

# MC14007UB

## Dual Complementary Pair Plus Inverter

The MC14007UB multipurpose device consists of three N-Channel and three P-Channel enhancement mode devices packaged to provide access to each device. These versatile parts are useful in inverter circuits, pulse-shapers, linear amplifiers, high input impedance amplifiers, threshold detectors, transmission gating, and functional gating.

### Features

- Diode Protection on All Inputs
- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- Capable of Driving Two Low-power TTL Loads or One Low-power Schottky TTL Load Over the Rated Temperature Range
- Pin-for-Pin Replacement for CD4007A or CD4007UB
- This device has 2 outputs without ESD Protection. Antistatic precautions must be taken.
- These Devices are Pb-Free and are RoHS Compliant

### MAXIMUM RATINGS (Voltages Referenced to $V_{SS}$ )

| Symbol            | Parameter                                         | Value                  | Unit |
|-------------------|---------------------------------------------------|------------------------|------|
| $V_{DD}$          | DC Supply Voltage Range                           | -0.5 to +18.0          | V    |
| $V_{in}, V_{out}$ | Input or Output Voltage Range (DC or Transient)   | -0.5 to $V_{DD} + 0.5$ | V    |
| $I_{in}, I_{out}$ | Input or Output Current (DC or Transient) per Pin | $\pm 10$               | mA   |
| $P_D$             | Power Dissipation, per Package (Note 1)           | 500                    | mW   |
| $T_A$             | Ambient Temperature Range                         | -55 to +125            | °C   |
| $T_{stg}$         | Storage Temperature Range                         | -65 to +150            | °C   |
| $T_L$             | Lead Temperature (8 second Soldering)             | 260                    | °C   |

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.

#### 1. Temperature Derating:

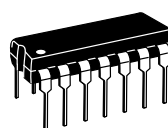
Plastic "P and D/DW" Packages: - 7.0 mW/°C from 65°C to 125°C.



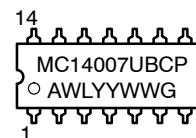
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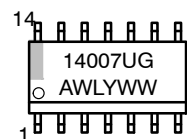
### MARKING DIAGRAMS



