

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

DESCRIPTION

The DG3408, DG3409 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 V 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


RoHS
COMPLIANT

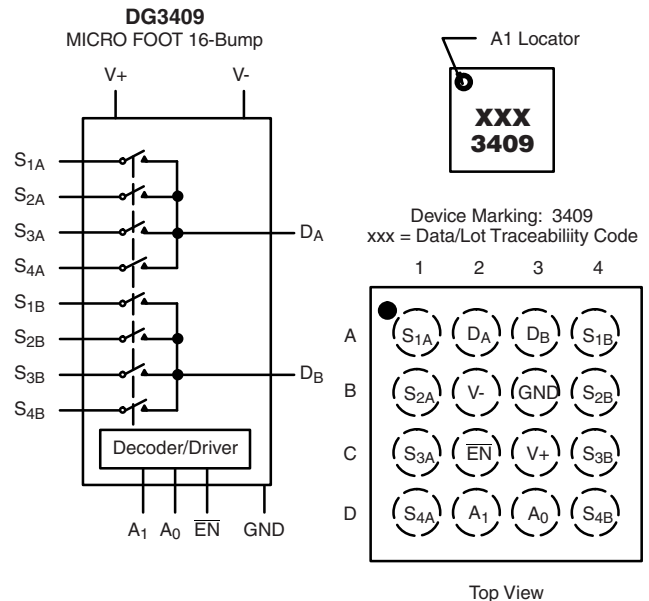
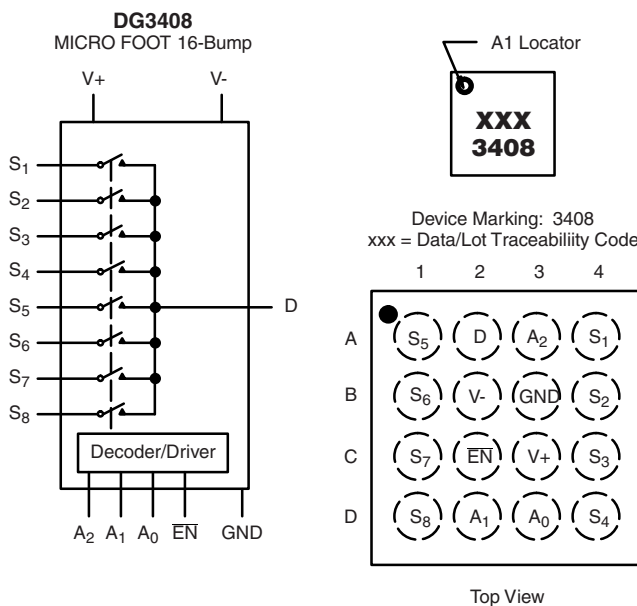
BENEFITS

- 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 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 °C 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 °C 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 | °C |
| Storage Temperature | - 65 to 150 | |
| Power Dissipation (Package) ^c , (T _A = 70 °C) | 16-Bump (4 x 4 mm) MICRO FOOT ^d | mW |

Notes:

