

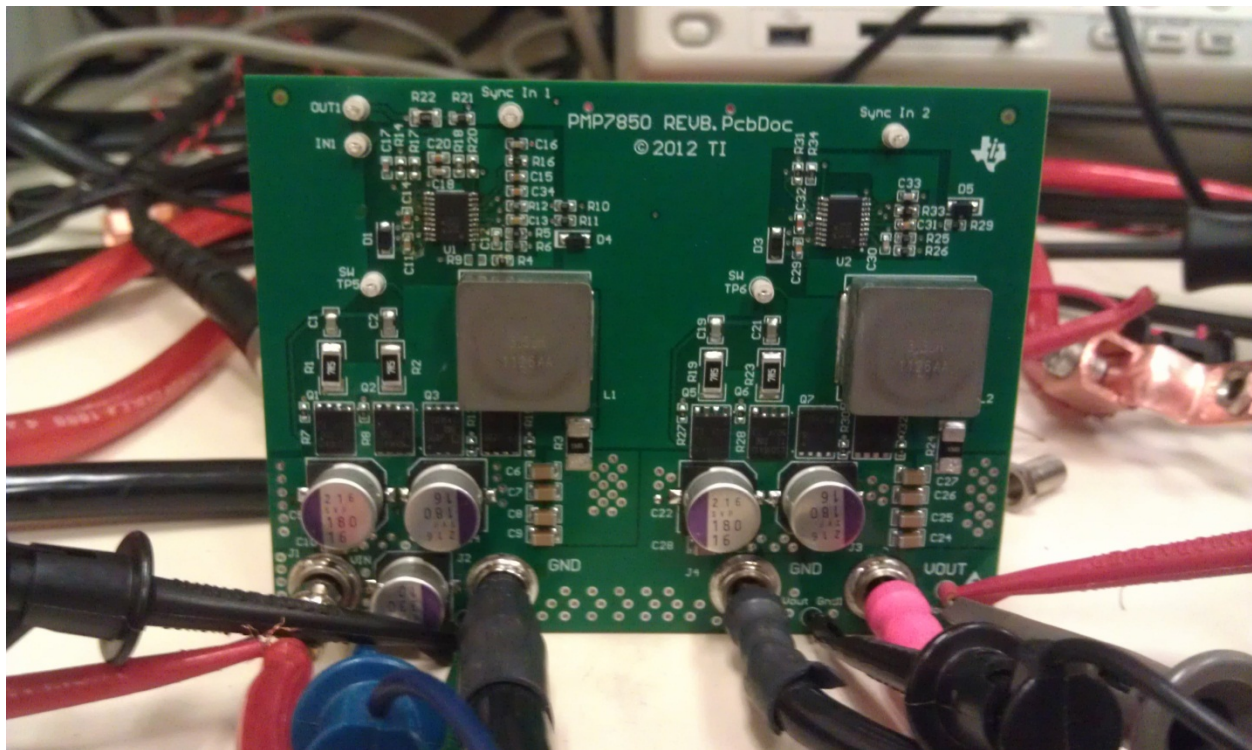
**Test Data  
For PMP7919  
2/20/2013**



<b>Vin</b>	5.5V – 16V (change input/output caps and FETs if need to handle load dump)
<b>Vout</b>	11.84V
<b>Iout Max</b>	15A
<b>Fsw</b>	450kHz per phase

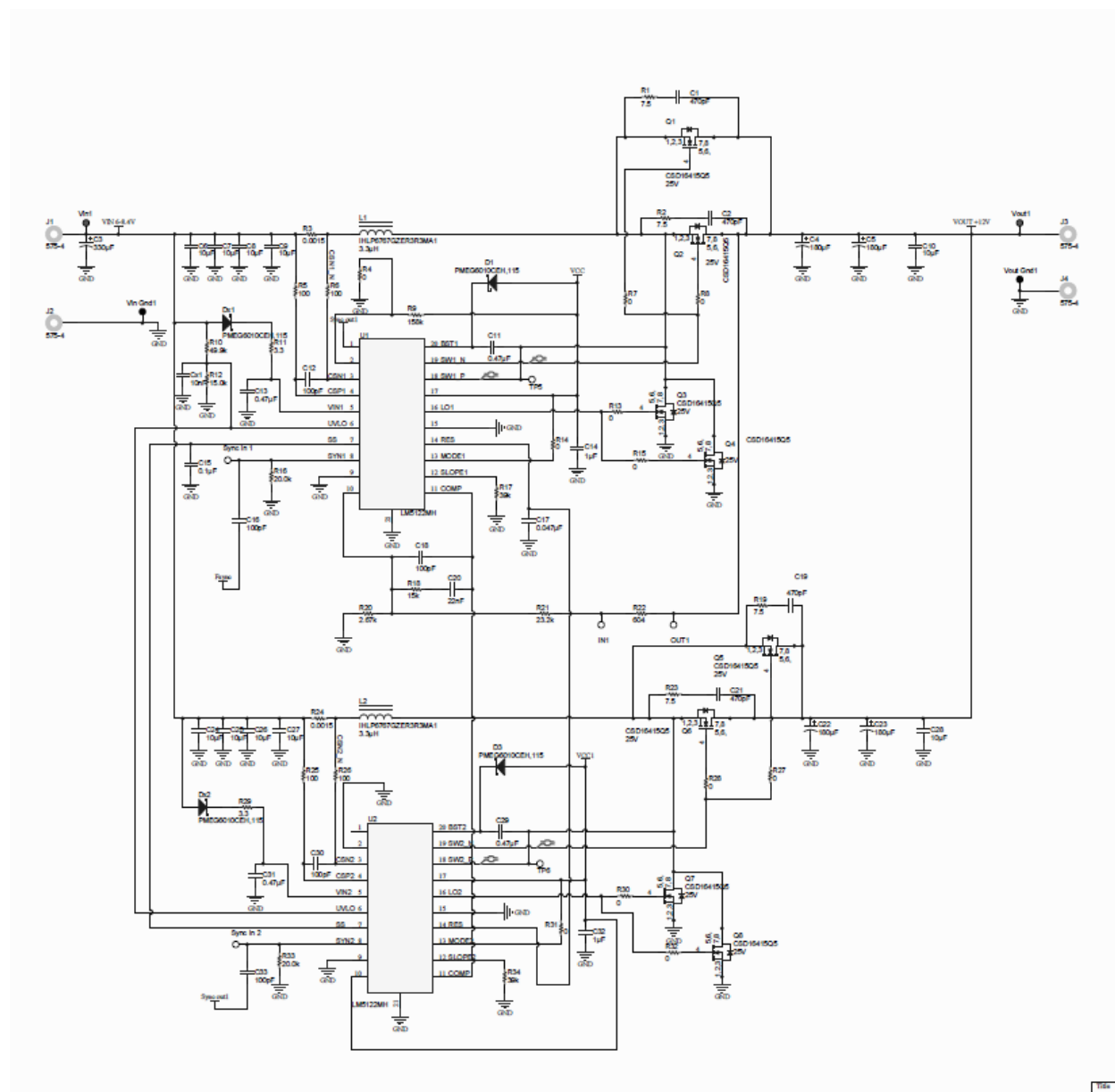
## FABRICATION

Board Dimensions: 4" x 3"



Top Side

## SCHEMATIC



Note: Q1 to Q8 are BSC050NE2LS

### Thermal Image #1...

Vin = 9.5V

Iout = 15A

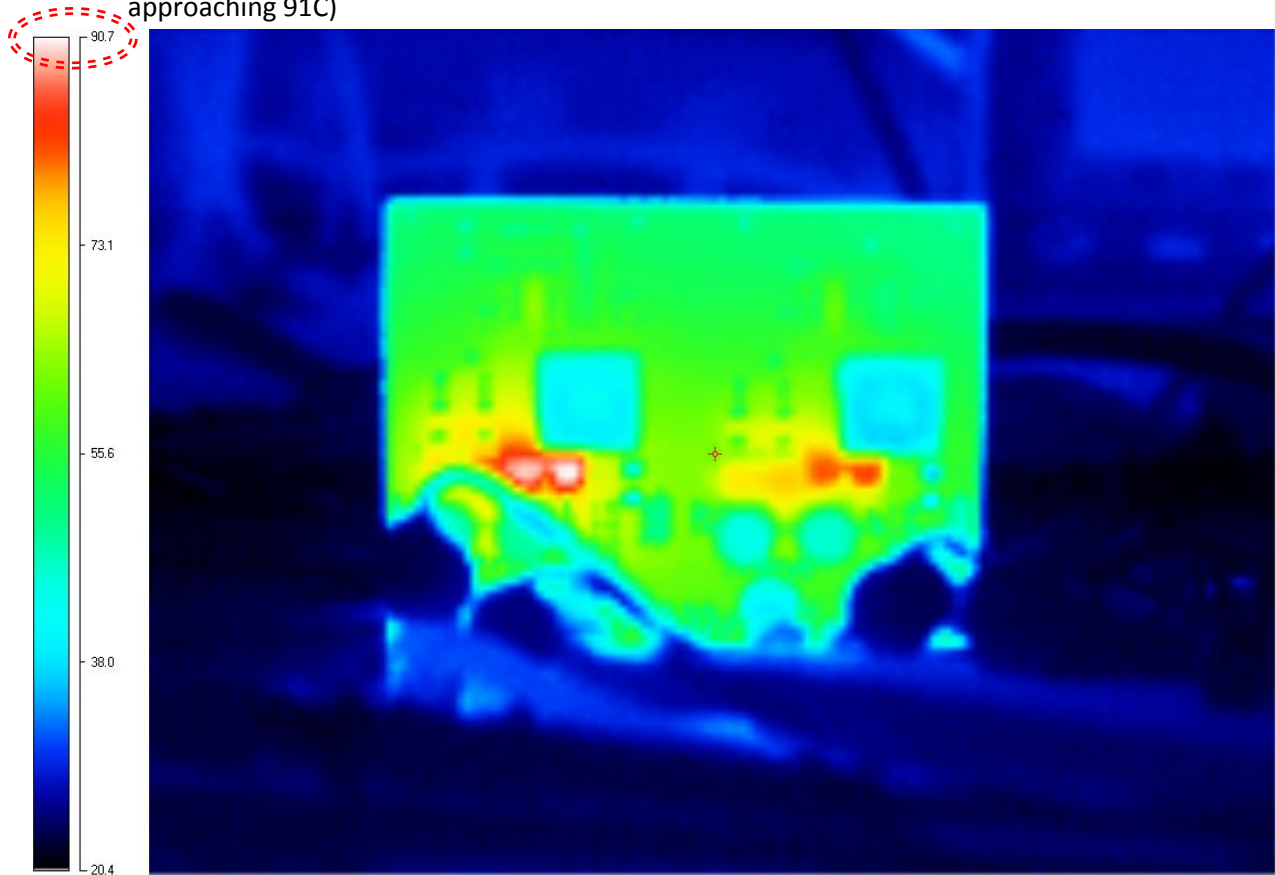
FETs... CSD16415's

25V

Rds\_on = 1.5m $\Omega$  (Vgs=4.5V)

Qg = 21nC (Vgs=4.5V)

Comments...Board was on for 3 minutes at Vin 9.5 volts at max load 15A. (Notice Q3 and Q4 approaching 91C)



