

# MAXIM

## Monolithic CMOS Analog Multiplexers

### General Description

Maxim's DG508A and DG509A are monolithic CMOS analog multiplexers (muxes): the DG508A is a single 8-channel (1-of-8) mux, and the DG509A is a differential 4-channel (2-of-8) mux.

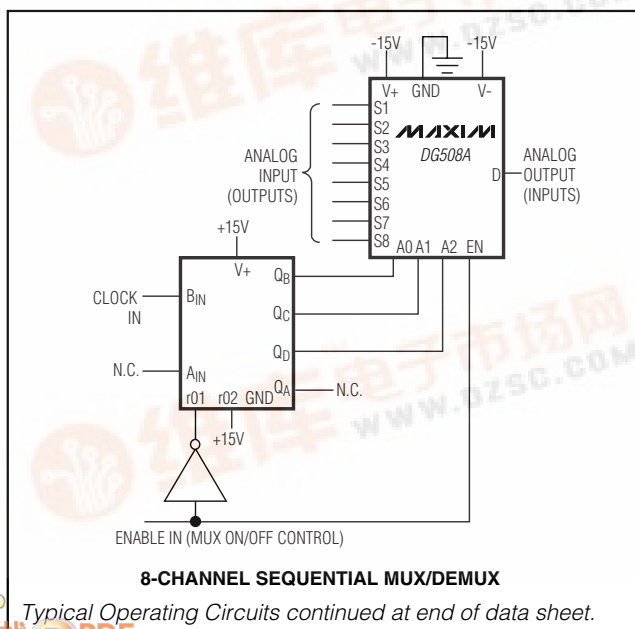
Both devices guarantee break-before-make switching. Maxim guarantees these muxes will not latch up if the power supplies are turned off with the input signals still present. Maxim also guarantees continuous operation when these devices are powered by supplies ranging from  $\pm 4.5\text{V}$  to  $\pm 18\text{V}$ .

The DG508A/DG509A are plug-in upgrades for the industry-standard DG08A/DG509A, respectively. Maxim's parts have lower on-resistance, faster enable switching times, and significantly lower leakage currents. The DG508A/DG509A also consume significantly lower power, making them ideal for portable equipment.

### Applications

Control Systems  
Data Logging Systems  
Aircraft Heads-Up Displays  
Data-Acquisition Systems  
Signal Routing

### Typical Operating Circuits



### Features

- ◆ Improved Second Source
- ◆ Operate from  $\pm 4.5\text{V}$  to  $\pm 18\text{V}$  Supplies
- ◆ Symmetrical, Bidirectional Operation
- ◆ Logic and Enable Inputs, TTL and CMOS Compatible
- ◆ Latchup-Proof Construction
- ◆ Monolithic, Low-Power CMOS Design

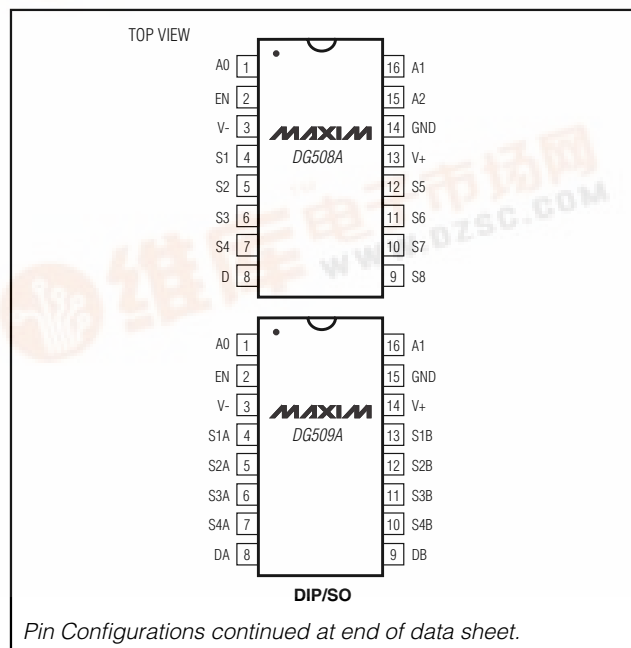
### Ordering Information

| PART      | TEMP RANGE      | PIN-PACKAGE    |
|-----------|-----------------|----------------|
| DG508ACJ  | 0°C to +70°C    | 16 Plastic DIP |
| DG508ACWE | 0°C to +70°C    | 16 Wide SO     |
| DG508AC/D | 0°C to +70°C    | Dice*          |
| DG508ABK  | -20°C to +85°C  | 16 CERDIP      |
| DG508ADJ  | -40°C to +85°C  | 16 Plastic DIP |
| DG508ADY  | -40°C to +85°C  | 16 Narrow SO   |
| DG508AEGE | -40°C to +85°C  | 16 QFN         |
| DG508AEWE | -40°C to +85°C  | 16 Wide SO     |
| DG508AAK  | -55°C to +125°C | 16 CERDIP      |

Ordering Information continued at end of data sheet.

\*Contact factory for dice specifications.

### Pin Configurations



DG508A/DG509A

# Monolithic CMOS Analog Multiplexers

## ABSOLUTE MAXIMUM RATINGS

Voltage Referenced to V-

|  |  |
|--|--|
| V+   | .....+44V  |
| GND  | .....+25V  |
| Digital Inputs, V <sub>S</sub> and V <sub>D</sub> (Note 1) | .....-2V to (V+ + 2V)<br>or 20mA, whichever occurs first |
| 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  |
| Continuous Power Dissipation (T <sub>A</sub> = +70°C)      |  |
| Plastic DIP (derate 10.53mW/°C above +70°C)                | .....842mW   |
| QFN (derate 19.2mW/°C above +70°C)                         | .....1538mW  |
| Narrow SO (derate 8.70mW/°C above +70°C)                   | .....696mW   |
| Wide SO (derate 9.52mW/°C above +70°C)                     | .....762mW   |
| CERDIP (derate 10.00mW/°C above +70°C)                     | .....800mW   |

Operating Temperature Ranges:

|                                   |                      |
|-----------------------------------|----------------------|
| DG50_ACJ/CWE/CGE                  | .....0°C to +70°C    |
| DG50_ABK                          | .....-20°C to +85°C  |
| DGS0_ADJ/DY/EWE/EGE               | .....-40°C to +85°C  |
| DG50_AAK                          | .....-55°C to +125°C |
| Storage Temperature Range         | .....-65°C to +150°C |
| Lead Temperature (soldering, 10s) | .....+300°C          |

**Note 1:** Signals on S<sub>-</sub>, D<sub>-</sub>, or IN<sub>-</sub> exceeding V+ or V- are clamped by internal diodes. Limit forward-diode current to maximum current ratings

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.

