

# Precision 8-Channel/Dual 4-Channel CMOS Analog Multiplexers

## DESCRIPTION

The DG508B is an 8-channel single-ended analog multiplexer designed to connect one of eight inputs to a common output as determined by a 3-bit binary address (A0, A1, A2). The DG509B is a dual 4-channel differential analog multiplexer designed to connect one of four differential inputs to a common dual output as determined by its 2-bit binary address (A0, A1). Break-before-make switching action protects against momentary crosstalk between adjacent channels.

An on channel conducts current equally well in both directions. In the off state each channel blocks voltages up to the power supply rails. An enable (EN) function allows the user to reset the multiplexer/demultiplexer to all switches off for stacking several devices. All control inputs, addresses (Ax) and enable (EN) are TTL compatible over the full specified operating temperature range.

The DG508B and DG509B are fabricated on an enhanced SG-II CMOS process that achieves improved performance on: reduced charge injection, lower device leakage, and minimized parasitic capacitance.

As the DG508, DG509 has a long history in the industry with many suppliers offering copies - and in some cases improved variations - with the best in class improvements, the Vishay Siliconix new version of the DG508B, DG509B are the superior alternatives to what is currently available.

Applications for the DG508B, DG509B include high speed and high precision data acquisition, audio signal switching and routing, ATE systems, and avionics. High performance and low power dissipation make them ideal for battery operated and remote instrumentation applications.

The DG508B and DG509B have the absolute maximum voltage rating extended to 44 V. Additionally, single supply operation is also allowed. An epitaxial layer prevents latch-up.

The DG508B and DG509B are both available in 16-lead SOIC, TSSOP, PDIP, and miniQFN (1.8 mm x 2.6 mm) package options with extended temperature range of - 40 °C to + 125 °C.

For more information, refer to Vishay Siliconix DG508B, DG509B evaluation board note.

## FEATURES

- Operate with single or dual power supply
- V+ to V- analog signal swing range
- 44 V power supply maximum rating
- Extended operate temperature range: - 40 °C to + 125 °C
- Low leakage typically < 3 pA
- Low charge injection -  $Q_{INJ} = 2$  pC
- Low power -  $I_{SUPPLY} = 10$   $\mu$ A
- TTL compatible logic
- > 250 mA latch up current per JESD78
- Available in SOIC16, TSSOP16, PDIP, and miniQFN16 packages
- Superior alternative to:
  - ADG508A, DG508A, HI-508
  - ADG509A, DG509A, HI-509
- **Compliant to RoHS Directive 2002/95/EC**
- **Halogen-free according to IEC 61249-2-21 definition**



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## BENEFITS

- Reduced switching errors
- Reduced glitching
- Improved data throughput
- Reduced power consumption
- Increased ruggedness
- Wide supply ranges ( $\pm 5$  V to  $\pm 20$  V)

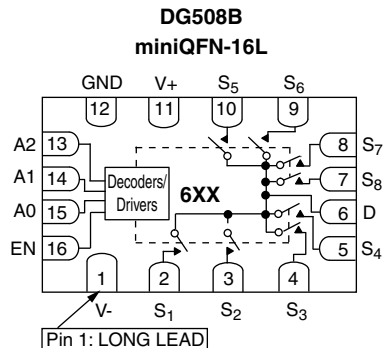
## APPLICATIONS

- Data acquisition systems
- Audio and video signal routing
- ATE systems
- Medical instrumentation

## FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION

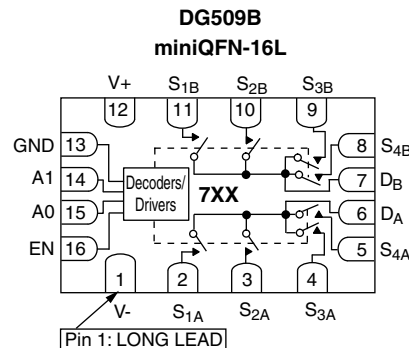


## FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



Top View

Device Marking: 6XX  
Traceability Code:  
6 is DG508BEN  
XX = Date/Lot



Top View

Device Marking: 7XX  
Traceability Code:  
7 is DG509BEN  
XX = Date/Lot

## TRUTH TABLES AND ORDERING INFORMATION

| TRUTH TABLE (DG508B) |                |                |    |           |
|----------------------|----------------|----------------|----|-----------|
| 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         |

| TRUTH TABLE (DG509B) |                |    |           |
|----------------------|----------------|----|-----------|
| A <sub>1</sub>       | A <sub>0</sub> | EN | On Switch |
| X                    | X              | 0  | None      |
| 0                    | 0              | 1  | 1         |
| 0                    | 1              | 1  | 2         |
| 1                    | 0              | 1  | 3         |
| 1                    | 1              | 1  | 4         |

Logic "0" =  $V_{IL} \leq 0.8\text{ V}$   
Logic "1" =  $V_{IH} \geq 2.0\text{ V}$   
X = Do not care

| ORDERING INFORMATION (DG508B)  |                |                 |
|--------------------------------|----------------|-----------------|
| Temp. Range                    | Package        | Part Number     |
| - 40 °C to 125 °C <sup>a</sup> | 16-Pin SOIC    | DG508BEY-T1-E3  |
|                                | 16-Pin TSSOP   | DG508BEQ-T1-E3  |
|                                | 16-Pin PDIP    | DG508BEJ-E3     |
|                                | 16-Pin MiniQFN | DG508BEN-T1-GE4 |

| ORDERING INFORMATION (DG509B)  |                |                 |
|--------------------------------|----------------|-----------------|
| Temp. Range                    | Package        | Part Number     |
| - 40 °C to 125 °C <sup>a</sup> | 16-Pin SOIC    | DG509BEY-T1-E3  |
|                                | 16-Pin TSSOP   | DG509BEQ-T1-E3  |
|                                | 16-Pin PDIP    | DG509BEJ-E3     |
|                                | 16-Pin MiniQFN | DG509BEN-T1-GE4 |

Notes:

a. - 40 °C to 85 °C datasheet limits apply.



