HEX INVERTING SCHMITT TRIGGER

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.

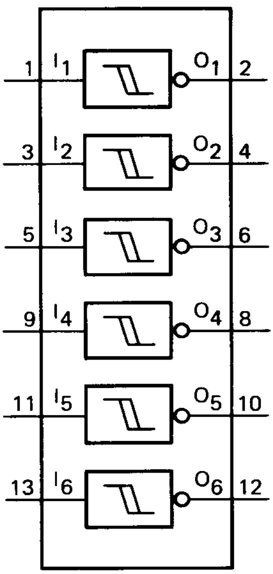

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Fig. 1 Functional diagram.

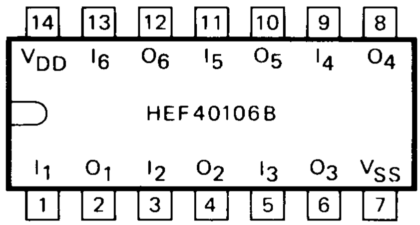

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Fig. 2 Pinning diagram.

HEF40106BP : 14-lead DIL; plastic (SOT-27).
HEF40106BD: 14-lead DIL; ceramic (cerdip) (SOT-73).
HEF40106BT : 14-lead mini-pack; plastic (SO-14; SOT-108A).

7Z84164

Fig. 3 Logic diagram (one inverter).

FAMILY DATA

I_{DD} LIMITS category GATES

} see Family Specifications

D.C. CHARACTERISTICS

V_{SS} = 0 V; T_{amb} = 25 °C

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

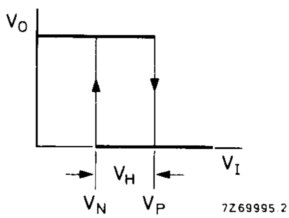

Fig. 4 Transfer characteristic.

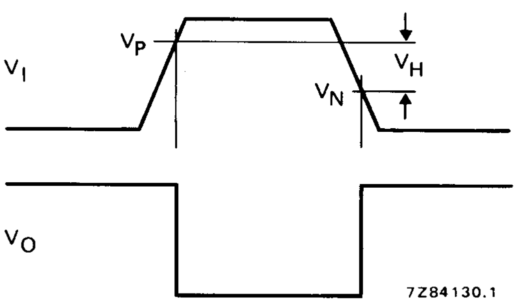

Fig. 5 Waveforms showing definition of V_P, V_N and V_H, where V_N and V_P are between limits of 30% and 70%.

A.C. CHARACTERISTICS

V_{SS} = 0 V; T_{amb} = 25 °C; C_L = 50 pF; input transition times ⩽ 20 ns

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

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

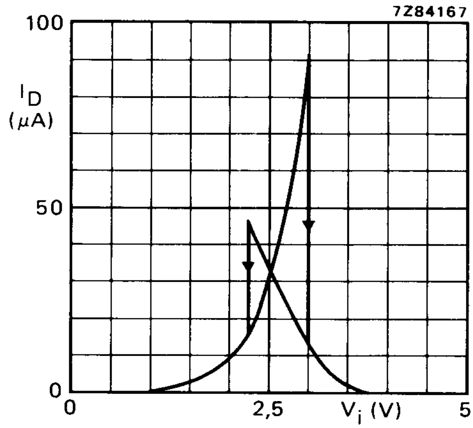

Fig. 6 Typical drain current as a function of input voltage; V_{DD} = 5 V; T_{amb} = 25 °C.

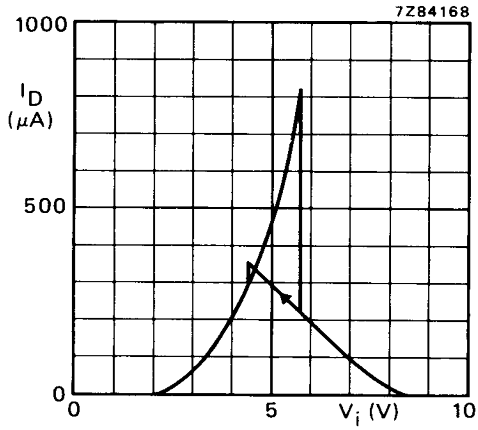

Fig. 7 Typical drain current as a function of input voltage; V_{DD} = 10 V; T_{amb} = 25 °C.

