

LM3423-based Boost-LED-Driver with 3.0A @ 18 .. 25.5V

- Input 6.0 .. 18.0V
- Output 3.0A @ 18 .. 25.5V
- PWM Dimming Input (60 Hz, 100us .. 4ms pulse width)
- Test LED BXRA-35E4000-H-00 (24.4V typ. @ 2.1A, warm-white)
- **Converter is thermally designed to work at 25% duty cycle maximum (dimming)!**



1 Startup

The startup waveform is shown in Figure 1. The input voltage is set to 12.0V with the LED connected to the output.

- Channel C1: **Output Current**
1A/div, 10ms/div
- Channel C2: **Input Voltage**
2V/div, 10ms/div



Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set to 12.0V with the LED connected to the output.

- Channel C1: **Output Current**
1A/div, 500us/div
- Channel C2: **Input Voltage**
2V/div, 500us/div



Figure 2

3 Efficiency

The efficiency and load regulation at 3.0A load are shown in Figure 3.

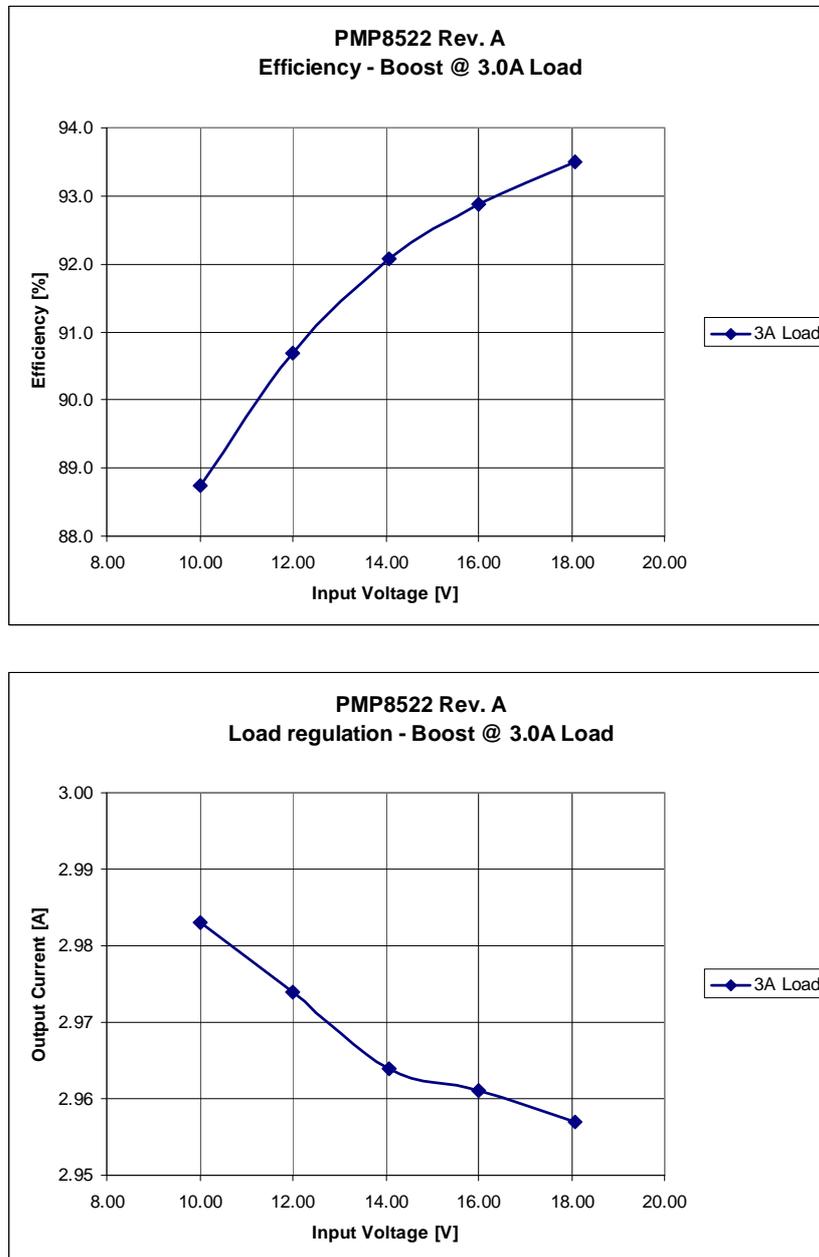


Figure 3

The efficiency was measured without dimming.
Due to the dissipation at low input voltage, the efficiency at 6V input voltage could not be measured without damaging the board.

