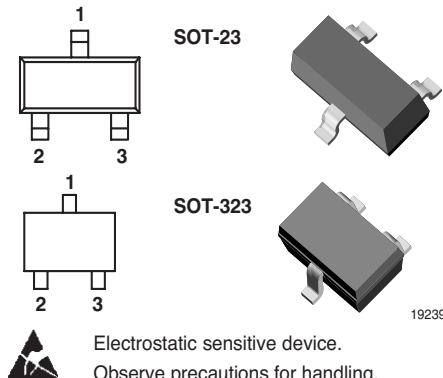


## Silicon NPN Planar RF Transistor

### Features

- Low supply voltage
- Low current consumption
- 50  $\Omega$  input impedance at 945 MHz
- Low noise figure
- High power gain
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



### Applications

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

### Mechanical Data

**Typ:** S852T

**Case:** SOT-23 Plastic case

**Weight:** approx. 8.0 mg

**Pinning:** 1 = Collector, 2 = Base, 3 = Emitter

**Typ:** S852TW

**Case:** SOT-323 Plastic case

**Weight:** approx. 6.0 mg

**Pinning:** 1 = Collector, 2 = Base, 3 = Emitter

### Parts Table

Part	Marking	Package
S852T	852	SOT-23
S852TW	W52	SOT-323

### Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

Parameter	Test condition	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	$T_{amb} \leq 125\text{ }^{\circ}\text{C}$	$P_{tot}$	30	mW
Junction temperature		$T_j$	150	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	- 65 to + 150	$^{\circ}\text{C}$

### Maximum Thermal Resistance

Parameter	Test condition	Symbol	Value	Unit
Junction ambient	1)	$R_{thJA}$	450	K/W

1) on glass fibre printed board (25 x 20 x 1.5) mm<sup>3</sup> plated with 35 μm Cu

### Electrical DC Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

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

### Electrical AC Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Transition frequency	$V_{CE} = 3\text{ V}$ , $I_C = 1\text{ mA}$ , $f = 500\text{ MHz}$	$f_T$		4.7		GHz
	$V_{CE} = 2\text{ V}$ , $I_C = 1.5\text{ mA}$ , $f = 500\text{ MHz}$	$f_T$		5.2		GHz
Collector-base capacitance	$V_{CB} = 1\text{ V}$ , $f = 1\text{ MHz}$	$C_{cb}$		0.25		pF
Noise figure	$Z_S = Z_{Sopt}$ , $f = 450\text{ MHz}$ , $V_{CE} = 2\text{ V}$ , $I_C = 0.5\text{ mA}$	$F_{opt}$		1.1		dB
	$Z_S = Z_{Sopt}$ , $f = 945\text{ MHz}$ , $V_{CE} = 3\text{ V}$ , $I_C = 1\text{ mA}$	$F_{opt}$		1.8		dB
	$Z_S = Z_{Sopt}$ , $f = 945\text{ MHz}$ , $V_{CE} = 2\text{ V}$ , $I_C = 1.5\text{ mA}$	$F_{opt}$		2		dB
Power gain	$V_{CE} = 2\text{ V}$ , $I_C = 0.5\text{ mA}$ , $f = 450\text{ MHz}$	$G_{pe} @ F_{opt}$		11.5		dB
	$V_{CE} = 3\text{ V}$ , $I_C = 1\text{ mA}$ , $f = 945\text{ MHz}$	$G_{pe} @ F_{opt}$		10.5		dB
	$V_{CE} = 2\text{ V}$ , $I_C = 1.5\text{ mA}$ , $f = 945\text{ MHz}$	$G_{pe} @ F_{opt}$		12		dB
Collector current for $f_T$ max	$V_{CE} = 2\text{ V}$ , $f = 500\text{ MHz}$	$I_C$		3		mA
Real part of input impedance	$V_{CE} = 3\text{ V}$ , $I_C = 1\text{ mA}$ , $f = 945\text{ MHz}$	$Re_{(h11e)}$		50		Ω
	$V_{CE} = 2\text{ V}$ , $I_C = 1.5\text{ mA}$ , $f = 945\text{ MHz}$	$Re_{(h11e)}$		50		Ω



## Common Emitter S-Parameters

V <sub>CE</sub> /V	I <sub>C</sub> /mA	f/MHz	S11		S21		S12		S22	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
2	0.5	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
2	1.5	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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

