Texas Instruments

PMP4435 REVA Test Procedure

China Power Reference Design

REVA

09/15/2015

1 General

1.1 PURPOSE

Provide the detailed data for evaluating and verifying the PMP4435.
The PMP4435 is a single output DC-DC converter with standard 1/8 Brick size, GaN Mosfets and full digital controlling configuration (UCD3138). It delivers up to 25A output current with 12V output voltage. The converter could provide high efficiency more than 96% and good performance, which makes it an ideal choice for bus converter.
For testing applications, a heat sink and sufficient airflow cooling is required.

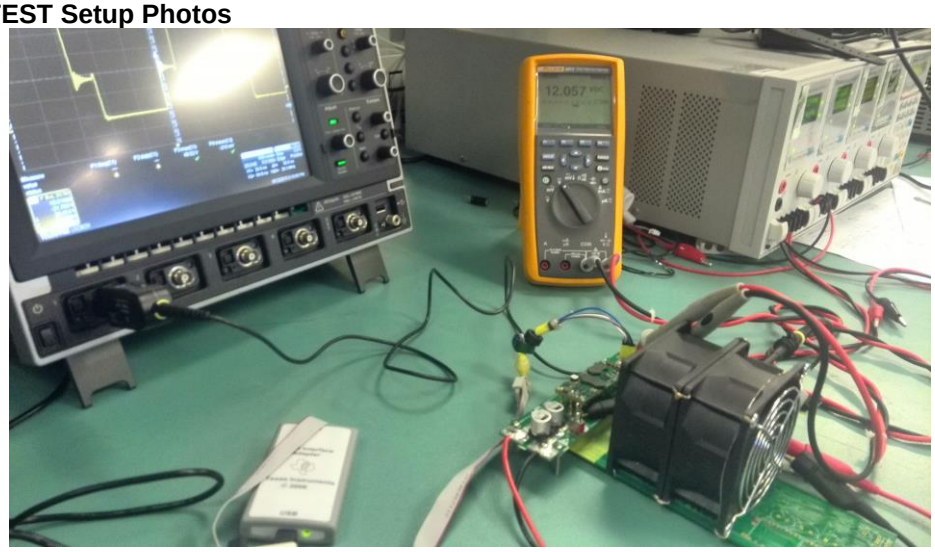
1.2 REFERENCE DOCUMENTATION

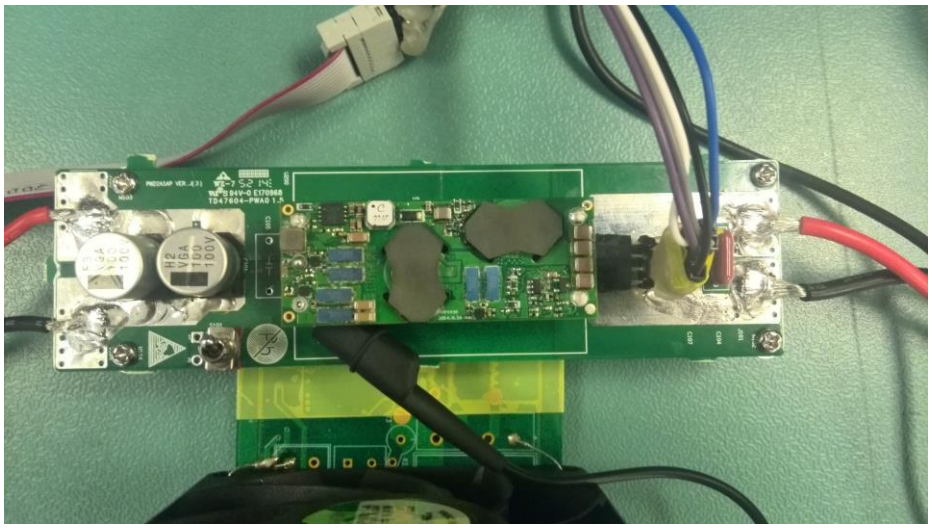
Schematic PMP4435_REVA_SCH.PDF
Assembly PMP4435_REVA_PCB.PDF
BOM

1.3 TEST EQUIPMENTS

Multi-meter: Fluke 187
DC Source: LAMBDA
E-Load: Chroma 6314A
Ambient Temperature at 25DegC, convectional cooling

