

## Precision Monolithic Low-Voltage CMOS Analog Switches

### DESCRIPTION

The DG417L, DG418L, DG419L are low voltage pin-for-pin compatible companion devices to the industry standard DG417, DG418, DG419 with improved performance.

Using BiCMOS wafer fabrication technology allows the DG417L, DG418L, DG419L to operate on single and dual supplies. Single supply voltage ranges from 3 V to 12 V while dual supply operation is recommended with  $\pm 3$  V to  $\pm 6$  V. Combining high speed ( $t_{ON}$ : 28 ns), flat  $R_{ON}$  over the analog signal range (6  $\Omega$ ), minimal insertion loss (up to 100 MHz), and excellent crosstalk and off-isolation performance ( $-70$  dB at 1 MHz), the DG417L, DG418L, DG419L are ideally suited for audio and video signal switching.

The DG417L and DG418L respond to opposite control logic as shown in the truth table. The DG419L has an SPDT configuration.

### FEATURES

- 2.7 V- thru 12 V single supply or  $\pm 3$ - thru  $\pm 6$  dual supply
- On-resistance -  $R_{ON}$ : 14  $\Omega$
- Fast switching -  $t_{ON}$ : 28 ns  
-  $t_{OFF}$ : 13 ns
- TTL, CMOS compatible
- Low leakage:  $< 100$  pA
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



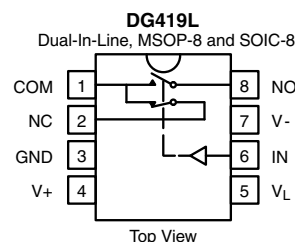
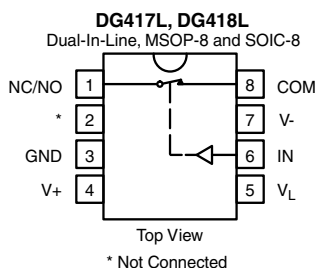
### APPLICATIONS

- Precision automatic test equipment
- Precision data acquisition
- Communication systems
- Battery powered systems
- Computer peripherals
- SDSL, DSLAM
- Audio and video signal routing

### BENEFITS

- Widest dynamic range
- Low signal errors and distortion
- Break-before-make switching action
- Simple interfacing

### FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



#### TRUTH TABLE

| Logic | DG417L | DG418L |
|-------|--------|--------|
| 0     | ON     | OFF    |
| 1     | OFF    | ON     |

#### ORDERING INFORMATION (DG417L, DG418L)

| Temp. Range | Package           | Part Number    |
|-------------|-------------------|----------------|
|             | 8-Pin Narrow SOIC | DG417LDY       |
|             |                   | DG417LDY-E3    |
|             |                   | DG417LDY-T1    |
|             |                   | DG417LDY-T1-E3 |
|             | 8-Pin MSOP        | DG418LDY       |
|             |                   | DG418LDY-E3    |
|             |                   | DG418LDY-T1    |
|             |                   | DG418LDY-T1-E3 |
|             | 8-Pin MSOP        | DG417LDQ-T1-E3 |
|             |                   | DG418LDQ-T1-E3 |

#### TRUTH TABLE (DG419L)

| Logic | NC  | NO  |
|-------|-----|-----|
| 0     | ON  | OFF |
| 1     | OFF | ON  |

#### ORDERING INFORMATION (DG419L)

| Temp. Range                                   | Package           | Part Number    |
|-----------------------------------------------|-------------------|----------------|
| $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ | 8-Pin Narrow SOIC | DG419LDY       |
|                                               |                   | DG419LDY-E3    |
|                                               |                   | DG419LDY-T1    |
|                                               |                   | DG419LDY-T1-E3 |
|                                               | 8-Pin MSOP        | DG419LDQ-T1-E3 |
|                                               |                   | DG419LDQ-T1-E3 |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

| ABSOLUTE MAXIMUM RATINGS                            |                           |                                                         |      |
|-----------------------------------------------------|---------------------------|---------------------------------------------------------|------|
| Parameter                                           |                           | Limit                                                   | Unit |
| V+ to V-                                            |                           | - 0.3 to 13                                             | V    |
| GND to V-                                           |                           | 7                                                       |      |
| V <sub>L</sub>                                      |                           | (GND - 0.3) to (V+) + 0.3                               |      |
| I <sub>N</sub> , COM, NC, NO <sup>a</sup>           |                           | - 0.3 to (V+ + 0.3)<br>or 30 mA, whichever occurs first |      |
| Continuous Current (Any Terminal)                   |                           | 30                                                      | mA   |
| Peak Current, S or D (Pulsed 1 ms, 10 % Duty Cycle) |                           | 100                                                     |      |
| Storage Temperature                                 | (AK, DQ, DY Suffix)       | - 65 to 150                                             | °C   |
| Power Dissipation (Packages) <sup>b</sup>           | 8-Pin MSOP <sup>c</sup>   | 320                                                     | mW   |
|                                                     | 8-Pin SOIC <sup>c</sup>   | 400                                                     |      |
|                                                     | 8-Pin CerDIP <sup>d</sup> | 600                                                     |      |

**Notes:**

a. Signals on NC, NO, COM, or IN exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

b. All leads welded or soldered to PC board.

c. Derate 6.5 mW/°C above 25 °C.

d. Derate 12 mW/°C above 75 °C.

