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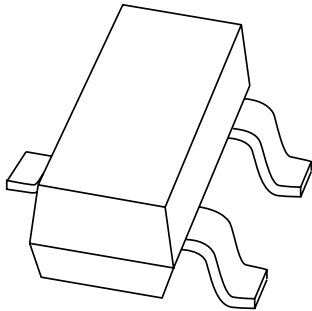
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Kind regards,

Team Nexperia

# DATA SHEET



## **BSR19; BSR19A** NPN high voltage transistors

Product data sheet  
Supersedes data of 2004 Jan 13

2004 Mar 15

## NPN high voltage transistors

## BSR19; BSR19A

## FEATURES

- Low current (max. 300 mA)
- High voltage (max. 160 V).

## APPLICATIONS

- General purpose switching and amplification
- Especially used for telephony applications.

## DESCRIPTION

NPN high-voltage transistor in a SOT23 plastic package.  
PNP complements: BSR20 and BSR20A.

## MARKING

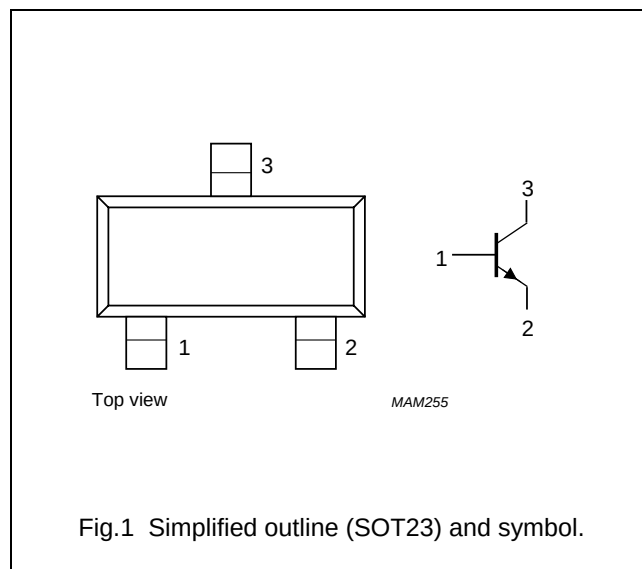
| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| BSR19       | 56* or U35                  |
| BSR19A      | 57* or U36                  |

## Note

- \* = p : Made in Hong Kong.  
\* = t : Made in Malaysia.  
\* = W : Made in China.

## PINNING

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



## ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | NAME    | DESCRIPTION                              | VERSION |
| BSR19       | –       | plastic surface mounted package; 3 leads | SOT23   |
| BSR19A      | –       | plastic surface mounted package; 3 leads | SOT23   |

## NPN high voltage transistors

## BSR19; BSR19A

## QUICK REFERENCE DATA

| SYMBOL           | PARAMETER                 | CONDITIONS                                                  | MIN. | MAX. | UNIT |
|------------------|---------------------------|-------------------------------------------------------------|------|------|------|
| V <sub>CBO</sub> | collector-base voltage    | open emitter                                                |      |      |      |
|                  | BSR19                     |                                                             | –    | 160  | V    |
|                  | BSR19A                    |                                                             | –    | 180  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                                                   |      |      |      |
|                  | BSR19                     |                                                             | –    | 140  | V    |
|                  | BSR19A                    |                                                             | –    | 160  | V    |
| I <sub>CM</sub>  | peak collector current    |                                                             | –    | 600  | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C                                    | –    | 250  | mW   |
| h <sub>FE</sub>  | DC current gain           | I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V               |      |      |      |
|                  | BSR19                     |                                                             | 60   | –    |      |
|                  | BSR19A                    |                                                             | 80   | –    |      |
| f <sub>T</sub>   | transition frequency      | I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 10 V; f = 100 MHz | 100  | 300  | MHz  |

