

SGM61130 Demo Board Test Report

4.5V to 18V Input (12V TYP), 3.3V/4A Output

Demo Board Pictures:

Top



Bottom

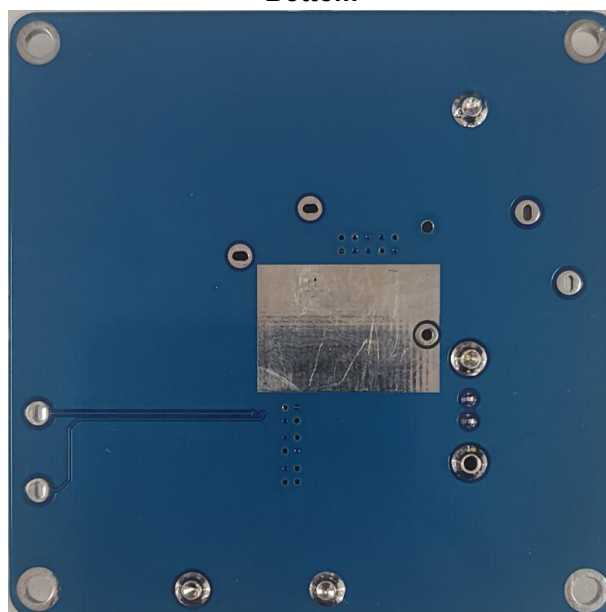
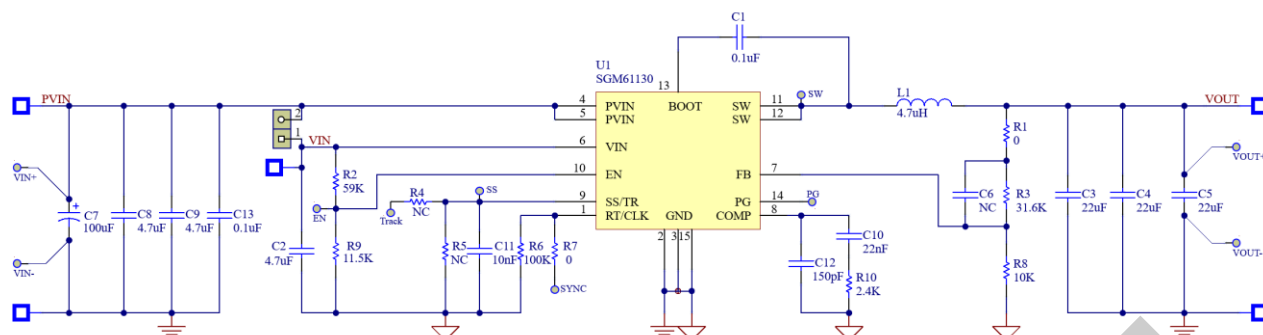


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1. Schematic, BOM List and PCB Layout

