

August 1997

## CMOS Analog Multiplexers

### Features

- Low Power Consumption
- TTL and CMOS-Compatible Address and Enable Inputs
- 44V Maximum Power Supply Rating
- High Latch-Up Immunity
- Break-Before-Make Switching
- Alternate Source

### Applications

- Data Acquisition Systems
- Communication Systems
- Signal Multiplexing/Demultiplexing
- Audio Signal Multiplexing

### Description

The DG506A, DG507A, DG508A and DG509A are CMOS Monolithic 16-Channel/Dual 8-Channel and 8-Channel/Dual 4-Channel Analog Multiplexers, which can also be used as demultiplexers. An enable input is provided. When the enable input is high, a channel is selected by the address inputs, and when low, all channels are off.

A channel in the ON state conducts current equally well in both directions. In the OFF state each channel blocks voltages up to the supply rails. The address inputs and the enable input are TTL and CMOS compatible over the full specified operating temperature range.

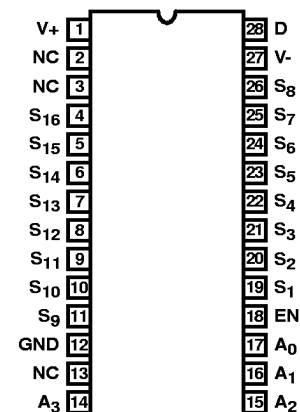
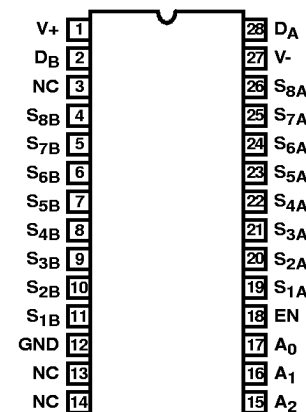
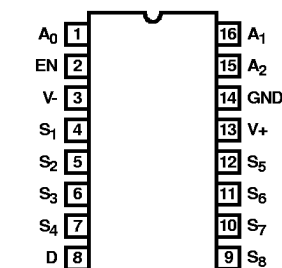
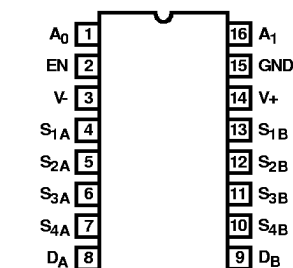
The DG506A, DG507A, DG508A and DG509A are pinout compatible with the industry standard devices.

### Ordering Information

| PART NUMBER   | TEMP. RANGE (°C) | PACKAGE      | PKG. NO. |
|---------------|------------------|--------------|----------|
| DG506AAK      | -55 to 125       | 28 Ld CERDIP | F28.6    |
| DG506AAK/883B | -55 to 125       | 28 Ld CERDIP | F28.6    |
| DG506ABK      | -25 to 85        | 28 Ld CERDIP | F28.6    |
| DG506ABY      | -25 to 85        | 28 Ld PDIP   | E28.6    |
| DG506ACJ      | 0 to 70          | 28 Ld PDIP   | E28.6    |
| DG506ACY      | 0 to 70          | 28 Ld SOIC   | M28.3    |
| DG507AAK      | -55 to 125       | 28 Ld CERDIP | F28.6    |
| DG507AAK/883B | -55 to 125       | 28 Ld CERDIP | F28.6    |
| DG507ABK      | -25 to 85        | 28 Ld CERDIP | F28.6    |
| DG507ABY      | -25 to 85        | 28 Ld PDIP   | E28.6    |
| DG507ACJ      | 0 to 70          | 28 Ld PDIP   | E28.6    |
| DG507ACK      | 0 to 70          | 28 Ld CERDIP | F28.6    |
| DG507ACY      | 0 to 70          | 28 Ld SOIC   | M28.3    |
| DG508AAK      | -55 to 125       | 16 Ld CERDIP | F16.3    |

| PART NUMBER   | TEMP. RANGE (°C) | PACKAGE      | PKG. NO. |
|---------------|------------------|--------------|----------|
| DG508AAK/883B | -55 to 125       | 16 Ld CERDIP | F16.3    |
| DG508ABK      | -25 to 85        | 16 Ld CERDIP | F16.3    |
| DG508ABY      | -25 to 85        | 16 Ld SOIC   | M16.3    |
| DG508ACJ      | 0 to 70          | 16 Ld PDIP   | E16.3    |
| DG508ACK      | 0 to 70          | 16 Ld CERDIP | F16.3    |
| DG508ACY      | 0 to 70          | 16 Ld SOIC   | M16.3    |
| DG509AAK      | -55 to 125       | 16 Ld CERDIP | F16.3    |
| DG509AAK/883B | -55 to 125       | 16 Ld CERDIP | F16.3    |
| DG509ABK      | -25 to 85        | 16 Ld CERDIP | F16.3    |
| DG509ABY      | -25 to 85        | 16 Ld SOIC   | M16.3    |
| DG509ACJ      | 0 to 70          | 16 Ld PDIP   | E16.3    |
| DG509ACK      | 0 to 70          | 16 Ld CERDIP | F16.3    |
| DG509ACY      | 0 to 70          | 16 Ld SOIC   | M16.3    |

### Pinouts

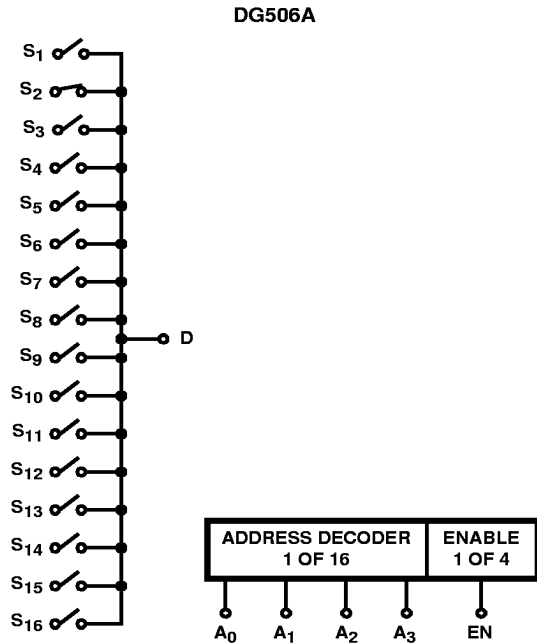
 DG506A (PDIP, CERDIP, SOIC)  
TOP VIEW

 DG507A (PDIP, CERDIP, SOIC)  
TOP VIEW

 DG508A (PDIP, CERDIP, SOIC)  
TOP VIEW

 DG509A (PDIP, CERDIP, SOIC)  
TOP VIEW


CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper IC Handling Procedures.

