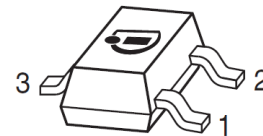


# BFS17P

## NPN Silicon RF Transistor

### Features

- Maximum collector-emitter voltage  $V_{CE0} = 15\text{ V}$
- Maximum collector current  $I_C = 25\text{ mA}$
- Noise figure  $NF = 3.5\text{ dB}$
- 3rd order output intercept point  $OIP_3 = 21.5\text{ dBm}$
- 1 dB output compression point  $P_{-1dB} = 10\text{ dBm}$
- Transition frequency  $f_T = 1.4\text{ GHz}$
- Maximum total power dissipation  $P_{tot} = 280\text{ mW}$
- Package: SOT23
- Pb-free (RoHS compliant) package



### Potential Applications

- For broadband amplifiers up to 1 GHz at collector currents from 1 mA to 20 mA
- For mixers and oscillators in sub-GHz applications

### Device Information

**ESD** (Electrostatic discharge) sensitive device, observe handling precaution!

Type / Ordering code	Marking	Pin Configuration			Package
BFS17P / BFS17PE6327HTSA1	MCs	1=B	2=E	3=C	SOT23

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**Maximum Ratings**

**1 Maximum Ratings**

**Table 1** Maximum Rating at  $T_A = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Values	Unit	Note or Test Condition
Collector-emitter voltage	$V_{CEO}$	15	V	–
Collector-base voltage	$V_{CBO}$	25		–
Emitter-base voltage	$V_{EBO}$	2.5		–
Collector current	$I_C$	25	mA	–
Peak collector current	$I_{CM}$	50		–
