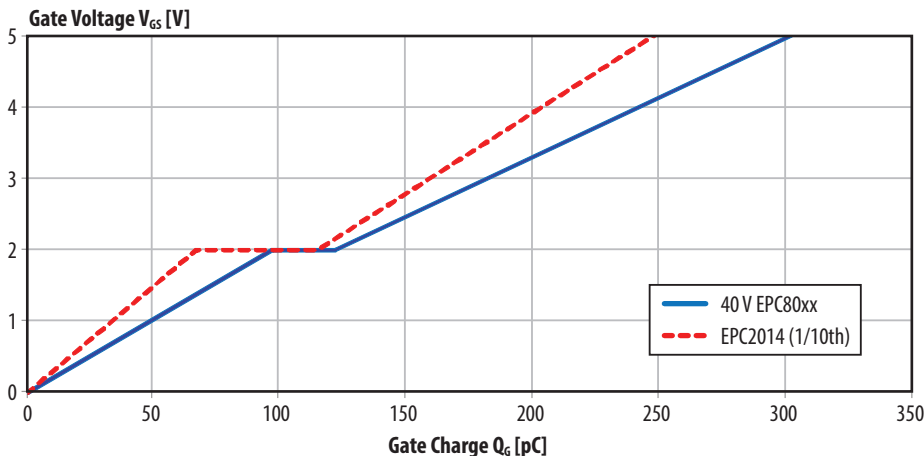


eGaN® FETs for Ultra-High Frequency Power Conversion

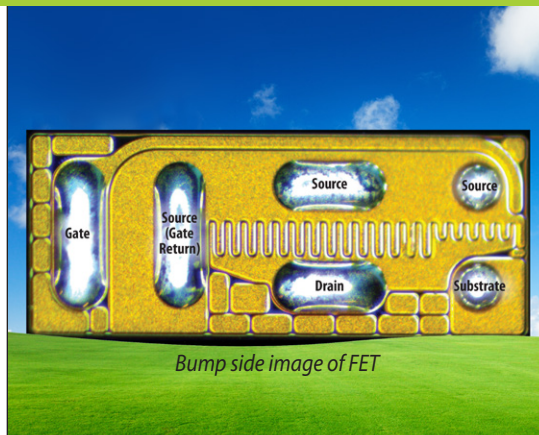


eGaN FETs Optimized for High Frequency Applications

Hard switching power conversion at 10 MHz and above requires both high speed eGaN FETs and a circuit that supports low common source inductance and power loop inductance. The ultra high speed capabilities and improved device pinout of the EPC8000 series of gallium nitride transistors enable this class of converters in applications such as envelope tracking and wireless power transmission. These eGaN FETs can achieve switching transition speeds in the sub-nano seconds range, and the gate drive loop and drain-source power path are designed for ultra low inductance.



Gate charge of the 40 V EPC80xx series device compared with the EPC2014 scaled to 1/10th of its active area.



Bump side image of FET

High Frequency Footprint

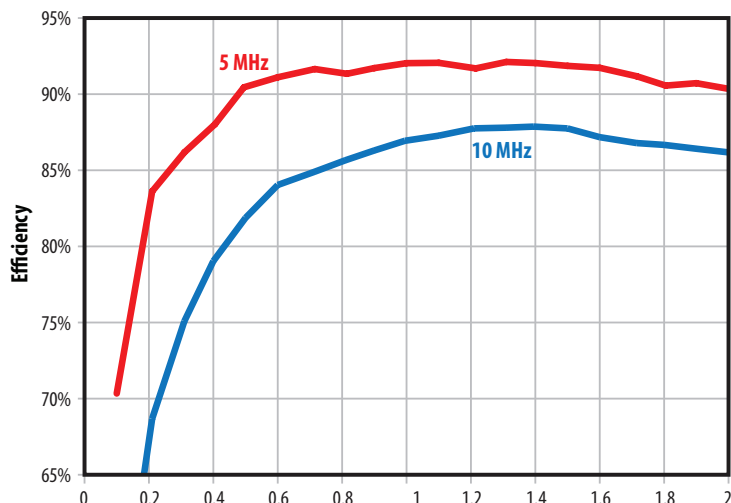
- Separate gate return (source) connection
- Low inductance gate connection
- High dv/dt immunity
- Orthogonal gate and drain circuit connections
- Low internal parasitic inductances
- Reduced Q_{GD} for faster switching

Design Example: 10 MHz Envelope Tracking Converter

42 V to 20 V, 40 W buck converter operating at 10 MHz

This family of devices is capable of greater than 10 MHz operation. Efficiency of both 5 MHz and 10 MHz operation is shown in the figure to the right.

