



ELECTRONICS, INC.
 44 FARRAND STREET
 BLOOMFIELD, NJ 07003
 (973) 748-5089
<http://www.nteinc.com>

NTE4049, NTE4049T NTE4050B, NTE4050BT Integrated Circuit CMOS, Hex Buffer/Converter

Description:

The NTE4049/NTE4049T (Inverting) and NTE4050B/NTE4050BT (Non-Inverting) are Hex Buffers and feature logic-level conversion using only one supply voltage (V_{DD}). The input-signal high level (V_{IH}) can exceed the V_{DD} supply voltage when these devices are used for logic level conversions. These devices are intended for use as COS/MOS to DTL/TTL converters and can drive directly two DTL/TTL loads ($V_{DD} = 5V$, $V_{OL} \leq 400mV$, $I_{OL} \geq 3.2mA$).

These devices are available in a standard 16-Lead DIP (NTE4049 and NTE4050B) and SOIC-16 surface mount (NTE4049T and NTE4050BT) type packages.

Features:

- High Sink Current for Driving 2 TTL Loads
- High-to-Low Level Logic Conversion
- Quiescent Current Specified to 20V
- Maximum Input Current of $1\mu A$ at 18V (Full Package Temperature Range)
- High "Sink" and "Source" Current Capability
- 5V, 10V, and 15V Parametric Ratings

Absolute Maximum Ratings:

Supply Voltage (Note 1), V_{DD}	-0.5 to 20V
Input Voltage, V_I	-0.5 to $V_{DD} + 0.5V$
DC Input Current (Any One Input), I_I	$\pm 10mA$
Total Power Dissipation, P_{tot}	
Per Package	200mW
Per Output Transistor ($T_{op} = -40^\circ$ to $+85^\circ C$)	100mW
Operating Temperature Range, T_{opr}	-40° to $+85^\circ C$
Storage Temperature Range, T_{stg}	-65° to $+150^\circ C$

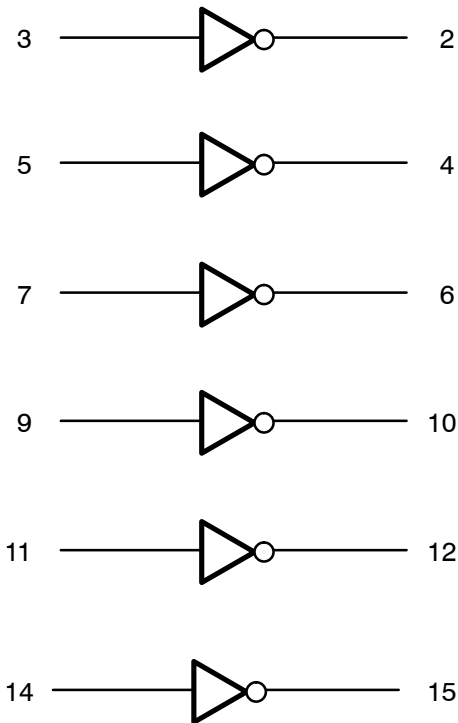
Note 1. All voltage values are referred to V_{SS} pin voltage.

Recommended Operating Conditions:

Supply Voltage, V_{DD}	3 to 18V
Input Voltage (Note 2), V_I	V_{DD} to 18V
Operating Temperature Range, T_{opr}	-40° to $+85^\circ C$

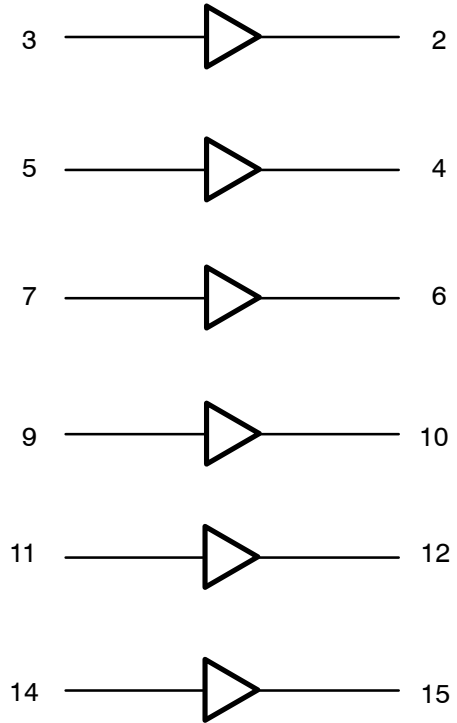
Note 2. The NTE4049/T and NTE4050B/BT have high-to-low-level voltage conversion capability but not low-to-high-level; therefore it is recommended that $V_{IN} \geq V_{DD}$.