| ABSOLUTE MAXIMUM RATINGS                                      |                                 |  |      |
|---|---------------------------------|--|------|
| Parameter   |                                 | Limit  | Unit |
| Voltages Referenced to V-                                     | V+                              | 44   | V    |
|   | GND                             | 25   |      |
| Digital Inputs <sup>a</sup> , V <sub>S</sub> , V <sub>D</sub> |                                 | (V-) - 2 to (V+) + 2<br>or 20 mA, whichever occurs first |      |
| Current (Any terminal)  |                                 | 30   | mA   |
| Peak Current, S or D (Pulsed at 1 ms, 10 % duty cycle max.)   |                                 | 100  |      |
| Storage Temperature   | (EY, EQ, EJ, EN suffix)         | - 65 to 150  | °C   |
| Power Dissipation (Packages) <sup>b</sup>                     | 16-Pin Narrow SOIC <sup>c</sup> | 600  | mW   |
|   | 16-Pin TSSOP <sup>d</sup>       | 450  |      |
|   | 16-Pin PDIP <sup>e</sup>        | 510  |      |
|   | 16-Pin miniQFN <sup>f</sup>     | 525  |      |
| Thermal Resistance (θ <sub>J-A</sub> ) <sup>b</sup>           | 16-Pin Narrow SOIC <sup>c</sup> | 125  | °C/W |
|   | 16-Pin TSSOP <sup>d</sup>       | 178  |      |
|   | 16-Pin PDIP <sup>e</sup>        | 159.6  |      |
|   | 16-Pin miniQFN <sup>f</sup>     | 152  |      |

Notes:

- a. Signals on S<sub>X</sub>, D<sub>X</sub> or IN<sub>X</sub> exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
- b. All leads soldered or welded to PC board.
- c. Derate 8.0 mW/°C above 70 °C.
- d. Derate 5.6 mW/°C above 70 °C.
- e. Derate 6.3 mW/°C above 70 °C.
- f. Derate 6.6 mW/°C above 70 °C.

| SPECIFICATIONS                       |                      |   |                    |                   |                   |                   |                   |                   |      |     |
|--------------------------------------|----------------------|---|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|-----|
| Parameter                            | Symbol               | Test Conditions<br>Unless Otherwise Specified<br>V+ = 15 V, V- = - 15 V (± 10 %)<br>V <sub>AX</sub> , V <sub>EN</sub> = 2.0 V, 0.8 V <sup>a</sup> | Temp. <sup>b</sup> | Typ. <sup>c</sup> | - 40 °C to 125 °C |                   | - 40 °C to 85 °C  |                   | Unit |     |
|                                      |                      |   |                    |                   | Min. <sup>d</sup> | Max. <sup>d</sup> | Min. <sup>d</sup> | Max. <sup>d</sup> |      |     |
| <b>Analog Switch</b>                 |                      |   |                    |                   |                   |                   |                   |                   |      |     |
| 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> = - 1 mA  | Room               | 180               |                   | 380               |                   | 380               | Ω    |     |
|                                      |                      |   | Full               |                   |                   | 480               |                   | 450               |      |     |
| R <sub>DS(on)</sub> Matching         | ΔR <sub>DS(on)</sub> | V <sub>D</sub> = ± 10 V   | Room               | 10                |                   |                   |                   |                   |      |     |
| Source Off Leakage Current           | I <sub>S(off)</sub>  | V <sub>D</sub> = ± 10 V<br>V <sub>S</sub> = ∓ 10 V<br>V <sub>EN</sub> = 0 V   | Room               |                   | - 1               | 1                 | - 1               | 1                 | nA   |     |
| Drain Off Leakage Current            | I <sub>D(off)</sub>  |   | DG508B             | Room              |                   | - 1               | 1                 | - 1               |      | 1   |
|                                      |                      |   | DG508B             | Full              |                   | - 100             | 100               | - 100             |      | 100 |
|                                      |                      |   | DG509B             | Room              |                   | - 1               | 1                 | - 1               |      | 1   |
|                                      |                      |   | DG509B             | Full              |                   | - 50              | 50                | - 50              |      | 50  |
| Drain On Leakage Current             | I <sub>D(on)</sub>   |   | DG508B             | Room              |                   | - 1               | 1                 | - 1               |      | 1   |
|                                      |                      | DG508B  | Full               |                   | - 100             | 100               | - 100             | 100               |      |     |
|                                      |                      | DG509B  | Room               |                   | - 1               | 1                 | - 1               | 1                 |      |     |
|                                      |                      | DG509B  | Full               |                   | - 50              | 50                | - 50              | 50                |      |     |
| <b>Digital Control</b>               |                      |   |                    |                   |                   |                   |                   |                   |      |     |
| Logic High Input Voltage             | V <sub>INH</sub>     |   | Full               |                   | 2.0               |                   | 2.0               |                   | V    |     |
| Logic Low Input Voltage              | V <sub>INL</sub>     |   | Full               |                   |                   | 0.8               |                   | 0.8               |      |     |
| Logic High Input Current             | I <sub>IH</sub>      | V <sub>AX</sub> , V <sub>EN</sub> = 2.0 V   | Full               |                   | - 1               | 1                 | - 1               | 1                 | μA   |     |
| Logic Low Input Current              | I <sub>IL</sub>      | V <sub>AX</sub> , V <sub>EN</sub> = 0.8 V   | Full               |                   | - 1               | 1                 | - 1               | 1                 |      |     |
| Logic Input Capacitance <sup>e</sup> | C <sub>in</sub>      | f = 1 MHz   | Room               | 4                 |                   |                   |                   |                   | pF   |     |