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL           | PARAMETER                     | CONDITIONS               | MIN. | MAX. | UNIT |
|------------------|-------------------------------|--------------------------|------|------|------|
| V <sub>CBO</sub> | collector-base voltage        | open emitter             |      |      |      |
|                  | BSR19                         |                          | –    | 160  | V    |
|                  | BSR19A                        |                          | –    | 180  | V    |
| V <sub>CEO</sub> | collector-emitter voltage     | open base                |      |      |      |
|                  | BSR19                         |                          | –    | 140  | V    |
|                  | BSR19A                        |                          | –    | 160  | V    |
| V <sub>EBO</sub> | emitter-base voltage          | open collector           | –    | 6    | V    |
| I <sub>C</sub>   | collector current (DC)        |                          | –    | 300  | mA   |
| I <sub>CM</sub>  | peak collector current        |                          | –    | 600  | mA   |
| I <sub>B</sub>   | base current (DC)             |                          | –    | 100  | mA   |
| P <sub>tot</sub> | total power dissipation       | T <sub>amb</sub> ≤ 25 °C | –    | 250  | mW   |
| T <sub>stg</sub> | storage temperature           |                          | –65  | +150 | °C   |
| T <sub>j</sub>   | junction temperature          |                          | –    | 150  | °C   |
| T <sub>amb</sub> | operating ambient temperature |                          | –65  | +150 | °C   |

## THERMAL CHARACTERISTICS

| SYMBOL               | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|----------------------|---------------------------------------------|------------|-------|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | note 1     | 500   | K/W  |

