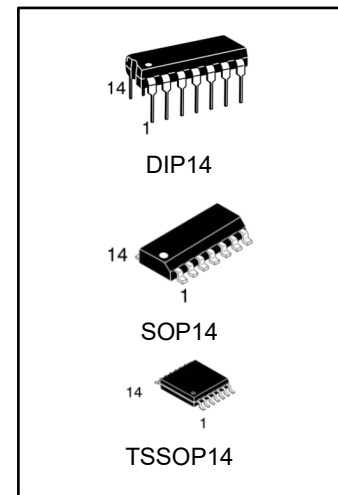


## CMOS Dual Complementary Pair Plus Inverter

### Features

- High-Voltage Type (20V Rating)
- Standardized Symmetrical Output Characteristics
- Medium Speed Operation:  $t_{PHL}, t_{PLH} = 30 \text{ ns (typ)}$  at 10V
- 100% Tested for Maximum Quiescent Current at 20V
- Meets All Requirements of JEDEC Tentative Standards No.13B, "Standard Specifications for Description of "B" Series CMOS Devices"
- Maximum Input Current of  $1\mu\text{A}$  at 18V Over Full Package-Temperature Range; 100nA at 18V and  $+25^\circ\text{C}$



### Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4007UBE	DIP14	CD4007UB	TUBE	1000pcs/Box
CD4007UBM/TR	SOP14	CD4007UB	REEL	2500pcs/Reel
CD4007UBMT/TR	TSSOP14	CD4007UB	REEL	2500pcs/Reel

## Description

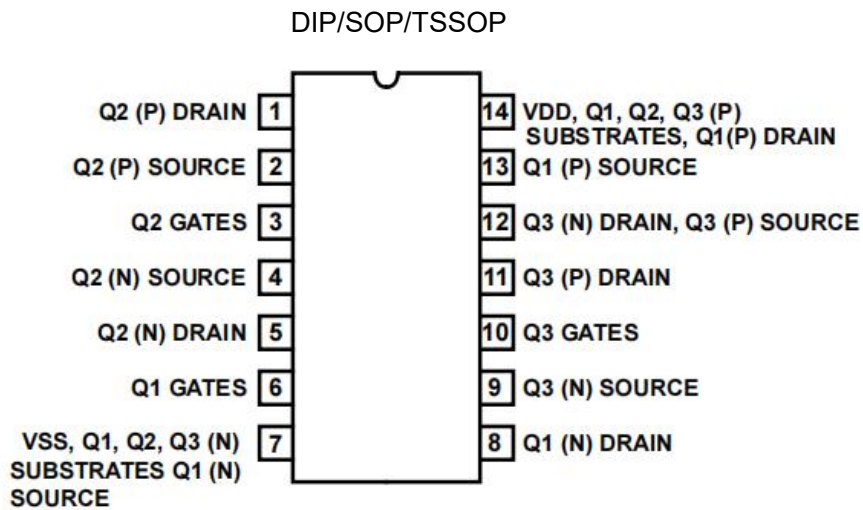
CD4007B types are comprised of three n-channel and three p-channel enhancement-type MOS transistors. The transistor elements are accessible through the package terminals to provide a convenient means for constructing the various typical circuits as shown in Figure 2.

More complex functions are possible using multiple packages. Numbers shown in parentheses indicate terminals that are connected together to form the various configurations listed.

## Applications

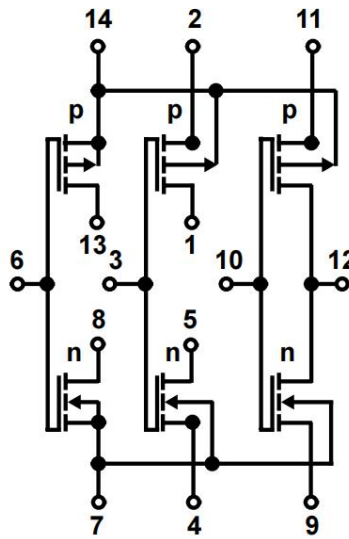
- Extremely High-Input Impedance Amplifiers
- Shapers
- Inverters
- Threshold Detector
- Linear Amplifiers
- Crystal Oscillators

## Pin Configuration



CD4007UB (TOP VIEW)

## Functional Diagram



TERMINAL NO.14- $V_{DD}$   
 TERMINAL NO.7- $V_{SS}$

## Absolute Maximum Ratings

Condition	Min	Max	UNITS
DC Supply Voltage Range, ( $V_{DD}$ ) (Voltage Referenced to $V_{SS}$ Terminals)	-0.5	+20	V
Input Voltage Range, All Inputs	-0.5	$V_{DD}+0.5V$	V
DC Input Current, Any One Input	$\pm 10$		mA
Operating Temperature Range	-40	+855	$^{\circ}C$
Storage Temperature Range ( $T_{STG}$ )	-65	+150	$^{\circ}C$
Lead Temperature (During Soldering) At Distance 1/16 $\pm$ 1/32 Inch (1.59mm $\pm$ 0.79mm) from case for 10s Maximum	-	+265	$^{\circ}C$

## Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
$V_{DD}$	DC Supply Voltage Range, ( $V_{DD}$ )	3.0	18	V

