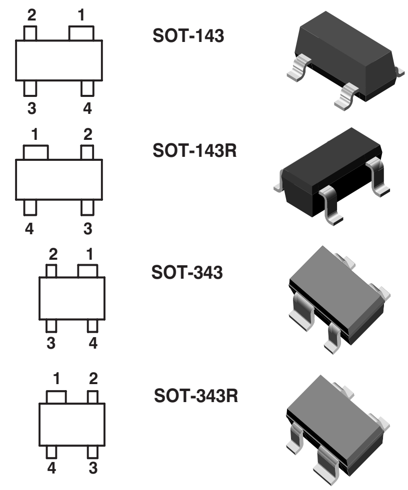
12 GHz Silicon NPN Planar RF Transistor

Features
- Low power applications
- Very low noise figure
- High transition frequency f_T = 12 GHz
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Applications
For low noise and small signal low power amplifiers. This transistor has superior noise figure and associated gain performance at UHF, VHF and microwave frequencies.



Electrostatic sensitive device.
Observe precautions for handling.
13629

Mechanical Data
Typ:TSDF1205
Case: SOT-143 Plastic case
Weight: approx. 8.0 mg
Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter
Typ: TSDF1205R
Case: SOT-143R Plastic case
Weight: approx. 8.0 mg
Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter

Typ: TDSF1205W
Case: SOT-343 Plastic case
Weight: approx. 6.0 mg
Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter
Typ: TSDF1205RW
Case: SOT-343R Plastic case
Weight: approx. 8.0 mg
Pinning: 1 = Collector, 2 = Emitter,
3 = Base, 4 = Emitter

Parts Table

Part	Marking	Package
TSDF1205	F05	SOT-143
TSDF1205R	05F	SOT-143R
TSDF1205RW	WF0	SOT-343R
TSDF1205W	W0F	SOT-343

Absolute Maximum Ratings

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

Parameter	Test condition	Symbol	Value	Unit
Collector-base voltage		V_{CBO}	9	V
Collector-emitter voltage		V_{CEO}	4	V
Emitter-base voltage		V_{EBO}	2	V
Collector current		I_C	12	mA
Total power dissipation	$T_{amb} \le 132$ °C	P_{tot}	40	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) mm^3 plated with 35 µm Cu

Electrical DC Characteristics

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

Parameter	Test condition	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} = 10 V, I_E = 0	I_{CBO}			100	nA
Emitter-base cut-off current	V_{EB} = 1 V, I_C = 0	I_{EBO}			2	µA
Collector-emitter breakdown voltage	I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	4			V
Collector-emitter saturation voltage	I_C = 5 mA, I_B = 0.5 mA	V_{CEsat}		0.1	0.5	V
DC forward current transfer ratio	V_{CE} = 2 V, I_C = 2 mA	h_{FE}	50	120	250	

Electrical AC Characteristics

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Transition frequency	V_{CE} = 2 V, I_C = 5 mA, f = 1 GHz	f_T		12		GHz
Collector-base capacitance	V_{CB} = 1 V, f = 1 MHz	C_{cb}		0.2		pF
Collector-emitter capacitance	V_{CE} = 1 V, f = 1 MHz	C_{ce}		0.35		pF
Emitter-base capacitance	V_{EB} = 0.5 V, f = 1 MHz	C_{eb}		0.15		pF
Noise figure	V_{CE} = 2 V, I_C = 2 mA, $Z_S = Z_{Sopt}$, Z_L = 50 Ω, f = 2 GHz	F		1.3		dB
Power gain	V_{CE} = 2 V, I_C = 2 mA, f = 2 GHz (@F_{opt})	G_{pe}		13		dB
	V_{CE} = 2 V, I_C = 5 mA, $Z_S = Z_{Sopt}$, Z_L = 50 Ω f = 2 GHz	G_{pe}		11.5		dB
Transducer gain	V_{CE} = 2 V, I_C = 5 mA, Z_0 = 50 Ω, f = 2 GHz	$\|S_{21e}\|^2$		12.5		dB

Typical Characteristics (Tamb = 25 °C unless otherwise specified)