1.4 TEST Setup Photos





2 INPUT & Output CHARACTERISTICS

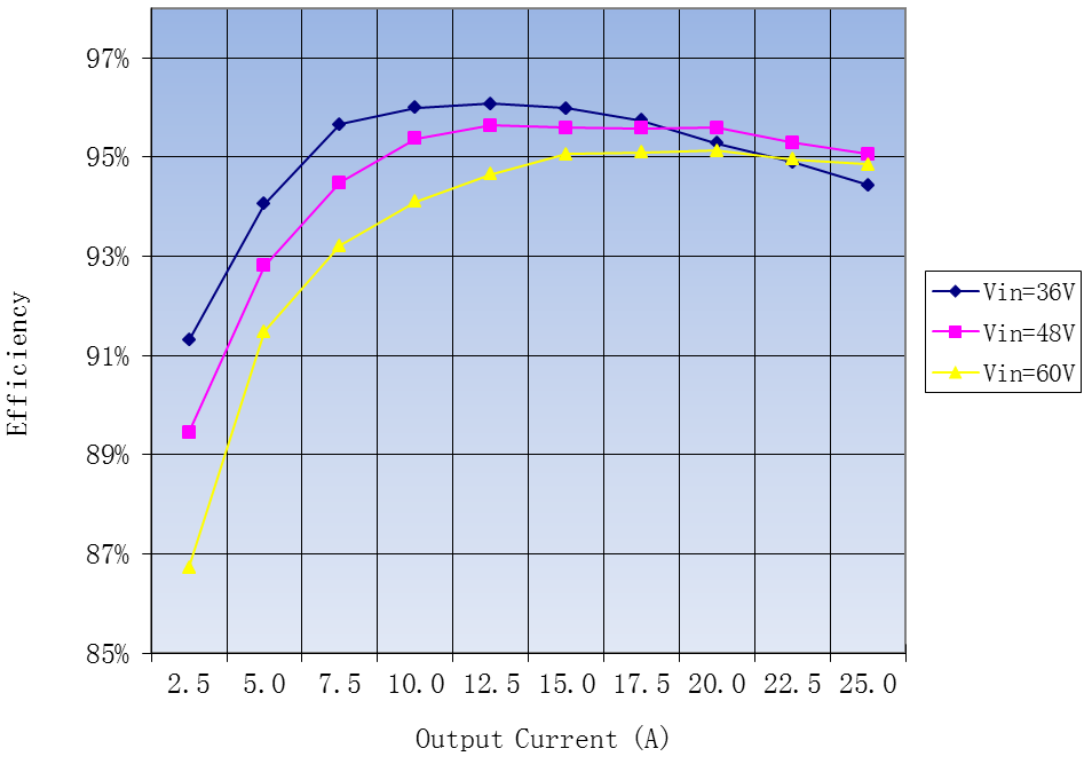
2.1: Efficiency & Regulation

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
36V Input				
36.41	0.08	11.831	0.0	0.0%
36.39	0.88	11.696	2.5	91.3%
36.36	1.69	11.56	5.0	94.1%
36.33	2.47	11.446	7.5	95.7%
36.30	3.26	11.361	10.0	96.0%
36.27	4.05	11.291	12.5	96.1%
36.24	4.84	11.224	15.0	96.0%
36.22	5.63	11.155	17.5	95.7%
36.19	6.43	11.084	20.0	95.3%
36.16	7.22	11.01	22.5	94.9%
36.13	8.01	10.933	25.0	94.4%

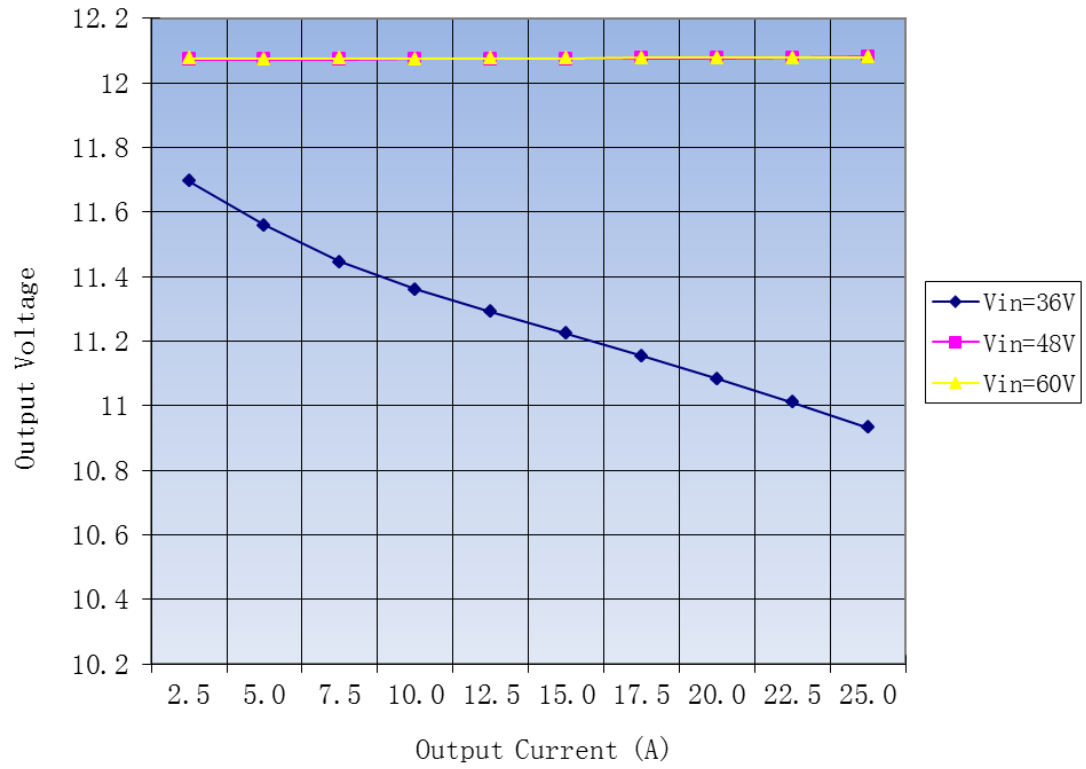
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
48V Input				
48.22	0.07	12.07	0.0	0.0%
48.20	0.70	12.073	2.5	89.4%
48.18	1.35	12.073	5.0	92.8%
48.16	1.99	12.073	7.5	94.5%
48.14	2.63	12.074	10.0	95.4%
48.11	3.28	12.074	12.5	95.6%
48.09	3.94	12.075	15.0	95.6%
48.06	4.60	12.076	17.5	95.6%
48.04	5.26	12.077	20.0	95.6%
48.02	5.94	12.079	22.5	95.3%
47.99	6.62	12.081	25.0	95.1%

