



Texas Instruments

PMP4438 Test Procedure

China Power Reference Design

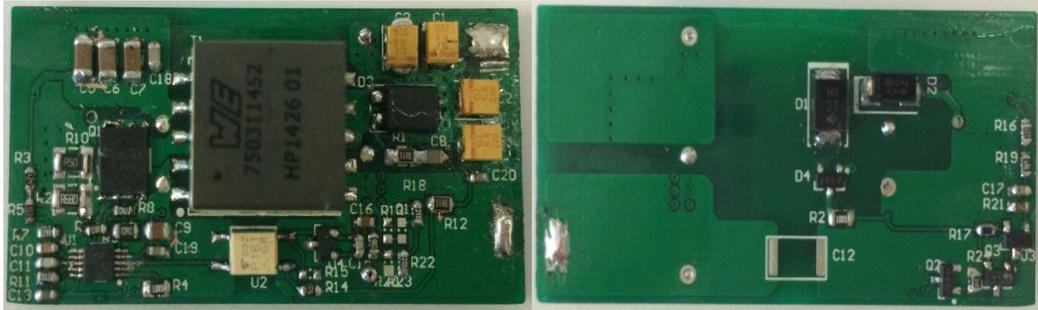
REV A

24/08/2014

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4438, this power module uses LM5020 for 5V/2A power supply with size 51mmx26mmx12.5mm. The below photo shows this demo board.



1.2 REFERENCE DOCUMENTATION

Schematic PMP4438_SCH.PDF

Assembly PMP4438_PCB.PDF

BOM

Promotion tools

1.3 TEST EQUIPMENTS

Power-meter: YOKOGAWA WT210

Multi-meter(current): Fluke 8845A

Multi-meter(voltage): Fluke 187

DC Source: Chroma 62102

Electronic load: Chroma 63110A module

Testing demo board

2 INPUT CHARACTERISTICS

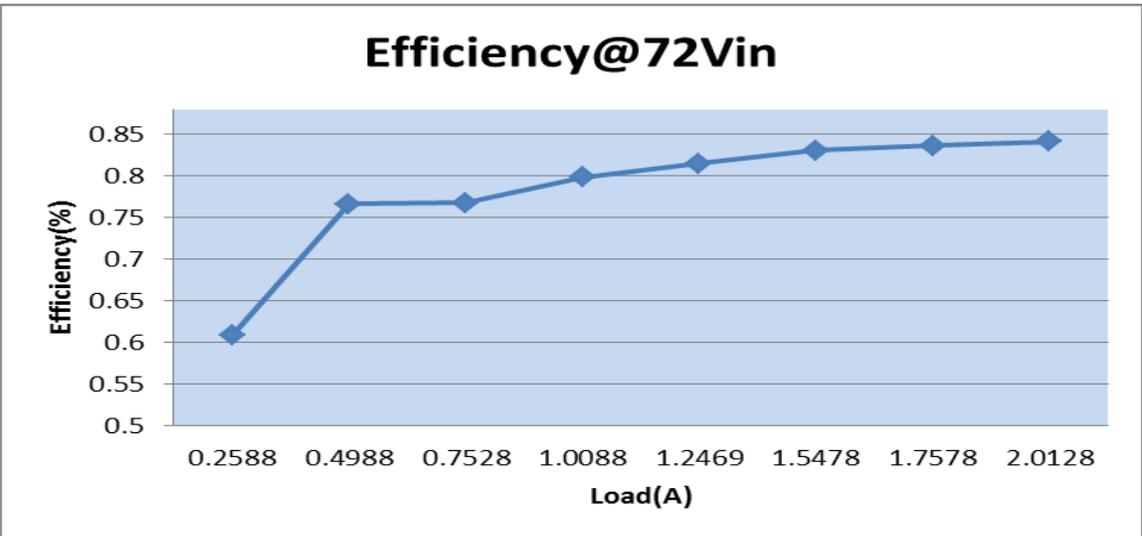
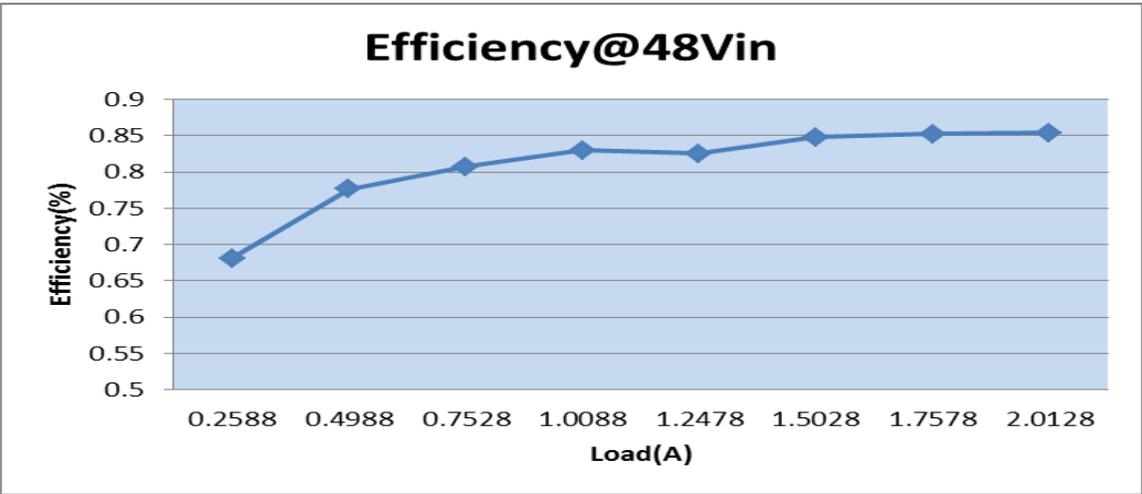
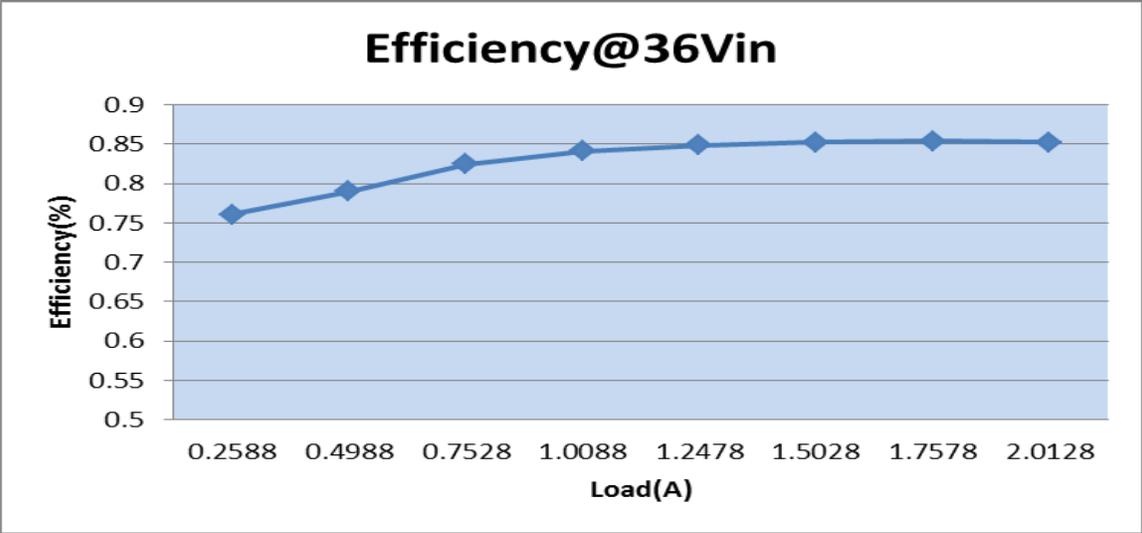
2.1 EFFICIENCY DATA

