Texas Instruments

PMP4442 Test Procedure

China Power Reference Design

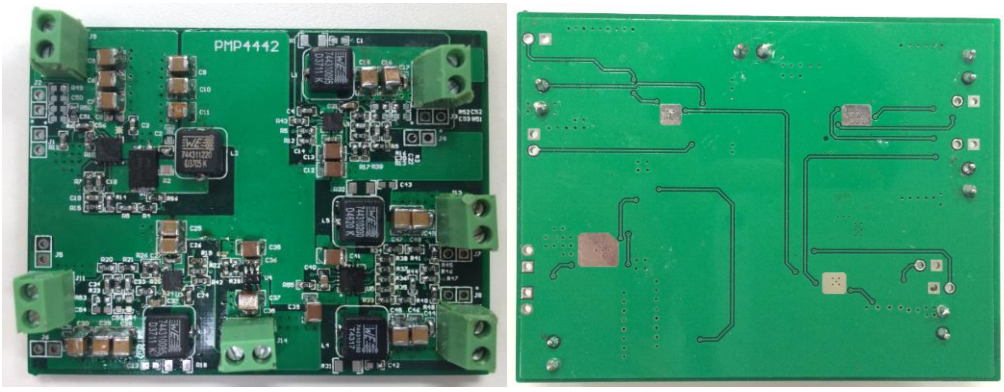
REV A

11/12/2014

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4442, which uses TI new TPS54561-Q1,TPS54388-Q1,TPS57114-Q1,LM26420-Q1,TLV70030-Q1 with size L*W:75mmx58mm. This design is for automotive with 2.1MHz switching frequency in order to avoid the AM band for radio.



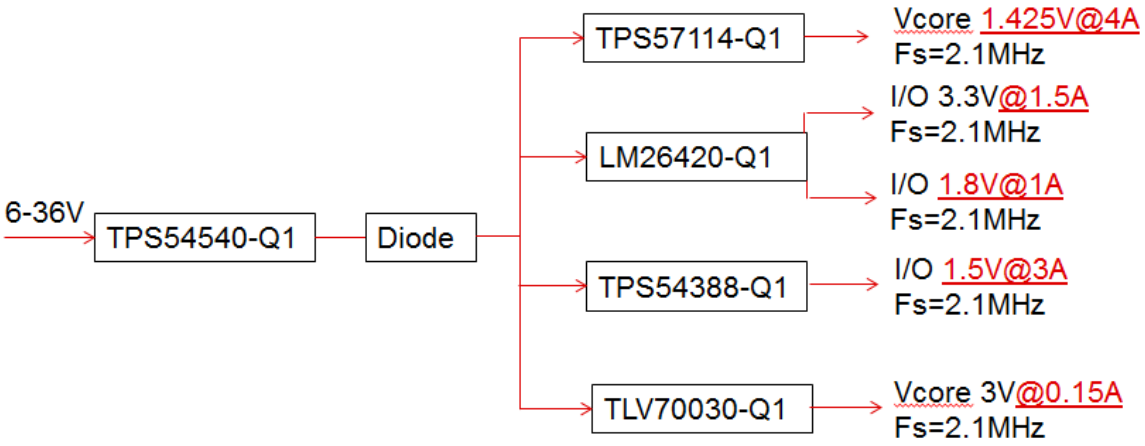
1.2 REFERENCE DOCUMENTATION

Schematic PMP4442_SCH.PDF
PMP4442_PCB.PDF
BOM

1.3 TEST EQUIPMENTS

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

1.4 SYSTEM BLOCK DIAGRAM

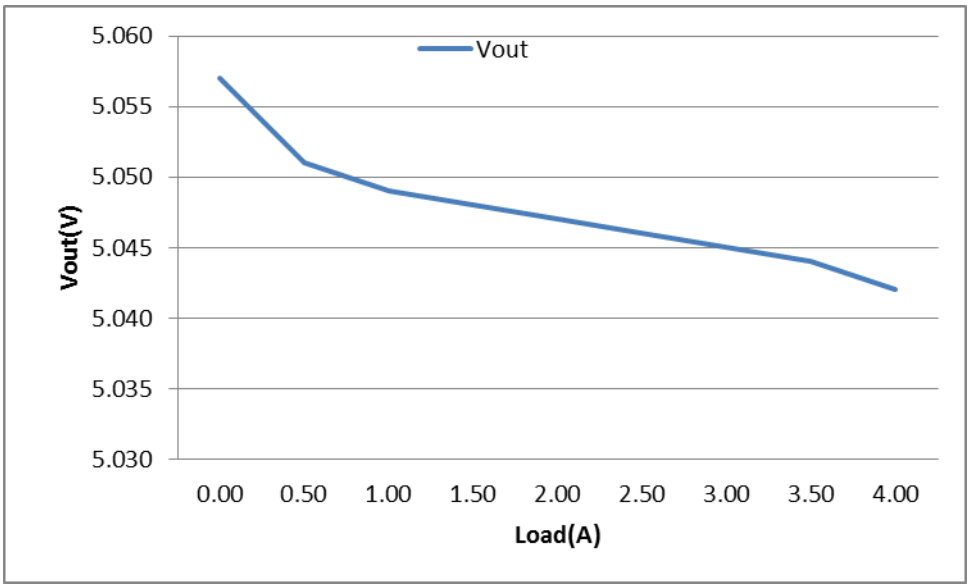


2 Output Characteristics

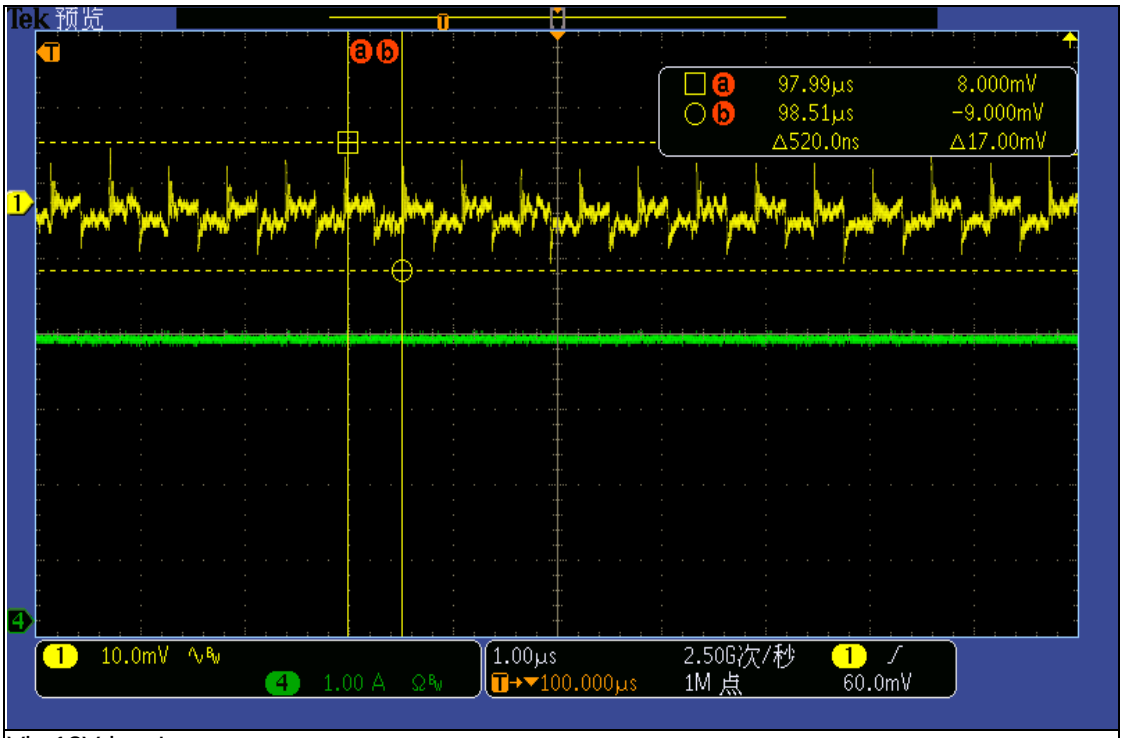
2.1 TPS54561 for 5V/4A

2.1.1 Output regulation and curve:

	Output Current(A)	Output Voltage(V)
12V	No load	5.057
	0.50	5.051
	1.00	5.049
	1.50	5.048
	2.00	5.047
	2.50	5.046
	3.00	5.045
	3.50	5.044
	4.00	5.042