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
60V Input				
60.03	0.07	12.076	0.0	0.0%
60.02	0.58	12.076	2.5	86.7%
60.00	1.10	12.075	5.0	91.5%
59.98	1.62	12.076	7.5	93.2%
59.96	2.14	12.075	10.0	94.1%
59.95	2.66	12.076	12.5	94.7%
59.93	3.18	12.077	15.0	95.1%
59.91	3.71	12.078	17.5	95.1%
59.89	4.24	12.078	20.0	95.1%
59.87	4.78	12.078	22.5	95.0%
59.85	5.32	12.08	25.0	94.8%

Efficiency vs Output Current @350kHz



Regulation vs Output Current @350kHz



2.2: Start Up Waveforms & Output Ripple

48V Input with Full Load & No Load

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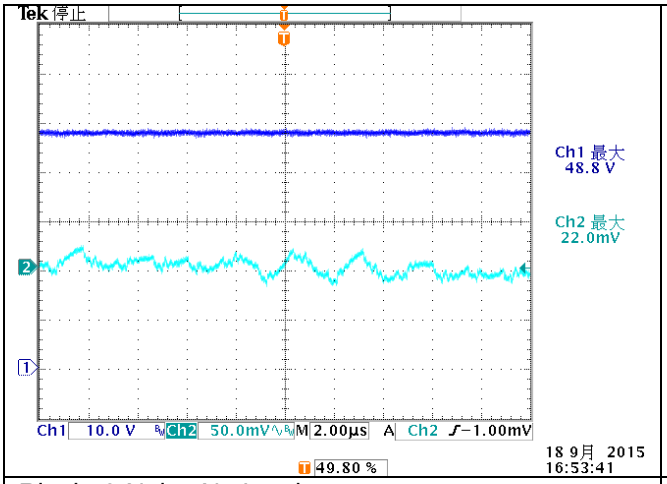
<td> 
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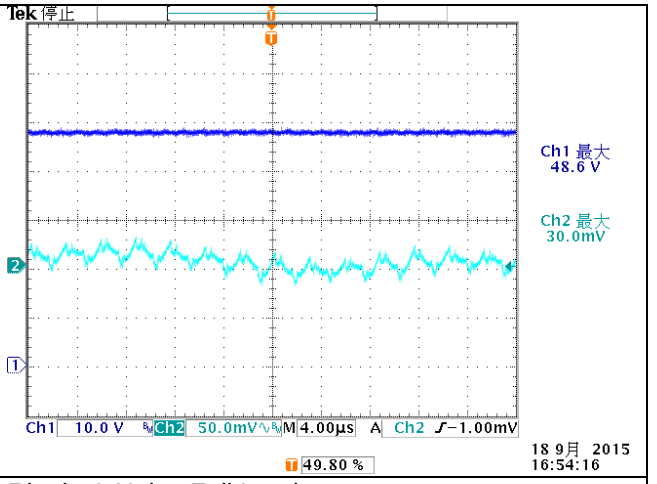
<td> 
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<tr>
