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## 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

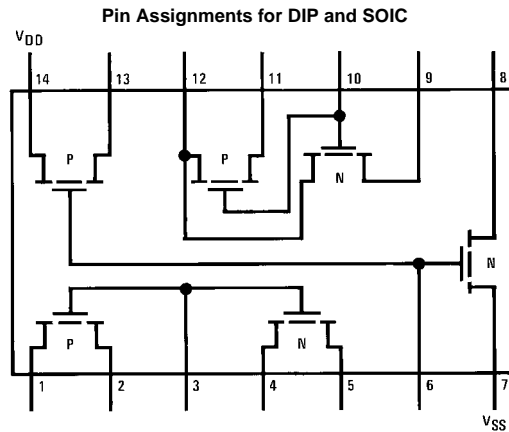
- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45  $V_{CC}$  (typ.)

### 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

**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   |         |

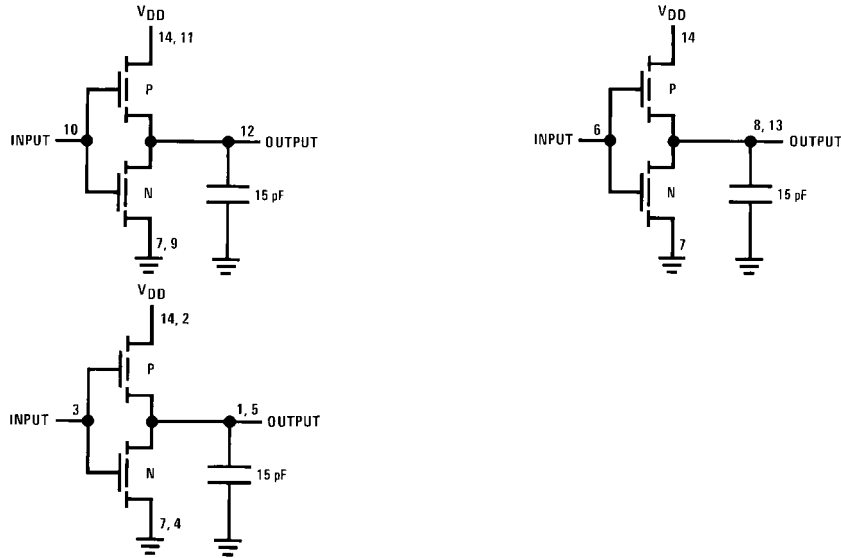
**AC Electrical Characteristics** (Note 2)

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

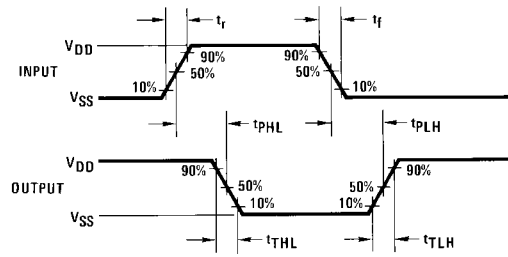
| Symbol              | Parameter              | Conditions      | Min | Typ | Max | Units |
|---------------------|------------------------|-----------------|-----|-----|-----|-------|
| $t_{PLH} = t_{PHL}$ | Propagation Delay Time | $V_{DD} = 5.0V$ |     | 35  | 75  | ns    |
|                     |                        | $V_{DD} = 10V$  |     | 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**

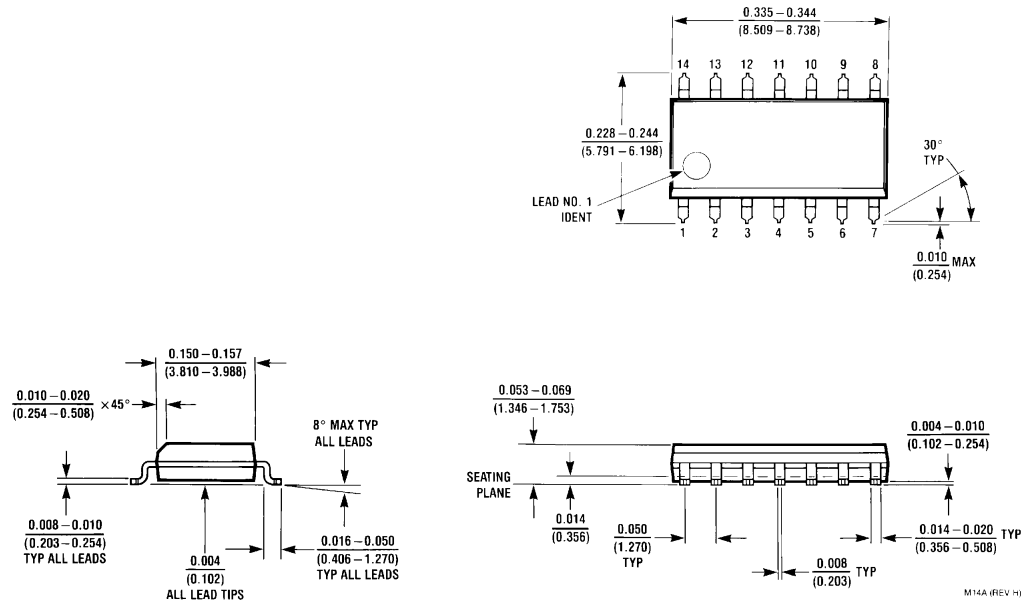


**Switching Time Waveforms**



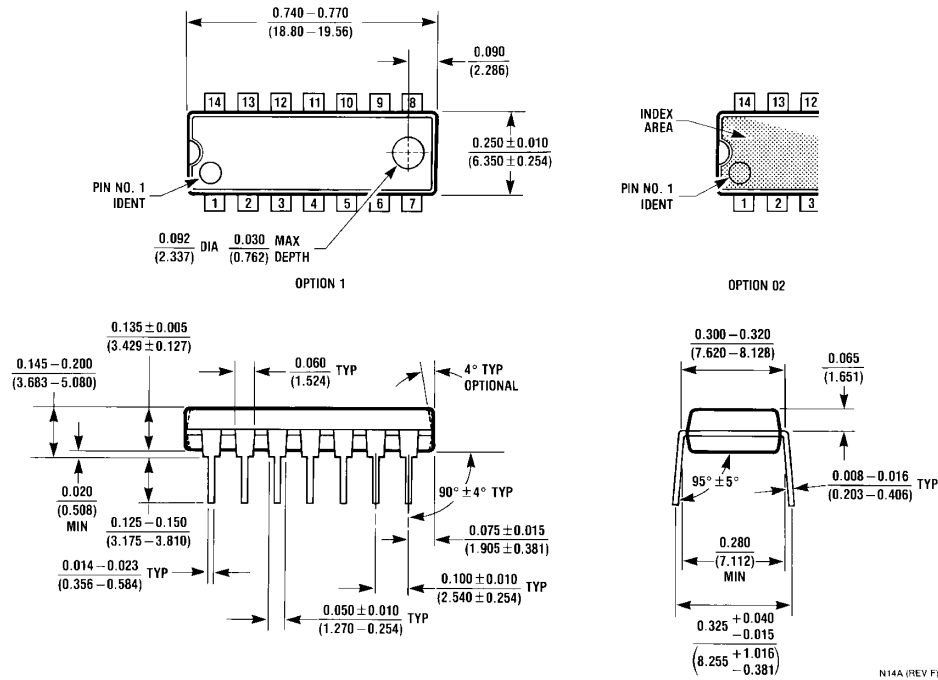
CD4007C

**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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