### 5.0 V ECL <br> 2-Input XOR/XNOR

## MC100EL07

## Description

The MC100EL07 is a 2 -input XOR/XNOR gate. The device is functionally equivalent to the E107 device with higher performance capabilities. With propagation delays and output transition times significantly faster than the E107, the EL07 is ideally suited for those applications which require the ultimate in AC performance.

The 100 Series contains temperature compensation.

## Features

- 260 ps Propagation Delay
- ESD Protection:
- > 1.0 kV Human Body Model
- > 100 V Machine Model
- PECL Mode Operating Range: $\mathrm{V}_{\mathrm{CC}}=4.2 \mathrm{~V}$ to 5.7 V with $\mathrm{V}_{\mathrm{EE}}=0 \mathrm{~V}$
- NECL Mode Operating Range: $\mathrm{V}_{\mathrm{CC}}=0 \mathrm{~V}$
with $\mathrm{V}_{\mathrm{EE}}=-4.2 \mathrm{~V}$ to -5.7 V
- Internal Input Pulldown Resistors
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity:
- Level 1 for SOIC-8 NB
- For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL 94 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count $=47$ Devices
- These Devices are $\mathrm{Pb}-$ Free, Halogen Free and are RoHS Compliant

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8 SOIC-8 NB
D SUFFIX
CASE 751-07

MARKING DIAGRAM*

$K=$ MC100
A = Assembly Location
L = Wafer Lot
$Y=$ Year
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

| Device | Package | Shipping $^{\dagger}$ |
| :---: | :---: | :---: |
| MC100ELO7DR2G | SOIC-8 NB <br> (Pb-Free) | $2500 /$ <br> Tape \& Reel |

$\dagger$ 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.


Table 1. PIN DESCRIPTION

| PIN | FUNCTION |
| :--- | :--- |
| D0, D1 | ECL Data Inputs |
| Q, $\bar{Q}$ | ECL Data Outputs |
| V $_{\mathrm{CC}}$ | Positive Supply |
| $\mathrm{V}_{\mathrm{EE}}$ | Negative Supply |
| NC | No Connect |

Figure 1. Logic Diagram and Pinout Assignment

Table 2. MAXIMUM RATINGS

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | PECL Mode Power Supply | $\mathrm{V}_{\mathrm{EE}}=0 \mathrm{~V}$ |  | 8 | V |
| $\mathrm{V}_{\mathrm{EE}}$ | NECL Mode Power Supply | $\mathrm{V}_{\mathrm{CC}}=0 \mathrm{~V}$ |  | -8 | V |
| $V_{1}$ | PECL Mode Input Voltage NECL Mode Input Voltage | $\begin{aligned} & \mathrm{V}_{\mathrm{EE}}=0 \mathrm{~V} \\ & \mathrm{~V}_{\mathrm{CC}}=0 \mathrm{~V} \end{aligned}$ | $\begin{aligned} & \mathrm{V}_{1} \leq \mathrm{V}_{\mathrm{CC}} \\ & \mathrm{~V}_{\mathrm{I}} \geq \mathrm{V}_{\mathrm{EE}} \end{aligned}$ | $\begin{gathered} 6 \\ -6 \end{gathered}$ | V |
| $\mathrm{I}_{\text {out }}$ | Output Current | Continuous Surge |  | $\begin{gathered} 50 \\ 100 \end{gathered}$ | mA |
| TA | Operating Temperature Range |  |  | -40 to +85 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{\text {stg }}$ | Storage Temperature Range |  |  | -65 to +150 | ${ }^{\circ} \mathrm{C}$ |
| $\theta_{\text {JA }}$ | Thermal Resistance (Junction-to-Ambient) | 0 Ifpm 500 lfpm | $\begin{aligned} & \text { SOIC-8 NB } \\ & \text { SOIC-8 NB } \end{aligned}$ | $\begin{aligned} & 190 \\ & 130 \end{aligned}$ | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| $\theta_{\mathrm{JC}}$ | Thermal Resistance (Junction-to-Case) | Standard Board | SOIC-8 NB | 41 to 44 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| $\mathrm{T}_{\text {sol }}$ | Wave Solder (Pb-Free) | < 2 to $3 \mathrm{sec} @ 260^{\circ} \mathrm{C}$ |  | 265 | ${ }^{\circ} \mathrm{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 3. 100EL SERIES PECL DC CHARACTERISTICS ( $\mathrm{V}_{\mathrm{CC}}=5.0 \mathrm{~V}$; $\mathrm{V}_{\mathrm{EE}}=0.0 \mathrm{~V}$ (Note 1))

