



## Efficient Power Conversion (EPC) and BrightLoop Converters Combine Design Expertise to Produce Smaller, Lighter Converters for Performance eMotorsport Vehicles

EL SEGUNDO, Calif. — December 2020 — [BrightLoop Converters](#) has greatly reduced the size, cost and improved reliability of its latest BB SP DC-DC buck converters thanks to Efficient Power Conversion Corporation's ([EPC](#)) EPC2029 enhancement-mode gallium nitride (eGaN®) FET transistors. By switching from silicon (Si) transistors to gallium nitride (GaN), BrightLoop was able to increase the switching frequency of their design from 200 kHz to 600 kHz, while keeping the same efficiency. This design change increased the power density of the solution by a factor of approximately two and this resulted in lower cost by enabling the implementation of a smaller enclosure.

EPC's [EPC2029](#) is an 80 V, 48 A eGaN® FET featuring a 1 mm ball pitch. The wider pitch allows for placement of additional and larger vias under the device to enable high current carrying capability despite the extremely small 2.6 mm x 4.6 mm footprint.

Compared to a state-of-the-art silicon power MOSFET with similar on-resistance, the [EPC2029](#) is much smaller and has many times superior switching performance, making it ideal for applications such as BrightLoop's high frequency BB SP DC-DC converter.

BrightLoop's converters are used primarily in motorsports and supercars with other applications including commercial and off-highway vehicles. Future higher power versions are coming next year to address the mild hybrid applications such as electrical starting assistance.

The BB SP is relevant in any dual voltage architecture (14 V / 48 V or 14 V / 24 V), or where a certain load is available only with a voltage that is different from the regular network (for example a 48 V pump on a 14V car), in which case the conversion can be done by the BB SP locally, just in front of the load.

To make the use of BB SP interesting, it needs to have negligible losses and weight compared with the rest of the system. This is possible thanks to EPC's eGaN FETs. For example, a 48V actuator plus BB SP using GaN can be lighter weight than the equivalent 12 V actuator.

Another important feature, thanks to BrightLoop's expertise in ultra-high speed digital control, is the ability to implement a closed control loop at 600 kHz, same as the switching frequency. The resulting bandwidth is so high, that very little capacitance is required. This has meant that electrolytic capacitors could be avoided, and only ceramic capacitors were used in the BB SP, reducing further the size and cost, while dramatically improving reliability.

Florent Liffra, CEO of BrightLoop Converters commenting on the development said, "BrightLoop Converters is excited to partner with EPC and to leverage their great expertise in GaN power transistors. Using EPC products has allowed us to design best-in-class solutions for automotive applications with converters that are drastically smaller and lighter than competition, such as the BB SP. We are proud to provide our customers with the best power conversion technologies on the market."

Wolfram Krueger, EPC's VP of Sales for EMEA added, "This is a great example of where our eGaN FETs demonstrate real advantage over silicon FETs by delivering performance in a significantly smaller package and the extreme reliability that is needed in these ultra-fast supercars. We are delighted to be working with BrightLoop Converters and are looking forward to working together on future applications."



## **About EPC**

EPC is the leader in enhancement-mode gallium nitride-based power management devices. EPC was the first to introduce enhancement-mode gallium-nitride-on-silicon (eGaN) FETs as power MOSFET replacements in applications such as [DC-DC converters](#), [wireless power transfer](#), [envelope tracking](#), RF transmission, [power inverters](#), [remote sensing technology \(lidar\)](#), and [class-D audio amplifiers](#) with device performance many times greater than the best silicon power MOSFETs. EPC also has a growing portfolio of eGaN-based integrated circuits that provide even greater space, energy, and cost efficiency.

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## **About BrightLoop Converters**

BrightLoop Converters is a leading French company in power electronics for top-performance applications. Addressing the needs of the harshest environments such as [motorsports](#), [defence](#), [aerospace](#) and [railways](#), BrightLoop Converters develops and manufactures high efficiency and high reliability power converters with the best power-to-weight ratio on the market. Already supplying first-class players in the most demanding hybrid and electric series such as Formula 1, [Formula E](#) or [ETCR](#), the goal for BrightLoop is more than ever to keep innovating and revolutionizing the world of power electronics. For more information, please visit: <https://www.brightloop.fr/en/> or follow us on [LinkedIn](#).

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