

1 Regulation / Efficiency / Thermal

Regulation vs. load and input: Output is consistently at 8.38V regardless of load. This is almost 2% below 8.5V. Although reference is +/-1%, voltage sense resistors used in model are also +/-1% each, allowing overall error to be > 1%.

Efficiency: $V_{out} I_{out}$ at battery terminals vs. $V_{in} I_{in}$ at Input terminals
For purpose of efficiency calculation of the output under load, I assigned to loaded output 1/6 of the total no load input current.

Input DC volts	Input amps	Output volts	Output amps	efficiency
14.00	.431 - .016	8.37	.503	72.4%
14.03	.321 - .016	8.37	.364	71.2%
14.04	.237 - .016	8.37	.254	68.5%
14.06	.141 - .016	8.37	.126	60.0%
14.08	.085 - .016	8.37	.051	43.9%
14.08	.056 - .016	8.37	.018	26.8%
14.09	.019	8.37	0	N/A

Thermal at full load: no air flow

5 Volts input with V_{out} at 8.38V and 527 milli-amps

Room ambient 25 degrees Celsius:
Q9 boost switch: 51 degrees Celsius
D3 output diode: 48 degrees Celsius
L1 boost choke: 47 degrees Celsius

Waveforms to follow:

Section 2: Start up: pages 2-3

Section 3: Load transients: pages 4-5

Section 4: Output ripple: page 6

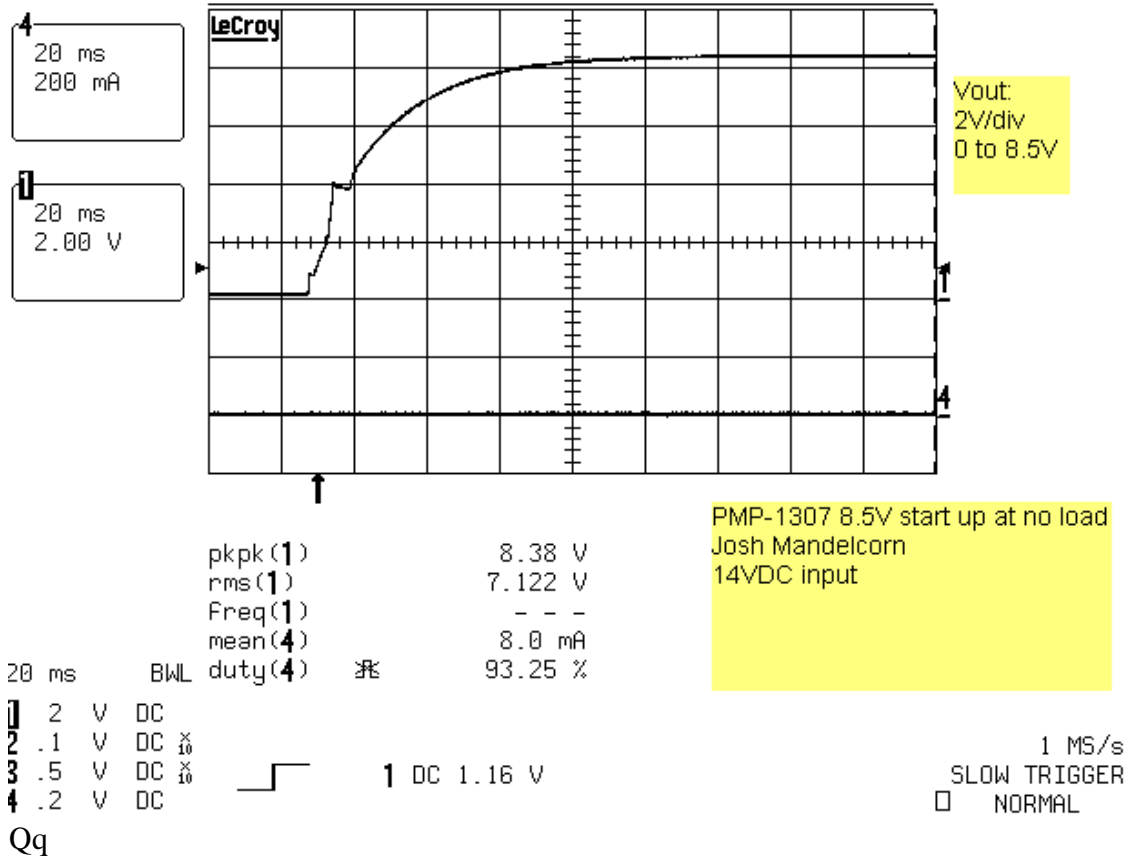
Section 5: Main switching waveform: page 7

