

*Bi-Directional GaNFast™ Switches Open Doors for New
High-Performance Topologies*

*Alfred Hesener, Senior Director Industrial & Consumer,
Navitas Semiconductor*

**Bodo's
Wide Bandgap
Event 2024**

Making WBG Designs Happen

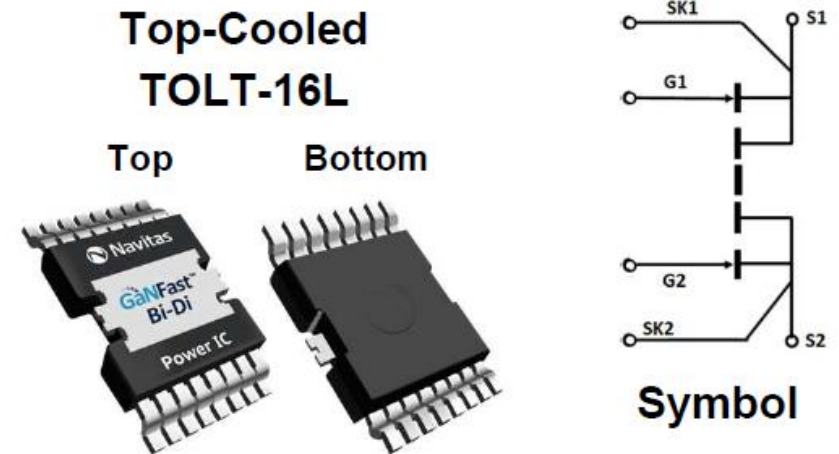
GaN

World's First Bi-Directional GaNFast™ Power IC



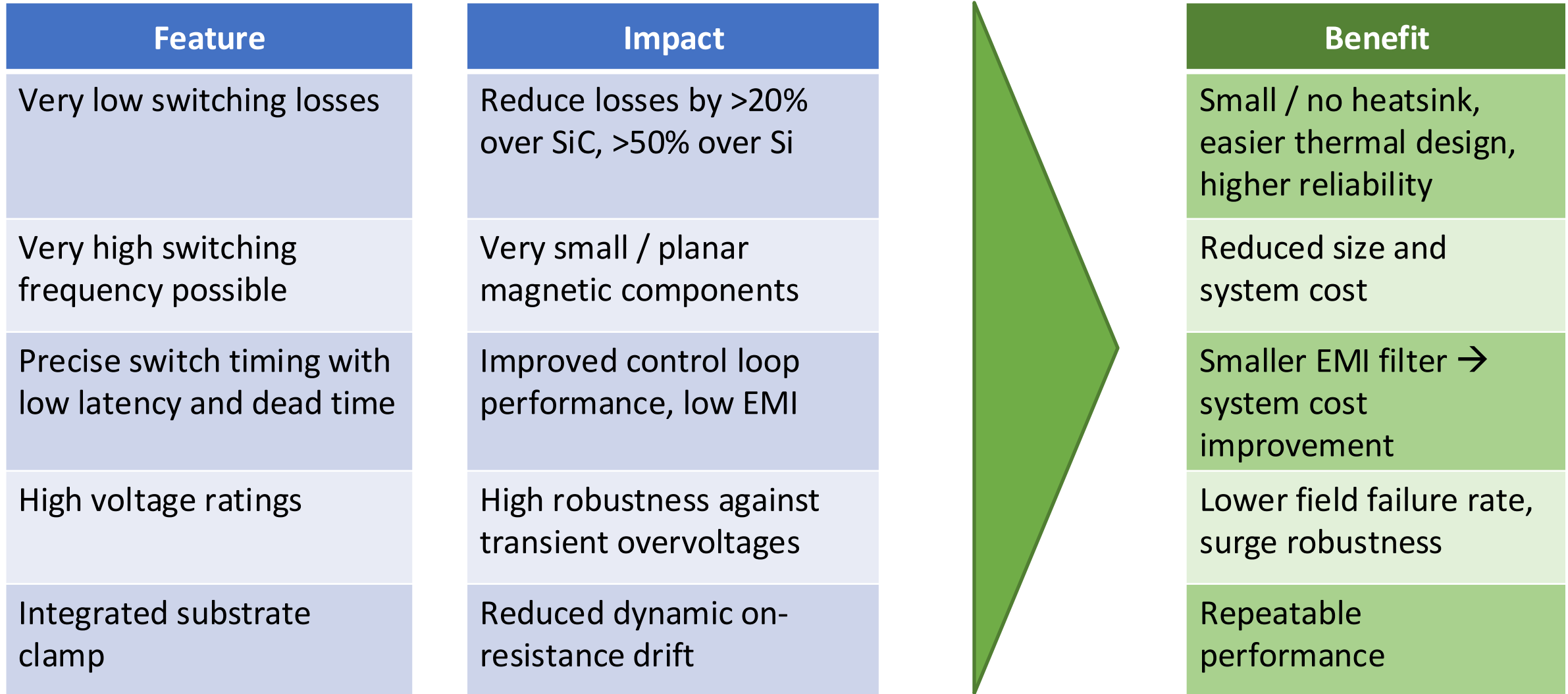
*4x smaller than SiC,
bi-directional FET,
3x smaller than two
uni-directional GaN,
9x smaller than silicon*

