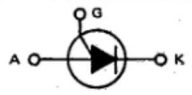
Silicon Programmable Unijunction Transistors

2N6116
2N6117
2N6118

PUTs
40 VOLTS — 250 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.

- Programmable — R_{BB}, η, I_V and I_P
- Hermetic TO-18 Package
- Low On-State Voltage — 1.5 Volts Maximum @ I_F = 50 mA
- Low Gate to Anode Leakage Current — 5 nA Maximum
- High Peak Output Voltage — 16 Volts Typical
- Low Offset Voltage — 0.35 Volt Typical (R_G = 10 k ohms)



CASE 22-03
(TO-18)
STYLE 6

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***MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
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
DC Forward Anode Current Derate Above 25°C	I_T	200 2	mA mA/°C
DC Gate Current	I_G	±20	mA
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	V_{AK}	±40	Volts
Forward Power Dissipation @ T_A = 25°C Derate Above 25°C	P_F $1/\theta_{JA}$	250 2.5	mW mW/°C
Operating Junction Temperature Range	T_J	−55 to +125	°C
Storage Temperature Range	T_{stg}	−65 to +200	°C

*Indicates JEDEC Registered Data.

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

Characteristic		Fig. No.	Symbol	Min	Typ	Max	Unit
Offset Voltage (V_S = 10 Vdc, R_G = 1 MΩ)	2N6116	1	V_T	0.2	0.70	1.6	Volts
	2N6117			0.2	0.50	0.6	
	2N6118			0.2	0.40	0.6	
(V_S = 10 Vdc, R_G = 10 k ohms)	All Types			0.2	0.35	0.6	
Gate to Anode Leakage Current		—	I_{GAO}				nAdc
(V_S = 40 Vdc, T_A = 25°C, Cathode Open)				—	1	5	
(V_S = 40 Vdc, T_A = 75°C, Cathode Open)				—	30	75	
Gate to Cathode Leakage Current (V_S = 40 Vdc, Anode to Cathode Shorted)		—	I_{GKS}	—	5	50	nAdc
Peak Current (V_S = 10 Vdc, R_G = 1 MΩ)	2N6116	2,9,14	I_P	—	1.25	2	μA
	2N6117			—	0.19	0.3	
	2N6118			—	0.08	0.15	
(V_S = 10 Vdc, R_G = 10 k ohms)	2N6116			—	4	5	
	2N6117			—	1.20	2	
	2N6118			—	0.70	1	
Valley Current (V_S = 10 Vdc, R_G = 1 MΩ)	2N6116, 2N6117	1,4,5	I_V	—	18	50	μA
	2N6118			—	18	25	
(V_S = 10 Vdc, R_G = 10 k ohms)	2N6116			70	270	—	
	2N6117, 2N6118			50	270	—	
Forward Voltage (I_F = 50 mA Peak)		1,6	V_F	—	0.8	1.5	Volts
Peak Output Voltage (V_B = 20 Vdc, C_C = 0.2 μF)		3,7	V_O	6	16	—	Volts
Pulse Voltage Rise Time (V_B = 20 Vdc, C_C = 0.2 μF)		3	t_r	—	40	80	ns

*Indicates JEDEC Registered Data.

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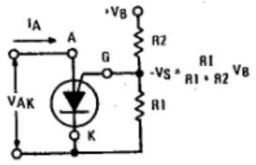
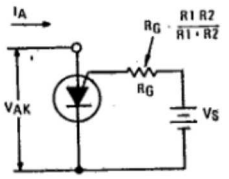
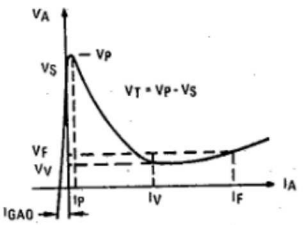
FIGURE 1 – ELECTRICAL CHARACTERIZATION



