



# CD4069

**CMOS IC**

## INVERTER CIRCUITS

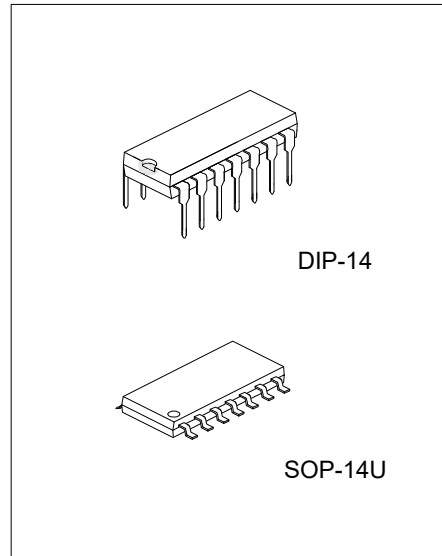
### DESCRIPTION

The UTC **CD4069** consists of six inverter circuits and is manufactured using complementary MOS (CMOS) to achieve wide power supply operating range, low power consumption, high noise immunity, and symmetric controlled rise and fall times.

All inputs are protected from damage due to static discharge by diode clamps to VDD and VSS.

### FEATURES

- \* Wide supply voltage range: 3.0V ~ 15V.
- \* High noise immunity: 0.45 V<sub>DD</sub> typ.
- \* Low Power TTL compatibility: Fan out of 2 driving 74L or 1 driving 74LS.



### ORDERING INFORMATION

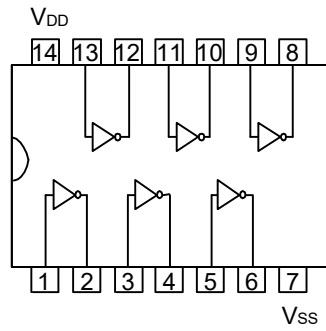
Ordering Number		Package	Packing
Lead Free	Halogen Free		
CD4069L-D14-T	CD4069G-D14-T	DIP-14	Tube
CD4069L-UEA-R	CD4069G-UEA-R	SOP-14U	Tape Reel

<p>CD4069G-D14-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) D14: DIP-14, UEA: SOP-14U (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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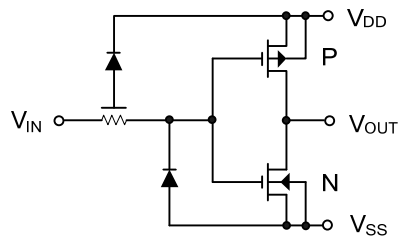
### MARKING

DIP-14	SOP-14U
<p>Date Code UTC □□□□ L: Lead Free G: Halogen Free Lot Code</p>	<p>Date Code UTC □□□□ L: Lead Free G: Halogen Free Lot Code</p>

## ■ PIN CONFIGURATION



## ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
DC Supply Voltage	$V_{DD}$	-0.5 ~ +18	V
Input Voltage	$V_{IN}$	-0.5 ~ $V_{DD} + 0.5$	V
Storage Temperature Range	$T_S$	-65 ~ +150	°C
Junction Temperature	$T_J$	+150	°C
Operating Temperature	$T_{OPR}$	-40 ~ +125	°C
Storage Temperature	$T_{STG}$	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ RECOMMENDED OPERATING CONDITIONS ( $V_{SS}=0V$ )

PARAMETER	SYMBOL	RATINGS	UNIT
DC Supply Voltage	$V_{DD}$	3 ~ 15	V
Input Voltage	$V_{IN}$	0 ~ $V_{DD}$	V

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-14	75	°C/W
	SOP-14U	105	°C/W

