

# ANTREX Electronics

Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** BFS17A,215  
**Manufacturer:** NXP USA Inc.  
**Package:** TO-236-3, SC-59, SOT-23-3  
**Availability:** Please confirm with sales

### Product Page:

<https://antrexco.com/product/details/nxp-usa-inc/bfs17a-215.html>

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### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

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# DATA SHEET

**BFS17A**

NPN 3 GHz wideband transistor

Product specification

September 1995



## NPN 3 GHz wideband transistor

## BFS17A

## DESCRIPTION

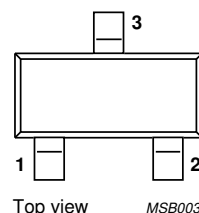
NPN transistor in a plastic SOT23 package.

## APPLICATIONS

- It is intended for RF applications such as oscillators in TV tuners.

## PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | base        |
| 2   | emitter     |
| 3   | collector   |



Marking code: E2p.

Fig.1 SOT23.

## QUICK REFERENCE DATA

| SYMBOL    | PARAMETER                     | CONDITIONS                                                                                                                                                         | TYP. | MAX. | UNIT |
|-----------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|
| $V_{CBO}$ | collector-base voltage        | open emitter                                                                                                                                                       | —    | 25   | V    |
| $V_{CEO}$ | collector-emitter voltage     | open base                                                                                                                                                          | —    | 15   | V    |
| $I_C$     | DC collector current          |                                                                                                                                                                    | —    | 25   | mA   |
| $P_{tot}$ | total power dissipation       | up to $T_s = 70\text{ °C}$ ; note 1                                                                                                                                | —    | 300  | mW   |
| $f_T$     | transition frequency          | $I_C = 25\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$                                                                     | 2.8  | —    | GHz  |
| $G_{UM}$  | maximum unilateral power gain | $I_C = 14\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 800\text{ MHz}$                                                                                               | 13.5 | —    | dB   |
| $F$       | noise figure                  | $I_C = 2\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$                                                                      | 2.5  | —    | dB   |
| $V_O$     | output voltage                | $d_{im} = -60\text{ dB}$ ; $I_C = 14\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $R_L = 75\text{ }\Omega$ ; $T_{amb} = 25\text{ °C}$ ; $f_{(p+q-r)} = 793.25\text{ MHz}$ | 150  | —    | mV   |

## LIMITING VALUES

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

| SYMBOL    | PARAMETER                 | CONDITIONS                          | MIN. | MAX. | UNIT |
|-----------|---------------------------|-------------------------------------|------|------|------|
| $V_{CBO}$ | collector-base voltage    | open emitter                        | —    | 25   | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                           | —    | 15   | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                      | —    | 2.5  | V    |
| $I_C$     | DC collector current      |                                     | —    | 25   | mA   |
| $I_{CM}$  | peak collector current    |                                     | —    | 50   | mA   |
| $P_{tot}$ | total power dissipation   | up to $T_s = 70\text{ °C}$ ; note 1 | —    | 300  | mW   |
| $T_{stg}$ | storage temperature       |                                     | −65  | +150 | °C   |
| $T_j$     | junction temperature      |                                     | —    | 150  | °C   |

## Note to the Quick reference data and the Limiting values

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

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## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                           | CONDITIONS                          | VALUE | UNIT |
|---------------|-----------------------------------------------------|-------------------------------------|-------|------|
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | up to $T_s = 70\text{ °C}$ ; note 1 | 260   | K/W  |