## ELECTRICAL CHARACTERISTICS

(V+ = 15V, V- = -15V, GND = 0V, T<sub>A</sub> = +25°C, unless otherwise noted.)

| PARAMETER  |   | SYMBOL               | CONDITIONS   |   | DG508AA<br>DG509AA |        |     | DG508AD/E/B/C<br>DG509AD/E/B/C |        |     | UNITS |
|--|---|----------------------|--|---|--------------------|--------|-----|--------------------------------|--------|-----|-------|
|  |   |                      |  |   | MIN                | TYP    | MAX | MIN                            | TYP    | MAX |       |
| SWITCH   |   |                      |  |   |                    |        |     |                                |        |     |       |
| Analog Signal Range  |   | V <sub>ANALOG</sub>  |  |   | -15                | +15    |     | -15                            | +15    |     | V     |
| Drain-Source On-Resistance                                     |   | R <sub>DS(ON)</sub>  | Sequence each switch on, V <sub>AL</sub> = 0.8V, V <sub>AH</sub> = 2.4V (Note 4)   | V <sub>D</sub> = 10V, I <sub>S</sub> = -200μA | 170                | 300    |     | 170                            | 350    | Ω   |       |
|  |   |                      |  | V <sub>D</sub> = 10V, I <sub>S</sub> = -200μA | 130                | 300    |     | 130                            | 350    |     |       |
| Greatest Change in Drain-Source On-Resistance Between Channels |   | ΔR <sub>DS(ON)</sub> | $\Delta R_{DS(ON)} = \left( \frac{R_{DS(ON) \text{ max}} - R_{DS(ON) \text{ min}}}{R_{DS(ON)}} \right)$ ,<br>-10V ≥ V <sub>S</sub> ≥ 10V |   | 6                  |        | 6   |                                | %      |     |       |
| Source Off-Leakage Current                                     |   | I <sub>S(OFF)</sub>  | V <sub>EN</sub> = 0V   | V <sub>S</sub> = 10V, V <sub>D</sub> = -10V   | 0.002              | 0.5    |     | 0.002                          | 1      | nA  |       |
|  |   |                      |  | V <sub>S</sub> = -10V, V <sub>D</sub> = 10V   | -0.5               | -0.005 |     | -1                             | -0.005 |     |       |
| Drain Off-Leakage Current                                      | DG508A                                      | I <sub>D(OFF)</sub>  | V <sub>EN</sub> = 0V   | V <sub>D</sub> = 10V, V <sub>S</sub> = -10V   | 0.01               | 2      |     | 0.01                           | 5      | nA  |       |
|  | V <sub>D</sub> = 10V, V <sub>S</sub> = -10V |                      |  | -2  | -0.015             |        | -5  | -0.015                         |        |     |       |
|  | DG509A                                      |                      |  | V <sub>D</sub> = 10V, V <sub>S</sub> = -10V   | 0.005              | 2      |     | 0.005                          | 5      |     |       |
|  |   |                      |  | V <sub>D</sub> = -10V, V <sub>S</sub> = 10V   | -2                 | -0.008 |     | -5                             | -0.008 |     |       |
| Drain On-Leakage Current                                       | DG508A                                      | I <sub>D(ON)</sub>   | Sequence each switch on, V <sub>AL</sub> = 0.8V V <sub>AH</sub> = 2.4V (Note 2)  | V <sub>S(all)</sub> = V <sub>D</sub> = 10V    | 0.015              | 2      |     | 0.015                          | 5      | nA  |       |
|  | V <sub>S(all)</sub> = V <sub>D</sub> = -10V |                      |  | -2  | -0.03              |        | -5  | -0.03                          |        |     |       |
|  | DG509A                                      |                      |  | V <sub>S(all)</sub> = V <sub>D</sub> = 10V    | 0.007              | 2      |     | 0.007                          | 5      |     |       |
|  |   |                      |  | V <sub>S(all)</sub> = V <sub>D</sub> = -10V   | -2                 | -0.015 |     | -5                             | -0.015 |     |       |

# Monolithic CMOS Analog Multiplexers

## ELECTRICAL CHARACTERISTICS (continued)

(V<sub>+</sub> = 15V, V<sub>-</sub> = -15V, GND = 0V, T<sub>A</sub> = +25°C, unless otherwise noted.)