| SPECIFICATIONS                         |               |   |                    |                   |                   |                   |                   |                   |               |     |
|--|---------------|---|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|-----|
| Parameter                              | Symbol        | Test Conditions<br>Unless Otherwise Specified<br>$V_+ = 15\text{ V}$ , $V_- = -15\text{ V}$ ( $\pm 10\%$ )<br>$V_{AX}$ , $V_{EN} = 2.0\text{ V}$ , $0.8\text{ V}^a$ | Temp. <sup>b</sup> | Typ. <sup>c</sup> | - 40 °C to 125 °C |                   | - 40 °C to 85 °C  |                   | Unit          |     |
|  |               |   |                    |                   | Min. <sup>d</sup> | Max. <sup>d</sup> | Min. <sup>d</sup> | Max. <sup>d</sup> |               |     |
| <b>Dynamic Characteristics</b>         |               |   |                    |                   |                   |                   |                   |                   |               |     |
| Transition Time                        | $t_{TRANS}$   | $VS_1 = +10\text{ V}/-10\text{ V}$ ,<br>$VS_8 = -10\text{ V}/+10\text{ V}$ ,<br>$R_L = 1\text{ M}\Omega$ , $C_L = 35\text{ pF}$                                     | Room               | 145               |                   | 300               |                   | 300               | ns            |     |
|  |               |   | Full               |                   |                   | 400               |                   | 400               |               |     |
| Break-Before-Make Interval             | $t_{OPEN}$    | $VS_1 = VS_8 = 5.0\text{ V}$ , $C_L = 35\text{ pF}$ ,<br>$R_L = 1\text{ k}\Omega$   | Room               | 37                | 15                |                   | 15                |                   |               |     |
|  |               |   | Full               |                   | 1                 |                   | 1                 |                   |               |     |
| Enable Turn-On Time                    | $t_{ON(EN)}$  | $VS_1 = 5\text{ V}$ , $VS_2$ to $VS_8 = 0\text{ V}$ ,<br>$R_L = 1\text{ k}\Omega$ , $C_L = 35\text{ pF}$  | Room               | 100               |                   | 250               |                   | 250               |               |     |
| Enable Turn-Off Time                   | $t_{OFF(EN)}$ |   | Full               |                   |                   | 340               |                   | 340               |               |     |
|  |               |   | Room               | 90                |                   | 240               |                   | 240               |               |     |
|  |               |   | Full               |                   |                   | 300               |                   | 300               |               |     |
| Charge Injection <sup>e</sup>          | $Q_{INJ}$     | $C_L = 1\text{ nF}$ , $R_{GEN} = 0\ \Omega$ , $V_{GEN} = 0\text{ V}$  | Full               | 2                 |                   |                   |                   | pC                |               |     |
| Off Isolation <sup>e</sup>             | OIRR          | $C_L = 5\text{ pF}$ , $R_L = 50\ \Omega$ , $f = 1\text{ MHz}$   | Room               | - 81              |                   |                   |                   |                   | dB            |     |
| Crosstalk <sup>e</sup>                 | XTALK         |   | Room               | - 88              |                   |                   |                   |                   |               |     |
| - 3 dB Bandwidth <sup>e</sup>          | BW            |   | $R_L = 50\ \Omega$ | Room              | 250               |                   |                   |                   |               | MHz |
| Total Harmonic Distortion <sup>e</sup> | THD           | $R_L = 10\text{ k}\Omega$ , $5\text{ V}_{rms}$<br>$f = 20\text{ Hz}$ to $20\text{ kHz}$   | Room               | 0.04              |                   |                   |                   |                   | %             |     |
| Source Off Capacitance <sup>e</sup>    | $C_{S(off)}$  | $f = 1\text{ MHz}$  | Room               | 3                 |                   |                   |                   |                   | pF            |     |
| Drain Off Capacitance <sup>e</sup>     | $C_{D(off)}$  |   | DG508B             | Room              | 13                |                   |                   |                   |               |     |
|  |               |   | DG509B             | Room              | 8                 |                   |                   |                   |               |     |
| Drain On Capacitance <sup>e</sup>      | $C_{D(on)}$   |   | DG508B             | Room              | 18                |                   |                   |                   |               |     |
|  |               |   | DG509B             | Room              | 11                |                   |                   |                   |               |     |
| <b>Power Supply</b>                    |               |   |                    |                   |                   |                   |                   |                   |               |     |
| Positive Supply Current                | $I_+$         | $V_{AX}$ , $V_{EN} = 0\text{ V}$ or $V_+$   | Room               | 0.01              |                   | 0.5               |                   | 0.5               | mA            |     |
|  |               |   | Full               |                   |                   | 0.6               |                   | 0.6               |               |     |
| Negative Supply Current                | $I_-$         |   | Full               |                   |                   | - 200             |                   | - 200             | $\mu\text{A}$ |     |

| SPECIFICATIONS (Single Supply 12 V) |                     |   |                    |                   |                   |                   |                   |                   |          |
|-------------------------------------|---------------------|---|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------|
| Parameter                           | Symbol              | Test Conditions<br>Unless Otherwise Specified<br>$V_+ = 12\text{ V}$ , $V_- = 0\text{ V}$ ( $\pm 10\%$ )<br>$V_{AX}$ , $V_{EN} = 2.0\text{ V}$ , $0.8\text{ V}^a$ | Temp. <sup>b</sup> | Typ. <sup>c</sup> | - 40 °C to 125 °C |                   | - 40 °C to 85 °C  |                   | Unit     |
|                                     |                     |   |                    |                   | Min. <sup>d</sup> | Max. <sup>d</sup> | Min. <sup>d</sup> | Max. <sup>d</sup> |          |
| <b>Analog Switch</b>                |                     |   |                    |                   |                   |                   |                   |                   |          |
| Analog Signal Range <sup>e</sup>    | $V_{ANALOG}$        |   | Full               |                   | 0                 | 12                | 0                 | 12                | V        |
| On-Resistance                       | $R_{DS(on)}$        | $V_D = 10\text{ V}/0\text{ V}$ , $I_S = 1\text{ mA}$  | Room               | 265               |                   | 500               |                   | 500               | $\Omega$ |
|                                     |                     |   | Full               |                   |                   | 650               |                   | 600               |          |
| $R_{DS(on)}$ Matching               | $\Delta R_{DS(on)}$ |   | Room               | 10                |                   |                   |                   |                   |          |
| Switch Off Leakage Current          | $I_{S(off)}$        | $V_+ = 12\text{ V}$ , $V_- = 0\text{ V}$<br>$V_D = 0\text{ V}/10\text{ V}$ ,<br>$V_S = 10\text{ V}/0\text{ V}$  | Room               |                   | - 1               | 1                 | - 1               | 1                 | nA       |
|                                     |                     |   | Full               |                   | - 50              | - 50              | - 50              | 50                |          |
|                                     | DG508B              |   | Room               |                   | - 1               | 1                 | - 1               | 1                 |          |
|                                     |                     |   | Full               |                   | - 100             | 100               | - 100             | 100               |          |
|                                     | DG509B              |   | Room               |                   | - 1               | 1                 | - 1               | 1                 |          |
|                                     |                     |   | Full               |                   | - 50              | 50                | - 50              | 50                |          |