| Symbol | Characteristic | $-40^{\circ} \mathrm{C}$ |  |  | $25^{\circ} \mathrm{C}$ |  |  | $85^{\circ} \mathrm{C}$ |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max |  |
| $\mathrm{I}_{\text {EE }}$ | Power Supply Current |  | 14 | 17 |  | 14 | 17 |  | 16 | 20 | mA |
| $\mathrm{V}_{\mathrm{OH}}$ | Output HIGH Voltage (Note 2) | 3915 | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4050 | 4120 | mV |
| $\mathrm{V}_{\mathrm{OL}}$ | Output LOW Voltage (Note 2) | 3170 | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV |
| $\mathrm{V}_{\mathrm{IH}}$ | Input HIGH Voltage | 3835 |  | 4120 | 3835 |  | 4120 | 3835 |  | 4120 | mV |
| $\mathrm{V}_{\text {IL }}$ | Input LOW Voltage | 3190 |  | 3525 | 3190 |  | 3525 | 3190 |  | 3525 | mV |
| $\mathrm{I}_{\mathrm{H}}$ | Input HIGH Current <br> D0 <br> D1 |  |  | $\begin{aligned} & 250 \\ & 150 \end{aligned}$ |  |  | $\begin{aligned} & 250 \\ & 150 \end{aligned}$ |  |  | $\begin{aligned} & 250 \\ & 150 \end{aligned}$ | $\mu \mathrm{A}$ |
| IIL | Input LOW Current | 0.5 |  |  | 0.5 |  |  | 0.5 |  |  | $\mu \mathrm{A}$ |

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 lfpm.

1. Input and output parameters vary $1: 1$ with $\mathrm{V}_{\mathrm{CC}} . \mathrm{V}_{\mathrm{EE}}$ can vary $+0.8 \mathrm{~V} /-0.5 \mathrm{~V}$.
2. Outputs are terminated through a $50 \Omega$ resistor to $\mathrm{V}_{\mathrm{CC}}-2.0 \mathrm{~V}$.

Table 4. 100EL SERIES NECL DC CHARACTERISTICS $\left(\mathrm{V}_{\mathrm{CC}}=0.0 \mathrm{~V} ; \mathrm{V}_{\mathrm{EE}}=-5.0 \mathrm{~V}\right.$ (Note 1))

| Symbol | Characteristic | $-40^{\circ} \mathrm{C}$ |  |  | $25^{\circ} \mathrm{C}$ |  |  | $85^{\circ} \mathrm{C}$ |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max |  |
| IEE | Power Supply Current |  | 14 | 17 |  | 14 | 17 |  | 16 | 20 | mA |
| $\mathrm{V}_{\mathrm{OH}}$ | Output HIGH Voltage (Note 2) | -1085 | -1005 | -880 | -1025 | -955 | -880 | -1025 | -955 | -880 | mV |
| $\mathrm{V}_{\text {OL }}$ | Output LOW Voltage (Note 2) | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV |
| $\mathrm{V}_{\mathrm{IH}}$ | Input HIGH Voltage | -1165 |  | -880 | -1165 |  | -880 | -1165 |  | -880 | mV |
| $\mathrm{V}_{\mathrm{IL}}$ | Input LOW Voltage | -1810 |  | -1475 | -1810 |  | -1475 | -1810 |  | -1475 | mV |
| $\mathrm{IIH}^{\text {H }}$ | $\begin{aligned} & \text { Input HIGH Current } \\ & \text { D0 } \\ & \text { D1 } \end{aligned}$ |  |  | $\begin{aligned} & 250 \\ & 150 \end{aligned}$ |  |  | $\begin{aligned} & 250 \\ & 150 \end{aligned}$ |  |  | $\begin{aligned} & 250 \\ & 150 \end{aligned}$ | $\mu \mathrm{A}$ |
| IIL | Input LOW Current | 0.5 |  |  | 0.5 |  |  | 0.5 |  |  | $\mu \mathrm{A}$ |

