

Self-Contained 3A μ Module Buck Regulator Produces 0.8V–24V Output from 3.6V–36V Input

by David Ng

Introduction

Ask any group of engineers, “What would you do with a 3A DC/DC converter?” and you will probably get a wide range of answers—from powering a DSP rail at 1.8V to running a bank of 24V switching I/O. Typically, these two particular applications would require completely different DC/DC controller ICs and topologies. However, the LTM8025 μ Module DC/DC converter can satisfy the requirements of these and just about any other 3A applications.

The LTM8025 3A μ Module DC/DC buck converter operates from 3.6V to 36V inputs to produce output voltages as low as 0.8V and as high as 24V. Furthermore, the LTM8025 features single cycle Burst Mode[®] operation, so it is able to handle a wide range of load currents, from no load to 3A, with minimum ripple.

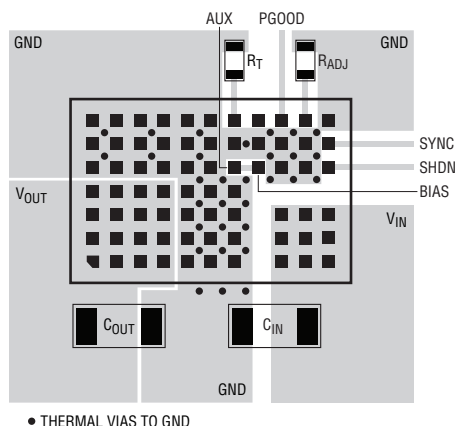


Figure 1. Layout is easy with the LTM8025.

The LTM8025 integrates the controller, control circuitry, inductor, power switch and rectifier all into a single IC form factor 15mm \times 9mm \times 4.32mm package. This LGA package is RoHS (e3) compliant, and features gold pads for easy assembly in both leaded and unleaded solder processes.

Easy Layout

The LTM8025’s high level of integration simplifies the design of just about any 3A power supply. Just add two resistors, input and output capacitance to make a complete power supply. Layout is easy, as shown in Figure 1. Figures 2 and 3 show the schematic and efficiency of the LTM8025 producing 12V bus power from a 24V source, while Figure 4 shows the LTM8025 producing 1.8V from an input range of 3.6V to 36V.

Versatile Feature Set

The LTM8025 may be operated over a wide frequency, from 200kHz to 2.4MHz, and may be synchronized to an external clock source through the SYNC pin. The LTM8025 start-up is controlled through its RUN/SS pin, which also serves to put the part into

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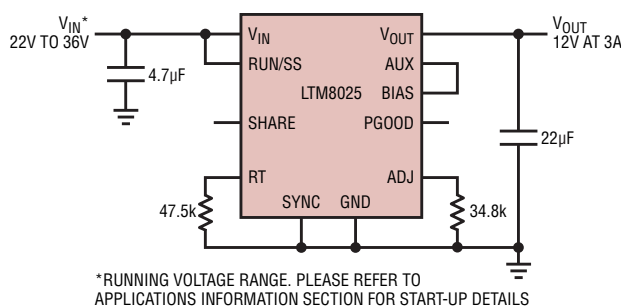


Figure 2. A complete 12V at 3A power supply requires only the LTM8025, two capacitors and two resistors.

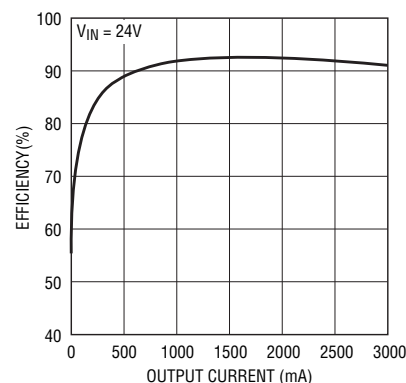


Figure 3. The LTM8025 boasts high efficiency.

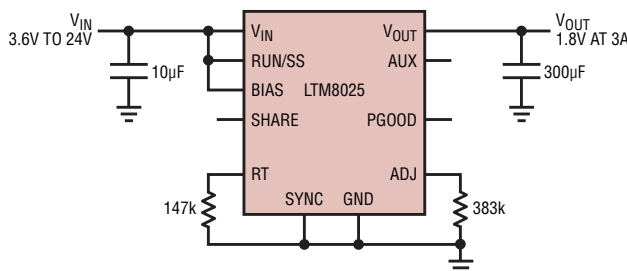


Figure 4. The LTM8025 can produce low voltages from a wide input range.

The LT4356-2 is offered in 12-pin DFN and 16-pin SO packages, while the LT4356-3 is available in 12-pin DFN, 16-pin SO, and 10-pin MSOP packages.

