5 V ECL Quad 4-Input OR/NOR Gate

Description

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

Features

- 500 ps Max. Propagation Delay
- PECL Mode Operating Range:
 - $V_{CC} = 4.2 \text{ V}$ to 5.7 V with $V_{EE} = 0 \text{ V}$
- NECL Mode Operating Range:
 - $V_{CC} = 0$ V with $V_{EE} = -4.2$ V to -5.7 V
- Internal Input 50 k Ω Pulldown Resistors
- ESD Protection:
 - Human Body Model; > 2 kV
 - Machine Model; > 200 V
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity: Level 3 (Pb-Free)
- Flammability Rating:
 - UL 94 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 115 devices
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



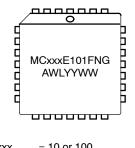
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PLCC-28 FN SUFFIX CASE 776-02

MARKING DIAGRAM*



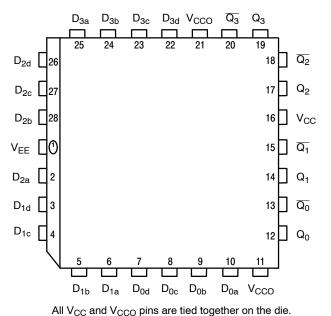
XXX	= 10 or 100
А	= Assembly Location
WL	= Wafer Lot
YY	= Year
WW	= Work Week
G	= Pb-Free Package

*For additional marking information, refer to Application Note <u>AND8002/D</u>.

ORDERING INFORMATION

Device	Package	Shipping [†]
MC10E101FNR2G	PLCC-28 (Pb-Free)	500/Tape & Reel
MC100E101FNR2G	PLCC-28 (Pb-Free)	500/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, <u>BRD8011/D</u>.



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

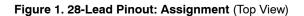


Table 1. PIN DESCRIPTION

<mark>ס</mark> 0 ס
Q ₁ Q ₁
Q_2 $\overline{Q_2}$
3 3 23

Figure 2. Logic Diagram

Pin	Function
D _{0a} – D _{3d}	ECL Data Inputs
$Q_0 - Q3, \overline{Q_0} - \overline{Q_3}$	ECL Differential Outputs
V _{CC} , V _{CCO}	Positive Supply
V _{EE}	Negative Supply

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		-6	V
VI	PECL Mode Input Voltage NECL Mode Input Voltage	V _{EE} = 0 V V _{CC} = 0 V	$\begin{array}{l} V_{I} \leq V_{CC} \\ V_{I} \geq V_{EE} \end{array}$	6 -6	V
I _{out}	Output Current	Continuous Surge		50 100	mA
T _A	Operating Temperature Range			0 to +85	°C
T _{stg}	Storage Temperature Range			-65 to +150	°C
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	PLCC-28	63.5 43.5	°C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	PLCC-28	22 to 26	°C/W
T _{sol}	Wave Solder (Pb-Free)			265	°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. 10E SERIES PECL DC CHARACTERISTICS (V_{CC} = 5.0 V, V_{EE} = 0.0 V (Note 1))

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current	23	30	40	23	30	40	23	30	40	mA
I _{EE}	Power Supply Current		30	36		30	36		30	36	mA
V _{OH}	Output HIGH Voltage (Note 2)	3980	4070	4160	4020	4105	4190	4090	4185	4280	mV
V _{OL}	Output LOW Voltage (Note 2)	3050	3210	3370	3050	3210	3370	3050	3227	3405	mV
VIH	Input HIGH Voltage	3830	3995	4160	3870	4030	4190	3940	4110	4280	mV
VIL	Input LOW Voltage	3050	3285	3520	3050	3285	3520	3050	3302	3555	mV
I _{IH}	Input HIGH Current			150			150			150	μA
۱ _{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.3	0.2		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.

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

2. Outputs are terminated through a 50 Ω resistor to V_{CC} – 2.0 V.

Table 4. 10E SERIES NECL DC CHARACTERISTICS (V_{CCx} = 0.0 V; V_{EE} = -5.0 V (Note 1))

		-40°C			25°C			85°C			
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		30	36		30	36		30	36	mA
V _{OH}	Output HIGH Voltage (Note 2)	-1020	-930	-840	-980	-895	-810	-910	-815	-720	mV
V _{OL}	Output LOW Voltage (Note 2)	-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	μA
١ _{١L}	Input LOW Current	0.5	0.3		0.5	0.065		0.3	0.2		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.

