

MGA-61563

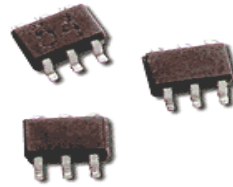
Avago Technologies MGA-61563 Current-Adjustable Low Noise Amplifier

Description

This E-pHEMT RFIC is an easy-to-use high linearity low noise amplifier built-in with Smart Bias function. For Smart Bias function, one external resistor is used to set the bias current taken by the device over a wide range. This allows the designer to use the same part in several circuit positions and tailor the linearity performance and current consumption to suit each position.

It is ideal as a LNA or driver amplifier for Cellular/PCS/W-CDMA base stations, WLL, Fixed Wireless Access, Wireless LAN and other high performance applications in the 0.1 to 6 GHz frequency range.

Lifecycle status: **Active**



Features

Typical performance at 2 GHz 3V/42mA is NF=1.4dB, OIP3=28dBm, P1dB=15dBm and Ga=16.5dB.

MGA-61563

Current-Adjustable, Low Noise Amplifier



Data Sheet

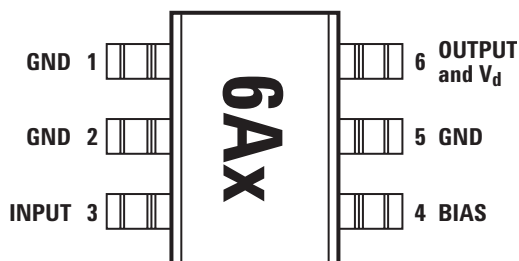
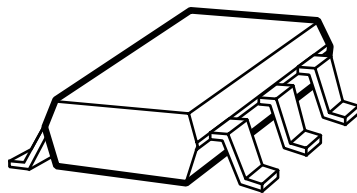
Description

Avago Technologies' MGA-61563 is an economical, easy-to-use GaAs MMIC amplifier that offers excellent linearity and low noise figure for applications from 0.1 to 6 GHz. Packaged in an miniature SOT-363 package, it requires half the board space of a SOT-143 package.

One external resistor is used to set the bias current taken by the device over a wide range. This allows the designer to use the same part in several circuit positions and tailor the linearity performance (and current consumption) to suit each position. The MGA-61563 is normally operating with I_d set in the 20-60mA range

The output of the amplifier is matched to 50Ω (below 2:1 VSWR) across the entire bandwidth and only requires minimum input matching. The amplifier allows a wide dynamic range by offering a 1.2 dB NF coupled with a +28.5 dBm Output IP3. The circuit uses state-of-the-art E-pHEMT technology with proven reliability. On-chip bias circuitry allows operation from a single +3V or +5V power supply, while internal feedback ensures stability ($K > 1$) over all frequencies.

Pin Connections and Package Marking



Note:

Package marking provides orientation and identification:

"6A" = Device Code

"x" = Date code indicates the month of manufacture.

Features

- Single +3V or + 5V supply
- High linearity
- Low noise figure
- Miniature SOT363 (SC70) package
- Unconditionally stable
- Lead-free option available

Specifications at 2 GHz; 3V, 41 mA (Typ.)

- 28.5 dBm OIP3
- 1.2 dB noise figure
- 16.6 dB gain
- 15.8 dBm P_{1dB}



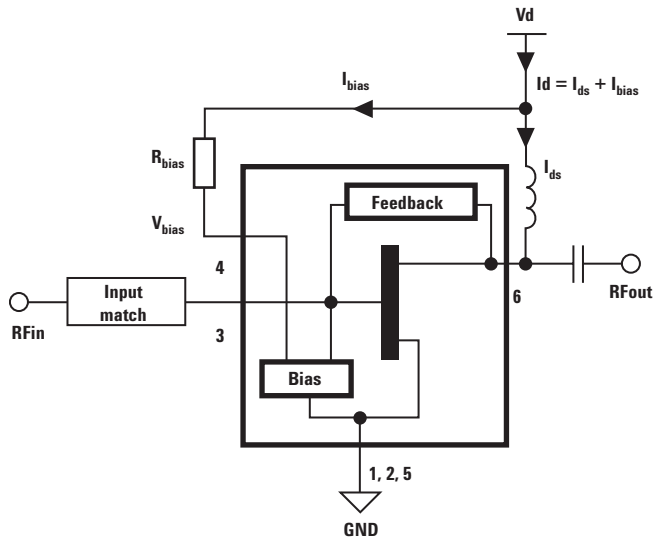
Attention: Observe precautions for handling electrostatic sensitive devices.