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



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



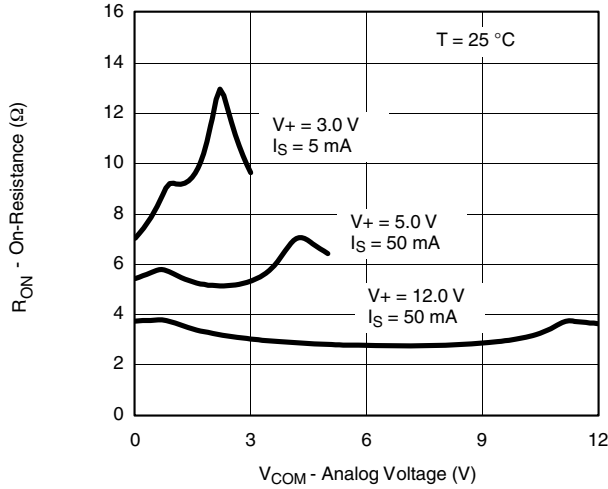
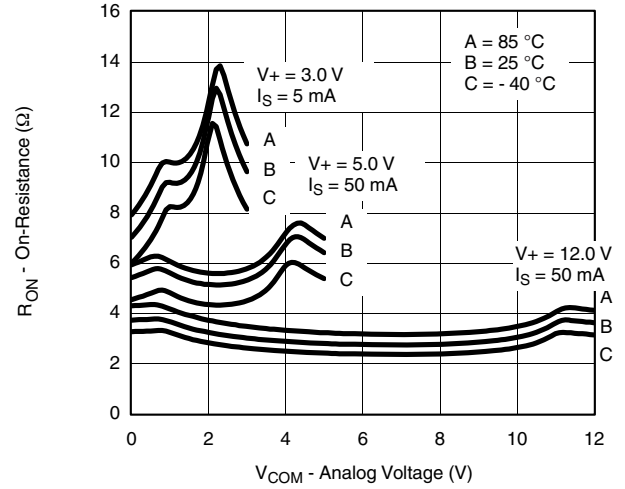
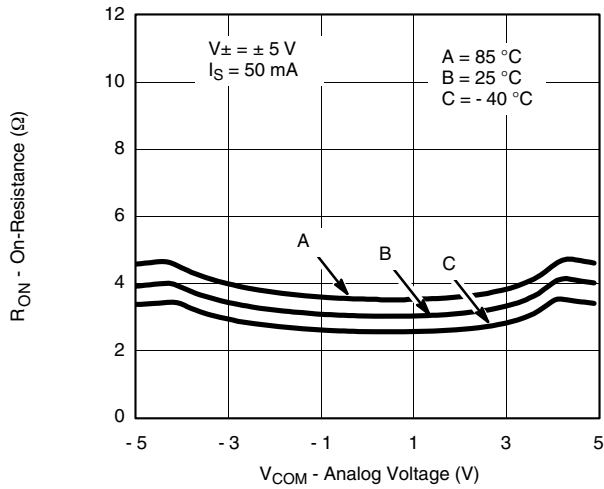
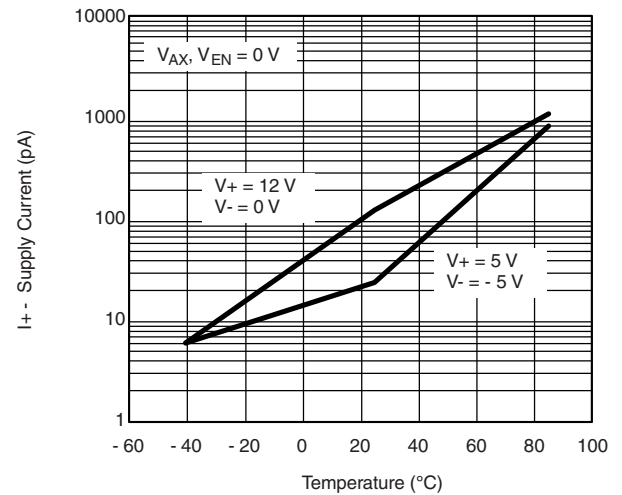
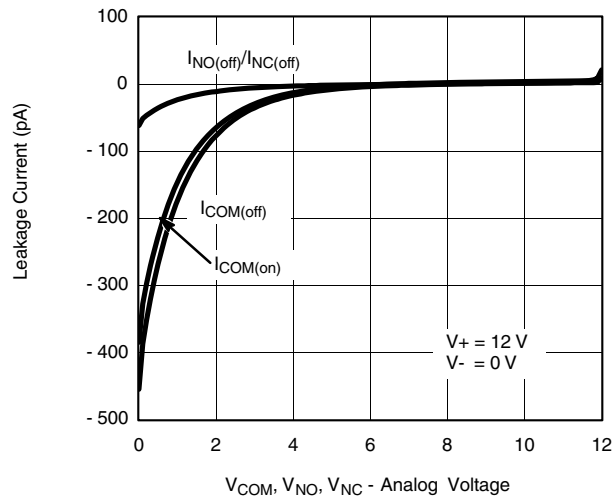
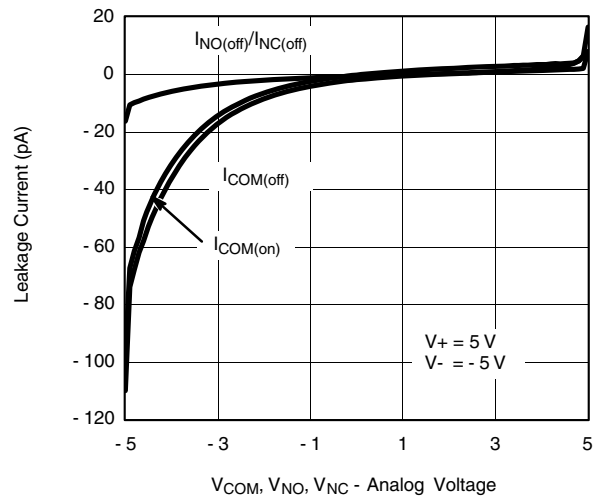
| SPECIFICATIONS (Single Supply 5 V) | | | | | | | |
|---|--|--|--------------------|----------------------------|-------------------|-------------------|------|
| Parameter | Symbol | Test Conditions Unless Otherwise Specified $V_+ = 5\text{ V}, \pm 10\%, V_- = 0\text{ V}$ $V_A, V_{\overline{EN}} =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