<td>Ripple & Noise No Load
CH1: Input Voltage 10V/Div
CH2: Output Voltage 5V/Div</td>
<td>Ripple & Noise Full Load
CH1: Input Voltage 10V/Div
CH2: Output Voltage 5V/Div</td>
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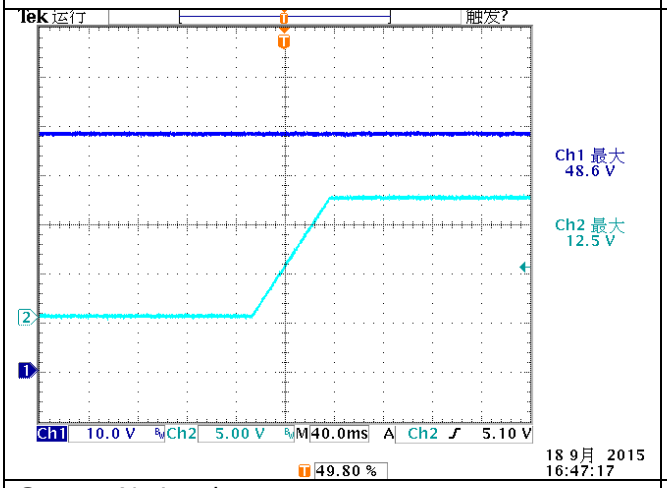
<td> 
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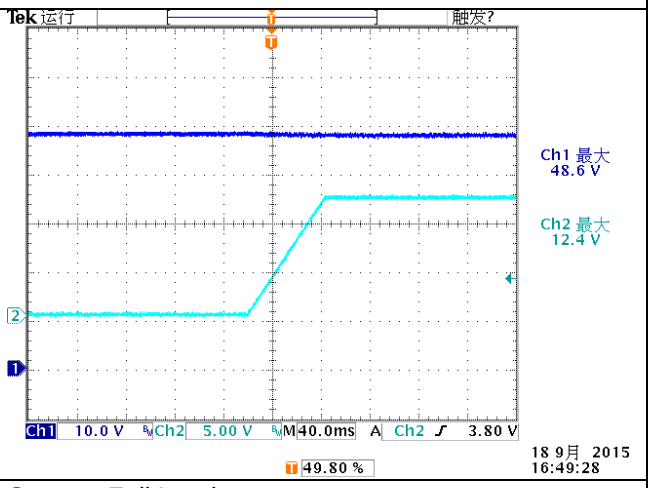
<td> 
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<tr>
<td>Start up No Load
CH1: Input Voltage 10V/Div
CH2: Output Voltage 5V/Div</td>
<td>Start up Full Load
CH1: Input Voltage 10V/Div
CH2: Output Voltage 5V/Div</td>
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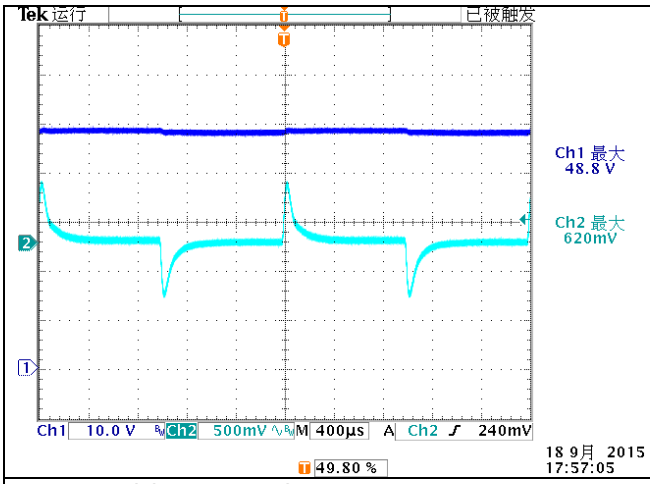
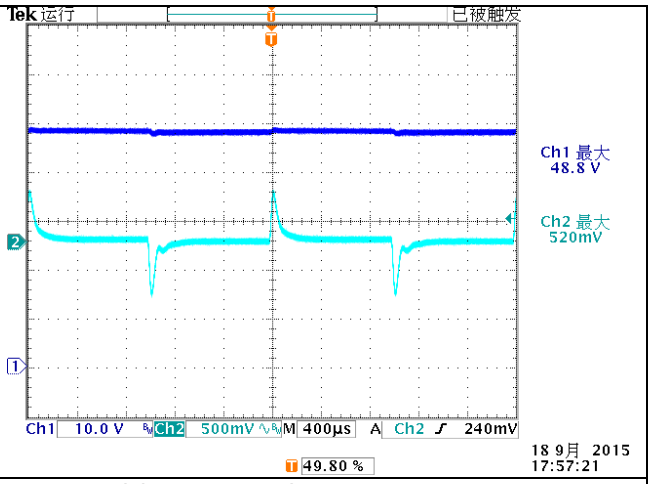
2.3: Dynamic Load Waveforms