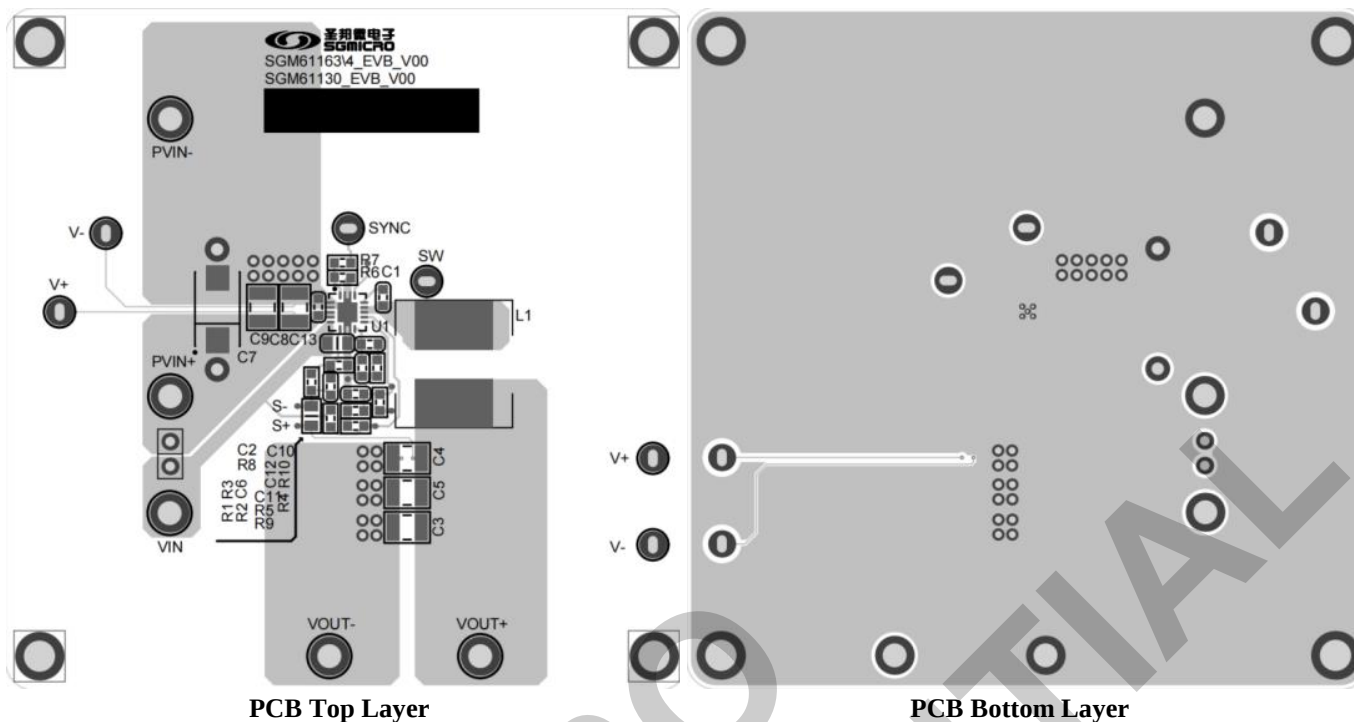
1.1 Schematic



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, 22µF 25V, X7R, ±10%, 1210, GRM32ER71E226KE15	muRata
4	0	C6	NC	/
5	1	C7	Solid Electrolytic capacitor, 100µF, 35V	Standard
6	2	C8,C9	Ceramic capacitor, 4.7µF 50V, X7R, ±10%, 1210, GCJ32ER71H475KA12	muRata
7	1	C10	Ceramic capacitor, 22nF 50V, X7R, ±10%, 0603	muRata
8	1	C11	Ceramic capacitor, 10nF 50V, X7R, ±10%, 0603	muRata
9	1	C12	Ceramic capacitor, 150pF 50V, C0G, ±5%, 0603	muRata
10	1	L1	Ind., 4.7µH±20%, I _{TEMP} (40°C)=14.9A, I _{SAT} (30%)=17.1A, DCR=7.25mΩ, 7443320470	Würth
11	2	R1,R7	Film Resistor, 1%, 0Ω, 0603	Standard
12	1	R2	Film Resistor, 1%, 59KΩ, 0603	Standard
13	1	R3	Film Resistor, 1%, 31.6KΩ, 0603	Standard
14	0	R4,R5	NC	/
15	1	R6	Film Resistor, 1%, 100KΩ, 0603	Standard
16	1	R8	Film Resistor, 1%, 10KΩ, 0603	Standard
17	1	R9	Film Resistor, 1%, 11.5KΩ, 0603	Standard
18	1	R10	Film Resistor, 1%, 2.4KΩ, 0603	Standard
19	1	U1	SGM61130, 4A, 18V, Synchronous Buck Converter, TQFN-3.5×3.5-14L	SGMICRO
Conclusion: Total 22 components				

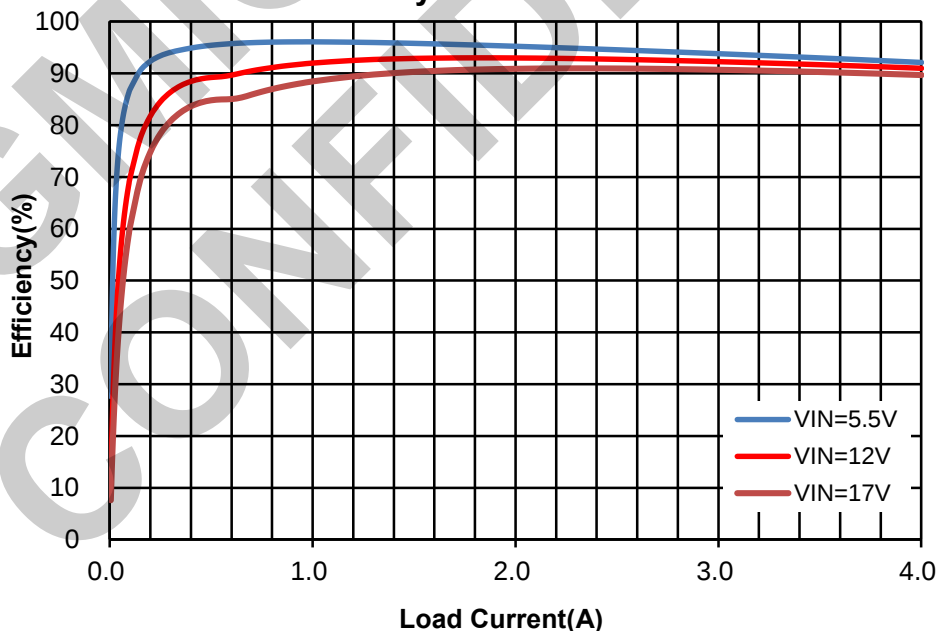
1.3 PCB Layout



2. Efficiency

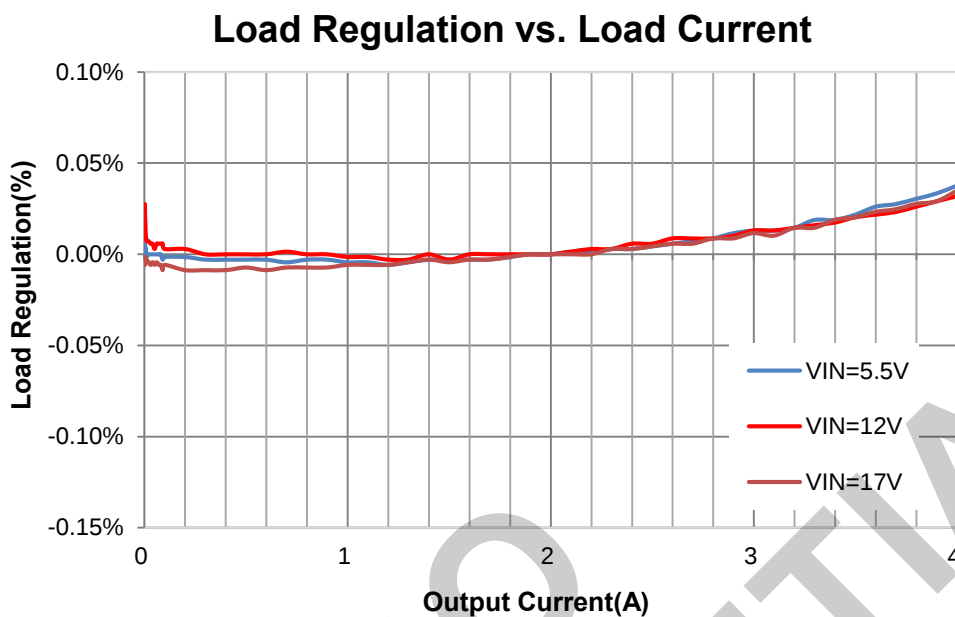
Test conditions: $V_{IN}=5.5V/12V/17V$, $V_{OUT}=3.3V$, EN floating.

