

## Quad Monolithic SPST CMOS Analog Switches

### DESCRIPTION

Featuring low on-resistance ( $60\ \Omega$ ) and fast switching (130 ns), the DG308A is supplied in the “normally open” configuration while DG309 is supplied “normally closed”. Input thresholds are high voltage CMOS compatible.

Designed with the Vishay Siliconix PLUS-40 CMOS process to combine low power dissipation with a high breakdown voltage rating of 44 V, each switch conducts equally well in both directions when on, and blocks up to the supply voltage when off. An epitaxial layer prevents latch up.

The DG308B, DG309B upgrades are recommended for new designs.

### FEATURES

- $\pm 15\text{ V}$  analog input range
- Low on-resistance:  $60\ \Omega$
- Fast switching: 130 ns
- Low power dissipation: 30 nW
- CMOS logic compatible



**RoHS\***  
COMPLIANT

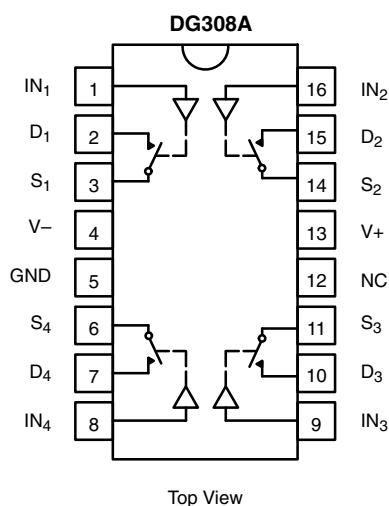
### BENEFITS

- Full rail-to-rail analog signal range
- Low signal error
- Wide dynamic range
- Single or dual supply capability
- Static protected logic inputs
- Space savings (TSSOP)

### APPLICATIONS

- Portable and battery powered instrumentation
- Communication systems
- Computer peripherals
- High-speed multiplexing

### FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



For SPST Switches per Package

| TRUTH TABLE |        |       |
|-------------|--------|-------|
| Logic       | DG308A | DG309 |
| 0           | OFF    | ON    |
| 1           | ON     | OFF   |

Logic “0”  $\leq 3.5\text{ V}$

Logic “1”  $\geq 11\text{ V}$

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

| ORDERING INFORMATION |                    |                                                          |
|----------------------|--------------------|----------------------------------------------------------|
| Temp. Range          | Package            | Part Number                                              |
| 0 °C to 70 °C        | 16-Pin Plastic DIP | DG308ACJ<br>DG308ACJ-E3                                  |
|                      |                    | DG309CJ<br>DG309CJ-E3                                    |
| - 40 °C to 85 °C     | 16-Pin Narrow SOIC | DG308ADY<br>DG308ADY-E3<br>DG308ADY-T1<br>DG308ADY-T1-E3 |
|                      |                    | DG309DY<br>DG309DY-E3<br>DG309DY-T1<br>DG309DY-T1-E3     |
|                      | 16-Pin TSSOP       | DG308ADQ<br>DG308ADQ-E3<br>DG308ADQ-T1<br>DG308ADQ-T1-E3 |
|                      |                    | DG309DQ<br>DG309DQ-E3<br>DG309DQ-T1<br>DG309DQ-T1-E3     |

| ABSOLUTE MAXIMUM RATINGS                                      |                                           |                                                                                    |      |
|---------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------|------|
| Parameter                                                     |                                           | Limit                                                                              | Unit |
| Voltages Referenced V <sub>+</sub> to V <sub>-</sub>          |                                           | 44                                                                                 | V    |
| GND                                                           |                                           | 25                                                                                 |      |
| Digital Inputs <sup>a</sup> , V <sub>S</sub> , V <sub>D</sub> |                                           | (V <sub>-</sub> ) - 2 to (V <sub>+</sub> ) + 2 or<br>20 mA, whichever occurs first |      |
| Current, Any Terminal Except S or D                           |                                           | 30                                                                                 | mA   |
| Continuous Current                                            | S or D                                    | 20                                                                                 |      |
|                                                               | (Pulsed at 1 ms, 10 % duty cycle max.)    | 70                                                                                 |      |
| Storage Temperature                                           | (AK Suffix)                               | - 65 to 150                                                                        | °C   |
|                                                               | (CJ, DY and DQ Suffix)                    | - 65 to 125                                                                        |      |
| Power Dissipation <sup>b</sup>                                | 16-Pin Plastic DIP <sup>c</sup>           | 470                                                                                | mW   |
|                                                               | 16-Pin Narrow SOIC and TSSOP <sup>e</sup> | 600                                                                                |      |
|                                                               | 16-Pin CerDIP <sup>d</sup>                | 900                                                                                |      |