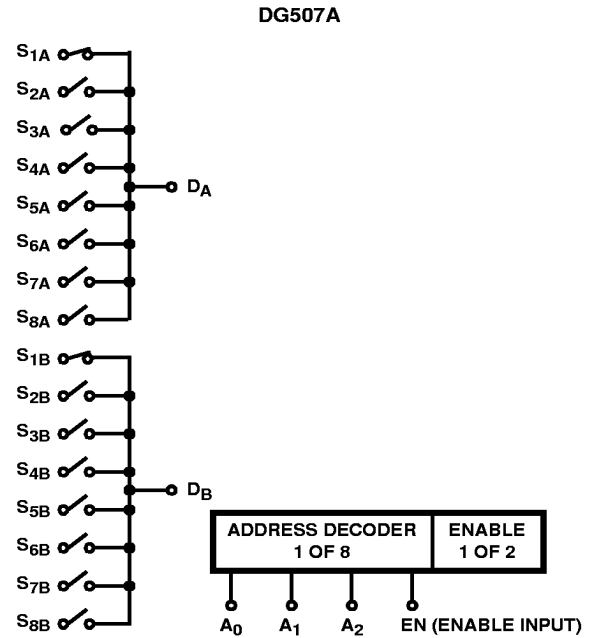
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 File Number **3137.1**

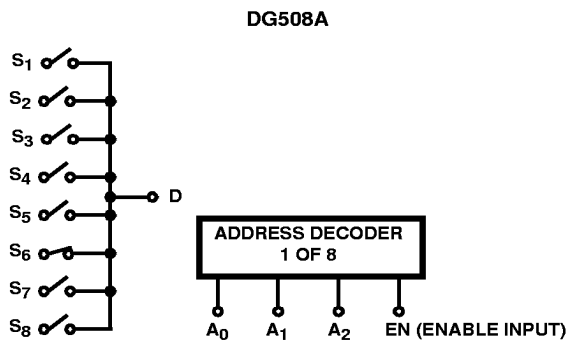
## Functional Block Diagrams



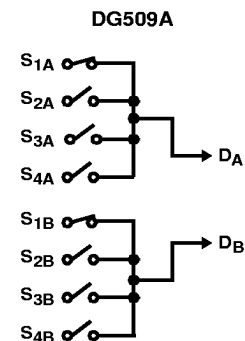
4 Line Binary Address Inputs  
(0 0 0 1) and EN = 5V  
Above example shows channel 2 turned ON.



3 Line Binary Address Inputs  
(0 0 0) and EN = 5V  
Above example shows channels 1A and 1B turned ON.

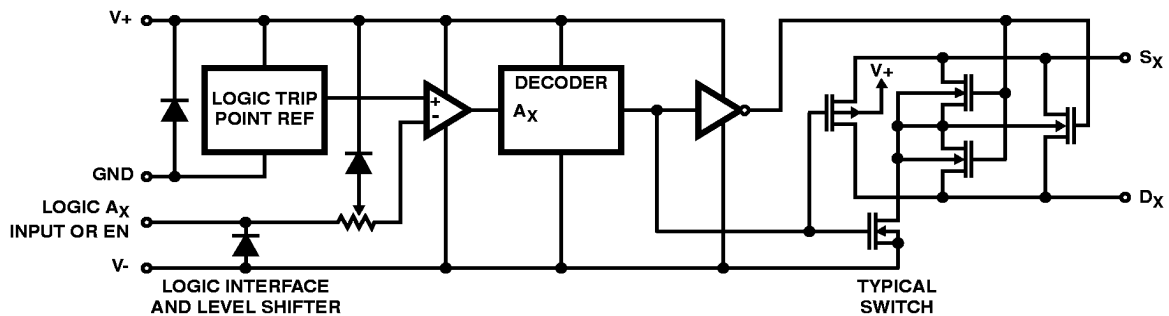


3 Line Binary Address Inputs  
(1 0 1) and EN = 1  
Above example shows channel 6 turned ON.



2 Line Binary Address Inputs  
(0 0) and EN = 1  
Above example shows channels 1A and 1B turned ON.

## Schematic Diagram



# DG506A, DG507A, DG508A, DG509A

## Absolute Maximum Ratings

|                                                          |                    |
|----------------------------------------------------------|--------------------|
| V+ to V-                                                 | 44V                |
| V- to Ground                                             | -25V               |
| V <sub>IN</sub> to Ground (Note 1)                       | (V- -2V), (V+ +2V) |
| V <sub>S</sub> or V <sub>D</sub> to V+ (Note 1)          | +2, (V- -2V)       |
| V <sub>S</sub> or V <sub>D</sub> to V- (Note 1)          | -2, (V+ +2V)       |
| Current, any Terminal Except S or D                      | 30mA               |
| Continuous Current, S or D                               | 20mA               |
| Peak Current, S or D (Pulsed at 1ms, 10% Duty Cycle Max) | 40mA               |

## Operating Conditions

### Operating Temperature Range

|          |                |
|----------|----------------|
| C Suffix | 0°C to 70°C    |
| B Suffix | -25°C to 85°C  |
| A Suffix | -55°C to 125°C |

## Thermal Information

| Thermal Resistance (Typical, Note 2)     | $\theta_{JA}$ (°C/W) | $\theta_{JC}$ (°C/W) |
|------------------------------------------|----------------------|----------------------|
| 16 Ld CERDIP Package                     | 75                   | 20                   |
| 28 Ld CERDIP Package                     | 55                   | 18                   |
| 16 Ld PDIP Package                       | 100                  | N/A                  |
| 28 Ld PDIP Package                       | 60                   | N/A                  |
| 16 Ld SOIC Package                       | 100                  | N/A                  |
| 28 Ld SOIC Package                       | 70                   | N/A                  |
| Maximum Junction Temperature             |                      |                      |
| CERDIP Package                           |                      | 175°C                |
| PDIP Package                             |                      | 150°C                |
| Maximum Storage Temperature              |                      |                      |
| C Suffix                                 |                      | -65°C to 125°C       |
| A and B Suffix                           |                      | -65°C to 150°C       |
| Maximum Lead Temperature (Soldering 10s) |                      |                      |
| (SOIC - Lead Tips Only)                  |                      | 300°C                |

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### NOTES:

1. Signals on V<sub>S</sub>, V<sub>D</sub> or V<sub>IN</sub> exceeding V+ or V- will be clamped by internal diodes. Limit diode forward current to maximum current ratings.
2.  $\theta_{JA}$  is measured with the component mounted on an evaluation PC board in free air.

## Electrical Specifications $T_A = 25^\circ\text{C}$ , V+ = +15V, V- = -15V, GND = 0V, V<sub>EN</sub> = 2.4V, Unless Otherwise Specified

| PARAMETER                                              | TEST CONDITIONS                                                                                                                                                 | DG506AA, DG507AA, DG508AA, DG509AA |                 |     | DG506AB/C, DG507AB/C, DG508AB/C, DG509AB/C |                 |     | UNITS         |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------|-----|--------------------------------------------|-----------------|-----|---------------|
|                                                        |                                                                                                                                                                 | MIN                                | (NOTE 1)<br>TYP | MAX | MIN                                        | (NOTE 1)<br>TYP | MAX |               |
| DYNAMIC CHARACTERISTICS                                |                                                                                                                                                                 |                                    |                 |     |                                            |                 |     |               |
| Switching Time of Multiplexer, $t_{\text{TRANSITION}}$ | See Figure 3                                                                                                                                                    | -                                  | 0.6             | 1   | -                                          | 0.6             | -   | $\mu\text{s}$ |
| Break-Before-Make Interval, $t_{\text{OPEN}}$          | See Figure 5                                                                                                                                                    | -                                  | 0.2             | -   | -                                          | 0.2             | -   | $\mu\text{s}$ |
| Enable Turn-On Time, $t_{\text{ON(EN)}}$               | See Figure 4                                                                                                                                                    | -                                  | 1               | 1.5 | -                                          | 1               | -   | $\mu\text{s}$ |
| Enable Turn-Off Time, $t_{\text{OFF(EN)}}$             | See Figure 4                                                                                                                                                    | -                                  | 0.4             | 1.0 | -                                          | 0.4             | -   | $\mu\text{s}$ |
| Off Isolation, OIRR                                    | $V_{\text{EN}} = 0\text{V}$ , $R_{\text{L}} = 1\text{k}\Omega$ , $C_{\text{L}} = 15\text{pF}$ , $V_{\text{S}} = 7V_{\text{RMS}}$ , $f = 500\text{kHz}$ (Note 3) | -                                  | 68              | -   | -                                          | 68              | -   | dB            |
| Source Off Capacitance, $C_{\text{S(OFF)}}$            | $V_{\text{S}} = 0\text{V}$ , $V_{\text{EN}} = 0\text{V}$ , $f = 140\text{kHz}$                                                                                  |                                    |                 |     |                                            |                 |     |               |
| DG506A, DG507A                                         |                                                                                                                                                                 | -                                  | 6               | -   | -                                          | 6               | -   | pF            |
| DG508A, DG509A                                         |                                                                                                                                                                 | -                                  | 5               | -   | -                                          | 5               | -   | pF            |
| Drain Off Capacitance, $C_{\text{D(OFF)}}$             | $V_{\text{D}} = 0\text{V}$ , $V_{\text{EN}} = 0\text{V}$ , $f = 140\text{kHz}$                                                                                  |                                    |                 |     |                                            |                 |     |               |
| DG506A                                                 |                                                                                                                                                                 | -                                  | 45              | -   | -                                          | 45              | -   | pF            |
| DG507A                                                 |                                                                                                                                                                 | -                                  | 23              | -   | -                                          | 23              | -   | pF            |
| DG508A                                                 |                                                                                                                                                                 | -                                  | 25              | -   | -                                          | 25              | -   | pF            |
| DG509A                                                 |                                                                                                                                                                 | -                                  | 12              | -   | -                                          | 12              | -   | pF            |
| Charge Injection, Q                                    | See Figure 6                                                                                                                                                    |                                    |                 |     |                                            |                 |     |               |
| DG506A, DG507A                                         |                                                                                                                                                                 | -                                  | 6               | -   | -                                          | 6               | -   | pC            |
| DG508A, DG509A                                         |                                                                                                                                                                 | -                                  | 4               | -   | -                                          | 4               | -   | pC            |
| INPUT                                                  |                                                                                                                                                                 |                                    |                 |     |                                            |                 |     |               |
| Address Input Current, $I_{\text{AH}}$                 | $V_{\text{A}} = 2.4\text{V}$                                                                                                                                    | -10                                | -0.002          | -   | -10                                        | -0.002          | -   | $\mu\text{A}$ |
| Input Voltage High, $I_{\text{AH}}$                    | $V_{\text{A}} = 15\text{V}$                                                                                                                                     | -                                  | 0.006           | 10  | -                                          | 0.006           | 10  | $\mu\text{A}$ |

