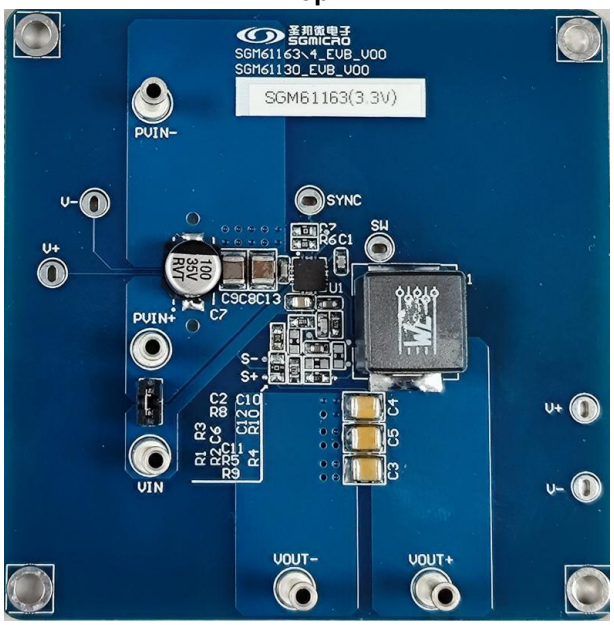
SGM61163 Demo Board Test Report

4.5V to 18V Input (12V TYP), 3.3V/6A Output

Demo Board Pictures:

Top



Bottom

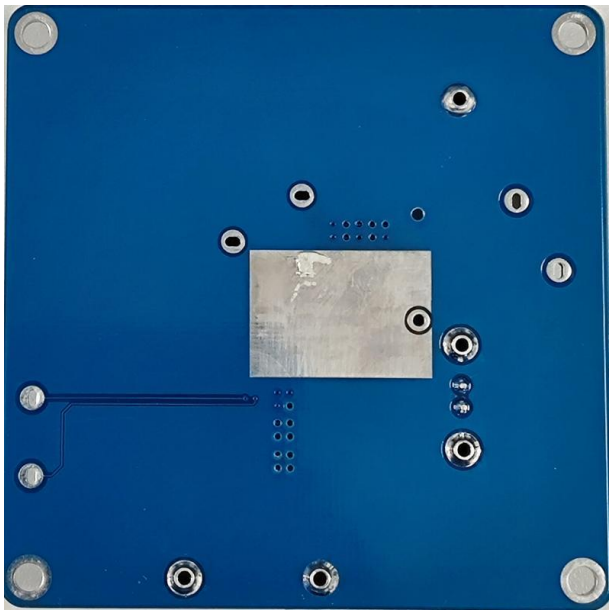
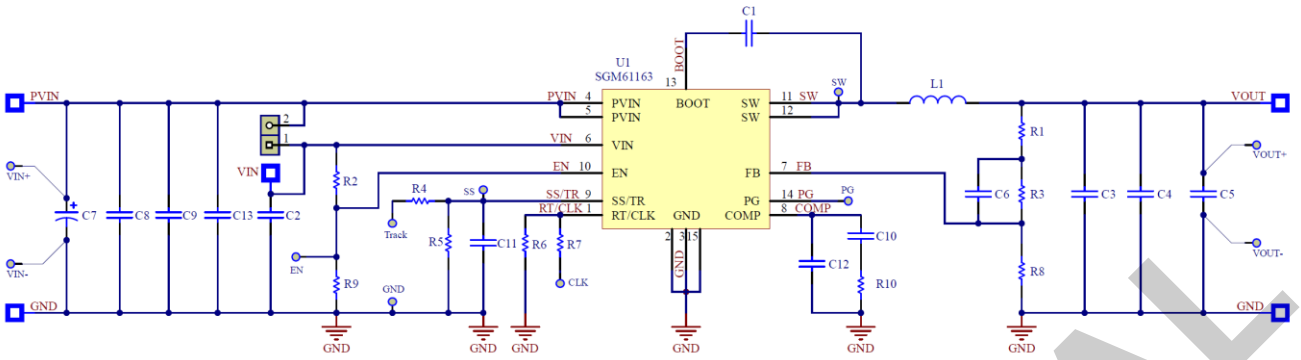


