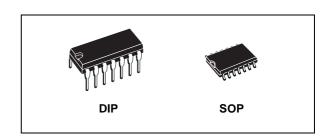


# HCF4069UB

## **HEX INVERTER**

- MEDIUM-SPEED OPERATION  $t_{PD} = 30$ ns (Typ.) at 10V
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT I<sub>I</sub> = 100nA (MAX) AT V<sub>DD</sub> = 18V T<sub>A</sub> = 25°C
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B " STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"



### **ORDER CODES**

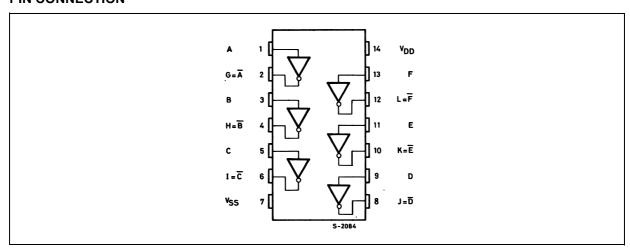
PACKAGE	TUBE	T&R
DIP	HCF4069UBEY	
SOP	HCF4069UBM1	HCF4069UM013TR

### **DESCRIPTION**

The HCF4069UB is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. The HCF4069UB consists of six COS/MOS inverter circuits. This device is intended for all

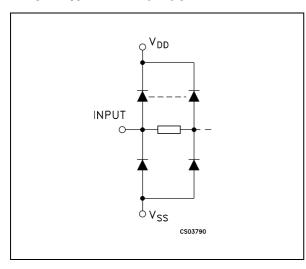
general purpose inverter applications where the medium power TTL-drive and logic level conversion capabilities of circuits such HCF4049B HEX INVERTER/BUFFERS are not required.

### **PIN CONNECTION**



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### **INPUT EQUIVALENT CIRCUIT**



### **PIN DESCRIPTION**

PIN No	SYMBOL	NAME AND FUNCTION					
1, 3, 5, 9, 11, 13	A, B, C, D, E, F	Data Inputs					
2, 4, 6, 8, 10, 12	G, H, I, J, K, L	Data Outputs					
7	$V_{SS}$	Negative Supply Voltage					
14	V <sub>DD</sub>	Positive Supply Voltage					

### **TRUTH TABLE**

INPUTS	OUTPUTS
A, B, C, D, E, F	G, H, I, J, K, L
L	Н
Н	L

### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	Supply Voltage	-0.5 to +22	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>DD</sub> + 0.5	V
I <sub>I</sub>	DC Input Current	± 10	mA
P <sub>D</sub>	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T <sub>op</sub>	Operating Temperature	-55 to +125	°C
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

All voltage values are referred to V<sub>SS</sub> pin voltage.

### **RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
$V_{DD}$	Supply Voltage	3 to 20	V
V <sub>I</sub>	Input Voltage	0 to V <sub>DD</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C

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### **DC SPECIFICATIONS**

		Test Condition			Value								
Symbol	Parameter	Vı	٧o	l <sub>o</sub>	V <sub>DD</sub> (V)	T <sub>A</sub> = 25°C		С	-40 to 85°C		-55 to 125°C		Unit
		(V)	(V)	(μ <b>A</b> )		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
ΙL	Quiescent Current	0/5			5		0.01	0.25		7.5		7.5	
		0/10			10		0.01	0.5		15		15	μΑ
		0/15			15		0.01	1		30		30	μΛ
		0/20			20		0.02	5		150		150	
$V_{OH}$	High Level Output	0/5		<1	5	4.95			4.95		4.95		
	Voltage	0/10		<1	10	9.95			9.95		9.95		V
		0/15		<1	15	14.95			14.95		14.95		
$V_{OL}$	Low Level Output	5/0		<1	5		0.05			0.05		0.05	
	Voltage	10/0		<1	10		0.05			0.05		0.05	V
		15/0		<1	15		0.05			0.05		0.05	
$V_{IH}$	High Level Input		0.5/4.5	<1	5	4			4		4		V
	Voltage		1/9	<1	10	8			8		8		
			1.5/13.5	<1	15	12.5			12.5		12.5		
$V_{IL}$	Low Level Input		4.5/0.5	<1	5			1		1		1	
	Voltage		9/1	<1	10			2		2		2	V
			13.5/1.5	<1	15			2.5		2.5		2.5	
I <sub>OH</sub>	Output Drive	0/5	2.5	<1	5	-1.36	-3.2		-1.15		-1.1		
	Current	0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		mA
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		111/1
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
$I_{OL}$	Output Sink	0/5	0.4	<1	5	0.44	1		0.36		0.36		
Current	0/10	0.5	<1	10	1.1	2.6		0.9		0.9		mΑ	
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I <sub>I</sub>	Input Leakage Current	0/18	Any In	put	18		±10 <sup>-5</sup>	±0.1		±1		±1	μΑ
Cl	Input Capacitance		Any In	put			5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with  $V_{DD}$ =5V, 2V min. with  $V_{DD}$ =10V, 2.5V min. with  $V_{DD}$ =15V