**DC ELECTRICAL PERFORMANCE CHARACTERISTICS**

PARAMETER	SYMBOL	CONDITIONS (NOTE 1)	GROUP A SUBGROUPS	TEMPERATURE	LIMITS		UNITS	
					MIN	MAX		
Supply Current	I <sub>DD</sub>	V <sub>DD</sub> = 20V, V <sub>IN</sub> = V <sub>DD</sub> or GND	1	+25°C	-	0.5	μA	
			2	+125°C	-	50	μA	
		V <sub>DD</sub> = 18V, V <sub>IN</sub> = V <sub>DD</sub> or GND	3	-55°C	-	0.5	μA	
Input Leakage Current	I <sub>IL</sub>	V <sub>IN</sub> = V <sub>DD</sub> or GND	V <sub>DD</sub> = 20V	1	+25°C	-100	-	nA
			V <sub>DD</sub> =18V	2	+125°C	-1000	-	nA
				3	-55°C	-100	-	nA
Input Leakage Current	I <sub>IH</sub>	V <sub>IN</sub> = V <sub>DD</sub> or GND	V <sub>DD</sub> = 20V	1	+25°C	-	100	nA
			V <sub>DD</sub> =18V	2	+125°C	-	1000	nA
				3	-55°C	-	100	nA
Output Voltage	VOL15	V <sub>DD</sub> = 15V, No Load	1, 2, 3	+25°C, +125°C, -55°C	-	50	mV	
Output Voltage	VOH15	V <sub>DD</sub> = 15V, No Load (Note 3)	1, 2, 3	+25°C, +125°C, -55°C	14.95	-	V	
Output Current (Sink)	IOL5	V <sub>DD</sub> = 5V, V <sub>OUT</sub> = 0.4V	1	+25°C	0.53	-	mA	
Output Current (Sink)	IOL10	V <sub>DD</sub> = 10V, V <sub>OUT</sub> = 0.5V	1	+25°C	1.4	-	mA	
Output Current (Sink)	IOL15	V <sub>DD</sub> = 15V, V <sub>OUT</sub> = 1.5V	1	+25°C	3.5	-	mA	
Output Current (Source)	IOH5A	V <sub>DD</sub> = 5V, V <sub>OUT</sub> = 4.6V	1	+25°C	-	-0.53	mA	
Output Current (Source)	IOH5B	V <sub>DD</sub> = 5V, V <sub>OUT</sub> = 2.5V	1	+25°C	-	-1.8	mA	
Output Current (Source)	IOH10	V <sub>DD</sub> = 10V, V <sub>OUT</sub> = 9.5V	1	+25°C	-	-1.4	mA	
Output Current (Source)	IOH15	V <sub>DD</sub> = 15V, V <sub>OUT</sub> = 13.5V	1	+25°C	-	-3.5	mA	
N Threshold Voltage	VNTH	V <sub>DD</sub> = 10V, I <sub>SS</sub> = -10μA	1	+25°C	-2.8	-0.7	V	
P Threshold Voltage	VPTH	V <sub>SS</sub> = 0V, I <sub>DD</sub> = 10μA	1	+25°C	0.7	2.8	V	
Functional	F	V <sub>DD</sub> = 2.8V, V <sub>IN</sub> = V <sub>DD</sub> or GND	7	+25°C	V <sub>OH</sub> > V <sub>DD</sub> /2	V <sub>OL</sub> < V <sub>DD</sub> /2	V	
		V <sub>DD</sub> = 20V, V <sub>IN</sub> = V <sub>DD</sub> or GND	7	+25°C				
		V <sub>DD</sub> = 18V, V <sub>IN</sub> = V <sub>DD</sub> or GND	8A	+125°C				
		V <sub>DD</sub> = 3V, V <sub>IN</sub> = V <sub>DD</sub> or GND	8B	-55°C				
Input Voltage Low (Note 2)	VIL	V <sub>DD</sub> = 5V, V <sub>OH</sub> > 4.5V, V <sub>OL</sub> < 0.5V	1, 2, 3	+25°C, +125°C, -55°C	-	1.0	V	
Input Voltage High (Note 2)	VIH	V <sub>DD</sub> = 5V, V <sub>OH</sub> > 4.5V, V <sub>OL</sub> < 0.5V	1, 2, 3	+25°C, +125°C, -55°C	4.0	-	V	
Input Voltage Low (Note 2)	VIL	V <sub>DD</sub> = 15V, V <sub>OH</sub> > 13.5V, V <sub>OL</sub> < 1.5V	1, 2, 3	+25°C, +125°C, -55°C	-	2.5	V	
Input Voltage High (Note 2)	VIH	V <sub>DD</sub> = 15V, V <sub>OH</sub> > 13.5V, V <sub>OL</sub> < 1.5V	1, 2, 3	+25°C, +125°C, -55°C	12.5	-	V	

**NOTES:**

1. All voltages referenced to device GND, 100% testing being implemented.
2. Go/No Go test with limits applied to inputs
3. For accuracy, voltage is measured differentially to V<sub>DD</sub>. Limit is 0.050V max.

**AC ELECTRICAL PERFORMANCE CHARACTERISTICS**

PARAMETER	SYMBOL	CONDITIONS (NOTE 1, 2)	GROUP A SUBGROUPS	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Propagation Delay	TPHL TPLH	$V_{DD}=5V, V_{IN}=V_{DD}$ or GND	9	+25°C	-	110	ns
			10, 11	+125°C, -55°C	-	149	ns
Transition Time	TTHL TTLH	$V_{DD}=5V, V_{IN}=V_{DD}$ or GND	9	+25°C	-	200	ns
			10, 11	+125°C, -55°C	-	270	ns

**NOTES:**

CL = 50pF, RL = 200K, Input TR, TF < 20ns.