Efficiency vs. Load Current



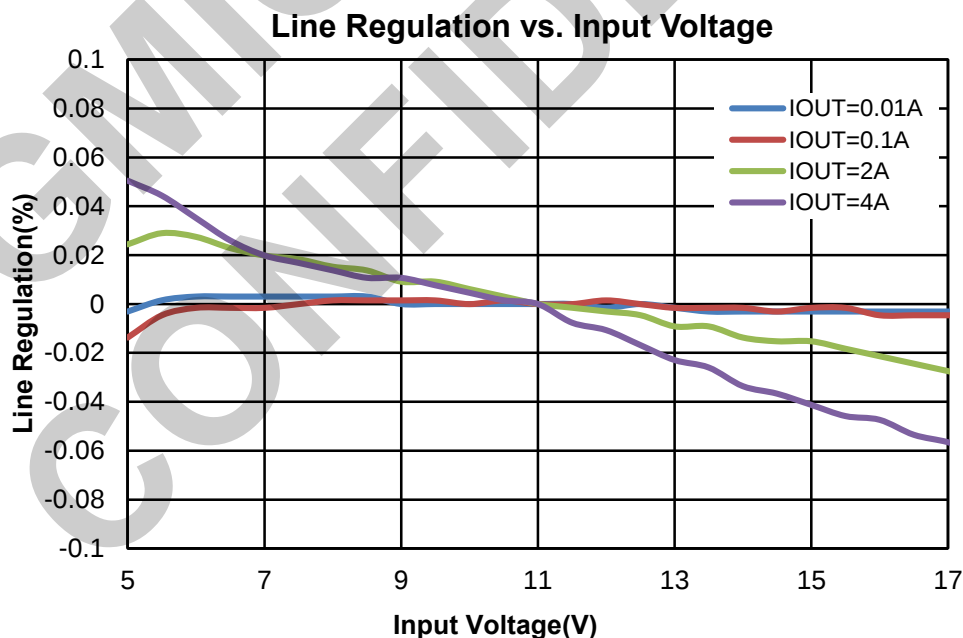
3. Load Regulation

Test conditions: $V_{IN}=5.5V/12V/17V$, $V_{OUT}=3.3V$, EN floating.



4. Line Regulation

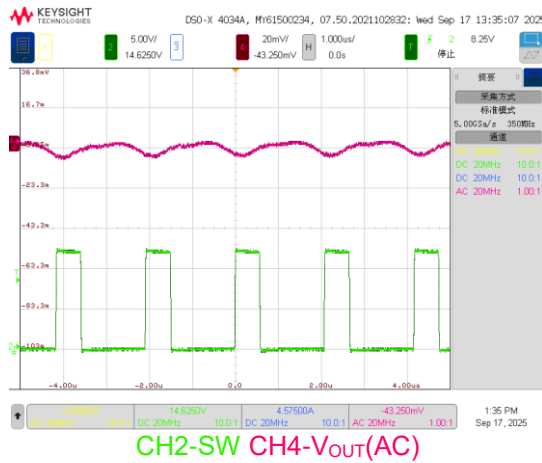
Test conditions: $V_{OUT}=3.3V$, $I_{OUT}=0.01A/0.1A/2A/4A$, EN floating.



