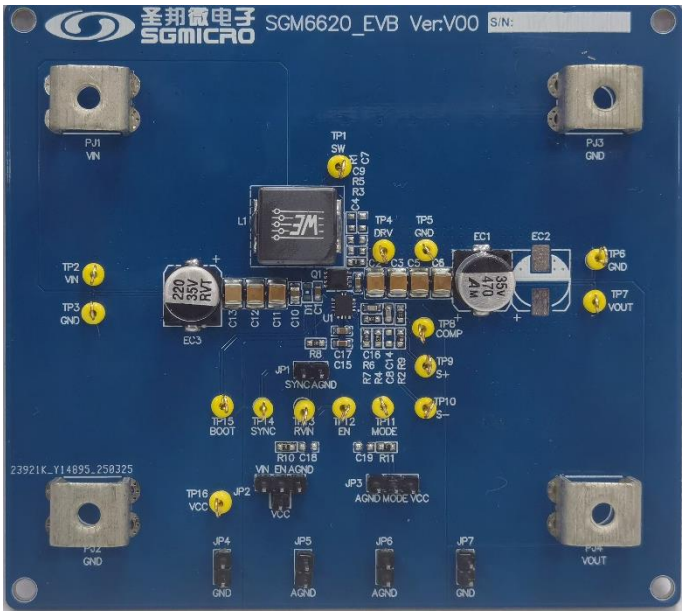
SGM6620 Demo Board Test Report

3V to 17.5V Input, 18V Output, 20A Switch Current

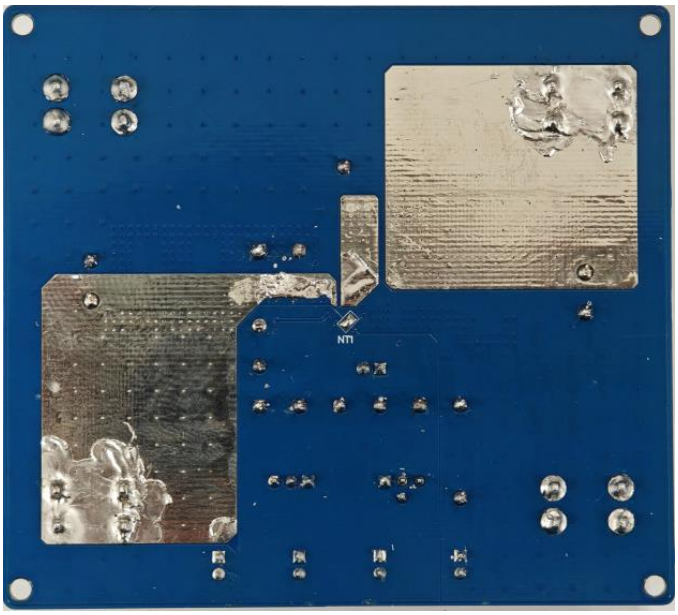
Synchronous Boost Converter

Demo Board Pictures:

Top



Bottom



NOTE: SGM6620 can operate with an input voltage range of 2.05V to 23V and an output voltage range of 4.5V to 25V, as specified in the datasheet. However, this report recommends an input voltage range of 3V to 17.5V to ensure optimal performance under typical output voltage 18V.

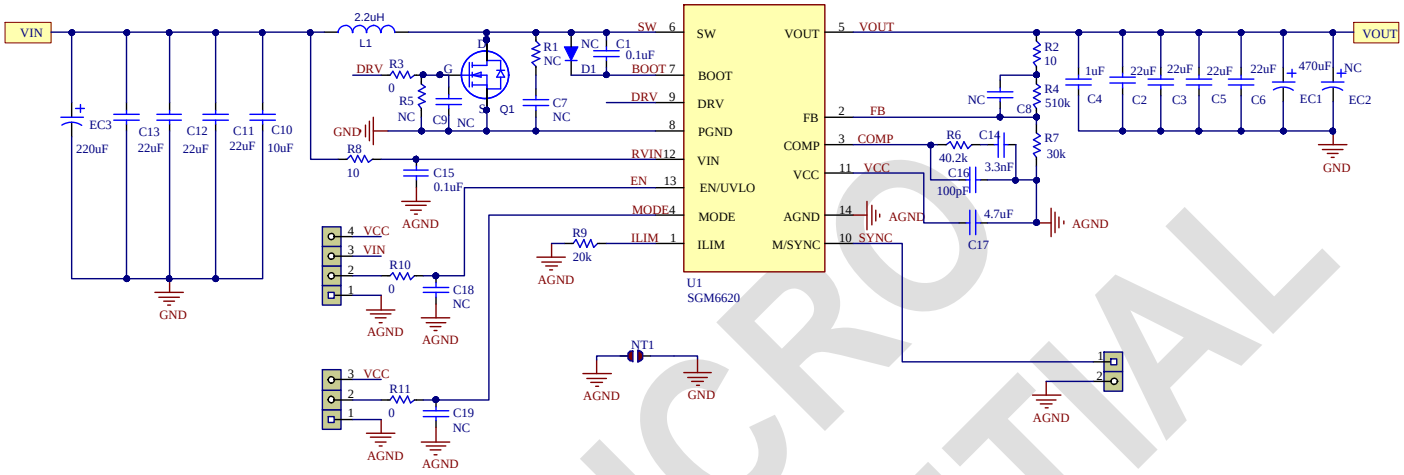
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SG-MICRO CONFIDENTIAL

1. Schematic, BOM List and PCB Layout

Schematic:



BOM List:

