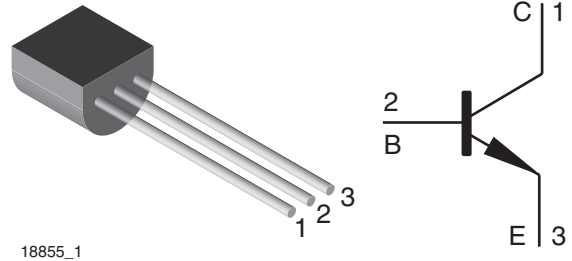


## Small Signal Transistors (NPN)

### Features

- NPN Silicon Epitaxial Planar Transistors
- These transistors are subdivided into three groups A, B, and C according to their current gain. The type BC546 is available in groups A and B, however, the types BC547 and BC548 can be supplied in all three groups. As complementary types the PNP transistors BC556...BC558 are recommended.
- On special request, these transistors are also manufactured in the pin configuration TO-18.



### Mechanical Data

**Case:** TO-92 Plastic case

**Weight:** approx. 177 mg

**Packaging Codes/Options:**

BULK / 5 k per container 20 k/box

TAP / 4 k per Ammopack 20 k/box

### Parts Table

Part	Ordering code	Remarks
BC546A	BC546A-BULK or BC546A-TAP	Bulk / Ammopack
BC546B	BC546B-BULK or BC546B-TAP	Bulk / Ammopack
BC547A	BC547A-BULK or BC547A-TAP	Bulk / Ammopack
BC547B	BC547B-BULK or BC547B-TAP	Bulk / Ammopack
BC547C	BC547C-BULK or BC547C-TAP	Bulk / Ammopack
BC548A	BC548A-BULK or BC548A-TAP	Bulk / Ammopack
BC548B	BC548B-BULK or BC548B-TAP	Bulk / Ammopack
BC548C	BC548C-BULK or BC548C-TAP	Bulk / Ammopack

### Absolute Maximum Ratings

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

Parameter	Test condition	Part	Symbol	Value	Unit
Collector - base voltage		BC546	$V_{CBO}$	80	V
		BC547	$V_{CBO}$	50	V
		BC548	$V_{CBO}$	30	V
Collector - emitter voltage		BC546	$V_{CES}$	80	V
		BC547	$V_{CES}$	50	V
		BC548	$V_{CES}$	30	V
		BC546	$V_{CEO}$	65	V
		BC547	$V_{CEO}$	45	V
		BC548	$V_{CEO}$	30	V
Emitter - base voltage		BC546	$V_{EBO}$	6	V
		BC547	$V_{EBO}$	6	V
		BC548	$V_{EBO}$	5	V
Collector current			$I_C$	100	mA
Collector peak current			$I_{CM}$	200	mA
Peak base current			$I_{BM}$	200	mA
Peak emitter current			$-I_{EM}$	200	mA
Power dissipation	$T_{amb} = 25\text{ }^{\circ}\text{C}$		$P_{tot}$	500 <sup>1)</sup>	mW

<sup>1)</sup> Valid provided that leads are kept at ambient temperature at distance of 2 mm from case.

### Maximum Thermal Resistance

Parameter	Test condition	Symbol	Value	Unit
Thermal resistance junction to ambient air		$R\theta_{JA}$	250 <sup>1)</sup>	$^{\circ}\text{C}/\text{W}$
Junction temperature		$T_j$	150	$^{\circ}\text{C}$
Storage temperature range		$T_S$	- 65 to + 150	$^{\circ}\text{C}$

<sup>1)</sup> Valid provided that leads are kept at ambient temperature at distance of 2 mm from case.

### Electrical DC Characteristics

Parameter	Test condition	Part	Symbol	Min	Typ	Max	Unit
Small signal current gain (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{fe}$		220		
Small signal current gain (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{fe}$		330		
Small signal current gain (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{fe}$		600		
Input impedance (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{ie}$	1.6	2.7	4.5	$k\Omega$
Input impedance (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{ie}$	3.2	4.5	8.5	$k\Omega$
Input impedance (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{ie}$	6	8.7	15	$k\Omega$
Output admittance (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{oe}$		18	30	$\mu\text{S}$
Output admittance (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{oe}$		30	60	$\mu\text{S}$
Output admittance (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{oe}$		60	110	$\mu\text{S}$



