

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 ¹⁾	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}	≤ 195	K/W	–

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

¹ 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	μA	$V_{CB} = 10\text{ V}$, $I_E = 0$
		–	–	10		$V_{CB} = 25\text{ V}$, $I_E = 0$
Emitter-base cutoff current	I_{EBO}	–	–	100	μA	$V_{EB} = 2.5\text{ V}$, $I_C = 0$
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

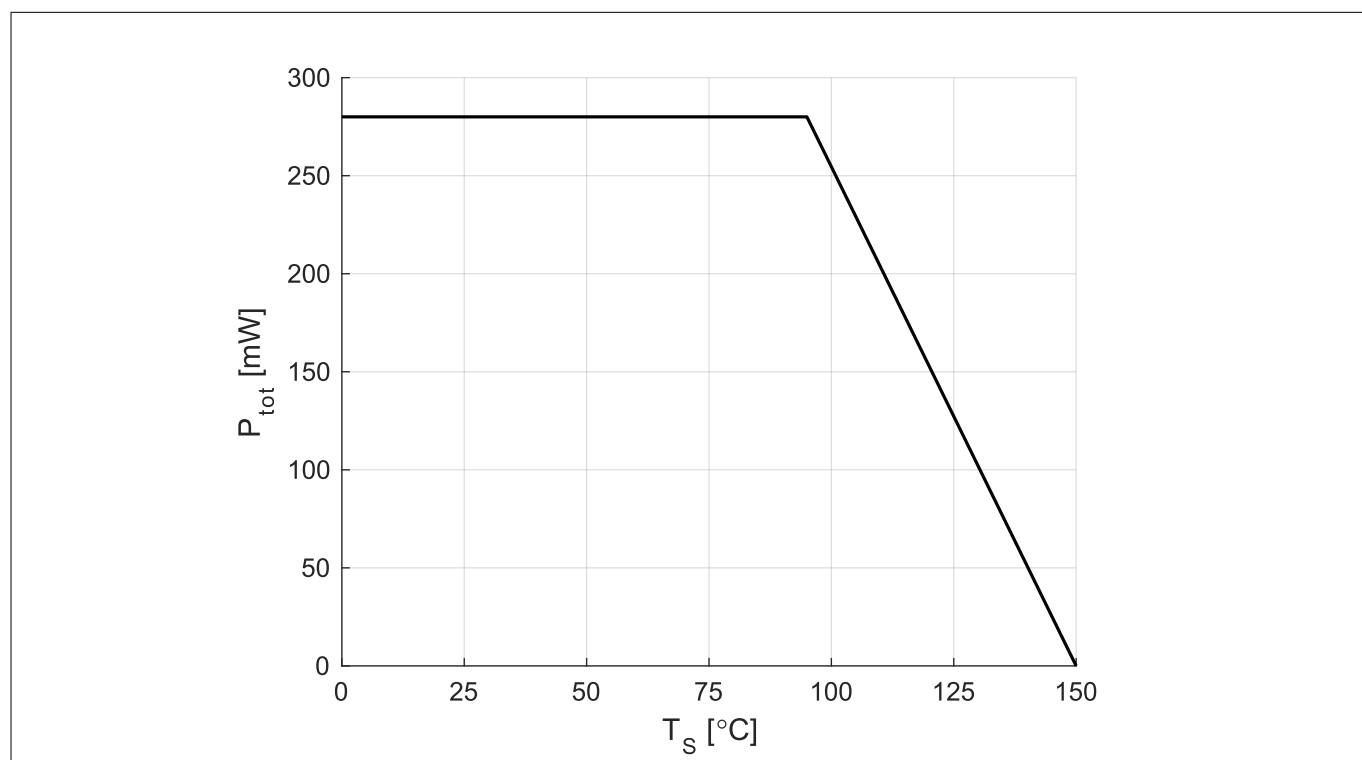


Figure 1 Total Power Dissipation

