BFP540FESD

Low profile robust silicon NPN RF bipolar transistor

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Product description

The BFP540FESD is a low noise device based on a grounded emitter (SIEGET™) that is part of Infineon's established fifth generation RF bipolar transistor family. Its high gain and ESD structure make the device suitable for applications that requires highly robustness and high performance. It remains cost competitive without compromising on ease of use.

Feature list

- Minimum noise figure NF_{min} = 0.9 dB at 1.8 GHz, 2 V, 5 mA
- High gain G_{ms} = 20 dB at 1.8 GHz, 2 V, 20 mA
- OIP_3 = 24.5 dBm at 1.8 GHz, 2 V, 20 mA
- High ESD robustness, typical 1 kV (HBM)

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC JESD47, JESD22, and J-STD-020.
Qualified for industrial applications according to the relevant tests of AEC-Q 101.

Potential applications

- Radio-frequency oscillators such as local oscillator in LNB
- Broadband low noise amplifiers (LNAs) for CATV, DVB-T, DAB/DMB and FM/AM radio
- LNAs for wireless communications such as cordless phones

Device information

Table 1 **Part information**

Product name / Ordering code	Package	Pin configuration				Marking	Pieces / Reel
BFP540FESD / BFP540FESDH6327XTSA1	TSFP-4-1	1 = B	2 = E	3 = C	4 = E	AUs	3000

***Attention**: ESD (Electrostatic discharge) sensitive device, observe handling precautions*

Table of contents

1 Absolute maximum ratings

Table 2 Absolute maximum ratings at T_A = 25 °C (unless otherwise specified)

Parameter	Symbol	Values		Unit	Note or test condition
		Min.	Max.		
Collector emitter voltage	V_{CEO}	–	4.5	V	Open base
			4		T_A = -55 °C, open base
Collector emitter voltage	V_{CES}		10		E-B short circuited
Collector base voltage	V_{CBO}		10		Open emitter
Emitter base voltage	V_{EBO}		1		Open collector
Base current	I_B		8	mA	–
Collector current	I_C		80		
Total power dissipation [1]	P_{tot}		250	mW	$T_S \leq 80$ °C
Junction temperature	T_J		150	°C	–
Storage temperature	T_{Stg}	-55			

Attention: ***Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Exceeding only one of these values may cause irreversible damage to the integrated circuit.***

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[1] T_S is the soldering point temperature. T_S is measured on the emitter lead at the soldering point of the PCB.

2 Thermal characteristics

Table 3 Thermal resistance

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Junction - soldering point	R_{thJS}	–	280	–	K/W	–

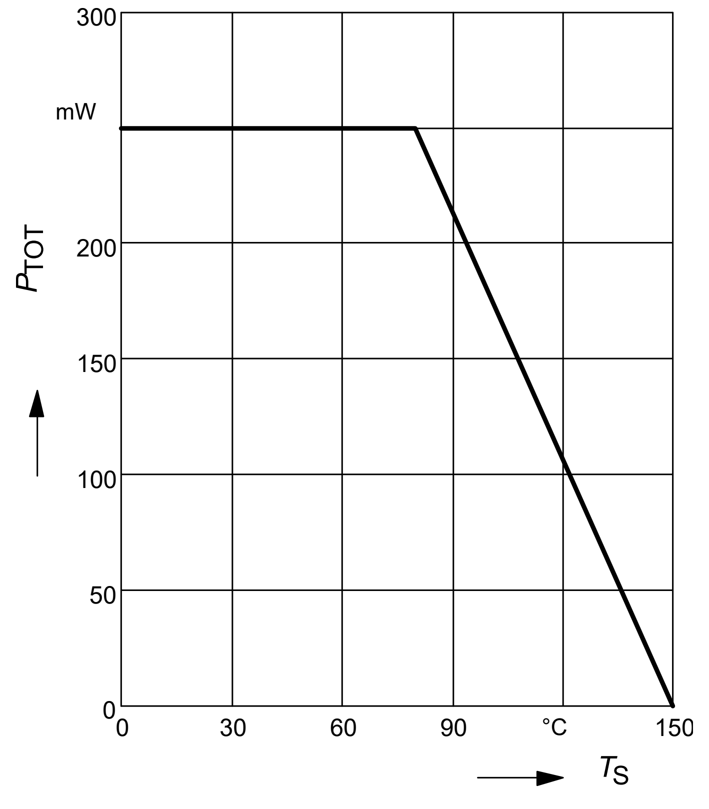

Figure 1 Total power dissipation $P_{tot} = f(T_s)$

3 Electrical characteristics

3.1 DC characteristics

Table 4 **DC characteristics at T_A = 25 °C**

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Collector emitter breakdown voltage	$V_{(BR)CEO}$	4.5	5	–	V	I_C = 1 mA, I_B = 0, open base
Collector emitter leakage current	I_{CES}	–	–	10 2)	µA	V_{CE} = 10 V, V_{BE} = 0, E-B short circuited
Collector base leakage current	I_{CBO}			100 2)	nA	V_{CB} = 5 V, I_E = 0, open emitter
Emitter base leakage current	I_{EBO}			10 2)	µA	V_{EB} = 0.5 V, I_C = 0, open collector
DC current gain	h_{FE}	50	110	170		V_{CE} = 3.5 V, I_C = 20 mA, pulse measured

3.2 General AC characteristics

Table 5 **General AC characteristics at T_A = 25 °C**

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Transition frequency	f_T	21	30	–	GHz	V_{CE} = 4 V, I_C = 50 mA, f = 1 GHz
Collector base capacitance	C_{CB}	–	0.16	0.26	pF	V_{CB} = 2 V, V_{BE} = 0, f = 1 MHz, emitter grounded
Collector emitter capacitance	C_{CE}		0.4	–		V_{CE} = 2 V, V_{BE} = 0, f = 1 MHz, base grounded
Emitter base capacitance	C_{EB}		0.55			V_{EB} = 0.5 V, V_{CB} = 0, f = 1 MHz, collector grounded

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[2] Maximum values not limited by the device but by the short cycle time of the 100% test.

