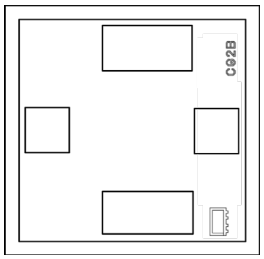
Wideband, High Gain, Low Noise

Monolithic Amplifier Die

GALI-S66-D+

50Ω DC to 3 GHz



The Big Deal

- Low Noise Figure, 2.4 dB typ.
- High Gain, 18.2 dB typ. at 2 GHz
- Excellent Return Loss, 20 dB typ.
- Internally Matched to 50 Ohms

Product Overview

GALI-S66-D+ (RoHS compliant) is a low current, low noise wideband amplifier Die offering high dynamic range.it is fabricated using GaAs HBT technology.

Key Features

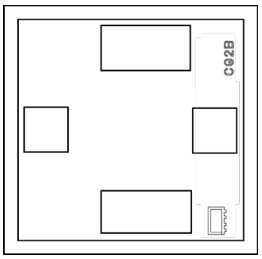
Feature	Advantages
Broad Band: DC to 3 GHz	Broadband covering primary wireless communications bands: Cellular, PCS, communication receivers and transmitters
Low Noise Figure, 2.4 dB typ.	Low noise in combination with low current saves DC power consumption and ideal for frontend applications.
High Gain, 18.2 dB at 2 GHz	Minimize the effect of subsequence stages on overall Noise Figure
Unpackaged Die	Enables the user to integrate the amplifier directly into hybrids

Wideband, High Gain, Low Noise

Monolithic Amplifier Die

GALI-S66-D+

50Ω DC to 3 GHz



Product Features

- Low Noise Figure, 2.4 dB typ.
- High Gain, 18.2 dB typ. at 2 GHz
- Frequency range, DC to 3 GHz
- Internally Matched to 50 Ohms

Typical Applications

- Cellular infrastructure
- PCS
- Communication receivers & transmitters

+RoHS Compliant

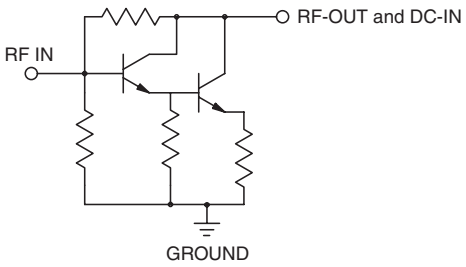
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

General Description

GALI-S66-D+ (RoHS compliant) is a low current, low noise wideband amplifier Die offering high dynamic range.it is fabricated using GaAs HBT technology.

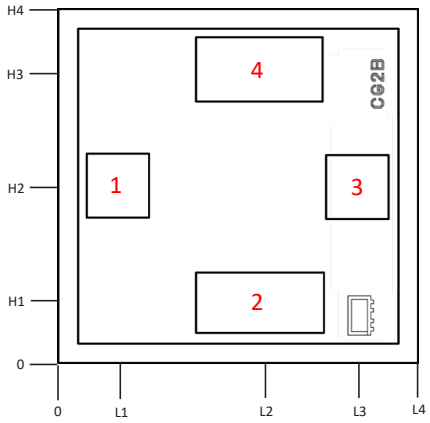
Simplified Schematic and Pad description



Pad #	Function	Description
1	RF-IN	RF input pad. This pad requires the use of an external DC blocking capacitor chosen for the frequency of operation.
3	RF-OUT and DC-IN	RF output and bias pad. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke and Bias resistor are needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit".
2,4	GROUND	Ground pads. Connect to ground per assembly diagram.

Note: 1. Bond Pad material - Gold
2. Bottom of Die - Gold plated

Bonding Pad Position



Dimensions in µm, Typical

L1	L2	L3	L4	H1	H2	H3	H4
95.0	313.5	465	560	95.0	275.0	455	550

Bond pad #1 & #3	Thickness	Die size	Bond pad #2 & #4
95.0 x 95.0	100	560.0 x 550.0	145.0 x 95.0

Electrical Specifications at 25°C, and 16mA, unless noted[1]

Parameter		Min.	Typ.	Max.	Units
Frequency Range		DC		3	GHz
Gain	f=0.1 GHz	—	21.6	—	dB
	f=1 GHz	—	20.3	—	
	f=2 GHz	—	18.2	—	
	f=3 GHz	—	16.4	—	
Input Return Loss	f= DC to 3 GHz		25		dB
Output Return Loss	f= DC to 3 GHz		20		dB
Output Power @ 1 dB compression	f=2 GHz		3.3		dBm
Output IP3	f=2 GHz		19.1		dBm
Noise Figure	f=2 GHz		2.4		dB
Recommended Device Operating Current			16		mA
Device Operating Voltage		3.0	3.5	4.0	V
Device Voltage Variation vs. Temperature at 16 mA			-2.1		mV/°C
Device Voltage Variation vs. Current at 25°C			3.7		mV/mA
Thermal Resistance, junction-to-case[1]			64		°C/W