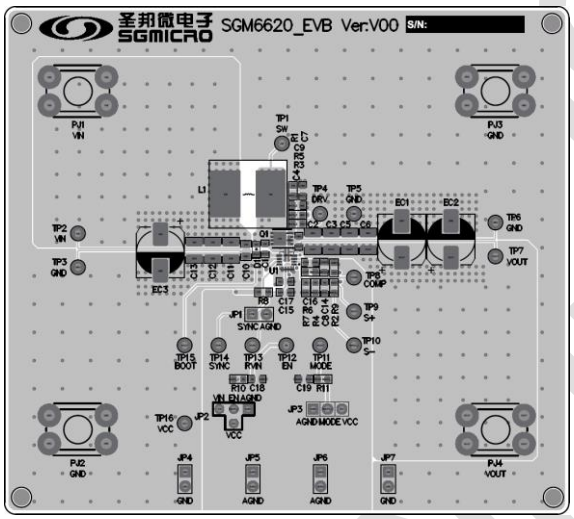
Item	Quantity	Designator	Description	Manufactory
1	2	C1, C15	Ceramic Capacitor, 0.1μF, 25V, X5R, 10%, 0603	
2	7	C2, C3, C5, C6, C11, C12, C13	Ceramic Capacitor, 22μF, 25V, X7R, 10%, 1210	Murata GRM32ER71E226KE15
3	1	C4	Ceramic Capacitor, 1μF, 25V, X5R, 10%, 0603	
4	0	C7, C8, C9,C18, C19	NC	
5	1	C10	Ceramic Capacitor, 10μF, 25V, X5R, 10%, 0805	
6	1	C14	Ceramic Capacitor, 3.3nF, 25V, X5R, 10%, 0603	
7	1	C16	Ceramic Capacitor, 100pF, 25V, X5R, 10%, 0603	
8	1	C17	Ceramic Capacitor, 4.7μF, 25V, X5R, 10%, 0603	
9	0	D1	NC	
10	1	EC1	Electrolytic Capacitor, 470μF, 35V, 20%	
11	0	EC2	NC	
12	1	EC3	Electrolytic Capacitor, 220μF, 35V, 20%	
13	1	L1	Inductor, 2.2μH, DCR(max)=4.3mΩ, Isat=27.2A, 12.1mm*11.4mm*9.5mm	Wurth 7443320220
14	0	NT1	Shorted	
15	1	Q1	MOSFET, N-CH, 30V, 35A, PDFN-3.3×3.3-8AL	SG-Micro SGMNQ48430
16	0	R1, R5	NC	

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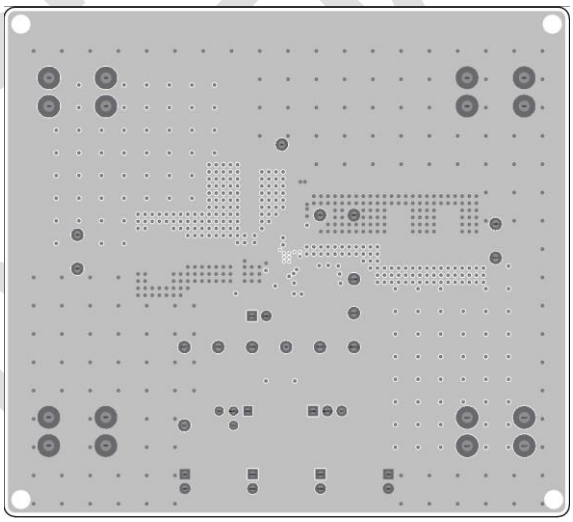
17	2	R2, R8	Film Resistor, 1%, 10, 0603	
18	3	R3, R10, R11	Film Resistor, 1%, 0, 0603	
19	1	R4	Film Resistor, 1%, 510k, 0603	
20	1	R6	Film Resistor, 1%, 40.2k, 0603	
21	1	R7	Film Resistor, 1%, 30k, 0603	
22	1	R9	Film Resistor, 1%, 20k, 0603	
23	1	U1	Synchronous Boost Converter with Stackable Multi-Phase Function	SG-Micro SGM6620
Conclusion: Total 28 components				

PCB Layout:

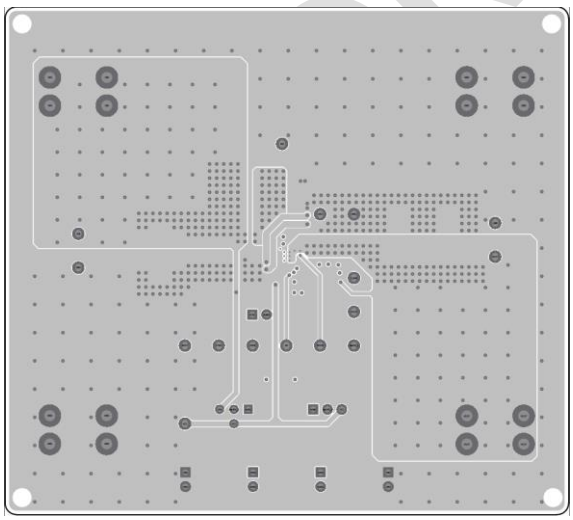
Top Layer



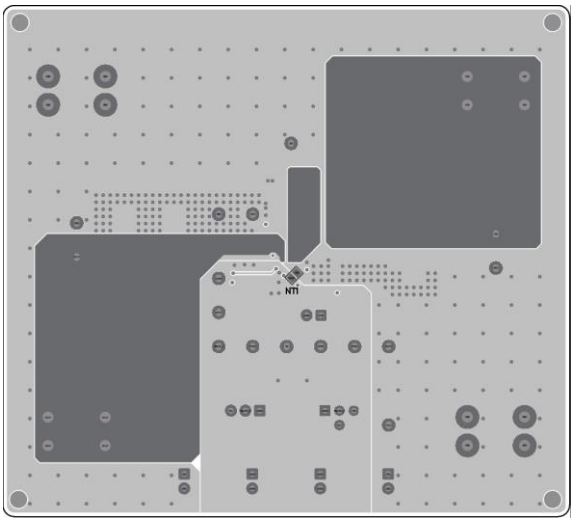
Internal Layer1



Internal Layer2



Bottom Layer



2. Bode Plot

Test conditions: V_{IN}=7.2V, V_{OUT}=18V, I_{OUT}=3A/6A, L: 2.2μH(7443320220), measure the bode plot of the device.

