



Highest Performance, Highest Reliability GaN

www.transphormusa.com

PRODUCT PORTFOLIO

FETs

Evaluation Kits

Reference Designs

Devices and Design Resources
Crossing the Power Spectrum



SuperGaN[®]



Leading the GaN Revolution

Founded in 2007, Transphorm is the leading pioneer and global supplier of GaN power conversion products. The company's SuperGaN® platform offers the industry's highest performance available, driven by best-in-class quality and reliability.

Today, our GaN solutions support the widest range of power levels across the broadest range of applications. Our device portfolio includes 650 V FETs, with 1200 V FETs in development. We deliver that technology in well-known, commonly-used TO-XXX, TOLL, TOLT, and PQFN packages—leading to easier designability and drivability along with higher power efficiency.

Transphorm's innovations eliminate more energy losses than possible with competitive solutions. This helps customers introduce new, disruptive end products while increasing the overall sustainability of power electronics.

Transphorm Value Proposition

Vertically integrated supply chain with ownership of EPI, wafer process, and GaN FET die design.

Largest patent portfolio (1,000+) covering the GaN process end to end.

Engineering team with combined 300+ years of GaN experience.

Asset-light manufacturing structure supports long-term demand.

Company Highlights

First pure-play GaN supplier to go public (Nasdaq: TGAN).

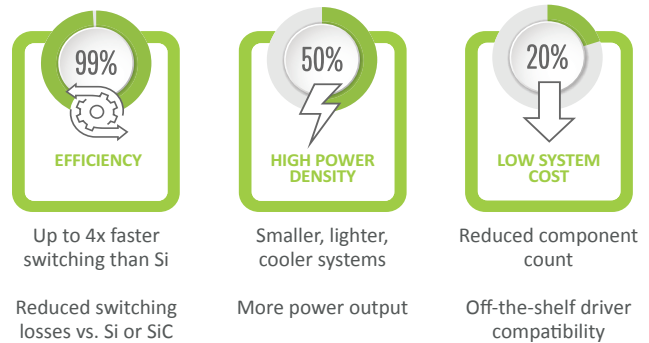
First publicly recorded GaN customers; ramping volumes with Tier 1 customers.

Only GaN supplier publicly in production in low to high power markets.



* Forecasts as of 2023

GaN Value Proposition



Innovation Highlights

Only broad spectrum GaN power supplier.

First JEDEC and AEC-Q101 FETs.

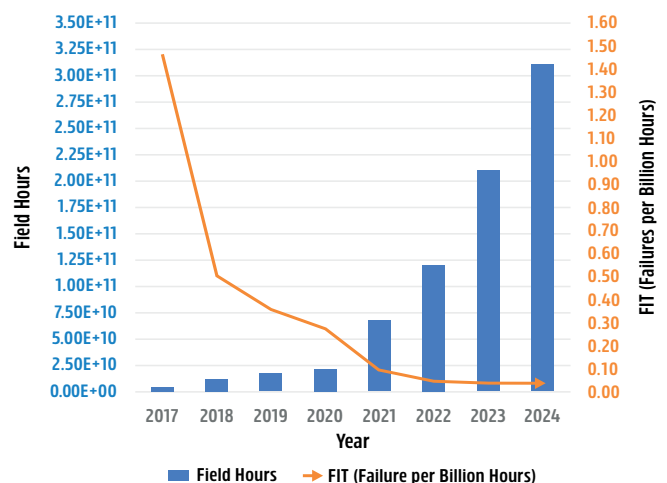
Only GaN platform automotive qualified to 175°C.

Only demonstrated 1200 V platform GaN-on-Sapphire platform and short circuit current limiter (SCCL) up to 5 μ s.

Best GaN platform for quality and reliability.

First to publicly report customer field reliability data; now at < 0.05 FIT.

Reliability



Devices (FETs)

