

Programmable Unijunction Transistors

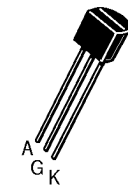
Silicon Programmable Unijunction Transistors

... 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)

2N6027
2N6028

PUTs
40 VOLTS
300 mW



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

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ 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, $R_{GA} = \text{open}$

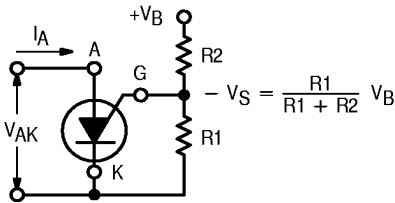
2N6027 2N6028

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

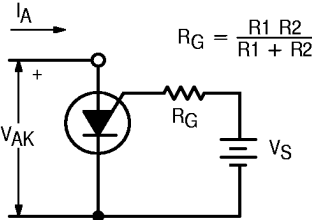
Characteristic		Fig. No.	Symbol	Min	Typ	Max	Unit	
*Peak Current (V _S = 10 Vdc, R _G = 1 MΩ)	2N6027	2,9,11	I _P	—	1.25	2	μA	
	2N6028			—	0.08	0.15		
	(V _S = 10 Vdc, R _G = 10 k ohms)			2N6027	—	4		5
	2N6028			—	0.70	1		
*Offset Voltage (V _S = 10 Vdc, R _G = 1 MΩ)	2N6027	1	V _T	0.2	0.70	1.6	Volts	
	2N6028			0.2	0.50	0.6		
	(Both Types)			0.2	0.35	0.6		
*Valley Current (V _S = 10 Vdc, R _G = 1 MΩ)	2N6027	1,4,5	I _V	—	18	50	μA	
	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 (V _S = 40 Vdc, T _A = 25°C, Cathode Open)		—	I _G AO	—	1	10	nAdc	
	(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 _G KS	—	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.

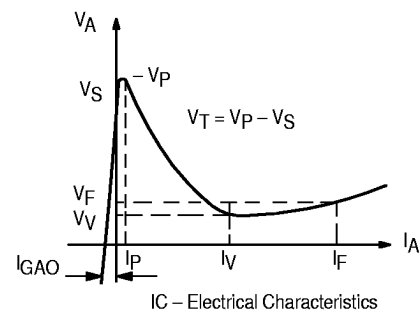
FIGURE 1 – ELECTRICAL CHARACTERIZATION



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)



1C – Electrical Characteristics

FIGURE 2 – PEAK CURRENT (I_P) TEST CIRCUIT

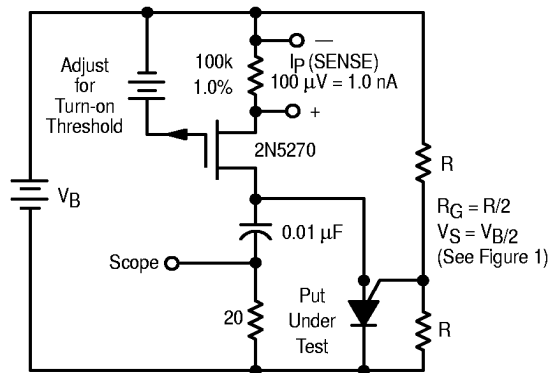
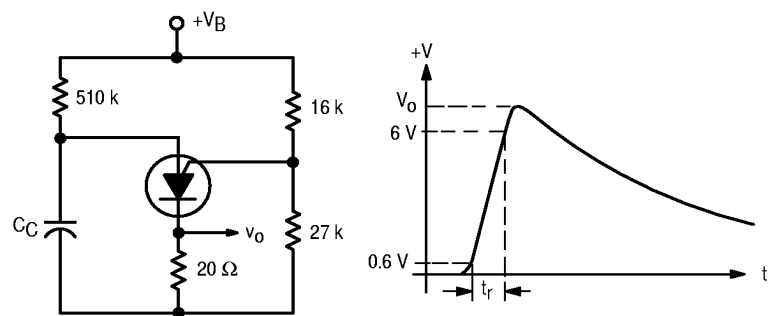