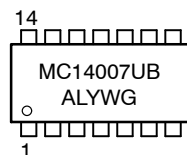
PDIP-14  
P SUFFIX  
CASE 646



SOIC-14  
D SUFFIX  
CASE 751A

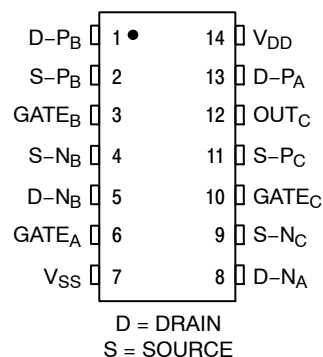


SOEIAJ-14  
F SUFFIX  
CASE 965



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G = Pb-Free Indicator

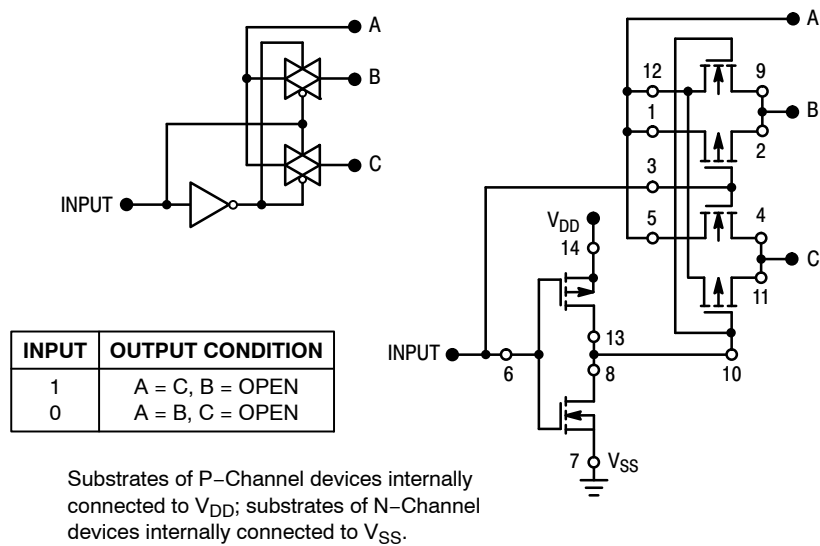
### PIN ASSIGNMENT



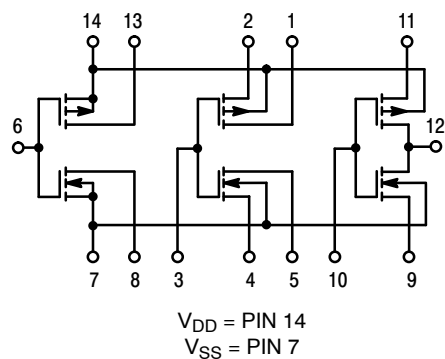
### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

