Input, output data and efficiency: (room ambient temperature)
Channel 1: UCD74110 + Susumu PCMB104T-R36MT 960 and 480kHz
Power drawn by UCD9244 and Test interface (83mA off 5Vin) not included

Vin Volts	Iin A	Vout Volts	Iout A	% Effi ciency	Losses in W
960	*kHz*	*operation*			
5.01	3.487	1.014	15.07	87.5	2.189
5.01	2.869	1.014	12.57	88.7	1.628
5.01	2.273	1.014	10.07	89.7	1.177
5.01	1.695	1.014	7.56	90.3	0.826
5.00	1.139	1.014	5.07	90.3	0.554
5.00	0.5945	1.014	2.57	87.7	0.367
5.03	0.2945	1.014	1.17	80.1	0.295
5.05	0.046	1.014	0	N/A	0.232
480	*kHz*	*operation*			
5.03	3.421	1.014	15.07	88.8	1.927
5.01	2.826	1.013	12.57	89.9	1.425
5.05	2.2195	1.013	10.07	91.0	1.008
5.01	1.6665	1.013	7.56	91.7	0.691
5.05	1.1045	1.013	5.07	92.1	0.442
5.01	0.576	1.013	2.57	90.2	0.282
5.04	0.278	1.013	1.17	84.6	0.216
5.01	0.0365	1.013	0	N/A	0.183

Qq

Dynamic step load and load dump:

Processor applications have step load and load dump requirements of up to about 70% full load , and these changes can occur within 1 usec.

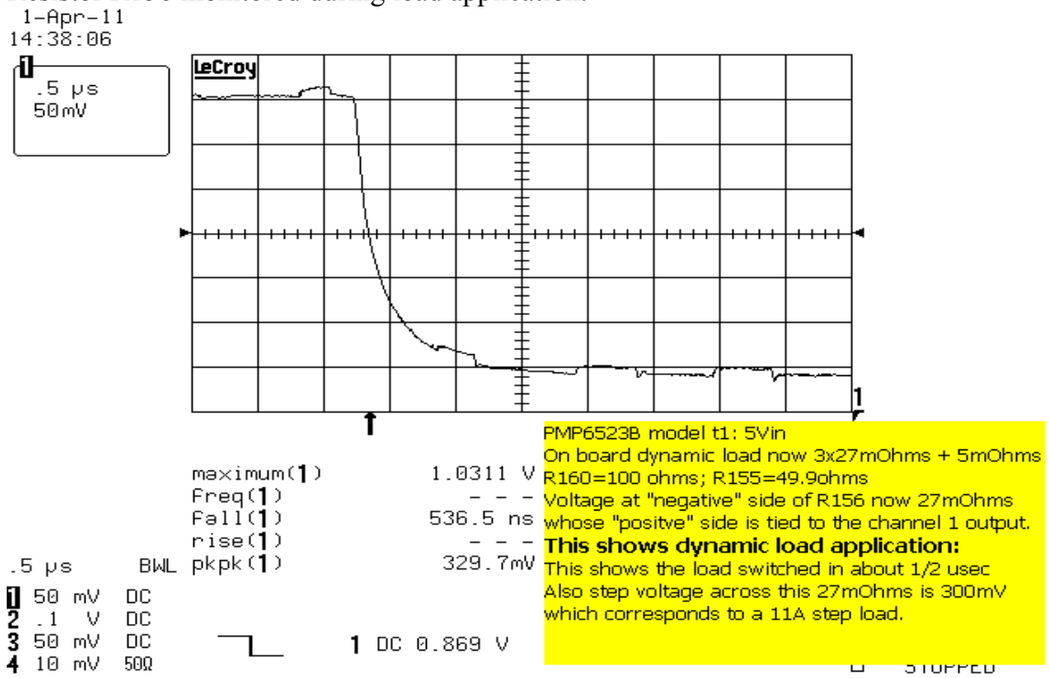
Monitoring the step load change with a loop and current probe can be problematic. For example, with a 1.0V application and an 11A step load and a monitoring loop inductance of 200nHy; the fastest the load step can be done is in 2.2uSec. Load banks generally have cable inductances of about 1uHy. Hence, an on board dynamic load is needed and the voltage across a load bank resistor monitored to see the magnitude of the load step and how fast the step load is occurring.

