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

## DESCRIPTION

The DG3408/3409 uses BiCMOS wafer fabrication technology that allows the DG3408/3409 to operate on single and dual supplies. Single supply voltage ranges from 3 to 12 V while dual supply operation is recommended with ± 3 to ± 6 V.

The DG3408 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 DG3409 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.

## FEATURES

- 2.7 to 12 V Single Supply or ± 3 to ± 6 V Dual Supply Operation
- Low On-Resistance-$r_{ON}$: 3.9 Ω 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)
- MICRO FOOT® Package
- Lead (Pb)-free Solder Bumps

Pb-free

**RoHS**
COMPLIANT

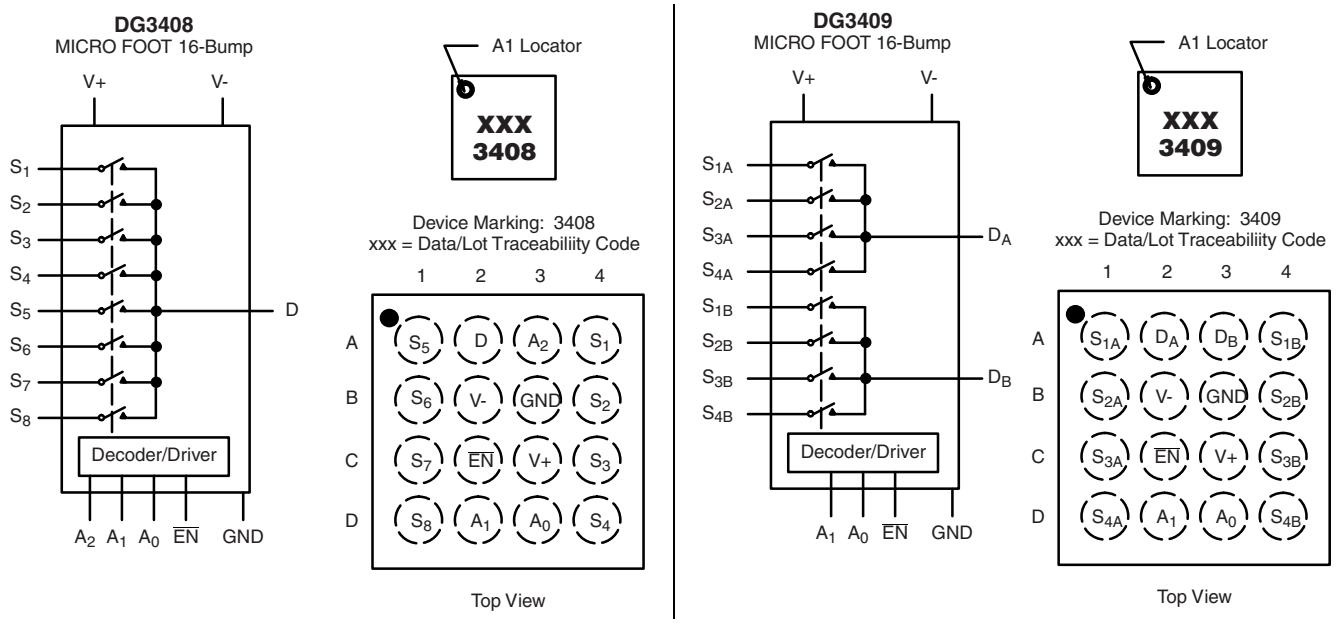
## BENEFITS

- 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

## FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



## TRUTH TABLES AND ORDERING INFORMATION

| TRUTH TABLE - DG3408 | | | | |
|---|---|---|---|---|
| $A_2$ | $A_1$ | $A_0$ | $\overline{EN}$ | 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 - DG3409 | | | |
|---|---|---|---|
| $A_1$ | $A_0$ | $\overline{EN}$ | On Switch |
| X | X | 1 | None |
| 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 2 |
| 1 | 0 | 0 | 3 |
| 1 | 1 | 0 | 4 |

X = Do not care

For low and high voltage levels for $V_{AX}$ and $V_{EN}$ 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 - DG3408 | | |
|---|---|---|
| Temperature Range | Package | Part Number |
| - 40 to 85 °C | MICRO FOOT: 16-Bump (4 x 4, 0.5 mm Pitch, 238 µm Bump Height) | DG3408DB-T2-E1 (Lead (Pb)-free) |

| ORDERING INFORMATION - DG3409 | | |
|---|---|---|
| Temperature Range | Package | Part Number |
| - 40 to 85 °C | MICRO FOOT: 16-Bump (4 x 4, 0.5 mm Pitch, 238 µm Bump Height) | DG3409DB-T2-E1 (Lead (Pb)-free) |

| ABSOLUTE MAXIMUM RATINGS $T_A$ = 25 °C, unless otherwise noted | | | |
|---|---|---|---|
| Parameter | | Limit | Unit |
| Voltage Referenced V+ to V- | | 14 | V |
| GND | | 7 | |
| Digital Inputs[a], $V_S$, $V_D$ | | (V-) - 0.3 V to (V) + 0.3 V | |
| Current (Any Terminal Except S or D) | | 30 | mA |
| Continuous Current, S or D) | | 100 | |
| Peak Current, S or D (Pulsed at 1 ms, 10 % Duty Cycle Max) | | 200 | |
| Package Solder Reflow Conditions[b] | IR/Convection | 250 | °C |
| Storage Temperature | | - 65 to 150 | |
| Power Dissipation (Package)[c], ($T_A$ = 70 °C) | 16-Bump (4 x 4 mm) MICRO FOOT[d] | 719 | mW |

Notes:
a. Signals on $S_X$, $D_X$ or $IN_X$ exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
b. Refer to IPC/JEDEC (J-STD-020B).
c. All bumps soldered or welded to PC board.
d. Derate 9.0 mW/°C above 70 °C.