| SPECIFICATIONS (Single Supply 12 V)       |                                              |                                                                                                                                                                   |                    |                   |                                      |                   |                                     |                   |      |
|-------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------------------------|-------------------|-------------------------------------|-------------------|------|
| Parameter                                 | Symbol                                       | Test Conditions<br>Unless Otherwise Specified<br>V <sub>+</sub> = 12 V, V <sub>-</sub> = 0 V<br>V <sub>L</sub> = 5 V, V <sub>IN</sub> = 2.4 V, 0.8 V <sup>f</sup> | Temp. <sup>b</sup> | Typ. <sup>c</sup> | A Suffix Limits<br>- 55 °C to 125 °C |                   | D Suffix Limits<br>- 40 °C to 85 °C |                   | Unit |
|                                           |                                              |                                                                                                                                                                   |                    |                   | Min. <sup>d</sup>                    | Max. <sup>d</sup> | Min. <sup>d</sup>                   | Max. <sup>d</sup> |      |
| Analog Switch                             |                                              |                                                                                                                                                                   |                    |                   |                                      |                   |                                     |                   |      |
| Analog Signal Range <sup>e</sup>          | V <sub>ANALOG</sub>                          |                                                                                                                                                                   | Full               |                   | 0                                    | 12                | 0                                   | 12                | V    |
| On-Resistance                             | R <sub>ON</sub>                              | V <sub>+</sub> = 10.8 V, V <sub>-</sub> = 0 V<br>I <sub>NO</sub> , I <sub>NC</sub> = 5 mA, V <sub>COM</sub> = 2 V / 9 V                                           | Room Full          | 13                |                                      | 20<br>32          |                                     | 20<br>23.5        | Ω    |
| Switch Off Leakage Current                | I <sub>NO(off)</sub><br>I <sub>NC(off)</sub> | V <sub>COM</sub> = 1 V / 11 V<br>V <sub>NO</sub> , V <sub>NC</sub> = 11 V / 1 V                                                                                   | Room Full          |                   | - 1<br>- 15                          | 1<br>15           | - 1<br>- 10                         | 1<br>10           | nA   |
|                                           | I <sub>COM(off)</sub>                        |                                                                                                                                                                   | Room Full          |                   | - 1<br>- 15                          | 1<br>15           | - 1<br>- 10                         | 1<br>10           |      |
| Channel On Leakage Current                | I <sub>COM(on)</sub>                         | V <sub>NO</sub> , V <sub>NC</sub> = V <sub>COM</sub> = 11 V / 1 V                                                                                                 | Room Full          |                   | - 1<br>- 15                          | 1<br>15           | - 1<br>- 10                         | 1<br>10           |      |
| Digital Control                           |                                              |                                                                                                                                                                   |                    |                   |                                      |                   |                                     |                   |      |
| Input Current                             | I <sub>INL</sub> or I <sub>INH</sub>         |                                                                                                                                                                   | Full               | 0.01              | - 1.5                                | 1.5               | - 1                                 | 1                 | μA   |
| Dynamic Characteristics                   |                                              |                                                                                                                                                                   |                    |                   |                                      |                   |                                     |                   |      |
| Turn-On Time                              | t <sub>ON</sub>                              | R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF<br>V <sub>NO</sub> , V <sub>NC</sub> = 5 V, see figure 2                                                           | Room Full          | 28                |                                      | 43<br>50          |                                     | 43<br>46          | ns   |
| Turn-Off Time                             | t <sub>OFF</sub>                             |                                                                                                                                                                   | Room Full          | 13                |                                      | 31<br>35          |                                     | 31<br>32          |      |
| Break-Before-Make Time Delay              | t <sub>D</sub>                               | DG419L only, V <sub>NC</sub> , V <sub>NO</sub> = 5 V<br>R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF                                                            | Room               | 13                |                                      |                   |                                     |                   |      |
| Charge Injection <sup>e</sup>             | Q <sub>INJ</sub>                             | V <sub>g</sub> = 0 V, R <sub>g</sub> = 0 Ω, C <sub>L</sub> = 1 nF                                                                                                 | Room               | 1                 |                                      |                   |                                     |                   | pC   |
| Off-Isolation <sup>e</sup>                | OIRR                                         | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f = 1 MHz                                                                                                           | Room               | - 71              |                                      |                   |                                     |                   | dB   |
| Channel-to-Channel Crosstalk <sup>e</sup> | X <sub>TALK</sub>                            |                                                                                                                                                                   | Room               | - 71              |                                      |                   |                                     |                   |      |
| Source Off Capacitance <sup>e</sup>       | C <sub>NO(off)</sub><br>C <sub>NC(off)</sub> | V <sub>IN</sub> = 0 or V <sub>+</sub> , f = 1 MHz                                                                                                                 | Room               | 5                 |                                      |                   |                                     |                   | pF   |
| Channel-On Capacitance <sup>e</sup>       | C <sub>ON</sub>                              |                                                                                                                                                                   | Room               | 15                |                                      |                   |                                     |                   |      |
| Power Supplies                            |                                              |                                                                                                                                                                   |                    |                   |                                      |                   |                                     |                   |      |
| Positive Supply Current                   | I <sub>+</sub>                               | V <sub>IN</sub> = 0 or V <sub>L</sub>                                                                                                                             | Room Full          | 0.02              |                                      | 1<br>7.5          |                                     | 1<br>5            | μA   |
| Negative Supply Current                   | I <sub>-</sub>                               |                                                                                                                                                                   | Room Full          | - 0.002           | - 1<br>- 7.5                         |                   | - 1<br>- 5                          |                   |      |
| Logic Supply Current                      | I <sub>L</sub>                               |                                                                                                                                                                   | Room Full          | 0.002             |                                      | 1<br>7.5          |                                     | 1<br>5            |      |
| Ground Current                            | I <sub>GND</sub>                             |                                                                                                                                                                   | Room Full          | - 0.002           | - 1<br>- 7.5                         |                   | - 1<br>- 5                          |                   |      |



| SPECIFICATIONS (Dual Supply $\pm 5$ V)    |                                              |                                                                                                                         |                    |                   |                     |                   |                  |            |          |
|-------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|---------------------|-------------------|------------------|------------|----------|
| Parameter                                 | Symbol                                       | Test Conditions                                                                                                         | Temp. <sup>b</sup> | Typ. <sup>c</sup> | A Suffix Limits     |                   | D Suffix Limits  |            | Unit     |
|                                           |                                              | Unless Specified                                                                                                        |                    |                   | Otherwise Specified | - 55 °C to 125 °C | - 40 °C to 85 °C |            |          |
|                                           |                                              | V+ = 5 V, V- = - 5 V<br>V <sub>L</sub> = 5 V, V <sub>IN</sub> = 2.4 V, 0.8 V <sup>f</sup>                               |                    |                   |                     |                   |                  |            |          |
| Analog Switch                             |                                              |                                                                                                                         |                    |                   |                     |                   |                  |            |          |
| Analog Signal Range <sup>e</sup>          | V <sub>ANALOG</sub>                          |                                                                                                                         | Full               |                   | - 5                 | 5                 | - 5              | 5          | V        |
| On-Resistance                             | R <sub>ON</sub>                              | V+ = 5 V, V- = - 5 V<br>I <sub>NO</sub> , I <sub>NC</sub> = 5 mA, V <sub>COM</sub> = $\pm$ 3.5 V                        | Room Full          | 14                |                     | 18.5<br>30        |                  | 18.5<br>21 | $\Omega$ |
| Switch Off Leakage Current <sup>a</sup>   | I <sub>NO(off)</sub><br>I <sub>NC(off)</sub> | V+ = 5.5 , V- = - 5.5 V<br>V <sub>COM</sub> = $\pm$ 4.5 V<br>V <sub>NO</sub> , V <sub>NC</sub> = $\pm$ 4.5 V            | Room Full          |                   | - 1<br>- 15         | 1<br>15           | - 1<br>- 10      | 1<br>10    | nA       |
|                                           | I <sub>COM(off)</sub>                        |                                                                                                                         | Room Full          |                   | - 1<br>- 15         | 1<br>15           | - 1<br>- 10      | 1<br>10    |          |
| Channel On Leakage Current <sup>a</sup>   | I <sub>COM(on)</sub>                         | V+ = 5.5 V, V- = - 5.5 V<br>V <sub>NO</sub> , V <sub>NC</sub> = V <sub>COM</sub> = $\pm$ 4.5 V                          | Room Full          |                   | - 1<br>- 15         | 1<br>15           | - 1<br>- 10      | 1<br>10    |          |
| Digital Control                           |                                              |                                                                                                                         |                    |                   |                     |                   |                  |            |          |
| Input Current <sup>a</sup>                | I <sub>INL</sub> or I <sub>INH</sub>         |                                                                                                                         | Full               | 0.05              | - 1.5               | 1.5               | - 1              | 1          | $\mu$ A  |
| Dynamic Characteristics                   |                                              |                                                                                                                         |                    |                   |                     |                   |                  |            |          |
| Turn-On Time <sup>e</sup>                 | t <sub>ON</sub>                              | R <sub>L</sub> = 300 $\Omega$ , C <sub>L</sub> = 35 pF<br>V <sub>NO</sub> , V <sub>NC</sub> = $\pm$ 3.5 V, see figure 2 | Room Full          | 30                |                     | 41<br>50          |                  | 41<br>44   | ns       |
| Turn-Off Time <sup>e</sup>                | t <sub>OFF</sub>                             |                                                                                                                         | Room Full          | 16                |                     | 32<br>36          |                  | 32<br>33   |          |
| Break-Before-Make Time Delay <sup>e</sup> | t <sub>D</sub>                               | DG419L only, V <sub>NO</sub> , V <sub>NC</sub> = 3.5 V<br>R <sub>L</sub> = 300 $\Omega$ , C <sub>L</sub> = 35 pF        | Room               | 10                |                     |                   |                  |            |          |
| TransitionTime                            | t <sub>TRANS</sub>                           | R <sub>L</sub> = 300 $\Omega$ , C <sub>L</sub> = 35 pF<br>V <sub>S1</sub> = $\pm$ 3.5 V, V <sub>S2</sub> = $\pm$ 3.5 V  | Room               | 33                |                     | 47                |                  | 47         |          |
| Charge Injection <sup>e</sup>             | Q <sub>INJ</sub>                             | V <sub>g</sub> = 0 V, R <sub>g</sub> = 0 $\Omega$ , C <sub>L</sub> = 1 nF                                               | Room               | 3                 |                     |                   |                  |            | pC       |
| Off-Isolation <sup>e</sup>                | OIRR                                         | R <sub>L</sub> = 50 $\Omega$ , C <sub>L</sub> = 5 pF , f = 1 MHz                                                        | Room               | - 71              |                     |                   |                  |            | dB       |
| Channel-to-Channel Crosstalk <sup>e</sup> | X <sub>TALK</sub>                            |                                                                                                                         | Room               | - 76              |                     |                   |                  |            |          |
| Source Off Capacitance <sup>e</sup>       | C <sub>NO(off)</sub><br>C <sub>NC(off)</sub> | f = 1 MHz                                                                                                               | Room               | 5.2               |                     |                   |                  |            | pF       |
| Channel-On Capacitance <sup>e</sup>       | C <sub>ON</sub>                              |                                                                                                                         | Room               | 15                |                     |                   |                  |            |          |
| Power Supplies                            |                                              |                                                                                                                         |                    |                   |                     |                   |                  |            |          |
| Positive Supply Current <sup>e</sup>      | I+                                           | V <sub>IN</sub> = 0 or V <sub>L</sub>                                                                                   | Room Full          | 0.03              |                     | 1<br>7.5          |                  | 1<br>5     | $\mu$ A  |
| Negative Supply Current <sup>e</sup>      | I-                                           |                                                                                                                         | Room Full          | - 0.002           | - 1<br>- 7.5        |                   | - 1<br>- 5       |            |          |
| Logic Supply Current <sup>e</sup>         | I <sub>L</sub>                               |                                                                                                                         | Room Full          | 0.002             |                     | 1<br>7.5          |                  | 1<br>5     |          |
| Ground Current <sup>e</sup>               | I <sub>GND</sub>                             |                                                                                                                         | Room Full          | - 0.002           | - 1<br>- 7.5        |                   | - 1<br>- 5       |            |          |