Total power dissipation <sup>1)</sup>	$P_{tot}$	280	mW	$T_S \leq 95\text{ °C}$
Junction temperature	$T_j$	150	°C	–
Ambient temperature	$T_A$	-65 ... 150		–
Storage temperature	$T_{Stg}$	-65 ... 150		–

**2 Thermal Resistance**

**Table 2** Thermal resistance

Parameter	Symbol	Values	Unit	Note or Test Condition
Junction - soldering point	$R_{thJS}$	$\leq 195$	K/W	–

Note: For calculation of  $R_{thJA}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

<sup>1</sup>  $T_S$  is measured on the collector lead at the soldering point to the pcb

**Electrical Characteristics**

**3 Electrical Characteristics**

**Table 3 DC Characteristics at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

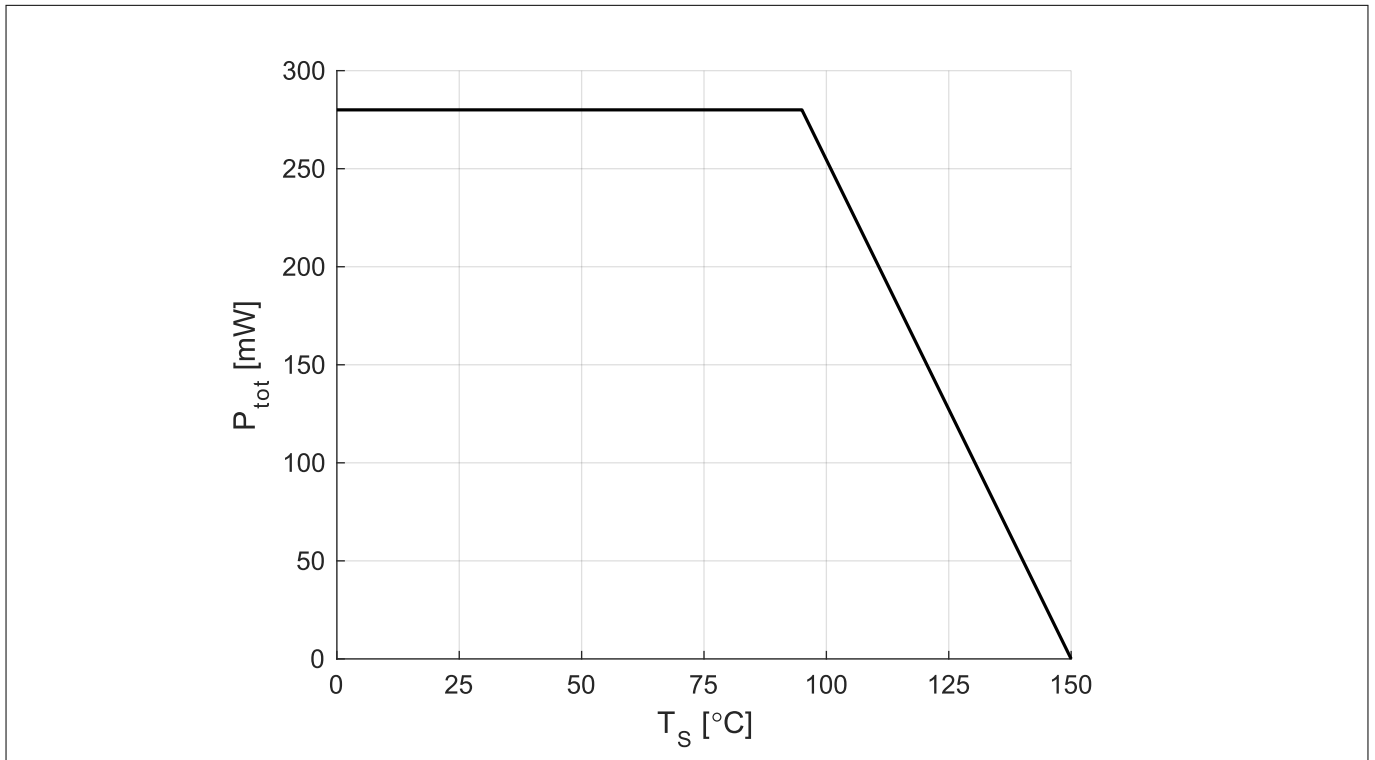
Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	15	–	–	V	$I_C = 1\text{ mA}, I_B = 0$
Collector-base cutoff current	$I_{CBO}$	–	–	0.05	$\mu\text{A}$	$V_{CB} = 10\text{ V}, I_E = 0$
		–	–	10		$V_{CB} = 25\text{ V}, I_E = 0$
Emitter-base cutoff current	$I_{EBO}$	–	–	100	$\mu\text{A}$	$V_{EB} = 2.5\text{ V}, I_C = 0$
DC current gain	$h_{FE}$	40	–	150	–	$I_C = 2\text{ mA}, V_{CE} = 1\text{ V}$ pulse measured
		20	70	–		$I_C = 25\text{ mA}, V_{CE} = 1\text{ V}$ pulse measured
Collector-emitter saturation voltage	$V_{CEsat}$	–	0.1	0.4	V	$I_C = 10\text{ mA}, I_B = 1\text{ mA}$

