MC1488

Quad Line EIA-232D Driver

The MC1488 is a monolithic quad line driver designed to interface data terminal equipment with data communications equipment in conformance with the specifications of EIA Standard No. EIA–232D.

Features

• Current Limited Output
  ±10 mA typical
• Power–Off Source Impedance
  300 Ω minimum
• Simple Slew Rate Control with External Capacitor
• Flexible Operating Supply Range
• Compatible with All ON Semiconductor DTL and TTL Logic Families
• Pb–Free Packages are Available

![Figure 1. Simplified Application](image)

[Diagram of simplified application showing a DTL Logic Output interconnecting cable, Line Driver MC1488, Interconnecting Cable, Line Receiver MC1489, DTL Logic Input, and Interconnecting Cable]

ON Semiconductor

http://onsemi.com

PIN CONNECTIONS

[Diagram showing pin connections with labels: VEE, VCC, Input A, Input B1, Input B2, Output A, Output B, Input C1, Input C2, Output D, Output C]

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 8 of this data sheet.
Figure 2. Circuit Schematic
(1/4 of Circuit Shown)
### MAXIMUM RATINGS ($T_A = +25^\circ C$, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Voltage</td>
<td>$V_{CC}$</td>
<td>+15</td>
<td>Vdc</td>
</tr>
<tr>
<td></td>
<td>$V_{EE}$</td>
<td>-15</td>
<td>Vdc</td>
</tr>
<tr>
<td>Input Voltage Range</td>
<td>$V_{IR}$</td>
<td>$-15 \leq V_{IR} \leq 7.0$</td>
<td>Vdc</td>
</tr>
<tr>
<td>Output Signal Voltage</td>
<td>$V_O$</td>
<td>±15</td>
<td>Vdc</td>
</tr>
<tr>
<td>Power Derating (Package Limitation, SO-14 and Plastic Dual-In-Line Package)</td>
<td>$P_D/1/R_{IL,JA}$</td>
<td>1000 mW, 6.7 mW/°C</td>
<td></td>
</tr>
<tr>
<td>Operating Ambient Temperature Range</td>
<td>$T_A$</td>
<td>0 to +75</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>$T_{MS}$</td>
<td>-65 to +175</td>
<td>°C</td>
</tr>
</tbody>
</table>

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### ELECTRICAL CHARACTERISTICS ($V_{CC} = +9.0 \pm 1\%$ Vdc, $V_{EE} = -9.0 \pm 1\%$ Vdc, $T_A = 0$ to $75^\circ C$, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current – Low Logic State ($V_{IL} = 0$)</td>
<td>$I_{IL}$</td>
<td>–</td>
<td>1.0</td>
<td>1.6</td>
<td>mA</td>
</tr>
<tr>
<td>Input Current – High Logic State ($V_{IH} = 5.0$ V)</td>
<td>$I_{IH}$</td>
<td>–</td>
<td>–</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td>Output Voltage – High Logic State ($V_{IH} = 0.8$ Vdc, $R_L = 3.0$ kΩ, $V_{CC} = +9.0$ Vdc, $V_{EE} = -9.0$ Vdc)</td>
<td>$V_{OH}$</td>
<td>6.0</td>
<td>7.0</td>
<td>–</td>
<td>Vdc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.0</td>
<td>10.5</td>
<td>–</td>
<td>Vdc</td>
</tr>
<tr>
<td>Output Voltage – Low Logic State ($V_{IL} = 1.9$ Vdc, $R_L = 3.0$ kΩ, $V_{CC} = +9.0$ Vdc, $V_{EE} = -9.0$ Vdc)</td>
<td>$V_{OL}$</td>
<td>-6.0</td>
<td>-7.0</td>
<td>–</td>
<td>Vdc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-9.0</td>
<td>-10.5</td>
<td>–</td>
<td>Vdc</td>
</tr>
<tr>
<td>Positive Output Short–Circuit Current, Note 1</td>
<td>$I_{OS+}$</td>
<td>+6.0</td>
<td>+10</td>
<td>+12</td>
<td>mA</td>
</tr>
<tr>
<td>Negative Output Short–Circuit Current, Note 1</td>
<td>$I_{OS-}$</td>
<td>-6.0</td>
<td>-10</td>
<td>-12</td>
<td>mA</td>
</tr>
<tr>
<td>Output Resistance ($V_{CC} = V_{EE} = 0$, $</td>
<td>V_O</td>
<td>= \pm 2.0$ V)</td>
<td>$r_o$</td>
<td>300</td>
<td>–</td>
</tr>
<tr>
<td>Positive Supply Current ($R_I = \infty$)</td>
<td>$I_{CC}$</td>
<td>–</td>
<td>+15</td>
<td>+20</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>+4.5</td>
<td>+6.0</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>+19</td>
<td>+25</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>+5.5</td>
<td>+7.0</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>+34</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>+12</td>
<td>mA</td>
</tr>
<tr>
<td>Negative Supply Current ($R_L = \infty$)</td>
<td>$I_{EE}$</td>
<td>–</td>
<td>–</td>
<td>-13</td>
<td>–17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-18</td>
<td>–23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-19</td>
<td>–500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-18</td>
<td>–23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-19</td>
<td>–500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-18</td>
<td>–23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-19</td>
<td>–500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-18</td>
<td>–34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-19</td>
<td>–34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-18</td>
<td>–34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>-19</td>
<td>–34</td>
</tr>
<tr>
<td>Power Consumption ($V_{CC} = 9.0$ Vdc, $V_{EE} = -9.0$ Vdc)</td>
<td>$P_C$</td>
<td>–</td>
<td>–</td>
<td>333</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>576</td>
<td></td>
</tr>
</tbody>
</table>

