

MC10EL35, MC100EL35

5V ECL JK Flip-Flop

Description

The MC10EL/100EL35 is a high speed JK flip-flop. The J/K data enters the master portion of the flip-flop when the clock is LOW and is transferred to the slave, and thus the outputs, upon a positive transition of the clock. The reset pin is asynchronous and is activated with a logic HIGH.

The 100 Series contains temperature compensation.

Features

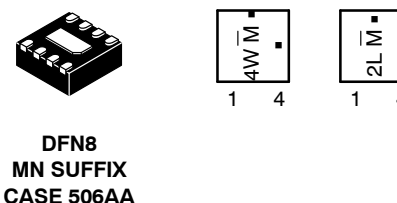
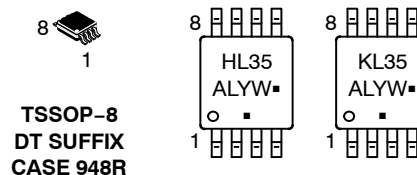
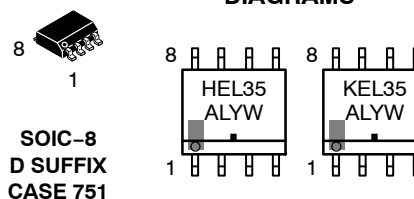
- 525 ps Propagation Delay
- 2.2G Hz Toggle Frequency
- ESD Protection: > 1 kV Human Body Model, > 100 V Machine Model
- PECL Mode Operating Range: $V_{CC} = 4.2\text{ V to }5.7$ with $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range: $V_{CC} = 0\text{ V}$ with $V_{EE} = -4.2\text{ V to }-5.7\text{ V}$
- Internal Input Pulldown Resistors on J, K, CLK, 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
- Transistor Count = 81 devices
- Pb-Free Packages are Available



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MARKING DIAGRAMS*



H = MC10 L = Wafer Lot
 K = MC100 Y = Year
 4W = MC10 W = Work Week
 2L = 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 5 of this data sheet.

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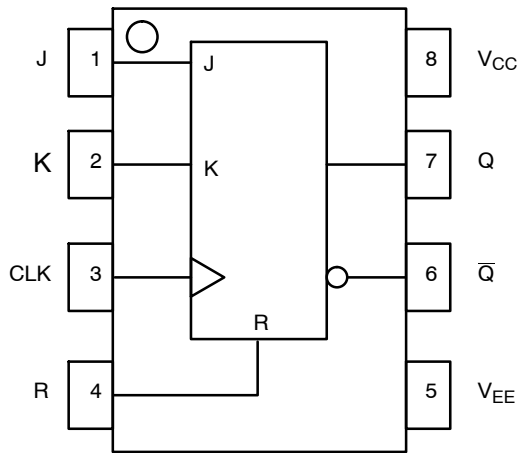


Figure 1. Logic Diagram and Pinout Assignment

Table 1. PIN DESCRIPTION

| PIN | FUNCTION |
|-----------------|--|
| J | ECL Input |
| K | ECL Input |
| R | ECL Reset |
| CLK | ECL Clock Input |
| Q, \bar{Q} | ECL Data Outputs |
| V _{CC} | Positive Supply |
| V _{EE} | Negative Supply |
| EP | (DFN8 only) Thermal exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply (GND) or leave unconnected, floating open. |

Table 1. TRUTH TABLE

| J* | K* | R* | CLK | Q _{n+1} |
|----|----|----|-----|------------------|
| L | L | L | Z | Q _n |
| L | H | L | Z | L |
| H | L | L | Z | H |
| H | H | L | Z | \bar{Q}_n |
| X | X | H | X | L |