55°C and +125°C limits guaranteed, 100% testing being implemented.

**ELECTRICAL PERFORMANCE CHARACTERISTICS**

PARAMETER	SYMBOL	CONDITIONS	NOTES	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Supply Current	IDD	$V_{DD} = 5V, V_{IN} = V_{DD}$ or GND	1, 2	-55°C, +25°C	-	0.25	A
				+125°C	-	7.5	A
		$V_{DD}=10V, V_{IN} = V_{DD}$ or GND	1, 2	-55°C, +25°C	-	0.5	A
				+125°C	-	15	A
		$V_{DD}=15V, V_{IN} = V_{DD}$ or GND	1, 2	-55°C, +25°C	-	0.5	A
				+125°C	-	30	A
Output Voltage	VOL	$V_{DD} = 5V$ , No Load	1, 2	+25°C, +125°C, -55°C	-	50	mV
Output Voltage	VOL	$V_{DD} = 10V$ , No Load	1, 2	+25°C, +125°C, -55°C	-	50	mV
Output Voltage	VOH	$V_{DD} = 5V$ , No Load	1, 2	+25°C, +125°C, -55°C	4.95	-	V
Output Voltage	VOH	$V_{DD} = 10V$ , No Load	1, 2	+25°C, +125°C, -55°C	9.95	-	V
Output Current (Sink)	IOL5	$V_{DD} = 5V, V_{OUT} = 0.4V$	1, 2	+125°C	0.36	-	mA
				-55°C	0.64	-	mA
Output Current (Sink)	IOL10	$V_{DD} = 10V, V_{OUT} = 0.5V$	1, 2	+125°C	0.9	-	mA
				-55°C	1.6	-	mA
Output Current (Sink)	IOL15	$V_{DD} = 15V, V_{OUT} = 1.5V$	1, 2	+125°C	2.4	-	mA
				-55°C	4.2	-	mA
Output Current (Source)	IOH5A	$V_{DD} = 5V, V_{OUT} = 4.6V$	1, 2	+125°C	-	-0.36	mA
				-55°C	-	-0.64	mA
Output Current (Source)	IOH5B	$V_{DD} = 5V, V_{OUT} = 2.5V$	1, 2	+125°C	-	-1.15	mA
				-55°C	-	-2.0	mA
Output Current (Source)	IOH10	$V_{DD} = 10V, V_{OUT} = 9.5V$	1, 2	+125°C	-	-0.9	mA
				-55°C	-	-1.6	mA
Output Current (Source)	IOH15	$V_{DD} = 15V, V_{OUT} = 13.5V$	1, 2	+125°C	-	-2.4	mA
				-55°C	-	-4.2	mA
Input Voltage Low	VIL	$V_{DD}=10V, V_{OH}>9V, V_{OL}<1V$	1, 2	+25°C, +125°C, -55°C	-	2	V
Input Voltage High	VIH	$V_{DD}=10V, V_{OH}>9V, V_{OL}<1V$	1, 2	+25°C, +125°C, -55°C	8	-	V
Propagation Delay	TPHL TPLH	$V_{DD} = 10V$	1, 2, 3	+25°C	-	60	ns
		$V_{DD} = 15V$	1, 2, 3	+25°C	-	50	ns
Transition Time	TTHL TTLH	$V_{DD}=10V$	1, 2, 3	+25°C	-	100	ns
		$V_{DD}=15V$	1, 2, 3	+25°C	-	80	ns
INPUT Capacitance	CIN	Any Input	1, 2	+25°C	-	15.0	pF

**NOTES:**

- All voltages referenced to device GND.
- The parameters listed on Table 3 are controlled via design or process and are not directly tested. These parameters are characterized on initial design release and upon design changes which would affect these characteristics.
- CL = 50pF, RL = 200K, Input TR, TF < 20ns.

