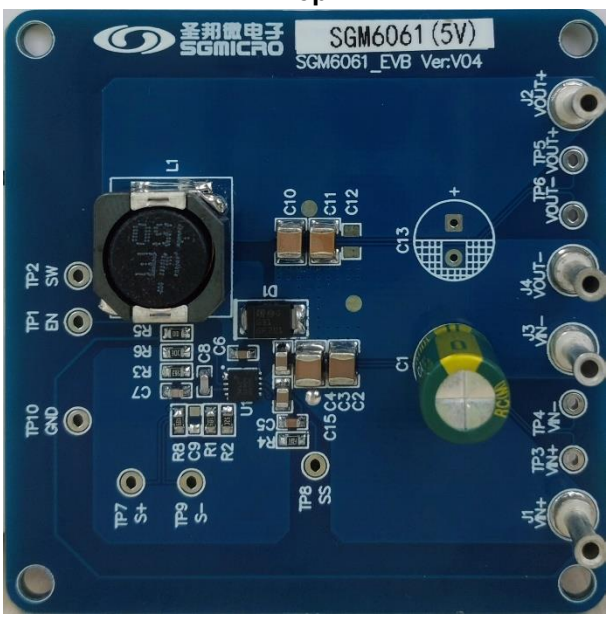
SGM6061 Demo Board Test Report

3.8V to 55V Input (12V TYP), 5V/1.5A Output

Demo Board Pictures:

Top



Bottom

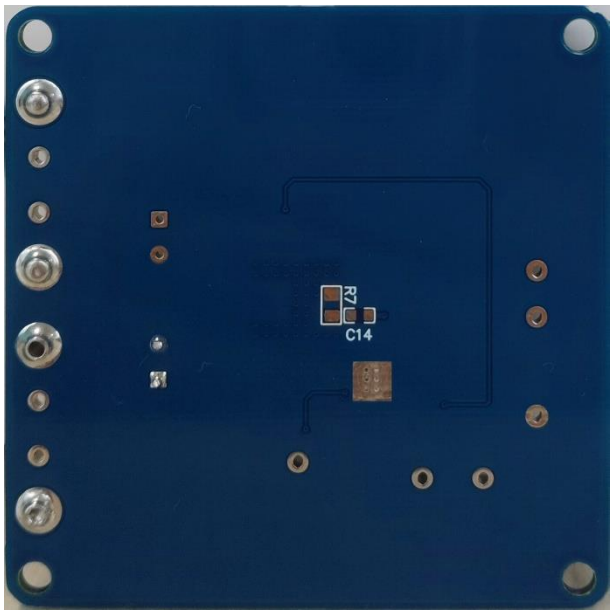
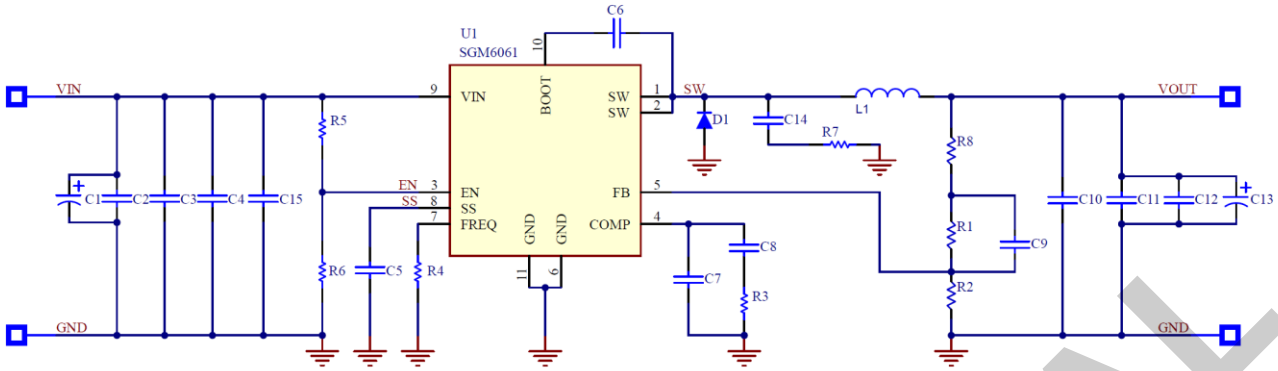


