



## **PMP20721 TPS53513 Differential remote sense**

The following test report is for the PMP20721 Board.

The tests performed were as follows:

- A. PMP20721 – 12V Input
  1. Output Voltage Ripple (No Load)
  2. Output Voltage Ripple (Full Load)
  3. Switch Node (Full Load)
  4. Transient Response (25% to 75%)
  5. Bode Plot
  6. Thermal Images
  7. Efficiency and Load Regulation

## 1 Output Voltage Ripple (No Load)

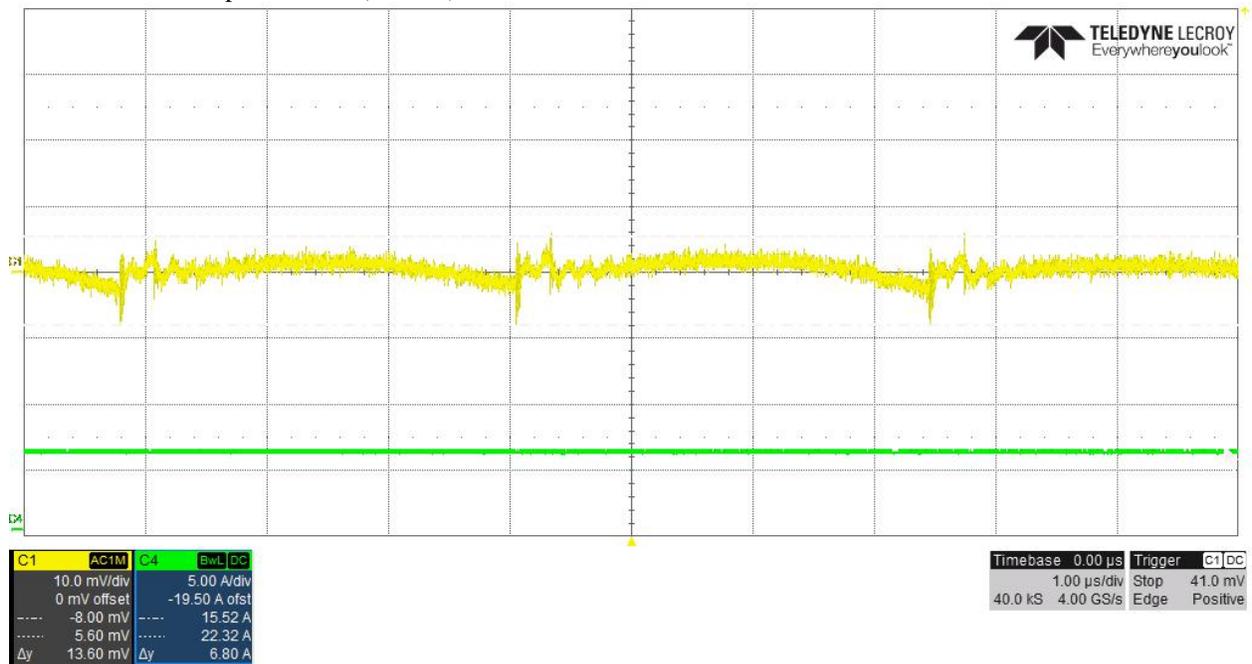
The photos below show the output voltage ripple. The output is not loaded. The input voltage is 12V.  
 Channel 1 – Yellow: Output Voltage – (10mV/Division; AC Coupled; FULL BW)



TPS53513 (0.9V)

## 2 Output Voltage Ripple (Full Load)

The captures below show the output voltage ripple. The output is loaded to the full output current.  
 Channel 1 – Yellow: Output Voltage – (10mV/Division; AC Coupled; FULL BW)  
 Channel 4 – Green: Output Current – (5A/Div)