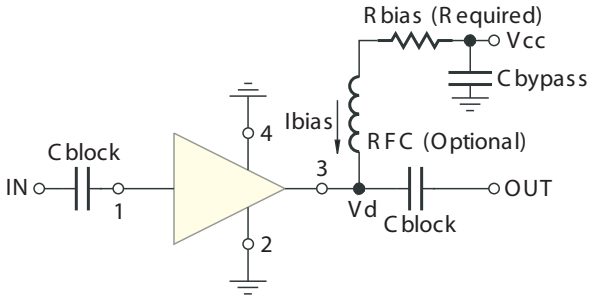
1. Measured on Mini-Circuits Characterization test board TB-409-S66+. DUT packaged in industry standard SOT-89 package. See characterization test circuit. (Fig. 1)

Absolute Maximum Ratings[3]

Parameter	Ratings
Operating Temperature	-45°C to 85°C
Operating Current	50mA
Input Power	20dBm

3. Permanent damage may occur if any of these limits are exceeded.
Electrical maximum ratings are not intended for continuous normal operation.

Recommended Application and Characterization Test Circuit



Test Board includes case, connectors, and components (in bold) soldered to PCB

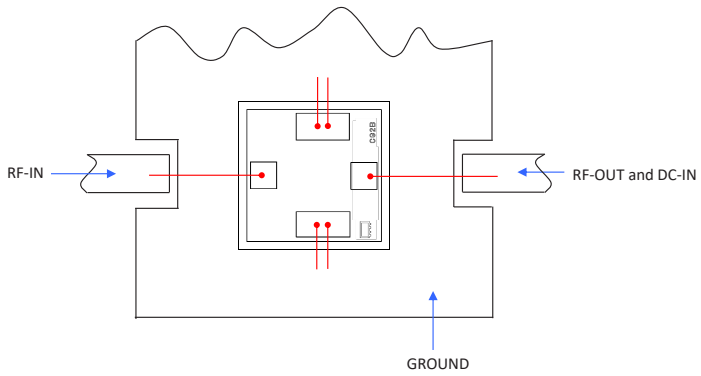
R BIAS	
Vcc	**"1%" Res. Values (ohms) for Optimum Biasing**
7	187
8	243
9	301
10	374
11	432
12	499
13	562
14	619
15	681
16	750
17	806
18	866
19	931
20	976

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT, Die packaged in SOT-89 package, soldered on Mini-Circuits Characterization test board TB-409-S66+)

Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: Pin= -25dBm.
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at output.

Assembly Diagram



Assembly and Handling Procedure

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC HBT amplifier dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static workstation. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.
3. Die Attach
   The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030HK-PT/H579 or Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
4. Wire Bonding
   Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

Additional Detailed Technical Information

additional information is available on our dash board.

Performance Data	Data Table	
	Swept Graphs	
	S-Parameter (S2P Files) Data Set with and without port extension(.zip file)	
Case Style	Die	
Die Ordering and packaging information	Quantity, Package	Model No.
	Small, Gel - Pak: 5,10,50,100 KGD*	GALI-S66-DG+
	Medium†, Partial wafer: KGD*<2805	GALI-S66-DP+
	Large†, Full Wafer	GALI-S66-DF+
	†*Available upon request contact sales representative*	
	Refer to AN-60-067	
Environmental Ratings	ENV80	

*Known Good Dice ("KGD") means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does help to provide a higher degree of confidence that dice are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

ESD Rating**

Human Body Model (HBM): Class 1C (1000V to 2000V) in accordance with ANSI/ESD STM 5.1 - 2001

** Tested in industry standard SOT-89 package.

Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

D. Mini-Circuits does not warrant the accuracy or completeness of the information, text, graphics and other items contained within this document and same are provided as an accommodation and on an "As is" basis, with all faults.

E. Purchasers of this part are solely responsible for proper storing, handling, assembly and processing of Known Good Dice (including, without limitation, proper ESD preventative measures, die preparation, die attach, wire bond ing and related assembly and test activities), and Mini-Circuits assumes no responsibility therefor or for environmental effects on Known Good Dice.

F. Mini-Circuits and the Mini-Circuits logo are registered trademarks of Scientific Components Corporation d/b/a Mini-Circuits. All other third-party trademarks are the property of their respective owners. A reference to any third-party trademark does not constitute or imply any endorsement, affiliation, sponsorship, or recommendation by any such third-party of Mini-Circuits or its products.