The on board dynamic load Q151 with R156-8 was adjusted to give a dynamic step of 11A for a 1.0V output with step and dump times set to be about ½ usec.
R160 was set at 100 ohms to set speed of load dump and R155 at 49.9 ohms to set speed of load application. The 3 series load resistors R156-7-8 were set each at 27 mOhms which along with 10 mOhms between wiring, Q151 and R159 give an overall resistance of 90 mOhms. This yields 11A off 1.0Vout. This load is applied for 1.36mSec (measured) every 15.6msec (measured) for a duty cycle of 8.7%.

Based upon the added power drawn off the 5V source when the dynamic load is turned on and the duty cycle and an assumed incremental efficiency of 85% I also got a 11A step load. The following waveforms on the dynamic load resistor closest to channel 1 Vout further confirm the 11A step and also show the speed of load application and removal.

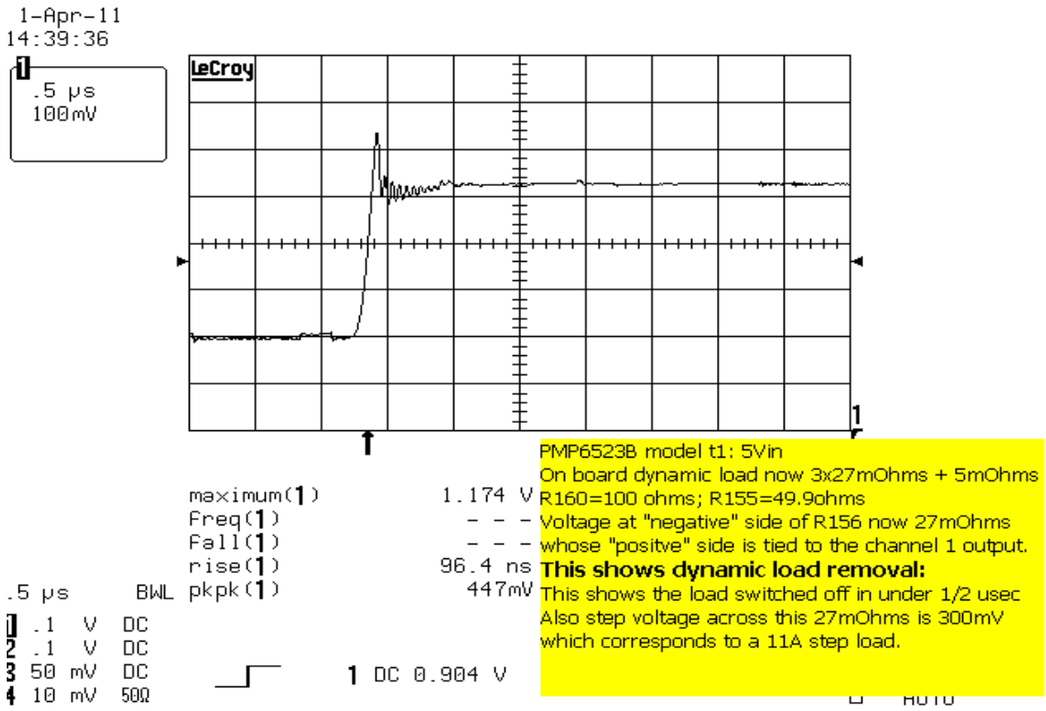
On the next page are detailed waveforms across a load resistor used to confirm the step load to be 11 A, and the time of the load change to be under 1 usec; whether a load step or a load dump.
The following page shows the output voltage of channel one when the step load of 11A is applied, both starting at 1 A load and starting at 4 a load.
The last page shows the load dump response of 11A, both starting at 12 A and starting at 15 A.
In general the peak overshoot / undershoot was 50mV with recovery to within 20mV in 10 usec.

