

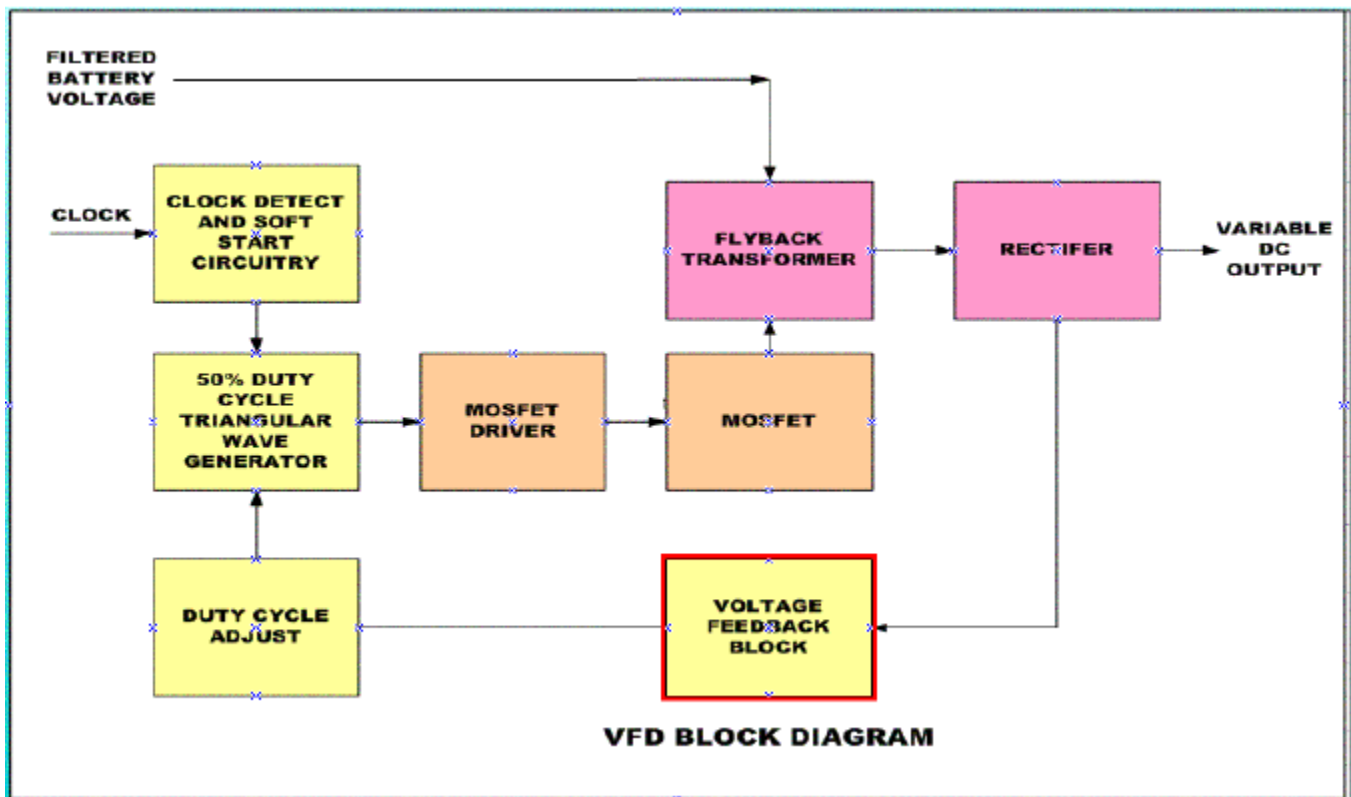
Case Study on Simulation

The objective is to present a case where the PSpice has helped to uncover unexpected issue in design and to analyze the failure mode of the MOSFET driving section of a switch mode power supply.