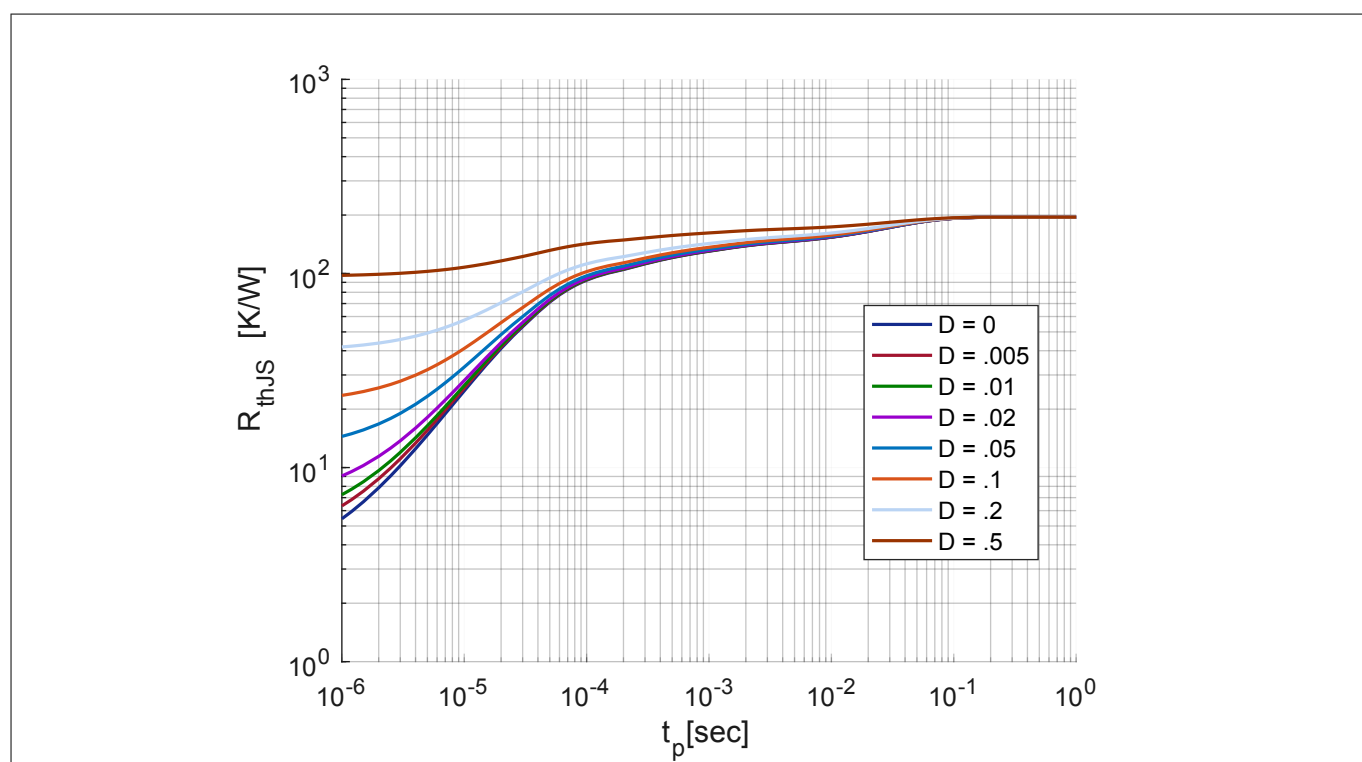


Figure 2 Permissible Pulse Load $R_{thJS} = f(t_p)$

Typical characteristics diagrams

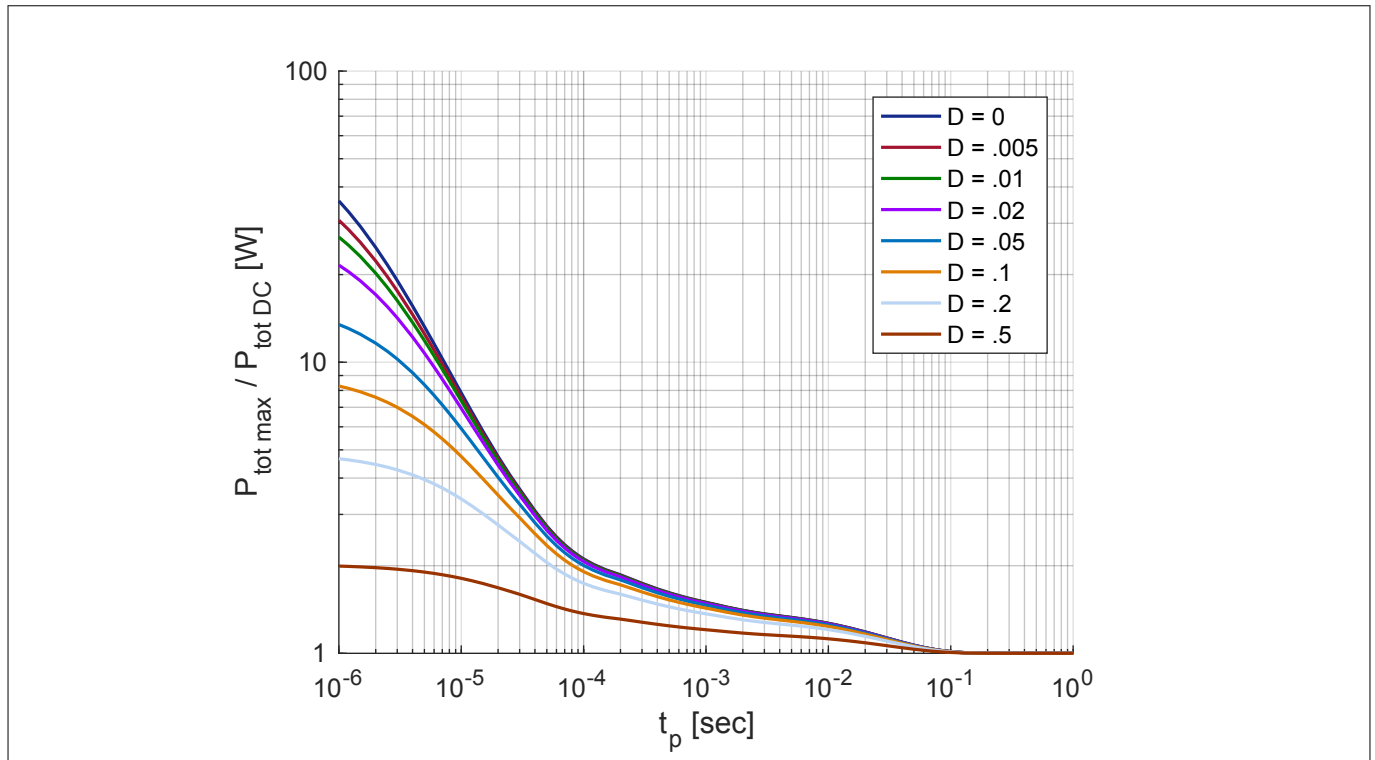


Figure 3 Permissible Pulse Load $P_{\text{tot max}} / P_{\text{tot DC}} = f(t_p)$