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 Ifpm.

1. Input and output parameters vary $1: 1$ with $\mathrm{V}_{\mathrm{CC}} . \mathrm{V}_{\mathrm{EE}}$ can vary $+0.8 \mathrm{~V} /-0.5 \mathrm{~V}$.
2. Outputs are terminated through a $50 \Omega$ resistor to $\mathrm{V}_{\mathrm{CC}}-2.0 \mathrm{~V}$.

Table 5. AC CHARACTERISTICS ( $\mathrm{V}_{\mathrm{CC}}=5.0 \mathrm{~V}$; $\mathrm{V}_{\mathrm{EE}}=0.0 \mathrm{~V}$ or $\mathrm{V}_{\mathrm{CC}}=0.0 \mathrm{~V} ; \mathrm{V}_{\mathrm{EE}}=-5.0 \mathrm{~V}$ (Note 1))

| Symbol | Characteristic | -40 ${ }^{\circ} \mathrm{C}$ |  |  | $25^{\circ} \mathrm{C}$ |  |  | $85^{\circ} \mathrm{C}$ |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max |  |
| $\mathrm{f}_{\text {max }}$ | Maximum Toggle Frequency |  |  |  |  | >2 |  |  |  |  | GHz |
| $\begin{aligned} & \mathrm{t}_{\mathrm{PLLH}} \\ & \mathrm{t}_{\mathrm{PHL}} \end{aligned}$ | Propagation Delay to Output | 90 | 250 | 435 | 150 | 260 | 395 | 170 | 280 | 415 | ps |
| $\mathrm{t}_{\text {IITTER }}$ | Random Clock Jitter |  | 0.5 |  |  | 0.5 |  |  | 0.5 |  | ps |
| $\mathrm{t}_{\mathrm{r}}$ $\mathrm{t}_{\mathrm{f}}$ | 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 Ifpm.

1. $V_{E E}$ can vary $+0.8 \mathrm{~V} /-0.5 \mathrm{~V}$.


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 ${ }^{\text {m }}$ 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


SOIC-8 NB
CASE 751-07
ISSUE AK
SCALE 1:1
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
. CONTROLLING DIMENSION: MILLIMETER.
2. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
3. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
4. 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.
5. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS |  | INCHES |  |
| :---: | :---: | :---: | :---: | :---: |
|  | MIN | MAX | MIN | MAX |
|  | 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 | $\circ$ | $8^{\circ}$ | 0 |
|  | $\circ$ | 8 |  |  |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

GENERIC
MARKING DIAGRAM*



XXXXX = Specific Device Code
A = Assembly Location
L Wafer Lot
= Year
= Work Week
= Pb-Free Package
*This information is generic. Please refer to device data sheet for actual part marking. $\mathrm{Pb}-\mathrm{Free}$ indicator, " G " or microdot " $\mathrm{=}$ ", may or may not be present. Some products may not follow the Generic Marking.
*For additional information on our $\mathrm{Pb}-$ Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## STYLES ON PAGE 2

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CASE 751-07
ISSUE AK
DATE 16 FEB 2011