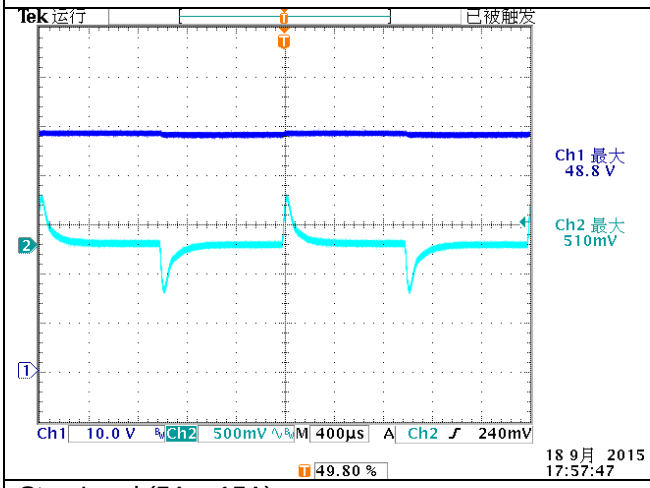
48V Input



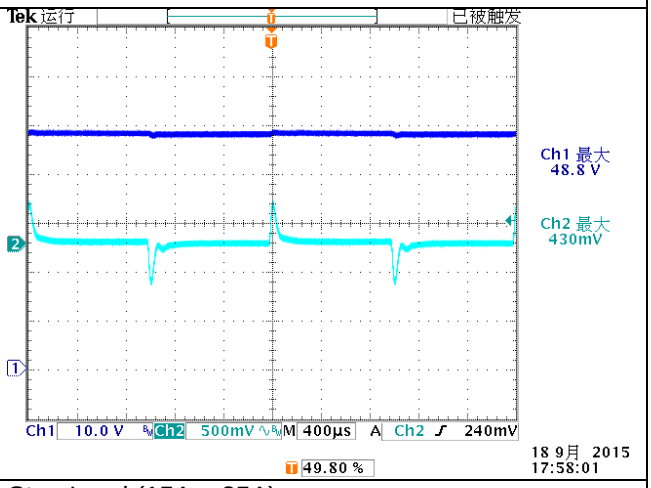
Step Load (0A – 12.5A)
CH1: Output Voltage 500mV/Div
CH2: Input Voltage 10V/Div



Step Load (12.5A– 25A)
CH1: Output Voltage 500mV/Div
CH2: Input Voltage 10V/Div



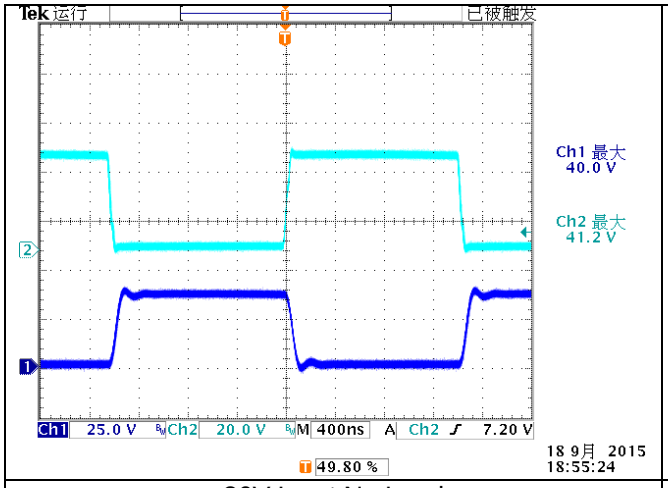
Step Load (5A – 15A)
CH1: Output Voltage 500mV/Div
CH2: Input Voltage 10V/Div



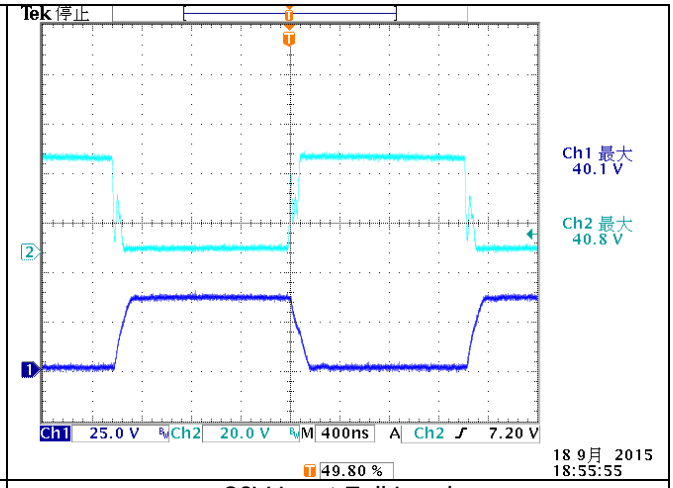
Step Load (15A – 25A)
CH1: Output Voltage 500mV/Div
CH2: Input Voltage 10V/Div

2.4: Operating waveform (Primary MOSFET VDS)

