

$$Q_p = \frac{1}{\pi(m_c D' - 0.5)}$$

$$\omega_a = \pi F_{sw} \sqrt{\frac{\frac{2K_c}{K} \left( \frac{1}{2} - \frac{S_e}{MS_n} \right) - 1}{\frac{2K_c}{K} \left( \frac{S_e}{S_n} - \frac{M}{2} \right) - 1}}$$

$$Q_a = \frac{1}{\pi D} \left( M - \frac{2K_c}{K} \left( \frac{M}{2} - \frac{S_e}{S_n} \right) \right)$$

$$K_c = D'^2$$

$$K = \frac{2LF_{sw}}{R}$$

Current-mode, DCM

Reference 2, 3, 4, and 5 equations:

$$\frac{V_{out}(s)}{V_{err}(s)} = F_m H_d \frac{\left(1 + \frac{s}{\omega_{z1}}\right) \left(1 - \frac{s}{\omega_{z2}}\right)}{\left(1 + \frac{s}{\omega_{p1}}\right) \left(1 + \frac{s}{\omega_{p2}}\right)} \quad (2A-26)$$

$$\omega_{z1} = \frac{1}{r_{cf} C}$$

$$\omega_{z2} = \frac{R}{M(1 + M)L} \quad (\text{high-frequency RHPZ}) \quad \text{In relation to } \omega_{p2}:$$

$$\omega_{z2} = \omega_{p2} (1 + 1/M) > 2F_{sw}$$

$$\omega_{p1} = \frac{2}{RC}$$

$$\omega_{p2} = 2F_{sw} \left( \frac{1/D}{1 + 1/M} \right)^2 \geq 2F_{sw}$$

$$H_d = \frac{V_{in}}{\sqrt{K}}$$

$$F_m = \frac{1}{S_n m_c T_{sw}}$$

$$M = -D \sqrt{\frac{1}{2\tau_L}} \quad \text{with } \tau_L = \frac{L}{RT_{sw}}$$

$$K = \frac{2LF_{sw}}{R}$$

For a flyback topology, we can use the buck-boost equations. However, a few manipulations are necessary as the primary inductance  $L_p$  and the sense resistor  $R_i$  are located on the primary side whereas the load and the output capacitor reside on the secondary side.