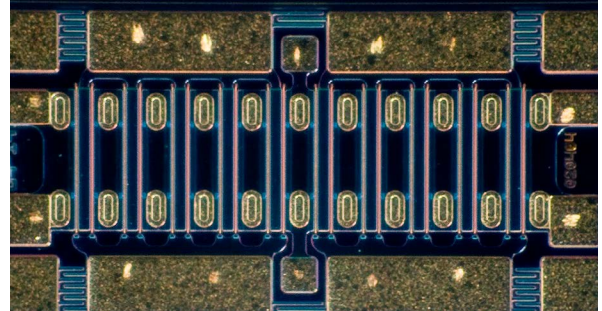


CG2H80030D

30 W, 8.0 GHz, GaN HEMT Die

Description

The CG2H80030D is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT). GaN has superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. GaN HEMTs offer greater power density and wider bandwidths compared to Si and GaAs transistors.



PNs: CG2H80030D

Features

- 17 dB Typical Small Signal Gain at 4 GHz
- 12 dB Typical Small Signal Gain at 8 GHz
- 30 W Typical P_{SAT}
- 28 V Operation
- High Breakdown Voltage
- High Temperature Operation
- Up to 8 GHz Operation
- High Efficiency

Applications

- 2-Way Private Radio
- Broadband Amplifiers
- Cellular infrastructure
- Test Instrumentation
- Class A, AB, Linear amplifiers suitable for OFDM, W-CDMA, EDGE, CDMA waveforms

Packaging Information



- Bare die are shipped in Gel-Pak® containers
- Non-adhesive tacky membrane immobilizes die during shipment



Large Signal Models Available for ADS and MWO



Absolute Maximum Ratings (not simultaneous) at 25°C Case Temperature

Parameter	Symbol	Rating	Units	Conditions
Drain-Source Voltage	V_{DSS}	120	V	25°C
Gate-to-Source Voltage	V_{GS}	-10, +2		
Storage Temperature	T_{STG}	-65, +150	°C	
Operating Junction Temperature	T_J	225		
Maximum Forward Gate Current	I_{GMAX}	7.0	mA	25°C
Maximum Drain Current ¹	I_{DMAX}	3.0	A	
Thermal Resistance, Junction to Case (packaged) ²	$R_{\theta JC}$	4.9	°C/W	85°C, 28.8 W Dissipation
Thermal Resistance, Junction to Case (die only)		2.74		
Mounting Temperature (30 seconds)	T_s	320	°C	30 seconds

Notes:

¹ Current limit for long term, reliable operation² Eutectic die attach using 80/20 AuSn mounted to a 10 mil thick Cu15Mo85 carrier

Electrical Characteristics (Frequency = 4 GHz unless otherwise stated; $T_c = 25^\circ\text{C}$)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	-3.6	-3.0	-2.4	V_{DC}	$V_{DS} = 10\text{ V}, I_D = 7.2\text{ mA}$
Gate Quiescent Voltage	$V_{GS(Q)}$	—	-2.7	—	V_{DC}	$V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}$
Drain-Source Breakdown Voltage	V_{BD}	84	—	—	V_{DC}	$V_{GS} = -8\text{ V}, I_D = 7.2\text{ mA}$
On Resistance	R_{ON}	0.26	0.33	0.41	Ω	$V_{DS} = 0.1\text{ V}$
RF Characteristics						
Small Signal Gain	G_{SS}	—	17	—	dB	$V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}$
Output Power ¹	P_{SAT}	—	30	—	W	
Drain Efficiency ²	η	—	65	—	%	$V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}, P_{SAT} = 30\text{ W}$
Output Mismatch Stress ³	VSWR	—	—	10 : 1	Y	$V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}, P_{OUT} = 30\text{ W (CW)}$
Dynamic Characteristics						
Input Capacitance	C_{GS}	—	7.3	—	pF	$V_{DS} = 28\text{ V}, V_{GS} = -8\text{ V}, f = 1\text{ MHz}$
Output Capacitance	C_{DS}	—	2.2	—		
Feedback Capacitance	C_{GD}	—	0.37	—		

Notes:

¹ P_{SAT} is defined as $I_G = 0.7\text{ mA}$ ² Drain Efficiency = P_{OUT} / P_{DC} ³ No damage at all phase angles

Electrostatic Discharge (ESD) Classifications

Parameter	Symbol	Class	Classification Level	Test Methodology
Human Body Model	HBM	TBD	ANSI/ESDA/JEDEC JS-001 Table 3	JEDEC JESD22 A114-D

