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## NTE2021 & NTE2022 Integrated Circuit 8-Digit/Segment Fluorescent Display Driver

**Description:**

The NTE2021 and NTE2022 consist of eight NPN Darlington output stages and the associated common-emitter input stages in an 18-Lead DIP type package. These devices are designed to interface between low-level digital logic and vacuum fluorescent displays. They are capable of driving the digits and/or segments of these displays and are designed to permit all outputs to be activated simultaneously. Pulldown resistors are incorporated into each output and no external components are required for most fluorescent displays.

The NTE2020 is compatible with TTL, Schottky TTL, DTL and 5V CMOS. The NTE2021 device is intended for use with MOS (PMOS & CMOS) logic operating from supply voltages of 6V to 15V.

**Features:**

- Digit or Segment Drivers
- Low Input Current
- Integral Output Pull-Down Resistors
- Low Power
- Reliable Monolithic Construction
- High Output Breakdown Voltage

**Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$ , Note 1)

Supply Voltage, $V_{BB}$ .....	85V
Input Voltage, $V_{IN}$ .....	20V
Output Current, $I_{OUT}$ .....	-40mA
Allowable Power Dissipation, $P_D$ .....	1W
Derate Above $25^\circ\text{C}$ .....	8.0mW/ $^\circ\text{C}$
Operating Temperature Range, $T_A$ .....	$-20^\circ$ to $+85^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ\text{C}$

Note 1. Voltages are with reference to GND unless otherwise specified

**Recommended Operating Conditions:**

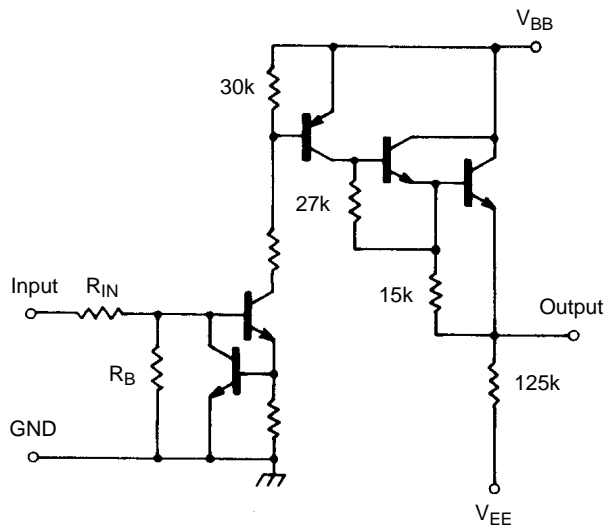
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{BB}$		5	-	70	V
Input ON Voltage NTE2021	$V_{IN}$		2.4	-	15	V
NTE2022			4.0	-	15	V
Output ON Current	$I_{OUT}$		-	-	-25	mA

Note 2. Positive (negative) current is defined as going into (coming out of) the specified device pin.

**Electrical Characteristics:** ( $T_A = -20^{\circ}$  to  $+85^{\circ}\text{C}$ ,  $V_{BB} = 80\text{V}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Leakage Current	$I_{OUT}$	$V_{IN} = 400\text{mV}$	–	–	15	$\mu\text{A}$
Output OFF Voltage	$V_{OUT}$	$V_{IN} = 400\text{mV}$	–	–	1.0	V
Output Pull-Down Current	$I_{OUT}$	$V_{OUT} = V_{BB}$ , Input Open	450	650	1100	$\mu\text{A}$
Output ON Voltage NTE2021	$V_{OUT}$	$V_{IN} = 2.4\text{V}$ , $I_{OUT} = -25\text{mA}$	77	78	–	V
NTE2022		$V_{IN} = 4.0\text{V}$ , $I_{OUT} = -25\text{mA}$	77	78	–	V
Input ON Current NTE2021	$I_{IN}$	$V_{IN} = 2.4\text{V}$	–	120	225	$\mu\text{A}$
		$V_{IN} = 5.0\text{V}$	–	375	650	$\mu\text{A}$
NTE2022		$V_{IN} = 4.0\text{V}$	–	130	250	$\mu\text{A}$
		$V_{IN} = 15.0\text{V}$	–	675	1150	$\mu\text{A}$
Supply Current NTE2021 & NTE2022	$I_{BB}$	All Inputs Open	–	10	100	$\mu\text{A}$
NTE2021		All Inputs = 2.4V	–	6.0	9.0	$\text{mA}$
NTE2022		All Inputs = 4.0V	–	6.0	9.0	$\text{mA}$

**Partial Schematic  
(One Driver)**



	$R_{IN}$	$R_B$
NTE2021	10k $\Omega$	30k $\Omega$
NTE2022	20k $\Omega$	20k $\Omega$

**Pin Connection Diagram**