Schematic Diagram

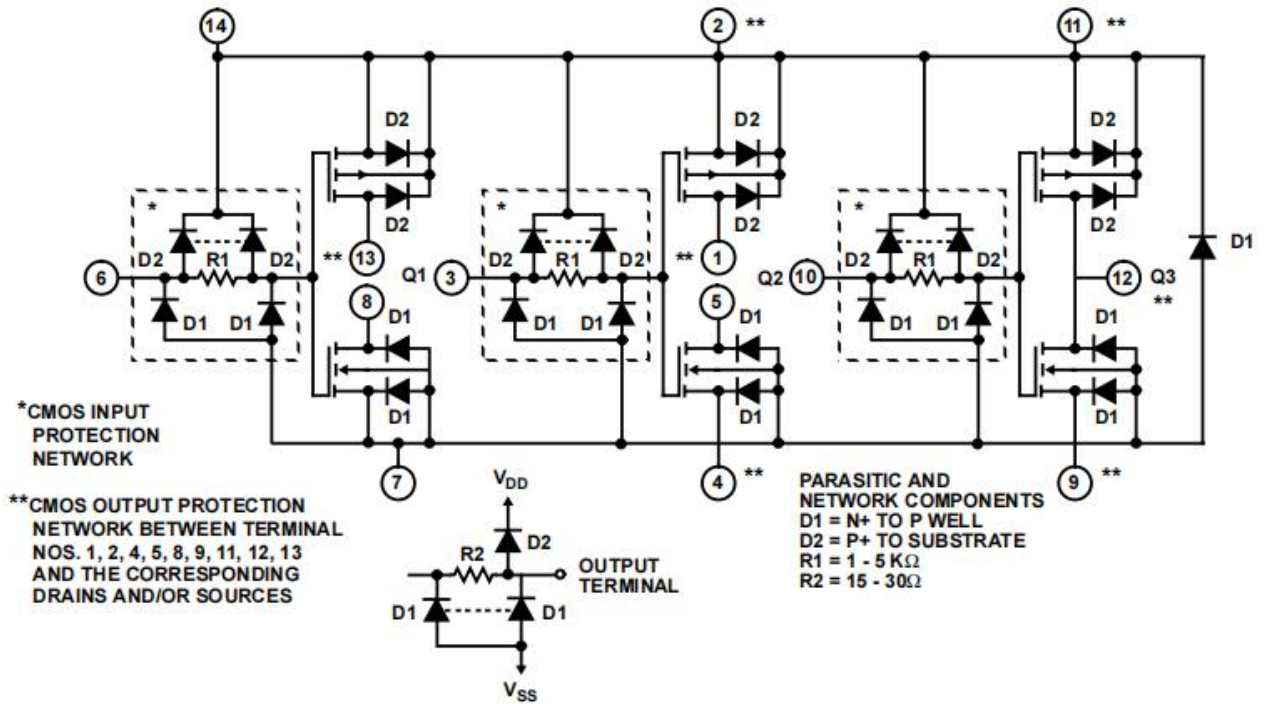
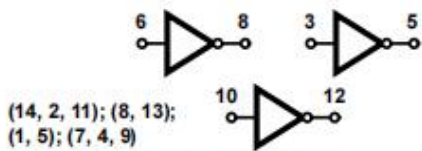
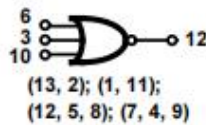


FIGURE 1. DETAILED SCHEMATIC DIAGRAM OF CD4007UB SHOWING INPUT, OUTPUT, AND PARASITIC DIODES

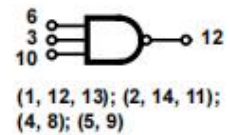
Logic Circuits



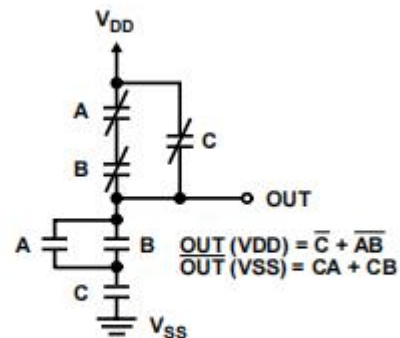
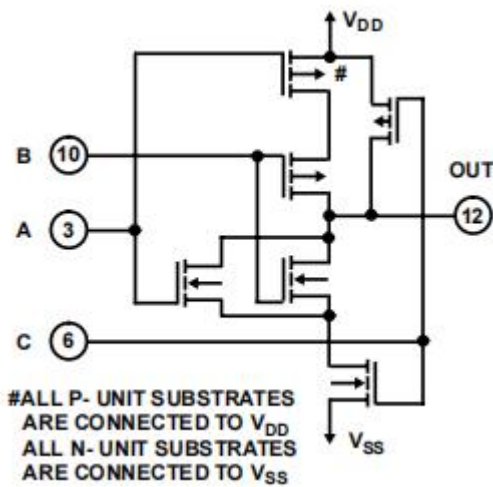
a) TRIPLE INVERTERS



b) 3 - INPUT NOR GATE



c) 3 - INPUT NAND GATE



(13, 12, 5); (4, 9, 8);  
(14, 2); (1, 11)