Devices

Part Number	V _{ds} (V) min	R _{ds(on)} (mΩ) typ	R _{ds(on)} (mΩ) max	V _{th} (V) typ	I _d (25°C) (A) max	Package
TP65H015G5WS	650	15	18	4	95	TO-247
TP65H035G4YS*	650	35	42	3.6	46.5	TO-247-4L
TP65H035G4WS	650	35	41	4	46.5	TO-247
TP65H035G4WSQA	650	35	41	4	46.5	TO-247
TP65H035G4QS	650	35	41	4	46.5	TOLL
TP65H050G4YS	650	50	60	4	34	TO-247-4L
TP65H050G4WS	650	50	60	4	34	TO-247
TP65H050G4BS	650	50	60	4	34	TO-263
TP65H050G4QS	650	50	60	4	34	TOLL
TP65H070G4LSG	650	72	85	4	29	PQFN88
TP65H070G4LSGB	650	72	85	4	29	PQFN88
TP65H070G4PS	650	72	85	4	29	TO-220
TP65H070G4QS	650	72	85	4	29	TOLL
TP65H070G4RS	650	72	85	4	29	TOLT
TP65H100G4PS	650	92	110	3.6	18.9	TO-220
TP65H100G4LSGB	650	92	110	3.6	18.9	PQFN88
TP65H150G4PS	650	150	180	4	16	TO-220
TP65H150BG4JSG	650	150	180	2.4	16	PQFN56
TP65H150G4LSG	650	150	180	4	16	PQFN88
TP65H150G4LSGB*	650	150	180	2.1	13	PQFN88
TP65H300G4LSG	650	240	312	2.1	6.5	PQFN88
TP65H300G4JSGB	650	240	312	2.4	6.5	PQFN56
TP65H300G4LSGB	650	240	312	2.4	6.5	PQFN88
TP65H480G4JSG	650	480	560	2.1	3.6	PQFN56
TP65H480G4JSGB	650	480	560	2.4	3.6	PQFN56

Initial 1200 V Design Resources

Part Number	V _{ds} (V) min	R _{ds(on)} (mΩ) typ	R _{ds(on)} (mΩ) max	V _{th} (V) typ	I _d (25°C) (A) max	Package
TP120H058WS	1200	58	70	4	28	TO-247



TO-220



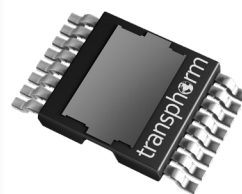
TO-263



TO-247



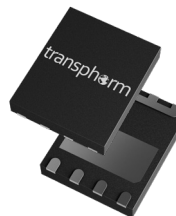
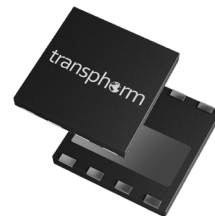
TO-247-4L



TOLT



TOLL

PQFN56
PerformancePQFN88
PerformancePQFN56
IndustryPQFN88
Industry

* SAMPLING

Evaluation Kits

Kit No.	TDHBG1200DC100-KIT
Topology	Half-bridge synchronous buck or boost (DC-to-DC)
Power (W)	1200
SuperGaN FET	TDHB-65H070L-DC
FET Package	PQFN88
Input Voltage	≤ 400 Vdc
Output Voltage	≤ 400 Vdc
Controller	n/a
PWM Freq. (kHz)	50 - 300
Peak Efficiency (%)	> 99



TDHBG1200DC100-KIT



TDHB-65H070L-DC

Kit No.	TDHB-65H070L-DC
Topology	Half-bridge synchronous buck or boost (DC-to-DC)
Power (W)	1200
SuperGaN FET	TP65H070LDG/LSG
FET Package	PQFN88
Input Voltage	≤ 400 Vdc
Output Voltage	≤ 400 Vdc
Controller	n/a
PWM Freq. (kHz)	50 - 300
Peak Efficiency (%)	> 99

Kit No.	TDTP2500B066B-KIT
Topology	Totem-pole PFC (AC-to-DC)
Power (W)	2500
SuperGaN FET	TP65H050G4BS
FET Package	TO-263
Input Voltage	85 Vac to 265 Vac
Output Voltage	387 Vdc, +/- 5 Vdc
Controller	Microchip DP PIM dsPIC33CK256MP506
PWM Freq. (kHz)	66
Peak Efficiency (%)	> 99



TDTP2500B066B-KIT



TDINV3000W050B-KIT

Kit No.	TDINV3000W050B-KIT
Topology	Inverter (DC-to-AC)
Power (W)	3000
SuperGaN FET	TP65H050G4WS
FET Package	TO-247
Input Voltage	≤ 400 Vdc
Output Voltage	Vdc / $\sqrt{2}$ VRMS at 50/60 Hz, ≤ 3 kW
Controller	Microchip DP PIM dsPIC33CK256MP506
PWM Freq. (kHz)	50 - 150
Peak Efficiency (%)	> 98.85