# DG506A, DG507A, DG508A, DG509A

**Electrical Specifications**  $T_A = 25^\circ\text{C}$ ,  $V_+ = +15\text{V}$ ,  $V_- = -15\text{V}$ ,  $\text{GND} = 0\text{V}$ ,  $V_{\text{EN}} = 2.4\text{V}$ , Unless Otherwise Specified **(Continued)**

| PARAMETER                                                                                     | TEST CONDITIONS                                                                                                  |                                                   | DG506AA, DG507AA, DG508AA, DG509AA |                 |        | DG506AB/C, DG507AB/C, DG508AB/C, DG509AB/C |                 |     | UNITS |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|-----------------|--------|--------------------------------------------|-----------------|-----|-------|
|                                                                                               |                                                                                                                  |                                                   | MIN                                | (NOTE 1)<br>TYP | MAX    | MIN                                        | (NOTE 1)<br>TYP | MAX |       |
| Address Input Current<br>Input Voltage Low, I <sub>AL</sub>                                   | V <sub>EN</sub> = 2.4V                                                                                           | V <sub>A</sub> = 0V                               | -10                                | -0.002          | -      | -10                                        | -0.002          | -   | μA    |
|                                                                                               | V <sub>EN</sub> = 0V                                                                                             |                                                   | -10                                | -0.002          | -      | -10                                        | -0.0002         | -   | μA    |
| SWITCH                                                                                        |                                                                                                                  |                                                   |                                    |                 |        |                                            |                 |     |       |
| Analog Signal Range,<br>V <sub>ANALOG</sub>                                                   | (Note 5)                                                                                                         |                                                   | -15                                | -               | +15    | -15                                        | -               | +15 | V     |
| Drain Source On<br>Resistance, r <sub>DS(ON)</sub>                                            | Sequence Each<br>Switch On<br>V <sub>AL</sub> = 0.8V<br>V <sub>AH</sub> = 2.4V                                   | I <sub>S</sub> = -200μA,<br>V <sub>D</sub> = +10V | -                                  | 270             | 400    | -                                          | 270             | 450 | Ω     |
|                                                                                               |                                                                                                                  | I <sub>S</sub> = -200μA,<br>V <sub>D</sub> = -10V | -                                  | 230             | 400    | -                                          | 230             | 450 | Ω     |
| Greatest Change in Drain<br>Source On Resistance<br>Between Channels,<br>Δr <sub>DS(ON)</sub> | -10V ≤ V <sub>S</sub> ≤ +10V<br><br>Δr <sub>DS(ON)</sub> = $\frac{r_{DS(ON)MAX} - r_{DS(ON)MIN}}{r_{DS(ON)AVG}}$ |                                                   | -                                  | 6               | -      | -                                          | 6               | -   | %     |
| Source Off Leakage<br>Current, I <sub>S(OFF)</sub>                                            | V <sub>EN</sub> = 0V                                                                                             | V <sub>S</sub> = +10V, V <sub>D</sub> = -10V      | -1                                 | 0.002           | 1      | -5                                         | 0.002           | 5   | nA    |
|                                                                                               |                                                                                                                  | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V      | -1                                 | -0.005          | 1      | -5                                         | -0.005          | 5   | nA    |
| Drain Off Leakage<br>Current, I <sub>D(OFF)</sub><br>DG506A                                   | V <sub>EN</sub> = 0V                                                                                             |                                                   |                                    |                 |        |                                            |                 |     |       |
|                                                                                               |                                                                                                                  | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V      | -10                                | 0.02            | 10     | -20                                        | 0.02            | 20  | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                                                  |                                                                                                                  | -10                                               | -0.03                              | 10              | -20    | -0.03                                      | 20              | nA  |       |
| DG507A                                                                                        |                                                                                                                  | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V      | -5                                 | 0.007           | 5      | -10                                        | 0.007           | 10  | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                                                  |                                                                                                                  | -5                                                | -0.015                             | 5               | -10    | -0.015                                     | 10              | nA  |       |
| DG508A                                                                                        |                                                                                                                  | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V      | -                                  | 0.01            | 10     | -                                          | 0.01            | 20  | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                                                  |                                                                                                                  | -10                                               | -0.015                             | -               | -20    | -0.015                                     | -               | nA  |       |
| DG509A                                                                                        |                                                                                                                  | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V      | -                                  | 0.005           | 10     | -                                          | 0.005           | 20  | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                                                  | -10                                                                                                              | -0.008                                            | -                                  | -20             | -0.008 | -                                          | nA              |     |       |
| Drain On Leakage Current,<br>I <sub>D(ON)</sub><br>DG506A                                     | (Note 4)<br>Sequence Each<br>Switch On<br>V <sub>AL</sub> = 0.8V<br>V <sub>AH</sub> = 2.4V                       |                                                   |                                    |                 |        |                                            |                 |     |       |
|                                                                                               |                                                                                                                  | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V       | -10                                | 0.03            | 10     | -20                                        | 0.03            | 20  | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                                                   |                                                                                                                  | -10                                               | -0.06                              | 10              | -20    | -0.06                                      | 20              | nA  |       |
| DG507A                                                                                        |                                                                                                                  | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V       | -5                                 | 0.015           | 5      | -10                                        | 0.015           | 10  | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                                                   |                                                                                                                  | -5                                                | -0.03                              | 5               | -10    | -0.03                                      | 10              | nA  |       |
| DG508A                                                                                        |                                                                                                                  | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V       | -                                  | 0.015           | 10     | -                                          | 0.015           | 20  | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                                                   |                                                                                                                  | -10                                               | -0.03                              | -               | -20    | -0.03                                      | -               | nA  |       |
| DG509A                                                                                        |                                                                                                                  | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V       | -                                  | 0.007           | 10     | -                                          | 0.007           | 20  | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                                                   | -10                                                                                                              | -0.015                                            | -                                  | -20             | -0.015 | -                                          | nA              |     |       |
| POWER SUPPLY CHARACTERISTICS                                                                  |                                                                                                                  |                                                   |                                    |                 |        |                                            |                 |     |       |
| Positive Supply Current,<br>I <sub>+</sub>                                                    | V <sub>EN</sub> = 5.0V, V <sub>A</sub> = 0V                                                                      |                                                   | -                                  | 1.3             | 2.4    | -                                          | 1.3             | 2.4 | mA    |
| Negative Supply Current,<br>I <sub>-</sub>                                                    | V <sub>EN</sub> = 5.0V, V <sub>A</sub> = 0V                                                                      |                                                   | -1.5                               | -0.7            | -      | -1.5                                       | -0.7            | -   | mA    |
| Positive Supply Current,<br>I <sub>+</sub> Standby                                            | V <sub>EN</sub> = 0V, V <sub>A</sub> = 0V                                                                        |                                                   | -                                  | 1.3             | 2.4    | -                                          | 1.3             | 2.4 | mA    |
| Negative Supply Current,<br>I <sub>-</sub> Standby                                            | V <sub>EN</sub> = 0V, V <sub>A</sub> = 0V                                                                        |                                                   | -1.5                               | -0.7            | -      | -1.5                                       | -0.7            | -   | mA    |