d) TREE(RELAY)LOGIC

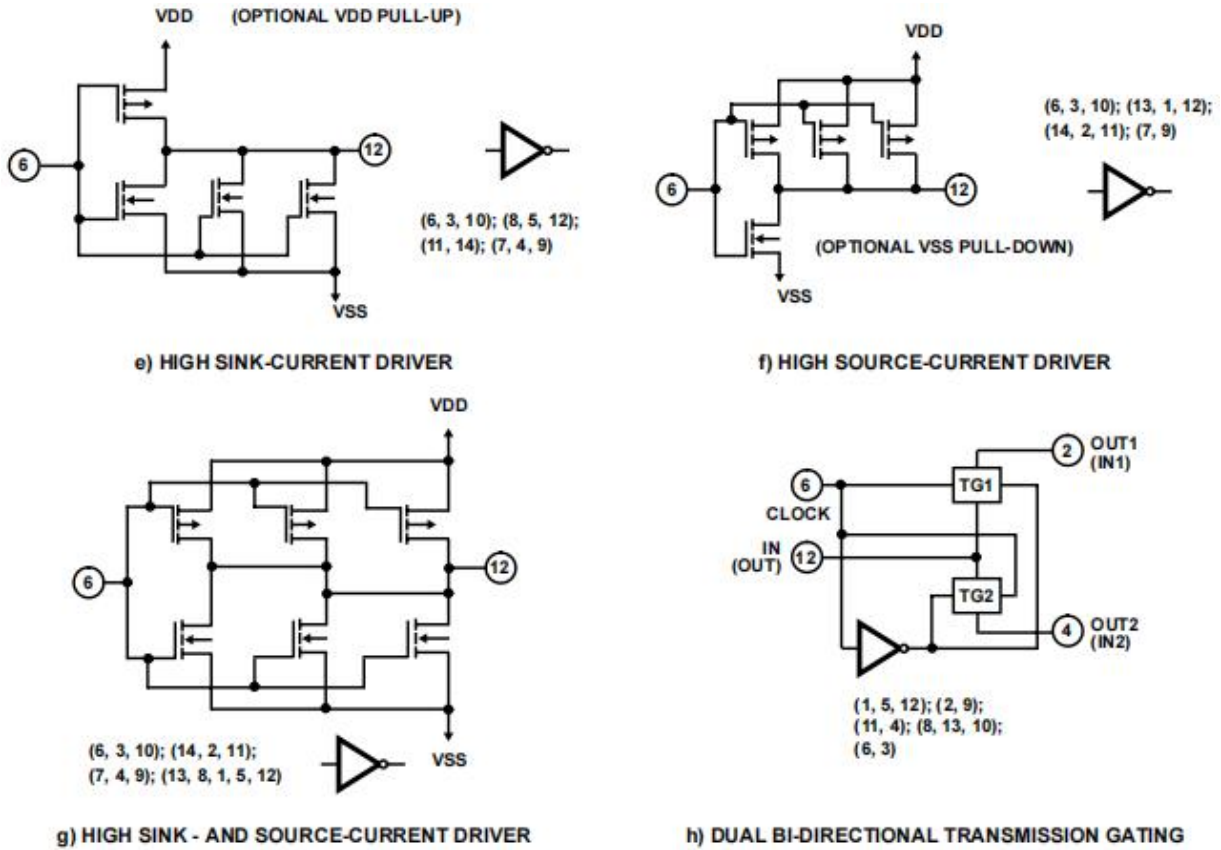


FIGURE 2. SAMPLE CMOS LOGIC CIRCUIT ARRANGEMENTS USING TYPE CD4007UB

Typical Performance Characteristics

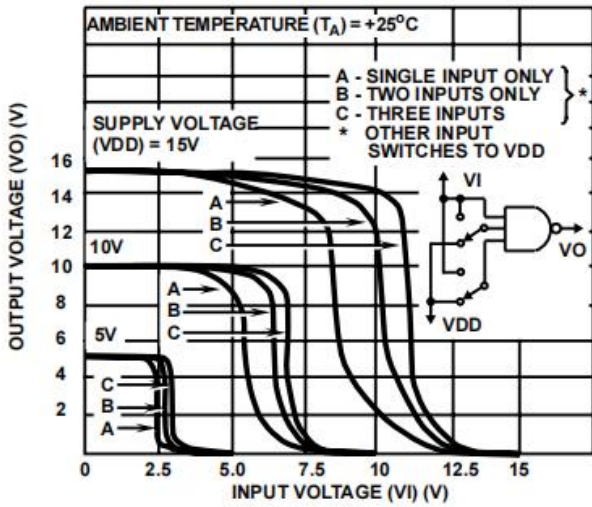


FIGURE 3. TYPICAL VOLTAGE-TRANSFER CHARACTERISTICS FOR NAND GATE

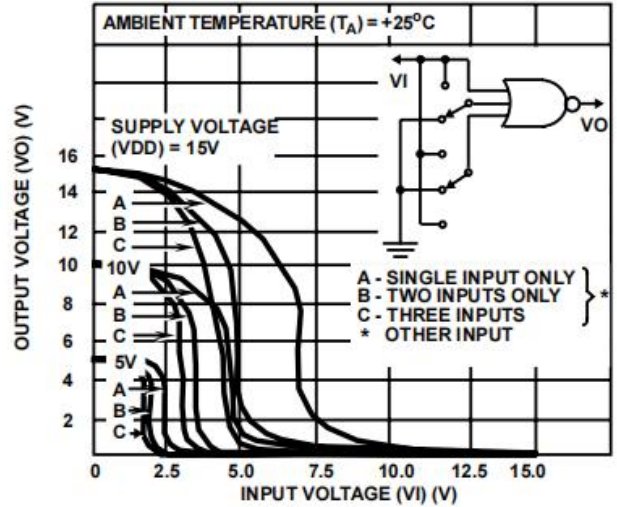


FIGURE 4. TYPICAL VOLTAGE-TRANSFER CHARACTERISTICS FOR NOR GATE

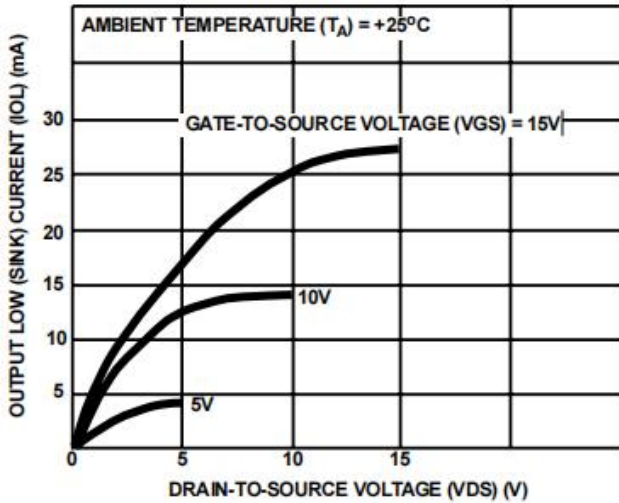


