



Combinatorial ECL 16P4 Programmable Logic Device

Features

- **Standard 16P4 pinout and architecture**
 - 16 inputs, 4 outputs
 - User-programmable output polarity
- **Ultra high speed/standard power**
 - $t_{PD} = 3 \text{ ns (max.)}$
 - $I_{EE} = 220 \text{ mA (max.)}$
- **Low-power version**
 - $t_{PD} = 4 \text{ ns (max.)}$
 - $I_{EE} = 170 \text{ mA (max.)}$
- **Both 10KH- and 100K-compatible I/O versions available**
- **Enhanced test features**
 - Additional test input terms
 - Additional test product terms
- **Security fuse**

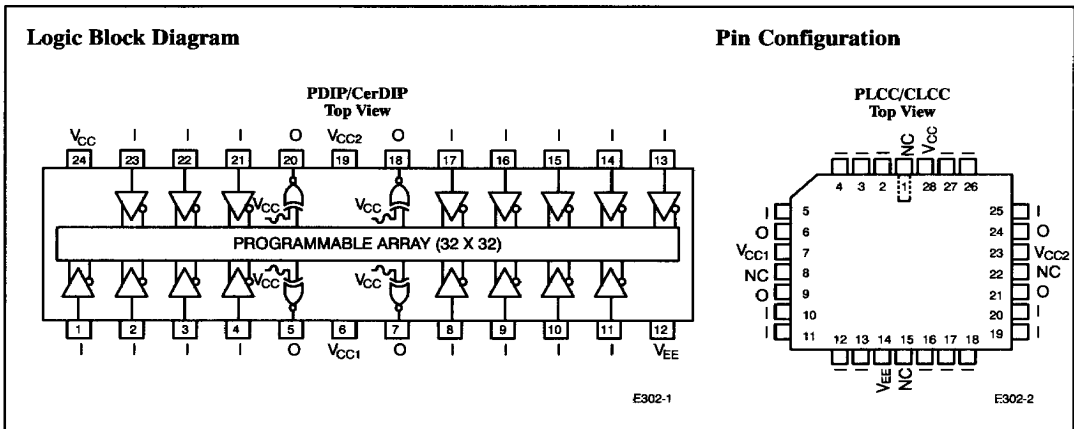
Functional Description

Cypress Semiconductor's PLD family offers the user the highest level of performance in ECL programmable logic devices. These PLDs are developed using an advanced process incorporating proven Ti-W fuses.

The CY10E302 is 10KH compatible and the CY100E302 is 100K compatible. These PLDs implement the familiar sum-of-products logic functions by selectively programming cell elements to configure the AND gates by disconnecting either the true or complement input term. If all inputs are disconnected from an AND gate, then a logical true will exist at the output of this AND gate. An output polarity fuse is also provided to allow an active LOW to

occur if this fuse is blown. A security feature provides the user protection for the implementation of proprietary logic. When invoked by blowing the security fuse, the contents of the array cannot be accessed in the verify mode.

The CY10E302 and CY100E302 can be programmed using Cypress's QuickPro II or other industry-standard programming equipment. Programming support information can be obtained from local Cypress Semiconductor sales offices.



Selection Guide

	10E302-3 100E302-3	10E302-4	100E302-4	10E302L-4 100E302L-4
Maximum Input to Output Propagation Delay Time (ns)	3	4	4	4
I_{EE} (mA)	Commercial	-220	-220	-170
	Military		-220	

Maximum Ratings

(Above which the useful life may be impaired. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability. For user guidelines, not tested.)

Storage Temperature	- 65°C to +150°C
Ambient Temperature with Power Applied	- 55°C to +125°C
Supply Voltage V_{EE} to V_{CC}	- 7.0V to +0.5V
Input Voltage	V_{EE} to +0.5V
Output Current	- 50 mA

Operating Range Referenced to V_{CC} at Ground

Range	I/O	Temperature	V_{CC}
Commercial (Standard, L)	10KH	0°C to +75°C Ambient	-5.2V + 5%
Commercial (Standard, L)	100K	0°C to +85°C Ambient	-4.2V to -0.3V
Military	100KH	-55°C to +125°C Case	-5.2V + 5%