Notes:

a. Signals on S<sub>X</sub>, D<sub>X</sub>, or IN<sub>X</sub> exceeding V<sub>+</sub> or V<sub>-</sub> will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

b. All leads welded or soldered to PC board.

c. Derate 12 mW/°C above 75 °C.

d. Derate 6.5 mW/°C above 25 °C.

e. Derate 7.6 mW/°C above 75 °C.



| SPECIFICATIONS <sup>a</sup> |        |                                                                                                                                       |                    |                   |                              |                   |                   |                   |      |
|-----------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|------------------------------|-------------------|-------------------|-------------------|------|
| Parameter                   | Symbol | Test Conditions<br>Unless Specified<br>V <sub>+</sub> = 15 V, V <sub>-</sub> = - 15 V<br>V <sub>IN</sub> = 3.5 V or 11 V <sup>f</sup> | Temp. <sup>b</sup> | Typ. <sup>c</sup> | A Suffix<br>- 55 °C to 125°C |                   | C, D Suffix       |                   | Unit |
|                             |        |                                                                                                                                       |                    |                   | Min. <sup>d</sup>            | Max. <sup>d</sup> | Min. <sup>d</sup> | Max. <sup>d</sup> |      |
| Power Supplies              |        |                                                                                                                                       |                    |                   |                              |                   |                   |                   |      |
| Positive Supply Current     | I+     | all channels on or off<br>V <sub>IN</sub> = 0 V or 15 V                                                                               | Room Full          | 0.001             |                              | 10<br>100         |                   | 10<br>100         | μA   |
| Negative Supply Current     | I-     |                                                                                                                                       | Room Full          | - 0.001           | - 10<br>- 100                |                   | - 100             |                   |      |

Notes:

a. Refer to PROCESS OPTION FLOWCHART.

b. Room = 25 °C, Full = as determined by the operating temperature suffix.

c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

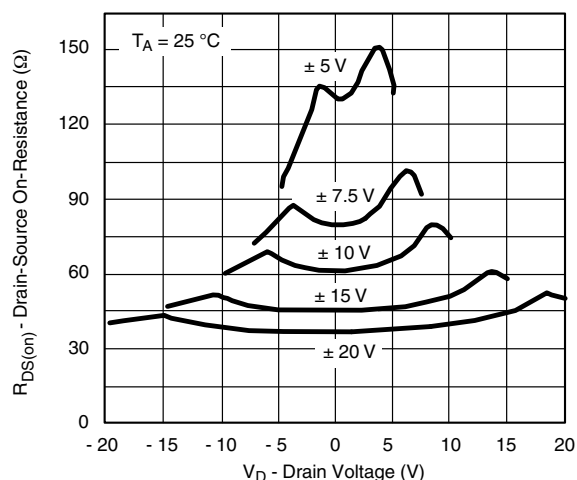
d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.

e. Guaranteed by design, not subject to production test.

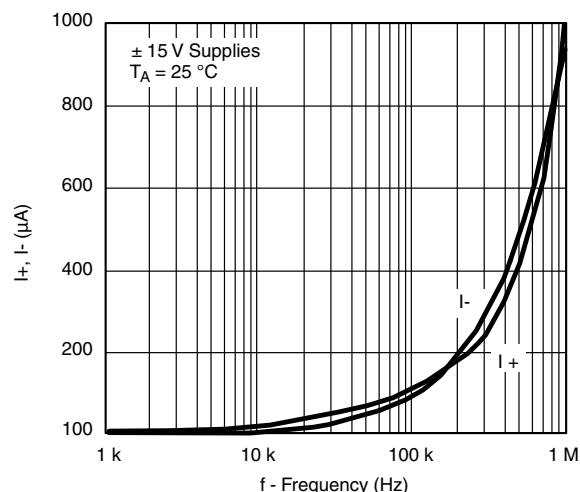
f.  $V_{IN}$  = input voltage to perform proper function.