## SPECIFICATIONS (SINGLE SUPPLY 12 V)

| Parameter | Symbol | Test Conditions Unless Otherwise Specified V+ = 12 V, ± 10 %, V- = 0 V $V_A$, $V_{\overline{EN}}$ = 0.8 V or 2.4 V[f] | | Temp[b] | Limits - 40 to 85 °C Min[c] | Typ[d] | Max[c] | Unit |
|---|---|---|---|---|---|---|---|---|
| **Analog Switch** | | | | | | | | |
| Analog Signal Range[e] | $V_{ANALOG}$ | | | Full | 0 | | 12 | V |
| On-Resistance | $r_{ON}$ | V+ = 10.8 V, $V_D$ = 2 V or 9 V, $I_S$ = 50 mA Sequence Each Switch On | | Room<br>Full | | 4 | 7<br>7.5 | Ω |
| $r_{ON}$ Match Between Channels[g] | $\Delta r_{ON}$ | V+ = 10.8 V, $V_D$ = 2 V or 9 V, $I_S$ = 50 mA | | Room | | | 3.6 | Ω |
| On-Resistance Flatness[i] | $r_{ON}$ Flatness | | | Room | | | 8 | Ω |
| Switch Off Leakage Current | $I_{S(off)}$ | $V_{\overline{EN}}$ = 2.4 V, $V_D$ = 11 V or 1 V, $V_S$ = 1 V or 11 V | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| | $I_{D(off)}$ | | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| Channel On Leakage Current | $I_{D(on)}$ | $V_{\overline{EN}}$ = 0 V, $V_S$ = $V_D$ = 1 V or 11 V | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| **Digital Control** | | | | | | | | |
| Logic High Input Voltage | $V_{INH}$ | | | Full | 2.4 | | | V |
| Logic Low Input Voltage | $V_{INL}$ | | | Full | | | 0.8 | V |
| Input Current | $I_{IN}$ | $V_{AX}$ = $V_{\overline{EN}}$ = 2.4 V or 0.8 V | | Full | - 1 | | 1 | µA |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time | $t_{TRANS}$ | $V_{S1}$ = 8 V, $V_{S8}$ = 0 V, (DG3408)<br>$V_{S1b}$ = 8 V, $V_{S4b}$ = 0 V, (DG3409)<br>See Figure 2 | | Room<br>Full | | 42 | 71<br>75 | ns |
| Break-Before-Make Time | $t_{BBM}$ | $V_{S(all)}$ = $V_{DA}$ = 5 V<br>See Figure 4 | | Room<br>Full | 2 | 24 | | ns |
| Enable Turn-On Time | $t_{ON(\overline{EN})}$ | $V_{AX}$ = 0 V, $V_{S1}$ = 5 V (DG3408)<br>$V_{AX}$ = 0 V, $V_{S1b}$ = 5 V (DG3409)<br>See Figure 3 | | Room<br>Full | | 42 | 70<br>75 | ns |
| Enable Turn-Off Time | $t_{OFF(\overline{EN})}$ | | | Room<br>Full | | 24 | 44<br>46 | ns |
| Charge Injection[e] | Q | $C_L$ = 1 nF, $V_{GEN}$ = 0 V, $R_{GEN}$ = 0 Ω | | Room | | 29 | | pC |
| Off Isolation[e, h] | OIRR | f = 100 kHz, $R_L$ = 1 kΩ | | Room | | - 80 | | dB |
| Crosstalk[e] | $X_{TALK}$ | | | Room | | - 85 | | dB |
| Source Off Capacitance[e] | $C_{S(off)}$ | f = 1 MHz, $V_S$ = 0 V, $V_{\overline{EN}}$ = 2.4 V | DG3408 | Room | | 21 | | pF |
| | | | DG3409 | Room | | 23 | | pF |
| Drain Off Capacitance[e] | $C_{D(off)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 2.4 V | DG3408 | Room | | 211 | | pF |
| | | | DG3409 | Room | | 112 | | pF |
| Drain On Capacitance[e] | $C_{D(on)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 0 V | DG3408 | Room | | 238 | | pF |
| | | | DG3409 | Room | | 137 | | pF |
| **Power Supplies** | | | | | | | | |
| Power Supply Current | I+ | $V_{\overline{EN}}$ = $V_A$ = 0 V or V+ | | Room | | | 1.0 | µA |

## SPECIFICATIONS (DUAL SUPPLY V+ = 5 V, V- = - 5 V)

| Parameter | Symbol | Test Conditions Unless Otherwise Specified V+ = 5 V, V- = - 5 V, ± 10 % $V_A$, $V_{\overline{EN}}$ = 0.8 V or 2.0 V[f] | | Temp[b] | Limits - 40 to 85 °C Min[c] | Typ[d] | Max[c] | Unit |
|---|---|---|---|---|---|---|---|---|
| **Analog Switch** | | | | | | | | |
| Analog Signal Range[e] | $V_{ANALOG}$ | | | Full | - 5 | | 5 | V |
| On-Resistance | $r_{ON}$ | V+ = 4.5 V, V- = - 4.5 V, $V_D$ = ± 3.5 V, $I_S$ = 50 mA, Sequence Each Switch On | | Room<br>Full | | 5 | 8<br>8.5 | Ω |
| $r_{ON}$ Match Between Channels[g] | $\Delta r_{ON}$ | V+ = 4.5 V, V- = - 4.5 V, $V_D$ = ± 3.5 V, $I_S$ = 50 mA | | Room | | | 3.6 | Ω |
| On-Resistance Flatness[i] | $r_{ON}$ Flatness | | | Room | | | 8.2 | Ω |
| Switch Off Leakage Current[a] | $I_{S(off)}$ | V+ = 5.5, V- = - 5.5 V<br>$V_{\overline{EN}}$ = 2.4 V, $V_D$ = ± 4.5 V, $V_S$ = ± 4.5 V | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| | $I_{D(off)}$ | | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| Channel On Leakage Current[a] | $I_{D(on)}$ | V+ = 5.5 V, V- = - 5.5 V<br>$V_{\overline{EN}}$ = 0 V, $V_D$ = ± 4.5 V, $V_S$ = ± 4.5 V | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| **Digital Control** | | | | | | | | |
| Logic High Input Voltage | $V_{INH}$ | | | Full | 2.0 | | | V |
| Logic Low Input Voltage | $V_{INL}$ | | | Full | | | 0.8 | V |
| Input Current[a] | $I_{IN}$ | $V_{AX}$ = $V_{EN}$ = 2.0 V or 0.8 V | | Full | - 1 | | 1 | µA |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time[e] | $t_{TRANS}$ | $V_{S1}$ = 3.5 V, $V_{S8}$ = - 3.5 V, (DG3408)<br>$V_{S1b}$ = 3.5 V, $V_{S4b}$ = - 3.5 V, (DG3409)<br>See Figure 2 | | Room<br>Full | | 68 | 89<br>94 | ns |
| Break-Before-Make Time[e] | $t_{BBM}$ | $V_{S(all)}$ = $V_{DA}$ = 3.5 V<br>See Figure 4 | | Room<br>Full | 1 | 16 | | ns |
| Enable Turn-On Time[e] | $t_{ON(\overline{EN})}$ | $V_{AX}$ = 0 V, $V_{S1}$ = 3.5 V (DG3408)<br>$V_{AX}$ = 0 V, $V_{S1b}$ = 3.5 V (DG3409)<br>See Figure 3 | | Room<br>Full | | 68 | 88<br>94 | ns |
| Enable Turn-Off Time[e] | $t_{OFF(\overline{EN})}$ | | | Room<br>Full | | 58 | 78<br>81 | ns |
| Source Off Capacitance[e] | $C_{S(off)}$ | f = 1 MHz, $V_S$ = 0 V, $V_{\overline{EN}}$ = 2.0 V | DG3408 | Room | | 23 | | pF |
| | | | DG3409 | Room | | 23 | | pF |
| Drain Off Capacitance[e] | $C_{D(off)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 2.0 V | DG3408 | Room | | 223 | | pF |
| | | | DG3409 | Room | | 113 | | pF |
| Drain On Capacitance[e] | $C_{D(on)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 0 V | DG3408 | Room | | 246 | | pF |
| | | | DG3409 | Room | | 137 | | pF |
| **Power Supplies** | | | | | | | | |
| Power Supply Current | I+ | $V_{\overline{EN}}$ = $V_A$ = 0 V or V+ | | Room | | | 1.0 | µA |
| | I- | | | Room | - 1.0 | | | µA |