4 LED current and voltage

The output current and voltage at 12.0V input voltage are shown in Figure 4.

Channel C1: **Output Current**
1A/div, 2 μ s/div

Channel C2: **Output Voltage, AC coupled** -322mV min / 350mV max
500mV/div, 2 μ s/div

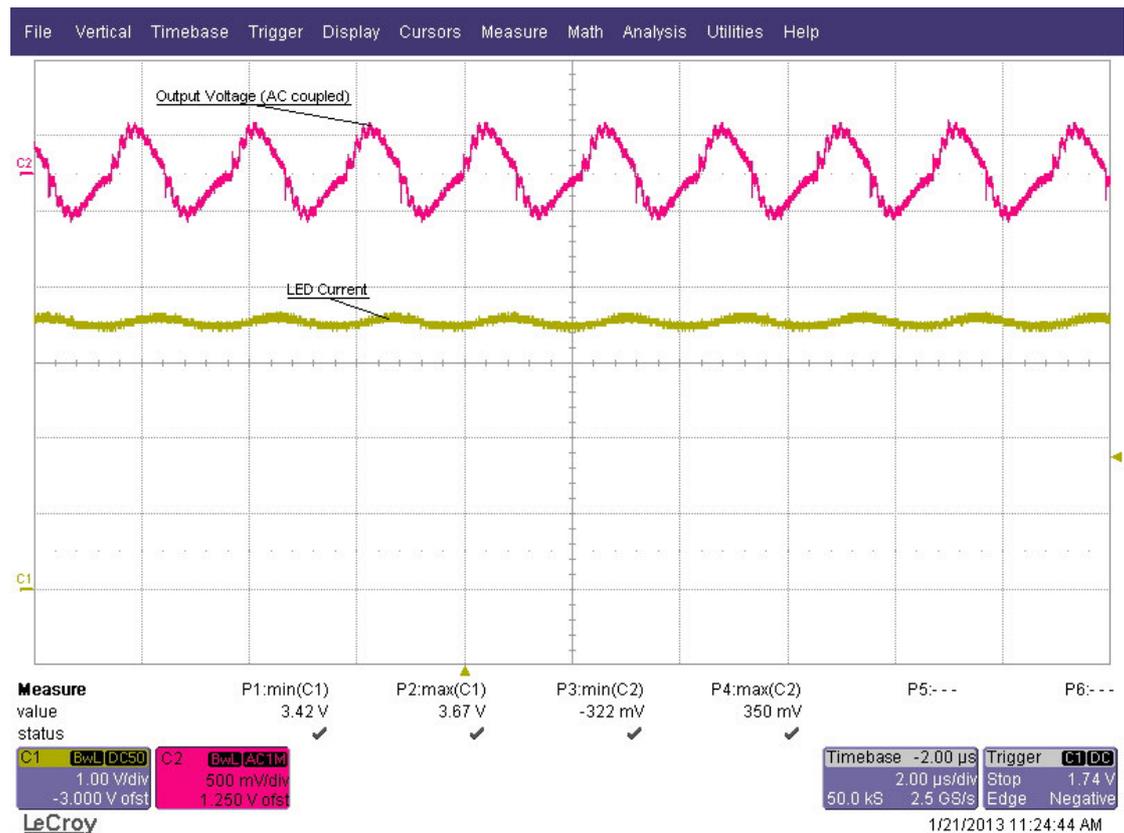


Figure 4

5 Dimming

Figure 5 shows the switching node and the output current with dimming (60 Hz, 25%).

