



Not for new design, this product will be obsoleted soon

S822T / S822TW / S822TRW

Vishay Semiconductors

Silicon NPN Planar RF Transistor

Comments

Electrostatic sensitive device.
Observe precautions for handling.

Features

- Low supply voltage
- Low current consumption
- 50 Ω 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: S822T

Case: SOT-143 Plastic case

Weight: approx. 8.0 mg

Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter

Typ: S822TW

Case: SOT-343 Plastic case

Weight: approx. 6.0 mg

Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter

Typ: S822TRW

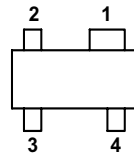
Case: SOT-343R Plastic case

Weight: approx. 6.0 mg

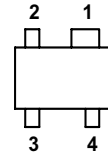
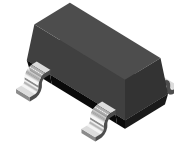
Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter

Parts Table

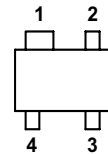
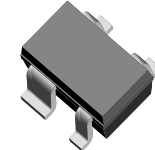
Part	Marking	Package
S822T	82	SOT-143
S822TW	W22	SOT-343
S822TRW	WS2	SOT-343R



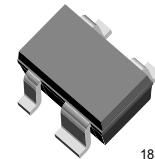
SOT-143



SOT-343



SOT-343R



18383



Electrostatic sensitive device.
Observe precautions for handling.

Absolute Maximum Ratings

$T_{amb} = 25\text{ °C}$, 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	$T_{amb} \leq 125\text{ °C}$	P_{tot}	30	mW
Junction temperature		T_J	150	°C
Storage temperature range		T_{stg}	- 65 to + 150	°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) mm³ plated with 35 μm Cu

Electrical DC Characteristics

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Transition frequency	V _{CE} = 3 V, I _C = 1 mA, f = 500 MHz	f _T		4.7		GHz
	V _{CE} = 2 V, I _C = 1.5 mA, f = 500 MHz	f _T		5.2		GHz
Collector-base capacitance	V _{CB} = 1 V, f = 1 MHz	C _{cb}		0.2		pF
Noise figure	Z _S = Z _{Sopt} , f = 450 MHz, V _{CE} = 2 V, I _C = 0.5 mA	F _{opt}		1.1		dB
	Z _S = Z _{Sopt} , f = 945 MHz, V _{CE} = 3 V, I _C = 1 mA	F _{opt}		1.8		dB
	Z _S = Z _{Sopt} , f = 945 MHz, V _{CE} = 2 V, I _C = 1.5 mA	F _{opt}		2		dB
Power gain	V _{CE} = 2 V, I _C = 0.5 mA, f = 450MHz	G _{pe} @F _{opt}		13.5		dB
	V _{CE} = 3 V, I _C = 1 mA, f = 945 MHz	G _{pe} @F _{opt}		12.5		dB
	V _{CE} = 2 V, I _C = 1.5 mA, f = 945 MHz	G _{pe} @F _{opt}		14.0		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, I _C = 1 mA, f = 945 MHz	Re(h _{11e})		50		Ω
	V _{CE} = 2 V, I _C = 1.5 mA, f = 945 MHz	Re(h _{11e})		50		Ω

Common Emitter S-Parameters

V _{CE} /V	I _C /mA	f/MHz	S11		S21		S12		S22	
			LIN MAG	ANG deg	LIN MAG	ANG deg	LIN MAG	ANG deg	LIN MAG	ANG deg
2	0.5	100	0.974	-4.0	1.86	175.2	0.012	86.4	0.997	-2.3
		200	0.967	-7.9	1.84	169.7	0.024	82.4	0.993	-4.8
		300	0.956	-11.8	1.82	164.2	0.035	78.6	0.87	-6.9
		400	0.941	-15.6	1.79	158.9	0.046	75.1	0.979	-9.3
		500	0.926	-19.0	1.75	153.9	0.056	71.7	0.968	-11.4
		600	0.907	-22.5	1.72	149.2	0.066	69.0	0.959	-13.1
		700	0.890	-25.8	1.68	145.0	0.075	66.4	0.951	-15.2
		800	0.870	-29.3	1.66	141.0	0.084	63.9	0.940	-16.9
		900	0.851	-32.3	1.63	136.1	0.092	61.1	0.930	-18.8
		1000	0.833	-35.6	1.60	132.6	0.099	59.0	0.924	-20.4
		1100	0.814	-39.0	1.58	128.6	0.108	56.9	0.913	-22.2
		1200	0.794	-42.4	1.57	124.9	0.115	54.8	0.904	-24.0
1300	0.773	-45.6	1.55	121.2	0.121	52.7	0.895	-25.7		
2	1.5	100	0.919	-6.9	4.86	171.8	0.012	84.3	0.992	-3.6