Table of Contents

1. Schematic, BOM List and PCB Layout

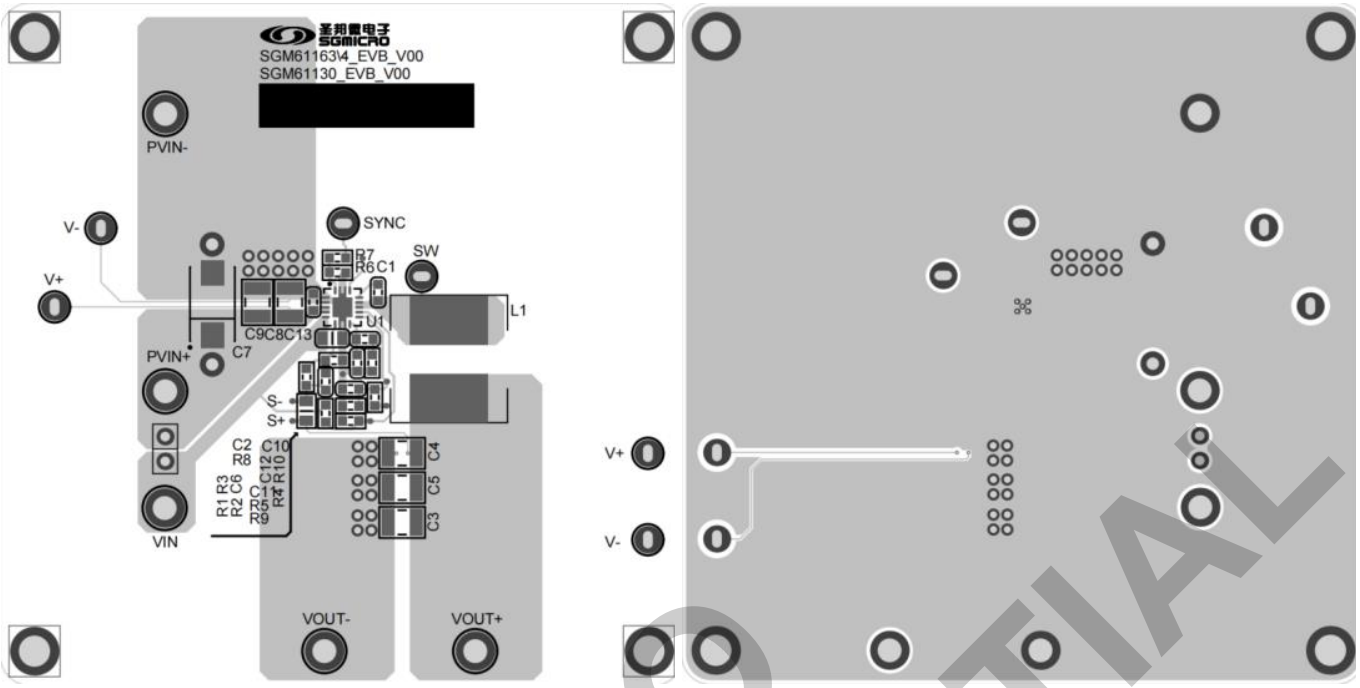
1.1 Schematic



1.2 BOM List

Item	Quantity	Designator	Description	Manufactory
1	2	C1, C13	Ceramic capacitor, 0.1μF 25V, X7R, ±10%, 0603	muRata
2	1	C2	Ceramic capacitor, 4.7μF 25V, X5R, ±10%, 0805, GRM219R61E475KA73	muRata
3	3	C3, C4, C5	Ceramic capacitor, 47μF 10V, X7R, ±10%, 1210, GRM32ER71A476KE15	muRata
4	0	C6	NC	/
5	1	C7	Solid Electrolytic Capacitor, 100μF, 35V	Standard
6	1	C8	Ceramic capacitor, 10μF 25V, X7R, ±10%, 1210, GCM32ER71E106KA57	muRata
7	1	C9	Ceramic capacitor, 4.7μF 50V, X7R, ±10%, 1210, GCJ32ER71H475KA12	muRata
8	1	C10	Ceramic capacitor, 15nF 50V, X7R, ±10%, 0603	muRata
9	1	C11	Ceramic capacitor, 22nF 50V, X7R, ±10%, 0603	muRata
10	1	C12	Ceramic capacitor, 22pF 50V, C0G, ±5%, 0603	muRata
11	1	L1	Ind., 3.3μH±20%, I_{TEMP}=17.0A, I_{SAT}=17.0A, DCR=5.2mΩ, WE 7443320330	Würth
12	2	R1, R7	Film Resistor, 1%, 0Ω, 0603	Standard
13	1	R2	Film Resistor, 1%, 56KΩ, 0603	Standard
14	1	R3	Film Resistor, 1%, 10KΩ, 0603	Standard
15	0	R4, R5	NC	/
16	1	R6	Film Resistor, 1%, 100KΩ, 0603	Standard
17	1	R8	Film Resistor, 1%, 2.21KΩ, 0603	Standard
18	1	R9	Film Resistor, 1%, 10.5KΩ, 0603	Standard
19	1	R10	Film Resistor, 1%, 3.83KΩ, 0603	Standard
20	1	U1	SGM61163, 6A, 18V, Synchronous Buck Converter, TQFN-3.5×3.5-14L	SGMICRO
			Conclusion: Total 22 components	