Vin(V)	Iin(A)	Vo(V)	Io(A)	Efficiency(%)
36.08	0.0476	5.0488	0.2588	76.08
36.093	0.0883	5.0471	0.4988	78.99
36.083	0.1277	5.0465	0.7528	82.45
36.073	0.1677	5.0451	1.0088	84.13
36.063	0.2056	5.0439	1.2478	84.88
36.054	0.2465	5.0429	1.5028	85.27
36.093	0.2874	5.0412	1.7578	85.43
36.083	0.3296	5.0375	2.0128	85.26

Vin(V)	Iin(A)	Vo(V)	Io(A)	Efficiency(%)
48.069	0.0399	5.0497	0.2588	68.14
48.063	0.0675	5.0488	0.4988	77.62
48.056	0.0979	5.0480	0.7528	80.77
48.048	0.1277	5.0469	1.0088	82.98
48.042	0.1588	5.0460	1.2478	82.53
48.034	0.1861	5.0457	1.5028	84.83
48.027	0.2166	5.0438	1.7578	85.23
48.019	0.2475	5.0418	2.0128	85.39

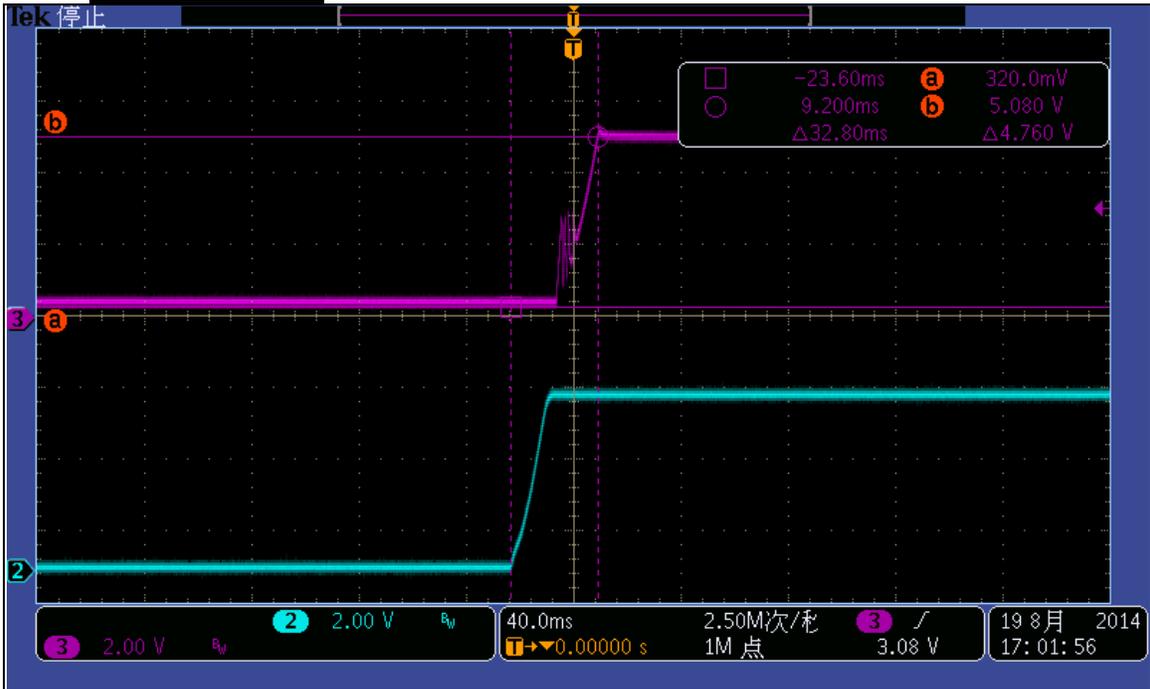
Vin(V)	Iin(A)	Vo(V)	Io(A)	Efficiency(%)
72.06	0.0298	5.0507	0.2588	60.87
72.06	0.0456	5.0501	0.4988	76.66
72.06	0.0687	5.0499	0.7528	76.79
72.05	0.0885	5.0489	1.0088	79.88
72.04	0.1072	5.0484	1.2469	81.51
72.09	0.1305	5.0469	1.5478	83.03
72.09	0.1471	5.0452	1.7578	83.63
72.08	0.1674	5.0441	2.0128	84.14

