*Click here to ask about the production status of specific part numbers.*

# DG1208/DG1209

# Low-Leakage, Single 8-Channel and Dual 4-Channel, Analog Multiplexers

## General Description

The DG1208 and DG1209 are low-leakage, low-charge-injection, single 8-channel or dual 4-channel multiplexing switch devices. The DG1208 uses three selection inputs A2, A1, and A0 to determine the switching logic; the DG1209 uses two selection inputs A1 and A0. On both devices, an enable (EN) input is used to enable or disable the device.

The low capacitance and low charge injection of the DG1208/DG1209 make them ideal for automatic test equipment systems, data acquisition systems and sample-and-hold systems where low glitch and fast settling time are required.

The DG1208/DG1209 are available in 4mm x 4mm 16-lead TQFN or 16-lead TSSOP packages. The devices are specified for operation over the -40°C to +85°C temperature range.

## Applications

- Automatic Test Equipment Systems
- Data Acquisition Systems
- Sample-and-Hold Systems
- Communication Systems
- Audio and Video Routing

## Benefits and Features

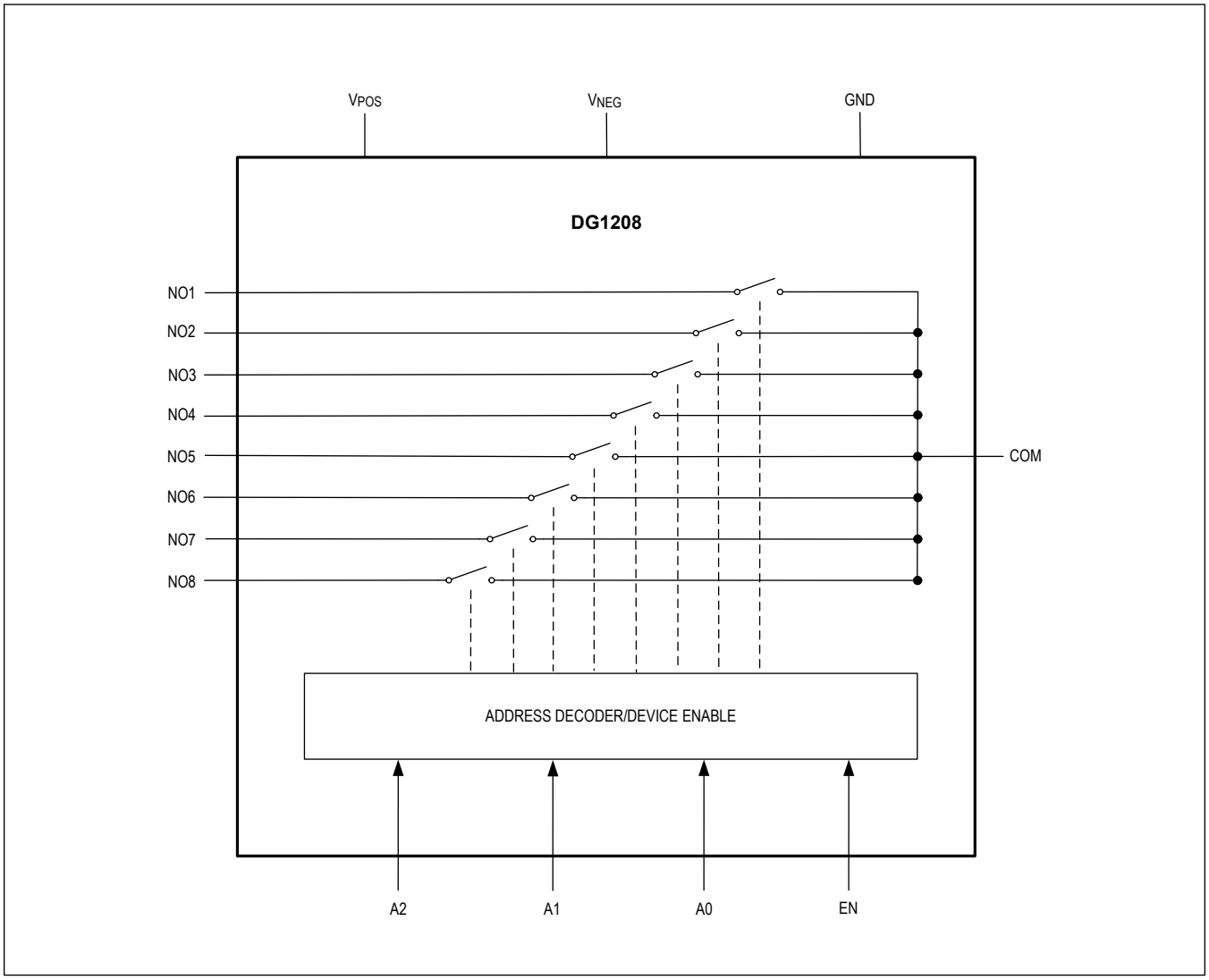
- Distortion-Free Measurement
  - 100Ω (typ) On Resistance
  - ≤ 1nA (max) On/Off-Leakage Current at +85°C
  - ≤ 0.5pC (typ) Charge Injection
- Wide Supply Range with Low Supply Current
  - 40µA (typ) Quiescent Current at Room Temperature
  - Fully Specified with ±15V Bipolar Supplies or +12V Single Supply
  - Rail-to-Rail Operation
- Flexible Design Option
  - GPIO-Compatible Control Inputs
  - EN Input to Enable/Disable Device
  - Available in both 16-TQFN and 16-TSSOP Packages
  - -40°C to +85°C Temperature Range

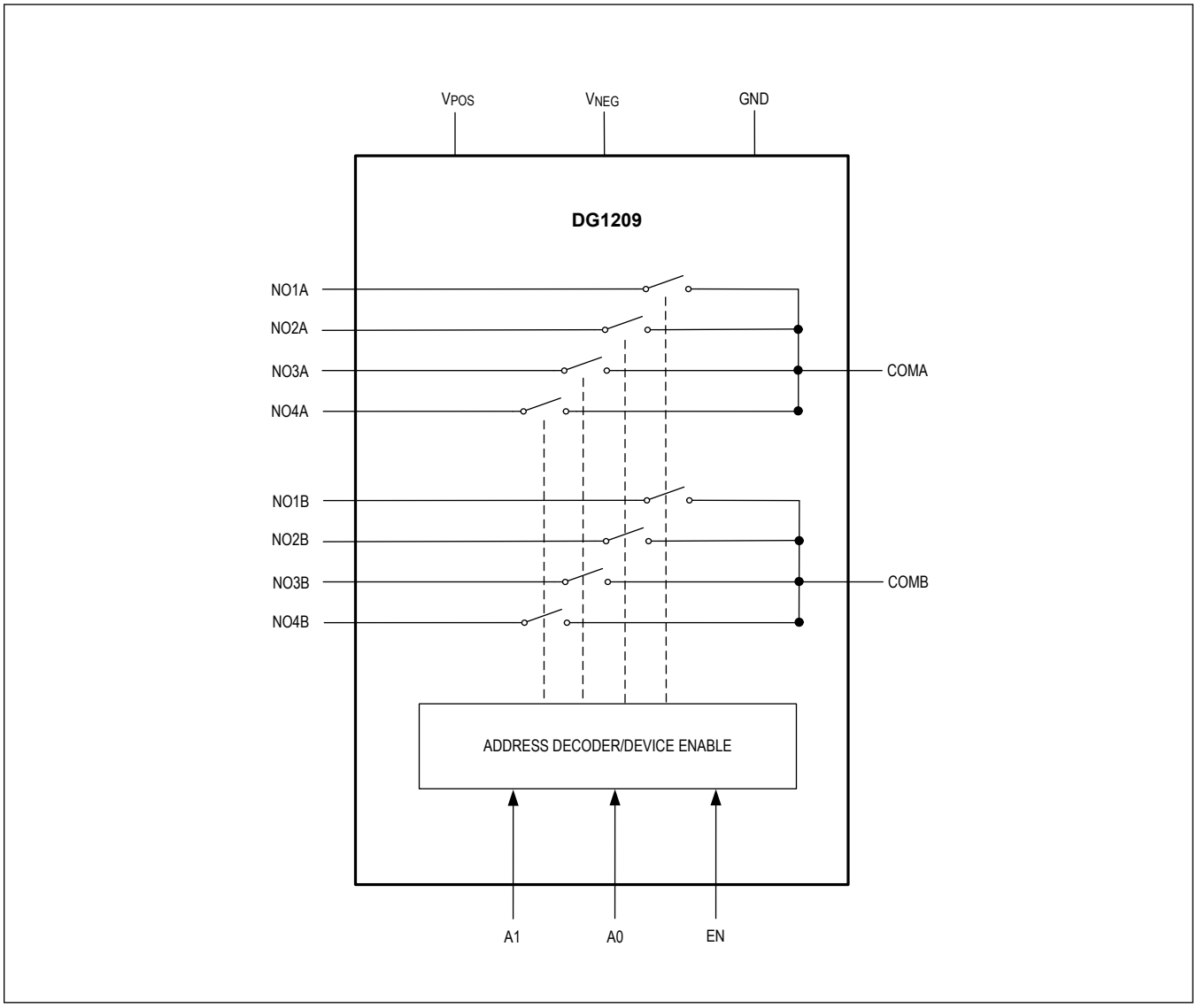
***Ordering Information* appears at end of data sheet.**