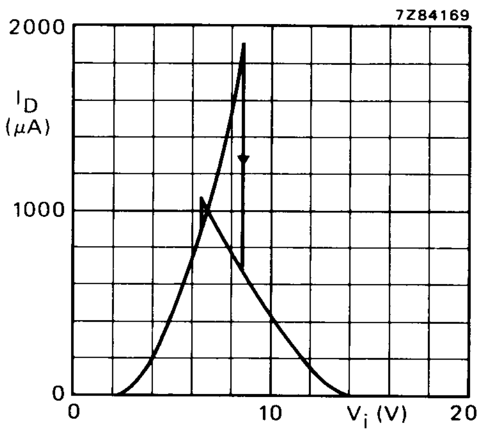

Fig. 8 Typical drain current as a function of input voltage; V_{DD} = 15 V; T_{amb} = 25 °C.

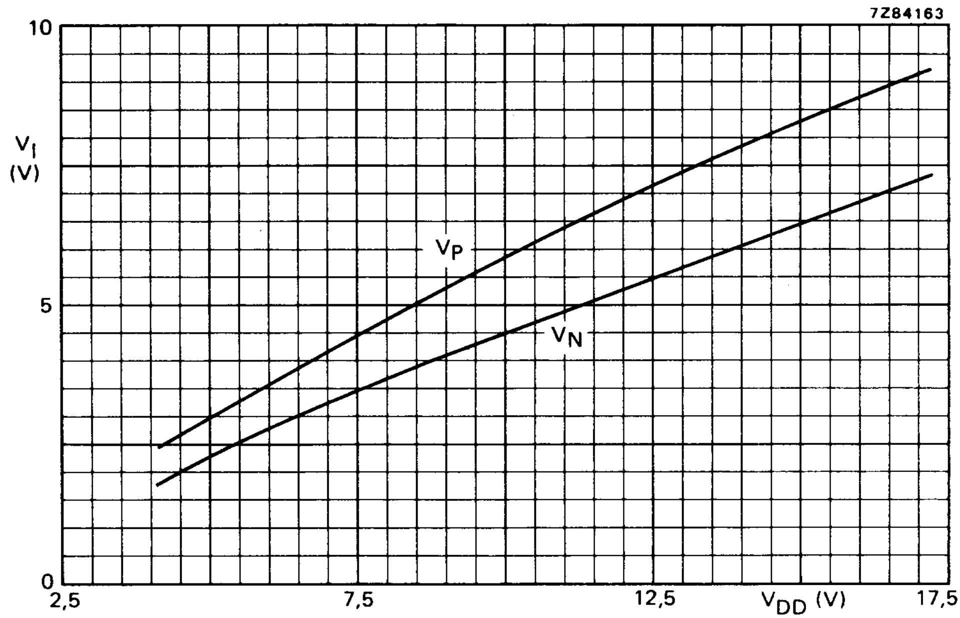

Fig. 9 Typical switching levels as a function of supply voltage V_{DD}; T_{amb} = 25 °C.

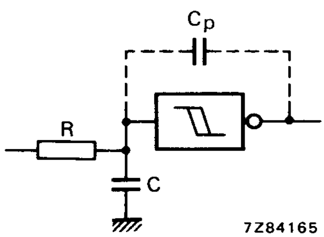

Fig. 10 Schmitt trigger driven via a high impedance (R > 1 kΩ).

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.

APPLICATION INFORMATION

Some examples of applications for the HEF40106B are:

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

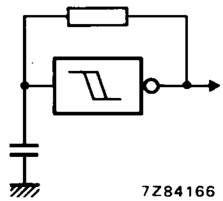

Fig. 11 The HEF40106B used as an astable multivibrator.