

**NTE1960, NTE1962, NTE1964, NTE1966, NTE1968,  
 NTE1970, NTE1972, NTE1974, NTE1976  
 Integrated Circuit  
 Positive, 3-Terminal Voltage Regulator**

**Description:**

The NTE1960 through NTE1976 series of monolithic 3-terminal positive voltage regulators employ internal current limiting, thermal shut-down, and safe-area compensation in an isolated TO220 type package making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. These devices are intended for use as fixed voltage regulators in a wide range of applications including local (on card) regulation for elimination of distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, they can be used with external components to obtain adjustable output voltages and currents.

**Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Input Voltage, $V_{IN}$	NTE1960, NTE1962, NTE1964, NTE1966, NTE1968, NTE1970, NTE1972	35V
	NTE1974, NTE1976	40V
Power Dissipation ( $T_C \leq +70^\circ\text{C}$ ), $P_D$		16W
Operating Junction Temperature Range, $T_J$		$-30^\circ$ to $+150^\circ\text{C}$
Operating Ambient Temperature Range, $T_{opr}$		$-30^\circ$ to $+75^\circ\text{C}$
Storage Temperature Range, $T_{stg}$		$-40^\circ$ to $+125^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$		$60^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case, $R_{thJC}$		$5^\circ\text{C/W}$

**Electrical Characteristics:** ( $T_J = +25^\circ\text{C}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage NTE1960	$V_{OUT}$	$V_{IN} = 10\text{V}$ , $I_O = 0.5\text{A}$	4.8	5.0	5.25	V
NTE1962		$V_{IN} = 11\text{V}$ , $I_O = 0.5\text{A}$	5.75	6.0	6.25	V
NTE1964		$V_{IN} = 14\text{V}$ , $I_O = 0.5\text{A}$	7.7	8.0	8.3	V
NTE1966		$V_{IN} = 15\text{V}$ , $I_O = 0.5\text{A}$	8.65	9.0	9.35	V
NTE1968		$V_{IN} = 16\text{V}$ , $I_O = 0.5\text{A}$	9.6	10.0	10.4	V
NTE1970		$V_{IN} = 19\text{V}$ , $I_O = 0.5\text{A}$	11.5	12.0	12.5	V
NTE1972		$V_{IN} = 23\text{V}$ , $I_O = 0.5\text{A}$	14.4	15.0	15.6	V
NTE1974		$V_{IN} = 27\text{V}$ , $I_O = 0.5\text{A}$	17.3	18.0	18.7	V
NTE1976		$V_{IN} = 33\text{V}$ , $I_O = 0.5\text{A}$	23.0	24.0	25.0	V

Note 1. Measurement is to be conducted in pulse testing.

**Electrical Characteristics (Cont'd):** ( $T_J = +25^\circ\text{C}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Quiescent Current	$I_Q$	$V_{IN} = 10\text{V}, I_O = 0\text{mA}$	-	4.2	6.0	mA
NTE1960						
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1970						
NTE1972						
NTE1974						
NTE1976						
Load Regulation	$\Delta V_O - I_O$	$V_{IN} = 10\text{V}, I_O = 0.005 \text{ to } 1.5\text{A}$	-	15	50	mV
NTE1960						
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1970						
NTE1972						
NTE1974						
NTE1976						
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN} = 7\text{V to } 25\text{V}, I_O = 0.5\text{A}$	-	3	50	mV
NTE1960						
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1970						
NTE1972						
NTE1974						
NTE1976						
Ripple Rejection	RR	$V_{IN} = 10\text{V}, I_O = 0.5\text{A}, e_{in} = 2V_{P-P}, f = 120\text{Hz}$	68	78	-	dB
NTE1960						
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1970						
NTE1972						
NTE1974						
NTE1976						
Output Noise Voltage	$V_{NO}$	$V_{IN} = 10\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	-	45	-	$\mu\text{V}$
NTE1960						
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1960	$V_{IN} = 11\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	$V_{IN} = 11\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	-	45	-	$\mu\text{V}$
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1960	$V_{IN} = 14\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	$V_{IN} = 14\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	-	55	-	$\mu\text{V}$
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1960	$V_{IN} = 15\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	$V_{IN} = 15\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	-	60	-	$\mu\text{V}$
NTE1962						
NTE1964						
NTE1966						
NTE1968						
NTE1960	$V_{IN} = 16\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	$V_{IN} = 16\text{V}, \text{BW} = 10\text{Hz to } 100\text{kHz}, I_O = 0.5\text{A}$	-	65	-	$\mu\text{V}$
NTE1962						
NTE1964						
NTE1966						
NTE1968						

Note 1. Measurement is to be conducted in pulse testing.

**Electrical Characteristics (Cont'd):** ( $T_J = +25^\circ\text{C}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Noise Voltage NTE1970	$V_{NO}$	$V_{IN} = 19\text{V}$ , BW = 10Hz to 100kHz, $I_O = 0.5\text{A}$	-	75	-	$\mu\text{V}$
NTE1972		$V_{IN} = 23\text{V}$ , BW = 10Hz to 100kHz, $I_O = 0.5\text{A}$	-	90	-	$\mu\text{V}$
NTE1974		$V_{IN} = 27\text{V}$ , BW = 10Hz to 100kHz, $I_O = 0.5\text{A}$	-	100	-	$\mu\text{V}$
NTE1976		$V_{IN} = 33\text{V}$ , BW = 10Hz to 100kHz, $I_O = 0.5\text{A}$	-	120	-	$\mu\text{V}$
Average Temperature Coefficient of Output Voltage NTE1960	$\Delta V_O/\Delta T$	$V_{IN} = 10\text{V}$ , $I_O = 0.5\text{A}$	-	-0.5	-	$\text{mV}/^\circ\text{C}$
NTE1962		$V_{IN} = 11\text{V}$ , $I_O = 0.5\text{A}$	-	-0.6	-	$\text{mV}/^\circ\text{C}$
NTE1964		$V_{IN} = 14\text{V}$ , $I_O = 0.5\text{A}$	-	-0.8	-	$\text{mV}/^\circ\text{C}$
NTE1966		$V_{IN} = 15\text{V}$ , $I_O = 0.5\text{A}$	-	-0.9	-	$\text{mV}/^\circ\text{C}$
NTE1968		$V_{IN} = 16\text{V}$ , $I_O = 0.5\text{A}$	-	-1.0	-	$\text{mV}/^\circ\text{C}$
NTE1970		$V_{IN} = 19\text{V}$ , $I_O = 0.5\text{A}$	-	-1.2	-	$\text{mV}/^\circ\text{C}$
NTE1972		$V_{IN} = 23\text{V}$ , $I_O = 0.5\text{A}$	-	-1.5	-	$\text{mV}/^\circ\text{C}$
NTE1974		$V_{IN} = 27\text{V}$ , $I_O = 0.5\text{A}$	-	-1.8	-	$\text{mV}/^\circ\text{C}$
NTE1976		$V_{IN} = 33\text{V}$ , $I_O = 0.5\text{A}$	-	-2.4	-	$\text{mV}/^\circ\text{C}$

Note 1. Measurement is to be conducted in pulse testing.