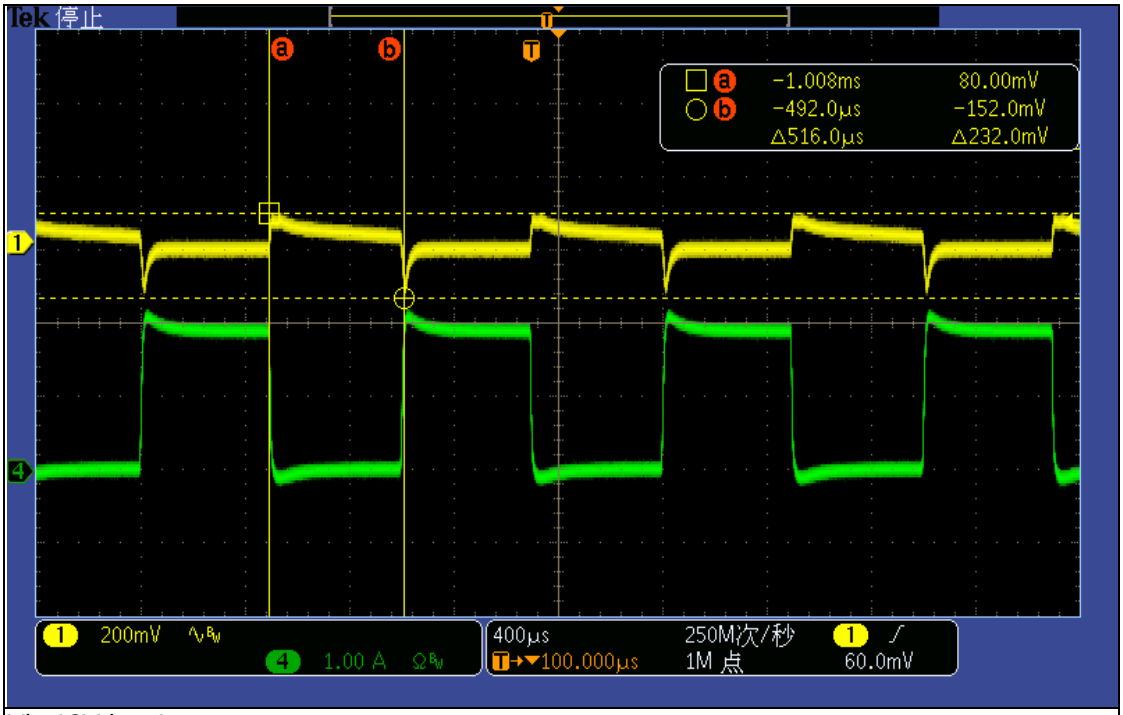


2.1.2 Output ripple voltage:

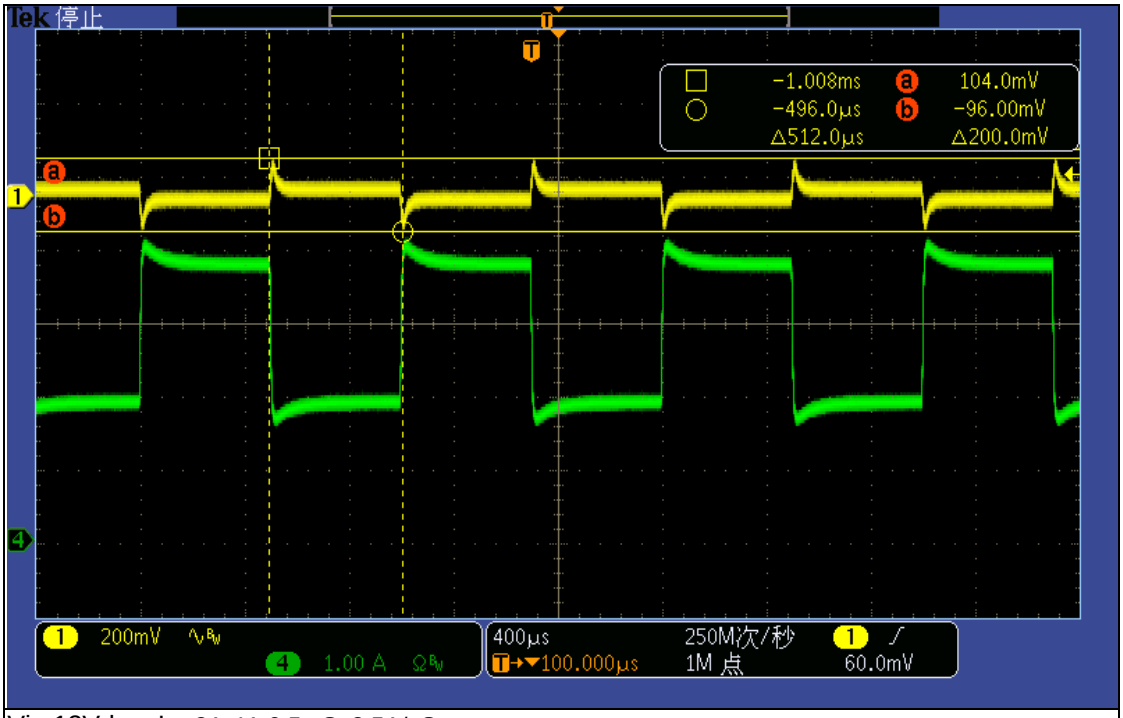


Vin:12Vdc Io: 4A
Ch1: Output Ripple Voltage 10mV/div
Ch3: Output Current 1A/div

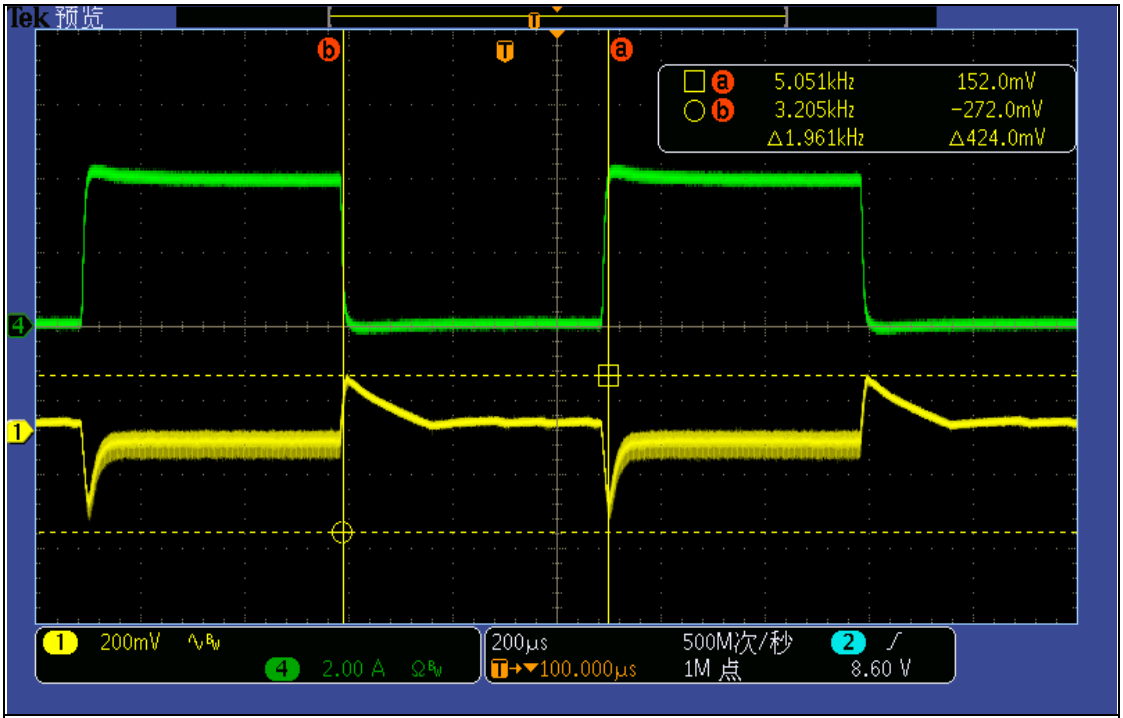
2.1.3 Dynamic response:



Vin:12Vdc Io: 0A-2A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 200mV/div
Ch3: Output Current 1A/div



Vin:12Vdc Io: 2A-4A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 200mV/div
Ch3: Output Current 1A/div

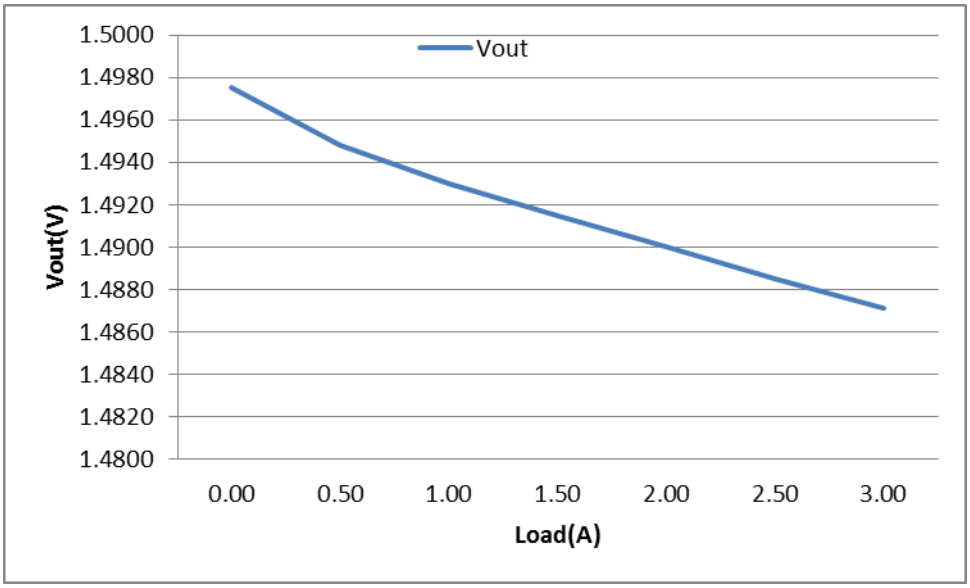


Vin:12Vdc Io: 0A-4A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 200mV/div
Ch4: Output Current 2A/div

2.2 TPS54388 for 1.5V/3A

2.2.1 Output regulation and curve:

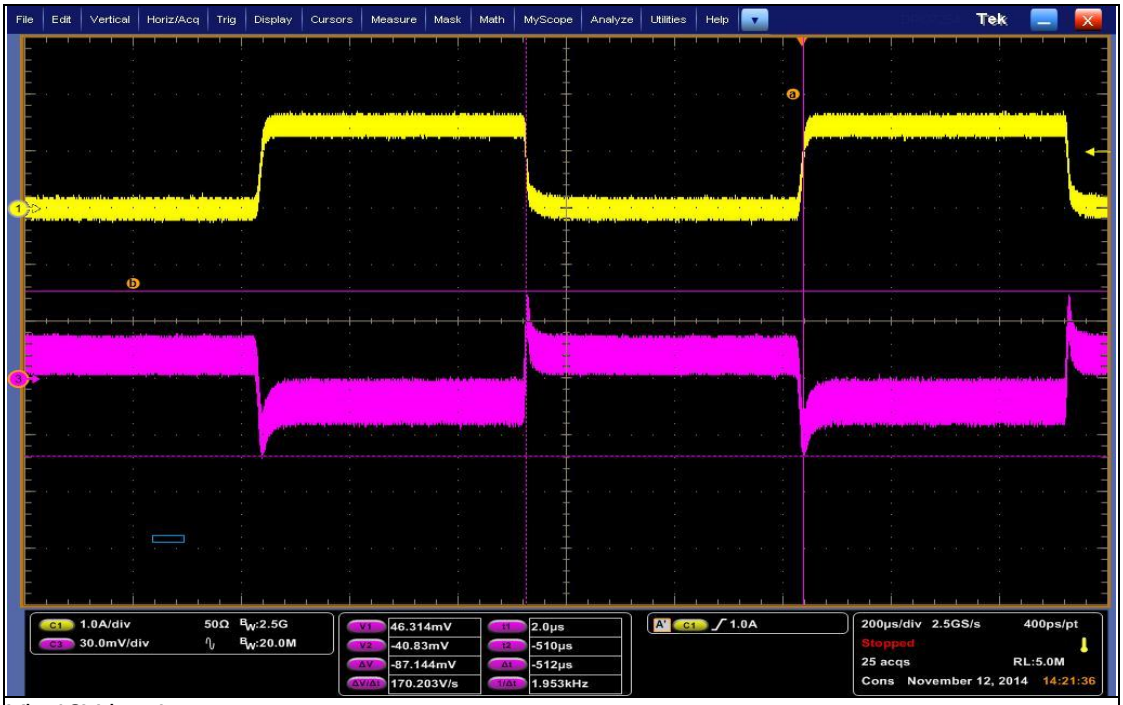
	Output Current(A)	Output Voltage(V)
12V	No load	1.4975
	0.50	1.4948
	1.00	1.4930
	1.50	1.4915
	2.00	1.4900
	2.50	1.4885
	3.00	1.4871



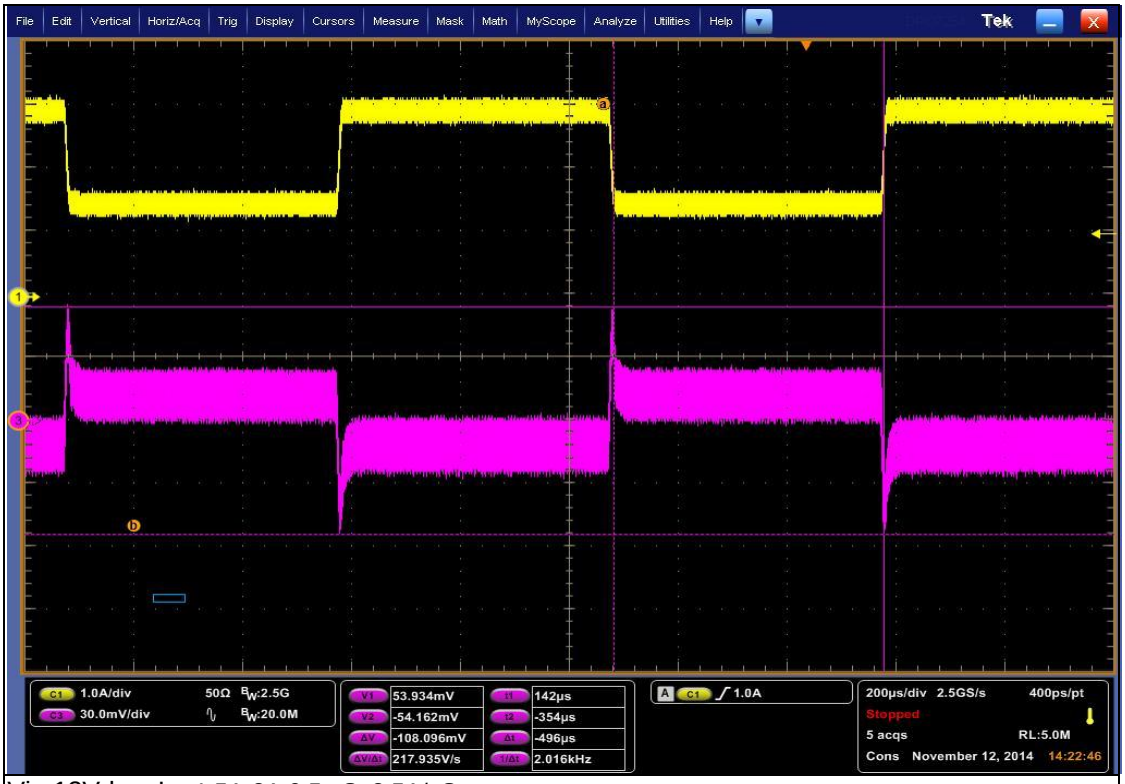
2.2.2 Output ripple voltage:

