NPN Silicon RF Transistor
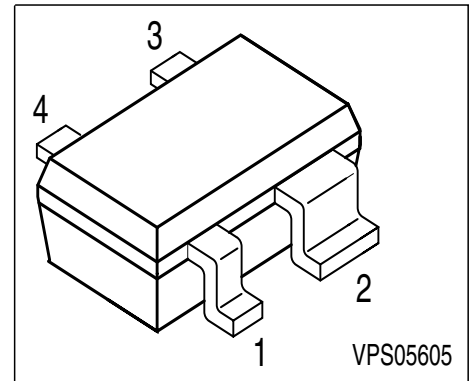
Preliminary data

- Low voltage/ low current operation
- For low noise amplifiers
- For Oscillators up to 3.5 GHz and Pout > 10 dBm
- Low noise figure: 1.0 dB at 1.8 GHz

VPS05605

ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precaution!

Type	Marking	Pin Configuration						Package
BFP360W	FBs	1 = E	2 = C	3 = E	4 = B	-	-	SOT343

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	6	V
Collector-emitter voltage	V_{CES}	15	
Collector-base voltage	V_{CBO}	15	
Emitter-base voltage	V_{EBO}	2	
Collector current	I_C	35	mA
Base current	I_B	4	
Total power dissipation[1] $T_S \le 95°C$	P_{tot}	210	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[2]	R_{thJS}	≤ 260	K/W

[1] T_S is measured on the collector lead at the soldering point to the pcb

[2] For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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Electrical Characteristics at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	6	9	-	V
Collector-emitter cutoff current V_{CE} = 15 V, V_{BE} = 0	I_{CES}	-	-	10	µA
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	100	nA
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EBO}	-	-	1	µA
DC current gain I_C = 15 mA, V_{CE} = 3 V	h_{FE}	60	130	200	-

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Electrical Characteristics at T_A = 25°C, unless otherwise specified

| Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 15 mA, V_{CE} = 3 V, f = 1 GHz	f_T	11	14	-	GHz
Collector-base capacitance V_{CB} = 5 V, f = 1 MHz, emitter grounded	C_{cb}	-	0.3	0.5	pF
Collector emitter capacitance V_{CE} = 5 V, f = 1 MHz, base grounded	C_{ce}	-	0.28	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, collector grounded	C_{eb}	-	0.47	-	
Noise figure I_C = 3 mA, V_{CE} = 3 V, Z_S = Z_{Sopt}, f = 1.8 GHz	F_{min}	-	1	-	dB
Power gain, maximum stable [1] I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 1.8 GHz	G_{ms}	-	17.5	-	dB
Power gain, maximum available [1] I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 3 GHz	G_{ma}	-	12	-	dB
Transducer gain I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω , f = 1.8 GHz	$\|S_{21e}\|^2$	-	14	-	dB
I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω , f = 3 GHz		-	9.5	-	
Third order intercept point at output [2] V_{CE} = 3 V, I_C = 15 mA, f = 1.8 GHz, Z_S = Z_L = 50Ω	IP_3	-	24	-	dBm
1dB Compression point at output I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 1.8 GHz	P_{-1dB}	-	9	-	

[1] G_{ms} = $|S_{21e}/S_{12e}|$, G_{ma} = $|S_{21e} / S_{12e}|$ (k-(k²-1)$^{1/2}$)

[2] IP3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

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

Transitor Chip Data:

IS =	0.0689	fA	BF =	147	-	NF =	1	-
VAF =	20	V	IKF =	77.28	mA	ISE =	150	fA
NE =	2.4	-	BR =	6	-	NR =	1	-
VAR =	60	V	IKR =	0.3	A	ISC =	20	fA
NC =	1.4	-	RB =	0.1	Ω	IRB =	74	µA
RBM =	7.31	Ω	RE =	78.2	mΩ	RC =	0.35	Ω
CJE =	400	fF	VJE =	1.3	V	MJE =	0.5	-
TF =	9.219	ps	XTF =	0.115	-	VTF =	0.198	V
ITF =	1.336	mA	PTF =	0	deg	CJC =	473	fF
VJC =	0.864	V	MJC =	0.486	-	XCJC =	0.129	-
TR =	1.92	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	0	-	FC =	0.954	-	NK =	0.5	K
AF =	1	-	KF =	1E-14	-			

All parameters are ready to use, no scalling is necessary.

Package Equivalent Circuit:
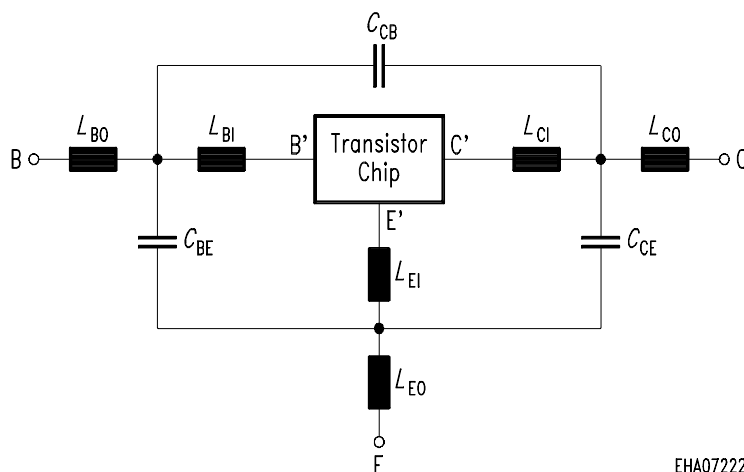
EHA07222

L_{BI} =	0.43	nH
L_{BO} =	0.47	nH
L_{EI} =	0.26	nH
L_{EO} =	0.12	nH
L_{CI} =	0.06	nH
L_{CO} =	0.36	nH
C_{BE} =	68	fF
C_{CB} =	46	fF
C_{CE} =	232	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/silicondiscretes

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