Texas Instruments

China Power Reference Design

PMP4357 Test Procedure

REV A

2/16/2013

1 General

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4357 using TI DC/DC converter LM5006
LM5006 operating frequency is 300 KHz

1.2 SPECIFICATIONS

‘Vin: 20V-75V
Vo1: 15V, 0.3A
Vo2: 14.5V, 0.3A

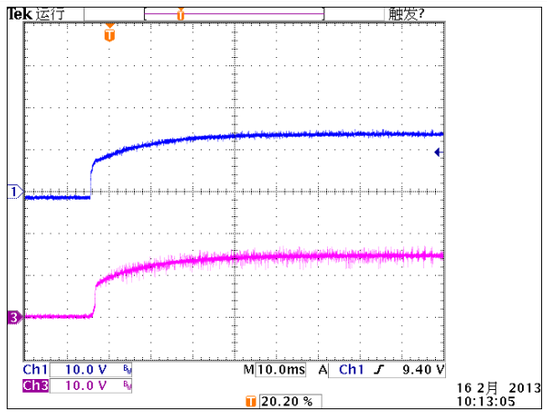
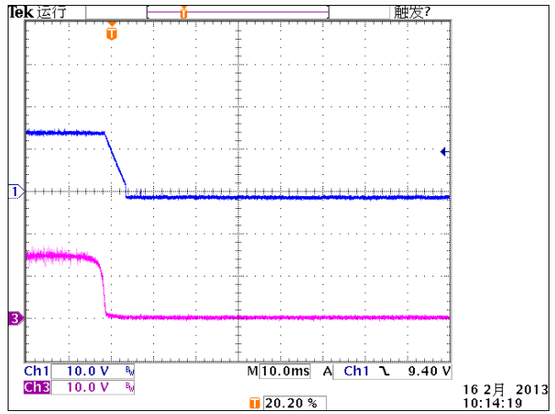
1.3 TEST EQUIPMENTS

DC Source: GPS3030C
E-load: Chroma6314A frame and 63103A, 63110A module
Oscillograph: TDS3034C
Multi-meter(current): Fluke 8845A
Multi-meter(voltage): Fluke 287C, Fluke 17B

2 OUTPUT CHARACTERISTICS

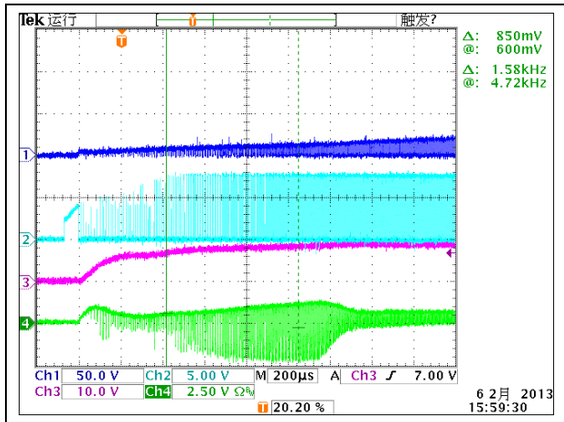
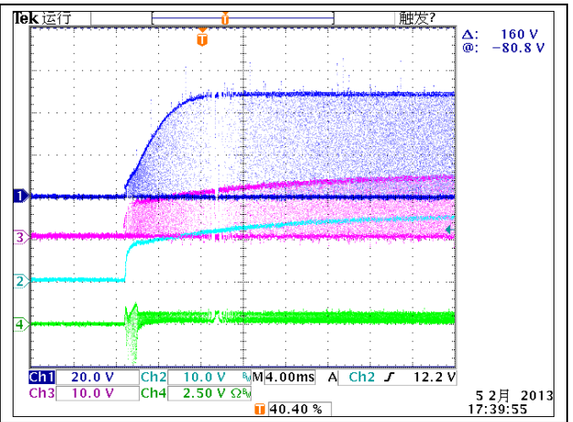
2.1 Start up and shut down waveform

