Texas Instruments

PMP4428 Test Procedure

China Power Reference Design

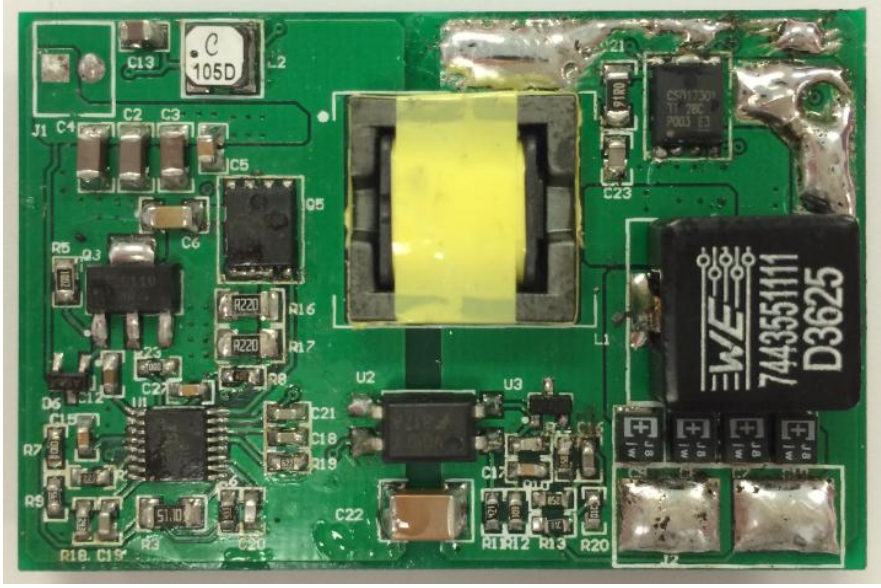
REV A

05/06/2014

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4428, which uses TI active clamp forward LM5025A, with size 40mmx60mmx8mm.The below photo shows this demo board.



1.2 REFERENCE DOCUMENTATION

Schematic PMP4428_SCH.PDF
Assembly PMP4428_PCB.PDF
BOM
Promotion tools

1.3 TEST EQUIPMENTS

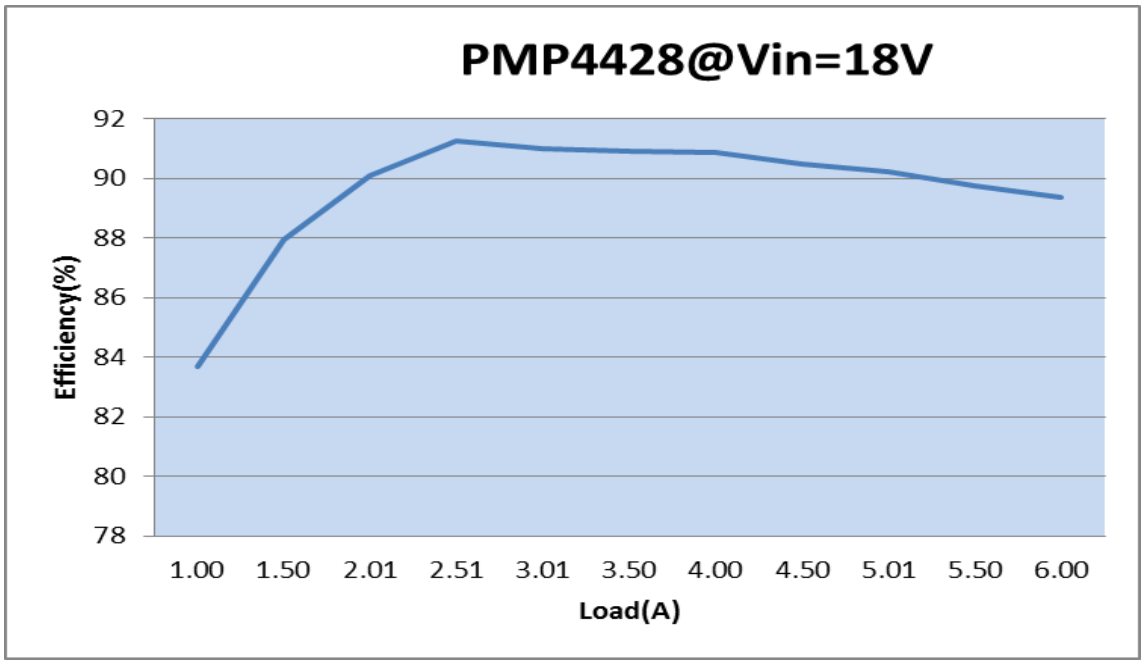
Multi-meter(voltage): Fluke 178
DC Source: GWINSTEK GPS-3303C
Electronic load: Chroma 63103A module
Testing Demo Board

2 INPUT CHARACTERISTICS

2.1 EFFICIENCY DATA

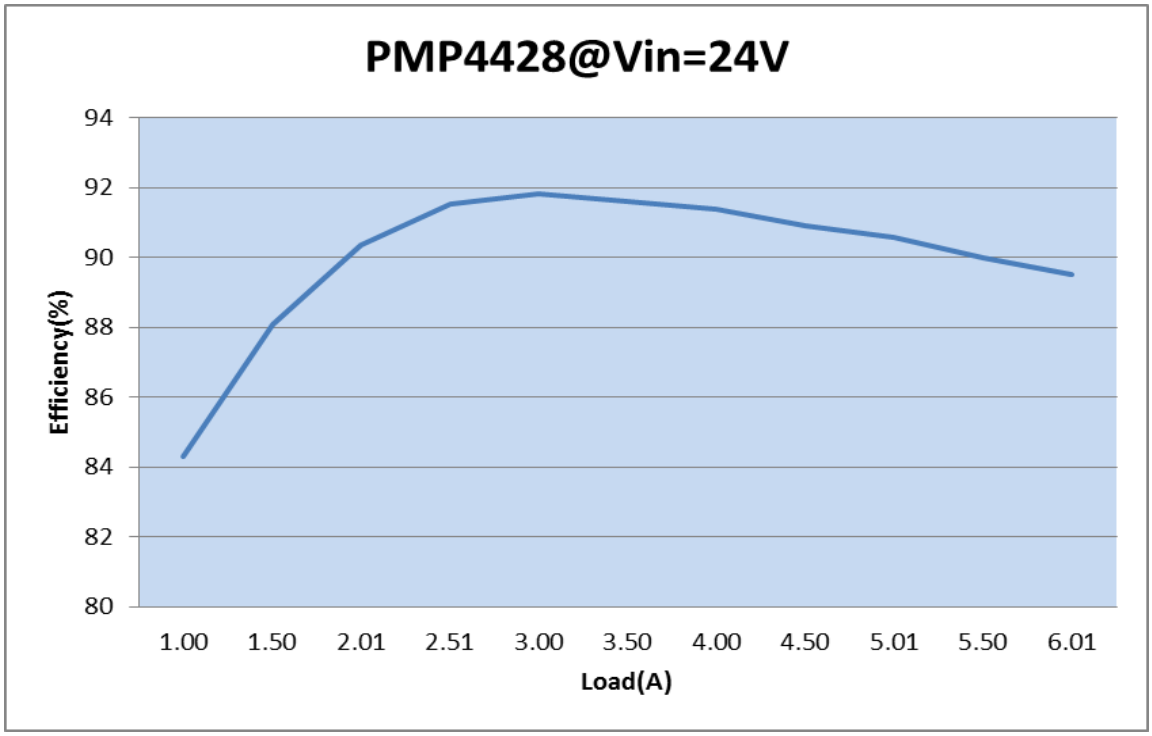
Vin=18V

Vin	Iin	Vout	Iout	Efficiency
18.05	0.331	5.00	1.00	83.69%
18.03	0.473	5.00	1.50	87.94%
17.99	0.620	5.00	2.01	90.10%
17.98	0.765	5.00	2.51	91.24%
18.04	0.917	5.00	3.01	90.98%
18.02	1.068	5.00	3.50	90.93%
18.04	1.220	4.00	4.00	9.087%
18.01	1.381	5.00	4.50	90.46%
17.98	1.544	5.00	5.01	90.23%
17.99	1.703	5.00	5.50	89.76%
18.04	1.856	5.00	6.00	89.35%



