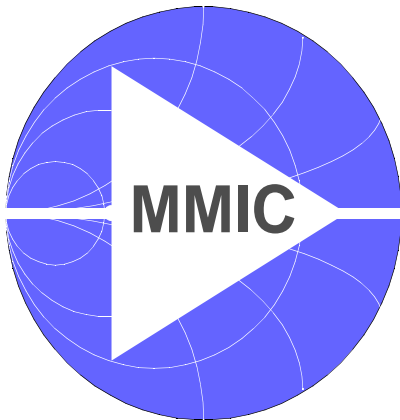


BGA622L7

Wide Band Low Noise Amplifier with
Integrated 2kV HBM ESD Protection



Silicon Discretes



Never stop thinking.

Edition 2005-11-10

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BGA622L7**Data Sheet****Revision History: 2005-11-10**Previous Version: 2005-08-29

Page	Subjects (major changes since last revision)
all	New Chip Version with integrated ESD protection
4	New Marking Code
6	Electrical Characteristics slightly changed
7-8	Figures updated

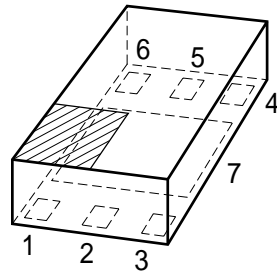
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Wide Band Low Noise Amplifier with Integrated 2kV HBM ESD Protection

BGA622L7

Features

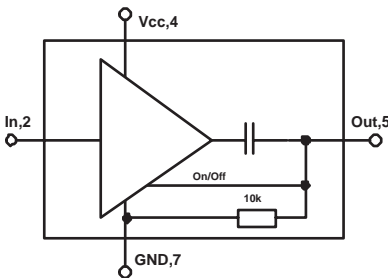
- High gain, $|S_{21}|^2=17.5$ dB at 1.575 GHz
 $|S_{21}|^2=16.8$ dB at 1.9 GHz
 $|S_{21}|^2=16.2$ dB at 2.14 GHz
- Low noise figure, NF=0.95 dB at 1.575 GHz
- Operating frequency range 0.5 - 6 GHz
- Typical supply voltage: 2.75V
- On/Off - Switch
- Output-match on chip, input pre-matched
- Low external part count
- Tiny P-TSLP-7-1 leadless package
- 70 GHz f_T - Silicon Germanium technology
- 2 kV HBM ESD protection (Pin-to-Pin)



P-TSLP-7-1

Applications

- LNA for GSM, GPS, DCS, PCS, UMTS, Bluetooth, ISM and WLAN



Description

The BGA622L7 is a wide band low noise amplifier, based on Infineon Technologies' Silicon Germanium Technology B7HF. The out-pin is simultaneously used for RF out and On/Off switch. This functionality can be accessed using a RF-Choke at the Out pin, where a DC level of 0 V or an open switches the device on and a DC level of V_{cc} switches the device off. While the device is switched off, it provides an insertion loss of 26 dB together with a high IIP3 up to 24 dBm at GPS frequencies.

ESD: Electrostatic discharge sensitive device, observe handling precaution!

Type	Package	Marking	Chip
BGA622L7	P-TSLP-7-1	BX	T1593

Maximum Ratings

Parameter	Symbol	Value	Unit
Voltage at pin Vcc	V_{CC}	3.5	V
Voltage at pin Out	V_{OUT}	4	V
Current into pin In	I_{IN}	0.1	mA
Current into pin Out	I_{OUT}	1	mA
Current into pin Vcc	I_{VCC}	10	mA
RF input power	P_{IN}	6	dBm
Total power dissipation, $T_S < 142\text{ °C}^{1)}$	P_{tot}	35	mW
Junction temperature	T_j	150	°C
Ambient temperature range	T_A	-65 ... +150	°C
Storage temperature range	T_{STG}	-65 ... +150	°C
Thermal resistance: junction-soldering point	$R_{th\,JS}$	240	K/W
ESD capability all pins (HBM: JESD22-A114)	V_{ESD}	2000	V

¹⁾ T_S is measured on the ground lead at the soldering point

Note: All Voltages refer to GND-Node

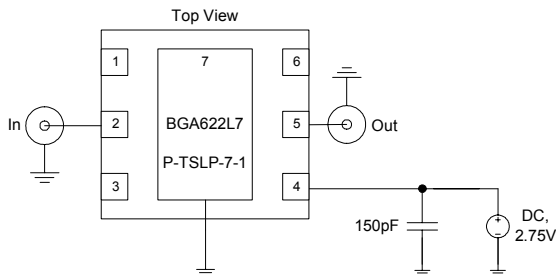


Figure 1 S-Parameter Test Circuit (loss-free microstrip line)