| PARAMETER                                   | SYMBOL                          | CONDITIONS  |   | DG508AA<br>DG509AA |        |       | DG508AD/E/B/C<br>DG509AD/E/B/C |        |       | UNITS |
|---|---------------------------------|---|---|--------------------|--------|-------|--------------------------------|--------|-------|-------|
|   |                                 |   |   | MIN                | TYP    | MAX   | MIN                            | TYP    | MAX   |       |
| LOGIC INPUT                                 |                                 |   |   |                    |        |       |                                |        |       |       |
| Logic Input Current, Input Voltage High     | I <sub>AH</sub>                 | V <sub>A</sub> = 24V  |   | -10                | -0.002 |       | 10                             | -0.002 |       | μA    |
|   |                                 | V <sub>A</sub> = 15V  |   |                    | 0.006  | 10    |                                | 0.006  | 10    |       |
| Logic Input Current, Input Voltage Low      | I <sub>AL</sub>                 | All V <sub>A</sub> = 0V   | V <sub>EN</sub> = 2.4V                                | -10                | -0.002 |       | 10                             | -0.002 |       | μA    |
|   |                                 |   | V <sub>EN</sub> = 0V                                  | -10                | -0.002 |       | -10                            | -0.002 |       |       |
| DYNAMIC                                     |                                 |   |   |                    |        |       |                                |        |       |       |
| Multiplexer Switching Time                  | t <sub>transition</sub>         | Figure 1  |   |                    | 0.6    | 1.0   |                                | 0.6    | 1.0   | μs    |
| Break-Before-Make Interval                  | t <sub>OPEN</sub>               | Figure 3  |   |                    | 0.2    |       |                                | 0.2    |       | μs    |
| Enable Turn-On Time                         | t <sub>ON(EN)</sub>             | Figure 2  |   |                    | 0.4    | 1.0   |                                | 0.4    | 1.5   | μs    |
| Enable Turn-Off Time                        | t <sub>OFF(EN)</sub>            | Figure 2  |   |                    | 0.2    | 0.7   |                                | 0.2    | 1.0   | μs    |
| Off-Isolation                               | OIRR                            | V <sub>EN</sub> = 0V, R <sub>L</sub> = 1kΩ, C <sub>L</sub> = 15pF, V <sub>S</sub> = 7V <sub>RMS</sub> f = 500kHz (Note 3) |   |                    | 68     |       |                                | 68     |       | dB    |
| Source Off-Capacitance                      | C <sub>S(OFF)</sub>             | V <sub>S</sub> = 0V, V <sub>EN</sub> = 0V, f = 140kHz   |   |                    | 5      |       |                                | 5      |       | pF    |
| Drain Off-Capacitance                       | IDG508A                         | C <sub>D(OFF)</sub>   | V <sub>S</sub> = 0V, V <sub>EN</sub> = 0V, f = 140kHz |                    | 25     |       |                                | 25     |       | pF    |
|   | DGS09A                          |   |   |                    | 12     |       |                                | 12     |       |       |
| SUPPLY                                      |                                 |   |   |                    |        |       |                                |        |       |       |
| Positive Supply Current                     | I <sub>+</sub>                  | V <sub>EN</sub> = 2.4V, all V <sub>A</sub> = 0V or 2.4V   |   |                    | 0.02   | 0.2   |                                | 0.02   | 0.2   | mA    |
| Negative Supply Current                     | I <sub>-</sub>                  | V <sub>EN</sub> = 2.4V, all V <sub>A</sub> = 0V or 2.4V   |   | -0.1               | -0.01  |       | -0.1                           | -0.01  |       | mA    |
| Positive Supply Current in Standby          | I <sub>+</sub>                  | V <sub>EN</sub> = 0V, all V <sub>A</sub> = 0V or 2.4V   |   |                    | 0.02   | 0.2   |                                | 0.02   | 0.2   | mA    |
| Negative Supply Current in Standby          | I <sub>-</sub>                  | V <sub>EN</sub> = 0V, all V <sub>A</sub> = 0V or 2.4V   |   | -0.1               | -0.01  |       | -0.1                           | -0.01  |       | mA    |
| Power-Supply Range for Continuous Operation | V <sub>-</sub> , V <sub>+</sub> | (Notes 4, 5)  |   | ±4.5               |        | ±18.0 | ±4.5                           |        | ±18.0 | V     |

DG508A/DG509A

# Monolithic CMOS Analog Multiplexers

## ELECTRICAL CHARACTERISTICS

(V<sub>+</sub> = 15V, GND = 0V, T<sub>A</sub> = T<sub>MIN</sub> to T<sub>MAX</sub>, unless otherwise noted.)

| PARAMETER                               |  | SYMBOL              | CONDITIONS   |   | DG508AA<br>DG509AA |      |     | DG508AD/E/B/C<br>DG509AD/E/B/C |     |     | UNITS |
|---|--|---------------------|--|---|--------------------|------|-----|--------------------------------|-----|-----|-------|
|   |  |                     |  |   | MIN                | TYP  | MAX | MIN                            | TYP | MAX |       |
| SWITCH                                  |  |                     |  |   |                    |      |     |                                |     |     |       |
| Analog Signal Range                     |  | V <sub>ANALOG</sub> |  |   | -15                |      | +15 | -15                            |     | +15 | V     |
| Drain-Source On-Resistance              |  | R <sub>DS(ON)</sub> | Sequence each switch on, V <sub>AL</sub> = 0.8V, V <sub>AH</sub> = 2.4V          | V <sub>D</sub> = 10V, I <sub>S</sub> = -200μA |                    | 400  |     | 450                            | Ω   |     |       |
|   |  |                     |  | V <sub>D</sub> = 10V, I <sub>S</sub> = -200μA |                    | 400  |     | 450                            |     |     |       |
| Source Off-Leakage Current              |  | I <sub>S(OFF)</sub> | V <sub>EN</sub> = 0V   | V <sub>S</sub> = 10V, V <sub>D</sub> = -10V   |                    | +50  |     | +50                            | nA  |     |       |
|   |  |                     |  | V <sub>S</sub> = -10V, V <sub>D</sub> = -10V  | -50                |      | -50 |                                |     |     |       |
| Drain Off-Leakage Current               | DG508A                                       | I <sub>D(OFF)</sub> | V <sub>EN</sub> = 0V   | V <sub>D</sub> = 10V, V <sub>S</sub> = -10V   |                    | +200 |     | +100                           | nA  |     |       |
|   | V <sub>D</sub> = -10V, V <sub>S</sub> = -10V |                     |  | -200  |                    | -200 |     |                                |     |     |       |
|   | DG509A                                       |                     |  | V <sub>D</sub> = 10V, V <sub>S</sub> = -10V   |                    | +200 |     | +100                           |     |     |       |
|   | V <sub>D</sub> = -10V, V <sub>S</sub> = -10V |                     |  | -100  |                    | -100 |     |                                |     |     |       |
| Drain On-Leakage Current                | DG508A                                       | I <sub>D(ON)</sub>  | Sequence each switch on, V <sub>AL</sub> = 0.8V, V <sub>AH</sub> = 2.4V (Note 2) | V <sub>S(all)</sub> = V <sub>D</sub> = 10V    |                    | +200 |     | +100                           | nA  |     |       |
|   | V <sub>S(all)</sub> = V <sub>D</sub> = -10V  |                     |  | -200  |                    | -100 |     |                                |     |     |       |
|   | DG509A                                       |                     |  | V <sub>S(all)</sub> = V <sub>D</sub> = 10V    |                    | +100 |     | +100                           |     |     |       |
|   | V <sub>S(all)</sub> = V <sub>D</sub> = -10V  |                     |  | -100  |                    | -100 |     |                                |     |     |       |
| LOGIC INPUT                             |  |                     |  |   |                    |      |     |                                |     |     |       |
| Logic Input Current, Input Voltage High |  | I <sub>AH</sub>     | V <sub>A</sub> = 2.4V  |   | -30                |      | -30 | μA                             |     |     |       |
|   |  |                     | V <sub>A</sub> = 15V   |   |                    | +30  |     |                                |     | +30 |       |
| Logic Input Current, Input Voltage Low  |  | I <sub>AL</sub>     | All V <sub>A</sub> = 0V  | V <sub>EN</sub> = 2.4V                        | -30                |      | -30 | μA                             |     |     |       |
|   |  |                     |  | V <sub>EN</sub> = 0V                          | -30                |      | -30 |                                |     |     |       |