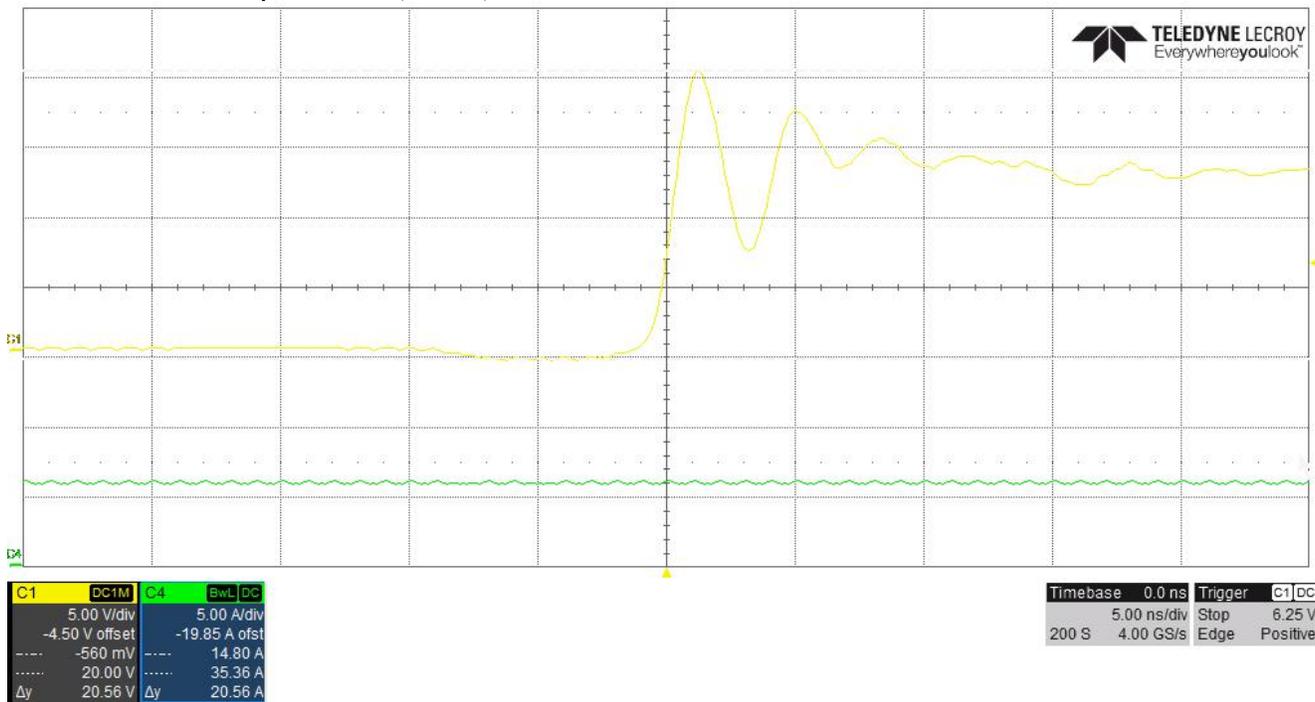
TPS53513 (0.9V)

### 3 Switch Node (Full Load)

The waveforms below show the switching behavior of the converter.

Channel 1 – Yellow: Switch node Voltage – (5V/Division; DC Coupled; FULL BW)

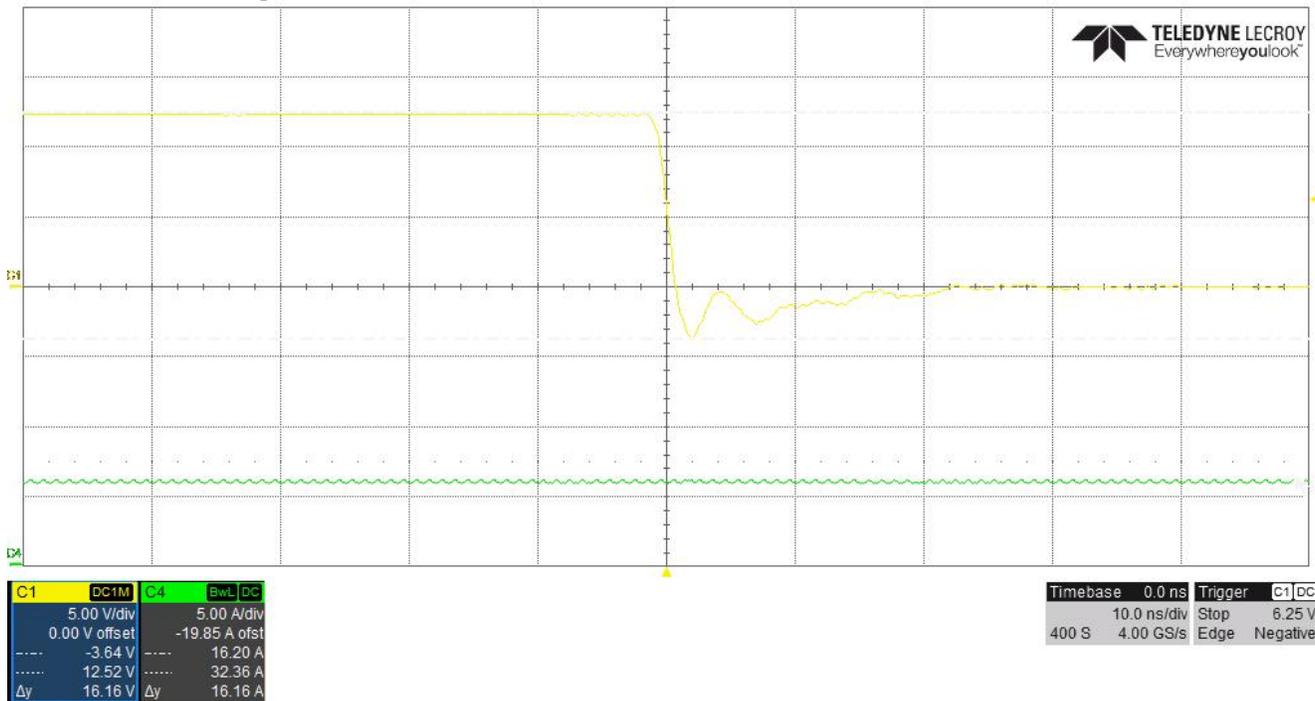
Channel 4 – Green: Output Current – (5A/Div)



