

## Features

- Cascadable 50  $\Omega$  Gain Block
- 3dB Bandwidth: DC to 2 GHz
- Gain: 11.5 dB @ 1 GHz
- Unconditionally Stable ( $k > 1$ )
- Low Voltage Operation
- 370 x 370 x 120  $\mu\text{m}$
- RoHS\* Compliant

## Applications

- Narrow and Wide Band IF and RF Amplifiers
- Industrial
- Military

## Description

The MAAM-011007 is a high performance silicon bipolar MMIC chip. This amplifier is ideally suited for use where a general purpose 50  $\Omega$  gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

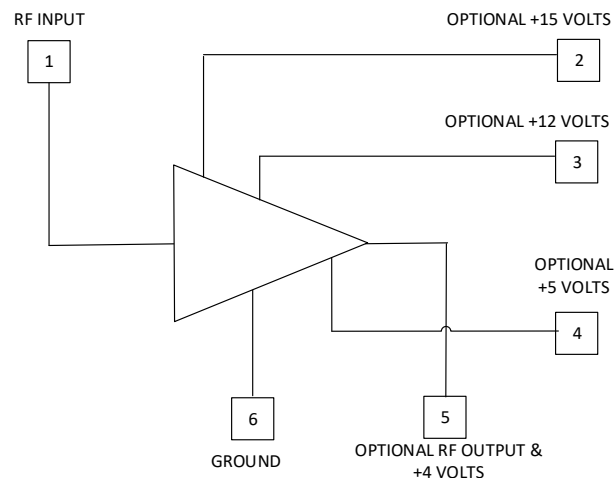
The MAAM-011007 is fabricated using a 10 GHz fT silicon bipolar technology that features gold metallization and IC passivation for increased performance and reliability.

## Ordering Information

Part Number	Package
MAAM-011007-DIE	Gel Pack <sup>1</sup>

1. Die quantity varies.

## Functional Schematic



## Pad Configuration

Pad	Function	Comment
1	RF Input	—
2	Bias	Optional +15 Volts
3	Bias	Optional +12 Volts
4	Bias	Optional +5 Volts
5	RF Output and Bias <sup>2</sup>	Optional RF Output and +4 Volts
6	Ground	—

2. RF output contact & +DC voltage is normally made on the backside of the chip at die attach.

\* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

**Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $I_D = 22\text{ mA}$ ,  $Z_0 = 50\ \Omega$** 

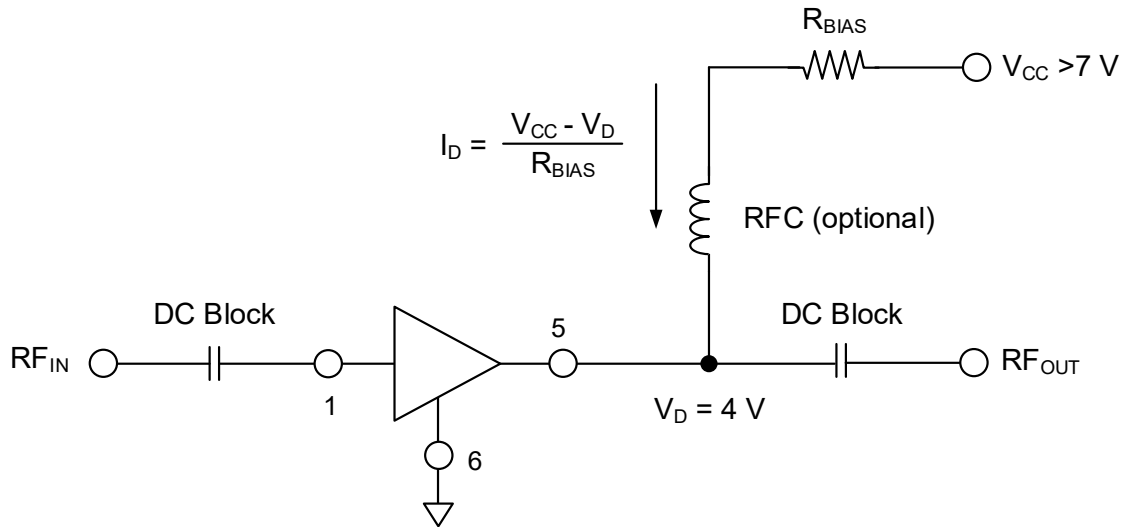
Parameter	Freq	Units	Min.	Typ.	Max.
Power Gain ( $ S_{21} ^2$ )	0.1 GHz	dB	—	11.5	—
Gain Flatness	0.1 - 1.5 GHz	dB	—	$\pm 1$	—
3 dB Bandwidth	—	GHz	—	2	—
Input Return Loss	0.1 - 2.0 GHz	dB	—	18	—
Output Return Loss	0.1 - 2.0 GHz	dB	—	12	—
Power Output at 1 dB Gain Compression	1 GHz	dBm	—	9	—
50W Noise Figure	1 GHz, 50 $\Omega$	dB	—	4.5	—
Third Order Intercept Point	1 GHz	dBm	—	16	—
Group Delay	1 GHz	ps	—	140	—
Device Voltage	—	V	3.5	4.0	4.5
Device Voltage Temperature Coefficient	—	mV/ $^\circ\text{C}$	—	-7.0	—