**Note 2:** I<sub>D(ON)</sub> is leakage from driver into on switch.

**Note 3:** Off-isolation =  $20 \log \frac{|V_S|}{|V_D|}$

V<sub>S</sub> = input to off switch,  
V<sub>D</sub> = output due to V<sub>S</sub>.

**Note 4:** Electrical characteristics (such as on-resistance) change when power supplies other than ±15V are used.

**Note 5:** For designs requiring single 5V or dual ±5V operation, refer to Maxim's improved MAX338 and MAX339. Minimum operating voltage for DG508ADY and DG509ADY is ±9V.

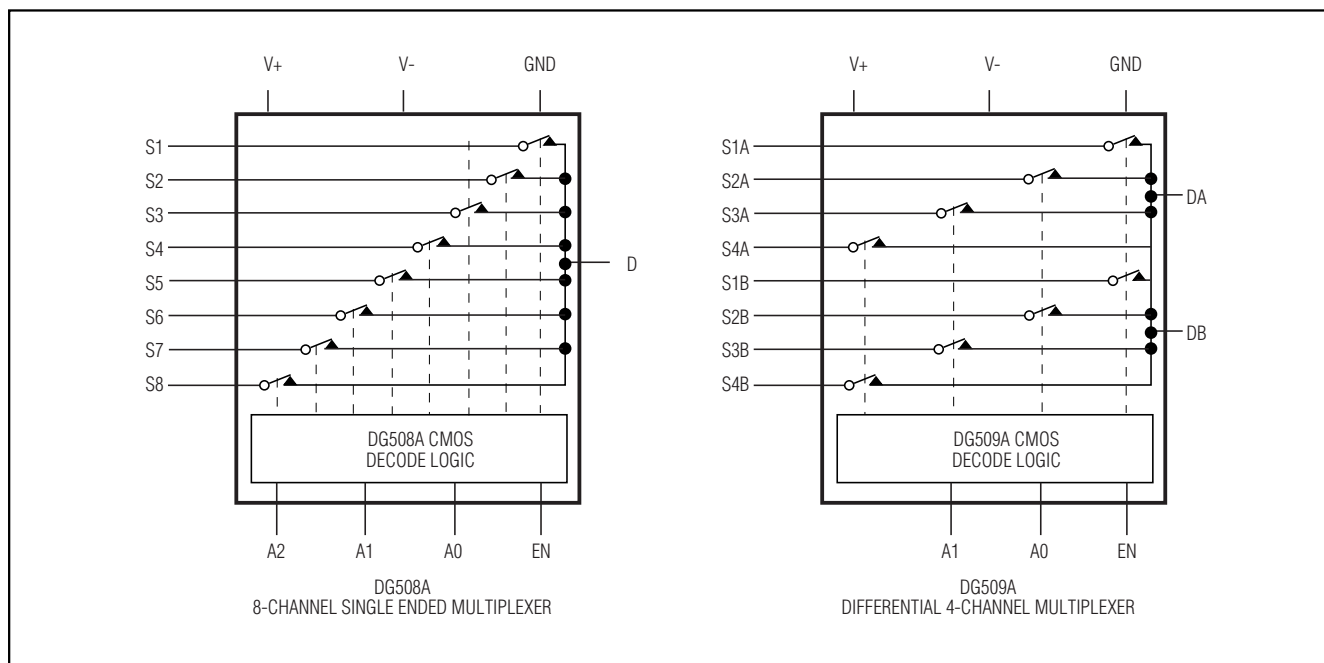
# Monolithic CMOS Analog Multiplexers

## Pin Description

| PIN       |            |        |        | NAME       | FUNCTION                      |
|-----------|------------|--------|--------|------------|-------------------------------|
| DG508A    |            | DG509A |        |            |                               |
| DIP/SO    | QFN        | DIP/SO | QFN    |            |                               |
| 1, 15, 16 | 15, 14, 13 | —      | —      | A0, A2, A1 | Address Input                 |
| —         | —          | 1, 16  | 15, 14 | A0, A1     | Address Input                 |
| 2         | 16         | 2      | 16     | EN         | Enable                        |
| 3         | 1          | 3      | 1      | V-         | Negative-Supply Voltage Input |
| 4–7       | 2–5        | —      | —      | S1–S4      | Analog Inputs, Bidirectional  |
| —         | —          | 4–7    | 2–5    | S1A–S4A    | Analog Inputs, Bidirectional  |
| 8         | 6          | —      | —      | D          | Analog Outputs, Bidirectional |
| —         | —          | 8, 9   | 6, 7   | DA, DB     | Analog Outputs, Bidirectional |
| 9–12      | 7–10       | —      | —      | S8–S5      | Analog Inputs, Bidirectional  |
| —         | —          | 10–13  | 8–11   | S4B–S1B    | Analog Inputs, Bidirectional  |
| 13        | 11         | 14     | 12     | V+         | Positive-Supply Voltage Input |
| 14        | 12         | 15     | 13     | GND        | Ground                        |