# MC14007UB



**Figure 1. Typical Application: 2-Input Analog Multiplexer**



**Figure 2. Schematic**

# MC14007UB

## ELECTRICAL CHARACTERISTICS (Voltages Referenced to V<sub>SS</sub>)

| Symbol          | Characteristic                                                                                                                                    | V <sub>DD</sub><br>Vdc           | -55°C                                                                                                                                                                |      | 25°C  |                 |      | 125°C |      | Unit |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-----------------|------|-------|------|------|
|                 |                                                                                                                                                   |                                  | Min                                                                                                                                                                  | Max  | Min   | Typ<br>(Note 2) | Max  | Min   | Max  |      |
| V <sub>OL</sub> | Output Voltage<br>V <sub>in</sub> = V <sub>DD</sub> or 0                                                                                          | “0” Level<br>5.0<br>10<br>15     | –                                                                                                                                                                    | 0.05 | –     | 0               | 0.05 | –     | 0.05 | Vdc  |
|                 |                                                                                                                                                   |                                  | –                                                                                                                                                                    | 0.05 | –     | 0               | 0.05 | –     | 0.05 |      |
|                 |                                                                                                                                                   |                                  | –                                                                                                                                                                    | 0.05 | –     | 0               | 0.05 | –     | 0.05 |      |
| V <sub>OH</sub> | V <sub>in</sub> = 0 or V <sub>DD</sub>                                                                                                            | “1” Level<br>5.0<br>10<br>15     | 4.95                                                                                                                                                                 | –    | 4.95  | 5.0             | –    | 4.95  | –    | Vdc  |
|                 |                                                                                                                                                   |                                  | 9.95                                                                                                                                                                 | –    | 9.95  | 10              | –    | 9.95  | –    |      |
|                 |                                                                                                                                                   |                                  | 14.95                                                                                                                                                                | –    | 14.95 | 15              | –    | 14.95 | –    |      |
| V <sub>IL</sub> | Input Voltage<br>(V <sub>O</sub> = 4.5 Vdc)<br>(V <sub>O</sub> = 9.0 Vdc)<br>(V <sub>O</sub> = 13.5 Vdc)                                          | “0” Level<br>5.0<br>10<br>15     | –                                                                                                                                                                    | 1.0  | –     | 2.25            | 1.0  | –     | 1.0  | Vdc  |
|                 |                                                                                                                                                   |                                  | –                                                                                                                                                                    | 2.0  | –     | 4.50            | 2.0  | –     | 2.0  |      |
|                 |                                                                                                                                                   |                                  | –                                                                                                                                                                    | 2.5  | –     | 6.75            | 2.5  | –     | 2.5  |      |
| V <sub>IH</sub> | (V <sub>O</sub> = 0.5 Vdc)<br>(V <sub>O</sub> = 1.0 Vdc)<br>(V <sub>O</sub> = 1.5 Vdc)                                                            | “1” Level<br>5.0<br>10<br>15     | 4.0                                                                                                                                                                  | –    | 4.0   | 2.75            | –    | 4.0   | –    | Vdc  |
|                 |                                                                                                                                                   |                                  | 8.0                                                                                                                                                                  | –    | 8.0   | 5.50            | –    | 8.0   | –    |      |
|                 |                                                                                                                                                   |                                  | 12.5                                                                                                                                                                 | –    | 12.5  | 8.25            | –    | 12.5  | –    |      |
| I <sub>OH</sub> | Output Drive Current<br>(V <sub>OH</sub> = 2.5 Vdc)<br>(V <sub>OH</sub> = 4.6 Vdc)<br>(V <sub>OH</sub> = 9.5 Vdc)<br>(V <sub>OH</sub> = 13.5 Vdc) | Source<br>5.0<br>5.0<br>10<br>15 | –3.0                                                                                                                                                                 | –    | –2.4  | –5.0            | –    | –1.7  | –    | mAdc |
|                 |                                                                                                                                                   |                                  | –0.64                                                                                                                                                                | –    | –0.51 | –1.0            | –    | –0.36 | –    |      |
|                 |                                                                                                                                                   |                                  | –1.6                                                                                                                                                                 | –    | –1.3  | –2.5            | –    | –0.9  | –    |      |
|                 |                                                                                                                                                   |                                  | –4.2                                                                                                                                                                 | –    | –3.4  | –10             | –    | –2.4  | –    |      |
| I <sub>OL</sub> | (V <sub>OL</sub> = 0.4 Vdc)<br>(V <sub>OL</sub> = 0.5 Vdc)<br>(V <sub>OL</sub> = 1.5 Vdc)                                                         | Sink<br>5.0<br>10<br>15          | 0.64                                                                                                                                                                 | –    | 0.51  | 1.0             | –    | 0.36  | –    | mAdc |
|                 |                                                                                                                                                   |                                  | 1.6                                                                                                                                                                  | –    | 1.3   | 2.5             | –    | 0.9   | –    |      |
|                 |                                                                                                                                                   |                                  | 4.2                                                                                                                                                                  | –    | 3.4   | 10              | –    | 2.4   | –    |      |
| I <sub>in</sub> | Input Current                                                                                                                                     | 15                               | –                                                                                                                                                                    | ±0.1 | –     | ±0.00001        | ±0.1 | –     | ±1.0 | μAdc |
| C <sub>in</sub> | Input Capacitance<br>(V <sub>in</sub> = 0)                                                                                                        | –                                | –                                                                                                                                                                    | –    | –     | 5.0             | 7.5  | –     | –    | pF   |
| I <sub>DD</sub> | Quiescent Current<br>(Per Package)                                                                                                                | 5.0                              | –                                                                                                                                                                    | 0.25 | –     | 0.0005          | 0.25 | –     | 7.5  | μAdc |
|                 |                                                                                                                                                   | 10                               | –                                                                                                                                                                    | 0.5  | –     | 0.0010          | 0.5  | –     | 15   |      |
|                 |                                                                                                                                                   | 15                               | –                                                                                                                                                                    | 1.0  | –     | 0.0015          | 1.0  | –     | 30   |      |
| I <sub>T</sub>  | Total Supply Current (Notes 3 and 4)<br>(Dynamic plus Quiescent,<br>Per Gate) (C <sub>L</sub> = 50 pF)                                            | 5.0<br>10<br>15                  | I <sub>T</sub> = (0.7 μA/kHz) f + I <sub>DD</sub> /6<br>I <sub>T</sub> = (1.4 μA/kHz) f + I <sub>DD</sub> /6<br>I <sub>T</sub> = (2.2 μA/kHz) f + I <sub>DD</sub> /6 |      |       |                 |      |       |      | μAdc |

2. Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.

3. The formulas given are for the typical characteristics only at 25°C.

4. To calculate total supply current at loads other than 50 pF: I<sub>T</sub>(C<sub>L</sub>) = I<sub>T</sub>(50 pF) + (C<sub>L</sub> – 50) Vfk

where: I<sub>T</sub> is in μA (per package), C<sub>L</sub> in pF, V = (V<sub>DD</sub> – V<sub>SS</sub>) in volts, f in kHz is input frequency, and k = 0.003.

