



Texas Instruments

PMP4387 Test Procedure

China Power Reference Design

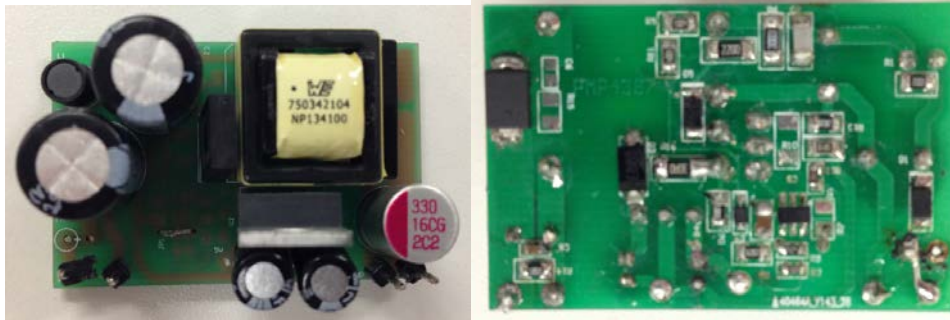
REV A

20/11/2013

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4387, which uses TI new Primary Side Controller UCC28722 and bipolar transistor for 12V0.5A adapter with size 43mmx28mmx16mm. The below photo shows this demo board.



1.2 TEST EQUIPMENTS

Power-meter: YOKOGAWA WT210
 Multi-meter(current): Fluke 8845A
 Multi-meter(voltage): Fluke 187
 AC Source: Chroma 61530
 Electronic load: Chroma 63110A module
 Testing demoboard

2 INPUT CHARACTERISTICS

2.1 EFFICIENCY DATA

Notes: efficiency test is based on the board.

| Vin(V) | Iin(mA) | Pin(W) | 5V | I5V(mA) | 12V | I12V(A) | Po(W) | Efficiency |
|--------|---------|--------|------|---------|-------|---------|-------|------------|
| 90 | 126.98 | 4.222 | 5.08 | 80 | 12.42 | 0.2 | 2.890 | 68.49% |
| 90 | 153.92 | 5.524 | 5.08 | 80 | 12.31 | 0.3 | 4.099 | 74.21% |
| 90 | 177.86 | 6.636 | 5.08 | 80 | 12.25 | 0.4 | 5.306 | 79.96% |
| 90 | 202.9 | 7.822 | 5.08 | 80 | 12.21 | 0.5 | 6.513 | 83.26% |

| Vin(V) | Iin(mA) | Pin(W) | 5V | I5V(mA) | 12V | I12V(A) | Po(W) | Efficiency |
|--------|---------|--------|------|---------|-------|---------|-------|------------|
| 110 | 113.07 | 4.222 | 5.08 | 80 | 12.46 | 0.2 | 2.898 | 68.65% |
| 110 | 131.29 | 5.288 | 5.08 | 80 | 12.35 | 0.3 | 4.111 | 77.75% |
| 110 | 151.85 | 6.51 | 5.08 | 80 | 12.29 | 0.4 | 5.322 | 81.76% |
| 110 | 172.29 | 7.717 | 5.08 | 80 | 12.23 | 0.5 | 6.521 | 84.51% |

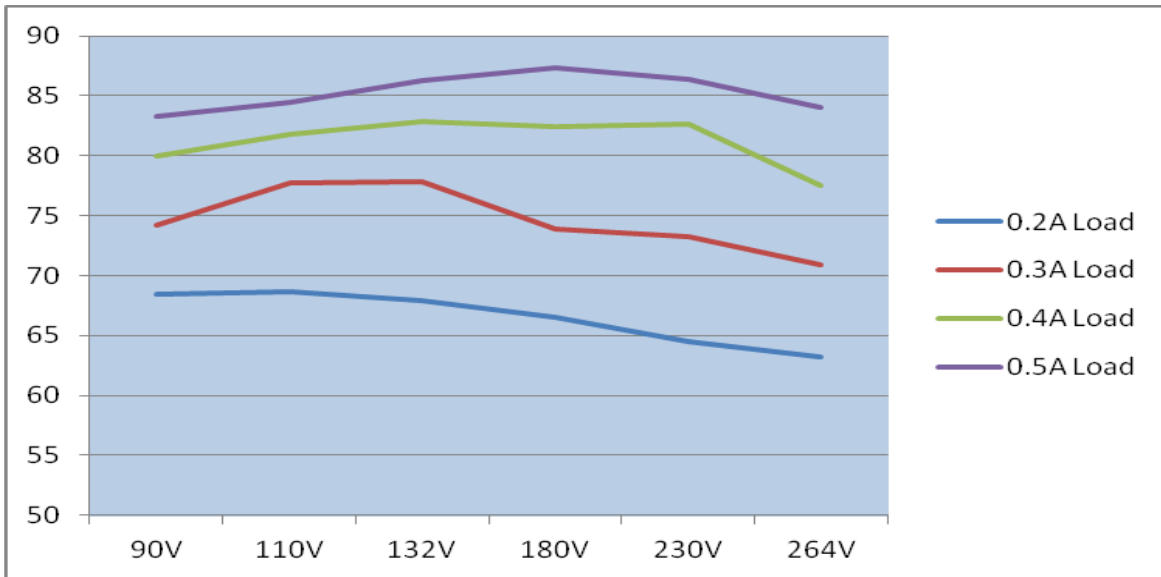
| Vin(V) | Iin(mA) | Pin(W) | 5V | I5V(mA) | 12V | I12V(A) | Po(W) | Efficiency |
|--------|---------|--------|------|---------|-------|---------|-------|------------|
| 132 | 103.18 | 4.269 | 5.08 | 80 | 12.47 | 0.2 | 2.900 | 67.94% |
| 132 | 118.55 | 5.286 | 5.08 | 80 | 12.36 | 0.3 | 4.114 | 77.84% |
| 132 | 134.63 | 6.43 | 5.08 | 80 | 12.3 | 0.4 | 5.326 | 82.84% |
| 132 | 150.48 | 7.571 | 5.08 | 80 | 12.26 | 0.5 | 6.536 | 86.33% |

