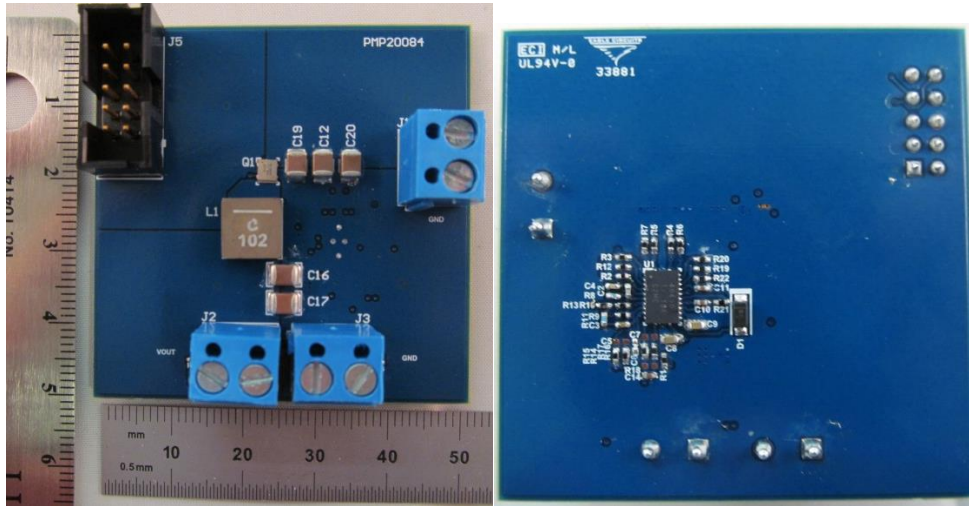


## 1 Background

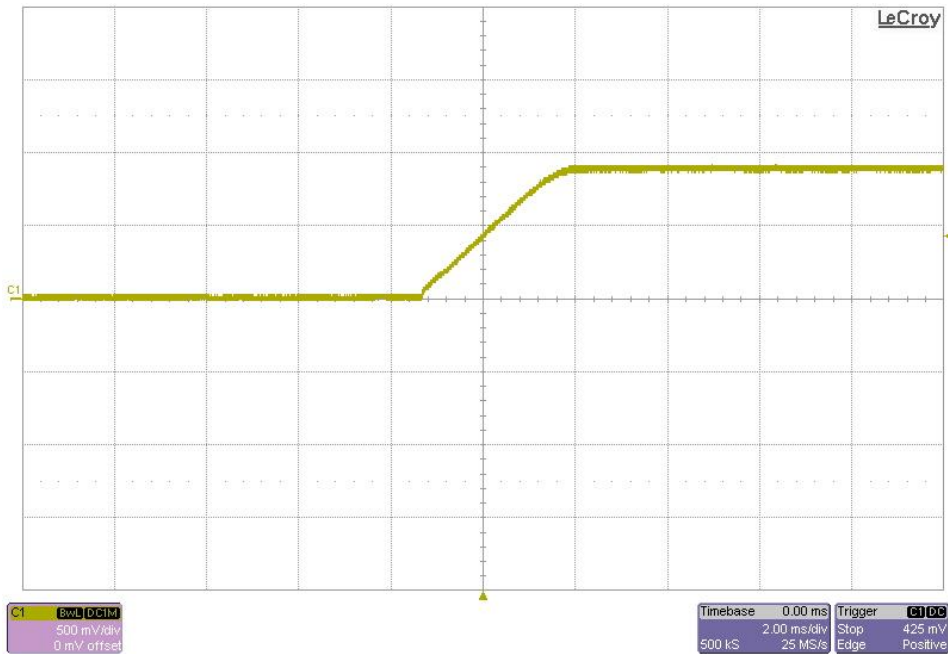
The following design showcases a 3.3V<sub>in</sub> to 0.9V@10A power supply in a small form-factor, cost-effective design. It uses the TPS40400 controller in conjunction with the CSD87381P (a high and low side FET IC). The TPS40400 features full PMBUS telemetry for enhanced monitoring and control. The PMP20084 Board is a 4-layer, 2-oz copper weight per layer board.

