

## 650-V GaN FET Features Integrated Driver And Enhanced Protection

[Tagore Technology's](#) TP44200NM is a 180-m $\Omega$  650-V GaN E-HEMT device with monolithically integrated driver and protection circuits in a compact 22-pin, 5-mm x 7-mm QFN package (see the figure). The monolithic integration of the driver minimizes inductance in the gate loop, enabling safe and clean switching even in high-voltage, high-frequency operation. A key differentiator for this part, which can also be described as a GaN power IC, is its built-in UVLO and dv/dt protection features. Unlike competing devices, the TP44200NM provides high dv/dt immunity even when the driver supply is not present.

With its low  $R_{DS(ON)}$  and fast switching, the enhancement-mode device enables a highly efficient, low-cost power converter solution in a small footprint for a variety of applications including USB-PD chargers, server and telecom ac-dc power supplies, and power factor correction (PFC) converters. The 180-m $\Omega$  on-resistance makes the TP44200NM well suited to the popular 65-W USB-PD chargers (adapters).

According to Amitava Das, CEO of Tagore Technology, the company also plans to introduce versions of this device with lower on-resistance for higher power applications. In the future, a 90-m $\Omega$  version will accommodate power levels up to 1000 W, while 70-m $\Omega$  and 30-m $\Omega$  devices will enable use of the device up to 7.2 kW, making the devices candidates for use in on-board chargers in EVs.

Meanwhile, the TP44200NM is designed to provide immunity against high dv/dt up to 200 V/ns. Typically, a driver circuit is designed to provide immunity against high dv/dt when the driver supply is present. But in the absence of the driver supply, dv/dt immunity is limited. However, the TP44200 is designed to provide the same immunity even when the driver supply is not present. This feature is critical when the chip is used as a high-side device where the supply is derived from a bootstrap circuit.

For example, in an active-clamp flyback (ACF) application, the very first turn-on of a low-side device will cause a high dv/dt across the high-side device which doesn't have a supply yet since the boot capacitor is not charged. Without this feature there would be undesirable shoot-through current from high side to low side.

Meanwhile, the UVLO circuit ensures that the power HEMT remains off until the supply voltage crosses the UVLO threshold. The device also has a feature to control slew rate with an external resistor. This is useful to mitigate EMI. The TP44200NM's 5-mm x 7-mm PQFN package complies with high-voltage creepage requirements and provides excellent thermal performance. For a full datasheet and samples email [powergan@tagoretech.com](mailto:powergan@tagoretech.com). Or for more information about Tagore Technology, see the company's [website](#).

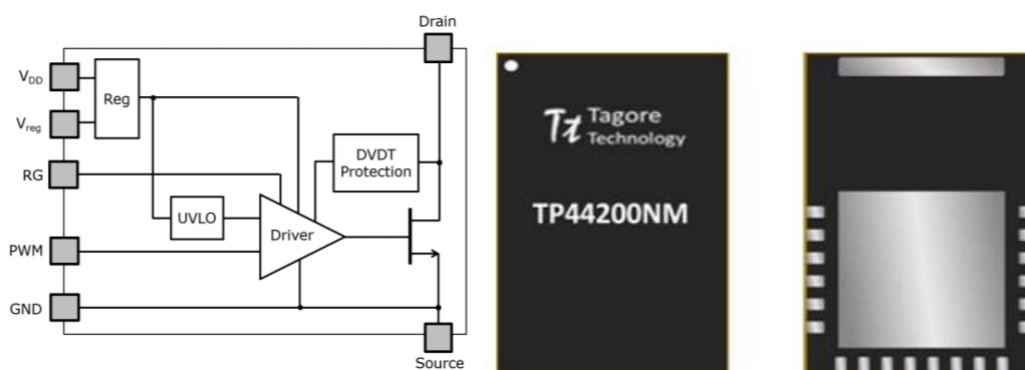


Figure. Along with the power FET and driver, the TP44200NM power IC features UVLO and high dv/dt immunity—with and without driver supply—all monolithically integrated on a GaN-on-Si substrate. The device has low propagation delay for high-frequency applications and slew rate control through an external resistor (also see the table below).

Table. Key specifications of the TP44200NM.

Part Number	$R_{DS(ON)}$	BV	$I_{DS}$	$T_{Prop\_Delay}$	$V_{CC}$	PWM	Package
TP44200NM	180 m $\Omega$	650 V	7.5 A	20 ns	7.5 V	6 V	5-mm x 7-mm QFN