TPS54240 Buck Circuit - 3.8V @ 2.5A

- Input 9..14V DC
  Can withstand up to 40V
- Output 3.8V @ 2.5A
- Working in continuous conduction mode
- Built on PCB PMP2644 Rev.B
- Revision B
  - Fine tuning of switching frequency to 400 kHz (R3 = 287 kOhm)
  - Output capacitance
    - 1x 100uF/6.3V/X5R/1210 (C3) directly on converter output
    - 2x 100uF/6.3V/X5R/1210 in approx. 4cm distance
    - Feedback is connected to the single 100uF capacitor on the converter output
  - Fine tuning of compensation network

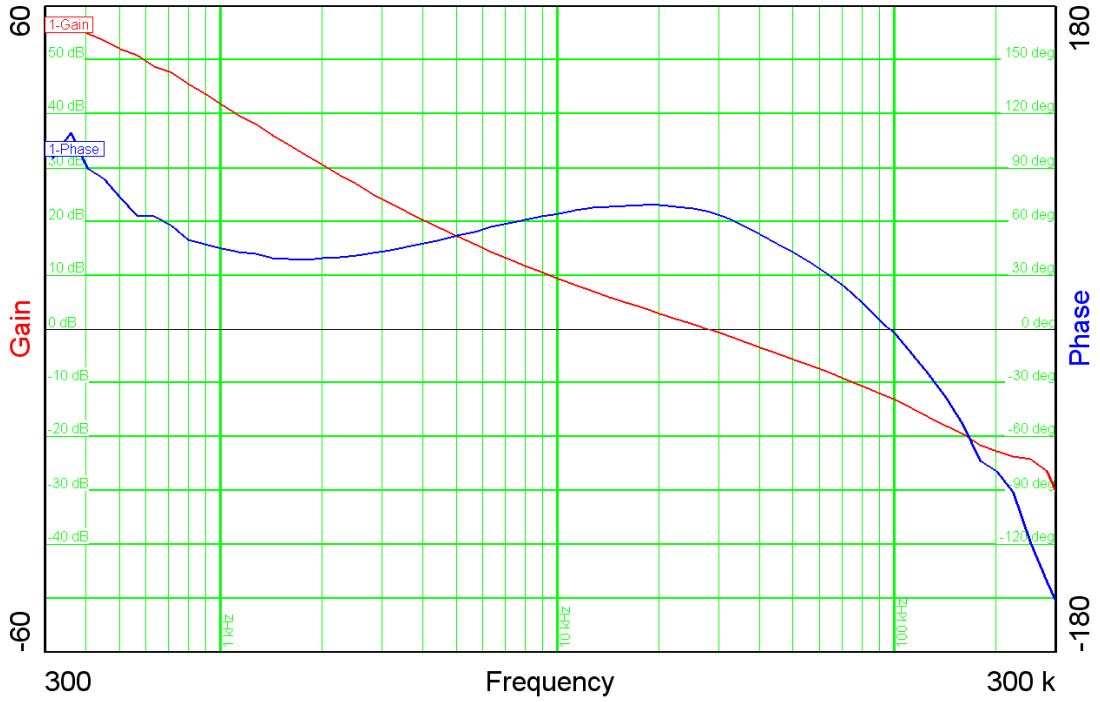
1 Fine tuning of compensation network

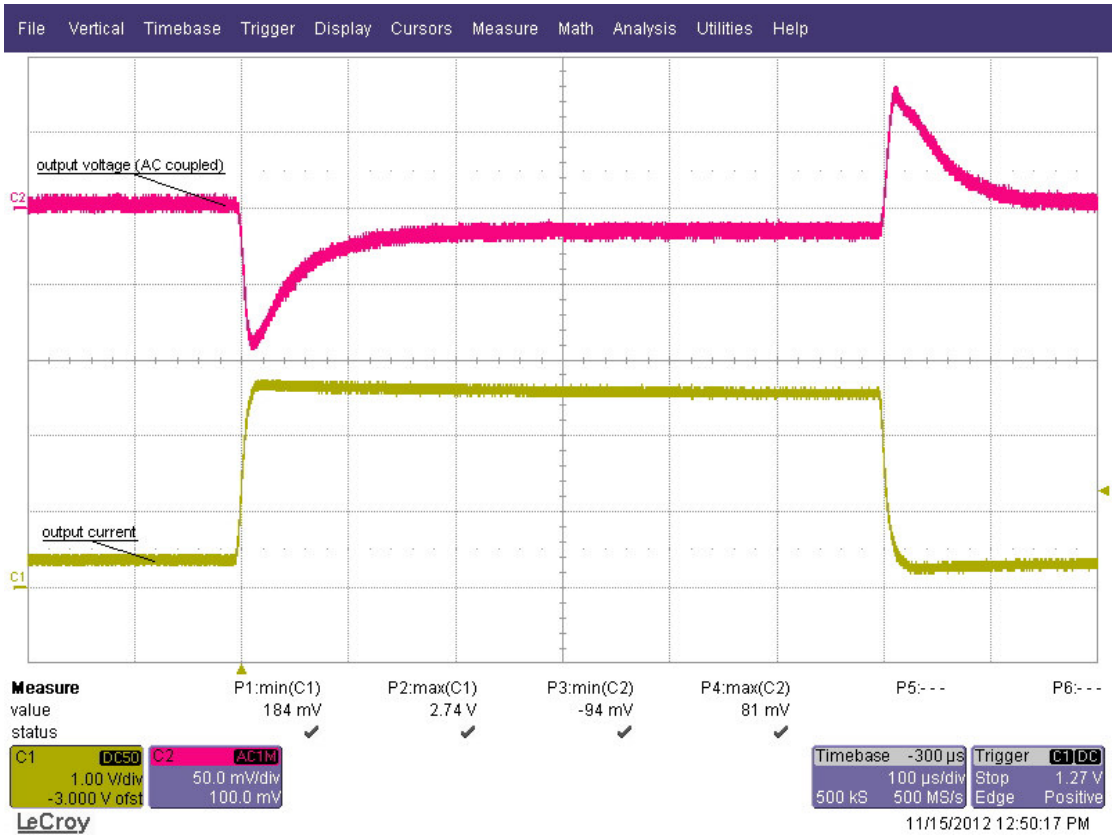
Four different settings for the compensation network (R1/C10/C9) were tested and compared.

A load step from 0.17A to 2.5A and vice versa with a frequency of 217 Hz and a duty cycle of 12.5% was applied by an electronic load.

