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BF496

## SILICON PLANAR TRANSISTOR

NPN transistor in a plastic TO-92 envelope intended for VHF applications, e.g. as gain controlled pre-amplifier in VHF television and FM tuners.

### QUICK REFERENCE DATA

|                                                                    |           |      |                      |
|--------------------------------------------------------------------|-----------|------|----------------------|
| Collector-base voltage (open emitter)                              | $V_{CBO}$ | max. | 30 V                 |
| Collector-emitter voltage (open base)                              | $V_{CEO}$ | max. | 20 V                 |
| Collector current (DC)                                             | $I_C$     | max. | 20 mA                |
| Total power dissipation up to $T_{amb} = 75^\circ\text{C}$         | $P_{tot}$ | max. | 300 mW               |
| Junction temperature                                               | $T_j$     | max. | 150 $^\circ\text{C}$ |
| Transition frequency<br>$-I_E = 2\text{ mA}; V_{CB} = 10\text{ V}$ | $f_T$     | min. | 300 MHz              |

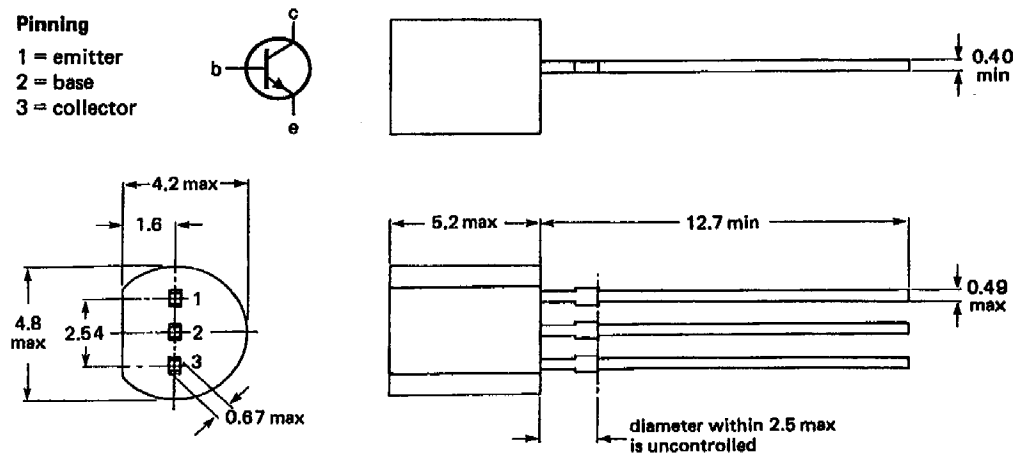
### MECHANICAL DATA

Dimensions in mm

Fig.1 TO-92.

#### Pinning

- 1 = emitter
- 2 = base
- 3 = collector



## RATINGS

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

|                                                               |           |      |                               |
|---------------------------------------------------------------|-----------|------|-------------------------------|
| Collector-base voltage (open emitter)                         | $V_{CB0}$ | max. | 30 V                          |
| Collector-emitter voltage (open base)                         | $V_{CEO}$ | max. | 20 V                          |
| Collector-emitter voltage ( $R_{BE} \leq 1 \text{ k}\Omega$ ) | $V_{CER}$ | max. | 30 V                          |
| Emitter-base voltage (open collector)                         | $V_{EBO}$ | max. | 3 V                           |
| Collector current (DC)                                        | $I_C$     | max. | 20 mA                         |
| Collector current (peak value)                                | $I_{CM}$  | max. | 20 mA                         |
| Total power dissipation up to $T_{amb} = 75^\circ\text{C}$    | $P_{tot}$ | max. | 300 mW                        |
| Storage temperature range                                     | $T_{stg}$ |      | $-65$ to $+150^\circ\text{C}$ |
| Junction temperature                                          | $T_J$     | max. | $150^\circ\text{C}$           |

## THERMAL RESISTANCE

From junction to ambient in free air

|               |   |         |
|---------------|---|---------|
| $R_{th\ j-a}$ | = | 420 K/W |
|---------------|---|---------|

## CHARACTERISTICS

$T_{amb} = 25^\circ\text{C}$  unless otherwise specified

DC current gain

$-I_E = 2 \text{ mA}; V_{CB} = 10 \text{ V}$

|          |      |    |
|----------|------|----|
| $h_{FE}$ | min. | 13 |
|----------|------|----|

$-I_E = 12 \text{ mA}; V_{CB} = 7 \text{ V}^*$

|          |      |   |
|----------|------|---|
| $h_{FE}$ | min. | 6 |
|----------|------|---|

Emitter-base voltage

$-I_E = 2 \text{ mA}; V_{CB} = 10 \text{ V}$

|           |      |       |
|-----------|------|-------|
| $-V_{EB}$ | max. | 0.9 V |
|-----------|------|-------|

