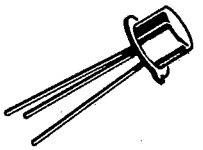
PN Unijunction Transistor
Silicon Annular Unijunction Transistor

2N5431

PN UJT

. . . characterized primarily for low interbase-voltage operation in sensing, pulse triggering, and timing circuits.

- Low R_{BB} Spread — 6 to 8.5 kΩ
- Low Peak-Point Current — Ip = 4 μA (Max) @ V_{B2B1} = 4 V
- Low Emitter Saturation Voltage — $V_{EB1(sat)}$ = 3 V (Max)
- Narrow Intrinsic Standoff Ratio — η = 0.72 to 0.80



CASE 22A-01
STYLE 1

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted.)

Rating	Symbol	Value	Unit
RMS Power Dissipation, Note 1	P_D	360	mW
RMS Emitter Current	I_e	50	mA
Peak-Pulse Emitter Current, Note 2	i_e	1.5	Amp
Emitter Reverse Voltage	V_{B2E}	30	Volts
Interbase Voltage, Note 3	V_{B2B1}	35	Volts
Operating Junction Temperature Range	T_J	−65 to +125	°C
Storage Temperature Range	T_{stg}	−65 to +200	°C

Notes: 1. Derate 3 mW/°C increase in ambient temperature.
2. Duty Cycle ≤ 1%, PRR = 10 PPS (see Figure 5).
3. Based upon power dissipation at T_A = 25°C.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Fig. No.	Symbol	Min	Max	Unit
Intrinsic Standoff Ratio, Note 1 (V_{B2B1} = 10 V)	4	η	0.72	0.80	—
Interbase Resistance (V_{B2B1} = 3 V, I_E = 0)		R_{BB}	6	8.5	kΩ
Interbase Resistance Temperature Coefficient (V_{B2B1} = 3 V, I_E = 0, T_A = 0 to 100°C)		αR_{BB}	0.4	0.8	%/°C
Emitter Saturation Voltage, Note 2 (V_{B2B1} = 10 V, I_E = 50 mA)		$V_{EB1(sat)}$	—	3	Volts
Modulated Interbase Current (V_{B2B1} = 10 V, I_E = 50 mA)		$I_{B2(mod)}$	5	30	mA
Emitter Reverse Current (V_{B2E} = 30 V, I_{B1} = 0)		I_{EB2O}	—	10	nA
Peak-Point Emitter Current (V_{B2B1} = 25 V) (V_{B2B1} = 4 V)		I_P	— —	0.4 4	μA
Valley-Point Current (2) (V_{B2B1} = 20 V, R_{B2} = 100 ohms)		I_V	2	—	mA
Base-One Peak Pulse Voltage (V_{BB} = 4 Volts)	3	V_{OB1}	1	—	Volts

Notes: 1. η, Intrinsic standoff ratio, 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 0.45 volt at 25°C @ I_F = 10 μA and decreases with temperature at about 2.5 mV/°C. The test circuit is shown in Figure 4. Components R_1, C_1, and the UJT form a relaxation oscillator; the remaining circuitry serves as a peak-voltage detector. The forward drop of Diode D_1 compensates for V_F. To use, the "cal" button is pushed, and R_3 is adjusted to make the current meter, M_1, read full scale. When the "cal" button is released, the value of η is read directly from the meter, if full scale on the meter reads 1.

2. Use pulse techniques: PW ≈ 300 μs, Duty Cycle ≤ 2% to avoid internal heating, which may result in erroneous readings.

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FIGURE 1 – UNIJUNCTION TRANSISTOR SYMBOL AND NOMENCLATURE

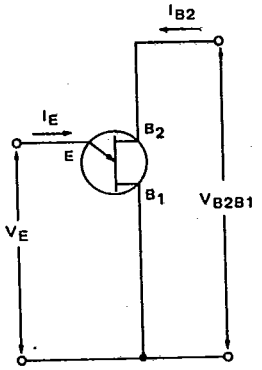


FIGURE 2 – STATIC EMITTER CHARACTERISTICS CURVES

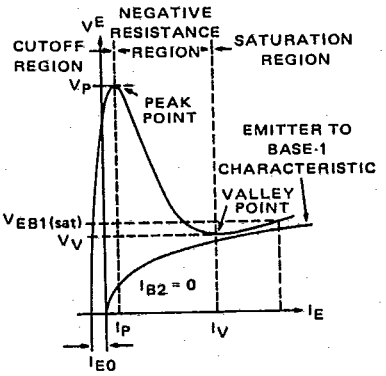


FIGURE 3 – V_{OB1} TEST CIRCUIT

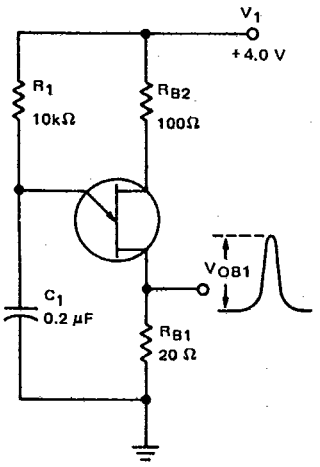
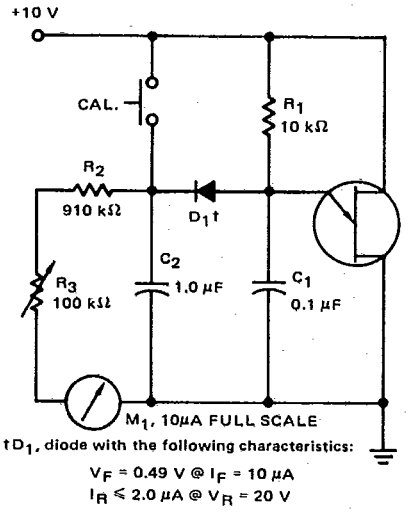


FIGURE 4 – η TEST CIRCUIT



†D_1, diode with the following characteristics:
V_F = 0.49 V @ I_F = 10 μA
$I_R \leq$ 2.0 μA @ V_R = 20 V

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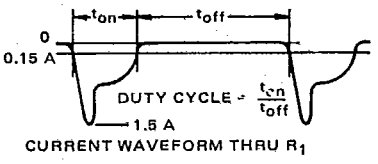
FIGURE 5 – PRR TEST CIRCUIT AND WAVEFORM

DUTY CYCLE ≤ 1.0%, PRR ≤ 10 PPS



CURRENT WAVEFORM THRU R_1