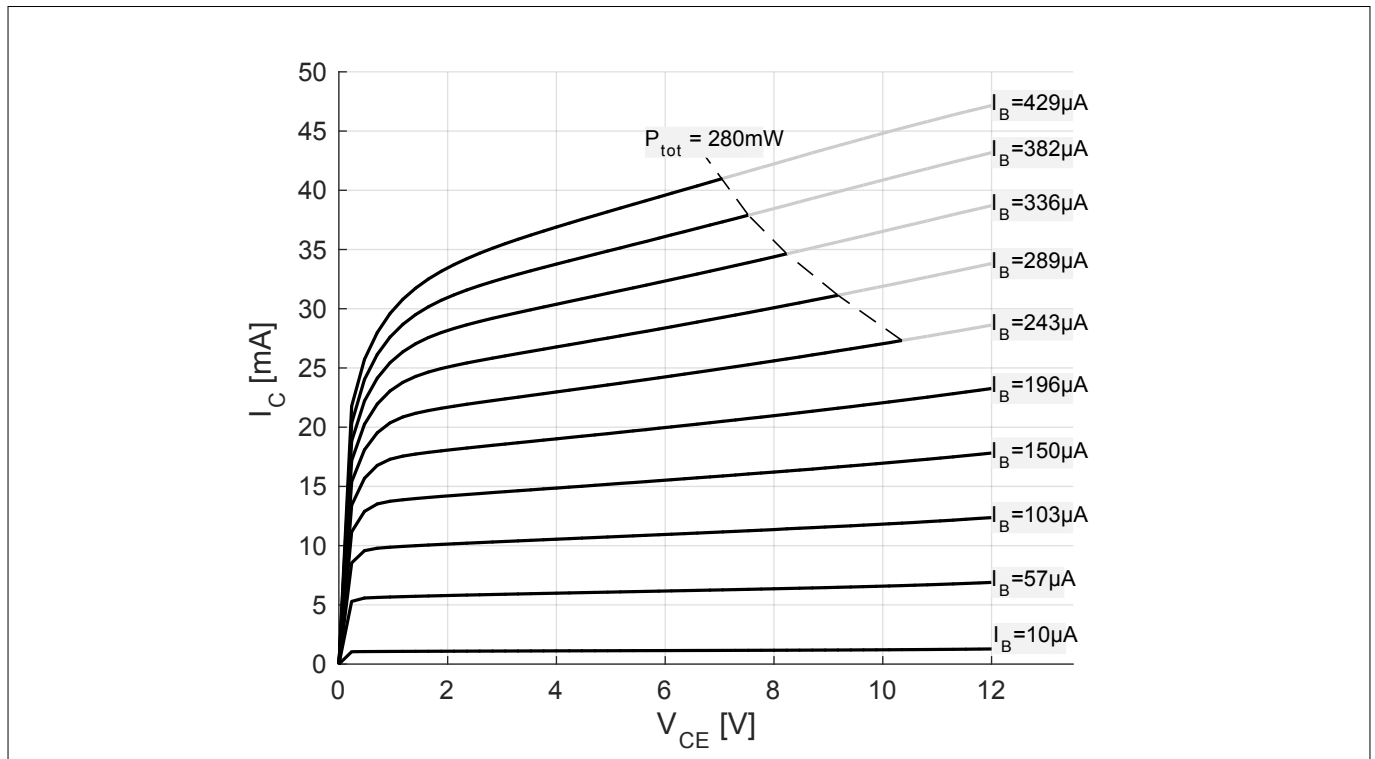


Figure 4 Collector current $I_C = f(V_{CE})$, $I_B = \text{parameter}$