V_{IN}=7.2V, V_{OUT}=18V, I_{OUT}=3A

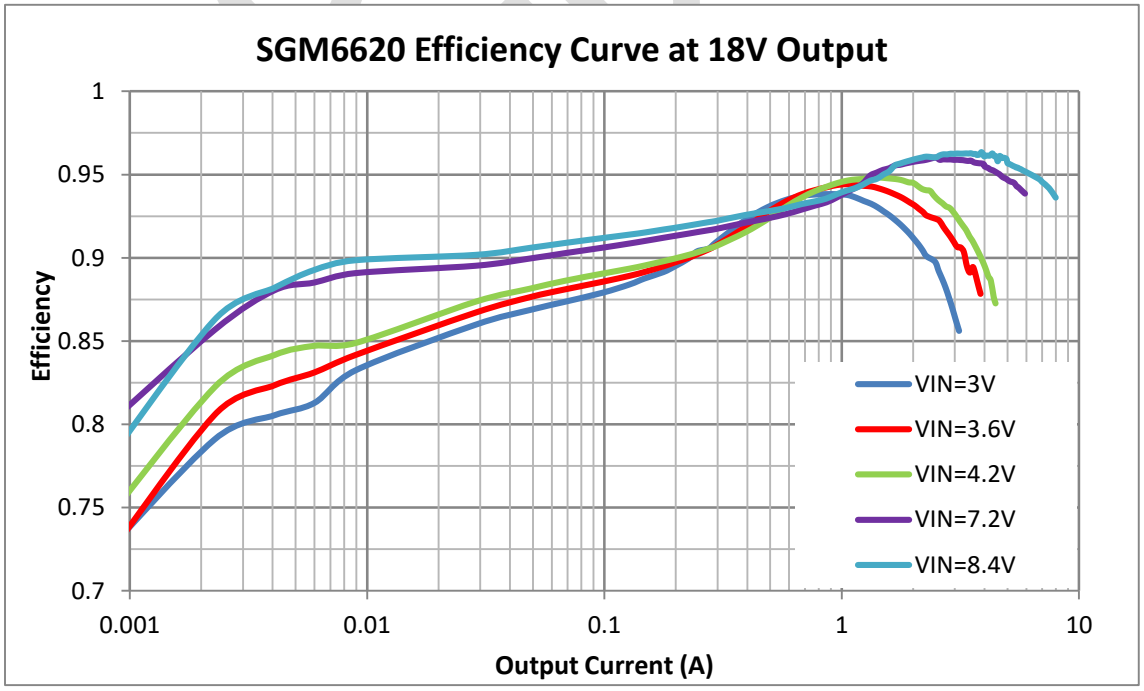


V_{IN}=7.2V, V_{OUT}=18V, I_{OUT}=6A



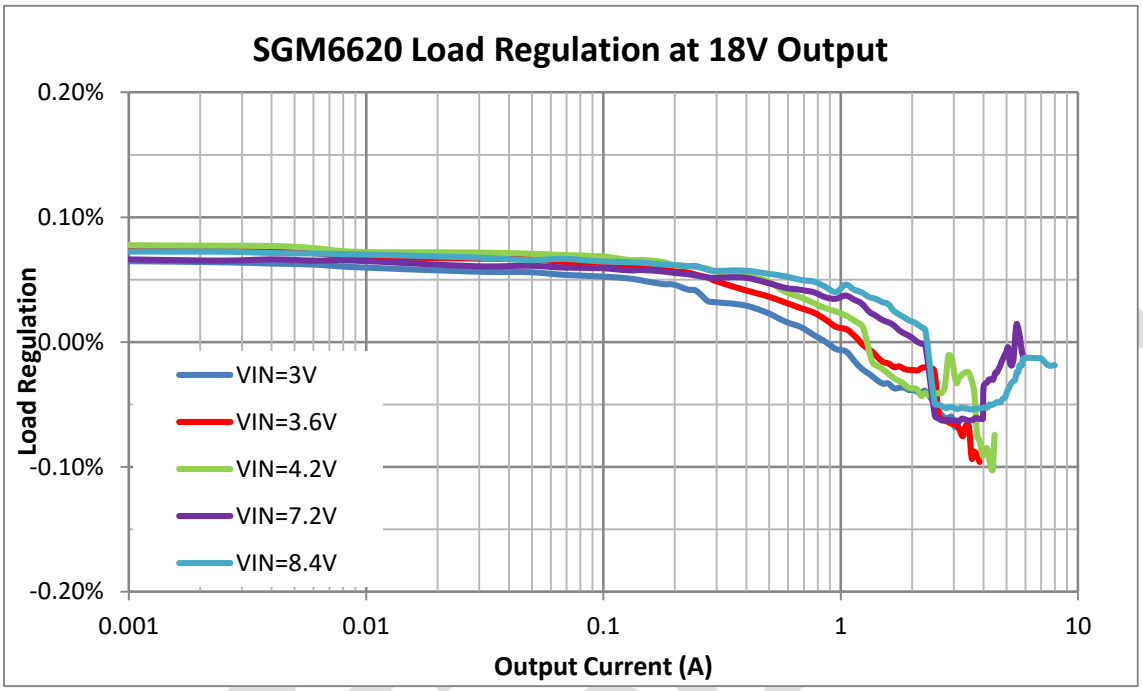
3. Efficiency

Test conditions: L: 2.2μH(7443320220), V_{OUT}=18V, measure the efficiency with different V_{IN} and I_O.



