

**NPN Silicon RF Transistor\***

- For low noise, high-gain broadband amplifiers at collector currents from 2 mA to 30 mA
- $f_T = 8$  GHz,  $F = 0.9$  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
BFR183	RHs	1=B	2=E	3=C	SOT23

**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	$I_C$	65	mA
Base current	$I_B$	5	
Total power dissipation <sup>2)</sup> $T_S \leq 60$ °C	$P_{tot}$	450	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>	$R_{thJS}$	$\leq 200$	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- $I_C = 15 \text{ mA}, V_{CE} = 8 \text{ V}, \text{ pulse measured}$	$h_{FE}$	70	100	140	-

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

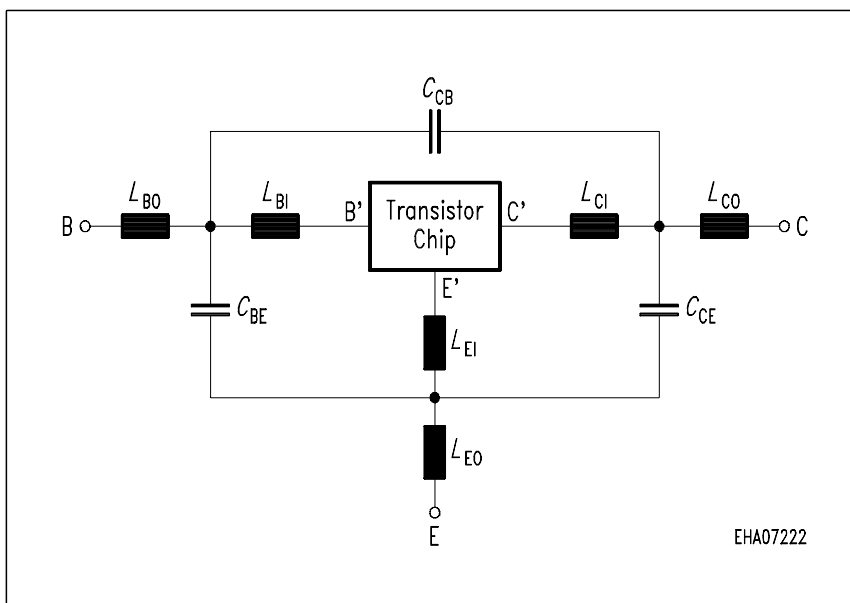
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b> (verified by random sampling)					
Transition frequency $I_C = 25\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 500\text{ MHz}$	$f_T$	6	8	-	GHz
Collector-base capacitance $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.37	0.57	pF
Collector emitter capacitance $V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , base grounded	$C_{ce}$	-	0.2	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	1.1	-	
Noise figure $I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	$F$	-	0.9	-	dB
Power gain, maximum stable <sup>1)</sup> $I_C = 15\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 900\text{ MHz}$	$G_{ms}$	-	17.5	-	dB
Power gain, maximum available <sup>1)</sup> $I_C = 15\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$G_{ma}$	-	11.5	-	dB
Transducer gain $I_C = 15\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 900\text{ MHz}$ $f = 1.8\text{ MHz}$	$ S_{21e} ^2$	-	14.5	-	dB
		-	9	-	

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

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

IS =	1.0345	fA	BF =	115.98	-	NF =	0.80799	-
VAF =	14.772	V	IKF =	0.14562	A	ISE =	16.818	fA
NE =	1.2149	-	BR =	10.016	-	NR =	0.99543	-
VAR =	3.4276	V	IKR =	0.013483	A	ISC =	1.3559	fA
NC =	0.85331	-	RB =	2.5426	$\Omega$	IRB =	0.43801	mA
RBM =	1.0112	$\Omega$	RE =	1.3435	-	RC =	0.20486	$\Omega$
CJE =	23.077	fF	VJE =	1.0792	V	MJE =	0.45354	-
TF =	22.746	ps	XTF =	0.36823	-	VTF =	0.50905	V
ITF =	1.8773	mA	PTF =	0	deg	CJC =	460.11	fF
VJC =	1.1967	V	MJC =	0.3	-	XCJC =	0.053823	-
TR =	1.0553	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.54852	-	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)