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

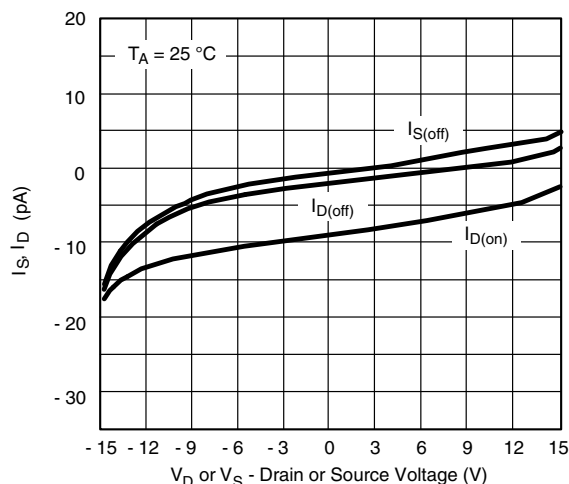
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



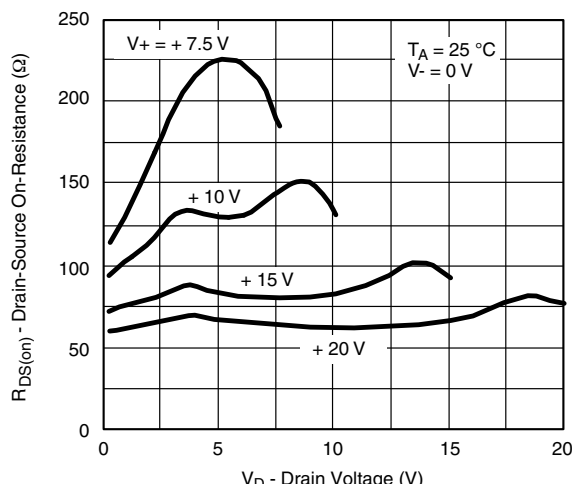
$R_{DS(on)}$  vs.  $V_D$  and Power Supply



Supply Currents vs. Switching Frequency (All Inputs Active)