**Table 4 AC Characteristics at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

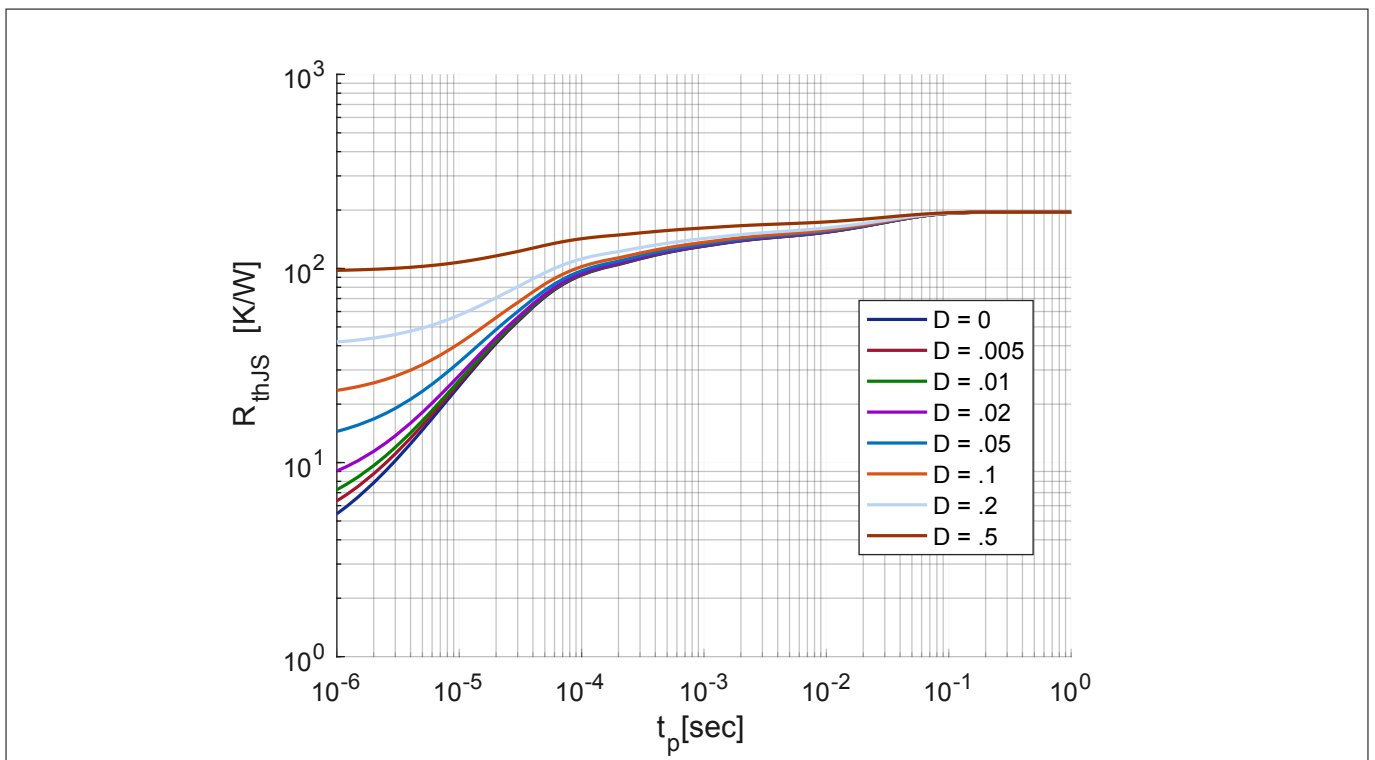
Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Transition frequency	$f_T$	1	1.4	–	GHz	$I_C = 2\text{ mA}, V_{CE} = 5\text{ V},$ $f = 200\text{ MHz}$
		1.3	2.5	–		$I_C = 25\text{ mA}, V_{CE} = 5\text{ V},$ $f = 200\text{ MHz}$
Collector-base capacitance	$C_{cb}$	–	0.55	0.8	pF	$V_{CB} = 5\text{ V}, f = 1\text{ MHz},$ $V_{BE} = 0$ , emitter grounded
Collector emitter capacitance	$C_{ce}$	–	0.27		pF	$V_{CE} = 5\text{ V}, f = 1\text{ MHz},$ $V_{BE} = 0$ , base grounded
Emitter-base capacitance	$C_{eb}$	–	0.9	1.45	pF	$V_{EB} = 0.5\text{ V}, f = 1\text{ MHz},$ $V_{CB} = 0$ , collector grounded
Minimum noise figure	$NF_{min}$	–	3.5	5	dB	$I_C = 2\text{ mA}, V_{CE} = 5\text{ V},$ $Z_S = 50\Omega, f = 800\text{ MHz}$
Transducer gain	$ S_{21e} ^2$	–	13	–	dB	$I_C = 20\text{ mA}, V_{CE} = 5\text{ V},$ $Z_S = Z_L = 50\Omega, f = 500\text{ MHz}$
Third order intercept point at output	$OIP_3$	–	21.5	–	dBm	$V_{CE} = 5\text{ V}, I_C = 20\text{ mA},$ $f = 800\text{ MHz}, Z_S = Z_{Sopt},$ $Z_L = Z_{Lopt}$
1dB compression point	$P_{-1dB}$	–	10	–	dBm	$I_C = 20\text{ mA}, V_{CE} = 5\text{ V},$ $Z_S = Z_L = 50\Omega, f = 800\text{ MHz}$