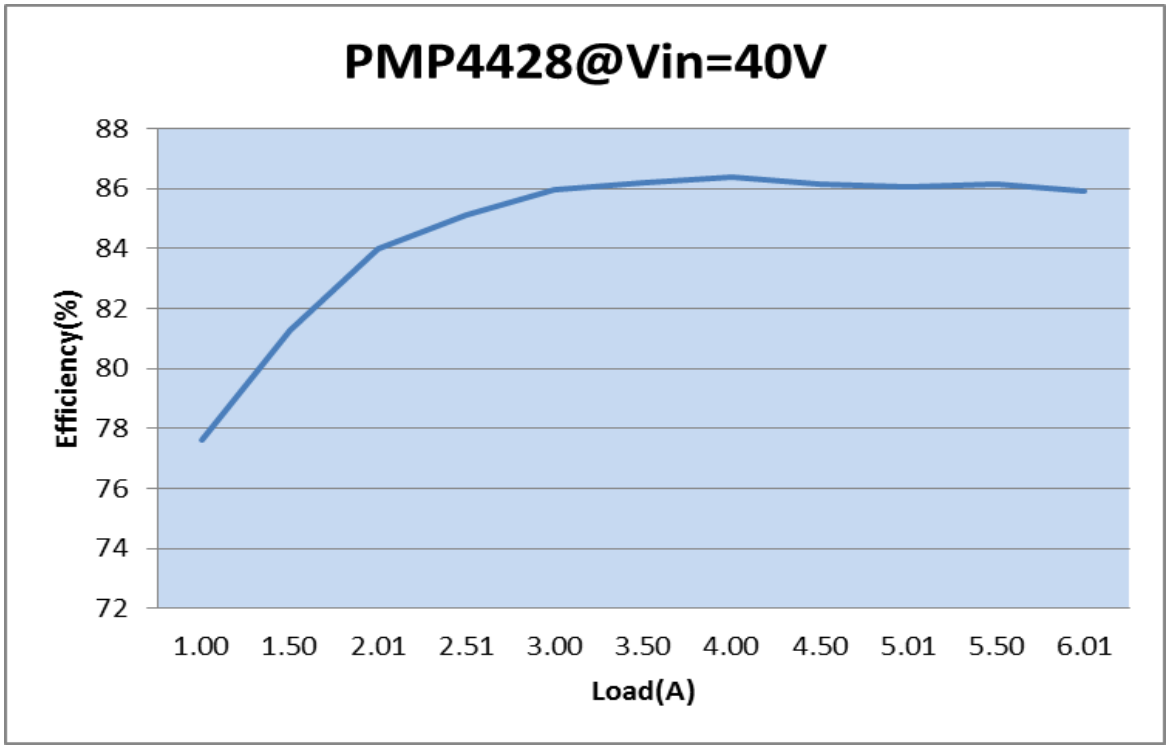
Vin=24V

Vin	Iin	Vout	Iout	Efficiency
24.01	0.247	5.00	1.00	84.31%
23.99	0.355	5.00	1.50	88.06%
24.02	0.463	5.00	2.01	90.37%
24.01	0.571	5.00	2.51	91.54%
23.99	0.681	5.00	3.00	91.82%
23.97	0.797	5.00	3.50	91.60%
24.02	0.911	5.00	4.00	91.39%
24.01	1.031	5.00	4.50	90.89%
23.99	1.153	5.00	5.01	90.56%
23.97	1.275	5.00	5.50	89.98%
24.01	1.398	5.00	6.01	89.53%



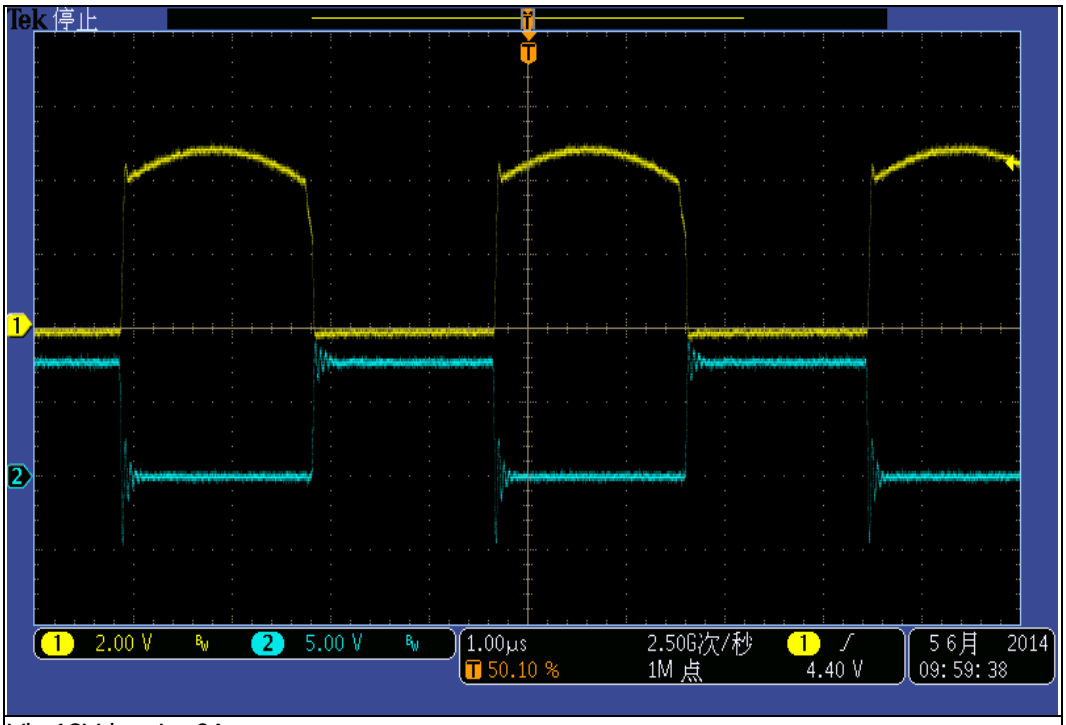
Vin=40V

Vin	Iin	Vout	Iout	Efficiency
40.00	0.161	5.00	1.00	77.64%
39.95	0.231	5.00	1.50	81.27%
40.00	0.299	5.00	2.01	84.03%
39.96	0.369	5.00	2.51	85.11%
40.00	0.436	5.00	3.00	86.01%
39.97	0.508	5.00	3.50	86.19%
39.90	0.581	5.00	4.00	86.42%
39.94	0.654	5.00	4.50	86.14%
39.90	0.729	5.00	5.01	86.12%
39.96	0.799	5.00	5.50	86.13%
39.90	0.875	5.00	6.01	86.07%