| SPECIFICATIONS (Single Supply 5 V)           |                     |                                                                                                                                          |                    |                   |                                      |                   |                                     |                   |      |
|----------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------------------------|-------------------|-------------------------------------|-------------------|------|
| Parameter                                    | Symbol              | Test Conditions<br>Unless Otherwise Specified<br>V+ = 5 V, V- = 0 V<br>V <sub>L</sub> = 5 V, V <sub>IN</sub> = 2.4 V, 0.8 V <sup>f</sup> | Temp. <sup>b</sup> | Typ. <sup>c</sup> | A Suffix Limits<br>- 55 °C to 125 °C |                   | D Suffix Limits<br>- 40 °C to 85 °C |                   | Unit |
|                                              |                     |                                                                                                                                          |                    |                   | Min. <sup>d</sup>                    | Max. <sup>d</sup> | Min. <sup>d</sup>                   | Max. <sup>d</sup> |      |
| Analog Switch                                |                     |                                                                                                                                          |                    |                   |                                      |                   |                                     |                   |      |
| Analog Signal Range <sup>e</sup>             | V <sub>ANALOG</sub> |                                                                                                                                          | Full               |                   |                                      | 5                 |                                     | 5                 | V    |
| On-Resistance <sup>e</sup>                   | R <sub>ON</sub>     | V+ = 4.5 V, I <sub>NO</sub> , I <sub>NC</sub> = 5 mA<br>V <sub>COM</sub> = 1 V, 3.5 V                                                    | Room<br>Full       | 26                |                                      | 36.5<br>50        |                                     | 36.5<br>40.5      | Ω    |
| Dynamic Characteristics                      |                     |                                                                                                                                          |                    |                   |                                      |                   |                                     |                   |      |
| Turn-On Time <sup>e</sup>                    | t <sub>ON</sub>     | R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF<br>V <sub>NO</sub> , V <sub>NC</sub> = 3.5 V, see figure 2                                | Room<br>Full       | 37                |                                      | 49<br>60          |                                     | 49<br>54          | ns   |
| Turn-Off Time <sup>e</sup>                   | t <sub>OFF</sub>    |                                                                                                                                          | Room<br>Full       | 16                |                                      | 31<br>35          |                                     | 31<br>32          |      |
| Break-Before-Make Time<br>Delay <sup>e</sup> | t <sub>D</sub>      | DG419L only, V <sub>NO</sub> , V <sub>NC</sub> = 3.5 V<br>R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF                                 | Room               | 19                |                                      |                   |                                     |                   |      |
| Charge Injection <sup>e</sup>                | Q <sub>INJ</sub>    | V <sub>g</sub> = 0 V, R <sub>g</sub> = 0 Ω, C <sub>L</sub> = 1 nF                                                                        | Room               | 0.4               |                                      |                   |                                     |                   | pC   |
| Power Supplies                               |                     |                                                                                                                                          |                    |                   |                                      |                   |                                     |                   |      |
| Positive Supply Current <sup>e</sup>         | I+                  | V <sub>IN</sub> = 0 or V <sub>L</sub>                                                                                                    | Room<br>Full       | 0.02              |                                      | 1<br>7.5          |                                     | 1<br>5            | μA   |
| Negative Supply Current <sup>e</sup>         | I-                  |                                                                                                                                          | Room<br>Full       | - 0.002           | - 1<br>- 7.5                         |                   | - 1<br>- 5                          |                   |      |
| Logic Supply Current <sup>e</sup>            | I <sub>L</sub>      |                                                                                                                                          | Room<br>Full       | 0.002             |                                      | 1<br>7.5          |                                     | 1<br>5            |      |
| Ground Current <sup>e</sup>                  | I <sub>GND</sub>    |                                                                                                                                          | Room<br>Full       | - 0.002           | - 1<br>- 7.5                         |                   | - 1<br>- 5                          |                   |      |



