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# 2N6028
# Programmable Unijunction Transistor

**Description:**

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. This device may also be used in special thyristor applications due to availability of an anode gate. Supplied in an inexpensive TO–92 type plastic package for high–volume requirements, this package is readily adaptable for use in automatic insertion equipment.

**Features:**

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

**Absolute Maximum Ratings:** ($T_J$ = +25°C, Note 1 unless otherwise specified)

| | |
|---|---|
| Power Dissipation, $P_F$ | 300mW |
| Derate above +25°C | 4.0mW/°C |
| DC Forward Anode Current, $I_T$ | 150mA |
| Derate above +25°C | 2.67mA/°C |
| DC Gate Current, $I_G$ | ±50mA |
| Repetitive Peak Forward Current (1% Duty Cycle), $I_{TRM}$ | |
| 100μs Pulse Width | 1A |
| 20μs Pulse Width | 2A |
| Non–Repetitive Peak Forward Current (10ms Pulse Width), $I_{TSM}$ | 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 2), $V_{AK}$ | ±40V |
| capacitive Discharge Energy (Note 3), E | 250μJ |
| Power Dissipation (Note 4), $P_D$ | 300mW |
| Operating Temperature Range, $T_{opr}$ | –50° to +100°C |
| Junction Temperature Range, $T_J$ | –50° to +125°C |
| Storage Temperature Range, $T_{stg}$ | –55° to +150°C |
| Thermal Resistance, Junction–to–Case, $R_{thJC}$ | 75°C/W |
| Thermal Resistance, Junction–to–Ambient, $R_{thJA}$ | 200°C/W |
| Lead Temperature (During Soldering, < 1/16” from case, 10sec max), $T_L$ | +260°C |

Note 1. Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Note 2. Anode Positive, $R_{GA}$ = 1000W; Anode Negative, $R_{GA}$ = Open

Note 3. $E = 0.5 \bullet CV^2$capacitor discharge energy limiting resistor and repetition.

Note 4. Derate current an power above +25°C.

**Electrical Characteristics:** ($T_C$ = +25°C unless otherwise specified)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Peak Current | $I_P$ | $V_S$ = 10V | $R_G$ = 1MΩ | – | 0.08 | 0.15 | μA |
| | | | $R_G$ = 10kΩ | – | 0.70 | 1.0 | μA |
| Offset Voltage | $V_T$ | $V_S$ = 10V | $R_G$ = 1MΩ | 0.2 | 0.50 | 0.6 | V |
| | | | $R_G$ = 10kΩ | 0.2 | 0.35 | 0.6 | V |
| Valley Current | $I_V$ | $V_S$ = 10V | $R_G$ = 1MΩ | – | 18 | 25 | μA |
| | | | $R_G$ = 10kΩ | 25 | 10 | – | μA |
| | | | $R_G$ = 200Ω | 1.0 | – | – | mA |
| Gate–to–Anode Leakage Current | $I_{GAO}$ | $V_S$ = 40V, Cathode Open | $T_A$ = +25°C | – | 1.0 | 10 | nA |
| | | | $T_A$ = +75°C | – | 3.0 | – | nA |
| Gate–to–Cathode Leakage Current | $I_{GKS}$ | $V_S$ = 40V, Anode–to–Cathode Shorted | | – | 5.0 | 50 | nA |
| Forward Voltage | $V_F$ | $I_F$ = 50mA Peak, Note 5 | | – | 0.8 | 1.5 | V |
| Peak Output Voltage | $V_o$ | $V_G$ = 20V, $C_C$ = 0.2μF | | 6.0 | 11 | – | V |
| Pulse Voltage Rise Time | $t_r$ | $V_G$ = 20V, $C_C$ = 0.2μF | | – | 40 | 80 | ns |

Note 5. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.