The L6591 is a double-ended PWM controller specific for the soft-switched half-bridge topology. It provides complementary PWM control, where the high-side switch is driven ON for a duty cycle D and the low-side switch for a duty cycle 1-D, with D < 50%. An externally programmable dead-time inserted between the turn-off of one switch and the turn-on of the other one guarantees soft-switching and enables high-frequency operation.

To drive the high-side switch with the bootstrap approach, the IC incorporates a high-voltage floating structure able to withstand more than 600 V with a synchronous-driven high-voltage DMOS that replaces the external fast-recovery bootstrap diode.

The IC enables the designer to set the operating frequency of the converter by means of an externally programmable oscillator: the maximum duty cycle is digitally clipped at 50% by a T-flip-flop, so that the operating frequency will be half that of the oscillator.

At very light load the IC enters a controlled burst-mode operation that, along with the built-in non-dissipative high-voltage start-up circuit and the low quiescent current, helps keep low the consumption from the mains and be compliant with energy saving recommendations.

To allow compliance with these standards in two-stage power-factor-corrected systems as well, an interface with the PFC controller is provided that enables to switch off the pre-regulator between one burst and the following one.

An innovative adaptive UVLO helps minimize the issues related to the fluctuations of the self-supply voltage with the output load, due to transformer's parasitic.

IC's protection functions include: not-latched input undervoltage (brownout), a first-level OCP with delayed shutdown able to protect the system during overload and short circuit conditions (either auto-restart or latch mode can be selected) and a second-level OCP that latches off the IC when the transformer saturates or one of the secondary diodes fails short. Finally, a latched disable function allows easy implementation of OTP or OVP.

Programmable soft-start and digital leading-edge blanking on current sense input pin complete the equipment of the IC.

Figure 2. Typical system block diagram

PWM is turned off in case of PFC's anomalous operation, for safety. PFC can be turned off at light load to ease compliance with energy saving regulations.