SGM66075A Demo Board Test Report

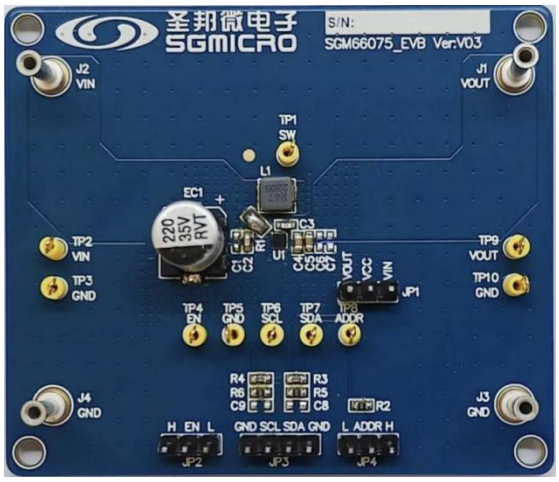
2.3V to 5.5V Input, 3.4V Output,

Up to 9A(TYP) Programmable Valley Current Limit in Boost Mode,

Up to 11.2A(TYP) Current Limit in Bypass Mode

Demo Board Picture:

Top



Bottom

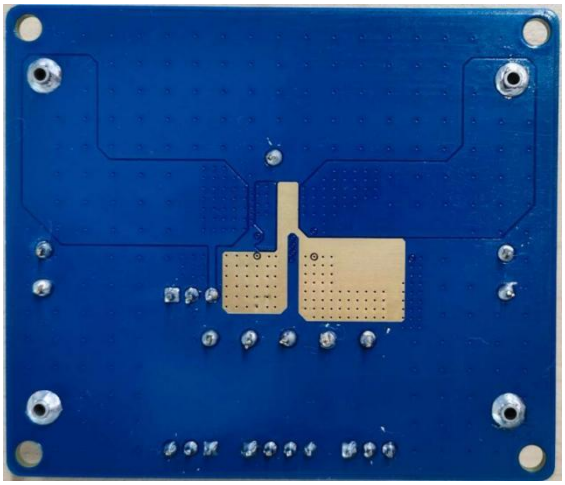


Table of Contents

1. Demo Board User's Guide

1.1 Test Setup

1.1.1 Equipment Connection

A. J2&J4: connecting VIN/GND to input power source.

B. J1&J3: connecting VOUT/GND to E-load.

C. JP2: connecting EN to H.

D. JP3: connecting SCL/SDA/GND to USB dongle.

E. JP4: connecting ADDR to L(0x75), H(0x76) or floating(0x77) according to the selected slave address.

1.1.2 Register Setup

A. After hardware setup done as shown in 1.1.1, connect the USB dongle to PC, then open the SGM USB GUI interface as Fig-1, choose the "SGM66075A" and click "Entry" button to entry the GUI interface.

Fig-1: SGM USB GUI Interface

B. After entering the SGM66075A GUI interface as shown in Fig-2, choose the COM port and click the "Open Serial" button, then the bottom left corner of the page will display "Serial port opened" firstly. Next, choose the slave address and click the "Read All" button, if "Device Read OK!" is displayed, it means that the I2C communication is normal.

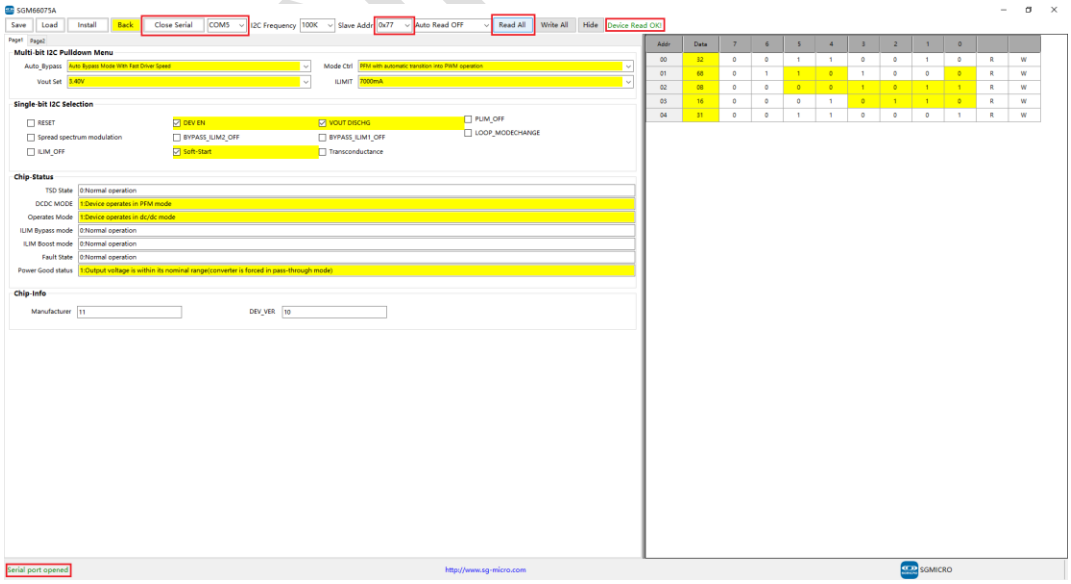
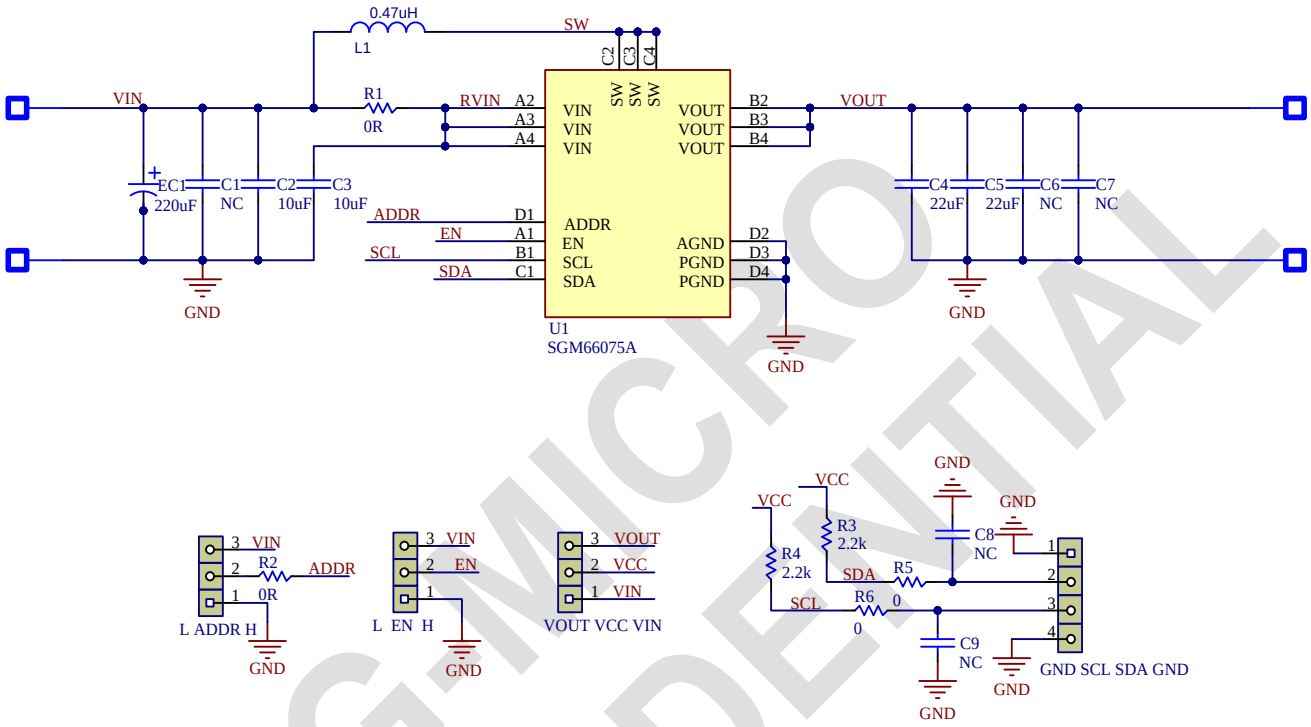