## Note

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

## CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise specified.

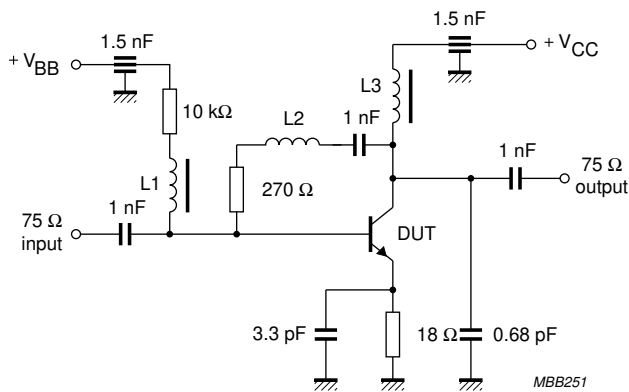
| SYMBOL    | PARAMETER                               | CONDITIONS                                                                                                               | MIN. | TYP. | MAX. | UNIT |
|-----------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| $I_{CBO}$ | collector cut-off current               | $I_E = 0$ ; $V_{CB} = 10\text{ V}$                                                                                       | –    | –    | 50   | nA   |
| $h_{FE}$  | DC current gain                         | $I_C = 2\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $T_{amb} = 25\text{ °C}$                                                   | 25   | 90   | –    |      |
|           |                                         | $I_C = 25\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $T_{amb} = 25\text{ °C}$                                                  | 25   | 90   | –    |      |
| $f_T$     | transition frequency                    | $I_C = 25\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$                           | –    | 2.8  | –    | GHz  |
| $C_c$     | collector capacitance                   | $I_E = 0$ ; $V_{CB} = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$                                       | –    | 0.7  | –    | pF   |
| $C_e$     | emitter capacitance                     | $I_C = 0$ ; $V_{EB} = 0.5\text{ V}$ ; $f = 1\text{ MHz}$                                                                 | –    | 1.25 | –    | pF   |
| $C_{re}$  | feedback capacitance                    | $I_C = 0$ ; $V_{CE} = 5\text{ V}$ ; $f = 1\text{ MHz}$                                                                   | –    | 0.6  | –    | pF   |
| $G_{UM}$  | maximum unilateral power gain<br>note 1 | $I_C = 14\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 800\text{ MHz}$                                                     | –    | 13.5 | –    | dB   |
| F         | noise figure                            | $I_C = 2\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $Z_S = 60\text{ }\Omega$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$ | –    | 2.5  | –    | dB   |
| $V_O$     | output voltage                          | note 2                                                                                                                   | –    | 150  | –    | 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.
- $d_{im} = -60\text{ dB}$  (DIN 45004B);  $I_C = 14\text{ mA}$ ;  $V_{CE} = 10\text{ V}$ ;  $R_L = 75\text{ }\Omega$ ;  $T_{amb} = 25\text{ °C}$ ;  
 $V_p = V_O$ ;  $f_p = 795.25\text{ MHz}$ ;  
 $V_q = V_O - 6\text{ dB}$ ;  $f_q = 803.25\text{ MHz}$ ;  
 $V_r = V_O - 6\text{ dB}$ ;  $f_r = 805.25\text{ MHz}$ ;  
measured at  $f_{(p+q-r)} = 793.25\text{ MHz}$ .

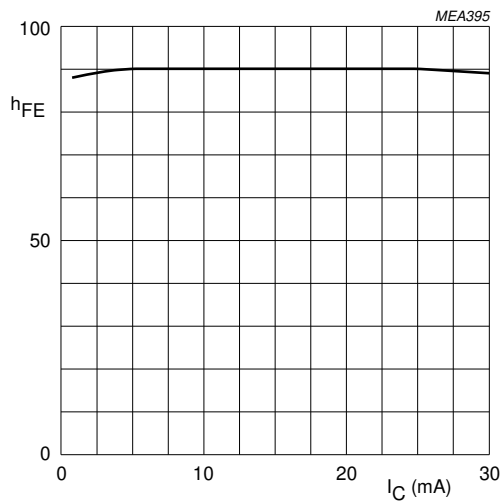
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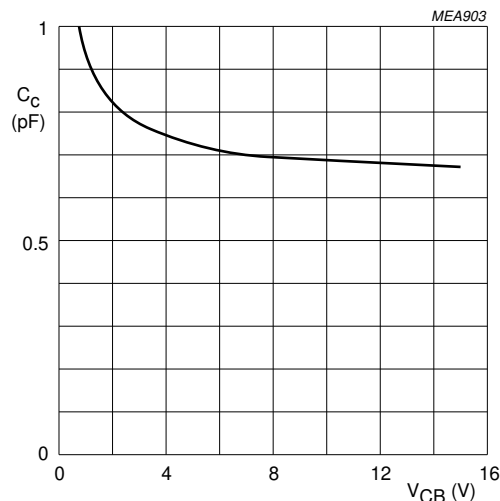
L1 = L3 = 5 μH Ferroxcube choke.  
L2 = 3 turns 0.4 mm copper wire; winding pitch 1 mm; internal diameter 3 mm.

Fig.2 Intermodulation distortion and second order intermodulation distortion test circuit.



$V_{CE} = 1\text{ V}$ ;  $T_{amb} = 25\text{ °C}$ .

Fig.3 DC current gain as a function of collector current.

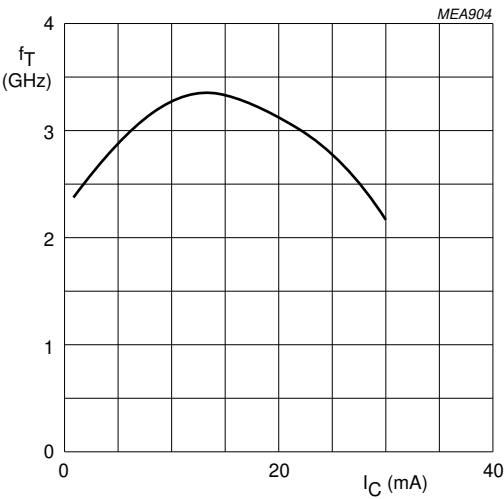


$I_E = 0$ ;  $f = 1\text{ MHz}$ ;  $T_{amb} = 25\text{ °C}$ .

Fig.4 Collector capacitance as a function of collector-base voltage.