### Thermal Image #2...

Vin = 13V

Iout = 15A

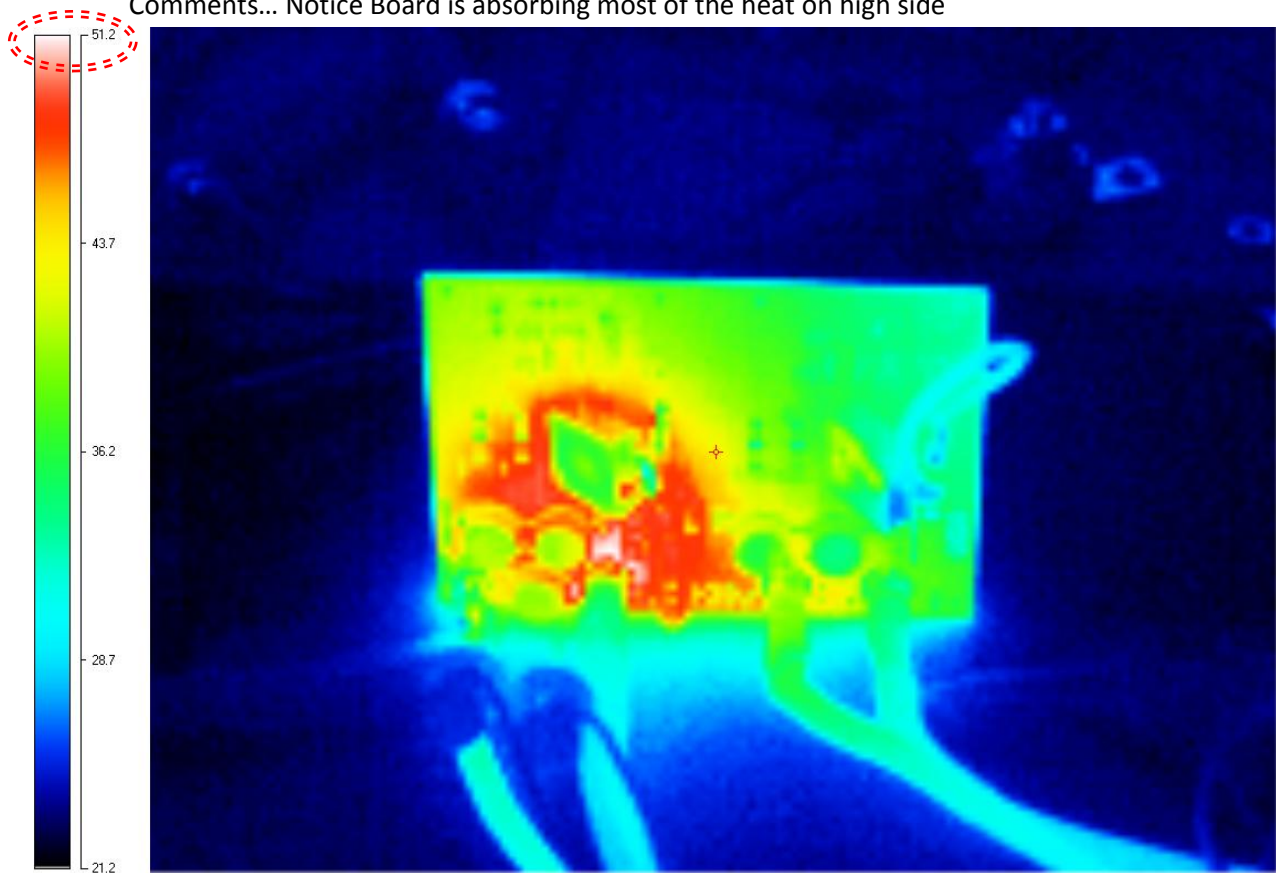
FETs... CSD16415's

25V

Rds\_on = 1.5m $\Omega$  (Vgs=4.5V)

Qg = 21nC (Vgs=4.5V)

Comments... Notice Board is absorbing most of the heat on high side



### Thermal Image #3...

Vin = 10V

Iout = 15A

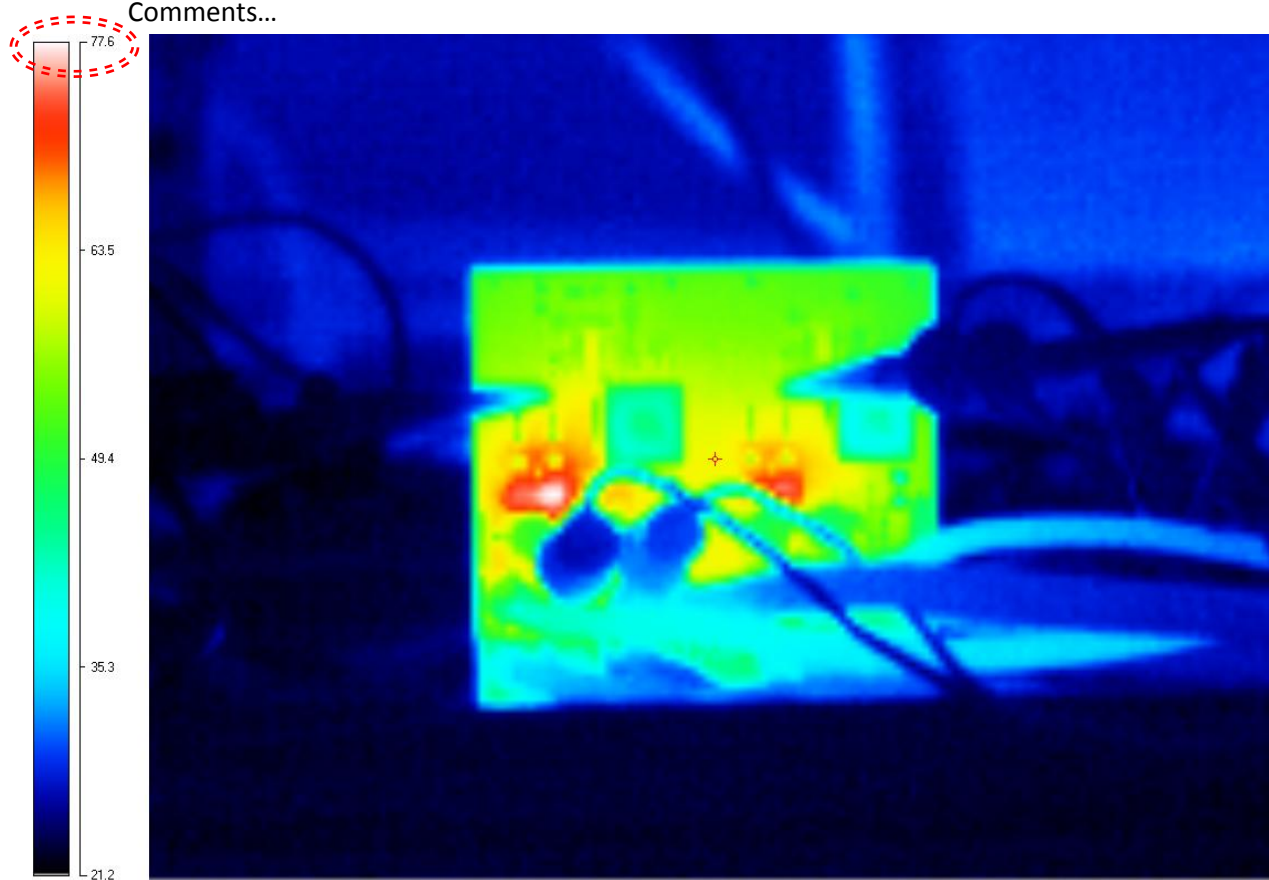
FETs...BSC050NE2LS's

25V

Rds\_on= 3m $\Omega$

Qg = 10.4nC

Comments...





### **Thermal Image #4...**

Vin = 10.5V

Iout = 15A

FETs...

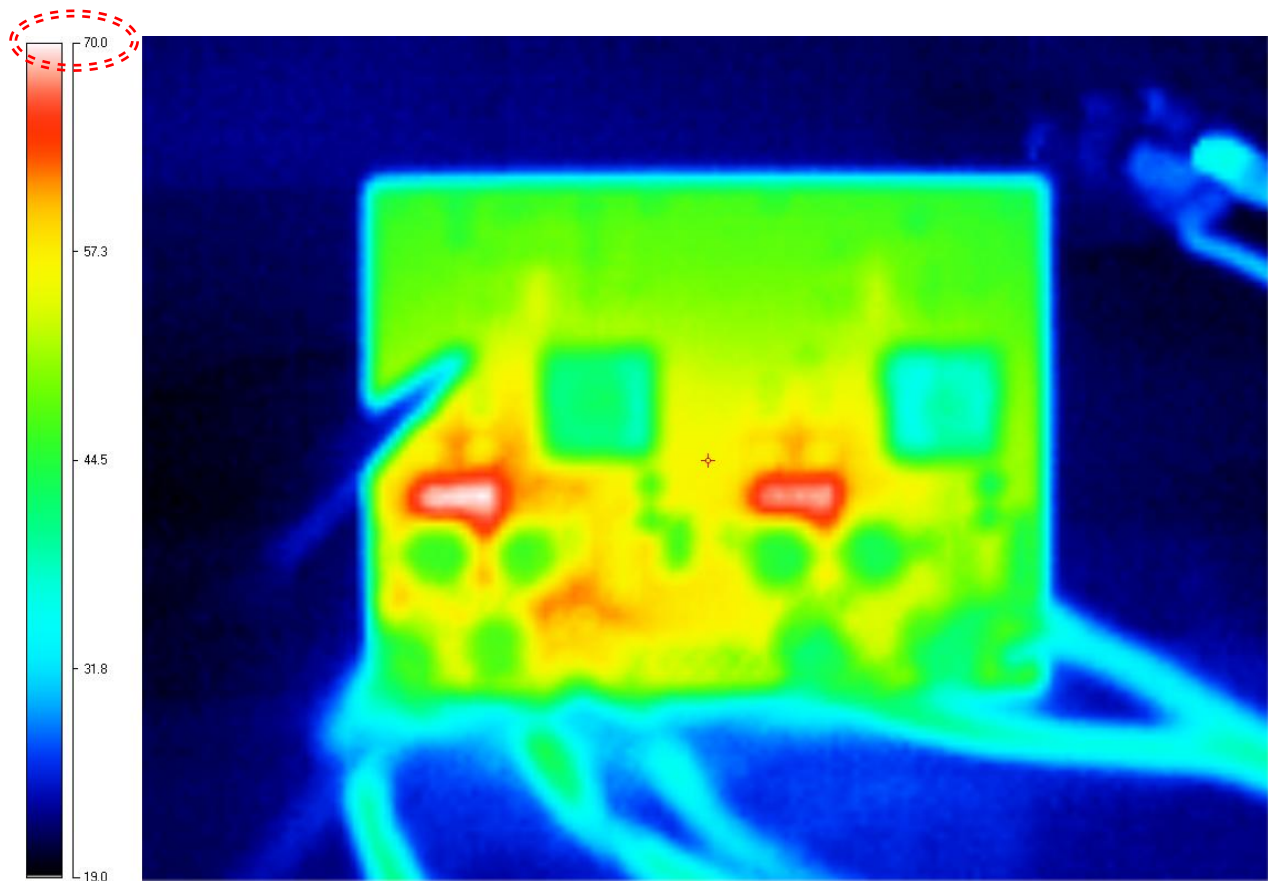
V

Rds\_on= m $\Omega$

Qg = nC

Comments...

Vin 10.5 Volts load is at 15A with the 40V FET's ( CSD16413Q5A) All 8 of them. Max Temp is 72C.



**Thermal Image #5...**

Vin = 10V

Iout = 15A

FETs...

