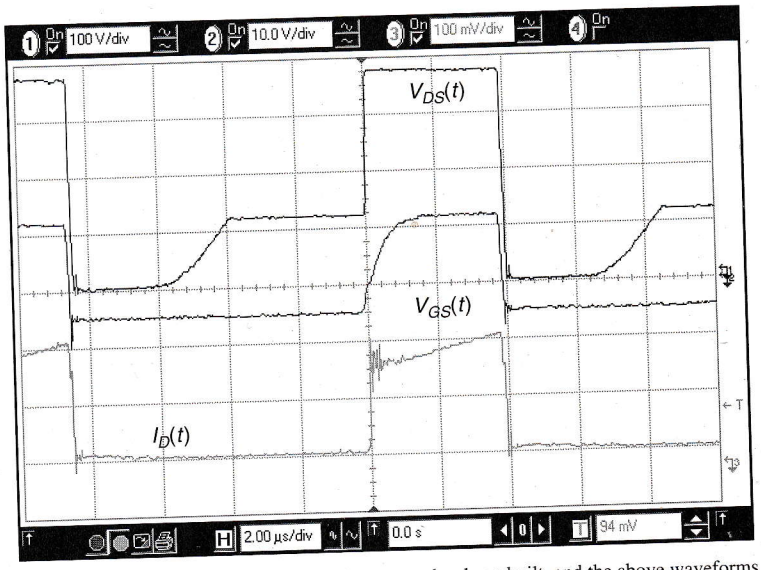

FIGURE 8-12d A two-switch forward converter has been built, and the above waveforms have been captured.

Figure 8-12d shows an oscilloscope shot captured on a real two-switch forward implementing a similar gate-drive circuit. Waveforms do not differ that much from the simulation. Reference 2 details a design procedure for a two-switch forward converter.

8.3.1 Two-Switch Forward and Half-Bridge Driver

In some cases, a gate-drive transformer can be considered too bulky, especially in dc-dc applications requiring a compact design, e.g., for brick converters. The half-bridge driver, as detailed in App. 8A, might therefore represent a possible solution to replace the transformer. Figure 8-13a presents the proposed sketch.

Unfortunately, the two-switch forward does not lend itself very well to the implementation of a half-bridge driver. Why? Because the lower C_{boot} terminal (node HB in Fig. 8-13a, U_2 pin 6) does not swing to the ground when M_{lower} turns on, as in a classical half-bridge configuration. On the contrary, it drops to $-V_f$ during the reset time, in other words, when both MOSFETs are off and the magnetizing current circulates in D_3/D_4. When the core is fully reset, both diodes stop conducting and the HB node turns to a high-impedance state (both MOSFET and the freewheel diodes are blocked): the refresh of the bootstrap capacitor C_{boot} prematurely disappears and the upper-side UVLO is quickly reached, disturbing the converter operation. The proposed circuit involving U_1 and M_1 actually builds an independent 1.5 µs pulse width occurring a few hundred nanoseconds after M_{lower} has been released. The pulse drives M_1 which independently pulls the HB pin to ground. No current circulates since M_{upper} is off. This technique has been successfully tested on a high-voltage two-switch forward converter used in an ATX power supply, originally working with a gate-drive transformer. Figure 8-13b portrays a typical shot showing the effect of the added circuitry.

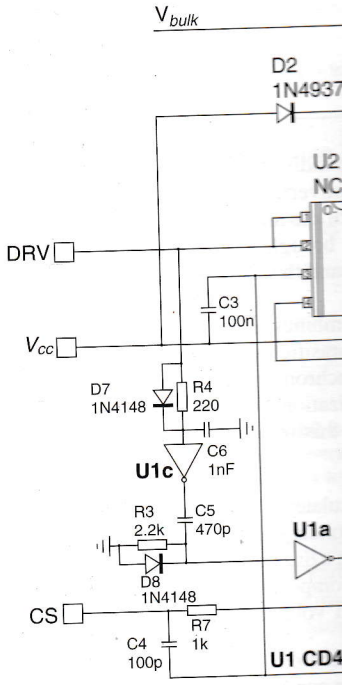

FIGURE 8-13a A half-bridge driver c
refresh circuit built around M_1 and U_1.

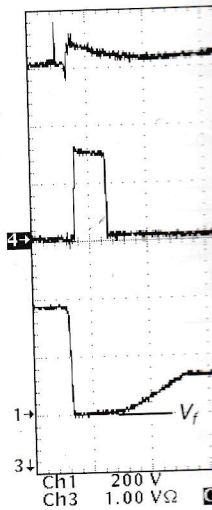

FIGURE 8-13b The s
bootstrap capacitor desp