Electrical Characteristics Over the Operating Range¹⁾

Parameters	Description	Test Conditions	Temperature ^[2]	10E302		100E302		Units
				Min.	Max.	Min.	Max.	
V_{OH}	Output HIGH Voltage	10KH, $R_L = 50\Omega$ to -2V, $V_{IN} = V_{IH}$ Min. or V_{IL} Max.	$T_C = 55^\circ C$	-1140	-920			mV
			$T_A = 0^\circ C$	-1020	-840			mV
			$T_A = +25^\circ C$	-980	-810			mV
			$T_A = +75^\circ C$	-920	-735			mV
			$T_C = +125^\circ C$	-900	-700			mV
			$T_A = 0^\circ C$ to $85^\circ C$			-1025	-880	mV
V_{OL}	Output LOW Voltage	10KH, $R_L = 50\Omega$ to -2V, $V_{IN} = V_{IH}$ Min. or V_{IL} Max.	$T_C = -55^\circ C$	-1950	-1650			mV
			$T_A = 0^\circ C$	-1950	-1630			mV
			$T_A = +25^\circ C$	-1950	-1630			mV
			$T_A = +75^\circ C$	-1950	-1600			mV
			$T_C = +125^\circ C$	-1930	-1590			mV
			$T_A = 0^\circ C$ to $85^\circ C$			-1810	-1620	mV
V_{IH}	Input HIGH Voltage	10KH	$T_C = -55^\circ C$	-1270	-920			mV
			$T_A = 0^\circ C$	-1170	-840			mV
			$T_A = +25^\circ C$	-1130	-810			mV
			$T_A = +75^\circ C$	-1070	-735			mV
			$T_C = +125^\circ C$	-1050	-700			mV
			$T_A = 0^\circ C$ to $85^\circ C$			-1165	-880	mV
V_{IL}	Input LOW Voltage	10KH	$T_C = 55^\circ C$	-1950	-1520			mV
			$T_A = 0^\circ C$	-1950	-1480			mV
			$T_A = +25^\circ C$	-1950	-1480			mV
			$T_A = +75^\circ C$	-1950	-1450			mV
			$T_C = +125^\circ C$	-1950	-1440			mV
			$T_A = 0^\circ C$ to $85^\circ C$			-1810	-1475	mV
I_{IH}	Input HIGH Current	$V_{IN} = V_{IH}$ Max.		220		220	μA	
I_{IL}	Input LOW Current	$V_{IN} = V_{IL}$ Min.		0.5		0.5	μA	
I_{EE}	Supply Current (All inputs and outputs open)	Commercial L (Low Power)			-170		-170	mA
		Commercial (Standard Power)			-220		-220	mA
		Military			-220			mA

Notes:

1. See AC Test Loads and Waveforms for test conditions.

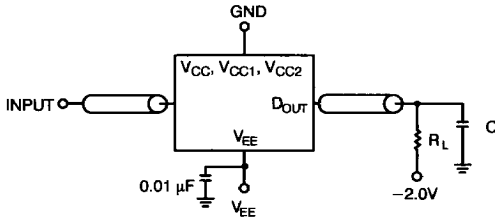
2. Commercial grade is specified as ambient temperature with transverse air flow greater than 500 linear feet per minute. Military grade is specified as case temperature.

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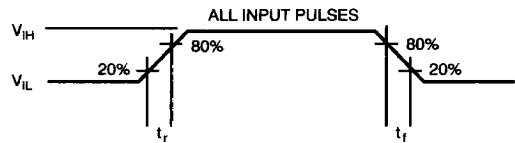
Capacitance^[3]

Parameters	Description	Min.	Typ.	Max.	Units
C_{IN}	Input Capacitance		4	8	pF
C_{OUT}	Output Capacitance		6	10	pF

AC Test Load and Waveform^[4, 5, 6, 7, 8, 9]



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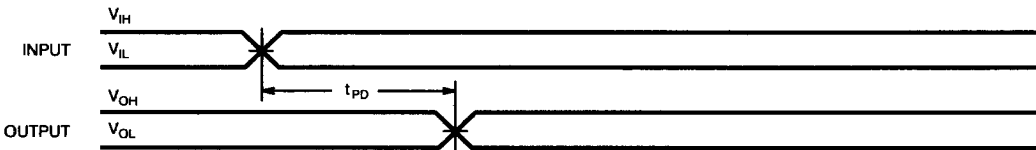
Notes:

- Tested initially and after any design or process changes that may affect these parameters.
- $V_{IL} = V_{IL} \text{ Min.}$, $V_{IH} = V_{IH} \text{ Max.}$ on 10KH version.
- $V_{IL} = -1.7V$, $V_{IH} = -0.9V$ on 100K version
- $R_L = 50\Omega$, $C < 5 \text{ pF}$ (includes fixture and stray capacitance).
- All coaxial cables should be 50Ω with equal lengths. The delay of the coaxial cables should be "nulled" out of the measurement.
- $t_r = t_f = 0.7 \text{ ns}$
- All timing measurements are made from the 50% point of all waveforms.

