

## CD4007M/CD4007C Dual Complementary Pair Plus Inverter

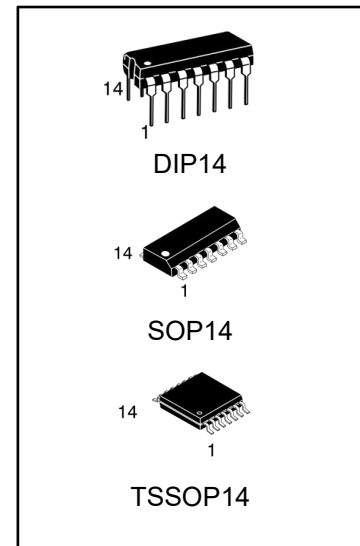
### General Description

The CD4007B 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

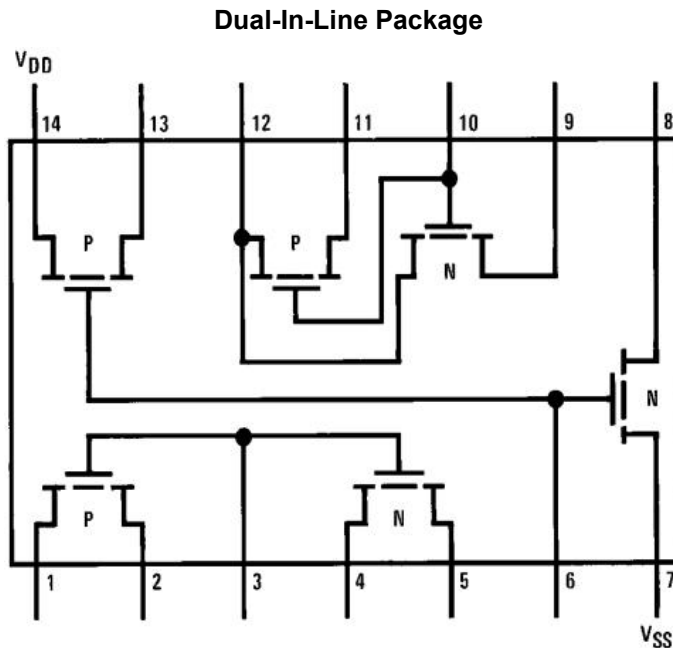
- Wide supply voltage range: 3.0V to 15V
- High noise immunity:  $0.45 V_{CC}$  (typ.)



### Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4007BE	DIP14	CD4007BE	TUBE	1000pcs/Box
CD4007BM/TR	SOP14	CD4007B	REEL	2500pcs/Reel
CD4007BMT/TR	TSSOP14	CD4007B	REEL	2500pcs/Reel

## Connection Diagram



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

## Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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

## DC Electrical Characteristics

Symbol	Parameter	Conditions	Limits									Units
			-40°C			+25°C			+85°C			
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I <sub>L</sub>	Quiescent Device Current	V <sub>DD</sub> = 5.0V	-	-	0.5	-	0.005	0.05	-	-	15	mA
		V <sub>DD</sub> = 10V	-	-	1.0	-	0.005	1.0	-	-	30	mA
P <sub>D</sub>	Quiescent Device Dissipation Package	V <sub>DD</sub> = 5.0V	-	-	2.5	-	0.025	2.5	-	-	75	mW
		V <sub>DD</sub> = 10V	-	-	10	-	0.05	10	-	-	300	mW
V <sub>OL</sub>	Output VoltageLow Level	V <sub>DD</sub> = 5.0V	-	-	0.05	-	0	0.01	-	-	0.05	V
		V <sub>DD</sub> = 10V	-	-	0.05	-	0	0.01	-	-	0.05	V
V <sub>OH</sub>	Output VoltageHigh Level	V <sub>DD</sub> = 5.0V	4.95	-	-	4.95	5.0	-	4.95	-	-	V
		V <sub>DD</sub> = 10V	9.95	-	-	9.95	10	-	9.95	-	-	V
V <sub>NL</sub>	Noise Immunity (All inputs)	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 3.6V	-	-	1.5	-	2.25	1.5	-	-	1.4	V
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 7.2V	-	-	3.0	-	4.5	3.0	-	-	2.9	V
V <sub>NH</sub>	Noise Immunity (All Inputs)	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.95V	3.6	-	-	3.5	2.25	-	3.5	-	-	V
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 2.9V	7.1	-	-	7.0	4.5	-	7.0	-	-	V
I <sub>DN</sub>	Output Drive CurrentN-Channel	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.4V, V <sub>I</sub> = V <sub>DD</sub>	0.35	-	-	0.3	1.0	-	0.24	-	-	Ma
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 0.5V, V <sub>I</sub> = V <sub>DD</sub>	1.2	-	-	1.0	2.5	-	0.8	-	-	mA
I <sub>DP</sub>	Output Drive CurrentP-Channel	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 2.5V, V <sub>I</sub> = V <sub>SS</sub>	-1.3	-	-	-1.1	-4.0	-	-0.9	-	-	mA
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 9.5V, V <sub>I</sub> = V <sub>SS</sub>	-0.65	-	-	-0.55	-2.5	-	-0.45	-	-	mA
I <sub>I</sub>	Input Current	-	-	-	-	10	-	-	-	-	pA	

