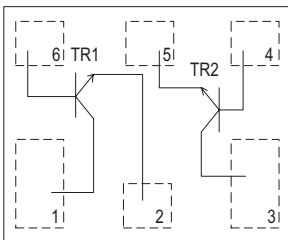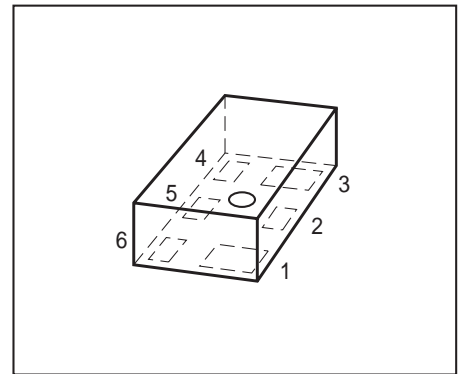**NPN Silicon RF TWIN Transistor***

- Low voltage/ low current applications

- Ideal for VCO modules and low noise amplifiers

- World's smallest SMD 6-pin leadless package

- Built in 2 transitors (TR1: die as BFR460L3,
                              TR2: die as BFR360L3)

- Low noise figure: TR1: 1.1dB at 1.8 GHz
                            TR2: 1.0 dB at 1.8 GHz

- TR1 with excellent ESD performance
  typical value > 1500 V (HBM)

- Pb-free (RoHS compliant) package[1]

- Qualified according AEC Q101

* Short term description

ESD (**E**lectro**s**tatic **d**ischarge) 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

[1]Pb-containing package may be available upon special request

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
TR1, $T_A > 0\ °C$		4.5	
TR1, $T_A \leq 0\ °C$		4.2	
TR2, $T_A > 0\ °C$		6	
TR2, $T_A \leq 0\ °C$		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[1]	P_{tot}		mW
TR1, $T_S \leq 104°C$		200	
TR2, $T_S \leq 102°C$		210	
Junction temperature	T_j		°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[2]	R_{thJS}		K/W
TR1		≤ 230	
TR2		≤ 230	

[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	$V_{(BR)CEO}$				V
TR1, I_C = 1 mA, I_B = 0		4.5	5	-	
TR2, I_C = 1 mA, I_B = 0		6	9	-	
Collector-emitter cutoff current	I_{CES}				µA
TR1, V_{CE} = 15 V, V_{BE} = 0		-	-	10	
TR2, V_{CE} = 15 V, V_{BE} = 0		-	-	10	
Collector-base cutoff current	I_{CBO}				nA
TR1, V_{CB} = 5 V, I_E = 0		-	-	100	
TR2, V_{CB} = 5 V, I_E = 0		-	-	100	
Emitter-base cutoff current	I_{EBO}				µA
TR1, V_{EB} = 0,5 V, I_C = 0		-	-	1	
TR2, V_{EB} = 1 V, I_C = 0		-	-	1	
DC current gain	h_{FE}				-
TR1, I_C = 20 mA, V_{CE} = 3 V, Pulse measured		90	120	160	
TR2, I_C = 15 mA, V_{CE} = 3 V, Pulse measured		90	120	160	