Vin:12Vdc Io: 3A
Ch1: Output Current 1A/div
Ch3: Output Ripple Voltage 10mV/div

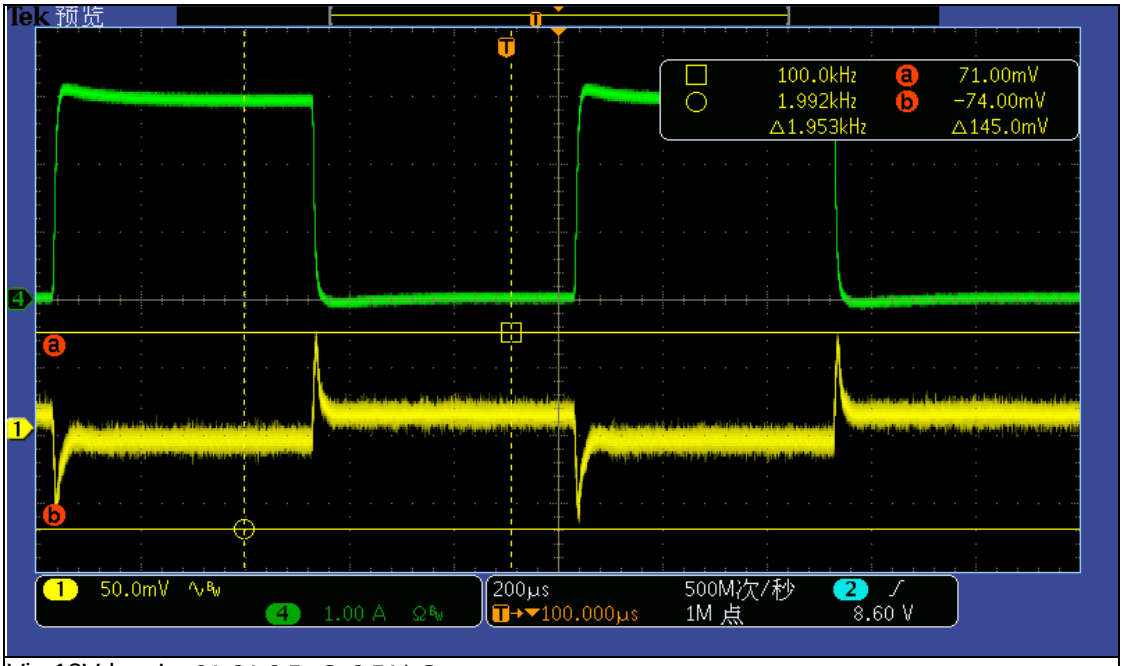
2.2.3 Dynamic response:



Vin:12Vdc Io: 0A-1.5A 0.5mS, 2.5A/uS
Ch1: Output Current 1A/div
Ch3: Output Ripple Voltage 30mV/div



Vin:12Vdc Io: 1.5A-3A 0.5mS, 2.5A/uS
Ch1: Output Current 1A/div
Ch3: Output Ripple Voltage 30mV/div

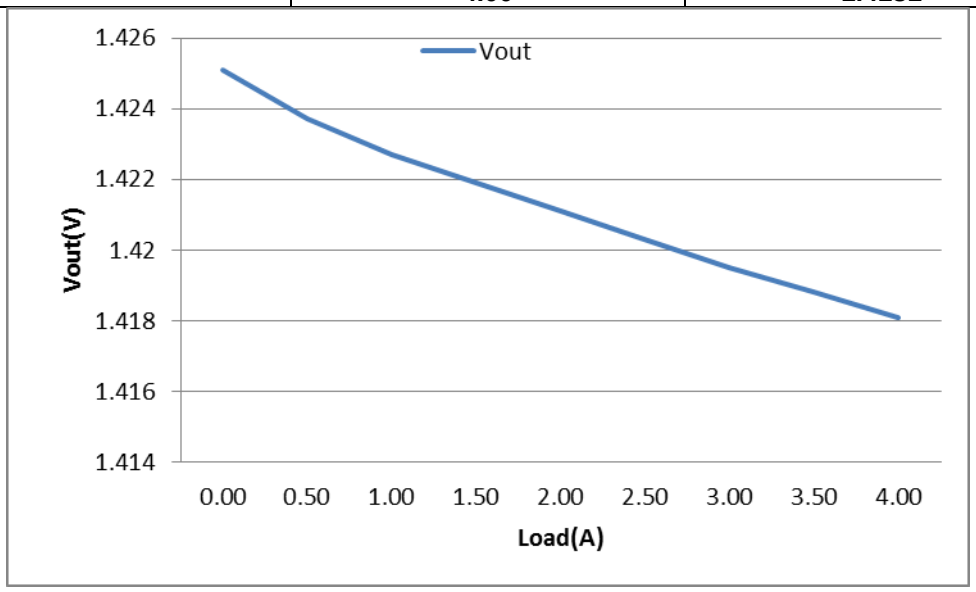


Vin:12Vdc Io: 0A-3A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 50mV/div
Ch4: Output Current 1A/div

2.3 TPS57114 for 1.425V/4A

2.3.1 Output regulation and curve:

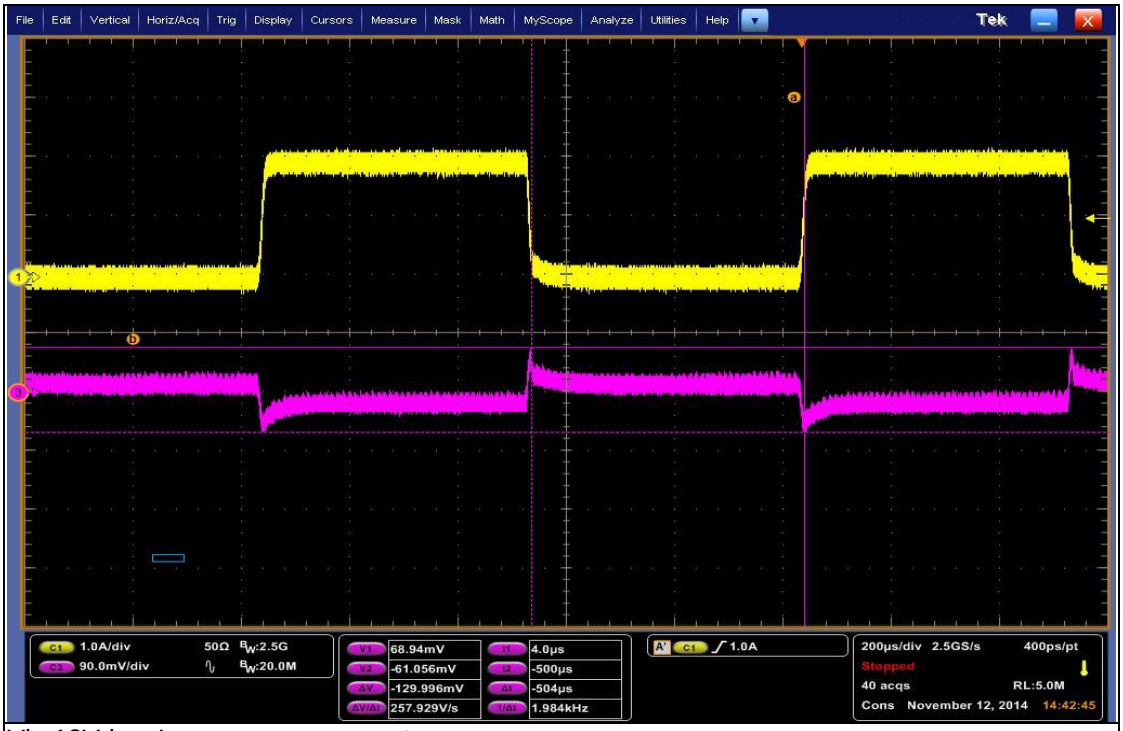
	Output Current(A)	Output Voltage(V)
12V	No load	1.4251
	0.50	1.4237
	1.00	1.4227
	1.50	1.4219
	2.00	1.4211
	2.50	1.4203
	3.00	1.4195
	3.50	1.4188
	4.00	1.4181



