BGR420

NPN Silicon RF Transistor With Bias Circuitry

Small Signal Discretes



Edition 2008-06-06

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BGR420, I	NPN Silicon RF Transistor With Bias Circuitry
Revision I	History: 2008-06-06, Rev. 1.0
Prevision I	History: no previous version
Page	Subjects (major changes since last revision)

Trademarks

 ${\sf SIEGET}^{\$} \ \text{is a registered trademark of Infineon Technologies AG}.$

Data Sheet 3 Rev. 1.0, 2008-06-06



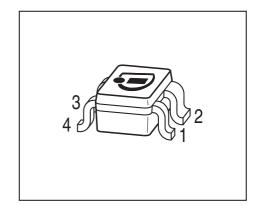
NPN Silicon RF Transistor With Bias Circuitry*

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 $V_{\rm CC}$ = 3.6 V; $V_{\rm BB}$ = 2.8 V
- SIEGET ® 25 GHz f_T -Line
- · Pb-free (RoHS compliant) package
- * Short term description





Applications

LNAs

2 Description

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

Туре	Package	Marking
BGR420	SOT343	AWs

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

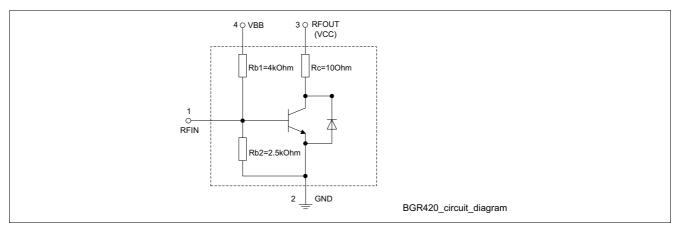


Figure 1 Circuit diagram

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

Data Sheet 4 Rev. 1.0, 2008-06-06



Description

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	$V_{\sf CC}$	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⁾ $T_{\rm S}$ = 115 °C	P_{tot}	120	mW
Operation junction temperature range	T_{jo}	-65 150	°C
Storage junction temperature range	$T_{ m jstg}$	-65 150	°C
			1

¹⁾ $T_{\rm S}$ 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 $R_{\rm thJA}$ please refer to Application Note Thermal Resistance.

Electrical Characteristics

3 Electrical Characteristics

Table 4 DC characteristics at T_A = 25 °C, unless otherwise specified

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

Table 5 AC characteristics (measured in test circuit Figure 2; verified by random sampling) $T_{\Delta} = 25 \, ^{\circ}\text{C}$, $V_{BB} = 2.8 \, \text{V}$, $V_{CC} = 3.6 \, \text{V}$, $Z_0 = 50 \, \Omega$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note /
		Min.	. Тур.	Max.		Test Condition
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.

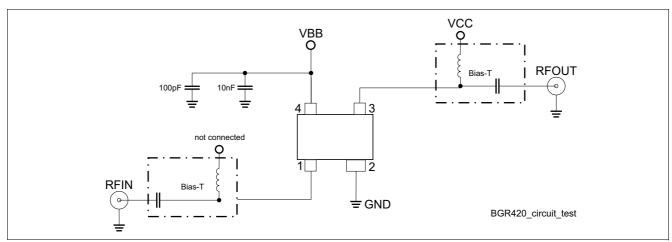


Figure 2 BGR420 test circuit



Package Information

4 Package Information

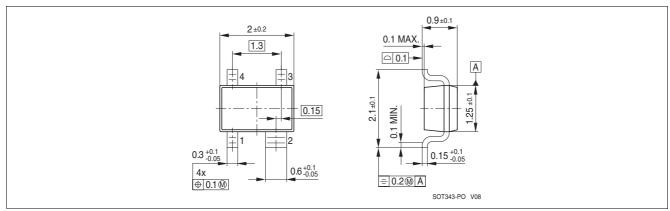


Figure 3 Package Outline SOT343

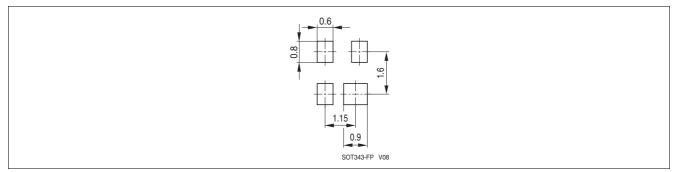


Figure 4 Footprint of SOT343

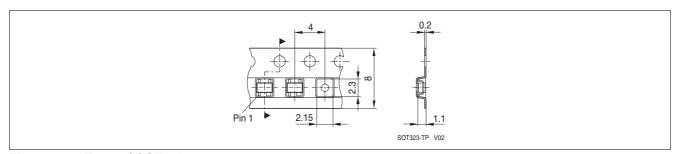


Figure 5 Tape of SOT343