FIGURE 3 – V_O AND t_r TEST CIRCUIT



TYPICAL VALLEY CURRENT BEHAVIOR

FIGURE 4 – EFFECT OF SUPPLY VOLTAGE

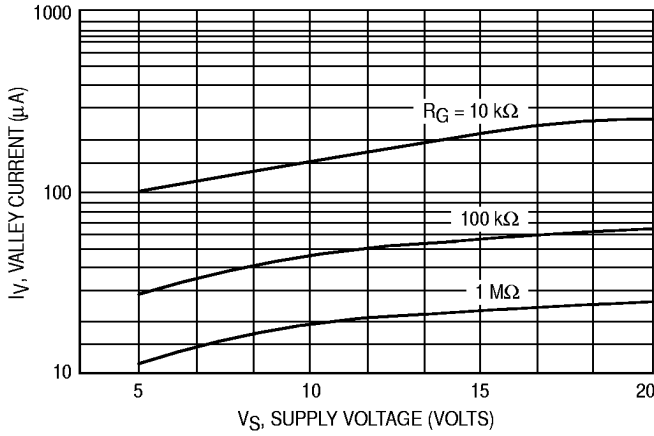


FIGURE 5 – EFFECT OF TEMPERATURE

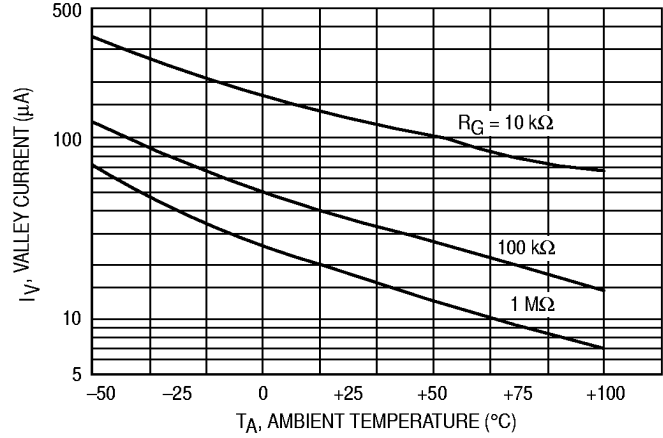


FIGURE 6 – FORWARD VOLTAGE

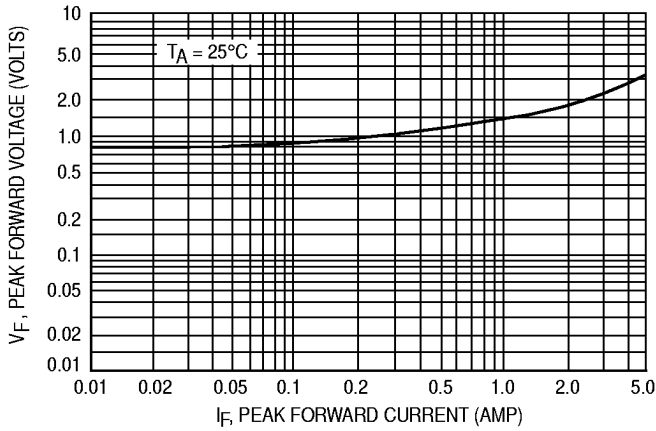


FIGURE 7 – PEAK OUTPUT VOLTAGE

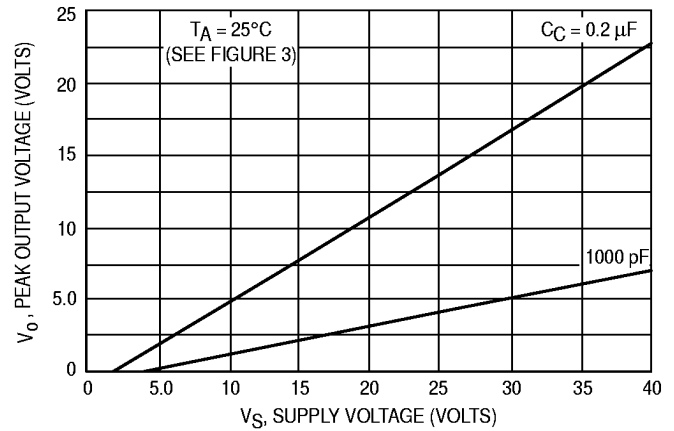
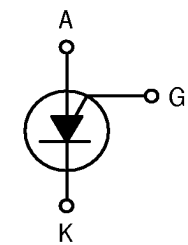
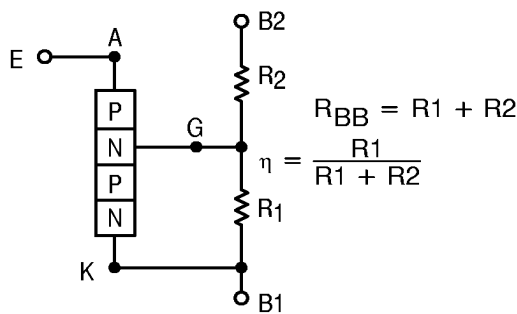


