

DATA SHEET

For a complete data sheet, please also download:

- The IC04 LOC莫斯 HE4000B Logic Family Specifications HEF, HEC
- The IC04 LOC莫斯 HE4000B Logic Package Outlines/Information HEF, HEC

HEF40106B **gates** **Hex inverting Schmitt trigger**

Product specification
File under Integrated Circuits, IC04

January 1995

Philips
Semiconductors



PHILIPS

Hex inverting Schmitt trigger

HEF40106B
gates

DESCRIPTION

Each circuit of the HEF40106B functions as an inverter with Schmitt-trigger action. The Schmitt-trigger switches at different points for the positive and negative-going input signals. The difference between the positive-going voltage (V_P) and the negative-going voltage (V_N) is defined as hysteresis voltage (V_H).

This device may be used for enhanced noise immunity or to "square up" slowly changing waveforms.

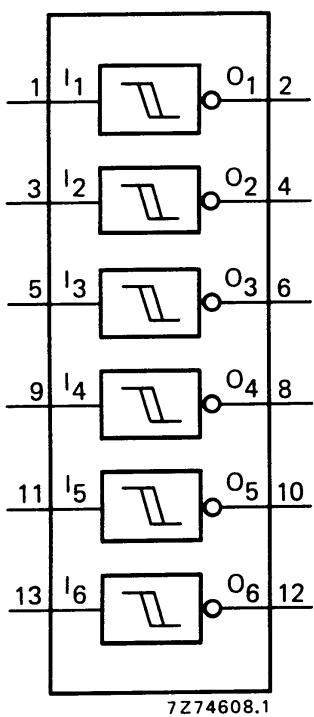


Fig.1 Functional diagram.

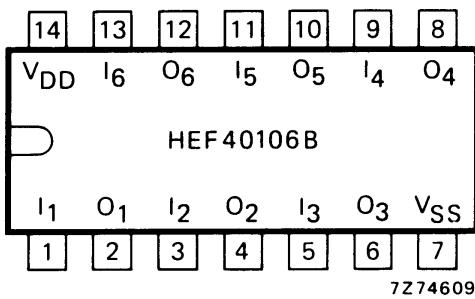


Fig.2 Pinning diagram.

HEF40106BP(N): 14-lead DIL; plastic (SOT27-1)
 HEF40106BD(F): 14-lead DIL; ceramic (cerdip) (SOT73)
 HEF40106BT(D): 14-lead SO; plastic (SOT108-1)
 (): Package Designator North America

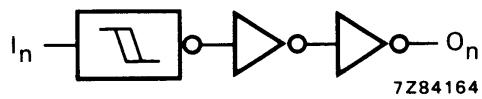


Fig.3 Logic diagram (one inverter).

FAMILY DATA, I_{DD} LIMITS category GATES

See Family Specifications

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DC CHARACTERISTICS

 $V_{SS} = 0 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.
Hysteresis voltage	5	V_H	0,5	0,8	V
	10		0,7	1,3	V
	15		0,9	1,8	V
Switching levels positive-going input voltage	5	V_P	2	3,0	3,5 V
	10		3,7	5,8	7 V
	15		4,9	8,3	11 V
negative-going input voltage	5	V_N	1,5	2,2	3 V
	10		3	4,5	6,3 V
	15		4	6,5	10,1 V

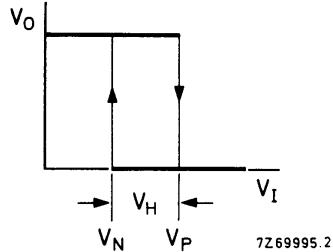
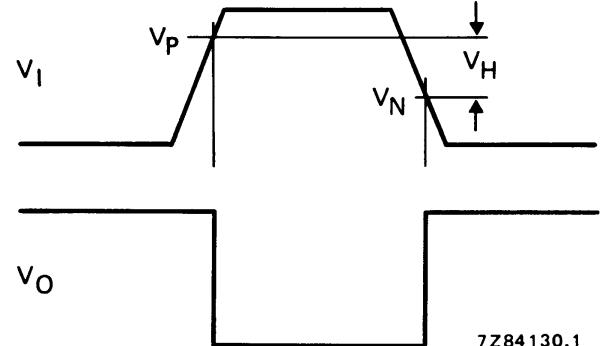


Fig.4 Transfer characteristic.

Fig.5 Waveforms showing definition of V_P , V_N and V_H , where V_N and V_P are between limits of 30% and 70%.