Kit No.	TDTP4000W066C-KIT
Topology	Totem-pole PFC (AC-to-DC)
Power (W)	4000
SuperGaN FET	TP65H035G4WS
FET Package	TO-247
Input Voltage	85 VAC - 270 Vac
Output Voltage	387 VDC, +/- 5 Vdc
Controller	Microchip DP PIM dsPIC33CK256MP506
PWM Freq. (kHz)	66
Peak Efficiency (%)	> 99.1



TDTP4000W066C-KIT

Reference Designs (Partner Adapters)

RD No.	SZ-RD29-00
Partner	Silanna Semiconductor
Topology	ACF
Power (W)	65
Output	USB-C PD
SuperGaN FET	TP65H300G4LSG
FET Package	PQFN88
PWM Freq. (kHz)	140
Peak Efficiency (%)	94 @ 115 Vac, 94.5 @ 230 Vac
PWR Density (W/in³)	65



SZ-RD29-00



ACF+GaN PD 3.0

RD No.	ACF+GaN PD 3.0
Partner	Diodes Inc.
Topology	ACF + PFC
Power (W)	140
Output	USB-C PD/PPS
SuperGaN FET	TP65H150G4LSG
FET Package	PQFN88
PWM Freq. (kHz)	110 + 140
Peak Efficiency (%)	93.18 @ full load
PWR Density (W/in³)	140

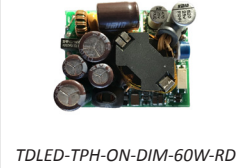
RD No.	ACF+GaN EVB2
Partner	Diodes Inc.
Topology	ACF
Power (W)	65
Output	USB-C PD/PPS
SuperGaN FET	TP65H150G4LSG
FET Package	PQFN88
PWM Freq. (kHz)	≤ 20
Peak Efficiency (%)	93.94 at full load
PWR Density (W/in³)	29



ACF+GaN EVB2

Reference Designs (Adapters)

RD No.	TDADP-TPH-ON-USBC-45W-RD
Topology	QRF
Power (W)	45
Output	USB-C PD
SuperGaN FET	TP65H480G4JSG
FET Package	PQFN56
Controller	onsemi QRF PWM (NCP1342)
PWM Freq. (kHz)	≤ 200
Peak Efficiency (%)	93.9 @ 115 Vac, 93.78 @ 230 Vac
PWR Density (W/in ³)	24



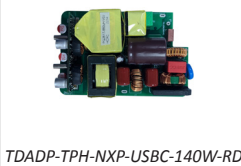
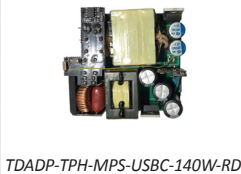
RD No.	TDLED-TPH-ON-DIM-60W-RD
Topology	QRF
Power (W)	60
Output	LED
SuperGaN FET	TP65H300G4LSG
FET Package	PQFN88
Controller	onsemi QRF PWM (NCP1342)
PWM Freq. (kHz)	≤ 200
Peak Efficiency (%)	> 93.9 @ 120 Vac
PWR Density (W/in ³)	30

RD No.	TDADP-TPH-ON-USBC-65W-RD
Topology	QRF
Power (W)	65
Output	USB-C PD
SuperGaN FET	TP65H300G4LSG
FET Package	PQFN88
Controller	onsemi QRF PWM (NCP1342)
PWM Freq. (kHz)	≤ 300
Peak Efficiency (%)	94.05 @ 115 Vac, 93.98 @ 230 Vac
PWR Density (W/in ³)	30



RD No.	TDADP-TPH-ON-USBC-100W-RD
Topology	PFC/QRF
Power (W)	100
Output	USB-C PD
SuperGaN FET	TP65H150G4LSG, TP65H300G4LSG
FET Package	PQFN88
Controller	onsemi PFC (NCP1623) + QRF PWM (NCP1342)
PWM Freq. (kHz)	≤ 300
Peak Efficiency (%)	92.29 @ 115 Vac, 91 @ 230 Vac
PWR Density (W/in ³)	18

RD No.	TDADP-TPH-MPS-USBC-140W-RD
Topology	PFC/QRF
Power (W)	140
Output	USB-C PD
SuperGaN FET	TP65H150G4PS, TP65H150G4LSG
FET Package	TO-220, PQFN88
Controller	MPS CrM/DCM PFC (MP44018A) + DCM/CrM/CCM AIO Controller (MPX2002)
PWM Freq. (kHz)	≤ 60/80
Peak Efficiency (%)	93.55 @ 115 Vac, 94.38 @ 230 Vac
PWR Density (W/in ³)	≤ 20