Fig-2: SGM USB GUI Interface

C. After both the hardware and software setup done, the registers can be read/written normally according to the test.

1.2 Schematic, BOM List and PCB Layout

1.2.1 Schematic

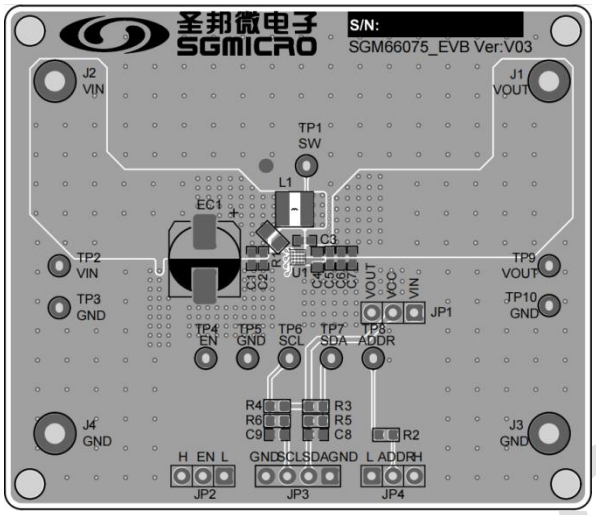


1.2.2 BOM List

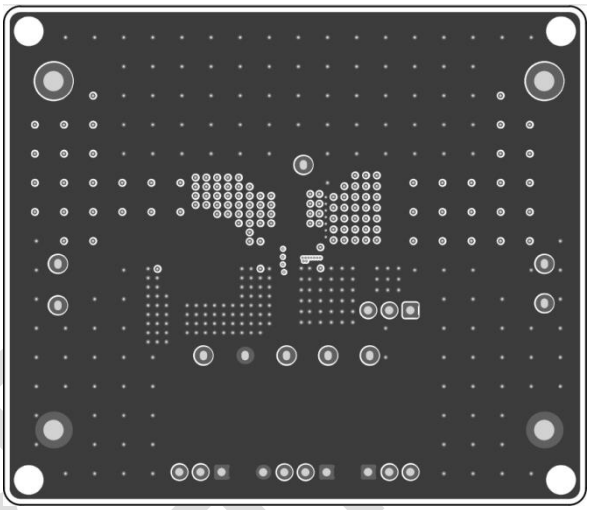
Item	Quantity	Designator	Description	Manufactory
1	0	C1, C6, C7, C8, C9	NC	
2	2	C2, C3	Ceramic Capacitor, 10μF, 6.3V, X5R, 20%, 0402	Murata GRM155R60J106ME05
3	2	C4, C5	Ceramic Capacitor, 22μF, 10V, X5R, 20%, 0603	Murata GRM188R61A226ME15
4	1	EC1	Electrolytic Capacitor, 220μF, 35V, 20%	
5	1	L1	Inductor, 0.47μH, DCR(max)=14mΩ, Isat=14.5A, 4.45mm*4.06mm*2mm	Wurth 744373240047
6	0	R1	Shorted	
7	3	R2, R5, R6	Film Resistor, 1%, 0, 0603	
8	2	R3, R4	Film Resistor, 1%, 2.2k, 0603	
9	1	U1	Synchronous Boost Converter with Bypass Switch	SG-Micro SGM66075A
Conclusion: Total 12 components				

1.2.3 PCB Layout

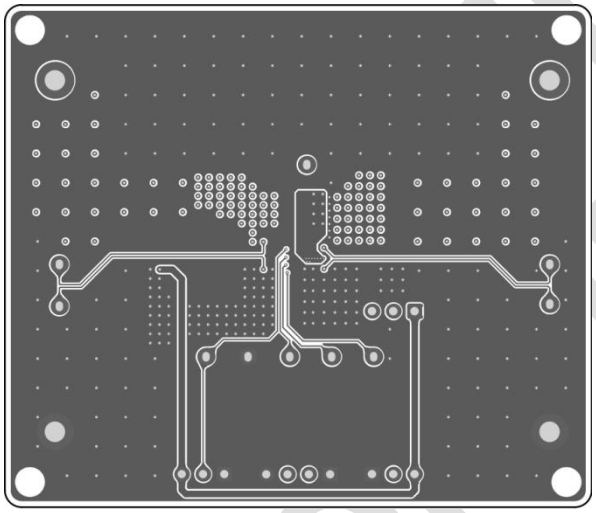
Top Layer



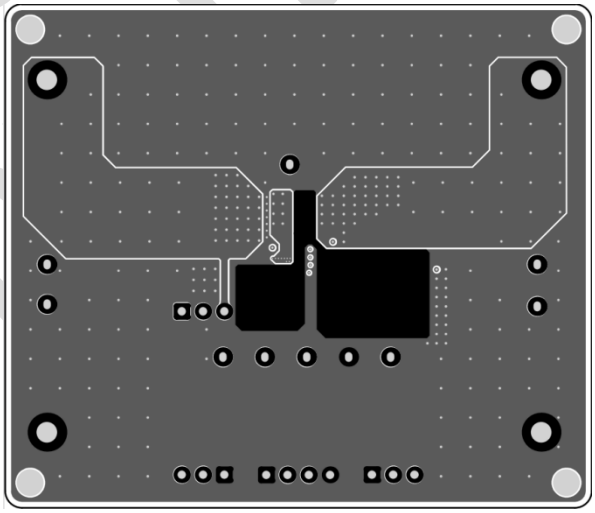
Internal Layer1



Internal Layer2



Bottom Layer

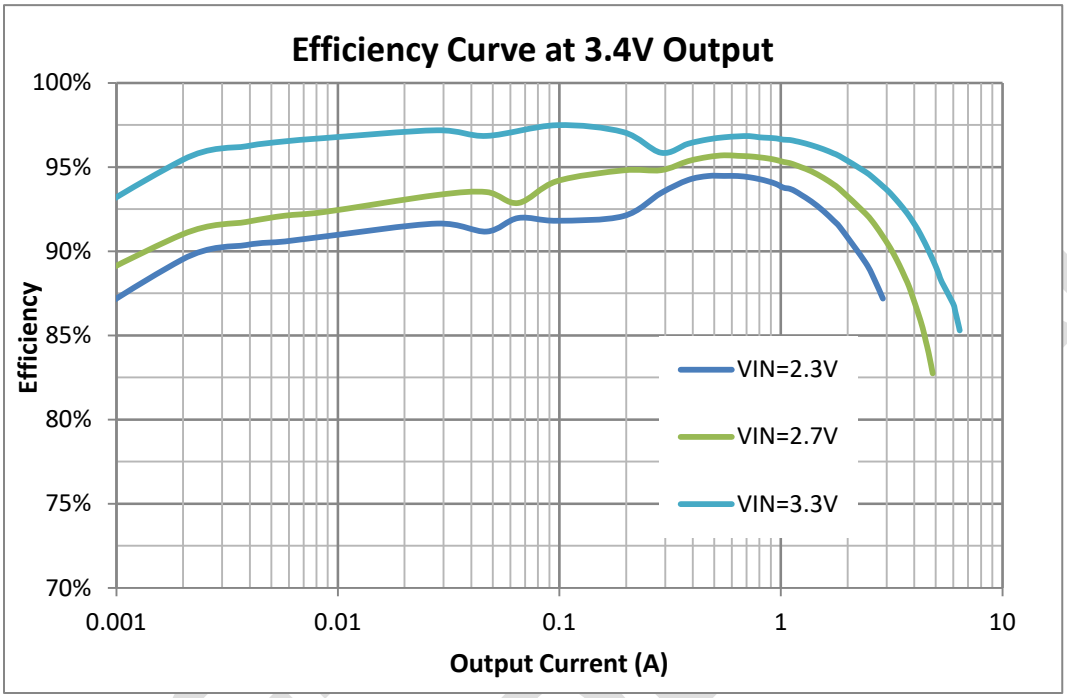


2. Demo Board Test Items

All items are tested in Auto PFM mode(REG0x01 D[0]=0), unless otherwise noted.

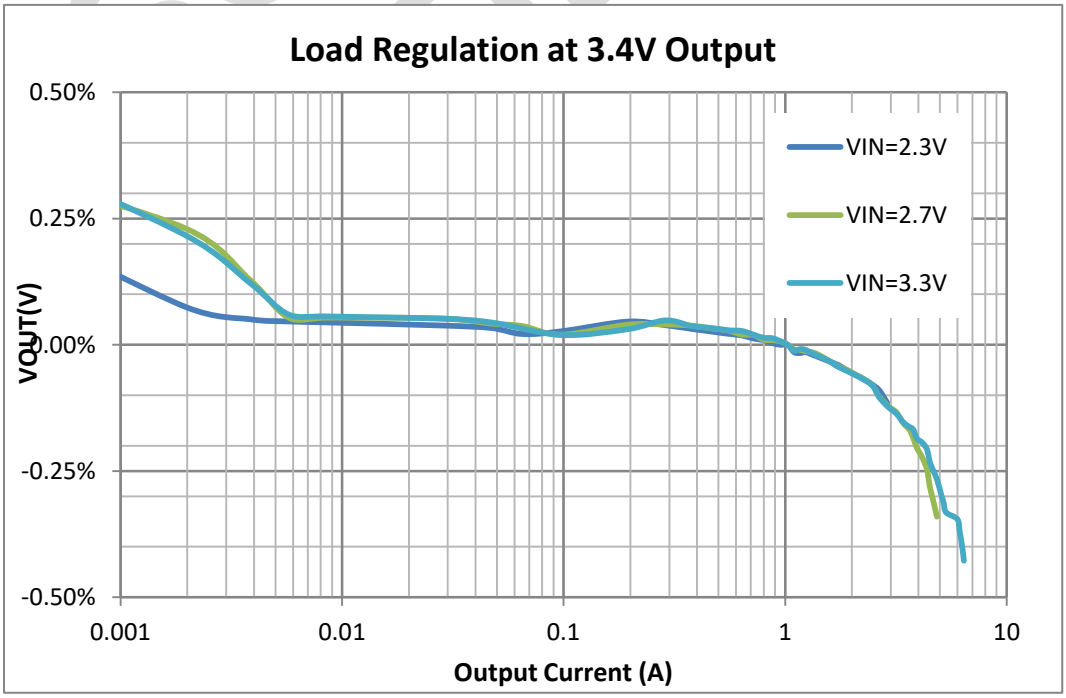
2.1 Efficiency

Test conditions: V_{IN}=2.3V/2.7V/3.3V, V_{OUT}=3.4V, measure the efficiency.