Table of Contents

1. Schematic, BOM List and PCB Layout

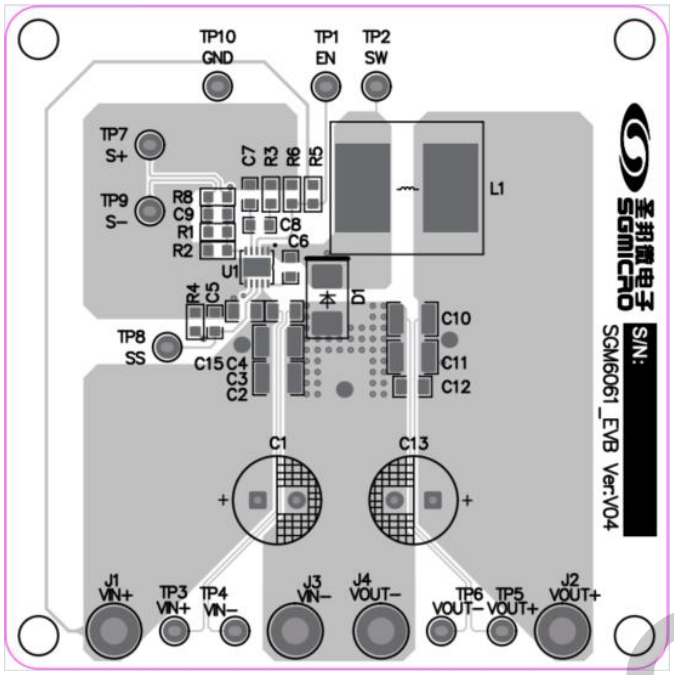
1.1 Schematic



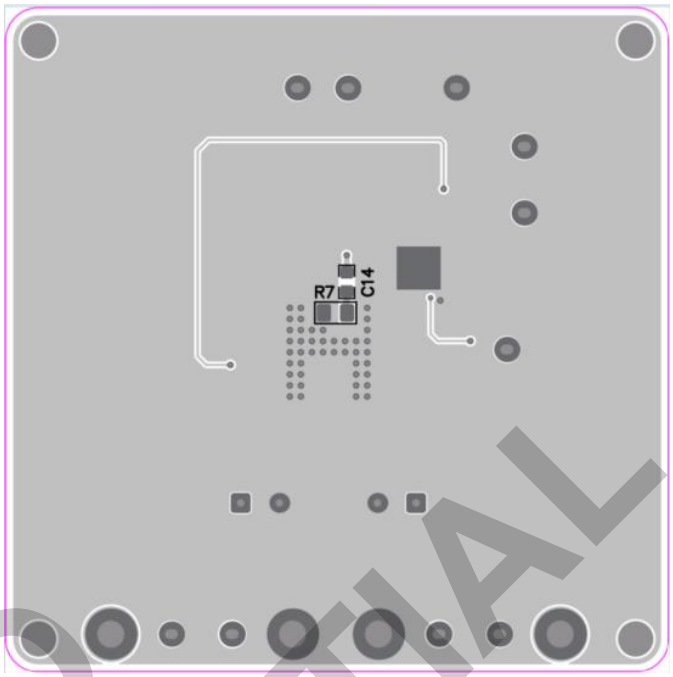
1.2 BOM List

Item	Quantity	Designator	Description	Manufactory
1	1	C1	47μF, 100V, Electrolytic capacitor	muRata
2	2	C2,C3	Ceramic capacitor, 10μF 100V, X7S, 1210	muRata
3	2	C4,C15	Ceramic capacitor, 0.1μF 100V, X7R, 0805	muRata
4	1	C5	Ceramic capacitor, 10nF 25V, C0G, 0603	muRata
5	1	C6	Ceramic capacitor, 0.1μF 25V, X7R, 0603	muRata
6	1	C7	Ceramic capacitor, 15pF 25V, C0G, 0603	muRata
7	1	C8	Ceramic capacitor, 1nF 25V, C0G, 0603	muRata
8	0	C9,C12,C13,C14	NC	
9	2	C10,C11	Ceramic capacitor, 22μF 25V, X7R, 1210	muRata
10	1	D1	Schottky rectifier, 100V, 3A, SMB, STPS3H100U	ST
11	1	L1	15μH Wire Wound, DCR = 26.5mΩ, I_{SAT}(10%) =9A, I_{RMS}(40℃) = 4.7A, 7447707150	Würth
12	1	R1	Film Resistor, 1%, 180KΩ, 0603	Standard
13	1	R2	Film Resistor, 1%, 34KΩ, 0603	Standard
14	1	R3	Film Resistor, 1%, 56KΩ, 0603	Standard
15	1	R4	Film Resistor, 1%, 180KΩ, 0603	Standard
16	1	R5	Film Resistor, 1%, 100KΩ, 0603	Standard
17	1	R6	Film Resistor, 1%, 20KΩ, 0603	Standard
18	0	R7	NC	
19	1	R8	Film Resistor, 1%, 50Ω, 0603	Standard
20	1	U1	SGM6061, 1.5A, 55V, High Frequency Buck Converter, TDFN-3×3-10L	SGMICRO
			Conclusion: Total 21 components	

