

## Silicon NPN Planar RF Transistor

Electrostatic sensitive device.  
Observe precautions for handling.

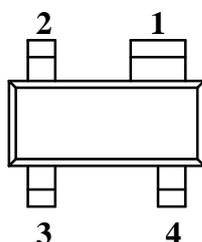


### Applications

For low-noise and high-gain broadband amplifiers at collector currents from 0.2 mA to 5 mA.

### Features

- Low supply voltage
- Low current consumption
- 50  $\Omega$  input impedance at 945 MHz
- Low noise figure
- High power gain



94 9279

Marking: 822  
Plastic case (SOT 143)  
1 = Collector; 2 = Emitter; 3 = Base; 4 = Emitter

### Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Collector-base voltage	$V_{CB0}$	12	V
Collector-emitter voltage	$V_{CEO}$	6	V
Emitter-base voltage	$V_{EBO}$	2	V
Collector current	$I_C$	8	mA
Total power dissipation $T_{amb} \leq 125^\circ\text{C}$	$P_{tot}$	30	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 (25 x 20 x 1.5 mm) <sup>3</sup> plated with 35 $\mu\text{m}$ Cu	$R_{thJA}$	450	K/W

## Electrical DC Characteristics

T<sub>amb</sub> = 25°C

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector-emitter cut-off current V <sub>CE</sub> = 12 V, V <sub>BE</sub> = 0	I <sub>CES</sub>			100	μA
Collector-base cut-off current V <sub>CB</sub> = 8 V, I <sub>E</sub> = 0	I <sub>CBO</sub>			100	nA
Emitter-base cut-off current V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0	I <sub>EBO</sub>			1	μA
Collector-emitter breakdown voltage I <sub>C</sub> = 1 mA, I <sub>B</sub> = 0	V <sub>(BR)CEO</sub>	6			V
Collector-emitter saturation voltage I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.5 mA	V <sub>CEsat</sub>		0.1	0.4	V
DC forward current transfer ratio V <sub>CE</sub> = 3 V, I <sub>C</sub> = 1 mA	h <sub>FE</sub>	40	90	150	

## Electrical AC Characteristics

T<sub>amb</sub> = 25°C

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Transition frequency V <sub>CE</sub> = 3 V, I <sub>C</sub> = 1 mA, f = 500 MHz V <sub>CE</sub> = 2 V, I <sub>C</sub> = 1.5 mA, f = 500 MHz	f <sub>T</sub> f <sub>T</sub>		4.7 5.2		GHz GHz
Collector-base capacitance V <sub>CB</sub> = 1 V, f = 1 MHz	C <sub>cb</sub>		0.2		pF
Noise figure Z <sub>S</sub> = Z <sub>Sopt</sub> , f = 945 MHz, V <sub>CE</sub> = 3 V, I <sub>C</sub> = 1 mA V <sub>CE</sub> = 2 V, I <sub>C</sub> = 1.5 mA Z <sub>S</sub> = Z <sub>Sopt</sub> , f = 450 MHz, V <sub>CE</sub> = 2 V, I <sub>C</sub> = 0.5 mA	F <sub>opt</sub> F <sub>opt</sub> F <sub>opt</sub>		1.8 2.0 1.1		dB dB dB
Power gain V <sub>CE</sub> = 3 V, I <sub>C</sub> = 1 mA, f = 945 MHz V <sub>CE</sub> = 2 V, I <sub>C</sub> = 1.5 mA, f = 945 MHz V <sub>CE</sub> = 2 V, I <sub>C</sub> = 0.5 mA, f = 450 MHz	G <sub>pe</sub> at F <sub>opt</sub> G <sub>pe</sub> at F <sub>opt</sub> G <sub>pe</sub> at F <sub>opt</sub>		12.5 14.0 13.5		dB dB dB
Collector current for f <sub>T</sub> max V <sub>CE</sub> = 2 V, f = 500 MHz	I <sub>C</sub>		3		mA
Real part of input impedance V <sub>CE</sub> = 3 V, I <sub>C</sub> = 1 mA, f = 945 MHz V <sub>CE</sub> = 2 V, I <sub>C</sub> = 1.5 mA, f = 945 MHz	Re(h <sub>11e</sub> ) Re(h <sub>11e</sub> )		50 50		Ω Ω

