7 Boost Mode (Push-Pull) - Functional Description

7.1 Voltage Mode Control (VMC)

VMC mode implementation in the boost mode is similar to the VMC implementation in buck mode as shown in Figure 43. The key difference in this mode of operation is that the converter works as a duty controlled converter, unlike the phase-shift controlled buck mode converter.

The buck mode output inductor acts as a current source in the boost mode allowing this topology to work as a current-fed push-pull converter. The push pull switches are driven with PWM signals with greater than 50% duty cycles that are 180 degrees out of phase with respect to each other. This duty cycle dictates the amount of energy transferred to the high voltage side. The controller regulates the output by controlling this energy transfer by way of directly controlling the duty cycle of PWM signals driving the two push-pull switches. Full-bridge switches on the HV side may be kept off and their body diodes used for rectification. However, in this implementation the full-bridge switches are used for synchronous rectification in the boost mode. These waveforms are shown in Figure 45.

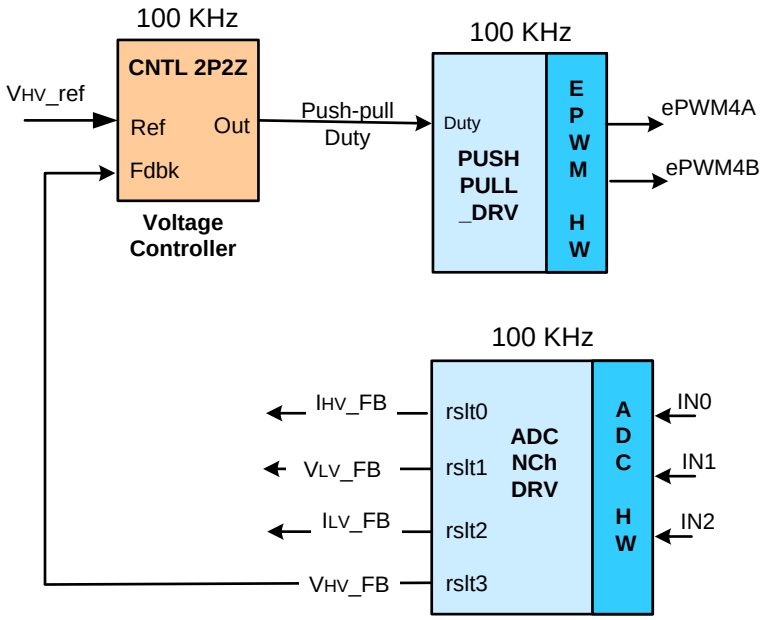

Figure 43. *VMC Block Diagram*

7.2 Average Current Mode Control (ACMC) of Output Current

Similar to the ACMC implementation in buck mode, this implementation uses a single average current loop to control the high voltage battery/bus charging current (constant current charging). The ACMC implementation is similar to the above VMC implementation in terms of waveform generation and power stage control. As shown in Figure 44, the controller directly drives and controls the duty cycle of PWM signals driving the two push-pull switches. As in VMC mode, the controller regulates the output by controlling energy transfer by way of directly controlling this duty cycle. Figure 45 depicts various waveforms during boost mode of operation.