



**ELECTRONICS, INC.**  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089

## NTE999 Integrated Circuit Adjustable Precision Shunt Regulator

**Description:**

The NTE999 is a three-terminal adjustable shunt regulator with guaranteed thermal stability over a temperature range of  $-0^{\circ}$  to  $+70^{\circ}\text{C}$ . The output voltage may be set to any value between  $V_{\text{ref}}$  (approximately 2.5V) and 36V with two external resistors. This device has a typical dynamic output impedance of  $0.2\Omega$ . Active output circuitry provides a very sharp turn-on characteristic, making the NTE999 an excellent replacement for zener diodes in many applications.

**Features:**

- Equivalent Full-Range Temperature Coefficient: 30ppm/ $^{\circ}\text{C}$  Typ
- Adjustable Output Voltage
- Fast Turn-On Response
- Sink Current Capability: 1mA to 100mA
- Low Dynamic Output Impedance:  $0.2\Omega$  Typ
- Low Output Noise Voltage

**Absolute Maximum Ratings:** ( $T_A = 0^{\circ}$  to  $+70^{\circ}\text{C}$  unless otherwise specified)

Cathode Voltage (Note 1), $V_{KA}$ .....	37V
Continuous Cathode Current Range, $I_K$ .....	$-100\text{mA}$ to $150\text{mA}$
Reference Input Current Range, $I_{\text{ref}}$ .....	$-50\mu\text{A}$ to $10\text{mA}$
Continuous Power Dissipation, $P_D$	
Up to $+25^{\circ}\text{C}$ .....	775mW
Derate Above $+25^{\circ}\text{C}$ .....	$6.2\text{mW}/^{\circ}\text{C}$
Operating Ambient Temperature Range, $T_{\text{opr}}$ .....	$0^{\circ}$ to $+70^{\circ}\text{C}$
Storage Temperature Range, $T_{\text{stg}}$ .....	$-65^{\circ}$ to $+150^{\circ}\text{C}$
Lead Soldering Temperature ( $.0625$ (1.6mm) from case for 10s), $T_L$ .....	$260^{\circ}\text{C}$

**Recommended Operating Conditions:**

Cathode Voltage, $V_{KA}$	
Min .....	$V_{\text{ref}}$
Max .....	36V
Cathode Current (For Regulation), $I_K$	
Min .....	1mA
Max .....	100mA

Note 1. Voltage values are with respect to the anode terminal unless otherwise specified.

**Electrical Characteristics:** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Reference Input Voltage	$V_{\text{ref}}$	$V_{\text{KA}} = V_{\text{ref}}, I_{\text{K}} = 10\text{mA}$	2440	2495	2550	mV	
Deviation of Reference Input Voltage	$V_{\text{ref(dev)}}$	$V_{\text{KA}} = V_{\text{ref}}, I_{\text{K}} = 10\text{mA}, T_A = 0^\circ \text{ to } +70^\circ\text{C}$	-	8	17	mV	
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\frac{\Delta V_{\text{ref}}}{\Delta V_{\text{KA}}}$	$I_{\text{K}} = 10\text{mA}$	$\Delta V_{\text{KA}} = 10\text{V} - V_{\text{ref}}$	-	-1.4	-2.7	mV
			$\Delta V_{\text{KA}} = 36\text{V} - 10\text{V}$	-	-1.0	-2.0	V
Reference Input Current	$I_{\text{ref}}$	$I_{\text{K}} = 10\text{mA}, R_1 = 10\text{k}\Omega, R_2 = \infty$	-	2.0	4.0	$\mu\text{A}$	
Deviation of Reference Input Current	$I_{\text{ref(dev)}}$	$I_{\text{K}} = 10\text{mA}, R_1 = 10\text{k}\Omega, R_2 = \infty, T_A = 0^\circ \text{ to } +70^\circ\text{C}$	-	0.4	1.2	$\mu\text{A}$	
Minimum Cathode Current for Regulation	$I_{\text{min}}$	$V_{\text{KA}} = V_{\text{ref}}$	-	0.4	1.0	mA	
Off-State Cathode Current	$I_{\text{off}}$	$V_{\text{KA}} = 36\text{V}, V_{\text{ref}} = 0$	-	0.1	1.0	$\mu\text{A}$	
Dynamic Impedance	$ z_{\text{ak}} $	$V_{\text{KA}} = V_{\text{ref}}, I_{\text{K}} = 1\text{mA to } 100\text{mA}, f \leq 1\text{kHz}$	-	0.2	0.5	$\Omega$	

