TYPE TIS43
P-N PLANAR SILICON UNIJUNCTION TRANSISTOR

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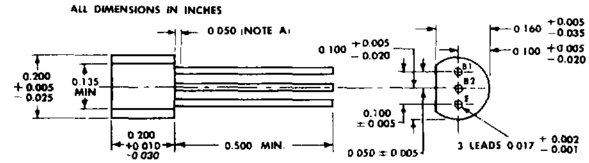
**PLANAR UNIJUNCTION SILECT† TRANSISTOR‡
FOR APPLICATION IN SCR DRIVERS, MOTOR-SPEED CONTROLS,
TIMERS, WAVEFORM GENERATORS, MULTIVIBRATORS, RING COUNTERS,
ELECTRONIC ORGANS, AND MILITARY FUZES**

- **Low Leakage Allows More Accurate Timing Circuit Design**
- **Provides Wider Range of Design Applications than Bar-Type Unijunction Transistors**
- **2N4891 is Recommended for New Designs**

mechanical data

This transistor is encapsulated in a plastic compound specifically designed for this purpose, using a highly mechanized process developed by Texas Instruments. The case will withstand soldering temperatures without deformation. This device exhibits stable characteristics under high-humidity conditions and is capable of meeting MIL-STD-202C, Method 106B. The transistor is insensitive to light.

ALL JEDEC TO-92 DIMENSIONS AND NOTES ARE APPLICABLE



NOTE A: Lead diameter is not controlled in this area.

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

Emitter–Base-Two Reverse Voltage	−30 V
Interbase Voltage	See Note 1
Continuous Emitter Current	50 mA
Peak Emitter Current (See Note 2)	1 A
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 3)	360 mW
Continuous Device Dissipation at (or below) 25°C Lead Temperature (See Note 4)	500 mW
Storage Temperature Range	−65°C to 150°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C

NOTES: 1. Interbase voltage is limited solely by power dissipation, $V_{B2\text{-}B1} = \sqrt{r_{BB} \cdot P_T}$. The r_{BB} range specified gives maximum values ranging from 35 V to 52 V.

2. This value applies for a capacitor discharge through the emitter–base-one diode. Current must fall to 0.37 A within 3 ms and pulse-repetition rate must not exceed 10 pps.

3. Derate linearly to 150°C free-air temperature at the rate of 2.88 mW/deg.

4. Derate linearly to 150°C lead temperature at the rate of 4 mW/deg. Lead temperature is measured on the base-two lead 1/16 inch from the case.

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‡U. S. Patent No. 3,439,238

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

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
r_{BB}	Static Interbase Resistance	$V_{B2-B1} = 3$ V, $I_E = 0$	4	9.1	kΩ
α_{rBB}	Interbase Resistance Temperature Coefficient	$V_{B2-B1} = 3$ V, $I_E = 0$, $T_A = -65°C$ to 100°C, See Note 5	0.1	0.9	%/deg
η	Intrinsic Standoff Ratio	$V_{B2-B1} = 10$ V, See Figure 1	0.55	0.82	
$I_{B2(mod)}$	Modulated Interbase Current	$V_{B2-B1} = 10$ V, $I_E = 50$ mA	10		mA
I_{EB2O}	Emitter Reverse Current	$V_{B2-E} = 30$ V, $I_{B1} = 0$		−10	nA
I_P	Peak-Point Emitter Current	$V_{B2-B1} = 25$ V		5	μA
$V_{EB1(sat)}$	Emitter — Base-One Saturation Voltage	$V_{B2-B1} = 10$ V, $I_E = 50$ mA, See Note 6		4	V
I_V	Valley-Point Emitter Current	$V_{B2-B1} = 20$ V	2		mA
V_{OB1}	Base-One Peak Pulse Voltage	See Figure 2	3		V

NOTES: 5. Temperature coefficient, α_{rBB}, is determined by the following formula:

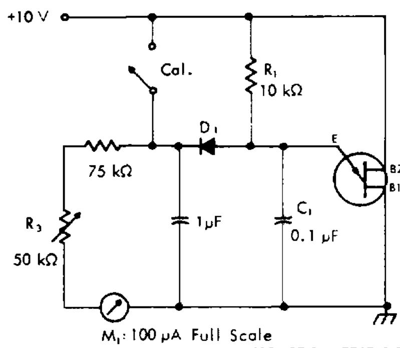
$$\alpha_{rBB} = \left[\frac{(r_{BB} @ 100°C) - (r_{BB} @ -55°C)}{(r_{BB} @ 25°C)}\right]\frac{100\%}{155\ deg}$$

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

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

6. This parameter is measured using pulse techniques. $t_p = 300$ μs, duty cycle ≤ 2%.

PARAMETER MEASUREMENT INFORMATION



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 0.56 volt at 25°C and decreases with temperature at about 2 millivolts/deg.

The circuit used to measure η is shown in the figure. In this circuit, R_1, C and the unijunction transistor form a relaxation oscillator, and the remainder of the circuit serves as a peak-voltage detector with the diode D_1 automatically subtracting the voltage V_F. To use the circuit, the cal button is pushed and R_3 is adjusted to make the current meter M_1 read full scale. The cal button then is released and the value of η is read directly from the meter, with $\eta = 1$ corresponding to full scale deflection of 100 μA.

D_1: 1N457, or equivalent, with the following characteristics:
$V_F = 0.565$ V at $I_F = 50$ μA,
$I_R \le 2$ μA at $V_R = 20$ V

FIGURE 1 — TEST CIRCUIT FOR INTRINSIC STANDOFF RATIO (η)

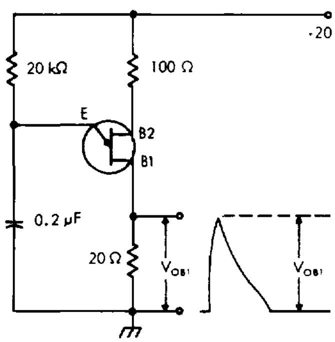


FIGURE 2 — V_{OB1} TEST CIRCUIT

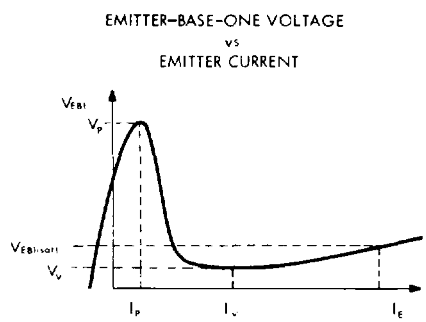


FIGURE 3 — GENERAL STATIC EMITTER CHARACTERISTIC CURVE

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