PMP10898 Test Results

Table of Contents:

Efficiency & losses page 1
Thermal image page 2
Main waveform page 3
Output Ripple page 4
Start up / Bode plot page 5
Step load & load dump responses page 6

Note: Tested with load step from 100mA to full 7A as application of satellite communications often has transmitter that goes from near no load to full load.

Efficiency & Losses:

Model t2 of PMP10828 build modified to be PMP10898
tested January 13-15, 2015
Switching frequency was 151+ kHz at 50 and 55 Vin
Tested without fan
Vin at (TP2-TP3) & Vout (TP7-TP10) senses
FLIR EX320 thermal camera with emissivity set at 0.94
Meters Fluke 83V and 87III cal. Due March 2015;

Vin Volts DVM	Iin A DVM	Vout Volts DVM	Iout A	% Effi ciency	Losses in W
55.08	0.853	6.0665	7.00	90.4	4.518
55.04	0.7295	6.068	6.00	90.7	3.744
55.09	0.6065	6.070	5.0005	90.8	3.059
55.10	0.486	6.073	4.0005	90.7	2.484
55.09	0.367	6.074	3.001	90.2	1.990
55.10	0.2495	6.075	2.0005	88.4	1.594
55.08	0.133	6.069	1.000	82.8	1.257
55.09	0.017	6.080	0	0.0	0.937
50.04	0.934	6.0665	7.00	90.9	4.272
50.04	0.798	6.068	6.00	91.2	3.524
50.045	0.6635	6.070	5.0005	91.4	2.852
50.02	0.532	6.072	4.0005	91.3	2.320
50.03	0.401	6.074	3.001	90.9	1.834
50.04	0.272	6.074	2.0005	89.3	1.460
50.055	0.144	6.069	1.000	84.2	1.139
50.01	0.017	6.0795	0	0.0	0.850

Q
Same UVLO as PMP10828 with turn on at 28V and turn off at 25 Vin.

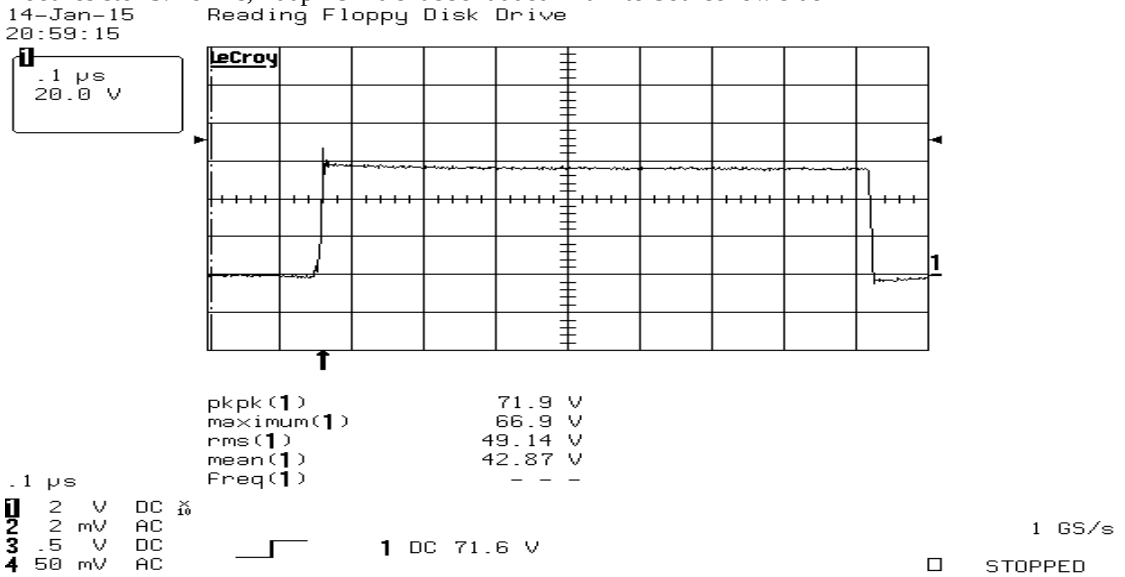
Thermal image:

PMP10898 55Vin 6.0Vout at 7A ~4.5W on PCB, no fan, steady state >20 minutes
21 deg. C ambient 151+kHz switching: All temperatures in degrees Celsius
Hottest is high side FET at 70+, low side FET 63, main inductor top 50, TPS40170 controller 47, snubber 10 ohm size 2010 at 43

Q
Snubber R (10 ohms) was size 2010. Based upon minimal heating, it can be size 1210 or even size 1206.