- Multiple topologies benefit from bi-directional power flow control
- Bi-directional GaNFast power ICs are the smallest, most efficient, lowest system cost solution
 - Optimized for fast switching, AC voltage applications
 - Enable 'previously-impractical' topologies
 - Integrated circuitry ensures reliability
- Applications: Power Supplies, Industrial, Solar, Energy Storage, Motor drives
- Mass production target 2024

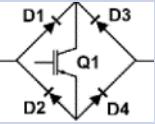
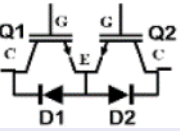
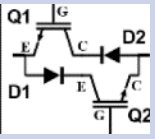
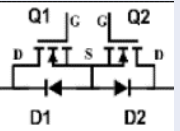
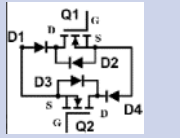
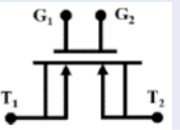
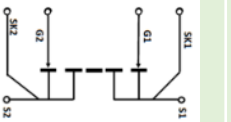


Bi-Directional GaNFast™ Power IC

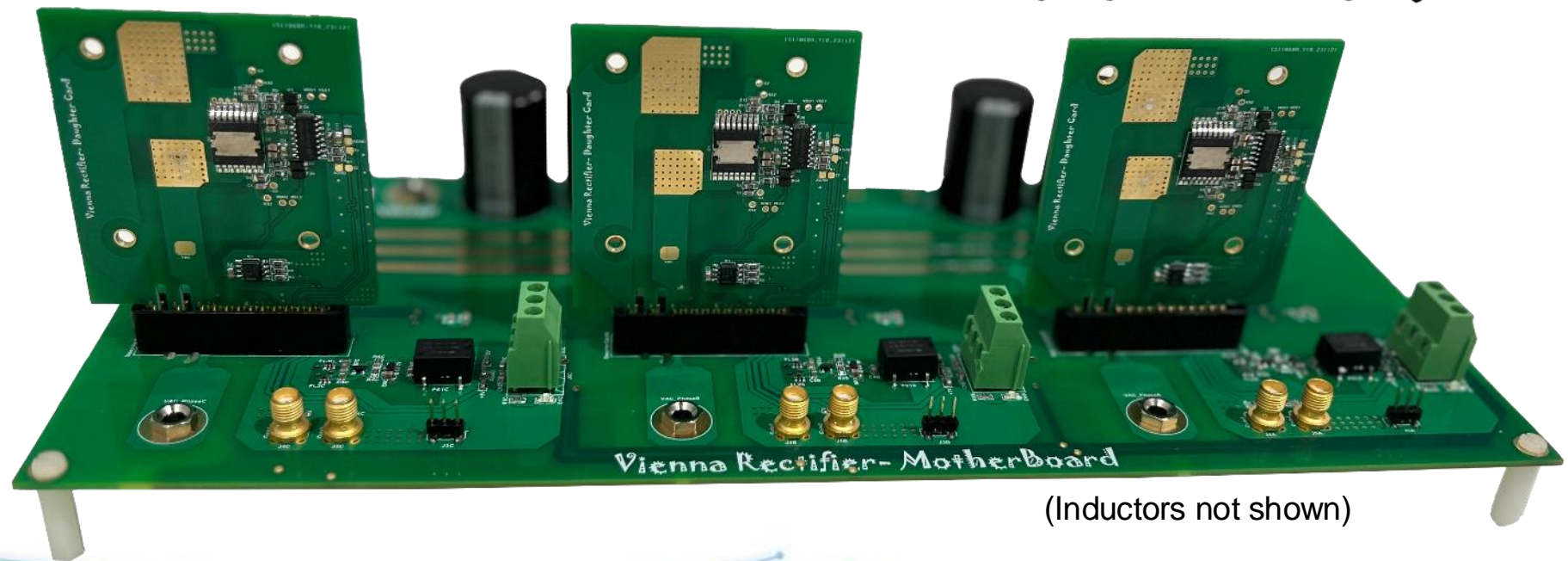
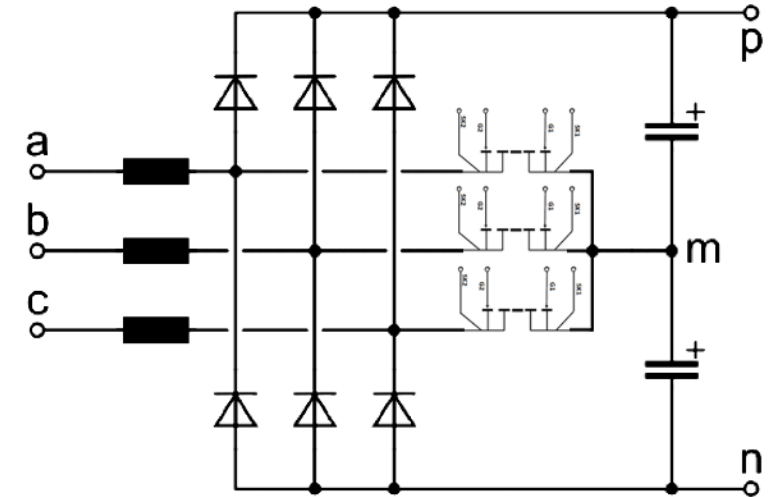
Unlock the Next Level of Performance