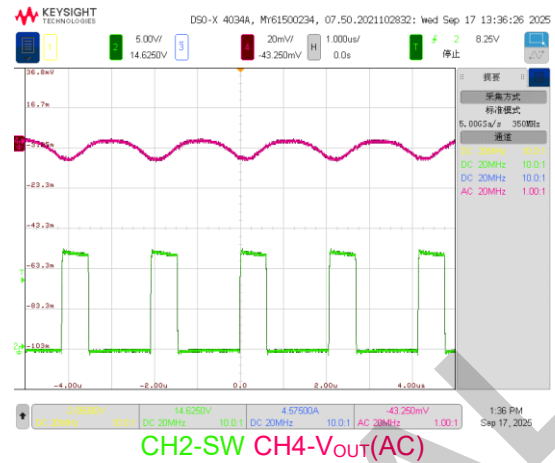
5. Output Voltage Ripple

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

$I_{OUT}=0A$



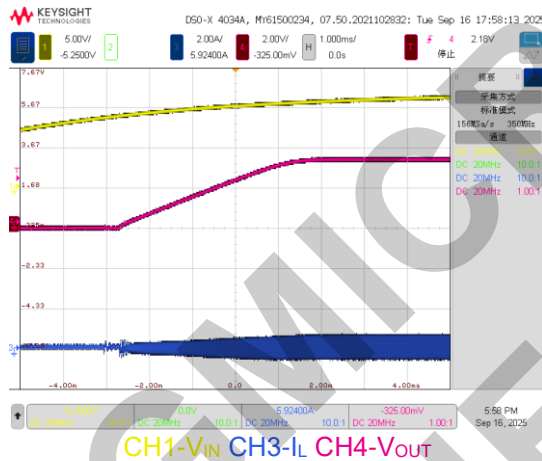
$I_{OUT}=4A$



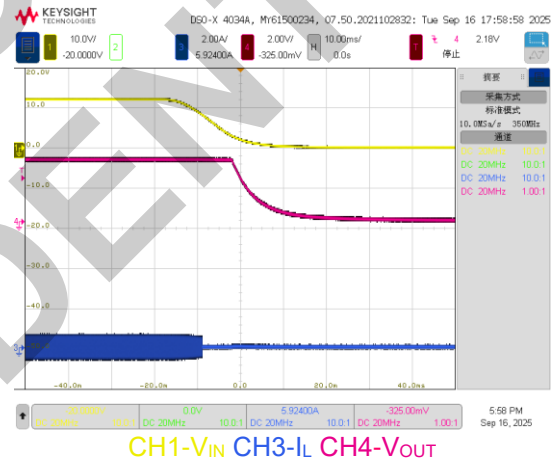
6. VIN Power On/Off

Test conditions: $V_{OUT}=3.3V$, $I_{OUT}=0A$.

V_{IN} Power On

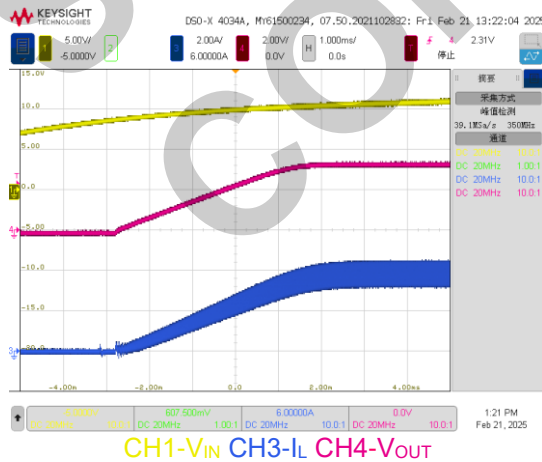


V_{IN} Power Off

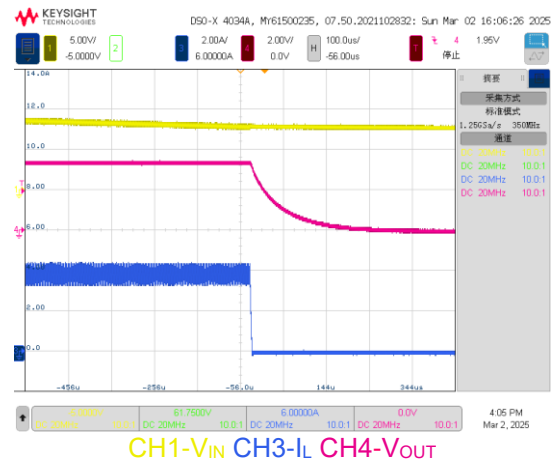


Test conditions: $V_{OUT}=3.3V$, $R_{LOAD}=0.86\Omega$.

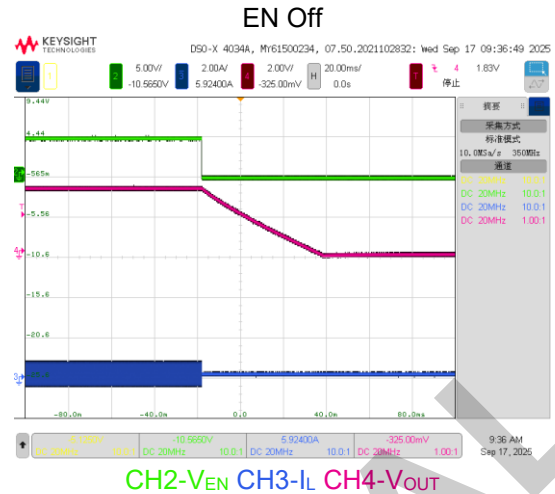
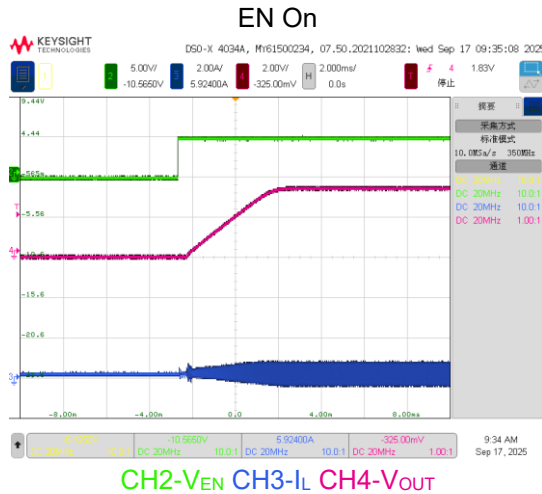
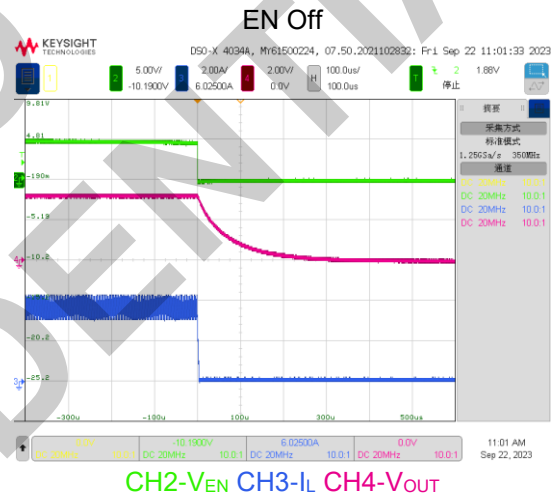
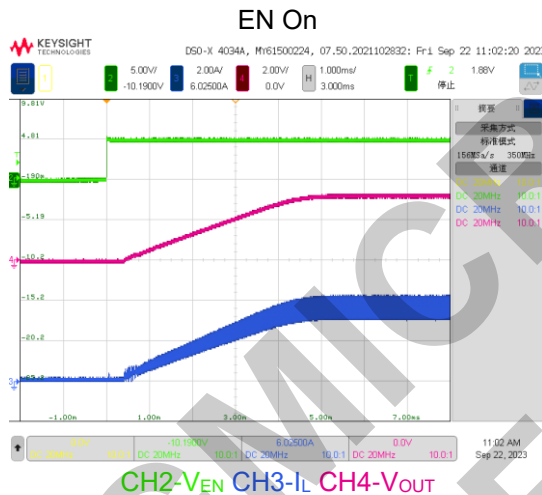
V_{IN} Power On



