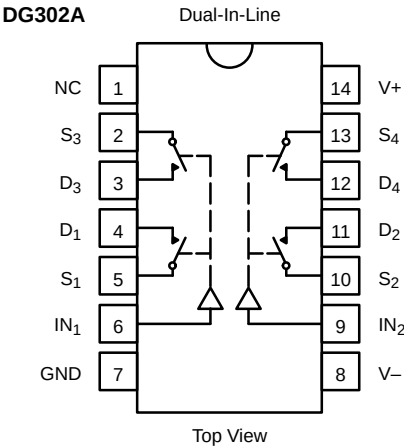




FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



| TRUTH TABLE |        |
|-------------|--------|
| Logic       | Switch |
| 0           | OFF    |
| 1           | ON     |

Logic "0"  $\leq 0.8\text{ V}$   
Logic "1"  $\geq 4\text{ V}$

| ORDERING INFORMATION |                    |                  |
|----------------------|--------------------|------------------|
| Temp Range           | Package            | Part Number      |
| DG300A               |                    |                  |
| 0 to 70°C            | 14-Pin Plastic DIP | DG300ACJ         |
| -55 to 125°C         | 14-Pin CerDIP      | DG300AAK         |
|                      |                    | DG300AAK/883     |
|                      |                    | JM38510/11601BCA |
|                      | 14-Pin Sidebrazed  | JM38510/11601BCC |
|                      | 10-Pin Metal Can   | DG300AAA/883     |
|                      |                    | JM38510/11601BIA |
| DG301A               |                    |                  |
| 0 to 70°C            | 14-Pin Plastic DIP | DG301ACJ         |
| -55 to 125°C         | 14-Pin CerDIP      | DG301AAK/883     |
|                      |                    | JM38510/11602BCA |
|                      |                    | JM38510/11602BCC |
|                      | 10-Pin Metal Can   | DG301AAA         |
|                      |                    | DG301AAA/883     |
|                      |                    | JM38510/11602BIA |
| DG302A               |                    |                  |
| 0 to 70°C            | 14-Pin Plastic DIP | DG302ACJ         |
| -55 to 125°C         | 14-Pin CerDIP      | DG302AAK         |
|                      |                    | DG302AAK/883     |
|                      |                    | JM38510/11603BCA |
|                      | 14-Pin Sidebrazed  | JM38510/11603BCC |

## ABSOLUTE MAXIMUM RATINGS

Voltages Referenced to V<sub>-</sub>

V<sub>+</sub> ..... 44 V

GND ..... 25 V

Digital Inputs<sup>NO TAG</sup>, V<sub>S</sub>, V<sub>D</sub> ..... (V<sub>-</sub>) -2 V to (V<sub>+</sub>) +2V or  
30 mA, whichever occurs first

Current, Any Terminal ..... 30 mA

Continuous Current, S or D  
(Pulsed at 1 ms, 10% duty cycle max) ..... 100 mA

Storage Temperature (A Suffix) ..... -65 to 150°C  
(C Suffix) ..... -65 to 125°C

Power Dissipation<sup>NO TAG</sup>

14-Pin Plastic DIP<sup>NO TAG</sup> ..... 470 mW

14-Pin CerDIP<sup>NO TAG</sup> ..... 825 mW

10-Pin Metal Can<sup>NO TAG</sup> ..... 450 mW

Notes:

- Signals on S<sub>X</sub>, D<sub>X</sub>, or IN<sub>X</sub> exceeding V<sub>+</sub> or V<sub>-</sub> will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
- All leads welded or soldered to PC Board.
- Derate 6.5 mW/°C above 25°C
- Derate 11 mW/°C above 75°C
- Derate 6 mW/°C above 75°C