| SPECIFICATIONS (Single Supply 12 V)    |               |   |                    |                   |                   |                   |                   |                   |               |    |
|--|---------------|---|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|----|
| Parameter                              | Symbol        | Test Conditions<br>Unless Otherwise Specified<br>$V_+ = 12\text{ V}$ , $V_- = 0\text{ V}$ ( $\pm 10\%$ )<br>$V_{AX}$ , $V_{EN} = 2.0\text{ V}$ , $0.8\text{ V}^a$ | Temp. <sup>b</sup> | Typ. <sup>c</sup> | - 40 °C to 125 °C |                   | - 40 °C to 85 °C  |                   | Unit          |    |
|  |               |   |                    |                   | Min. <sup>d</sup> | Max. <sup>d</sup> | Min. <sup>d</sup> | Max. <sup>d</sup> |               |    |
| <b>Analog Switch</b>                   |               |   |                    |                   |                   |                   |                   |                   |               |    |
| Channel On Leakage Current             | $I_{D(on)}$   | $V_+ = 12\text{ V}$ , $V_- = 0\text{ V}$<br>$V_S = V_D = 0\text{ V}/10\text{ V}$  | DG508B             | Room              |                   | - 1               | 1                 | - 1               | 1             | nA |
|  |               |   |                    | Full              |                   | - 100             | 100               | - 100             | 100           |    |
|  |               |   | DG509B             | Room              |                   | - 1               | 1                 | - 1               | 1             |    |
|  |               |   |                    | Full              |                   | - 50              | 50                | - 50              | 50            |    |
| <b>Digital Control</b>                 |               |   |                    |                   |                   |                   |                   |                   |               |    |
| Logic High Input Voltage               | $V_{INH}$     |   | Full               |                   | 2.0               |                   | 2.0               |                   | V             |    |
| Logic Low Input Voltage                | $V_{INL}$     |   | Full               |                   |                   | 0.8               |                   | 0.8               |               |    |
| Logic High Input Current               | $I_{IH}$      | $V_{AX}$ , $V_{EN} = 2.0\text{ V}$  | Full               |                   | - 1               | 1                 | - 1               | 1                 | $\mu\text{A}$ |    |
| Logic Low Input Current                | $I_{IL}$      | $V_{AX}$ , $V_{EN} = 0.8\text{ V}$  | Full               |                   | - 1               | 1                 | - 1               | 1                 |               |    |
| Logic Input Capacitance <sup>e</sup>   | $C_{in}$      | $f = 1\text{ MHz}$  | Room               | 4                 |                   |                   |                   |                   | pF            |    |
| <b>Dynamic Characteristics</b>         |               |   |                    |                   |                   |                   |                   |                   |               |    |
| Transition Time                        | $t_{TRANS}$   | $V_{S1} = 10\text{ V}/0\text{ V}$ , $V_{S8} = 0\text{ V}/10\text{ V}$ ,<br>$R_L = 1\text{ M}\Omega$ , $C_L = 35\text{ pF}$  | Room               | 165               |                   | 400               |                   | 400               | ns            |    |
|  |               |   | Full               |                   |                   | 550               |                   | 500               |               |    |
| Break-Before-Make Interval             | $t_{OPEN}$    | $V_{S1} = V_{S8} = 5\text{ V}$ , $C_L = 35\text{ pF}$ ,<br>$R_L = 1\text{ k}\Omega$   | Room               | 37                | 15                |                   | 15                |                   |               |    |
|  |               |   | Full               |                   | 1                 |                   | 1                 |                   |               |    |
| Enable Turn-On Time                    | $t_{ON(EN)}$  | $V_{S1} = 5\text{ V}$ , $V_{S2}$ to $V_{S8} = 0\text{ V}$ ,<br>$R_L = 1\text{ k}\Omega$ , $C_L = 35\text{ pF}$  | Room               | 125               |                   | 300               |                   | 300               |               |    |
|  |               |   | Full               |                   |                   | 550               |                   | 425               |               |    |
| Enable Turn-Off Time                   | $t_{OFF(EN)}$ |   | Room               | 75                |                   | 250               |                   | 250               |               |    |
|  |               |   | Full               |                   |                   | 350               |                   | 300               |               |    |
| Charge Injection <sup>e</sup>          | $Q_{INJ}$     | $C_L = 1\text{ nF}$ , $R_{GEN} = 0\ \Omega$ , $V_{GEN} = 0\text{ V}$  | Full               | 2.5               |                   |                   |                   | pC                |               |    |
| Off Isolation <sup>e</sup>             | OIRR          | $C_L = 5\text{ pF}$ , $R_L = 50\ \Omega$<br>$f = 1\text{ MHz}$  | Room               | - 80              |                   |                   |                   | dB                |               |    |
| Crosstalk <sup>e</sup>                 | $X_{TALK}$    |   | Room               | - 88              |                   |                   |                   |                   |               |    |
| - 3 dB Bandwidth <sup>e</sup>          | BW            | $R_L = 50\ \Omega$  | Room               | 200               |                   |                   |                   | MHz               |               |    |
| Total Harmonic Distortion <sup>e</sup> | THD           | $R_L = 10\text{ k}\Omega$ , $5\text{ V}_{RMS}$ ,<br>$f = 20\text{ Hz}$ to $20\text{ kHz}$   | Room               | 0.26              |                   |                   |                   | %                 |               |    |
| Source Off Capacitance <sup>e</sup>    | $C_{S(off)}$  | $f = 1\text{ MHz}$  | Room               |                   | 2                 |                   |                   | pF                |               |    |
| Drain Off Capacitance <sup>e</sup>     | $C_{D(off)}$  |   |                    | DG508B            | 13                |                   |                   |                   |               |    |
|  |               |   |                    | DG509B            | 8                 |                   |                   |                   |               |    |
| Channel On Capacitance <sup>e</sup>    | $C_{D(on)}$   |   |                    | DG508B            | 17                |                   |                   |                   |               |    |
|  |               | DG509B  | 12                 |                   |                   |                   |                   |                   |               |    |
| <b>Power Supply</b>                    |               |   |                    |                   |                   |                   |                   |                   |               |    |
| Power Supply Current                   | $I_+$         | $V_{AX}$ , $V_{EN} = 0\text{ V}$ , or $V_+$   | Room               | 0.01              |                   | 0.5               |                   | 0.5               | mA            |    |
|  |               |   | Full               |                   |                   | 0.6               |                   | 0.6               |               |    |

Notes:

- a.  $V_{AX}$ ,  $V_{EN}$  = input voltage perform proper function.
- b. Room = 25 °C, Full = as determined by the operating temperature suffix.
- c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this datasheet.
- e. Guaranteed by design, not subject to production test.
- f.  $\Delta R_{DS(on)} = R_{DS(on)} \text{ max.} - R_{DS(on)} \text{ min.}$

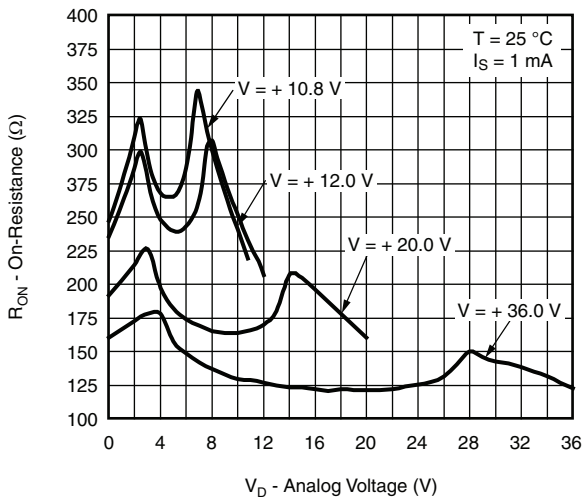
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## SCHEMATIC DIAGRAM (Typical Channel)



Figure 1.