Channel C1: **Output Current**
 1A/div, 10ms/div

Channel C2: **Switching Node**
 20V/div, 10ms/div

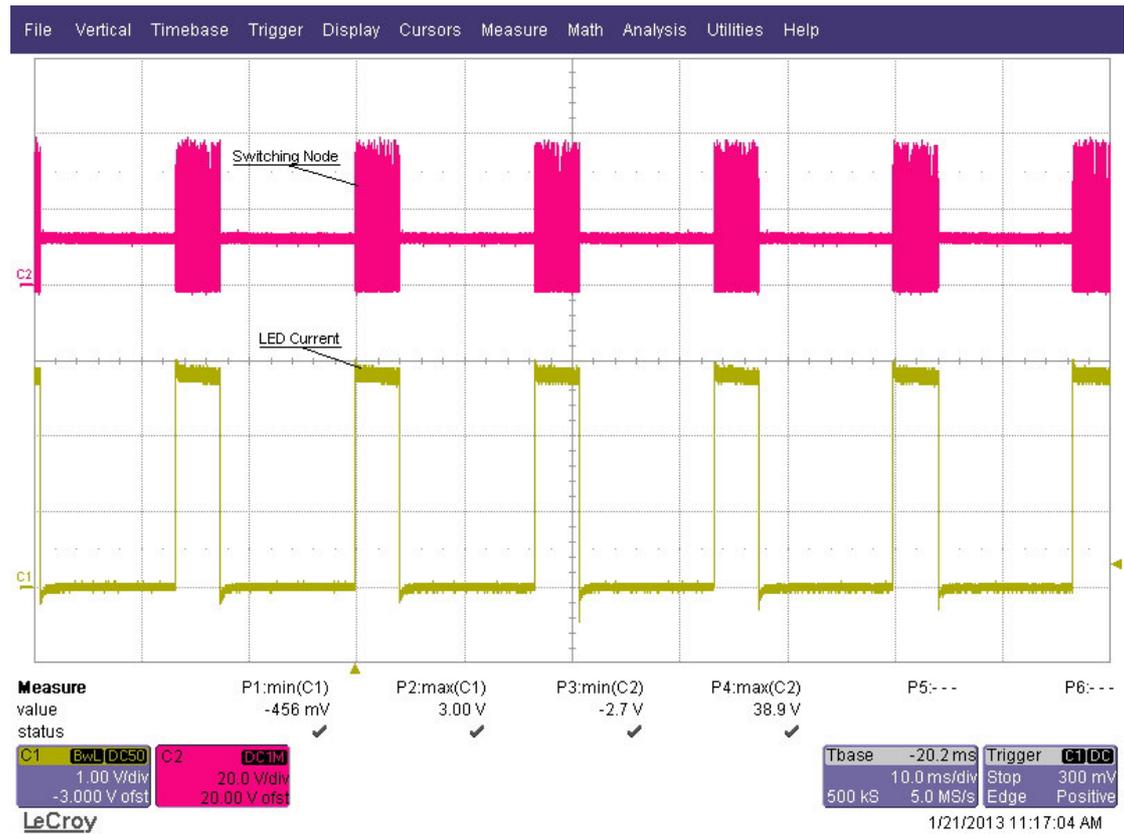


Figure 5

Figure 6 shows the output current at the minimum and maximum dimming ratio (100us / 4ms @ 60 Hz).

