# Silicon NPN Planar RF Transistor

## Features

- Low noise figure
- High transition frequency $f_T$ = 7.5 GHz
- Excellent large signal behaviour
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

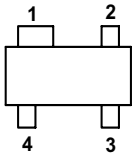
## Applications

For low noise, low distortion broadband amplifiers in telecommunications and antenna systems and power amplifiers

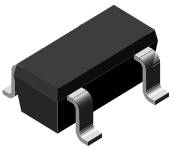
for DECT and PCN systems at collector currents between 20 mA and 80 mA up to 2 GHz

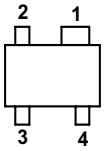

SOT-143



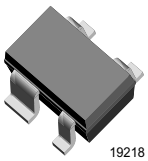



SOT-143R






SOT-343



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Electrostatic sensitive device.
Observe precautions for handling.

## Mechanical Data

**Typ:** BFP196T
**Case:** SOT-143 Plastic case
**Weight:** approx. 8.0 mg
**Pinning:**
1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter
**Typ:** BFP196TR
**Case:** SOT-143R Plastic case
**Weight:** approx. 8.0 mg
**Pinning:**
1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter
**Typ:** BFP196TW
**Case:** SOT-343 Plastic case
**Weight:** approx. 6.0 mg
**Pinning:**
1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter

## Parts Table

| Part | Marking | Package |
|---|---|---|
| BFP196T | 196 | SOT-143 |
| BFP196TR | R96 | SOT-143R |
| BFP196TW | W96 | SOT-343 |

## Absolute Maximum Ratings

$T_{amb}$ = 25 °C, unless otherwise specified

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-base voltage | | $V_{CBO}$ | 20 | V |
| Collector-emitter voltage | | $V_{CEO}$ | 12 | V |
| Emitter-base voltage | | $V_{EBO}$ | 2 | V |
| Collector current | | $I_C$ | 100 | mA |
| Total power dissipation | $T_{amb} \leq 60$ °C | $P_{tot}$ | 500 | mW |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | - 65 to + 150 | °C |

## Maximum Thermal Resistance

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Junction ambient | 1) | $R_{thJA}$ | 180 | K/W |

1) on glass fibre printed board (25 x 20 x 1.5) $mm^3$ plated with 35 µm Cu

## Electrical DC Characteristics

$T_{amb}$ = 25 °C, unless otherwise specified

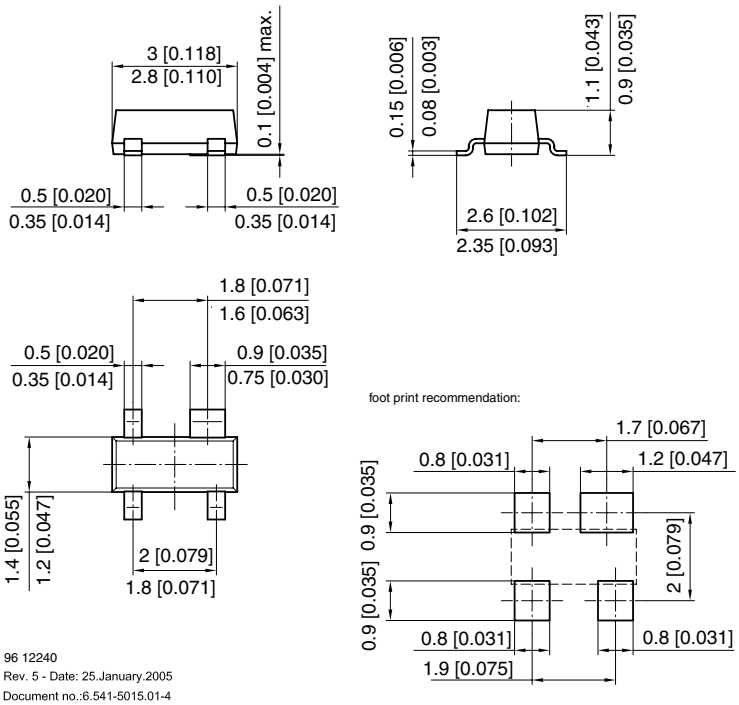
| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-emitter cut-off current | $V_{CE}$ = 20 V, $V_{BE}$ = 0 | $I_{CES}$ | | | 100 | µA |
| Collector-base cut-off current | $V_{CB}$ = 10 V, $I_E$ = 0 | $I_{CBO}$ | | | 100 | nA |
| Emitter-base cut-off current | $V_{EB}$ = 1 V, $I_C$ = 0 | $I_{EBO}$ | | | 1 | µA |
| Collector-emitter breakdown voltage | $I_C$ = 1 mA, $I_B$ = 0 | $V_{(BR)CEO}$ | 12 | | | V |
| Collector-emitter saturation voltage | $I_C$ = 70 mA, $I_B$ = 7 mA | $V_{CEsat}$ | | 0.1 | 0.5 | V |
| DC forward current transfer ratio | $V_{CE}$ = 8 V, $I_C$ = 50 mA | $h_{FE}$ | 50 | 100 | 150 | |