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

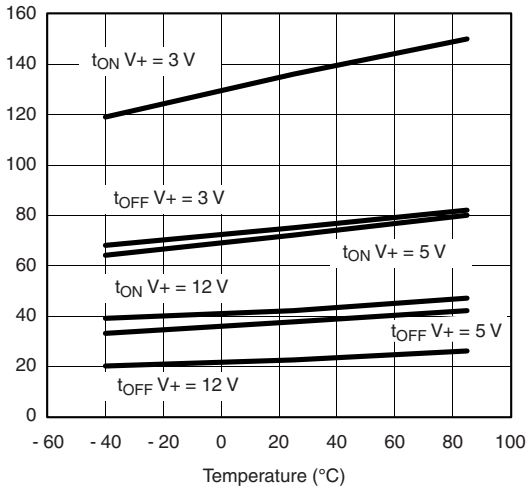
Notes:

- 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_{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 due to proximity to the drain pin.
- R_{DON} flatness is measured as the difference between the minimum and maximum measured values across a defined Analog signal.

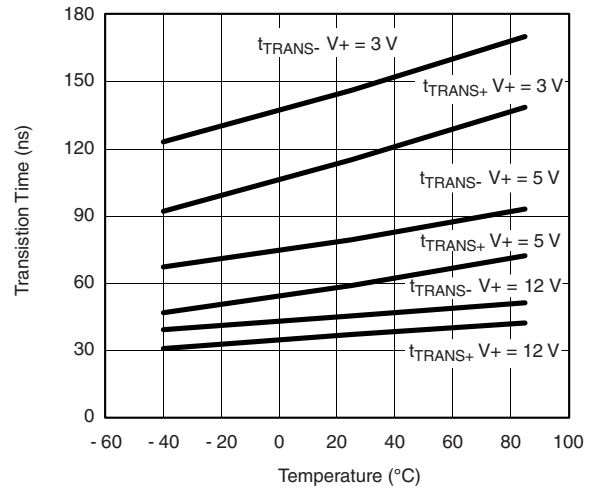
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

RON vs. VCOM and Single Supply Voltage

RON vs. Analog Voltage and Temperature

RON vs. Analog Voltage and Temperature

Supply Current vs. Temperature

Leakage Current vs. Analog Voltage

Leakage Current vs. Analog Voltage

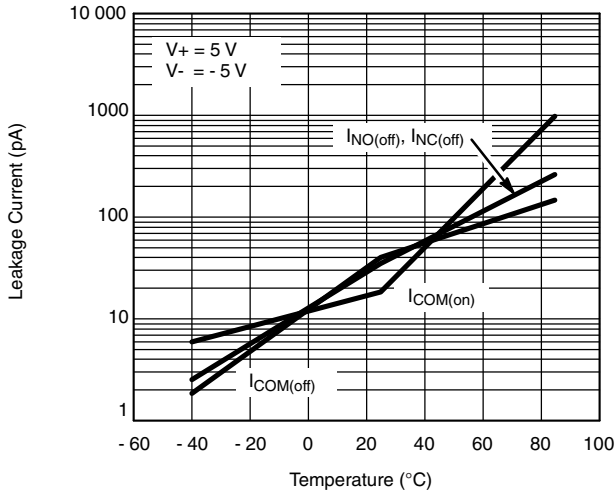
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



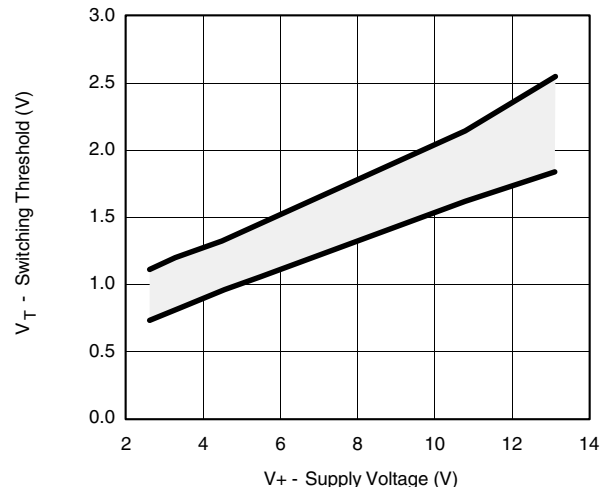
Switching Time vs. Temperature and Single Supply Voltage



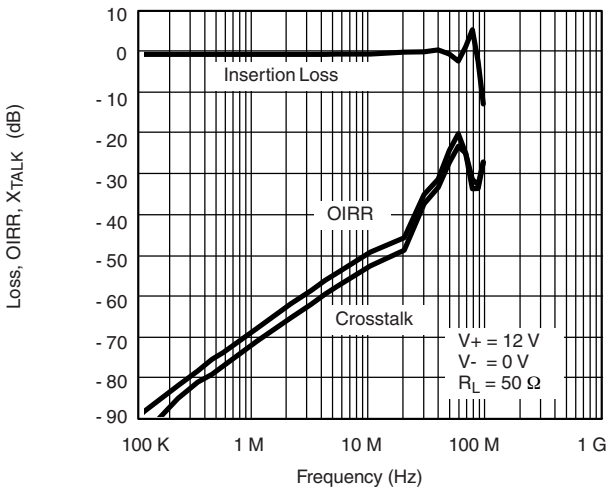
Transition Time vs. Temperature and Single Supply Voltage