Typical characteristics diagrams

**4 Typical characteristics diagrams**

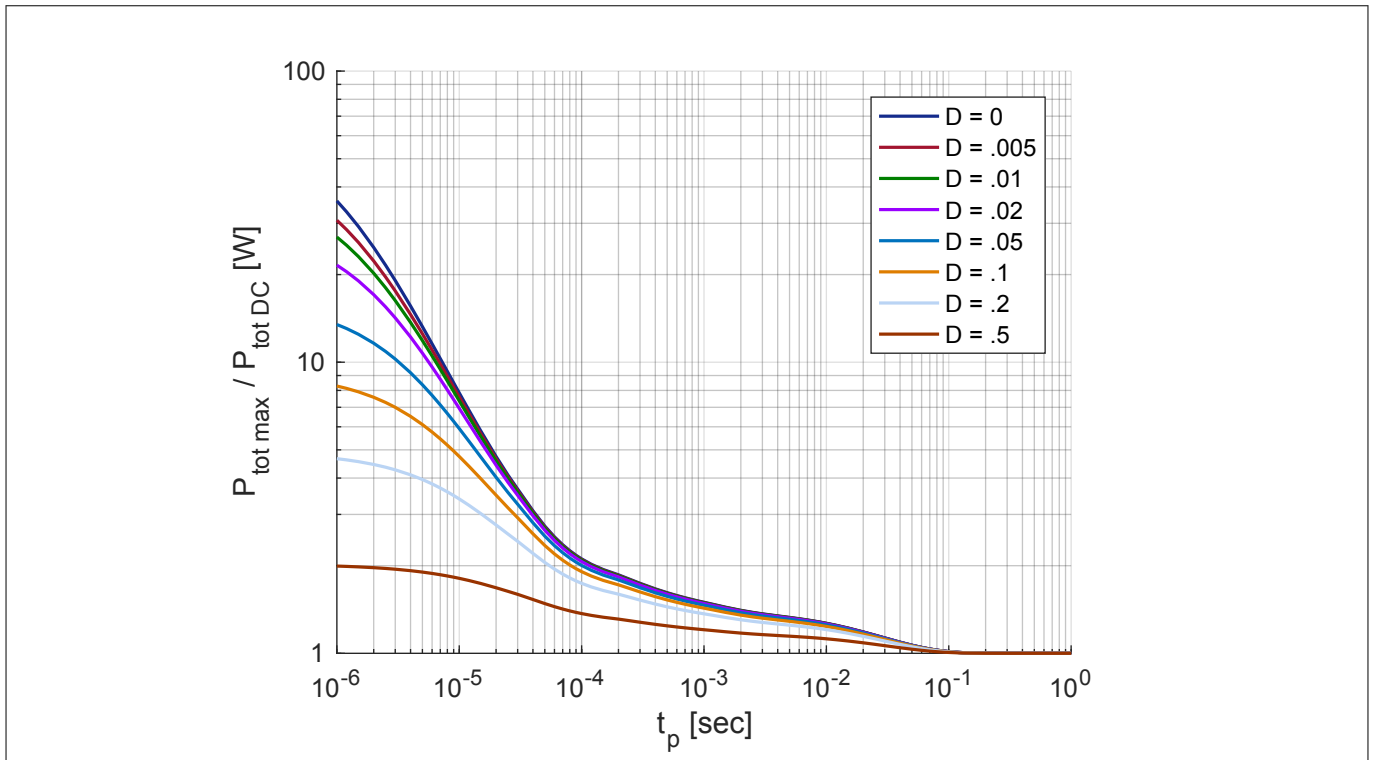


**Figure 1 Total Power Dissipation**

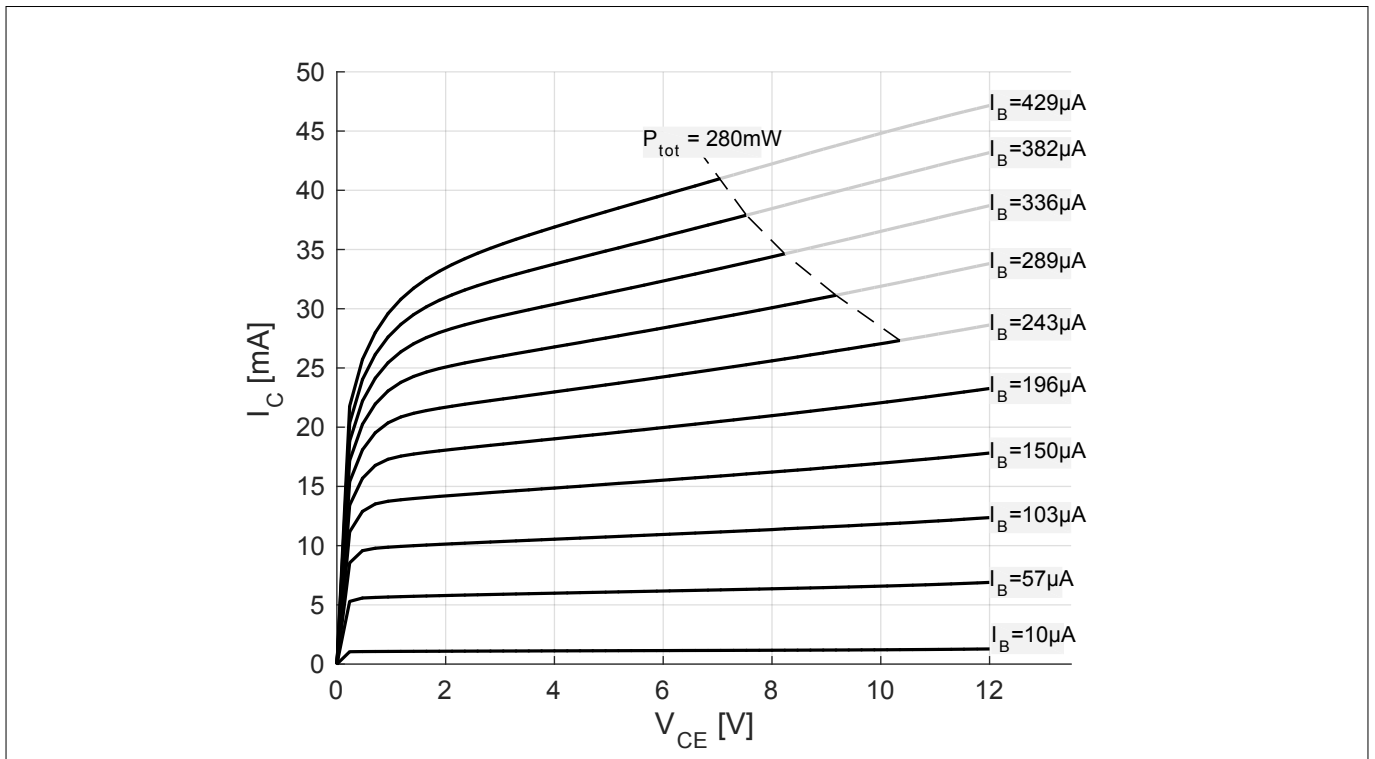


**Figure 2 Permissible Pulse Load  $R_{thJS} = f(t_p)$**

**Typical characteristics diagrams**

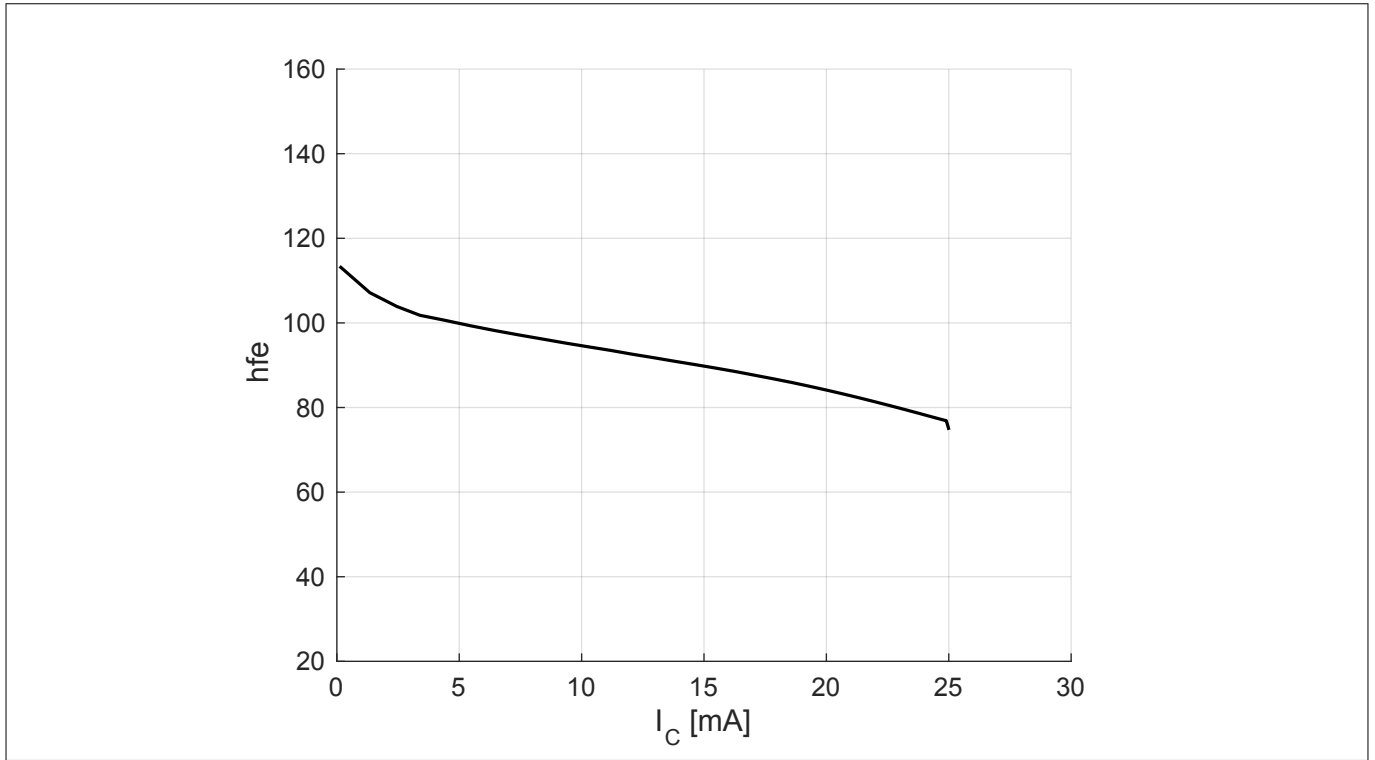


**Figure 3** Permissible Pulse Load  $P_{totmax} / P_{totDC} = f(t_p)$

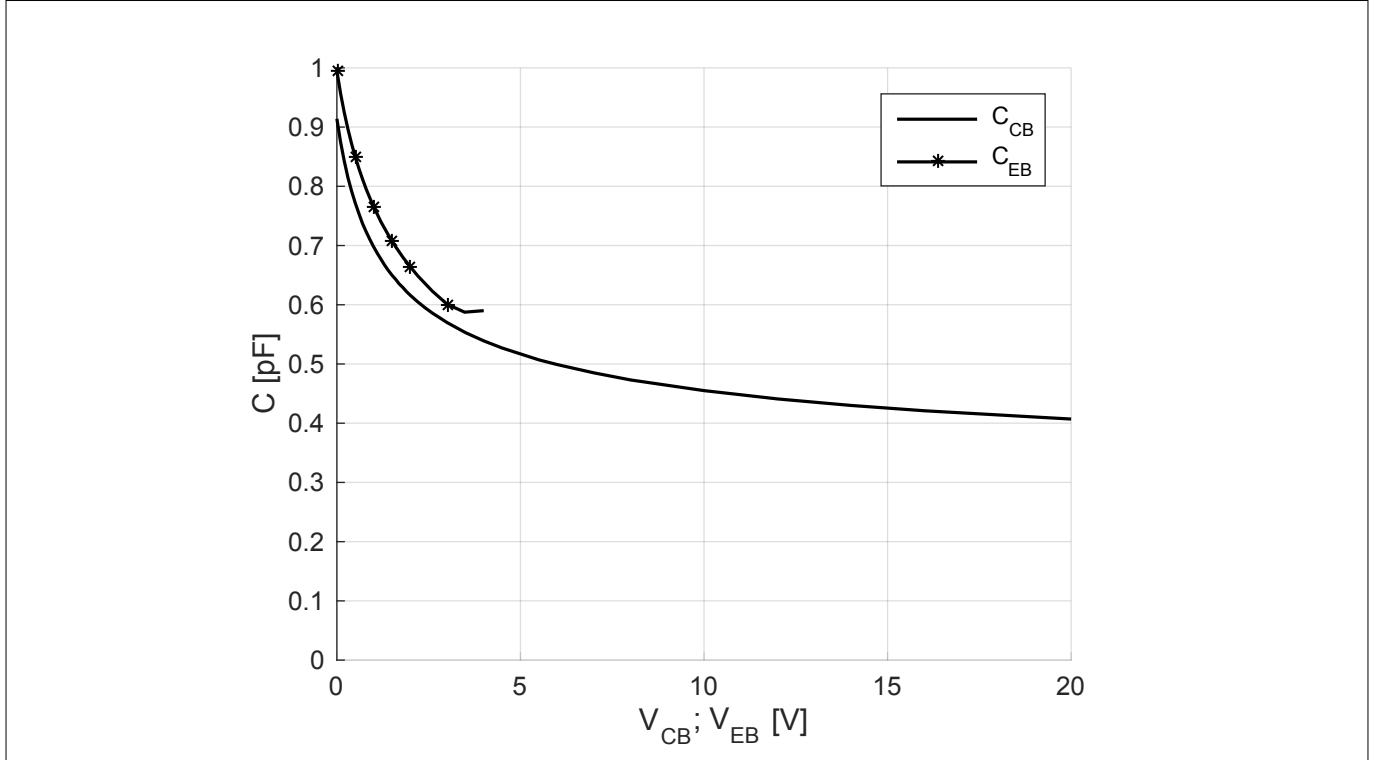


