

T-37-21

## PN Unijunction Transistors

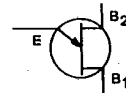
### Silicon PN Unijunction Transistors

... designed for military and industrial use in pulse, timing, triggering, sensing, and oscillator circuits. The annular process provides low leakage current, fast switching and low peak-point currents as well as outstanding reliability and uniformity. Recommended usage includes:

- Silicon Controlled Rectifier Triggering Circuits — 2N4948
- Long-time Delay Circuits — 2N4949

**2N4948**  
**2N4949**

PN UJTs



CASE 22A-01  
STYLE 1

3

#### MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted.)

Rating	Symbol	Value	Unit
RMS Power Dissipation, Note 1	P <sub>D</sub>	360	mW
RMS Emitter Current	I <sub>e</sub>	50	mA
Peak Pulse Emitter Current, Note 2	I <sub>e</sub>	1	Amp
Emitter Reverse Voltage	V <sub>B2E</sub>	30	Volts
Storage Temperature Range	T <sub>stg</sub>	-65 to +200	°C

Notes: 1. Derate 2.4 mW/°C increase in ambient temperature. Total power dissipation (available power to Emitter and Base-Two) must be limited by the external circuitry. Interbase voltage (V<sub>B2B1</sub>) limited by power dissipation, V<sub>B2B1</sub> =  $\sqrt{R_{BB} \cdot P_D}$ .

2. Capacitance discharge current must fall to 0.37 Amp within 3 ms and PRR ≤ 10 PPS.

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ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Intrinsic Standoff Ratio (V <sub>B2B1</sub> = 10 V), Note 1	η	0.55 0.74	—	0.82 0.86	—
Interbase Resistance (V <sub>B2B1</sub> = 3 V, I <sub>E</sub> = 0)	R <sub>BB</sub>	4	7	12.0	k ohms
Interbase Resistance Temperature Coefficient (V <sub>B2B1</sub> = 3 V, I <sub>E</sub> = 0, T <sub>A</sub> = -65°C to +100°C)	αR <sub>BB</sub>	0.1	—	0.9	%/°C
Emitter Saturation Voltage (V <sub>B2B1</sub> = 10 V, I <sub>E</sub> = 50 mA), Note 2	V <sub>EB1(sat)</sub>	—	2.5	3	Volts
Modulated Interbase Current (V <sub>B2B1</sub> = 10 V, I <sub>E</sub> = 50 mA)	I <sub>B2(mod)</sub>	12	15	—	mA
Emitter Reverse Current (V <sub>B2E</sub> = 30 V, I <sub>B1</sub> = 0) (V <sub>B2E</sub> = 30 V, I <sub>B1</sub> = 0, T <sub>A</sub> = 125°C)	I <sub>EB20</sub>	—	5	10	nA μA
Peak Point Emitter Current (V <sub>B2B1</sub> = 25 V)	I <sub>p</sub>	—	0.6	2	μA
Valley Point Current (V <sub>B2B1</sub> = 20 V, R <sub>B2</sub> = 100 ohms), Note 2	I <sub>v</sub>	2	4	—	mA
Base-One Peak Pulse Voltage (Note 3, Figure 3)	V <sub>OB1</sub>	3 6	5 8	—	Volts
Maximum Oscillation Frequency (Figure 4)	f(max)	—	400	—	kHz

Notes:

- Intrinsic standoff ratio, η, is defined by equation:

$$\eta = \frac{V_p - V_{EB1}}{V_{B2B1}}$$

Where V<sub>p</sub> = Peak Point Emitter Voltage

V<sub>B2B1</sub> = Interbase Voltage

V<sub>F</sub> = Emitter to Base-One Junction Diode Drop  
 (≈ 0.45 V @ 10 μA)

- Use pulse techniques: PW ≈ 300 μs duty cycle ≤ 2% to avoid internal heating due to interbase modulation which may result in erroneous readings.

- Base-One Peak Pulse Voltage is measured in circuit of Figure 3. This specification is used to ensure minimum pulse amplitude for applications in SCR firing circuits and other types of pulse circuits.

3

FIGURE 1 - UNIJUNCTION TRANSISTOR SYMBOL AND NOMENCLATURE

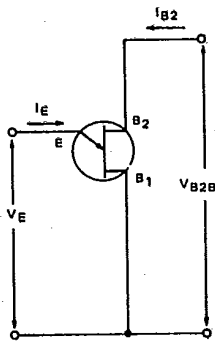


FIGURE 2 - STATIC EMITTER CHARACTERISTICS CURVES

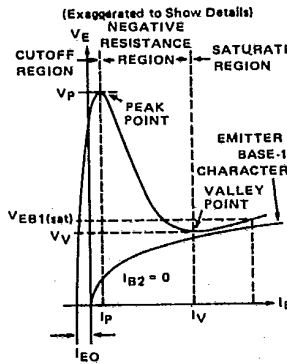


FIGURE 3 - V<sub>OB1</sub> TEST CIRCUIT (Typical Relaxation Oscillator)

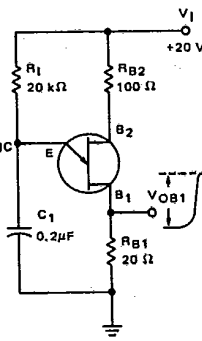


FIGURE 4 - F(max) MAXIMUM FREQUENCY TEST CIRCUIT