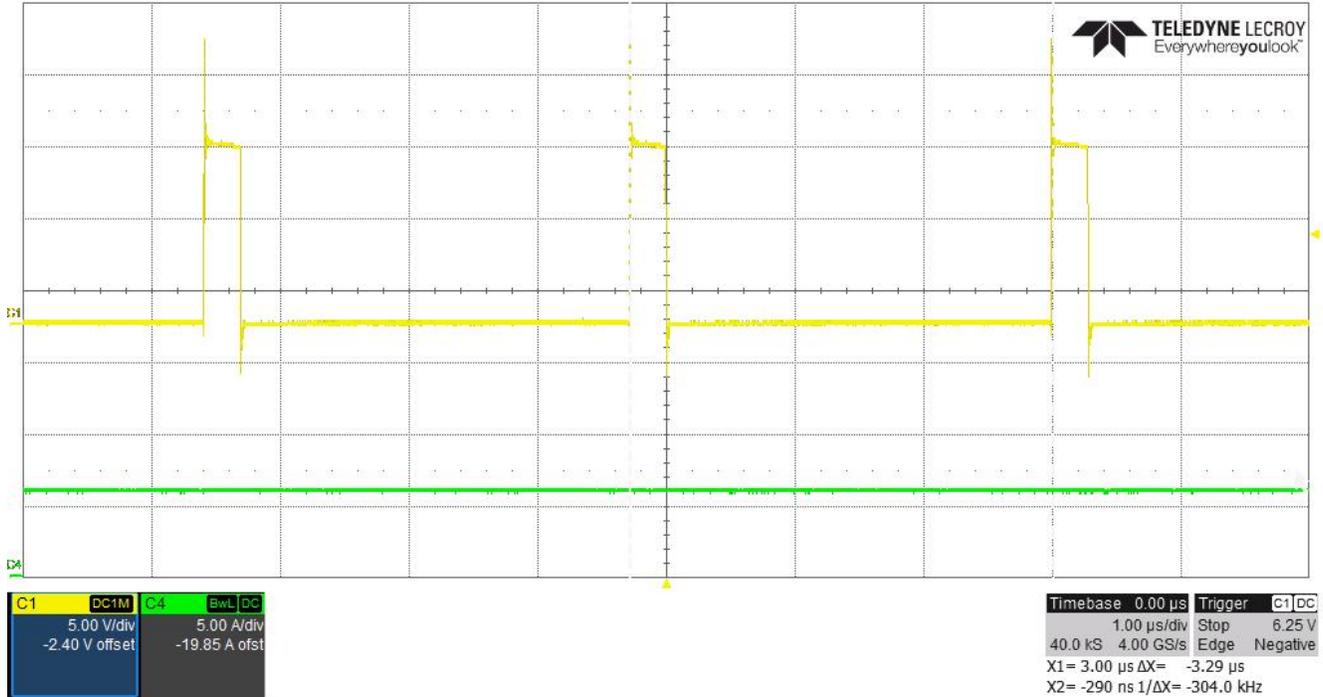
TPS53513 (0.9V)-Vmax=20V

Channel 1 – Yellow: Switch node Voltage – (5V/Division; DC Coupled; FULL BW)