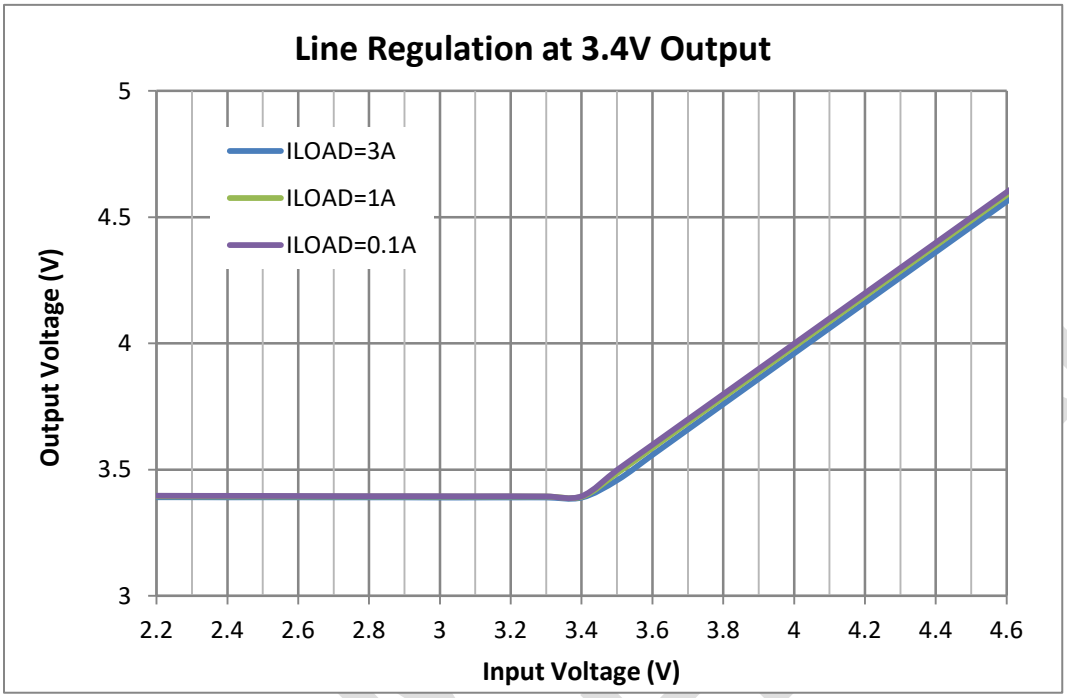
2.2 Load Regulation

Test conditions: V_{IN}=2.3V/2.7V/3.3V, V_{OUT}=3.4V, measure the load regulation.



2.3 Line Regulation

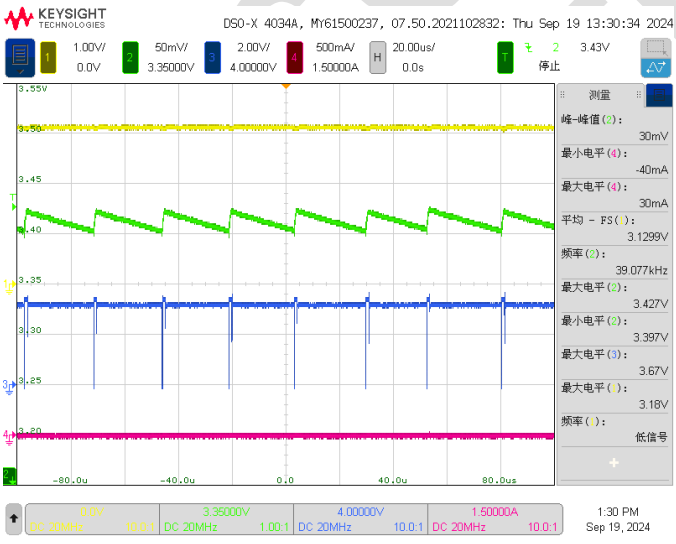
Test conditions: V_{IN}=2.2V-4.6V, I_{LOAD}=0.1A/1A/3A, V_{OUT}=3.4V, measure the line regulation.



2.4 Output Voltage Ripple

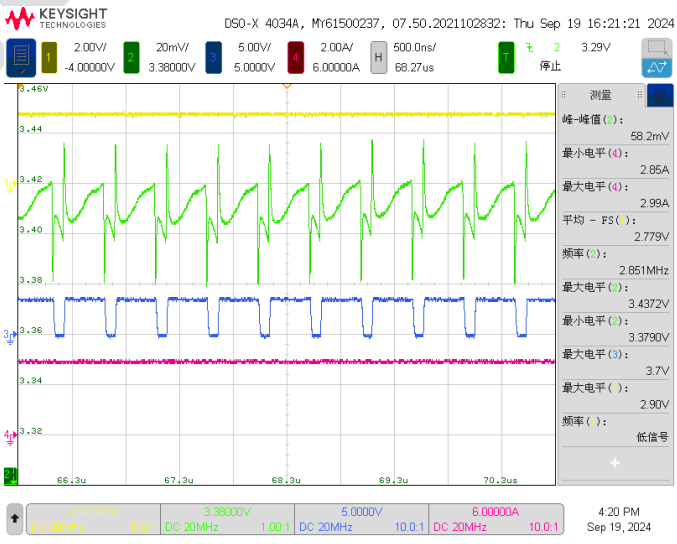
Test conditions: V_{IN}=3.2V, V_{OUT}=3.4V, measure the output voltage ripple.

I_{LOAD}=10mA



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

I_{LOAD}=3A



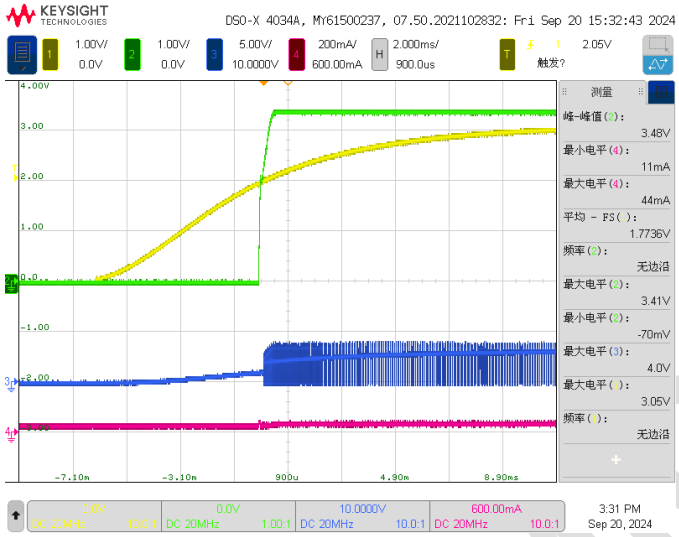
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.5 VIN On/Off

2.5.1 Boost mode

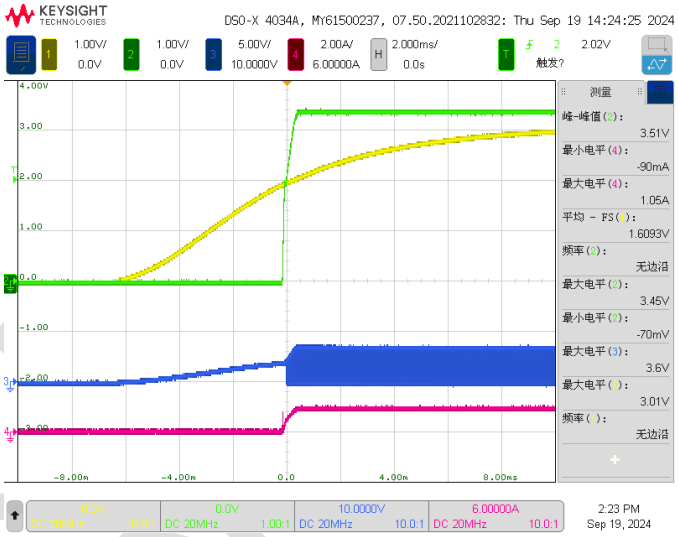
Test conditions: V_{IN}=3.2V, V_{OUT}=3.4V, V_{IN} power on.

