

DATA SHEET

For a complete data sheet, please also download:

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

HEF40106B

gates

Hex inverting Schmitt trigger

Product specification
File under Integrated Circuits, IC04

January 1995

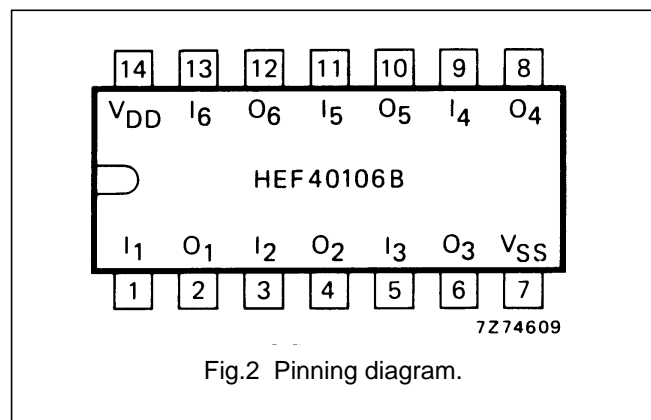
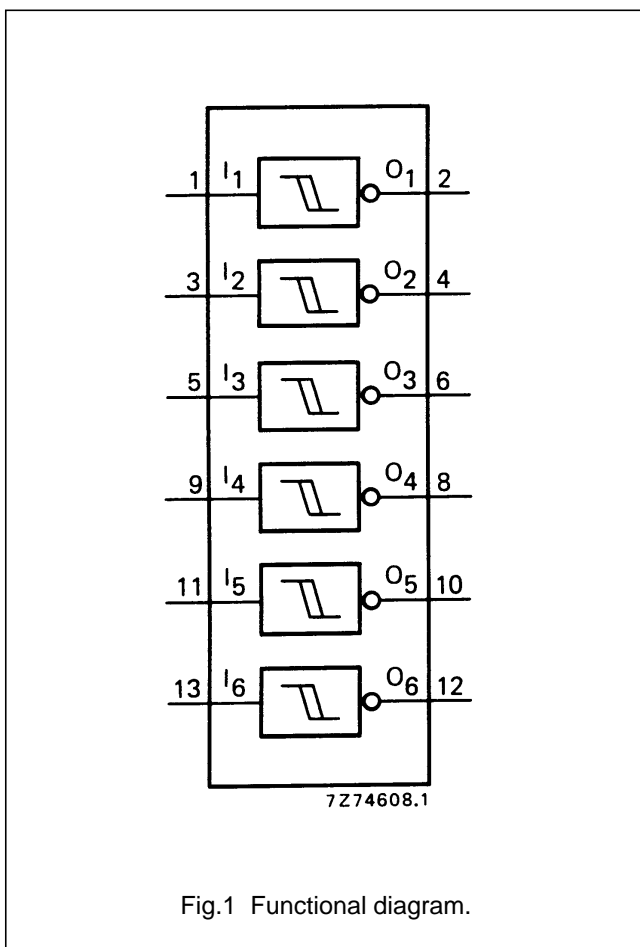
Hex inverting Schmitt trigger

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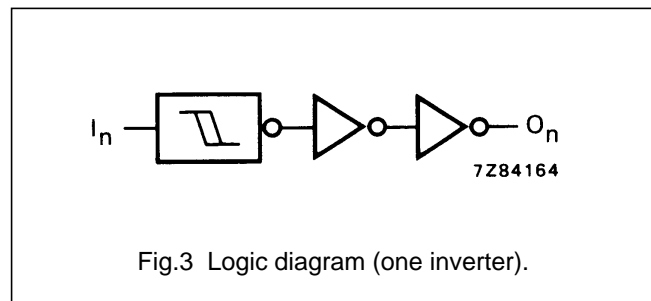
DESCRIPTION

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.



