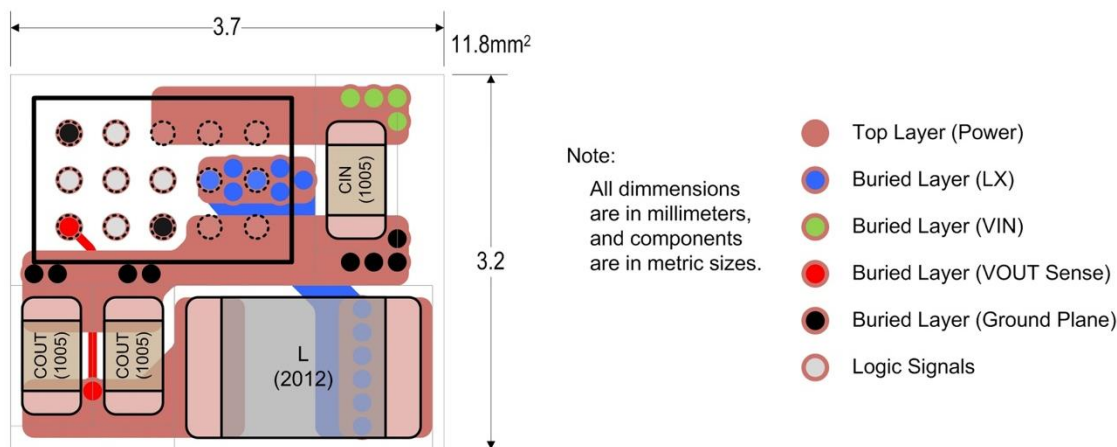


KTB8400 – OptiComp™ Delivers Superior Performance for Adaptive On-time (AOT) Control

Kinetic Technologies’ latest breakthrough solves some of the biggest challenges in buck regulator design with its new OptiComp™ architecture. This groundbreaking technology combines fast transient response, fixed frequency operation, current sharing capability and no-brainer compensation using an improved adaptive on-time (AOT) control scheme. The parts are available in wafer level packaging with very few external components for the smallest possible solution and deliver the best price/performance ratio in the industry.

In recent years there has been a major shift in the buck regulator market toward adaptive on-time (AOT) control due to simplicity of design, high performance, low cost, and small size. While traditional AOT regulators offer great transient response and are simple to compensate, two major trade-offs exclude their use in many applications. Variation in switching frequency and reduced output accuracy, especially at light load, are synonymous with today’s AOT parts. Even with these limitations, the popularity of AOT regulators has skyrocketed with increasingly creative control schemes emerging, incrementally improving operating specs. OptiComp™ provides a unique approach that finally eliminates the remaining compromises for designers who want to take advantage of the benefits of AOT control.



Kinetic Technologies’ buck regulator integrates our new OptiComp™ control scheme, leveraging the strengths of AOT while solving the traditional drawbacks associated with an adaptive on-time architecture. The OptiComp™ regulator uses an ultra-fast recovery phase-locked loop (PLL) to fix the switching frequency of the regulator and an integrator to improve output voltage accuracy.

There are a few major issues associated with AOT control. When using a fixed on-time regulator, the buck regulator’s switching frequency inherently shifts with line and load changes. Many systems are noise sensitive and are unable to tolerate these variations in frequency. Another common drawback in today’s AOT regulators is that there can be a change in output voltage when the regulator shifts into skip mode during light load operation. Designs requiring high accuracy can’t accept this change in output voltage, which can be as much as 40-50mV in some of the most popular AOT parts on the market. Additionally, it is difficult to get multiple AOT regulators to share current, as is often required in high current applications.

Improved Adaptive On-time (AOT) Control Using OptiComp™

The engineering team at Kinetic Technologies has developed an improved AOT control architecture that solves the issues associated with AOT by combining a phase-locked loop (PLL) for fixed frequency operation and an integrator, for improved output accuracy and current sharing. One key feature of OptiComp™ is that it employs a patented ultra-fast acting PLL. This is important during a load transient event, when the PLL releases control of the regulator to optimize output slew rate. Once the transient event has settled, the OptiComp™ PLL circuit re-establishes control over switching frequency in a mere 2-3 switching cycles. Not many AOT regulators on the market incorporate a PLL, but the few that do typically take about 50 cycles to lock back in synch. The fast-reacting PLL allows OptiComp™ regulators to take advantage of AOT’s fast transient response, while holding the switching frequency steady during normal operation. This eliminates the frequency shift issue, which is a big disadvantage in typical AOT regulators. Lab measurements (below) show only +/-0.2% frequency shift over the entire load range for our premier OptiComp™ KTB8400 product.