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2 Start Up

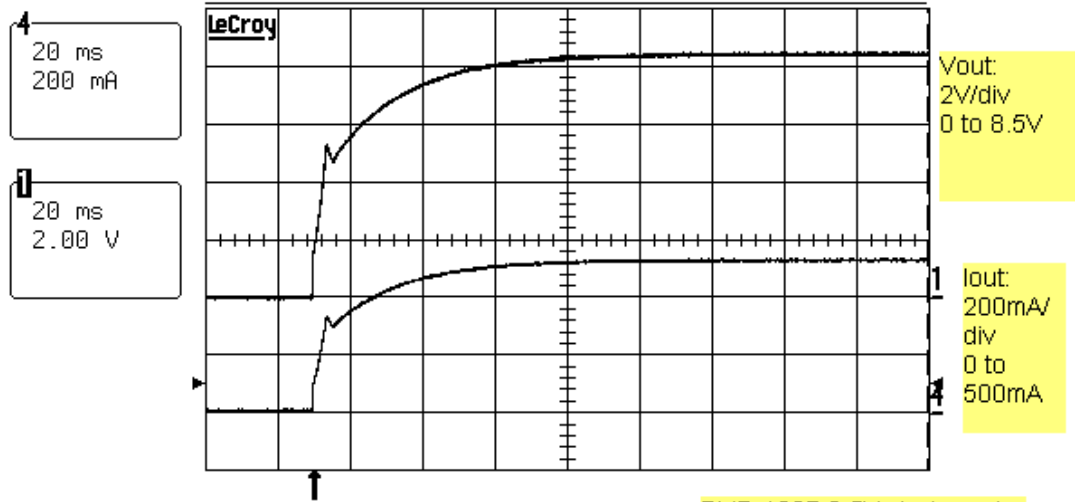
Start up at no load: 8.5V output off 5V; input = 14V

6-May-05
14:58:43



Start up of 8.5V at full load:

6-May-05
14:57:21



PMP-1307 8.5V start up at full load

pkpk(1)	8.63 V
rms(1)	7.273 V
Freq(1)	- - -
mean(4)	420.6 mA
duty(4)	- - -

20 ms
2 V DC
.1 V DC $\times 10$
.5 V DC $\times 10$
.2 V DC

4 DC 0.108 A

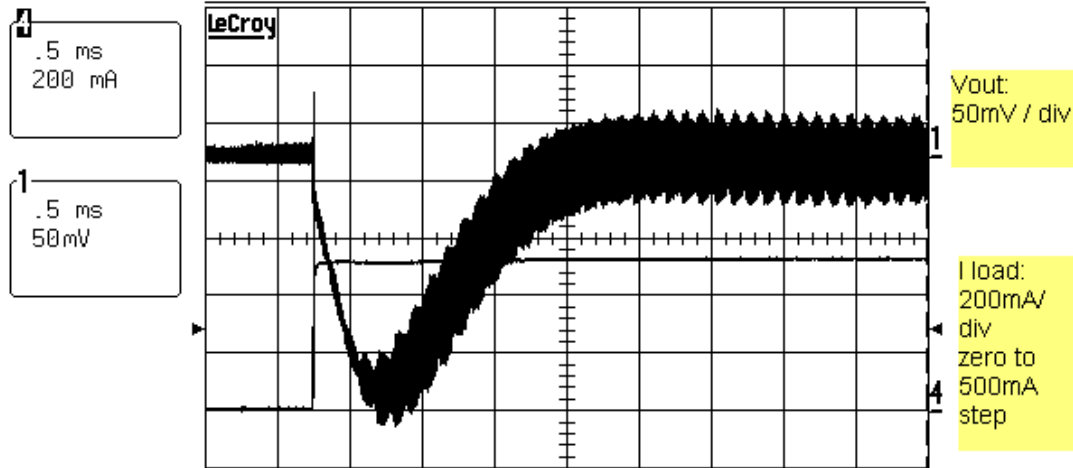
1 MS/s
SLOW TRIGGER
 NORMAL

Qq

3 Load Transients

8.5V output off 5 volts output: step load from zero to full 0.5A load:

6-May-05
14:54:24



PMP-1307 step load applied
Vin=14V; 8.5V boosted off 5V
no load to full 500mA load
about 200mV negative excursion

pkpk(1)	290.6mV
rms(1)	77.65mV
Freq(1)	7.72585 kHz
mean(4)	445.7 mA
duty(4)	92.98 %

.5 ms

- 1 50 mV AC
- 2 .1 V DC
- 3 .5 V DC
- 4 .2 V DC



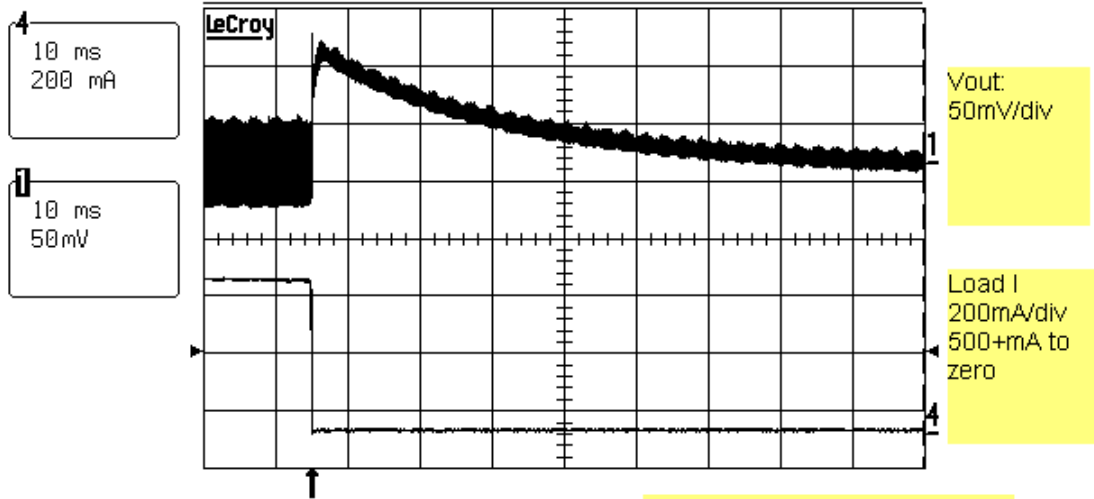
4 DC 0.288 A

50 MS/s
SLOW TRIGGER
NORMAL

Qq

8.5V output: step load removal from full 0.5A to no load:

6-May-05
14:52:03



pkpk(1)	153.1mV
rms(1)	35.84mV
Freq(1)	- - -
mean(4)	83.4 mA
duty(4)	- - -

PMP-1307 8.5V output
step load dump
Full load (500mA) to no load
about 100mV excursion with
slow bleed down