Typical characteristics diagrams

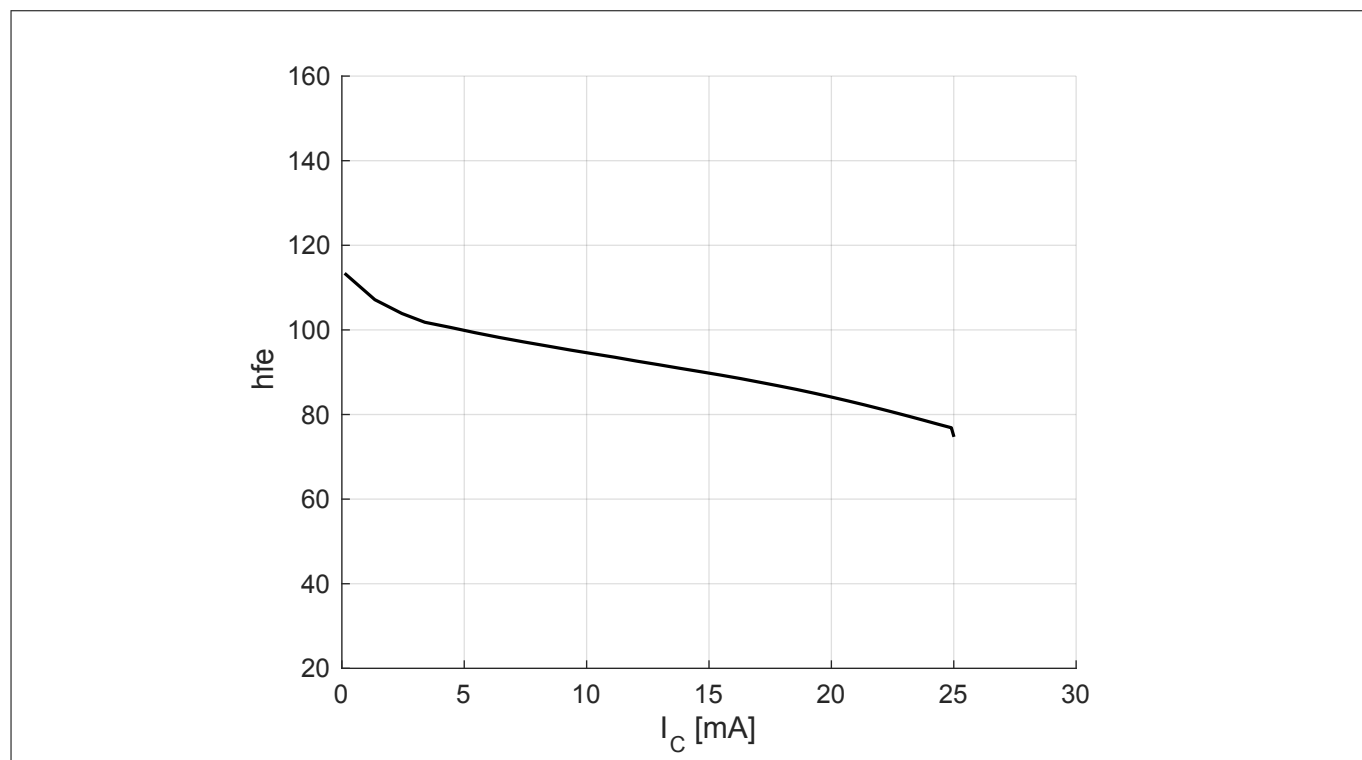


Figure 5 Current gain $h_{FE} = f(I_C)$, $V_{CE} = 8\text{ V}$