DG508A/DG509A

## Functional Diagrams



# Monolithic CMOS Analog Multiplexers

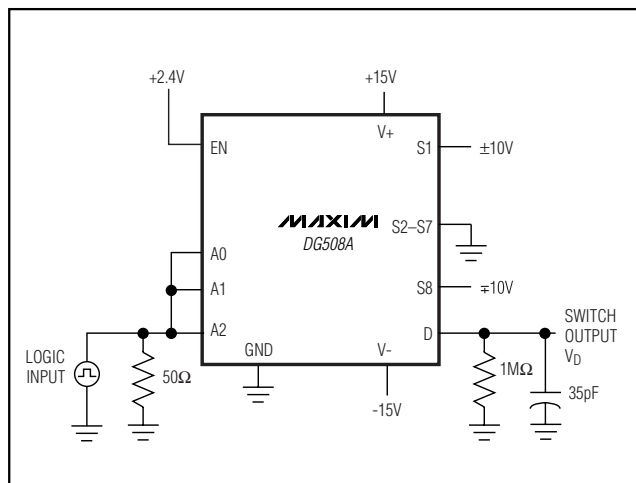


Figure 1a. Switching-Time Test Circuit

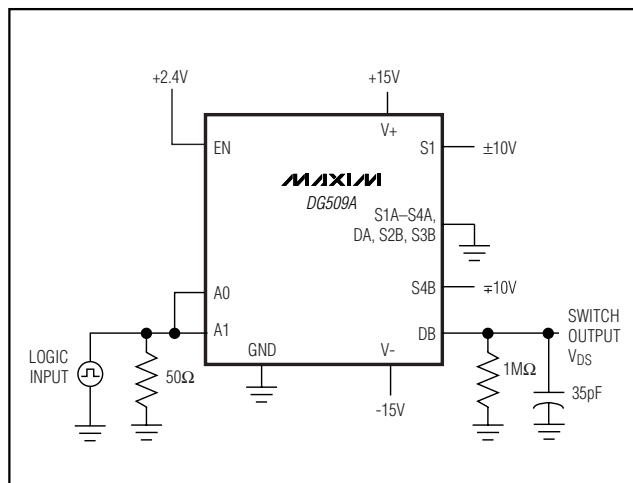


Figure 1b. Switching-Time Test Circuit

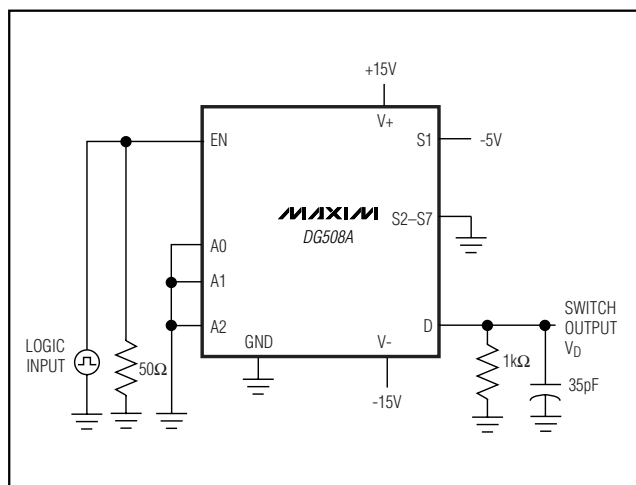


Figure 2a. DG509A Enable-Time Test Circuit

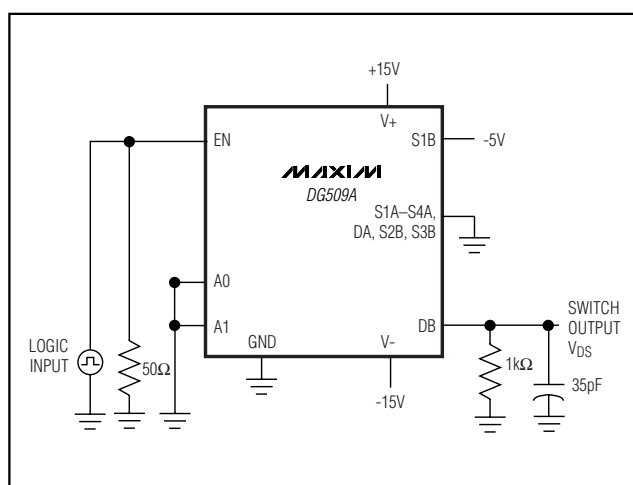


Figure 2b. DG509A Enable-Time Test Circuit

# Monolithic CMOS Analog Multiplexers

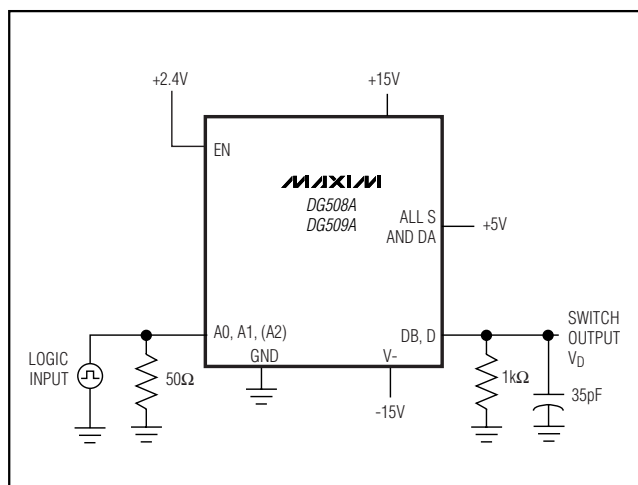


Figure 3. Break-Before-Make Test Circuit

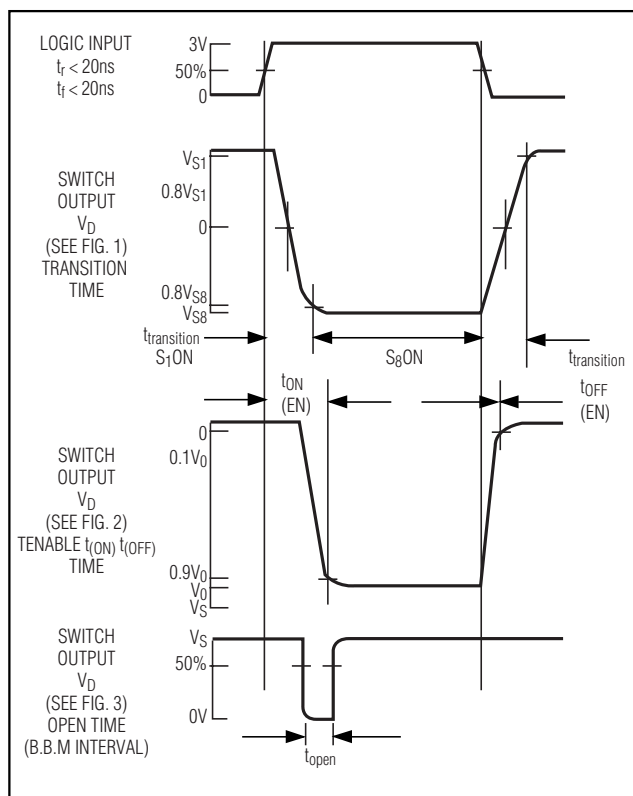


Figure 4. Timing Diagram for Figures 1, 2, and 3

Table 1a. DG508A Truth Table

| A2 | A1 | A0 | 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         |

X = Don't care.