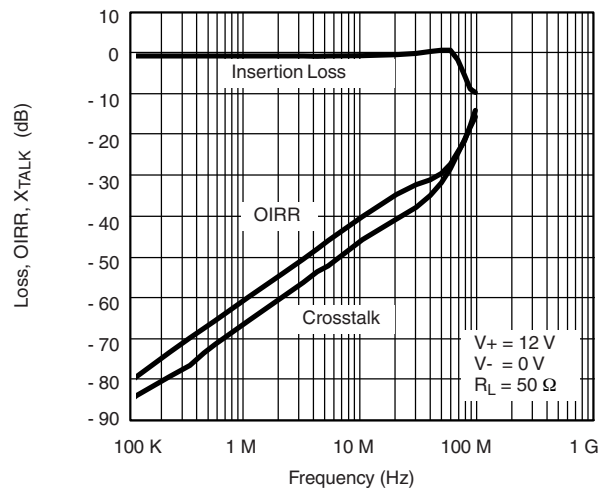
Leakage Current vs. Temperature



Switching Threshold vs. Supply Voltage

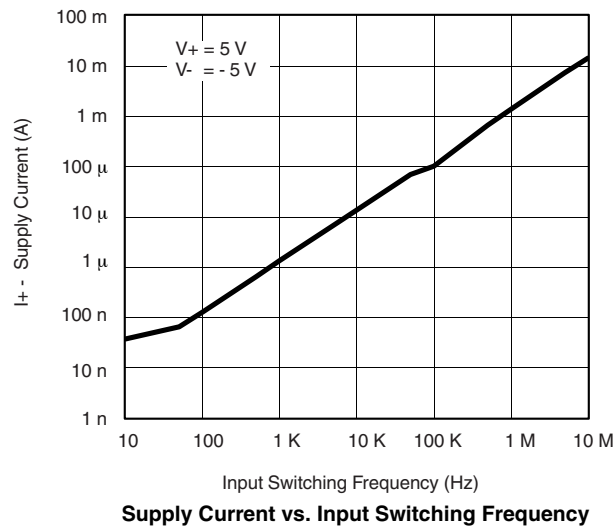


Insertion Loss, Off Isolation and Crosstalk vs. Frequency (DG3408)



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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



SCHEMATIC DIAGRAM (Typical Channel)