Description

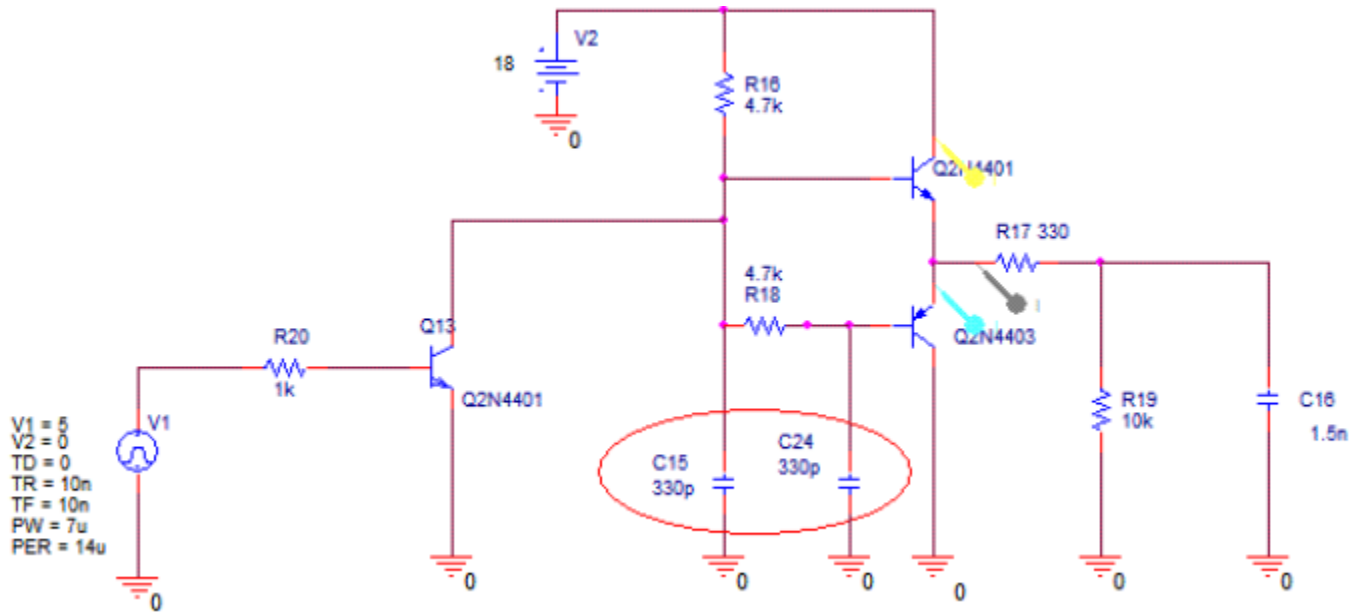
The block diagram of a voltage controlled SMPS is shown below. This was a complete discrete implementation to suit the needs of automotive industry. The MOSFET gate slewing capacitors were added (See the marked capacitors in the schematic) during the EMI/EMC testing to meet the requirements. However the impact of this on the driver went unnoticed. The added capacitors were causing cross conduction in the totem-pole driver stage. This led to higher power consumption from the battery and unnecessary stress on the driver section components. Using the PSpice simulation the cause for this is easily identified and an elegant solution was used.