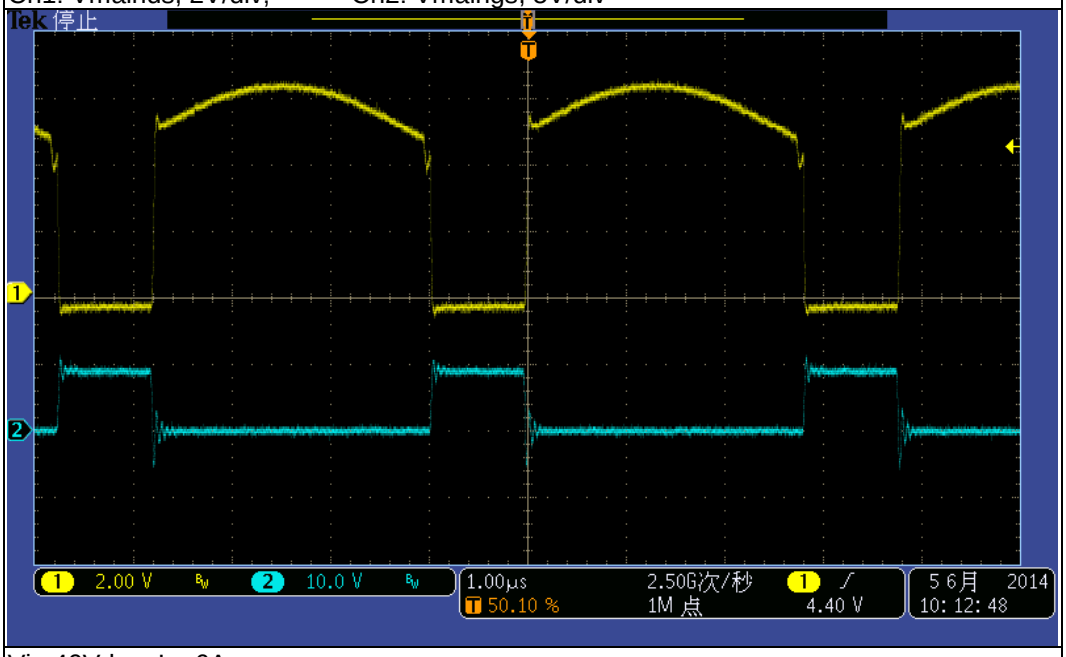


3 Key waveform:

3.1 Main MOSFET Vds VS Vgs

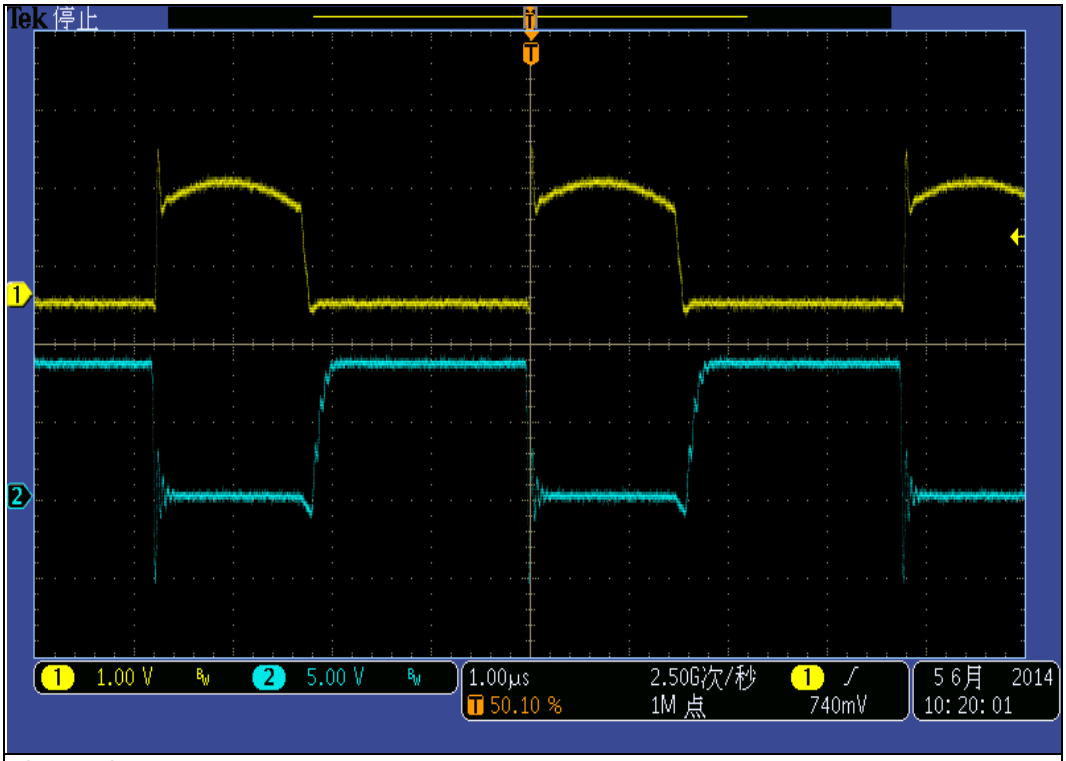


Vin:18Vdc Io: 6A
Ch1: Vmainds, 2V/div; Ch2: Vmaings, 5V/div

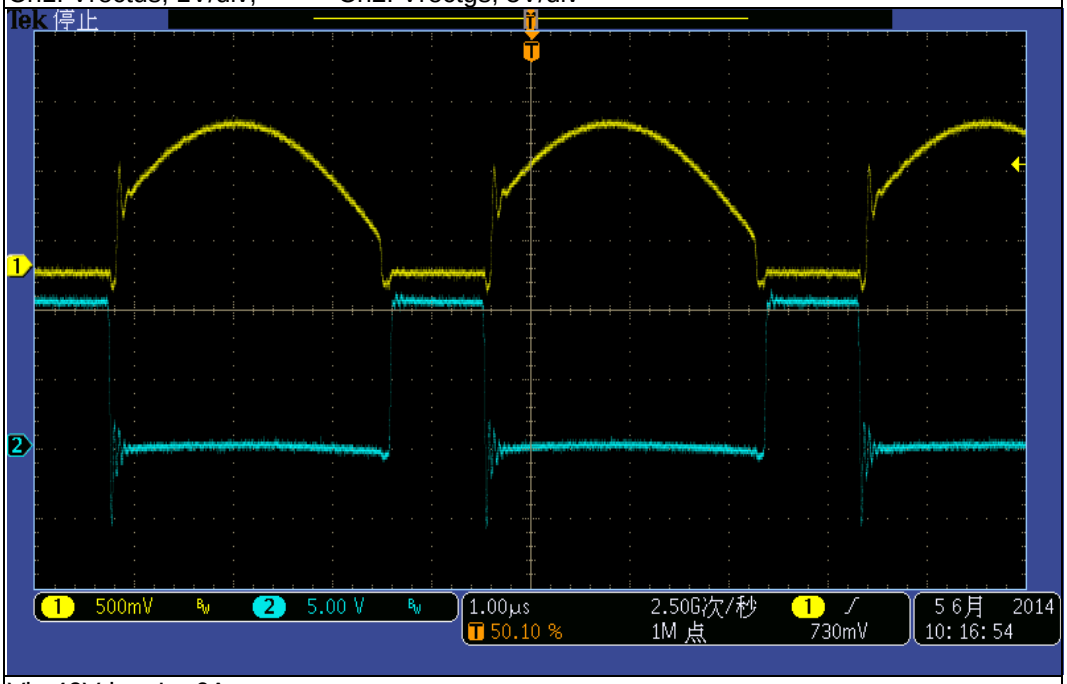


Vin:40Vdc Io: 6A
Ch1: Vmainds, 2V/div; Ch2: Vmaings, 5V/div