Channel 4 – Green: Output Current – (5A/Div)



TPS53513 (0.9V)-Vmin=-3.64V



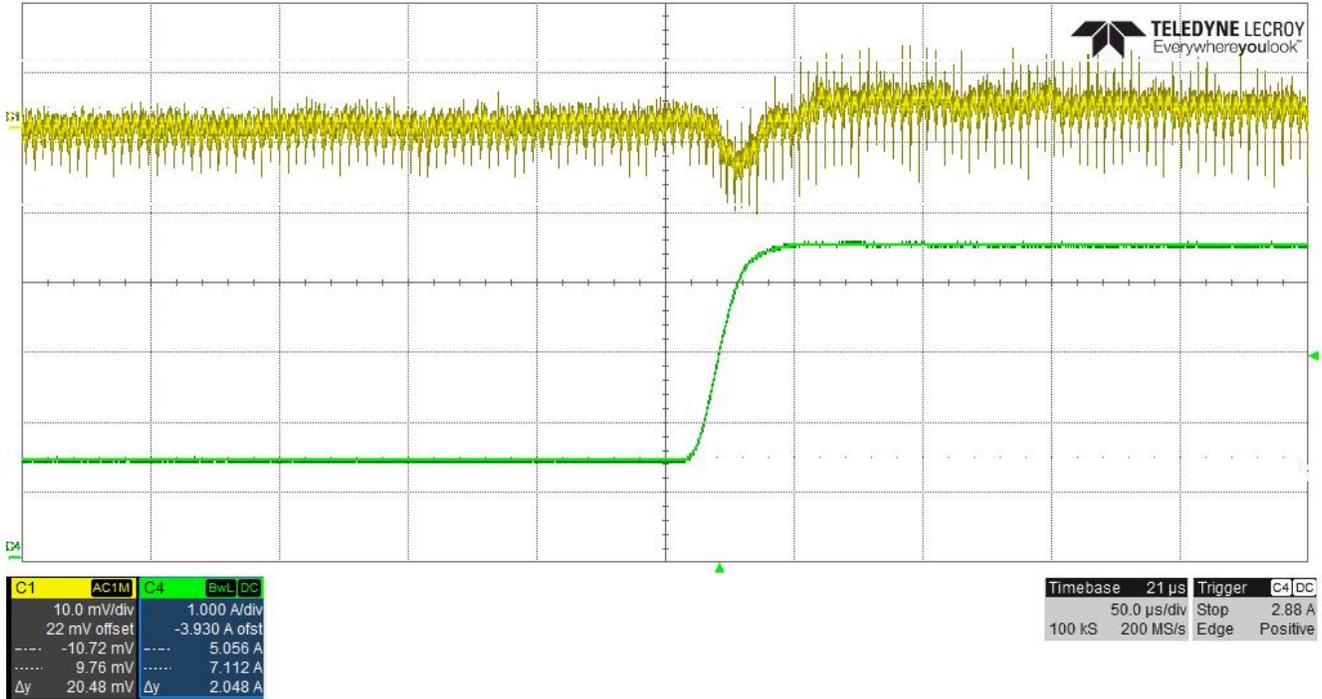
TPS53513 (0.9V)-Switching frequency =304kHz

## 4 Transient Response

The transient responses of the converters are shown in the figures below. The current is pulsed from 25% to 75%.

Channel 1 – Blue: Output Voltage – (10mV/Division; AC Coupled; FULL BW)

