1 Startup

The LED current startup waveform (GREEN) is shown after the input voltage (RED) is applied. The CTRL signal was connected to Vin. Vin = 12V and I_LED = 0.24A. (2V/DIV, 100mA/DIV, 2mS/DIV)

The LED current startup waveform (GREEN) is shown after the CTRL voltage (RED) is applied. The input voltage (Vin = 12V) was applied prior to enabling. I_LED = 0.24A. (2V/DIV, 100mA/DIV, 2mS/DIV)
2 Efficiency

The converter’s efficiency is shown in the figure below. An external 0-5V, 50KHz PWM input signal was connected to the CTRL input and duty cycle modulated between 20% - 80% to adjust the LED current.

The converter’s efficiency is shown in the figure below. The CTRL input was connected to VIN for max LED current.
An external 0-5V, 50KHz PWM input was duty cycle modulated between 20% - 80% to adjust the LED current.
The waveform below shows the switch node voltage at TP1 and the LED current. The input voltage is 8.7V and the LED output is 0.24A. (5V/DIV, 100mA/DIV, 500nS/DIV)

The waveform below shows the switch node voltage at TP1 and the LED current. The input voltage is 12V and the LED output is 0.24A. (5V/DIV, 100mA/DIV, 500nS/DIV)
The waveform below shows the switch node voltage at TP1 and the LED current. The input voltage is 16.5V and the LED output is 0.24A. (5V/DIV, 100mA/DIV, 500nS/DIV)

The waveform below shows the switch node voltage at TP1 and the LED current. An external 0-5V, 50KHz PWM input signal was connected to the CTRL input with the duty cycle set to 32% to adjust the LED current to 0.079A. The input voltage was set to 8.7V. The converter is in DCM operation at this LED current and below. (5V/DIV, 100mA/DIV, 500nS/DIV)
The waveform below shows the switch node voltage at TP1 and the LED current. An external 0-5V, 50KHz PWM input signal was connected to the CTRL input with the duty cycle set to 64% to adjust the LED current to 0.156A. The input voltage was set to 16.5V. The converter is in DCM operation at this LED current and below.  

(5V/DIV, 100mA/DIV, 500nS/DIV)
5 Open LED Test

The waveform below shows the LED current (GREEN), Output Voltage (BLUE), and the /OPENLED signal after the LED is removed. The input voltage is 12V and the LED output is 0.24A.
(5V/DIV, 100mA/DIV, 50uS/DIV)
6 Control Loop Gain / Stability

The plot below shows the converter’s gain and phase margin when the LED current is 0.24A.

\[
\begin{align*}
&\text{Vin} = 8.7V \quad \text{Band Width} = 8.59\text{KHz} \quad \text{Phase Margin} = 87\text{ degrees} \\
&\text{Vin} = 16.5V \quad \text{Band Width} = 12.8\text{KHz} \quad \text{Phase Margin} = 89\text{ degrees}
\end{align*}
\]

The plot below shows the converter’s gain and phase margin for \(\text{Vin} = 12V\). An external 0-5V, 50KHz PWM input signal was connected to the CTRL input with the duty cycle adjusted to vary the LED current.

\[
\begin{align*}
&\text{I LED} = 0.048A \quad \text{Band Width} = 3.52\text{KHz} \quad \text{Phase Margin} = 86\text{ degrees} \\
&\text{I LED} = 0.120A \quad \text{Band Width} = 6.41\text{KHz} \quad \text{Phase Margin} = 89\text{ degrees} \\
&\text{I LED} = 0.192A \quad \text{Band Width} = 9.44\text{KHz} \quad \text{Phase Margin} = 82\text{ degrees}
\end{align*}
\]
The photo below shows the PMP10835 REV B assy built on the REVA PWB.
The thermal image below shows operation at 12V input and an LED current of 0.24A, with no airflow.
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