I_{LOAD}=10mA



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

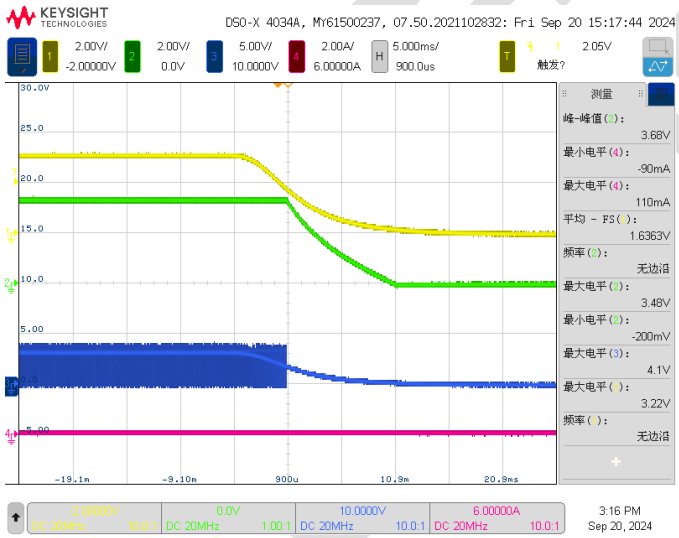
R_{LOAD}=3.4ohm



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

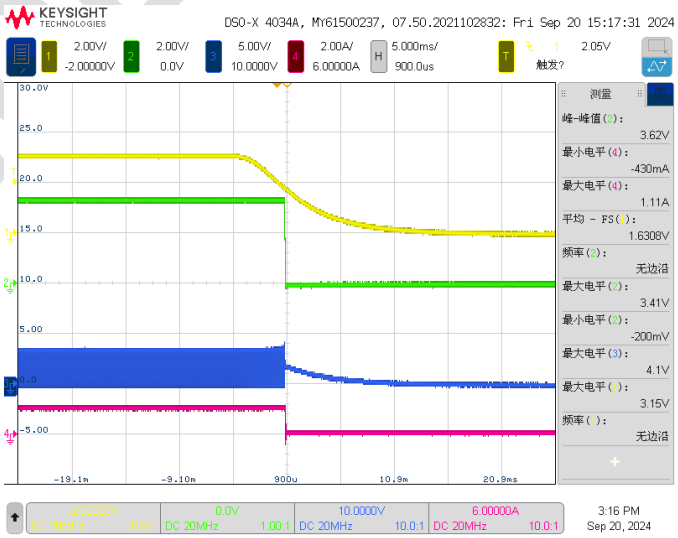
Test conditions: V_{IN}=3.2V, V_{OUT}=3.4V, V_{IN} power off.

I_{LOAD}=10mA



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

I_{LOAD}=1A

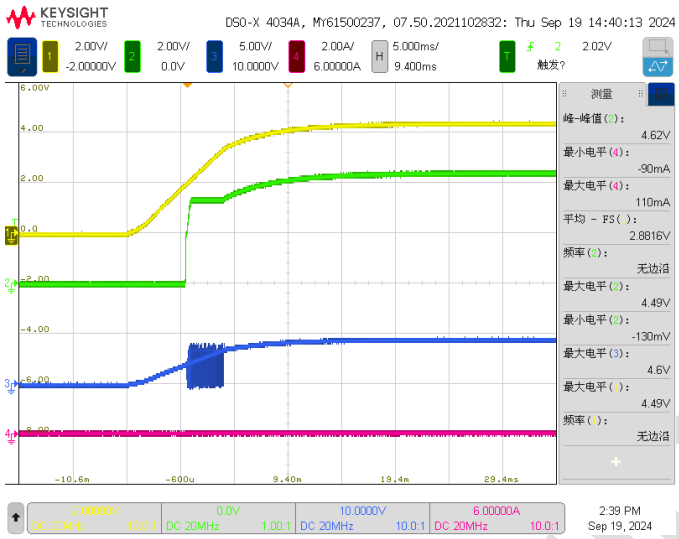


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.5.2 Bypass mode

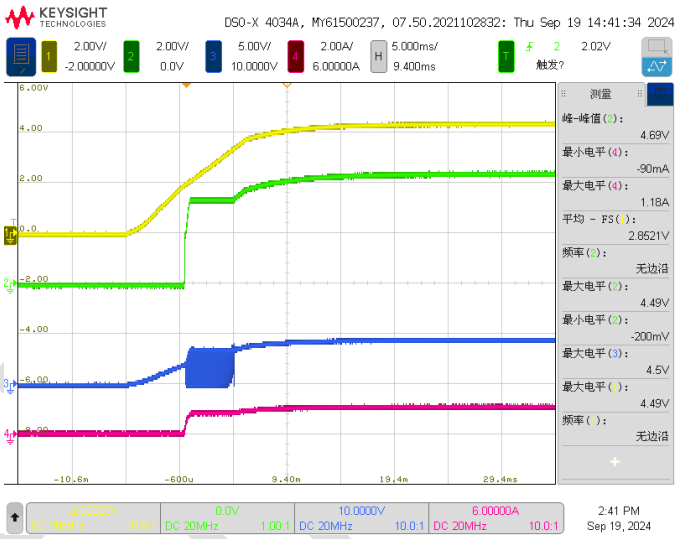
Test conditions: V_{IN}=4.5V, V_{OUT}=3.4V, V_{IN} power on.

I_{LOAD}=10mA



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

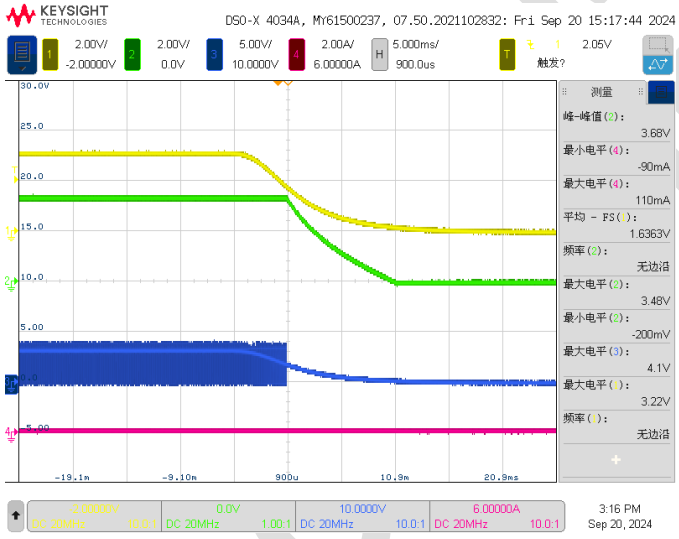
R_{LOAD}=3.4ohm



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

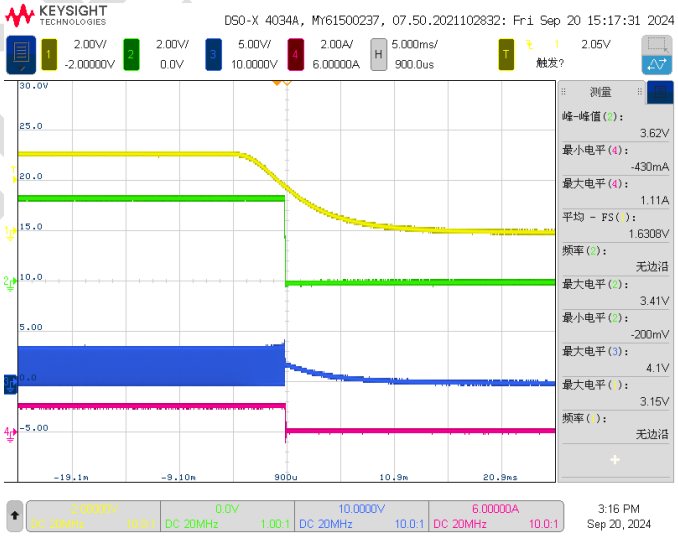
Test conditions: V_{IN}=4.5V, V_{OUT}=3.4V, V_{IN} power off.