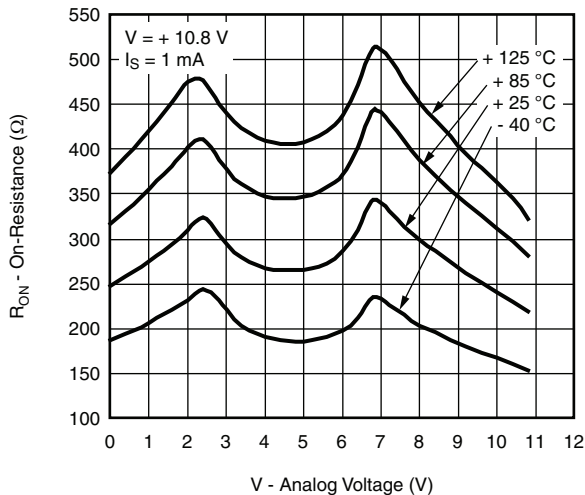
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



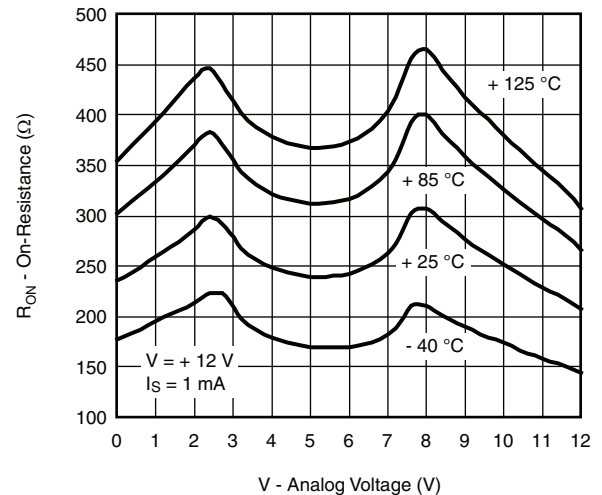
On-Resistance vs.  $V_D$  and Single Supply Voltage



On-Resistance vs.  $V_D$  and Dual Supply Voltage

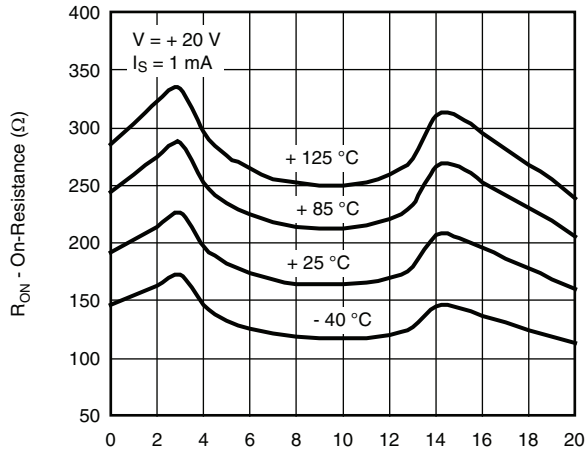


On-Resistance vs. Analog Voltage and Temperature

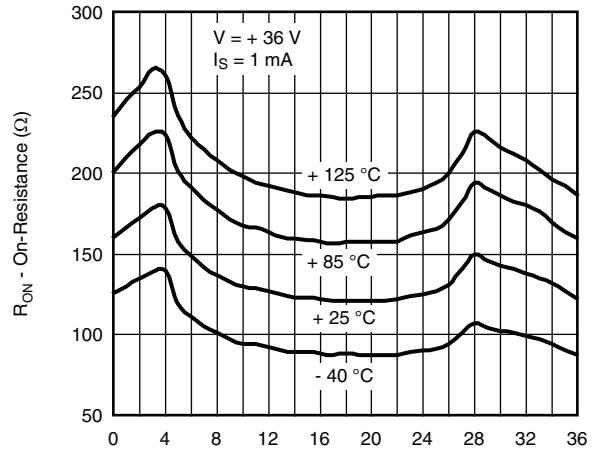


On-Resistance vs. Analog Voltage and Temperature

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



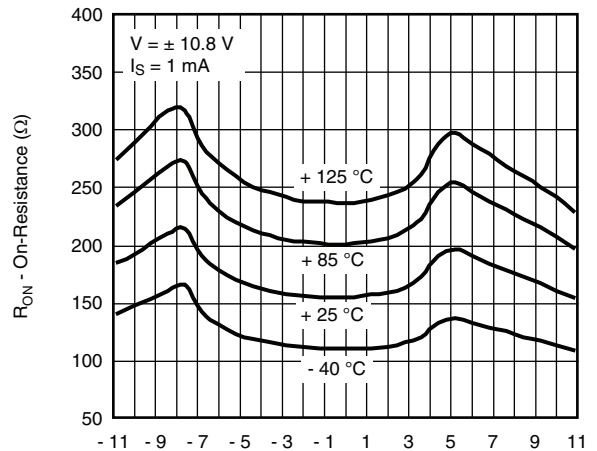
V - Analog Voltage (V)  
**On-Resistance vs. Analog Voltage and Temperature**



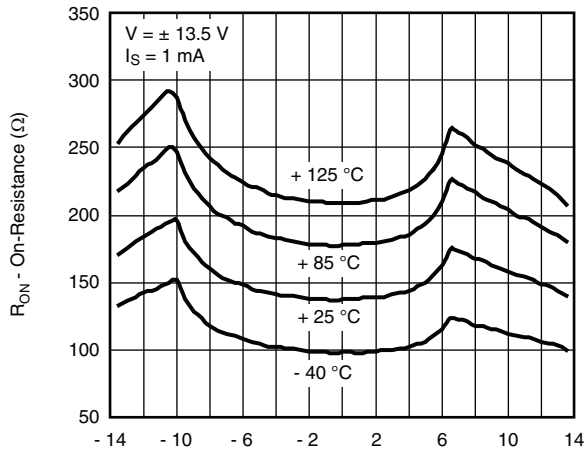
V - Analog Voltage (V)  
**On-Resistance vs. Analog Voltage and Temperature**



