Rethink Data Center Server Power Architecture: eGaN FETs and ICs Enable Single Stage Conversion

Data centers consume vast amounts of electrical energy. Operating power for these centers runs from megawatts to tens of megawatts.

Power conversion design today in the data center is focused on improving energy efficiency and reducing operation costs.

Buck conversion is a very economical way to convert 48 V to lower voltages data centers require.

While all levels of power conversion would benefit from wide bandgap semiconductors, the biggest impact on overall efficiency is at the lowest voltage. This is where eGaN® FETs as a switch for the control and rectifier functions in the 48 V Buck design have a huge advantage over MOSFETs and will significantly improve data center efficiency.

Benefits of eGaN FETs and ICs in 48 V Buck Converters:

- Increase output current while reducing size
- Ultra low $Q_{GD}$ and zero $Q_{RR}$ = efficient switching of high current and high voltage
- Wafer level package = low inductance, low noise, low cost
- High frequency switching = smaller, cheaper passives and faster transient response
- Ultra-low capacitance = high efficiency at light load

GaN Enables Single-Stage Conversion from 48 V to Point of Load

Traditional Multi-Stage Conversion: Intermediate Bus Architecture

<table>
<thead>
<tr>
<th>DC Bus 48 V</th>
<th>IBC</th>
<th>12 V</th>
<th>POL</th>
<th>1 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency Ratio with GaN</td>
<td>96% x 98% x 88%</td>
<td>≈ 83%</td>
<td>≈250 W/in$^3$</td>
<td></td>
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f$_{SW}$ = 300 kHz 550 W/in$^3$

Featuring eGaN FETs EPC2020 and EPC2021

Single-Stage Conversion: DC Bus Architecture

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Featuring eGaN FET EPC2105

Did You Know? ...

A single stage, GaN-based approach in telecom and datacom systems can yield higher power densities and lower system cost with similar system efficiencies.
APPLICATION BRIEF: AB009

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DC-DC Converter Handbook
DC-DC Power Conversion Application Page
EPC9041 - 80 V, 20 A Development Board
EPC9059 - High Power GaN Point-of-Load
EPC9115 - 500 W 1/8th Brick Converter
GaN Transistors for Efficient Power Conversion Textbook
Re-Thinking Server Design in the Age of GaN
GaN is Eyeing Silicon's Data Center Lunch
Demo Boards
Assembly Guides
Reliability Reports
Device Models

Note: Table data subject to change. Please refer to the Product section on www.epc-co.com.