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

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

4—BASE-2
2—BASE-1
1—EMITTER

*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

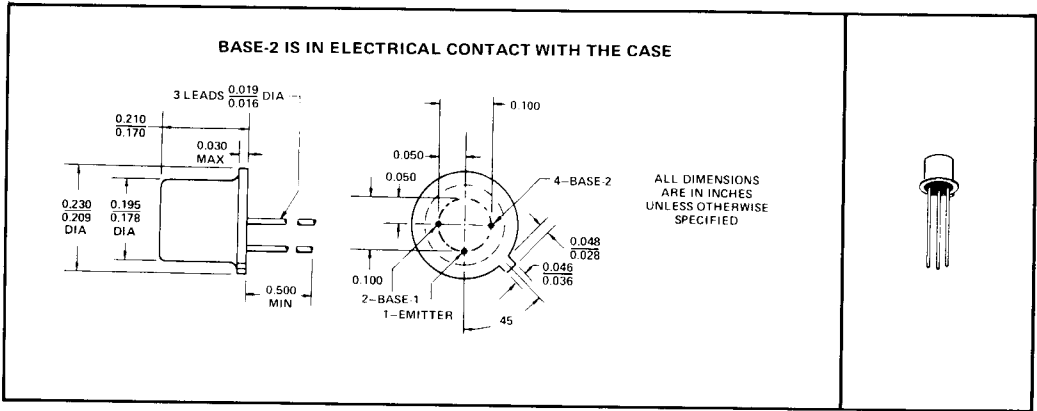# TYPES 2N2646, 2N2647
P-N PLANAR SILICON UNIJUNCTION TRANSISTORS

*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:

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

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

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

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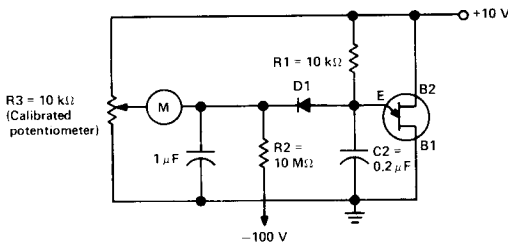
η—Intrinsic Standoff Ratio—This parameter is defined by the equation: $V_P = \eta V_{BB} + V_F$, where V_F is about 0.67 volts at 25°C and decreases with temperature at about 2 millivolts/°C.

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 $\eta = 0.6$.

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

FIGURE 1—η TEST CIRCUIT
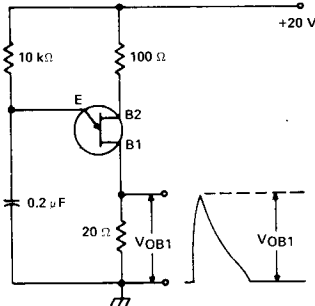
FIGURE 2—V_{OB1} TEST CIRCUIT

EMITTER—BASE-ONE VOLTAGE
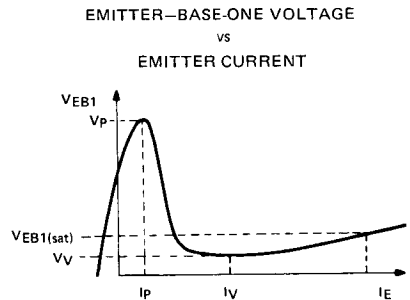vs
EMITTER CURRENT

FIGURE 3—GENERAL STATIC EMITTER CHARACTERISTIC CURVE

*JEDEC registered data

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INCORPORATED
POST OFFICE BOX 5012 • DALLAS, TEXAS 75222