# DG506A, DG507A, DG508A, DG509A

**Electrical Specifications**  $T_A$  = Over Operating Temperature Range,  $V_+ = +15V$ ,  $V_- = -15V$ ,  $GND = 0V$ ,  $V_{EN} = 2.4V$ ,  
Unless Otherwise Specified

| PARAMETER                                                     | TEST CONDITIONS                                                                            |                                                | DG506AA, DG507AA,<br>DG508AA, DG509AA |                 |     | DG506AB/C,<br>DG507AB/C,<br>DG508AB/C,<br>DG509AB/C |                 |     | UNITS |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------|-----------------|-----|-----------------------------------------------------|-----------------|-----|-------|
|                                                               |                                                                                            |                                                | MIN                                   | (NOTE 2)<br>TYP | MAX | MIN                                                 | (NOTE 2)<br>TYP | MAX |       |
| INPUT                                                         |                                                                                            |                                                |                                       |                 |     |                                                     |                 |     |       |
| Address Input Current,<br>Input Voltage High, I <sub>AH</sub> | V <sub>A</sub> = 2.4V                                                                      |                                                | -30                                   | -               | -   | -                                                   | -               | -   | μA    |
|                                                               | V <sub>A</sub> = 15V                                                                       |                                                | -                                     | -               | 30  | -                                                   | -               | -   | μA    |
| Address Input Current<br>Input Voltage Low, I <sub>AL</sub>   | V <sub>EN</sub> = 2.4V                                                                     | V <sub>A</sub> = 0V                            | -30                                   | -               | -   | -                                                   | -               | -   | μA    |
|                                                               | V <sub>EN</sub> = 0V                                                                       |                                                | -30                                   | -               | -   | -                                                   | -               | -   | μA    |
| SWITCHING CHARACTERISTICS                                     |                                                                                            |                                                |                                       |                 |     |                                                     |                 |     |       |
| Analog Signal Range,<br>V <sub>ANALOG</sub>                   | (Note 5)                                                                                   |                                                | -15                                   | -               | +15 | -                                                   | -               | -   | V     |
| Drain Source On<br>Resistance, r <sub>DS(ON)</sub>            | Sequence Each<br>Switch On<br>V <sub>AL</sub> = 0.8V<br>V <sub>AH</sub> = 2.4V             | I <sub>S</sub> = -200μA, V <sub>D</sub> = +10V | -                                     | -               | 500 | -                                                   | -               | -   | Ω     |
|                                                               |                                                                                            | I <sub>S</sub> = -200μA, V <sub>D</sub> = -10V | -                                     | -               | 500 | -                                                   | -               | -   | Ω     |
| Source Off Leakage<br>Current, I <sub>S(OFF)</sub>            | V <sub>EN</sub> = 0V                                                                       | V <sub>S</sub> = +10V, V <sub>D</sub> = -10V   | -                                     | -               | 50  | -                                                   | -               | -   | nA    |
|                                                               |                                                                                            | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V   | -50                                   | -               | -   | -                                                   | -               | -   | nA    |
| Drain Off Leakage Current,<br>I <sub>D(OFF)</sub><br>DG506A   | V <sub>EN</sub> = 0V                                                                       | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V   | -                                     | -               | 300 | -                                                   | -               | -   | nA    |
|                                                               |                                                                                            | V <sub>S</sub> = +10V, V <sub>D</sub> = -10V   | -300                                  | -               | -   | -                                                   | -               | -   | nA    |
| DG507A                                                        |                                                                                            | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V   | -                                     | -               | 200 | -                                                   | -               | -   | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                  |                                                                                            | -200                                           | -                                     | -               | -   | -                                                   | -               | nA  |       |
| DG508A                                                        |                                                                                            | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V   | -                                     | -               | 200 | -                                                   | -               | -   | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                  |                                                                                            | -200                                           | -                                     | -               | -   | -                                                   | -               | nA  |       |
| DG509A                                                        |                                                                                            | V <sub>S</sub> = -10V, V <sub>D</sub> = +10V   | -                                     | -               | 100 | -                                                   | -               | -   | nA    |
| V <sub>S</sub> = +10V, V <sub>D</sub> = -10V                  |                                                                                            | -100                                           | -                                     | -               | -   | -                                                   | -               | nA  |       |
| Drain On Leakage Current,<br>I <sub>D(ON)</sub><br>DG506A     | (Note 4)<br>Sequence Each<br>Switch On<br>V <sub>AL</sub> = 0.8V<br>V <sub>AH</sub> = 2.4V | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V    | -                                     | -               | 300 | -                                                   | -               | -   | nA    |
|                                                               |                                                                                            | V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V    | -300                                  | -               | -   | -                                                   | -               | -   | nA    |
| DG507A                                                        |                                                                                            | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V    | -                                     | -               | 200 | -                                                   | -               | -   | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                   |                                                                                            | -200                                           | -                                     | -               | -   | -                                                   | -               | nA  |       |
| DG508A                                                        |                                                                                            | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V    | -                                     | -               | 200 | -                                                   | -               | -   | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                   |                                                                                            | -200                                           | -                                     | -               | -   | -                                                   | -               | nA  |       |
| DG509A                                                        |                                                                                            | V <sub>D</sub> = V <sub>S(ALL)</sub> = +10V    | -                                     | -               | 100 | -                                                   | -               | -   | nA    |
| V <sub>D</sub> = V <sub>S(ALL)</sub> = -10V                   |                                                                                            | -100                                           | -                                     | -               | -   | -                                                   | -               | nA  |       |
| POWER SUPPLY CHARACTERISTICS                                  |                                                                                            |                                                |                                       |                 |     |                                                     |                 |     |       |
| Positive Supply Current, I <sub>+</sub>                       | V <sub>EN</sub> = 5.0V, V <sub>A</sub> = 0V                                                |                                                | -3.2                                  | -               | 4.5 | -                                                   | -               | -   | mA    |
| Negative Supplu Current I <sub>-</sub>                        | V <sub>EN</sub> = 5.0V, V <sub>A</sub> = 0V                                                |                                                | -3.2                                  | -               | 4.5 | -                                                   | -               | -   | mA    |
| Positive Standby Supply Current I <sub>+</sub>                | V <sub>EN</sub> = 0V, V <sub>A</sub> = 0V                                                  |                                                | -3.2                                  | -               | 4.5 | -                                                   | -               | -   | mA    |
| Negative Standby Supply Current I <sub>-</sub>                | V <sub>EN</sub> = 0V, V <sub>A</sub> = 0V                                                  |                                                | -3.2                                  | -               | 4.5 | -                                                   | -               | -   | mA    |

**NOTES:**

- Typical values are for design aid only, not guaranteed and not subject to production testing.
- The algebraic convention whereby the most negative value is a minimum, and the most positive value is a maximum, is used in this data sheet.
- Off isolation =  $20\log |V_S|/|V_D|$ , where  $V_S$  = input to Off switch, and  $V_D$  = output due to  $V_S$ .
- $I_{D(ON)}$  is leakage from driver into "ON" switch.
- Parameter not tested. Parameter guaranteed by design or characterization.

