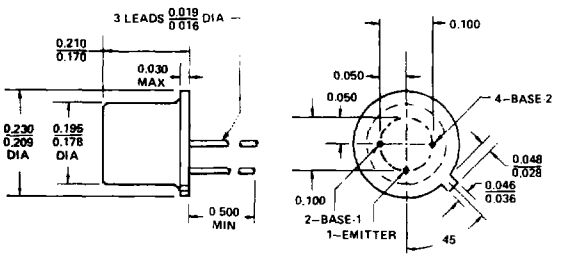
PLANAR UNIJUNCTION TRANSISTORS SPECIFICALLY CHARACTERIZED FOR A WIDE RANGE OF MILITARY AND INDUSTRIAL APPLICATIONS

- **Planar Process Ensures Low Leakage, Low Drive-Current Requirement, and Improved Reliability**

*mechanical data

Package outline is the 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



*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)	2 A
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 3)	300 mW
Storage Temperature Range	–65°C to 150°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C

NOTES: 1. This rating is based upon allowable power dissipation: $V_{B2B1} = \sqrt{r_{BB} \cdot P_T}$.
2. This value applies for a capacitor discharge through the emitter–base-one diode. Current must fall to 0.74 A within 1.5 ms and pulse-repetition rate must not exceed 10 pps.
3. Derate linearly to 125°C free-air temperature at the rate of 3 mW/°C.

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

USES CHIP U42

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

PARAMETER		TEST CONDITIONS		2N2646		2N2647		UNIT
				MIN	MAX	MIN	MAX	
r_{BB}	Static Interbase Resistance	V_{B2B1} = 3 V,	I_E = 0	4.7	9.1	4.7	9.1	kΩ
α_{rBB}	Interbase Resistance Temperature Coefficient	V_{B2B1} = 3 V, T_A = −55°C to 125°C,	I_E = 0, See Note 4	0.1	0.9	0.1	0.9	%/°C
η	Intrinsic Standoff Ratio	V_{B2B1} = 10 V,	See Figure 1	0.56	0.75	0.68	0.82	
I_{EB2O}	Emitter Reverse Current	V_{EB2} = −30 V,	I_{B1} = 0		−12		−0.2	μA
I_P	Peak-Point Emitter Current	V_{B2B1} = 25 V			5		2	μA
I_V	Valley-Point Emitter Current	V_{B2B1} = 20 V		4		8	18	mA
V_{OB1}	Base-One Peak Pulse Voltage	See Figure 2		3		6		V

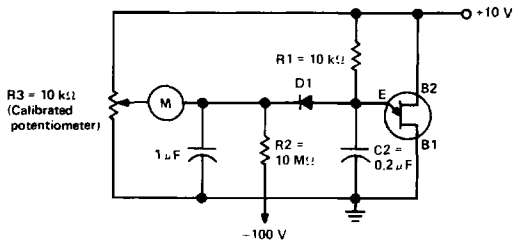
NOTE 4: Temperature coefficient α_{rBB} is determined by the following formula:

$$\alpha_{rBB} = \left[\frac{(r_{BB}\ @\ 125^\circ C) - (r_{BB}\ @\ -55^\circ C)}{r_{BB}\ @\ 25^\circ C}\right]\frac{100\%}{180\%}.$$

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

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

*PARAMETER MEASUREMENT INFORMATION



D1: Silicon diode with the following characteristics:
V_F = 0.672 V at I_F = 0.5 mA
$I_R \leq 2$ nA at V_R = 20 V.

η—Intrinsic Standoff Ratio—This parameter is defined by the equation: $V_p = \eta V_{BB} + V_F$, where V_F is about 0.67 volts at 25°C and decreases with temperature at about 2 millivolts/°C.

A circuit which may be used to measure η is shown in this figure. In this circuit, R1, C1, and the unijunction transistor form a relaxation oscillator. The remainder of the circuit serves as a peak-voltage detector with the diode D1 automatically subtracting the voltage V_F. To use the circuit, the calibrated potentiometer R3 is adjusted to null the meter M. The potentiometer is then read directly for η, e.g., 6 kΩ represents η = 0.6.

FIGURE 1—η TEST CIRCUIT

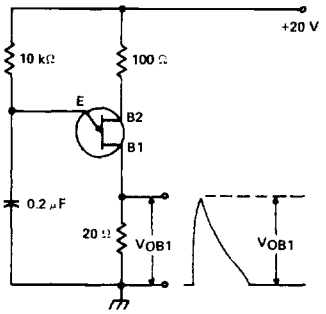


FIGURE 2—V_{OB1} TEST CIRCUIT

EMITTER–BASE-ONE VOLTAGE
vs
EMITTER CURRENT

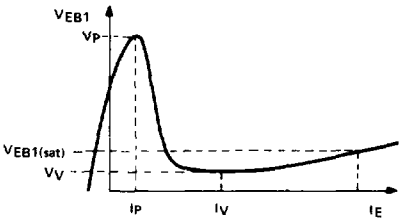


FIGURE 3—GENERAL STATIC EMITTER CHARACTERISTIC CURVE

*JEDEC registered data

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