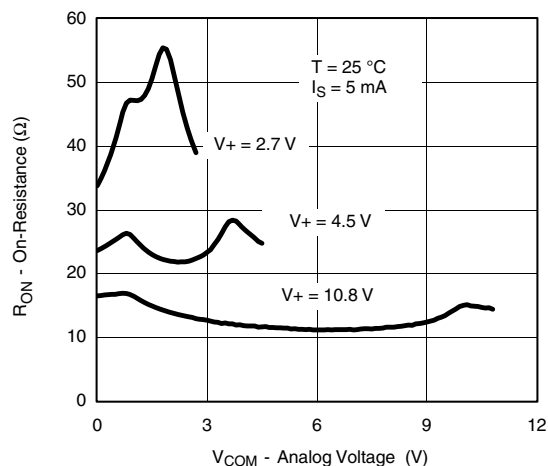
| SPECIFICATIONS (Single Supply 3 V)           |                                              |                                                                                                                                        |                    |                   |                                      |                   |                                     |                   |      |
|----------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------------------------|-------------------|-------------------------------------|-------------------|------|
| Parameter                                    | Symbol                                       | Test Conditions<br>Unless Otherwise Specified<br>V+ = 3 V, V- = 0 V<br>V <sub>L</sub> = 3 V, V <sub>IN</sub> = 2 V, 0.4 V <sup>f</sup> | Temp. <sup>b</sup> | Typ. <sup>c</sup> | A Suffix Limits<br>- 55 °C to 125 °C |                   | D Suffix Limits<br>- 40 °C to 85 °C |                   | Unit |
|                                              |                                              |                                                                                                                                        |                    |                   | Min. <sup>d</sup>                    | Max. <sup>d</sup> | Min. <sup>d</sup>                   | Max. <sup>d</sup> |      |
| Analog Switch                                |                                              |                                                                                                                                        |                    |                   |                                      |                   |                                     |                   |      |
| Analog Signal Range <sup>e</sup>             | V <sub>ANALOG</sub>                          |                                                                                                                                        | Full               |                   | 0                                    | 3                 | 0                                   | 3                 | V    |
| On-Resistance                                | R <sub>ON</sub>                              | V+ = 2.7 V, V- = 0 V<br>I <sub>NO</sub> , I <sub>NC</sub> = 5 mA, V <sub>COM</sub> = 0.5 V, 2.2 V                                      | Room<br>Full       | 47                |                                      | 70<br>80          |                                     | 70<br>75          | Ω    |
| Switch Off<br>Leakage Current <sup>a</sup>   | I <sub>NO(off)</sub><br>I <sub>NC(off)</sub> | V+ = 3.3 , V- = 0 V<br>V <sub>COM</sub> = 1, 2 V, V <sub>NO</sub> , V <sub>NC</sub> = 2, 1 V                                           | Room<br>Full       |                   | - 1<br>- 15                          | 1<br>15           | - 1<br>- 10                         | 1<br>10           | nA   |
|                                              | I <sub>COM(off)</sub>                        |                                                                                                                                        | Room<br>Full       |                   | - 1<br>- 15                          | 1<br>15           | - 1<br>- 10                         | 1<br>10           |      |
| Channel On<br>Leakage Current <sup>a</sup>   | I <sub>COM(on)</sub>                         | V+ = 3.3 V, V- = 0 V<br>V <sub>NO</sub> , V <sub>NC</sub> = V <sub>COM</sub> = 1 V, 2 V                                                | Room<br>Full       |                   | - 1<br>- 15                          | 1<br>15           | - 1<br>- 10                         | 1<br>10           |      |
| Digital Control                              |                                              |                                                                                                                                        |                    |                   |                                      |                   |                                     |                   |      |
| Input Current <sup>a</sup>                   | I <sub>INL</sub> or I <sub>INH</sub>         |                                                                                                                                        | Full               | 0.005             | - 1.5                                | 1.5               | - 1                                 | 1                 | μA   |
| Dynamic Characteristics                      |                                              |                                                                                                                                        |                    |                   |                                      |                   |                                     |                   |      |
| Turn-On Time                                 | t <sub>ON</sub>                              | R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF<br>V <sub>NO</sub> , V <sub>NC</sub> = 1.5 V, see figure 2                              | Room<br>Full       | 65                |                                      | 75<br>95          |                                     | 75<br>85          | ns   |
| Turn-Off Time                                | t <sub>OFF</sub>                             |                                                                                                                                        | Room<br>Full       | 26                |                                      | 41<br>45          |                                     | 41<br>43          |      |
| Break-Before-Make Time<br>Delay              | t <sub>D</sub>                               | DG419L only, V <sub>NO</sub> , V <sub>NC</sub> = 1.5 V<br>R <sub>L</sub> = 300 Ω, C <sub>L</sub> = 35 pF                               | Room               | 33                |                                      |                   |                                     |                   |      |
| Charge Injection <sup>e</sup>                | Q <sub>INJ</sub>                             | V <sub>g</sub> = 0 V, R <sub>g</sub> = 0 Ω, C <sub>L</sub> = 10 nF                                                                     | Room               | 1                 |                                      |                   |                                     |                   | pC   |
| Off-Isolation <sup>e</sup>                   | OIRR                                         | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF , f = 1 MHz                                                                               | Room               | - 71              |                                      |                   |                                     |                   | dB   |
| Channel-to-Channel<br>Crosstalk <sup>e</sup> | X <sub>TALK</sub>                            |                                                                                                                                        | Room               | - 77              |                                      |                   |                                     |                   |      |
| Source Off Capacitance <sup>e</sup>          | C <sub>NO(off)</sub><br>C <sub>NC(off)</sub> | f = 1 MHz                                                                                                                              | Room               | 5.6               |                                      |                   |                                     |                   | pF   |
| Channel On Capacitance <sup>e</sup>          | C <sub>D(on)</sub>                           |                                                                                                                                        | Room               | 16                |                                      |                   |                                     |                   |      |

**Notes:**

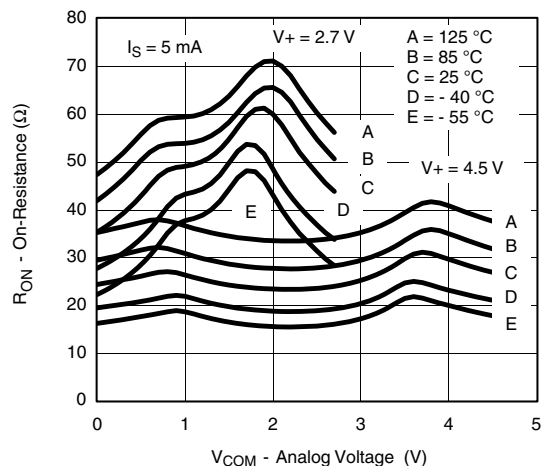
- a. Leakage parameters are guaranteed by worst case test condition and not subject to production test.  
b. Room = 25 °C, Full = as determined by the operating temperature suffix.  
c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.  
d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.  
e. Guaranteed by design, not subject to production test.  
f.  $V_{IN}$  = input voltage to perform proper function.

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.

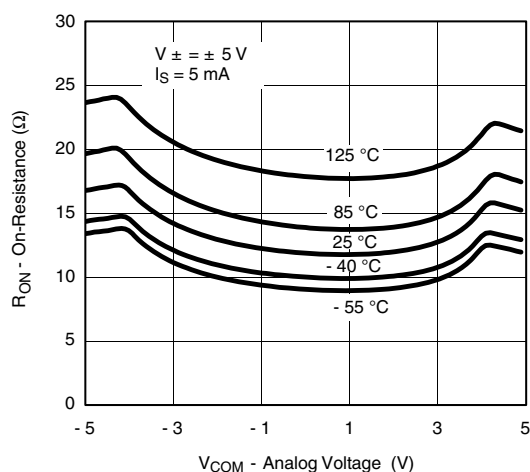
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



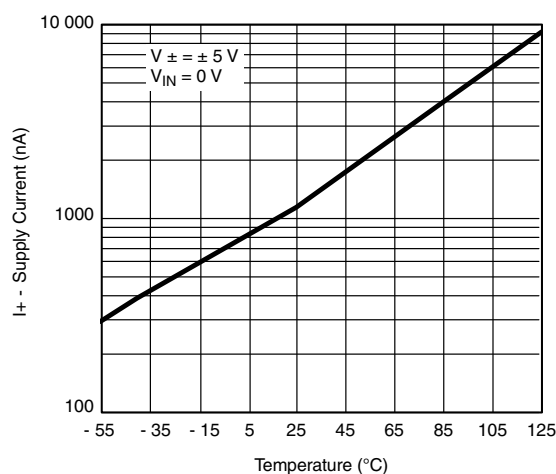
$R_{ON}$  vs.  $V_{COM}$  and Supply Voltage



