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## NTE40106B & NTE40106BT Integrated Circuit CMOS, Hex Schmitt Trigger

### **Description:**

The NTE40106B (14-Lead DIP) and NTE40106BT (SOIC-14) consist of six Schmitt Trigger circuits. Each circuit functions as an inverter with Schmitt Trigger action on the input. The trigger switches different points for positive-going and negative-going signals. The difference between the positive-going voltage ( $V_P$ ) and the negative-going voltage ( $V_N$ ) is defined as hysteresis voltage ( $V_H$ ).

### **Features:**

- Schmitt-Trigger with No External Components
- Hysteresis Voltage (Typ): 0.9V at  $V_{DD} = 5V$ , 2.3V at  $V_{DD} = 10V$ , 3.5V at  $V_{DD} = 15V$
- Noise Immunity Greater Than 50%
- No Limit on Input Rise and Fall Times
- Standardized, Symmetrical Output Characteristics
- Maximum Input Current of 1 $\mu$ A at 18V over Full Package Temperature Range: 100nA at 18V and +25°C
- Low  $V_{DD}$  to  $V_{SS}$  Current during Slow Input Ramp
- 5V, 10V, and 15V Parametric Ratings

### **Applications:**

- Wave and Pulse Shapers
- High-Noise-Environment Systems
- Monostable Multivibrators
- Astable Multivibrators

### **Absolute Maximum Ratings:**

DC Supply Voltage (Voltages Referenced to $V_{SS}$ ), $V_{DD}$ .....	-0.5 to +20V
Input Voltage (All Inputs) .....	-0.5 to $V_{DD}+0.5V$
DC Input Current (Any One Input) .....	$\pm 10mA$
Power Dissipation (Per Package), $P_D$	
For $T_A = -55^\circ$ to $+100^\circ C$ .....	500mW
For $T_A = +100^\circ$ to $+125^\circ C$ .....	Derate Linearly at 12mW/ $^\circ C$ to 200mW
Device Dissipation (Per Output Transistor)	
For $T_A =$ Full package Temperature Range .....	100mW
Operating Temperature Range, $T_A$ .....	$-55^\circ$ to $+125^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+150^\circ C$
Lead Temperature (During Soldering, 10sec), $T_L$ .....	$+265^\circ C$

### **Recommended Operating Conditions:**

DC Supply Voltage (For $T_A =$ Full Package Temperature Range) .....	3 to 18V
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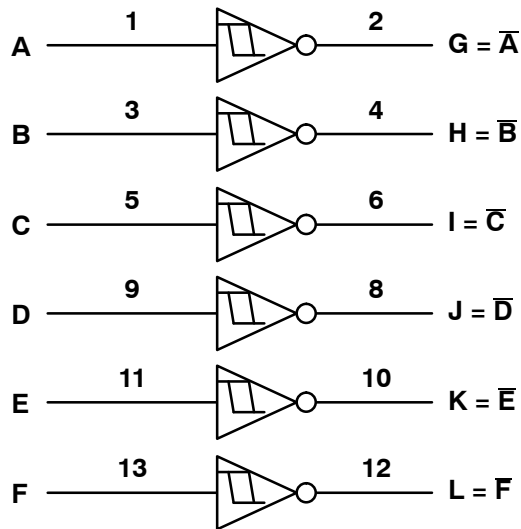
### Static Electrical Characteristics:

Characteristic	Conditions			Limits at Indicated Temperature (°C)							Units	
	V <sub>O</sub> (V)	V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	-55°C	-40°C	+85°C	+125°C	+25°C				
								Min.	Typ.	Max.		
Quiescent Device Current, I <sub>DD</sub> Max	-	0,5	5	1	1	30	30	-	0.02	1	μA	
	-	0,10	10	2	2	60	60	-	0.02	2	μA	
	-	0,15	15	4	4	120	120	-	0.02	4	μA	
	-	0,20	20	20	20	600	600	-	0.04	20	μA	
Positive Trigger Threshold Voltage, V <sub>P</sub> Min.	-	-	5	2.2	2.2	2.2	2.2	2.2	2.9	-	V	
	-	-	10	4.6	4.6	4.6	4.6	4.6	5.9	-	V	
	-	-	15	6.8	6.8	6.8	6.8	6.8	8.8	-	V	
	V <sub>P</sub> Max.	-	-	5	3.6	3.6	3.6	3.6	-	2.9	3.6	V
		-	-	10	7.1	7.1	7.1	7.1	-	5.9	7.1	V
-	-	15	10.8	10.8	10.8	10.8	-	8.8	10.8	V		
Negative Trigger Threshold Voltage, V <sub>N</sub> Min.	-	-	5	0.9	0.9	0.9	0.9	0.9	1.9	-	V	
	-	-	10	2.5	2.5	2.5	2.5	2.5	3.9	-	V	
	-	-	15	4.0	4.0	4.0	4.0	4.0	5.8	-	V	
	V <sub>N</sub> Max.	-	-	5	2.8	2.8	2.8	2.8	-	1.9	2.8	V
		-	-	10	5.2	5.2	5.2	5.2	-	3.9	5.2	V
-	-	15	7.4	7.4	7.4	7.4	-	5.8	7.4	V		
Hysteresis Voltage, V <sub>H</sub> Min.	-	-	5	0.3	0.3	0.3	0.3	0.3	0.9	-	V	
	-	-	10	1.2	1.2	1.2	1.2	1.2	2.3	-	V	
	-	-	15	1.6	1.6	1.6	1.6	1.6	3.5	-	V	
	V <sub>H</sub> Max.	-	-	5	1.6	1.6	1.6	1.6	-	0.9	1.6	V
		-	-	10	3.4	3.4	3.4	3.4	-	2.3	3.4	V
-	-	15	5.0	5.0	5.0	5.0	-	3.5	5.0	V		
Output Low (Sink) Current I <sub>OL</sub> Min.	0.4	0,5	5	0.64	0.61	0.42	0.36	0.51	1.0	-	mA	
	0.5	0,10	10	1.6	1.5	1.1	0.9	1.3	2.6	-	mA	
	1.5	0,15	15	4.2	4.0	2.8	2.4	3.4	6.8	-	mA	
Output High (Source) Current I <sub>OH</sub> Min.	4.6	0,5	5	-0.64	-0.61	-0.42	-0.36	-0.51	-1.0	-	mA	
	2.5	0,5	5	-2.0	-1.8	-1.3	-1.15	-1.6	-3.2	-	mA	
	9.5	0,10	10	-1.6	-1.5	-1.1	-0.9	-1.3	-2.6	-	mA	
	13.5	0,15	15	-4.2	-4.0	-2.8	-2.4	-3.4	-6.8	-	mA	
Output Voltage Low-Level V <sub>OL</sub> Max.	-	5	5	0.05				-	0	0.05	V	
	-	10	10	0.05				-	0	0.05	V	
	-	15	15	0.05				-	0	0.05	V	
Output Voltage High-Level V <sub>OH</sub> Min.	-	5	5	4.95				4.95	5	-	V	
	-	10	10	9.95				9.95	10	-	V	
	-	15	15	14.95				14.95	15	-	V	
Input Current, I <sub>IN</sub> Max.	-	0,18	18	±0.1	±0.1	±1.0	±1.0	-	±10 <sup>-5</sup>	±0.1	μA	

**Dynamic Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$ ,  $C_L = 50\text{pF}$ ,  $R_L = 200\text{k}\Omega$ ,  $t_r$  and  $t_f = 20\text{ns}$  unless otherwise specified)

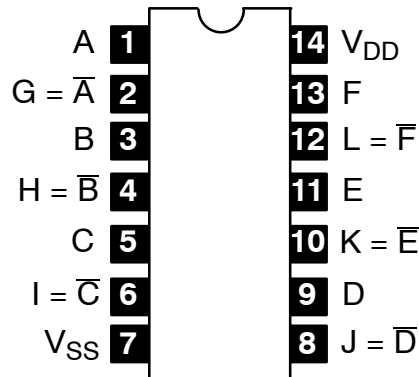
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Propagation Delay Time from	$t_{\text{PHL}}$ or $t_{\text{PLH}}$	$V_{\text{DD}} = 5\text{V}$	–	140	280	ns
		$V_{\text{DD}} = 10\text{V}$	–	70	140	ns
		$V_{\text{DD}} = 15\text{V}$	–	60	120	ns
Transition Time	$t_{\text{THL}}$ or $t_{\text{TLH}}$	$V_{\text{DD}} = 5\text{V}$	–	100	200	ns
		$V_{\text{DD}} = 10\text{V}$	–	50	100	ns
		$V_{\text{DD}} = 15\text{V}$	–	40	80	ns
Input Capacitance	$C_{\text{IN}}$	Any Input	–	5.0	7.5	pF

