2N6027
2N6028

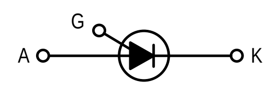
Programmable Unijunction Transistors

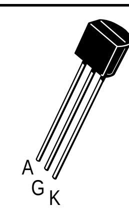
Silicon Programmable Unijunction Transistors

PUTs
40 VOLTS
300 mW

. . . designed to enable the engineer to “program” unijunction characteristics such as R_{BB}, η, I_V, and I_P by merely selecting two resistor values. Application includes 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. Supplied in an inexpensive TO-92 plastic package for high-volume requirements, this package is readily adaptable for use in automatic insertion equipment.

- Programmable — R_{BB}, η, I_V and I_P.
- Low On-State Voltage — 1.5 Volts Maximum @ I_F = 50 mA
- Low Gate to Anode Leakage Current — 10 nA Maximum
- High Peak Output Voltage — 11 Volts Typical
- Low Offset Voltage — 0.35 Volt Typical (R_G = 10 k ohms)





CASE 29-04
(TO-226AA)
STYLE 16

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted.)

Rating	Symbol	Value	Unit
*Power Dissipation Derate Above 25°C	P_F $1/\theta_{JA}$	300 4	mW mW/°C
*DC Forward Anode Current Derate Above 25°C	I_T	150 2.67	mA mA/°C
*DC Gate Current	I_G	±50	mA
Repetitive Peak Forward Current 100 µs Pulse Width, 1% Duty Cycle *20 µs Pulse Width, 1% Duty Cycle	I_{TRM}	 1 2	Amps
Non-repetitive Peak Forward Current 10 µs Pulse Width	I_{TSM}	5	Amps
*Gate to Cathode Forward Voltage	V_{GKF}	40	Volts
*Gate to Cathode Reverse Voltage	V_{GKR}	–5	Volts
*Gate to Anode Reverse Voltage	V_{GAR}	40	Volts
*Anode to Cathode Voltage(1)	V_{AK}	±40	Volts
Operating Junction Temperature Range	T_J	–50 to +100	°C
*Storage Temperature Range	T_{stg}	–55 to +150	°C

*Indicates JEDEC Registered Data

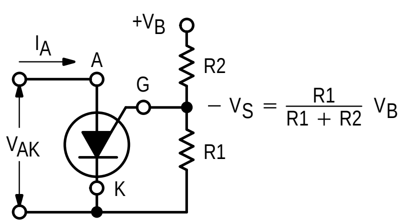
1. Anode positive, R_{GA} = 1000 ohms
   Anode negative, R_{GA} = open

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

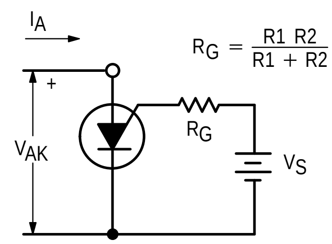
Characteristic		Fig. No.	Symbol	Min	Typ	Max	Unit
*Peak Current		2,9,11	I_P				µA
(V_S = 10 Vdc, R_G = 1 MΩ)	2N6027			—	1.25	2	
	2N6028			—	0.08	0.15	
(V_S = 10 Vdc, R_G = 10 k ohms)	2N6027			—	4	5	
	2N6028			—	0.70	1	
*Offset Voltage		1	V_T				Volts
(V_S = 10 Vdc, R_G = 1 MΩ)	2N6027			0.2	0.70	1.6	
	2N6028			0.2	0.50	0.6	
(V_S = 10 Vdc, R_G = 10 k ohms)	(Both Types)			0.2	0.35	0.6	
*Valley Current		1,4,5	I_V				µA
(V_S = 10 Vdc, R_G = 1 MΩ)	2N6027			—	18	50	
	2N6028			—	18	25	
(V_S = 10 Vdc, R_G = 10 k ohms)	2N6027			70	150	—	
	2N6028			25	150	—	
(V_S = 10 Vdc, R_G = 200 ohms)	2N6027			1.5	—	—	mA
	2N6028			1	—	—	
*Gate to Anode Leakage Current		—	I_{GAO}				nAdc
(V_S = 40 Vdc, T_A = 25°C, Cathode Open)				—	1	10	
(V_S = 40 Vdc, T_A = 75°C, Cathode Open)				—	3	—	
Gate to Cathode Leakage Current (V_S = 40 Vdc, Anode to Cathode Shorted)		—	I_{GKS}	—	5	50	nAdc
*Forward Voltage (I_F = 50 mA Peak)		1,6	V_F	—	0.8	1.5	Volts
*Peak Output Voltage (V_G = 20 Vdc, C_C = 0.2 µF)		3,7	V_o	6	11	—	Volt
Pulse Voltage Rise Time (V_B = 20 Vdc, C_C = 0.2 µF)		3	t_r	—	40	80	ns

*Indicates JEDEC Registered Data.