STYLE

| PIN 1. | EMITTER |
| ---: | :--- |
| 2. | COLLECTOR |
| 3. | COLLECTOR |
| 4. | EMITTER |
| 5. | EMITTER |
| 6. | BASE |
| 7. | BASE |
| 8. | EMITTER |
| STYLE 5: |  |
| PIN 1. | DRAIN |
| 2. | DRAIN |
| 3. | DRAIN |
| 4. | DRAIN |
| 5. | GATE |
| 6. | GATE |
| 7. | SOURCE |
| 8. | SOURCE |

STYLE 9:
PIN 1. EMITTER, COMMON
COLLECTOR, DIE \#1 COLLECTOR, DIE \#2 EMITTER, COMMON EMITTER, COMMON BASE, DIE \#2
BASE, DIE \#1
8. EMITTER, COMMON

STYLE 13:
PIN 1. N.C.
2. SOURCE
3. SOURCE

GATE
DRAIN
DRAIN
DRAIN
8. DRAIN

STYLE 17:
PIN 1. VCC
V2OUT
V10UT
V10UT
TXE
RXE
VEE
8. ACC

STYLE 21:
PIN 1. CATHODE 1
2. CATHODE 2
3. CATHODE 3

CATHODE 4
CATHODE 5
6. COMMON ANODE
7. COMMON ANODE
8. CATHODE 6

STYLE 25:
PIN 1. VIN
2. $\mathrm{N} / \mathrm{C}$

REXT
GND
IOUT
IOUT
IOUT
8. IOUT

## STYLE 29

PIN 1. BASE, DIE \#
EMITTER, \#1
BASE, \#2
. EMITTER, \#2
5. COLLECTOR, \#2
6. COLLECTOR, \#2
7. COLLECTOR, \#1
7. COLLECTOR, \#1

STYLE
PIN 1. COLIECTOR, DIE,
2. COLLECTOR, \#1
3. COLLECTOR, \#2

COLLECTOR, \#2
BASE, \#2
. EMITTER, \#2
7. BASE, \#1
8. EMITTER, \#1

STYLE 6:
PIN 1. SOURCE
DRAIN
DRAIN
. SOURC
5. SOURCE
6. GATE
7. GATE
8. SOURCE

STYLE 10:
PIN 1. GROUND
2. BIAS 1
3. OUTPUT
4. GROUND

GROUND
BIAS 2
7. INPUT
8. GROUND

STYLE 14:
PIN 1. N-SOURCE
2. N-GATE
. P-SOURCE
P-GATE
5-DRAIN
6. P-DRAIN
7. N-DRAIN
8. N -DRAIN

STYLE 18
PIN 1. ANODE
2. ANODE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. CATHODE
8. CATHODE

STYLE 22 :
PIN 1. I/O LINE
2. COMMON CATHODE/VCC
3. COMMON CATHODE/VCC
4. I/O LINE 3
5. COMMON ANODE/GND
6. I/O LINE 4
7. I/O LINE 5
8. COMMON ANODE/GND

STYLE 26:
PIN 1. GND
2. $\mathrm{dv} / \mathrm{dt}$
3. ENABLE
4. ILIMIT
5. SOURCE

SOURCE
7. SOURCE
8. VCC

STYLE 30:
PIN 1. DRAIN 1
2. DRAIN 1
. GATE 2
4. SOURCE 2
5. SOURCE 1/DRAIN 2
. SOURCE 1/DRAIN 2
SOURCE 1/DRAIN 2
8. GATE 1

STYLE 3
STYLE
2. DRAIN, DIE
2. DRAIN, \#1
2. DRAIN, \#
3. DRAIN, \#2
4. DRAIN, \#2
5. GATE, \#2
7. GATE, \#1
8. SOURCE, \#1

