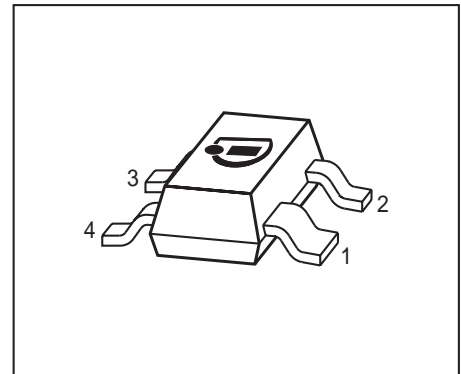


**NPN Silicon RF Transistor\***

- For low noise, low distortion broadband amplifiers in antenna and telecommunications systems up to 1.5 GHz at collector currents from 20 mA to 80 mA
- Power amplifier for DECT and PCN systems
- $f_T = 7.5$  GHz,  $F = 1.3$  dB at 900 MHz
- Pb-free (RoHS compliant) package<sup>1)</sup>
- Qualified according AEC Q101



\* Short term description



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

Type	Marking	Pin Configuration						Package
BFP196	RIs	1 = C	2 = E	3 = B	4 = E	-	-	SOT143

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{CEO}$	12	V
Collector-emitter voltage	$V_{CES}$	20	
Collector-base voltage	$V_{CBO}$	20	
Emitter-base voltage	$V_{EBO}$	2	
Collector current	$I_C$	150	mA
Base current	$I_B$	15	
Total power dissipation <sup>2)</sup> $T_S \leq 77^\circ\text{C}$	$P_{tot}$	700	mW
Junction temperature	$T_j$	150	°C
Ambient temperature	$T_A$	-65 ... 150	
Storage temperature	$T_{stg}$	-65 ... 150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>3)</sup>	$R_{thJS}$	$\leq 105$	K/W

<sup>1</sup>Pb-containing package may be available upon special request

<sup>2</sup> $T_S$  is measured on the collector lead at the soldering point to the pcb

<sup>3</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC Characteristics</b>					
Collector-emitter breakdown voltage $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	12	-	-	V
Collector-emitter cutoff current $V_{CE} = 20 \text{ V}, V_{BE} = 0$	$I_{CES}$	-	-	100	$\mu\text{A}$
Collector-base cutoff current $V_{CB} = 10 \text{ V}, I_E = 0$	$I_{CBO}$	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 1 \text{ V}, I_C = 0$	$I_{EBO}$	-	-	1	$\mu\text{A}$
DC current gain- $I_C = 50 \text{ mA}, V_{CE} = 8 \text{ V}, \text{ pulse measured}$	$h_{FE}$	70	100	140	-

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics (verified by random sampling)</b>					
Transition frequency $I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 500\text{ MHz}$	$f_T$	5	7.5	-	GHz
Collector-base capacitance $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.83	1.3	pF
Collector emitter capacitance $V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , base grounded	$C_{ce}$	-	0.35	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	3.9	-	
Noise figure $I_C = 20\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $f = 900\text{ MHz}$ $I_C = 20\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $f = 1.8\text{ GHz}$	$F$	-	1.3	-	dB
		-	2.3	-	
Power gain, maximum available <sup>1)</sup> $I_C = 50\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 900\text{ MHz}$ $I_C = 50\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$G_{ma}$	-	16.5	-	
		-	10.5	-	
Transducer gain $I_C = 50\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 900\text{ MHz}$ $I_C = 50\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 1.8\text{ GHz}$	$ S_{21e} ^2$	-	13	-	dB
		-	7	-	