Typical Performance

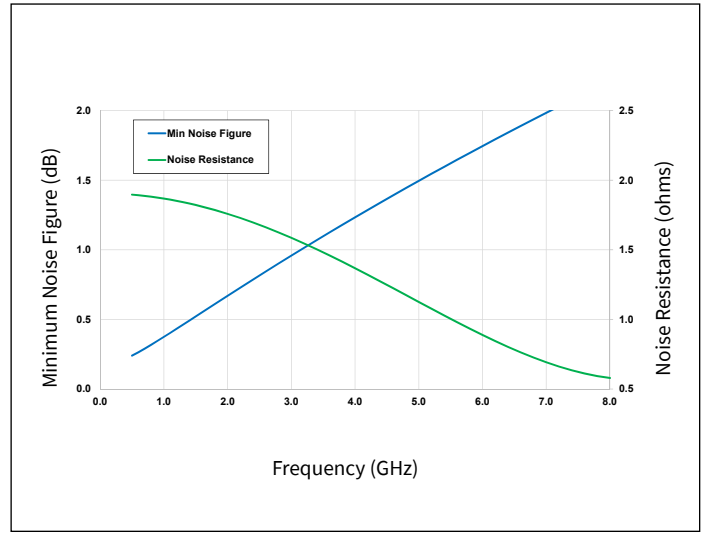
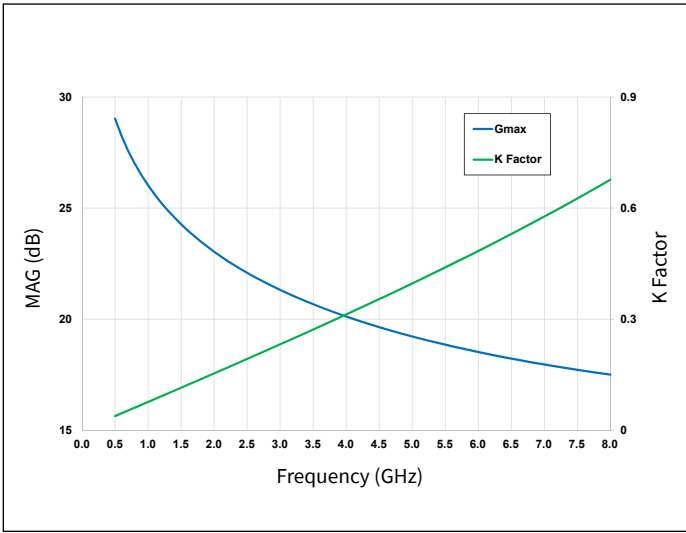
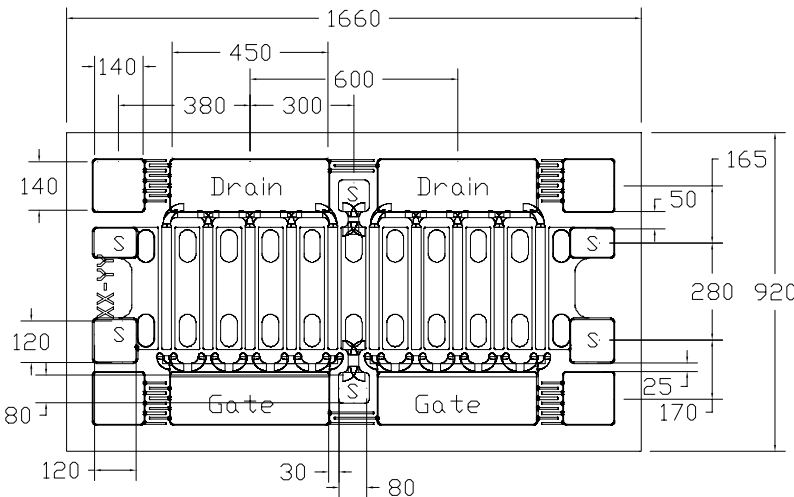


Figure 1. Simulated Maximum Available Gain and K-Factor
 $V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}$

Figure 2. Simulated Minimum Noise Figure and Noise Resistance vs. Frequency
 $V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}$

Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Die Dimensions (units in microns)



Assembly Notes:

- Recommended solder is AuSn (80/20) solder. Refer to the website for the Eutectic Die Bond Procedure application note.
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge bonding are the preferred connection methods.
- Gold wire must be used for connections.
- Use the die label (XX-YY) for correct orientation.