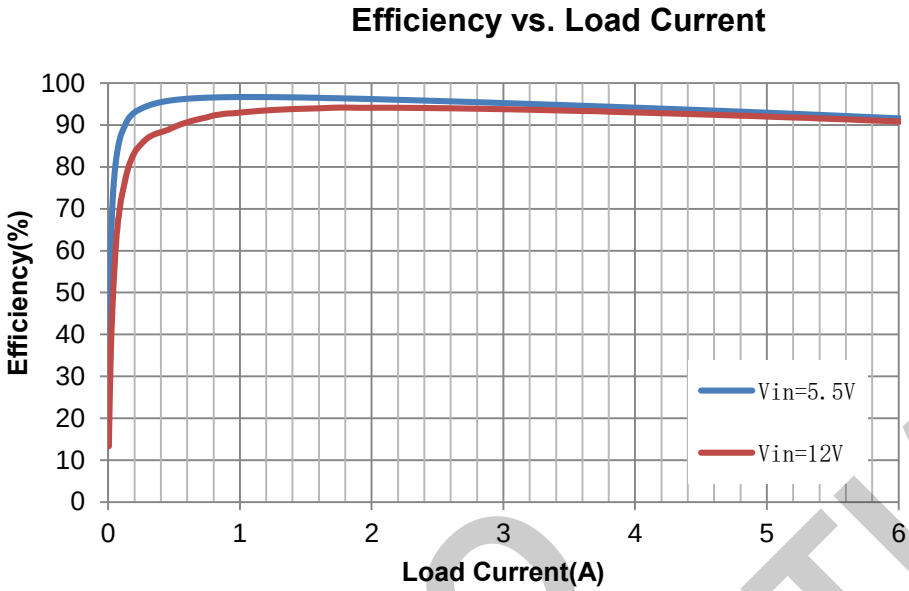
1.3 PCB Layout



PCB Top Layer PCB Bottom Layer

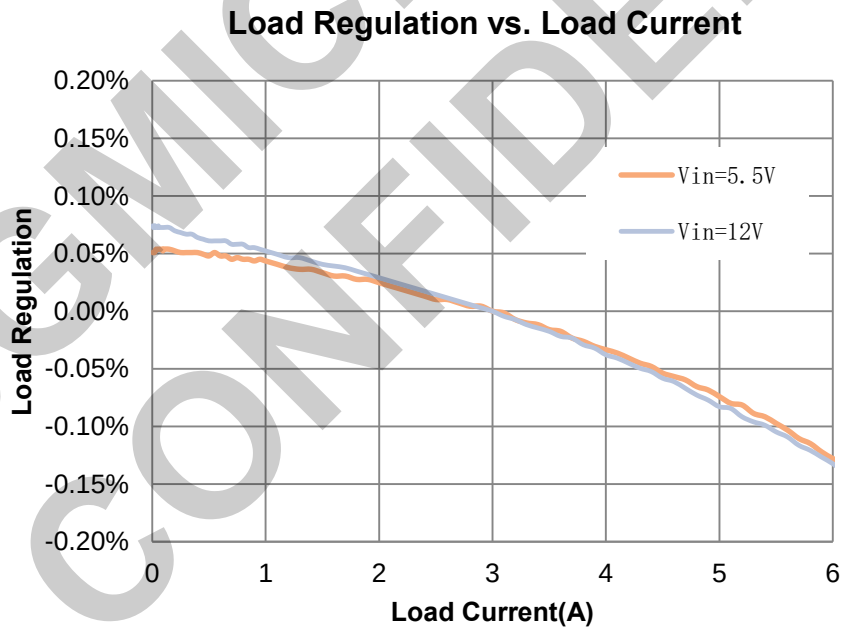
2. Efficiency

Test conditions: V_{IN}=5.5V/12V, V_{OUT}=3.3V, EN floating.



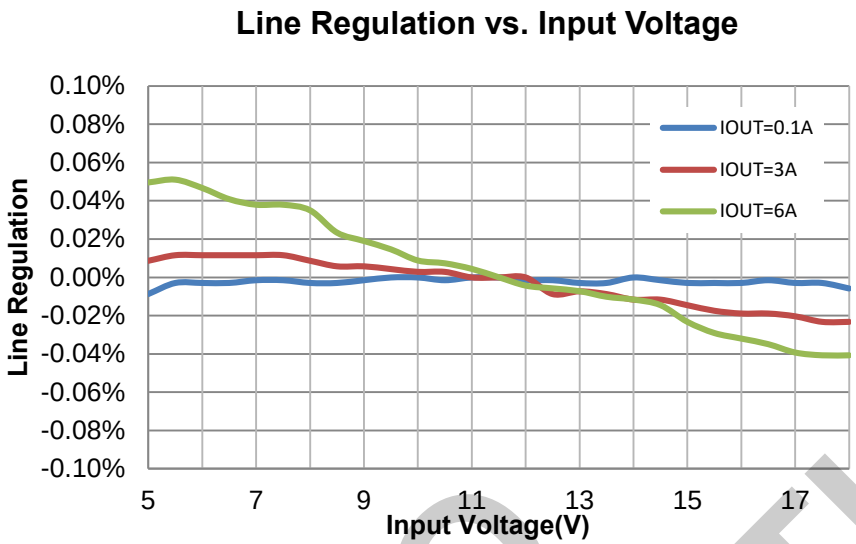
3. Load Regulation

Test conditions: V_{IN}=5.5V/12V, V_{OUT}=3.3V, EN floating.



4. Line Regulation

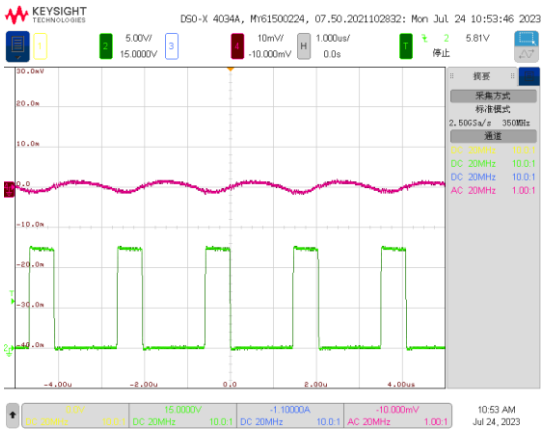
Test conditions: V_{OUT}=3.3V, I_{OUT}=0.1A/3A/6A, EN floating.



5. Output Voltage Ripple

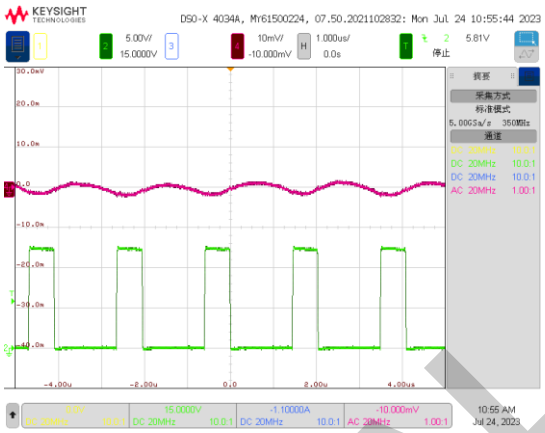
Test conditions: V_{IN}=12V, V_{OUT}=3.3V.