*19-100865; Rev 1; 8/21*

maxim integrated™

## Simplified Block Diagram




VPOS
VNEG
GND
DG1209
NO1A
NO2A
NO3A
NO4A
COMA
NO1B
NO2B
NO3B
NO4B
COMB
ADDRESS DECODER/DEVICE ENABLE
A1
A0
EN

## Absolute Maximum Ratings

$V_{POS}$ to GND ..... -0.3V to +20.5V
$V_{NEG}$ to GND ..... -20.5V to +0.3V
$V_{POS}$ to $V_{NEG}$ ..... -0.3V to +41V
A_, EN to GND ..... -0.3V to ($V_{POS}$ + 0.3V)
NO_, COM_ to GND ..... ($V_{NEG}$ - 0.3V) to ($V_{POS}$ + 0.3V)
Continuous Current Into Any Pin ..... ±30mA
Continuous Power Dissipation (16 TQFN)
Single-Layer Board ($T_A$ = +70°C, derate 16.90mW/°C above +70°C)..... 1349.10mW
Multilayer Board ($T_A$ = +70°C, derate 25mW/°C above +70°C)..... 2000mW
Continuous Power Dissipation (16 TSSOP)
Single-Layer Board ($T_A$ = +70°C, derate 9.40mW/°C above +70°C) ..... 754.70mW
Multilayer Board ($T_A$ = +70°C, derate 11.10mW/°C above +70°C) ..... 888.90mW
Operating Temperature Range ..... -40°C to 85°C
Junction Temperature ..... +150°C
Storage Temperature Range ..... -40°C to +150°C
Soldering Temperature (reflow) ..... +260°C

*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.*

## Package Information

### 16 TQFN

| | |
|---|---|
| Package Code | T1644+4 |
| Outline Number | 21-0139 |
| Land Pattern Number | 90-0070 |
| **THERMAL RESISTANCE, SINGLE-LAYER BOARD** | |
| Junction to Ambient ($\theta_{JA}$) | 59.30°C/W |
| Junction to Case ($\theta_{JC}$) | 6°C/W |
| **THERMAL RESISTANCE, FOUR-LAYER BOARD** | |
| Junction to Ambient ($\theta_{JA}$) | 40°C/W |
| Junction to Case ($\theta_{JC}$) | 6°C/W |

### 16 TSSOP

| | |
|---|---|
| Package Code | U16+1 |
| Outline Number | 21-0066 |
| Land Pattern Number | 90-0117 |
| **THERMAL RESISTANCE, SINGLE-LAYER BOARD** | |
| Junction to Ambient ($\theta_{JA}$) | 106°C/W |
| Junction to Case ($\theta_{JC}$) | 27°C/W |
| **THERMAL RESISTANCE, FOUR-LAYER BOARD** | |
| Junction to Ambient ($\theta_{JA}$) | 90°C/W |
| Junction to Case ($\theta_{JC}$) | 27°C/W |

For the latest package outline information and land patterns (footprints), go to *www.maximintegrated.com/packages*. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to *www.maximintegrated.com/thermal-tutorial*.

## Electrical Characteristics - ±15V Bipolar Supplies

($V_{POS}$ = +15V, $V_{NEG}$ = -15V, GND = 0V, $T_A$ = -40°C to 85°C, unless otherwise noted.) (*Note 1*)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **POWER SUPPLY** | | | | | | |
| Positive Power-Supply Voltage | $V_{POS}$ | | +5 | | +20 | V |
| Negative Power-Supply Voltage | $V_{NEG}$ | | -20 | | -5 | V |
| Positive Power-Supply Current | $I_{POS}$ | EN = A_ = 0V | | 40 | 70 | µA |
| | | EN = A_ = 2.4V | | 40 | 80 | |
| Negative Power-Supply Current | $I_{NEG}$ | EN = A_ = 0V | -1 | | +1 | µA |
| | | EN = A_ = 2.4V | -1 | | +1 | |
| **ANALOG SWITCH** | | | | | | |
| Analog-Signal Voltage Range | $V_{NO_}$, $V_{COM_}$ | | $V_{NEG}$ | | $V_{POS}$ | V |
| On-Resistance | $R_{ON}$ | $V_{COM_}$ = 0V, ±5V, ±10V, $I_{COM_}$ = 1mA (*Note 2*) | | 100 | 160 | Ω |
| On-Resistance Match Between Channels | $\Delta R_{ON}$ | $V_{COM_}$ = 0V, ±5V, ±10V, $I_{COM_}$ = 1mA (*Note 2*) | | 10 | 30 | Ω |
| On-Resistance Flatness | $R_{FLAT}$ | $V_{COM_}$ = -5V, 0V, +5V, $I_{COM_}$ = 1mA (*Note 3*) | | 17 | 25 | Ω |
| NO_ Off Capacitance | $C_{NO_OFF}$ | $V_{NO_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | 4 | | pF |
| COM_ Off Capacitance | $C_{COM_OFF}$ | $V_{COM_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | 15 | | pF |
| COM_ On Capacitance | $C_{COM_ON}$ | $V_{COM_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | 10 | | pF |
| NO_ Off-Leakage Current | $I_{NO_OFF}$ | $V_{NO_}$ = ±10V, $V_{COM_}$ = ∓10V (*Note 4*) | -1 | | +1 | nA |
| COM_ Off-Leakage Current | $I_{COM_OFF}$ | DG1208, $V_{NO_}$ = +1/+10V, $V_{COM_}$ = +10/+1V (*Note 5*) | -1 | | +1 | nA |
| | | DG1209, $V_{NO_}$ = +1/+10V, $V_{COM_}$ = +10/+1V (*Note 5*) | -1 | | +1 | |
| COM_ On-Leakage Current | $I_{COM_ON}$ | DG1208, $V_{NO_}$ = $V_{COM_}$ = ±10V | -1 | | +1 | nA |
| | | DG1209, $V_{NO_}$ = $V_{COM_}$ = ±10V | -1 | | +1 | |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Turn-On Time | $t_{ON}$ | *Figure 1*, $V_S$ = 10V | | 200 | 400 | ns |
| Turn-Off Time | $t_{OFF}$ | *Figure 1*, $V_S$ = 10V | | 300 | 400 | ns |
| Break-Before-Make Time | $t_{BBM}$ | *Figure 2*, $V_S$ = 10V | 50 | | | ns |
| Total Transition Time | $t_{TT}$ | *Figure 3*, $V_S$ = 10V | | | 400 | ns |
| -3dB Bandwidth | $f_{BW}$ | DG1208, *Figure 4*, $R_S$ = $R_L$ = 50Ω | | 200 | | MHz |
| | | DG1209, *Figure 4*, $R_S$ = $R_L$ = 50Ω | | 250 | | |
| Total Harmonic Distortion Plus Noise | THD+N | *Figure 5*, $R_S$ = 50Ω, $R_L$ = 10kΩ, $V_S$ = $5V_{RMS}$, $f_{SW}$ = 20Hz to 20kHz | | 0.1 | | % |
| Off-Isolation | | *Figure 6*, $R_S$ = $R_L$ = 50Ω, $V_{NO_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | -80 | | dB |
| Crosstalk | | *Figure 7*, $R_S$ = $R_L$ = 50Ω, $V_{NO_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | -80 | | dB |

## Electrical Characteristics - ±15V Bipolar Supplies (continued)

($V_{POS}$ = +15V, $V_{NEG}$ = -15V, GND = 0V, $T_A$ = -40°C to 85°C, unless otherwise noted.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Charge Injection | $C_{INJ}$ | Figure 8, $R_S$ = 0Ω, $V_S$ = 0V | | 0.5 | | pC |
| **DIGITAL INPUTS (A_, EN)** | | | | | | |
| Input Logic High Voltage | $V_{IH}$ | | 2.4 | | | V |
| Input Logic Low Voltage | $V_{IL}$ | | | | 0.8 | V |
| Input-Leakage Current | $I_{IN}$ | | -5 | | +40 | µA |

