

# MC10EL31, MC100EL31

## 5 V ECL D Flip-Flop With Set and Reset

The MC10EL/100EL31 is a D flip-flop with set and reset. The device is functionally equivalent to the E131 device with higher performance capabilities. With propagation delays and output transition times significantly faster than the E131, the EL31 is ideally suited for those applications which require the ultimate in AC performance.

Both set and reset inputs are asynchronous, level triggered signals. Data enters the master portion of the flip-flop when clock is LOW and is transferred to the slave, and thus the outputs, upon a positive transition of the clock.

The 100 Series contains temperature compensation.

### Features

- 475 ps Propagation Delay
- 2.8 GHz Toggle Frequency
- ESD Protection: > 1 kV Human Body Model, > 100 V Machine Model
- 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 Pulldown Resistors on D, CLK, S, and R
- 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
- Metastability 125 ps (see Application Note AN1504)
- Transistor Count = 79 devices
- Pb-Free Packages are Available



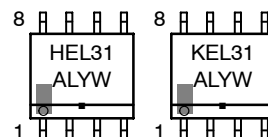
ON Semiconductor®

<http://onsemi.com>

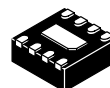
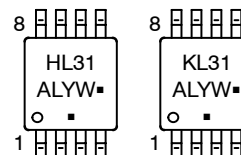
### MARKING DIAGRAMS\*



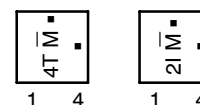
SOIC-8  
D SUFFIX  
CASE 751



TSSOP-8  
DT SUFFIX  
CASE 948R



DFN8  
MN SUFFIX  
CASE 506AA



H = MC10                      L = Wafer Lot  
K = MC100                    Y = Year  
4T = MC10                    W = Work Week  
2I = MC100                   M̄ = Date Code  
A = Assembly Location      ■ = Pb-Free Package

(Note: Microdot may be in either location)

\*For additional marking information, refer to Application Note AND8002/D.

### ORDERING INFORMATION

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

# MC10EL31, MC100EL31

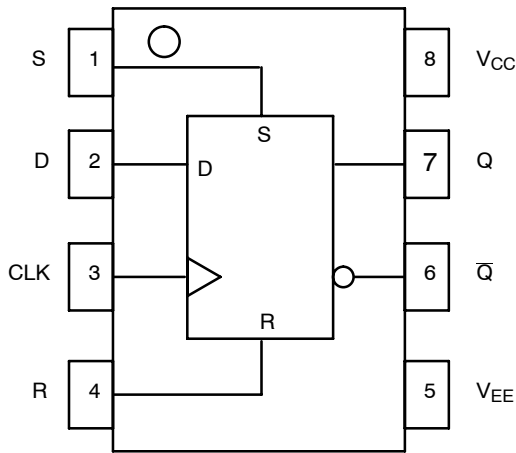


Figure 1. Logic Diagram and Pinout Assignment

Table 1. TRUTH TABLE

| D | S* | R* | CLK | Q     |
|---|----|----|-----|-------|
| L | L  | L  | Z   | L     |
| H | L  | L  | Z   | H     |
| X | H  | L  | X   | H     |
| X | L  | H  | X   | L     |
| X | H  | H  | X   | Undef |

Z = LOW to HIGH Transition

\* Pins will default low when left open.

Table 2. PIN DESCRIPTION

| PIN          | FUNCTION  |
|--------------|---|
| S            | ECL Set Input   |
| D            | ECL Data Input  |
| R            | ECL Reset Input   |
| CLK          | ECL Clock Input   |
| Q, $\bar{Q}$ | ECL Data Outputs  |
| $V_{CC}$     | Positive Supply   |
| $V_{EE}$     | Negative Supply   |
| EP           | Exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply or leave floating open. |