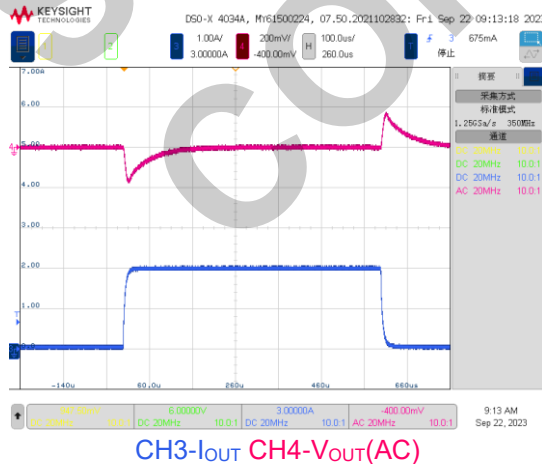
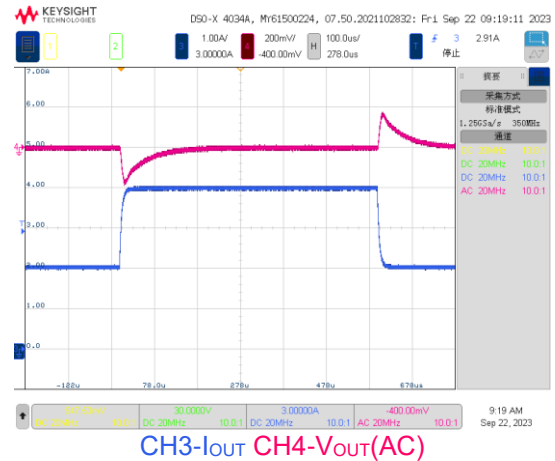
V_{IN} Power Off



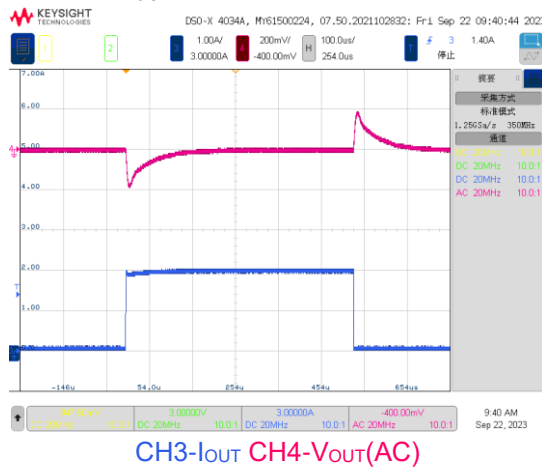
7. EN On/Off

Test conditions: $V_{OUT}=3.3V$, $I_{OUT}=0A$.Test conditions: $V_{OUT}=3.3V$, $R_{LOAD}=0.86\Omega$.

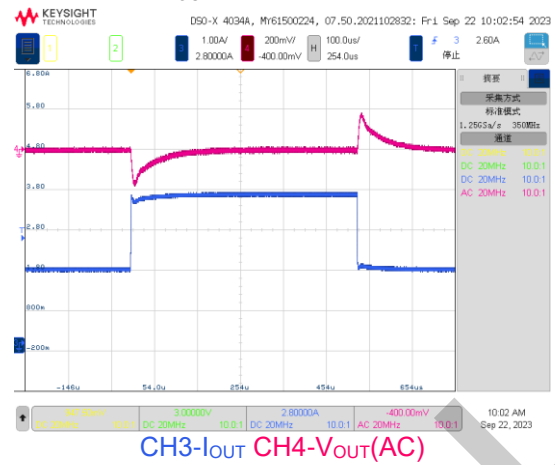
8. Load Transient

Test conditions: $V_{IN}=12V$, $V_{OUT}=3.3V$, Slew rate=0.5A/ μs . $I_{OUT}=50mA$ to 2A to 50mA $I_{OUT}=2A$ to 4A to 2A

Test conditions: $V_{IN}=12V$, $V_{OUT}=3.3V$, Slew rate= $4A/\mu s$.
 $I_{OUT}=50mA$ to $2A$ to $50mA$