## SCHEMATIC DIAGRAM (TYPICAL CHANNEL)

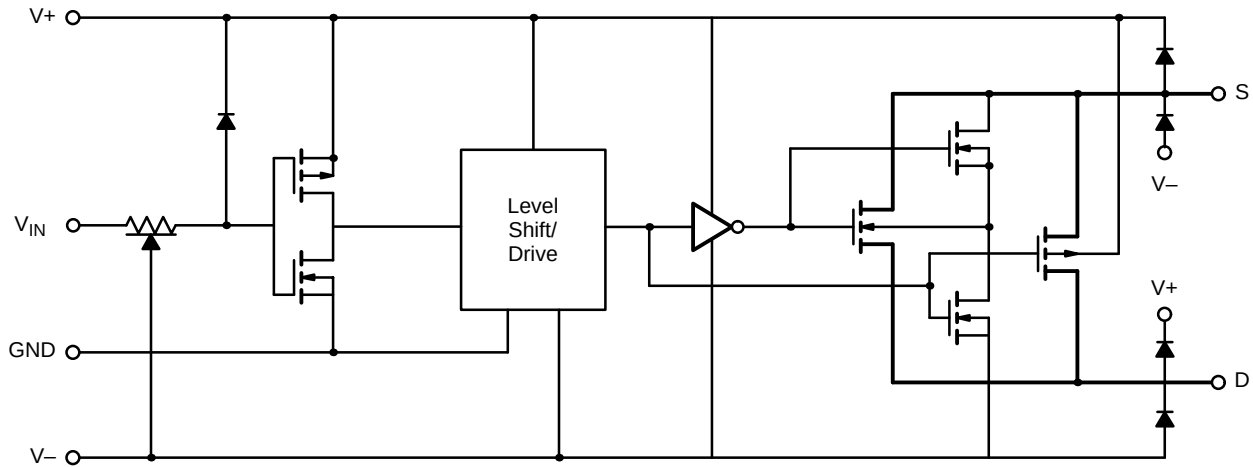


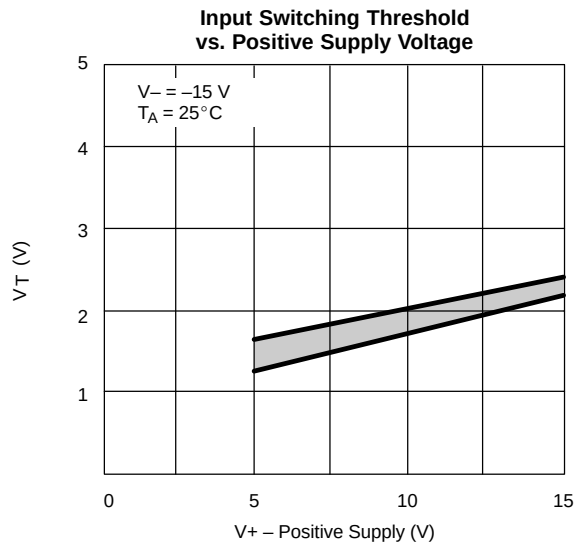
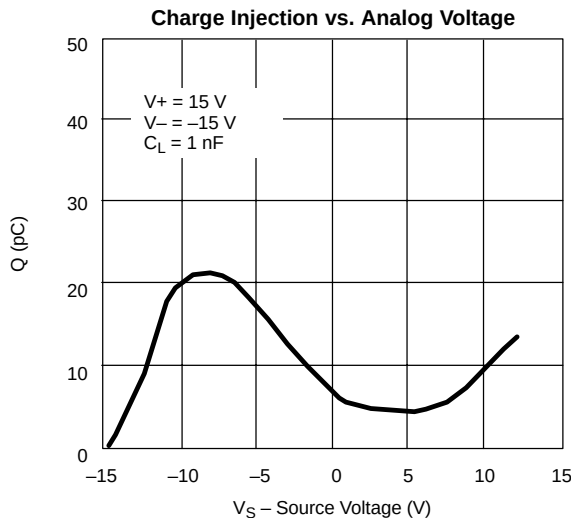