I_{LOAD}=10mA



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

I_{LOAD}=1A

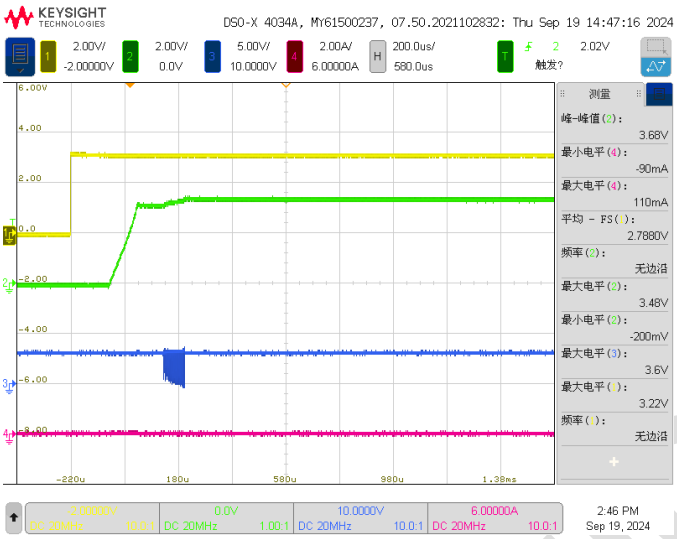


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.6 EN On/Off

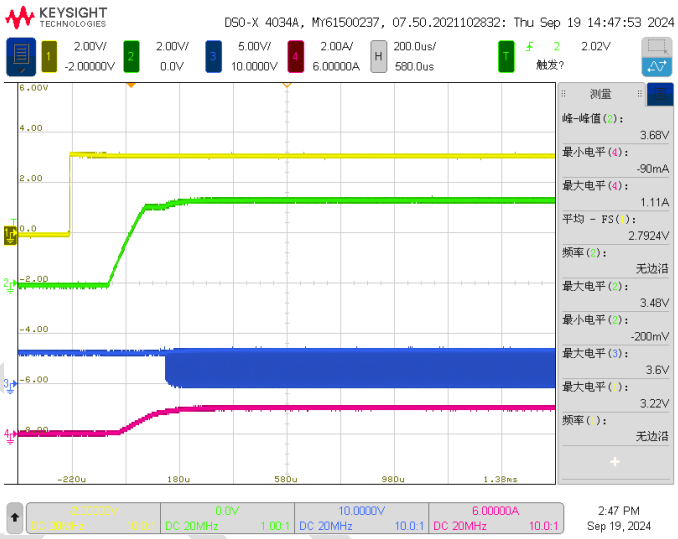
Test conditions: V_{IN}=V_{EN}=3.2V, V_{OUT}=3.4V, EN on.

I_{LOAD}=10mA



Ch1-V_{EN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

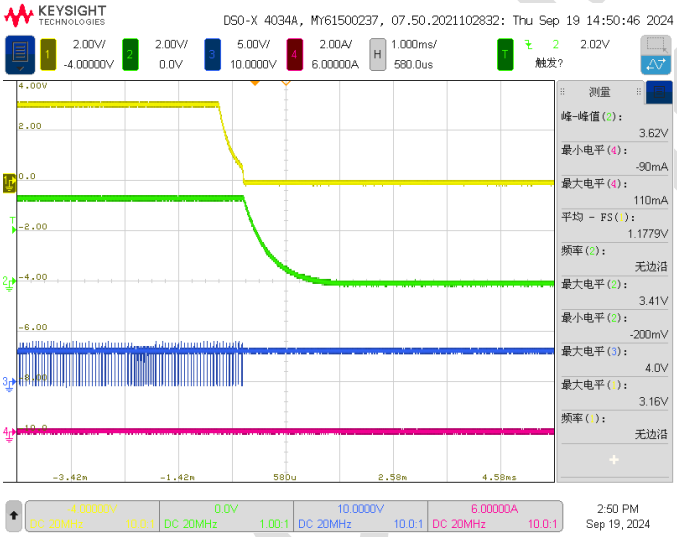
R_{LOAD}=3.4ohm



Ch1-V_{EN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

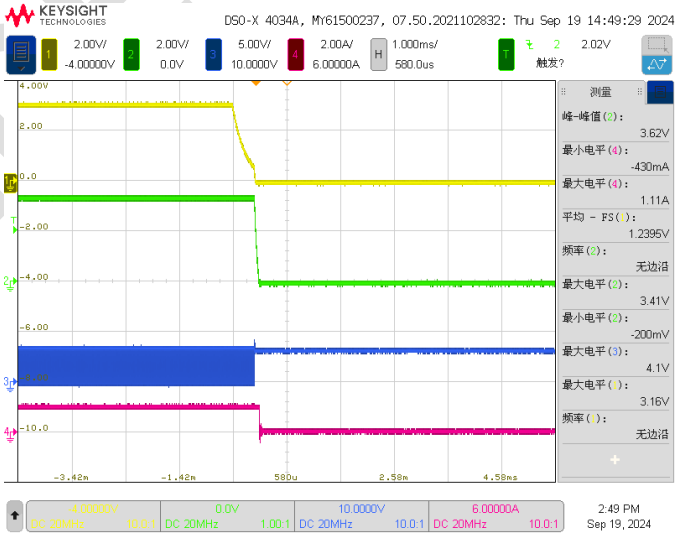
Test conditions: V_{IN}=V_{EN}=3.2V, V_{OUT}=3.4V, EN off.

I_{LOAD}=10mA



Ch1-V_{EN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

I_{LOAD}=1A



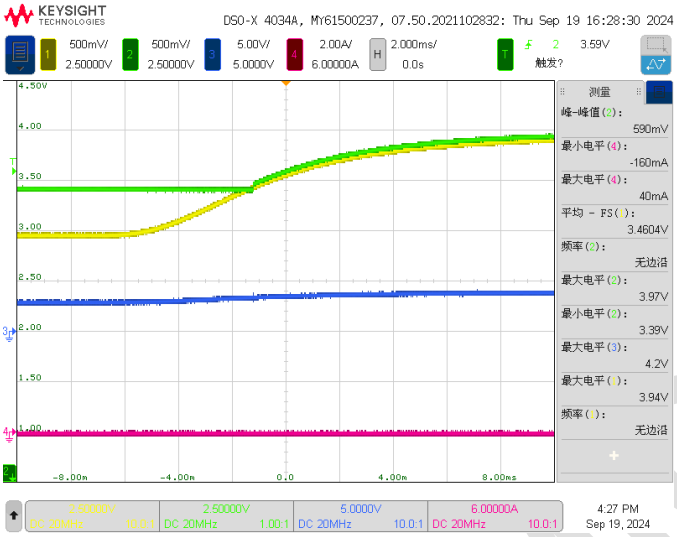
Ch1-V_{EN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.7 Mode Transient

2.7.1 Mode transient by changing VIN in auto bypass mode.

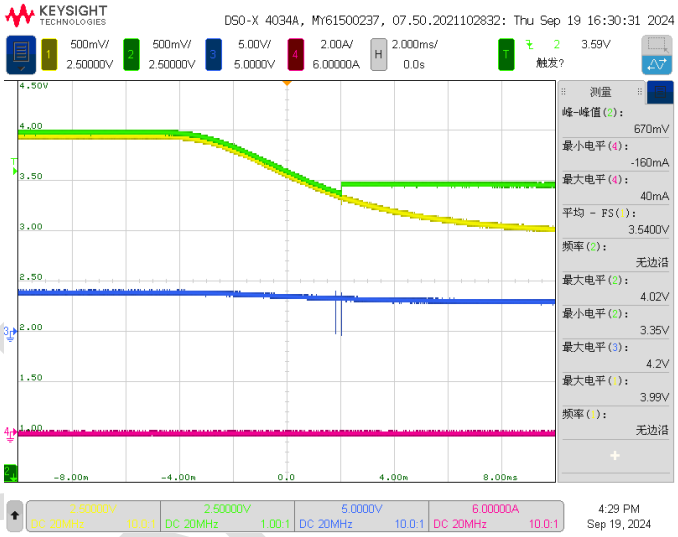
Test conditions: V_{OUT}=3.4V, change mode by V_{IN} and measure the mode transient.