1.3 PCB Layout



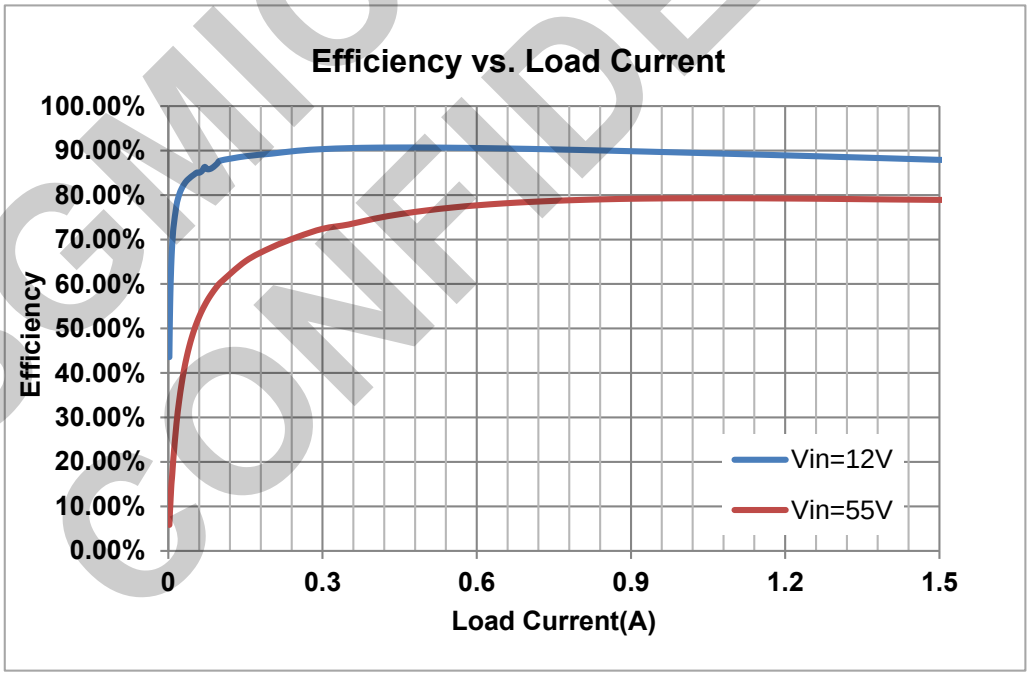
PCB Top Layer



PCB Bottom Layer

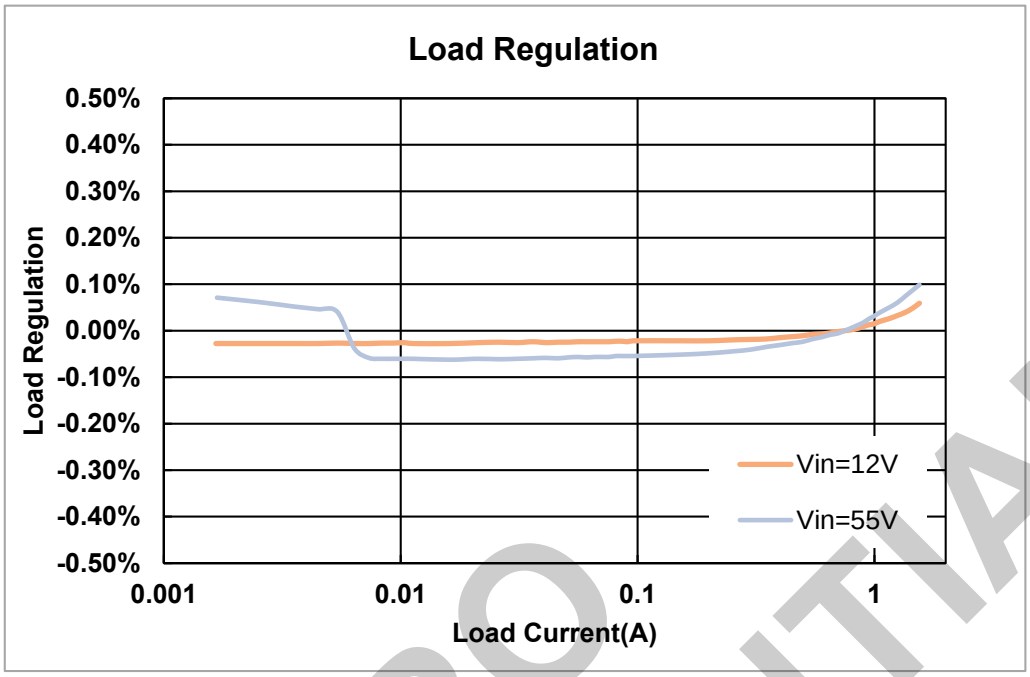
2. Efficiency

Test conditions: V_{IN}=12V/55V, V_{OUT}=5V, I_{OUT}=0.001A~1.5A.



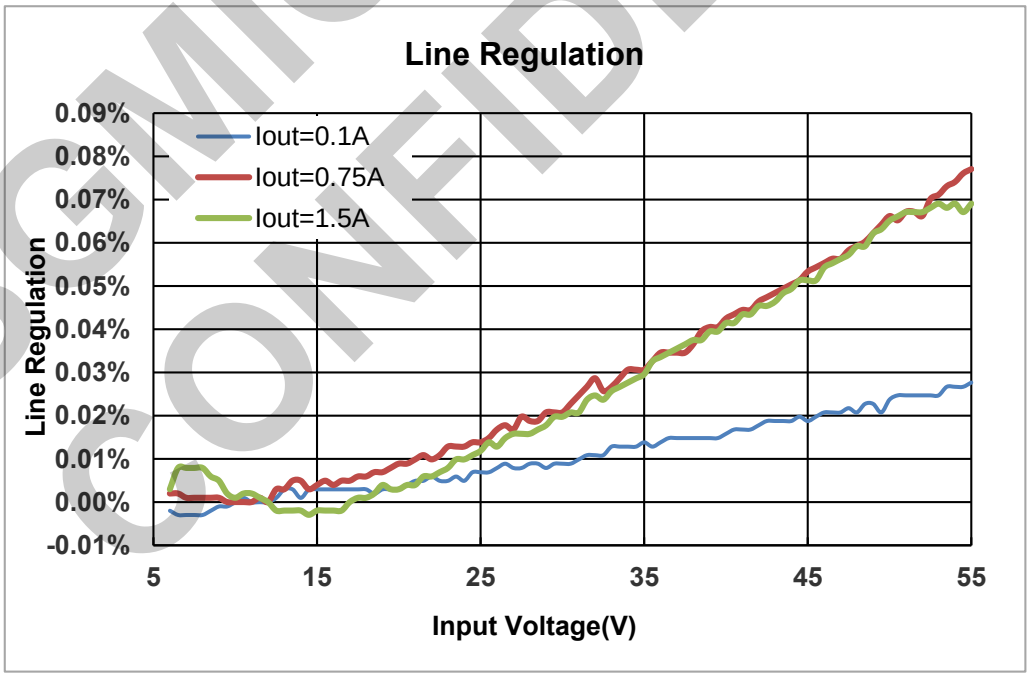
3. Load Regulation

Test conditions: V_{IN}=12V/55V, V_{OUT}=5V, I_{OUT}=0.001A~1.5A.