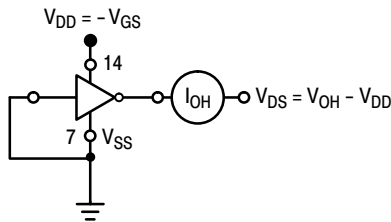
# MC14007UB

## SWITCHING CHARACTERISTICS (Note 5) ( $C_L = 50 \text{ pF}$ , $T_A = 25^\circ\text{C}$ )

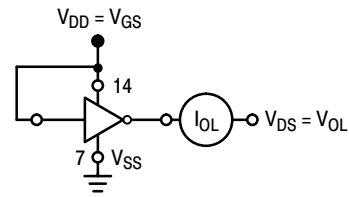
| Symbol    | Characteristic                                                                                                                                                                              | $V_{DD}$<br>Vdc | Min         | Typ<br>(Note 6) | Max             | Unit |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|-----------------|-----------------|------|
| $t_{TLH}$ | Output Rise Time<br>$t_{TLH} = (1.2 \text{ ns/pF}) C_L + 30 \text{ ns}$<br>$t_{TLH} = (0.5 \text{ ns/pF}) C_L + 20 \text{ ns}$<br>$t_{TLH} = (0.4 \text{ ns/pF}) C_L + 15 \text{ ns}$       | 5.0<br>10<br>15 | —<br>—<br>— | 90<br>45<br>35  | 180<br>90<br>70 | ns   |
| $t_{THL}$ | Output Fall Time<br>$t_{THL} = (1.2 \text{ ns/pF}) C_L + 15 \text{ ns}$<br>$t_{THL} = (0.5 \text{ ns/pF}) C_L + 15 \text{ ns}$<br>$t_{THL} = (0.4 \text{ ns/pF}) C_L + 10 \text{ ns}$       | 5.0<br>10<br>15 | —<br>—<br>— | 75<br>40<br>30  | 150<br>80<br>60 | ns   |
| $t_{PLH}$ | Turn-Off Delay Time<br>$t_{PLH} = (1.5 \text{ ns/pF}) C_L + 35 \text{ ns}$<br>$t_{PLH} = (0.2 \text{ ns/pF}) C_L + 20 \text{ ns}$<br>$t_{PLH} = (0.15 \text{ ns/pF}) C_L + 17.5 \text{ ns}$ | 5.0<br>10<br>15 | —<br>—<br>— | 60<br>30<br>25  | 125<br>75<br>55 | ns   |
| $t_{PHL}$ | Turn-On Delay Time<br>$t_{PHL} = (1.0 \text{ ns/pF}) C_L + 10 \text{ ns}$<br>$t_{PHL} = (0.3 \text{ ns/pF}) C_L + 15 \text{ ns}$<br>$t_{PHL} = (0.2 \text{ ns/pF}) C_L + 15 \text{ ns}$     | 5.0<br>10<br>15 | —<br>—<br>— | 60<br>30<br>25  | 125<br>75<br>55 | ns   |

5. The formulas given are for the typical characteristics only. Switching specifications are for device connected as an inverter.

6. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.



All unused inputs connected to ground.



All unused inputs connected to ground.

