Constant-On-Time Control in DC/DC Converters

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Agenda

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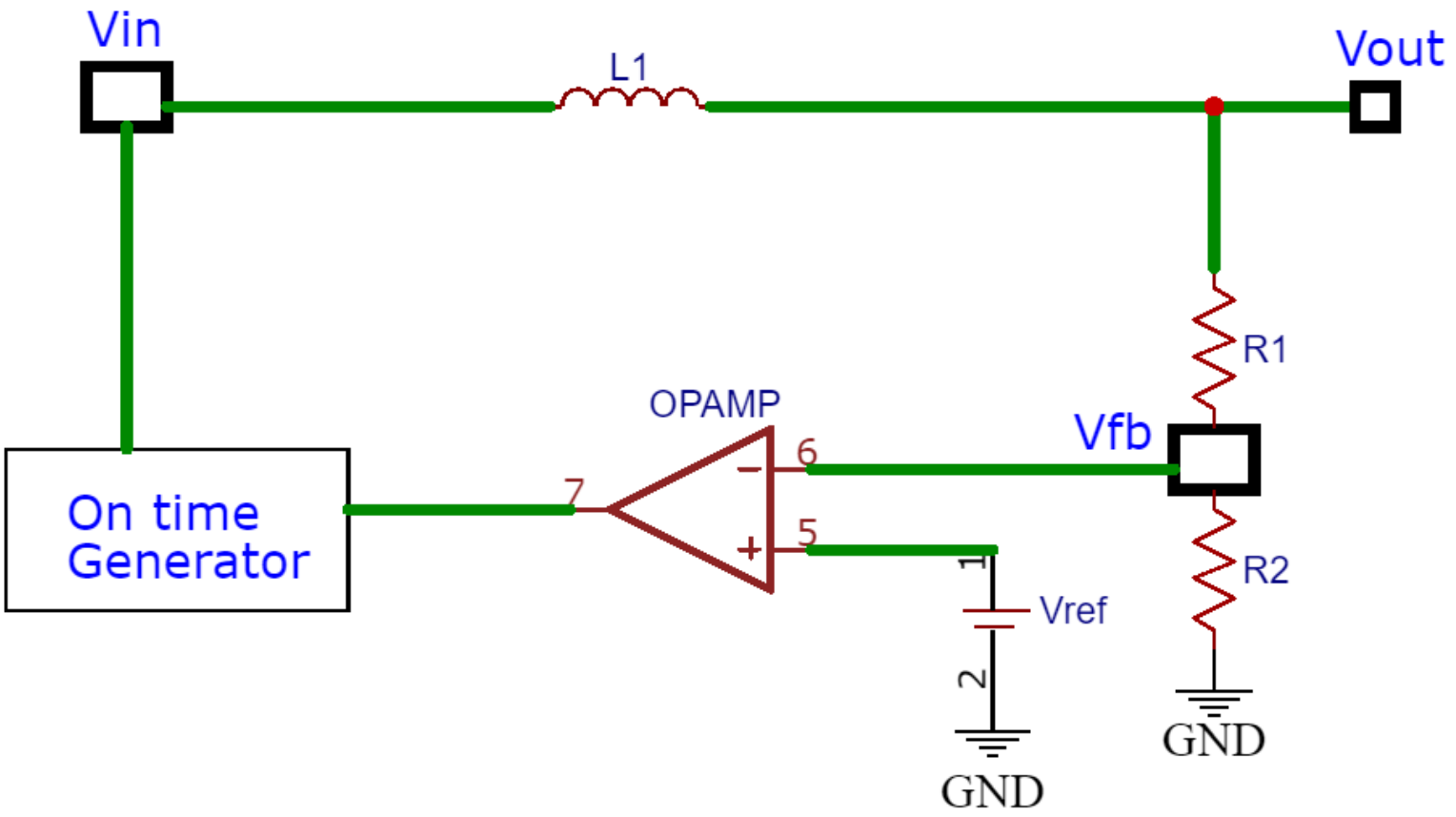
- COT Buck DCDC 架構
- 各類架構比較
- Phase/Gain margin 上的影響
- COT Loop Response and Stability Using Load Step Test
- 補償電路的設計方式

COT Buck DCDC



COT 具有與電壓模式相反的特性：它的頻率是可變的，但它的佔空比是固定的。可變頻率有助於調節負載階躍、負載釋放和峰峰值偏差，但仍有下沖和過衝需要應對。

各類架構比較

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模式	Current Mode	Constant-On-Time(COT)
優點	1.反應速度優於電壓模式 2.回授電路安定性高 3.自帶電流限制	1.Transient反應速度快 2.可在眾多負載情況下維持效率 3.元件少 4.設計簡單
缺點	1.抗干擾能力較差 2.需斜率補償	1.輸出紋波抑制 2.頻率的變化

Phase/Gain margin 上的影響

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Bode plot of COT topology can not been measured by network analyzer is because of there is feedback paths for COT IC:

1. VFB path feedbacks output voltage, in this path COT employ a comparator for internal feedback loop, comparator's voltage response is fast but may not constant, so bode plot can not be stably measured.

Bode Plot	Loop Bandwidth (kHz)	Phase Margin (Degrees)	Gain Margin (dB)
Positive Load Step Response	Magnitude of output voltage undershoot (mV)	Output voltage behavior after load step (magnitude of overshoot, duration of settling time, and whether it has damped or oscillatory response)	Does not show up in the load transient response

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Thank You!