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## NTE7444 Integrated Circuit TTL – 4–Line–to–10–Line Gray–to–Decimal Decoder

**Description:**

The NTE7444 is a monolithic Gray-to-Decimal decoder in a 16-Lead plastic DIP type package that consists of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of valid input logic ensures that all outputs remain off for all invalid input conditions.

The NTE7444 Gray-to-Decimal decoder features inputs and outputs that are compatible with most TTL and other saturated low-level logic circuits. DC noise margins are typically one volt.

**Features:**

- All Outputs are High for Invalid Input Conditions
- Diode-Clamped Inputs
- Also for Application as:
  - 4-Line-to-16-Line Decoder
  - 3-Line-to-8-Line Decoder

**Absolute Maximum Ratings:** (Note 1)

Supply Voltage,  $V_{CC}$  ..... 7V  
 Input Voltage ..... 5.5V  
 Operating Temperature Range,  $T_A$  ..... 0°C to +70°C  
 Storage Temperature Range,  $T_{stg}$  ..... -65°C to +150°C

Note 1. Unless otherwise specified, all voltages are referenced to GND.

**Recommended Operating Conditions:**

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$	4.75	5.0	5.25	V
High-Level Output Current	$I_{OH}$	-	-	-800	$\mu A$
Low-Level Output Current	$I_{OL}$	-	-	16	mA
Operating Temperature Range	$T_A$	0	-	+70	°C

**Electrical Characteristics:** (Note 2, Note 3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
High Level Input Voltage	$V_{IH}$		2	–	–	V
Low Level Input Voltage	$V_{IL}$		–	–	0.8	V
Input Clamp Voltage	$V_{IK}$	$V_{CC} = \text{MIN}, I_I = -12\text{mA}$	–	–	-1.5	V
High Level Output Voltage	$V_{OH}$	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}, I_{OH} = -800\mu\text{A}$	2.4	3.4		V
Low Level Output Voltage	$V_{OL}$	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}, I_{OL} = 16\text{mA}$	–	0.2	0.4	V
Input Current	$I_I$	$V_{CC} = \text{MAX}, V_I = 5.5\text{V}$	–	–	1	mA
High Level Input Current	$I_{IH}$	$V_{CC} = \text{MAX}, V_I = 2.4\text{V}$	–	–	40	$\mu\text{A}$
Low Level Input Current	$I_{IL}$	$V_{CC} = \text{MAX}, V_I = 0.4\text{V}$	–	–	-1.6	mA
Short-Circuit Output Current	$I_{OS}$	$V_{CC} = \text{MAX}, \text{Note 4}$	-18	–	-55	mA
Supply Current	$I_{CC}$	$V_{CC} = \text{MAX}, \text{Note 5}$	–	28	56	mA

Note 2. For conditions shown as MIN or MAX, use the appropriate value specified under “Recommended Operation Conditions”.

Note 3. All typical values are at  $V_{CC} = 5\text{V}, T_A = +25^\circ\text{C}$ .

Note 4. Not more than one output should be shorted at a time.

Note 5.  $I_{CC}$  is measured with all outputs open and inputs grounded.

**Switching Characteristics:** ( $V_{CC} = 5\text{V}, T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Propagation Delay Time (From A, B, C, or D input Through 2 Levels of Logic)	$t_{PHL}$	$R_L = 400\Omega,$ $C_L = 15\text{pF}$	–	14	25	ns
Propagation Delay Time (From A, B, C, or D input Through 3 Levels of Logic)	$t_{PHL}$		–	17	30	ns
Propagation Delay Time (From A, B, C, or D input Through 2 Levels of Logic)	$t_{PLH}$		–	10	25	ns
Propagation Delay Time (From A, B, C, or D input Through 3 Levels of Logic)	$t_{PLH}$		–	17	30	ns

**Function Tables:**

No.	Gray-Input				Decimal Output									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	H		L	H	H	H	H	H	H	H	H	H
1	L	H	H		H	L	H	H	H	H	H	H	H	H
2	L	H	H		H	H	L	H	H	H	H	H	H	H
3	L	H	L		H	H	H	L	H	H	H	H	H	H
4	L	H	L		H	H	H	H	L	H	H	H	H	H
5	H	H	L		H	H	H	H	H	L	H	H	H	H
6	H	H	L		H	H	H	H	H	H	L	H	H	H
7	H	H	H		H	H	H	H	H	H	H	L	H	H
8	H	H	H		H	H	H	H	H	H	H	H	L	H
9	H	L	H		H	H	H	H	H	H	H	H	H	L
Invalid	H	L	H		H	H	H	H	H	H	H	H	H	H
	H	L	L		H	H	H	H	H	H	H	H	H	H
	H	L	L		H	H	H	H	H	H	H	H	H	H
	L	L	L		H	H	H	H	H	H	H	H	H	H
	L	L	H		H	H	H	H	H	H	H	H	H	H

H = HIGH Level, L = LOW Level

### Pin Connection Diagram

