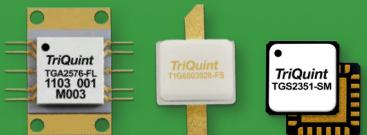


2013

Market-Tested GaN Innovation from TriQuint

TriQuint Semiconductor is proud of its Infrastructure and Defense Products heritage. Our continuing development of innovative, high performance solutions and renowned foundry services support the RF / microwave / millimeter wave needs of global manufacturers. Our success is based on trust, value, unrivaled support and an in-depth understanding of high-power, high-frequency active devices using gallium nitride (GaN) and gallium arsenide (GaAs) technology.



Gallium Nitride Innovation

The GaN Advantage

Power densities made possible with gallium nitride technology range between two and five-times that of gallium arsenide-based RF amplifiers. GaN technology's proven abilities to handle high current and high voltage make it an ideal choice for defense, aerospace and infrastructure networks including radar, electronic warfare including counter-IED (C-IED), communications and other infrastructure applications. Only TriQuint delivers reliability that sets a standard for the industry.



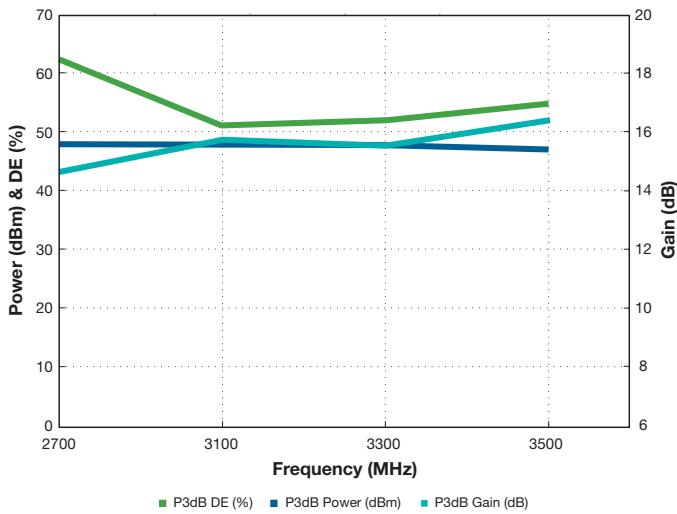
Key GaN capabilities:

- Very high thermal conductivity
- High power density and ESD resistance
- Proven reliability at high junction temperatures
 - Mean time to failure (MTTF) of greater than 10^7 (10 million) hours at 200 degrees (C) and greater than 10^6 (1 million) hours at 225 degrees (C)
- Applications from UHF to W-band to THz
- Excellent noise figure – comparable to pHEMT, but at higher voltage for increased dynamic range and input survivability

T1G4006032-FS 2700 - 3500 MHz

Evaluation Fixture RF Results (3dB Compression)

Bias Condition: Vds = 32V, Idq = 200 mA

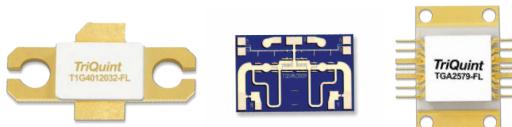


GaN Foundry Services

As a DoD accredited 'Microelectronics Trusted Source', TriQuint offers a variety of GaN custom ASIC solutions; accreditation encompasses foundry, post-processing, packaging / assembly and test services. The support provided by our foundry services division complements TriQuint's high-frequency standard product portfolio. TriQuint foundry services are centered on satisfying custom requirements. Our award-winning, highly-experienced foundry team guides customers through each development phase, supported by the latest industry-leading design kits and modeling from ADS and AWR. For more information about GaN and GaAs foundry services, please visit us on the web at triquint.com/foundry.

GaN process specifications:

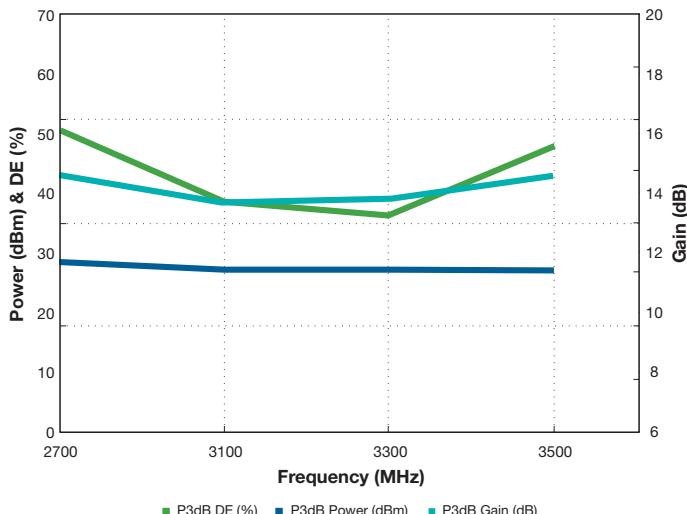
- Technology: 0.25μm GaN on SiC
- Drain Bias (Vd): up to 40V
- Operating frequencies: DC to 18 GHz
- PAE: >60% at 10 GHz
- Power density: >5.5W/mm at 10 GHz
- Reliability: 10M hours at 200C (3-temp DC MTTF w/failure defined as 10% degradation in Idmax)



T1G4003532-FS 2700 - 3500 MHz

Evaluation Fixture RF Results (3dB Compression)

Bias Condition: Vds = 32V, Idq = 150 mA



GaN Standard Product Portfolio

TriQuint's unique experience with GaN technology and long-established expertise with both GaN and GaAs power solutions enable us to offer many product options beginning with world-class / high-performance 'off-the-shelf' devices. Products include a variety of form factors and circuit types including die-level FETs, MMICs, switches, packaged transistors and multi-chip, integrated modules.