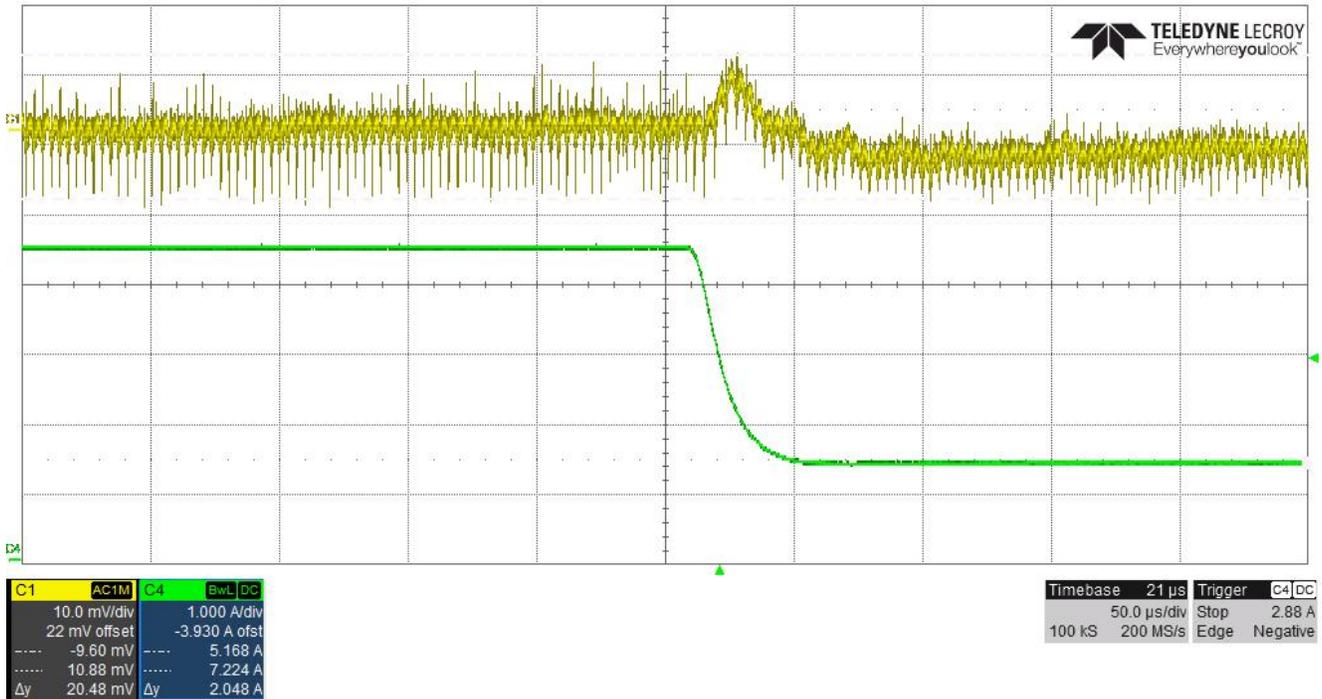
Channel 4 – Green: Output Current – (1A/Division), (50usec/Div)



TPS53513 (0.9V)-Vtrans=20.48mV

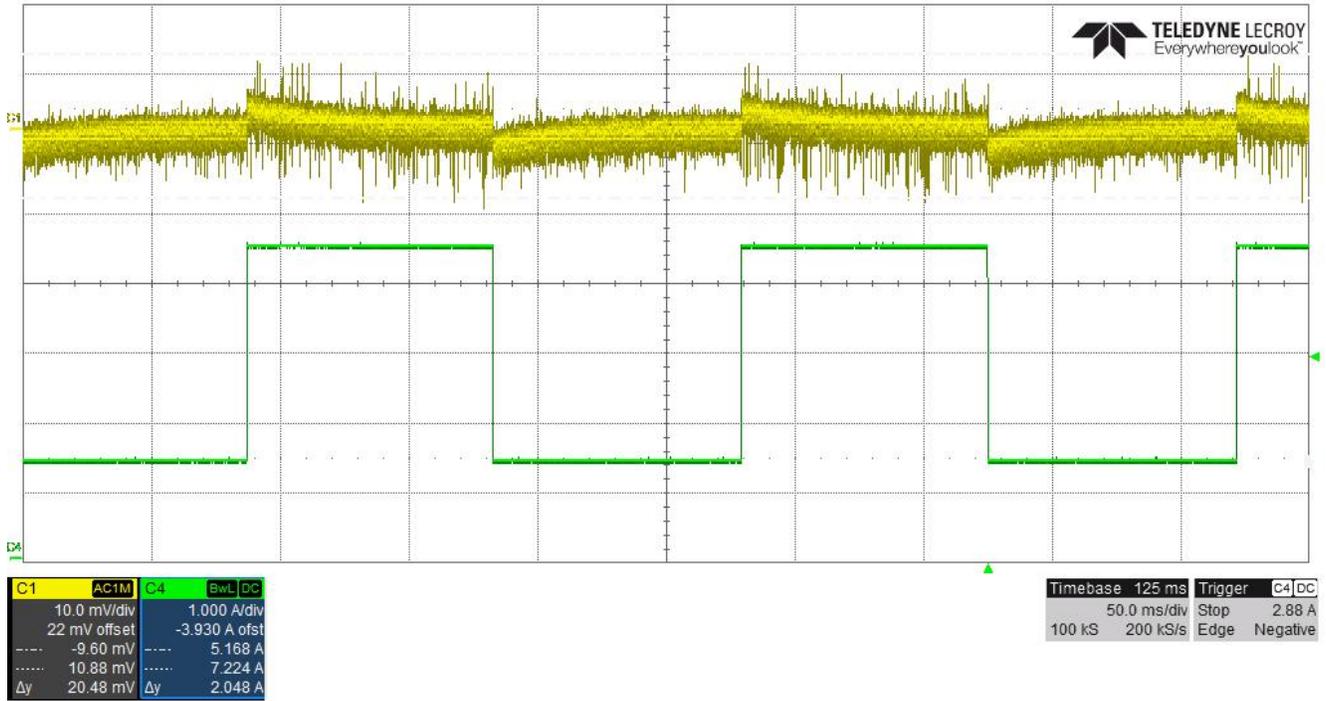
Channel 1 – Blue: Output Voltage – (10mV/Division; AC Coupled; FULL BW)