Test condition: Vin=48V, Io1=0.3A, Io2=0.3A

	
CH1: Vo1 CH3: Vo2	CH1: Vo1 CH3: Vo2

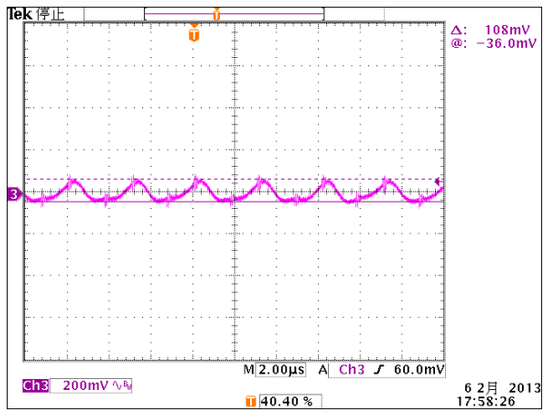
2.2 startup waveform

Test condition: Vin=72V and 48V, Io1=0.3A, Io2=0.3A

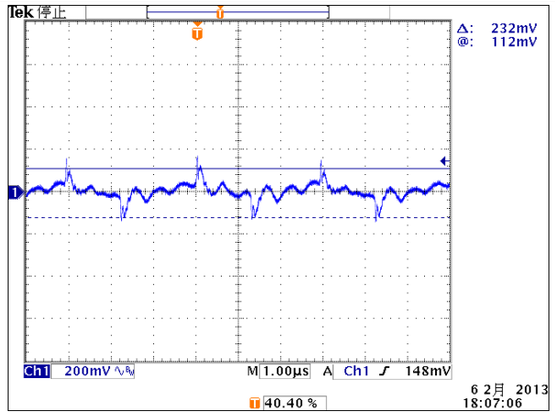
	
Vin=72V CH1: Vsw CH2:Vlg CH3:Vo1 CH4:Io1	Vin=72V CH1: Vsw CH2:Vlg CH3:Vo1 CH4:Io1

2.3 Output Ripple

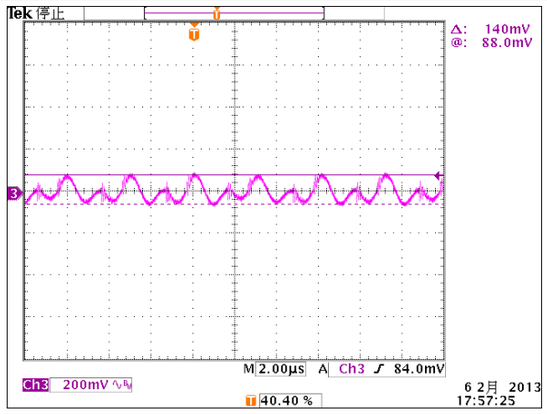
Test condition: Vin=36V, 48V and 72V. Io1=0.3A, Io2=0.3A