ESD Machine Model (Class A)

ESD Human Body Model (Class 0)

Refer to Avago Technologies Application Note A004R: Electrostatic Discharge Damage and Control.

Simplified Schematic



MGA-61563 Absolute Maximum Ratings^[1]

Symbol	Parameter	Units	Absolute Maximum
V_d	Device Voltage (pin 6) ^[2]	V	6
I_d	Device Current (pin 6) ^[2]	mA	100
P_{in}	CW RF Input Power (pin 3) ^[3]	dBm	18
I_{ref}	Bias Reference Current (pin 4)	mA	10
P_{diss}	Total Power Dissipation ^[4]	mW	500
T_{CH}	Channel Temperature	°C	150
T_{STG}	Storage Temperature	°C	150
$\theta_{ch,b}$	Thermal Resistance ^[5]	°C/W	115

Notes:

1. Operation of this device in excess of any one of these parameters may cause permanent damage.
2. Assumes DC quiescent conditions.
3. With the DC (typical bias) and RF applied to the device at board temperature $T_b = 25^\circ\text{C}$.
4. Total dissipation power is referred to lead "x" temperature. $T_c = 92.5^\circ\text{C}$, derate P_{diss} at $8.7\text{mW}/^\circ\text{C}$ for $T_c > 92.5^\circ\text{C}$.
5. Thermal resistance measured using 150°C Liquid Crystal Measurement method.

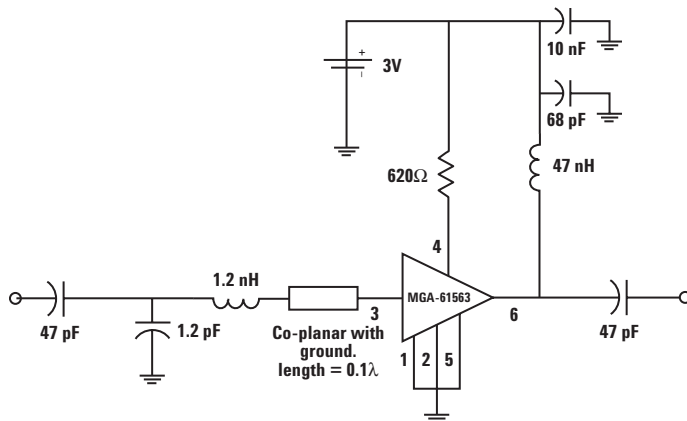


Figure 1. Test circuit of the 2 GHz production test board used for NF, Gain and OIP3 measurements. This circuit achieves a trade-off between optimal NF, Gain, OIP3 and input return loss. Circuit losses have been de-embedded from actual measurements.

MGA-61563 Electrical Specifications

Rbias = 620ohm

TC = 25°C, ZO = 50Ω, Vd = 3V (unless otherwise specified)

Symbol	Parameters and Test Conditions	Freq	Units	Min.	Typ.	Max.	Std Dev
$I_d^{[1,2]}$	Device Current		mA	32	41	48	0.91
$NF_{test}^{[1,2]}$	Noise Figure in test circuit ^[1]	f = 2.047 GHz	dB		1.17	1.8	0.03
$G_{test}^{[1,2]}$	Associated Gain in test circuit ^[1]	f = 2.047 GHz	dB	15	16.6	18	0.36
$OIP3_{test}^{[1,2]}$	Output 3 rd Order Intercept in test circuit ^[1]	f = 2 GHz	dBm	26	28.5		0.5
$NF_{50\Omega}^{[3]}$	Noise Figure in 50Ω system	f = 0.2 GHz	dB		1.4		0.03
		f = 0.5 GHz		1.1			
		f = 1.0 GHz		0.9			
		f = 2.0 GHz		1.0			
		f = 3.0 GHz		1.4			
		f = 4.0 GHz		1.8			
		f = 5.0 GHz		2.3			
	f = 6.0 GHz	2.7					
$ S_{21} ^2^{[3]}$	Associated Gain in 50Ω system	f = 0.2 GHz	dB		21		0.36
		f = 0.5 GHz		20			
		f = 1.0 GHz		19.3			
		f = 2.0 GHz		15.5			
		f = 3.0 GHz		12.4			
		f = 4.0 GHz		10.4			
		f = 5.0 GHz		8			
	f = 6.0 GHz	6.9					
$OIP3_{50\Omega}^{[3]}$	Output 3 rd Order Intercept Point in 50Ω system	f = 0.2 GHz	dBm		29		0.5
		f = 0.5 GHz		29.8			
		f = 1.0 GHz		30.5			
		f = 2.0 GHz		31.7			
		f = 3.0 GHz		30.9			
		f = 4.0 GHz		30.6			
		f = 5.0 GHz		30.6			
	f = 6.0 GHz	30.7					
$P1dB_{50\Omega}^{[3]}$	Output Power at 1dB Gain Compression in 50Ω system	f = 0.2 GHz	dBm				15.6
		f = 0.5 GHz		15.5			
		f = 1.0 GHz		15.4			
		f = 2.0 GHz		15.1			
		f = 3.0 GHz		15.1			
		f = 4.0 GHz		14.8			
		f = 5.0 GHz		14.6			
	f = 6.0 GHz	14.6					