I_{OUT}=0.01A



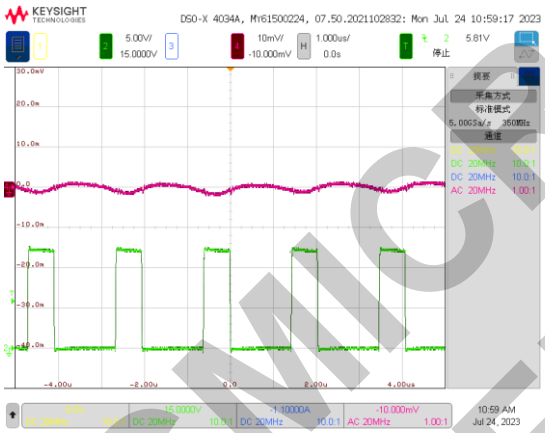
CH2=SW CH4=V_{OUT}(AC)

I_{OUT} =0.5A



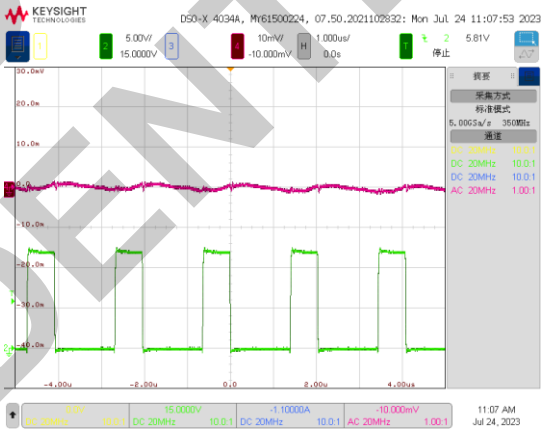
CH2=SW CH4=V_{OUT}(AC)

I_{OUT}=3A



CH2=SW CH4=V_{OUT}(AC)

I_{OUT} =6A

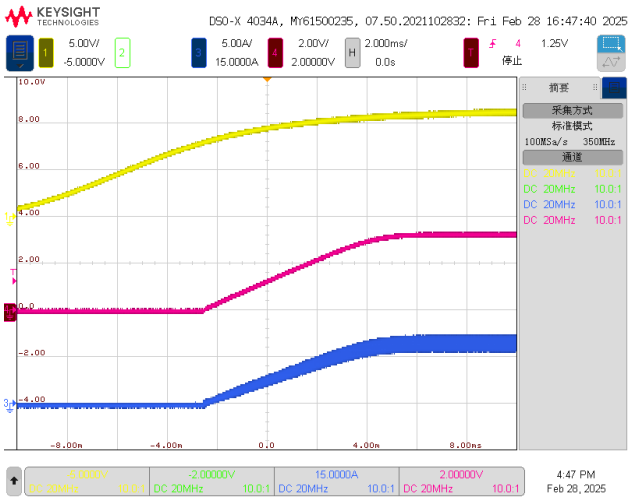


CH2=SW CH4=V_{OUT}(AC)

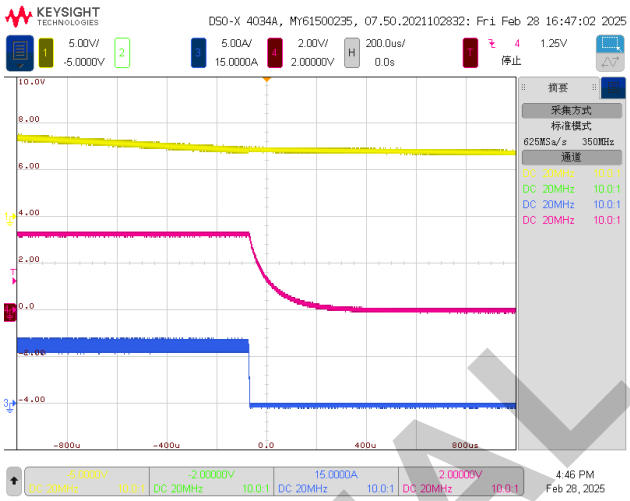
6. VIN Power On/Off

Test conditions: V_{OUT}=3.3V, R_{LOAD} =0.55Ω.

