

MC10EP08DG Datasheet



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DiGi Electronics Part Number MC10EP08DG-DG

Manufacturer onsemi

Manufacturer Product Number MC10EP08DG

Description IC GATE XOR/XNOR ECL 2INP 8SOIC

Detailed Description XOR/XNOR Gate Configurable 1 Circuit 2 Input (1, 1

) Input 8-SOIC



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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
MC10EP08DG	onsemi
Series:	Product Status:
10EP	Active
Logic Type:	Number of Circuits:
XOR/XNOR Gate	1
Number of Inputs:	Schmitt Trigger Input:
2 Input (1, 1)	No
Output Type:	Current - Output High, Low:
Differential	
Voltage - Supply:	Operating Temperature:
3V ~ 5.5V	-40°C ~ 85°C
Mounting Type:	Package / Case:
Surface Mount	8-SOIC (0.154", 3.90mm Width)
Supplier Device Package:	Base Product Number:
8-SOIC	10EP08

Environmental & Export classification

8542.39.0001

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	



3.3 V/5 V ECL 2-Input Differential XOR/XNOR MC10EP08, MC100EP08

Description

The MC10/100EP08 is a differential XOR/XNOR gate. The EP08 is ideal for applications requiring the fastest AC performance available. The 100 Series contains temperature compensation.

Features

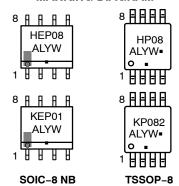
- 250 ps Typical Propagation Delay
- Maximum Frequency = > 3 GHz Typical
- PECL Mode Operating Range: V_{CC} = 3.0 V to 5.5 V with V_{EE} = 0 V
- NECL Mode Operating Range:
 V_{CC} = 0 V with V_{EE} = -3.0 V to -5.5 V
- Open Input Default State
- Safety Clamp on Inputs
- Q Output Will Default LOW with Inputs Open or at V_{EE}
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant





SOIC-8 NB D SUFFIX CASE 751-07 TSSOP-8 DT SUFFIX CASE 948R-02

MARKING DIAGRAM



= Assembly Location

= Wafer Lot Y = Year

H = MC10 W = Work Week K = MC100 \bullet = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]
MC10EP08DTG	TSSOP-8 (Pb-Free)	100 Units / Tube
MC100EP08DG	SOIC-8 NB (Pb-Free)	98 Units / Tube
MC100EP08DTG	TSSOP-8 (Pb-Free)	100 Units / Tube
MC100EP08DTR2G	TSSOP-8 (Pb-Free)	2500 / Tape & Reel

DISCONTINUED (Note 1)

1

MC10EP08DG	SOIC-8 NB (Pb-Free)	98 Units / Tube
MC10EP08DR2G	SOIC-8 NB (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.

 DISCONTINUED: This device is not recommended for new design. Please contact your onsemi representative for information. The most current information on this device may be available on www.onsemi.com.

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

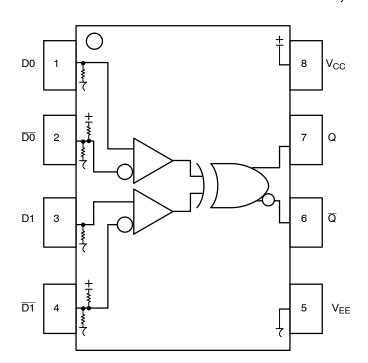


Table 1. PIN DESCRIPTION

PIN	FUNCTION
D0, D1, D0 , D1	ECL Data Inputs
Q, \overline{Q}	ECL Data Outputs
V _{CC}	Positive Supply
V _{EE}	Negative Supply

Table 2. TRUTH TABLE

D0*	D1*	D0 **	D1 **	ø	Q
L L H	ILIC	ΙΙΙ	エーエー	L H H L	H L L H

- ** Pins will default to 0.666% of V_{CC} when left open.
 * Pins will default LOW when left open.

Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

Table 3. ATTRIBUTES

Characteristics	Value
Internal Input Pulldown Resistor	75 kΩ
Internal Input Pullup Resistor	37.5 kΩ
ESD Protection Human Body Model Machine Model Charged Device Model	> 4 kV > 200 V > 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Pb-Free Pkg
SOIC-8 NB TSSOP-8	Level 1 Level 3
Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count	135 Devices
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	·

^{1.} For additional information, see Application Note AND8003/D.

