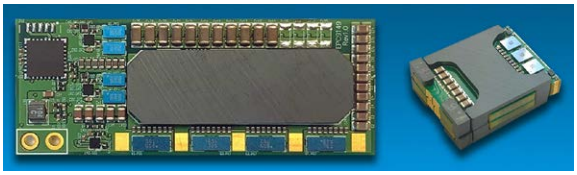
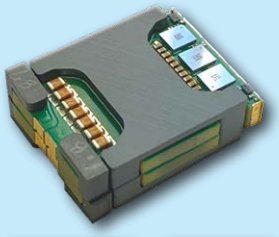
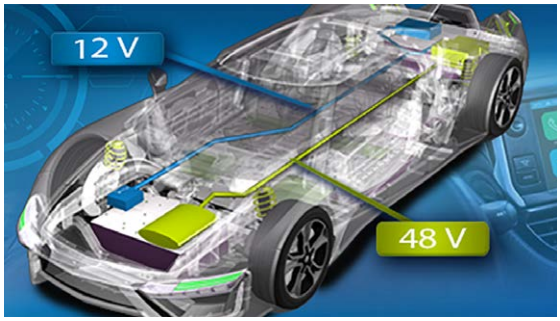
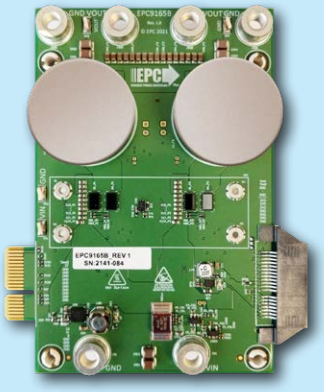
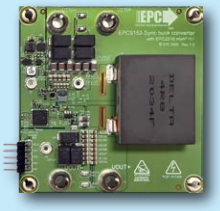
# eGaN® FETs and ICs for DC-DC Conversion

EFFICIENT POWER CONVERSION

| | DC-DC Power Conversion | eGaN Technology Solutions |
|---|---|---|
| **48 V – 12 V Power Converters with State-of-the-Art Power Density** |  <br>The smallest, most cost effective and highest efficiency non-isolated 48 V – 12 V converter, suitable for high-performance computing and telecommunication applications, can be achieved with eGaN FETs and ICs. | **EPC9159: 1 kW LLC, High Efficiency and High Power Density Evaluation Board**<br>- Peak efficiency: 98% at 25 A<br>- Full-load efficiency: 96.2% at 83 A<br>- High power density: 5130 W/in$^3$<br>- Tiny footprint: 17.5 x 22.8 mm<br>  <br>EPC2067<br>  <br>EPC2619 |
| **48 V – 12 V Power Converters Regulated Output, High Power** |  <br>Automotive electronics can now take full advantage of the improved efficiency, speed, smaller size, and lower cost of eGaN FETs and ICs. | **EPC9165: 2 kW 48 V/14 V, 140 A Bi-directional Power Module**<br>– High efficiency: 96.1% @ 14.3 V/140 A output(buck)<br>– Small size<br>– Designed switching frequency: 500 kHz<br>  <br>  <br>EPC2302 |
| **48 V – 12 V Power Converters Regulated Output, Medium Power** |  <br>Power conversion is at the core of reducing energy consumption of data centers. Highly efficient eGaN FETs and ICs enable the 48 V rack design adopted by Facebook and Google's Open Compute Project (OCP), cutting cloud data center energy bills. |  <br>**EPC9157**: 300 W $^1/_{16}^{th}$ Brick Module<br>  <br>**EPC9177:** 240 W Small Area, Low-profile, Synchronous Buck Converter<br>  <br>**EPC9148**: 48 V - 19 V Ultra-thin, Multi-level Converter<br>  <br>**EPC9153**: 250 W High Efficiency, Thin Buck Converter |