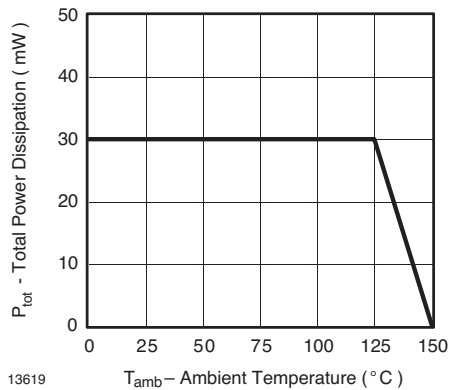


Figure 1. Total Power Dissipation vs. Ambient Temperature

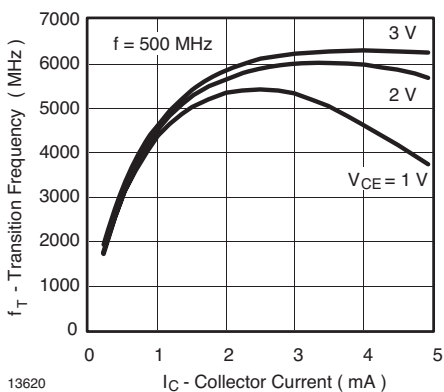


Figure 2. Transition Frequency vs. Collector Current

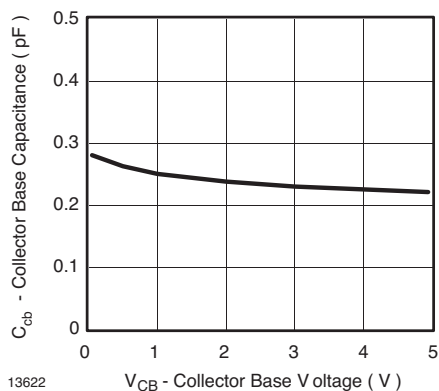


Figure 3. Collector Base Capacitance vs. Collector Base Voltage

$V_{CE} = 8\text{ V}$ ,  $I_C = 25\text{ mA}$ ,  $Z_0 = 50\ \Omega$

$S_{11}$

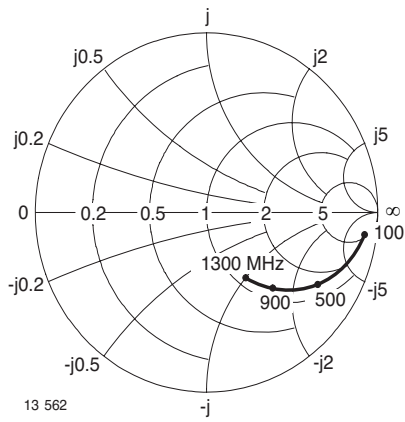


Figure 4. Input Reflection Coefficient

$S_{12}$

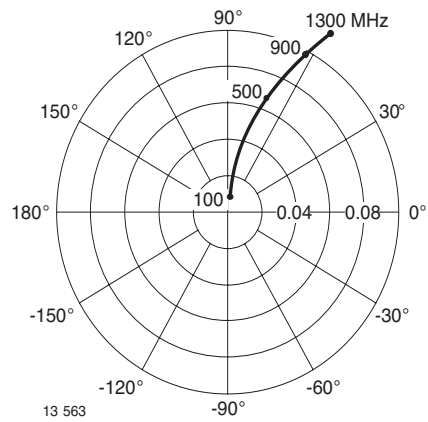


Figure 6. Reverse Transmission Coefficient

$S_{21}$

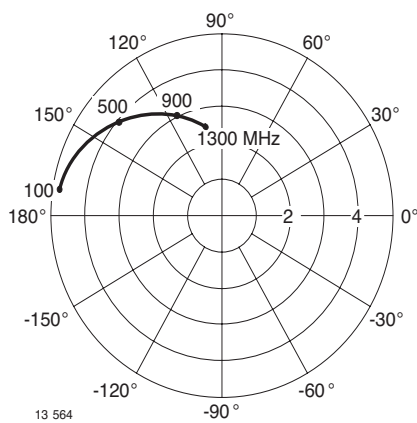


Figure 5. Forward Transmission Coefficient

