Field-Proven GaN Solutions from Qorvo®

all around you

Gallium Nitride Innovation

With high-performance GaN technology Qorvo® continues to build on a strong GaAs legacy by offering new products and strategic foundry services that strive to meet our partner's demanding requirements. With Qorvo, our partners also benefit from a 'trusted' supplier with industry-leading GaN reliability. Qorvo is also the only GaN supplier to reach manufacturing readiness level MRL10.

The GaN Advantage

Qorvo GaN powers improvements in SWaP-C analyses. With superior power, efficiency and gain, system designers now have the flexibility to make design trades that were previously not possible. Higher power densities lead to higher power capability in a smaller area. Reduced combining leads to improved efficiencies. Higher voltage operation results in lower system losses. Improved power handling supports high power switches and highly robust LNAs. Qorvo's leading GaN reliability at higher junction temperatures gives the user the confidence in long-term operation. Whether the motivation is to increase power, reduce board area or improve efficiency, Qorvo GaN makes this possible while reducing overall system costs.

Key Qorvo GaN attributes:

- >65 million device hours on 16,900 devices in the field, with less than 0.013% failures per million hours
- Proven reliability at high junction temperatures, mean time to failure (MTTF) of greater than 10^7 (10 million) to 10^9 (1 billion) hours at 200 degrees (C) and greater than 10^6 (1 million) to 10^8 (100 million) hours at 225 degrees (C)
- Production technologies supporting DC through Ka-band
- Excellent noise figure – comparable to pHEMT
- Highly robust to ESD and RF input signals
- SiC substrates for superior thermal management
- High power density (Improved SWaP)
- High power-added efficiency (Improved SWaP)

GaN Foundry Processes

As a DoD-accredited 'Microelectronics Trusted Source', Qorvo offers a variety of GaN technologies for optimized solutions. Accreditation encompasses foundry, post-processing, packaging/assembly and test services. Support provided by our foundry services division complements Qorvo's high-frequency standard product portfolio.

QGaN25:

- Technology: 0.25µm GaN on SiC
- Drain bias (Vd): up to 40V
- Operating frequencies: DC-18 GHz
- PAE: >60% at 10 GHz
- Power density: 6W/mm at 10 GHz
- Reliability: >10M hours at 200C and 40V (3-temp DC MTTF w/failure defined as 10% degradation in Idmax)

QGaN15:

- Technology: 0.15µm GaN on SiC
- Drain bias (Vd): up to 28V
- Operating frequencies: DC-40 GHz
- PAE: >50% at 30 GHz
- Power density: 4.2W/mm at 30 GHz
- Reliability: >10M hours at 200C and 28V (DC MTTF w/failure defined as 10% degradation in Idmax)

QGaN25HV:

- Technology: 0.25µm GaN on SiC
- Drain bias (Vd): up to 48V
- Operating frequencies: DC-12 GHz
- PAE: >78% at 3.5 GHz
- Power density: 6.5W/mm at 3.5 GHz
- Reliability: >10M hours at 200C and 48V (3-temp DC MTTF w/failure defined as 10% degradation in Idmax)

QGaN50:

- Technology: 0.50µm GaN on SiC
- Drain bias (Vd): up to 65V
- Operating frequencies: DC-8 GHz
- PAE: >78% at 3.5 GHz
- Power density: 9W/mm at 3.5 GHz
- Reliability: >10M hours at 200C and 65V (DC MTTF w/failure defined as 10% degradation in Idmax)

GaN Packaging Solutions

Qorvo packaging solutions focus on maximizing performance while managing thermal behavior and cost. Our high performance GaN products can be found in a variety of Cu- based packages for superior heat transfer. Depending on the functionality and operating conditions, Qorvo offers bolt down packages down to small surface mount packages in either air cavity or overmold formats.

GaN Standard Product Portfolio

Qorvo's leadership in high-performance gallium arsenide (GaAs) has been extended to gallium nitride (GaN). With GaN proving to be an evolutionary technology in support of next generation military and commercial applications, Qorvo is leading the way with world-class products across frequency and functionality. With a growing portfolio of GaN-based amplifiers and switches, along with high-performance transistors, Qorvo is the premiere solution provider for your GaN needs.

Qorvo conducts extensive testing and analysis of both processes and products to provide exceptional performance, reliability and high volume manufacturing capability. When measuring and predicting thermal behaviors, Qorvo simulates FET channel temperature using finite element analysis, then verifies those models against micro-Raman measurements of the FET to provide accurate, lifetime reliability data.