Channel C1: **Output Current**
 1A/div, 10ms/div

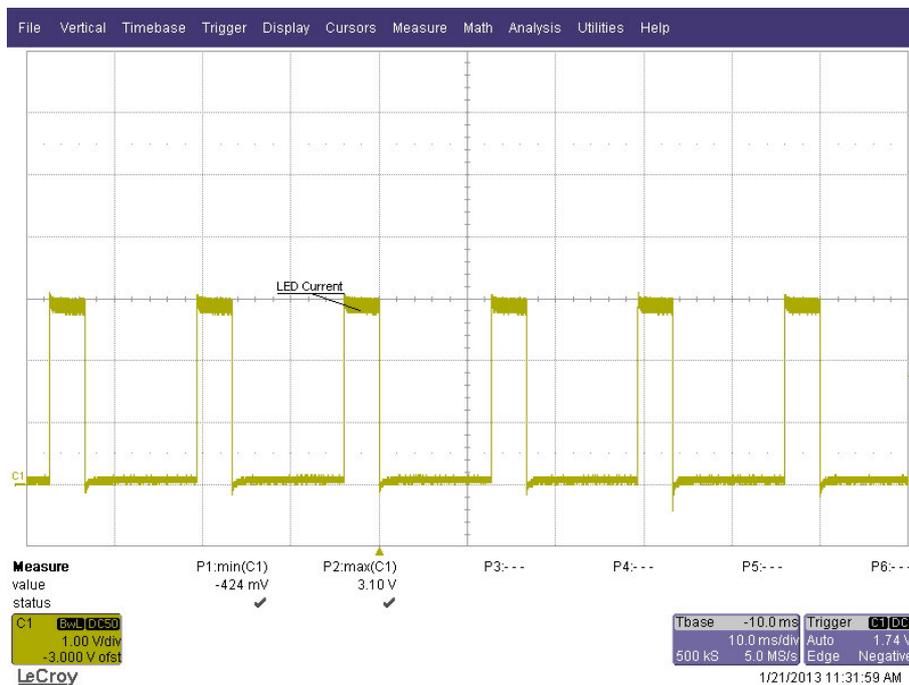


Figure 6

Figure 7 shows the start and beginning during dimming (60 Hz, 25%).

Channel C1: **Output Current**
 1A/div, 10ms/div

Channel C2: **Switching Node**

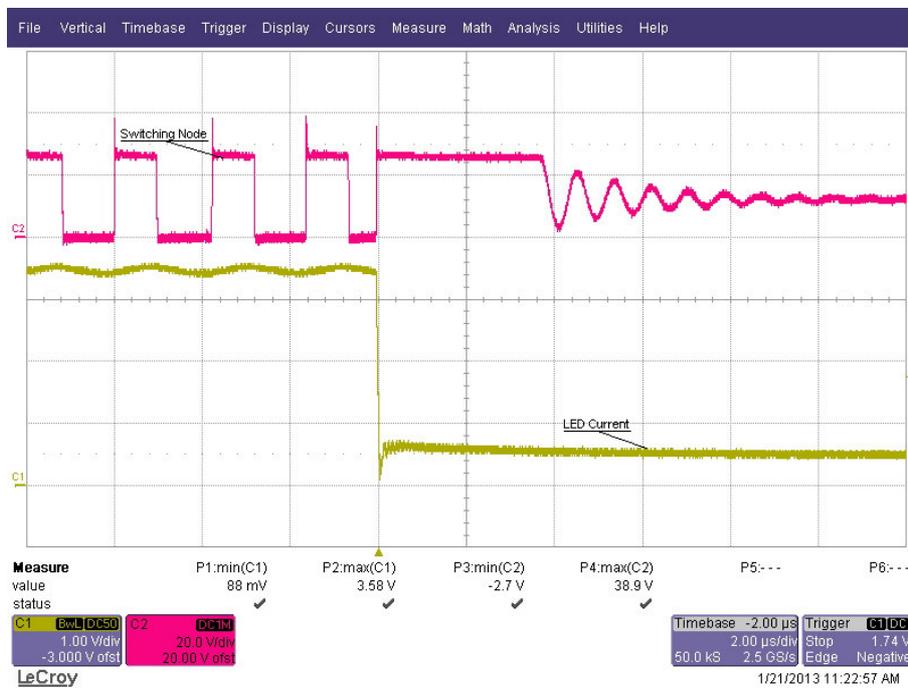
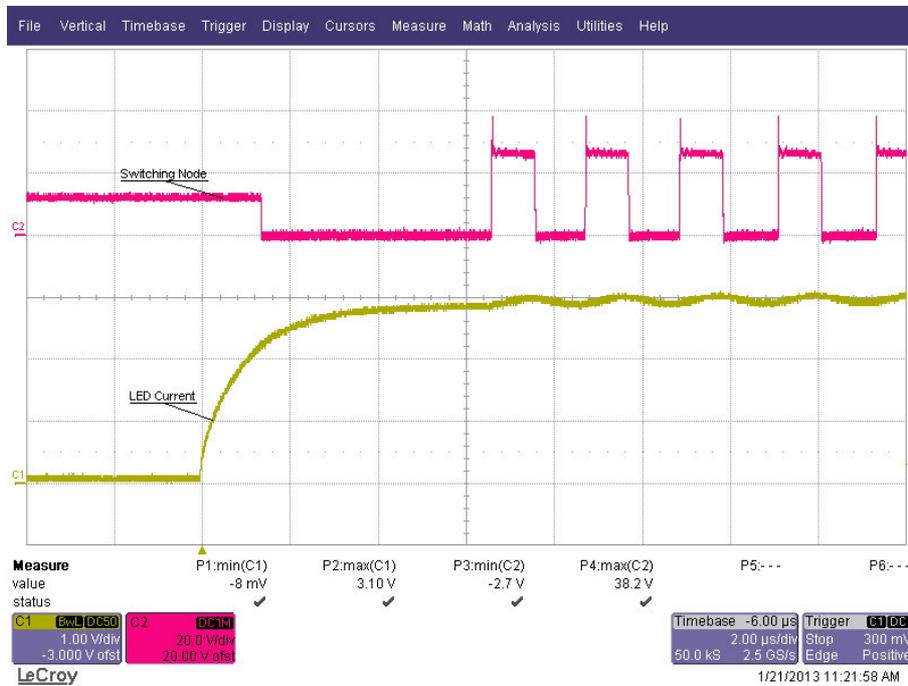