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	f_T				GHz
TR1, I_C = 30 mA, V_{CE} = 3 V, f = 1 GHz		16	22	-	
TR2, I_C = 15 mA, V_{CE} = 3 V, f = 1 GHz		11	14	-	
Collector-base capacitance	C_{cb}				pF
TR1, V_{CB} = 3 V, f = 1 MHz, V_{BE} = 0 , emitter grounded		-	0.29	0.45	
TR2, V_{CB} = 5 V, f = 1 MHz, V_{BE} = 0 , emitter grounded		-	0.26	0.4	
Collector emitter capacitance	C_{ce}				
TR1, V_{CE} = 3 V, f = 1 MHz, V_{BE} = 0 , base grounded		-	0.14	-	
TR2, V_{CE} = 5 V, f = 1 MHz, V_{BE} = 0 , base grounded		-	0.14	-	
Emitter-base capacitance	C_{eb}				
TR1, V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded		-	0.54	-	
TR2, V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded		-	0.43	-	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Noise figure	F				dB
TR1, I_C=5mA, V_{CE} = 3 V, f = 1.8 GHz, Z_S = Z_{Sopt}		-	1.1	-	
TR1, I_C=5mA, V_{CE} = 3 V, f = 3 GHz, Z_S = Z_{Sopt}		-	1.4	-	
TR2, I_C=3mA, V_{CE} = 3 V, f = 1.8 GHz, Z_S = Z_{Sopt}		-	1	-	
TR2, I_C=3mA, V_{CE} = 3 V, f = 3 GHz, Z_S = Z_{Sopt}		-	1.4	-	
Power gain, maximum available[1]	G_{ma}				
TR1, I_C = 20 mA, V_{CE} = 3 V, Z_S=Z_{Sopt}, Z_L=Z_{Lopt}, f = 1.8 GHz		-	17	-	
TR1, I_C = 20 mA, V_{CE} = 3 V, Z_S=Z_{Sopt}, Z_L=Z_{Lopt}, f = 3 GHz		-	12	-	
TR2, I_C = 15 mA, V_{CE} = 3 V, Z_S=Z_{Sopt}, Z_L=Z_{Lopt}, f = 1.8 GHz		-	16.5	-	
TR2, I_C = 15 mA, V_{CE} = 3 V, Z_S=Z_{Sopt}, Z_L=Z_{Lopt}, f = 3 GHz		-	11.5	-	
Transducer gain	$\|S_{21e}\|^2$				
TR1, I_C = 20 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 1.8GHz		-	14.5	-	
TR1, I_C = 20 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 3GHz		-	10	-	
TR2, I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 1.8GHz		-	13.5	-	
TR2, I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 3GHz		-	9.5	-	
Third order intercept point at output[2]	IP_3				dBm
TR1, V_{CE}=3V, I_C=20mA, Z_S=Z_L=50Ω, f=1.8GHz		-	28	-	
TR2, V_{CE}=3V, I_C=15mA, Z_S=Z_L=50Ω, f=1.8GHz		-	24.5	-	
1dB Compression point, at output	P_{-1dB}				
TR1, I_C=20mA, V_{CE}=3V, Z_S=Z_L=50Ω, f=1.8GHz		-	12	-	
TR1, I_C=15mA, V_{CE}=3V, Z_S=Z_L=50Ω, f=1.8GHz		-	9	-	

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

[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
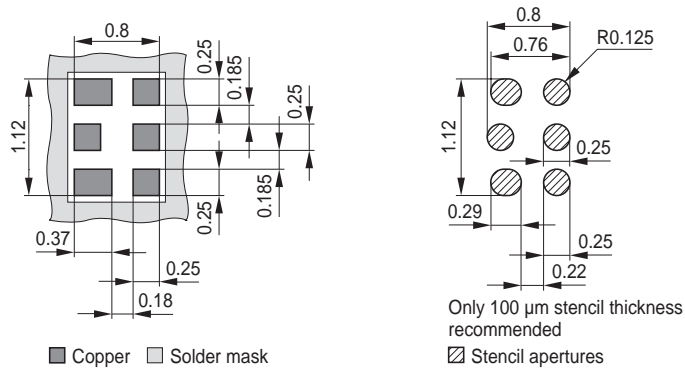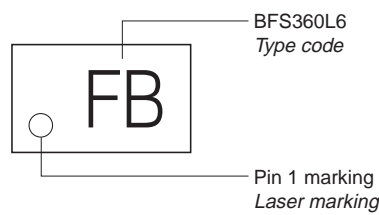
2007-04-26

Package Outline

Top view

Bottom view

0.4 $^{+0.1}$

0.05 MAX.

0.8±0.05

0.45±0.05

2 x 0.23±0.035 [1]

0.87±0.05

0.55±0.05

1.2±0.05

2 x 0.35±0.035 [1]

4 x 0.23±0.035 [1]

4 x 0.15±0.035 [1]

Pin 1 marking

1) Dimension applies to plated terminal

Foot Print

For board assembly information please refer to Infineon website "Packages"

0.8

0.25

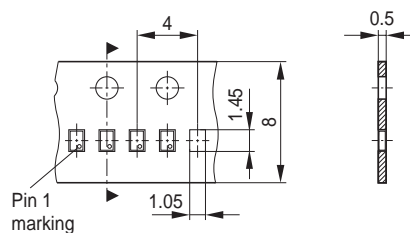0.185

0.25

1.12

0.185

0.25

0.25

0.37

0.25

0.18

0.8

0.76

R0.125

1.12

0.25

0.29

0.25

0.22

Only 100 µm stencil thickness recommended

⊠ Stencil apertures

■ Copper □ Solder mask

Marking Layout (Example)

BFS360L6
Type code

FB

Pin 1 marking
Laser marking

Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel

4

0.5

1.45

8

Pin 1
marking

1.05

Attention please!

Information

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

Warnings