## SPECIFICATIONS (SINGLE SUPPLY 5 V)

| Parameter | Symbol | Test Conditions Unless Otherwise Specified V+ = 5 V, ± 10 %, V- = 0 V $V_A$, $V_{\overline{EN}}$ = 0.8 V or 2.0 V[f] | | Temp[b] | Limits - 40 to 85 °C Min[c] | Typ[d] | Max[c] | Unit |
|---|---|---|---|---|---|---|---|---|
| **Analog Switch** | | | | | | | | |
| Analog Signal Range[e] | $V_{ANALOG}$ | | | Full | 0 | | 5 | V |
| On-Resistance | $r_{ON}$ | V+ = 4.5 V, $V_D$ or $V_S$ = 1 V or 3.5 V, $I_S$ = 50 mA | | Room<br>Full | | 7 | 10.5<br>11 | Ω |
| $r_{ON}$ Match Between Channels[g] | $\Delta r_{ON}$ | V+ = 4.5 V, $V_D$ = 1 V or 3.5 V, $I_S$ = 50 mA | | Room | | | 3.6 | Ω |
| On-Resistance Flatness[i] | $r_{ON}$ Flatness | | | Room | | | 9 | Ω |
| Switch Off Leakage Current[a] | $I_{S(off)}$ | V+ = 5.5 V<br>$V_S$ = 1 V or 4 V, $V_D$ = 4 V or 1 V | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| | $I_{D(off)}$ | | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| Channel On Leakage Current[a] | $I_{D(on)}$ | V+ = 5.5 V<br>$V_D$ = $V_S$ = 1 V or 4 V, Sequence Each Switch On | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| **Digital Control** | | | | | | | | |
| Logic High Input Voltage | $V_{INH}$ | V+ = 5 V | | Full | 2.0 | | | V |
| Logic Low Input Voltage | $V_{INL}$ | | | Full | | | 0.8 | V |
| Input Current[a] | $I_{IN}$ | $V_{AX}$ = $V_{\overline{EN}}$ = 2.0 V or 0.8 V | | Full | - 1 | | 1 | µA |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time[e] | $t_{TRANS}$ | $V_{S1}$ = 3.5 V, $V_{S8}$ = 0 V, (DG3408)<br>$V_{S1b}$ = 3.5 V, $V_{S4b}$ = 0 V, (DG3409)<br>See Figure 2 | | Room<br>Full | | 73 | 94<br>104 | ns |
| Break-Before-Make Time[e] | $t_{OPEN}$ | $V_{S(all)}$ = $V_{DA}$ = 3.5 V<br>See Figure 4 | | Room<br>Full | 2 | 29 | | ns |
| Enable Turn-On Time[e] | $t_{ON(\overline{EN})}$ | $V_{AX}$ = 0 V, $V_{S1}$ = 3.5 V (DG3408)<br>$V_{AX}$ = 0 V, $V_{S1b}$ = 3.5 V (DG3409)<br>See Figure 3 | | Room<br>Full | | 74 | 94<br>104 | ns |
| Enable Turn-Off Time[e] | $t_{OFF(\overline{EN})}$ | | | Room<br>Full | | 38 | 57<br>61 | ns |
| Charge Injection[e] | Q | $C_L$ = 1 nF, $R_{GEN}$ = 0 Ω, $V_{GEN}$ = 0 V | | Room | | 20 | | pC |
| Off Isolation[e, h] | OIRR | $R_L$ = 1 kΩ, f = 100 kHz | | Room | | - 81 | | dB |
| Crosstalk[e] | $X_{TALK}$ | | | Room | | - 85 | | dB |
| Source Off Capacitance[e] | $C_{S(off)}$ | f = 1 MHz, $V_S$ = 0 V, $V_{\overline{EN}}$ = 0 V | DG3408 | Room | | 22 | | pF |
| | | | DG3409 | Room | | 24 | | pF |
| Drain Off Capacitance[e] | $C_{D(off)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 2.0 V | DG3408 | Room | | 223 | | pF |
| | | | DG3409 | Room | | 113 | | pF |
| Drain On Capacitance[e] | $C_{D(on)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 0 V | DG3408 | Room | | 244 | | pF |
| | | | DG3409 | Room | | 143 | | pF |
| **Power Supplies** | | | | | | | | |
| Power Supply Current | I+ | $V_{\overline{EN}}$ = $V_A$ = 0 V or V+ | | Room | | | 1.0 | µA |

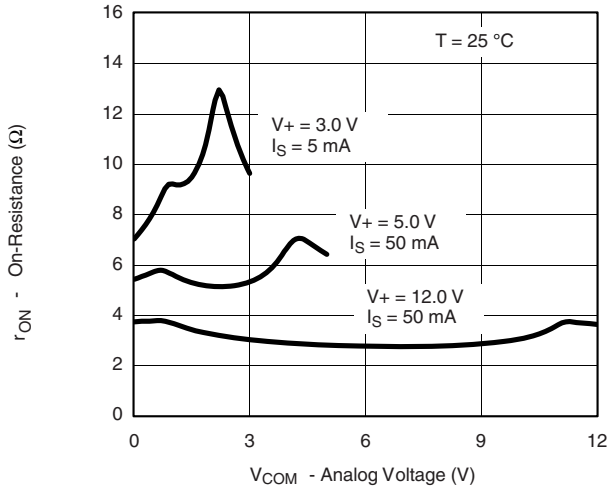
## SPECIFICATIONS (SINGLE SUPPLY 3 V)