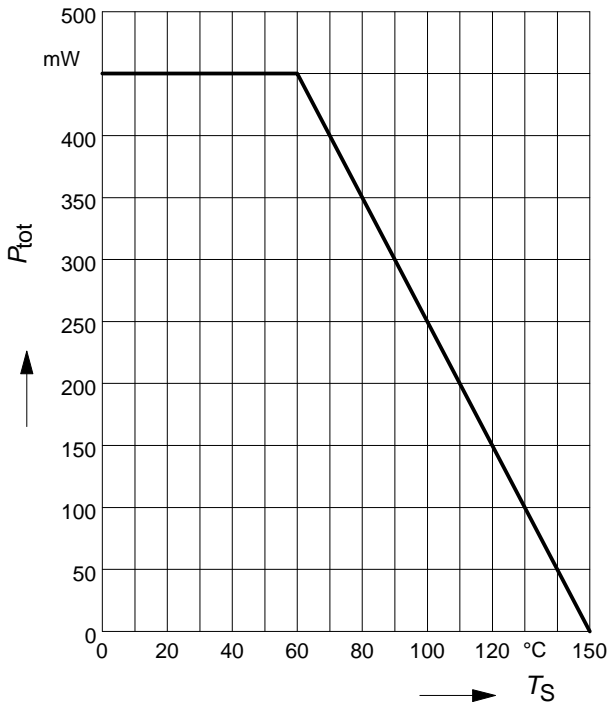
**Package Equivalent Circuit:**


$L_{BI} =$	0.85	nH
$L_{BO} =$	0.51	nH
$L_{EI} =$	0.69	nH
$L_{EO} =$	0.61	nH
$L_{CI} =$	0	nH
$L_{CO} =$	0.49	nH
$C_{BE} =$	73	fF
$C_{CB} =$	84	fF
$C_{CE} =$	165	fF

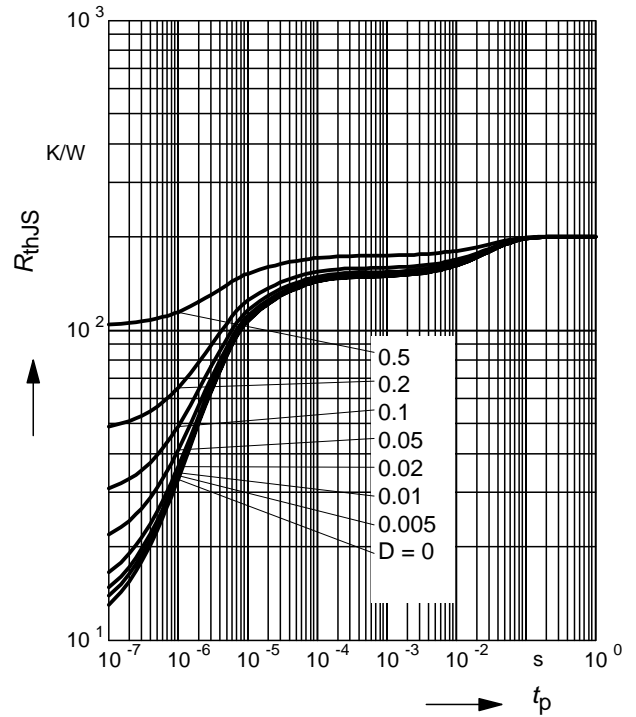
Valid up to 6GHz

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  $P_{tot} = f(T_S)$**

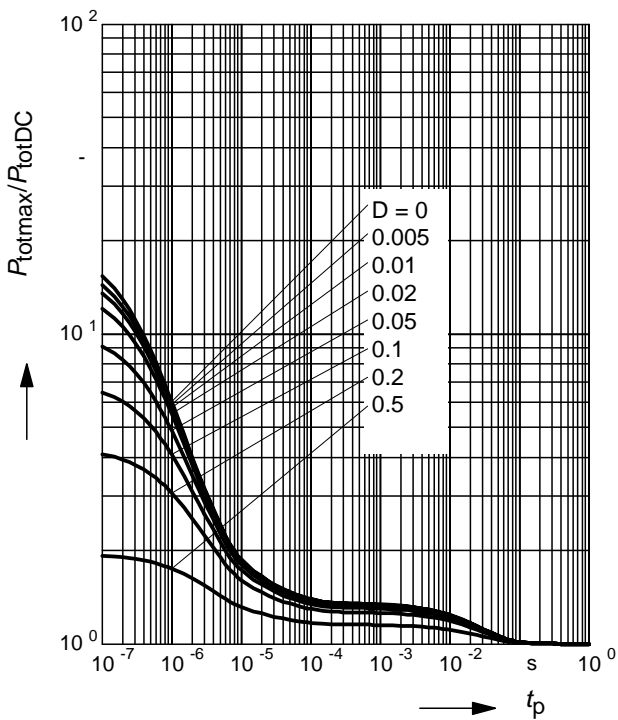


**Permissible Pulse Load  $R_{thJS} = f(t_p)$**



**Permissible Pulse Load**

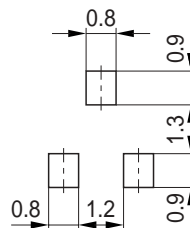
$P_{totmax}/P_{totDC} = f(t_p)$



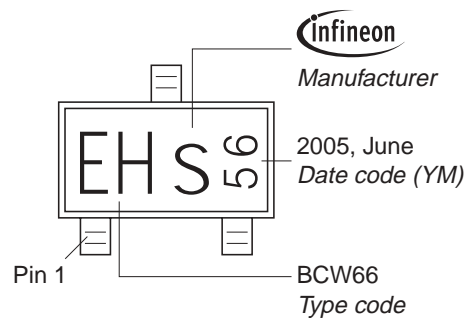
Package Outline



Foot Print

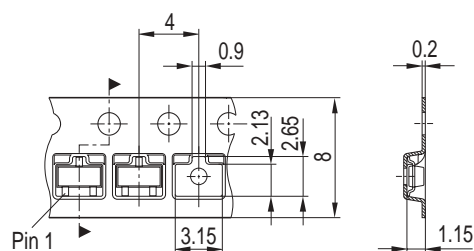


Marking Layout (Example)



Standard Packing

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



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