FIGURE 5. TYPICAL OUTPUT LOW (SINK) CURRENT CHARACTERISTICS

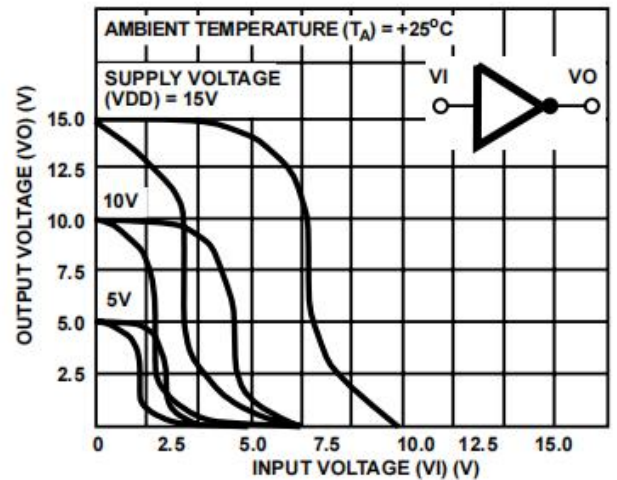


FIGURE 6. MINIMUM AND MAXIMUM VOLTAGE-TRANSFER CHARACTERISTICS FOR INVERTER

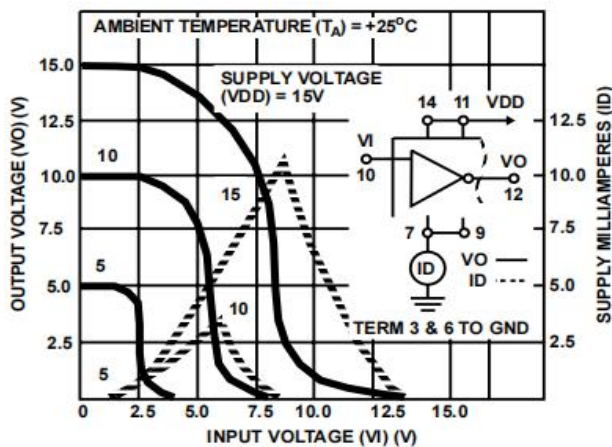


FIGURE 7. TYPICAL CURRENT AND VOLTAGE-TRANSFER CHARACTERISTICS FOR INVERTER

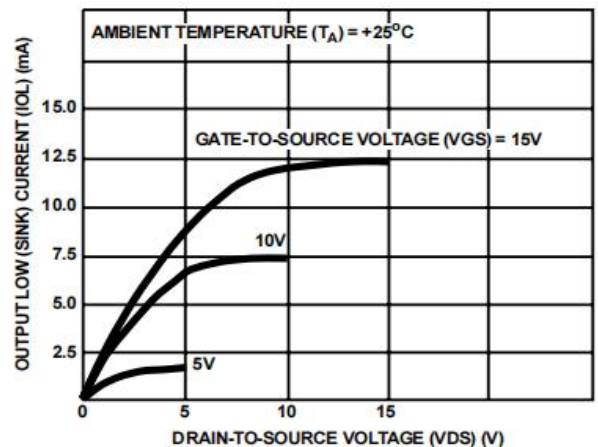


FIGURE 8. MINIMUM OUTPUT LOW (SINK) CURRENT CHARACTERISTICS



Typical Performance Characteristics (Continued)