Table 2. MAXIMUM RATINGS

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Unit |
|------------------|--|--|--|---------------|--------------|
| V _{CC} | PECL Mode Power Supply | V _{EE} = 0 V | | 8 | V |
| V _{EE} | NECL Mode Power Supply | V _{CC} = 0 V | | -8 | V |
| V _I | PECL Mode Input Voltage NECL Mode Input Voltage | V _{EE} = 0 V V _{CC} = 0 V | V _I ≤ V _{CC} V _I ≥ V _{EE} | 6 -6 | V V |
| I _{out} | Output Current | Continuous Surge | | 50 100 | mA mA |
| T _A | Operating Temperature Range | | | -40 to +85 | °C |
| T _{stg} | Storage Temperature Range | | | -65 to +150 | °C |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | 8 SOIC 8 SOIC | 190 130 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | 8 SOIC | 41 to 44 | °C/W |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | 8 TSSOP 8 TSSOP | 185 140 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | 8 TSSOP | 41 to 44 ± 5% | °C/W |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | DFN8 DFN8 | 129 84 | °C/W °C/W |
| T _{sol} | Wave Solder | Pb Pb-Free | <2 to 3 sec @ 248°C <2 to 3 sec @ 260°C | 265 265 | °C |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | (Note 1) | DFN8 | 35 to 40 | °C/W |

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. JEDEC standard multilayer board – 2S2P (2 signal, 2 power)

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Table 3. 10EL SERIES PECL DC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = 0\text{ V}$ (Note 2)

| 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 3) | 3920 | 4010 | 4110 | 4020 | 4105 | 4190 | 4090 | 4185 | 4280 | mV |
| V_{OL} | Output LOW Voltage (Note 3) | 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 | μA |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.3 | | | μA |

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.

- Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.25 V / -0.5 V.
- Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

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

| 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 5) | -1080 | -990 | -890 | -980 | -895 | -810 | -910 | -815 | -720 | mV |
| V_{OL} | Output LOW Voltage (Note 5) | -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 | μA |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.3 | | | μA |

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.

- Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.25 V / -0.5 V.
- Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

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

| 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 | | 32 | 37 | mA |
| V_{OH} | Output HIGH Voltage (Note 7) | 3915 | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4050 | 4120 | mV |
| V_{OL} | Output LOW Voltage (Note 7) | 3170 | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV |
| V_{IH} | Input HIGH Voltage (Single-Ended) | 3835 | | 4120 | 3835 | | 4120 | 3835 | | 4120 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | 3190 | | 3525 | 3190 | | 3525 | 3190 | | 3525 | mV |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | μA |

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.

- Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.
- Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

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Table 6. 100EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 8)

| 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 | | 32 | 37 | mA |
| V_{OH} | Output HIGH Voltage (Note 9) | -1085 | -1005 | -880 | -1025 | -955 | -880 | -1025 | -955 | -880 | mV |
| V_{OL} | Output LOW Voltage (Note 9) | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV |
| V_{IH} | Input HIGH Voltage (Single-Ended) | -1165 | | -880 | -1165 | | -880 | -1165 | | -880 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | -1810 | | -1475 | -1810 | | -1475 | -1810 | | -1475 | mV |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | μA |

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.

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

9. Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

Table 7. 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 10)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|--------------------------------------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f_{max} | Maximum Toggle Frequency | 1.4 | 2.0 | | 1.8 | 2.2 | | 1.8 | 2.2 | | GHz |
| t_{PLH} t_{PHL} | Propagation Delay to Output CLK MR | 290 225 | 515 450 | 740 675 | 350 275 | 525 450 | 700 625 | 395 350 | 570 525 | 745 700 | ps |
| t_{S} | Setup Time J, K | 150 | 0 | | 150 | 0 | | 150 | 0 | | ps |
| t_{H} | Hold Time J, K | 250 | 100 | | 250 | 100 | | 250 | 100 | | ps |
| t_{RR} | Reset Recovery | 400 | 200 | | 400 | 200 | | 400 | 200 | | ps |
| t_{PW} | Minimum Pulse Width CLK, Reset | 400 | | | 400 | | | 400 | | | ps |
| t_{JITTER} | Cycle-to-Cycle Jitter | | 1.0 | | | 1.0 | | | 1.0 | | ps |
| t_{r} t_{f} | Output Rise/Fall Times Q (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.