2.3.2 Output ripple voltage:

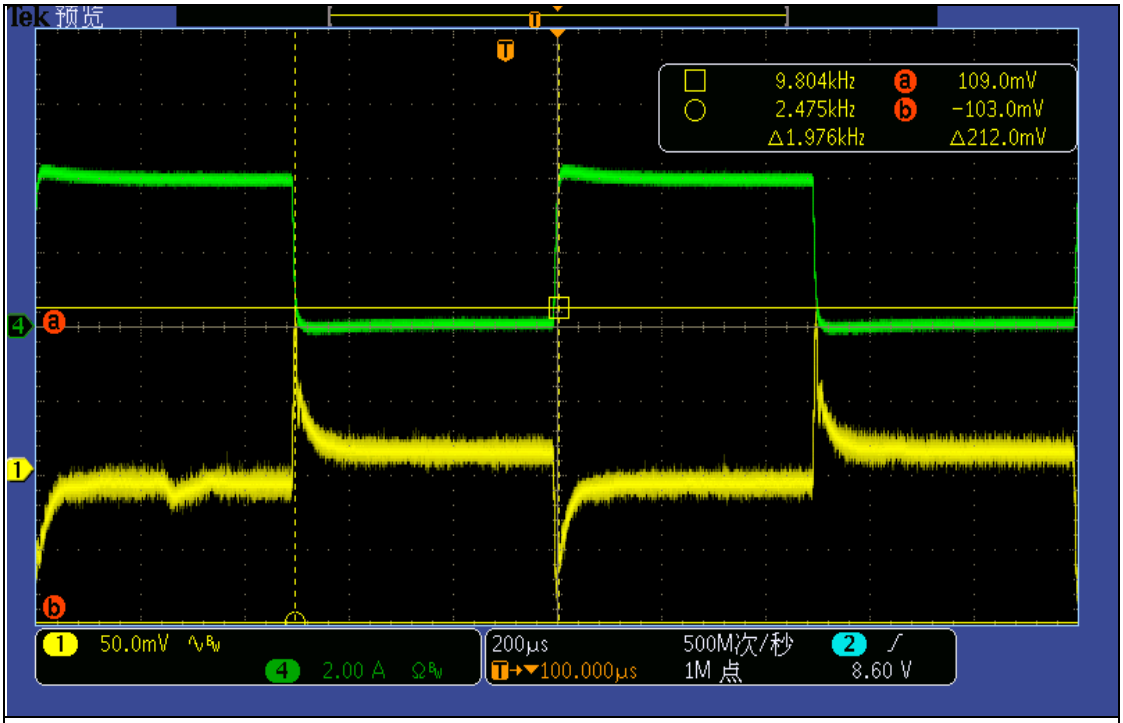
Vin:12Vin Io: 4A
Ch1: Output Current 1A/div
Ch3: Output Ripple Voltage 10mV/div

2.3.3 Dynamic response:



Vin:12Vdc Io: 0A-2A 0.5mS, 2.5A/uS
Ch1: Output Current 1A/div
Ch3: Output Ripple Voltage 90mV/div

Vin:12Vdc Io: 2A-4A 0.5mS, 2.5A/uS
Ch1: Output Current 1A/div
Ch3: Output Ripple Voltage 30mV/div

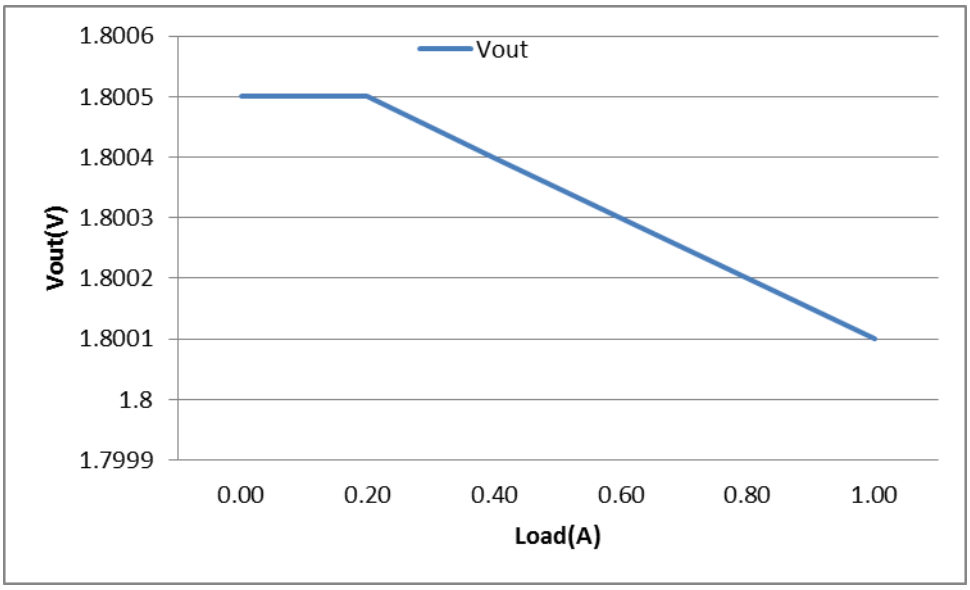


Vin:12Vdc Io: 0A-4A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 50mV/div
Ch4: Output Current 2A/div

2.4 LM26420 for 1.8V/1A

2.4.1 Output regulation and curve:

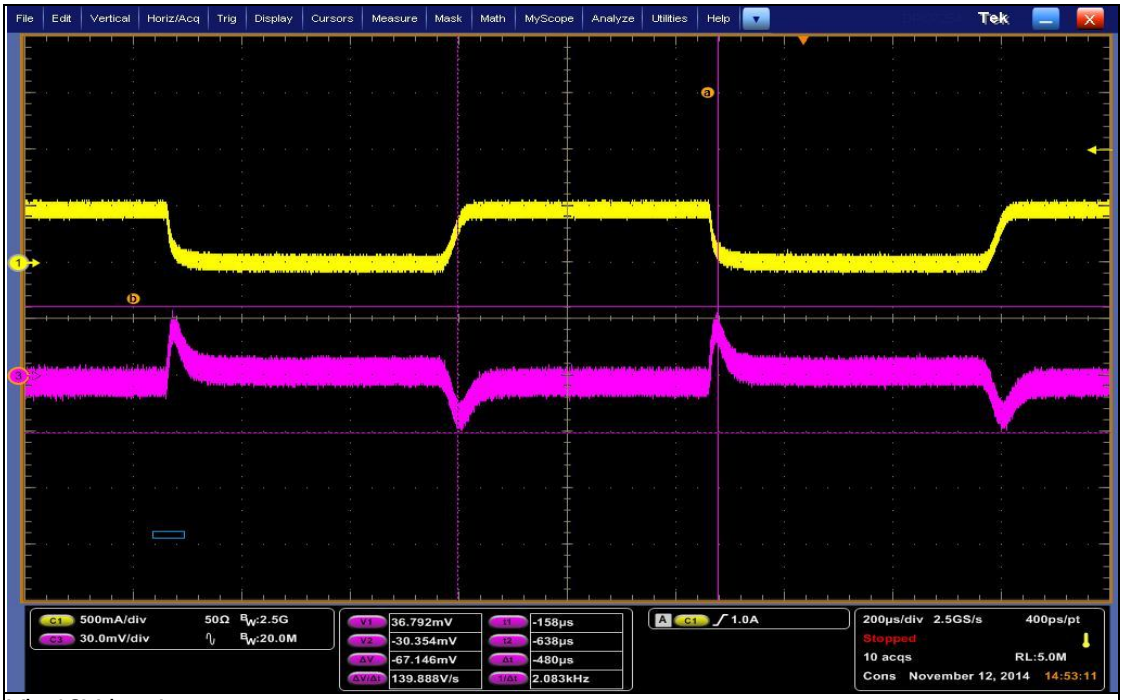
	Output Current(A)	Output Voltage(V)
12V	No load	1.8005
	0.20	1.8005
	0.40	1.8004
	0.60	1.8003
	0.80	1.8002
	1.00	1.8001