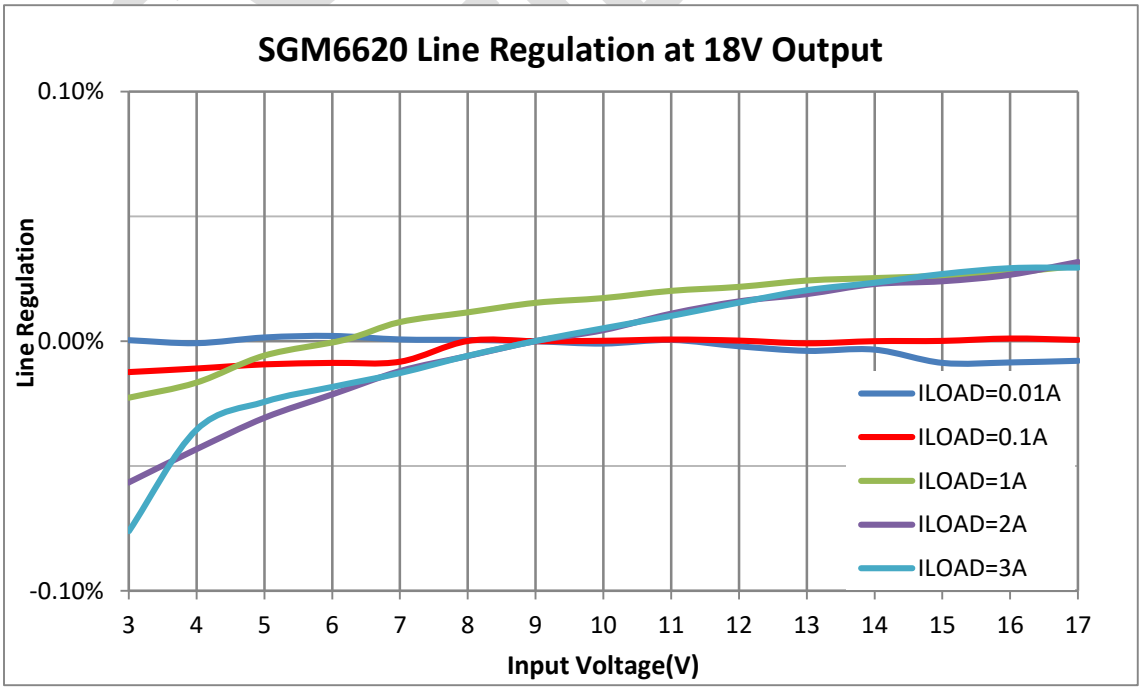
4. Load Regulation

Test conditions: L: 2.2μH(7443320220), V_{OUT}=18V, measure the load regulation with different V_{IN} and I_O.



5. Line Regulation

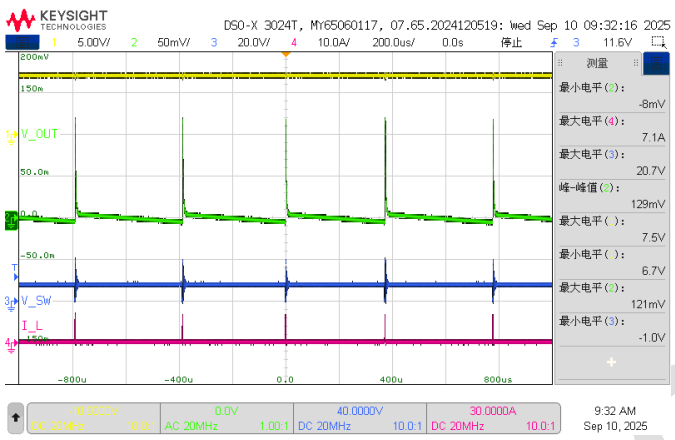
Test conditions: L: 2.2μH(7443320220), V_{OUT}=18V, measure the line regulation with different V_{IN} and I_O.



6. Output Voltage Ripple

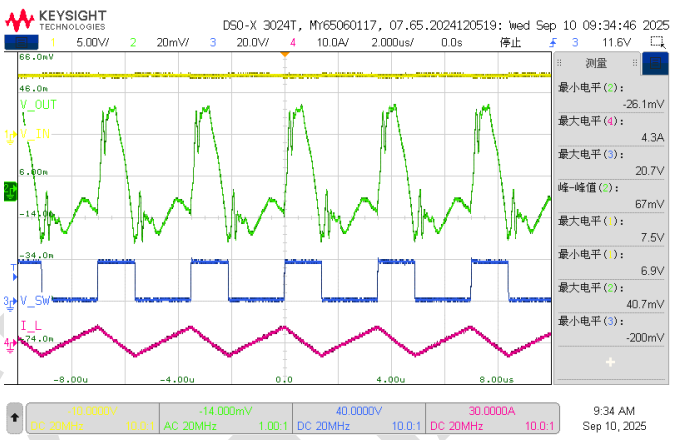
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), measure the output voltage ripple.

I_O =10mA, Auto PFM



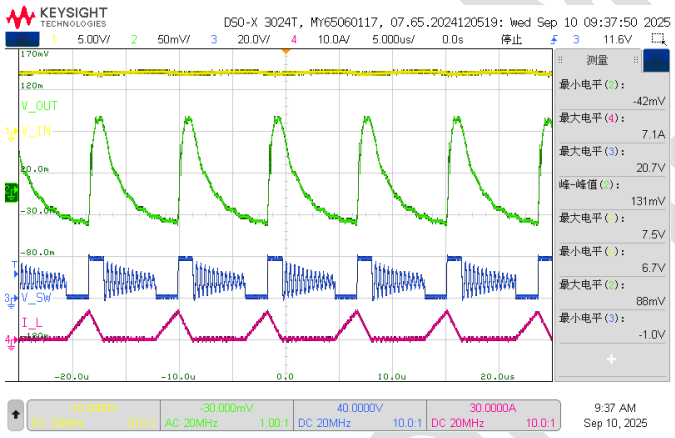
Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