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

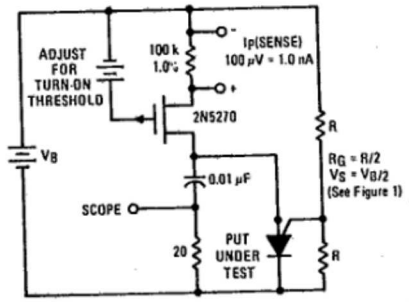
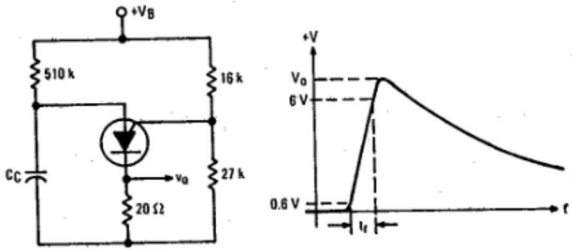


FIGURE 3 – V_O AND t_r TEST CIRCUIT



TYPICAL VALLEY CURRENT BEHAVIOR

FIGURE 4 – EFFECT OF SUPPLY VOLTAGE

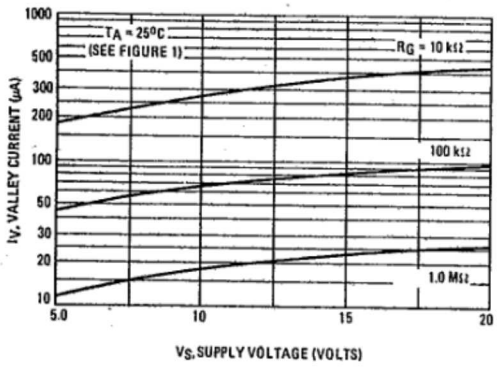


FIGURE 5 – EFFECT OF TEMPERATURE

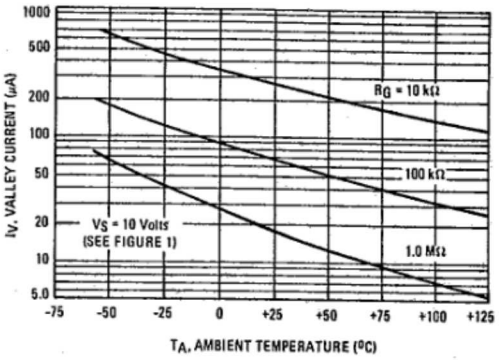


FIGURE 6 – FORWARD VOLTAGE

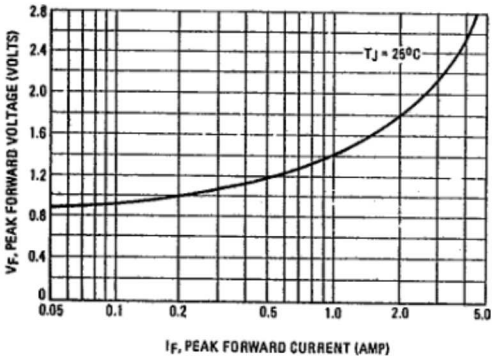


FIGURE 7 – PEAK OUTPUT VOLTAGE

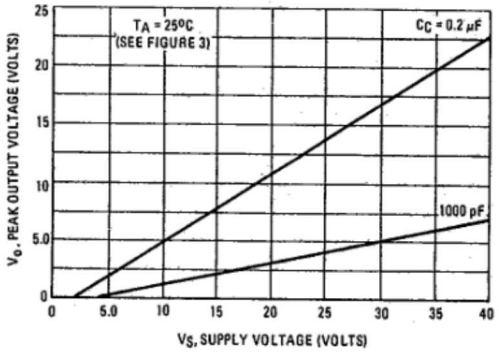
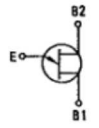
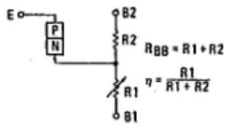