## Electrical AC Characteristics

$T_{amb}$ = 25 °C, unless otherwise specified

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Transition frequency | $V_{CE}$ = 8 V, $I_C$ = 50 mA, f = 1 GHz | $f_T$ | 6 | 7.5 | | GHz |
| Collector-base capacitance | $V_{CB}$ = 10 V, f = 1 MHz | $C_{cb}$ | | 1.0 | 1.4 | pF |
| Collector-emitter capacitance | $V_{CE}$ = 10 V, f = 1 MHz | $C_{ce}$ | | 0.3 | | pF |
| Emitter-base capacitance | $V_{EB}$ = 0.5 V, f = 1 MHz | $C_{eb}$ | | 3.5 | | pF |
| Noise figure | $V_{CE}$ = 8 V, $I_C$ = 20 mA, $Z_S = Z_{Sopt}$, $Z_L$ = 50 Ω, f = 900 MHz | F | | 1.5 | | dB |
| | $V_{CE}$ = 8 V, $I_C$ = 20 mA, $Z_S = Z_{Sopt}$, $Z_L$ = 50 Ω, f = 2 GHz | F | | 2.5 | | dB |
| Power gain | $V_{CE}$ = 8 V, $I_C$ = 50 mA, $Z_S = Z_{Sopt}$, $Z_L$ = 50 Ω, f = 900 MHz | $G_{pe}$ | | 16 | | dB |
| | $V_{CE}$ = 8 V, $I_C$ = 50 mA, $Z_S = Z_{Sopt}$, $Z_L$ = 50 Ω, f = 2 GHz | $G_{pe}$ | | 10 | | dB |
| Transducer gain | $V_{CE}$ = 8 V, $I_C$ = 50 mA, $Z_0$ = 50 Ω, f = 900 MHz | $\lvert S_{21e}\rvert^2$ | | 12.5 | | dB |
| | $V_{CE}$ = 8 V, $I_C$ = 50 mA, $Z_0$ = 50 Ω, f = 2 GHz | $\lvert S_{21e}\rvert^2$ | | 6.5 | | dB |
| Third order intercept point at output | $V_{CE}$ = 8 V, $I_C$ = 50 mA, f = 900 MHz | $IP_3$ | | 36 | | dBm |

## Package Dimensions in mm

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Rev. 5 - Date: 25.January.2005
Document no.:6.541-5015.01-4

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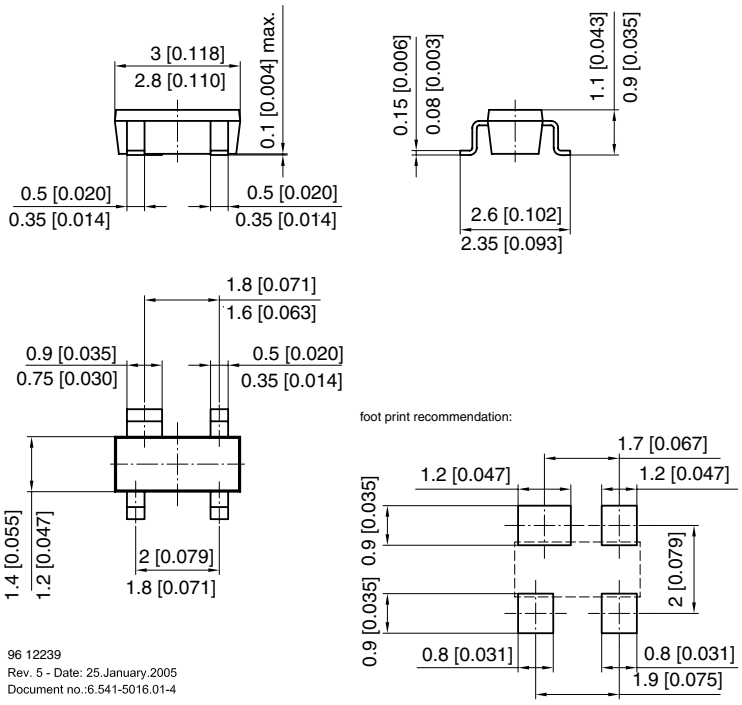


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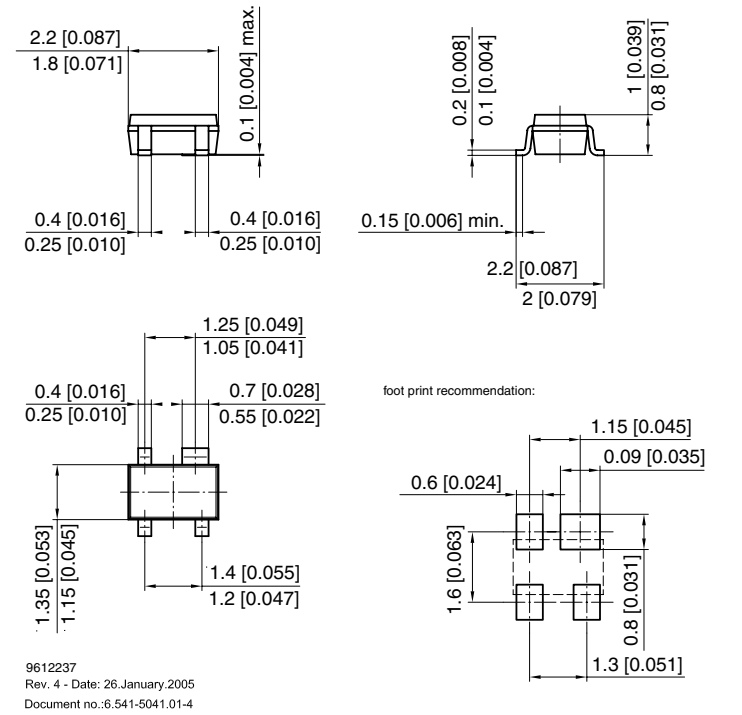


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Rev. 4 - Date: 26.January.2005
Document no.:6.541-5041.01-4

## Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.



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