## Typical Performance Curves

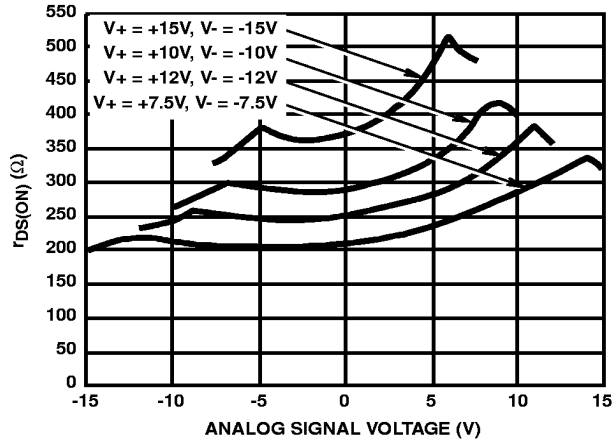


FIGURE 1.  $r_{DS(ON)}$  vs ANALOG SIGNAL VOLTAGE vs SUPPLY VOLTAGE

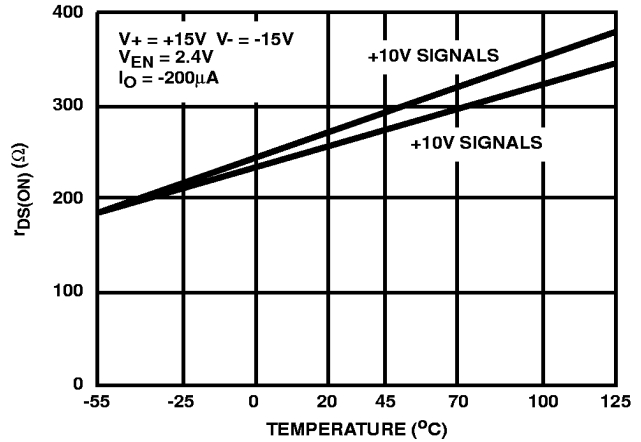
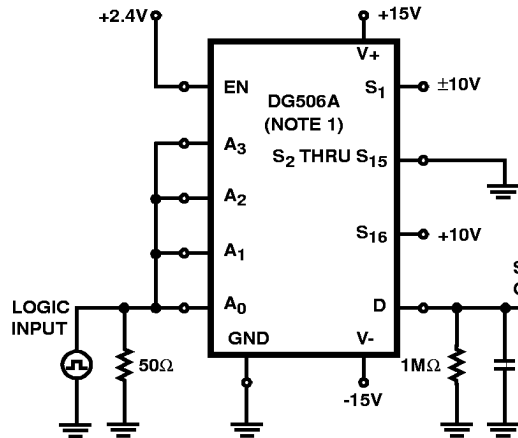


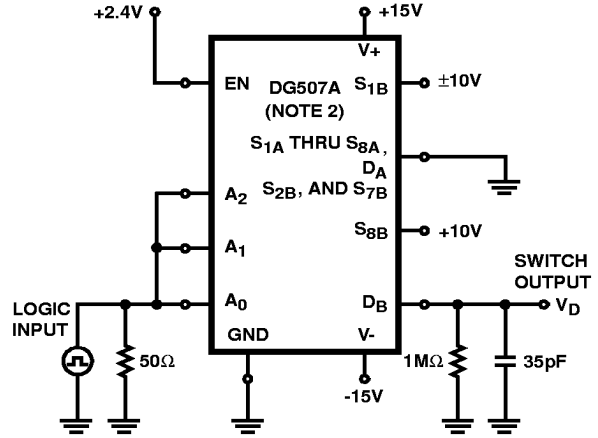
FIGURE 2. TYPICAL  $r_{DS(ON)}$  VARIATION WITH TEMPERATURE

## Test Circuits and Waveforms



NOTE: 1. Similar connections for DG508A

FIGURE 3A.  $t_{TRANSITION}$  SWITCHING TIME TEST CIRCUIT



NOTE: 2. Similar connections for DG509A

FIGURE 3B.  $t_{TRANSITION}$  SWITCHING TIME TEST CIRCUIT

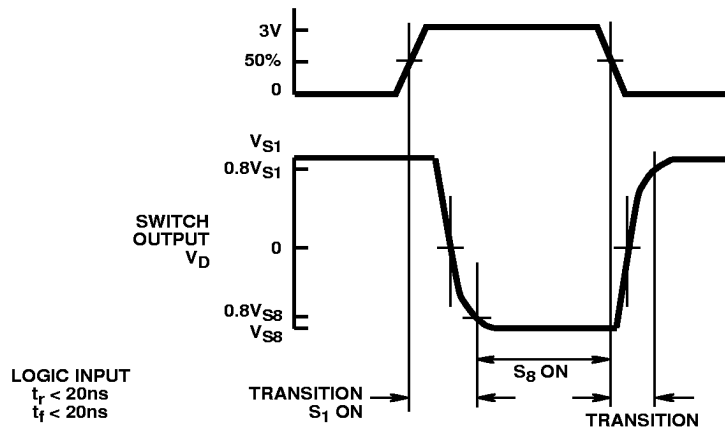
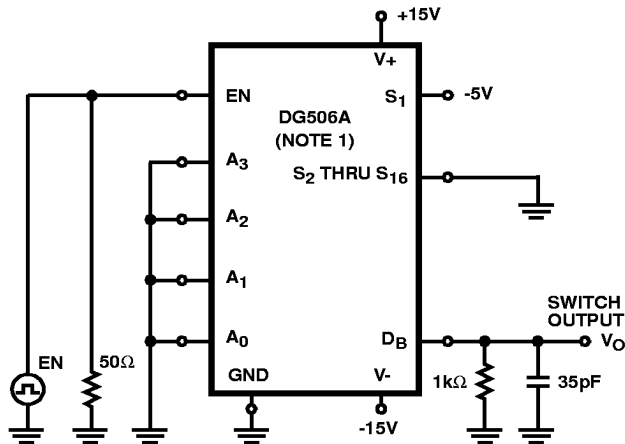


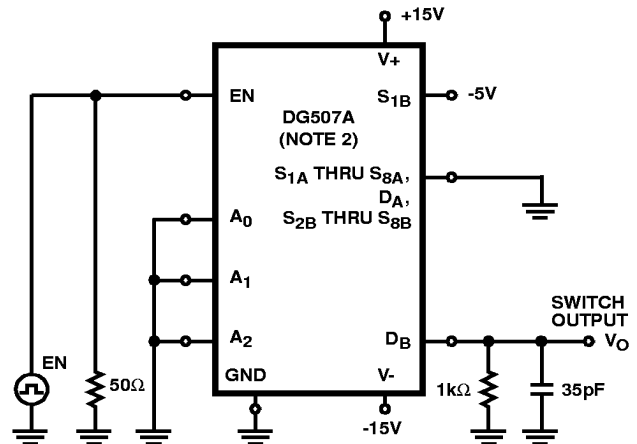
FIGURE 3C.  $t_{TRANSITION}$  SWITCHING TIME WAVEFORMS

