T-37-17

# SILICON PLANAR EPITAXIAL TRANSISTORS

P-N-P silicon planar epitaxial transistors in plastic TO-92 envelope for general purpose applications.
N-P-N complement is PN2222/A.

## QUICK REFERENCE DATA

| | | | PN2907 | PN2907A |
|---|---|---|---|---|
| Collector-emitter voltage (open base) | $-V_{CEO}$ | max. | 40 | 60 V |
| Collector-base voltage (open emitter) | $-V_{CBO}$ | max. | 60 | V |
| Collector current (d.c.) | $-I_C$ | max. | 600 | mA |
| Total power dissipation up to $T_{amb}$ = 25 °C | $P_{tot}$ | max. | 625 | mW |
| Collector-emitter saturation voltage $-I_C$ = 150 mA; $-I_B$ = 15 mA | $-V_{CEsat}$ | max. | 0,4 | V |
| D.C. current gain $-I_C$ = 150 mA; $-V_{CE}$ = 10 V | $h_{FE}$ | min.<br>max. | 100<br>300 | |

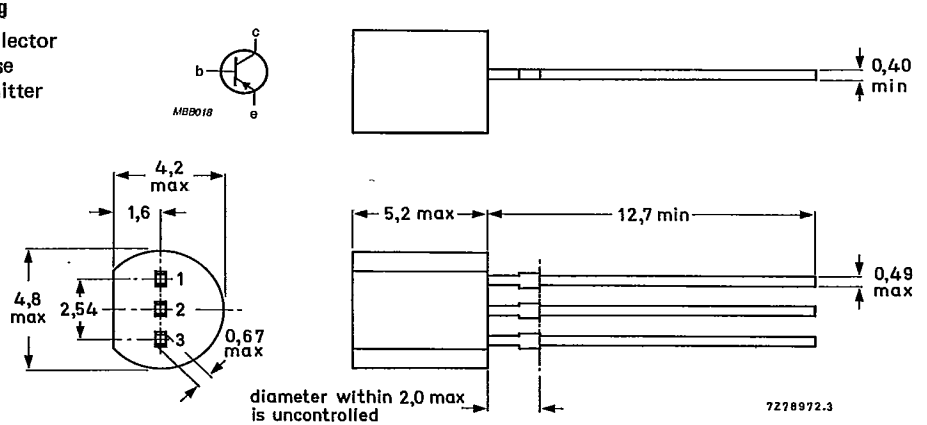
## MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-92.

**Pinning**

1 = collector
2 = base
3 = emitter




Capability approved to CECC NECC-C-002

T-37-17

## RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| | | | PN2907 | PN2907A | |
|---|---|---|---|---|---|
| Collector-emitter voltage (open base) | $-V_{CEO}$ | max. | 40 | 60 | V |
| Collector-base voltage (open emitter) | $-V_{CBO}$ | max. | 60 | | V |
| Emitter-base voltage (open collector) | $-V_{EBO}$ | max. | 5,0 | | V |
| Collector current (d.c.) | $-I_C$ | max. | 600 | | mA |
| Total power dissipation up to $T_{amb}$ = 25 °C | $P_{tot}$ | max. | 625 | | mW |
| Storage temperature range | $T_{stg}$ | | −65 to +150 | | °C |
| Junction temperature | $T_j$ | max. | 150 | | °C |

## THERMAL RESISTANCE

| | | | | | |
|---|---|---|---|---|---|
| From junction to ambient in free air | $R_{th\ j\text{-}a}$ | = | 200 | | K/W |

## CHARACTERISTICS

$T_j$ = 25 °C unless otherwise specified

| | | | | | |
|---|---|---|---|---|---|
| Collector-emitter breakdown voltage $I_B$ = 0; $-I_C$ = 10 mA | $-V_{(BR)CEO}$ | min. | 40 | 60 | V |
| Collector-base breakdown voltage $I_E$ = 0; $-I_C$ = 10 μA | $-V_{(BR)CBO}$ | min. | 60 | | V |
| Emitter-base breakdown voltage $-I_E$ = 10 μA; $I_C$ = 0 | $-V_{(BR)EBO}$ | min. | 5,0 | | V |
| Base cut-off current $-V_{CE}$ = 30 V; $-V_{BE}$ = 0,5 V | $-I_{BEX}$ | max. | 50 | | nA |
| Collector cut-off current $-V_{CE}$ = 30 V; $-V_{BE}$ = 0,5 V | $-I_{CEX}$ | max. | 50 | | nA |
| Collector cut-off current $I_E$ = 0; $V_{CB}$ = 50 V | $-I_{CBO}$ | max. | 20 | 10 | nA |
| $I_E$ = 0; $V_{CB}$ = 50 V; $T_{amb}$ = 125 °C | $-I_{CBO}$ | max. | 20 | 10 | μA |
| D.C. current gain | | | | | |
| $-I_C$ = 0,1 mA; $-V_{CE}$ = 10 V | $h_{FE}$ | min. | 35 | 75 | |
| $-I_C$ = 1,0 mA; $-V_{CE}$ = 10 V | $h_{FE}$ | min. | 50 | 100 | |
| $-I_C$ = 10 mA; $-V_{CE}$ = 10 V | $h_{FE}$ | min. | 75 | 100 | |
| $-I_C$ = 150 mA; $-V_{CE}$ = 10 V | $h_{FE}$ | min.<br>max. | 100<br>300 | 100<br>300 | |
| $-I_C$ = 500 mA; $-V_{CE}$ = 10 V | $h_{FE}$ | min. | 30 | 50 | |

