DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

# 2N4948, 2N4949

## PN UNIJUNCTION TRANSISTORS

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **RMS power dissipation**(1) | $P_D$ | 360 | mW |
| **RMS emitter current** | $I_e$ | 50 | mA |
| **Peak pulse emitter current**(2) | $i_e$ | 1.0 | Amp |
| **Emitter reverse voltage** | $V_{B2E}$ | 30 | Volts |
| **Storage temperature range** | $T_{stg}$ | -65 to 200 | °C |

Note 1: Derate 2.4mW/°C increase in ambient temperature. Total power dissipation must be limited by external circuitry. Interbase voltage limited by power dissipation: $V_{B2B1} = V(R_{BB}*P_{D)}$
Note 2: Capacitance discharge current must fail to 0.37A within 3.0ms and PRR ≤ 10PPS.

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise specified)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Intrinsic standoff ratio** ($V_{B2B1}$ = 10V)(1) | 2N4948<br>2N4949 | η | 0.55<br>0.74 | -<br>- | 0.82<br>0.86 | - |
| **Interbase resistance** ($V_{B2B1}$ = 3.0V, $I_E$ = 0) | | $R_{BB}$ | 4.0 | 7.0 | 12.0 | kohms |
| **Interbase resistance temperature coefficient** ($V_{B2B1}$ = 3.0V, $I_E$ = 0, $T_A$ = -65° to 100°C | | $\alpha R_{BB}$ | 0.1 | - | 0.9 | %/°C |
| **Emitter saturation voltage** ($V_{B2B1}$ = 10V, $I_E$ = 50mA)(2) | | $V_{EB1(sat)}$ | - | 2.5 | 3.0 | Volts |
| **Modulated interbase current** ($V_{B2B1}$ = 10V, $I_E$ = 50mA) | | $I_{B2(mod)}$ | 12 | 15 | - | mA |
| **Emitter reverse current**<br>($V_{B2E}$ = 30V, $I_{B1}$ = 0)<br>($V_{B2E}$ = 30V, $I_{B1}$ = 0, $T_A$ = 125°C) | | $I_{EB20}$ | -<br>- | 5.0<br>- | 10<br>1.0 | nA<br>µA |
| **Peak point emitter current** ($V_{B2B1}$ = 25V) | 2N4948<br>2N4949 | $I_P$ | -<br>- | 0.6<br>0.6 | 2.0<br>1.0 | µA |
| **Valley point current** ($V_{B2B1}$ = 20V, $R_{B2}$ = 100ohms)(2) | | $I_V$ | 2.0 | 4.0 | - | mA |
| **Base-one peak pulse voltage** (3) | 2N4949<br>2N4948 | $V_{OB1}$ | 3.0<br>6.0 | 5.0<br>8.0 | -<br>- | Volts |
| **Maximum oscillation frequency** | | $f_{(max)}$ | - | 1.25 | - | MHz |

Note 1: Intrinsic standoff ratio: $\eta = (V_P-V_{EB1})/V_{B2B1}$, where $V_P$ = peak point emitter voltage, $V_{B2B1}$ = interbase voltage, and $V_{EB1}$ = emitter to base-one junction diode drop (≈ 0.45V @ 10µA)
Note 2: Use pulse techniques: PW ≈ 300µs duty cycle ≤ 2% to avoid internal heating due to interbase modulation which may result in erroneous readings.
Note 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.

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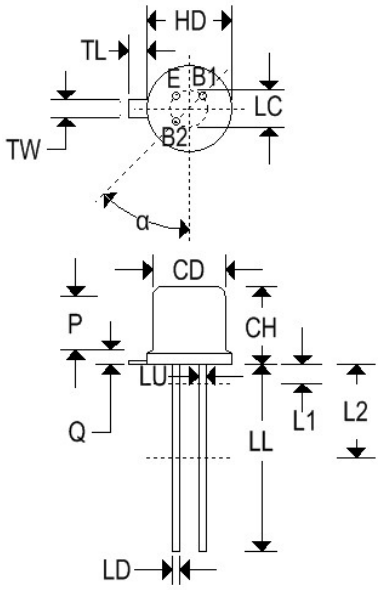
**MECHANICAL CHARACTERISTICS**

| | |
|---|---|
| **Case** | TO-18 |
| **Marking** | Alpha-numeric |
| **Polarity** | See below |




| Dim | TO-18 | | | |
|---|---|---|---|---|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| **CD** | 0.178 | 0.195 | 4.520 | 4.950 |
| **CH** | 0.170 | 0.210 | 4.320 | 5.330 |
| **HD** | 0.209 | 0.230 | 5.310 | 5.840 |
| **LC** | 0.100 TP | | 2.540 TP | |
| **LD** | 0.016 | 0.021 | 0.410 | 0.530 |
| **LL** | 0.500 | 0.750 | 12.700 | 19.050 |
| **LU** | 0.016 | 0.019 | 0.410 | 0.480 |
| **$L_1$** | - | 0.050 | - | 1.270 |
| **$L_2$** | 0.250 | - | 6.350 | - |
| **P** | 0.100 | - | 2.540 | - |
| **Q** | - | 0.040 | - | 1.020 |
| **TL** | 0.028 | 0.048 | 0.710 | 1.220 |
| **TW** | 0.036 | 0.046 | 0.910 | 1.170 |
| **α** | 45°TP | | 45°TP | |

FIGURE 1 – UNIJUNCTION TRANSISTOR SYMBOL AND NOMENCLATURE

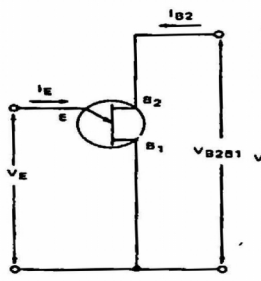



FIGURE 2 – STATIC EMITTER CHARACTERISTICS CURVES

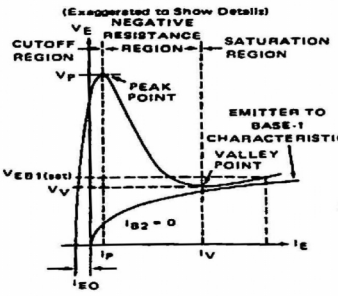



FIGURE 3 – $V_{OB1}$ TEST CIRCUIT (Typical Relaxation Oscillator)

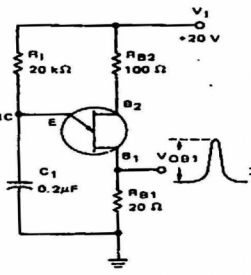



FIGURE 4 – F(max) MAXIMUM FREQUENCY TEST CIRCUIT