$-I_E = 12 \text{ mA}; V_{CB} = 7 \text{ V}^*$

|           |      |       |
|-----------|------|-------|
| $-V_{EB}$ | max. | 1.0 V |
|-----------|------|-------|

Transition frequency

$-I_E = 2 \text{ mA}; V_{CB} = 10 \text{ V}$

|       |  |                |
|-------|--|----------------|
| $f_T$ |  | 300 to 800 MHz |
|-------|--|----------------|

$-I_E = 4 \text{ mA}; V_{CB} = 5 \text{ V}$

|       |      |         |
|-------|------|---------|
| $f_T$ | max. | 530 MHz |
|-------|------|---------|

Feedback capacitance at  $f = 10.7 \text{ MHz}$

$I_C = 1 \text{ mA}; V_{CE} = 10 \text{ V}$

|          |      |        |
|----------|------|--------|
| $C_{re}$ | typ. | 0.8 pF |
|          | max. | 1.0 pF |

Collector cut-off current

$I_E = 0; V_{CB} = 20 \text{ V}$

|           |      |        |
|-----------|------|--------|
| $I_{CBO}$ | max. | 500 nA |
|-----------|------|--------|

$I_E = 0; V_{CB} = 20 \text{ V}; T_{amb} = 150^\circ\text{C}$

|           |      |                  |
|-----------|------|------------------|
| $I_{CBO}$ | max. | 10 $\mu\text{A}$ |
|-----------|------|------------------|

Emitter-base cut-off current

$I_C = 0; V_{EB} = 2 \text{ V}$

|           |      |        |
|-----------|------|--------|
| $I_{EBO}$ | max. | 500 nA |
|-----------|------|--------|

y-parameters at  $f = 100 \text{ MHz}$  (common base)

$I_C = 2 \text{ mA}; V_{CE} = 10 \text{ V}$

|                                    |                |      |                   |
|------------------------------------|----------------|------|-------------------|
| Input conductance                  | $g_{ib}$       | typ. | 66 mS             |
| Input susceptance                  | $-b_{ib}$      | typ. | 15 mS             |
| Feedback admittance                | $ Y_{rb} $     | typ. | 190 mS            |
| Phase angle of feedback admittance | $\varphi_{rb}$ | typ. | $280^\circ$       |
| Transfer admittance                | $ Y_{fb} $     | typ. | 66 mS             |
| Phase angle of transfer admittance | $\varphi_{fb}$ | typ. | $155^\circ$       |
| Output conductance                 | $g_{ob}$       | typ. | 15 $\mu\text{S}$  |
| Output susceptance                 | $b_{ob}$       | typ. | 660 $\mu\text{S}$ |

y-parameters at  $f = 50 \text{ MHz}$  (common base)

$-I_E = 3 \text{ mA}; V_{CB} = 10 \text{ V}$

|                                    |                |      |                   |
|------------------------------------|----------------|------|-------------------|
| Input conductance                  | $g_{ib}$       | typ. | 9.5 mS            |
| Input susceptance                  | $-b_{ib}$      | typ. | 12 mS             |
| Feedback admittance                | $ Y_{rb} $     | typ. | 100 $\mu\text{S}$ |
| Phase angle of feedback admittance | $\varphi_{rb}$ | typ. | $270^\circ$       |
| Transfer admittance                | $ Y_{fb} $     | typ. | 95 mS             |
| Phase angle of transfer admittance | $\varphi_{fb}$ | typ. | $160^\circ$       |
| Output conductance                 | $g_{ob}$       | typ. | 10 $\mu\text{S}$  |
| Output susceptance                 | $b_{ob}$       | typ. | 350 $\mu\text{S}$ |

y-parameters at  $f = 200 \text{ MHz}$  (common base)

$-I_E = 3 \text{ mA}; V_{CB} = 10 \text{ V}$

|                                    |                |      |                   |
|------------------------------------|----------------|------|-------------------|
| Input conductance                  | $g_{ib}$       | typ. | 70 mS             |
| Input susceptance                  | $-b_{ib}$      | typ. | 46 mS             |
| Feedback admittance                | $ Y_{rb} $     | typ. | 340 $\mu\text{S}$ |
| Phase angle of feedback admittance | $\varphi_{rb}$ | typ. | $275^\circ$       |
| Transfer admittance                | $ Y_{fb} $     | typ. | 85 mS             |
| Phase angle of transfer admittance | $\varphi_{fb}$ | typ. | $130^\circ$       |
| Output conductance                 | $g_{ob}$       | typ. | 75 $\mu\text{S}$  |
| Output susceptance                 | $b_{ob}$       | typ. | 1.3 mS            |