2.2 LOAD AND INPUT VOLTAGE VS LOAD CURRENT

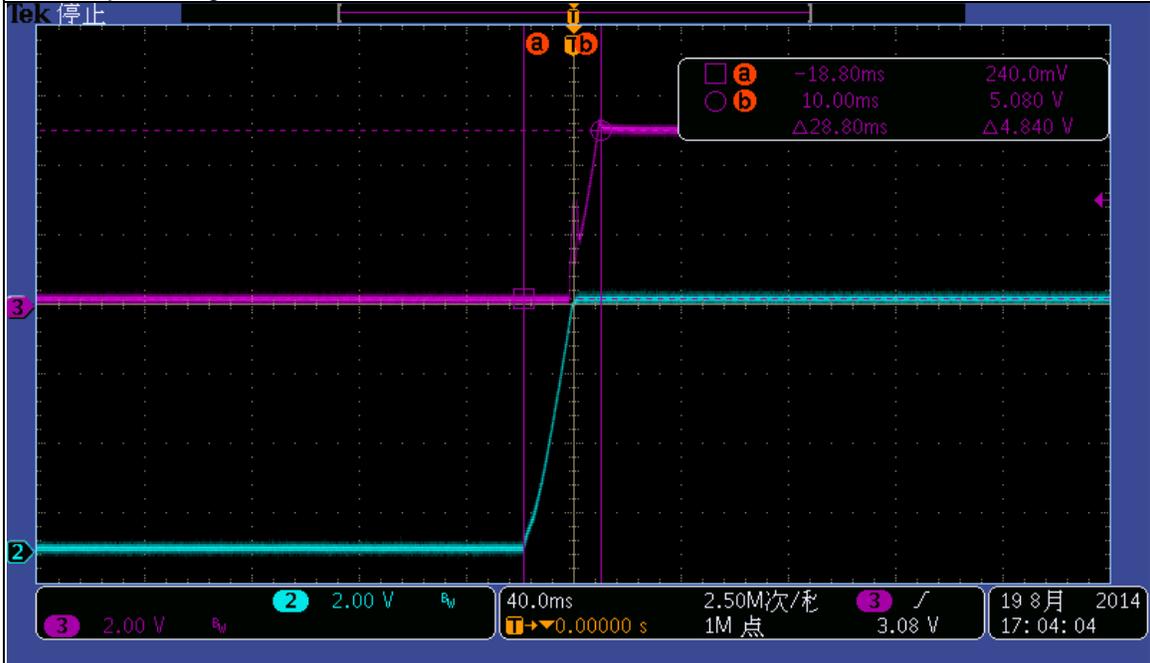


3 OUTPUT CHARACTERISTICS

3.1 STARTUP TIME

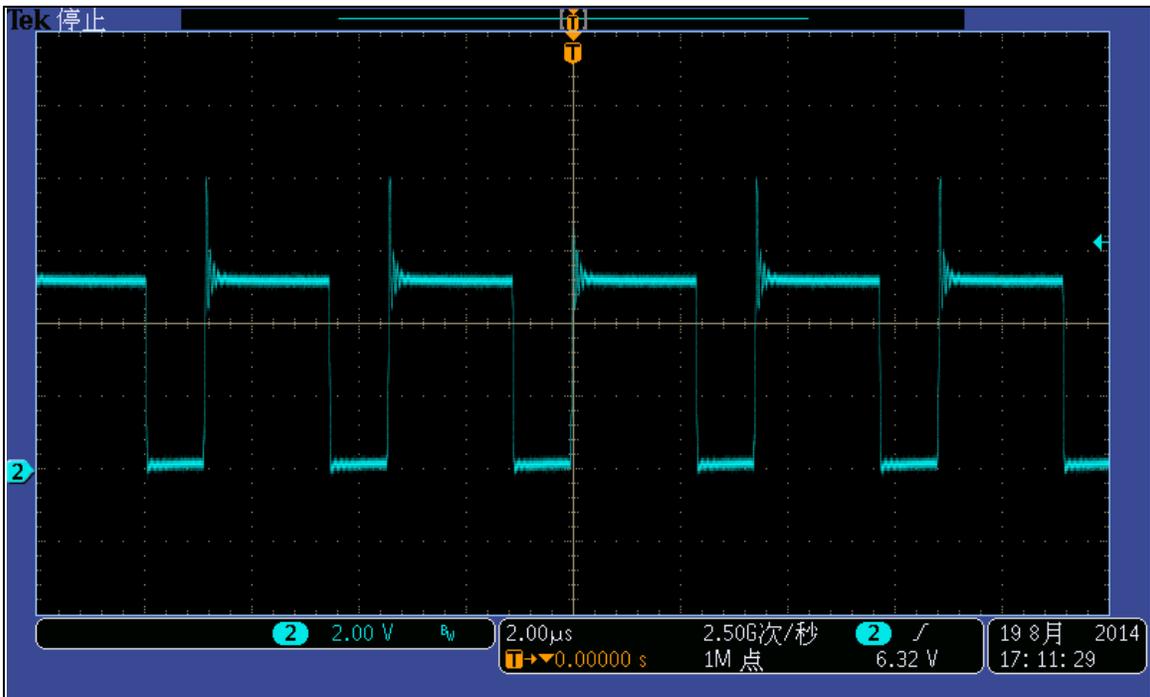


Vin:36Vdc Io: 2A