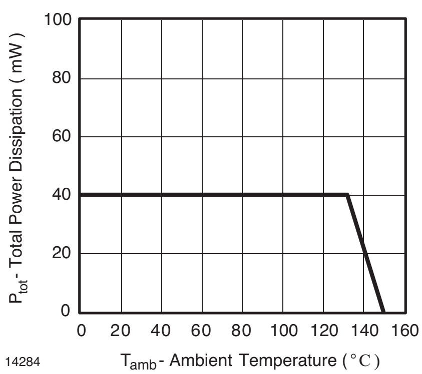


Figure 1. Total Power Dissipation vs. Ambient Temperature

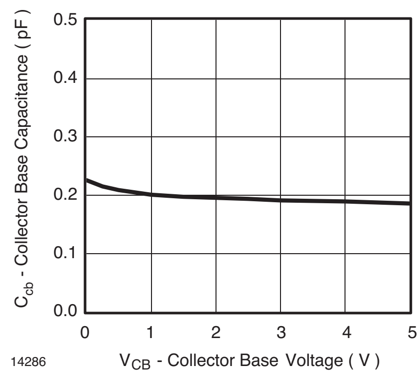


Figure 3. Collector Base Capacitance vs. Collector Base Voltage

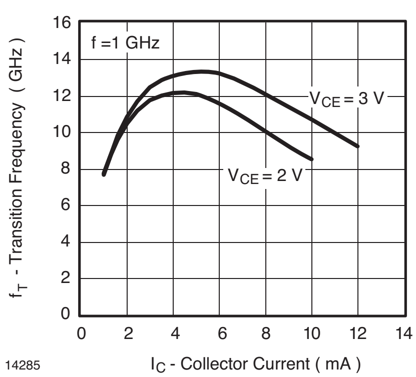


Figure 2. Transition Frequency vs. Collector Current

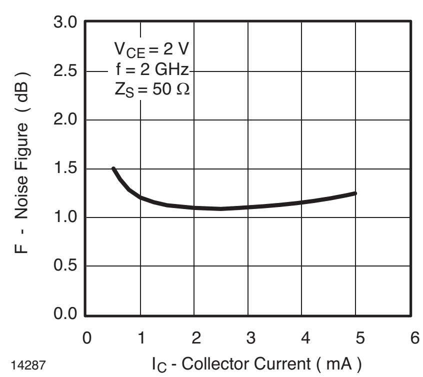
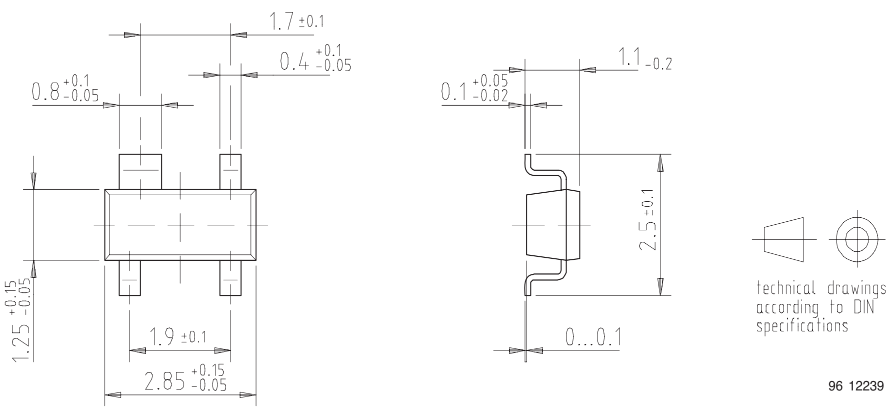
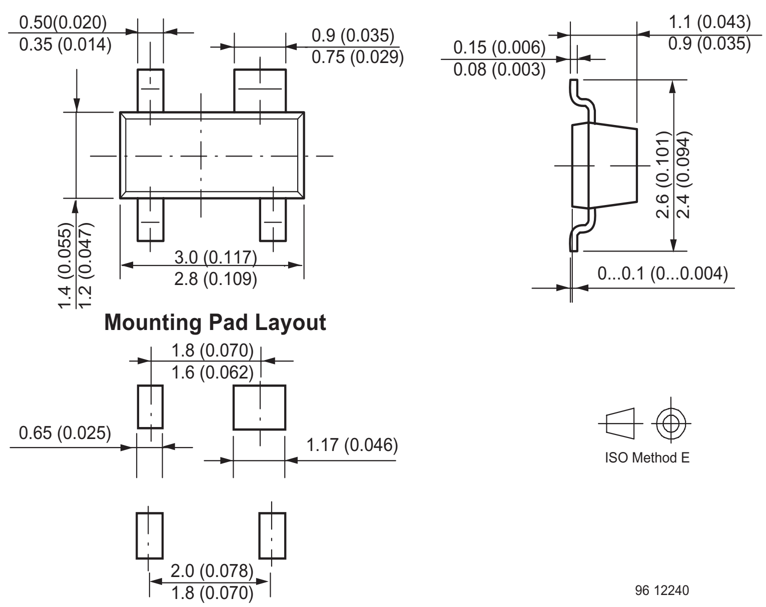