Table 3. MAXIMUM RATINGS

| Symbol        | Parameter  | Condition 1                                    | Condition 2                                | Rating        | Unit         |
|---------------|--|--|--|---------------|--------------|
| $V_{CC}$      | PECL Mode Power Supply                             | $V_{EE} = 0\text{ V}$                          |  | 8             | V            |
| $V_{EE}$      | NECL Mode Power Supply                             | $V_{CC} = 0\text{ V}$                          |  | -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            |
| $I_{out}$     | Output Current                                     | Continuous<br>Surge                            |  | 50<br>100     | mA<br>mA     |
| $T_A$         | Operating Temperature Range                        |  |  | -40 to +85    | °C           |
| $T_{stg}$     | Storage Temperature Range                          |  |  | -65 to +150   | °C           |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | SOIC-8<br>SOIC-8                           | 190<br>130    | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | SOIC-8                                     | 41 to 44      | °C/W         |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | TSSOP-8<br>TSSOP-8                         | 185<br>140    | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | TSSOP-8                                    | 41 to 44 ± 5% | °C/W         |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | DFN8<br>DFN8                               | 129<br>84     | °C/W<br>°C/W |
| $T_{sol}$     | Wave Solder  | Pb<br>Pb-Free                                  | <2 to 3 sec @ 248°C<br><2 to 3 sec @ 260°C | 265<br>265    | °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.

# MC10EL31, MC100EL31

**Table 4. 10EL SERIES PECL DC CHARACTERISTICS**  $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = 0\text{ V}$  (Note 1)

| Symbol   | Characteristic               | -40°C |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|----------|------------------------------|-------|------|------|------|------|------|------|------|------|---------------|
|          |                              | Min   | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$ | Power Supply Current         |       | 27   | 32   |      | 27   | 32   |      | 27   | 32   | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 4) | 3920  | 4010 | 4110 | 4020 | 4105 | 4190 | 4090 | 4185 | 4280 | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 2)  | 3050  | 3200 | 3350 | 3050 | 3210 | 3370 | 3050 | 3227 | 3405 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | 3770  |      | 4110 | 3870 |      | 4190 | 3940 |      | 4280 | mV            |
| $V_{IL}$ | Input LOW Voltage            | 3050  |      | 3500 | 3050 |      | 3520 | 3050 |      | 3555 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   |      |      | 0.5  |      |      | 0.3  |      |      | $\mu\text{A}$ |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.25 V / -0.5 V.
2. Outputs are terminated through a 50 ohm resistor to  $V_{CC}$ -2 volts.

**Table 5. 10EL SERIES NECL DC CHARACTERISTICS**  $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (Note 3)

| Symbol   | Characteristic               | -40°C |       |       | 25°C  |       |       | 85°C  |       |       | Unit          |
|----------|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
|          |                              | Min   | Typ   | Max   | Min   | Typ   | Max   | Min   | Typ   | Max   |               |
| $I_{EE}$ | Power Supply Current         |       | 27    | 32    |       | 27    | 32    |       | 27    | 32    | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 4) | -1080 | -990  | -890  | -980  | -895  | -810  | -910  | -815  | -720  | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 4)  | -1950 | -1800 | -1650 | -1950 | -1790 | -1630 | -1950 | -1773 | -1595 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | -1230 |       | -890  | -1130 |       | -810  | -1060 |       | -720  | mV            |
| $V_{IL}$ | Input LOW Voltage            | -1950 |       | -1500 | -1950 |       | -1480 | -1950 |       | -1445 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   |       |       | 0.5   |       |       | 0.3   |       |       | $\mu\text{A}$ |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

3. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.25 V / -0.5 V.
4. Outputs are terminated through a 50 ohm resistor to  $V_{CC}$ -2 volts.