 Ch2: input voltage, 20V/div
 Ch3: output voltage, 2V/div

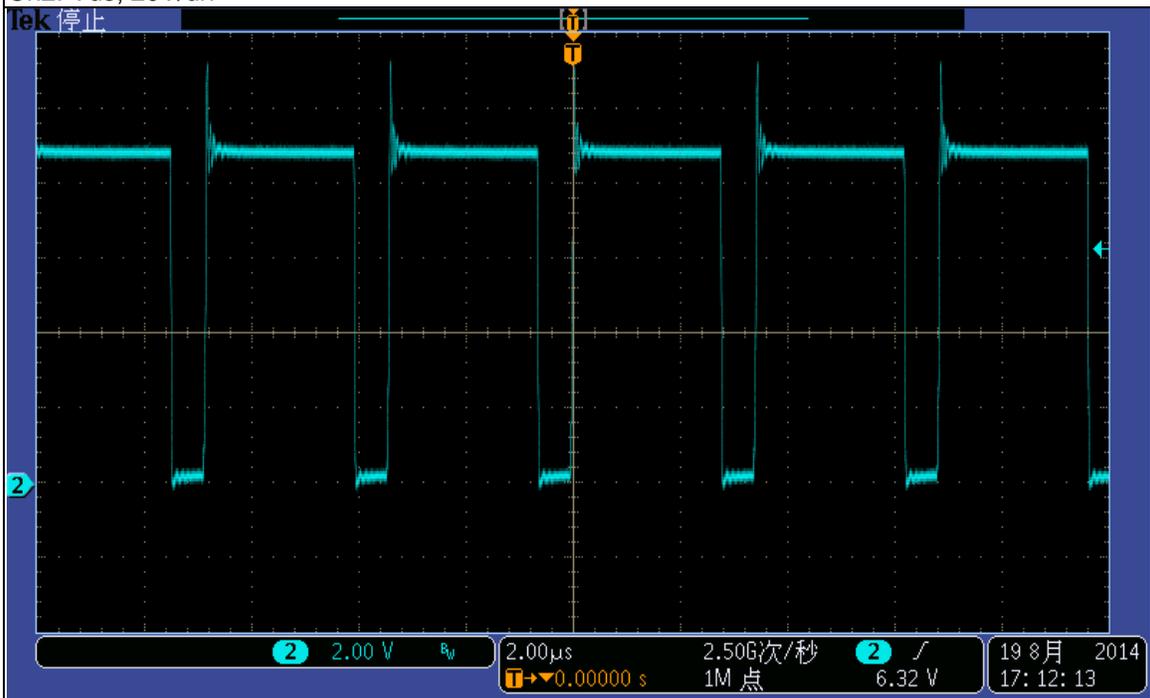


Vin:72Vdc Io: 2A
 Ch2: input voltage, 20V/div
 Ch3: output voltage, 2V/div

3.2 MOSFET VOLTAGE STRESS

