

Alternate Use of the HV9922 as an Off-line, Non-Isolated, 50 to 100mA Auxiliary Power Supply

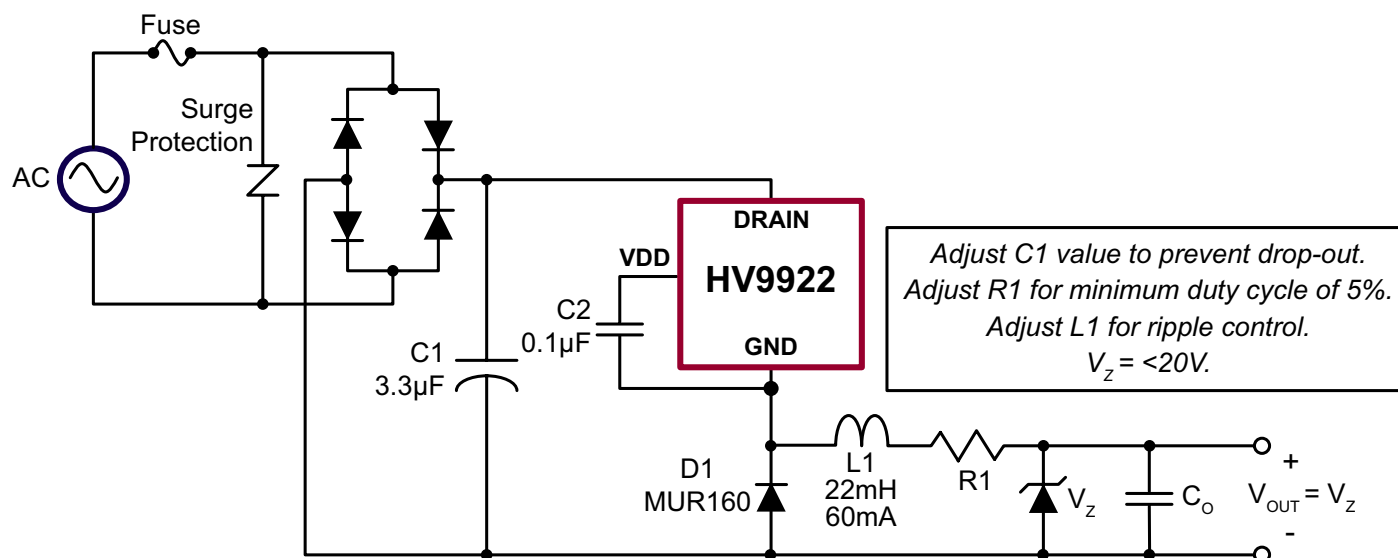
Introduction

The HV9922 was originally designed to be a high voltage switching-converter for driving LEDs at a fixed, regulated, 50mA output current.

It will operate from 80 to 240VAC, is stable with open and short circuit loads, and since there is no feedback loop, it is unconditionally stable.

It has found use as an off-line, non-isolated, 50mA auxiliary power supply.

Figure 1: Basic HV9922 Circuit



The power line interface is the classic rectifier with hold-up capacitor C1.

It is followed by a classic buck-converter operating in the continuous current mode.

The HV9922 serves as a smart switch that turns itself off when the current through it reaches 60mA. The switch stays off for 10µsec and then turns itself back on.

C2 maintains V_{DD} constant for proper operations internal to the HV9922.

The inductor L1 operates in the continuous current mode to maintain output current when the HV9922 is off. The value of L1 can be calculated as: $L1 > = 10\mu S * (V_Z + 20V)/20mA$. An inductor of 22mH and 60mA will generally be adequate.

The output zener diode determines the output voltage. It also serves as a shunt regulator. When the load is at 50mA,

there is very little power dissipation in the zener. When the output current is zero (open load), the zener absorbs all the current and dissipates a maximum of 1.0W ($20V \times 50mA$). When the Zener voltage is less than 20V, the dissipation is correspondingly lower.

The output capacitor C_O serves to bypass surge currents.

R1 is used to provide output short circuit protection. When the output is shorted, there is no voltage across the zener. The voltage across R1 ($R1 \times 50mA$) provides flyback voltage across L1 to allow the current in L1 to decay, thus preventing the current from building toward infinity. The value of R1 is sized to provide a 20V drop to guarantee a minimum duty-cycle of 5% when the input voltage is up to 400V. The dissipation in R1 is 1W.