Typical Package S-Parameters for CG2H80030D
 (Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 100\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
0.5	0.896	-144.83	14.54	99.06	0.028	9.74	0.489	-142.29
0.6	0.893	-150.27	12.23	95.00	0.029	5.81	0.494	-146.11
0.7	0.892	-154.23	10.53	91.65	0.029	2.60	0.500	-148.62
0.8	0.892	-157.23	9.23	88.78	0.029	-0.14	0.506	-150.31
0.9	0.892	-159.57	8.20	86.22	0.029	-2.56	0.512	-151.46
1.0	0.892	-161.45	7.36	83.90	0.029	-4.75	0.519	-152.26
1.1	0.893	-162.99	6.67	81.75	0.029	-6.76	0.526	-152.81
1.2	0.894	-164.27	6.09	79.74	0.029	-8.63	0.533	-153.19
1.3	0.895	-165.35	5.60	77.84	0.028	-10.40	0.541	-153.46
1.4	0.896	-166.28	5.17	76.03	0.028	-12.07	0.549	-153.65
1.5	0.897	-167.08	4.80	74.29	0.028	-13.67	0.558	-153.79
1.6	0.898	-167.79	4.47	72.62	0.028	-15.21	0.566	-153.90
1.8	0.901	-168.98	3.92	69.45	0.027	-18.11	0.584	-154.09
2.0	0.903	-169.94	3.47	66.47	0.027	-20.82	0.602	-154.26
2.2	0.906	-170.74	3.10	63.64	0.027	-23.37	0.619	-154.48
2.4	0.909	-171.43	2.79	60.96	0.026	-25.78	0.637	-154.73
2.6	0.912	-172.03	2.53	58.40	0.025	-28.07	0.654	-155.04
2.8	0.915	-172.57	2.31	55.96	0.025	-30.23	0.671	-155.40
3.0	0.918	-173.06	2.11	53.63	0.024	-32.29	0.687	-155.80
3.2	0.921	-173.51	1.94	51.40	0.024	-34.25	0.702	-156.24
3.4	0.924	-173.94	1.79	49.26	0.023	-36.12	0.717	-156.70
3.6	0.927	-174.33	1.65	47.22	0.023	-37.89	0.731	-157.19
3.8	0.929	-174.71	1.53	45.25	0.022	-39.58	0.744	-157.70
4.0	0.932	-175.07	1.43	43.37	0.022	-41.19	0.757	-158.21
4.2	0.934	-175.42	1.33	41.57	0.021	-42.72	0.769	-158.74
4.4	0.937	-175.75	1.24	39.83	0.021	-44.18	0.780	-159.27
4.6	0.939	-176.08	1.16	38.17	0.020	-45.57	0.790	-159.80
4.8	0.941	-176.39	1.09	36.57	0.020	-46.90	0.800	-160.33
5.0	0.943	-176.70	1.03	35.02	0.019	-48.16	0.809	-160.85
5.2	0.945	-177.00	0.97	33.54	0.019	-49.37	0.818	-161.37
5.4	0.947	-177.29	0.91	32.11	0.018	-50.53	0.826	-161.89
5.6	0.948	-177.58	0.86	30.73	0.018	-51.63	0.834	-162.39
5.8	0.950	-177.86	0.82	29.40	0.018	-52.69	0.841	-162.89
6.0	0.951	-178.13	0.77	28.11	0.017	-53.70	0.848	-163.37
6.2	0.953	-178.41	0.74	26.87	0.017	-54.66	0.855	-163.85
6.4	0.954	-178.67	0.70	25.66	0.016	-55.59	0.861	-164.32
6.6	0.955	-178.93	0.67	24.50	0.016	-56.47	0.866	-164.77
6.8	0.957	-179.19	0.63	23.37	0.016	-57.32	0.872	-165.22
7.0	0.958	-179.45	0.61	22.27	0.015	-58.14	0.877	-165.66
7.2	0.959	-179.70	0.58	21.21	0.015	-58.92	0.881	-166.09
7.4	0.960	-179.95	0.55	20.18	0.015	-59.67	0.886	-166.5
7.6	0.961	-179.81	0.53	19.18	0.014	-60.39	0.890	-166.91
7.8	0.9615	-179.57	0.51	18.20	0.014	-61.08	0.894	-167.31
8.0	0.9623	-179.33	0.49	17.25	0.014	-61.74	0.898	-167.70

To download the s-parameters in s2p format, go to the CG2H80030D product page.

