Surface Mount

Monolithic Amplifier

DC-1 GHz

Product Features

- Wideband, DC to 1 GHz
- Exact footprint substitute for Avago's MSA-0486
- Internally Matched to 50 Ohms
- Unconditionally stable
- Protected by US Patent, 6,943,629

Generic photo used for illustration purposes only

MAR-4SM+

CASE STYLE: WW107

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

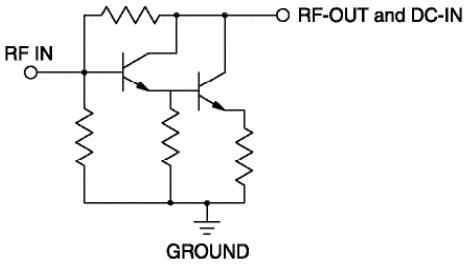
Typical Applications

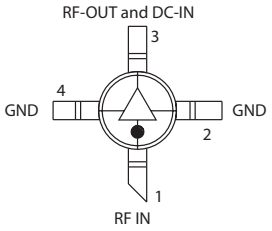
- Cellular
- Instrumentation
- VHF/UHF transmitters/receivers

General Description

MAR-4SM+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a Micro-X package. MAR-4SM+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 900 years at 85°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.

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

Electrical Specifications at 25°C and 50mA, unless noted

Parameter		Min.	Typ.	Max.	Units
Frequency Range*		DC		1	GHz
Gain	f=0.1 GHz f=1 GHz	— 7.0[2]	8.3 8.0	— —	dB
Input Return Loss	f=DC to 1 GHz		14		dB
Output Return Loss	f=DC to 1 GHz		10		dB
Output Power @ 1 dB compression	f= 1 GHz		+12.5		dBm
Output IP3	f=1 GHz		+25.5		dBm
Noise Figure	f=1 GHz		6.0		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[1]			157		°C/W

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

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Operating Current	85mA
Power Dissipation	500mW
Input Power	13dBm

Note: Permanent damage may occur if any of these limits are exceeded.
These ratings are not intended for continuous normal operation.
[1]Case is defined as ground leads.
[2]Full temperature range.

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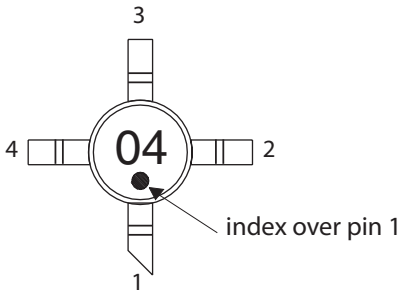
Product Marking



Markings in addition to model number designation may appear for internal quality control purposes.

Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs, s-parameter data set (.zip file)

Case Style: WW107
Plastic micro-x, .085 body diameter, lead finish: Matte-Tin

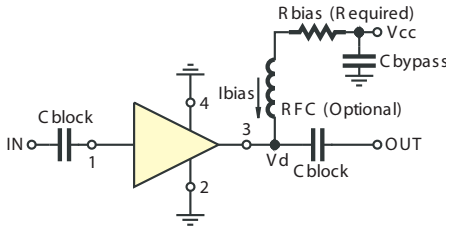
Tape & Reel: F4
7" Reels with 20, 50, 100, 200, 500, 1K devices
13" Reels with 2K, 4K devices

Suggested Layout for PCB Design: PL-253

Evaluation Board: TB-411-4+

Environmental Ratings: ENV08T3

Recommended Application Circuit



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

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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ESD Rating

Human Body Model (HBM): Class 1B (500 v to < 1000 v) in accordance with ANSI/ESD STM 5.1 - 2001

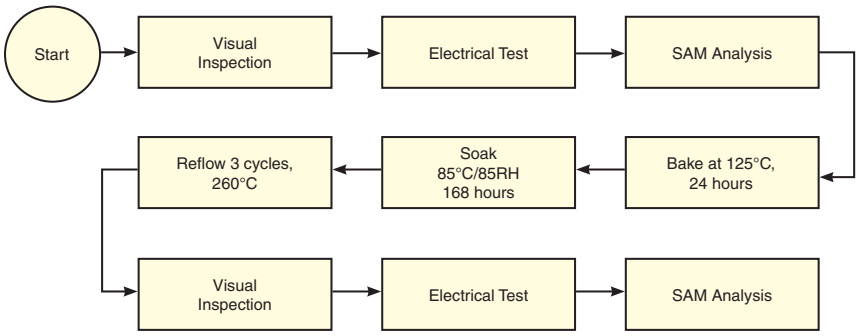
Machine Model (MM): Class M1 (<100 v) in accordance with ANSI/ESD STM 5.2 - 1999

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDECJ-STD-020C

No.	Test Required	Condition	Standard	Quantity
1	Visual Inspection	Low Power Microscope Magnification 40x	MIP-IN-0003 (MCT spec)	45 units
2	Electrical Test	Room Temperature	SCD (MCL spec)	45 units
3	SAM Analysis	Less than 10% growth in term of delamination	J-Std-020C (Jedec Standard)	45 units
4	Moisture Sensitivity Level 1	Bake at 125°C for 24 hours Soak at 85°C/85%RH for 168 hours Reflow 3 cycles at 260°C peak	J-Std-020C (Jedec Standard)	45 units

MSL Test Flow Chart



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