3.2 Secondary Rectifier MOSFET Vds VS Vgs

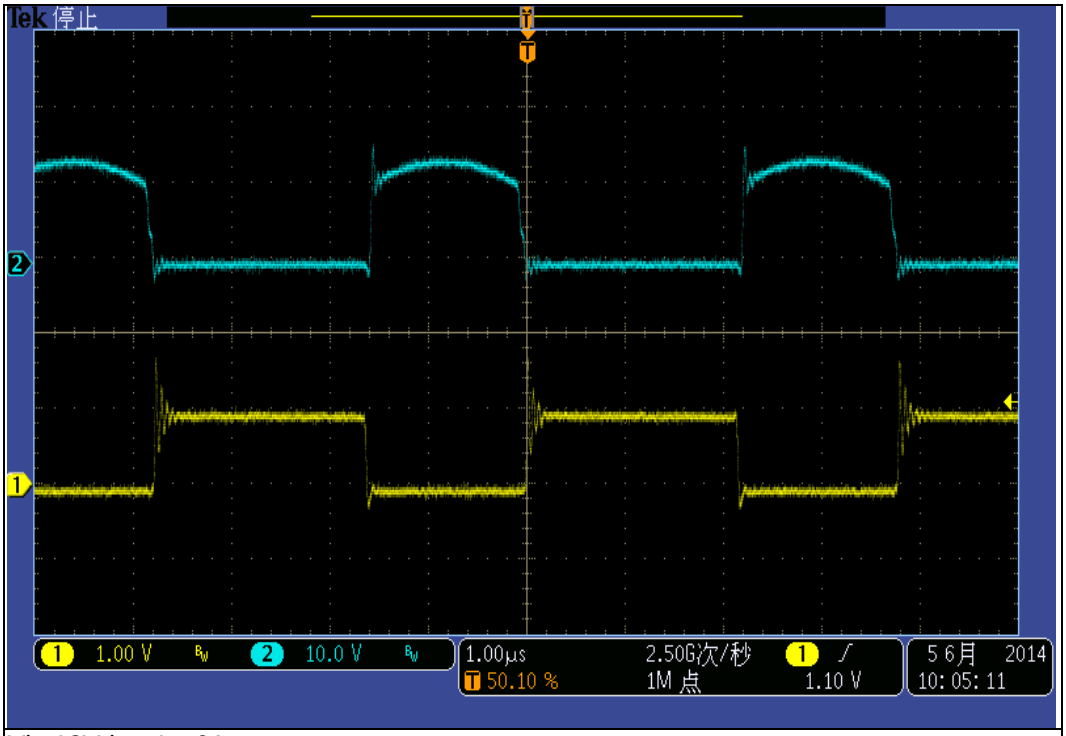


Vin:18Vdc Io: 6A
Ch1: Vrectds, 1V/div; Ch2: Vrectgs, 5V/div

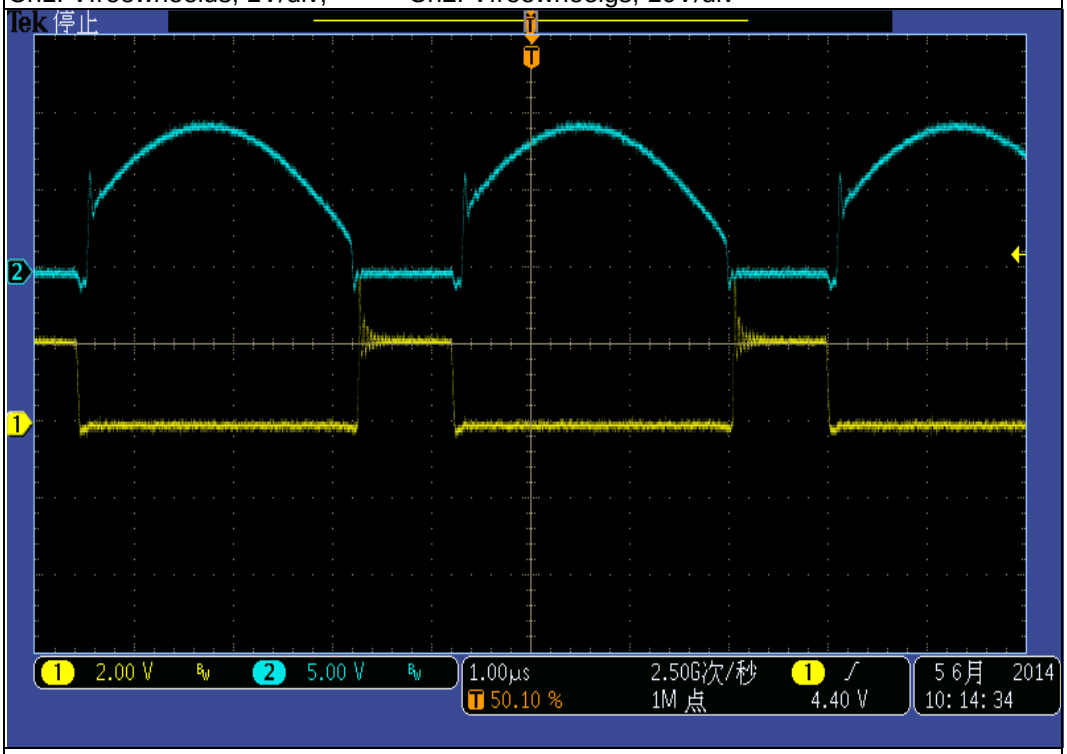


Vin:40Vdc Io: 6A
Ch1: Vrectds, 500mV/div; Ch2: Vrectgs, 5V/div

3.3 Secondary Freewheel MOSFET Vds VS Vgs