GaN on SiC Power Transistors

Description	Frequency (GHz)	Linear Gain (dB)	Psat (dBm)	PAE (%)	Voltage (V)	Current (mA)	Package (mm)	ECCN	Part Number
30W, 28V, 9.2-9.7 GHz	9.2-9.7	9.1	34.3	48.6	25	240	7x7 LGA	3A001.b.3.b	QPD9300
5W, 32V, DC-12 GHz	DC-12	13@10 GHz	37	50	32	25	3x3 PQFN	EAR99	TGF2977-SM
5W, 32V, DC-4 GHz	DC-4	19	37	68	32	25	3x3 QFN	EAR99	TQP0102
5W, 32V, 0.03-3 GHz	0.03-3	17	37	50	32	30	3x3 PQFN	EAR99	TGF2965-SM
7W Discrete Power	DC-14	14	37.6	54	32	25	Die	EAR99	TGF2952
6W Discrete Power	DC-18	18	38	71.6	28	25-125	Die	EAR99	TGF2023-2-01
8W, 50V, DC-4 GHz	DC-4	25	39	70	50	18	3x3 PQFN	EAR99	QPD1010
7W, 50V, 0.03-1.2 GHz	0.03-1.2	21	39.4	60	50	20	6x5 DFN/SMT	EAR99	QPD1011
7W, 28V, DC-6 GHz	DC-6	15.5	39.5	50	28	50	NI-200	EAR99	T2G6000528-Q3
10W, 32V, 0.03-3 GHz	0.03-3	17	39.7	51	32	50	3x3 PQFN	EAR99	TGF3015-SM
12W Discrete Power	DC-18	21	40.1	73.3	28	50-250	Die	EAR99	TGF2023-2-02
10W, 32V, DC-12 GHz	DC-12	24	40.4	68.8	32	50	3x3 QFN	EAR99	QPD1022
15W, 50V, 0.03-1.2 GHz	0.03-1.2	18.4	41	69.5	50	25	5x6 DFN	EAR99	QPD1014
12W Discrete Power	DC-12	14	41.2	54	32	50	Die	EAR99	TGF2953
15W, 28V, 0.03-1.215 GHz	0.03-1.215	20	42	70	28	26	5x6 PQFN	EAR99	QPD1000
16W, 50V, DC-4 GHz	DC-4	24	42	72	50	26	x3 PQFN	EAR99	QPD1009
15W, 28V, DC-6 GHz	DC-6	15.5	42.3	70	28	100	NI-200	EAR99	T2G6001528-SG
18W, 28V, DC-6 GHz	DC-6	15	42.5	>50	28	50	NI-200	EAR99	T2G6001528-Q3
25W Discrete Power	DC-18	18	43	78.3	28	100-500	Die	3A001b.3.b	TGF2023-2-05
20W, 32V, DC-12 GHz	DC-12	11@10 GHz	43	50	32	100	3x4 PQFN	3A001b.3.b	TGF2978-SM
15W, 32V, DC-4 GHz	DC-4	19	43.5	64	32	70	3x4 QFN	EAR99	TQP0103
5W, 32V, 0.03-4 GHz	0.03-4	17	44	55	32	65	3x4 PQFN	EAR99	TGF3021-SM
5W, 32V, 4-6 GHz	0.03-4	12	44	50	32	25	3x3 PQFN	EAR99	TGF3020-SM
25W, 32V, DC-12 GHz	DC-12	11@10 GHz	44	50	32	150	3x4 PQFN	3A001b.3.b	TGF2979-SM
27W Discrete Power	DC-12	14	44.3	54	32	100	Die	3A001b.3.b	TGF2954
30W, 32V, DC-3.5 GHz	DC-3.5	16.5	44.5	49	32	150	NI-200	EAR99	T2G4003532-FL/-FS
30W, 32V, DC-4 GHz	DC-4	17	44.6	64	32	60	3x4 QFN	EAR99	TQP0104
30W, 28V, DC-6 GHz	DC-6	14	45	50	28	200	NI-200	EAR99	T2G6003028-FL/-FS
