

# PN Unijunction Transistors

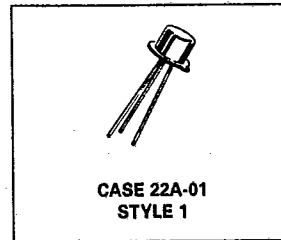
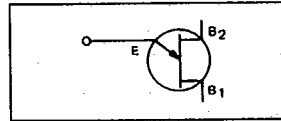
## Silicon PN Unijunction Transistors

... designed for use in pulse and timing circuits, sensing circuits and thyristor trigger circuits. These devices feature:

- Low Peak Point Current — 2  $\mu$ A (Max)
- Low Emitter Reverse Current — 200 nA (Max)
- Passivated Surface for Reliability and Uniformity

**2N2646**  
**2N2647**

**PN UJTs**



\*MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$  unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Dissipation, Note 1	$P_D$	300	mW
RMS Emitter Current	$I_E(\text{RMS})$	50	mA
Peak Pulse Emitter Current, Note 2	$i_E$	2	Amps
Emitter Reverse Voltage	$V_{B2E}$	30	Volts
Interbase Voltage	$V_{B2B1}$	35	Volts
Operating Junction Temperature Range	$T_J$	-65 to +125	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	-65 to +150	$^\circ\text{C}$

**3**

\*Indicates JEDEC Registered Data.

Notes: 1. Derate 3 mW/ $^\circ\text{C}$  increase in ambient temperature. The total power dissipation (available power to Emitter and Base-Two) must be limited by the external circuitry.

2. Capacitor discharge — 10  $\mu$ F or less, 30 volts or less.

\*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	0.56 0.68	—	0.75 0.82	—
Interbase Resistance (V <sub>B2B1</sub> = 3 V, I <sub>E</sub> = 0)	r <sub>BB</sub>	4.7	7	9.1	k ohms
Interbase Resistance Temperature Coefficient (V <sub>B2B1</sub> = 3 V, I <sub>E</sub> = 0, T <sub>A</sub> = -55°C to +125°C)	α <sub>rBB</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>	—	3.5	—	Volts
Modulated Interbase Current (V <sub>B2B1</sub> = 10 V, I <sub>E</sub> = 50 mA)	I <sub>B2(mod)</sub>	—	15	—	mA
Emitter Reverse Current (V <sub>B2E</sub> = 30 V, I <sub>B1</sub> = 0)	I <sub>EB20</sub>	—	0.005 0.005	12 0.2	μA
Peak Point Emitter Current (V <sub>B2B1</sub> = 25 V)	I <sub>p</sub>	—	1 1	5 2	μA
Valley Point Current (V <sub>B2B1</sub> = 20 V, R <sub>B2</sub> = 100 ohms), Note 2	I <sub>v</sub>	4 8	6 10	— 18	mA
Base-One Peak Pulse Voltage (Note 3, Figure 3)	V <sub>OB1</sub>	3 6	5 7	— —	Volts

\*Indicates JEDEC Registered Data.

Notes:

1. Intrinsic standoff ratio,

η, is defined by equation:

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

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)

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

3. 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

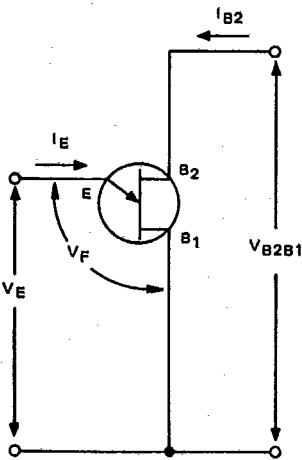


FIGURE 2  
STATIC EMITTER CHARACTERISTIC  
CURVES  
(Exaggerated to Show Details)

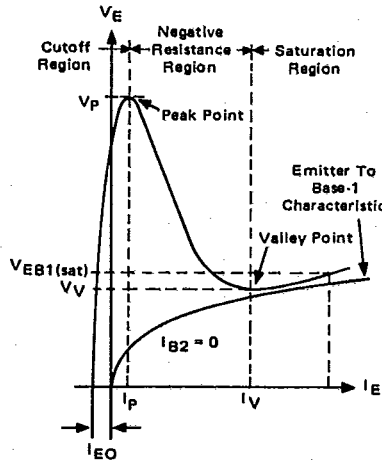


FIGURE 3 - V<sub>OB1</sub> TEST CIRCUIT  
(Typical Relaxation Oscillator)