Extended technology comparison *

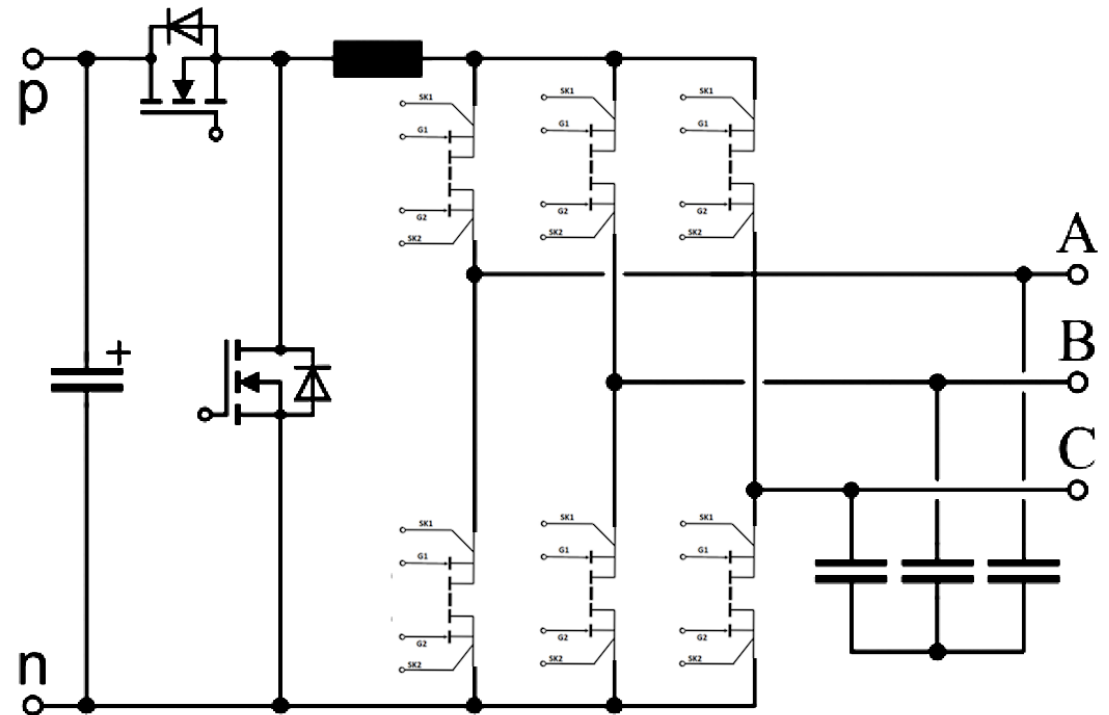
| Switch configuration | Description | Chip area / Size / Complexity | Number of components | ON-state voltage drop | Switching loss | Switching frequency | Gate control complexity |
|---|---|-------------------------------|----------------------|-------------------------------------|----------------|---------------------|-------------------------|
|  | Diode bridge + asymmetric IGBT | Very high | 5 | 3.5V [2 diodes + 1 IGBT] | High | 16kHz | Low |
|  | Asymmetric IGBT + freewheeling diodes | Very high | 4 | 2.5V [1 diode + 1 IGBT] | High | 16kHz | Low |
|  | Back-to-back reverse-blocking IGBTs | High | 2 | 2.0V [1 symmetric IGBT] | Very high | 8kHz | Medium |
|  | Si power MOSFETs + JBS diodes | High | 4 | 1.25V [1 diode + 1 MOSFET] | Low | 60kHz | Low |
|  | Back-to-back SiC power MOSFETs + antiparallel and series JBS diodes | Very high | 6 | 1.25V [1 diode + 1 MOSFET] | Low | 100kHz | Medium |
|  | Four-terminal SiC monolithic BiDFET | Medium | 1 | 0.5V [1 BiDFET] | Low | 100kHz+ | Medium |
|  | Monolithic bidirectional GaN power IC | Lowest | 1 | 0.5V [1 Bidirectional GaN power IC] | Lowest | 500kHz+ | Medium |