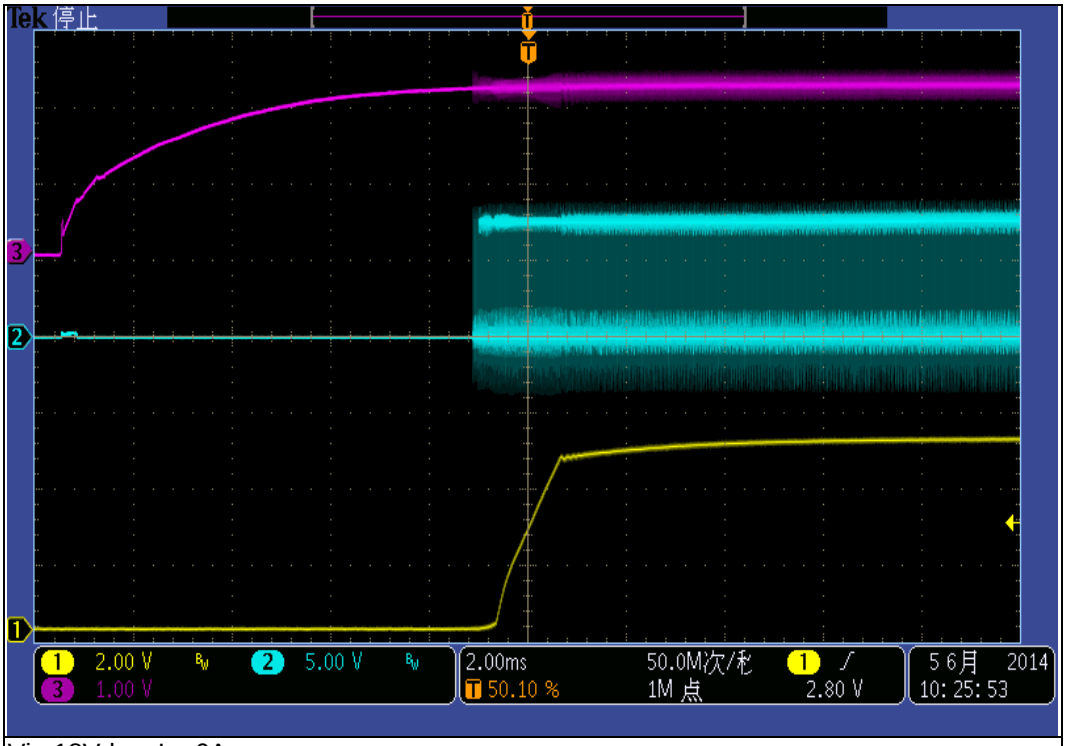


Vin:18Vdc Io: 6A
Ch1: Vfreewheelds, 1V/div; Ch2: Vfreewheelgs, 10V/div

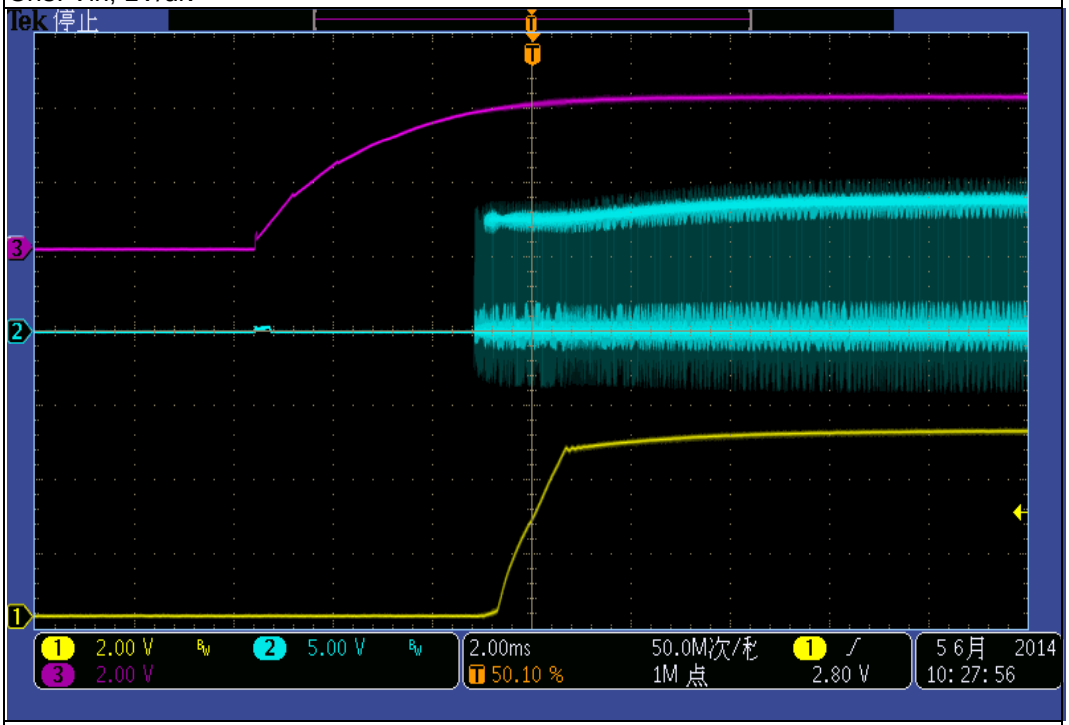


Vin:40Vdc Io: 6A
Ch1: Vfreewheelds, 2V/div; Ch2: Vfreewheelgs, 5V/div

3.4 OUTPUT VOLTAGE RISE TIME

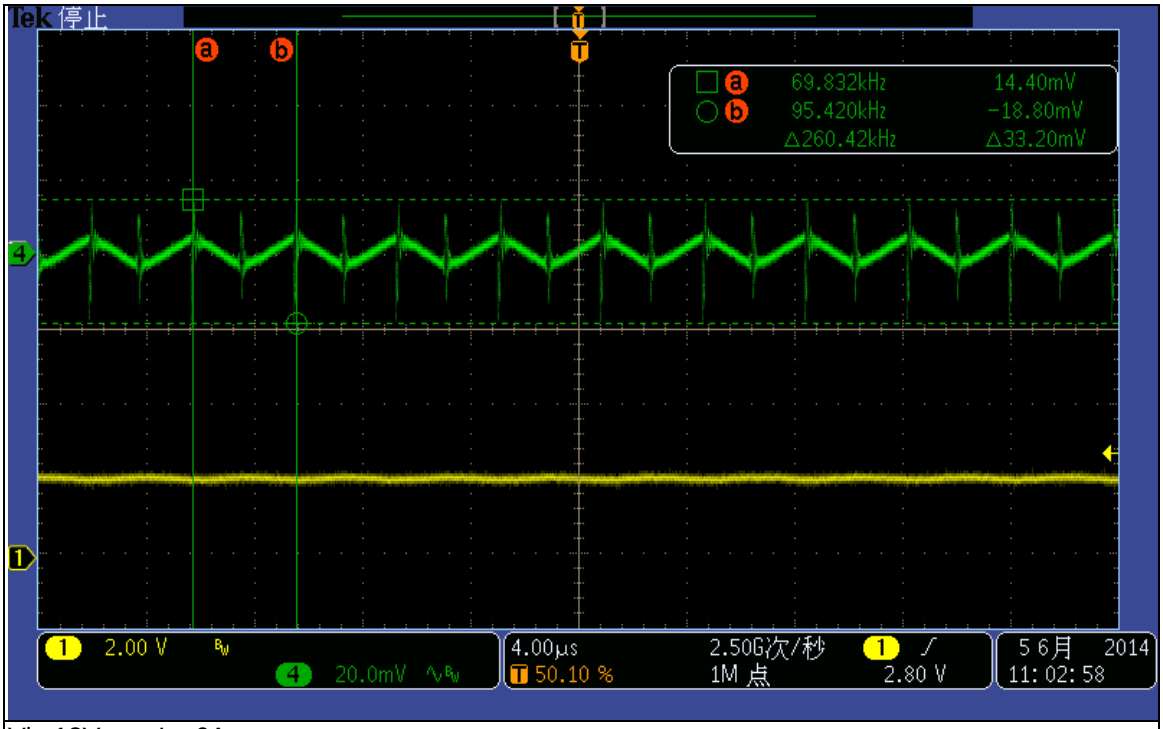


Vin:18Vdc Io: 6A