**Absolute Maximum Ratings<sup>3,4</sup>**

Parameter	Absolute Maximum
Device Current	60 mA
Junction Temperature <sup>5,6</sup>	+200 $^\circ\text{C}$
Storage Temperature	-65 $^\circ\text{C}$ to +200 $^\circ\text{C}$
Power Dissipation <sup>7</sup>	275 mW
RF Input Power	+13 dBm

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.
5. Operating at nominal conditions with  $T_J \leq +150^\circ\text{C}$  will ensure  $\text{MTTF} > 1 \times 10^6$  hours.
6. Junction Temperature ( $T_J$ ) =  $T_C + \Theta_{jc} * (V * I)$   
 Typical thermal resistance ( $\Theta_{jc}$ ) = 188  $^\circ\text{C}/\text{W}$ .
  - a) For  $T_C = +25^\circ\text{C}$ ,  
 $T_J = 70.1\ ^\circ\text{C}$  @ 4 V, 60 mA
  - b) For  $T_C = +100^\circ\text{C}$ ,  
 $T_J = 145.1\ ^\circ\text{C}$  @ 4 V, 60 mA
7. Derate at 5.2 mW/ $^\circ\text{C}$  for  $T_c > 148\ ^\circ\text{C}$

**Typical Bias Configuration**



**Handling Procedures**

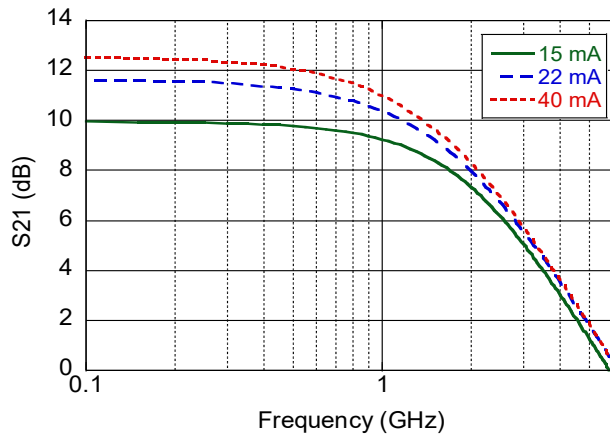
Please observe the following precautions to avoid damage:

**Static Sensitivity**

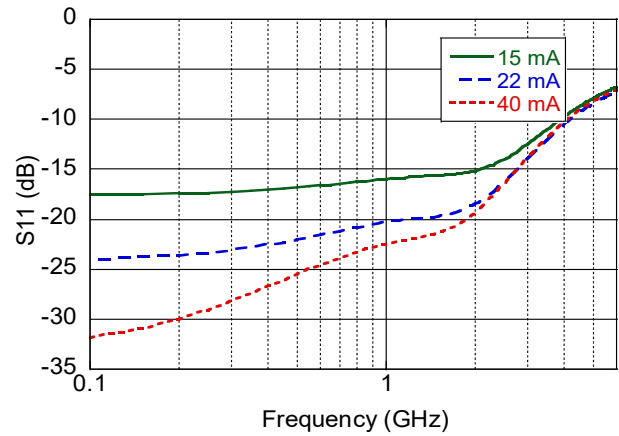
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1B (500 V) HBM devices.