**Figure 4** Collector current  $I_C = f(V_{CE})$ ,  $I_B = \text{parameter}$

**Typical characteristics diagrams**

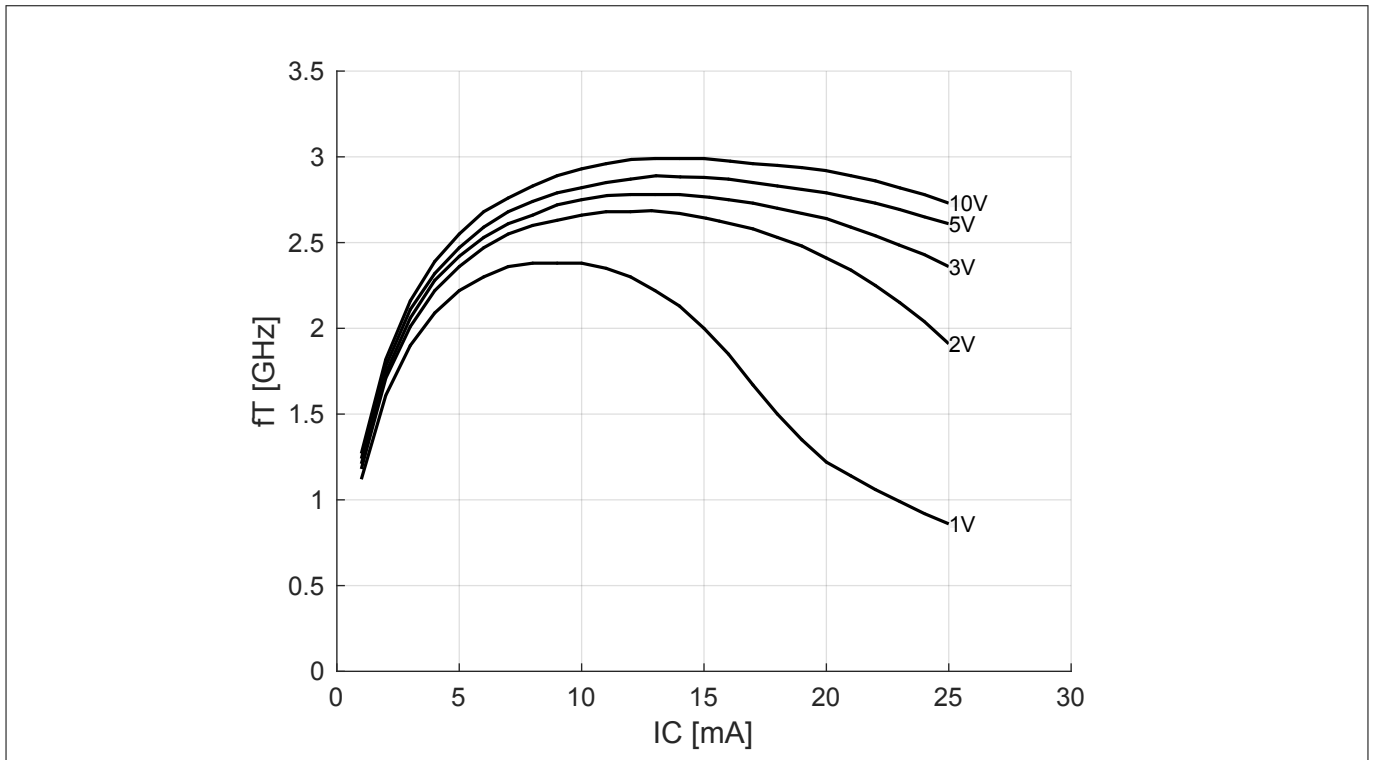


**Figure 5** Current gain  $h_{FE} = f(I_C)$ ,  $V_{CE} = 8\text{ V}$



**Figure 6** Collector-Base  $C_{CB} = f(V_{CB})$ ; Emitter-Base Capacitance  $C_{EB} = f(V_{EB})$

**Typical characteristics diagrams**



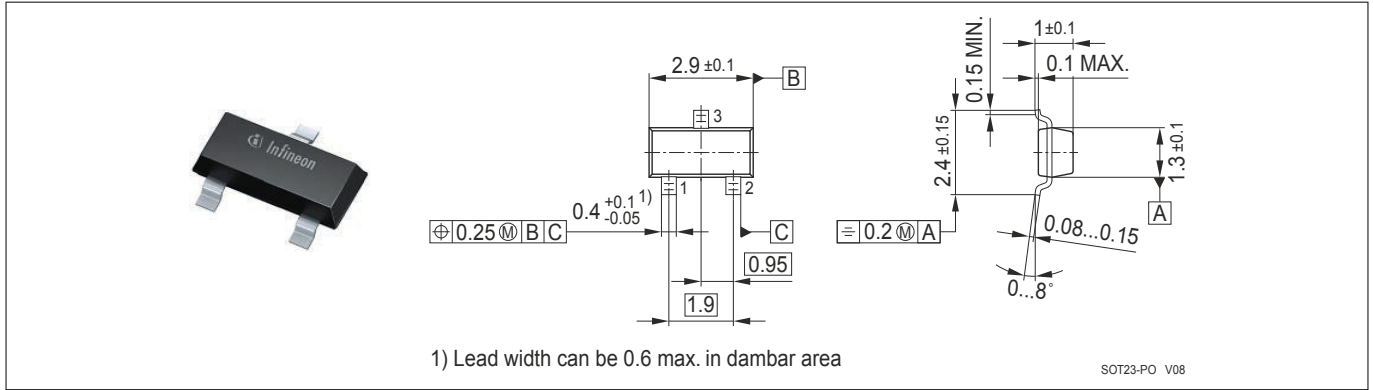
**Figure 7** Transition frequency  $f_T = f(I_C)$ ,  $V_{CE} = \text{parameter}$