Parameter	Test condition	Part	Symbol	Min	Typ	Max	Unit
Reverse voltage transfer ratio (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{re}$		$1.5 \times 10^{-4}$		
Reverse voltage transfer ratio (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{re}$		$2 \times 10^{-4}$		
Reverse voltage transfer ratio (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$		$h_{re}$		$3 \times 10^{-4}$		
DC current gain (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 10\text{ }\mu\text{A}$		$h_{FE}$		90		
DC current gain (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 10\text{ }\mu\text{A}$		$h_{FE}$		150		
DC current gain (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 10\text{ }\mu\text{A}$		$h_{FE}$		270		
DC current gain (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$		$h_{FE}$	110	180	220	
DC current gain (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$		$h_{FE}$	200	290	450	
DC current gain (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$		$h_{FE}$	420	500	800	
DC current gain (current gain group A)	$V_{CE} = 5\text{ V}, I_C = 100\text{ mA}$		$h_{FE}$		120		
DC current gain (current gain group B)	$V_{CE} = 5\text{ V}, I_C = 100\text{ mA}$		$h_{FE}$		200		
DC current gain (current gain group C)	$V_{CE} = 5\text{ V}, I_C = 100\text{ mA}$		$h_{FE}$		400		
Collector saturation voltage	$I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$		$V_{CEsat}$		80	200	mV
	$I_C = 100\text{ mA}, I_B = 5\text{ mA}$		$V_{CEsat}$		200	600	mV
Base saturation voltage	$I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$		$V_{BEsat}$		700		mV
	$I_C = 100\text{ mA}, I_B = 5\text{ mA}$		$V_{BEsat}$		900		mV
Base - emitter voltage	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$		$V_{BE}$	580	660	700	mV
	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$		$V_{BE}$			720	mV
Collector-emitter cut-off current	$V_{CE} = 80\text{ V}$	BC546	$I_{CES}$		0.2	15	nA
	$V_{CE} = 50\text{ V}$	BC547	$I_{CES}$		0.2	15	nA
	$V_{CE} = 30\text{ V}$	BC548	$I_{CES}$		0.2	15	nA
	$V_{CE} = 80\text{ V}, T_j = 125\text{ }^\circ\text{C}$	BC546	$I_{CES}$			4	$\mu\text{A}$
	$V_{CE} = 50\text{ V}, T_j = 125\text{ }^\circ\text{C}$	BC547	$I_{CES}$			4	$\mu\text{A}$
	$V_{CE} = 30\text{ V}, T_j = 125\text{ }^\circ\text{C}$	BC548	$I_{CES}$			4	$\mu\text{A}$

## Electrical AC Characteristics

Parameter	Test condition	Part	Symbol	Min	Typ	Max	Unit
Gain - bandwidth product	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 100\text{ MHz}$		$f_T$		300		MHz
Collector - base capacitance	$V_{CB} = 10\text{ V}, f = 1\text{ MHz}$		$C_{CBO}$		3.5	6	pF
Emitter - base capacitance	$V_{EB} = 0.5\text{ V}, f = 1\text{ MHz}$		$C_{EBO}$		9		pF
Noise figure	$V_{CE} = 5\text{ V}, I_C = 200\text{ }\mu\text{A}, R_G = 2\text{ k}\Omega, f = 1\text{ kHz}, \Delta f = 200\text{ Hz}$	BC546	F		2	10	dB
		BC547	F		2	10	dB
		BC548	F		1.2	4	dB