V_{IN} Power On



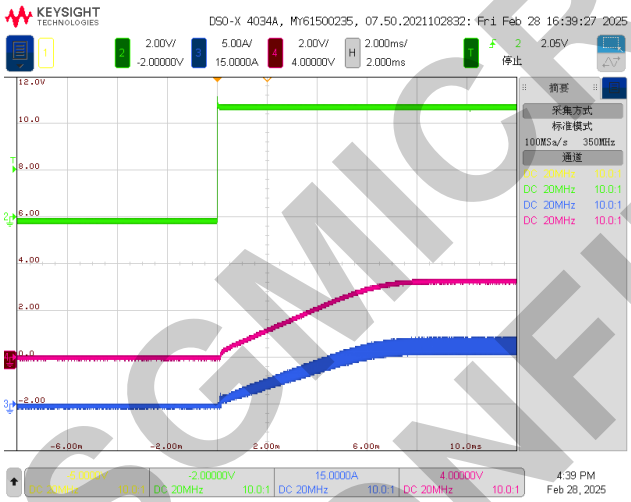
V_{IN} Power Off



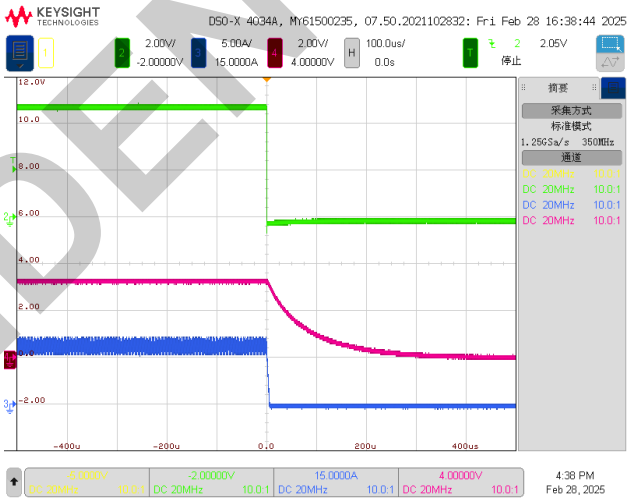
7. EN On/Off

Test conditions: V_{OUT}=3.3V, R_{LOAD} =0.55Ω.

EN Power On



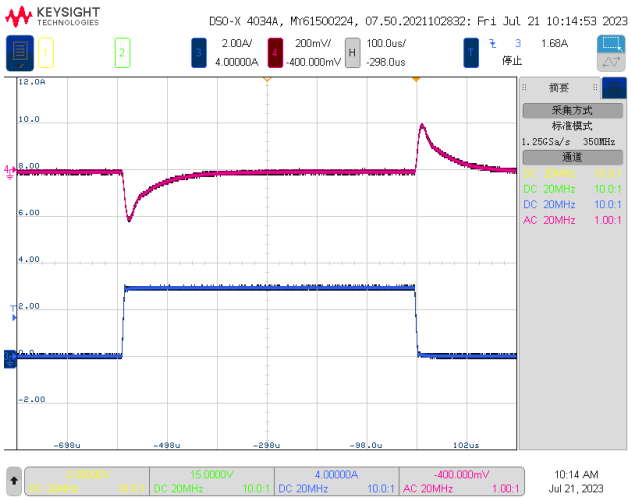
EN Power Off



8. Load Transient

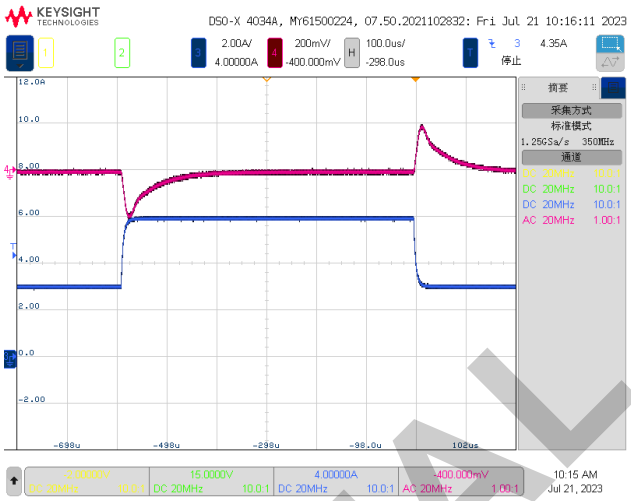
Test conditions: V_{IN}=12V, V_{OUT}=3.3V, Slew rate=0.5A/μs.

I_{OUT}=50mA to 3A to 50mA



CH3=I_{OUT} CH4=V_{OUT}(AC)

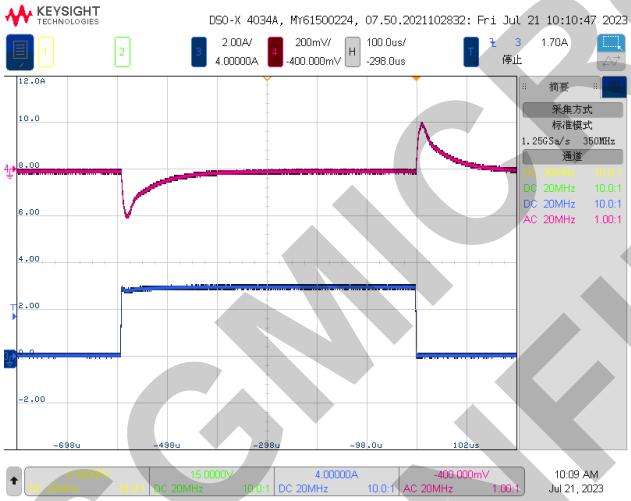
I_{OUT}=3A to 6A to 3A



CH3=I_{OUT} CH4=V_{OUT}(AC)

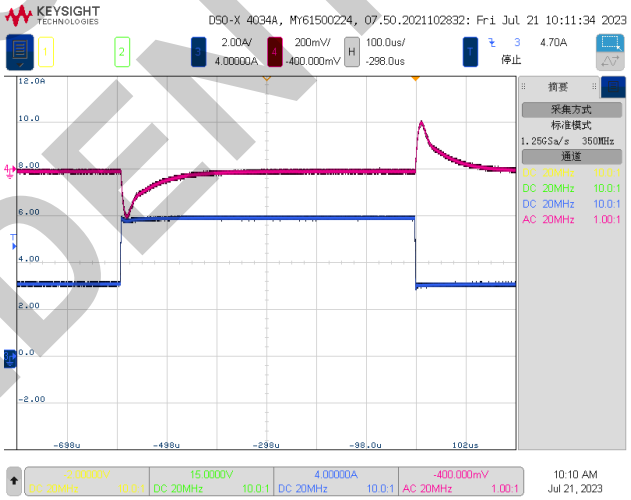
Test conditions: V_{IN}=12V, V_{OUT}=3.3V, Slew rate=4A/μs.