2.4.2 Output ripple voltage:

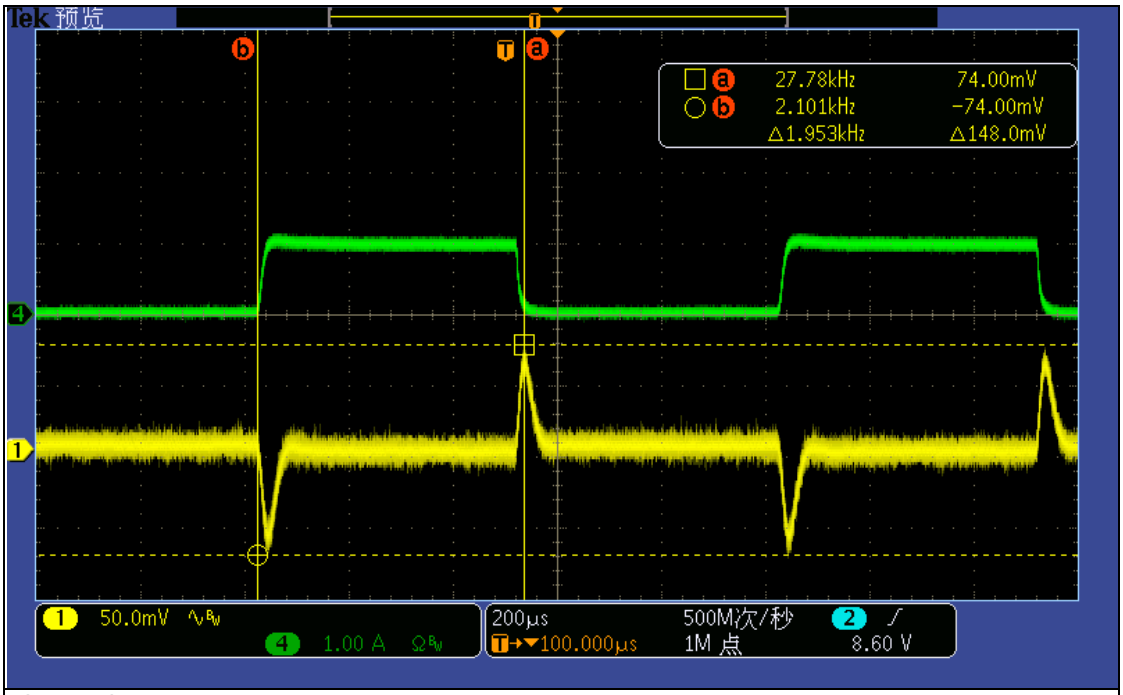
Vin:12Vin Io: 1A
Ch1: Output Current 500mA/div
Ch3: Output Ripple Voltage 10mV/div

2.4.3 Dynamic response:



Vin:12Vdc Io: 0A-0.5A 0.5mS, 2.5A/uS
Ch1: Output Current 500mA/div
Ch3: Output Ripple Voltage 30mV/div

Vin:12Vdc Io: 0.5A-1.0A 0.5mS, 2.5A/uS
Ch1: Output Current 500mA/div
Ch3: Output Ripple Voltage 30mV/div

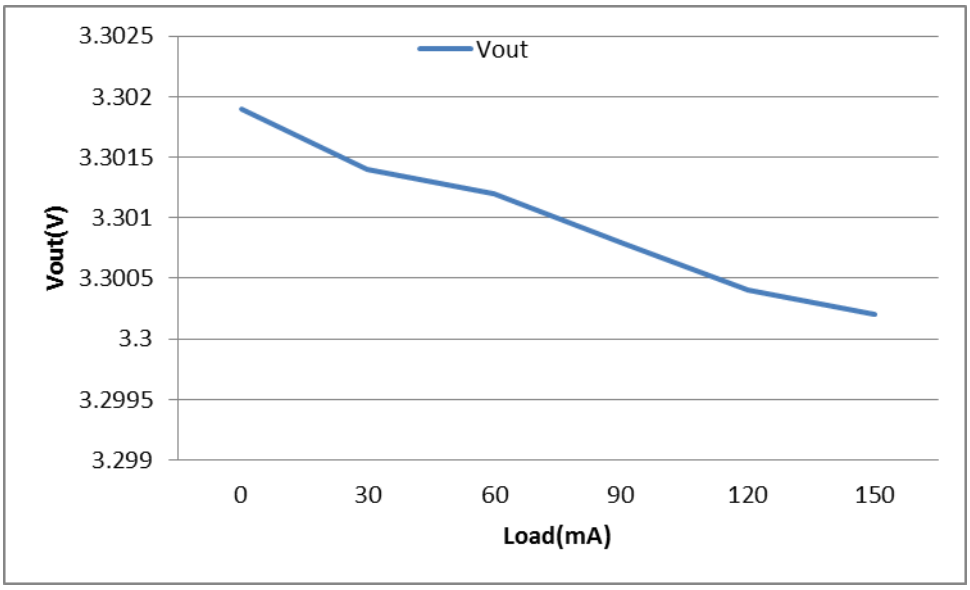


Vin:12Vdc Io: 0A-1A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 50mV/div
Ch4: Output Current 1A/div

2.5 LM26420 for 3.3V/1.5A

2.5.1 Output regulation and curve:

	Output Current(A)	Output Voltage(V)
12V	No load	3.3019
	0.30	3.3014
	0.60	3.3012
	0.90	3.3008
	1.20	3.3004
	1.50	3.3002