$S_{22}$

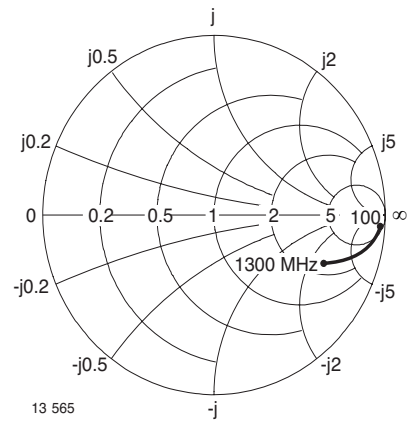


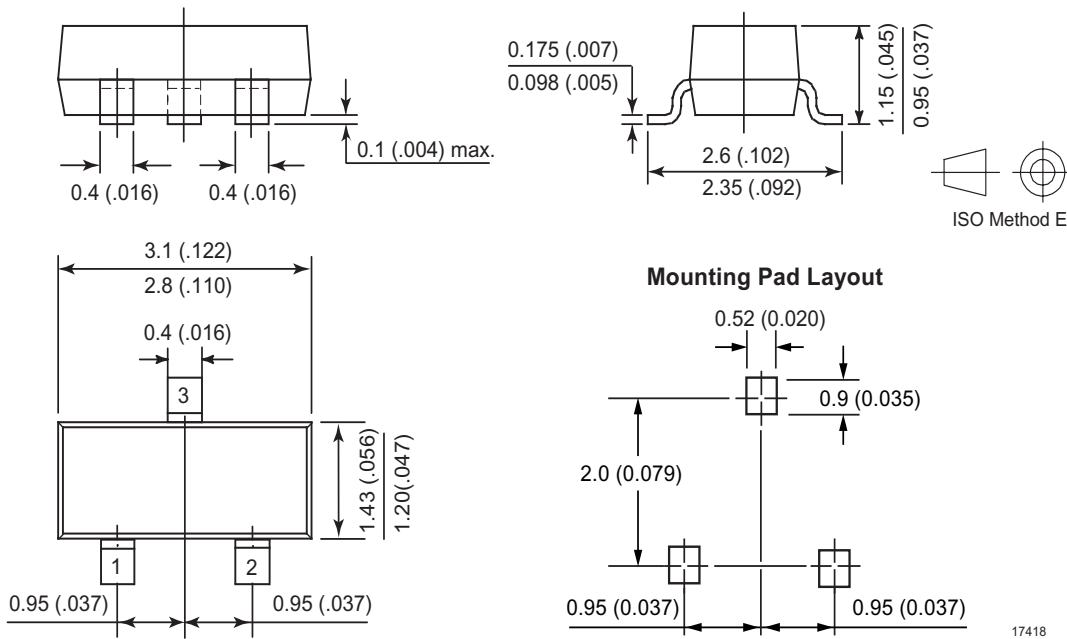
Figure 7. Output Reflection Coefficient

# S852T / S852TW

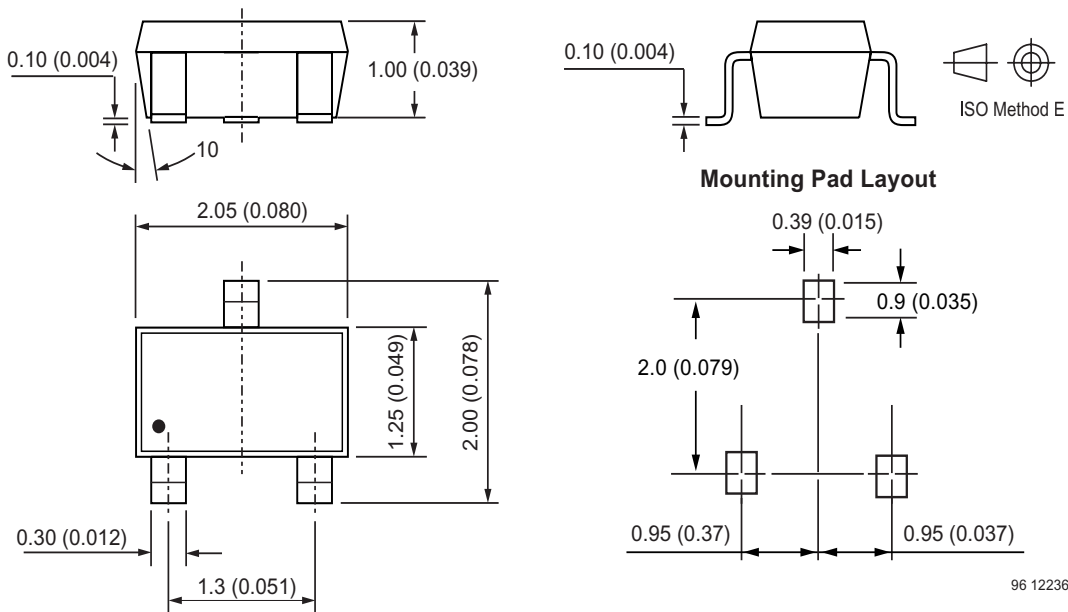


Vishay Semiconductors

## Package Dimensions in mm (Inches)



## Package Dimensions in mm (Inches)





## Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor 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).

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Vishay Semiconductor GmbH 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.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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