Silicon NPN Planar RF Transistor

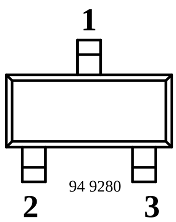
Electrostatic sensitive device.
Observe precautions for handling.

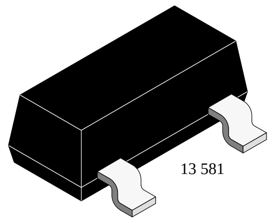
Applications

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 Ω input impedance at 945 MHz
- Low noise figure
- High power gain





Marking: 852
Plastic case (SOT 23)
1 = Collector; 2 = Base; 3 = Emitter

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Collector-base voltage	V_{CBO}	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 $T_{amb} \leq 125$°C	P_{tot}	30	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	–65 to +150	°C

Maximum Thermal Resistance

Parameters	Symbol	Maximum	Unit
Junction ambient on glass fibre printed board (25 x 20 x 1.5) mm^3 plated with 35 µm Cu	R_{thJA}	450	K/W

Electrical DC Characteristics

T_{amb} = 25°C

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector-emitter cut–off current V_{CE} = 12 V, V_{BE} = 0	I_{CES}			100	µA
Collector-base cut–off current V_{CB} = 8 V, I_E = 0	I_{CBO}			100	nA
Emitter-base cut–off current V_{EB} = 1 V, I_C = 0	I_{EBO}			1	µA
Collector-emitter breakdown voltage I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	6			V
Collector-emitter saturation voltage I_C = 5 mA, I_B = 0.5 mA	V_{CEsat}		0.1	0.4	V
DC forward current transfer ratio V_{CE} = 3 V, I_C = 1 mA	h_{FE}	40	90	150	

Electrical AC Characteristics

T_{amb} = 25°C

Parameters / Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Transition frequency V_{CE} = 3 V, I_C = 1 mA, f = 500 MHz V_{CE} = 2 V, I_C = 1.5 mA, f = 500 MHz	f_T f_T		4.7 5.2		GHz GHz
Collector-base capacitance V_{CB} = 1 V, f = 1 MHz	C_{cb}		0.25		pF
Noise figure $Z_S = Z_{Sopt}$, f = 945 MHz, V_{CE} = 3 V, I_C = 1 mA V_{CE} = 2 V, I_C = 1.5 mA $Z_S = Z_{Sopt}$, f = 450 MHz V_{CE} = 2 V, I_C = 0.5 mA	F_{opt} F_{opt} F_{opt}		1.8 2.0 1.1		dB dB dB
Power gain V_{CE} = 3 V, I_C = 1 mA, f = 945 MHz V_{CE} = 2 V, I_C = 1.5 mA, f = 945 MHz V_{CE} = 2 V, I_C = 0.5 mA, f = 450 MHz	G_{pe} at F_{opt} G_{pe} at F_{opt} G_{pe} at F_{opt}		10.5 12.0 11.5		dB dB dB
Collector current for f_T max V_{CE} = 2 V, f = 500 MHz	I_C		3		mA
Real part of input impedance V_{CE} = 3 V, f = 945 MHz, I_C = 1 mA V_{CE} = 2 V, f = 945 MHz, I_C = 1.5 mA	$Re(h_{11e})$ $Re(h_{11e})$		50 50		Ω Ω