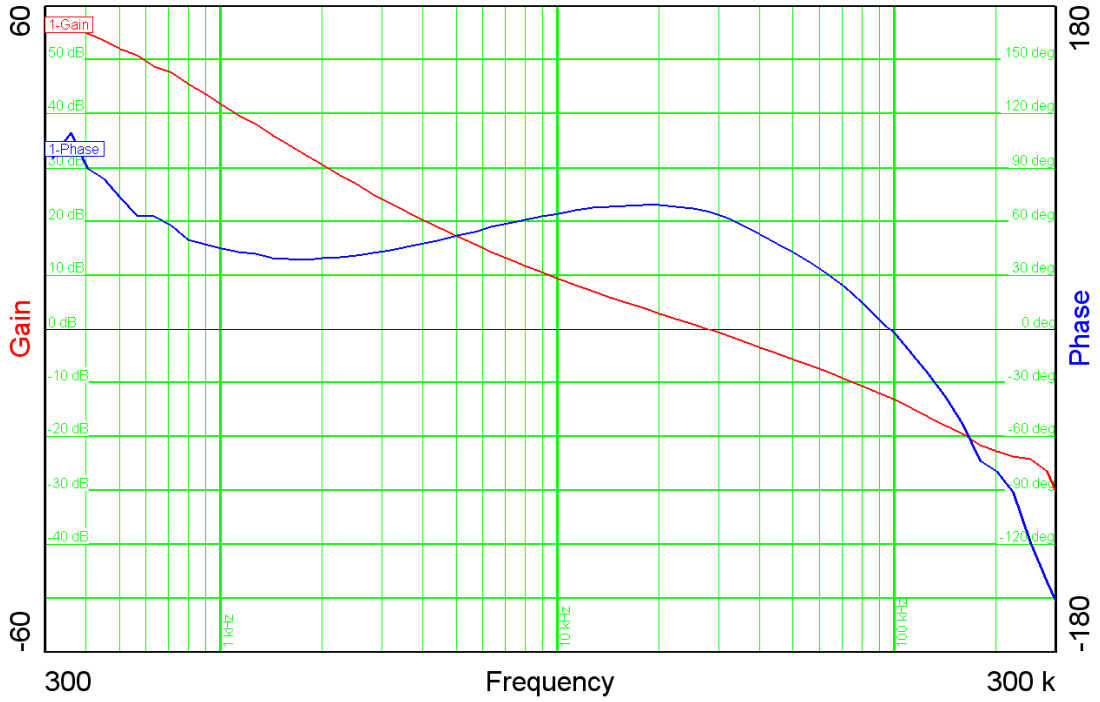
Compensation Network	Phase Margin / Bandwidth	Gain Margin	Over-/ Undershoot	Regulation Time
R1 = 33.2k C10 = 1nF C9 = 15pF	65.6 deg @ 28.0 kHz	-12.8 dB	-94 / 81 mV	150 us
R1 = 45.3k C10 = 1nF C9 = 15pF	57.5 deg @ 34.4 kHz	-10.0 dB	-89 / 76 mV	150 us
R1 = 33.2k C10 = 680pF C9 = 15pF	61.3 deg @ 27.5 kHz	-12.9 dB	-111 / 95 mV	80 us
R1 = 45.3k C10 = 680pF C9 = 15pF	51.7 deg @ 37.9 kHz	-9.0 dB	-90 / 76 mV	80 us