I_{OUT}=50mA to 3A to 50mA



CH3=I_{OUT} CH4=V_{OUT}(AC)

I_{OUT}=3A to 6A to 3A

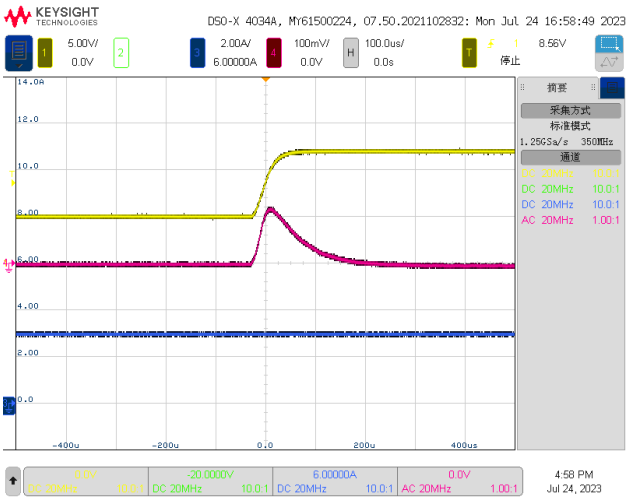


CH3=I_{OUT} CH4=V_{OUT}(AC)

9. Line Transient

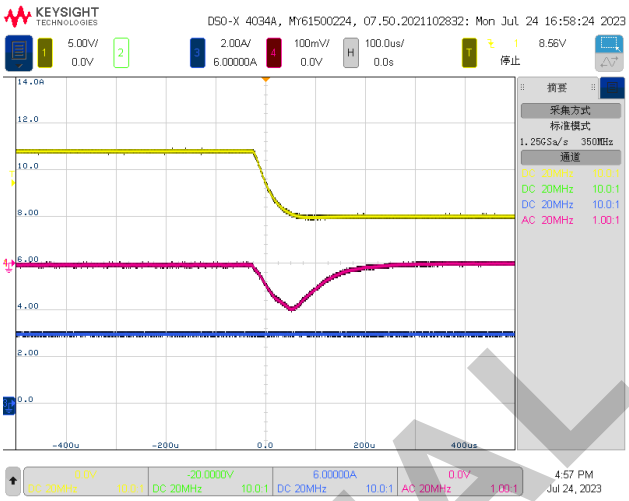
Test conditions: V_{OUT}=3.3V, I_{OUT}=3A, EN floating.

V_{IN}=5V to 12V



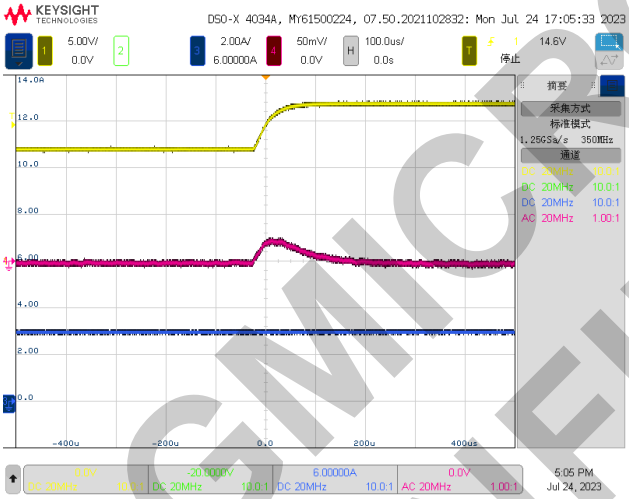
CH1=V_{IN} CH3=I_{OUT} CH4=V_{OUT}(AC)

V_{IN}=12V to 5V



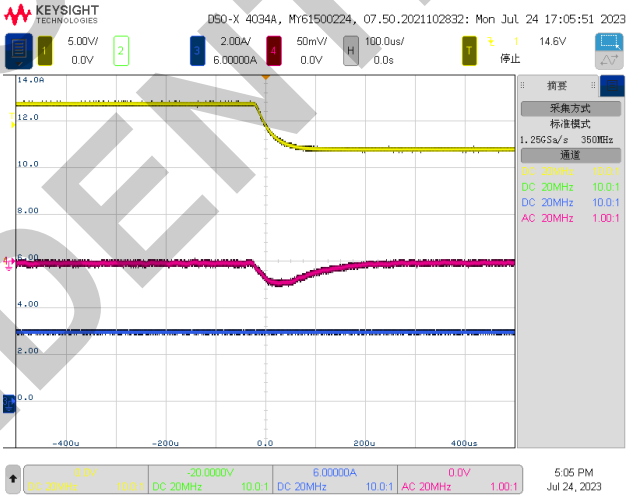
CH1=V_{IN} CH3=I_{OUT} CH4=V_{OUT}(AC)

V_{IN}=12V to 17V



CH1=V_{IN} CH3=I_{OUT} CH4=V_{OUT}(AC)

V_{IN}=17V to 12V

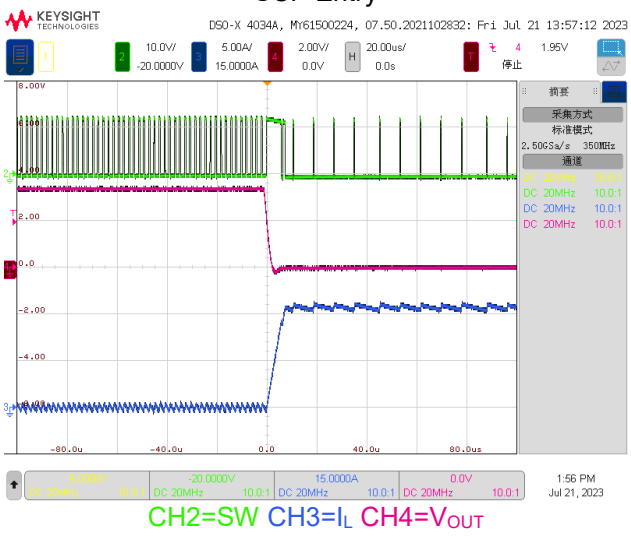


CH1=V_{IN} CH3=I_{OUT} CH4=V_{OUT}(AC)