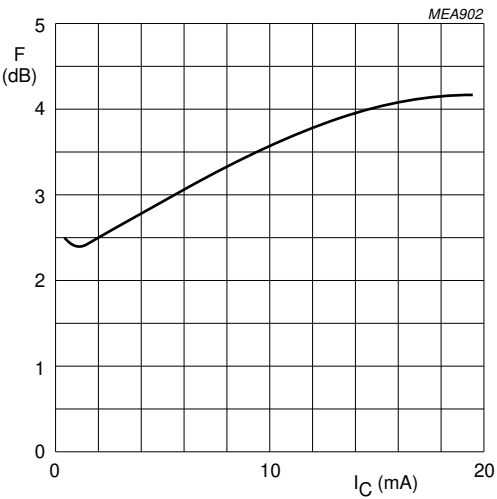
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$V_{CE} = 5\text{ V}$ ;  $f = 500\text{ MHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Fig.5 Transition frequency as a function of collector current.



$V_{CE} = 5\text{ V}$ ;  $Z_s = 60\text{ }\Omega$ ;  $f = 800\text{ MHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Fig.6 Minimum noise figure as a function of collector current.

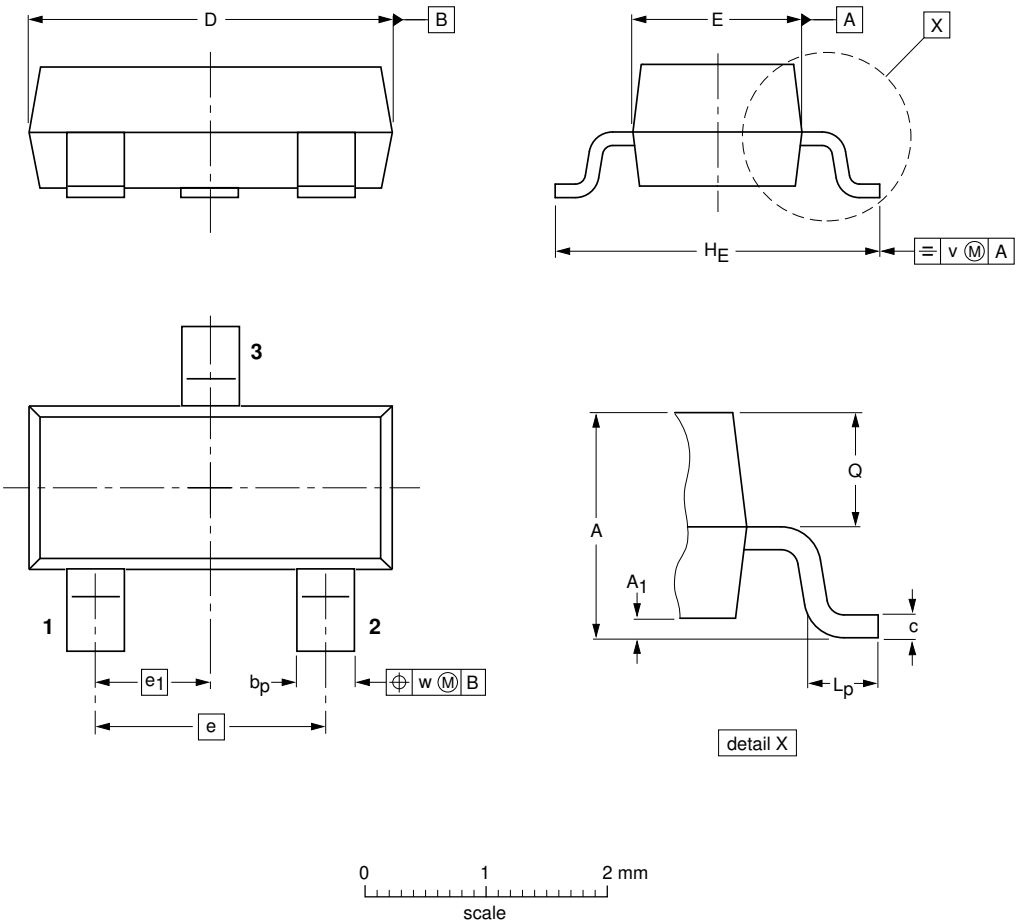
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max. | b <sub>p</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   |
|------|------------|------------------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm   | 1.1<br>0.9 | 0.1                    | 0.48<br>0.38   | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 0.95           | 2.5<br>2.1     | 0.45<br>0.15   | 0.55<br>0.45 | 0.2 | 0.1 |

| OUTLINE<br>VERSION | REFERENCES |          |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE                      |
|--------------------|------------|----------|-------|--|------------------------|---------------------------------|
|                    | IEC        | JEDEC    | JEITA |  |                        |                                 |
| SOT23              |            | TO-236AB |       |  |                        | <del>04-11-04</del><br>06-03-16 |

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## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION                                                                            |
|--------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

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