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**Transphorm** is the leader in the development and supply of GaN solutions for high-voltage power conversion applications

 **Richardson  
Electronics**  
POWER & MICROWAVE  
TECHNOLOGIES

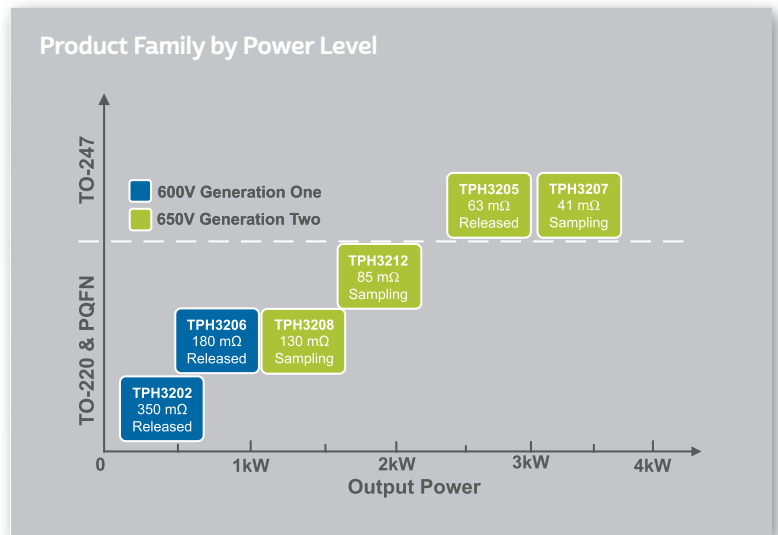
**transphorm**  
Highest Performance, Highest Reliability GaN

# HIGHEST PERFORMANCE, HIGHEST RELIABILITY GaN

## THE WORLD LEADER IN GaN POWER ELECTRONICS

**Transphorm** is a global semiconductor company that designs and manufactures gallium nitride (GaN) devices for high-voltage power conversion applications. Built on an industry-leading IP portfolio and over 300 years of combined GaN engineering expertise, Transphorm is delivering the highest performance and highest reliability GaN devices and best-in-class system-level design support to a growing customer base. Transphorm is creating innovations that move beyond the limitations of silicon to achieve over 99% efficiency and reduce energy loss by more than 40%.

- Optimized high-voltage GaN portfolio
  - Second-generation family in production with improved Figure of Merit and supporting many different applications and topologies
- Application expertise with in-depth topology understanding
  - Supported with design and evaluation kits, application notes and selector guide
- Successfully qualified and production-ramping with Tier 1 power supply companies
  - Design-ins with a wide variety of Tier 1 and 2 customers
- Worldwide and quick-responding customer applications, sales support and quality assurance



### Discretes

R <sub>ON</sub> mΩ (max)	Q <sub>g</sub> (nC) (typ)	TO-220 (Drain Tab)	TO-220 (Source Tab)	TO-247 (Source Tab)	PQFN88 (Drain Tab)	PQFN88 (Source Tab)
600V						
350	6.2	TPH3202PD	TPH3202PS		TPH3202LD	TPH3202LS
180	6.2	TPH3206PD	TPH3206PS		TPH3206LD	TPH3206LS
650V						
130	10	TPH3208PD*	TPH3208PS*		TPH3208LD*	TPH3208LS*
85	14	TPH3212PD*	TPH3212PS*	TPH3212WS*		
63	28			TPH3205WS**		
41	28			TPH3207WS*		

\* Preliminary \*\* Upgrading to 650V

### Module

R <sub>ON</sub> mΩ (max)	Q <sub>g</sub> (nC) (typ)	Description	Device
600V			
34	28	Half Bridge Module	TPD3215M

## Demo Kit Design Portfolio

Transphorm offers a number of demonstration kits in various topologies to help reduce design time



