

MC10EL04, MC100EL04

5V ECL 2-Input AND/NAND

The MC10EL/100EL04 is a 2-input AND/NAND gate. The device is functionally equivalent to the E104 device with higher performance capabilities. With propagation delays and output transition times significantly faster than the E104, the EL04 is ideally suited for those applications which require the ultimate in AC performance.

The 100 Series contains temperature compensation.

Features

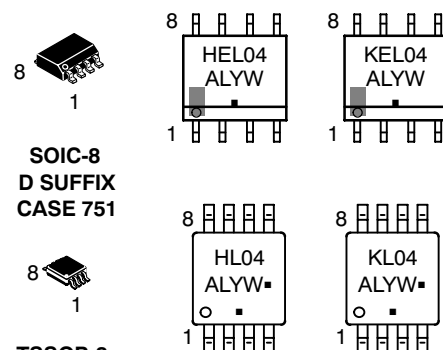
- 240 ps Propagation Delay
- ESD Protection: > 1 kV Human Body Model, > 100 V Machine Model
- PECL Mode Operating Range: $V_{CC} = 4.2\text{ V}$ to 5.7 V with $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range: $V_{CC} = 0\text{ V}$ with $V_{EE} = -4.2\text{ V}$ to -5.7 V
- Internal Input Pulldown Resistors
- 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, Oxygen Index 28 to 34
- Transistor Count = 45 devices
- Pb-Free Packages are Available



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MARKING DIAGRAMS*



**SOIC-8
D SUFFIX
CASE 751**

**TSSOP-8
DT SUFFIX
CASE 948R**

H = MC10 L = Wafer Lot
K = MC100 Y = Year
A = Assembly Location W = Work Week
▪ = 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 7 of this data sheet.

MC10EL04, MC100EL04

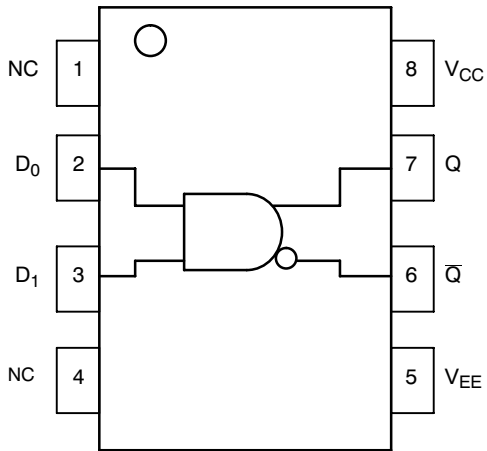


Figure 1. Logic Diagram and Pinout

Table 1. PIN DESCRIPTION

| PIN | FUNCTION |
|---------------------------------|------------------|
| D ₀ , D ₁ | ECL Data Inputs |
| Q, \bar{Q} | ECL Data Outputs |
| V _{CC} | Positive Supply |
| V _{EE} | Negative Supply |
| NC | No Connect |

MC10EL04, MC100EL04

Table 2. MAXIMUM RATINGS

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Units |
|------------------|--|--|--|---------------|--------------|
| 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 | SOIC-8 SOIC-8 | 190 130 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | SOIC-8 | 41 to 44 | °C/W |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | TSSOP-8 TSSOP-8 | 185 140 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | TSSOP-8 | 41 to 44 ± 5% | °C/W |
| T _{sol} | Wave Solder | Pb Pb-Free | <2 to 3 sec @ 248°C <2 to 3 sec @ 260°C | 265 265 | °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.

Table 3. 10EL SERIES PECL DC CHARACTERISTICS V_{CC} = 5.0 V; V_{EE} = 0.0 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 | | 14 | 17 | | 14 | 17 | | 14 | 17 | 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 | | | | | | | | | | μA |
| | D0 | | | 250 | | | 250 | | | 250 | |
| | D1 | | | 150 | | | 150 | | | 150 | |
| 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 lfpm. 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 for +25°C and +85°C or V_{EE} can vary +0.06 V / -0.5 V for -40°C.
- Outputs are terminated through a 50 Ω resistor to V_{CC} - 2.0 V.