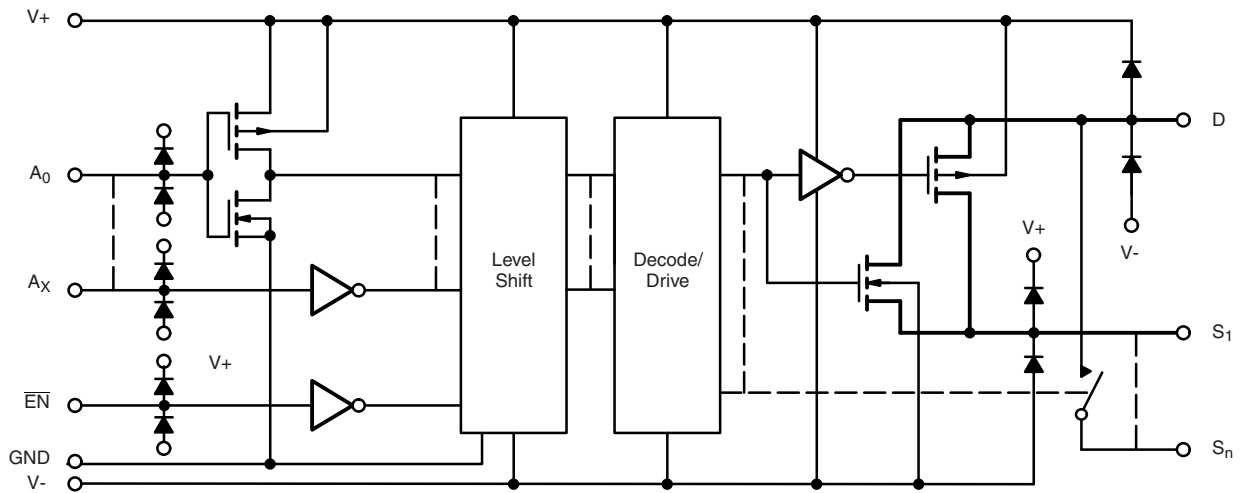
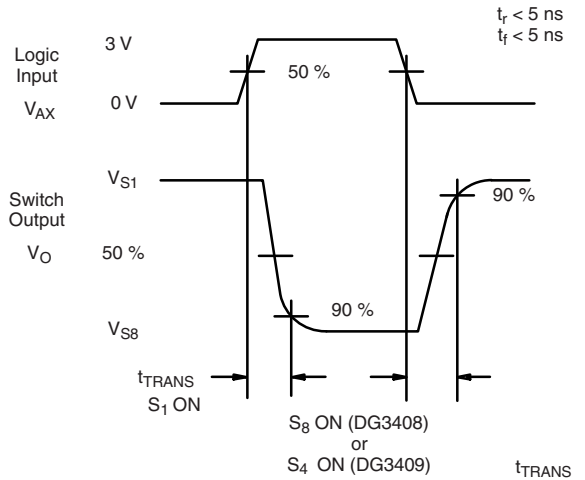
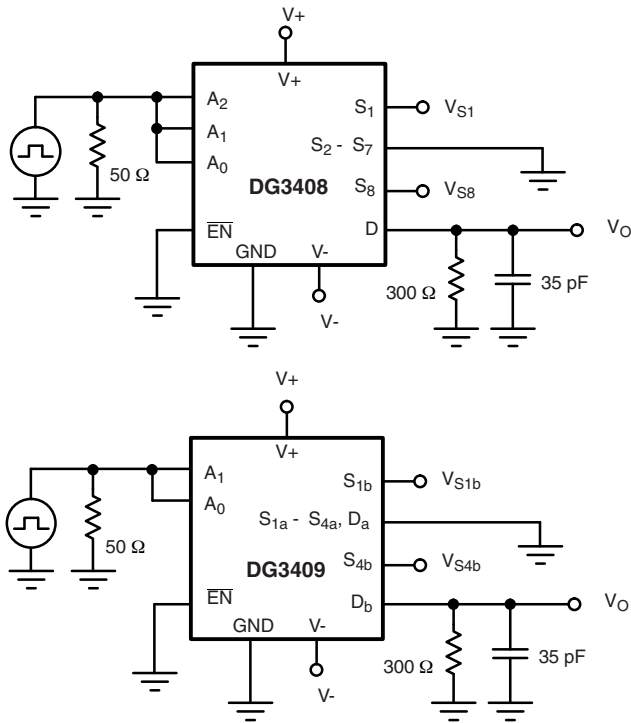


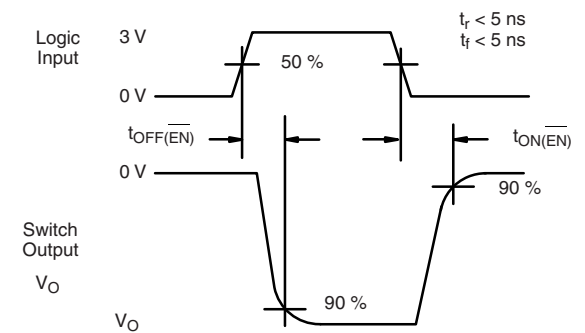
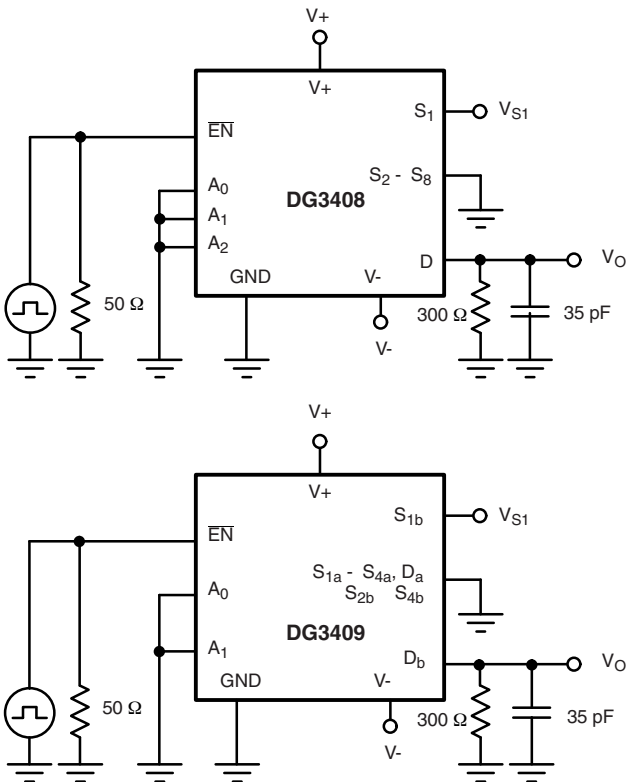
Figure 1.

