

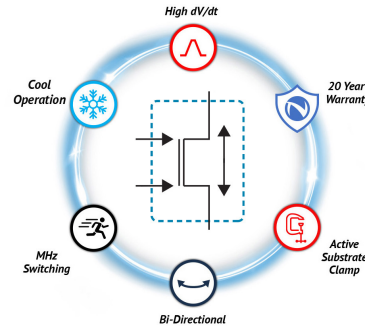
# First Production-Released 650 V Bi-Directional GaNFast™ Power ICs with IsoFast™ Dual-Channel Isolated GaN Driver



Bi-Directional GaNFast power ICs function as two 'back-to-back' GaN power switches. They are leading-edge, monolithic, single-chip designs with a merged drain structure, two gate controls, and a patented, integrated, autonomous substrate clamp. This latest breakthrough creates a paradigm shift in power with single-stage bi-directional switch (BDS) converters, enabling the transition from two-stage to single-stage topologies, to provide highest efficiency, power density, and performance, while reducing system cost and complexity.



**650 V Bi-Directional GaN with  
top-cooled TOLT**



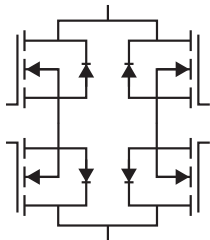
**High-speed dual-channel  
digital Isolated GaN driver**

## GaNFast™ Bi-directional Monolithically Replaces up to 4 Power Switches

One high-speed, high-efficiency bi-directional GaNFast IC replaces up to 4 older switches, increasing system performance while reducing component count, PCB area, and system costs.

- Higher system efficiency
- MHz switching frequency
- Improves reliability

### 4x Si MOSFETs



4 to 1 component reduction

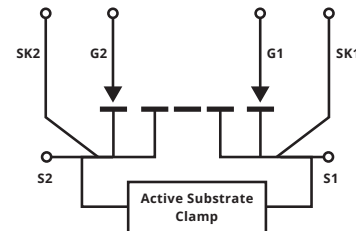
Over 50% footprint reduction

Over 20x lower  $Q_g$  & 10x lower  $C_{oss}$

Proprietary integrated substrate clamp

- Simplified circuit design
- Reduced component cost
- Reduced PCB area

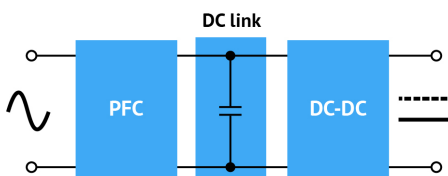
### 1x Bi-Directional GaNFast™



## Single-stage Topology Advantage

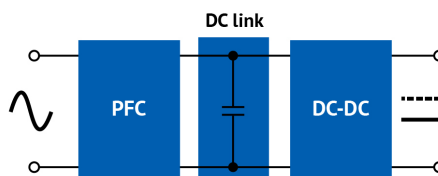
Over 70% of today's high-voltage power converters use a 'two-stage' topology. For example, a typical AC-DC converter implements an initial power-factor-correction (PFC) stage and a follow-on DC-DC stage, with bulky 'DC-link' buffering capacitors. The resulting systems are large, lossy, and expensive. Bi-directional GaNFast consolidates the two stages into a single, high-speed, high-efficiency stage and eliminates the bulky capacitors and input inductors - the ultimate solution in power electronics.

### Traditional Two-Stage with Si Uni-Directional Devices



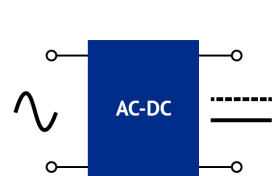
- Inefficient
- Low power density
- Higher costs
- Low frequency

### Latest Two-Stage with GaN/SiC Uni-Directional Devices



- Medium frequencies
- 20-30% energy savings
- 20-30% higher density
- 0-20% more expensive

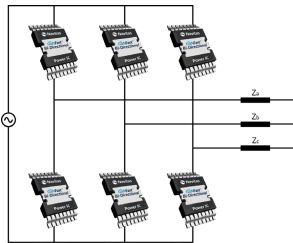
### New Single-Stage with Bi-Directional GaN/SiC



