



Simplifying the design of high-efficiency resonant power supplies

TEA1916/TEA1995 Digital LLC Platform

NXP's TEA1916 and TEA1995 IC combination helps you significantly reduce the design complexity of high-efficiency resonant power supplies while meeting ever-tougher regulations. Offering a high level of digital integration and control, this new LLC platform delivers a significant advance over previous topologies, resulting in high efficiency over the complete load range.

KEY FEATURES

- ▶ TEA1916 DCM PFC + LLC resonant controller
 - Multi-mode operation for superior efficiency at lower loads
 - Excellent no-load (standby) power
 - Meets EuP Lot 6 requirements with significant margin
 - No need for auxiliary (standby) power supply
 - Capacitive Mode Protection, OCP, OPP and many other protections
 - Integrated high-voltage startup, drivers and level shifter
 - Adaptive non-overlap time
- ▶ TEA1995 dual SR controller
 - Adaptive gate drive for maximum efficiency at any load
 - No-load supply current <math><200 \mu\text{A}</math>
 - Wide supply voltage range (4.5 to 38 V)
 - Switching frequency up to 500 kHz
 - No minimum on-time
 - Adaptive gate drive for fast turn-off at end of conduction

KEY APPLICATIONS

- ▶ Desktop, server and all-in-one PCs
- ▶ Gaming consoles
- ▶ TV and monitor power supplies (Ultra HD, 4K)
- ▶ Notebook adapters
- ▶ Lighting applications up to 350 W

The TEA1916 and TEA1995 ICs provide integrated digital control for easy and robust design of high efficiency resonant

power supplies with excellent no-load power. The solution maximizes light-load efficiency without adding cost for additional switching circuitry.

The result is a cost-effective design that meets current and upcoming regulations (Energy Star v6, CoC tier 2, 80+ Platinum) and government guidelines, including US Department of Energy (DoE) and the European Union's Ecodesign Directive.

Our digital platform combines PFC and LLC resonant technology with synchronous rectifier (SR) control with adaptive gate drive. Compared to a flyback topology, the LLC resonant topology makes it easier to meet requirements for Common Mode noise and 200 percent peak power.

The overall system guarantees increased efficiency over the entire load range due to NXP's patented Cycle-by-Cycle/ V_{CAP} control. It also delivers excellent performance at low and standby power so it complies with new regulations and reduces system cost. Two features in particular make the new LLC platform superior to over previous topologies: variable operating modes and cycle-by-cycle capacitive voltage V_{CAP} control.

VARIABLE MODES

Three operating modes—burst, low power, and high power—allow selection of the best mode for each combination of power and control voltage, resulting in higher efficiency. To ensure less acoustic noise, burst and low-power modes operate at lower loads and use switching frequencies that are outside the audible spectrum.