Block Diagram

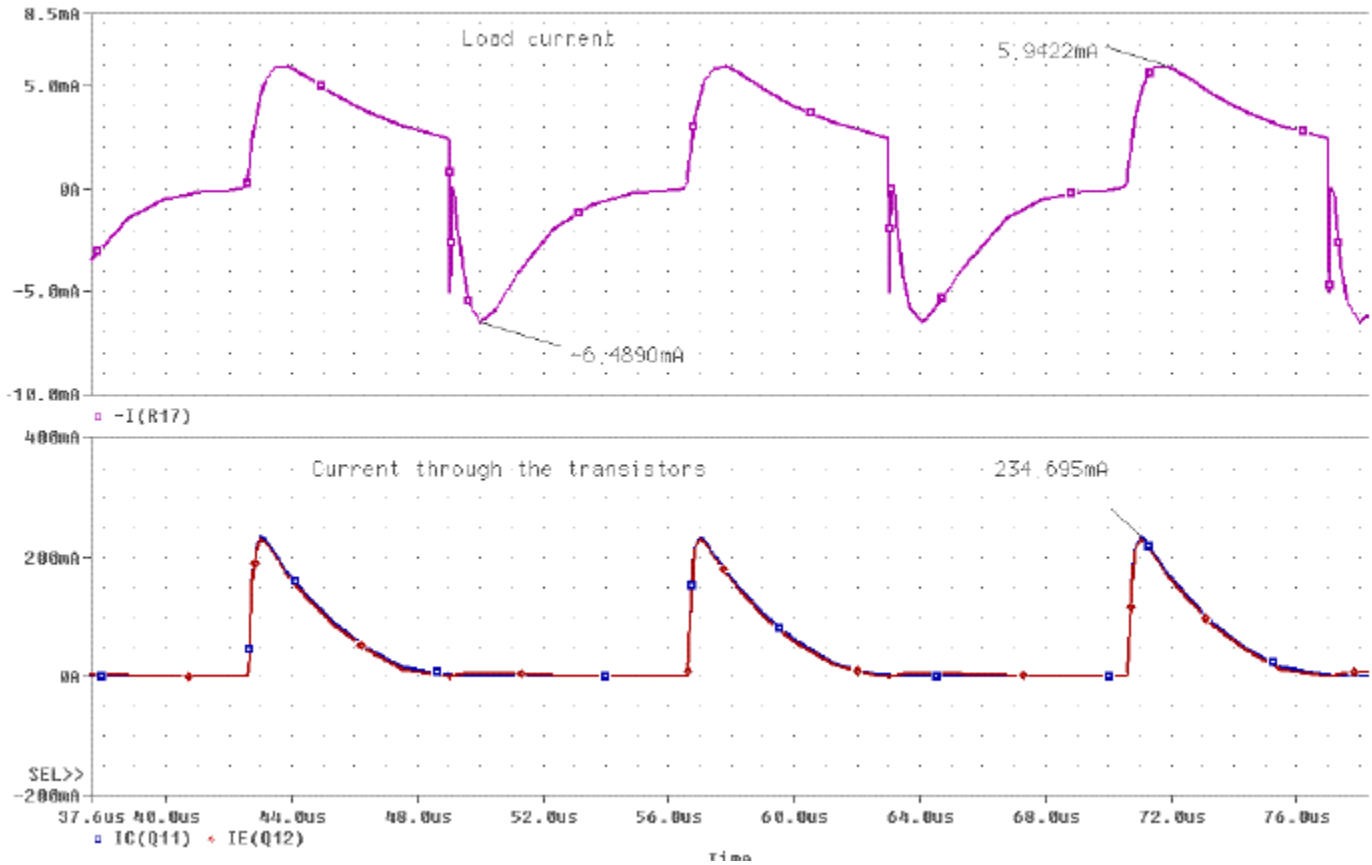


Schematic Diagram of MOSFET driver that has cross conduction problem

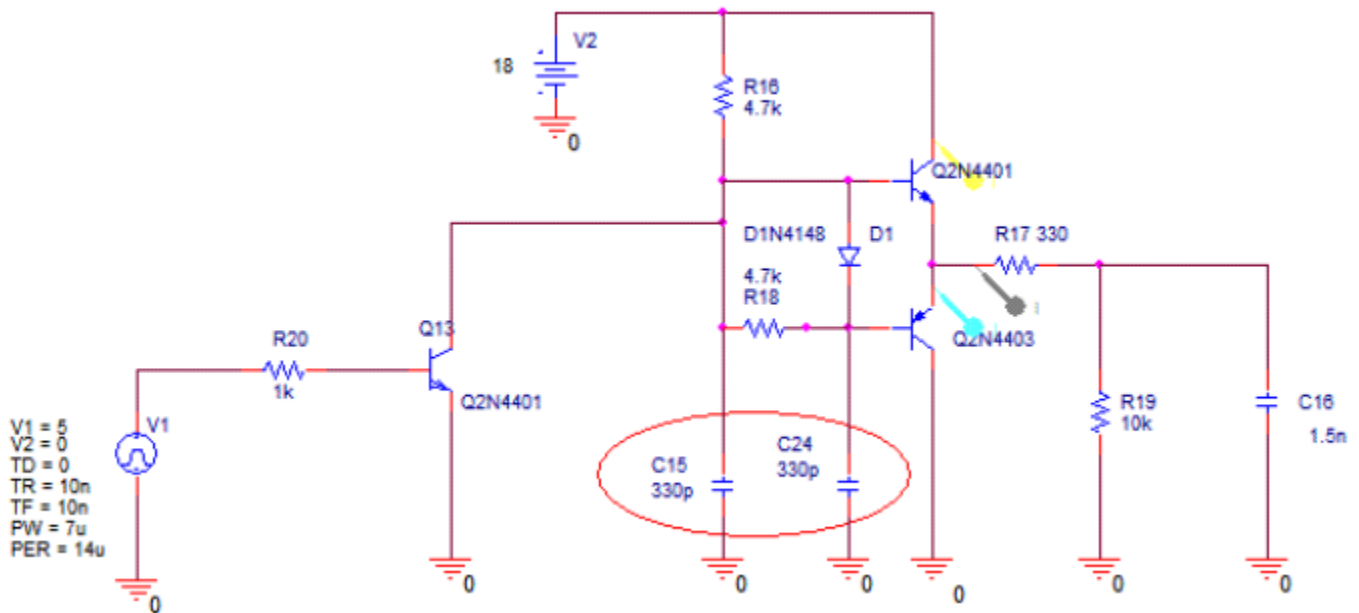
The following schematic is to demonstrate the problem of cross conduction in the MOSFET driver.



Result of simulation showing cross conduction problem



Schematic diagram of MOSFET driver after solving problem



A diode (D1) has been put to avoid the cross conduction.

Result of simulation with problem solved