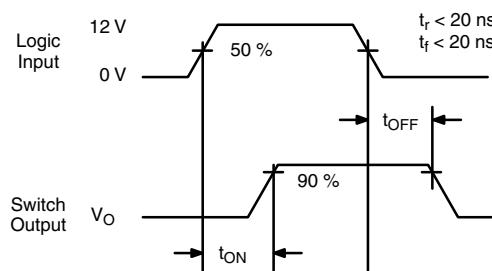
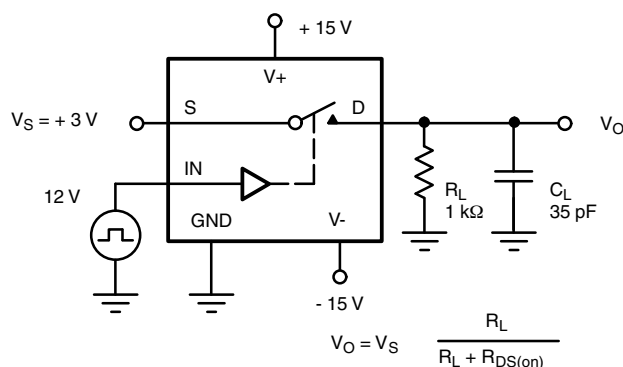
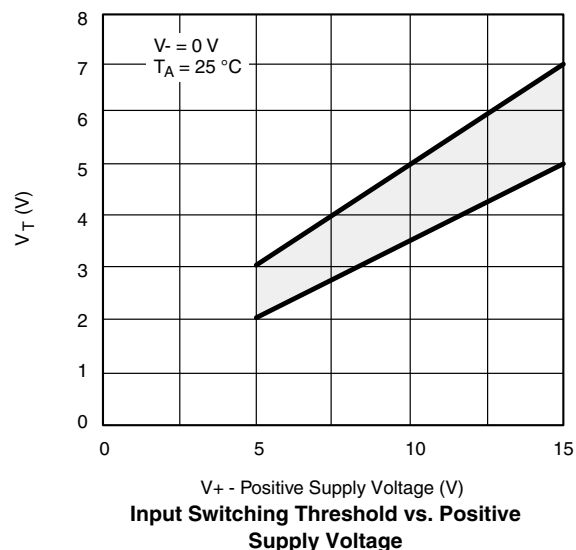
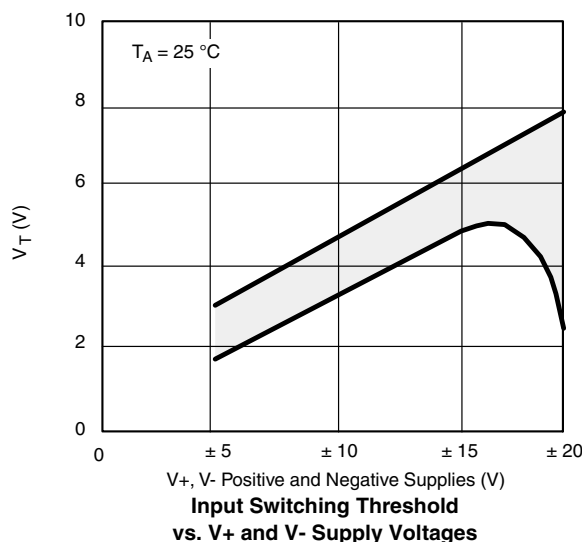


Leakage Currents vs. Analog Voltage



$R_{DS(on)}$  vs.  $V_D$  and Power Supply Voltage

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



### Figure 2. Switching Time

## APPLICATIONS

### Single Supply Operation

The DG308A and DG309 will switch positive analog signals while using a single positive supply. This will allow use in many applications where only one supply is available. The trade-offs or performance given up while using single supplies are:

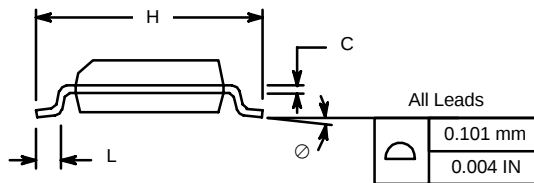
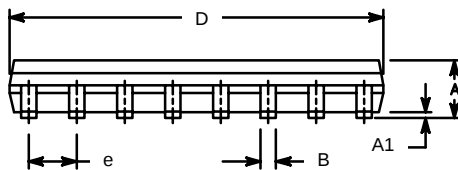
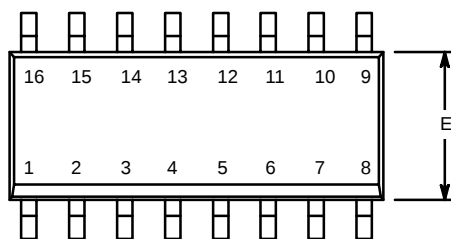
1) increased  $R_{DS(on)}$  and 2) slower switching speed. As stated in the absolute maximum ratings section of the data sheet, the analog voltage should not go above or below the supply voltages which in single supply operation are  $V+$  and  $0\text{ V}$ .

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Siliconix Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see [www.vishay.com/ppg?70046](http://www.vishay.com/ppg?70046).