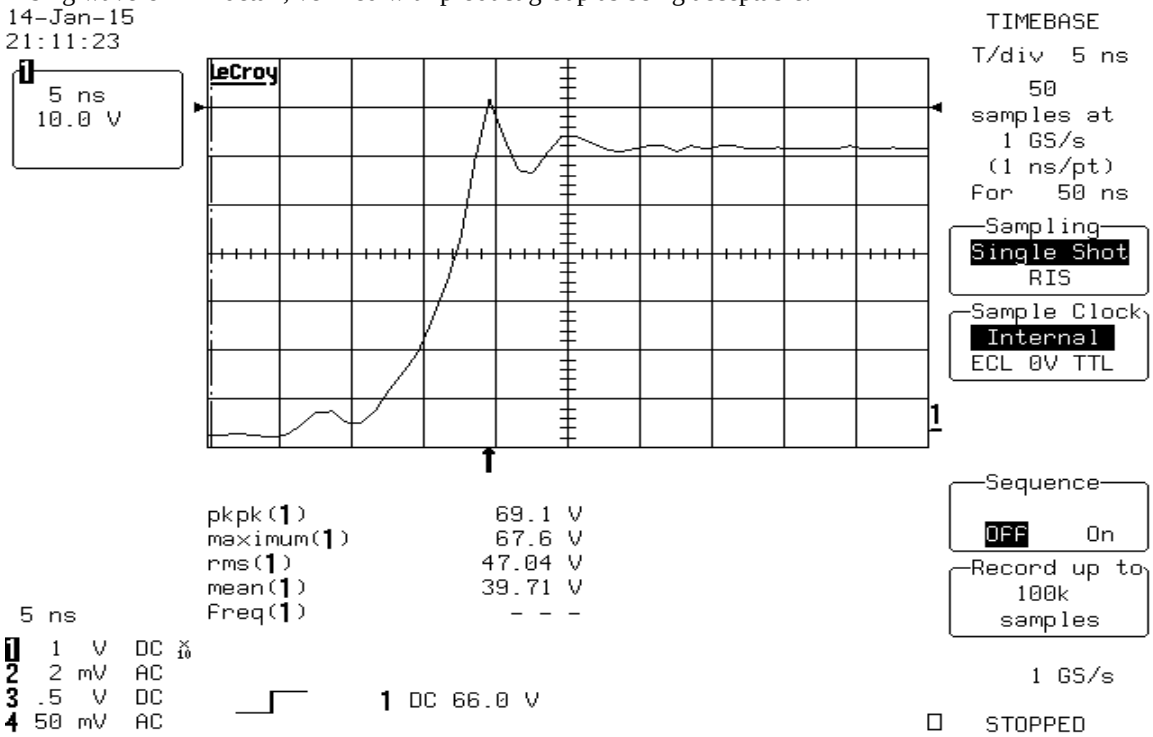
Main waveform:

Main waveform at full 7A load: 55Vin 6.0 Vout 7A 151+kHz operation:
Boot resistor 5.1 ohms, 100pF & 10 snubber added Drain to Source low side FET