## 2 Board Photo



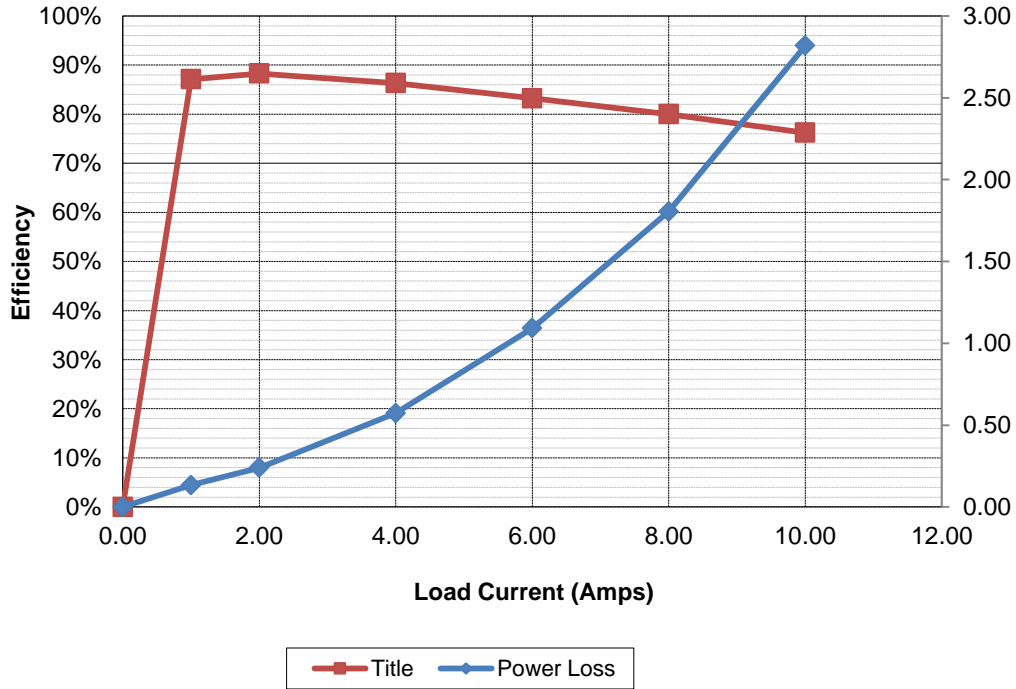
## 3 Startup

The photo below shows the startup waveform for the 0.9V output with no load. Start-up is approximately 1.5 milliseconds.



### 4 Efficiency

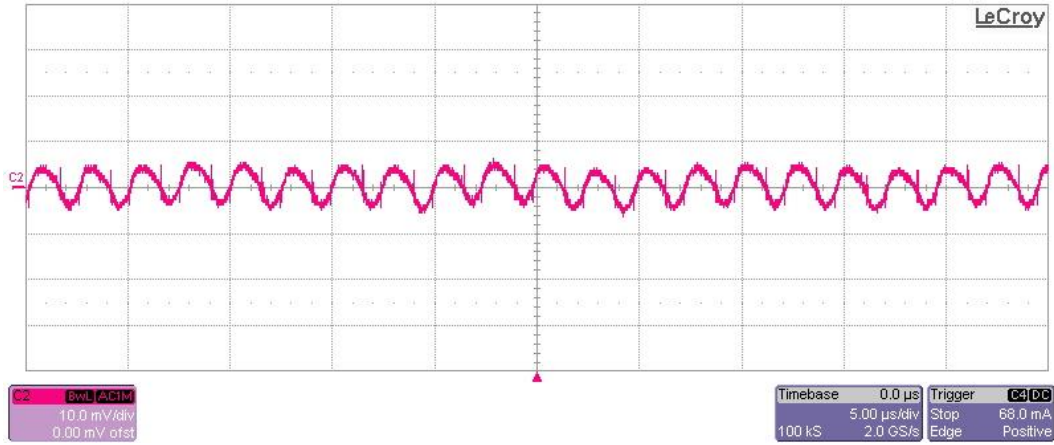
The converter efficiency and power loss are shown in the graph below, operating at fsw = 400 KHz.



lout	Vout	Vin	Iin	Pin	Pout	Losses	Efficiency
0.000	0.000	0.0	0.00000	0.0000	0.00	0.00	#DIV/0!
1.000	0.902	3.3	0.3130	1.0354	0.90	0.13	87.1%
2.000	0.902	3.3	0.619	2.0433	1.80	0.24	88.3%
4.000	0.903	3.3	1.267	4.1849	3.61	0.57	86.3%
6.000	0.903	3.3	1.974	6.5103	5.42	1.09	83.2%
8.000	0.903	3.3	2.735	9.0282	7.22	1.80	80.0%
10.000	0.903	3.3	3.596	11.8488	9.03	2.82	76.2%