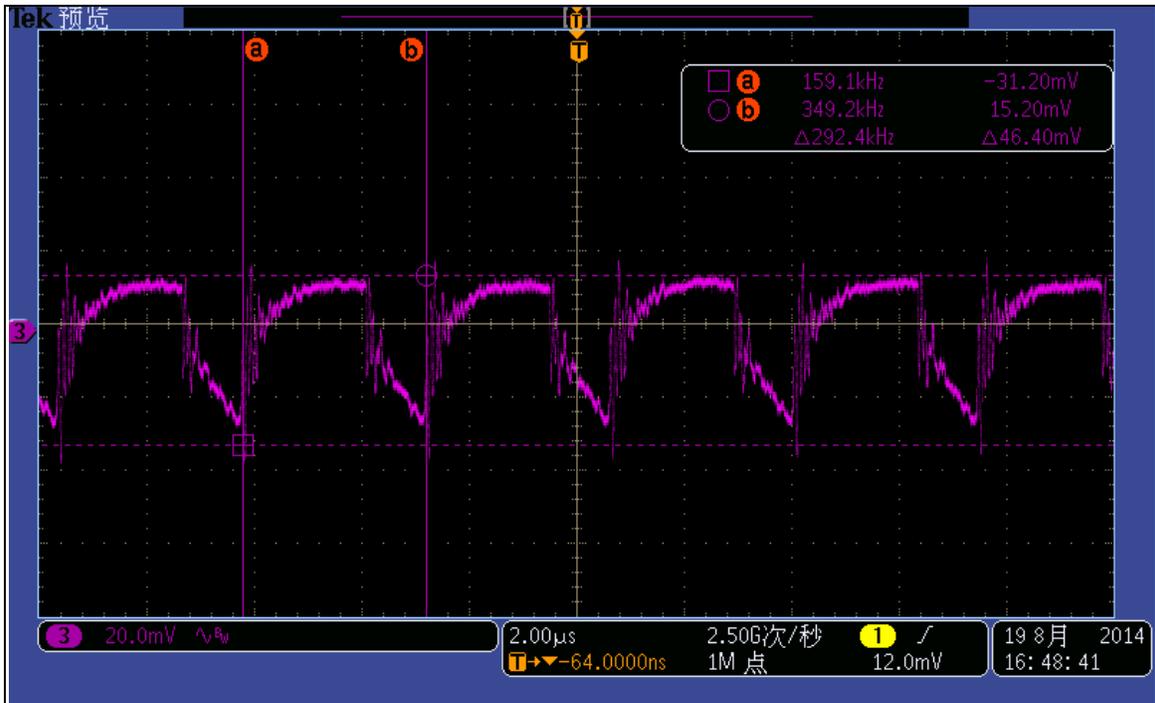


Vin:36Vdc Io: 2A
Ch2: Vds, 20V/div



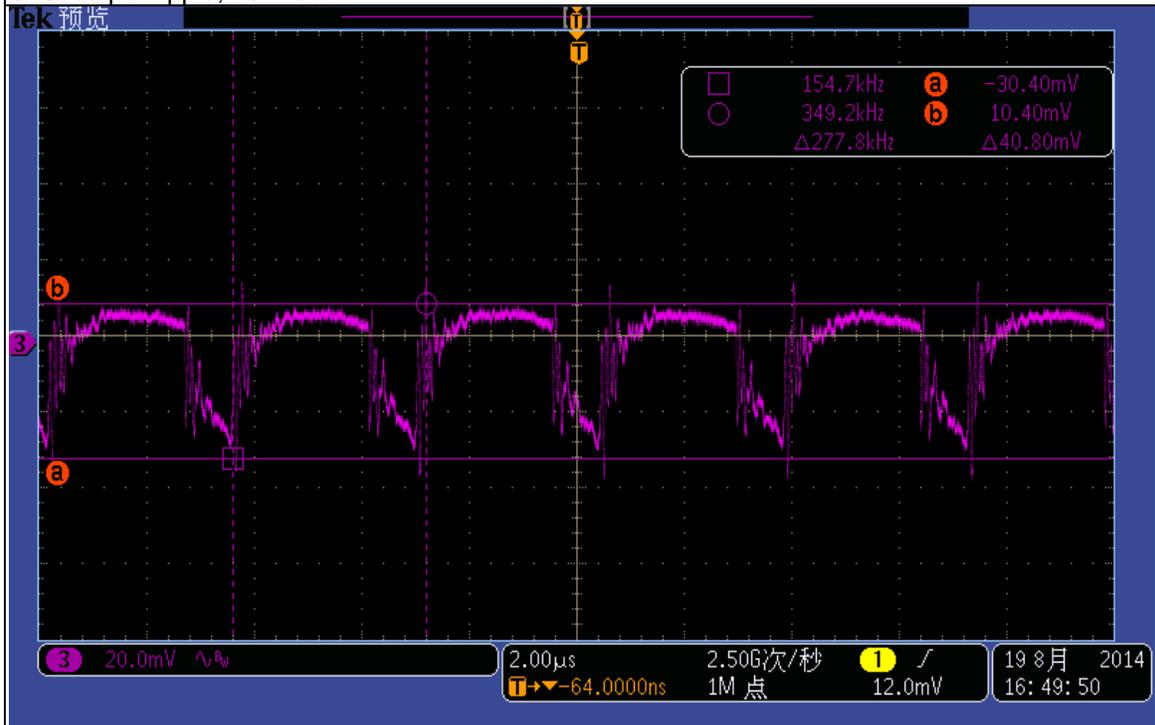
Vin:72Vdc Io: 2A
Ch2: Vds, 20V/div

3.3 RIPPLE VOLTAGE



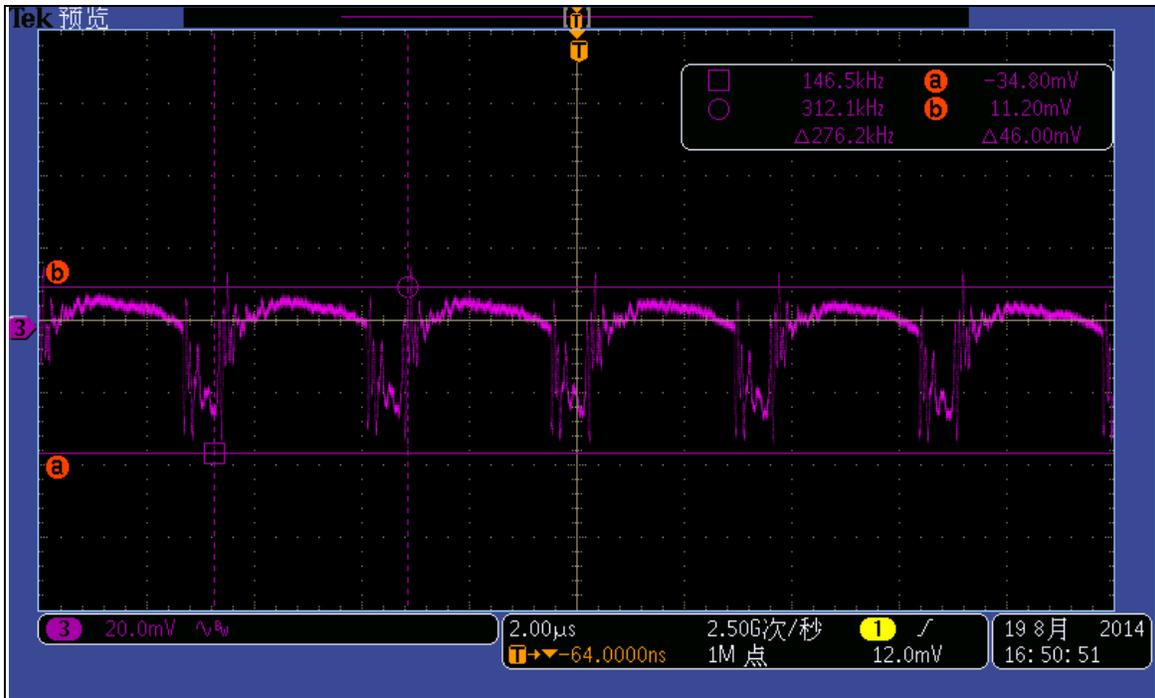