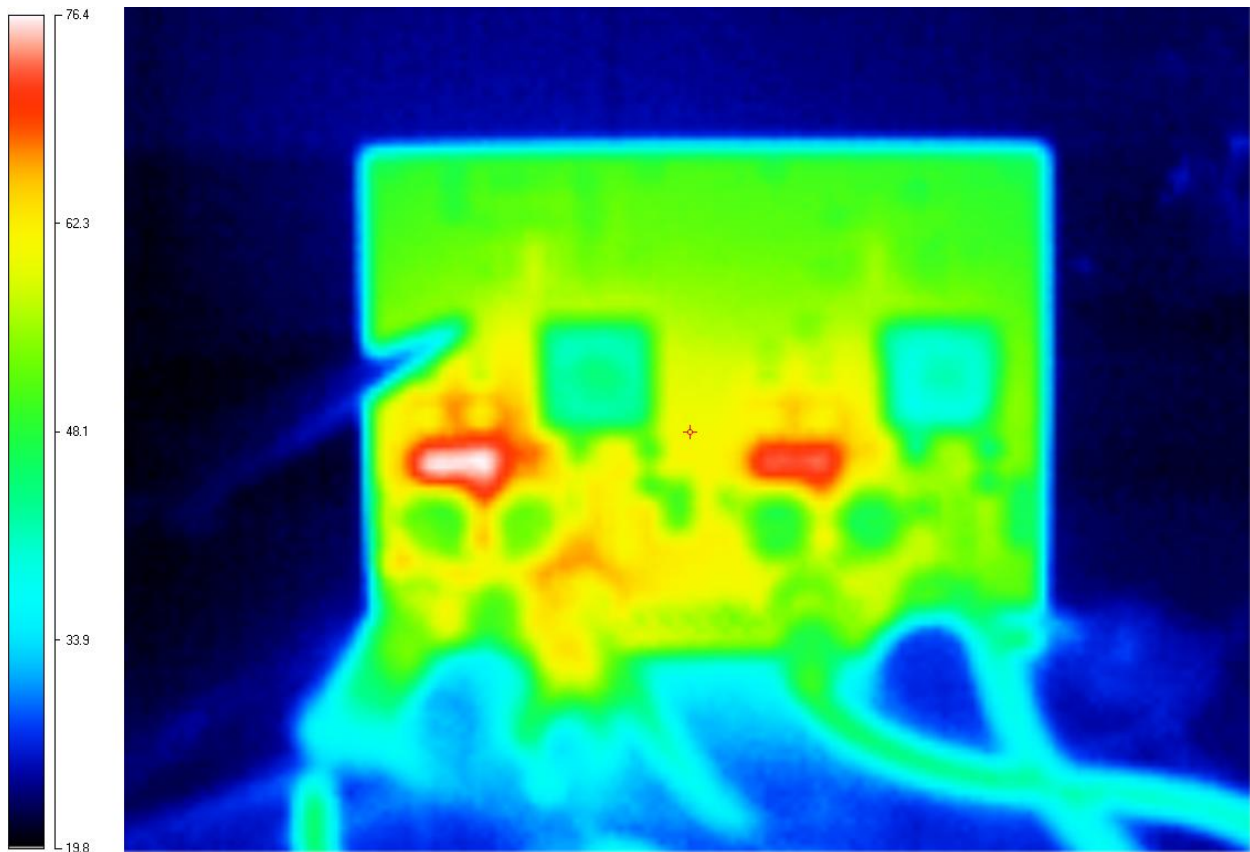
V

Rds\_on= m $\Omega$ 

Qg = nC

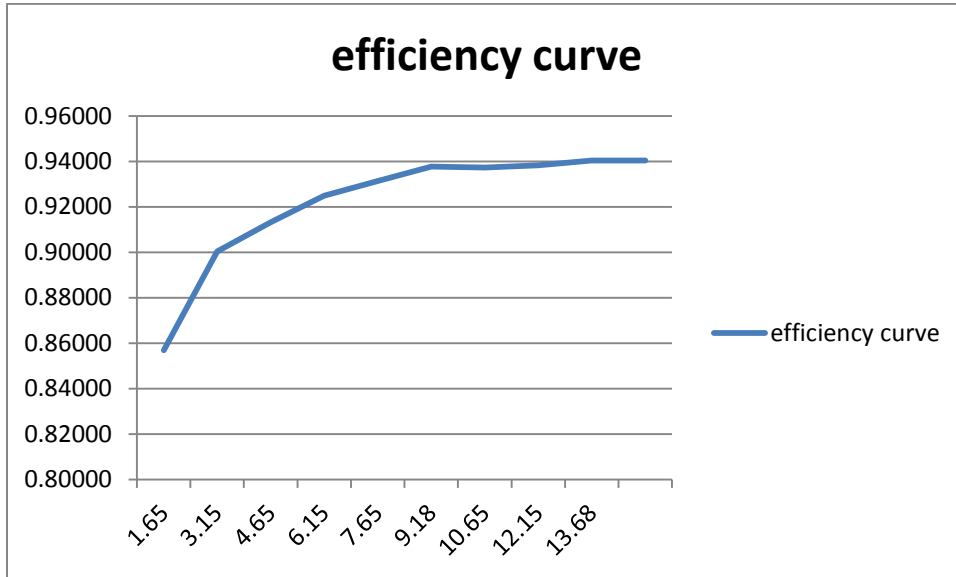
Comments...

Vin 10.5 Volts load is at 15A with the 40V FET's ( CSD16413Q5A) Q4 and Q8 are removed. Max Temp is 77C.





### **Efficiency Curve** with original FETs CSD16415



### **Efficiency Curve Data**

Vin	Iin	Vout	Iout	Pin	Pout	Ploss	EFF
9.5	2.4	11.84	1.65	22.8	19.536	3.264	0.85684
9.5	4.36	11.84	3.15	41.42	37.296	4.124	0.90043
9.5	6.35	11.847	4.65	60.325	55.08855	5.23645	0.91320
9.5	8.292	11.846	6.15	78.774	72.8529	5.9211	0.92483
9.5	10.24	11.844	7.65	97.28	90.6066	6.6734	0.93140
9.5	12.204	11.843	9.18	115.938	108.7187	7.21926	0.93773
9.5	14.165	11.842	10.65	134.5675	126.1173	8.4502	0.93720
9.5	16.14	11.841	12.15	153.33	143.8682	9.46185	0.93829
9.5	18.13	11.84	13.68	172.235	161.9712	10.2638	0.94041
9.5	20.118	11.839	15.18	191.121	179.716	11.40498	0.94033