| Parameter | Symbol | Test Conditions Unless Otherwise Specified V+ = 3 V, ± 10 %, V- = 0 V $V_{\overline{EN}}$ = 0.4 V or 1.8 V[f] | | Temp[b] | Limits - 40 to 85 °C Min[c] | Typ[d] | Max[c] | Unit |
|---|---|---|---|---|---|---|---|---|
| **Analog Switch** | | | | | | | | |
| Analog Signal Range[e] | $V_{ANALOG}$ | | | Full | 0 | | 3 | V |
| On-Resistance | $r_{ON}$ | V+ = 2.7 V, $V_D$ = 0.5 or 2.2 V, $I_S$ = 5 mA | | Room<br>Full | | 12 | 25.5<br>26.5 | Ω |
| $r_{ON}$ Match Between Channels[g] | $\Delta r_{ON}$ | V+ = ± 2.7 V, $V_D$ = 0.5 V or 2.2 V, $I_S$ = 5 mA | | Room | | | 3.6 | Ω |
| On-Resistance Flatness[i] | $r_{ON}$ Flatness | | | Room | | | 13 | Ω |
| Switch Off Leakage Current[a] | $I_{S(off)}$ | V+ = 3.3 V<br>$V_S$ = 2 or 1 V, $V_D$ = 1 or 2 V | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| | $I_{D(off)}$ | | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| Channel On Leakage Current[a] | $I_{D(on)}$ | V+ = 3.3 V<br>$V_D$ = $V_S$ = 1 or 2 V, Sequence Each Switch On | | Room<br>Full | - 2<br>- 20 | | 2<br>20 | nA |
| **Digital Control** | | | | | | | | |
| Logic High Input Voltage | $V_{INH}$ | | | Full | 1.8 | | | V |
| Logic Low Input Voltage | $V_{INL}$ | | | Full | | | 0.4 | V |
| Input Current[a] | $I_{IN}$ | $V_{AX}$ = $V_{\overline{EN}}$ = 1.8 V or 0.4 V | | Full | - 1 | | 1 | µA |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time | $t_{TRANS}$ | $V_{S1}$ = 1.5 V, $V_{S8}$ = 0 V, (DG3408)<br>$V_{S1b}$ = 1.5 V, $V_{S4b}$ = 0 V, (DG3409)<br>See Figure 2 | | Room<br>Full | | 140 | 165<br>182 | ns |
| Break-Before-Make Time | $t_{BBM}$ | $V_{S(all)}$ = $V_{DA}$ = 1.5 V<br>See Figure 4 | | Room<br>Full | 2 | 63 | | ns |
| Enable Turn-On Time | $t_{ON(\overline{EN})}$ | $V_{AX}$ = 0 V, $V_{S1}$ = 1.5 V (DG3408)<br>$V_{AX}$ = 0 V, $V_{S1b}$ = 1.5 V (DG3409)<br>See Figure 3 | | Room<br>Full | | 140 | 162<br>178 | ns |
| Enable Turn-Off Time | $t_{OFF(\overline{EN})}$ | | | Room<br>Full | | 76 | 97<br>104 | ns |
| Charge Injection[e] | Q | $C_L$ = 1 nF, $R_{GEN}$ = 0, $V_{GEN}$ = 0 V | | Room | | 7 | | pC |
| Off Isolation[e, h] | OIRR | f = 100 kHz, $R_L$ = 1 kΩ | | Room | | - 81 | | dB |
| Crosstalk[e] | $X_{TALK}$ | | | Room | | - 85 | | dB |
| Source Off Capacitance[e] | $C_{S(off)}$ | f = 1 MHz, $V_S$ = 0 V, $V_{\overline{EN}}$ = 1.8 V | DG3408 | Room | | 23 | | pF |
| | | | DG3409 | Room | | 25 | | pF |
| Drain Off Capacitance[e] | $C_{D(off)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 1.8 V | DG3408 | Room | | 230 | | pF |
| | | | DG3409 | Room | | 120 | | pF |
| Drain On Capacitance[e] | $C_{D(on)}$ | f = 1 MHz, $V_D$ = 0 V, $V_{\overline{EN}}$ = 0 V | DG3408 | Room | | 256 | | pF |
| | | | DG3409 | Room | | 147 | | pF |
| **Power Supplies** | | | | | | | | |
| Power Supply Current | I+ | $V_{\overline{EN}}$ = $V_A$ = 0 V or V+ | | Room | | | 1.0 | µA |

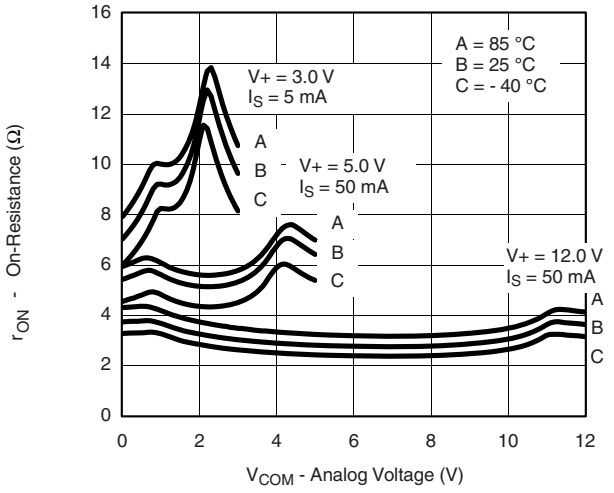
Notes:
a. Leakage parameters are guaranteed by worst case test condition and not subject to production test.
b. Room = 25 °C, Full = as determined by the operating temperature suffix.
c. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in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

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

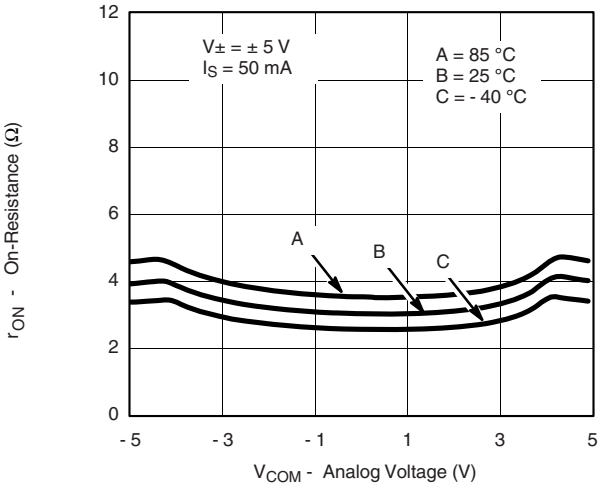
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



