DCAP Ripple injection Approach

Application Report - SLVA453

New loop stability criteria for D-CAP™ Mode with ripple injection approach:

$$\frac{L \times Co}{R_r \times C_r} > \frac{Ton}{2} \quad (3)$$

$$C_r > C_c > \frac{1}{2\pi \times f_{sw} \times \left(\frac{R1 \times R2}{R1 + R2}\right)} \quad (4)$$

= N ?

TPS53355 datasheet

$$\frac{L \times C_{OUT}}{R7 \times C1} > N \times \frac{t_{ON}}{2} \quad (11)$$

where

- N is the coefficient to account for L and C_{OUT} variation

N is also used to provide enough margin for stability. It is recommended N=2 for $V_{OUT} \leq 1.8$ V and N=4 for $V_{OUT} \geq 3.3$ V or when L ≤ 250 nH. The higher V_{OUT} needs a higher N value because the effective output capacitance is reduced significantly with higher DC bias. For example, a 6.3-V, 22-µF ceramic capacitor may have only 8 µF of effective capacitance when biased at 5 V.