

# Zero-Current-Switching

## Overview

The heart of Vicor’s module technology, zero-current-switching, allows Vicor converters to operate at frequencies in excess of 1 MHz, with efficiencies greater than 80% and power densities ten or more times those of conventional converters.

## Lossless Energy Transfer

Switch turn-on of the MOSFET switch transfers a quantized energy packet from the input source to an LC “tank” circuit, composed of inherent transformer leakage inductance of T1 and a capacitive element, C, in the secondary. Simultaneously, an approximately half-sinusoidal current flows through the switch, resulting in switch turn-on at zero current and turn-off when current returns to zero. Resonance, or bidirectional energy flow, cannot occur because D1 will only permit unidirectional energy transfer. A low-pass filter (Lo, Co) following the capacitor produces a low ripple DC output. The result is a virtually lossless energy transfer from input to output with greatly reduced levels of conducted and radiated noise.

*1st Generation  
Zero-Current-Switching  
Block Diagram*