| Vin(V) | Iin(mA) | Pin(W) | 5V | I5V(mA) | 12V | I12V(A) | Po(W) | Efficiency |
|--------|---------|--------|------|---------|-------|---------|-------|------------|
| 180 | 89.73 | 4.36 | 5.08 | 80 | 12.47 | 0.2 | 2.900 | 66.52% |
| 180 | 104.82 | 5.57 | 5.08 | 80 | 12.37 | 0.3 | 4.117 | 73.92% |
| 180 | 114.22 | 6.47 | 5.08 | 80 | 12.31 | 0.4 | 5.330 | 82.39% |
| 180 | 124.63 | 7.50 | 5.08 | 80 | 12.29 | 0.5 | 6.551 | 87.33% |

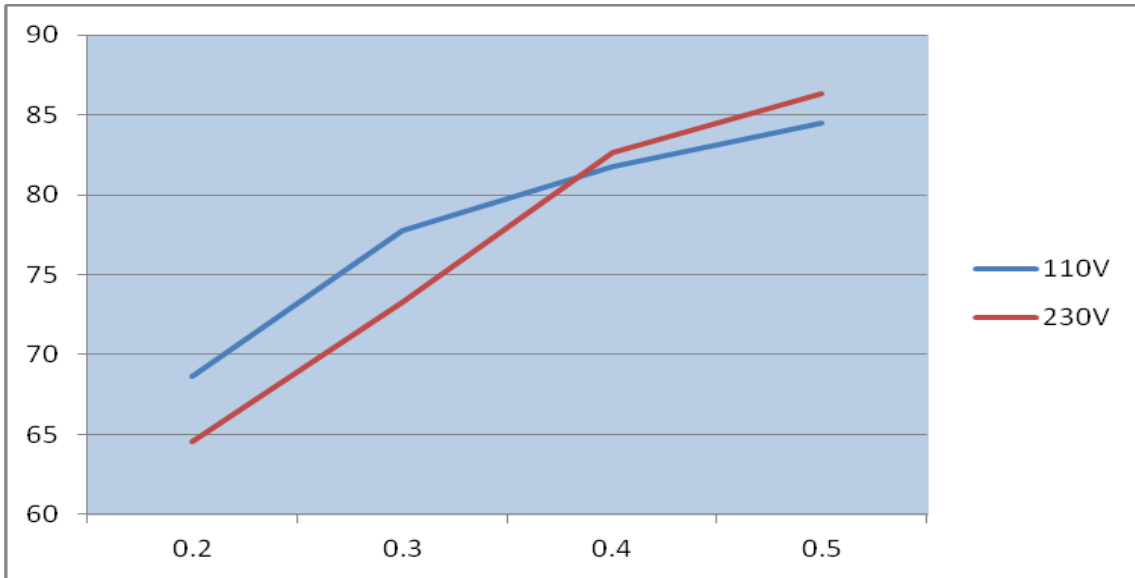
| Vin(V) | Iin(mA) | Pin(W) | 5V | I5V(mA) | 12V | I12V(A) | Po(W) | Efficiency |
|--------|---------|--------|------|---------|-------|---------|-------|------------|
| 230 | 77.91 | 4.49 | 5.08 | 80 | 12.47 | 0.2 | 2.900 | 64.54% |
| 230 | 93.26 | 5.63 | 5.08 | 80 | 12.38 | 0.3 | 4.120 | 73.25% |
| 230 | 103.62 | 6.45 | 5.08 | 80 | 12.31 | 0.4 | 5.330 | 82.64% |
| 230 | 111.24 | 7.58 | 5.08 | 80 | 12.28 | 0.5 | 6.546 | 86.36% |

| Vin(V) | Iin(mA) | Pin(W) | 5V | I5V(mA) | 12V | I12V(A) | Po(W) | Efficiency |
|--------|---------|--------|------|---------|-------|---------|-------|------------|
| 264 | 71.27 | 4.59 | 5.08 | 80 | 12.47 | 0.2 | 2.900 | 63.18% |
| 264 | 87.43 | 5.81 | 5.08 | 80 | 12.39 | 0.3 | 4.120 | 70.92% |
| 264 | 98.26 | 6.88 | 5.08 | 80 | 12.31 | 0.4 | 5.330 | 77.48% |
| 264 | 105.18 | 7.81 | 5.08 | 80 | 12.31 | 0.5 | 6.560 | 83.99% |