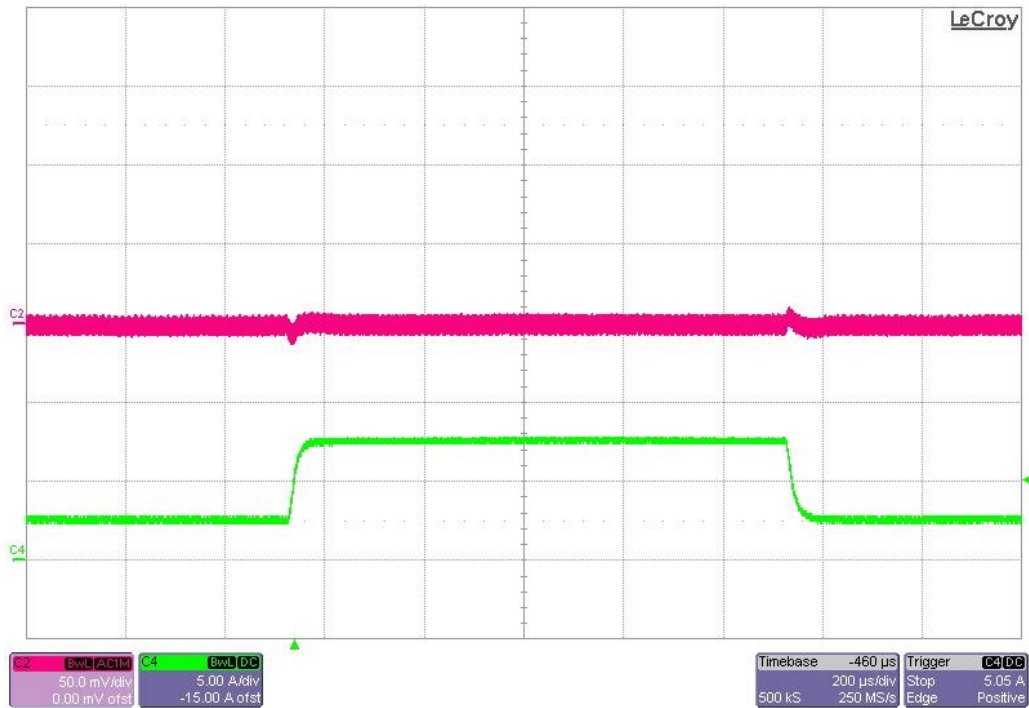
## 5 Output Ripple Voltage

The waveform below shows the output ripple voltage of the 0.9V output with a 10A load.



