BGR420

NPN Silicon RF Transistor With Bias Circuitry

Small Signal Discretes

Never stop thinking

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BGR420, 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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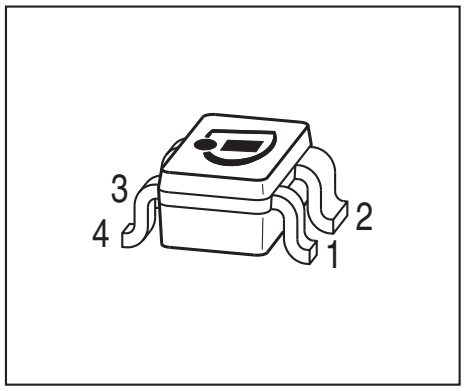
1 NPN Silicon RF Transistor With Bias Circuitry*

Features

- Noise figure NF = 1.5 dB at 0.4 GHz
- Gain S_{21} = 26 dB at 0.4 GHz
- On chip bias circuitry, 13 mA bias current at V_{CC} = 3.6 V; V_{BB} = 2.8 V
- SIEGET ® 25 GHz f_T-Line
- Pb-free (RoHS compliant) package

* Short term description



RoHS

Applications

- LNAs

2 Description

The BGR420 is a monolithic silicon amplifier with a NPN silicon RF transistor and integrated resistors for biasing.

Type	Package	Marking
BGR420	SOT343	AWs

*Note: **ESD** (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!*

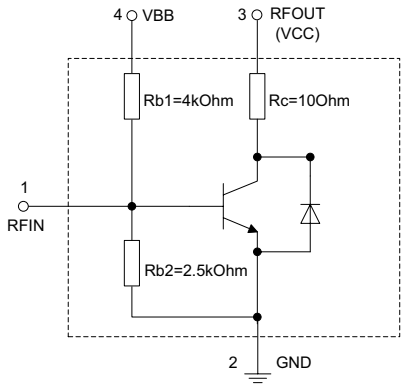


Figure 1 Circuit diagram

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

Table 1 Pinning table

Pin	Function
1	RFIN
2	GND
3	RFOUT (VCC)
4	VBB

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}	25	mA
Voltage at pin VCC	V_{CC}	13	V
Current at pin VBB	I_{BB}	2.2	mA
Voltage at pin VBB	V_{BB}	8	V
Current at pin RFIN	I_{IN}	3	mA
Voltage at pin RFIN	V_{IN}	5	V
Total power dissipation[1)] T_S = 115 °C	P_{tot}	120	mW
Operation junction temperature range	T_{jo}	-65... 150	°C
Storage junction temperature range	T_{jstg}	-65... 150	°C

1) 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}	≤ 290	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 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
VCC-GND cutoff current	I_{CC}			10	µA	V_{CC} = 13 V, I_{BB} = 0, V_{IN} = 0
Current at pin VCC	I_{CC}	7	13	20	mA	V_{BB} = 2.8 V, I_{IN} = 0, V_{CC} = 3.6 V

Table 5 AC characteristics (measured in test circuit Figure 2; verified by random sampling)
T_A = 25 °C, V_{BB} = 2.8 V, V_{CC} = 3.6 V, Z_0 = 50 Ω, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion power gain	S_{21}		26.0 15.5		dB	f = 0.4 GHz f = 1.8 GHz
Reverse isolation	S_{12}		-32.5 -23.4		dB	f = 0.4 GHz f = 1.8 GHz
Noise figure, $Z_S = Z_{Sopt}$	NF		1.5 1.7		dB	f = 0.4 GHz f = 1.8 GHz
Third order intercept point at the output[1)]	OIP_3		21 23		dBm	f = 0.4 GHz f = 1.8 GHz
1 dB compression point at the output	OP_{-1dB}		5.5 7.4		dBm	f = 0.4 GHz f = 1.8 GHz
Return loss input	S_{11}		-7.3 -11		dB	f = 0.4 GHz f = 1.8 GHz
Return loss output	S_{22}		-2.5 -9.5		dB	f = 0.4 GHz f = 1.8 GHz

1) OIP_3 value depends on termination of all intermodulation frequency components. Termination used for this measurement is 50 Ω from 0.1 MHz to 6 GHz.