With mobile communications traffic increasing by 70% in 2012 and over 10x by 2017, envelope tracking will provide a high efficiency RF solution. The eGaN FET, with very low propagation delay, and high frequency capability, and high efficiency is a key enabler of envelope tracking converters which dramatically increases RF power amplifier efficiency.



EPC8000 Product Family

This family of products is available in $R_{DS(on)}$ values from 110 mΩ through 480 mΩ, and three blocking voltage capabilities, 40 V, 65 V and 100 V.

Part Number	BV_{DSS} (V)	$R_{DS(on)}$ Max (mΩ) ($V_{GS} = 5V$, $I_D = 0.5 A$)	Peak I_D Min (A) (Pulsed, 25 °C, $T_{pulse} = 300 \mu s$)	Typical Charge (pC)					Typical Capacitance (pF) ($V_{DS} = BV/2$, $V_{GS} = 0 V$)		
				Q_G	Q_{GD}	Q_{GS}	Q_{OSS}	Q_{RR}	C_{ISS}	C_{OSS}	C_{RSS}
EPC8004	40	110	7.5	370	47	120	630	0	45	23	0.8
EPC8002	65	480	2	133	15	57	344	0	20	6.7	0.12
EPC8009	65	130	7.5	370	55	120	940	0	45	19	0.5
EPC8010	100	160	7.5	360	60	130	2200	0	43	25	0.3

* Preliminary Data - subject to change without notice

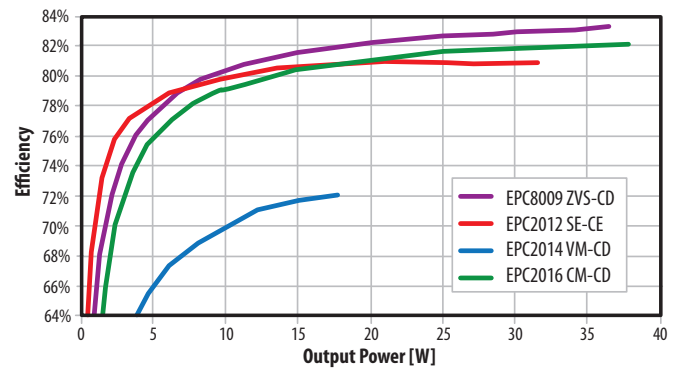
Design Example: Wireless Power Transfer

6.78 MHz Class D Wireless Power Transfer

One of the most exciting applications to emerge in the past few years is wireless energy transmission.

eGaN FETs, due to their ability to operate at high frequency, is an enabling technology for wireless energy transfer.

eGaN FETs enable the highest efficiencies in all topologies using 6.78 MHz and 13.56 MHz frequencies.



ZVS-CD = Zero Voltage Switched Class-D
 SE-CE = Single Ended Class-E
 CM-CD = Current Mode Class-D
 VM-CD = Voltage Mode Class-D

Applications

- 10 MHz power supply
- Envelope Tracking or Drain modulation in RF Power Amplifiers
- Class D or E wireless charging for tablets and laptops

More Information at epc-co.com

Application Note: Introducing Family of eGaN FETs for Multi-MHz Hard Switching Applications

EPC eGaN FET Product Line: epc-co.com/epc/Products/eGaNfets.aspx

eGaN FET Demo Boards: epc-co.com/epc/Products/DemoBoards.aspx

Device Models: epc-co.com/epc/DesignSupport/DeviceModels.aspx



For More Information

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