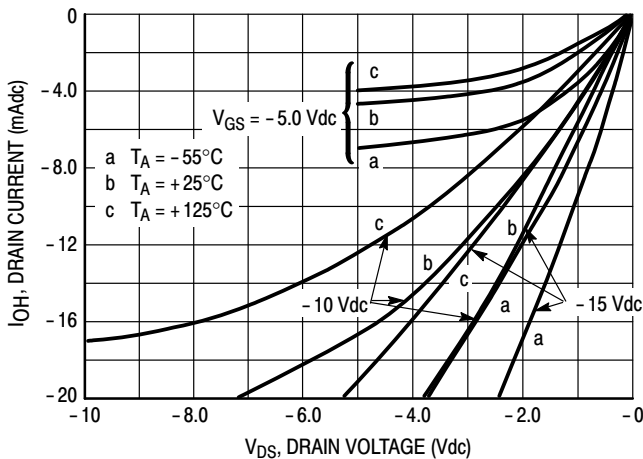


Figure 3. Typical Output Source Characteristics

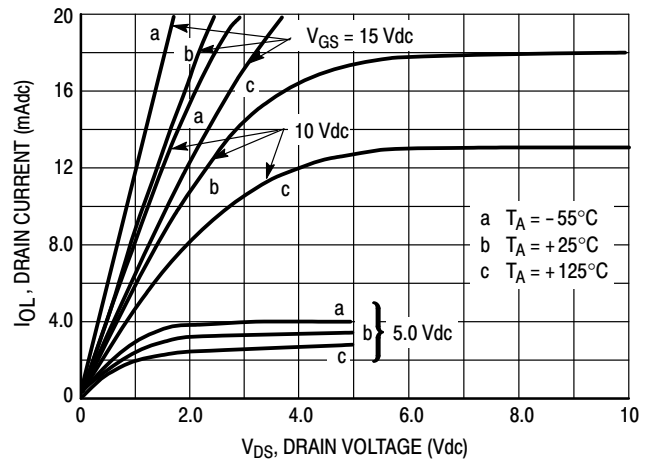
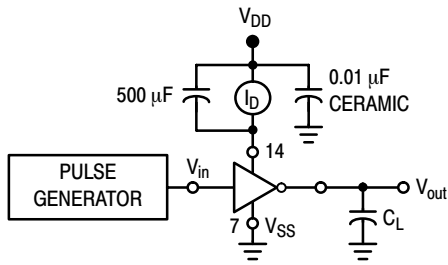


Figure 4. Typical Output Sink Characteristics

These typical curves are not guarantees, but are design aids.

Caution: The maximum current rating is 10 mA per pin.

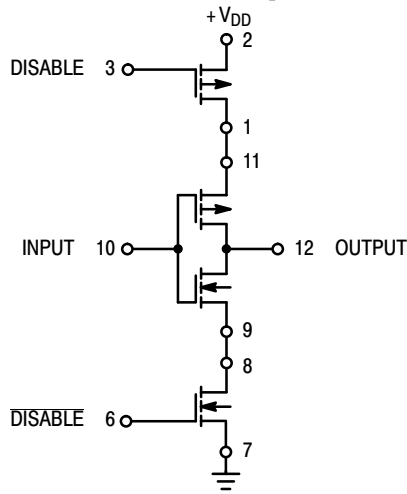
# MC14007UB



**Figure 5. Switching Time and Power Dissipation Test Circuit and Waveforms**

## APPLICATIONS

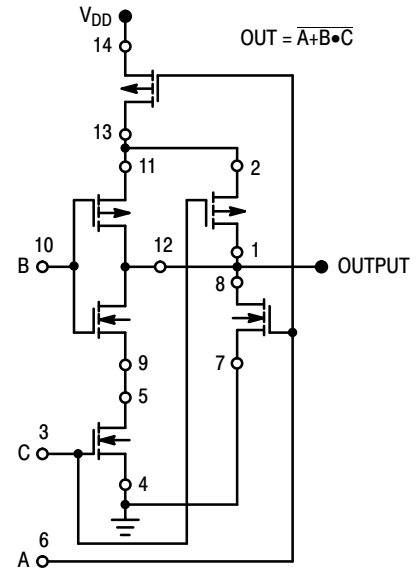
The MC14007UB dual pair plus inverter, which has access to all its elements offers a number of unique circuit applications. Figures 1, 6, and 7 are a few examples of the device flexibility.



| INPUT | DISABLE | OUTPUT |
|-------|---------|--------|
| 1     | 0       | 0      |
| 0     | 0       | 1      |
| X     | 1       | OPEN   |

X = Don't Care

**Figure 6. 3-State Buffer**



Substrates of P-Channel devices internally connected to  $V_{DD}$ ;  
Substrates of N-Channel devices internally connected to  $V_{SS}$ .