30W, 50V, 2.7-3.5 GHz	2.7-3.5	18.4	45	64	50	52.5	6x5 DFN	EAR99	QPD1020
35W, 48V, DC-6 GHz	DC-6	18.8	45.4	77.8	48	30	4x3 QFN	EAR99	QPD0020
25W, 50V, 0.03-1.2 GHz	0.03-1.2	20.8	46	73.2	50	50	6x5 DFN	EAR99	QPD1004
40W Discrete Power	DC-12	14	46.3	54	32	150	Die	3A001b.3.b	TGF2955
45W, 32V, DC-3.5 GHz	DC-3.5	19	46.4	52	32	220	NI-360	EAR99	T1G4004532-FL/-FS
45W, 48V, DC-4 GHz	DC-4	22.3	46.9	71.5	48	85	4x3 QFN	EAR99	QPD0030
55W, 28V, DC-3.5 GHz	DC-3.5	15	47.2	50	28	200	NI-360	EAR99	T2G4005528-FS
50W Discrete Power	DC-18	19.8	47.3	69.5	28	200-1,000	Die	3A001b.3.b	TGF2023-2-10
55W Discrete Power	DC-12	14	47.7	54	32	200	Die	3A001b.3.b	TGF2956
70W Discrete Power	DC-12	14	48.5	52	32	250	Die	3A001b.3.b	TGF2957
65W, 50V, DC-4 GHz	DC-4	21.5	48.5	74.1	50	65	NI-360	EAR99	QPD1015/L
75W, 48V, DC-3.6 GHz	DC-3.6	22.5	48.7	80	48	130	7.2x6.6 DFN	EAR99	QPD0050
90W, 48V, DC-3.6 GHz	DC-3.6	25	49.5	73	48	150	7.2x6.6 DFN	EAR99	QPD0060
100W, 28V, DC-3.5 GHz	DC-3.5	15	50	55	28	260	NI-360 HM	EAR99	TGF2929-HM
100W, 28V, DC-3.5 GHz	DC-3.5	15	50	55	28	260	NI-360	EAR99	TGF2929-FL/-FS
90W Discrete Power	DC-18	19.2	50.5	70.5	28	400-2,000	Die	3A001b.3.b	TGF2023-2-20
100W, 32V, DC-3.5 GHz	DC-3.5	15	51	50	32	250	NI-360	3A001b.3.b	TGF2819-FL/-FS
120W, 50V, DC-3.2 GHz	DC-3.2	18.6	52.1	72.6	50	260	NI-360	EAR99	QPD1008/L
150W, 65V, DC-2.7 GHz	DC-2.7	21.8	52.5	64.8	65	240	7.2x6.6 DFN	EAR99	QPD1013
2x120W, 36V, DC-3.5 GHz	DC-3.5	16	54	52	36	520	NI-650	3A001b.3.b	T1G4020036-FL/-FS
285W, 36V, DC-2 GHz	DC-2	19	54.2	54	36	576	NI-780	EAR99	T1G2028536-FL/-FS
400 W, 50V, 2.7-2.9 GHz	2.7-2.9	21.2	56.3	75.1	50	700	NI-780	EAR99	QPD1881L
500W, 50V 3.1-3.5 GHz	3.1-3.5	16.5	56.6	60	50	750	17.4x24 Cu Bolt Down	3A001b.3.a	QPD1017
500W, 50V,1.2-1.4 GHz	1.2-1.4	19.9	57.3	66.7	50	750	17.4x24 Cu Bolt Down	EAR99	QPD1003
500W, 50V, 2.7-3.1 GHz	2.7-3.1	17.7	57.6	67.9	50	750	RF-565	3A001b.3a	QPD1018
500W, 50V, 2.9-3.3 GHz	2.9-3.3	15.5	57.7	67	50	750	RF-565	3A001b.3a	QPD1019
500W, 50V, 1.2-1.4 GHz	DC-1	23.9	58.3	77.4	50	1,000	NI-780	EAR99	QPD1016
1800W, 65V, 0.96-1.215 GHz	0.96-1.215	22.5	62.7	77.2	65	1,500	NI-1230	EAR99	QPD1025/L