# MC10EL31, MC100EL31

**Table 6. 100EL SERIES PECL DC CHARACTERISTICS**  $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = 0\text{ V}$  (Note 5)

| Symbol   | Characteristic               | -40°C |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|----------|------------------------------|-------|------|------|------|------|------|------|------|------|---------------|
|          |                              | Min   | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$ | Power Supply Current         |       | 27   | 32   |      | 27   | 32   |      | 31   | 37   | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 6) | 3915  | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4050 | 4120 | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 6)  | 3170  | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | 3835  |      | 4120 | 3835 |      | 4120 | 3835 |      | 4120 | mV            |
| $V_{IL}$ | Input LOW Voltage            | 3190  |      | 3525 | 3190 |      | 3525 | 3190 |      | 3525 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   |      |      | 0.5  |      |      | 0.5  |      |      | $\mu\text{A}$ |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

5. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8 V / -0.5 V.

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

**Table 7. 100EL SERIES NECL DC CHARACTERISTICS**  $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (Note 7)

| Symbol   | Characteristic               | -40°C |       |       | 25°C  |       |       | 85°C  |       |       | Unit          |
|----------|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
|          |                              | Min   | Typ   | Max   | Min   | Typ   | Max   | Min   | Typ   | Max   |               |
| $I_{EE}$ | Power Supply Current         |       | 27    | 32    |       | 27    | 32    |       | 31    | 37    | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 8) | -1085 | -1005 | -880  | -1025 | -955  | -880  | -1025 | -955  | -880  | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 8)  | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | -1165 |       | -880  | -1165 |       | -880  | -1165 |       | -880  | mV            |
| $V_{IL}$ | Input LOW Voltage            | -1810 |       | -1475 | -1810 |       | -1475 | -1810 |       | -1475 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   |       |       | 0.5   |       |       | 0.5   |       |       | $\mu\text{A}$ |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

7. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8 V / -0.5 V.

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

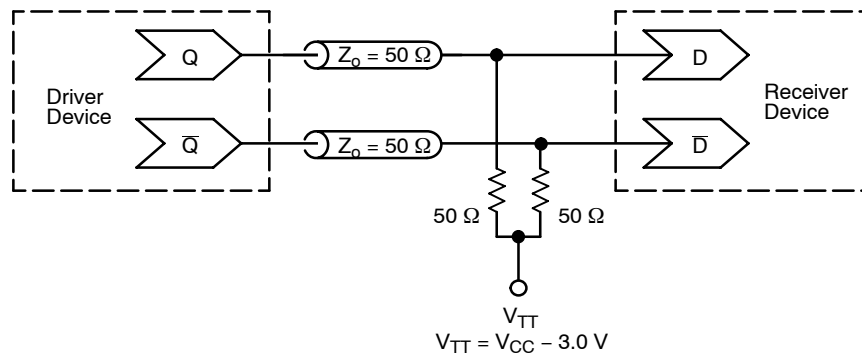
# MC10EL31, MC100EL31

**Table 8. AC CHARACTERISTICS**  $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = 0\text{ V}$  or  $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (Note 9)

| Symbol                               | Characteristic                             | -40°C      |            |            | 25°C       |            |            | 85°C       |            |            | Unit |
|--------------------------------------|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
|                                      |  | Min        | Typ        | Max        | Min        | Typ        | Max        | Min        | Typ        | Max        |      |
| $f_{\max}$                           | Maximum Toggle Frequency                   | 2.0        | 2.5        |            | 2.2        | 2.8        |            | 2.2        | 2.8        |            | GHz  |
| $t_{\text{PLH}}$<br>$t_{\text{PHL}}$ | Propagation Delay to Output<br>CLK<br>S, R | 315<br>295 | 465<br>455 | 630<br>630 | 375<br>355 | 475<br>465 | 590<br>590 | 430<br>400 | 530<br>510 | 645<br>645 | ps   |
| $t_S$<br>$t_H$                       | Setup Time<br>Hold Time                    | 150<br>250 | 0<br>100   |            | 150<br>250 | 0<br>100   |            | 150<br>250 | 0<br>100   |            | ps   |
| $t_{\text{RR}}$                      | Set/Reset Recovery                         | 400        | 200        |            | 400        | 200        |            | 400        | 200        |            | ps   |
| $t_{\text{PW}}$                      | Minimum Pulse Width<br>CLK, Set, Reset     | 400        |            |            | 400        |            |            | 400        |            |            | ps   |
| $t_{\text{JITTER}}$                  | Cycle-to-Cycle Jitter                      |            | TBD        |            |            | TBD        |            |            | TBD        |            | ps   |
| $t_r$<br>$t_f$                       | Output Rise/Fall Times Q<br>(20% - 80%)    | 100        | 225        | 350        | 100        | 225        | 350        | 100        | 225        | 350        | ps   |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