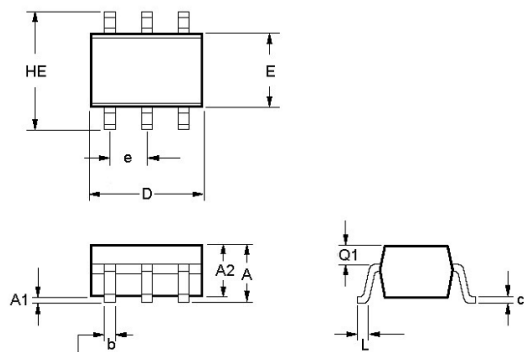
Notes:

1. Guaranteed specifications are 100% tested in the production test circuit as shown in Figure 1, the typical value is based on measurement of at least 500 parts from three non-consecutive wafer lots during initial characterization of this product.
2. Circuit achieved a trade-off between optimal NF, Gain, OIP3 and input return loss.
3. Parameter quoted at 50Ω is based on measurement of selected typical parts tested on a 50Ω input and output test fixture.

Ordering Information

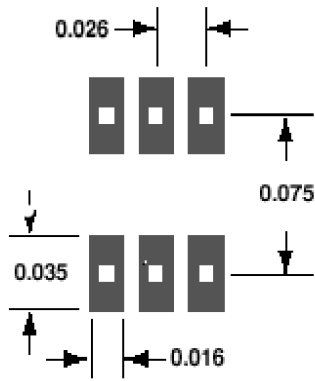
Part Number	No. of Devices	Container
MGA-61563-TR1G	3000	7" Reel
MGA-61563-TR2G	10000	13" Reel
MGA-61563-BLKG	100	antistatic bag

SOT-363/SC-70 (JEDEC DFP-N) Package Dimensions



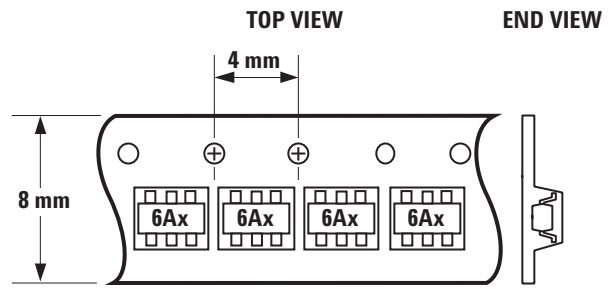
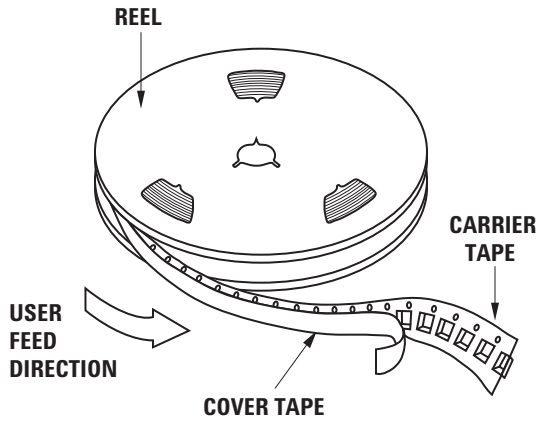
Dimensions		
Symbol	Min (mm)	Max (mm)
E	1.15	1.35
D	1.80	2.25
HE	1.80	2.40
A	0.80	1.10
A2	0.80	1.00
A1	0.00	0.10
e	0.650 BCS	0.650 BCS
b	0.15	0.30
c	0.10	0.20
L	0.10	0.30

Recommended PCB Pad Layout for Agilent's SC70 6L/SOT-363 Products



(dimensions in inches)

Device Orientation



(Package marking example orientation shown.)