TEMIC

TELEFUNKEN Semiconductors

BFR 92 / BFR 92 R

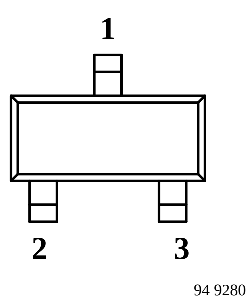
Silicon NPN Planar RF Transistor

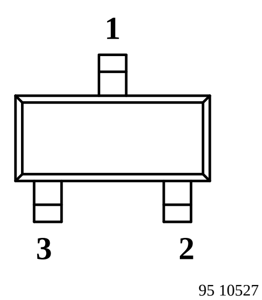
Applications

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

Features

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





BFR92 Marking: P1
Plastic case (SOT 23)
1= Collector; 2= Base; 3= Emitter

BFR92R Marking: P4
Plastic case (SOT 23R)
1= Collector; 2= Base; 3= Emitter

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Collector-base voltage	V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	15	V
Emitter-base voltage	V_{EBO}	2	V
Collector current	I_C	30	mA
Total power dissipation $T_{amb} \leq 60°C$	P_{tot}	200	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	–65 to +150	°C

Maximum Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient on glass fibre printed board (7 x 5 x 0.6) mm^3 plated with 35 μm Cu	R_{thJA}	450	K/W

Electrical DC Characteristics

T_{amb} = 25°C, unless otherwise specified

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector cut-off current V_{CB} = 10 V, I_E = 0 A	I_{CBO}			50	nA
Collector-base breakdown voltage I_C = 10 μA	$V_{(BR)CBO}$	20			V
Collector-emitter breakdown voltage I_C = 2 mA	$V_{(BR)CEO}$	15			V
Emitter-base breakdown voltage I_E = 10 μA	$V_{(BR)EBO}$	2			V
DC forward current transfer ratio I_C = 14 mA, V_{CE} = 10 V	h_{FE}	25	50		

Electrical AC Characteristics

T_{amb} = 25°C

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Transition frequency I_C = 14 mA, V_{CE} = 10 V, f = 500 MHz	f_T		5		GHz
Collector-emitter capacitance V_{CE} = 10 V, f = 1 MHz	C_{CE}		0.15		pF
Collector base capacitance V_{CB} = 10 V, f = 1 MHz	C_{CB}		0.38		pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{EB}		1.3		pF
Noise figure I_C = 2 mA, V_{CE} = 10 V, R_G = 50 Ω, f = 500 MHz	F		2.2		dB
Power gain I_C = 14 mA, V_{CE} = 10 V, R_L = R_{Lopt}, f = 500 MHz f = 800 MHz	 G_{pe} G_{pe}		 19.5 14		 dB dB
Linear output voltage – two tone intermodulation test I_C = 14 mA, V_{CE} = 10 V, d_{IM} = 60 dB, f_1 = 806 MHz, f_2 = 810 MHz, R_G = R_L = 50 Ω	$V_1 = V_2$		110		mV
Third order intercept point I_C = 14 mA, V_{CE} = 10 V, f = 800 MHz	IP_3		23.5		dBm

Common Source S-Parameters
V_{CE} = 5 V, I_C = 2 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
5	2	100	0.874	–27.5	6.36	158.2	0.032	74.7	0.959	–9.9
		300	0.668	–74.2	4.86	125.0	0.073	54.4	0.793	–21.4
		500	0.501	–107.9	3.59	104.4	0.089	47.0	0.677	–24.1
		800	0.385	–143.1	2.48	86.2	0.103	47.5	0.612	–24.5
		1000	0.361	–160.4	2.08	77.5	0.113	50.4	0.602	–25.9
		1200	0.351	–175.7	1.81	69.4	0.124	53.6	0.596	–28.7
		1500	0.371	164.7	1.52	59.0	0.145	58.1	0.581	–33.8
		1800	0.386	146.8	1.32	50.2	0.170	61.6	0.569	–38.6
		2000	0.407	136.8	1.23	45.1	0.192	62.9	0.564	–42.1