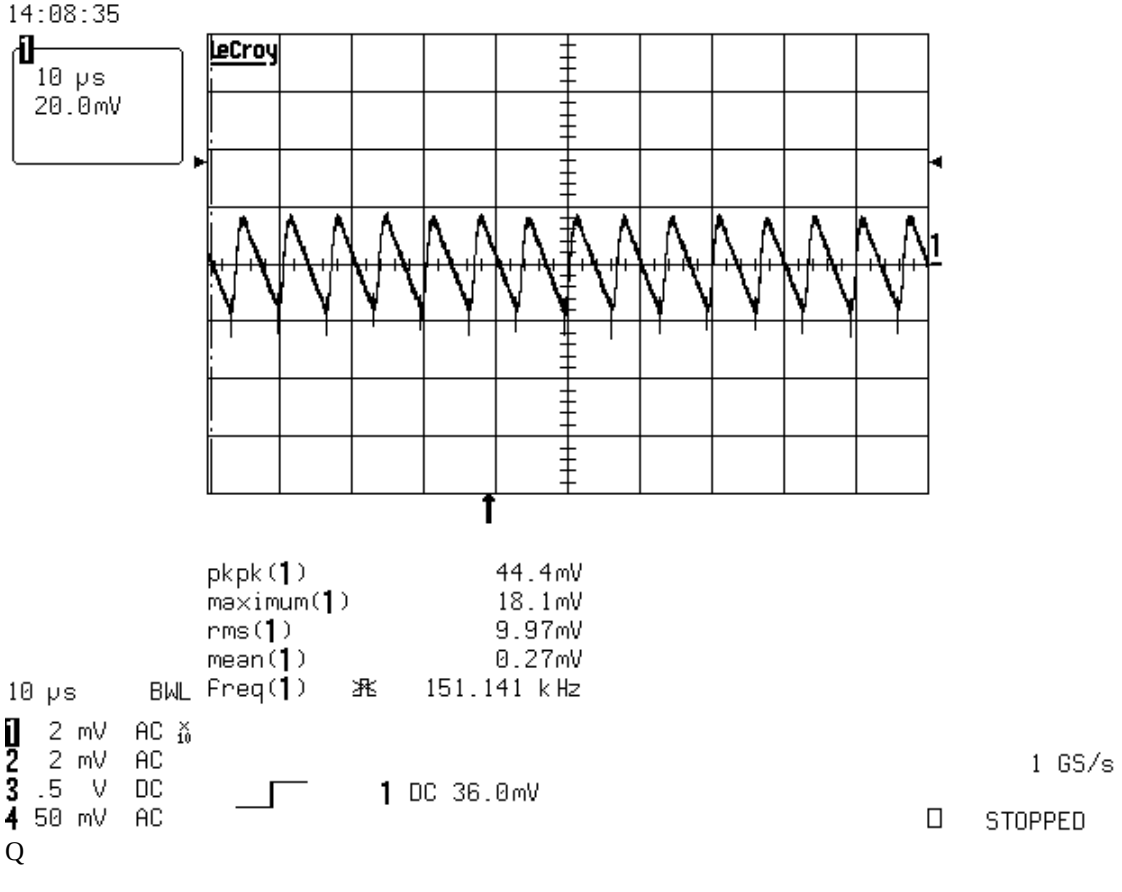
Q

Rising waveform in detail, verified with product group as being acceptable:



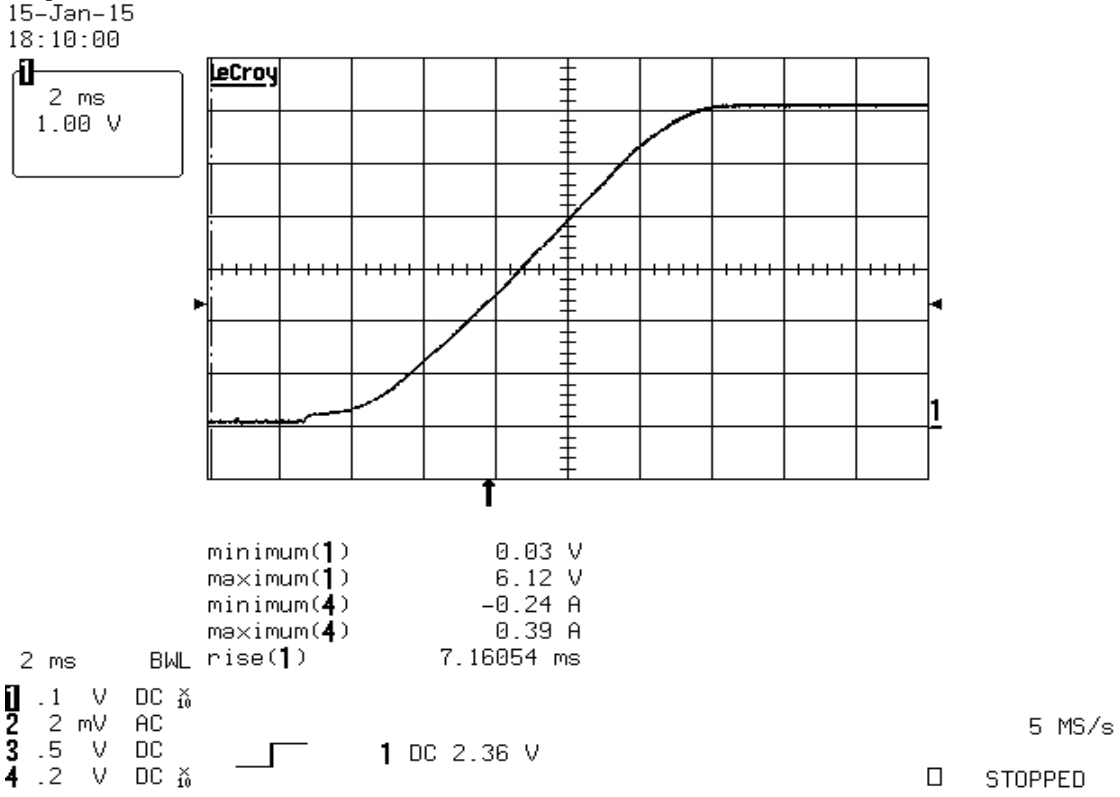
Output Ripple:

Output ripple at C28, same conditions as above full 7A load



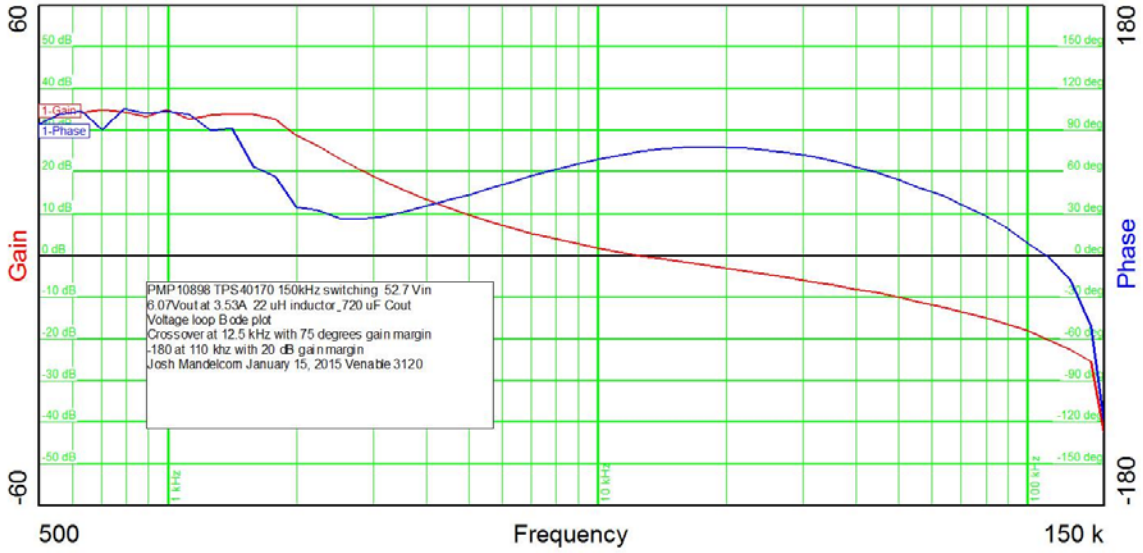
Start up:

Start up at no load: 55Vin applied: Rise time to 6Vout is 11 msec with no overshoot
Scope calculated rise is 10% to 90%