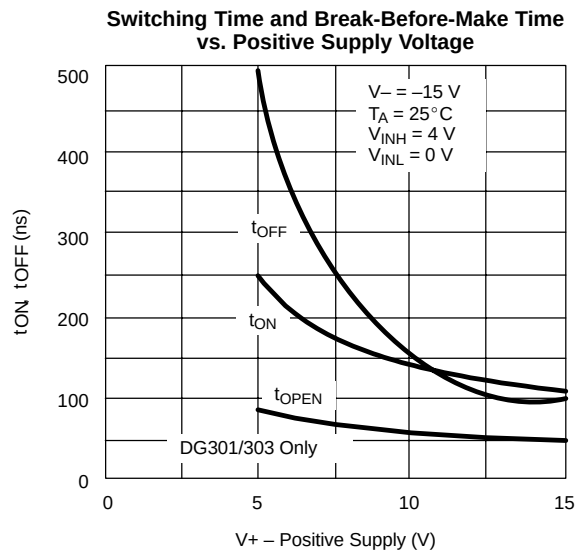
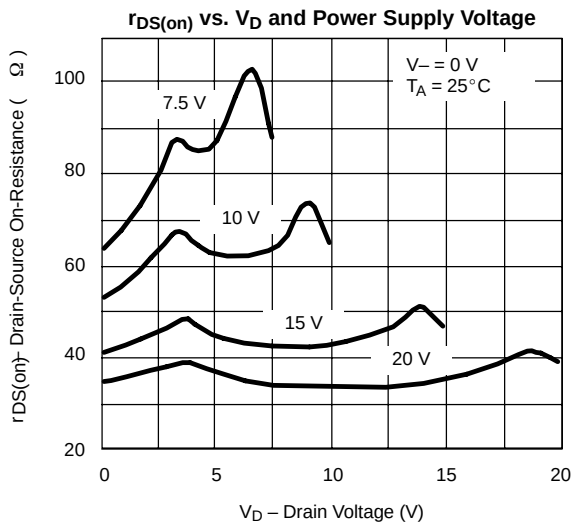
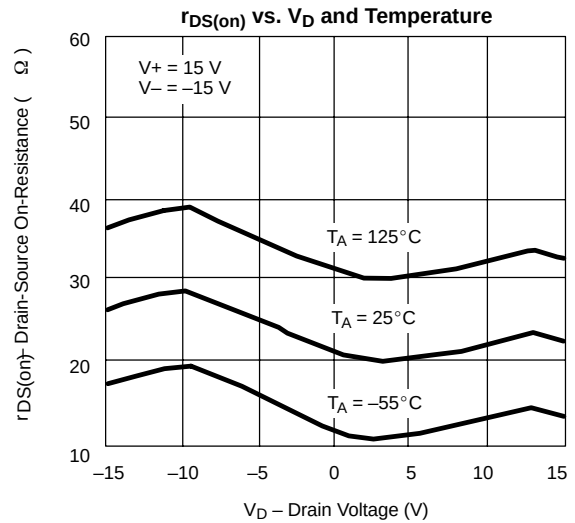
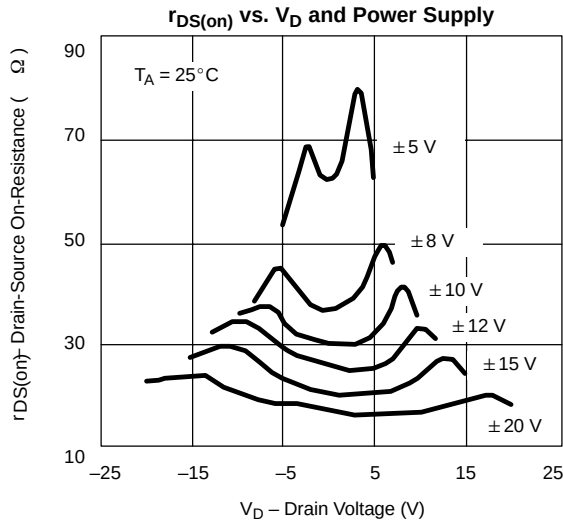
FIGURE 1.

