



Mini-Circuits

MMIC SURFACE MOUNT

# Monolithic Amplifier

RAM-4+

50Ω DC to 1 GHz

## FEATURES

- Wideband, DC to 1 GHz
- Cascadable Ceramic Package
- Internally Matched to 50Ω
- Low Noise Figure, 6.5 dB Typ.
- Excellent Repeatability
- Aqueous Washable
- Protected Under US Patent 6,943,629



Generic photo used for illustration purposes only

CASE STYLE: AF190

## +RoHS Compliant

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

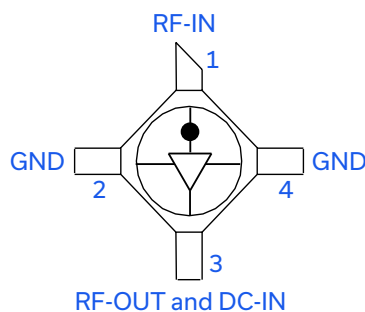
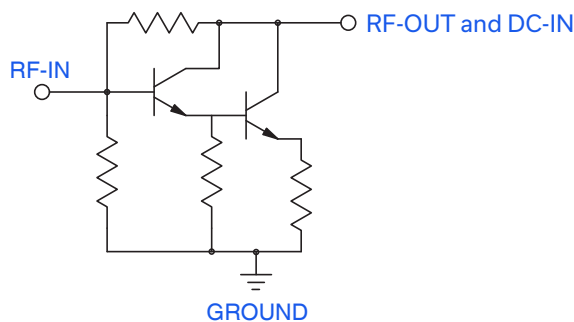
## APPLICATIONS

- Cellular
- UHF/VHF
- Communication Systems
- Transmission Receivers

## PRODUCT OVERVIEW

RAM-4+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a ceramic surface-mount package. RAM-4+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTBF is 300 years at +100°C case temperature.

## SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION



Function	Pin Number	Description
RF-IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit".
GND	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

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## ELECTRICAL SPECIFICATIONS AT +25°C AND 50 mA UNLESS NOTED OTHERWISE

Parameter	Conditions (GHz)	Min.	Typ.	Max.	Units
Frequency Range <sup>1</sup>		DC		1	GHz
Gain	0.1 1		8.5 8.0		dB
Input Return Loss	DC - 1		15.5		dB
Output Return Loss	DC - 1		10		dB
Output Power @ 1 dB Compression	1		+12.5		dBm
Output IP3	1		+25.5		dBm
Noise Figure	1		6.5		dB
Recommended Device Operating Current			50		mA
Device Operating Voltage			+5.25		V
Device Voltage Variation vs. Temperature at 50 mA			-2.2		mV/°C
Device Voltage Variation vs. Current at +25°C			23.0		mV/mA
Thermal Resistance, Junction-to-Case <sup>3</sup>			140		°C/W

1. Guaranteed specification DC-1 GHz. Low frequency cut off determined by external coupling capacitors.

2. Full temperature range.

3. Case is defined as ground leads.

## ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-54°C to +100°C
Storage Temperature	-65°C to +150°C
Operating Current	100 mA
Power Dissipation	540 mW
Input Power	+13 dBm

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





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The diagram shows a common-emitter amplifier circuit. The input signal **IN** is connected to the base of a BJT through a coupling capacitor **Cblock** (labeled 1). The base is biased by a voltage divider consisting of **Rbias** (Required) and **RFC** (Optional) connected to **Vcc**. A bypass capacitor **Cbypass** is connected in parallel with **RFC** to ground. The emitter is connected to ground through a capacitor **Cblock** (labeled 2). The collector is connected to the output **OUT** through a coupling capacitor **Cblock** (labeled 3). The collector is also connected to **Vcc** through a resistor **Rbias** (Required). The output voltage **Vd** is taken across the collector resistor. The circuit is labeled with node numbers 1, 2, 3, and 4.

R BIAS	
Vcc	"1%" Res. Values (Ohms) for Optimum Biasing
7	34.8
8	54.9
9	75
10	95.3
11	115
12	133
13	154
14	174
15	196





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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. [CLICK HERE](#)

Performance Data & Graphs	Data Table
	Swept Graphs
	S-Parameter Data Set (.zip file)
Case Style	AF190 Ceramic surface-mount, 0.083 body diameter
Suggested Layout for PCB Design	PL-254
Evaluation Board	TB-414-4+
Environmental Ratings	ENV08T6

**ESD RATING**

Human Body Model (HBM): Class 1B (500 V to &lt; 1,000 V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 ( &lt; 100 V) in accordance with ESD STM 5.2 - 1999

**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-Circuits' 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)