

BGR405

NPN Silicon RF Transistor With Bias Circuitry

Small Signal Discretes



Never stop thinking

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BGR405, NPN Silicon RF Transistor With Bias Circuitry

Revision History: 2008-06-06, Rev. 1.0

Prevision History: no previous version

Page	Subjects (major changes since last revision)

Trademarks

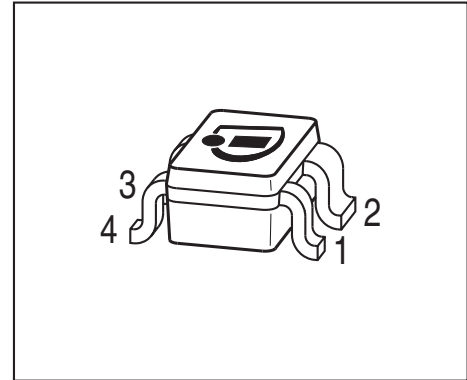
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1 NPN Silicon RF Transistor With Bias Circuitry*

Features

- Noise figure $NF = 1.0$ dB at 0.4 GHz
- Gain $S_{21} = 7.5$ dB at 0.4 GHz
- On chip bias circuitry, 0.85 mA bias current at $V_{CC} = 1.2$ V
- SIEGET ® 25 GHz f_T -Line
- Pb-free (RoHS compliant) package

* Short term description



Applications

- LNAs

2 Description

The BGR405 is a monolithic silicon amplifier with a NPN silicon RF transistor and integrated resistors for biasing.

Type	Package	Marking
BGR405	SOT343	AVs

Note: ESD (Electrostatic discharge) sensitive device, observe handling precaution!

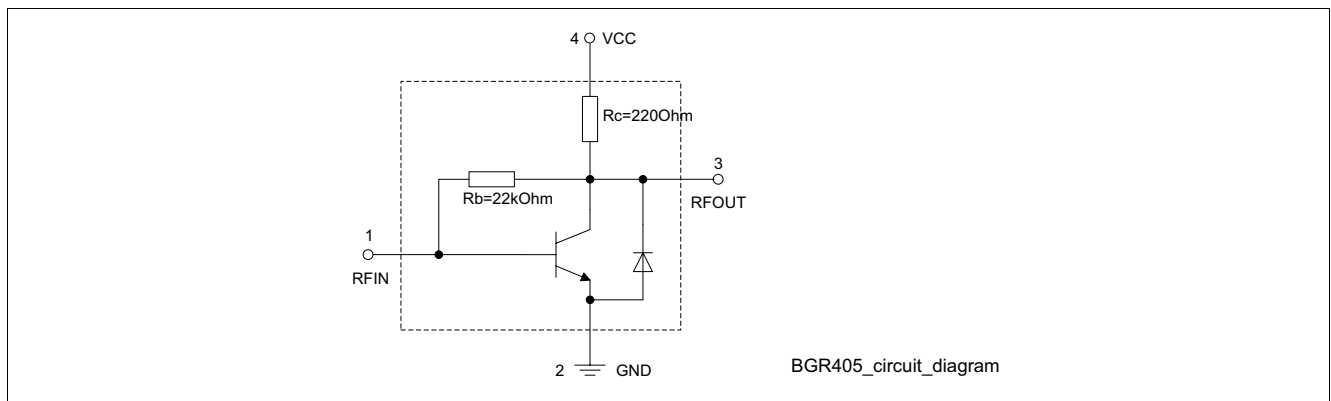


Figure 1 Circuit diagram

Note: Due to design there is an additional diode between emitter and collector, which does not effect normal operation for common emitter configuration.

Table 1 Pinning table

Pin	Function
1	RFIN
2	GND
3	RFOUT
4	VCC

2.1 Maximum Ratings

Note: All Voltages refer to GND-node

Table 2 Maximum ratings

Parameter	Symbol	Value	Unit
Current at pin VCC	I_{CC}	12	mA
Voltage at pin VCC	V_{CC}	5	V
Current at pin RFIN	I_B	0.8	mA
Voltage at pin RFIN	V_B	2	V
Current at pin RFOUT ¹⁾	I_{OUT}	12	mA
Voltage at pin RFOUT	V_{OUT}	4.1	V
Total power dissipation ²⁾ $T_S = 120\text{ °C}$	P_{tot}	50	mW
Operation junction temperature range	T_{jo}	-65... 150	°C
Storage junction temperature range	T_{jstg}	-65... 150	°C

1) Applicable if VCC and RFOUT are shorted, otherwise a coupling capacitor at RFOUT is demanded

2) T_S is measured on the emitter (GND) lead at the soldering point to the pcb

Note: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions even only for a short moment may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit. Absolute maximum ratings typically differ heavily from recommended operation conditions.