- 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



FAMILY DATA, I_{DD} LIMITS category GATES

See Family Specifications

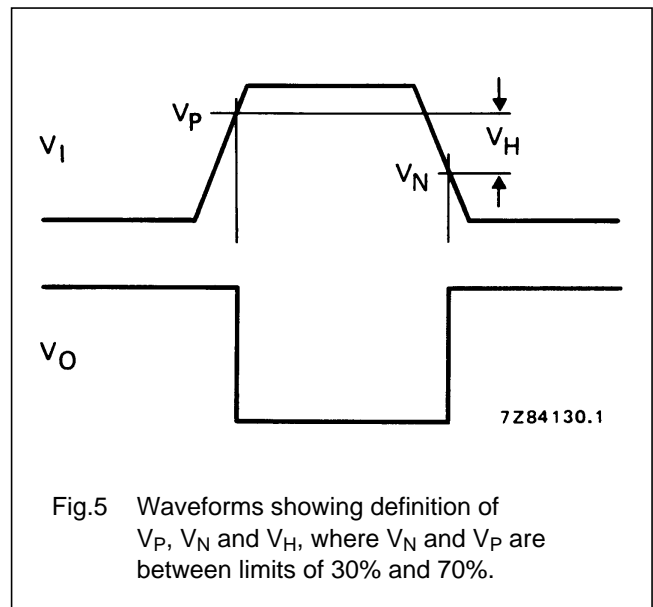
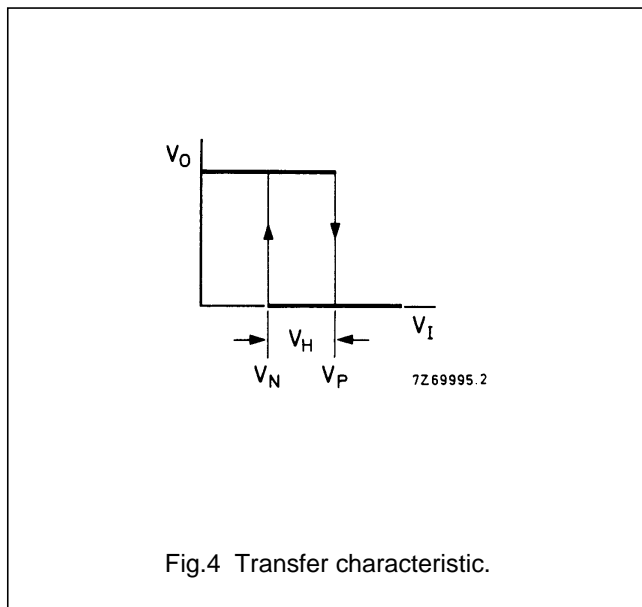
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DC CHARACTERISTICS

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

	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



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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	$22\text{ ns} + (0,16\text{ ns/pF}) C_L$
LOW to HIGH	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	$22\text{ ns} + (0,16\text{ ns/pF}) C_L$
Output transition times HIGH to LOW	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	$6\text{ ns} + (0,28\text{ ns/pF}) C_L$
LOW to HIGH	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	$2\ 300 f_i + \sum (f_o C_L) \times V_{DD}^2$	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)
	10	$9\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	$20\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$	

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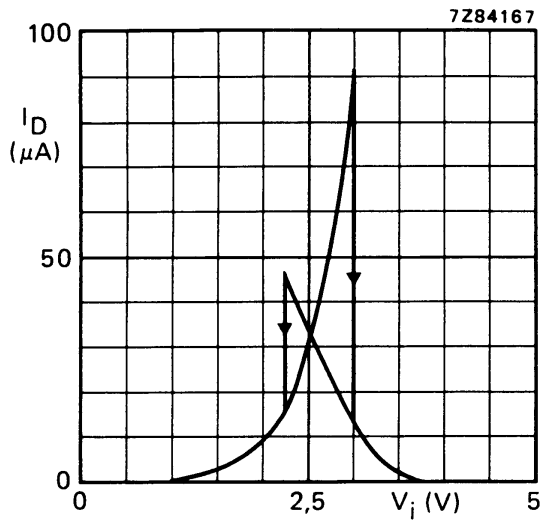


Fig.6 Typical drain current as a function of input voltage; $V_{DD} = 5 V$; $T_{amb} = 25^\circ C$.

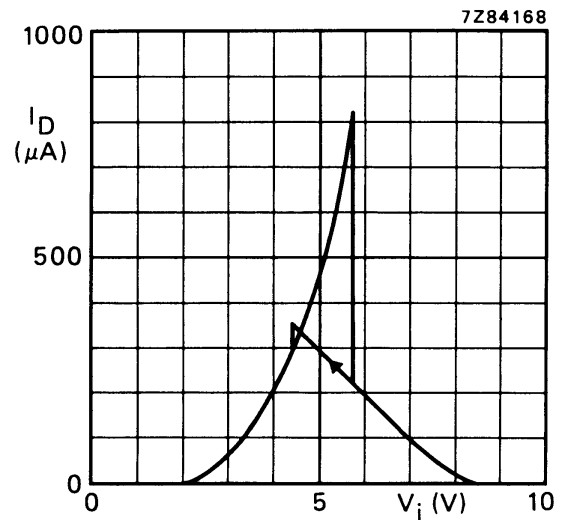


Fig.7 Typical drain current as a function of input voltage; $V_{DD} = 10 V$; $T_{amb} = 25^\circ C$.

