

High Directivity

# Monolithic Amplifier

0.5-2.5 GHz

## Product Features

- 2.8V & 5V operation
- Micro-miniature size .120"X.120"
- Internal DC blocking at RF input and output
- High directivity, 20 dB typ.
- Low noise figure
- Output power, up to +19 dBm typ.
- Excellent repeatability
- Low cost
- Aqueous washable



**MNA-4+**

CASE STYLE: DQ849  
PRICE: \$1.90 ea. QTY. (20)

**+RoHS Compliant**

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

## Typical Applications

- Buffer amplifier
- Cellular
- PCN
- Communications satellite
- Defense

## General Description

MNA-4+ is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a 3x3 mm MCLP plastic package. MNA-4+ is fabricated using GaAs MESFET technology. Expected MTBF at 85°C case temperature is 40,000 years at 2.8V; 9,000 years at 5V.

Function	Pin Number	Description	
RF IN	2	RF input pin	
RF-OUT	5	RF output pin	
DC	7, with 1000 pF bypass to ground; connect pin 8 via 33 ohms to pin 7 externally	Bias pins	
GND	3,4 and paddle in center of bottom	Connections to ground	
OPTIONAL	1,6	No internal connection; recommended use: per PCB Layout PL-078	

**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](http://www.minicircuits.com/MCLStore/terms.jsp)



## Electrical Specifications at 25°C

Parameter		Min.	Typ.		Max.	Units
Frequency Range		0.5			2.5	GHz
at DC Volts		5.0	5.0	2.8	5.0	V
Gain	f=0.5 GHz	14.0	15.6	14.3		dB
	f=1.0 GHz		16.6	14.6		
	f=1.5 GHz		16.4	14.5		
	f=2.0 GHz		15.8	14.1		
	f=2.5 GHz		13.3	11.7		
Input Return Loss		f=0.75-2.5 GHz		14	14	
Output Return Loss		f=0.75-2.5 GHz		11.5	11.5	
Output Power @ 1 dB compression		f=0.5 GHz	19.0	13.7		dBm
		f=2.5GHz	17.0	13.7		
Output IP3		f=1 GHz	28.4	23.9		dBm
		f=2 GHz	29.0	24.9		
Noise Figure		f=1 GHz	4.8			dB
Directivity (Isolation - Gain)		f=0.5-2.5 GHz	20			
DC Current			75	67	90	mA
Thermal Resistance, junction-to-case			78			°C/W

## Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
DC Voltage	7V at pin 7 10V at pins 2 & 5
Power Dissipation	500mW
Input Power	13dBm (continuous operation) 23dBm (5 minutes max)

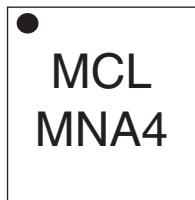
Note: Permanent damage may occur if any of these limits are exceeded.  
These ratings are not intended for continuous normal operation.

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## Product Marking



## 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: DQ849

MNA-4+: Plastic package, exposed paddle, lead finish: tin/silver/nickel

#### Tape & Reel: F104

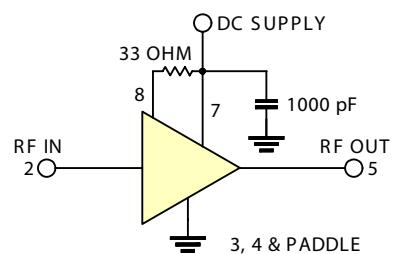
Standard quantities available on reel: 7" reels with 20, 50, 100, 200, 500, 1K, or 2K devices.

#### Suggested Layout for PCB Design: PL-078

#### Evaluation Board: TB-186+

#### Environmental Ratings: ENV08T1

## Recommended Application Circuit



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## ESD Rating

Human Body Model (HBM): Class 1A (250v to < 500v) in accordance with ANSI/ESD STM 5.1 - 2001

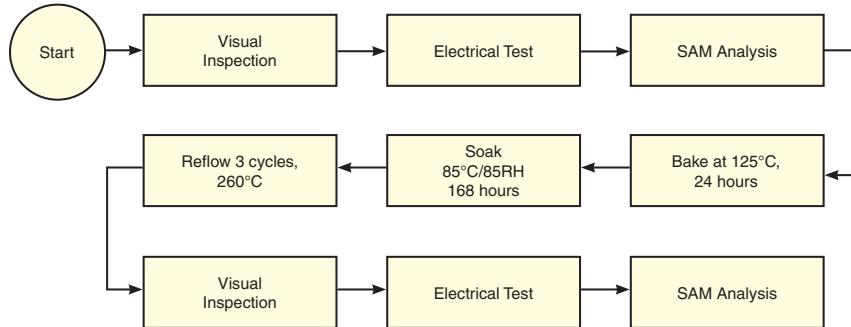
Charged Device Model (CDM): Class III (500 to 1000v) in accordance with JESD22-C101A

## MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-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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