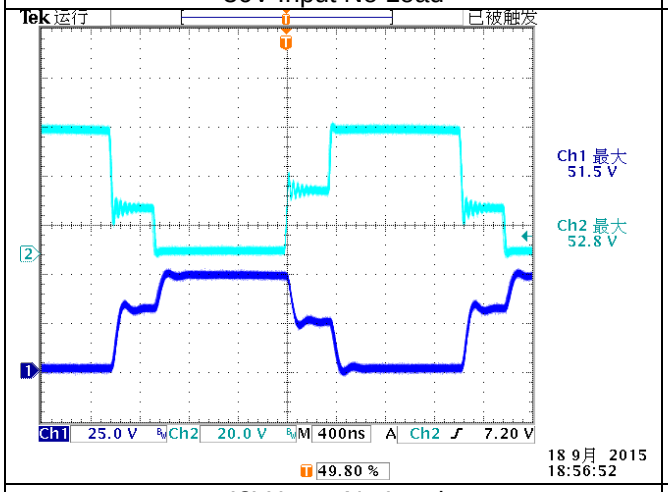
CH1: High Side MOSFET VDS 25V/Div
CH2: Low Side MOSFET VDS 20V/Div



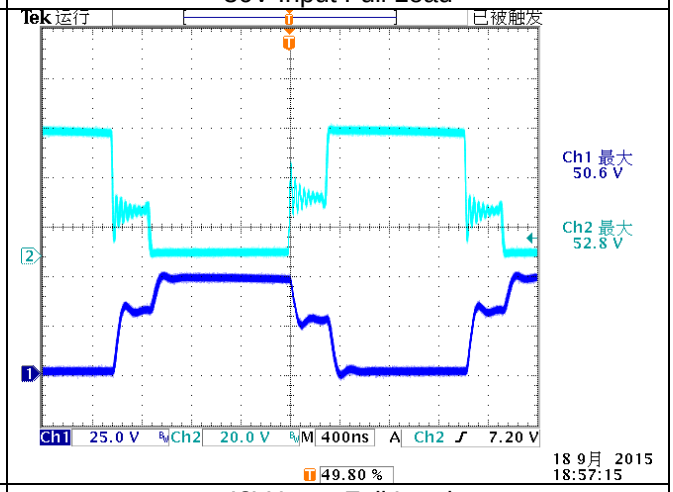
36V Input No Load



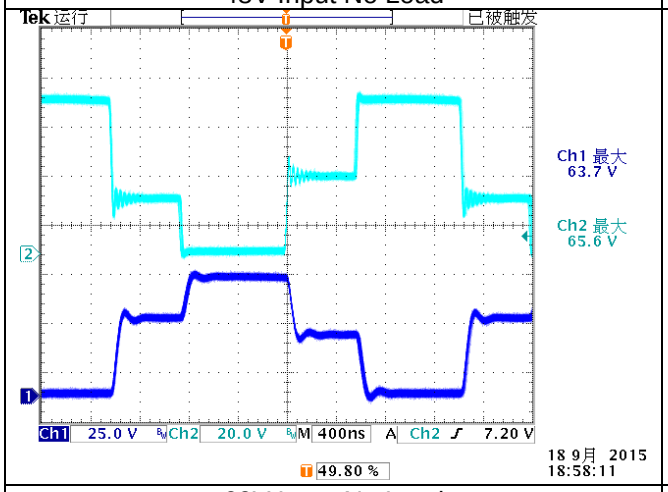
36V Input Full Load



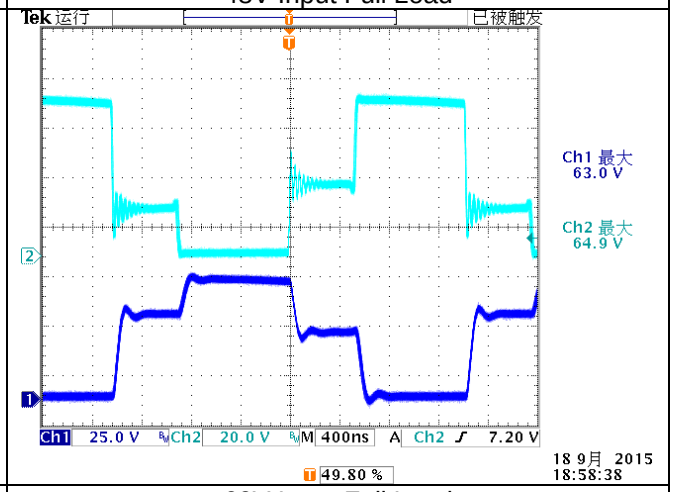
48V Input No Load