Ch1: Vout, 2V/div; Ch2: Vmaings, 2V/div
Ch3: Vin, 1V/div

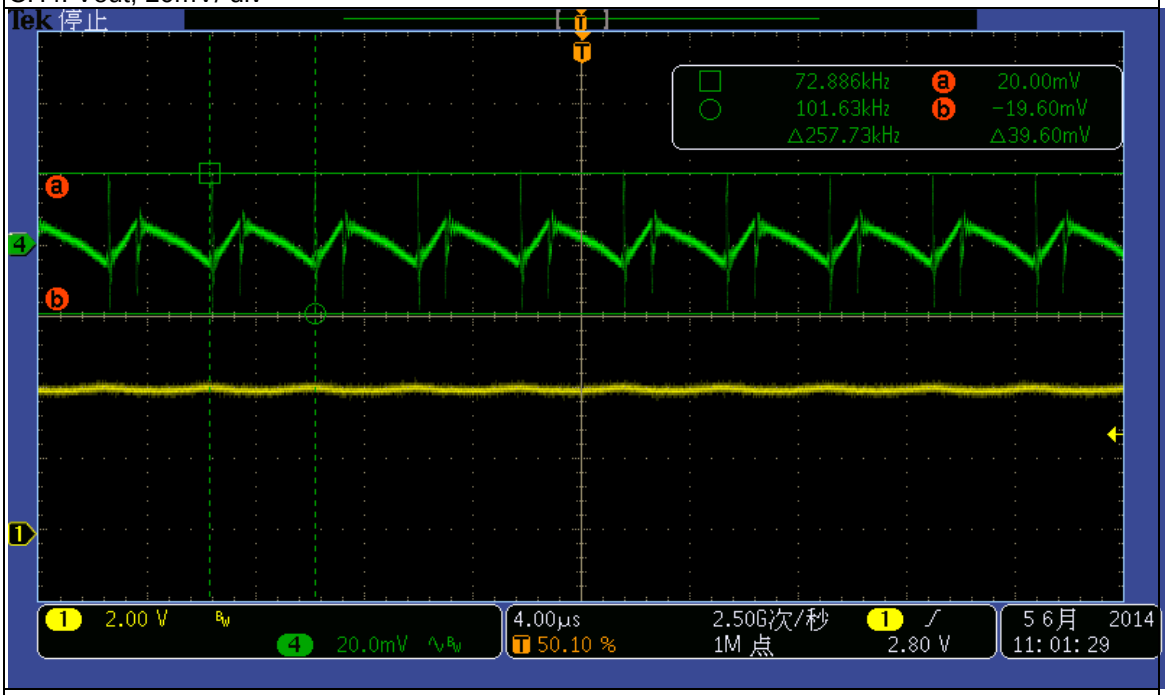


Vin:40Vdc Io: 6A
Ch1: Vout, 2V/div; Ch2: Vmaings, 2V/div
Ch3: Vin, 2V/div

3.5 RIPPLE VOLTAGE



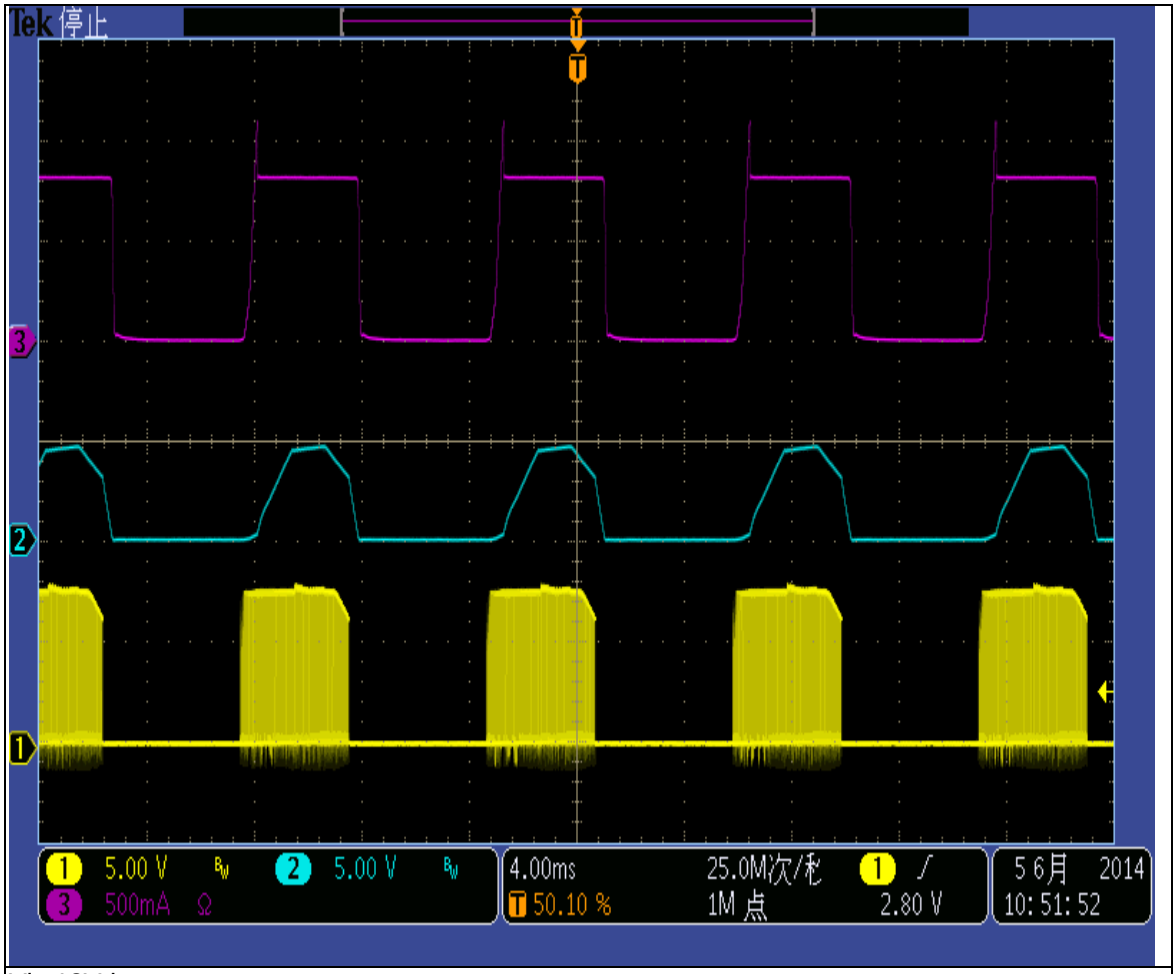
Vin:18Vac Io: 6A
CH1: Vin, 20V/div
CH4: Vout, 20mV/ div