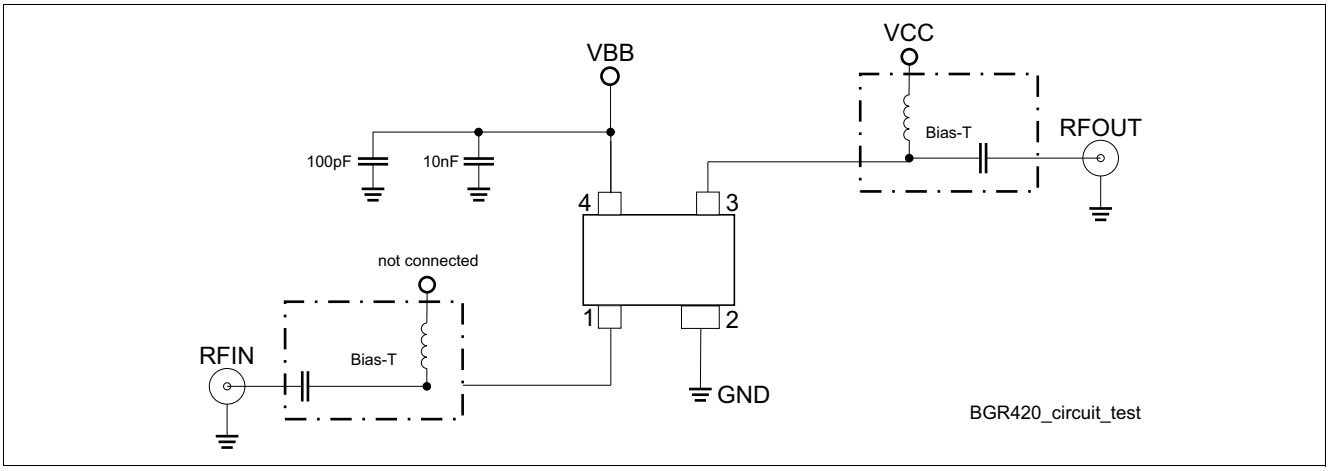


Figure 2 BGR420 test circuit

4 Package Information

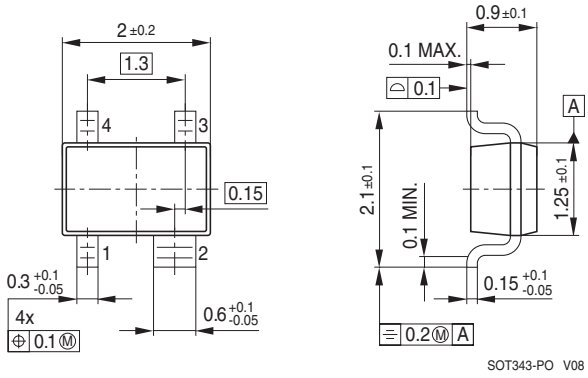


Figure 3 Package Outline SOT343

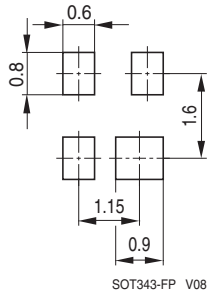


Figure 4 Footprint of SOT343

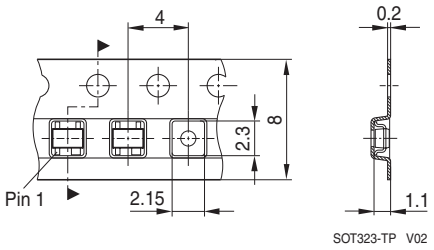


Figure 5 Tape of SOT343