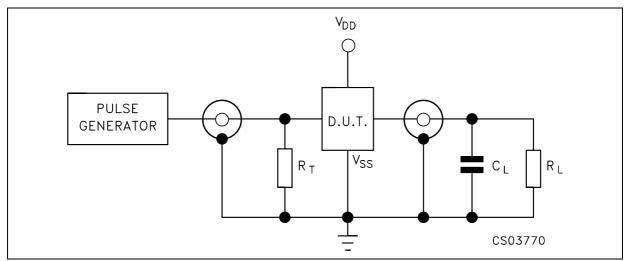
# $\textbf{DYNAMIC ELECTRICAL CHARACTERISTICS} \; (T_{amb} = 25^{\circ}C, \;\; C_{L} = 50 pF, \; R_{L} = 200 K\Omega, \;\; t_{f} = t_{f} = 20 \; ns)$

Complete Borons	Doromotor	Test Condition		\	Unit		
Symbol	Parameter	V <sub>DD</sub> (V)		Min.	Тур.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time	5			55	110	
		10			30	60	ns
		15			25	50	
t <sub>TLH</sub> t <sub>THL</sub>	Output Transition Time	5			100	200	
		10			50	100	ns
		15			40	80	

(\*) Typical temperature coefficient for all V<sub>DD</sub> value is 0.3 %/°C.

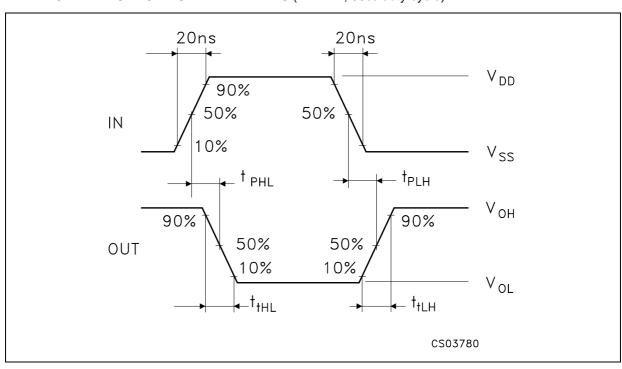
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### **TEST CIRCUIT**



 $C_L$  = 50pF or equivalent (includes jig and probe capacitance)  $R_L$  = 200KΩ  $R_T$  =  $Z_{OUT}$  of pulse generator (typically 50Ω)

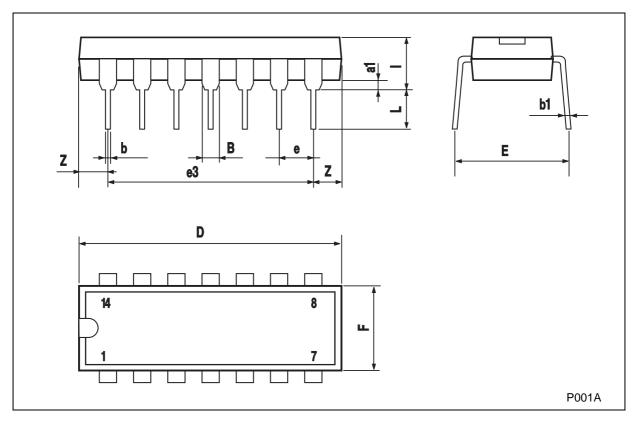
# WAVEFORM: PROPAGATION DELAY TIMES (f=1MHz; 50% duty cycle)



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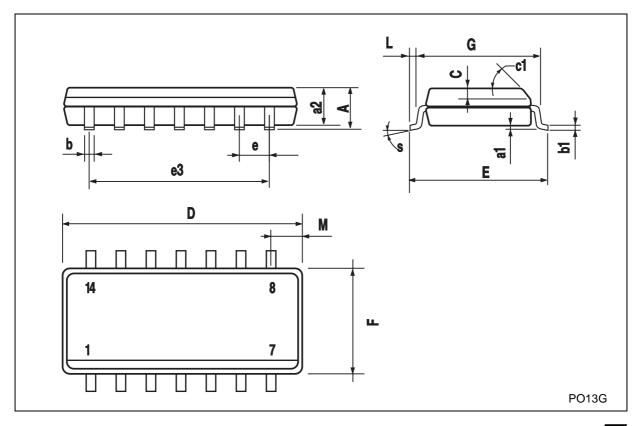
# **Plastic DIP-14 MECHANICAL DATA**

DIM		mm.		inch				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.		
a1	0.51			0.020				
В	1.39		1.65	0.055		0.065		
b		0.5			0.020			
b1		0.25			0.010			
D			20			0.787		
E		8.5			0.335			
е		2.54			0.100			
e3		15.24			0.600			
F			7.1			0.280		
I			5.1			0.201		
L		3.3			0.130			
Z	1.27		2.54	0.050		0.100		



# **SO-14 MECHANICAL DATA**

DIM		mm.			inch				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.			
Α			1.75			0.068			
a1	0.1		0.2	0.003		0.007			
a2			1.65			0.064			
b	0.35		0.46	0.013		0.018			
b1	0.19		0.25	0.007		0.010			
С		0.5			0.019				
c1			45°	(typ.)	•				
D	8.55		8.75	0.336		0.344			
Е	5.8		6.2	0.228		0.244			
е		1.27			0.050				
e3		7.62			0.300				
F	3.8		4.0	0.149		0.157			
G	4.6		5.3	0.181		0.208			
L	0.5		1.27	0.019		0.050			
М			0.68			0.026			
S			8° (	max.)	•	•			



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