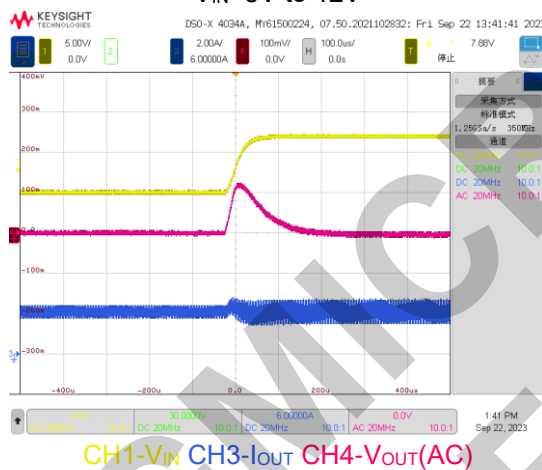


$I_{OUT}=2A$ to $4A$ to $2A$

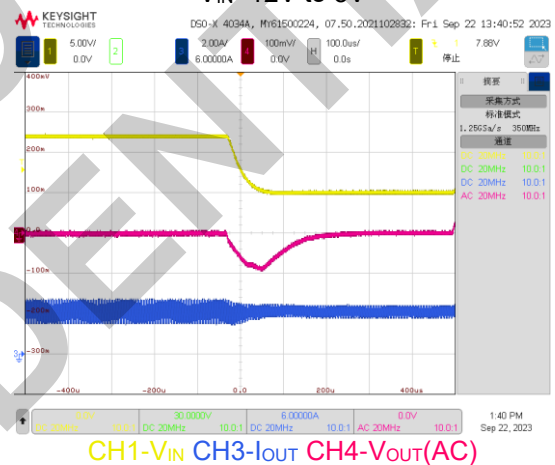


9. Line Transient

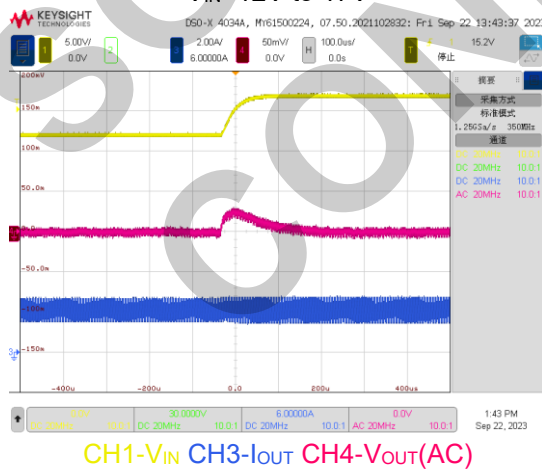
Test conditions: $V_{OUT}=3.3V$, $I_{OUT}=2A$, EN floating.
 $V_{IN}=5V$ to $12V$



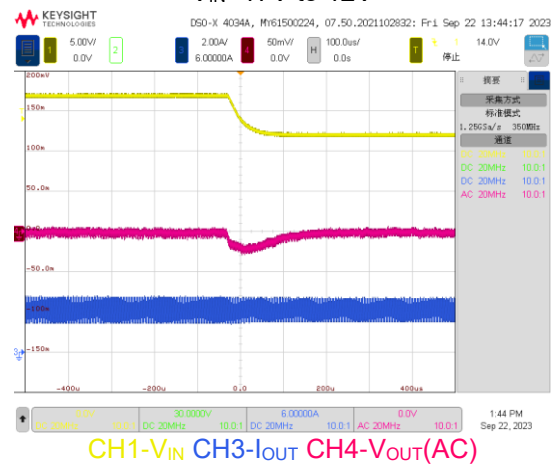
$V_{IN}=12V$ to $5V$

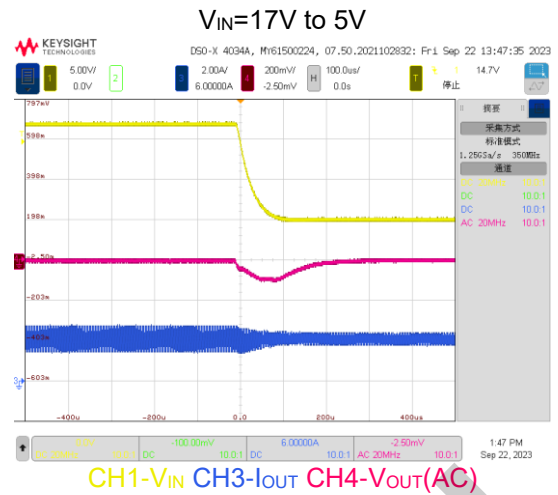
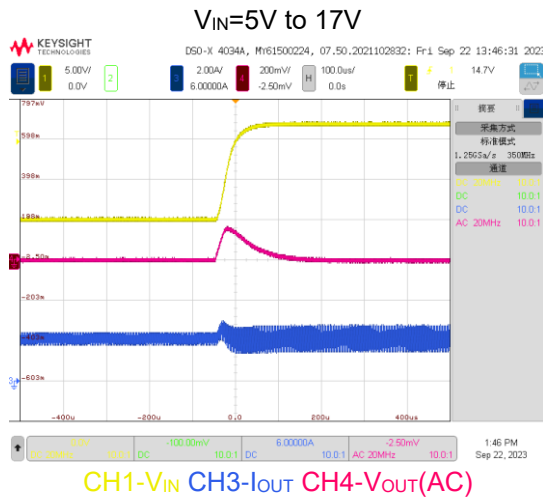