## Current Sharing #1

Vin = 9.5Vin

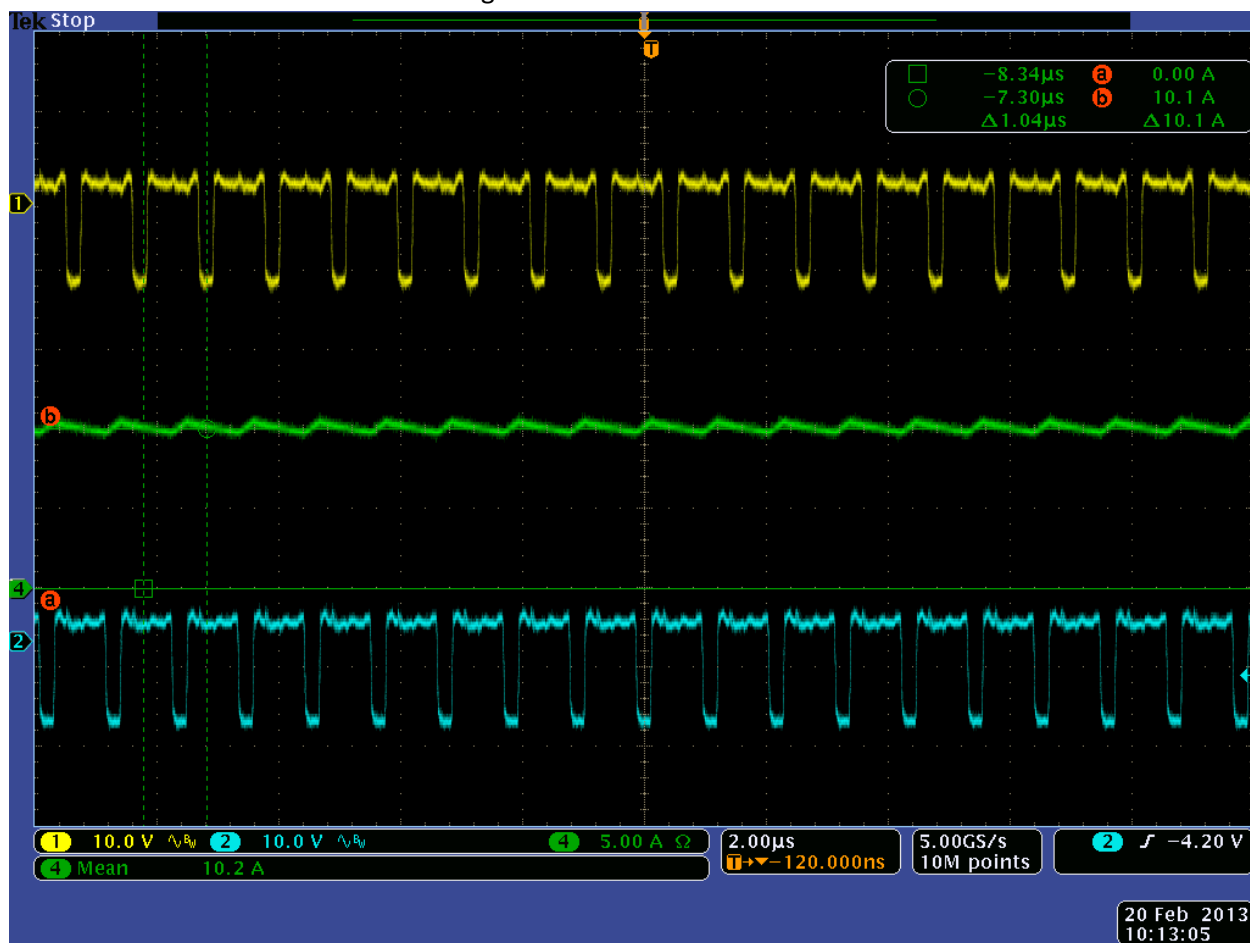
Iout = 15A

Channel 1 =

Channel 2 =

Channel 3 =

Comments... CH1 Current average is 10.2A



## Current Sharing #2

Vin = 9.5V

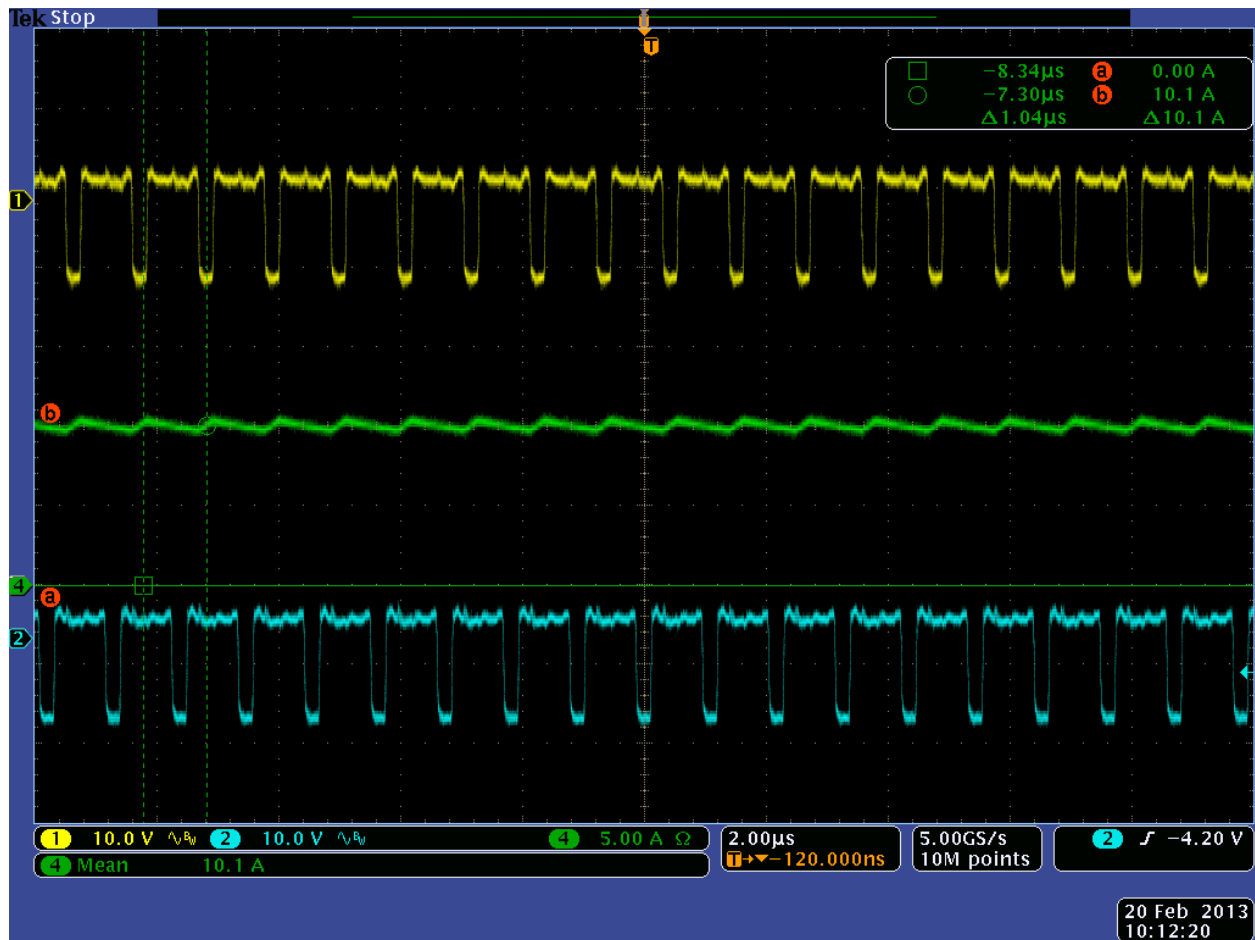
Iout = 15A

Channel 1 =

Channel 2 =

Channel 3 =

Comments... CH2 Current average is 10.1A, Current Sharing between the 2 phases is +/- .5%



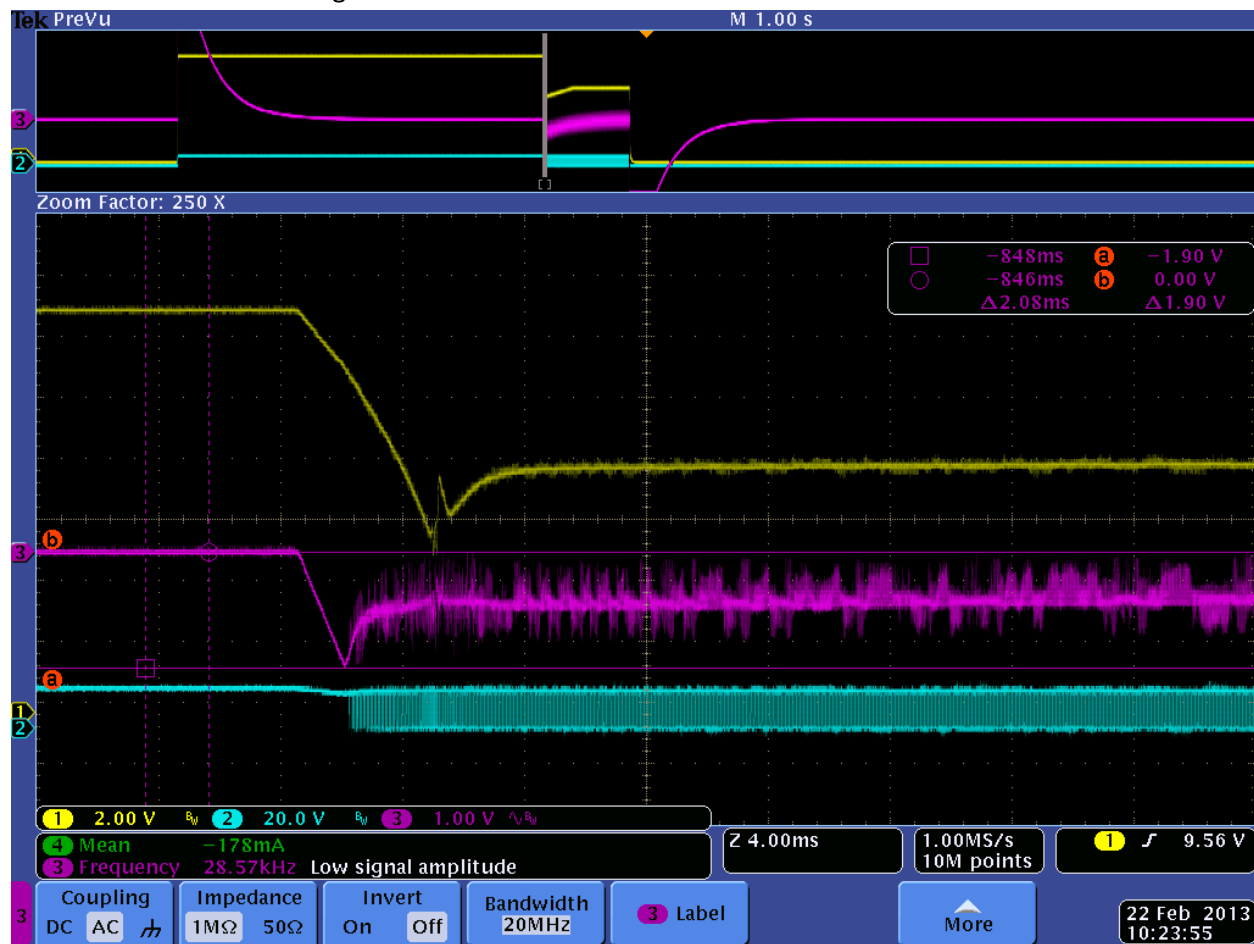
## Input Line Transient #1

Vin = 13.2V down to 5.5V (2.7ms) then up to 9V (700ms)

Iout = 15A

Comments...No extra output capacitor, Deviation from Vout (right side of perturbation) 1.1V.

Recommend setting vout to 11.6V and above to clear the 10.5V Vout min level

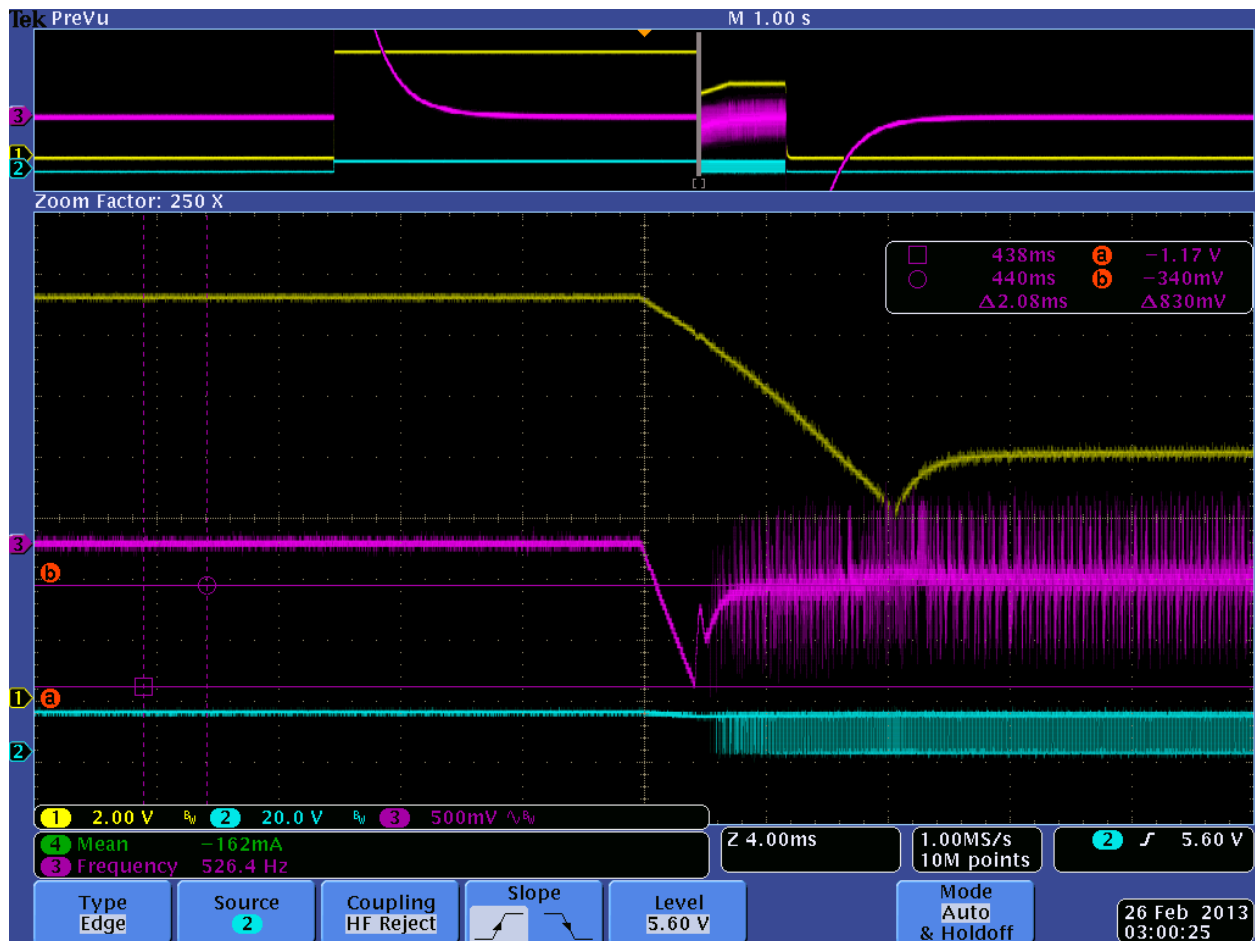


## Input Line Transient #2

Vin = 13.2V down to 5.5V (2.7ms) then up to 9V (700ms)

Iout = 7.5A

Comments...No extra output capacitor, Deviation from Vout (right side of perturbation) 1.17V.