**Figure 7. AOI Functions Using Tree Logic**

## MC14007UB

### ORDERING INFORMATION

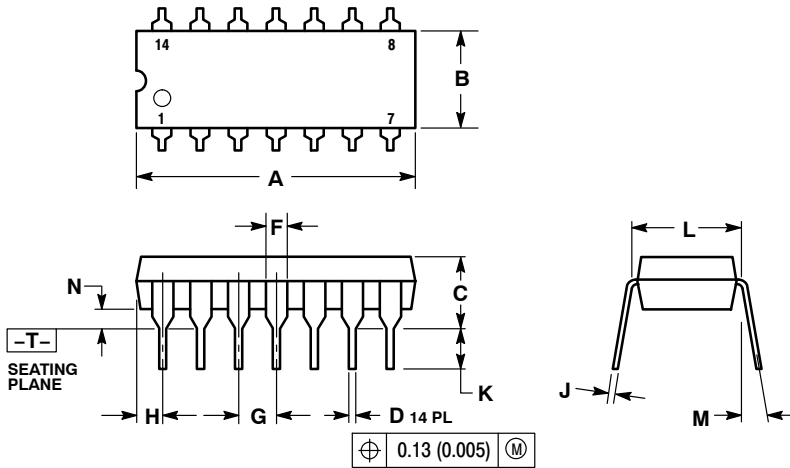
| Device        | Package                | Shipping†          |
|---------------|------------------------|--------------------|
| MC14007UBCPG  | PDIP-14<br>(Pb-Free)   | 25 Units / Rail    |
| MC14007UBDG   | SOIC-14<br>(Pb-Free)   | 55 Units / Rail    |
| MC14007UBDR2G | SOIC-14<br>(Pb-Free)   | 2500 / Tape & Reel |
| MC14007UBFELG | SOEIAJ-14<br>(Pb-Free) | 2000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MC14007UB

## PACKAGE DIMENSIONS

**PDIP-14**  
CASE 646-06  
ISSUE P



### NOTES:

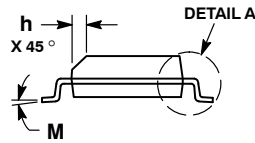
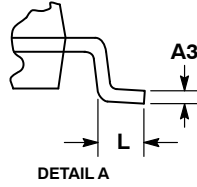
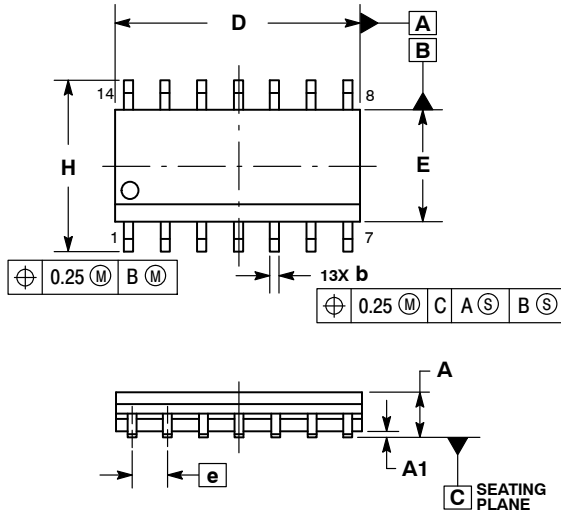
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.715     | 0.770 | 18.16       | 19.56 |
| B   | 0.240     | 0.260 | 6.10        | 6.60  |
| C   | 0.145     | 0.185 | 3.69        | 4.69  |
| D   | 0.015     | 0.021 | 0.38        | 0.53  |
| F   | 0.040     | 0.070 | 1.02        | 1.78  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.052     | 0.095 | 1.32        | 2.41  |
| J   | 0.008     | 0.015 | 0.20        | 0.38  |
| K   | 0.115     | 0.135 | 2.92        | 3.43  |
| L   | 0.290     | 0.310 | 7.37        | 7.87  |
| M   | ---       | 10 °  | ---         | 10 °  |
| N   | 0.015     | 0.039 | 0.38        | 1.01  |

