

Buck Regulators Deliver High Efficiency, Small Size For USB-PD Applications

[Silanna Semiconductor](#)'s SZPL3102A/3103A family of wide-voltage, high-frequency point-of-load converters targets USB-PD applications. Operating up to 2 MHz, these two buck regulators feature industry leading wide input and output range, according to the company, supporting up to 27-V input in a 3-mm X 3-mm QFN (Fig. 1).

Tim Wilhelm, director of marketing, commented, "Higher switching frequency means a smaller, lower cost output filter that has delighted the clients we have sampled. The SZPL3102/3103 have ground-breaking efficiencies (see Fig. 2) in the smallest size and weight designs. Our support tools give customers the flexibility and confidence to quickly increase the performance efficiency which ultimately increases the power density in their designs approaching 12% of the volume required by low-frequency competitive solutions (Fig. 3). The SZPL3102/3103 significantly reduce BOM cost, design cycles and time to market."

The SZPL3102A and SZPL3103A have unique features that optimize their performance in USB port power supply applications such as USB-PD and fast charging power adapters. Other applications include high power density dc-dc power supplies. Extremely low operating power dissipation enables very low no-load power that is an important specification for regulatory certification. Furthermore, the SZPL3102A contains a momentary internal feedback path that allows for clean and well controlled start-up operation until external USB-PD controllers can bias themselves and take over control of the converter's output voltage (see Fig. 4).

"At Silanna Semiconductor we have the mantra 'Power Management Re-Imagined' and this family of dc-dc converters is one more example, we approached the size cost challenge completely differently than our competitors," said Mark Drucker, CEO of Silanna Semiconductor. "Our design team increased the frequency to 2 MHz and maintained highest efficiency and power density which allowed unheard of size and cost reductions. We are witnessing some fantastic customer reactions, which have resulted in a large number of early design wins particularly in USB-PD applications."

Other features includes support for 18-W, 27-W, and 45-W up to 65-W PD-ports, 3.3-V to 21-V output at 3.25 A (covers USB-PD 3.0 and PPS applications), 8-V to 27-V input and dual-input LDOs (VIN and VOUT) for product bias, which optimizes overall efficiency.

The SZPL3102A/3103A devices are being sampled to key accounts and will be fully released before February 2021. More information is available at the company [website](#).

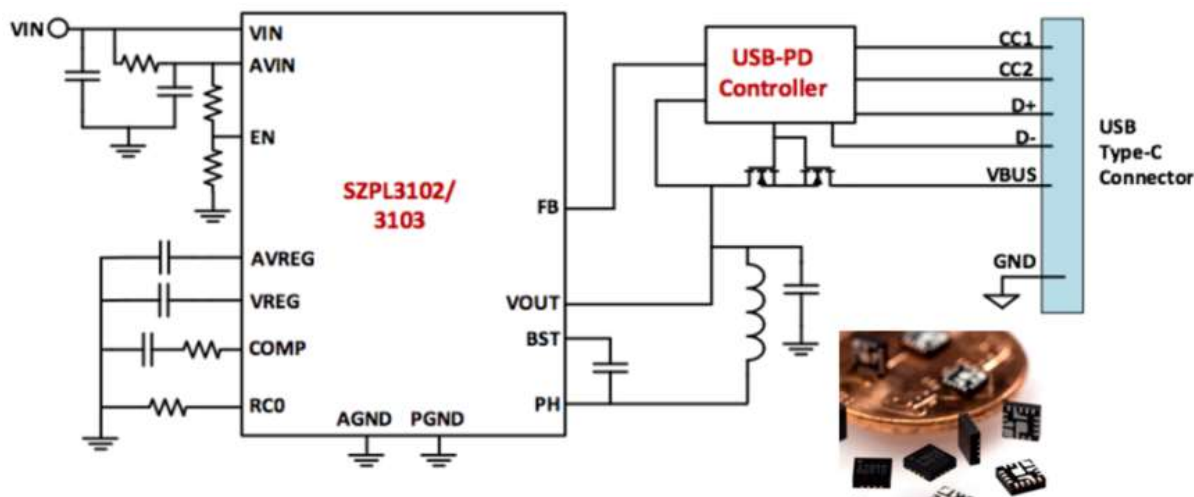


Fig. 1. The SZPL3102A is a fully integrated high efficiency synchronous buck converter intended to be paired with certain USB-PD controllers having their own feedback resistor divider. The SZPL3103A differs in that it requires an external feedback divider. Both devices are optimized for the highest efficiency performance, including dual input LDOs for self-bias, across a wide output voltage range. These converters are optimal for USB PD and fast charging including 18-W, 27-W, and 45-W up to 65-W USB PD ports. Samples of the converter ICs, which come in 3-mm x 3-mm QFNs, are pictured in the lower right hand corner of the figure.