| | | | PN2907 | PN2907A | |
|---|---|---|---|---|---|
| Saturation voltages | | | | | |
| $-I_C$ = 150 mA; $-I_B$ = 15 mA | $-V_{CEsat}$ | max. | 0,4 | | V |
| $-I_C$ = 500 mA; $-I_B$ = 50 mA | $-V_{CEsat}$ | max. | 1,6 | | V |
| $-I_C$ = 150 mA; $-I_B$ = 15 mA | $-V_{BEsat}$ | max. | 1,3 | | V |
| $-I_C$ = 150 mA; $-I_B$ = 50 mA | $-V_{BEsat}$ | max. | 2,6 | | V |
| Transition frequency at f = 100 MHz | | | | | |
| $-I_C$ = 50 mA; $-V_{CE}$ = 20 V; $T_{amb}$ = 25 °C | $f_T$ | min. | 200 | | MHz |
| Output capacitance at f = 1 MHz | | | | | |
| $I_E$ = 0; $-V_{CB}$ = 10 V; $T_{amb}$ = 25 °C | $C_c$ | max. | 8,0 | | pF |
| Input capacitance at f = 1 MHz | | | | | |
| $I_C$ = 0; $-V_{EB}$ = 2,0 V; $T_{amb}$ = 25 °C | $C_e$ | max. | 30 | | pF |
| **Switching times** | | | | | |
| Turn-on time (see Fig. 2) | | | | | |
| $-I_C$ = 150 mA; $-I_{Bon}$ = 15 mA; $-V_{CC}$ = 30 V | $t_{on}$ | max. | 45 | | ns |
| delay time | $t_d$ | max. | 10 | | ns |
| rise time | $t_r$ | max. | 40 | | ns |
| Turn-off time (see Fig. 3) | | | | | |
| $-I_C$ = 150 mA; $-I_{Bon}$ = $I_{Boff}$ = 15 mA; $-V_{CC}$ = 6,0 V | $t_{off}$ | max. | 100 | | ns |
| storage time | $t_s$ | max. | 80 | | ns |
| fall time | $t_f$ | max. | 30 | | ns |

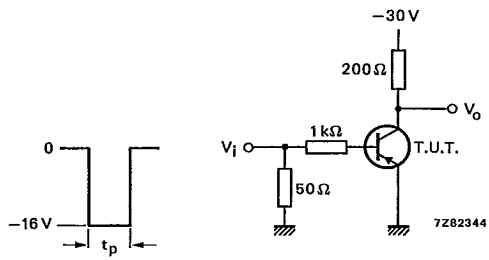



Fig. 2 Input waveform and test circuit for determining delay, rise and turn-on time.

T-37-17

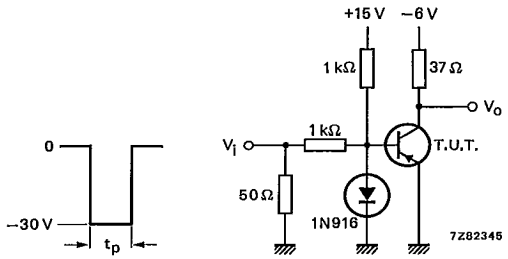



Fig. 3 Input waveform and test circuit for determining storage, fall and turn-off time.

| Pulse generator (see Figs 2 and 3) | | | |
|---|---|---|---|
| frequency | f | = | 150 Hz |
| pulse duration | $t_p$ | = | 200 ns |
| rise time | $t_r$ | ⩽ | 2 ns |
| output impedance | $Z_o$ | = | 50 Ω |

| Oscilloscope (see Figs 2 and 3) | | | |
|---|---|---|---|
| rise time | $t_r$ | ⩽ | 5 ns |
| input impedance | $Z_i$ | ⩽ | 10 MΩ |