### SWITCHING CHARACTERISTICS ($V_{CC} = +9.0 \pm 1\%$ Vdc, $V_{EE} = -9.0 \pm 1\%$ Vdc, $T_A = +25^\circ C$.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propagation Delay Time ($z_I = 3.0$ k and 15 pF)</td>
<td>$t_{PLH}$</td>
<td>–</td>
<td>275</td>
<td>350</td>
<td>ns</td>
</tr>
<tr>
<td>Fall Time ($z_I = 3.0$ k and 15 pF)</td>
<td>$t_{THL}$</td>
<td>–</td>
<td>45</td>
<td>75</td>
<td>ns</td>
</tr>
<tr>
<td>Propagation Delay Time ($z_I = 3.0$ k and 15 pF)</td>
<td>$t_{PLH}$</td>
<td>–</td>
<td>110</td>
<td>175</td>
<td>ns</td>
</tr>
<tr>
<td>Rise Time ($z_I = 3.0$ k and 15 pF)</td>
<td>$t_{TLH}$</td>
<td>–</td>
<td>55</td>
<td>100</td>
<td>ns</td>
</tr>
</tbody>
</table>

1. Maximum Package Power Dissipation may be exceeded if all outputs are shorted simultaneously.
MC1488

CHARACTERISTIC DEFINITIONS

Figure 3. Input Voltage

Figure 4. Output Current

Figure 5. Output Short-Circuit Current

Figure 6. Output Resistance (Power Off)

Figure 7. Power Supply Currents

Figure 8. Switching Response
TYPICAL CHARACTERISTICS
(T_A = +25°C, unless otherwise noted.)

Figure 9. Transfer Characteristics versus Power Supply Voltage

Figure 10. Short Circuit Output Current versus Temperature

Figure 11. Output Slew Rate versus Load Capacitance

Figure 12. Output Voltage and Current–Limiting Characteristics

Figure 13. Maximum Operating Temperature versus Power Supply Voltage
The Electronic Industries Association EIA−232D specification details the requirements for the interface between data processing equipment and data communications equipment. This standard specifies not only the number and type of interface leads, but also the voltage levels to be used. The MC1488 quad driver and its companion circuit, the MC1489 quad receiver, provide a complete interface system between DTL or TTL logic levels and the EIA−232D defined levels. The EIA−232D requirements as applied to drivers are discussed herein.

The required driver voltages are defined as between 5.0 and 15 V in magnitude and are positive for a Logic “0” and negative for a Logic “1.” These voltages are so defined when the drivers are terminated with a 3000 to 7000 Ω resistor. The MC1488 meets this voltage requirement by converting a DTL/TTL logic level into EIA−232D levels with one stage of inversion.

The EIA−232D specification further requires that during transitions, the driver output slew rate must not exceed 30 V per microsecond. The inherent slew rate of the MC1488 is much too fast for this requirement. The current limited output of the device can be used to control this slew rate by connecting a capacitor to each driver output. The required capacitor can be easily determined by using the relationship $C = \frac{I_{OS} \times \Delta T}{\Delta V}$ from which Figure 14 is derived. Accordingly, a 330 pF capacitor on each output will guarantee a worst case slew rate of 30 V per microsecond.