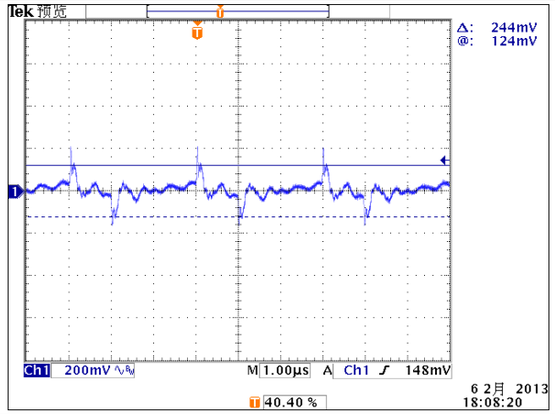
Vin=36V, Vo1 ripple



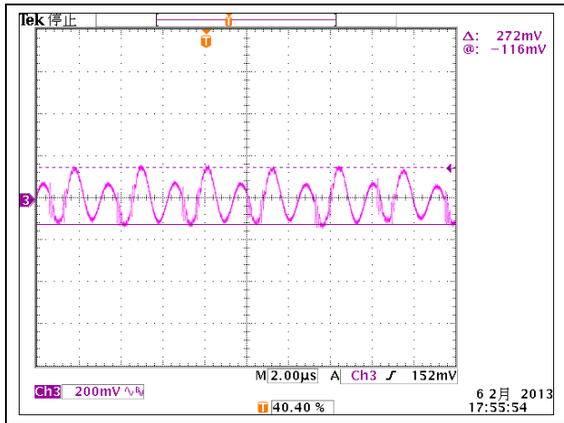
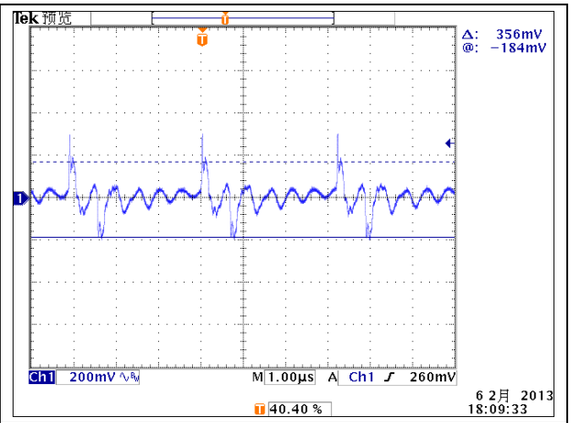
Vin=36V, Vo2 ripple



Vin=48V, Vo1 ripple

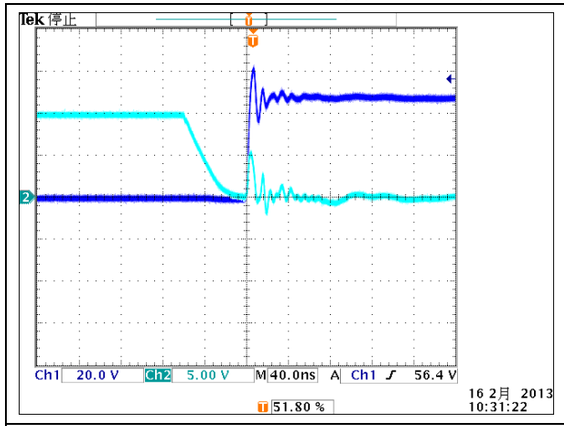
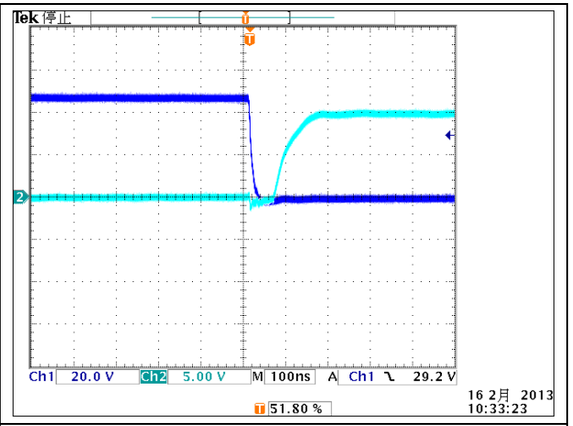


