

eGaN® FETs and ICs for 48 V Buck Converters



Revised March 13, 2025

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

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.

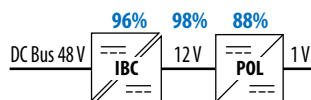
Power conversion design today in the data center is focused on improving energy efficiency and reducing operation costs.

Buck conversion is a very economical way to convert 48V 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.

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

Traditional Multi-Stage Conversion: Intermediate Bus Architecture

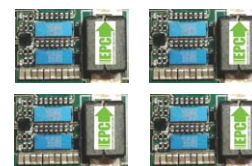


EPC9115 Demo Circuit


 $f_{sw} = 300 \text{ kHz } 550 \text{ W/in}^3$

Featuring eGaN FETs EPC2020 and EPC2021

EPC9059 Half Bridge Development Board

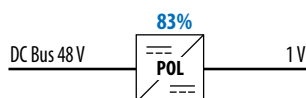

 $f_{sw} = 1 \text{ MHz } 500 \text{ W/in}^3$

Featuring eGaN FET EPC2100

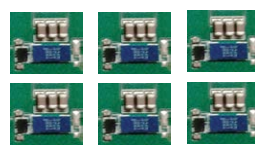
Efficiency Ratio with GaN

 $96\% \times 98\% \times 88\%$
 $\approx 83\%$
 $\approx 250 \text{ W/in}^3$

Single-Stage Conversion: DC Bus Architecture



EPC9041 Half Bridge Development Board


 $f_{sw} = 300 \text{ kHz } 500 \text{ W/in}^3$

Featuring eGaN FET EPC2105

Efficiency Ratio with GaN

 $\approx 83\%$
 $\approx 300 \text{ W/in}^3$

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.

Demo Circuits

Part Number	Description	V _{IN}	V _{OUT}	I _{OUT}	Featured Product
EPC9115	48 V to 12 V 1/8 th Brick Converter	48 V–60 V	12 V	42 A	EPC2020 EPC2021

Half Bridge Development Boards

Part Number	Description	V _{DS}	I _D (max RMS)	Featured Product
EPC9059	Half Bridge Parallel Evaluation for High Current Applications	30	50	EPC2100
EPC9041	Power Stage evaluation of monolithic GaN half bridge	80	20	EPC2105

Recommended Devices for 48 V Buck Converters

Part Number	Configuration	V _{DS}	Max R _{DS(on)} (mΩ) @ 5 V _{GS}	Q _G typ (nC)	Q _{GS} typ (nC)	Q _{GD} typ (nC)	Q _{OSS} typ (nC)	Q _{RR} (nC)	I _D (A)	Pulsed I _b (A)	Package (mm)	Development Board
EPC2102	Dual	60	4.9	8	2.5	1.5	26 31	0	30	220	BGA 6.05 x 2.3	EPC9038
EPC2031	Single	60	3	16	5	3	48	0	48	450	BGA 4.6 x 2.6	EPC9061
EPC2101	Half Bridge	60	11.5 2.8	3.3 13	1.1 3.9	0.5 2.2	9.3 45	0	10 40	80 350	BGA 6.05 x 2.3	EPC9037
EPC2103	Dual	80	5.5	6.5	2.2	1.1	30 34	0	30	195	BGA 6.05 x 2.3	EPC9039
EPC2065	Single	80	3.6	9.4	2.6	1.7	33	0	60	215	LGA 3.5 x 2	EPC90137
EPC2105	Half Bridge	80	14.5 3.6	2.7 11	0.9 3	0.5 2.1	11 51	0	10 40	70 300	BGA 6.05 x 2.3	EPC9041
EPC2252	Single – AEC-Q101	80	11	3.5	1	0.5	15	0	8.2	75	BGA 1.5 x 1.5	EPC9179
EPC2206	Single - AEC Q101	80	2.2	15	4.1	3	72	0	90	390	LGA 6.05 x 2.3	EPC90122
EPC2107	Dual with Sync Boot	100	390 3300	0.19 0.044	0.077 0.02	0.041 0.004	1.25 0.9 0.134	0	1.7 0.5	3.8 0.5	BGA 1.35 x 1.35	EPC9510
EPC2106	Half Bridge	100	70	0.73	0.24	0.140	3.96 4.68	0	1.7	18	BGA 1.35 x 1.35	EPC9055
EPC2051	Single	100	25	1.8	0.6	0.3	7.3	0	1.7	37	BGA 1.3 x 0.85	EPC9091
EPC2052	Single	100	13.5	3.5	1.5	0.5	13	0	8.2	74	BGA 1.5 x 1.5	EPC9092
EPC2104	Half Bridge	100	6.8	6.8	2.3	1.4	35 41	0	30	180	BGA 6.05 x 2.3	EPC9040
EPC2204	Single	100	6	5.7	1.8	0.8	25	0	29	125	LGA 2.5 x 1.5	EPC9097
EPC2306	Single	100	3.8	11.0		1.1	41	0	48	197	QFN 3 x 5	EPC90145
EPC2619	Single	100	3.3	8.3	2.1	1	27	0	29	164	LGA 2.5 x 1.5	EPC90153
EPC2088	Single	100	3.2	12.5	4.4	1.4	47	0	60	231	LGA 3.5 x 1.95	EPC90123
EPC2071	Single	100	2.2	18	6	1.8	71	0	64	350	LGA 4.45 x 2.3	EPC90146
EPC2302	Single	100	1.8	23	8	2.3	85	0	101	408	QFN 3 x 5	EPC90142
EPC2367	Single	100	1.2 (typ)	17	5.3	2.4	54	0	78	309	QFN 3.3 x 3.3	EPC90164
EPC2361	Single	100	1.0 (typ)	28	7.2	2.5	86	0	101	519	QFN 3 x 5	EPC90156

Note: Table data subject to change. Please refer to the Product section on epc-co.com/epc/Products/gan-fets-and-ics/



For More Information

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