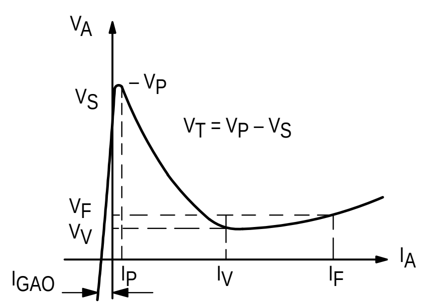
FIGURE 1 – ELECTRICAL CHARACTERIZATION



1A – Programmable Unijunction with "Program" Resistors R1 and R2



1B – Equivalent Test Circuit for Figure 1A used for electrical characteristics testing (also see Figure 2)



IC – Electrical Characteristics

FIGURE 2 – PEAK CURRENT (I_P) TEST CIRCUIT

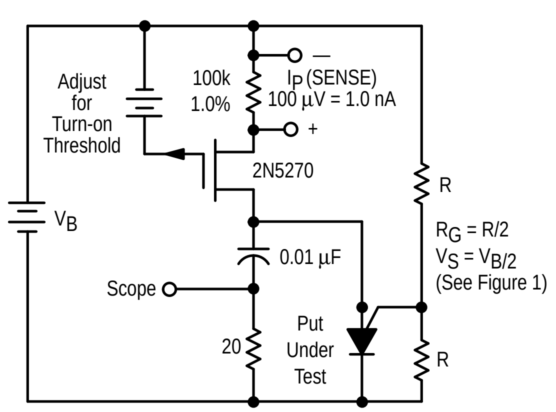
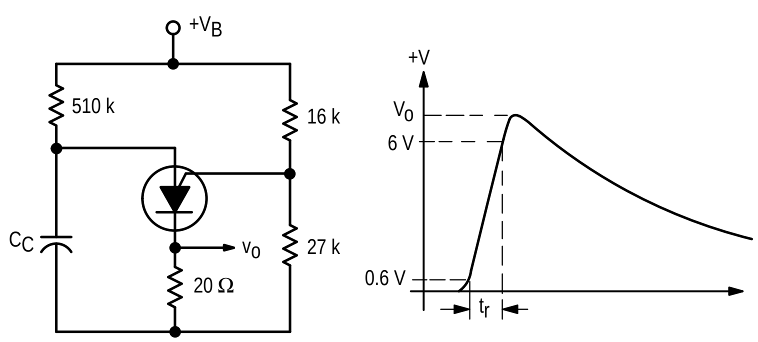