## Typical Characteristics ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

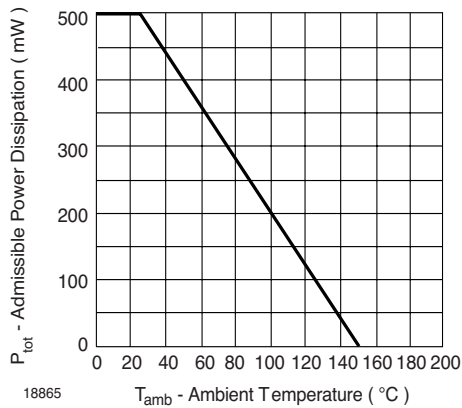


Figure 1. Admissible Power Dissipation vs. Ambient Temperature

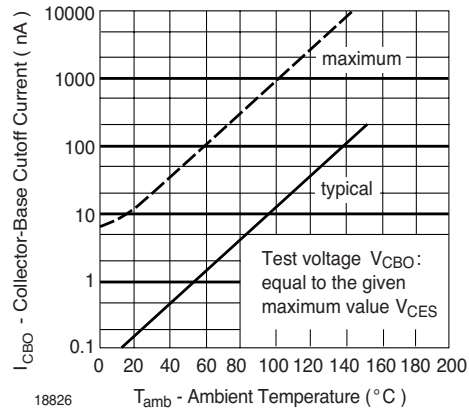


Figure 4. Collector-Base Cutoff Current vs. Ambient Temperature

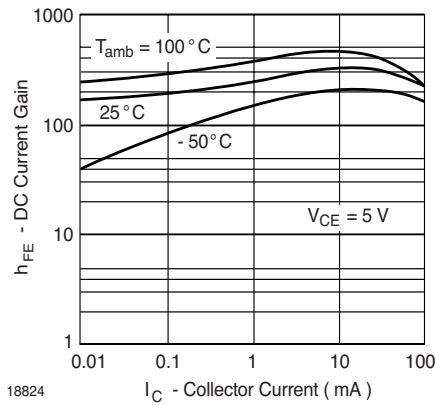


Figure 2. DC Current Gain vs. Collector Current

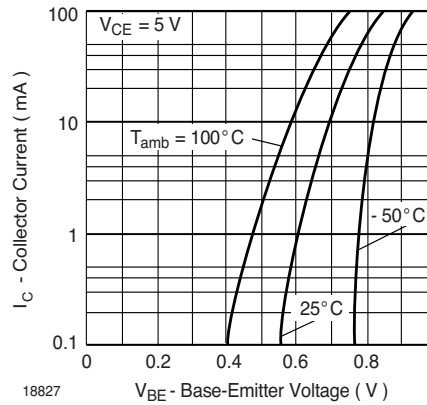


Figure 5. Collector Current vs. Base-Emitter Voltage

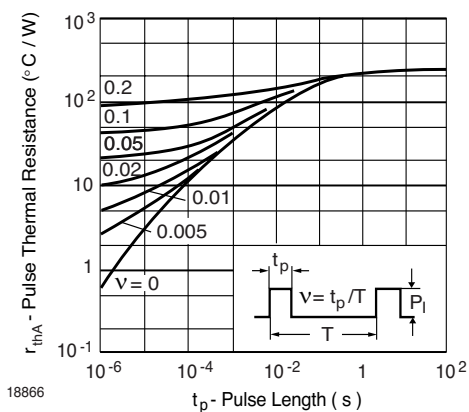


Figure 3. Pulse Thermal Resistance vs. Pulse Duration

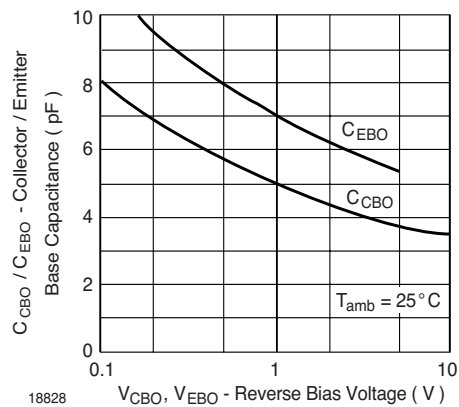


Figure 6. Collector Base Capacitance, Emitter base Capacitance vs. Bias Voltage

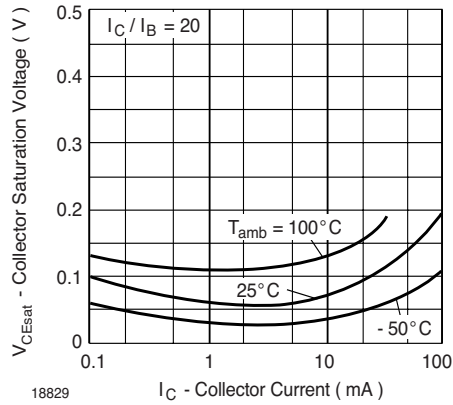