Demo Kit	Topology	Application	Switching Frequency	Power Rating
TDTPP4000W066-KIT	Totem-pole PFC	High efficiency bridgeless PFC	66kHz	4000W
TDPS2800E2C1-KIT	Totem-pole PFC	High efficiency bridgeless PFC	100kHz	2800W
TDPS500E2A2-KIT	PFC	High efficiency PFC	133kHz	1000W
TDPS251E0D2-KIT	LLC	DC/DC converter	200kHz	250W
TDPS501E0A-KIT	Boost daughter board	PFC or boost	100kHz	1000W
TDPS250E2D2-KIT	All-in-one power supply	Computer power supply	200kHz	250W
TDPS3500E0E10-KIT	Hard Switched 1/2 Bridge, Buck or Boost	PV Inverter, Motor Drive Inverter, PFC or Bridge	Programmable	3500W
TDPS1000E0E10-KIT	Hard Switched 1/2 Bridge, Buck or Boost	PV Inverter, Motor Drive Inverter, PFC or Bridge	Programmable	1000W
TDMC2000E0I-KIT	3-phase bridge	Motor Drive, Solar	100kHz	2000W
TDINV4500W050-KIT	Inverter	Single-Phase Solar PV Inverter, Motor Drive	50kHz	4500W
TDPV3000E0C1-KIT	Inverter	Single-Phase Solar PV Inverter, Motor Drive	50kHz	3000W
TDPV1000E0C1-KIT	Inverter	Single-Phase Solar PV Inverter, Motor Drive	100kHz	1000W

## QUALITY AND RELIABILITY

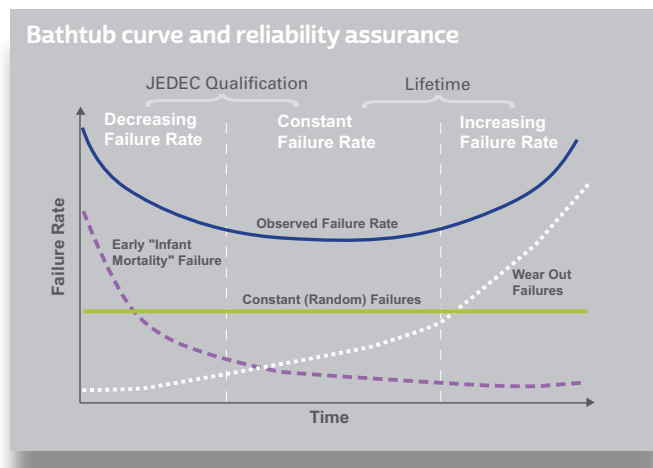
Transphorm, ISO9001:2008 registered, has more experience qualifying GaN products than any other manufacturer and has the most comprehensive lifetime reliability testing beyond JEDEC qualification and extended lifetime testing, achieving industry firsts for 600V and 650V GaN products.

### Quality and reliability program highlights

- Owner of the design, epi and manufacturing processes for all GaN power devices
- Supply chain is mature and able to manufacture at volume
- Qualified platforms to prevent both 'early infant mortality failure' and 'wear out failures'
- All devices have full traceability, easily accessible electronically
- Automotive-qualified wafer manufacturing plant (TS-16949)

### Two important areas we focus on in quality and reliability in our GaN devices are:

- Early infant mortality failure—JEDEC qualification and aggressive JEDEC testing help predict the early failures
- Wear out failure—Life test to failure is used to forecast when parts will enter the end-stage of their useful life



Temperature and voltage acceleration are used to evaluate the reliability of GaN FETs in the following modes:

#### High Temperature Reverse Bias (HTRB)

- Condition: Breakdown voltage ( $V_{ds}$ ) - 80% to 100%
- Temperature: Junction temperature - 150°C

#### High Temperature Operating Life (HTOL)

- Boost converter: Hard switching
- Temperature: Junction temperature - 175°C

#### High Voltage Off State (HVOS)

- Condition: Drain voltage up to 1150V (off state)
- Condition: Operating temperature - 150°C

#### High Temperature DC (HTDC)

- Condition: Temperature - 360°C (on state)

## Global GaN Engineering Expertise and System-level Design Resources



Transphorm's global network of GaN engineering, manufacturing and application-driven design support are unmatched, enabling our growing customer base to create the most energy-efficient and highest power density system solutions.



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