FIGURE 3 – V_O AND t_r TEST CIRCUIT



TYPICAL VALLEY CURRENT BEHAVIOR

FIGURE 4 – EFFECT OF SUPPLY VOLTAGE

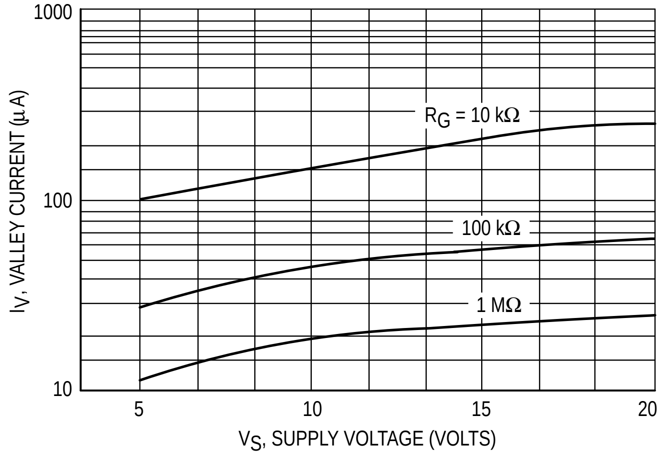


FIGURE 5 – EFFECT OF TEMPERATURE

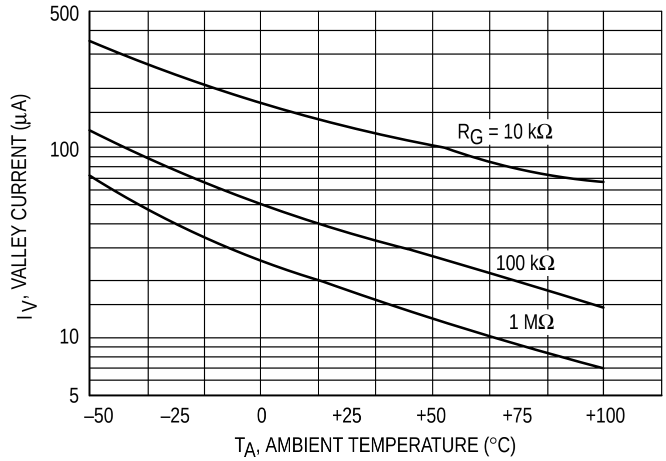


FIGURE 6 – FORWARD VOLTAGE

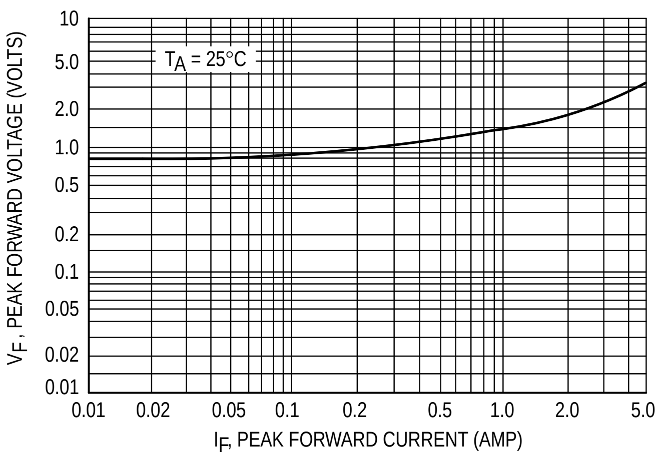


FIGURE 7 – PEAK OUTPUT VOLTAGE

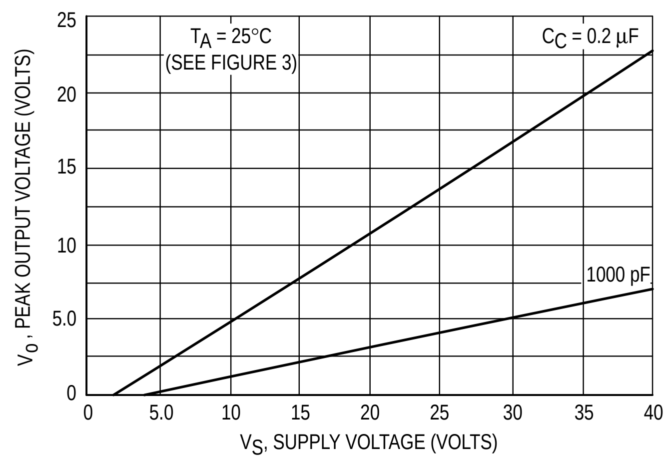
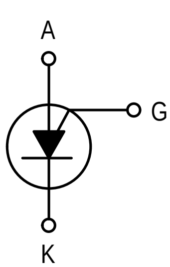
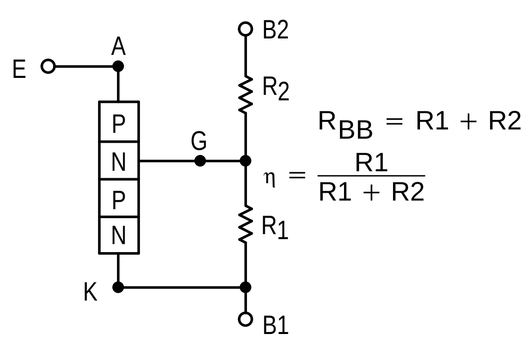