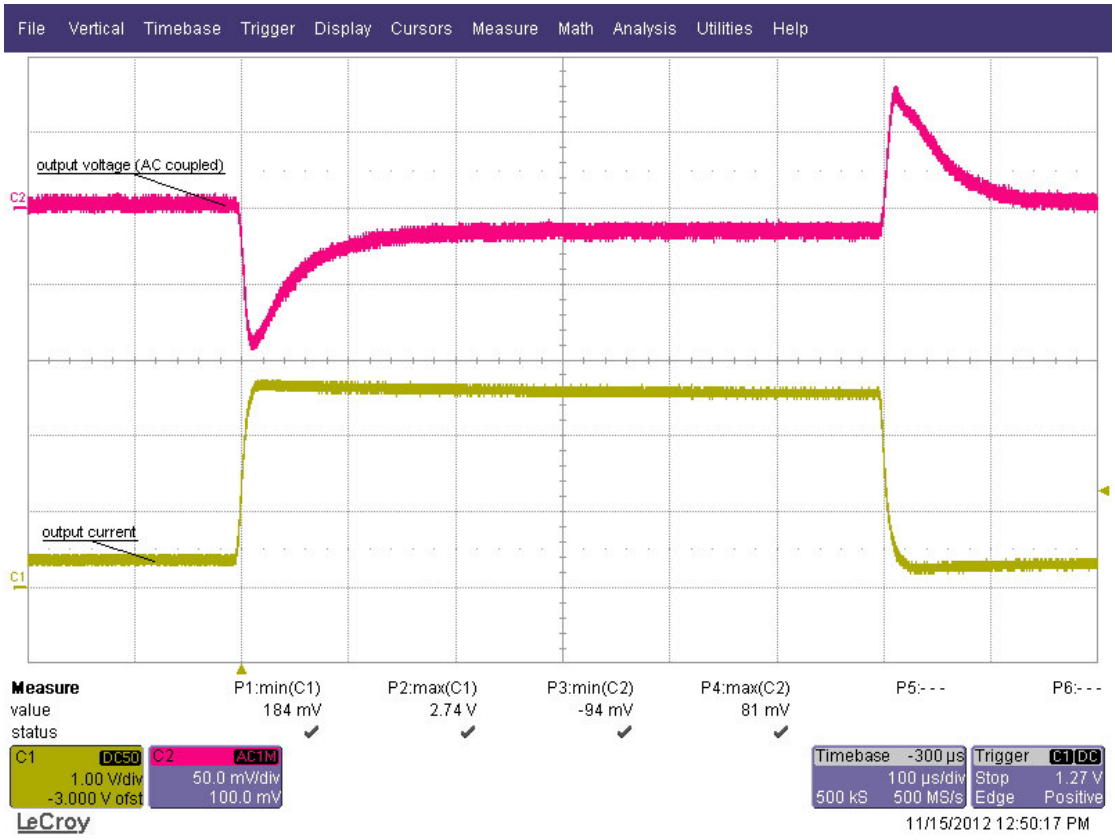
2 R1 = 33.2k / C10 = 1nF / C9 = 15pF



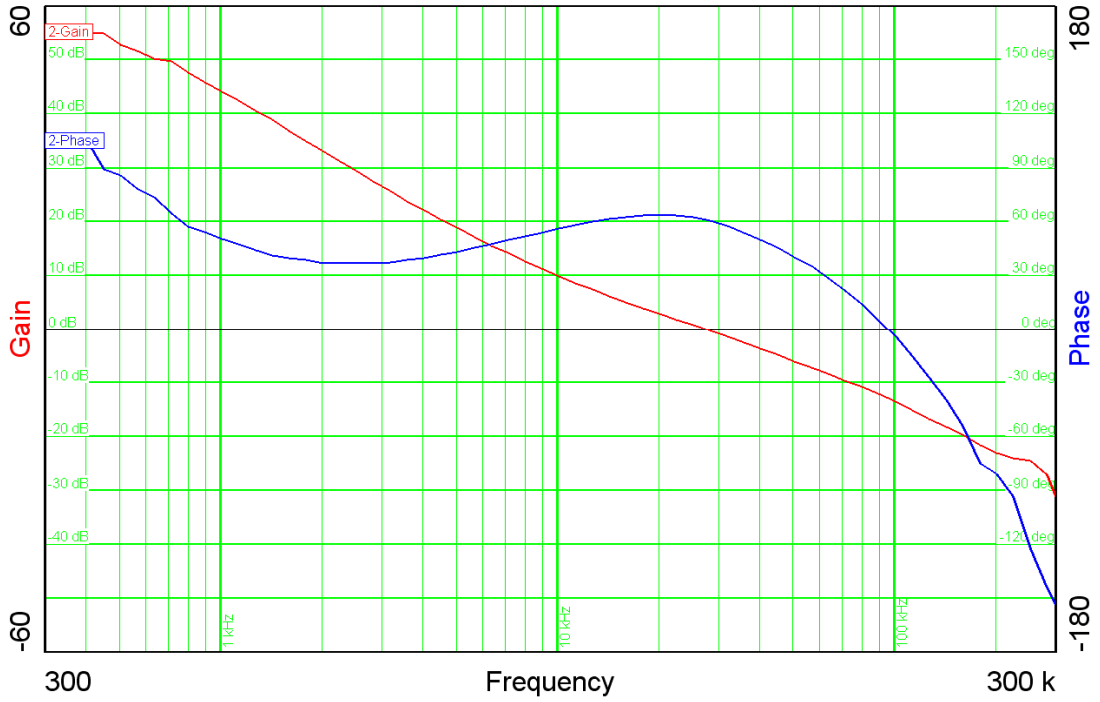


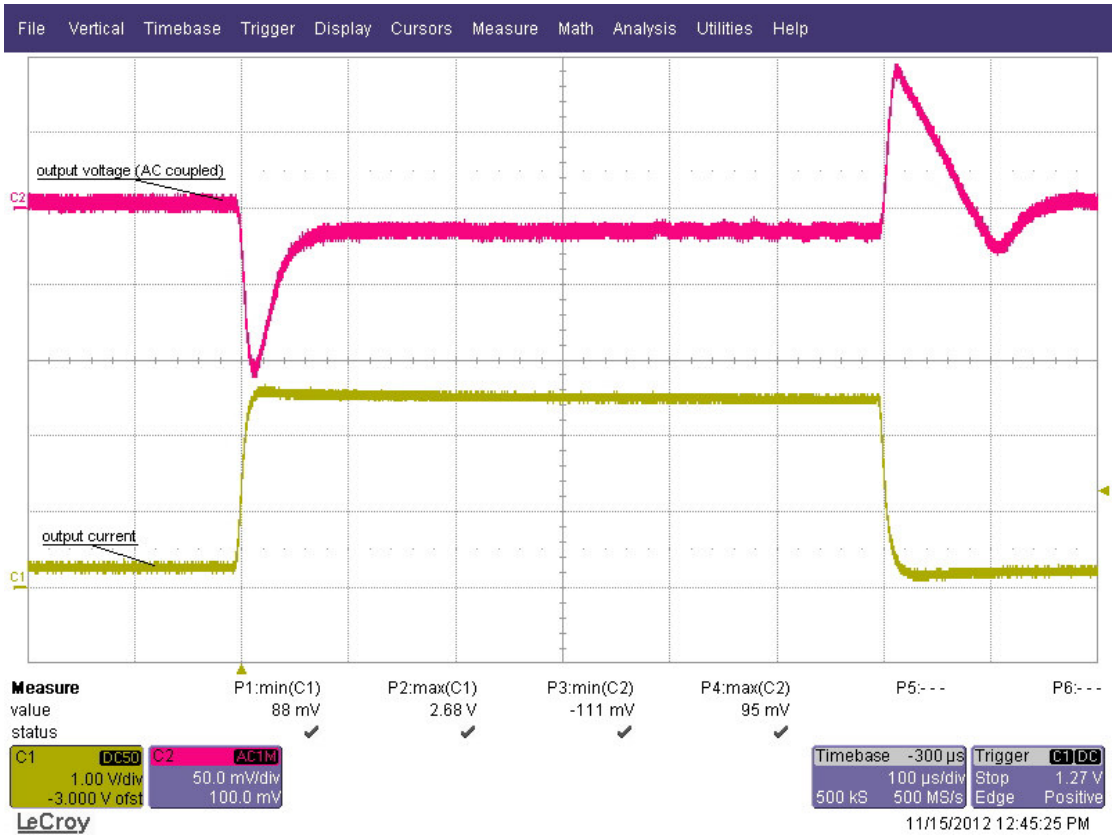