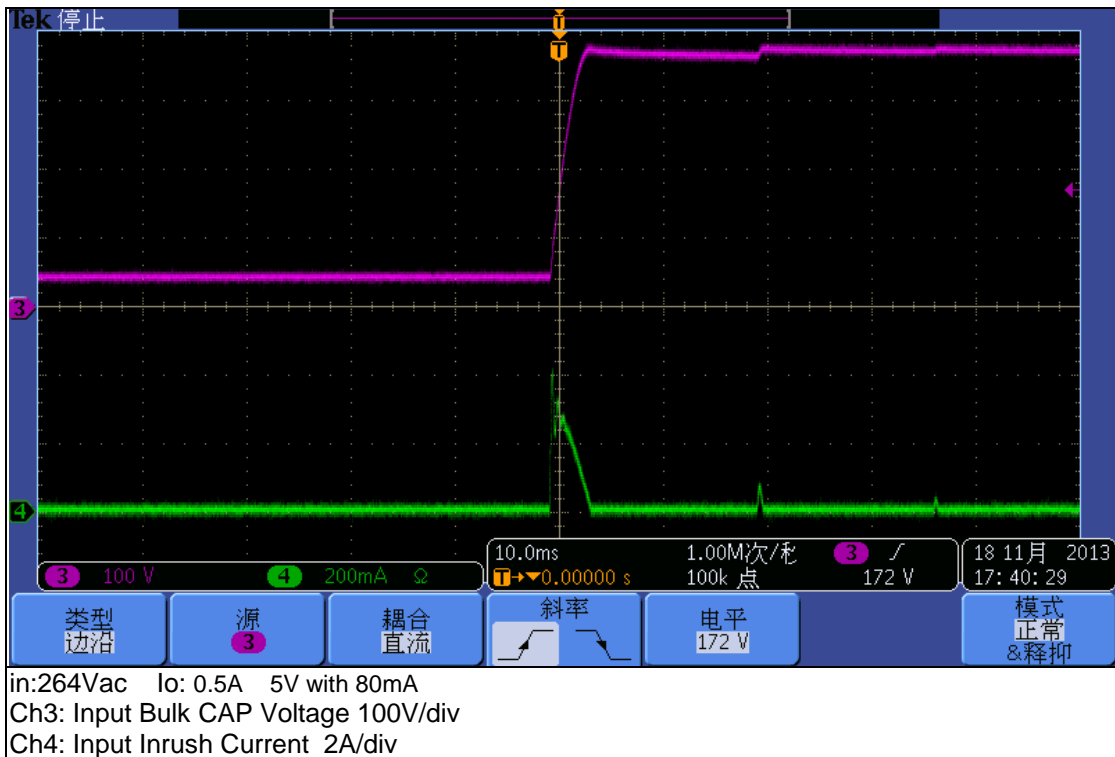
2.2.1 Load and input voltage Vs efficiency curve