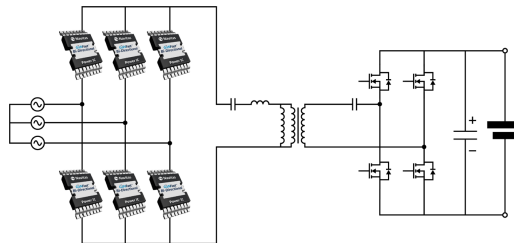
- Inherently bi-directional
- Eliminates PFC stage
- Eliminates DC Link capacitors
- Enables ultra-high frequencies
- 30% density, size, weight
- 10% energy savings
- 10% system cost savings

## Single-stage Converters

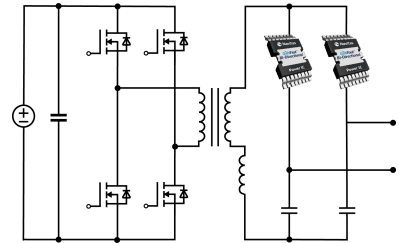
Bi-Directional GaNFast advances topologies by directly converting AC input voltage into a highly-efficient, corrected & controlled AC or DC output voltage. Targeted applications range widely from EV charging (On-Board Chargers (OBC) and roadside), solar inverters, energy storage and motor drives.



Motor Drives



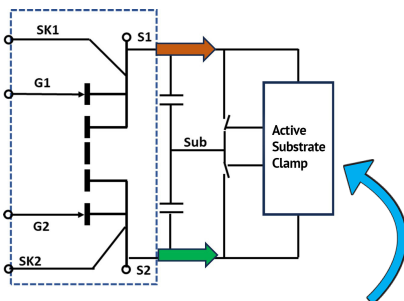
EV On-Board Charger (OBC)



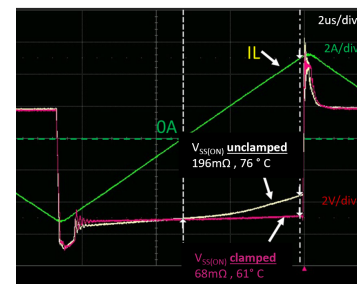
Solar Microinverter

## Active Substrate Clamp Delivers Efficient, Reliable, Cool Operation

Navitas patented monolithically-integrated active substrate clamp automatically connects the substrate to the Source terminal with the lowest voltage potential, eliminating a 'back-gating' effect, which prevents an undesired increase in  $R_{SS(ON)}$  when the substrate potential is uncontrolled. This results in a stable  $R_{SS(ON)}$  for highest performance, efficiency, & reliability.



Automatically detects and connects alternative Sources to Substrate for highest performance, efficiency & reliability.

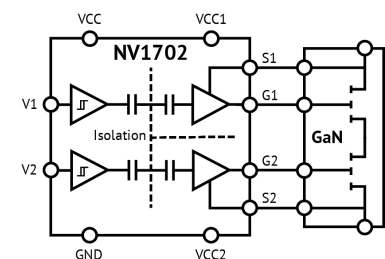


3x lower  $R_{SS(ON)}$  = 15°C cooler!

## IsoFast™ - Dual Independent Channel Digital Isolated GaN Driver

IsoFast™ is Navitas new galvanically-isolated, high-speed driver family optimized to isolate and drive GaN/SiC, including GaN BDS ICs. With 4x higher transient immunity than existing drivers (up to 200 V/ns) and no external negative bias supply needed, they deliver reliable, fast, accurate power control in high-voltage systems.

Feature	Existing Drivers	IsoFast NV1702	Benefit
Transient Immunity	50 V/ns	200 V/ns	4x better (high-freq GaN/SiC)
Negative drive req'd	Yes	No	Save \$0.50, 10 pcs per BDS
Reg 6V drive req'd	Yes	No	Save \$0.30, 8 pcs per BDS
Standby leakage	10 mA	0.3 mA	Improved standby efficiency
Housekeeping (UVLO, 1st pulse)	Start-up / shutdown glitches	UVLO, clean 1 <sup>st</sup> pulse	Reliable



No external negative bias supply required

## Bi-Directional GaNFast Portfolio

Part #	Voltage ( $V_{cont}$ )	Voltage ( $V_{dyn}$ )	$R_{SS(ON)}$ , typ	$I_{ss}$ @25°C (A)	Package	Availability
<a href="#">NV6428</a>	650 V	800 V	50 mΩ	49	TOLT	Now
<a href="#">NV6427</a>	650 V	800 V	100 mΩ	25	TOLT	Now