V_{IN}=3V to 4V, I_{LOAD}=0A



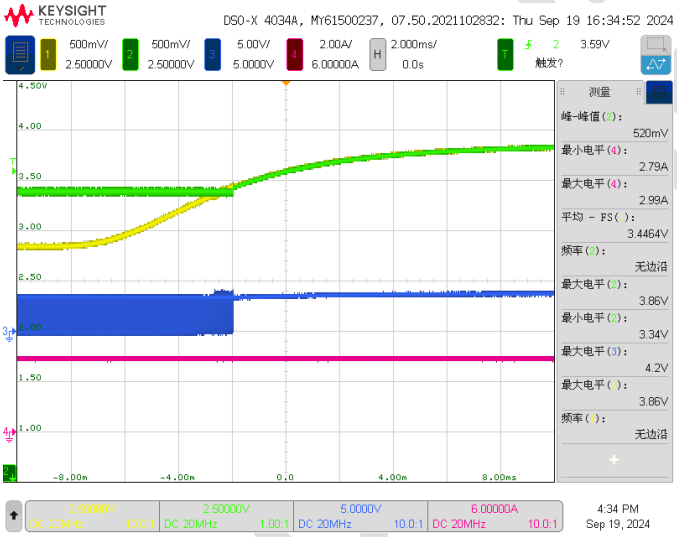
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{IN}=4V to 3V, I_{LOAD}=0A



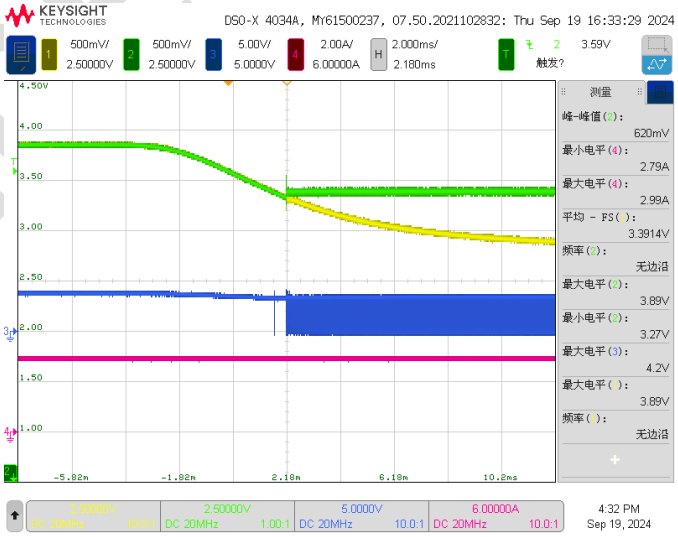
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{IN}=3V to 4V, I_{LOAD}=3A



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{IN}=4V to 3V, I_{LOAD}=3A

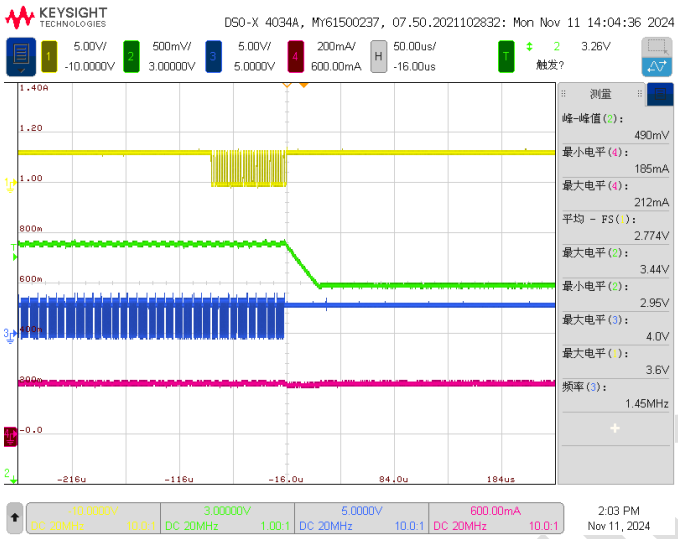


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.7.2 Mode transient by registers between auto bypass mode and forced bypass mode.

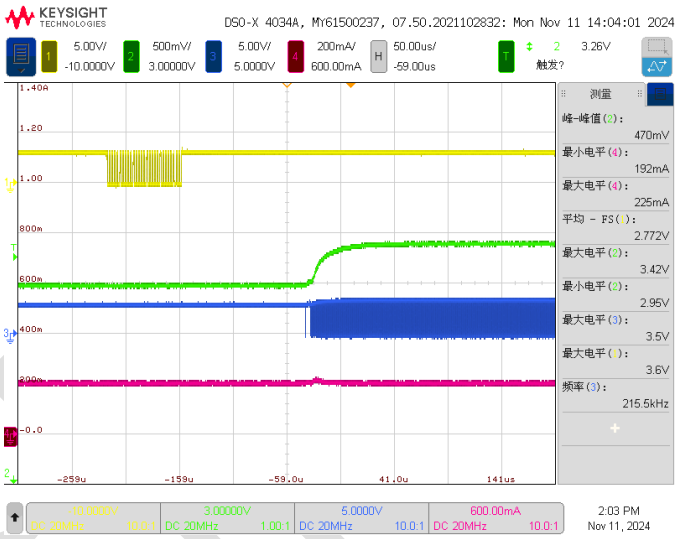
Test conditions: V_{IN}=3V, V_{OUT}=3.4V, change mode by registers and measure the mode transient.

Boost to Bypass, I_{LOAD}=200mA



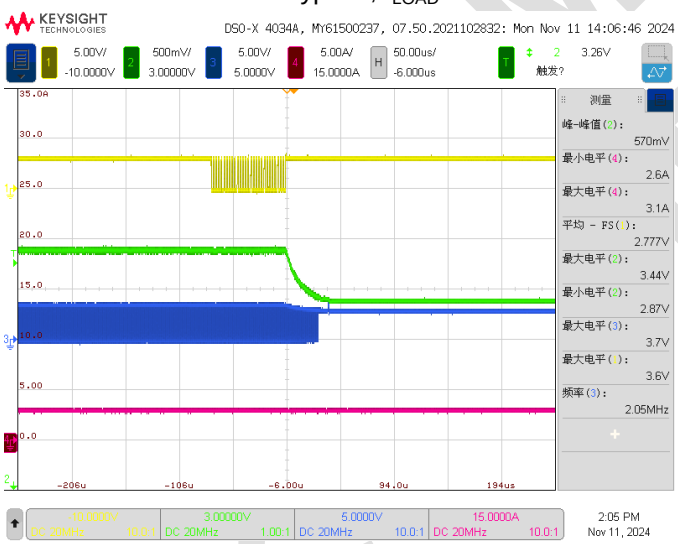
Ch1-V_{SCL}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

Bypass to Boost, I_{LOAD}=200mA



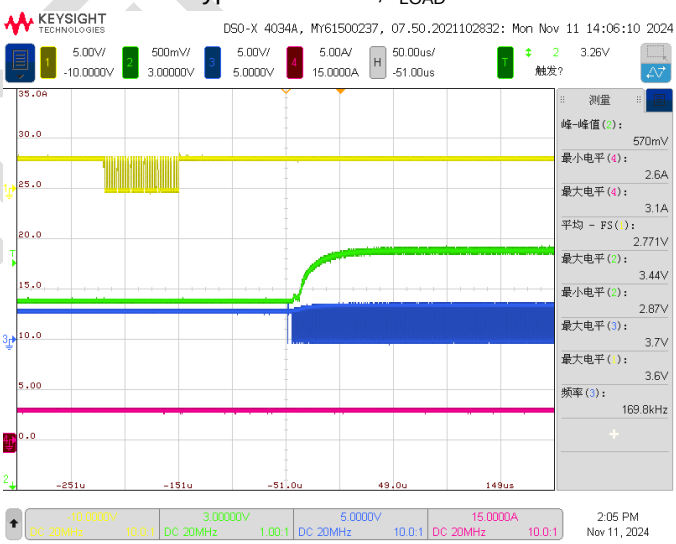
Ch1-V_{SCL}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

Boost to Bypass, I_{LOAD}=3A



Ch1-V_{SCL}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

Bypass to Boost, I_{LOAD}=3A

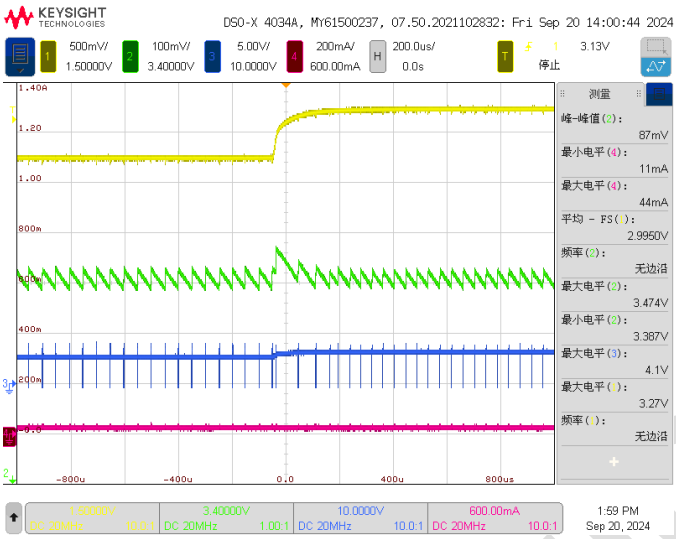


Ch1-V_{SCL}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.8 Line Transient

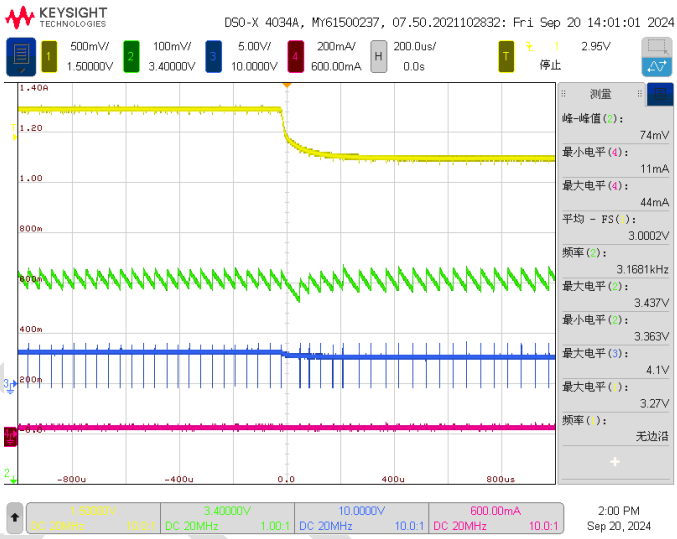
Test conditions: V_{OUT}=3.4V, change V_{IN} and measure the line transient in boost mode.