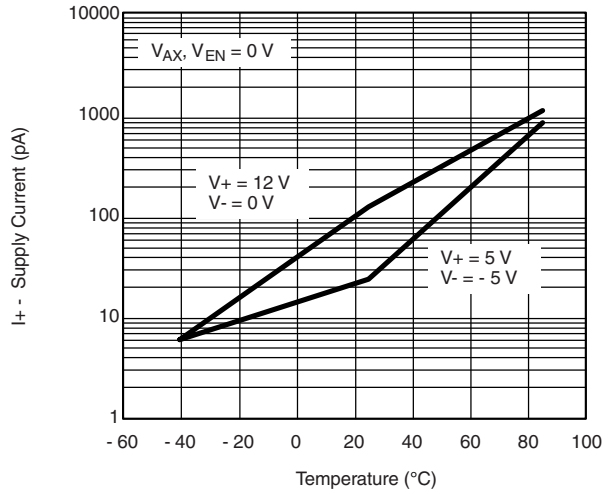

**$r_{ON}$ vs. $V_{COM}$ and Single Supply Voltage**



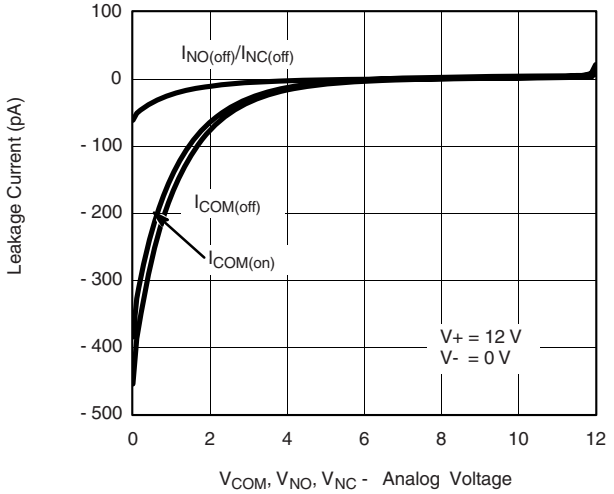

**$r_{ON}$ vs. Analog Voltage and Temperature**



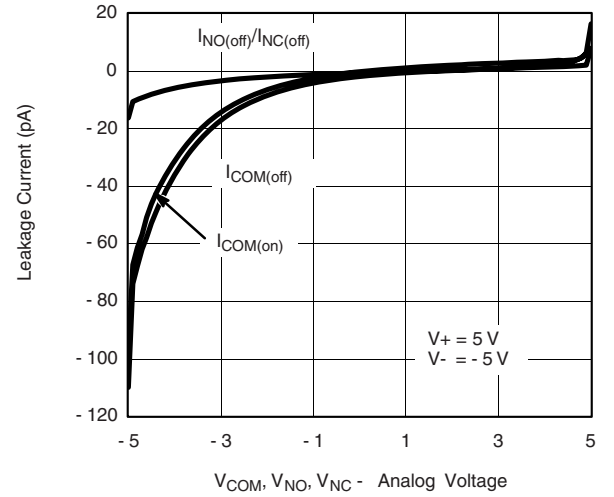

**$r_{ON}$ vs. Analog Voltage and Temperature**




**Supply Current vs. Temperature**

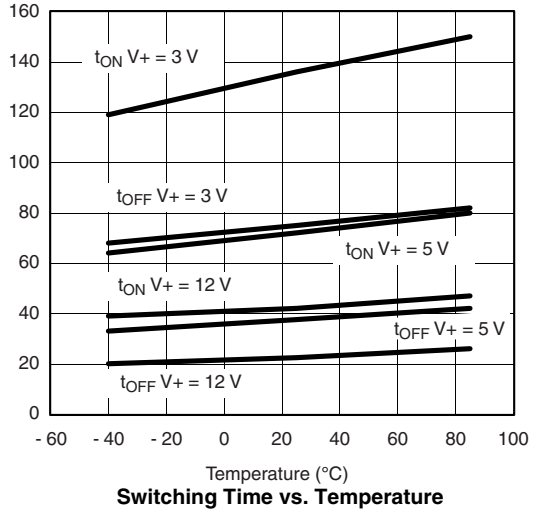



**Leakage Current vs. Analog Voltage**

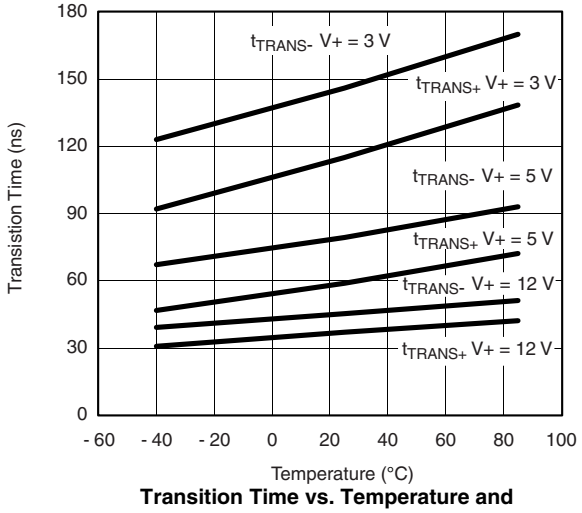



**Leakage Current vs. Analog Voltage**

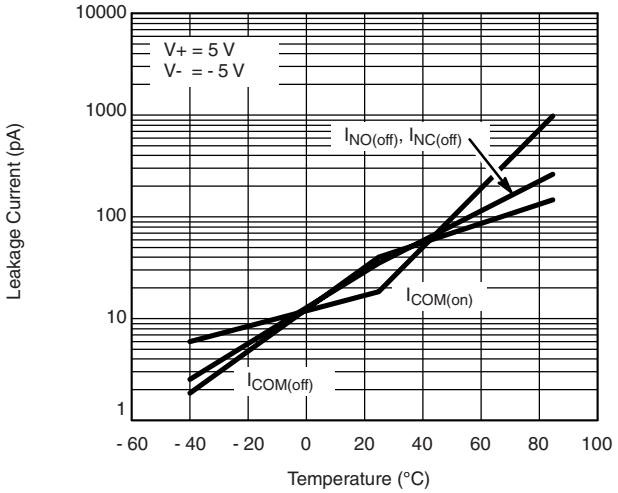
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