Common Source S-Parameters
V_{CE} = 5 V, I_C = 5 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
5	5	100	0.727	–41.3	12.49	147.4	0.028	69.6	0.891	–16.3
		300	0.457	–97.0	7.47	111.5	0.056	56.7	0.632	–25.5
		500	0.338	–131.5	4.94	95.1	0.073	57.6	0.532	–23.8
		800	0.276	–164.9	3.24	80.7	0.099	61.4	0.498	–21.3
		1000	0.268	–179.7	2.66	73.6	0.117	63.1	0.500	–22.4
		1200	0.272	168.1	2.29	67.0	0.137	63.9	0.499	–25.2
		1500	0.299	153.6	1.90	57.8	0.167	64.0	0.486	–30.3
		1800	0.324	138.7	1.64	50.0	0.199	63.5	0.476	–34.7
		2000	0.345	130.8	1.52	45.1	0.221	62.6	0.473	–38.1

Common Source S-Parameters
V_{CE} = 5 V, I_C = 10 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
5	10	100	0.566	–56.6	18.29	136.5	0.024	67.9	0.796	–21.6
		300	0.325	–116.5	8.85	103.0	0.048	63.4	0.526	–25.2
		500	0.263	–149.8	5.61	89.8	0.069	66.1	0.455	–21.2
		800	0.233	179.9	3.61	77.7	0.101	68.2	0.441	–17.7
		1000	0.229	167.5	2.95	71.4	0.123	68.1	0.449	–19.1
		1200	0.236	158.6	2.53	65.4	0.146	67.5	0.453	–22.4
		1500	0.271	147.4	2.08	57.0	0.179	65.9	0.440	–27.7
		1800	0.294	133.6	1.80	49.6	0.213	64.0	0.430	–32.0
		2000	0.318	126.8	1.66	44.7	0.235	62.3	0.427	–35.5

Common Source S-Parameters
V_{CE} = 5 V, I_C = 14 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
5	14	100	0.487	–65.1	20.67	131.1	0.022	67.4	0.745	–23.5
		300	0.286	–125.4	9.25	100.0	0.046	66.3	0.491	–24.2
		500	0.243	–156.9	5.79	87.9	0.068	69.3	0.433	–19.6
		800	0.223	174.5	3.71	76.6	0.102	70.2	0.427	–16.2
		1000	0.223	163.2	3.02	70.5	0.125	69.6	0.436	–17.7
		1200	0.230	155.2	2.59	64.7	0.148	68.4	0.440	–21.2
		1500	0.262	145.1	2.13	56.6	0.182	66.5	0.427	–26.6
		1800	0.290	132.4	1.83	49.1	0.216	64.1	0.417	–30.9
		2000	0.313	124.8	1.69	44.6	0.239	62.3	0.413	–34.5

Common Source S-Parameters
V_{CE} = 5 V, I_C = 20 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
5	20	100	0.409	–74.8	22.66	125.6	0.020	67.2	0.690	–24.7
		300	0.257	–135.4	9.45	97.1	0.044	69.7	0.463	–22.2
		500	0.232	–165.7	5.87	86.2	0.068	72.0	0.417	–17.4
		800	0.224	169.2	3.74	75.4	0.103	71.7	0.418	–14.6
		1000	0.223	159.7	3.05	69.5	0.127	70.8	0.430	–16.4
		1200	0.233	153.2	2.61	63.9	0.150	69.1	0.433	–20.1
		1500	0.265	143.6	2.15	55.9	0.184	66.9	0.421	–25.7
		1800	0.292	131.8	1.84	48.7	0.217	64.3	0.411	–29.9
		2000	0.315	124.3	1.70	44.0	0.241	62.3	0.407	–33.6