Figure 7

6 Switching Node

The drain-source voltage on the switching node is shown in Figure 8. The image was captured with 18.0V input and the LED connected.

Channel C2: **Drain-source voltage**, -1.4V minimum voltage, 31.7V maximum voltage
5V/div, 1us/div

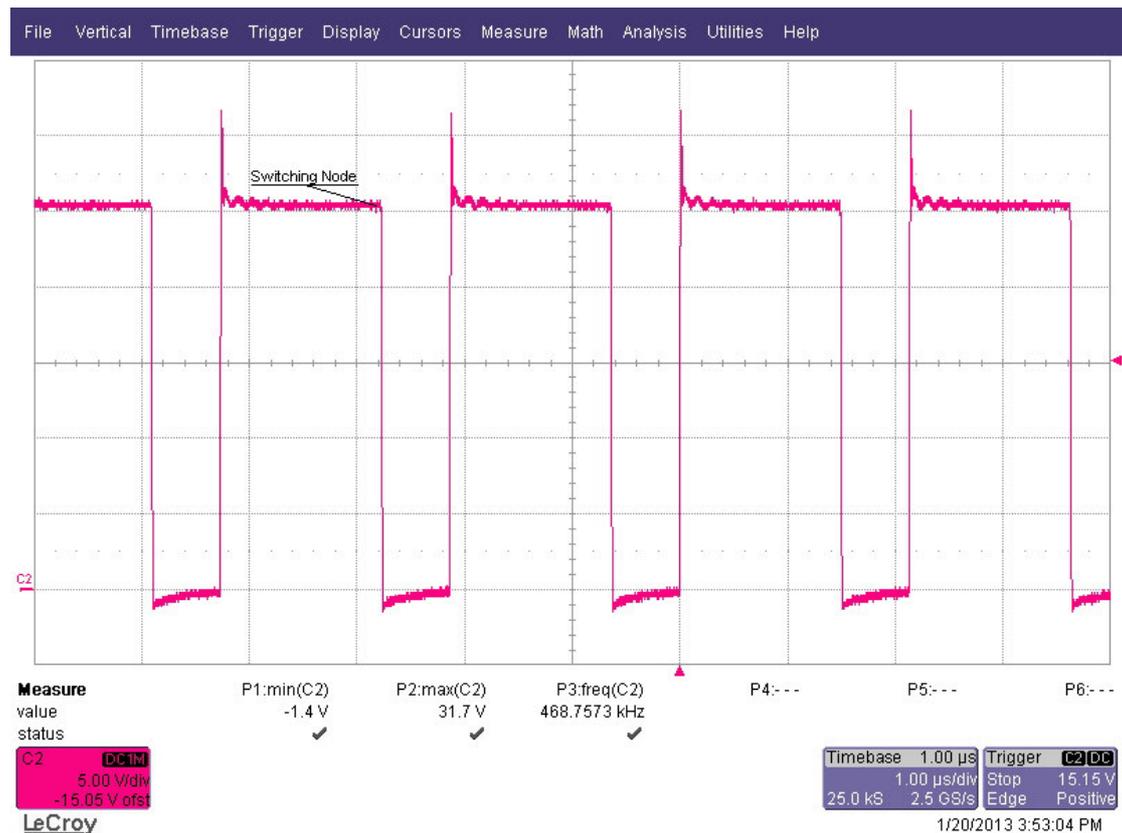


Figure 8

7 Thermal measurement