## Electrical Characteristics - +12V Single Supply

($V_{POS}$ = +12V, $V_{NEG}$ = GND = 0V, $T_A$ = -40°C to 85°C, unless otherwise noted.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **POWER SUPPLY** | | | | | | |
| Positive Power-Supply Voltage | $V_{POS}$ | | 10 | 12 | 20 | V |
| Positive Power-Supply Current | $I_{POS}$ | EN = A_ = 0V | | | 70 | µA |
| | | EN = A_ = 2.4V | | | 90 | |
| **ANALOG SWITCH** | | | | | | |
| Analog-Signal Voltage Range | $V_{NO_}$, $V_{COM_}$ | | 0 | | $V_{POS}$ | V |
| On-Resistance | $R_{ON}$ | $V_{COM_}$ = 3V, 6V, 9V, $I_{COM_}$ = 1mA (Note 6) | | 165 | 250 | Ω |
| On-Resistance Match Between Channels | $\Delta R_{ON}$ | $V_{COM_}$ = 3V, 6V, 9V, $I_{COM_}$ = 1mA (Note 6) | | 18 | 50 | Ω |
| On-Resistance Flatness | $R_{FLAT}$ | $V_{COM_}$ = 3V, 6V, 9V, $I_{COM_}$ = 1mA (Note 6) | | 15 | 50 | Ω |
| NO_ Off Capacitance | $C_{NO_OFF}$ | $V_{NO_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | 4 | | pF |
| COM_ Off Capacitance | $C_{COM_OFF}$ | $V_{COM_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | 15 | | pF |
| COM_ On Capacitance | $C_{COM_ON}$ | $V_{COM_}$ = 0.5$V_{P-P}$, $f_{SW}$ = 1MHz | | 10 | | pF |
| NO_ Off-Leakage Current | $I_{NO_OFF}$ | $V_{NO_}$ = +1/+10V, $V_{COM_}$ = +10/+1V (Note 7) | -1 | | +1 | nA |
| COM_ Off-Leakage Current | $I_{COM_OFF}$ | DG1208, $V_{NO_}$ = +1/+10V, $V_{COM_}$ = +10/+1V (Note 7) | -1 | | +1 | nA |
| | | DG1209, $V_{NO_}$ = +1/+10V, $V_{COM_}$ = +10/+1V (Note 7) | -1 | | +1 | |
| COM_ On-Leakage Current | $I_{COM_ON}$ | DG1208, $V_{NO_}$ = $V_{COM_}$ = +1V or +10V | -1 | | +1 | nA |
| | | DG1209, $V_{NO_}$ = $V_{COM_}$ = +1V or +10V | -1 | | +1 | |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Turn-On Time | $t_{ON}$ | Figure 1, $V_S$ = 10V | | 400 | 600 | ns |
| Turn-Off Time | $t_{OFF}$ | Figure 1, $V_S$ = 10V | | 250 | 500 | ns |
| Break-Before-Make Time | $t_{BBM}$ | Figure 2, $V_S$ = 10V | 50 | | | ns |
| Total Transition Time | $t_{TT}$ | Figure 3, $V_S$ = 10V | | | 700 | ns |
| -3dB Bandwidth | $f_{BW}$ | DG1208, Figure 4, $R_S$ = $R_L$ = 50Ω | | 200 | | MHz |
| | | DG1209, Figure 4, $R_S$ = $R_L$ = 50Ω | | 250 | | |

## Electrical Characteristics - +12V Single Supply (continued)

($V_{POS}$ = +12V, $V_{NEG}$ = GND = 0V, $T_A$ = -40°C to 85°C, unless otherwise noted.) (*Note 1*)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Total Harmonic Distortion Plus Noise | THD+N | *Figure 5*, $R_S$ = 50Ω, $R_L$ = 10kΩ, $V_S$ = $5V_{RMS}$, $f_{SW}$ = 20Hz to 20kHz, | | 0.1 | | % |
| Off-Isolation | | *Figure 6*, $R_S$ = $R_L$ = 50Ω, $V_{NO_}$ = $0.5V_{P-P}$, $f_{SW}$ = 1MHz | | -80 | | dB |
| Crosstalk | | Figure 7, $R_S$ = $R_L$ = 50Ω, $V_{NO_}$ = $0.5V_{P-P}$, $f_{SW}$ = 1MHz | | -80 | | dB |
| Charge Injection | $C_{INJ}$ | *Figure 8*, $V_S$ = 6V, $R_S$ = 0Ω | | 0.5 | | pC |
| **DIGITAL INPUTS (A_, EN)** | | | | | | |
| Input Logic High Voltage | $V_{IH}$ | | 2.4 | | | V |
| Input Logic Low Voltage | $V_{IL}$ | | | | 0.8 | V |
| Input-Leakage Current | $I_{IN}$ | | -5 | | +30 | µA |

**Note 1:** Limits are 100% tested at $T_A$ = +85°C. Limits over the operating temperature range and relevant supply-voltage range are guaranteed by design and characterization.

**Note 2:** On Resistance ($R_{ON}$) and On-Resistance Match Between Channels ($\Delta R_{ON}$) are measured when the output channel is turned on. The output (COM_) is sourced with 1mA current while biased at one of these levels: 0V, ±5V, or ±10V.

**Note 3:** On-Resistance Flatness ($R_{FLAT}$) is measured when the output channel is turned on. The output (COM_) is sourced with 1mA current while biased at one of these levels: -5V, 0V, or +5V.

**Note 4:** NO_ Off-Leakage Current ($I_{NO_OFF}$) is measured when the output channel is switched off while the input (NO_) is biased at +10V and output (COM_) at -10V, or while the input is biased at -10V and output at +10V.

**Note 5:** COM_ Off-Leakage Current ($I_{COM_OFF}$) is measured when the output channel is switched off while the input (NO_) is biased at +1V and output (COM_) at +10V, or while the input is biased at +10V and output at +1V.

**Note 6:** On Resistance ($R_{ON}$), On-Resistance Match Between Channels ($\Delta R_{ON}$), and On-Resistance Flatness ($R_{FLAT}$) are measured when the output channel is turned on. The output (COM_) is sourced with 1mA current while biased at one of these levels: 3V, 6V, or 9V.

**Note 7:** NO_ Off-Leakage Current ($I_{NO_OFF}$) and COM_ Off-Leakage Current ($I_{COM_OFF}$) are measured when the output channel is switched off while the input (NO_) is biased at +1V and output (COM_) at +10V, or while the input is biased at +10V and output at +1V.