Channel 4 – Green: Output Current – (1A/Division), (50usec/Div)



TPS53513 (0.9V)-Vtrans=20.48mV

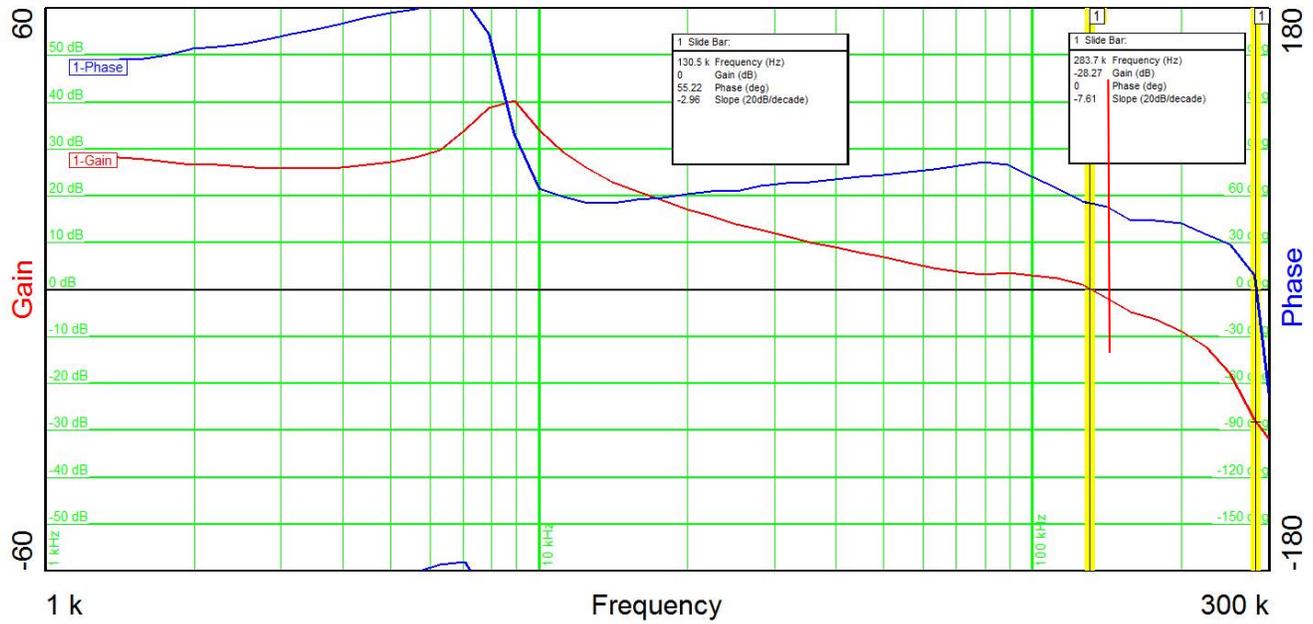
Channel 1 – Blue: Output Voltage – (10mV/Division; AC Coupled; FULL BW)  
Channel 4 – Green: Output Current – (1A/Division), (50msec/Div)



TPS53513 (0.9V)

## 5 Loop response

The loop responses of the converters are shown in the figures below.