NTE4049 & NTE4049T



NC = Pin 13, 16
 V_{SS} = Pin 8
 V_{DD} = Pin 1

NTE4050B and NTE4050BT



NC = Pin 13, 16
 V_{SS} = Pin 8
 V_{DD} = Pin 1

Static Electrical Characteristics: (T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions			Min	Typ	Max	Unit		
		V _I (V)	V _O (V)	V _{DD} (V)						
Quiescent Supply Current	I _L	0 to 5	-	5	-	0.02	-	μA		
		0 to 10	-	10	-	0.02	-	μA		
		0 to 15	-	15	-	0.02	-	μA		
		0 to 20	-	20	-	0.04	-	μA		
Output High Voltage	V _{OH}	0 to 5	-	5	4.95	-	-	V		
		0 to 10	-	10	9.95	-	-	V		
		0 to 15	-	15	14.95	-	-	V		
Input High Voltage NTE4049, NTE4049T	V _{IH}	-	0.5	5	4	-	-	V		
		-	1.0	10	8	-	-	V		
		-	2.0	15	12	-	-	V		
		NTE4050B, NTE4050BT		-	4.5	5	3.5	-	-	V
		-	9.0	10	7.0	-	-	V		
		-	13.5	15	11.0	-	-	V		

Static Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions			Min	Typ	Max	Unit	
		V_I (V)	V_O (V)	V_{DD} (V)					
Input Low Voltage NTE4049, NTE4049T	V_{IL}	-	4.5	5	-	-	1	V	
		-	9.0	10	-	-	2	V	
		-	13.0	15	-	-	3	V	
		NTE4050B, NTE4050BT	-	0.5	5	-	-	1.5	V
			-	1.0	10	-	-	3.0	V
			-	1.5	15	-	-	4.0	V
Output Drive Current	I_{OH}	0 to 5	2.5	5	-6.0	-6.4	-	mA	
		0 to 5	4.6	5	-3.2	-1.6	-	mA	
		0 to 10	9.5	10	-0.8	-3.6	-	mA	
		0 to 15	13.5	15	-1.8	-12.0	-	mA	
Output Sink Current	I_{OL}	0 to 5	0.4	4.5	2.6	5.2	-	mA	
		0 to 5	0.4	5	3.2	6.4	-	mA	
		0 to 10	0.5	10	8.0	16.0	-	mA	
		0 to 15	1.5	15	24.0	48.0	-	mA	
Input Leakage Current	I_{IH}, I_{IL}	0 to 18	Any Input	18	-	$\pm 10^{-5}$	± 0.1	μA	
Input Capacitance NTE4049, NTE4049T	C_I	Any Input		-	-	15	22.5	pF	
					-	5	7.5	pF	
NTE4050B, NTE4050BT									

Note 3. The Noise Margin (NTE4050B/BT Only) for both "1" and "0" level is: 1V min. with $V_{DD} = 5\text{V}$
 2V min. with $V_{DD} = 10\text{V}$
 2.5V min. with $V_{DD} = 15\text{V}$

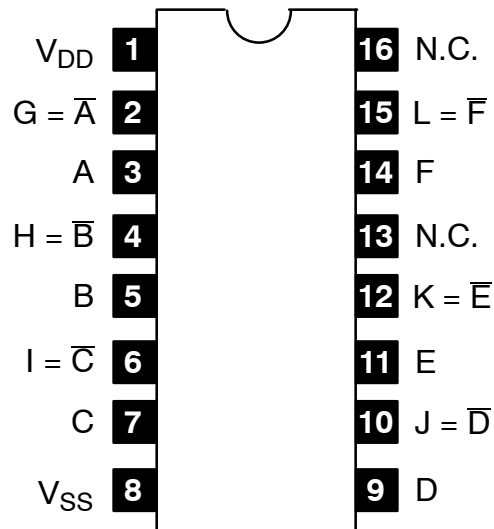
Dynamic Electrical Characteristics: ($T_A = +25^\circ\text{C}$, $C_L = 50\text{pF}$, $R_L = 200\text{k}\Omega$, typical temperature coefficient for all V_{DD} values is $0.3\%/^\circ\text{C}$, all input rise and fall times = 20ns unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit	
		V_I (V)	V_{DD} (V)					
Propagation Delay Time NTE4049, NTE4049T	t_{PLH}	5	5	-	60	120	ns	
		10	10	-	32	65	ns	
		10	5	-	45	90	ns	
		15	15	-	25	590	ns	
		15	5	-	45	90	ns	
		NTE4050B, NTE4050BT	5	5	-	70	140	ns
			10	10	-	40	80	ns
			10	5	-	45	90	ns
			15	15	-	30	60	ns
			15	5	-	40	80	ns

Dynamic Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$, $C_L = 50\text{pF}$, $R_L = 200\text{k}\Omega$, typical temperature coefficient for all V_{DD} values is $0.3\%/^\circ\text{C}$, all input rise and fall times = 20ns unless otherwise specified)