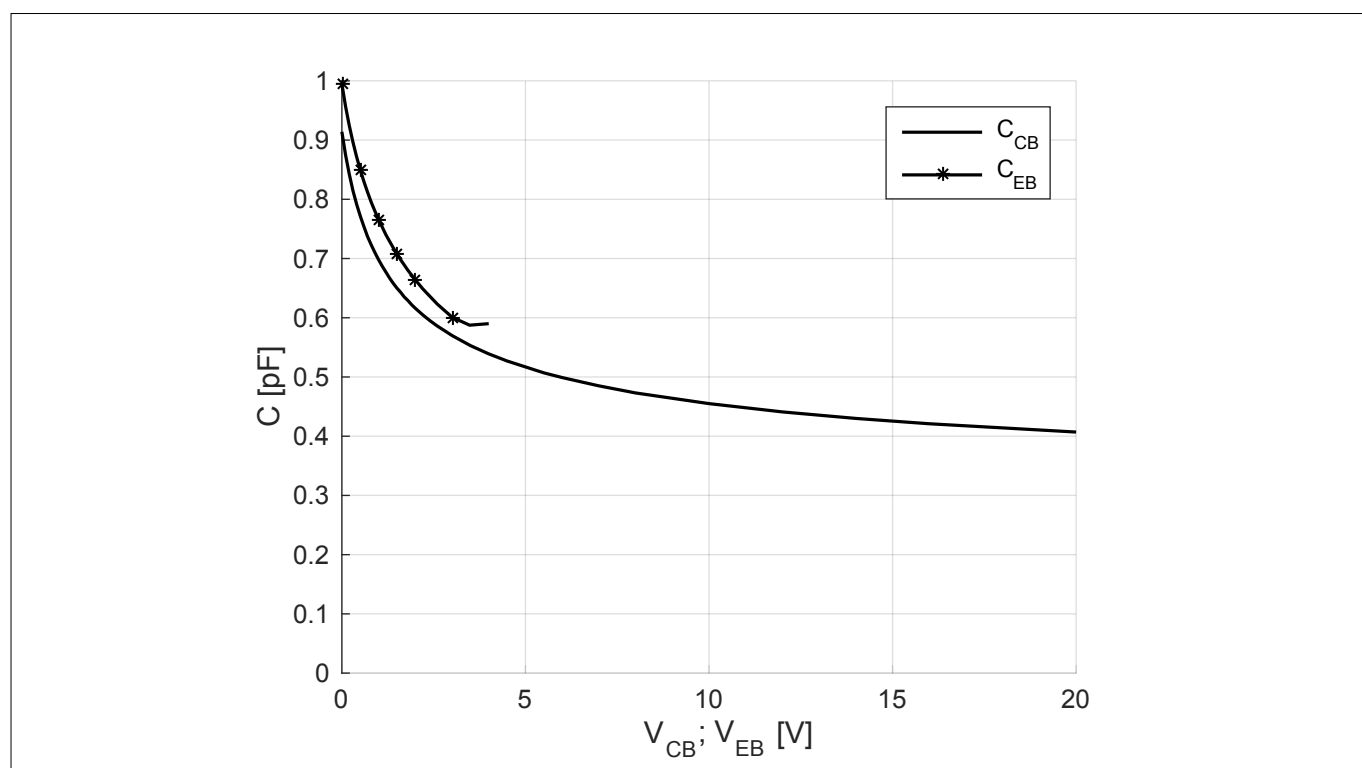


Figure 6 Collector-Base $C_{CB} = f(V_{CB})$; Emitter-Base Capacitance $C_{EB} = f(V_{EB})$