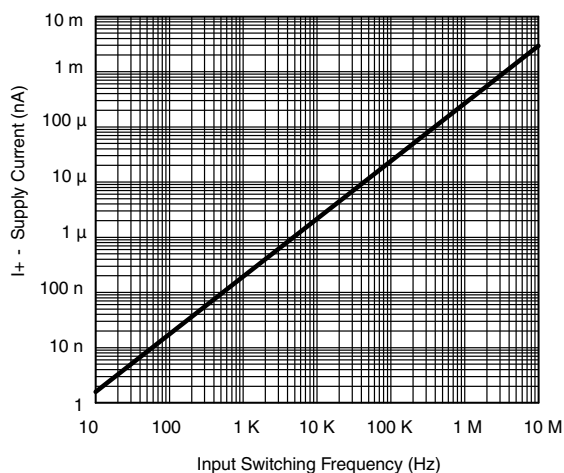
$R_{ON}$  vs. Analog Voltage and Temperature



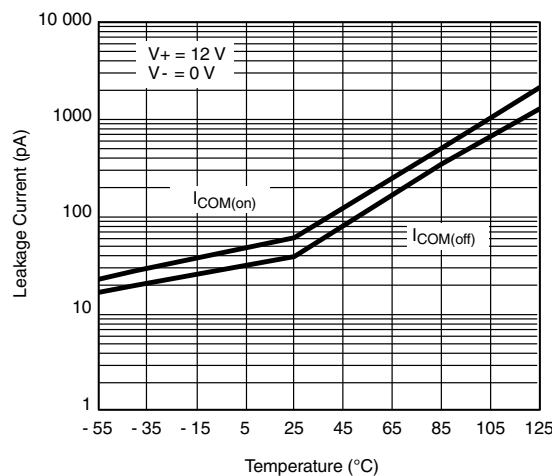
$R_{ON}$  vs. Analog Voltage and Temperature



Supply Current vs. Temperature

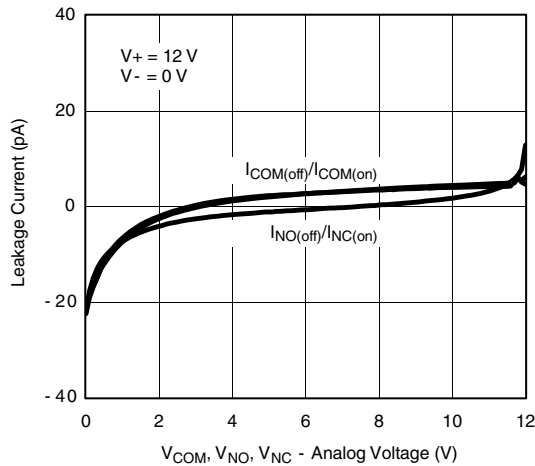


Supply Current vs. Input Switching Frequency

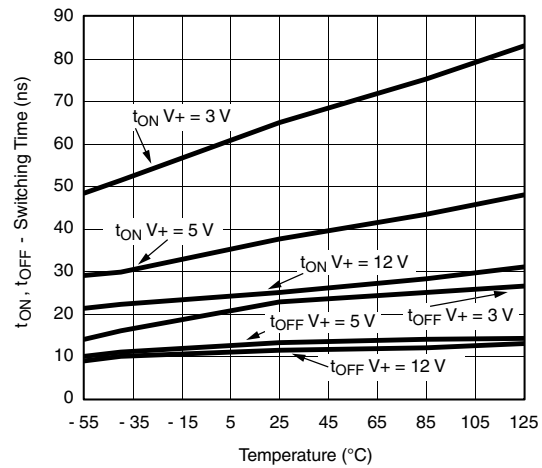


Leakage Current vs. Temperature

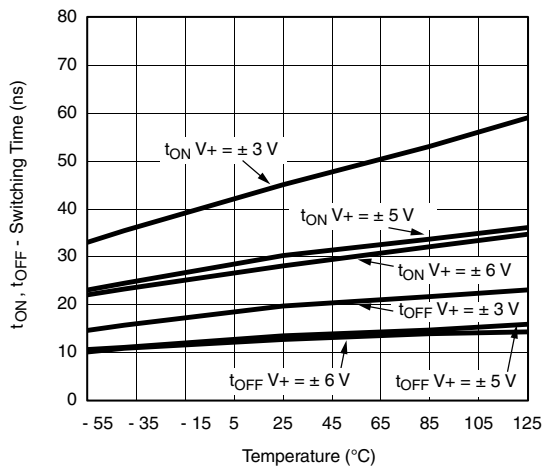
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



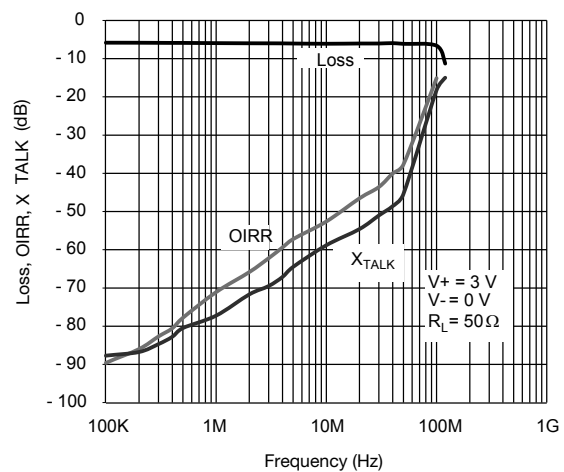
Leakage vs. Analog Voltage



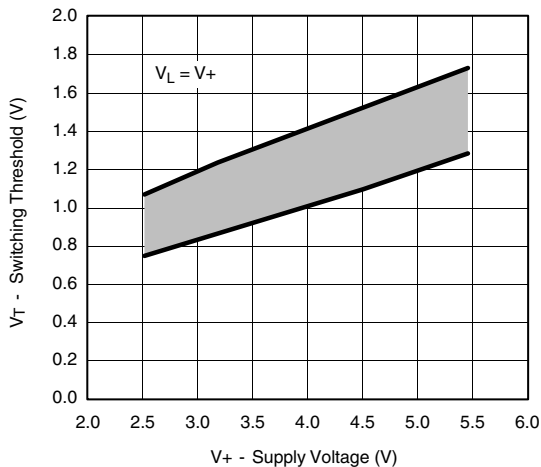
Switching Time vs. Temperature and Single Supply Voltage



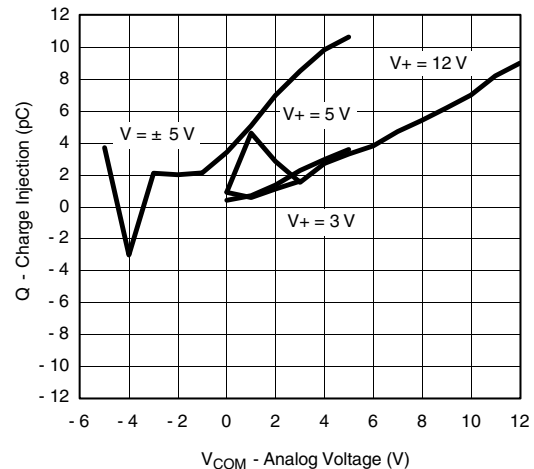
Switching Time vs. Temperature and Dual Supply Voltage