2.2.3 Efficiency Vs load curve

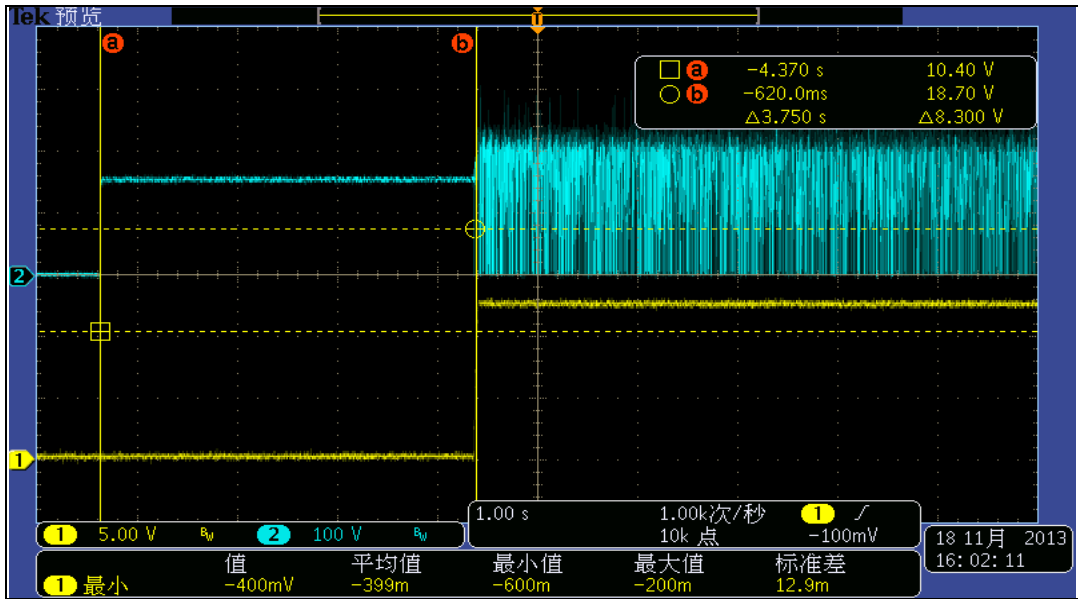


2.2 INPUT INRUSH CURRENT

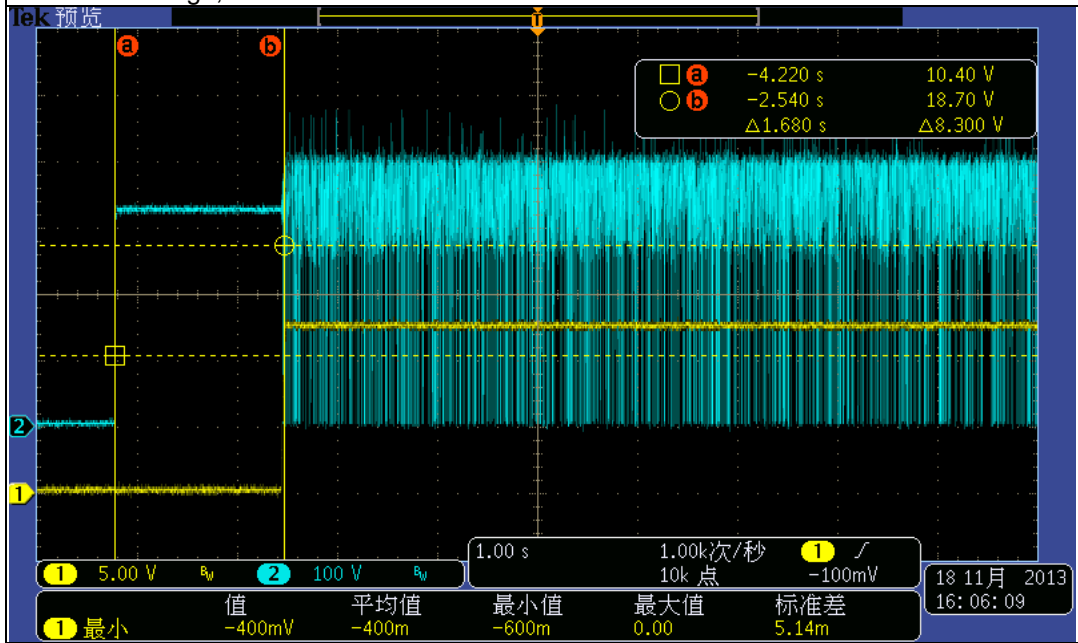


3 OUTPUT CHARACTERISTICS

3.1 STARTUP TIME

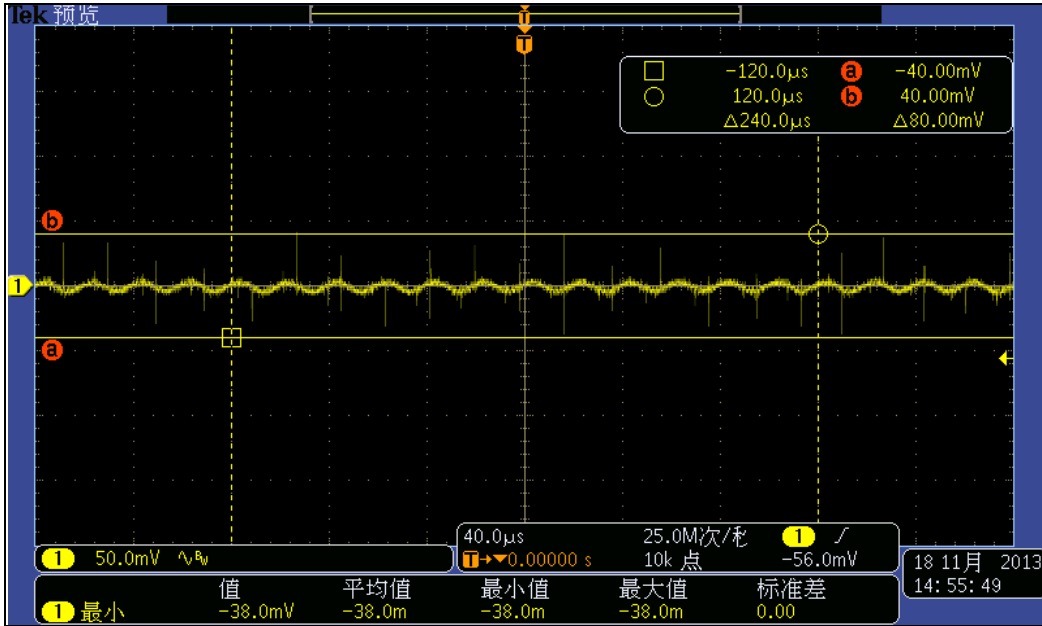


Vin:115Vac Io: 0.5A