<sup>1)</sup>  $G_{ma} = |S_{21} / S_{12}| (k - (k^2 - 1)^{1/2})$

**SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):**
**Transistor Chip Data:**

IS =	1.7264	fA	BF =	125	-	NF =	0.80012	-
VAF =	20	V	IKF =	0.4294	A	ISE =	119.22	fA
NE =	1.1766	-	BR =	10.584	-	NR =	0.94288	-
VAR =	3.8128	V	IKR =	0.019551	A	ISC =	4.8666	fA
NC =	0.88299	-	RB =	1.2907	$\Omega$	IRB =	0.084011	mA
RBM =	1	$\Omega$	RE =	0.75103	-	RC =	0.27137	$\Omega$
CJE =	13.325	fF	VJE =	0.7308	V	MJE =	0.33018	-
TF =	23.994	ps	XTF =	0.44322	-	VTF =	0.1	V
ITF =	1.9775	mA	PTF =	0	deg	CJC =	1667	fF
VJC =	0.73057	V	MJC =	0.3289	-	XCJC =	0.29998	-
TR =	2.2413	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	NK =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.50922	-	TNOM	300	K

All parameters are ready to use, no scaling is necessary. Extracted on behalf of Infineon Technologies AG by: Institut für Mobil- und Satellitentechnik (IMST)

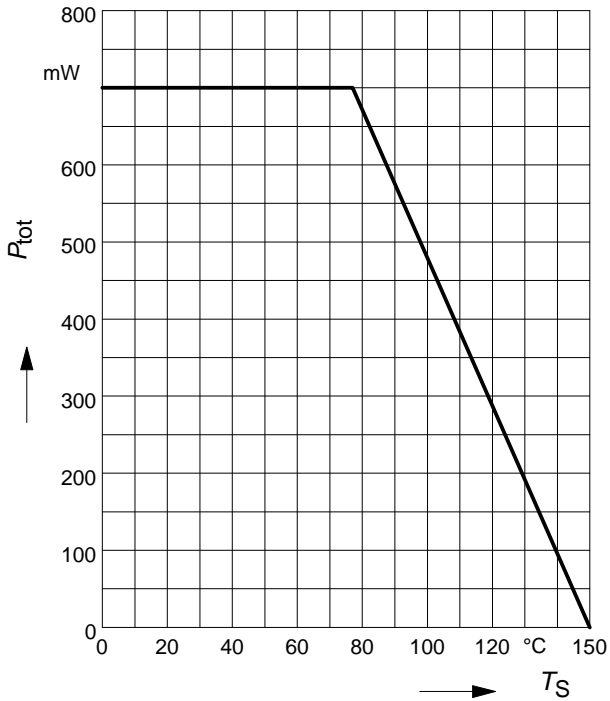
**Package Equivalent Circuit:**


$L_{BI}$ =	0.84	nH
$L_{BO}$ =	0.65	nH
$L_{EI}$ =	0.31	nH
$L_{EO}$ =	0.14	nH
$L_{CI}$ =	0.07	nH
$L_{CO}$ =	0.42	nH
$C_{BE}$ =	145	fF
$C_{CB}$ =	19	fF
$C_{CE}$ =	281	fF