f<sub>S</sub> = disturbance signal, f<sub>N</sub> = useful signal

## Common Emitter S-Parameters

$V_{CE} = 2\text{ V}$ ,  $I_C = 0.5\text{ mA}$

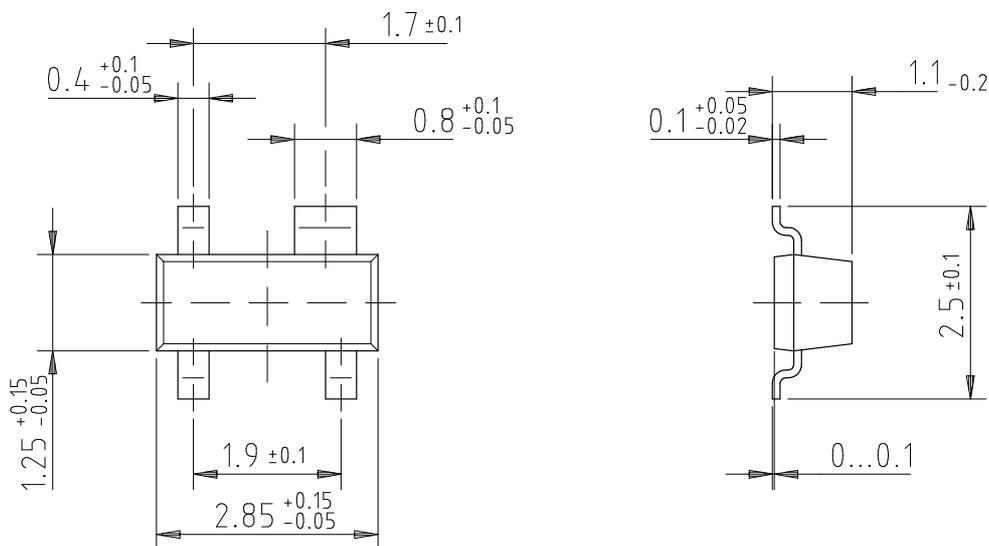
f/MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG
	dB	deg	dB	deg	dB	deg	dB	deg
100	-0.23	-4.0	5.37	175.2	-38.24	86.4	-0.03	-2.3
200	-0.29	-7.9	5.31	169.7	-32.38	82.4	-0.06	-4.8
300	-0.39	-11.8	5.21	164.2	-29.04	78.6	-0.11	-6.9
400	-0.53	-15.6	5.07	158.9	-26.71	75.1	-0.18	-9.3
500	-0.67	-19.0	4.87	153.9	-25.05	71.7	-0.28	-11.4
600	-0.85	-22.5	4.69	149.2	-23.61	69.0	-0.36	-13.1
700	-1.01	-25.8	4.53	145.0	-22.46	66.4	-0.44	-15.2
800	-1.21	-29.3	4.38	141.0	-21.52	63.9	-0.54	-16.9
900	-1.40	-32.3	4.24	136.1	-20.74	61.1	-0.63	-18.8
1000	-1.59	-35.6	4.09	132.6	-20.07	59.0	-0.69	-20.4
1100	-1.79	-39.0	4.00	128.6	-19.36	56.9	-0.79	-22.2
1200	-2.00	-42.4	3.91	124.9	-18.76	54.8	-0.88	-24.0
1300	-2.24	-45.6	3.81	121.2	-18.33	52.7	-0.96	-25.7

## Common Emitter S-Parameters

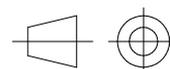
$V_{CE} = 2\text{ V}$ ,  $I_C = 1.5\text{ mA}$

f/MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG
	dB	deg	dB	deg	dB	deg	dB	deg
100	-0.73	-6.9	13.74	171.8	-38.45	84.3	-0.07	-3.6
200	-0.94	-13.7	13.58	163.4	-32.68	78.4	-0.18	-7.1
300	-1.27	-19.8	13.29	155.7	-29.44	73.0	-0.38	-10.2
400	-1.68	-25.7	12.89	148.3	-27.32	68.4	-0.60	-13.0
500	-2.15	-31.0	12.49	141.3	-25.91	64.0	-0.83	-15.6
600	-2.67	-36.1	12.04	135.3	-24.72	60.6	-1.10	-17.3
700	-3.19	-40.5	11.63	129.4	-23.83	58.2	-1.33	-19.2
800	-3.78	-44.6	11.17	124.3	-22.97	54.7	-1.56	-20.7
900	-4.37	-48.5	10.78	118.9	-22.36	52.0	-1.79	-22.3
1000	-4.93	-52.4	10.38	114.3	-21.79	49.8	-1.98	-23.6
1100	-5.58	-56.4	9.98	110.0	-21.43	48.1	-2.18	-24.9
1200	-6.18	-60.1	9.67	105.7	-20.92	46.1	-2.35	-26.3
1300	-6.79	-64.4	9.32	102.0	-20.54	44.9	-2.53	-27.5

## Dimensions of in mm



96 12240



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.**

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