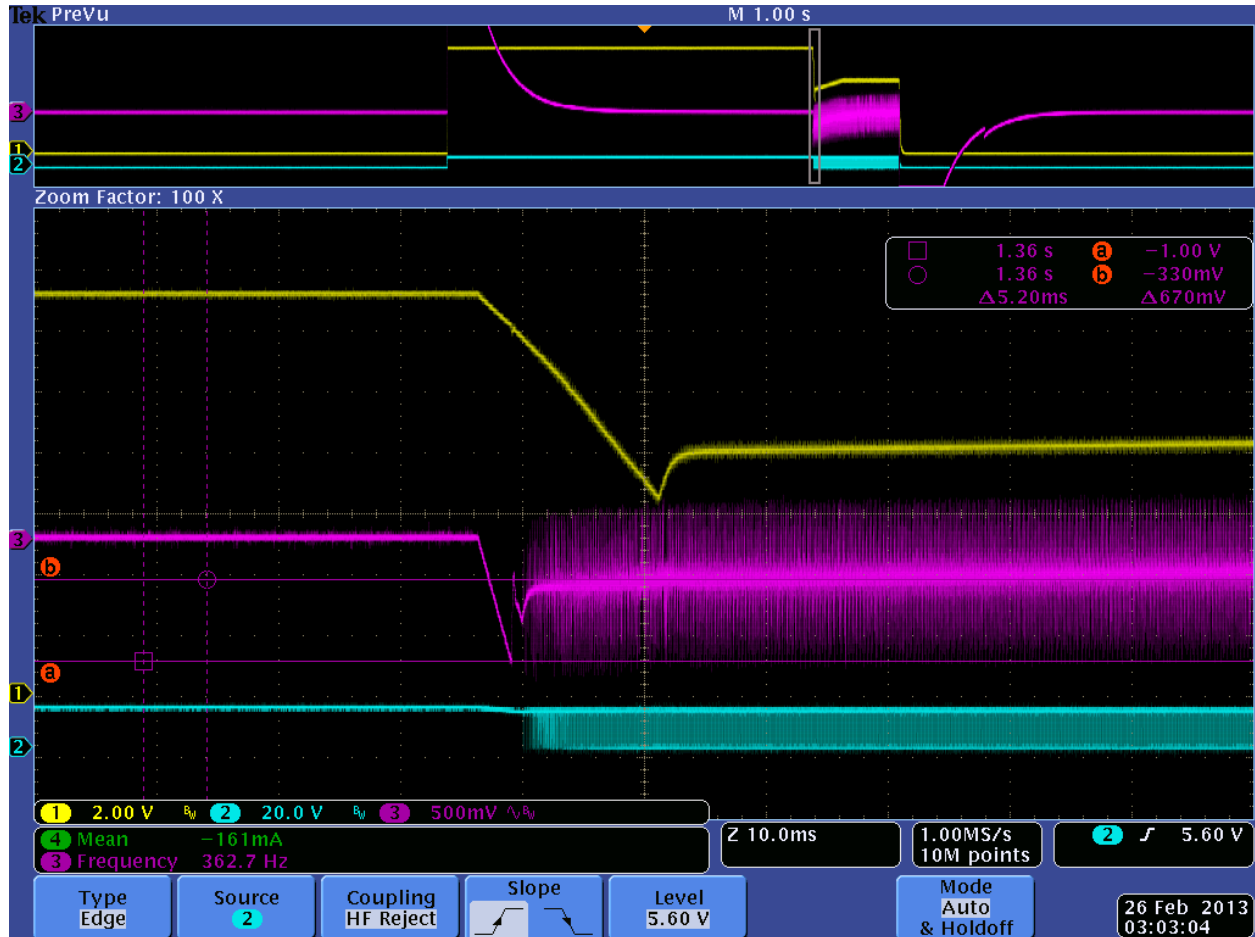
## Input Line Transient #3



Vin = 13.2V down to 5.5V (2.7ms) then up to 9V (700ms)

Iout = 3.5A

Comments...No extra output capacitor, Deviation from Vout (right side of perturbation) 670mV.

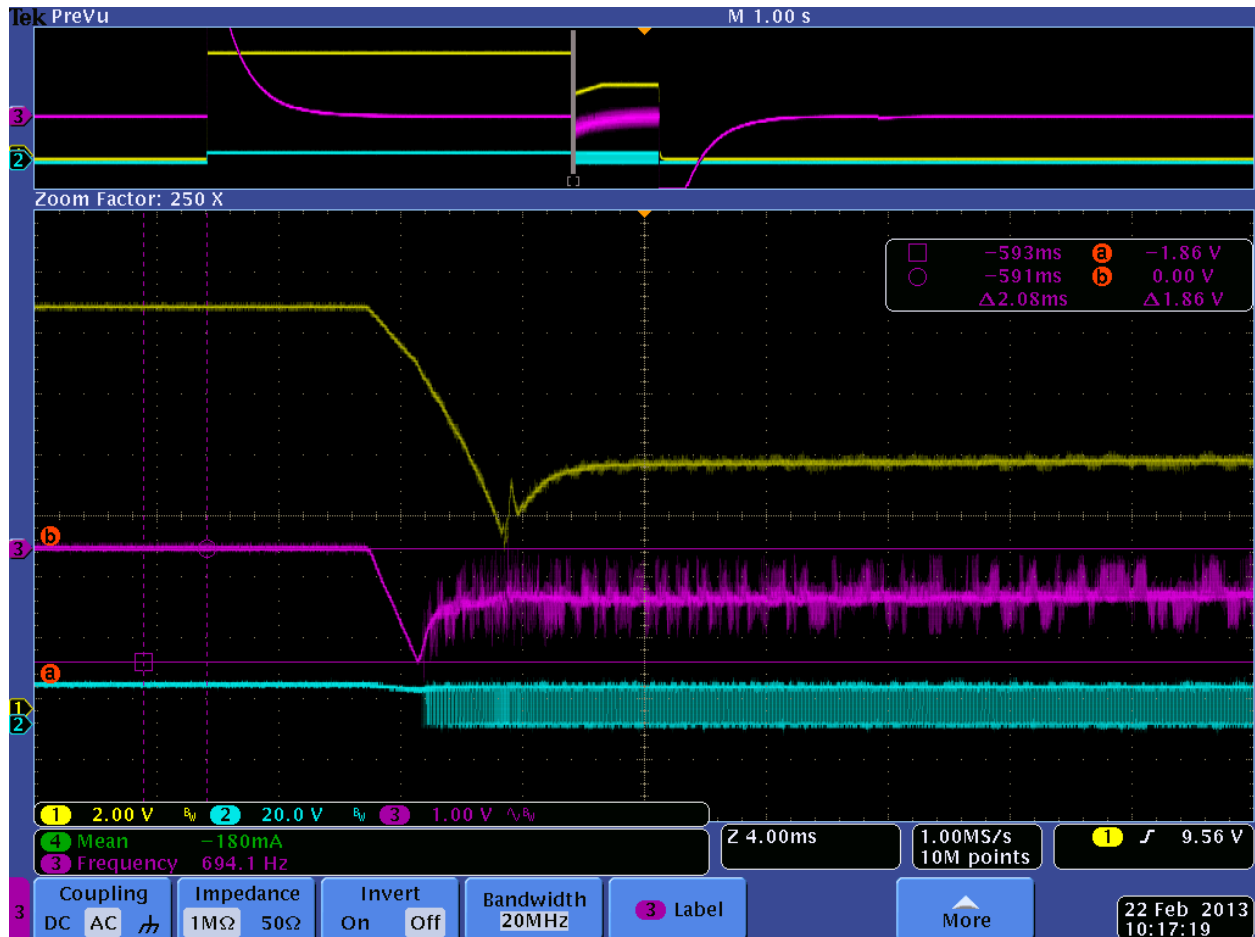


#### Input Line Transient #4

Vin = 13.2V down to 5.5V (2.7ms) then up to 9V (700ms)

$I_{out} = 3.5A$

Comments...1,000 $\mu F$  added to output cap, Deviation from  $V_{out}$  (right side of perturbation) 1.0V.  
Recommend setting  $V_{out}$  to 11.5V and above to clear the 10.5V  $V_{out}$  min level

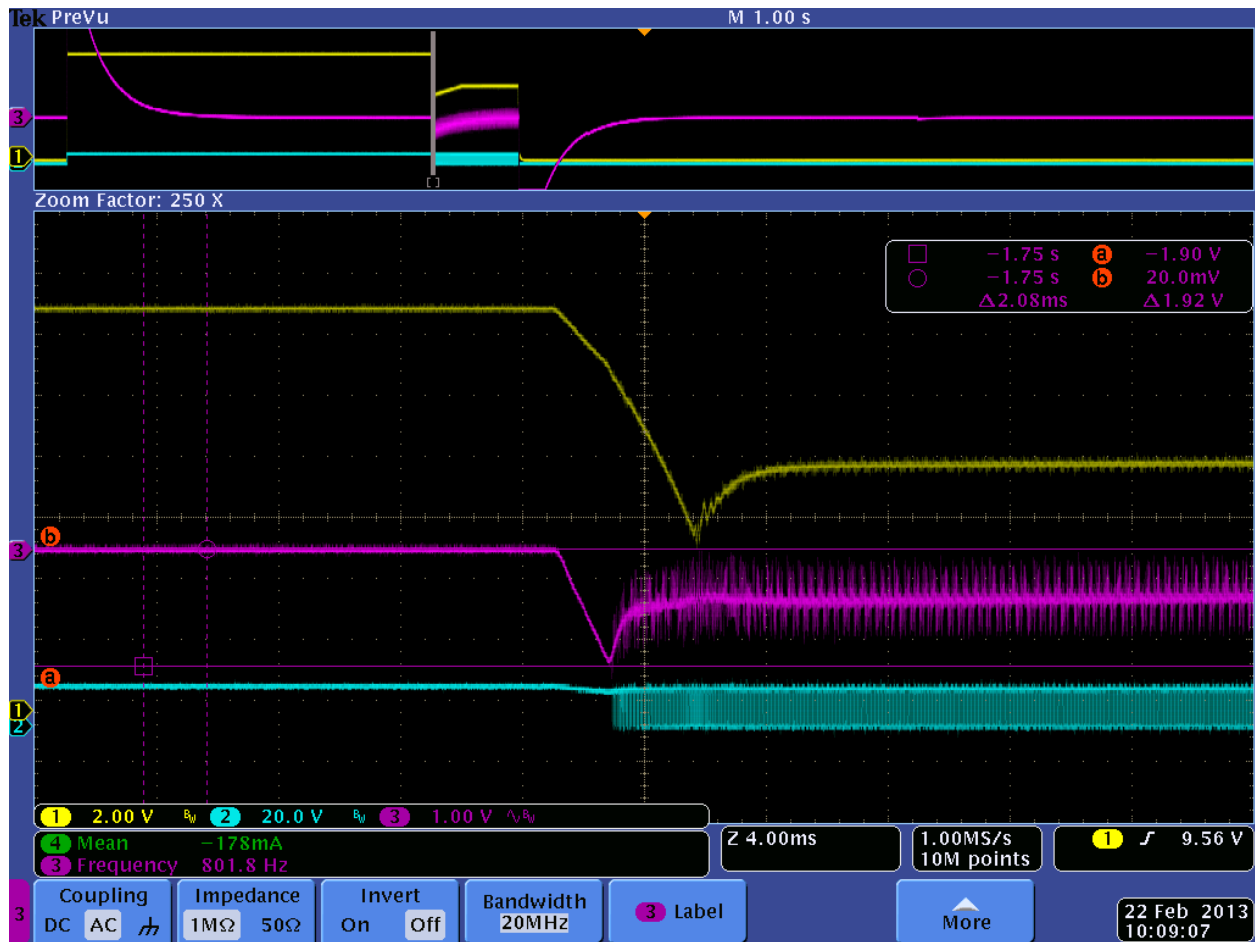


### Input Line Transient #5

$V_{in} = 13.2V$  down to 5.5V (2.7ms) then up to 9V (700ms)

$I_{out} = 3.5A$

Comments...2,000 $\mu$ F added to output cap, Deviation from Vout (right side of perturbation) 1.0V.  
Recommend setting Vout to 11.5V and above to clear the 10.5V Vout min level



