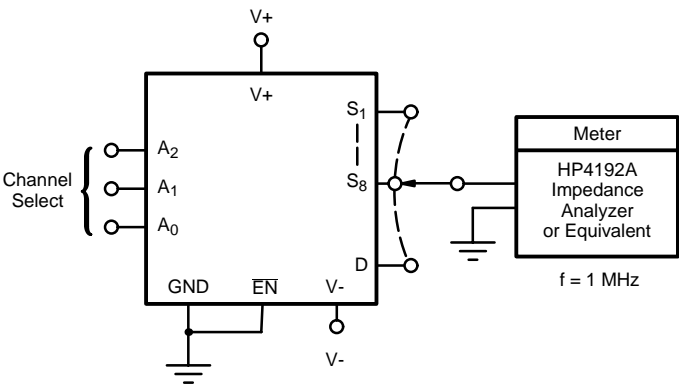


FIGURE 9. Source Drain Capacitance