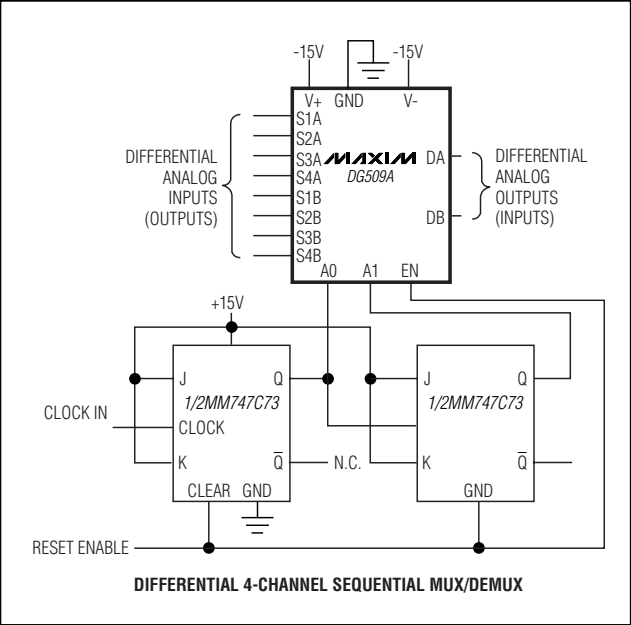
Table 1 b. DG509A Truth Table

| A1 | A0 | EN | ON SWITCH |
|----|----|----|-----------|
| X  | X  | 0  | NONE      |
| 0  | 0  | 1  | 1         |
| 0  | 1  | 1  | 2         |
| 1  | 0  | 1  | 3         |
| 1  | 1  | 1  | 4         |

X = Don't care.

# Monolithic CMOS Analog Multiplexers

## Typical Operating Circuits (continued)

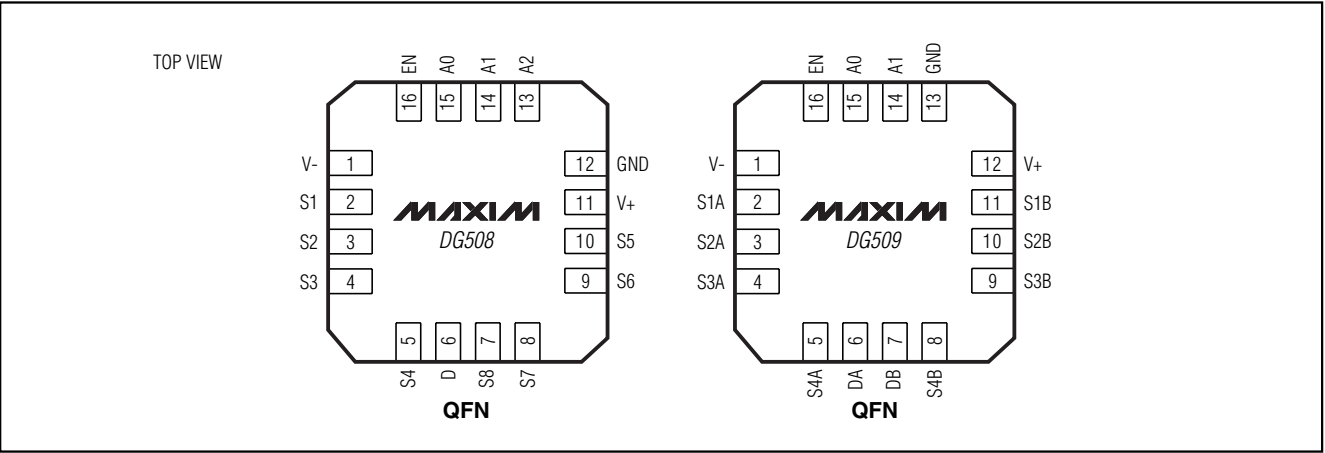


## Ordering Information (continued)

| PART      | TEMP RANGE      | PIN-PACKAGE    |
|-----------|-----------------|----------------|
| DG509ACJ  | 0°C to +70°C    | 16 Plastic DIP |
| DG509ACWE | 0°C to +70°C    | 16 Wide SO     |
| DG509AC/D | 0°C to +70°C    | Dice*          |
| DG509ABK  | -20°C to +85°C  | 16 Cerdip      |
| DG509ADJ  | -40°C to +85°C  | 16 Plastic DIP |
| DG509ADY  | -40°C to +85°C  | 16 Narrow SO   |
| DG509AEGE | -40°C to +85°C  | 16 QFN         |
| DG509AEWE | -40°C to +85°C  | 16 Wide SO     |
| DG509AAK  | -55°C to +125°C | 16 Cerdip      |

\*Contact factory for dice specifications.

