

APPLICATION NOTE 1153

MAX1967 Efficiency Improvement with 3.3V Input

The MAX1967 is a voltage mode PWM synchronous buck controller that is ideal for a variety of cost-sensitive applications. Fixed 100kHz switching frequency allows cheap aluminum electrolytic capacitors and powdered-iron core magnetics to be used for minimum-cost designs. The MAX1967 has an input range of 2.7V to 28V. A drawback with low-voltage inputs like 3.3V is that efficiency is penalized due to low gate drive for the external MOSFETs, which exhibit higher on-resistance. This application note shows how to improve low input voltage efficiency by boosting the gate drive supply voltage with a simple diode-capacitor charge pump circuit.

In **Figure 1**, a discrete charge pump composed of D1, D2, C1 and C2 boosts the input voltage. The voltage at the IN pin is 2 times the input voltage, V_{in} . This is fed to the MAX1967's internal linear regulator input to generate a 5V output, V_L . Thus, the 5V gate drive is provided to the external MOSFET, even with a 3V input. D3 is used to start up the IC during the soft start. Once the IC and the charge pump circuit start to operate, V_L provides 5V output, which reverses bias diode D3.

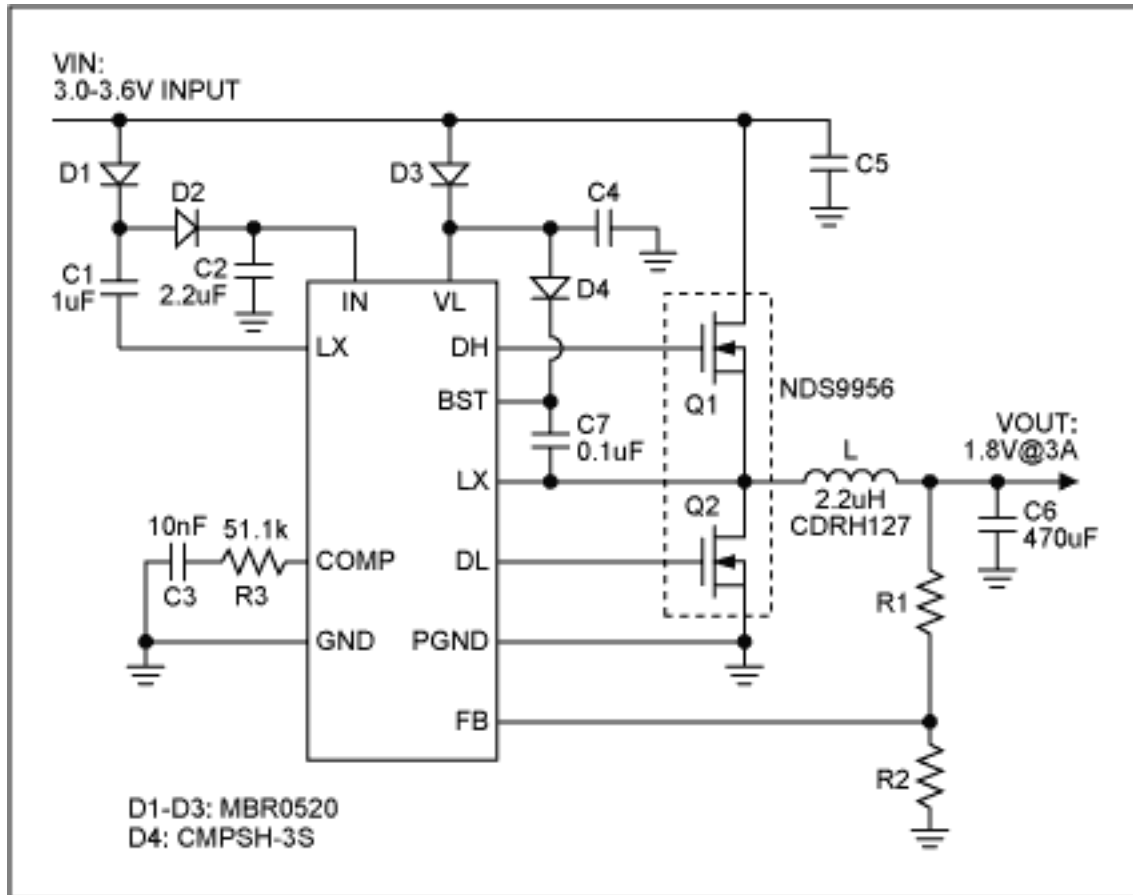


Figure 1. Synchronous buck converter with charge pump.

Figure 2 shows conversion efficiency with 3.0V input and 1.8V output. It is shown that the measured efficiency with the charge pump is 3% higher than that of conventional connection (IN and VL tie to input) at a 2.5A load. This results in 0.35W power savings and reduces heat dissipation.

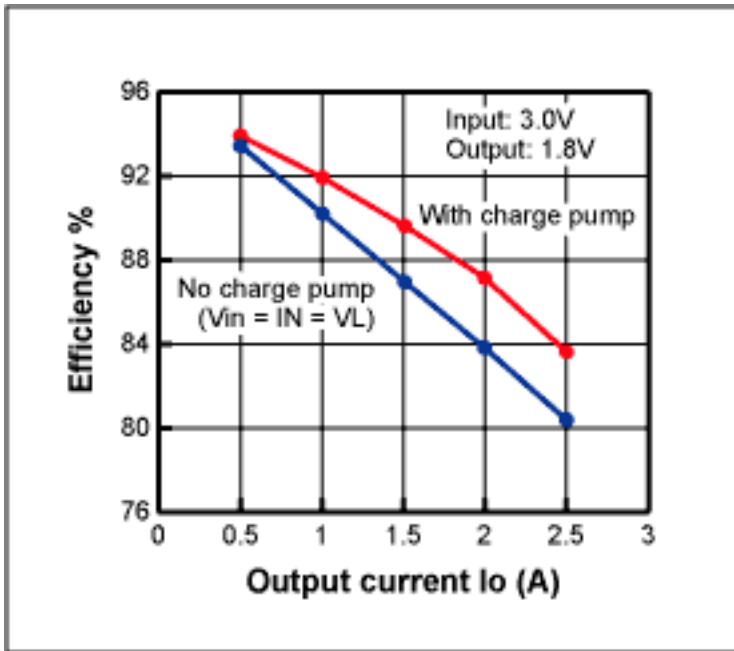


Figure 2. Measured efficiency vs output current.

Application Note 1153: <http://www.maxim-ic.com/an1153>

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Related Parts

MAX1967: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

AN1153, AN 1153, APP1153, Appnote1153, Appnote 1153

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