### ■ DC ELECTRICAL CHARACTERISTICS ( $V_{SS}=0V$ , $T_A=25^\circ C$ , unless otherwise specified.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Quiescent Device Current	$I_{DD}$	$V_{DD}=5V$ , $V_{IN}=V_{DD}$ or $V_{SS}$			1.0	$\mu A$
		$V_{DD}=10V$ , $V_{IN}=V_{DD}$ or $V_{SS}$			2.0	$\mu A$
		$V_{DD}=15V$ , $V_{IN}=V_{DD}$ or $V_{SS}$			4.0	$\mu A$
Low Level Output Voltage	$V_{OL}$	$ I_O  < 1\mu A$ , $V_{DD}=5V$		0	0.05	V
		$V_{DD}=10V$		0	0.05	V
		$V_{DD}=15V$		0	0.05	V
High Level Output Voltage	$V_{OH}$	$ I_O  < 1\mu A$ , $V_{DD}=5V$	4.95			V
		$V_{DD}=10V$	9.95			V
		$V_{DD}=15V$	14.95			V
Low Level Input Voltage	$V_{IL}$	$ I_O  < 1\mu A$ , $V_{DD}=5V$ , $V_O=4.5V$			1.0	V
		$V_{DD}=10V$ , $V_O=9V$			2.0	V
		$V_{DD}=15V$ , $V_O=13.5V$			3.0	V
High Level Input Voltage	$V_{IH}$	$ I_O  < 1\mu A$ , $V_{DD}=5V$ , $V_O=0.5V$	4.0			V
		$V_{DD}=10V$ , $V_O=1V$	8.0			V
		$V_{DD}=15V$ , $V_O=1.5V$	12.0			V
Low Level Output Current (Note 2)	$I_{OL}$	$V_{DD}=5V$ , $V_{OL}=0.4V$	0.44	0.88		mA
		$V_{DD}=10V$ , $V_{OL}=0.5V$	1.1	2.25		mA
		$V_{DD}=15V$ , $V_{OL}=1.5V$	3.0	8.8		mA
High Level Output Current (Note 2)	$I_{OH}$	$V_{DD}=5V$ , $V_{OH}=4.6V$	-0.44	-0.88		mA
		$V_{DD}=10V$ , $V_{OH}=9.5V$	-1.1	-2.25		mA
		$V_{DD}=15V$ , $V_{OH}=13.5V$	-3.0	-8.8		mA
Input Current	$I_{IN}$	$V_{DD}=15V$ , $V_{IN}=0V$		$-10^{-5}$	-0.30	$\mu A$
		$V_{DD}=15V$ , $V_{IN}=15V$		$10^{-5}$	0.30	$\mu A$

■ AC ELECTRICAL CHARACTERISTICS (Note 1)

( $T_A=25^\circ\text{C}$ ,  $C_L=50\text{pF}$ ,  $R_L=200\text{k}\Omega$ ,  $t_R$  and  $t_F \leq 20\text{ ns}$ , unless otherwise specified)

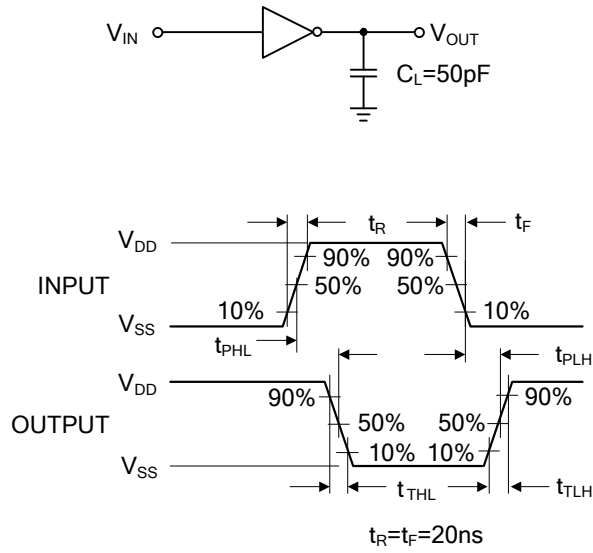
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay Time from Input to Output	$t_{PHL}$ or $t_{PLH}$	$V_{DD}=5\text{V}$		50	90	ns
		$V_{DD}=10\text{V}$		30	60	ns
		$V_{DD}=15\text{V}$		25	50	ns
Transition Time	$t_{THL}$ or $t_{TLH}$	$V_{DD}=5\text{V}$		80	150	ns
		$V_{DD}=10\text{V}$		50	100	ns
		$V_{DD}=15\text{V}$		40	80	ns
Average Input Capacitance	$C_{IN}$	Any Gate		6	15	pF
Power Dissipation Capacitance	$C_{PD}$	Any Gate (Note 3)		12		pF

Notes: 1. AC Parameters are guaranteed by DC correlated testing.