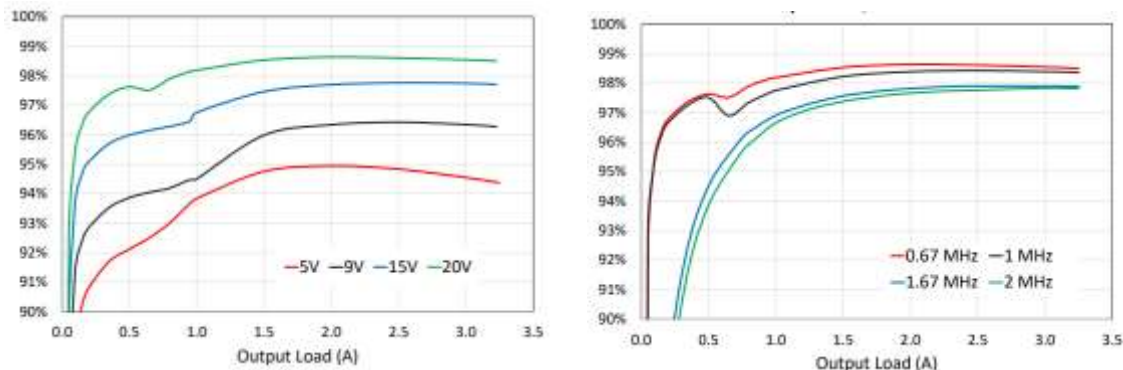


Fig. 2. The SZPL3102A/3103A achieve high efficiencies across the load range even at switching frequencies up to 2 MHz. The graph on the left shows converter efficiency at various output voltages, while the graph on the right shows efficiency at various switching frequencies with output set at 20 V.



	Competitor	Silanna Semiconductor
fsw	125 to 150 kHz	667 kHz to 2,000 kHz (4x to 16x)
Power FETs	+2 pcs NMOS Low Ron, Low Qg FETS	Fully Monolithic – No Additional FETs
Inductor	22 uH large toroid	Small molded inductor (1.8-4.7uH)
Output Cap	220 uF , electrolytic	<50 uF , MLCC's

Fig. 3. With the SZPL3102A and SZPL3103A buck converters, a dc-dc port design can be implemented in less than one-eighth the volume of competing buck converter solutions with comparable efficiency, according to the vendor.

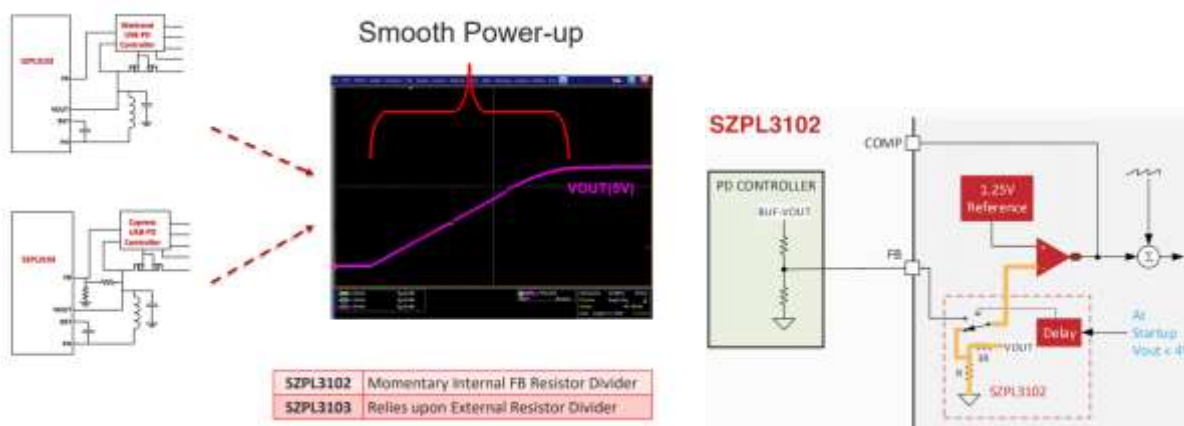


Fig. 4. The two versions of the regulator are architected for optimum power delivery (PD) performance. The SZPL3102A has a momentary internal feedback resistor divider allowing time for some port controllers to power up and smoothly take control of VOUT, while the SZPL3103 works with an external FB resistor divider for standalone operation and to allow operation with Cypress types of port controllers. The diagram on the right shows how on start-up, the regulator employs its internal feedback path to regulate its output voltage until the external PD controller powers up.