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FAIRCHILD SEMICONDUCTOR™

October 1987
Revised April 2002

CD4099BC
8-Bit Addressable Latch

General Description

The CD4099BC is an 8-bit addressable latch with three address inputs (A0–A2), an active low enable input ($\overline{E}$), active high clear input (CL), a data input (D), and eight outputs (Q0–Q7).

Data is entered into a particular bit in the latch when that bit is addressed by the address inputs and the enable ($\overline{E}$) is LOW. Data entry is inhibited when enable ($\overline{E}$) is HIGH.

When clear (CL) and enable ($\overline{E}$) are HIGH, all outputs are LOW. When clear (CL) is HIGH and enable ($\overline{E}$) is LOW, the channel demultiplexing occurs. The bit that is addressed has an active output which follows the data input while all unaddressed bits are held LOW. When operating in the addressable latch mode ($\overline{E}$ = CL = LOW), changing more than one bit of the address could impose a transient wrong address. Therefore, this should only be done while in the memory mode ($\overline{E}$ = HIGH, CL = LOW).

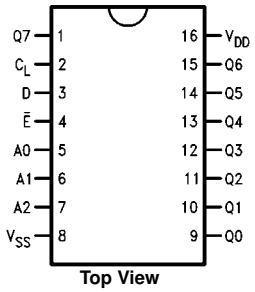
Features

- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ.)
- Low power TTL: fan out of 2 driving 74L compatibility: or 1 driving 74LS
- Serial to parallel capability
- Storage register capability
- Random (addressable) data entry
- Active high demultiplexing capability
- Common active high clear

Ordering Code:

Order Number	Package Number	Package Description
CD4099BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Connection Diagram

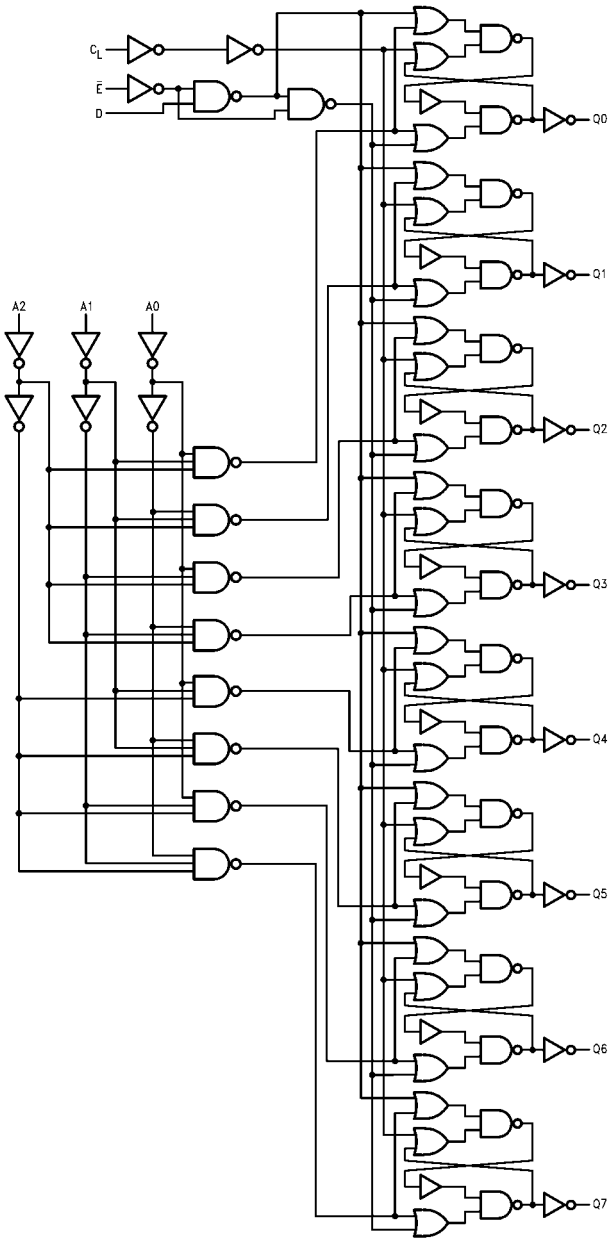


Top View

Truth Table

Mode Selection				
$\overline{E}$	CL	Addressed Latch	Unaddressed Latch	Mode
L	L	Follows Data	Holds Previous Data	Addressable Latch
H	L	Holds Previous Data	Holds Previous Data	Memory
L	H	Follows Data	Reset to “0”	Demultiplexer
H	H	Reset to “0”	Reset to “0”	Clear

Logic Diagram



Absolute Maximum Ratings(Note 1)

(Note 2)