Figure 7. Collector Saturation Voltage vs. Collector Current

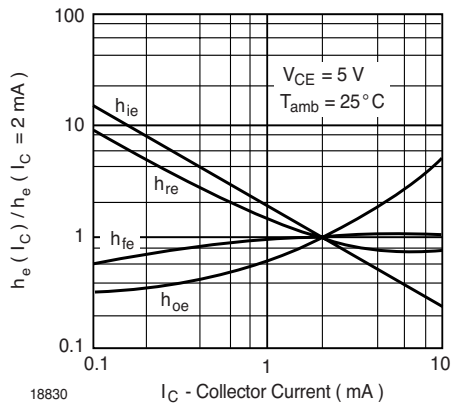


Figure 8. Relative h-Parameters vs. Collector Current

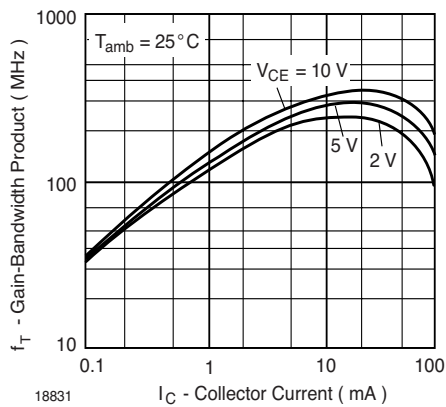
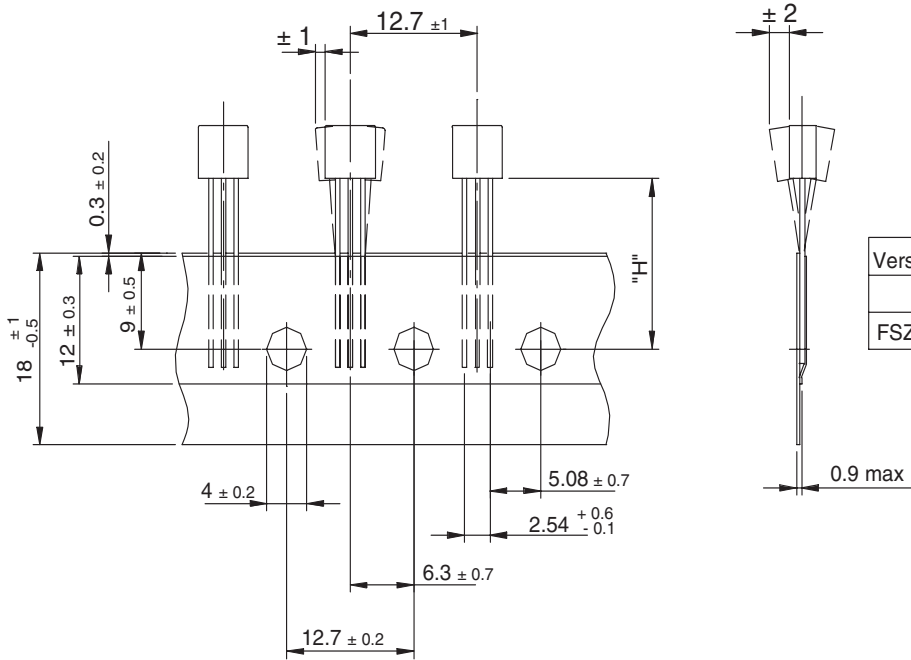
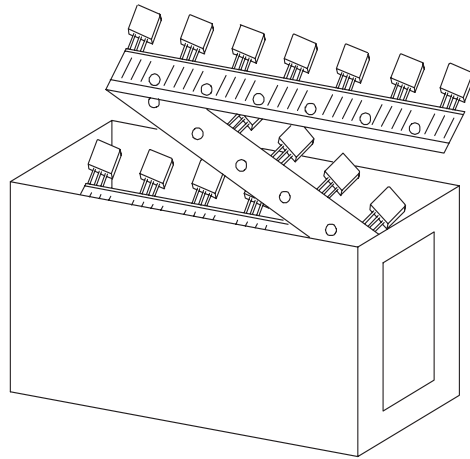


Figure 9. Gain-Bandwidth Product vs. Collector Current

### Packaging for Radial Taping

Dimensions in mm

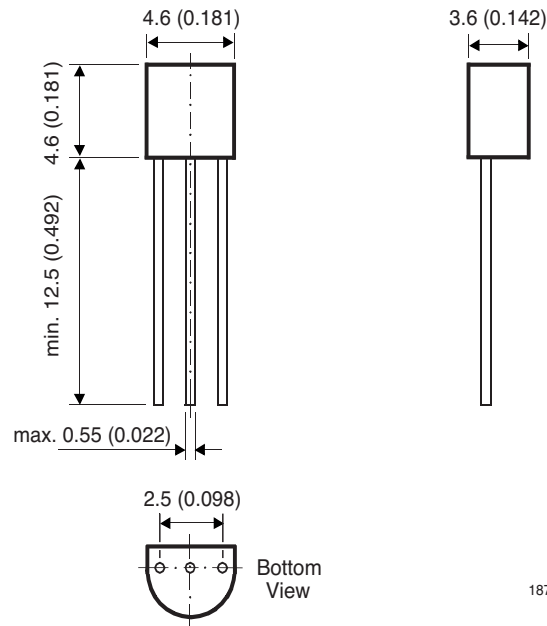


Vers.	Dim. "H"
FSZ	27 ± 0.5

Measure limit over 20 index - holes: ± 1

18787

## Package Dimensions in mm (Inches)



18776

### 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.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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