R1 is optional and not needed if short circuit protection is not necessary.

Other Circuit Combinations:

Figure 2: HV9922 Used as a Dual Output 50mA Supply

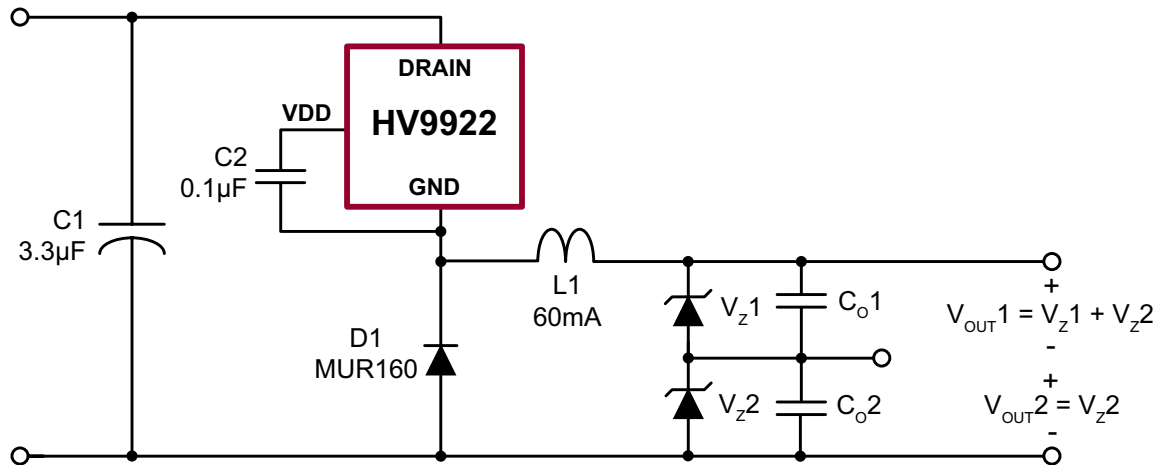


Figure 3: HV9922 Used as an Off-Line Non-Isolated 50mA Supply with Output Referenced to High Side