Vin=48V, Vo2 ripple

	
Vin=72V, Vo1 ripple	Vin=72V, Vo2 ripple

2.4 Vsw and Vlg cross point waveform

Test condition: Vin=48V, Io1=0.3A, Io2=0.3A

	
Vsw rise time	Vsw fall time

CH1: Vsw CH2: Vlg	CH1: Vsw CH2: Vlg

3 CROSS REGULATION

Vi n=72V					Vi n=36V				
Vo1(V)	15. 31	15. 36	15. 18	15. 37	Vo1(V)	15. 29	15. 35	15. 06	15. 07
I o1(A)	0. 3	0	0. 3	0	I o1(A)	0. 3	0	0. 3	0
Vo2(V)	14. 64	14. 42	15. 32	15. 79	Vo2(V)	14. 21	13. 96	15. 16	14. 95
I o2(A)	0. 3	0. 3	0	0	I o2(A)	0. 3	0. 3	0	0
Vi n=48V					Vi n=24V				
Vo1(V)	15. 29	15. 35	15. 12	15. 34	Vo1(V)	15. 25	15. 31	14. 95	14. 99
I o1(A)	0. 3	0	0. 3	0	I o1(A)	0. 3	0	0. 3	0
Vo2(V)	14. 49	14. 24	15. 34	15. 38	Vo2(V)	12. 82	12. 88	15. 12	14. 75
I o2(A)	0. 3	0. 3	0	0	I o2(A)	0. 3	0. 3	0	0

4 EFFICIENCY CHARACTERISTICS

4.1 Efficiency data

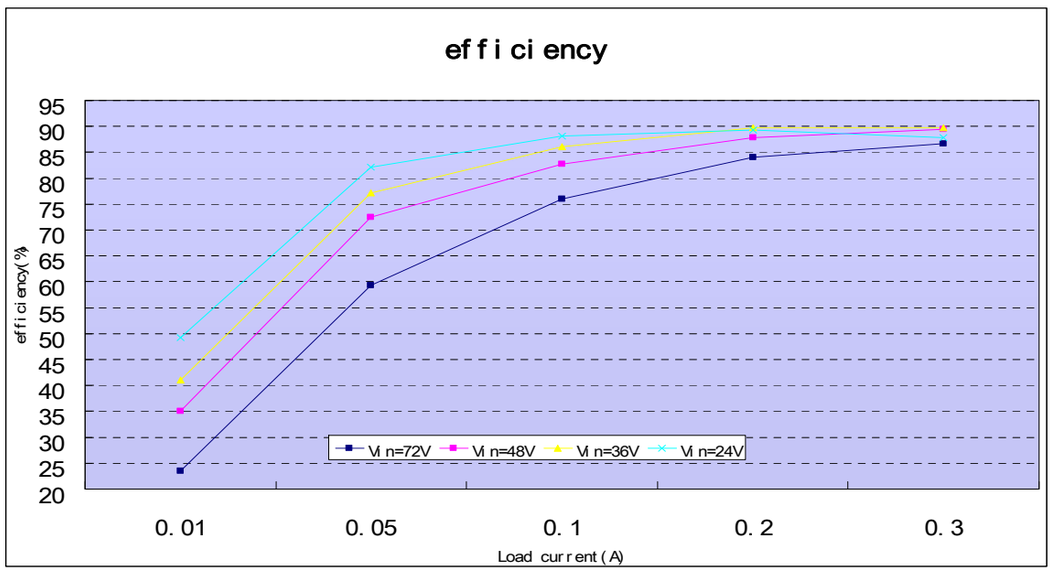
Vin(V)	72	72.16	72.24	72.28	72.3
Iin(A)	0.144	0.099	0.055	0.035	0.018
Vo1(V)	15.31	15.27	15.33	15.36	15.36
Io1(A)	0.3	0.2	0.1	0.049	0.01
Vo2(V)	14.64	14.73	14.88	15.02	15.25
Io2(A)	0.3	0.2	0.1	0.05	0.01
efficiency	0.867	0.84	0.76	0.594	0.235

Vin(V)	48	48.1	48.19	48.23	48.25
Iin(A)	0.208	0.141	0.075	0.043	0.018
Vo1(V)	15.29	15.25	15.2	15.25	15.36
Io1(A)	0.3	0.2	0.1	0.05	0.01
Vo2(V)	14.49	14.57	14.68	14.82	15.11
Io2(A)	0.3	0.2	0.1	0.05	0.01
efficiency	0.895	0.879	0.827	0.725	0.351