Insertion Loss, Off-Isolation Crosstalk vs. Frequency



Switching Threshold vs. Supply Voltage



Charge Injection vs. Analog Voltage

## SCHEMATIC DIAGRAM (Typical Channel)

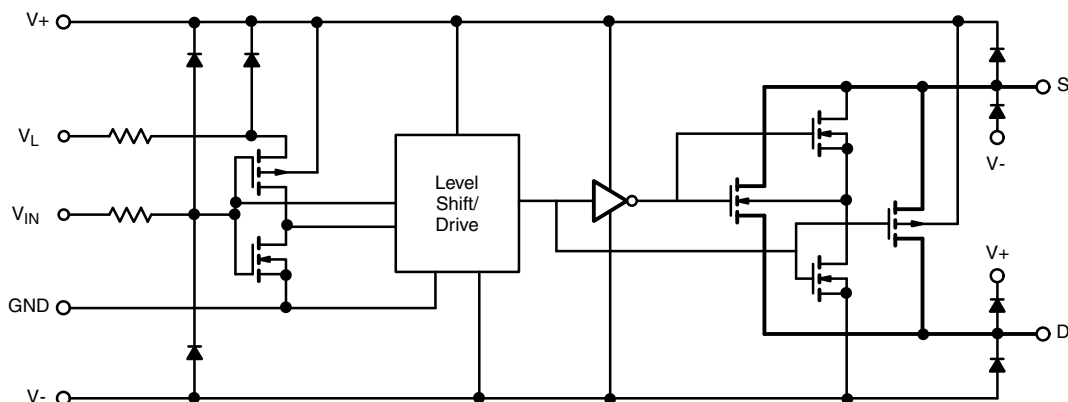
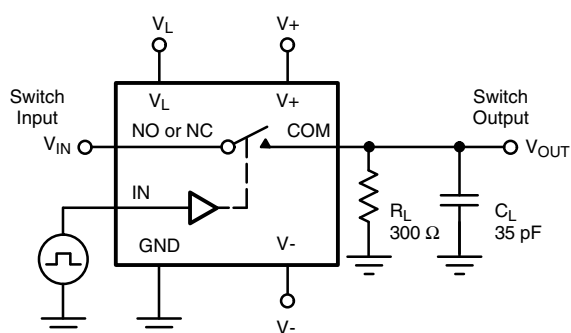


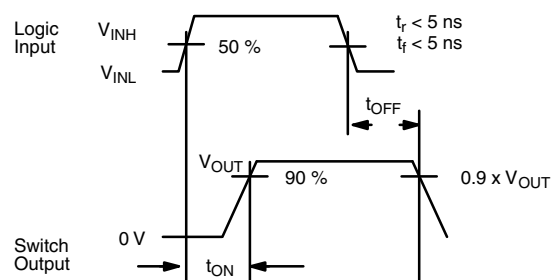
Figure 1.

## TEST CIRCUITS



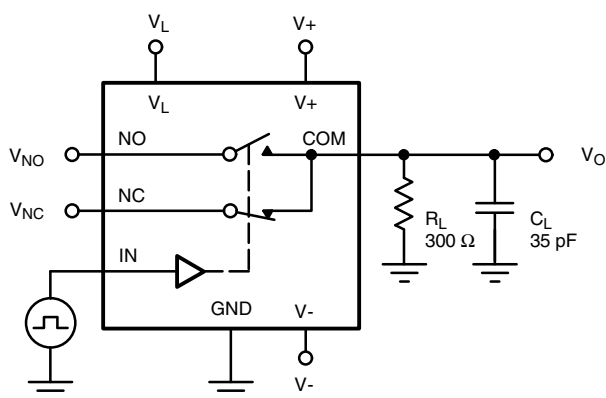
$C_L$  (includes fixture and stray capacitance)

$$V_{OUT} = V_{IN} \frac{R_L}{R_L + R_{ON}}$$



Note: Logic input waveform is inverted for switches that have the opposite logic sense control

Figure 2. Switching Time



$C_L$  (includes fixture and stray capacitance)

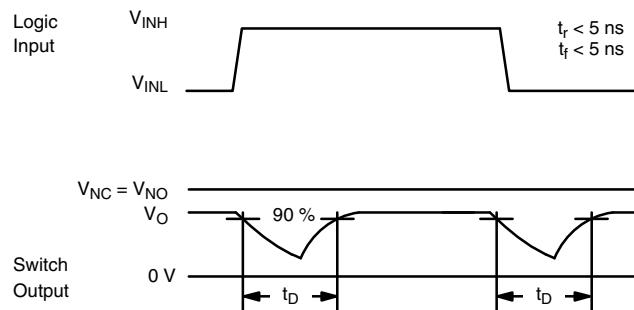
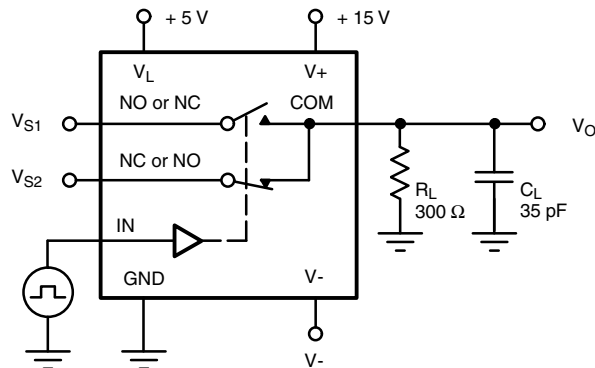


Figure 3. Break-Before-Make (DG419L)

## TEST CIRCUITS



$C_L$  (includes fixture and stray capacitance)