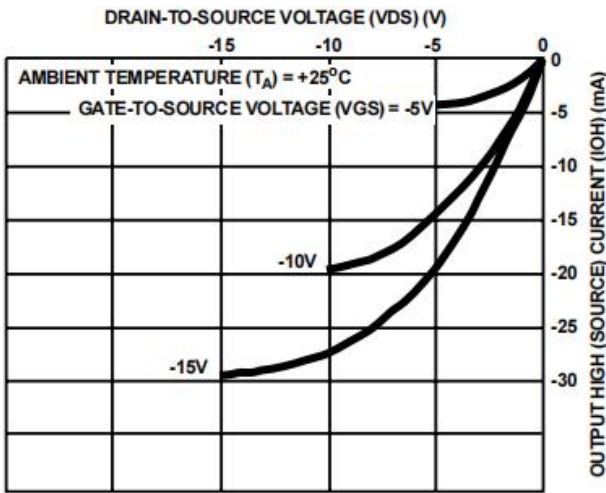


FIGURE 9. TYPICAL OUTPUT HIGH (SOURCE) CURRENT CHARACTERISTICS

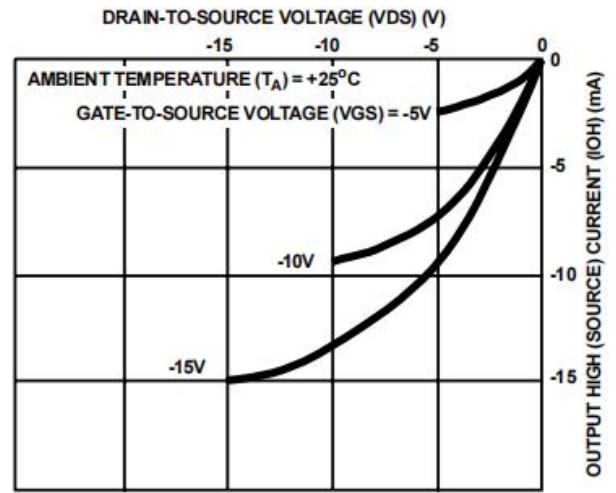


FIGURE 10. MINIMUM OUTPUT HIGH (SOURCE) CURRENT CHARACTERISTICS

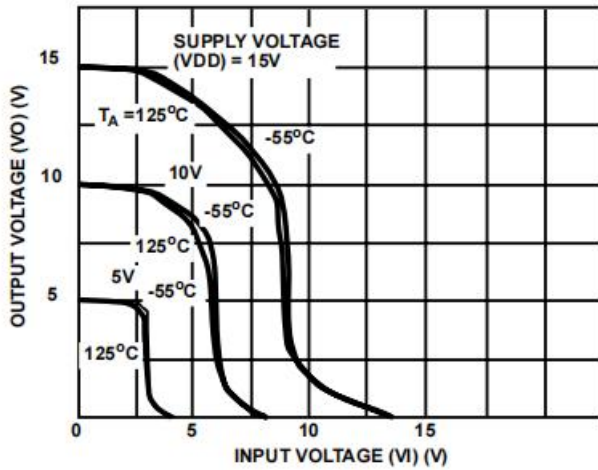


FIGURE 11. TYPICAL VOLTAGE-TRANSFER CHARACTERISTICS AS A FUNCTION OF TEMPERATURE

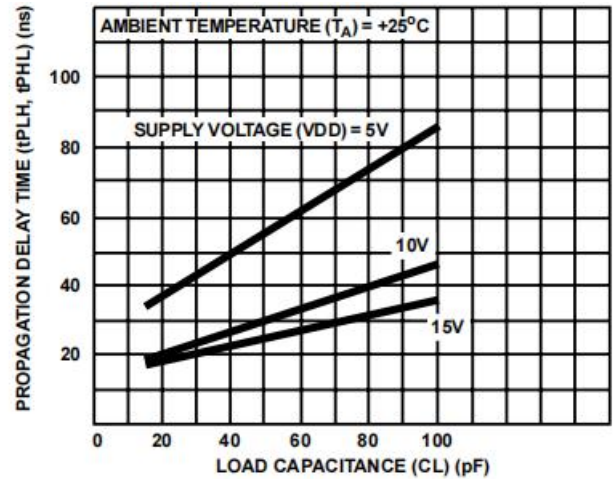


FIGURE 12. TYPICAL PROPAGATION DELAY TIME vs LOAD CAPACITANCE

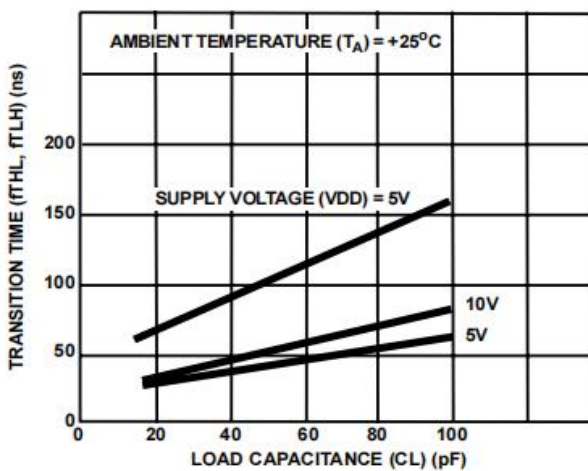


FIGURE 13. TYPICAL TRANSITION TIME vs LOAD CAPACITANCE

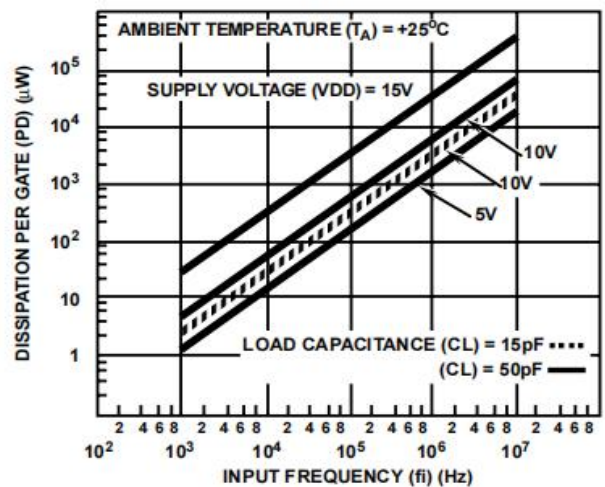
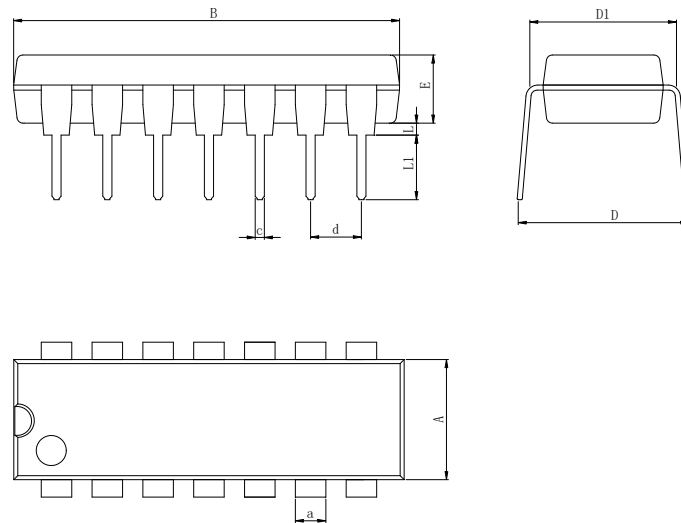