Vin(V)	36	36.1	36.32	36.42	36.49
Iin(A)	0.274	0.183	0.095	0.053	0.02
Vo1(V)	15.29	15.22	15.15	15.12	15.12
Io1(A)	0.3	0.2	0.1	0.05	0.01
Vo2(V)	14.21	14.4	14.56	14.63	14.82
Io2(A)	0.3	0.2	0.1	0.05	0.01
efficiency	0.897	0.897	0.861	0.771	0.41

Vin(V)	24	24.42	24.67	24.8	24.88
Iin(A)	0.399	0.264	0.134	0.072	0.024
Vo1(V)	15.25	15.19	15.07	15.02	14.77

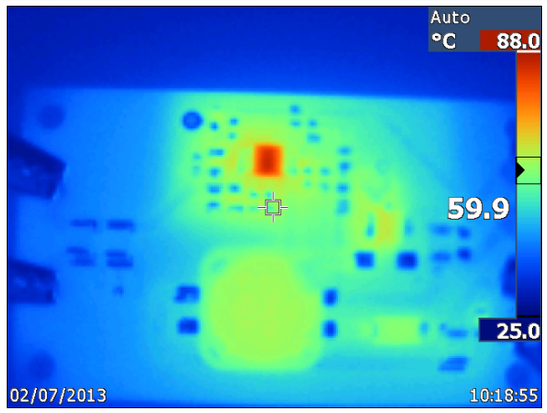
4.2 Efficiency curve



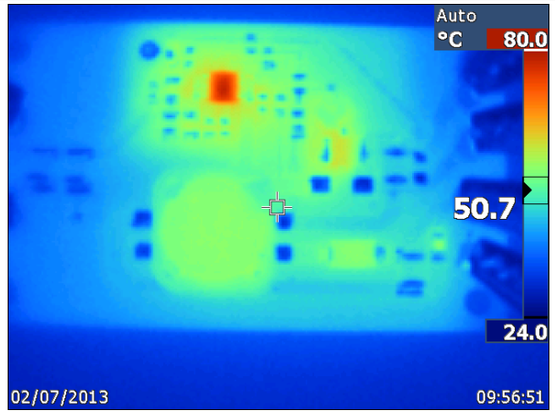
5 THERMAL CHARACTERISTICS

device temperature @Vin=72V and Ta=25°C				
device case	U2	L1	Q1	D3
Io1=Io2=0.3A	88°C	62°C	65°C	60°C
Io1=Io2=0.25A	80°C	56°C	61°C	55°C
Io1=Io2=0.2A	77°C	53°C	58°C	53°C
Io1=Io2=0.15A	73°C	48°C	53°C	48°C

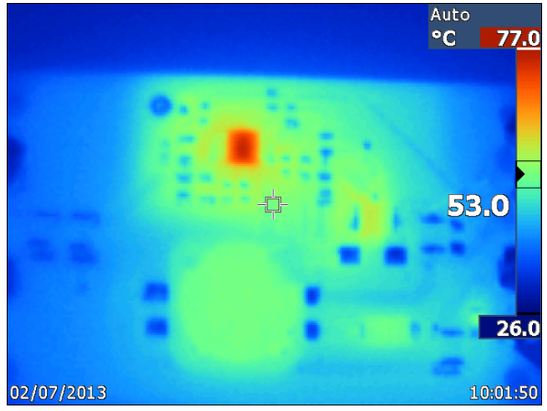
device temperature @Vin=48V and Ta=25°C				
device case	U2	L1	Q1	D3
Io1=Io2=0.3A	66°C	59°C	48°C	57°C
Io1=Io2=0.25A	62°C	53°C	45°C	52°C
Io1=Io2=0.2A	56°C	45°C	42°C	47°C
Io1=Io2=0.15A	55°C	43°C	40°C	44°C