V_{CE}/V	I_C/mA	f/MHz	S11		S21		S12		S22	
			LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG	LIN MAG	ANG
				deg		deg		deg		deg
		200	0.897	-13.7	4.78	163.4	0.023	78.4	0.979	-7.1
		300	0.864	-19.8	4.62	155.7	0.034	73.0	0.957	-10.2
		400	0.824	-25.7	4.41	148.3	0.043	68.4	0.933	-13.0
		500	0.781	-31.0	4.21	141.3	0.051	64.0	0.909	-15.6
		600	0.735	-36.1	4.00	135.3	0.058	60.6	0.881	-17.3
		700	0.693	-40.5	3.82	129.4	0.064	58.2	0.858	-19.2
		800	0.647	-44.6	3.62	124.3	0.071	54.7	0.836	-20.7
		900	0.605	-48.5	3.46	118.9	0.076	52.0	0.814	-22.3
		1000	0.567	-52.4	3.30	114.3	0.081	49.8	0.796	-23.6
		1100	0.526	-56.4	3.16	110.0	0.085	48.1	0.778	-24.9
		1200	0.491	-60.1	3.04	105.7	0.090	46.1	0.763	-26.3
		1300	0.458	-64.4	2.92	102.0	0.094	44.9	0.747	-27.5

Typical Characteristics ($T_{amb} = 25\text{ }^\circ\text{C}$ unless otherwise specified)