### Note 1:

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

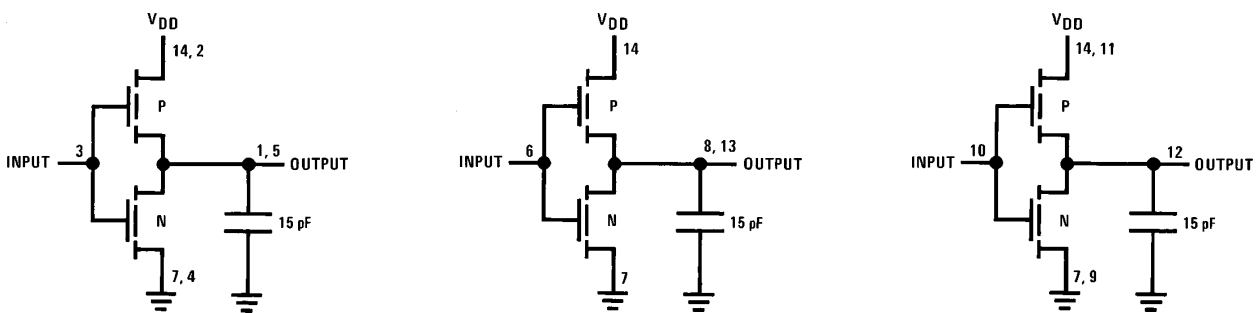
## AC Electrical Characteristics\*

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

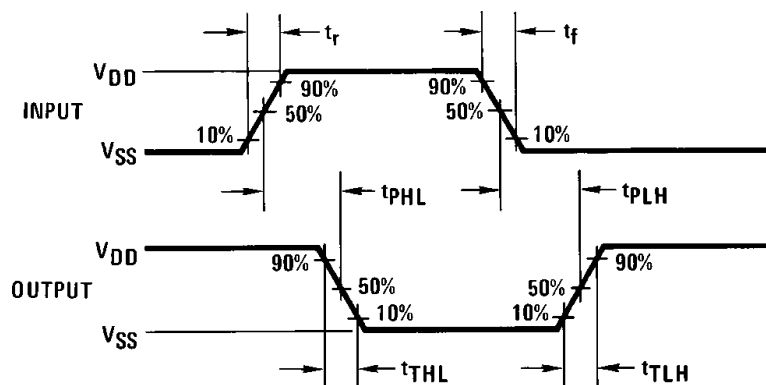
Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{PLH} = t_{PHL}$	Propagation Delay Time	$V_{DD} = 5.0\text{V}$ $V_{DD} = 10\text{V}$		35 20	75 50	ns ns
$t_{TLH} = t_{THL}$	Transition Time	$V_{DD} = 5.0\text{V}$ $V_{DD} = 10\text{V}$		50 30	100 50	ns ns
$C_I$	Input Capacitance	Any Input		5		pF

\*AC Parameters are guaranteed by DC correlated testing.

## AC Test Circuits

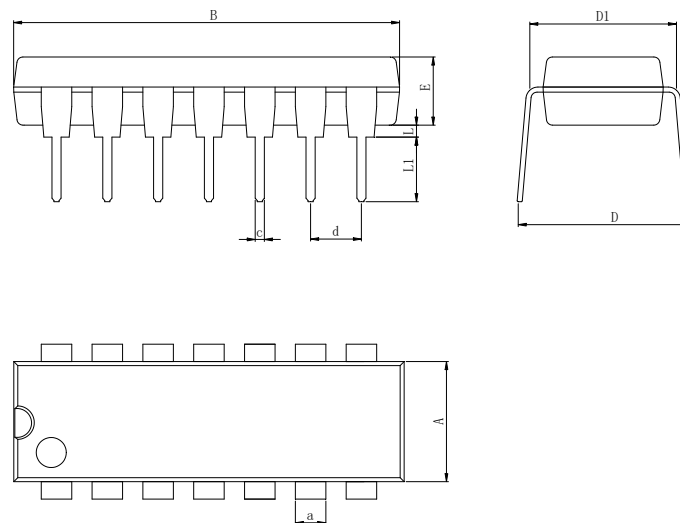


## Switching Time Waveforms



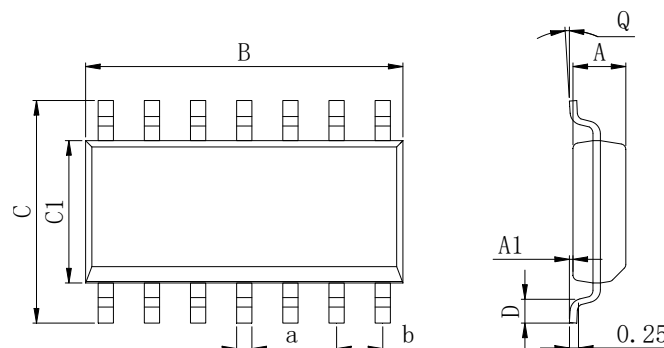
## Physical Dimensions

### DIP14



Dimensions In Millimeters(DIP14)										
Symbol:	A	B	D	D1	E	L	L1	a	c	d
Min:	6.10	18.94	8.40	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	19.56	9.00	7.82	3.55	0.70	3.60	1.55	0.50	

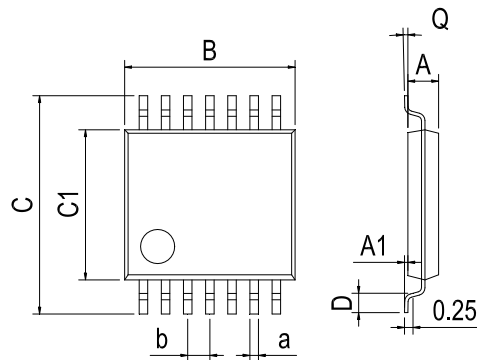
### SOP14



Dimensions In Millimeters(SOP14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	8.55	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	8.75	6.20	4.00	0.80	8°	0.45	

**Physical Dimensions**

TSSOP14



Dimensions In Millimeters(TSSOP14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

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