f_S = disturbance signal, f_N = useful signal

Common Emitter S-Parameter
V_{CE} = 2 V, I_C = 0.5 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
100	9.976	–3.8	1.71	174.9	0.015	86.8	0.998	–2.3
200	0.969	–7.9	1.71	168.9	0.029	83.4	0.993	–4.7
300	0.955	–11.7	1.70	163.3	0.044	80.0	0.984	–6.7
400	0.939	–15.5	1.68	157.7	0.058	76.8	0.974	–8.7
500	0.920	–18.9	1.64	151.9	0.070	73.6	0.959	–10.6
600	0.901	–22.4	1.62	147.2	0.082	71.5	0.948	–12.4
700	0.881	–25.8	1.58	142.2	0.093	69.0	0.935	–13.9
800	0.861	–28.9	1.56	137.6	0.104	66.7	0.922	–15.5
900	0.838	–32.3	1.53	133.1	0.114	65.0	0.909	–17.2
1000	0.818	–35.4	1.50	129.4	0.121	63.5	0.898	–18.6
1100	0.793	–38.8	1.49	125.1	0.130	61.8	0.884	–19.7
1200	0.772	–41.5	1.46	121.3	0.138	60.4	0.873	–21.3
1300	0.746	–45.1	1.44	117.2	0.148	58.6	0.859	–22.6

Common Emitter S-Parameter
V_{CE} = 2 V, I_C = 1.5 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
100	0.972	–7.5	4.84	170.9	0.016	84.8	0.990	–3.9
200	0.898	–14.5	4.69	161.7	0.031	79.8	0.972	–7.4
300	0.858	–21.0	4.49	153.1	0.045	75.1	0.944	–10.6
400	0.811	–27.0	4.27	145.1	0.057	71.5	0.913	–13.1
500	0.762	–32.2	4.01	137.8	0.067	68.3	0.880	–15.3
600	0.710	–36.8	3.77	131.3	0.077	65.9	0.849	–16.8
700	0.662	–40.3	3.55	125.3	0.085	63.6	0.820	–17.8
800	0.617	–43.8	3.33	120.0	0.093	62.1	0.796	–18.7
900	0.576	–46.9	3.15	115.1	0.099	61.2	0.775	–19.5
1000	0.540	–50.0	2.98	110.7	0.106	60.3	0.756	–20.3
1100	0.502	–52.4	2.82	106.5	0.113	59.5	0.740	–20.8
1200	0.470	–54.8	2.69	102.8	0.118	59.3	0.724	–21.4
1300	0.439	–57.6	2.56	99.0	0.123	58.7	0.710	–21.7

Typical Characteristics (T$_j$ = 25°C unless otherwise specified)