### SOIC (NARROW): 16-LEAD

JEDEC Part Number: MS-012

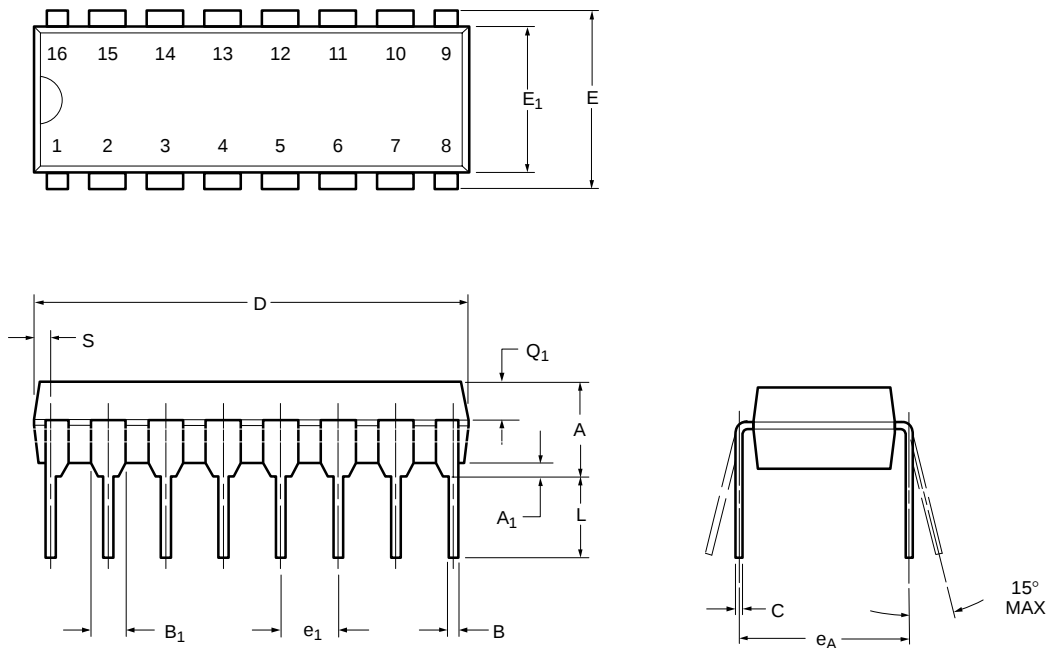


| Dim            | MILLIMETERS |       | INCHES    |       |
|----------------|-------------|-------|-----------|-------|
|                | Min         | Max   | Min       | Max   |
| A              | 1.35        | 1.75  | 0.053     | 0.069 |
| A <sub>1</sub> | 0.10        | 0.20  | 0.004     | 0.008 |
| 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 |
| Ø              | 0°          | 8°    | 0°        | 8°    |