Electrical Characteristics at $T_A=25^\circ\text{C}$ (measured according to fig. 1)

 $V_{CC}=2.75\text{ V}$, Frequency= 1.575 GHz , unless otherwise specified

Parameter	Symbol	min.	typ.	max.	Unit
Insertion power gain	$ S_{21} ^2$		17.5		dB
Insertion power gain (Off-State)	$ S_{21} ^2$		-26		dB
Input Return Loss (On-State)	RL_{IN}		5		dB
Output Return Loss (On-State)	RL_{OUT}		12		dB
Noise Figure ($Z_S=50\Omega$)	$F_{50\Omega}$		0.95		dB
Input Third Order Intercept Point ¹⁾ (On-State) $\Delta f=1\text{MHz}$, $P_{IN}=-28\text{dBm}$	IIP_3		-2		dBm
Input Third Order Intercept Point ¹⁾ (Off-State) $\Delta f=1\text{MHz}$, $P_{IN}=-8\text{dBm}$	IIP_3		24		dBm
Input Power at 1dB Gain Compression	P_{-1dB}		-20		dBm
Total Device Off Current, $V_{CC}=2.75\text{V}$, $V_{out}=V_{CC}$	$I_{tot-off}$		260		μA
Total Device On Current, $V_{CC}=2.75\text{V}$	I_{tot-on}		5.8		mA
On/Off - Switch Control Voltage, $V_{CC}=2.75\text{V}$, ON-Mode $V_{out}=V_{on}$ OFF-Mode $V_{out}=V_{off}$	V_{on} V_{off}	0 2.0	- -	0.8 3.5	V V

Electrical Characteristics at $T_A=25^\circ\text{C}$ (measured according to fig. 1)

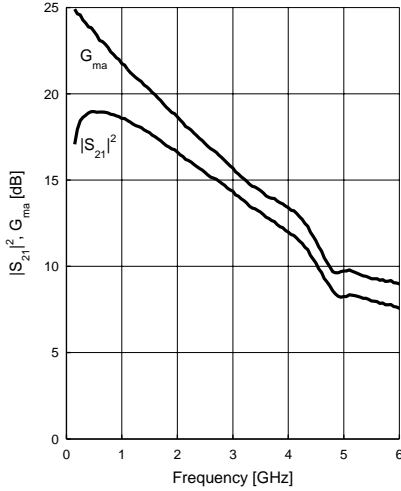
 $V_{CC}=2.75\text{ V}$, Frequency= 2.14 GHz , unless otherwise specified

Parameter	Symbol	min.	typ.	max.	Unit
Insertion power gain	$ S_{21} ^2$		16.2		dB
Insertion power gain (Off-State)	$ S_{21} ^2$		-23		dB
Input Return Loss (On-State)	RL_{IN}		6		dB
Output Return Loss (On-State)	RL_{OUT}		12		dB
Noise Figure ($Z_S=50\Omega$)	$F_{50\Omega}$		1.05		dB
Input Third Order Intercept Point ¹⁾ (On-State) $\Delta f=1\text{MHz}$, $P_{IN}=-28\text{dBm}$	IIP_3		0		dBm
Input Third Order Intercept Point ¹⁾ (Off-State) $\Delta f=1\text{MHz}$, $P_{IN}=-8\text{dBm}$	IIP_3		22		dBm
Input Power at 1dB Gain Compression	P_{-1dB}		-16		dBm

¹⁾ IP3 value depends on termination of all intermodulation frequency components. Termination used for this measurement is $50\ \Omega$ from 0.1 to 6 GHz