**Test Circuits and Waveforms** (Continued)



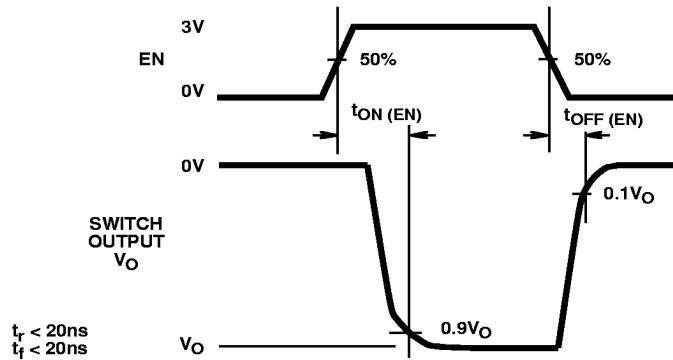
NOTE: 1. Similar connections for DG508A

**FIGURE 4A. ENABLE  $t_{ON}$  and  $t_{OFF}$  SWITCHING TIME TEST CIRCUIT**

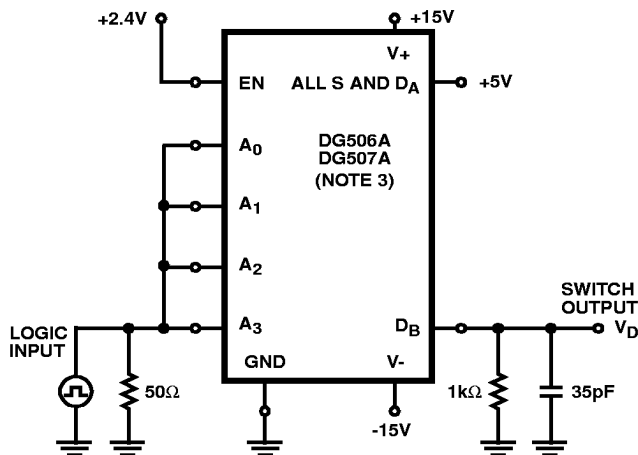


NOTE: 2. Similar connections for DG509A

**FIGURE 4B. ENABLE  $t_{ON}$  and  $t_{OFF}$  SWITCHING TIME TEST CIRCUIT**

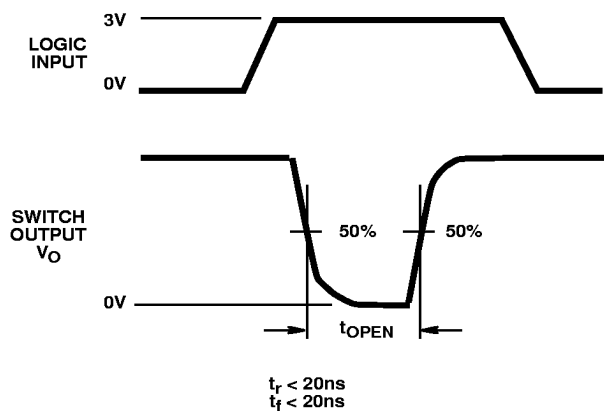


**FIGURE 4C. ENABLE  $t_{ON}$  and  $t_{OFF}$  SWITCHING TIME WAVEFORMS**



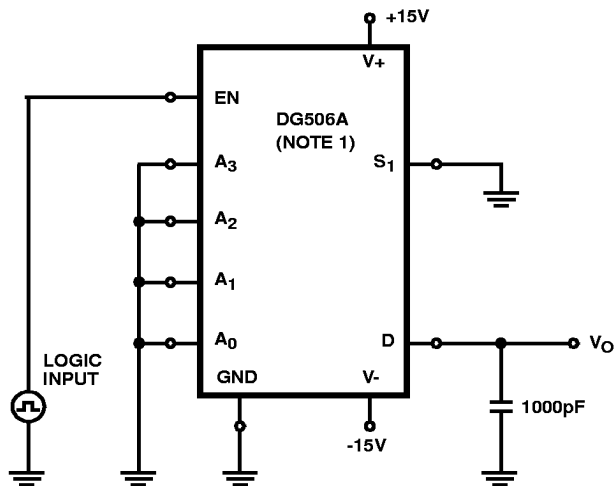
NOTE: 3. Similar connections for DG508A, DG509A.

**FIGURE 5A.  $t_{OPEN}$  (BREAK-BEFORE-MAKE) SWITCHING TIME TEST CIRCUIT**



**FIGURE 5B.  $t_{OPEN}$  (BREAK-BEFORE-MAKE) SWITCHING TIME WAVEFORMS**

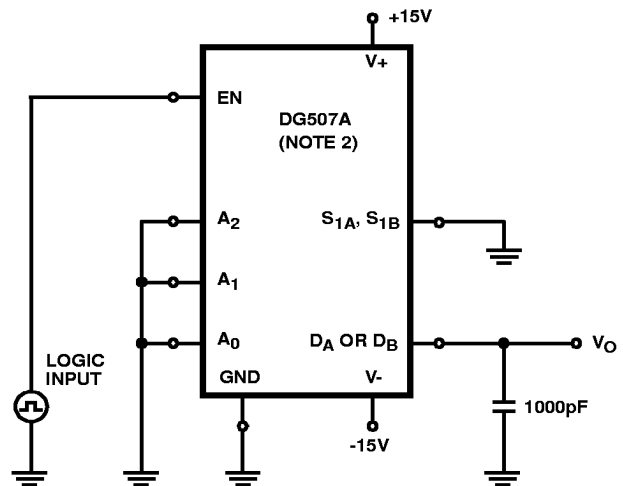
**Test Circuits and Waveforms** (Continued)



NOTE:

1. Similar connections for DG508A.

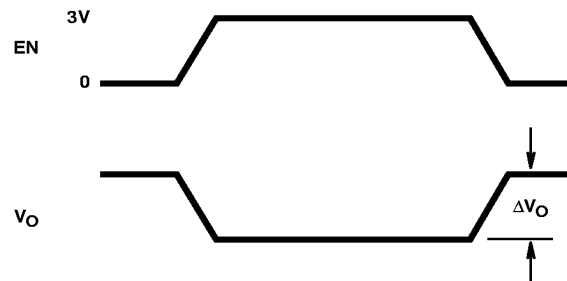
**FIGURE 6A. CHARGE INJECTION TEST CIRCUIT**



NOTE:

2. Similar connections for DG509A.

**FIGURE 6B. CHARGE INJECTION TEST CIRCUIT**



$\Delta V_O$  is the measured voltage error due to charge injection.  
The error voltage in Coulombs is  $Q = C_L \times \Delta V_O$ .

**FIGURE 6C. CHARGE INJECTION WAVEFORMS**

# Truth Tables

DG506A

| A <sub>3</sub> | A <sub>2</sub> | A <sub>1</sub> | A <sub>0</sub> | EN | ON SWITCH |
|----------------|----------------|----------------|----------------|----|-----------|
| X              | X              | X              | X              | 0  | None      |
| 0              | 0              | 0              | 0              | 1  | 1         |
| 0              | 0              | 0              | 1              | 1  | 2         |
| 0              | 0              | 1              | 0              | 1  | 3         |
| 0              | 0              | 1              | 1              | 1  | 4         |
| 0              | 1              | 0              | 0              | 1  | 5         |
| 0              | 1              | 0              | 1              | 1  | 6         |
| 0              | 1              | 1              | 0              | 1  | 7         |
| 0              | 1              | 1              | 1              | 1  | 8         |
| 1              | 0              | 0              | 0              | 1  | 9         |
| 1              | 0              | 0              | 1              | 1  | 10        |
| 1              | 0              | 1              | 0              | 1  | 11        |
| 1              | 0              | 1              | 1              | 1  | 12        |
| 1              | 1              | 0              | 0              | 1  | 13        |
| 1              | 1              | 0              | 1              | 1  | 14        |
| 1              | 1              | 1              | 0              | 1  | 15        |
| 1              | 1              | 1              | 1              | 1  | 16        |

Logic "0" = V<sub>AL</sub>, V<sub>ENL</sub> ≤ 0.8V, Logic "1" = V<sub>AH</sub>, V<sub>ENH</sub> ≥ 2.4V.