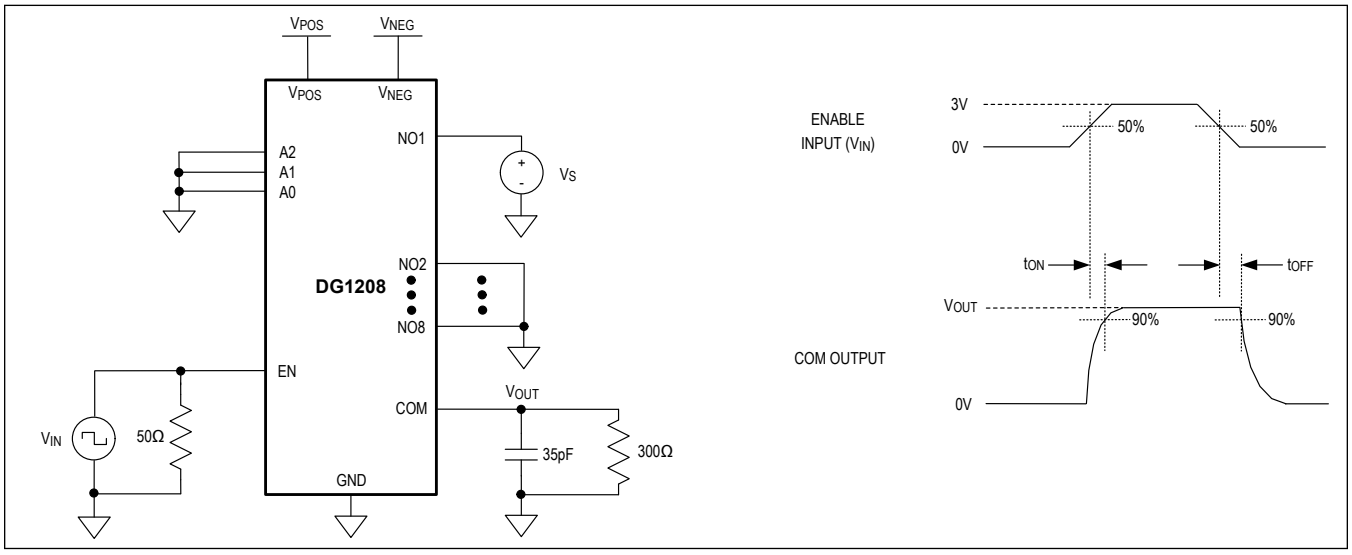



*Figure 1. Turn-On Time and Turn-Off Time (Similar Connection for DG1209)*

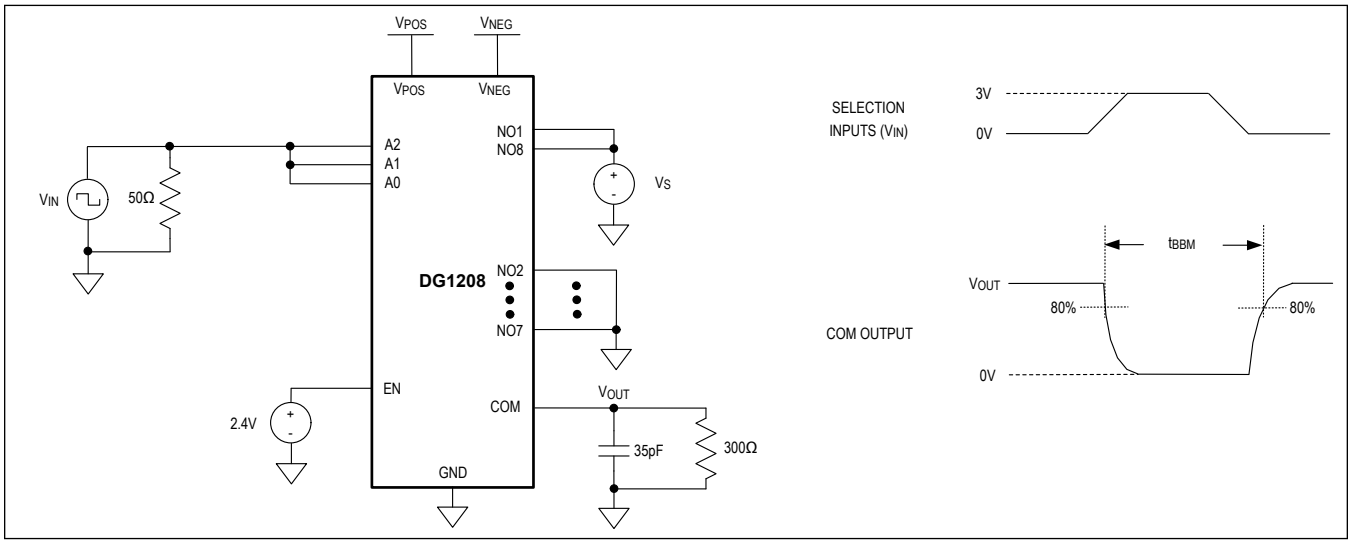



*Figure 2. Break-Before-Make Time (Similar Connection for DG1209)*

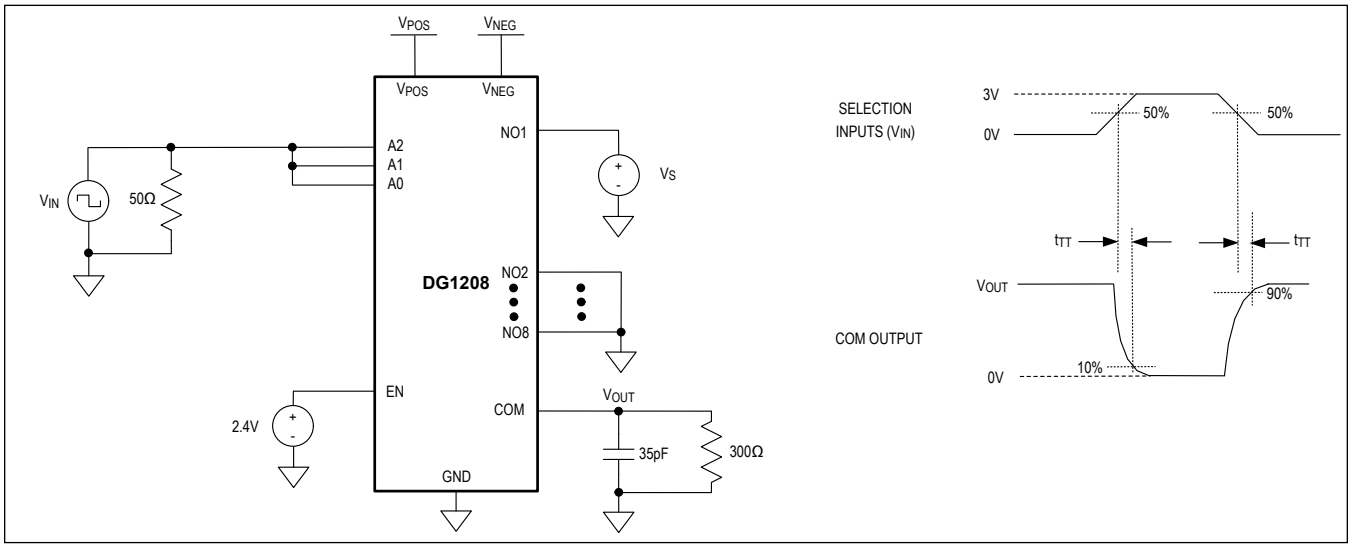



*Figure 3. Total Transition Time (Similar Connection for DG1209)*

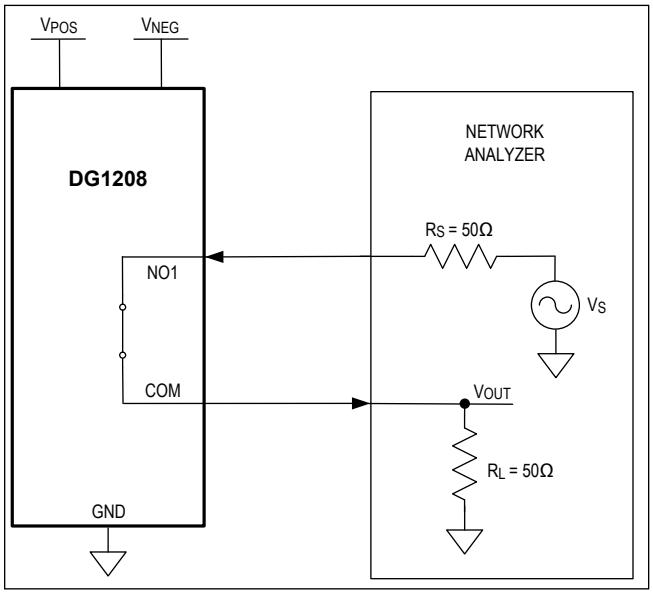



*Figure 4. -3dB Bandwidth (Similar Connection for DG1209)*

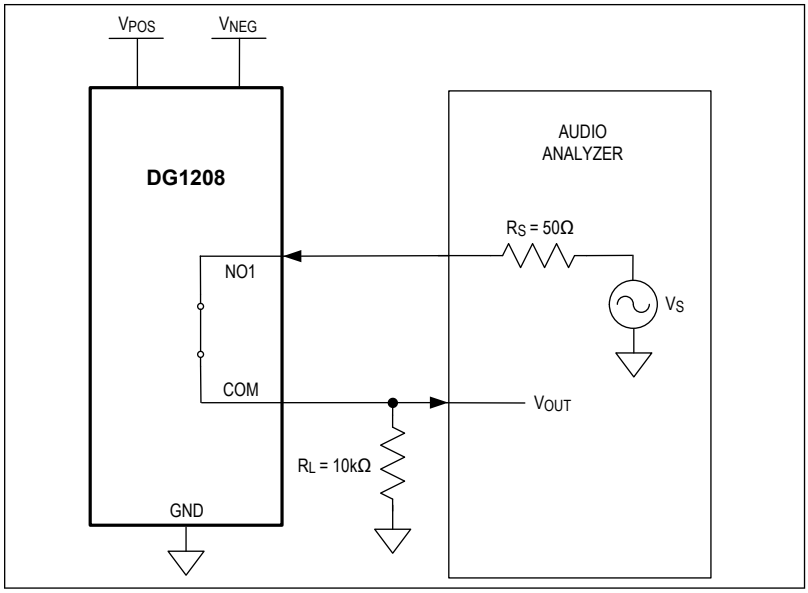



*Figure 5. Total Harmonic Distortion Plus Noise (Similar Connection for DG1209)*

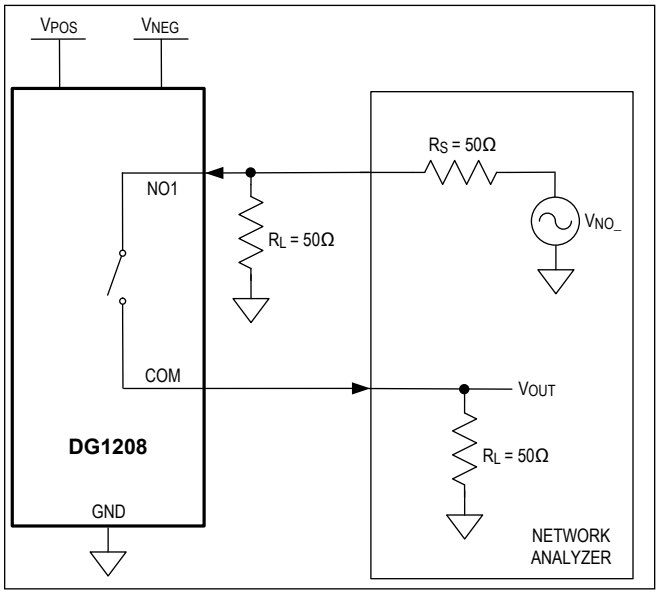



*Figure 6. Off Isolation (Similar Connection for DG1209)*

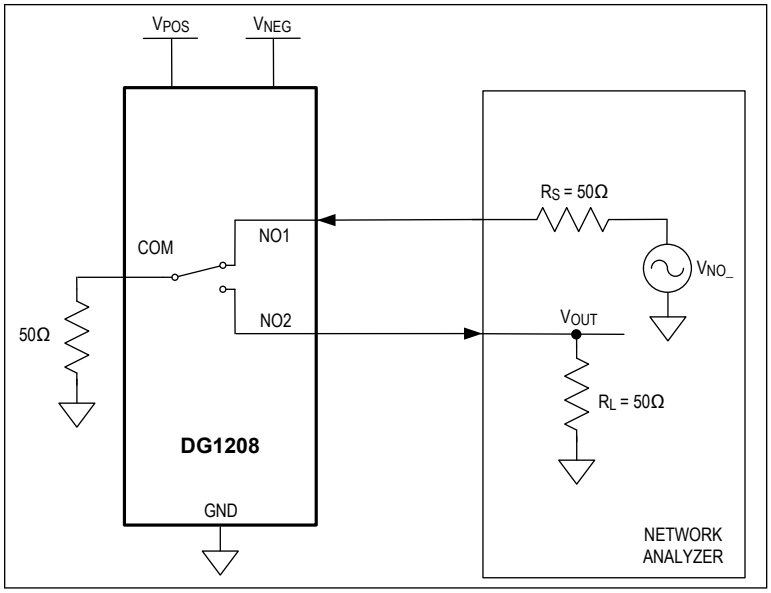



*Figure 7. Crosstalk (Similar Connection for DG1209)*

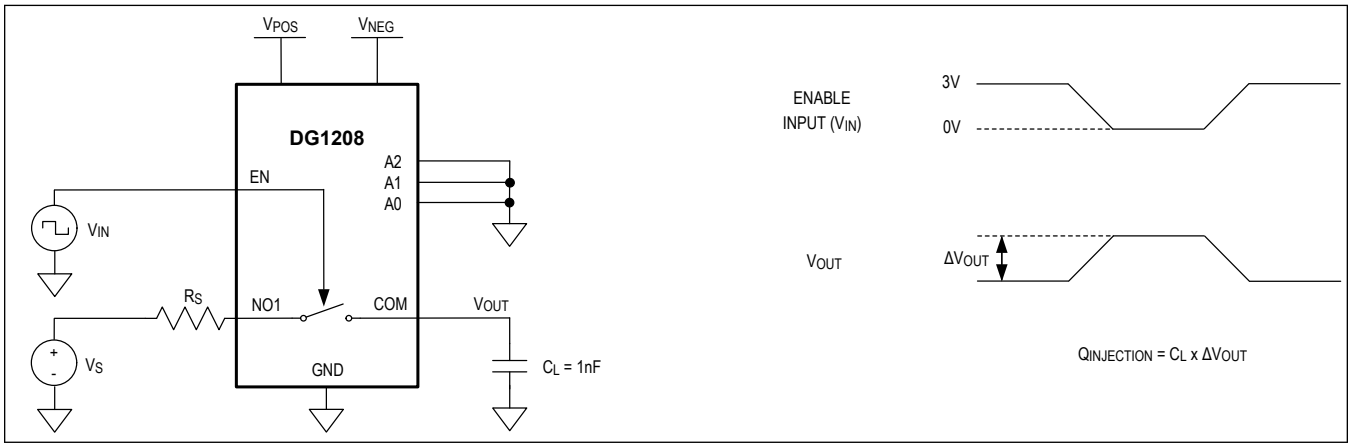
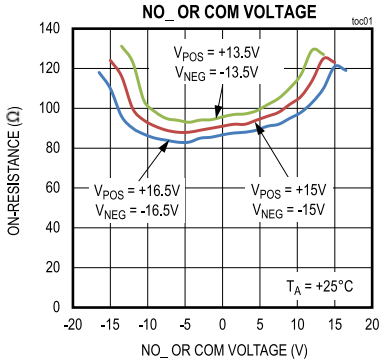



*Figure 8. Charge Injection (Similar Connection for DG1209)*

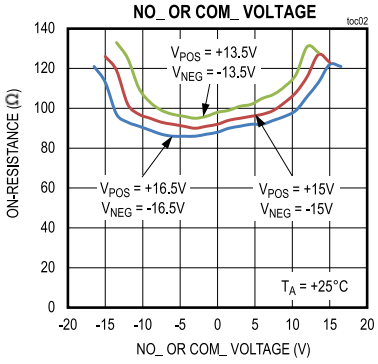