### Output Voltage Ripple #1

Vin = 9.5V

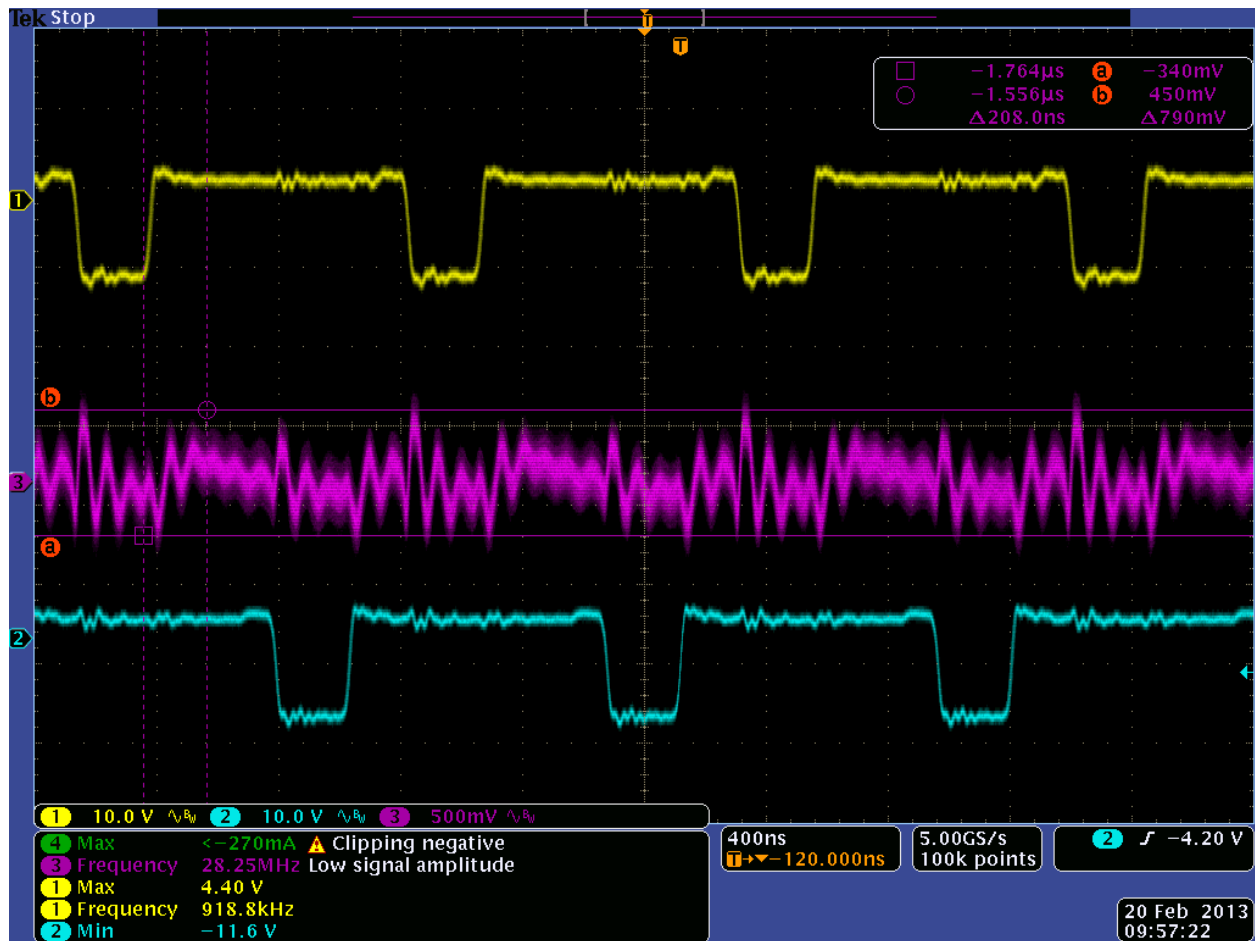
Iout = 15A

Channel 1 =

Channel 3 =

Channel 4 =

Comments... 790mVpk-pk ripple, CH2 Current average is 10.1A, Current Sharing between the 2 phases is +/- .5%



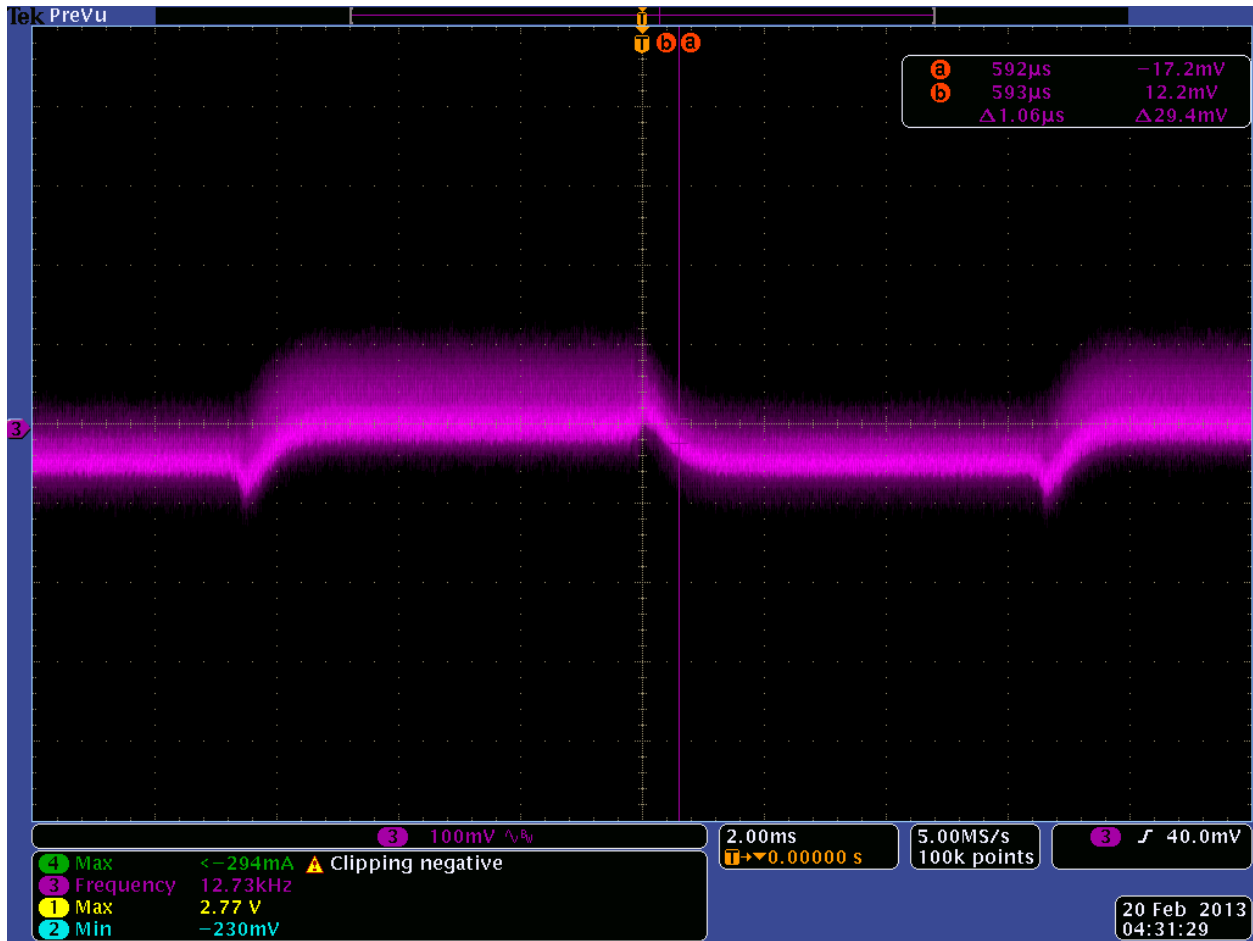
## Load Transient #1

Vin = 9.5V

Iout = 7.5A to 15A (100mA/µs, 1kHz, 50% duty cycle)

Channel 3 = Output voltage

Comments...



## Startup Waveforms #1

Vin = 9.5V

Iout = No Load

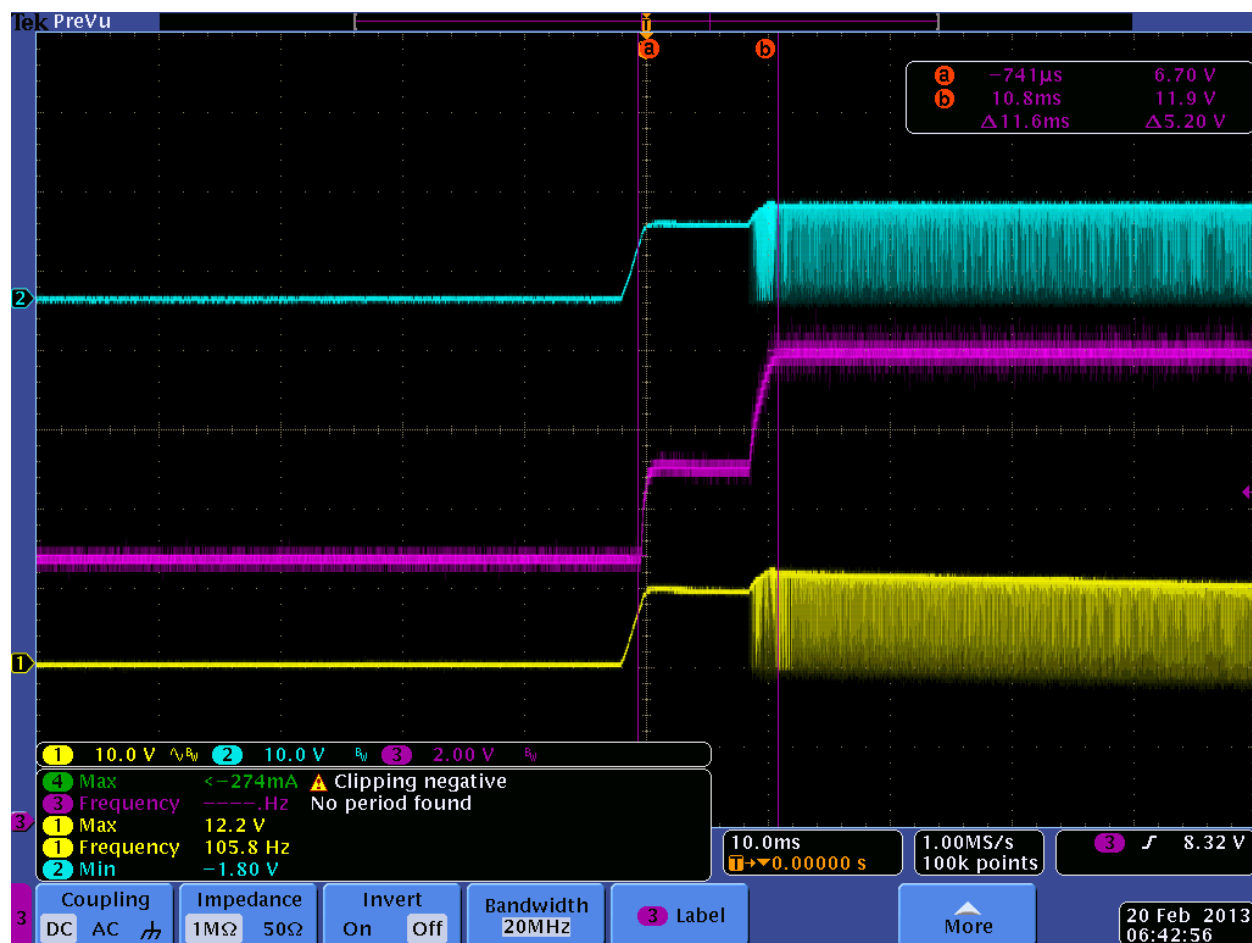
Channel 1 = Switch node of phase 1 ()



Channel 2 = Switch node of phase 2 ()

Channel 3 = Vout

Comments...



