

Features

- Zero Bias Operation
- Low Video Impedance
- Excellent Temperature Stability
- Screening per MIL-PRF-19500 and MIL-PRF-35834 available
- RoHS* Compliant



Description

The MBD series of back (tunnel) diodes are fabricated on germanium substrates using passivated, planar construction and gold metallization for reliable operation up to +110°C. Unlike the standard tunnel diode IP is minimized for detector operation and offered in five nominal values with varying degrees of sensitivity and video impedance. The back detector is generally operated with zero bias and is known for its excellent temperature stability and fast video rise times

Die Electrical Specifications: $T_A = +25^\circ\text{C}$, Peak / Valley Current = 2.5 A

Part Number	Junction Capacitance (C_J)	Peak Current (I_P)		Sensitivity (γ)	Video Resistance (R_V)	Reverse Voltage (V_R)	Forward Voltage (V_F)
	$V_R = V_V$, 100 MHz			$P_{IN} = -20 \text{ dBm}$, $R_L = 10 \text{ k}\Omega$, 10 GHz		$I_R = 500 \mu\text{A}$	$I_F = 3 \text{ mA}$
	(pF)	(μA)		(mV / mW)	(Ω)	(mV)	(mV)
	Max.	Min.	Max.	Typ.	Typ.	Min.	Max.
MBD1057-C18	0.30	100	200	1000	180	420	135
MBD2057-C18	0.30	200	300	750	130	410	130
MBD3057-C18	0.30	300	400	500	80	400	125
MBD4057-C18	0.30	400	500	275	65	400	120
MBD5057-C18	0.30	500	600	250	60	400	110

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

Package Electrical Specifications: $T_A = +25^\circ\text{C}$, Peak / Valley Current = 2.5 A

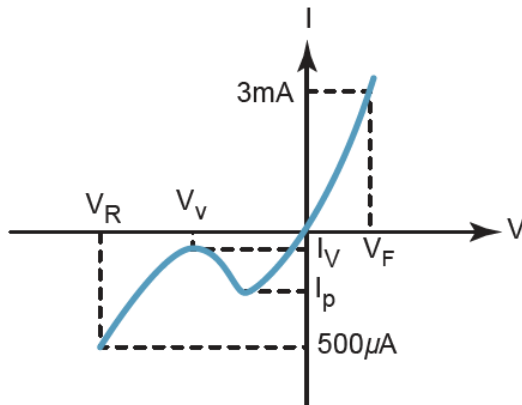
Base Part Number ¹	Package Style	Total Capacitance (C_T)	Peak Current (I_P)		Sensitivity (γ)	Video Resistance (R_V)	Reverse Voltage (V_R)	Forward Voltage (V_F)
		$V_R = V_V$, 100 MHz			$P_{IN} = -20 \text{ dBm}$, $R_L = 10 \text{ k}\Omega$, 10 GHz		$I_R = 500 \mu\text{A}$	$I_F = 3 \text{ mA}$
		(pF)	(μA)		(mV / mW)	(Ω)	(mV)	(mV)
		Max.	Min.	Max.	Typ.	Typ.	Min.	Max.
MBD1057	E28 / 28X	0.40	100	200	1000	180	420	135
	0805-2	0.41						
	H20	0.50						
	T54	0.55						
	T80	0.65						
MBD2057	E28 / 28X	0.40	200	300	750	130	410	130
	0805-2	0.41						
	H20	0.50						
	T54	0.55						
	T80	0.65						
MBD3057	0805-2	0.41	300	400	500	80	400	125
	E28 / 28X	0.45						
	H20	0.55						
	T54	0.60						
	T80	0.70						
MBD4057	0805-2	0.41	400	500	275	65	400	120
	E28 / 28X	0.50						
	H20	0.60						
	T54	0.65						
	T80	0.75						
MBD5057	0805-2	0.41	500	600	250	60	400	110
	E28 / 28X	0.55						
	H20	0.65						
	T54	0.70						
	T80	0.80						