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

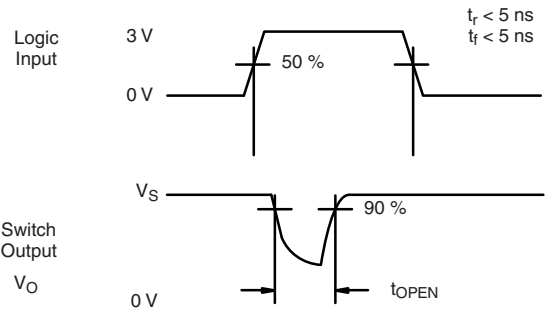
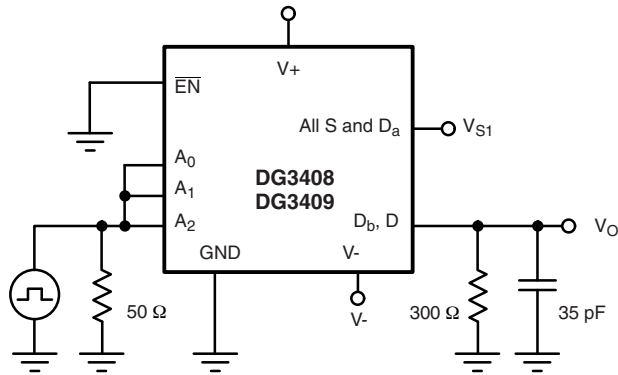
Figure 2. Transition Time



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



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 4. Break-Before-Make Interval

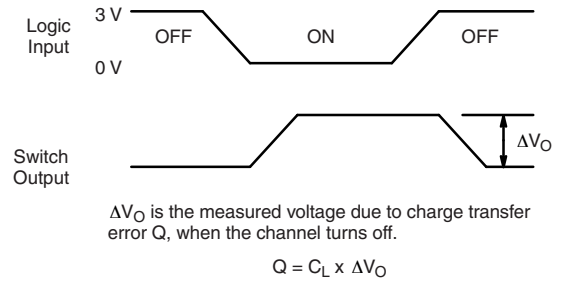
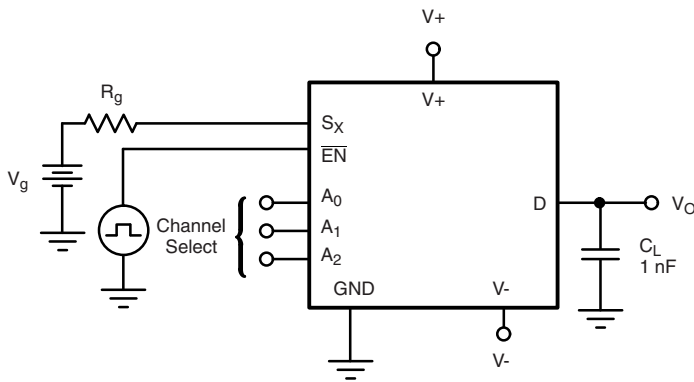