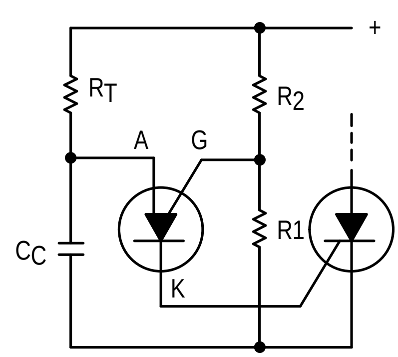
FIGURE 8
PROGRAMMABLE UNIJUNCTION



Circuit Symbol



Equivalent Circuit
with External "Program"
Resistors R1 and R2



Typical Application

TYPICAL PEAK CURRENT BEHAVIOR

2N6027

FIGURE 9 – EFFECT OF SUPPLY VOLTAGE AND R_G

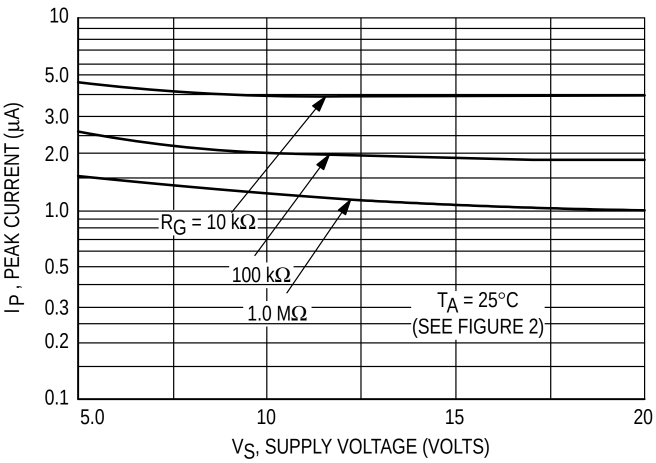
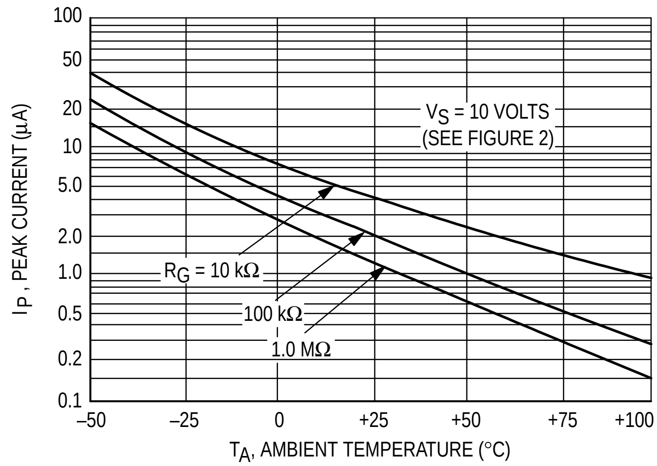


FIGURE 10 – EFFECT OF TEMPERATURE AND R_G



2N6028

FIGURE 11 – EFFECT OF SUPPLY VOLTAGE AND R_G

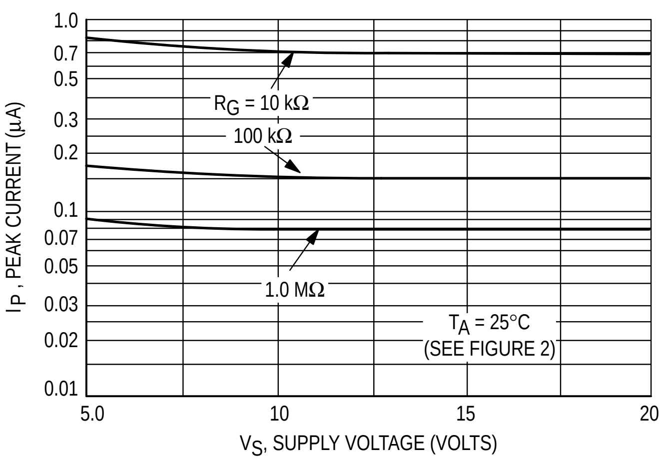
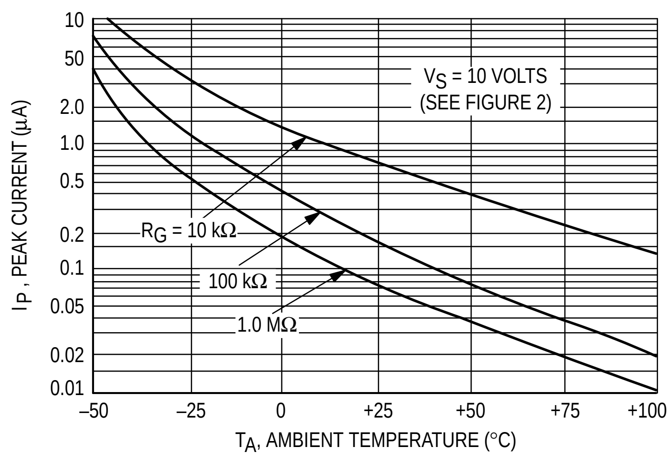
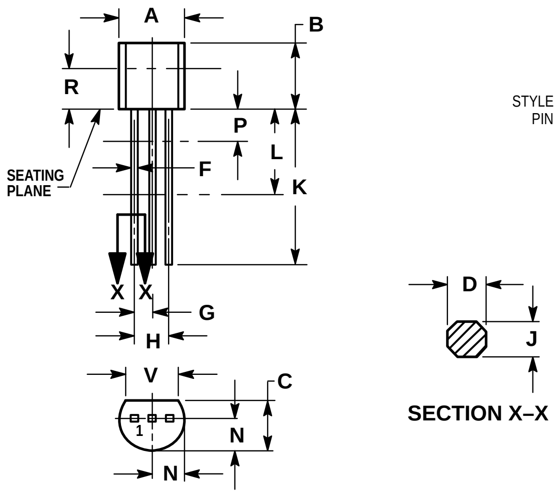


FIGURE 12 – EFFECT OF TEMPERATURE AND R_G



PACKAGE DIMENSIONS



STYLE 16:
PIN 1. ANODE
2. GATE
3. CATHODE
3. SOURCE

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—–	12.70	—–
L	0.250	—–	6.35	—–
N	0.080	0.105	2.04	2.66
P	—–	0.100	—–	2.54
R	0.115	—–	2.93	—–
V	0.135	—–	3.43	—–

CASE 029–04
(TO–226AA)

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