10. SCP Entry and Recovery

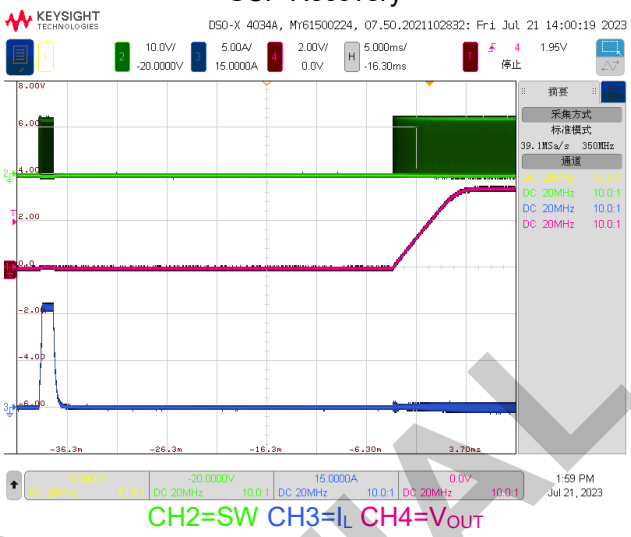
Test conditions: V_{IN}=12V, V_{OUT}=3.3V, Output Shorted Protection.

SCP Entry



CH2=SW CH3=I_L CH4=V_{OUT}

SCP Recovery

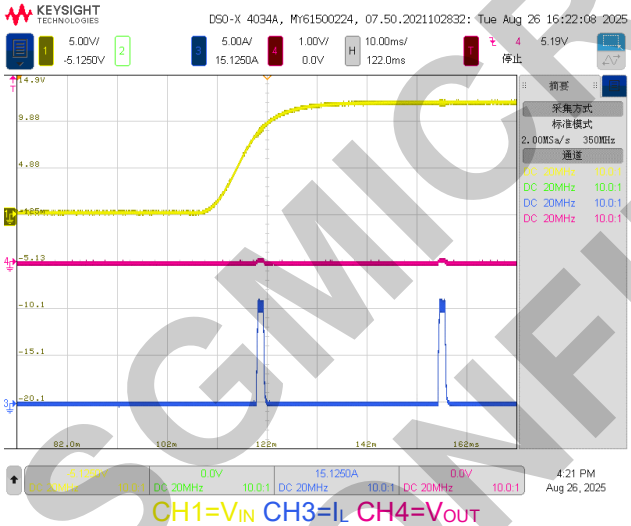


CH2=SW CH3=I_L CH4=V_{OUT}

11. VIN/EN On/Off during SCP

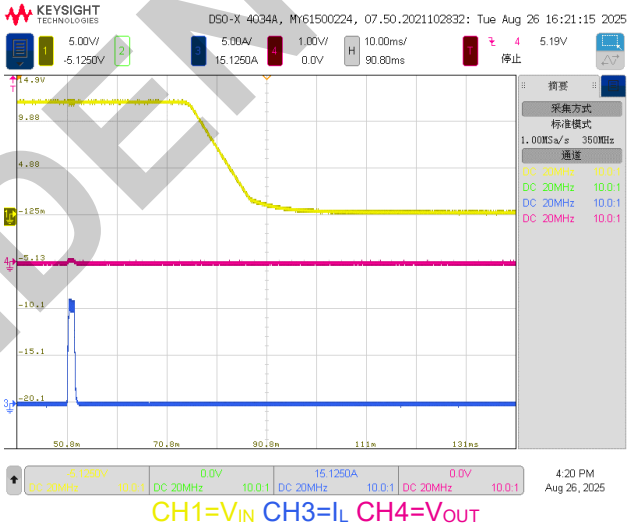
Test conditions: V_{IN}=12V, V_{OUT}=3.3V, short V_{OUT} to GND, V_{IN} Power On/Off.

