



Industrial 3D Printing

Factorized Power in a 3D Printer Application



Factorized Power



Small Size, Low Profile



Low Weight



Technical Support

The Customer's Challenge

Industrial 3D printer manufacturers are competing to increase file-to-finished-part speed and accuracy. A customer we were working with was exploring how they could make relatively small changes to their industrial 3D printer design to improve both speed and accuracy, without relying on a new, disruptive design of the whole system.

Working with Vicor FAEs, it became clear that changing the way the printer was powered could provide significant improvements. Print speed, for example, was limited by the transient response of the existing power system; and if there was a small and light enough power solution that could be placed on the print head itself print precision could be improved.

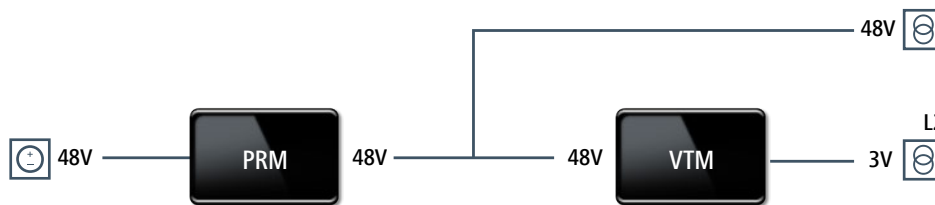
The power supply should be able to support the dynamic loading resulting from the various positioning motors in the system.



The Solution

A solution based on Vicor's Factorized Power Architecture (FPA) was implemented, with a PRM regulator module (weighing 15g; measuring 32.3 x 21.8 x 6.48mm) and a VTM current multiplier at the point-of-load (weighing 14.5g; measuring 32.3 x 21.8 x 6.48mm).

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The Results

With FPA the DC power distribution bus is regulated by a pre-regulator module (PRM), and then the voltage is isolated and stepped down at the point of load by a voltage transformation module (VTM).

The FPA approach offers a number of solutions to challenges faced by power system designers. In this application the ability to separate the functions of a traditional DC-DC converter enabled the placement of the PRM (the regulation) away from the print head, and the VTM could be placed at the point-of-load to minimize size and weight of the power solution at the print head. Locating the VTM close to the load improved voltage regulation and the speed of response of the print head.

Product Family Key Specifications

PRM™ Regulator Module

Input Voltages	48V, (36 – 75V)
Output Voltage	48V
Output Power	Up to 600W
Efficiency	Up to 97%
Dimensions	32.5 x 22.0 x 6.73mm

VTM™ Current Multiplier

Input Voltages	0 – 60V
Output Voltage	0 – 55V
Output Power	Up to 135A
Efficiency	Up to 96%
Dimensions	32.5 x 22.0 x 6.73mm