**Typical S-Parameters:  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 50 \Omega$**

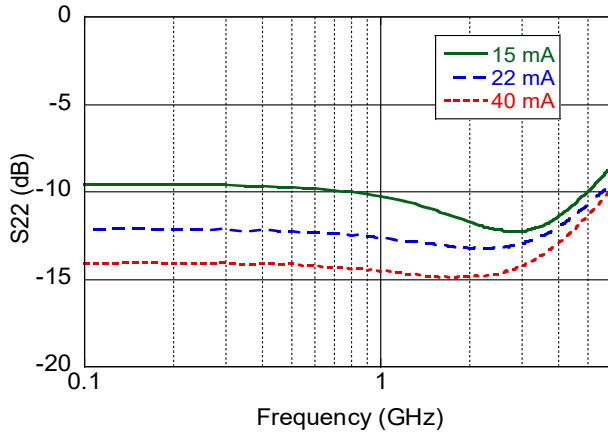
**Gain**



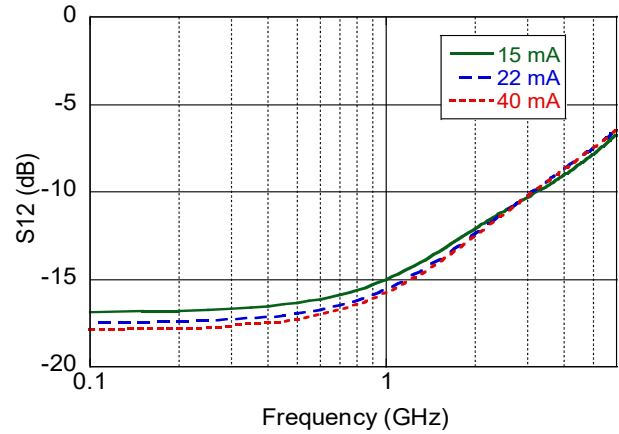
**Input Return Loss**



**Output Return Loss**

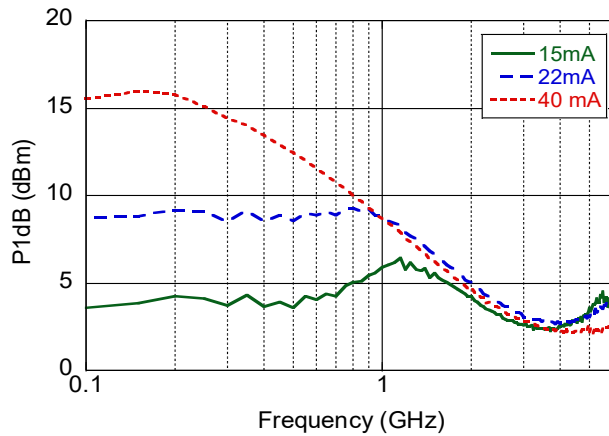


**Reverse Isolation**

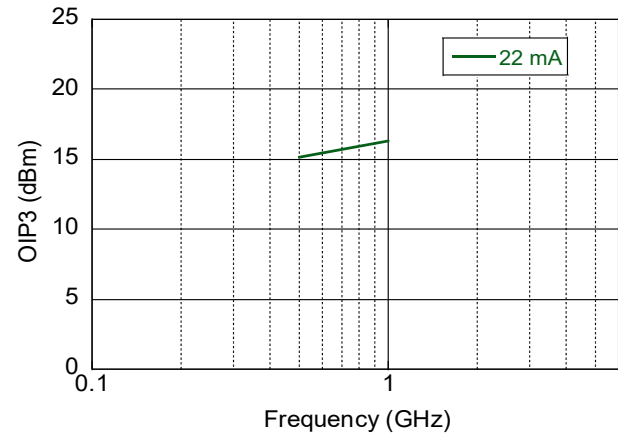