1. To order enter base part number-package style.

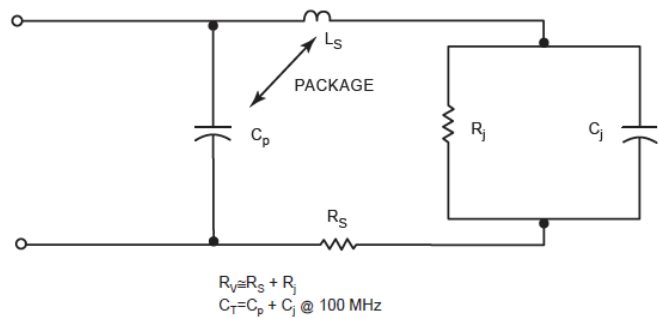
Absolute Maximum Ratings

Parameter	Absolute Maximum
Input Power	14 dBm CW or Pulsed in a tuned detector
Operating Temperature	-65°C to +110°C
Storage Temperature	-65°C to +125°C
Soldering Temperature: Die Packaged	See chip assembly instructions +230°C for 5 seconds (must be hand soldered)

Back Diode Parameters



Diode Equivalent Circuit



Die Assembly

The germanium planar back (tunnel) diode is sensitive to mechanical pressure and high temperatures.

Die attach: Conductive epoxy only with maximum curing temperature of +125°C

Wire Bond: 0.7 mil gold wire and thermo-compression wedge bond within the following:

Stage Temperature: +155°C maximum for 20 seconds max

Tip Temperature: +160°C maximum

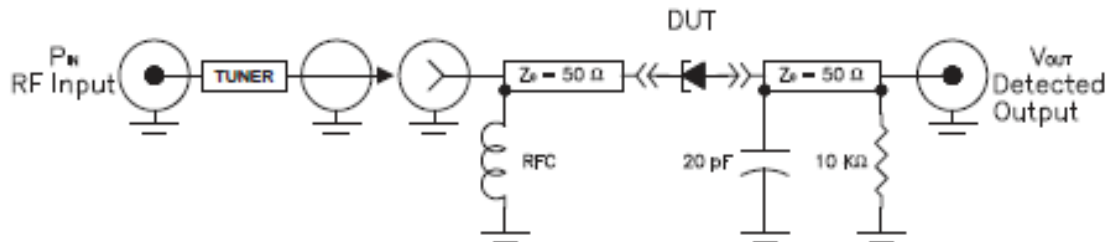
Bonding Pressure: 20 grams maximum

Bonding is performed on the larger diameter offset bonding pad (see figure 1) and not over the junction.