Products sorted by Psat. Samples/evaluation fixtures are available; call for details.

GaN Switches

Description	Frequency (GHz)	IL (dB)	ISO (dB)	P.1dB (dBm)	Voltage (V)	Package (mm)	ECCN	Part Number
40W SPDT	0.5-6	<1.1	>25	46	0/-40	4x4 QFN	EAR99	TGS2354-SM
100W SPDT	0.5-6	<1.1	>40	50	0/-40	5x5 QFN	EAR99	TGS2355-SM
20W SPDT	0.5-12	<1	>30	43	0/-40	4x4 QFN	EAR99	TGS2352-2-SM
10W SPDT	0.5-18	<1.5	>25	40	0/-40	4x4 QFN	EAR99	TGS2353-2-SM

Products sorted by frequency. Samples/evaluation fixtures are available; call for details.

GaN Power Amplifiers

Description	Frequency (GHz)	Psat (dBm)	LS Gain (dB)	PAE (%)	Bias (V/mA)	Package (mm)	ECCN	Part Number
10W Wideband PA	0.03-2.5	40	>13	55	32/360	4x4 PQFN	EAR99	QPA2237
10W Wideband PA	0.03-2.5	40	>13	55	32/360	5x5 QFN	EAR99	TGA2237-SM
10W Wideband PA	0.1-3	41	>13	>40	40/360	4x4 QFN	EAR99	TGA2976-SM
10W Wideband PA	0.1-3	41	>13	>40	40/360	5x5 QFN	EAR99	TGA2216-SM
10W Wideband PA	1-8	40	15	30	28/650	5x6 QFN	3A001.b.2.b	QPA1003P
2W Wideband Driver	2-6	32.5	14.5	>30	25/40	4x4 QFN	EAR99	TGA2597-SM
30W Wideband PA	2-6	45	22	>30	28/400	15x15 Cu Bolt Down	3A001.b.2.a	TGA2578-CP
4W Wideband PA	2-18	36	14	>15	22/600	15x15 Cu Bolt Down	3A001.b.2.c	TGA2214-CP
10W Wideband PA	2-18	40	5	25	30/500	Die	3A611	TGA2573-2
2W Wideband PA	2-20	34	16	23	18/330	4.5x4.5 QFN	EAR99	QPA2213
45W Wideband PA	2.5-6	46.5	20	>36	30/1550	Flange	3A001.b.2.a	TGA2576-2-FL
12W S-Band PA	2.7-3.5	41	25	52	28/175	5x5 PQFN	EAR99	TGA2975-SM
18W S-Band PA	2.7-3.5	42.5	25	54	28/225	5x5 PQFN	EAR99	TGA2830-SM
10W S-Band PA	2.7-3.7	40.5	25	>50	25/175	5x5 QFN	EAR99	TGA2583-SM
18W S-Band PA	2.7-3.7	42.5	24.5	>50	28/225	5x5 QFN	EAR99	TGA2585-SM
40W S-Band PA	2.7-3.7	46	24	48	28/450	6x6 PQFN	EAR99	QPA1014
50W S-Band PA	2.8-3.2	47	22	58	25/200	7x7 PQFN	EAR99	QPA1000
60W/50V S-Band PA	2.8-3.5	48	22	55	50/300	6x6 PQFN	3A001.b.2.a	QPA1027
60W S-Band PA	2.9-3.5	>48	>24	>54	28/200	7x7 PQFN	EAR99	TGA2817-SM
100W S-Band PA	2.9-3.5	50	25	57	30/300	15x15 Cu Bolt Down	3A001.b.2.a	QPA3055P
100W S-Band PA	3-3.6	50	23	>50	30/300	15x15 Cu Bolt Down	3A001.b.2.a	TGA2813-CP
80W S-Band PA	3.1-3.5	49.5	24.5	55	30/200	7x7 PQFN	3A001.b.2.a	TGA2814-SM
80W S-Band PA	3.1-3.6	49	22	50	30/200	15x15 Cu Bolt Down	3A001.b.2.a	TGA2814-CP
100W S-Band PA	3.1-3.6	50	24	56	30/300	7x9 PQFN	3A001.b.2.a	TGA2813-SM
10W C-Band PA	4.5-7	40	19	40	22/290	5x5 PQFN	3A001.b.2.b	QPA1019
50W C-Band PA	5-6	47	20	45	28/500	6x6 PQFN	3A001.b.2.b	TGA2307-SM
60W C-Band PA	5-6	48	22	47	28/1200	15x15 Cu Bolt Down	3A001.b.2.b	QPA2308
2W C-Band Driver	5-8	>33	>15	>34	25/50	4x4 PQFN	EAR99	TGA2599-SM
100W C-Band PA	5.7-7	50	20	38	26/2000	19x19 Cu Bolt Down	3A001.b.2.b	QPM1017
2W C/X-Band Driver	6-12	>32	20	>15	25/200	5x5 QFN	EAR99	TGA2627-SM
2W C/X-Band Driver	6-12	33	14	>25	25/100	4x4 QFN	EAR99	TGA2598-SM