**Typical Performance:  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 50 \Omega$**

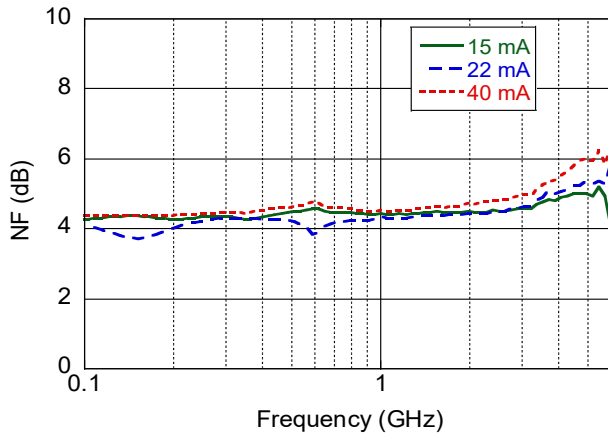
**P1dB**



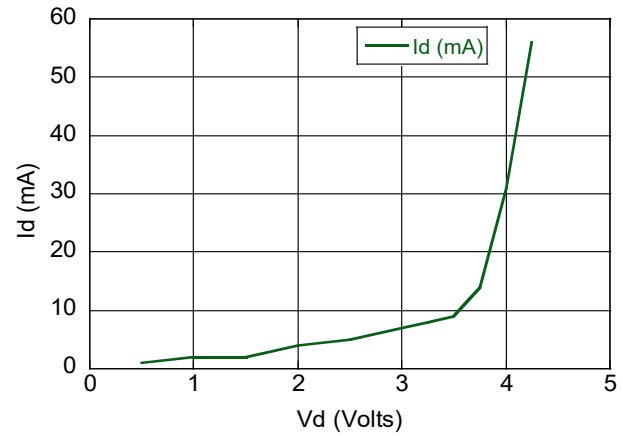
**Output 3rd Order Intercept Point**



**Noise Figure**



**Bias Current vs Voltage**



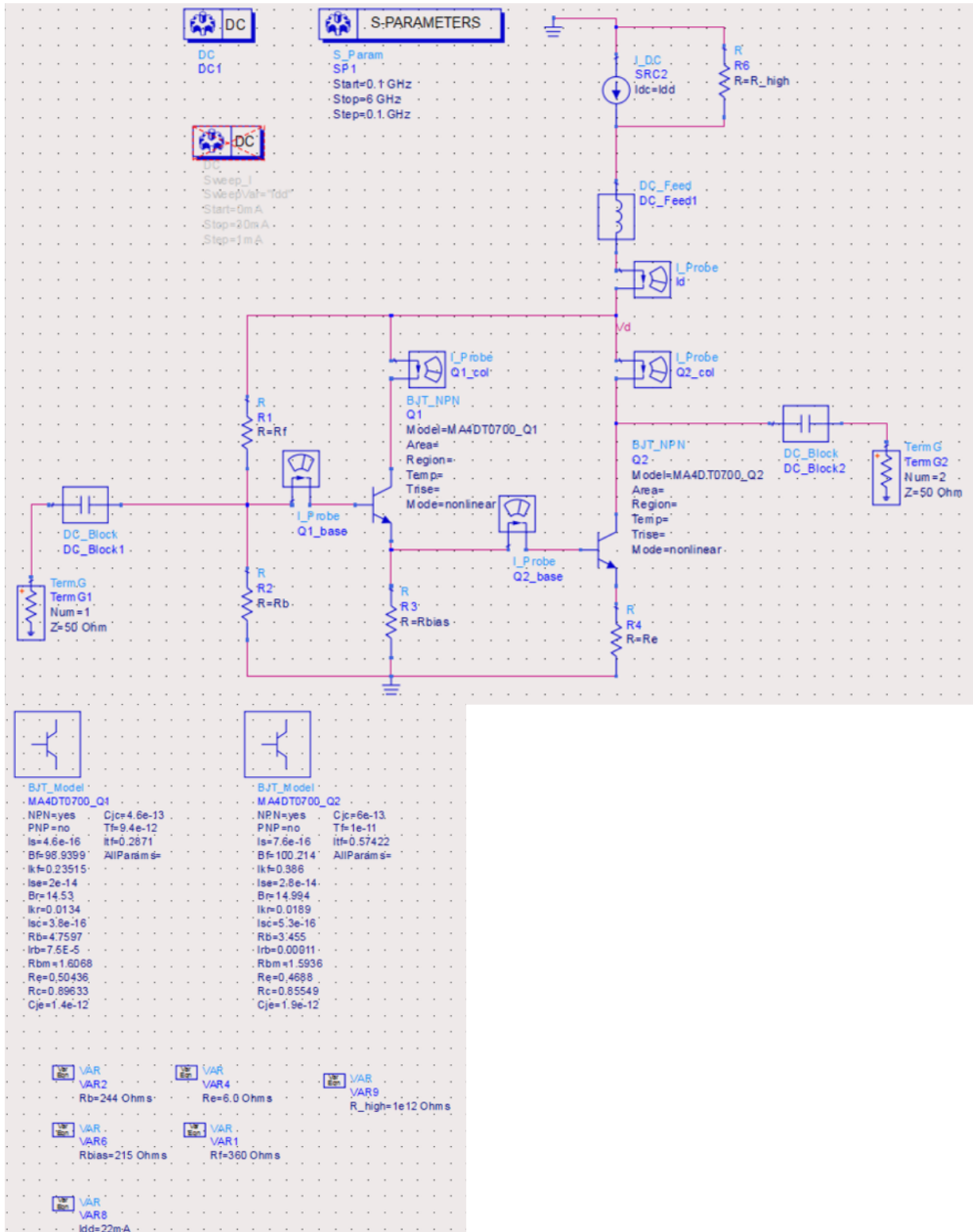
# Silicon Bipolar MMIC Cascadable Amplifier DC - 2 GHz