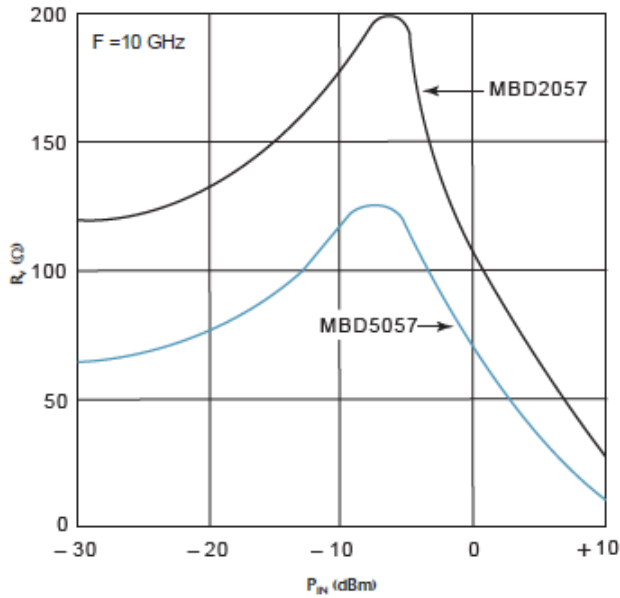
Figure 1

10 GHz RF Detector Test Circuit

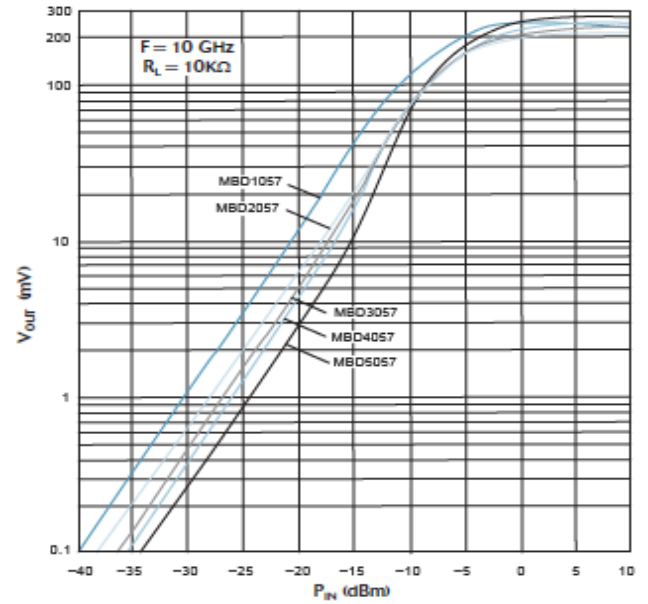


Typical Performance Curves

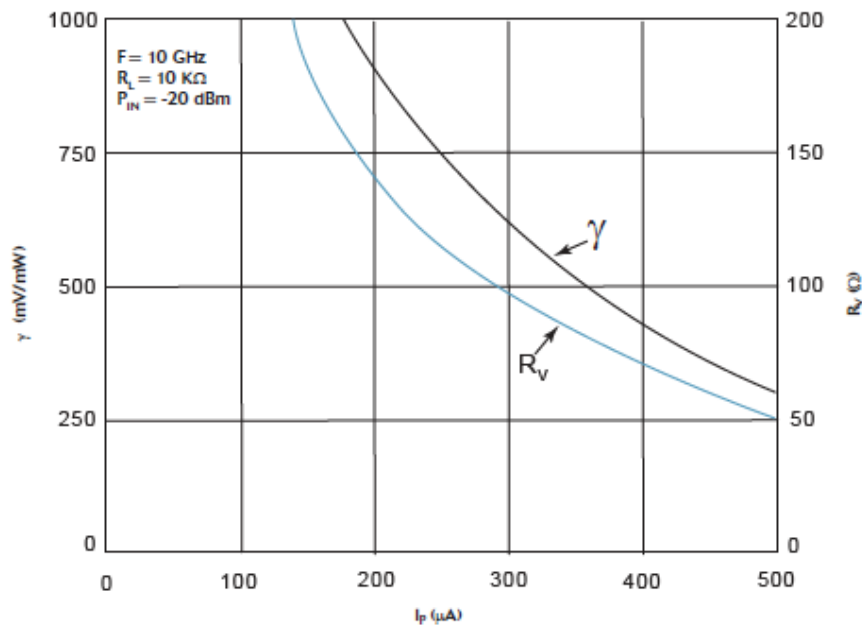
Video Resistance vs. Input Power



Output Power vs. Input Power