30W C/X-Band PA	6-12	>45	>22	>30	20/2000	15x15 Cu Bolt Down	3A001.b.2.b	TGA2590-CP
10W Wideband PA	6-18	40	20	20	20/1250	Die	3A001.b.2.c	QPA1013D
20W Wideband PA	6-18	43	18	20	20/2500	15x15 Cu Bolt Down	3A001.b.2.c	TGA2963-CP
4.5W X-Band PA	7-10.5	36.5	23.5	38.5	20/200	4.5x4.5 QFN	EAR99	TGA3042-SM
50W X-Band PA	7.9-8.4	47	10	36	24/2240	Flange	EAR99	TGA2586-FL
15W X-Band PA	7.9-11	42	18	38	24/600	4.5x5.0 QFN	3A001.b.2.b	QPA1010
25W X-Band PA	7.9-11	44.5	19.5	37.5	24/1200	4.5x5.0 QFN	3A001.b.2.b	QPA1011
50W X-Band PA	7.9-11	47	24	34	28/650	15x15 Cu Bolt Down	3A001.b.2.b	TGA2238-CP
100W X-Band PA	7.9-11	50	22	35	28/1300	19x19 Cu Bolt Down	3A001.b.4.b	TGM2635-CP
4W X-Band PA	8.5-11	36.5	24	45	22/500	4x4 PQFN	EAR99	QPA1022
20W X-Band PA	9-10	43	25	40	28/365	7x7 QFN	3A001.b.2.b	TGA2624-SM
16W X-Band PA	9-10	>42	>27	>37	28/365	15x15 Cu Bolt Down	3A001.b.2.b	TGA2624-CP
35W X-Band PA	9-10	45.5	27.5	>42	28/290	7x7 QFN	3A001.b.2.b	TGA2622-SM
35W X-Band PA	9-10	45.5	27.5	>43	28/290	15x15 Cu Bolt Down	3A001.b.2.b	TGA2622-CP
60W X-Band HPA	9-10	48	10	38	24/2400	Flange	3A001.b.3.b	TGA2312-FL
17W X-Band PA	10-11	42.5	28	>40	28/365	15x15 Cu Bolt Down	3A001.b.2.b	TGA2625-CP
32W X-Band PA	10-11	45	27	>41	28/290	15x15 Cu Bolt Down	3A001.b.2.b	TGA2623-CP
100W X-Band PA	10-12	50	22	26	28/2000	19x19 Cu Bolt Down	3A001.b.4.b	QPM1021
2W Ku-Band Driver	13-18	33	20	>25	20/70	4x4 QFN	EAR99	TGA2958-SM
17W X-Band PA	10.7-12.7	43.5	17	40	20/600	Die	3A001.b.2.b	QPA1009D
35W X-Band PA	10.7-12.7	46	17	40	20/1200	Die	3A001.b.2.b	QPA1006D
80W Ku-Band PA	13-15.5	49	24	25	28/800	19x19 Cu Bolt Down	3A001.b.4.b	QPM2239
35W Ku-Band PA	13.4-15.5	45.5	25.5	>34	28/900	15x15 Cu Bolt Down	3A001.b.2.b	TGA2239-CP
12W Ku-Band PA	13.4-16.5	41	23	30	28/225	5.5x4.5 QFN	3A001.b.2.c	TGA2218-SM
25W Ku-Band PA	13.4-16.5	44	28	31	28/450	15x15 Cu Bolt Down	3A001.b.2.c	TGA2219-CP
10W K-Band PA	17-20	40	22	30	28/300	5x5.5 QFN	3A001.b.2.c	TGA4548-SM
4W Ka-Band PA	27-31	36.5	22.5	25	20/140	7x7 QFN	3A001.b.2.c	TGA2594-HM
8W Ka-Band PA	27.5-31	39	21	>22	20/560	15x15 Cu Bolt Down	3A001.b.2.c	TGA2595-CP
0.4W Ka-Band PA	28-38	26	23	n/a	20/64	Die	3A001.b.2.d	QPA2225D
5W Ka-Band PA	32-38	37	16	20	24/320	Die	3A001.b.2.d	TGA2224
10W Ka-Band PA	32-38	40	16	22	24/640	Die	3A001.b.2.d	TGA2222

Products sorted by frequency. Samples/evaluation fixtures are available; call for details.

GaN Low Noise Amplifiers

Description	Frequency (GHz)	Max Pin (dBm)	P1dB/IIP3 (dBm)	Gain (dB)	NF (dB)	Voltage / Current (V / mA)	Package (mm)	ECCN	Part Number
S/C-Band LNA	2-6	30	18/30	22	1	10/100	4x4 PQFN	EAR99	TGA2611-SM
Wideband LNA	2-20	40	23	15	2	8/125	4x4 QFN	EAR99	TGA2227-SM

Products sorted by frequency. Samples/evaluation fixtures are available; call for details.

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