9. 10 Series:  $V_{EE}$  can vary +0.25 V / -0.5 V.  
100 Series:  $V_{EE}$  can vary +0.8 V / -0.5 V.



**Figure 2. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

# MC10EL31, MC100EL31

## ORDERING INFORMATION

| Device         | Package              | Shipping†          |
|----------------|----------------------|--------------------|
| MC10EL31D      | SOIC-8               | 98 Units / Rail    |
| MC10EL31DG     | SOIC-8<br>(Pb-Free)  | 98 Units / Rail    |
| MC10EL31DR2    | SOIC-8               | 2500 / Tape & Reel |
| MC10EL31DR2G   | SOIC-8<br>(Pb-Free)  | 2500 / Tape & Reel |
| MC10EL31DT     | TSSOP-8              | 100 Units / Rail   |
| MC10EL31DTG    | TSSOP-8<br>(Pb-Free) | 100 Units / Rail   |
| MC10EL31DTR2   | TSSOP-8              | 2500 / Tape & Reel |
| MC10EL31DTR2G  | TSSOP-8<br>(Pb-Free) | 2500 / Tape & Reel |
| MC10EL31MNR4   | DFN8                 | 1000 / Tape & Reel |
| MC10EL31MNR4G  | DFN8<br>(Pb-Free)    | 1000 / Tape & Reel |
| MC100EL31D     | SOIC-8               | 98 Units / Rail    |
| MC100EL31DG    | SOIC-8<br>(Pb-Free)  | 98 Units / Rail    |
| MC100EL31DR2   | SOIC-8               | 2500 / Tape & Reel |
| MC100EL31DR2G  | SOIC-8<br>(Pb-Free)  | 2500 / Tape & Reel |
| MC100EL31DT    | TSSOP-8              | 100 Units / Rail   |
| MC100EL31DTG   | TSSOP-8<br>(Pb-Free) | 100 Units / Rail   |
| MC100EL31DTR2  | TSSOP-8              | 2500 / Tape & Reel |
| MC100EL31DTR2G | TSSOP-8<br>(Pb-Free) | 2500 / Tape & Reel |
| MC100EL31MNR4  | DFN8                 | 1000 / Tape & Reel |
| MC100EL31MNR4G | DFN8<br>(Pb-Free)    | 1000 / 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.

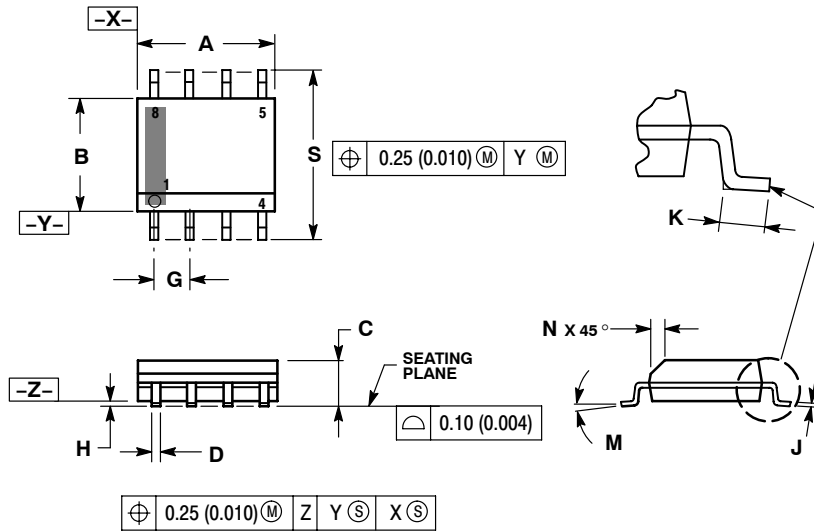
### Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPICE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