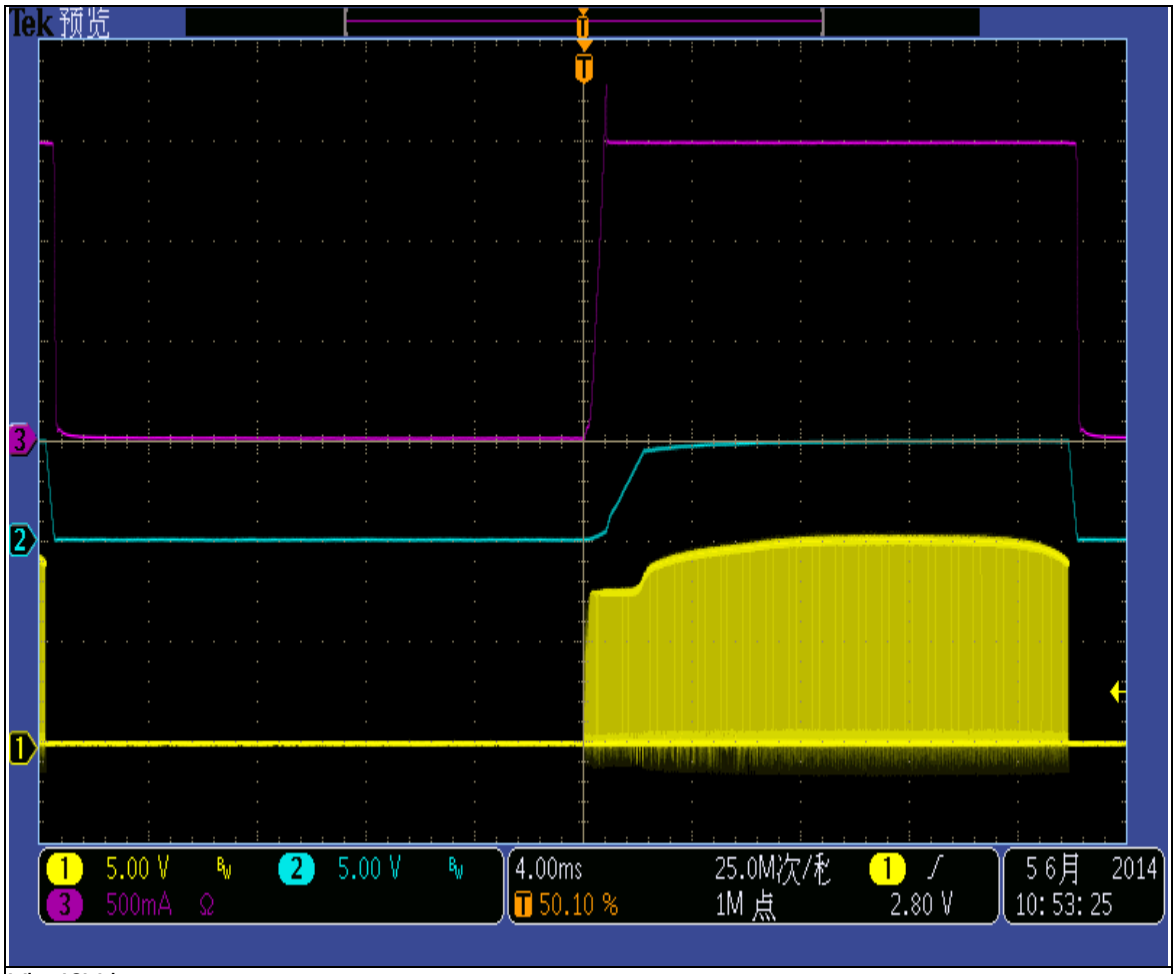
Vin:40Vac Io: 6A
CH1: Vin, 20V/div
CH4: Vout, 20mV/ div