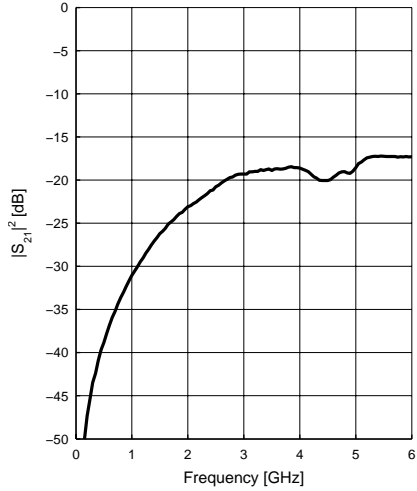
Power Gain $|S_{21}|^2, G_{ma} = f(f)$

$V_{CC} = 2.75V, I_{tot-on} = 5.8mA$



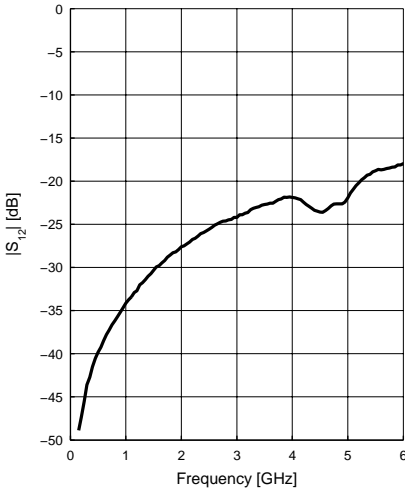
Off Gain $|S_{21}|^2 = f(f)$

$V_{CC} = 2.75V, V_{OUT} = 2.75V, I_{tot-off} = 0.3mA$



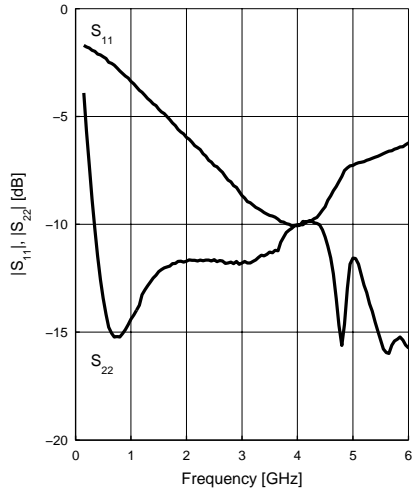
Reverse Isolation $|S_{12}| = f(f)$

$V_{CC} = 2.75V, I_{tot-on} = 5.8mA$



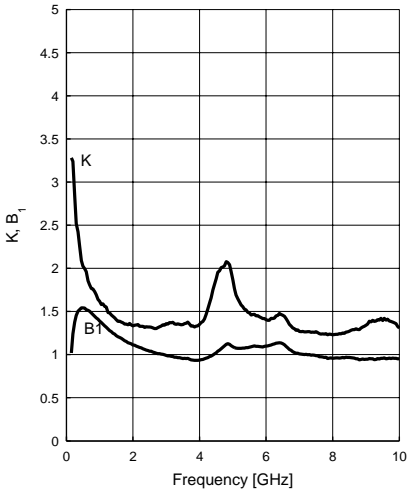
Matching $|S_{11}|, |S_{22}| = f(f)$

$V_{CC} = 2.75V, I_{tot-on} = 5.8mA$



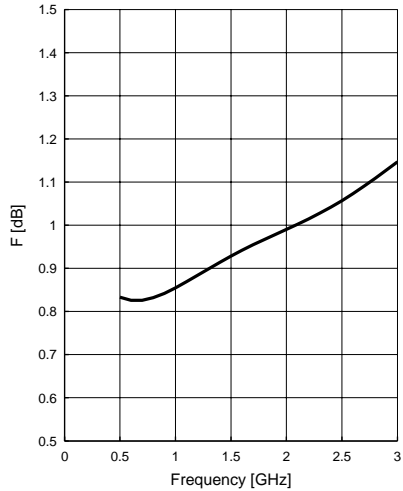
Stability $K, B_1 = f(f)$

$V_{CC} = 2.75V, I_{tot-on} = 5.8mA$



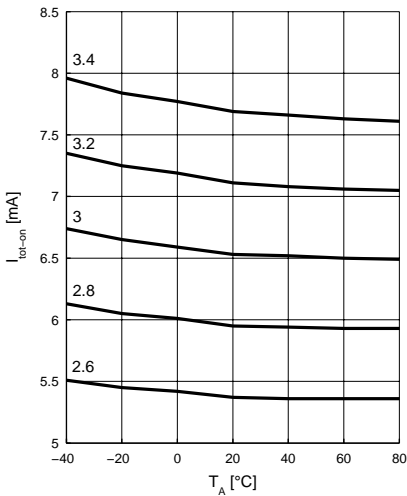
Noise Figure $F = f(f)$

$V_{CC} = 2.75V, I_{tot-on} = 5.8mA, Z_S = 50\Omega$



Device Current $I_{tot-on} = f(T_A, V_{CC})$

$V_{CC} = \text{parameter in } V$



Device Current $I_{tot-on} = f(V_{CC}, T_A)$

$T_A = \text{parameter in } ^\circ C$