# MC14007UB

## PACKAGE DIMENSIONS

SOIC-14 NB  
CASE 751A-03  
ISSUE K

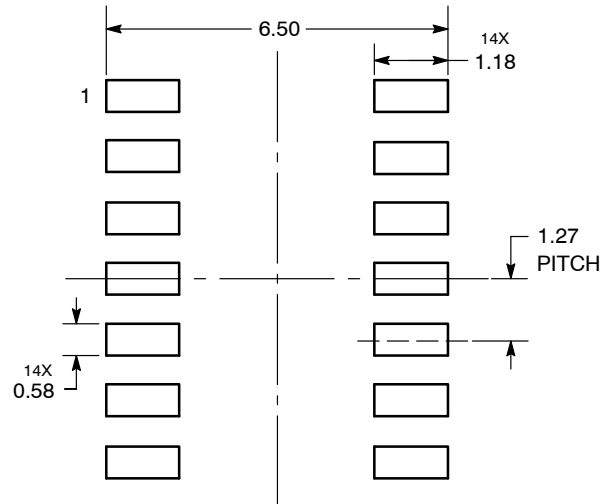


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
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.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 1.35        | 1.75 | 0.054     | 0.068 |
| A1  | 0.10        | 0.25 | 0.004     | 0.010 |
| A3  | 0.19        | 0.25 | 0.008     | 0.010 |
| b   | 0.35        | 0.49 | 0.014     | 0.019 |
| D   | 8.55        | 8.75 | 0.337     | 0.344 |
| E   | 3.80        | 4.00 | 0.150     | 0.157 |
| e   | 1.27 BSC    |      | 0.050 BSC |       |
| H   | 5.80        | 6.20 | 0.228     | 0.244 |
| h   | 0.25        | 0.50 | 0.010     | 0.019 |
| L   | 0.40        | 1.25 | 0.016     | 0.049 |
| M   | 0°          | 7°   | 0°        | 7°    |

### SOLDERING FOOTPRINT\*



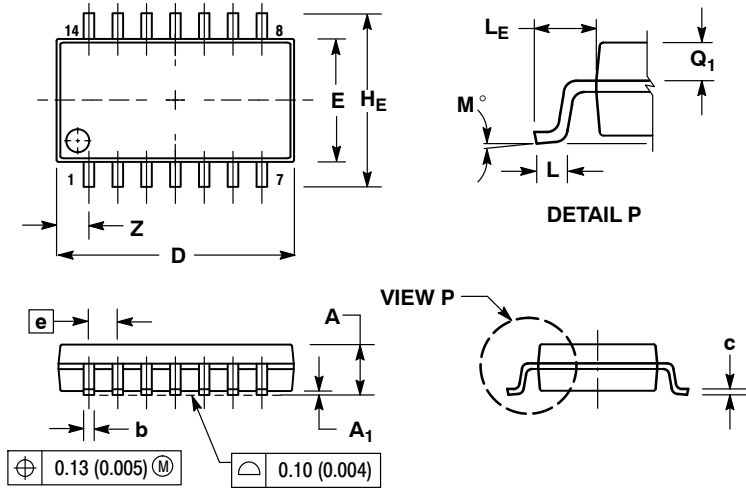
DIMENSIONS: MILLIMETERS

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

# MC14007UB

## PACKAGE DIMENSIONS

SOEIAJ-14  
CASE 965-01  
ISSUE B



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
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 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).

| DIM            | MILLIMETERS |       | INCHES    |       |
|----------------|-------------|-------|-----------|-------|
|                | MIN         | MAX   | MIN       | MAX   |
| A              | ---         | 2.05  | ---       | 0.081 |
| A <sub>1</sub> | 0.05        | 0.20  | 0.002     | 0.008 |
| b              | 0.35        | 0.50  | 0.014     | 0.020 |
| c              | 0.10        | 0.20  | 0.004     | 0.008 |
| D              | 9.90        | 10.50 | 0.390     | 0.413 |
| E              | 5.10        | 5.45  | 0.201     | 0.215 |
| e              | 1.27 BSC    |       | 0.050 BSC |       |
| H <sub>E</sub> | 7.40        | 8.20  | 0.291     | 0.323 |
| L              | 0.50        | 0.85  | 0.020     | 0.033 |
| L <sub>E</sub> | 1.10        | 1.50  | 0.043     | 0.059 |
| M              | 0 °         | 10 °  | 0 °       | 10 °  |
| Q <sub>1</sub> | 0.70        | 0.90  | 0.028     | 0.035 |
| Z              | ---         | 1.42  | ---       | 0.056 |

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Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
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- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)