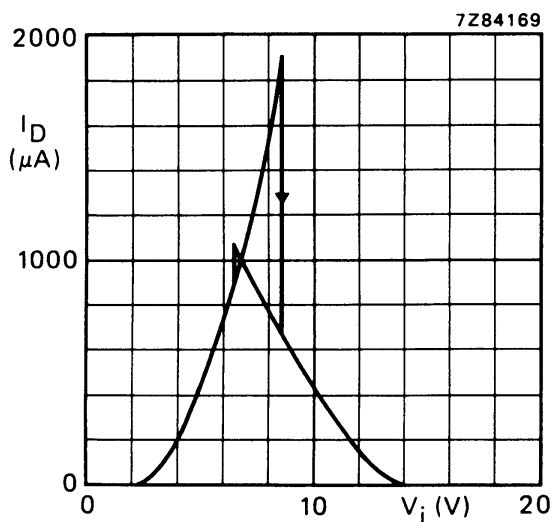


Fig.8 Typical drain current as a function of input voltage; $V_{DD} = 15 V$; $T_{amb} = 25^\circ C$.

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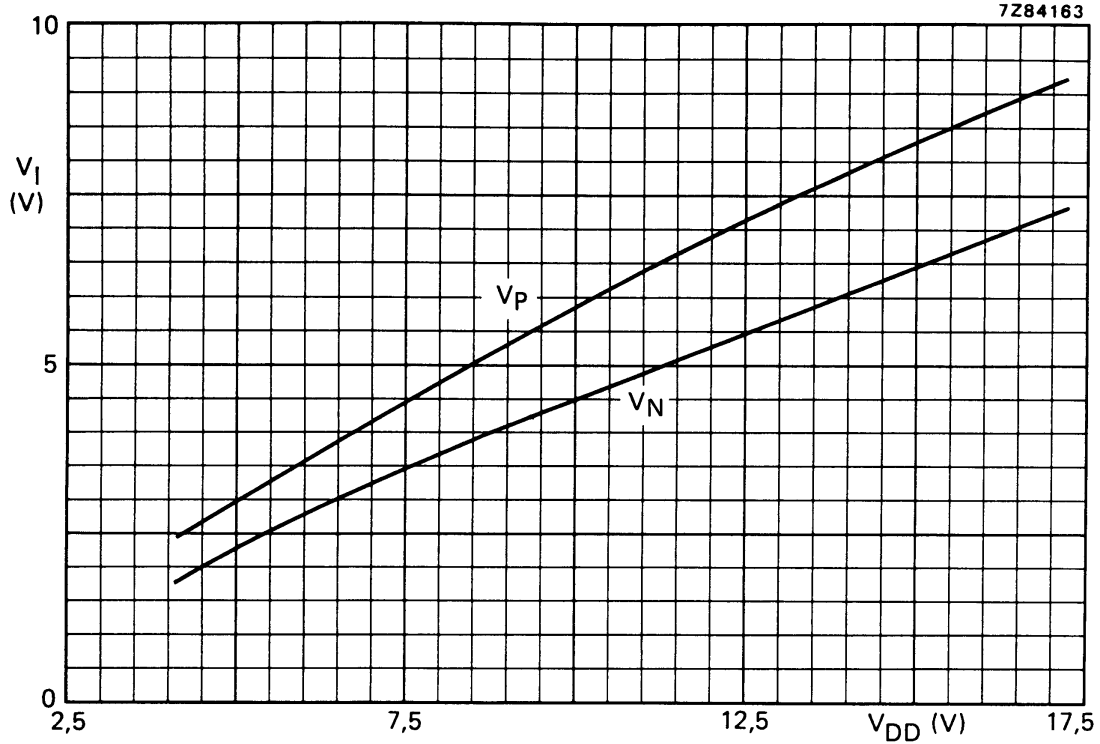


Fig.9 Typical switching levels as a function of supply voltage \$V_{DD}\$; \$T_{amb} = 25\text{ }^\circ\text{C}\$.

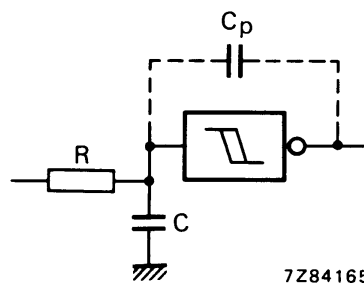


Fig.10 Schmitt trigger driven via a high impedance (\$R > 1\text{ k}\Omega\$).

If a Schmitt trigger is driven via a high impedance (\$R > 1\text{ k}\Omega\$) 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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APPLICATION INFORMATION

Some examples of applications for the HEF40106B are:

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

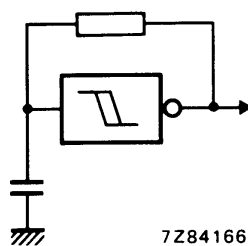


Fig.11 The HEF40106B used as an astable multivibrator.