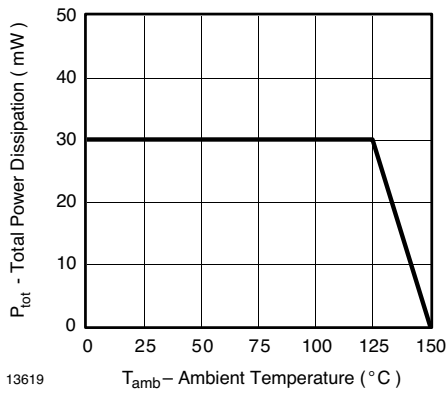


Figure 1. Total Power Dissipation vs. Ambient Temperature

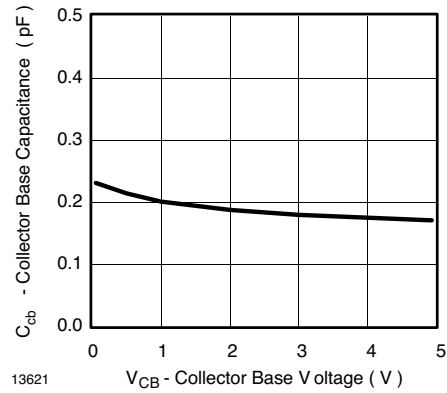


Figure 3. Collector Base Capacitance vs. Collector Base Voltage

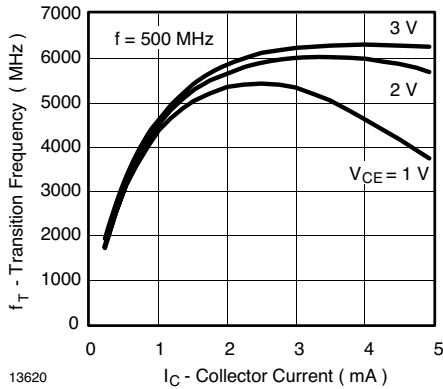


Figure 2. Transition Frequency vs. Collector Current

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

S_{11}

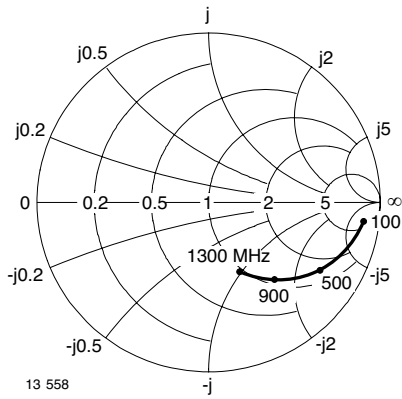


Figure 4. Input Reflection Coefficient

S_{12}

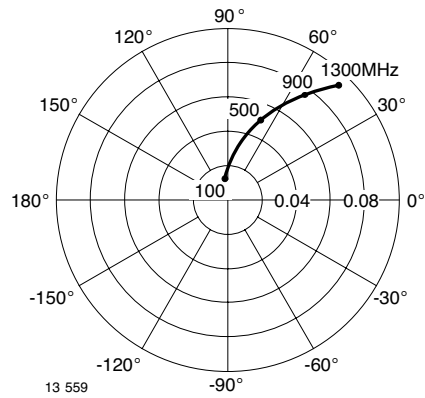


Figure 6. Reverse Transmission Coefficient

S_{21}

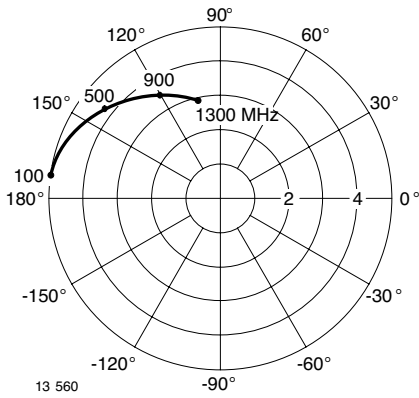


Figure 5. Forward Transmission Coefficient

S_{22}

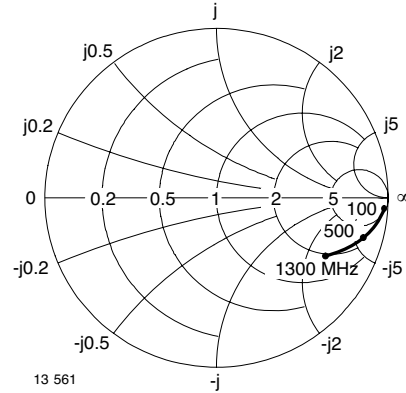


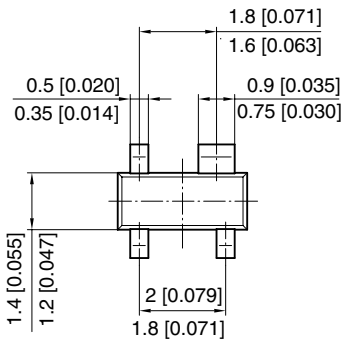
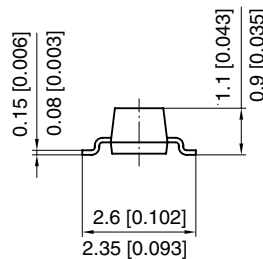
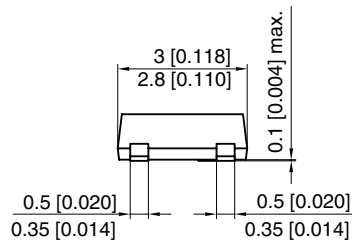
Figure 7. Output Reflection Coefficient