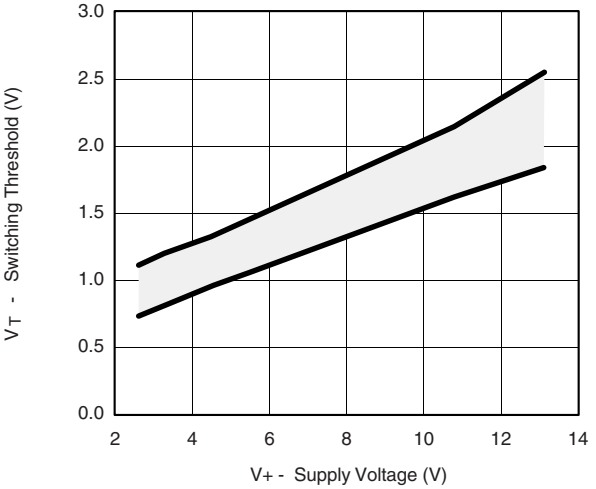

**Switching Time vs. Temperature and Single Supply Voltage**



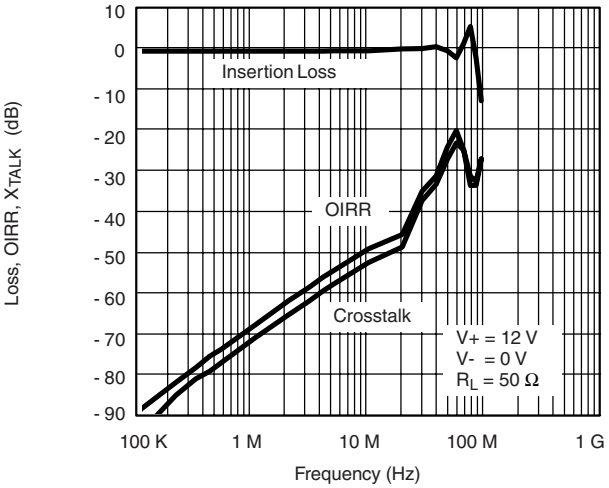

**Transition Time vs. Temperature and Single Supply Voltage**



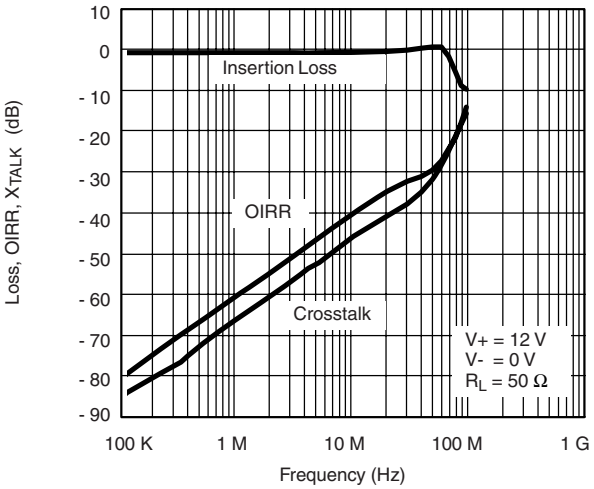

**Leakage Current vs. Temperature**




**Switching Threshold vs. Supply Voltage**

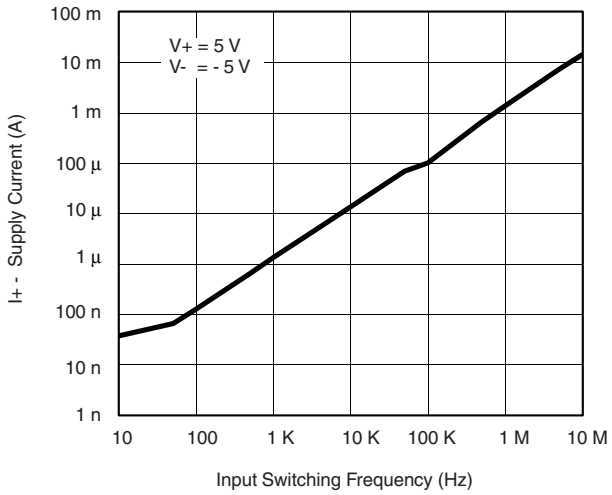



**Insertion Loss, Off Isolation and Crosstalk vs. Frequency (DG3408)**




**Insertion Loss, Off Isolation and Crosstalk vs. Frequency (DG3409)**

## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted




**Supply Current vs. Input Switching Frequency**

## SCHEMATIC DIAGRAM (TYPICAL CHANNEL)

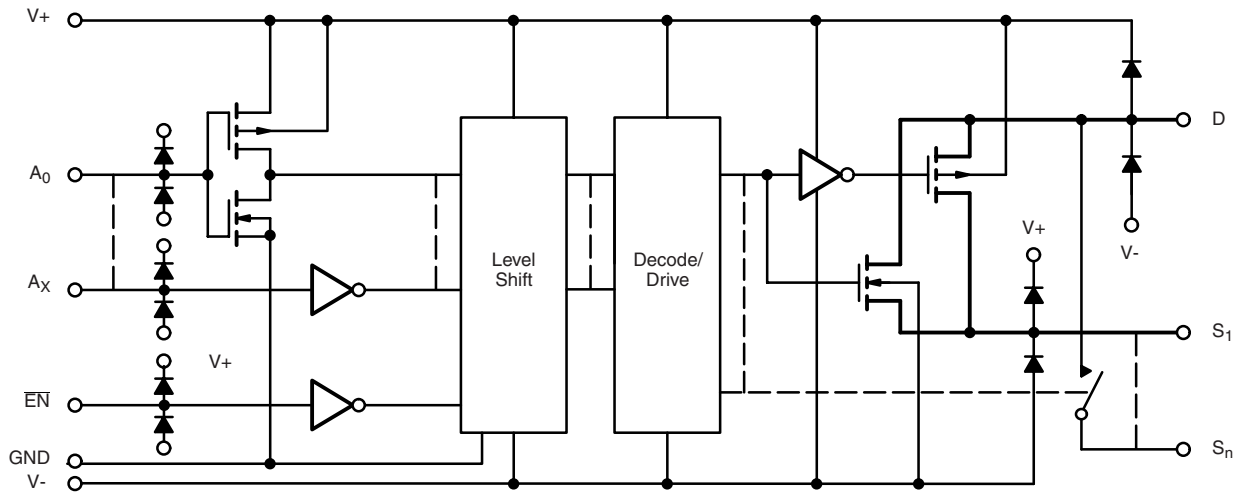
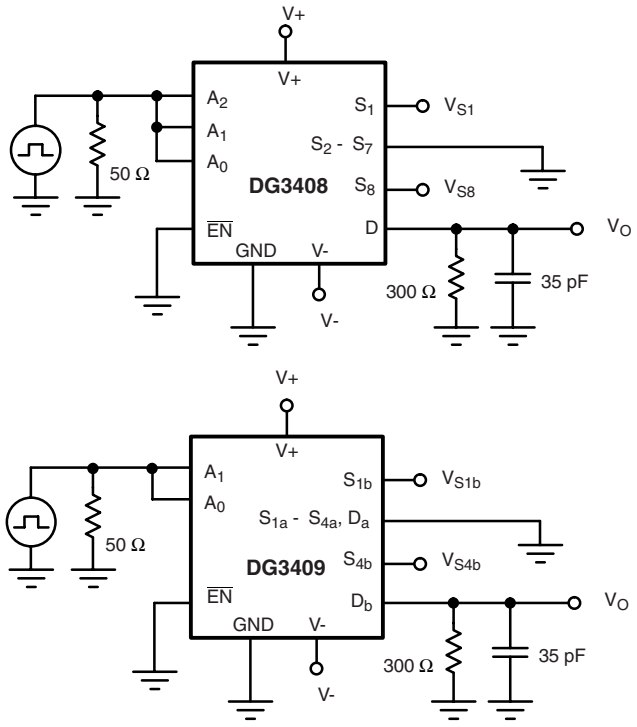
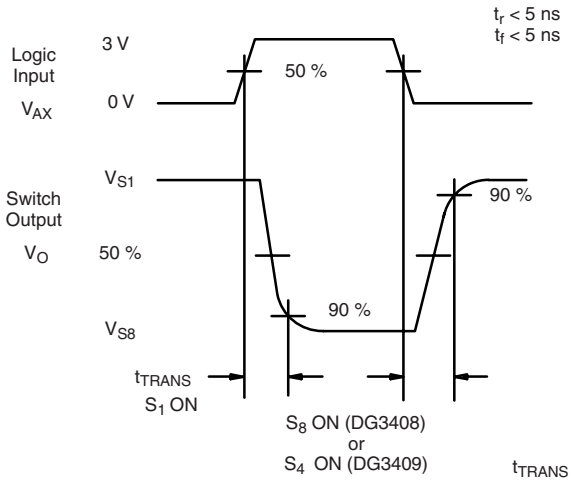