## Typical Operating Characteristics

($T_A$ = 25°C, unless otherwise noted.)

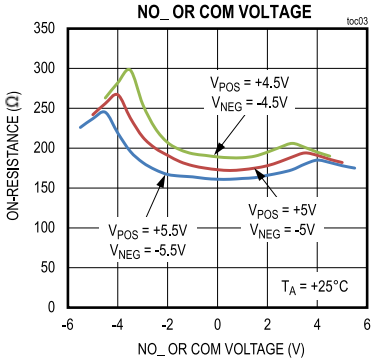
DG1208 ON-RESISTANCE vs. NO_ OR COM VOLTAGE



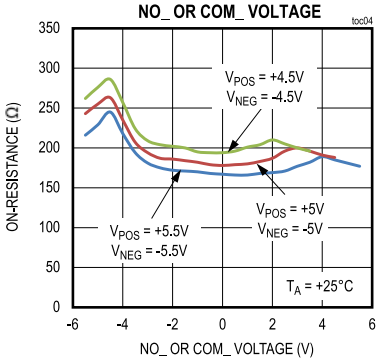

DG1209 ON-RESISTANCE vs. NO_ OR COM_ VOLTAGE



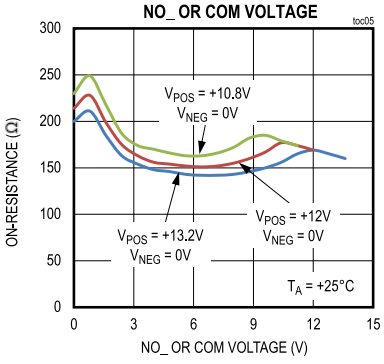

DG1208 ON-RESISTANCE vs. NO_ OR COM VOLTAGE



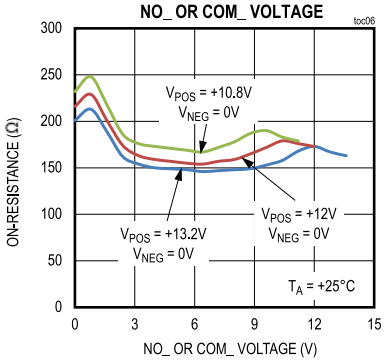

DG1209 ON-RESISTANCE vs. NO_ OR COM_ VOLTAGE



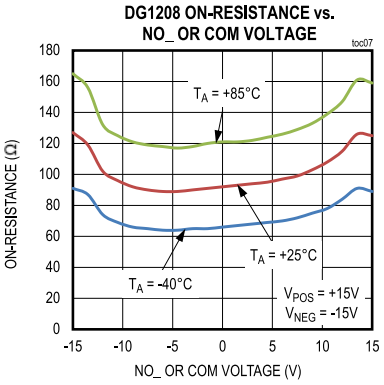

DG1208 ON-RESISTANCE vs. NO_ OR COM VOLTAGE



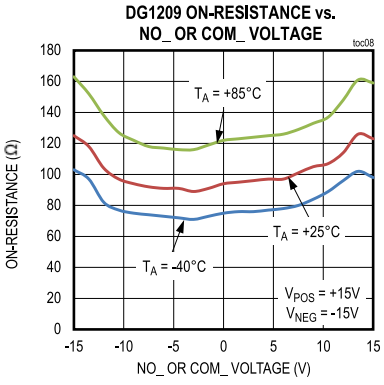

DG1209 ON-RESISTANCE vs. NO_ OR COM_ VOLTAGE



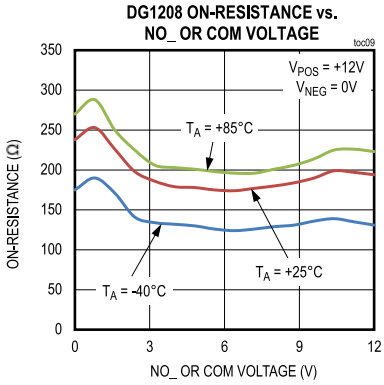

DG1208 ON-RESISTANCE vs. NO_ OR COM VOLTAGE




DG1209 ON-RESISTANCE vs. NO_ OR COM_ VOLTAGE



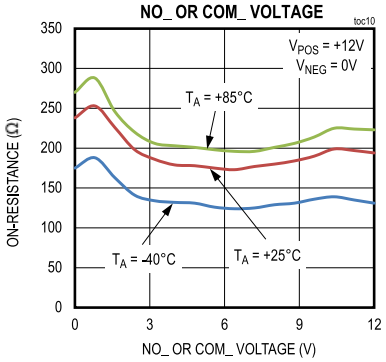

DG1208 ON-RESISTANCE vs. NO_ OR COM VOLTAGE



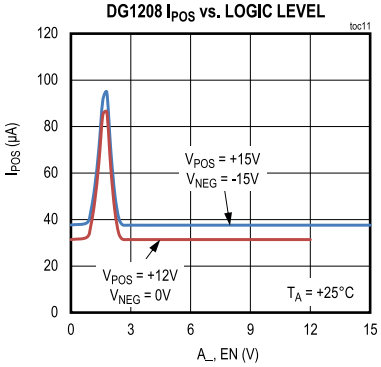
## Typical Operating Characteristics (continued)

($T_A$ = 25°C, unless otherwise noted.)