**SPECIFICATIONS<sup>a</sup>**

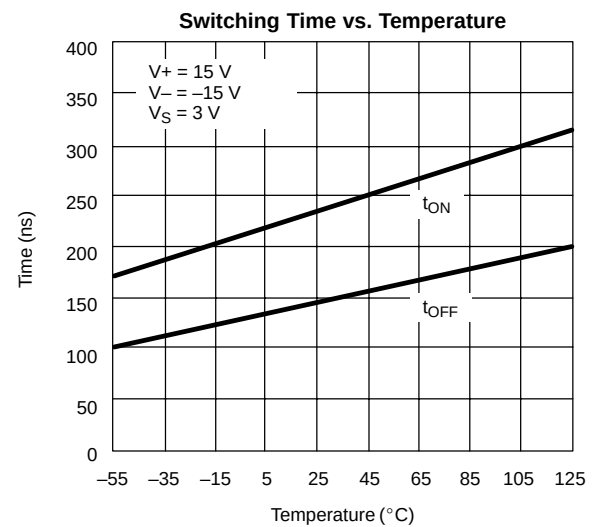
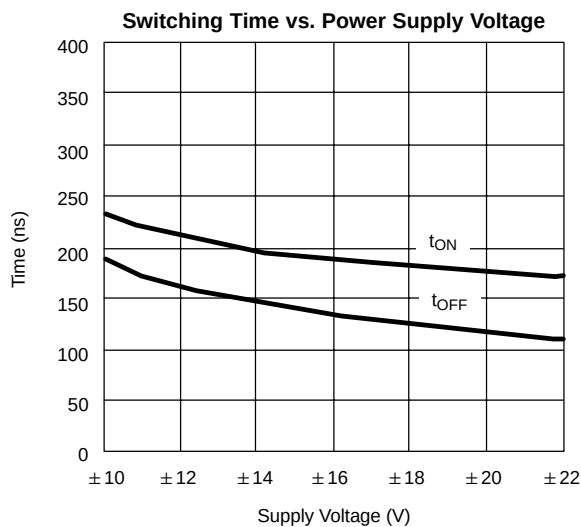
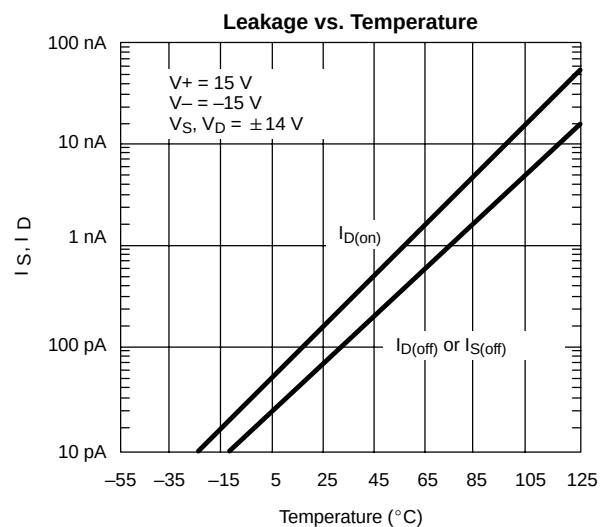
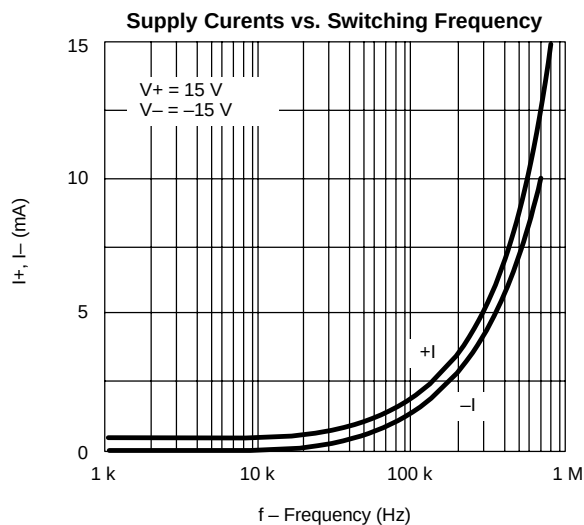
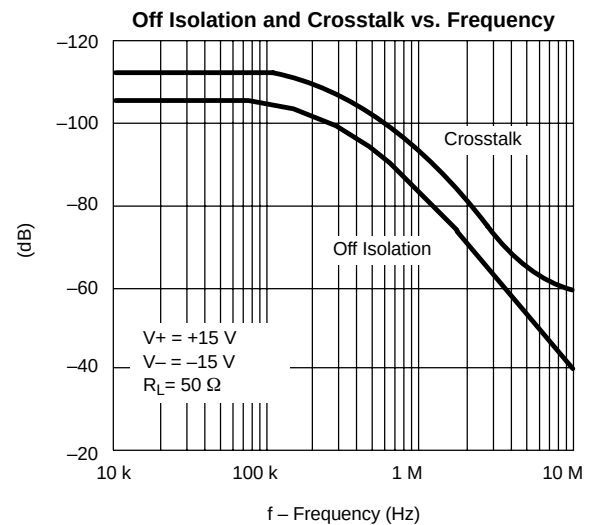
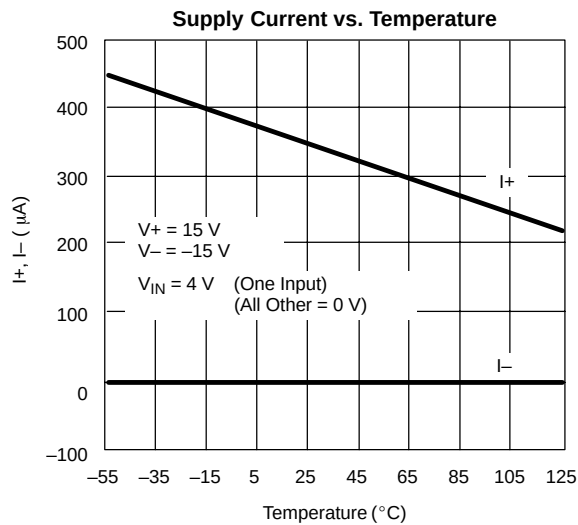
| Parameter                                | Symbol              | Test Conditions<br>Unless Specified<br><br>V+ = 15 V, V− = −15 V<br>VIN = 0.8 V or VIN = 4 V <sup>f</sup> | Temp <sup>b</sup>      | Typ <sup>c</sup> | A Suffix<br>−55 to 125°C |                  | C Suffix<br>0 to 70°C |                  | 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                   |                  | −15                      | 15               | −15                   | 15               | V    |
| Drain-Source On-Resistance               | r <sub>DS(on)</sub> | V <sub>D</sub> = ±10 V, I <sub>S</sub> = −10 mA                                                           | Room Full              | 30               |                          | 50<br>75         |                       | 50<br>75         | Ω    |
| Source Off Leakage Current               | I <sub>S(off)</sub> | V <sub>S</sub> = ±14 V, V <sub>D</sub> = ∓14 V                                                            | Room Hot               | ±0.1             | −1<br>−100               | 1<br>100         | −5<br>−100            | 5<br>100         | nA   |
| Drain Off Leakage Current                | I <sub>D(off)</sub> |                                                                                                           | Room Hot               | ±0.1             | −1<br>−100               | 1<br>100         | −5<br>−100            | 5<br>100         |      |
| Drain On Leakage Current                 | I <sub>D(on)</sub>  | V <sub>D</sub> = V <sub>S</sub> = ±14 V                                                                   | Room Hot               | ±0.1             | −1<br>−100               | 1<br>100         | −5<br>−100            | 5<br>100         |      |
| Digital Control                          |                     |                                                                                                           |                        |                  |                          |                  |                       |                  |      |
| Input Current with<br>Input Voltage High | I <sub>INH</sub>    | V <sub>IN</sub> = 5 V                                                                                     | Room Full              | −0.001           | −1<br>−1                 |                  | −1                    |                  | μA   |
|                                          |                     | V <sub>IN</sub> = 15 V                                                                                    | Room Full              | 0.001            |                          | 1<br>1           |                       | 1                |      |
| Input Current with<br>Input Voltage Low  | I <sub>INL</sub>    | V <sub>IN</sub> = 0 V                                                                                     | Room Full              | −0.001           | −1<br>−1                 |                  | −1                    |                  |      |
| Dynamic Characteristics                  |                     |                                                                                                           |                        |                  |                          |                  |                       |                  |      |
| Turn-On Time                             | t <sub>ON</sub>     | See Figure NO TAG                                                                                         | Room                   | 150              |                          | 300              |                       |                  | ns   |
| Turn-Off Time                            | t <sub>OFF</sub>    |                                                                                                           | Room                   | 130              |                          | 250              |                       |                  |      |