I_O =10mA, FPWM



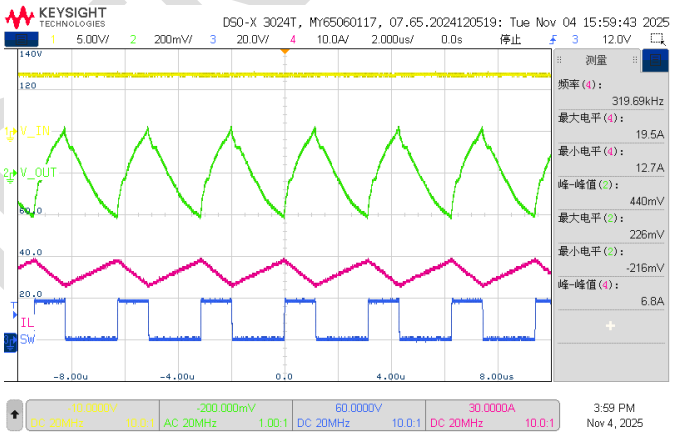
Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

I_O=500mA, Auto PFM



Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

I_O=6A, Auto PFM



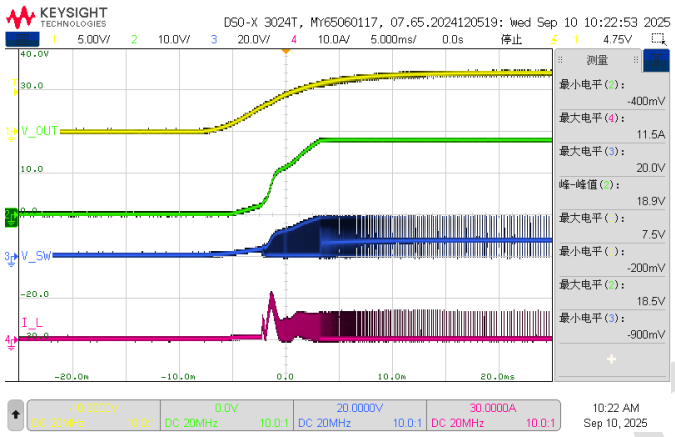
Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

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7. V_{IN} On/Off

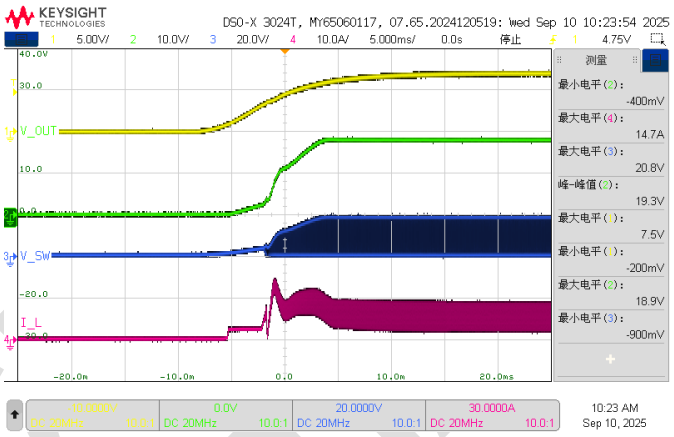
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), V_{IN} power on.

I_O=10mA



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

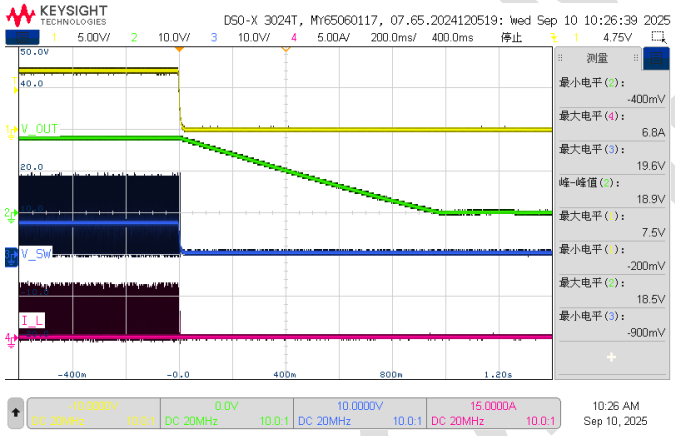
I_O=2A



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

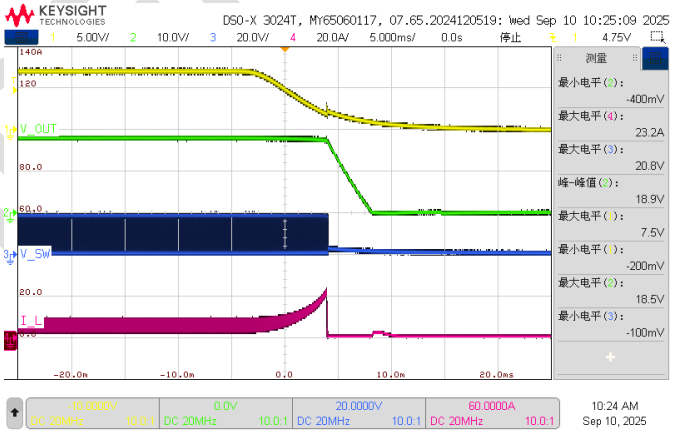
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), V_{IN} power off.