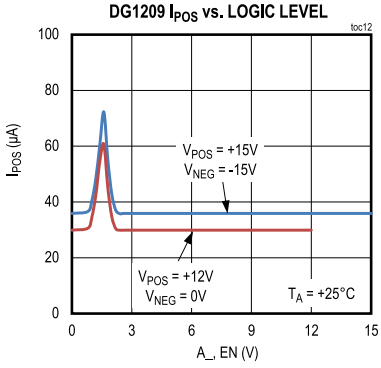
DG1209 ON-RESISTANCE vs. NO_ OR COM_ VOLTAGE



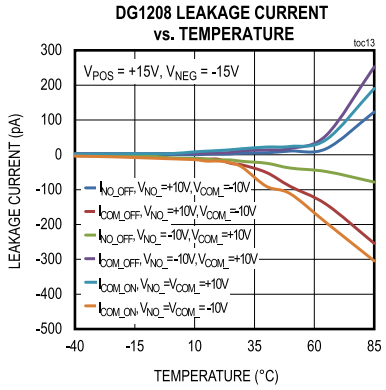

DG1208 $I_{POS}$ vs. LOGIC LEVEL



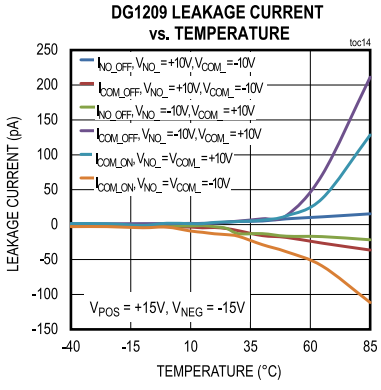

DG1209 $I_{POS}$ vs. LOGIC LEVEL



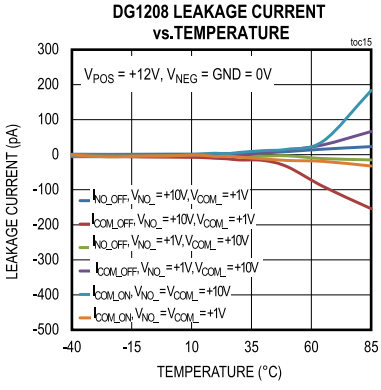

DG1208 LEAKAGE CURRENT vs. TEMPERATURE



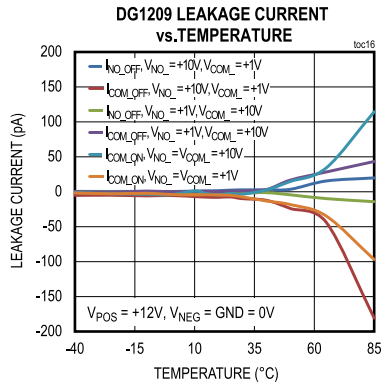

DG1209 LEAKAGE CURRENT vs. TEMPERATURE



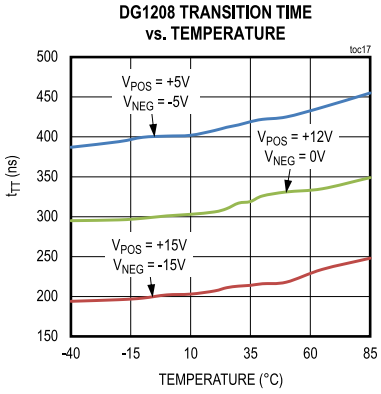

DG1208 LEAKAGE CURRENT vs.TEMPERATURE



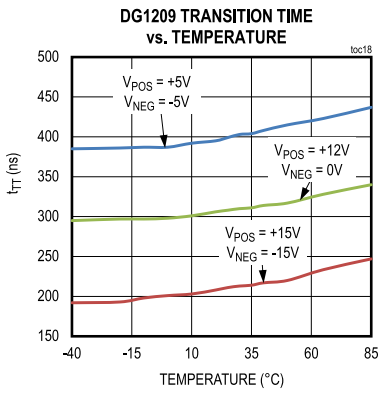

DG1209 LEAKAGE CURRENT vs.TEMPERATURE




DG1208 TRANSITION TIME vs. TEMPERATURE



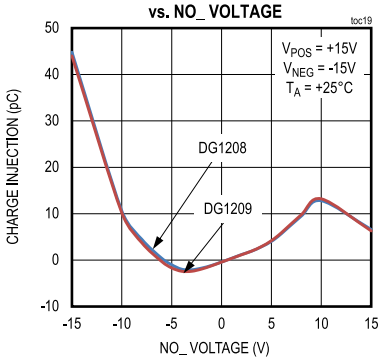

DG1209 TRANSITION TIME vs. TEMPERATURE



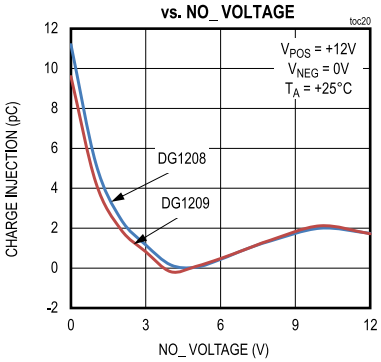
## Typical Operating Characteristics (continued)

($T_A$ = 25°C, unless otherwise noted.)

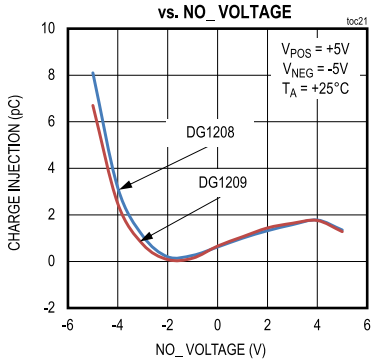
NO_ to COM_ CHARGE INJECTION vs. NO_ VOLTAGE



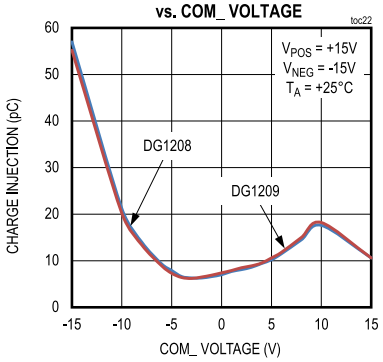

NO_ to COM_ CHARGE INJECTION vs. NO_ VOLTAGE



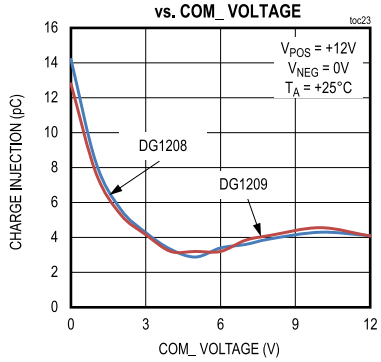

NO_ to COM_ CHARGE INJECTION vs. NO_ VOLTAGE



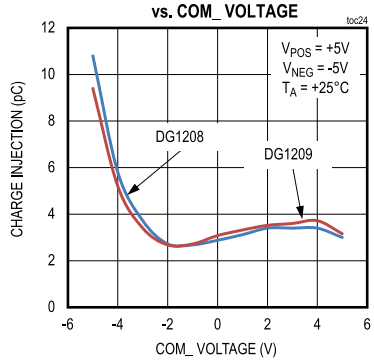

COM_ to NO_ CHARGE INJECTION vs. COM_ VOLTAGE



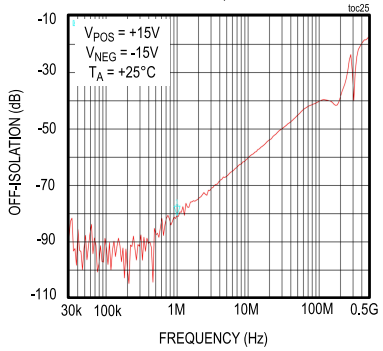

COM_ to NO_ CHARGE INJECTION vs. COM_ VOLTAGE



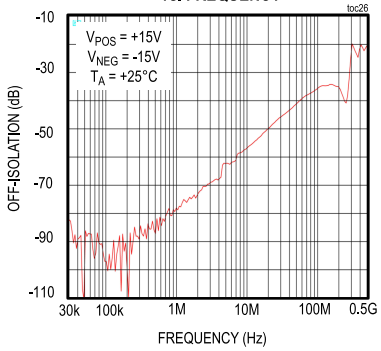

COM_ to NO_ CHARGE INJECTION vs. COM_ VOLTAGE



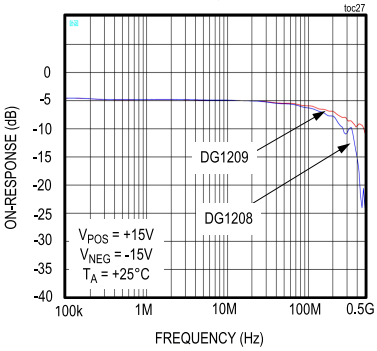

DG1208 OFF ISOLATION vs. FREQUENCY




DG1209 OFF ISOLATION vs. FREQUENCY



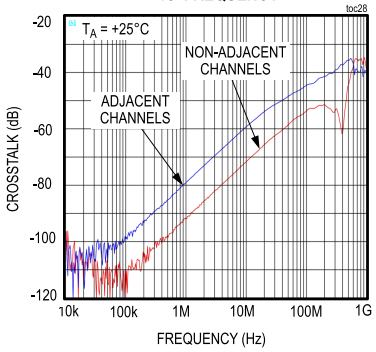

ON-RESPONSE vs. FREQUENCY



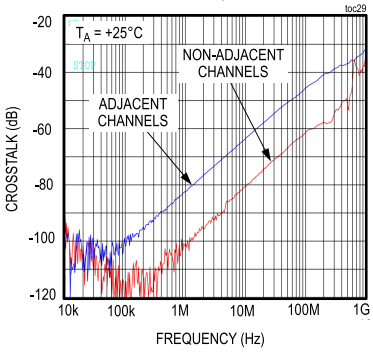
## Typical Operating Characteristics (continued)

($T_A$ = 25°C, unless otherwise noted.)

