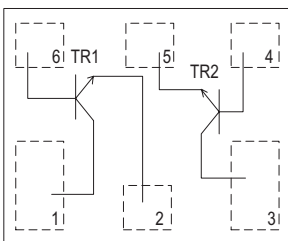
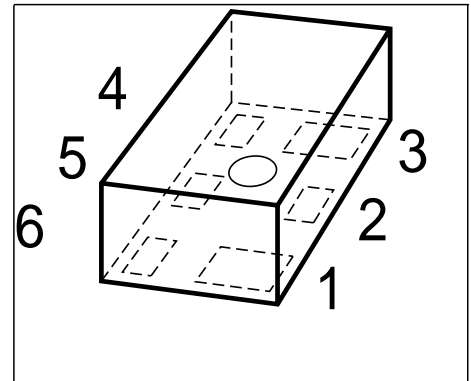


**NPN Silicon RF TWIN Transistor**

Preliminary data

- Low voltage/ low current applications
- Ideal for VCO modules and low noise amplifiers
- Low noise figure: TR1: 1.1dB at 1.8 GHz  
TR2: 1.0 dB at 1.8 GHz
- World's smallest SMD 6-pin leadless package
- Built in 2 transistors (TR1: die as BFR460L3,  
TR2: die as BFR360L3)


**ESD: Electrostatic discharge sensitive device, observe handling precaution!**

Type	Marking	Pin Configuration						Package
BFS466L6	AC	1=C1	2=E1	3=C2	4=B2	5=E2	6=B1	TSLP-6-1

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{CEO}$		V
TR1		4.5	
TR2		6	
Collector-emitter voltage	$V_{CES}$		
TR1		15	
TR2		15	
Collector-base voltage	$V_{CBO}$		
TR1		15	
TR2		15	
Emitter-base voltage	$V_{EBO}$		
TR1		1.5	
TR2		2	
Collector current	$I_C$		mA
TR1		50	
TR2		35	

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Base current	$I_B$		mA
TR1		5	
TR2		4	
Total power dissipation <sup>1)</sup>	$P_{tot}$		mW
TR1, $T_S \leq 104^\circ\text{C}$		200	
TR2, $T_S \leq 102^\circ\text{C}$		210	
Junction temperature	$T_j$		$^\circ\text{C}$
TR1		150	
TR2		150	
Ambient temperature	$T_A$		
TR1		-65 ... 150	
TR2		-65 ... 150	
Storage temperature	$T_{stg}$		
TR1		-65 ... 150	
TR2		-65 ... 150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	$R_{thJS}$		K/W
TR1		$\leq 230$	
TR2		$\leq 230$	

<sup>1)</sup> $T_S$  is measured on the collector lead at the soldering point to the pcb

<sup>2)</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 TR1, $I_C = 1\text{ mA}$ , $I_B = 0$ TR2, $I_C = 1\text{ mA}$ , $I_B = 0$	$V_{(BR)CEO}$	4.5 6	5 9	- -	V
Collector-emitter cutoff current TR1, $V_{CE} = 15\text{ V}$ , $V_{BE} = 0$ TR2, $V_{CE} = 15\text{ V}$ , $V_{BE} = 0$	$I_{CES}$	- -	- -	10 10	$\mu\text{A}$
Collector-base cutoff current TR1, $V_{CB} = 5\text{ V}$ , $I_E = 0$ TR2, $V_{CB} = 5\text{ V}$ , $I_E = 0$	$I_{CBO}$	- -	- -	100 100	nA
Emitter-base cutoff current TR1, $V_{EB} = 0,5\text{ V}$ , $I_C = 0$ TR2, $V_{EB} = 1\text{ V}$ , $I_C = 0$	$I_{EBO}$	- -	- -	1 1	$\mu\text{A}$
DC current gain TR1, $I_C = 20\text{ mA}$ , $V_{CE} = 3\text{ V}$ TR2, $I_C = 20\text{ mA}$ , $V_{CE} = 3\text{ V}$	$h_{FE}$	- 90	130 130	- 160	-