$V_{IN}=12V$ to $17V$



$V_{IN}=17V$ to $12V$

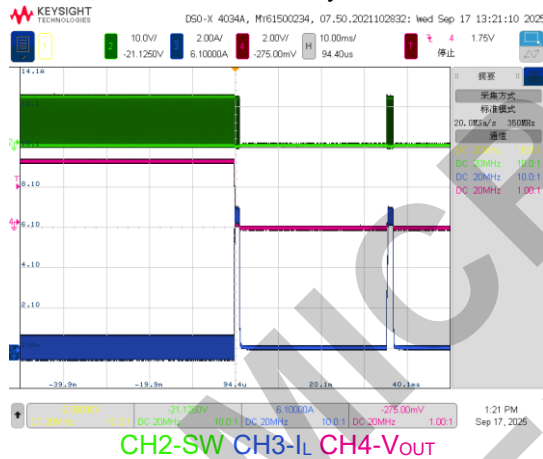




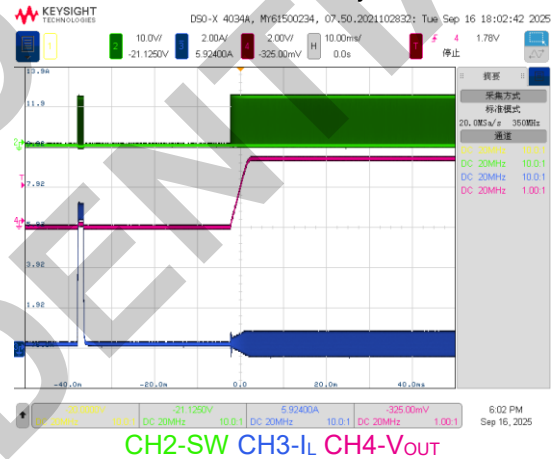
10. SCP Entry and Recovery

Test conditions: V_{IN}=12V, V_{OUT}=3.3V, I_{OUT}=0A, Output Shorted Protection.

SCP Entry

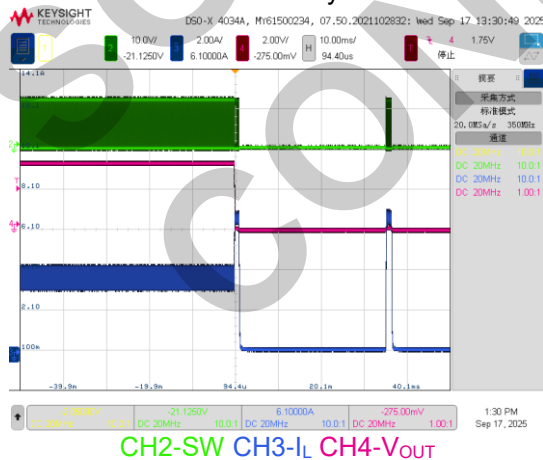


SCP Recovery

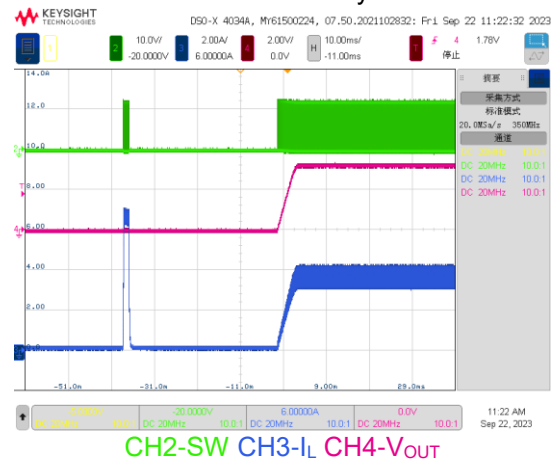


Test conditions: V_{IN}=12V, V_{OUT}=3.3V, I_{OUT}=4A, Output Shorted Protection.

SCP Entry

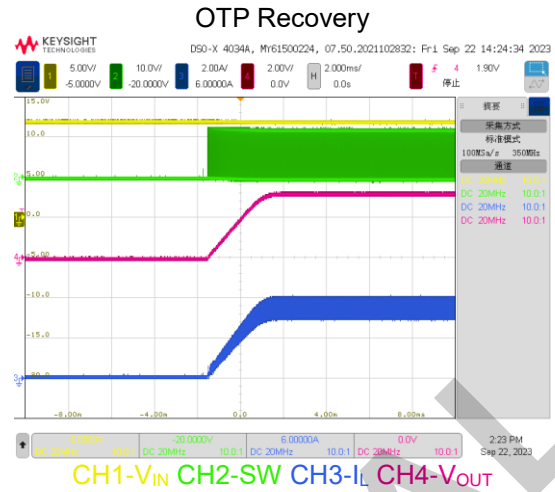
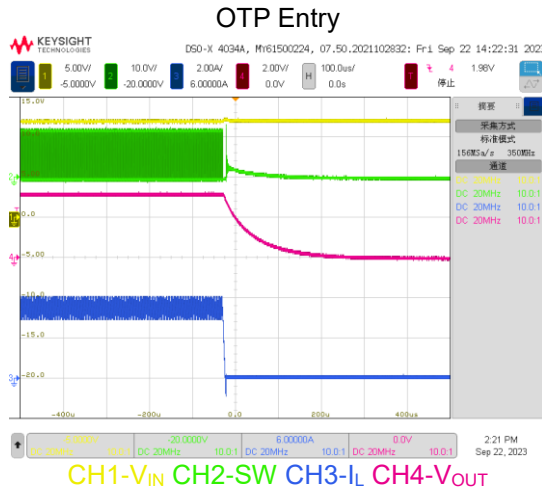