Typical characteristics diagrams

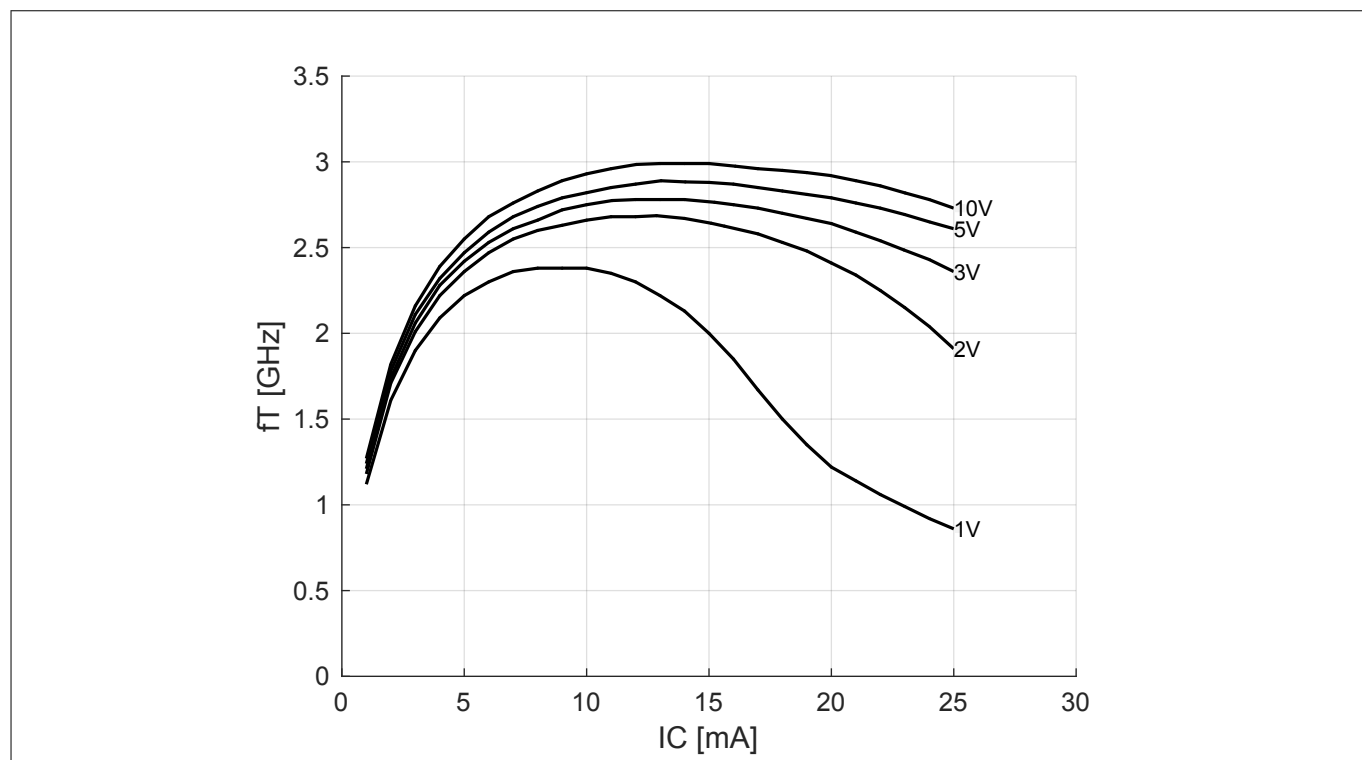


Figure 7 Transition frequency $f_T = f(I_C)$, $V_{CE} = \text{parameter}$

Package information

5 Package information

5.1 SOT23 package

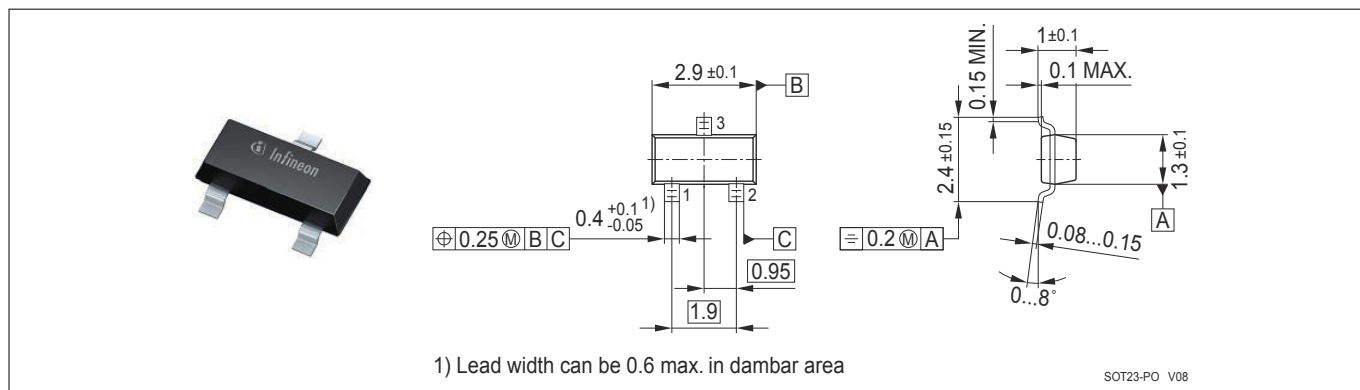


Figure 8 SOT23 package outline

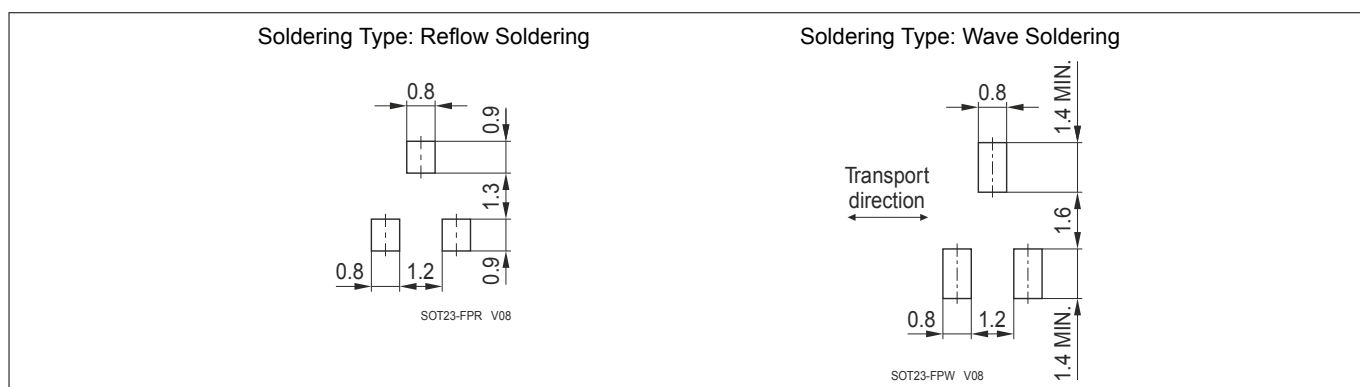


Figure 9 SOT23 foot print

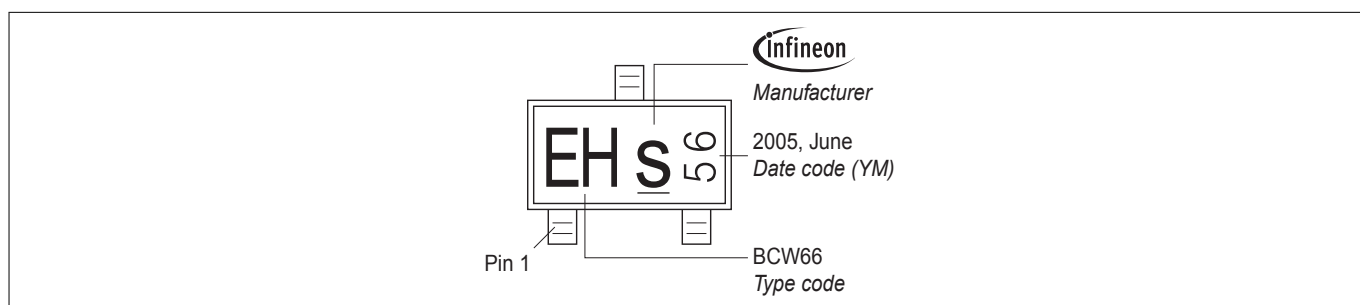