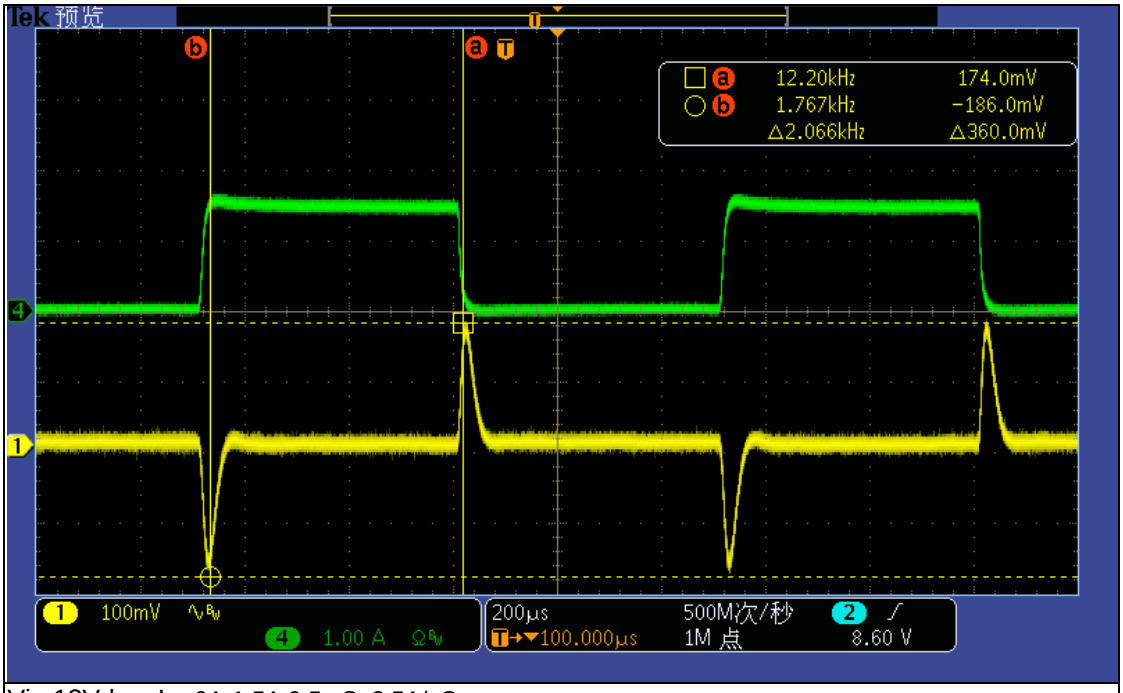
2.5.2 Output ripple voltage:

Vin:12Vin Io: 1.5A
Ch1: Output Current 500mA/div
Ch3: Output Ripple Voltage 10mV/div

2.5.3 Dynamic response:

Vin:12Vdc Io: 0A-0.75A 0.5mS, 2.5A/uS
Ch1: Output Current 500mA/div
Ch3: Output Ripple Voltage 30mV/div

Vin:12Vdc Io: 0.75A-1.5A 0.5mS, 2.5A/uS
Ch1: Output Current 500mA/div
Ch3: Output Ripple Voltage 30mV/div

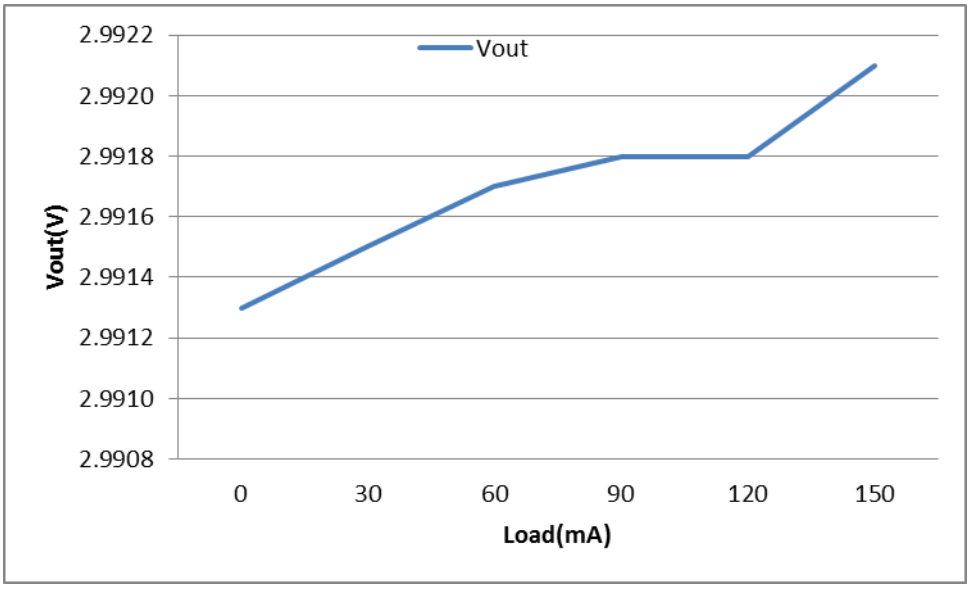


Vin:12Vdc Io: 0A-1.5A 0.5mS, 2.5A/uS
Ch1: Output Ripple Voltage 100mV/div
Ch4: Output Current 1A/div

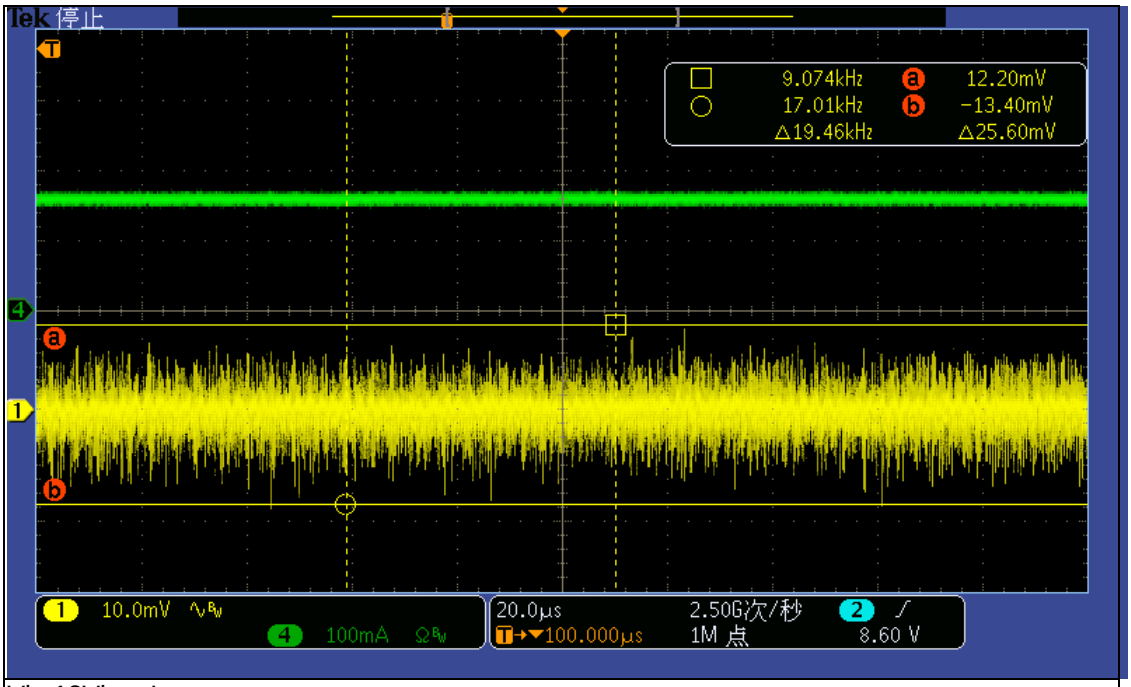
2.6 TLV70030 for 3V/0.15A

2.6.1 Output regulation and curve:

	Output Current(A)	Output Voltage(V)
12V	No load	2.9913
	0.03	2.9915
	0.06	2.9917
	0.09	2.9918
	0.12	2.9918
	0.15	2.9921