| Break-Before-Make Time                   | t <sub>OPEN</sub>   | DG301A Only<br>Figure NO TAG                                                                              | Room                   | 50               |                          |                  |                       |                  |      |
| Charge Injection                         | Q                   | C <sub>L</sub> = 1 nF, R <sub>gen</sub> = 0 Ω<br>V <sub>gen</sub> = 0 V, Figure NO TAG                    | Room                   | 8                |                          |                  |                       |                  | pC   |
| Source-Off Capacitance                   | C <sub>S(off)</sub> | V <sub>S</sub> , V <sub>D</sub> = 0 V, f = 1 MHz                                                          | Room                   | 14               |                          |                  |                       |                  | pF   |
| Drain-Off Capacitance                    | C <sub>D(off)</sub> |                                                                                                           | Room                   | 14               |                          |                  |                       |                  |      |
| Channel-On Capacitance                   | C <sub>D(on)</sub>  |                                                                                                           | Room                   | 40               |                          |                  |                       |                  |      |
| Input Capacitance                        | C <sub>in</sub>     | f = 1 MHz                                                                                                 | V <sub>IN</sub> = 0 V  | Room             | 6                        |                  |                       |                  |      |
|                                          |                     |                                                                                                           | V <sub>IN</sub> = 15 V | Room             | 7                        |                  |                       |                  |      |
| Off-Isolation                            | OIRR                | V <sub>IN</sub> = 0 V, R <sub>L</sub> = 1 kΩ<br>V <sub>S</sub> = 1 V <sub>rms</sub> , f = 500 kHz         | Room                   | 62               |                          |                  |                       |                  | dB   |
| Crosstalk (Channel-to-Channel)           | X <sub>TALK</sub>   |                                                                                                           | Room                   | 74               |                          |                  |                       |                  |      |
| Power Supplies                           |                     |                                                                                                           |                        |                  |                          |                  |                       |                  |      |
| Positive Supply Current                  | I+                  | V <sub>IN</sub> = 4 V (One Input)<br>All Others = 0 V                                                     | Room Full              | 0.23             |                          | 0.5<br>1         |                       | 1                | mA   |
| Negative Supply Current                  | I−                  |                                                                                                           | Room Full              | −0.001           | −10<br>−100              |                  | −100                  |                  |      |
| Positive Supply Current                  | I+                  | V <sub>IN</sub> = 0.8 V (All Inputs)                                                                      | Room Full              | 0.001            |                          | 10<br>100        |                       | 100              | μA   |
| Negative Supply Current                  | I−                  |                                                                                                           | Room Full              | −0.001           | −10<br>−100              |                  | −100                  |                  |      |