Ch1: Output Voltage, 5V/div
Ch2: Vds Voltage, 100V/div

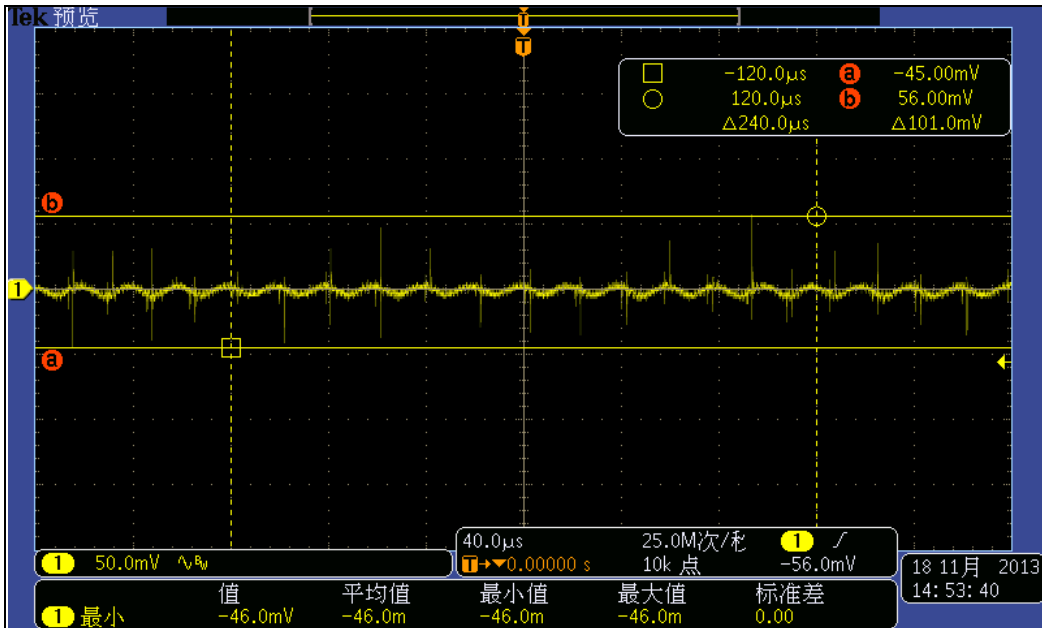


Vin:230Vac Io: 0.5A
Ch1: Output Voltage, 5V/div
Ch2: Vds Voltage, 100V/div

3.2 RIPPLE VOLTAGE

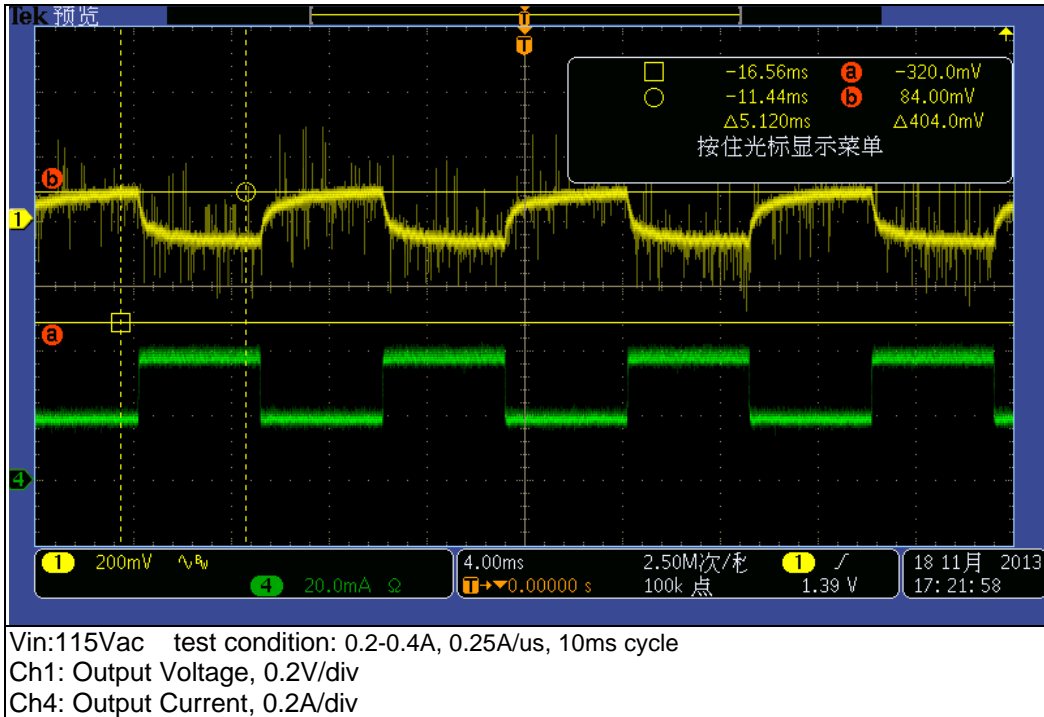


Vin: 115Vac Io: 0.5A 5V with 80mA