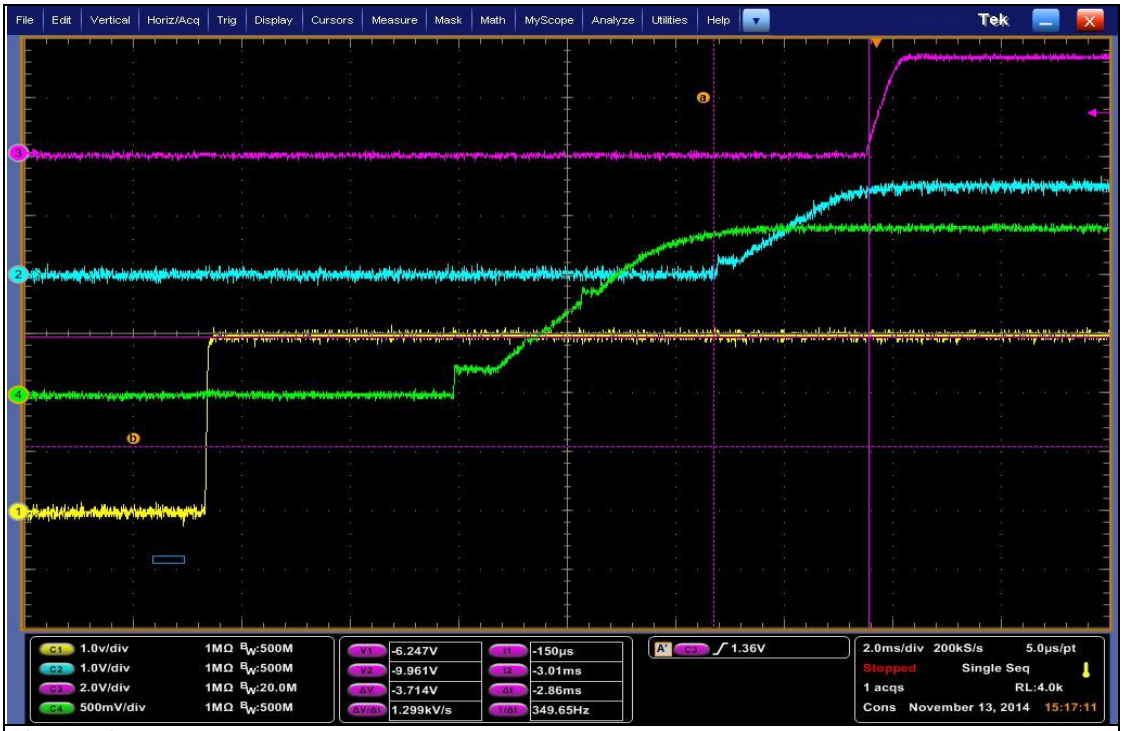


2.6.2 Output ripple voltage:

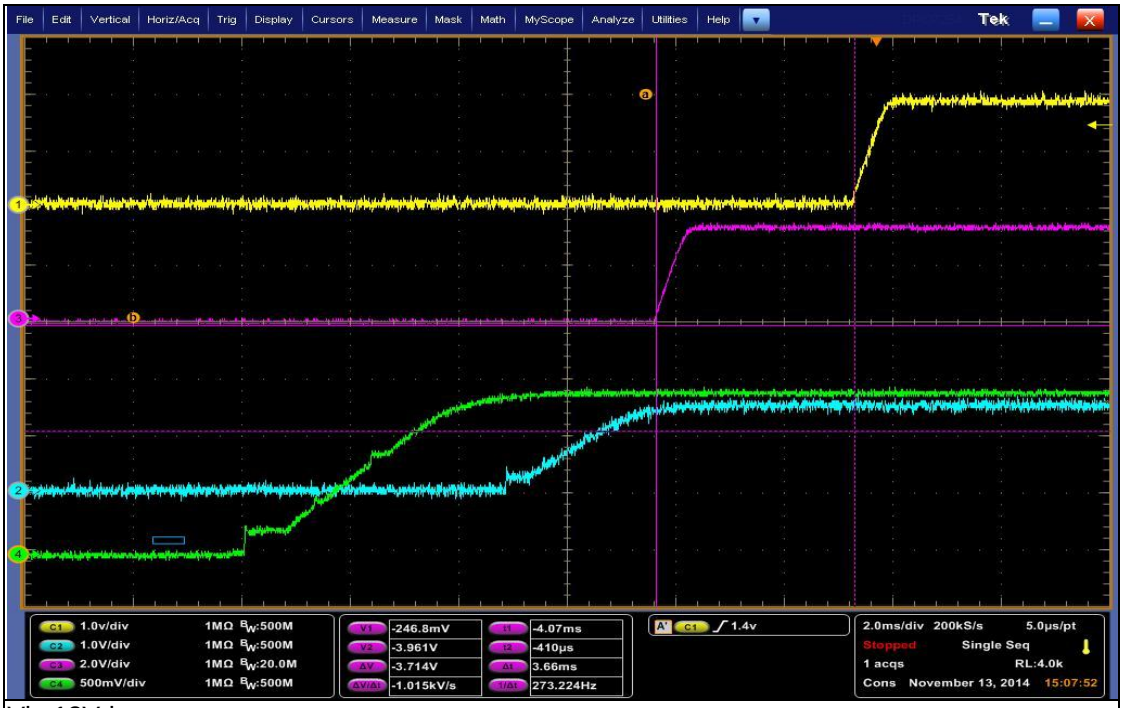


Vin:12Vin Io: 0.15A
Ch1: Output Ripple Voltage 10mV/div
Ch4: Output Current 100mA/div

3 Output Voltage Time Sequence

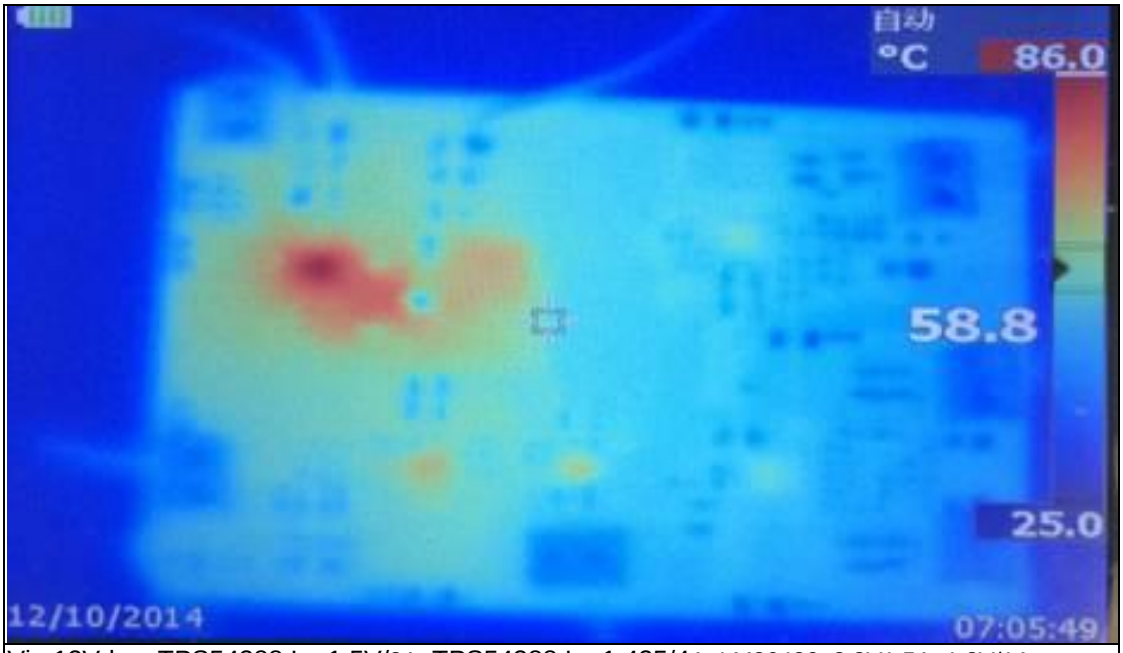


Vin:12Vdc
Ch1: 3V Output Voltage 1V/div Ch2: 1.5V Output Voltage 1V/div
Ch3: 3.3V Output Voltage 2V/div Ch4: 1.425V Output Voltage 500mV/div



Vin:12Vdc
Ch1: 1.8V Output Voltage 1V/div Ch2: 1.425V Output Voltage 1V/div
Ch3: 3.3V Output Voltage 2V/div Ch4: 1.425V Output Voltage 500mV/div

4 Thermal performance



Vin:12Vdc TPS54388 Io: 1.5V/3A, TPS54388 Io: 1.425/4A, LM26420: 3.3V1.5A, 1.8V/1A, TLV70030 3V/0.15A

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