I_O=10mA



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

I_O=2A



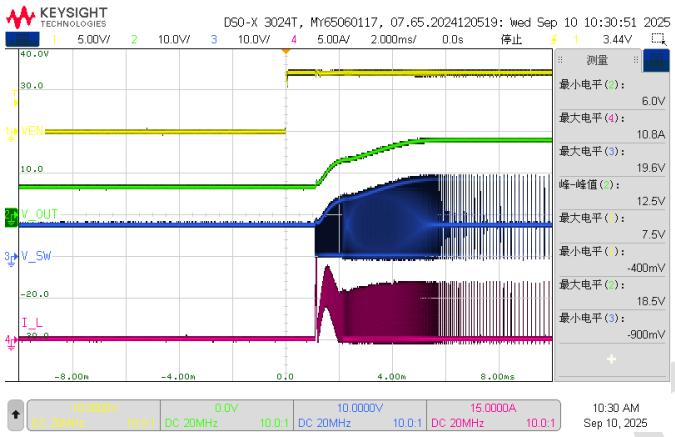
Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_L

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8. EN On/Off

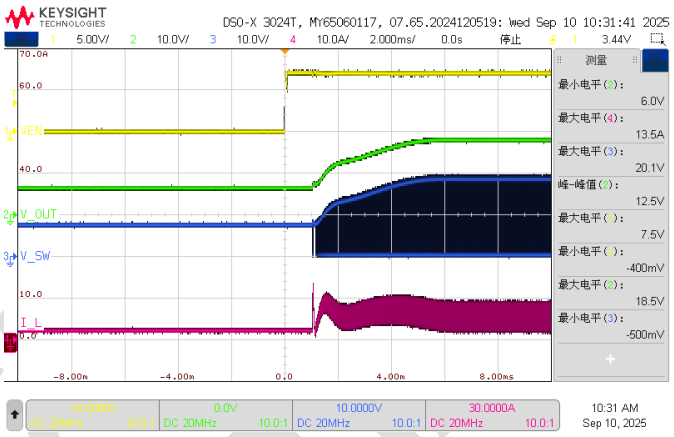
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), EN on.

I_O=10mA



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

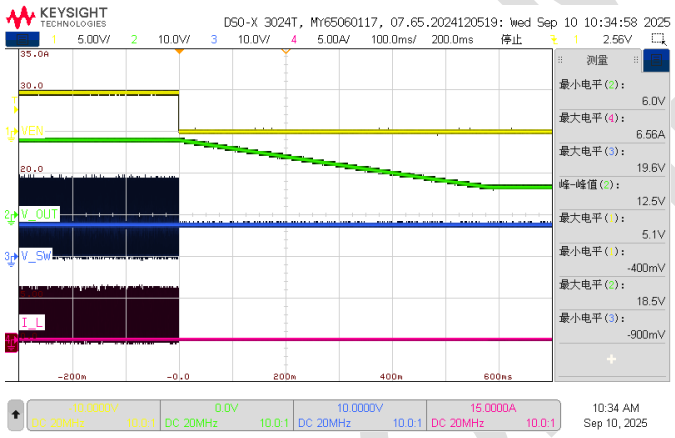
I_O=2A



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

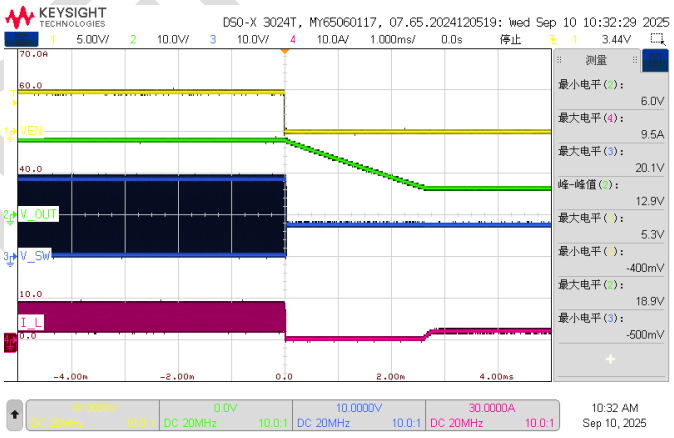
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), EN off.

I_O=10mA



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

I_O=2A



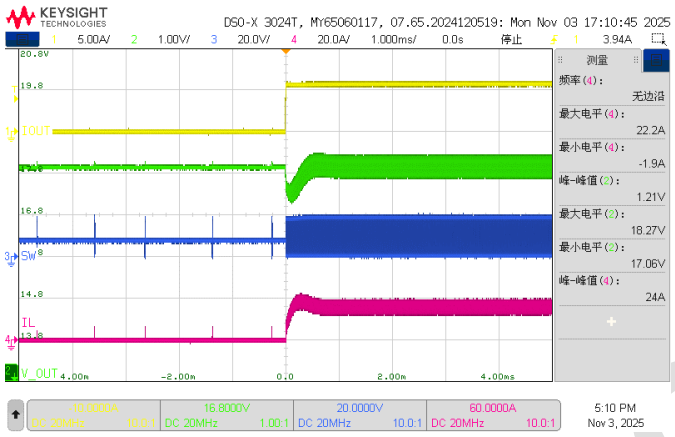
Ch1-V_{EN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_L

MICRO CONFIDENTIAL

9. Load Transient

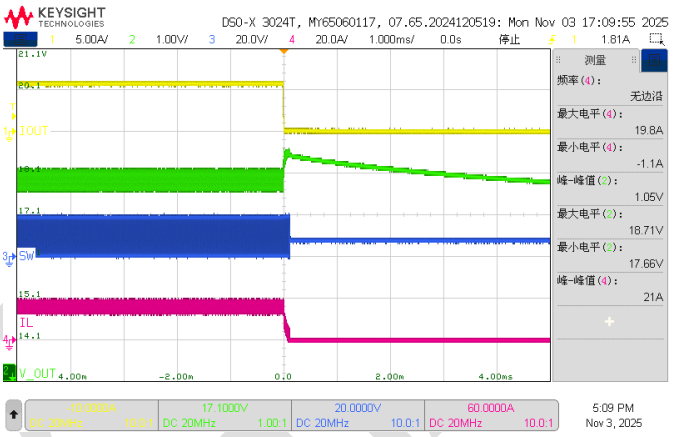
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), measure the load transient.