Typical Package S-Parameters for CG2H80030D
 (Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 200\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
0.5	0.916	-151.73	16.08	97.77	0.020	8.51	0.571	-158.18
0.6	0.915	-156.27	13.49	94.46	0.020	5.35	0.577	-160.60
0.7	0.914	-159.56	11.60	91.75	0.020	2.79	0.581	-162.18
0.8	0.914	-162.05	10.17	89.43	0.020	0.62	0.585	-163.25
0.9	0.914	-164.00	9.03	87.38	0.020	-1.29	0.589	-163.96
1.0	0.914	-165.56	8.12	85.51	0.020	-3.01	0.593	-164.45
1.1	0.914	-166.84	7.37	83.79	0.020	-4.58	0.597	-164.76
1.2	0.915	-167.92	6.74	82.17	0.020	-6.05	0.600	-164.95
1.3	0.915	-168.83	6.21	80.64	0.020	-7.44	0.604	-165.06
1.4	0.915	-169.61	5.75	79.17	0.020	-8.75	0.608	-165.10
1.5	0.916	-170.29	5.35	77.77	0.020	-10.01	0.613	-165.10
1.6	0.916	-170.89	5.00	76.41	0.020	-11.22	0.617	-165.06
1.8	0.918	-171.89	4.40	73.81	0.020	-13.52	0.626	-164.93
2.0	0.919	-172.71	3.93	71.34	0.020	-15.69	0.636	-164.76
2.2	0.920	-173.39	3.54	68.98	0.019	-17.76	0.645	-164.58
2.4	0.922	-173.96	3.21	66.71	0.019	-19.73	0.656	-164.42
2.6	0.923	-174.47	2.93	64.52	0.019	-21.62	0.666	-164.29
2.8	0.925	-174.92	2.68	62.41	0.019	-23.43	0.676	-164.19
3.0	0.927	-175.32	2.47	60.36	0.018	-25.18	0.687	-164.13
3.2	0.928	-175.69	2.29	58.38	0.018	-26.86	0.697	-164.11
3.4	0.930	-176.03	2.13	56.46	0.018	-28.48	0.707	-164.13
3.6	0.932	-176.35	1.98	54.60	0.017	-30.04	0.717	-164.18
3.8	0.933	-176.65	1.85	52.79	0.017	-31.54	0.727	-164.27
4.0	0.935	-176.94	1.73	51.04	0.017	-32.99	0.737	-164.38
4.2	0.937	-177.22	1.62	49.34	0.017	-34.38	0.746	-164.53
4.4	0.938	-177.48	1.53	47.69	0.016	-35.73	0.755	-164.69
4.6	0.940	-177.74	1.44	46.09	0.016	-37.02	0.764	-164.88
4.8	0.941	-177.99	1.36	44.54	0.016	-38.27	0.772	-165.09
5.0	0.943	-178.24	1.29	43.03	0.015	-39.47	0.780	-165.31
5.2	0.944	-178.48	1.22	41.56	0.015	-40.63	0.788	-165.54
5.4	0.945	-178.72	1.15	40.14	0.015	-41.75	0.796	-165.79
5.6	0.947	-178.95	1.10	38.76	0.015	-42.82	0.803	-166.05
5.8	0.948	-179.18	1.04	37.41	0.014	-43.85	0.810	-166.31
6.0	0.949	-179.41	0.99	36.10	0.014	-44.85	0.816	-166.58
6.2	0.950	-179.63	0.95	34.83	0.014	-45.81	0.823	-166.86
6.4	0.951	-179.85	0.90	33.59	0.013	-46.73	0.829	-167.14
6.6	0.953	-179.93	0.86	32.38	0.013	-47.62	0.834	-167.42
6.8	0.954	-179.71	0.83	31.21	0.013	-48.47	0.840	-167.70
7.0	0.955	-179.49	0.79	30.06	0.013	-49.30	0.845	-167.99
7.2	0.955	-179.27	0.76	28.94	0.012	-50.09	0.850	-168.28
7.4	0.956	-179.06	0.73	27.86	0.012	-50.85	0.855	-168.56
7.6	0.957	-178.85	0.70	26.79	0.012	-51.59	0.860	-168.85
7.8	0.958	-178.64	0.672	25.7570	0.012	-52.30	0.864	-169.13
8.0	0.959	-178.42	0.646	24.7440	0.011	-52.98	0.868	-169.42

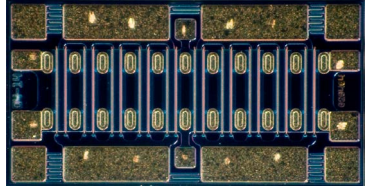
To download the s-parameters in s2p format, go to the CG2H80030D product page.