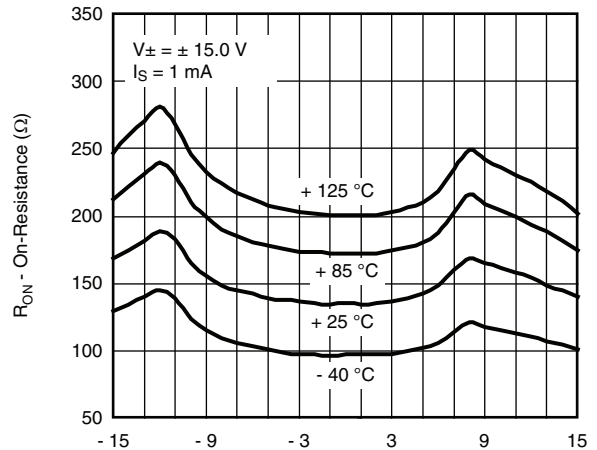
V - Analog Voltage (V)  
**On-Resistance vs. Analog Voltage and Temperature**



V - Analog Voltage (V)  
**On-Resistance vs. Analog Voltage and Temperature**



V - Analog Voltage (V)  
**On-Resistance vs. Analog Voltage and Temperature**

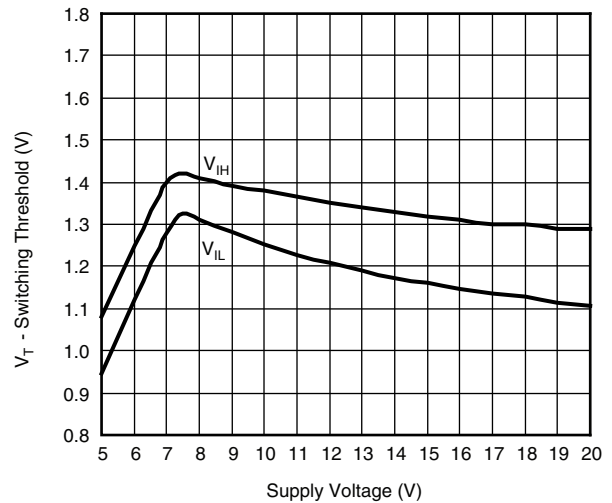


V - Analog Voltage (V)  
**On-Resistance vs. Analog Voltage and Temperature**

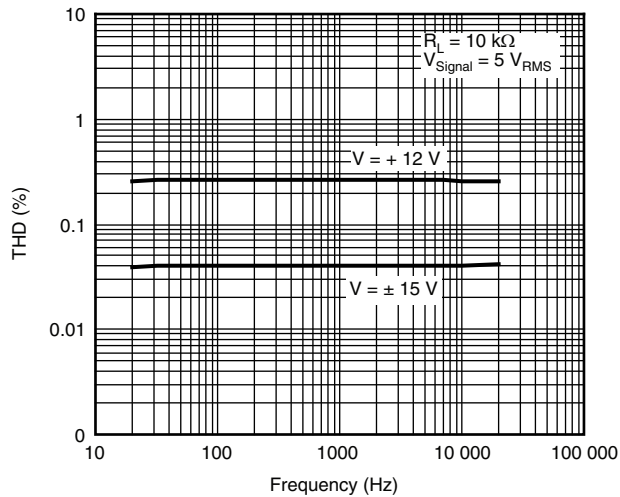
### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



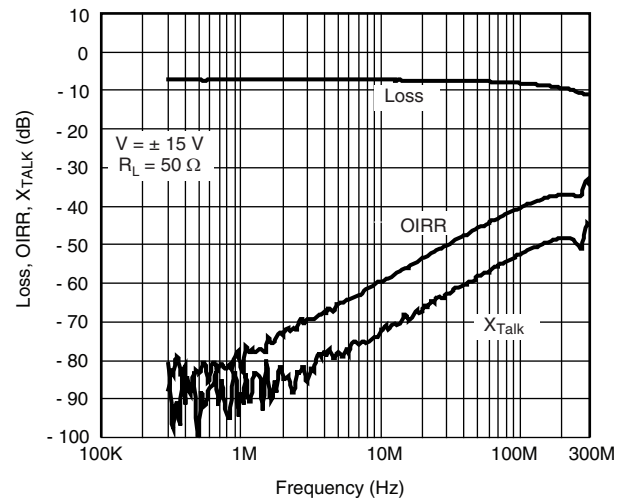
**On-Resistance vs. Analog Voltage and Temperature**



