

## PNP 4 GHz wideband transistor


**BFQ32**

N AMER PHILIPS/DISCRETE

69E D

## DESCRIPTION

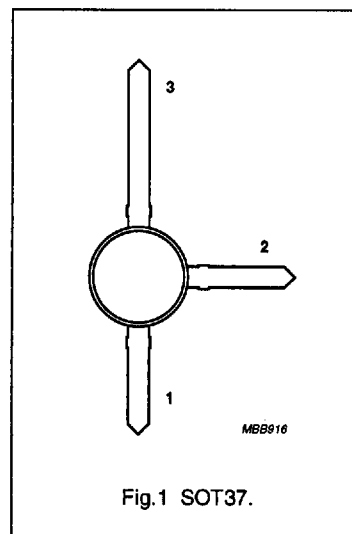
PNP transistor in a plastic SOT37 envelope, intended for use in UHF applications such as broadband aerial amplifiers (30 to 860 MHz) and in microwave amplifiers such as radar systems, spectrum analyzers etc.

The device offers a high transition frequency and a low intermodulation distortion figure over a wide current range.

NPN complement is BFR96.

## PINNING

| PIN            | DESCRIPTION |
|----------------|-------------|
| Code: BFQ32/02 |             |
| 1              | base        |
| 2              | emitter     |
| 3              | collector   |



## QUICK REFERENCE DATA

| SYMBOL    | PARAMETER                 | CONDITIONS                                                                                                                                | MIN. | TYP. | MAX. | UNIT |
|-----------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| $V_{CE0}$ | collector-emitter voltage | open base                                                                                                                                 | -    | -    | -15  | V    |
| $I_C$     | DC collector current      |                                                                                                                                           | -    | -    | -100 | mA   |
| $P_{tot}$ | total power dissipation   | up to $T_s = 143^\circ\text{C}$ (note 1)                                                                                                  | -    | -    | 700  | mW   |
| $f_T$     | transition frequency      | $I_C = -70\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ;<br>$f = 500\text{ MHz}$                                                                 | 4    | -    | -    | GHz  |
| $C_{re}$  | feedback capacitance      | $I_C = -10\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $f = 1\text{ MHz}$                                                                      | -    | 1.3  | -    | pF   |
| F         | noise figure              | $I_C = -50\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ;<br>$f = 500\text{ MHz}$ ; $Z_S = \text{opt.}$                                           | -    | 3.75 | -    | dB   |
| $V_O$     | output voltage            | $I_C = -50\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ;<br>$R_L = 75\ \Omega$ ; $f_{(p+q-r)} = 493.25\text{ MHz}$ ;<br>$d_{im} = -60\text{ dB}$ | -    | 500  | -    | mV   |

## Note

- $T_s$  is the temperature at the soldering point of the collector lead.

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## LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

| SYMBOL    | PARAMETER                 | CONDITIONS                    | MIN. | MAX. | UNIT |
|-----------|---------------------------|-------------------------------|------|------|------|
| $V_{CBO}$ | collector-base voltage    | open emitter                  | -    | -20  | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                     | -    | -15  | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                | -    | -3   | V    |
| $I_C$     | DC collector current      |                               | -    | -100 | mA   |
| $I_{CM}$  | peak collector current    | $f > 1$ MHz                   | -    | -150 | mA   |
| $P_{tot}$ | total power dissipation   | up to $T_s = 143$ °C (note 1) | -    | 700  | mW   |
| $T_{stg}$ | storage temperature       |                               | -65  | 150  | °C   |
| $T_j$     | junction temperature      |                               | -    | 175  | °C   |

## THERMAL RESISTANCE

| SYMBOL        | PARAMETER                                           | CONDITIONS                    | THERMAL RESISTANCE |
|---------------|-----------------------------------------------------|-------------------------------|--------------------|
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | up to $T_s = 143$ °C (note 1) | 45 K/W             |

## Note

- $T_s$  is the temperature at the soldering point of the collector lead.

## CHARACTERISTICS

 $T_j = 25$  °C unless otherwise specified.

| SYMBOL    | PARAMETER                                 | CONDITIONS                                                                          | MIN. | TYP. | MAX. | UNIT |
|-----------|-------------------------------------------|-------------------------------------------------------------------------------------|------|------|------|------|
| $I_{CBO}$ | collector cut-off current                 | $I_E = 0$ ; $V_{CB} = -10$ V                                                        | -    | -    | -100 | nA   |
| $h_{FE}$  | DC current gain                           | $I_C = -70$ mA; $V_{CE} = -10$ V                                                    | 20   | 50   | -    |      |
| $f_T$     | transition frequency                      | $I_C = -70$ mA; $V_{CE} = -10$ V;<br>$f = 500$ MHz                                  | 4    | 5    | -    | GHz  |
| $C_c$     | collector capacitance                     | $I_E = 0$ ; $V_{CB} = -10$ V; $f = 1$ MHz                                           | -    | 1.3  | -    | pF   |
| $C_e$     | emitter capacitance                       | $I_C = 0$ ; $V_{EB} = -0.5$ V; $f = 1$ MHz                                          | -    | 6    | -    | pF   |
| $C_{re}$  | feedback capacitance                      | $I_C = -10$ mA; $V_{CE} = -10$ V; $f = 1$ MHz                                       | -    | 1.3  | -    | pF   |
| F         | noise figure                              | $I_C = -50$ mA; $V_{CE} = -10$ V;<br>$f = 500$ MHz; $T_{amb} = 25$ °C; $Z_S = opt.$ | -    | 3.75 | -    | dB   |
| $G_{UM}$  | maximum unilateral power gain<br>(note 1) | $I_C = -50$ mA; $V_{CE} = -10$ V;<br>$f = 500$ MHz; $T_{amb} = 25$ °C               | -    | 14   | -    | dB   |
| $V_O$     | output voltage                            | note 2                                                                              | -    | 500  | -    | mV   |