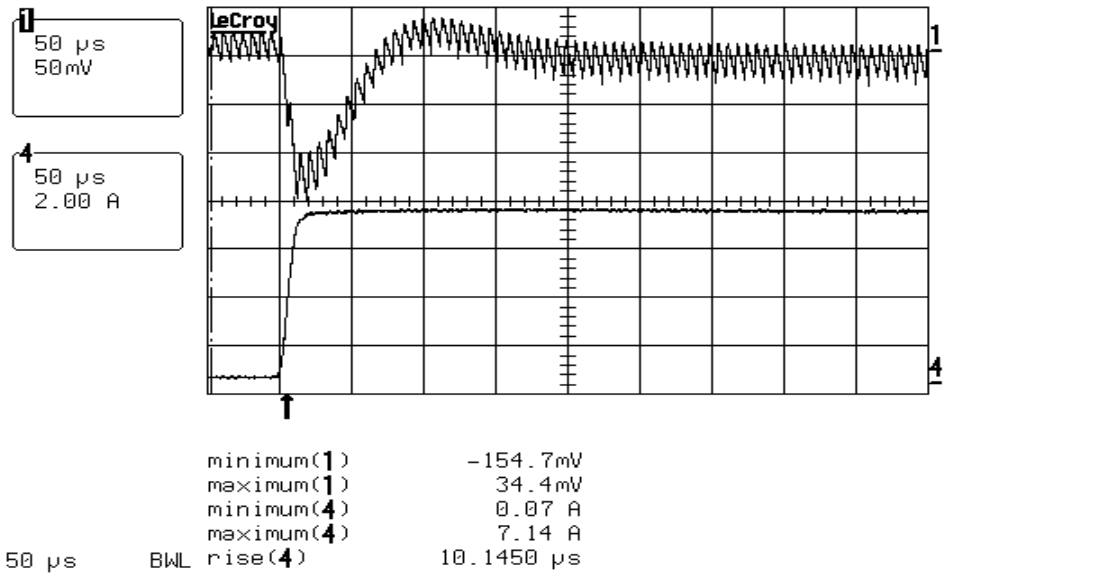
Bode plot:

Bode Plot of main control loop: crossover target 15 kHz, 12.5 kHz actual



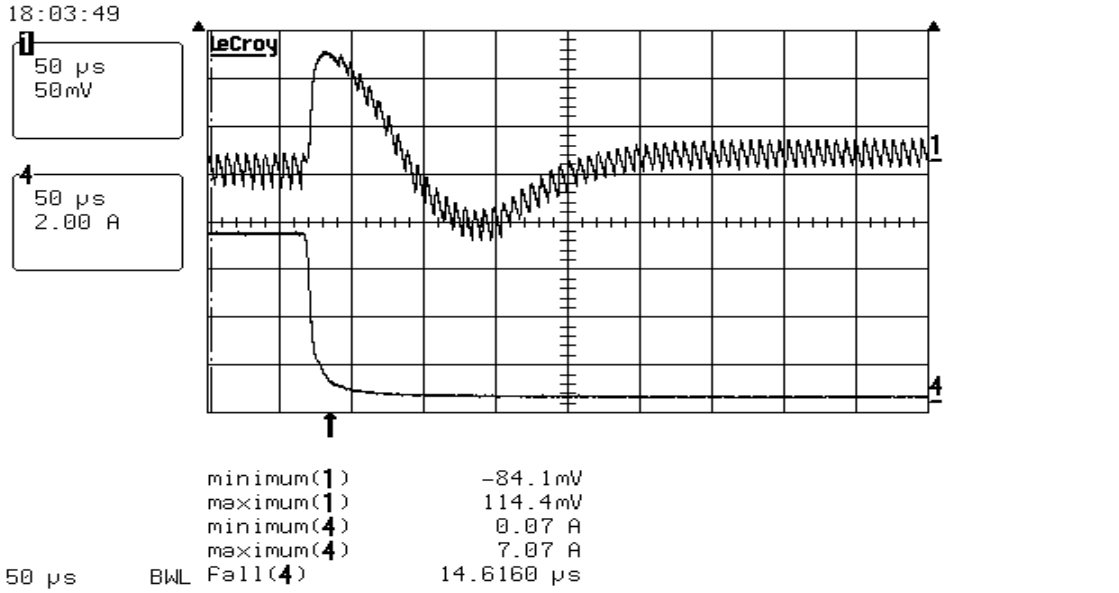
Step load & load dump responses:

Step load response: 52.5Vin, 6.0Vout 100mA to 7A in ~13 usec:



~140mV undershoot with recovery to within 50mV in 60 usec.

Load dump response: 52.5Vin 6Vout 7A to 100mA in ~20 usec:
~100mV overshoot with recovery to within 50mV in 180 usec.



IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale (https:www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

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