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



**PDIP: 16-LEAD**

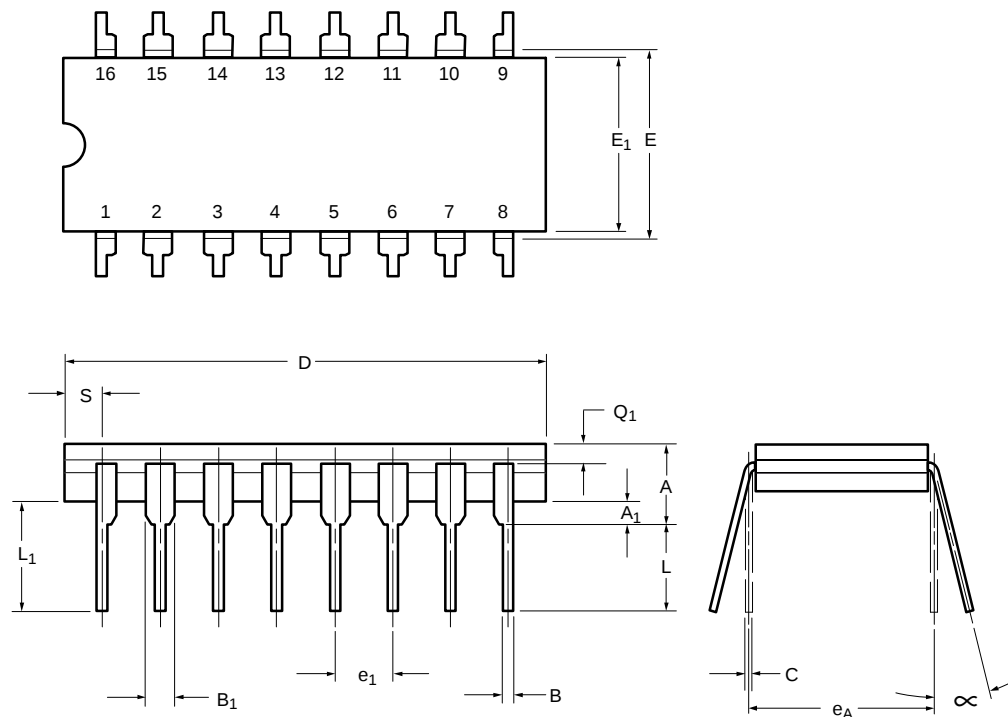


| Dim            | MILLIMETERS |       | INCHES |       |
|----------------|-------------|-------|--------|-------|
|                | Min         | Max   | Min    | Max   |
| A              | 3.81        | 5.08  | 0.150  | 0.200 |
| A <sub>1</sub> | 0.38        | 1.27  | 0.015  | 0.050 |
| B       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