**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 TR1, $I_C = 30\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1\text{ GHz}$ TR2, $I_C = 15\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1\text{ GHz}$	$f_T$	16 11	22 14	- -	GHz
Collector-base capacitance TR1, $V_{CB} = 3\text{ V}$ , $f = 1\text{ MHz}$ , emitter grounded TR2, $V_{CB} = 5\text{ V}$ , $f = 1\text{ MHz}$ , emitter grounded	$C_{cb}$	- -	0.33 0.3	0.5 0.45	pF
Collector emitter capacitance TR1, $V_{CE} = 3\text{ V}$ , $f = 1\text{ MHz}$ , base grounded TR1, $V_{CE} = 3\text{ V}$ , $f = 1\text{ MHz}$ , base grounded	$C_{ce}$	- -	0.17 0.17	- -	
Emitter-base capacitance TR1, $V_{EB} = 0,5\text{ V}$ , $f = 1\text{ MHz}$ , collector grounded TR2, $V_{EB} = 0,5\text{ V}$ , $f = 1\text{ MHz}$ , collector grounded	$C_{eb}$	- -	0.57 0.48	- -	

**Electrical Characteristics at TA = 25°C, unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics (verified by random sampling)</b>					
Noise figure	$F$				dB
TR1, $I_C=5\text{mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{\text{Sopt}}$		-	1.1	-	
TR1, $I_C=5\text{mA}$ , $V_{CE} = 3\text{ V}$ , $f = 3\text{ GHz}$ , $Z_S = Z_{\text{Sopt}}$		-	1.4	-	
TR2, $I_C=3\text{mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{\text{Sopt}}$		-	1	-	
TR2, $I_C=3\text{mA}$ , $V_{CE} = 3\text{ V}$ , $f = 3\text{ GHz}$ , $Z_S = Z_{\text{Sopt}}$		-	1.4	-	
Power gain, maximum available <sup>1)</sup>	$G_{\text{ma}}$				
TR1, $I_C = 20\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S=Z_{\text{Sopt}}$ , $Z_L=Z_{\text{Lopt}}$ , $f = 1.8\text{ GHz}$		-	14.5	-	
TR1, $I_C = 20\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S=Z_{\text{Sopt}}$ , $Z_L=Z_{\text{Lopt}}$ , $f = 3\text{ GHz}$		-	10	-	
TR2, $I_C = 15\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S=Z_{\text{Sopt}}$ , $Z_L=Z_{\text{Lopt}}$ , $f = 1.8\text{ GHz}$		-	14.5	-	
TR2, $I_C = 15\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S=Z_{\text{Sopt}}$ , $Z_L=Z_{\text{Lopt}}$ , $f = 3\text{ GHz}$		-	10	-	
Transducer gain	$ S_{21e} ^2$				
TR1, $I_C = 20\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 1.8\text{GHz}$		-	12.5	-	
TR1, $I_C = 20\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 3\text{GHz}$		-	9	-	
TR2, $I_C = 15\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 1.8\text{GHz}$		-	12.5	-	
TR2, $I_C = 15\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 3\text{GHz}$		-	8.5	-	
Third order intercept point at output <sup>2)</sup>	$IP_3$				dBm
TR1, $V_{CE}=3\text{V}$ , $I_C=20\text{mA}$ , $Z_S=Z_L=50\Omega$ , $f=1.8\text{GHz}$		-	28	-	
TR2, $V_{CE}=3\text{V}$ , $I_C=15\text{mA}$ , $Z_S=Z_L=50\Omega$ , $f=1.8\text{GHz}$		-	24.5	-	
1dB Compression point, at output	$P_{-1\text{dB}}$				
TR1, $I_C=20\text{mA}$ , $V_{CE}=3\text{V}$ , $Z_S=Z_L=50\Omega$ , $f=1.8\text{GHz}$		-	12	-	
TR1, $I_C=15\text{mA}$ , $V_{CE}=3\text{V}$ , $Z_S=Z_L=50\Omega$ , $f=1.8\text{GHz}$		-	9	-	

$$^1G_{\text{ma}} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2})$$

<sup>2</sup>IP3 value depends on termination of all intermodulation frequency components.

Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

**Published by Infineon Technologies AG,  
St.-Martin-Strasse 53,  
81669 München**

**© Infineon Technologies AG 2004.  
All Rights Reserved.**

**Attention please!**

The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

**Information**

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

**Warnings**

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.