DC Supply Voltage (V_{DD})	−0.5 to +18 V_{DC}
Input Voltage (V_{IN})	−0.5 to V_{DD} +0.5 V_{DC}
Storage Temperature Range (T_S)	−65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature (T_L) (Soldering, 10 seconds)	260°C

Recommended Operating Conditions (Note 2)

DC Supply Voltage (V_{DD})	3.0 to 15 V_{DC}
Input Voltage (V_{IN})	0 to V_{DD} V_{DC}
Operating Temperature Range (T_A)	−55°C to +125°C

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed; they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 2)

Symbol	Parameter	Conditions	−55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device	V_{DD} = 5V, V_{IN} = V_{DD} or V_{SS}		5.0		0.02	5.0		150	
	Current	V_{DD} = 10V, V_{IN} = V_{DD} or V_{SS}		10		0.02	10		300	μA
		V_{DD} = 15V, V_{IN} = V_{DD} or V_{SS}		20		0.02	20		600	
V_{OL}	LOW Level	$\|I_O\| \leq 1\mu A$								
	Output Voltage	V_{DD} = 5V		0.05		0	0.05		0.05	
		V_{DD} = 10V		0.05		0	0.05		0.05	V
		V_{DD} = 15V		0.05		0	0.05		0.05	
V_{OH}	HIGH Level	$\|I_O\| \leq 1$ μA								
	Output Voltage	V_{DD} = 5V	4.95		4.95	5		4.95		
		V_{DD} = 10V	9.95		9.95	10		9.95		V
		V_{DD} = 15V	14.95		14.95	15		14.95		
V_{IL}	LOW Level	V_{DD} = 5V, V_O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	
	Input Voltage	V_{DD} = 10V, V_O = 1.0V or 9.0V		3.0		4.5	3.0		3.0	V
		V_{DD} = 15V, V_O = 1.5V or 13.5V		4.0		6.75	4.0		4.0	
V_{IH}	HIGH Level	V_{DD} = 5V, V_O = 0.5V or 4.5V	3.5		3.5	2.75		3.5		
	Input Voltage	V_{DD} = 10V, V_O = 1.0V or 9.0V	7.0		7.0	5.5		7.0		V
		V_{DD} = 15V, V_O = 1.5V or 13.5V	11.0		11.0	8.25		11.0		
I_{OL}	LOW Level Output	V_{DD} = 5V, V_O = 0.4V	0.64		0.51	0.88		0.36		
	Current (Note 3)	V_{DD} = 10V, V_O = 0.5V	1.6		1.3	2.25		0.9		mA
		V_{DD} = 15V, V_O = 1.5V	4.2		3.4	8.8		2.4		
I_{OH}	HIGH Level Output	V_{DD} = 5V, V_O = 4.6V	−0.64		−0.51	−0.88		−0.36		
	Current (Note 3)	V_{DD} = 10V, V_O = 9.5V	−1.6		−1.3	−2.25		−0.9		mA
		V_{DD} = 15V, V_O = 13.5V	−4.2		−3.4	−8.8		−2.4		
I_{IN}	Input Current	V_{DD} = 15V, V_{IN} = 0V		−0.1		-10^{-5}	−0.1		−1.0	μA
		V_{DD} = 15V, V_{IN} = 15V		0.1		10^{-5}	0.1		1.0	

Note 3: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 4)