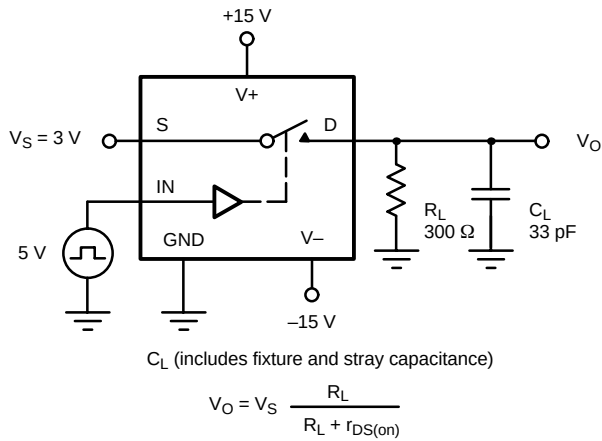
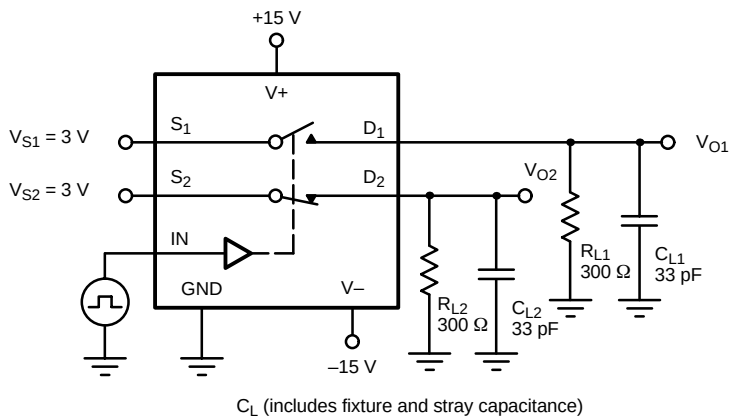
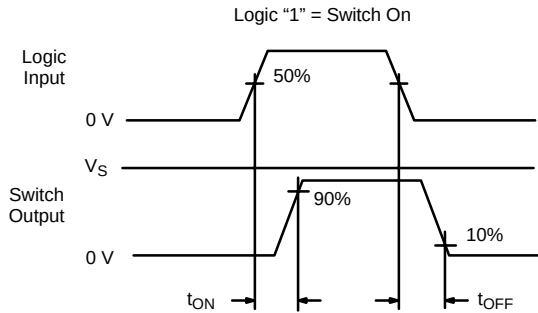
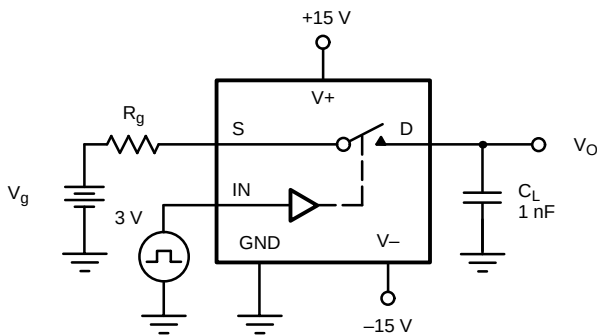
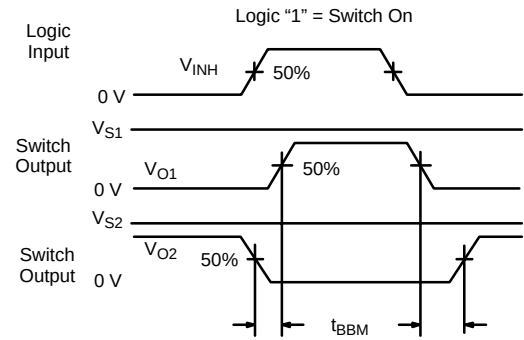
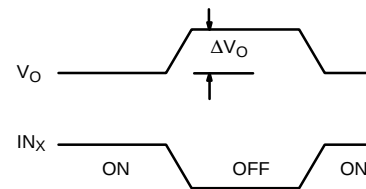
## Notes:

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

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

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



**TEST CIRCUITS**

**FIGURE 2. Switching Time**

**FIGURE 3. Break-Before-Make SPDT (DG301A)**

**FIGURE 4. Charge Injection**


### APPLICATION HINTS<sup>NO TAG</sup>

| V+<br>Positive Supply<br>Voltage<br>(V) | V-<br>Negative Supply<br>Voltage<br>(V) | GND<br>Voltage<br>(V) | V <sub>IN</sub><br>Logic Input<br>Voltage<br>V <sub>INH(min)</sub> /V <sub>INL(max)</sub><br>(V) | V <sub>S</sub> or V <sub>D</sub><br>Analog Voltage<br>Range<br>(V) |
|-----------------------------------------|-----------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 15                                      | -15                                     | 0                     | 4/0.8                                                                                            | -15 to 15                                                          |
| 20                                      | -20                                     | 0                     | 4/0.8                                                                                            | -20 to 20                                                          |
| 15                                      | 0                                       | 0                     | 4/0.8                                                                                            | 0 to 15                                                            |

Note:

a. Application Hints are for DESIGN AID ONLY, not guaranteed and not subject to production testing.

### APPLICATIONS

The DG300A series of analog switches will switch positive analog signals while using a single positive supply. This facilitates their use in applications where only one supply is available. The trade-offs of using single supplies are:

1) Increased  $r_{DS(on)}$ ; 2) slower switching speed. The analog voltage should not go above or below the supply voltages which in single operation are V+ and 0 V. (See Input Switching Threshold vs. Positive Supply Voltage Curve.)