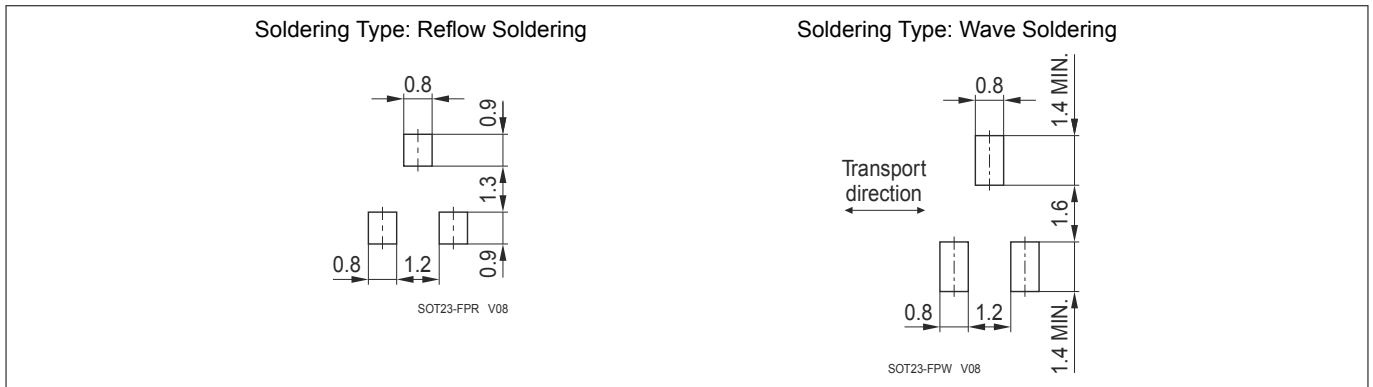
**Package information**

**5 Package information**

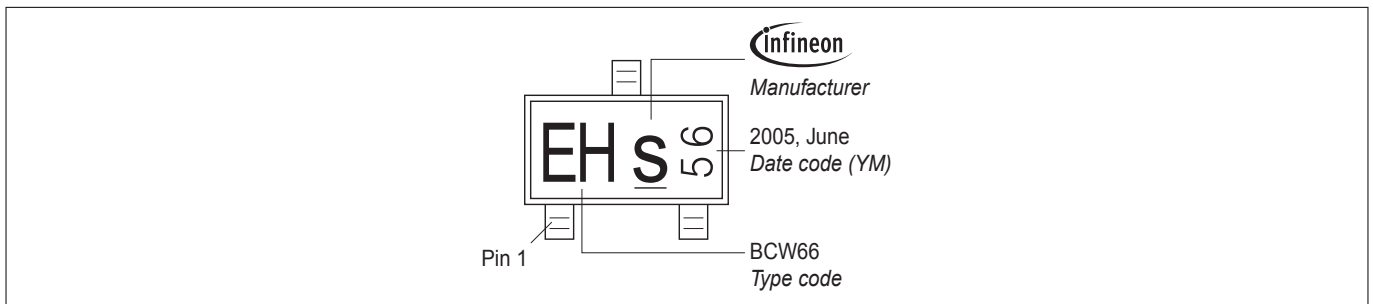
**5.1 SOT23 package**



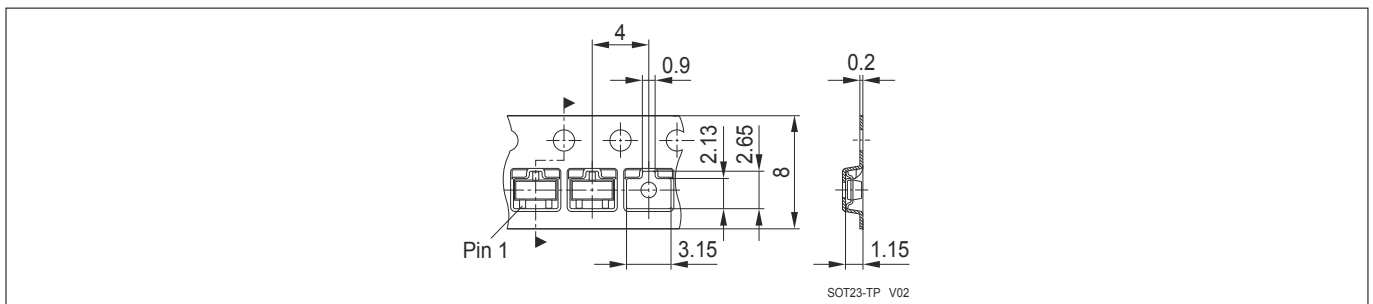
**Figure 8 SOT23 package outline**



**Figure 9 SOT23 foot print**



**Figure 10 SOT23 marking layout (example)**



**Figure 11 SOT23 tape and reel**

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**Revision History**

**Revision History**

Major changes since previous revision

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**Revision History**

<b>Reference</b>	<b>Description</b>
All pages	2017-06-01: Conversion to new document template
$R_{thJS}$	2017-06-01: Update of value

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