4. Line Regulation

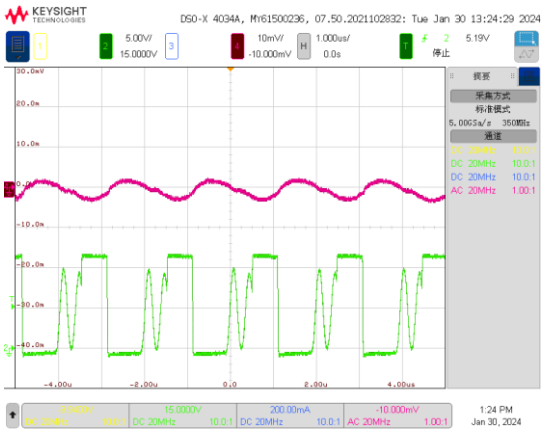
Test conditions: V_{IN}=5V~55V, V_{OUT}=5V, I_{OUT}=0.1A/0.75A/1.5A.



5. Output Voltage Ripple

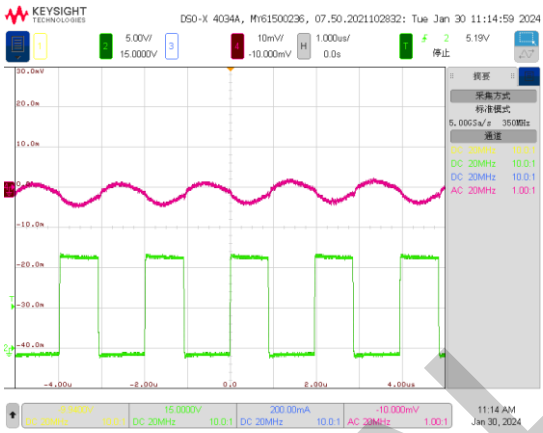
Test conditions: V_{IN}=12V, V_{OUT}=5V.

I_{OUT}=0.1A



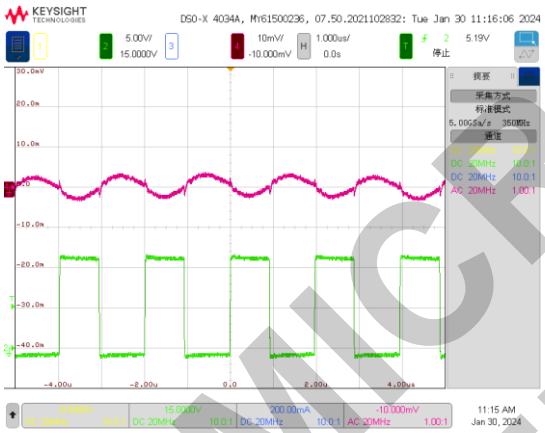
CH2-V_{SW} CH4-V_{OUT}/AC

I_{OUT} =0.5A



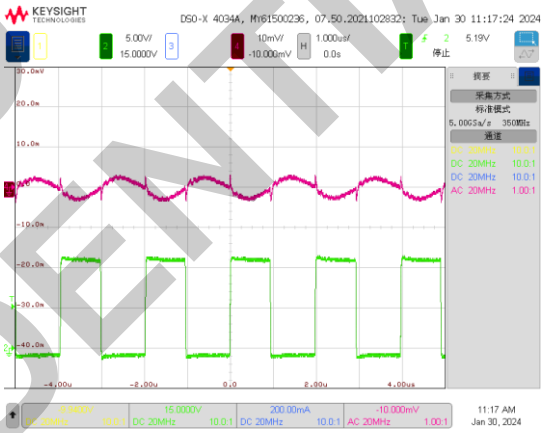
CH2-V_{SW} CH4-V_{OUT}/AC

I_{OUT}=1A



CH2-V_{SW} CH4-V_{OUT}/AC

I_{OUT} =1.5A

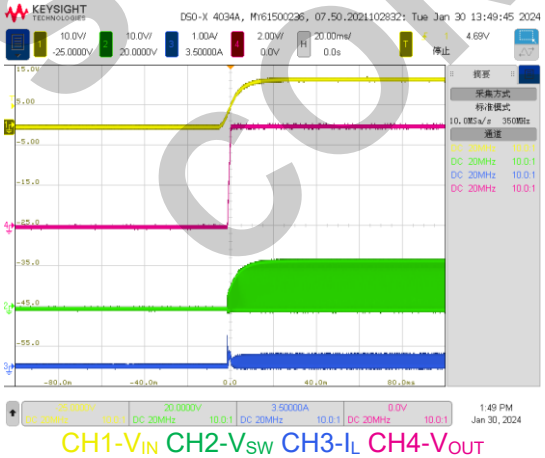


CH2-V_{SW} CH4-V_{OUT}/AC

6. VIN Power On/Off

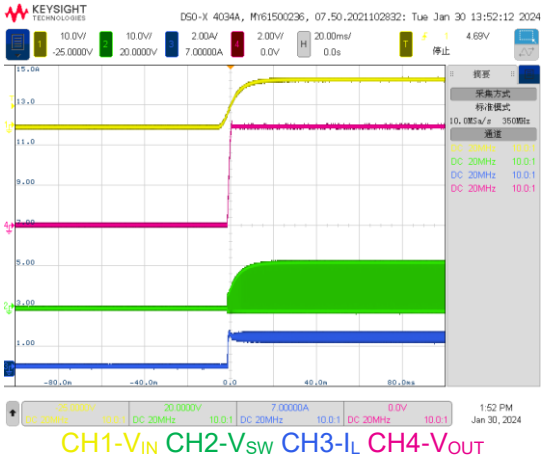
Test conditions: V_{IN}=12V, V_{OUT}=5V, V_{IN} Power On.