SCP Recovery



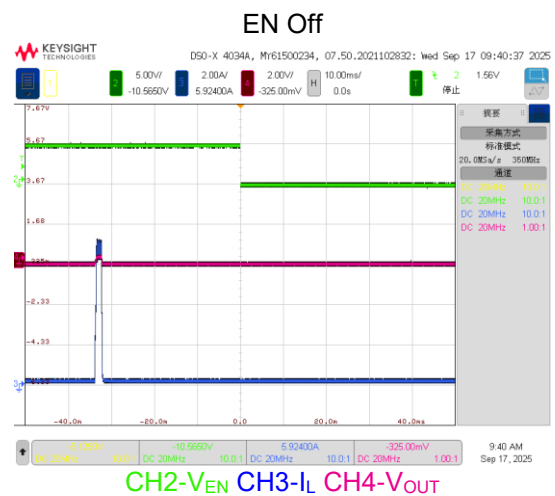
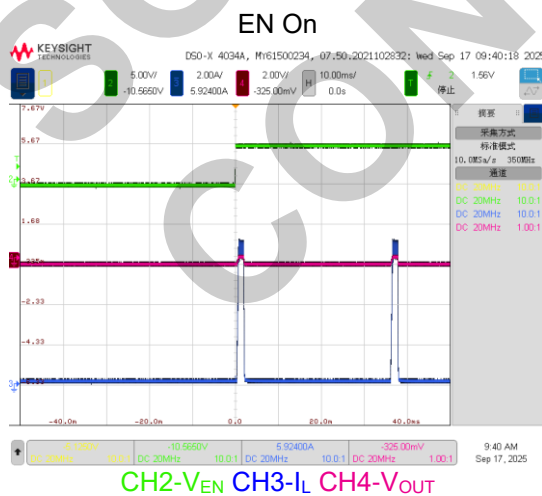
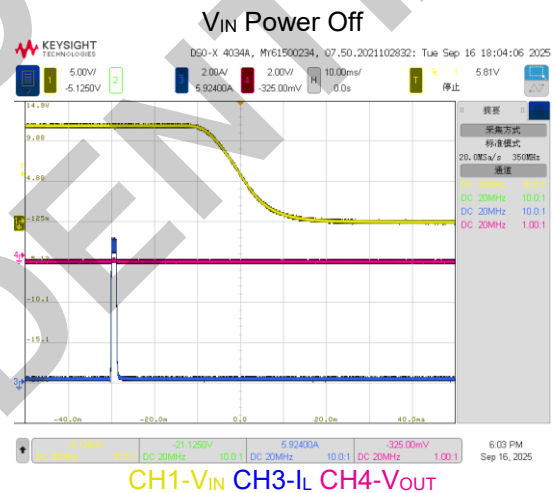
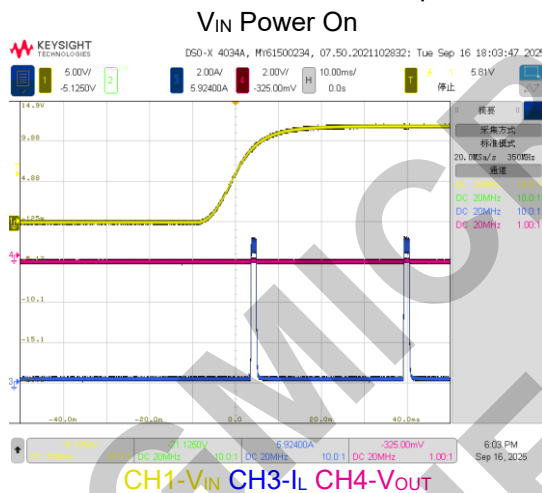
11. OTP Entry and Recovery

Test conditions: $V_{IN}=12V$, $V_{OUT}=3.3V$, $R_{LOAD}=0.86\Omega$, Over temperature Protection.



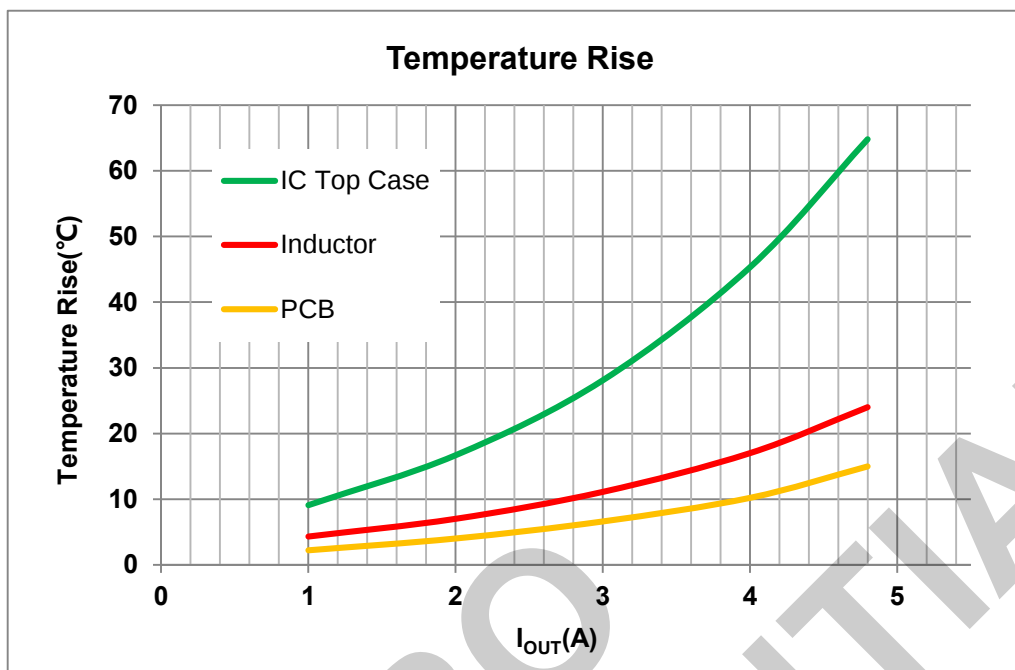
12. VIN/EN On/Off during SCP

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



13. Thermal Test

Test conditions: $V_{IN}=12V$, $V_{OUT}=3.3V$, Room temperature test, Natural air convection heat dissipation.



$I_{OUT}(A)$	1	2	3	4	4.8
IC Top Case(°C)	37.3	44.9	56.3	73.5	93.4
Inductor(°C)	32.5	35.2	39.3	45.2	52.6
PCB(°C)	30.4	32.2	34.8	38.4	43.6
Ambient(°C)	28.2	28.2	28.2	28.2	28.6