## Startup Waveforms #2

Vin = 9.5V

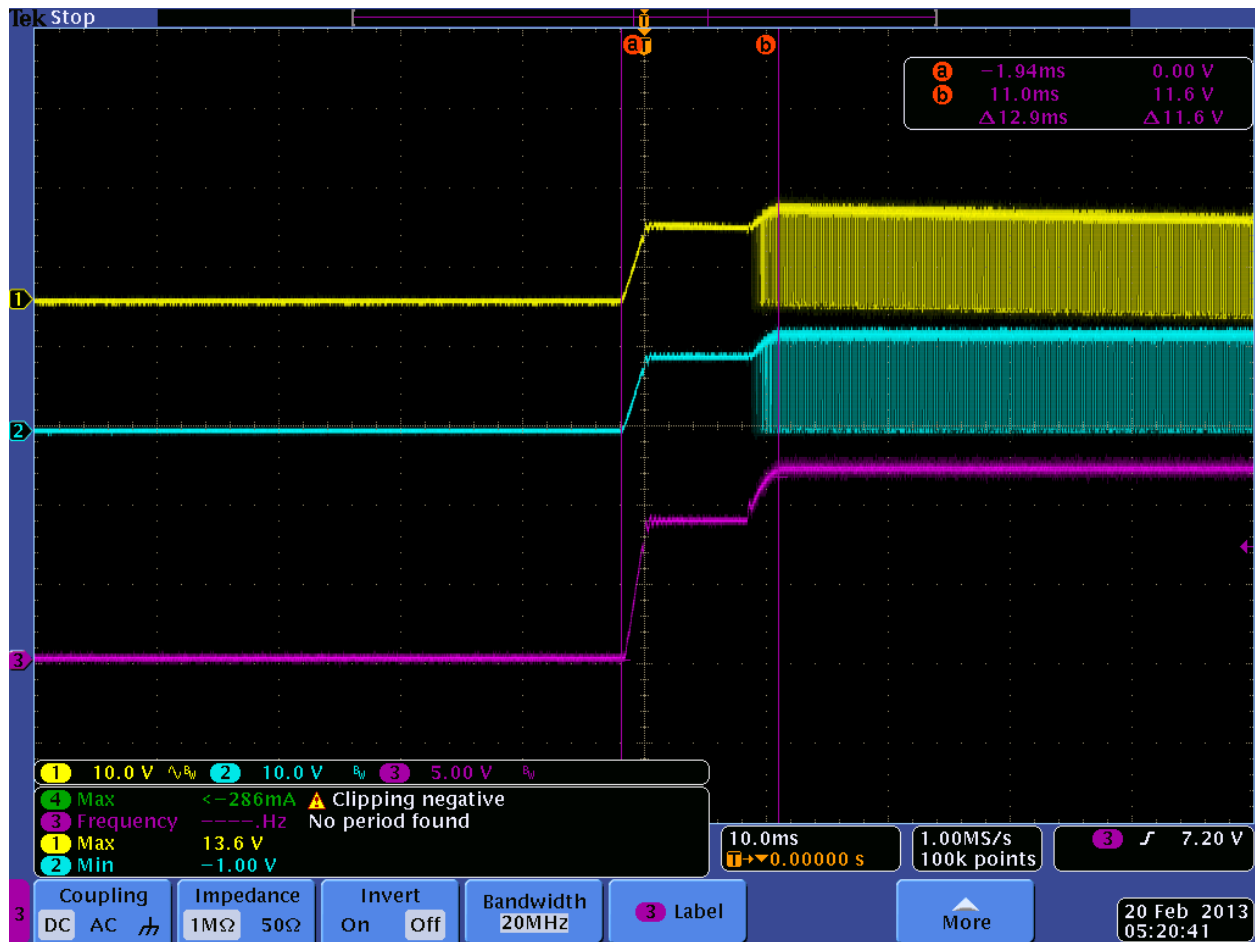
Iout = 15A (Full load)

Channel 1 = Switch node of phase 1 ()

Channel 2 = Switch node of phase 2 ()

Channel 3 = Vout

Comments...



### Startup Waveforms #3

Vin = 13V

Iout = No Load

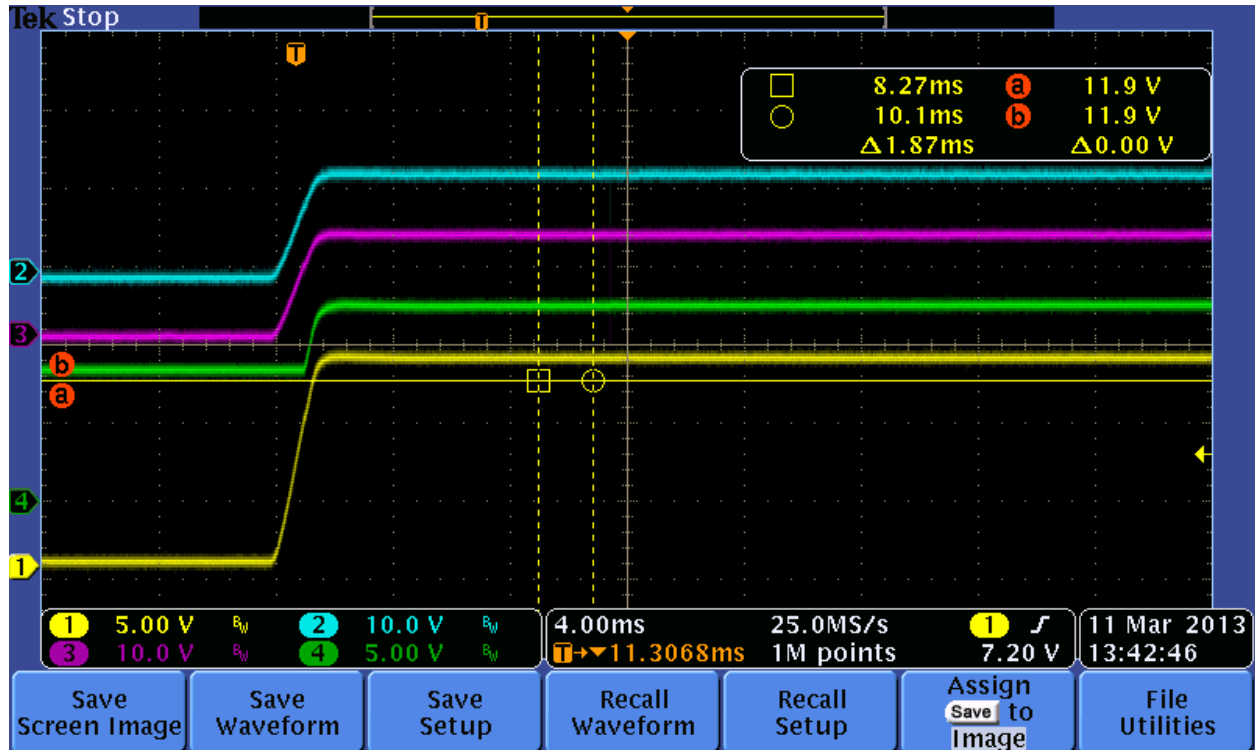
Channel 1 = Vin

Channel 2 = Switch node of phase 2 ()

Channel 3 = Switch node of phase 2 ()

Channel 4 = Vout

Comments...



### Startup Waveforms #4

Vin = 13V

Iout = 15A

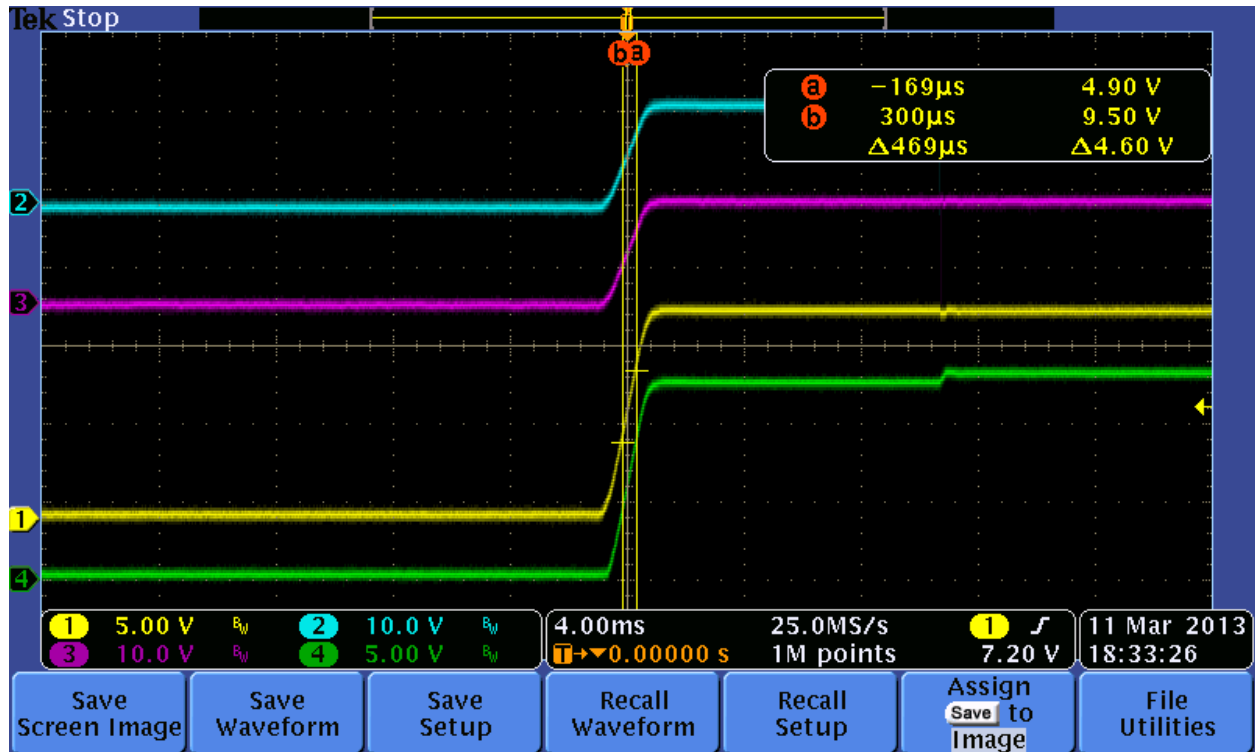
Channel 1 = Vin

Channel 2 = Switch node of phase 2 ()

Channel 3 = Switch node of phase 2 ()

Channel 4 = Vout

Comments...