MC10EL04, MC100EL04

Table 4. 10EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (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 | | 14 | 17 | | 14 | 17 | | 14 | 17 | 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 D0 D1 | | | 250 | | | 250 | | | 250 | μA |
| | | | | 150 | | | 150 | | | 150 | |
| 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 lfpm. 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 for +25°C and +85°C or V_{EE} can vary +0.06 V / -0.5 V for -40°C.
 4. Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

Table 5. 100EL SERIES PECL DC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ (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 | | 14 | 17 | | 14 | 17 | | 16 | 20 | 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 D0 D1 | | | 250 | | | 250 | | | 250 | μA |
| | | | | 150 | | | 150 | | | 150 | |
| 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 lfpm. 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 Ω resistor to $V_{CC} - 2.0\text{ V}$.

MC10EL04, MC100EL04

Table 6. 100EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (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 | | 14 | 17 | | 14 | 17 | | 16 | 20 | 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 D0 D1 | | | 250 | | | 250 | | | 250 | μA |
| | | | | 150 | | | 150 | | | 150 | |
| 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.

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 Ω resistor to $V_{CC} - 2.0\text{ V}$.

Table 7. AC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ or $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 9)

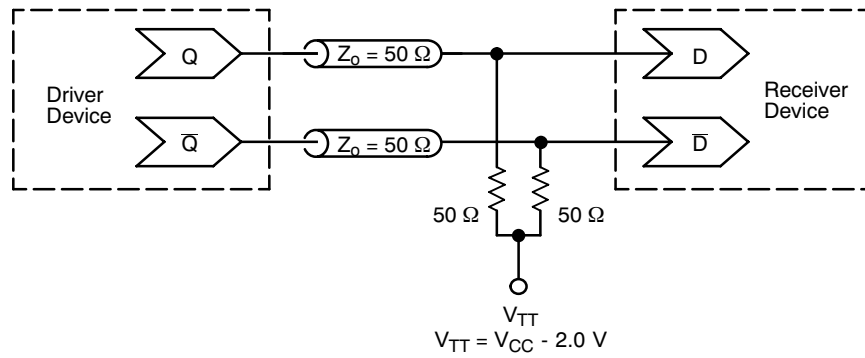
| Symbol | Characteristic | -40 °C | | | 25 °C | | | 85 °C | | | Unit |
|------------------------|---|--------|-----|-----|-------|-----|-----|-------|-----|-----|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f_{max} | Maximum Toggle Frequency | | TBD | | | TBD | | | TBD | | GHz |
| t_{PLH} t_{PHL} | Propagation Delay to Output | 70 | 235 | 410 | 130 | 240 | 370 | 155 | 265 | 395 | ps |
| t_{JITTER} | Cycle-to-Cycle Jitter | | TBD | | | TBD | | | TBD | | 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.

9. 10 Series: V_{EE} can vary +0.25 V / -0.5 V for +25°C and +85°C. or V_{EE} can vary +0.06 V / -0.5 V for -40°C.

