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## NTE40107B Integrated Circuit CMOS – Dual 2 Input NAND Buffer/Driver

**Description:**

The NTE40107B is a dual, 2-input, NAND buffer/driver in an 8-Lead DIP type package containing two independent 2-input NAND buffers with open-drain single N-Channel transistor outputs. This device features a wired-OR capability and high output sink current capability (136mA Typ. at  $V_{DD} = 10V$ ,  $V_{DS} = 1V$ ).

**Features:**

- 32 Times Standard B-Series Output Current Drive Sinking Capability:  
 136mA Typ. at  $V_{DD} = 10V$ ,  $V_{DS} = 1V$
- 100% Tested for Quiescent Current at 20V
- Maximum Input Current of 1 $\mu$ A at 18V Over Full Package Temperature Range; 100nA at 18V and +25°C
- 5V, 10V, and 15V Parametric Ratings
- Noise margin, Full Package Temperature Range,  $R_L$  to  $V_{DD} = 10k\Omega$ :  
 1V at  $V_{DD} = 5V$   
 2V at  $V_{DD} = 10V$   
 2.5V at  $V_{DD} = 15V$

**Applications:**

- Driving Relays, Lamps, and LEDs
- Line Driver
- Level Shifter (Up or Down)

**Absolute Maximum Ratings:**

DC Supply Voltage Range (Voltages Referenced to  $V_{SS}$  Terminal),  $V_{DD}$  ..... -0.5V to +2.0V  
 Input Voltage Range, All Inputs ..... -0.5V 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 Linearity at 12mW/ $^\circ C$  to 200mW  
 Device Dissipation Per Output Transistor ( $T_A =$  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, 1/16" from Case for 10sec Max),  $T_L$  .....  $+265^\circ C$

**Recommended Operating Conditions:** (Note 1)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage Range	$V_{DD}$	$T_A = -55^\circ$ to $+125^\circ C$	3	-	18	V

Note 1. For maximum reliability, nominal operating conditions should be selected so that operation is always within the above ranges.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Propagation Delay, High-to-Low	$t_{PHL}$	$R_L = 120\Omega$ , Note 2	$V_{DD} = 5\text{V}$	-	100	200	ns
			$V_{DD} = 10\text{V}$	-	45	90	ns
			$V_{DD} = 15\text{V}$	-	30	60	ns
Propagation Delay, Low-to-High	$t_{PLH}$	$R_L = 120\Omega$ , Note 2	$V_{DD} = 5\text{V}$	-	100	200	ns
			$V_{DD} = 10\text{V}$	-	60	120	ns
			$V_{DD} = 15\text{V}$	-	50	100	ns
Transition Time, High-to-Low	$t_{THL}$	$R_L = 120\Omega$ , Note 2	$V_{DD} = 5\text{V}$	-	50	100	ns
			$V_{DD} = 10\text{V}$	-	20	40	ns
			$V_{DD} = 15\text{V}$	-	10	20	ns
Transition Time, Low-to-High	$t_{TLH}$	$R_L = 120\Omega$ , Note 2	$V_{DD} = 5\text{V}$	-	50	100	ns
			$V_{DD} = 10\text{V}$	-	35	70	ns
			$V_{DD} = 15\text{V}$	-	25	50	ns
Average Input Capacitance	$C_{IN}$	Any Input	-	5.0	7.5	pF	
Average Output Capacitance	$C_{OUT}$	Any Output	-	30	-	pF	

Note 2.  $R_L$  is external pull-up resistor to  $V_{DD}$ .

**Static Electrical Characteristics:**

Parameter	Symbol	Conditions			Limits at Indicated Temperatures ( $^\circ\text{C}$ )							Unit
		$V_O$ (V)	$V_{IN}$ (V)	$V_{DD}$ (V)					+25			
					-55	-40	+85	+125	Min	Typ	Max	
Quiescent Device Current	$I_{DDMax}$	-	0.5	5	1	1	30	30	-	0.02	1	$\mu\text{A}$
		-	0,10	10	2	2	60	60	-	0.02	2	$\mu\text{A}$
		-	0,15	15	4	4	120	120	-	0.02	4	$\mu\text{A}$
		-	0,20	20	20	20	600	600	-	0.04	20	$\mu\text{A}$
Output Low (Sink) Current	$I_{OLMin}$	0.4	0,5	5	21	20	14	12	16	32	-	mA
		1	0,5	5	44	42	30	25	34	68	-	mA
		0.5	0,10	10	49	46	32	28	37	74	-	mA
		1	0,10	10	89	85	60	51	68	136	-	mA
		0.5	0,15	15	66	63	44	38	50	100	-	mA
Output High (Source) Current	$I_{OHMin}$	No Internal Pull-Up Devices										mA
Input Low Voltage (Note 3)	$V_{ILMax}$	4.5	-	5	-	1.5			-	-	1.5	V
		9	-	10	-	3.0			-	-	3.0	V
		13.5	-	15	-	4.0			-	-	4.0	V
Input High Voltage (Note 3)	$V_{IHMin}$	0,5,4.5	-	5	-	3.5			3.5	-	-	V
		1,9	-	10	-	7			7	-	-	V
		1.5,13.5	-	15	-	11			11	-	-	V
Input Current	$I_{INMax}$	-	0,18	18	$\pm 0.1$	$\pm 0.1$	$\pm 1$	$\pm 1$	-	$\pm 10^{-5}$	$\pm 0.1$	$\mu\text{A}$
Output Leakage Current	$I_{OZMax}$	18	0,18	18	2	2	20	20	-	$10^{-4}$	2	$\mu\text{A}$

Note 3. Measured with external pull-up resistor,  $R_L = 10\text{k}\Omega$  to  $V_{DD}$ .

**Special Considerations:**

**Limiting Capacitive Currents for  $C_L > 500\text{pF}$ ,  $V_{DD} > 15\text{V}$ .** For  $V_{DD} > 15\text{V}$ , and load capacitance ( $C_L$ ) from output to GND  $> 500\text{pF}$ , an external  $25\Omega$  series limiting resistor should be inserted between the output terminal and  $C_L$ . No external resistor is necessary if  $C_L < 500\text{pF}$  or  $V_{DD} < 15\text{V}$ .

**Driving Inductive Loads.** When using the NTE40107B to drive inductive loads, the load should be shunted with a diode to prevent high voltages from developing across the device output.

**Truth Table:**

A	B	C	
0	0	1 *	Z #
1	0	1 *	Z #
0	1	1 *	Z #
1	1	0	

\* Requires external pull-up resistor ( $R_L$ ) to  $V_{DD}$ .

# Without pull-up resistor (3-state).