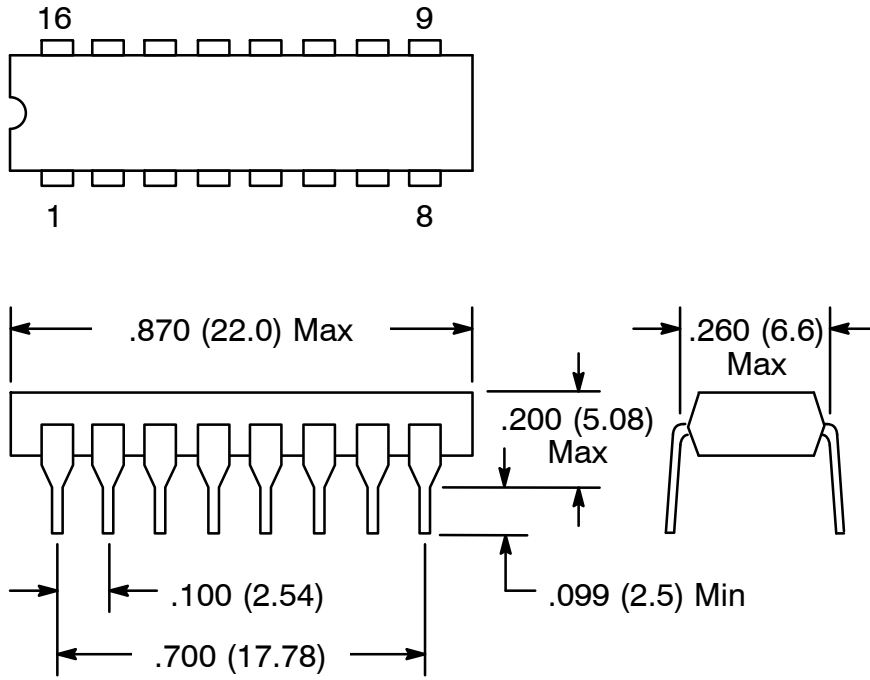
Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
		V_I (V)	V_{DD} (V)				
Propagation Delay Time NTE4049, NTE4049T NTE4050B, NTE4050BT	t_{PHL}	5	5	–	32	65	ns
		10	10	–	20	40	ns
		10	5	–	15	30	ns
		15	15	–	15	30	ns
		15	5	–	10	20	ns
		5	5	–	55	110	ns
		10	10	–	22	55	ns
		10	5	–	50	100	ns
		15	15	–	15	30	ns
		15	5	–	50	100	ns
Transition Time	t_{TLH}	5	5	–	80	160	ns
		10	10	–	40	80	ns
		15	15	–	30	60	ns
Transition Time	t_{THL}	5	5	–	30	60	ns
		10	10	–	20	40	ns
		15	15	–	15	30	ns

Pin Connection Diagram

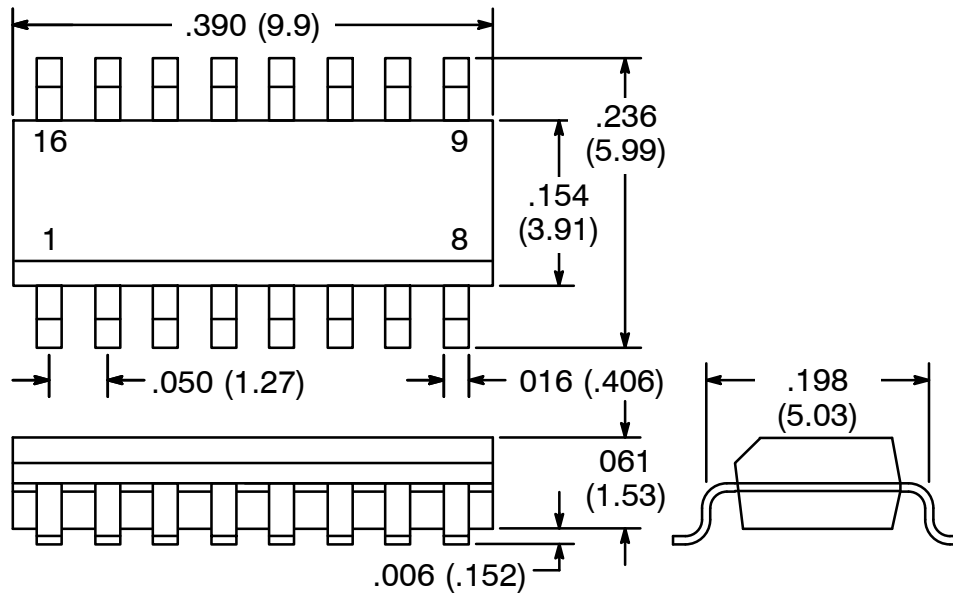


Note: On NTE4050B/BT, Pins 2, 4, 6, 10, 12, and 15 are not inverted.

NTE4049 / NTE4049T



NTE4050B / NTE4050BT



NOTE: Pin1 on Beveled Edge