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

MC10EL04, MC100EL04



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

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

MC10EL04, MC100EL04

ORDERING INFORMATION

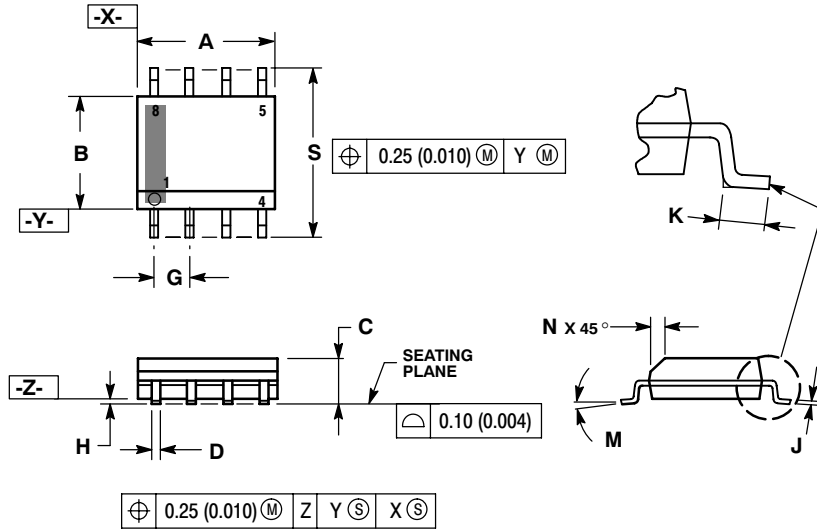
| Device | Package | Shipping† |
|----------------|----------------------|--------------------|
| MC10EL04D | SOIC-8 | 98 Units / Rail |
| MC10EL04DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC10EL04DR2 | SOIC-8 | 2500 / Tape & Reel |
| MC10EL04DR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |
| MC10EL04DT | TSSOP-8 | 100 Units / Rail |
| MC10EL04DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC10EL04DTR2 | TSSOP-8 | 2500 / Tape & Reel |
| MC10EL04DTR2G | TSSOP-8 (Pb-Free) | 2500 / Tape & Reel |
| MC100EL04D | SOIC-8 | 98 Units / Rail |
| MC100EL04DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC100EL04DR2 | SOIC-8 | 2500 / Tape & Reel |
| MC100EL04DR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |
| MC100EL04DT | TSSOP-8 | 100 Units / Rail |
| MC100EL04DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC100EL04DTR2 | TSSOP-8 | 2500 / Tape & Reel |
| MC100EL04DTR2G | TSSOP-8 (Pb-Free) | 2500 / 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.

MC10EL04, MC100EL04

PACKAGE DIMENSIONS

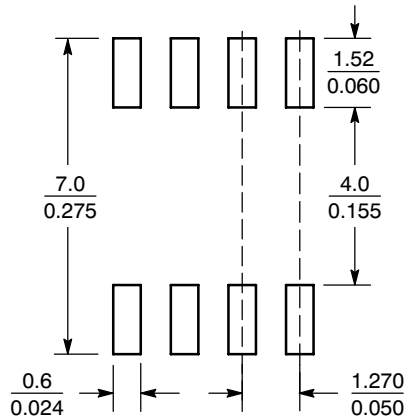
SOIC-8 NB
CASE 751-07
ISSUE AH



- 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.

| MILLIMETERS | | INCHES | | |
|-------------|----------|--------|-----------|-------|
| DIM | 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*



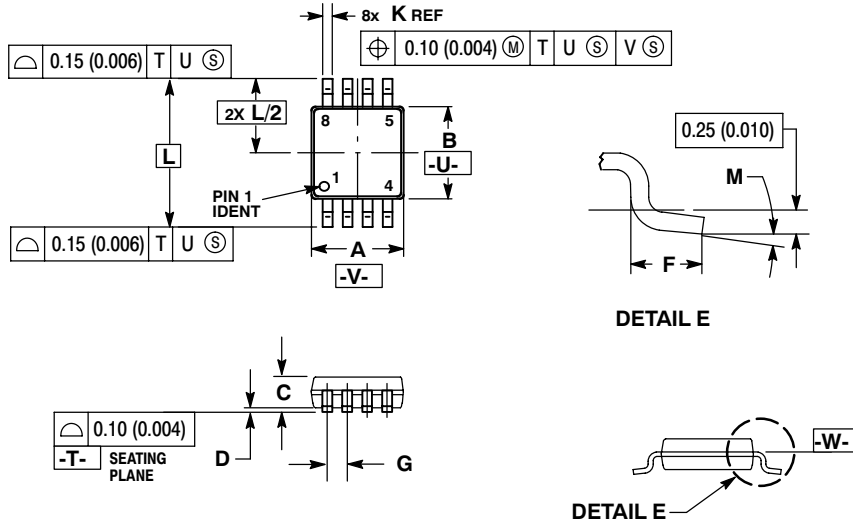
SCALE 6:1 ($\frac{\text{mm}}{\text{inches}}$)

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

MC10EL04, MC100EL04

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 -V-.

| 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° |

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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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