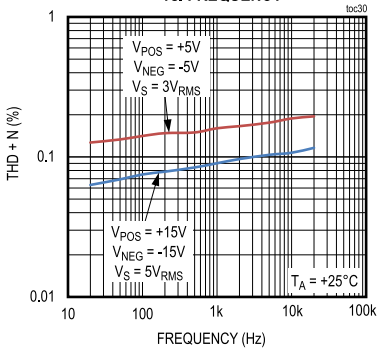
DG1208 CROSSTALK vs. FREQUENCY



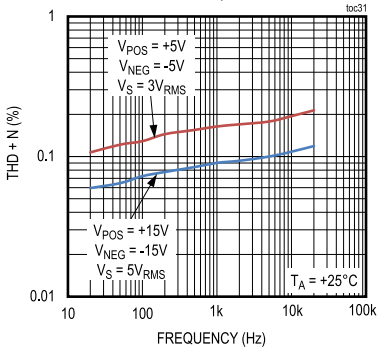

DG1209 CROSSTALK vs. FREQUENCY



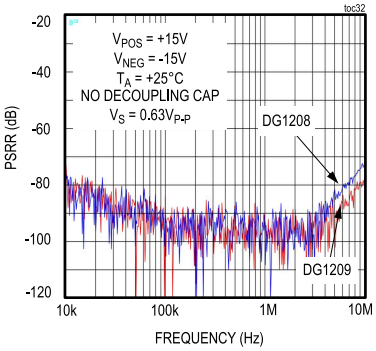

DG1208 THD + N vs. FREQUENCY




DG1209 THD + N vs. FREQUENCY

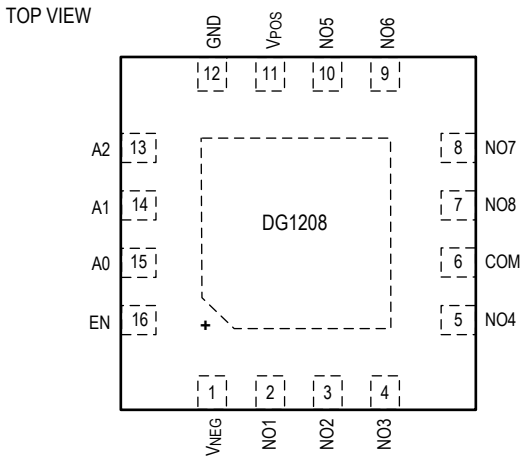



PSRR vs. FREQUENCY



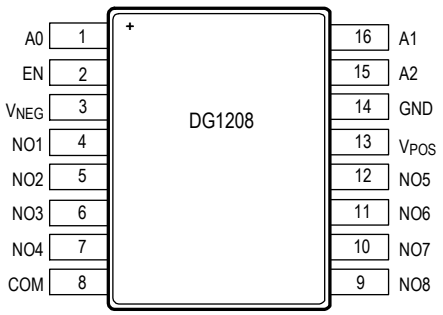
## Pin Configurations

### DG1208ETE+




**16 TQFN**
**4mm x 4mm**

### DG1208EUE+



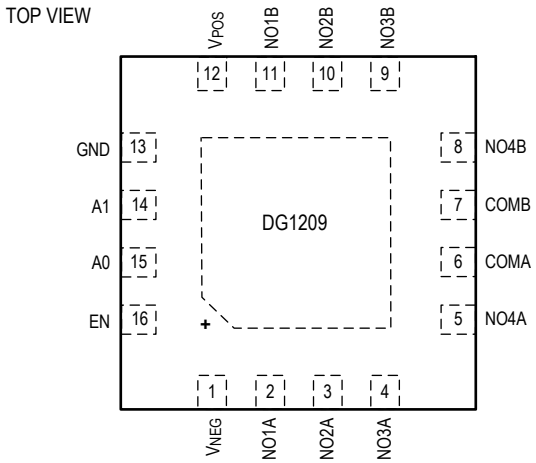

**16 TSSOP**

## Pin Description

| PIN | | NAME | FUNCTION |
|---|---|---|---|
| DG1208ETE+ | DG1208EUE+ | | |
| **POWER SUPPLY** | | | |
| 11 | 13 | $V_{POS}$ | Positive Power Supply. Bypass $V_{POS}$ to GND with a minimum 0.1µF ceramic capacitor as close to the pin as possible. |
| 1 | 3 | $V_{NEG}$ | Negative Power Supply. Bypass $V_{NEG}$ to GND with a minimum 0.1µF ceramic capacitor as close to the pin as possible. In single-supply applications, connect $V_{NEG}$ to GND. |
| 12 | 14 | GND | Logic Ground Reference |
| EP | - | EP | Exposed Pad. Leave unconnected. |
| **DIGITAL INPUTS** | | | |
| 13 | 15 | A2 | Logic Address Input. See the *Control Logic* section for more information. |
| 14 | 16 | A1 | Logic Address Input. See the *Control Logic* section for more information. |
| 15 | 1 | A0 | Logic Address Input. See the *Control Logic* section for more information. |
| 16 | 2 | EN | Enable Input. Drive EN high to enable the multiplexer. Drive EN low to disable all switches. Do not leave EN unconnected. |
| **ANALOG SWITCH** | | | |
| 6 | 8 | COM | Common Bidirectional Analog Signal Terminal. It can be either an input or output. |
| 7 | 9 | NO8 | Normally-Open Bidirectional Analog Signal Terminal 8. It can be either an input or output. |
| 8 | 10 | NO7 | Normally-Open Bidirectional Analog Signal Terminal 7. It can be either an input or output. |
| 9 | 11 | NO6 | Normally-Open Bidirectional Analog Signal Terminal 6. It can be either an input or output. |
| 10 | 12 | NO5 | Normally-Open Bidirectional Analog Signal Terminal 5. It can be either an input or output. |
| 5 | 7 | NO4 | Normally-Open Bidirectional Analog Signal Terminal 4. It can be either an input or output. |
| 4 | 6 | NO3 | Normally-Open Bidirectional Analog Signal Terminal 3. It can be either an input or output. |
| 3 | 5 | NO2 | Normally-Open Bidirectional Analog Signal Terminal 2. It can be either an input or output. |
| 2 | 4 | NO1 | Normally-Open Bidirectional Analog Signal Terminal 1. It can be either an input or output. |

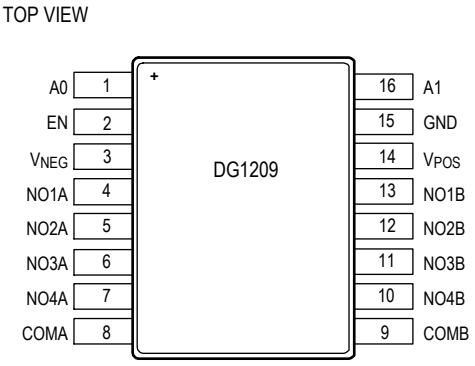
## Pin Configurations

### DG1209ETE+




**16 TQFN**
**4mm x 4mm**

### DG1209EUE+




**16 TSSOP**

## Pin Description

| PIN | | NAME | FUNCTION |
|---|---|---|---|
| DG1209ETE+ | DG1209EUE+ | | |
| **POWER SUPPLY** | | | |
| 12 | 14 | $V_{POS}$ | Positive Power Supply. Bypass $V_{POS}$ to GND with a minimum 0.1µF ceramic capacitor as close to the pin as possible. |
| 1 | 3 | $V_{NEG}$ | Negative Power Supply. Bypass $V_{NEG}$ to GND with a minimum 0.1µF ceramic capacitor as close to the pin as possible. In single supply applications, connect $V_{NEG}$ to GND. |
| 13 | 15 | GND | Logic Ground Reference |
| EP | - | EP | Exposed Pad. Leave unconnected. |
| **DIGITAL INPUTS** | | | |
| 14 | 16 | A1 | Logic Address Input. See the *Control Logic* section for more information. |
| 15 | 1 | A0 | Logic Address Input. See the *Control Logic* section for more information. |
| 16 | 2 | EN | Enable Input. Drive EN high to enable the multiplexer. Drive EN low to disable all switches. Do not leave EN unconnected. |
| **ANALOG SWITCH** | | | |
| 7 | 9 | COMB | B-Side Common Bidirectional Analog Signal Terminal. It can be either an input or output. |
| 6 | 8 | COMA | A-Side Common Bidirectional Analog Signal Terminal. It can be either an input or output. |
| 8 | 10 | NO4B | B-Side Normally-Open Bidirectional Analog Signal Terminal 4. It can be either an input or output. |
| 9 | 11 | NO3B | B-Side Normally-Open Bidirectional Analog Signal Terminal 3. It can be either an input or output. |
| 10 | 12 | NO2B | B-Side Normally-Open Bidirectional Analog Signal Terminal 2. It can be either an input or output. |
| 11 | 13 | NO1B | B-Side Normally-Open Bidirectional Analog Signal Terminal 1. It can be either an input or output. |
| 5 | 7 | NO4A | A-Side Normally-Open Bidirectional Analog Signal Terminal 4. It can be either an input or output. |
| 4 | 6 | NO3A | A-Side Normally-Open Bidirectional Analog Signal Terminal 3. It can be either an input or output. |
| 3 | 5 | NO2A | A-Side Normally-Open Bidirectional Analog Signal Terminal 2. It can be either an input or output. |
| 2 | 4 | NO1A | A-Side Normally-Open Bidirectional Analog Signal Terminal 1. It can be either an input or output. |

## Detailed Description

The DG1208/DG1209 are single 8-channel or dual 4-channel multiplexing switch devices with low leakage and low charge injection. The low capacitance and low charge injection of the DG1208/DG1209 make them ideal for automatic test equipment systems, data acquisition systems, sample-and-hold systems, and communication systems where low glitch and fast settling time are required.