Dual Output Synchronous DC/DC Controller Draws Only 170µA in Battery-Powered Systems

The LTC3868/-1 is a low quiescent current, 2-phase dual output synchronous step-down DC/DC controller. The LTC3868/-1 draws only 170µA with one output active and only 300µA when both outputs are active, making it ideal for battery-powered applications. With both outputs shut down, the LTC3868/-1 draws only 8µA. The LTC3868/-1 has an input supply range of 4V to 24V and each output can be set from 0.8V to 14V at output currents up to 20A. With efficiency as high as 95%, a LTC3868/-1 based DC/DC converter is well suited for powering industrial and medical devices, along with portable instruments, notebook and netbook computers.

The LTC3868/-1 operates with a user-adjustable, fixed frequency between 50kHz and 900kHz, and


can be synchronized to an external clock from 75kHz to 850kHz using its phase-locked-loop (PLL). The user can select from continuous operation, pulse-skipping and low ripple Burst Mode operation during light loads. These parts also safely start up with a prebiased load by powering up and down in pulse-skipping mode.

The LTC3868/-1's 2-phase operation reduces input capacitance requirements and its current mode architecture provides easy loop compensation and fast transient response. Both outputs have adjustable soft-start to control the turn-on time, and the output overload protection feature latches off the converter until the input voltage is recycled. The LTC3868/-1 also features a tight $\pm 1.5\%$ reference voltage accuracy over a -40°C to 85°C operating temperature range. The LTC3868 is the fully featured part with additional functions beyond the LTC3868-1 including a clock out, phase modulation, two power good outputs and adjustable current limit.

The LTC3868 is offered in a 32-lead 5mm \times 5mm QFN package and the

LTC3868-1 in a 28-pin SSOP or 4mm \times 5mm QFN-28 packages.

Boost & Inverting DC/DC Converter for Active Matrix OLED & CCD Bias

The LT3582, LT3582-5 and LT3582-12 dual channel DC/DC converters that deliver both positive and negative outputs required in many biasing applications such as active matrix OLED (organic light-emitting diode) displays as well as CCD (charge coupled device) applications. The LT3582/-5/-12 offer an I²C interface that can dynamically program output voltages, power sequencing and output voltage ramps as the application requires. Alternatively, these parameters can be set in manufacturing and made permanent via the built in nonvolatile OTP (one time programmable) memory. The LT3582's positive output voltage can be set between 3.2V and 12.775 in 25mV steps, whereas the negative output can be set between -1.2V and -13.95V in 50mV steps. The LT3582-5 and LT3582-12 are pre-configured with $\pm 5\text{V}$ and $\pm 12\text{V}$ outputs respectively, useful in many signal conditioning applications. 


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a low power off state in which the part draws less than 1µA. Furthermore, the part comes with a PGOOD pin to indicate that the output is within 90% of its target voltage.

Parallel Multiple LTM8025s for High Current Capability

The LTM8025 is equipped with a SHARE pin to allow parallel operation for applications requiring more than 3A load current. Figure 5 shows two synchronized LTM8025's providing 2.5V_{OUT} at 5.6A.

Conclusion

The highly versatile LTM8025 3A µModule DC/DC buck converter is easy to use and fits just about any step-down regulator need. Its wide input and output ranges and high level of integration reduce design effort and associated costs. 

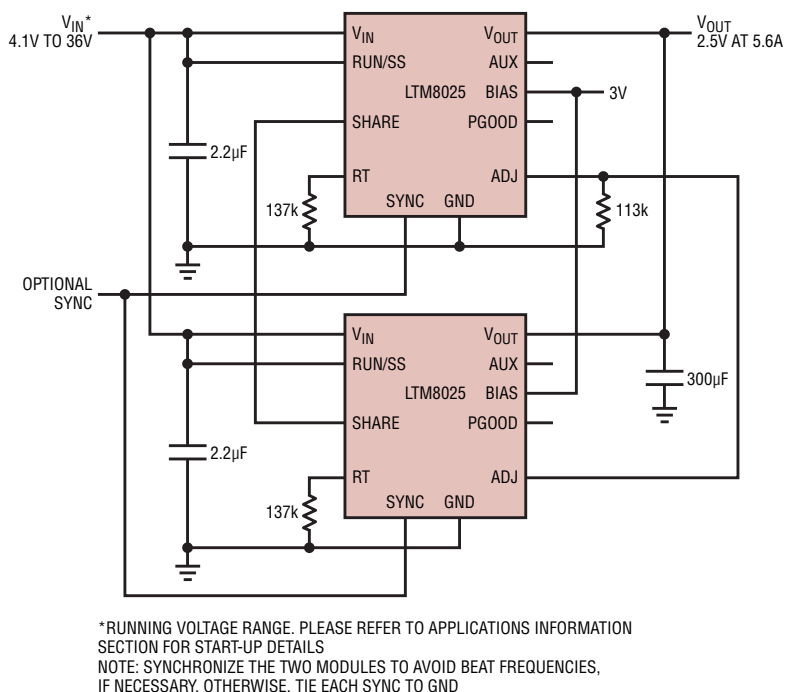


Figure 5. Two LTM8025s can be operated in parallel for more than 3A load current.