I_O=0-6A, 1A/us, V_{OUT} undershoot=0.94V



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

I_O=6A-0, 1A/us, V_{OUT} overshoot=0.71V

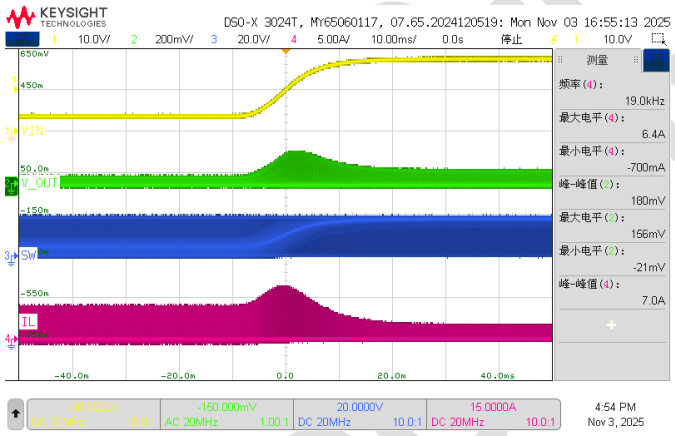


Ch1- I_{LOAD}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_L

10. Line Transient

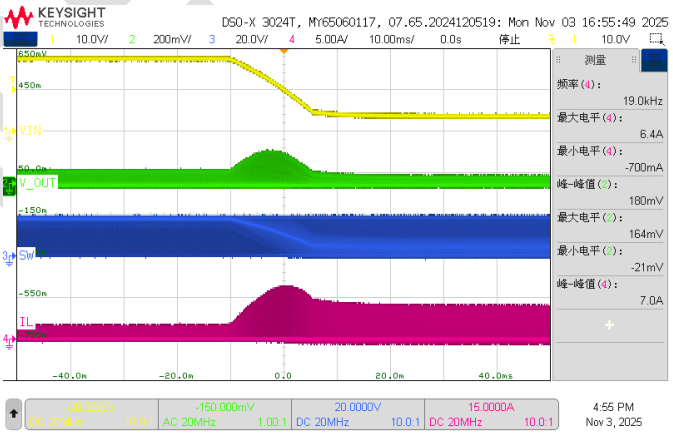
Test conditions: V_{OUT}=18V, L: 2.2μH(7443320220), change V_{IN} and measure the line transient.

V_{IN} =3.6V to 17.5V, I_O=100mA, Auto PFM



Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

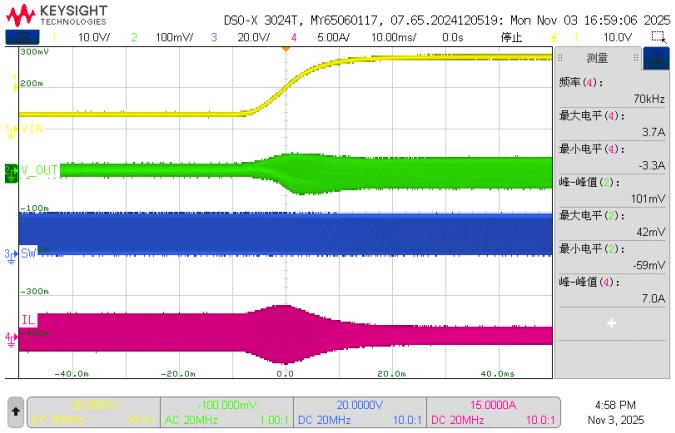
V_{IN} =17.5V to 3.6V, I_O=100mA, Auto PFM



Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

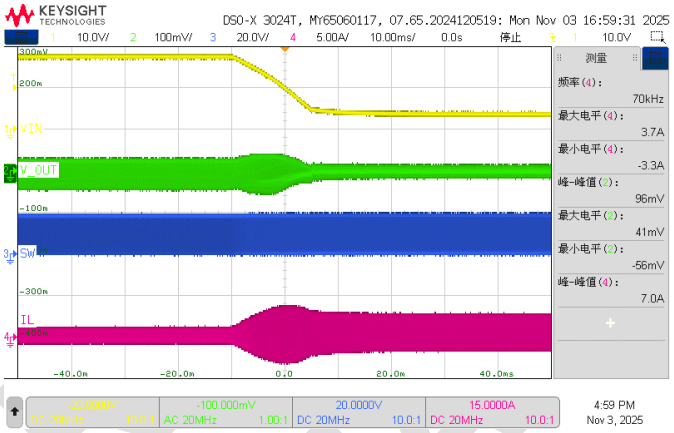
CONFIDENTIAL

V_{IN} =3.6V to 17.5V, I_O=100mA, FPWM



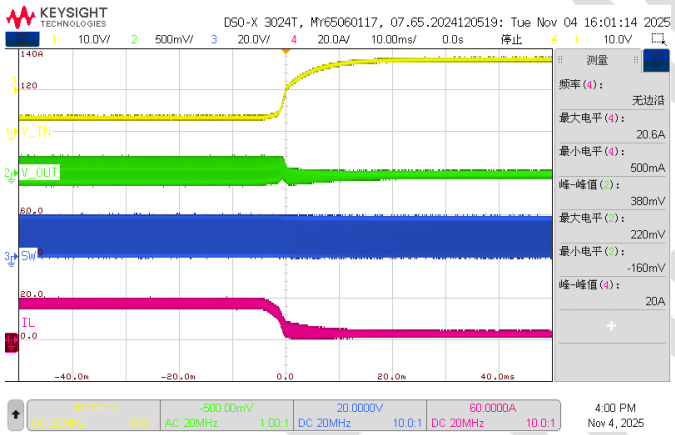
Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