I_{OUT}=0.1A



CH1-V_{IN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

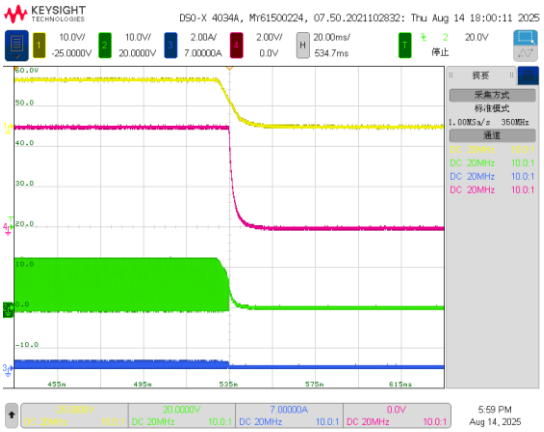
I_{OUT} =1.5A



CH1-V_{IN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

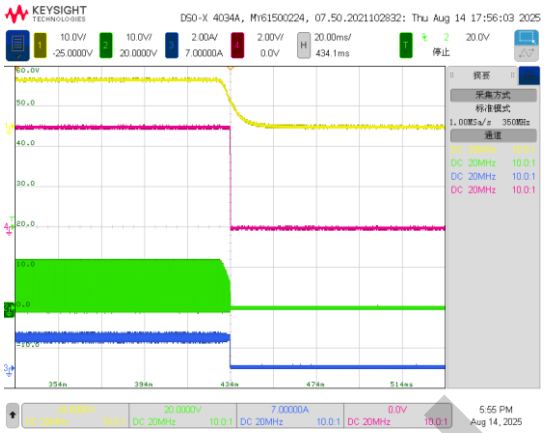
Test conditions: V_{IN}=12V, V_{OUT}=5V, V_{IN} Power Off.

I_{OUT}=0.1A



CH1-V_{IN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

I_{OUT} =1.5A

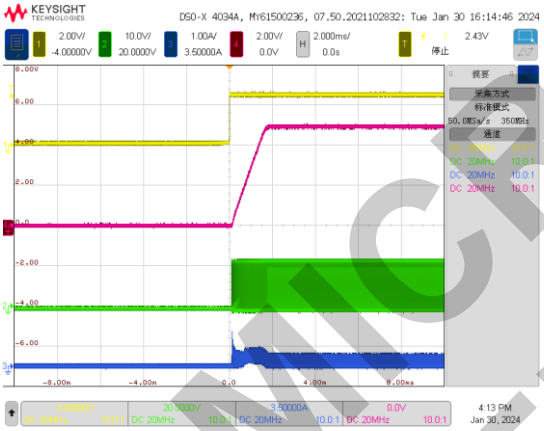


CH1-V_{IN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

7. EN On/Off

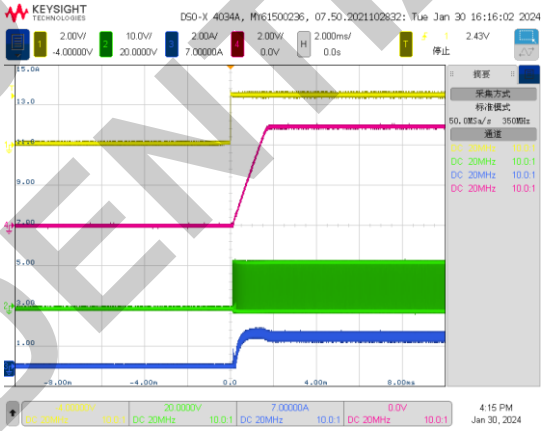
Test conditions: V_{IN}=12V, V_{OUT}=5V, EN On.

I_{OUT}=0.1A



CH1-V_{EN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

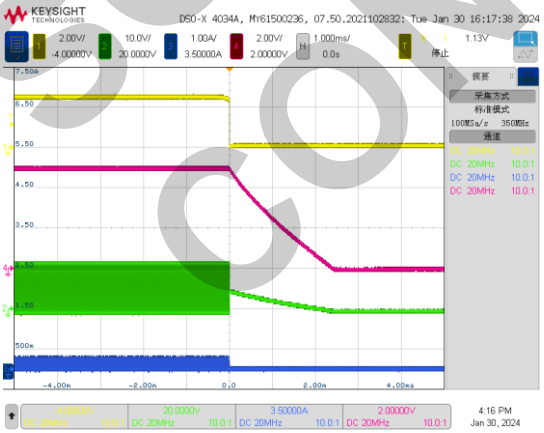
I_{OUT}=1.5A



CH1-V_{EN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

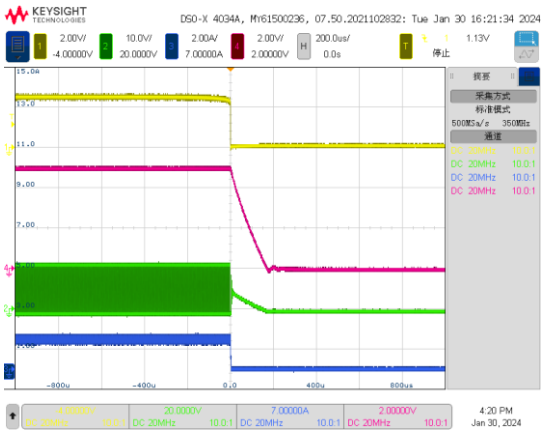
Test conditions: V_{IN}=12V, V_{OUT}=5V, EN Off.