RD No.	TDADP-TPH-NXP-USBC-140W-RD
Topology	PFC/LLC
Power (W)	140
Output	Dual USB-C PD
SuperGaN FET	TP65H150G4LSG, TP65H300G4LSG
FET Package	PQFN88
Controller	NXP DCM/CrM PFC + LLC controller (TEA2016)
PWM Freq. (kHz)	≤ 90
Peak Efficiency (%)	92.82 @ 115 Vac, 94.24 @ 230 Vac
PWR Density (W/in ³)	≤ 28

Reference Designs (Adapters)

RD No.	TDAIO-TPH-ON-240W-RD
Topology	PFC/LLC
Power (W)	240
Output	24 V
SuperGaN FET	TP65H150G4PS
FET Package	TO-220
Controller	onsemi CCM PFC (NCP1654) + LLC (NCP1300)
PWM Freq. (kHz)	≤ 180
Peak Efficiency (%)	94.79 @ 115 Vac, 96.28 @ 230 Vac
PWR Density (W/in ³)	24 - 30



TDAIO-TPH-ON-240W-RD



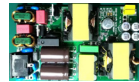
TDAIO-TPH-NXP-240W-RD

RD No.	TDAIO-TPH-NXP-240W-RD
Topology	AHB/PFC/LLC
Power (W)	240
Output	48 V
SuperGaN FET	TP65H070LSG, TP65H150G4LSG
FET Package	PQFN88
Controller	NXP AHB (TEA2206A) + PFC + LLC (TEA6017/TEA2017) + SR (TEA2096)
PWM Freq. (kHz)	≤ 200
Peak Efficiency (%)	95.43 @ 115 Vac, 96.6 @ 230 Vac
PWR Density (W/in ³)	28.5

RD No.	TDAIO-TPH-ON-CCCV-300W-RD
Topology	PFC/LLC
Power (W)	300
Output	Battery Charger
SuperGaN FET	TP65H070G4PS
FET Package	TO-220
Controller	onsemi PFC (NCP1654) + LLC (NCP1399)
PWM Freq. (kHz)	≤ 150
Peak Efficiency (%)	> 95% @ 264 Vac
PWR Density (W/in ³)	30



TDAIO-TPH-ON-CCCV-300W-RD



TDTTPLLC-TPH-ON-330W-RD

RD No.	TDTTPLLC-TPH-ON-330W-RD
Topology	TDTTP/LLC
Power (W)	330
Output	20 V
SuperGaN FET	TP65H070LSG, TP65H150G4LSG
FET Package	PQFN88
Controller	onsemi CCM/CrM (NCP1680) + LLC (NCP13992) + NXP SR (TEA1995T)
PWM Freq. (kHz)	Power stage dependent
Peak Efficiency (%)	95.05 @ 115 Vac, 95.97 @ 230 Vac
PWR Density (W/in ³)	29.4

RD No.	TDAIO-TPH-MPS-CCCV-600W-RD
Topology	DCM/CCM PFC + LLC
Power (W)	600
Output	Battery Charger
SuperGaN FET	TP65H070G4PS, TP65H150G4PS
FET Package	TO-220
Controller	MPS PFC + LLC combo (HR1211)
PWM Freq. (kHz)	≤ 120
Peak Efficiency (%)	94.4% @ 264 Vac
PWR Density (W/in ³)	n/a



TDAIO-TPH-MPS-CCCV-600W-RD



TDDCDC-TPH-ON-LLC-600W-RD

RD No.	TDDCDC-TPH-ON-LLC-600W-RD
Topology	LLC
Power (W)	600
Output	48 V
SuperGaN FET	TP65H150G4PS (x2)
FET Package	TO-220
Controller	onsemi LLC (NCP1399)
PWM Freq. (kHz)	≤ 168
Peak Efficiency (%)	> 97.8%
PWR Density (W/in ³)	107



About Transphorm

Transphorm is a global leader in high performance, high reliability GaN semiconductors. Its high voltage GaN device portfolio supports the widest power level range (45 W to 10+ kW) across the broadest variety of applications. Holding 1000+ patents, the vertically integrated company innovates at each critical stage of development: HEMT Design, EPI Wafer, Wafer Process, and GaN FET Die. As a result, Transphorm GaN solutions can achieve over 99% efficiency, 50% more power density and 20% lower system cost. Transphorm is headquartered in Goleta, California and has manufacturing operations in Goleta and Aizu, Japan.

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