10.10 Series: V_{EE} can vary +0.25 V / -0.5 V.

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

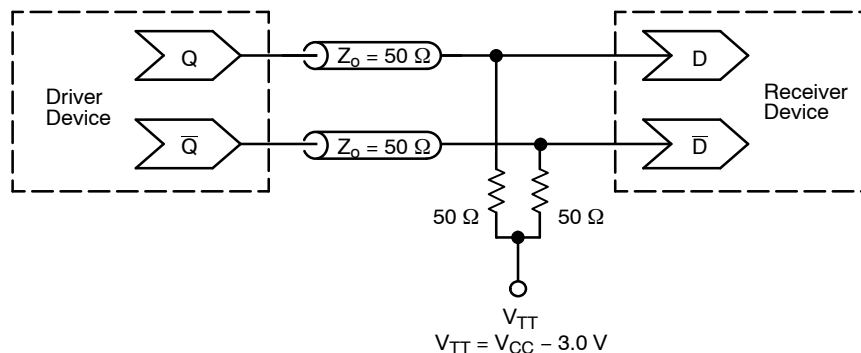


Figure 2. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

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ORDERING INFORMATION

| Device | Package | Shipping [†] |
|----------------|----------------------|-----------------------|
| MC10EL35D | SOIC-8 | 98 Units / Rail |
| MC10EL35DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC10EL35DR2 | SOIC-8 | 2500 / Tape & Reel |
| MC10EL35DR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |
| MC10EL35DT | TSSOP-8 | 100 Units / Rail |
| MC10EL35DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC10EL35DTR2 | TSSOP-8 | 2500 / Tape & Reel |
| MC10EL35DTR2G | TSSOP-8 (Pb-Free) | 2500 / Tape & Reel |
| MC10EL35MNR4 | DFN8 | 1000 / Tape & Reel |
| MC10EL35MNR4G | DFN8 (Pb-Free) | 1000 / Tape & Reel |
| MC100EL35D | SOIC-8 | 98 Units / Rail |
| MC100EL35DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC100EL35DR2 | SOIC-8 | 2500 / Tape & Reel |
| MC100EL35DR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |
| MC100EL35DT | TSSOP-8 | 100 Units / Rail |
| MC100EL35DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC100EL35DTR2 | TSSOP-8 | 2500 / Tape & Reel |
| MC100EL35DTR2G | TSSOP-8 (Pb-Free) | 2500 / Tape & Reel |
| MC100EL35MNR4 | DFN8 | 1000 / Tape & Reel |
| MC100EL35MNR4G | DFN8 (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.

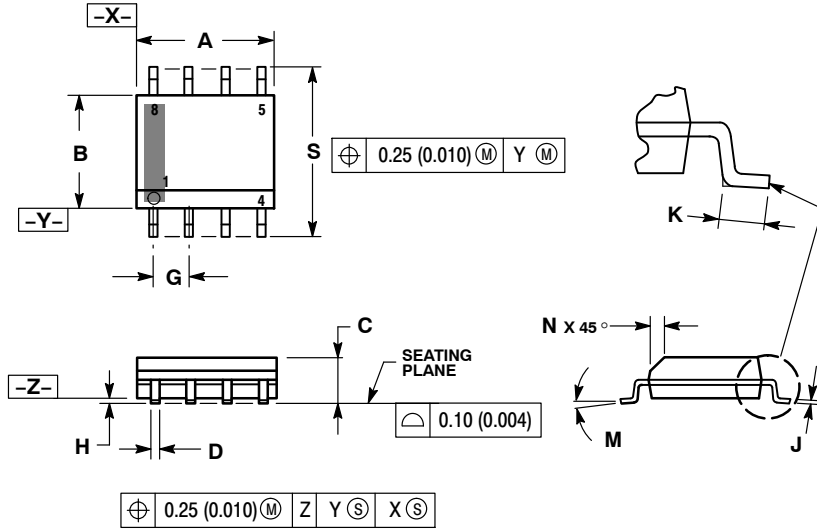
Resource Reference of Application Notes

- 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

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PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AH

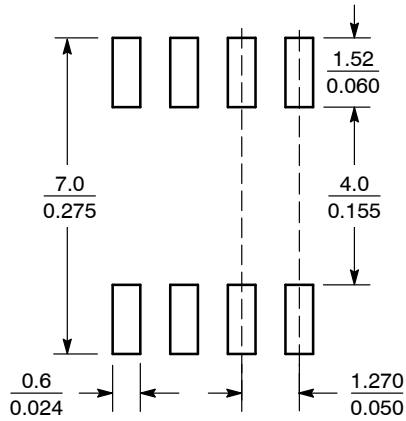


NOTES:

