TYPES 2N4891 THRU 2N4894
P-N PLANAR SILICON UNIJUNCTION TRANSISTORS

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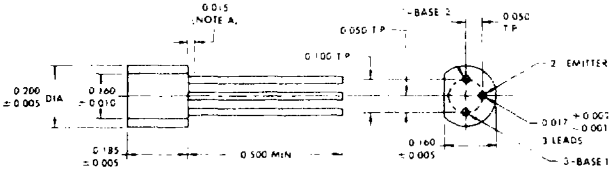
PLANAR UNIJUNCTION SILECT† TRANSISTORS‡ FOR APPLICATION IN SCR DRIVERS, MOTOR-SPEED CONTROLS, TIMERS, WAVEFORM GENERATORS, MULTIVIBRATORS, RING COUNTERS, ELECTRONIC ORGANS, AND MILITARY FUZES

- Low Leakage Allows More Accurate Timing Circuit Design
- High Performance Capability at Low Drive Currents
- Provides Wider Range of Design Applications than Bar-Type Unijunction Transistors
- Rugged, One-Piece Construction Features Standard 100-mil TO-18 Pin-Circle

mechanical data

These transistors are 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. These devices exhibit stable characteristics under high-humidity conditions and are capable of meeting MIL-STD-202C, Method 106B. The transistors are insensitive to light.

***CASE OUTLINE**



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

B. Leads having maximum diameter (0.019) shall be within 0.007 of their true positions measured in the gaging plane 0.054 below the seating plane of the device relative to a maximum-diameter package

C. All dimensions are in inches.

*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)	300 mW
Storage Temperature Range	−55°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,* $V_{B2\text{-}B1} = \sqrt{r_{BB} \cdot P_T}$.

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/°C.

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*JEDEC registered data

†Trademark of Texas Instruments

‡U.S. Patent No. 3,439,238

USES CHIP U42

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

PARAMETER		TEST CONDITIONS	2N4891		2N4892		2N4893		2N4894		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
r_{BB}	Static Interbase Resistance	$V_{B2\text{-}B1} = 3$ V, $I_E = 0$	4	9.1	4	9.1	4	12	4	12	kΩ
α_{rBB}	Interbase Resistance Temperature Coefficient	$V_{B2\text{-}B1} = 3$ V, $I_E = 0$, $T_A = -55°C$ to $100°C$, See Note 4	0.1	0.9	0.1	0.9	0.1	0.9	0.1	0.9	%/deg
η	Intrinsic Standoff Ratio	$V_{B2\text{-}B1} = 10$ V, See Figure 1	0.55	0.82	0.51	0.69	0.55	0.82	0.74	0.86	
$I_{B2(mod)}$	Modulated Interbase Current	$V_{B2\text{-}B1} = 10$ V, $I_E = 50$ mA, See Note 5	10		10		10		10		mA
I_{EB2O}	Emitter Reverse Current	$V_{EB2} = -30$ V, $I_{B1} = 0$		−10		−10		−10		−10	nA
I_P	Peak-Point Emitter Current	$V_{B2\text{-}B1} = 25$ V		5		2		2		1	μA
$V_{EB1(sat)}$	Emitter – Base-One Saturation Voltage	$V_{B2\text{-}B1} = 10$ V, $I_E = 50$ mA, See Note 5		4		4		4		4	V
I_V	Valley-Point Emitter Current	$V_{B2\text{-}B1} = 20$ V	2		4		2		2		mA
V_{OB1}	Base-One Peak Pulse Voltage	See Figure 2	3		3		6		3		V

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

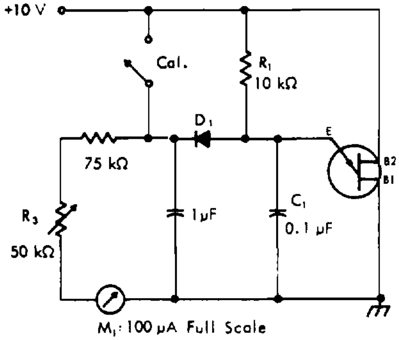
$$\alpha_{rBB} = \left[\frac{(r_{BB} @ 100°C) - (r_{BB} @ -55°C)}{(r_{BB} @ 25°C)}\right]\frac{100\%}{155 \text{ deg}}$$

To obtain r_{BB} for a given temperature $T_{A(2)}$, use the following formula: $r_{BB(2)} = [r_{BB} @ 25°C]\,[1 + (\alpha_{rBB}/100)\,(T_{A(2)} - 25°C)]$

5. These parameters must be measured using pulse techniques. $t_p = 300\ \mu s$, duty cycle $\leq 2\%$.

*JEDEC registered data

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_1 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 $I_F = 50\ \mu A$,
$I_R \leq 2\ \mu A$ at $V_R = 20$ V

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

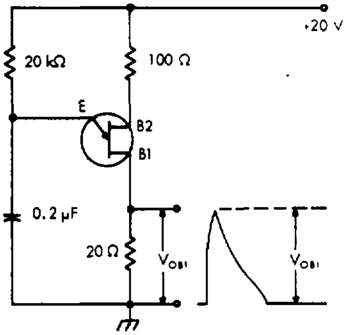


FIGURE 2 — V_{OB1} TEST CIRCUIT

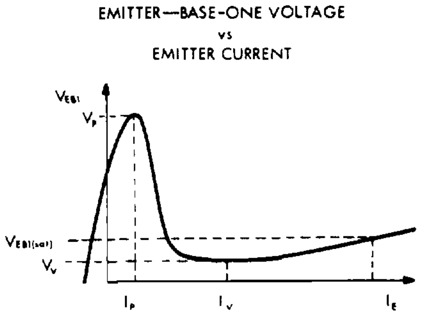


FIGURE 3 — GENERAL STATIC EMITTER CHARACTERISTIC CURVE

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