## STYLE 7

PIN 1. INPUT
2. EXTERNAL BYPASS
3. THIRD STAGE SOURCE
4. GROUND
5. DRAIN
6. GATE 3
7. SECOND STAGE Vd
8. FIRST STAGE Vd

## STYLE 11:

PIN 1. SOURCE
2. GATE 1
3. SOURCE 2
4. GATE 2
5. DRAIN 2
6. DRAIN 2
7. DRAIN
8. DRAIN 1

## STYLE 15:

PIN 1. ANODE 1
2. ANODE 1
3. ANODE 1
4. ANODE 1
5. CATHODE, COMMON
6. CATHODE, COMMON
7. CATHODE, COMMON
8. CATHODE, COMMON

## STYLE 19:

PIN 1. SOURCE
2. GATE 1
3. SOURCE 2
4. GATE 2
5. DRAIN 2
6. MIRROR 2
7. DRAIN 1
8. MIRROR 1

## STYLE 23:

PIN 1. LINE 1 IN
2. COMMON ANODE/GND
3. COMMON ANODE/GND
4. LINE 2 IN
5. LINE 2 OUT
6. COMMON ANODE/GND
7. COMMON ANODE/GND
8. LINE 1 OUT

STYLE 27:
PIN 1. ILIMIT
2. OVLO
3. UVLO
4. INPUT+
4. INPUT+
5. SOURCE
6. SOURCE
7. SOURCE
8. DRAIN

STYLE 4:
PIN 1. ANODE
2. ANODE
3. ANODE
4. ANODE
5. ANODE
6. ANODE
8. COMMON CATHODE

## STYLE 8:

PIN 1. COLLECTOR, DIE \#1
2. BASE, \#1
3. BASE, \#2
4. COLLECTOR, \#2
5. COLLECTOR, \#2
6. EMITTER, \#2
7. EMITTER, \#1
8. COLLECTOR, \#1

## STYLE 12

PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

## STYLE 16:

PIN 1. EMITTER, DIE \#1
2. BASE, DIE \#1
3. EMITTER, DIE \#2
3. EMITTER, DIE
4. BASE, DIE \#2
4. BASE, DIE \#2
6. COLLECTOR, DIE \#2
7. COLLECTOR, DIE \#1
8. COLLECTOR, DIE \#1

## STYLE 20:

PIN 1. SOURCE (N)
2. GATE (N)
3. SOURCE (P)
4. GATE (P)
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

STYLE 24
PIN 1. BASE
2. EMITTER
3. COLLECTOR/ANODE
4. COLLECTOR/ANODE
5. CATHODE
6. CATHODE
7. COLLECTOR/ANODE
8. COLLECTOR/ANODE

## STYLE 28:

PIN 1. SW_TO_GND
2. DA $\bar{S} I C \bar{O} F F$
3. DASIC_SW_DET
4. GND
5. V_MON
6. VBULK
7. VBULK
8. VIN

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NLX1G11AMUTCG NLX1G97MUTCG 74LS38 74LVC1G08Z-7 74LVC32ADTR2G CD4025BE MC74HCT20ADTR2G NLV17SZ00DFT2G NLV17SZ126DFT2G NLV27WZ17DFT2G NLV74HC02ADR2G 74HC32S14-13 74LS133 74LVC1G32Z-7

74LVC1G86Z-7 NLV74HC14ADR2G NLV74HC20ADR2G NLX2G86MUTCG NLU1G00AMUTCG 74LVC2G32RA3-7
74LVC2G00HD4-7 NL17SG02P5T5G 74LVC2G86HK3-7 NL17SG08DFT2G NLVVHC1G14DFT2G NLX1G99DMUTWG
NLVVHC1G00DFT2G NLV7SZ57DFT2G NLV74VHC04DTR2G NLV27WZ86USG NLV27WZ00USG NLU1G86CMUTCG
NLU1G08CMUTCG NL17SZ32P5T5G NL17SZ00P5T5G NL17SH02P5T5G 74AUP2G00RA3-7 NLVVHC1GT00DFT2G
NLV74HC02ADTR2G NLX1G332CMUTCG NLVHCT132ADTR2G NL17SG86P5T5G NL17SZ05P5T5G


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