



E-mode HEMT

Taiwan Semiconductor introduces 650V Enhancement Mode GaN Transistors which are packaged in thermally efficient PDFN packages with small 5x6 & 8x8 mm footprint. These GaN Transistor products meet today's high-power system requirements to achieve higher operating currents, higher efficiency, and smaller size and weight. The transistors, developed specifically for industrial, and renewable energy industries, feature the highest current GaN in production.

Key Features

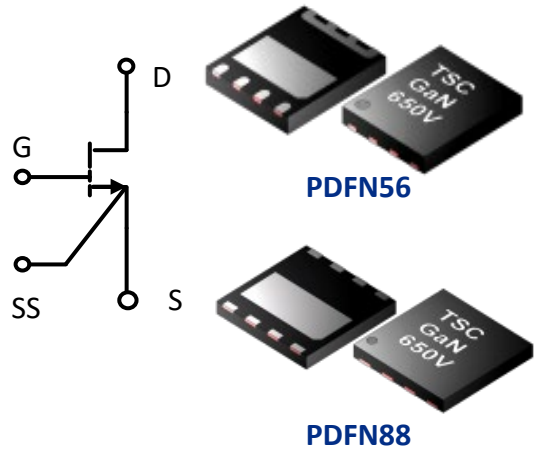
- True Enhancement mode
- Best FOM and performance
- No reverse recovery loss
- Easy to parallel

Applications

- Low voltage, high frequency, inverter
- DC/DC converter
- Freewheeling diodes
- Reverse battery protection
- Car lighting

Common with Si MOSFET

- True enhancement-mode: Normally off
- Voltage driven
- Easy slew rate control by external R_G
- Compatible with Si MOSEFT gate driver chip



Differences with Si MOSFET

- Lower Q_G : Lower drive loss / faster switching
- Higher gain and lower V_{GS} (+5V ~ 6V) to turn on
- Lower $V_{GS(th)}$: 1.5V (typ.)

Product Portfolio

Package	Part Number	V_{DS} (V)	V_{GS} (V)	$V_{GS(th)}$ (V)	ID (A)	$R_{DS(ON)}$ Typ. (m Ω)	$R_{DS(ON)}$ Max. (m Ω)	Q_g (nC)	Q_{oss} (nC)	Q_{rr} (nC)
PDFN88	TSG65N068CE	650	-10 / +7	1.1~ 2.6	30	50	68	6.7	61	0
PDFN88	TSG65N110CE	650	-10 / +7	1.1~ 2.6	18	78	110	4	37	0
PDFN88	TSG65N195CE	650	-10 / +7	1.1~ 2.6	11	150	195	2.2	19	0
PDFN56	TSG65N190CR	650	-10 / +7	1.1~ 2.6	11	150	190	2.2	19	0

* Max Tj =150 °C

Simple-driven for E-mode HEMT

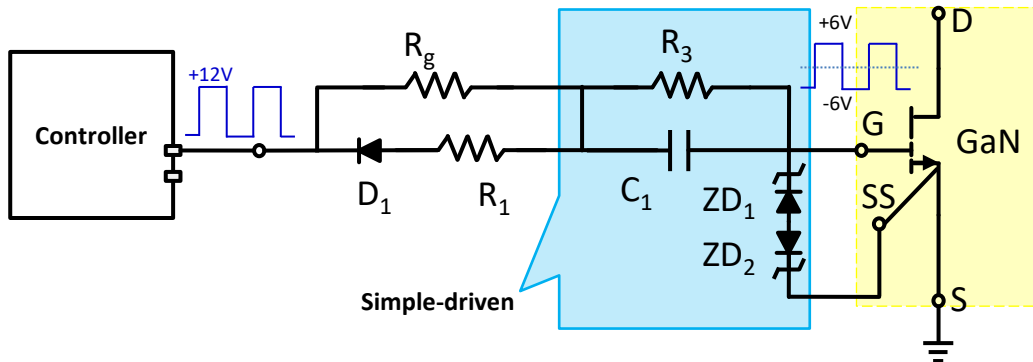
- Most Popular Solutions**

Gate Drivers for GaN device: ADuM4121ARIZ/ ACPL-P346/ NCP51820/ Si8271/ Si8273/ 4/ 5.

- Si MOS Driver Circuit Modification**

The driving voltage for Si MOSFET is usually 10V to 12V. It's easy to shift the voltage level to 6V for GaN Transistor by add 4 extra R, C, ZD components.

Gate Bias Level		GaN E-HEMT	Si MOSFET
Maximum rating		-10V / +7V	-20V / +20V
Typical value	Off	0V ~ -3V	0V
	On	+5V ~ 6V	+10V ~ 12V



Recommend Value

Symbol	Value	Footprint	Function	TSC product
R_3	~ 10 k Ω	0402 / 0603	Keep the driving voltage	
C_1	~ 47 nF	0402 / 0603	Hold negative voltage for turning off	
ZD_1	5.6V Zener	SOD923F / 0603	Clamp the positive gate voltage	TSZU52C5V6
ZD_2	9.1V Zener	SOD923F / 0603	Clamp the negative gate voltage	TSZU52C9V1

For more information or other products, please visit TSC website <https://www.taiwansemi.com/>