Vin:36Vdc Io: 2A

Ch3: output ripple, 20mV/div



Vin:48Vdc Io: 2A

Ch3: output ripple, 20mV/div



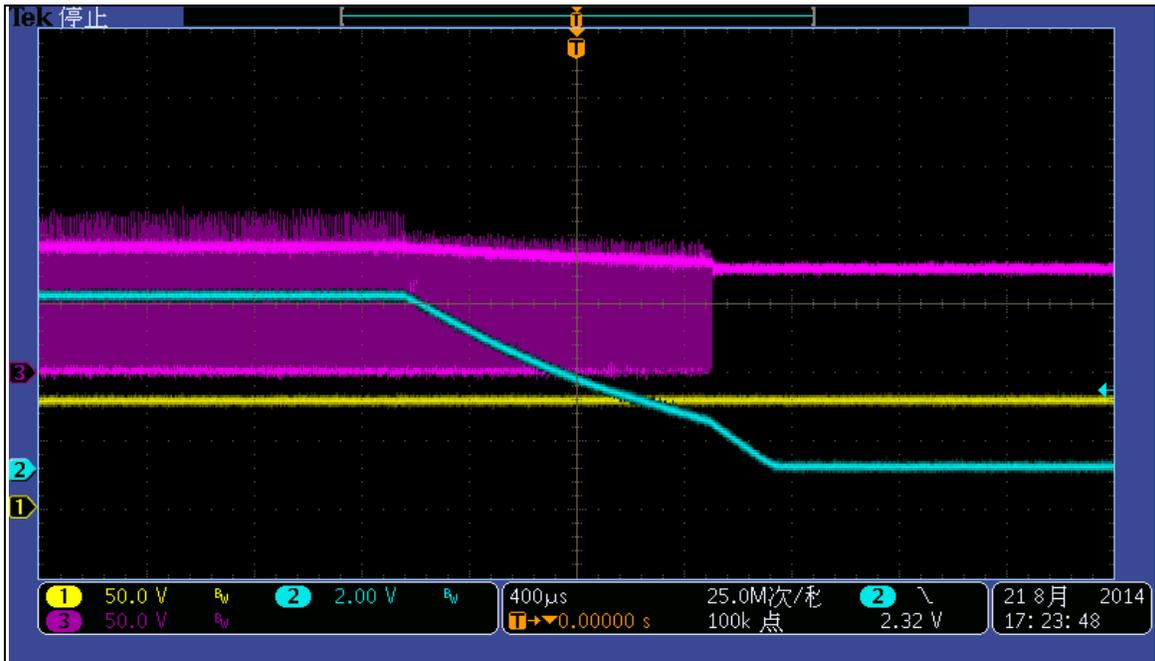
Vin:72Vdc Io: 2A
Ch3: output ripple, 20mV/div