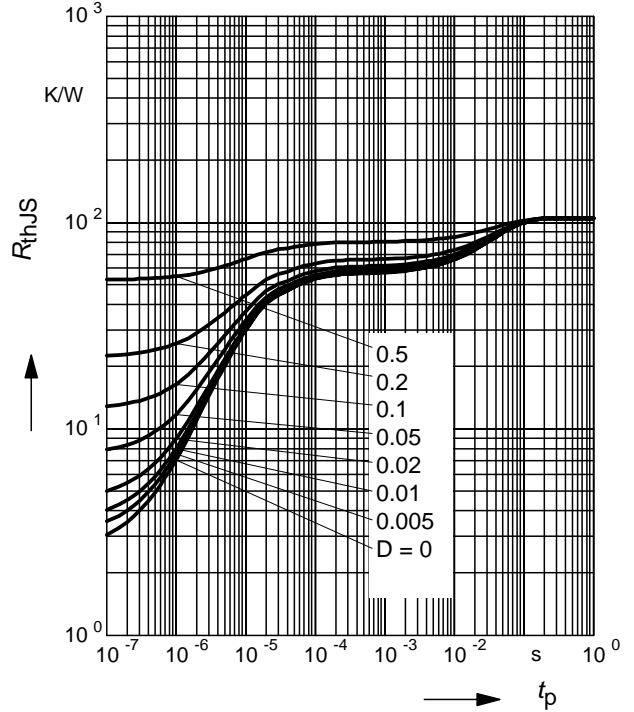
Valid up to 6GHz

For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com>

**Total power dissipation  $P_{tot} = f(T_S)$**

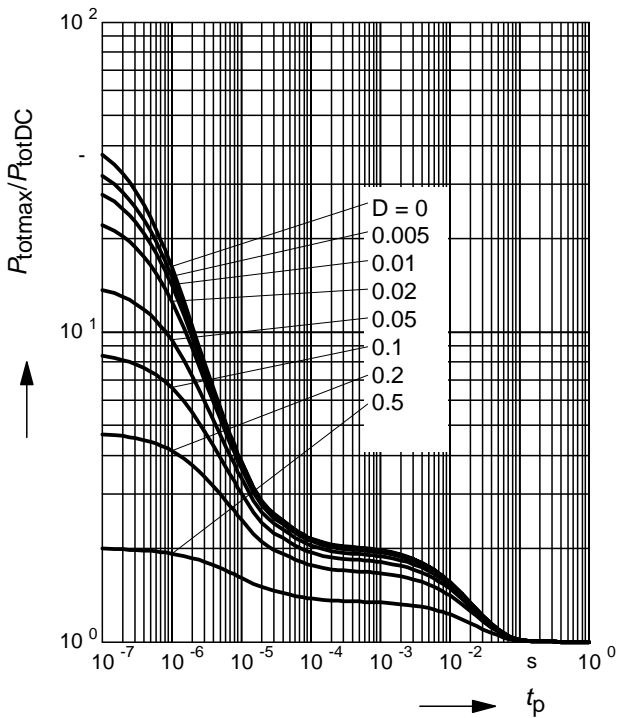


**Permissible Pulse Load  $R_{thJS} = f(t_p)$**

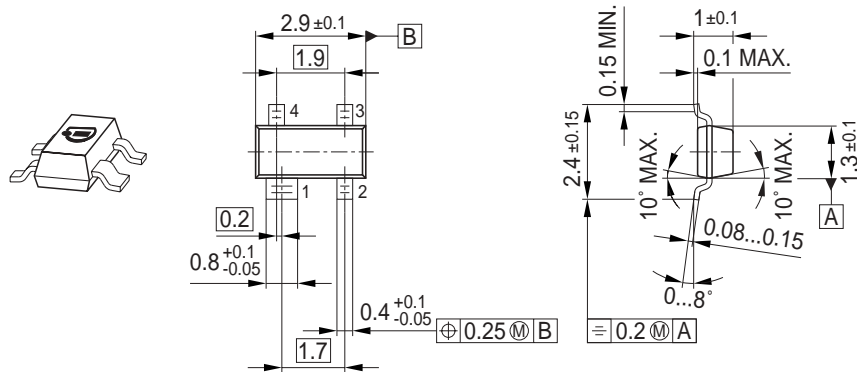


**Permissible Pulse Load**

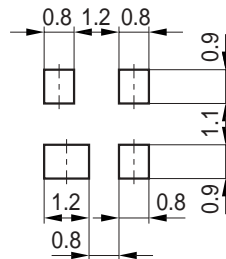
$P_{totmax}/P_{totDC} = f(t_p)$



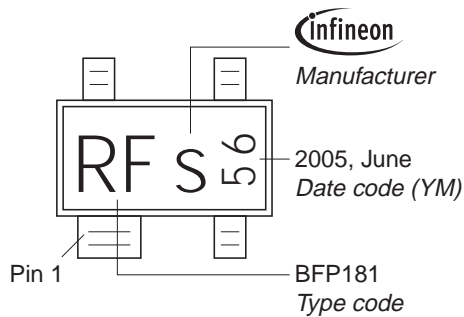
Package Outline



Foot Print



Marking Layout (Example)



Standard Packing

Reel  $\varnothing 180 \text{ mm} = 3.000 \text{ Pieces/Reel}$   
 Reel  $\varnothing 330 \text{ mm} = 10.000 \text{ Pieces/Reel}$



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