### Startup Waveforms #5

Vin = 12V

Iout = No Load

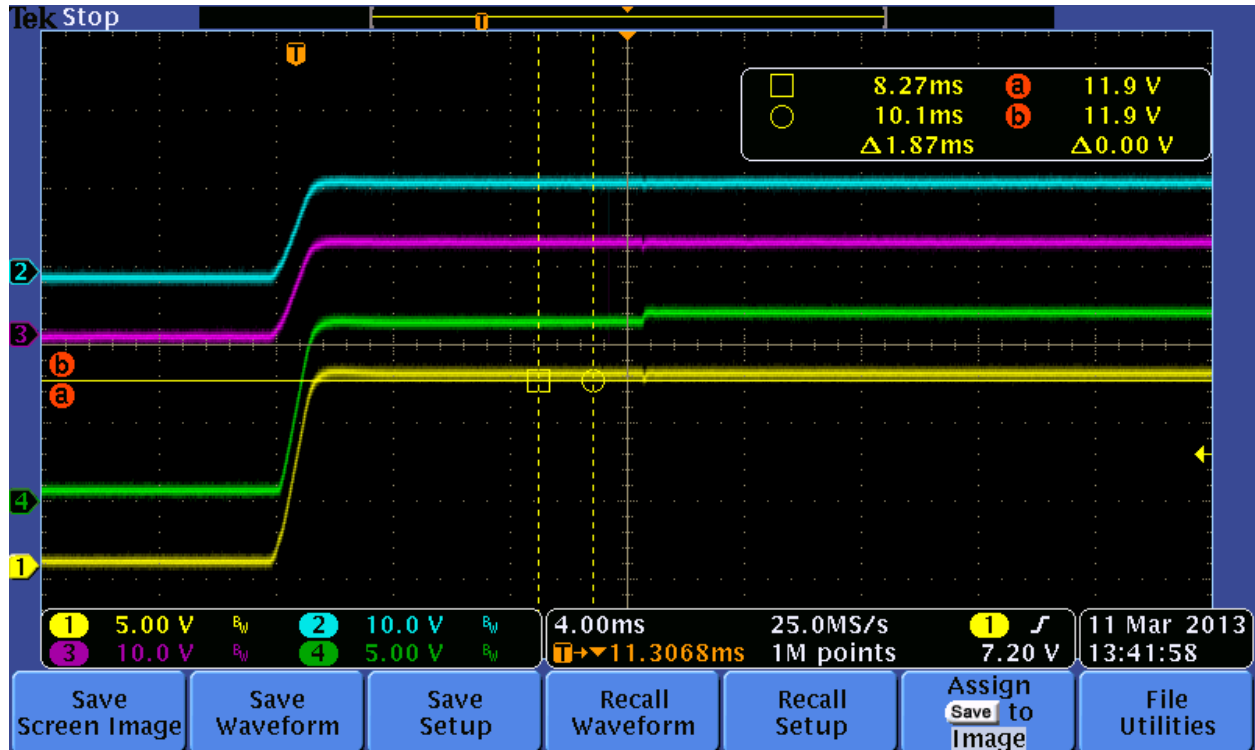
Channel 1 = Vin

Channel 2 = Switch node of phase 2 ()

Channel 3 = Switch node of phase 2 ()

Channel 4 = Vout

Comments...



## Startup Waveforms #6

Vin = 12V

Iout = 15A

Channel 1 = Vin

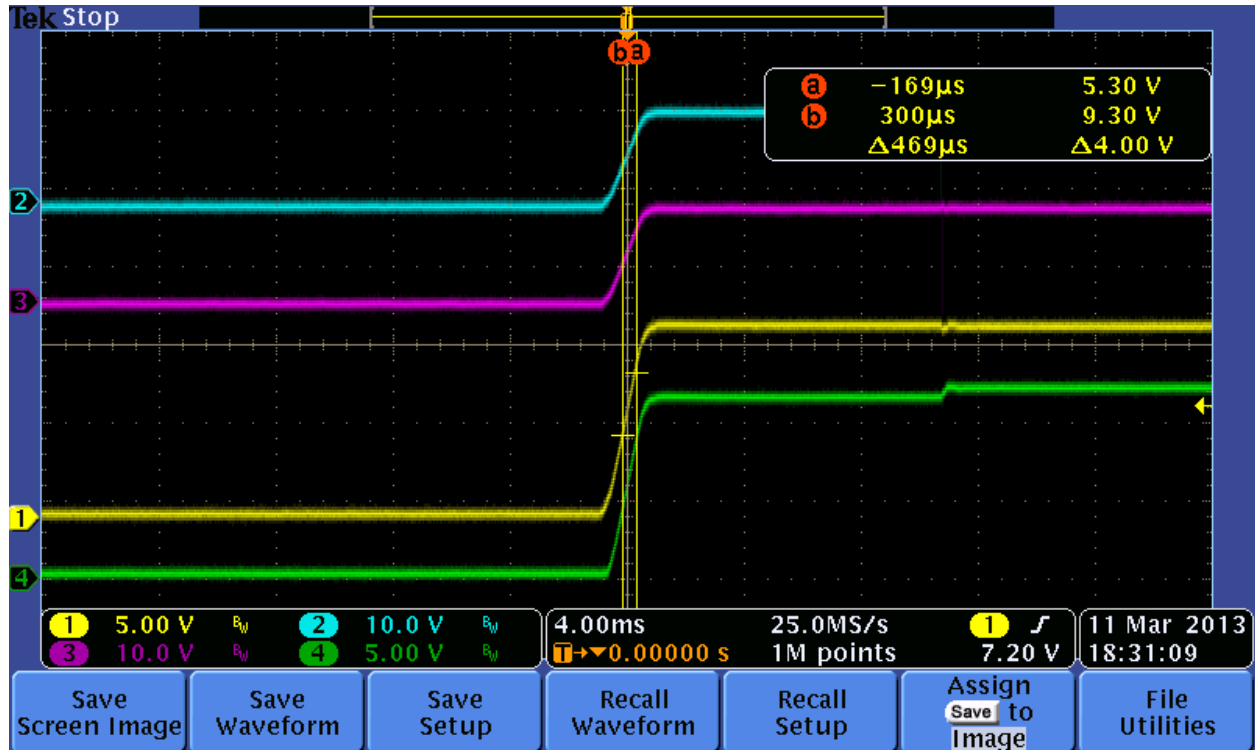
Channel 2 = Switch node of phase 2 ()



Channel 3 = Switch node of phase 2 ()

Channel 4 = Vout

Comments...



### Startup Waveforms #7

Vin = 11V

Iout = No Load

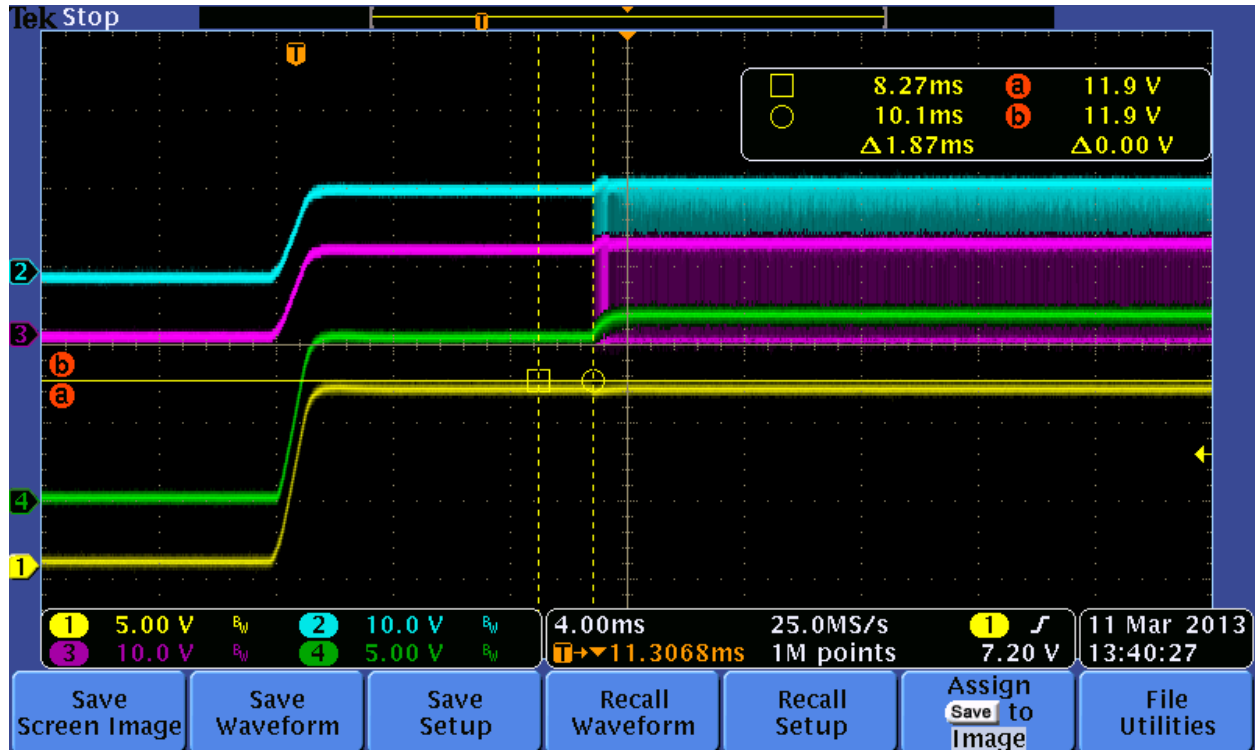
Channel 1 = Vin

Channel 2 = Switch node of phase 2 ()

Channel 3 = Switch node of phase 2 ()

Channel 4 = Vout

Comments...



### Startup Waveforms #8

Vin = 11V

Iout = 15A

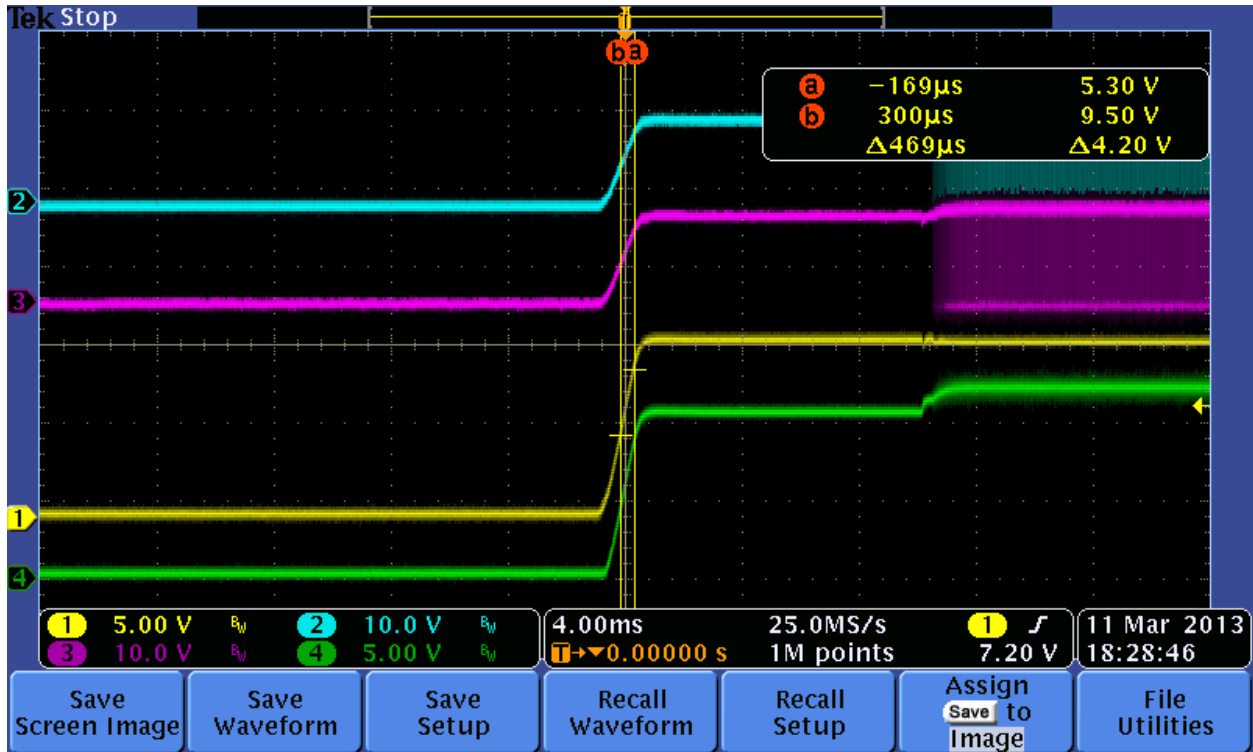
Channel 1 = Vin

Channel 2 = Switch node of phase 2 ()

Channel 3 = Switch node of phase 2 ( )

Channel 4 = Vout

Comments...



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