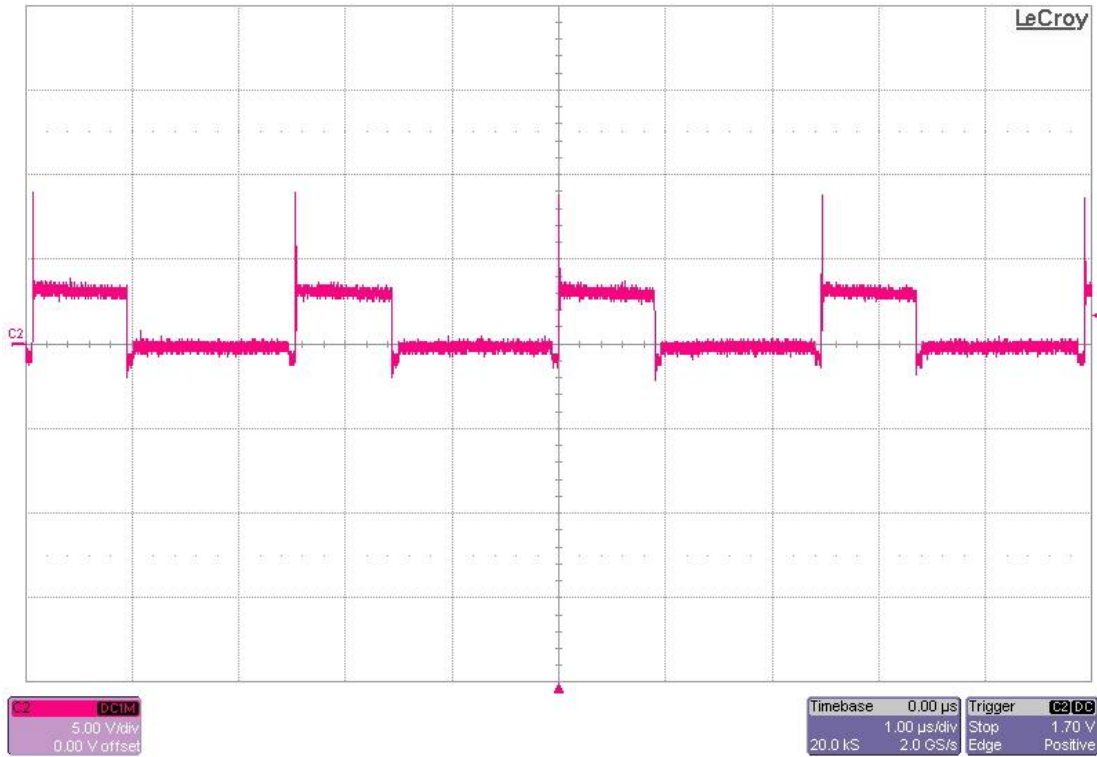
## 6 Load Transients

The capture below was taken at the 0.9V output. The load was pulsed between 2.5A and 7.5A with 50% duty cycle at 500Hz.



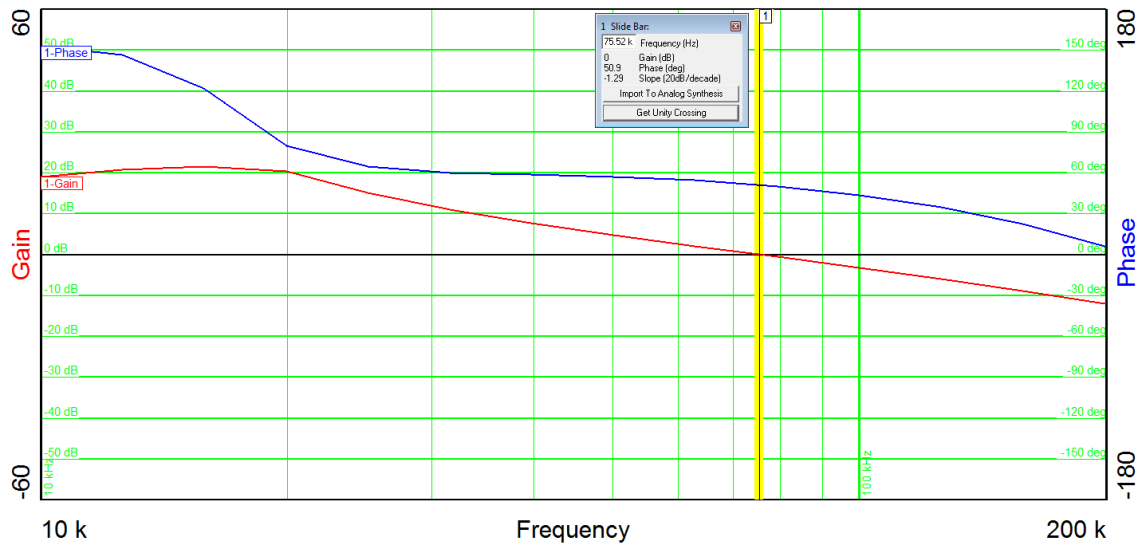
## 7 Switch Node Waveform

The photo below shows the L1 switch node. This was taken when  $V_{in} = 3.3V$  with the 0.9V output loaded to 10A.