GaN Transistors

Description	Frequency (GHz)	Psat (dBm)	LS Gain (dB)	PAE (%)	Bias (V / mA)	Package	ECCN	Part Number
35W HEMT	DC - 3.5	45.6	14	54	32 / 150	Ceramic Flat Lead	EAR99	T1G4003532-FS
35W HEMT	DC - 3.5	45.6	14	54	32 / 150	Ceramic Flat Lead	EAR99	T1G4003532-FL
55W HEMT	DC - 3.5	47.2	12	50	28 / 200	Ceramic Flat Lead	EAR99	T1G4005528-FS
60W HEMT	DC - 3.5	48.2	14	51	32 / 200	Ceramic Flat Lead	EAR99	T1G4006032-FS
60W HEMT	DC - 3.5	48.2	14	51	32 / 200	Ceramic Flat Lead	EAR99	T1G4006032-FL
120W HEMT	DC - 3.5	50.8	14	52	32 / 575	Ceramic Flat Lead	EAR99	T1G4012032-FS
120W HEMT	DC - 3.5	50.8	14	52	32 / 575	Ceramic Flat Lead	EAR99	T1G4012032-FL
9W HEMT	DC - 6	39.5	12.5	50	28 / 50	Ceramic Flat Lead	EAR99	T1G6000528-Q3
10W HEMT	DC - 6	40.5	15	52	32 / 50	5x5 QFN	EAR99	T1G6001032-SM
18W HEMT	DC - 6	42.5	12	50	28 / 50	Ceramic Flat Lead	EAR99	T1G6001528-Q3
30W HEMT	DC - 6	44.7	12	50	28 / 200	Ceramic Flat Lead	EAR99	T1G6003028-FS
30W HEMT	DC - 6	44.7	12	50	28 / 200	Ceramic Flat Lead	EAR99	T1G6003028-FL
1.25mm HEMT	DC - 18	37.4	10.4	52	28 / 125	Die	EAR99	TGF2023-01
2.5mm HEMT	DC - 18	40.2	9.9	50	28 / 250	Die	EAR99	TGF2023-02
5.0mm HEMT	DC - 18	43	9.4	49	28 / 500	Die	3A001b.3b	TGF2023-05
10mm HEMT	DC - 18	45.8	8.9	47	28 / 1000	Die	3A001b.3b	TGF2023-10
20mm HEMT	DC - 18	48.6	8.4	46	28 / 2000	Die	3A001b.3b	TGF2023-20

Samples / evaluation fixtures are available; call for details.

GaN Amplifiers

Description	Frequency (GHz)	Psat (dBm)	LS Gain (dB)	PAE (%)	Bias (V / mA)	Package	ECCN	Part Number
10W HPA	0.03 - 3	39.5	19.5	40	30 / 360	Flange	ITAR	TGA2540-FL
10W HPA	2 - 18	40	9	25	30 / 500	Die	ITAR	TGA2573
10W HPA	2 - 18	40	9	25	30 / 500	Die on Tab	ITAR	TGA2573-TS
30W HPA	2.5 - 6	45	25	>30	30 / 1400	Flange	3A001.b.2.a	TGA2576-FL
20W HPA	13.75 - 15.5	43	23	30	25 / 1000	Flange	3A001.b.2.b	TGA2579-FL
20W HPA	14 - 16	43	23	>30	30 / 2000	Die	ITAR	TGA2572
20W HPA	14 - 16	43	23	>30	30 / 2000	Die on Tab	ITAR	TGA2572-TS
20W HPA	14 - 16	43	23	>30	30 / 2000	Flange	ITAR	TGA2572-FL

Samples / evaluation fixtures are available; call for details.

GaN Switches

Description	Frequency (GHz)	IL (dB)	ISO (dB)	P1dB (dBm)	Voltage (V)	Package	ECCN	Part Number
High Power SPDT Switch	DC - 6	0.8	-40	>45	0 / -40	Die	EAR99	TGS2351
High Power SPDT Switch	DC - 6	0.8	-40	>45	0 / -40	5x5 QFN	EAR99	TGS2351-SM
High Power SPDT Switch	DC - 12	<1	-35	>43	0 / -40	Die	EAR99	TGS2352
High Power SPDT Switch	DC - 18	1.5	-25	>40	0 / -40	Die	EAR99	TGS2353

Samples / evaluation fixtures are available; call for details.

Gallium Nitride Innovation

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Visit triquint.com/subscribe to register for TriQuint product and process updates.



Integrated Assemblies and Packaging Services

TriQuint offers many packaging, integration and die-level services that make final assembly easier and more efficient. Our DOD Accredited Category 1A 'Trusted Packaging / Assembly Services' are backed by TriQuint's industry-leading expertise in a state-of-the-art facility. This expertise has expanded TriQuint's range of integrated solutions. TriQuint packaged products benefit from the same innovative and dependable manufacturing process controls that ensure reliability and functionality for our MMIC solutions. Integration – either through on-chip designs or multi-chip assemblies – offers greater BOM economy, overall cost savings, PCB area reduction and greater performance / efficiency.

- One-stop convenience: fabricate circuits, package die and test components in one secure location for rapid time to market and greater savings
- Single- and multi-chip assembly: integrate single or multiple die using industry-standard or custom packages
- Experience and innovation: ensure your program success through TriQuint's expert teams and state-of-the-art facilities
- Die-on-Tab (DoT): simplify assembly, increase yields and mitigate thermal considerations
 - Virtually void-free vacuum reflow die attach
 - 100% in-factory x-ray inspected
 - In-house RF test services