I_{OUT}=0.1A



CH1-V_{EN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

I_{OUT}=1.5A

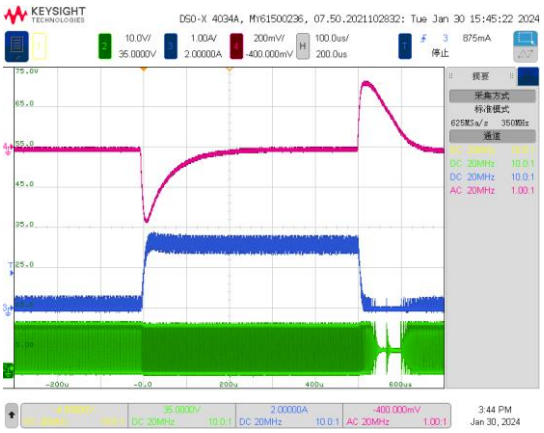


CH1-V_{EN} CH2-V_{SW} CH3-I_L CH4-V_{OUT}

8. Load Transient

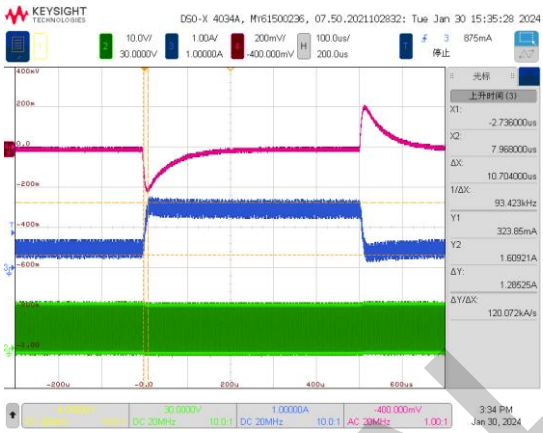
Test conditions: V_{IN}=12V, V_{OUT}=5V, Slew rate=5A/μs.

I_{OUT}=0.1A to 1.5A to 0.1A



CH2-V_{SW} CH3-I_L CH4-V_{OUT}/AC

I_{OUT}=0.5A to 1.5A to 0.5A

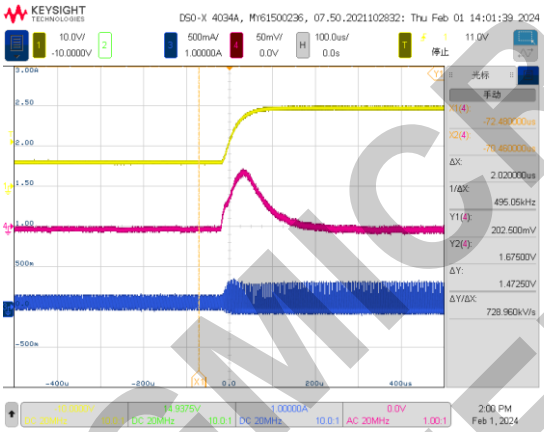


CH2-V_{SW} CH3-I_L CH4-V_{OUT}/AC

9. Line Transient

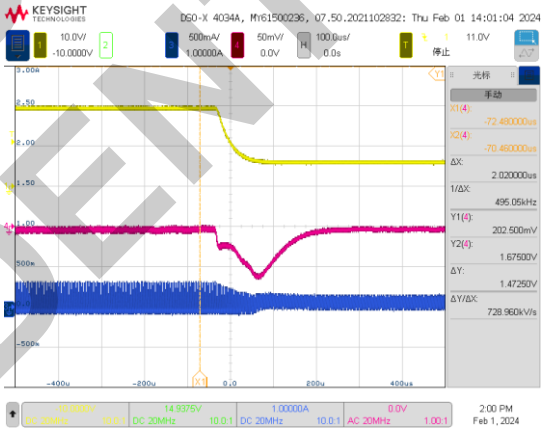
Test conditions: V_{OUT}=5V, I_{OUT}=0.1A, V_{IN}=6.5V to 20V to 6.5V.