DG508A

| A <sub>2</sub> | A <sub>1</sub> | A <sub>0</sub> | EN | ON SWITCH |
|----------------|----------------|----------------|----|-----------|
| X              | X              | X              | 0  | None      |
| 0              | 0              | 0              | 1  | 1         |
| 0              | 0              | 1              | 1  | 2         |
| 0              | 1              | 0              | 1  | 3         |
| 0              | 1              | 1              | 1  | 4         |
| 1              | 0              | 0              | 1  | 5         |
| 1              | 0              | 1              | 1  | 6         |
| 1              | 1              | 0              | 1  | 7         |
| 1              | 1              | 1              | 1  | 8         |

A<sub>0</sub>, A<sub>1</sub>, A<sub>2</sub>, EN  
Logic "1" = V<sub>AH</sub> ≥ 2.4V, Logic "0" = V<sub>AL</sub> ≤ 0.8V

DG507A

| A <sub>2</sub> | A <sub>1</sub> | A <sub>0</sub> | EN | ON SWITCH |
|----------------|----------------|----------------|----|-----------|
| X              | X              | X              | 0  | None      |
| 0              | 0              | 0              | 1  | 1         |
| 0              | 0              | 1              | 1  | 2         |
| 0              | 1              | 0              | 1  | 3         |
| 0              | 1              | 1              | 1  | 4         |
| 1              | 0              | 0              | 1  | 5         |
| 1              | 0              | 1              | 1  | 6         |
| 1              | 1              | 0              | 1  | 7         |
| 1              | 1              | 1              | 1  | 8         |

Logic "0" = V<sub>AL</sub>, V<sub>ENL</sub> ≤ 0.8V, Logic "1" = V<sub>AH</sub>, V<sub>ENH</sub> ≥ 2.4V.

DG509A

| A <sub>1</sub> | A <sub>0</sub> | EN | ON SWITCH |
|----------------|----------------|----|-----------|
| X              | X              | 0  | None      |
| 0              | 0              | 1  | 1A, 1B    |
| 0              | 1              | 1  | 2A, 2B    |
| 1              | 0              | 1  | 3A, 3B    |
| 1              | 1              | 1  | 4A, 4B    |

A<sub>0</sub>, A<sub>1</sub>, EN  
Logic "1" = V<sub>AH</sub> ≥ 2.4V, Logic "0" = V<sub>AL</sub> ≤ 0.8V.

## Die Characteristics

### DIE DIMENSIONS:

3810 $\mu$ m x 2770 $\mu$ m

### METALLIZATION:

Type: Al

Thickness: 10k $\text{\AA}$   $\pm$  1k $\text{\AA}$

### PASSIVATION:

Type: PSG/Nitride

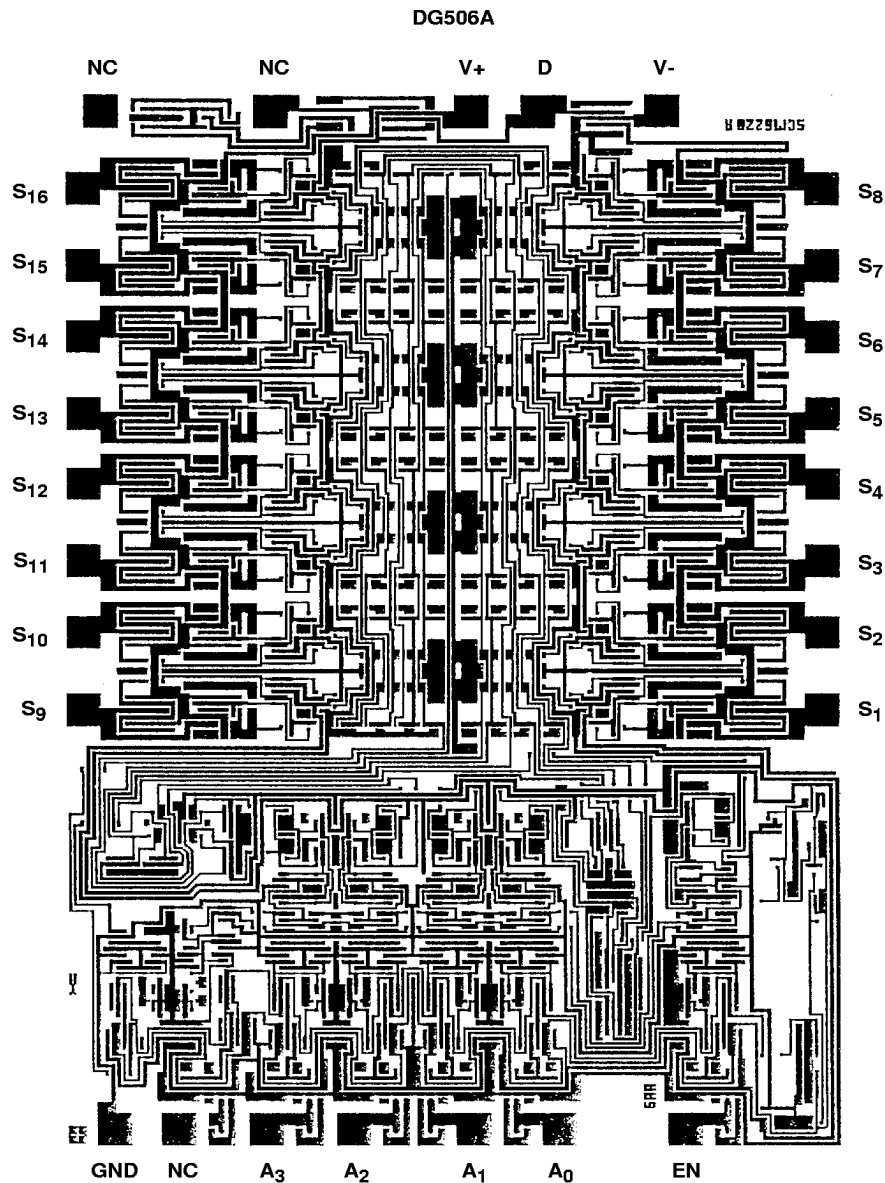
Thickness: PSG: 7k $\text{\AA}$   $\pm$  1.4k $\text{\AA}$