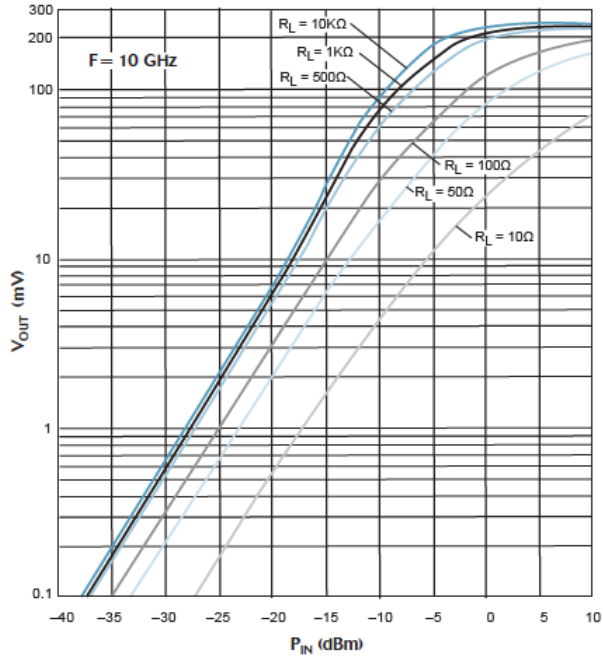


Video Impedance & Sensitivity vs. Peak Current

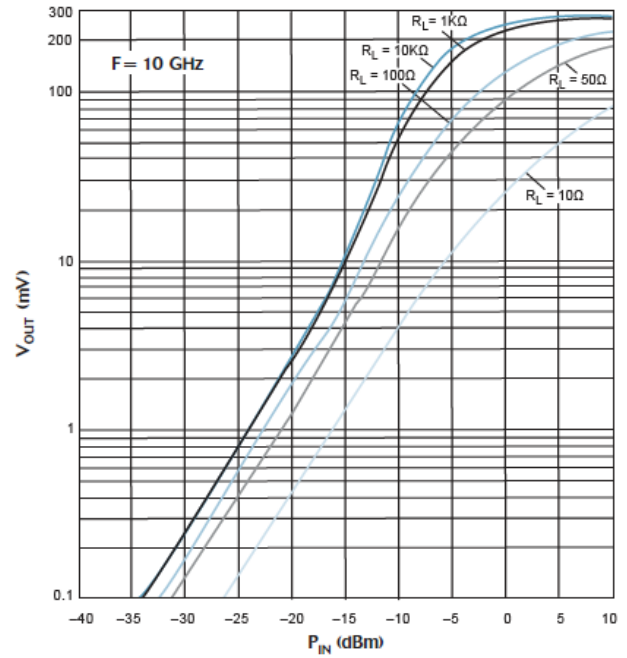


Typical Performance Curves

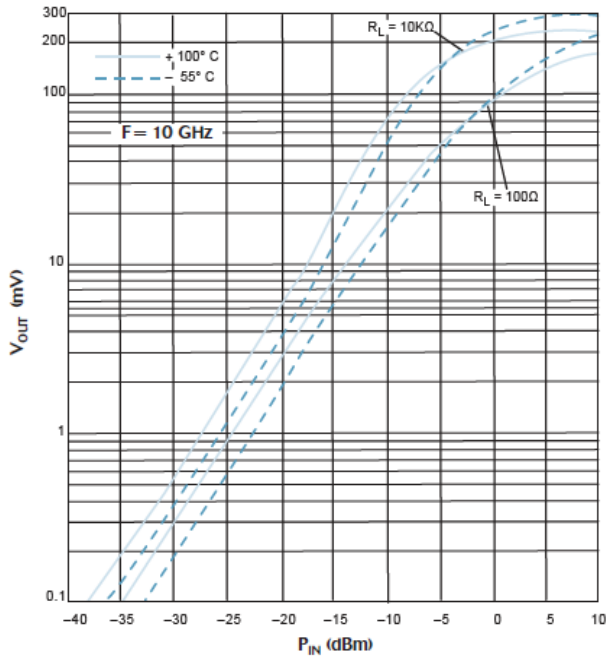
Output Voltage vs. Input Power



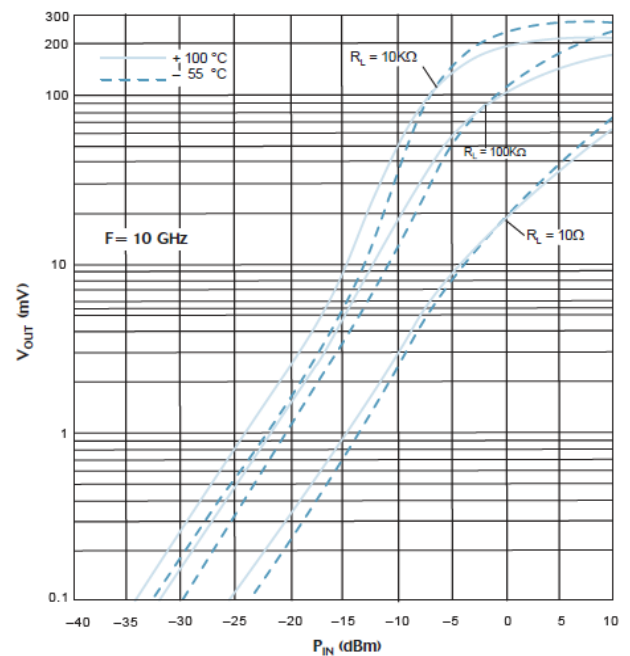