### DC-DC Conversion

| Part Number | Description | $V_{IN}$ | $V_{OUT}$ | $I_{OUT}$ | Featured Product |
|---|---|---|---|---|---|
| EPC9163 | Synchronous, buck or boost, digital controller | 20 – 60 V (1)<br>11.3 –16 V (2) | 5–16 V (1)<br>20– 50 V (2) | 140 A (1) | EPC2218 |
| EPC9165 | Synchronous, buck or boost, digital controller, QFN-packaged GaN FETs | 20 – 60 V (1)<br>11.3 –16 V (2) | 5 – 16 V (1)<br>20– 50 V (2) | 140 A (1) | EPC2302 |
| EPC9170 | Synchronous, buck, digital controller, GaN power IC | 20 – 60 V (1) | 5 – 16 V (1) | 140 A (1) | EPC23101, EPC2302 |
| EPC9174 | Small ($^1/_8$th Brick), LLC, fixed ratio 1:4, bi-directional, for servers | 48 – 60 V | 10 – 15 V | 100 A | EPC2071, EPC2066 |
| EPC9159 | Small, High-Power-Density, Bi-directional LLC, for servers | Partial power: 12 – 52 V<br>Through power: 9 – 40 V | 12 V | 83 A (PP) | EPC2619, EPC2067 |
| EPC9158 | Small, synchronous buck, analog controller | 14 – 54 V | 12 V | 50 A | EPC2218 |
| EPC90135 | Parallel, half-bridge (4 parallel FETs) | up to 80 V | up to 80 V | 45 A | EPC2218 |
| EPC9166 | Boost, analog controller | 9 – 28 V | Configurable:<br>36 V, 48 V, 60 V | 16 A @ 36 V<br>11 A @ 48 V<br>8 A @ 60 V | EPC2218 |
| EPC9157 | Small ($^1/_{16}$th brick), synchronous buck, analog controller, with motherboard | 18 – 60 V | 12 V | 25 A | EPC2218 |
| EPC9143 | Small ($^1/_{16}$th brick), synchronous buck, digital controller, with motherboard | 18 – 60 V | 12 V | 25 A | EPC2053 |
| EPC9151 | Small ($^1/_{16}$th brick), synchronous buck or boost, featuring Power Stage GaN IC, digital controller, with motherboard | 18 – 60 V (1)<br>12–15 V (2) | 12 V (1)<br>48 V (2) | 25 A (1)<br>5.5 A (2) | EPC2152 |
| EPC91108 | High power density Synchronous Buck | 20 - 32 V | 12 V | 21 A | EPC2055 |
| EPC9177 | Synchronous, Buck, digital controller, GaN power IC | 12– 64 V | 12 V | 20 A | EPC23102 |
| EPC9195 | High efficiency, small, single-phase, buck converter | 36 - 60 V | 13 V | 16 A | EPC2619 |
| EPC9160 | Dual output, analog controller, synchronous, buck | 9 – 24 V | Dual output:<br>5 V / 3.3 V | 15 A | EPC2055 |
| EPC91106 | High Power Density, Low Profile,Synchronous Buck and Boost Converter | 12 - 64 V | 4 - 40 V | 13 A | EPC23104 |
| EPC9153 | Thin, 1-phase buck | 44 – 60 V | 12 – 20 V | 12.5 A | EPC2218 |
| EPC9148 | Ultra-thin, multi-level, synchronous, buck | 44 – 60 V | 19 V | 12.5 A | EPC2053 |
| EPC9162 | Boost or buck, synchonous | 12 V (2)<br>48 V (1) | 60 V (2)<br>12 V (1) | 0.85 A (2)<br>5 A (1) | EPC2052 |

(1) Buck converter (2) Boost Converter

### ePower™ Stage

| Part Number | Configuration | Function | V | $I_{OUT}$ | $I_{OUT}$ Peak | $V_{DD}$ | Input Logic | Frequency (Max) | UVLO | Package (mm) | Development Board |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EPC2152 | Half-Bridge ePower™ Stage | ePower™ Stage | 80 | 12.5 | 90 | 12 | 3.3 V | 3 MHz | 7.5 | LGA 3.9 x 2.6 | EPC90120 |
| EPC23101 | HS FET + Driver + Level Shift | ePower™ Stage | 100 | 65 | 240 | 6 | 5.5 V | 3 MHz | 0.5– 4 | QFN 3.5 x 5 | EPC90142 |
| EPC23102 | HS FET + Driver + Level Shift | ePower™ Stage | 100 | 35 | 140 | 6 | 5.5 V | 3 MHz | 0.5– 4 | QFN 3.5 x 5 | EPC90147 |
| EPC23103 | HS FET + Driver + Level Shift | ePower™ Stage | 100 | 25 | 61 | 6 | 3.3 V or 5 V | 3 MHz | | QFN 3.5 x 5 | EPC90151 |
| EPC23104 | HS FET + Driver + Level Shift | ePower™ Stage | 100 | 15 | 44 | 6 | 3.3 V or 5 V | 3 MHz | | QFN 3.5 x 5 | EPC90152 |

