

## NTE957 Integrated Circuit 3-Terminal Adjustable Negative Voltage Regulator

### **Description:**

The NTE957 is an adjustable 3-terminal negative voltage regulator in a TO220 type package capable of supplying in excess of  $-1.5A$  over a  $-1.2V$  to  $-37V$  output range. The circuit design has been optimized for excellent regulation and low thermal transients. Further, the NTE957 features internal current limiting, thermal shutdown, and safe-area compensation, making this device virtually blowout-proof against overloads.

The NTE957 serves a wide variety of applications including local on-card regulation, programmable-output voltage regulation or precision current regulation. The NTE957 is the ideal complement to the NTE956 adjustable positive regulator.

### **Features:**

- Output Voltage Adjustable from  $-1.2V$  to  $-37V$
- Guaranteed  $1.5A$  Output Current
- Line Regulation Typically  $0.01\%/V$
- Load Regulation Typically  $0.3\%$
- Excellent Thermal Regulation:  $0.002\%/W$
- $77dB$  Ripple Rejection
- Temperature-Independent Current Limit
- Internal Thermal Overload Protection
- 100% Electrical Burn-In
- Eliminates the Need to Stock Many Voltages

### **Absolute Maximum Ratings:**

Power Dissipation, $P_D$ .....	Internally Limited
Input-Output Voltage Differential, $V_I - V_O$ .....	$40V$
Operating Junction Temperature Range, $T_J$ .....	$0^\circ$ to $+125^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+150^\circ C$
Typical Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	$4^\circ C/W$
Lead Temperature (During Soldering, 10sec), $T_L$ .....	$+300^\circ C$

**Electrical Characteristics:** ( $0^{\circ} \leq T_J \leq +125^{\circ}\text{C}$ ,  $V_{\text{IN}} - V_{\text{OUT}} = 5\text{V}$ ,  $I_O = 500\text{mA}$ ,  $I_{\text{MAX}} = 1.5\text{A}$ , Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Line Regulation	$\text{Reg}_{\text{line}}$	$T_A = +25^{\circ}\text{C}$ , $3\text{V} \leq (V_{\text{IN}} - V_{\text{OUT}}) \leq 40\text{V}$ , Note 2	–	0.01	0.04	%/V
		$3\text{V} \leq (V_{\text{IN}} - V_{\text{OUT}}) \leq 40\text{V}$	–	0.02	0.07	%/V
Load Regulation	$\text{Reg}_{\text{load}}$	$T_A = +25^{\circ}\text{C}$ , $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ , Note 2	$V_{\text{OUT}} \leq 5\text{V}$	–	15	mV
			$V_{\text{OUT}} \geq 5\text{V}$	–	0.3	%
		$10\text{mA} \leq I_O \leq 1_{\text{MAX}}$ , Note 2	$V_{\text{OUT}} \leq 5\text{V}$	–	20	mV
			$V_{\text{OUT}} \geq 5\text{V}$	–	0.3	%
Thermal Regulation		$T_A = +25^{\circ}\text{C}$ , 20ms Pulse	–	0.003	0.04	%/W
Adjustment Pin Current	$I_{\text{Adj}}$		–	65	100	$\mu\text{A}$
Adjustment Pin Current Change	$\Delta I_{\text{Adj}}$	$10\text{mA} \leq I_L \leq I_{\text{MAX}}$ , $2.5\text{V} \leq (V_{\text{IN}} - V_{\text{OUT}}) \leq 40\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	2	5	$\mu\text{A}$
Reference Voltage	$V_{\text{ref}}$	$T_A = +25^{\circ}\text{C}$	–1.213	–1.250	–1.287	V
		$3\text{V} \leq (V_{\text{IN}} - V_{\text{OUT}}) \leq 40\text{V}$ , $10\text{mA} \leq I_O \leq 1_{\text{MAX}}$ , $P \leq P_{\text{MAX}}$	–1.200	–1.250	–1.300	V
Temperature Stability	$T_S$	$0^{\circ} \leq T_J \leq +125^{\circ}\text{C}$	–	0.6	–	%
Minimum Load Current	$I_{\text{Lmin}}$	$(V_{\text{IN}} - V_{\text{OUT}}) \leq 40\text{V}$	–	2.5	10	mA
		$(V_{\text{IN}} - V_{\text{OUT}}) \leq 10\text{V}$	–	1.5	6.0	mA
Maximum Output Current Limit	$I_{\text{max}}$	$V_{\text{IN}} - V_{\text{OUT}} \leq 15\text{V}$	1.5	2.2	–	A
		$V_{\text{IN}} - V_{\text{OUT}} = 40\text{V}$	–	0.4	–	A
RMS Output Noise, % of $V_{\text{OUT}}$	N	$T_A = +25^{\circ}\text{C}$ , $10\text{Hz} \leq f \leq 10\text{kHz}$	–	0.003	–	%
Ripple Rejection Ratio	RR	$V_{\text{OUT}} = 10\text{V}$ , $f = 120\text{Hz}$	–	60	–	dB
		$C_{\text{ADJ}} = 10\mu\text{F}$	66	77	–	dB
Long Term Stability	S	$T_A = +125^{\circ}\text{C}$ , 1000 Hours	–	0.3	1.0	%

Note 1. Although power dissipation is internally limited, these specifications are applicable for power dissipations of 20W.

Note 2. Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.