The DG1208 is a single 8-channel multiplexer. It switches one of the 8 NO_ inputs to a common output COM, as determined by the three selection inputs A2, A1, and A0. The DG1209 is a dual 4-channel multiplexer. It switches a pair of differential NO_ inputs to differential outputs COMA and COMB, as determined by the two selection inputs A1 and A0. See the *Control Logic* section for more information.

The DG1208/DG1209 operate rail-to-rail and are fully specified for ±15V bipolar supplies or +12V single supply. The EN input on the DG1208/DG1209 is used to enable or disable the device. When EN is low, all channels are switched off. When EN is high, each channel conducts bidirectionally according to the selection inputs.

### Control Logic

The DG1208 uses three selection inputs A2, A1, and A0 to determine the switching logic.

## Table 1. DG1208 Control Logic

| A2 | A1 | A0 | EN | SWITCH ON |
|---|---|---|---|---|
| X | X | X | 0 | Switch Off |
| 0 | 0 | 0 | 1 | NO1 |
| 0 | 0 | 1 | 1 | NO2 |
| 0 | 1 | 0 | 1 | NO3 |
| 0 | 1 | 1 | 1 | NO4 |
| 1 | 0 | 0 | 1 | NO5 |
| 1 | 0 | 1 | 1 | NO6 |
| 1 | 1 | 0 | 1 | NO7 |
| 1 | 1 | 1 | 1 | NO8 |

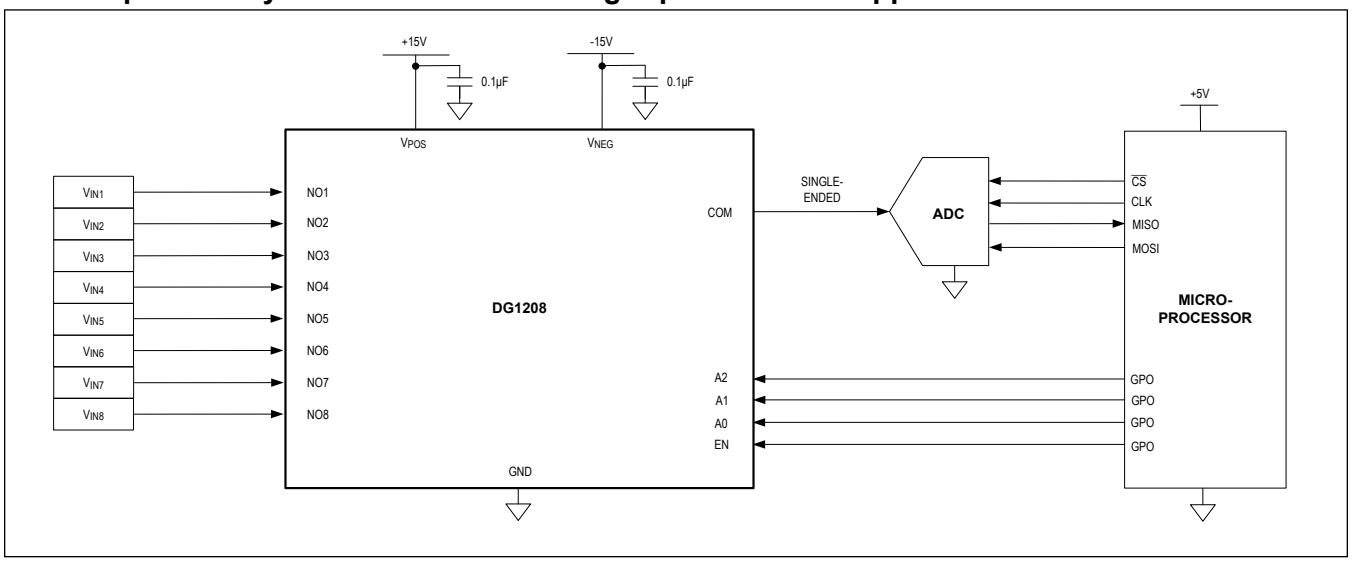
The DG1209 uses two selection inputs A1, and A0 to determine the switching logic.

## Table 2. DG1209 Control Logic

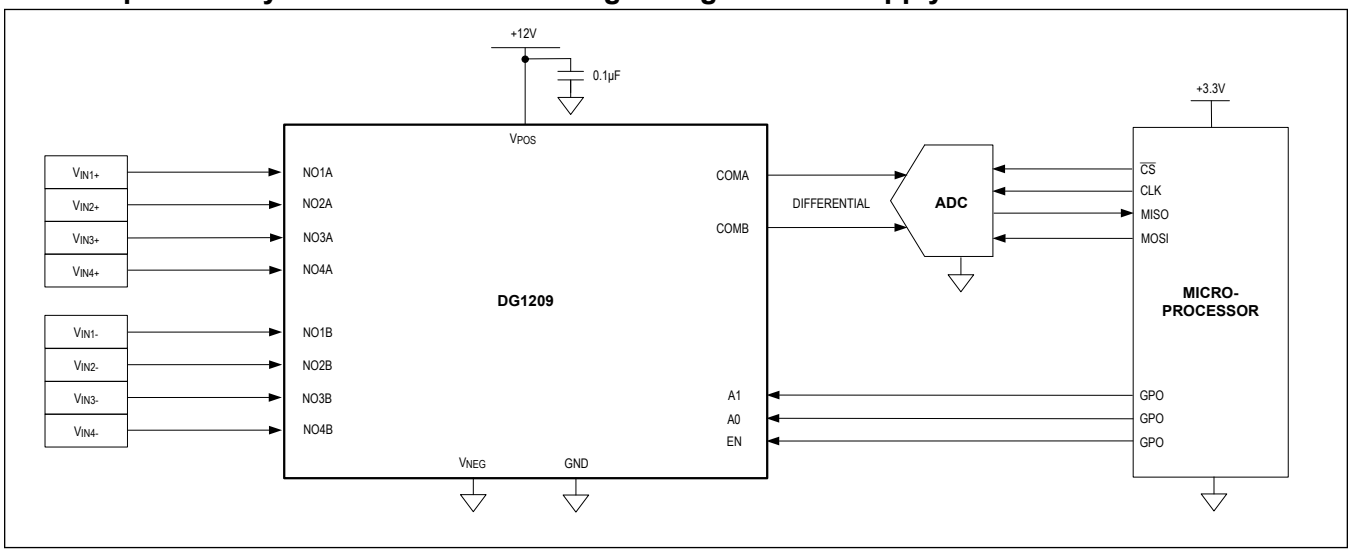
| A1 | A0 | EN | SWITCH ON |
|---|---|---|---|
| X | X | 0 | Switch Off |
| 0 | 0 | 1 | NO1A, NO1B |
| 0 | 1 | 1 | NO2A, NO2B |
| 1 | 0 | 1 | NO3A, NO3B |
| 1 | 1 | 1 | NO4A, NO4B |

## Typical Application Circuits

### Data Acquisition System with DG1208 Using Bipolar Power Supplies




### Data Acquisition System with DG1209 Using a Single Power Supply



## Ordering Information

| PART NUMBER | PIN-PACKAGE | TEMPERATURE |
|---|---|---|
| DG1208ETE+ | 16 TQFN | -40°C to +85°C |
| DG1208ETE+T | 16 TQFN | -40°C to +85°C |
| DG1208EUE+ | 16 TSSOP | -40°C to +85°C |
| DG1208EUE+T | 16 TSSOP | -40°C to +85°C |
| DG1209ETE+ | 16 TQFN | -40°C to +85°C |
| DG1209ETE+T | 16 TQFN | -40°C to +85°C |
| DG1209EUE+ | 16 TSSOP | -40°C to +85°C |
| DG1209EUE+T | 16 TSSOP | -40°C to +85°C |

*+ Denotes a lead(Pb)-free/RoHS-compliant package.*

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|---|
| 0 | 11/20 | Release for Market Intro | — |
| 1 | 8/21 | Removed future product asterisks from *Ordering Information* table | 22 |

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at https://www.maximintegrated.com/en/storefront/storefront.html.

*Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time. The parametric values (min and max limits) shown in the Electrical Characteristics table are guaranteed. Other parametric values quoted in this data sheet are provided for guidance.*

Maxim Integrated and the Maxim Integrated logo are trademarks of Maxim Integrated Products, Inc. © 2021 Maxim Integrated Products, Inc.