48V Input Full Load



60V Input No Load

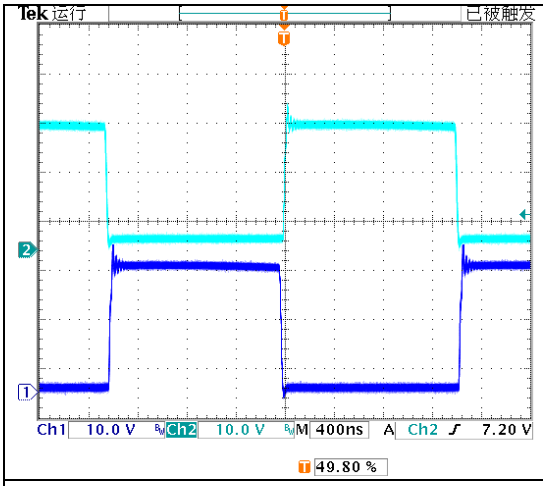


60V Input Full Load

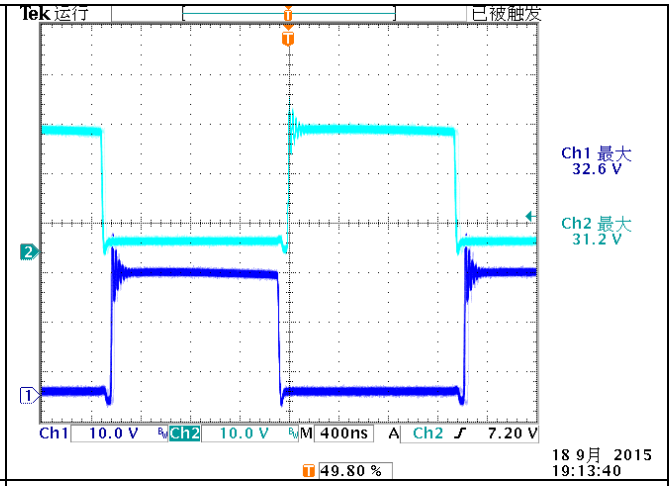
2.5: Operating waveform (Secondary MOSFET VDS)

CH1: Secondary MOSFET VDS 10.0V/Div (Q1)

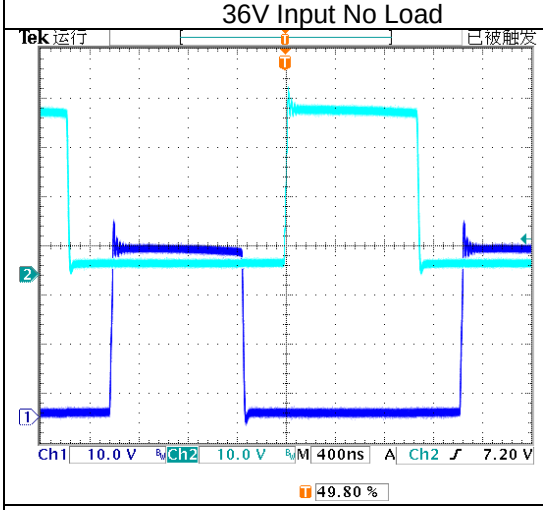
CH2: Secondary MOSFET VDS 10.0V/Div (Q2)



