

## **Excellent Integrated System Limited**

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[Fairchild Semiconductor](#)  
[CD4007CM](#)

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October 1987  
Revised January 1999

## CD4007C Dual Complementary Pair Plus Inverter

### General Description

The CD4007C consists of three complementary pairs of N- and P-channel enhancement mode MOS transistors suitable for series/shunt applications. All inputs are protected from static discharge by diode clamps to  $V_{DD}$  and  $V_{SS}$ .

For proper operation the voltages at all pins must be constrained to be between  $V_{SS} - 0.3V$  and  $V_{DD} + 0.3V$  at all times.

### Features

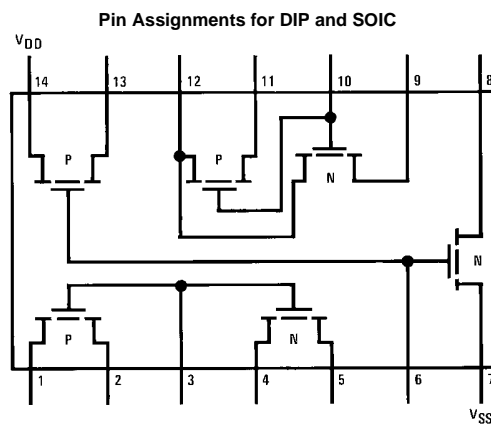
- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45  $V_{CC}$  (typ.)

### Ordering Code:

Order Number	Package Number	Package Description
CD4007CM	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow
CD4007CN	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

### Connection Diagram



**Note:** All P-channel substrates are connected to  $V_{DD}$  and all N-channel substrates are connected to  $V_{SS}$ .

Top View

CD4007C

### Absolute Maximum Ratings (Note 1)

Voltage at Any Pin	$V_{SS} - 0.3V$ to $V_{DD} + 0.3V$	Operating $V_{DD}$ Range	$V_{SS} + 3.0V$ to $V_{SS} + 15V$
Operating Temperature Range	$-40^{\circ}C$ to $+85^{\circ}C$	Lead Temperature	
Storage Temperature Range	$-65^{\circ}C$ to $+150^{\circ}C$	(Soldering, 10 seconds)	$260^{\circ}C$
Power Dissipation ( $P_D$ )			
Dual-In-Line	700 mW		
Small Outline	500 mW		

**Note 1:** This device should not be connected to circuits with the power on because high transient voltages may cause permanent damage.

### DC Electrical Characteristics

Symbol	Parameter	Conditions	Limits									Units
			$-40^{\circ}C$			$+25^{\circ}C$			$+85^{\circ}C$			
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_L$	Quiescent Device Current	$V_{DD} = 5.0V$			0.5		0.005	0.05			15	$\mu A$
		$V_{DD} = 10V$			1.0		0.005	1.0			30	$\mu A$
$P_D$	Quiescent Device Dissipation Package	$V_{DD} = 5.0V$			2.5		0.025	2.5			75	$\mu W$
		$V_{DD} = 10V$			10		0.05	10			300	$\mu W$
$V_{OL}$	Output Voltage LOW Level	$V_{DD} = 5.0V$			0.05		0	0.01			0.05	V
		$V_{DD} = 10V$			0.05		0	0.01			0.05	V
$V_{OH}$	Output Voltage HIGH Level	$V_{DD} = 5.0V$	4.95			4.95	5.0		4.95			V
		$V_{DD} = 10V$	9.95			9.95	10		9.95			V
$V_{NL}$	Noise Immunity (All inputs)	$V_{DD} = 5.0V, V_O = 3.6V$			1.5		2.25	1.5			1.4	V
		$V_{DD} = 10V, V_O = 7.2V$			3.0		4.5	3.0			2.9	V
$V_{NH}$	Noise Immunity (All Inputs)	$V_{DD} = 5.0V, V_O = 0.95V$	3.6			3.5	2.25		3.5			V
		$V_{DD} = 10V, V_O = 2.9V$	7.1			7.0	4.5		7.0			V
$I_{DN}$	Output Drive Current N-Channel	$V_{DD} = 5.0V, V_O = 0.4V, V_I = V_{DD}$	0.35			0.3	1.0		0.24			mA
		$V_{DD} = 10V, V_O = 0.5V, V_I = V_{DD}$	1.2			1.0	2.5		0.8			mA
$I_{DP}$	Output Drive Current P-Channel	$V_{DD} = 5.0V, V_O = 2.5V, V_I = V_{SS}$	-1.3			-1.1	-4.0		-0.9			mA
		$V_{DD} = 10V, V_O = 9.5V, V_I = V_{SS}$	-0.65			-0.55	-2.5		-0.45			mA
$I_I$	Input Current						10				pA	

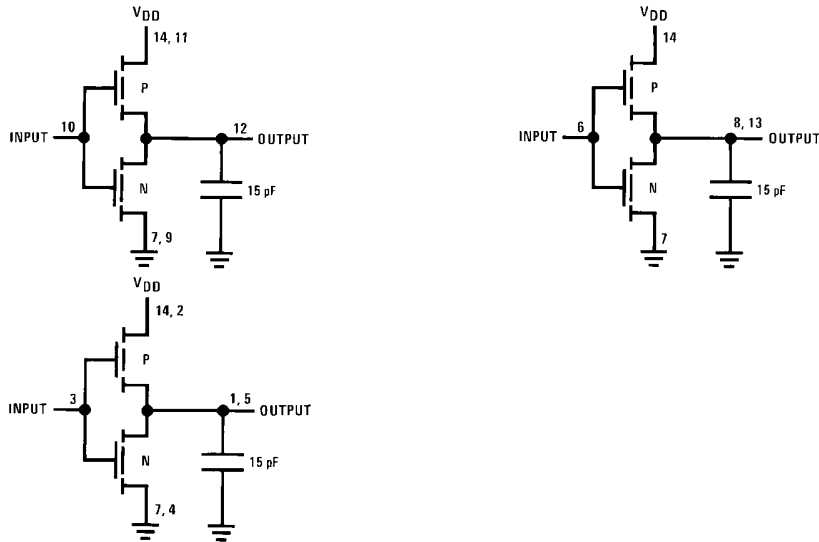
### AC Electrical Characteristics (Note 2)