**Figure 1.**

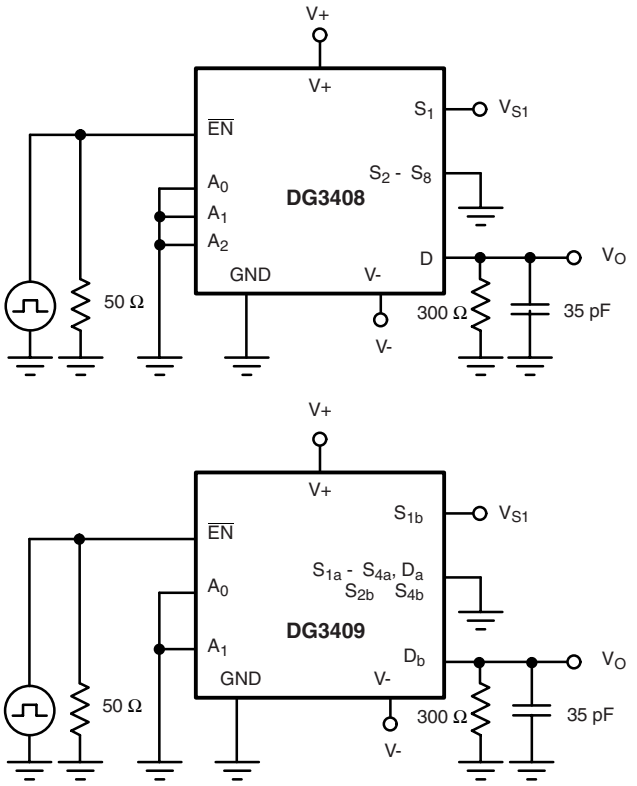
## TEST CIRCUITS

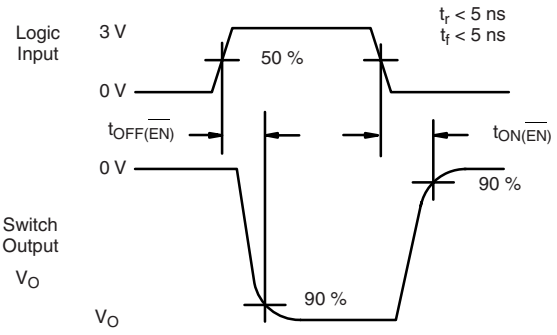



Return to Specifications:
Single Supply 12 V
Dual Supply V+ = 5 V, V- = - 5 V
Single Supply 5 V
Single Supply 3 V

**Figure 2. Transition Time**

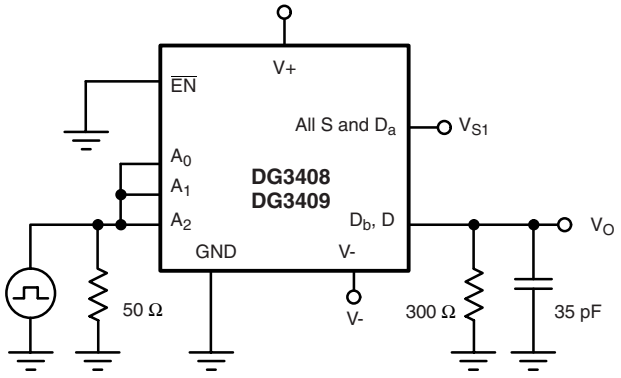


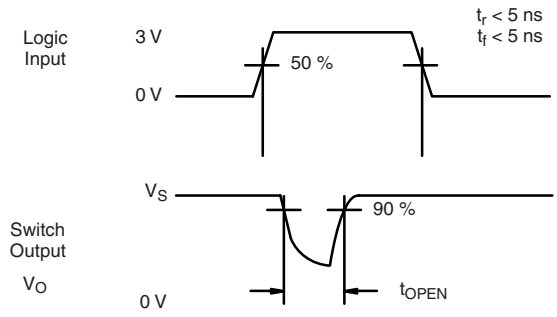




Return to Specifications:
Single Supply 12 V
Dual Supply V+ = 5 V, V- = - 5 V
Single Supply 5 V
Single Supply 3 V

**Figure 3. Enable Switching Time**

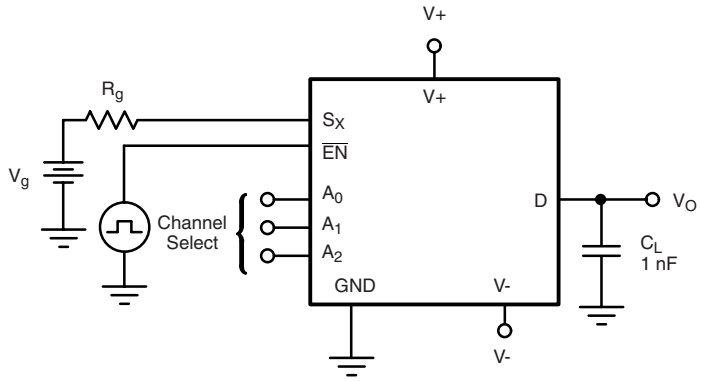
## TEST CIRCUITS

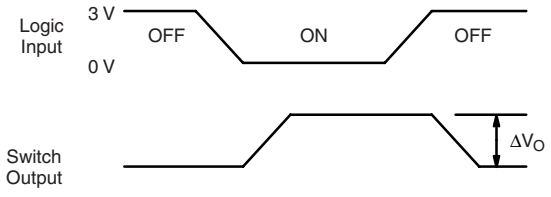



Return to Specifications:
Single Supply 12 V
Dual Supply V+ = 5 V, V- = - 5 V
Single Supply 5 V
Single Supply 3 V