The interface driver is also required to withstand an accidental short to any other conductor in an interconnecting cable. The worst possible signal on any conductor would be another driver using a plus or minus 15 V, 500 mA source. The MC1488 is designed to indefinitely withstand such a short to all four outputs in a package as long as the power supply voltages are greater than 9.0 V (i.e., $V_{CC} \geq 9.0$ V; $V_{EE} \leq -9.0$ V). In some power supply designs, a loss of system power causes a low impedance on the power supply outputs. When this occurs, a low impedance to ground would exist at the power inputs to the MC1488 effectively shorting the 300 Ω output resistors to ground. If all four outputs were then shorted to plus or minus 15 V, the power dissipation in these resistors would be excessive. Therefore, if the system is designed to permit low impedances to ground at the power supplies of the drivers, a diode should be placed in each power supply lead to prevent overheating in this fault condition. These two diodes, as shown in Figure 15, could be used to decouple all the driver packages in a system. (These same diodes will allow the MC1488 to withstand momentary shorts to the ±25 V limits specified in the earlier Standard EIA−232B.) The addition of the diodes also permits the MC1488 to withstand faults with power supplies of less than the 9.0 V stated above.
2. Power Supply Range – as can be seen from the schematic drawing of the drivers, the positive and negative driving elements of the device are essentially independent and do not require matching power supplies. In fact, the positive supply can vary from a minimum 7.0 V (required for driving the negative pulldown section) to the maximum specified 15 V. The negative supply can vary from approximately −2.5 V to the minimum specified −15 V. The MC1488 will drive the output to within 2.0 V of the positive or negative supplies as long as the current output limits are not exceeded. The combination of the current limiting and supply voltage features allow a wide combination of possible outputs within the same quad package. Thus if only a portion of the four drivers are used for driving EIA–232D lines, the remainder could be used for DTL to MOS or even DTL to DTL translation. Figure 17 shows one such combination.

Figure 16. DTL/TTL-to-MOS Translator

Figure 17. Logic Translator Applications
## ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Device</th>
<th>Package</th>
<th>Operating Temperature Range</th>
<th>Shipping</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC1488D</td>
<td>SOIC–14</td>
<td>$T_A = 0$ to $+75^\circ C$</td>
<td>55 Units/Rail</td>
</tr>
<tr>
<td>MC1488DG</td>
<td>SOIC–14</td>
<td>(Pb–Free)</td>
<td></td>
</tr>
<tr>
<td>MC1488DR2</td>
<td>SOIC–14</td>
<td>(Pb–Free)</td>
<td>2500/Tape &amp; Reel</td>
</tr>
<tr>
<td>MC1488DR2G</td>
<td>SOIC–14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC1488P</td>
<td>PDIP–14</td>
<td>(Pb–Free)</td>
<td>25 Units/Rail</td>
</tr>
<tr>
<td>MC1488PG</td>
<td>PDIP–14</td>
<td>(Pb–Free)</td>
<td></td>
</tr>
<tr>
<td>MC1488M</td>
<td>SOEIAJ–14</td>
<td></td>
<td>50 Units/Rail</td>
</tr>
<tr>
<td>MC1488MG</td>
<td>SOEIAJ–14</td>
<td>(Pb–Free)</td>
<td></td>
</tr>
<tr>
<td>MC1488MEL</td>
<td>SOEIAJ–14</td>
<td></td>
<td>2000/Tape &amp; Reel</td>
</tr>
<tr>
<td>MC1488MELG</td>
<td>SOEIAJ–14</td>
<td>(Pb–Free)</td>
<td></td>
</tr>
</tbody>
</table>

## MARKING DIAGRAMS

**SOIC–14**
- **D SUFFIX**
  - CASE 751A
  - MC1488G
  - AWLYWW

**PDIP–14**
- **P SUFFIX**
  - CASE 646
  - MC1488P
  - AWLYWW

**SOEIAJ–14**
- **M SUFFIX**
  - CASE 965
  - MC1488
  - ALYWG

### MARKING DIAGRAMS EXPLANATION
- **A** = Assembly Location
- **WL, L** = Wafer Lot
- **YY, Y** = Year
- **WW, W** = Work Week
- **G** = Pb–Free Package

---

http://onsemi.com 8
**MECHANICAL CASE OUTLINE**

**PACKAGE DIMENSIONS**

**PDIP–14**

CASE 646–06

ISSUE S

**DATE 22 APR 2015**

**NOTES:**

2. CONTROLLING DIMENSION: INCHES.
4. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 0.10 INCH.
5. DIMENSION E IS MEASURED AT A POINT 0.015 BELOW DATUM PLANE H WITH THE LEADS CONSTRAINED PERPENDICULAR TO DATUM C.
6. DIMENSION D1 IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
7. DATUM PLANE H IS COINCIDENT WITH THE BOTTOM OF THE LEADS, WHERE THE LEADS EXIT THE BODY.
8. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE CORNERS).