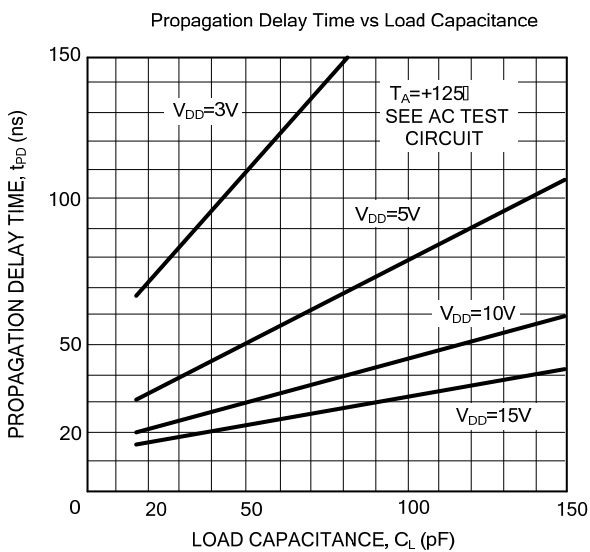
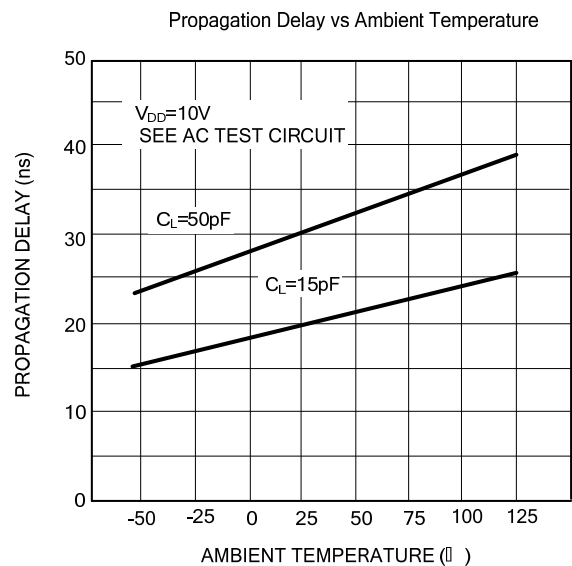
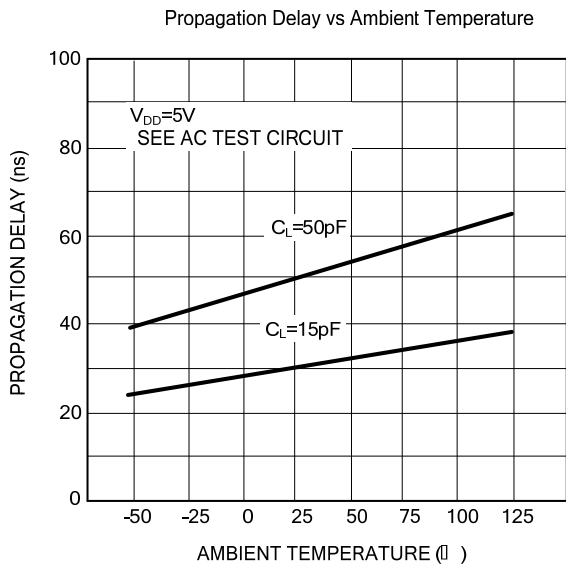
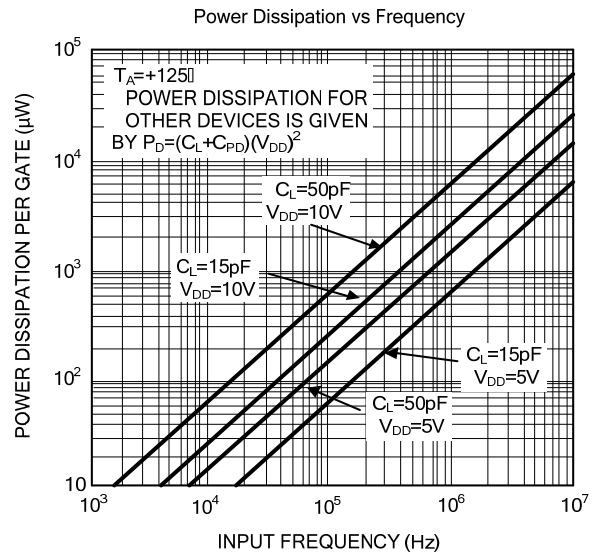
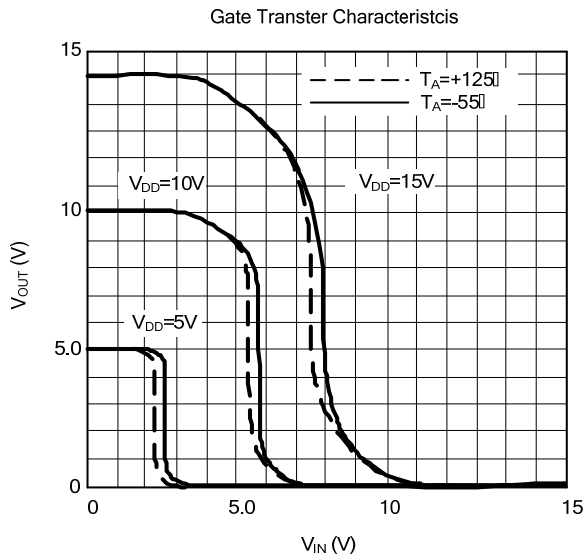
2.  $I_{OH}$  and  $I_{OL}$  are tested one output at a time.

3.  $C_{PD}$  determines the no load AC power consumption of any CMOS device.

■ AC TEST CIRCUITS AND SWITCHING TIME WAVEFORMS



## TYPICAL PERFORMANCE CHARACTERISTICS



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