Typical Package S-Parameters for CG2H80030D
 (Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
0.5	0.927	-154.58	16.26	96.98	0.017	7.77	0.599	-162.76
0.6	0.926	-158.72	13.63	93.94	0.017	4.89	0.604	-164.66
0.7	0.926	-161.72	11.71	91.46	0.017	2.57	0.608	-165.90
0.8	0.925	-163.98	10.26	89.33	0.017	0.60	0.611	-166.73
0.9	0.925	-165.76	9.12	87.45	0.017	-1.12	0.614	-167.28
1.0	0.925	-167.19	8.20	85.73	0.017	-2.68	0.617	-167.64
1.1	0.926	-168.36	7.45	84.15	0.017	-4.11	0.620	-167.87
1.2	0.926	-169.35	6.81	82.66	0.017	-5.44	0.623	-168.00
1.3	0.926	-170.18	6.28	81.24	0.017	-6.69	0.626	-168.05
1.4	0.926	-170.90	5.81	79.89	0.017	-7.89	0.630	-168.06
1.5	0.927	-171.53	5.41	78.59	0.017	-9.03	0.633	-168.02
1.6	0.927	-172.08	5.06	77.33	0.017	-10.13	0.636	-167.96
1.8	0.928	-173.02	4.46	74.92	0.017	-12.22	0.644	-167.79
2.0	0.929	-173.78	3.99	72.62	0.016	-14.20	0.651	-167.57
2.2	0.930	-174.41	3.59	70.41	0.016	-16.09	0.659	-167.35
2.4	0.931	-174.95	3.27	68.28	0.016	-17.90	0.667	-167.14
2.6	0.932	-175.43	2.99	66.22	0.016	-19.64	0.676	-166.94
2.8	0.933	-175.85	2.74	64.22	0.016	-21.31	0.684	-166.78
3.0	0.934	-176.23	2.53	62.28	0.016	-22.93	0.693	-166.64
3.2	0.936	-176.58	2.35	60.40	0.015	-24.49	0.702	-166.54
3.4	0.937	-176.90	2.18	58.56	0.015	-26.00	0.710	-166.48
3.6	0.938	-177.20	2.04	56.78	0.015	-27.45	0.719	-166.44
3.8	0.939	-177.48	1.91	55.05	0.015	-28.86	0.727	-166.44
4.0	0.941	-177.75	1.79	53.36	0.014	-30.22	0.736	-166.46
4.2	0.942	-178.01	1.68	51.71	0.014	-31.54	0.744	-166.51
4.4	0.943	-178.26	1.59	50.11	0.014	-32.81	0.752	-166.59
4.6	0.944	-178.50	1.50	48.55	0.014	-34.04	0.760	-166.69
4.8	0.946	-178.74	1.42	47.03	0.014	-35.22	0.768	-166.81
5.0	0.947	-178.97	1.34	45.55	0.013	-36.37	0.775	-166.95
5.2	0.948	-179.19	1.27	44.11	0.013	-37.47	0.782	-167.10
5.4	0.949	-179.41	1.21	42.71	0.013	-38.54	0.789	-167.27
5.6	0.950	-179.63	1.15	41.34	0.013	-39.57	0.796	-167.46
5.8	0.951	-179.85	1.10	40.01	0.012	-40.56	0.802	-167.65
6.0	0.952	-179.94	1.04	38.71	0.012	-41.52	0.809	-167.85
6.2	0.953	-179.73	1.00	37.44	0.012	-42.44	0.815	-168.06
6.4	0.954	-179.52	0.95	36.20	0.012	-43.33	0.821	-168.28
6.6	0.955	-179.31	0.91	35.00	0.012	-44.18	0.826	-168.51
6.8	0.956	-179.11	0.87	33.82	0.011	-45.01	0.832	-168.73
7.0	0.957	-178.9	0.84	32.67	0.011	-45.80	0.837	-168.97
7.2	0.957	-178.70	0.80	31.55	0.011	-46.57	0.842	-169.2
7.4	0.958	-178.5	0.77	30.45	0.011	-47.30	0.846	-169.44
7.6	0.959	-178.29	0.74	29.38	0.010	-48.01	0.851	-169.69
7.8	0.960	-178.09	0.72	28.3310	0.010	-48.69	0.855	-169.93
8.0	0.960	-177.89	0.69	27.3060	0.010	-49.35	0.859	-170.17

To download the s-parameters in s2p format, go to the CG2H80030D product page.

Product Ordering Information

Order Number	Description	Unit of Measure	Image
CG2H80030D	GaN HEMT Bare Die	Each	

Notes & Disclaimer

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.