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>MILLIMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.200–0.210</td>
</tr>
<tr>
<td>A1</td>
<td>0.080–0.085</td>
</tr>
<tr>
<td>A2</td>
<td>0.195–0.200</td>
</tr>
<tr>
<td>b</td>
<td>0.000–0.005</td>
</tr>
<tr>
<td>b1</td>
<td>0.002–0.005</td>
</tr>
<tr>
<td>b2</td>
<td>0.020–0.025</td>
</tr>
<tr>
<td>C</td>
<td>0.000–0.002</td>
</tr>
<tr>
<td>D</td>
<td>1.000–1.005</td>
</tr>
<tr>
<td>D1</td>
<td>1.000–1.002</td>
</tr>
<tr>
<td>E</td>
<td>0.300–0.325</td>
</tr>
<tr>
<td>D1</td>
<td>0.240–0.260</td>
</tr>
<tr>
<td>e</td>
<td>0.100 BSC</td>
</tr>
<tr>
<td>eB</td>
<td>0.060 TYP</td>
</tr>
<tr>
<td>L</td>
<td>0.015–0.020</td>
</tr>
<tr>
<td>M</td>
<td>0.115–0.150</td>
</tr>
<tr>
<td>m</td>
<td>0.100–0.150</td>
</tr>
<tr>
<td>eB</td>
<td>0.430–0.480</td>
</tr>
<tr>
<td>M</td>
<td>10°–10°</td>
</tr>
</tbody>
</table>

**GENERAL MARKING DIAGRAM**

*This information is generic. Please refer to device data sheet for actual part marking. Pb–Free indicator, “G” or microdot “*”, may or may not be present.

- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- G = Pb–Free Package

- XXXXXXXXXX
- XXXXXXXXXX
- AWLYYYYWG

- ☃️

**STYLES ON PAGE 2**

**DOCUMENT NUMBER:** 98ASB42428B

**DESCRIPTION:** PDIP–14

Electronic versions are uncontrolled except when accessed directly from the Document Repository.

Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC d/b/a ON Semiconductor or its subsidiaries in the United States and/or other countries.

ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

© Semiconductor Components Industries, LLC, 2019

www.onsemi.com
**STYLE 1:**
- PIN 1. COLLECTOR
- PIN 2. BASE
- PIN 3. EMITTER
- PIN 4. NO CONNECTION
- PIN 5. EMITTER
- PIN 6. BASE
- PIN 7. COLLECTOR
- PIN 8. COLLECTOR
- PIN 9. BASE
- PIN 10. EMITTER
- PIN 11. NO CONNECTION
- PIN 12. EMITTER
- PIN 13. BASE
- PIN 14. COLLECTOR

**STYLE 2:**
- CANCELLED

**STYLE 3:**
- CANCELLED

**STYLE 4:**
- PIN 1. DRAIN
- PIN 2. SOURCE
- PIN 3. GATE
- PIN 4. NO CONNECTION
- PIN 5. GATE
- PIN 6. SOURCE
- PIN 7. DRAIN
- PIN 8. DRAIN
- PIN 9. SOURCE
- PIN 10. GATE
- PIN 11. NO CONNECTION
- PIN 12. GATE
- PIN 13. SOURCE
- PIN 14. DRAIN

**STYLE 5:**
- PIN 1. GATE
- PIN 2. DRAIN
- PIN 3. SOURCE
- PIN 4. NO CONNECTION
- PIN 5. SOURCE
- PIN 6. DRAIN
- PIN 7. GATE
- PIN 8. GATE
- PIN 9. SOURCE
- PIN 10. SOURCE
- PIN 11. NO CONNECTION
- PIN 12. SOURCE
- PIN 13. DRAIN
- PIN 14. GATE

**STYLE 6:**
- PIN 1. COMMON CATHODE
- PIN 2. ANODE/CATHODE
- PIN 3. ANODE/CATHODE
- PIN 4. NO CONNECTION
- PIN 5. ANODE/CATHODE
- PIN 6. GATE
- PIN 7. ANODE/CATHODE
- PIN 8. ANODE/CATHODE
- PIN 9. ANODE/CATHODE
- PIN 10. NO CONNECTION
- PIN 11. ANODE/CATHODE
- PIN 12. NO CONNECTION
- PIN 13. NO CONNECTION
- PIN 14. ANODE/CATHODE

**STYLE 7:**
- PIN 1. NO CONNECTION
- PIN 2. ANODE
- PIN 3. ANODE
- PIN 4. NO CONNECTION
- PIN 5. ANODE
- PIN 6. NO CONNECTION
- PIN 7. ANODE
- PIN 8. ANODE
- PIN 9. ANODE
- PIN 10. NO CONNECTION
- PIN 11. ANODE
- PIN 12. NO CONNECTION
- PIN 13. NO CONNECTION
- PIN 14. COMMON CATHODE