Output Voltage vs. Input Power



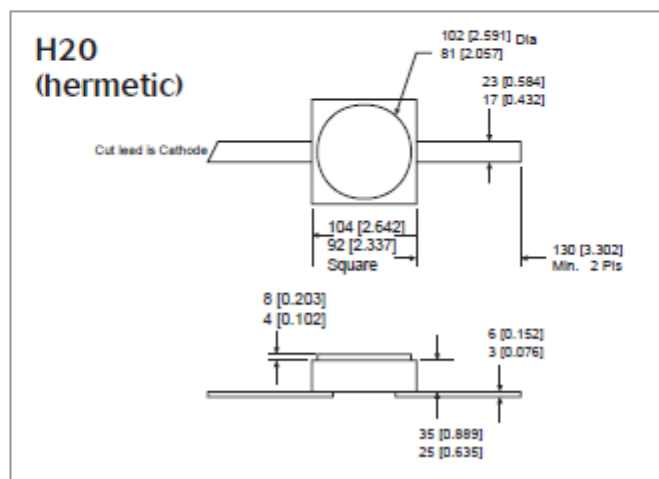
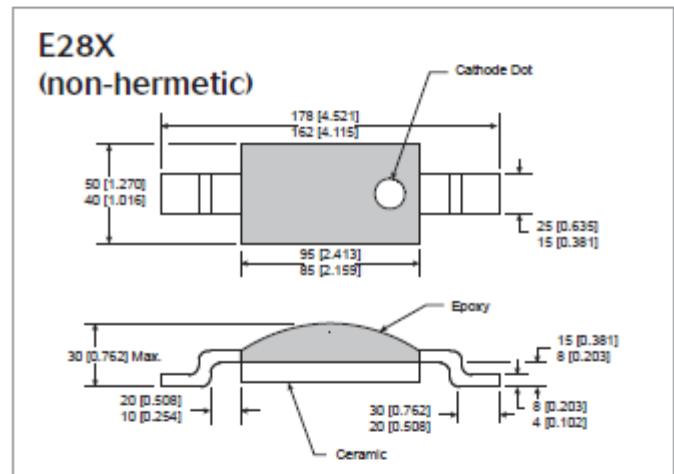
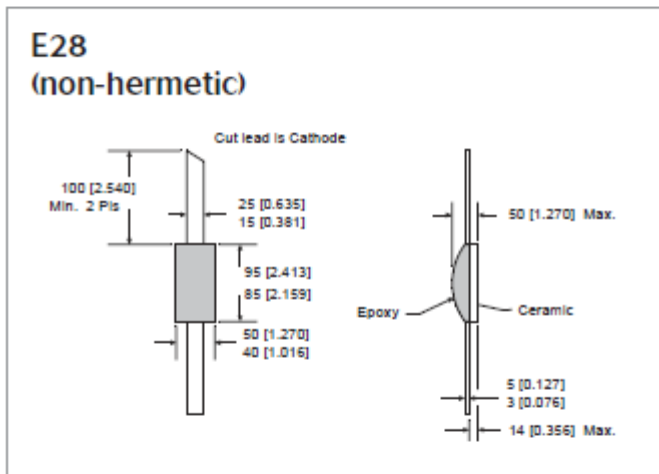
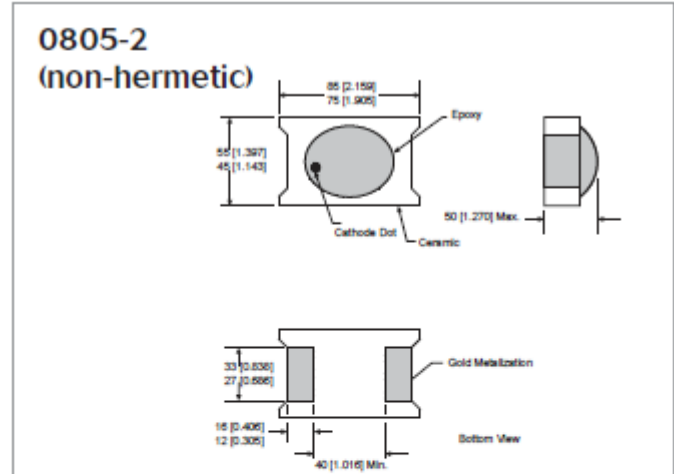
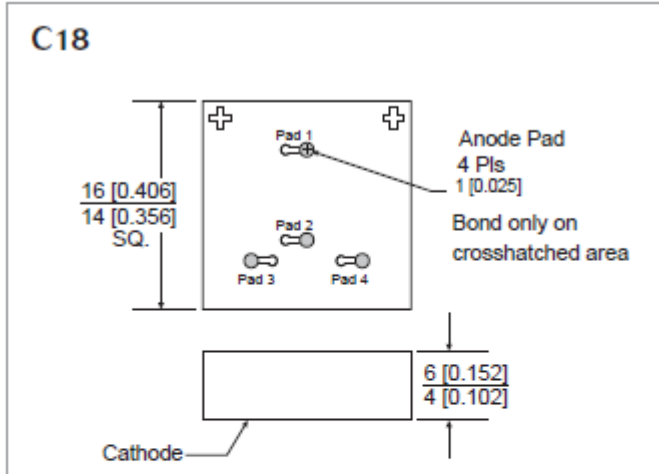
Output Voltage vs. Temperature