**Switching Threshold vs. Supply Voltage**



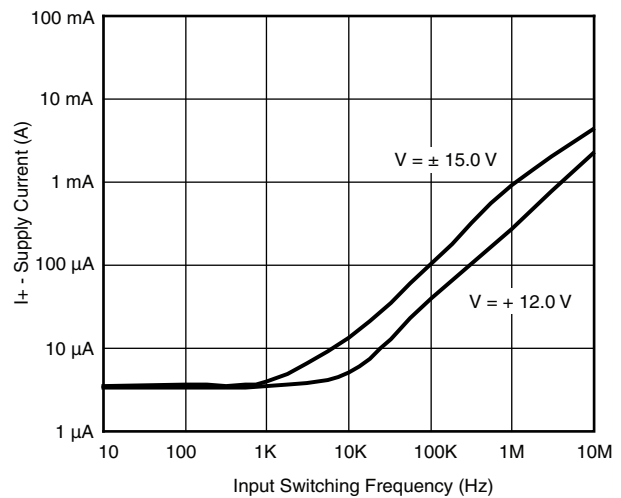
**THD vs. Frequency**



**Insertion Loss, Off-Isolation, Crosstalk vs. Frequency**

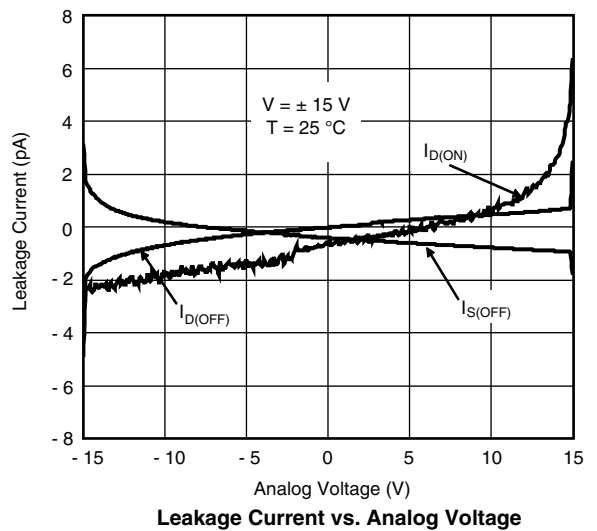
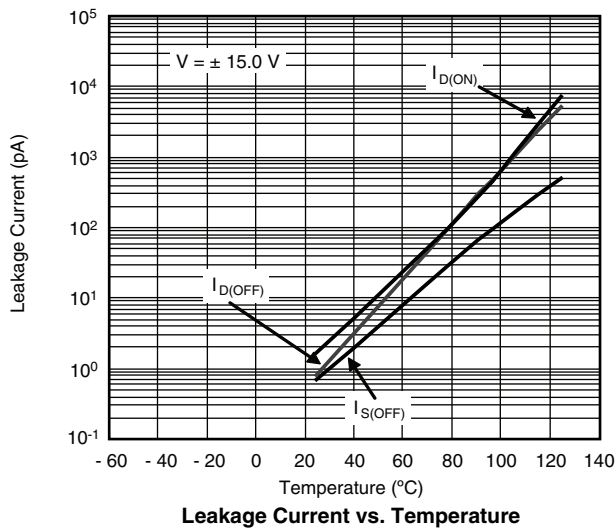
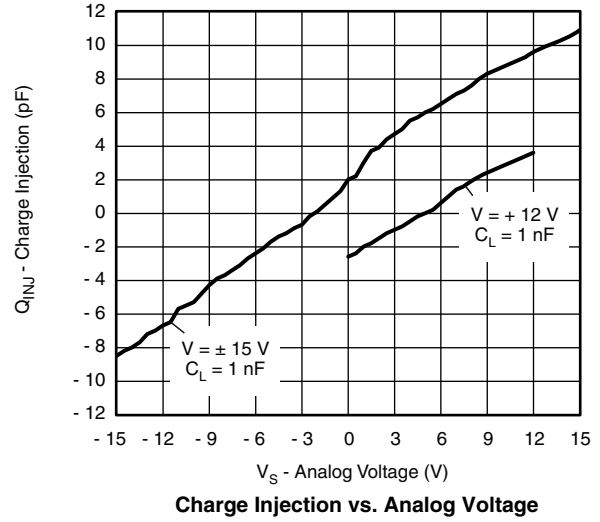


**Insertion Loss, Off-Isolation, Crosstalk vs. Frequency**



**Supply Current vs. Input Switching Frequency**



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


## TEST CIRCUITS

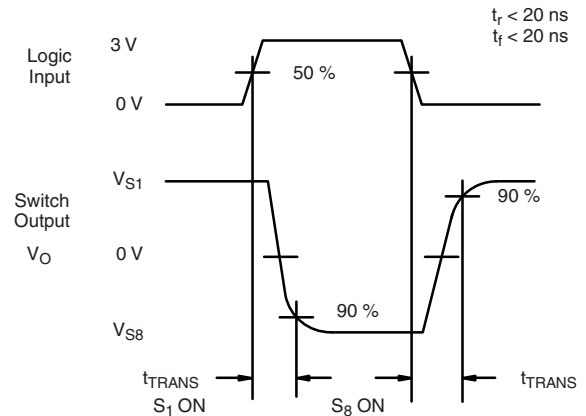


Figure 2. Transition Time



Figure 3. Enable Switching Time

## TEST CIRCUITS

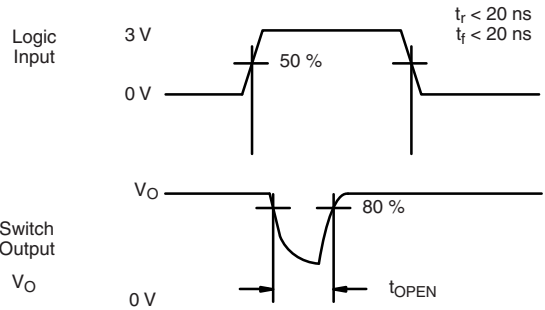


Figure 4. Break-Before-Make Interval

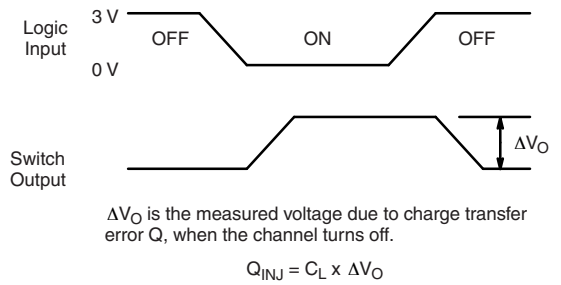
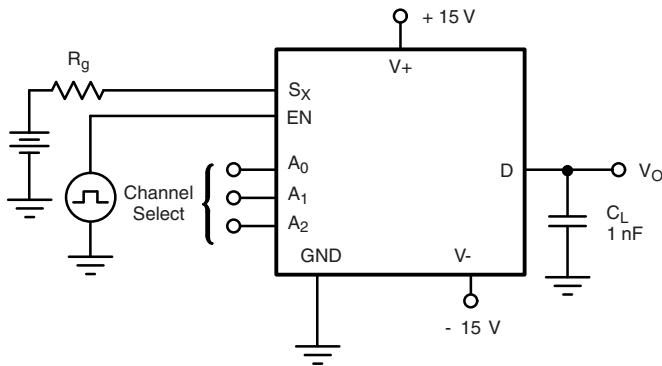