V_{IN}=6.5V to 20V



CH1-V_{IN} CH3-I_L CH4-V_{OUT}/AC

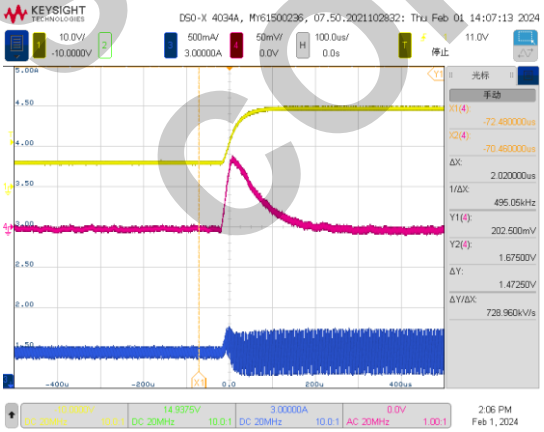
V_{IN}=20V to 6.5V



CH1-V_{IN} CH3-I_L CH4-V_{OUT}/AC

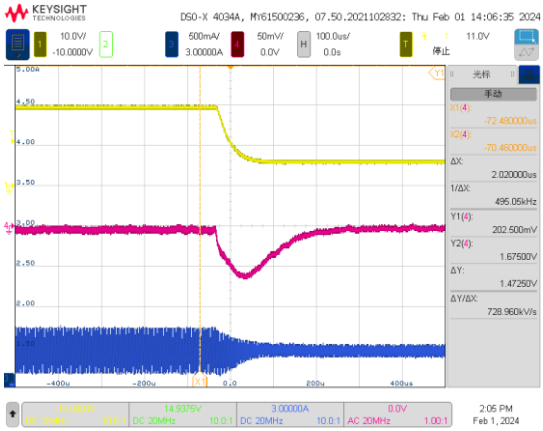
Test conditions: V_{OUT}=5V, I_{OUT}=0.5A, V_{IN}=6.5V to 20V to 6.5V.

V_{IN}=6.5V to 20V



CH1-V_{IN} CH3-I_L CH4-V_{OUT}/AC

V_{IN}=20V to 6.5V

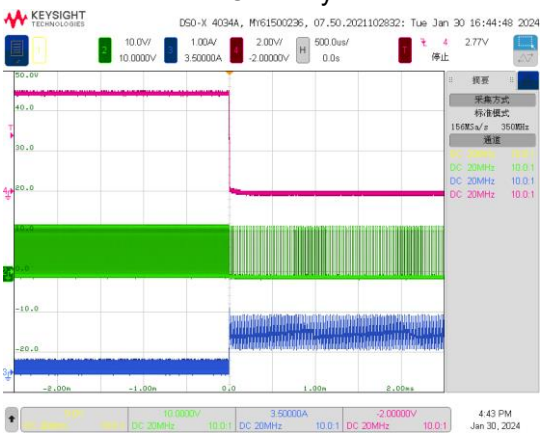


CH1-V_{IN} CH3-I_L CH4-V_{OUT}/AC

10. SCP Entry and Recovery

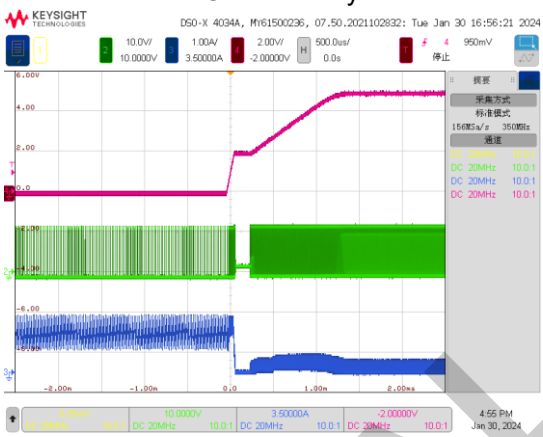
Test conditions: V_{IN}=12V, V_{OUT}=5V, Output Shorted.

SCP Entry



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

SCP Recovery

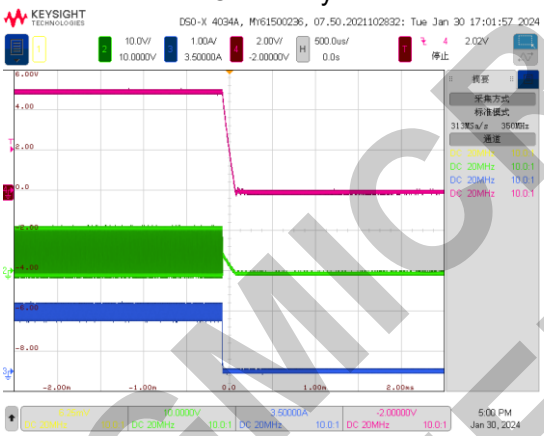


CH2-V_{SW} CH3-I_L CH4-V_{OUT}

11. OTP Entry

Test conditions: V_{IN}=12V, V_{OUT}=5V, I_{OUT}=1.5A, Over temperature.

OTP Entry

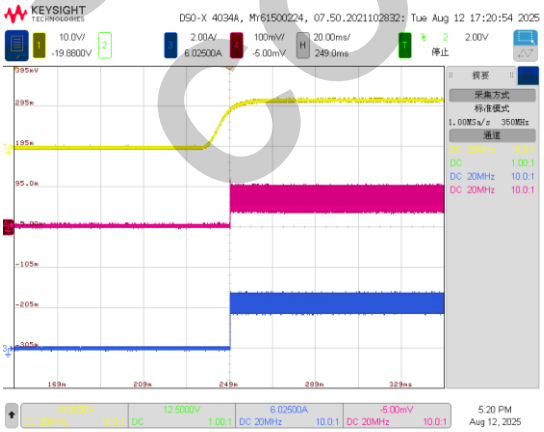


CH2-V_{SW} CH3-I_L CH4-V_{OUT}

12. VIN/EN On/Off during SCP

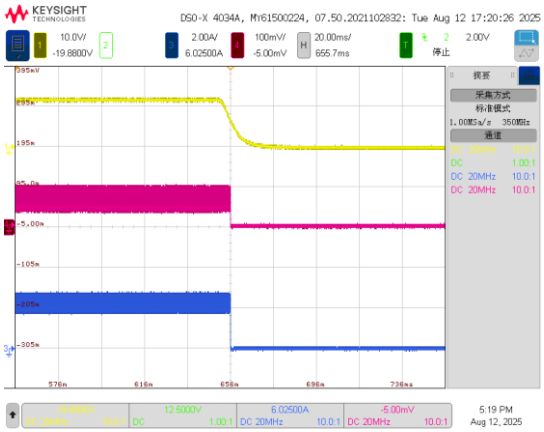
Test conditions: V_{IN}=12V, V_{OUT}=5V, Output Shorted.