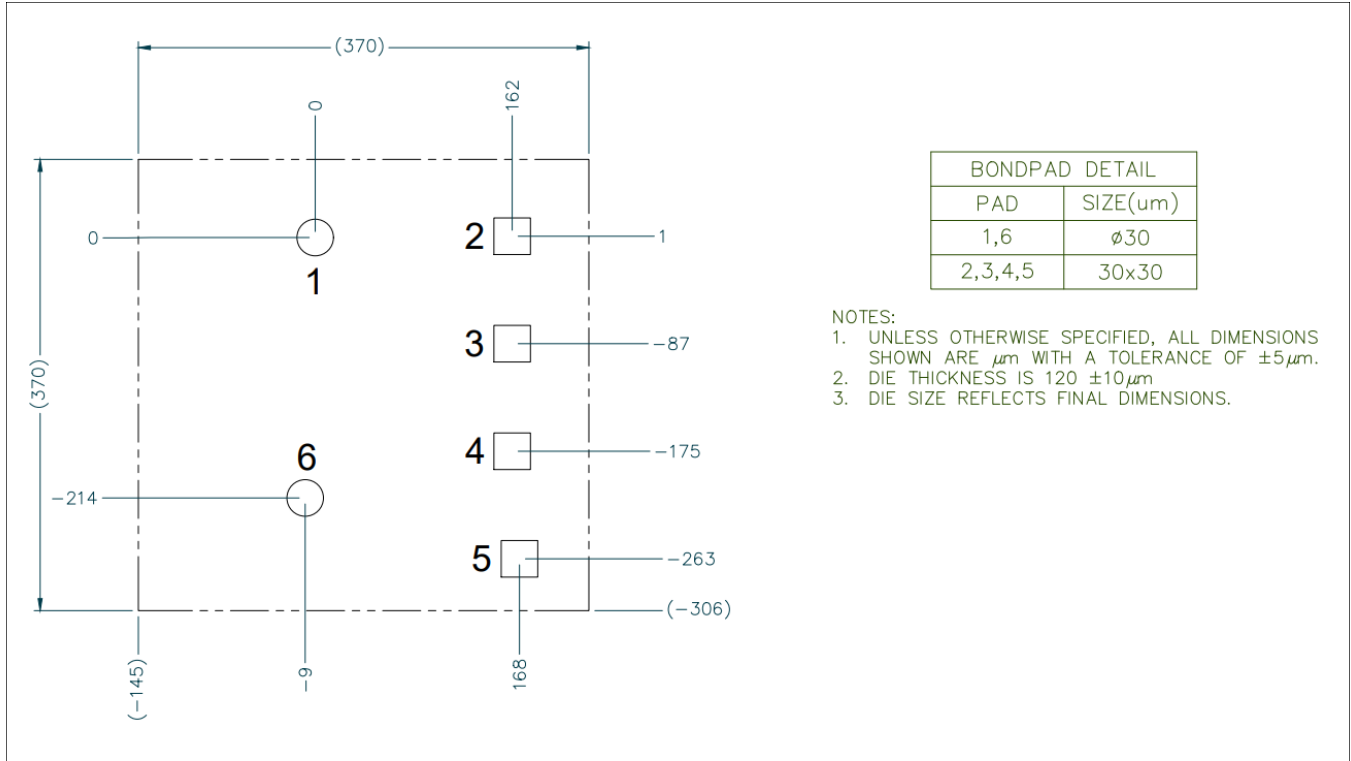
MAAM-011007

Rev. V1

## Schematic and Model



Chip Outline Drawing



MACOM Technology Solutions Inc. ("MACOM"). All rights reserved.

These materials are provided in connection with MACOM's products as a service to its customers and may be used for informational purposes only. Except as provided in its Terms and Conditions of Sale or any separate agreement, MACOM assumes no liability or responsibility whatsoever, including for (i) errors or omissions in these materials; (ii) failure to update these materials; or (iii) conflicts or incompatibilities arising from future changes to specifications and product descriptions, which MACOM may make at any time, without notice. These materials grant no license, express or implied, to any intellectual property rights.

THESE MATERIALS ARE PROVIDED "AS IS" WITH NO WARRANTY OR LIABILITY, EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHT, ACCURACY OR COMPLETENESS, OR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.