2.2 Thermal Resistance

Table 3 Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R_{thJS}	≤ 595	K/W

1) For calculation of R_{thJA} please refer to Application Note Thermal Resistance.

3 Electrical Characteristics

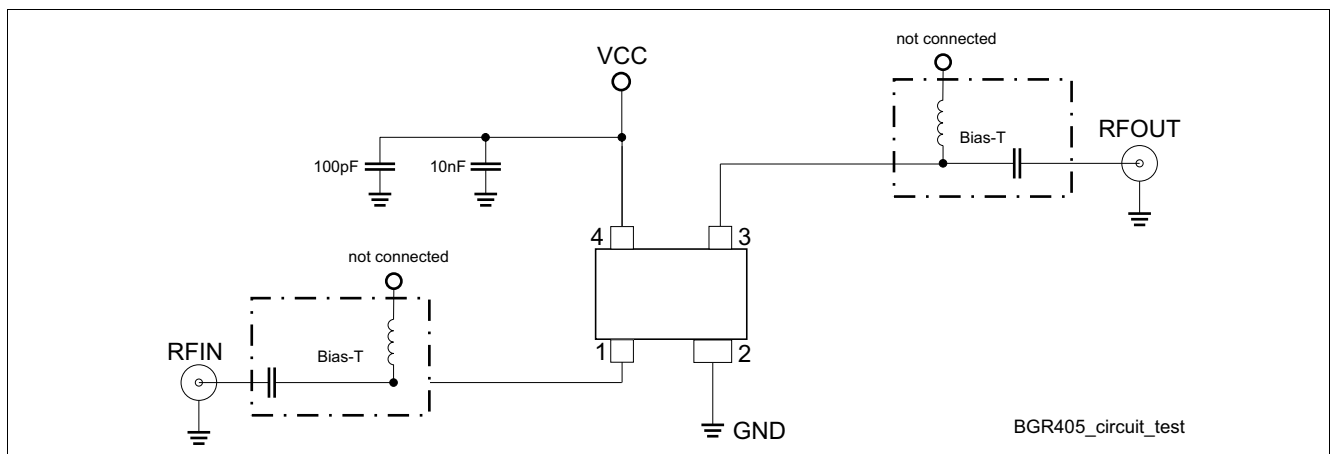
Table 4 DC characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Device current	I_{CC}	0.6	0.85	1.1	mA	$V_{CC} = 1.2\text{ V}$

**Table 5 AC characteristics (measured in test circuit [Figure 2](#); verified by random sampling)
 $T_A = 25\text{ }^\circ\text{C}$, $V_{CC} = 1.2\text{ V}$, $Z_0 = 50\text{ }\Omega$, unless otherwise specified**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion power gain	S_{21}		7.5 7.0		dB	$F = 0.4\text{ GHz}$ $f = 1.8\text{ GHz}$
Reverse isolation	S_{12}		-37 -25		dB	$F = 0.4\text{ GHz}$ $f = 1.8\text{ GHz}$
Noise figure, $Z_S = Z_{Sopt}$	NF		1.0 1.6		dB	$F = 0.4\text{ GHz}$ $f = 1.8\text{ GHz}$
Third order intercept point at the output ¹⁾	OIP_3		-9 14.5		dBm	$F = 0.4\text{ GHz}$, $V_{CC} = 1.2\text{ V}$ $f = 1.8\text{ GHz}$, $V_{CC} = 4\text{ V}$
1 dB compression point at the output	OP_{-1dB}		-19 -0.5		dBm	$F = 0.4\text{ GHz}$, $V_{CC} = 1.2\text{ V}$ $f = 1.8\text{ GHz}$, $V_{CC} = 4\text{ V}$
Return loss input	S_{11}		-0.4 -1.8		dB	$F = 0.4\text{ GHz}$ $f = 1.8\text{ GHz}$
Return loss output	S_{22}		-4.0 -6.0		dB	$F = 0.4\text{ GHz}$ $f = 1.8\text{ GHz}$

1) OIP_3 value depends on termination of all intermodulation frequency components. Termination used for this measurement is $50\text{ }\Omega$ from 0.1 MHz to 6 GHz.


