

HVDC QFN-Packaged GaN Power Devices



High-voltage DC power conversion systems require Gallium Nitride (GaN) power devices that integrate gate drivers, protection circuits, sensing capabilities, and thermal management in compact, high-current packages. TI's HVDC QFN-packaged GaN portfolio spans 26mΩ to 230mΩ resistance range across 600V to 700V voltage classes, featuring integrated zero-current detection, zero-voltage detection, current-sense emulation, and complete half-bridge modules for demanding DC/DC converter applications.

These devices enable >2MHz switching frequencies with <100ns fault protection response times, integrated temperature monitoring through PWM output, and thermal pad-enhanced packages supporting up to 32A continuous current operation in HVDC converters, isolated DC/DC modules, and high-power battery management systems while eliminating 8 to 15 external components per switching node and enabling >95% conversion efficiency in telecom rectifiers, server PSUs, and industrial HVDC applications.

Product Portfolio

The following devices shown in Figure 1 represent TI's complete QFN GaN integration spectrum across both GaN FETs and half bridges, and across three power levels demonstrating scalable design approaches. These devices support multiple protection features along with LDO and current sensing integrations.

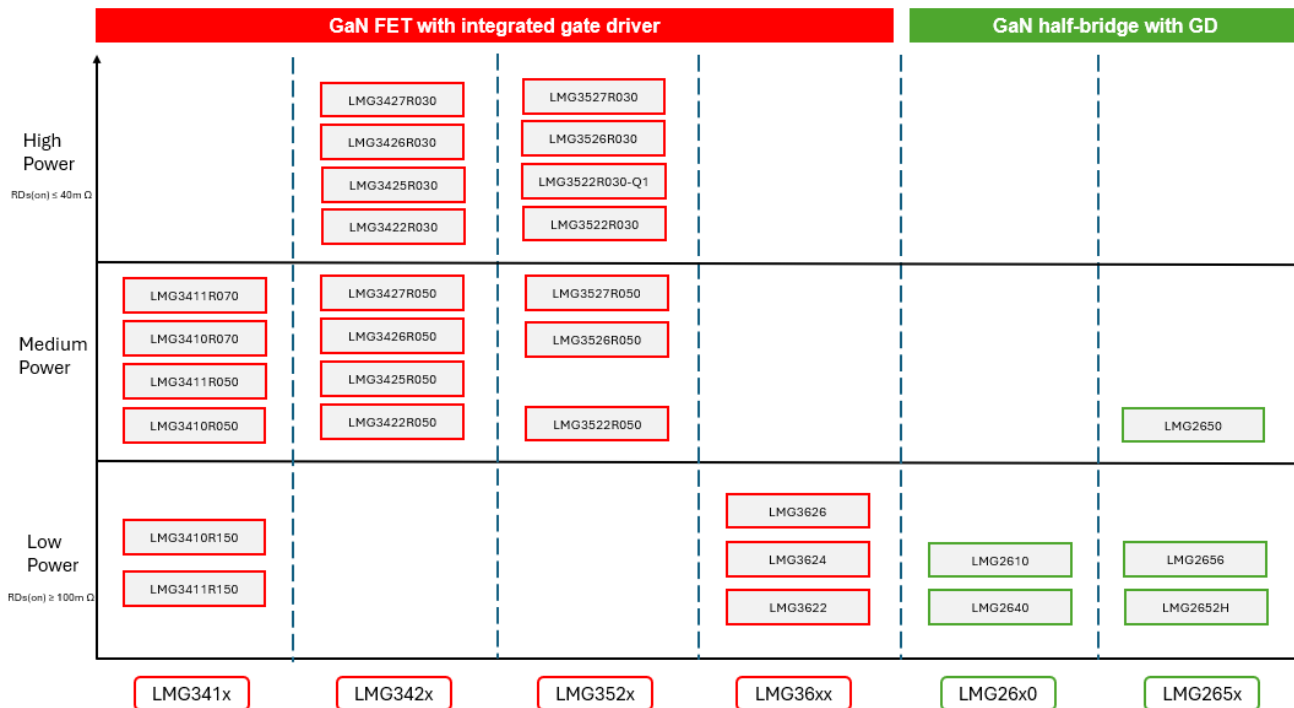


Figure 1. HVDC QFN - Portfolio

Major Features

1. Thermal-enhanced QFN packaging

- Large thermal pads provide RthJ-C as low as 0.28°C/W, with both top-side and bottom-side cooling options supporting 150°C junction operation in compact 5mm × 8mm to 12mm × 12mm footprints. Top-side cooling enables direct heat transfer to system heat sinks or airflow, reducing thermal resistance and enabling higher power density in space-constrained applications.

2. Low-parasitic QFN design

- Optimized lead frame geometry and shortened bond-wire lengths minimize package inductance, enabling high-frequency switching up to 3.6MHz with reduced EMI and ringing. The low-parasitic QFN structure is specifically designed to support high-frequency power conversion topologies and improved switching performance.

3. Integrated protection features

- Sub-100ns overcurrent protection with both cycle-by-cycle and latched modes, 720V surge withstand capability, overtemperature protection with ideal-diode mode, and UVLO monitoring enhance system reliability. Devices are qualified for JEDEC JEP180 hard-switching conditions, providing dependable operation in demanding industrial and automotive environments.

4. Complete system integration

- **Protection features:** Overcurrent, overvoltage, overtemperature, and UVLO monitoring
- **Current and Voltage Sensing:** Zero-current detection for soft-switching optimization, zero-voltage detection for resonant converters, and current-sense emulation eliminating external sense-resistor losses
- **Auxiliary Power and Control:** Internal buck-boost converter in D-mode devices for direct-drive gate drive capability, 5V or 50mA LDO for digital isolators and current sensors, PWM temperature monitoring, and integrated bootstrap circuitry for half-bridge designs
- **Reduced BOM:** High level of integration reduces the number of required external components compared to discrete implementations, simplifying system design

End Application Usage for Each Device

1. **LMG341x:** Industrial AC-DC, LED signage, notebook PC power adapters, servo drive power stage
2. **LMG342x:** Switch-mode power converters, merchant network and server PSUs, merchant telecom rectifiers, solar inverters and industrial motor drives, uninterruptible power supplies
3. **LMG352x:** Switch-mode power converters, merchant network and server PSUs, merchant telecom rectifiers, solar inverters and industrial motor drives, uninterruptible power supplies
4. **LMG36xx:** AC/DC adapters and chargers, mobile wall charger design, USB wall power outlet, auxiliary power supplies, SMPS power supply for TV, LED power supply
5. **LMG26X0:** AC/DC adapters and chargers, AC/DC USB wall outlet power supplies, AC/DC auxiliary power supplies, mobile wall charger design, USB wall power outlet
6. **LMG265x:** mobile wall charger design, USB wall power outlet, AC/DC auxiliary power supplies, motor drives

For more QFN-packaged GaN power devices, browse through the [online parametric tool](#), which supports sorting by desired voltage, RDSon, and other features.

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