TYPES 2N4851, 2N4852, 2N4853
P-N UNIJUNCTION SILICON TRANSISTORS

BULLETIN NO. DL-S 7311967, MARCH 1973

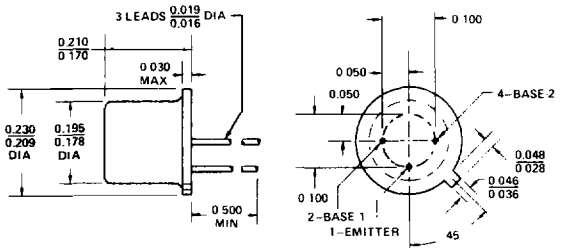
PLANAR UNIJUNCTION TRANSISTORS SPECIFICALLY CHARACTERIZED FOR A WIDE RANGE OF MILITARY, SPACE, AND INDUSTRIAL APPLICATIONS

- **Planar Process Ensures Low Leakage, High-Performance With Low Driving Currents, and Greatly Improved Reliability**

*mechanical data

Package outline is same as JEDEC TO-18 except for lead position. All TO-18 registration notes also apply to this outline.

BASE-2 IS IN ELECTRICAL CONTACT WITH THE CASE



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*absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)

Emitter–Base-Two Reverse Voltage	−30 V
Interbase Voltage (See Note 1)	35 V
Continuous Emitter Current	50 mA
Peak Emitter Current (See Note 2)	1.5 A
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 3)	300 mW
Storage Temperature Range	−65°C to 200°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C

*electrical characteristics at 25°C free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		2N4851		2N4852		2N4853		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
r_{BB}	Static Interbase Resistance	V_{B2B1} = 3 V,	I_E 0	4.7	9.1	4.7	9.1	4.7	9.1	kΩ
α_{rBB}	Interbase Resistance Temperature Coefficient	V_{B2B1} = 3 V, T_A = −65°C to 125°C,	I_E = 0, See Note 4	0.2	0.8	0.2	0.8	0.2	0.8	%/°C
η	Intrinsic Standoff Ratio	V_{B2B1} = 10 V,	See Figure 3	0.56	0.75	0.7	0.85	0.7	0.85	
I_{EB2O}	Emitter Reverse Current	V_{EB2} = 30 V,	I_{B1} = 0		100		100		50	nA
I_P	Peak-Point Emitter Current	V_{B2B1} = 25 V			2		2		0.4	μA
I_V	Valley-Point Emitter Current	V_{B2B1} = 25 V		2		4		6		mA
V_{OB1}	Base-One Peak Pulse Voltage	See Figure 4		3		5		6		V
f_{max}	Maximum Frequency of Oscillation	See Figure 5		1		1		1		MHz

NOTES: 1. The interbase voltage rating is based upon allowable power dissipation: $V_{B2B1} = \sqrt{r_{BB} \cdot P_T}$.

2. The peak emitter current rating is based on the capability of the transistor to operate safely in the circuit of Figure 4.

3. Derate linearly to 125°C free-air temperature at the rate of 3 mW/°C.

4. Temperature coefficient α_{rBB} is determined by the following formula:

$$\alpha_{rBB} = \left[\frac{(r_{BB} @ 125°C) - (r_{BB} @ -65°C)}{r_{BB} @ 25°C}\right] \frac{100\%}{190°C}.$$

To obtain r_{BB} for a given temperature $T_{A(2)}$, use the following formula:

$$r_{BB(2)} = [r_{BB} @ 25°C][1 + (\alpha_{rBB}/100\%)(T_{A(2)} - 25°C)].$$

*JEDEC registered data. This data sheet contains all applicable data in effect at the time of publication.

