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## 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 a TO220 full pack 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.

**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	$V_{OUT}$					
NTE1960		$V_{IN} = 10\text{V}, I_O = 0.5\text{A}$	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 NTE1960	$I_Q$	$V_{IN} = 10\text{V}$ , $I_O = 0\text{mA}$	-	4.2	6.0	mA
NTE1962		$V_{IN} = 11\text{V}$ , $I_O = 0\text{mA}$	-	4.3	6.0	mA
NTE1964		$V_{IN} = 14\text{V}$ , $I_O = 0\text{mA}$	-	4.3	6.0	mA
NTE1966		$V_{IN} = 15\text{V}$ , $I_O = 0\text{mA}$	-	4.3	6.0	mA
NTE1968		$V_{IN} = 16\text{V}$ , $I_O = 0\text{mA}$	-	4.3	6.0	mA
NTE1970		$V_{IN} = 19\text{V}$ , $I_O = 0\text{mA}$	-	4.3	6.0	mA
NTE1972		$V_{IN} = 23\text{V}$ , $I_O = 0\text{mA}$	-	4.4	6.0	mA
NTE1974		$V_{IN} = 27\text{V}$ , $I_O = 0\text{mA}$	-	4.5	6.0	mA
NTE1976		$V_{IN} = 33\text{V}$ , $I_O = 0\text{mA}$	-	4.6	6.0	mA
Load Regulation NTE1960		$\Delta V_O - I_O$	$V_{IN} = 10\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$	-	15	50
NTE1962	$V_{IN} = 11\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	15	60	mV
NTE1964	$V_{IN} = 14\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	15	80	mV
NTE1966	$V_{IN} = 15\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	15	90	mV
NTE1968	$V_{IN} = 16\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	15	100	mV
NTE1970	$V_{IN} = 19\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	25	120	mV
NTE1972	$V_{IN} = 23\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	35	150	mV
NTE1974	$V_{IN} = 27\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	55	180	mV
NTE1976	$V_{IN} = 33\text{V}$ , $I_O = 0.005$ to $1.5\text{A}$		-	65	240	mV
Line Regulation NTE1960	$\Delta V_O - V_{IN}$		$V_{IN} = 7\text{V}$ to $25\text{V}$ , $I_O = 0.5\text{A}$	-	3	50
NTE1962		$V_{IN} = 8\text{V}$ to $25\text{V}$ , $I_O = 0.5\text{A}$	-	5	60	mV
NTE1964		$V_{IN} = 10.5\text{V}$ to $25\text{V}$ , $I_O = 0.5\text{A}$	-	6	80	mV
NTE1966		$V_{IN} = 11.5\text{V}$ to $25\text{V}$ , $I_O = 0.5\text{A}$	-	7	90	mV
NTE1968		$V_{IN} = 12.5\text{V}$ to $25\text{V}$ , $I_O = 0.5\text{A}$	-	8	100	mV
NTE1970		$V_{IN} = 14.5\text{V}$ to $30\text{V}$ , $I_O = 0.5\text{A}$	-	10	120	mV
NTE1972		$V_{IN} = 17.5\text{V}$ to $30\text{V}$ , $I_O = 0.5\text{A}$	-	11	150	mV
NTE1974		$V_{IN} = 21\text{V}$ to $33\text{V}$ , $I_O = 0.5\text{A}$	-	15	180	mV
NTE1976		$V_{IN} = 27\text{V}$ to $38\text{V}$ , $I_O = 0.5\text{A}$	-	18	240	mV
Ripple Rejection NTE1960		RR	$V_{IN} = 10\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$	68	78	-
NTE1962	$V_{IN} = 11\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		65	75	-	dB
NTE1964	$V_{IN} = 14\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		62	72	-	dB
NTE1966	$V_{IN} = 15\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		62	72	-	dB
NTE1968	$V_{IN} = 16\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		62	72	-	dB
NTE1970	$V_{IN} = 19\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		62	71	-	dB
NTE1972	$V_{IN} = 23\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		60	70	-	dB
NTE1974	$V_{IN} = 27\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		59	69	-	dB
NTE1976	$V_{IN} = 33\text{V}$ , $I_O = 0.5\text{A}$ , $e_{in} = 2V_{P-P}$ $f = 120\text{Hz}$		56	66	-	dB
Output Noise Voltage NTE1960	$V_{NO}$		$V_{IN} = 10\text{V}$ , $\text{BW} = 10\text{Hz}$ to $100\text{kHz}$ , $I_O = 0.5\text{A}$	-	45	-
NTE1962		$V_{IN} = 11\text{V}$ , $\text{BW} = 10\text{Hz}$ to $100\text{kHz}$ , $I_O = 0.5\text{A}$	-	45	-	$\mu\text{V}$
NTE1964		$V_{IN} = 14\text{V}$ , $\text{BW} = 10\text{Hz}$ to $100\text{kHz}$ , $I_O = 0.5\text{A}$	-	55	-	$\mu\text{V}$
NTE1966		$V_{IN} = 15\text{V}$ , $\text{BW} = 10\text{Hz}$ to $100\text{kHz}$ , $I_O = 0.5\text{A}$	-	60	-	$\mu\text{V}$
NTE1968		$V_{IN} = 16\text{V}$ , $\text{BW} = 10\text{Hz}$ to $100\text{kHz}$ , $I_O = 0.5\text{A}$	-	65	-	$\mu\text{V}$

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
Output Noise Voltage NTE1970	$V_{NO}$	$V_{IN} = 19\text{V}$ , $\text{BW} = 10\text{Hz to } 100\text{kHz}$ , $I_O = 0.5\text{A}$	-	75	-	$\mu\text{V}$
NTE1972		$V_{IN} = 23\text{V}$ , $\text{BW} = 10\text{Hz to } 100\text{kHz}$ , $I_O = 0.5\text{A}$	-	90	-	$\mu\text{V}$
NTE1974		$V_{IN} = 27\text{V}$ , $\text{BW} = 10\text{Hz to } 100\text{kHz}$ , $I_O = 0.5\text{A}$	-	100	-	$\mu\text{V}$
NTE1976		$V_{IN} = 33\text{V}$ , $\text{BW} = 10\text{Hz to } 100\text{kHz}$ , $I_O = 0.5\text{A}$	-	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.