Ch1: Output Ripple Voltage, 50mV/div

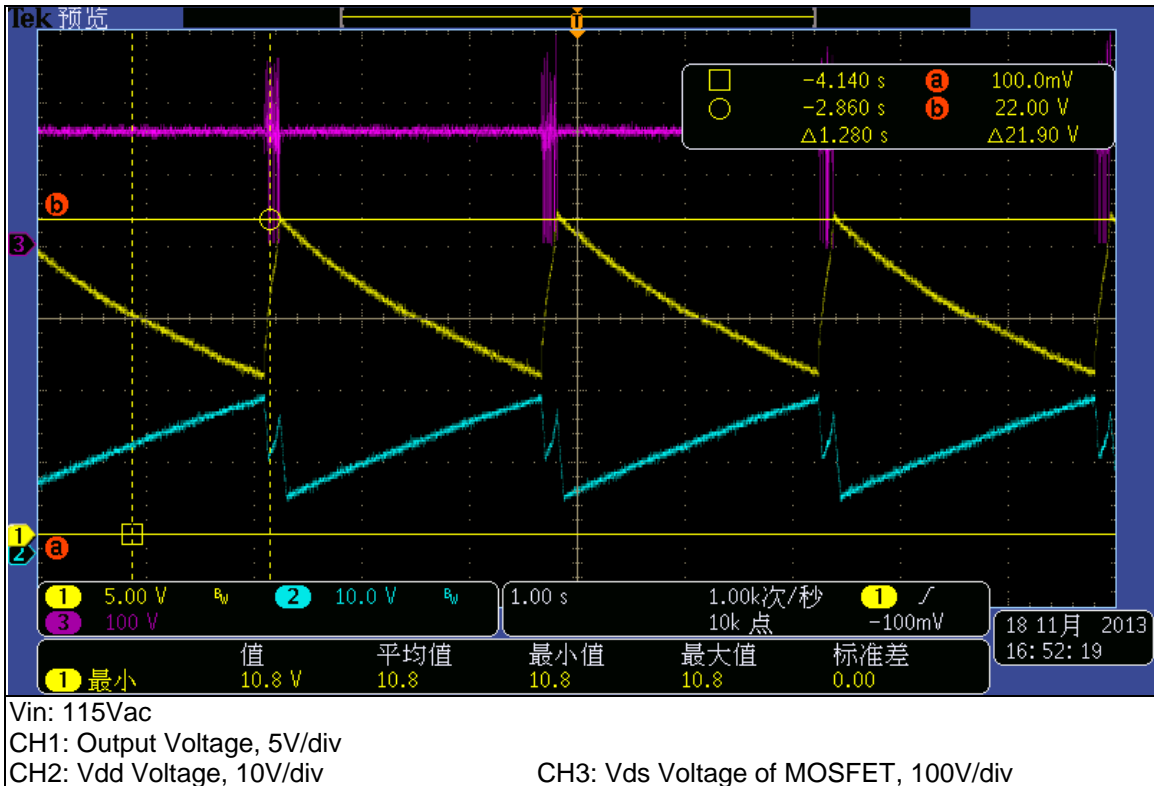


Vin: 230Vac Io: 0.5A 5V with 80mA
Ch4: Output Ripple Voltage, 50mV/div

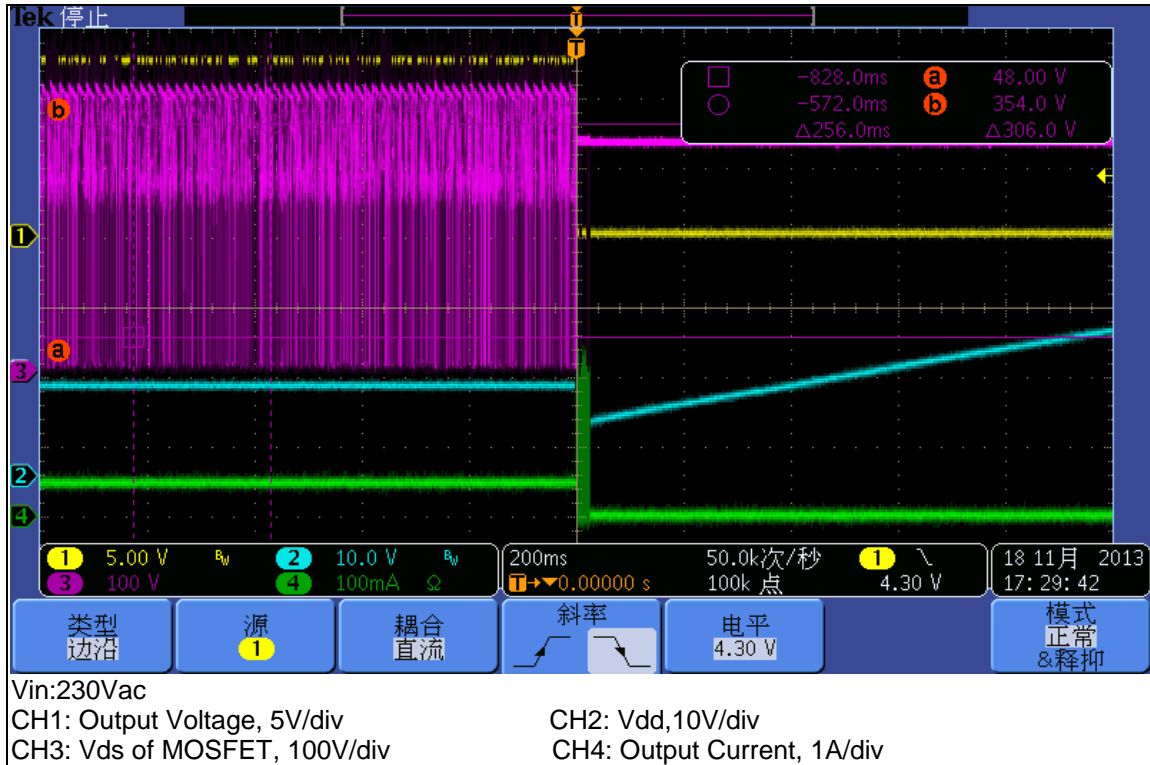
3.3 DYNAMIC RESPONSE



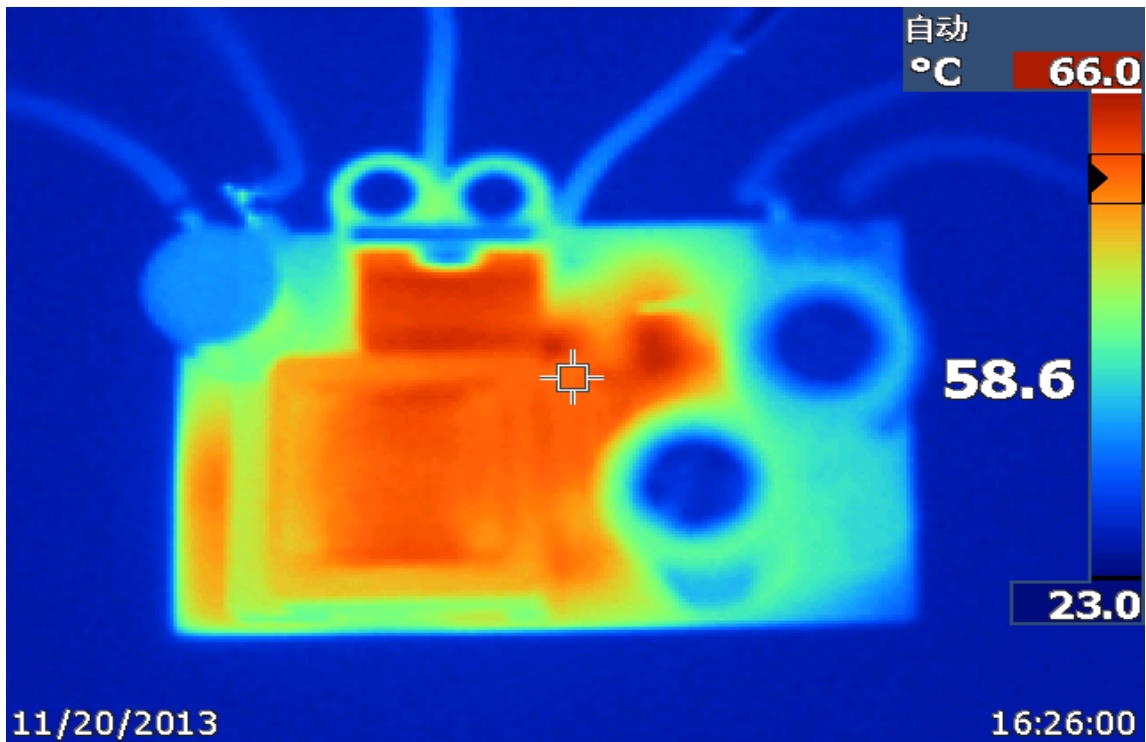