V_{IN} =17.5V to 3.6V, I_O=100mA, FPWM



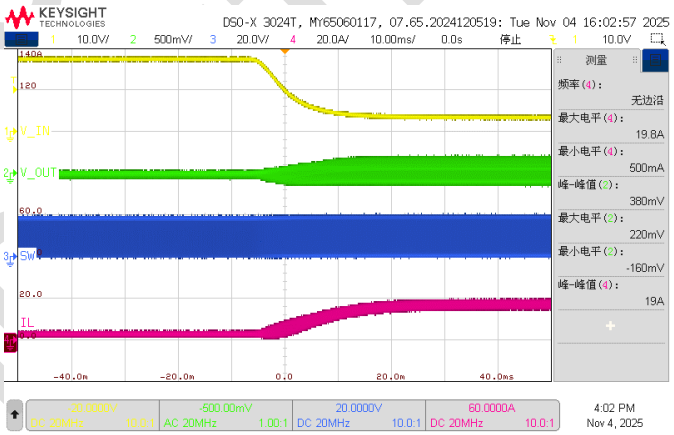
Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

V_{IN} =3.6V to 17.5V, I_O=3A



Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

V_{IN} =17.5V to 3.6V, I_O=3A

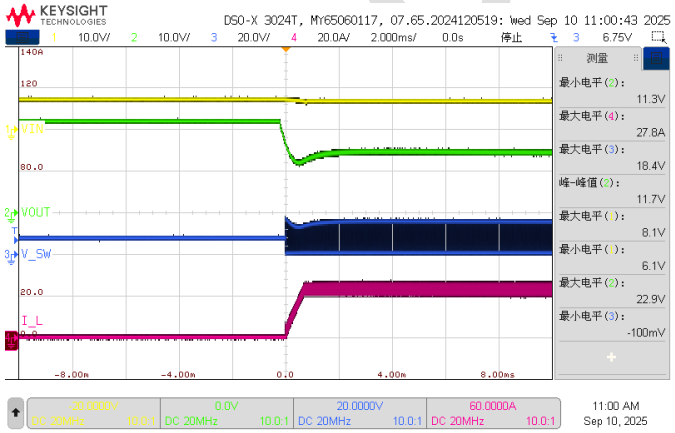


Ch1-V_{IN}, Ch2-V_{OUT}/AC, Ch3-V_{SW}, Ch4-I_L

11. Over Current Protection

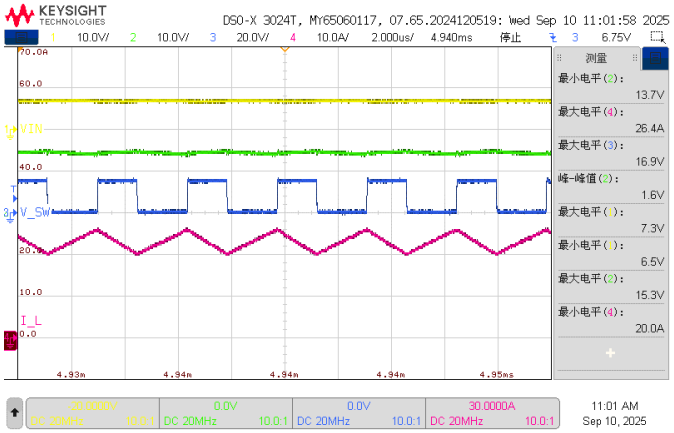
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), increasing I_O and measure OCP.

I_O=0 to 10A, set valley Limit=20A



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

OCP threshold

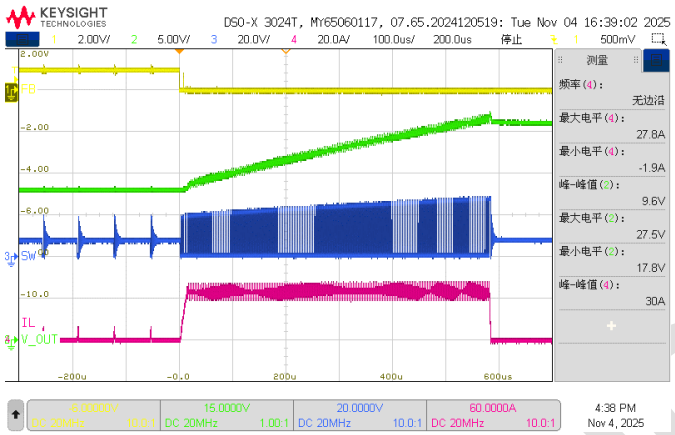


Ch1-V_{IN}, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_L

12. Over Voltage Protection

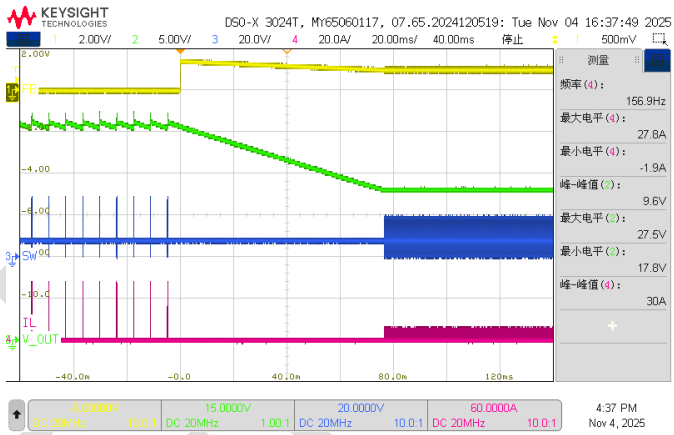
Test conditions: V_{IN}=7.2V, V_{OUT}=18V, I_O=50mA, L: 2.2μH(7443320220), short FB Pin, measure the OVP entry and recovery.

OVP entry



Ch1-FB, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_L

OVP recovery



Ch1-FB, Ch2-V_{OUT}, Ch3-V_{SW}, Ch4-I_L

13. Thermal Test

Test conditions: V_{IN}=7.2V, V_{OUT}=18V, L: 2.2μH(7443320220), measure the case temperature rise with different load current.