Figure 5. Charge Injection

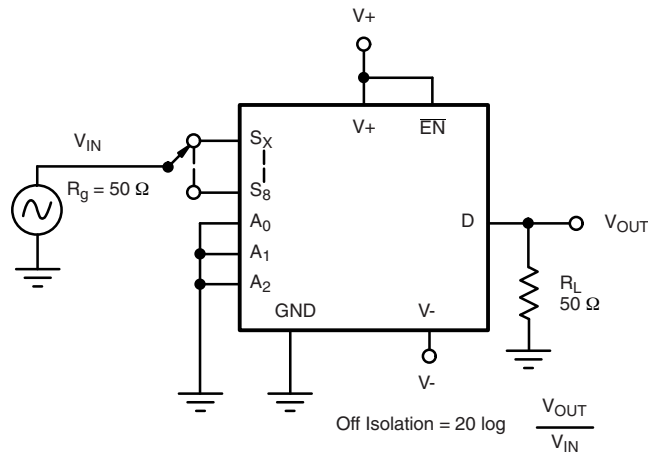


Figure 6. Off Isolation

TEST CIRCUITS

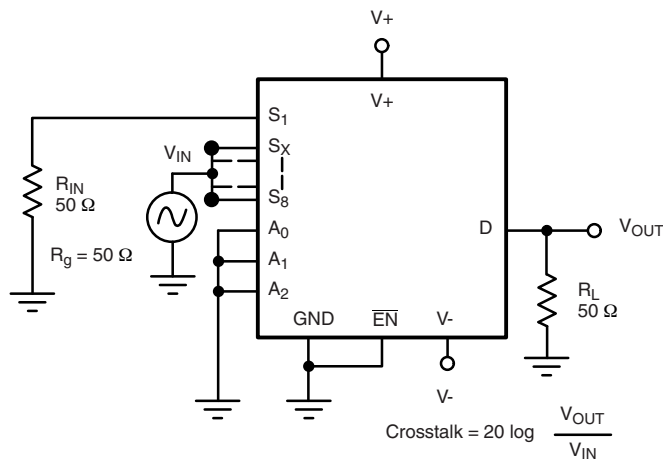


Figure 7. Crosstalk

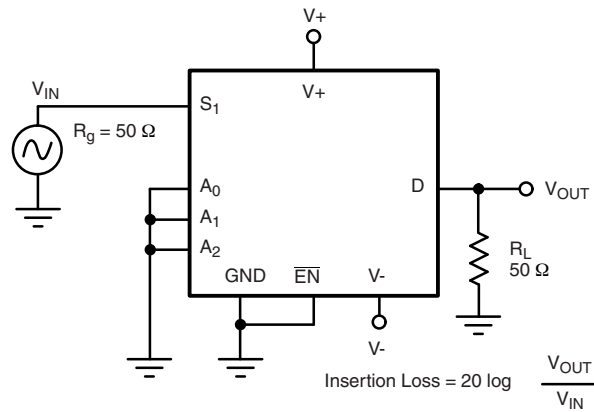


Figure 8. Insertion Loss

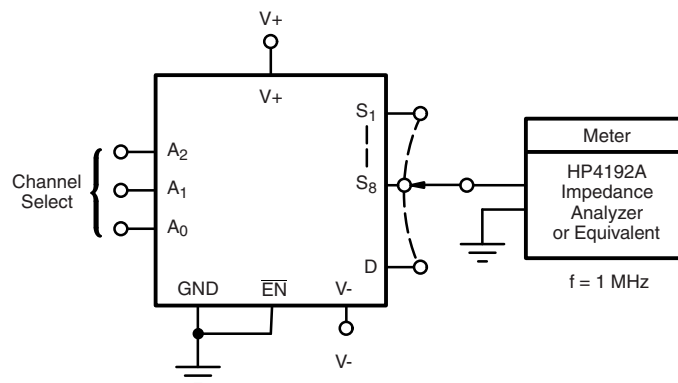
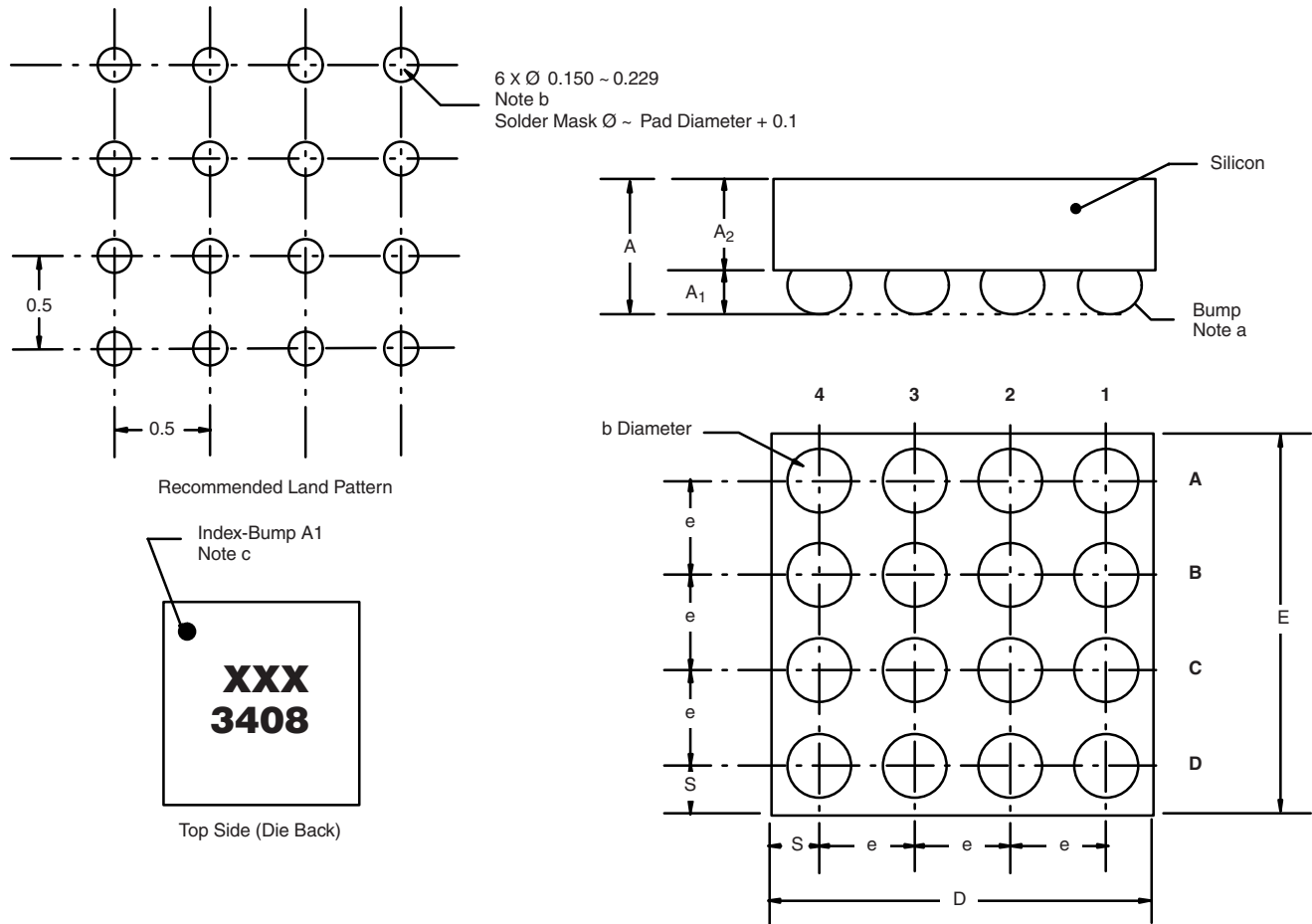