**Functional Diagram**

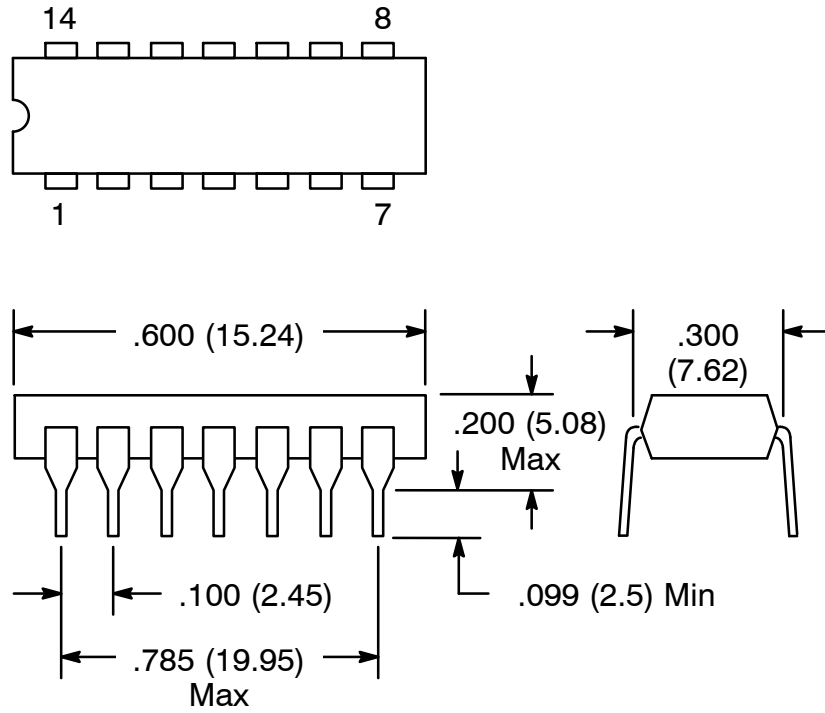


$V_{\text{DD}} = \text{Pin14}$   
 $V_{\text{SS}} = \text{Pin7}$

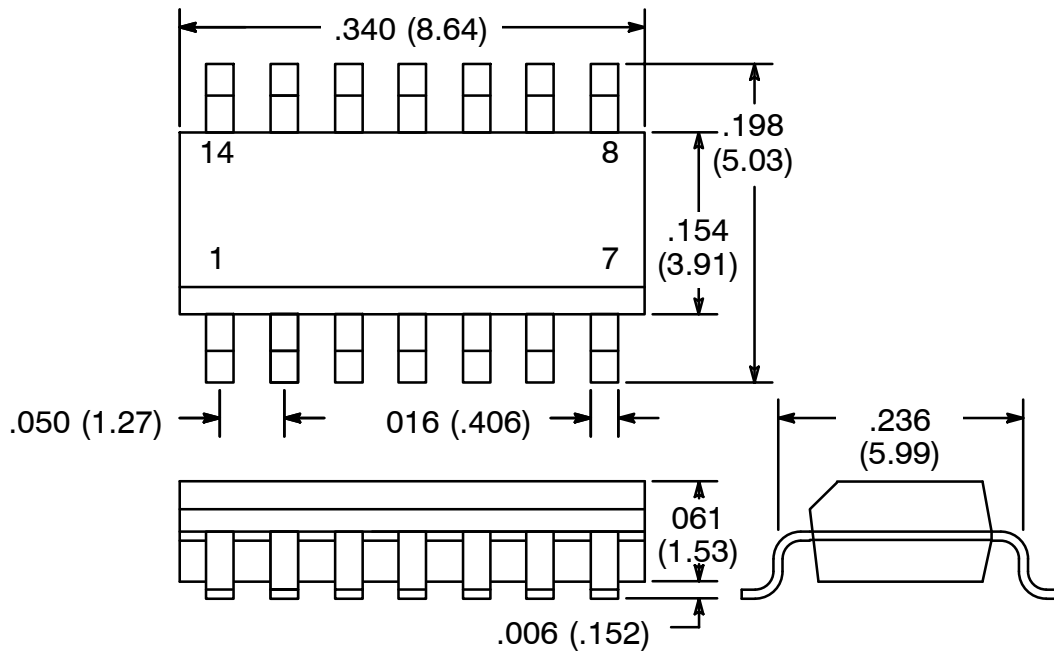
**Pin Connection Diagram**



NTE40106B



NTE40106BT



NOTE: Pin1 on Beveled Edge