V_{IN} =2.7V to 3.2V, I_{LOAD}=10mA



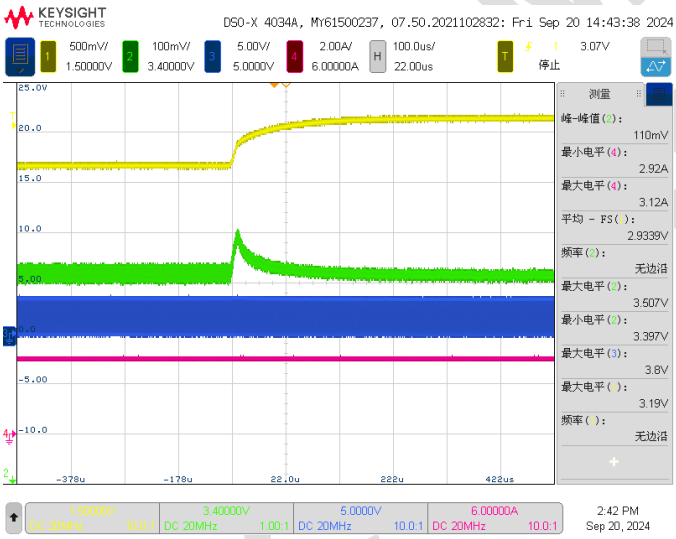
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{IN} =3.2V to 2.7V, I_{LOAD}=10mA



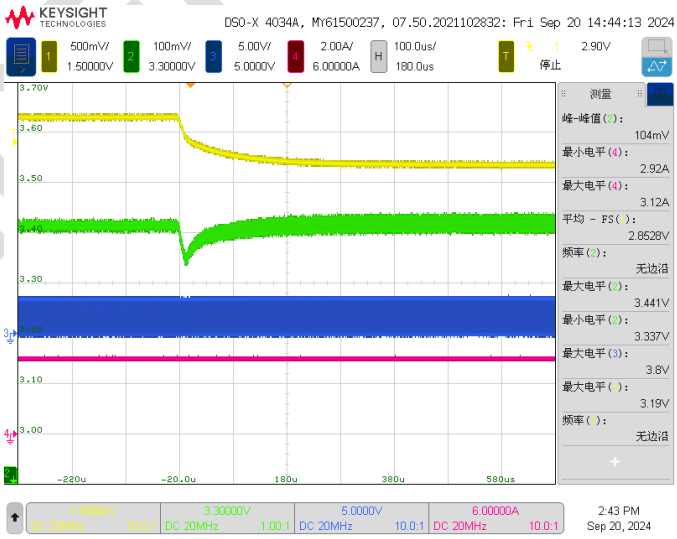
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{IN} =2.7V to 3.2V, I_{LOAD}=3A



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{IN} =3.2V to 2.7V, I_{LOAD}=3A

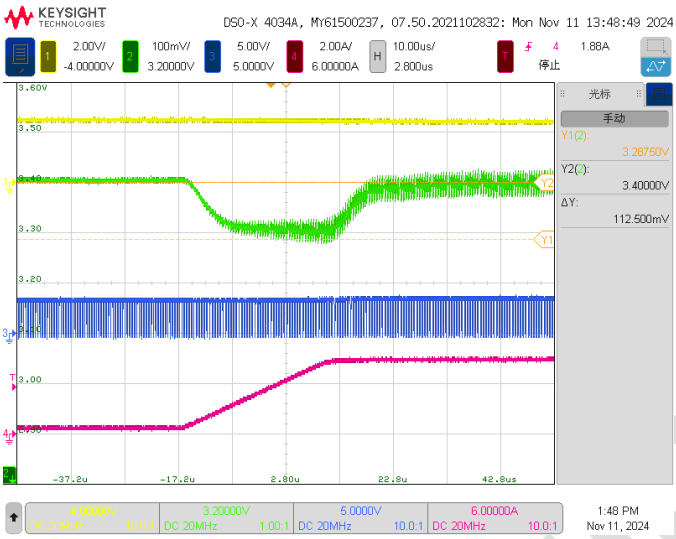


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.9 Load Transient

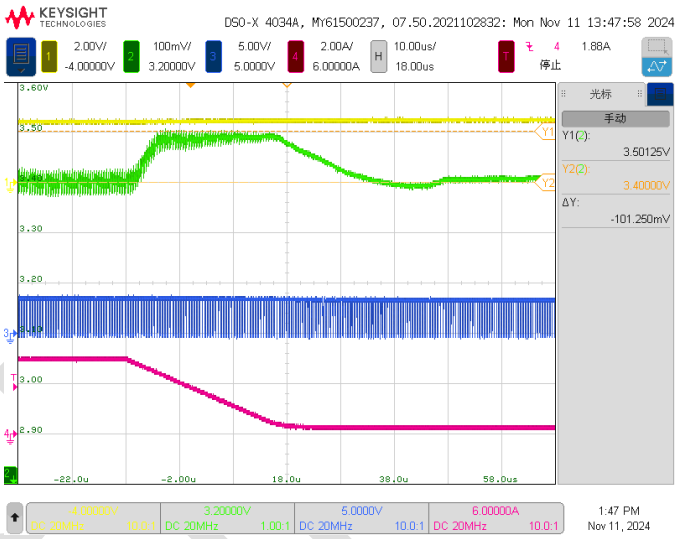
Test conditions: V_{IN}=2.5V, V_{OUT}=3.4V, measure the load transient in boost mode.

I_{LOAD}=0.2-3A, 0.1A/us



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

I_{LOAD}=3A-0.2A, 0.1A/us

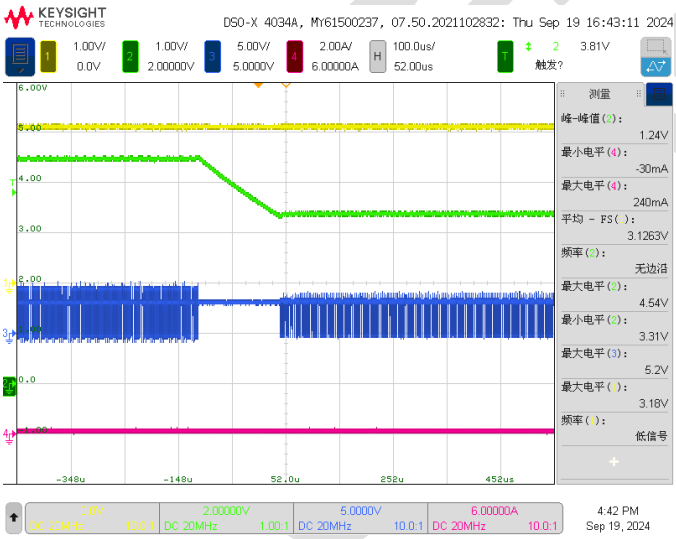


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.10 Dynamic Voltage Scaling

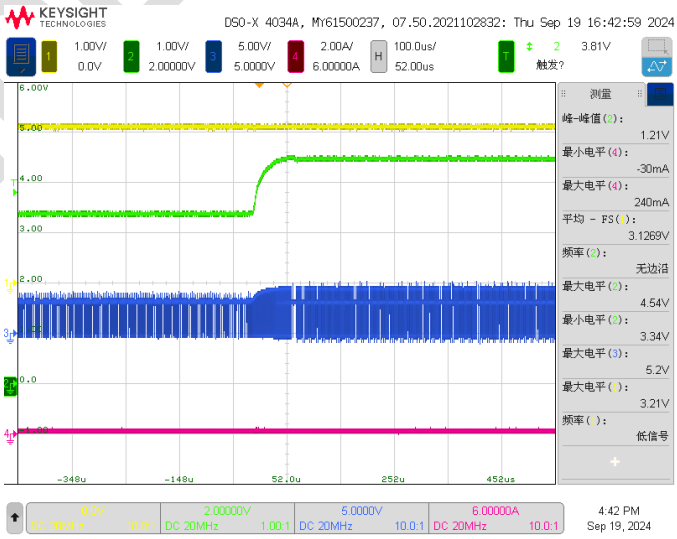
Test conditions: V_{IN}=3.2V, change the output voltage and measure the dynamic voltage scaling.

