

## Silicon NPN Planar RF Transistor

Electrostatic sensitive device.  
Observe precautions for handling.

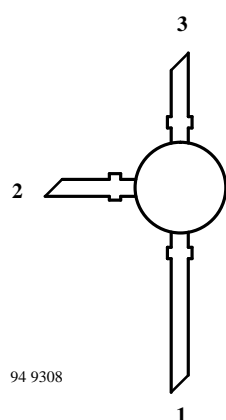


### Applications

RF-amplifier up to GHz range specially for wide band antenna amplifier.

### Features

- High power gain
- Low noise figures
- High transition frequency



Marking: BFQ 65  
Plastic case (TO 50)  
1 = Collector; 2 = Emitter; 3 = Base

### Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Collector-base voltage	$V_{CBO}$	20	V
Collector-emitter voltage	$V_{CEO}$	10	V
Emitter-base voltage	$V_{EBO}$	2.5	V
Collector current	$I_C$	50	mA
Total power dissipation $T_{amb} \leq 60^\circ\text{C}$	$P_{tot}$	300	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-65 to +150	$^\circ\text{C}$

### Maximum Thermal Resistance

Parameters	Symbol	Maximum	Unit
Junction ambient on glass fibre printed board (40 x 25 x 1.5) mm <sup>3</sup> plated with 35 $\mu\text{m}$ Cu	$R_{thJA}$	300	K/W

## Electrical DC Characteristics

$T_{amb} = 25^{\circ}\text{C}$

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector-emitter cut-off current $V_{CE} = 20\text{ V}, V_{BE} = C$	$I_{CES}$			100	$\mu\text{A}$
Collector-base cut-off current $V_{CB} = 15\text{ V}, I_E = 0$	$I_{CBO}$			100	nA
Emitter-base cut-off current $V_{EB} = 1\text{ V}, I_C = 0$	$I_{EBO}$			1	$\mu\text{A}$
Collector-emitter breakdown voltage $I_C = 1\text{ mA}, I_B = 0$	$V_{(BR)CEO}$	10			V
Collector-emitter saturation voltage $I_C = 50\text{ mA}, I_B = 5\text{ mA}$	$V_{CEsat}$		0.1	0.4	V
DC forward current transfer ratio $I_C = 15\text{ mA}, V_{CE} = 5\text{ V}$	$h_{FE}$	60	100	150	

## Electrical AC Characteristics

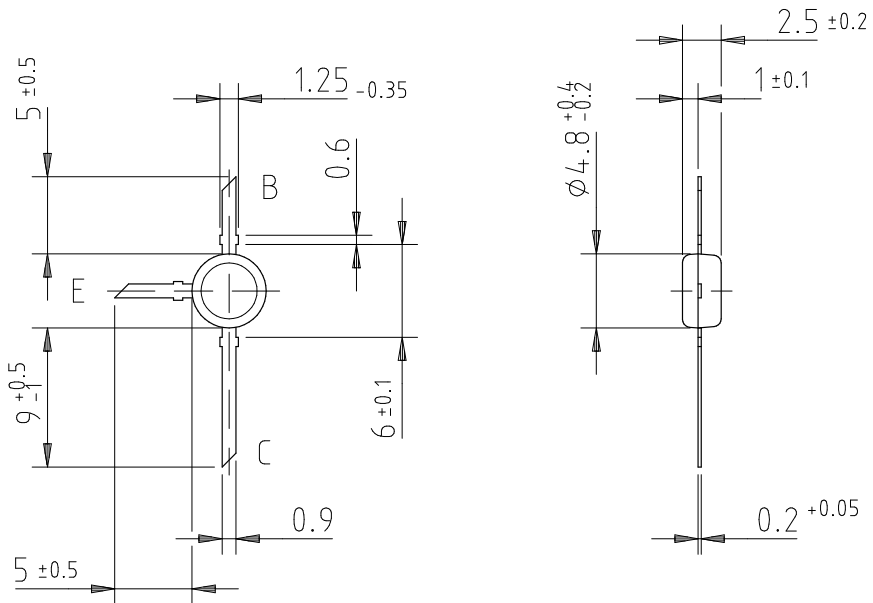
$T_{amb} = 25^{\circ}\text{C}$

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Transition frequency $V_{CE} = 8\text{ V}, I_C = 15\text{ mA}, f = 500\text{ MHz}$	$f_T$		7.5		GHz
Collector-base capacitance $V_{CB} = 8\text{ V}, f = 1\text{ MHz}$	$C_{cb}$		0.4		pF
Collector-emitter capacitance $V_{CE} = 8\text{ V}, f = 1\text{ MHz}$	$C_{ce}$		0.3		pF
Emitter-base capacitance $V_{EB} = 0.5\text{ V}, f = 1\text{ MHz}$	$C_{eb}$		1.0		pF
Noise figure $V_{CE} = 8\text{ V}, Z_S = 50\ \Omega, f = 800\text{ MHz}$ $I_C = 5\text{ mA}$ $I_C = 15\text{ mA}$	F F		1.3 1.7		dB dB
$V_{CE} = 8\text{ V}, Z_S = 50\ \Omega, f = 2\text{ GHz}$ $I_C = 5\text{ mA}$ $I_C = 15\text{ mA}$	F F		2.5 3.0		dB dB
Power gain $I_C = 15\text{ mA}, V_{CE} = 8\text{ V}, f = 2\text{ GHz}, Z_S = 50\ \Omega,$ $Z_L = Z_{Lopt}$	$G_{pe}$		8		dB
Linear output voltage – two tone intermodulation test $V_{CE} = 8\text{ V}, I_C = 15\text{ mA}, d_{IM} = 60\text{ dB},$ $f_1 = 806\text{ MHz}, f_2 = 810\text{ MHz}, Z_S = Z_L = 50\ \Omega$	$V_{01} = V_{02}$		160		mV
Third order intercept point $V_{CE} = 8\text{ V}, I_C = 15\text{ mA}, f = 800\text{ MHz}$	$IP_3$		26		dBm