3.4 DYNAMIC RESPONSE

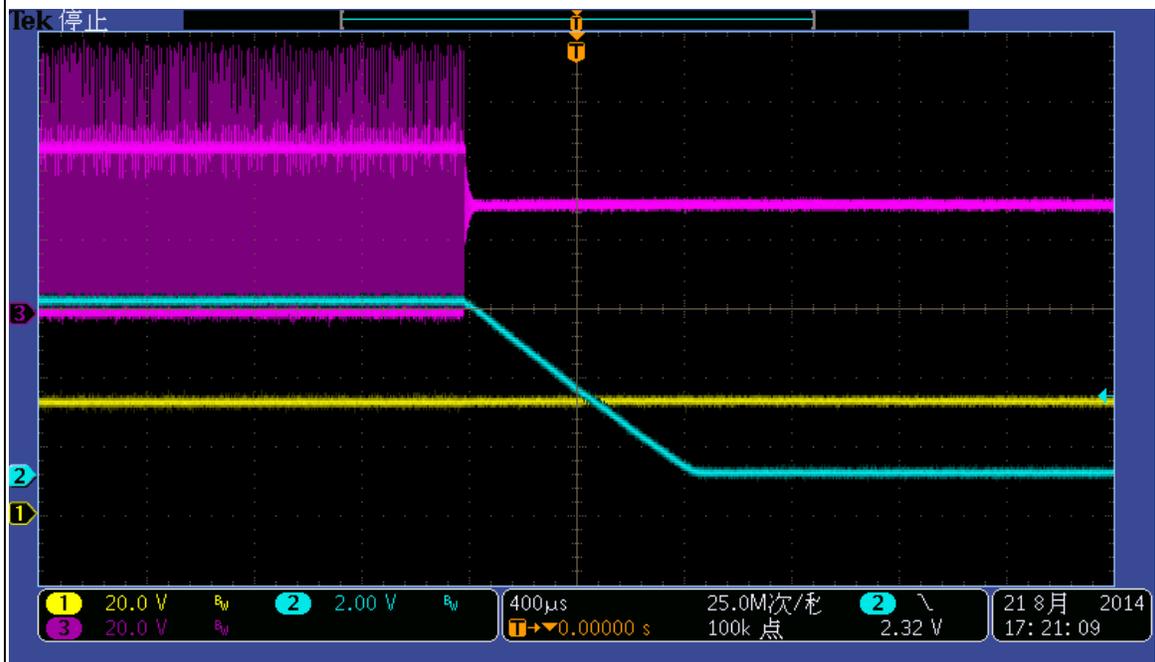


Vin:48Vdc test condition: 0-0.5A, 0.4A/us, 10ms cycle
Ch4: output ripple voltage, 50mV/div