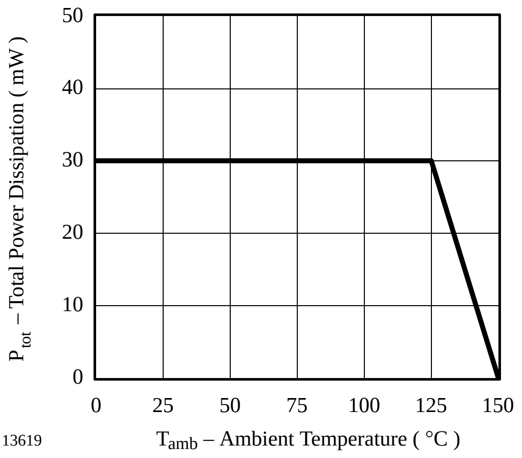


Figure 1. Total Power Dissipation vs. Ambient Temperature

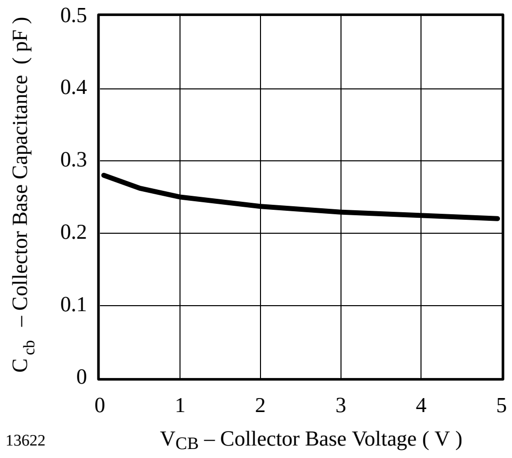


Figure 3. Collector Base Capacitance vs. Collector Base Voltage

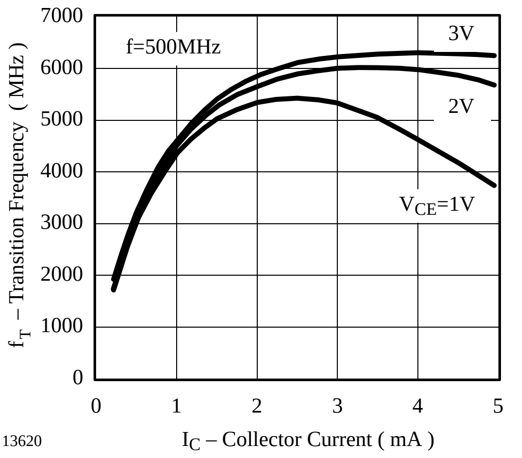


Figure 2. Transition Frequency vs. Collector Current

V_{CE} = 2 V; I_C = 1.5 mA; Z_0 = 50 Ω

S_{11}

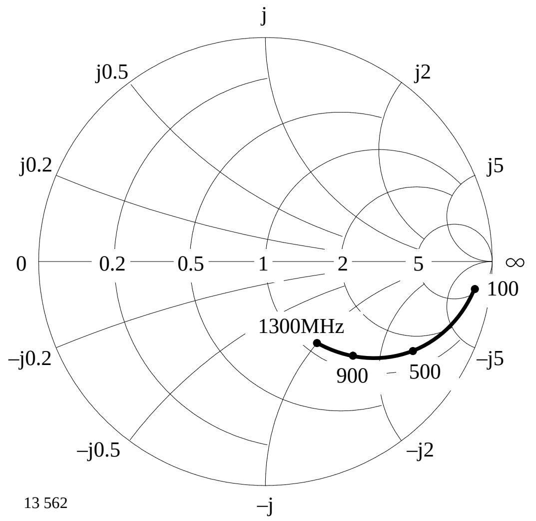


Figure 4. Input reflection coefficient