Figure 5. Charge Injection



Figure 6. Off Isolation

$$\text{Off Isolation} = 20 \log \left| \frac{V_{OUT}}{V_{IN}} \right|$$

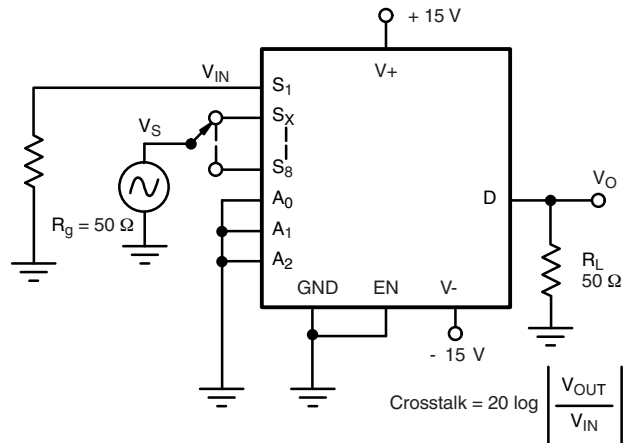


Figure 7. Crosstalk

$$\text{Crosstalk} = 20 \log \left| \frac{V_{OUT}}{V_{IN}} \right|$$

## TEST CIRCUITS



Figure 8. Insertion Loss



Figure 9. Source Drain Capacitance

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**SOIC (NARROW): 16-LEAD**  
JEDEC Part Number: MS-012



| Dim            | MILLIMETERS |       | INCHES    |       |
|----------------|-------------|-------|-----------|-------|
|                | Min         | Max   | Min       | Max   |
| A              | 1.35        | 1.75  | 0.053     | 0.069 |
| A <sub>1</sub> | 0.10        | 0.20  | 0.004     | 0.008 |
| B              | 0.38        | 0.51  | 0.015     | 0.020 |
| C              | 0.18        | 0.23  | 0.007     | 0.009 |
| D              | 9.80        | 10.00 | 0.385     | 0.393 |
| E              | 3.80        | 4.00  | 0.149     | 0.157 |
| e              | 1.27 BSC    |       | 0.050 BSC |       |
| H              | 5.80        | 6.20  | 0.228     | 0.244 |
| L              | 0.50        | 0.93  | 0.020     | 0.037 |
| ∅              | 0°          | 8°    | 0°        | 8°    |

ECN: S-03946—Rev. F, 09-Jul-01  
DWG: 5300



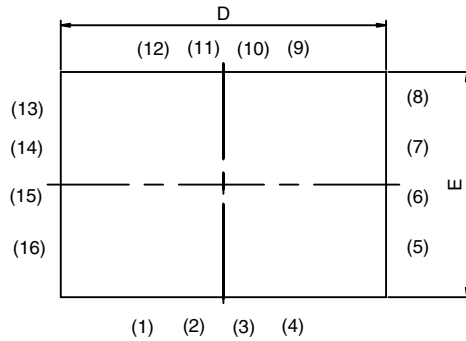
### PDIP: 16-LEAD



| Dim                  | MILLIMETERS |       | INCHES |       |
|----------------------|-------------|-------|--------|-------|
|                      | Min         | Max   | Min    | Max   |
| <b>A</b>             | 3.81        | 5.08  | 0.150  | 0.200 |
| <b>A<sub>1</sub></b> | 0.38        | 1.27  | 0.015  | 0.050 |
| <b>B</b>             | 0.38        | 0.51  | 0.015  | 0.020 |
| <b>B<sub>1</sub></b> | 0.89        | 1.65  | 0.035  | 0.065 |
| <b>C</b>             | 0.20        | 0.30  | 0.008  | 0.012 |
| <b>D</b>             | 18.93       | 21.33 | 0.745  | 0.840 |
| <b>E</b>             | 7.62        | 8.26  | 0.300  | 0.325 |
| <b>E<sub>1</sub></b> | 5.59        | 7.11  | 0.220  | 0.280 |
| <b>e<sub>1</sub></b> | 2.29        | 2.79  | 0.090  | 0.110 |
| <b>e<sub>A</sub></b> | 7.37        | 7.87  | 0.290  | 0.310 |
| <b>L</b>             | 2.79        | 3.81  | 0.110  | 0.150 |
| <b>Q<sub>1</sub></b> | 1.27        | 2.03  | 0.050  | 0.080 |
| <b>S</b>             | 0.38        | 1.52  | .015   | 0.060 |

ECN: S-03946—Rev. D, 09-Jul-01  
DWG: 5482

## MINI QFN-16L



BACK SIDE VIEW



| DIM | MILLIMETERS |      |      | INCHES     |        |        |
|-----|-------------|------|------|------------|--------|--------|
|     | MIN.        | NAM  | MAX. | MIN.       | NAM    | MAX.   |
| A   | 0.70        | 0.75 | 0.80 | 0.0275     | 0.0295 | 0.0315 |
| A1  | 0           | -    | 0.05 | 0          | -      | 0.002  |
| b   | 0.15        | 0.20 | 0.25 | 0.0059     | 0.0078 | 0.0098 |
| C   | 0.15        | 0.20 | 0.25 | 0.0059     | 0.0078 | 0.0098 |
| D   | 2.60 BSC    |      |      | 0.1023 BSC |        |        |
| E   | 1.80 BSC    |      |      | 0.0708 BSC |        |        |
| e   | 0.40 BSC    |      |      | 0.0157 BSC |        |        |
| L   | 0.35        | 0.40 | 0.45 | 0.0137     | 0.0157 | 0.0177 |
| L1  | 0.45        | 0.50 | 0.55 | 0.0177     | 0.0196 | 0.0216 |

ECN T-06380-Rev. A, 14-Aug-06  
DWG: 5954

## TSSOP: 16-LEAD



| Symbols | DIMENSIONS IN MILLIMETERS |       |      |
|---------|---------------------------|-------|------|
|         | Min                       | Nom   | Max  |
| A       | -                         | 1.10  | 1.20 |
| A1      | 0.05                      | 0.10  | 0.15 |
| A2      | -                         | 1.00  | 1.05 |
| B       | 0.22                      | 0.28  | 0.38 |
| C       | -                         | 0.127 | -    |
| D       | 4.90                      | 5.00  | 5.10 |
| E       | 6.10                      | 6.40  | 6.70 |
| E1      | 4.30                      | 4.40  | 4.50 |
| e       | -                         | 0.65  | -    |
| L       | 0.50                      | 0.60  | 0.70 |
| L1      | 0.90                      | 1.00  | 1.10 |
| y       | -                         | -     | 0.10 |
| θ1      | 0°                        | 3°    | 6°   |

ECN: S-61920-Rev. D, 23-Oct-06  
DWG: 5624





## RECOMMENDED MINIMUM PAD FOR TSSOP-16



Recommended Minimum Pads  
Dimensions in inches (mm)

**RECOMMENDED MINIMUM PADS FOR MINI QFN 16L**



Mounting Footprint  
Dimensions in mm (inch)

## RECOMMENDED MINIMUM PADS FOR SO-16



Recommended Minimum Pads  
Dimensions in Inches/(mm)

[Return to Index](#)



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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А