Figure 9. Source Drain Capacitance

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.

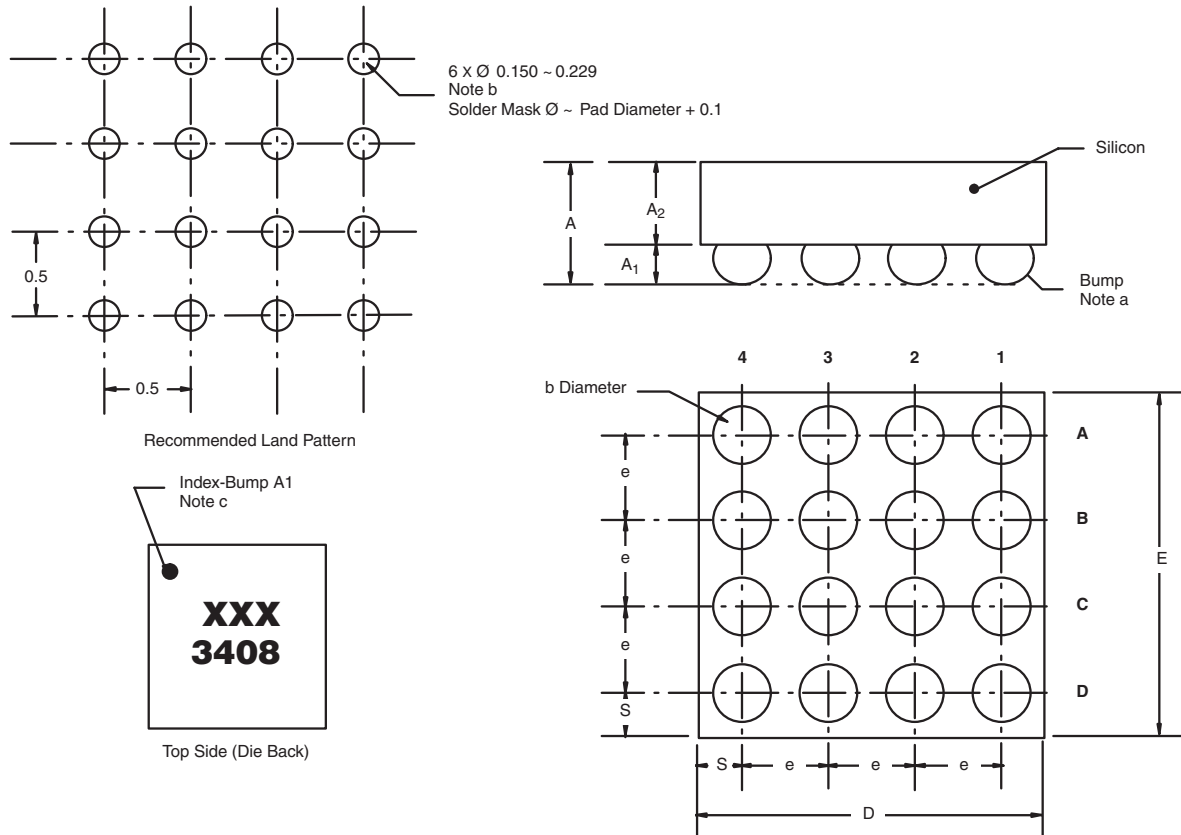
| Dim. | Millimeters ^a | | Inches | |
|----------------------|--------------------------|-------|--------------|--------|
| | Min. | Max. | Min. | Max. |
| A | 0.688 | 0.753 | 0.0271 | 0.0296 |
| A₁ | 0.218 | 0.258 | 0.0086 | 0.0102 |
| A₂ | 0.470 | 0.495 | 0.0185 | 0.0195 |
| b | 0.306 | 0.346 | 0.0120 | 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.

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



Notes

(unless otherwise specified)

- a. Bump is lead (Pb)-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 |

Note

- a. Use millimeters as the primary measurement.

ECN: S11-1065-Rev. A, 13-Jun-11
 DWG: 6000



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