## Notes

- $G_{UM}$  is the maximum unilateral power gain, assuming  $S_{12}$  is zero and  $G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)}$  dB.
- $d_{im} = -60$  dB;  $I_C = -50$  mA;  $V_{CE} = -10$  V;  $R_L = 75$   $\Omega$ ;  $T_{amb} = 25$  °C;  
 $V_p = V_O$  at  $d_{im} = -60$  dB;  $f_p = 495.25$  MHz;  
 $V_q = V_O - 6$  dB;  $f_q = 503.25$  MHz;  
 $V_r = V_O - 6$  dB;  $f_r = 505.25$  MHz;  
measured at  $f_{(p+q-r)} = 493.25$  MHz.

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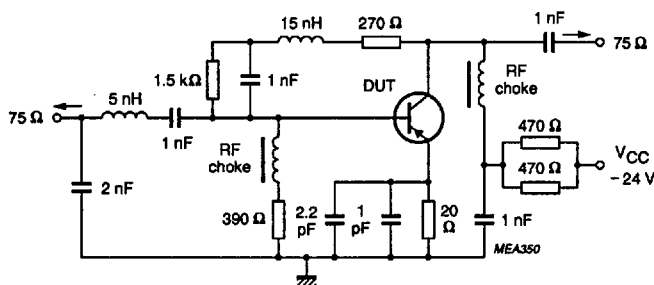


Fig.2 Intermodulation distortion test circuit.

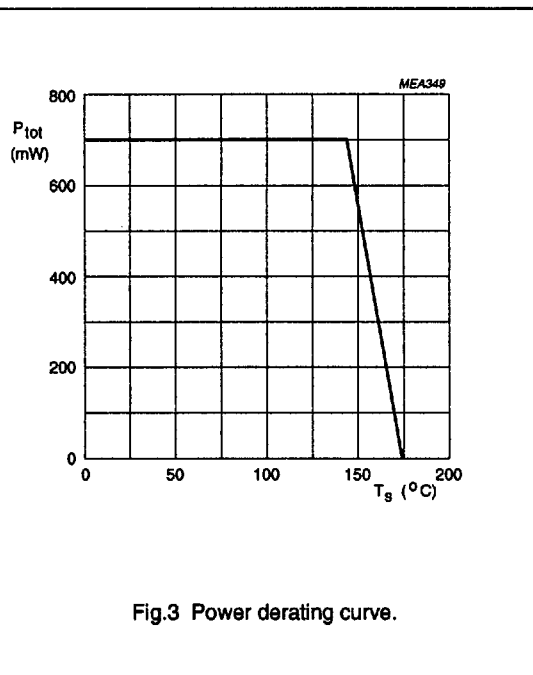
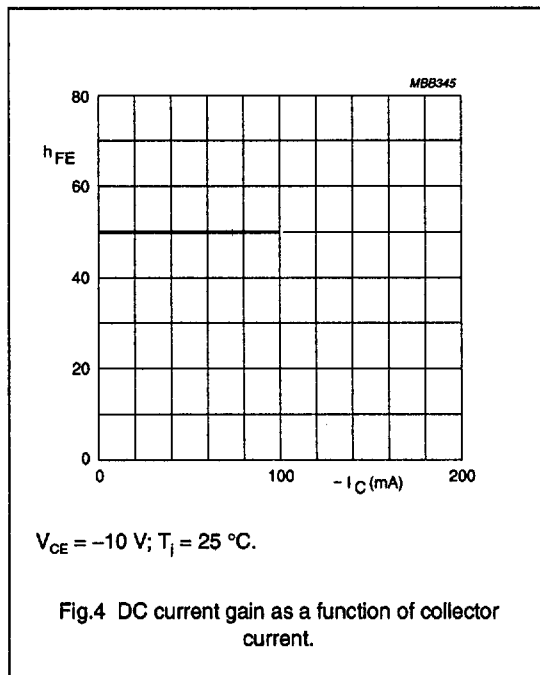


Fig.3 Power derating curve.



V<sub>CE</sub> = -10 V; T<sub>j</sub> = 25 °C.

Fig.4 DC current gain as a function of collector current.

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