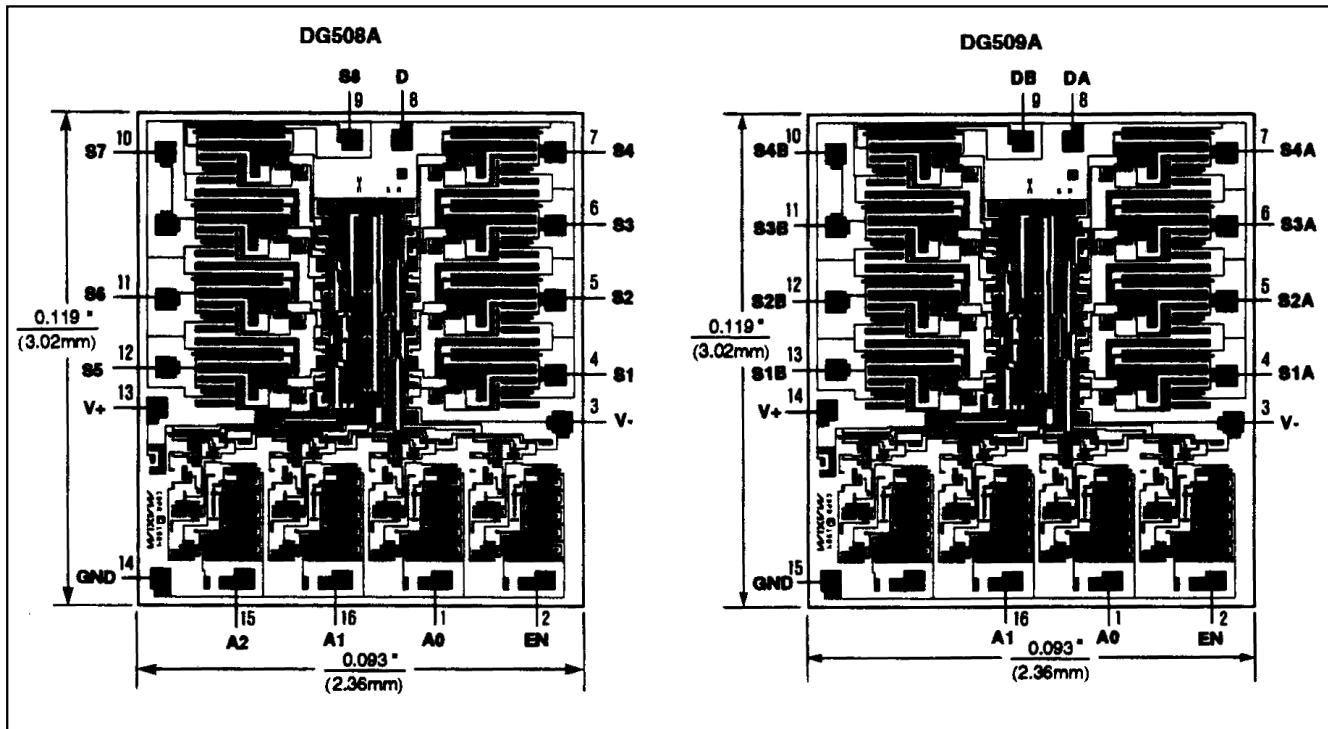
## Pin Configurations (continued)





# Monolithic CMOS Analog Multiplexers

## Chip Topographies

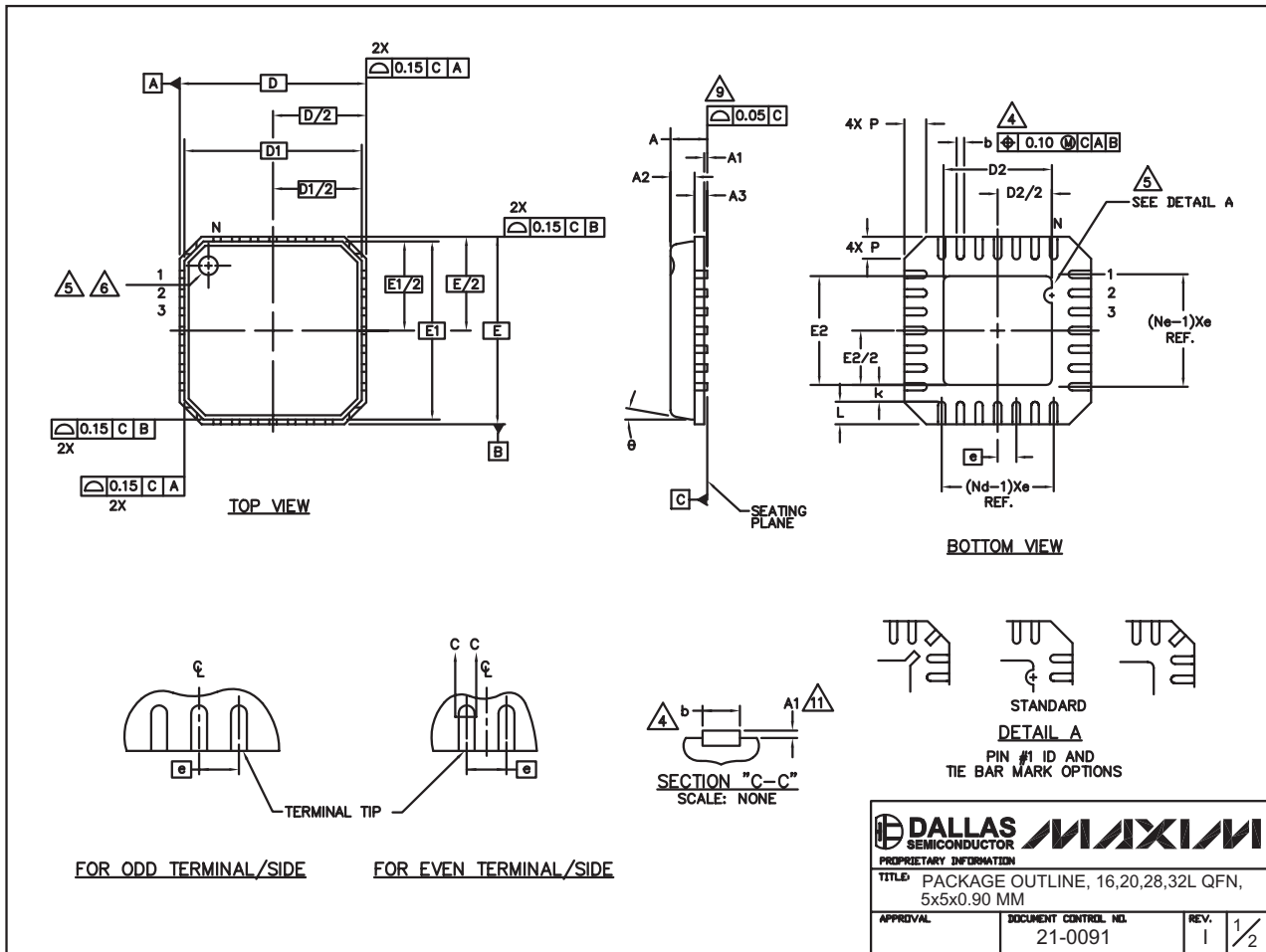


DG508A/DG509A

# Monolithic CMOS Analog Multiplexers

## Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).)