FIGURE 14. TYPICAL DISSIPATION vs FREQUENCY CHARACTERISTICS

## Physical Dimensions

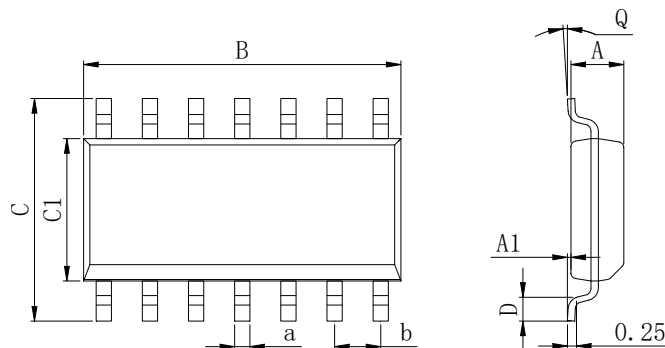
### DIP14



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

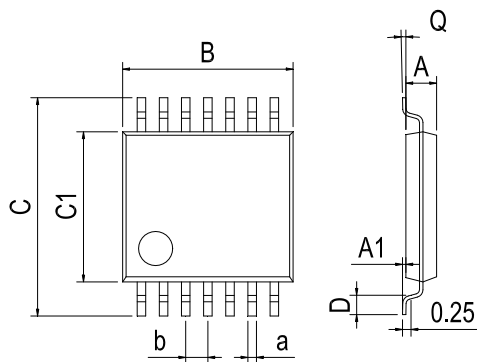


Dimensions In Millimeters(SOP14)

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	

**IMPORTANT STATEMENT:**

Huaguan Semiconductor reserves the right to change its products and services without notice. Before ordering, the customer shall obtain the latest relevant information and verify whether the information is up to date and complete. Huaguan Semiconductor does not assume any responsibility or obligation for the altered documents.

Customers are responsible for complying with safety standards and taking safety measures when using Huaguan Semiconductor products for system design and machine manufacturing. You will bear all the following responsibilities: select the appropriate Huaguan Semiconductor products for your application; Design, validate and test your application; Ensure that your application meets the appropriate standards and any other safety, security or other requirements. To avoid the occurrence of potential risks that may lead to personal injury or property loss.

Huaguan Semiconductor products have not been approved for applications in life support, military, aerospace and other fields, and Huaguan Semiconductor will not bear the consequences caused by the application of products in these fields.

The technical and reliability data (including data sheets), design resources (including reference designs), application or other design suggestions, network tools, safety information and other resources provided for the performance of semiconductor products produced by Huaguan Semiconductor are not guaranteed to be free from defects and no warranty, express or implied, is made. The use of testing and other quality control technologies is limited to the quality assurance scope of Huaguan Semiconductor. Not all parameters of each device need to be tested.

The documentation of Huaguan Semiconductor authorizes you to use these resources only for developing the application of the product described in this document. You have no right to use any other Huaguan Semiconductor intellectual property rights or any third party intellectual property rights. It is strictly forbidden to make other copies or displays of these resources. You should fully compensate Huaguan Semiconductor and its agents for any claims, damages, costs, losses and debts caused by the use of these resources. Huaguan Semiconductor accepts no liability for any loss or damage caused by infringement.

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Inverters](#) category:*

*Click to view products by [HGSEMI](#) manufacturer:*

Other Similar products are found below :

[E5-652Z](#) [NL17SGU04P5T5G](#) [NLX2G04BMX1TCG](#) [CD4009UBE](#) [TC4584BFN](#) [022413E](#) [NL17SG14AMUTCG](#) [NLU2GU04BMX1TCG](#)  
[NLV17SZ14DFT2G](#) [TC74VHC04FK\(EL,K\)](#) [NLV74HC04ADTR2G](#) [NLV17SZ04DFT2G](#) [74AUP2G04FW3-7](#) [NLU1G04AMUTCG](#)  
[NLX2G04CMUTCG](#) [NLV27WZ04DFT1G](#) [NLU1GT14AMUTCG](#) [NLU1G04CMUTCG](#) [NL17SZU04P5T5G](#) [74LVC06ADTR2G](#)  
[74LVC04ADR2G](#) [6SL3210-5BB13-7BV1](#) [NLV37WZ04USG](#) [NLX3G14FMUTCG](#) [NL17SZ04P5T5G](#) [NLV27WZU04DFT2G](#)  
[NLVVHC1GT14DFT1G](#) [NLV17SG14DFT2G](#) [TC7S14F\(TE85L,F\)](#) [MM74HC14MTCX](#) [74VHC14MX](#) [BU4069UBF-E2](#) [EMPP008Z](#)  
[NC7WZ14P6X](#) [NL27WZU04DTT1G](#) [NLU3G14MUTAG](#) [NLV14106BDTR2G](#) [NLV74AC14DTR2G](#) [SN74HCT04DE4](#) [ODE-3-120023-](#)  
[1F12](#) [74LVC2G04GW-Q100H](#) [74VHCT04AM](#) [TC74HC04APF](#) [TC7SH04F,LJ\(CT](#) [JM38510/65711BRA](#) [CD74HC14M96](#) [TC7W14FK,LF](#)  
[TC7WH04FU,LJ\(CT](#) [74VHC14MTCX](#) [74LVC2G14FZ4-7](#)