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AC CHARACTERISTICS

 $V_{SS} = 0 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$; $C_L = 50 \text{ pF}$; input transition times $\leq 20 \text{ ns}$

	V_{DD} V	SYMBOL	TYP. MAX.	TYPICAL EXTRAPOLATION FORMULA
Propagation delays $I_n \rightarrow O_n$ HIGH to LOW	5	t_{PHL}	90 180 ns	$63 \text{ ns} + (0,55 \text{ ns/pF}) C_L$
	10		35 70 ns	$24 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
	15		30 60 ns	$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
	5	t_{PLH}	75 150 ns	$48 \text{ ns} + (0,55 \text{ ns/pF}) C_L$
	10		35 70 ns	$24 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
	15		30 60 ns	$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
	5	t_{THL}	60 120 ns	$10 \text{ ns} + (1,0 \text{ ns/pF}) C_L$
	10		30 60 ns	$9 \text{ ns} + (0,42 \text{ ns/pF}) C_L$
	15		20 40 ns	$6 \text{ ns} + (0,28 \text{ ns/pF}) C_L$
Output transition times HIGH to LOW	5	t_{TLH}	60 120 ns	$10 \text{ ns} + (1,0 \text{ ns/pF}) C_L$
	10		30 60 ns	$9 \text{ ns} + (0,42 \text{ ns/pF}) C_L$
	15		20 40 ns	$6 \text{ ns} + (0,28 \text{ ns/pF}) C_L$

	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5 10 15	$2\ 300 f_i + \sum (f_o C_L) \times V_{DD}^2$ $9\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $20\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$	where f_i = input freq. (MHz) f_o = output freq. (MHz) C_L = load capacitance (pF) $\sum (f_o C_L)$ = sum of outputs V_{DD} = supply voltage (V)

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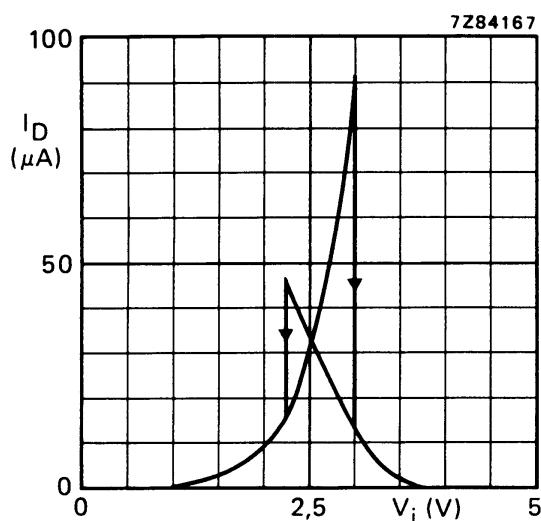
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Fig.6 Typical drain current as a function of input voltage; $V_{DD} = 5 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$.

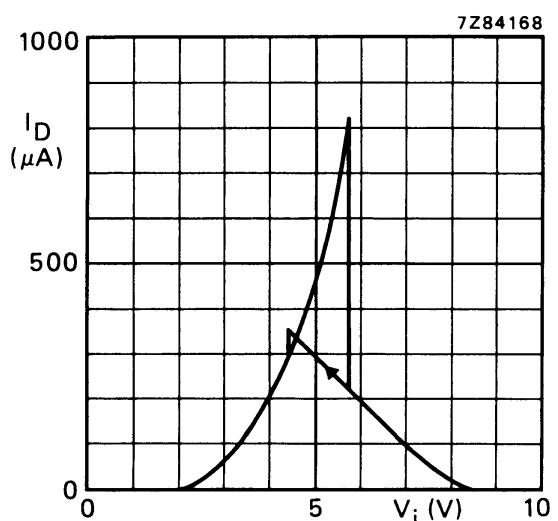


Fig.7 Typical drain current as a function of input voltage; $V_{DD} = 10 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$.