### Recommended Devices and Development Boards for DC-DC Conversion

| Part Number | Configuration | $V_{DS}$ | Max $R_{DS(on)}$ (mΩ) ($V_{GS}$ = 5 $V_{GS}$) | $Q_G$ typ (nC) | $Q_{GS}$ typ (nC) | $Q_{GD}$ typ (nC) | $Q_{OSS}$ typ (nC) | Max. Peak Pulsed $I_D$(A) (25°C, Tpulse = 300 µs) | Package (mm) | Half-Bridge Development Boards |
|---|---|---|---|---|---|---|---|---|---|---|
| EPC2100 | Half Bridge | 30 | 8.2 /2.1 | 3.6 /15 | 1.3 /4.8 | 0.6 /2.7 | 6.1 / 29 | 100 /400 | BGA 6.05 x 2.3 | EPC9036 |
| EPC2023 | Single | 30 | 1.45 | 19 | 5.7 | 3.2 | 30 | 590 | LGA 6.05 x 2.3 | EPC9031 |
| EPC2014C | Single | 40 | 16 | 2 | 0.7 | 0.3 | 4 | 60 | LGA 1.7 x 1.1 | EPC9005C |
| EPC2055 | Single | 40 | 3.6 | 6.6 | 2.3 | 0.7 | 13 | 161 | LGA 2.5 x 1.5 | EPC90132 |
| EPC2030 | Single | 40 | 2.4 | 17 | 5.8 | 3.4 | 32 | 490 | BGA 4.6 x 2.6 | EPC9060 |
| EPC2067 | Single | 40 | 1.55 | 17.1 | 5.3 | 2.0 | 37 | 409 | LGA 2.85 x 3.25 | EPC90138 |
| EPC2057 | Single | 50 | 8.5 | 3 | 1.2 | 0.5 | 8 | 66 | LGA 1.5 x 1.2 | EPC90155 |
| EPC2101 | Half Bridge | 60 | 11.5 / 2.8 | 3.3 / 13 | 1.1 / 3.9 | 0.5 / 2.2 | 9.3 / 45 | 80 / 350 | BGA 6.05 x 2.3 | EPC9037 |
| EPC2031 | Single | 60 | 2.6 | 16 | 5 | 3.2 | 48 | 450 | BGA 4.6 x 2.6 | EPC9061 |
| EPC2020 | Single | 60 | 2.2 | 16 | 3.9 | 2.3 | 50 | 470 | LGA 6.05 x 2.3 | EPC9033 |
| EPC2252 | Single – AEC-Q101 | 80 | 11 | 3.5 | 1 | 0.5 | 15 | 75 | BGA 1.5 x 1.5 | EPC9179 |
| EPC2065 | Single | 80 | 3.6 | 9.4 | 2.6 | 1.7 | 33 | 150 | 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 | 70 / 300 | BGA 6.05 x 2.3 | EPC9041 |
| EPC2206 | Single – AEC-Q101 | 80 | 2.2 | 15 | 4.1 | 3 | 72 | 330 | LGA 6.05 x 2.3 | EPC90122 |
| EPC2106 | Half Bridge | 100 | 70 | 0.73 | 0.24 | 0.140 | 3.96 / 4.68 | 18 | BGA 1.35 x 1.35 | EPC9055 |
| EPC2007C | Single | 100 | 30 | 1.6 | 0.6 | 0.3 | 8.3 | 40 | LGA 1.7 x 1.1 | EPC9006C |
| EPC2051 | Single | 100 | 25 | 1.8 | 0.6 | 0.3 | 7.3 | 37 | LGA 1.3 x 0.85 | EPC9091 |
| EPC2016C | Single | 100 | 16 | 3.4 | 1.1 | 0.55 | 16 | 75 | LGA 2.1 x 1.6 | EPC9010C |
| EPC2052 | Single | 100 | 13.5 | 3.5 | 1.5 | 0.5 | 13 | 74 | BGA 1.5 x 1.5 | EPC9092 |