Resistor R156 monitored during load application:



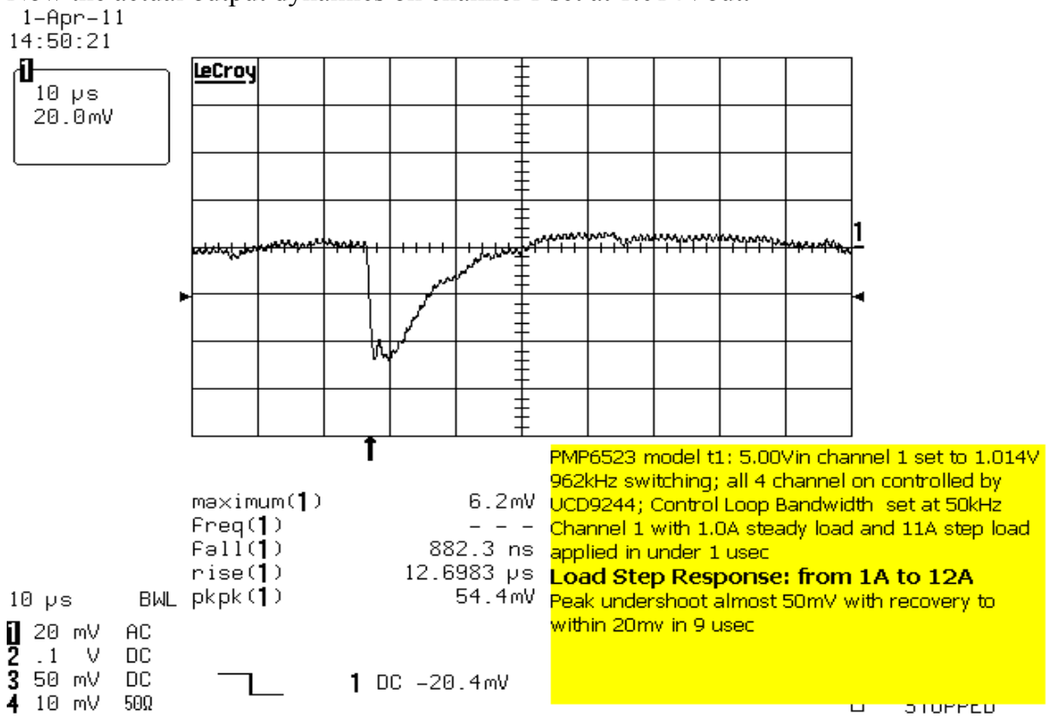
Qq

And now during load removal:

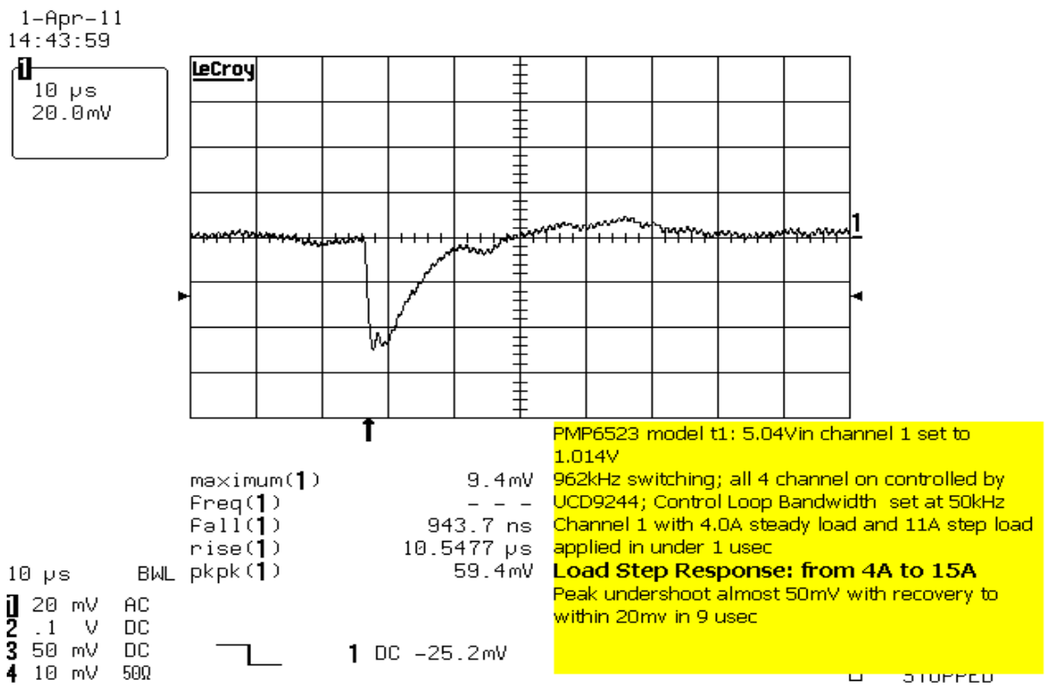

1-Apr-11
14:39:36
.5 µs
100mV
LeCroy
maximum(1) 1.174 V
Freq(1) - - -
Fall(1) - - -
rise(1) 96.4 ns
pkpk(1) 447mV
.5 µs BWL
1 .1 V DC
2 .1 V DC
3 50 mV DC
4 10 mV 50Ω
1 DC 0.904 V
PMP6523B model t1: 5Vin
On board dynamic load now 3x27mOhms + 5mOhms
R160=100 ohms; R155=49.9ohms
Voltage at "negative" side of R156 now 27mOhms
whose "positve" side is tied to the channel 1 output.
This shows dynamic load removal:
This shows the load switched off in under 1/2 usec
Also step voltage across this 27mOhms is 300mV
which corresponds to a 11A step load.

Qq

Now the actual output dynamics on channel 1 set at 1.014Vout:

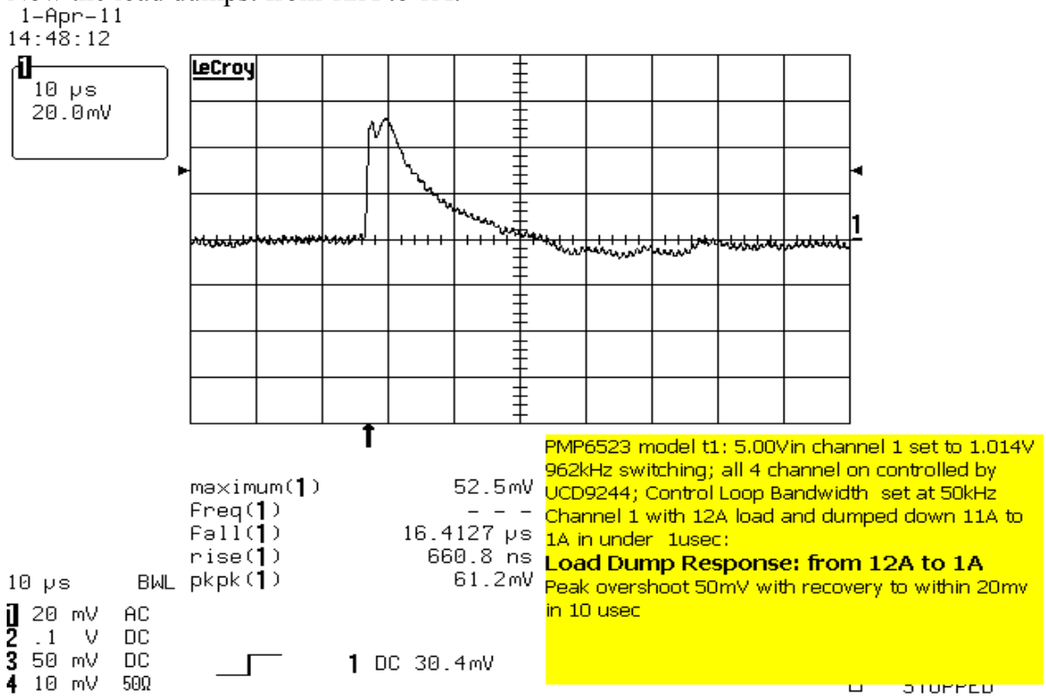


Now load step from 4A to 15A, the full load:

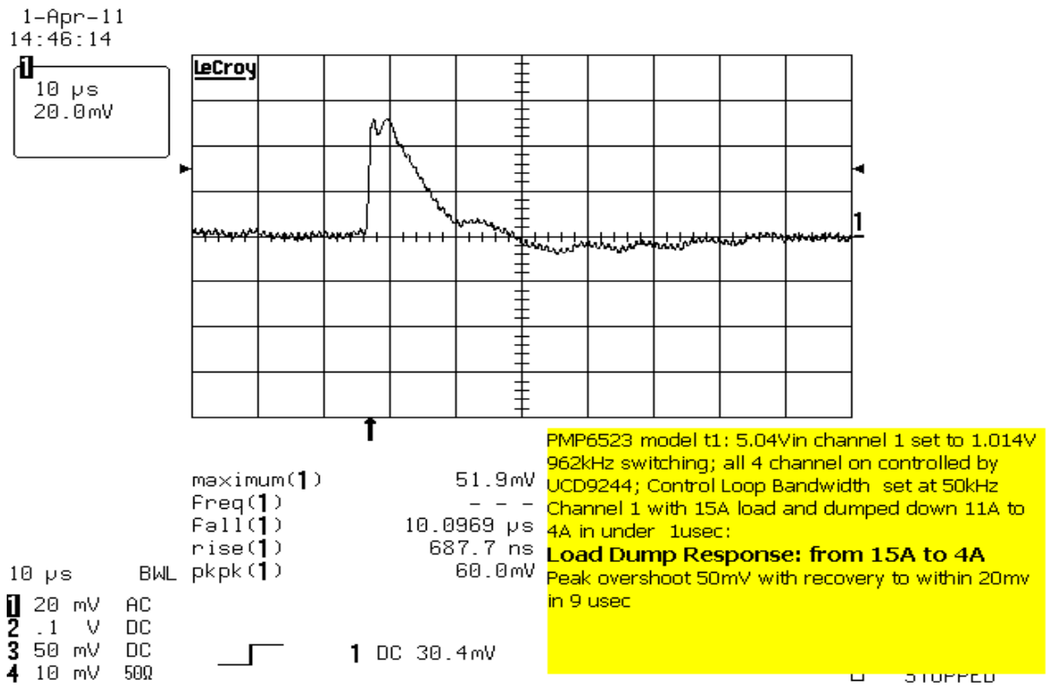

1-Apr-11
14:43:59
10 µs
20.0mV
LeCroy
1
maximum(1) 9.4mV
Freq(1) - - -
Fall(1) 943.7 ns
rise(1) 10.5477 µs
pkpk(1) 59.4mV
10 µs BWL
1 20 mV AC
2 .1 V DC
3 50 mV DC
4 10 mV 50Ω
1 DC -25.2mV
PMP6523 model t1: 5.04Vin channel 1 set to 1.014V
962kHz switching; all 4 channel on controlled by UCD9244; Control Loop Bandwidth set at 50kHz
Channel 1 with 4.0A steady load and 11A step load applied in under 1 usec
Load Step Response: from 4A to 15A
Peak undershoot almost 50mV with recovery to within 20mv in 9 usec

Qq

Now the load dumps: from 12A to 1A:



And now from 15A to 4A:



PMP6523 model t1: 5.04Vin channel 1 set to 1.014V 962kHz switching; all 4 channel on controlled by UCD9244; Control Loop Bandwidth set at 50kHz Channel 1 with 15A load and dumped down 11A to 4A in under 1usec:

Load Dump Response: from 15A to 4A

Peak overshoot 50mV with recovery to within 20mv in 9 usec

Qq

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