TPS53513 (0.9V)  $f_{c0}$  = 130.5kHz; Phase margin = 55.22deg; Gain margin = 28dB

## 6 Thermal Images

Thermal images of the board are shown below. The input voltage is 12V, the boards are at full load, are mounted with no airflow.

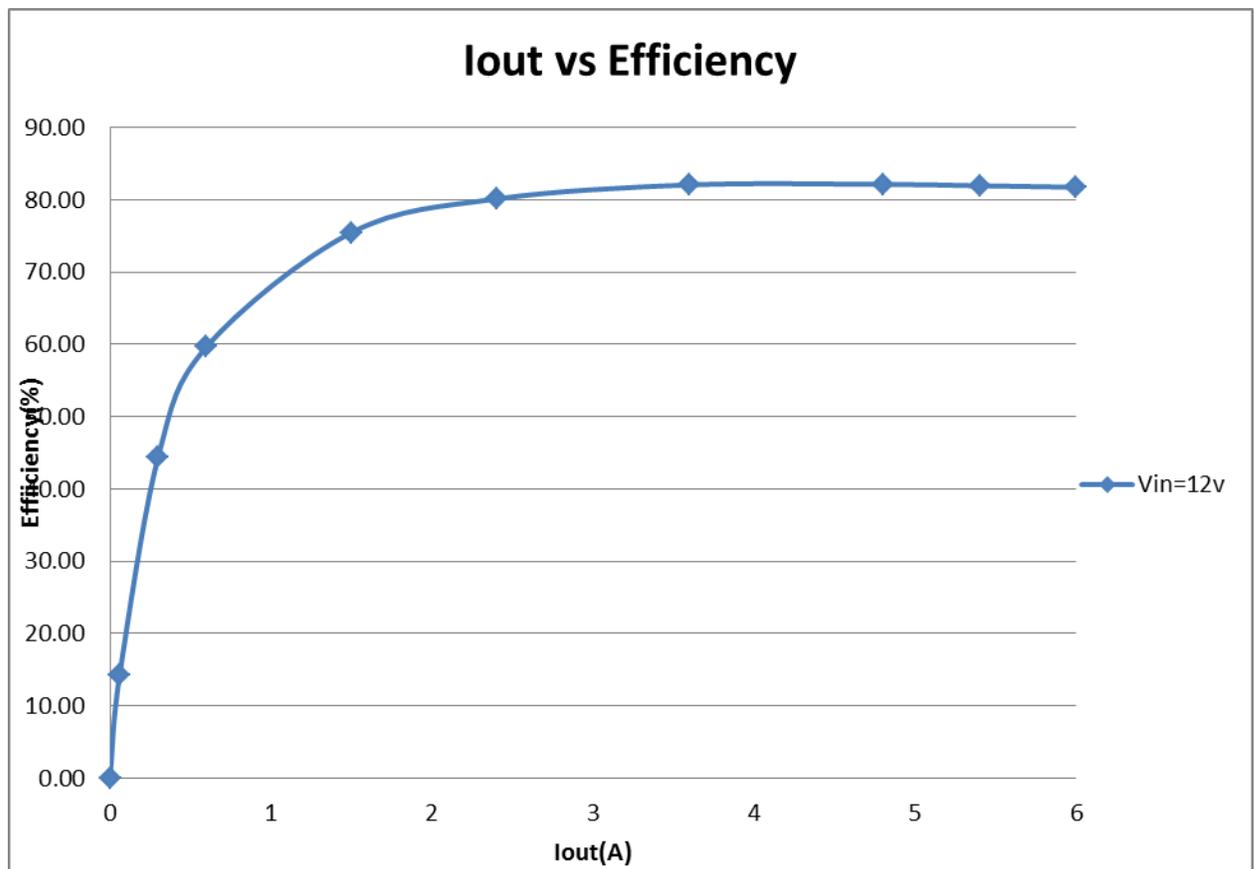


## 7 Efficiency and Load regulation (IR drop)

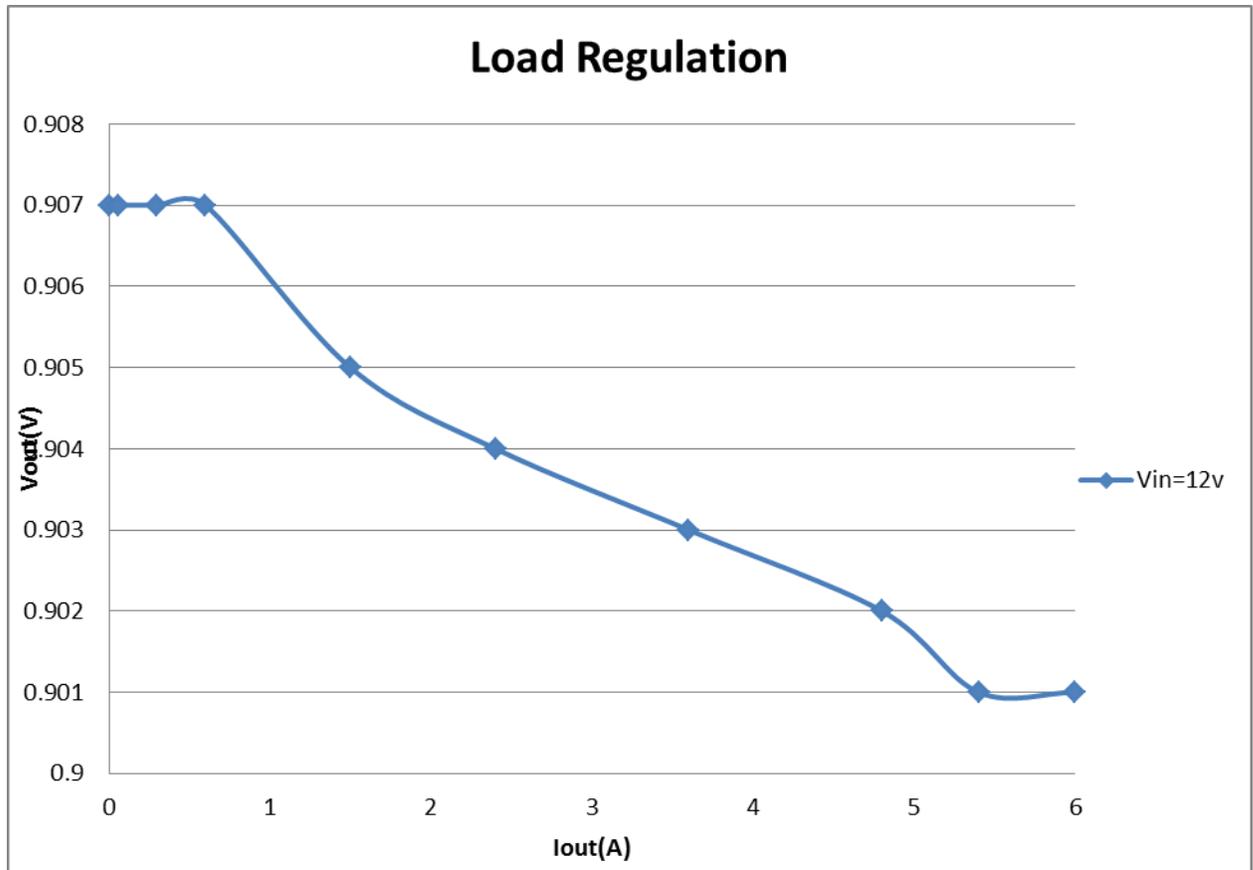
At 12 Vin, efficiency data was taken at multiple loads as shown in table 1 below:

VIN(V)	IIN(A)	VOOUT(V)	IOOUT(A)	Eff(%)
12.005	0.027	0.907	0	0.00
12.004	0.032	0.907	0.06	14.17
12.002	0.051	0.907	0.3	44.45
11.998	0.076	0.907	0.6	59.68
11.989	0.15	0.905	1.5	75.49
11.979	0.226	0.904	2.4	80.14
11.965	0.331	0.903	3.6	82.08
11.951	0.441	0.902	4.8	82.15
11.944	0.497	0.901	5.4	81.96
11.936	0.554	0.901	6	81.75

Below are the figures for efficiency and load regulation:



Efficiency max is 82.15% at 4.8A out



Load regulation shows a max reduction of 6mv over a 6A load. Hence the max deviation from nominal Vout over the load range is 0.66%.

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