3.4 OUTPUT VOLTAGE PROTECTION



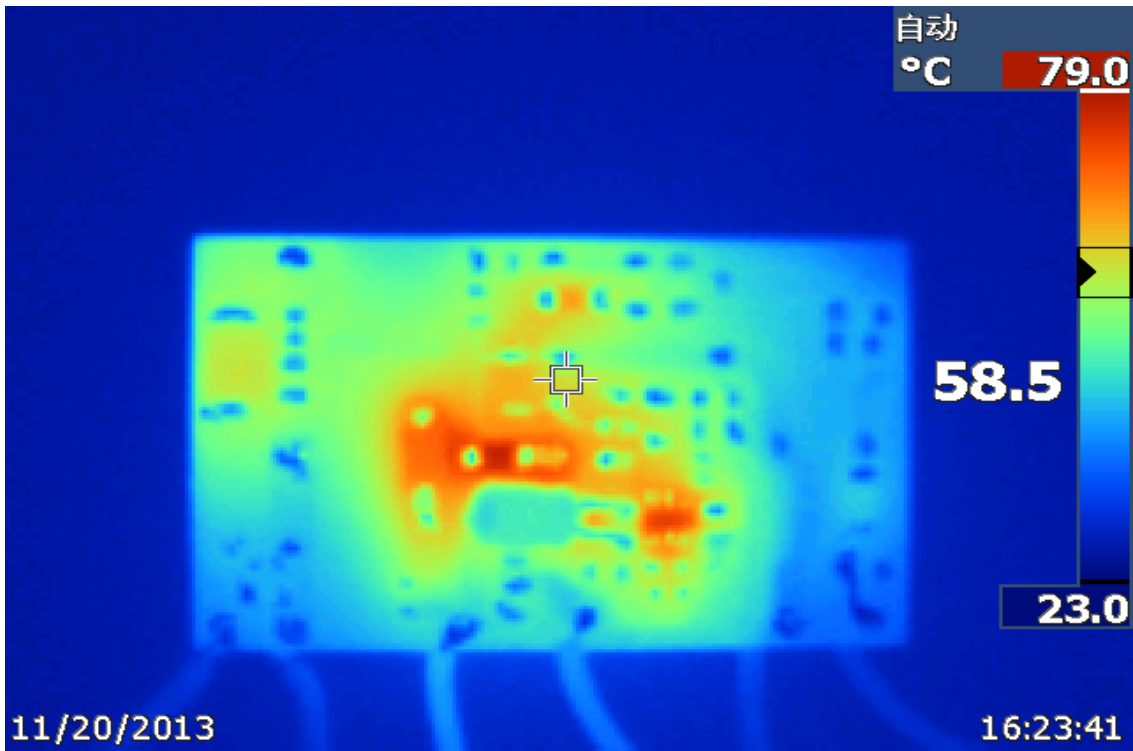
3.5 OUTPUT SHORT PROTECTION



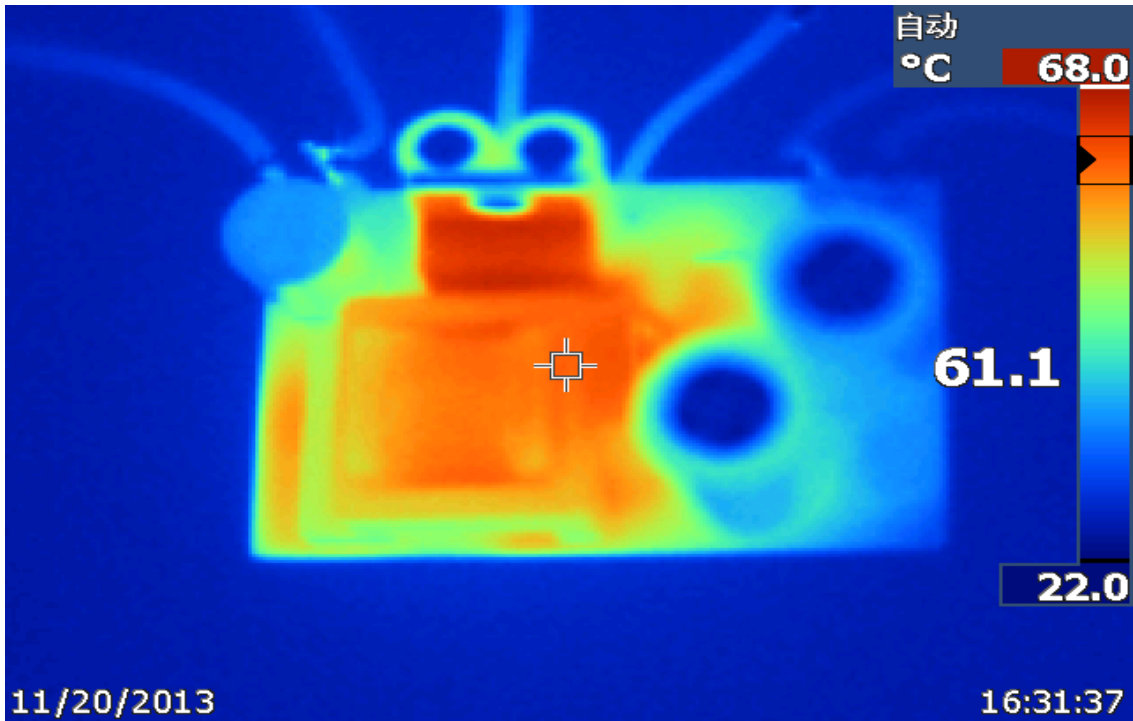
4 THERMAL IMAGE



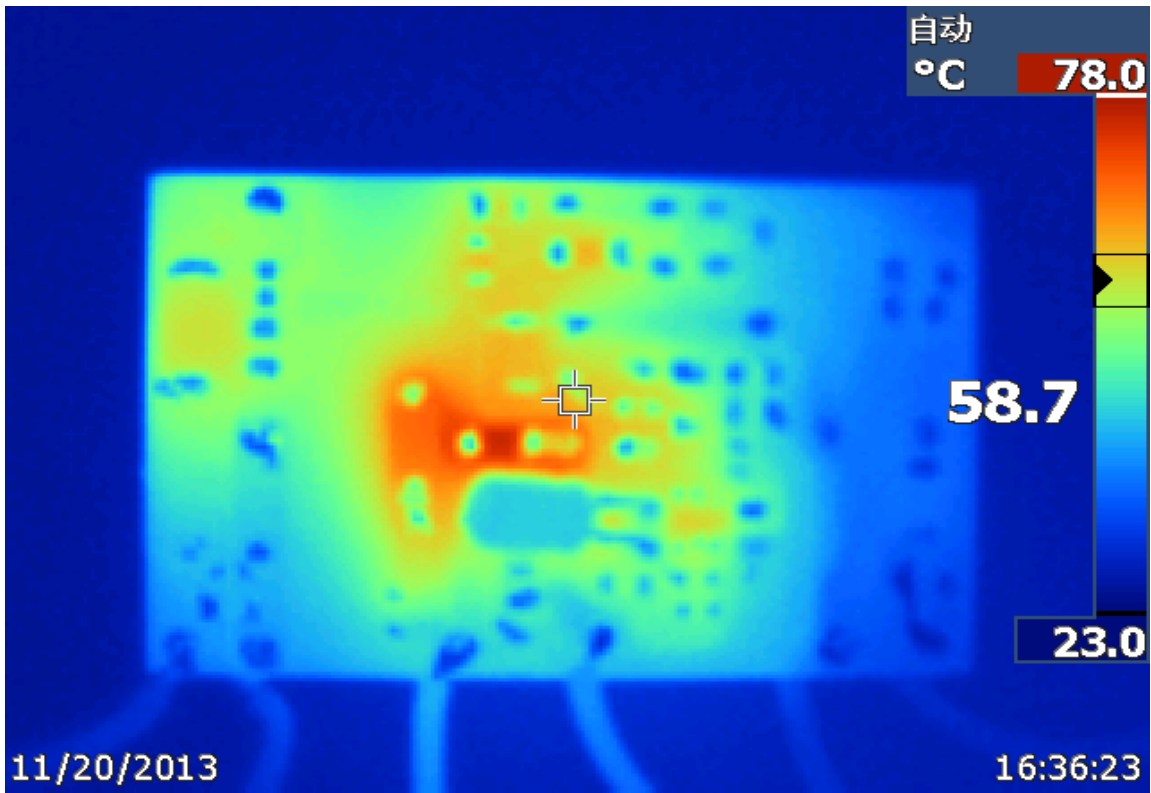
Component side, 90Vac and 12V0.5A, 5V80mA load, Ta=25° C



Soldering side, 115Vac and 12V0.5A, 5V80mA load, $T_a=25^\circ\text{C}$



Component side, 230Vac and 12V0.5A, 5V80mA load, $T_a=25^\circ\text{C}$



Soldering side, 230Vac and 12V0.5A, 5V80mA load, $T_a=25^\circ\text{C}$

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