**Recommended Devices and Development Boards for DC-DC Conversion** *(continued)*

| Part Number | Configuration | $V_{DS}$ | Max $R_{DS(on)}$ (mΩ) ($V_{GS}$ = 5 $V_{GS}$) | $Q_G$ typ (nC) | $Q_{GS}$ typ (nC) | $Q_{GD}$ typ (nC) | $Q_{OSS}$ typ (nC) | Max. Peak Pulsed $I_D$(A) (25°C, Tpulse = 300 µs) | Package (mm) | Half-Bridge Development Boards |
|---|---|---|---|---|---|---|---|---|---|---|
| EPC2204 | Single | 100 | 6 | 5.7 | 1.8 | 0.8 | 25 | 125 | LGA 2.5 x 1.5 | EPC9097 |
| EPC2032 | Single | 100 | 4 | 12 | 3 | 2 | 66 | 340 | BGA 4.6 x 2.6 | EPC9062 |
| EPC2361 | Single | 100 | 1.0 (typ) | 28 | 7.2 | 2.5 | 86 | 519 | QFN 3 x 5 | EPC90156 |
| EPC2306 | Single | 100 | 3.8 | 11.0 | | 1.1 | 41 | 197 | QFN 3 x 5 | EPC90145 |
| EPC2088 | Single | 100 | 3.2 | 12.5 | 4.4 | 1.4 | 47 | 231 | LGA 3.5 x 1.95 | EPC90123 |
| EPC2619 | Single | 100 | 3.3 | 8.3 | 2.1 | 1 | 27 | 164 | LGA 2.5 x 1.5 | EPC90153 |
| EPC2071 | Single | 100 | 2.2 | 18 | 6 | 1.8 | 71 | 64 | LGA 4.45 x 2.3 | EPC90146 |
| EPC2302 | Single | 100 | 1.8 | 23 | 8 | 2.3 | 85 | 408 | QFN 3 x 5 | EPC90142 |
| EPC2033 | Single | 150 | 7 | 12 | 3.8 | 3.2 | 90 | 260 | BGA 4.6 x 2.6 | EPC9047 |
| EPC2308 | Single | 150 | 6 | 11 | 3.8 | 1.3 | 50 | 157 | QFN 3 x 5 | EPC90148 |
| EPC2305 | Single | 150 | 4 | 21 | 6.3 | 2.6 | 105 | 329 | QFN 3 x 5 | EPC90143 |
| EPC2234 | Single - AEC Q101 | 160 | 8 | 11 | 3.8 | 2.0 | 96 | 213 | BGA 4.6 x 2.6 | n/a |
| EPC2059 | Single | 170 | 9 | 5.7 | 1.3 | 0.9 | 35 | 102 | BGA 2.8 x 1.4 | EPC9098 |
| EPC2019 | Single | 200 | 50 | 1.8 | 0.6 | 0.35 | 18 | 42 | LGA 2.77 x 0.95 | EPC9014 |
| EPC2010C | Single | 200 | 25 | 3.7 | 1.3 | 0.7 | 40 | 90 | LGA 3.6 x 1.6 | EPC9003C |
| EPC2207 | Single | 200 | 22 | 4.5 | 1.3 | 0.7 | 23 | 54 | LGA 2.8 x 0.9 | EPC90124 |
| EPC2307 | Single | 200 | 10 | 10.6 | | 1.3 | 58 | 130 | QFN 3 x 5 | EPC90150 |
| EPC2215 | Single | 200 | 8 | 13.6 | 3.3 | 2.1 | 69 | 162 | LGA 4.6 x 1.6 | EPC9099 |
| EPC2304 | Single | 200 | 5 | 21 | 0.0 | 2.6 | 115 | 260 | QFN 3 x 5 | EPC90140 |

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