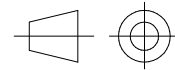
## Common Emitter S-Parameters

V <sub>CE</sub> /V	I <sub>C</sub> /mA	f/MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
8	5	100	0.813	-27.4	13.71	157.3	0.020	76.8	0.943	-13.0
		300	0.600	-71.0	10.17	125.7	0.047	62.9	0.763	-28.5
		500	0.447	-100.9	7.39	106.9	0.063	59.4	0.652	-35.2
		800	0.336	-133.0	5.04	89.6	0.084	60.5	0.585	-41.8
		1000	0.289	-149.8	4.10	81.2	0.098	61.9	0.569	-46.1
		1200	0.264	-164.8	3.48	74.4	0.114	62.6	0.563	-50.7
		1500	0.236	-175.8	2.81	65.5	0.139	63.0	0.566	-57.7
		1800	0.217	-157.0	2.38	57.4	0.164	62.6	0.578	-65.0
	2000	0.205	-147.5	2.17	52.8	0.179	61.9	0.589	-69.8	
	10	100	0.661	-38.2	21.80	148.0	0.018	74.0	0.879	-18.1
		300	0.398	-86.9	13.04	113.8	0.039	66.1	0.636	-31.3
		500	0.283	-114.8	8.62	98.3	0.056	67.4	0.548	-35.2
		800	0.220	-144.6	5.63	84.7	0.082	69.1	0.508	-41.1
		1000	0.194	-160.9	4.55	77.9	0.101	69.4	0.501	-45.7
		1200	0.182	-174.5	3.84	72.1	0.120	68.8	0.500	-50.5
		1500	0.170	168.0	3.10	64.5	0.148	67.1	0.507	-58.2
		1800	0.157	149.9	2.63	57.1	0.177	65.2	0.521	-65.8
	2000	0.151	140.7	2.38	52.8	0.194	63.7	0.531	-70.8	
	15	100	0.551	-45.6	26.77	142.0	0.016	72.9	0.828	-21.1
		300	0.304	-96.1	14.11	108.4	0.036	69.4	0.576	-31.3
		500	0.216	-122.9	9.04	94.9	0.054	71.5	0.505	-34.1
		800	0.177	-152.2	5.82	82.6	0.083	72.3	0.477	-40.3
		1000	0.160	-167.4	4.69	76.4	0.102	71.9	0.474	-45.2
		1200	0.153	178.8	3.96	71.1	0.123	71.0	0.476	-50.3
		1500	0.144	163.0	3.20	63.9	0.152	68.7	0.484	-58.3
		1800	0.136	144.9	2.71	56.8	0.182	66.0	0.498	-66.2
	2000	0.133	136.3	2.47	52.7	0.200	64.2	0.508	-71.2	
	20	100	0.472	-51.3	29.92	137.7	0.015	72.8	0.788	-22.8
300		0.250	-102.7	14.61	105.4	0.035	72.4	0.542	-30.9	
500		0.183	-129.7	9.22	92.9	0.054	73.9	0.484	-33.3	
800		0.157	-156.6	5.92	81.6	0.083	74.2	0.462	-39.5	
1000		0.145	-171.8	4.76	75.6	0.104	73.1	0.461	-44.7	
1200		0.141	174.2	4.02	70.5	0.124	71.8	0.463	-50.1	
1500		0.133	159.7	3.25	63.5	0.155	69.4	0.472	-58.2	
1800		0.134	140.9	2.74	56.6	0.185	66.6	0.487	-66.2	
2000	0.128	135.5	2.50	52.5	0.203	64.4	0.496	-71.3		
30	100	0.366	-60.5	33.31	132.4	0.014	74.0	0.736	-24.7	
	300	0.197	-114.6	15.00	102.0	0.034	75.0	0.506	-29.8	
	500	0.158	-141.2	9.32	90.8	0.053	76.3	0.461	-32.0	
	800	0.147	-165.8	5.95	80.2	0.083	75.7	0.447	-38.9	
	1000	0.142	-178.5	4.79	74.3	0.104	74.4	0.446	-44.3	
	1200	0.139	169.5	4.04	69.3	0.125	72.8	0.450	-49.8	
	1500	0.136	154.0	3.26	62.5	0.156	69.9	0.460	-58.2	
	1800	0.136	138.7	2.76	55.6	0.187	66.7	0.476	-66.4	
2000	0.132	130.5	2.51	51.6	0.204	64.5	0.486	-71.7		

## Dimensions in mm



96 12244



technical drawings  
according to DIN  
specifications

## Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**TEMIC TELEFUNKEN microelectronic GmbH** semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**TEMIC** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use TEMIC products for any unintended or unauthorized application, the buyer shall indemnify TEMIC against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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