Nitride: 8k $\text{\AA}$   $\pm$  1.2k $\text{\AA}$

### WORST CASE CURRENT DENSITY:

9.1 x 10<sup>4</sup> A/cm<sup>2</sup>

## Metallization Mask Layout



## Die Characteristics

### DIE DIMENSIONS:

3810 $\mu$ m x 2770 $\mu$ m

### METALLIZATION:

Type: Al

Thickness: 10k $\text{\AA}$   $\pm$  1k $\text{\AA}$

### PASSIVATION:

Type: PSG/Nitride

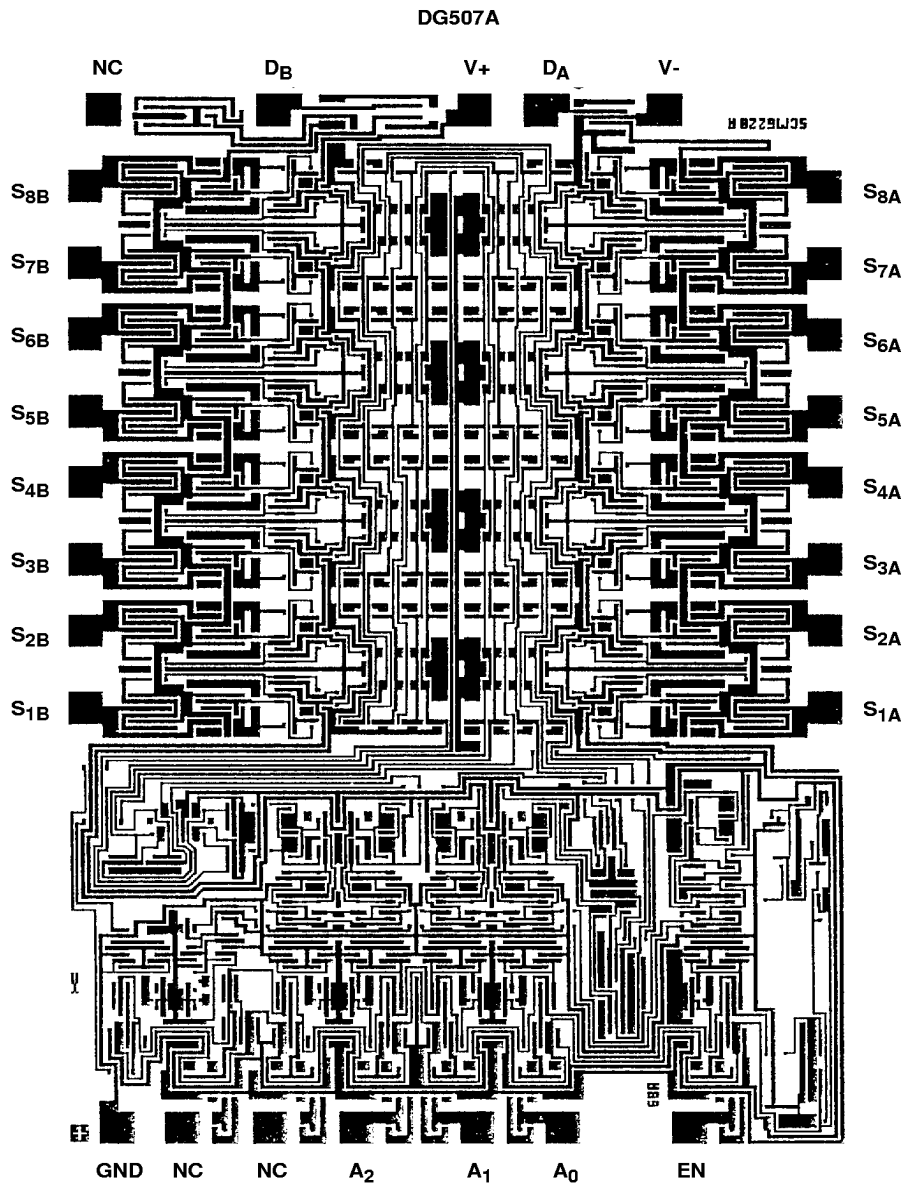
Thickness: PSG: 7k $\text{\AA}$   $\pm$  1.4k $\text{\AA}$

Nitride: 8k $\text{\AA}$   $\pm$  1.2k $\text{\AA}$

### WORST CASE CURRENT DENSITY:

9.1 x 10<sup>4</sup> A/cm<sup>2</sup>

## Metallization Mask Layout



## Die Characteristics

### DIE DIMENSIONS:

3100 $\mu$ m x 2083 $\mu$ m

### METALLIZATION:

Type: Al

Thickness: 10k $\text{\AA}$   $\pm$  1k $\text{\AA}$

### PASSIVATION:

Type: PSG/Nitride

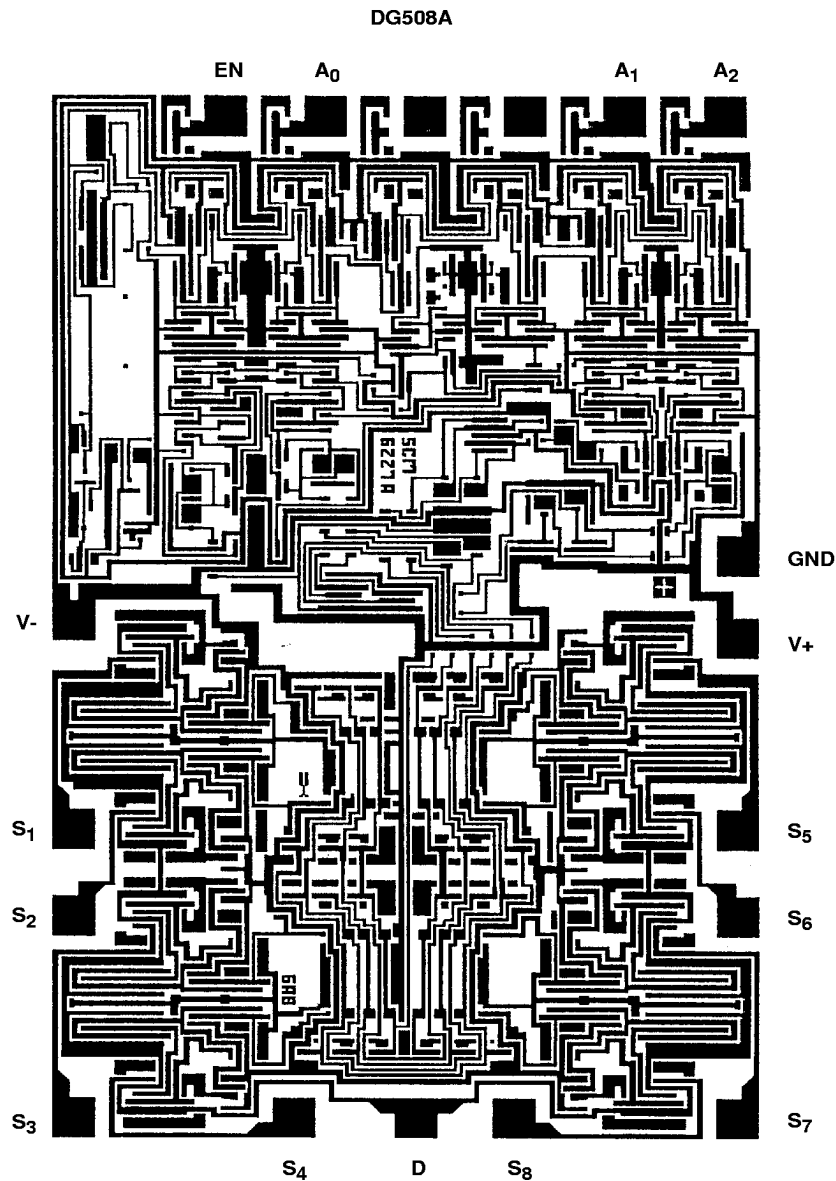
Thickness: PSG: 7k $\text{\AA}$   $\pm$  1.4k $\text{\AA}$

Nitride: 8k $\text{\AA}$   $\pm$  1.2k $\text{\AA}$

### WORST CASE CURRENT DENSITY:

$9.1 \times 10^4$  A/cm<sup>2</sup>

## Metallization Mask Layout



## Die Characteristics

### DIE DIMENSIONS:

3100 $\mu$ m x 2083 $\mu$ m

### METALLIZATION:

Type: Al

Thickness: 10k $\text{\AA}$   $\pm$  1k $\text{\AA}$

### PASSIVATION:

Type: PSG/Nitride

Thickness: PSG: 7k $\text{\AA}$   $\pm$  1.4k $\text{\AA}$

Nitride: 8k $\text{\AA}$   $\pm$  1.2k $\text{\AA}$

### WORST CASE CURRENT DENSITY:

9.1 x 10<sup>4</sup> A/cm<sup>2</sup>

## Metallization Mask Layout

