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## NTE6402 Programmable Unijunction Transistor (PUT)

**Description:**

The NTE6402 is a 3-terminal silicon planer passivated PNP device available in the standard plastic low cost TO98 and TO92 type packages. The terminals are designated as anode, anode gate, and cathode.

This device has been characterized as a Programmable Unijunction Transistor (PUT), designed to enable the engineer to “program” unijunction characteristics such as  $R_{BB}$ ,  $\eta$ ,  $I_V$ , and  $I_P$  by merely selecting two resistor values. Applications include thyristor-trigger, oscillator, pulse and timing circuits. These devices may also be used in special thyristor applications due to the availability of an anode gate.

**Features:**

- Programmable –  $R_{BB}$ ,  $\eta$ ,  $I_V$ , and  $I_P$
- Low On-State Voltage – 1.5V Max @  $I_F = 50mA$
- Low Gate to Anode Leakage Current – 10nA Max
- High Peak Output Voltage – 11V Typ
- Low Offset Voltage – 0.35V Typ ( $R_G = 10k\Omega$ )

**Absolute Maximum Ratings:** ( $T_J = +25^\circ C$  unless otherwise specified)

Power Dissipation, $P_F$ .....	300mW
Derate Above $+25^\circ C$ .....	4mW/ $^\circ C$
DC Forward Anode Current, $I_T$ .....	150mA
Derate Above $+25^\circ C$ .....	2.67mA/ $^\circ C$
DC Gate Current, $I_G$ .....	$\pm 50V$
Repetitive Peak Forward Current, $I_{TRM}$	
Pulse Width = 100 $\mu s$ , Duty Cycle = 1% .....	1A
Pulse Width = 20 $\mu s$ , Duty Cycle = 1% .....	2A
Non-Repetitive Peak Forward Current (Pulse Width = 10 $\mu s$ ), $I_{TSM}$ .....	5A
Gate-to-Cathode Forward Voltage, $V_{GKF}$ .....	+40V
Gate-to-Cathode Reverse Voltage, $V_{GKR}$ .....	-5V
Gate-to-Anode Reverse Voltage, $V_{GAR}$ .....	+40V
Anode-to-Cathode Voltage (Note 1), $V_{AK}$ .....	$\pm 40V$
Operating Junction Temperature Range, $T_J$ .....	$-50^\circ$ to $+100^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ C$
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	75 $^\circ C/W$
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ .....	200 $^\circ C/W$
Lead Temperature (During Soldering, 1/16" from case, 10sec max.), $T_L$ .....	+260 $^\circ C$

Note 1. Anode positive,  $R_{GA} = 100\Omega$   
 Anode negative,  $R_{GA} = \text{Open}$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Peak Current	$I_P$	$V_S = 10\text{V}, R_G = 1\text{M}\Omega$	-	1.25	2.0	$\mu\text{A}$
		$V_S = 10\text{V}, R_G = 10\text{k}\Omega$	-	4.0	5.0	$\mu\text{A}$
Offset Voltage	$V_T$	$V_S = 10\text{V}, R_G = 1\text{M}\Omega$	0.2	0.7	1.6	V
		$V_S = 10\text{V}, R_G = 10\text{k}\Omega$	0.2	0.35	0.6	V
Valley Current	$I_V$	$V_S = 10\text{V}, R_G = 1\text{M}\Omega$	-	18	50	$\mu\text{A}$
		$V_S = 10\text{V}, R_G = 10\text{k}\Omega$	70	150	-	$\mu\text{A}$
		$V_S = 10\text{V}, R_G = 200\Omega$	1.5	-	-	mA
Gate-to-Anode Leakage Current	$I_{GAO}$	$V_S = 40\text{V}, T_A = +25^\circ\text{C}, \text{Cathode Open}$	-	1.0	10	nA
		$V_S = 40\text{V}, T_A = +75^\circ\text{C}, \text{Cathode Open}$	-	3.0	-	nA
Gate-to-Cathode Leakage Current	$I_{GKS}$	$V_S = 40\text{V}, \text{Anode-Cathode Short}$	-	5.0	50	nA
Forward Voltage	$V_F$	$I_F = 50\text{mA Peak}, \text{Note 2}$	-	0.8	1.5	V
Peak Output Voltage	$V_O$	$V_G = 20\text{V}, C_C = 0.2\mu\text{F}$	6.0	11.0	-	V
Pulse Voltage Rate of Rise	$t_r$	$V_B = 20\text{V}, C_C = 0.2\mu\text{F}$	-	40	80	ns

Note 2. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