3.6 OUTPUT SHORT PROTECTION

Input voltage	Output short protection
18&40Vdc	**Hiccup up mode**

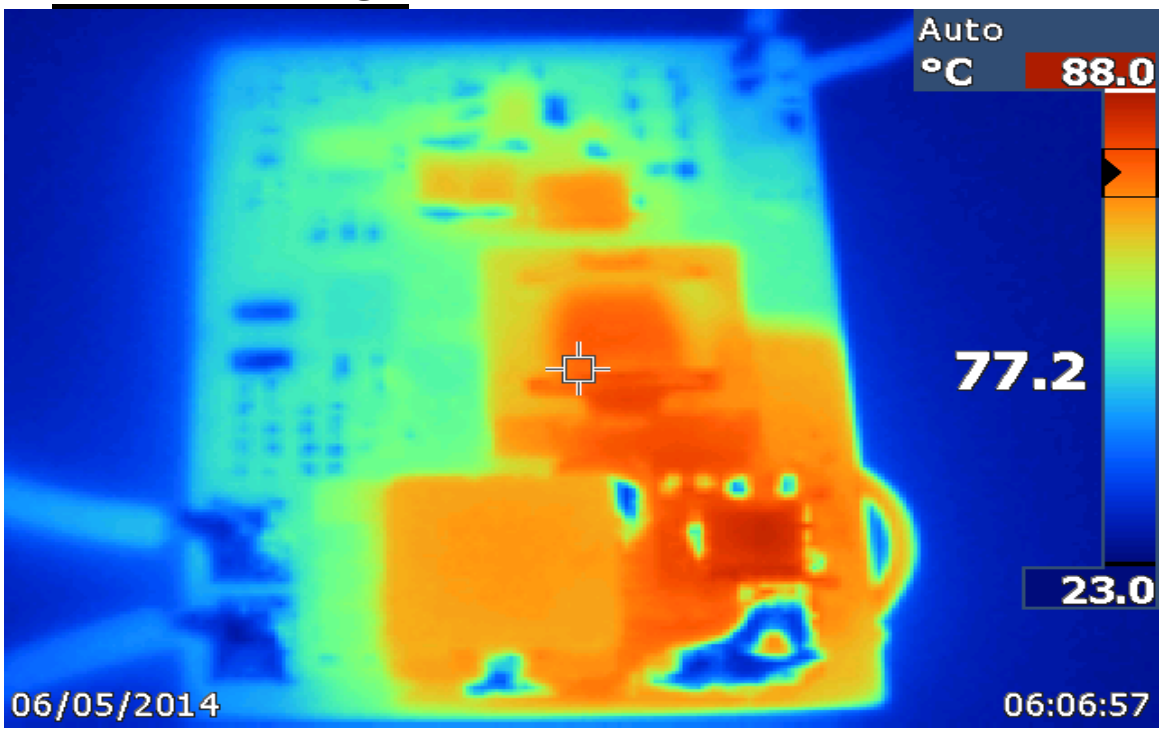


Vin:18Vdc
CH1: Vmaings, 5V/div
CH2: Vout, 5V/div
CH3: Iout, 5A/div

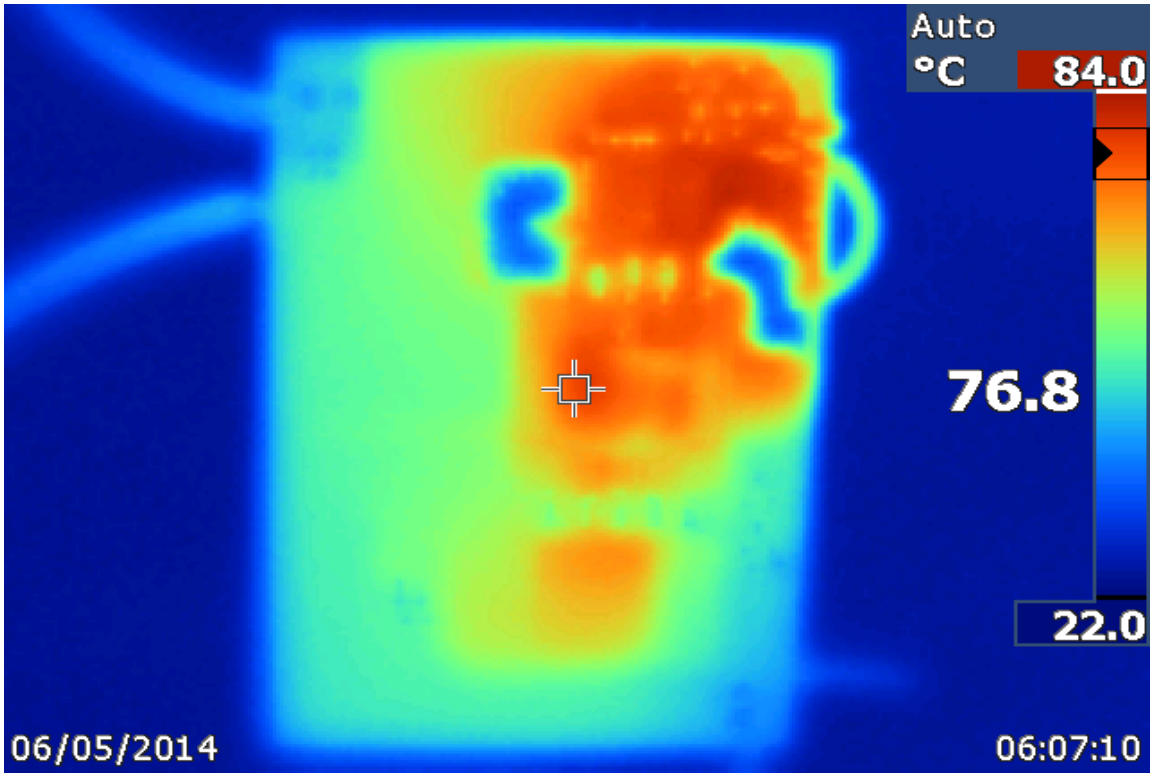


Vin:40Vdc
CH1: Vmaings, 5V/div
CH2: Vout, 5V/div
CH3: Iout, 5A/div

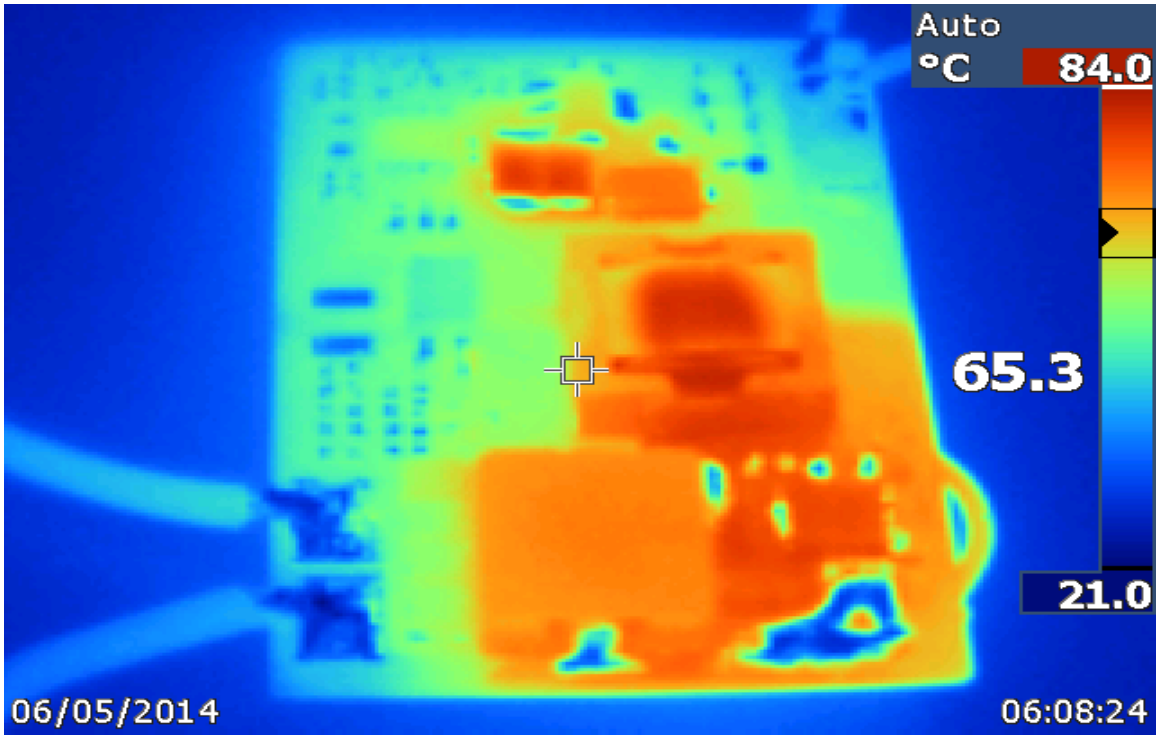
4 THERMAL IMAGE



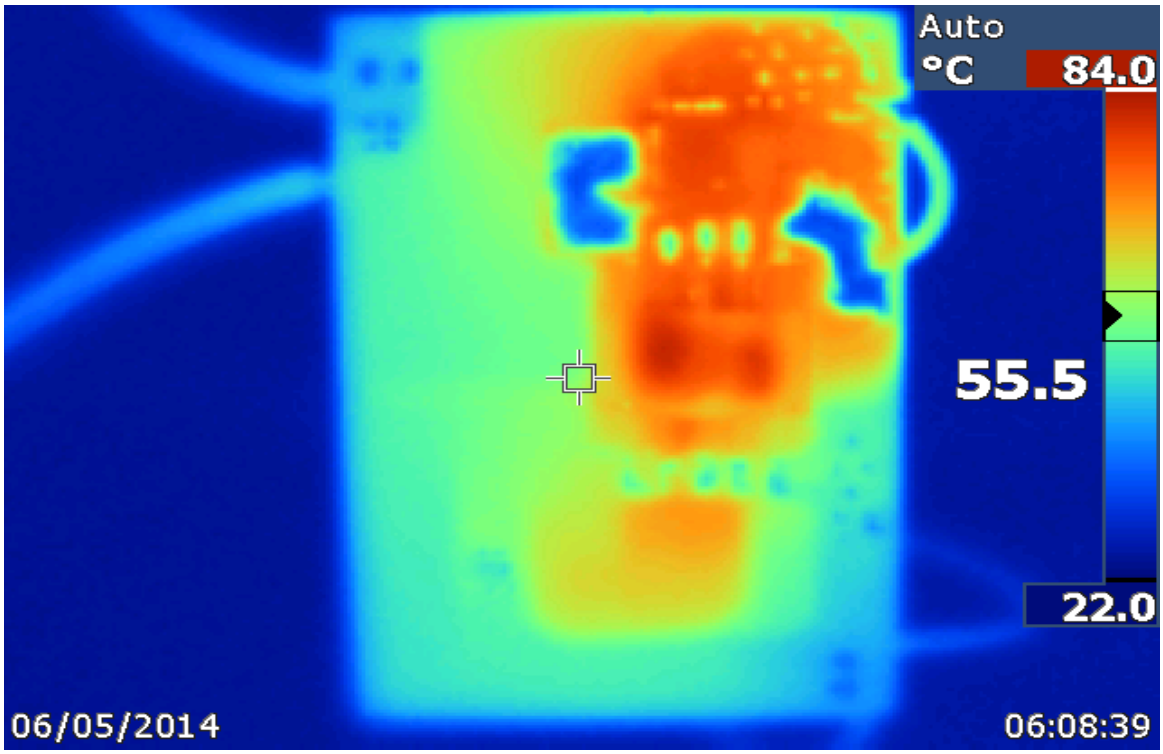
Top side, 40Vdc and 6A load, Ta=25°



Bottom side, 40Vdc and 6A load, Ta=25°



Top side, 18Vdc and 6A load, Ta=25°



Bottom side, 18Vdc and 6A load, Ta=25°

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