S_{12}

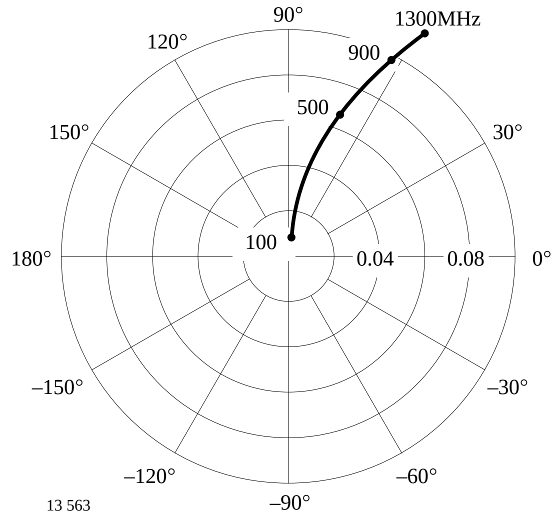


Figure 6. Reverse transmission coefficient

S_{21}

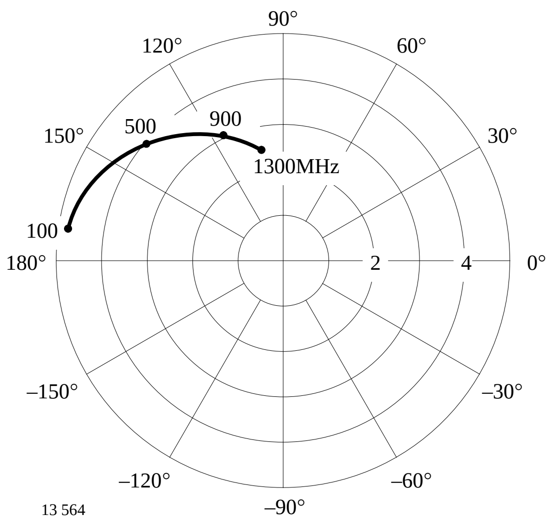


Figure 5. Forward transmission coefficient

S_{22}

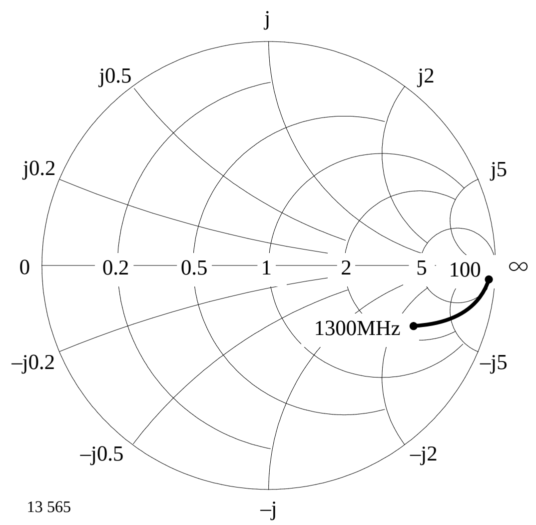
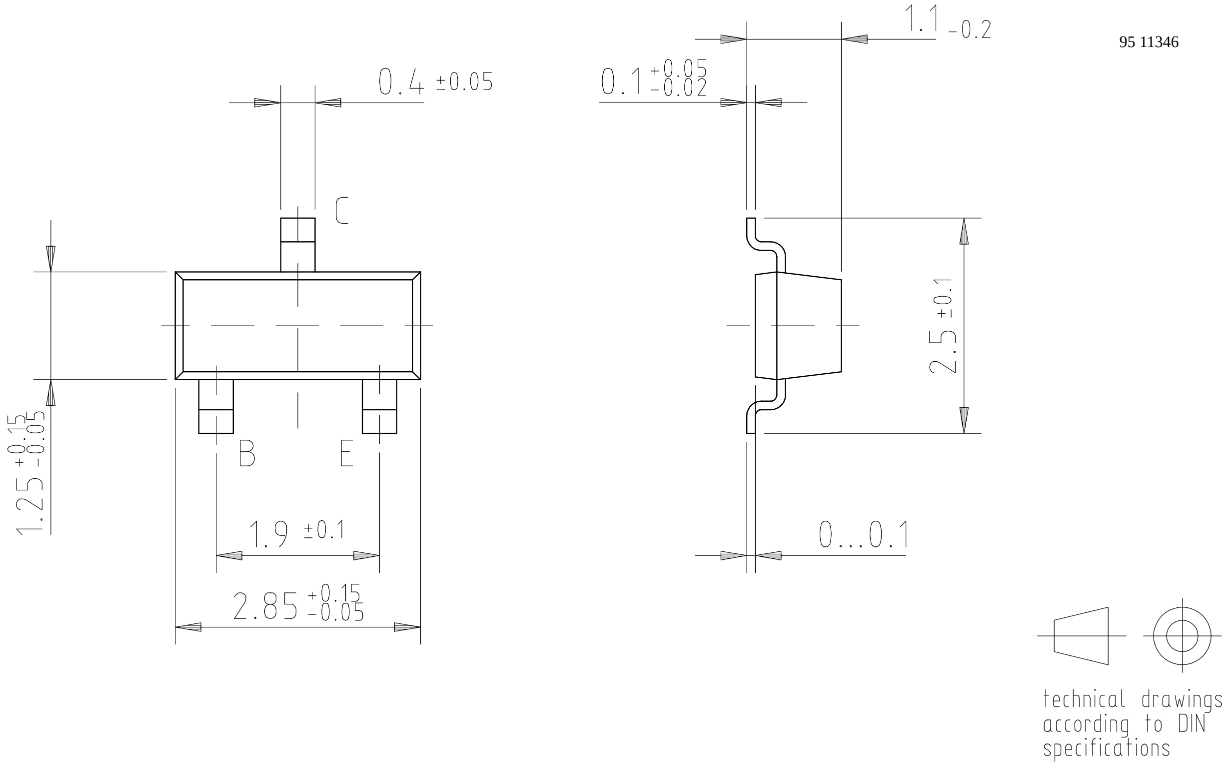


Figure 7. Output reflection coefficient

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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