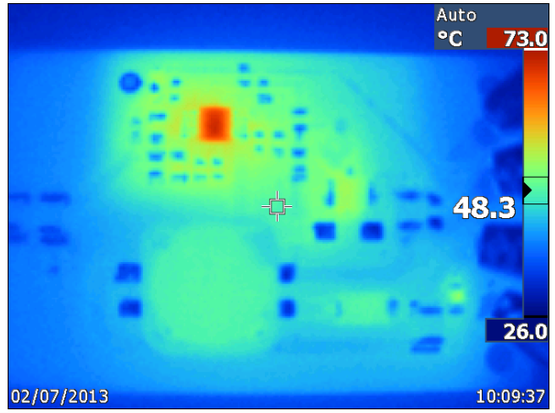
Vin=72V, Io1=Io2=0.3A



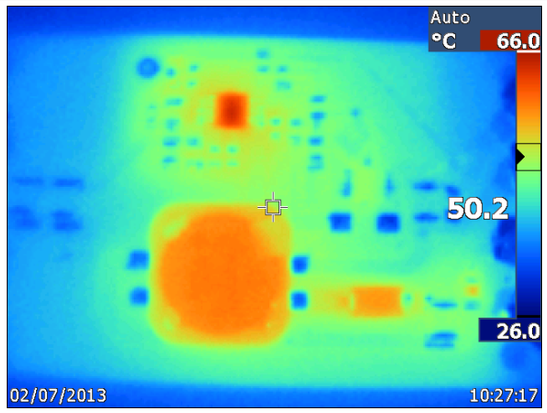
Vin=72V, Io1=Io2=0.25A



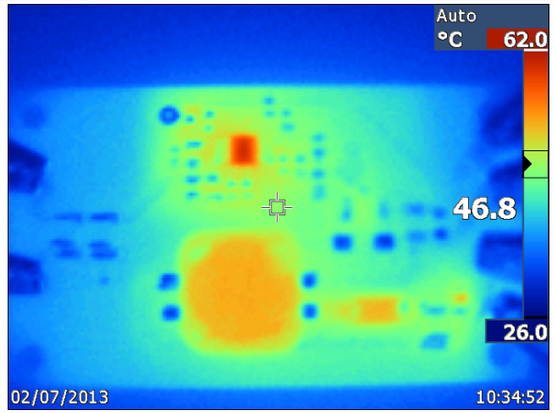
Vin=72V, Io1=Io2=0.2A



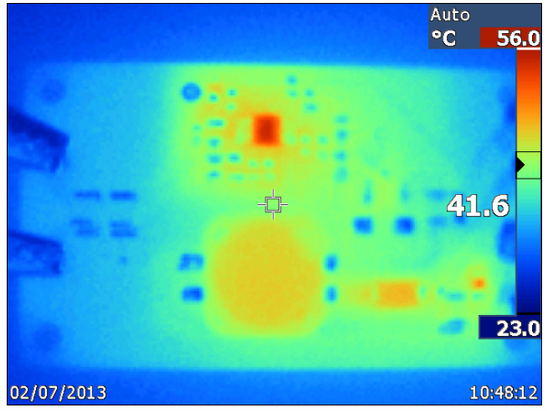
Vin=72V, Io1=Io2=0.15A



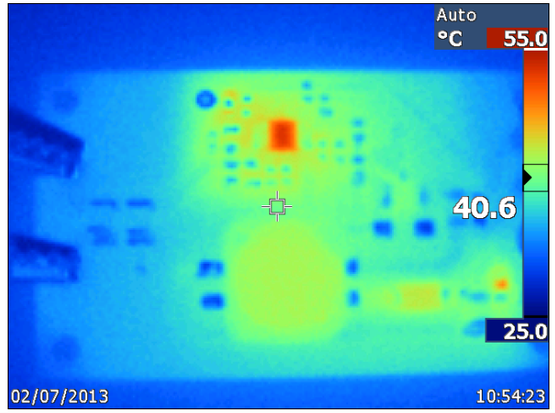
Vin=48V, Io1=Io2=0.3A



Vin=48V, Io1=Io2=0.25A



Vin=48V, Io1=Io2=0.2A



Vin=48V, Io1=Io2=0.15A

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