Switching Characteristics Over the Operating Range^[1]

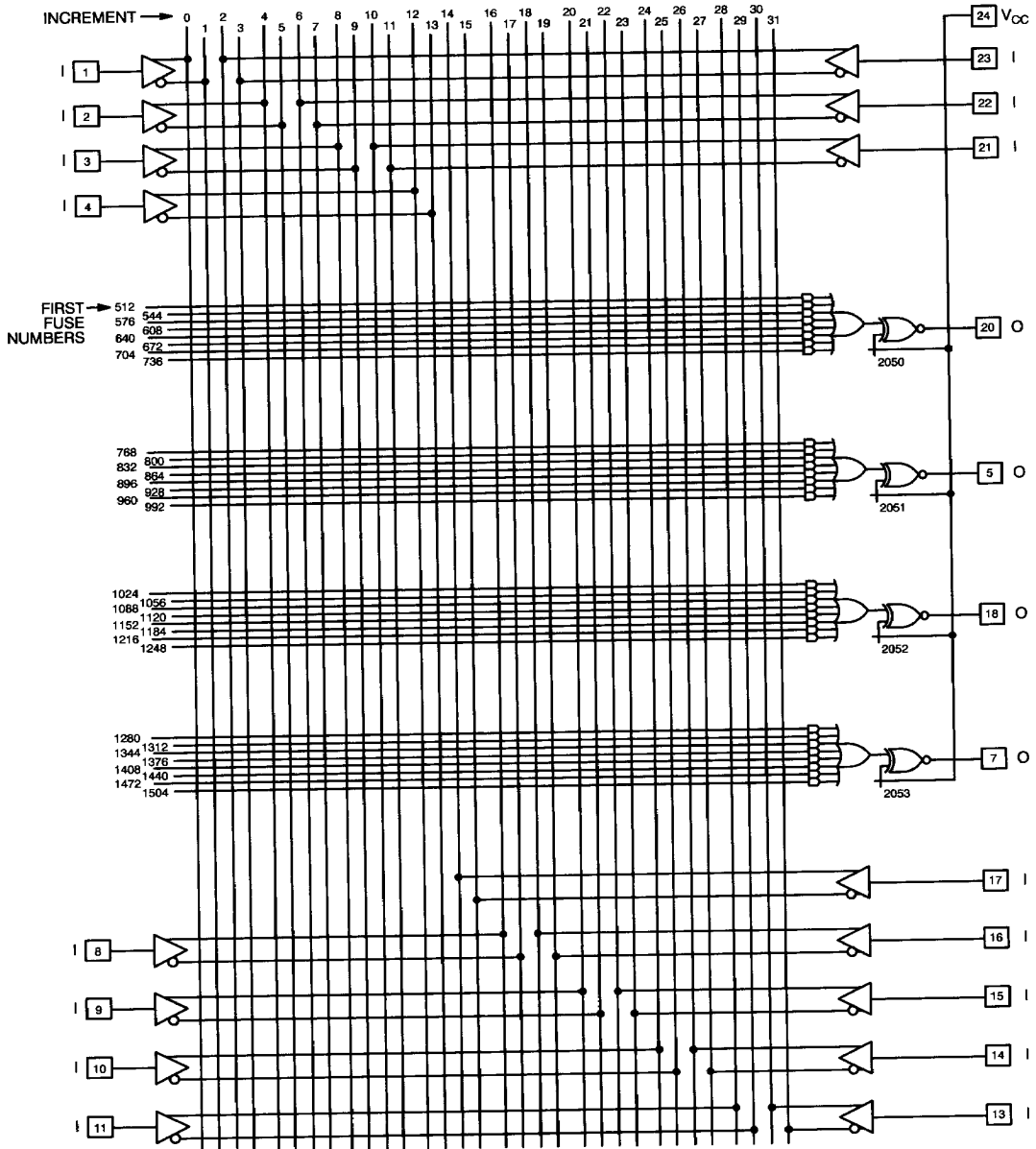
Parameters	Description	10E302-3 100E302-3		10E302-4 100E302-4		10E302L-4 100E302L-4		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
t_{PD}	Input to Output Propagation Delay		3.0		4.0		4.0	ns
t_r	Output Rise Time	0.35	1.5	0.35	1.5	0.35	1.5	ns
t_f	Output Fall Time	0.35	1.5	0.35	1.5	0.35	1.5	ns

Switching Waveforms



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Functional Logic Diagram (DIP Pinout)



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JEDEC fuse number = first fuse number + increment

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Ordering Information

I/O	t _{PD} (ns)	I _{EE} (mA)	Ordering Code	Package Type	Operating Range
10KH	3	220	CY10E302-3DC	D14	Commercial
			CY10E302-3YC	Y64	
	4	220	CY10E302-4DC	D14	Commercial
			CY10E302-4YC	Y64	
	4	220	CY10E302-4DMB	D14	Military
			CY10E302-4YMB	Y64	
4	170	CY10E302L-4PC	P13A	Commercial	
		CY10E302L-4JC	J64		
100K	3	220	CY100E302-3DC	D14	Commercial
			CY100E302-3YC	Y64	
	4	220	CY100E302-4DC	D14	Commercial
			CY100E302-4YC	Y64	
	4	170	CY100E302L-4PC	P13A	Commercial
			CY100E302L-4JC	J64	

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