# Monolithic CMOS Analog Multiplexers

## Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).)

DG508A/DG509A

| COMMON DIMENSIONS |          |      |      |          |      |      |          |      |      |          |      |      |
|-------------------|----------|------|------|----------|------|------|----------|------|------|----------|------|------|
| PKG               | 16L 5x5  |      |      | 20L 5x5  |      |      | 28L 5x5  |      |      | 32L 5x5  |      |      |
| SYMBOL            | MIN.     | NOM. | MAX. | MIN.     | NOM. | MAX. | MIN.     | NOM. | MAX. | MIN.     | NOM. | MAX. |
| A                 | 0.80     | 0.90 | 1.00 | 0.80     | 0.90 | 1.00 | 0.80     | 0.90 | 1.00 | 0.80     | 0.90 | 1.00 |
| A1                | 0.00     | 0.01 | 0.05 | 0.00     | 0.01 | 0.05 | 0.00     | 0.01 | 0.05 | 0.00     | 0.01 | 0.05 |
| A2                | 0.00     | 0.65 | 1.00 | 0.00     | 0.65 | 1.00 | 0.00     | 0.65 | 1.00 | 0.00     | 0.65 | 1.00 |
| A3                | 0.20 REF |      |      | 0.20 REF |      |      | 0.20 REF |      |      | 0.20 REF |      |      |
| b                 | 0.28     | 0.33 | 0.40 | 0.23     | 0.28 | 0.35 | 0.18     | 0.23 | 0.30 | 0.18     | 0.23 | 0.30 |
| D                 | 4.90     | 5.00 | 5.10 | 4.90     | 5.00 | 5.10 | 4.90     | 5.00 | 5.10 | 4.90     | 5.00 | 5.10 |
| D1                | 4.75 BSC |      |      | 4.75 BSC |      |      | 4.75 BSC |      |      | 4.75 BSC |      |      |
| E                 | 4.90     | 5.00 | 5.10 | 4.90     | 5.00 | 5.10 | 4.90     | 5.00 | 5.10 | 4.90     | 5.00 | 5.10 |
| E1                | 4.75 BSC |      |      | 4.75 BSC |      |      | 4.75 BSC |      |      | 4.75 BSC |      |      |
| e                 | 0.80 BSC |      |      | 0.65 BSC |      |      | 0.50 BSC |      |      | 0.50 BSC |      |      |
| k                 | 0.25     | —    | —    | 0.25     | —    | —    | 0.25     | —    | —    | 0.25     | —    | —    |
| L                 | 0.35     | 0.55 | 0.75 | 0.35     | 0.55 | 0.75 | 0.35     | 0.55 | 0.75 | 0.30     | 0.40 | 0.50 |
| N                 | 16       |      |      | 20       |      |      | 28       |      |      | 32       |      |      |
| ND                | 4        |      |      | 5        |      |      | 7        |      |      | 8        |      |      |
| NE                | 4        |      |      | 5        |      |      | 7        |      |      | 8        |      |      |
| P                 | 0.00     | 0.42 | 0.60 | 0.00     | 0.42 | 0.60 | 0.00     | 0.42 | 0.60 | 0.00     | 0.42 | 0.60 |
| ø                 | 0"       |      | 12"  | 0"       |      | 12"  | 0"       |      | 12"  | 0"       |      | 12"  |

| EXPOSED PAD VARIATIONS |      |      |      |      |      |      |
|------------------------|------|------|------|------|------|------|
| PKG. CODES             | D2   |      |      | E2   |      |      |
|                        | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| G1655-3                | 2.95 | 3.10 | 3.25 | 2.95 | 3.10 | 3.25 |
| G2055-1                | 2.55 | 2.70 | 2.85 | 2.55 | 2.70 | 2.85 |
| G2055-2                | 2.95 | 3.10 | 3.25 | 2.95 | 3.10 | 3.25 |
| G2855-1                | 2.55 | 2.70 | 2.85 | 2.55 | 2.70 | 2.85 |
| G2855-2                | 2.95 | 3.10 | 3.25 | 2.95 | 3.10 | 3.25 |
| G3255-1                | 2.95 | 3.10 | 3.25 | 2.95 | 3.10 | 3.25 |

### NOTES:

1. DIE THICKNESS ALLOWABLE IS 0.305mm MAXIMUM (.012 INCHES MAXIMUM)
2. DIMENSIONING & TOLERANCES CONFORM TO ASME Y14.5M. - 1994.
3. N IS THE NUMBER OF TERMINALS.  
Nd IS THE NUMBER OF TERMINALS IN X-DIRECTION & Ne IS THE NUMBER OF TERMINALS IN Y-DIRECTION.
4. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.20 AND 0.25mm FROM TERMINAL TIP.
5. THE PIN #1 IDENTIFIER MUST BE EXISTED ON THE TOP SURFACE OF THE PACKAGE BY USING INDENTATION MARK OR INK/LASER MARKED. DETAILS OF PIN #1 IDENTIFIER IS OPTIONAL, BUT MUST BE LOCATED WITHIN ZONE INDICATED.
6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.
7. ALL DIMENSIONS ARE IN MILLIMETERS.
8. PACKAGE WARPAGE MAX 0.05mm.
9. APPLIED FOR EXPOSED PAD AND TERMINALS. EXCLUDE EMBEDDED PART OF EXPOSED PAD FROM MEASURING.
10. MEETS JEDEC M0220; EXCEPT DIMENSION "b".
11. APPLIED FOR EXPOSED PAD AND TERMINALS. EXCLUDE EMBEDDING PART OF EXPOSED PAD FROM MEASURING.
12. THIS PACKAGE OUTLINE APPLIES TO ANVIL SINGULATION (STEPPED SIDES).

|   |                                 |   |     |
|---|---------------------------------|---|-----|
|  <b>DALLAS SEMICONDUCTOR</b> |                                 |  |     |
| PROPRIETARY INFORMATION   |                                 |   |     |
| TITLE: PACKAGE OUTLINE, 16,20,28,32L QFN, 5x5x0.90 MM   |                                 |   |     |
| APPROVAL  | DOCUMENT CONTROL NO.<br>21-0091 | REV.<br>I   | 2/2 |

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