Figure 2 BGR405 test circuit

4 Package Information

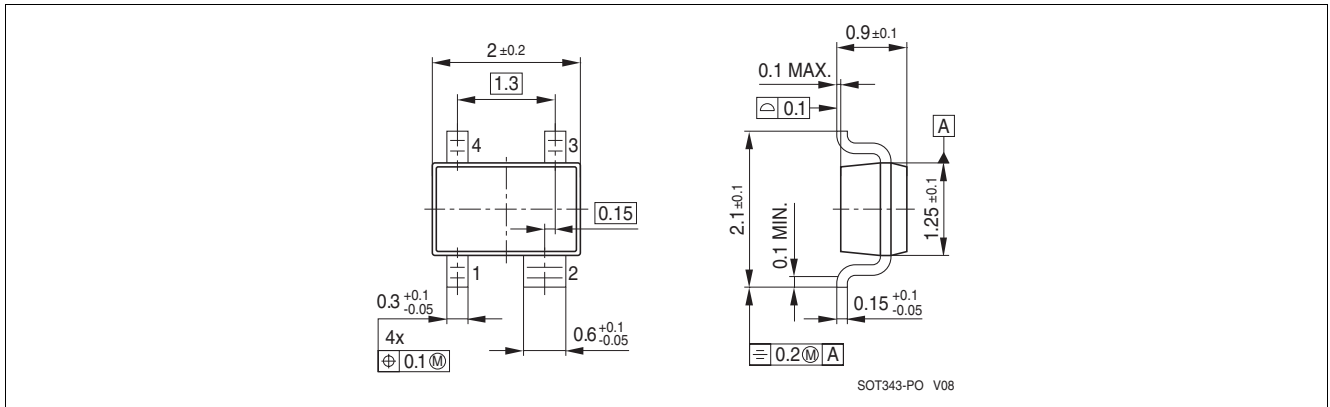


Figure 3 Package Outline SOT343

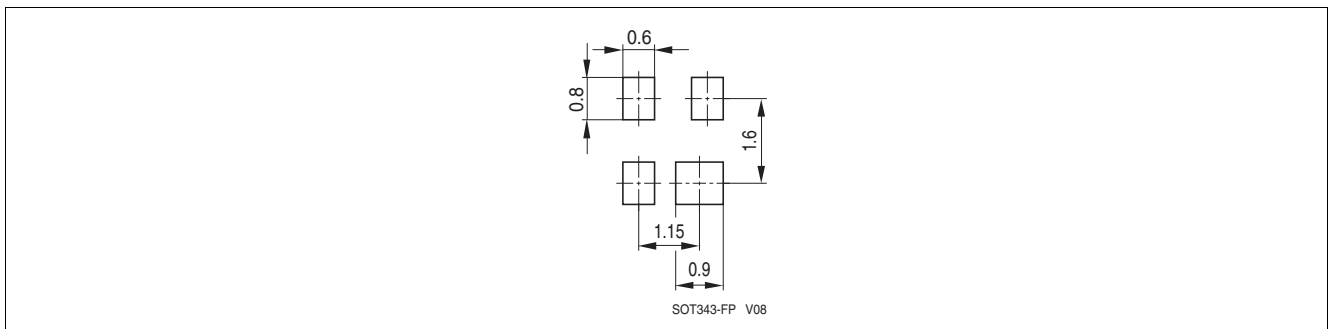


Figure 4 Footprint of SOT343

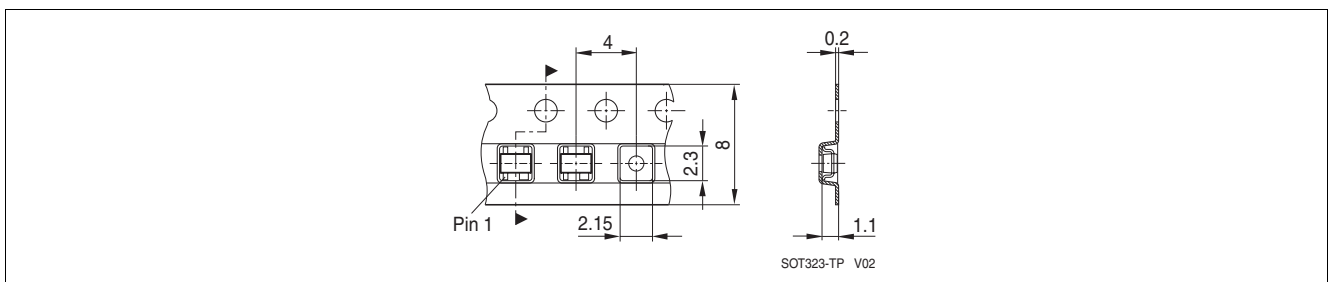


Figure 5 Tape of SOT343