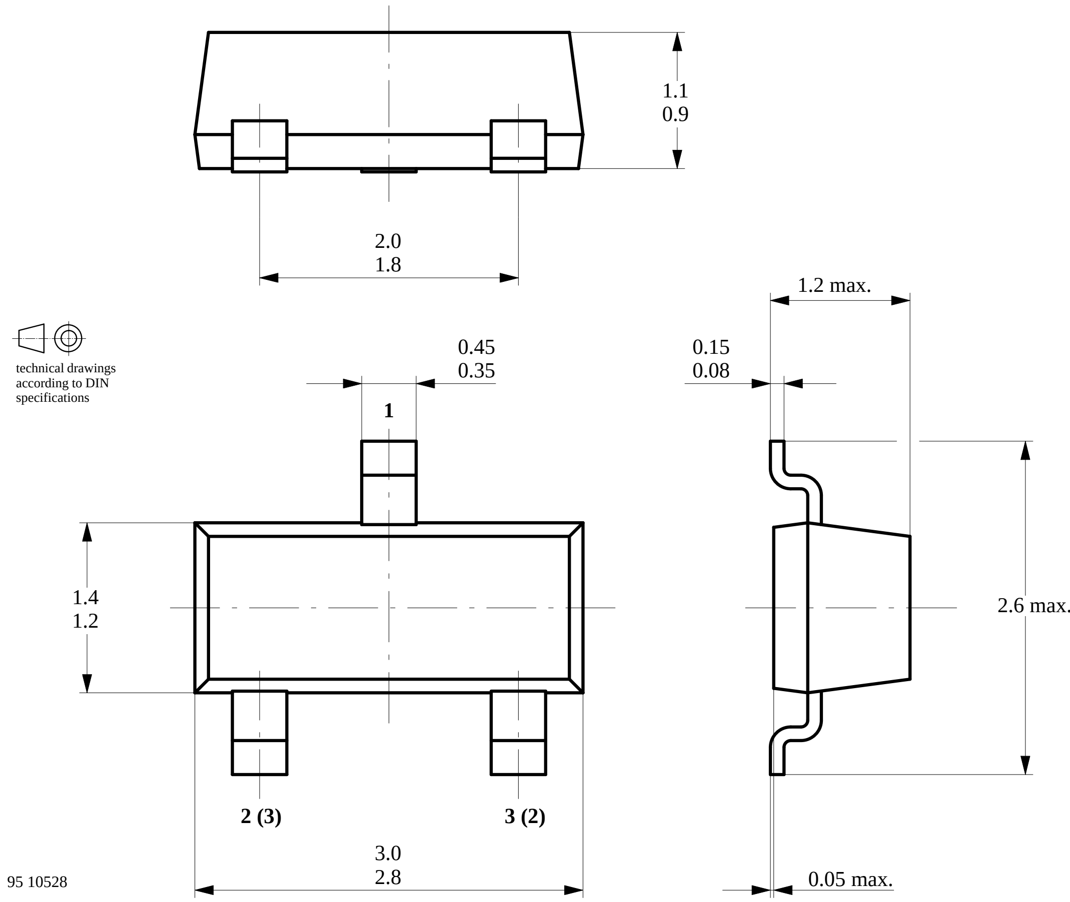
Common Source S-Parameters
V_{CE} = 5 V, I_C = 30 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
5	30	100	0.345	–88.0	23.55	119.9	0.019	68.3	0.638	–24.3
		300	0.246	–146.3	9.26	94.3	0.042	72.2	0.451	–19.3
		500	0.242	–173.0	5.70	84.4	0.067	74.0	0.417	–15.3
		800	0.236	164.2	3.63	74.0	0.103	73.0	0.423	–13.3
		1000	0.240	156.0	2.95	68.2	0.127	71.7	0.435	–15.4
		1200	0.248	150.1	2.52	62.6	0.149	70.0	0.438	–19.3
		1500	0.281	141.6	2.08	54.7	0.184	67.5	0.426	–25.1
		1800	0.310	129.7	1.79	47.4	0.217	64.9	0.416	–29.5
		2000	0.332	123.3	1.64	42.9	0.240	63.0	0.412	–33.2

Common Source S-Parameters
V_{CE} = 10 V, I_C = 20 mA, Z_o = 50 Ohm

V_{CE}/V	I_C/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
10	20	100	0.482	–64.4	22.24	128.1	0.018	67.5	0.754	–19.0
		300	0.253	–119.6	9.56	98.8	0.038	69.0	0.557	–17.0
		500	0.202	–153.7	5.96	87.3	0.059	71.7	0.519	–14.0
		800	0.180	176.6	3.79	76.5	0.089	72.5	0.521	–12.9
		1000	0.179	163.4	3.08	70.7	0.109	71.8	0.532	–14.9
		1200	0.188	156.0	2.63	65.3	0.129	70.9	0.536	–18.0
		1500	0.220	146.1	2.17	57.5	0.159	69.5	0.527	–22.8
		1800	0.250	131.5	1.86	50.2	0.187	67.8	0.520	–26.9
		2000	0.276	124.2	1.71	45.7	0.208	66.3	0.520	–30.1

Dimensions in mm



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.

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