## Note

1. Transistor mounted on an FR4 printed-circuit board.

## NPN high voltage transistors

## BSR19; BSR19A

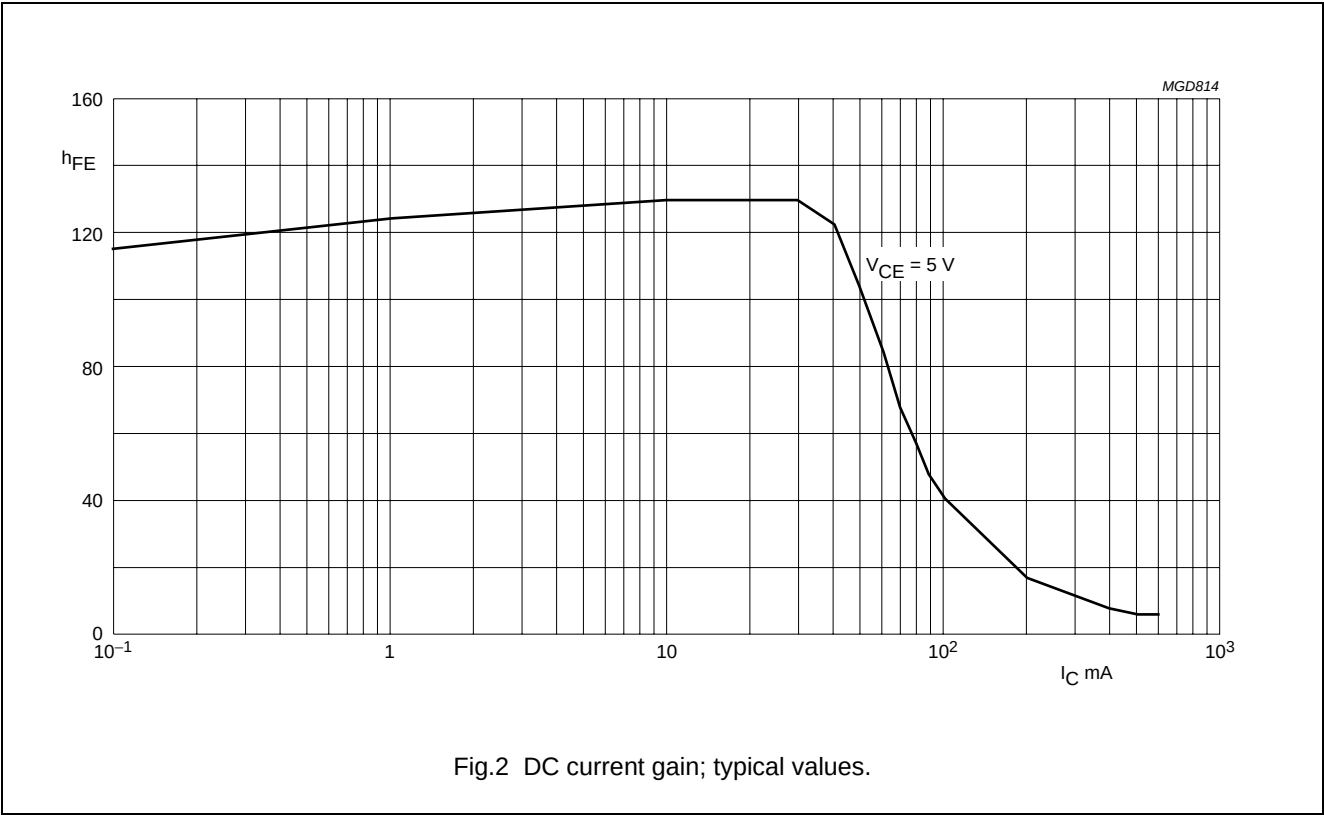
**CHARACTERISTICS**

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

| SYMBOL             | PARAMETER                                               | CONDITIONS                                                                                              | MIN. | MAX. | UNIT          |
|--------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------|------|---------------|
| $I_{\text{CBO}}$   | collector cut-off current<br>BSR19                      | $I_{\text{E}} = 0\text{ A}; V_{\text{CB}} = 100\text{ V}$                                               | –    | 100  | nA            |
|                    |                                                         | $I_{\text{E}} = 0\text{ A}; V_{\text{CB}} = 100\text{ V}; T_{\text{amb}} = 100\text{ }^{\circ}\text{C}$ | –    | 100  | $\mu\text{A}$ |
| $I_{\text{CBO}}$   | collector cut-off current<br>BSR19A                     | $I_{\text{E}} = 0\text{ A}; V_{\text{CB}} = 120\text{ V}$                                               | –    | 50   | nA            |
|                    |                                                         | $I_{\text{E}} = 0\text{ A}; V_{\text{CB}} = 120\text{ V}; T_{\text{amb}} = 100\text{ }^{\circ}\text{C}$ | –    | 50   | $\mu\text{A}$ |
| $I_{\text{EBO}}$   | emitter cut-off current                                 | $I_{\text{C}} = 0\text{ A}; V_{\text{EB}} = 4\text{ V}$                                                 | –    | 50   | nA            |
| $h_{\text{FE}}$    | DC current gain<br>BSR19<br>BSR19A                      | $I_{\text{C}} = 1\text{ mA}; V_{\text{CE}} = 5\text{ V}$                                                | 60   | –    |               |
|                    |                                                         |                                                                                                         | 80   | –    |               |
|                    | DC current gain<br>BSR19<br>BSR19A                      | $I_{\text{C}} = 10\text{ mA}; V_{\text{CE}} = 5\text{ V}$                                               | 60   | 250  |               |
|                    |                                                         |                                                                                                         | 80   | 250  |               |
|                    | DC current gain<br>BSR19<br>BSR19A                      | $I_{\text{C}} = 50\text{ mA}; V_{\text{CE}} = 5\text{ V}$                                               | 20   | –    |               |
|                    |                                                         |                                                                                                         | 30   | –    |               |
| $V_{\text{CEsat}}$ | collector-emitter saturation voltage                    | $I_{\text{C}} = 10\text{ mA}; I_{\text{B}} = 1\text{ mA}$                                               | –    | 150  | mV            |
| $V_{\text{CEsat}}$ | collector-emitter saturation voltage<br>BSR19<br>BSR19A | $I_{\text{C}} = 50\text{ mA}; I_{\text{B}} = 5\text{ mA}$                                               | –    | 250  | mV            |
|                    |                                                         |                                                                                                         | –    | 200  | mV            |
| $C_{\text{c}}$     | collector capacitance                                   | $I_{\text{E}} = 0\text{ A}; V_{\text{CB}} = 10\text{ V}; f = 1\text{ MHz}$                              | –    | 6    | pF            |
| $f_{\text{T}}$     | transition frequency                                    | $I_{\text{C}} = 10\text{ mA}; V_{\text{CE}} = 10\text{ V}; f = 100\text{ MHz}$                          | 100  | 300  | MHz           |

NPN high voltage transistors

BSR19; BSR19A



NPN high voltage transistors

BSR19; BSR19A

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23

0 1 2 mm  
scale

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 |       |  |                        | 04-11-04<br>06-03-16 |

## NPN high voltage transistors

## BSR19; BSR19A

## 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.                                     |

## Notes

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## **Contact information**

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