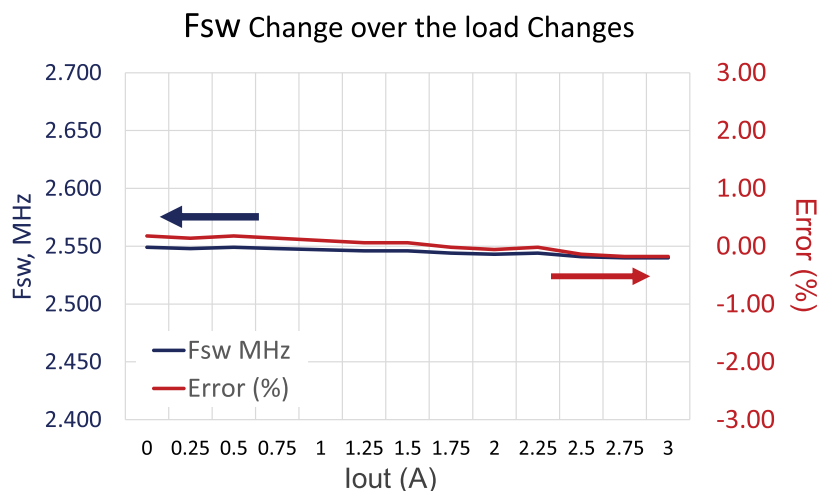


Figure 1. FSW Change Over the Load Changes

At light load a buck regulator will normally transition from pulse-width modulation (PWM) to pulse-frequency modulation (PFM) to maintain high efficiency. This change in operating mode typically results in a shift of 30-40mV on the output voltage, which can be an unacceptable deviation in many applications. Kinetic Technologies’ latest OptiComp™ regulator will maintain a consistent and accurate output voltage while shifting between PWM and PFM mode, which is a differentiating factor when deciding which regulator to choose for your design.

Coming soon, Kinetic’s complete family of OptiComp™ buck regulators will allow for current matching between parallel switchers. This enables our fast transient, AOT regulators to be used in higher current applications. These regulators are integrated in WLCSP (super small sized) packages and require very few external components making for a tiny footprint. The largest external component is typically the power inductor, which is kept as small as possible using a high switching frequency, e.g. 2.4MHz for the KTB8400. The parts have a 1MHz digital I²C interface to program operating parameters and read status registers, further reducing the need for external, discrete programming components.

For applications with 3.3V or 5V input, the KTB8400 buck regulator is an excellent choice for designs requiring up to 3A. The KTB8400 and entire family of OptiComp™ products will soon be available from our catalog distribution partners at DigiKey and Mouser. More information on the part can be found on the Kinetic Technologies website at <https://www.kinet-ic.com/ktb8400/> and our application engineers are also available to help with your development.

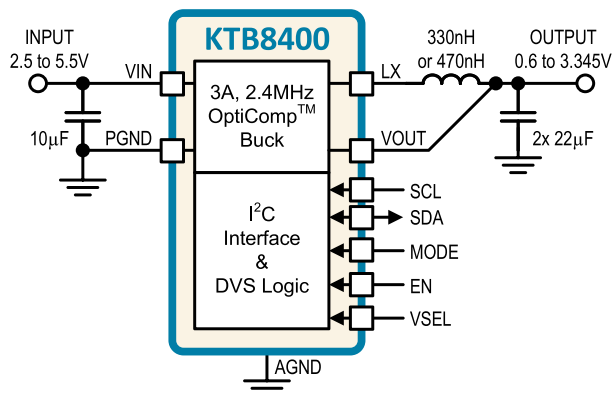


Figure 2. KTB8400 Typical Application Diagram

For applications where 5V or 12V input, the KTB8370* buck regulator will provide up to 5A output current. These parts are reading available through Mouser <https://www.mouser.com/c/?q=ktb8370> and an evaluation board can be ordered for engineering analysis in your lab. More information on the part can be found on the Kinetic Technologies website at <https://www.kinet-ic.com/ktb8370/> and our application engineers are also available to help with your development.

*KTB8370 is not an OptiComp™ product.