3.3 Frequency dependent AC characteristics

Measurement setup is a test fixture with Bias-T's in a 50 Ω system, T_A = 25 °C.

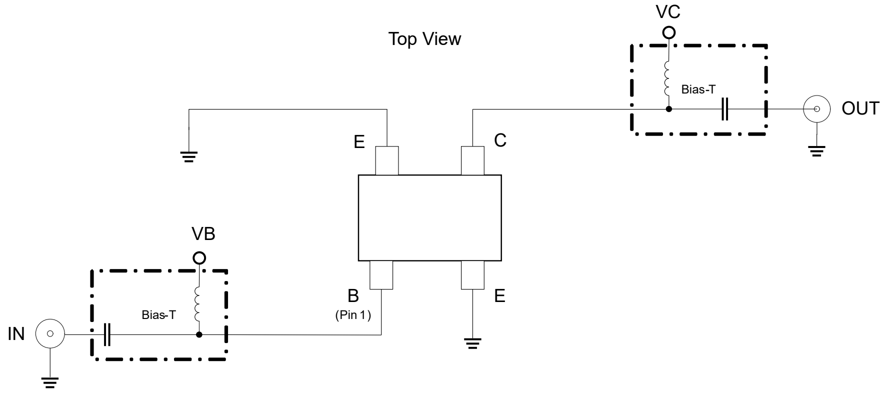


Figure 2 Testing circuit

Table 6 AC characteristics, V_{CE} = 2 V, f = 1.8 GHz

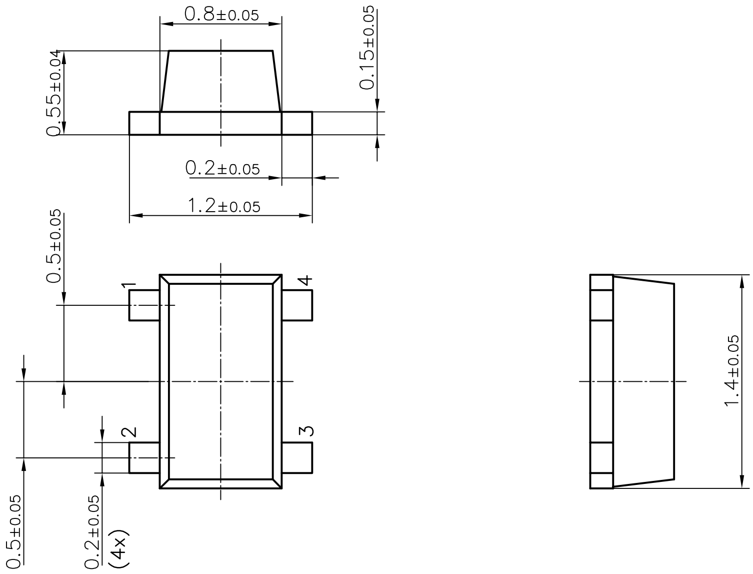
Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Power gain				–	dB	
• Maximum stable power gain	G_{ms}	–	20			I_C = 20 mA
• Transducer gain	$\lvert S_{21}\rvert^2$	15.5	18			
Noise figure		–				
• Minimum noise figure	NF_{min}		0.9	1.4		I_C = 5 mA
Linearity				–	dBm	
• 3rd order intercept point at output	OIP_3		24.5			I_C = 20 mA, $Z_S = Z_L$ = 50 Ω
• 1 dB gain compression point at output	OP_{1dB}		11			

Table 7 AC characteristics, V_{CE} = 2 V, f = 3 GHz

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Power gain		–		–	dB	
• Maximum available power gain	G_{ma}		14.5			I_C = 20 mA
• Transducer gain	$\lvert S_{21}\rvert^2$		13			
Noise figure						
• Minimum noise figure	NF_{min}		1.3			I_C = 5 mA

***Note**:* *$G_{ms} = |S_{21} / S_{12}|$ for $k < 1$; $G_{ma} = |S_{21} / S_{12}|(k-(k^2-1)^{1/2})$ for $k > 1$. In order to get the NF_{min} values stated in this chapter, the test fixture losses have been subtracted from all measured results. OIP_3 value depends on termination of all intermodulation frequency components. Termination used for this measurement is 50 Ω from 0.1 MHz to 6 GHz.*

4 Package information TSFP-4-1



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2) MOLD FLASH, PROTRUSION OR GATE BURRS SHALL NOT EXCEED 0.1 PER SIDE
ALL DIMENSIONS ARE IN UNITS MM
THE DRAWING IS IN COMPLIANCE WITH ISO 128 & PROJECTION METHOD 1 [⊲⊕]

Figure 3 **TSFP-4-1 package**

***Note**: For package information including footprint, packing and assembly recommendation refer to:*

https://www.infineon.com/packages/TSFP-4-1/

Revision history

Document version	Date of release	Description of changes
Revision 2.0	2019-01-25	New datasheet layout.
Revision 3.0	2024-07-01	Updated product validation

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