3 R1 = 33.2k / C10 = 1nF / C9 = 15pF



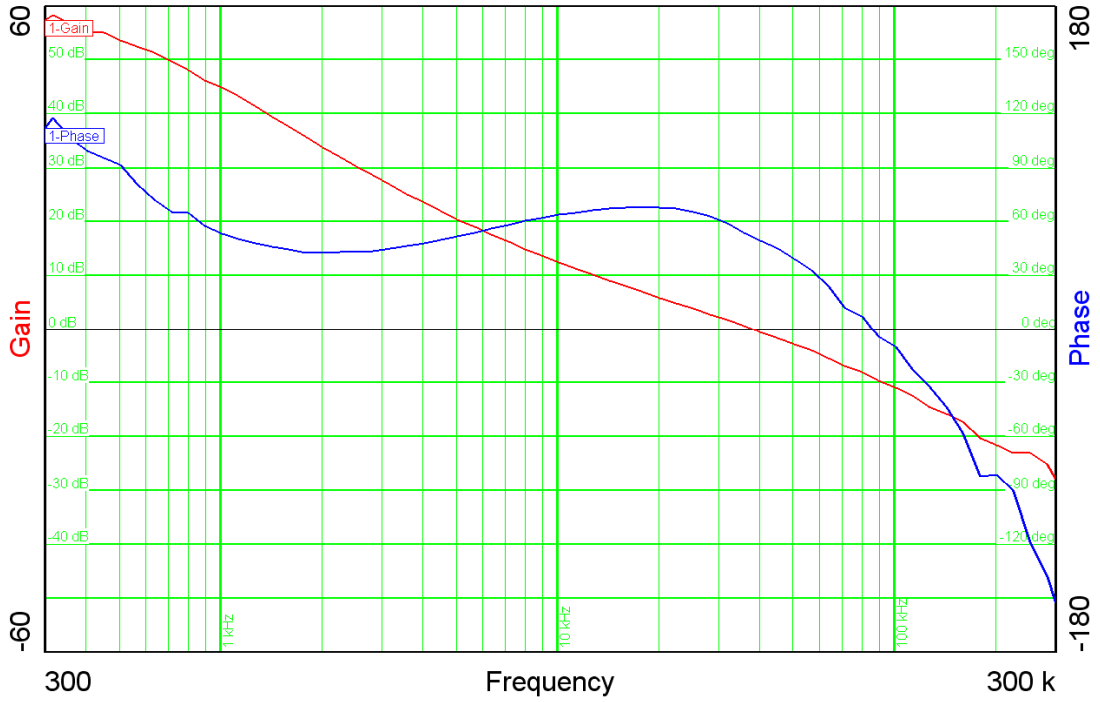


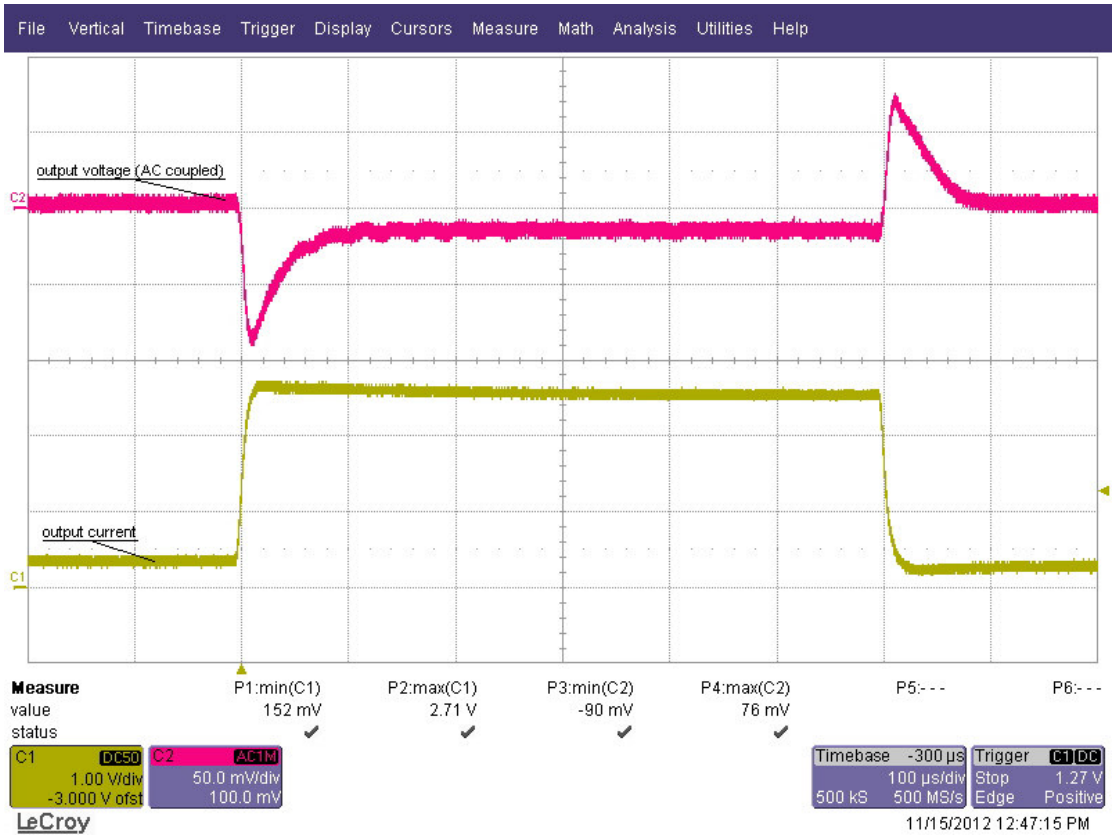
4 R1 = 33.2k / C10 = 680pF / C9 = 15pF





5 R1 = 45.3k / C10 = 680pF / C9 = 15pF





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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265