**Figure 4. Break-Before-Make Interval**




ΔVO 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**

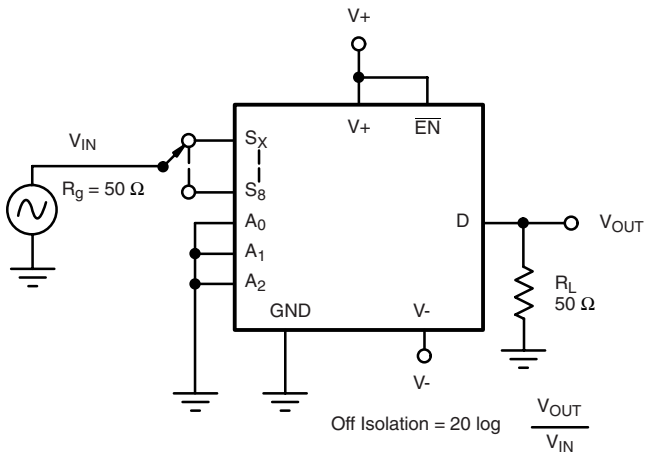



**Figure 6. Off Isolation**

## TEST CIRCUITS

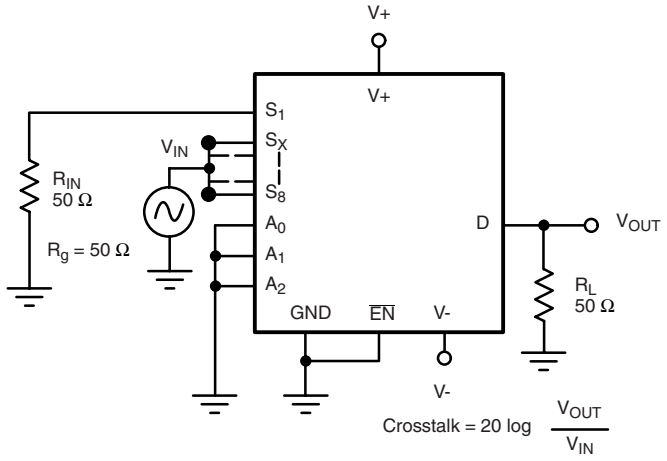



**Figure 7. Crosstalk**

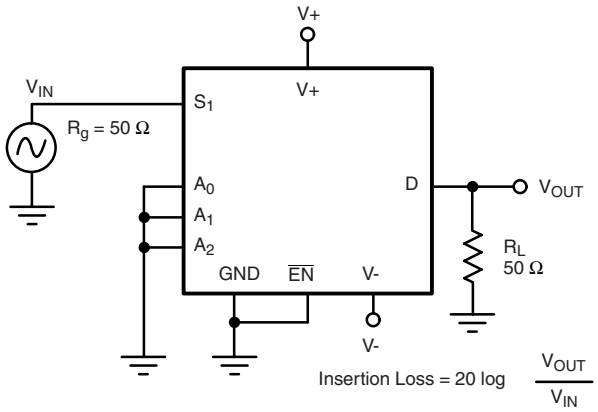



**Figure 8. Insertion Loss**

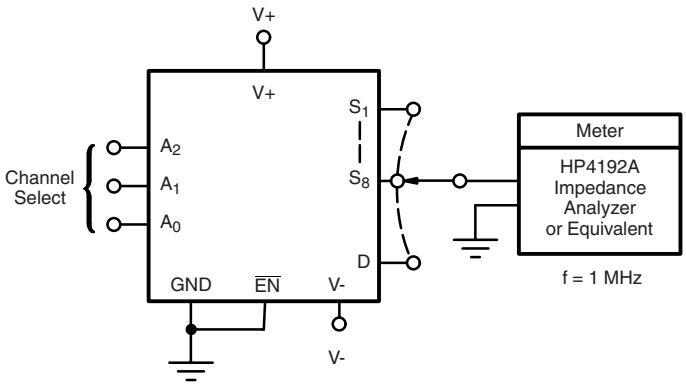
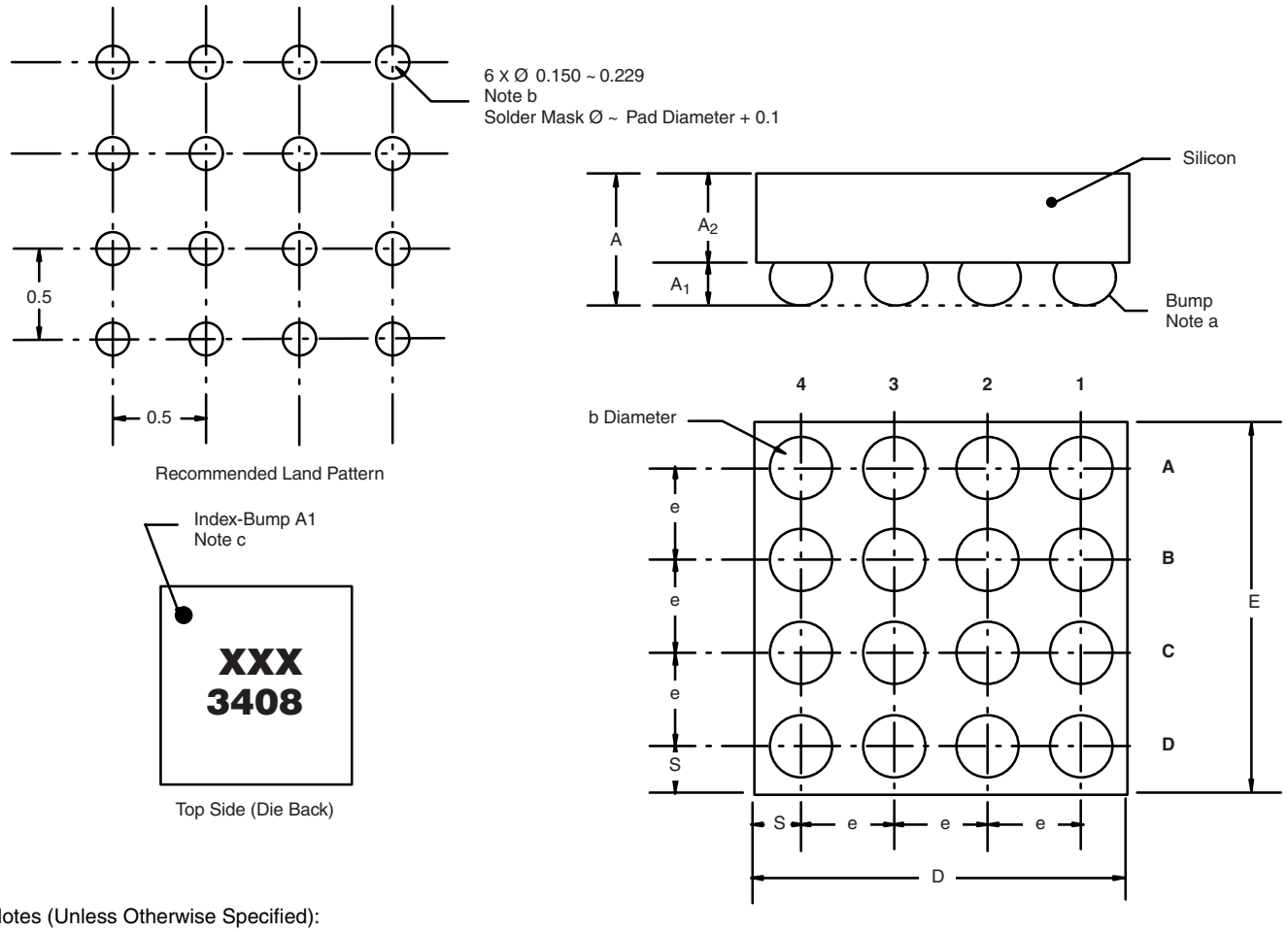



**Figure 9. Source Drain Capacitance**

## PACKAGE OUTLINE

### MICRO FOOT: 16-BUMP (4 x 4, 0.5 mm PITCH, 0.238 mm BUMP HEIGHT)




Notes (Unless Otherwise Specified):
a. Bump is Lead Free Sn/Ag/Cu.
b. Non-solder mask defined copper landing pad.
c. Laser Mark on silicon die back; back-lapped, no coating. Shown is not actual marking; sample only.

| Dim | Millimeters[a] | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| **A** | 0.688 | 0.753 | 0.0271 | 0.0296 |
| **$A_1$** | 0.218 | 0.258 | 0.0086 | 0.0102 |
| **$A_2$** | 0.470 | 0.495 | 0.0185 | 0.0195 |
| **b** | 0.306 | 0.346 | 0.0120 | 0.0136 |
| **D** | 1.980 | 2.020 | 0.0780 | 0.0795 |
| **E** | 1.980 | 2.020 | 0.0780 | 0.0795 |
| **e** | 0.5 BASIC | | 0.0197 BASIC | |
| **S** | 0.230 | 0.270 | 0.0091 | 0.0106 |

Notes:

a. Use millimeters as the primary measurement.

*Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see http://www.vishay.com/ppg?72858.*

# Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.