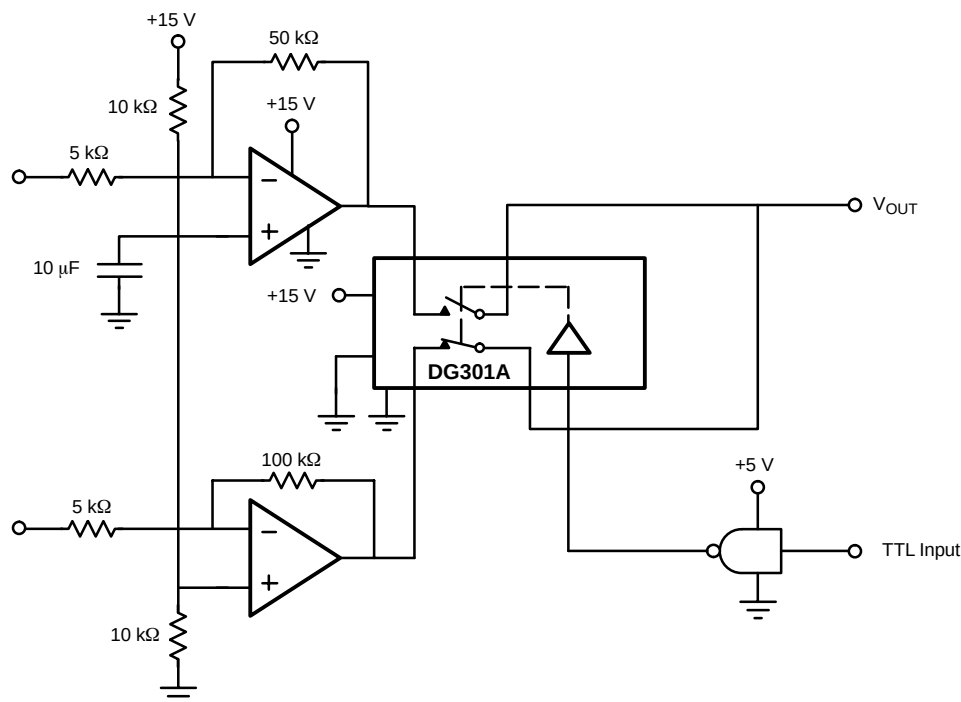
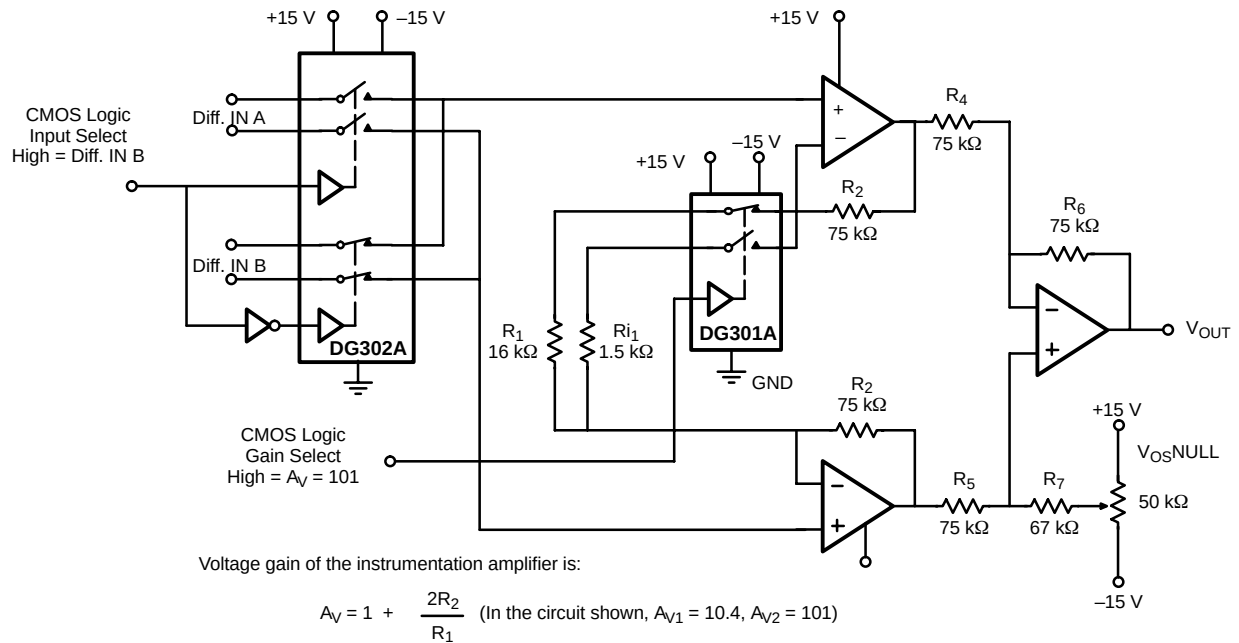


FIGURE 5. Single Supply Op Amp Switching

**APPLICATIONS**

**FIGURE 6.** Low Power Instrumentation Amplifier with Digitally Selectable Inputs and Gain





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