

$$Z_{Cout}(s) = \frac{1}{s \cdot C_{out}} + ESR_{Cout} + s \cdot ESL_{Cout} \quad (1)$$

$$Z_{out_closed}(s) = \frac{Z_{out_open}(s)}{1 + G_{total_open}(s)} \quad (2)$$

$$C_{out_min_CM} = \frac{1}{2\pi \cdot bandwidth} \cdot \frac{1}{\text{phasemargin}_{factor} \cdot \frac{\Delta V_{transient}}{\Delta I_{loadstep}} - ESR_{Cout}} \quad (3)$$

$$\text{phasemargin}_{factor} = \sqrt{2 - 2 \cdot \cos(\text{phasemargin})} \quad (4)$$

$$C_{out_simple} = \frac{\Delta I_{loadstep}}{2\pi \cdot bandwidth \cdot \Delta V_{transient}} \quad (5)$$

$$Z_{out_open_VM}(s) = \frac{1}{\frac{1}{DCR_{Lout} + s \cdot L_{out}} + \frac{1}{ESR_{Cout} + \frac{1}{s \cdot C_{out}} + s \cdot ESL_{Cout}}} \quad (6)$$

$$C_{out_min_VM}(s) = \frac{1}{2\pi \cdot bandwidth} \cdot \frac{1}{\frac{\Delta I_{loadstep}}{\text{phasemargin}_{factor} \cdot \Delta V_{transient}} - \frac{1}{DCR_{Lout} + 2\pi \cdot bandwidth \cdot L_{out}} - ESR_{Cout}} \quad (7)$$