

# MC10E101, MC100E101

## 5V ECL Quad 4-Input OR/NOR Gate

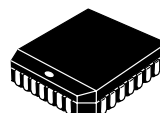
The MC10E/100E101 is a quad 4-input OR/NOR gate. The 100 Series contains temperature compensation.

- 500 ps Max. Propagation Delay
- PECL Mode Operating Range:  $V_{CC} = 4.2\text{ V}$  to  $5.7\text{ V}$  with  $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range:  $V_{CC} = 0\text{ V}$  with  $V_{EE} = -4.2\text{ V}$  to  $-5.7\text{ V}$
- Internal Input  $50\text{ K}\Omega$  Pulldown Resistors
- ESD Protection: Human Body Model;  $> 2\text{ KV}$ , Machine Model;  $> 200\text{ V}$
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1  
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL 94 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 115 devices



**ON Semiconductor®**

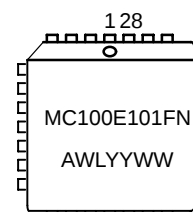
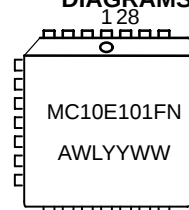
<http://onsemi.com>



**PLCC-28  
FN SUFFIX  
CASE 776**

A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

### MARKING DIAGRAMS



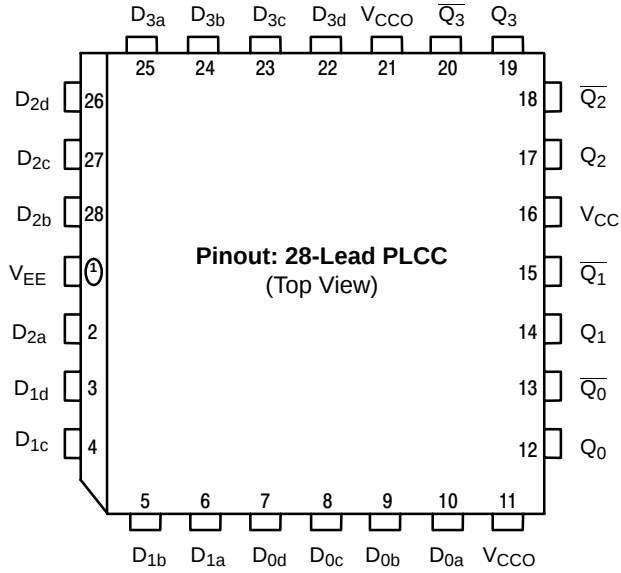
### ORDERING INFORMATION

| Device        | Package | Shipping <sup>†</sup> |
|---------------|---------|-----------------------|
| MC10E101FN    | PLCC-28 | 37 Units/Rail         |
| MC10E101FNR2  | PLCC-28 | 500 Units/Reel        |
| MC100E101FN   | PLCC-28 | 37 Units/Rail         |
| MC100E101FNR2 | PLCC-28 | 500 Units/Reel        |

<sup>†</sup>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.

# MC10E101, MC100E101

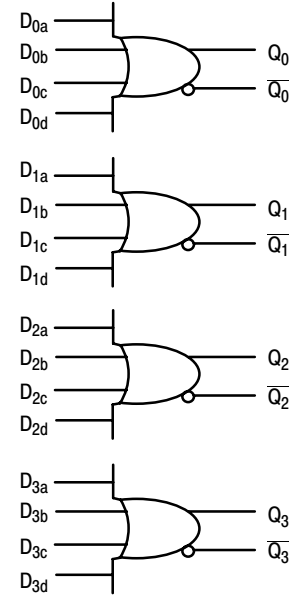
## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



\* All  $V_{CC}$  and  $V_{CCO}$  pins are tied together on the die.

Warning: All  $V_{CC}$ ,  $V_{CCO}$ , and  $V_{EE}$  pins must be externally connected to Power Supply to guarantee proper operation.