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

2. Outputs are terminated through a 50 Ω resistor to V_{CC} – 2.0 V.

Table 5. 100E SERIES PECL DC CHARACTERISTICS (V_{CCx} = 5.0 V; V_{EE} = 0.0 V (Note 1))

			–40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		30	36		30	36		35	42	mA
V _{OH}	Output HIGH Voltage (Note 2)	3975	4050	4120	3975	4050	4120	3975	4050	4120	mV
V _{OL}	Output LOW Voltage (Note 2)	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	μA
۱ _{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		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.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary –0.46 V / +0.8 V.

2. Outputs are terminated through a 50 Ω resistor to V_{CC} – 2.0 V.

Table 6. 100E SERIES NECL DC CHARACTERISTICS (V_{CCx} = 0.0 V; V_{EE} = -5.0 V (Note 1))

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		30	36		30	36		35	42	mA
V _{OH}	Output HIGH Voltage (Note 2)	-1025	-950	-880	-1025	-950	-880	-1025	-950	-880	mV
V _{OL}	Output LOW Voltage (Note 2)	-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
VIL	Input LOW Voltage	-1810	-1645	-1475	-1810	-1645	-1475	-1810	-1645	-1475	mV
I _{IH}	Input HIGH Current			150			150			150	μA
۱ _{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		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.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary –0.46 V / +0.8 V.

2. Outputs are terminated through a 50 Ω resistor to V_{CC} – 2.0 V.

Table 7. AC CHARACTERISTICS (V_{CCx} = 5.0 V; V_{EE} = 0.0 V or V_{CCx} = 0.0 V; V_{EE} = -5.0 V (Note 1))

			–40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f _{MAX}	Maximum Toggle Frequency		700			700			700		MHz
t _{PLH} t _{PHL}	Propagation Delay to Output D to Q	300	450	600	300	450	600	300	450	600	ps
t _{SKEW}	Within-Device Skew (Note 2) Within-Gate Skew (Note 3)		50 25			50 25			50 25		ps
t _{JITTER}	Random Clock Jitter (RMS)		< 1			< 1			< 1		ps
t _r t _f	Rise/Fall Time (20 - 80%)	275	380	575	300	380	575	275	380	575	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 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.

1. 10 Series: V_{EE} can vary -0.46 V / +0.06 V.

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

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

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

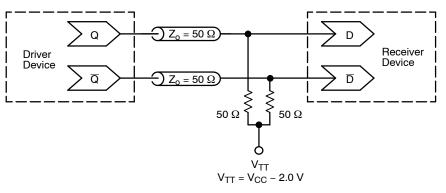
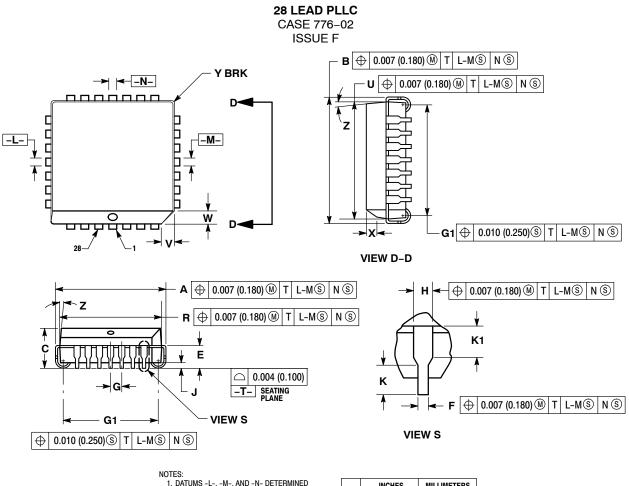


Figure 3. Typical Termination for Output Driver and Device Evaluation (See Application Note <u>AND8020/D</u> – Termination of ECL Logic Devices.)

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

PACKAGE DIMENSIONS



- IOTES: 1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE. 2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE. 3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 GPO DED GUIDE
- 0.010 (0.250) PER SIDE. 4. DIMENSIONING AND TOLERANCING PER
- ANSI Y14.5M, 1982. 5. CONTROLLING DIMENSION: INCH.
- 6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 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 PODY. PLASTIC BODY. 7. DIMENSION H DOES NOT INCLUDE DAMBAR
- PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H IDMENSION 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).

	INC	HES	MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.485	0.495	12.32	12.57
В	0.485	0.495	12.32	12.57
C	0.165	0.180	4.20	4.57
Ε	0.090	0.110	2.29	2.79
F	0.013	0.021	0.33	0.53
G	0.050	BSC	1.27	BSC
Н	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
۷	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
Ζ	2 °	10°	2 °	10°
G1	0.410	0.430	10.42	10.92
K1	0.040		1.02	

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