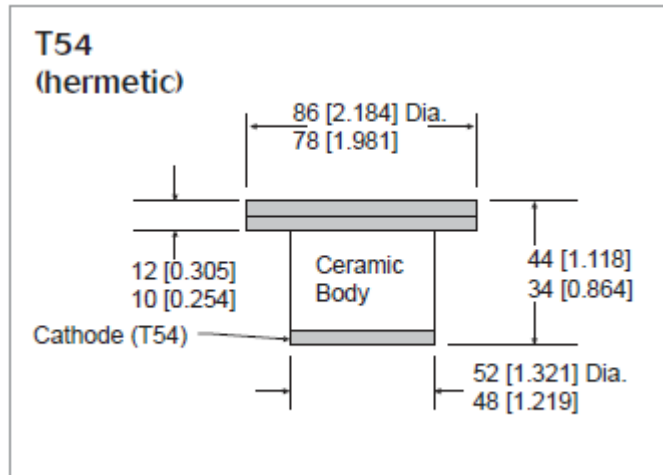
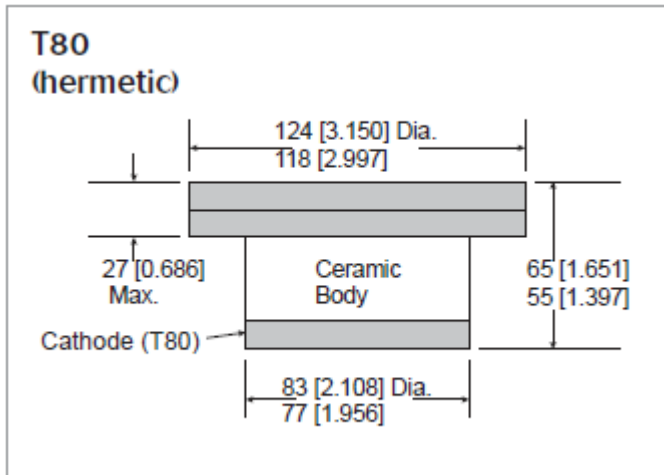
Output Voltage vs. Temperature



Outline Drawings



Outline Drawings (continued)



MACOM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with MACOM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE 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.