**STYLE 8:**
- PIN 1. NO CONNECTION
- PIN 2. CATHODE
- PIN 3. CATHODE
- PIN 4. NO CONNECTION
- PIN 5. CATHODE
- PIN 6. NO CONNECTION
- PIN 7. CATHODE
- PIN 8. CATHODE
- PIN 9. CATHODE
- PIN 10. NO CONNECTION
- PIN 11. CATHODE
- PIN 12. NO CONNECTION
- PIN 13. NO CONNECTION
- PIN 14. COMMON ANODE

**STYLE 9:**
- PIN 1. COMMON CATHODE
- PIN 2. ANODE/CATHODE
- PIN 3. ANODE/CATHODE
- PIN 4. NO CONNECTION
- PIN 5. ANODE/CATHODE
- PIN 6. NO CONNECTION
- PIN 7. COMMON ANODE
- PIN 8. COMMON ANODE
- PIN 9. ANODE/CATHODE
- PIN 10. ANODE/CATHODE
- PIN 11. NO CONNECTION
- PIN 12. ANODE/CATHODE
- PIN 13. NO CONNECTION
- PIN 14. COMMON ANODE

**STYLE 10:**
- COMMON CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- NO CONNECTION
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- NO CONNECTION
- ANODE/CATHODE
- ANODE/CATHODE
- COMMON ANODE

**STYLE 11:**
- COMMON CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- COMMON ANODE
- COMMON ANODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- COMMON CATHODE

**STYLE 12:**
- COMMON CATHODE
- COMMON ANODE
- ANODE/CATHODE
- ANODE/CATHODE
- COMMON ANODE
- COMMON CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE
- ANODE/CATHODE

**PDIP-14**

**CASE 646–06**

**ISSUE S**

**DATE 22 APR 2015**

**DOCUMENT NUMBER:** 98ASB42428B

**DESCRIPTION:** PDIP-14

Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.
NOTES:
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

*This information is generic. Please refer to device data sheet for actual part marking.

Pb−Free indicator, “G” or microdot “/C0071”, may or may not be present.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2
### STYLE 7:
- Pin 1: COMMON ANODE
- Pin 2: ANODE/CATHODE
- Pin 3: ANODE/CATHODE
- Pin 4: ANODE/CATHODE
- Pin 5: ANODE/CATHODE
- Pin 6: ANODE/CATHODE
- Pin 7: ANODE/CATHODE
- Pin 8: ANODE/CATHODE
- Pin 9: ANODE/CATHODE
- Pin 10: ANODE/CATHODE
- Pin 11: ANODE/CATHODE
- Pin 12: COMMON CATHODE
- Pin 13: COMMON ANODE
- Pin 14: COMMON ANODE

### STYLE 8:
- Pin 1: COMMON CATHODE
- Pin 2: ANODE/CATHODE
- Pin 3: ANODE/CATHODE
- Pin 4: NO CONNECTION
- Pin 5: ANODE/CATHODE
- Pin 6: ANODE/CATHODE
- Pin 7: COMMON ANODE
- Pin 8: COMMON ANODE
- Pin 9: ANODE/CATHODE
- Pin 10: ANODE/CATHODE
- Pin 11: NO CONNECTION
- Pin 12: ANODE/CATHODE
- Pin 13: ANODE/CATHODE
- Pin 14: COMMON CATHODE

**ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.**

© Semiconductor Components Industries, LLC, 2019 www.onsemi.com
**MECHANICAL CASE OUTLINE**

**PACKAGE DIMENSIONS**

---

**SOEIAJ-14**
CASE 965–01
ISSUE B

**DATE**: 29 FEB 2008

---

**NOTES:**
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH.
6. DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

---

**DIMENSIONS**

<table>
<thead>
<tr>
<th>DIM</th>
<th>MIN</th>
<th>MAX</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.27</td>
<td>0.050</td>
<td>0.050</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>0.13</td>
<td>0.005</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>0.35</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>0.10</td>
<td>0.000</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0.85</td>
<td>0.000</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>0.10</td>
<td>0.000</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>0.70</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>0.15</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>Lm</td>
<td>0.10</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>Le</td>
<td>0.10</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.10</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>0.10</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>0.10</td>
<td>0.000</td>
<td>0.020</td>
<td></td>
</tr>
</tbody>
</table>

---

**SCALE**: 1:1

---

**DESCRIPTION**: 14 LD SOEIAJ

---

Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.