Figure 10 SOT23 marking layout (example)

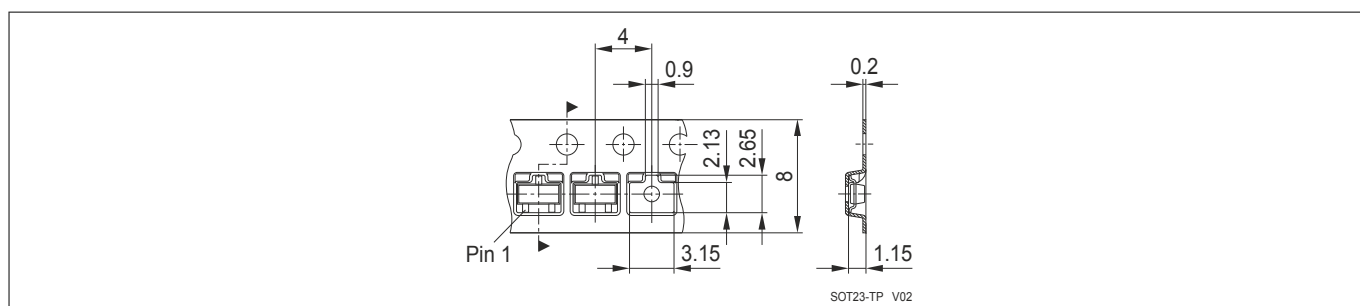


Figure 11 SOT23 tape and reel

Revision History

Revision History

Major changes since previous revision

Revision History	
Reference	Description
All pages	2017-06-01: Conversion to new document template
R_{thJS}	2017-06-01: Update of value

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