$T_A = 25^{\circ}C$  and  $C_L = 15$  pF and rise and fall times = 20 ns. Typical temperature coefficient for all values of  $V_{DD} = 0.3\%/^{\circ}C$

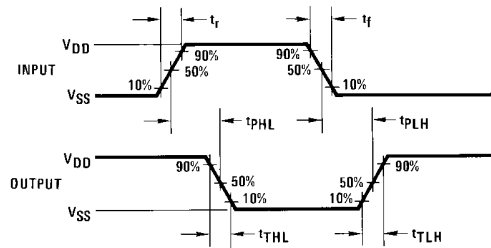
Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{PLH} = t_{PHL}$	Propagation Delay Time	$V_{DD} = 5.0V$		35	75	ns
		$V_{DD} = 10V$		20	50	ns
$t_{TLH} = t_{THL}$	Transition Time	$V_{DD} = 5.0V$		50	100	ns
		$V_{DD} = 10V$		30	50	ns
$C_I$	Input Capacitance	Any Input		5		pF

**Note 2:** AC Parameters are guaranteed by DC correlated testing.

**AC Test Circuits**

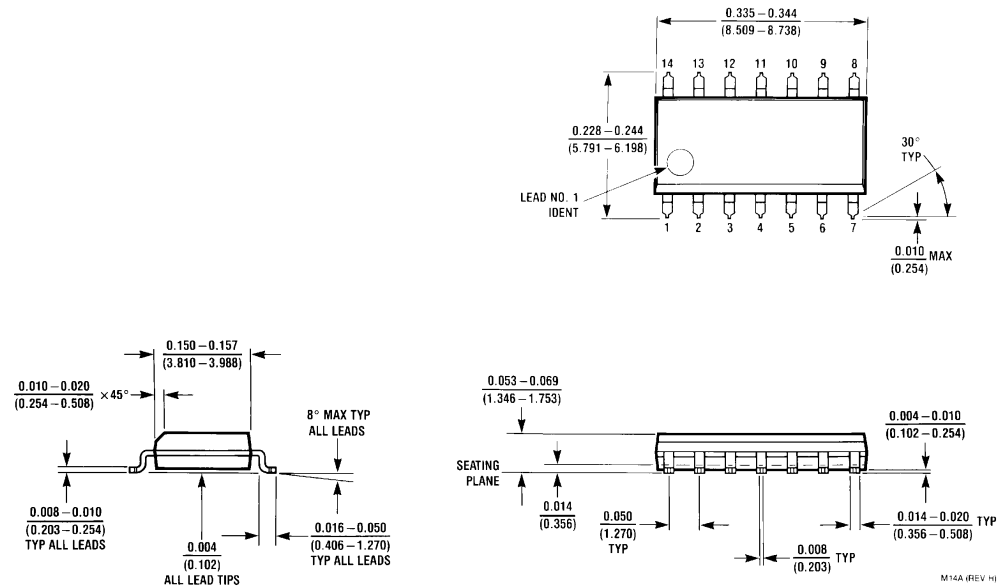


**Switching Time Waveforms**



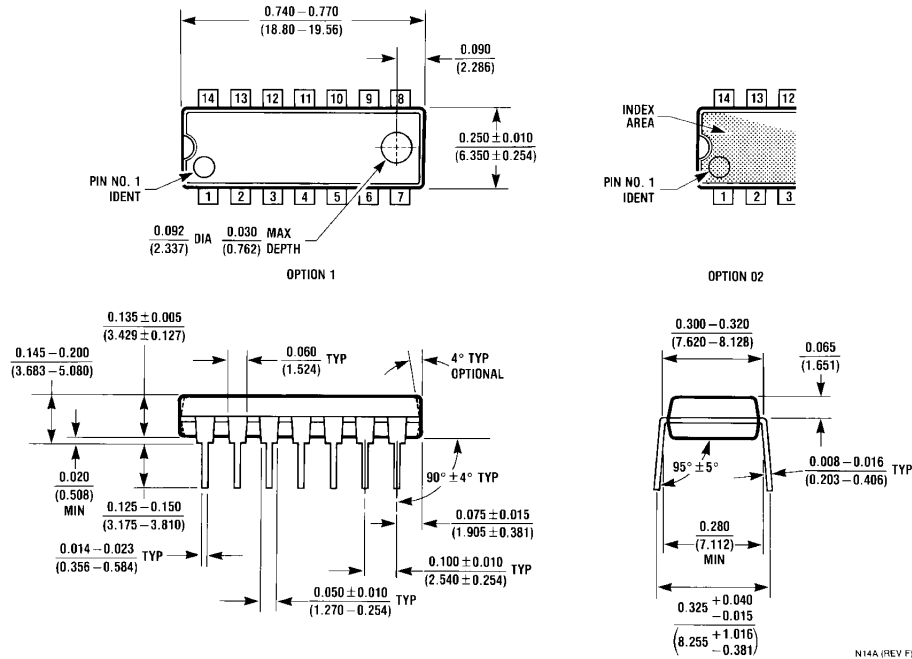
CD4007C

**Physical Dimensions** inches (millimeters) unless otherwise noted



**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow  
 Package Number M14A**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide  
 Package Number N14A**

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