The thermal image (Figure 9) shows the circuit at an ambient temperature of 21 °C with an input voltage of 12.0V and a load of 3.0A (PWM dimming @ 25%).

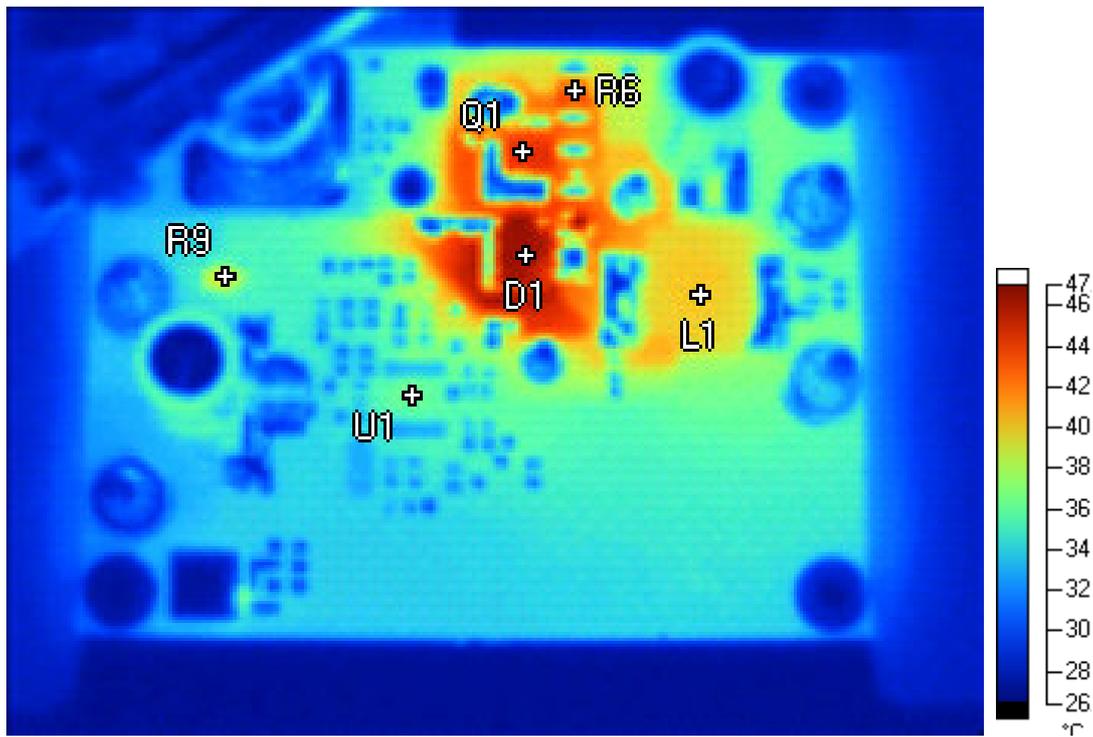


Figure 9

Label	Temperature	Emissivity	Background
L1	40.3 °C	0.95	21.0 °C
U1	36.4 °C	0.95	21.0 °C
D1	46.7 °C	0.95	21.0 °C
Q1	44.5 °C	0.95	21.0 °C
R6	42.9 °C	0.95	21.0 °C
R9	39.0 °C	0.95	21.0 °C

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