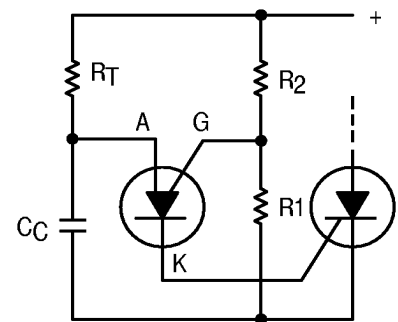
FIGURE 8 PROGRAMMABLE UNIJUNCTION



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

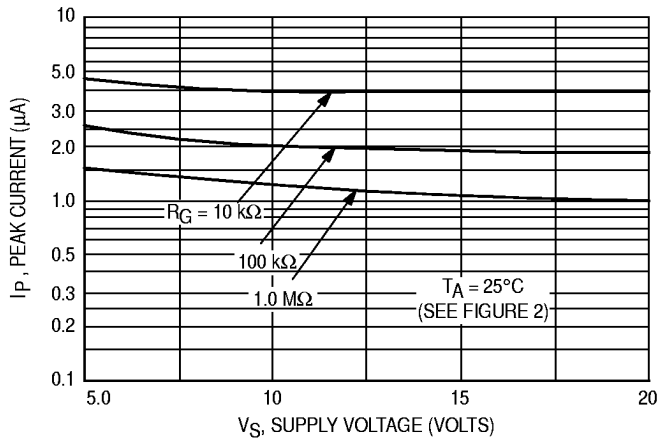
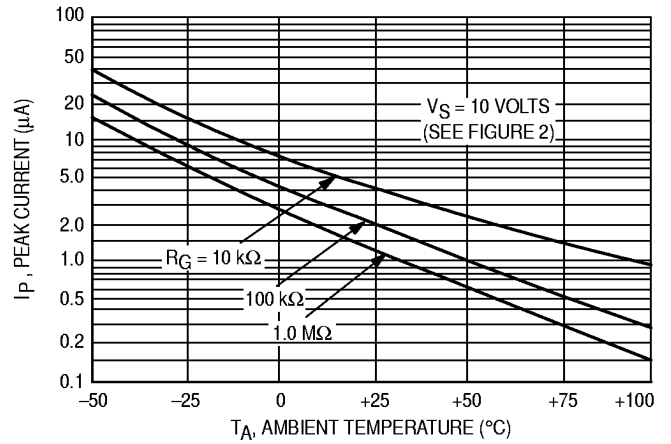


FIGURE 10 – EFFECT OF TEMPERATURE AND R_G



2N6028

FIGURE 11 – EFFECT OF SUPPLY VOLTAGE AND R_G

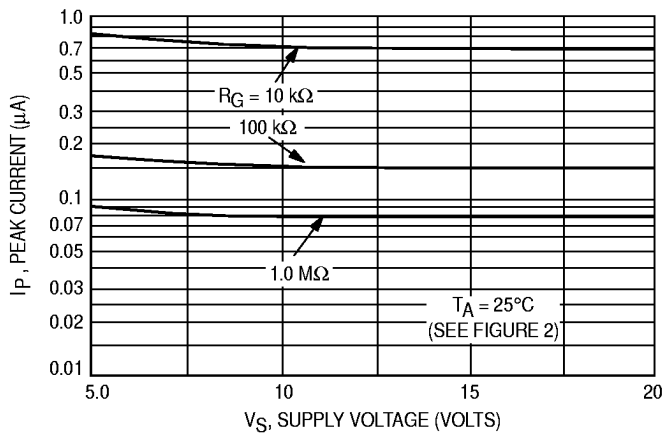
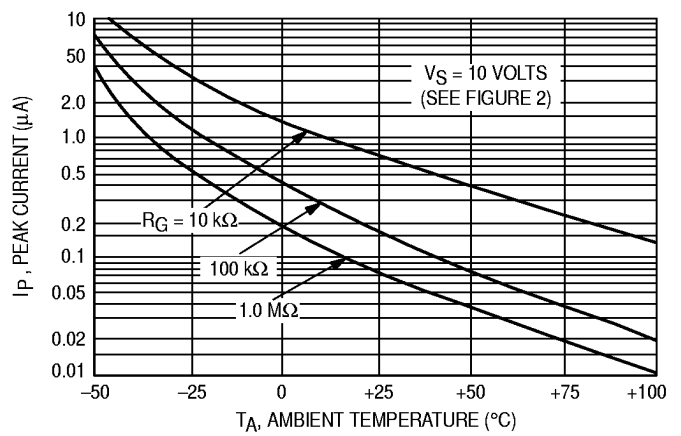
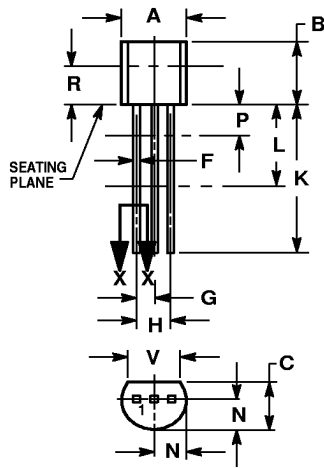


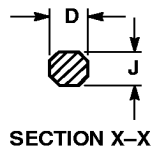
FIGURE 12 – EFFECT OF TEMPERATURE AND R_G



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.

DIM	INCHES		MILLIMETERS	
	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)