$$V_O = V_S \frac{R_L}{R_L + R_{ON}}$$

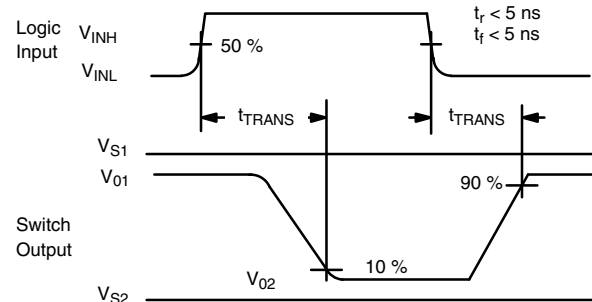
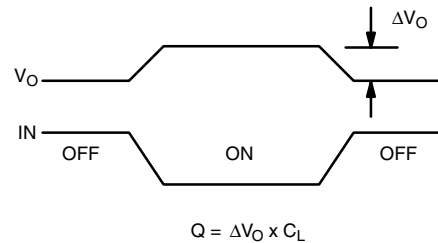
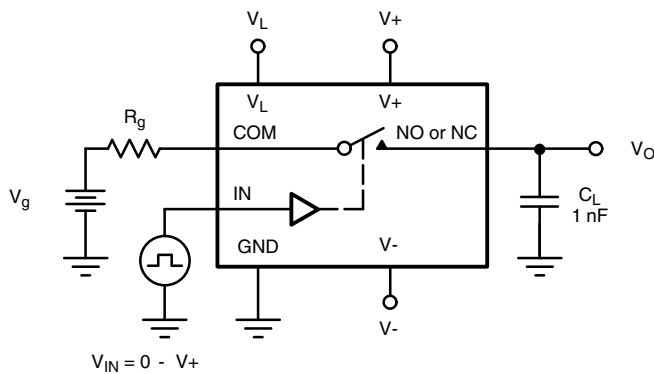
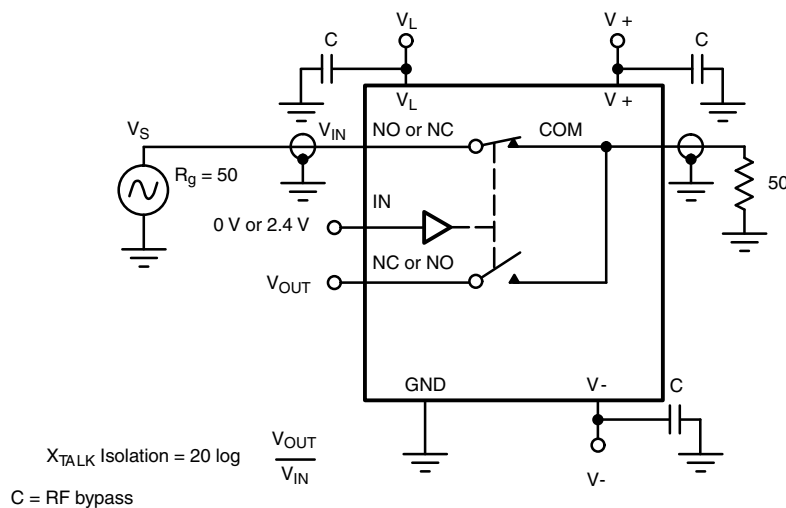


Figure 4. Transition Time (DG419L)



IN dependent on switch configuration Input polarity determined by sense of switch.

Figure 5. Charge Injection



$X_{TALK} \text{ Isolation} = 20 \log \frac{V_{OUT}}{V_{IN}}$   
C = RF bypass

Figure 6. Crosstalk (DG419L)

## TEST CIRCUITS

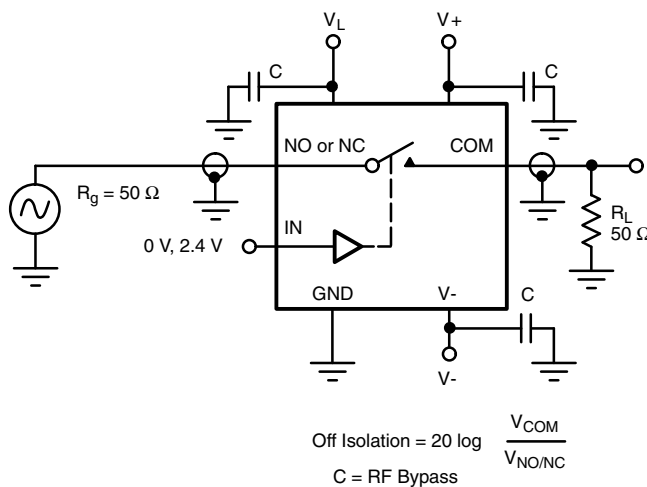


Figure 7. Off Isolation

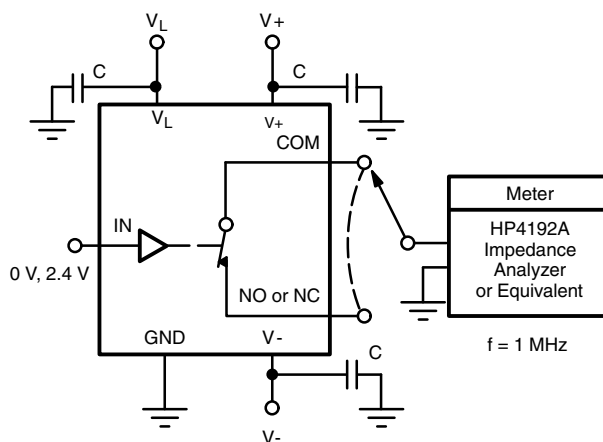
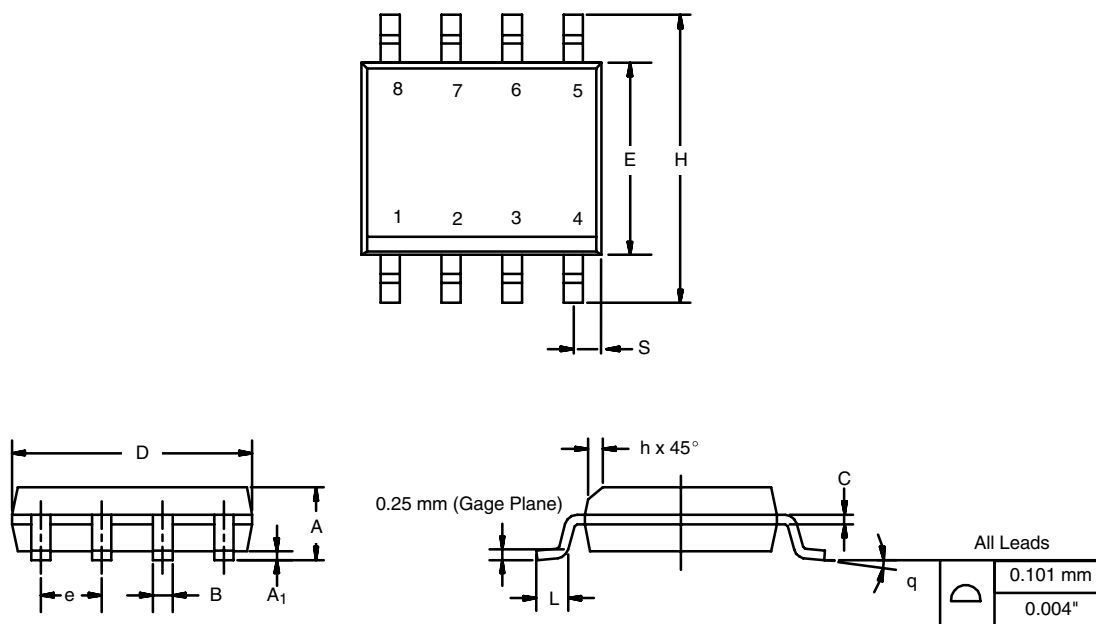


Figure 8. Source/Drain Capacitances

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 [www.vishay.com/ppg?71763](http://www.vishay.com/ppg?71763).

## SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012

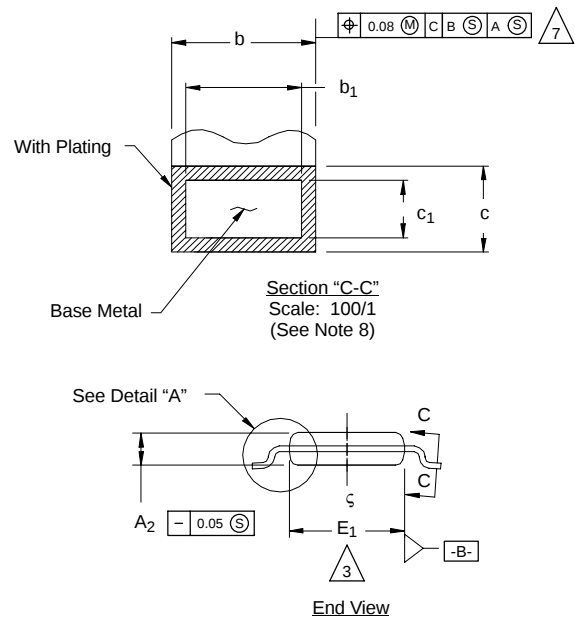
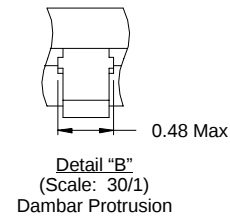
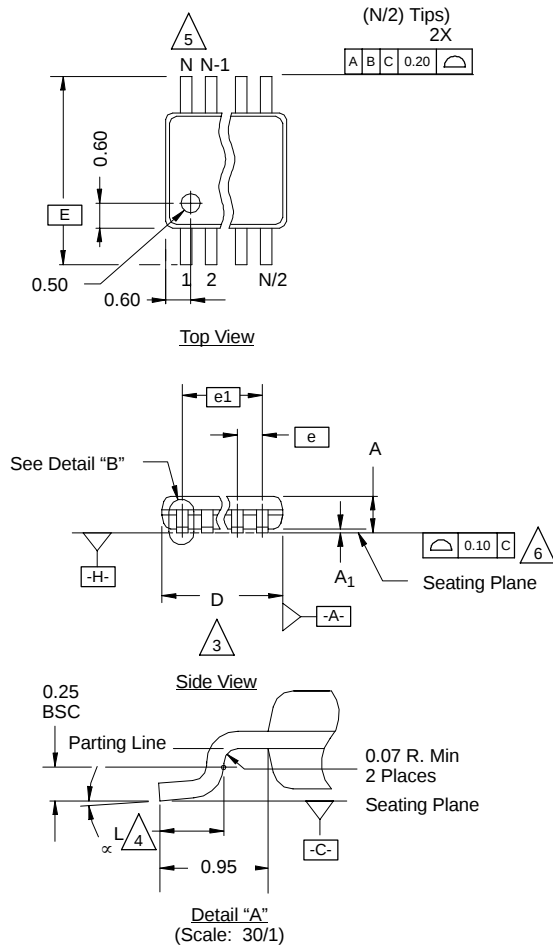


| DIM                            | MILLIMETERS |      | INCHES    |       |
|--------------------------------|-------------|------|-----------|-------|
|                                | Min         | Max  | Min       | Max   |
| A                              | 1.35        | 1.75 | 0.053     | 0.069 |
| A <sub>1</sub>                 | 0.10        | 0.20 | 0.004     | 0.008 |
| B                              | 0.35        | 0.51 | 0.014     | 0.020 |
| C                              | 0.19        | 0.25 | 0.0075    | 0.010 |
| D                              | 4.80        | 5.00 | 0.189     | 0.196 |
| E                              | 3.80        | 4.00 | 0.150     | 0.157 |
| e                              | 1.27 BSC    |      | 0.050 BSC |       |
| H                              | 5.80        | 6.20 | 0.228     | 0.244 |
| h                              | 0.25        | 0.50 | 0.010     | 0.020 |
| L                              | 0.50        | 0.93 | 0.020     | 0.037 |
| q                              | 0°          | 8°   | 0°        | 8°    |
| S                              | 0.44        | 0.64 | 0.018     | 0.026 |
| ECN: C-06527-Rev. I, 11-Sep-06 |             |      |           |       |
| DWG: 5498                      |             |      |           |       |



### MSOP: 8-LEADS

JEDEC Part Number: MO-187, (Variation AA and BA)



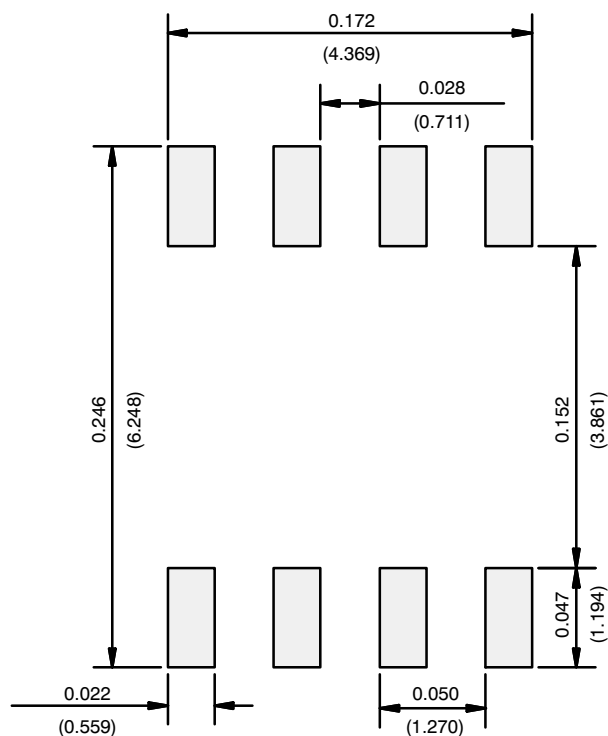
#### NOTES:

- Die thickness allowable is  $0.203 \pm 0.0127$ .
- Dimensioning and tolerances per ANSI.Y14.5M-1994.
- Dimensions "D" and "E<sub>1</sub>" do not include mold flash or protrusions, and are measured at Datum plane  $\square\text{-H-}$ , mold flash or protrusions shall not exceed 0.15 mm per side.
- Dimension is the length of terminal for soldering to a substrate.
- Terminal positions are shown for reference only.
- Formed leads shall be planar with respect to one another within 0.10 mm at seating plane.
- The lead width dimension does not include Dambar protrusion. Allowable Dambar protrusion shall be 0.08 mm total in excess of the lead width dimension at maximum material condition. Dambar cannot be located on the lower radius or the lead foot. Minimum space between protrusions and an adjacent lead to be 0.14 mm. See detail "B" and Section "C-C".
- Section "C-C" to be determined at 0.10 mm to 0.25 mm from the lead tip.
- Controlling dimension: millimeters.
- This part is compliant with JEDEC registration MO-187, variation AA and BA.
- Datums  $\square\text{-A-}$  and  $\square\text{-B-}$  to be determined Datum plane  $\square\text{-H-}$ .
- Exposed pad area in bottom side is the same as the leadframe pad size.

**N = 8L**

| Dim                                         | MILLIMETERS |      |      | Note |
|---------------------------------------------|-------------|------|------|------|
|                                             | Min         | Nom  | Max  |      |
| A                                           | -           | -    | 1.10 |      |
| A <sub>1</sub>                              | 0.05        | 0.10 | 0.15 |      |
| A <sub>2</sub>                              | 0.75        | 0.85 | 0.95 |      |
| b                                           | 0.25        | -    | 0.38 | 8    |
| b <sub>1</sub>                              | 0.25        | 0.30 | 0.33 | 8    |
| c                                           | 0.13        | -    | 0.23 |      |
| c <sub>1</sub>                              | 0.13        | 0.15 | 0.18 |      |
| D                                           | 3.00 BSC    |      |      | 3    |
| E                                           | 4.90 BSC    |      |      |      |
| E <sub>1</sub>                              | 2.90        | 3.00 | 3.10 | 3    |
| e                                           | 0.65 BSC    |      |      |      |
| e <sub>1</sub>                              | 1.95 BSC    |      |      |      |
| L                                           | 0.40        | 0.55 | 0.70 | 4    |
| N                                           | 8           |      |      | 5    |
| α                                           | 0°          | 4°   | 6°   |      |
| ECN: T-02080—Rev. C, 15-Jul-02<br>DWG: 5867 |             |      |      |      |

## RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads  
Dimensions in Inches/(mm)

[Return to Index](#)



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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