

# Power Gallium Nitride (GaN) FETs

## Maximised power density with leading efficiency



Whether for low- or high-power conversion applications, power Gallium Nitride FETs (GaN FETs) are increasingly making their way into mainstream markets. For a variety of high-voltage and low-voltage applications GaN FETs deliver the fastest transition/switching capability (highest  $dv/dt$  and  $di/dt$ ), and best power efficiency. Additionally, Nexperia power GaN FETs bring enhanced power density through reduced conduction and switching losses. Nexperia GaN FETs are available in 2 configurations:

### Enhancement mode (e-mode) (for low-voltage & high-voltage low/mid-power applications)

- › Enhancement mode transistor-normally off power switch
- › Ultra-high switching frequency
- › Leading soft-switching performance
- › No reverse-recovery charge
- › Low gate charge, low output charge
- › High performance (>99% efficiency)
- › Tight dynamic characteristics
- › Easy to drive, 0 to 5 V gate drive
- › Qualified for industrial applications according to JEDEC standard

### Key applications $\leq 150$ V high-power

- › 400 V-48 V LLC converter for datacenters
- › 48 V to POL direct conversion
- › Power supply (AC/DC) fast-charging for e-mobility
- › USB-C power delivery fast-charging for portables
- › LiDAR (non-automotive)
- › Class D audio amplifiers

### Key applications 650 V low-power

- › Datacom and telecom (AC/DC and DC/DC)
- › Photovoltaic (PV) micro inverter (DC/AC)
- › Industrial (DC/AC)
- › BLDC / micro servo motor drives
- › LED driver
- › TV power supply unit (PSU)

### Key applications 40 V bi-directional

- › High-side load switch
- › OVP protection in smart phone USB port
- › DC-to-DC converters
- › Power switch circuits
- › Stand-by power system

### Cascode mode (for 650 V high-power applications)

- › 3 times lower inductances than industry-standard packages for lowest switching losses & EMI
- › Higher reliability compared to wire-bonded solutions
- › 99% power conversion efficiency
- › Up to 1 MHz in soft-switching (high power density)
- › Easy to design gate drive, 0 to 12 V
- › Low  $R_{th(j-mb)}$  typ for optimal cooling & 175 °C rated
- › Virtually no  $Q_{rr}$
- › Flexible gull winged leads for temperature cycling & board level reliability
- › MSL1 & Halogen free qualifications

### Key applications 650 V high-power The path to Net Zero CO<sub>2</sub>

- › Solar (PV) inverters
- › Server Titanium grade power supplies
- › Battery storage/ UPS inverters
- › Heat pumps

### Industry 4.0

- › Servo motor drives/ frequency inverters
- › Telecom power supplies
- › Class-D Audio amplifiers
- › Welding machines



## Power GaN FETs product portfolio

Types in **bold** represent new products

Types in **bold red** are in development

NRND - not recommended for new designs

### Low voltage e-mode GaN FETs

Package	Type number	V <sub>DS</sub> max (V)	R <sub>DS(on)</sub> max @ V <sub>GS</sub> = 5 V (mΩ)	T <sub>J</sub> max (°C)	I <sub>D</sub> max (A)	Q <sub>G(tot)</sub> [typ] (nC)	Q <sub>oss</sub> [typ] (nC)
WLCSP8 (SOT8072)	GAN3R2-100CBE	100	3.2	150	60	9.2	50
WLCSP6 (SOT8090)	<b>GAN7R0-100CBA</b>		7	150	29	4.5	25
WLCSP22 (SOT8089)	<b>GAN2R7-100CBA</b>		2.7	150	64	13	77
VQFN7 (SOT8091-1)	<b>GAN1R8-100QBA</b>		1.8	150	100	22	125
	<b>GAN3R9-150QBA</b>	150	3.9	150	100	20	130
FCLGA3 (SOT8073-1)	GAN7R0-150LBE		7	150	28	7.6	47

### 650 - 700 V e-mode GaN FETs

Package	Type number	V <sub>DS</sub> max (V)	R <sub>DS(on)</sub> max @ V <sub>GS</sub> = 6 V (mΩ)	T <sub>J</sub> max (°C)	I <sub>D</sub> max (A)	Q <sub>G(tot)</sub> [typ] (nC)	Q <sub>oss</sub> [typ] (nC)
DFN5060-5 (SOT8075-1)	GAN140-650FBE	650	140	150	17	3.5	33
	GAN190-650FBE		190	150	11.5	2.8	24.5
	<b>GAN350-650FBA</b>		350	150	6	1.5	60
DFN8080-8 (SOT8074-1)	GAN080-650EBE		80	150	29	6.2	60
	GAN140-650EBE		140	150	17	3.5	33
	GAN190-650EBE		190	150	11.5	2.8	24.5
DPAK (SOT428-2)	<b>GAN140-700BBA</b>	700	140	150	17	3.5	33
	<b>GAN190-700BBA</b>		190	150	11.5	2.8	24.5
	<b>GAN240-700BBA</b>		240	150	10	2	21
	<b>GAN350-700BBA</b>		350	150	6	1.5	13

### Bi-directional e-mode GaN FETs

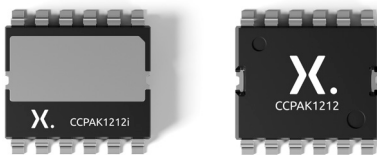
Package	Type number	V <sub>DS</sub> max (V)	R <sub>DS(on)</sub> max @ V <sub>GS</sub> = 5 V (mΩ)	T <sub>J</sub> max (°C)	I <sub>D</sub> max (A)	Q <sub>G(tot)</sub> [typ] (nC)	Q <sub>oss</sub> [typ] (nC)
VQFN16 (SOT8092-1)	<b>GANB1R2-040QBA</b>	40	1.2	125	100	60	45
WLCSP22 (SOT8086)	<b>GANB4R8-040CBA</b>		4.8	125	20	15.8	12.2
WLCSP16 (SOT8087)	<b>GANB8R0-040CBA</b>		8	125	14	10.1	8
WLCSP12 (SOT8088)	<b>GANB012-040CBA</b>		12	125	10	7.2	5.6

### 650 V cascode GaN FETs

Package	Type number	V <sub>DS</sub> max (V)	R <sub>DS(on)</sub> max @ V <sub>GS</sub> = 10 V (mΩ)	T <sub>J</sub> max (°C)	I <sub>D</sub> max (A)	Q <sub>G(tot)</sub> [typ] (nC)	Q <sub>oss</sub> [typ] (nC)
CCPAK1212 (SOT8000)	<b>GAN039-650NBB</b>	650	39	150	58.5	26	173
CCPAK1212i (SOT8005)	GAN039-650NTB		39	150	58.5	26	173
TO-247-3L (SOT429-3)	<b>GAN041-650WSB</b>		41	175	47.2	22	150
TO-247-3 (SOT429)	GAN063-650WSA (NRND)		60	175	34.5	15	125
	<b>GAN111-650WSB</b>		114	175	21	4.9	65

### The innovators of copper-clip package technology

Nexperia brings 20 years of experience in high-quality, robust copper-clip SMD packaging to its GaN FET portfolio. The CCPAK comes in top-side (CCPAK1212i) and bottom-side (CCPAK1212) cooling designs for enhanced flexibility and heat dissipation.



For more information visit [nexperia.com/gan-fets](https://nexperia.com/gan-fets)

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