# MC10EL31, MC100EL31

## PACKAGE DIMENSIONS

SOIC-8 NB  
CASE 751-07  
ISSUE AH

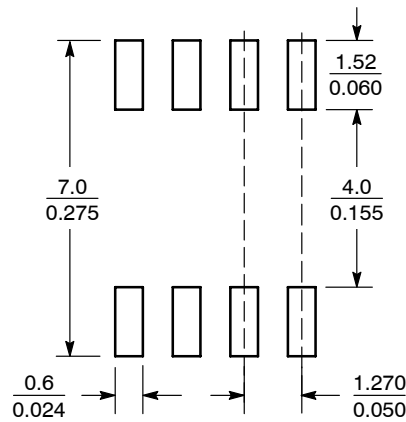


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 4.80        | 5.00 | 0.189     | 0.197 |
| B   | 3.80        | 4.00 | 0.150     | 0.157 |
| C   | 1.35        | 1.75 | 0.053     | 0.069 |
| D   | 0.33        | 0.51 | 0.013     | 0.020 |
| G   | 1.27 BSC    |      | 0.050 BSC |       |
| H   | 0.10        | 0.25 | 0.004     | 0.010 |
| J   | 0.19        | 0.25 | 0.007     | 0.010 |
| K   | 0.40        | 1.27 | 0.016     | 0.050 |
| M   | 0°          | 8°   | 0°        | 8°    |
| N   | 0.25        | 0.50 | 0.010     | 0.020 |
| S   | 5.80        | 6.20 | 0.228     | 0.244 |

### SOLDERING FOOTPRINT\*



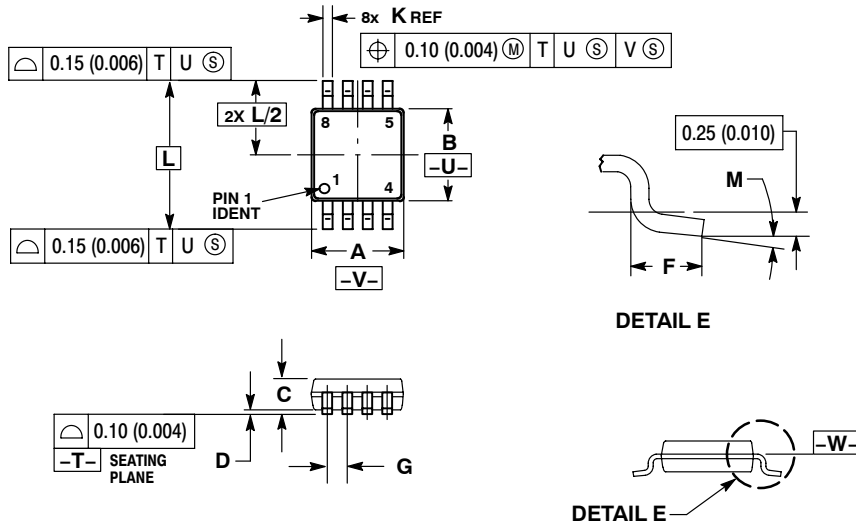
SCALE 6:1 ( $\frac{\text{mm}}{\text{inches}}$ )