## LOGIC DIAGRAM



## PIN DESCRIPTION

| PIN                                          | FUNCTION                 |
|----------------------------------------------|--------------------------|
| $D_{0a} - D_{3d}$                            | ECL Data Inputs          |
| $Q_0 - Q_3, \overline{Q_0} - \overline{Q_3}$ | ECL Differential Outputs |
| $V_{CC}, V_{CCO}$                            | Positive Supply          |
| $V_{EE}$                                     | Negative Supply          |

## MAXIMUM RATINGS (Note 1)

| Symbol        | Parameter                                          | Condition 1                                    | Condition 2                            | Rating       | Units        |
|---------------|----------------------------------------------------|------------------------------------------------|----------------------------------------|--------------|--------------|
| $V_{CC}$      | PECL Mode Power Supply                             | $V_{EE} = 0\text{ V}$                          |                                        | 8            | V            |
| $V_I$         | PECL Mode Input Voltage<br>NECL Mode Input Voltage | $V_{EE} = 0\text{ V}$<br>$V_{CC} = 0\text{ V}$ | $V_I \leq V_{CC}$<br>$V_I \geq V_{EE}$ | 6<br>-6      | V<br>V       |
| $I_{out}$     | Output Current                                     | Continuous<br>Surge                            |                                        | 50<br>100    | mA<br>mA     |
| $T_A$         | Operating Temperature Range                        |                                                |                                        | 0 to +85     | °C           |
| $T_{stg}$     | Storage Temperature Range                          |                                                |                                        | -65 to +150  | °C           |
| $\theta_{JA}$ | Thermal Resistance (Junction to Ambient)           | 0 LFPM<br>500 LFPM                             | 28 PLCC<br>28 PLCC                     | 63.5<br>43.5 | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction to Case)              | Standard Board                                 | 28 PLCC                                | 22 to 26     | °C/W         |
| $T_{sol}$     | Wave Solder                                        | <2 to 3 sec @ 248°C                            |                                        | 265          | °C           |

1. Maximum Ratings are those values beyond which device damage may occur.

# MC10E101, MC100E101

## 10E SERIES PECL DC CHARACTERISTICS $V_{CCx} = 5.0\text{ V}$ ; $V_{EE} = 0.0\text{ V}$ (Note 2)

| Symbol   | Characteristic               | 0°C  |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|----------|------------------------------|------|------|------|------|------|------|------|------|------|---------------|
|          |                              | Min  | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$ | Power Supply Current         |      | 30   | 36   |      | 30   | 36   |      | 30   | 36   | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 3) | 3980 | 4070 | 4160 | 4020 | 4105 | 4190 | 4090 | 4185 | 4280 | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 3)  | 3050 | 3210 | 3370 | 3050 | 3210 | 3370 | 3050 | 3227 | 3405 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | 3830 | 3995 | 4160 | 3870 | 4030 | 4190 | 3940 | 4110 | 4280 | mV            |
| $V_{IL}$ | Input LOW Voltage            | 3050 | 3285 | 3520 | 3050 | 3285 | 3520 | 3050 | 3302 | 3555 | mV            |
| $I_{IH}$ | Input HIGH Current           |      |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5  | 0.3  |      | 0.5  | 0.25 |      | 0.3  | 0.2  |      | $\mu\text{A}$ |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

2. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $-0.46\text{ V}$  /  $+0.06\text{ V}$ .

3. Outputs are terminated through a 50 ohm resistor to  $V_{CC} - 2\text{ volts}$ .

## 10E SERIES NECL DC CHARACTERISTICS $V_{CCx} = 0.0\text{ V}$ ; $V_{EE} = -5.0\text{ V}$ (Note 4)

| Symbol   | Characteristic               | 0°C   |       |       | 25°C  |       |       | 85°C  |       |       | Unit          |
|----------|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
|          |                              | Min   | Typ   | Max   | Min   | Typ   | Max   | Min   | Typ   | Max   |               |
| $I_{EE}$ | Power Supply Current         |       | 30    | 36    |       | 30    | 36    |       | 30    | 36    | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 5) | -1020 | -930  | -840  | -980  | -895  | -810  | -910  | -815  | -720  | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 5)  | -1950 | -1790 | -1630 | -1950 | -1790 | -1630 | -1950 | -1773 | -1595 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | -1170 | -1005 | -840  | -1130 | -970  | -810  | -1060 | -890  | -720  | mV            |
| $V_{IL}$ | Input LOW Voltage            | -1950 | -1715 | -1480 | -1950 | -1715 | -1480 | -1950 | -1698 | -1445 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   | 0.3   |       | 0.5   | 0.065 |       | 0.3   | 0.2   |       | $\mu\text{A}$ |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

4. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $-0.46\text{ V}$  /  $+0.06\text{ V}$ .

5. Outputs are terminated through a 50 ohm resistor to  $V_{CC} - 2\text{ volts}$ .

# MC10E101, MC100E101

## 100E SERIES PECL DC CHARACTERISTICS $V_{CCx} = 5.0\text{ V}$ ; $V_{EE} = 0.0\text{ V}$ (Note 6)

| Symbol   | Characteristic               | 0°C  |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|----------|------------------------------|------|------|------|------|------|------|------|------|------|---------------|
|          |                              | Min  | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$ | Power Supply Current         |      | 30   | 36   |      | 30   | 36   |      | 35   | 42   | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 7) | 3975 | 4050 | 4120 | 3975 | 4050 | 4120 | 3975 | 4050 | 4120 | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 7)  | 3190 | 3295 | 3380 | 3190 | 3255 | 3380 | 3190 | 3260 | 3380 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | 3835 | 3975 | 4120 | 3835 | 3975 | 4120 | 3835 | 3975 | 4120 | mV            |
| $V_{IL}$ | Input LOW Voltage            | 3190 | 3355 | 3525 | 3190 | 3355 | 3525 | 3190 | 3355 | 3525 | mV            |
| $I_{IH}$ | Input HIGH Current           |      |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5  | 0.3  |      | 0.5  | 0.25 |      | 0.5  | 0.2  |      | $\mu\text{A}$ |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

6. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $-0.46\text{ V}$  /  $+0.8\text{ V}$ .

7. Outputs are terminated through a 50 ohm resistor to  $V_{CC} - 2\text{ volts}$ .

## 100E SERIES NECL DC CHARACTERISTICS $V_{CCx} = 0.0\text{ V}$ ; $V_{EE} = -5.0\text{ V}$ (Note 8)

| Symbol   | Characteristic               | 0°C   |       |       | 25°C  |       |       | 85°C  |       |       | Unit          |
|----------|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
|          |                              | Min   | Typ   | Max   | Min   | Typ   | Max   | Min   | Typ   | Max   |               |
| $I_{EE}$ | Power Supply Current         |       | 30    | 36    |       | 30    | 36    |       | 35    | 42    | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 9) | -1025 | -950  | -880  | -1025 | -950  | -880  | -1025 | -950  | -880  | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 9)  | -1810 | -1705 | -1620 | -1810 | -1745 | -1620 | -1810 | -1740 | -1620 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | -1165 | -1025 | -880  | -1165 | -1025 | -880  | -1165 | -1025 | -880  | mV            |
| $V_{IL}$ | Input LOW Voltage            | -1810 | -1645 | -1475 | -1810 | -1645 | -1475 | -1810 | -1645 | -1475 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   | 0.3   |       | 0.5   | 0.25  |       | 0.5   | 0.2   |       | $\mu\text{A}$ |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

8. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $-0.46\text{ V}$  /  $+0.8\text{ V}$ .