FIGURE 8 – STANDARD UNIJUNCTION
COMPARED TO PROGRAMMABLE UNIJUNCTION

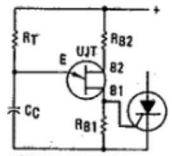
STANDARD UNIJUNCTION



CIRCUIT SYMBOL

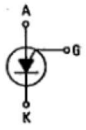


EQUIVALENT CIRCUIT

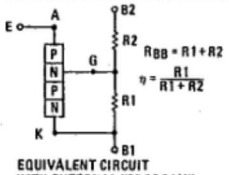


TYPICAL APPLICATION

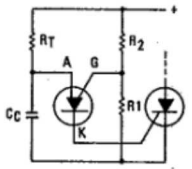
PROGRAMMABLE UNIJUNCTION



CIRCUIT SYMBOL



EQUIVALENT CIRCUIT
WITH EXTERNAL "PROGRAM"
RESISTORS R1 and R2



TYPICAL APPLICATION

TYPICAL PEAK CURRENT BEHAVIOR

2N6116

FIGURE 9 – EFFECT OF SUPPLY VOLTAGE AND R_G

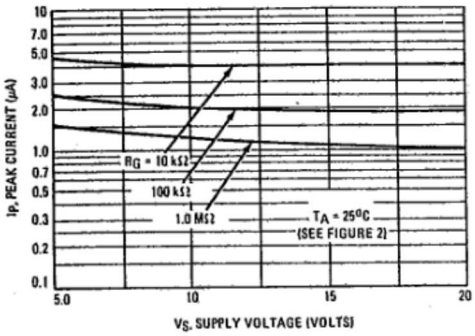


FIGURE 10 – EFFECT OF TEMPERATURE AND R_G

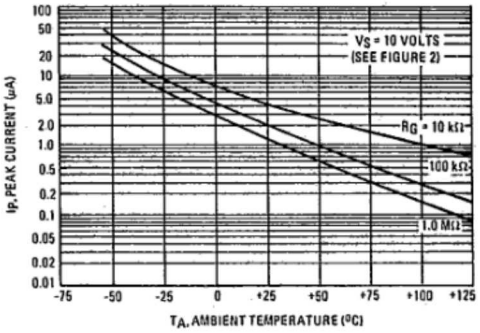


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FIGURE 11 – EFFECT OF SUPPLY VOLTAGE AND R_G

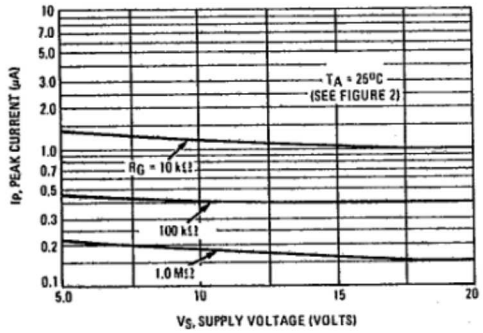

FIGURE 12 – EFFECT OF TEMPERATURE AND R_G

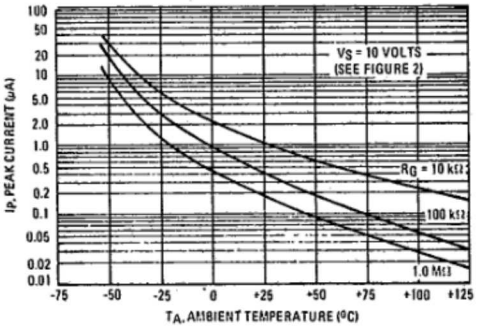

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FIGURE 13 – EFFECT OF SUPPLY VOLTAGE AND R_G

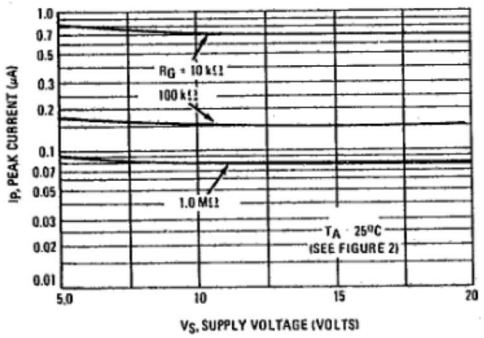
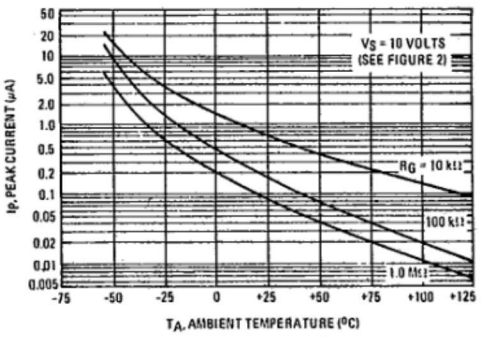


FIGURE 14 – EFFECT OF TEMPERATURE AND R_G



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