10 ms
50 mV AC
.1 V DC
.5 V DC
.2 V DC
Qq

4 DC 0.288 A

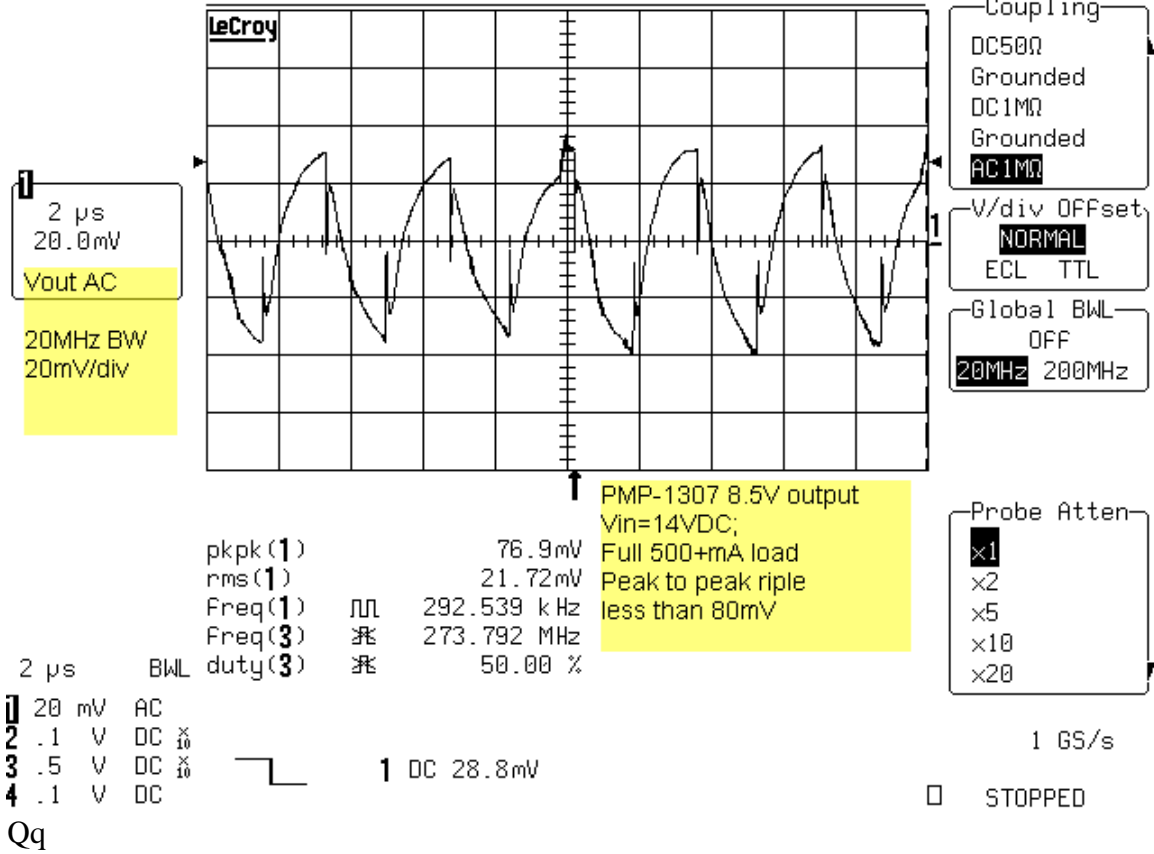
2.5 MS/s
SLOW TRIGGER
NORMAL

4 Output Ripple

Output Ripple: 8.5V at Full Load boosted off 5V output

6-May-05
14:43:26

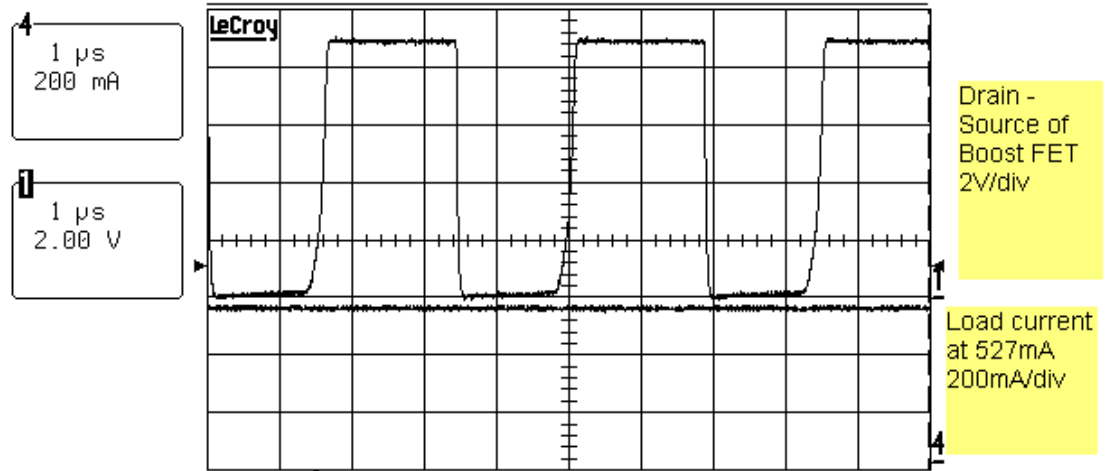
Reading Floppy Disk Drive



Major switching waveform

Major switching waveform: Full Load off 5 Vout:

6-May-05 Reading Floppy Disk Drive
16:37:18



PMP-1307: 8.5V main switching waveform:
Full load; boosted off 5V

pkpk(1)		9.19 V
rms(1)		6.385 V
Freq(1)	ΠΠ	291.010 kHz
mean(4)		527.0 mA
duty(4)	⌘	13.89 %

- 1 μs
- 1 2 V DC
- 2 .1 V DC $\times \frac{10}{10}$
- 3 .5 V DC $\times \frac{10}{10}$
- 4 .2 V DC

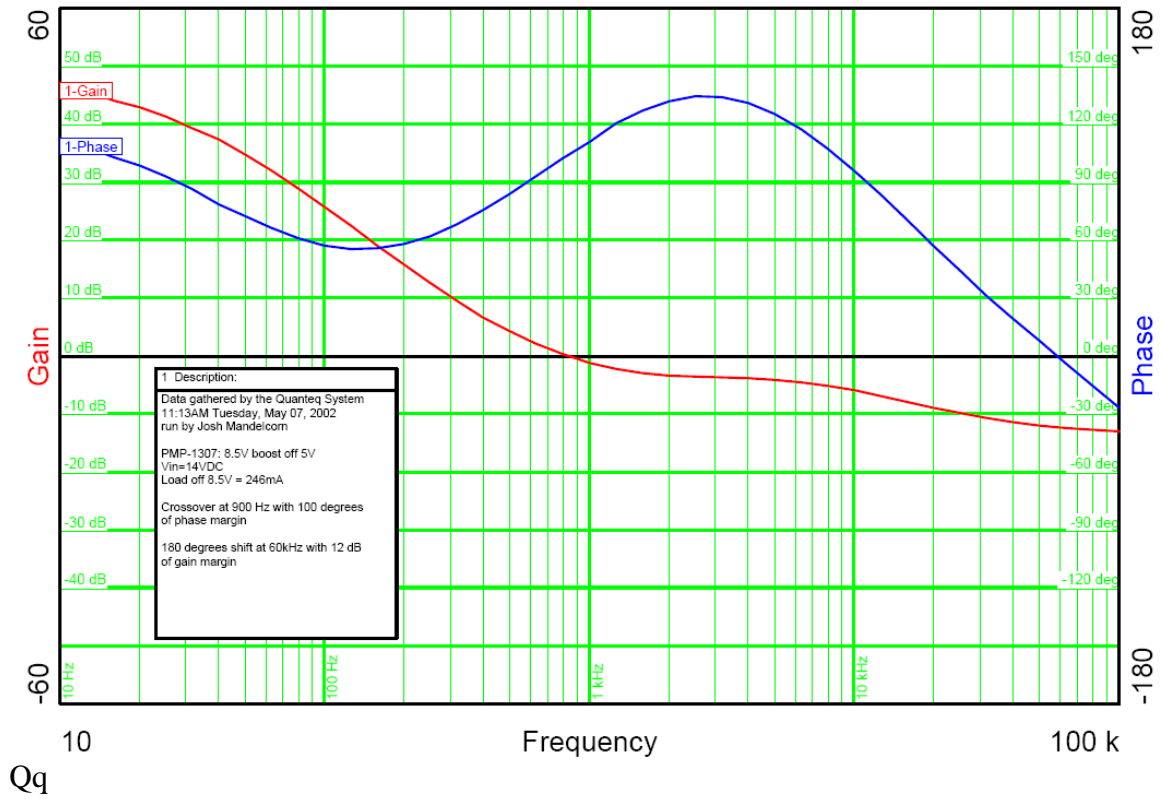
1 DC 1.16 V

1 GS/s

□ AUTO

Qq

Bode plot of Boost voltage loop:



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