- Input: Universal AC, output: 800V (+/- 400 V)
- Switching frequency: 100 kHz
- Using GaNFast™ Bi-directional GaN in TOLT
- Very high efficiency and low complexity



Bi-Directional GaNFast™ Power IC in Current Source Inverter

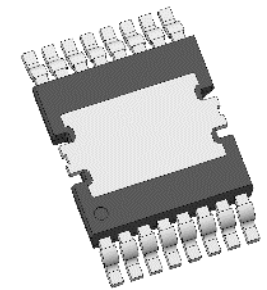
- Inherently sinusoidal output
- Very high switching frequency possible through further reduction of the switching losses
- Bi-directional power flow
- Potential to optimize motor size and cost, through lower inductance



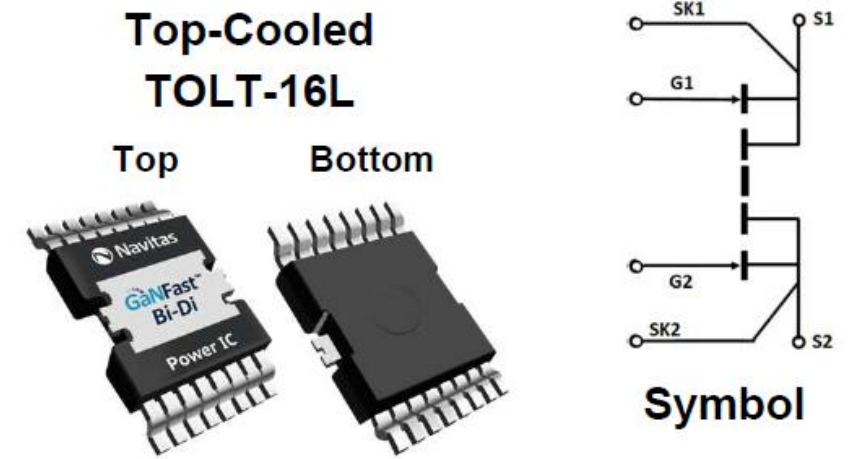
- Replacing electromechanical switches with a solid-state switch

Significant advantages for critical applications:

- No arcing
- No degradation from vibration or shock
- Much smaller size and weight
- Fast response time
- No moving parts → better reliability, switch cycles
- Handles AC or DC
- Low power remote control



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Navitas' GaNFast™ Bidirectional offers convincing solutions to enable new topologies for better performance and system cost savings

Discover more at
navitassemi.com