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

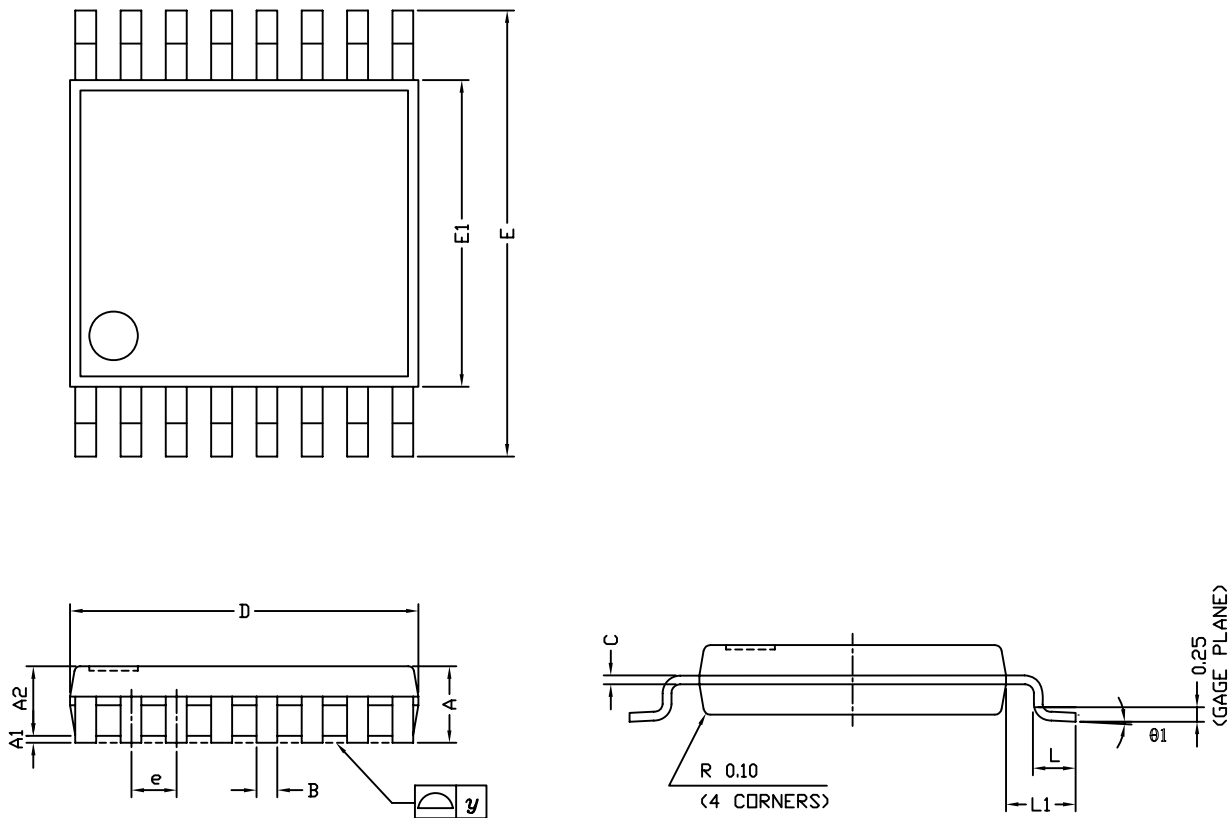


**CERDIP: 16-LEAD**



| Dim                                         | MILLIMETERS |       | INCHES    |       |
|---------------------------------------------|-------------|-------|-----------|-------|
|                                             | Min         | Max   | Min       | Max   |
| A                                           | 4.06        | 5.08  | 0.160     | 0.200 |
| A <sub>1</sub>                              | 0.51        | 1.14  | 0.020     | 0.045 |
| B                                           | 0.38        | 0.51  | 0.015     | 0.020 |
| B <sub>1</sub>                              | 1.14        | 1.65  | 0.045     | 0.065 |
| C                                           | 0.20        | 0.30  | 0.008     | 0.012 |
| D                                           | 19.05       | 19.56 | 0.750     | 0.770 |
| E                                           | 7.62        | 8.26  | 0.300     | 0.325 |
| E <sub>1</sub>                              | 6.60        | 7.62  | 0.260     | 0.300 |
| e <sub>1</sub>                              | 2.54 BSC    |       | 0.100 BSC |       |
| e <sub>A</sub>                              | 7.62 BSC    |       | 0.300 BSC |       |
| L                                           | 3.18        | 3.81  | 0.125     | 0.150 |
| L <sub>1</sub>                              | 3.81        | 5.08  | 0.150     | 0.200 |
| Q <sub>1</sub>                              | 1.27        | 2.16  | 0.050     | 0.085 |
| S                                           | 0.38        | 1.14  | 0.015     | 0.045 |
| ∞                                           | 0°          | 15°   | 0°        | 15°   |
| ECN: S-03946—Rev. G, 09-Jul-01<br>DWG: 5403 |             |       |           |       |