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*PARAMETER MEASUREMENT INFORMATION

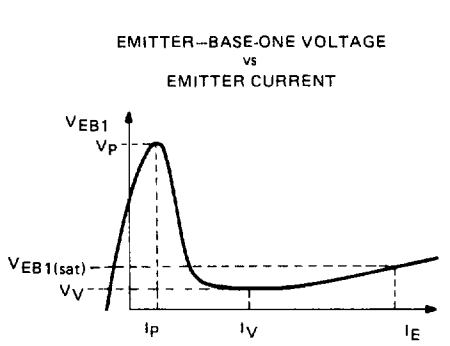


FIGURE 1–GENERAL STATIC EMITTER CHARACTERISTIC CURVE

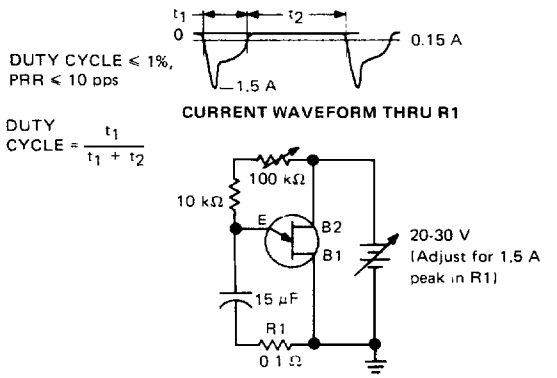
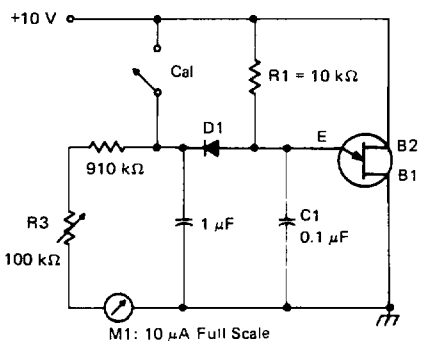


FIGURE 2–PEAK-EMITTER-CURRENT TEST CIRCUIT AND WAVEFORM



η–Intrinsic Standoff Ratio–This parameter is defined in terms of the peak-point voltage, V_P, by means of the equation: $V_P = \eta V_{B2B1} + V_F$, where V_F is about 0.49 volt at 25°C and decreases with temperature at about 2 millivolts/°C.

The circuit used to measure η is shown in the figure. In this circuit, R1, C1 and the unijunction transistor form a relaxation oscillator, and the remainder of the circuit serves as a peak-voltage detector with the diode D1 automatically subtracting the voltage V_P. To use the circuit, the "cal" button is pushed, and R3 is adjusted to make the current meter M1 read full scale. The "cal" button then is released and the value of η is read directly from the meter, with N = 1 corresponding to full-scale deflection of 10 μA.
D1: 1N457, or equivalent, with the following characteristics:
$V_F = 0.49$ V at $I_F = 10$ μA
$I_R \leq 2$ μA at $V_R = 20$ V

FIGURE 3–TEST CIRCUIT FOR INTRINSIC STANDOFF RATIO (η)

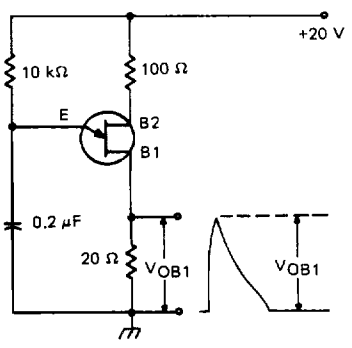
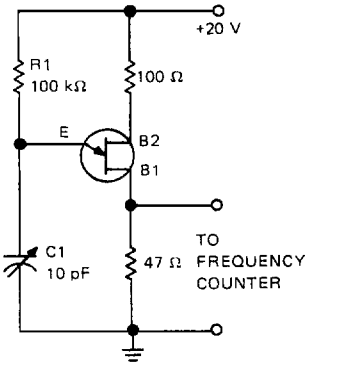


FIGURE 4–V_{OB1} TEST CIRCUIT



R1 and C1 are adjusted to maximize the frequency of oscillation.

FIGURE 5–f_{max} TEST CIRCUIT

*JEDEC registered data

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