3.5 INPUT VOLTAGE PROTECTION

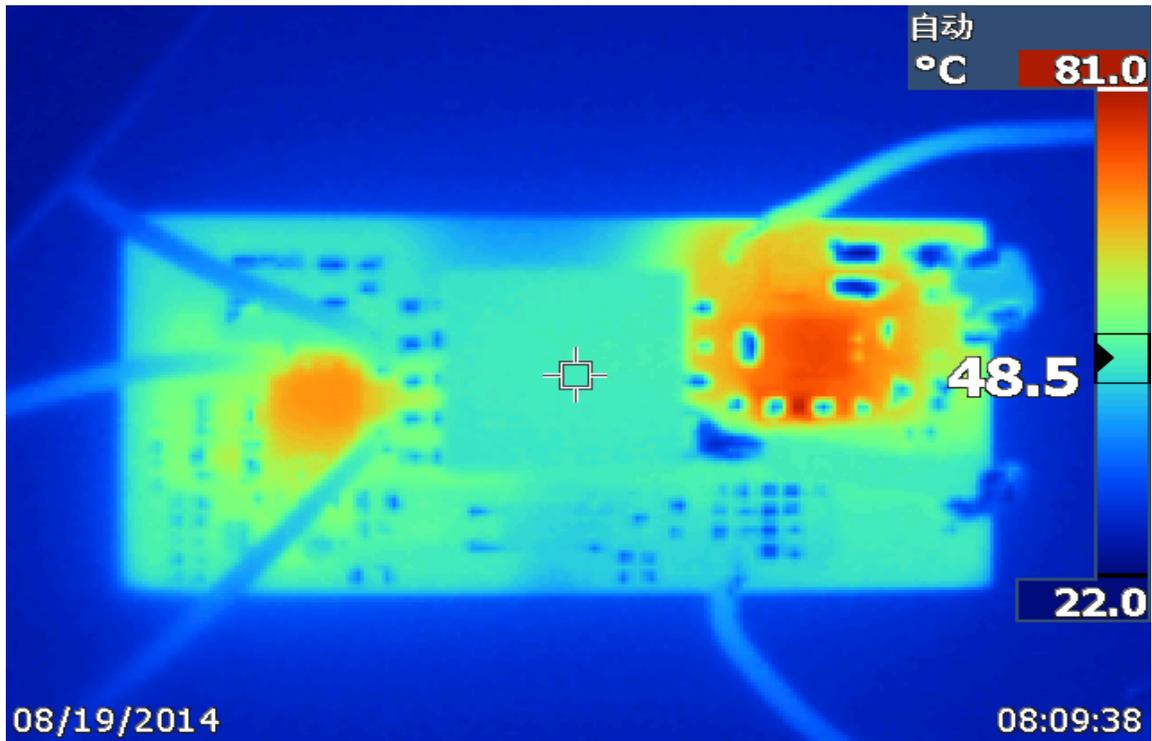


Vin: Vdc OVP: 74V
CH1: input voltage, 50V/div
CH2: output voltage, 2V/div
CH3: Vds voltage of MOSFET, 50V/div

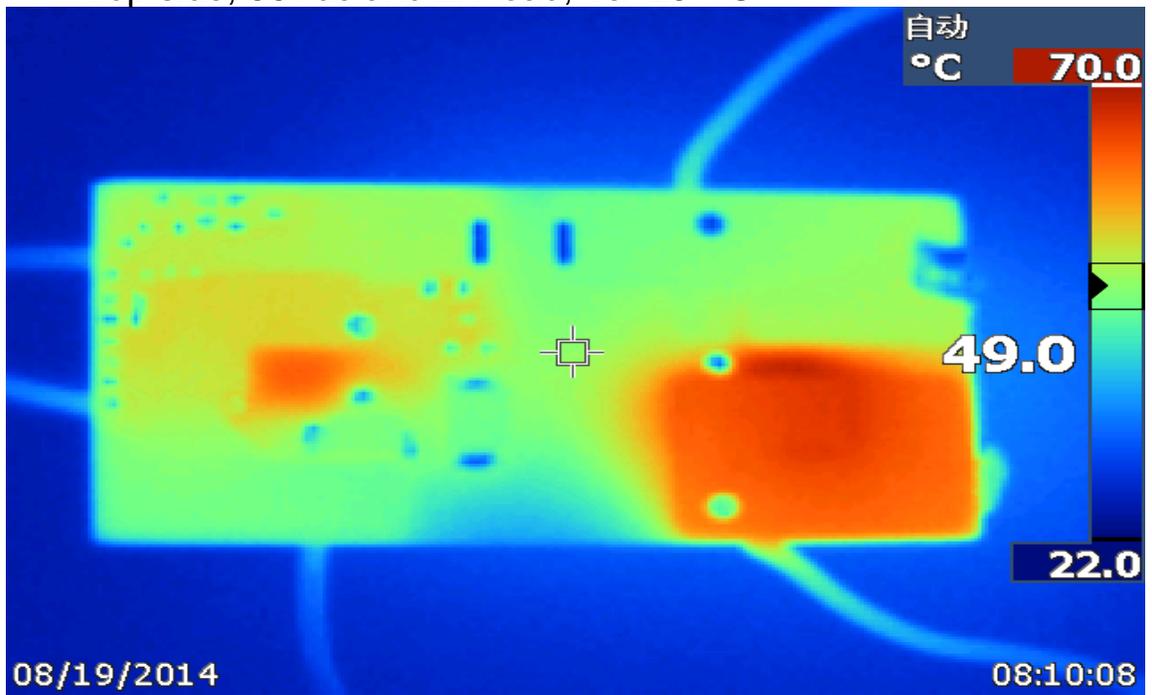


Vin: Vdc UVP: 34V
CH1: input voltage, 50V/div
CH2: output voltage, 2V/div
CH3: Vds voltage of MOSFET, 50V/div

4 THERMAL IMAGE



Top side, 36Vdc and 2A load, $T_a=25^\circ\text{C}$



Bottom side, 36Vac and 2A load, $T_a=25^\circ\text{C}$

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](https://www.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
Copyright © 2021, Texas Instruments Incorporated