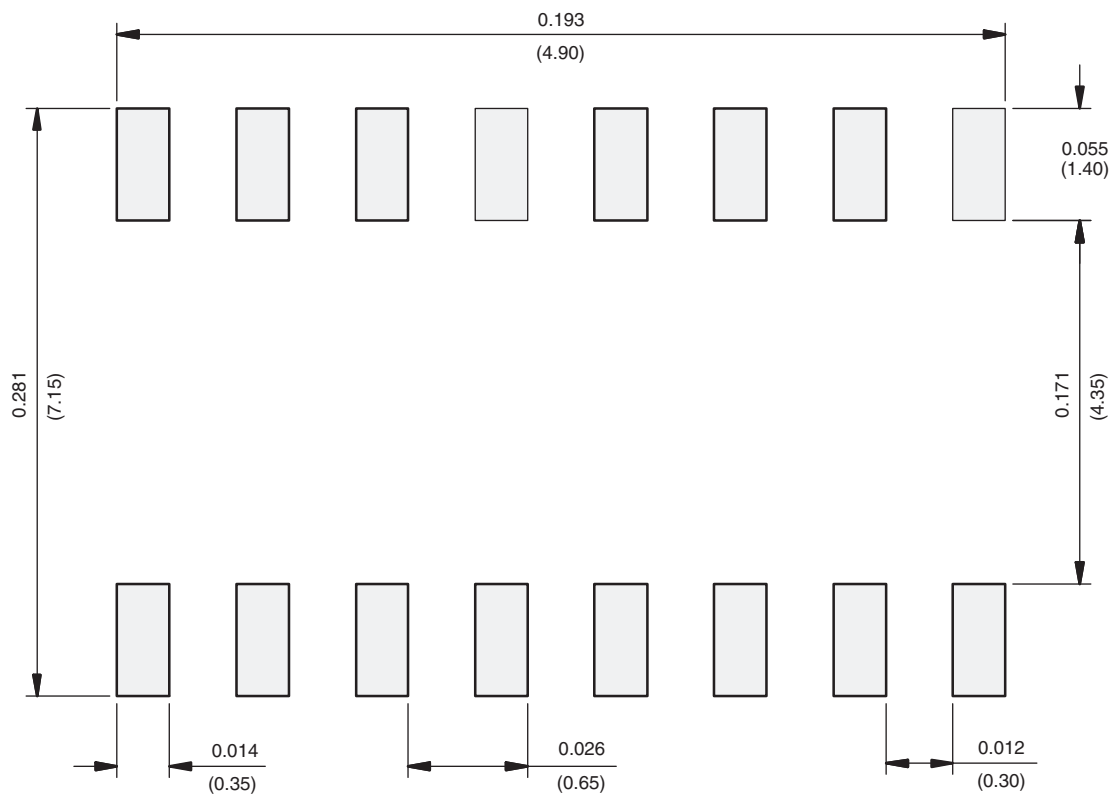
## TSSOP: 16-LEAD



| 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                      |                           |       |      |

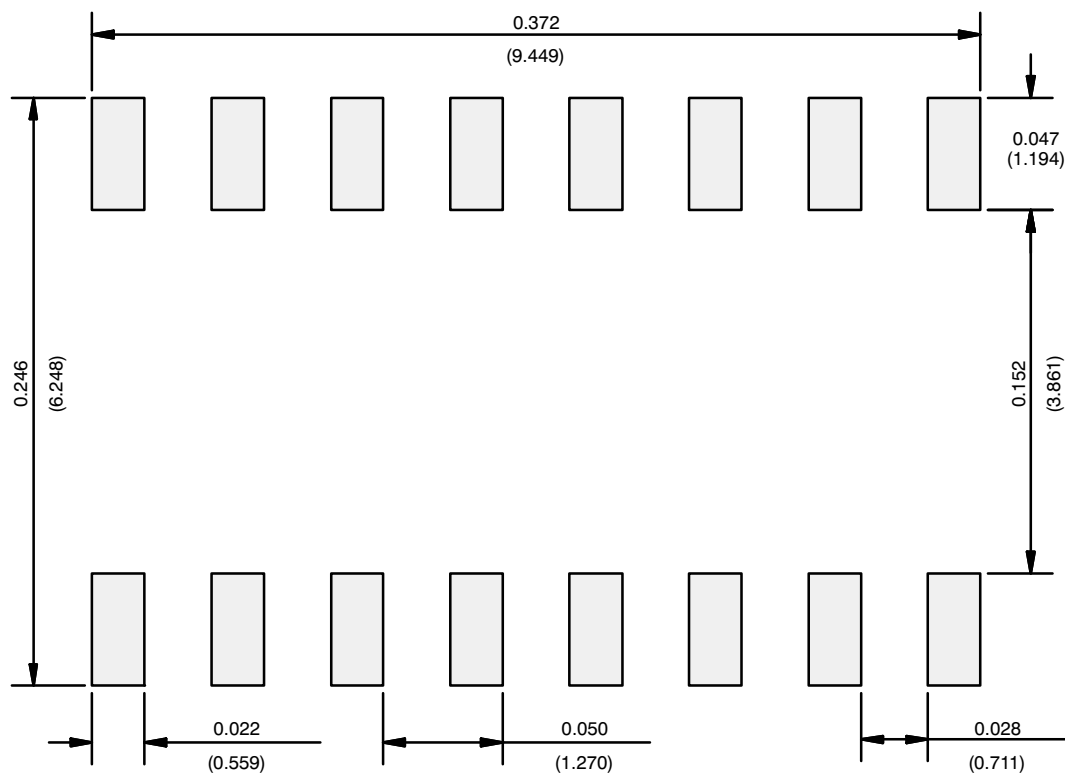


## RECOMMENDED MINIMUM PAD FOR TSSOP-16



Recommended Minimum Pads  
Dimensions in inches (mm)

## RECOMMENDED MINIMUM PADS FOR SO-16



Recommended Minimum Pads  
Dimensions in Inches/(mm)

[Return to Index](#)



## Disclaimer

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

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

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

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

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

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**



**Стандарт  
Электрон  
Связь**

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331