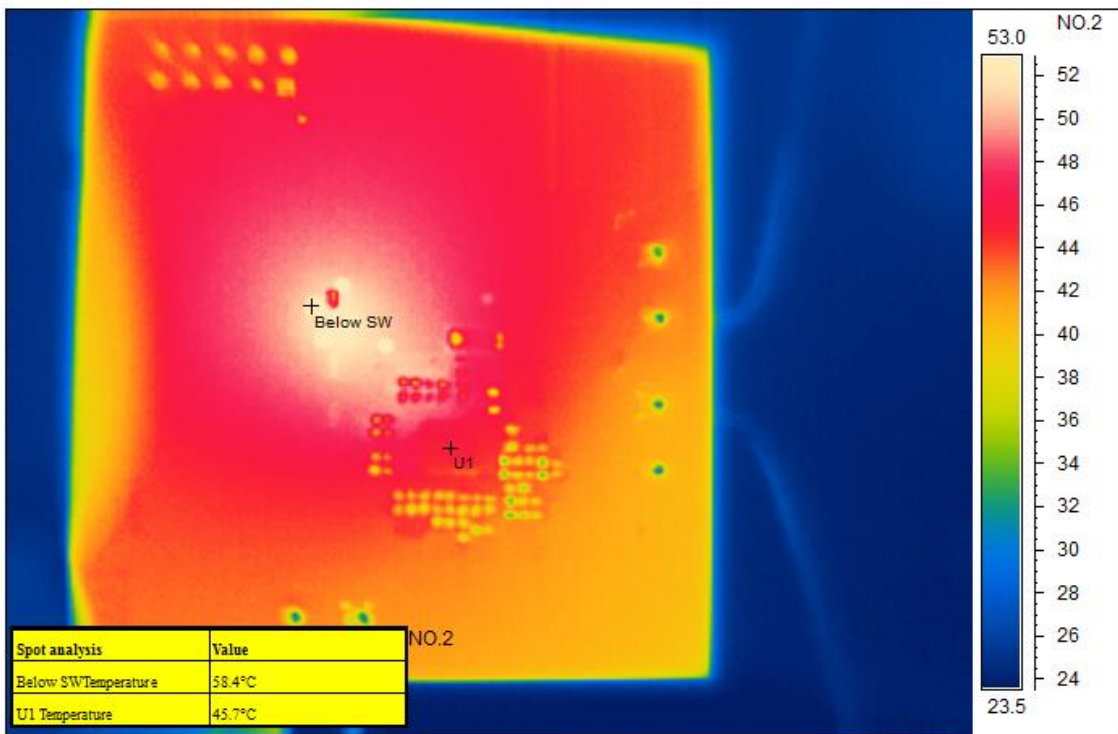
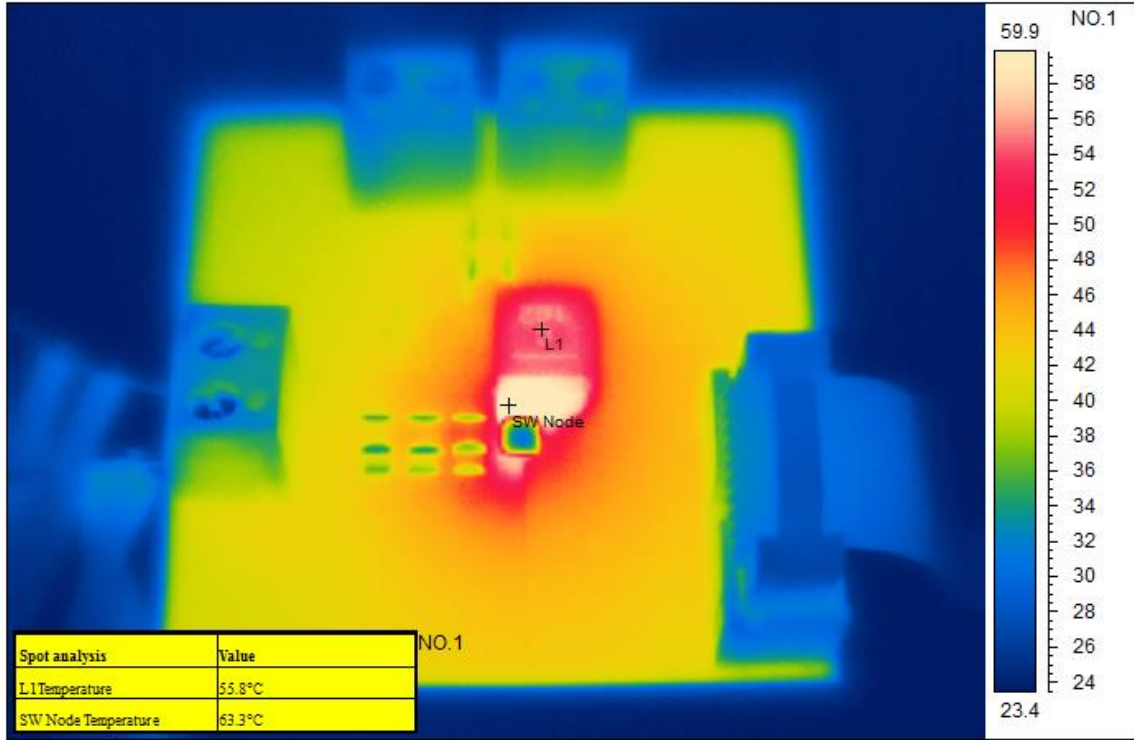
## 8 Loop Response

Below is the loop response for the 0.9V@10A buck showing a phase margin of about 51 degrees.



## 9 Thermal Image

Below are thermal images of the board taken with  $V_{in}=3.3V$ , the 0.9V output loaded at 10A, and no airflow. The board thermal was taken after 15 minutes of full loading.



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