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*



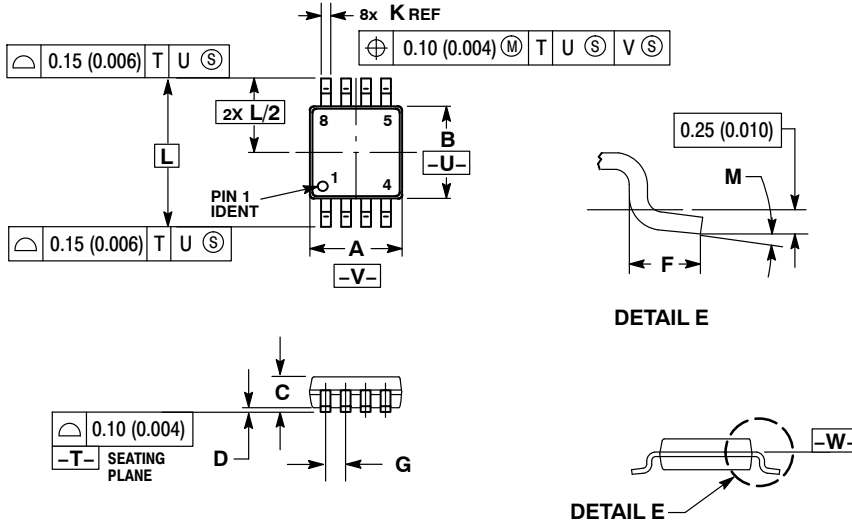
SCALE 6:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

MC10EL35, MC100EL35

PACKAGE DIMENSIONS

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



NOTES:

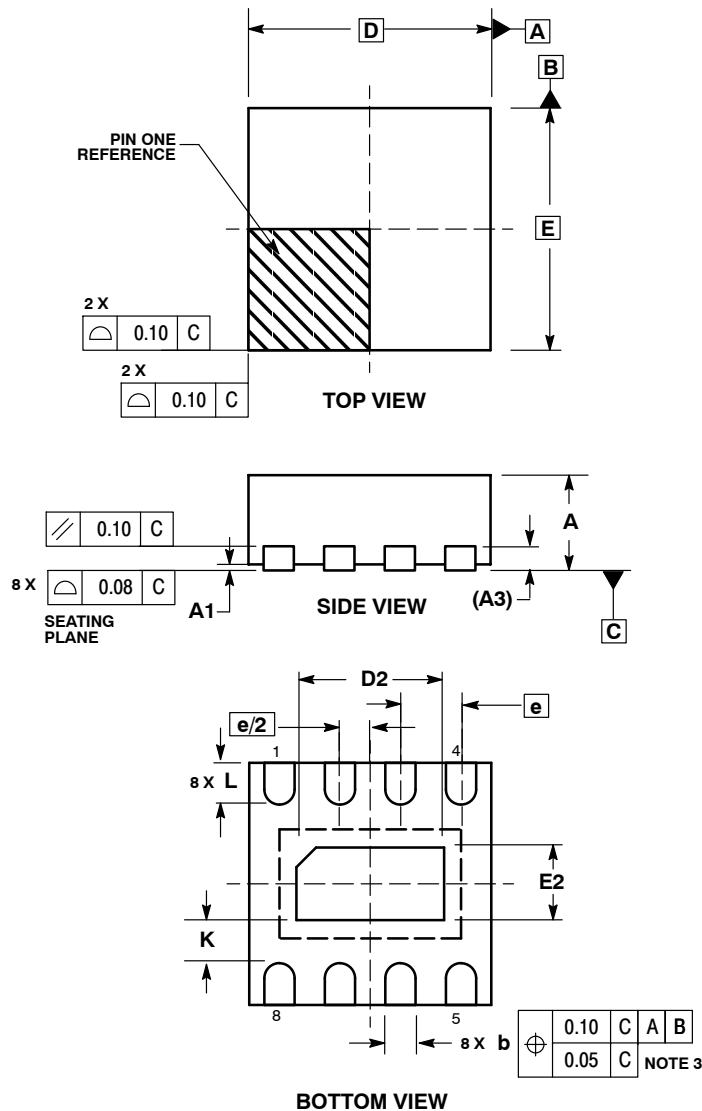
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL 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° |

MC10EL35, MC100EL35

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 |

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Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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