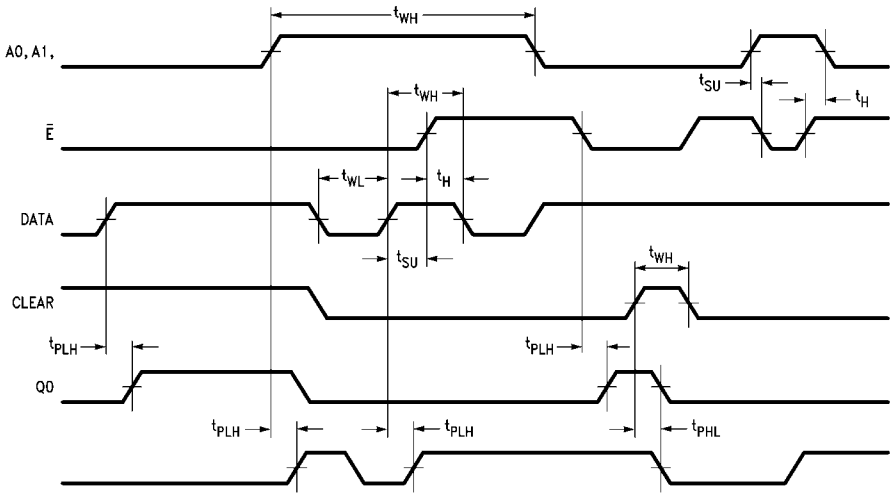
$T_A = 25°C$, $C_L = 50$ pF, $R_L = 200$k, Input $t_r = t_f = 20$ ns, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PHL}, t_{PLH}	Propagation Delay	$V_{DD} = 5V$		200	400	
	Data to Output	$V_{DD} = 10V$		75	150	ns
		$V_{DD} = 15V$		50	100	
t_{PLH}, t_{PHL}	Propagation Delay	$V_{DD} = 5V$		200	400	
	Enable to Output	$V_{DD} = 10V$		80	160	ns
		$V_{DD} = 15V$		60	120	
t_{PHL}	Propagation Delay	$V_{DD} = 5V$		175	350	
	Clear to Output	$V_{DD} = 10V$		80	160	ns
		$V_{DD} = 15V$		65	130	
t_{TLH}, t_{THL}	Propagation Delay	$V_{DD} = 5V$		225	450	
	Address to Output	$V_{DD} = 10V$		100	200	ns
		$V_{DD} = 15V$		75	150	
t_{THL}, t_{TLH}	Transition Time	$V_{DD} = 5V$		100	200	
	(Any Output)	$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	
T_{WH}, T_{WL}	Minimum Data	$V_{DD} = 5V$		100	200	
	Pulse Width	$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	
t_{WH}, t_{WL}	Minimum Address	$V_{DD} = 5V$		200	400	
	Pulse Width	$V_{DD} = 10V$		100	200	ns
		$V_{DD} = 15V$		65	125	
t_{WH}	Minimum Clear	$V_{DD} = 5V$		75	150	
	Pulse Width	$V_{DD} = 10V$		40	75	ns
		$V_{DD} = 15V$		25	50	
t_{SU}	Minimum Set-Up Time	$V_{DD} = 5V$		40	80	
	Data to E	$V_{DD} = 10V$		20	40	ns
		$V_{DD} = 15V$		15	30	
t_H	Minimum Hold Time	$V_{DD} = 5V$		60	120	
	Data to E	$V_{DD} = 10V$		30	60	ns
		$V_{DD} = 15V$		25	50	
t_{SU}	Minimum Set-Up Time	$V_{DD} = 5V$		−15	50	
	Address to E	$V_{DD} = 10V$		0	30	ns
		$V_{DD} = 15V$		0	20	
t_H	Minimum Hold Time	$V_{DD} = 5V$		−50	15	
	Address to E	$V_{DD} = 10V$		−20	10	ns
		$V_{DD} = 15V$		−15	5	
C_{PD}	Power Dissipation Capacitance	Per Package (Note 5)		100		pF
C_{IN}	Input Capacitance	Any Input		5.0	7.5	pF

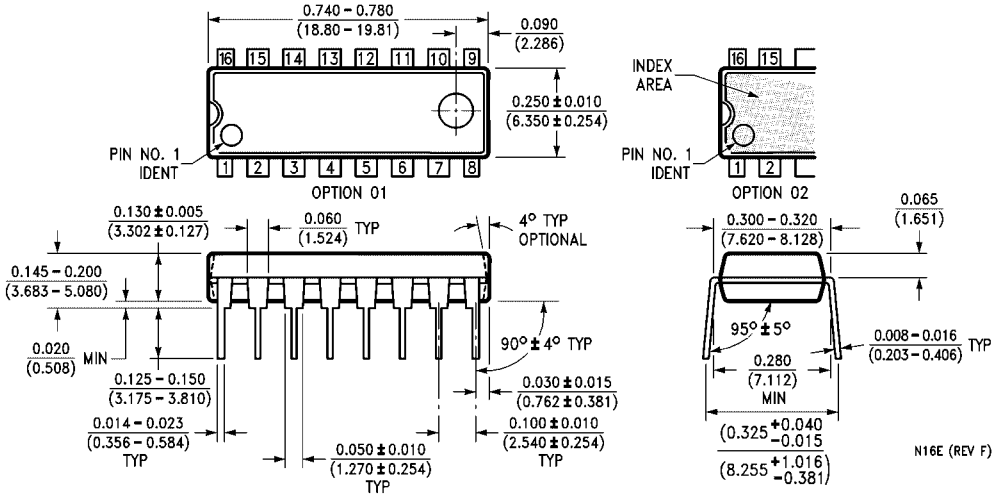
Note 4: AC Parameters are guaranteed by DC correlated testing.

Note 5: Dynamic power dissipation (P_D) is given by: $P_D = (C_{PD} + C_L)\ V_{CC}^2 f + P_Q$; where C_L = load capacitance; f = frequency of operation; for further details, see application note AN-90, "54C/74C Family Characteristics".

Switching Time Waveforms



Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N16E