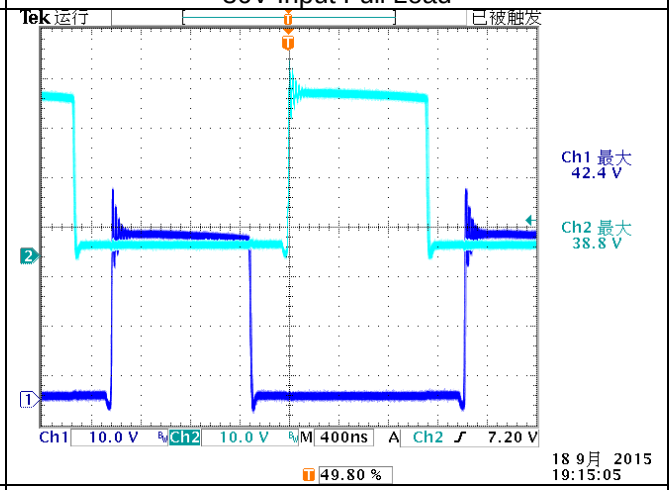
36V Input No Load



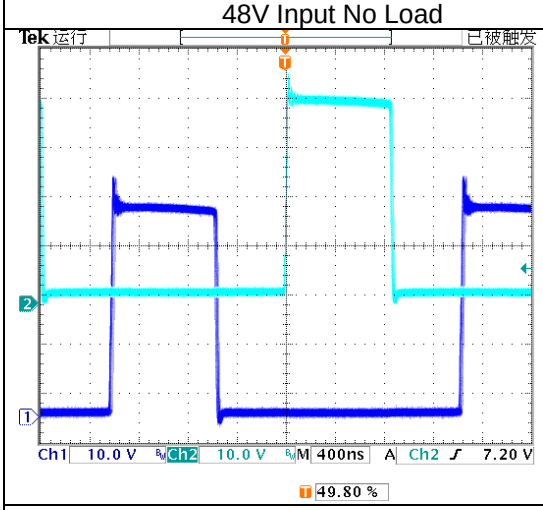
36V Input Full Load



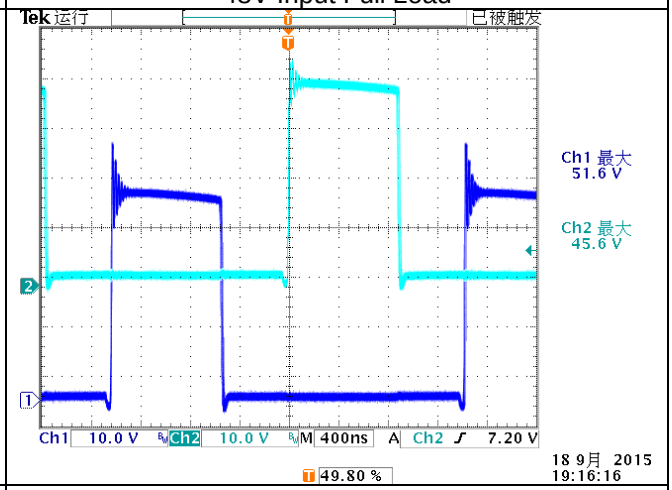
48V Input No Load



48V Input Full Load



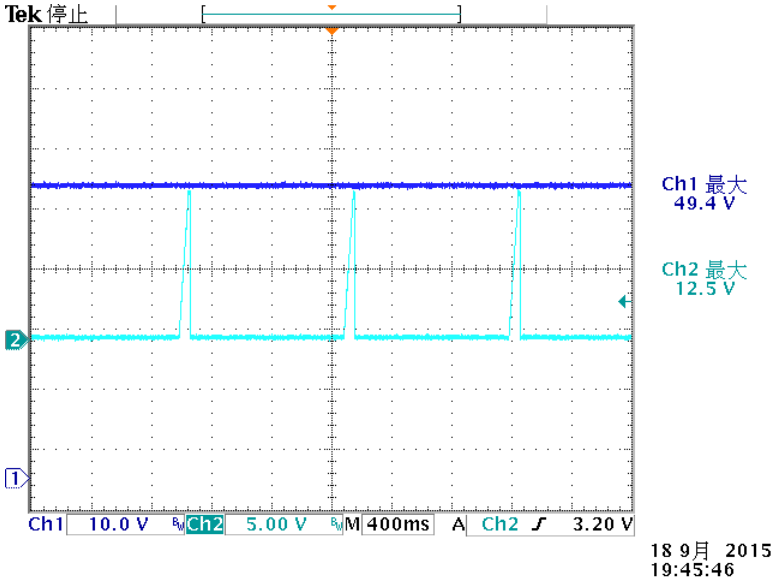
60V Input No Load



60V Input Full Load

2.6: Over Current Protection

CH1: Input Voltage 10.0V/Div CH2: Output Voltage 5.0V/Div



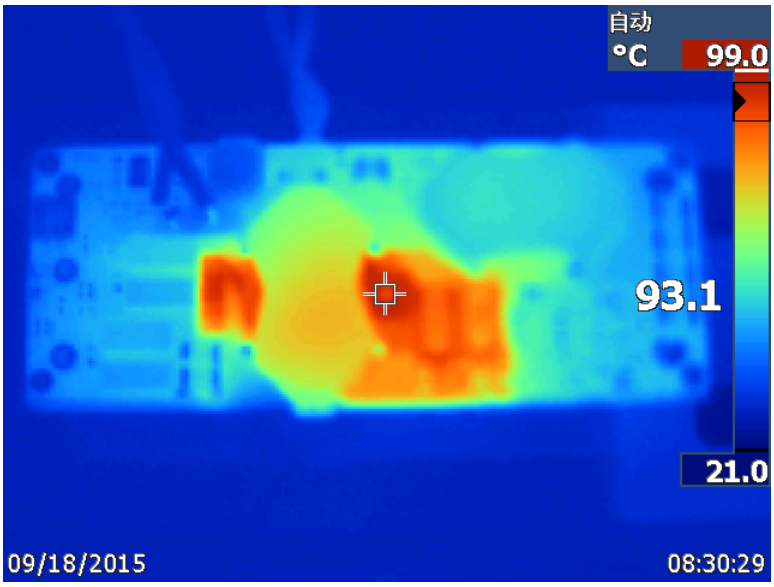
3 Thermal IR Scan

Testing condition:

Ambient temperature with Fan cooling

60V input with full load (15 minutes warm up)

Top Thermal Gradient Overview



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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265