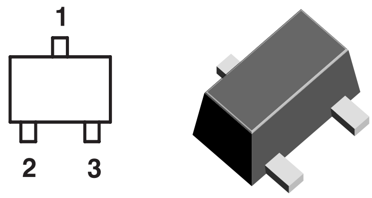
Silicon NPN Planar RF Transistor

Description

The main purpose of this bipolar transistor is broadband amplification up to 2 GHz. In the space-saving 3-pin surface-mount SOT-490 package electrical performance and reliability are taken to a new level covering a smaller footprint on PC boards than previous packages. In addition to space savings, the SOT-490 provides a higher level of reliability than other 3-pin packages, such as more resistance to moisture. Due to the short length of its leads the SOT-490 is also reducing package inductances resulting in some better electrical performance. All of these aspects make this device an ideal choice for demanding RF applications.



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Electrostatic sensitive device.
Observe precautions for handling.

Features

- Small feedback capacitance
- Low noise figure
- High power gain
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Applications

For low noise and high gain broadband amplifiers at collector currents from 0.5 mA to 12 mA.

Mechanical Data

Typ: BFR181TF
Case: SOT-490 Plastic case
Weight: approx. 2.5 mg
Pinning: 1 = Collector, 2 = Base, 3 = Emitter

Parts Table

Part	Marking	Package
BFR181TF	RF	SOT-490

Absolute Maximum Ratings

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

Parameter	Test condition	Symbol	Value	Unit
Collector-base voltage		V_{CBO}	15	V
Collector-emitter voltage		V_{CEO}	10	V
Emitter-base voltage		V_{EBO}	2	V
Collector current		I_C	20	mA
Base current		I_B	2	mA
Total power dissipation	$T_{amb} \le 78$ °C	P_{tot}	160	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}	450	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

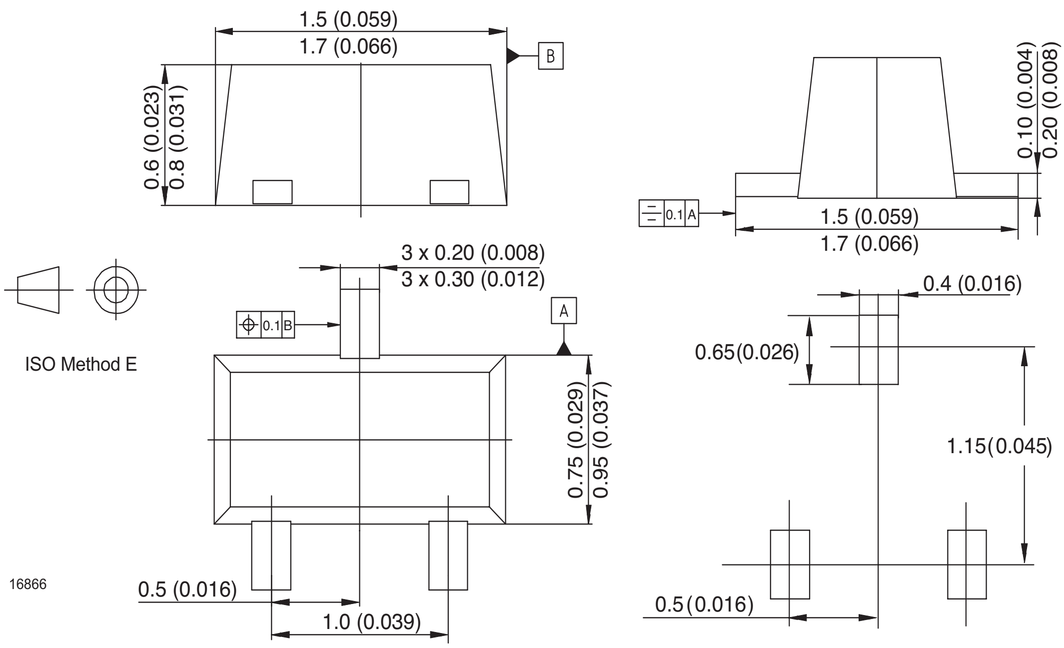
Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector-emitter cut-off current	V_{CE} = 15 V, V_{BE} = 0	I_{CES}			100	µA
Collector-base cut-off current	V_{CB} = 10 V, I_E = 0	I_{CBO}			100	nA
Emitter-base cut-off current	V_{EB} = 1 V, I_C = 0	I_{EBO}			1	µA
Collector-emitter breakdown voltage	I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	10			V
Collector-emitter saturation voltage	I_C = 15 mA, I_B = 1.5 mA	V_{CEsat}		0.1	0.4	V
DC forward current transfer ratio	V_{CE} = 6 V, I_C = 5 mA	h_{FE}	50	100		
	V_{CE} = 6 V, I_C = 10 mA	h_{FE}		100		

Electrical AC Characteristics

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Transition frequency	V_{CE} = 3 V, I_C = 6 mA, f = 500 MHz	f_T		7		GHz
	V_{CE} = 8 V, I_C = 20 mA, f = 500 MHz	f_T		8		GHz
Collector-base capacitance	V_{CB} = 10 V, f = 1 MHz	C_{cb}		0.3		pF
Collector-emitter capacitance	V_{CE} = 10 V, f = 1 MHz	C_{ce}		0.2		pF
Emitter-base capacitance	V_{EB} = 0.5 V, f = 1 MHz	C_{eb}		0.4		pF
Noise figure	V_{CE} = 5 V, I_C = 3 mA, $Z_S = Z_{Sopt}$, f = 900 MHz	F		1.4		dB
	V_{CE} = 5 V, I_C = 3 mA, $Z_S = Z_{Sopt}$, f = 1.75 GHz	F		2.2		dB
Power gain	V_{CE} = 8 V, Z_S = 50 Ω, $Z_L = Z_{Lopt}$, I_C = 8 mA, f = 900 MHz	G_{pe}		16		dB
	V_{CE} = 8 V, Z_S = 50 Ω, $Z_L = Z_{Lopt}$, I_C = 8 mA, f = 1.75 GHz	G_{pe}		12.5		dB
Transducer gain	V_{CE} = 8 V, I_C = 8 mA, f = 900 MHz, Z_O = 50 Ω	$\|S_{21e}\|^2$		15		dB

Package Dimensions in mm



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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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