Figure 4. Noise Figure vs. Collector Current

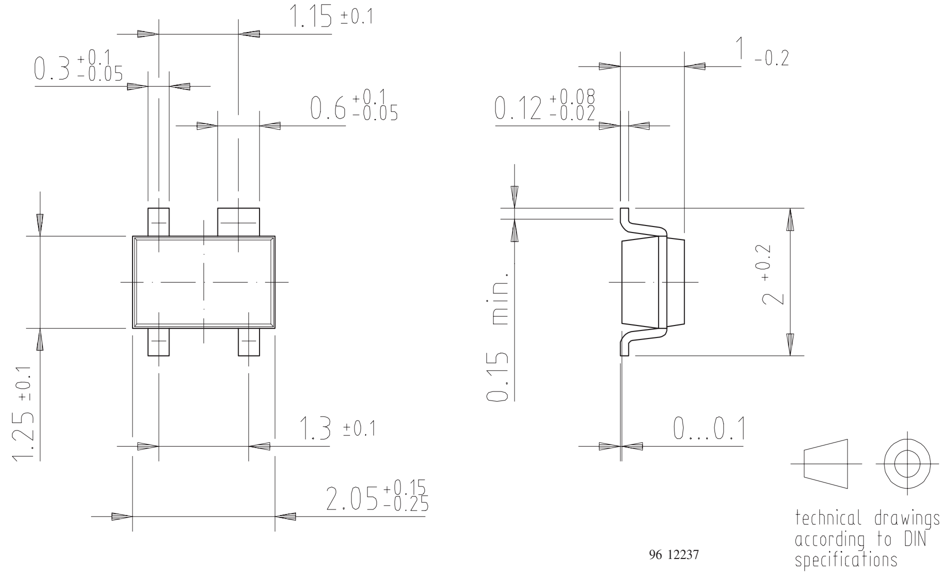
Package Dimensions in mm



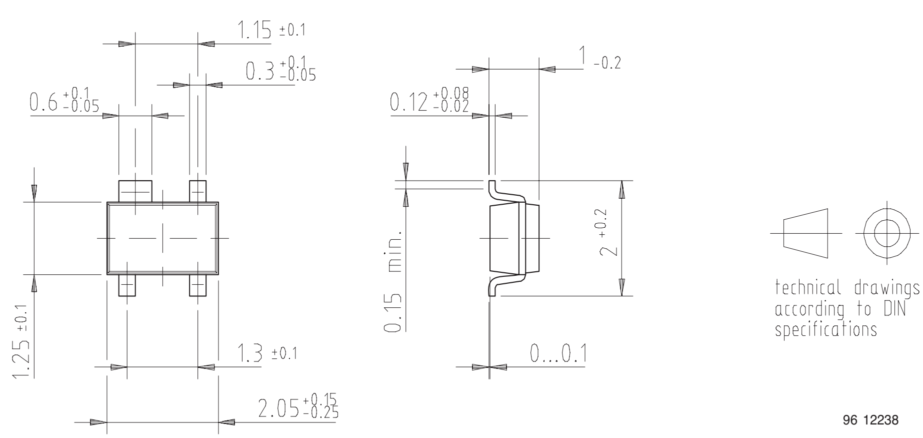
Package Dimensions in mm



Package Dimensions in mm



Package Dimensions in mm



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.

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

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