S822T / S822TW / S822TRW

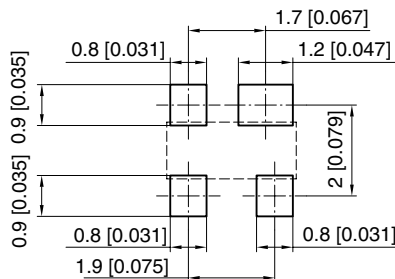


Vishay Semiconductors

Package Dimensions in mm

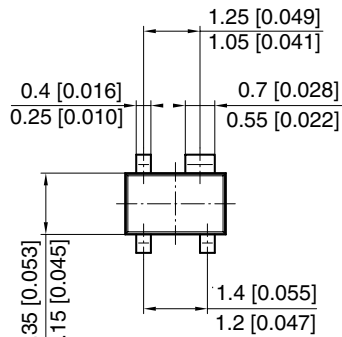
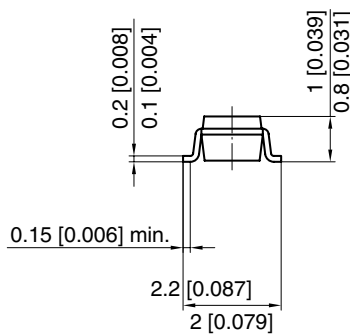
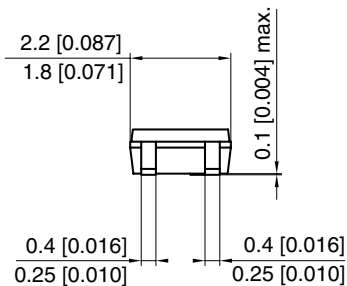


foot print recommendation:

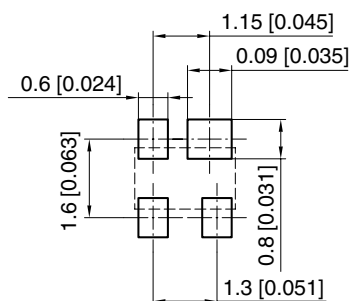


96 12240
Rev. 5 - Date: 25 January 2005
Document no.: 6.541-5015.01-4

Package Dimensions in mm



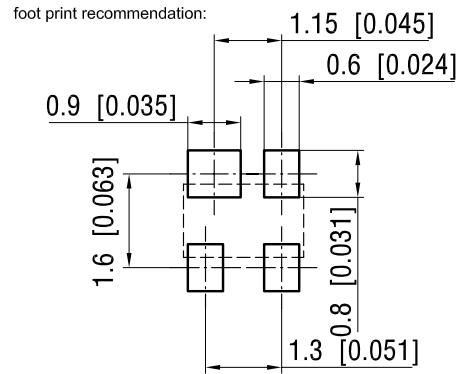
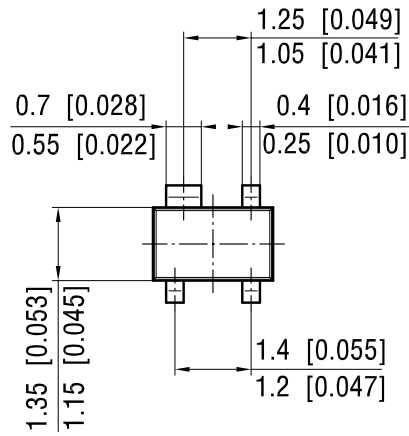
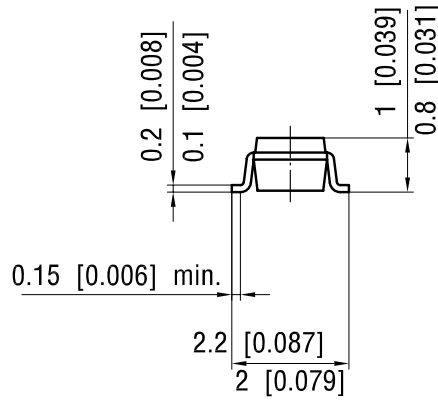
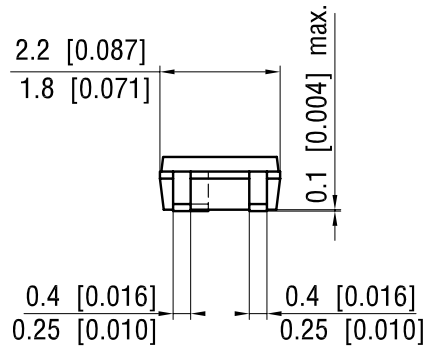
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9612237
Rev. 4 - Date: 26 January 2005
Document no.: 6.541-5041.01-4



Package Dimensions in mm



96 12238
Rev. 4 - Date: 26 January 2005
Document no.: 6.541-5042.01-4

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).

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.

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.

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

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Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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