V_{IN} Power On



CH1=V_{IN} CH3=I_L CH4=V_{OUT}

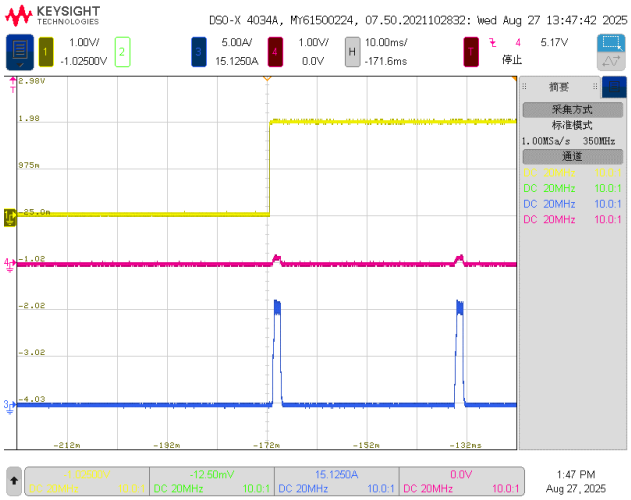
V_{IN} Power Off



CH1=V_{IN} CH3=I_L CH4=V_{OUT}

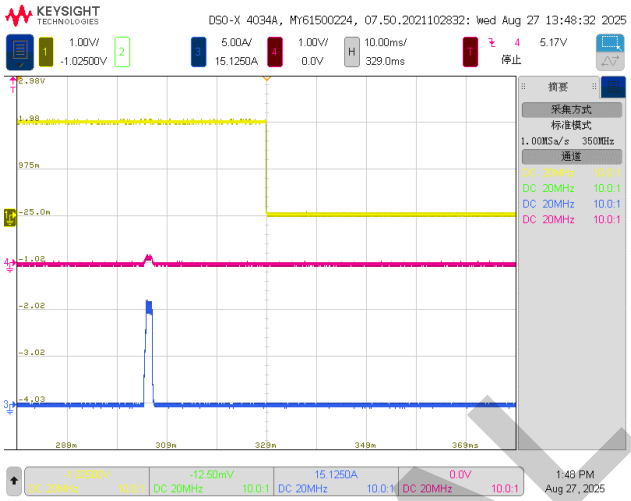
Test conditions: V_{IN}=12V, V_{OUT}=3.3V, short V_{OUT} to GND, EN On/Off.

EN On



CH1=V_{EN} CH3=I_L CH4=V_{OUT}

EN Off

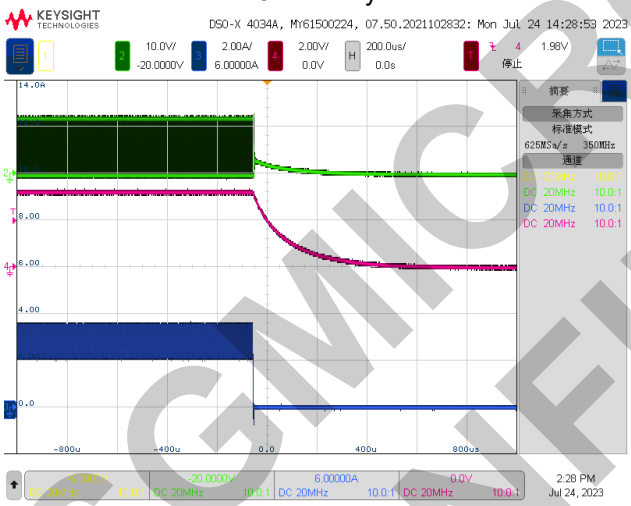


CH1=V_{EN} CH3=I_L CH4=V_{OUT}

12. OTP Entry

Test conditions: V_{IN}=12V, V_{OUT}=3.3V, R_{LOAD}=1Ω, Over temperature Protection.

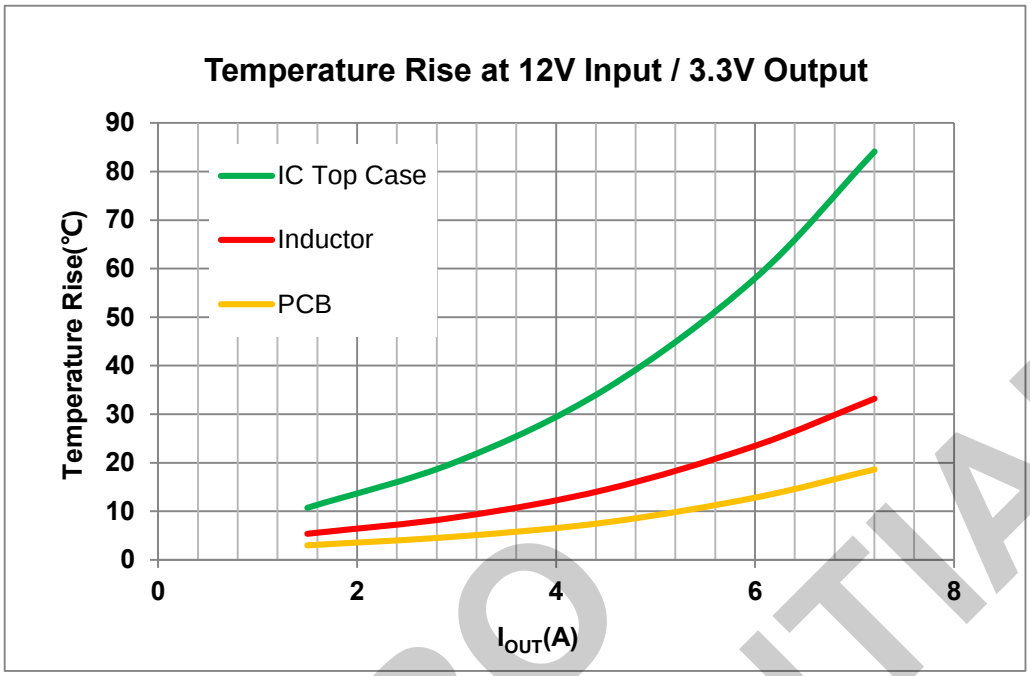
OTP Entry



CH2=SW CH3=I_L CH4=V_{OUT}

13. Thermal Test

Test conditions: V_{IN}=12V, V_{OUT}=5V, Room temperature test, Natural air convection heat dissipation.



I_{OUT}(A)	1.5	3	4.5	6	7.2
IC Top Case(℃)	38.2	48.3	63.0	86.0	112.2
Inductor(℃)	32.9	36.9	42.3	51.5	61.3
PCB(℃)	30.5	32.9	35.5	40.8	46.7
Ambient(℃)	28.0	28.1	27.8	28.0	28.1