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

# MC10EL31, MC100EL31

## PACKAGE DIMENSIONS

TSSOP-8  
DT SUFFIX  
PLASTIC TSSOP PACKAGE  
CASE 948R-02  
ISSUE A



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

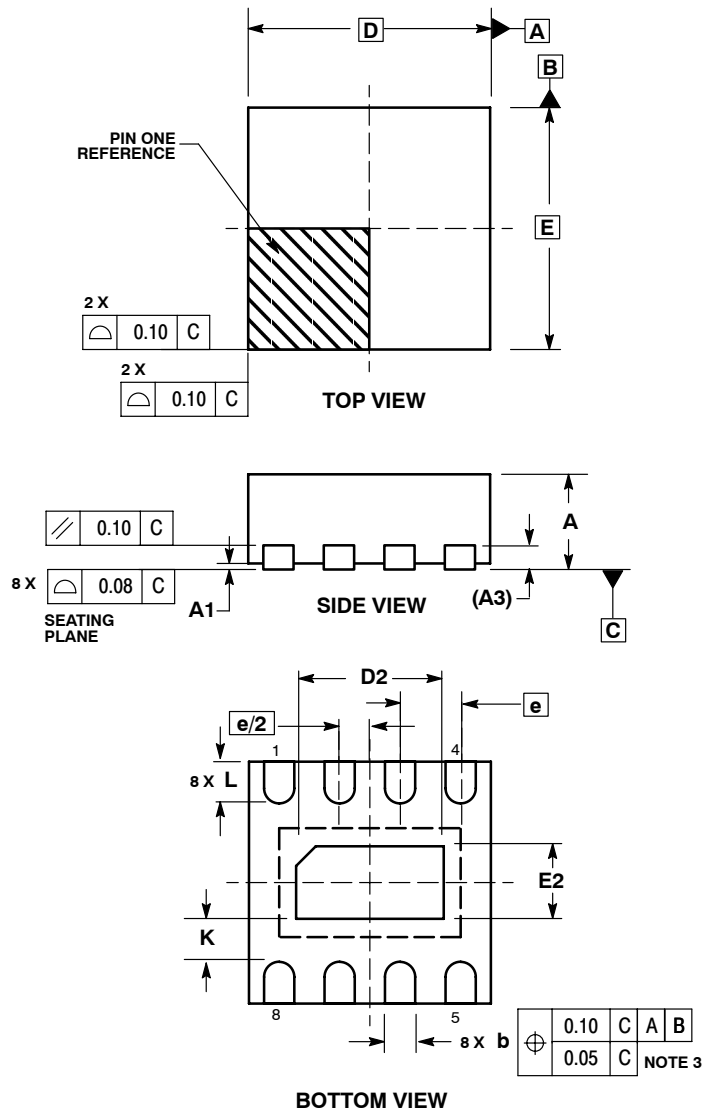
| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 2.90        | 3.10 | 0.114     | 0.122 |
| B   | 2.90        | 3.10 | 0.114     | 0.122 |
| C   | 0.80        | 1.10 | 0.031     | 0.043 |
| D   | 0.05        | 0.15 | 0.002     | 0.006 |
| F   | 0.40        | 0.70 | 0.016     | 0.028 |
| G   | 0.65 BSC    |      | 0.026 BSC |       |
| K   | 0.25        | 0.40 | 0.010     | 0.016 |
| L   | 4.90 BSC    |      | 0.193 BSC |       |
| M   | 0°          | 6°   | 0°        | 6°    |



# MC10EL31, MC100EL31

## PACKAGE DIMENSIONS

DFN8  
CASE 506AA-01  
ISSUE D



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994 .
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 0.80        | 1.00 |
| A1  | 0.00        | 0.05 |
| A3  | 0.20 REF    |      |
| b   | 0.20        | 0.30 |
| D   | 2.00 BSC    |      |
| D2  | 1.10        | 1.30 |
| E   | 2.00 BSC    |      |
| E2  | 0.70        | 0.90 |
| e   | 0.50 BSC    |      |
| K   | 0.20        | ---  |
| L   | 0.25        | 0.35 |

ECLinPS is a trademark of Semiconductor Components INdustries, LLC (SCILLC).

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

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5773-3850

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
For additional information, please contact your local Sales Representative

MC10EL31/D