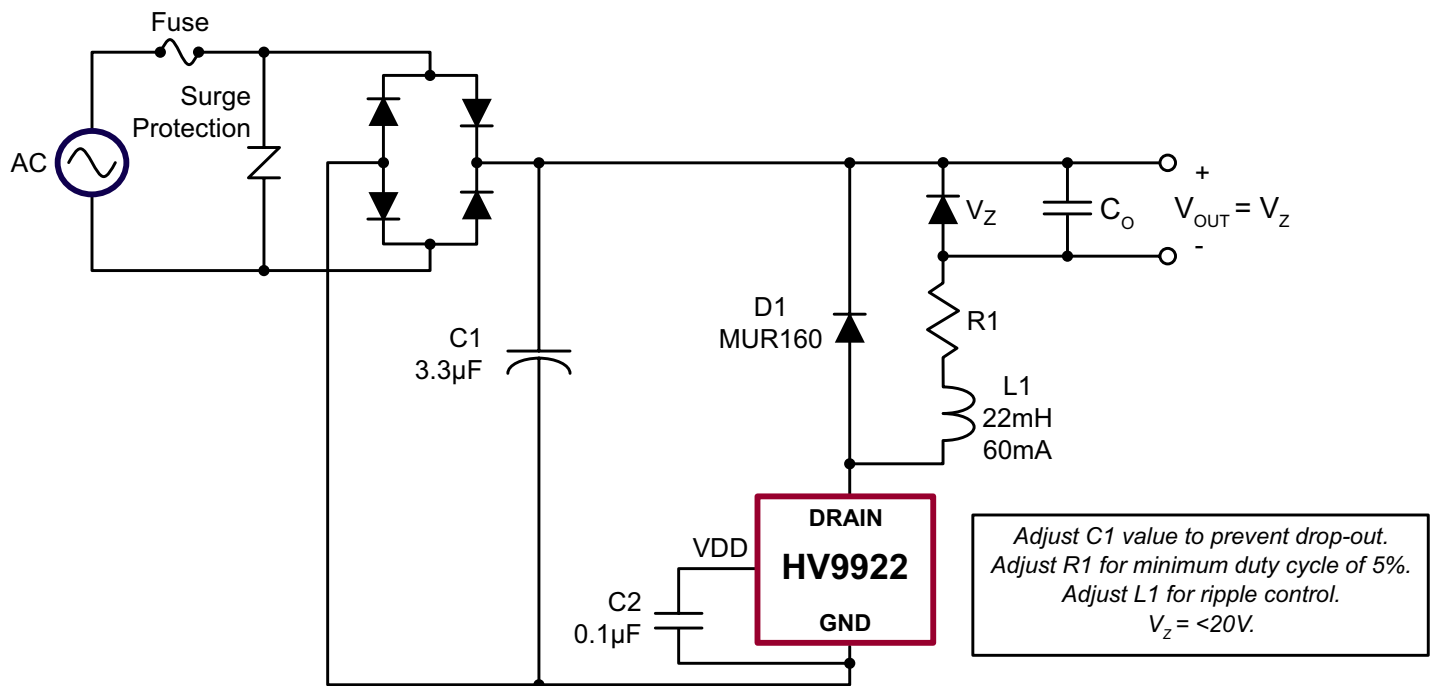
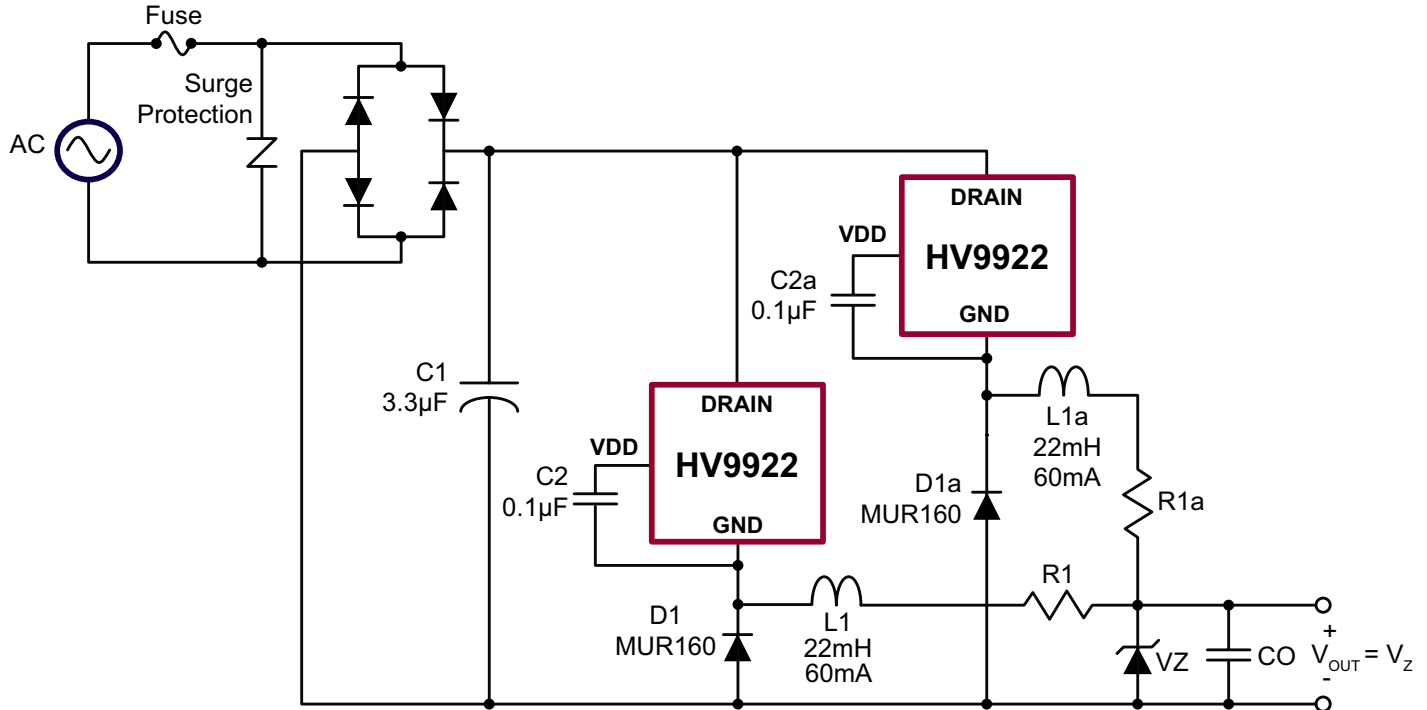


Figure 4: 2 HV9922s Used as a Basic Off-Line Non-Isolated 100mA Supply



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