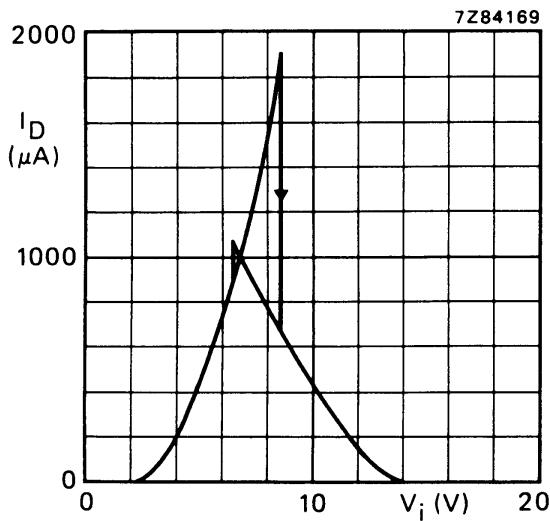
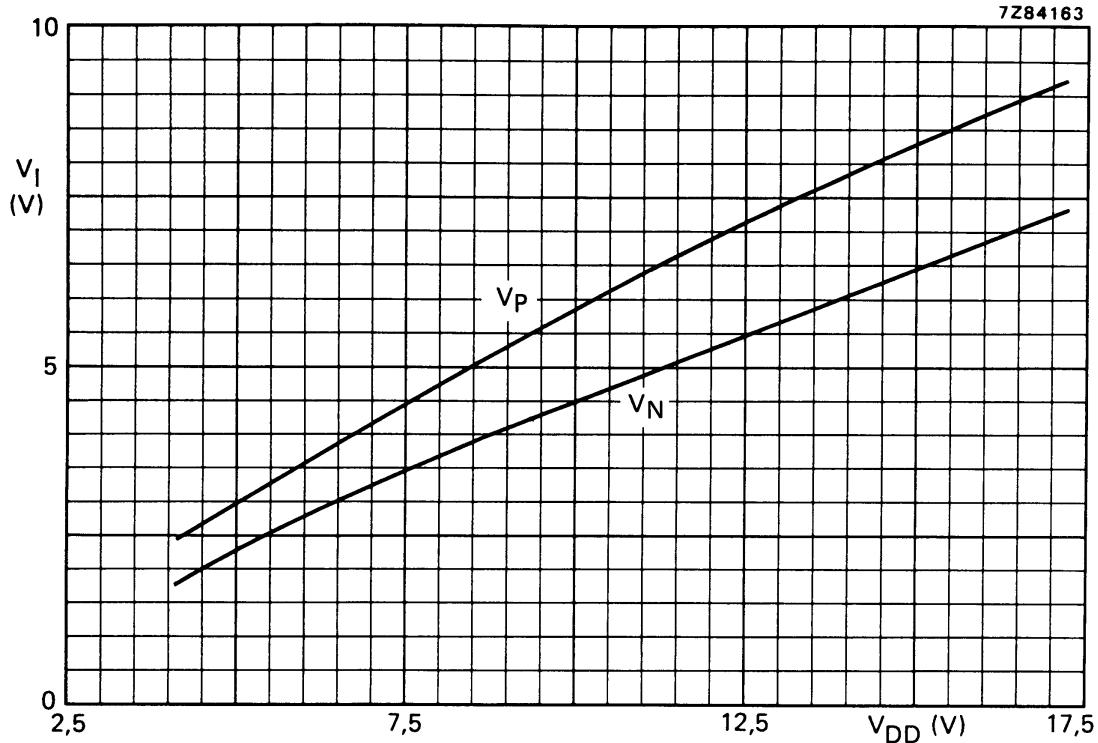
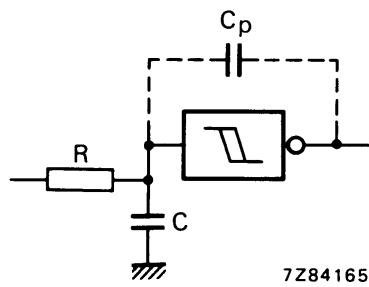


Fig.8 Typical drain current as a function of input voltage; $V_{DD} = 15 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$.

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If a Schmitt trigger is driven via a high impedance ($R > 1$ kΩ) then it is necessary to incorporate a capacitor C of such value that: $\frac{C}{C_p} > \frac{V_{DD} - V_{SS}}{V_H}$, otherwise oscillation can occur on the edges of a pulse.

C_p is the external parasitic capacitance between input and output; the value depends on the circuit board layout.

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Some examples of applications for the HEF40106B are:

- Wave and pulse shapers
- Astable multivibrators
- Monostable multivibrators.

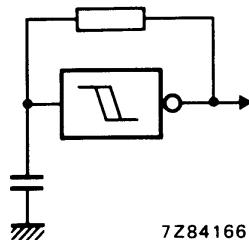


Fig.11 The HEF40106B used as an astable multivibrator.