9. Outputs are terminated through a 50 ohm resistor to  $V_{CC} - 2\text{ volts}$ .

# MC10E101, MC100E101

**AC CHARACTERISTICS**  $V_{CCx} = 5.0\text{ V}$ ;  $V_{EE} = 0.0\text{ V}$  or  $V_{CCx} = 0.0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (Note 8)

| Symbol                   | Characteristic                                             | 0°C |          |     | 25°C |          |     | 85°C |          |     | Unit |
|--------------------------|------------------------------------------------------------|-----|----------|-----|------|----------|-----|------|----------|-----|------|
|                          |                                                            | Min | Typ      | Max | Min  | Typ      | Max | Min  | Typ      | Max |      |
| $f_{MAX}$                | Maximum Toggle Frequency                                   |     | 700      |     |      | 700      |     |      | 700      |     | MHz  |
| $t_{PLH}$<br>$t_{PHL}$   | Propagation Delay to Output<br>D to Q                      | 200 | 350      | 500 | 200  | 350      | 500 | 200  | 350      | 500 | ps   |
| $t_{SKEW}$<br>$t_{SKEW}$ | Within-Device Skew (Note 11)<br>Within-Gate Skew (Note 12) |     | 50<br>25 |     |      | 50<br>25 |     |      | 50<br>25 |     | ps   |
| $t_{JITTER}$             | Random Clock Jitter (RMS)                                  |     | < 1      |     |      | < 1      |     |      | < 1      |     | ps   |
| $t_r$<br>$t_f$           | Rise/Fall Time<br>(20 - 80%)                               | 300 | 380      | 575 | 300  | 380      | 575 | 300  | 380      | 575 | ps   |

NOTE: Devices are designed to meet the AC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

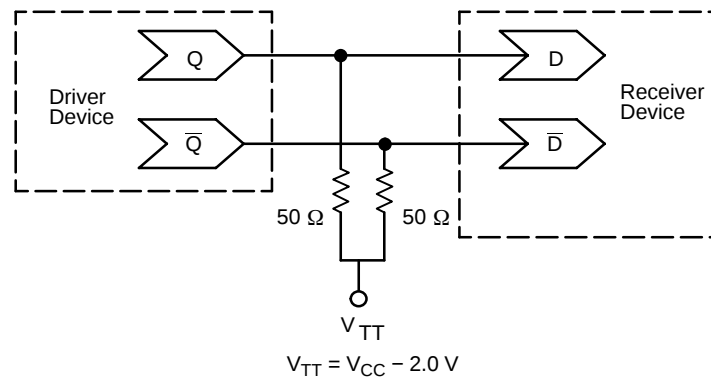
10.10 Series:  $V_{EE}$  can vary  $-0.46\text{ V} / +0.06\text{ V}$ .