Table 4. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V _{CC}	PECL Mode Power Supply	V _{EE} = 0 V		6	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	$V_{I} \le V_{CC}$ $V_{I} \ge V_{EE}$	6 -6	V
l _{out}	Output Current	Continuous Surge		50 100	mA
T _A	Operating Temperature Range			-40 to +85	°C
T _{stg}	Storage Temperature Range			-65 to +150	°C
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC-8 NB SOIC-8 NB	190 130	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8 NB	41 to 44	°C/W
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8 TSSOP-8	185 140	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44	°C/W
T _{sol}	Wave Solder (Pb-Free)	< 2 to 3 sec @ 260°C		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 5. 10EP DC CHARACTERISTICS, PECL ($V_{CC} = 3.3 \text{ V}, V_{EE} = 0 \text{ V}$ (Note 1))

			-40°C 25°C								
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current	20	28	36	20	30	38	20	32	38	mA
V _{OH}	Output HIGH Voltage (Note 2)	2165	2290	2415	2230	2355	2480	2290	2415	2540	mV
V _{OL}	Output LOW Voltage (Note 2)	1365	1490	1615	1430	1555	1680	1490	1615	1740	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	2090		2415	2155		2480	2215		2540	mV
V_{IL}	Input LOW Voltage (Single-Ended)	1365		1690	1430		1755	1490		1815	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	2.0		3.3	2.0		3.3	2.0		3.3	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current D D	0.5 -150			0.5 -150			0.5 -150			μΑ

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 V_{CC} . V_{EE} can vary +0.3 V to -2.2 V.
- All loading with 50 Ω to V_{CC} 2.0 V.
 V_{IHCMR} min varies 1:1 with V_{EE}, V_{IHCMR} max varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 6. 10EP DC CHARACTERISTICS, PECL (V_{CC} = 5.0 V, V_{EE} = 0 V (Note 1))

		-40°C			25°C						
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current	20	28	36	20	30	38	20	32	38	mA
V _{OH}	Output HIGH Voltage (Note 2)	3865	3940	4115	3930	4055	4180	3990	4115	4240	mV
V _{OL}	Output LOW Voltage (Note 2)	3065	3190	3315	3130	3255	3380	3190	3315	3440	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	3790		4115	3855		4180	3915		4240	mV
V _{IL}	Input LOW Voltage (Single-Ended)	3065		3390	3130		3455	3190		3515	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	2.0		5.0	2.0		5.0	2.0		5.0	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current D D	0.5 -150			0.5 -150			0.5 -150			μΑ

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 V_{CC} . V_{EE} can vary +2.0 V to -0.5 V.
- 2. All loading with 50 Ω to V_{CC} 2.0 V.
- 3. V_{IHCMR} min varies 1:1 with V_{EE} , V_{IHCMR} max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 7. 10EP DC CHARACTERISTICS, NECL ($V_{CC} = 0 \text{ V}$; $V_{EE} = -5.5 \text{ V}$ to -3.0 V (Note 1))

			-40°C		25°C						
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current	20	28	36	20	30	38	20	32	38	mA
VOH	Output HIGH Voltage (Note 2)	-1135	-1010	-885	-1070	-945	-820	-1010	-885	-760	mV
V _{OL}	Output LOW Voltage (Note 2)	-1935	-1810	-1685	-1870	-1745	-1620	-1810	-1685	-1560	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	-1210		-885	-1145		-820	-1085		-760	mV
V_{IL}	Input LOW Voltage (Single-Ended)	-1935		-1610	-1870		-1545	-1810		-1485	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	V _{EE} ·	V _{EE} + 2.0		V _{EE}	+ 2.0	0.0	V _{EE}	+ 2.0	0.0	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current D D	0.5 -150			0.5 -150			0.5 -150			μΑ

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 V_{CC}. 2. All loading with 50 Ω to V_{CC} 2.0 V.
- 3. V_{IHCMR} min varies 1:1 with V_{EE}, V_{IHCMR} max varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 8. 100EP DC CHARACTERISTICS, PECL ($V_{CC} = 3.3 \text{ V}$, $V_{EE} = 0 \text{ V}$ (Note 1))

		-40°C				25°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current	20	28	36	20	30	38	20	32	40	mA
V _{OH}	Output HIGH Voltage (Note 2)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
V _{OL}	Output LOW Voltage (Note 2)	1355	1480	1605	1355	1480	1605	1355	1480	1605	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	2075		2420	2075		2420	2075		2420	mV
V_{IL}	Input LOW Voltage (Single-Ended)	1355		1675	1355		1675	1355		1675	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	2.0		3.3	2.0		3.3	2.0		3.3	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	put LOW Current D D	0.5 -150			0.5 -150			0.5 -150			μΑ

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 V_{CC} . V_{EE} can vary +0.3 V to -2.2 V.
- 2. All loading with 50 Ω to V_{CC} 2.0 V.
- 3. V_{IHCMR} min varies 1:1 with V_{EE}, V_{IHCMR} max varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 9. 100EP DC CHARACTERISTICS, PECL ($V_{CC} = 5.0 \text{ V}$, $V_{EE} = 0 \text{ V}$ (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	20	28	36	20	30	38	20	32	40	mA
V _{OH}	Output HIGH Voltage (Note 2)	3855	3980	4105	3855	3980	4105	3855	3980	4105	mV
V _{OL}	Output LOW Voltage (Note 2)	3055	3180	3305	3055	3180	3305	3055	3180	3305	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	3775		4120	3775		4120	3775		4120	mV
V _{IL}	Input LOW Voltage (Single-Ended)	3055		3375	3055		3375	3055		3375	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	2.0		5.0	2.0		5.0	2.0		5.0	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current D D	0.5 -150			0.5 -150			0.5 -150			μΑ