V_{OUT}=4.5V to 3.4V, I_{LOAD}=100mA



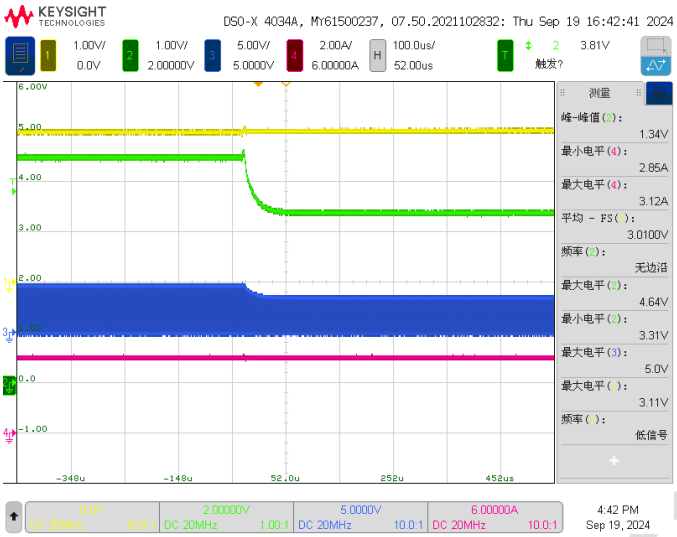
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{OUT}=3.4V to 4.5V, I_{LOAD}=100mA



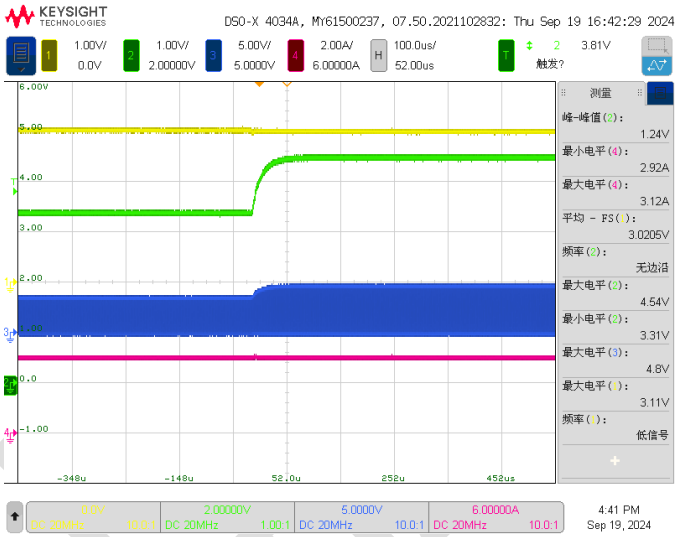
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{OUT}=4.5V to 3.4V, I_{LOAD}=3A



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

V_{OUT}=3.4V to 4.5V, I_{LOAD}=3A

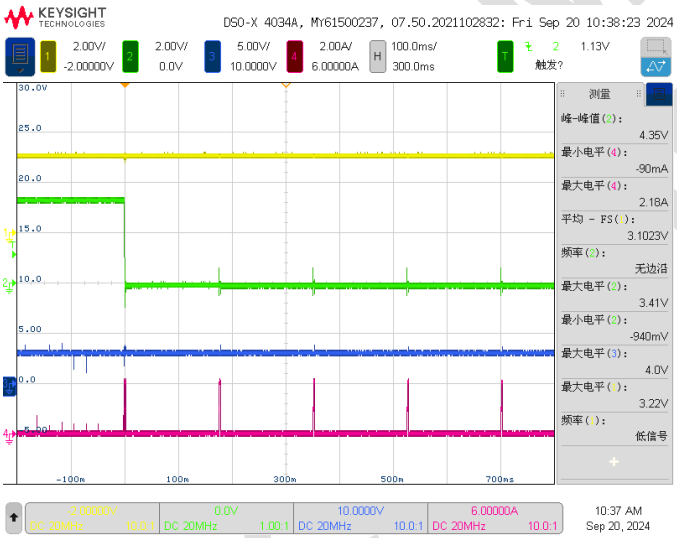


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.11 Short Circuit Protection

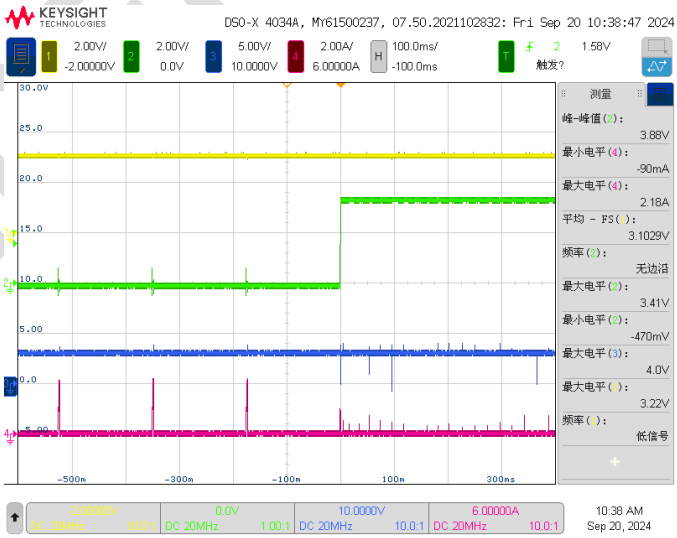
Test conditions: V_{IN}=3.2V, V_{OUT}=3.4V, measure the SCP entry and recovery in boost mode.

I_{LOAD}=0, SCP entry



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{L}

I_{LOAD}=0, SCP recovery

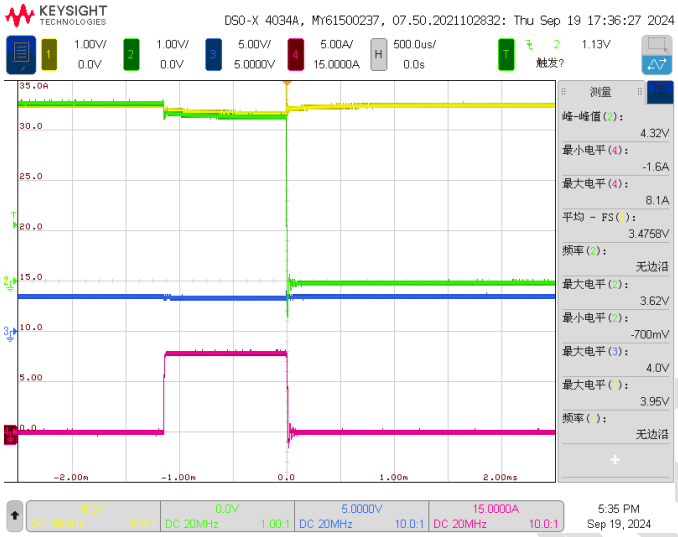


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{L}

2.12 Over Current Protection

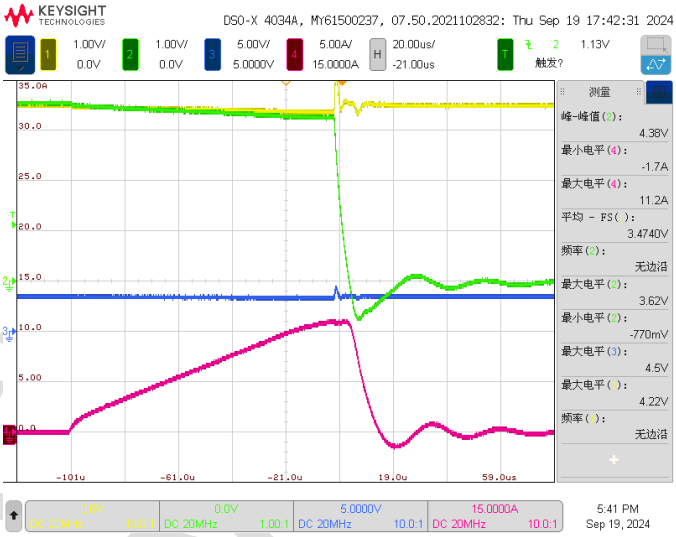
Test conditions: V_{IN}=3.6V, increasing I_{LOAD} and measure OCP in bypass mode.

I_{LOAD}=0 to 8A, BYPASS_LIM1_OFF=0, BYPASS_LIM2_OFF=1



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

I_{LOAD}=0 to 12A, BYPASS_LIM1_OFF=1, BYPASS_LIM2_OFF=0



Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_{LOAD}

2.13 Thermal Test

Test conditions: measure the case temperature (Tc) rise with different input voltage, output voltage and load current.