V_{IN} Power On



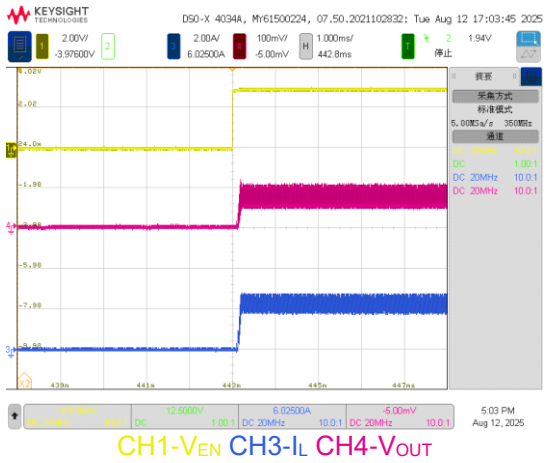
CH1-V_{IN} CH3-I_L CH4-V_{OUT}

V_{IN} Power Off



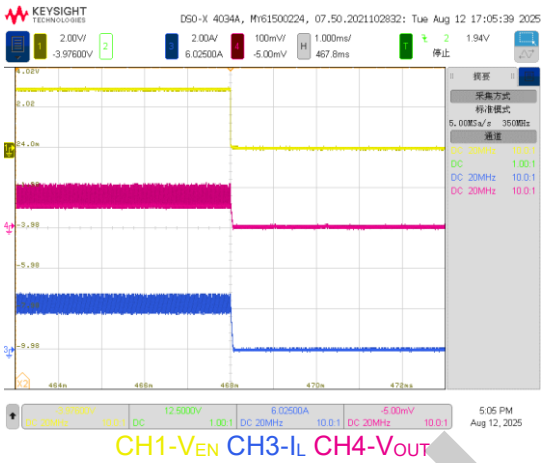
CH1-V_{IN} CH3-I_L CH4-V_{OUT}

EN On



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

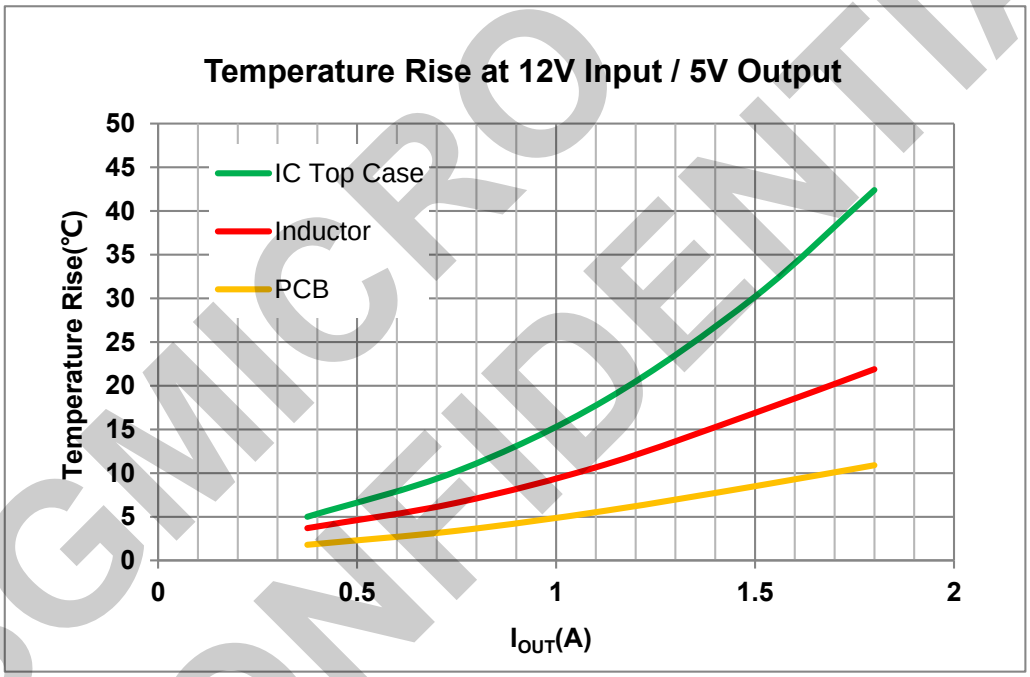
EN Off



CH1-V_{EN} 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)	0.375	0.75	1.125	1.5	1.8
IC Top Case(℃)	32.8	38.1	46.2	58.0	70.3
Inductor(℃)	31.5	34.5	38.8	44.7	49.8
PCB(℃)	29.6	31.3	33.5	36.3	38.8
Ambient(℃)	27.8	27.9	27.8	27.8	27.9