100 Series:  $V_{EE}$  can vary  $-0.46\text{ V} / +0.8\text{ V}$ .

11. Within-device skew is defined as identical transitions on similar paths through a device.

12. Within-gate skew is defined as the variation in propagation delays of a gate when driven from its different inputs.

## MC10E101, MC100E101



**Figure 1. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020 – Termination of ECL Logic Devices.)

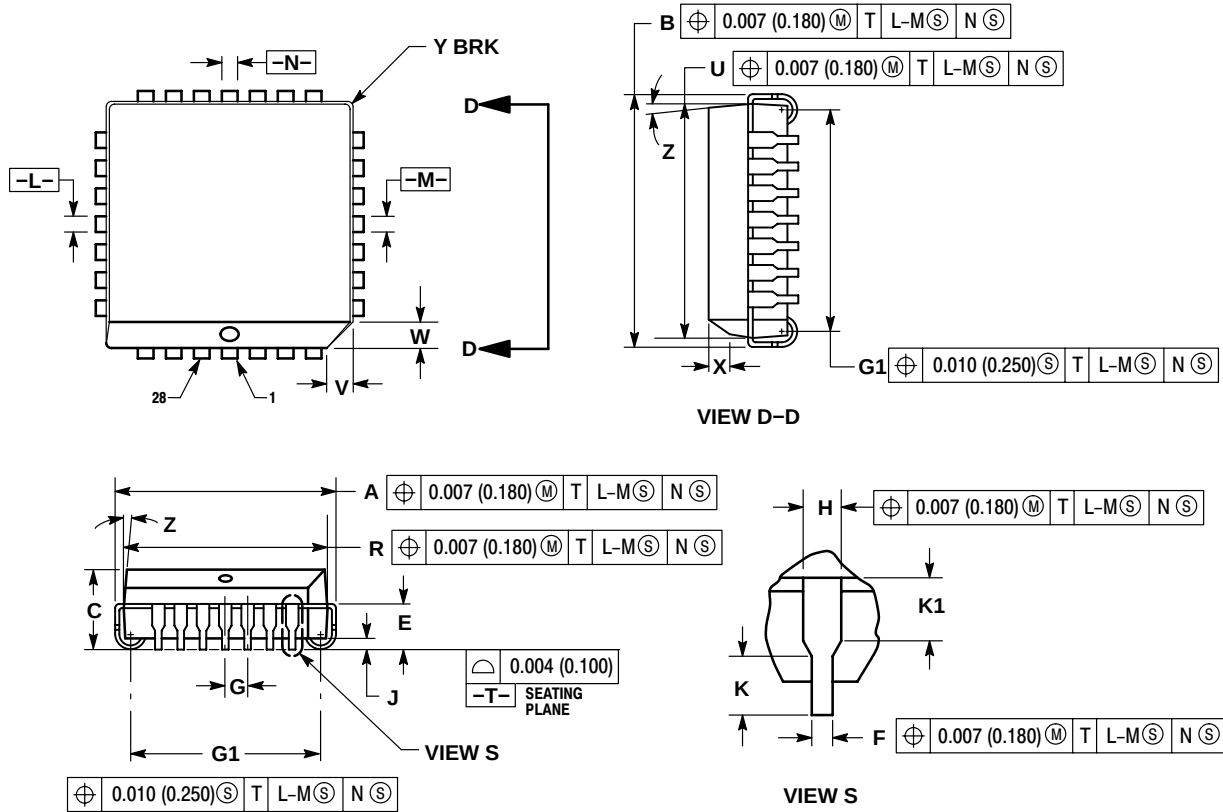
### Resource Reference of Application Notes

|                |                                                               |
|----------------|---------------------------------------------------------------|
| <b>AN1404</b>  | – ECLinPS Circuit Performance at Non-Standard $V_{IH}$ Levels |
| <b>AN1405</b>  | – ECL Clock Distribution Techniques                           |
| <b>AN1406</b>  | – Designing with PECL (ECL at +5.0 V)                         |
| <b>AN1503</b>  | – ECLinPS I/O SPICE Modeling Kit                              |
| <b>AN1504</b>  | – Metastability and the ECLinPS Family                        |
| <b>AN1568</b>  | – Interfacing Between LVDS and ECL                            |
| <b>AN1596</b>  | – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit      |
| <b>AN1650</b>  | – Using Wire-OR Ties in ECLinPS Designs                       |
| <b>AN1672</b>  | – The ECL Translator Guide                                    |
| <b>AND8001</b> | – Odd Number Counters Design                                  |
| <b>AND8002</b> | – Marking and Date Codes                                      |
| <b>AND8020</b> | – Termination of ECL Logic Devices                            |

# MC10E101, MC100E101

## PACKAGE DIMENSIONS

PLCC-28  
FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 776-02  
ISSUE E



### NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.485     | 0.495 | 12.32       | 12.57 |
| B   | 0.485     | 0.495 | 12.32       | 12.57 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.019 | 0.33        | 0.48  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | ---   | 0.51        | ---   |
| K   | 0.025     | ---   | 0.64        | ---   |
| R   | 0.450     | 0.456 | 11.43       | 11.58 |
| U   | 0.450     | 0.456 | 11.43       | 11.58 |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | ---       | 0.020 | ---         | 0.50  |
| Z   | 2° 10°    |       | 2° 10°      |       |
| G1  | 0.410     | 0.430 | 10.42       | 10.92 |
| K1  | 0.040     | ---   | 1.02        | ---   |

# MC10E101, MC100E101

**ON Semiconductor** and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA

**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada

**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada

**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Japan:** ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
**Phone:** 81-3-5773-3850

**ON Semiconductor Website:** <http://onsemi.com>

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.