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 $V_{CC}.\ V_{EE}$ can vary +2.0 V to –0.5 V.
- 2. All loading with 50 Ω to V_{CC} 2.0 V.
- 3. V_{IHCMR} min varies 1:1 with V_{EE}, V_{IHCMR} max varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 10. 100EP DC CHARACTERISTICS, NECL ($V_{CC} = 0 \text{ V}$; $V_{EE} = -5.5 \text{ V}$ to -3.0 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	20	28	36	20	30	38	20	32	40	mA
V _{OH}	Output HIGH Voltage (Note 2)	-1145	-1020	-895	-1145	-1020	-895	-1145	-1020	-895	mV
V _{OL}	Output LOW Voltage (Note 2)	-1945	-1820	-1695	-1945	-1820	-1695	-1945	-1820	-1695	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	-1225		-880	-1225		-880	-1225		-880	mV
V _{IL}	Input LOW Voltage (Single-Ended)	-1945		-1625	-1945		-1625	-1945		-1625	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	V _{EE}	+ 2.0	0.0	V _{EE}	+ 2.0	0.0	V _{EE}	+ 2.0	0.0	٧
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current D D	0.5 -150			0.5 -150			0.5 -150			μΑ

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 V_{CC}.
- 2. All loading with 50 Ω to V_{CC} 2.0 V.
- 3. V_{IHCMR} min varies 1:1 with V_{EE} , V_{IHCMR} max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 11. AC CHARACTERISTICS (V_{CC} = 0 V; V_{EE} = -3.0 V to -5.5 V or V_{CC} = 3.0 V to 5.5 V; V_{EE} = 0 V (Note 1))

	(00) EE			U	O		,	`	//		
		−40°C		25°C			85°C				
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f _{max}	Maximum Frequency (Figure 2)		> 3			> 3			> 3		GHz
t _{PLH} , t _{PHL}	Propagation Delay to Output Differential D, D to Q, Q	170	220	280	180	250	300	200	270	320	ps
t _{JITTER}	Cycle-to-Cycle Jitter (Figure 2)		0.2	< 1		0.2	< 1		0.2	< 1	ps
V _{PP}	Input Voltage Swing (Differential Configuration)	150	800	1200	150	800	1200	150	800	1200	mV
t _r t _f	Output Rise/Fall Times Q, Q (20%-80%)	70	120	170	80	130	180	100	150	200	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.

1. Measured using a 750 mV source, 50% duty cycle clock source. All loading with 50 Ω to V_{CC} – 2.0 V.

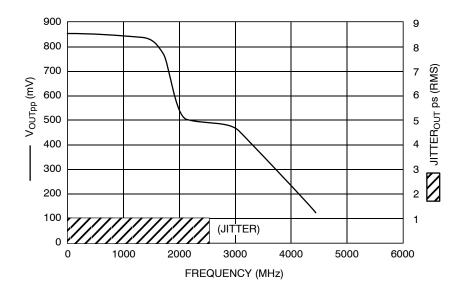


Figure 2. F_{max}/Jitter

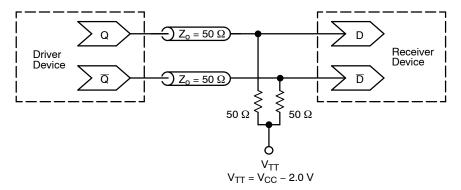


Figure 3. Typical Termination for Output Driver and Device Evaluation (See Application Note $\underline{\text{AND8020/D}}$ – Termination of ECL Logic Devices)

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

AN1642/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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☐ 0.10 (0.004) -T- SEATING

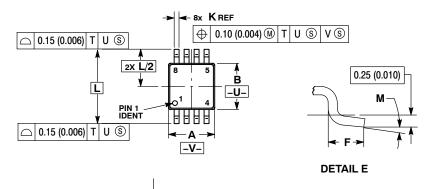
MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



TSSOP-8 3.00x3.00x0.95 CASE 948R-02 **ISSUE A**

DATE 07 APR 2000





NOTES:

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

	MILLIN	IETERS	INCHES			
DIM	MIN	MAX	MIN	MAX		
Α	2.90	3.10	0.114	0.122		
В	2.90	3.10	0.114	0.122		
С	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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DESCRIPTION:	TSSOP-8 3.00x3.00x0.95		PAGE 1 OF 1				

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